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84 LAW AND POLITICAL SCIENCE 1037
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 1038
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 1038
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 1038
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 1040
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 1040
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 1041
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL 1041

Note: N.A. means that no abstracts were assigned to this category for this issue.

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REPORT NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.
CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL
C. P. Chen Aug. 1985 22 p refs
(Contract NASw-3458)
(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS
HC A02/MF A01 CSCL 20D

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 6 / MARCH 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-15240# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
[ACTIVITIES REPORT IN AEROSPACE RESEARCH] Annual Report, 1984 [KONZERN-GESCHAEFTSBERICHT 1984]
Jun. 1985 43 p In GERMAN Original contains color illustrations
Avail: NTIS HC A03/MF A01

Research concerning helicopters, transport aircraft, and airliners, astronautics, and defense are discussed. Energy and process techniques are studied. Author (ESA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-15241 Old Dominion Univ., Norfolk, Va.
STUDIES ON THE INTERFERENCE OF WINGS AND PROPELLER SLIPSTREAMS Ph.D. Thesis
Ramadas Prabhu 1985 114 p Previously announced as N85-17553
Avail: Univ. Microfilms Order No. DA8517782

The small disturbance potential flow theory is applied to determine the lift of an airfoil in a nonuniform parallel stream. The given stream is replaced by an equivalent stream with a certain number of velocity discontinuities, and the influence of these discontinuities is obtained by the method of images. Next, this method is extended to the problem of an airfoil in a nonuniform stream of smooth velocity profile. This model allows perturbation velocity potential in a rotational undisturbed stream. A comparison of these results with numerical solutions of Euler equations indicates that, although approximate, the present method provides useful information about the interaction problem while avoiding the need to solve the Euler equations. Author

N86-15242# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
THE EXPERIMENTAL DETERMINATION OF THE SUBSONIC AERODYNAMIC CHARACTERISTICS OF AN OGIVE-CYLINDER BODY INCLUDING A COMPARISON WITH THEORETICAL ESTIMATES, VOLUME 1
D. I. T. P. Llewelyn-Davies Jun. 1985 78 p refs
(CAR-8509; ISBN-0-9477-67-24-X) Avail: NTIS HC A05/MF A01

Wind tunnel tests made on an ogive cylinder body of 6:1 fineness ratio are reported. The distribution of pressure on the body was measured over an incidence range of -1 to 10 degrees. The local loading distributions were obtained by integration of the pressure coefficients; further integration yielded the overall normal force and pitching moment coefficients and hence the center of pressure position. It is shown that the aerodynamic characteristics are very sensitive to conditions in the base region and that unexpectedly large loadings are present over the last 10% of the body length. It is indicated that the bluff asymmetric model support system may be the source of some additional interference effects at the higher incidences, even though it is some 3.7 body diameters downstream of the base. The experimental results are compared with theoretical estimates obtained by an inviscid ring-source method of estimation for axisymmetrical bodies. E.A.K.

N86-15243*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERFORMANCE AND LOADS DATA FROM A HOVER TEST OF A FULL-SCALE XV-15 ROTOR
Fort F. Felker, Mark D. Betzina, and David B. Signor Nov. 1985 97 p refs
(NASA-TM-86833; Rept-85404; NAS 1.15:86833) Avail: NTIS HC A05/MF A01 CSCL 01A

A hover test of a full-scale XV-15 rotor was conducted at the Outdoor Aerodynamic Research Facility at Ames Research Center. The primary objective of the test was to obtain accurate measurements of the hover performance of the original, metal-blade XV-15 rotor system. Data were acquired for rotor tip Mach numbers ranging from 0.60 to 0.73. This report presents data on rotor performance, rotor wake downwash velocities, and rotor loads. Author

N86-15244*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
RELATIVE ADVANTAGES OF THIN-LAYER NAVIER-STOKES AND INTERACTIVE BOUNDARY-LAYER PROCEDURES
Unmeel Mehta, K. C. Chang (Douglas Aircraft Co., Long Beach, Calif.), and Tuncer Cebeci (Douglas Aircraft Co., Long Beach, Calif.)
Nov. 1985 52 p refs
(NASA-TM-86778; A-85346; NAS 1.15:86778) Avail: NTIS HC A04/MF A01 CSCL 01A

Numerical procedures for solving the thin-shear-layer Navier-Stokes equations and for the interaction of solutions to inviscid and boundary-layer equations are described and evaluated. To allow appraisal of the numerical and fluid dynamic abilities of the two schemes, they have been applied to one airfoil as a function of angle of attack at two slightly different Reynolds numbers. The NACA 0012 airfoil has been chosen because it allows comparison with measured lift, drag, and moment and with surface-pressure distributions. Calculations have been performed with algebraic eddy-viscosity formulations, and they include consideration of transition. The results are presented in a form that allows easy appraisal of the accuracy of both procedures and of the relative costs. The interactive procedure is computationally efficient but restrictive relative to the thin-layer Navier-Stokes procedure. The latter procedure does a better job of predicting drag than does the former. In both procedures, the location of transition is crucial for accurate or detailed computations, particularly at high

angles of attack. When the upstream influence of pressure field through the shear layer is important, the thin-layer Navier-Stokes procedure has an edge over the interactive procedure. Author

N86-15245*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HYPERSONIC CHARACTERISTICS OF AN ADVANCED AEROSPACE PLANE AT MACH 20.3
Ronald S. McCandless Dec. 1985 28 p refs
(NASA-TM-86435; L-15953; NAS 1.15:86435) Avail: NTIS HC A03/MF A01 CSCL 01A

Wind-tunnel studies have been performed in the Langley Hypersonic Helium Tunnel Facility to obtain static longitudinal and lateral-directional aerodynamic characteristics of an advanced aerospace plane concept. The nominal test conditions are a Mach number of 20.3 and a Reynolds number of 6.8 x 10 to the 6th power per foot at angles of attack from 0 to 25 deg and angles of sideslip of -3 and 0 deg. Stability and control characteristics are obtained for several deflections of the elevators, elevons, and rudder. In addition, a modified canopy is examined. The results indicate that this vehicle is longitudinally stable at angles of attack near the maximum lift-drag ratio. Also, the vehicle is shown to be directionally unstable with positive dihedral effect. Author

N86-15246*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A CONSISTENT SPATIAL DIFFERENCING SCHEME FOR THE TRANSONIC FULL-POTENTIAL EQUATION IN THREE DIMENSIONS
Scott D. Thomas and Terry L. Holst Dec. 1985 18 p refs
(NASA-TM-86716; Rept-85213; NAS 1.15:86716) Avail: NTIS HC A02/MF A01 CSCL 01A

A full-potential steady transonic wing flow solver has been modified so that freestream density and residual are captured in regions of constant velocity. This numerically precise freestream consistency is obtained by slightly altering the differencing scheme without affecting the implicit solution algorithm. The changes chiefly affect the fifteen metrics per grid point, which are computed once and stored. With this new method, the outer boundary condition is captured accurately, and the smoothness of the solution is especially improved near regions of grid discontinuity. Author

N86-15247*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SEPARATED TRANSONIC AIRFOIL FLOW CALCULATIONS WITH A NONEQUILIBRIUM TURBULENCE MODEL
L. S. King and D. A. Johnson Nov. 1985 20 p refs
(NASA-TM-86830; A-85397; NAS 1.15:86830) Avail: NTIS HC A02/MF A01 CSCL 01A

Navier-Stokes transonic airfoil calculations based on a recently developed nonequilibrium, turbulence closure model are presented for a supercritical airfoil section at transonic cruise conditions and for a conventional airfoil section at shock-induced stall conditions. Comparisons with experimental data are presented which show that this nonequilibrium closure model performs significantly better than the popular Baldwin-Lomax and Cebeci-Smith equilibrium algebraic models when there is boundary-layer separation that results from the inviscid-viscous interactions. Author

N86-15248*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF A SUPERSONIC CRUISE FIGHTER MODEL FLOW FIELD
David E. Reubush and E. Ann Bare Nov. 1985 150 p refs
(NASA-TM-86361; L-15884; NAS 1.15:86361) Avail: NTIS HC A07/MF A01 CSCL 01A

An investigation was conducted in the Langley 16-Foot Transonic Tunnel to survey the flow field around a model of a supersonic cruise fighter configuration. Local values of angle of attack, side flow, Mach number, and total pressure ratio were measured with a single multi-holed probe in three survey areas on a model previously used for nacelle/nozzle integration investigations. The investigation was conducted at Mach numbers of 0.6, 0.9, and 1.2, and at angles of attack from 0 deg to 10 deg. The purpose of the investigation was to provide a base of experimental data with which theoretically determined data can be compared. To that end the data are presented in tables as well as graphically, and a complete description of the model geometry is included as fuselage cross sections and wing span stations. Measured local angles of attack were generally greater than free stream angle of attack above the wing and generally smaller below. There were large spanwise local angle-of-attack and side flow gradients above the wing at the higher free stream angles of attack. Author

N86-15249*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FUNDAMENTAL STUDY OF FLOW FIELD GENERATED BY ROTORCRAFT BLADES USING WIDE-FIELD SHADOWGRAPH
S. P. Parthasarathy, Y. I. Cho, and L. H. Back 1 Oct. 1985 41 p refs
(Contract NAS7-918)
(NASA-CR-176443; JPL-Pub-85-64; NAS 1.26:176443) Avail: NTIS HC A03/MF A01 CSCL 01A

The vortex trajectory and vortex wake generated by helicopter rotors are visualized using a wide-field shadowgraph technique. Use of a retro-reflective Scotchlite screen makes it possible to investigate the flow field generated by full-scale rotors. Tip vortex trajectories are visible in shadowgraphs for a range of tip Mach number of 0.38 to 0.60. The effect of the angle of attack is substantial. At an angle of attack greater than 8 degrees, the visibility of the vortex core is significant even at relatively low tip Mach numbers. The theoretical analysis of the sensitivity is carried out for a rotating blade. This analysis demonstrates that the sensitivity decreases with increasing dimensionless core radius and increases with increasing tip Mach number. The threshold value of the sensitivity is found to be 0.0015, below which the vortex core is not visible and above which it is visible. The effect of the optical path length is also discussed. Based on this investigation, it is concluded that the application of this wide-field shadowgraph technique to a large wind tunnel test should be feasible. In addition, two simultaneous shadowgraph views would allow three-dimensional reconstruction of vortex trajectories. Author

N86-15250# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.
EARLY TRANSONIC IDEAS IN THE LIGHT OF LATER DEVELOPMENTS
J. D. Cole 6 Aug. 1985 42 p
(Grant AF-AFOSR-0155-82)
(AD-A159101; AFOSR-85-0694TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

A survey is given of early ideas about transonic flow and their current interpretation. GRA

N86-15251# Royal Aircraft Establishment, Farnborough (England).
A RAPID METHOD FOR ESTIMATING EQUIVALENT PARABOLIC POLARS FROM WIND-TUNNEL TESTS
D. E. Lean and S. P. Fiddes Apr. 1985 19 p
(AD-A159559; RAE-TM-AERO-2034; DRIC-BR-96601) Avail: NTIS HC A02/MF A01 CSCL 14/2

A method for obtaining a best-fit parabolic drag polar from measured force results is presented. The method is used in estimating the blockage correction due to separated flow that must be applied to wind tunnel results. An important part of the method is the use of computer graphics to identify the part of the measured drag polar that may best be described by a parabola, and thus used as the basis for a curve fit. The method is fast, when compared to existing curve-fitting techniques, and suited to use with an online data reduction system. GRA

N86-15252# Institut Franco-Allemand de Recherches, St. Louis (France).
VORTICES AND PRESSURE WAVES AT TRAILING EDGES
F. Seiler and J. Srulijes 16 Aug. 1984 10 p refs Presented at 16th International Congress on High Speed Photography and

Photonics, Strasbourg, France, 27-31 Aug. 1984
(ISL-CO-224/84) Avail: NTIS HC A02/MF A01

Shock tube experiments using differential interferometry were carried out to investigate compressible subsonic flows around and behind flat plates and cylinders. Pictures taken at framing speeds up to 2 million frames/sec second and streak records show that the trailing edge vortex separation induces pressure waves moving upstream. Each vortex separation is related to the formation of a pressure wave. The flow around the bodies is influenced by the shedding frequency and is possibly coupled with the wake. After a symmetrical onset, the process of vortex separation and pressure wave generation develops into an asymmetrical wake with alternating separation. The experiments show that the dynamics of vortices close to the trailing edge is practically inviscid and incompressible. The pressure waves moving upstream must be treated as a problem of purely compressible nature. Author (ESA)

N86-15253# Institut Franco-Allemand de Recherches, St. Louis (France).
DAMPING OF THE ROLLING MOTION OF FULL CALIBER FIN-STABILIZED PROJECTILES IN SUPERSONIC FLIGHT
M. Giraud 21 Nov. 1984 17 p refs Presented at 8th International Symposium on Ballistics, Orlando, Fla., 23-25 Oct. 1984
(ISL-CO-233/84) Avail: NTIS HC A02/MF A01

Simultaneous measurements conducted on fin-stabilized projectiles in supersonic flight by recording the longitudinal velocity (V) with a Doppler radar and the roll velocity (p) by a radioelectric telemetering device are used to determine the variation of the roll damping moment coefficient as a function of the reduced roll velocity p/V. The variation of p/V as a function of the distance travelled is also determined. Launching the projectiles with a glide band at different initial velocities from gun barrels with different angles of twist increases the range of the reduced roll velocities in the ratio of 1 to 4. The roll damping moment coefficient varies strongly in the ratio of 1 to 8.5. In the Mach number range from 1.5 to 3.3, the action of the Mach number on the coefficient is shown. The proportionality of the roll damping moment coefficient to the reduced roll velocity is verified over the range 12 to 44 rps. Author (ESA)

N86-15254# Institut Franco-Allemand de Recherches, St. Louis (France).
QUASI NONSTRETCHING HYPERVELOCITY JETS
P. Y. Chanteret and F. Jamet 13 Dec. 1984 11 p refs Presented at 8th International Symposium on Ballistics, Orlando, Fla., 23-25 Oct. 1984
(ISL-CO-236/84) Avail: NTIS HC A02/MF A01

The possibility to obtain high velocity shaped charge jets characterized by a very low velocity gradient is studied using one-dimensional calculations and experimental flash X-ray observations. Results show that it is possible to form high velocity jets with < 0.5 km/sec velocity difference between tip and rear of the jet with a kinetic energy equivalent to that of classical stretching jets. Comparison of jets is used to discuss analytical models employed to evaluate velocities, break-up, and penetration of shaped charge jets. Author (ESA)

N86-15255# Technische Hogeschool, Delft (Netherlands). Inst. voor Windenergie.
THE FLAPPING MOVEMENT AND FREQUENCY OF ROTATING WINDMILL WINGS DEFINED WITH A DIFFERENTIAL EQUATION [DE KLAPBEWEGING EN FREQUENTIE VAN DRAAIENDE WINDMOLENBLADEN BEPAALD MET EEN DIFFERENTIEVERGELIJKING]
P. A. Joosse Apr. 1985 38 p refs In DUTCH
(IW-R501) Avail: NTIS HC A03/MF A01

Two programs to determine the bending of rotating windmill wings with finite stiffness in a uniform parallel flow are described. Using this bending, the resonant frequencies, necessary for wing design are quickly determined. Both bending programs are based on a differential equation with a finite number of elements. An iteration program with an initial condition problem is presented. As this program shows divergence problems, a limiting condition program presenting a closed solution for a schematized wing, was developed. Using a lumped mass method, resonant frequencies and vibrations are accurately determined for a first draft and a large part of the design. Author (ESA)

N86-15256# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel Working Group 07.
TEST CASES FOR INVISCID FLOW FIELD METHODS
Loughton, England May 1985 336 p refs
(AGARD-AR-211; ISBN-92-835-1497-1) Avail: NTIS HC A15/MF A01

The escalating costs and the continuing limitations of wind tunnel testing together with the growing imperative to achieve the optimal design have rapidly increased the importance of computational fluid dynamics in the design of military aircraft. At relevant Reynolds numbers, inviscid flow methods continue to play an essential role in this design process. In recognition of this, the AGARD Fluid Dynamics panel established Working Group 07 to specify relevant reference test cases to serve as validation bases for those developing new methods with improved accuracy and cost-effectiveness. These cases further serve as check cases for those learning to use existing production codes. The recommendations of the Working Group are presented. For individual titles, see N86-15257 through N86-15265.

N86-15257# Boeing Military Airplane Development, Seattle, Wash.
OBJECTIVES AND SCOPE OF THE WORKING GROUP 07
H. Yoshihara *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 3 p (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

The objectives and scope of the working group on test cases for inviscid flow field methods are defined. The types of solutions sort and their procedures are given. The membership of the group is given, both panel and nonpanel members. Also given is the meetings procedures. E.R.

N86-15258# Trondheim Univ. (Norway).
FORMULATION OF THE EULER BOUNDARY VALUE PROBLEM
H. Norstrud *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 56 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

Most of the obtained solutions to fluid flow problems are based on irrotational motion and, hence, can be grouped together as potential flow solutions. In many practical cases such potential approximations yields satisfactory results as compared to a rotational flow solution. The Mach number contours around an airfoil at supersonic speed is shown. For flows with strong entropy variation in the flow field the situation, however, is changed. This is especially true for embedded shocks. The Mach number contour around a cylinder for M sub infinity less than 1, and the corresponding streamlines are illustrated. The major reason behind the discrepancy between a rotational and irrotational solution lies in the fact that the potential flow solution does not satisfy the Rankine-Hugoniot jump condition across a shock. As it can be seen, an irrotational solution like the full potential solution or the transonic small perturbation solution (TSP), will yield a larger Mach number jump across the shock as compared to the equivalent rotational or Euler solution. Furthermore, the shock location will differ between a rotational and irrotational solution. It must be stated that for flows with complex shock patterns and for flows with inherent vorticity the method of solution adopted must be based on the Euler equations. The flow field around a modern combat aircraft is well suited to serve as an example to this. The calculated pressure distribution around an aircraft forebody at M sub infinity is shown. Author

N86-15259# National Aerospace Lab., Amsterdam (Netherlands).
NUMERICAL METHODS

J. W. Boerstoel *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 7 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

A survey of numerical techniques used in computational simulations of Euler flows is presented. The number of techniques reported in literature is so large that a detailed description of all of them is out of scope. Therefore, this survey is concentrated to sketching only the more important numerical topics, and pointing out differences in possible approaches. The general approach to the numerical solution of the initial boundary value problem of the Euler equations consists of two major steps. In the first step the flow equations, the boundary conditions, and the initial conditions of the continuum-model formulation of the problem are replaced by a large system of algebraic equations (discretization). In the second step the resulting system of algebraic equations is solved (solution). The discretization process reduces to splitting the (t,x,y,z)-space into small elementary volumes called cells (grid generation), and writing down, for each cell, algebraic approximations of the conservation equations, of the initial conditions, and of boundary conditions. The solution of the algebraic equation system is discussed, and the topic of well-posedness of the numerical problem is briefly discussed. Author

N86-15260# Politecnico di Milano (Italy).
EXACT SOLUTIONS TO TRANSONIC AND SUPERSONIC FLOWS
G. Chiocchia *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 14 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

A survey of the most important analytical solutions for transonic and supersonic flows is presented. Particular attention is paid to the transonic cases, where the presence of embedded supersonic regions of a priori unknown extension causes considerable difficulties to the numerical computations and raises the need for reference test cases. Exact analytical transonic solutions are rare and not always adequate for checking practical cases. For this reason some approximate analytical solutions are also presented; in this case, however, the approximations must be well known in advance and their numerical effects must be limited. As a general standard of judgement, solutions in which the approximation consists in the replacement of partial differential equations by finite difference equations are excluded. Closed form or series solutions for two or three cases of approximate equations whose validity fields are well established are accepted. Author

N86-15261# National Aeronautical Establishment, Ottawa (Ontario).
REFERENCE TEST CASES AND CONTRIBUTORS
D. J. Jones *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 24 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

The reference test cases are divided into two sections. They are the two dimensional airfoils and cascades and three dimensional cases. Specifications, reference solutions, and contributors are given for the two dimensional cases. Specifications are divided into planform, profiles, root sections, and tip sections for the three dimensional cases. E.R.

N86-15262# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
NUMERICAL SOLUTIONS OF TWO-DIMENSIONAL REFERENCE TEST CASES
H. Viviand *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 68 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

Selected numerical solutions of the two dimensional reference test cases are presented and the quality if not the absolute accuracy of these solutions are assessed. The numerical methods used to solve the Euler equations are not taken into consideration in the present discussion, and the numerical solutions available for a given test case are evaluated essentially through cross-comparisons of these solutions and by taking into account some known features of the exact (unknown) solution. The present evaluation has shown the importance of the outer boundary position in relation with the boundary conditions and the numerical treatment applied at this boundary. It seems that the minimum distance at which this boundary should be located in order to achieve a given accuracy can vary to a very large extent depending on the boundary treatment. This is an important question which requires detailed studies of all the factors involved. Whereas the trailing edge problem and the Zierep singularity problem change in nature when viscous effects are taken into account, the problem of the far field treatment (outside the viscous wake) remains exactly the same at high Reynolds numbers. Author

N86-15263# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
NUMERICAL SOLUTIONS FOR THREE-DIMENSIONAL CASES: SWEPT WINGS
P. Sacher *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 110 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

The simplest swept wing geometry of practical interest was Test Case 11 and 12, ONERA M6, with constant section, moderate Aspect Ratio = 3.8 and only 30 deg leading edge sweep. But even this simple planform produced in TC11 with 3.06 deg angle of attack the rolling up of a Tip-Vortex which may contribute to induced drag. The numerical analysis of the nonlinear wake leaving the trailing edge of a lifting wing including the rolling up at the wing tips is one of the most promising aspects of the potential of solving the Euler equations at considerably higher cost in place of Full Potential equation. Consequently the complexity of a realistic transport type planform with twist, camber, variations of section profiles and breakpoints in leading and/or trailing edge sweep can be represented by Test Case 16, NASA AMES SWEPT WING. More or less, all additional problems in computation of the flow field are due to mesh-grid generation and the increase of the number of grid points which are necessary to simulate the flow sufficiently accurate. Only one contribution was obtained for this Test Case. Author

N86-15264# Royal Aircraft Establishment, Farnborough (England).
NUMERICAL SOLUTIONS FOR THREE-DIMENSIONAL CASES: DELTA WINGS
J. H. B. Smith *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 94 p refs (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

Wings of delta planform present the real problems of estimating wave drag and representing vortex flows in their simplest form. Any method of calculation aiming to contribute to these problems should be capable of performing well on such simple shapes. On the other hand, there is no evidence that reliable solutions for such simple shapes already exist. It was decided to seek solutions for wings of delta planform for conditions which are relevant to wave-drag estimation and vortex-flow prediction. For a shape which is reasonably slender, at a Mach number sufficiently greater than unity, the flow is supersonic everywhere, so that there is no upstream influence, and the flow can, in principle, be calculated by a space marching method. The final considerations affecting the choice of case are that the shape should be simple, and that experimental measurements should exist. The first makes it easy to ensure that the description of the shape is complete and unambiguous, and makes it possible for all potential computers to represent the shape in their programs. The second, while not strictly necessary and perhaps even irrelevant to the assessment of the accuracy of inviscid calculations, does provide an assurance that solutions judged to be mathematically accurate are not in serious conflict with physical reality. Author

N86-15265# Boeing Military Airplane Development, Seattle, Wash.
CONCLUDING REMARKS Abstract Only
H. Yoshara *In* AGARD Test Cases for Inviscid Flow Field Methods May 1985 1 p (For primary document see N86-15256 06-02)
Avail: NTIS HC A15/MF A01

It may be recalled that the primary purpose of the WG07 was the generation of relevant Euler solutions, both planar and 3D, to serve as Reference Test Cases which developers of Euler methods could use to assess their codes. Since such Reference Test Cases in most cases must themselves be generated numerically, there was initial concern as to the meaningfulness of this objective. The quality of the results produced by the many dedicated contributors has largely dispelled this concern. Except for a few instances, the numerical algorithms used by the contributors within the flow field and at the boundaries were sound. The relative accuracies of the various contributions were due in large part to the density and extent of the mesh used, though the quality of the artificial viscosity used was also an important factor. The planar airfoil solutions recommended herein should serve as reliable Reference Test Cases. The 3D cases understandably are relatively less reliable and must at present be considered as interim Test Cases to serve as approximate guides. It is hoped that the latter cases can be upgraded by future improved calculations. To monitor such activities as well as possibly to extent the scope to viscous solutions, the AGARD Fluid Dynamics Panel has established a Computational Fluid Dynamics Subcommittee. Author

N86-15266# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AIRCRAFT DRAG PREDICTION AND REDUCTION
Loughton, England Jul. 1985 269 p refs Special course held in Rhode-Saint-Genese, Belgium, 20-23 May 1985 and in Hampton, Va., 5-8 Aug. 1985; sponsored by von Karman Inst. and AGARD (AGARD-R-723; ISBN-92-835-1507-2) Avail: NTIS HC A12/MF A01

Numerous topics relating to aircraft drag prediction and control are discussed. Laminar flow control with suction; parasitic and interference drag prediction and reduction; and vortex drag reduction are among the topics discussed. For individual titles, see N86-15267 through N86-15275.

N86-15267# Lockheed-Georgia Co., Marietta. Advanced Flight Sciences.
AIRCRAFT DRAG REDUCTION TECHNOLOGY: A SUMMARY
Andrew S. Thomas *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 20 p refs Previously announced as N85-16782 (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

The current techniques of aircraft viscous drag reduction and some of the more recent developments that have taken place in this technology are reviewed. The various sources and relative contributions of aircraft drag are described including skin friction drag, pressure drag, interference drag and lift induced drag. The physical processes that lead to these drag contributions are emphasized and methods of reducing the impact of these drag sources are discussed. It is shown how innovative and optimized aircraft configurations can lead to drag benefits. E.A.K. (IAA)

N86-15268# Arizona State Univ., Tempe. Mechanical and Aerospace Engineering.
BOUNDARY-LAYER TRANSITION: T-S WAVES AND CROSSFLOW MECHANISMS
William S. Saric *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 18 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

The basic instability mechanisms are discussed from an elementary standpoint considering only boundary layers in external flows. The current state-of-the-art of boundary-layer transition prediction is reviewed and, by using recent results, it is shown that a number of unique transition mechanisms exist and each can play a different role in the breakdown to turbulence. The control of the stability and transition characteristics of a particular flow field requires thoroughly understanding the details of these breakdown mechanisms. Author

N86-15269# Arizona State Univ., Tempe. Mechanical and Aerospace Engineering.
LAMINAR FLOW CONTROL WITH SUCTION: THEORY AND EXPERIMENT
William S. Saric *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 11 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

The concept of boundary-layer stabilization with weak wall suction is introduced at a basic level and the means for calculating the effects of suction are described. The historical development of this technique is reviewed and the state-of-the-art of theory and experiment is covered. Some problems associated with the implementation of suction into aircraft boundary layers are discussed. Author

N86-15270*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN CONSIDERATIONS FOR APPLICATION OF LAMINAR FLOW CONTROL SYSTEMS TO TRANSPORT AIRCRAFT
Albert L. Braslow and Michael C. Fischer *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 27 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01 CSCL 01A

The current status of the laminar-flow control LFC technology is summarized. Factors that have previously inhibited the application of LFC are first reviewed. Involved are the effects of atmospheric ice crystals, surface irregularities, acoustical environment, and off-design operating conditions. Aircraft design trends that are different from turbulent aircraft are discussed as are various design requirements unique to the LFC systems. Current design approaches for the principal LFC systems are reviewed. These include the system for protection of the leading-edge region from surface contamination and icing and the system for removal of a portion of the boundary-layer air. The latter includes consideration of both multiple spanwise suction slots and distributed perforations and required differences between the wing-box and leading-edge box regions. Author

N86-15271*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TURBULENT DRAG REDUCTION FOR EXTERNAL FLOWS
D. M. Bushnell *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 26 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

A summary of turbulent drag reduction approaches applicable to external flows is given. Because relatively recent and exhaustive reviews exist for laminar flow control and polymer (hydrodynamic) drag reduction, the focus here is upon the emerging areas of nonplanar geometry and large-eddy alteration. Turbulent control techniques for air generally result in modest (but technologically significant) drag reductions (order of 20 percent or less), whereas hydrodynamic approaches can yield drag reductions the order of 70 percent. Suggestions are included for alternative concepts and optimization of existing approaches. Author

N86-15272# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PARASITIC AND INTERFERENCE DRAG PREDICTION AND REDUCTION
Ph. Poisson-Quinton *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 27 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

Parasitic drag related to excrescences, leaks, etc., and to local flow separations, and interference drag related to wing/fuselage, propulsive nacelle/wing or fuselage, and external stores/wing or fuselage, etc., are discussed. Although a precise prediction of such drag terms is still difficult to obtain in wind-tunnel testing, a

large number of typical trends are available to the designer to avoid too large penalties on transport or combat aircraft at the preliminary design stage; several examples are given to illustrate these trends, together with some optimization methods. Author

N86-15273# Lockheed-Georgia Co., Marietta.
RECENT DEVELOPMENTS IN THREE-DIMENSIONAL WAKE ANALYSIS
J. E. Hackett and A. Sugavanam *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 19 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

Significant advances in the determination of drag and its components (viscous, vortex, source, blockage, etc.) have been made in recent years. These were triggered by the reduction of the vortex drag integral to a wake integral by Maskell in the early 1970's. In 1979, Wu Hackett, and Lilley broadened the basis for Maskell's results and, in 1984, Hackett and Sugavanam devised methods which make it suitable for use in the near-wake of wind tunnel models. These advances are reviewed. A consistent derivation, starting from a simple form of the momentum equations, which include the best and least restrictive assumptions and procedures is provided. A practical example is discussed. Author

N86-15274# Royal Aircraft Establishment, Farnborough (England).
PREDICTION OF THE DRAG OF WINGS AT SUBSONIC SPEEDS BY VISCOUS/INVISCID INTERACTION TECHNIQUES
R. C. Lock *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 71 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

Alternative ways of calculating the drag of an aerofoil or wing are discussed, and it is concluded that, at the present time, the far field approach is both more accurate and more informative. In this approach, the total drag is split into three components, wave (C sub D sub W), vortex (C sub D sub i) and viscous (C sub D sub V), and it is shown how simple methods for estimating these components can be derived. A brief account is given of the modern technique of viscous-inviscid interaction, concentrating on methods in which an accurate inviscid code is coupled with an integral method for calculating the viscous shear layers (boundary layer and wake). Recent advances are described which should improve the overall accuracy and allow more difficult cases, where boundary layer separation is present, to be treated successfully. Some methods of this type for aerofoils in two dimensions are summarized, and their accuracy assessed by comparison with experiment, including examples where flow separation takes place. Finally, an experiment on a particular wing-body combination, typical of a modern transport aircraft design, is chosen to show how an analysis of the drag can be performed by using the experimental pressure distribution as input to theoretical methods for calculating the separate wave, vortex and viscous components of drag. Author

N86-15275# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Institut fuer Experimentelle Stroemungsmechnik.
TRANSONIC DRAG RISE AND DRAG REDUCTION BY ACTIVE/PASSIVE BOUNDARY LAYER CONTROL
E. Stanewsky and F. Krogmann *In* AGARD Aircraft Drag Prediction and Reduction Jul. 1985 41 p refs (For primary document see N86-15266 06-02)
Avail: NTIS HC A12/MF A01

Accurate drag prediction and efficient drag reduction are, particularly in the transonic speed range, paramount to the future of economical aircraft design and operation. The prediction of drag based on high-speed wind tunnel results are discussed with emphasis placed on problems associated with testing at transonic speeds and the transfer of low Reynolds number wind tunnel results to full-scale aircraft conditions. A more general consideration of the drag development associated with compressibility and viscosity and the viscous-inviscid interaction of the flow on an aerodynamic configuration is given. Drag reduction methods which are mainly based on active and passive boundary layer control by means of slots and perforated strips utilized to either draw material from and/or add material to the boundary layer are discussed. It may be concluded that present transonic drag predicton methods need further improvement, especially at off-design conditions; and that some of the approaches to boundary layer control considered may be quite efficient in increasing aircraft aerodynamic performance. Author

N86-15287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LIFTING SURFACE THEORY FOR A HELICOPTER ROTOR IN FORWARD FLIGHT
H. Tai and Harry L. Runyan *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 89-101 refs Previously announced as N85-10916 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01

N86-15288*# Hughes Helicopters, Culver City, Calif.
DEVELOPMENT OF AN UNSTEADY AERODYNAMICS MODEL TO IMPROVE CORRELATION OF COMPUTED BLADE STRESSES WITH TEST DATA
Santu T. Gangwani *In* NASA. Ames Research Center Rotorcraft Dynamics 11984 Nov. 1985 p 103-116 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

N86-15289*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROELASTIC CONSIDERATIONS FOR TORSIONALLY SOFT ROTORS
Wayne R. Mantay and William T. Yeager, Jr. *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 117-136 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

N86-15293*# Indian Inst. of Science, Bangalore. Dept. of Aeronautical Engineering.
A REVIEW OF DYNAMIC INFLOW AND ITS EFFECT ON EXPERIMENTAL CORRELATIONS
Gopal H. Gaonkar and David A. Peters (Washington Univ., St. Louis, Mo.) *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 187-205 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

N86-15298*# Howard Univ., Washington, D. C.
DYNAMIC RESPONSE CHARACTERISTICS OF A CIRCULATION CONTROL ROTOR MODEL PNEUMATIC SYSTEM
Charles B. Watkins, Kenneth R. Reader (Naval Ship Research and Development Center, Bethesda, Md.), and Subash K. Dutta *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 273-285 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01B

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-15276# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: VIEQUES AIR LINK, INC., BRITTEN-NORMAN BN-21-6 ISLANDER, N589SA, VIEQUES, PUERTO RICO, AUGUST 2, 1984
27 Sep. 1985 51 p
(PB85-901408; NTSB/AAR-85/08) Avail: NTIS HC A04/MF A01

About 0805 Atlantic standard time on August 2, 1984, Vieques Air Link, Inc., Flight 901A, a Britten-Norman BN-2A-6 Islander, crashed into the ocean shortly after takeoff from Vieques, Puerto Rico. Flight 901A was operated from Vieques, Puerto Rico, to St. Croix, U.S. Virgin Islands. The pilot and his eight passengers were killed, and the airplane was destroyed on impact with the water. The left engine lost power shortly after takeoff and the pilot lost control of the airplane. The National Transportation Safety Board determines that the probable cause of the accident was the failure of the pilot to execute the emergency engine-out procedure properly shortly after takeoff following a loss of power in the left engine due to water in the airplane's fuel system, and the failure of the Puerto Rico Ports Authority to remove excess water known to be in the airport's in-ground fuel tank before conducting fueling operations. The pilot's failure to execute the engine-out procedure properly was due to his inexperience in multi-engine airplanes. Contributing to the accident were: (1) the air carrier's use of a pilot not certified for the flight; (2) the air carrier's failure to train the pilot adequately; (3) the pilot's failure to follow proper practices to detect water in the airplane's fuel tanks; (4) the out of weight and balance condition of the airplane; (5) the Federal Aviation Administration's (FAA) incorrect application of 14 CFR Part 135 Rules to commuter air carriers; and (6) the FAA's generally inadequate surveillance of the air carrier. Author

N86-15277# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
THREE-AXIS ELECTROFLUIDIC ANGULAR RATE SENSOR FOR EJECTION SEAT STEERING THRUST VECTOR CONTROL Final Report
V. Nuyen 2 Oct. 1984 166 p
(F41-400; F41-451)
(AD-A159413; NADC-85053-60) Avail: NTIS HC A08/MF A01 CSCL 17/7

Three-axis electrofluidic rate sensors were fabricated to NAVAIRDEVCEN specifications by the Hamilton Standard Division of United Technologies. Three units were delivered for test and evaluation. These units met or exceeded all but one of the performance goals specified for the maximum performance ejection system. This exception was a 119 millisecond (ms) ready time instead of the 100 ms goal. The other important performance characteristics include the linear range of + or -700 deg/sec, a transport delay at 5 ms, and the capability to operate during and after an ejection acceleration profile which peaked at 12.3 g. These units are suitable for use in the thrust vector control system of an advanced escape system. They are ready for system integration and full system performance testing. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-15278*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A FAULT TOLERANT SYSTEM FOR AN INTEGRATED AVIONICS SENSOR CONFIGURATION Final Report
Alper K. Caglayan and Roy E. Lancraft Sep. 1984 191 p refs
(Contract NAS1-16579)
(NASA-CR-3834; NAS 1.26:3834; BBN-5352) Avail: NTIS HC A09/MF A01 CSCL 01D

An aircraft sensor fault tolerant system methodology for the Transport Systems Research Vehicle in a Microwave Landing System (MLS) environment is described. The fault tolerant system provides reliable estimates in the presence of possible failures both in ground-based navigation aids, and in on-board flight control and inertial sensors. Sensor failures are identified by utilizing the analytic relationships between the various sensors arising from the aircraft point mass equations of motion. The estimation and failure detection performance of the software implementation (called FINDS) of the developed system was analyzed on a nonlinear digital simulation of the research aircraft. Simulation results showing the detection performance of FINDS, using a dual redundant sensor compliment, are presented for bias, hardover, null, ramp, increased noise and scale factor failures. In general, the results show that FINDS can distinguish between normal operating sensor errors and failures while providing an excellent detection speed for bias failures in the MLS, indicated airspeed, attitude and radar altimeter sensors. Author

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-15279# Aeronautical Research Labs., Melbourne (Australia).
AN OPTIMISATION METHOD FOR RECONSTRUCTION OF FLIGHT PATH TRAJECTORIES FROM NON-SYNCHRONOUS TIME-SAMPLED OBSERVATIONS BY TWO CINE CAMERAS
A. Ross, L. Mockridge, and D. Drumm Oct. 1984 68 p ref
(ARL-SYS-R-34; AR-003-969) Avail: NTIS HC A04/MF A01

Helicopter flight path trajectories in approach to a tactical landing aid were monitored, ad hoc, by two cine cameras. Post-trial trajectory reconstruction using simple triangulation methods was confounded by the presence of an unknown bias error in the orientation of one camera, and by nonsynchronous camera timing. The report describes the concept, formulation and implementation of an optimization method which pools all data for a trajectory, permits extraction of bias terms, and yields a complete trajectory smoothed in space and time. Author

N86-15280*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ROTORCRAFT DYNAMICS 1984
Nov. 1985 497 p refs Proceedings of the 2d Decennial Specialists' Meeting on Rotorcraft Dynamics, Moffett Field, Calif., 7-9 Nov. 1984; sponsored by NASA. Ames Research Center and the American Helicopter Society
(NASA-CP-2400; Rept-85122; NAS 1.55:2400) Avail: NTIS HC A21/MF A01 CSCL 01C

In the conference proceedings are 24 presented papers, their discussions, and material given in two panels. The presented papers address the general areas of the dynamics of rotorcraft or helicopters. Specific topics include the stability of rotors in hover and forward flight, the stability of coupled rotor-fuselage systems in hover, the loads on a rotor in forward flight including new developments in rotor loads calculations, and the calculation of rotorcraft vibration and means for its control or suppression. Material in the first panel deals with the successful application of dynamics technology to engineering development of flight vehicles. Material in the second panel is concerned with large data bases in the area of rotorocraft dynamics and how they are developed, managed, and used. For individual titles, see N86-15281 through N86-15304.

N86-15281*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE USE OF ACTIVE CONTROLS TO AUGMENT ROTOR/FUSELAGE STABILITY c08
Friedrich K. Straub (Hughes Helicopters, Inc., Culver City, Calif.) and William Warmbrodt *In its* Rotorcraft Dynamics 1984 Nov. 1985 p 1-15 refs Previously announced in IAA as A85-43220
(For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The use of active blade pitch control to increase helicopter rotor/body damping is studied. Control is introduced through a

conventional nonrotating swashplate. State variable feedback of rotor and body states is used. Feedback parameters include cyclic rotor flap and lead-lag states, and body pitch and roll rotations. The use of position, rate, and acceleration feedback is studied for the various state variables. In particular, the influence of the closed loop feedback gain and phase on system stability is investigated. For the rotor/body configuration analyzed, rotor cyclic inplane motion and body roll-rate and roll-acceleration feedback can considerably augment system damping levels and eliminate ground resonance instabilities. Scheduling of the feedback state, phase, and gain with rotor rotation speed can be used to maximize the damping augmentation. This increase in lead-lag damping can be accomplished without altering any of the system modal frequencies. Investigating various rotor design parameters (effective hinge offset, blade precone, blade flap stiffness) indicates that active control for augmenting rotor/body damping will be particularly powerful for hingeless and bearingless rotor hubs. Author

N86-15282*# Kaman Aerospace Corp., Bloomfield, Conn.
GROUND RESONANCE ANALYSIS USING A SUBSTRUCTURE MODELING APPROACH **c08**
Shyi-Yaung Chen, Edward E. Austin (Applied Technology Lab., Fort Eustis, Va.), and Alex Berman *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 16-26 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

A convenient and versatile procedure for modeling and analyzing ground resonance phenomena is described and illustrated. A computer program is used which dynamically couples differential equations with nonlinear and time dependent coefficients. Each set of differential equations may represent a component such as a rotor, fuselage, landing gear, or a failed damper. Arbitrary combinations of such components may be formulated into a model of a system. When the coupled equations are formed, a procedure is executed which uses a Floquet analysis to determine the stability of the system. Illustrations of the use of the procedures along with the numerical examples are presented. Author

N86-15283*# Boeing Vertol Co., Philadelphia, Pa.
PARAMETRIC STUDY OF THE AEROELASTIC STABILITY OF A BEARINGLESS ROTOR **c08**
W. Euan Hooper *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 27-43 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

A trade study was conducted to illustrate the sensitivity of the aeroelastic stability of a bearingless main rotor to the rotor hub coupling parameters that are available for the designer. The results are presented over the complete range of rotor speed and collective pitch available and the effects on air resonance of the 6 beam installation angles are compared together with the results of offsetting the cuff snubber attachment. The major part of the study was conducted using the FLAIR analysis which incorporates a uniform representation of the flexbeam. Results are also shown for a modified version of FLAIR in which the uniform beam is replaced by a member having the geometric tailoring resulting from structural optimization. Author

N86-15284*# Duke Univ., Durham, N. C. Dept. of Mechanical Engineering and Material Science.
NONLINEAR DYNAMICS OF A HELICOPTER MODEL IN GROUND RESONANCE **c08**
D. M. Tang and E. H. Dowell *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 45-55 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

An approximate theoretical method is presented which determined the limit cycle behavior of a helicopter model which has one or two nonlinear dampers. The relationship during unstable ground resonance oscillations between lagging motion of the blades and fuselage motion is discussed. An experiment was carried out on using a helicopter scale model. The experimental results agree with those of the theoretical analysis. Author

N86-15285*# Sikorsky Aircraft, Stratford, Conn.
TEST RESULTS FROM A DYNAMIC MODEL DYNAFLEX ROTOR
Charles F. Niebanck and Robert K. Goodman *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 57-68 ref (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

A one-fifth scale dynamic model of the Sikorsky Dynaflex rotor was tested in hover and in forward flight conditions in a wind tunnel. The Dynaflex rotor features an advanced composite structure which flexes to provide a constant speed universal joint action. Testing concentrated on confirming that the stability and dynamic response of the rotor were satisfactory. Lift conditions of up to .11 Ct/sigma and advance ratios as high as .46 were reached. Vibratory loads were compared to those of articulated rotors. The Dynaflex rotor concept appears to be a practical concept from the standpoint of dynamic response and stability. Author

N86-15286*# Army Aviation Systems Command, Moffett Field, Calif. Aeromechanics Lab.
EXPERIMENTALLY DETERMINED FLUTTER FROM TWO- AND THREE-BLADED MODEL BEARINGLESS ROTORS IN HOVER **c08**
William G. Bousman and Seth Dawson *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 69-88 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

A series of experiments was performed on a 1.8-m-diam model rotor in hover for the principal purpose of investigating the lead-lag stability of isolated bearingless rotors. Incidental to those tests, at least three types of pitch-flap flutter were encountered. Type 1 flutter occurred approximately at the second flap-mode frequency on both two-and three-bladed rotors for both small and large pitch angles and appeared to be a classic pitch-flap flutter. Type 2 flutter showed mostly torsional motion and was seen on both two- and three-bladed rotors. Type 3 flutter was a regressing flap flutter that occurred for only the three-bladed rotor configurations and appears to be a wake excited flutter. Although flutter occurred on a number of different configurations, no rotor parameters were identified that were clearly stabilizing or destabilizing. Author

N86-15287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LIFTING SURFACE THEORY FOR A HELICOPTER ROTOR IN FORWARD FLIGHT **c02**
H. Tai and Harry L. Runyan *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 89-101 refs Previously announced as N85-10916 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01

A lifting surface theory was developed for a helicopter rotor in forward flight for compressible and incompressible flow. The method utilizes the concept of the linearized acceleration potential and makes use of the vortex lattice procedure. Calculations demonstrating the application of the method are given in terms of the lift distribution on a single rotor, a two-bladed rotor, and a rotor with swept-forward and swept-back tips. In addition, the lift on a rotor which is vibrating in a pitching mode at 4/rev is given. Compressibility effects and interference effects for a two-bladed rotor are discussed. Author

N86-15288*# Hughes Helicopters, Culver City, Calif.
DEVELOPMENT OF AN UNSTEADY AERODYNAMICS MODEL TO IMPROVE CORRELATION OF COMPUTED BLADE STRESSES WITH TEST DATA **c02**
Santu T. Gangwani *In* NASA. Ames Research Center Rotorcraft Dynamics 11984 Nov. 1985 p 103-116 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

A reliable rotor aeroelastic analysis operational that correctly

predicts the vibration levels for a helicopter is utilized to test various unsteady aerodynamics models with the objective of improving the correlation between test and theory. This analysis called Rotor Aeroelastic Vibration (RAVIB) computer program is based on a frequency domain forced response analysis which utilizes the transfer matrix techniques to model helicopter/rotor dynamic systems of varying degrees of complexity. The results for the AH-1G helicopter rotor were compared with the flight test data during high speed operation and they indicated a reasonably good correlation for the beamwise and chordwise blade bending moments, but for torsional moments the correlation was poor. As a result, a new aerodynamics model based on unstalled synthesized data derived from the large amplitude oscillating airfoil experiments was developed and tested. Author

N86-15289*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROELASTIC CONSIDERATIONS FOR TORSIONALLY SOFT ROTORS c02
Wayne R. Mantay and William T. Yeager, Jr. *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 117-136 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

A research study was initiated to systematically determine the impact of selected blade tip geometric parameters on conformable rotor performance and loads characteristics. The model articulated rotors included baseline and torsionally soft blades with interchangeable tips. Seven blade tip designs were evaluated on the baseline rotor and six tip designs were tested on the torsionally soft blades. The designs incorporated a systemmatic variation in geometric parameters including sweep, taper, and anhedral. The rotors were evaluated in the NASA Langley Transonic Dynamics Tunnel at several advance ratios, lift and propulsive force values, and tip Mach numbers. A track sensitivity study was also conducted at several advance ratios for both rotors. Based on the test results, tip parameter variations generated significant rotor performance and loads differences for both baseline and torsionally soft blades. Author

N86-15290*# Kaman Aerospace Corp., Bloomfield, Conn.
OPTIMAL DESIGN APPLICATION ON THE ADVANCED AEROELASTIC ROTOR BLADE
Fu-Shang Wei and Robert Jones *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 137-151 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The vibration and performance optimization procedure using regression analysis was successfully applied to an advanced aeroelastic blade design study. The major advantage of this regression technique is that multiple optimizations can be performed to evaluate the effects of various objective functions and constraint functions. The data bases obtained from the rotorcraft flight simulation program C81 and Myklestad mode shape program are analytically determined as a function of each design variable. This approach has been verified for various blade radial ballast weight locations and blade planforms. This method can also be utilized to ascertain the effect of a particular cost function which is composed of several objective functions with different weighting factors for various mission requirements without any additional effort. Author

N86-15291*# Sikorsky Aircraft, Stratford, Conn. Dynamics Methods.
DEVELOPMENT AND APPLICATION OF A TIME-HISTORY ANALYSIS FOR ROTORCRAFT DYNAMICS BASED ON A COMPONENT APPROACH
Robert Sopher and Daniel W. Hallock *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 153-169 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

A time history analysis for rotorcraft dynamics based on dynamical substructures, and nonstructural mathematical and aerodynamic components is described. The analysis is applied to predict helicopter ground resonance and response to rotor damage. Other applications illustrate the stability and steady vibratory response of stopped and gimballed rotors, representative of new technology. Desirable attributes expected from modern codes are realized, although the analysis does not employ a complete set of techniques identified for advanced software. The analysis is able to handle a comprehensive set of steady state and stability problems with a small library of components. Author

N86-15292*# Boeing Vertol Co., Philadelphia, Pa.
RESTRUCTURING THE ROTOR ANALYSIS PROGRAM C-60
In NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 171-185 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The continuing evolution of the rotary wing industry demands increasing analytical capabilities. To keep up with this demand, software must be structured to accommodate change. The approach discussed for meeting this demand is to restructure an existing analysis. The motivational factors, basic principles, application techniques, and practical lessons from experience with this restructuring effort are reviewed. Author

N86-15293*# Indian Inst. of Science, Bangalore. Dept. of Aeronautical Engineering.
A REVIEW OF DYNAMIC INFLOW AND ITS EFFECT ON EXPERIMENTAL CORRELATIONS c02
Gopal H. Gaonkar and David A. Peters (Washington Univ., St. Louis, Mo.) *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 187-205 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01A

A review is given of the relationship between experimental data and the development of modern dynamic-inflow theory. Some of the most interesting data, first presented 10 years ago at the Dynamic Specialist's Meeting, is now reviewed in light of the newer theories. These pure blade-flapping data correlate very well with analyses that include the new dynamic inflow theory, thus verifying the theory. Experimental data are also presented for damping with coupled inplane and body motions. Although inclusion of dynamic inflow is often required to correlate this coupled data, the data cannot be used to verify any particular dynamic inflow theory due to the uncertainties in modeling the inplane degree of freedom. For verification, pure flapping is required. However, the coupled data do show that inflow is often important in such computations. Author

N86-15294*# California Univ., Los Angeles. Dept. of Mechanical, Aerospace and Nuclear Engineering.
INFLUENCE OF VARIOUS UNSTEADY AERODYNAMIC MODELS ON THE AEROMECHANICAL STABILITY OF A HELICOPTER IN GROUND RESONANCE c08
P. P. Friedmann and C. Venkatesan *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 207-219 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The aeromechanical stability of a helicopter in ground resonance was analyzed, by incorporating five different aerodynamic models in the coupled rotor/fuselage analysis. The sensitivity of the results to changes in aerodynamic modelling was carefully examined. The theoretical results were compared with experimental data and useful conclusions are drawn regarding the role of aerodynamic modeling on this aeromechanical stability problem. The aerodynamic model which provided the best all around correlation with the experimental data was identified. Author

N86-15295*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE INFLUENCE OF DYNAMIC INFLOW AND TORSIONAL FLEXIBILITY ON ROTOR DAMPING IN FORWARD FLIGHT FROM SYMBOLICALLY GENERATED EQUATIONS c08
T. S. R. Reddy and William Warmbrodt *In its* Rotorcraft Dynamics 1984 Nov. 1985 p 221-240 refs (For primary document see

N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The combined effects of blade torsion and dynamic inflow on the aeroelastic stability of an elastic rotor blade in forward flight are studied. The governing sets of equations of motion (fully nonlinear, linearized, and multiblade equations) used in this study are derived symbolically using a program written in FORTRAN. Stability results are presented for different structural models with and without dynamic inflow. A combination of symbolic and numerical programs at the proper stage in the derivation process makes the obtainment of final stability results an efficient and straightforward procedure. B.W.

N86-15296*# Maryland Univ., College Park. Center for Rotorcraft Education and Research.
FLAP-LAG-TORSION STABILITY IN FORWARD FLIGHT c08
Brahmananda Panda and Inderjit Chopra *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 241-258 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

An aeroelastic stability of three-degree flap-lag-torsion blade in forward flight is examined. Quasisteady aerodynamics with a dynamic inflow model is used. The nonlinear time dependent periodic blade response is calculated using an iterative procedure based on Floquet theory. The periodic perturbation equations are solved for stability using Floquet transition matrix theory as well as constant coefficient approximation in the fixed reference frame. Results are presented for both stiff-inplane and soft-inplane blade configurations. The effects of several parameters on blade stability are examined, including structural coupling, pitch-flap and pitch-lag coupling, torsion stiffness, steady inflow distribution, dynamic inflow, blade response solution and constant coefficient approximation. Author

N86-15297*# Maryland Univ., College Park. Center for Rotorcraft Education and Research.
DYNAMIC STABILITY OF A BEARINGLESS CIRCULATION CONTROL ROTOR BLADE IN HOVER c08
Inderjit Chopra *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 259-271 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

The aeroelastic stability of flap bending, lead-lag bending and torsion of a bearingless circulation control rotor blade in hover is investigated using a finite element formulation based on Hamilton's principle. The flexbeam, the torque tube and the outboard blade are discretized into beam elements, each with fifteen nodal degrees of freedom. Quasisteady strip theory is used to evaluate the aerodynamic forces and the airfoil characteristics are represented either in the form of simple analytical expressions or in the form of data tables. A correlation study of analytical results with the experimental data is attempted for selected bearingless blade configurations with conventional airfoil characteristics. B.W.

N86-15298*# Howard Univ., Washington, D. C.
DYNAMIC RESPONSE CHARACTERISTICS OF A CIRCULATION CONTROL ROTOR MODEL PNEUMATIC SYSTEM c02
Charles B. Watkins, Kenneth R. Reader (Naval Ship Research and Development Center, Bethesda, Md.), and Subash K. Dutta *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 273-285 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01B

Numerical and experimental simulation of unsteady airflow through the control valve and slotted air duct of a circulation control rotor is described. The numerical analysis involves the solution of the quasi-one-dimensional compressible fluid-dynamic equations in the blade air duct together with the coupled isentropic flow equations for flow into the blade through the valve and out of the blade through the Coanda slot. Numerical solutions are compared with basic experimental results obtained for a mockup of a circulation control rotor and its pneumatic valving system. The pneumodynamic phenomena that were observed are discussed with particular emphasis on the characteristic system time lags associated with the response of the flow variables to transient and periodic control valve inputs. Author

N86-15299*# Sikorsky Aircraft, Stratford, Conn.
AN EXAMINATION OF THE RELATIONS BETWEEN ROTOR VIBRATORY LOADS AND AIRFRAME VIBRATIONS c08
Charles F. Niebanck *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 287-305 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

Harmonic rotor hub loads and airframe interactions in steady flight are reviewed, with regard to the objective of achieving lower airframe vibration by modifying blade root loads. Flight test and wind tunnel data are reviewed, along with sample fuselage response data. Trends which could provide a generalized approach to the above objective are found to be very limited. Recent analytical and corresponding experimental blade tuning modifications are reviewed and compared. Rotor vibratory load modification and substantial vibration changes were achieved over a wide range of rotor operating conditions. B.W.

N86-15300*# Boeing Vertol Co., Philadelphia, Pa.
PLANNING, CREATING AND DOCUMENTING A NASTRAN FINITE ELEMENT MODEL OF A MODERN HELICOPTER c39
R. Gabal, D. Reed, R. Ricks, and W. Kesack *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 307-324 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 20K

Mathematical models based on the finite element method of structural analysis as embodied in the NASTRAN computer code are widely used by the helicopter industry to calculate static internal loads and vibration of airframe structure. The internal loads are routinely used for sizing structural members. The vibration predictions are not yet relied on during design. NASA's Langley Research Center sponsored a program to conduct an application of the finite element method with emphasis on predicting structural vibration. The Army/Boeing CH-47D helicopter was used as the modeling subject. The objective was to engender the needed trust in vibration predictions using these models and establish a body of modeling guides which would enable confident future prediction of airframe vibration as part of the regular design process. Author

N86-15301*# Washington Univ., St. Louis, Mo. Dept. of Mechanical Engineering.
COUPLED ROTOR-BODY VIBRATIONS WITH INPLANE DEGREES OF FREEDOM c08
Huang Ming-Sheng and David A. Peters *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 325-341 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

In an effort to understand the vibration mechanisms of helicopters, the following basic studies are considered. A coupled rotor-fuselage vibration analysis including inplane degrees of freedom of both rotor and airframe is performed by matching of rotor and fuselage impedances at the hub. A rigid blade model including hub motion is used to set up the rotor flaplag equations. For the airframe, 9 degrees of freedom and hub offsets are used. The equations are solved by harmonic balance. For a 4-bladed rotor, the coupled responses and hub loads are calculated for various parameters in forward flight. The results show that the addition of inplane degrees of freedom does not significantly affect the vertical vibrations for the cases considered, and that inplane vibrations have similar resonance trends as do flapping vibrations. Author

N86-15302*# United Technologies Research Center, East Hartford, Conn. Aeromechanics Research.
ANALYSIS OF POTENTIAL HELICOPTER VIBRATION REDUCTION CONCEPTS c08
Anton J. Landgrebe and Mark W. Davis *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 243-363 refs (For primary document see N86-15280 06-05)

Avail: NTIS HC A21/MF A01 CSCL 01C

Results of analytical investigations to develop, understand, and evaluate potential helicopter vibration reduction concepts are presented in the following areas: identification of the fundamental sources of vibratory loads, blade design for low vibration, application of design optimization techniques, active higher harmonic control, blade appended aeromechanical devices, and the prediction of vibratory airloads. Primary sources of vibration are identified for a selected four-bladed articulated rotor operating in high speed level flight. The application of analytical design procedures and optimization techniques are shown to have the potential for establishing reduced vibration blade designs through variations in blade mass and stiffness distributions, and chordwise center-of-gravity location. B.W.

N86-15303*# Sikorsky Aircraft, Stratford, Conn.

ADAPTATION OF A MODERN MEDIUM HELICOPTER (SIKORSKY S-76) TO HIGHER HARMONIC CONTROL c08

James J. OLeary, Sesi B. R. Kottapalli, and Mark W. Davis *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 365-378 refs (For primary document see N86-15280 06-05)

Avail: NTIS HC A21/MF A01 CSCL 01C

Sikorsky Aircraft has performed analytical studies, design analyses, and risk reduction tests have been performed for Higher Harmonic Control (HHC) on the S-76. The S-76 is an 8 to 10,000 lb helicopter which cruises at 145 kts. Flight test hardware has been assembled, main servo frequency response tested and upgraded, aircraft control system shake tested and verified, open loop controllers designed and fabricated, closed loop controllers defined and evaluated, and rotors turning ground and flight tests planned for the near future. Open loop analysis shows that about 2 deg of higher harmonic feathering at the blade 75% radius will be required to eliminate 4P vibration in the cockpit. B.W.

N86-15304*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EVALUATION OF A LOAD CELL MODEL FOR DYNAMIC CALIBRATION OF THE ROTOR SYSTEMS RESEARCH AIRCRAFT

R. W. DuVal (Advanced Rotorcraft Technology, Inc., Los Altos, Calif.), H. Bahrami, and B. Wellman *In its* Rotorcraft Dynamics 1984 Nov. 1985 p 379-393 refs (For primary document see N86-15280 06-05)

Avail: NTIS HC A21/MF A01 CSCL 01C

The Rotor Systems Research Aircraft uses load cells to isolate the rotor/transmission system from the fuselage. An analytical model of the relationship between applied rotor loads and the resulting load cell measurements is derived by applying a force-and-moment balance to the isolated rotor/transmission system. The model is then used to estimate the applied loads from measured load cell data, as obtained from a ground-based shake test. Using nominal design values for the parameters, the estimation errors, for the case of lateral forcing, were shown to be on the order of the sensor measurement noise in all but the roll axis. An unmodeled external load appears to be the source of the error in this axis. Author

N86-15305*# Boeing Commercial Airplane Co., Seattle, Wash.

F-111 NATURAL LAMINAR FLOW GLOVE FLIGHT TEST DATA ANALYSIS AND BOUNDARY LAYER STABILITY ANALYSIS Contractor Report, Aug. 1981 - Jul. 1983

L. James Runyan, Brent H. Navran, and Rodger A. Rozendaal Jan. 1984 224 p refs

(Contract NAS1-15325)

(NASA-CR-166051; NAS 1.26:166051; D6-51153) Avail: NTIS HC A10/MF A01 CSCL 01C

An analysis of 34 selected flight test data cases from a NASA flight program incorporating a natural laminar flow airfoil into partial wing gloves on the F-111 TACT airplane is given. This analysis determined the measured location of transition from laminar to turbulent flow. The report also contains the results of a boundary layer stability analysis of 25 of the selected cases in which the crossflow (C-F) and Tollmien-Schlichting (T-S) disturbance amplification factors are correlated with the measured transition location. The chord Reynolds numbers for these cases ranges from about 23 million to 29 million, the Mach numbers ranged from 0.80 to 0.85, and the glove leading-edge sweep angles ranged from 9 deg to 25 deg. Results indicate that the maximum extent of laminar flow varies from 56% chord to 9-deg sweep on the upper surface, and from 51% chord at 16-deg sweep to 6% chord at 25-deg sweep on the lower. The results of the boundary layer stability analysis indicate that when both C-F and T-S disturbances are amplified, an interaction takes place which reduces the maximum amplification factor of either type of disturbance that can be tolerated without causing transition. Author

N86-15306# Army Training and Doctrine Command, Fort Monroe, Va.

LIGHT HELICOPTER FAMILY TRADE-OFF ANALYSIS. VOLUME 4: APPENDIX N Final Report

R. Fico, J. Wallace, B. Simpson, and N. H. Cleek 15 May 1985 452 p

(AD-A158075; AD-F630692) Avail: NTIS HC A20/MF A01 CSCL 01/3

During the Light Helicopter Family (LHX) Trade-Off Analysis (TOA), 10 major areas of aircraft performance and subsystems were evaluated. These 10 substudies formed the following Annexes: (1) light helicopter family (LHX) subsystems; (2) structures- pertinent issues and systems characteristics; (3) LHX deployability; (4) vertical flight analysis; (5) maneuverability/agility analysis; (6) level flight analysis speed; (7) level flight analysis - cruise efficiency; (8) level flight analysis - one engine inoperative (OEI); (9) multiple attribute decision making analysis; and (10) aircraft performance and engine power margin. These substudies with a summary formed this volume of the LHX TOA Report. GRA

N86-15307# Army Training and Doctrine Command, Fort Monroe, Va.

LIGHT HELICOPTER FAMILY TRADE-OFF ANALYSIS. VOLUME 7: APPENDIX R Final Report

P. W. Hickman, R. N. Armstrong, and N. H. Cleek 15 May 1985 613 p

(AD-A158076; AD-F630692) Avail: NTIS HC A99/MF A01 CSCL 01/3

Thirteen subanalyses were performed and reported in Annexes found within this HF/MMI volume. Their titles follow and are fairly descriptive of both the substudy's emphasis and contents: (1) projective application of the subjective workload assessment technique to advance helicopter crew system designs; (2) human factors engineering review of the integrated crewstation for the LHX; (3) tactical implications of one-man versus two-man aircrews for the LHX; (4) a computer analysis to predict crew workload during LHX scout-attack missions; (5) visually coupled airborne systems simulator (VCASS) LHX cockpit simulation; (6) human factors assessment of voice technology of the LHX cockpit simulation; (7) issues for a trade-off analysis of conventional; versus advanced cockpit controllers for the LHX; (8) biomedical analysis of visual displays and cockpit design options for the LHX; (9) NBC contamination protection, detection, and decontamination concepts analysis for the LHX; (10) humman factors engineering assessment of navigation systems for the LHX; (11) the integration of voice and visual displays for aviation systems; (12) theory and measurement of human workload; and (13) pilot workload, performance, and aircraft control automation. GRA

N86-15308# Army Training and Doctrine Command, Fort Monroe, Va.

LIGHT HELICOPTER FAMILY TRADE-OFF ANALYSIS. VOLUME 8: APPENDICES S AND T Final Report

E. M. Berta, F. C. Sautter, M. Sykes, N. H. Cleek, and R. Flynn 15 May 1985 167 p

(AD-A158077; AD-F630692) Avail: NTIS HC A08/MF A01 CSCL 01/3

This volume of the light helicopter family (LHX) trade-off analysis (TOA) report contains the reports of two separate but

related analyses. The first is the force structure analysis that identifies the foreseeable impact of the LHX on the Army's aircraft and manpower requirements. The study concludes that: (1) the total LHX force structure requirements are: (a) LHX-SCAT - 3,072 aircraft; and (b) LHX-Utility - 1,951 aircraft; and (2) depending on LHX candidate, maintenance personnel savings of 8 to 10% are achievable. The second analysis is of reliability, availability, and maintainability/logistics (RAM/LOG). The RAM/LOG analysis intended to identify and quantify the minimum values of RAM and associated supportability goals that the LHX would need to achieve. The RAM/LOG findings/conclusions included: (1) optimum unit size: (a) 11 aircraft per attack helicopter battalion company; and (b) 10 aircraft per aviation reconnaissance squadron troop; (2) 5.7 to 5.8 aircraft flying hours per aircraft per day are the objective flight program; (3) 1.0-hour mean time to repair; (4) 3.6-maintenance man-hours/flight hour maintenance ratio; and (5) 7.1 to 8.7 hours mean time between mission about failure (minimum acceptable value). GRA

N86-15309# Army Training and Doctrine Command, Fort Monroe, Va.
LIGHT HELICOPTER FAMILY TRADE-OFF ANALYSIS. VOLUME 10: APPENDICES V, W, X, AND Z Final Report
B. Roberts, J. Parrish, B. J. Watts, N. H. Cleek, and P. Hickman 15 May 1985 194 p
(AD-A158079; AD-F630692) Avail: NTIS HC A09/MF A01 CSCL 01/3

This volume of the light helicopter family (LHX) trade-off analysis (TOA) report gives the details of four substudies done within the TOA. These substudy areas were: safety, cost, commonality, and downwash. The findings/conclusions reached by the Safety Analysis included: (1) the LHX should be planned for two crewmembers; (2) the LHX should be designed with two engines; (3) these important safety design features should be included in the LHX: (a) twin engines with an OEI flight capability; (b) effective antitorque control under all mission flight environments; (c) no tail rotor or a high degree of protection for the tail rotor; (d) visionics system for use during reduced visibility conditions; (e) wire strike protection system (WSPS); (f) backup or redundant flight control system; (g) wheeled landing gear; (h) rigid or redundant flight control system; (i) maintenance and flight data recorders; (j) performance planning computer; and (k) automated systems to reduce pilot workload; and (4) the following crashworthiness items are important and should be features of the LHX: (a) crashworthy fuel systems; (b) high mass item retention; (c) high-energy absorption gear (fixed or automatic extension) and fuselage; (d) crew seat and restraint system; (e) troop seat and restraint system; (f) noninjurious cockpit environment; and (g) emergency locator transmitter (ELT). GRA

N86-15310# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
AIRCRAFT FLIGHT PERFORMANCE METHODS. REVISION 2 Final Report, Jun. 1974 - Jul. 1975
L. E. Miller and P. G. Koch Jul. 1985 284 p
(DA Proj. 136-6)
(AD-A158227; AFFDL-TR-75-89-Rev-2) Avail: NTIS HC A13/MF A01 CSCL 01/2

This report addresses the problems associated with the derivation of aircraft performance characteristics. The emphasis is on segments which are a part of a mission profile. In particular, the following areas are studied; takeoff, climb, cruise, descent and glide, turning, and landing. The generalized approach to performance estimates is first presented. Next, appropriate solutions are derived. Last sensitivity relationships are developed. The relationships determine changes in the performance characteristics as a result of an aircraft configuration change. This permits rapid evaluation of the performance variations for any segment of a mission profile. GRA

N86-15311# Center for Naval Analyses, Alexandria, Va. Naval Planning Manpower and Logistics Div.
THE RELATIONSHIP BETWEEN MATERIAL FAILURES AND FLIGHT HOURS: STATISTICAL CONSIDERATIONS
M. S. Goldberg Jan. 1985 22 p
(Contract N00014-83-C-0725)
(AD-A159571; CNA-PP-430) Avail: NTIS HC A02/MF A01 CSCL 01/3

This paper attempts to clarify the relationships among the following four hypotheses: (1) the number of material failures across intervals of calender time containing equal accumulated flight hours follows a Poisson distribution; (2) the number of elapsed flight hours between successive independent material failures follows an exponential distribution; (3) the expected number of monthly material failures is exactly proportional to monthly flight hours; and (4) the observed number of monthly material failures is strongly correlated with monthly flight hours. By a well-known result, hypotheses (1) and (2) are equivalent. By a second well-known result, hypotheses (1) and (3) are also equivalent. However, hypotheses (1) and (4) are not equivalent. That is, while the expected number of failures is exactly proportional to flight hours under a Poisson distribution, this relationship is not revealed by a linear regression between failures and flight hours. For example, we demonstrate that if the mean and variance of flight hours across months are equal and if the failure rate per flight hour equals .01, then the correlation between failures and flight hours will equal .10. GRA

N86-15449# Joint Publications Research Service, Arlington, Va.
MBB STUDIES VARIABLE-CAMBER WING FOR AIRBUS
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 20-21 Transl. into ENGLISH from MBB Aktuell (West Germany), Feb. 1985 p 3 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

N86-15450# Joint Publications Research Service, Arlington, Va.
FRENCH PROGRAM CHARME DEVELOPS PROPFAN AIRCRAFT
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 22-24 Transl. into ENGLISH from AFP Sciences (Paris), 14 Mar. 1985 p 25-27 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-15312# National Aerospace Lab., Tokyo (Japan).
DYNAMIC CHARACTERISTICS OF AIR DATA SENSOR SYSTEMS: ALTIMETER, SPEEDOMETER AND ALPHA TIMES BETA VANE
Yukichi Tsukano and Takatsugu Ono [1985] 20 p refs In JAPANESE; ENGLISH summary
(NAL-TR-852; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Dynamic response characteristics of air-data-sensor systems including a pressure altitude sensor, a dynamic pressure sensor and a alpha-beta vane are described in this paper. These air data sensors are currently used as part of instrumentation systems for the Variable Stability and Response Airplane (VSRA). Responses of the pressure sensor system to stepwise inputs from both static and total pressure ports were measured and analyzed to identify the dynamic model of the system, which is assumed to be linear. Response of a alpha-beta vane to initial displacement were measured in a 2 m diameter wind tunnel at wind speeds from 30 m/s and the assumed dynamic model including weak nonlinearity was identified. Author

N86-15947# Joint Publications Research Service, Arlington, Va.
WORK ON PUTTING COMPUTER AND CRTS IN AIRLINER CONTROL PANELS

V. Tseyukov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 25-26 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Aug. 1985 p 3 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-15313*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DYNAMIC RESPONSE OF FILM THICKNESS IN SPIRAL-GROOVE FACE SEALS
Eliseo DiRusso Dec. 1985 22 p refs
(NASA-TP-2544; E-2683; NAS 1.60:2544) Avail: NTIS HC A02/MF A01 CSCL 21E

Tests were performed on an inward- and an outward-pumping spiral-groove face seal to experimentally determine the film thickness response to seal seat motions and to gain insight into the effect of secondary seal friction on film thickness behavior. Film thickness, seal seat axial motion, seal frictional torque, and film axial load were recorded as functions of time. The experiments revealed that for sinusoidal axial oscillations of the seal seat, the primary ring followed the seal seat motion very well. For a skewed seal seat, however, the primary ring did not follow the seal seat motion, and load-carrying capacity was degraded. Secondary seal friction was varied over a wide range to determine its effect on film thickness dynamics. The seals were tested with ambient air at room temperature and atmospheric pressure as the fluid medium. The test speed ranged from 7000 to 20,000 rpm. Seal tangential velocity ranged from 34 to 98 m/sec (113 to 323 ft/sec). Author

N86-15314*# National Aeronautics and Space Administration, Washington, D.C.
REVIEW OF THE DEVELOPMENT OF SMALL- AND MEDIUM-CAPACITY GAS TURBINES AT THE MOTOREN- UND TURBINEN UNION
Wolfgang Heilmann Nov. 1985 31 p refs Transl. into ENGLISH of conf. paper DGLR-77-061, "Ubersicht uber die Entwicklung von Gasturbinen Kleiner und Mittlerer Leistung in der MTU" presented at the German Aerospace Society Symposium on Small Gas Turbines, 1977 p 1-30 Symposium held in Stuttgart, West Germany, 11-12 Oct. 1977 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77942; NAS 1.15:77942; DGLR-77-061) Avail: NTIS HC A03/MF A01 CSCL 21E

Small- and medium-capacity gas turbines under development for turboprop aircraft and helicopter, as well as for armored and commercial vehicle propulsion, are discussed. Design problems related to axial turbines, ceramic components, regenerative gas turbines, and the optimal expansion ratios for turbines with capacities from 250 to greater than 800 kW are considered; in addition, combustion chamber technology is mentioned. Prototype gas turbines with capacities of 500 to 600 kW or 800 to 1800 kW are described. Author

N86-15315# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ANALYSIS OF THE EFFECTS OF TRANSIENT HEAT TRANSFER ON AXIAL FLOW COMPRESSOR BLADE BOUNDARY LAYERS M.S. Thesis
C. W. Wood Jun. 1985 69 p
(AD-A158094; AFIT/CI/NR-85-87T) Avail: NTIS HC A04/MF A01 CSCL 21/5

This thesis determines the magnitude of heat transfer in the high-pressure compressor of a turbofan engine during a Bodie throttle transient and estimates the effect of transient heat transfer on compressor blade boundary layer growth. Total stored thermal energy available for release is determined considering compressor blades and roots only. Thermal energy released during a throttle transient is determined and allocated to individual compressor stages and used to estimate blade heat flux. The average heat transfer coefficient at the maximum heat transfer rate is also calculated. A simple boundary layer analysis is performed assuming zero pressure gradient, compressible turbulent flow over a flat plate. Under free-stream conditions similar to those in the tenth stage of the compressor, this analysis shows increased boundary layer displacement thickness with heat transfer. In zero pressure gradient, the displacement thickness change with heat transfer is small, as is the change in flow deviation angle at the trailing edge of the compressor blade. Heat transfer coefficients are also calculated in the boundary layer analysis and agree with results from the experimental heat transfer allocation procedure to within 30%. Results of boundary layer analysis indicate assumptions made in heat transfer allocation procedure are reasonable and that simple boundary layer analysis with the absence of modifying pressure gradients provides a good first estimate of heat transfer effects on blade boundary layers. GRA

N86-15316# Institute for Defense Analyses, Alexandria, Va.
SMALL TURBINE TECHNOLOGY REVIEW Final Report, Feb. - Dec. 1984
I. C. Oelrich, D. D. Weidhuner, and F. R. Riddell Jul. 1985 91 p
(Contract MDA903-84-C-0031)
(AD-A158514; AD-E500724; IDA-P-1840; IDA/HQ-85-29944) Avail: NTIS HC A05/MF A01 CSCL 21/5

This study, for OUSDRE (Research and Advanced Technology, Military Systems Technology), examines the nature of the small gas turbine development process for military applications, attempts to identify gaps between current programs and probable future needs, and makes program recommendations for acquiring desirable new turbine technology. Small turbines are found to fall into one of four categories: man-rated, expendable, auxiliary power, and ground vehicle engines. The technical requirements of each category are reviewed and possible R&D opportunities identified. GRA

N86-15317# Department of the Air Force, Washington, D.C.
RESONANT CAVITIES FOR STALL RECOVERY IN GAS TURBINE ENGINES Patent Application
French, inventor (to Air Force) Filed 23 Jul. 1985 20 p
(AD-D011891; US-Patent-Appl-SN-757994) Avail: NTIS HC A02/MF A01 CSCL 21/5

The present patent application is related generally to aircraft which use gas turbine engines as a means of propulsion, and specifically to a means for improvement in the stall recoverability characteristics of such gas turbine engines through the use of resonant cavities. The ability of gas turbine engines to recover when their compressors enter a rotating stall is enhanced with the accessing resonant cavity to the compressor exhaust port. The added volume of the resonant cavities induces a dynamically unstable operating point in the rotating stall as the cavity acts as a Helmholtz resonator matched with the dynamics of the primary flow. The resonant cavity is effective in enhancing the stall recovery characteristics of the engine. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-15318# Advanced Engineering Lab., Salisbury (Australia).
FLUTTER GENERATOR CONTROL AND FORCE COMPUTER

R. W. Levinge Jul. 1985 60 p
(AEL-0242-TM; AR-004-156) Avail: NTIS HC A04/MF A01

The possibility of flutter induced by a store carried under the wing of an aircraft is investigated. This involves in-flight dynamic analysis of structural deformations at given points on an airframe due to forces originating in the store. A system of rotating eccentric masses generates a force spectrum 2.4 to 20.0 Hz in both horizontal and vertical axes. Electronically controlled, the Flutter Generator runs for 28 s with a swept frequency of force is computed continuously and telemetered to ground as an analogue signal. Author

N86-15319*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PREDICTION OF WING AEROELASTIC EFFECTS ON AIRCRAFT LIFT AND PITCHING MOMENT CHARACTERISTICS
Clinton V. Eckstrom Nov. 1985 22 p refs Presented at the Aircraft Flight Loads Technology Transfer Conference, Washington, D.C., 16-17 Oct. 1985
(NASA-TM-87631; NAS 1.15:87631) Avail: NTIS HC A02/MF A01 CSCL 01C

The distribution of flight loads on an aircraft structure determines the lift and pitching moment characteristics of the aircraft. When the load distribution changes due to the aeroelastic response of the structure, the lift and pitching moment characteristics also change. Some estimate of the effect of aeroelasticity on stability and control characteristics, particularly lift and pitching moment, is required for use in aircraft simulation models for evaluation of flight characteristics. This presentation outlines a procedure to incorporate aeroelastic effects into lift and pitching moment data from wind tunnel tests. Results are presented which were obtained from applying this procedure to an aircraft with a very flexible transport-type research wing. The procedure described is generally applicable to all types of aircraft. Author

N86-15320*# Information and Control Systems, Inc., Hampton, Va.
PIFCGT: A PIF AUTOPILOT DESIGN PROGRAM FOR GENERAL AVIATION AIRCRAFT
John R. Broussard Dec. 1983 176 p
(Contract NAS1-16303)
(NASA-CR-166123; NAS 1.26:166123; TR-681103) Avail: NTIS HC A09/MF A01 CSCL 01C

This report documents the PIFCGT computer program. In FORTRAN, PIFCGT is a computer design aid for determing Proportional-Integral-Filter (PIF) control laws for aircraft autopilots implemented with a Command Generator Tracker (CGT). The program uses Linear-Quadratic-Regulator synthesis algorithms to determine feedback gains, and includes software to solve the feedforward matrix equation which is useful in determining the command generator tracker feedforward gains. The program accepts aerodynamic stability derivatives and computes the corresponding aerodynamic linear model. The nine autopilot modes that can be designed include four maneuver modes (ROLL SEL, PITCH SEL, HDG SEL, ALT SEL), four final approach models (APR GS, APR LOCI, APR LOCR, APR LOCP), and a BETA HOLD mode. The program has been compiled and executed on a CDC computer. Author

N86-15321# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
USE OF HINGED STRAKES FOR LATERAL CONTROL AT HIGH ANGLES OF ATTACK M.S. Thesis
R. E. Erb May 1985 164 p
(AD-A158005; AFIT/CI/NR-85-61T) Avail: NTIS HC A08/MF A01 CSCL 20/4

This thesis investigated the feasibility of using a portion of the leading edge (LE) strake hinged along the longitudinal axis as a roll control device for a high performance aircraft at high angles of attack (AOA). A wind tunnel test was conducted to gather static force and moment data for use in a six degree of freedom computer simulation. Asymmetric strake deflections, both dihedral and anhedral, were investigated. The longitudinal coefficients were little affected by strake deflection, but the lateral directional coefficients showed a nonlinear, but repeatable, behavior with strake deflection. Comparisons to be published data indicate that the strakes produce similar behavior for different aircraft designs. Simulations of the aircraft response to the strakes showed that an improvement over current roll performance could be obtained by combining the positive strake deflection with the ailerons up to 38 deg. AOA, after which the strakes alone produced the best roll performance. Sideslip and AOA must be closely controlled or the aircraft will either not roll, or will depart during the roll. The roll performance using hinged strakes at high AOA is compared to roll performance using differential (LE) flaps. The diffential LE flaps produce comparable roll rates with less sideslip than produced by the hinged strakes. However, the possibility exists of combining hinged strakes with differential (LE) flaps for improved roll performance. GRA

N86-15322# Southwest Research Inst., San Antonio, Tex.
DIGITAL SERVOCONTROLLER SYSTEM. VOLUME 2. MAINTENANCE MANUAL Final Report, 6 Jul. 1983 - 6 Nov. 1984
J. Lopez and K. Miller Feb. 1985 70 p
(Contract F33615-83-C-3201)
(AD-A159066; SwRI-14-7676-060-Vol-2;
AFWAL-TR-84-3117-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 09/2

This final report describes an exploratory development effort for the design and fabrication of a digital servocontroller system for load control in full-scale air-frame fatigue tests. Each digital controller replaces four analog controllers. The LSI-11/23 microcomputer in the digital controller executes a PI algorithm to implement direct digital control. It may operate in a stand-alone mode or as a slave processor to a master computer via fiber optic link. Other programmable features specifying loop parameters, building load profiles, adjusting control system gains and monitoring alarm and abort conditions. GRA

N86-15281*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE USE OF ACTIVE CONTROLS TO AUGMENT ROTOR/FUSELAGE STABILITY
Friedrich K. Straub (Hughes Helicopters, Inc., Culver City, Calif.) and William Warmbrodt *In its* Rotorcraft Dynamics 1984 Nov. 1985 p 1-15 refs Previously announced in IAA as A85-43220
(For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15282*# Kaman Aerospace Corp., Bloomfield, Conn.
GROUND RESONANCE ANALYSIS USING A SUBSTRUCTURE MODELING APPROACH
Shyi-Yaung Chen, Edward E. Austin (Applied Technology Lab., Fort Eustis, Va.), and Alex Berman *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 16-26 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15283*# Boeing Vertol Co., Philadelphia, Pa.
PARAMETRIC STUDY OF THE AEROELASTIC STABILITY OF A BEARINGLESS ROTOR
W. Euan Hooper *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 27-43 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15284*# Duke Univ., Durham, N. C. Dept. of Mechanical Engineering and Material Science.
NONLINEAR DYNAMICS OF A HELICOPTER MODEL IN GROUND RESONANCE
D. M. Tang and E. H. Dowell *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 45-55 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15286*# Army Aviation Systems Command, Moffett Field, Calif. Aeromechanics Lab.
EXPERIMENTALLY DETERMINED FLUTTER FROM TWO- AND THREE-BLADED MODEL BEARINGLESS ROTORS IN HOVER
William G. Bousman and Seth Dawson *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 69-88 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15294*# California Univ., Los Angeles. Dept. of Mechanical, Aerospace and Nuclear Engineering.
INFLUENCE OF VARIOUS UNSTEADY AERODYNAMIC MODELS ON THE AEROMECHANICAL STABILITY OF A HELICOPTER IN GROUND RESONANCE
P. P. Friedmann and C. Venkatesan *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 207-219 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15295*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE INFLUENCE OF DYNAMIC INFLOW AND TORSIONAL FLEXIBILITY ON ROTOR DAMPING IN FORWARD FLIGHT FROM SYMBOLICALLY GENERATED EQUATIONS
T. S. R. Reddy and William Warmbrodt *In its* Rotorcraft Dynamics 1984 Nov. 1985 p 221-240 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15296*# Maryland Univ., College Park. Center for Rotorcraft Education and Research.
FLAP-LAG-TORSION STABILITY IN FORWARD FLIGHT
Brahmananda Panda and Inderjit Chopra *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 241-258 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15297*# Maryland Univ., College Park. Center for Rotorcraft Education and Research.
DYNAMIC STABILITY OF A BEARINGLESS CIRCULATION CONTROL ROTOR BLADE IN HOVER
Inderjit Chopra *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 259-271 (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15299*# Sikorsky Aircraft, Stratford, Conn.
AN EXAMINATION OF THE RELATIONS BETWEEN ROTOR VIBRATORY LOADS AND AIRFRAME VIBRATIONS
Charles F. Niebanck *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 287-305 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15301*# Washington Univ., St. Louis, Mo. Dept. of Mechanical Engineering.
COUPLED ROTOR-BODY VIBRATIONS WITH INPLANE DEGREES OF FREEDOM
Huang Ming-Sheng and David A. Peters *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 325-341 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15302*# United Technologies Research Center, East Hartford, Conn. Aeromechanics Research.
ANALYSIS OF POTENTIAL HELICOPTER VIBRATION REDUCTION CONCEPTS
Anton J. Landgrebe and Mark W. Davis *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 243-363 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

N86-15303*# Sikorsky Aircraft, Stratford, Conn.
ADAPTATION OF A MODERN MEDIUM HELICOPTER (SIKORSKY S-76) TO HIGHER HARMONIC CONTROL
James J. OLeary, Sesi B. R. Kottapalli, and Mark W. Davis *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 365-378 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 01C

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-15323*# Kansas Univ. Center for Research, Inc., Lawrence.
AN ANALYSIS OF CROSS-COUPLING OF A MULTICOMPONENT JET ENGINE TEST STAND USING FINITE ELEMENT MODELING TECHNIQUES Final Report
William G. Schweikhard and Wera Singnoi [1985] 55 p refs
(Grant NAG3-85)
(NASA-CR-176424; NAS 1.26:1/6424) Avail: NTIS HC A04/MF A01 CSCL 14B

A two axis thrust measuring system was analyzed by using a finite a element computer program to determine the sensitivities of the thrust vectoring nozzle system to misalignment of the load cells and applied loads, and the stiffness of the structural members. Three models were evaluated: (1) the basic measuring element and its internal calibration load cells; (2) the basic measuring element and its external load calibration equipment; and (3) the basic measuring element, external calibration load frame and the altitude facility support structure. Alignment of calibration loads was the greatest source of error for multiaxis thrust measuring systems. Uniform increases or decreases in stiffness of the members, which might be caused by the selection of the materials, have little effect on the accuracy of the measurements. It is found that the POLO-FINITE program is a viable tool for designing and analyzing multiaxis thrust measurement systems. The response of the test stand to step inputs that might be encountered with thrust vectoring tests was determined. The dynamic analysis show a potential problem for measuring the dynamic response characteristics of thrust vectoring systems because of the inherently light damping of the test stand. E.A.K.

N86-15324# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CONCEPTS FOR THE DEVELOPMENT OF A NONDESTRUCTIVE TESTING AND EVALUATION SYSTEM FOR RIGID AIRFIELD PAVEMENTS Ph.D. Thesis
P. T. Foxworthy 1985 274 p
(AD-A158004; AFIT/CI/NR-85-93T) Avail: NTIS HC A12/MF A01 CSCL 13/2

This thesis develops a complete system for nondestructive testing and evaluation of rigid airfield pavements. An extensive review of present destructive and nondestructive equipment and methodologies is made to form the basis for selection of the equipment and analytical model used in this research. A brief description of the selected Dynatest Model 8000 Falling Weight Deflectometer and the ILLISLAB finite element computer model is presented. Three Air Force installations were chosen for in-depth study of pavement response to FWD loads under a variety of environmental and geological conditions. Techniques are presented to determine the location of maximum damage to rigid pavement slabs for one or any combination of aircraft, and the validity of the calculated stresses is established through comparisons of measured and predicted deflections at joints. Major study findings include: (1) new designations for pavement features based on actual loading conditions, (2) guidelines for planning and conducting large scale evaluations of major airfield systems, (3) a computer-based determination of E and K, (4) joint behavior prediction under

fluctuating temperatures and their effect on generated slab stresses, (5) procedures to account for the annual distribution of traffic over the range of temperatures normally experienced at any facility, (6) a simplistic means of estimating total past damage from aircraft operations, and (7) development of computer programs to predict remaining structural life of rigid airfield pavements. GRA

N86-15325# Naval Postgraduate School, Monterey, Calif.
CONSIDERATIONS FOR THE DESIGN AND IMPLEMENTATION OF A MANAGEMENT SUPPORT SYSTEM FOR THE ELECTRONIC WARFARE SYSTEM SUPPORT LABORATORY M.S. Thesis
H. G. Banks, III Jun. 1985 80 p
(AD-A158978) Avail: NTIS HC A05/MF A01 CSCL 14/2

This thesis presents a review of current literature on management support system development, some current management philosophy, and an organizational analysis of the Electronic Warfare System Support Laboratory located at the Pacific Missile Test Center, Pt., Mugu, California. Using the knowledge gained on management system development and the organizational analysis, appropriate objectives and requirements for a management system were developed for the laboratory. Author (GRA)

N86-15326# Air Force Engineering and Services Center, Tyndall AFB, Fla. Engineering and Services Lab.
DEVELOPMENT OF PACKED-TOWER AIR STRIPPERS FOR TRICHLOROETHYLENE REMOVAL AT WURTSMITH AIR FORCE BASE, MICHIGAN Final Report, Dec. 1979 - Mar. 1985
R. L. Gross Aug. 1985 94 p
(DA Proj. 210-3)
(AD-A159139; AFESC/ESL-TR-85-28) Avail: NTIS HC A05/MF A01 CSCL 13/2

Packed-tower air stripping was researched and developed to treat trichloroethylene (TCE)-contaminated groundwater at Wurtsmith Air Force Base (Oscoda), Michigan. A leaking underground storage tank has caused a 1000 meters (3200 feet) long, 500 meters (1600 feet) wide, and 18 meters (60 feet) deep plume, with a maximum concentration approaching 10,000 ppb. While activated carbon could have produced treated water with an effluent TCE concentration below Michigan's 1.5 ppb discharge standard, the projected $1.5 million capital cost and the annual $400,000 operating and maintenance costs were prohibitive. At the request of HQ Strategic Air Command, the Engineering and Services Center investigated alternate groundwater treatment techniques. Laboratory studies were performed to determine removal efficiencies and mass transfer coefficients for TCE on 16 mm (5/8-inch) (and 25 mm (1-inch)) polypropylene Pall rings at various liquid and air flows, and at temperatures ranging from 10 to 30 C (50 to 86 F). Performance equations and removal efficiencies were combined to provide relationships for determining the required packing volume. Based on these studies, twin packed-tower air strippers were built onsite at Wurtsmith AFB. The strippers were performance-tested from May 1982 to May 1983, with removal efficiencies averaging better than 99.9 percent. GRA

N86-15327# Technology Service Corp., Santa Monica, Calif.
REAL-TIME DIGITAL TERRAIN IMAGE GENERATOR Final Report
R. Clark and R. Pferdner Jul. 1985 33 p
(Contract DAAK11-83-C-0009)
(AD-A159316; HEL-TM-10-85) Avail: NTIS HC A03/MF A01 CSCL 05/5

The Technology Service Corporation has created a real-time digital terrain image generator. The system, HELICON, has been installed and integrated into the Human Engineering Laboratory's (HEL) Human Factors Research Simulator (HFRS) system. The HELICON receives location and attitude data in real time from one of the crew station components of the HFRS and provides stylized representations of terrain as would be seen from the crew station. The HELICON system exceeds most of the contract's performance requirements, like gaming area size, flight capability, maximum viewing distance, and number of moving objects. It creates computer-generated imagery in full color at the rate of 15 frames per second (fps), with a density of 50 objects per square mile (mi2) and an image resolution of 512 x 512. Author (GRA)

N86-15328# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
PROGRAMMING A MULTIPLE-ORIFICE HYDRAULIC DECELERATOR Final Report, Mar. 1978 - Feb. 1985
C. G. Toler Jun. 1985 30 p
(AF Proj. 7231)
(AD-A159428; AAMRL-TR-85-049) Avail: NTIS HC A03/MF A01 CSCL 14/2

The AAMRL Horizontal Deceleration Facility is used to conduct experimental research for the development of design criteria for aircrew personnel protection. The hydraulic deceleration device is a water-filled cylinder. A piston mounted on the front of a deceleration sled ruptures a frangible diaphragm positioned at the opening of the cylinder and displaces the water in the cylinder through the multiple orifices. As the piston travels along the cylinder it closes off the orifices thereby decreasing the available area for the water to escape. Bernoulli's conservation-of-energy equation was applied to the physical state of fluid flow in the cylinder, allowing the orifice area to be determined as a function of the piston cross-sectional area, acceleration, velocity and weight of the sled. A computer program was developed to determine the appropriate plug orifice and location to produce desired acceleration-time profiles. The program corrects for the energy loss due to the vena contracta of each plug. Data from several tests were used to determine a correction coefficient for other losses, such as those attributable to conduit length and surface roughness, as a lumped quantity. Author (GRA)

N86-15329# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.
CONTROL SYSTEM DESIGN FOR CRYOGENIC WIND TUNNEL BY PERFORMANCE VECTOR PERFORMANCE Ph.D. Thesis - Karlsruhe Univ., West Germany
Reinhold Steinhauser Apr. 1985 191 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-965)
(DFVLR-FB-85-37; ISSN-0171-1342) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 56

A cryogenic wind tunnel was transformed to reach higher Reynolds numbers using a controller design. The problem of a controller design for a nonlinear multivariable dead time system was solved by linearization, model decomposition, discretization and order reduction to obtain an efficient design algorithm based on pole assignment and performance vector optimization. The controller design behavior on a nonlinear model before and after performance vector optimization was studied. The optimized controller can be applied in a real wind tunnel. The reduced static pressure deviation due to performance vector optimization leads to reduced control costs for suction and injection of gaseous nitrogen. Further development of the control system design equipment as well as the development of a graphic interactive algorithm for the design procedure is recommended. Author (ESA)

N86-15446# Joint Publications Research Service, Arlington, Va.
DFVLR DEVELOPS NEW KIND OF WALLS OR WIND TUNNEL
In its West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 18-19 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtschaft (Frankfurt/Main), 4 Mar. 1985 p 7 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-15330# Committee on Science and Technology (U. S. House).
SPACE ACTIVITIES OF THE UNITED STATES, SOVIET UNION

AND OTHER LAUNCHING COUNTRIES/ORGANIZATIONS, 1957-1984
Marcia S. Smith Washington GPO 1985 145 p Presented to the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, Apr. 1985 Prepared by the Library of Congress, Congressional Research Service
(GPO-46-504) Avail: Subcommittee on Space Science and Applications

Five countries and one international organization currently have the capability to place satellites in space. The United States and the Soviet Union conduct the most comprehensive programs, and have been launching spacecraft for both military and civil purposes for over 25 years. The entry of countries such as Japan and the members of the European Space Agency into the space business has now introduced the element of economic competition in providing space services and hardware. This annual report reviews the space activities of the launching countries/organization--China, the European Space Agency, India, Japan, the Soviet Union, and the United States--both statistically and programmatically. This edition covers events through December 31, 1984, and highlights significant activities in 1984. Author

N86-15331# Worcester Polytechnic Inst., Mass.
ENVIRONMENTAL CONSIDERATIONS AND WASTE PLANNING ON THE LUNAR SURFACE: AN INTERACTIVE QUALIFYING B.S. Thesis
Randall A. Briggs 20 Dec. 1985 62 p refs
Avail: NTIS HC A04/MF A01

Lunar operations in the near future will generate waste management problems. Environmental considerations arising from a lunar manufacturing facility were identified. The operations chosen for the initial base were developed through discussions with various NASA officials and individuals in industries closely related with the space program. The goal of the study is to initiate conversation on fundamental questions that need to be answered before building lunar facilities. During the discussion of lunar operations, the following assumptions were taken: (1) the base will be manned by a 15 member crew; (2) the primary function of the base will be the extraction of oxygen from ilmenite (FeTiO3) via a hydrogen reduction process; (3) nuclear power will form the central power supply on the surface; and (4) a semi-closed life support system will be employed with the total resupply of food coming from earth. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-15445# Joint Publications Research Service, Arlington, Va.
SPEED OF HERMES TO GIVE EUROPEANS SPACE ACCESS, DUCROCQ SAYS
Albert Ducrocq *In its* West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 7-11 Transl. into ENGLISH from Sciences and Avenir (Paris), Feb. 1985 p 82; 84-86 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

N86-15332*# San Francisco Univ., Calif. Physics Research Lab.
RADIATION MAPPING ON SPACELAB 1: EXPERIMENT NO. INS006 Final Report
E. V. Benton, A. Frank, R. Cassou, R. Henke, and V. Rowe 1 Mar. 1985 24 p refs
(Contract NAS9-15337)
(NASA-CR-171893; NAS 1.26:171893; USF-TR-68) Avail: NTIS HC A02/MF A01 CSCL 22B

The first attempt at mapping the radiation environment inside Spacelab is described. Measurements were made by a set of passive radiation detectors distributed throughout the volume inside the Spacelab 1 module, in the access tunnel and outside on the pallet. Measurements of the low linear energy transfer (LET) component obtained from the TLD thermoluminescent detectors (TLD) ranged from 92 to 134 mrad, yielding an average low LET dose rate of 10.0 mrads/day inside the module. Because of the higher inclination orbit, substantial fluxes of highly ionizing (HZE particles) high charge and energy galactic cosmic rays were observed for the first time on an STS flight, yielding an overall average mission dose-equivalent of 295 mrem, or 29.5 mrem/day, which is about three times higher than that measured on previous STS missions. Little correlation is found between measured average dose rates or HZE fluences and the estimates shielding throughout the volume of the module. E.A.K.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

N86-15333*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A PROPOSED TECHNIQUE FOR THE VENUS BALLOON TELEMETRY AND DOPPLER FREQUENCY RECOVERY
Raymond F. Jurgens and Dariush Divsalar 15 Apr. 1985 51 p refs
(Contract NAS7-918)
(NASA-CR-176448; JPL-Pub-85-68; NAS 1.26:176448) Avail: NTIS HC A04/MF A01 CSCL 09F

A technique is proposed to accurately estimate the Doppler frequency and demodulate the digitally encoded telemetry signal that contains the measurements from balloon instruments. Since

the data are prerecorded, one can take advantage of noncausal estimators that are both simpler and more computationally efficient than the usual closed-loop or real-time estimators for signal detection and carrier tracking. Algorithms for carrier frequency estimation subcarrier demodulation, bit and frame synchronization are described. A Viterbi decoder algorithm using a branch indexing technique has been devised to decode constraint length 6, rate 1/2 convolutional code that is being used by the balloon transmitter. These algorithms are memory efficient and can be implemented on microcomputer systems. Author

N86-15493# Joint Publications Research Service, Arlington, Va.
OPTIMUM FREQUENCY OF COMMUNICATION CHANNEL FOR INDOOR RADIO TELEMETRY Abstract Only
A. A. Kvitka, B. I. Podlepetskiy, and S. D. Chernysheva *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 14 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 70-73 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-15334*# Ball Aerospace Systems Div., Boulder, Colo.
BASD: SIRTF TELESCOPE INSTRUMENT CHANGEOUT AND CRYOGEN REPLENISHMENT (STICCR) STUDY
A. J. Mord, A. R. Urbach, M. E. Poyer, L. C. Andreozzi, L. A. Hermanson, H. A. Snyder, W. R. Blalock, and R. P. Haight Aug. 1985 336 p refs
(Contract NAS2-11979)
(NASA-CR-177381; NAS 1.26:177381; F85-06) Avail: NTIS HC A15/MF A01 CSCL 22B

The Space Infrared Telescope Facility (SIRTF) is a long-life cryogenically cooled space-based telescope for infrared astronomy from 2 micrometer to 700 miocrometers currently under study by NASA-ARC, and planned for launch in approximately the mid 90's. SIRTF will operate as a multi-user facility, initially carrying 3 instruments at the focal plane. It will be cooled to below 2 K by superfluid liquid helium to achieve radiometric sensitivity limited only by the statistical fluctuations in the natural infrared background radiation over most of its spectral range. The lifetime of the mission will be limited by the lifetime of the liquid helium supply, and is currently baselined to be 2 years. The telescope changes required to allow in-space replenishment of the 2,000 liter superfluid helium tank are investigated. A preliminary design for the space services equipment is also developed. The impacts of basing the equipment and servicing on the space station are investigated. Space replenishment and changeout of instruments requires changes to the telescope design and preliminary concepts are presented. Author

N86-15335*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CATALYTIC SURFACE EFFECTS ON CONTAMINATED SPACE SHUTTLE TILE IN A DISSOCIATED NITROGEN STREAM
Orvel L. Flowers and David A. Stewart Nov. 1985 17 p refs
(NASA-TM-86770; Rept-85328; NAS 1.15:86770) Avail: NTIS HC A02/MF A01 CSCL 22B

Visual inspection revealed contamination on the surface of tiles removed from the lower section of the space shuttle orbiter after the second flight of Columbia (STS-2). Possible sources of this contamination and the effect on surface catalycity are presented. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-15336 Department of the Air Force, Washington, D.C.
SOLAR ROCKET ABSORBER Patent
P. I. Robinson, inventor (to Air Force) Issued 16 Jul. 1985 5 p Supersedes AD-D010773
(AD-D011897; US-Patent-4,528,978; US-Patent-Appl-SN-559169; US-Patent-Class-126-438) Avail: US Patent and Trademark Office CSCL 21/8

In this patent a solar rocket absorber of rhenium tubes is used to provide heated liquid hydrogen to a thruster. The rhenium tubes are wrapped in a closed shape having an opening for receiving solar radiation for heating the liquid propellant. The vessel of rhenium tubes is held by a carbon shell which is further encased in a reradiation shield to prevent heat loss. GRA

N86-15337*# Queensland Univ., Brisbane (Australia). Dept. of Mechanical Engineering.
SCRAMJET SIDEWALL BURNING: PRELIMINARY SHOCK TUNNEL RESULTS
R. G. Morgan, A. Paull, N. Morris, and R. J. Stalker [1985] 56 p refs
(Grant NAGw-674)
(NASA-CR-176420; NAS 1.26:176420; Rept-12/85) Avail: NTIS HC A04/MF A01 CSCL 21H

Experiments performed with a two dimensional model scramjet with particular emphasis on the effect of fuel injection from a wall are reported. Air low with a nominal Mach number of 3.5 and varied enthalpies was produced. It was found that neither hydrogen injection angle nor combustor divergence angle had any appreciable effect on thrust values while increased combustor length appeared to increase thrust levels. Specific impulse was observed to peak when hydrogen was injected at an equivalence ratio of about 2. Lowering the Mach number of the injected hydrogen at low equivalence ratios, less than 4, appeared to benefit specific impulse while hydrogen Mach number had little effect at higher equivalence ratios. When a 1:1 mixture by volume of nitrogen and oxygen is used instead of air as a test gas, it is found that hydrogen combustion is enhanced but only at high enthalpies. E.A.K.

N86-15338*# Rockwell International Corp., Downey, Calif.
ADVANCED INTEGRATED POWER AND ATTITUDE CONTROL SYSTEM (IPACS) STUDY Final Report
Ronald E. Oglevie and David B. Eisenhaure (Draper (Charles Stark) Lab., Cambridge, Mass.) Washington NASA Nov. 1985 170 p refs
(Contract NAS1-17633)
(NASA-CR-3912; NAS 1.26:3912; SSS85-0025) Avail: NTIS HC A08/MF A01 CSCL 22B

Integrated Power and Attitude Control System (IPACS) studies performed over a decade ago established the feasibility of simultaneously satisfying the demands of energy storage and attitude control through the use of rotating flywheels. It was demonstrated that, for a wide spectrum of applications, such a

system possessed many advantages over contemporary energy storage and attitude control approaches. More recent technology advances in composite material rotors, magnetic suspension systems, and power control electronics have triggered new optimism regarding the applicability and merits of this concept. This study is undertaken to define an advanced IPACS and to evaluate its merits for a space station application. System and component designs are developed to establish the performance of this concept and system trade studies conducted to examine the viability of this approach relative to conventional candidate systems. It is clearly demonstrated that an advanced IPACS concept is not only feasible, but also offers substantial savings in mass and life-cycle cost for the space station mission. Author

N86-15339*# Boeing Aerospace Co., Seattle, Wash.
SPACE STATION PROPULSION REQUIREMENTS STUDY Final Report
Calvin L. Wilkinson and Scott M. Brennan Aug. 1985 484 p
(Contract NAS3-23353)
(NASA-CR-174934; NAS 1.26:174934; D180-28264-1) Avail: NTIS HC A21/MF A01 CSCL 21H

Propulsion system requirements to support Low Earth Orbit (LEO) manned space station development and evolution over a wide range of potential capabilities and for a variety of STS servicing and space station operating strategies are described. The term space station and the overall space station configuration refers, for the purpose of this report, to a group of potential LEO spacecraft that support the overall space station mission. The group consisted of the central space station at 28.5 deg or 90 deg inclinations, unmanned free-flying spacecraft that are both tethered and untethered, a short-range servicing vehicle, and a longer range servicing vehicle capable of GEO payload transfer. The time phasing for preferred propulsion technology approaches is also investigated, as well as the high-leverage, state-of-the-art advancements needed, and the qualitative and quantitative benefits of these advancements on STS/space station operations. The time frame of propulsion technologies applicable to this study is the early 1990's to approximately the year 2000. Author

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-15340# Committee on Science and Technology (U. S. House).
CONGRESSIONAL WORKSHOP ON ADVANCED MATERIALS RESEARCH AND DEVELOPMENT
Washington GPO 1985 119 p Presented to the Committee on Science and Technology, 99th Congress, 1st Session, Jun. 1985
(GPO-47-717) Avail: US Capitol, House Document Room

A workshop was held on materials research and development sponsored by the House Committee on Science and Technology. Over forty representatives from industry, academia and the Federal government were selected to participate in the workshop. The workshop was to provide assistance to the Committee in carrying out its oversight responsibility with respect to the National Critical Materials Act of 1984 relating to advanced materials research and development. In particular, the workshop focused on the parameters necessary to define a national federal advanced materials program plan. While broader issues were considered, discussion focused on three areas related to the materials R&D infrastructure: (1) materials research facilities; (2) materials engineering and science; and (3) research establishments. Author

N86-15341# Illinois Univ., Urbana. Dept. of Chemistry.
CHEMILUMINESCENCE FROM ORGANIC REACTIONS. FORMATION OF DIPHENOYL PEROXIDE AS AN INTERMEDIATE
C. B. Little and G. B. Schuster 30 Aug. 1985 28 p
(Contract N00014-76-C-0745)
(AD-A159144) Avail: NTIS HC A03/MF A01 CSCL 07/4

Visible, long-lasting chemiluminescence results when diphenic anhydride and p-nitroperoxybenzoic acid in THF are treated with powdered KOH in the presence of a catalytic chemiluminescence (CIEEL) activator. This chemiluminescent process is presumed to involve in situ generation of diphenoyl peroxide, which then undergoes chemiluminescent decomposition by the CIEEL mechanism. Carboxylate 4, the precursor to diphenoyl peroxide in this reaction, was generated by an entirely different route from peroxide 5. Author (GRA)

N86-15342# Illinois Univ., Urbana. Dept. of Chemistry.
REACTIONS OF SINGLET OXYGEN WITH ENOL ESTERS
S. L. Wilson and G. B. Schuster 30 Aug. 1985 24 p
(Contract N00014-76-C-0745)
(AD-A159160; TR-38) Avail: NTIS HC A02/MF A01 CSCL 07/3

Singlet oxygenation of (l-adamantylidene)ethyl acetate (4) and 6,6-dimethylcyclohex-l-enyl acetate (7) produces only ene reaction products. Photooxygenation of Delta 1,6-2-oxabicyclo(4.4.0)decen-3-one (9), in contrast, yields ene, acyl-shifted, and (2+2) cycloaddition products. The product distribution resulting from oxidation of 9 indicates that attack of singlet oxygen (1O2) occurs exclusively on the same side of the double bond as the ester functional group. The bimolecular rate constant for reaction of 9 with 1O2 is found to be ca. 50 times larger than those of 4 and 7. These results are explained most economically by invoking the initial formation of perepoxide intermediate. In the case of 9, stabilization of the transition state leading to the perepoxide by interaction of the incoming 1O2 molecule with the ester functionality produces the observed rate enhancement and stereospecificity. Author (GRA)

N86-15343# Air Force Academy, Colo.
UNITED STATES AIR FORCE ACADEMY, DEPARTMENT OF CHEMISTRY RESEARCH: AY 1983-1984 Final Report, 1 Jun. 1983 - 31 May 1984
L. P. Davis Jul. 1985 127 p
(AD-A159319; USAFA-TR-85-3) Avail: NTIS HC A07/MF A01 CSCL 07/1

Department of Chemistry Research during AY-1983-84 has progressed well in the areas of energetic materials, theoretical chemistry, and catalysis research. Working closely with Frank J. Seiler Research Laboratory on many of these projects, department researchers have synthesized new energetic compounds. Theoretical methods have been used to study basic silicon chemistry and biochemical molecules. Spectroscopic studies of the photodegradation of riboflavin have lead to an understanding of this important photochemical reaction. The following topics are discussed: synthesis of polynitrophenyl acetylenes; regiospecific fluorination of aryl anions with xenon difluoride; correlation of sigma 13 constants with NMR chemical shifts in Fluorine, Phosphorus, and nitrogen-containing styrene derivatives; photodegradation of riboflavin; a quantum-chemical study relating pseudorotation to the stereochemistry of nucleophilic substitution in silicon; and theoretical calculations of the peptide bond. GRA

N86-15344# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CHEMISTRY Abstracts Only
22 Oct. 1985 72 p Transl. into ENGLISH from various Russian articles
(JPRS-UCH-85-013) Avail: NTIS HC A04/MF A01

USSR Report - Chemistry, 22 October 1985 (JPRS-UCH-85-013) contains articles on adsorption, catalysis, coal gasification, electrochemistry, free radicals, inorganic compounds, nitrogen compounds, organometallic compounds, organophosphorus compounds, petroleum processing technology, pharmacology and toxicology, polymers and polymerization, rubber and elastomers, and water treatment. Of particular interest in this issue are articles on jet engine fuels and metal-polymer composites. For individual titles, see N86-15345 through N86-15347.

N86-15345# Joint Publications Research Service, Arlington, Va.
EVALUATING STRUCTURAL CHANGES IN JET FUELS BY ELECTRICAL CONDUCTIVITY AND VISCOSITY c28

A. I. Belousov and Ya. M. Bushuyeva *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 39-40 Transl. into ENGLISH from Khimiya i Tekhnologiya Topliv i Masel (Moscow, USSR), no. 3, Mar. 1985 p 20-21 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

Using the temperature-electrical conductivity relationship of jet fuels alone as an indication of structural changes gives contradictory results. A study is made using both conductivity and viscosity relationships to temperature at -60 C to + 80 C. RT, TS-1 and T-1 jet fuels exhibit linear temperature-conductivity curves, indicating no structural changes. A break in the curve below 20 C for T-6 fuels indicate a change. Temperature viscosity at -50 C to +80 C for RT, TS-1 and T-1 fuels are also linear (no structural change) and confirm the conductivity results. Breaks in these curves at -40 C and at +20 C for T-6 fuel indicate structural changes and also confirm the conductivity data. These curves may thus be used to evaluate structural changes in jet fuels. These changes may be prevented by using special additives or by blending with less viscous fuels. Author

N86-15346# Joint Publications Research Service, Arlington, Va.
EFFECTS OF VIBRATION-INDUCED CAVITATION OF PHYSICOCHEMICAL CHARACTERISTICS OF AIRCRAFT FUEL c28
P. P. Mertsalov, B. G. Bedrik, and K. L. Suponko *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 46-47 Transl. into ENGLISH from Khimiya i Tekhnologiya Topliv i Masel (Moscow, USSR), no. 7, Jul. 1985 p 23-25 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

An analysis was conducted on the factors leading to vibration-induced cavitation in aircraft fuel, resulting from sudden changes in hydrostatic pressure and resultant variability in tensile stresses. The data demonstrates that both hydrodynamic and aircraft factors are predisposed to maximum cavitation in the vibration range of 30 to 300 Hz and vibroaceleration of 10 to 30 g. The specific alterations in fuels TS-1 and T-6 consist of changes in the granulometric profile with an increase in the percentage of particles 1 to 5 micron in size and a decrease in the percentages of those in the 5 to 100 micron (most pronounced with the 15 to 100 micron fraction). Other changes include a decrease in fuel viscosity and thermal stability, and an increase in tar substances. Vibration is, therefore, an important factor to be considered in the formulation and testing of new aviation fuels. Author

N86-15347# Joint Publications Research Service, Arlington, Va.
ENERGY FUNCTION AND CONDUCTIVITY OF METAL-POLYMER COMPOSITES c24
O. N. Khitrova, A. M. Danyushina, Yu. S. Mardashev, and B. V. Yerofeyev *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 49-50 Transl. into ENGLISH from Vestsi Akademii Navuk BSSR: Seryya Khimichnykh Navuk (Minsk, USSR), no. 3, May-Jun. 1985 p 105-106 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

The work function of electrons from polymer or metal as a function of electrical conductivity at the percolation zone is studied in two series of composites. In the first series (Zn + polyethylene), the metal is varied, and in the second (Zn + polyethylene, polyvinyl alcohol, polytetrafluoroethylene), the polymer is varied. The rise in conductivity of the composite is shown to vary with the work function of the polymer, which is apparently related to the transfer mechanism. The conductivity of the composite is thus determined by the nature of the dielectric (polymer). Author

24 COMPOSITE MATERIALS

Includes laminates.

N86-15348*# California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
EFFECT OF STRESS CONCENTRATIONS IN COMPOSITE STRUCTURES Progress Report
C. D. Babcock and A. M. Waas Nov. 1985 47 p refs
(Grant NsG-1483)
(NASA-CR-176410; NAS 1.26:176410; SM-85-12) Avail: NTIS HC A03/MF A01 CSCL 11D

Composite structures have found wide use in many engineering fields and a sound understanding of their response under load is important to their utilization. An experimental program is being carried out to gain a fundamental understanding of the failure mechanics of multilayered composite structures at GALCIT. As a part of this continuing study, the performance of laminated composite plates in the presence of a stress gradient and the failure of composite structures at points of thickness discontinuity is assessed. In particular, the questions of initiation of failure and its subsequent growth to complete failure of the structure are addressed. Author

N86-15349*# Wyoming Univ., Laramie. Composite Materials Research Group.
MECHANICAL PROPERTIES TESTING OF CANDIDATE POLYMER MATRIX MATERIALS FOR USE IN HIGH PERFORMANCE COMPOSITES Contractor Report, May 1983 - May 1984
Richard S. Zimmerman and Donald F. Adams Dec. 1985 301 p refs
(Grant NAG1-277)
(NASA-CR-177970; NAS 1.26:177970; UWME-DR-401-104-1)
Avail: NTIS HC A14/MF A01 CSCL 11D

The mechanical properties of four candidate neat resin systems for use in graphite/epoxy composites are characterized. This includes tensile and shear stiffnesses and strengths, coefficients of thermal and moisture expansion, and fracture toughness. Tests are conducted on specimens in the dry state and moisture-saturated, at temperatures of 23C, 82C and 121C. The neat resins tested are Hexcel HX-1504, Narmco 5245-C, American Cyanamid CYCOM 907, and Union Carbide ERX-4901A (MDA). Results are compared with those obtained for four other epoxy resins tested in a prior program, i.e., Hercules 3502, 2220-1, and 2220-3, and Ciba-Geigy Fibredux 914, as well as with available Hercules 3501-6 data. Scanning electron microscopic examination of fracture surfaces is performed to permit the correlation of observed failure modes with the environmental test conditions. A finite element micromechanics analysis is used to predict unidirectional composite response under various test conditions, using the measured neat resin properties as input data. Author

N86-15350*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STRESS CONCENTRATION AROUND A SMALL CIRCULAR HOLE IN THE HIMAT COMPOSITE PLATE
William L. Ko Dec. 1985 18 p refs
(NASA-TM-86038; H-1235; NAS 1.15:86038) Avail: NTIS HC A02/MF A01 CSCL 11D

Anisotropic plate theory is used to calculate the anisotropic stress concentration factors for a composite plate (AS/3501-5 graphite/epoxy composite, single ply or laminated) containing a circular hole. This composite material is used on the highly maneuverable aircraft technology (HiMAT) vehicle. It is found that the anisotropic stress concentration factor could be greater or less than 3 (the stress concentration factor for isotropic materials), and that the locations of the maximum tangential stress points could shift with the change of fiber orientation with respect to the loading axis. The effect of hole size on the stress concentration factor is examined using the Point Stress Criterion and the Averaged Stress Criterion. The predicted stress concentration factors based on the two theories compared fairly well with the measured values for the hole size 0.3175 cm (1/8 in). It is also found that through the lamination process, the stress concentration factor could be reduced drastically, indicating an improvement in structural performance. Author

N86-15351# Naval Surface Weapons Center, Silver Spring, Md.
CORROSION RESISTANT MAGNESIUM-BASED MATERIALS

FOR NAVAL APPLICATIONS
W. A. Ferrando 1 Apr. 1985 39 p
(AD-A158012; NSWC/TR-85-88) Avail: NTIS HC A03/MF A01 CSCL 11/4

This report reviews the corrosion related properties of magnesium, magnesium alloys, and magnesium based composites. It attempts to place in perspective the corrosion behavior limitations of these materials in environments likely experienced by naval systems. These are treated from both macro- and microscopic perspectives. The role of base metal impurities is investigated. The strengths and limitations of the more traditional corrosion protection methods are discussed. Some modern non-paint surface treatments and still experimental anticorrosion surface modification techniques are assessed for magnesium. Special emphasis is given to the magnesium-graphite fiber composite system, identified as unique for certain space satellite applications by virtue of its very high stiffness, near zero coefficient of thermal expansion (CTE), and high electrical conductivity. Some evidence of potential corrosion problems with this composite material in the prelaunch environment and a mechanism possibly responsible for this are presented. Relatively brief discussion is devoted to achieving the desirable properties of Gr/Mg composites using alternative materials. Finally some recommendations are made for corrosion protection of magnesium-based materials for naval systems in light of recent research efforts. Additional consideration again is given to the potentially important Gr/Mg composite system. GRA

N86-15352# Department of the Army, Washington, D. C.
METALLOGRAPHIC PREPARATION OF PARTICULATE FILLED ALUMINUM METAL MATRIX COMPOSITE MATERIAL Patent Application
E. L. Goodwin, inventor (to Army) Filed 24 Jun. 1985 10 p
(AD-D011862; US-Patent-Appl-SN-747741) Avail: NTIS HC A02/MF A01 CSCL 11/4

In accordance with this invention, a metallographic preparation method is disclosed for the preparation of particulate filled aluminum metal matrix composite material having approximately 25% silicon therein. The method includes first cutting the sample to size, mounting the sample in a plastic to provide a holder for the sample, then rough grinding the sample on a belt grinder, next fine grinding the sample on a multiplicity of different grit size silicon carbide paper, rough polishing the sample after fine grinding using a flat aluminum wheel with nylon polishing cloth and diamond bort paste thereon and finally final polishing the sample using a three-step final polishing procedure to produce a sample of fine quality which is ready for microscopic examination to determine quality and completeness of the polishing method. GRA

N86-15353# Aeronautical Research Labs., Melbourne (Australia).
THE AIRLIFT DILEMMA: AN UPDATE
E. M. Bullard May 1985 54 p
(AD-A159307; AD-F250300; AU-AWC-85-030) Avail: NTIS HC A04/MF A01 CSCL 15/5

The US, in order to protect its security, must be able to support its forces currently forward deployed as well as projecting other military forces into regions of the world where they do not exist. Time has become a critical factor because of the rapid mobility of modern armed forces and especially for the US because of its geographic isolation from most of the world. Transport by air becomes the only available method of movement during the early stages of conflict. In order to satisfy that requirement, an airlift force structure must be capable of not only meeting the time constraints, but be capable of carrying a combat unit from its origin to its employment area. The current airlift force does not have this capability. After examining doctrinal and strategic principles, this report recommends a force structure which responds to our national military strategy. First, it recommends modernization of the tactical airlift fore through purchase of newer model C-130 aircraft from a production line which is still open. Second, it recommends the purchase of a long-range C-17 type aircraft which, through its method of direct delivery, can avoid the traditional hub and spoke transportation system and save precious reaction time. Author (GRA)

N86-15347# Joint Publications Research Service, Arlington, Va.
ENERGY FUNCTION AND CONDUCTIVITY OF METAL-POLYMER COMPOSITES
O. N. Khitrova, A. M. Danyushina, Yu. S. Mardashev, and B. V. Yerofeyev *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 49-50 Transl. into ENGLISH from Vestsi Akademii Navuk BSSR: Seryya Khimichnykh Navuk (Minsk, USSR), no. 3, May-Jun. 1985 p 105-106 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-15354 Defence Research Information Centre, Orpington (England).
ELECTROCHEMICAL GAS SENSORS AND GAS ANALYSIS EQUIPMENT
Harald Boehm May 1985 27 p refs Transl. into ENGLISH from Techniches Messen (West Germany), v. 50, no. 11, 1983 p 399-406
(DRIC-T-7521; BR95923) Copyright. Avail: NTIS HC A03/MF A01

Electrochemical processes for the chemical analysis of gases are described. A distinction between direct processes, based on the application of gas diffusion electrodes, and indirect processes, where gases are dissolved or undergo a reaction in a prior step is made. Author (ESA)

N86-15355# Oak Ridge National Lab., Tenn.
TIME DEPENDENT RATE THEORY FOR DIFFUSIONAL DEFECT PROCESSES
A. D. Brailsford and L. K. Mansur Jan. 1985 53 p refs
(ORNL-6122) Avail: NTIS HC A04/MF A01

Effective Medium Theory is used to derive the equation governing the time evolution of the volume averaged defect concentration in a system containing cavities and dislocations. Any generation of defects due to external causes is assumed to be spatially homogeneous but may vary with time in an arbitrary manner. Within the approximation of spatial uniformity the theory is suitable for application to the study of irradiation effects in fusion reactor components. Specific examples of the general formalism are analyzed in detail. These indicate that although differences do exist between the present theory and that which would be inferred from a simple extension of steady state considerations, such departures are of minor practical significance. The formalism also permits a more detailed justification of steady state growth models to be given than has heretofore been available. The main emphasis for irradiated materials is placed upon the domain where instrinsic recombination between interstitials and vacancies is a minor source of defect loss. However, a brief discussion of this process is appended in order to cast it within the present formalism. Author

N86-15356# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
A CASCADE DIFFUSION THEORY OF SINK CAPTURE FLUCTUATIONS DURING IRRADIATION OF A SOLID
L. K. Mansur, A. D. Brailsford (Ford Motor Company, Dearborn, Mich.), and W. A. Coghlan (Arizona State Univ., Tempe) Jan. 1985 72 p refs Sponsored in part by Ford Motor Co.
(Contract DE-AC05-84OR-21400)
(ORNL-6123) Avail: NTIS HC A04/MF A01

Fluctuations in the number of defects captured by sinks in an irradiated solid, that arise because of the stochastic nature of collision cascade events, are analyzed. Two types of sinks are considered, cavities (or voids) and dislocations. The importance of the physical size of the sink is emphasized, as also is the magnitude of the fluctuations in defect capture relative to the behavior of its statistical mean. In particular, it is shown that the ratio of the variance to the mean, for either a cavity or a dislocation segment, decreases rapidly as overall steady state is approached. Further analytical and computational aspects of a shell model are analyzed. The relationship of this model to a truly random system is established, and additional calculations are presented to exemplify some of the features predicted by the mathematical analysis. Important functions describing the spatial origins of the point defects contributing to the average concentration and flux are described. The probabilities of special types of cascade coincidences are developed. The application of the present formalism to the problems of void nucleation, and dislocation climb over localized obstacles, in irradiated solids is indicated. Author

N86-15357# National Bureau of Standards, Washington, D.C.
STANDARD X-RAY DIFFRACTION POWDER PATTERNS Final Report
Marlene C. Morris, Howard F. McMurdie, Eloise H. Evans, Boris Paretzkin, Harry S. Parker, Winnie Wong-Ng, Donna M. Gladhill, and Camden R. Hubbard Sep. 1985 144 p refs Prepared in cooperation with International Center for Diffraction Data, Swathmore, Pa.
(NBS/MN-25-Sec-21; LC-53-61386) Avail: NTIS HC A07/MF A01

Standard X-ray powder diffraction patterns are presented for 92 substances. These patterns are useful for identification and are obtained by automated diffractometer methods. The lattice constants from the experimental work were refined by least-squares methods, and reflections were assigned hk lambda indices consistent with space group extinctions. Relative intensities, calculated densities, literature references, and other relevant data are included. E.A.K.

N86-15358*# Research Triangle Inst., Research Triangle Park, N.C.
COLLECTION AND ANALYSIS OF NASA CLEAN ROOM AIR SAMPLES Final Report
Linda S. Sheldon and Jeffrey Keever Washington NASA Nov. 1985 63 p refs
(NASA Order L-78258B)
(NASA-CR-3947; NAS 1.26:3947) Avail: NTIS HC A04/MF A01 CSCL 07D

The environment of the HALOE assembly clean room at NASA Langley Research Center is analyzed to determine the background levels of airborne organic compounds. Sampling is accomplished by pumping the clean room air through absorbing cartridges. For volatile organics, cartridges are thermally desorbed and then analyzed by gas chromatography and mass spectrometry, compounds are identified by searching the EPA/NIH data base using an interactive operator INCOS computer search algorithm. For semivolatile organics, cartridges are solvent entracted and concentrated extracts are analyzed by gas chromatography-electron capture detection, compound identification is made by matching gas chromatogram retention times with known standards. The detection limits for the semivolatile organics are; 0.89 ng cu m for dioctylphlhalate (DOP) and 1.6 ng cu m for polychlorinated biphenyls (PCB). The detection limit for volatile organics ranges from 1 to 50 parts per trillion. Only trace quantities of organics are detected, the DOP levels do not exceed 2.5 ng cu m and the PCB levels do not exceed 454 ng cu m. Author

N86-15359*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE APPLICATION OF DIFFUSION THEORY TO THE ANALYSIS OF HYDROGEN DESORPTION DATA AT 25 DEG C
Merlin D. Danford Oct. 1985 27 p refs
(NASA-TM-86531; NAS 1.15:86531) Avail: NTIS HC A03/MF A01 CSCL 07D

The application of diffusion theory to the analysis of hydrogen desorption data (coulombs of H2 desorbed versus time) has been studied. From these analyses, important information concerning hydrogen solubilities and the nature of the hydrogen distributions in the metal has been obtained. Two nickel base alloys, Rene' 41 and Waspaloy, and one ferrous alloy, 4340 steel, are studied in this work. For the nickel base alloys, it is found that the hydrogen distributions after electrolytic charging conforms closely to those which would be predicted by diffusion theory. For Waspaloy samples charged at 5,000 psi, it is found that the hydrogen distributions are essentially the same as those obtained by electrolytic charging. The hydrogen distributions in electrolytically charged 4340 steel, on the other hand, are essentially uniform in nature, which would not be predicted by diffusion theory. A possible explanation has been proposed. Finally, it is found that the hydrogen desorption is completely explained by the nature of the hydrogen distribution in the metal, and that the fast hydrogen is not due to surface and sub-surface hydride formation, as was originally proposed. Author

N86-15360*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NOVEL SORBENTS FOR HIGH TEMPERATURE REGENERATIVE H2S REMOVAL Final Report
Maria Flytzani-Stephanopoulos, George R. Gavalas, Satish S. Tamhankar, and Pramod K. Sharma Oct. 1985 110 p refs
(Contracts NAS7-918; DE-AI21-83MC-20417)
(NASA-CR-176449; JPL-Pub-85-80; NAS 1.26:176449; DOE/MC-20417-1898) Avail: NTIS HC A06/MF A01 CSCL 07D

The overall objective of this program is to develop improved regenerable sorbents for the high-temperature desulfurization of coal-derived gas streams. The aim is to reduce the H2S level, preferably in a single-stage, from 0.5 to 1.0 mol% down to 1 ppm. The specific objectives of this project are to synthesize, characterize, and test two classes of sorbents. One consists of eutectic mixtures of metal oxides (e.g., ZnO-V2O5, CuMoO4-MoO3) in the form of a melt coating the pore surface of a high surface area solid support. The second class of sorbents includes unsupported mixed oxides, in the form of solid solutions or solid compounds, e.g., Zn-Fex-Oy, Cu-Fex-Oy, prepared as highly dispersed microcrystalline solids. The principal characteristics of both classes of sorbents are rapid kinetics of absorption, high absorption capacity, and good regenerability. The rapid absorption kinetics are realized by eliminating or minimizing the resistance associated with solid state diffusion. With these properties, the sorbents would be suitable for coal gasification/molten carbonate fuel cell (MCFC) applications, but could also be applied to combined cycle power generation and the purification of synthesis gas. Author

N86-15361# Arizona State Univ., Tempe.
MECHANISMS OF EXCITATION AND IONIZATION PROCESSES IN SPUTTERING Final Report, 1 Sep. 1981 - 28 Feb. 1985
I. S. T. Tsong 7 Aug. 1985 5 p
(Contract N00014-81-K-0844)
(AD-A158061) Avail: NTIS HC A02/MF A01 CSCL 07/4

The primary objective of our research project is to understand the basic mechanisms governing the inelastic outershell processes, i.e., excitation, ionization and neutralization, in particle-solid interactions. To this end, we direct our investigation of the particles sputtered when a solid surface is subjected to energetic ion bombardment. An understanding of the basic mechanisms will allow better interpretation of experimental data obtained by surface analytical techniques which make use of sputtering such as secondary ion mass spectrometry (SIMS), auger electron spectrometry (AES) and X-ray photoemission spectrometry (XPS). These techniques are commonly used to study microelectronics problems concerning interfairal properties and diffusion of dopants and impurities. Author (GRA)

N86-15362# Cornell Univ., Ithaca, N.Y.
CRYOGENIC SAMPLE STAGE FOR THE CAMECA IMS-3F ION MICROSCOPE Interim Technical Report
M. T. Bernius, S. Chandra, and G. H. Morrison 17 Jul. 1985 7 p
(Contract N00014-80-C-0538)
(AD-A158071; AD-F630692; TR-14) Avail: NTIS HC A02/MF A01 CSCL 07/4

A liquid nitrogen cooled sample stage for use with the CAMECA-IMS-3F ion microscope has been designed, built and incorporated into the existing laboratory instrumentation for SIMS analysis of samples at cryogenic temperatures. This is particularly useful for the ion microscopic analysis of frozen hydrated samples (biologicals), and the study of sputter and ion yields of materials in a water matrix. The application to semiconductor analysis is being explored. GRA

N86-15363# New Mexico Univ., Albuquerque. School of Medicine.
ULTRASENSITIVE DETECTION OF CHEMICAL SUBSTANCES Quarterly Report, 1 Mar. - 31 May 1985
R. G. Dean 31 May 1985 8 p
(Contract N00014-82-K-0690; ARPA Order 4507)
(AD-A158224) Avail: NTIS HC A02/MF A01 CSCL 06/1

During the past quarter, we have produced and cloned several hybridomas with antibody against AChE or ACnE-DFP conjugate. One of these antibodies, designed V16-6B, has special interest. As expected this antibody binds the AChE-DFP conjugate effectively and shows a lowered cross reaction with AChE alone. The remarkable feature of the antibody is that it does not appear to bind DFP significantly. Figure 1 shows the protective effect V16-6B has in inhibiting the inactivation of AChE by decreasing amounts of DFP. Normally, DFP will activate AChE rapidly, However, if an agent such as an antibody is introduced which binds DFP then the reaction between AChE and DFP will be slowed. This data is very preliminary and requires a number of further control experiments. These will include more accurate quantization of the antibody so that molar ratios and equilibrium binding conditions can be better established and control conditions include a protein such as non-reactive Goat IgG. This data does suggest, however, that V16-6B may be directed against an AChE site which changes determinant form of conformation when DFP binding takes place and that this site is probably not located at the active site of AChE. That AChE should have been a determinant site that changes its conformation when irreversibly bound to DFP is not surprising. This data is very interesting and suggest possibilities of detecting a wide variety of potential toxins that inactivate AChE. GRA

N86-15364# Geo-Centers, Inc., Newton, Mass.
ELECTROLYSIS OF CO(2) BY NOVEL METALLOPOLYMERIC CATHODES
Mar. 1985 53 p
(Contract N00014-83-C-0690)
(AD-A158228; GC-TR-85-426) Avail: NTIS HC A04/MF A01 CSCL 07/4

One of the most critical requirements for the maintenance of a suitable atmosphere for human occupancy in a closed environment is the elimination of carbon dioxide (CO2) from ambient air. Technology is presently available for large-scale conversion of CO2. In a typically electrolysis unit, CO2 is pre-concentrated in aqueous solution then fed into a stacked assembly of alternating current collectors, solid polymer electrolyte separators and cathodes arranged in a flow-through configuration. Part 1 describes the investigation of the quantitative electrochemical response characteristics of selected metal and semiconductor electrodes with regard to CO2 reduction in nonaqueous solution. Part 2 describes the electrochemistry of a large family of monomeric and dimeric palladium and platinum phosphine complexes which are promising CO2 reduction catalysts. Part 3 describes the work performed on two chemical systems which can serve as both chelating agents and menas of immobilizing catalytic metal complexes onto an electrode surface. One system involves the di(styryl) bipyridine ligand, metal complexes of which can be attached to surfaces by electromechanical polymerization. The second system is a soluable bipyridine-ligand containing polyester, which can be evaporatively deposited onto a surface with or without a chelated metal complex catalyst. GRA

N86-15365# Naval Postgraduate School, Monterey, Calif.
PRELIMINARY RESULTS OF VELOCITIES AND DECELERATION OF ALUMINUM, MAGNESIUM, ZIRCONIUM, TANTALUM, PYROFUZE AND TITANIUM PARTICLES BURNING IN STEAM Contractor Report, Dec. 1984 - May 1985
J. Kol, Y. Chozev, and M. Berger Jul. 1985 31 p
(AD-A159141; NPS67-85-005CR) Avail: NTIS HC A03/MF A01 CSCL 21/2

The energy released by metals burning in steam has several important applications including torpedo propulsion, nuclear reactor safety, underwater vehicles, underwater ordnance, etc. For investigation of shaped charge performance, velocities and decelerations of the burning particles are important parameters that can be used for aerodynamic drag studies as well as for studies of different burning mechanisms. Wires of various metals were exploded in a steam atmosphere. The metals investigated were aluminum, magnesium, tantalum, zirconium, pyrofuze, and titanium. Exploding wires generated numerous hot, small particles. Using high speed photography, velocities and decelerations were measured. Typical results are as follows: aluminum particles initial velocity 26 + or - 0.74 m/s and deceleration of 8075 m/sq. s zirconium (ejected from 1 mm diameter wire) particles initial velocity is from 5 to 11 + or - 0.47 m/s and deceleration is from 200 to 635 m/sq. s; zirconium (ejected from 0.127 mm diameter wire) particles initial velocity is from 1.25 to 1.6 + or - 0.47 m/s and acceleration 16 m/sq. s; magnesium particles initial velocity from 27 to 34 + or - 0.43 m/s and deceleration from 3300 to 6750 m/sq. s; tantalum (ejected from 1 mm diameter wire) particles initial velocity is 5.9 + or - 0.74 m/s; pyrofuze (ejected from 0.5 mm diameter wire) particles initial velocity is from 1.25 to 1.6 + or - 0.74 m/s and deceleration from 3700 to acceleration of 200 m/sq. s; titanium titanium (ejected from 0.127 mm diameter wire) particles initial velocity is 0.6 + or - 0.43 m/s and acceleration of 15 m/sq. s. GRA

N86-15366# Naval Postgraduate School, Monterey, Calif.
BURNING TIME AND SIZE OF ALUMINUM, MAGNESIUM, ZIRCONIUM, TANTALUM, AND PYROFUZE PARTICLES BURNING IN STEAM Contractor's Report, Nov. 1984 - Mar. 1985
J. Kol and Y. Chozev Jul. 1985 33 p
(AD-A159161; NPS67-85-003CR) Avail: NTIS HC A03/MF A01 CSCL 21/2

The energy released by metals burning in steam has several important applications including torpedo propulsion, nuclear reactor safety, underwater vehicles, underwater ordnance, etc. This report continues the studies that were performed by Hallenbeck and Kol, Fuhs and Berger which are related to underwater shaped charge investigations. Wires of various metals were exploded in a steam atmosphere. The metals investigated were aluminum, magnesium, tantalum, zirconium, and pyrofuze. Exploding wires generated numerous hot, small particles. Using photography, the burning time and particle sizes were measured. Typical results are as follows: 125 + or - 25 micron diameter aluminum burns in 3.8 + or - .75 ms; 175 + or - 35 micron diameter magnesium burns in 3.8 + or - .75 ms; 125 + or - 25 micron diameter zirconium in 25 to 31 ms; 125 + or - 25 micron diameter tantalum in 24 to 50 ms; and 125 + or - 25 micron pyrofuze in 30 to 50 ms. The atmosphere was pure saturated steam at approximately 20 psig. GRA

N86-15367# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
PREDICTIVE MODELS FOR GASEOUS-PHASE CARBON ADSORPTION AND HUMIDITY EFFECTS ON TRICHLOROETHYLENE ADSORPTION Final Report, Jun. - Aug. 1984
M. D. Werner, R. L. Gross, and E. C. Heyse Aug. 1985 50 p
(Contract F49620-82-C-0035)
(AD-A159167; AFESC/ESL-TR-85-29) Avail: NTIS

HC A03/MF A01 CSCL 07/1

Theoretical models were applied to the adsorption of trichloroethylene (TCE) at influent concentrations ranging from 300 to 1350 mg/cum in air on granular activated carbon at low relative humidity. The models are shown to predict both the adsorptive capacity of activated carbon (maximum error < 8 percent). These low humidity data were then compared to TCE absorption by the same carbon at 25, 50, 65, and 85 percent relative humidities. Increasing levels of humidity had increasingly deleterious effects on the absorptive capacity of activated carbon at all TCE concentrations tested. The adverse effect caused by the presence of water vapor was more significant at the lower TCE concentrations than at the higher concentrations. The presence of water vapor not only decreased the carbon's absorptive capacity but also reduced its efficiency by increasing the dispersion of the breakthrough curve. Data at all humidity levels fit the Dubinin-Polanyi isotherm equation equally well, indicating that the impact of water vapor on the adsorptive capacity of carbon for TCE is predictable and could be accurately modeled. GRA

N86-15368# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CRITICAL ANALYSIS OF NITRAMINE DECOMPOSITION DATA: PRODUCT DISTRIBUTIONS FROM HMX AND RDX DECOMPOSITION Final Report
M. A. Schroeder Jun. 1985 116 p
(DA Proj. 1L1-61102-AH-43)
(AD-A159325; BRL-TR-2659) Avail: NTIS HC A06/MF A01 CSCL 21/2

A summary of a critical interpretative literature review on product distributions from HMX and RDX decomposition is presented. Principal products formed include N2O, N2, H2CO, CO, CO2, and NO; these and a number of other products such as HCN, HCOOH, NO2(-), NO3(-), hydroxymethyl formamide, H2, and H2O are tabulated. NO2 appears to be formed, but is so reactive that many failures to report it may well be due to the fact that is disappears too rapidly due to further reaction. Relative amounts of HCN and NO2 may increase at high temperature, while H2CO, etc., decreases. A discussion of the first step of the decomposition is presented. A discussion of some possible unimolecular and bimolecular follow-up steps is also presented; among other things the N2/N2O ratio and some possible mechanisms for formation of molecular nitrogen (N2) are discussed. In conclusion, it is pointed out that possibly the most useful aspect of thermal decomposition studies at low temperatures and pressures is to elucidate the types of chemical deposition processes involved, including minor (at low temperatures and pressures) pathways, in addition to the principal ones. Informed extension of this body of knowledge to combustion conditions could then provide the basis for improved understanding and control of combustion processes and operational properties such as stability, sensitivity, and burning rate behavior. GRA

N86-15369# Ballistic Research Labs., Aberdeen Proving Ground, Md.
FLASH X-RAY WITH IMAGE ENHANCEMENT APPLIED TO COMBUSTION EVENTS Memorandum Report, Jan. 1983 - Jan. 1984
K. J. White and D. G. McCoy Aug. 1985 50 p
(DA Proj. 1L1-61102-AH-43)
(AD-A159328; BRL-MR-3457) Avail: NTIS HC A03/MF A01 CSCL 14/5

Flow visualization of interior ballistic processes by use of X-ray has placed more stringent requirements on flash X-ray techniques. The problem of improving radiographic contrast of propellants in X-ray transparent chambers has been studied by devising techniques for evaluating, measuring and reducing the effects of scattering from both the test object and structures in the test area. X-ray film and processing is reviewed and techniques for evaluating and calibrating these are outlined. Finally, after X-ray techniques have been optimized, the application of image enhancement processing which can improve image quality is described. This technique has been applied to X-ray studies for the combustion of Very High Buring Rate (VHBR) propellants and stick propellant charges. GRA

N86-15370# Department of Energy, Washington, D. C.
OPTICAL EMISSION LINE MONITOR WITH BACKGROUND OBSERVATION AND CANCELLATION Patent Application
D. R. Goff, inventors (to DOE) and J. E. Notestein Filed 4 Jan. 1985 15 p Sponsored by DOE
(DE85-017745; US-Patent-Appl-SN-688670) Avail: NTIS HC A02/MF A01

A fiber optics based optical emission line monitoring system is provided in which selected spectral emission lines, such as the sodium D-line emission in coal combustion, may be detected in the presence of interferring background or blackbody radiation with emissions much greater in intensity than that of the emission line being detected. A bifurcated fiber optic light guide is adapted at the end of one branch to view the combustion light which is guided to a first bandpass filter, adapted to the common trunk end of the fiber. A portion of the light is reflected back through the common trunk portion of the fiber to a second bandpass filter adapted to the end of the other branch of the fiber. The first filter bandpass is centered at a wavelength corresponding to the emission line to be detected with a bandwidth of about three nanometers (nm). The second filter is centered at the same wavelength but having a width of about 10 nm. First and second light detectors are located to view the light passing through the first and second filters respectively. Thus, the second detector is blind to the light corresponding to the emission line of interest detected by the first detector and the difference between the two detector outputs is uniquely indicative of the intensity of only the combustion flame emission of interest. DOE

N86-15424# Hokkaido Univ., Sapporo (Japan).
THE CATALYTIC ACTIVITY AND SELECTIVITY OF CHEMICAL TREATED CLINOPTILOLITE IN THE CONVERSION OF METHANOL
Harumi Sakou, Masahiro Nitta, and Kazuo Aomura *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 25 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-15371 United Kingdom Atomic Energy Authority, Risley (England).
TIN HARD COATING BY REACTIVE ION-PLATING
H. Shimada (Toyota Central R&D Lab., Inc.) 13 Sep. 1985 10 p refs Transl. into ENGLISH from Kinzoku Hyomen Gijutsu (Japan), v. 35, no. 1, 1984 p 67-70
(BLL-Risley-Tr-5112-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

A glow discharge was generated in reactive ion-plating around the substrate at low pressure with ample ion production by using a probe current in the abnormal discharge region by the ARE method. The TiN lattice constant and TiN crystallographic orientation, which depend on the glow discharge current in the substrate and nitrogen concentration, were dependent on probe current, and this was interpreted as an ion effect. The wear resistance and cohesion of the TiN hard coating, evaluated by comparison of the results of cutting tests with treated and untreated tools using a throw-away tip of SKH-4 high-speed steel, was demonstrated by prolongation of tool service life. B.W.

N86-15372 Lehigh Univ., Bethlehem, Pa.
APPLICATION OF FRACTURE MECHANICS PRINCIPLES TO FATIGUE CRACK GROWTH IN A POWDER METALLURGY NI-BASE SUPERALLOY Ph.D. Thesis
Robert Scott Vecchio 1985 208 p

Avail: Univ. Microfilms Order No. DA8516264

The fatigue crack propagation response of hot isostatically pressed (HIP) L.C. Astroloy was examined as a function of grain size, various loading parameters, crack configurations and temperature. Results for material with average grain sizes ranging from 5 micrometer to 50 micrometers are presented. Long crack near threshold FCP behavior obtained using disc compact tension (DC(T)) specimens was found to be relatively insensitive to changes in grain size at a stress ratio of 0.1. Increasing the stress ratio to 0.5 revealed an increase in FCP rates with increasing grain size. Of greater significance, however, was the observation that crack growth rates in region 1 were highly sensitive to variations in specimen geometry. At a given stress intensity range, fatigue crack growth rates were observed to increase as the loading of a given geometry became more symmetric with respect to the crack plane. It is suggested that this phenomenon is related to differing near field crack tip stress distributions between specimen geometries and their interaction with the material's microstructure.

Dissert. Abstr.

N86-15373 Illinois Inst. of Tech., Chicago.

MECHANICAL PROPERTIES AND DEFORMATION BEHAVIOR OF MARTENSITE-FERRITE DUAL-PHASE STEELS Ph.D. Thesis

Chuen-Taur Wu 1985 260 p refs

Avail: Univ. Microfilms Order No. DA8517589

The martensite-ferrite dual-phase (DP) steels were produced using a rapid resistance heating method. Starting with a commercial cold drawn 1018 pearlitic structure, DP steels with a variety of properties were obtained depending upon the dislocation structure of the ferrite matrix in combination with the carbon content and volume fraction of the martensite. A strength maximum accompanied by a ductility trough for these DP steels was observed at 34 percent martensite by volume. The structure-property relationships of the DP steels were studied in terms of the effects of the amount of martensite and its carbon content as well as the changes in ferrite properties. The strength maximum was reconciled in terms of the combined effect of increasing amounts of martensite with accompanying lowering of the strength (carbon content) of the martensite as a function of increasing intercritical heat treatment temperature for this single grade of steel. Dissert. Abstr.

N86-15374 Drexel Univ., Philadelphia, Pa.

MELTING AND CONSOLIDATION OF NICKEL ALLOY POWDERS WITH A PLASMA JET OPERATING IN A LOW PRESSURE INERT ENVIRONMENT Ph.D. Thesis

Ronald William Smith 1985 332 p

Avail: Univ. Microfilms Order No. DA8517065

Plasma deposition powder consolidation was conducted on a series of nickel alloys deposited using two plasma jets of largely different enthalpy and velocity distributions. The deposits were studied for density changes and structure changes as a function of powder composition and plasma jet condition. The powder consolidation mechanisms were observed and compared to mechanisms in conventional P/M. The melting of particles in the plasma was observed and the mechanism of melting was compared to current melting models for plasma deposition. Deposit density was increased by using a higher enthalpy, lower velocity distribution plasma jet. Compositions and powder structures have been shown to affect density. Pure elements (Ni) or eutectic composition (Ni50Cr) powder required hotter jets or trajectories were more sensitive to deposit conditions than alloy powder with wider melting ranges. Unmelted powder particles were found in all deposits resulting from the process variables and powder distributions.

Dissert. Abstr.

N86-15375 Carnegie-Mellon Univ., Pittsburgh, Pa.

THE ROLE OF MICROSTRUCTURE IN HYDROGEN-ASSISTED CRACK INITIATION IN HIGH STRENGTH STEELS Ph.D. Thesis

William Joseph Sisak 1985 192 p

Avail: Univ. Microfilms Order No. DA8517533

The effect of hydrogen on crack initiation in lower bainite and tempered martensite was investigated in two high strength steels, 9Ni-4Co and 4140. Crack initiation was studied in both uncharged and hydrogen precharged notched bend specimens. Crack initiation in uncharged single-edge-notched bend bars with polished notch surfaces occurred at a constant NOD, independent of yield strength and strain-hardening exponent. Strain localization at the notch surface was controlled by the grain size and was a precursor to crack initiation. Crack initiation occurred beneath the notch in most hydrogen precharged specimens at a relatively constant macroscopic stress of 1820 MPa. Lower bainite and tempered martensite generally exhibited similar susceptibility to hydrogen-assisted crack initiation. However, martensite tempered at 595 C exhibited the best resistance to hydrogen. The increased resistance to hydrogen-assisted crack initiation was attributed to the presence of (Mo,V) sub 2 C carbides in this microstructure. Dissert. Abstr.

N86-15376 Ohio State Univ., Columbus.

COMBINED MODE 1 - MODE 3 FRACTURE TOUGHNESS OF HIGH-STRENGTH LOW-ALLOY STEEL Ph.D. Thesis

James Gregory Schroth 1985 211 p

Avail: Univ. Microfilms Order No. DA8519022

Combined mode 1 - mode 3 fracture behavior was investigated for two heat treated conditions of a copper-bearing high-strength low-alloy steel. Special formulations of the J integral, denoted J sub 1 and J sub 3 for the opening mode and transverse shear mode respectively, were used to characterize crack initiation while Paris' tearing modulus was used to characterize J-resistance behavior during stable crack extension. Combined mode fracture initiation data define a linear fracture envelope in J sub 1 - J sub 3 space. This behavior is predicted qualitatively by a superdislocation model of combined mode elastic-plastic fracture in which the plastic zone is modeled by two superdislocations ahead of the crack tip; one of edge character with Burgers vector equal to the model CTOD, the other of screw configuration with Burgers vector equal to the model 3 CTOD. For all loading modes, the overaged condition containing incoherent face-centered-cubic copper precipitates exhibited superior toughness as compared to the peak aged condition which had a similar grain size and carbide distribution, but contained coherent body-centered-cubic copper-containing clusters. Dissert. Abstr.

N86-15377 Connecticut Univ., Storrs.

CRYSTALLOGRAPHIC FATIGUE CRACK PROPAGATION IN SINGLE CRYSTAL NICKEL-BASE SUPERALLOY Ph.D. Thesis

Otis Yuchia Chen 1985 228 p

Avail: Univ. Microfilms Order No. DA8516178

A study of the fatigue crack propagation behavior of single crystal nickel-base superalloy MAR-M200 (Ni-9Cr-10Co-12W-1Nb-2Ti-5A1) was conducted in order to gain a detailed understanding of how fatigue cracks propagate along crystallographic planes. This included both the study of Stage 1 fatigue crack propagation using conventional compact-type (C-T) specimens and four-point loading specimens specially designed to achieve a pure cyclic shear condition. A two dimensional Boundary Integral Equation (BIE) method was used to calculate both the shear stress intensity factor (K sub 11) and the tensile stress intensity factor (K sub 1) of C-T specimens with angled cracks as well as for pure shear specimens in four-point loading. It was observed that crystallographic fatigue crack propagation occurred exclusively along octahedral (111) planes and was independent of the specimen crystallographic orientations. For the first time, it has been demonstrated that fatigue cracks propagate along crystallographic planes subject to pure cyclic shear loading. Dissert. Abstr.

N86-15378*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THERMAL-MECHANICAL FATIGUE TEST APPARATUS FOR METAL MATRIX COMPOSITES AND JOINT ATTACHMENTS

Leonard J. Westfall and Donald W. Petrasek 1985 21 p refs

Presented at 1st Symposium on Testing Technology of Metal Matrix Composites, Nashville, Tenn., 18-20 Nov. 1985; sponsored by American Society for Testing and Materials

(NASA-TM-87187; E-2773; NAS 1.15:87187) Avail: NTIS

HC A02/MF A01 CSCL 11F

Two thermal-mechanical fatigue (TMF) test facilities were designed and developed, one to test tungsten fiber reinforced metal matrix composite specimens at temperature up to 1430C (2600F) and another to test composite/metal attachment bond joints at temperatures up to 760C (1400 F). The TMF facility designed for testing tungsten fiber reinforced metal matrix composites permits test specimen temperature excursions from room temperature to 1430C (2600F) with controlled heating and loading rates. A strain-measuring device measures the strain in the test section of the specimen during each heating and cooling cycle with superimposed loads. Data is collected and recorded by a computer. The second facility is designed to test composite/metal attachment bond joints and to permit heating to a maximum temperature of 760C (1400F) within 10 min and cooling to 150C (300F) within 3 min. A computer controls specimen temperature and load cycling. Author

N86-15379*# National Aeronautics and Space Administration, Washington, D.C.

FLUIDIZED REDUCTION OF OXIDES ON FINE METAL POWDERS WITHOUT SINTERING

T. Hayashi Nov. 1985 8 p Transl. into ENGLISH of Japanese Patent no. 59-116302 (Appl. no. Sho-5-7-208500, 30 Nov. 1982) p 1-3 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-4004)

(NASA-TM-77928; NAS 1.15:77928) Avail: NTIS HC A02/MF A01 CSCL 11F

In the process of reducing extremely fine metal particles (av. particle size < or = 1000 angstroms) covered with an oxide layer, the metal particles are fluidized by a gas flow contg. H, heated, and reduced. The method uniformly and easily reduces surface oxide layers of the extremely fine metal particles without causing sintering. The metal particles are useful for magnetic recording materials, conductive paste, powder metallurgy materials, chem. reagents, and catalysts. Author

N86-15380*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CREEP RUPTURE BEHAVIOR OF STIRLING ENGINE MATERIALS

R. H. Titran, C. M. Scheuerman, and J. R. Stephens [Oct. 1985] 10 p refs Presented at the Advanced Technology Development Contractors Coordination Meeting, Dearborn, Mich., 21-24 Oct. 1985; sponsored by DOE

(Contract DE-AI01-77CS-51044)

(NASA-TM-87209; E-2846; DOE/NASA/51044-37; NAS 1.15:87209) Avail: NTIS HC A02/MF A01 CSCL 11F

The automotive Stirling engine, being investigated jointly by the Department of Energy and NASA Lewis as an alternate to the internal combustion engine, uses high-pressure hydrogen as the working fluid. The long-term effects of hydrogen on the high temperature strength properties of materials is relatively unknown. This is especially true for the newly developed low-cost iron base alloy NASAUT 4G-A1. This iron-base alloy when tested in air has creep-rupture strengths in the directionally solidified condition comparable to the cobalt base alloy HS-31. The equiaxed (investment cast) NASAUT 4G-A1 has superior creep-rupture to the equiaxed iron-base alloy XF-818 both in air and 15 MPa hydrogen. Author

N86-15381# Lockheed Missiles and Space Co., Palo Alto, Calif.

FUNDAMENTAL STUDIES ON THE ALUMINUM-LITHIUM-BERYLLIUM ALLOY SYSTEM

J. Wadsworth Jul. 1985 56 p

(Contract N00014-84-C-0032)

(AD-A158088; LMSC-F035827) Avail: NTIS HC A04/MF A01 CSCL 11/6

A considerable effort has been expended in recent years in the development of advanced aluminum alloys. Two major areas of work have evolved. The first area is directed toward the production of high modulus alloys, predominantly for use at high temperature, using rapid solidification processing (RPS) and power metallurgy (PM) consolidation. These alloys are based on the Al-Mn and Al-Fe systems. The second area, in recognition of the overriding importance of low density in weight savings in aerospace structures, is the development of low density and high modulus alloys based on the aluminum lithium system. These Al-Li alloys are predominantly manufactured using ingot metallurgy techniques although successful PM alloys have also been produced. In order to take further advantage of density decreases in aluminum alloys, it is not possible simply to continue to increase the lithium content of the alloy. Only two elemental additions to aluminum have the effect of simultaneously decreasing density and increasing the elastic modulus by significant amounts. These are lithium and beryllium; Li is both the most efficient density-decreasing and modulus-increasing of all metallic elements when added to aluminum. Rapid solidification processing (RSP) is a unique and potentially practical method for the development of high modulus and high strength microstructures in Al-Li alloys containing more than about 0.03% Be. GRA

N86-15382# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.

X-RAY ELASTIC CONSTANTS AND THEIR MEANING FOR Al AND Fe

R. M. Zhong, I. C. Noyan, and J. B. Cohen Jul. 1985 7 p

(Contract N00014-80-C-0116)

(AD-A158251; TR-19) Avail: NTIS HC A02/MF A01 CSCL 11/6

In the measurement of residual stresses via diffraction (using X-rays or neutrons) it is strains that are actually determined, by employing the interplanar spacing (d subscript hkl) of the (hkl) planes as an internal strain gauge. The change in this spacing is measured from the shift of diffraction peaks (and Bragg's law) at several orientations of the sample to the incident beam, and the resultant strains are converted to stresses with the diffraction elastic constants, S subcript 1(hkl) and S subscript 2(hkl)/2. While these take on the values (-v/E) and (1 + v)/E respectively for an isotropic solid, in anisotropic materials their values depend on many factors; preferred orientation, shape and orientation of second phases, interaction between grains. In fact there are reports of variation these constants with plastic deformation 2 and theory predicts variations with morphology. It is demonstrated that the diffraction elastic constants for residual stress measurements can be determined even in the presence of oscillations in interplanar spacing vs sin squared psi. Furthermore, these values can be employed to ascertain whether the oscillations are due to local fluctuations in plastic deformation, or elastic anisotropy. GRA

N86-15383# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

EFFECTS OF CHEMISTRY AND PROCESSING ON THE FRACTURE RELATED PROPERTIES OF P/M ALLOY CT91 Final Report, Sep. 1980 - May 1984

W. M. Griffith Aug. 1985 334 p

(DA Proj. 241-8)

(AD-A159299; AD-F250300; AFWAL-TR-84-4165) Avail: NTIS HC A15/MF A01 CSCL 11/6

With the single exception of fatigue crack propagation resistance, the development of high strength powder metallurgy (P/M) aluminum alloys has been very successful. CT91, an example of this class of alloy, has been studied to determine the effect of chemistry (Co content), deformation processing (38% and 64% uniaxial upset forging), and stress relief on engineering and fracture related properties. Stress relief by compression after solution heat treatment was found to have little effect on the properties studied and made no apparent change in the microstructure. A slight reduction in strength and slight improvement in fatigue crack propagation (FCP) resistance was noted in material that had been stress relieved. Co content had the largest effect of all program variables on strength - the 0.4% Co alloy exhibits a 28 MPa (4 ksi) increase in both ultimate and yield strength compared to the 0% Co alloy. No effect of Co content on fracture toughness or FCP resistance was observed. Changing the uniaxial forging

deformation from 38% to 64% produced no measureable effect on strength, toughness, or FCP resistance. There was a marked increase in scatter in the fracture related properties at the lower forging strain. This is attributed to the reduced degree of breakup and distribution of oxides found at the prior powder particle boundaries which provides sites for easy crack propagation. None of the major program variables had a significant effect on the Low Cycle Fatigue (LCF) behavior of the alloy. Author (GRA)

N86-15384# Department of Energy, Washington, D. C.
LOW ACTIVATION FERRITIC ALLOYS Patent Application
D. S. Gelles (Hanford Engineering Development Lab., Richland, Wash.), N. M. Ghoniem (Hanford Engineering Development Lab., Richland, Wash.), and R. W. Powell, inventors (to DOE) (Hanford Engineering Development Lab., Richland, Wash.) Filed 7 Feb. 1985 20 p
(Contract DE-AC06-76FF-02170)
(DE85-017795; US-Patent-Appl-SN-699092) Avail: NTIS HC A02/MF A01

Low activation ferritic alloys, specifically bainitic and martensitic stainless steels, are described for use in the production of structural components for nuclear fusion reactors. They are designed specifically to achieve low activation characteristics suitable for efficient waste disposal. The alloys essentially exclude molybdenum, nickel, nitrogen and niobium. Strength is achieved by substituting vanadium, tungsten, and/or tantalum in place of the usual molybdenum content in such alloys. DOE

N86-15385# Los Alamos National Lab., N. Mex.
MACH STEM CHARACTERIZATION IN Mbar DESIGNS USING RSR POWDER
K. P. Staudhammer and K. A. Johnson 1985 7 p Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015700; LA-UR-85-2515; CONF-850736-59) Avail: NTIS HC A02/MF A01

Suitable selection of powders can be used as a modeling device for complicated experimental designs. The powder melt zone is clearly defined and the RSR-834 powder is reasonably well behaved. This experiment was with only one composition, size and distribution. However, it is believed that other morphologies, composition, and size distributions could result in a more complete modeling of the compaction process that would enable heuristic calculations of the combined effects of adiabatic temperature rise and entropic heating (strain/deformation). DOE

N86-15386# Argonne National Lab., Ill. Materials Science and Technology Div.
THE ROLE OF HYDROGEN EMBRITTLEMENT IN INTERGRANULAR STRESS CORROSION CRACKING OF SENSITIZED TYPE 304 STAINLESS STEEL
W. E. Ruther, T. F. Kassner, and F. A. Nichols Jun. 1985 16 p refs Presented at the 2nd International Symposium on Environmental Degradation of Materials in Nuclear Power Systems-Water Reactors, Monterey, Calif., 9-12 Sep. 1985; sponsored by ANS, AIME and NACE Sponsored in part by Nuclear Regulatory Commission, Washington, D.C.
(TI85-014965; CONF-850902-1) Avail: NTIS HC A02/MF A01

Fixed-load Mode 1/Mode 3 comparative tests have been conducted on lightly sensitized (EPR - 2 C/sq cm) Type 304 SS specimens in 289 C oxygenated water with other impurity additives. Substantial susceptibility to IGSCC was shown in Mode 1 but no conclusive evidence for SCC was found in Mode 3. These results are consistent with a hydrogen embrittlement mechanism of crack advance, but electrochemical measurements seem to accord better with a slip-dissolution mechanism. Further studies are needed to clarify the operative mechanism(s). Author

N86-15387# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
TEST FOR A POSSIBLE MELTING TRANSITION IN GRAIN BOUNDARIES IN ALUMINUM NEAR THE MELTING POINT
S. W. Chan, J. S. Liu, and R. W. Balluffi Jul. 1985 6 p
(Contract DE-FG02-84ER-45116)
(DE85-013238; DOE/ER-45116/6) Avail: NTIS HC A02/MF A01

Results indicate that the near-(SIGMA)5 [100] twist and tilt boundaries did not undergo melting at temperatures as high as (0.89 + or - 0.03) T sub m and (0.93 + or - 0.03) T sub m, respectively. This result appears to be in disagreement with the calculated grain boundary melting transistions at lower values of T/T sub m. Our results are not inconsistent with calculations which suggest that a type of disordering may occur in which the boundary becomes highly defective locally while still retaining its basic crystallinity. Also, our work seems consistent with the experimental results in which the rotating crystallite method was used to demonstrate that at least many boundaries in copper remain ordered to temperatures as high as 0.97 T sub m. The cause of the grain boundary splitting phenomenon observed for the tilt boundaries near 0.94 T sub m is not completely clear. The observation of the lattice dislocation activity in the adjoining crystals suggests that stresses were present which may have caused simple fracture at the boundaries. On the other hand, the authors cannot preclude the more complex possibility that come structural change occurred at these boundaries which played an essential role in the splitting. DOE

N86-15388# Allied Bendix Aerospace, Kansas City, Mo.
MICROSTRUCTURAL EVALUATION OF 49Co-49Fe-2V ALLOY Final Report
W. S. Gibbs Jul. 1985 14 p
(Contract DE-AC04-76DP-00613)
(DE85-016500; BDX-613-3292) Avail: NTIS HC A02/MF A01

Improvements in the magnetic and mechanical properties related to machinability of 49Co-49Fe-2V alloy have been reported in current literature. Recommended heat treatments were evaluated, and torque improvment of an MC2969 solenoid assembly was realized using an 885(0) C final anneal and a slow cooling cycle. Investigation of a recommended water quenching procedure to improve ductility revealed an undersirable growth of 0.0005 mm/mm, after final heat treatment. Water quenching of bar stock is not recommended for applications at Bendix Kansas City Division (BKCD). The current literature on this alloy was reviewed and is summarized in this report. DOE

N86-15389# Ames Lab., Iowa.
PROBABILISTIC ANALYSIS OF STEEL CONTAINMENT STRENGTH WITH INTERNAL PRESSURE
L. Greimann and F. Fanous 1985 7 p Presented at the 8th International Conference on Structural Mechanics in Reactor Technology, Brussels, Belgium, 19 Aug. 1985
(Contract W-7405-eng-82)
(DE85-015520; IS-M-545; CONF-850809-74) Avail: NTIS HC A02/MF A01

Recently, there has been heightened interest in the behavior of the containments under internal pressure conditions beyond the design level. By example, the reliability analysis of the containment resistance is presented in three steps: (1) each of the basic structural parameters is described in statistical terms; (2) a structural analysis is used to relate these parameters to a failure condition; (3) the uncertainties of the basic parameters are propagated through the structural analysis to describe the failure probability and to evaluate the total uncertainty of the containment resistance. DOE

N86-15390# Combustion Engineering, Inc., Chattanooga, Tenn. Metallurgical and Materials Lab.
MICROSTRUCTURAL CONTROL TO IMPROVE THE PROPERTIES OF CHROMIUM-MOLYBDENUM WELD METAL Final Technical Report, 1 Oct. 1983 - 30 Oct. 1984
E. W. Pickering, Jr. 10 Mar. 1985 36 p
(Contract DE-AC05-84OR-21400)
(DE85-016179; DOE/OR-21400/T169; CEMML-64760-13) Avail: NTIS HC A03/MF A01

The objective of this work was to formulate and produce a variety of welding consumables for the purpose of determining

the effects of compositional and process variables on the microstructure and mechanical properties of shielded metal arc (SMA) weld metal of advanced Cr-Mo steels. Composition variables included the effect of slag basicity and oxygen potential as well as the effect of alloying elements. Welding variables included heat input, preheat and interpass temperature, and post weld heat treatments. Primary work centered on development, and supplying welding consumables, welding of test plates and related testing at both Combustion Engineering (C-E) and the Oak Ridge National Laboratory (ORNL). In addition, two experimental heats of 3Cr-1.5Mo were laboratory manufactured for use by other contractors on the Advanced Fossil Energy Materials Research and Technology Development Program. This report summarizes the work accomplished during the contract period. Electrodes were produced for 3Cr-1.5Mo-V steel with three levels of C and V, and SMA weldments were made in 1-in. thick plates. After a 6-h post weld heat treatment at 700 C the electrode producing the highest deposited C and V (0.1% for each) showed the best strength and impact properties. DOE

N86-15422# Hokkaido Univ., Sapporo (Japan).
A STUDY OF REACTIVE SPUTTER ETCHING FOR CARBON STEEL BY FREON GAS: ON THE EFFECT OF OXYGEN GAS MIXTURE
Toshio Yuhta, Jun Osanai, Toshikazu Satoh, and Tatsuo Takahashi *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 26 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15439# Joint Publications Research Service, Arlington, Va.
HYDROGEN DIFFUSION, POSITRON ANNIHILATION IN 40CrNiMo STEEL
Du Fengmu, Gui Jianian, and Wang Zixiao *In its* China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 34-36 refs Transl. into ENGLISH from Wuhan Dzxue Xuebao (Ziran Kexue Ban) (Wuhan), no. 2, 1984 p 95-96 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-15391*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STUDIES OF MOLECULAR PROPERTIES OF POLYMERIC MATERIALS: AEROSPACE ENVIRONMENTAL EFFECTS ON THREE LINEAR POLYMERS Final Technical Report, 1 Nov. 1984 - 31 Oct. 1985
Wynford L. Harries (Old Dominion Univ., Norfolk, Va.), Heidi R. Ries (Old Dominion Univ., Norfolk, Va.), Cynthia A. Bradbury (Old Dominion Univ., Norfolk, Va.), Stephanie L. Gray (Old Dominion Univ., Norfolk, Va.), William D. Collins (Old Dominion Univ., Norfolk, Va.), Sheila Ann T. Long, and Edward R. Long, Jr. Dec. 1985 42 p refs
(Contract NCC1-90)
(NASA-TM-87532; NAS 1.15:87532) Avail: NTIS HC A03/MF A01 CSCL 11B

The development of crystal handling techniques for reflection infrared spectroscopy and methods for the fabrication and testing of tensile specimens are discussed. Data from mechanical, ac and dc electrical, and electron paramagnetic resonance studies conducted to determine the effects of 0.1-MeV and 1.0-MeV electron radiation on Mylar, Kapton, Ultem, and metal-doped Ultem are presented. Total doses ranging from 1 X 10 to the 8 rads to 1 X 10 to the 10 rads and dose rates from 5 X 10 to the 7 rads/hr to 1 X 10 to the 9 rads/hr were employed. The results of a study on the effects of aircraft service-environment fluids on Ultem are also reported. The weights and mechanical properties of Ultem were evaluated before and after exposure to water, JP4, Skydrol, an antifreeze, and a paint stripper. For individual titles, see N86-15392 through N86-15393.

N86-15392*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STUDIES OF MOLECULAR PROPERTIES OF POLYMERIC MATERIALS: AEROSPACE ENVIRONMENTAL EFFECTS ON THREE LINEAR POLYMERS (POLYMER DURABILITY)
In its Studies of Molecular Properties of Polymeric Materials: Aerospace Environmental Effects on Three Linear Polymers Dec. 1985 p 1-34 refs (For primary document see N86-15391 06-27)
Avail: NTIS HC A03/MF A01 CSCL 11B

Aerospace environmental effects on polymeric materials were studied. The polymers under study are being considered for use as structural materials for spacecraft and advanced aircraft. It is necessary to understand the durability of these polymers to the environment in which they are to be used. G.L.C.

N86-15393*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RADIO-FREQUENCY ELECTRICAL PROPERTIES OF SOME NEAT AND METAL-DOPED POLYIMIDES
Edward R. Long, Jr., Sheila Ann T. Long, Heidi R. Ries (Old Dominion Univ., Norfolk, Va.), and Wynford L. Harries (Old Dominion Univ., Norfolk, Va.) *In its* Studies of Molecular Properties of Polymeric Materials: Aerospace Environmental Effects on Three Linear Polymers Dec. 1985 p 35-36 (For primary document see N86-15391 06-27)
Avail: NTIS HC A03/MF A01 CSCL 11B

As the size and complexity of aerospace systems increase, the uses of polymers are also expected to increase. Polyimides constitute one promising generic class of polymeric materials. They retain good mechanical and physical properties at higher temperatures and absorb less moisture than do the epoxies, which are the polymers most frequently used in present aerospace systems. The properties of these polyimide materials are, therefore, of considerable interest to the aerospace community. Of particular importance are the electrical properties because these properties relate to both electrical and structural applications. Author

N86-15394*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEXTURED CARBON ON COPPER: A NOVEL SURFACE WITH EXTREMELY LOW SECONDARY ELECTRON EMISSION CHARACTERISTICS
Arthur N. Curren and Kenneth A. Jensen Dec. 1985 16 p refs (NASA-TP-2543; E-2674; NAS 1.60:2543) Avail: NTIS HC A02/MF A01 CSCL 11G

Experimentally determined values of true secondary electron emission and relative values of reflected primary electron yield for a range of primary electron beam energies and beam impingement angles are presented for a series of novel textured carbon surfaces on copper substrates. (All copper surfaces used in this study were oxygen-free, high-conductivity grade). The purpose of this investigation is to provide information necessary to develop high-efficiency multistage depressed collectors (MDC's) for microwave amplifier traveling-wave tubes (TWT's) for communications and aircraft applications. To attain the highest TWT signal quality and overall efficiency, the MDC electrode surface must have low secondary electron emission characteristics. While copper is the material most commonly used for MDC electrodes, it exhibits relatively high levels of secondary electron emission unless its surface is treated for emission control. The textured carbon surface on copper substrate described in this report is a particularly promising candidate for the MDC electrode application. Samples of textured carbon surfaces on copper substrates typical of three different levels of treatment are prepared and tested for this study. The materials are tested at primary electron beam energies of 200 to 2000 eV and at direct (0 deg) to near-grazing (85 deg) beam impingement angles. True secondary electron emission and relative reflected primary electron yield characteristics of the textured surfaces are

compared with each other and with those of untreated copper. All the textured carbon surfaces on copper substrate tested exhibited sharply lower secondary electron emission characteristics than those of an untreated copper surface. Author

N86-15395*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
CHEMOVISCOSITY MODELING FOR THERMOSETTING RESINS Final Report
Surendra N. Tiwari, T. H. Hou, and J. M. Bai Nov. 1985 23 p refs
(Grant NAG1-569)
(NASA-CR-176409; NAS 1.26:176409) Avail: NTIS HC A02/MF A01 CSCL 11G

A chemoviscosity model, which describes viscosity rise profiles accurately under various cure cycles, and correlates viscosity data to the changes of physical properties associated with structural transformations of the thermosetting resin system during cure, was established. Work completed on chemoviscosity modeling for thermosetting resins is reported. E.A.K.

N86-15396*# National Aeronautics and Space Administration, Washington, D.C.
MANUFACTURE OF DENSE SINTERED BODIES CONTAINING SILICON NITRIDE
K. Hirota, Y. Hasegawa, K. Ogura, and Y. Yashima Dec. 1985 10 p Transl. into ENGLISH of Japanese Patent no. 59-111981 (Appl. no. 57-221276, 17 Nov. 1982) p 1-4 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77929; NAS 1.15:77929) Avail: NTIS HC A02/MF A01 CSCL 11G

Sintered bodies containing 1-32.5 Si oxide and > 1.5 wt.% SiC (Si oxide/SiC wt. ratio < 3/2) are prepared and kept in a 10-3000 kg/2 sq. cm. N (g) atmosphere at 1500-2300 degrees, while simultaneously maintaining the CO (g) partial pressure around the body lower than the nitrogenation equil. pressure to give a dense sintered body. The prepared dense sintered body has high strength at high temperatures. Thus, SiC 40, oxide 30 and Si3N4 30 wt% were fired to a body which was kept in 1500 kg/sq. cm. N (g) for 20 h at 2000 degrees to give a dense sintered body having high bending strength at high temperatures. Author

N86-15397*# National Aeronautics and Space Administration, Washington, D.C.
HOT ISOSTATIC PRESSING OF CERAMICS
K. Honma Oct. 1985 10 p Transl. into ENGLISH of Japanese Patent no. 58-84713 (Appl. S56-182735, 13 Nov. 1981) p 1-5 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77931; NAS 1.15:77931) Avail: NTIS HC A02/MF A01 CSCL 11B

A mixture containing glass 70 to 95 and BN or B4C powder (0.1-10 microns) 5 to 30 vol. % is used as a secondary pressure medium in hot isostatic pressing of ceramics. Thus, Pyrex beads were mixed with 15% vol. BN powder (average diameter 2 microns), fused at 1400 deg for 2 h, cooled, crushed, and put into a graphite crucible. A Si3N4 sintered body was embedded in the powder, heated in vacuum at 1200 deg for 2 h, treated in a hot isostatic press furnace at 1700 deg and 1000 atm. for 1 h, and cooled to give a Si3N4 ceramic. It was easily separated from the crucible. Author

N86-15398# Chronos Research Labs., Inc., Olivehain, Calif.
DEMONSTRATION OF A PYROELECTRIC CONVERSION POWER CYCLE WITH A POLYMER Final Report, Oct. 1983 - Oct. 1984
R. B. Olsen Mar. 1985 54 p
(Contract F33615-83-C-2344)
(AD-A158964; AFWAL-TR-85-2011) Avail: NTIS HC A04/MF A01 CSCL 20/3

Copolymers of vinylidene fluoride trifluoroethylene P(VDF-TrFE) exhibit large piezoelectric effects. Standard isothermal D-E hysteresis loops were found to be inaccurate predictors of the pyroelectric conversion performance of this material. Conduction effects obscured the observation of conversion cycles for the presently available materials. A conversion cycle was measured with electric energy density of 30 mJ/cc, which is 15 times larger than that of any other polymer yet measured. Resistivity and displacement change data are discussed in terms of predicted pyroelectric energy conversion performance. Author (GRA)

N86-15399# Lawrence Livermore National Lab., Calif.
CALCULATING THE VULNERABILITY OF SYNTHETIC POLYMERS TO AUTOIGNITION DURING NUCLEAR FLASH Final Report
R. Hickman and T. Reitter Mar. 1985 36 p Sponsored in part by Federal Emergency Management Agency
(Contracts W-7405-eng-48; EMW-E-0883)
(AD-A159420; UCRL-53545) Avail: NTIS HC A03/MF A01 CSCL 11/9

In an experiment that was part of a 1953 nuclear test (Encore), a furnished room exposed to nuclear heat was completely consumed when the fire unexpectedly progressed to flashover. The result of this unique experiment has been called an anomaly, but a flashover under these conditions may actually be typical (and consequently worth exploration). The calculations detailed in this report represent a first approach to this question. Because synthetic polymers in the form of furnishing are more common in modern dwellings than the cellulose-based materials used in the 1953 experiment, we have emphasized the polymers in our calculations. Our investigations have virtually ruled out photochemical processes as an explanation of past or future flashovers induced by nuclear detonation. Our calculations of rapid radiant heating of a few common synthetic materials show they would quickly ignite when exposed to a 25-cal sq cm fluence from a 1-Mt weapon detonated in the air. This result, together with the fact at a higher rate during combustion, suggests that modern dwellings are vulnerable to nuclear-flash-induced flashover. A definitive answer to the question, however, must await carefully planned, full-scale experiments. GRA

N86-15400# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
MICROSTRUCTURES BUILT FROM ELECTROACTIVE POLYMERS: TOWARD A MACROMOLECULAR ELECTRONICS
R. W. Murray Sep. 1985 18 p
(Contract N00014-82-K-0337)
(AD-A159430; TR-14) Avail: NTIS HC A02/MF A01 CSCL 09/1

Electrodes can be coated with electrochemically reactive polymers in several microstructural formats called sandwich, array, bilayer, microelectrode, and ion gate electrodes. These microstructures can be used to study the transport of ions through in the polymers as a function of the polymer oxidation state, which is essential to understanding the conductivity properties of these new chemical materials. The microstructures also exhibit potentially useful electrical and optical responses, including current rectification, charge and amplification, electron hole pair separation, and gates for ion flow. Author (GRA)

N86-15401# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
REDOX CAPACITY AND dc ELECTRON CONDUCTIVITY IN ELECTROACTIVE MATERIALS
R. W. Murray Sep. 1985 21 p
(Contract N00014-82-K-0337)
(AD-A159431; TR-15) Avail: NTIS HC A02/MF A01 CSCL 11/9

The storage and transport of charge in electroactive materials are closely related. We develop the macroscopic concepts of redox capacity, rho, and dc electronic conductivity, sigma subscript e/rho. Their ratio, De = Sigma subscript e/rho, is identified as the electron diffusion coefficient. A microscopic model is developed incorporating interaction among the stored electrons and variation of countering activity as a function of electrochemical potential. Data

obtained for the polymer poly Os(2 ,2'-bipyridine)2(4-vinylpyridine 2 (C104) x (x = 0-3) are compared with the model. The dependence of the electron diffusion coefficient on electrochemical potential is particularly revealing of discrepancies between the real material and the model, suggesting that this quantity will be a useful parameter for the characterization of a variety of electroactive materials. Author (GRA)

N86-15402# Department of the Navy, Washington, D. C.
MOLDABLE ELECTRICALLY CONDUCTIVE POLYMER COMPOSITIONS Patent Application
O. K. Kim, inventor (to Navy) Filed 30 May 1985 16 p
(AD-D011887; US-Patent-Appl-SN-739355) Avail: NTIS HC A02/MF A01 CSCL 07/4

Accordingly, it is an object of this invention to obtain high electrical conductivity in a polymeric composition. Another object is to provide a bulky, moldable polymeric composition that conducts electricity. Another object is to provide a polymeric composition that is stable in an oxygen-rich atmosphere. Another object is to de-couple the choice of structural polymer from the choice of cation so as to allow optimization of composition properties and choice of the most economical materials. Another object is to provide a means for improving the normal structure properties of TCNQ while retaining the desirable thermal or electrical properties of any given TCNQ/salt species. The above and other objects are achieved by the present inventive method and material. A salt of 7,7,8,8-tetracyanoquinodimethane (TCNQ) and a structural polymer are dissolved in a mutual solvent. The solution is chilled and subsequently added to a liquid with which the solvent is miscible but in which the TCNQ and polymer are less soluble. A precipitate results which is a massive, conducting, moldable substance stable in atmospheric oxygen. It consists of polymer filaments coated with TCNQ microcrystals. These filiments retain many properties of the pure, crystalline TCNQ salt. GRA

N86-15403# Department of Energy, Washington, D. C.
PRODUCTION OF GLASS OR GLASS-CERAMIC TO METAL SEALS WITH THE APPLICATION OF PRESSURE Patent Application
M. D. Kelly (Monsanto Research Corp., Dayton, Ohio) and D. P. Kramer, inventors (to DOE) (Monsanto Research Corp., Dayton, Ohio) Filed 4 Jan. 1985 13 p
(Contract DE-AC04-76DP-00053)
(DE85-017746; US-Patent-Appl-SN-688671) Avail: NTIS HC A02/MF A01

In a process for preparing a glass or glass-ceramic to metal seal comprising contacting the glass with the metal and heat-treating the glass and metal under conditions whereby the glass to metal seal is effected and, optionally, the glass is converted to a glass-ceramic, an improvement comprises carrying out the heat-treating step using hot isostatic pressing. DOE

N86-15404# Energy Materials Research Co., Berkeley, Calif.
DEVELOPMENT OF RADIATIVE COOLING MATERIALS, PHASE 3 Final Technical Report
[1985] 100 p
(Contract DE-FC03-80SF-11504)
(DE85-014666; DOE/SF-11504/T3-Vol-1) Avail: NTIS HC A05/MF A01

Research on far infrared (FIR, 8-13 micron) transparent polyethylene glazing and FIR selective emitter films for radiative cooling applications was conducted. Materials performance goals were developed from computer modelled cooling calculations of horizontal radiative cooling panels. Emphasis was placed on determining the minimum glazing properties necessary to allow daytime cooling. Minimum solar reflectances for polyethylene glazings were calculated to be between 0.60 to 0.93 depending on other glazing and radiator properties. FIR selective radiators significantly reduced necessary glazing solar reflectance when glazing was also solar absorptive. Glazing films produced were solar transparent, absorptive, or reflective. Approximately 70% solar reflectance was achieved with ZnO pigment while maintaining minimum of 75% FIR transmittance. This glazing would allow cooling if insolation is less than or equal to 800 W/sq cm. ZnS pigmentation produced better solar reflectance but dramatically reduced film FIR transmittance. Neither Ferro Corp's F-6331 black nor fine particle carbon black were found to be good solar absorptive pigments for thin polyethylene films due to high FIR absorption. Poor mechanical properties prohibited development of good selective radiator films for SiO2 and Si3N4 pigmented polyethylene. DOE

N86-15405# Sandia Labs., Albuquerque, N. Mex.
CONFIGURATIONAL DIFFUSION IN SEMIDILUTE SOLUTIONS
J. E. Martin 1985 5 p refs Presented at the Polymer Flow Workshop, La Jolla, Calif., 10 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017121; SAND-85-1582C; CONF-850778-1) Avail: NTIS HC A02/MF A01

Dynamic light scattering measurements of the relaxation times of internal modes of single polymer chains in semidilute solution are reported for dilute high molecular weight polystyrene in a semidilute poly(vinylemthylether) (PVME)/toluene host. Since PVME is index matched by toluene these light scattering measurements probe the dynamics of the isolated polystyrene chains and are insensitive to the collective fluctuations of the PVME host. The principle result is that the Rayleigh linewidth scales like the third power of the momentum transfer regardless of the concentration of the semidilute polymer. This is in apparent contradiction to current theories of hydrodynamic screening in semidilute solutions, which predict a fourth power dependence for the linewidth. DOE

N86-15406# Sandia Labs., Albuquerque, N. Mex.
EXTENSION OF ELECTRONIC TRANSPORT PROPERTIES OF POLYMER DIELECTRICS TO SEVERE ENVIRONMENTS ENCOUNTERED IN SYSTEMS
S. R. Kurtz Jun. 1984 18 p
(Contract DE-AC04-76DP-00789)
(DE85-017321; SAND-85-1030) Avail: NTIS HC A02/MF A01

The factors that determine the level of radiation-induced conductivity in polymer dielectrics are summarized. These concepts are extended into high-dose radiation environments, beyond the range of our present data. This report provides an introduction of this field to researchers dealing with these effects in systems. DOE

N86-15407# Sandia National Labs., Albuquerque, N. Mex.
THE EFFECT OF ENVIRONMENTAL STRESS ON SYLGARD 170 SILICONE ELASTOMER
W. H. Buckalew and F. J. Wyant May 1985 89 p
(Contract DE-AC04-76DP-00789)
(TI85-013268; NUREG/CR-4147; SAND-85-0209) Avail: NTIS HC A05/MF A01

Dow Corning Sylgard 170 Silicone Elastomer has been investigated to characterize its response to accelerated thermal aging, radiation exposure, and its behavior under applied compressive forces. Sylgard 170 response to accelerated thermal aging suggests the material properties are not particularly age dependent. Radition exposures, however, produce significant, monotonic changes in both elongation and hardness with increasing absorbed radiation dose. Elastomer response to an applied compressive force was strongly dependent on environment temperature and degree of material confinement. Variations in temperature produced large changes in compressive forces applied to confined samples. Attempts to mitigate force fluctuations by means of pressure relief paths resulted in total loss of the applied compressive force. Thus, seal applications employing this elastomer in Class 1E equipment required to function during or following an accident should consider the potential loss of compressive force from long-term aging and potential LOCA temperature transient conditions. Author

N86-15408# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
20 Dec. 1985 79 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-037) Avail: NTIS HC A05/MF A01

Current scientific developments and technical advances from Eastern European nations are reported. Among the topics discussed are: (1) physician recruitment and retention; (2) data bases; (3) pharmacology; (4) enamel; (5) synthetic leather; (6) mining; and (7) engineering products. For individual titles, see N86-15409 through N86-15410.

N86-15409# Joint Publications Research Service, Arlington, Va.
THERMALLY, CHEMICALLY RESISTANT ENAMELS
Maria Zaharescu, Georgeta Jitianu, Eva Barbulescu, and Melania Pascut *In its* East Europe Report: Science and Technology (JPRS-ESA-85-037) 20 Dec. 1985 p 29-37 refs Transl. into ENGLISH from Revista de Chimie (Bucharest, Romania), no. 7, Jul. 1985 p 656-659 (For primary document see N86-15408 06-27)
Avail: NTIS HC A05/MF A01

The physical and chemical criteria underlying the synthesis of thermally and chemically resistant enamels are discussed. An empirical correlation is established between the chemical stability of frits and that of the corresponding enamels. The properties of the enamels were tested both by standard methods and by studying their behavior during the enameling process. A vitreous crystalline enamel with improved technical and product qualities was produced. G.L.C.

N86-15410# Joint Publications Research Service, Arlington, Va.
USE OF NEW POLYURETHANE IN LEATHER SUBSTITUTE
Carmen Anghel and Tudorel Lungu *In its* East Europe Report: Science and Technology (JPRS-ESA-85-037) 20 Dec. 1985 p 67-74 Transl. into ENGLISH from Industria Usoara (Bcharest, Romania), no. 5, May 1985 p 202-211 (For primary document see N86-15408 06-27)
Avail: NTIS HC A05/MF A01

There are two basic trends to be observed worldwide in the area of poromeric and non-poromeric leather substitutes. There is, first of all, the spectacular Japanese development of porometric synthetic leather of the Alcantara type, which possesses characteristics approaching those of natural leather, and then there are the sustained efforts to improve the current generation of synthetic leathers by modifying polymers, textile backings, finishes, technologies, and so forth. B.L.C.

N86-15884# Joint Publications Research Service, Arlington, Va.
FORMATION OF VOLATILE SUBSTANCES DURING POLYMER DESTRUCTION BY PSEUDOMONAS AERUGINOSA
N. D. Novikova and S. N. Zaloguyev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 109-113 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 74-76 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-15411 Department of the Air Force, Washington, D.C.
SIMULTANEOUS INCREMENTAL STRAIN/INCREMENTAL TEMPERATURE ANALOG DEVICE FOR, AND METHOD, OF TESTING FOR STRESS RESPONSE Patent
K. W. Bills, Jr. and G. J. Svoboda, inventors (to Air Force) Issued 18 Jun. 1985 9 p
(AD-D011912; US-Patent-4,523,475; US-Patent-Appl-SN-533230; US-Patent-Class-73-781) Avail: US Patent and Trademark Office CSCL 21/9

A device for, and a method of, applying an incremental strain to a test specimen of a solid propellant is described which is at the stress-free temperature, while simultaneously subjecting the test specimen to an incremental temperature change above and below the stress-free temperature. The device includes a frame assembly in which a captive strain multiplier is used to apply the thermally induced loads to the test specimen of the solid propellant that is mounted within the device. Temperature changes, above or below the stress-free temperature, cause volume changes of the rubber members of the strain multiplier and result in the strain multiplier axially loading the mounted test specimen in simulation of the loading conditions that occur in a case-bonded solid rocket grain. When the temperature is raised, the rubber members expand and exert an axial compressive load on the mounted specimen; and, when the temperature is lowered, the rubber members contract and exert an axial tensile load on the mounted specimen. Author (GRA)

N86-15412*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANTIMISTING KEROSENE: DEVELOPMENT OF A CONTINUOUS 10 GPM IN-LINE BLENDER Final Report, Aug. 1983 - Sep. 1984
P. Parikh, A. Yavrouian, and V. Sarohia Oct. 1985 29 p refs
(Contracts NAS7-918; DTFA03-80-A-00215)
(NASA-CR-176432; JPL-Pub-D-2582; NAS 1.26:176432; FAA/CT-85/12) Avail: NTIS HC A03/MF A01 CSCL 07D

A continuous inline blender is developed at JPL to blend precisely metered quantities of ICI developed polymer slurries into a stream of Jet-A fuel. The inline blender is used to produce 5 to 10 gallons per minute of freshly blended AMK. The proprietary ICI slurries are made of FM-9 type polymers in a glycol/amine carrier fluid. Depending upon the polymer particle size and powder loading, the slurry consistency ranges from free flowing to a paste with viscosities in the range of 5000 to 100,000 centipoise. With one of the polymer slurries, a provision is made for a time delay between the addition of slurry and the addition of the amine sequentially into the Jet-A stream. Author

N86-15413# Maryland Univ., College Park. Dept. of Mechanical Engineering.
MICROSTRUCTURAL ORIGINS OF HOT SPOTS IN RDX EXPLOSIVE AND SEVERAL REFERENCE INERT MATERIALS Summary Report, 30 Dec. 1981 - 30 Sep. 1984
W. L. Elban, J. C. Hoffsommer, D. J. Glover, C. S. Coffey, and R. W. Armstrong Nov. 1984 46 p
(Contract N00014-82-K-0263; DA P2402)
(AD-A158223; NSWC-MP-84-358) Avail: NTIS HC A03/MF A01 CSCL 19/1

The research effort over the past three years to investigate the microstructural basis for hot spot formation in RDX explosive is summarized. The microstructure and the deformation and fracture behavior of various laboratory-grown and production-grade RDX crystals have been investigated and compared to selected reference inert materials, particularly MgO and MgF2. Microstructural characterization was accomplished using a number of X-ray diffraction techniques, including the Laue method, Berg-Barrett X-ray topography, and powder diffractometry, and by optical and scanning electron microscopy. Several types of controlled deformation experiments have been performed by microindentation hardness testing. The initial stages of chemical decomposition in plastically deformed and fractured RDX have been studied. The fractoemission behavior of RDX crystals fractured in compression and in three-point bending was determined, and the concentrations of two nitroso compounds formed during drop-weight impact testing were measured, Infrared emission was measured during the drop-weight impact deformation of PETN explosive crystals. GRA

N86-15414# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
MULTI-DIMENSIONAL COMBUSTION INSTABILITY ANALYSIS OF SOLID PROPELLANT ROCKET MOTORS Final Report, 15 Mar. 1983 - 14 Mar. 1985
T. J. Chung 15 May 1985 47 p
(Grant AF-AFOSR-0084-83)
(AD-A158314; AFOSR-85-0567TR) Avail: NTIS

HC A03/MF A01 CSCL 21/8

Analytical models are developed for the multi-dimensional combustion instability analysis of solid propellant rocket motors. This research was motivated by the need for improvement of the current practice in combusiton instability analysis. For example, the burning rates and response functions are affected by the extremely complex flowfield. The flow is three-dimensional or at least two-dimensional in axisymmetric geometries; vortex motions and turbulent flows must be adequately calculated; the coupling mechanism of acoustic and hydrodynamic wave oscillations and particle damping should be clarified. These flowfield phenomena, after all, are originated from the flame zone activities oscillatory behavior of all field variables such as temperature, velocity, pressure, density of the gas, and fuel fractions. The response functions, which serve as boundary conditions for the flowfield can be calculated from the first and second order perturbation eigenvalue analyses of the flame zone governing equations. The effect of velocity coupling appears, naturally, in the second order (nonlinear) solutions. All calculations are carried out using the finite element method. Some of the findings are summarized. GRA

N86-15415# Monsanto Co., Dayton, Ohio.
VARIABILITY OF MAJOR ORGANIC COMPONENTS IN AIRCRAFT FUELS Final Report, Nov. 1983 - Dec. 1984
B. Mason, K. Wiefling, and G. Adams Aug. 1985 216 p
(Contract F08635-83-C-0067)
(AD-A159057; AFESC/ESL-TR-85-13) Avail: NTIS
HC A10/MF A01 CSCL 21/4

This report summarizes qualitative data on the chemical variability of approximately 300 features (chemical components or mixture of components) in neat Air Force distillate fuels, in water equilibrated with the fuels, and in the vapor phase above the fuels, from over 50 fuel sources. These data were obtained to better understand the environmental effects of possible fuel spills and to serve as baseline data which can be used in the development of environmental models for photochemical smog, soot formation from Air Force use of these fuels. Over 50 petroleum-derived JP-4 fuels, one shale-derived JP-4 fuel, and one petroleum-derived JP-5 fuel were analyzed. This report summarizes results for the variability of the major features in water which has been equilibrated with the neat fuels, and in the headspace above the neat fuels. Data base management programs were used to measure feature variability in the data base of over 50 fuels. Feature concentration averages, ranges, standard deviations, and percent relative standard deviations were determined for the 300 features in over 50 fuels, analyzed in duplicate. The variability of data acquisition and data analysis phases of the study was also assessed by calculating the averages, ranges, standard deviations, and percent relative standard deviations for the 300 feature concentrations of one JP-4 fuel which was used as the Reference Fuel and analyzed 18 times for water-soluble features and seven times for vapor phase features. GRA

N86-15416# AeroChem Research Labs., Inc., Princeton, N. J.
FUEL EFFECTS ON SOOT FORMATION IN TURBOJET ENGINES Final Report, 15 Sep. 1983 - 14 Mar. 1985
R. J. Gill and D. B. Olson Aug. 1985 104 p
(Contract N00014-83-C-2311; DA Proj. Z08-38)
(AD-A159073; AEROCHEM-TP-451) Avail: NTIS
HC A06/MF A01 CSCL 21/4

The results of tests on how fuel composition affects the performance of three Navy aircraft engine combustors, the TF30, T56, and T53, were analyzed. The objective of this analysis was to identify which fuel property best correlated with the smoke-related measurements: radiation flux, linear temperature rise, smoke number, and smoke emissions. The effects of fuel composition were investigated by using a series of 10 Naval Air Propulsion Center jet fuels with various properties, such as hydrogen contents of 12.83 to 13.82% and total aromatic hydrocarbon contents of 15.9 to 28.5%. Several laboratory combustion characteristics of these fuels were measured and these characteristics were used in analysis. Altogether, 15 fuel parameters were used to correlate the 45 combustor test results. The reported operating conditions of the tests, such as inlet air pressure, inlet air temperature, or fuel/air ratio, were also used as correlating parameters to determine whether variations in these variables, nearly constant for individual tests, also affected the smoke-related test results. GRA

N86-15417# Department of Energy, Washington, D. C.
EXTRUSION CAST EXPLOSIVE Patent Application
K. J. Scribner, inventor (to DOE) (California Univ., Livermore, Lawrence Livermore Lab.) Filed 29 Jan. 1985 20 p
(Contract W-7405-eng-48)
(DE85-017785; US-Patent-Appl-SN-696276) Avail: NTIS
HC A02/MF A01

Improving, multiphase, high performance, high energy, extrusion cast explosive compositions, comprising, a crystalline explosive material; an energetic liquid plasticizer; a urethane prepolymer, comprising a blend of polyvinyl formal, and polycaprolactone; a polyfunctional isocyanate; and a catalyst are disclosed. These new explosive compositions exhibit higher explosive content, a smooth detonation front, excellent stability over long periods of storage, and lower sensitivity to mechanical stimulants. DOE

N86-15418# Department of Energy, Washington, D. C.
MINIATURE PLASMA ACCELERATING DETONATOR AND METHOD OF DETONATING INSENSITIVE MATERIALS Patent Application
R. W. Bickes, Jr. (Sandia Labs., Albuquerque, N. Mex.), M. R. Kopczewski (Sandia Labs., Albuquerque, N. Mex.), and A. C. Schwarz, inventors (to DOE) (Sandia Labs., Albuquerque, N. Mex.) Filed 4 Jan. 1985 19 p
(Contract DE-AC04-76DP-00789)
(DE85-017747; US-Patent-Appl-SN-688672) Avail: NTIS
HC A02/MF A01

The invention is a detonator for use with high explosives. The detonator comprises a pair of parallel rail electrodes connected to a power supply. By shorting the electrodes at one end, a plasma is generated and accelerated toward the other end to impact against explosives. A projectile can be arranged between the rails to be accelerated by the plasma. An alternative arrangement is to a coaxial electrode construction. The invention also relates to a method of detonating explosives. DOE

N86-15419# Sandia National Labs., Albuquerque, N. Mex.
SPECTROSCOPIC STUDIES OF DETONATING HETEROGENEOUS EXPLOSIVES
A. M. Renlund and W. M. Trott 1985 10 p refs Presented at the Physics of Explosives Technical Meeting, Albuquerque, N. Mex., 17 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-007687; SAND-84-1605C; CONF-851038-1) Avail: NTIS
HC A02/MF A01

The experimental objectives of this work are to use real-time spectroscopic techniques, emission spectroscopy and Raman spectra to monitor chemical and physcial changes in shock-loaded or detonating high explosive (HE) samples. The investigators hope to identify chemical species including any transient intermediates. Also, they wish to determine the physical state of the material when the reactions are taking place; measure the temperature and the pressure; and study the effect of different initiation parameters and bulk properties of the explosive material. This work is just part of the effort undertaken to gain information on the detailed chemistry involved in initiation and detonation. In summary, the investigators have obtained vibrational temperatures of some small radical products of detonation, which may correlate with the detonation temperature. They have also observed that NO2 is an early product from detonating HNS and RDX, and that other electronically excited radical species such as CN(B) are formed in HNS detonations. In the Raman work, the single-pulse spectra could be obtained even in the severe environment of a detonation, and that the rate of removal of the parent molecule could be monitored. DOE

N86-15345# Joint Publications Research Service, Arlington, Va.
EVALUATING STRUCTURAL CHANGES IN JET FUELS BY

ELECTRICAL CONDUCTIVITY AND VISCOSITY
A. I. Belousov and Ye. M. Bushuyeva *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 39-40 Transl. into ENGLISH from Khimiya i Tekhnologiya Topliv i Masel (Moscow, USSR), no. 3, Mar. 1985 p 20-21 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

N86-15346# Joint Publications Research Service, Arlington, Va.
EFFECTS OF VIBRATION-INDUCED CAVITATION OF PHYSICOCHEMICAL CHARACTERISTICS OF AIRCRAFT FUEL
P. P. Mertsalov, B. G. Bedrik, and K. L. Suponko *In its* USSR Report: Chemistry (JPRS-UCH-85-013) 22 Oct. 1985 p 46-47 Transl. into ENGLISH from Khimiya i Tekhnologiya Topliv i Masel (Moscow, USSR), no. 7, Jul. 1985 p 23-25 (For primary document see N86-15344 06-23)
Avail: NTIS HC A04/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-15420# Hokkaido Univ., Sapporo (Japan). Faculty of Engineering.
BULLETIN OF THE FACULTY OF ENGINEERING, HOKKAIDO UNIVERSITY, NO. 128
Oct. 1985 121 p refs In JAPANESE; ENGLISH summaries (ISSN-0385-602X) Avail: NTIS HC A06/MF A01

The Bulleting of the Faculty of Engineering of Hokkaido (Japan) University (No. 28, Oct. 1985) contains articles on the following topics: the deformation behavior of anisotropic sand during stress axis rotation; a study of reactive sputter etching; the athermal condition of optical elements; catalytic activity of clinoptilolite in methanol conversion; a down-scattering spectrometer using a spallation neutron source; an assignment algorithm using a multilinked data structure; the accuracy of polynomial approximation of the quasi-minimax method; and, an analysis of drops in the accuracy of the least-squares approximation. For individual titles, see N86-15421 through N86-15428.

N86-15421# Hokkaido Univ., Sapporo (Japan).
DEFORMATION BEHAVIOR OF ANISOTROPIC SAND DURING PRINCIPAL STRESS AXES ROTATION c39
Kinya Miura, Seiichi Miura, and Shosuke Toki *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 39 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

To investigate the fundamental characteristics of the deformation behavior of sand under general stress conditions involving the rotation of the principal stress axes, a series of drained tests was carried out on dense anisotropic sand using a hollow cylinder torsional shear apparatus. The hollow cylindrical specimens have an anisotropic fabric formed by the parallel alignment of particles induced during the sand deposition in a mold, and are tested under principal stress axes rotation maintaining the values of the three principal stresses constant. Experimental results show that the shear deformation of sand under the rotation of principal stress axes and the effects of the inherent anisotropic fabric on the deformation behavior are considerably large. It is indicated that the anisotropic deformation characteristics can be explained by taking account of the predominant sliding occurring on the bedding plane, irrespective of whether the principal stress axes rotate or not. This consideration seems to be supported by the fact that the bedding plane has the lowest value of the resistance against shear stress, owing to the horizontal alignment of subelongated sand particles. Author

N86-15422# Hokkaido Univ., Sapporo (Japan).
A STUDY OF REACTIVE SPUTTER ETCHING FOR CARBON STEEL BY FREON GAS: ON THE EFFECT OF OXYGEN GAS MIXTURE c26
Toshio Yuhta, Jun Osanai, Toshikazu Satoh, and Tatsuo Takahashi *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 26 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

A study of reactive sputter etching of carbon steel using Freon gas is conducted. This tests dry etching as a new method for the processing of micro mechanical parts. Investigated are experiments on the improvement of etching characteristics using oxygen gas mixed with the reactive gas. The results obtained were as follows: improvement of etching characteristics; the decrease of etch rate was not large, but with a low value of the mixture ratio (0.09), the improvement of surface roughness was remarkable. However, the applicable region was limited. When the mixture value exceeded 0.09, the etch rate rapidly decreased and the surface roughness approached that of a pre-machined surface. Author

N86-15423# Hokkaido Univ., Sapporo (Japan).
ATHERMAL CONDITIONS OF OPTICAL ELEMENTS AND PROPERTIES OF OPTICAL MATERIALS c74
Teruhito Mishima, Kenji Hisadome, and Ichiro Sakuraba *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 74 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

In precision interferometry, as in interferometry for the determination of the refractive index of gas, the temperature dependence of optical path length of a transparent window is important. The temperature coefficients of optical path length of transparent windows are calculated for various optical materials in vacuum and several gases. The conditions where temperature coefficients are equal to zero are studied using generalized athermal conditions. As the result, it is found that LHG-10 is good for normal incident window in air and for Brewster window in vacuum, and athermal glass 3036 and another athermal glass 3038 are good for normal incident window in vacuum and Brewster window in air, respectively. For these windows the temperature coefficients normalized by the thickness of the window are of the order of 10 to the -7 power C, so that temperature tolerance of the order of 0.1C can be allowed in the interferometric system which has the solution of 10 to the -4 power lambda. In the last stage, the athermal condition independent of incident angle is checked with material constants of optical materials and gases and it is found that the condition is, at this moment, far from that required. Material meeting these conditions should be developed. Author

N86-15424# Hokkaido Univ., Sapporo (Japan).
THE CATALYTIC ACTIVITY AND SELECTIVITY OF CHEMICAL TREATED CLINOPTILOLITE IN THE CONVERSION OF METHANOL c25
Harumi Sakou, Masahiro Nitta, and Kazuo Aomura *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 25 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

The catalytic activity and selectivity of clinoptilolites modified with HCl, NH4Cl, H2SO4 and NH4HSO4 are determined by the conversion of methanol to hydrocarbons. The conversion to hydrocarbons increases with the increase in degree of proton exchange. The hydrocarbons produced are essentially only aliphatic compounds with the number of carbon atoms of 6 or below, mainly C2-C5 olefins. The removal of Al by acids from the clinoptilolite framework enlarges the pore size and results in the decrease of the selectivity for C2-C4 olefins; however, the deposition of sulphur from H2SO4 or NH4HSO4 on the surface decreases the pore size and increases the selectivity up to 83 wt% at almost 100% conversion. The surface properties of the modified catalysts are investigated by means of XRD, XPS and heat of immersion. It is found out that the strong Bronsted acid sites formed by hydrogen ion exchange and molecular shape-selectivity due to the pore, of which the size was precisely controlled by the deposition of SO sub 4 sup 2(-) ions, are the dominant factors for

the catalytic activity and the product selectivity in this reaction, respectively. Author

N86-15425# Hokkaido Univ., Sapporo (Japan).
CRYSTAL ANALYSER MIRROR TYPE DOWN-SCATTERING SPECTROMETER USING SPALLATION NEUTRON SOURCE **c35**
K. Inoue, K. Kaji, Y. Kiyanagi, T. Kanaya, H. Iwasa, and K. Nishida *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 35 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

A crystal analyzer having a mirror type down-scattering neutron spectrometer is developed and installed at a spallation pulsed neutron source. By using the pulsed source and the crystal analyzer mirror, the spectrometer has a performance feature with a capability of measuring the density of states over a wide region from several 1/cm to 3000 1/cm. Its usefulness is demonstrated in dynamical structure studies for molecular crystals, molecular liquids, polymers, magnetic substances, and other materials. Author

N86-15426# Hokkaido Univ., Sapporo (Japan).
ON THE ASSIGNMENT ALGORITHM BY MEANS OF MULTI-LINKED DATA STRUCTURE **c61**
Tsutomu Da-Te and Hidetoshi Nonaka *In* the Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 61 p In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

A problem of assigning individuals to classes under certain rules is presented. An individual can be assigned to one class according to both the priorities attached from an individual to classes and from a class to individuals. Such problems are often encountered, for instance, in the assignment of students to departments or certain goods to storehouses, and so on. In the present algorithm, two-dimensionally multilinked data structure is used. The utility of the algorithm and time complexity are discussed to some extent, notwithstanding the difficulty in making theoretical estimations for time complexity. Several results of computer simulations are given to illustrate the expected time complexity of the algorithm. Author

N86-15427# Hokkaido Univ., Sapporo (Japan).
ACCURACY OF POLYNOMIAL APPROXIMATION OF QUASI-MINIMAX METHODS **c64**
Tsutomu Da-Te and Mayuka Kawaguchi *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 64 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

Methods of finding a polynomial that can be used to determine approximate values of a given function are discussed. The minimax method is considered to give the best approximations for this purpose, but its procedure to obtain polynomials is so complicated that more simple and convenient algorithms with minimal loss of accuracy have been required. Along with the above formula, the sine function and exponential function as representative samples are used, and their accuracies compared with those of the approximations, which are arranged as a sort of quasi-minimax algorithms in such a way as to simplify the minimax method. Author

N86-15428# Hokkaido Univ., Sapporo (Japan).
ANALYSIS OF DROPS IN ACCURACY OF LEAST-SQUARES APPROXIMATION **c64**
Mayuka Hawaguchi and Tsutomu Da-Te *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 64 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

It is demonstrated that, in the practical use of the least square methods, unexpected trouble, is often encountered and that the resulting fitness often fails even if the degree of polynomials is increased. Theoretical considerations are given to this problem introducing the measure of fitness and it is shown that the failure of fitness in a power series approximation arises from an ill-conditioned case of equations to be solved. For Legendre polynomials, however, such failure of fitness is not expected from that view-point. The numerical experiments show the above projection to a high extent. Author

N86-15429# National Bureau of Standards, Washington, D.C. Center for Fire Research.
SUMMARIES OF CENTER FOR FIRE RESEARCH GRANTS AND IN-HOUSE PROGRAMS, 1985
Sonya M. Cherry Nov. 1985 149 p
(NBSIR-85-3258) Avail: NTIS HC A07/MF A01

This conference report was prepared for distribution at the First International Symposium on Fire Safety Science, October 7 to 11, 1985 in Gaithersburg, Md. It contains extended abstracts of grants for fire research sponsored by the Center for Fire Research, National Bureau of Standards, as well as descriptions of the internal programs of the Center for Fire Research. Author

N86-15430# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
REPAIR, EVALUATION, MAINTENANCE, AND REHABILITATION RESEARCH PROGRAM. THE CONDITION OF CORPS OF ENGINEERS CIVIL WORKS CONCRETE STRUCTURES Final Report
J. E. McDonald and R. L. Campbell, Sr. Apr. 1985 136 p
(AD-A157992; WES/TR/SL-REMR-CS-2) Avail: NTIS HC A07/MF A01 CSCL 13/2

Two computerized data bases were compiled: (1) structure-description, and (2) damage and repair. The structure-description data base contains basic information (location, category, age, purpose, etc.) on 766 projects. The damage and repair data base contains information on the current condition of the concrete in the Corps' civil works structures as determined through detailed reviews of over 2000 periodic inspection reports. To assist in the analysis, a number of computer programs were developed to manipulate and search the data bases. This analysis concentrated on the types of deficiencies observed, the cause (if reported), location within the structure, and degree of damage. In cases where the deficiency had been repaired, the material or technique or both that were used and the performance were analyzed. This identification and assessment of problems relating to evaluation, maintenance, and repair of concrete will provide guidance in developing and establishing priorities for research in the Repair, Evaluation, Maintenance, and Rehabilitation (REMR) Research Program. GRA

N86-15431# Forest Products Lab., Madison, Wis.
CONDENSATION POTENTIAL IN HIGH THERMAL PERFORMANCE WALLS. HOT, HUMID SUMMER CLIMATE Forest Service Research Paper
G. E. Sherwood Jul. 1985 30 p
(AD-A158002; FSRP-FPL-455) Avail: NTIS HC A03/MF A01 CSCL 13/1

To observe actual moisture patterns and the potential for condensation due to long periods of air conditioning in a hot, humid climate, a test structure was constructed near Gulfport, Mississippi, for exposure of eight types of insulated wall panels at controlled indoor conditions and typical outdoor weather conditions. Panels were instrumented with moisture sensors and tested without (Phase 1) and with (Phase 2) penetrations (electrical outlets) in the indoor surface. There was no sustained condensation in any of the walls during either winter season. One type of high thermal performance wall had sustained condensation during both summers, but the wall dried out as the weather became cooler, and moisture content of framing never exceeded 17 percent. Low-permeance sheathing appeared to provide resistance to the buildup of moisture during summer in walls with high overall R values. Penetrating the walls with electrical outlets resulted in slightly higher moisture levels in all of the walls throughout the year. This paper should be useful to building designers, builders, and building code officials in establishing vapor retarder requirements for walls. GRA

N86-15432# New Mexico Univ., Albuquerque. Engineering Research Inst.
MODELING OF CONCRETE, SOIL, AND INTERFACES Final Report, Nov. 1983 - Oct. 1984
H. L. Schreyer Jun. 1985 106 p
(Contract F29601-81-C-0013)
(AD-A158062; NMERI-8-13-TAB-80; AFWL-TR-85-05) Avail: NTIS HC A06/MF A01 CSCL 13/3

The ability to predict the response of structures subjected to large, abrupt bursts of energy depends on a number of factors. These include load definition, the characteristics of the geological material in which the structure is embedded, the mechanism by which forces are transferred from the geological material to the structure, and the characteristics of the structure. The basic objective of the research project discussed here is to provide an improved understanding of the response of common geological and structural materials and of structure-media (concrete-soil) interfaces (SMI), to abrupt loading. For this purpose, engineering constitutive models have been developed, and appropriate experimental data are being used to validate the models. An improved relation for predicting the limit surface of concrete is given. The need for new devices and measurement techniques for rate effects in concrete and the response of unsaturated clay and salt is discussed. Preliminary data from existing experimental equipment are shown. The implications of strain softening are displayed with the use of a model problem. Proposed work includes the use of a strain-softening model to represent interfaces, the extension of the viscoplastic model to represent anisotropic media, and the determination of rate effects in concrete for one and two-dimensional experimental specimens. GRA

N86-15433# Florida Univ., Gainesville.
DESIGN OF FOUNDATIONS IN PERMAFROST M.S. Thesis
K. R. Shankle 1985 80 p
(Contract N66314-72-A-3029)
(AD-A158063; AD-F630692) Avail: NTIS HC A05/MF A01 CSCL 13/2

The relatively recent growth in military and scientific facilities in polar regions and the industrial exploitation of Alaska and northern Canada, has necessitated a better understanding of the physical environment of cold regions. With this increased activity and occupation of cold regions also comes the need for better engineered structures. Foundations on permafrost, or perennially frozen ground, present special problems and demands in design and construction. Design of foundations in areas of seasonal frost where the material below the frost line remains unfrozen present certain problems. However, by taking structural loads to depths below the frost line, potential problems from heave and lateral thrust are generally removed. Permafrost itself is actually a fairly good material with high compressive strength. However, it does tend to creep under load, and cyclical freezing and thawing are of particular concern. Freezing and thawing have dramatic effects on the soil properties upon which the stability or a structure depends. The magnitude of these effects depend not only on the type of soil and its water content, but also on environmental factors such as weather, ground cover, snow, and the thermal properties of subsurface materials. GRA

N86-15434# Ohio State Univ., Columbus.
AN EXPERIMENTAL STUDY OF AN ULTRA-MOBILE VEHICLE FOR OFF-ROAD TRANSPORTATION. APPENDIX 2. DISSERTATION. KINEMATIC OPTIMAL DESIGN OF A SIX-LEGGED WALKING MACHINE Ph.D. Thesis
R. B. McGhee, K. J. Waldron, and S. M. Song May 1985 432 p
(Contract MDA903-82-K-0058)
(AD-A159147) Avail: NTIS HC A19/MF A01 CSCL 13/6

Chapter 2 is a review of previous work in the following two areas: The mechanical structure of walking machines and walking gaits. In Chapter 3, the mathematical and graphical background for gait analysis is presented. The gait selection problem in different types of terrain is also discussed. Detailed studies of the major gaits used in level walking are presented. In Chapter 4, gaits for walking on gradients and methods to improve stability are studied. Also, gaits which may be used in crossing three major obstacle types are studied. In Chapter 5, the design of leg geometries based on four-bar linkages is discussed. Major techniques to optimize leg linkages for optimal walking volume are introduced. In Chapter 6, the design of a different leg geometry, based on a pantograph mechanism, is presented. A theoretical background of the motion characteristics of pantographs is given first. In Chapter 7, some other related items of the leg design are discussed. One of these is the foot-ankle system. A few conceptual passive foot-ankle systems are introduced. The second is a numerical method to find the shortest crank for a four-finitely-separated-position-synthesis problem. The shortest crank usually results in a crank rocker, which is the most desirable linkage type in many applications. Finally, in Chapter 8, the research work presented in this dissertation is evaluated and the future development of walking machines is discussed. GRA

N86-15435# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
19 Sep. 1985 75 p Transl. into ENGLISH from various West European articles
(JPRS-WST-85-028) Avail: NTIS HC A04/MF A01

Progress in West European Science and technology is reported. Topics discussed include: advanced materials, biotechnology, civil aviation, factory automation, microelectronics, scientific and industrial policy, and technology transfer. For individual titles, see N86-15436 through N86-15437.

N86-15436# Joint Publications Research Service, Arlington, Va.
FRG TURNS EFFORTS TO LASER DEVELOPMENT c36
Klaus Gertoberens *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-028) 19 Sep. 1985 p 27-28 Transl. into ENGLISH from Sueddeutsche Zeitung (Munich), 17 Jul. 1985 p 25 (For primary document see N86-15435 06-31)
Avail: NTIS HC A04/MF A01

Recommendations, and development of laser applications is discussed. In terms of its technical and economic significance this key technology is compared with microelectronics. Lasers are light sources which emit highly focused, intense rays with virtually infinite potential applications. Lasers (Light Amplification by Stimulated Emission of Radiation) are used especially in measurement technology and medical technology and in optical communications engineering. As wearfree universal machines tools, they assume great significance in production. The light has also become a weapon called Star Wars. E.A.K.

N86-15437# Joint Publications Research Service, Arlington, Va.
FUJI, THOMSON TO DEVELOP, PRODUCE HIGH-POWERED TRANSISTORS c33
P. DeVittor *In its* West Europe Report: Science and Technology p 53-57 Transl. into ENGLISH from Elettronica Oggi (Milan), May 1985 p 117-122 (For primary document see N86-15435 06-31)
Avail: NTIS HC A04/MF A01

Some development lines pursued in making innovative products in the field of transistors for power switching are pointed out. The essential features of the new high-power modules produced are outlined. E.A.K.

N86-15438# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
5 Nov. 1985 119 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-85-038) Avail: NTIS HC A06/MF A01

Progress in science and technology in the People's Republic of China is reported. Topics include: national developments, physical sciences, applied sciences, acoustics, chemistry, electronics, high energy physics, mathematics, physics, and semiconductors. For individual titles, see N86-15439 through N86-15442.

N86-15439# Joint Publications Research Service, Arlington, Va.
HYDROGEN DIFFUSION, POSITRON ANNIHILATION IN 40CrNiMo STEEL c26
Du Fengmu, Gui Jianian, and Wang Zixiao *In its* China Report:

Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 34-36 refs Transl. into ENGLISH from Wuhan Dzxue Xuebao (Ziran Kexue Ban) (Wuhan), no. 2, 1984 p 95-96 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

The 40CrNiMo steel which has superior overall mechanical and technological properties and is used in aeronautical applications is discussed. Various quenching and tempering treatments can be used to meet different strength and tenacity requirements. The diffusion behavior of hydrogen in this material and its ability to resist hydrogen losses was studied. The electrochemical permeation method is used to determine the effect of tempering temperature on the diffusion coefficient and surface solubility of hydrogen, which were compared with the Doppler broadening line pattern parameter-S in positron annihilation parameter. The hydrogen diffusion behavior is confirmed. E.A.K.

N86-15440# Joint Publications Research Service, Arlington, Va.
CHINA REACHES NEW LEVEL IN MINICOMPUTER DEVELOPMENT **c36**
In its China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 39-46 refs Transl. into ENGLISH from Jisuanji Shijie (Beijing), no. 15, 8 Aug. 1985 p 1 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

Stability of electron trajectories in free-electron lasers with an axial magnetic field is analyzed. The results show that in the case of noncyclotron-resonance (omega sub 0 is not equal to kappa sub 0 Vsub2) (V=initial velocity) the trajectories are unstable if the condition omega sub 0 - kappa sub 0 V sub 2) (2 omega sub omega)sq. = 1 is satisfied, while in the case of cyclotron-resonance (omega sub c = kappa sub 0 V sub beta) the trajectories are always stable if the initial perpendicular velocities of electrons are small. Oscillation amplitudes of the parallel velocities of electrons depend on the ratio beta sub omega/beta sub 0. The smaller the ratio, the smaller the oscillation amplitudes. E.A.K.

N86-15441# Joint Publications Research Service, Arlington, Va.
MICRO-POWER DISSIPATION DEVICE DESCRIBED **c33**
Mao Xingwu, Zhou Likai, and Zhou Jianjun *In its* China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 51-56 Transl. into ENGLISH from Dianzi Rexue Jishu (Beijing), v. 15, no. 3, 10 Mar. 1985 p 24-26 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

The common-emitter current gain beta of a common two-pole transistor is generally below 250. They are referred to as high-beta or high gain transistors when the beta of such transistors exceeds 300. When the beta of a transistor is higher than 1,000, it is called a super-beta transistor (SBT) or supergain transistor. The micropower dissipation type has the widest applications among the high-beta. Micropower dissipation high-beta means that there is a high gain or a superhigh gain under a microcurrent. The device is widely used in small signal-detection systems and stereo audio equipment because of their characteristics of high gain, low frequency and low noise under small signals. E.A.K.

N86-15442# Joint Publications Research Service, Arlington, Va.
SELF-QUENCHING STREAMER DISCHARGE CHARACTERISTICS AT EXTREME GAS COMPOSITIONS **c75**
You Tiejian, Yang Baozhong, and Chen Hongfang *In its* China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 64-67 refs Transl. into ENGLISH from Zhongguo Kexue Jishu Daxue Xuebao (Hefei), v. 14, no. 2, Jun. 1984 p 295-297 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

A self-quenching streamer discharge which is produced in filament chambers containing certain gas compositions, and its discharge mechanism were investigated. Self-quenching streamer discharges have large output signals, a narrow amplitude distribution, and a fast rise time. This discharge mode was measured. New phenomena in self-quenching streamer discharges at extreme gas composition, differing from those reported is also observed. E.A.K.

N86-15443# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
14 May 1985 75 p Transl. into ENGLISH from various West European articles
(JPRS-WST-85-015) Avail: NTIS HC A04/MF A01

Several topics related to Western Europe's technology and science effects are discussed. Spacecraft control, the use of antibodies in agriculture, civil aviation, industrial policies, and microelectronics are among the topics covered. For individual titles, see N86-15444 through N86-15446.

N86-15444# Joint Publications Research Service, Arlington, Va.
CNES OF FRANCE RESEARCHES REMOTE CONTROL SYSTEM FOR SPACE **c54**
Jean-Michel Guilbert *In its* West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 1-4 Transl. into ENGLISH from Revue Generale de L'Electricite (Paris), Nov. 9814 p 724; 728-729 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

Mission analysis studies show that the needs for remote control fall into two broad categories: (1) needs for intervention, repair and maintenance; and (2) needs for deployment, assembly and construction. Depending on the missions and on whether the operator is on board the remote-controlling craft or on Earth, the remote-control system will have more or less autonomy of decision. The field of remote-control in space is discussed, as are a few projected or completed systems illustrating the interest of remote control, with or without a man on board. Author

N86-15445# Joint Publications Research Service, Arlington, Va.
SPEED OF HERMES TO GIVE EUROPEANS SPACE ACCESS, DUCROCQ SAYS **c15**
Albert Ducrocq *In its* West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 7-11 Transl. into ENGLISH from Sciences and Avenir (Paris), Feb. 1985 p 82; 84-86 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

After the commercial success of Ariane, the French aerospace industry actually has a new goal: manned flights. In 10 years, the Ariane 5 launcher should be putting the European spacecraft Hermes into orbit. A brief account is given of French participation in U.S. space shuttle flights. Author

N86-15446# Joint Publications Research Service, Arlington, Va.
DFVLR DEVELOPS NEW KIND OF WALLS OR WIND TUNNEL **c09**
In its West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 18-19 Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtschaft (Frankfurt/Main), 4 Mar. 1985 p 7 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

A three-dimensional adaptive wind tunnel test section was developed whose walls adapt to the air flow during the test. Initial calculations showed that a thick-walled, flexible rubber tube was found to be the most adaptive kind of material to air flow. The rubber tube is 240 cm long, has a diameter of 80 cm and a wall thickness of 6 cm. A total of 64 spindles-each controlled by a positioning motor-make it possible to reduce the cylindrical test section or also, if required to increase the test cross-section by a maximum of 40 mm. This adaptive test section, also called thicking walls, in addition has 128 pressure holes connected to tiny sensors which permit precise determination of existing pressure directly on the test section wall. Without this exact information no conclusions about interference factors on the model could be made. The first sample measurements were made in the high-speed wind. Measurements were made on various so-called calibration models. The results achieved exceeded all expectations. They have proven identical to the test values which were previously arrived at by computer calculation. R.J.F.

N86-15447# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
13 Aug. 1985 68 p Transl. into ENGLISH from various West European articles
(JPRS-WST-85-024) Avail: NTIS HC A04/MF A01

Several topics related to Western Europe's technology and science efforts are discussed. The Airbus, the use of laser Doppler velocimeters for wind tunnel measurements, prop-fan technology, biotechnology, and microelectronics are among the topics covered. For individual titles, see N86-15448 through N86-15451.

N86-15448# Joint Publications Research Service, Arlington, Va.
LAUNCHERS, SATELLITES, MULTINATIONAL PLANS IN 1985 CHES BUDGET **c81**
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 1-10 Transl. into ENGLISH from AFP Sciences (Paris), 28 Mar. 1985 p 24-32 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

A breakdown of appropriations for the National Center for Space Studies (France) is given. Appropriations are listed for the European Space Agency, several artificial satellites, the Ariane launch vehicle, the Ulysses and Giotto missions, and solar and plasma physics studies. R.J.F.

N86-15449# Joint Publications Research Service, Arlington, Va.
MBB STUDIES VARIABLE-CAMBER WING FOR AIRBUS **c05**
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 20-21 Transl. into ENGLISH from MBB Aktuell (West Germany), Feb. 1985 p 3 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

A program is described that encompasses the application of variable camber to a transonic wing in long-distance aircraft such as the Airbus. The task is to configure previously employed flaps for variable camber use over the entire wing span. R.J.F.

N86-15450# Joint Publications Research Service, Arlington, Va.
FRENCH PROGRAM CHARME DEVELOPS PROPFAN AIRCRAFT **c05**
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 22-24 Transl. into ENGLISH from AFP Sciences (Paris), 14 Mar. 1985 p 25-27 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

France has decided to begin studies on future engines for heavy cargo propeller planes. The first research in France started around 1978, three years after the American Hamilton Standard (of the United Technologies group, which also owns Pratt and Whitney). The French studies are currently carried out as part of the Propeller Design for Fast Plane for Greater Economy (CHARME) program. The French government prefers the term fast plane propeller instead of the American names Propfan, Freefan, or Unducted Fan (UDF) of General Electric. A test of a new propeller, perfected in France and consisting of 12 blades, is scheduled for September 1985 in a wind tunnel which will model flight conditions. This test is intended to determine the noise level of this propeller. R.J.F.

N86-15451# Joint Publications Research Service, Arlington, Va.
FRG USES LASER FOR NON-DESTRUCTIVE TESTING IN WIND CANAL **c38**
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 25-26 Transl. into ENGLISH from VDI Nachrichten (Dusseldorf), 5 Apr. 1985 p 16 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

Over a period of years, laser technology has been adopted in many areas; lately it has gained a place in wind tunnel measurements. After previous applications mainly with laboratory-scale systems, a large measurement system was successfully tested recently in the Goettingen wind tunnel of the German Research and Test Establishment for Aeronautics and Astronautics (DFVLR). The three-component laser doppler anemometer (3-D LDA) will in the future provide aerodynamicists with noncontact and noninterference measurements of stream velocity, for example in testing model airplanes. In contrast to laboratory installations, the large dimensions in the Goettingen wind tunnel require a stand-off of more than two meters from the test article. Since the available laser-light power attenuates very strongly with distance, precision fabrication and assembly of the optical system is required. On their way to the model, the laser beams encounter tiny particles (aerosols) which are transported by the air stream in the wind tunnel. A result is light scattering which, due to the doppler effect, contains the information about the local stream velocity. With the aid of transducer systems the intercepted scattered light is immediately converted into electrical information and stored in computers. R.J.F.

N86-15452# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING Abstracts Only
4 Sep. 1985 116 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-85-009) Avail: NTIS HC A06/MF A01

Progress in U.S.S.R. electronics and electrical engineering is reported. Specific topics discussed include communications; broadcasting and consumer electronics; antennas and propagation; circuits and systems; solid state circuits; microwave theory and techniques; power engineering; transportation; electromagnetic compatibility; components, hybrids and manufacturing technology; industrial applications; reliability; electron devices; magnetics; quantum electronics, electro-optics; and industrial electronics. For individual titles, see N86-15453 through N86-15472.

N86-15453# Joint Publications Research Service, Arlington, Va.
MILLIMETRIC-WAVE ANTENNAS AND DEVICES: REVIEW Abstract Only **c32**
D. I. Voskresenskiy, V. M. Maksimov, S. V. Rud, and I. G. Sukharev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 35 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 4-23 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Millimetric waves are eminently suitable for many applications in the national defense and in the national economy, ranging from detection of low-flying objects to meteorological, geological, and medical research. They occupy a unique position in the electromagnetic spectrum, namely between optical waves and radio waves. Most important and interesting among millimetric-wave devices are waveguides, antennas, and antenna auxiliaries. Waveguides are essentially the same as those used for other wave bands, however here there is a choice available between optical or radio-technical methods of energy channeling. Waveguides or transmission lines which have been and are being developed include rectangular and circular single-mode and multimode metal ones, helical ones, metal-dielectric ones, solid and hollow cylindrical dielectric ones, Y-dielectric ones, microstrip lines, dielectric image lines, dielectric strip in substrate, dielectric strip on substrate, grooved open ones and slotted closed ones. Millimetric-wave antennas, on the other hand, require special manufacturing precision on account of critical lossiness and narrow transparence windows in the Earth's atmosphere. B.W.

N86-15454# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF LOG-PERIODIC ANTENNAS WITH PRESCRIBED GEOMETRY Abstract Only **c32**
V. A. Yatskevich *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 37 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 40-45 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The synthesis of log-periodic dipole antennas for wideband shortwave or ultrashort-wave communication systems is shown,

assuming a prescribed array geometry with the oscillator connected to the smallest dipole and with currents in or voltages across the dipoles predetermined for best approximation of the prescribed radiation pattern. The problem of synthesis reduces to calculation of the y-parameters of the connecting four-pole networks which will yield the prescribed amplitude-phase distribution. The procedure begins with synthesis of purely reactive and thus lossless four-pole networks for a fixed single frequency, preferably for the lower limit of the frequency range so that the frequency characteristics of those y-parameters can then be calculated directly without need for additional data, while the input impedance of the antenna is made purely resistive. A reactive feed system is synthesized next according to conventional methodology, which has been simplified for a series rather than parallel feed system. Minimum-phase four-pole networks are considered for physical realization of mathematically established frequency characteristics with reactive circuit elements. B.W.

N86-15455# Joint Publications Research Service, Arlington, Va.
BOUNDARY WAVES IN FINITE ANTENNA ARRAYS Abstract Only **c32**
V. S. Filippov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 39-40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 61-67 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Boundary effects in a finite antenna array are analyzed by the superposition method, a method less unwieldy and more consistent with the physical nature of the subject than direct numerical methods of solving boundary-value problems of electrodynamics and methods based on an infinite-array model with high concentration of elements in the central region. According to this method the currents in the radiator elements of a finite array are represented as superpositions of quiescent currents in a periodic infinite array, of which the given finite array is a part, and a boundary wave propagating from the edge of that finite array inward. Following a qualitative analysis, the resulting system of equations of a boundary wave is found to be solvable by direct numerical methods for simpler antenna array configurations but only by a special iteration method for more intricate configurations. The iteration procedure, with use of Fourier transformation and asymptotic estimates, is based on complementing the given finite array to a infinite one with radiators under matched loads and then subtracting from the resulting boundary wave the contribution of this complementary array. B.W.

N86-15456# Joint Publications Research Service, Arlington, Va.
SCATTERING BY CYLINDER WITH ANISOTROPIC IMPEDANCE Abstract Only **c32**
A. V. Klimov, B. M. Petrov, and A. I. Semenikhin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 74-78 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Scattering of plane waves by an isotropic cylinder with anisotropic coating is considered, for the design of radar reflectors and shaping of secondary fields. The corresponding boundary-value problem for the distribution of surface impedance is formulated in accordance with physical optics and reduced to a system of two equations with six unknowns, which leaves four degrees of freedom for combinations of resistances and reactances. Special cases are zero reactances only and zero resistances only, a more general case being rotation of the principal axis of the impedance tensor so that neither reactances nor resistances are zero. The problem is solved rigorously by the separation of variables method, for a cylinder of arbitrary cross-section inside a circumscribing circular cylinder with the smallest possible radius and with the Lorenz lemma in integral for applicable to the region between both cylindrical surfaces. Infinitesimally thin electric and magnetic current filaments as sources of the auxiliary field are placed first inside the inner cylinder and then outside the outer one. B.W.

N86-15457# Joint Publications Research Service, Arlington, Va.
MATRIX ANALYSIS OF PERIODIC INTERLEAVED MULTIFREQUENCY ANTENNA ARRAYS Abstract Only **c32**
L. I. Ponomarev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 79-86 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The scattering matrix is constructed for periodic interleaved multifrequency antenna arrays with radiators of q different types within the overall antenna aperture, all radiators of each type excited at the same frequency f sub q. A plane doubly periodic antenna array is considered and on the basis of its finite-dimensional scattering matrix are derived expressions for total gain and surface utilization factor. Calculations by conventional methods of electrodynamics are made for an antenna arrays which operates in the transmitting mode or in the receiving mode, with power rereflection in the latter case, with the radiation field at each frequency represented as a finite Floquet spectrum containing TE-mode and TM-mode plane harmonics. The results of this analysis are used for optimizing the excitation pattern so as to suppress additional side lobes in the antenna radiation pattern at high frequencies, while only plane interference side lobes appear at low frequencies and these can be suppressed by reducing the mismatch between radiators. Author

N86-15458# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF MULTIMODE WAVEGUIDE-TYPE POWER DISTRIBUTOR Abstract Only **c32**
Yu. V. Likhoded and L. I. Ponomarev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 87-91 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Characteristics of a power distributor which consists of a multimode waveguide excited by several waveguides on the input side and loaded by an array of receiver waveguides on the output side is analyzed, for extending the application of such devices from centimetric-wave power to millimetric-wave power. The corresponding boundary-value problem of electrodynamics is solved numerically in two stages, evaluation of the scattering matrix for the multipole network representing the function of an array of waveguides with smaller cross-section and a waveguide with larger cross-section followed by evaluation of the scattering matrix for a finite array of such multipole networks representing the complete power distributor. In the first stage the smaller waveguides are assumed to be filled with dielectrics having generally a different permittivity each and to contain matching dielectric slugs of appropriate thickness and permittivity each. The transverse electric and magnetic field components are expanded into series of vector eigenfunctions separately for the two characteristic regions, the orthogonal basis vector eigenfunction having the same form for both regions and being calculated with the aid of the scalar potential. Author

N86-15459# Joint Publications Research Service, Arlington, Va.
EXCITATION OF ARRAY OF PLANE-PARALLEL WAVEGUIDES COVERED WITH DIELECTRIC LAYER OF FINITE LENGTH Abstract Only **c32**
B. D. Manuilov and V. M. Shablovskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 96-99 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

An antenna array of plane-parallel waveguides under a dielectric

layer of finite length is considered and excitation of such an array with T-mode waves is analyzed, assuming metallized lower and lateral surfaces except the aperture and an infinitely large ideally conducting flange around the dielectric layer on the upper surface. The corresponding boundary-value problem is solved by the method of partial regions, with superposition of waves inside the waveguides and on the basis of the Lorenz lemma for the dielectric layer as well as for the remaining half-space. The resulting system of integral equations is solved by the Galerkin method. A typical numerical experiment has yielded quite accurately both the efficiency and the directive gain, with the number of terms equal to the number of wave propagating through a plane waveguide with dielectric filler. It also reveals the dependence of the beam orientation error near antiresonance on the beam deflection angle, attributable to prevailing electrodynamic effects. Author

N86-15460# Joint Publications Research Service, Arlington, Va.
USE OF ACTIVE QUENCHING FOR REDUCTION OF POWER DISSIPATION IN DIPOLE ANTENNA ARRAY Abstract Only c32

L. I. Ponomarev, A. V. Dolgin, and A. V. Shatalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy:: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 99-100 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Reduction of power dissipation in dipoles upon incidence of plane waves by means of an oscillator coherent with the field of such a wave is extended from a single thin dipole to a finite periodic array of thin dipoles with an arbitrary direction of incident waves. The problem reduces to a system of Gallen integral equations for unknown currents and the solution is sought which minimizes the current norm. Calculations for an array with a period d = 1.8 lambda (lambda - wavelength) in both H-plane and E-plane, composed of 0.007 thick and 0.625 lambda long dipoles reveal that the quenching effectiveness factor depends only slightly on the angle of wave incidence. Varying the dipole dimensions reveals that it decreases fast with increasing dipole thickness and peaks to a maximum at some dipole length corresponding to resonance. Author

N86-15461# Joint Publications Research Service, Arlington, Va.
SIGNAL AND INTERFERENCE LEVELS IN ANTENNA ARRAY WITH OPTIMUM RADIATION PATTERN Abstract Only c32

A. S. Popov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 44 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 103-104 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

An antenna array is considered which has an optimum radiation pattern, with the minimum mean-square deviation of the vector of weight factors as the the optimality criterion and this vector described by the Wiener-Hopf matrix equation. Power of the useful signal and total power of all interference signals in such an array are calculated on this basis, assuming mutually noncorrelated signal, interference, and thermal noise. The results reveal that signal power and interference power as well as combined output power all depended on the signal-to-(interference-noise) ratio at the output. They also indicate the attainable power characteristics of such an antenna array. Author

N86-15462# Joint Publications Research Service, Arlington, Va.
EFFECT OF CORNER REFLECTOR ON FIELD OF LINEAR RADIATOR Abstract Only c32

Yu. V. Pimenov and A. K. Salakh *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 44 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 83-84 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The effect of a corner reflector in the vicinity of an electric dipole on the radiation pattern of the latter is treated as a two-dimensional problem and solved using two systems of coordinates, a Cartesian one and a cylindrical one with common origin 0 and z-axis. The infintely large surface method reduces the problem for the reflector cross-section and contour to an integral equation for the current density distribution induced in the reflector. This equation is in turn solved in two successive approximations, the first one corresponding to symmetric excitation. The resulting expressions for the electromagnetic field in the second approximation apply to any point in space, but they simplify for the far-field region. Author

N86-15463# Joint Publications Research Service, Arlington, Va.
LONGITUDINALLY SLOTTED CYLINDRICAL SHIELD WITH FINITE THICKNESS AND ELECTRICAL CONDUCTANCE Abstract Only c32

R. M. Dzhala *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 45 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 1-7 Previously announced in IAA as A85-23551 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The problem of determining E-waves in the presence of a metallic cylinder with a longitudinal sectorial slot in a wall of finite thickness is examined with allowance for the high conductivity of the structure. This problem is reduced to a set of linear algebraic equations with respect to the unknown amplitudes of the diffraction harmonics. Both thin and thick screens are considered, and the effective broadening of the slot is determined. The narrow-slot approximation is used to obtain explicit expressions for resonant-frequency shifts caused by field penetration into the screen and slot. Fluctuations of the frequency dependence of the level of the field passing through a slightly transparent open screen are observed. B.J. (IAA)

N86-15464# Joint Publications Research Service, Arlington, Va.
RADIATION PATTERN AND REDUCED GAIN OF LINEAR ANTENNA IN TURBULENT ANISOTROPIC ATMOSPHERE Abstract Only c32

N. A. Armand, I. N. Kibardina, and A. N. Lomakin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 45 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 8-14 Previously announced in IAA as A85-23552 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The radiation pattern and the directive gain of linear antennas in an anisotropic randomly inhomogeneous atmosphere are analyzed for systems with and without compensation of arrival-angle fluctuations. The analysis is based on an anisotropic model for the spectrum of refractive-index fluctuations of the atmosphere. It is shown that, as compared with the anisotropic model, the isotropic model yields higher values of the directive gain and smaller distortions of the radiation pattern, especially at small angles of elevation. This is because the broadening of the pattern and the reduction of directive gain are determined by the magnitude of phase fluctuations of the signal on the aperture, the isotropic model yielding lower values of phase fluctuations at small angles of elevation. B.J. (IAA)

N86-15465# Joint Publications Research Service, Arlington, Va.
MULTILAYER VOLUME MICROWAVE FILTERS Abstract Only c32

V. I. Gvozdev, S. V. Smirnov, and A. M. Chernushenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 59 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 2, Feb. 1985 p 47-48 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Multilayer volume microwave filters are particularly suitable for miniaturization of radioelectronic devices by way of circuit integration, the principal advantage over planar filters being the much higher Q-factor; Q sub 0 > or = 10 to the 3rd power as compared with Q sub 0 < or = 10 to the 2nd power. Their metal-dielectric

structure forms an array of coupled half-wavelength resonators electrically symmetric with respect to the center layer, coupling being affected by a magnetic field normal to the plane of resonators. The structure consists of an asymmetric strip line with conductor at the input end, followed by a metal layer with cut out symmetric slot line, a dielectric layer, a symmetric strip line with conductor, a metal layer with cut out symmetric slot line, a dielectric layer, and an asymmetric strip line with conductor at the output end. The size of such a filter depends directly on the number of resonator stages and, without the case, is comparable with the size of conventional filters on symmetric strip lines only but is much smaller than that of conventional filters on asymmetric strip lines only.
Author

N86-15466# Joint Publications Research Service, Arlington, Va.
PLASMA PARAMETERS AT LOW LEVEL OF INTRINSIC MICROWAVE RADIATION Abstract Only **c75**
V. N. Kolesnikov and Yu. G. Tishchenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 61 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 102-105 Previously announced in IAA as A85-23561 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

A method for determining plasma parameters according to intrinsic microwave mission is described which uses the linear transformation of plasma oscillations by inhomogeneities produced by means of finely dispersed particles. The possibility of determining the parameters of a plasma whose level of microwave-emission power is 4-8 times less than that of the surrounding medium is demonstrated experimentally by the introduction of finely dispersed Al2O3 particles into a gas-discharge plasma. B.J. (IAA)

N86-15467# Joint Publications Research Service, Arlington, Va.
ACTIVE MICROWAVE FILTERS Abstract Only **c33**
B. Yu. Kaplievich *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 62 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 1, Jan. 1985 p 3-10 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Design principles and state-of-the-art of microwave filters employing FET, avalanche transit time diodes, Gunn Diodes, varactors, or other microwave semiconductors as active elements with negative dynamic impedance were reviewed and various design approaches were examined. Three main directions in the active filter development, which include the technology, the design and modeling were outlined. It was pointed out that the technological aspects of the active filter development are now focused on finding ways of using active structures or active media for amplification or signal generation. A heterostructure of GaAs substrate with epitaxial active semiconductor n-layer and ohmic contact of AgGaIn alloy on one side of the substrate and dielectric-SiO-metal-Cr-Cu-Ni on the other side can serve as an example of such a structure. It can be used for Q-switched resonators in the two cm range. Prospects of developing monolith microwave filters with GaAs substrates are very attractive. B.W.

N86-15468# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF TRANSIENTS IN DIRECT CURRENT CABLE INSULATION Abstract Only **c33**
M. Yu. Shuvalov, S. Ye. Gleyzer, and E. T. Larina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 79 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 3, Mar. 1985 p 49-52 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

This paper thoroughly analyzes the physical phenomena originating in the impregnated oil-paper insulation of a dc cable with the changes applied to it by voltage. A mathematical model of transients is proposed which uses an operational calculus method. The concept of complete operational resistance of insulation is introduced. Formulas are presented which make it possible to determine the distribution of the electrical field in the insulation at any moment of time. As an application of the theoretical results obtained, problems of testing dc currents are considered. It is concluded that if in a steady-state region the electrical field intensity in the dc cable insulation is distributed according to resistance, then in the transient process the image of the intensity is distributed according to the operational resistance.
Author

N86-15469# Joint Publications Research Service, Arlington, Va.
LASER TECHNOLOGY IN MANUFACTURE OF PRINTED-CIRCUIT BOARDS Abstract Only **c36**
G. A. Machulka, M. F. Stelmakh, and A. B. Uladinov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 84 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 3-11 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

The complexity of the printed-circuit board manufacturing process, additionally encumbered by the intricacy of topology and layout, especially in multilayer boards, makes application of laser technology a very attractive possibility. Extensive studies have established the feasibility of using laser radiation in polygraphic dry offset printing, despite difficulties created by the high thermal conductivity of metallized surfaces, also in etching of patterns, drilling of holes, and soldering of joints. A gaseous (CO2) laser and a solid-state (garnet) laser have been found to be most suitable, each for specific operations. One of the most critical factors here is selection of oxidation-resistant materials for masks and insulation. The next step is incorporating the laser operations in the production line. The feasibility of this has been established in three versions. The first and simplest version, without computer, is proposed for experimental or pilot production of bilateral boards. The second version is proposed or commercial production, with an automatic work station and a control computer. In the third and most advanced version, for large-scale production, the automatic work station has been replaced by a computer-aided design system. B.W.

N86-15470# Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR CALCULATING ATTENUATION IN AND RELIABILITY OF ATMOSPHERIC OPTICAL DATA TRANSMISSION SYSTEMS Abstract Only **c32**
Ye. R. Milyutin and Yu. I. Yaremenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 91 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 11-18 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

A procedure is developed for calculating the energy characteristics and the reliability of atmospheric data transmission systems operating in the optical range. The principal energy characteristic is the energy loss, which determines the signal attenuation in the optical channel. This parameter is evaluated in accordance with Bouguer's law, combining molecular absorption and scattering with absorption and scattering by aerosol particles. The aerosol contribution to attenuation is evaluated on the basis of a single universal parameter, namely the meteorological visibility range. Into account is taken the effect of atmospheric turbulence on both diffraction and refraction of light. For calculation of the reliability is needed the probability distribution of energy losses in the atmospheric channel. The probability of the losses exceeding the acceptable threshold level can be easily found when the general law of their probability distribution is known. The procedure has been formalized in a 9-step algorithm which yields both signal attenuation and system reliability for given transmitter output power and minimum receiver input power. The design problem of ensuring a prescribed level of interference immunity is not considered here and the minimum receiver input power is assumed to have already been determined.
Author

N86-15471# Joint Publications Research Service, Arlington, Va.
SELECTION OF SIGNALS FOR DIGITAL OPTICAL CHANNEL Abstract Only **c32**
S. Ye. Fedorov and A. N. Martyanov *In its* USSR Report:

Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 91-92 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 139-147 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

Optimum selection of signals for digital optical communication channels is considered on the basis of the maximum likelihood difference rather than the Bayes average risk as criterion. One among M > oo equiprobable ones is to be sent into the channel within a time interval O < or = t < or = T. The detection process in the receiver is treated as testing of hypotheses according to the quantum theory, namely as a sequence of three operations with the electromagnetic field of signals and interference describable by nonnegative-definite operators in the Hilbert space. The first operation, measuring this electromagnetic field in subspace A of the Hilbert vector space H, is followed by calculation of the likelihood functions, which are then compared with one another for selection of the signal with the largest one. In the case of ambiguity it is necessary to randomize the selection. Optimization of such signals for a channel without thermal noise on the basis of minimum mean error probability or on the basis of maximum likelihood difference yields orthogonal signals, while optimization for a coherent channel yields antiphasal signals. B.W.

N86-15472# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF COHERENT RECEPTION OF OPTICAL SIGNAL PROPAGATING THROUGH TURBULENT ATMOSPHERE c32
Abstract Only
V. A. Bureyev, V. Ye. Kirakosyants, and V. A. Loginov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 93 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 90-93 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

A multichannel heterodyne receiver with a compound telescope is considered for coherent reception of optical signals propagating through a turbulent atmosphere, each of its N identical channels consisting of an entrance lens with a filter before the heterodyne and a photodetector followed by an intermediate-frequency filter and an envelope detector behind it. The efficiency of such a receiver is calculated on the basis of two alternative models, with a random phase only in the first model and with not only a random phase but also a random amplitude subject to Rayleigh fluctuation in the second model. Calculations on the basis of the first model yield a lower missed-hit probability at a fixed false-alarm probability, except in the range of few photodetector readings where it is equal to or higher than according to the second model. A comparison with a single-channel receiver indicates a much higher detection efficiency of a multichannel one in terms of missed-hit probability, the optimum number of channels being selected on the basis of maximum signal-to-noise ratio. B.W.

N86-15473# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
5 Nov. 1985 53 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-033) Avail: NTIS HC A04/MF A01

Progress in East European Science and Technology is reported. Topics discussed include: microelectronics, computer program systems, programming languaes, information networks, electroluminescence display, cryogenics, automatic control, computer networks, semiconductors, computerized control. For individual titles, see N86-15474 through N86-15477.

N86-15474# Joint Publications Research Service, Arlington, Va.
ROBOTRON HARDWARE COMPATIBLE PROGRAMMING LANGUAGES SURVEYED c60
W. Nyderle *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 9-13 refs Transl. into ENGLISH from Neue Technik im Buero (East Berlin, East Germany), v. 29, no. 4, 1985 p 116-117 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

The use of higher-level programming languages is an essential and decisive prerequisite for rationalizing software development. Programming languages enable developing portable software and help reduce development time and maintenance costs. Problem-oriented programming languages will be in future completely replace assembler languages in software development. The decline in importance of assembler languages is indicated and this trend is speeded up especially by the incompatibility of microprocessor generations. Today, all the common programming languages are available on microcomputers. Compilers of higher-level programming languages are shown to be the most successful software tools. It is recommended they must be extended by tools which support program design, interface testing and program testing. E.A.K.

N86-15475# Joint Publications Research Service, Arlington, Va.
CALL TO EXPAND INFORMATION NETWORK FOR BASIC RESEARCH c82
Joachim Kramer *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 14-20 refs Transl. into ENGLISH from Das Hochschulwesen (East Berlin, East Germany), v. 33, no. 6, Jun. 1985 p 168-171 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

Contributions to the acceleration of scientific-technical progress by modern technologies of production processes are outlined. The potential is given two essential challenges: (1) to achieve results that, in the sense of fundamental solutions, contribute to the sciences' own development, determine development directions, insure instruction on a high level, lay long-range foundations for technically applicable results and; (2) to make apt achievements within shorter time spans, so that they may result in effects on the national economy as they are made part of the national restructuring process as new technologies or products. There is a special need for achievements that are sufficiently superior to the international state of technology and are suitable to have important long-range effects, especially on production and export. E.A.K.

N86-15476# Joint Publications Research Service, Arlington, Va.
GDR SCIENTISTS DEVELOP ELECTROLUMINESCENCE DISPLAY c33
Christian Waldner *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 21-22 Transl. into ENGLISH from Volksstimme (Magdeburg, East Germany), 20 Jun. 1985 p 4 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

Electroluminescence display devices were developed. A laboratory technology was developed which allowed the manufacturing of models of such a display. In the displays the conversion is accomplished by a very thin layer consisting of a semiconducting compound which is based upon a glass support only a few millimeters in thickness. This thin film, embedded in equally thin layers of insulation, is covered with a superfine lattice of electrode strips. The light emitting diodes (LED) have advantages over the liquid crystal displays in high contrast and greater brightness. E.A.K.

N86-15477# Joint Publications Research Service, Arlington, Va.
SCIENTISTS CITE USES OF CRYOGENICS, LOW TEMPERATURE MEASUREMENT
Rudolf Knoener and Reinhold Weiss *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 25-27 Transl. into ENGLISH from Neues Deutschland (East Berlin, East Germany), 27-28 Jul. 1985 p 8 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

Temperatures means the phenomena and processes occurring at temperatures below 120 K. Cryogenics deals with the production and the technical and technological application of temperatures below 120 K, in contrast to refrigeration technology, which is responsible for the temperature level above that. In the production of very low temperatures the efficiency of refrigeration machines declines as temperatures fall and that a temperature of absolute

zero can never be reached. It means that lowering the temperature to -100 degrees Celsius is substantially more expensive than increasing the temperature to +100 degrees Celsius. In attempting ever-lower temperatures completely novel natural phenomena are observed. The physical properties of a great many materials change drastically when temperatures are lowered significantly. The change in the mechanical properties of metals with temperatures causes high-alloy steels to be used in low-temperature facilities to preclude the brittle breaking of structural parts. Low temperatures are important in electrical engineering, where they can increase the electrical conductivity of the metals copper and aluminum, the conductors most used, by a factor of 10 with the lowering of the temperature to 80 K. E.A.K.

N86-15478# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
20 Nov. 1985 103 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-85-040) Avail: NTIS HC A06/MF A01

China Reports - Science and Technology, 20 November 1985 (JPRS-CST-85-040) contains articles on the Chinese Patent System, Computer Sciences, Isotope Chemistry, Acoustics, Aerodynamics, and Metallurgy. Of particular interest in this issue are items related to Computer Science, Research and image processing. For individual titles, see N86-15479 through N86-15483.

N86-15479# Joint Publications Research Service, Arlington, Va.
MC68000 MONITOR PROGRAM DISASSEMBLED **c61**
Yuan Hongchun *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 6-18 Transl. into ENGLISH from Weixing Jisuanji (Chongqing, China), no. 2, 14 Mar. 1985 p 102-107 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

A monitor for the MC68000 single board microcomputer has been developed. It is the DJS-0600N 16-bit single bord microcomputer, which underwent technical evaluation in July 1984, and is now being produced in small quantities at State Factory 830. The original MC68000 twenty-six monitor command inventory was broken down, analyzed, and adapted for the new monitor. F.M.R.

N86-15480# Joint Publications Research Service, Arlington, Va.
MICROPROCESSOR APPLICATION IN ERROR CODE CORRECTION **c61**
Zhou Dahua and Liu Yuqin *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 19-32 refs Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), v. 15, 10 Feb. 1985 p 2-8 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

Microprocessor software is used to correct error codes. Hamming code and cyclic code are interwoven to correct 8 bits of burst error. Thus, the use of complicated equipment required in the conventional interweaving method can be avoided. Author

N86-15481# Joint Publications Research Service, Arlington, Va.
NOVEL CONTROL CIRCUIT FOR PROXIMITY FOCUSED MICROCHANNEL PLATE IMAGE INTENSIFIERS **c33**
Zhou Xuan *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 33-44 refs Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 6, no. 6, Nov. 1984 p 473-480 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

A microchannel plate image intensifier and a gating pulse generator, which controls its shutter effect, constitute a super high-speed camera with high gain and fast response. A comparison of three pulse control modes for a typical second generation image intensifier (18 mm, Model ITT-F4111 image intensifier) is made. Based on the comparison, a novel control circuit for gating the photocathode of the image intensifier, as well as capable of generating high amplitude nanosecond pulses, is introduced. It is experimentally determined that the exposure time of the camera could reach approximately 2 ns by using this control generator. In addition, the paper discusses the match between the generator and the image intensifier. Furthermore, a simple and effective method is introduced to eliminate multiple exposures which are to be avoided in single shot photography. Author

N86-15482# Joint Publications Research Service, Arlington, Va.
DELAY EFFECT IN PULSED AVALANCHE DISCHARGE OF AN XeCl LASER AT HIGH GAS PRESSURE **c36**
Lou Qihong *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 45-49 refs Transl. into ENGLISH from Wuli Xuebao (Beijing, China), v. 34, no. 7, Jul. 1985 p 960-963 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

The pulsed avalanche discharge process in an XeCl laser at pressures up to 10 atm is analyzed and the effect of the delay phase on discharge formation time is discussed. By comparison with experimental results for a pulsed avalanche discharge in an XeCl laser, a critical avalanche track length of about 1 mm is derived. Author

N86-15483# Joint Publications Research Service, Arlington, Va.
PSEUDOINVERSE RESTORATION OF BLURRED IMAGE IN UNIFORM MOTION **c64**
Si Xianyu, Zhang Guanshen, Zhang Shaoying, and Li Yongguo *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 50-56 refs Transl. into ENGLISH from Journal of Sichuan Univ. Natural Science Edition (Chengdu, China), no. 2, 1985 p 44-49 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

Earlier mistakes in the iteration formula for the restoration of blurred images in uniform motion are identified. The correct formula is given. In addition, a pseudoinverse restoration method, which adds a corrected image to a basic image, is introduced. Results obtained from the computer show that this method is effective. Author

N86-15484# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING Abstracts Only
24 Oct. 1985 92 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-85-011) Avail: NTIS HC A05/MF A01

USSR Reports, Electronics and Electrical Engineering, 24 October 1985, (JPRS-UEE-85-011) contains reports on solid state circuits, communications, electromagnetic compatibility, electron devices, microwave theory and techniques, industrial electronics and control instrumentation, magnetics, computers, power engineering, quantum electronics, electro-optics, and antennas and propagation. Of special interest in this issue are articles on semiconductor circuits, MOS structures, performance prediction in transistors, integrated circuits, and large-scale integration circuits, oscillators with multifrequency SAW resonators, stroboscopic transducers, changes in semiconductors during optical pumping, dynamic characteristics of tristable-logic integrated circuits, error reduction in integrated-circuit CMOS switches, and indoor radio telemetry. For individual titles, see N86-15485 through N86-15513.

N86-15485# Joint Publications Research Service, Arlington, Va.
SURFACE PASSIVATION OF SEMICONDUCTOR CIRCUIT ELEMENTS WITH LAYER OF WIDEBAND SEMICONDUCTOR Abstract Only **c33**
B. I. Sysoyev, N. N. Bezryakin, A. S. Dronov, and A. P. Rovinskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 2-3 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 140-143 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Protective surface passivation of semiconductor elements for circuit integration is studied experimentally on Al-SiO2-ZnP2-Si structures and evaluated theoretically on the basis of the MOS*S-structure model. Specimens for this study are built on n-Si and

p-Si single crystals with high electrical resistivity rho approx. = 7.75 ohm.cm) and with orientation in the <111> plane or the <100> plane. Layers of beta-ZnP2 are deposited by vacuum evaporation to various thicknesses of 0.1 to 1.2 microns. Data on charge redistribution in the ZnP2-Si system are obtained by measurement of high-frequency capacitance-voltage characteristics, 1 MHz having been empirically found to be the most suitable tect frequency. The results reveal that the capacitance of structures on high-resistivity silicon depends on both the magnitude and the sign of dV/dt, unlike the capacitance of structures on strongly doped low-resistivity (rho - 0.01 ohm.cm) silicon, this dependence being related to modulation of the space-charge region in the Si substrate. The state of this space-charge region in an Al-SiO2-ZnP2-Si structure almost corresponds to the state of flat energy bands. With a thin ZnP sublayer (d < 0.4 micrometers, this space-charge region is controlled even by a dV/dtt < 0.01 V/s. With a thick ZnP2 sublayer (d > 2L sub Dubye), on the other hand, the charge in the SiO2 layer has almost no influence on the state of the space-charge region in the Si layer. Therefore, a sufficiently thick ZnP2 sublayer (d > 0.7 micrometer) ensures a voltage-independent capacitance of the structure approximately corresponding to the state of flat energy bands in Si. Author

N86-15486# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF ELECTROPHYSICAL AND PHOTOELECTRIC PROPERTIES OF MOS-STRUCTURES ON INDIUM ARSENIDE Abstract Only **c33**
Ye. A. Loskutova, V. N. Davydov, and T. D. Lezina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 3-4 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 134-139 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

An experimental study is made of MOS-structures on InAs, for an exploration of their electrophysical and photoelectric characteristics. Specimens are prepared from n-InAs single crystals with a [111] orientation and a donor concentration of 1.6 10 to the 16th power cu cm. Their chemico-mechanically and mechanically polished surfaces are oxidized galvanostatically in a 20% solution of orthophosphoric acid on ethylene glycol with an anodizing current density of 1 A/sq. cm., until a 0.1 micrometers thick anodic oxide film characterized by a breakdown voltage of 40 to 50 V and a leakage current of 10 to the -10 power A/sq. cm builds up. A semitransparent nickel electrode is deposited by vacuum evaporation. The capacitance-voltage characteristics are measured by the frequency-divider method at 1 MHz, with no capacitance dispersion found over the 300 kHz to 10 MHz range. The photo-emf is measured with a light-activated diode at the 0.95 micrometers wavelength and a 70 Hz modulation frequency. The data obtained include voltage of the flat energy bands and hysteresis of the capacitance-voltage characteristic on both positive and negative halves of the voltage sweep (-14 V yields 0 yields +14 V) at a constant reverse bias (-5 V), spectrum of surface states and voltage dependence of the small-signal photo-emf over the -10-(-2) V range at various voltage sweep rates, also dependence of the photo-emf on the frequency of radiation intensity modulation at various field-electrode voltages and temperature dependence of the photo-emf under weak and strong inversion of the InAs surface. Author

N86-15487# Joint Publications Research Service, Arlington, Va.
PREDICTING AND DIAGNOSING PERFORMANCE OF TRANSISTORS, INTEGRATED CIRCUITS AND LARGE-SCALE-INTEGRATION SYSTEMS BY MULTILEVEL SIMULATION METHODS AND PROGRAMS Abstract Only **c33**
A. N. Bubennikov, B. N. Mitashev, and A. D. Sadovnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 5 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 3-7 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Application of multilevel simulation methods and programs to discrete transistors as well as to integrated circuits and large-scale-integration systems is considered, for effective performance and reliability evaluation on the basis of technological, physico-topological, or componential models. To predict and diagnose the behavior of such devices, it is necessary to determine the sensitivity of electrical characteristics on design, structural, and fabrication factors. The most important factors are increase of the perimeter-to-area ratio of the surface-recombination component of the base current, relative increases of the peripheral minority-carrier injection current, effects of high doping and injection levels, and effects of low collector-junction breakdown voltage of thin-film semiconductor structures. Author

N86-15488# Joint Publications Research Service, Arlington, Va.
NONSINUSOIDAL MODES OF OSCILLATOR WITH MULTIFREQUENCY SURFACE-ACOUSTIC-WAVE RESONATOR Abstract Only **c33**
G. L. Gurevich, L. N. Zhizhenkova, V. M. Pashkin, and A. M. Spasyuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 6 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 604-611 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Quartz resonators for stabilization of oscillators are being replaced by SAW resonators, because the latter can operate at higher frequencies with the same high stability and are technologically more advantageous. A multifrequency SAW resonator is considered as a means of producing tunable monochromatic signals for such applications as frequency synthesizers and multistate memories. Such a resonator is also capable of producing simultaneous oscillations at several frequencies resulting in a modulated and thus nonsinusoidal output signal. Such a resonator is formed by a pair of interdigital electroacoustic transducers with a highly inductive load each, to ensure a high reflection coefficient, and with feedback through a unidirectional amplifier between them for compensation of losses. Its performance is analyzed on the basis of the admittance matrix which relates currents and voltages in the equivalent electric circuit. Steady state and transients are included in the general analysis. Author

N86-15489# Joint Publications Research Service, Arlington, Va
NOISE CHARACTERISTICS OF STROBOSCOPIC TRANSDUCERS BUILT WITH GaAs MICROCIRCUIT INTEGRATION Abstract Only **c33**
V. I. Staroselskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 7-8 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 162-168 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Stroboscopic transducers are used for measuring electric signals over a wide frequency range, the sensitivity of these devices being largely determined by the equivalent input noise voltage. The internal noise level can be appreciably lowered and the performance of such a transducer correspondingly improved by GaAs microcircuit integration of the input stage. A chip of 1x1 sq mm area can carry a mixer bridge of four Schottky-barrier diodes, a storing capacitor with discharge circuit, and a voltage repeater on Schottky-gate field-effect transistors, shot noise in the mixer diodes, and flicker noise in the diodes as well as in the voltage repeater. Two noise mechanisms are identified, corresponding to the two modes of transducer operation: mixer noise alone during strobing, mixer noise with noise in the discharge circuit and in the voltage repeater during measurement of widened pulses. The resultant spectral noise density is calculated on the basis of these identifications and corresponding equivalent circuit diagrams. During strobing the flicker noise appears as a multiplicative component and its deviation from the 1/omega law determines its lower frequency limit. During measurement of a widened pulse the noise

is limited to the pass band of the output amplifier-integrator stage and a low-pass filter before this stage becomes desirable. Author

N86-15490# Joint Publications Research Service, Arlington, Va.
STRUCTURAL TRANSFORMATIONS IN SEMICONDUCTORS DURING OPTICAL PUMPING Abstract Only c33
Yu. V. Kopayev, V. v. Menyaylenko, and S. N. Molotkov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 8-9 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 153-161 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Phase transformations in AIVBVI semiconductors which occur during irradiation by a laser beam are analyzed on the basis of a theoretical model with the electron energy-band spectrum in the zeroth-order approximation and with the coupling in p-orbitals assumed to be strong, a characteristic feature of AIVBVI semiconductors being their deviation from stoichiometry and a consequently high doping level. Instability of their cubic lattice stems from the behavior of the Fermi surface in the hypothetical metallic initial phase. Distortion of the cubic lattice is accounted for by the phase potential. With the difference between A and B atoms disregarded, the electron spectrum corresponds to three one-dimensional half-filled energy bands. Nonequivance of A and B atoms is then taken into account by introduction of the ionicity potential. Dependence of the energy gap on the ionicity level and on the doping level is established, whereupon the dependence of the energy gap on the pumping power is bound to be unique at ionicity levels below critical and ambiguous at ionicity levels above critical. Laser pumping evidently weakens the effect of doping. Author

N86-15491# Joint Publications Research Service, Arlington, Va.
METHODOLOGY FOR DETERMINING DYNAMIC CHARACTERISTICS OF TRISTABLE-LOGIC INTEGRATED CIRCUITS Abstract Only c33
A. M. Pashayev and A. R. Adzhalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 9 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 169-170 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The problem of determining the dynamic characteristics of integrated-circuit transistor-transistor logic with three stable states is considered. The third state besides logic 1 and logic 0 is a high-impedance open-circuit state equivalent to that of a relay with normally open contact. Measurement of the dynamic characteristics in this state is very difficult, even with automatic or semiautomatic instruments, because the INHABIT potential of an input pulse cannot be established with sufficient accuracy. There has therefore been proposed determination by prediction on the basis of a set of output parameters, using analytical relations between electrical parameters along with functional relations as well as correlations between parameters of the integrated circuit and those of its components. In tests, moreover, one will use statistical distributions of integrated-circuit parameters. According to this methodology, within prescribed tolerances on easily measurable dynamic parameters in the resolving state, one can calculate other parameters such as the signal-propagation delay time with a guaranteed probability of 0.9937 according to the three sigma rule. Author

N86-15492# Joint Publications Research Service, Arlington, Va.
REDUCING DYNAMIC ERRORS OF INTEGRATED-CIRCUIT CMOS SWITCHES Abstract Only c33
A. A. Danilov and D. Ye. Polonnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 10 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 178-179 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Analog CMOS switches and commutators such as those of series 590 and 571 feature high open-state resistance, low and nonlinear conducting-state resistance, low residual voltage, bidirectionality, potential coupling between switch or commutator circuit and control circuit, high speed, and voltage as well as current switching capability. Their major drawbacks are high interference level and long transient period, high input and output capacitances, high temperature coefficient of resistance and appreciable open-circuit leakage current. An analysis of an inverter-controlled CMOS transistor pair reveals that interference signals generated by passage of the control-voltage pulsefront through the gate-channel capacitances in the two complementary transistors, successively, do not compensate one another but add up. At the same time, the main cause of a slow output signal transient are transients in the control circuit which prolong the rise time of the control-voltage pulse. The oscillatory transient with overshoots travels through the gates to the channels, subsequently appearing across the switch resistance and thus prolonging the output signal transient. Author

N86-15493# Joint Publications Research Service, Arlington, Va.
OPTIMUM FREQUENCY OF COMMUNICATION CHANNEL FOR INDOOR RADIO TELEMETRY Abstract Only c17
A. A. Kvitka, B. I. Podlepetskiy, and S. D. Chernysheva *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 14 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 70-73 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A major problem in application of radiotelemetry to biological research and medical practice is indoor interference caused by superposition of forward and reflected waves, with resulting signal fadeout. Avoidance of this effect requires that the radio transmitter operate at the optimum signal wavelength and the radio receiver be placed in the optimum location. A method of determining both is proposed on the basis of an experimental study and a theoretical model. Measurements are made with the Prima radiotelemetry system developed and built by A. A. Kvitka with others and V6-1 selective microvoltmeter, in an 8x5x3.5 cu m large room where the radio receiver is placed successively in three different locations (first in corner 0,0,0 m, then closer to the center 2.5,1.5,1.0 m and 1.25,0.75,1.0 m) while the radio transmitter on a dielectric post is moved around in 0.25 m steps successively in three horizontal planes 1, 1.5, 2 m, respectively, above the floor. Measurements are made at eight frequencies (60, 30, 20, 15, 12, 10, 8.89, 7.5 MHz). Author

N86-15494# Joint Publications Research Service, Arlington, Va.
MAIN TRENDS IN SATELLITE COMMUNICATION AND BROADCASTING RESEARCH Abstract Only c32
Yu. B. Zubarev and L. Ya. Kantor *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 16-17 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 5, May 1985 p 15-18 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The main advantages of satellite communication systems are possibility of multiple-call communication over a wide geographical zone, multistation access to a common satellite trunk resulting in a high utilization factor, formation of direct channels between any ground stations, commutation of floating channels in the time domain according to demand, and elimination of the distance between ground stations as a factor influencing the channel quality and cost. Satellite communication systems also have physically inherent drawbacks, namely a long signal delay of up to 300 ms in geostationary of Molniya systems, a Doppler frequency shift of up to + or - 10 to the minus 8 power in a geostationary orbit or up to + or - 10 to the minus 5 power in an elliptical orbit, and predictable short interruptions caused by solar effects on the antennas of ground stations or during necessary switching from one satellite to another. With the advantages well established and the drawbacks taken into consideration, a major effort is underway to fit satellite communication into the Unified Automatic Communication Network. One promising development is television broadcasting via satellite, which requires a channel within the

12 GHz frequency band and a narrow beam so as to facilitate broadcasting of republic-wide programs and reception of more nationwide programs within any given broadcast zone where no more channels within the Ekran, Moskva, Orbita frequency bands are available. B.W.

N86-15495# Joint Publications Research Service, Arlington, Va.
TRANSMISSION OF TELEVISION SIGNALS OVER OPTICAL COMMUNICATION CHANNEL BY MEANS OF FREQUENCY MODULATION Abstract Only c32
Yu. M. Kirik, M. I. Krivosheyev, Yu. I. Marimont, Yu. A. Kharitonova, A. I. Shlayn, and Ye. A. Shchervakov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 17 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 5, May 1985 p 28-30 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

Frequency modulation is considered as means of transmitting television signals over fiber-optic communication channels, because this method remains viable in nonlinear channels and retains a high signal-to-noise ratio even at a high modulation index. Its advantage over pulse-rate modulation, also an effective method for this application, is that a much narrower frequency band suffices and no special modem equipment needs to be installed. The signal-to-noise ratio is in this case defined as the ratio of image signal voltage squared to weighted noise signal squared. It is calculated here accordingly, at the subcarrier frequency, for a receiver channel with an avalanche photodiode as current source or with a p-i-n photodiode as a special case with unity mean avalanche multiplication factor. An experimental verification was made with a 32DL103 semiconductor laser emitting radiation at the 0.85 micrometer wavelength and a 0 to 60 dB adjustable light intensity attenuator on the transmitter side. On the receiver side was used a germanium or silicon photodiode and an intermediate-frequency pre-amplifier in a common housing, the first stage of the preamplifier built on a field-effect transistor with an input impedance of 400 ohms resistive after compensation of the input capacitance by a circuit with a 30 MHz bandwidth at the 70 MHz center frequency. B.W.

N86-15496# Joint Publications Research Service, Arlington, Va.
APPARATUS FOR EXPERIMENTAL STUDY OF HIGH-RESOLUTION RADIOMETERS AND THEIR CHARACTERISTICS Abstract Only c35
A. V. Afonin, A. P. Zakharnev, and G. I. Muravyeva *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 24 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 33-35 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A test stand has been developed and built for determining the characteristics of high-resolution optoelectronic instruments such as radiometers experimentally. Its main optical components are a collimator with a telephoto lens of 4544 mm focal length, for simulating an infinitely far object of 5 inches angular width. Optical fibers of a light collector-conductor are placed with their glowing exit apertures between the focal plane and the first optical surface of that lens so that their distance from the entrance pupil of a tested instrument can be simulated at a distance from 2.5 m to infinity. Other optical components include a lamp, a modulator followed by a condenser lens between the lamp and the entrance aperture of the fiber-optic bundle, two external point light sources, an objective which together with two fixed-and-scanning mirror pairs produces moving images of these sources, a luminaire, a shield, a photometric sphere with the luminance of its window controllable over the 10 to the minus 4 power - 250 cd/sq m range, a light-splitter plate before the photometer window, and a light-activated diode operating in the pulse mode for measuring the transfer characteristics of the tested instrument. The test stand was used for determining the pulse response characteristic of a scanning radiometer with a 40 inches wide field of vision. B.W.

N86-15497# Joint Publications Research Service, Arlington, Va.
FREQUENCY CHARACTERISTICS OF DIFFERENTIAL OPTRON Abstract Only c33
A. K. Mamedov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 25 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 76-78 Original language document was announced in IAA as A85-34176 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

An experimental study of the frequency response of an optopair of differential optrons of type KOD301 is presented. It is shown that good agreement between the transfer characteristics of the main and auxiliary optopairs is maintained in the frequency band. The optopair mode of operation that provides for minimum time lag is defined. B.J. (IAA)

N86-15498# Joint Publications Research Service, Arlington, Va.
HIGH-POWER SOURCES WITH SMOOTHLY ADJUSTABLE PULSE DURATION FOR POWERING GAS-DISCHARGE TUBES OF LASER PUMPING SYSTEMS Abstract Only c36
V. M. Vakulenko, L. P. Ivanov, Yu. A. Ganshin, I. L. Karpyshev, and V. A. Korneyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 29-30 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 19-20 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A series of power supplies for gas-discharge tubes in laser pumping systems has been developed on the basis of the same circuit but with different levels of partial discharge of the capacitive energy storing device. The charger converts the a.c. network voltage into a constant current, very efficiently and at the same charging rate regardless of the discharge level An overall size and weight reduction is made possible by an intermediate frequency conversion from 50 Hz to 1 kHz, which also allows raising the repetition rate of output pulses. The charger consists of an inverter and a rectifier. The parallel-type inverter includes a thyristor-diode bridge with capacitors and a transformer, and a choke coil, for converting the sine-wave a.c. network voltage into a higher-frequency (1 kHz) square-wave alternating one after the first rectifying it. An important feature here is stiff overvoltage suppression, especially across the switching capacitors, during wide swings such as from no load to full load. The rectifier includes a 300/1000 V step-up transformer with another thyristor-diode bridge and a choke coil in series. A discharge commutator across the rectifier output shunted by a filter-capacitance ensures proper cutoff of the charge discharge current and corresponding control of the pulse duration. B.W.

N86-15499# Joint Publications Research Service, Arlington, Va.
HIGH-POWER PULSE GENERATOR WITH PULSEFORM CONTROL FOR POWERING GAS-DISCHARGE TUBES OF LASER PUMPING SYSTEMS Abstract Only c36
L. P. Ivanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 30-31 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 21-22 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A power pulse generator with controllability of the pulseform as well as with regulation of the pulse amplitude, duration, and repetition rate is very desirable as a power supply for gas-discharge tubes of laser pumping systems. An outstanding example of such a generator is one which consists of split capacitive and inductive energy storing devices, with thyristors used for switching. The pulseform is varied by changing the connections between capacitive and inductive elements in the parallel-series grid and by regulation of the switching schedule. A typical generator consisting of five capacitors, seven thyristors (controlled rectifiers), four diodes (fixed rectifiers), and a choke coil can power a gas-discharge flash tube with a variety of pulses depending on the particular application. A welding laser, for instance, requires a pulse which peaks early its leading edge and then drops to a lower level so as to maintain the melt at a constant temperature before it falls along its trailing edge. A piercing laser requires a pulse which peaks late so as to

facilitate removal of the liquid phase of material from the hole, just before it falls along its trailing edge. B.W.

N86-15500# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF UNIDIRECTIONAL FERRITE MICROSTRIP LINES Abstract Only **c32**
P. P. Bobrov, A. V. Gidlevskiy, and Yu. A. Kirsanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 32 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 64-67 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

An experimental study of unidirectional ferrite microstrip lines was made, for the purpose of determining their characteristic and input impedances as well as the effect of insertion of a lumped inhomogeneity on the unidirectional properties. The characteristic impedance was determined by comparison of a known lumped load impedance along the line with the input impedance near the free edge of the upper conductor, after measurement of the complex reflection coefficient as the ratio of output-to-input complex voltage amplitudes over the 1 to 3 GHz frequency range with a DK1-5 instrument and a 50 ohm standard S6-2A resistor (ceramic cylinder with absorbent coating layer of thickness equal to that of the ferrite substrate). The characteristic impedance was found to be low, within 3 to 5 ohms for the 60SCh ferrite material, and to thus limit the range of insertable amplifying or control elements. The data are useful for design optimization of rectifiers, circulators, attenuators, modulators and other nonreciprocal devices on microstrip lines. Author

N86-15501# Joint Publications Research Service, Arlington, Va.
SELF-MODULATION INSTABILITY OF GYROTRON EMISSION Abstract Only **c35**
G. S. Nusinovich and V. Ye. Zapevalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 36 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 563-570 Original language document was announced in IAA as A85-30487 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A description is given of a method for analyzing the conditions of self-modulation instability (SMI) in a wide class of electron masers with resonators having a nearly equidistant spectrum of natural frequencies. It is shown that stable high-efficiency single-mode oscillation can be achieved in a gyrotron with an arbitrarily dense spectrum of competing modes. However, in the case of an arbitrary frequency distribution of competing modes, SMI arises if the magnitude of the beam current is more than twice that of the efficiency-optimal current under conditions of high-efficiency single-mode oscillation. B.J. (IAA)

N86-15502# Joint Publications Research Service, Arlington, Va.
ACTIVE MAGNETIC SUSPENSION IN MAIN MAGNETIC FIELD OF ELECTRIC MOTOR Abstract Only **c33**
I. D. Urusov, V. I. Galkin, and I. P. Likhoshvay *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 50 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 38-41 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

An active magnetic suspension for the rotor of an electric motor is considered, especially in small or miniature high-speed devices such as gyros, microturbomachines, and machine-tool spindle drives where it would eliminate the need for extra bearings and contribute to size and weight reduction. A disk-type rotor made of a ferromagnetic material is located horizontally inside the bore of a vertical stator so that weight and external loads compensate the magnetic pull upward. This pull is generated by the magnetic field in the air gap and can be automatically controlled by an electronic feedback circuit which regulates the stator input voltage depending on the rotor position along the stator bore, with a displacement transducer on the rotor indicating the position. The performance of such a suspension with automatic control in a 3-phase induction motor is analyzed on the basis of the system of differential equations describing the behavior of the electromechanical system during axial oscillations of the rotor, assuming a constant rotor speed during the transient periods. B.W.

N86-15503# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODELING OF MAIN LIGHTNING STAGE Abstract Only **c47**
B. N. Gorin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 53 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 10-16 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A mathematical model is constructed describing the main stage of lightning buildup. The corresponding system of two differential equations for the potential and the current, in the one-dimensional approximation, is based on the analog a spark in a long discharge gap and on a power function of time (power exponent $n = 1.5$ to 4) simulating the voltage transient. All parameters of the lightning channel are evaluated on the basis of applicable circuit relations and available data. The conductance is a function of the electric charge present as well as on the current pulse characteristics (rise time, amplitude, half-fall time), while the inductance is approximately constant and equal to that of an equivalent vertical conductor. The dynamic capacitance is more difficult to determine, requiring an analysis of the streamer field and the neutralization process. Reasonable assumptions are made regarding the electric field in a cylindrical vertical channel and, with all necessary parameters established, the system of equations is reduced to a form suitable for computer-aided numerical solution by the method of characteristics. Author

N86-15504# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF ELECTROMAGNETIC FORCES IN MAGNETIC FIELD CALCULATIONS Abstract Only **c32**
A. G. Nazaryan, A. L. Mailyan, and E. Kh. Adzhemyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 54-55 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 58-60 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A procedure is outlined for determining the electromagnetic force in the equation of motion for an electrical machine. Instead of approximating the inductance, the force is determined directly from the magnetic field distribution corresponding to a specific relative position of the electromechanical system components. The field pattern is most intricate, with the magnetic induction changing most abruptly, in the regions of strong fringing at corners of teeth or salient poles in the air gap. Calculations for plotting the magnetic field by the method of finite elements or finite differences yields most accurate results when the selected surfaces pass through points where components of magnetic induction have discontinuities or overshoots. The procedure is demonstrated on a machine with rectangular slots on both sides of the air gap and with the magnetic cores made of E1A steel. The magnetization curves for all components of the ferromagnetic structure are approximated. In calculating electromagnetic forces on the conductors in slots by this method, it has been found to be most expedient to treat them as tension forces. Author

N86-15505# Joint Publications Research Service, Arlington, Va.
PULSE-TYPE VOLTAGE STABILIZER WITH INTEGRAL PULSE-WIDTH MODULATION Abstract Only **c33**
I. A. Fedorova, A. P. Kuznetsov, and L. Yu. Shilin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 55-56 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 60-61 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A voltage stabilizer with integral pulse width modulation consists of a power amplifier followed by a low pass filter for the line voltage, a reference oscillator and a variable ratio frequency divider, and a pulse phase detector which performs the integral control

by comparing the two incoming signals from the reference oscillator and the frequency divider respectively, and feeds the mismatch signal to the power amplifier. The operation of such a voltage stabilizer is best analyzed on the basis of a system of two equations describing respectively the state vector and the output signal of its continuous linear amplifier filter part, assuming that the latter has a constant structure, as functions of time. From these equations and the law of unipolar integral pulse width modulation are obtained the performance characteristics of the voltage stabilizer in the locking mode. The error load characteristic and the stability limits as well as the locking band of a voltage stabilizer whose continuous linear part has the simplest transfer function indicate that there is an optimum load resistance corresponding to the minimum stabilizer error. An increase of the load resistance will gradually increase the error until the locking and stabilization limit is exceeded. A decrease of the load resistance below that optimum will actuate the overload protection and thus cut out the voltage stabilizer altogether. Author

N86-15506# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF OPTICAL FILTERS ON CdSe-HgSe BASE Abstract Only **c74**
N. P. Gavaleshko, S. Yu. Paranchich, L. D. Paranchich, and V. G. Antoshchuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 58-59 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost Leningrad, USSR), no. 1, Jan. 1985 p 10-11 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The two compounds CdSe and HgSe form pseudobinary alloys Cd sub x Hg sub 1 - x Se whose energy gap and refractive index depend on the composition and the temperature. The filter properties of these materials were measured in an experimental study, to determine the suitability of such filters for matching infrared devices with the window in the atmosphere. Their transmission spectra, wavelength dependence of the transmission coefficient over the 2 to 8 micrometer range, were measured at 300 K and at 80 K. They were also measured before and after heat treatment at 200 C for 50 h in vacuum or in mercury vapor as well as before and after clearing with SiO. The data yield the basic filter characteristics, namely the maximum transmission coefficient and the corresponding wavelength in a peaking spectrum or wavelength range in a flat spectrum. The data are also useful for stoichiometric control of the transmission band as well as the transmission level. The transmission coefficient increases with an increase of the cadmium content owing to an increase of the energy gap which in this system varies from 0 to 1.8 eV. Annealing in vacuum increases the transmission coefficient at the long-wave end and decreases the slope of the short-wave edge, annealing in mercury vapor having a similar effect on the short-wave edge. Author

N86-15507# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF HOLOGRAM ANALYZER WITH SINGLE-COMPONENT OPTICAL HOLOGRAM MATCHING SYSTEM Abstract Only **c35**
L. T. Mustafina, N. P. Kutikova, and N. B. Frantsuzova *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 62 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 4, Apr. 1985 p 8-10 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A hologram analyzer is examined in which variable magnification of the image is achieved by placing the holograms in matched planes at close to twice the focal length of the single component optical system. The analyzer is made up of a light source, a rotating diffuser, a focusing lens, two holograms, a spatial filter, a matching lens, a receiving lens, a diaphragm, and the photographic film. The system permits arbitrary orientation of the interference bands with minimum distortions of the interacting wavefronts. Author

N86-15508# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ROUGHNESS OF ENDS OF FIBER OPTIC PLATES ON MODULATION TRANSFER COEFFICIENT Abstract Only **c74**
L. I. Vasin, A. V. Guzhevskaya, and D. K. Sattarov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 64 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 4, Apr. 1985 p 56-57 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The modulation transfer coefficient is investigated for the series of selected spatial frequencies as a function of the roughness of the treated ends of fiber optic plates. Seven plates prepared from a single block of multiconductor light guides made of KBF10-VT046 glass were investigated. The investigations were performed by finding the modulation transfer coefficient of the polished plates, and comparing that value with the figure found after polishing one of the ends with one of a series of silicon carbide powders. It is found that the modulation transfer coefficient is the same, to within the measurement error, for all of the plates polished on the resin device; felt polished plates exhibit modulation transfer coefficients coinciding with those of other parts only in the low frequency region; at 25 lines per mm, the coefficient then becomes significantly lower than for any other plates. This indicates that the form of the working end, all otyher conditions being equal is a determining factor in transmitting the contrast of an image by a fiber optic part. Author

N86-15509# Joint Publications Research Service, Arlington, Va.
GENERATION OF ELECTROMAGNETIC RADIATION IN RADIO-FREQUENCY BAND IN SOLIDS EXPOSED TO LASER RADIATION Abstract Only **c76**
A. D. Pogrebnyak and S. V. Rakitin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 67 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 4, Apr. 1985 p 773-775 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The development of a stabilized fabrication process for shaping optical parts with aspherical surfaces having slight asphericity (of approximately 10 micrometers using a mask during the polishing process by taking the asphericity allowance once is described. A recursive formula is derived for defining the i-th mask that measures the theoretical allowance H sub - 1 to within the random errors of the process. The use of the proposed method in polishing an Era-18 convex aspherical lens is described. The results confirm the possbility of using the mask method to produce aspherical optical parts on commercially produced type ShP equipment. Author

N86-15510# Joint Publications Research Service, Arlington, Va.
VENUS-15, VENUS-16 SYNTHETIC APERTURE RADAR ON VENUS SATELLITE ORBIT Abstract Only **c91**
A. F. Bogomolov, N. V. Zherikhin, and G. A. Sokholov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 71 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 259-274 Original language document was announced in IAA as A85-34876 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The principles of the radar survey of the Venus surface made by the Venus-15 and Venus-16 missions are described. Basic technical data for the Polyus-V2 synthetic aperture radar on board the Venus-15 and Venus-16 are given in a table. A photograph is shown of the instrumental container with the antenna system mounted on it. The construction is described of the radar displays and the means and order of data processing by the ground-based stations are discussed. Radar pictures of the Venus surface and altitude profiles are shown. Information was obtained on approximately 115 million km2 of the Northern Hemisphere of Venus and surface images of almost optical quality make it possible to begin mapping of the planet. Author

N86-15511# Joint Publications Research Service, Arlington, Va.
ABSOLUTE MEASUREMENTS OF ANTENNA PARAMETERS BY ILLUMINATION METHOD Abstract Only c32
S. A. Pelyushenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 71-72 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 275-282 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A new method for absolute calibration of antenna gain is described which uses a metal disk located in the far field of the antenna, which reflects the wideband noise signal radiated by the antennas as the calibrated transmitter. A block diagram is shown of the radiometer and the antenna feeder sections. The results of measurements of the effective area of the RTN-7 radio telescope at lambda = 95 cm agree well with data from the simultaneous calibration of the RTN-7 by the black disk method. Graphs are presented of the dependence of the signal-to-noise ratio on the magnitude of the signal illumination during matching of the feed. A diagram is shown of the directivity of the RTN-7 radio telescope in an azimuthal plane. The new method can also be used to measure the radiating power of antennas. Author

N86-15512# Joint Publications Research Service, Arlington, Va.
TIME CHARACTERISTICS OF SCATTERING BY RADAR TARGETS Abstract Only c32
V. I. Kirmasov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 73-74 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 16-19 Original language document was announced in IAA as A85-34170 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

A simple method for calculating the temporal scattering characteristics of radar targets is proposed which involves the calculation of the ramp function in the framwork of the physical-optics approximation. The proposed method can be used to compile a catalog of target profile functions with the aim of target indentification. In addition, the computed profile functions can be used as input data for simulating algorithms for the reconstruction of three-dimensional images of targets (e.g., tomography-based algorithms), Numerical results are compared with experimental data for the 1.08 to 10.8 GHz range. B.J.

N86-15513# Joint Publications Research Service, Arlington, Va.
EFFECTIVENESS OF PHASE-CONJUGATION SYSTEMS IN TURBULENT ATMOSPHERE Abstract Only c32
A. V. Polovinkin and A. I. Saichev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 78 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 463-469 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

The performance of phase conjugation adaptive systems for ranging and probing is analyzed, taking into account turbulence of the real atmosphere. Specifically, a system is considered which reverses only the front of the incident wave, and builds up the reflected wave to an amplitude not dependent on that of the incident wave. The mean field intensity and the mean energy of reflected waves are calculated in the Gaussian approximation, with an attendant evaluation of their statistical characteristics, assuming that a spherical wave from a point source is reflected by such a phase conjugation system at a given distance L away and that the amplitude of the reflected wave is known. General relations are established and applied to reflectors with small aperture and correspondingly strong diffraction, to reflectors with apertures within the intermediate range, and to reflectors with large apertures with compensation and strong refraction. In both large and small apertures the mean intensity is equal to the intensity at the center, owing to the particular mechanism operating in each case. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-15514 Missouri Univ., Rolla.
A NEW APPROACH TO SIGNAL REGISTRATION WITH THE EMPHASIS ON VARIABLE TIME DELAY ESTIMATION Ph.D. Thesis
Mohamad Namazi 1985 203 p
Avail: Univ. Microfilms Order No. DA8516295

The problem of Signal Registration is viewed as a problem in nonlinear estimation. A received waveform r(t) is the sum of a nonlinearly modulated signal s(t,a(t)) and white Gaussian noise n(t) (power spectrum height No/2). The modulating signal a(t) is zero mean and has a known covariance function Ka(t,z). New algorithms are developed to estimate a(t) from r(t) = s(t, a(t)) + n(t). Special consideration is given to the problem of estimating a time-varying time delay. The performance of the estimation algorithm is studied both analytically and by simulation and compared to previously known techniques. Author

N86-15515 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL TELEVISION ROUTING SYSTEMS: AN INTRODUCTION TO INTEGRATED OPTICAL WAVEGUIDE TECHNIQUES AND DEVICES
J. P. Willson Aug. 1985 29 p refs
(BBC-RD-1985/9) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

The development of a digital standard for the coding of component video signals has raised the problem of the appropriate technology to be used for the routing and distribution of such signals within a television studio center. Optical fibers offer a numberr of advantages over coaxial cable, such as high bandwidth, low loss, and small size. However, a major problem with optical transmission is that of routing the optical signals. One possible solution is to use integrated optical switches. The application of such devices for fabricating a large (100 x 100) array suitable for an all-digital BBC Television Centre is considered. The conclusion is that there remains a great deal of development to be done before such an array is feasible. Author

N86-15516 University Coll. of North Staffordshire, Keele (England). Dept. of Communications and Neuroscience.
PROSODIC ANALYSIS BY RULE Final Report
D. Lindsay Feb. 1985 24 p refs, Sponsored by Joint Speech Research Unit, Cheltenham, UK
(Contract F7T/50377/C)
(BR94770) Avail: NTIS HC A02/MF A01

Research on the automatic computer analysis of intonation using linguistic knowledge is described. The use of computer programs to analyze and classify fundamental frequency (FO) contours, and work on the psychophysics of Biritish English intonation and on the phonetics of FO contours are described. Results suggest that FO can be conveniently tracked to represent intonation through time, which can be subsequently used by a computer program as the basis for analysis. Nuclear intonation, where the intonational nucleus is the region of auditory prominence, or information focus, found in all spoken sentences was studied. The main mechanism behind such prominence is the perception of an extensive FO movement on the nuclear syllable. A classification of the nuclear contour shape is a classification of the sentence type, often into categories that cannot be readily determined from only the segmental phonemes of the utterance. Author (ESA)

N86-15517# Sandia National Labs., Albuquerque, N. Mex. Simulation Theory Div.
FINITE-DIFFERENCE ELECTRODYNAMIC ANALYSIS OF A TAPERING COAXIAL WAVEGUIDE INCORPORATING A

DIELECTRIC WEDGE-SHAPED LENS FOR CONCENTRATING TRANSVERSE ELECTROMAGNETIC (TEM) WAVES

Charles N. Vittitoe and Robert E. Clark (Mission Research Corp., Albuquerque, N. Mex.) Dec. 1984 25 p refs
(SAND-84-2062) Avail: NTIS HC A02/MF A01

The three-dimensional, finite-difference, electrodynamic computer code SOS models a portion of a coaxial, azimuthally symmetric tapering waveguide. A transverse electromagnetic (TEM) wave is launched at the inlet section in an oil medium. The wave is reflected from a Lucite section, from a wedge-shaped water dielectric, from a vacuum section, and from the tapering conductors. The edge is a lens that aids concentrating the energy into the tapering section. Voltage and current traces are examined at several locations within the waveguide. They determine the 40 pF wedge capacitance that increases the pulse risetime from the input 0.5 ns to < 1.5 ns at the outlet. Alterations are discussed to include more effects within the waveguide, to reduce the outlet-signal risetime, and to reduce the probability of arcing. Appendixes describe a dielectric thin-wedge subgrid model and a treatment for dielectric-interface boundary conditions that were developed and implemented into SOS so the code would be applicable.
Author

N86-15518# Systems Control, Inc., West Palm Beach, Fla.
VHF-AM COMMUNICATIONS EQUIPMENT SELECTION AND INSTALLATION PRACTICES FOR HELICOPTERS Final Report, Sep. 1983 - Mar. 1984

E. H. Bolz and L. D. King Sep. 1985 46 p refs
(Contract DTFA01-80-C-10080)
(DOT/FAA/PM-85/8) Avail: NTIS HC A03/MF A01

The problems helicopter operators face when using VHF communications within typical operating environments where coverage by the network of ground stations may be deficient are addressed. This is of particular interest to IFR helicopter operators. The specific reasons why communications effectiveness can be limited in mountainous or remote regions, considering typical low helicopter operating altitudes, are reviewed. Recommendations to operators for improving the airborne VHF installation, and therefore improving its coverage capabilities, are presented. Several installation-related factors are discussed. These include the characteristics of the hardware, i.e., the transceiver and the antenna, and the characteristics of the installation, including antenna installation and resulting coverage pattern, the cable run, the effects of signal availability and ways of maximizing the capture of the available signal. A set of procedures is presented which allows operators to evaluate numerically the benefit in terms of signal strength or sensitivity they may expect given that they make specific improvements to a given actual or planned installation.
Author

N86-15519# Pacific-Sierra Research Corp., Los Angeles, Calif.
EXPERIMENTS IN LONG-WAVELENGTH COMMUNICATION USING MODULATED ELECTRON BEAM ANTENNAS: A PARAMETER STUDY Final Report, 15 Jun. 1984 - 13 Jan. 1985

L. E. Johnson Aug. 1985 137 p
(Contract DNA001-84-C-0288; AF Proj. 2305)
(AD-A157810; PSR-1513; RADC-TR-85-133) Avail: NTIS HC A07/MF A01 CSCL 20/7

This preliminary study scopes the feasibility of producing electromagnetic signals from modulated beam antennas in the ionosphere and detecting those signals on the ground. Restricted to frequencies between tens of hertz and a megahertz, the report is essentially a handbook that gives predicted characteristics of the radiation produced by modulated electron beams employed in four different experiments. THe first is hypothetical and is optimized for the generation of detection of long-wavelength radiation. The other three are BERT-I, SEPAC, and VCAP. GRA

N86-15520# Pennsylvania Univ., Philadelphia.
RESEARCH IN ADAPTIVE BEAMFORMING FOR SATELLITE COMMUNICATIONS Final Technical Report, Apr. 1983 - Oct. 1984

F. Haber, Y. Bar-Ness, C. C. Yeh, S. U. Pillai, and T. H. Chao May 1985 186 p
(Contract F30602-83-K-0046)
(AD-A157828; UP-VFRC-26-84; RADC-TR-85-96) Avail: NTIS HC A09/MF A01 CSCL 17/2

The results of a study on adaptive beam forming and interference cancelling pertinent to communication satellites are herein reported. The study was an extension of an earlier effort aimed at overcoming the effects of uncertainty in the formation of a pointing vector. That work led to the Hybrid Array which utilized prior information on signal direction and structure. The work herein described deals with: (1) improvements and alternatives to existing schemes of reducing sensitivity to pointing error; and (2) extensions to wideband schemes which are not overly sensitive to pointing error; and (3) methods to aid in the accurate determination of the pointing vector. GRA

N86-15521# Naval Postgraduate School, Monterey, Calif.
AN EXAMINATION OF SOME ERROR CORRECTING TECHNIQUES FOR CONTINUOUS SPEECH RECOGNITION TECHNOLOGY

G. K. Poock and B. J. Martin Jun. 1985 37 p
(AD-A158001; NPS55-85-012) Avail: NTIS HC A03/MF A01 CSCL 17/2

The primary purpose of this research was to examine the effects of various input string lengths and error correction methods on the recognition accuracy and efficiency of a currently available continuous automatic speech recognition (ASR) system. The effect of sex was examined also and an estimate of the average recognition accuracy of a continuous ASR system was sought. In the entry of numerical data, the input string length of seven digits at a time proved significantly more efficient than strings of three or five. Although subjects preferred some error correction methods over others, there were no significant differences in error rates or efficiency due to the correction method used. There were also no significant differences due to sex. The average recognition accuracy of the continuous ASR system was conservatively estimated at over 95%. GRA

N86-15522# Royal Military Coll. of Science, Shrivenham (England).
INVESTIGATIONS AND COMPARISONS OF NEW TYPES OF MILLIMETRE-WAVE PLANAR ARRAYS USING MICROSTRIP AND DIELECTRIC STRUCTURES Final Technical Report, Aug. 1983 - Apr. 1985

J. R. James and C. M. Hall Apr. 1985 119 p
(Contract DAJA45-83-C-0054; DA Proj. 1T1-61102-BH-57)
(AD-A158313) Avail: NTIS HC A06/MF A01 CSCL 09/1

The combination of microstrip and dielectric structures has been found to offer possibilities for improvements upon purely microstrip planar antennas which are limited particularly at millimeter wavelengths by dissipative losses and by radiation from complex feed networks. All the structures considered retain microstrip radiating elements and in the first case a dielectric feed line was used in a travelling-wave array which enabled feeder losses to be reduced. However field compatibility problems with all-dielectric feeder networks caused excessive radiation losses. The same compatibility problems with conventional rectangular waveguide prevent the full potential of this array from being realized but is still preferable to all-dielectric feeder networks. The retention of microstrip feed networks allows much improved integration possibilities and this was realized by combining a microstrip patch with an overlaid dielectric sphere. When combined in the form of parallel connected arrays with a sparse feed network the result is much lower levels of corrupting radiation than have previously been achieved and the provision of space within the aperture for electronic components such as phase shifters. GRA

N86-15523# Naval Research Lab., Washington, D. C.
NAVAL SPACE SURVEILLANCE MODERNIZED RECEIVER SYSTEM. VOLUME 6: DATA COMMUNICATIONS SUBSYSTEM Interim Report, 1979 - 1984

C. H. Weaver 14 Aug. 1985 17 p
(AD-A158465; NRL-8910-Vol-6) Avail: NTIS HC A02/MF A01

CSCL 17/2

The Naval Space Surveillance System was developed by the Naval Research Laboratory (NRL) during the period 1958 to 1964. This system was necessary to satisfy the needs of the U. S. Government's desire to detect nonradiating space objects passing over the continental United States (CONUS). This system has been operational since 1960 and is the only Navy system contributing to the Space Detection and Tracking System operated by the Space Defense Center, North American Aerospace Defense Command. This system, with no prior information, detects all objects in Earth's orbit passing over CONUS and computes the orbital elements of these objects. This report describes the design of the data communications system that was developed as part of the modernization program for improving the performance of the original Naval Space Surveillance Receiver Systems. Salient aspects of the design include increased data throughput, failure-recovery transmission modes, and message formatting characterization to satisfy the special requirements for system operation at Naval Space Surveillance Headquarters. The design also emphasized an abundant margin of data space for the control and text fields that were nearly exhausted at the completion of the developmental tests. GRA

N86-15524# Naval Postgraduate School, Monterey, Calif.
DETECTION OF PERIODIC SIGNAL OF ARBITRARY SHAPE WITH RANDOM TIME DELAY M.S. Thesis
K. A. Ansari Jun. 1985 113 p
(AD-A158979) Avail: NTIS HC A06/MF A01 CSCL 09/4

The detection of periodic signals of arbitrary wave shape with random time delay in additive white Gaussian noise, is a problem of practical significance in radar and communication applications. In this thesis, the analysis and design of optimum and suboptimum receivers for detecting signals as described above has been carried out. The design of optimum (in minimum probability of error, Pe sense) receivers is based on the likelihood ratio test under the assumption of low SNR conditions. The design of suboptimum receivers is based on the heuristic approaches that intuitively yield reasonably good performance. Examples have been analyzed in order to present numerical results in graphical form on the performance of the receivers under different assumptions of wave ships and p.d.f. on the random time delay associated with the signal. Author (GRA)

N86-15525# Mitre Corp., Bedford, Mass.
EFFECT OF ANTENNA IMPEDANCE MISMATCH ON THE SIGNAL-TO-NOISE RATIO OF A RADIO RECEIVING SYSTEM Final Report
M. M. Weiner Jul. 1985 170 p
(Contract F19628-84-C-0001)
(AD-A159070; MTR-9221; ESD-TR-85-136) Avail: NTIS HC A08/MF A01 CSCL 17/2

The noise factor of linear two-port networks are derived for several networks of interest, including those of a passive transmission line and of an active receiver, whose source impedance may be mismatched to the characteristic impedance of the line. It is shown that a large impedanco mismatch at the antenna-transmission line interface of a radio receiving system can cause a significant increase in the system internal noise factor (more than a 50 dB increase for a voltage reflection coefficient of 09999). Numerical results are presented for a VHF-FM radio receiving system with an electrically-short monopole antenna. In the absence of a matching network, the limiting noise of the system is generated within the system (by the transmission line and receiver) and can be more than 20 dB larger than the external man-made noise. With a matching network, the limiting noise of the system is external man-made noise. GRA

N86-15526# Stanford Univ., Calif. Dept. of Computer Science.
HOST GROUPS: A MULTICAST EXTENSION FOR DATAGRAM INTERNETWORKS
D. R. Cheriton and S. E. Deering Jul. 1985 11 p
(Contract N00039-83-K-0431)
(AD-A159146; SU-STAN-CS-85-1058; SU-CSL-85-280) Avail: NTIS HC A02/MF A01 CSCL 17/2

The extensive use of local networks is beginning to drive requirements for internetwork facilities that connect these local networks. In particular, the availability of multicast addressing in many local networks and its use by sophisticated distributed applications motivates providing multicast across internetworks. This paper proposes a model of service for multicast in an internetwork, describe how this service can be used, and describe aspects of its implementation including how it would fit into one existing internetwork architecture, namely the US DOD internet Architecture. Author (GRA)

N86-15527# Naval Postgraduate School, Monterey, Calif.
A VARIANCE DETECTOR FOR SIGNAL-GAP DISCRIMINATION IN NOISY SPEECH CHANNELS Technical Report, Aug. - Sep 1984
J. L. Wayman May 1985 22 p
(AD-A159227; NPS53-85-0007) Avail: NTIS HC A02/MF A01 CSCL 17/2

This report documents a program written for post- (FFT) processor activity/gap detection in noisy speech communication channels. The algorithm used is based on the assumption that the variance of the logs of the frequency-domain magnitudes of a signal is greater than the corresponding variance of the channel noise. Trade-offs between Type 1 and Type 2 errors can be controlled with and interactively defined program parameters. Parameters were found to yield a 16% missed detection rate with a 5% false alarm rate, performance entirely acceptable in speech compression applications. Some problems were encountered with sibilate detection, due to the close relationship between these sounds and white noise. Author (GRA)

N86-15528# Air Force Academy, Colo.
NUMBER OF TARGETS THREATENED SIMULTANEOUSLY (NOTTS) IN CONJUNCTION WITH OVER THE HORIZON BACK-SCATTER (OTHB) RADAR COVERAGE Final Report, Jan. 1984 - Dec. 1985
J. F. Sheedy Aug. 1985 74 p
(AD-A159304; AD-F250300; USAFA-TR-85-9) Avail: NTIS HC A04/MF A01 CSCL 17/9

Number of Targets Threatened Simultaneously (NOTTS) is a measure of the presence (in a background of unknowns) of a surprise attack on the U.S. retaliatory force. Four NOTTS indicators PEAK, KURTOSIS, RIDGE, and P1, P2, and P3 are defined and evaluated using the J5YA Raid Recognition Algorithm for a bomber or cruise missile raid against SAC and C3 target sets. Scatter charts showing background noise produced by commercial traffic, raid plus noise combined are presented and used to describe the setting of reaction thresholds. The effect of time of day, probability of radar detection, and the choice of target set and raid design on reaction threshold are discussed. Although ideal settings of indicators are practical in the cases discussed, attention is drawn to the limited data available for modeling of unknowns in OTHB coverage. GRA

N86-15529# Massachusetts Univ., Amherst. Dept. of Mathematics and Statistics.
MATHEMATICAL PROBLEMS IN STABILITY, CONTROL AND RELIABILITY OF RANDOM ACCESS COMMUNICATION SYSTEMS Annual Report, 15 May 1984 - 14 May 1985
W. A. Rosenkrantz 11 Jun. 1985 3 p
(Grant AF-AFOSR-0167-82)
(AD-A159402; AFOSR-85-0715TR; AR-11) Avail: NTIS HC A02/MF A01 CSCL 17/2

Current research is focused on three problems: (1) stability analysis of the exponential back-off protocol; (2) a diffusion approximation for the steady state distribution of the slotted ALOHA protocol; and (3) a Poisson limit theorem for a load balancing protocol. Work began on applying Stochastic Catastrophe Theory to the study of the exponential back-off protocol when there are a finite number of users. Work is also planned on a theoretical analysis of the diffusion approximation to the slotted ALOHA protocol. (Author). GRA

N86-15530# Environmental Research Inst. of Michigan, Ann Arbor. Radar Div.
SAR (SYNTHETIC APERTURE RADAR) DATA COLLECTION AND PROCESSING SUMMARY - 1984 SARSEX (SAR INTERNAL WAVE SIGNATURE EXPERIMENT) EXPERIMENT Topic Report, May 1984 - Feb. 1985
E. S. Kasischke, R. A. Shuchman, R. W. Larson, D. R. Lyzenga, and J. C. Clinthorne Mar. 1985 149 p
(Contract N00014-81-C-0692)
(AD-A159440; ERIM-155900-21-T) Avail: NTIS HC A07/MF A01 CSCL 17/9

This report describes the SAR data collection and processing activities performed to date for the SAR Internal Wave Signature Experiment (SARSEX). During SARSEX, a total of 88 passes of X- and L-band SAR data were collected over two test areas by the ERIM/CCRS CV-580 SAR System. These data were collected over an instrumented ocean site located 100 km south of Long Island, NY and a calibrated reflector array site. A description of the CV-580 SAR System is presented. The location of each SAR pass, along with a listing of the SAR and aircraft parameters, are given. All SAR data have been precision optically processed and reviewed. A selected subset of data have been digitally processed and a preliminary engineering assessment of the quality of the SAR imagery performed. The results of this assessment are presented, as are representative examples of optically-and digitally-processed SAR imagery collected during SARSEX. Finally, the analysis plans for the SAR data are discussed, including a presentation of the procedures to calibrate the SAR imagery. GRA

N86-15531# Naval Postgraduate School, Monterey, Calif.
INTEGRATED SERVICES DIGITAL NETWORK (ISDN) M.S. Thesis
M. T. Weidert Jun. 1985 70 p
(AD-A159578) Avail: NTIS HC A04/MF A01 CSCL 09/2

This thesis contains development of a conceptual framework for an Integrated Services Digital Network (ISDN) and relates ISDN concepts to non-tactical Department of Defense (DOD) communications applications. The conceptual framework developed is non-technical and is intended to provide general management with an introduction to the ISDN. An existing model communications system, Japan's Information Network System (INS), which exhibits characteristics of ISDN, is also discussed in terms of the conceptual framework developed. General ISDN concepts are also related to DoD applications. The Defense Data Network (DDN) is presented as a candidate network on which a potential military ISDN could be based. GRA

N86-15532# Department of the Air Force, Washington, D.C.
WAVELENGTH SELECTIVE DEMULTIPLEXER TUNER Patent Application
C. R. Husbands, inventor (to Air Force) Filed 25 Oct. 1983 15 p
(AD-D011890; US-Patent-Appl-SN-545307) Avail: NTIS HC A02/MF A01 CSCL 17/2

A wavelength selective demultiplexer tuner having an optically transmissive body for receiving an input signal containing a plurality of different wavelengths and transmitting the signal therethrough is presented. An electro-optic block of material is secured to the body of the tuner and a reflective grating or mirror is secured to the electro-optic block of material for redirecting through the body the input signal as a plurality of signals, each containing a different one of the wavelengths. By appropriately varying a voltage placed across the electro-optic block of material, the index of refraction of the block of material changes thereby altering the optical paths followed by the plurality of signals redirected through the body. In this manner, each of the signals containing a different one of the wavelengths can be selectively output from the body at different times and at the same, single location. Author (GRA)

N86-15533# Rome Univ. (Italy). Dipt. di Fisica.
CORRELATIONS BETWEEN SIGNALS FROM GRAVITATIONAL WAVE ANTENNAS IN ROME AND IN GENEVA
E. Amaldi, P. Bonifazi, E. Coccia, S. Frasca, R. Habel, I. Modena, G. V. Pallottino, G. Pizzella, P. Rapagnani, F. Ricci et al 22 May 1985 35 p refs Submitted for publication Prepared in cooperation with CNR, Frascati, Italy; CNR, Rome and European Nuclear Energy Agency, Frascati, Italy
(Preprint-462) Avail: NTIS HC A03/MF A01

Signals from a gravitational wave antenna in Rome at room temperature were compared with a 4.2 K antenna in Geneva. Since the Rome antenna was not fully ready at the time of the coincidence analysis more data are required, with both antennas in full operation, before conclusions can be reached. Author (ESA)

N86-15534# Helsinki Univ. (Finland). Radio Lab.
[ACTIVITIES REPORT OF THE RADIO LABORATORY] Annual Report, 1983
Martti Hallikainen, ed. 1984 28 p refs
(Rept-S-160; ISBN-951-753-305-5; ISSN-0355-5712) Avail: NTIS HC A03/MF A01

Electromagnetic research; microwave applications to remote sensing and industrial and medical studies; radio science instrumentation; microwave and millimeter wave propagation; radio astronomy; circuit theory; and computer aided design are discussed. Author (ESA)

N86-15535# Helsinki Univ. (Finland). Radio Lab.
EXACT IMAGE METHOD FOR IMPEDANCE COMPUTATION OF ANTENNAS ABOVE THE GROUND
Ismo V. Lindell, Esko Alanen, and Kari Mannersalo 1984 23 p refs Sponsored by Academy of Finland
(Rept-S-161; ISBN-951-753-395-0; ISSN-0355-5712) Avail: NTIS HC A02/MF A01

A principle of exact image developed for the Sommerfeld problem is applied to the classical impedance problem of antennas above the ground. The effect of the ground is taken into account with an image source located in complex space, leading to a modified Green function for the antenna current integral equation. The image of the antenna can be determined through expressions evaluated for the image current function. The stationary functional for the antenna impedance is extended to take into account the effect of the ground. Impedance expressions for small dipoles and half-wave dipoles are calculated and compared with previous results. Methods for calculating the impedance of wire antennas with finite thickness from that of infinitesimally thin antennas, and to determine ground parameters from horizontal dipole minimum resistance and height measurements are presented. Author (ESA)

N86-15536# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
VISIBILITY OF NOISE IN HOMOGENEOUS AND TEXTURED AREAS
Hans Marmolin and Anders Carlstroem May 1985 23 p refs
(FOA-C-50010-H2; ISSN-0347-7665) Avail: NTIS HC A02/MF A01

A study to find a measure of noise in good accord with its visibility was conducted. The effect of average luminance level on noise visibility and the effect of gradual and stepwise luminance changes were studied. Results indicate that noise visibility is strongly affected by average luminance level while the effects of luminance changes are weak. As a first approximation it is recommended to use the ratio between noise RMS and average luminance as an index of noise visibility and to compute noise visibility in textured areas by averaging noise-luminance ratios. Author (ESA)

N86-15537# Physics and Electronics Lab. TNO, The Hague (Netherlands).
THE DESIGN OF A ROTMAN LENS
H. J. Exalto and H. R. vanEs Feb. 1985 54 p refs In DUTCH; ENGLISH summary
(Contract L77/Alg/115)
(FEL-1985-13, TDCK-93256) Avail: NTIS HC A04/MF A01

A Rotman parallel-plate-lens with a linear array antenna preceeded by a multibeam forming network to excite several orthogonal beams simultaneously, is described. This lens type is

chosen for its relatively few phase errors. The lens principle is based upon electrical path length differences between input and output-ports, the beam direction being frequency independent. The design is executed in microstrip with a 10.5 substrate permittivity, using computer facilities to fix contours and ports accurately. The design is meant for the 8 to 12 GHz frequency-band. Measurements show good agreement with the theory, although standing wave ratios of the input-ports are still too high. The antenna is developed for electronic countermeasures. Author (ESA)

N86-15538# Physics and Electronics Lab. TNO, The Hague (Netherlands). Research Group 3
PROGRAMS TO COMPUTE THE CIRCULAR ERROR PROBABILITY (CEP) OF A LOCATION SYSTEM WITH DIRECTION FINDING STATIONS
R. Middelkoop Mar. 1985 58 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/134)
(FEL-1985-20; TDCK-93154) Avail: NTIS HC A04/MF A01

Three programs to compute circular error probabilities (CEP) for a radio direction finder location system, a general program with no propagation effects, a program for VHF propagation, and one for HF groundwave, are described. They form the tools for research into the influence of parameters such as bearing base, number and disposition of the stations, spread spectrum modulation, and bearing mistakes caused by instruments and surroundings. Supposing that the bearings are independent and normally distributed, the CEP is calculated from an ellipse drawn from crossbearing two or more stations. The CEP is computed for maximum arrangement of 10 stations and for low signal to noise ratio. Comparing the results with literature data, the programs show good agreement. Author (ESA)

N86-15539# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Hochfrequenzphysik.
INVESTIGATIONS OF THE INTERFERENCE SCATTERING AND METHODS FOR ITS SUPPRESSION IN NEAR-GROUND RADAR BACKSCATTERING MEASUREMENTS
Karl-Heinz Bethke Jun. 1985 66 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-967)
(DFVLR-FB-85-42; ISSN-0171-1342) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 22

Electromagnetic wave scattering in near-ground measurements was studied with examples of ground reflection and wedge diffraction to reach high dynamic ranges for field strength measurements with a controlled suppression of the scattering signals in near-ground level. The effects of the ground reflection on the intensity distribution of the electric field strength were studied. Experimental results at 10 GHz under real conditions were compared with theory. The suppression of the ground reflected signals with screening fences is described. Electromagnetic wave diffraction was investigated using the Fresnel diffraction theory. The diffraction on a slit screen was studied to obtain a dimensioning method for optimal strip grid construction as well as the diffraction on a large slot. Computerized simulation results are confirmed on simple grid structures and the limits of application of the Fresnel diffraction theory are determined. Author (ESA)

N86-15540# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Apparate.
BROADBAND SIMULATION OF MULTIPATH PROPAGATION IN VHF MOBILE RADIO Thesis - Univ. der Bunderwehr, Munich, West Germany [BREITBANDGE SIMULATION DER MEHRWEGEAUSBREITUNG IM VHF-MOBILFUNK]
Karl H. Niederhofer 31 May 1985 130 p refs In GERMAN
(MBB-UA-905/85) Avail: NTIS HC A07/MF A01

A broadband simulator which allows the reproduction of the essential characteristics of mobile radio communication was designed and built. The statistics of multipath propagation, and modulation perturbations due to multipath propagation are discussed. Simulator and control concepts for VHF multipath mobile radio are presented. The technical realization of the simulation of the reflected signals and vehicle motions was performed by variable retardation modules. The parameters can be changed with a calculator or manually. Control programs were developed for real time simulation. The simulator processes signals between 50 and 70 MHz. The dynamic range is 30 dB. The input signal can be shifted by 1.7 microsec for a 5 Mhz bandwidth. The simulator allows a broadband reproduction of multipath propagation. Author (ESA)

N86-15453# Joint Publications Research Service, Arlington, Va.
MILLIMETRIC-WAVE ANTENNAS AND DEVICES: REVIEW Abstract Only
D. I. Voskresenskiy, V. M. Maksimov, S. V. Rud, and I. G. Sukharev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 35 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 4-23 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15454# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF LOG-PERIODIC ANTENNAS WITH PRESCRIBED GEOMETRY Abstract Only
V. A. Yatskevich *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 37 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 40-45 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15455# Joint Publications Research Service, Arlington, Va.
BOUNDARY WAVES IN FINITE ANTENNA ARRAYS Abstract Only
V. S. Filippov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 39-40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 61-67 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15456# Joint Publications Research Service, Arlington, Va.
SCATTERING BY CYLINDER WITH ANISOTROPIC IMPEDANCE Abstract Only
A. V. Klimov, B. M. Petrov, and A. I. Semenikhin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 74-78 (For primary document see N86-15452 06-31)
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N86-15457# Joint Publications Research Service, Arlington, Va.
MATRIX ANALYSIS OF PERIODIC INTERLEAVED MULTIFREQUENCY ANTENNA ARRAYS Abstract Only
L. I. Ponomarev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 79-86 (For primary document see N86-15452 06-31)
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N86-15458# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF MULTIMODE WAVEGUIDE-TYPE POWER DISTRIBUTOR Abstract Only
Yu. V. Likhoded and L. I. Ponomarev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28 no. 2, Feb. 1985 p 74-78 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15459# Joint Publications Research Service, Arlington, Va.
EXCITATION OF ARRAY OF PLANE-PARALLEL WAVEGUIDES COVERED WITH DIELECTRIC LAYER OF FINITE LENGTH Abstract Only
B. D. Manuilov and V. M. Shablovskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 96-99 (For primary document see N86-15452 06-31)
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N86-15460# Joint Publications Research Service, Arlington, Va.
USE OF ACTIVE QUENCHING FOR REDUCTION OF POWER DISSIPATION IN DIPOLE ANTENNA ARRAY Abstract Only
L. I. Ponomarev, A. V. Dolgin, and A. V. Shatalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28 no. 2, Feb. 1985 p 99-100 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15461# Joint Publications Research Service, Arlington, Va.
SIGNAL AND INTERFERENCE LEVELS IN ANTENNA ARRAY WITH OPTIMUM RADIATION PATTERN Abstract Only
A. S. Popov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 44 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radioelektronika (Kiev, USSR), v. 28, no. 2, Feb. 1985 p 103-104 (For primary document see N86-15452 06-31)
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N86-15462# Joint Publications Research Service, Arlington, Va.
EFFECT OF CORNER REFLECTOR ON FIELD OF LINEAR RADIATOR Abstract Only
Yu. V. Pimenov and A. K. Salakh *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 44 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 83-84 (For primary document see N86-15452 06-31)
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N86-15463# Joint Publications Research Service, Arlington, Va.
LONGITUDINALLY SLOTTED CYLINDRICAL SHIELD WITH FINITE THICKNESS AND ELECTRICAL CONDUCTANCE Abstract Only
R. M. Dzhala *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 45 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 1-7 Previously announced in IAA as A85-23551 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15464# Joint Publications Research Service, Arlington, Va.
RADIATION PATTERN AND REDUCED GAIN OF LINEAR ANTENNA IN TURBULENT ANISOTROPIC ATMOSPHERE Abstract Only
N. A. Armand, I. N. Kibardina, and A. N. Lomakin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 45 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 8-14 Previously announced in IAA as A85-23552 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15465# Joint Publications Research Service, Arlington, Va.
MULTILAYER VOLUME MICROWAVE FILTERS Abstract Only
V. I. Gvozdev, S. V. Smirnov, and A. M. Chernushenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 59 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 2, Feb. 1985 p 47-48 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15470# Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR CALCULATING ATTENUATION IN AND RELIABILITY OF ATMOSPHERIC OPTICAL DATA TRANSMISSION SYSTEMS Abstract Only
Ye. R. Milyutin and Yu. I. Yaremenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 91 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 11-18 (For primary document see N86-15452 06-31)
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N86-15471# Joint Publications Research Service, Arlington, Va.
SELECTION OF SIGNALS FOR DIGITAL OPTICAL CHANNEL Abstract Only
S. Ye. Fedorov and A. N. Martyanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 91-92 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 139-147 (For primary document see N86-15452 06-31)
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N86-15472# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF COHERENT RECEPTION OF OPTICAL SIGNAL PROPAGATING THROUGH TURBULENT ATMOSPHERE Abstract Only
V. A. Bureyev, V. Ye. Kirakosyants, and V. A. Loginov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 93 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 90-93 (For primary document see N86-15452 06-31)
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N86-15494# Joint Publications Research Service, Arlington, Va.
MAIN TRENDS IN SATELLITE COMMUNICATION AND BROADCASTING RESEARCH Abstract Only
Yu. B. Zubarev and L. Ya. Kantor *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 16-17 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 5, May 1985 p 15-18 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15495# Joint Publications Research Service, Arlington, Va.
TRANSMISSION OF TELEVISION SIGNALS OVER OPTICAL COMMUNICATION CHANNEL BY MEANS OF FREQUENCY MODULATION Abstract Only
Yu. M. Kirik, M. I. Krivosheyev, Yu. I. Marimont, Yu. A. Kharitonova, A. I. Shlayn, and Ye. A. Shchervakov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 17 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 5, May 1985 p 28-30 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15500# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF UNIDIRECTIONAL FERRITE MICROSTRIP LINES Abstract Only
P. P. Bobrov, A. V. Gidlevskiy, and Yu. A. Kirsanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 32 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 64-67 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15504# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF ELECTROMAGNETIC FORCES IN MAGNETIC FIELD CALCULATIONS Abstract Only
A. G. Nazaryan, A. L. Mailyan, and E. Kh. Adzhemyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 54-55 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 58-60 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15511# Joint Publications Research Service, Arlington, Va.
ABSOLUTE MEASUREMENTS OF ANTENNA PARAMETERS BY ILLUMINATION METHOD Abstract Only
S. A. Pelyushenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 71-72 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 275-282 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15512# Joint Publications Research Service, Arlington, Va.
TIME CHARACTERISTICS OF SCATTERING BY RADAR TARGETS Abstract Only
V. I. Kirmasov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 73-74 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 16-19 Original language document was announced in IAA as A85-34170 (For primary document see N86-15484 06-31)
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N86-15513# Joint Publications Research Service, Arlington, Va.
EFFECTIVENESS OF PHASE-CONJUGATION SYSTEMS IN TURBULENT ATMOSPHERE Abstract Only
A. V. Polovinkin and A. I. Saichev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 78 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 463-469 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15562# Joint Publications Research Service, Arlington, Va.
SOLUTION TO REVERSE REFRACTION PROBLEM Abstract Only
A. G. Pavelyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 1 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1658-1667 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15563# Joint Publications Research Service, Arlington, Va.
MAXIMUM ANTENNA POWER RECEPTION IN LOSSY MEDIUM Abstract Only
Ya. N. Feld *In its* USSR Report: Electronis and Electric Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 1-2 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1668-1676 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15564# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF POINT SOURCE IMAGE FIELD STRUCTURE BY REAL RADIOOPTICAL ANTENNA Abstract Only
F. Kh. Baybulatov and M. I. Kudryashov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 2 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1677-1683 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15565# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF MAGNETOSTATIC WAVE PROPAGATION THROUGH FILM WAVEGUIDES Abstract Only
G. M. Novikov and Ye. Z. Petrunkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 3 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1691-1695 Original language document was announced in IAA as A85-10431 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15566# Joint Publications Research Service, Arlington, Va.
STATISTICAL CHARACTERISTICS OF ULTRASHORT-WAVE SIGNAL FAST PHASE FLUCTUATIONS BASED ON AMPLITUDE MEASUREMENTS ON SEA LANES Abstract Only
B. S. Rybakov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 3-4 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1720-1725 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15567# Joint Publications Research Service, Arlington, Va.
ESTIMATING NUMBER AND PARAMETERS OF SIGNAL COMPONENTS IN PRESENCE OF NOISE Abstract Only
A. A. Kuriksha *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 4-5 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1740-1744 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15568# Joint Publications Research Service, Arlington, Va.
MODULAR FLOATING DECIMAL POINT OPERATIONS FOR ANTENNA ARRAY ADAPTATION Abstract Only
V. V. Kryuchkov, V. P. Leevshin, V. F. Strucheev, and A. G. Kharitonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006-) 30 Apr. 1985 p 5 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1754-1756 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15569# Joint Publications Research Service, Arlington, Va.
LOCAL IONOSPHERIC IRREGULARITY EFFECT ON ELF RADIOWAVE PROPAGATION Abstract Only
A. P. Nikolayenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 8 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1227-1237 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15570# Joint Publications Research Service, Arlington, Va.
IONOSPHERE INFLUENCE ON MHD WAVE BUNDLE PROPAGATION Abstract Only
L. S. Alperovich and Ye. N. Fedorov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 8 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), no. 27, no. 10, Oct. 1984 p 1238-1247 (For primary document see N86-15561 06-33)
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CONTRIBUTION TO MULTILAYER SPHERICAL SCREEN THEORY Abstract Only
V. L. Avramenko and V. N. Krasilnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 10 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1299-1305 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15572# Joint Publications Research Service, Arlington, Va.
ADIABATIC INVARIANT VALUE VARIATION UNDER SHORT-WAVE BAND SUBCRITICAL CONDITIONS Abstract Only
K. V. Svistunov and M. V. Tinin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 11 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy. Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1340-1343 Original language document was announced in IAA as A85-17467 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15573# Joint Publications Research Service, Arlington, Va.
DEGRADATION OF SURFACE-ACOUSTIC-WAVE RESONATORS Abstract Only
M. A. KRevskiy, M. S. Sandler, and A. V. Yakimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006)

30 Apr. 1985 p 12-13 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2101-2104 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15574# Joint Publications Research Service, Arlington, Va.
EFFECT OF CYLINDRICAL RERADIATOR ON PARAMETERS OF ANTENNA AND ANTENNA ARRAY Abstract Only
B. M. Levin and S. S. Fomintsev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 13 Transl. nto ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2140-2147 Original language document was announced in IAA as A85-15684 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15575# Joint Publications Research Service, Arlington, Va.
BASIC CHARACTERISTICS OF RADAR ANTENNA WITH SYNTHESIZED APERTURE TRACKING ARBITRARY MOTION OF AIRCRAFT Abstract Only
Ya. S. Itskhoki, N. A. Sazonov, and Ye. F. Tolstov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 14 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2164-2172 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15576# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF RADAR OBJECTS DETECTABLE BY SUPERWIDE-BAND SIGNALS Abstract Only
L. Yu. Astanin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 15-16 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 19-24 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15577# Joint Publications Research Service, Arlington, Va.
REFLECTION COEFFICIENT OF HARROW GRATING WITH CONDUCTOR STRIPS WITH RESPECT TO ELECTROMAGNETIC WAVES Abstract Only
V. I. Ponomarenko, D. I. Mirovitskiy, and I. F. Budagyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 16 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 68-71 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15578# Joint Publications Research Service, Arlington, Va.
MODULATION INSTABILITY AND SOLITONS OF ELECTROMAGNETIC WAVE ENVELOPES IN FERROMAGNETIC SEMICONDUCTORS Abstract Only
F. G. Bass and N. N. Masonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 19 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Radiofizika (Gorkiy, USSR), v. 27, no. 11, Nov. 1984 p 1460-1467 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15586# Joint Publications Research Service, Arlington, Va.
LOWER LIMIT OF ERROR PROBABILITY IN DISCRETE ADDITION OF BINARY SIGNALS FROM PARALLEL CHANNELS Abstract Only
Ye. D. Kononov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 35 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 57-59 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15611# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF HIGHER TYPES OF OSCILLATIONS ON PISTON-TUNED WAVEGUIDE GUNN OSCILLATOR FREQUENCY Abstract Only
A. A. Litsov, D. A. Usanov, B. P. Bezruchko, and A. Yu. Vagarin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 60 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow), v. 29, no. 10, Oct. 1984 p 2057-2058 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15612# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF ELLIPTICAL WAVEGUIDES IN CYLINDRICAL REFERENCE BASIS Abstract Only
G. I. Veselov and N. I. Platonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 61 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 64-67 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15622# Joint Publications Research Service, Arlington, Va.
ACOUSTOOPTIC DEMODULATOR OF PHASE-KEYED SIGNALS Abstract Only
A. V. Pugovkin, V. A. Krakovskiy, and G. A. Kolchina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 73-74 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2266-2268 Original language document was announced in IAA as A85-15694 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-15541 Department of the Air Force, Washington, D.C.
SELF-GUARDING SCHOTTKY BARRIER INFRARED DETECTOR ARRAY Patent
F. D. Shepherd, Jr., P. W. Pellegrini, C. E. Ludington, and M. M. Weeks, inventors (to Air Force) Issued 23 Jul. 1985 6 p Supersedes AD-D010089
(AD-D011894; US-Patent-4,531,055; US-Patent-Appl-SN-455677; US-Patent-Class-250-211J) Avail: US Patent and Trademark Office CSCL 09/5

A two dimensional focal plane array of Schottky photodiodes on a silicon substrate for infrared imaging is presented. The array is designed for mating with multiplexing circuitry and has a self-guarding feature wherein adjacent Schottky electrodes act as guard electrodes. This feature allows a substantial increase of the focal plane area coverage ratio. Author (GRA)

N86-15542 Department of the Air Force, Washington, D.C.
BIPOLAR DIGITIZER HAVING COMPRESSION CAPABILITY Patent
J. E. Simpson, inventor (to Air Force) Issued 9 Jul. 1985 11 p Supersedes AD-D010139
(AD-D011895; US-Patent-4,528,549; US-Patent-Appl-SN-461426; US-Patent-Class-340-347AD) Avail: US Patent and Trademark Office CSCL 09/5

A bipolar digitizer (A/D converter) is disclosed which uses a single comparator circuit for initially determining the polarity of a sampled input signal and for thereafter comparing the absolute magnitude of the signal to an applied ramp voltage. The time required for the ramp voltage to exceed the magnitude of the sampled input signal is converted into a digital waveform representative of the magnitude of the sampled input signal. Resistive means are selectively connected in shunt with a signal storage

capacitor to achieve bipolar signal compression and increased dynamic range. Author (GRA)

N86-15543*# Raytheon Co., Waltham, Mass. Microwave and Power Tube Div.
OPTIMIZATION OF A MAGNET CIRCUIT DESIGN FOR A CYLINDRICAL MASS SPECTROMETER
25 Oct. 1983 12 p Sponsored by NASA
(NASA-CR-176400; NAS 1.26:176400; PT-6440) Avail: NTIS HC A02/MF A01 CSCL 09C

The results of an optimization effort to achieve a minimum weight configuration for a magnetic section circuit (MSC) used in the magnetic portion of a double-focusing mass spectrometer is presented. G.L.C.

N86-15544*# California Inst. of Tech., Pasadena. Power Electronics Group.
INPUT CURRENT SHAPED ac-TO-dc CONVERTERS Semi-annual Status Report
Dec. 1985 38 p refs
(Grant NAG3-615)
(NASA-CR-176438; NAS 1.26:176438) Avail: NTIS HC A03/MF A01 CSCL 09C

Input current shaping techniques for ac-to-dc converters were investigated. Input frequencies much higher than normal, up to 20 kHz were emphasized. Several methods of shaping the input current waveform in ac-to-dc converters were reviewed. The simplest method is the LC filter following the rectifier. The next simplest method is the resistor emulation approach in which the inductor size is determined by the converter switching frequency and not by the line input frequency. Other methods require complicated switch drive algorithms to construct the input current waveshape. For a high-frequency line input, on the order of 20 kHz, the simple LC cannot be discarded so peremptorily, since the inductor size can be compared with that for the resistor emulation method. In fact, since a dc regulator will normally be required after the filter anyway, the total component count is almost the same as for the resistor emulation method, in which the filter is effectively incorporated into the regulator. E.A.K.

N86-15545# Mission Research Corp., Santa Barbara, Calif.
A BRIEF INVESTIGATION OF ADAPTIVE DECISION FEEDBACK EQUALIZATION FOR DIGITAL HF LINKS EMPLOYING PSK (PHASE SHIFT KEYING) MODULATION
B. E. Sawyer 1 Nov. 1983 67 p
(Contract DNA001-80-C-0022)
(AD-A157809; AD-E301748; MRC-R-801; DNA-6319T) Avail: NTIS HC A04/MF A01 CSCL 09/5

Adaptive decision feedback equalization is one of several mitigation techniques that can be employed to improve the performance of narrowband HF modems operating under time and frequency selective channel conditions. The decision feedback equalizer (DEF) is described and several adaptation algorithms are derived. Computer simulations of BPSK HF modems were used to compare link performance (in terms of bit error rate) with and without employment of an adaptive DFE. Also the performance was quantified versus channel disturbance parameters for a specific 2400 band modem. GRA

N86-15546# Stanford Univ., Calif.
NOVEL APPROACHES TO PASSIVATION OF SI FOR VHSIC - BASED ON FUNDAMENTAL STUDIES Final Report, 28 Mar. 1982 - 28 Mar. 1985
W. E. Spicer, I. Lindau, and J. Nogami 24 May 1985 9 p
(Contract DAAG29-82-K-0087)
(AD-A158238; ARO-18679.6-PH) Avail: NTIS HC A02/MF A01 CSCL 09/5

The primary focus of this work was the exploration of fundamental aspects of the oxidation of semiconductor surfaces with a view to addressing some of the problems that have arisen in industry in the growth of ultra thin silicon dioxide layers that are a requirement of smaller, faster CMOS devices. The work falls into three categories, each concerned with a problem that is related to the central issue in a different way: (1) A study of th fundamental properties of the diamond surface. (2) A study of rare earth metal/semiconductor interfaces and compounds. (3) A study of the fundamental characteristics of the oxidation of silicon and the production of thin silicon oxide layers. GRA

N86-15547# Rensselaer Polytechnic Inst., Troy, N.Y. Center for Integrated Electronics.
ELECTRICAL CHARACTERISTICS OF SI DEVICES FABRICATED WITH COMPLETELY CONSUMED CARBIDE (C3) DIELECTRIC ISOLATION PROCESS
W. J. Lu, A. J. Steckl, and T. P. Chow 1985 16 p Prepared in cooperation with General Electric Company, Schenectady, N.Y.
(Contract N00014-81-K-0605)
(AD-A158296) Avail: NTIS HC A02/MF A01 CSCL 09/1

Electrical characteristics of Si devices fabricated with the C3 dielectric isolation process have been investigated. The C3 process produces local field oxide regions due to the differential oxidation rate of SiC versus Si (typically approx. 2-11). Si devices with good electrical properties result when the local oxidation process is allowed to Completely Consume the Carbide (C3) film. This new process is compared to the standard silicon nitride LOCOS process. The bird's beak profiles and the damage on the Si surface resulting from both processes were investigated by SEM and Secco etch, respectively. In order to evaluate the C3 process, MOS capacitors and Schottky barrier diodes have been fabricated with both techniques for varying pad oxide thickness. The measured electrical properties of these devices include lifetime, breakdown voltage, and I-V characteristics. For the minimum bird's beak case (no pad oxide), the C3 process results in superior electrical properties over the standard nitride process. Author (GRA)

N86-15548# Rensselaer Polytechnic Inst., Troy, N.Y. Center for Integrated Electronics.
COMPLETELY CONSUMED CARBIDE (C3) - A NEW PROCESS FOR DIELECTRIC ISOLATION
W. J. Lu, A. J. Steckl, and T. P. Chow May 1985 12 p Presented at the 3rd International Symposium, VLSI Science and Technology, Toronto
(Contract N00014-81-K-0605)
(AD-A158298) Avail: NTIS HC A02/MF A01 CSCL 20/12

A new process for dielectric isolation based on the use of silicon carbide has been investigated. This process uses the lower oxidation rate of SiC compared to Si to provide local regions of thick field oxide. If the local oxidation process results is the complete consumption of the carbide (C3) film, then a high quality MOS structure is obtained. In this paper, this C3 process is compared to the standard silicon nitride LOCOS process. MOS capacitors and Schottky barrier diodes have been fabricated with both techniques for varying pad oxide thickness (0, 100, 200 A). The effect of high temperature anneal on these structures has been investigated. The electrical properties of these devices have been measured. This includes lifetime, breakdown voltage and I-V characteristics. For the minimum bird's beak case (no pad oxide) the C3 process results in superior electrical properties over the standard nitride process. Author (GRA)

N86-15549# Cambridge Univ. (England).
NOVEL TRANSPORT AND RECOMBINATION PROCESSES IN SEMICONDUCTORS Final Technical Report, Mar. 1982 - Jun. 1985
M. Pepper Mar. 1985 40 p
(Contract DAJA37-82-C-0181; DA Proj. 1T1-61102-BH-57)
(AD-A158321) Avail: NTIS HC A03/MF A01 CSCL 20/12

This report describes work on spin dependent recombination processes, electron injection from point contacts into semiconductors and the Quantization of Hall resistance in strong magnetic fields. The work on spin dependent processes has identified spin dependent recombination and generation processes as well as a non-resonant magnetic field effect centered at zero magnetic field. This effect clearly has the same cause as the resonant generation and recombination processes. Resonance effects were constant over a wide range of frequencies confirming theoretical predictions

that this was the case. Work on two dimensional systems has concentrated on the two terminal properties in the regime of quantized Hall resistance. The inversion layer has been shown to behave as a voltage source with quantized impedance. Frequency measurements have shown that fractional quantization can be introduced as integer quantization is destroyed. The frequency dependence is shown to be dependent on sample length, this being the maximum localization length which can occur. Point contact injection from Al and Ag point contacts into Si has been investigated, it is shown that instabilities occur due to coupling between electronics and plasmons. GRA

N86-15550# IBM Watson Research Center, Yorktown Heights, N.Y.
INVESTIGATION OF QUANTUM EFFECTS IN HETEROSTRUCTURES Final Report, 21 Sep. 1981 - 20 Mar. 1985
L. Esaki 20 Mar. 1985 9 p
(Contract DAAG29-81-C-0038)
(AD-A158327; ARO-18683.48-PH) Avail: NTIS HC A02/MF A01 CSCL 20/12

InAs/GaSb and GaSb/AlSb superlattices, GaSb/InAs/GaSb quantum wells and GaAs/GaAlAs heterojunctions were prepared by MBE. Their electronic properties were investigated by optical and transport measurements including photoluminescence, far-infrared magneto-absorption, and the quantized Hall effect. GRA

N86-15551# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
THEORETICAL MODEL OF Hg(1-x)Cd(x)Te PHOTOVOLTAIC AND PHOTOCONDUCTIVE INFRARED DETECTORS
A. A. Fote 12 Aug. 1985 25 p
(Contract F04701-83-C-0084)
(AD-A158668; TR-0084A(5945-07)-1; SD-TR-85-53) Avail: NTIS HC A02/MF A01 CSCL 17/5

Theoretical models have been developed for calculating the spectral responsivity and noise of Hg1-xCdxTe photovoltaic and photoconductive infrared detectors. These models are based on the classical theories for p-n junctions and sweepout-limited photoconductors. They incorporate numerous empirical expressions for describing all important material parameters of Hgx-xCdxTe as functions of the composition parameter x and temperature. The excess carrier lifetimes in n-type material are calculated by including radiative and Auger processes. In p-type material, Shockley-Read recombination is also included when appropriate. Provisions are made to include surface effects in photoconductors, but 1/f noise is neglected. Author (GRA)

N86-15552# Wisconsin Univ., Madison. Dept. of Chemistry.
PHOTOCUMINESCENT RESPONSE OF PALLADIUM-CADMIUM SULFIDE AND PALLADIUM-GRADED CADMIUM SULFO-SELENIDE SCHOTTKY DIODES TO MOLECULAR HYDROGEN
M. K. Carpenter, H. VanRyswyk, and A. B. Ellis 15 Aug. 1985 13 p
(Contract N00014-78-C-0633)
(AD-A158759; UWIS/DC/TR-85/1) Avail: NTIS HC A02/MF A01 CSCL 09/1

The bulk photoluminescence (PL) of Schottky diodes constructed from Pd and n-type CdS (Pd-CdS) and from n-type, graded CdSxSe1-x (0 less than or = x less than or = 1; x - 1 at surface) (Pd-CdSxSe1-x) is sensitive to molecular H2. For the Pd-CdS diode, exposure to H2 (3:1, N2:H2 mixture) significantly enhances the PL intensity of edge emission lambda max (approx. 510 nm) relative to the intensity in air; using a dead-layer model, the corresponding reductions in depletion width and Schottky barrier height can be estimated. For the Pd-CdSxSe1-x diode, H2 changes the spectral distribution; PL from this material, color-coded to spatially resolve e(-)-h(+) pair recombination, indicates the depth over which the electric field is reduced in the semiconductor. These phenomenal demonstrate optically-coupled chemical sensing of hydrogen. Author (GRA)

N86-15553# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
A TWO-TERMINAL MICROELECTROCHEMICAL DIODE WITH CONTACT SPACING OF ABOUT ONE MICRON. A DEVICE BASED ON ONE SOLUTION REDOX COUPLE AND ONE ELECTRODE-CONFINED REDOX COUPLE Interim Technical Report
G. P. Kittlesen and M. S. Wrighton 14 Aug. 1985 36 p
(Contracts N00014-84-K-0553; N00014-84-K-0291)
(AD-A158774; TR-5-ONR) Avail: NTIS HC A03/MF A01 CSCL 09/1

A microelectrochemical diode can be fabricated by functionalizing one of two identical, adjacent platinized Au microelectrodes of an eight electrode microelectrode array with a redox polymer, (BPQ(2+)/(+)n), derived from an N,N'-dibenzyl-4,4'-bipyridinium monomer. The microelectrode array consists of eight Au microelectrodes each about 50 microns long, 2.3 microns wide, and 0.1 microns thick and separated from each other by about 1.3 micron. The array is fabricated on a Si3N4 surface chemically deposited on a Si/SiO2 substrate using conventional microfabrication procedures. Diode behavior is found in aqueous electrolyte solution containing the Ru(NH3)6(3+)/(2+) redox couple which responds reversibly at a platinized Au electrode. Rectifying behavior is obtained, because a micro electrode modified with greater than approx. 0000000001 mol/sq cm of the ((BPQ(2+)(+))n) polymer is capable of reducing the oxidized form of the redox couple (Ru(NH3)6(3+)) but is incapable of oxidizing the reduced form of the redox couple (Ru(NH3)6(2+)). When the negative lead of a power supply is attached to a (BPQ(2+)/(+)n)-derivatized microelectrode and positive lead is attached to an adjacent, naked microelectrode current flows when the applied potential approaches the difference in the formal redox potentials of the Ru(NH3)6(3+)/(2+) and (BPQ(2+9/(+)n redox couples, about 0.4 V. When the potential is applied in the opposite sense, no current flows. GRA

N86-15554# Spire Corp., Bedford, Mass.
IMPROVED LIFETIME HIGH VOLTAGE SWITCH ELECTRODE Final Report, 1 Sep. 1984 - 31 May 1985
W. Halverson 28 Jun. 1985 49 p
(Contract F49620-84-C-0120)
(AD-A158961; SPIRE-FR-60053; AFOSR-85-0733TR) Avail: NTIS HC A03/MF A01 CSCL 09/1

In this Phase 1 Small Business Innovation Research (SBIR) program, preliminary tests of ion implantation to increase the lifetime of spark switch electrodes have indicated that a 185 keV carbon ion implant into a tungsten-copper composite has reduced electrode erosion by a factor of two to four. Apparently, the thin layer of tungsten carbide (WC) has better thermal properties than pure tungsten; the WC may have penetrated into the unimplanted body of the electrode by liquid and/or solid phase diffusion during erosion testing. These encouraging results should provide the basis for a Phase 2 SBIR program to investigate further the physical and chemical effects of ion implantation on spark gap electrodes and to optimize the technique for applications. GRA

N86-15555# Naval Postgraduate School, Monterey, Calif.
SILICON COMPILER DESIGN OF COMBINATIONAL AND PIPELINE ADDER INTEGRATED CIRCUITS M.S. Thesis
A. O. Froede, III Jun. 1985 140 p
(AD-A158995) Avail: NTIS HC A07/MF A01 CSCL 09/5

The architecture and structures used by the MacPitts silicon compiler to design integrated circuits are described, and the capabilities and limitations of the compiler are discussed. The performance of several combinational and pipeline adders designed by MacPitts and a hand-crafted pipeline adder are compared. Several different MacPitts design errors are documented. Tutorial material is presented to aid in using the MacPitts interpreter and to illustrate timing analysis of MacPitts-designed circuits using the program Crystal. GRA

N86-15556# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
MICRON-SPACED PLATINUM INTERDIGITATED ARRAY ELECTRODE: FABRICATION, THEORY AND INITIAL USE
R. W. Murray Sep. 1985 26 p

(Contract N00014-82-K-0337)
(AD-A159429; TR-16) Avail: NTIS HC A03/MF A01 CSCL 09/1

An interdigitated array (IDA) electrode composed of 40 pairs of 0.3 micrometers thick Pt fingers 3.5 micrometers wide and separated by 2.5 micrometer gaps of insulating borosilicate glass substrate has been fashioned by a modified microlithographic technique. The two IDA is applied to measurement of redox electron conduction through films of poly-Os(bpy)2 (vpy)2 (C1O4)2, poly-CRu(bpy)2 (vpy)2 (C104)2, and Prussian Blue that had been electrochemically deposited over the Pt fingers and in the insulating gaps. Appropriate theory for using the IDA for this purpose is developed. Electrochemically generated luminescence from solutions of Ru(bpy)3 (2+) is also observed with the IDA.
Author (GRA)

N86-15557# Naval Postgraduate School, Monterey, Calif.
VLSI (VERY LARGE SCALE INTEGRATED) DESIGN OF A SIXTEEN BIT PIPELINED MULTIPLIER USING THREE MICRON NMOS TECHNOLOGY M.S. Thesis
R. J. Simchik, Jr. Jun. 1985 95 p
(AD-A159433) Avail: NTIS HC A05/MF A01 CSCL 09/5

The application of computer-aided design (CAD) tools in the full custom design and testing of a 16-bit pipelined two's complement multiplier in three micron NMOS is described. A comparison between the full custom carry-save addition (CSA) multiplier designed using CAD tools and a multiplier generated by the MacPitts silicon compiler is presented. Additional background material is also presented on the CSA multiplication algorithm used. GRA

N86-15558# Westinghouse Defense and Electronic Systems Center, Baltimore, Md. Development and Operations Div.
ACCEPTANCE TEST PLAN FOR BROADBAND MICROWAVE AMPLIFIER PANEL
R. R. Barron 5 Aug. 1985 6 p
(Contract N00014-84-C-2232)
(AD-A159450) Avail: NTIS HC A02/MF A01 CSCL 09/5

Acceptance tests for the broadband 10 KW panel developed under the microwave amplifier module program are designed to show that the delivered unit meets performance requirements in the areas of bandwidth, power output, pulse drop and tolerance to load impedance variations. When coupled with the special reliability tests described in document DSC-13509, these tests will also verify the thermal data used as an input to the reliability model for the amplifier. Since this is a research and development program with a high degree of flexibility in performance parameters, data will be taken for a great variety of pulsewidth, duty, and cooling conditions. The data from these other test conditions will be included in the final report, and made available at the time of the acceptance tests. The acceptance test procedures described herein for each testing category define the tests to be performed, parameters, ranges, special test equipment, and interface requirements. GRA

N86-15559# Department of the Air Force, Washington, D.C.
A BUFFER DIVERTER SYSTEM Patent Application
J. C. Foster, Jr., inventor (to Air Force) Filed 25 Jul. 1985 22 p
(AD-D011902; US-Patent-Appl-SN-758928) Avail: NTIS HC A02/MF A01 CSCL 19/2

The prevention of sympathetic detonations between donor and acceptor bombs, which are stored lying horizontally lying parallel to each other, is accomplished using a buffer diverter system. One example of a buffer diverter system is a pair of molded concrete bases, each supporting a horizontal bomb and conforming to the shape of its respective bomb up to its horizontal centerline. In the first example, the entire space between the two molded concrete bases and bombs is filled in with a buffer which has sufficient width to attenuate the shock of detonation down pressure levels below a pressure threshold needed to induce an acceptor bomb to sympathetically detonate. In another example of a buffer diverter system, the buffer is replaced with a diverter. The diverter is an I-beam which abuts each bomb at its horizontal centerline and runs the length of the two bombs. The I-beam has the same width as the buffer, but its surface area presented to each bomb is nearly the minimum required to deflect fragments from the silhouette of the acceptor bomb. GRA

N86-15560# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-K.
ACCELERATOR TIMING SYSTEM [VERSNELLER-TIMING SYSTEEM]
E. Timmer and E. Heine 1 Jul. 1985 36 p refs In DUTCH
(LINO-109) Avail: NTIS HC A03/MF A01

An electron accelerator timing signal system providing synchronous operation of all apparatus, is described. Four timing signals, a 2 MHz clock frequency, a 2.5 kHz master pulse, a 10 Hz walk pulse, and a synchronous pulse are transported to the modulator stations. Triggers for the stations are divided from the 2.5 kHz master pulse to the appropriate modulator frequency; mutual synchronization is assured by the 10 Hz walk pulse. The synchronous pulse is also used for this purpose, on initiation by an operator or program. For triggering the beam synchronic apparatus and scopes, a separate beam synchronous pulse, induced in a trigger modulator, is provided. Author (ESA)

N86-15561# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING
30 Apr. 1985 93 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-85-006) Avail: NTIS HC A05/MF A01

Current developments in electronics and electrical engineering from the USSR are presented. Some of the topics discussed include: (1) antennas and propagation; (2) broadcasting and consumer electronics; (3) circuits and systems; (4) communications; (5) components, hybrids and manufacturing technology; (6) electrical insulation; (7) electromagnetic compatability; (8) electron devices; (9) industrial electronics and control instrumentation; (10) instrumentation and measurements; (11) magnetics; (12) microwave theory and techniques; (13) power engineering; (14) quantum electronics and electro-optics; (15) solid state circuits; (16) sonics and ultrasonics; and (17) transportation. For individual titles, see N86-15562 through N86-15622.

N86-15562# Joint Publications Research Service, Arlington, Va.
SOLUTION TO REVERSE REFRACTION PROBLEM Abstract Only c32
A. G. Pavelyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 1 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1994 p 1658-1667 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The reverse refraction problem (determination of radial profile of refractive index in planetary atmospheres, such as Earth, from radio probe measurements) is formulated as a bistatic radar problem for a spherically symmetric medium. The modified refractive indux n(r)r (a-radius at which the refraction angle as function of relative distance is measured) is assumed to reach extreme values at the upper boundary r sub 1 or at observation level. Before the corresponding Fredholm equation of the first kind can be solved, it must be well-conditioned in the Tikhonov sense. This is done here by two quasi-optimum integral transformation variants with respect to the measurement function and subsequent simplified regularization. The first method is two successive Fourier cosine transformations followed by an Abel transformation, with the possibility of discrete Fourier transformations and numerical Abel transformation. The second method is twofold discrete Fourier transformation. Both yield solutions readily evaluated by simple algorithms. Regularization is effected by approximating functions satisfying the two fundamental conditions for convergence required of the measurement function. Author

N86-15563# Joint Publications Research Service, Arlington, Va.
MAXIMUM ANTENNA POWER RECEPTION IN LOSSY MEDIUM

Abstract Only c32
Ya. N. Feld *In its* USSR Report: Electronis and Electric Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 1-2 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1668-1676 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The power problem of a receiver antenna is a lossy medium with the incident electromagnetic field of a wave from two current generators is solved on the basis of circuit theory with no constraints on antenna directivity. Maximum antenna reception power is calculated on assumption that single-mode feeder channel is perfectly matched to receiver and that this maximum is finite as long as electrical conductivity of medium is not zero. The optimum radiation pattern of this antenna is then calculated; in particular the field distribution on a surrounding surface for antenna in transmitter mode which ensures pickup of maximum power when antenna is in receiver mode. Author

N86-15564# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF POINT SOURCE IMAGE FIELD STRUCTURE BY REAL RADIOOPTICAL ANTENNA Abstract Only c32
F. Kh. Baybulatov and M. I. Kudryashov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 2 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1677-1683 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The reverse electrodynamic problem (determination of field structure in point source image and design of a radiooptical antenna for this purpose) is solved rigorously by taking into account arbitrariness of active surfaces and corresponding variations in number of field components in real antennas. Firstly, field components in the geometric optic approximation are computed after replacement of antenna readings by an equivalent field on some surface in the image space. Secondly, field components and the average-in-time relative distribution of electric energy density in the image are computed by conventional electrodynamics methods, with the corresponding integral equations for an open region excluding its boundary transformed into equations for Kirchhoff-Kottler integrals. Theoretical results for a lense with large relative aperture were checked against experimental data for a lens cut on a lathe without finishing surface treatment. In the experiment, amplitude-modulated radiation from a microwave oscillator was passed through a stationary rectangular single-mode waveguide with 1.6x0.8 sq. mm. cross section whose open other end simulated a point source. Analysis of results showed unequal energy density distributions along the two principal orthogonal coordinate axes in the large plane indicating partial polarization of radiation by the antenna focusing lens. Author

N86-15565# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF MAGNETOSTATIC WAVE PROPAGATION THROUGH FILM WAVEGUIDES Abstract Only c32
G. M. Novikov and Ye. Z. Petrunkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 3 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1691-1695 Original language document was announced in IAA as A85-10431 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Experimental results are presented concerning the characteristics of magnetostatic waves (MSWs) propagating in a ferromagnetic-film waveguide whose width is comparable to the wavelength. A constant magnetic field was applied in the waveguide plane and formed an arbitrary angle theta with the waveguide axis. Experimental and calculated MSW dispersion curves are compared for theta = 90 deg. Backward surface waves were observed experimentally in the case of longitudinal (theta = 0 deg) magnetization of the waveguide. Forward and backward surface MSWs were observed simultaneously at theta = 60-90 deg. Author

N86-15566# Joint Publications Research Service, Arlington, Va.
STATISTICAL CHARACTERISTICS OF ULTRASHORT-WAVE SIGNAL FAST PHASE FLUCTUATIONS BASED ON AMPLITUDE MEASUREMENTS ON SEA LANES Abstract Only c32
B. S. Rybakov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 3-4 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1720-1725 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Statistical characteristics of fast phase fluctuations in ultrashortwave signal (time correlation interval and rms magnitudes and ratio of maximum to minimum rms) were calculated from measurements over 225-420 km long sea lanes for signals with three different wavelengths (10, 36, 190 cm). Data were processed according to the general Gauss model applicable to a large class of communication channels with time fluctuations assumed to have a symmetric spectrum. Integral distribution functions characterizing monthly and yearly cycles as well as the wavelength dependence of the medium time correlation interval were evaluated on this basis and separately for day and night. Author

N86-15567# Joint Publications Research Service, Arlington, Va.
ESTIMATING NUMBER AND PARAMETERS OF SIGNAL COMPONENTS IN PRESENCE OF NOISE Abstract Only c32
A. A. Kuriksha *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 4-5 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1740-1744 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

An algorithm is constructed for extimating the number and parameters of signal components in a signal noise mixture based on a minimum average risk criterion with special choice of cost function and a simplifying assumption on apriori distribution. Intuitively the number of signal components is expected to be the minimum most likely number not including false noise components. A cost function asymmetric with respect to the true number and parameter values is selected consisting of a principal part, a simple function of the number and signal component amplitudes and parameters and an additional term which is a constant multiplied by the sum of decision rules for a possible larger number of components. An increase of the probability of correct detection when the estimated number of signal components is increased by one is the measure of likelihood. The minimum average risk function is maximized by maximum-likelihood extimates and by a reasonable assumption of quasi-uniform apriori distribution. Protection against overestimates is built into this algorithm since each addition of one to the estimated number of signal components increases the number of alternatives for selection of parameters while the error penalty for their number and values is assumed the same. Author

N86-15568# Joint Publications Research Service, Arlington, Va.
MODULAR FLOATING DECIMAL POINT OPERATIONS FOR ANTENNA ARRAY ADAPTATION Abstract Only c32
V. V. Kryuchkov, V. P. Leevshin, V. F. Strucheev, and A. G. Kharitonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006-) 30 Apr. 1985 p 5 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1754-1756 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

An adaptive signal processing algorithm for antenna arrays is proposed with modular floating decimal point arithmematic operations usable when vector and matrix arrays are of common order and ensuring stable and efficient interference suppression at almost the same hardware cost as for fixed arithmetic. The interference suppression factor depends on calculation sequences and site of rounding, and on sample size which can be kept up by retaining only real part of denominator with discard of error-producing

imaginary part and omission of rounding in summation of component scalar vector products since scaler multiplication of two vectors is base algorithm operation. A typical algorithm use is adaptive signal processing in phased antenna array after partial beam formation. The reflected signal envelope is assumed to have complex amplitude with zero mean normal distribution and random side lobe radiation pattern. Input signals are sampled by analog-to-digital converters, whose output signal matissa is limited by input quantization step. Regularization factor increase leads to increase and stabilization of interference suppression factor, as sample size approximates and exceeds number of interference signals. When sample is small phased antenna array efficiency falls sharply where ideal machine arithmetic is approached as regularization factor increases to infinity. This is now the case with finite arithmetic so that regularized correlation matrix estimates are not needed.
Author

N86-15569# Joint Publications Research Service, Arlington, Va.
LOCAL IONOSPHERIC IRREGULARITY EFFECT ON ELF RADIOWAVE PROPAGATION Abstract Only c32
A. P. Nikolayenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 8 Transl. into ENGLISH from Izvestigy Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1227-1237 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The Stratton-Chu integral equation is used to solve the ELF radiowave propagation electrodynamic problem over an irregular spherical interval between the ground and ionosphere. The Stratton-Chu formula makes it possible to obtain field estimates in Born approximation with allowance for the vector nature of the electrodynamic field. Changes are investigated in the perturbation of the vertical electrical field component as the irregularity moves along the line between the source and the observer and across the propagation path. It is found that a local irregularity above the source or observer can change the field level significantly as compared with a uniform resonator, especially near the antipodes of the source.
Author

N86-15570# Joint Publications Research Service, Arlington, Va.
IONOSPHERE INFLUENCE ON MHD WAVE BUNDLE PROPAGATION Abstract Only c32
L. S. Alperovich and Ye. N. Fedorov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 8 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), no. 27, no. 10, Oct. 1984 p 1238-1247 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The horizontal propagation of geomagnetic variations with periods exceeding 30 seconds excited by bundles of hydromagnetic waves of varying polarization is investigated. The primary magnetic field is assumed to be orthogonal to the ionosphere and the Earth's suface. Expressions are derived for fields at long distances from the source. When the distances are sufficient, the wave is found to travel along the ground at the Alfven velocity.
Author

N86-15571# Joint Publications Research Service, Arlington, Va.
CONTRIBUTION TO MULTILAYER SPHERICAL SCREEN THEORY Abstract Only c32
V. L. Avramenko and V. N. Krasilnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 10 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1299-1305 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The incidence of a plane electromagnetic wave on a sphere consisting of an arbitrary number of layers with different electrodynamic properties is examined and it is shown that the exact solution of the diffraction problem can be described and investigated analytically. The influence of the dielectric space between the metal layers on the shielding properties of a spherical shell is studied. If the width of the space is smaller than the thickness of the skin layer in the middle, the space has little influence on the shielding of the magnetic field. The influence of the space is also smaller in metals with high magnetic permeability if the width of the space exceeds the thickness of the skin layer in the middle.
Author

N86-15572# Joint Publications Research Service, Arlington, Va.
ADIABATIC INVARIANT VALUE VARIATION UNDER SHORT-WAVE BAND SUBCRITICAL CONDITIONS Abstract Only c32
K. V. Svistunov and M. V. Tinin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 11 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1340-1343 Original language document was announced in IAA as A85-17467 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The possibility of significant variations of the adiabatic invariant is examined for the propagation of radio waves in an irregular Earth-ionosphere waveguide with a parabolic dependence of permittivity on height. Numerical and analytical results indicate that nonexponential deviations of the adiabatic invariant can occur not only when the characteristic size of horizontal irregularity decreases (e.g., during resonant beam excitation) but also in quasi-critical conditions and for smoothly irregular waveguides.
Author

N86-15573# Joint Publications Research Service, Arlington, Va.
DEGRADATION OF SURFACE-ACOUSTIC-WAVE RESONATORS Abstract Only c32
M. A. KRevskiy, M. S. Sandler, and A. V. Yakimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 12-13 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2101-2104 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Degradation of SAW resonators is analyzed, the irreversible upward frequency drift in the case of interdigital transducers with aluminum pin-electrode is explained by logarithmic oxidation faster than normally but the irreversible downward frequency drift in the case of interdigital transducers with gold pin-electrodes is evidently caused by oxidation together with diffusional smear. This latter mechanism is analyzed on the basis of a model which describes flicker fluctuations as a microprocess of thermodynamic aging. Calculations are made for the simplest oscillator consisting of two identical interdigital structures on a delay line each having N pin pairs.
Author

N86-15574# Joint Publications Research Service, Arlington, Va.
EFFECT OF CYLINDRICAL RERADIATOR ON PARAMETERS OF ANTENNA AND ANTENNA ARRAY Abstract Only c32
B. M. Levin and S. S. Fomintsev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 13 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2140-2147 Original language document was announced in IAA as A85-15684 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

An analysis is made of the effect of a cylindrical reradiator on the electrical characteristics of a rod antenna and an array of rod antennas. The study is based on the replacement of the cylinder by a model of nonintersecting wires and on the method of moments. Experimental data are used as the calculation correctness criterion, and methods for improving the calculation efficiency are examined.
IAA

N86-15575# Joint Publications Research Service, Arlington, Va.
BASIC CHARACTERISTICS OF RADAR ANTENNA WITH SYNTHESIZED APERTURE TRACKING ARBITRARY MOTION OF AIRCRAFT Abstract Only c32
Ya. S. Itskhoki, N. A. Sazonov, and Ye. F. Tolstov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 14 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2164-2172 (For primary document see N86-15561 06-33)

Avail: NTIS HC A05/MF A01

A problem in tracking the motion of an aircraft which carries a radar antenna with synthesized aperture are random phase fluctuations of the input signal. These fluctuations, caused by instability of the aircraft trajectory and elastic vibrations of the aircraft structure as well as by tropospheric effects and intentional interference, worsen the azimuth resolution and the accuracy of azimuth determination. This situation is analyzed here for the more general case of arbitrary motion of the aircraft and arbitrary observation angle rather than for rectilinear motion and lateral observation. The output signal serves as performance criterion, its waveform being determined principally by the radiation pattern of the real antenna and its modulus remaining approximately constant over the aperture synthesization time. On this basis, the trajectory of the phase center of the real antenna can be approximated with a quadratic parabola. For given wavelength and elevation angle, the best azimuth resolution attainable with signal processing by the straight convolution method (second target on observation line) is determined by the length of aperture synthesization time, the tangential component of aircraft velocity, and the form of the weight function. In the absence of phase fluctuations, the error of azimuth determination is in this case determined only by the resolving power of the radar with synthesized antenna aperture. Signal processing by the harmonic analysis method introduces some defocusing, which worsens the resolution, even in the absence of phase fluctuations. Author

N86-15576# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF RADAR OBJECTS DETECTABLE BY SUPERWIDE-BAND SIGNALS Abstract Only c32
L. Yu. Astanin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 15-16 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 19-24 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Use of superwide-band probing signals for detection of intricate objects is examined with the object scattering characteristic as the criterion. The resolving power of such signals is compared with that of narrow-band signals, especially high-resolution narrow-band signals. The global frequency characteristics of scattered signals or the pulse response will describe an object, especially when the polarized components of both probing signal and echo signal are taken into account. Changes in the global scattering pattern which are associated with the form and the orientation of the object can result in superresolution, namely transformation of a single probing signal into a packet of pulses. A typical superwide-band signal is a short radio pulse, usually produced with the aid of a matched filter unless it is a simple one. The bandwidth of such a pulse is defined as 4-times the inverse of its duration and then referred to the carrier frequency so that the relative bandwidth becomes equal to twice the inverse of the number of carrier periods during the pulse. Both frequency characteristic and pulse response of an object are related to the Green function, in the space domain and in the time domain respectively, in the electrodynamic problem of scattering and diffraction with interference. Author

N86-15577# Joint Publications Research Service, Arlington, Va.
REFLECTION COEFFICIENT OF HARROW GRATING WITH CONDUCTOR STRIPS WITH RESPECT TO ELECTROMAGNETIC WAVES Abstract Only c32
V. I. Ponomarenko, D. I. Mirovitskiy, and I. F. Budagyan *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 16 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 68-71 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The reflection coefficient of harrow microwave gratings with conductors on a metal mirror base is calculated by a method not only more accurate but also less unwieldy than the conventional method of partial regions. Bar conductors of finite thickness are replaced with ribbon conductors of a form approximately describable by 0o-functions, which taper them to infinitesimally thin ones and thus reduces the three-dimensional grating to a two-dimensional one. The effective conductor thickness is now much smaller than the grating period and than the skin depth. Both reflection and absorption coefficients become independent of the frequency, and the transcendental dispersion equation for the propagation constant simplify as a result of easier solution by numerical methods. With the absorption layer superposable on the dispersion layer, the reflection factor is calculated specifically for waves with E-polarization, by reduction of the corresponding diffraction problem to an infinite system of linear algebraic equations. Author

N86-15578# Joint Publications Research Service, Arlington, Va.
MODULATION INSTABILITY AND SOLITONS OF ELECTROMAGNETIC WAVE ENVELOPES IN FERROMAGNETIC SEMICONDUCTORS Abstract Only c32
F. G. Bass and N. N. Masonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 19 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Radiofizika (Gorkiy, USSR), v. 27, no. 11, Nov. 1984 p 1460-1467 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Nonlinear electromagnetic waves in a uniaxial ferromagnetic semiconductor located in a homogeneous magnetic field are considered. The propagation of nonlinear spin-spiral waves is analyzed within the frame-work of the hydrodynamic description of conductivity electron plasma. A material equation for the spin subsystem is the Landau-Lifshits equation, with allowance for inhomogeneous exchange, magnetic anisotropy and magnetic dipole interaction. Weakly nonlinear electromagnetic waves propagating along the magnetic field parallel to the axis of anisotropy of the semiconductor are analyzed. Solitons of the envelopes of spin-spiral waves are studied with no assumptions regarding the smallness of their amplitude. Author

N86-15579# Joint Publications Research Service, Arlington, Va.
DIGITAL METHODS OF RECORDING COLOR TELEVISION IMAGES ON FILM TAPE Abstract Only c35
R. Ya. Krivitskaya and V. M. Semenov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 21-22 Transl. into ENGLISH from Tekhnika Kino i Televideniya (Moscow, USSR), no. 11, Nov. 1984 p 31-35 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Three methods are now available for recording color television images on film tape, directly or after appropriate finish of signal processing. Conventional recording of images from the screens of three kinescopes with synthetic crystal face plates is still most effective for high fidelity. This method was improved by digital preprocessing of brightness color-difference signal. Frame-by-frame storage of these signals in the memory in digital form is followed by gamma and aperture correction and electronic correction of crossover distortions in the color layers of the film with fixing in accordance with specific emulsion procedures. The newer method of recording color television images with line arrays of light-emitting diodes involves dichromic superposing mirrors and a movable scanning mirror. This method allows the use of standard movie cameras, simplifies interlacing-to-linewise conversion and the mechanical equipment, and lengthens exposure time while it shortens recording time. The latest image transform method requires an audio-video recorder, a memory disk, a digital computer, and a decoder. The 9-step procedure includes preprocessing the total color television signal with reduction of noise level and time errors, followed by frame frequency conversion and setting the number of lines. The total signal is then resolved into its brightness and color-difference components and phase errors and image blurring are also reduced. After extraction of R,G,B signals and colorimetric matching of TV camera and film tape, the simultaneous R,B, B signals are converted from interlacing to sequential triades of color-quotient frames with linewise scanning at triple frequency. Color-quotient signals are recorded with an electron beam on a smoothly moving black-and-white film tape under vacuum. While digital techniques improve the signal quality and simplify the

control of processes, not requiring stabilization of circuits, image processing is still analog. Author

N86-15580# Joint Publications Research Service, Arlington, Va.
COLOR-ENCODING RASTER LIGHT FILTERS FOR SINGLE-TUBE COLOR TELEVISION CAMERAS Abstract Only
V. M. Ivanova, L. A. Lyubavskaya, Yu. N. Tarasov, and M. N. Cherapanova *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 22 Transl. into ENGLISH from Tekhnika Kino i Televideniya (Moscow, USSR), no. 11, Nov. 1984 p 44-48 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Raster light filters for strip or facsimile color encoding consist of two or three line arrays: one transmits red and green light, the second transmits blue and green light, the third, optional, transmits blue and red light. Optical color encoding is based on frequency separation of color signals and requires inclusion of a corrective light filter. The performance of filter structures is determined by the spectral characteristics of the color strips, these characteristics having been calculated here for a Standard System television receiver and a 6500 K white light reference source with the L sub R: L sub C: L sub B=0.3:0.59:0.11 ratio of liminance coefficients. Three configurations for alignment of the light filters with the phototarget in a single-tube camera are evaluated, direct superposition by building the light filters into the phototarget being more expedient than placing the light filters in the plane of the intermediate image or using a fibrous face plate underneath the phototarget as entrance window. Multilayer interference coatings based on refractory oxide layers ensure the necessary spectral characteristics. The photolithographic technology has been adapted to such filters, reverse photo-lithography with masking and selective etching applicable here. Refractive oxide layers do not require strong etchants. Photoresist masks remaining stable thermally and chemically up to 250 C are much better than bimetal ones, they cut the processing time almost to one half. The technology has been verified experimentally. Author

N86-15581# Joint Publications Research Service, Arlington, Va.
IMPROVEMENT OF COLOR REPRODUCTION BY TELEVISION CAMERAS Abstract Only
G. V. Luriye *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 23 Transl. into ENGLISH from Tekhnika Kino i Televideniya (Moscow, USSR), no. 11, Nov. 1984 p 61-63 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Two colorimetric methods of checking and adjusting individual television cameras for accurate color reproduction are compared, namely vector measurements and comparison of signal levels in the R-G-B channels. A special color test table was prepared which is more suitable for both methods than the 0569 table or other analogous tables used in other countries. This table lists the reflection coefficients of 10 color specimens ranging from yellow to violet and including white at 13 different wavelengths from 440 to 660 nm spaced 20 nm apart. On the basis of this table the reflection spectrum of each reference specimen was plotted for subsequent calculation of chromaticity coordinates relative to a D65 white light source. The vector method of checking the chrominance characteristics of system signals is most appropriate for inspection of camera channels and encoders, as well as for locating sources of color distortions and tolerancing the latter. This method involves applying one color-difference signal to the vertical-deflection amplifier and another one to the horizontal-deflection amplifier so that the vector diagram of the color test table will appear on the screen in the form of light spots whose location is determined by the chromaticity and the degree of saturation. Author

N86-15582# Joint Publications Research Service, Arlington, Va.
LUMINESCENCE PHOTOGRAPHY Abstract Only c35
V. B. Nazarov and M. V. Alfimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 23-24 Transl. into ENGLISH from Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii (Moscow, USSR), v. 29, no. 4, Jul. - Aug. 1984 p 307-315 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The development of luminescence photography is traced briefly, and descriptions are given of the photographic process and the principles underlying luminescence photography. It is found that luminescence photography has certain advantages over other types of photography, including the possibility of recording an image on luminescent material so that it cannot be seen under natural light, but can be read out through a luminescent means. This property can be exploited for marking articles and for placing sound tracks on movie film. Luminescence photography can be used to record latent images without using chemical intensification. The use of luminescence photography is determined to a significant extent by the performance of the reproducing equipment. Author

N86-15583# Joint Publications Research Service, Arlington, Va.
DESIGN OF DIFFERENTIAL CIRCUIT FOR LSI N-THRESHOLD COMPARATOR Abstract Only
A. I. Kondalvev and Yu. M. Greshischev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 29 Transl. into ENGLISH from Elektronnoye Modelirovaniye (Kiev, USSR), v. 6, Jul. - Aug. 1984 p 33-36 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The static mode of the analog element of an N-threshold comparator (differential comparison circuit) is analyzed in order to find the relationship between the parameters that determine the static accuracy of the comparator and the number N and spacing of its threshold levels. Analysis of the differential circuit makes it possible to estimate the maximum number of threshold levels of the comparator and the word length of the analog-digital converter. The step of the threshold levels is at least 120 mV; therefore, the number N is limited by the acceptable dynamic range of the signal at the input to the comparator of the large scale integration analog-digital converter. Consequently, N sub max = (5V/120mV) -1 approximately 42. If the quantity is n >, 6, two or more comparators with the maximum number of thresholds can be employed in the low order bits; however, coding elements are required in this case. A similar treatment can be employed if the restrictions on the number N are determined by the acceptable value of U sub o(N) rather than the dynamic range. Author

N86-15584# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF STORING PULSE PRODUCTS IN COHERENT SIGNAL PACKETS Abstract Only
V. V. Latushkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 31 Transl. into ENGLISH from Radiotekhnika i Elektronike (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1832-1833 Original language document was announced in IAA as A85-10444 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

An analysis is made of the characteristics of the detection of a packet of pulses on a background of white (delta-correlated) noise during the integration of pulse products in a radar receiver. Coherent and incoherent integration techniques are compared, and it is shown that the coherent technique results in a smaller energy loss than the incoherent technique. Another advantage of the coherent technique is the possibility of measuring the rate of motion. B.J. (IAA)

N86-15585# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF AMPLITUDE SUPPRESSION ON SINUSOIDAL INTERFERENCE Abstract Only
V. A. Danilov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 31-32 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1836-1838 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Polygonal approximation of nonlinear conversion is considered for amplitude suppression of non-Gaussian interference, specifically sinusoidal, with predominance of radio-frequency components in spectrum. Sinusoidal interference is defined as additive mixture of Gaussian white noise and harmonic fluctuations with constant amplitude and frequency but random initial phase uniformly distributed over the -pi, pi interval and arbitrary phase modulation. Statistical characteristics of this interference are functions of a parameter representing ratio of harmonic fluctuation power to Gaussian noise power. The amplitude suppression factor characterizing efficiency of the nonlinear converter, i.e., signal-to-interference ratio at output divided by signal-to-interference ratio at input, is calculated taking into account converter amplitude characteristic relative to fundamental frequency component and envelope distribution over interference. Results showed that amplitude suppression with a polygonal converter is somewhat less efficient than optimal amplitude suppression but simpler to implement than amplitude suppression with polynomial converter. Author

N86-15586# Joint Publications Research Service, Arlington, Va.
LOWER LIMIT OF ERROR PROBABILITY IN DISCRETE ADDITION OF BINARY SIGNALS FROM PARALLEL CHANNELS Abstract Only **c32**
Ye. D. Kononov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 35 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 57-59 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Addition of binary signals from parallel channels with variable parameters and finite number of states is examined, specifically, discrete addition in diversity receivers. An algorithm of optimal addition is constructed for binary channels conforming to the Markov model and forming together a discrete vector channel and the probability of addition error is calculated assuming the states of this discrete vector channel to be exactly known. Weighted sampling, which improves the reliability in the case of duplications, is found to be optimal and simplified appreciably in the case of independent constituent channels. The mean probability of addition error, obtained by averaging over all channel states, is the lower limit of this probability and characterizes the maximum possible interference immunity of discrete signal addition. As an example, the latter is evaluated for three statistically uniform and independent discrete states. Author

N86-15587# Joint Publications Research Service, Arlington, Va.
METHODS OF EQUALIZING ELECTRIC FIELDS IN HIGH-VOLTAGE DEVICES Abstract Only
L. D. Ginzburg, R. S. Ibragimov, and B. A. Korotkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 38 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 55-57 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Size and weight reduction of high-voltage devices depends on an insulation system which ensures a uniform, or almost uniform, electric field distribution over the surface. This in turn requires large metal backup parts and their monolithic bonding to the dielectric part, a source of high thermoelastic stresses. The problem of reducing these stresses is analyzed on the basis of the equation of elasticity for a monolithic insulator with metallized inside wall and metal mounting endpiece. According to the solution of this equation, the thermoelastic stress between dielectric and metal depends on the difference between their linear thermal expansion coefficients and on the ratio of their Young's moduli. Reliable performance requires that the thermoelastic stress be 20 to 50% lower than the ultimate tensile strength of the dielectric and the ultimate adhesive strength of the dielectric-metal bond, these levels being determined principally by the thermal relaxation characteristics of the dielectric. An evaluation of various materials and manufacturing methods indicates that both equalization of electric fields and minimization of thermoelastic stresses are attainable by using ceramic materials or polymer molding compounds for insulators, with a shielding brass mesh rolled into a wire ring for weakening the edge effect and raising the mechanical strength. Author

N86-15588# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF ELECTRIC CURRENT THROUGH HUMAN BODY ON PARAMETERS OF 3-0 NETWORK IN RANGE OF HIGH INSULATION ADMITTANCE Abstract Only
F. Ya. Motuzko and A. V. Trubitsyn *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 39 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 58-60 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The electric current I sub h through a human body touching one phase of a 3-0 network is calculated on the basis of the conventional equivalent circuit for the general case of unequal insulation admittances in all three phases. The two extreme cases here are all three insulation admittances approaching zero or infinity respectively. The theoretical relation in the latter case is not consistent with reality, in which an infinitely large insulation admittance presents a short circuit across the 3-0 source and a fully effective shunt across the human body. The equivalent circuit is modified, accordingly, to include the internal source resistance in series with the insulation admittance in each phase. Calculations pertaining to the method of personnel protection are continued, to establish the dependence of current on the insulation resistance of the touched phase and thus establish the safe range of this resistance when the resistance as well as the insulation admittance of this phase are different from those of the other two phases and those of the other two phases are equal. Author

N86-15589# Joint Publications Research Service, Arlington, Va.
RATE OF WIDENING OF STRONG-FIELD DOMAIN IN SUPERCRITICALLY DOPED GUNN-EFFECT DEVICES Abstract Only **c76**
L. S. Chkhartishvili, Z. N. Chigogidze, and N. P. Khuchua *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 41-42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1820-1823 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Intrinsic magnetic field of an electron beam was calculated for later application in relativistic electron devices. An axisymmetric beam was considered and, for simplicity, calculations were for an annular volume element with internal elementary convection current. Vector potential and electron velocity components were transformed from Cartesian to a cylindrical system of coordinates and magnetic induction was established at observation points inside and outside the volume element. The self-consistent problem discretized in space was treated according to electron optics theory and solved by numerical methods, analogously to calculation of intrinsic electrostatic field, with an auxiliary grid for the beam propagation space, assuming space charge and electron velocity distributions to be known. Validity of procedure and algorithms was verified against analytical solutions of two test problems: (1) magnetic field of a long solid or hollow electron beam with uniform current density distribution; (2) magnetic field of long hollow revolving electron beam. The numerical procedure was programmed in FORTRAN for YeS computers. Author

N86-15590# Joint Publications Research Service, Arlington, Va.
INTRINSIC MAGNETIC FIELD OF ELECTRON BEAM Abstract Only **c72**
M. P. Zaft and S. I. Molokovskiy *In* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 41-42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1845-1848 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The widening of strong-field domains in Gunn-effect diodes is analyzed on the basis of the Shoji model of electric dipole arrays, when the domain expands transversely simultaneously with longitudinal buildup in direction of electric bis field. The widening

rate (about one order of magnitude higher than electron drift velocity in epitaxial n-GaAs layers) is calculated for the supercritical doping case and is found to increase with increasing electron concentration but less so with increasing layer thickness. In this case linear approximation of the velocity-field characteristics requires three rather than two different straight segments and diffusion current must also be taken into account. Resulting relation indicates feasibility of increasing charge carrier concentration beyond 5 times 10 to the 16th power cm(-3) ceiling imposed by requirement of a current voltage characteristic with sufficiently large current drop. Author

N86-15591# Joint Publications Research Service, Arlington, Va.
STIMULATED EMISSION OF BOUNDED STRONG-CURRENT ELECTRON BEAM WITH LONGITUDINAL MAGNETIC FIELD MAGNETOSTATIC PUMPING Abstract Only c72
V. P. Grigoryev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1977-1984 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The kinetic equation method is employed to analyze stimulated emission of a radius-limited strong relativistic electron beam propagating in a resonant system in the presence of a transverse spatially periodic and a uniform longitudinal external magnetic fields. The field of the emitted wave and the space-charge potential field are represented as eigenfunction expansions of a resonant system, assuming that type H waves, as well as E waves, can be emitted. Stimulated emission is investigated on the basis of a kinetic equation taking the state in a longitudinal magnetic field as the beam steady state. Cyclotron resonance with the pumping wave and the combination wave are investigated. It is found that an external focusing longitudinal magnetic field produces effective stimulated emission when the pumping wave is in resonance with the cyclotron frequency of the electrons in the beam and the focusing field, and when the conditions for cyclotron resonance with the combination wave are satisfied. Author

N86-15592# Joint Publications Research Service, Arlington, Va.
TUBULAR STRONG-CURRENT RELATIVISTIC ELECTRON BEAM INSTABILITY Abstract Only c72
O. B. Ovsyannikova, F. F. Kamenets, and V. G. Leyman *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 43 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1985-1993 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Tubular strong-current beam instability in a vacuum is investigated allowing for the gene region formation conditions which make it necessary to consider the transverse electron relativistic movement. Perturbations disturbing the homogeneity of the beam transverse to the magnetic field are investigated as the most rapidly increasing. The model employed assumes that the beam is an infinitely thin charged surface. Development of such perturbations in beams with finite thickness is analyzed numerically allowing for the influence of the conducting electrode and relativistic transverse movement. The instability is found to depend little upon the distance to the conducting electrode and stability improves significantly as the relativistic factor of the transverse movement is increased by increasing beam current. Author

N86-15593# Joint Publications Research Service, Arlington, Va.
FASTER-THAN-LIGHT SOURCES IN ELECTRON BEAMS Abstract Only c72
B. G. Tsikin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 43 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1994-1997 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

It is demonstrated that a flow of electrons moving over a retarding system and amplifying the surface electromagnetic wave loses some of its energy to the radiation of TEM-waves indicating that faster-than-light radiation sources exist in electron beams if slow current waves with monotonically varying amplitude are excited in them. The effect is caused by the occurrence of faster-than-light Fourier components in the variable component of the current as the amplitude varies. The present effect can be observed when bulk charge density decreases in modulated electron flows. Author

N86-15594# Joint Publications Research Service, Arlington, Va.
ANALYSIS AND IDENTIFICATION OF INERTIAL DEVICES Abstract Only
N. Z. Safiullin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 44-45 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 12-18 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A hybrid theoretical and experimental model of nonlinear inertial devices is constructed for their identification and analysis such that its complexity does not increase excessively with increasing order of nonlinearity. A continuous and stable nonlinear receiver-amplifier with finite inertia is described by a finite sum of a Volterra series characterizing the response to a bounded input signal. Identification with either a real signal or a special test signal uses a double-trace memory oscilloscope or a stroboscopic unit. Multidimensional pulse response characteristics of a device are plotted in parametric form, most convenient for scanning and analysis. Analytical multiple integration becomes feasible after reduction of the number of unknown parameters. An analytical general expression was derived for the output signal from nonlinear inertial devices with weak oscillatory properties and input signal or arbitrary form. The results of identification and analysis are used for solving the model optimization problem, typically with respect to the mean-square error, including search for its global minimum by such methods as modified random search or complete sorting. Author

N86-15595# Joint Publications Research Service, Arlington, Va.
NEW TYPE OF IMPURITY DEFECTS IN SEMIINSULATING GALLIUM ARSENIDE Abstract Only c76
V. V. Voronkov, G. I. Voronkova, V. P. Kalinushkin, D. I. Murin, E. M. Omelyanovskiy, L. Ya. Pervova, A. M. Prokhorov, and V. I. Raykhshteyn *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 46 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1363-1366 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The kinetics of the action of millisecond laser pulses on semiconductors are studied, as well as the characteristics of melting, recrystallization and redistribution of impurities associated with the spike nature of laser radiation in the free lasing mode. The studies were performed by reflecting the sounding radiation from the illuminated surface of the crystal. It was found that, when the irradiation conditions are selected optimally, uniformly recrystallized layers with modified physical and mechanical characteristics can be obtained by exposing the specimens to millisecond laser pulses. The influence of segregation effects and impurity evaporation processes on the properties of the recrystallized layers is analyzed. It is found that uniform expitaxial layers with modified impurity distribution by depth can be obtained; millisecond pulsing also makes it possible to clean the crystal surface of absorbed layers and remaining reaction products formed during chemical treatment of the material. Author

N86-15596# Joint Publications Research Service, Arlington, Va.
PICOSECOND PHOTOCONDUCTIVITY OF INDIUM ARSENIDE Abstract Only c76
E. Adomaytis, Z. Dobrovolskis, and A. Krotkus *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 46 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1422-1424 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Optoelectronic switching in indium arsenide was investigated. Specimens made from an InAs single crystal doped with Cr and Zn, and of an undoped crystal, were prepared. The shape and amplitude of pulses passing through the indium arsenide specimen are examined for different amounts of radiant energy illuminating the specimen. The output signal is not proportional to the conductivity of the specimen. Indium arsenide is found to exhibit some fundamental shortcomings as a semiconductor, including low dark resistance and limited maximum amplitude of the output signal, which restricts its use in optoelectronic switches to the region of small amplitudes. Author

N86-15597# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF RECRYSTALLIZATION AND REDISTRIBUTION OF IMPURITIES IN SEMICONDUCTORS EXPOSED TO MILLISECOND LASER RADIATION Abstract Only c76
S. G. Kiyak, A. K. Shukhostanov, G. V. Savitskiy, S. Zh. Gonov, and V. V. Gafiychuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 47 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1446-1448 Original language document was announced as N85-26302 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The kinetics of millisecond laser pulses acting upon semiconductors are investigated by reflecting probing radiation from the irradiated surface of the crystal. The characteristics of fusion, recrystallization and impurity redistribution associated with the spike nature of laser radiation in the free lasing mode are investigated. The temporal characteristics of fusion and recrystallization were investigated on germanium specimens by charting the variation in intensity of probing radiation from an LG52-1 helium-neon laser reflected from the surface. The surface layer of the crystals was heated and fused by radiation from a GOS-301 neodymium-laser. It is found that millisecond laser pulses (under optimum conditions) can produce uniformly recrystallized layers with modified physical and mechanical characteristics. The influence of segregation effects and impurity evaporation processes on the properties of the recrystallized layers is discussed. The radiation mode employed can be used to remove adsorbed layers from the crystal surfaces, and to eliminate reaction products formed during chemical treatment of the material. Author (IAA)

N86-15598# Joint Publications Research Service, Arlington, Va.
PRINCIPLES AND PROBLEMS OF BUILDING dc ELECTRIC DRIVES WITH SYMISTOR CONTROL Abstract Only
A. D. Pozdeyev and A. G. Ivanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 48 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 2-6 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Reversible symistor (triac) converters are considered for d.c. electric drives. The main problem is the much lower reliability of symmetric thyristors than that of plain ones, owing to the possibility of spontaneous reversal in the absence of a resolution signal from the switching logic when the device is controlled by unipolar pulses or upon reversal of voltage polarity across the power terminals when the device is controlled by bipolar signals. Spontaneous symistor reversal can be prevented either by limiting the reverse dv/dt to the permissible commutation level or by delaying application of the reverse voltage till after recovery. The latter condition is achieved by means of saturable reactors. The authors propose using a polyphase laminated reactor core, with alternating solid and slit laminations, so as to combine these delaying reactors and the switching reactors with common windings. Two methods of controlling symistors were developed which not only improve their reliability but also reduce the size of such dual reactors involving, respectively, monitoring the point where the counter-emf wave intersects the voltage wave across the switched-off rectifier or monitoring the voltage polarity across the switched-off symistor. Author

N86-15599# Joint Publications Research Service, Arlington, Va.
MODULAR DISTRIBUTOR FOR CONTROLLING GROUP OF ELECTRIC DRIVES Abstract Only
A. I. Parkhomenko, V. I. Koshman, V. F. Petrichenko, V. D. Gorotov, and L. P. Abera *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 50 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 14-18 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A series of modular distributors, RASK, was developed for controlling a group of electric drives in coal mines or other mines, where a large number of contractors must be protectively enclosed. Unlike conventional distributors with three electromagnets for circuit closing, circuit opening, and zero-sequence protection respectively, a RASK distributor has only one main electromagnet for circuit closing. The other two functions are performed by small auxiliary electromagnets, their number being equal to the number of controlled drives and additional contactors being provided for their operation as intermediate relays. Such a distributor not only switches drives on or off, selectively and independently rather than sequentially, but also commutates the arc-quenching circuits. All circuits can be controlled by current signals transmitted over two or three wires, either all or only some controlled circuits to be closed or opened, and all circuits can be opened simultaneously for zero-sequence protection. The advantages of fewer components are appreciable reduction of metal content. Author

N86-15600# Joint Publications Research Service, Arlington, Va.
ELECTRIC DRIVE MOTORS FOR INDUSTRIAL ROBOTS Abstract Only
Klaus Fichtner *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 51 Transl. into ENGLISH from Elektrotekhnika (Moscow), no. 11, Nov. 1984 p 33-35 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

In robotized industrial plants it is possible to use electric motors in the technological process and also for control, assembly, transport, testing, and measurements. Particularly suitable for these applications are permanent-magnet d.c. motors. A new special series was developed for industrial robots with hinge joints in kinematic pairs. The complete drive includes thyristors or transistor controls with regulators and, if necessary, a line transformer as well as a servomotor with tachometer and odometer for speed, current, and position control. The drive is coupled to a robot tong through mechanical torque and force converters. In addition to a 0 to 4000 rpm speed regulation, without wobble at low speeds, and a high torque-to-weight ratio for repetitive short-time heavy duty, these low-inertia motors develop high starting and accelerating torques over the entire speed range. They operate from a 1 to O 220 V a.c. line through a rectifier. The motors are totally enclosed, or of open construction for better ventilation. Their windings have class F insulation for operation at ambient temperatures up to 40 C. Author

N86-15601# Joint Publications Research Service, Arlington, Va.
TWO-STEP PULSE TRIGGERING OF DYNISTOR POWER SWITCHES Abstract Only
A. V. Gorbatyuk, I. V. Grekhov, and S. V. Korotkov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 51-52 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 42-46 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The performance of reversibly switching power dynistors is examined on the basis of physical processes which occur in their structure to determine their dv/dt and di/dt characteristics. Conditions for normal and most efficient operation are established by qualitative and quantiative analysis of available data. Pulse triggering of these thyristor-diode devices is considered, a particularly important parameter here being the lifetime of the high-conductance phase in internal p-N-n(+) diode segments from reverse injection till flow of positive anode current (reverse diode current). The length of this period is calculated according to the

conventional simple theory of diffusion with charge storage, which is applied here to a semiinfinite model structure and the transient state with arbitrary waveforms of forward and reverse diode currents. The corresponding equation of ambipolar diffusion is solved for appropriate initial and boundary conditions for the hole concentration and its rate of change. A comparative evaluation of single-step and two-step triggering reveals the advantages of the latter mode with simultaneous uniform injection of initially induced charge. Author

N86-15602# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL DETERMINATION OF TURN-OFF TIME OF HIGH-VOLTAGE POWER THYRISTORS Abstract Only
G. V. Grigoryeva, A. V. Konyukhov, V. A. Kuzmin, and Yu. A. Chesnokov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 52 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 50-53 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Silicon power thyristors were studied to determine the dependence of their turn-off time on the repetitive reverse voltage, on the rate of decrease of the forward current and on the lifetime of holes. Three groups of thyristors were tested corresponding to T630, T173-1250, T353-800 four-layer devices rated for 2400 to 2800 V, 2600 to 2800 V, 2800 to 3200 V respectively. The data are evaluated and the dynamics of charge buildup and dissipation during reversals of anode voltage polarity are considered. Significant differences in turn-off characteristics between the three groups of thyristors are shown. It decrease in the life of holes for minimum turn-off time and thus maximum switching speed involves a tradeoff with a higher blocking-state pulse voltage and larger leakage currents is indicated. E.A.K.

N86-15603# Joint Publications Research Service, Arlington, Va.
RECOMMENDATIONS FOR DEVELOPING SIMULATORS OF SOLAR RADIATION PENETRATING TO THE EARTH'S SURFACE Abstract Only c35
F. K. Maslovets *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 53 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 12, Dec. 1984 p 46-48 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

By irradiation of materials provides a possibility of producing processes not characteristics of the natural solar radiation and intensification of other processes can also occur. Tests were conducted to obtain a total intensity of simulated solar radiation of 1.6 to 1.8 cal/(sq. cm. min), where 0.06 cal/(sq. cm. min.) lie in the ultraviolet region (0.28-0.4 micrometer), or, based on the photochemical activity, 5.4-5.5 mg/sq. cm .h of decomposed oxalic acid at the chamber temperature of 80 C for an hour exposure. The radiation intensity was measured at each corner of a 500x500 sq mm area for three different elevations. It is indicated that the test objectives are satisfied for the elevation of 600 to 700 mm from the chamber bottom. Author

N86-15604# Joint Publications Research Service, Arlington, Va.
MEASURING RADIATION ELECTROCONDUCTIVITY OF SOLID DIELECTRICS EXPOSED TO PULSED IONIZING RADIATION Abstract Only c74
S. N. Makeyev and O. I. Shmid *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 54-55 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 12, Dec. 1984 p 48-51 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Radiation electroconductivity (REC) is one of the fundamental parameters which describes the behavior of dielectric materials and metal-dielectric systems in a field of ionizing radiation. The development of improved methods for measuring this parameter are described. The work done on measuring the radiation electroconductivity of solid dielectrics and metal-dielectric semiconductors (MDS) under the impact of ionizing radiation pulses in the 2000-0.03 micron range is summarized. The existing methods are based on measuring the voltage across a reference resistor carrying current, which depends on the resistance of the sample and the externally applied voltage. A new method for measuring the REC under pulsed radiation in the 0.26-2600 kCl/kg gamma radiation energy range allows to reduce the level of induced voltage to a value not greater than 20 mV. Under conditions of pulsed gamma-neutron radiation an additional pulse appears at the leading edge of the conductivity signal. Electret charges, responsible for the polarization effects with pulsed gamma radiation are stored in the dielectric material of the measuring cell and in the measuring line. E.A.K.

N86-15605# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF AUTOMATED LIGHT GUIDE PULSE DISPERSION MEASUREMENT Abstract Only
T. V. Babkina, V. V. Gruzoryants, S. V. Kuryuzhin, I. Ye. Nefedov, G. A. Malakhova, A. Ya. Oleynikov, Ye. V. Pankrats, A. Ya. Smirnov, and M. A. Khaldina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 54 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 2033-2038 Original language document was announced in IAA as A85-14798 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The use of a stroboscopic set up employing CAMAC hardware for measuring pulse dispersion in fiber-optic waveguides is described, and a block diagram of the automated setup is presented. It is shown that this instrumentation produces an order-of-magnitude reduction in the time required for the experiment and improves accuracy by the statistical processing of the experimental data. The measurement accuracy of the waveguide passband is 5% at a 0.5 level in the 1-Ghz band for a wavelength of 0.85 micron. B.J. (IAA)

N86-15606# Joint Publications Research Service, Arlington, Va.
INTERNAL CONDITIONS FOR SELF EXCITATION OF SUPERCONDUCTOR DC GENERATORS Abstract Only
B. L. Aliyevskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 57 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 11, Nov. 1984 p 24-30 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Relationships were developed for self-contained dc generators describing the conditions for the self-excitation in the case of parallel and series connections of the inductor winding made of the type 2 superconductor. The Hurwitz stability criteria were applied for the analysis of equations describing the electromagnetic process, and the conditions for the existence and stability of the mode which would be established after the excitation. The validity of the method was verified experimentally using results obtained for similar phenomena with conventional dc generators. Author

N86-15607# Joint Publications Research Service, Arlington, Va.
EFFECT OF CONDUCTOR PROFILE ON FORCE CHARACTERISTICS DUE TO MOTION OF A MAGNETIC FIELD SOURCE Abstract Only c70
V. I. Astakhov and M. V. Bondarenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 57-58 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 11, Nov. 1984 p 8-12 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Algorithms were developed for computing the lift, lateral, and braking forces acting on a source of a magnetic field moving along a conductor with complex profile. Numerical values of the acting forces were obtained for a rectangular configuration and different bend angles of the current conductor. Computations indicated that with an increased angle of the conductor bend phi, or an increased curvature K, the characteristics of the electrodynamic suspension system became worse. E.A.K.

N86-15608# Joint Publications Research Service, Arlington, Va.
STRIP AND MICROSTRIP LINE PERIODIC HETEROGENEITIES Abstract Only
A. M. Lerer, B. M. Lerer, V. D. Ryazanov, and V. A. Sledkov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 59 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1877-1886 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A quasistatic method is described for analyzing periodic heterogeneities in single and coupled strip lines and microstrip lines. An ALGOL program on a BESM-6 computer calculated the running inductance and capacitance, wave impedances and delay coefficients for single and coupled strip lines and microstrip lines with periodic heterogeneities of arbitrary form. The analyzed quantities are investigated as a function of distance (from side shield to the strip), number of terms in the series and number of approximated functions. The method demonstrates good convergence and requires little machine time and results were verified experimentally. E.A.K.

N86-15609# Joint Publications Research Service, Arlington, Va.
THIN-FILM BOLOMETER POWER TRANSDUCE ELECTRODYNAMIC ANALYSIS AND EXPERIMENTAL INVESTIGATION Abstract Only
Kh. L. Garb, P. V. Nikolayev, P. Sh. Fridberg, and I. M. Yakover *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 59 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1917-1926 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A bolometric power transducer consisting of metal holders and thin resistor film in a single-mode rectangular waveguide is examined and a system of integral vector equations for surface currents on the transducer element is derived and solved by Galerkin's method. Asymptotic methods are derived for equivalent circuit shunt impedance and a method is described for calculating matrix elements containing slowly converging dual series. The frequency behavior of quantities mod S11 and Mod S21 is investigated for the heterogeneity represented by metal holders and resistive film. It is confirmed that the model of a holder with thickness of 0 is valid. E.A.K.

N86-15610# Joint Publications Research Service, Arlington, Va.
POWER COMBINATIONS MICROWAVE AMPLIFIER LOADING CHARACTERISTICS Abstract Only
V. V. Zayentsev and M. A. Minkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 60 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1966-1970 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Improvements in loading properties of amplifiers in combination with the power from an arbitrary number of amplifiers based on noncoherent adders with relatively small phase shift were studied. Loading properties are described with the ratio of the power output by the system into an unmatched load to matched condition power. It is found that multichannel noncoherent channel adders with phase difference of pi/n at the low end of the working frequency band allow effective compensation for input reflections and improve amplifier loading properties. E.A.K.

N86-15611# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF HIGHER TYPES OF OSCILLATIONS ON PISTON-TUNED WAVEGUIDE GUNN OSCILLATOR FREQUENCY Abstract Only c32
A. A. Litsov, D. A. Usanov, B. P. Bezruchko, and A. Yu. Vagarin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 60 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow), v. 29, no. 10, Oct. 1984 p 2057-2058 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The influence of higher types of oscillations on the piston-tuned waveguide Gunn oscillator frequency was investigated. Diode loaded impedance is investigated for the case of higher types of oscillations existing near holder and interacting between holer and piston only in terms of the basic type of H10, and for the case of interaction between the piston and holder in terms of the basic and attenuating higher types of oscillation. Calculated and experimental frequency behavior are found to agree sufficiently well but it is essential to allow for interaction of higher types of oscillations to explain the nature of the relationship between Gunn oscillator frequency and the position of the shorting piston when the distances between the holder and piston are sufficiently small. E.A.K.

N86-15612# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF ELLIPTICAL WAVEGUIDES IN CYLINDRICAL REFERENCE BASIS Abstract Only c32
G. I. Veselov and N. I. Platonov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 61 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 64-67 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Analysis of elliptical waveguides and determination of their eigenfunctions by the classical method of coordinate surfaces and angularly periodic Mathieu functions in an elliptical system of coordinates is cumbersome. A simpler method of solving the problem of electrodynamics is generalized separation of variables in a cylindrical system of coordinates, which yields series of circular cylindrical waves which satisfy the corresponding homogeneous Helmholtz equation and are periodic with respect to the angular coordinate. This method is applied here to an ideal elliptical waveguide with a homogeneous filler occupying the entire cavity and to a coaxial elliptical waveguide with a tubular filler. In an elliptical reference basis the eigenfunctions of both waveguides would appear in closed form. Determination of eigenfunctions for the corresponding simply connected region reduces to solving a homogeneous system of linear algebraic equations. DOE

N86-15613# Joint Publications Research Service, Arlington, Va.
PHOTOGRAPHIC RECORDING OF TRAJECTORIES OF AEROSOL PARTICLES BY METHOD OF MULTIPLE EXPOSURE Abstract Only c35
N. S. Mikhovich, B. I. Petrov, and Yu. P. Toporov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 65 Transl. into ENGLISH from Zhurnal Nauchnoy i Prikladnoy Polografii i Kinematografii (Moscow, USSR), v. 29, no. 6, Nov. - Dec. 1984 p 409-413 Original language document was announced in IAA as A85-18300 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A device using a pulsed-lamp light source has been developed for the photographic recording of the trajectories of rapidly moving aerosol particles. The recording of an aerosol stream is carried out by the illumination of the stream with a packet of light pulses of given frequency and duration, which makes it possible to obtain the particle velocity distribution. The device can measure a minimum particle size of 10 microns for an aerosol stream velocity up to 25 m/s. The electronic circuit for the power supply and control of the ISP-70 lamp is described. B.J. (IAA)

N86-15614# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF REVERSE BRANCH OF VOLTAGE-CURRENT CURVE OF GaAs HIGH-VOLTAGE p-n STRUCTURE Abstract Only
V. I. Korolkov, R. S. Osipova, S. I. Ponomarve, M. N. Stepanova, and G. I. Tsvilev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 68 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 11, Nov. 1984 p 2029-2035 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The temperature behavior of the reverse branches of the

voltage-current curves of p-n junctions based on lightly doped gallium arsenide, capable of operating with reverse voltages of up to 1.5 kV and at temperatures of up to 250C, was investigated. The volumetric component of the reverse current was measured by a guard ring at temperatures ranging from 20 to 250C and voltages of 2 to 1500 V. The measured volumetric component of the reverse current disagreed with that predicted by the Shockley-Noyce-Sah theory, which assumes that the rate at which electron-hole pairs is generated is independent of the electrical field intensity. It is shown that this assumption does not always hold when the rate of emission of charge carriers depends strongly upon the field. It is conducted that the anomalies observed in the field and temperature behavior of the reverse current of p-n junctions in lightly doped gallium arsenide can be explained by the field dependence of the rate of emission of electrons from deep levels. E.A.K.

N86-15615# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF EMBEDDED ELECTRICAL FIELDS ON TEMPERATURE STABILITY OF PARAMETERS OF I-Ga-As HETEROPHOTOELEMENTS Abstract Only
A. M. Allakhverdiyev, V. M. Andreyev, N. B. Dzhelepova, B.V. Yegorov, and O. V. Sulima *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 69 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 11, Nov. 1984 p 1979-1984 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The saturation current I sub o and idling voltage U sub xx in heterophotoelements employed in high-efficiency solar concentrators are examined to determine the influence of embedded elongated electrical fields caused by hole concentration gradients. It is found that the temperature variation in U sub xx is less when the field is present than when it is absent. The element with the best temperature stability is an Al sub 0.14 Ga sub 0.86 As p-n-junction element with a thin diffusion p-region and large hole concentration gradient obtained by liquid film epitaxy and diffusion of zinc from the vapor phase. At elevated working temperatures, AlxGa sub 1- sub (x) sub As p-n-junction photoelements with strong embedded elongated electrical fields are preferred. E.A.K.

N86-15616# Joint Publications Research Service, Arlington, Va.
HIGH-FREQUENCY CHARACTERISTICS OF BALLISTIC BIPOLAR HETEROJUNCTION TRANSISTORS Abstract Only
V. I. Ryzhiy and V. A. Fedirko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 69-70 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2250-2256 Original language document was announced in IAA as A85-15692 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The HF characteristics of bipolar transistors based on semiconductor heterostructures are calculated and analyzed. It is suggested that, for n-p-n transistors, the motion of electrons in the base and collector junction is ballistic, while the high conductivity of the base assures its quasineutrality. Allowance is made for the nonquadratic character of the electron dispersion law, significant in the collector-junction region. Frequency dependences of the current gain coefficients are determined for a circuit with a common base and emitter, and boundary frequencies are determined. B.J. (IAA)

N86-15617# Joint Publications Research Service, Arlington, Va.
SENSITIVITY OF SQUIDS BUILT WITH LOW-CAPACITANCE JOSEPHSON TUNNEL JUNCTIONS Abstract Only
A. B. Zorin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 70 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow), v. 29, no. 11, Nov. 1984 p 2224-2233 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The dynamic characteristics of squids built with a single low-capacitance Josephson tunnel junction or with two such junctions are analyzed. A low-inductance interferometer ring is assumed. Relations are derived by the microscopic theory, which agrees with the resistive model at temperatures lower than half the critical and at frequencies much lower than the energy-gap frequency. The resolving power and the energy yield sensitivity of such squids are calculated and low-frequency fluctuation noise and the squid reaction on the signal source are considered. E.A.K.

N86-15618# Joint Publications Research Service, Arlington, Va.
EXTERNAL LOCKING OF IMPATT-DIODE POWER OSCILLATORS Abstract Only
Ye. M. Gershenzon, A. A. Levites, L. A. Plokhova, and A. I. Smetanin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 70-71 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2179-2185 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A single-stage oscillator with nonlinear delay in the feedback loop is analyzed for locking by an external signal. The results are applied to silicon IMPATT-diode oscillators. Calculations are based on the equivalent circuit with three voltage generators in series which are produced in the: hole transit region, the electron transit region, and compensate the field difference between the real p-n junction and the equivalent multiplier layer. Amplitude-frequency phase-frequency, power-frequency characteristics and the dependence of the locking band on the load are determined. The latter is characterized by the ratio of starting current to diode supply current and the amplitude dependence of the delay angle and the frequency dependence on the diode resistance is considered. It is indicated that the oscillator performance droops only slightly in the range of load ratios lower than optimum but droops appreciably in the range of load ratio higher than optimum. In the latter case reconciliation of theoretical data with experimental data requires a more precise and intricate equivalent circuit. E.A.K.

N86-15619# Joint Publications Research Service, Arlington, Va.
MAXIMUM ATTAINABLE SENSITIVITY OF dc SQUIDS BUILT WITH JOSEPHSON TUNNEL JUNCTIONS Abstract Only
O. V. Snigirev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UES-85-006) 30 Apr. 1985 p 71 Transl. into ENGLISH from Radiotekhnika i Elektronia (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2216-2223 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The performance of dc squids built with Josephson tunnel junctions is analyzed for the ideal equivalent circuit with the junctions unshunted and for the fundamental relation according to which a variation of the magnetic flux produces a change in the critical current and consequently a variation of the high-frequency component of the voltage signal, the low-frequency component of the voltage signal is passed by a narrow-band filter. The dynamic characteristics of a low-inductance interferometer, analogous to those of a single Josephson tunnel junction, are calculated first for a device without noise. They are then calculated for a device with fluctuation noise, the effect of the latter depending largely on the ratio of fluctuation intensity to rate of current buildup. A lower bound is established for the energy sensitivity of the device, this lower bound is found to be much higher with high-frequency pumping near the upper frequency limit and not much different than that for a conventional squid with shunted Josephson tunnel junctions. E.A.K.

N86-15620# Joint Publications Research Service, Arlington, Va.
STANDARDIZATION OF SCHWARZ-CHRISTOFFEL TRANSFORMATION FOR ENGINEERING DESIGN OF SEMICONDUCTOR AND HYBRID INTEGRATED-CIRCUIT ELEMENTS Abstract Only
A. A. Yashin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 72 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 11, Nov. 1984 p 55-57 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

A semiconductor or hybrid structure into a calculable two-dimensional region mapped by the Schwarz-Christoffel transformation and a universal algorithm can be constructed on the basis of Maxwell's electro-magnetic-thermal similarity principle for engineering design of integrated-circuit elements. The design procedure involves conformal mapping of the original region into a polygon and then the latter into a rectangle with uniform field distribution, where conductances and capacitances are calculated, using tabulated standard mapping functions. Subsequent synthesis of a device requires inverse conformal mapping. Devices adaptable as integrated-circuit elements are high-resistance film resistors with periodic serration, distributed-resistance film attenuators with high transformation ratio, coplanar microstrip lines, bipolar transistors, directional couplers with distributed coupling to microstrip lines for microwave bulk devices, and quasirregular smooth matching transitions from asymmetric to coplanar microstrip lines. E.A.K.

N86-15621# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL INVESTIGATION OF ACOUSTIC WAVE ELECTRICAL EXCITATION IN ELECTROLYTE SOLUTION Abstract Only c71
A. N. Malakhov and V. V. Cherepennikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 73 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1349-1352 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

The electrical excitation of acoustic oscillations in an electrolyte solution in a rectangular container was investigated. A solution of sodium chloride was employed with a radiator consisting of a metal grid of steel wires 3.3 mm in diameter. An equation is derived for vibrational velocity potential and is solved for a rectangular container with no initial conditions, rigid boundaries and free surface obtained by the Fourier method. Predicted and experimental values agree satisfactorily. The use of a wire grid radiator is suggested for creating standard hydroacoustic fields to be used for calibrating hydroacoustic sensors. E.A.K.

N86-15622# Joint Publications Research Service, Arlington, Va.
ACOUSTOOPTIC DEMODULATOR OF PHASE-KEYED SIGNALS Abstract Only c32
A. V. Pugovkin, V. A. Krakovskiy, and G. A. Kolchina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 73-74 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 11, Nov. 1984 p 2266-2268 Original language document was announced in IAA as A85-15694 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

Theoretical and experimental results are presented on an acoustooptic (AO) demodulator of PSK signals based on an AO processor. The passage of the phase surge through the AO modulator is analyzed. It is shown that, in order to achieve significant band broadening and a uniform frequency-response curve, it is necessary to reduce the laser-beam aperture and to use spatial filters that exclude the region of spatial frequencies alpha less than 0.5. B.J. (IAA)

N86-15437# Joint Publications Research Service, Arlington, Va.
FUJI, THOMSON TC DEVELOP, PRODUCE HIGH-POWERED TRANSISTORS
P. DeVittor *In its* West Europe Report: Science and Technology p 53-57 Transl. into ENGLISH from Elettronica Oggi (Milan), May 1985 p 117-122 (For primary document see N86-15435 06-31)
Avail: NTIS HC A04/MF A01

N86-15441# Joint Publications Research Service, Arlington, Va.
MICRO-POWER DISSIPATION DEVICE DESCRIBED
Mao Xingwu, Zhou Likai, and Zhou Jianjun *In its* China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 51-56 Transl. into ENGLISH from Dianzi Rexue Jishu (Beijing), v. 15, no. 3, 10 Mar. 1985 p 24-26 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

N86-15467# Joint Publications Research Service, Arlington, Va.
ACTIVE MICROWAVE FILTERS Abstract Only
B. Yu. Kapilevich *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 62 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 1, Jan. 1985 p 3-10 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15468# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF TRANSIENTS IN DIRECT CURRENT CABLE INSULATION Abstract Only
M. Yu. Shuvalov, S. Ye. Gleyzer, and E. T. Larina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 79 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 3, Mar. 1985 p 49-52 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15476# Joint Publications Research Service, Arlington, Va.
GDR SCIENTISTS DEVELOP ELECTROLUMINESCENCE DISPLAY
Christian Waldner *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 21-22 Transl. into ENGLISH from Volksstimme (Magdeburg, East Germany), 20 Jun. 1985 p 4 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

N86-15481# Joint Publications Research Service, Arlington, Va.
NOVEL CONTROL CIRCUIT FOR PROXIMITY FOCUSED MICROCHANNEL PLATE IMAGE INTENSIFIERS
Zhou Xuan *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 33-44 refs Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 6, no. 6, Nov. 1984 p 473-480 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

N86-15485# Joint Publications Research Service, Arlington, Va.
SURFACE PASSIVATION OF SEMICONDUCTOR CIRCUIT ELEMENTS WITH LAYER OF WIDEBAND SEMICONDUCTOR Abstract Only
B. I. Sysoyev, N. N. Bezryakin, A. S. Dronov, and A. P. Rovinskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 2-3 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 140-143 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15486# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF ELECTROPHYSICAL AND PHOTOELECTRIC PROPERTIES OF MOS-STRUCTURES ON INDIUM ARSENIDE Abstract Only
Ye. A. Loskutova, V. N. Davydov, and T. D. Lezina *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 3-4 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 134-139 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15487# Joint Publications Research Service, Arlington, Va.
PREDICTING AND DIAGNOSING PERFORMANCE OF TRANSISTORS, INTEGRATED CIRCUITS AND LARGE-SCALE-INTEGRATION SYSTEMS BY MULTILEVEL SIMULATION METHODS AND PROGRAMS Abstract Only
A. N. Bubennikov, B. N. Mitashev, and A. D. Sadovnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 5 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 3-7 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15488# Joint Publications Research Service, Arlington, Va.
NONSINUSOIDAL MODES OF OSCILLATOR WITH MULTIFREQUENCY SURFACE-ACOUSTIC-WAVE RESONATOR Abstract Only
G. L. Gurevich, L. N. Zhizhenkova, V. M. Pashkin, and A. M. Spasyuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 6 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 604-611 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15489# Joint Publications Research Service, Arlington, Va.
NOISE CHARACTERISTICS OF STROBOSCOPIC TRANSDUCERS BUILT WITH GaAs MICROCIRCUIT INTEGRATION Abstract Only
V. I. Staroselskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 7-8 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 162-168 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15490# Joint Publications Research Service, Arlington, Va.
STRUCTURAL TRANSFORMATIONS IN SEMICONDUCTORS DURING OPTICAL PUMPING Abstract Only
Yu. V. Kopayev, V. v. Menyaylenko, and S. N. Molotkov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 8-9 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 153-161 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15491# Joint Publications Research Service, Arlington, Va.
METHODOLOGY FOR DETERMINING DYNAMIC CHARACTERISTICS OF TRISTABLE-LOGIC INTEGRATED CIRCUITS Abstract Only
A. M. Pashayev and A. R. Adzhalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 9 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 169-170 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15492# Joint Publications Research Service, Arlington, Va.
REDUCING DYNAMIC ERRORS OF INTEGRATED-CIRCUIT CMOS SWITCHES Abstract Only
A. A. Danilov and D. Ye. Polonnikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 10 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), v. 14, no. 2, Mar. - Apr. 1985 p 178-179 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15497# Joint Publications Research Service, Arlington, Va.
FREQUENCY CHARACTERISTICS OF DIFFERENTIAL OPTRON Abstract Only
A. K. Mamedov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 25 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 76-78 Original language document was announced in IAA as A85-34176 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15502# Joint Publications Research Service, Arlington, Va.
ACTIVE MAGNETIC SUSPENSION IN MAIN MAGNETIC FIELD OF ELECTRIC MOTOR Abstract Only
I. D. Urusov, V. I. Galkin, and I. P. Likhoshvay *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 50 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 38-41 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15505# Joint Publications Research Service, Arlington, Va.
PULSE-TYPE VOLTAGE STABILIZER WITH INTEGRAL PULSE-WIDTH MODULATION Abstract Only
I. A. Fedorova, A. P. Kuznetsov, and L. Yu. Shilin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 55-56 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 60-61 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15930# Joint Publications Research Service, Arlington, Va.
MICROELECTRONICS TECHNOLOGY
M. Sidorovyy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 16-24 Transl. into ENGLISH from Znaniye-Sila (Moscow), no. 4, Apr. 1985 p 2-5 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-15623 British Library Lending Div., Boston Spa (England).
THE MOVEMENT OF A CLUSTER OF PARTICLES SUBJECT TO THE EFFECT OF GRAVITY AND THEIR SEDIMENTATION ONTO A PLANE HORIZONTAL SURFACE
G. M. Makhviladze and O. I. Melilhov [1985] 15 p refs Transl. into ENGLISH from Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 6, 1982 p 64-73
(BLL-Risley-Tr-5161-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

A numerical investigation, on the basis of nonstationary two-dimensional equations of the mechanics of heterogeneous media, into the movemont mechanisms of a cloud of particles subject to the effect of gravity in an unbounded medium, and into the interaction of the descending cluster of particles with a plane horizontal surface is reported. According to the degree of hydrodynamic interaction between the particles, various conditions of movement are discerned of the cloud which is settling, and the change in its spatial configuration is traced, which is determined by the large-scale vortical movement of the carrier medium which develops. Distributions are obtained of the concentrations of particles on the sedimentation surfaces. A dispersion coefficient for the cluster of particles on the plane horizontal surface is introduced, and its relationship with the concentration of the particles, with their size and with other parameters is examined.
E.A.K.

N86-15624 British Library Lending Div., Boston Spa (England).
RESEARCH INTO HEAT TRANSFER BY CONVECTION IN THE CHAMBER OF A FURNACE WITH RELATION TO THE ANGLE AT WHICH A HIGH VELOCITY JET STRIKES A PLANE SURFACE
P. G. Krasnokutskii, V. A. Krivandin, A. V. Shpernyi, and G. M. Podolyako [1985] 7 p refs Transl. into ENGLISH from a Russian source
(BLLD-M-36478-(5828.4)) Copyright. Avail: Issuing Activity

Heat transfer between high velocity jets in furnace chambers and flat metal surfaces was investigated. Equations are given for calculating heat transfer from jet to metal with differnt nozzle-surface distances and jet angles of attack. The criterial relationships make it possible to calculate the heat transfer by convection in furnace chambers.
E.A.K.

N86-15625*# Arizona State Univ., Tempe.
HEAT TRANSFER CHARACTERISTICS WITHIN AN ARRAY OF IMPINGING JETS. EFFECTS OF CROSSFLOW TEMPERATURE RELATIVE TO JET TEMPERATURE Final Report
L. W. Florschuetz and C. C. Su Washington NASA Oct. 1985

175 p refs
(Grant NsG-3075)
(NASA-CR-3936; E-2696; NAS 1.26:3936; CR-R-R85020) Avail: NTIS HC A08/MF A01 CSCL 20D

Spanwise average heat fluxes, resolved in the streamwise direction to one stream-wise hole spacing were measured for two-dimensional arrays of circular air jets impinging on a heat transfer surface parallel to the jet orifice plate. The jet flow, after impingement, was constrained to exit in a single direction along the channel formed by the jet orifice plate and heat transfer surface. The crossflow onginated from the jets following impingement and an initial crossflow was present that approached the array through an upstream extension of the channel. The regional average heat fluxes are considered as a function of parameters associated with corresponding individual spanwise rows within the array. A linear superposition model was employed to formulate appropriate governing parameters for the individual row domain. The effects of flow history upstream of an individual row domain are also considered. The results are formulated in terms of individual spanwise row parameters. A corresponding set of streamwise resolved heat transfer characteristics formulated in terms of flow and geometric parameters characterizing the overall arrays is described. E.A.K.

N86-15626*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPUTATIONAL FLUID DYNAMICS AT NASA AMES AND THE NUMERICAL AERODYNAMIC SIMULATION PROGRAM
Victor L. Peterson Sep. 1985 23 p refs
(NASA-TM-86769; Rept-85321; NAS 1.15:86769) Avail: NTIS HC A02/MF A01 CSCL 20D

Computers are playing an increasingly important role in the field of aerodynamics such as that they now serve as a major complement to wind tunnels in aerospace research and development. Factors pacing advances in computational aerodynamics are identified, including the amount of computational power required to take the next major step in the discipline. The four main areas of computational aerodynamics research at NASA Ames Research Center which are directed toward extending the state of the art are identified and discussed. Example results obtained from approximate forms of the governing equations are presented and discussed, both in the context of levels of computer power required and the degree to which they either further the frontiers of research or apply to programs of practical importance. Finally, the Numerical Aerodynamic Simulation Program--with its 1988 target of achieving a sustained computational rate of 1 billion floating-point operations per second--is discussed in terms of its goals, status, and its projected effect on the future of computational aerodynamics. Author

N86-15627*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL SIMULATION OF VISCOUS SUPERSONIC FLOW OVER A GENERIC FIGHTER CONFIGURATION
Denny S. Chaussee, Gordon Blum (Boeing Co., Seattle, Wash.), and John Wai (Boeing Co., Seattle, Wash.) Dec. 1985 10 p refs
(NASA-TM-86823; A-85436; NAS 1.15:86823) Avail: NTIS HC A02/MF A01 CSCL 20D

A procedure is presented, as well as some results, to calculate the flow over a generic fighter configuration. A parabolized marching Navier-Stokes code is used to obtain the solution over a wing-canopy body. The flow conditions simulate supersonic cruise with a freestream Mach number of 2.169 and angles of attack of 4 and 10 deg. The body surface is considered to be an adiabatic wall and the flow is assumed to be turbulent for the given Reynolds number. Author

N86-15628*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TAYLOR-GOERTLER INSTABILITIES OF TOLLMIEN-SCHLICHTING WAVES AND OTHER FLOWS GOVERNED BY THE INTERACTIVE BOUNDARY LAYER EQUATIONS Final Report
Philip Hall Oct. 1985 30 p refs Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178010; ICASE-85-47; NAS 1.26:178010) Avail: NTIS HC A03/MF A01 CSCL 20D

The Taylor-Gortler vortex instability equations are formulated for steady and unsteady interacting boundary layer flows of the type which arise in triple-deck theory. The effective Gortler number is shown to be a function of the all shape in the boundary layer and the possibility of both steady and unsteady Taylor-Gortler modes exists. As an example the steady flow in a symmetrically constricted channel is considered and it is shown that unstable Gortler vortices exist before the boundary layers at the wall develop the Goldstein singularity. As an example of an unsteady spatially varying basic state the instability of high frequency large amplitude Tollmien-Schlichting waves in a curved channel were considered. It is shown that they are unstable in the first Stokes layer stage of the hierarchy of nonlinear states. The Tollmien-Schlichting waves are shown to be unstable in the presence of both convex and concave curvature. Author

N86-15629*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INSTABILITY OF TIME-PERIODIC FLOWS Final Report
Philip Hall (Exeter Univ., England) Oct. 1985 32 p refs Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178009; ICASE-85-46; NAS 1.26:178009) Avail: NTIS HC A03/MF A01 CSCL 20D

The instabilities of some spatially and/or time-periodic flows are discussed, in particular, flows with curved streamlines which can support Taylor-Gortler vortices are described in detail. The simplest flow where this type of instability can occur is that due to the torsional oscillations of an infinitely long circular cylinder. For more complicated spatially varying time-periodic flows, a similar type of instability can occur and is spatially localized near the most unstable positions. When nonlinear effects are considered it is found that the instability modifies the steady streaming boundary layer induced by the oscillatory motion. It is shown that a rapidly rotating cylinder in a uniform flow is susceptible to a related type of instability; the appropriate stability equations are shown to be identical to those which govern the instability of a boussinesq fluid of Prandtl number unity heated time periodically from below. Author

N86-15630# Naval Underwater Systems Center, New London, Conn.
HYDRODYNAMIC NOISE AND SURFACE COMPLIANCE--AN OVERVIEW OF THE NAVAL UNDERWATER SYSTEMS CENTER IR/IED PROGRAM
H. Bakewell, Jr. and W. A. VonWinkle 15 May 1985 38 p
(AD-A157799; NUSC/TM-851080) Avail: NTIS HC A03/MF A01 CSCL 20/4

This Independent Research and exploratory development program on compliant surfaces is investigating turbulent flows over compliant layers to determine whether a class or classes of such layers can be devised for control and reduction of hydrodynamic (flow) noise. To accomplish this end we are addressing the coupled fluid/elastic problem to characterize the flow/layer interactions, resultant effects on the turbulent velocity components and effects both at the surface and within the layer. The motivation for the NUSC program is provided by an experiment in 1960 in which significant reductions in the turbulent boundary layer wall pressure spectra were measured on a vehicle coated with U.S. rubber Lamiflo. The Lamiflo coating was basically a version of a dolphin-like surface devised to extend Kramer's well known drag reductions investigations into the flow noise domain. The measured flow noise reductions have yet to be adequately explained or understood. The NUSC program seeks to develop an adequate physical framework within which the effects of compliant layers on flow noise may be understood. GRA

N86-15631# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
A CONSERVATION LAW RELATED TO KELVIN'S CIRCULATION THEOREM Interim Report
B. E. McDonald and J. M. Witting Jan. 1985 13 p
(AD-A157819; NORDA-75) Avail: NTIS HC A02/MF A01 CSCL 20/4

The governing equations for a moving hydrodynamic surface lead to a local conservation law for a surface velocity variable q sub s not in common use. When the surface is closed and applied forces are conservative, the law reduces to Kelvin's circulation theorem. When the flow is irrotational, it reduces to Bernoulli's law. Incorporation of the conservation law into a numerical water wave model case in an Eulerian representation can result in reduction of the prognostic equations from two spatial dimensions to one and in realization of formal accuracy to all order in nonlinearity. In a companion paper, the shallow water diagnostic equation (Poisson's equation) is also reduced to a one-dimensional problem. The prognostic equation derived here thus allows a purely one-dimensional treatment of traditionally two-dimensional shallow water waves. This yields significant resolution and execution speed benefits for the numerical integration of the overall system. Techniques also exist that reduce the deep water diagnostic equation to one dimension. Thus, the new prognostic equation should be useful in modeling two-dimensional deep water waves as a one-dimensional problem. GRA

N86-15632# Naval Underwater Systems Center, New London, Conn.
THE DOWLING WALL PRESSURE-SPECTRUM ANALOGY APPLIED TO AN ISOTROPIC TWO-LAYERED ELASTIC MEDIUM
C. A. Wagner 14 Nov. 1984 38 p
(AD-A158009; NUSC-TR-7235) Avail: NTIS HC A03/MF A01 CSCL 20/4

The Dowling analogy applies Lighthill's equation to predict the surface pressure spectrum on a single elastic layer subjected to turbulent excitation. We have extended the analogy to obtain the low wavenumber surface pressure spectrum for an infinitely long two-layered isotropic elastic media. This low wavenumber model includes the effect of turbulent surface shear stresses on the wall pressure spectrum. The surface pressure spectrum is calculated on the surface of the elastic layer in contact with the turbulent fluid and for the interface between the two different elastic layers. Water is used for the turbulent fluid on one surface of the elastic media. Air at rest is used as the fluid media in contact with the opposite surface. Pressure spectra are given first for the reduced case in which both layers are treated as steel of particular thicknesses at various frequencies. Then, we compare this to the pressure spectrum on the surface of two different viscoelastic layers applied to the steel plates. The results show that the propagation speeds of compressive, shear, and flexural waves in the elastic layers govern the location of singularities in the pressure spectra. It is also shown how damping can affect the strength of the singularities and the level of the local maxima. GRA

N86-15633# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
EFFECTS OF WAVES ON THE BOUNDARY LAYER OF A SURFACE-PIERCING BODY Technical Report, Nov. 1983 - May 1985
F. Stern May 1985 69 p
(Contract N00014-83-K-0136)
(AD-A158053; IIHR-288) Avail: NTIS HC A04/MF A01 CSCL 20/4

The boundary-value problem associated with the boundary-layer development on a surface-piercing body is formulated in a rigorous manner in which proper consideration is given both to the kinematic and dynamic boundary conditions and to the deformation of the potential-flow free surface within the boundary layer. Simplifications that are appropriate for small amplitude waves are then investigated. The flow field in the neighborhood of the body-boundary-layer/free-surface juncture is divided into five regions and order-of-magnitude estimated for each region are provided. Of particular interest is the body free-surface boundary layer in the region very close to the free surface in which the free-surface boundary conditions have a significant influence. In this region, it is shown that, for laminar flow, the parameter Ak/e (where Ak is the wave-steepness parameter and e = delta/L is the nondimensional boundary-layer thickness) is an important parameter for characterizing the flow. Different solution regimes are identified depending on the magnitude of Ak/e. In particular, for Ak/e the magnitude is sufficiently large such that the free-surface boundary conditions have a significant influence. A consistent formulation requires the solution of the partially-parabolic Navier-Stokes equations. For turbulent flow, these conclusions cannot be reached with the same degree of certainty due to the present uncertainties in turbulence modelling, especially when a free surface is present. Numerical results are provided for the idealized geometry of a combination Stokes-wave/flat-plate. GRA

N86-15634# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TIME-RESOLVED FLOWFIELD MEASUREMENTS IN A TURBINE STAGE M.S. Thesis
J. L. Holt Jun. 1985 166 p
(AD-A158092; AFIT/CI/NR-85-77T) Avail: NTIS HC A08/MF A01 CSCL 20/4

Time-resolved flowfield measurements for a 0.5-meter diameter, high work transonic turbine have been completed in the MIT Turbine Blowdown Facility (TBF). Measurements were taken: to determine the blade-to-blade total temperature profile for comparison with predictions from the Euler turbine equation; to determine the effect of using time-averaged pressures to calculate turbine performance; and to provide a complete set of time-resolved turbine stage data. A preliminary objective (given a 6 kHz blade passing frequency) was to determine the frequency response characteristics of the instrumentation used to make the flowfield measurements. A shock tube was built for this purpose. Measurements were taken with high-frequency response instrumentation including a dual-hot-wire aspirating probe, a four-way angle probe, and two cobra head total pressure probes incorporating silicon diaphragm pressure transducers. The aspirating probe is found to have a natural frequency of 15.5 kHz in the test gas with a damping ratio of 0.36; the angle probe a characteristic frequency of 45 kHz with a settling time of 18 usec. Both results are satisfactory for application in the TBF. The measured total temperature profile shows a peak-to-peak variation of 65 C (20%) and a characteristic frequency twice that of the blade passing frequency. GRA

N86-15635# Technion - Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
EVOLUTION OF NONLINEAR WAVE GROUPS ON WATER OF SLOWLY-VARYING DEPTH Final Report
M. Stiassnie and R. Iusim Jun. 1985 75 p
(Contract DAJA37-82-C-0300; DA Proj. 1L1-61102-BH-57)
(AD-A158860) Avail: NTIS HC A04/MF A01 CSCL 20/4

This report develops a mathematical formulation which describes the evolution of non-linear wave groups in water of slowly varying depths. It summarizes the derivations of the appropriate equations and their solutions. An approximate analytical solution is provided giving the physical processes involved in the shoaling of wave groups. Also, included are calculations of the induced mean flow accompanying an envelope soliton moving on deep water. GRA

N86-15636# Ballistic Research Labs., Aberdeen Proving Ground, Md.
WAVE MOTION ANALYSIS OF A NONSPINNING LIQUID FILLED CYLINDER Final Report
P. Weinacht and C. J. Nietubicz Jun. 1985 48 p Supersedes IMR-812 dated Apr. 1984
(DA Proj. 1L1-62622-A-554)
(AD-A159324; BRL-MR-3451; IMR-812) Avail: NTIS HC A03/MF A01 CSCL 19/4

The results of a wave motion analysis of a partially liquid-filled, nonspinning cylinder are described. The analysis was undertaken to determine the internal fluid motion of a partially liquid-filled shell when subjected to large impulsive pressures. The high

pressure levels are formed from the rupture of an internal burster tube. The primary concern is the determination of the endwall and sidewall pressure levels after the burster tube rupture. The final objective of this program is to develop a predictive capability which can be used for determining the effects of various liquids, ullages, and burster pressure levels. This report describes an initial analysis of the fluid motion inside a partially liquid-filled, nonspinning cylinder subject to a large impulsive pressure at one end. The analysis presented tracks the pressure wave motion as a function of time and uses conservation of mass and momentum principles to determine the fluid properties in front of and behind the pressure waves. The results show the effect of initial pressure level and ullage on the resulting end wall and side wall pressures as a function of time. The peak end wall pressure is found to vary directly with the initial pressure level. The time duration of the maximum pressure acting on the end wall is a strong function of the ullage and to a lesser degree on the bulk modulus of the liquid. GRA

N86-15637# California Univ., Berkeley. Lawrence Berkeley Lab.
MONITORING OF HOT WATER PLUME MOVEMENTS IN AN AQUIFER WITH BOREHOLD/SURFACE RESISTIVITY MEASUREMENTS
C. F. Tsang and M. J. Wilt May 1985 8 p Presented at ENERSTOCK 1985 International Conference on Energy Storage for Building Heating and Cooling, Toronto, Canada, 22 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE85-014531; LBL-19644; CONF-850905-4) Avail: NTIS HC A02/MF A01

In this study a simulation of a downhole/surface resistivity experiment to map a hot water plume was performed using a three-dimensional computer code. A fixed amount of hot water was placed in an aquifer between 45 and 70 m below ground surface and resistivity measurements were made at the surface using a current electrode in the hot water body. Results indicate that the anomaly is much greater using the downhole electrode than for surface arrays and that the data may be used to roughly characterize the hot water mass and its boundaries. Several cases involving different plume boundaries were studied and results indicate that the downhole/surface measurements are not very sensitive to differences in the boundary geometry although a rough determination of the boundary position is possible. For the case where the hot water plume is moving relative to the downhole current electrode until it completely leaves the electrode behind, the anomaly size is smaller but the shape allows for good discrimination of the near-side boundary. DOE

N86-15638# Lawrence Livermore National Lab., Calif.
ANALYSIS OF DISLOCATION KINETICS ACROSS SHOCKS
R. B. Stout Jul. 1985 22 p Presented at EXPLOMET '85 Intern. Conf. on Met. Appl. of Shock Wave and High Strain-Rate Phenomena, Portland, Ore., 28 Jul. 1985
(Contract W-7405-eng-48)
(DE85-016444; UCRL-91697; CONF-850770-3) Avail: NTIS HC A02/MF A01

The classical continuum analysis for possible propagating spatial discontinuites of mass density, velocity, stress, and energy across a shock front does not explicity consider the possibility of a discontinuity in the dislocation density function. One reason for not previously considering this possibility is that the dislocation density function does not appear explicity in the mathematical representation for deformation in a continuum approach. For purposes of a more physically realistic model, a discontinuum formulation that does represent interatomic discontinuities and does have an explicit dislocation density dependent deformation and thermodynamics has been developed. Based on this formulation, a discontinuum analysis for a discontinuity in the dislocation density function, as well as the mass density, velocity, stress and energy across a shock is described. In the limit of no dislocation kinetics, the discontinuum shock conditions reduce to the continuum shock conditions. A nonequilibrium thermodynamics is formulated that partitions the work rate at the shock front into different energetic components of internal energy. By applying Onsager's methods, a relationship is derived for the propagation velocity of the shock front in terms of the train discontinuity and dislocation kinetics across the shock front. Because of recent experiments that studied the change in dislocation density resulting from strong shocks, it is believed that these discontinuum shock conditions will be useful to interpret, analyze, and design experiments. DOE

N86-15639# Institut Franco-Allemand de Recherches, St. Louis (France).
PARTICLE SIZING WITH WHISKER COLLECTORS
H. J. Schaefer 7 Nov. 1984 23 p refs Presented at Arnold Engineering Development Center Visit, Arnold Air Force Station, Tenn., 25-28 Sep. 1984
(ISL-CO-230/84) Avail: NTIS HC A02/MF A01

Aerosol sizing for laser anemometry studies in fluid turbulence research, using the whisker sampling method with electron-microscopic evaluation is described. The technique is based on particle deposition on fine-pored fibrous filters, the whisker collectors. By analyzing the particle size distribution on a single collector and its variation across a multistage filter, information on collection efficiency is obtained. Results show that the technique provides meaningful aerosol size distributions of particles > 0.02 microns. This limit is due to the resolving power of the electron microscope employed for the measurements. However, the sizes of all aerosol types considered are clearly > 0.02 microns. Author (ESA)

N86-15640# Institut Franco-Allemand de Recherches, St. Louis (France).
NEW EXPERIMENTAL TECHNIQUES FOR PROBING GUN BARREL BOUNDARY LAYERS
H. Mach 22 Nov. 1984 12 p refs Presented at 8th International Symposium on Ballistics, Orlando, Florida, 23-25 Oct. 1984
(ISL-CO-234/84) Avail: NTIS HC A02/MF A01

A laser Doppler velocimeter measures velocity histories of the propellant gas flow inside a gun barrel. Two coupled velocimeters measure velocity reductions near the tube wall at distances of 1 mm. A shaped window to measure propellant gas luminances under observation angles of 90 and 27 deg is designed, and used to measure the transmittance of propellant gas residues deposited on its inner surface. To measure surface temperature at the inner side of the window, a sensor based on the temperature dependence of the reflectivity of silver coatings in the UV is designed. Using the optical probes effective absorption thickness of the thermal boundary layer in the 0.5 mm range is detected. Author (ESA)

N86-15641# Institut Franco-Allemand de Recherches, St. Louis (France).
SPECTROSCOPIC TEMPERATURE MEASUREMENTS IN INTERIOR BALLISTIC ENVIRONMENTS
G. Klingenberg (Ernst-Mach-Inst.) and H. Mach 22 Nov. 1984 14 p refs Presented at 10th International Congress on Instrumentation in Aerospace Simulation Facilities, St. Louis, France, 20-23 Sep. 1983
(ISL-CO-235/84) Avail: NTIS HC A02/MF A01

Spectroscopic temperature measurements during the interior ballistic cycle of a 20 mm test fixture gun and inside the muzzle flash of a 7.62 mm rifle are described. The investigation yields information on temperature distribution in the burning propellant charge of the 20 mm test fixture and on radial temperature profiles in the 7.62 mm muzzle flash region. A technique to obtain temperature during the ignition and combustion within the 20 mm propellant charge is presented. Additional in-bore measurements by quartz windows mounted into bores along the barrel and emission-absorption measurements inside the muzzle flash of the 20 mm test fixture yield a complete temperature profile for the gun system. Spectroscopic infrared measurements inside the muzzle flash of a 7.62 mm rifle complete the investigation. Author (ESA)

N86-15642# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Forschungsbereich

Stroemungsmechanik.
NUMERICAL STUDY OF THE LAMINAR SHOCK BOUNDARY LAYER INTERACTION Ph.D. Thesis - Karlsruhe Univ., West Germany
Edgar Katzer Feb. 1985 139 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-958)
(DFVLR-FB-85-34; ISSN-0171-1342) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 19

The interaction of an oblique shock wave with a laminar boundary layer on an adiabatic flat plate was analyzed numerically with solutions of the two dimensional Navier-Stokes equations using McCormack's explicit finite volume method. The agreement between numerical calculations and experimental results is good. Local and global properties of the interaction region are discussed regarding shock strength, separation bubble length using a similarity law, and separation environment. The asymetrical structure inside the separation bubble produces an asymetrical shape of the wall shear stress distribution. The calculation speed was increased by algorithm vectorization on a CRAY 1S supercomputer. Further investigations for determination of a similarity law in interaction with turbulent boundary layer, of the physical mechanisms of the laminar interaction, and for study of the wall temperature transfer are recommended. Author (ESA)

N86-15643# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Hauptabt. Windkanaele.
RESULTS OF WIND TUNNEL TESTS ON EXTERNAL COMBUSTION
Berthold Schaefer Jan. 1985 55 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-959) Original contains color illustrations
(DFVLR-FB-85-35; ISSN-0171-1342) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 56

Wind tunnel tests on external combustion were carried out to study the flow distribution on a flat plate in a supersonic flow for spoiler optimization and combustion efficiency. The influence of spoiler geometry, mass flow rate and injection angle on flow distribution was studied. The separation area can be enlarged with the spoiler inclination against the flow. Resistance problems and mass flow rate against a split opening are reduced with a hole-line flow nozzle. The area of increased pressure is enlarged by injecting hydrogen in the recirculation area before the spoiler and by igniting the mixture. The cross force after ignition is five times as strong as the spoiler action. Author (ESA)

N86-15644# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
INVESTIGATION OF LARGE SCALE STRUCTURES IN A SUBSONIC FREE JET Ph.D. Thesis - Goettingen Univ., West Germany
Hans-Heinrich Claus Jun. 1985 93 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-962)
(DFVLR-FB-85-38; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 29.50

Large scale structures in a subsonic free jet were investigated using shadow photographs at Mach numbers from 0.03 to 0.1, with jet acoustic excitation. The shadow photographs show the free jet evolution from the nozzle exhaust to the turbulence entry. The point of instability is characterized by the shear flow thickness corresponding to a critical Reynolds number. The vortex convection velocity in an acoustically excited free jet studied with streak picture illumination depends on the nozzle distance and Strouhal number. The dependence shows good agreement with the course of the phase velocity of density gradient deviations in a natural free jet. The large scale structures in a natural free jet found by average determination of the time rate density gradient deviations does not show any periodic behavior at Mach numbers from 0.3 to 0.6. Investigation of their behavior at Mach numbers visualization using illuminated streak photographs. Author (ESA)

N86-15645# Karlsruhe Univ. (West Germany). Sonderforschungsbereich 210.
[ACTIVITIES AND RESULTS REPORT FOR THE SPECIAL DOMAIN 210] Annual Report, 1983-1984 [ARBEITS- UND ERGEBNISBERICHT DES SONDERFORSCHUNGSBEREICH 210 FUER DIE JAHRE 1983-1984]
R. Friedrich, ed. Mar. 1985 286 p refs In GERMAN
(KU-SFB-210/A/11) Avail: NTIS HC A13/MF A01

Interaction between flows and structures was studied. Numerical simulation of laminar flows about and over obstacles was performed. Wind channel modeling of flow about orographic obstacles and structures, mathematical simulation of the flow system cooling tower-wind field, and instability and motion induced vibrations of up and downstream structures were investigated. The loading of cylindrical structures due to natural wind, and its wind channel modeling, and the resistance behavior and flow about rectangular bodies in turbulent boundary layers were studied. The dynamics of unsteady flow in freely laid pipes was mathematically simulated. Measuring criteria for flocculation reactors and the influence of flow parameters on physiochemical reactions were examined. Flow and sedimentation phenomena in setting tanks were calculated. Miniature laser Doppler systems based on light guides were studied. Author (ESA)

N86-15646# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Neutronenphysik und Reaktortechnik.
TRANSIENT THREE PHASE, THREE COMPONENT FLOW. PART 2: ONE-DIMENSIONAL SLIP MODEL, COMPARISON THEORY-EXPERIMENT
N. I. Kolev Aug. 1985 89 p refs In GERMAN; ENGLISH summary Sponsored by Alexander von Humboldt Foundation
(KfK-3926-Pt-2; ISSN-0303-4003) Avail: NTIS HC A05/MF A01

Prediction and experimentally determined flows were compared using a one dimensional slip model for boiling two-phase flow, pre and postboiling crisis flow and heat transfer, loss-of-flow for nuclear heated rod bundles for typical pressurized water reactors, and critical flow. The results prove the usefulness of the entropy concept in modeling. Author (ESA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-15647 Department of the Air Force, Washington, D.C.
FERROMAGNETIC RESONANCE PROBE LIFTOFF SUPPRESSION APPARATUS Patent
T. J. Davis and P. L. Tomeraasen, inventors (to Air Force) Issued 9 Jul. 1985 5 p Supersedes AD-D010243
(AD-D011913; US-Patent-4,528,506; US-Patent-Appl-SN-444004; US-Patent-Class-324-225) Avail: US Patent and Trademark Office CSCL 14/2

A liftoff suppression apparatus is described which utilizes a liftoff sensing coil to sense the amount a ferromagnetic resonance probe lifts off the test surface during flaw detection. The liftoff signal is used to modulate the probe's field modulating coil to suppress the liftoff effects. Author (GRA)

N86-15648 Westland Helicopters Ltd., Yeovil (England).
ELASTOHYDRODYNAMIC STUDIES USING THIN FILM TRANSDUCERS Final Report
M. M. A. Safa (Imperial Coll. of Science and Technology, London, England) and P. B. MacPherson Jan. 1984 231 p refs
(Contracts MIN-DEF-A12/1598; MIN-DEF-A91A/971)
(RP-666; BR94608) Avail: NTIS HC A11/MF A01

Thin film microtransducers for application to the study of the

variation of pressure, temperature, and oil film thickness in an elastohydrodynamically lubricated, nominal line contact were developed. Fabrication techniques were improved to enhance the useful life. Techniques to achieve higher resolution by reducing sensor size and improving the signal monitoring circuitry were developed. Material properties in thin film form used in fabricating the sensors were examined. Possible sources of errors in interpreting the results obtained from these devices were studied. Results under various operating conditions were compared with theoretical and experimental results, and reasonably good agreement is found. Author (ESA)

N86-15649 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE SURFACE ACOUSTIC WAVE (SAW) CHEMISENSOR. PART 1: A LITERATURE REVIEW [DE SAW-CHEMOSENSOR. 1. EEN LITERATUURSTUDIE]
Z. Klous, A. W. Barendsz, and A. Venema (Technische Hogeschool, Delft, Netherlands) Apr. 1984 60 p refs In DUTCH; ENGLISH summary
(PML-1985-3-Pt-1; TDCK-93000) Copyright. Avail: Issuing Activity

The state of the art of microtransducers for chemical signals is presented. The sensors are grouped according to their operation mode, (semiconductor, optical fiber sensing, and piezoelectric crystal detection). Properties such as response time, sensitivity (detection limit), selectivity, reversibility, and durability are indicated. None of the chemisensors meets all the requirements for measuring equipment. Piezoelectric crystal sensors offer the best perspectives, followed by chemfets and optical waveguide sensors. Author (ESA)

N86-15650# Rockwell International Corp., Golden, Colo.
PROVING RING CALIBRATIONS USING A DEADWEIGHT PRESSURE SYSTEM
John P. Affatica, Andre L. Grable, and R. L. Thomas (ed.) 25 Feb. 1985 22 p
(Contract DE-AC04-76DP-03533)
(RFP-3677; DOE/TIC-4500-Rev-73) Avail: NTIS HC A02/MF A01

The Rocky Flats Standard Laboratory has devised a method to utilize a deadweight pressure gage to calibrate proving rings to 1,050 pounds of force (lbf). The equipment and the necessary modifications are described, as is the setup and operation. The modifications are additions to the main structure of the pressure gage allowing direct force measurements without damaging or permanently altering the pressure gage. Also included are a brief descrption of the computer program used with the system and an error analysis of the system. This development has increased the Standards Laboratory capabilities; previously, proving rings to be calibrated were sent to the National Bureau of Standards or the Primary Standards Laboratory. Author

N86-15651*# Pratt and Whitney Aircraft, East Hartford, Conn.
DYNAMIC GAS TEMPERATURE MEASUREMENT SYSTEM. VOLUME 2: OPERATION AND PROGRAM MANUAL
Paul T. Purpura [1983] 151 p Sponsored by NASA
(NASA-CR-168267; NAS 1.26:168267) Avail: NTIS HC A08/MF A01 CSCL 14B

The hot section technology (HOST) dynamic gas temperature measurement system computer program acquires data from two type B thermocouples of different diameters. The analysis method determines the in situ value of an aerodynamic parameter T, containing the heat transfer coefficient from the transfer function of the two thermocouples. This aerodynamic parameter is used to compute a fequency response spectrum and compensate the dynamic portion of the signal of the smaller thermocouple. The calculations for the aerodynamic parameter and the data compensation technique are discussed. Compensated data are presented in either the time or frequency domain, time domain data as dynamic temperature vs time, or frequency domain data. E.A.K.

N86-15652# Lawrence Livermore National Lab., Calif.
ULTIMATE LIMITS OF FT-IR
T. Hirschfeld Jul. 1985 9 p Presented at the International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Canada, 24 Jun. 1985
(Contract W-7405-eng-48)
(DE85-016442; UCRL-92414; CONF-8506118-2) Avail: NTIS HC A02/MF A01

Continual improvements in FT-IR have brought us within two orders of magnitude of theoretical limits of the technology, set by the intrinsic noise of the black body spectrum. Further improvements in the technology still require further optimization by step-by-step comparison between actual components performance and their theoretical limit. Among insights from such interferometers, substantial amounts of excess noise in the detectors and nonlinearity in their amplifiers, and an insufficient utilization of the very low aberration levels of interferometers. Beyond this, substantial improvements in spectroscopic sensitivity can be achieved by appropriate choice of the optical interaction. Here the elimination of the 100% line is a particularly desirable goal. The optics of sampling accessories also merit much attention, including throughput matching (and also throughput conservation), optimizing interaction strength, signal strength and detector noise optimization, etc. Finally, data processing can be used to substantially improve the performance capabilities of FT-IR, particularly if we are willing to depart from the conventional data presentations used in IR spectroscopy. DOE

N86-15653# Spectron Development Labs., Inc., Costa Mesa, Calif.
DROPLET SIZING RESEARCH Annual Report, 15 Jan. 1984 - 15 Jan. 1985
C. F. Hess 15 Apr. 1985 63 p
(Contract F49620-83-C-0060)
(AD-A158318; SDL-85-2286-12; AFOSR-85-0562TR) Avail: NTIS HC A04/MF A01 CSCL 14/2

A method to measure the size and velocity of individual particles in a flow is discussed. Results are presented for controlled monodisperse sprays and compared to flash photographs. Typical errors between predicted and measured sizes are less than 5%. Experimental results of the probe volume size are satisfactorily compared to a theoretical algorithm. A very simple optical apparatus is described and used to characterize a spray produced by a simplex nozzle. The size distribution and the Sauter mean diameter of this spray are presented as a function of position and pressure. GRA

N86-15654# Naval Training Equipment Center, Orlando, Fla.
VISUAL DISPLAY PARAMETERS Final Report, Oct. 1982 - Sep. 1984
R. C. Hebb 21 Mar. 1985 63 p
(377-4)
(AD-A158773; NAVTRAEQUIPC-IH-356) Avail: NTIS HC A04/MF A01 CSCL 05/8

The Visual Display Parameters (VDP) project was directed towards the analysis of wide-angle visual displays on dome (or spherical) screens. The objective was to gain the capability to explore the image parameters of distortion, luminance, and resolution of proposed dome displays. A problem with dome displays is in their physical specification and subsequent display performance. Often, the resulting display system does not meet the intended specifications. The main product of the VDP project is a FORTRAN computer program, NVDPMAP, that assists in the analysis of a dome display based on a generalized projection system model. The purpose of the program is to reduce the time spent performing calculations, to automate and improve display analyses, and to provide graphic output concerning a system's performance in an easily digestable form. The parameters of distortion, luminance, and resolution can be examined on perspective and aitoff maps of the display. NVDPMAP can be run via a command sequence menu. Input to NVDPMEAP may be from a formatted input file, or may be entered interactively when running the program. The NVDPMAP program is an aid in designing a dome display and predicting final performance. The basic NVDPMAP program can be modified to change the projector, lens, and screen functions to those of a specific projection system. GRA

N86-15655# Sandia National Labs., Albuquerque, N. Mex.
DEVELOPMENT OF A PHOTONIC DATA RECORDER
H. P. Davis, G. R. Allen, and J. Chang 1985 6 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, California, 18 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017120; SAND-85-1775C; CONF-850887-21) Avail: NTIS HC A02/MF A01

In conjunction with our implementation of photonic diagnostics on pulsed power accelerators at Sandia, we are developing a photonic data recorder (PDR) which sweeps and records photon analog signals directly rather than coverting photons to electrons and sweeping the electrons, as in a conventional oscilloscope or streak camera. DOE

N86-15656# Midwest Research Inst., Golden, Colo.
INTEGRATING SPHERE SPECTROMETER FOR HIGH-TEMPERATURE MATERIALS CHARACTERIZATION
K. D. Masterson, G. J. Jorgensen, R. W. Burrows, and P. Schissel Aug. 1985 12 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012170; SERI/TP-255-2771; CONF-850887-25) Avail: NTIS HC A02/MF A01

A state-of-the-art, high-temperature integrating sphere spectrometer has been fabricated and characterized. The liquid-cooled sphere is combined with a furnace designed for a maximum specimen temperature of 1200 C. The spectrometer is capable of measuring the spectral, diffuse, and hemispherical reflectance and transmittance over the wavelength range of 0.35 to 2.5 micrometers. Chopped white light from a high pressure xenon arc-lamp is introduced into the sphere, alternately reflected from the sphere wall and reflected from r transmitted through the specimen, spectrally resolved by a monochromator, and focused onto a two-color Si/PbS detector. Data are sampled at wavelengths corresponding to equal energy bands of the terrestrial solar distribution and are graphically displayed. Data acquisition and hardware module commands are computer controlled. The sphere and light collecting optics can be rotated about the horizontal optical axis of the monochromator so that the specimen port is at the top (0 deg), side (90 deg), or bottom (180 deg) of the sphere. This allows optical characterization of a variety of materials relevant to high-temperature solar energy applications to be carried out by rotating the instrument into a desired orientation. For example, in the 9 deg (loop up at the sample) position, reflectance and transmittance of molten salt in a furnace-heated cell can be measured without salt vapor entering the sphere. At 90 deg, a vertical wall of falling sand particles can be characterized. In the 180 deg (look down) position, the optical properties of solids such as ceramics, metal alloys, or powders can be ascertained. DOE

N86-15657# Institut Franco-Allemand de Recherches, St. Louis (France).
USE OF OPTICAL FIBERS IN PULSED HOLOGRAPHY
F. Albe, H. Fagot, and P. Smigielski 16 Oct. 1984 10 p refs Presented at European Conference on Optics, Optical Systems and Applications, Amsterdam, Netherlands, 9-12 Oct. 1984 Submitted for publication
(Contract DRET-83/1160)
(ISL-CO-231/84) Avail: NTIS HC A02/MF A01

Holograms of small objects were recorded through multimode and monomode fibers with ruby and YAG lasers. For a ruby laser giving a pulse of 20 mJ in 20 nsec at 0.6943 microns, set-ups where the object beam passes through a 1 mm-multimode step-index fiber (no fiber for the reference beam) and with the same arrangement for the object beam, the reference passing through a monomode fiber (beam splitter located between the oscillator and the amplifier) were tested. With a YAG laser giving a pulse of 20 mJ in 20 nsec at 0.53 microns, a 1 mm-multimode step-index fiber in the object beam and a 133 microns-multimode step-index fiber in the reference beam, and same arrangement for the object beam and a monomode fiber in the reference beam were tested. In each case single and double-exposure holograms were recorded. Author (ESA)

N86-15425# Hokkaido Univ., Sapporo (Japan).
CRYSTAL ANALYSER MIRROR TYPE DOWN-SCATTERING SPECTROMETER USING SPALLATION NEUTRON SOURCE
K. Inoue, K. Kaji, Y. Kiyanagi, T. Kanaya, H. Iwasa, and K. Nishida *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 35 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15496# Joint Publications Research Service, Arlington, Va.
APPARATUS FOR EXPERIMENTAL STUDY OF HIGH-RESOLUTION RADIOMETERS AND THEIR CHARACTERISTICS Abstract Only
A. V. Afonin, A. P. Zakharnev, and G. I. Muravyeva *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 24 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 33-35 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15501# Joint Publications Research Service, Arlington, Va.
SELF-MODULATION INSTABILITY OF GYROTRON EMISSION Abstract Only
G. S. Nusinovich and V. Ye. Zapevalov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 36 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 3, Mar. 1985 p 563-570 Original language document was announced in IAA as A85-30487 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15507# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF HOLOGRAM ANALYZER WITH SINGLE-COMPONENT OPTICAL HOLOGRAM MATCHING SYSTEM Abstract Only
L. T. Mustafina, N. P. Kutikova, and N. B. Frantsuzova *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 62 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 4, Apr. 1985 p 8-10 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15579# Joint Publications Research Service, Arlington, Va.
DIGITAL METHODS OF RECORDING COLOR TELEVISION IMAGES ON FILM TAPE Abstract Only
R. Ya. Krivitskaya and V. M. Semenov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 21-22 Transl. into ENGLISH from Tekhnika Kino i Televideniya (Moscow, USSR), no. 11, Nov. 1984 p 31-35 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15582# Joint Publications Research Service, Arlington, Va.
LUMINESCENCE PHOTOGRAPHY Abstract Only
V. B. Nazarov and M. V. Alfimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 23-24 Transl. into ENGLISH from Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii (Moscow, USSR), v. 29, no. 4, Jul. - Aug. 1984 p 307-315 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15603# Joint Publications Research Service, Arlington, Va.
RECOMMENDATIONS FOR DEVELOPING SIMULATORS OF SOLAR RADIATION PENETRATING TO THE EARTH'S SURFACE Abstract Only
F. K. Maslovets *In its* USSR Report: Electronics and Electrical

Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 53 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 12, Dec. 1984 p 46-48 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15613# Joint Publications Research Service, Arlington, Va.
PHOTOGRAPHIC RECORDING OF TRAJECTORIES OF AEROSOL PARTICLES BY METHOD OF MULTIPLE EXPOSURE Abstract Only
N. S. Mikhovich, B. I. Petrov, and Yu. P. Toporov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 65 Transl. into ENGLISH from Zhurnal Nauchnoy i Prikladnoy Potografii i Kinematografii (Moscow, USSR), v. 29, no. 6, Nov. - Dec. 1984 p 409-413 Original language document was announced in IAA as A85-18300 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15896# Joint Publications Research Service, Arlington, Va.
ADVANCES IN OPTOELECTRONIC, NUCLEAR REACTOR, RADIOBIOLOGICAL RESEARCH: HIGH VOLTAGE OPTO-COUPLER
Jacek Stanislawski and Ewa Serebrankow *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) 9 Oct. 1985 p 26-36 refs Transl. into ENGLISH from Nukleonika (Warsaw, Poland), v. 27, no. 9-10, 1982 p 419-434 (For primary document see N86-15893 06-31)
Avail: NTIS HC A04/MF A01

N86-15946# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL THEORY OF HOLOGRAPHIC MEMORY Abstract Only
M. V. Karasev and V. P. Maslov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 13 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), no. 5, 1985 p 1055-1058 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-15658*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOLAR-PUMPED SOLID STATE Nd LASERS
M. D. Williams and L. Zapata Oct. 1985 24 p refs
(NASA-TM-87615; NAS 1.15:87615) Avail: NTIS HC A02/MF A01 CSCL 20E

Solid state neodymium lasers are considered candidates for space-based polar-pumped laser for continuous power transmission. Laser performance for three different slab laser configurations has been computed to show the excellent power capability of such systems if heat problems can be solved. Ideas involving geometries and materials are offered as potential solutions to the heat problem. Author

N86-15659# Austin Research Associates, Inc., Tex.
THEORETICAL STUDIES OF TWO-DIMENSIONAL EFFECTS IN FREE ELECTRON LASERS Final Technical Report, 1 Feb. - 31 Oct. 1984
M. N. Rosenbluth, H. V. Wong, and B. N. Moore Dec. 1984 148 p
(AF Proj. 2301)
(AD-A158229; I-ARA-84-U-121; ARA-525; AFOSR-85-0493TR)
Avail: NTIS HC A07/MF A01 CSCL 20/5

This report describes the development of a two-dimensional numerical simulation free electron laser code which includes pass-to-pass electromagnetic pulse evolution, wave diffraction, transverse betatron motion of the electrons, and frequency discrimination to suppress the growth of unstable sidebands. The code was used to simulate the experiment recently completed at TRW, the experiment being done at LANL, and the proposed MSNW experiment. The TRW simulations are in qualitative agreement with experimental results. The LANL simulations are similar to the one-dimensional simulations (1-D) previously done. The MSNW simulations exhibit general trends which are similar to those of the MSNW 1-D simulations; in both, frequency discrimination improves the trapping efficiency and produces a smooth optical pulse. This report also discusses the feasibility of steady state operation of tapered wigglers in storage rings. Long smooth optical pulses are necessary to reduce energy spreading in the wiggler. Conventional tapered wigglers appear to require lower circulating power levels than phase area displacement wigglers. GRA

N86-15660# Michigan Univ., Ann Arbor.
INVESTIGATIONS OF LASER INITIATED DISCHARGE CHANNELS Annual Summary Report
R. M. Gilgenbach and T. Kammash 19 Aug. 1985 48 p
(Contract N00014-81-K-0700)
(AD-A158872; TR-114) Avail: NTIS HC A03/MF A01 CSCL 20/9

We report progress on the generation of intense, microsecond, electron beams. Diode closure has been studied for electron beam pulselengths up to 4 microseconds. Reduced density channels produced by laser induced gas breakdown and by laser guided discharges are modelled by means of a one dimensional gas hydrodynamics code for times earlier than the onset of convective mixing. Comparison of laser induced gas breakdown experiments with the code indicate that the conversion of laser energy to gas heating is limited to 25 to 30%. Collinear holographic measurements of channel density profiles produced by laser guided discharges are found to be in good agreement with code predictions for times less than 50 s. This agrees with other experiments which have indicated onset times for convective mixing in the range 50 to 70 microsec. after the start of the discharge. A Monte Carlo Fokker Planck code is used to investigate the scattering loss of particles from a relativistic electron beam propagating in a low pressure air channel. GRA

N86-15661# Toronto Univ. (Ontario). Dept. of Chemistry.
LASER PLUS SURFACE-DYNAMICS FACILITY Final Report, 1 Aug. 1984 - 31 Jul. 1985
J. C. Polanyi 31 Jul. 1985 14 p
(Contract N00014-84-G-0184)
(AD-A158922) Avail: NTIS HC A02/MF A01 CSCL 20/5

The objective in this one-year study has been to develop a vacuum ultraviolet (VUV) laser suitable for investigating the simplest of chemical reactions, H + H2 yields H2 + H. This reaction has been fundamental to the development of our understanding of chemical reactions in gases over the past half century, and could come to occupy a similar pivotal role in regard to the elucidation of the molecular dynamics of exchange reactions at surfaces. In order to generate atomic H we have expanded HI from a quartz nozzle (0.1 mm I.D.) into a high vacuum chamber (10 to the -6th power). The density of HI beyond the nozzle could readily be made approx. 0.01 Torr. A Lumonics TE 861-4 excimer laser with unstable resonator operating on KrF at 248 nm (65 mJ/pulse) was used to completely photolyse the HI. When the HI was mixed (ahead of the nozzle) with D2, the reaction H + D2 yields HD + D took place in the jet. A second laser beam was then used (following variable time delay) to probe the reaction product D. GRA

N86-15662# United Technologies Research Center, East Hartford, Conn.
COUPLED HIGH POWER WAVEGUIDE LASER RESEARCH Final Report, 1 Jun. 1984 - 31 May 1985
L. A. Newman, A. J. Cantor, R. A. Hart, J. T. Kennedy, and A. J. DeMaria 30 Jul. 1985 64 p
(Contract F49620-84-C-0062)
(AD-A159079; UTRC/R85-926869; AFOSR-85-0734TR) Avail: NTIS HC A04/MF A01 CSCL 20/5

The United Technologies Research Center (UTRC) conducted a research program to explore a unique ridged waveguide technique

to phase-lock an array of coupled CO2 waveguide lasers. The motivation for this investigation was scale the output power capability of CO2 waveguide lasers by one to two orders of magnitude greater than the present state-of-the-art (i.e., scale to power levels of 100 W to 1 kW) while maintaining single frequency operation. A 1 year program was conducted to test the feasibility of the ridged waveguide coupling technique. The feasibility study clearly produced positive results. In particular, stable phase-locked operation of two and three-channel arrays was demonstrated at the 50 W level. Phase-locking was maintained in a laboratory environment for many hours without adjustments other than length tuning of the laser. In addition, a first-order theory was developed to strengthen the understanding of the coupled waveguide laser array. Author (GRA)

N86-15663# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODAL ANALYSIS OF UNSTABLE RESONATORS Ph.D. Thesis
M. E. Rogers 3 Apr. 1985 249 p
(AD-A159225; AFIT/DS/PH-85-2) Avail: NTIS HC A11/MF A01 CSCL 20/5

The analysis of the modes of optical resonators is crucial to understanding how actual laser devices operate. A consistent formulation that treats both the empty and loaded resonator modes is presented in this report. The study centers on unstable resonators and, in particular, strip resonators. The analysis of the bare cavity modes uses a matrix expansion technique with the linear prolate functions as a basis set. These functions form an optimal basis set in that they are related to the Schmidt expansion functions for the integral equation that describes the modes of the bare cavity. As a consequence, the matrix eigenvalue problem is solved using the minimum number of basis functions. The analysis is implemented in a numerical model that generates the linear prolate functions using a finite difference algorithm. The model was used to study the validity of the asymptotic approach at low Fresnel numbers. The results show that the first few lower loss modes predicted by the asymptotic approach are accurate but that the higher loss modes are inaccurately represented by that approach. The linear prolate function expansion is also used to numerically demonstrate the orthogonality of the resonator modes. GRA

N86-15664# California Univ., Los Angeles. Dept. of Materials Science and Engineering.
BETA ALUMINA: A SOLID-ELECTROLYTE AS A SOLID-STATE LASER HOST
B. Dunn, J. O. Thomas, and G. C. Farrington Sep. 1985 14 p
(Contract N00014-83-K-0498)
(AD-A159409; TR-7) Avail: NTIS HC A02/MF A01 CSCL 20/5

Sodium beta alumina is a non-stoichiometric sodium aluminate known for its rapid transport of Na(+) ions. The unique ability of Beta alumina to exhibit divalent and trivalent cation motion permits optically active ions to be introduced in the structure by low temperature ion exchange techniques. The synthesis, structure and optical properties of Nd(3+) exchanged Beta alumina are reviewed in this paper. The material exhibits interesting optical properties, including laser action in small platelet crystals. The structure of the conduction plane, the presence of Na(+) and its motion all appear to have a significant influence on optical properties. Sodium Beta alumina is a non-stoichiometric solid electrolyte known for its high conductivity of Na(+) ions. The structure consists of spinal blocks of closely packed Al(3+) and O(2-) separated by loosely packed slabs containing Na(+) and O(2-) ions. The open space within these slabs permits rapid Na(+) migration in two dimensions. GRA

N86-15665# California Univ., Santa Barbara. Quantum Inst.
ANGULAR-GAIN SPECTRUM OF FREE ELECTRON LASERS Final Report, 1 Jul. 1984 - 28 Feb. 1985
W. B. Colson, G. Dattoli, and F. Ciocci Feb. 1985 16 p
(Contract N00014-81-K-0809)
(AD-A159412; FR-3) Avail: NTIS HC A02/MF A01 CSCL 20/5

The theory of free-electron lasers is extended to include the new coupling between an electron beam and optical wave propagating at an angle theta in an arbitrary harmonic. The coupling allows the laser to be tuned to a wider range of wavelengths and to include the effects of emittance in the electron beam. The formulation of the results in terms of coupling constants means that the existing knowledge of high gain, low gain, weak optical fields, strong optical fields, and short pulses in free electron lasers can be immediately generalized to off-axis propagation in an arbitrary harmonic. Author (GRA)

N86-15666# Alabama Univ., Huntsville.
PLASMAS AS LIGHT SOURCES FOR LASERS Final Technical Report
T. A. Barr, Jr. and W. B. McKnight Sep. 1984 47 p
(Contract DAAH01-82-D-A016)
(AD-A159460; AD-E950752; AMSMI/RH-CR-85-14) Avail: NTIS HC A03/MF A01 CSCL 20/5

This report describes an experimental and analytical investigation of the properties of high intensity, visible wavelength, light sources for optical pumping of pulsed lasers. Background information on rsearch that may be applicable to this problem is presented, the experiment design is outlined and the results of system modelling are detailed. The experimental apparatus, consisting of a Blumlein pulse-forming network and a cylindrical plasma cell load, is described. The instrumentation used for the experiment is discussed, and experimental results are presented, together with a possible explanation of the optical radiation-time history of the plasma. Potential applications are evaluated and future development recommended. Author (GRA)

N86-15667# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Electronique et Physique.
EFFECT OF OPTICAL INJECTION ON THE OPTICAL PROPERTIES OF A (GaAl)As SEMICONDUCTOR LASER: OPTICAL BISTABILITY AND FOUR WAVE MIXING Ph.D. Thesis [EFFETS DE L'INJECTION OPTIQUE SUR LES PROPRIETES OPTIQUES D'UN LASER A SEMICONDUCTEUR (GaAl)As: BISTABILITE OPTIQUE ET MELANGE A QUATRE ONDES]
Hisao Nakajima 24 Apr. 1985 165 p refs In FRENCH
(ENST-85E005; ISSN-0751-1353) Avail: NTIS HC A08/MF A01

The optical bistability is observed and the magnitude of the nonlinear susceptibility of (GaAl)As semiconductor is estimated. The two laser experimental assembly is described. The spectral width of a semiconductor laser with optical injection is discussed. The observations of optical bistability and optical memorization are described. The linear mixing of four waves in a laser cavity is analyzed. The possibility of studying the processes in a nonlinear Fabry-Perot interferometer is demonstrated. Author (ESA)

N86-15668*# Institut Franco-Allemand de Recherches, St. Louis (France).
STUDY OF HIGH SPEED COMBUSTION FLOWS BY LASER VELOCIMETRY
H. J. Schaefer 26 Oct. 1984 29 p Presented at NASA Langley Research Center Visit, Hampton, VA., 5 Oct. 1984 Sponsored in part by NASA
(NASA-CR-176439; NAS 1.26:176439; ISL-CO-232/84) Avail: NTIS HC A03/MF A01

The feasibility of laser velocimetry in a high temperature jet was assessed in a model of an aircraft engine combustor. Experiments show that the problems encountered in measuring combustion flow can flow can be overcome by a carefully designed optical set-up and an appropriate signal processing and data acquisition system. Laser Doppler velocimetry provides useful information about coherent structures in hot free jets. The measurements agree with measurements in an isothermal jet. Author (ESA)

N86-15436# Joint Publications Research Service, Arlington, Va.
FRG TURNS EFFORTS TO LASER DEVELOPMENT
Klaus Gertoberens *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-85-028) 19 Sep. 1985 p 27-28 Transl. into ENGLISH

from Sueddeutsche Zeitung (Munich), 17 Jul. 1985 p 25 (For primary document see N86-15435 06-31)
Avail: NTIS HC A04/MF A01

N86-15440# Joint Publications Research Service, Arlington, Va.
CHINA REACHES NEW LEVEL IN MINICOMPUTER DEVELOPMENT
In its China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 39-46 refs Transl. into ENGLISH from Jisuanji Shijie (Beijing), no. 15, 8 Aug. 1985 p 1 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

N86-15469# Joint Publications Research Service, Arlington, Va.
LASER TECHNOLOGY IN MANUFACTURE OF PRINTED-CIRCUIT BOARDS Abstract Only
G. A. Machulka, M. F. Stelmakh, and A. B. Uladinov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 84 Transl. into ENGLISH from Radiotekhnika (Moscow, USSR), no. 2, Feb. 1985 p 3-11 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

N86-15482# Joint Publications Research Service, Arlington, Va.
DELAY EFFECT IN PULSED AVALANCHE DISCHARGE OF AN XeCl LASER AT HIGH GAS PRESSURE
Lou Qihong *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 45-49 refs Transl. into ENGLISH from Wuli Xuebao (Beijing, China), v. 34, no. 7, Jul. 1985 p 960-963 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

N86-15498# Joint Publications Research Service, Arlington, Va.
HIGH-POWER SOURCES WITH SMOOTHLY ADJUSTABLE PULSE DURATION FOR POWERING GAS-DISCHARGE TUBES OF LASER PUMPING SYSTEMS Abstract Only
V. M. Vakulenko, L. P. Ivanov, Yu. A. Ganshin, I. L. Karpyshev, and V. A. Korneyev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 29-30 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 19-20 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15499# Joint Publications Research Service, Arlington, Va.
HIGH-POWER PULSE GENERATOR WITH PULSEFORM CONTROL FOR POWERING GAS-DISCHARGE TUBES OF LASER PUMPING SYSTEMS Abstract Only
L. P. Ivanov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 30-31 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 3, Mar. 1985 p 21-22 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-15669 Department of the Air Force, Washington, D.C.
MACHINE WITH AN INTERMITTENTLY ROTATING TABLE FOR THE PERFORMANCE OF WORK OPERATIONS Patent
M. Gippa, inventor (to Air Force) Issued 18 Jun. 1985 8 p
(AD-D011911; US-Patent-4,523,359; US-Patent-Appl-SN-454081; US-Patent-Class-29-38) Avail: US Patent and Trademark Office
CSCL 13/9

A machine is described which has an intermittently rotating table for holding parts to be worked on or assembled. Operating units are actuable either simultaneously for all units or groups of units, or independently of one another. The operating units can be mounted vertically over or under the table and also laterally and can receive the rotary movement of a central wheel or independent motors. According to a perfect embodiment, the control of the feed is effected by the central shaft. During a work cycle, this shaft makes a vertical movement and transmits that movement to the operating units by radial linear cams i.e., feed and return occur during a single movement of the shaft, for example, downward. During idle time, i.e., the time used to move and index the table but not to perform the work, the central shaft is also turned through a certain angle so that the linear cams are no longer in contact with the operating units and in this position the central shaft is returned without influencing the operating units. Thus it is possible to give the operating units any feed and return characteristic of machines with rotary cams, while having very much simplified kinematics. GRA

N86-15670# Ballistic Research Labs., Aberdeen Proving Ground, Md.
STEADY STATE PENETRATION OF RIGID PERFECTLY PLASTIC TARGETS
R. C. Batra and T. W. Wright May 1985 38 p
(AD-A158081; AD-F630692; BRL-TR-2656) Avail: NTIS
HC A03/MF A01 CSCL 19/4

In this paper a detailed numerical solution to an idealized penetration problem is presented in an attempt to shed some light on these matters. The problem of steady penetration by a semi-infinite, rigid penetrator into an infinite, rigid/perfectly plastic target has been studied. The rod is assumed to be cylindrical, with a hemispherical nose, and the target is assumed to obey the Von Mises yield criterion with the associated flow rule. Contact between target and penetrator has been assumed to be smooth and frictionless. Results computed and presented graphically include the velocity field in the target, the tangential velocity of target particles on the penetrator nose, normal pressure over the penetrator nose, and the dependence of the axial resisting force on penetrator speed and target strength. The kinematics and stress fields found in this paper should prove useful in devising or checking the results from simpler engineering theories of penetration. GRA

N86-15671# Department of the Air Force, Washington, D.C.
ADAPTER PALLET SYSTEM Patent Application
F. R. Harris, inventor (to Air Force) Filed 11 Dec. 1984 17 p
(AD-D011858; US-Patent-Appl-SN-680611) Avail: NTIS
HC A02/MF A01 CSCL 15/5

A bifurcated adapter pallet system for providing an interface between the 463L and ISO systems is presented. Each adapter has mounting faces to attach to an ISO container at the container corner fittings and 463L tongues for restraint by 463L equipment. The ISO/463L adapter pallet facilitates efficient and appropriate tiedown and transportation of ISO cargo by means of vehicles equipped with the 463L handling system. GRA

N86-15672# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ELASTIC BEARING
16 Aug. 1985 7 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 12, Dec. 1982 p 19
(AD-A159140; FTD-ID(RS)T-0562-85) Avail: NTIS
HC A02/MF A01 CSCL 13/9

The common ball bearings and sliding bearings are well known to people since they are widely employed in modern industries such as trains, automobiles, ships, aircraft, machine tools, instruments, etc. They have also been used in many household appliances or equipment such as fan, sewing machine, bicycle, clock, etc. The elastic bearings are rather unfamiliar to people. This report describes the features of elastic bearings and compares them to sliding and ball bearings. An elastic bearing has a thick inner sleeve and an outer sleeve similar to most common bearings. However, it contains no steel balls or cylindrical rods of the ball bearings. It has, instead, a laminated structure with alternative layers of metal and rubber. It usually contains 30 to 40 layers or more. GRA

N86-15673# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Automatic Control.
PRELIMINARY STUDY ON THE CONTROL OF A DIRECT

INJECTION DIESEL ENGINE FOR BETTER FUEL FLEXIBILITY AND EMISSIONS CONTROL, PARTS 1 AND 2
Rolf Egnell (Aspen Utvecklings AB, Lerum), Nabil Kassem, and Torsten Bohlin 1985 71 p refs Partly in ENGLISH and SWEDISH Prepared for Swedish Motor Fuel Technology Co., Stockholm
(Grant STU-83-4018)
(TRITA-REG-8501) Avail: NTIS HC A04/MF A01

Qualitative dynamic aspects, factors that affect the transient behavior of the diesel engine and methods to improve the transient response, thus reducing fuel consumption and smoke emissions, are reviewed. Literature on sensors, actuators, and injection systems was surveyed to decide if these components satisfy the requirements of electronic control systems. Dynamic aspects and thermal loading; time delay of fuel injection; control system design; adaptive and transient compensation control of air/fuel ratio; control of boost pressure; retardation of injection timing; and combined electronic control of fuel injection and air supercharging are considered. Author (ESA)

N86-15674# Sheffield Univ. (England). Dept. of Control Engineering.
PROGRESS ON COMBINED LOAD- AND PROFILE-CONTROL FOR HORIZONTAL-TURRET, SINGLE- AND DOUBLE-ARM TUNNELLING MACHINES Progress Report
J. B. Edwards and S. M. Sadreddini Apr. 1985 25 p refs
(Contract NCB-PSD-19(84))
(RR-276) Avail: NTIS HC A02/MF A01

A combined load-profile control system for horizontal-turret machines that can be readily adapted for other mechanisms is designed. Simulation results for the system algorithm coupled to a much simplified model of the machine's cutting dynamics are given. The double-arm mechanism is analyzed and simulations showing the movement of the two arms and the torques developed at the pivots are presented. Author (ESA)

N86-15675# Technische Hogeschool, Twente (Netherlands). Afdeling der Werktuigbouwkunde.
INVESTIGATION OF THE FRICTION OF BECORIT 820 VERSUS CAST IRON [ONDERZOEK NAAR DE WRIJVING VAN BECORIT 820 VERSUS GIETIJZER]
P. H. Vroegop Sep. 1983 15 p In DUTCH
(WB-83/Tri-10053) Avail: NTIS HC A02/MF A01

The tribotechnical behavior of Becorit 820 on C 45 steel and CG 25 iron was investigated, using a tribometer. Becorit 820, an asbestos-metal particles resin matrix composite, is used with cast iron for disk brakes in subway cars. Causes of a large (temporal) decrease of friction were examined. Friction as function of temperature was investigated. Investigating the wear, the resin shows a water absorbtion possibility of 1%. Cooling the disk to below dew point, friction measurenents show a temporal friction coefficient reduction of < 1/3 of higher temperature values. Author (ESA)

N86-15676# Instituut TNO voor Werktuigkundige Constructies, Delft (Netherlands).
STATIC AND DYNAMIC MATERIAL MODEL FOR ELASTOHYDRODYNAMIC BEARING CALCULATIONS [STATISCH EN DYNAMISCH MATERIAAL-MODEL T.B.V. ELASTOHYDRODYNAMISCHE LAGER BEREKENINGEN]
S. Seinstra Dec. 1984 61 p refs In DUTCH
(Contract A76/KM/134)
(IWECO-5076503; TDCK-79878) Avail: NTIS HC A04/MF A01

Possibilities and conditions to model the dynamic behavior of rubber and synthetic bearing race materials were investigated. Stiffness and damping coefficients of water lubricated propeller shaft bearings with elastic race are insufficiently known. Based on a literature review, nonlinear elasticity, high damping, and incompressible behavior is assessed. Clear differences between static and dynamic properties are noted. A dynamic model using a complex dynamic modulus of elasticity is described. Author (ESA)

N86-15677# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Regelung.
BALANCING OF A ROD USING A DIGITALLY CONTROLLED ROBOT
Klaus-Peter Sondergeld Jul. 1985 70 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-966) Sponsored by Stiftung Volkswagenwerk
(DFVLR-FB-85-41; ISSN-0171-1342) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 25

A digital linear controller based on the ASEA IRB 60 robot was designed for balancing a rod suspended at a cardan. The rod deflection angles were measured with potentiometers on the robot arm. The transmission behavior of the robot was modeled with a linear system of second order with dead times. The controller parameters were determined by sequential linear least squares programming. The theoretical results are confirmed by an experiment which shows the possible balancing of a rod with the robot with respect to the boundary conditions (deflection angle and rod position, oversimplification of the mathematical robot model, robot arm velocity up to 0.3 m/sec and deflection up to 0.5 m) and with application of a joystick potentiometer. A more accurate identification of the robot model parameters with a suspended pendulum is recommended. Author (ESA)

N86-15678# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
5 Sep. 1985 76 p Transl. into ENGLISH from various West European articles
(JPRS-WST-85-027) Avail: NTIS HC A05/MF A01

Progress in West European science and technology is reported. Topics include: aerospace, automobile industry, biotechnology, computers, microelectronics, scientific and industrial policy, and technology transfer. For individual titles, see N86-15679 through N86-15679.

N86-15679# Joint Publications Research Service, Arlington, Va.
FIAT TO ASSEMBLE EFFICIENT ENGINE IN AUTOMATED PLANT
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-85-027) 5 Sep. 1985 p 21-30 Transl. into ENGLISH from ATA Ing. Automotoristica (Turin), May 1985 p 354-370 (For primary document see N86-15678 06-37)
Avail: NTIS HC A05/MF A01

The development of Fiat's Fire 1000 engine is described. A new plant was built since it was impossible to produce a radically new engine in any existing conventional production facility. It was decided to go back to square one, in designing the engine and in deivising and building the equipment, and to do both jobs at the same time. The interchange between the engine's designers and those working on the plant led to simpler and more elegant solutions and to construction of a plant endowed with an exceptional productivity potential. Both the engine and the plant are the offspring of an innovative design and planning philosophy. The plant was build after the production lines were designed which made it possible to set up the lines in the most efficient way and to achieve an optimum flow of materials to and through the plant. E.A.K.

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-15680*# Houston Univ., Tex. Dept. of Mechnaical Engineering.
NONDESTRUCTIVE ULTRASONIC CHARACTERIZATION OF ENGINEERING MATERIALS Final Report
Kamel Salama Nov. 1985 23 p refs
(Contract NCC1-88)
(NASA-CR-176349; NAS 1.26:176349) Avail: NTIS HC A02/MF A01 CSCL 14D

The development of an ultrasonic method for the nondestructive characterization of mechanical properties of engineering material is described. The method utilizes the nonlinearity parameter measurement which describes the anharmonic behavior of the solid through measurements of amplitudes of the fundamental and of the generated second harmonic ultrasonic waves. The nonlinearity parameter is also directly related to the acoustoelastic constant of the solid which can be determined by measuring the linear dependence of ultrasonic velocity on stress. A major advantage of measurements of the nonlinearity parameter over that of the acoustoelastic constant is that it may be determined without the application of stress on the material, which makes it more applicable for in-service nondestructive characterization. The relationships between the nonlinearity parameter of second-harmonic generation and the percentage of solid solution phase in engineering materials such as heat treatable aluminum alloys was established. The acoustoelastic constants are measured on these alloys for comparison and confirmation. A linear relationship between the nonlinearity parameter and the volume fraction of second phase precipitates in the alloys is indicated. E.A.K.

N86-15681# University of Southern California, Los Angeles. Dept. of Electrical Engineering.
BASIC RESEARCH IN RELIABILITY FOR REAL SYSTEMS Annual Technical Report, 15 Jul. 1984 - 14 Jul. 1985
V. O. K. Li 14 Jul. 1985 6 p
(Grant AF-AFOSR-0269-84)
(AD-A159100; AFOSR-85-0711TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Event-Based Reliability Model (EBRM) was developed to model and analyze the reliability of a network in which component failures are statistically dependent. In EBRM, the events that could cause component failures were modeled explicitly. This approach had the great advantage that it required much less parameters than the traditional model employing conditional probabilities. The EBRM was also proved to be a completely general model which could be applied to any kind of failure dependencies. For reliability evaluations, many existing algorithms for computing network reliability could be used with minor modifications and no significant increase in computational complexity. An improved algorithm for the appropriate evaluation of network performance was also developed. For multistate systems, ordered enumeration was used to approximate and bound system reliabilities and other performance measures, and an efficient algorithm was developed for this purpose. Author (GRA)

N86-15682# La Jolla Inst., Calif. Center for the Study of Nonlinear Dynamics.
THEORETICAL STUDIES IN NONDESTRUCTIVE EVALUATION (NDE) Final Report, 1 Jul. 1980 - 14 Feb. 1984
B. J. West Apr. 1985 87 p
(Contract F49620-81-K-0017)
(AD-A159155; LJI-R-85-318; AFOSR-85-0730TR) Avail: NTIS HC A05/MF A01 CSCL 20/1

A previously developed technique has been use to describe the discrete scattering of scalar waves from defects on a regular simple cubic lattice. THe method makes no assumption about the symmetry of the scatterers and therefore can be applied to inhomogeneities of arbitrary shape. The only limitation of the technique is the maximum number of defects one can use to specify the scatter, which in turn is determined by limitations in computation time. The multiple scattering model proposed by Foldy and later extended by Lax was implemented by West and Shlesinger as a means of evaluating the distribution of grains in polycrystalline materials. If the material consists of grains such that the wavelength is much larger than the grain size then the density of scatterers probed by the acoustic wave is unchanged as the frequency is increased, provided that one remains in the Rayleigh scattering domain. If one is in the scattering domain where the wavelength is less than or equal to the grain size, then the density of scatterers increases no more rapidly than the square of the linear scale (a-squared) rather than as its cube as it would in the usual situation. This implies that the density of scatterers is a fractal in the stochastic scattering domain. Note also that the surface of a grain can have many scales and may in part be responsible for the fractal behavior observed in the phenomenological expression. GRA

N86-15683# Materials Research Labs., Ascot Vale (Australia).
USE OF ULTRASONICS TO DETERMINE THE CRACK SIZE IN HIGH STRENGTH STEEL GUN BARRELS
G. Wulf Jan. 1985 28 p
(AD-A159405; MRL-R-953) Avail: NTIS HC A03/MF A01 CSCL 19/6

The use of high strength steel for large caliber gun barrels has increased the possibility that fatigue crack growth, as opposed to wear and erosion, will determine the safe life of a barrel. This is the case for the 5-in/54 Naval Gun. Because fatigue cracking may lead to catastrophic failure, it is necessary to provide some form of life prediction that will ensure that fatigue cracks or other damage will not grow to a critical size. Fortunately such a provision can be confidently based on fracture mechanics. The role of nondestructive testing is to check the crack length predictions and to ensure that cracks corresponding to the critical crack size for rapid fracture at the design load are not attained while the barrel remains in service. The ultrasonic end-on probe technique described provides a simple method of rapidly detecting, locating and sizing cracks without shadowing, and without the need for calculations required by other techniques. Author (GRA)

N86-15684# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
ACOUSTICAL IMAGING SYSTEM EVALUATION Final Report, 1 May 1984 - 31 May 1985
M. Foley Sep. 1985 20 p
(AF Proj. 5730)
(AD-A159425; AFRPL-TR-85-057) Avail: NTIS HC A02/MF A01 CSCL 14/2

A nondestructive evaluation device was delivered to the AFRPL by Battelle Laboratories. The sensitivity and other operational limitations of the device were not known, and a project was initiated at the AFRPL to determine those parameters. Sensitivities for both the through transmission subsystem and the pulse echo subsystem were determined. Both techniques use ultrasound to detect inner bore cracks in the propellant grains, and case/liner debonds (respectively) in tactical missile motors. In addition, the limitation of the mechanical subsystem and the transducer head geometry were investigated. Several inert analog motor sections, with both metal and phenolic cases, were used in the investigation, including a full size inert Sidewinder motor. The goal for the technology is to produce a field-usable motor health monitor for the DOD. GRA

N86-15451# Joint Publications Research Service, Arlington, Va.
FRG USES LASER FOR NON-DESTRUCTIVE TESTING IN WIND CANAL
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 25-26 Transl. into ENGLISH from VDI Nachrichten (Dusseldorf), 5 Apr. 1985 p 16 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-15685 Welding Inst., Cambridge (England).
FRACTURE TOUGHNESS TESTING OF LASER WELDS IN 2 mm THICK TITANIUM ALLOY IMI 550 Final Report
M. H. Scott, J. R. Gordon, and M. F. Gittos Mar. 1985 27 p refs

(Contract MIN-DEF-A91A/1149)
(Rept-3784/1/85; BR95196) Avail: NTIS HC A03/MF A01

Compact specimens are used to assess the toughness of laser welds in 2 mm thick IMI 550 Ti alloy sheet in the as-welded state and after a stress-relieving heat treatment. Tensile and hardness tests are also made on the welds. All testing is carried out at room temperature. Problems are experienced in making acceptable welds reproducibly and also in carrying out the toughness tests. The latter is because of crack deviation during fatigue precracking and the toughness tests themselves. In the as-welded state the weld metal has similar or greater toughness than the parent metal but heat treatment causes a reduction below that of the as-received parent metal. In all cases, fracture takes place in a brittle manner. The welds are harder than the parent metal with lower proof stresses but higher tensile strengths. Heat treatment raises proof stresses without markedly affecting tensile strength. Author (ESA)

N86-15686# Sydney Univ. (Australia). School of Civil and Mining Engineering.
THE DYNAMIC RESPONSE OF DISCRETELY DAMPED STRUCTURES UNDER HARMONIC AND RANDOM EXCITATION
W. K. Wheeler and G. J. Hancock Jul. 1984 33 p refs
(R-475) Avail: NTIS HC A03/MF A01

One of the ways to minimize the excitation of structure under dynamic load is to include viscous dampers both within the structure and connected to points of support outside the structure. However, the magnitude of the damping required and the position of the dampers is not always easily determined. For multi-degree of freedom structures, some modes may not be damped while others may be excessively damped. Excessive damping of one mode may also precipitate other modes of vibration. An analysis based on the frequency response method for studying the dynamic response of framed structures under both harmonic and random excitation is described. Studies of a multi-storey frame structure and a cable stayed pedestrian footbridge are described. These studies include investigations of the location and magnitude of the dampers. Author

N86-15687*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
EFFECTS OF LOAD PROPORTIONING ON THE CAPACITY OF MULTIPLE-HOLE COMPOSITE JOINTS Final Report, Mar. 1984 - Mar. 1985
M. W. Hyer (Maryland Univ., College Park) and P. A. Chastain (Aerojet Strategic Propulsion Co., Sacramento, Calif.) Nov. 1985 176 p Sponsored in part by Army Aviation Systems Command
(Grant NAG1-343)
(NASA-CR-178019; NAS 1.26:178019) Avail: NTIS HC A09/MF A01 CSCL 20K

This study addresses the issue of adjusting the proportion of load transmitted by each hole in a multiple-hole joint so that the joint capacity is a maximum. Specifically two-hole-in-series joints are examined. The results indicate that when each hole reacts 50% of the total load, the joint capacity is not a maximum. One hole generally is understressed at joint failure. The algorithm developed to determine the load proportion at each hole which results in maximum capacity is discussed. The algorithm includes two-dimensional finite-element stress analysis and failure criteria. The algorithm is used to study the effects of joint width, hole spacing, and hole to joint-end distance on load proportioning and capacity. To study hole size effects, two hole diameters are considered. Three laminates are considered: a quasi-isotropic laminate; a cross-ply laminate; and a 45 degree angle-ply laminate. By proportioning the load, capacity can be increased generally from 5 to 10%. In some cases a greater increase is possible. Author

N86-15688*# Failure Analysis Associates, Palo Alto, Calif. Engineering and Metallurgical Consultants.
TECHNIQUES FOR FATIGUE LIFE PREDICTIONS FROM MEASURED STRAINS
Robert Sire, Philip Besuner, Craig Schoof, and Jerrell Thomas Aug. 1985 174 p refs
(Contract NAS8-34971)
(NASA-CR-178574; NAS 1.26:178574; FaAA-PA-R-85-06-13; RAS:FR-9746) Avail: NTIS HC A08/MF A01 CSCL 20K

Orginal fatigue life prediction methods for certain components of the Space Shuttle Main Engines (SSME) have proved inaccurate in light of failure experience. An effort is made to improve fatigue life prediction methods. Research is focused on 1) the characterization of fatigue environments as a function of engine operating parameters and 2) the improvement of fatigue life estimates based on strain information from engine tests. In Phase 1 of the project, completed in July 1984, main injector LOX-post strain data is used to illustrate a cycle-by-cycle fatigue damage calculation method and software. In Phase 2, the software is used to statistically characterize the loading environments of two additional components: the high pressure oxidizer turbopump (HPOTP) bearing cartridge and the main combustion chamber (MCC) coolant inlet duct. Data tapes are supplied for a third additional component, the HPOTP discharge duct. A cycle-by-cycle (CBC) fatigue damage model which uses experimental strain histories to predict the relative impact that variations in engine operating parameters have on fatigue life has been developed. Author

N86-15689*# Failure Analysis Associates, Palo Alto, Calif. Engineering and Metallurgical Consultants.
TECHNIQUES FOR FATIGUE LIFE PREDICTIONS FROM MEASURED STRAINS. APPENDIX E: HPOTP BEARING CARTRIDGE AND MCC COOLANT INLET DUCT POWER SPECTRAL DENSITIES Final Report
Robert Sire, Philip Besuner, Craig Schoof, and Jerrell Thomas Aug. 1985 266 p
(Contract NAS8-34971)
(NASA-CR-178515; NAS 1.26:178515; FaAA-PA-R-85-06-13-App-E; RAS:FR-9746-App-E) Avail: NTIS HC A12/MF A01 CSCL 20K

In this appendix to the main report, power spectral densities are given for high pressure oxidizer turbopump (HPOTP) bearing cartridges and main combustion chambers (MCC) coolant inlet ducts. The power spectra are measured for HPOTP bearing cartridges at 30, 180, and 300 deg gages. The power spectra for MCC coolant inlet duct is measured at gage 5 and gage 7. There is no text. E.R.

N86-15690# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Automation Technology Center.
SPRING STIFFNESSES FOR BEAM-COLUMN ANALYSIS OF SOIL-STRUCTURE INTERACTION PROBLEMS Final Report
R. L. Hall Jul. 1985 128 p
(AD-A158072; AD-F630692; WES/TR/K-85-2) Avail: NTIS HC A07/MF A01 CSCL 13/13

The study documented in this report provides a simple means of combining a two-dimensional foundation with a beam-column structure for use in preliminary design and analysis. The report demonstrates that a foundation can be investigated and formed independently of the structural beam-column matrix. Two procedures for developing and interface matrix, which represents a linear elastic semi-infinite half plane, are presented. The terms needed to construct the interface matrix are dependent on values of Poisson's ratio and the modulus of elasticity of the foundation. Details on the two procedures, necessary terms to generate interface matrices, and example problems are provided. GRA

N86-15691# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
PROFILE FITTING IN RESIDUAL STRESS DETERMINATION
T. J. Devine and J. B. Cohen Aug. 1985 16 p
(Contract N00014-80-C-0116)
(AD-A158881; TR-22) Avail: NTIS HC A02/MF A01 CSCL 20/11

Of major importance in the determination of residual stress via diffraction is the accuracy of the measurement of the scattering angle (2 theta p) of a Bragg peak. This determines the accuracy of the interplanar (d) spacing and hence the strain and stress. In

the U.S., the most commonly accepted method of determining peak position is a parabolic fit near the top of a peak. (While a diffraction peak is not parabolic, this is a satisfactory function near the maximum.) The error is this procedure has been derived and tested, and it has been shown that a multipoint fit with at least 7 points is rapid and as precise or more precise than the centroid, the bisector of the half width, or cross correlation, except for sharp peaks in which case the centroid or cross correlation are slightly better. Thus a parabolic fit is generally useful and, since a least-squares fit to this function is readily carried out on modern microprocessors, automation of a stress measurement is possible, including evaluation of errors. The parabolic fit has the best overall ability to determine peak positions over a wide range of shapes. A Modified Lorentzian can be quite helpful if only a part of a peak can be explored, especially for sharp peaks. The errors in a Modified Lorentzian fit are not very sensitive to counting time. With a position sensitive detector precision comparable to that for a parabolic fit can be obtained in about one tenth the time. Goodness-of-Fit is not necessarily an accurate gage of error in peak position. GRA

N86-15692# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
LIMIT ANALYSIS OF TRANSVERSELY LOADED GRILLAGES M.S. Thesis
G. A. Harvey Jun. 1985 119 p
(Contract N66314-70-A-0073)
(AD-A158988) Avail: NTIS HC A06/MF A01 CSCL 20/11

A computer program that can determine the collapse load of a transversely loaded grillage that allows for various types of loading and failure modes is presented. The program allows the user to constrain particular grillage members to have fully developed plastic hinges at the location of maximum moment which gives the program the capability to study redundancy of transversely loaded grillages. The lower bound theorem of limit analysis and linear programming techniques are used to determine a grid load factor and provide a failure mode and associated bending moments. A user's guide and program explanation are provided. An example grillage is studied using this program and the load factor and redundancy is discussed. Author (GRA)

N86-15693# Rock Island Arsenal, Ill. Engineering Directorate.
STRESS ANALYSIS ON SCREW THREAD Final Technical Report
A. R. Yao and J. A. Doran Aug. 1984 182 p
(AD-A159347; AD-E700021; SMCRI-EN-84-13) Avail: NTIS HC A09/MF A01 CSCL 13/5

This report documents a thread joint analysis method which has been applied to an interactive computer program for evaluation of thread form deviations encountered in production. Thread forms covered include FED-STD-H28 standards and special forms generated by user supplied input. The analysis method, which includes static and dynamic analysis using elastic theory, provides thread joint performance indicators in the form of static load capacity and fatigue safety factor for various life cycle ranges. The analysis method and subsequent program is also useful for developing thread joint design criteria and verification of existing designs. GRA

N86-15694# Technische Univ., Berlin (West Germany). Fachgebiet Fuegetechnik/Schweisstechnik.
INVESTIGATIONS OF THE RELATIONS BETWEEN THE DAMAGE EVOLUTION OF VIBRATIONALLY LOADED SAMPLES AND THE MEASURING QUANTITIES OF THE INSTRUMENTED ACCELERATED FATIGUE TEST DURING THE CRACKFREE FATIGUE PHASE AND MICROCRACK FORMATION PHASE Final Report [UNTERSUCHUNG DER ZUSAMMENHAENGE ZWISCHEN DEM SCHAEDIGUNGSVERLAUF SCHWINGEND BEANSPRUCHTER PROBEN UND DEN MESSGROESSEN DES INSTRUMENTIERTEN DAUERSCHWINGVERSUCHES IN DER ANRISSFREIEN ERMUEDUNGSPHASE UND DER PHASE DER MIKRORISSBILDUNG]
Lutz Dorn 31 Mar. 1984 360 p refs In GERMAN
(Contract DFG-Do-202/11)
Avail: NTIS HC A16/MF A01

Vibration tests were developed to study load and vibration cycle-dependent material changes. The influence of vibration frequency, loading amplitude, average stress, cooling conditions, and test materials on the characteristics of the damage process were investigated. A high frequency vibration testing machine based on the resonance principle was used. The characteristics were measured and digitally processed, in single step as well as in load increase tests. The results show that the developed instrumentation of the vibration testing machine and of the sample allows to determine material changes during dynamic loading, and relations between loading amplitude and the measured and calculated characteristics of the damage process. Author (ESA)

N86-15300*# Boeing Vertol Co., Philadelphia, Pa.
PLANNING, CREATING AND DOCUMENTING A NASTRAN FINITE ELEMENT MODEL OF A MODERN HELICOPTER
R. Gabal, D. Reed, R. Ricks, and W. Kesack *In* NASA. Ames Research Center Rotorcraft Dynamics 1984 Nov. 1985 p 307-324 refs (For primary document see N86-15280 06-05)
Avail: NTIS HC A21/MF A01 CSCL 20K

N86-15421# Hokkaido Univ., Sapporo (Japan).
DEFORMATION BEHAVIOR OF ANISOTROPIC SAND DURING PRINCIPAL STRESS AXES ROTATION
Kinya Miura, Seiichi Miura, and Shosuke Toki *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 39 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

42 GEOSCIENCES (GENERAL)

N86-15695# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
GEOPHYSICAL BULLETIN OF HOKKAIDO UNIVERSITY, NO. 46
Izumi Yokoyama, ed., Tadaharu Fujiki, ed., Takeo Moriya, ed., Hiroshi Okada, ed., Toshio Harimaya, ed., Kinshiro Nakao, ed., Tsutomu Sasatani, ed., Sei-ichi Kanari, ed., Ichiro Nakanishi, ed., Hideki Shimamura, ed. et al Oct. 1985 91 p refs In JAPANESE; ENGLISH summaries
(ISSN-0439-3503) Avail: NTIS HC A05/MF A01

Several topics in geophysics are discussed. The reduction of the nocturnal cooling value by smudging; the atmospheric electrical environment of sea fog in the Pacific coast of eastern Hokkaido, Japan; and a numerical model of the seasonal variation of the tropical Pacific sea surface temperature are among the topics covered. For individual titles, see N86-15696 through N86-15702.

N86-15696# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics
THE REDUCTION OF NOCTURNAL COOLING VALUE BY SMUDGING c47
Toshio Harimaya, Masayuki Maki, Katsuhiro Kikuchi, Takashi Taniguchi, Chikashi Hiramatsu, and Satoshi Azumane *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 1-11 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

The effect of smudging was measured during the observation period of nocturnal cooling in a land basin. Based on the estimation by three kinds of measurements, the effect of smudging produced a difference in temperature of about 2.5 C. Consequently, frost formation was prevented at the bottom of the Akaigawa Basin. Based on the consideration of increasing further benefits of smudging, it was shown that the reduction rate increased if the duration of smudge layer is longer and the effect increased if the onset time of smudging is earlier. In addition, it was shown that

the smudge layer containing natural fog droplets was superior to that of smudge alone. Topography of the land basin likewise raised the effect by nondispersion of the smudge layer. Author

N86-15697# Hokkaido Univ., Sapporo (Japan). Meteorological Lab.
OBSERVATIONS ON THE ATMOSPHERIC ELECTRICAL ENVIRONMENT OF SEA FOG IN THE PACIFIC COAST OF EASTERN HOKKAIDO, JAPAN **c47**
Masashi Yoshihiro, Takashi Taniguchi, and Katsuhiro Kikuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 13-31 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

Observations of sea fogs were carried out at the Cape Aikappu in Akkeshi (43 01N 144 51 E) located on the coast of the Pacific Ocean, Eastern Hokkaido, Japan from July 15 to July 26, 1983. One of the main purposes of the observations was to know the atmospheric electrical nature of sea fogs of which very little is known to date. Throughout the observation period, the atmospheric electric field, atmospheric electrical conductivity, air-earth current, total space charge, electric charges on precipitation particles, horizontal visibility, heights of inversion layer and other meteorological factors were measured. Fog droplets were sampled to examine the size distribution, liquid water content and elemental compositions of the nuclei using an energy dispersive X-ray microanalyzer. In view of the characteristics of time variation of the horizontal visbility, the fog events were divided into two types. One of them as the advection fog which was generated along the sea side and on the Pacific Ocean, and advected to the observation site, and the other was the radiation fog which was generated around the observation site. It was concluded that: (1) time variations of the atmospheric electric field during fog events was influenced by condensation-evaporation effects on fog droplets and the change of depth of the fog layer; (2) in advection fog, positive electrical conductivity decreased, and was inversely proportional to the total surface area of fog droplets per unit volume of the atmosphere; and (3) the condensation nuclei of the advection fog were probably combustion products and sea salt particles. R.J.F.

N86-15698# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL STUDY ON THE RESPONSE OF THE TROPICAL PACIFIC SEA SURFACE TEMPERATURE TO A SUDDEN CHANGE OF WIND STRESS **c48**
Kensuke Takeuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 33-41 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

Responses of sea surface temperature in the tropical Pacific Ocean to a sudden change of wind stress is examined using a multi-level numerical model. The model ocean is a rectangular basin with a flat bottom, and is driven by steady wind stress until a quasi-stational state is attained, at which time eastward windstress is added suddenly in the eastern portion of the model ocean. Sea surface temperature around the Equator in the central and eastern portion of the model ocean increases by up to 3.5 degrees. Analysis of the result show that the increase of sea surface temperature in the central area is due to advection by eastward current associated with eastward propagating internal equatorial Kelvin waves excited by the change of wind stress, while in the area near the eastern boundary, along with the zonal advection, deepending of the thermocline and resulting reduction of equatorial upwelling also play important roles. It is also shown that it is the first vertical mode which is mostly responsible for the variation of the sea surface temperature. Author

N86-15699# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL MODELLING OF THE SEASONAL VARIATION OF THE TROPICAL PACIFIC SEA SURFACE TEMPERATURE **c48**
Kensuke Takeuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

Responses of the tropical Pacific Ocean to seasonally changing wind stress are examined by a numerical experiment, in an attempt to throw light upon mechanisms behind seasonal variations of sea surface temperature in this region. The model ocean is nearly the same as one used in Takeuchi(1985) except for a wider zonal dimension, and the seasonal change of wind stress is idealized as north-south migration of a wind system. The model results show basically good agreements with observations, including development of a cold water tongue extending along the equator from the eastern boundary in the season from northern summer to autumn and shrinking from winter to spring. Analysis of the results show that the origin of the cold water of the cold water tongue is several hundreds kilometer south of the equator along the eastern boundary, where a intense coastal upwelling takes place slightly earlier than the development of the cold water tongue. The seasonal variation of the coastal upwelling is attributed to both changes in local meridional wind stress and remotely forced equatorial Kelvin waves. Author

N86-15700# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL SIMULATION OF COASTAL MIXED LAYER BY A MODIFIED 1-D DKT MODEL **c48**
Sei-ichi Kanari and Momoki Koga *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 53-68 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

A modified DKT (Denman, Kraus and Turner) model was applied to the coastal mixed layer 5 km off the Oshore, in Ishikari Bay, Hokkaido. Modification of the model was made by adding advective effects and wind-depending penetration coefficient of short wave radiation in sea water. Input data used in the model simulation were abtained by a moored Meteo-oceanographic Spar Buoy with a 11-sensors thermister chain of 20 m long. Estimate of horizontal advection and vertical flow were based on the Csnady's inertial response model for wind-induced coastal currents. The advection model with constant horizontal temperature gradient showed that the observed rapid temperature drop was due to coastal upwelling induced by an atmospheric low pressure passing. However, successive rapid SST recovery could not be reproduced by the above constant gradient model. The recovery was attained by assuming a temporal reversal horizontal temperature gradient after passing the low pressure. In this case, standard error of simulated mixed layer temperature was plus or minus 0.8 C throughout 40 days. Author

N86-15701# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A STUDY OF THE STRONG GROUND MOTION OF THE WESTERN HIDAKA, HOKKAIDO EARTHQUAKE **c46**
Tsutomu Sasatani *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 69-83 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

An attempt is made to model strong ground motion from the western Hidaka earthquake of January 23, 1981. First, the source parameters for this event are obtained from a study of teleseismic P and S waves. Parameter values are: focal depth = 110 km, fault strike = 248, dip angle = 80, rake angle = 97, source process time = 3-4 sec, and seismic moment = 2.2 x 10 to the 26th power dyne-cm. Then synthetic strong-motion seismograms are calculated for the source parameters obtained and the assumed plane-layered earth model. These seismograms are compared with the observed JMA strong-motion seismograms at seven stations in Hokkaido. The duration and amplitude behavior of observed strong-motion can be explained by the simple source and earth models, except data from Tomakomai, Urakawa and Obihiro whose observed seismograms show waves with abnormally large amplitude after the direct S wave arrival. These abnormal strong-motions

may be due to propagational effects introduced by local crustal structure. Author

N86-15702# Hokkaido Univ., Sapporo (Japan). Research Center for Earthquake Prediction.
SEISMIC INTENSITY SURVEY AND HYPOCENTER RECALCULATION ON THE 1985 SAPPORO EARTHQUAKE (M 3.5) c46
Sadaomi Suzuki and Yoshinobu Motoya *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 85-91 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42) Avail: NTIS HC A05/MF A01

A felt earthquake (M 3.5) occurred under Sapporo city on January 23, 1985. Recalculation of the earthquake hypocenter assigned the parameters: origin time = 07h33m07.8s, latitude = 42 59.1 N, longitude = 141 22.6 E, depth = 11 km. One of the best focal mechanism solutions shows a P-axis dipping 25 toward N64 R. A questionnaire survey was carried out on this earthquake and distribution of seismic intensity was determined from ninety two answers of dwellers in Sapporo and its environs. Felt area extends to mountain area in the southwest of Sapporo and to Ishikari town in the north of Sapporo. An area of intensity 2 in JMA scale was found near the epicenter, Toyohira-ku in Sapporo. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-15703*# Pacific Northwest Lab., Richland, Wash.
LANDSAT TM IMAGE DATA QUALITY ANALYSIS FOR ENERGY-RELATED APPLICATIONS Final Report
George E. Wukelic, H. P. Foote, G. M. Petrie, J. C. Barnard, and J. R. Eliason Aug. 1985 21 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(NASA Order S-12402-C; Contract KC-04-03-03-87070)
(E86-10009; NASA-CR-176268; NAS 1.26:176268; PNL-5572) Avail: NTIS HC A02/MF A01 CSCL 08G

This project represents a no-cost agreement between National Aeronautic Space Administration Goddard Space Flight Center (NASA GSFC) and the Pacific Northwest Laboratory (PNL). PNL is a Department of Energy (DOE) national laboratory operted by Battelle Memorial Institute at its Pacific Northwest Laboratories in Richland, Washington. The objective of this investigation is to evaluate LANDSAT's thematic mapper (TM) data quality and utility characteristics from an energy research and technological perspective. Of main interest is the extent to which repetitive TM data might support DOE efforts relating to siting, developing, and monitoring energy-related facilities, and to basic geoscientific research. The investigation utilizes existing staff and facility capabilities, and ongoing programmatic activities at PNL and other DOE national laboratories to cooperatively assess the potential usefulness of the improved experimental TM data. The investigation involves: (1) both LANDSAT 4 and 5 TM data, (2) qualitative and quantitative use consideration, and 3) NASA P (corrected) and A (uncorrected) CCT analysis for a variety of sites of DOE interest. Initial results were presented at the LANDSAT Investigator's Workshops and at specialized LANDSAT TM sessions at various conferences. Author

N86-15704*# Minnesota Univ., Minneapolis.
PEAT LANDFORMS ALONG THE ALBANY RIVER, NORTHERN ONTARIO. AN ECOLOGICAL STUDY OF PEAT LANDFORMS IN CANADA AND ALASKA Progress Report
Paul H. Glaser 1985 20 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-28740)
(E86-10014; NASA-CR-176429; NAS 1.26:176429) Avail: NTIS HC A02/MF A01 CSCL 08B

During the summer of 1985 a field investigation was started in the Hudson Bay lowland region of northern Ontario, which represents the largest expanse of peatland in North America and is an important sink in the global carbon cycle. A key area in the lowlands is situated along the Albany River near the confluence of the Chepay River. Here the striking vegetation-landforms are transitional between those found on the bed of Glacial Lake Agassiz in northern Minnesota and southern Manitoba and the more northern peatlands in the Hudson Bay lowland region. In peatland studies elsewhere the landform patterns have been used not only to classify different peatland types but also as an indicator of potential developmetnal trends. The study area is generally defined by that covered by the TM scene E-40062-15532 taken on Sept. 16, 1982. The purpose of the field work is to acquire sufficent information to interpret the TM imagery and test various hypotheses on peatland develpment on the gasis of the pattern transitions. Author

N86-15705*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIOCHEMICAL PROCESSES IN SAGEBRUSH ECOSYSTEMS: INTERACTIONS WITH TERRAIN Semiannual Report
Pamela Matson, Principal Investigator, William Reiners (Wyoming Univ.), and Laurence Strong (Technicolor Government Services, Inc.) 10 Dec. 1985 11 p ERTS
(E86-10015; NASA-TM-87508; NAS 1.15:87508) Avail: NTIS HC A02/MF A01 CSCL 08B

The objectives of a biogeochemical study of sagebrush ecosystems in Wyoming and their interactions with terrain are as follows: to describe the vegetational pattern on the landscape and elucidate controlling variables, to measure the soil properties and chemical cycling properties associated with the vegetation units, to associate soil properties with vegetation properties as measured on the ground, to develop remote sensing capabilities for vegetation and surface characteristics of the sagebrush landscape, to develop a system of sensing snow cover and indexing seasonal soil to moisture; and to develop relationships between temporal Thematic Mapper (TM) data and vegetation phenological state. F.M.R.

N86-15706*# Delaware Univ., Newark. Coll. of Marine Studies.
EVALUATION OF SPATIAL, RADIOMETRIC AND SPECTRAL THEMATIC MAPPER PERFORMANCE FOR COASTAL STUDIES Final Project Report
Vytautas Klemas, Steven G. Ackleson, and Michael A. Hardisky 30 Nov. 1985 59 p refs ERTS
(Contract NAS5-27580)
(E86-10016; NASA-CR-176427; NAS 1.26:176427) Avail: NTIS HC A04/MF A01 CSCL 08B

On 31 March 1983, the University of Delaware's Center for Remote Sensing initiated a study to evaluate the spatial, radiometric and spectral performance of the LANDSAT Thematic Mapper for coastal and estuarine studies. The investigation was supported by Contract NAS5-27580 from the NASA Goddard Space Flight Center. The research was divided into three major subprojects: (1) a comparison of LANDSAT TM to MSS imagery for detecting submerged aquatic vegetation in Chesapeake Bay; (2) remote sensing of submerged aquatic vegetation - a radiative transfer approach; and (3) remote sensing of coastal wetland biomass using Thematic Mapper wavebands. For individual titles, see N86-15707 through N86-15709.

N86-15707*# Delaware Univ., Newark. Coll. of Marine Studies.
A COMPARISON OF LANDSAT TM TO MSS IMAGERY FOR DETECTING SUBMERGED AQUATIC VEGETATION IN LOWER CHESAPEAKE BAY
Steven G. Ackleson and Vytautas Klemas *In its* Evaluation of Spatial, Radiometric and Spectral Thematic Mapper Performance for Coastal Studies 30 Nov. 1985 17 p refs Presented at the ACSM-ASPRS Fall Convention, Indianapolis, Ind., 8-13 Sep. 1985 ERTS (For primary document see N86-15706 06-43)

Avail: NTIS HC A04/MF A01 CSCL 08J

LANDSAT Thematic Mapper (TM) and Multispectral Scanner (MSS) imagery generated simultaneously over Guinea Marsh, Virginia, are assessed in the ability to detect submerged aquatic, bottom-adhering plant canopies (SAV). An unsupervised clustering algorithm is applied to both image types and the resulting classifications compared to SAV distributions derived from color aerial photography. Class confidence and accuracy are first computed for all water areas and then only shallow areas where water depth is less than 6 feet. In both the TM and MSS imagery, masking water areas deeper than 6 ft. resulted in greater classification accuracy at confidence levels greater than 50%. Both systems perform poorly in detecting SAV with crown cover densities less than 70%. On the basis of the spectral resolution, radiometric sensitivity, and location of visible bands, TM imagery does not offer a significant advantage over MSS data for detecting SAV in Lower Chesapeake Bay. However, because the TM imagery represents a higher spatial resolution, smaller SAV canopies may be detected than is possible with MSS data. Author

N86-15708*# Delaware Univ., Newark. Coll. of Marine Studies.
REMOTE RECONNAISSANCE OF SUBMERGED AQUATIC VEGETATION: A RADIATIVE TRANSFER APPROACH
Steven G. Ackleson and Vytautas Klemas *In its* Evaluation of Spatial, Radiometric and Spectral Thematic Mapper Performance for Coastal Studies 30 Nov. 1985 17 p refs Presented at the 3rd LANDSAT-4 Workshop, Greenbelt, Md., 6-7 Dec. 1983 ERTS
(For primary document see N86-15706 06-43)
Avail: NTIS HC A04/MF A01 CSCL 08J

The effectiveness of LANDSAT TM and MSS sensors for detecting submerged aquatic vegetation (SAV) is assessed. The problem is approached from a theoretical standpoint in which volume reflectance from SAV under a variety of conditions is simulated. The focus is on the spectral and radiometric qualities of TM bands 1, 2 and 3 and MSS bands 4 and 5. Author

N86-15709*# Delaware Univ., Newark. Coll. of Marine Studies.
REMOTE SENSING OF COASTAL WETLANDS BIOMASS USING THEMATIC MAPPER WAVEBANDS
Michael A. Hardisky and Vytautas Klemas *In its* Evaluation of Spatial, Radiometric and Spectral Thematic Mapper Performance for Coastal Studies 30 Nov. 1985 19 p refs Presented at the LANDSAT-4 Science Characterization Early Results Symposium, Greenbelt, Md., 23-24 Feb. 1984 Previously announced as N85-23198 ERTS (For primary document see N86-15706 06-43)
Avail: NTIS HC A04/MF A01 CSCL 13B

Spectral data, simulating thematic mapper bands 3, 4 and 5 are gathered in salt and brackish marshes using a hand-held radiometer. Simple regression models are developed equating spectral radiance indices with total live biomass for S. alterniflora in a salt marsh and for a variety of plant species in a brackish marsh. Models are then tested using an independent set of data and compared to harvest estimates of biomass. In the salt marsh, biomass estimates from spectral data are similar to harvest biomass estimates during most of the growing season. Estimates of annual net aerial primary productivity calculated from spectral data are within 21% of production estimated from harvest data. During August, biomass estimates from spectral data in the brackish marsh are similar to biomass estimated by harvesting techniques. At other times during the growing season, spectral data estimates of biomass are not always comparable to harvest biomass estimates. Reasonable estimates of wetlands biomass are possible during the peak of the growing season (August) using spectral data similar to thematic mapper bands 3, 4 and 5 gathered with hand-held radiometers. Author

N86-15710*# Arizona Univ., Tucson.
LANDSAT-4 THEMATIC MAPPER MODULATION TRANSFER FUNCTION (MTF) EVALUATION Progress Report, 15 Dec. 1983 - 15 Mar. 1984
Robert Schowengerdt, Principal Investigator 5 Apr. 1985 6 p ERTS
(E86-10017; NASA-CR-176426; NAS 1.26:176426) Avail: NTIS HC A02/MF A01 CSCL 08B

The Modulation Transfer Function (MTF) for thematic mapping (TM) bands 3, 4, 5 and 7 is reliably estimated with the San Mateo Bridge target in the 12/31/82 scene. These results are to be compared with those from the 8/12/83 scene. Bands 1, 2 and 6 are to be analyzed with a different target possessing greater contrast. This may be possible with the underflight data comparison currently underway. The registration of this data to the TM image of 8/12/83 for a region arround the Stockton sewage pond east of San Francisco has begun. This particular approach has the advantage that the full two-dimensional MFT will be measured instead of the MFT in only one azimuth as reported. Author

N86-15711*# State Univ. of New York, Syracuse.
SYSTEMATIC AND RANDOM VARIATIONS IN DIGITAL THEMATIC MAPPER DATA Final Report
Michael J. Duggin, Principal Investigator and H. Sakhavat 1985 68 p refs Original contains imagery. Original phototgraphy may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-27595)
(E86-10018; NASA-CR-176425; NAS 1.26:176425) Avail: NTIS HC A04/MF A01 CSCL 08B

Radiance recorded by any remote sensing instrument will contain noise which will consist of both systematic and random variations. Systematic variations may be due to sun-target-sensor geometry, atmospheric conditions, and the interaction of the spectral characteristics of the sensor with those of upwelling radiance. Random variations in the data may be caused by variations in the nature and in the heterogeneity of the ground cover, by variations in atmospheric transmission, and by the interaction of these variations with the sensing device. It is important to be aware of the extent of random and systematic errors in recorded radiance data across ostensibly uniform ground areas in order to assess the impact on quantative image analysis procedures for both the single date and the multidate cases. It is the intention here to examine the systematic and the random variations in digital radiance data recorded in each band by the thematic mapper over crop areas which are ostensibly uniform and which are free from visible cloud. Author

N86-15712# Committee on Science and Technology (U. S. House).
BIOTECHNOLOGY AND AGRICULTURE
Washington GPO 1985 359 p Hearings before the Subcommittee on Investigations and Oversight of the Committee on Science and Technology, 99th Congression, 1st Session, no. 18, 16-7 Apr. 1985
(GPO-48-672) Avail: Subcommittee on Investigations and Oversight

The U.S. House of Representatives's subcommittee on investigations and oversight held hearings on biotechnology and agricultural sciences research programs. Advances in biotechnology research in agriculture and the direction of future research are reported. New capabilities in molecular biology, involving recombinant DNA methodologies are outlined. Applications of biotechnology to benefit agriculture, forestry, natural resources, animal production, and the related industrial processes are emphasized. E.A.K.

N86-15713# SRI International Corp., Menlo Park, Calif.
COMPUTER VISION RESEARCH AND ITS APPLICATIONS TO AUTOMATED CARTOGRAPHY Semiannual Technical Report, 11 Jun. 1984 - 10 Jun. 1985
M. A. Fischler Sep. 1985 204 p
(Contract MDA903-83-C-0027; ARPA Order 3862)
(AD-A159435; TR-4/5) Avail: NTIS HC A10/MF A01 CSCL 09/2

The SRI Image Understanding program is a broad effort spanning the entire range of machine vision research. Its three major concerns are: (1) to develop an understanding of the physics and mathematics of the vision process, (2) to develop a knowledge-based framework for integrating and reasoning about sensed (imaged) data, and (3) to develop a machine-based

environment for effective experimentation, demonstration, and evaluation of our theoretical results, as well as providing a vehicle for technology transfer. This report describes recent process in all three areas. In particular, we describe progress in constructing and testing a state-of-the-art automated system for stereo compilation, new approaches to extracting depth and structural information from imaged data, a knowledge-based system for feature extraction, and tools for scene modeling and interaction with a machine terrain data base. Author (GRA)

N86-15714# Pacific Northwest Lab., Richland, Wash.
APPROACH TO UNCERTAINTY ASSESSMENT FOR FLUID FLOW AND CONTAMINANT TRANSPORT MODELING IN HETEROGENEOUS GROUNDWATER SYSTEMS
R. W. Nelson, E. A. Jacobson, and W. Conbere Jun. 1985 24 p refs Presented at NATO Advanced Study Institute on Fundamentals of Transport Phenomena in Porous Media, Newark, Del., 14 Jul. 1985
(Contract DE-AC06-76RL-01830)
(DE85-016621; PNL-SA-13282; CONF-850780-1) Avail: NTIS HC A02/MF A01

There is a growing awarneness of the need to quantify uncertainty in groundwater flow and transport model results. regulatory organizations are beginning to request the statistical distributions of predicted contaminant arrival to the biosphere, so that realistic confidence intervals can be obtained for the modeling results. To meet these needs, methods are being developed to quantify uncertainty in the subsurface flow and transport analysis sequence. A method for evaluating this uncertainty, described in this paper, considers uncertainty in material properties and was applied to an example field problem. Our analysis begins by using field measurements of transmissivity and hydraulic head in a regional, parameter estimation method to obtain a calibrated fluid flow model and a covariance matrix of the parameter estimation errors. The calibrated model and the covariance matrix are next used in a conditional simulation mode to generate a large number of head realizations. The specific pore water velocity distribution for each realization is calculated from the effective porosity, the aquifer parameter realization, and the associated head values. Each velocity distribution is used to obtain in a transport solution for a contaminant originating from the same source for all realizations. The results are the statistical distributions for the outflow arrival times. The confidence intervals for contamination reaching the biosphere are obtained from the outflow statistical distributions. DOE

N86-15715# Helsinki Univ. (Finland). Radio Lab.
FORMULAS CONCERNING NONELECTRICAL PROPERTIES OF SNOW: THE ELECTRICAL ENGINEER'S POINT OF VIEW
Ari Sihvola 1984 12 p refs
(Rept-S-156; ISBN-951-753-271-7; ISSN-0355-5712) Avail: NTIS HC A02/MF A01

The nonelectrical properties of snow most commonly used in snow research reports are discussed. Density, wetness, water equivalent, dry density, porosity, void ratio, saturation, and the depolarization factors of the ice and water grains are considered. Author (ESA)

N86-15716# Helsinki Univ. (Finland). Radio Lab.
MICROWAVE RADIOMETERS FOR REMOTE SENSING APPLICATIONS
Martti Tiuri 1984 8 p refs Presented at Specialist Meeting on Microwave Radiometry and Remote Sensing Applications, Rome, Italy, 1-2 Mar. 1983
(Rept-S-157; ISBN-951-753-273-3; ISSN-0355-5712) Avail: NTIS HC A02/MF A01

Dicke radiometer, noise injection radiometer and total power radiometers used in remote sensing are described. The achievable temperature resolution and the absolute accuracy of the brightness temperature measurement are discussed. A remote sensing radiometer for oil slick detection is described. Author (ESA)

N86-15717# Helsinki Univ. (Finland). Radio Lab.
MIXING FORMULAS AND EXPERIMENTAL RESULTS OF THE DIELECTRIC CONSTANT OF SNOW
Ari Sihvola, Ebbe Nyfors, and Martti Tiuri 1984 27 p refs
(Rept-S-158; ISBN-951-753-274-1; ISSN-0355-5712) Avail: NTIS HC A03/MF A01

Dielectric properties of snow according to dielectric models are compared to experimental results. The complex permittivity of wet snow is assumed to consist of two parts: the sum of the permittivity of dry snow (a mixture of ice and air) and the excess permittivity due to liquid water (resulting from the dielectric mixture of water and air). The effect of liquid water is considered. Exponential models and structure-dependent models based on mixture theories are applied. It is shown that the assumptions of water inclusions having the form of either randomly oriented disks, needles, or spheres do not get empirical confirmation, but the inclusions are preferably prolate ellipsoids (ellipticity 0.16) or oblate ellipsoids (ellipticity 0.12), dry snow being a dielectric mixture of randomly oriented disk-shaped ice particles and air. Author (ESA)

N86-15718# Wageningen Agricultural Univ. (Netherlands). Faculty Advisory Commission.
IMAGE REGISTRATION Final Report [BEELDREGISTRATIE]
28 Jan. 1985 97 p In DUTCH
Avail: NTIS HC A05/MF A01

Introduction of a speciality in image registration to an agricultural college syllabus is examined. Utility within agricultrual research is investigated. Introduction is advised. Author (ESA)

N86-15719# Geological Survey, Columbus, Ohio. Water Resources Div.
WATER RESOURCES DATA FOR OHIO, WATER YEAR 1984. VOLUME 2: ST. LAWRENCE RIVER BASIN, STATEWIDE PROJECT DATA Annual Report, 1 Oct. 1983 - 30 Sep. 1984
H. L. Shindel, L. L. Stewart, and J. R. Kolva Apr. 1985 235 p
(PB85-230233; USGS/WDR/OH-84/2-Vol-2;
USGS/WRD/HD-85/223-Vol-2) Avail: NTIS HC A11/MF A01
CSCL 08H

Water resources data for the 1984 water year for Ohio consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of groundwater wells. Records for water discharge at 127 gaging stations, stage and contents at four lakes and reservoirs, water quality at 31 gaging stations, 32 wells, and 14 partial record sites, and water levels at 387 observation wells are reported. Also included are data from 60 crest-stage partial-record stations and four miscellaneous sites. GRA

N86-15720# Geological Survey, Sacramento, Calif.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1983. VOLUME 3: SOUTHERN CENTRAL VALLEY BASINS AND THE GREAT BASIN FROM WALKER RIVER TO TRUCKER RIVER Annual Report, 1 Oct. 1982 - 30 Sep. 1983
R. P. Fogelman, T. C. Hunter, J. R. Mullen, W. G. Simpson, and D. A. Grillo Mar. 1985 408 p Prepared in cooperation with California State Dept. of Water Resources, Sacramento, California
(PB85-232312; USGS/WDR/CA-83/3-Vol-3;
USGS/WRD/HD-85/218-Vol-3) Avail: NTIS HC A18/MF A01
CSCL 08H

Water resources data for the 1983 water year for California consists of records of stage, discharge, gage-height, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and quality of water in wells. Discharge records for 159 gaging stations; stage contents for 41 lakes and reservoirs; gage height records for two lakes; water quality for 6 streams and 46 wells; and water levels for 99 observation wells are reported. GRA

N86-15721# Geological Survey, Tacoma, Wash. Water Resources Div.
WATER RESOURCES DATA FOR WASHINGTON, WATER YEAR 1982. VOLUME 2: EASTERN WASHINGTON Annual Water-

Data Report, 1 Oct. 1981 - 30 Sep. 1982
Mar. 1985 224 p
(PB85-236834; USGS/WRD/HD-85/221-Vol-2; USGS/WDR/WA-82/2-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 08H

Water resources data for the 1982 water year for Washington consist of: (1) records of stage, discharge, and water quality of streams; (2) stage, contents, and water quality of lakes and reservoirs; and (3) water levels and water quality of wells and springs. Discharge records for 253 gaging stations; stage only records for 8 gaging stations; stage and contents for 37 lakes and reservoirs; water quality for 81 gaging stations; and water levels for 57 observation wells are reported. Also included are data for 33 crest-stage partial-record stations. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-15722*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 2: CONCEPTUAL AND PRELIMINARY DESIGN, BOOK 1 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 374 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-2-Bk-1; DOE/NASA/0153-Vol-2-Bk-1; NAS 1.26:174735-Vol-2-Bk-1; Doc-84AEPD004-Vol-2-Bk-1) Avail: NTIS HC A16/MF A01 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. There are four volumes. In Volume 2, book 1 the requirements and criteria for the design are presented. The conceptual design studies, which defined a baseline configuration and determined the weights, costs and sizes of each subsystem, are described. The development and optimization of the wind turbine generator are presented through the description of the ten intermediate configurations between the conceptual and final designs. Analyses of the system's load and dynamics are presented. Author

N86-15723*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 2: CONCEPTUAL AND PRELIMINARY DESIGN, BOOK 2 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 788 p refs 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-2-Bk-2; DOE/NASA/0153-Vol-2-Bk-2; NAS 1.26:174735-Vol-2-Bk-2; Doc-84AEPD004-Vol-2-Bk-2) Avail: NTIS HC A99/MF E03 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind tunnel generator is documented. There are four volumes. In Volume 2, book 2 the requirements and criteria for the design are presented. The development tests, which determined or characterized many of the materials and components of the wind turbine generator, are described. Author

N86-15724*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 3: FINAL DESIGN AND SYSTEM DESCRIPTION, BOOK 1 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 574 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-3-Bk-1; DOE/NASA/0153-Vol-3-Bk-1; NAS 1.26:174735-Vol-3-Bk-1; Doc-84AEPD004-Vol-3-Bk-1) Avail: NTIS HC A24/MF A01 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. Volume 3, book 1 describes the performance and characteristics of the MOD-5A wind turbine generator in its final configuration. Each subsystem - the rotor, drivetrain, nacelle, tower and foundation is described in detail. Author

N86-15725*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 3: FINAL DESIGN AND SYSTEM DESCRIPTION, BOOK 2 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 571 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-3-Bk-2; DOE/NASA/0153-Vol-3-Bk-2; NAS 1.26:174735-Vol-3-Bk-2; Doc-84AEPD004-Vol-3-Bk-2) Avail: NTIS HC A24/MF A01 CSCL 10B

The design, development and analysis of the 7.3MW MOD-5A wind turbine generator is documented. The report is divided into four volumes: Volume 1 summarizes the entire MOD-5A program, Volume 2 discusses the conceptual and preliminary design phases, Volume 3 describes the final design of the MOD-5A, and Volume 4 contains the drawings and specifications developed for the final design. Volume 3, book 2 describes the performance and characteristics of the MOD-5A wind turbine generator in its final configuration. The subsystem for power generation, control, and instrumentation subsystems is described in detail. The manufacturing and construction plans, and the preparation of a potential site on Oahu, Hawaii, are documented. The quality assurance and safety plan, and analyses of failure modes and effects, and reliability, availability and maintainability are presented. Author

N86-15726*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 4: DRAWINGS AND SPECIFICATIONS, BOOK 1 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 737 p refs 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-4-Bk-1; DOE/NASA/0153-Vol-4-Bk-1; NAS 1.26:174735-Vol-4-Bk-1; Doc-84AEPD004-Vol-4-Bk-1) Avail: NTIS HC A99/MF E03 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. Volume 4 contains the drawings and specifications that were developed in preparation for building the MOD-5A wind turbine generator. This is the first of five books of volume four. It contains structural design criteria, generator step-up transformer specs, specs for design, fabrication and testing of the system, specs for the ground control enclosure, systems specs, slip ring specs, and control system specs. E.R.

N86-15727*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 4: DRAWINGS AND SPECIFICATIONS, BOOK 2 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 450 p In NEPA.I 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-4-Bk-2; DOE/NASA/0153-Vol-4-Bk-2; NAS 1.26:174735-Vol-4-Bk-2; Doc-84AEPD004-Vol-4-Bk-2) Avail: NTIS HC A19/MF A01 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. There are four volumes. This volume contains the drawings and specifications that were developed in preparation for building the MOD-5A wind turbine generator. This is the second book of volume four. Some of the items it contains are specs for the emergency shutdown panel, specs for the simulator software, simulator hardware specs, site operator terminal requirements, control data system requirements,

software project management plan, elastomeric tester bearing requirement specs, specs for the controls electronic cabinet, and specs for bolt pretensioning. E.R.

N86-15728*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 4: DRAWINGS AND SPECIFICATIONS, BOOK 3 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 542 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-4-Bk-3; DOE/NASA/0153-Vol-4-Bk-3; NAS 1.26:174735-Vol-4-BK-3; Doc-84AEPD004-Vol-4-Bk-3) Avail: NTIS HC A23/MF A01 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. This volume contains the drawings and specifications developed for the final design. This volume is divided into 5 books of which this is the third, containing drawings 47A380074 through 47A380126. A full breakdown parts listing is provided as well as a where used list. E.R.

N86-15729*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 4: DRAWINGS AND SPECIFICATIONS, BOOK 4 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 622 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-4-Bk-4; DOE/NASA/0153-Vol-4-Bk-4; NAS 1.26:174735-Vol-4-Bk-4; Doc-84AEPD004-Vol-4-Bk-4) Avail: NTIS HC A99/MF E03 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator are documented. There are four volumes. This volume contains the drawings and specifications that were developed in preparation for building the MOD-5A wind turbine generator. This volume contains 5 books of which this is the fourth, providing drawings 47A380128 through 47A387125. In addition to the parts listing and where-used list, the logic design of the controller software and the code listing of the controller software are provided. Also given are the aerodynamic profile coordinates. E.R.

N86-15730*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT. VOLUME 4: DRAWINGS AND SPECIFICATIONS, BOOK 5 Final Report, Jul. 1980 - Jun. 1984
Aug. 1984 403 p 10 Vol.
(Contracts DEN3-153; DE-AI01-79ET-20305)
(NASA-CR-174735-Vol-4-Bk-5; DOE/NASA/0153-Vol-4-Bk-5; NAS 1.26:174735-Vol-4-Bk-5; Doc-84AEPD004-Vol-4-Bk-5) Avail: NTIS HC A18/MF A01 CSCL 10B

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator is documented. There are four volumes. This volume contains the drawings and specifications that were developed in preparation for building the MOD-5A wind turbine generator. Detail drawings of several assemblies and subassemblies are given. This is the fifth book of volume 4. Author

N86-15731*# National Aeronautics and Space Administration, Washington, D.C.
MONOLITHIC CASCADE-TYPE SOLAR CELLS
S. Yamamoto, A. Shibukawa, and M. Yamaguchi Dec. 1985 12 p Transl. into ENGLISH of Japanese Patent no. 59-172780 (Appl. no. 1983-4718, 22 Mar. 1983) p 1-5 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77926; NAS 1.15:77926) Avail: NTIS HC A02/MF A01 CSCL 10A

Solar cells consist of a semiconductor base, a bottom cell with a band-gap energy of E1, and a top cell with a band-gap energy of E2, and 0.96 < E1 > 1.36 eV and (0.80 E + 0.77) eV < E2 < (0.80 E1 + 0.92) eV. A monolithic cascade-type solar cell was prepared with an n(+)-type GaAs base, a GaInAs bottom solar cell, and a GaAlnAs top solar cell. The surface of the cell is coated with a SIO antireflection film. The efficiency of the cell is 32%. E.A.K.

N86-15732# Universal Energy Systems, Inc., Dayton, Ohio.
DLTS (DEEP-LEVEL TRANSIENT SPECTROSCOPY) ANALYSIS OF GERMANIUM AND Al SUB x Ga SUB 1-x As SOLAR CELLS Final Report, Mar. - Sep. 1984
S. S. Li Jul. 1985 68 p Prepared in cooperation with Florida Univ., Gainesville
(Contract F33615-81-C-2058)
(AD-A159114; AFWAL-TR-84-2093) Avail: NTIS HC A04/MF A01 CSCL 10/2

The objective of this research project is to investigate the radiation-induced deep-level defects in the one-MeV electron irradiated germanium and AlxGa1-xAs with x=0.05 and 0.17 using the Deep-Level Transient Spectroscopy (DLTS) and Capacitance Voltage (C-V) techniques. The I-V and C-V measurements were employed to estimate the background concentration in Ge irradiated by the one-MeV electrons for fluences of 1x10 to the 14th power, 1x10 to the 15th power, 1x10 to the 16th power per sq cm and in AlxGa1-xAs for fluences of 10 to the 15th power and 1x10 to the 16th power. The C-V and DLTS measurements were used to determine the defect parameters such as energy level, defect density and capture cross section of both electron and hole traps. This information is vital for designing a radiation hard cascade solar cell using materials such as germanium, GaAs and AlxGa1-xAs. Section 2 provides a brief overview of the radiation induced defects in germanium and AlGaAs as reported in the literature. In section 3 the results of the I-V, C-V and DLTS measurements on germanium samples are discussed. The physical origin of the radiation-induced defects are also depicted. Section VI described the DLTS and C-V results for the AlxGa1-xAs (with x = 0.05 and 0.17) specimen. Conclusions are given in the section V. GRA

N86-15733# Massachusetts Inst. of Tech., Cambridge. Lab for Water Resources and Hydrodynamics.
USER'S MANUAL FOR MASSACHUSETTS INSTITUTE OF TECHNOLOGY SOLAR THERMAL POND PROGRAM (MITSOL)
J. Atkinson, E. Adams, A. Salhotra, and R. Harleman Jun. 1985 116 p
(DE85-012147; SERI/STR-252-2679) Avail: NTIS HC A06/MF A01

The Massachusetts Institute of Technology Solar Pond Model (MITSOL) is a one-dimensional numerical model, written in FORTRAN, that may be used to predict transient vertical temperature and salinity profiles in a salt gradient solar pond. The formulation is based on a mixed-layer approach to modeling the vertical structure of a water body, and uses a finite difference explicit technique to solve basic salt and heat budget equations. A separate algorithm calculates wind-induced entrainment and subsequent deepening of the pond's upper mixed layer (or upper convecting zone). This report includes: (1) a discussion of the main program and subroutines and functions; (2) a discussion of the input file and the model's output; (3) a sample test case for the model; (4) the FORTRAN code for the model; and (5) a complete glossary for the code. DOE

N86-15734# Intersol Power Corp., Lakewood, Colo.
DEVELOPMENT AND FABRICATION OF PHOTOVOLTAIC CONCENTRATOR MODULES FOR A POINT-FOCUS FRESNEL LENS ARRAY
S. Broadbent and J. A. Sanders Jun. 1985 77 p
(Contract DE-AC04-76DP-00789)
(DE85-017322; SAND-85-7001) Avail: NTIS HC A05/MF A01

Design of the second generation photovoltaic concentrator module originally developed by Martin Marietta was improved. Module efficiency was improved from 14.4% to 15.5% and numerous detailed design enhancements were incorporated to facilitate fabrication and improve cost effectiveness. Sixty modules were manufactured to populate the second generation structure

already installed at the Sandia National Laboratories test site in Albuquerque, NM, plus 10 spares and test units. To further improve the life capability and facilitate installtion of the design, additional design development was authorized for: (1) cell interconnect research to provide greater stress relief at the cell-interconnect and substrate-interconnect interfaces; and (2) incorporation of a reflective secondary to relieve tracking accuracy and initial alignment accuracy requirements. DOE

N86-15735# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
165-kW OPEN-CYCLE OTEC EXPERIMENT
B. Shelpuk Jun. 1985 10 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC02-83CH-10093)
(DE85-008818; SERI/TP-251-2725; CONF-850808-14) Avail: NTIS HC A02/MF A01

The Solar Energy Research Institute (SERI) is developing a research experiment to establish the feasibility of producing significant amounts of net power from an open-cycle ocean thermal energy conversion (OC-OTEC) system. This experiment is sized at 165 kW sub e gross and is adequate to evaluate turbine performance and system process interactions at a scale that can be extrapolated to projected commercial market entry system sizes of 5 to 15 MW sub e. DOE

N86-15736# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ANALYSIS OF A DIRECT RADIATION SOLAR DEHUMIDIFICATION SYSTEM
K. Schultz, R. Barlow, A. Pesaran, and F. Kreith 4 Aug. 1985 9 p Presented at the National Heat Transfer Conference, Denver, Colorado, 4 Aug. 1985
(DE85-008820; SERI/TP-252-2705; CONF-850810-22) Avail: NTIS MF A02/MF A01

SERI researchers investigated a desiccant dehumidifier that is regenerated by direct absorption of solar radiation using a simplified numerical model (DESSIM) of the adsorption and desorption processes. This paper presents estimates of the performance of a solar-fired air conditioning system (ventilation cycle) containing the dehumidifier/collector. The researchers also considered the effects of dehumidifier NTUs, heat exchanger performance, and insolation levels. The direct radiation system can operate effectively at low insolation levels and thus may have some advantages in some geographic areas. DOE

N86-15737# Los Alamos National Lab., N. Mex.
ASSESSMENT OF DYNAMIC ENERGY CONVERSION SYSTEMS FOR RADIOISOTOPE HEAT SOURCES
G. R. Thayer and C. A. Mangeng Jun. 1985 137 p
(Contract W-7405-eng-36)
(DE85-016202; LA-10462-MS) Avail: NTIS HC A07/MF A01

The use of dynamic conversion systems to convert the heat generated in a 7500 W(t) 90 Sr radioisotopic heat source to electricity is examined. The systems studies were: Stirling; Brayton cycle; three organic Rankines (ORCs) (Barber-Nichols/ORMAT, Sundstrand, and TRW); and an organic Rankine plus thermoelectrics. The systems were ranked for a North Warning System mission using a Los Alamos multiattribute decision theory code. Three different heat source designs were used: case 1 with a beginning of life (BOL) source temperature of 640 C, case 2 with a BOL source temperature of 745 C, and case 3 with a BOL source temperature of 945 C. The Stirling engine system was the top-ranked system of case 1 and 2, closely followed by the ORC systems in case 1 and ORC plus thermoelectrics in case 2. The Brayton cycle system was top-ranked for case 3, with the Stirling engine system a close second. The use of (238) Pu in heat source sizes of 7500 W(t) is examined and it is found to be questionable because of cost and material availability and because of additional requirements for anlaysis of safeguards and critical mass. DOE

N86-15738# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SYSTEM ENGINEERING AND ENERGY COST ANALYSIS OF SMALL AND MEDIUM WIND TURBINES
P. K. C. Tu Jul. 1985 17 p Presented at the International Conference on Solar and Wind Energy Applications (ICSWEA), Beijing, China, 3 Aug. 1985
(DE-AC02-83CH-10093)
(DE85-012159; SERI/TP-217-2785; CONF-850888-2) Avail: NTIS HC A02/MF A01

A preliminary system-level, computational model was developed to allow broad assessment and optimization of wind turbine design and costs analysis at The Wind Energy Research Center, Solar Energy Research Institute under contract to the US Department of Energy (DOE). This paper briefly describes the basic principles used in the model for energy capture and cost-of-energy (COE), and demonstrates the model's usefulness in determining the effects of rotor and system design modifications. The model's utilization for conducting parametric studies and defining the energy cost of small and medium-sized wind turbines is also shown. Topics of interest to wind turbine engineers and designers include the effects on rotor performance of airfoil geometry, blade pitch angle setting, and the system RPM schedule, etc. DOE

N86-15739# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Gruppe Solarenergiewandlung.
MEASUREMENT OF RADIATION INTENSITY ON THE IEA SSPS/CRS SOLAR TOWER PLANT IN SPAIN
Andreas Brinner Jun. 1985 43 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-961)
(DFVLR-FB-85-36; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 15

The Kendall MK 9 radiometer was selected to measure the radiation intensity on the IEA SSPS/CRS solar tower plant in Spain. The measuring signal was applied to calibrate a video camera used for measurement of power density distribution in the aperture of the solar absorber. The measurement results were used to show a relationship between the gray values of a video picture of the ASR receiver under radiation and the absolute radiation intensity measured at three points so as to calculate the absolute irradiation in MW. The tests show good reproducibility and high accuracy. The conversion factors were applied to calculate the flux distribution, the maximal flux, and the ASR receiver efficiency. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-15740# Dugway Proving Ground, Utah.
MIGRATION OF HAZARDOUS SUBSTANCES THROUGH SOIL PART 2: DETERMINATION OF THE LEACHABILITY OF METALS FROM FIVE INDUSTRIAL WASTES AND THEIR MOVEMENT WITHIN SOIL Final Report, Apr. 1974 - Dec. 1977
M. J. Houle, D. E. Long, R. Bell, D. C. Weatherhead, Jr., and R. Grabbe Aug. 1985 284 p
(AD-A158990; DPG-FR-85-012) Avail: NTIS HC A13/MF A01 CSCL 13/2

Samples of industrial wastes from the electroplating, inorganic pigment, nickel-cadmium battery, water-base paint, and chlorine production industries were characterized as to their composition, toxic metal content, and leaching characteristics using serial batch extractions and continuous flow columns. Distilled water was used as one solvent to simulate rainwater or ground water and municipal landfill leachate was used to simulate the effects of mixing industrial and municipal refuse in the same disposal site. The metal content of the waste leachate was measured before and after contact with the soil. The soils used were: Davidson, Chalmers,

Nicholson, Anthony, and Kalkaska. The metals of interest were: cadmium, chromium, copper, mercury, lead, nickel, and zinc. The concentration of metals in waste and soil leachate were compared to published drinking water standards. It was found that the nickel-cadmium battery waste was extremely soluble and both water and municipal landfill leachate released extremely high concentrations of nickel and cadmium. These metals rapidly penetrated soil columns and would overwhelm the attenuation capacity of the soils underlying a disposal site. GRA

N86-15741# Department of Energy, New York. Environmental Measurements Lab.
WORLDWIDE DEPOSITION OF (90)Sr THROUGH 1983
R. J. Larsen Jul. 1985 160 p refs
(DE85-017599; EML-444) Avail: NTIS HC A08/MF A01

The total deposition of Sr 90 in the Northern Hemisphere during 1983 was 0.3 PBq, while the total deposition in the Southern Hemisphere was 0.2 PBq making the total deposition on the surface of the Earth during 1983 0.5 PBq. This is the lowest total yearly deposit since the initiation of the Environmental Measurements Laboratory's global fallout program in the late 1950's. The worldwide cumulative deposit decreased to 365.6 PBq. The last reported nuclear detonation in the atmosphere occurred at the Lop Nor test site in China on October 16, 1980. DOE

N86-15742# Argonne National Lab., Ill.
CONTROLLING ACIDIC DEPOSITION: TARGETED STRATEGIES FOR REDUCING SULFUR DIOXIDE EMISSIONS
D. G. Streets, D. A. Hanson, L. A. Conley, and L. D. Carter Oct. 1984 80 p
(Contract W-31-109-eng-38)
(DE85-015058; ANA/EES-TM-282) Avail: NTIS HC A05/MF A01

This volume presents methods of optimizing the efficiency of selected control proposals presented in the 98th Congress. These methods apply models of sulfur dioxide emissions and control costs and models of atmospheric transport and deposition of sulfur. In particular, targeted strategies that aim to reduce deposition in several sensitive regions at minimum cost are described. The cost-effectiveness of proposed and targeted strategies is compared. DOE

N86-15743# Brookhaven National Lab., Upton, N. Y.
CAPABILITIES, NEEDS AND APPLICATIONS OF GASEOUS TRACERS
R. N. Dietz and G. I. Senum Aug. 1984 65 p Workshop held on Atmospheric Tracers, Santa Fe, New Mexico, 21 May 1984
(DE85-015194; BNL-35108; CONF-8405224-3) Avail: NTIS HC A04/MF A01

Those compounds which meet most or all of the gaseous conservative tracer criteria for selection, including low atmospheric background concentration, simple sample workup and analysis, high detectability, limited industrial use, harmless, low reactivity and removal rates, and low cost generally are confined to SF6, halocarbons, perfluorocarbons, and deuterated methanes. The properties, availability, and cost of these tracers are reviewed. A system for tagging and following a parcel of air consists not only of the gaseous tracer, but also its release, sampling, and analysis equipment; each will be reviewed in some detail. For tracers that are gases at normal temperatures the release is simply through metered valves; for those that are liquids, metered atomization and/or vaporization techniques must be used. Sampling has most commonly been performed by whole air techniques (plastic bags, syringes, evacuated bottles, etc.) but also by adsorbent samplers, located primarily on the ground but in a number of cases above-ground as well with the use of vertical sampling techniques. Analyses for some tracers can be done in real-time making use of aircraft more viable. The techniques for analyzing collected air samples are discussed. DOE

N86-15744# Argonne National Lab., Ill.
PROPOSALS FOR ACID-RAIN CONTROL FROM THE 98TH CONGRESS
D. G. Streets, J. E. Vernet, and T. D. Veselka Oct. 1984 111 p
(Contract W-31-109-eng-38)
(DE85-015268; ANL/EES-TM-281) Avail: NTIS HC A06/MF A01

This volume summarizes the acid-rain-control activities of the 98th Congress, collating and analyzing many of the major bills in the form in which they were proposed. Effects of the proposals are compared, with emphasis on control costs, sulfur dioxide emission reductions, and coal usage. DOE

N86-15745# Institute of Oceanographic Sciences, Wormley (England).
A REVIEW OF BIOLOGICAL PROCESSES WITHIN OCEANIC WATER COLUMNS RELEVANT TO THE ASSESSMENT OF THE SAFETY OF DISPOSAL OF WASTE, NOTABLY RADIOACTIVE ISOTOPES, ON OR WITHIN THE SEABED
M. V. Angel 1985 96 p refs
(Contract DOE-DGR-481/178)
(IOS-198; DOE/RW-84/163) Avail: NTIS HC A05/MF A01

Pelagic biological processes and their connotations in the assessment of dispersal mechanisms of contaminants released on the deep oceanic seabed are reviewed. Biological gradients tend to be from the surface down so the search is for processes which run counter to these general gradients. Observed profiles off standing crop of plankton and micronekton show that below 2000 m biological activity has to be exceptionally dynamic to have an influence even within an order of magnitude of the dispersive effect of physical mixing. Examination of all forms of known migration mechanisms fails to reveal such dynamic activity. No critical pathways within the present or foreseeable pattern of exploitation of the oceans are identified. However, a major gap in knowledge is whether the pattern of these biological processes changes substantially in the region of continental slopes. Author (ESA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-15746 Washington Univ., Seattle.
GEOLOGY, PETROLOGY, AND GEOCHEMISTRY OF A YOUNGER GRANITE PLUTON, CENTRAL EASTERN DESERT OF EGYPT; IMPORTANCE OF MIXING Ph.D. Thesis
Mohamed Ibrahim Sultan 1984 248 p
Avail: Univ. Microfilms Order No. DA8509055

The Younger Granite pluton that is the main subject of study of this work, is a small epizonal pluton in the central part of the Eastern Desert (C.E.D.) of Egypt. This pluton is a representative example of widespread and abundant shallow intrusions emplaced in northern and northeastern Africa in late Precambrian time. The Younger Granite pluton occupies a central position in the Maetiq Dome, a metamorphic core complex. It was emplaced along foliation planes of the country rocks, mainly gneisses and mylonites. This together with other observations indicate that it is a sill. Samples from the Younger Granite pluton are silica rich (77.2-75.3 wt% SiO_2), metaluminous to peraluminous rocks (molar $Al_2O_3/(Na_2O + K_2O + CaO) = 0.98 - 1.09$). Whole rock major element abundances of 21 samples show only small variation in SiO_2, Al_2O_3, Na_2O and K_2O compared to larger variation for the less abundant major elements such as FeO, TiO_2, CaO, MnO and MgO and the trace elements Sc, Cr, Co, Rb, Sr, Zr, La, Ce, Nd, Sm, Tb, Yb, Lu, Ta, Th and U. Dissert. Abstr.

N86-15747 California Univ., Santa Barbara.
PALEOMAGNETISM AND TECTONICS OF THE CENTRAL AND EASTERN TRANSVERSE RANGES, SOUTHERN CALIFORNIA Ph.D. Thesis
Richard Ralph Terres 1984 364 p
Avail: Univ. Microfilms Order No. DA8509456

This paleomagnetic study was conducted with the purpose of characterizing the extent, timing, and magnitude of tectonic rotations in the eastern parts of the Transverse Ranges in an effort to understand better the Neogene tectonic evolution of Southern California. Paleomagnetic studies were conducted on the following rock units; the mid- Tertiary Plush Ranch, Vasquez, and Diligencia formations; the upper Miocene Mint Canyon Formation; and Mesozoic mafic and felsic dike rocks and Miocene basalt flows of the Eagle and Chuckwalla Mountains. In total, 1167 oriented samples from 185 sites were collected and analyzed. Clockwise tectonic rotations, as indicated by anomalous paleomagnetic declinations are inferred for the Diligencia Formation (90 deg to 220 deg), the Vasquez Formation (up to 90 deg), and the Eagle Mountains (40 deg). The mean results of the Plush Ranch and Mint Canyon formations are not anomalous. In the Diligencia Formation, dextral shearing adjacent to the right-slip Clemens Well fault caused localized clockwise rotations of perhaps over 100 deg. Dissert. Abstr.

N86-15748 Texas A&M Univ., College Station.
ONE-DIMENSIONAL ITERATIVE INVERSION OF VERTICAL SEISMIC PROFILES Ph.D. Thesis
William Gregory Dillon 1985 178 p
Avail: Univ. Microfilms Order No. DA8514247

In a vertical seismic profile, the earth's response to a surface excitation is measured by geophones located in a borehole. The objective of this research has been to use the recorded up and downgoing waves to estimate depths to reflectors and velocities below the bottom of the well and in the near surface. An inversion scheme was developed to accomplish this. It works by iteratively adjusting a forward model unit its output best matches a recorded field trace (in a least squares sense). The forward model is the well known equal-traveltime model. The model consists of reflecting interfaces spaced at uniform traveltime intervals. The output of the model is adjusted by using a steepest descent technique to change the reflection coefficients characterizing the interfaces. By assuming constant density and by knowing the velocity in one layer, the reflection coefficients derived from the scheme may be converted into velocity and depth estimates. Dissert. Abstr.

N86-15749 Rice Univ., Houston, Tex.
RADIATION PRESSURE AND THE GEOCORONA Ph.D. Thesis
James Edward Bishop 1985 139 p
Avail: Univ. Microfilms Order No. DA8517178

The theory of planetary exospheres is extended to incorporate solar radiation pressure in a rigorous manner, and an evaporative geocoronal prototype (classical, motionless exobase) is constructed using Liouville's theorem. Calculations for density and kinetic temperature at points along the Earth-Sun axis (solar and anti-solar directions) reveal an extensive satellite component, comprising approx. 2/3 of the total hydrogen density near 10 Earth radii, and a temperature profile suggestive of a near-isotropic quasi-Maxwellian kinetic distribution for the bound component. A geotail is also evident in this model as an enhancement of the local midnight density compared to local noon that increases radially outward from roughly 25% at 10 Earth radii to over 60% at 20 Earth radii. Additional mechanisms acting upon the geocorona alter this evaporative case in notable ways. Solar ionization has been include in a simple fashion; the effect is to deplete the density somewhat without otherwise altering the structure. Dissert. Abstr.

N86-15750 California Univ., San Diego.
SEISMIC MOMENT TENSOR RECOVERY AT LOW FREQUENCIES Ph.D. Thesis
Mark Alan Riedesel 1985 280 p
Avail: Univ. Microfilms Order No. DA8515601

A low-frequency, normal mode technique which provides estimates of the seismic moment tensor in as many as ten separate 1 mHz bands is described. The basic data kernels are integrals of the complex spectra of the untaped seismograms with a bandwidth of .1 mHz, centered on the model frequencies of the fundamental modes. The frequency-domain integration process reduces the sensitivity of the solutions to attenuation and splitting. Adjustments in the phase of the integrals are computed to compensate for the effects of latteral heterogeneity, station timing errors, and centroid time shifts. Estimates of the covariance of the solutions are used to provide uncertainties for the source mechanism and the principle stress axes. A graphical method is developed which allows a rapid visual assessment of the significance of nondouble-couple and isotropic components of the solutions. The method was applied to 57 earthquakes recorded on the IDA network between 1977 and 1984. The moment rate tensor and its uncertainty was investigated in 1 mHz bands over the 1 to 11 mHz frequency range. Dissert. Abstr.

N86-15751 Florida Univ., Gainesville.
THE EFFECT OF THE BENTHIC BOUNDARY LAYER ON THE PHYSICS OF INTENSE MESOSCALE EDDIES Ph.D. Thesis
Germana Peggion 1985 152 p Previously announced as N85-28270
Avail: Univ. Microfilms Order No. DA8517345

It is found that the decay of eddy-like flow occurs through conversion of kinetic to potential energy and through dissipation by bottom friction. The relative importance of both processes is expressed by the Rossby number and by the stratification parameter. A larger Rossy number and stratification parameter lead to a larger conversion of kinetic to potential energy, but a smaller mechanical dissipation of the same energy. Examination of the structure of the Benthic Boundary Layer indicates that a clear distinction should be made between the mixed layer, or the region neutrally stratified, and the Bottom Boundary Layer, or the region where most of the turbulent activity occurs. It is found that the structure of the Bottom Boundary Layer depends also on the magnitude of the flow above the Benthic region, but the mixed layer depends also on the sign of the mesoscale activity. Under a cyclonic flow, the mixed layer is defined by vertical advection and it is usually much thicker than the Bottom Boundary Layer. The mixed layer of an anticyclonic flow is the result of both vertical advection and near bottom turbulence, and the ambiguity between the mixed layer and Bottom Boundary Layer is notably reduced. GRA

N86-15752 Rhode Island Univ., Kingston.
STRUCTURE AND TECTONICS OF THE LONG ISLAND PLATFORM Ph.D. Thesis
Deborah Ruth Hutchinson 1985 306 p
Avail: Univ. Microfilms Order No. DA8516674

Structures within the crust of the Long Island platform have been mapped using multichannel seismic-reflection profiles and magnetic and gravity data. Four buried rift basins show that low-angle normal faults, high-angle cross faults and possibly regional uplift characterized the platform during active rifting in the early Mesozoic. Crustal thinning probably occurred along both low-angle normal faults (three basins) and detachment surfaces (one basin). Reactivated Paleozoic structures have controlled the general shape and orientation of these basins, except possibly near the basement hinge zone. A low-angle, west dipping fault, the Block Island fault, penetrates most of the crust and is characterized by a large north-trending magnetic high at its basement subcrop. The fault is interpreted to be equivalent to the late Paleozoic boundary between the Avalon block and North America and provides evidence that crustal imbrication, as well as thin-skinned tectonics, from the Appalachian orogen. This low-angle fault may have been reactivated in Cretaceous and Tertiary times to form the near-vertical postrift New Shoreham fault as an antithetic (i.e., normal) or splay (i.e., reverse) fault off the deeper structure. Dissert. Abstr.

N86-15753 Institut d'Aeronomie Spatiale de Belgique, Brusseis.
THE CO2 AND CO ABUNDANCES BELOW 130 km ALTITUDE FROM INFRARED SPECTRA
J. Vercheval, C. Lippens, C. Muller, M. Ackerman, M.-P. Lemaitre (ONERA, Paris, France), J. Besson (ONERA, Paris, France), A. Girard (ONERA, Paris, France), and J. Laurent (ONERA, Paris, France) 1985 19 p refs Presented at American Geophysics Union Fall Meeting, 3-7 Dec. 1984

(Aeronomica-Acta-A-296-1985) Avail: Issuing Activity
Observations of infrared absorption lines by grill spectrometer on Spacelab 1 are used to determine CO2 and CO abundances in the low thermosphere and in the middle atmosphere. It is shown that the results can be well represented by theoretical models based on the interaction processes between solar UV radiation, CO, CO2 and OH molecules. Author (ESA)

N86-15754# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE TWILIGHT SODIUM LAYER
V. W. J. H. Kirchhoff, P. P. Batista, B. R. Clemesha, and D. M. Simoich Jul. 1985 19 p refs Presented at the 5th Scientific Assembly IAGA, Symposium on Metallic Atoms and Ions, Prague, 13 August 1985 Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3568-PRE/773) Avail: NTIS HC A02/MF A01
It is believed that the sodium photochemistry is strongly influenced by mesospheric atomic oxygen and ozone and one might thus expect sodium variations to occur during twilight. This expectation has been investigated by measuring the sodium density using a laser radar system. The results are reported for thirty-one evening twilights and compare with the recent model calculations. The measurements show a rapid decrease in sodium density at the bottom of the layer, immediately after sunset, in agreement with the theoretical predictions. B.W.

N86-15755*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AURORAL THERMOSPHERE TEMPERATURES FROM OBSERVATIONS OF 6300 A EMISSIONS
John C. Bird (Alabama Univ., Huntsville), Gary R. Swenson, and Richard H. Comfort (Alabama Univ., Huntsville) Nov. 1985 65 p refs
(NASA-TM-86530; NAS 1.15:86530) Avail: NTIS HC A04/MF A01 CSCL 04A
Doppler temperatures determined from observations of the atomic oxygen OI 6300 A line during March 1984 at the University of Alaska/Fairbanks are presented. Temperatures are obtained from Fabry-Perot Interferometer pressure scans using a Fourier transform smoothing and fitting technique; this technique is presented in detail. The temperatures and the spread in the temperatures are consistent from day to day. On the clear nights of March 10 to 13, the temperatures were 800, 750, 750 and 800 K, respectively, with a spread of + or - 100 K. These temperatures are compared to the MSIS (84) model atmosphere for similar geomagnetic conditions and found to be in general agreement; they are also consistent with results obtained by other investigators. Author

N86-15756*# ST/E Technical Services, Inc., San Ramon, Calif.
MICRO-RAMAN SPECTROSCOPY: THE ANALYSIS OF MICROMETER AND SUBMICROMETER ATMOSPHERIC AEROSOLS Final Technical Report
Stan M. Klainer and Fred P. Milanovich 20 Jun. 1985 59 p refs
(Contract NAS1-17943)
(NASA-CR-177964; NAS 1.26:177964) Avail: NTIS HC A04/MF A01 CSCL 04A
A nondestructive method of molecular analysis which is required to fully utilize the information contained within a collected particle is discussed. Upper atmosphere reaction mechanisms are assessed when the chemical compounds, the use of micro-Raman spectrometric techniques to perform micron and submicron particle analysis was evaluated. The results are favorable and it is concluded that micron and submicron particles can be analyzed by the micron-Raman approach. Completely automatic analysis should be possible to 0.3 micro m. No problems are anticipated with photo or thermal decomposition. Sample and impurity fluorescence are the key source of background as they cannot be completely eliminated. Author

N86-15757# Aerospace Corp., El Segundo, Calif.
THE CHARGE-STATE COMPOSITION OF 0.4-MeV HELIUM IONS IN EARTH'S OUTER RADIATION BELTS DURING QUIET TIMES
David L. Chenette, J. Bernard Blake, and Joseph F. Fennell 30 Sep. 1984 30 p refs
(Contract F04701-83-C-0084)
(AD-A147561; TR-0084(4940-05)-06; SD-TR-84-48) Avail: NTIS HC A03/MF A01 CSCL 04/1
The charge state of 0.40 to 0.55 MeV helium ions in Earth's outer magnetosphere (L approx. 6) were measured by a novel technique. The radial gradient of the helium ion flux and the east-west anisotropy in the pitch-angle distribution are both measured. These are combined with measurements of the magnetic field to calculate the flux-weighted average ion gyroradius. Since the magnitude of the magnetic field and the energies of the ions are known, the gyroradius determines the ion's charge state. During two pairs of geomagnetically quiet days in 1979 it was found that most of these ions are singly charged which is in accord with theoretical calculations which found that charge-exchange reactions between these ions and the neutral hydrogen geocorona are the dominant factors in controlling the charge state of these ions at times longer than a day after their injection. It is also suggested that the mean charge state of the helium ions may vary with position in the magnetosphere and with time. E.A.K.

N86-15758# Messina Univ. (Italy). Ist. di Struttura della Materia.
THE OPTICAL SPECTRA OF AEROSOLS Final Technical Report
F. Borghese Feb. 1985 109 p
(Contract DAJA37-81-C-0895)
(AD-A158057; R/D-4103-EN) Avail: NTIS HC A06/MF A01 CSCL 04/1
The macroscopic optical constants of an aerosol of model nonspherical particles are calculated. The effect of chemical reactions on the spectra of the aerosols are taken into account. The computer programs necessary to perform these calculations are listed and a user's guide is supplied. GRA

N86-15759# Herndon Science and Software, Inc., San Diego, Calif.
TECHNOLOGICAL APPLICATIONS OF EARTH CORE RESEARCH Final Report, 1 Jan. 1982 - 1 Jan. 1985
J. M. Herndon May 1985 37 p
(Contract F49620-82-C-0024)
(AD-A158991; HSSI-82-0004; AFOSR-85-0728TR) Avail: NTIS HC A03/MF A01 CSCL 08/4
The research undertaken under the present AFOSR contract is intended to address the question of what elements might be expected to form silicides in the core of the Earth and is aimed at determining and demonstrating the technological feasibility of new concepts originating from the research. Specifically, the research objectives are the following: (1) prepare a complete bibliography on silicide technology, including the physical and chemical properties; (2) determine the effects of phosphorous and copper on nickel silicide, conduct experiments to determine what elements form silicides; (3) conduct experiments on Earth core type materials to provide new materials and processes. The schedule is given for the tasks that are the research objectives and the deliverables. GRA

N86-15760# Naval Research Lab., Washington, D. C.
TRANSVERSE MOTION OF HIGH SPEED BARIUM CLOUDS IN THE IONOSPHERE
H. G. Mitchell, J. A. Fedder, J. D. Huba, and S. T. Zalesak 18 Sep. 1985 19 p
(AD-A159058; NRL-MR-5626) Avail: NTIS HC A02/MF A01 CSCL 04/1
Simulation results, based on a field-line-integrated, 2D, electrostatic model, are presented for the motion of a barium cloud injected transverse to the geomagnetic field in the ionosphere at high speeds. It is found that the gross evolution of injected plasma clouds depends sensitively on the initial conditions, as well as the nature of the background coupling. For a massive (M sub O =

approx. 10 kg), orbital (V sub O = approx. 5 km/sec) release in the F region (350 to 450 km), we find that plasma clouds can drift tens of kilometers across the magnetic field in tens of seconds after ionization. GRA

N86-15761# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.
DEVELOPMENT AND EVALUATION OF A REGIONAL SEISMIC ARRAY IN NORWAY Quarterly Technical Report, 1 Jan. - 31 Mar. 1985
S. Mykkeltveit, ed. 30 Apr. 1985 38 p
(Contract F49620-85-C-0016; AF Proj. 2309; ARPA Order 2309)
(AD-A159129; AFOSR-85-0717TR) Avail: NTIS
HC A03/MF A01 CSCL 08/11

Field installations have been operating very reliably during the reporting period. Sources of rather minor errors in the data were traced in close cooperation with Sandia, and appropriate actions were taken to modify the field system to eliminate these errors. Computer equipment for acquisition and processing of the NORESS data has been purchased and installed. All data received at Kjeller are now subjected to online processing for detection and location of seismic events. The RONAP program package, developed at NORSAR during the last couple of years, has been adapted for use on the new data. An advanced status monitoring system has been developed. This system generates statistics on all essential aspects of operations of the new array and suitable units for display of essential parameters have been acquired and installed. Author (GRA)

N86-15762# Sandia National Labs., Albuquerque, N. Mex. Waste Management Systems Div.
DETERMINING PROBABILITIES OF GEOLOGIC EVENTS AND PROCESSES
R. L. Hunter, C. John Mann (Illinois Univ., Urbana), and R. M. Cranwell 1985 10 p Presented at conference
(Contract DE-AC04-76DP-00789)
(TI85-014642; SAND-85-0024C; CONF-850918-3) Avail: NTIS
HC A02/MF A01

The Environmental Protection Agency has recently published a probabilstic standard for releases of high-level radioactive waste from a mined geologic repository. The standard sets limits for contaminant releases with more than one change in 100 of occurring within 10,000 years, and less strict limits for releases of lower probability. The standard offers no methods for determining probabilities of geologic events and processes, and no consensus exists in the waste-management community on how to do this. Sandia National Laboratories is developing a general method for determining probabilities of a given set of geologic events and processes. In addition, we will develop a repeatable method for dealing with events and processes whose probability cannot be determined. Author

N86-15763# Comision Nacional de Investigacion del Espacio, Madrid.
MEASUREMENTS OF STRATOSPHERIC OZONE BY INDIGO DECOLORATION
J. M. Cisneros 1985 5 p refs
Avail: NTIS HC A02/MF A01

A simple system for ozone stratospheric measurements to be used with big balloons was designed. Good measurements are obtained in flight tests. Maximum relative error is 20%. Author (ESA)

N86-15764# Uppsala Ionospheric Observatory (Sweden).
LOWER HYBRID PARAMETRIC PROCESSES ON AURORAL FIELD LINES IN THE TOPSIDE IONOSPHERE
Hannu E. J. Koskinen 23 Apr. 1985 42 p refs
(UIO-SR-85-03; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Parametric decay channels of lower hybrid waves (LHW) in a topside ionospheric plasma are considered in order to find out whether VLF waves generated by precipitating keV electrons could be converted into waves having larger perpendicular wave number and thus interacting more effectively with ionospheric ions. In dipole approximation, it is found that the most promising decay channel is a decay into an LHW and a nonresonant quasi-mode. However, use of the dipole approximation can be criticized and a consideration of the wave vector of the pump suggests that the decay into hot ion plasma waves or ion Bernstein waves and nonresonant quasi-modes is important. The theory of parametric processes could be applied in interpretation of sounding rocket data where artificially produced LHW's are detected together with other wave modes. Author (ESA)

N86-15765# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
THE SEISMICITY OF SOUTHERN SWEDEN, 1979 - 1984 Final Report
Ragnar Slunga Apr. 1985 47 p refs Sponsored by Swedish Nuclear Power Inspectorate and Swedish National Board for Spent Fuel
(FOA-C-20572-Ti; ISSN-0347-3694) Avail: NTIS
HC A03/MF A01

The focal depths of Swedish seismic activity and their relation to knowledge about stick-slip motion of granites for varying pressures and temperature are shown. Agreement is very good with most seismic activity in the range 7 to 18 km. One earthquake is found to have a most likely focal depth just below the Moho discontinuity while no earthquake is observed in the lowest 10 km of crust. The apparent crustal thickness of southern Sweden was studied by regional network recordings. The results are given as an apparent crustal thickness map. The crustal thickness seems to vary between 32 and 48 km and indicates a possible block structure with block sizes of the order of 50 to 150 km. Author (ESA)

N86-15766# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
PROJECT HERO: HEATING ROCKET EXPERIMENTS. THE H AND E FIELD PROBE (HESO): IN SITU MEASUREMENTS OF PLASMA PARAMETERS IN THE IONOSPHERIC PLASMA MODIFIED BY ELECTROMAGNETIC WAVES OF HIGH INTENSITY Final Report, Dec. 1984
Gerhard Rose Bonn Bundesministerium fuer Forschung und Technologie Aug. 1985 81 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-009; ISSN-0170-1339) Avail: NTIS
HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17

In situ artificial ionospheric modifications produced in the undisturbed F-layer by high power radio waves were measured. Electron density fluctuations and their variations along the trajectory, and the spectra of the generated electrostatic high frequency electron plasma waves and of the low frequency ion acoustic waves were observed. Their effects on the plasma, increased electron temperature, appearance of suprathermal electrons and of plasma inhomogeneities were observed. Local electric and magnetic fields of the heating wave were recorded. The preparation and calibration of the H and E field probes, and the HESO experiments and their functions in plasma are described. Author (ESA)

N86-15701# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A STUDY OF THE STRONG GROUND MOTION OF THE WESTERN HIDAKA, HOKKAIDO EARTHQUAKE
Tsutomu Sasatani *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 69-83 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

N86-15702# Hokkaido Univ., Sapporo (Japan). Research Center for Earthquake Prediction.
SEISMIC INTENSITY SURVEY AND HYPOCENTER RECALCULATION ON THE 1985 SAPPORO EARTHQUAKE (M 3.5)
Sadaomi Suzuki and Yoshinobu Motoya *In its* Geophysical Bulletin

of Hokkaido Univ., No. 46 Oct. 1985 p 85-91 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-15767 Meteorological Office, Bracknell (England).
TEMPERATURE AND HUMIDITY DATA FOR DESIGN: BRITISH FORCES AREA OF WEST GERMANY
M. E. Crewe Nov. 1984 24 p refs
(Met-O-Memo-113; Met-O-9; ISBN-0-86180-184-9; BR95133)
Copyright. HC A02/MF A01

The air temperature regime of the No. 1 (BR) Corps area of West Germany is described using graphs derived from computer analyses of observations made at Gutersloh and Hannover. Cumulative frequency distributions from which temperatures corresponding to any percentage probability can be read off, and used for design standards limits are emphasized. Diurnal cycles for testing material are considered. Frequencies of dew-point and relative humidity at given temperatures are depicted. Temperatures in the area are related to those in other parts of western Europe.
Author (ESA)

N86-15768# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LARGE-SCALE CIRCULATION ANOMALIES AND THE PREDICTABILITY OF NORTHEAST BRAZIL DROUGHTS
Paulo Nobre, Carlos A. Nobre, and Antonio D. Moura Sep. 1985 47 p refs Submitted for publication
(INPE-3656-PRE/819) Avail: NTIS HC A03/MF A01

An analysis of the monthly departure of the relative vorticity and wind fields over the globe was performed for the period from 1963 to 1980. Planetary-scale wavelike (teleconnection) patterns were observed in the vorticity and wind deviation fields extending from subtropical North Atlantic through the North Pole to eastern Siberia for years of droughts and excessive rainfall over Northeast Brazil (Nordeste). These patterns are sharpest in December and January. Of major interest is the phase coherence of the wavelike patterns and the precipitation anomalies of Nordeste, that is, the phase of the patterns is reversed from very dray to very wet years. Such phase coherence and also the emergence and persistence of the wavelike pattern several months preceding the rainy season in Nordeste (March and May), seems to indicate that there might be some predictive potential in these configurations. An index of the existence and phase of the wavelike patterns was developed. It was seen that the sign of the index is highly associated with the sign of the precipitation anomaly in Nordeste for most of the years.
Author

N86-15769*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NASA/MSFC FY-85 ATMOSPHERIC PROCESSES RESEARCH REVIEW
William W. Vaughan, comp. and Fay Porter, comp. Washington Oct. 1985 143 p refs Review held in Huntsville, Ala., 7-9 May 1985 and in Columbia, Md., 8-12 Jul. 1985
(NASA-CP-2402; M-503; NAS 1.55:2402) Avail: NTIS HC A07/MF A01 CSCL 04B

The two main areas of focus for NASA/MSFC's Atmospheric Research Program are: (1) Global Scale Processes (Geophysical Fluid Processes, Satellite Doppler Lidar Wind Profiler, and Satellite Data Analyses); and (2) Mesoscale Processes (Atmospheric Electricity (Lightning), Ground/Airborne Doppler Lidar Wind Measurements, and Mesoscale Analyses and Space Sensors). The research project summaries, in narrative outline, supplied by the individual investigators are presented. For individual titles, see N86-15770 through N86-15820.

N86-15770*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL AND EXPERIMENTAL STUDIES OF BAROCLINIC PROCESSES
Tim L. Miller, Fred Leslie, Dan R. Fitzjarrald, and Nathaniel Reynolds *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 5-6 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An experimental study in a baroclinic annulus with heating and cooling on the upper and lower horizontal surfaces was completed. Four basic regimes of flow were observed: (1) axisymmetric flow, (2) cellular (deep) convection, (3) convective rolls (boundary layer), and (4) baroclinic instability. There was no symmetric (or nearly symmetric) baroclinic instability observed, although it was determined by numerical calculations that regions in parameter space were transversed where the symmetric instability was present. The nonsymmetric baroclinic instability (Eady type) was observed instead. A linear analysis of symmetric baroclinic instability was completed. The analysis covered the range from nonhydrostatic through strongly hydrostatic (i.e., from weakly baroclinic through strongly baroclinic) cases. The dependence of the critical Richardson number (Ri) upon baroclinicity, Ekman number, and Prandtl number was ellucidated. A linear analysis of three dimensional, nongeostrophic baroclinic instability was completed. It was shown that, when finite viscosity is present, the preferred angle of orientation (for small enough Ri) is not the symmetric angle, regardless of Prandtl number.
Author

N86-15771*# Mississippi Univ., University.
MOBILE INTERCEPT OF STORMS
Roy T. Arnold *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 7-8 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A NASA U2 research aircraft was used to fly over storms in the area of Oklahoma, southern Kansas, and north Texas. The primary goal was to acquire lightning data to serve as ground truth for U2 overflights. A mobile laboratory was instrumented and the storm intercept was coordinated through communication to the U2 provided by airplane guidance at NSSL and through direct communication with the U2 pilot from a portable transceiver in the mobile lab. The flights were successful in spite of an unusual sparsity of storm activity during the operational period and an early termination of the scheduled flight program. Severe storms data was gathered within the area of Oklahoma with good Doppler radar coverage. A vehicle followed a mobile lab and released instrumented balloons. A standard meteorological rawinsonde was used as was a balloon-borne electric field meter. There was success in flying, tracking, and receiving data from mobily launched balloons on several days.
Author

N86-15772*# Colorado Univ., Boulder. Dept. of Astrophysical, Planetary and Atmospheric Sciences.
THEORETICAL AND EXPERIMENTAL STUDIES IN SUPPORT OF THE GEOPHYSICAL FLUID FLOW EXPERIMENT
John Hart and Juri Toomre *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 9-11 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The continuous low gravity environment of the orbiting space shuttle offers an opportunity to make laboratory studies of such large scale thermally driven flows under the constraint imposed by rotation and sphericity. This is possible because polarization forces in a dielectric liquid, which are linearly dependent on fluid temperature, give rise to an effectively radial buoyancy force when a radial electrostatic field is imposed. The Geophysical Fluid Flow Cell (GFFC) is an implementation of this ideal in which fluid is contained between two rotating hemispheres that are differentially heated and stressed with a large a-c voltage. Nonlinear mode selection and high Rayleigh number turbulence in a rotating convecting spherical shell of liquid was explored. Experiments were carried out in a low driving parameter range where some limited

numerical experimentation is currently feasible, as well as in a parameter range significantly beyond numerical computation for many years. A data analysis system was developed and several theoretical, numerical, and (terrestrial) laboratory problems which model certain aspects of the expected GFFC motions were studied. Author

N86-15773*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL AND EXPERIMENTAL DESIGN STUDIES FOR THE ATMOSPHERIC GENERAL CIRCULATION EXPERIMENT
William W. Fowlis, David H. Hathaway, Timothy L. Miller, Glyn O. Roberts (Roberts Associates, Inc., Vienna, Va.), and Kenneth J. Kopecky (Drake Univ.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 12-13 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The major criterion for the AGCE design is that it be possible to realize strong baroclinic instability in the spherical configuration chosen. Another configuration was selected for the stability studies. In this configuration, a hemispherical shell of fluid is subjected to latitudinal temperature gradients on its spherical boundaries and the latitudinal boundaries are insulators. Work in the laboratory with a cylindrical version of this configuration revealed more instabilities than baroclinic instability. The laboratory cylindrical annulus studies were continued. Four flow regimes were identified, namely, an axisymmetric Hadley circulation, boundary layer convection, baroclinic waves and deep thermal convection and regime diagrams were prepared. Author

N86-15774*# Simpson Weather Associates, Inc., Charlottesville, Va.
MULTISCALE MODELING TO EVALUATE PROPOSED SPACE-BASED DOPPLER LIDAR SAMPLING STRATEGIES
G. D. Emmitt *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 17-18 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Doppler lidars have a demonstrated capability to measure the line-of-sight component of the winds at ranges up to a few tens of kilometers. Ground based CW and pulsed lidars were used to obtain estimates of the three wind components by conically scanning about a vertical axis. Airborne pulsed lidars have produced two dimensional maps of the horizontal winds in a manner similar to dual Doppler radar except that the aircraft motion is used to obtain two perspectives on the target volume. A proposal has been made to place a pulsed Doppler lidar on a space platform in a low Earth orbit (200 to 800 km) to measure the atmospheric winds with a spatial resolution commensurate with the current continental rawinsonde network density - i.e., 300 to 500 km resolution. Examples of how models on all these scales were applied in an ongoing simulation study are presented. In particular, the uncertainties in a mesoscale wind estimate are separated into those arising from pulse scale variances and those due to sample distribution within a prescribed resolution volume. Trade-offs between accuracy and representativeness are discussed in terms of the model results. Author

N86-15775*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ESTIMATION OF PRECIPITATION FROM GOES IR IMAGERY DURING FGGE: APPLICATION TO DIAGNOSTIC STUDIES
Franklin R. Robertson *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 21-22 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A method of estimating open ocean rainfall and associated latent heat release via GOES IR satellite imagery was developed. Remote precipitation estimates were used to investigate the role of diabatic forcing in the maintenance of the South Pacific Convergence Zone (SPCZ) during FGGE SOP-1. The significance of nonquasigeostrophic transports of energy in several cyclogenetic events preceding the development of North Atlantic blocking episode during FGGE SOP-1 was assessed. Author

N86-15776*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE USE OF SATELLITE DATA IN UNDERSTANDING AND PREDICTING CONVECTIVE AND LARGE-SCALE DYNAMICAL PROCESSES
John A. Dutton, John E. Clark, and Hampton N. Shirer *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 23-25 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Conventional and NOAA-III and NOAA-IV Earth Radiation Budget (ERB) data was combined to study the pronounced index oscillation of the 1974 to 1975 winter. The principal driving mechanism for the oscillation is barotropic wave-mean flow energy exchanges stimulated by the mean westerlies becoming periodically unstable. Polar cap radiative processes are phased with the oscillation such as to reinforce it. Variations in mid and high latitude cloud cover resulting from intrusions of warm air into high latitude regions modulate the net radiative cooling in such a way as to reinforce strong mid-latitude westerlies because of thermal wind balance and thus intensify the oscillation. A two layer truncated baroclinic spectral model was developed to study the long term evolution of disturbances to a baroclinically unstable mean flow. Topography and crudely-parameterized radiative processes were accounted for. The form-drag exerted by the topography on the barotropic part of the mean flow is larger than on the baroclinic part and thus we anticipate significant changes from the original calculations on the index oscillation when it is strongly modulated by topography. Since the index oscillation accounts for a significant portion of atmospheric temporal variance, the long term predictability could be improved if reliable forecasts of the index oscillation were available. Two spectral models of the index oscillation, one barotropic and the other baroclinic, were developed. Author

N86-15777*# Illinois State Water Survey, Champaign.
VARIATION OBJECTIVE ANALYSES FOR CYCLONE STUDIES
Gary L. Achtemeir, Stanley Q. Kidder, and Harry T. Ochs *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 26-28 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An objective analysis technique was developed that will maximize the information content of data available from diverse sources, with particular emphasis on the incorporation of observations from satellites with those from more traditional immersion techniques. The state of the synoptic scale atmosphere was diagnosed on a much finer scale over a much broader region than is presently possible to permit studies of the interactions and energy transfers between global, synoptic and regional scale atmospheric processes. Author

N86-15778*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.
UTILIZATION OF SATELLITE CLOUD INFORMATION TO DIAGNOSE THE ENERGY STATE AND TRANSFORMATIONS IN EXTRATROPICAL CYCLONES
Phillip J. Smith *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 29-30 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The impact of latent release on extratropical cyclone development was investigated. Previous efforts to accomplish this task have focused on the energy balance and the vertical motion field of an intense winter extratropical cyclone over the United States. A modified form of the quasi-geostrophic height tendency equation, in which geostrophic wind components were replaced by observed winds and a latent theat release term was added, was used. This methodology was adopted to produce a simple diagnostic model

which retains the essential mechanisms of quasi-geostrophic theory but more faithfully describes observed wave development when the Rossby Number approaches and exceeds 0.5. Results to date indicate that the new model yields height tendencies that are superior to those obtained from the quasi-geostrophic formulation and are sufficiently close to the observed tendencies to be a useful tool for diagnosing the principle large-scale forcing mechanisms in the 700 to 300 mb layer. Of the three forcing terms included in the new model (vorticity advection, differential thermal advection, and differential latent heat release), vorticity advection is in general dominant for this case. Author

N86-15779*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.
DYNAMICS AND ENERGETICS OF THE SOUTH PACIFIC CONVERGENCE ZONE DURING FGGE SOP-1
Dayton G. Vincent *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 31-33 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

It was found that wave number four plays an important role in the Southern Hemisphere tropics during the 15-day period when the SPCZ was a dominant feature, particularly with regard to the baroclinic conversion of potential to kinetic energy. The convective-active SPCZ area was found to make a significant contribution to this conversion process; thus, it appears that baroclinic effects and latent heating are important in maintaining the SPCZ. Cyclone activity within the SPCZ was examined and the heat and moisture budgets in the South Pacific was studied. It was found that cyclonic disturbances occurred with regularity in the zone from 10 to 17 January. Three cyclones, which developed and moved along the SPCZ, are being investigated. One cyclone remained tropical, while the other two propagated into middle latitudes and took on frontal characteristics. Satellite estimates have shown that areas of maximum precipitation are located in the vicinity of each cyclone. Preliminary results of budget studies show good agreement with patterns of satellite-derived precipitation. Author

N86-15780*# Texas A&M Univ., College Station. Dept. of Meteorology.
APPLICATION OF SATELLITE DATA TO TROPIC/SUBTROPIC MOISTURE COUPLING
James P. McGuirk and Aylmer H. Thompson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 34-36 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Analysis tools for use of satellite data to interpret synoptic-scale systems in data-void regions are under development. Interim goals are to: (1) quantify the synoptic information content of satellite data; and (2) utilize these data in the diagnosis of moisture bursts in the eastern tropical Pacific Ocean during FGGE. G.L.C.

N86-15781*# Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
OBSERVATIONAL AND THEORETICAL STUDIES OF THE EVOLVING STRUCTURE OF BAROCLINIC WAVES: ATTRACTOR DYNAMICS OF GLOBAL WEATHER SYSTEMS
Barry Salzman, Anthony R. Hansen, Richard N. Nagle, and Chung-Muh Tang (Universities Space Research Association, Columbia, Md.) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 37-38 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Low order modeling of global weather dynamics, passive tracer evolution, and satellite signatures of atmospheric blocking are three of the topics reviewed in the study of the evolution of the structure of baroclinic waves. G.L.C.

N86-15782*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEEP CONVECTION IN MESOSCALE CONVECTIVE SYSTEMS
Steven J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 41 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A study has been undertaken to examine the evolution of radar echoes and lightning attending the convective storms in mesoscale convective systems and the relationships between the spatial and temporal evolution of deep convection and the storm environment, precipitation, severe weather, and lightning. The total number of ground discharges ranges from 10,000 to 30,000 over the life cycle of the MCS with peak sustained rates (for up to 10 consecutive hours) in excess of 2000 per hour. The peak lightning activity occurs from 5 to 20 hours after the first storms and anywhere from 7 hours prior to 7 hours after the time of the maximum areal extent of the MCS for very similar synoptic environments. Thus, it appears that mesoscale and subsynoptic scale mechanisms are responsible for these large temporal variations in lightning activity. In addition, it was found that the lightning rates in MCS's are not related to either the size or the duration of the MCS. Preliminary results suggest that the MCS's with embedded squall lines produce the greatest flash rates. G.L.C.

N86-15783*# National Severe Storms Lab., Norman, Okla.
SEVERE STORM ELECTRICITY
W. David Rust and Donald R. MacGorman *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 42-44 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A field program was conducted and the data analyzed. The field program incorporated coordinated measurements made with a NASA U2. Additional results from this program are also reported. Results include the following: (1) ground truth measurements of lightning; (2) analysis of meteorological radar data for lightning mapping; (3) analysis of synoptic conditions during three simultaneous storm systems; (4) analysis of extremely low frequency (ELF) waveforms; (5) an assessment of the CG strike location system; (6) photographic varification of continuing current in + CG flashes; (7) work on expansion of NSSL's lightning ground strike locating system for mesoscale studies; and (8) setup and testing of a VHF lightning mapping system for entire hemisphere continuous recording. G.L.C.

N86-15784*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STORM SEVERITY DETECTION (RF)
R. L. Johnson (Southwest Research Inst., San Antonio, Tex.) and Steven J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 45-46 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Atmospheric electrical emissions occurring in association with Hurricane Alicia were observed by two crossed baseline phase linear interferometers. The sensors were located in San Antonio, Texas, and at Marshall Space Flight Center, Huntsville, Alabama. An analysis of the data indicated that the direction finding (DF) performance of the San Antonio site was extremely good while the DF performance at the MSFC site evidence erratic behavior. A check of the data acquisition hardware revealed an intermittent problem in one of the radio receiver channels. Since the system had experienced several lightning strikes during the early spring of 1984, it was necessary to ship the entire rack of equipment back to SwRI for refurbishment. G.L.C.

N86-15785*# Wisconsin Univ., Madison. Space Science and Engineering Center.
STUDIES OF LIGHTNING DATA IN CONJUNCTION WITH GEOSTATIONARY SATELLITE DATA
Brian Auvine and David W. Martin *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 47-48 (For primary document see

N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The creation of an extensive real-time lightning data base accessible via the SSEC McIdas system is discussed. Contacts were made with many of the major lightning networks including MSFC, NSSL, SUNY's East Coast Network, the LPATS networks (via the National Severe Storms Forecast Center and R*Scan Corporation), and the Bureau of Land Management to arrange for access to their data during the period of May through September 1985. With the exception of the BLM which is in the process of redefining its user's policy, all of these networks have generously consented to such access on a trial basis. The purpose of this endeavor is two-fold: to enhance the availability and ease of access to lightning data among the various networks, governmental and research agencies; and to test the feasibility and desirability of such efforts in succeeding years. G.L.C.

N86-15786*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LIGHTNING MAPPER AND THE FUTURE
Hugh J. Christian *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 49-50 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A trade-off analysis was completed that reveals how the lightning mapper detection efficiency will change as a function of interference filter bandwidth, pixel field of view, and telescope aperture. It is shown that the critical parameter on which we have minimum flexibility is filter bandwidth. The problem is that too narrow a filter bandwidth is incompatible with wide areal coverage. The trade-off analysis demonstrates that an 80 percent lightning detection efficiency will technically be relatively straightforward, while a 90 percent detection efficiency will apparently be difficult to achieve. Three focal plane designs are currently under consideration. One would use a single large, solid state silicon integrating array with multiple output channels and off-the-focal-plane analog, time domain, background removing filters. A second design would use the same technology, but the sensor would consist of up to four virtually independent focal plane arrays. This design reduces the areal coverage of each detector, thus narrower interference filters could be utilized. Superior performance would be realized at a probable increase in cost. The final design would use a three-dimensional focal plane in order to perform background removal at the focal plane. Superior performance would be achieved along with reduced weight and power requirements. Unfortunately, this focal plane technology is still under development. G.L.C.

N86-15787*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE/MESOSCALE LIGHTNING EXPERIMENT
Otha H. Vaughan, Jr., B. Vonnegut (State Univ. of New York, Albany), and Marx Brook (New Mexico Inst. of Mining and Technology, Socorro) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 51 ref (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An experimental technique which would employ the space shuttle's television equipment for a mesoscale lightning mapping experiment is discussed. At present the exercise is in the planning stage. G.L.C.

N86-15788*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL CHARACTERISTICS OF LIGHTNING AND THUNDERSTORM CURRENTS
E. Philip Krider (Arizona Univ., Tucson) and Richard J. Blakeslee *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 52 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01

Lightning can be used to determine the diurnal variations of thunderstorms, i.e., storms that produce audible thunder, and that these variations are also in good agreement with diurnal variations in rainfall and convective activity. Measurements of the Maxwell current density, J sub m, under active thunderstorms show that this physical quantity is quasi-steady between lightning discharges and that lightning does not produce large changes in J sub m. Maps of J sub m show contours of iso-current density that are consistent with the locations of radar echoes and the locations of where lightning has altered the cloud charge distribution. G.L.C.

N86-15789*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL CHARACTERISTICS OF LIGHTNING
Steven J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 53-55 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A study of the optical characteristics of cloud-to-ground discharges and how they compare with intracloud flashes was completed. Time resolved optical (7774A) and electric field-change waveforms were measured above clouds from a U2 airplane coincident with ground-based measurements of lightning. The optical pulse trains are studied for within and between flash variability. Specifically, for each flash the 10, 50 (full width half maximum), and 90 percent pulse widths; the 10-10, 10-50, 10-90, and 10-peak percent amplitude rise times; the radiances (optical power densities); radiant energy densities; and pulse intervals were examined. The optical pulse characteristics of first strokes, subsequent strokes, the intracloud components of cloud-to-ground flashes and intracloud flashes as viewed from above cloud are shown to exhibit very similar waveshapes, radiances and radiant energy densities. G.L.C.

N86-15790*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AIRBORNE ATMOSPHERIC ELECTRICITY EXPERIMENTS
Richard J. Blakeslee *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 56-57 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

During the 1984 U2 spring flight program, lightning spectra were measured in the wavelengths from 380 nm to 900 nm with a temporal resolution of 5 ms. With this capability, both visible and near-infrared lighting spectra were simultaneously acquired on a pulse to pulse basis, so that the spectral variability within a flash, as well as flash to flash variations, can be studied. Preliminary results suggest that important variations do occur, particularly in the strengths of the hydrogen and singly ionized nitrogen emission lines. Also, the results have revealed significant differences in the integrated energy distributions between the lightning spectra measured above clouds and the spectral measurements of cloud-to-ground lightning made at the ground. In particular, the ratio of the energy in the near-IR to that in the visible is around 1 to 2 for cloud top spectra versus about 1/3 for surface observations. G.L.C.

N86-15791*# California Univ., Davis. Dept. of Land Air and Water Resources.
AIRBORNE DOPPLER MEASUREMENTS OF THE CENTRAL CALIFORNIA EXTENDED SEA BREEZE
John J. Carroll *In* NASA/Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 61-62 ref (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The objective of this project is the mapping of the complex mesoscale flow associated with the intrusion of marine air into the central valley of California. This analysis seeks to delineate the mass flow through several passes in the coastal mountains and the pattern of difluence within the valley. Additional information in the form of rawinsonde data and hourly surface meteorological data will be employed to augment this analysis. This work is expected to yield improved understanding of the kinematics and dynamics of these types of flows. Author

N86-15792*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYSIS OF DOPPLER LIDAR DATA
Jeffry Rothermal *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 63-64 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Dual Doppler lidar analyses of data taken by pulsed lidars demonstrates the feasibility of deriving wind fields from coordinated lidar scans. Limited case histories of thunderstorm outflows are obtained. Co-located comparison between lidar and 5.5 cm radar demonstrates the desirability of lidar in cases of marginal radar reflectivity in clear air and low-elevation scans. Author

N86-15793*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AIRBORNE DOPPLER LIDAR ACTIVITIES
Dan R. Fitzjarrald and J. W. Bilbro *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 65-66 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

During August and September 1984, 20 airborne Doppler lidar research flights were conducted by the CV990 with the MSFC Airborne Doppler Lidar installed. Nine of these flights were dedicated to the Lidar project. Excellent data were obtained in the Carquenez strait downwind of San Francisco Bay, showing the divergence of the flow as it passes into the Central Valley. The data clearly show the horizontal and vertical structure of the wind flow in the pass region and adjoining parts of the Central Valley. Data were also obtained in the vicinity of Mount Shasta in northern California, showing the flow in the lee of the isolated mountain. Preliminary analyses of these flights using the McIdas interactive graphics system have been accomplished, and procurements have been initiated for detailed scientific analyses. A partial failure of a crucial optical component resulted in contamination of a portion of the wind data that were obtained in the Mount Shasta and subsequent flights. Analyses are underway to attempt reconstruction of the data to minimize the effects of the failure. Author

N86-15794*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESPONSE OF THE MESOSCALE ATMOSPHERE TO DIABATIC HEATING
Franklin R. Robertson *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 69-70 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A study is initiated to determine the influence of convective latent heat release/diabatic heating on the production of kinetic energy. The heating fields used are those derived from the diagnostic cumulus parameterization technique developed previously. The primary focus is on the relative importance of thermally forced modification of the wind field through thickness and height gradient changes versus inertial-advective effects via the diabatic component of vertical motion. Preliminary results show that because of the strong vertical shear over the convective region, ageostropic response is primarily caused by the latter process. The diagnostic parameterization of convective heating is extended for use in conjunction with satellite precipitation estimates in data-poor oceanic regions. An initial application is made to a mesoscale convective system embedded inthe South Pacific convergence zone. Comparison to the heating field diagnosed as a residual in the thermodynamic equation using the ECMWF III-b analyses shows that the methodology will be useful in explaining the observed heating fields and determining the relative contribution of moist processes to total diabatic heating. Author

N86-15795*# Wisconsin Univ., Madison. Space Science and Engineering Center.
MESOSCALE AGEOSTROPHIC CIRCULATIONS ASSOCIATED WITH BAROCLINIC JET STREAKS
Donald R. Johnson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 71 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The following is a list of publications and theses sponsored through the support of the NASA Severe Storms Research Project under NASA contract NAS8-33222: (1) effects of diabatic heating on the ageostrophic circulation of an upper tropospheric jet streak; (2) effects of diabatic heating on the ageostrophic circulation of an upper tropospheric jet streak; (3) the effects of the Asselin time filter on numerical solutions to the linearized shallow-water wave equations; (4) a comparison of methods for computing the sigma coordinate pressure gradient force for flow over sloped terrain in a hybrid theta-sigma model; (5) effects of diabatic heating on the ageostrophic circulation of an upper tropospheric jet streak; (6) the inducement of planetary boundary layer mass convergence associated with varying vorticity beneath tropospheric wind maximum; and (7) the inducement of planetary boundary layer mass convergence associated with varying vorticity beneath tropospheric wind maximum; and (8) numerical experiments of jet streak ageostrophic circulations using pseudo-geostrophic initialization and perspectives. Author

N86-15796*# Chicago Univ., Ill.
ANALYSIS OF SATELLITE DATA FOR SENSOR IMPROVEMENT (DETECTION OF SEVERE STORMS FROM SPACE)
T. Theodore Fujita *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 72 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An analysis of satellite data used for the detection of severe storms from space includes the following projects: (1) a climatological study of downbursts in a six-state-area (Arkansas, Louisiana, Tennessee, Mississippi, Alabama, and Georgia); (2) studies of Huntsville area microbursts; (3) preliminary design of the MIST/SPACE/FLOWS mesonet including five Doppler radars; and (4) completion of The Downburst book. Operation of the COHMEX network serving the three component projects, SPACE (Satellite Precipitation and Cloud Experiment), MIST (Microburst and Severe Thunderstorm), and FLOWS (FAA Lincoln Lab Operational Weather Studies) is to be conducted under the direction of the principal investigators assigned to each project. Author

N86-15797*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SEVERE STORM DETECTION WITH PASSIVE 37 GHz OBSERVATIONS
Roy W. Spencer, Michael R. Howland (Wisconsin Univ., Madison), and David W. Martin (Wisconsin Univ., Madison) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 73-74 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The information content of satellite passive 37 GHz brightness temperatures on the severity of thunderstorms, through the measurement of the attenuation (scattering) signature of precipitation is determined. The severe storm detection potential of satellite-observed passive 37 GHz radiances is evaluated by comparing Nimbus-7 Scanning Multi-channel Microwave Radiometer (SMMR) data to reports of severe weather contained in the NSSFC severe weather log for calendar years 1979 and 1980 over the United States east of the Rocky Mountains. Author

N86-15798*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATED MESOSCALE WINDS DERIVED FROM GOES MULTISPECTRAL IMAGERY
Gregory S. Wilson and Robert J. Atkinson (GE Co., Huntsville, Ala.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 75-77 ref (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An automated technique for extracting mesoscale winds from

sequences of GOES VISSR image pairs is developed, tested extensively, and configured for quasi-real time/research applications on the Atmospheric Sciences Division's research computing system. The entire system of computer codes is successfully vectorized for execution on an array processor resulting in job turnaround in less than 1 hour. An objective quality control system provides much greater than 99 percent accuracy in eliminating questionable wind estimates. Dynamical analysis of cloud wind divergence reveals temporally consistent convergence centers on the Meso-beta scale that are highly correlated with ongoing and future developing convective storms. Author

N86-15799*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SATELLITE PASSIVE MICROWAVE RAIN MEASUREMENT TECHNIQUES FOR LAND AND OCEAN

Roy W. Spencer *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 78-79 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Multiseasonal rainfall has been found to be measurable over land with satellite passive microwave data, based upon comparisons between Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) brightness temperatures (T sub B) and operational WSR-57 radar rain rates. All of the SMMR channels (bipolarized 37, 21, 18, 10.7, and 6.6 GHz T sub B) are compared to radar reflectivities for 25 SMMR passes and 234 radar scans over the U.S. during the spring, summer, and fall of 1979. It is found that the radar rain rates are closely related to the difference between 37 and 21 GHz T sub B. For rain over the ocean, the 37 GHz scattering relationship derived over land (which is nearly linear) is taken and extended to the ocean environment. By utilizing the 37 GHz polarization information the highly polarized ocean can be separated from the slightly polarized rain, and the rate can then be measured. Work is continuing in the analysis of SMMR data to learn more about the multifrequency signature of precipitation over land and ocean, during various seasons and in different climatic environments. Author

N86-15800*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

REMOTE SENSING OF SEVERE CONVECTIVE STORMS

R. J. Hung (Alabama Univ., Huntsville), R. E. Smith, and G. S. West *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 80-82 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The Tibet Plateau significantly affects the initiation and development of heavy rainfall and severe storms in China, just as the Rocky Mountains influence local severe storms in the United States. Many rain-bearing synoptic systems in China originate over the Plateau, and then move eastward and northward causing excessively heavy rains and outbreaks of severe storms in eastern and northern China. In the First GARP Global Experiment (FGGE), the American Satellite GOES-1 was moved to the Indian Ocean at 58 deg during the period of time from December 1, 1978 to November 30, 1979. The infrared and visible imagery from the GOES-1 Satellite over the Tibet Plateau were used to study the convective cloud development and the amount of rainfall over the Plateau area in comparison with that of the Rocky Mountains. Author

N86-15801*# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Science.

LAMPS SOFTWARE AND MESOSCALE PREDICTION STUDIES

D. J. Perkey *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 83 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The full-physics version of the LAMPS model was implemented on the Perkin-Elmer computer. The LAMPS graphics processors were rewritten to the run on the Perkin-Elmer. The impact of convective parameterized latent heat release on the evolution of a precipitating storm was investigated and the results are evaluated. The impact of initial conditions on LAMPS model results which will help define measurement requirements for future research field projects and for observations in support of operational forecasts is evaluated. The impact of parameterized latent heat on the evolution of precipitating systems is continuing. The development of methods for using satellite information, radiance and moisture information, to enhance the initial state used in the LAMPS model is planned. E.A.K.

N86-15802*# Universities Space Research Association, Rapid City, S.D.

MESOSCALE: CLOUD SCALE SIMULATION OF CONVECTIVE RESPONSE

Fred J. Kopp and Richard T. McNider (Alabama Univ., Huntsville) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 84-86 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The two-dimensional cloud model was used to simulate the convective response in an environment predicted by a mesoscale model. Simulation soundings were taken from the mesoscale model environment at the simulated time of 2000 Z. The seven positions in the mesoscale model represented different regions of surface heating, convergence effects and topography. The effect of the topography simulated in the mesoscale model did affect the convergence and mesoscale environment in that region which will affect the response of the cloud model to the sounding taken from that location. All of the cloud model runs were made with no ambient wind. The layer of divergence simulated a linearly increasing and then decreasing divergence value to produce a realistic horizontal wind profile resulting from the divergence. The cloud model simulates the convective activity for a period of about 2 hours with no further interaction with the mesoscale model. A convergence was held constant over the period of the simulation also. It is shown that there is a clear differential convective response due to the mesoscale model environment. E.A.K.

N86-15803*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

MESOSCALE RESEARCH ACTIVITIES WITH THE LAMPS MODEL

Michael W. Kalb *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 87-88 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Mesoscale research activities with the LAMPS model are reported. The LAMPS mesoscale model on atmospheric sciences division computer was implicated. A balanced and real wind initial states for three case studies, March 6, April 24, April 26, 1982 was derived. Numerical simulations for three separate studies were performed: (1) a satellite moisture data impact study using VAS precipitable water as a constraint on model initial state moisture analyses; (2) mesoscale model precipitation simulation accuracy with and without convective parameterization was evaluated; and (3) the sensitivity of model precipitation to mesoscale detail of moisture and vertical motion in an initial state was studied. E.A.K.

N86-15804*# Wisconsin Univ., Madison. Dept. of Meteorology.

COOPERATIVE VAS PROGRAM WITH NASA MARSHALL SPACE FLIGHT CENTER

David D. Houghton *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 89-90 (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Progress in making the regional numerical model LAMPS on-line is discussed. The importance of mesoscale moisture information in the forecasting of weather events was studied. The precipitation forecasts were validated. Data files for LAMPS simulations are prepared. E.A.K.

N86-15805*# Wisconsin Univ., Madison. Space Science and Engineering Center.

THE ASSIMILATION OF SATELLITE SOUNDINGS, WINDS AND SATELLITE PRODUCTS IN A MESOSCALE ANALYSIS FORECAST SYSTEM

George R. Diak and William L. Smith *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 91-92 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The complimentary nature of satellite soundings and winds in a forecast/analysis system was demonstrated. Cloud drift and water vapor winds enter into the height field as gradient information. The cloud drift winds have the character of supplying information in cloudy areas where satellite soundings are not possible. Analyses and forecasts using the combination satellite winds and soundings were superior to those using only soundings. Good consistency is shown between independent satellite forecasts from different initialization times run to the same verification time. The experiments were expanded to include a quasi-continuous initialization inserting satellite soundings and winds from several different times into an analysis forecast. The forecast initialization fields were not independent, but contained satellite information from two data times. The guess field for a satellite update at 1730 GMT was a forecast from 1430 GMT analysis also containing satellite soundings and winds. The forecast produced from this multiple assimilation was good in both primary variables and precipitation. A normal model initialization procedure implemented in our mesoscale model was instrumental in reducing spurious model oscillations in this experiment. The use of the horizontal gradient information may alleviate some of the bias problems associated with the soundings. E.A.K.

N86-15806*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

NUMERICAL SIMULATION OF CONVECTIVE RESPONSE TO MESOSCALE FORCING

Richard T. McNider (Alabama Univ., Huntsville), Fred J. Kopp (Universities Space Research Association, Rapid City), Michael W. Kalb, and Gregory S. Wilson *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 93-94 ref (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

A two-dimensional mesoscale model was used to initialize a two-dimensional cloud model with both mesoscale thermodynamic and dynamic information utilized int he initialization. The Mesoscale-cloud model linkage was to examine differential convective response due to mesoscale variations. Both data analyses and mesoscale model simulations indicated strong variations in thermodynamic and dynamic structure across the panhandle of Texas where a moderately strong convective line formed. The cloud model showed a preferred area for strong convection to occur due to concomitant mesoscale convergence and mesoscale destabilization of the atmosphere. The transfer of mean mesoscale thermodynamic and dynamic structure to the cloud model with an imposed temperature perturbation to start the convection was analyzed. A more consistent mechanism would be to scale the temperature perturbation to dry convective boundary layer scales such as the convective velocity scale, and the planetary boundary layer height. The parameters are available from the mesoscale model. Fine scale structure in the cloud model initial conditions can be initialized consistent with the mesoscale model boundary layer. E.A.K.

N86-15807*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.

A SUMMARY OF RESEARCH ON MESOSCALE ENERGETICS OF SEVERE STORM ENVIRONMENTS

Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 95-97 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Interactions between areas of intense convection and their surrounding mesoscale environments by using diagnostic budgets of kinetic (KE) and available potential energy (APE). It is found that: (1) the synoptic scale storm environment contains energy conversions and transports that are comparable to those of mature midlatitude cyclones; (2) energetics in the mesoscale storm environment are often an order of magnitude larger than those in an undisturbed region; (3) mesoscale wind maxima form in the upper troposphere on the poleward sides of convective areas, whereas speeds decrease south of storm regions; (4) geopotential heights in the storm environment rise concurrent with an increase in the divergent wind component; (5) directly over storm areas, winds above approx. 350 mb decrease during convective formation, whereas they increase within the 550 to 350 mb layer; and (6) the differential changes in speed (KE) arise because of particular combinations of source/sink terms in the budget equation. E.A.K.

N86-15808*# Hayden (Christopher), Madison, Wis.

TIME COMPOSITE SOUNDING

Christopher Hayden *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 98 ref (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

In the time composite sounding mode, the VAS data are collected in a series of images of one spin each rather than in the dwell sound mode where single lines are repeatedly scanned. A drawback of the time composite method is temporal smearing of the data, but to compensate this there is also the chance that shifting cloud patterns will permit better spatial coverage. It is concluded that: the time composite results were at least equivalent to the conventional dwell sounding results, despite the fact that compositing was done in a less than optimum way because of software limitations. E.A.K.

N86-15809*# Colorado State Univ., Fort Collins. Cooperative Inst. for Research in the Atmosphere.

INVESTIGATIONS OF SEVERE/TORNADIC THUNDERSTORM DEVELOPMENT AND EVOLUTION BASED ON SATELLITE AND AVE/SESAME/VAS DATA

Thomas H. VonderHaar and James F. W. Purdom *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 99-102 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Three areas in severe tornadic thunderstorm development were investigated. The areas were: (1) research of rapid scan satellite imagery to investigate the severe thunderstorm's local environment; (2) investigations of the April 10, 1979 AVE/SESAME case using rapid scan satellite imagery and AVE sounding data; and (3) investigations of VAS imagery for mesoscale applications. The rapid scan satellite imagery for severe thunderstorm's local environment is emphasized. E.A.K.

N86-15810*# Wisconsin Univ., Madison. Dept. of Meteorology.

DETECTION OF ROTATING THUNDERSTORMS USING SATELLITE IMAGERY

C. E. Anderson and Robert Schlesinger *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 103-104 refs (For primary document see N86-15769 06-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

In the case of the Carolina tornadoes, visible and IR GOES imagery covering the period 2000 Z when the storm entered South Carolina from Georgia until it exited North Carolina at 0200 Z into Virginia was proposed. The GOES IR imagery demonstrated that this storm was imbedded in a continuously propagating mesolow with a well defined cold dome. The ground damage track paralleled exactly with the cold dome throughout the storm's life across the Carolinas. The Carolina storm did exhibit rightward deviating outflow which was oriented about 60 deg to the 300 mb streamlines. More spectacular was cirrus outflow from several separate thunderstorm complexes along the Carolina coasts. These outflows had almost 90 deg rightward deviation to the streamlines at their height levels. These more isolated storms developed earlier but in the same meteorological regime as did the main Carolina storm

and could have been used as an early warning that tornadic storm development had a strong likelihood over the Carolinas that day. E.A.K.

N86-15811*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
STATISTICAL ANALYSIS AND USE OF VAS RADIANCE DATA
Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 105-107 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

VAS radiance data, especially the 6.7 micrometer water vapor channel are used to better interpret the atmosphere's water vapor structure from 6.7 micrometer imagery. New analysis and forecasting techniques utilizing retrieved VAS soundings are explored. A dark (dry) image streak having mesoscale details was located over the special data region, and it provides the major focus of the case study. Mesoscale radiosonde-derived humidity data are found to verify fine scale features of the image that are not evident from the standard National Weather Service network. Thus, VAS imagery is a reliable detector of mesoscale moisture structure during this case. Retrieved soundings for 6 and 7 March, 1982 water vapor channel are being investigated using statistical structure and correlation function analyses. Profiles from a physical procedure (Smith, University of Wisconsin) are compared with those using a regression technique and with ground truth radiosonde data. B.W.

N86-15812*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
IMPROVED SATELLITE RETRIEVALS AND MESOSCALE MOISTURE VARIABILITY
Gary J. Jedlovec *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 108-110 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The investigations over the past year have led to the finalization of results from the study of mesoscale atmospheric parameters derived from the VISSIR Atmospheric Sounder (VAS). Soundings from several retrieval techniques for the 6 to 7 March, 1982 special observation period were evaluated for mesoscale accuracy. Specific results and comparisons between data from a regression and two physical retrieval schemes are discussed. B.W.

N86-15813*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STUDIES OF HUMID CONTINENTAL HAZE DURING SPACE
David A. Bowdle and William A. Greene *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 113-114 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A solar radiometer network was developed to provide supporting data during the Satellite Precipitation and Cloud Experiment (SPACE). Each of the 9 prime and 10 supplementary SPACE ground sites will be equipped with an upward pointing global solar pyranometer. About half of the sites will also be equipped with an upward pointing diffuse (shade ring) solar pyranometers, and a downward pointing global albedo pyranometer. These radiometers will be used to monitor the spatial and temporal variability of solar insolation and haze optical depth. The insolation data will ultimately be input to numerical models of the pre-storm and near-storm boundary layer. The optical depth data will be compared with simultaneous measurements from airborne and satellite-based passive visible radiometers and airborne lidars. B.W.

N86-15814*# Alabama Univ., Huntsville. Environmental and Energy Center.
PRELIMINARY PLANNING FOR THE SATELLITE PRECIPITATION AND CLOUD EXPERIMENT (SPACE) FIELD PROGRAM
Steven F. Williams and Richard T. McNider *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 115-116 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Preliminary planning has been performed to support NASA/MSFC in the coordination of the field experiment to be conducted in central Tennessee and northern Alabama, and Mississippi during the spring/summer of 1986. The goal of SPACE is to investigate mesoscale cloud/precipitation systems and development of associated satellite remote sensing technology. The field program will incorporate remote sensing observations from aircraft, satellite imagery, radar observations, ground based lightning measurements, rawinsonde observations, and various surface meteorological observations. The coordination of existing and special observation networks will provide a data base for analysis of precipitation events and provide ground truth comparisons for remote sensing capabilities. Author

N86-15815*# New Technology, Inc., Huntsville, Ala.
ATMOSPHERIC MODELING AND SENSOR SIMULATION (AMASS) STUDY
Karen G. Parker *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 117-119 ref (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A 4800 baud synchronous communications link was established between the Perkin-Elmer (P-E) 3250 AMASS system and the Cyber 205 located at GSFC. An extensive study of off-the-shelf array processors offering standard interface of the Perkin-Elmer was conducted to determine which would meet computational requirements of the division. A Floating Point Systems AP-120B was borrowed from another MSFC laboratory for evaluation. It was determined that available array processors did not offer significantly more capabilities than the borrowed unit, although at least three other vendors indicated that standard Perkin-Elmer interfaces would be marketed in the future. Therefore, the recommendation was made to continue to utilize the 120B and to keep monitoring the AP market. Hardware necessary to support requirements of the ASD as well as to enhance system performance as specified and procured. B.W.

N86-15816*# Wisconsin Univ., Madison. Space Science and Engineering Center.
A DESIGN STUDY FOR A THREE-DIMENSIONAL DISPLAY COMPUTER TERMINAL FOR METEOROLOGICAL INFORMATION
Verner E. Suomi, Robert J. Krauss, Bill Hibbard, and J. T. Young *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 121 ref (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A design study of a three-dimensional display computer terminal for meteorological information was conducted. The software developed on this project in FY-84 was put into final form and documented for McIDAS user access. The stereo display has been used by most of the operational users of McIDAS or its progenies. Specifically, the National Hurricane Center, the National Severe Storm Forecast Center, the National Meteorological Center, and the Cape Canaveral Forecast Facility have all made use of the 4-D display techniques to help evaluate meteorological situations on various occasions. B.W.

N86-15817*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INTERACTIVE INFORMATION PROCESSING FOR NASA'S MESOSCALE ANALYSIS AND SPACE SENSOR PROGRAM
Karen G. Parker (New Technology, Inc., Huntsville, Ala.), Laura MacLean, Norman Reavis, Gregory S. Wilson, John S. Hickey (Atsuko Computing International), Michael Dickerson (Atsuko Computing International), Shogo Karitani (Atsuko Computing International), and David Keller *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 122-135 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The Atmospheric Sciences Division (ASD) of the Systems Dynamics Laboratory at NASA's Marshall Space Flight Center (MSFC) is currently involved in interactive information processing for the Mesoscale Analysis and Space Sensor (MASS) program. Specifically, the ASD is engaged in the development and implementation of new space-borne remote sensing technology to observe and measure mesoscale atmospheric processes. These space measurements and conventional observational data are being processed together to gain an improved understanding of the mesoscale structure and the dynamical evolution of the atmosphere relative to cloud development and precipitation processes. Author

N86-15818*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DOPPLER WIND PROFILE EXPERIMENT
James E. Arnold *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 139 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The data collection phase of a Doppler wind measurement experiment supported by high-resolution Jimsphere/FPS-16 wind data and Windsonde data was carried out. The Doppler wind measurements were made using a hybrid NOAA/WPL Doppler profiler and a SOUSY profiler. Both systems operated at 50 Mhz. Although the Doppler profiler systems were located 10 km apart to enable concurrent operation of the systems for data comparison, little concurrent data were obtained due to set-up delays with the SOUSY system, and system problems with the WPL system during the last month of the test. During the test period, special serial Jimsphere soundings were taken at two-hour intervals on six days in March and April in addition to balloon soundings taken in support of the Shuttle launch operations. In addition, there is temperature, moisture and wind information available from the daily morning Radiosonde sounding taken. The balloon release point was at the same location as the SOUSY profiler. Vertical resolution of the SOUSY profiler was 150 M to approximately 20 km. The vertical resolution of the WPL profiler was 290 M to 10 km and 870 M to 17 km. Winds determined form the Jimsphere balloon have a vertical resolution of 30 M. B.W.

N86-15819*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MULTISPECTRAL ATMOSPHERIC MAPPING SENSOR OF MESOSCALE WATER VAPOR FEATURES
Paul Menzel, Gary J. Jedlovec, Greg S. Wilson, Robert J. Atkinson, and William Smith *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 140-141 refs (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01

The MAMS is being flown over the Pre-Storm network during May 1985. MAMS will be used to measure at high spatial resolution the structure and variability of water vapor in the atmosphere in relation to development of cloud fields, precipitation, surface/boundary layer forcing, and sources/sinks of water vapor. The MAMS was checked out for specified spectral response and detector noise performance in the eight visible and three infrared (6.7, 11.2, 12.7 micron) spectral bands. A calibration algorithm was implemented for the infrared detectors. Engineering checkout flights on board the ER-2 produced imagery at 50 m resolution in which water vapor features in the 6.7 micron spectral band are most striking. These images were analyzed on the Man computer Interactive Data Access System (McIDAS). Ground truth and ancillary data (VAS, AVHRR) was accessed to verify the calibration. B.W.

N86-15820*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FIRST MEETING OF THE WORKING GROUP ON THE SHUTTLE MICROWAVE PRECIPITATION RADIOMETER (SMPR)
In its NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 p 142-143 (For primary document see N86-15769 06-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A summary of the consensus of opinion of the working group on the Shuttle Microwave Precipitation Radiometer (SMPR) as well as selected comments attributable to certain participants is given. The working group agreed that the first (primary) objective of such a Shuttle mission (instrument) should be the determination of methods for the accurate measurement of total rain water and total cloud water with passive microwave methods. It was noted by the group that there is merit in the evaluation of global data with high resolution at frequencies between 6 and 200 GHz, with better than 5 km resolution when possible. The first priority in meeting the precipitation measurement objective was observations at approximately 6, 10, 18, 21, 37, and 90 GHz. A second priority was the inclusion of channels near the 50 GHz oxygen absorption band so that differencing could be employed to determine the vertical extent of precipitation. A third priority was the addition of water vapor information at the 183 GHz line to study cloud systems in general. B.W.

N86-15821*# Wisconsin Univ., Madison.
SEVERE STORM IDENTIFICATION WITH SATELLITE MICROWAVE RADIOMETRY: AN INITIAL INVESTIGATION WITH NIMBUS-7 SMMR DATA
Roy W. Spencer and Michael R. Howland [1984] 15 p refs
(Contract NAS8-34767; Grant NAG5-391)
(NASA-CR-176431; NAS 1.26:176431) Avail: NTIS HC A02/MF A01 CSCL 04B

The severe weather characteristics of convective storms as observed by the Nimbus 7 Scanning Multichannel Microwave Radiometer (SMMR) are investigated. Low 37 GHz brightness temperatures (due to scattering of upwelling radiation by precipitation size ice) are related to the occurrence of severe weather (large hail, strong winds or wind damage, tornadoes and funnel clouds) within one hour of the satellite observation time. During 1979 and 1980 over the United States there were 263 storms which had very cold 37 GHz signatures. Of these storms 15% were severe. The SMMR detected hail, wind, and tornadic storms equally well. Critical Success Indices (CSI's) of 0.32, 0.48, and 0.38 are achieved for the thresholding of severe vs. nonsevere low brightness temperature events during 1979, 1980, and the two years combined, respectively. Such scores are comparable to skill scores for early radar detection methods. These results suggest that a future geostationary passive microwave imaging capability at 37 GHz, with sufficient spatial and temporal resolution, would allow the detection of severe convective storms. This capability would provide a useful complement to radar, especially in areas not covered by radar. Author

N86-15822*# Wisconsin Univ., Madison. Space Science and Engineering Center.
SATELLITE MICROWAVE OBSERVATIONS OF A STORM COMPLEX: A COMPARATIVE ANALYSIS Interim Report, 1 Feb. 1984 - 30 Apr. 1985
David W. Martin Sep. 1985 43 p refs
(Grant NAG5-391)
(NASA-CR-176430; NAS 1.26:176430) Avail: NTIS HC A03/MF A01 CSCL 04B

The hypothesis that cold events correspond to a particular stage in a class of thunderstorms was tested. That class is a storms class which updrafts are: (1) strong, broad and moist, and (2) extend well above the freezing level. Condition (1) implies strong mesoscale forcing. Condition (2) implies a tall updraft or a relatively low freezing level. Such storms should have big, intense radar echoes and cold, fast-growing anvils. The thunderstorm events were analyzed by radar, rain gauge and GOES infrared observations. Radar was the starting point for detection and definition of the hypothesized thunderstorms. The radar signature is compared to the signature of the storm in rain gauge observations, satellite infrared images and satellite microwave images.

N86-15823# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
VALIDATION OF OUTGOING LONGWAVE RADIATION IN THE GLAS (GODDARD LABORATORY FOR ATMOSPHERIC SCIENCES) GENERAL CIRCULATION MODEL M.S. Thesis

G. R. Borger 1985 77 p
(AD-A158006; AFIT/CI/NR-85-55T) Avail: NTIS
HC A05/MF A01 CSCL 04/2

Outgoing longwave radiation (OLR) simulated by the GLAS general circulation model is validated with that derived from measurements made by polar orbiting satellites. The mean observed and simulated OLR fields are compared for spatial and seasonal variations by expanding them into spherical surface harmonics. The student's t-test is to determine the significance of differences between the simulated and observed fields. The global mean and standard deviation of the simulated geographical fields are respectively about 20 per sq Wm-2 smaller and 10 per sq Wm-2 larger than the corresponding values of the observed field. The major fraction of the variability in the simulated field is due to a sharp meridional gradient in the field. The seasonal variation of the global mean and standard derivation of the simulated fields are in good agreement with observations. Correlation coefficients between the observed and simulated fields as a function of spatial scales show that the phase relationship for large spatial scales is very good for January and July months but fair for April and October. In the tropics, the differences between simulated and observed OLR means are not significantly different from zero, except over deep convective regions (Asiatic monsoon, Amazon, Central Africa) where the model convective clouds do not interact with radiation. The differences in the middle and high latitudes are highly significant, more so in the Southern Hemisphere than in the Northern Hemisphere. Author (GRA)

N86-15824# Air Force Geophysics Lab., Hanscom AFB, Mass.
A CONCEPTUAL MODEL OF THE SEVERE-STORM ENVIRONMENT FOR INCLUSION INTO AIR WEATHER SERVICE SEVERE-STORM ANALYSIS AND FORECAST PROCEDURES Scientific Interim Report, Jan. - Sep. 1984
J. M. Lanicci 16 Nov. 1984 91 p
(AD-A158010; AFGL-TR-84-0311; AFGL-ERP-898) Avail: NTIS
HC A05/MF A01 CSCL 04/2

A severe-storm conceptual model first proposed by Carlson and Ludlam is described, and its relevance to identifying potential areas for severe thunderstorms is discussed. The theory complements that of Fawbush and Miller, but revises some ideas concerning large-scale atmospheric structure preceding the outbreak of severe storms, particularly the presence of a capping inversion (or lid) in the pre-storm environment. The processes that produce the lid are then discussed along with methods for identifying the lid on both convectional pressure charts and Skew T-Log P diagrams. The diagrams are used to define a new stability index that considers the strength of the restraining inversion. Two detailed case studies are presented that illustrate the role of the lid in determining the location of severe weather and the analysis techniques used to identify the lid, and that incorporate the lid concept into the operational severe-storm analysis and forecast procedures used by the Air Weather Service. GRA

N86-15825# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A SYNOPTIC AND MESOSCALE STUDY OF A FREQUENT LIGHTNING EVENT M.S. Thesis
J. P. Alleca Jun. 1985 168 p
(AD-A158225; AFIT/CI/NR-85-75T) Avail: NTIS
HC A08/MF A01 CSCL 04/2

This thesis reviews synoptic and mesoscale features associated with the lightning flash distribution of a squall line and frontal system on the 13th and 14th of June, 1984. Thunderstorms on these days produced over 68,000 cloud-to-ground flashes from 13/13Z to 15/04Z. According to Orville (1985), these flashes represented about one-third of the world's average lightning for this time interval. Emphasis is placed on the squall line on the 13th since over 70% of the lightning flashes were associated with this feature. Synoptic and mesoscale analyses along with cloud-to-ground lightning data obtained from the State University of New York at Albany (SUNYA) Lightning Detection Network are used to document the conditions that created this unusual lightning event. Time and space distributions of the lightning data are examined in terms of flash polarity, stroke multiplicities, flash strengths, and geography. In addition, satellite infrared imagery is used in an attempt to determine a relationship between cloud heights and lightning. GRA

N86-15826# Naval Postgraduate School, Monterey, Calif.
USE OF SPACE SHUTTLE PHOTOGRAPHY IN THE STUDY OF METEOROLOGICAL PHENOMENA M.S. Thesis
F. J. Svetz Jun. 1985 106 p
(AD-A159415) Avail: NTIS HC A06/MF A01 CSCL 04/2

Analysis of three atmospheric phenomena (squall line over the Gulf of Mexico on 9 April 1984, Hurricane Kamisy in the Indian Ocean 7 to 12 April 1984, and the Mauna Loa volcano smoke plume, Hawaii 7 to 12 April 1984) is performed using handheld-camera photographs from the Space Transportation System (STS) 41-C mission (6 to 13 April 1984). High resolution color photographs taken of the earth from the Space Shuttle Challenger were made available from the National Aeronautics and Space Administration (NASA) through the Space Shuttle Earth Observations Project (SSEOP). Comparison is made to collocated meteorological satellite images (DMSP, AVHRR and GOES) and conventional meteorological data to illustrate the advantages and deficiencies of these new high resolution photographic data. Author (GRA)

N86-15827# Naval Postgraduate School, Monterey, Calif.
SINGLE STATION ASSESSMENT OF ATMOSPHERIC BOUNDARY LAYER PROPERTIES IN THE EASTERN MEDITERRANEAN SEA M.S. Thesis
C. E. Sellers Jun. 1985 59 p
(AD-A159432) Avail: NTIS HC A04/MF A01 CSCL 04/2

The marine environment strongly affects the use of naval weapons and sensor systems. The ducting of electromagnetic energy is one of the most important influences in modern systems. The ability to describe the atmosphere is the first step in producing a realistic forecast. This study shows that in the eastern Mediterranean Sea the observed soundings appear to have a systematic error in the lower sections of the mixed layer. This, coupled with the synoptic scale changes in the atmosphere, causes single station forecasting scheme to fail. The thesis emphasizes two points: (1) the need for an accurate description of the atmosphere is paramount to any forecast, (2) the users of any single station forecast must use their knowledge of the models and compare the model results to the other information on hand to determine whether or not the prediction is reliable. Author (GRA)

N86-15828# Royal Signals and Radar Establishment, Malvern (England).
THE EARTH'S ATMOSPHERE: IDEAS OLD AND NEW
D. G. King-Hele Apr. 1985 42 p
(AD-A159558; RAE-TM-SPACE-351; DRIC-BR-96188) Avail: NTIS
HC A03/MF A01 CSCL 04/2

This is the written version of the Milne Lecture for 1984, delivered at the Mathematical Institute, University of Oxford, on 1 November 1984. It offers a superficial survey of the modern view of the Earth's atmosphere, followed by samplings of past ideas between BC 350 and AD 1925. GRA

N86-15829# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
KITZINGEN AI, GERMANY LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Aug. 1974 - Jul. 1984
Jul. 1985 315 p
(AD-A159604; USAFETAC/DS-85/029) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Kitzingen AI, Germany(West). This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility;

Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-15830# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
AL JUBAYL/DHAHRAN, SAUDI ARABIA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Jun. 1975 - Dec. 1984
May 1985 447 p
(AD-A159605; USAFETAC/DS-85/013) Avail: NTIS
HC A19/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Al Jubayl Idhanran, Saudi Arabia. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-15831# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
DAKAR SENEGAL LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Jun. 1975 - May 1985
Sep. 1985 279 p
(AD-A159606; USAFETAC/DS-85/048) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Dakar Senegal. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-15832# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
TAHITI ISLAND PACIFIC LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Jun. 1975 - May 1985
Sep. 1985 277 p
(AD-A159607; USAFETAC/DS-85/049) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Tahiti Island, Pacific Ocean. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-15833# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
PIRMASENS AHP DL, WEST GERMANY LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Jun. 1975 - May 1985
Sep. 1985 144 p
(AD-A159608; USAFETAC/DS-85/053) Avail: NTIS
HC A07/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Pirmasens AHP, West Germany. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-15834# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F FORT BELVOIR/DAVISON AAF, VIRGINIA Data Summary Report, Jun. 1976 - May 1985
Sep. 1985 297 p
(AD-A159609; USAFETAC/DS-85/054) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface observation climatology for: Fort Belvoir, Davison AAF, Virginia. Summary consists of: Part A, Weather Conditions and Atmospheric Phenomena; Part B, Precipitation; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; Part F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-15835# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
YONGSAN RESERVATION, KOREA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, c-f Data Summary Report, Jul. 1974 - Jun. 1984
Jun. 1985 212 p
(AD-A159610; USAFETAC/DS-85/022) Avail: NTIS
HC A10/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Yongsan Reservation South Korea. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. note that Part B, Precipitation, is omitted. See SAFETAC/TN-83/001 (AD-A132 186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-15836# International Meteorological Inst., Stockholm (Sweden). Arrhenius Lab.
[ACTIVITIES REPORT IN METEOROLOGY] Annual Report, Jul. 1983 - Jun. 1984
Dec. 1984 44 p refs

(AR-83/84; ISSN-0349-0068) Avail: NTIS HC A03/MF A01

Research in dynamic meteorology and climatology; chemical meteorology and biogeochemistry; and atmospheric physics is summarized. International assessment of environmental effects of increased anthropogenic CO2 production is described. Atmospheric modeling; orography; atmospheric circulation; wet deposition; atmosphere-ground interaction; the carbon cycle; and aeronomy are discussed. Author (ESA)

N86-15837# Royal Netherlands Meteorological Inst., De Bilt. Climatological Div.

CLIMATOLOGICAL DATA OF STATIONS IN THE NETHERLANDS. NO. 24: A CLIMATOLOGY OF AMSTERDAM AIRPORT FOR THE PERIOD 1951 - 1980

1985 33 p In ENGLISH and DUTCH

(KNMI-150-24; B8569019) Avail: NTIS HC A03/MF A01

Meteorological observations concerning temperature and precipitation during 1 January 1951 through 31 December 1980, are presented. Monthly and decadal means and absolutes of highest and lowest temperatures were calculated from daily values observed between 06.00 and 18.00 hours UT, and between 18.00 and 06.00 hours UT (April to September) or 18.00 and 08.00 hours UT (October to March). Monthly mean lowest grass minimum temperatures were calculated from daily observed lowest temperatures in the past 24 hours at 08.00 hours UT and measured 10 cm above ground level. Seasonal, monthly, and decadal means and absolutes were calculated daily precipitation values, measured from a 200 sq cm funnel aperture at 18.00 hours UT Decadal mean frequencies of maximum temperatures of 20.0, 25.0, 30.0 deg or higher, groundfrost, frostdays, and icedays were calculated per 10 years. Author (ESA)

N86-15838# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Wolkenphysik.

RESULTS OF ICING FLIGHTS IN WINTER 1983/84: ICE ACCRETION THICKNESS IN CORRELATION WITH CLOUD PHYSICAL PARAMETERS, OBJECT AND CLOUD PARAMETERS

Hans-Eberhard Hoffmann, Roland Roth, and Johann Demmel May 1985 46 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-85-39; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16

Twenty-five icing flights on a DO 28 research aircraft were carried out to determine the correlation between ice accretion thickness on standard cylinders and cloud physical parameters (liquid water content, temperature, particle phase and size), object parameters (cylinder diameter) and cloud parameters (cloud altitude, location coordinates, time, stratus or cumulus). The relationship between ice accretion thickness and water content is demonstrated with the ice accretion model of the Canadian National Research Council. Effects of the cloud particle size on ice accretion thickness could not be shown. The ice accretion thickness change due to liquid water content depends on cylinder diameter. Liquid water content, ice accretion thickness, and icing degree increase with altitude. Stratus or cumulus has no effect on the ice accretion thickness. Author (ESA)

N86-15503# Joint Publications Research Service, Arlington, Va.

MATHEMATICAL MODELING OF MAIN LIGHTNING STAGE Abstract Only

B. N. Gorin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 53 Transl. into ENGLISH from Elektrichestvo (Moscow, USSR), no. 4, Apr. 1985 p 10-16 (For primary document see N86-15484 06-31)

Avail: NTIS HC A05/MF A01

N86-15696# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics

THE REDUCTION OF NOCTURNAL COOLING VALUE BY SMUDGING

Toshio Harimaya, Masayuki Maki, Katsuhiro Kikuchi, Takashi Taniguchi, Chikashi Hiramatsu, and Satoshi Azumane *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 1-11 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)

Avail: NTIS HC A05/MF A01

N86-15697# Hokkaido Univ., Sapporo (Japan). Meteorological Lab.

OBSERVATIONS ON THE ATMOSPHERIC ELECTRICAL ENVIRONMENT OF SEA FOG IN THE PACIFIC COAST OF EASTERN HOKKAIDO, JAPAN

Masashi Yoshihiro, Takashi Taniguchi, and Katsuhiro Kikuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 13-31 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)

Avail: NTIS HC A05/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-15839 North Carolina State Univ., Raleigh.

PROPERTIES OF THE INTERNAL WAVE FIELD ON THE EQUATOR Ph.D. Thesis

Chong-Kung Wu 1985 88 p

Avail: Univ. Microfilms Order No. DA8518289

The objectives of this thesis are: (1) to investigate the relationship between high frequency velocity fluctuations observed on the equator and linear internal waves; (2) to analyze the temporal variability of the equatorial internal wave field; and (3) to calculate statistical properties of the equaorial internal wave field and determine whether or not it is horizontally isotropic as well as vertically homogeneous and uniform in spectral slope to within a WKB scaling. Data from subsurface moored current meters were Fourier analyzed into frequency spectra, and statistical hypotheses were tested using the F-distribution for ratios of samles variances. It is concluded that the observed motions within the internal wave frequency band are consistent with the linear internal waves, the variability of the equatorial internal wave field at seasonal time scale is significant with high wave energy arising in the months of May to June and October to November. The horizontal velocity is anisotropic, particulary at times of high wave energy, with preferred meridional orientation. The distribution of kinetic energy is vertically homogeneous to within a WKB scaling. The power law for spectral slope with frequency is about -2. Seasonal variability and horizontal anisotropy observed in these equatorial data are contrary to the canonical internal wave field description put forth from mid-latitude observations. Dissert. Abstr.

N86-15840 Rhode Island Univ., Kingston.

OBSERVATIONS OF EQUATORIALLY TRAPPED WAVES IN THE EASTERN ATLANTIC OCEAN FROM INVERTED ECHO SOUNDERS Ph.D. Thesis

Laurence L. Miller 1984 133 p

Avail: Univ. Microfilms Order No. DA8516684

The measured vertical acoustic travel time data and ambient noise measured wind speed data from 0 deg, a topographically smooth region in the eastern equatorial Atlantic, are used to study the properties of equatorially trapped waves on two time scales and seasonal. Sharp spectral peaks are found in the travel time records at periods between 71 and 130 hours, coinciding with the predicted periods of several resonant, low meridional mode, first vertical mode inertia-gravity waves. The inverted echo sounder appears to be responding to vertically propagating waves with vertical wavelengths comparable to the first vertical mode. Prominent standing mode waves could be established without the strict requirement of zero zonal energy flux. Simultaneous observations of thermocline depths, sea surface temperature (SST), and local wind speed from 0 deg 4 deg are used to test the hypothesis that seasonal upwelling in the eastern equatorial Atlantic is caused by a remotely forced, equatorially trapped Kelvin wave. No

significant changed was noted in the local wind speed. It seems that local forcing could not nave caused the rise of the thermocline. A revised Kelvin wave scenario is suggested to explain the different timing of the observations. Dissert. Abstr.

N86-15841 Rhode Island Univ., Kingston.
DYNAMICS AND STRUCTURE OF GULF STREAM MEANDERS NORTHEAST OF CAPE HATTERAS, N.C. Ph.D. Thesis
William Edward Johns 1984 261 p
Avail: Univ. Microfilms Order No. DA8516676

Three arrays of inverted echo sounders (IES) and deep current meter moorings were deployed on the continental slope. This array continuously monitored the path of the Gulf Stream and the deep currents under it. The deep velocity fluctuations were characterized by a transition from transverse flow aligned with the local bathymetry for periods longer than 10 to 14 days, to fluctuations with a cross-stream orientation at shorter periods. The vertical structure, kinematics, and horizontal phase variations of the low-frequency motions are consistent with the properties of topographic-Rossby waves, while horizontal phase variations associated with higher-frequency motions are consistent with the observed dispersion of near-surface meanders. Considerations of the nondiffusive fluctuating heat equation for deep layers suggests a 3-term balance between local rate of change, cross-stream horizontal advection, and vertical advection of temperature, with the first two being of like sign. The description is consistent with the nonormal-flow boundary condition in this region, where the bottom slope is about a factor of two larger than the slope of the isotherms. Dissert. Abstr.

N86-15842 Delaware Univ., Newark.
DEVELOPMENT OF SLOPE SPECTRA OF THE WIND-DISTURBED WATER SURFACE Ph.D. Thesis
Stephen Perry Haimbach 1985 202 p
Avail: Univ. Mirofilms Order No. DA8517671

An optical system for determining two-dimensional slope spectra of the wind-distributed water surface was developed. The system consists of a collimated light source, a high-speed photodiode matrix camera, two digital wave-height probes, a computer interface, and a digital computer. Time series of highly resolved two-dimensional water-surface slopes were obtained in a wind wave tank. The wave energy spectrum is very narrow in the tank; consequently, the slope spectrum for the gravity region is not well developed. The variation of the spectral coefficient for the capillary region has four ranges. At low and intermediate winds, the coefficient is associated with boundary layer regimes and wave phase velocity. For higher wind speeds there are two ranges where the coefficient is affected by the saturation of the upwind-downwind and crosswind components of the capillary wave spectrum. The spectrum becomes more isotropic as the wind speed increased. Empirical expressions are proposed to describe the details of the growth and saturation of the directional slope spectrum. The coupling between the capillary waves and the surface drift current is determined and a modified dispersion relationship is proposed. Dissert. Abstr.

N86-15843 Rhode Island Univ., Kingston.
THE CARBON DIOXIDE SYSTEM AND ITS ROLE ON TRACE METAL CHEMISTRY IN THE MARINE ENVIRONMENT Ph.D. Thesis
Wilaiwan Thumtrakul 1985 163 p
Avail: Univ. Microfilms Order No. DA8516688

An equilibrium model was used to predict the changes in inorganic speciation of trace metals in the marine environment due to changes in water properties. The range of speciation in near-surface ocean waters was based on the chemical characteristics of a highly productive region off Peru. The salinity of these waters was nearly constant at about 35%. The only significant chemical property that would affect the speciation of trace metals in the region off Peru was pH which ranged from 7.75 to 8.37 in the upper 30 meters. Hydroxy complexes were the major forms of iron (3). Changes in pH were important for the speciation of Pb(2) and Cu(2) for which carbonate complexes were the major species. For Mn(2) and Fe(2), free ions and their chloro complexes contributed more than 90% of the total species. The chemical speciation of Mn(2) at various salinites was also examined. The amount of MnCl+ complexes increased from less than 0.1% in world-average river water to about 30% in seawater of salinity 35%. Dissert. Abstr.

N86-15844# Coastal Engineering Research Center, Vicksburg, Miss.
THE TMA SHALLOW-WATER SPECTRUM DESCRIPTION AND APPLICATIONS Final Report
S. A. Hughes Dec. 1984 45 p
(AD-A157975; CERC-TR-84-7) Avail: NTIS HC A03/MF A01 CSCL 08/3

Recent advances have been made in the specification of a shallow-water self-similar spectral form. This spectral form, referred to as the TMA spectrum, substitutes an expression for the shallow-water equilibrium range into the JONSWAP equation for spectral energy density. The JONSWAP parameters are empirically defined through examination of over 2,800 wind sea spectra obtained at various depths and locations. This spectral form is intended to describe single-peaked wind seas which have reached a growth equilibrium in finite depth water. The purposes of this report are to summarize the recent advances, to discuss the range of practical usage, and to provide engineering examples using these new formulations. Author (GRA)

N86-15845# Naval Postgraduate School, Monterey, Calif.
MIZLANT 84 DATA REPORT RESULTS OF AN OCEANOGRAPHIC CRUISE TO THE GREENLAND SEA, AUGUST-SEPTEMBER 1984 Interim Report, 1 Aug. 1984 - 1 Jun. 1985
R. H. Bourke and R. G. Paquette May 1985 156 p
(AD-A157997; NPS68-85-018) Avail: NTIS HC A08/MF A01 CSCL 08/10

This report presents plots of property profiles for each of the 333 oceanographic stations occupied by the U.S. Coast Guard Icebreaker over the continental shelf waters off the east coast of Greenland in August and September 1984. A Neil Brown Mark 3 CTD was used to obtain temperature and salinity profiles to the sea floor in shallow water and at least to 600 m in deeper water. In addition to temperature and salinity profiles, plots of sound speed and density (sigma-t) are shown. GRA

N86-15846# Naval Oceanographic Office, Bay St. Louis, Miss.
DESCRIPTION, ANALYSIS, AND PREDICTION OF SEA-FLOOR ROUGHNESS USING SPECTRAL MODELS Ph.D. Thesis
C. G. Fox Apr. 1985 233 p
(AD-A158000; NOO-TR-279) Avail: NTIS HC A11/MF A01 CSCL 08/10

A method has been developed which allows a valid statistical model of the variability of oceanic depths to be derived from existing digital bathymetric soundings. The bathymetry of the world ocean has been mapped using a variety of acoustic sounding instruments and traditional contouring methods. The bathymetric contours represent a low-frequency, deterministic model of the seafloor. To describe the higher frequency variability, or roughness, of the seafloor requires the development of an appropriate statistical method for generating a valid stochastic model. The smooth contoured surface (often preserved as a geographic grid of depths), when supplemented by such a roughness model, provides a complete description of the relief. The statistical model of the seafloor roughness is also a valuable tool for predicting acoustic scattering and bottom loss, and in addition contains a wealth of geological information for interpreting deep-sea processes. GRA

N86-15847# Oregon State Univ., Corvallis. Coll. of Oceanography.
TOWED THERMISTOR CHAIN OBSERVATIONS DURING MILDEX (MIXED LAYER DYNAMICS EXPERIMENT)
R. J. Baumann, L. M. DeWitt, C. A. Paulson, J. V. Paduan, and J. D. Wagner Jun. 1985 129 p
(Contracts N00014-79-C-0004; N00014-84-C-0218)

(AD-A158304; REF-85-12) Avail: NTIS HC A07/MF A01 CSCL 08/10

Observations of temperature and pressure in the upper 115 m of the Pacific Ocean were taken with a towed thermistor chain during October and November, 1983, as a part of the Mixed Layer Dynamics Experiment (MILDEX). The MILDEX area was approximately 400 nautical miles west of Santa Barbara. The chain was towed on four occasions for a total distance of approximately 2500 km. The observations were averaged over sequential 30-second intervals and isotherms depths were interpolated from the averaged observations. Cross-sections of temperature and isotherm depth are presented. GRA

N86-15848# Naval Postgraduate School, Monterey, Calif.
WAVE AND SURF FORECAST MODEL EVALUATION FOR USE ON A MICRO COMPUTER M.S. Thesis
L. E. Devendorf Jun. 1985 67 p
(AD-A159063) Avail: NTIS HC A04/MF A01 CSCL 08/3

A sea swell and surf model is implemented in BASIC, tested and evaluated on a micro computer (HP-9845B). The two-dimensional model includes spectral wind-wave generation in open water, and shallow water wave transformation over irregular topography. The model predicts surf zone width, breaker lines and types of breakers. Using change in momentum flux of gravity waves (radiation stress) as forcing, the model predicts current velocities within the surf zone. The model is evaluated for the conditions over constant depths and uniform sloping beaches. The numerical results are checked against accepted theory and field observations. The model is found to overbuild wind generated sea heights for a 30 kts wind but to give expected wave heights for a 15 kts wind. The model results compare well with observed nearshore wave heights but give poor location of breaking waves. The model's nearshore current calculation is found unsuitable for the HP-9845B due to computational instability and time requirements. The sources of the model's problems are identified, and recommendations are made for future improvements of the model. GRA

N86-15849# Naval Postgraduate School, Monterey, Calif.
TEMPORAL AND SPATIAL DISTRIBUTIONS OF ARCTIC SEA ICE THICKNESS AND PRESSURE RIDGING STATISTICS Final Report, Dec. 1983 - Mar. 1985
R. P. Garrett and R. H. Bourke Mar. 1985 163 p
(AD-A159577; NPS68-85-009) Avail: NTIS HC A08/MF A01 CSCL 08/12

Data from the unclassified literature were reviewed to determine the regional and seasonal distributions of sea ice thickness, pressure ridging statistics, frequency of occurrence of polynyas, and keel/sail height ratios. Seasonal and regional maps and histograms of these properties were constructed. The majority of the data were obtained from submarines equipped with a narrow-beam, upward-looking sonar. As determined from an analysis of 17 submarine cruises, the overall mean thickness of Arctic sea ice above 65 deg N, including both deformed and undeformed ice, is 2.9 m with a standard deviation of 1.8 m. The overall seasonal mean ranges from approximately 2.4 m in spring to 3.3 m in summer. Local mean ice thicknesses ranged from less than 1 m near the marginal ice zone to greater than 7 m to the north of the Canadian Archipelago. Histograms of sea ice thickness reflect a bimodal distribution in winter and spring, an effect of the presence of thin first year ice. Due to ice melt in summer and autumn only a single mode of much thicker multi-year ice is observed. GRA

N86-15850# Institute of Oceanographic Sciences, Wormley (England).
THE CTD DATA FROM THE NORTHEAST ATLANTIC 22 N-33 N, 19 W-24 W, JULY 1983. DISCOVERY CRUISES 138, 139.
P. M. Saunders and Amanda Manning (Oxford Univ., England) 1984 114 p refs
(Contract DoE-DGR-481/176)
(IOS-188; DoE/RW-85/007) Avail: NTIS HC A06/MF A01

Lists and graphs of CTD data from 27 stations in the vicinity of 32 deg 30'N 20 W, 150 miles West of Madeira, in support of an experiment to investigate the benthic boundary layer on the lower continental rise (in water depths 4000 to 5000 m) are presented. South of this location stations were occupied along longitude 24 W culminating in a series on the lower continental rise near 23 N. All CTD data were reconciled with reversing thermometer observations and with measurements of salinity and dissolved oxygen derived from samples. Author (ESA)

N86-15851# Institute of Oceanographic Sciences, Wormley (England).
CTD DATA FROM THE NORTHEAST ATLANTIC OCEAN 40-48 N, 12-21 W COLLECTED ON RRS DISCOVERY CRUISE 132 IN FEBRUARY 1983
R. T. Pollard 1985 48 p refs
(Contract EEC-CL115UK(H))
(IOS-192) Avail: NTIS HC A05/MF A01

The CTD data collected in an area northeast of the Azores bounded by 40.5 N, 48.5 N, 20.5 W and 12 W are presented. Twenty-nine stations were occupied, mostly to 1000 or 1200 dbar. Calibration and data editing techniques are described. The data are presented as potential temperature/salinity curves, profile plots of temperature, salinity, oxygen and density against pressure, and listings at standard levels of basic and derived values. Author (ESA)

N86-15852# Institute of Oceanographic Sciences, Wormley (England).
THE IOS GEOPHYSICAL DATA HELD ON MAGNETIC TAPE - SUMMARY. BATHYMETRIC, MAGNETIC AND GRAVITY DATA COLLECTED DURING MARINE GEOLOGY AND GEOPHYSICS CRUISES 1973 - 1984
S. Drake and P. R. Miles 1985 127 p refs
(IOS-194) Avail: NTIS HC A07/MF A01

Bathymetric, magnetic and gravity data collected during marine geology/geophysics cruises are presented. Track charts and a 5 deg square data identification system provide basic cruise information useful in locating required data coverage. Author (ESA)

N86-15853# Institute of Oceanographic Sciences, Wormley (England).
A RE-ANALYSIS OF SWOP DATA
M. A. Srokosz, P. G. Challenor, and A. D. Margetts 1985 37 p refs
(IOS-195) Avail: NTIS HC A03/MF A01

Analysis of stereophotographic data to produce information about the spatial statistics of waves on the sea surface is shown. It is clear from the analysis that the resolution (9.144 m) of the data is too poor to obtain conclusive answers to questions such as the importance of nonlinearity for the spatial statistics of waves. However, the analysis indicates that with better spatially resolved stereophotographic data it is possible to calculate parameters of interest, particularly those of importance in analyzing the radar altimeter return signal from the sea surface. Spatial resolution better than 1.5 m is needed. Author (ESA)

N86-15854# Institute of Oceanographic Sciences, Taunton (England).
A NUMERICAL MODEL OF THE TURBULENT BOUNDARY LAYER BENEATH SURFACE WAVES AND TIDES
H. L. King, A. G. Davies, and R. L. Soulsby 1985 90 p refs
Sponsored by UK Department of the Environment
(IOS-196) Avail: NTIS HC A05/MF A01

A numerical model for horizontally uniform, turbulent, oscillatory flow above a flat rough bed is applied to surface wave-induced and tidal boundary layer flows. The formulation of the problem involves the governing horizontal momentum equations, and closure assumptions which relate the turbulent shear stresses to the mean velocity gradients in the flow. The closure scheme is a standard description of the turbulence field in terms of the turbulent energy equation. This equation, together with various turbulence scaling laws, allows the eddy viscosity to be determined as a function of

height and phase angle in the wave cycle. The calculated eddy viscosity distribution is used in the finite difference solution of the governing momentum equations. Results show that the model is useful for the study of rough turbulent oscillatory boundary-layers, and that it predicts quite well the gross features of surface wave-induced and tidal flows. Author (ESA)

N86-15855# Institute of Oceanographic Sciences, Wormley (England).
THE PERMEABILITY AND CONSOLIDATION OF DEEP SEA SEDIMENTS
P. J. Schultheiss and D. E. Gunn 1985 92 p refs
(Contract DoE-DGR-481/179)
(IOS-201; DoE/RW-84/202) Avail: NTIS HC A05/MF A01

An apparatus which enables sea sediment permeability to be measured at decreasing void ratios during a back-pressured consolidation test in the laboratory was developed. Data from over 60 samples establish the major differences in permeability between various sediment types and how permeability changes as a function of burial depth and void ratio. Samples from two study areas in the North Atlantic Ocean, King's Trough Flank (KTF) and Great Meteor East (GME), were compared with samples of Red Clay (RC) obtained from the NW Pacific Ocean. The permeability of the nannofossil turbidites in the GME area is 0.00001 mm/sec, but increases to 0.001 mm/sec in their silty bases. The marls and oozes in the KTF area generally have higher permeabilities (0.00005 mm/sec). Permeabilities of the RC samples range from 0.0001 near the surface to < 0.0000001 mm/sec at a sub-bottom depth of 170 m. Author (ESA)

N86-15856# Institute of Oceanographic Sciences, Birkenhead (England).
AUTOMATIC CALIBRATION OF THE TEMPERATURE CHANNEL ON BANDERAA RECORDING CURRENT METERS
D. Flatt 1985 15 p ref
(IOS-206) Avail: NTIS HC A02/MF A01

Calibration of an ocean current meter is described. The system is reliable enough to be run overnight unattended, reducing electrical and acoustic noise in the laboratory. The temperature calibrations produced are done to a standard format with a high level of repeatability and a minimum of effort. This enables the time spent on post and pre cruise calibrations to be kept to a minimum, with the facility to do more detailed calibration if required. Using this system the standard calibration run takes 10hr and an accuracy of 10 m/deg C is achieved. Author (ESA)

N86-15857# Royal Netherlands Meteorological Inst., De Bilt. Centrale Weerdienst.
AN OPERATIONAL WAVE MODEL FOR THE NORTH ATLANTIC OCEAN [EEN OPERATIONEEL GOLFMODEL VOOR DE NOORDATLANTISCHE OCEAAN]
M. J. M. Saraber 1985 51 p refs In DUTCH; ENGLISH summary
(KNMI-WR-85-3; B8566672; ISSN-0169-1651) Avail: NTIS HC A04/MF A01

A numerical computer model to forecast daily North Atlantic Ocean Waves 5 days in advance was developed. Ship routing demands, such as fuel consumption optimization and more detailed spectral wave information are met. Using an existing North Sea model and an (ECMWF) atmospheric model for the 1000-mb windfield input, the energy balance is solved by splitting the energy into sea wind energy and swell energy. Input wind fields and calculated wave fields are compared with manually constructed wavecharts. Results of the model are plotted in such a way that useful information about sea wind and swell is given. Author (ESA)

N86-15858# Royal Netherlands Meteorological Inst., De Bilt. Centrale Weerdienst.
THE EFFECT OF THE WIND IN THE EEMSMOND (THE NETHERLANDS, WEST GERMANY) ON HIGH TIDE LEVELS IN DELFZIJL (THE NETHERLANDS) [HET EFFECT VAN DE WIND IN DE EEMSMOND OP HOOGWATERSTANDEN IN DELFZIJL]
J. Vinke Apr. 1985 9 p In DUTCH
(KNMI-TR-83; B8564433; ISSN-0169-1708) Avail: NTIS HC A02/MF A01

Differences between calculated and measured high tide level deviations in Delfzijl are investigated in order to establish a possible impact of nearby marine works on the water level. German Hydrographic Institute data concerning water levels in Borkum from November 1983 to April 1984, were compared with Delfzijl data. In Borkum no such works were executed, differences are possibly due to wind effects in the Eemsmond. However, calculations on the relations between wind velocity/direction and measured water levels show an effect which is much less than was expected. It is concluded that the average 32 cm high tide level difference between Delfzijl and Borkum is due to tide amplitude differences. It is also noted that the low tide levels of Delfzijl are often much lower than those Borkum. Author (ESA)

N86-15698# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL STUDY ON THE RESPONSE OF THE TROPICAL PACIFIC SEA SURFACE TEMPERATURE TO A SUDDEN CHANGE OF WIND STRESS
Kensuke Takeuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 33-41 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

N86-15699# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL MODELLING OF THE SEASONAL VARIATION OF THE TROPICAL PACIFIC SEA SURFACE TEMPERATURE
Kensuke Takeuchi *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

N86-15700# Hokkaido Univ., Sapporo (Japan). Dept. of Geophysics.
A NUMERICAL SIMULATION OF COASTAL MIXED LAYER BY A MODIFIED 1-D DKT MODEL
Sei-ichi Kanari and Momoki Koga *In its* Geophysical Bulletin of Hokkaido Univ., No. 46 Oct. 1985 p 53-68 refs In JAPANESE; ENGLISH summary (For primary document see N86-15695 06-42)
Avail: NTIS HC A05/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-15859# School of Aerospace Medicine, Brooks AFB, Tex.
POTENCY OF PHOTOFLASH-PRODUCED RETROGRADE AMNESIA IN RATS Final Technical Paper, Dec. 1983 - Mar. 1984
K. R. Page and T. G. Wheeler Jul. 1985 12 p
(AF Proj. 7757)
(AD-A159149; USAFSAM-TP-85-1) Avail: NTIS HC A02/MF A01 CSCL 05/9

A photoflash has been shown to be an effective amnesiac under certain conditions. The objective of this study was to evaluate the effectiveness of a photoflash in relation to the potency of the preceding event, a foot shock of varying intensities. The task was a single avoidance-trial paradigm. The subject was placed in a small aversive chamber with a door that allowed the subject to enter a large, preferred chamber. Once inside the preferred chamber, the subject received a 1-s foot shock followed by a photoflash. On the avoidance trail, the subject was again placed in the aversive chamber and the time required to enter the preferred chamber was measured. If the photoflash had produced retrograde amnesia (RA), the time required to enter would be small. Retrograde amnesia was demonstrated for the 80-, 85-, and 100-V foot-shock test trials. At 40 V the voltage may not have been great enough to be felt by the subject. For groups examined at shock levels above 100 V, the foot shock was so potent that a photoflash was ineffective in producing RA. Our conclusion was that the photoflash

was an effective amnesiac until the intensity of the foot shock became more potent than the photoflash; this is consistent with the recency theory generated in serial learning and memory tasks. GRA

N86-15860# California Inst. of Tech., Pasadena. Lab. of Chemical Physics.
APPLICATION OF ELECTRON-TRANSFER THEORY TO SEVERAL SYSTEMS OF BIOLOGICAL INTEREST
R. A. Marcus and N. Sutin 1985 9 p refs Presented at the Workshop on Antennas and Reaction Centers of Photosynthetic Bacteria - Structure, Interactions and Dynamics, Feldafing, West Germany, 23 Mar. 1985 Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE85-015835; BNL-36836; CONF-8503159-1) Avail: NTIS HC A02/MF A01

Electron-transfer reaction rates are compared with theoretically calculated values for several reactions in the bacterial photosynthetic reaction center. A second aspect of the theory, the cross-relation, is illustrated using protein-protein electron transfers. DOE

N86-15861# Case Western Reserve Univ., Cleveland, Ohio.
ELECTRON REACTIONS IN MODEL AND BIOLOGICAL SYSTEMS
G. Bakale 1985 6 p refs Presented at DOE Radiological and Chemical Physics Contractors' Meeting, Richland, Washington, 9 Apr. 1985
(Contract DE-AC02-78EV-04746)
(DE85-016062; CONF-8504170-1) Avail: NTIS HC A02/MF A01

Our pulse-conductivity studies of electrons in nonpolar liquids and reversed-micellar solutions in which electron mobilitis, (MU) sub e 's, that range from < 10 to the power -3 to > 1000 sq cm/Vs and electron-attachment rate constants, k sub e 's, that range from < 10 to the 8th power to > 10 to the 14th power MM to the - 1 s to the - 1 will be briefly described as well as the mechanisms of electron transport and attachment that are consistent with this millionfold range of (MU) sub e's and k sub e 's. Included among the electron-attachment results presented will be the K sub e's of > 150 chemicals that have been classified using animal tests as being carcinogens or noncarcinogens. The k sub e-carcinogenicity correlation will be compared with the bacterial mutagenicity-carcinogenicity correlation which is the basis of the Ames Salmonella bioassay, the short-term test that is most widely used to screen potentially carcinogenic chemicals. Finally, our use of the Ames Salmonella tester strains as a biological detector of electrophilic carcinogens will be discussed. DOE

N86-15862# Oak Ridge National Lab., Tenn.
FREEZING OF LIVING CELLS
P. Mazur 1985 24 p refs Presented at the 2nd National Summer School on Cryobiology and Freeze-Drying, Toulbuchin, Bulgaria, 1 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016297; CONF-8508116-1) Avail: NTIS HC A02/MF A01

It can be calculated that a living cell will survive more than 5000 years at -196 C. This ability to essentially stop biological time has important implications in medicine and agriculture, and in biological research. In medicine the chief implications are in the banking of transplantable tissues and organs and in vitro fertilization. In agriculture the applications stem in part from the role of frozen embryos in amplifying the number of calves produced by high quality cows. The problem is how can cells survive both the cooling to such very low temperatures and the return to normal temperatures. The answers involve fundamental characteristics of cells such as the permeability of their surface membranes to water and solutes. These characteristics determine whether or not cells undergo lethal internal ice formation and other response during freezing and thawing. DOE

N86-15863# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abt. Weltraumbiologie.
INVESTIGATIONS OF THE EFFECTS OF GRAVITY ON PARAMECIUM CAUDATUM STRUCTURE AND BEHAVIOR Thesis - Bonn Univ.
Ruth Hemmersbach Jul. 1985 70 p refs In GERMAN; ENGLISH summary Report will also announced as translation (ESA-TT-963)
(DFVLR-FB-85-40; ISSN-0171-1342) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 27

Paramecium caudatum was used to study the behavior of the contractile vacuolar system, the nutrient uptake, cyclose, multiplication rate, and ultrastructure under simulated weightlessness using a fast-running clinostat and a modified agar method. In comparing 0 and 1 g behavior, no modification is detected, except for the vacuolar system. The slowed and irregular functioning behavior of the contractile vacuolar system due to an inner timing modification is influenced by gravity. Negative geotaxis of Paramecium caudatum is not confirmed. The effects of gravity on vacuole formation, situation, and number cannot be determined. Author (ESA)

N86-15864# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Biophysik.
ON THE EFFECTS OF X IRRADIATION ON THE BACILLUS SUBTILIS SPORES IN A DAY AND WET SYSTEM Thesis - Fachhochschule, Giessen, West Germany
Eduard Woizenko Apr. 1985 82 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-968)
(DFVLR-FB-85-44; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 29

Bacillus subtilis spores were irradiated to study the influence of intracellular water and to explain the modulating role of water in the development of biological radiation damage. The effects of repair deficiency in mutants regarding sensitivity to radiation in dry and wet systems were studied to explain the damage process in correlation with cell water content. The experiments were verified in multiplication rate and lag phase curves. Wild and mutant species are more sensible to ionizing radiation in a dry medium than in a wet medium. The water content used as a radiation protective substance reduces inactivation. Rec+ species (wild species) is more sensitive to ionizing radiation under extremely dry conditions and in a vacuum than Rec- species (mutants) due to a reduced repair ability. Rec- species deficient in the Rec A gene develop other repair processes to compensate for damage. The results show the variety of the cell repair processes. Author (ESA)

N86-15865# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 19, NO. 4, JULY - AUGUST 1985
O. G. Gazenko, ed. 4 Nov. 1985 156 p refs Transl. into ENGLISH of Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul.-Aug. 1985 96 p
(JPRS-USB-85-006) Avail: NTIS HC A08

Biological and medical problems encountered in space flight are the subjects of journal articles from the U.S.S.R. Some sample titles are: (1) determining human physical work capacity; (2) effect of threat stress on psychomotor stability of pilots differing in anxiety levels; (3) effect of 7 day immersion hypokinesia on characteristics of precision movements; (4) long term rotation of rats as applied to the problem of artificial gravity; (5) microflora of chufa, a potential higher plant component of biological life support systems for man; (6) crew training; and (7) automatic determination of cardiac output from rheogram of the trunk. For individual titles, see N86-15866 through N86-15892.

N86-15866# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF STUDYING FLIGHT WORK IN SOVIET AVIATION MEDICINE OF THE 1920'S - 1930'S c52
V. M. Munipov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 1-10 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 4-11 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Multifaceted investigations of the flying work by Soviet aviation

medicine in the 1920 to 1930s are described. The early stages of the professional activity that is at present termed ergonomic foundations of the design, manufacture and use of the aircraft are examined. One of the first formulations of the problem of standardization of the human factors is discussed. Author

N86-15867# Joint Publications Research Service, Arlington, Va.
SOME ASPECTS OF DETERMINING HUMAN PHYSICAL WORK CAPACITY UNDER HYPERBARIC CONDITIONS c54
L. A. Bryantseva and A. Ye. Mikhnenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 11-23 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 11-19 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Physical work capacity of man during real and simulated dives is discussed in view of the reported data. The parameter is known to decrease as the breathing gas density and immersion depth increase. The factors limiting the work capacity growth are as follows: greater respiration resistance, higher energy cost of ventilation, CO_2 retention, dyspnea, adverse circulation changes. During exposure hyperbaric bradycardia occurs both at rest and upon a work load. This precludes prediction of physical work capacity on the basis of the heart rate alone as a parameter used in a normobaric environment. Tabulated data on the work capacity of divers at various depths obtained by different authors is presented. Author

N86-15868# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF FACTORS DETERMINING PILOT'S GEOCENTRIC ORIENTATION c53
V. V. Lapa, Ye. Ye. Bukalov, and N. A. Lemeshchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 24-30 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 19-23 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The use of a rational (geocentric) method of orientation in flight is determined by the specific content of the conceptual model that develops in the course of lying experience and by the display of the spatial position of perceptive signs of the geocentric system of coordinates. The importance of these factors is confirmed by a shorter time and a lower number of errors made in assessing the spatial position when the display presented signs of the geocentric system of coordinates. These concepts are studied through flight simulation and flight tests. Author

N86-15869# Joint Publications Research Service, Arlington, Va.
EFFECT OF THREAT STRESS ON PSYCHOMOTOR STABILITY OF PILOTS DIFFERING IN ANXIETY LEVEL c53
J. Terelak and J. Maciejczyk *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 31-34 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 24-26 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The apparent anxiety as a personality factor cannot serve as a differentiating factor in the performance of psychomotor tasks (oculomotor coordination). It is shown that when pilots manifest a higher level of anxiety, performing specific tasks, their physiological expenditures increase. Author

N86-15870# Joint Publications Research Service, Arlington, Va.
USE OF FLIGHT SIMULATORS FOR DEMONSTRATION OF FUNCTIONAL CAPACITIES OF FLIGHT PERSONNEL c53
V. A. Bodrov, A. A. Kupriyanov, and V. V. Kharin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 35-39 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 26-29 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Psychophysiological parameters of 89 pilots were examined when they performed flight tasks under normal and complicated conditions. The experiments helped to reveal a group of test subjects (11.2%) who had low capabilities and made serious errors. The results obtained suggest that psychophysiological examinations during stimulated professional activity can be recommended as a method to be used for measuring adaptive and compensatory capabilities of pilots undergoing medical expertise. Author

N86-15871# Joint Publications Research Service, Arlington, Va.
EFFECT OF LEVEL OF PHYSICAL ACTIVITY ON LIPID METABOLISM OF FLIGHT PERSONNEL c52
V. I. Libkind and V. D. Vlasov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 40-43 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 29-31 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Lipid metabolism of healthy pilots was investigated and verified by the PWC sub 170 test. Pilots with a lower physical activity showed high levels of cholesterol, triglycerides, total lipids, LDL and low levels of HDL as averaged per group. The PWC sub 170 value and the concentration of lipid fractions in blood were found to be highly correlated, the correlation being nonlinear. The nonlinear regression data suggest that greater physical activity leads to a decrease of the lipid concentration and an increase of the content of high density lipid-protein complexes. Author

N86-15872# Joint Publications Research Service, Arlington, Va.
OXYGENATION AND REGIONAL CIRCULATION IN GINGIVAL MUCOSAL TISSUES UNDER EFFECT OF HEAD-TO-PELVIS (+Gz) ACCELERATIONS c52
S. I. Volvach, Ye. A. Kovalenko, L. I. Voronin, N. V. Ulyatovskiy, V. K. Gabyshev, V. I. Nikiforov, and V. V. Arkhipov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 44-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 31-35 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The information content of a new rheopolarographic procedure used to determine the oxygen balance and regional circulation of the gingival mucosa was measured, bearing in mind the applicability of the procedure as an objective index of human tolerance to +Gz acceleration. It was found that the parameters of the oxygen balance and regional circulation of the gingival mucosa were well correlated with blood pressure in the floor of the auricle. In contrast to the traditional methods for assessing tolerance to acceleration, the new procedure provides information about the health condition of the centrifuged subjects on a continuous basis. Variations in the oxygen balance and regional circulation of the gingival mucosa helped to identify compensatory reactions of the cardiovascular system in response to +Gz acceleration. Author

N86-15873# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF SOME ASPECTS OF HUMAN AMINO ACID METABOLISM DURING 120-DAY ANTIORTHOSTATIC HYPOKINESIA c52
T. F. Vlasova, Ye. B. Miroshnikova, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 50-53 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 35-38 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The free amino acid pool of blood of man exposed to 120-day head-down tilt (at -4 deg) was examined. Beginning with bed rest day 28 and till the end of the study, the amino acid pool increased. The increase involved most free amino acids which was produced

by a decline of anabolic and stimulation of catabolic processes during hypokinesia. Author

N86-15874# Joint Publications Research Service, Arlington, Va.
EFFECT OF 7-DAY IMMERSION HYPOKINESIA ON CHARACTERISTICS OF PRECISION MOVEMENTS c52
L. S. Grigoryeva and I. B. Kozlovskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 54-59 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 38-42 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Experiments were carried out to study the effect of 7-day immersion hypokinesia on precision movements that included reproduction of a certain isometric strain of leg muscles and angular displacement of the ankle relative to the 90 deg position. Precision disorders were seen in the structure of movements which lost their stereotypic pattern and became fragmentary, transforming into slow approximate movements versus the pattern of preimmersion movements that were of a rapid programmed control type. Precision changes during plantar flexion movements were usually excessive, hypermetric and almost twice longer than preimmersion. The origin of the above precision changes seems to be primarily associated with muscle atonia. At the same time data analysis shows that in nearly 50% of cases the values of precision changes in movements of various types (efforts and displacements) and different directions (plantar and dorsioflexion) were correlated. This is suggestive of common central mechanisms underlying their development. Author

N86-15875# Joint Publications Research Service, Arlington, Va.
EFFECT OF DRY IMMERSION MODEL ON PARAMETERS OF FLUID-ELECTROLYTE METABOLISM, BLOOD PLASMA ALDOSTERONE AND CORTISOL LEVELS IN INDIVIDUALS DIFFERING IN BODY FLUID CONTENT c52
M. A. Yunusov, V. N. Orlov, and T. V. Virokhodova *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 60-64 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 42-45 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Experiments were carried out to study the effect of dry immersion on fluid-electrolyte metabolism, aldosterone and cortisol content in 22 test subjects with varying content of water in the organism. It was found that dry immersion produced a diuretic effect and facilitated a higher excretion of electrolytes and a lower aldosterone content. The test subjects with a higher content of water in the organism (16 subjects) exhibited a more distinct and prolonged polyuria. During the recovery period the aldosterone content increased insignificantly and failed to return to the baseline level, in contrast to the subjects with a normal content of water in the organism. Author

N86-15876# Joint Publications Research Service, Arlington, Va.
INTENSITY OF LIPID PEROXIDATION IN HYPOKINETIC RAT TISSUES
T. Ye. Shidlovskaya *in its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 65-69 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 45-48 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The intensity of lipid peroxidation in the homogenates and mitochondria of the liver, heart and skeletal muscle of hypokinetic rats was measured. The primary products of lipid peroxidation, i.e., diene conjugates, were accumulated in all tissues on hypokinesia days 3, 15 and 30. The content of the final product--malonic dialdehyde--in the mitochondria increased on hypokinesia days 15 and 30. The low level of NADPH, an ascrobate-dependent lipid peroxidation, in the mitochondria at early stages of hypokinesia (up to 15 days) and diene conjugates in homogenates on hypokinesia day 7 can be attributed to an activation of the protective systems of the organism against the immobilization stress. It is suggested that at early stages of hypokinesia the process of lipid peroxidation, or to be more precise, lipid hydroperoxidation can be blocked. Author

N86-15877# Joint Publications Research Service, Arlington, Va.
EFFECT OF 24,25-DIHYDROXYVITAMIN D3 ON OSTEOGENETIC PRECURSOR CELLS IN IMMOBILIZED RATS
V. N. Shvets, T. Ye. Burkovskaya, Z. Ye. Vnukova, and O. Ye. Kabitskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-003) 4 Nov. 1985 p 70-76 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 48-53 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The experiments were carried out on Wistar SPF rats that were immobilized for 35 days. By heterotopic marrow cell transplantation under the kidney capsule to the normal rates and by cloning these cells in vitro it was found that osteogenetic potentials were significantly inhibited and the amount of osteogenetic precursor cells was reduced. The addition of 24,25(OH)2D3 vitamin (at a dose of 1.25 micrograms per day) to the animal die led to the normalization of the above parameters. It is assumed that immobilization-associated osteoporosis develops via, among other mechanisms, inhibition of histogenesis of stromal precursor cells. The beneficial role of vitamin D3 is actually the activation of histogenesis of these cells which results in the recovery of bone remodelling during immobilization. Author

N86-15878# Joint Publications Research Service, Arlington, Va.
BASIC RESULTS OF EXPERIMENTS WITH LONG-TERM ROTATION OF RATS AS APPLIED TO THE PROBLEM OF ARTIFICIAL GRAVITY
A. R. Kotovskaya, I. B. Krasnov, and A. A. Shipov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 77-81 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 53-57 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Rats housed as a group per cage were centrifuged for 21 and 30 days at 1.1. and 2.0 G. The following parameters were measured: (1) motor activity, body mass, static and dynamic endurance, acceleration (+Gz) tolerance, vestibular function, equilibrium function, skeletal muscle contractility, bone dynamics, gas exchange, blood biochemistry, weight of adrenals, thymus and thyroid gland; (2) morphology of adrenals, thyroid gland, and cortex of the cerebellum nodulus; and (3) biochemistry of blood hormones, energy metabolism enzymes in the liver, bone phosphatase, myosin Ca-Mg-ATPase in the myocardium, protein sulfhydryl groups in the cerebellar motor cortex. It was demonstrated that prolonged (1/50 of their life time) centrifugation of unrestrained rats causes no deterioration of many physiological functions, i.e., rotation produces no adverse effects on the animal body. Author

N86-15879# Joint Publications Research Service, Arlington, Va.
MAN'S TOLERANCE TO FULMINANT FORM OF HYPOXIC HYPOXIA c52
A. Yu. Katkov. Ye. P. Vyazova, R. N. Chabdarova, I. S. Krikun, and Zh. M. Kudryashova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 82-86 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 57-60 (For primary document see N86-15865 06-51)
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Rapidly progressing, or fulminant form of hypoxic hypoxia is among the extreme factors to which one is exposed in case of depressurization of a flight vehicle. It can be simulated by means of breathing with inert gas. The results of testing reactions to fulminant hypoxia elicited by breathing nitrogen are presented in this report. B.W.

N86-15880# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CATECHOLAMINE METABOLISM AT HIGH ALTITUDES c52
N. A. Davydova, Yu. A. Senkevich, M. B. Belakovskiy, and S. V. Samratova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 87-91 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 60-63 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The function of the sympathoadrenal system (SAS) measured with respect to the content of epinephrine and norepinephrine in blood and urine as well as dopamine and DOPA in urine of mountaineers and atheletes nontrained to high altitudes was examined. It was found that the mediator component of the SAS was activated in the athletes and that the adaptive capability of the SAS of the mountaineers was adequately high. Author

N86-15881# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF INCREMENT OF BACILLUS SUBTILIS BIOMASS IN WEIGHTLESSNESS
F. Bergter, D. Harz, P. J. Muller, K. Mund, U. Gunter, T. Hesse, R. Hartmann, G. Wanke, M. G. Talrbekov, G. P. Parfenov et al *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 92-95 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 63-65 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

This paper presents the results of a microbiological experiment carried out by the Soviet and GDR scientists onboard SALYUT-6. The experiment was performed using a Bacillus subtilis suspension in the Jena unit. The purpose of the experiment was to study the time-course variations of the cell biomass increase in zero-g. The cell culture development was measured with respect to the utilization rate of glucose or casein hydrolysate in the nutrient medium and the rate of protein accumulation in cells. It has been shown that the rate of biomass increment in zero-g lags behind the 1 g level. It can be concluded that the decreased metabolic activity of bacterial cells in zero-g is associated with changes in the cell population distribution and physiochemical parameters of the nutrient medium. Author

N86-15882# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF MICROFLORA OF CHUFA, A POTENTIAL HIGHER PLANT COMPONENT OF BIOLOGICAL LIFE-SUPPORT SYSTEMS FOR MAN
L. S. Yunusova and N. A. Drugova *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 96-100 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 65-68 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The microbiological characteristics of the chufa plant grown alone or in combination with wheat and vegetables were investigated. The results showed that the bacterial flora of chufa plants did not change significantly. The bacterial count decreased during nodule formation. The number of actinomycetes increased when chufa and wheat plants were grown together. By the end of vegetation fungi were accumulated in the chufa rhizosphere. Among the physiological groups involved in the transformation of nitrogen-containing compounds ammonifiers were predominant. At the germination stage ammonification and denitrification processes increased, cellulose-decomposing bacteria appeared, oligonitrophilic forms occurred. From the microbiological point of view chufa plants can be used in the higher plant component of the biological life support system. Author

N86-15883# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF DISTINCTIONS REFERABLE TO GROWTH, DEVELOPMENT AND METABOLISM OF CLOSTERIOPSIS ACICULARIS ALGAE WHEN CELLS ARE LIMITED IN NITROGEN AS RELATED TO BIOLOGICAL LIFE-SUPPORT SYSTEMS FOR MAN
A. A. Antonyan, M. A. Levinskikh, and N. I. Sukhova *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 101-108 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 69-73 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The growth, development and metabolism of a new form of green unicellular algae Closteriopsis acicularis were investigated from the point of view of their potential use in the biological life support system (BLSS). Their growth and biochemical characteristics were studied as a function of nitrogen supply. During the nitrogen-deficiency cultivation the growth rate remained unchanged, cell division and biomass increment was uncoupled, and carbohydrate formation was predominant. The content of carbohydrates increased at the expense of assimilable fractions, particularly starch. These data can be used in the selection of an optimum nitrogen level for the case of algal continuous cultivation, in the development of diets that can be provided by a BLSS incorporating Closteriopsis acicularis. Author

N86-15884# Joint Publications Research Service, Arlington, Va.
FORMATION OF VOLATILE SUBSTANCES DURING POLYMER DESTRUCTION BY PSEUDOMONAS AERUGINOSA c27
N. D. Novikova and S. N. Zaloguyev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 109-113 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 74-76 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The effect of biodestruction of paint-and-varnish coatings on the formation and evolution of toxic substances was studied. It was found that the multiplication of Pseudomonas aeruginosa on epoxide resins (EP-255+EP-525/AK-070) modified the evolution of gases: that of acetone and n-butanone increased and evolution of xylene and ethyl benzene isomers decreased. Author

N86-15885# Joint Publications Research Service, Arlington, Va.
ONE ASPECT OF CREW TRAINING c53
Ye. D. Konovalov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 114-119 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 77-80 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

This paper describes the psychophysical training of crewmembers of flying vehicles who may find it necessary to cross a water boundary or to remain for long in water after emergency splashdown. In order to prevent attacks of fear and panic caused by such frightful things as whirlpools and convulsions, the paper presents data on the nature of turbulent processes in running water and the techniques of overcoming them as well as on the origin of convulsions in swimmers and methods of their alleviation. B.W.

N86-15886# Joint Publications Research Service, Arlington, Va.
METHOD OF CALCULATING ANGULAR DIMENSIONS OF FLIGHT VEHICLE COCKPIT CANOPY CASINGS c54
A. V. Lekarev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 120-124 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 81-83 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The view from flight vehicle (FV) cockpits is an important factor in assuring flying safety and providing comfortable conditions for the pilot's visual observation of space outside the cockpit. At the present time, transparent parts of most cockpits in different types of FV are executed in the form of flat panels installed into the

metal frame of the cockpit canopy. Presence of opaque components (casings) in the cockpit canopy results in obscuring part of the outside area, which worsens viewing conditions from the pilot's work place. In order to improve the view from FV cockpits with flat transparent parts, a method was developed for calculating the angular dimensions of casings (seams) on the basis of distinctions of human binocular vision. The proposed method makes it possible to meet the requirements as to strength features of the canopy frame and provide for comfortable viewing conditions outside the cockpit. The method is based on crossed diplopia in an empirical horopter from a point of the cyclopic eye of the observer. B.W.

N86-15887# Joint Publications Research Service, Arlington, Va.
INFORMATIVENESS OF ECHO SIGNAL IN PULSED ULTRASONOGRAPHY OF THE BRAIN (WITH USE OF MODEL) c52
L. G. Simonov, L. A. Rozenblyum, and N. N. Bogdanova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 125-130 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 83-85 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

A change in hydrostatic pressure leads to change in intracranial volumetric relationships (IVR) of liquid media, which has a substantial effect on intracranial pressure and blood supply to the brain. As a noninvasive method of assessing IVR, one can use ultrasonic pulsed probing of the walls of the cerebral ventricles. However, because of its low noise immunity and several other factors that affect the amplitude of the echo signal, the reliability of such a method for evaluation of IVR of liquid media is not satisfactory. A method of probing intracranial structures is described in which the ultrasonic pulse penetrates through the frontal bone, passes through the ventricle and is reflected from the stationary occipital bone. A model was developed to determine the informativeness of an echo obtained in this manner. It was demonstrated on this model that a change in level of the echo signal is elicited by change in ventricular volume. The base width of the ventricle causes this to be a monotone function. It was shown that such a probing method is less sensitive to change in acoustic properties of brain tissue than ultrasonic methods involving direct probing of ventricular walls. B.W.

N86-15888# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF POSSIBILITY OF USING TWO-FREQUENCY IMPEDOMETRY FOR ESTIMATION OF PROPORTION OF TOTAL AND EXTRACELLULAR BODY FLUIDS c52
V. P. Krotov, Ye. G. Bazunova, and B. S. Kulayev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 131-136 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 86-89 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

According to the results of postflight examination of cosmonauts, exposure to weightlessness leads to changes in fluid-electrolyte metabolism and in ratio between liquid phases of the body. It is not possible to establish the kinetics of fluid redistribution in the body as a function of duration of weightlessness, since a method has not yet been found that would permit measurement of body fluids and proportion of each in flight. Recently, works have been published, which report that it is possible to determine the ratio of total body fluid to its extracellular component. This is done by concurrently determination of impedance (Z) in the measured section of the body during passage of current through it at different frequencies. However, all of the studies cited above have a clinical and physiological orientation, with which it is impossible to determine distinctly the quantitative relationship between total fluid and its extracellular component. The objective in this research is to explore the possibility of using two-frequency impedometry to determine the quantitative ratio between total body fluid and its extracellular component. B.W.

N86-15889# Joint Publications Research Service, Arlington, Va.
AUTOMATIC DETERMINATION OF CARDIAC OUTPUT FROM RHEOGRAM OF THE TRUNK c52
I. V. Sokolova and L. A. Khryashcheva *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 137-140 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 89-90 (For primary document see N86-15865 06-51)
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Depending on the method of recording the trunk rheogram (TRG) and theoretical validation of formulas for subsequent calculations, many rheographic analogues of characteristics of cardiac output are calculated from the amplitude and period of the TRG with use of appropriate multiplicative coefficients. The technical execution of the system for automatic determination of characteristics of cardiac output on the TRG in the form of an algorithm for a computer does not impose restrictions on structure and number of coefficients, and it offers broad research opportunities for studying them in comparison of rheography to other methods. The algorithm for automatic determination of cardiac output features from the TRG is developed in this investigation in the form of a set of programs in the FORTRAN-IV algorithmic language for YeS or SM series computers, and it solves the following problems: (1) isolation of rheowave as the valid signal in the presence of interference, (2) identification of elements in the rheowave structure for the duration of the cardiac cycle, (3) calculation of rheographic characteristics of cardiac output for the cardiac cycle, and (4) statistical averaging of rheographic characteristics of cardiac output in a specified interval for a specified level of significance. B.W.

N86-15890# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATE OF THE OLFACTORY ANALYZER IN A PRESSURIZED ENVIRONMENT c52
S. S. Pashin and G. I. Solomin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 141-144 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 90-92 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Man's long-term presence in pressurized environments (PE) imposes certain requirements of the composition of the artificial atmosphere in space vehicles. It is important for there to be no odors of various impurities. The latter is attributable to the range of reflex effects of chemicals through receptors of the upper respiratory tract on other analyzers, functional state of the central nervous system, various organs, systems and the body as a whole. It is particularly undesirable to have persistent odorous stimuli in the atmosphere of a pressurized environment, and for this reason odorimetric studies are a mandatory stage of setting hygienic standards. However, such studies are performed under ordinary laboratory conditions, without consideration of the possible functional changes in the olfactory analyzer related to long-term isolation of an individual. An attempt was made in this research to demonstrate any possible functional changes in the olfactory analyzer during long-term exposure of man to the artificial atmosphere of a pressurized chamber. B.W.

N86-15891# Joint Publications Research Service, Arlington, Va.
GAS CHROMATOGRAPHIC ANALYSIS OF FREE FATTY ACIDS OF SKIN SURFACE LIPIDS c52
V. P. Maydina, B. L. Avetisyants, and D. M. Dubinin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 145-148 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 93-94 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

The basic components of sebaceous gland secretions are triglycerides, which are hydrolyzed to free fatty acids, monoglycerides and diglycerides on the skin surface, under the effect of

lipases of microorganisms and other factors. Studies of the microflora of the skin surface revealed that it contains aerobic staphylococci, anaerobic propionobacteria and fungi which have lypolytic activity. A correlation was establishment between quantity of microorganisms of the micrococcus family and acne propionobactria on the skin, on the one hand, and rate of formation of free fatty acids (FFA) of sebum cutneum, on the other band. The bactericidal and fungicidal properties of the skin are attributed to the presence of FFA on its surface. The authors of hypotheses on the pathogenesis of acne simplex believe that inflammation of the follicular wall of a sebaceous gland is related to the irritating effect of FFA. Because of the high sensitivity and informativeness of gas chromatography, it has gained wide use in the last 10 years in biomedical investigations. The objective here was to develop a gas chromatography method for examining the FFA of sebum cutaneum. B.W.

N86-15892# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF MINERAL NUTRITION OF A NEW FORM OF MICROALGAE TO BE USED IN BIOLOGICAL LIFE-SUPPORT SYSTEMS
M. A. Levinskikh and O. G. Livanskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 149-151 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 95-96 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

Closteriopsia acicularis var. africana Hind unicellular green algae attracted the attention of researchers because, unlike Chlorella, it has a readily broken down cell membrane and, according to preliminary data, its biomass contains considerable amounts of readily assimilated carbohydrates. It is felt that inclusion of this alga in the photoautotrophic part of a biological life-support system (BLSS) for man could optimize its features considerably. One of the main questions in studying unicellular algae as applied to human BLSS is their biogenic element requirements. Such knowledge is necessary in order to provide optimum mineral nutrition for algae and high productivity, but mainly to maintain these conditions on a specific level during continuous cultivation in the mode of medium recirculation, which requires constant replenishment of biogenic elements in strict accordance with their removal with the collected harvest. Data was obtained on biogenic element requirements of algae during accumulating cultivation under different cultivation conditions. B.W.

N86-15893# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
9 Oct. 1985 73 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-031) Avail: NTIS HC A4/MF A01

Progress in science and technology in East European countries is reported. Topics discussed include: German-Soviet joint training of electrical engineers, advanced process for metal glass which failed industrial adaptation, advances in radio biological research; advances in optoelectronic, nuclear reactor, radiobiological research. For individual titles, see N86-15894 through N86-15896.

N86-15894# Joint Publications Research Service, Arlington, Va.
ADVANCES IN RADIOBIOLOGICAL RESEARCH: HYPOXIC IRRADIATION EFFECTS
A. M. Dancewicz and M. M. Jelenska *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) 9 Oct. 1985 p 7-13 refs Transl. into ENGLISH from Nukleonika (Warsaw, Poland), no. 7-8, 1982 p 377-386 (For primary document see N86-15893 06-51)
Avail: NTIS HC A04/MF A01

The effect of hypoxic conditions during irradiation of rats with 9.0 Gy dose of X-rays determined in lung homogenate concentration of DNA, protein and collagen and the activity of cathepsin, beta-glucuronidase, acid phosphatase and plasminogen activator was studied. It was found that regardless of hypoxic conditions of irradiation, collagen content in rat lungs was increased with time after exposure. Thypoxic conditions resulted in partial decrease during later periods after exposure to other biochemical indices of irradiation. It is evident in the case of the fibrinolytic activity which in hypoxic rats is increased during first several days while in rats irradiated under normal conditions this increase persist for more than 1 year after exposure. E.A.K.

N86-15895# Joint Publications Research Service, Arlington, Va.
TRITIUM INGESTION IN RATS
Zofia Pietrzak-Flis and Irena Radwan *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) 9 Oct. 1985 p 14-25 refs Transl. into ENGLISH from Nukeonika (Warsaw, Poland), v. 27, no. 7-8, 1982 p 389-403 (For primary document see N86-15893 06-51)
Avail: NTIS HC A04/MF A01

The effect of chronic ingestion of tritiated water and tritiated food on growth and reproduction of Wistar rats was evaluated. The animals were exposed during one or three successive generations. Ingestion of tritiated food caused higher reduction in sperm count than tritiated water. It is found that the effect of tritium on growth of rats and ability for sperm production depends on the absorbed dose and the form of ingested tritium. E.A.K.

N86-15896# Joint Publications Research Service, Arlington, Va.
ADVANCES IN OPTOELECTRONIC, NUCLEAR REACTOR, RADIOBIOLOGICAL RESEARCH: HIGH VOLTAGE OPTO-COUPLER c35
Jacek Stanislawski and Ewa Serebrankow *In its* East Europe Report: Science and Technology (JPRS-ESA-85-031) 9 Oct. 1985 p 26-36 refs Transl. into ENGLISH from Nukleonika (Warsaw, Poland), v. 27, no. 9-10, 1982 p 419-434 (For primary document see N86-15893 06-31)
Avail: NTIS HC A04/MF A01

The parameters of optocouples are discussed and the results of measurements of light emitting diodes (LED's) and photodiodes are shown. The scheme and characteristics of the fast high voltage optical isolator developed are presented. The obtained parameters are as follows: isolation voltage over 70 kB, t sub d--delay time is less than 50 ns, stability delta t sub d/delta I sub LED < 0.5 ns/a with I sub LED > 5a. E.A.K.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-15897 Department of the Army, Washington, D. C.
ANTI-TRYPANOSOMAL ACTIVITY OF PLATINUM COORDINATION COMPOUNDS Patent
M. S. Wysor and L. A. Zwelling, inventors (to Army) Issued 30 Jul. 1985 4 p
(AD-D011860; US-Patent-4,532,122; US-Patent-Appl-SN-250991; US-Patent-Class-424-10) Avail: US Patent and Trademark Office CSCL 06/15

A novel method has been developed for improved chemotherapy of animals infected with African trypanosomiais. The method involves the concurrent administration of therapeutically effective amounts of cis-diamminedichloroplatinum (II) and bis-(diethylthiocarbamoyl)disulfide (disulfiram) or diethyl dithiocarbamate to the hydrated animal. Author (GRA)

N86-15898*# Stanford Univ., Calif. Dept. of Psychology.
COMPUTATIONAL MODELS OF HUMAN VISION WITH APPLICATIONS Final Report, Oct. 1985
Brian A. Wandell 12 Sep. 1985 7 p
(Contract NCC2-44)
(NASA-CR-176413; NAS 1.26:176413) Avail: NTIS HC A02/MF A01 CSCL 06P

Perceptual problems in aeronautics were studied. The mechanism by which color consistency is achieved in human vision was examined. A computable algorithm was developed to model the arrangement of retinal cones in spatial vision. The spatial frequency

spectra are similar to the spectra of actual cone mosaics. The Hartley transform as a tool of image processing was evaluated and it is suggested that it could be used in signal processing applications, GR image processing. E.A.K.

N86-15899# Desmatics, Inc., State College, Pa.
STATISTICAL RESEARCH ON PROBLEMS OF BIODYNAMICS Final Report
K. C. Burns, C. A. Mauro, and D. E. Smith Jul. 1985 23 p
(Contract N00014-79-C-0128)
(AD-A157993; TR-112-19) Avail: NTIS HC A02/MF A01 CSCL 06/19

The statistical research conducted focused on two major problem areas within the Navy's biodynamics program at NBDL. Those were: (1) impact acceleration injury, and (2) ship motion sickness. Additional research was conducted in the area of performance testing, which is relevant to both of the primary research topics. The following sections briefly summarize the research accomplished under this contract and provide a reference list of all technical reports (with abstracts), journal articles, and presentations resulting from this research effort. GRA

N86-15900# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE MIDDLE LATENCY RESPONSE (MLR) AND STEADY STATE EVOKED POTENTIAL (SSEP) IN NEONATES Ph.D. Thesis
R. C. Fifer May 1985 180 p
(AD-A158007; AFIT/CI/NR-85-100D) Avail: NTIS HC A09/MF A01 CSCL 06/16

This study evaluated the characteristics of the middle latency response (MLR) and the related steady state evoked potential (SSEP) in a total of 36 neonates. The reports of previous investigators have cast doubt on the existence of both the MLR and SSEP in neonates. The measurements in these studies were obtained, however, using stimulation and recording parameters that are appropriate for adults. Since virtually all other aspects of neonate audition differ significantly from comparable adult attributes, one goal of this study was to determine the appropriate parameters with which to obtain a valid MLR and SSEP in very young children. Other goals of this study included: (1) evaluation of two different algorithms for low-frequency sensitivity prediction using the SSEP; (2) investigation of the stability of the SSEP over repeated trials; and (3) elucidation of the relationship the neonatal MLR to later occurring auditory evoked potentials. GRA

N86-15901# Maryland Univ., College Park.
BINOCULAR IMAGE FLOWS: STEPS TOWARD STEREO - MOTION FUSION
A. M. Waxman and J. H. Duncan May 1985 60 p
(Contracts DAAK70-83-K-0018; DE-AC03-84ER-80189)
(AD-A158089; CAR-TR-119; CS-TR-1494) Avail: NTIS HC A04/MF A01 CSCL 06/16

In decomposing the visual information processing task into several stages, it is the intermediate level which is responsible for the recovery of surface shapes in a scene. It is often described as a set of shape from modules which, acting independently and in parallel, feed a viewer centered 2.5-D sketch of the visual field. Two of the most commonly studied and closely related modules are shape from stereo and shape from monocular motion. The analyses of visual data by stereo and motion modules have typically been treated as separate, parallel processes which both feed a common viewer-centered 2.5-D sketch of the scene. When acting separately, stereo and motion analyses are subject to certain inherent difficulties: (1) stereo must resolve a combinatorial correspondence problem and is further complicated by the presence of occluding boundaries; (2) motion analysis involves the solution of nonlinear equations and yields a 3-D interpretation specified up to an undetermined scale factor. This report describes a new module which unifies stereo and motion analysis in a manner in which each helps to overcome the other's shortcomings. One important result is a correlation between relative image flow (i.e., binocular difference flow) and stereo disparity; it points to the importance of the ratio delta/delta, rate of change of disparity delta to disparity delta, and its possible role in establishing stereo correspondence. Our formulation may reflect the human perception channel probed by Reagan and Beverley (1979). GRA

N86-15902# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
COMPARISON OF THE AIR FORCE FEMALE AND MALE PILOT GROUNDED TIME IN THE AIR FORCE MILITARY AIRLIFT COMMAND M.S. Thesis
J. A. Holl Jun. 1985 35 p
(AD-A158093; AFIT/CI/NR-85-64T) Avail: NTIS HC A03/MF A01 CSCL 05/9

The US Air Force presently has over 200 female pilots, and the numbers are steadily increasing. This thesis is the first step in determining the effect of female pilots on the Air Forces' flying squadrons' efficiency and effectiveness. This protocol will compare the average number of days per year men and women pilots are grounded for medical reasons. The duty not involving flying time or DNIF statistics will be used for the data. There are no known studies indicating there is a significant difference in male/female pilot medial absenteeism rates. If the female DNIF rate is found to be significantly larger than the males, it may indicate an effect on the squadrons readiness abilities. The Military Airlift Command (MAC) is chosen for sampling because a relatively large number of female pilots (96) are assigned to this command. The women will be compared to a representative sample of 288 male pilots also assigned to MAC. AF form 1041, which reports DNIF time to Command Headquarters, will be used to collect the DNIF days from the past year; age, rank, and marital status will also be collected. DNIF rates will be calculated correcting for person/months of observation. The age, rank, and marital status specific rates will also be compared. Author (GRA)

N86-15903# Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
TOPICAL HAZARD EVALUATION PROGRAM OF CANDIDATE INSECT REPELLENT AI3-35770 HEXAHYDRO-1-((2-METHYLCYCLOHEXYL) CARBONYL)-1-H-AZEPINE Report, Aug. 1984 - Jun. 1985
R. D. Russell Jun. 1985 10 p
(AD-A158386; USAEHA-75-51-0435-85) Avail: NTIS HC A02/MF A01 CSCL 06/20

Topical Hazard Evaluations of USDA Candidate Insect Repellent AI3-35770 were performed using New Zealand White rabbits, albino Hartley guinea pigs, and Sprague Dawley rats. Chemical AI3-35770 produced moderate to severe primary dermal irritation and necrosis in rabbits and guinea pigs. These effects were quantitatively worse in rabbits than in guinea pigs. This compound was moderately toxic to rats when given by the oral route. GRA

N86-15904# Army Research Inst. of Environmental Medicine, Natick, Mass.
HUMAN THERMOREGULATORY RESPONSES TO COLD AIR ARE ALTERED BY REPEATED COLD WATER IMMERSION
A. J. Young, S. R. Muza, M. N. Sawka, R. R. Gonzalez, and K. B. Pandolf Aug. 1985 30 p
(DA Proj. 3E1-62777-A-879)
(AD-A158871; USARIEM-M38/85) Avail: NTIS HC A03/MF A01 CSCL 06/19

The effects of repeated cold water immersion on thermoregulatory responses to cold air were studied in seven males. A cold air stress test (CAST) was performed before and after completion of an acclimation program consisting of daily 90-min cold (18 C) water immersion, repeated five times a week for five consecutive weeks. The CAST consisted of resting 30 min in a comfortable (24 C, 30% rh) enviroment followed by 90 min in cold (5 C, 30% rh)air. Pre- and post-acclimation, metabolism (M) increased ($P < 0.01$) by 85% during the first 10 min of CAST, and thereafter rose slowly. After acclimation, M was lower ($P < 0.02$) at 10 min of CAST compared to before, but by 30 min M was the same. Therefore, shivering onset may have been delayed following acclimation. After acclimation, rectal temperature (T_{re}) was lower ($P < 0.01$) before and during CAST, and the drop in T_{re} during CAST was greater ($P < 0.01$) than before.

Mean weighted skin temperature (T subscript sk) was lower ($P < 0.01$) following acclimation than before, and acclimation resulted in a larger ($P < 0.02$) T subscript re to T subscript sk gradient. Plasma norepinephrine increased during both CAST ($P < 0.002$), but the increase was larger ($P < 0.004$) following acclimation. These findings suggest that repeated cold water immersion stimulates development of true cold acclimation in man, as opposed to habituation. The cold acclimation produced appears to be of the insulative type. GRA

N86-15905# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
SOME EFFECTS OF ALCOHOL AND SIMULATED ALTITUDE ON COMPLEX PERFORMANCE SCORES AND BREATH ANALYZER READINGS
W. E. Collins, H. W. Mertens, and E. A. Higgins Jul. 1985 12 p
(AD-A158925; DOT/FAA-AM-85-5) Avail: NTIS
HC A02/MF A01 CSCL 06/15

This study assessed possible interactive effects of alcohol and a simulated altitude of 12,500 ft. Each of 17 men was trained on the various tasks that comprise the Multiple Task Performance Battery and then performed over a 2-week period in four experimental sessions, viz, ground level (1,300 ft), with and without alcohol, and altitude (12,500 ft), with and without alcohol. Subjects breathed appropriate gas mixtures through oxygen masks at both ground level and high altitude. Subjects performed for 3 hours in the afternoon. Alcohol doses were 2.2 mL of 100-proof vodka per kilogram of body weight mixed with three parts of a selected juice. Each 1-hour test block included five 10-minute performance periods with varying workloads and a 10-minute period for controlled breathanalyzer measurements. Results showed no differential effect of simulated altitude on breathanalyzer readings (peaks averaged .078% at 12,500 ft and .077% at ground level). The best performance occurred at ground level under placebo conditions; the 12,500-ft simulated altitude produced some decrement, for the placebo scores were depressed by altitude. Thus, there was no interactive effect of alcohol and altitude on either breathanalyzer readings or performance scores. However, the general decrement produced by altitude (witn or without alcohol) serves to reduce further whatever margin of safety remains in performance skills following alcohol ingestion. Author (GRA)

N86-15906# Northwestern Univ., Evanston, Ill.
ENHANCING VISUAL SENSITIVITY Final Report, 1 Oct. 1983 - 30 Sep. 1984
R. Sekuler 24 May 1985 36 p
(Grant AF-AFOSR-0246-80)
(AD-A158799; AFOSR-85-0663TR) Avail: NTIS
HC A03/MF A01 CSCL 05/10

This report summarizes the major studies carried out under AFOSR grant 80-0246 from October 1, 1983 through September 30, 1984. During this report period we did coordinated work on two aspects of motion perception. One work unit extended our earlier research on how training affects direction discrimination. These studies give new insights into the physiological locus and character of this particular form of perceptual learning. The second work unit exploited perceptual confusions among motion metamers in order to develop a quantitative model of the mechanisms that underlie human direction perception. The model is built around a small number ($n=12$) of broadly-tuned directionally-selective mechanisms. This model gives an excellent account of the experiments with motion metamers. Author (GRA)

N86-15907# Dalhousie Univ., Halifax (Nova Scotia).
VISUAL SENSITIVITIES AND DISCRIMINATIONS AND THEIR ROLES IN AVIATION Interim Technical Report, 1 Oct. 1983 - 30 Sep. 1984
D. Regan 17 Jun. 1985 44 p
(Grant AF-AFOSR-0030-84)
(AD-A158962; AFOSR-85-0639TR) Avail: NTIS
HC A03/MF A01 CSCL 05/9

This report present four studies. An individual's ability to discriminate small differences in orientation about 5% and 0.5 deg respectively contrasts with the coarse size and orientation selectivity of neurons in the visual cortex of the brain. We report evidence that these fine discriminations are achieved by means of opponent processing: size discrimination is determined by antagonism between neurons that are coarsely selective for size, and orientation discrimination is mediated by neurons that are coarsely selective for orientation. Opponent processing implies that the neurons that determine detection are not the neurons that determine fine discrimination: we have experimentally verified that prediction. We have measured motion discrimination in pilots and attempted to predict flying performance in simulators and telemetry-tracked aircraft. Correlations between laboratory tests and flying performance were encouraging, and were much stronger than for simple visual sensitivities such as motion on contrast sensitivity. Some objects are invisible unless they move relative to the background, for example, a grassy hillock viewed against grass in nap of the earth helicopter flight. We have compared human visual sensitivity to such objects, with sensitivity to conventional objects defined by brightness difference. Spatial summation area, and temporal summation area are much larger for motion-defined objects than for brightness-defined objects. We report evidence that the Vector Analysis technique of mathematics may be relevant to the physiological study of visual cues in guided self-motion. GRA

N86-15908# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
STOCHASTIC DIFFERENTIAL EQUATIONS FOR NEURONAL BEHAVIOR
S. K. Christensen and G. Kallianpur Jun. 1985 44 p
(Contract F49620-82-C-0009)
(AD-A159099; TR-103; AFOSR-85-0706TR) Avail: NTIS
HC A03/MF A01 CSCL 06/16

This article extends the recent work of Kallianpur and Wolpert modeling the behavior of neurons by means of stochastic partial differential equations on the dual of a nuclear space. The extensions will cover nuclear spaces of a more general structure and will apply to models described in terms of more general differential operators. A second objective of this article is to present a theoretical framework which will include the model recently proposed and heuristically investigated by Wan and Tuckwell. The authors illustrate their approach and its application by giving a rigorous treatment of the Wan and Tuckwell model. But first they briefly describe the neurophysiological context. Author (GRA)

N86-15909# North Dakota State Univ., Fargo. Dept. of Electrical and Electronics Engineering.
APPLICATION OF THE SYSTEM IDENTIFICATION TECHNIQUE TO GOAL-DIRECTED SACCADES Final Report, May 1984 - May 1985
J. D. Enderle Jul. 1985 30 p
(Contract F49620-82-C-0035)
(AD-A159102; USAFSAM-TR-85-37) Avail: NTIS
HC A03/MF A01 CSCL 06/16

System identification techniques were used to estimate muscle forces during horizontal saccadic eye movements in order to better understand the neuronal control strategy. The lateral and medial rectus muscle of each eye was modeled as a parallel combination of an active state tension generator with a viscosity and elastic element, connected to a series elastic element. The eyeball was modeled as a sphere connected to a viscosity and elastic element. The predictions of the model were shown to be in good agreement with the data. The results of extensive analysis did not support the existence of a postulated continuous-time external feedback control mechanism. Analysis of the data, however, did support a time optimal control strategy, a strategy which directs the eyeball to its destination in minimum time to saccades of all sizes. GRA

N86-15910# Naval Health Research Center, San Diego, Calif.
A COMPARISON OF THE EFFECTS OF CIRCUIT WEIGHT TRAINING ON MEN AND WOMEN Interim Report
E. J. Marcinik, J. A. Hodgdon, J. J. OBrien, and K. Mittleman

Jun. 1985 17 p
(M00-96-PN)
(AD-A159419; NAVHLTHRSCHC-85-13) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Prior to training, women exhibited 52.6% of male upper torso dynamic strength and 56.5% of male lower torso dynamic strength. Both sexes responded in a similar manner to the circuit weight training format. Dynamic muscular strength gains were 13.7% for men and 15.7% women. Stamina and all indices of relative body composition were unaffected by training. It can be concluded that circuit weight training demonstrates a potential for shipboard application. It results in the muscular strength gains shown to be necessary for shipboard work performance. It also helps to maintain aerobic fitness in a limited space environment. GRA

N86-15866# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF STUDYING FLIGHT WORK IN SOVIET AVIATION MEDICINE OF THE 1920'S - 1930'S
V. M. Munipov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 1-10 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 4-11 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15871# Joint Publications Research Service, Arlington, Va.
EFFECT OF LEVEL OF PHYSICAL ACTIVITY ON LIPID METABOLISM OF FLIGHT PERSONNEL
V. I. Libkind and V. D. Vlasov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 40-43 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 29-31 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15872# Joint Publications Research Service, Arlington, Va.
OXYGENATION AND REGIONAL CIRCULATION IN GINGIVAL MUCOSAL TISSUES UNDER EFFECT OF HEAD-TO-PELVIS (+Gz) ACCELERATIONS
S. I. Volvach, Ye. A. Kovalenko, L. I. Voronin, N. V. Ulyatovskiy, V. K. Gabyshev, V. I. Nikiforov, and V. V. Arkhipov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 44-49 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 31-35 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15873# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF SOME ASPECTS OF HUMAN AMINO ACID METABOLISM DURING 120-DAY ANTIORTHOSTATIC HYPOKINESIA
T. F. Vlasova, Ye. B. Miroshnikova, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 50-53 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 35-38 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15874# Joint Publications Research Service, Arlington, Va.
EFFECT OF 7-DAY IMMERSION HYPOKINESIA ON CHARACTERISTICS OF PRECISION MOVEMENTS
L. S. Grigoryeva and I. B. Kozlovskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 54-59 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 38-42 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15875# Joint Publications Research Service, Arlington, Va.
EFFECT OF DRY IMMERSION MODEL ON PARAMETERS OF FLUID-ELECTROLYTE METABOLISM, BLOOD PLASMA ALDOSTERONE AND CORTISOL LEVELS IN INDIVIDUALS DIFFERING IN BODY FLUID CONTENT
M. A. Yunusov, V. N. Orlov, and T. V. Vinokhodova *In its* USSR Report: Space Biology and Aerospace Medicine Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 60-64 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 42-45 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15879# Joint Publications Research Service, Arlington, Va.
MAN'S TOLERANCE TO FULMINANT FORM OF HYPOXIC HYPOXIA
A. Yu. Katkov, Ye. P. Vyazova, R. N. Chabdarova, I. S. Krikun, and Zh. M. Kudryashova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 82-86 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19 no. 4, Jul. - Aug. 1985 p 57-60 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15880# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CATECHOLAMINE METABOLISM AT HIGH ALTITUDES
N. A. Davydova, Yu. A. Senkevich, M. B. Belakovskiy, and S. V. Samratova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 87-91 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 60-63 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15887# Joint Publications Research Service, Arlington, Va.
INFORMATIVENESS OF ECHO SIGNAL IN PULSED ULTRASONOGRAPHY OF THE BRAIN (WITH USE OF MODEL)
L. G. Simonov, L. A. Rozenblyum, and N. N. Bogdanova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 125-130 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 83-85 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15888# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF POSSIBILITY OF USING TWO-FREQUENCY IMPEDOMETRY FOR ESTIMATION OF PROPORTION OF TOTAL AND EXTRACELLULAR BODY FLUIDS
V. P. Krotov, Ye. G. Bazunova, and B. S. Kulayev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 131-136 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 86-89 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15889# Joint Publications Research Service, Arlington, Va.
AUTOMATIC DETERMINATION OF CARDIAC OUTPUT FROM RHEOGRAM OF THE TRUNK
I. V. Sokolova and L. A. Khryashcheva *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 137-140 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 89-90 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15890# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATE OF THE OLFACTORY ANALYZER IN A PRESSURIZED ENVIRONMENT
S. S. Pashin and G. I. Solomin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 141-144 refs Transl. into

ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 90-92 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15891# Joint Publications Research Service, Arlington, Va.
GAS CHROMATOGRAPHIC ANALYSIS OF FREE FATTY ACIDS OF SKIN SURFACE LIPIDS
V. P. Maydina, B. L. Avetisyants, and D. M. Dubinin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 145-148 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 93-94 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-15911# Toronto Univ. (Ontario).
A COMPUTER MODEL OF DRIVER RESPONSE
L. D. Reid, W. O. Graf, and I. A. Stoddard Sep. 1985 153 p ref Sponsored in part by General Motors and Ontario Ministry of Transportation and Communications
(UTIAS-293; ISSN-0082-5255) Avail: NTIS HC A08/MF A01

The development of a digital computer software package designed to allow the user to predict the dynamic computer software package designed to allow the user to predict the dynamic response of a driver/vehicle system to a limited number of roadway scenarios is described. The simulation is restricted to a single vehicle travelling at constant forward speed and does not cover complex multivehicle interactions. When a driving scenario is specified, the program selects a driver model. A simulation program is used to steer the vehicle through the maneuvers necessary to complete the driving task. In this manner records of steering wheel position and vehicle trajectory are generated. Three driving scenarios are included in the present development: (1) lane tracking along a straight roadway in the presence of disturbances; (2) lane tracking along a winding roadway; and (3) the obstacle avoidance maneuver. They are basically linear differential equations which mimic the driver's steering wheel response under the conditions which hold in each driving scenario. Each module in the analysis package is described. Author

N86-15912# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A COMPUTER MODEL OF CASE-BASED REASONING IN PROBLEM SOLVING: AN INVESTIGATION IN THE DOMAIN OF DISPUTE MEDIATION Ph.D. Thesis
R. L. Simpson, Jr. Jun. 1985 393 p
(AD-A158097; AFIT/CI/NR-85-81D) Avail: NTIS HC A17/MF A01 CSCL 05/10

Rather than approach each problem as a unique event, people often try to solve problems by recalling similar previous experiences as guides to problem solving. This analogical process, which we call case-based reasoning, seems to provide an explanation for the change in problem solving behavior of people over time. This research presents a computer process model of problem solving based on the use of case-based reasoning. The necessary reasoning processes, operational measures of similarity, and memory structures needed for effective storage and retrieval are presented via the specifications for an advisory system called the MEDIATOR, which offers advice on resolving common sense disputes. In this context, issues associated with enabling machines to dynamically adapt their reasoning and automatically recover from failure are discussed. The model of case-based problem solving which has been developed seems to offer promise as an integrated solution for some issues in problem solving, analogical reasoning, and machine learning. GRA

N86-15913# Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.
ON LOOKING INTO THE BLACK BOX: PROSPECTS AND LIMITS IN THE SEARCH FOR MENTAL MODELS Technical Report, 1 Jun. 1982 - 31 May 1986
W. B. Rouse and N. M. Morris May 1985 81 p
(Contract N00014-82-K-0487)
(AD-A159080; GIT-TR-85-2) Avail: NTIS HC A05/MF A01 CSCL 05/10

The notion that humans have mental models of the systems with which they interact is a ubiquitous construct in many domains of study. This paper reviews the ways in which different domains define mental models, characterize the purposes of such models, and attempt to identify the forms, structures, and parameters of models. The resulting distinctions among domains are described in terms of two dimensions: (1) nature of model manipulation, and (2) level of behavioral discretion. A variety of salient issues emerge, including accessibility of mental models, forms and content of representation, nature of expertise, cue utilization, and, of most importance, instructional issues. Prospects for dealing with these issues are considered, as well as fundamental limits to identifying or capturing humans true mental models. GRA

N86-15914# Tennessee Univ., Knoxville.
A GENERAL MODEL FOR THE HOMOGENEOUS CASE OF THE CONTINUOUS RESPONSE Research Report
F. Samejima 31 Dec. 1983 125 p
(Contract N00014-81-C-0569; DA Proj. RR0-4204)
(AD-A159345; AD-F630701; RR-83-3-ONR) Avail: NTIS HC A06/MF A01 CSCL 12/1

A general model for the homogeneous case of the continuous response is proposed. The model is an expansion and generalization of the one proposed by the author in 1974, in which the open response situation is dealt with. In this generalized model, we deal with the closed response situation, and it includes the model for the open response situation as a special case. It also includes models for the open/closed and the closed/open response situations as two special cases. The distinction among the four response situations depends upon the probability assigned to each of the two extreme values of the continuous response, i.e., the probability zero corresponds to the word open, and non-zero to closed. Some examples are given. GRA

N86-15915# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abteilung Flugphysiologie und Psychologie.
EXPERIENCE AND PERFORMANCE IN VIDEO GAMES AND ITS INFLUENCE ON APTITUDE TESTS IN AVIATION PSYCHOLOGY
Klaus-Martin Goeters and Bernd Lorenz Jul. 1985 47 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-85-43; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16.50

A method of evaluation of computer video games was used to analyze the relevance of video games for operational aptitude training in aviation psychology and their effects. A video game was used to test visual reaction under increased concentration strain, resistance to mental distraction, spatial orientation, and psychomotor coordination of air traffic controller applicants. Preexperience and performance with the game; preexperience and personality structure and interest; and the relationship between preexperience and performance tests were studied. Preexperience can influence performance with the game and the capacity structure. Preexperience with video games gives advantages to applicants in aviation psychology aptitude tests. Video games constitute a major psychomotor component in evaluation. Author (ESA)

N86-15868# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF FACTORS DETERMINING PILOT'S GEO-CENTRIC ORIENTATION
V. V. Lapa, Ye. Ye. Bukalov, and N. A. Lemeshchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19,

No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 24-30 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 19-23 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15869# Joint Publications Research Service, Arlington, Va.
EFFECT OF THREAT STRESS ON PSYCHOMOTOR STABILITY OF PILOTS DIFFERING IN ANXIETY LEVEL
J. Terelak and J. Maciejczyk *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 31-34 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 24-26 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15870# Joint Publications Research Service, Arlington, Va.
USE OF FLIGHT SIMULATORS FOR DEMONSTRATION OF FUNCTIONAL CAPACITIES OF FLIGHT PERSONNEL
V. A. Bodrov, A. A. Kupriyanov, and V. V. Kharin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 35-39 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 26-29 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15885# Joint Publications Research Service, Arlington, Va.
ONE ASPECT OF CREW TRAINING
Ye. D. Konovalov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 114-119 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 77-80 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-15916# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
HUMAN FACTORS ENGINEERING DESIGN CRITERIA FOR FUTURE SYSTEMS. REPORT NUMBER 3: DESIGN CRITERIA EVOLVING FROM THE MULTIPLE MULTIPLE ROCKET SYSTEM (MLRS) OPERATIONAL TEST 3 Research Report, for Period Ending Apr. 1984
W. K. Earl and L. M. Crumley Jan. 1985 36 p
(AD-A158316; ARI-RP-85-05) Avail: NTIS HC A03/MF A01 CSCL 19/7

This document compares human factors engineering related problems identified in the U.S. Army Operational Test and Evaluation Agency MLRS Operational Test 3 with relevant criteria statements from MIL-HDBK-759A and MIL-STD-1472C. These criteria were reviewed to determine if they provided adequate guidance for making informed design judgements. Areas where existing criteria are inadequate or nonexistent were identified and new complete criteria developed. The new criteria are presented in a format designed to facilitate their use in the design of future similar systems. GRA

N86-15917# Naval Postgraduate School, Monterey, Calif.
MANAGING COMPUTER SYSTEMS DEVELOPMENT: UNDERSTANDING THE HUMAN AND TECHNOLOGICAL IMPERATIVES M.S. Thesis
G. S. Curtis Jun. 1985 154 p
(AD-A158976) Avail: NTIS HC A08/MF A01 CSCL 05/8

This thesis examines the human and technological issues that are often encountered during the development of modern computer information systems. People and technical constraints, including suggestions for minimizing negative consequences, are illustrated throughout the development life cycle. Special emphasis is placed on strategic planning, end user involvement in the requirements definition phase, and user-oriented software. The research consists of a review of current literature concerning techniques, methods and methodologies that are the basis for managing computer information system development. It is a collection of bits and pieces of wisdom by experts from all disciplines within the computer and managing fields. These techniques can be tailored to various scale projects having myriad objectives. The theory and practice of management methods included in this paper can be applied universally to computer projects. However, the study is directed at all U.S. Navy managers who are, or will be, involved in the transition to modern computer information systems. GRA

N86-15444# Joint Publications Research Service, Arlington, Va.
CNES OF FRANCE RESEARCHES REMOTE CONTROL SYSTEM FOR SPACE
Jean-Michel Guilbert *In its* West Europe Report: Science and Technology (JPRS-WST-85-015) 14 May 1985 p 1-4 Transl. into ENGLISH from Revue Generale de L'Electricite (Paris), Nov. 9814 p 724; 728-729 (For primary document see N86-15443 06-31)
Avail: NTIS HC A04/MF A01

N86-15867# Joint Publications Research Service, Arlington, Va.
SOME ASPECTS OF DETERMINING HUMAN PHYSICAL WORK CAPACITY UNDER HYPERBARIC CONDITIONS
L. A. Bryantseva and A. Ye. Mikhnenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 11-23 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 11-19 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

N86-15886# Joint Publications Research Service, Arlington, Va.
METHOD OF CALCULATING ANGULAR DIMENSIONS OF FLIGHT VEHICLE COCKPIT CANOPY CASINGS
A. V. Lekarev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 19, No. 4, Jul. - Aug. 1985 (JPRS-USB-85-006) 4 Nov. 1985 p 120-124 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 19, no. 4, Jul. - Aug. 1985 p 81-83 (For primary document see N86-15865 06-51)
Avail: NTIS HC A08

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-15918 Department of the Air Force, Washington, D.C.
VARIABLE RADIX PROCESSOR Patent
J. L. Burrows, inventor (to Air Force) Issued 9 Jul. 1985 13 p
Supersedes AD-D010047
(AD-D011893; US-Patent-4,528,641; US-Patent-Appl-SN-442212; US-Patent-Class-364-757) Avail: US Patent and Trademark Office CSCL 09/2

A variable radix processor is constructed on 1.25 micrometer CMOS/SOS. The processor, based upon a predetermined algorithm, is constructed to process radix 2 to 7 data wherein the data is input in a parallel-by-word, parallel-by-bit format. A format selection switch has the data input whereafter a plurality of switches outputs an address format to a bit-slice multiply-adder. The bit slice multiply-adder has ROMs addressed by the format selection switch. Based upon the predetermined algorithm, each unique address format causes the ROMs to output a unique word in parallel bits to a tally cascade circuit and then to a fast-carry adder. The processor can operate on a transfer function such as ZA = + or - (A + or - C), ZB = B where A = sigma aiSi, B = biXi with very high throughput rates such as 380 million operations per second. Author (GRA)

N86-15919# Committee on Science and Technology (U. S. House).
COMPUTER SECURITY POLICIES
Washington GPO 1985 182 p refs Hearing before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 26, 27 Jun. 1985
(GPO-52-154) Avail: Subcommittee on Transportation, Aviation and Materials

A congressional hearing was conducted and expert testimony heard on the subject of computer security policies. G.L.C.

N86-15920# Information Science Inst., Marina del Rey, Calif.
A RESEARCH PROGRAM IN COMPUTER TECHNOLOGY Annual Technical Report, Jul. 1983 - Jun. 1984
Apr. 1985 159 p
(Contracts F49620-84-C-0100; MDA903-81-C-0335; Grant NSF MCS-83-04190)
(AD-A157991; ISI/SR-85-150) Avail: NTIS HC A08/MF A01 CSCL 09/2

This research is focused on the development of computer science and technology, which is expected to have a high DOD/military impact. GRA

N86-15921# Florida Univ., Gainesville.
USE AND APPLICATION OF COMPUTERS IN CONSTRUCTION ESTIMATING M.S. Thesis
T. R. Huxel 1985 105 p
(Contract N66314-72-A-3029)
(AD-A158055) Avail: NTIS HC A06/MF A01 CSCL 09/2

The purpose of this thesis is to provide a general overview of construction estimating and an insight to computer-aided estimating. Increased knowledge about computerized estimating and confidence in the computer's potential use can result in providing more timely and accurate estimates. Although commputerized estimating is relatively new in the construction industry, its usage has been proven to be beneficial. The ability of the estimator to predict, as accurately as possible, the cost of construction today, correlates directly to the survival rate of a construction company. The thesis covers preliminary cost estimating and more detailed estimates, i.e., quantity surveys, lump sum and detailed unit cost estimates. The components of an estimate are reviewed and software are analyzed for the job of construction estimates. GRA

N86-15922# Army Military Personnel Center, Alexandria, Va.
A MODEL OF AN EXPERT COMPUTER VISION AND RECOGNITION FACILITY WITH APPLICATIONS OF A PROPORTION TECHNIQUE M.S. Thesis
G. E. Sherman 15 May 1985 109 p
(AD-A158073; AD-F630692) Avail: NTIS HC A06/MF A01 CSCL 09/2

In this thesis an expert vision system is proposed which infers, from the collection and evaluation of facial segments of a face, a set of possible identifies. Retrievals from a data store to accomplish this are facilitated by using the shape representations as keys to the records. The heuristic involves collecting the candidate identities in those sets by set intersection and a weighting scheme. Sensitivity and tolerance factors in this expert are adjustable in terms of range values. The value obtained during evaluation of a facial segment is accepted or tolerated relative to the range of values expected for that segment. A retrieval effects a subrange whose width is determined by sensitivity to be the center and some number of adjacent values above and below that center value. Expectation ranges can be tailored to incorporate system and environmental variables. GRA

N86-15923# Universal Energy Systems, Inc., Dayton, Ohio.
DEMONSTRATE CAPABILITIES OF DIGITAL GRAPHICS SYSTEM TO OBTAIN QUANTITATIVE INFORMATION FROM FLOW VISUALIZATION DATA Final Report, 1 Oct. 1984 - 31 May 1985
G. D. Streby 2 Jul. 1985 44 p
(Contract F33615-84-C-2481)
(AD-A158760; Rept-040-2-C; AFWAL-TR-85-2062) Avail: NTIS HC A03/MF A01 CSCL 09/2

The technical feasibility of using low cost digital graphics computer systems to obtain quantitative data from dynamic fluid simulations has been demonstrated. A computer graphic system is capable of capturing, digitizing, and color mapping of dynamic fluid flows. Such dynamic flow simulations are typical of test conditions found in a number of flow visualization test facilities. Using injected dye fluids, it is possible to visually determine the relative dye concentrations or dispersion characteristics within recirculation and mixing zones of a test configuration. The development of a complete dynamic fluid analysis system that includes a digital graphics system and basic image enhancement software would provide many engineering and design benefits to numerous simulation and flow visualization test facilities. A dynamic fluid analysis system could have great potential in commercial markets as an engineering or design tool in the areas of flow analysis, chemical processing, design of internal and external flow control devices, or as a teaching or training aid in fluid dynamics. GRA

N86-15924# Sparta, Inc., McLean, Va.
SPECIFIC RECOMMENDATIONS FOR IMPROVING NETWORK FEEDBACK TO HOSTS Final Report
22 Jun. 1985 81 p
(Contract DCA100-84-C-0085)
(AD-A158768; URW-5-DCA-039) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report provides recommendations for improving the feedback from the DDN network switching resources, IMPs, to their attached gateways/hosts so that the internetwork as a whole can function more efficiently and effectively. The report begins with a general description of the current internetworking environment. Problem areas in designing a efficient packet switching network or internetwork are identified along with potential improvements to current internetworking control mechanisms in the areas of flow control congestion control, type of service routing, uses of multipath routing and the impact/use of the new IMP end-to-end protocol. Emphasis is placed on the uses of the IMP end-to-end protocol to provide statistics about the network and on the DDN X.25 access protocol as the medium for passing this information to the gateways and hosts. Several approaches and techniques were identified which could improve the efficiency and effectiveness of the DoD internetwork and the DDN specifically. The main

information required by the hosts is readily available within the IMP, or at least will be available as the new IMP end to end protocol is introduced later this year. In order to develop new control algorithms, delay/capacity statistics need to be collected and analyzed. Network feedback mechanisms are proposed which would allow operational host/gateways to obtain the network delay/capacity parameters needed for optimal route selection, flow control, congestion control, etc. GRA

N86-15925# Stanford Univ., Calif. Dept. of Computer Science.
DATABASE THEORY Final Report, 15 Jun. 1980 - 1 Nov. 1984
J. D. Ulman 1 Feb. 1985 9 p
(Grant AF-AFOSR-0212-80)
(AD-A158975; AFOSR-85-0673TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The research carried out under this grant from 1979 to 1984 centered around the design of universal relation data base systems. Certain theoretical aspects of dependency theory received attention, especially the theory of acyclic hypergraphs and their corresponding join dependencies. We investigated the use of first-order logic as a way to describe the effect of updates on universal-relation databases, and views in general. A number of other topics concerning data base systems also received attention, including concurrency control by locking, data coding for massive write-once memories, hash table designs, and logical interfaces for data base systems. GRA

N86-15926# Texas A&M Univ., College Station. Texas Transportation Inst.
A STUDY OF DATA ENTRY KEYBOARDS: THE 4 X 4 KEYPAD Final Report
R. J. Koppa Jun. 1985 52 p
(Contract DAAD05-83-M-H723)
(AD-A159095; HEL-TN-4-85) Avail: NTIS HC A04/MF A01 CSCL 09/2

Research concerning the layout of keypads for data entry was briefly surveyed to determine what conventions exist suitable for inclusion in MIL-STD-1280 (military standard on keyboard arrangements). The calculator layout (bottom-up) is preferable to the telephone layout (top-down). More research is needed to establish the best methods of denoting key mode selection. Industry conventions have dictated the location of function keys, but more research is necessary to verify these locations. Chord keyboards are an alternative, but they have specialized uses and are not recommended for low-skilled operators. GRA

N86-15927# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
27 Aug. 1985 167 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UCC-85-004) Avail: NTIS HC A08

The USSR Report on Cybnernetics, Computers and Automation Technology, 27 August 1985 (JPRS-UCC-85-004) contains articles on microprocessors, microelectronics, multiprocessing, parallel processing, computer software, numerical control, and computer networks. For individual titles, see N86-15928 through N86-15942.

N86-15928# Joint Publications Research Service, Arlington, Va.
RAISING THE RELIABILITY OF A REMOTE PROCESSING SYSTEM c62
V. Ye. Beloshevskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 2-3 Transl. into ENGLISH from Avtomatike, Telemekhanika i Svyaz (Moscow), no. 3, Mar. 1985 p 34 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

To raise the reliability of the system created on the basis of the Y3SI035 computer, the Electronics Department of the Bilomission Railroad Computer Center has developed and introduced improvements in the devices and the procedures of working with them. First of all the Konsul-260.1 and Konsul-256 electromechanical typewriters were replaced with Videoton-340 and Videoton-52100.C video terminals. In order for the Videoton-340 to work with the YeSI035 computer, the circuit for recording the typewriter adapter and Videoton-340 codes had to be developed, and the control signals had to be matched. A special test bench was created for repeat testing and weeding out of failing 565RÜ1 memory microcircuits. The problem is that these microcircuits are very sensitive to temperature changes. When the processor fails, the system becomes uncontrollable. With introduction of redundancy, the consequences of failures may be minimized. But this immediately increases the system's cost, because all lines would have to be duplicated in the system, and an expensive processor would have to be placed in ready reserve. Getting round this problem is discussed. Author

N86-15929# Joint Publications Research Service, Arlington, Va.
PROCEDURES AND GENERAL METHOD FOR CHECKING MICROPROCESSOR MALFUNCTIONS ON THE BASIS OF PSEUDORANDOM TESTING SEQUENCES
K. G. Samofalov, Yu. S. Vilinskiy, and S. K. Ravnyago *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 9-15 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 44-46 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The method for checking malfunctions in BIS (large integrated circuit) microprocessors is based on using a determined flow of instructions containing pseudorandom operands representing a testing sequence and is formed by means of a tester based on a built-in pseudorandom code generator, which checks the microprocessor at its working frequency. This approach excludes the laborious stage of writing a test program and eliminates the need for storing microprocessor input units and output reactions in large memories. Moreover, use of pseudorandom testing sequences of considerable length (on the order of 100,000 to 1 million units) makes it possible to widen the class of malfunctions that are checked in a number of cases, and to avoid fault modeling, since probability methods can be used to assess the completeness of the check. Author

N86-15930# Joint Publications Research Service, Arlington, Va.
MICROELECTRONICS TECHNOLOGY c33
M. Sidorovyy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 16-24 Transl. into ENGLISH from Znaniye-Sila (Moscow), no. 4, Apr. 1985 p 2-5 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

To develop at a leading pace the production of high-speed control and computational systems, peripheral equipment and software for these, electronic devices for control and telemechanics applications, a nation must have a strong microelectronics industry. The world of microelectronics created by man is one of fantastic possibilities and its horizons broaden daily. It is undergoing a process of interlocking growth and of introduction into our daily lives as well as into many fields of human endeavor. Microelectronics is a catalyst for technical progress. It provides artificial intelligence for robots and systems of robots, for automated systems used in control, teaching, design and computing applications, spacecraft and production facilities. A country's economic might and defensive capability are defined by the scale at which it produces pure and ultrapure substances and materials, including semiconductor and metallic crystals. Author

N86-15931# Joint Publications Research Service, Arlington, Va.
ORGANIZATION OF PROCESSOR ORIENTED TO MULTIPROCESSING c61
V. F. Guzik and V. N. Reshetnyak N its USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 25-33 refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Priborostroyeniye (Leningrad), no. 12, Dec. 1984 p 23-29 (For primary document see N86-15927

06-60)
Avail: NTIS HC A08

The structure of a functionally distributed processor is proposed, permitting organization of source program multiprocessing. The foundation of this structure is the concept of basic functional processor elements in the form of multiservice units. The approach presented here makes it possible to reduce time expenditures for blocking computational processes and to increase processor speed. The problem of increasing the capacity of modern computer systems is most urgent. Increasing the number of processors is not always expedient and justified. The overall speed of system Q sub s can be defined by the expression Q sub s = Q sub pr log sub 2 M, where M = number of processors in the system; Q sub pr = speed of one processor. On the other hand, reserves in increasing Q sub pr through increasing the speed of electronic processor components are, for all practical purposes, now exhausted. Therefore, the outlook for increasing Q sub pr (and subsequently Q sub s) must be linked to architectural solutions. Author

N86-15932# Joint Publications Research Service, Arlington, Va.
MODELING PROBLEM-ORIENTED MULTIPROCESSOR SYSTEMS c62
V. A. Smolnikov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 34-37 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 37-39 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The problem orientation of computer systems is associated as a rule with expansion and complication of the basic functions of general-purpose computers. The architectural features of problem-oriented computer complexes must maximally reflect the unique features of the algorithms of the class of tasks carried out by the given complex, and insure satisfaction of requirements imposed on its use. Typical of this class of problem-oriented computer complexes are the following features: use of multiprocessors; presence of a wide assortment of nonstandard input-output devices; orientation of the structure of the problem-oriented computer complex on processing homogeneous information and on a pipeline system of organizing calculations both at the micro- and at the macrolevel; presence of the necessary hardware for multiprogramming; the possibility of using the principal processor time for complex data processing with minimum system outlays but with sufficiently complex and diverse software components; presence of standard software developed specially for the given problem-oriented computer complex for the purposes of achieving the greatest effectiveness of the complex's operation. Author

N86-15933# Joint Publications Research Service, Arlington, Va.
MULTIPROCESSOR SYSTEMS WITH DYNAMIC REDISTRIBUTION OF REQUESTS THROUGH A COMMON BUS c62
V. A. Bogatyrev *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 38-43 refs Transl. into ENGLISH from Izvestiya Vysshigk Uchebnykh Zavedeniy: Priborostroyeniye (Leningrad), no. 3, Mar. 1985 p 33-38 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

An approach to the evaluation of the reliability of multiprocessor systems or dynamic distribution of requests with the use of partially efficient states of the processors and the limited capacity of the common bus is proposed. Modern modules of computing equipment and, particularly, microprocessors are multifunctional devices. Multifunctional modules, due to incomplete coincidence of circuits activated during the performance of various functions, can preserve their ability of realizing part of the functions after failures. Such states of multifunctional modules are called partially efficient. The use of partially efficient states of processors with dynamic distribution of requests opens additional possibilities of increasing the reliability of process control computer complexes. Author

N86-15934# Joint Publications Research Service, Arlington, Va.
USING DIGITAL SIMULATION IN THE DESIGN OF CAMAC SYSTEMS c61
P. V. Gamin, S. V. Morgunov, and M. A. Shamashov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 44-47 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 46-48 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

Today most information-measuring systems use program-controlled CAMAC standard bus-module systems as linking devices when designing automated scientific research systems (ASNI) and when performing bench tests. These stems do not provide developed resources for debugging the programs. which sharply reduces the effectiveness of the process of design and debugging programs directly by means of the control microcomputer contained within the composition of the information-measuring system. On the other hand the diversity of the experiments that are carried out generates the need for creating new specialized CAMAC standard devices. The problems that arise in this case include those of determining the internal logical organization of the devices, time synchronization, studying reactions to external controlling influences and acquiring reliable programs for servicing such devices. The methods of simulational modeling are enjoying wide use as a way to solve these problems. In particular, a simulational model of an information-measuring system consisting of an emulator with a full configuration based on a YeS computer has been proposed as a design tool for the hardware and software base of an information-measuring system. Author

N86-15935# Joint Publications Research Service, Arlington, Va.
WIDE-BAND SINGLE-BOARD ANALOG-DIGITAL CONVERTER
A. N. Kasperovich and Yu. V. Shalaginov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 48-53 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 5, Sep. - Oct. 1984 p 108-112 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The use of fast domestically built series 1107 large-scale integrated circuits (LSI) as parallel 6- and 8-bit analog-digital converters (ADC) has considerably broadened the possibilities for creating digital signal processing systems. However, the practical use of such devices requires the development and assembly on the circuit board of a buffer amplifier for the input signal (because of the need for rapid conversion of the large input volume by the ADC microcircuit), a reference voltage source (-2V) and a trigger pulse formation unit. It is noted that the TRW company which produces this type of microcircuits also produces functionally complete ADC which are complete on a single board where, along with the LSI ADC there is also the required auxiliary equipment. Author

N86-15936# Joint Publications Research Service, Arlington, Va.
CYBERNETICS INSTITUTE DEVELOPS PARALLEL-PROCESSING COMPUTER
In its USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 54-55 Transl. into ENGLISH from Pravda (Moscow), 22 Feb. 1985 p 3 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The development of a multiprocessor computer that operates on the parallel-processing principle is reported. The so-called macro-assembly-line principle of organizing computations as one way of realizing recursive computers was proposed several years ago. The concept uses the analog of a number of plants making assemblies and parts that go into an end product. A control system which ensures effective execution of operations under a task-sharing system is a macro-assembly-line computer. The work led to a success which has demonstrated the possibility of building computing systems which ensure growth in capacity practically directly proportional to the number of processors that are linked into the system. The computer which has been developed for this occupies a room only 14-15 square meters in area. For communicating with the computer, a language called MAYAK was devel-

oped; the letters are an acrynym which stands for macro-assembly-line language of computer programming. Together with a system of parallel programming and an on-line system, it makes it possible for extremely complex tasks which would take a year to accomplish by conventional means to be done in a matter of weeks or days.
Author

N86-15937# Joint Publications Research Service, Arlington, Va.
PROGRAM BASE FOR RASTER DISPLAY c61
E. A. Talnykin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 56-60 Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 5, Sep. - Oct. 1984 p 104-107 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The programming for the graphics display based on the Elektronika-60 microcomputer is discussed. The microcomputer controls the graphic controller and can have a communication link to another more fully equipped host computer. The only variants considered are those in which both computers have compatible architecture. The basis for the organization of the programming is the primitive graphic base module which generates graphic display for other program components. The module is always located in the microcomputer. If the application program which requires graphic possibilities is also located in the microprocessor then all the problems of intermodular action are solved at the editing level of the external links.
Author

N86-15938# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED RECEIVERS OF MICROPROCESSOR SIGNAL CONVERSION DEVICES
L. I. Sulin and V. V. Romanov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 86-91 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 55-57 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The main effectiveness indicator of signal conversion devices intended for frequency-limited communication channels is the relative speed of data transmission, given certain limitations on the reliability of the received information. Raising the relative speed of data transmission requires use of combined modulation methods in combination with effective processing at the receiving end. As a rule this means an increase in the algorithmic complexity of the data processing. Growth in complexity of algorithms results in the need for developing complex specialized structures with rigid logical control, or synthesis of structures operating on the basis of microprogram control. The latter approach seems more preferable because use of LSI (large scale integration) microprocessor complexes that are series-produced by industry means that development time can be decreased, and the cost of the signal conversion devices is relatively low. On the other hand when a signal conversion device is built on the basis of microprocessor systems, the unique features of the microprocessor systems must be accounted for (in the selection or development of the signal conversion algorithms).
Author

N86-15939# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF DEVELOPING ALGORITHMIC DESIGN SYSTEM c61
O. M. Nabiyev and K. K. Zagidullin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 92-96 refs Transl. into ENGLISH from Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya Tekhnicheskikh Nauk (Tashkent), no. 6, Nov. - Dec. 1984 p 10-13 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

An algorithmic design system is intended for building systems which control design and support design execution. Research on possible ways of building such systems has shown the need of refining the concept of a complex system. The concept of a complex system is supplemented by the following principles: (1) a complex system (object in the real world) has properties of nonadditivity of characteristics. Nonadditivity of characteristics is understood in the sense of a system discontinuity of the second kind. For example, an optimal sector program is not the sum of optimal enterprise programs; (2) a complex system (object in the real world) has the property of substantial limitedness of resources. Substantial limitedness of resources is the prerequisite of a system discontinuity of the first kind consisting of a contradiction between the capabilities of various levels of control to store and process current information, on the one hand, and the requirements of optimality and efficiency, on the other. It follows from these principles that trying to build an algorithmic design system from the bottom up, i.e., first the individual banks and then the system as a whole, entails considerable difficulties in coordinating the interaction of the individual banks with each other.
Author

N86-15940# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL-LOGICAL SYSTEM FOR AUTOMATED PLANNING OF ROBOT PRODUCTION LINE CONTROL SYSTEMS c61
E. M. Pospelov and A. I. Savitskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 103-107 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 28-30 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

Combining automated design with the advantages of the methods for preparing and operating a flexible automatic production operation promotes a sharp rise in the effectiveness of design and production processes. As the object of design, a control system for a robot production line assembling printed boards is examined. This system provides for: assembly of printed boards with prescribed productivity and quality in accordance with the existing technology; and automatic adjustment of the robot production line to assemble one out of a prescribed set of types of printed boards while preserving the structure of the control system and the layout of the hardware complex of the robot production line. Use of the modular-hierarchical approach makes it possible to distinguish design of a robot production line, interpreted as a complex system, as a macrolevel consisting of a system of multilevel calculation macroprocedures. The flow chart for control system design is synthesized in the presence of uncertainties stemming from the modular-hierarchical approach itself.
Author

N86-15941# Joint Publications Research Service, Arlington, Va.
AUTOMATED FLAW DETECTION INFORMATION-MEASURING SYSTEM
B. M. Berezyuk and Yu. M. Shumkov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 108-112 refs Transl. into ENGLISH from Mekhanizatsiya i Automatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 48-50 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

Now that the metrological characteristics of nondestructive control have improved, the following problems have become important: insuring high efficiency and reliability of such control, and providing for the processing of multiparametric flaw detection information in such a way as to permit separation of the parameters being checked; building a mathematical model of flaws in order to associate any law detection information received with the parameters of different types of flaws; providing for current display of flaw detection information in a form convenient to the operator; forming and storing a flaw detection log on checked articles and so on. One of the most promising ways of solving these problems integrally is to develop and create general-purpose flaw detection information-measuring systems based on highly productive computers making it possible to completely automate the acquisition, processing, display and storage of flaw detection information.
Author

N86-15942# Joint Publications Research Service, Arlington, Va.
RED-GRAPHIC EDITOR IN PRINTED CIRCUIT BOARD DESIGN SYSTEM c61
E. A. Talnykin *In its* USSR Report: Cybernetics, Computers and

Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 113-118 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 5, Sep. - Oct. 1984 p 42-46 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

The main principles for a program for the design of printed circuit boards based on the Elektronika computer family or the SM-4 computer are given. The main component of the interactive system for graphic editing of printed circuit board topology is considered. The system works either on a computer with graphic peripherals connected by a link line, or on a microcomputer in an autonomous configuration. Author

N86-15943# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
19 Nov. 1985 56 p Transl. into ENGLISH from various Russian articles
(JPRS-UCC-85-009) Avail: NTIS HC A04

USSR Reports - Cybernetics, Computers, and Automation Technology, 19 November, 1985 (JPRS-UCC-85-009) contains reports on artificial intelligence, pattern recognition, robotics, holographic memory, and aircraft computer applications. For individual titles, see N86-15944 through N86-15947.

N86-15944# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF ARTIFICIAL INTELLIGENCE IN COMPUTERS **c63**
Yuriy Matveyev *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 5-9 Transl. into ENGLISH from Nauka I Tekhnika (Riga, USSR), no. 7, Jul. 1985 p 16-17 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

A long path has been covered from the first computers to today's most powerful computer complexes--all in three decades. No other area of human activity has known such progress. Such basic parameters as a speed of hundreds of millions and billions of operations per second and memory capacities of hundreds of millions of bits are achievable for modern computer systems. The time is not far off when computers will achieve, at least in the quantitative sense, the complexity of the human brain (of course, complexity according to our present concepts). The concept artificial intelligence was born in cybernetics. It permits one to classify objects and to combine successfully a number of properties of computers and similar qualities of human intelligence. Systems based on computers that claim to have intelligence have been developed within the framework of cybernetics. One of them was developed at the Institute of Cybernetics, Ukrainian SSR Academy of Sciences, and can exchange questions and answers with a human at the level of a four or five-year old child; moreover, as the system communicates with people, teaching itself, it increases its intelligent capabilities. Author

N86-15945# Joint Publications Research Service, Arlington, Va.
BELORUSSIAN COMPUTER SPEAKS, READS GRAPHICS, X-RAYS
G. M. Novikov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 10-11 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 4 Apr. 1985 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

The information-management complex created at the Special Design-Engineering Bureau (SPTB) of Management Systems of the Belorussian SSR Ministry of Housing and Communal Services can solve the tasks of management of a branch, conduct an economic analysis and plan, hear, speak, see items of various forms and volumes, and read graphic information. Author

N86-15946# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL THEORY OF HOLOGRAPHIC MEMORY **c35**
Abstract Only
M. V. Karasev and V. P. Maslov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 13 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), no. 5, 1985 p 1055-1058 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

Light waves are theoretically capable of recording octal information, based on the dimensionality of the set of bicharacteristic equations of Maxwell and their invariant vector measures. However, the impossibility of recording the amplitudes and phases of wave trains from actual light sources reduces this number to six. Holography allows all six signal parameters to be recorded on a two-dimensional surface and later reproduced. This statement is refined and is demonstrated mathematically. At points greater than a certain minimum distance from the surface of the hologram, the initial signal can be restored with accuracy equivalent to a certain complex factor and separated from the background for all orders of the short wave approximation. The amplitude, phase and polarization structure of the signal can take on any values. The reference wave is fixed, however. Complete restoration of signal polarization requires a known reference wave structure. Author

N86-15947# Joint Publications Research Service, Arlington, Va.
WORK ON PUTTING COMPUTER AND CRTS IN AIRLINER CONTROL PANELS **c06**
V. Tseyukov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 25-26 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Aug. 1985 p 3 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

The controls of airplanes of the future will have far fewer electro-mechanical devices. Such devices and dozens of dials and lights will be replaced by the screen of a cathode-ray tube. The development of this kind of integrated information-signaling system is now in progress. With aviation technology advancing rapidly, aircraft systems are becoming more complex, and the most important ones have back-up systems. It is not easy for a pilot to control an aircraft and interact with instruments and devices. The new system will make it possible to remove a portion of the devices that are located directly in front of the pilot, and to remove all the devices from the flight engineer's panel. Needed information on the operation of all of the airplane's manitenance systems and several of its main units will be concentrated in a single place--on the color screens of cathode-ray tubes in the center of the instrument panel. Author

N86-15474# Joint Publications Research Service, Arlington, Va.
ROBOTRON HARDWARE COMPATIBLE PROGRAMMING LANGUAGES SURVEYED
W. Nyderle *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 9-13 refs Transl. into ENGLISH from Neue Technik im Buero (East Berlin, East Germany), v. 29, no. 4, 1985 p 116-117 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-159'8# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
KBEmacs (KNOWLEDGE-BASED EDITOR IN emacs): A STEP TOWARD THE PROGRAMMER'S APPRENTICE
R. C. Waters May 1985 242 p
(Contract N00014-80-C-0505; Grants NSF MCS-79-12179; NSF MCS-81-17633)
(AD-A157814; AI-TR-753) Avail: NTIS HC A11/MF A01 CSCL

09/2

The Knowledge-Based Editor in Emacs (KBEmacs) is the current demonstration system implemented as part of the Programmer's Apprentice project. KBEmacs is capable of acting as a semi-expert assistant to a person who is writing a program-taking over some parts of the programming task. Using KBEmacs, it is possible to construct a program by issuing a series of high level commands. This series of commands can be as much as an order of magnitude shorter than the program it describes. KBEmacs is capable of operating on Ada and Lisp programs of realistic size and complexity. Although KBEmacs is neither fast enough nor robust enough to be considered a true prototype, both of these problems could be overcome if the system were to be reimplemented. Author (GRA)

N86-15949# Softech, Inc., Fairborn, Ohio.
Ada (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: RATIONAL ENVIRONMENT, VERSION A.2.0.6 FOR RATIONAL R1000 Final Report
24 May 1985 48 p
(Contract F33600-84-D-0280)
(AD-A157830) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the Rational Environment. On-site testing was performed. The Rational Environment is hosted on the R1000 computer. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.5, was used. The ACVC suite of tests is used to validate conformance of the compiler to ANSI/MIL-STD-1815A (ADA). The purpose of the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal language constructs. The testing also identifies implementation-dependent behavior permitted by the standard. These tests are designed to perform checks at compile time, during execution, and at link time. Results showed that all of the remaining 1797 valid tests were successfully passed by the Rational Environment. The AVF concluded that the results obtained show acceptable compliance to the January 1983 ANSI Ada Reference Manual. Author (GRA)

N86-15950# Syracuse Univ., N. Y.
THE LOGLISP PROGRAMMING SYSTEM Final Technical Report, Feb. 1981 - Feb. 1984
J. A. Robinson, E. E. Sibert, and K. J. Greene May 1985 129 p
(Contract F30602-81-C-0024)
(AD-A158011; RADC-TR-85-89) Avail: NTIS HC A07/MF A01 CSCL 09/2

LOGLISP is basically ZetaLisp with a logic programming system, LOGIC, embedded within it. LOGIC differs in a number of ways from the well-known PROLOG implementations of logic programming. The most noteworthy difference is that LOGIC is simply a set of new LISP primitive designed to be used freely within LISP programs. These primitives are invoked in the ordinary LISP manner by function calls from the terminal or from within other LISP programs. They return their results as LISP data objects which can be subject to analysis and manipulation. Each of the logical procedures comprising a LOGIC knowledge base is a LISP data object stored (like the definition of an ordinary LISP procedure) among the information concerning the identifier which is its name. Thus, one calls LOGIC from with LISP. It is also possible to call LISP from with LOGIC. The identifiers used as local predicate symbols, function symbols, and individual constants within a knowledge base or query can be given a LISP meaning by the ordinary LISP method of definition or assignment. Thus, every logic construct is capable of being interpreted as a LISP construct. During the deduction cycle of LOGIC each logic construct is evaluated as a LISP construct, according to a suitably generalized notion of evaluation, called LISP-reduction. The effect of this LISP-reduciton step within each deduction step is to make available to the LOGIC programmer virtually the full power of LISP. GRA

N86-15951# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
PRACTICAL GUIDELINES FOR TESTING Ada PROGRAMS M.S. Thesis
J. B. Snaufer May 1985 131 p
(AD-A158099; AFIT/CI/NR-85-58T) Avail: NTIS HC A07/MF A01 CSCL 09/2

Practical testing guidelines are given for Ada programs. This involves a general testing strategy supplemented with testing guidelines for specialized features. A general background of testing is given which covers testing objectives, testing steps, and current testing approaches for Pascal-like languages. Testing approaches for Pascal-like languages are given because Pascal is the base language for Ada. Ada is then analyzed from a testing point of view. Features are identified that are different from Pascal-like languages. The analysis includes a brief description of each feature and a description of errors/problems that might occur when using the feature. The analysis determines whether Pascal-like language structural testing approaches are adequate for the structural testing of each feature. If a new structural testing approach is needed for a feature, then testing guidelines are presented for that feature. A general testing strategy is then presented. The general testing strategy applies to Ada as a whole. The additional structural testing guidelines for certain features are to supplement the general testing strategy. Case studies are then given which demonstrate the general testing strategy and the supplemental guidelines. Each case study consists of a sample routine, sample test cases, and a step by step description of how to apply the supplemental guidelines to the sample routine. Finally, topics are given for future research. Author (GRA)

N86-15952# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.
REPRESENTING TIME AND SPACE IN AN OBJECT ORIENTED HARDWARE DESCRIPTION LANGUAGE
M. R. Barbacci, G. Lindstrom, M. P. Maloney, and E. I. Organick 28 Jan. 1985 33 p
(Contracts F33615-81-K-1539; MDA903-81-C-0411)
(AD-A158226; CMU-CS-85-105) Avail: NTIS HC A03/MF A01 CSCL 09/3

Hardware description languages (HDLs) will clearly play a vital role in the comprehensive VLSI design tools of the future. Now that the requirements for such HDLs are becoming better understood it is becoming increasingly evident that the central issues are abstraction, modularity, and complexity management --- the same issues faced by designers of large scale software systems, rather than low-level technological details (although these must ultimately be served as well). Consequently, we argue that Ada, constituting the most advanced, carefully conceived, and (soon to be) widely available modern high-order programming language, forms not only an adequate but a compelling choice as an HDL. Specifically, Ada offers separate compilation as well as nesting of packages, tasks, and subprograms. These, and other important features of Ada, allow the construction of modular systems communicating through well defined interfaces. This paper demonstrates how placement and routing information can be incorporated into Ada hardware descriptions; another paper (Barbacci et al., 1985) shows how component and signal propagation delays over carriers are also incorporated into the same hardware descriptions. Author (GRA)

N86-15953# University of Southern California, Los Angeles. Dept. of Computer Science.
PROGRAMMING PRODUCTIVITY ENHANCEMENT BY THE USE OF APPLICATION GENERATORS BY THE USE OF APPLICATION GENERATORS Research Progress Report, 10 Jan. - 31 May 1985
E. Horowitz 22 Jun. 1985 15 p
(Grant AF-AFOSR-0232-82)
(AD-A158590; AFOSR-85-0618TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The first chapter deals with the specific research areas that were investigated and discuss the accomplishments for each. The areas of research are: Application Generators; Office Information Systems; Software Engineering; and the Script Writer Software Development Environment. The next chapter reviews the progress

of all people who have been supported under the grant.
Author (GRA)

N86-15954# Mitre Corp., Bedford, Mass.
A DESIGN EVALUATION CHECKLIST FOR USER-SYSTEM INTERFACE SOFTWARE Final Report
S. L. Smith and J. N. Mosier Oct. 1984 66 p
(Contract F19628-84-C-0001)
(AD-A158599; MTR-9480; ESD-TR-84-358) Avail: NTIS HC A04/MF A01 CSCL 05/8

This report proposes a checklist for evaluating the design of user-system interface (USI) software. That checklist is based on recently published ESD/MITRE guidelines for USI software design, and can be used effectively only in conjunction with the source guidelines material. The checklist items cover six general functional areas of USI design: data entry, data display, sequence control, user guidance, data transmission, and data protection. For application to any particular system, the importance of each checklist item must be weighted in order to tailor the checklist to specific design requirements for USI software. This tailoring process should involve the joint efforts of system development managers, the software designers. and the intended system users. Once design requirements have been established in this way, then any proposed or implemented USI design can be evaluated in terms of its judged compliance with the specified checklist items. Overall estimates of design quality can be derived, along with more detailed analysis of design strengths and weaknesses, in order to recommend needed design improvements. This design evaluation checklist should prove a useful tool in Air Force system acquisition. As the USI design guidelines are revised and expanded, the checklist can be updated correspondingly. In the future, the checklist might be implemented to an on-line computer tool, with automated aids to facilitate its use. This report describes some of the potential computer aids that could be provided. GRA

N86-15955# Yale Univ. Observatory, New Haven, Conn. Dept. of Computer Science.
DYNAMIC MONOTONE PRIORITIES ON PLANAR SETS (EXTENDED ABSTRACT)
M. J. Fischer and M. S. Paterson Jul. 1985 8 p
(Contract N00014-82-K-0154)
(AD-A158610; YALEU/DCS/TR-415) Avail: NTIS HC A02/MF A01 CSCL 12/1

A monotonic priority set is a new data structure which supports maximum-finding and deletions over a set of weighted points in the plane. Global updates to the weights can also be made, incrementing the weights of all points above a given threshold in one of the coordinates. The weights are assumed to be always monotonic in both coordinates. An efficient implementation of this structure is presented and two main applications are described. The first is to the problem of optimal assembly of code for computers with two kinds of jump instruction: long and short. The task in the second application is the implementation of a queuing discipline based on the ranks with respect to two different criteria. GRA

N86-15956# Naval Postgraduate School, Monterey, Calif.
AN INTERACTIVE DISCRETE CONTROLS ANALYSIS OPTION (ORACLS) FOR THE CONTROLS ANALYSIS PACKAGE ON THE IBM 3033 M.S. Thesis
M. K. Brenny Jun. 1985 125 p
(AD-A158754) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis discusses the implementation of a discrete control systems analysis option, ORACLS, for the CONTROLS analysis package. The option encompassses a collection of FORTRAN programs that facilitate the design and analysis of linear, multiple input/multiple output digital feedback control systems. All programs are interactive and operate in the VM/CMS environment of the IBM 3033. The main focus of this thesis was the development of the FORTRAN programs ORACLSX and TRANFUNC. These serve as the foundation of the ORACLS option, complimenting as well as interacting with those programs currently in use in the CONTROLS package. A collection of FORTRAN subroutines Optimal Regulator Algorithms for the Control of Linear Systems (ORACLS), by E.S. Armstrong of the NASA Langley Research Center, was used in the development of the ORACLSX program. Subroutines from the Optimal Systems Control FORTRAN program (OPTSYS), were used as the foundation for the discrete transfer function analysis program, TRANFUNC. The ORACLS option capabilities include: analog-to-digital matrix conversion, transfer function analysis, complete eigenvalue analysis, modal analysis, transient response calculation, Kalman-Bucy filter synthesis, and optimal regulator synthesis. Graphical results are available for the transient analysis and transfer function analysis portions. Author (GRA)

N86-15957# Washington Univ., Seattle. Dept. of Psychology.
PROBLEM SOLVING UNDER TIME-CONSTRAINTS
M. Richardson and E. Hunt 15 Aug. 1985 29 p
(Contract N00014-84-K-5553)
(AD-A158921; TR-10) Avail: NTIS HC A03/MF A01 CSCL 05/10

The computer science concept of production execution has been the basis of a large number of simulations of human problem solving. Typically these simulations have operated in a timeless environment, in the sense that they did not consider any constraints to solve problems quickly. In a previous technical report in this series Hunt and Lansman proposed an architecture for production-executing machines that could be applied to real-time problem solving. Hunt and Lansman supported their ideas by simulating data from laboratory studies drawn from the attention and performance field. In this paper Hunt and Lansman's approach is extended to the simulation of people doing a simple arithmetic task under considerable time pressure and when subject to interruptions. Data from the simulation is compared to data from college students doing the same task. GRA

N86-15958# Colorado School of Mines, Golden. Center for Wave Phenomena.
A PRELIMINARY REPORT ON SOME RECENT RESULTS IN BORN INVERSION
J. K. Cohen, F. G. Hagin, and N. Bleistein 26 Jun. 1985 25 p
(Contract N00014-84-K-0049)
(AD-A158926; CWP-031) Avail: NTIS HC A02/MF A01 CSCL 12/1

A research group at the Center for Wave Phenomena, Department of Mathematics, Colorado School of Mines, has been developing inversion algorithms for progressively more complex background velocities and source-receiver configurations. In each extension, the crucial issue has been the determination of certain properties of a matrix involving derivatives of the travel time(s). This report discusses and extends a recent result along these lines which appeared in a recent paper by Gregory Beylkin that reduces the problem to consideration of a single canonical determinant, h, and then assumes that this determinant does not vanish. With this assumption, he establishes a very general inversion result. Consequently, future theoretical research will focus on the evaluation of h, on establishing conditions for its non-vanishing and on dealing with the phenomena arising when it does vanish. Beylkin's paper uses powerful mathematical tools, such as the notions of pseudo-differential operators, generalized Radon transforms, and generalized back projections. Moreover, Beylkin frames his work in an N-dimensional space. Here, we dispense with much of this mathematical machinery and for convenience confine ourselves to the 3D case (and its 2.5D specialization). We are able to espound Beylkin's results by an approach similar to that presented earlier by Cohen and Hagin. However, we do not attempt to rigorously prove our results, but instead content ourselves with an intuitive derivation and the citing of Beylkin's main theorem. GRA

N86-15959# Cornell Univ., Ithaca, N.Y.
THE ISIS PROJECT: R AND D STATUS AND TECHNICAL REPORT Report, 4 May - 4 Aug. 1985
K. P. Birman 1985 14 p
(Contract MDA903-85-C-0124; ARPA Order 5378)
(AD-A158930) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report describes the accomplishments of the ISIS project during the six month period February - August 1985. As reported previously, a prototype version of the ISIS system was completed during the first three months of the project. This software transforms fault-intolerant single-site program specifications into fault-tolerant distributed implementations, and supervises execution of the resulting code. During the second three-month period, several aspects of the system have been enhanced: the interface between external programs and resilient objects, the language used to specify resilient objects, and the command language used to control the system. The academic staff designed and begun construction of a performance monitoring tool and some application software. Concurrency is the key to a good performance in a distributed system: the less synchronization employed by a system, the less frequently it will experience delays while waiting for inter-site message transmissions to complete. Recently a basic insight into the nature of concurrency in systems like ISIS was achieved. This has led to redesign of the ISIS communication primitives resulting in a communication subsystem that achieves very high levels of concurrency, but at the same time makes it easier to design high-level software that is correct in the presence of failures. The development of these primitives will probably prove to be the most important achievement of the six-month report period. By achieving high levels of concurrency while simultaneously simplifying concurrent algorithms, these represent a breakthrough in the methodology for developing of large, fault-tolerant systems. GRA

N86-15960# Naval Postgraduate School, Monterey, Calif.
IMPLEMENTATION OF A SERIAL DELAY INSERTION TYPE LOOP COMMUNICATION FOR A REAL TIME MULTITRANSPUTER SYSTEM M.S. Thesis
B. Evin Jun. 1985 91 p
(AD-A158980) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis presents a design and implementation of a model of a multicluster loop interface. This Delay Insertion Loop type of interface is based on the IMS T424 Transputer and the Concurrent Sequential Processes type of programming language OCCAM. The Loop-type of communication systems are described and the Delay Insertion type of interface has been selected as the most appropriate one for high performance real-time applications. The OCCAM programming language, hosted on the VAX 11/780 VMS system (VAX-Virtual address extension, VMS-Virtual Memory System) was used to program the simulated version of the multicluster loop interface. GRA

N86-15961# Ballistic Research Labs., Aberdeen Proving Ground, Md.
COLOR POST-PROCESSOR FOR THE EPIC-2 COMPUTER PROGRAM Final Report
T. M. Sherrick Jun. 1985 30 p Original contains color illustrations
(DA Proj. 1L1-62618-AH-80)
(AD-A159321; BRL-SP-48) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report documents enhancements made to the EPIC=2 post-processor and the implementation of color into the post-processor. Reference 1 describes the EPIC-2 program and contains a user's manual for the program and post-processor. This report can be utilized as documentation for the original EPIC-2 post-processor, STPLOTPL, by merely neglecting the information pertaining to color graphics. Plotting information for the post-processor is written on two tapes by the EPIC-2 program at user-specified intervals. One tape contains all the flow field variables at preselected times. The other contains time histories of flow field variables at preselected times and locations. EPIC-2 is a two-dimensional computer program for impact and explosive detonation problems. The capability to treat spinning projectiles is also included. The numerical technique is based on a Lagrangian finite element formulation in which the equations of motion are integrated directly rather than through the traditional stiffness matrix approach. Trilinear material strength compressibility effects are included to account for elastic plastic flow and wave propagation. GRA

N86-15962# Naval Postgraduate School, Monterey, Calif.
RELATIONAL PROGRAMMING: DESIGN AND IMPLEMENTATION OF A PROTOTYPE INTERPRETER M.S. Thesis
J. R. Brown and S. G. Mitton Jun. 1985 228 p
(AD-A159404) Avail: NTIS HC A11/MF A01 CSCL 09/2

Relational programming is a methodology which combines the advantages of functional programming with the relatively simple laws which govern relations. The goal is to give the programmer an environment which allows a higher level of programming abstraction than currently exists, an easier approach to proving programs correct, and a language which can support new parallel architectures. In this thesis, the design and implementation of a prototype interactive interpreter for a relational programming language is presented. The reasoning behind the decision to use LISP as the implementation language is presented followed by an in depth discussion of the design issues involved and the implementation decisions made. How to use the interpreter and future research topics are discussed. Also several appendices are provided which include the grammar, the relational operators implemented, and the documented LISP code. GRA

N86-15963# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE REVISED REPORT ON SCHEME OR AN UNCOMMON LISP
H. Abelson, N. Adams, D. Bartley, G. Brooks, and W. Clinger, ed. Aug. 1985 77 p Sponsored in part by Indiana Univ.
(Contract N00014-80-C-050; Grants NSF NCS-83-04567; NSF 83-03325)
(AD-A159423; AI-M-848-Rev; Computer-Sci-Dept-TR-174) Avail: NTIS HC A05/MF A01 CSCL 09/2

Scheme is a statically scoped and properly tail-recursive dialect of the Lisp programming language invented by Guy Lewis, Steele Jr. and Gerald Jay Sussman. It was designed to have exceptionally clear and simple semantics and very few different methods of expression formation. This paper reports their unanimous recommendations augmented by committee work in the areas of arithmetic, characters, strings, and input/output. Scheme shares with Common Lisp the goal of a core language common to several implementations. Scheme differs from Common Lisp in its emphasis upon simplicity and function over compatibility with older dialects of Lisp. GRA

N86-15964# Naval Postgraduate School, Monterey, Calif.
THE DESIGN AND ANALYSIS OF A STYLIZED NATURAL GRAMMAR FOR AN OBJECT-ORIENTED LANGUAGE (OMEGA) M.S. Thesis
R. P. Ufford Jun. 1985 119 p
(AD-A159434) Avail: NTIS HC A06/MF A01 CSCL 09/2

In this thesis, we discuss the design issues of a stylized natural language syntax for Omega, an object-oriented programming language built upon rule-based pattern matching. Emphasis is placed on simplicity and flexibility in the design. The feasibility of the proposed grammar (Omega-1.5) is evaluated by developing a prototype translator to translate the Omega-1.5 grammar into the predicate logic style of Omega-1. Sample applications are provided to examine the features of the grammar and to explore possible application areas. Limitations in the design are analyzed and potential amelicriations are suggested. We conclude with a general assessment of the overall Omega system. Author (GRA)

N86-15965# Naval Postgraduate School, Monterey, Calif.
AN IMPLEMENTATION IN PASCAL: TRANSLATION OF PROLOG INTO PASCAL M.S. Thesis
A. Saraydin Jun. 1985 161 p
(AD-A159552) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis tries to find a mapping algorithm between Prolog and Pascal languages. For this purpose, a small subset of Prolog is chosen and translated into Pascal code. Also, the concept of logic programming and its practical application in the programming

language Prolog, are discussed. The reader is expected to be familiar with Pascal and Prolog. Author (GRA)

N86-15966# RAND Corp., Santa Monica, Calif.
RUNNING ROSS IN AN EMACS ENVIRONMENT
D. J. McArthur Apr. 1985 13 p
(AD-A159567; RAND/P-7088) Avail: NTIS HC A02/MF A01
CSCL 09/2

This paper describes a software environment in which to run ROSS, an object-oriented simulation language. The goal of the facility is to provide the user with tools that can increase the speed at which the user creates, tests and debugs large ROSS systems. Using ROSS alone, making permanent fixes to code was tedious. The user had to get out of ROSS, into and editor, make the changes, return to ROSS, then re-load the changed file. The approach is to embed ROSS inside Emacs, a powerful, personalizable, screen-oriented, to editor. Emacs was tailored to provide just the tools the ROSS programmer needs. For example, the user never has to leave ROSS to make code changes, and all the lower-level details of code management-such as finding the file (and location in the file) of behaviors or functions, saving permanent changes onto disk, and loading new definitions back into ROSS-are done automatically. This facility makes ROSS a much more friendly and powerful environment for debugging. This paper describe various facets of the ROSS-EMACS facility. It begins with a brief overview, followed by descriptions of commands for editing functions and behaviors, managing Emacs windows, evaluating Lisp forms, compiling Lisp forms, and defining ROSS systems. Each section starts with a brief description, followed by a list of the Emacs commands that implement the described capabilities. GRA

N86-15967# Los Alamos National Lab., N. Mex.
CAT: AN INTERACTIVE GRAPHICS CODE
K. S. Holian May 1985 63 p
(Contract W-7405-eng-36)
(DE85-016212; LA-10416-MS) Avail: NTIS HC A04/MF A01

CAT is an interactive graphics code available on the Cray machine. In addition to plotting, it can manipulate data in many ways, including performing arithmetic operations, rearranging data, and interpolating. This manual instructs in the use of CAT. DOE

N86-15968# Lawrence Livermore National Lab., Calif.
APPLICATION AND IMPLEMENTATION OF TRANSIENT ALGORITHMS IN COMPUTER PROGRAMS
D. J. Benson Jul. 1985 19 p Presented at the Computational Structural Mechanics and Dynamics Workshop, Hampton, Virginia, 17 Jun. 1985
(Contract W-7405-eng-48)
(DE85-015396; UCRL-92985; CONF-8506160-1) Avail: NTIS HC A02/MF A01

This presentation gives a brief introduction to the nonlinear finite element programs developed at Lawrence Livermore National Laboratory by the Methods Development Group in the Mechanical Engineering Department. The four programs are DYNA3D and DYNA2D, which are explicit hydrocodes, and NIKE3D and NIKE2D, which are implicit programs. The presentation concentrates on DYNA3D with asides about the other programs. During the past year several new features were added to DYNA3D, and major improvements were made in the computational efficiency of the shell and beam elements. Most of these new features and improvements will eventually make their way into the other programs. The emphasis in our computational mechanics effort has always been, and continues to be, efficiency. To get the most out of our supercomputers, all Crays, we have vectorized the programs as much as possible. Several of the more interesting capabilities of DYNA3D will be described and their impact on efficiency will be discussed. Some of the recent work on NIKE3D and NIKE2D will also be presented. In the belief that a single example is worth a thousand equations, we are skipping the theory entirely and going directly to the examples. DOE

N86-15969# Mound Lab., Miamisburg, Ohio.
OPERATIONAL METHODS FOR DATA INTERPOLATION
G. L. Silver 1 Aug. 1985 37 p
(Contract DE-AC04-76DP-00053)
(DE85-016050; MLM-3277) Avail: NTIS HC A03/MF A01

The operational method for data treatment is illustrated: four, five, six, and seven point echo functions, formulas for extremum evaluation and location, two-dimensional echo functions, equations relating data in two-dimensional configurations, derivative methods, and programs are given. DOE

N86-15970# California Univ., Santa Barbara. Dept. of Electrical and Computer Engineering.
ALGORITHMS AND SOFTWARE FOR POLE ASSIGNMENT AND OBSERVERS, REVISION 1
A. J. Laub and M. Wette 15 May 1985 91 p
(Contract W-7405-eng-48)
(DE85-016068; UCRL-15646-Rev-1) Avail: NTIS HC A05/MF A01

This is a final report for a project 6 entitled Algorithms and software for pole assignment and Observers for Dr. Charles J. Herget of Lawrence Livermore National Laboratory. The work consisted of evaluating some algorithms and software for pole placement and producing some software for full-order observers. Several promising pole placement approaches were tried and extensive numerical testing was done. This is documented in detail later in the report. A suite of programs to implement full-order observer design, as well as stand-alone pole placement software, has been written and documented and is also described in detail in the sequel. Both single-input and multi-input pole placement were investigated with considerable effort being devoted to writing code for the latter for which no reliable codes were already available. Time did not permit writing and testing of code to do minimal order observers buth such a project look feasible and may be undertaken independently by the authors. DOE

N86-15971# Sandia Labs., Albuquerque, N. Mex.
DAASY (DATA ACQUISITION AND ANALYSIS SYSTEM)
G. J. Hansen and M. J. Boyer Jul. 1985 103 p
(Contract DE-AC04-76DP-00789)
(DE85-016341; SAND-85-1140) Avail: NTIS HC A06/MF A01

This report describes a data acquisition and analysis system (DAASY) which is capable of digitizing up to 80 analog inputs to 12 bits plus parity and storing the converted data in a memory system. In direct support of DAASY is instrumentation trailer B-70. This trailer houses the necessary hardware and software to ask for and receive the data stored in DAASY's memory. These data are processed in the PDP-11 computers in B-70 where calculations are made to produce data plots in engineering units. Both the DAASY and B-70 are compatible with the Nevada Test Site (NTS) range timing system, signal system, and control system. DOE

N86-15972# Sandia National Labs., Albuquerque, N. Mex.
PETROS: A PROGAM FOR CALCULATING TRANSPORT OF HEAT, WATER, WATER VAPOR AND AIR THROUGH A POROUS MATERIAL
G. R. Hadley May 1985 68 p refs
(Contract DE-AC04-76DP-00789)
(DE85-013168; SAND-84-0878) Avail: NTIS HC A04/MF A01

The one-dimensional code PETROS computes the transport of water, water vapor, an inert gas, and heat through a partially saturated porous medium. The mass flux of liquid water is driven by gradients in saturation, temperature, and gas pressure as well as the force of gravity. Gas transport includes effects due to Knudsen diffusion and binary gaseous diffusion of each gas component, plus Darcy flow of he gas mixture. Evaporation and condensation are accounted for, both in the fluid mass balance and the heat equation. A description is given of the model assumptions and the resulting equations, together with the numerical techniques used to obtain problem solutions. Included also are instructions for running the code, and a sample problem. DOE

N86-15973# Oak Ridge Y-12 Plant, Tenn.
COMPUTER-ASSISTED PROGRAM DESIGN

K. G. Young 27 Jun. 1985 27 p refs
(Contract DE-AC05-84OR-21400)
(DE85-015315; Y-2351) Avail: NTIS HC A03/MF A01

An automated interactive specification technique that has a mathematical basis is discussed. Two sample applications, a hypothetical environmental monitoring system and data management in an industrial environment, are presented. To give a realistic understanding of this new technique, alternative methods of software specification are discussed. This new technique appears to be particularly suited for large complex systems. DOE

N86-15974# Argonne National Lab., Ill.
PERFORMANCE OF VARIOUS COMPUTERS USING STANDARD LINEAR EQUATIONS SOFTWARE IN A FORTRAN ENVIRONMENT
J. J. Dongarra 15 Jul. 1985 12 p
(Contract W-31-109-ent-38)
(DE85-015338; ANL/MCS-TM-23) Avail: NTIS HC A02/MF A01

This note compares the performance of different computer systems while solving dense systems of linear equations using the LINPACK software in a FORTRAN environment. About 100 computers, ranging from a CRAY X-MP to the 68,000 based systems such as the Apollo and SUN Workstations to IBM PC's, are compared. DOE

N86-15975# Lawrence Livermore National Lab., Calif.
DATA FLOW GRAPH OPTIMIZATION IN IF1
S. Skedzielewski and M. Welcome 7 Feb. 1985 23 p Presented at the Functional Programming Languages and Computer Architecture Conference, Nancy, France, 16 Aug. 1985
(Contract W-7405-eng-48)
(DE85-007979; UCRL-92122; CONF-850854-1) Avail: NTIS HC A02/MF A01

Optimization techniques are as important when compiling data flow languages as when compiling conventional languages. This paper describes work that has been done on optimizers for SISAL programs that have been translated into IF1 data flow graphs. It shows that conventional optimization algorithms are extremely cheap to implement for data flow graphs, and that the payoff for even simple optimizations can be large. DOE

N86-15426# Hokkaido Univ., Sapporo (Japan).
ON THE ASSIGNMENT ALGORITHM BY MEANS OF MULTI-LINKED DATA STRUCTURE
Tsutomu Da-Te and Hidetoshi Nonaka *In* the Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 61 p In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15479# Joint Publications Research Service, Arlington, Va.
MC68000 MONITOR PROGRAM DISASSEMBLED
Yuan Hongchun *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 6-18 Transl. into ENGLISH from Weixing Jisuanji (Chongqing, China), no. 2, 14 Mar. 1985 p 102-107 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

N86-15480# Joint Publications Research Service, Arlington, Va.
MICROPROCESSOR APPLICATION IN ERROR CODE CORRECTION
Zhou Dahua and Liu Yuqin *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 19-32 refs Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), v. 15, 10 Feb. 1985 p 2-8 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

N86-15931# Joint Publications Research Service, Arlington, Va.
ORGANIZATION OF PROCESSOR ORIENTED TO MULTIPROCESSING
V. F. Guzik and V. N. Reshetnyak N its USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 25-33 refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Priborostroyeniye (Leningrad), no. 12, Dec. 1984 p 23-29 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15934# Joint Publications Research Service, Arlington, Va.
USING DIGITAL SIMULATION IN THE DESIGN OF CAMAC SYSTEMS
P. V. Gamin, S. V. Morgunov, and M. A. Shamashov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 44-47 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 46-48 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15937# Joint Publications Research Service, Arlington, Va.
PROGRAM BASE FOR RASTER DISPLAY
E. A. Talnykin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 56-60 Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 5, Sep. - Oct. 1984 p 104-107 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15939# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF DEVELOPING ALGORITHMIC DESIGN SYSTEM
O. M. Nabiyev and K. K. Zagidullin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 92-96 refs Transl. into ENGLISH from Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya Tekhnicheskikh Nauk (Tashkent), no. 6, Nov. - Dec. 1984 p 10-13 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15940# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL-LOGICAL SYSTEM FOR AUTOMATED PLANNING OF ROBOT PRODUCTION LINE CONTROL SYSTEMS
E. M. Pospelov and A. I. Savitskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 103-107 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 28-30 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15942# Joint Publications Research Service, Arlington, Va.
RED-GRAPHIC EDITOR IN PRINTED CIRCUIT BOARD DESIGN SYSTEM
E. A. Talnykin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 113-118 refs Transl. into ENGLISH from Avtometriya (Novosibirsk), no. 5, Sep. - Oct. 1984 p 42-46 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

62 COMPUTER SYSTEMS

Includes computer networks.

N86-15976# Polytechnic of Central London (England). Dept. of Library Services.
MICROCOMPUTER NETWORKING IN LIBRARIES. REPORT OF A STUDY VISIT TO THE UNITED STATES 14TH OCTOBER 1983
Mel Collier 1984 18 p
(BLRDR-5819) Copyright. Avail: Issuing Activity

A study visit made to the United States of America by M.W. Collier is reported. The aim of the visit was to gather information on local area network developments in the U.S. Information was gathered on network developments in libraries. A presentation at a conference in Colorado Springs was made on microcomputer networking in libraries. The visit is outlined in detail. Author

N86-15928# Joint Publications Research Service, Arlington, Va.
RAISING THE RELIABILITY OF A REMOTE PROCESSING SYSTEM
V. Ye. Beloshevskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 2-3 Transl. into ENGLISH from Avtomatike, Telemekhanika i Svyaz (Moscow), no. 3, Mar. 1985 p 34 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15932# Joint Publications Research Service, Arlington, Va.
MODELING PROBLEM-ORIENTED MULTIPROCESSOR SYSTEMS
V. A. Smolnikov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 34-37 refs Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Upravleniya (Kiev), no. 1, Jan. - Mar. 1985 p 37-39 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

N86-15933# Joint Publications Research Service, Arlington, Va.
MULTIPROCESSOR SYSTEMS WITH DYNAMIC REDISTRIBUTION OF REQUESTS THROUGH A COMMON BUS
V. A. Bogatyrev *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-004) 27 Aug. 1985 p 38-43 refs Transl. into ENGLISH from Izvestiya Vysshigk Uchebnykh Zavedeniy: Priborostroyeniye (Leningrad), no. 3, Mar. 1985 p 33-38 (For primary document see N86-15927 06-60)
Avail: NTIS HC A08

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-15977 CIAD, Zoetermeer (Netherlands). Projectgroep.
EXPERT SYSTEMS IN ENGINEERING PRACTICE Final Report [EXPERTISYSTEMEN IN DE INGENIEURSPRAKTIJK]
Jun. 1985 201 p refs Partly in DUTCH and ENGLISH
(ISBN-90-6818-018-5) Copyright. Avail: Issuing Activity
The usefulness of artificial intelligence and particularly expert systems for computer aided design support, was investigated. The DELFI expert system was tested. Using the results of this test, DELFI was redesigned, providing possibilities of iteration, calling external calculation routines, initialization of fixed data into a base, and graphical reproduction. Design rules are framed as input for the DELFI program. A design process is made, to investigate phases and operations in which an expert system is useful.
Author (ESA)

N86-15978# Yale Univ., New Haven, Conn. Dept. of Computer Science.
DISTRIBUTED FIFO ALLOCATION OF IDENTICAL RESOURCES USING SMALL SHARED SPACE
M. J. Fischer, N. A. Lynch, J. E. Burns, and A. Borodin Jun. 1985 40 p
(Contracts N00014-82-K-0154; DAAG29-79-C-0155; Grants NSF MCS-77-02474; NSF MCS-77-15628)
(AD-A159151; Yaleu/DCS/TR-421) Avail: NTIS HC A03/MF A01 CSCL 09/2
This document presents a simple and efficient algorithm for the FIFO allocation of k identical resources among asynchronous processes which communicate via shared memory. The algorithm simulates a shared queue but uses exponentially fewer shared memory values, resulting in practical savings of time and space as well as program complexity. The algorithm is robust against processes failure through unannounced stopping, making it attractive also for use in an environment of processes of widely differing speeds. In addition to its practical advantages the authors show the algorithm is optimal (to within a constant factor) with respect to shared space complexity.
GRA

N86-15979# Oak Ridge National Lab., Tenn.
HYPERCUBE CONCURRENT COMPUTATION AND VIRTUAL TIME FOR ROBOTIC APPLICATION
J. Barhen 1985 31 p Presented at the International Conference on Robotics Research, St. Louis, Mo., 25 Mar. 1985
(Contract DE-AC05-84OR-21400)
(DE85-009479; CONF-8503154-1) Avail: NTIS HC A03/MF A01
The programmatic activities of CESAR, the Center for Engineering Systems Advanced Research, are briefly reviewed. In the concurrent computation area, critical issues related to the control of intelligent machines using hypercube ensembles are outlined. The mapping of task graphs exhibiting structural irregularity and nonlocal communication patterns is discussed and the results of an application to the solution of robot inverse dynamcs are given. Finally, the design of a Virtual Time Intelligent Machine Operating System (IMOS/VT) for the ORNL/NCube ensemble computer is presented.
DOE

N86-15980# Sheffield Univ. (England). Dept. of Control Engineering.
ON THE OPTIMAL CONTROL OF BILINEAR SYSTEMS AND ITS RELATION TO LIE ALGEBRAS
S. P. Banks and M. K. Yew 1985 14 p refs
(RR-275) Avail: NTIS HC A02/MF A01
The minimum fuel problem for a bilinear system is considered. It is shown how to obtain the optimal control by considering the Lie algebra generated by the system matrices. It is noted that an open-loop control depending on the initial value of the state x sub 0 is obtained. However, using the principle of receding horizon control, the control can be applied as if it were always starting at an optimizing interval of T seconds; x sub 0 can be replaced by x(t) and T allowed to depend on the state to obtain a nonlinear feedback control. The details are the same as with linear systems.
Author (ESA)

N86-15981# Sheffield Univ. (England). Dept. of Control Engineering.
ON THE OPTIMAL CONTROL OF NONLINEAR SYSTEMS
S. P. Banks 1985 11 p refs
(RR-278) Avail: NTIS HC A02/MF A01
The optimal control of a nonlinear analytic system is approached by writing the system in the form of an infinite-dimensional bilinear system. The theory of tensors is used, and the Lie algebra of tensors generated by the operators in the associated bilinear system is considered. This simplifies considerably the approach where a power series in the tensor operators is obtained for the optimal control. It is shown that particularly simple results hold if the Lie algebra is nilpotent.
Author (ESA)

N86-15944# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF ARTIFICIAL INTELLIGENCE IN COMPUTERS
Yuriy Matveyev *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-009) 19 Nov. 1985 p 5-9 Transl. into ENGLISH from Nauka I Tekhnika (Riga, USSR), no. 7, Jul. 1985 p 16-17 (For primary document see N86-15943 06-60)
Avail: NTIS HC A04

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-15982 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
EQUILIBRIUM POSITIONS AND EQUILIBRIUM DOMAINS OF AUTONOMOUS SYSTEMS [UEBER DIE GLEICHGEWICHTSLAGEN UND GLEICHGEWICHTSBEREICHE NICHTLINEARER AUTONOMER SYSTEME]
Horst J. Klepp Jun. 1985 102 p refs In GERMAN; ENGLISH summary
(RUB-IFM-MITT-45) Copyright. Avail: Issuing Activity

The behavior of autonomous systems subject to discontinuous forces in the equilibrium positions and equilibrium domains was investigated. Using the piecewise defined potential, auxiliary functions for conservative systems with discontinuous displacement-dependent forces were determined. These functions are used for stability investigations of the equilibrium positions. Representative phase-phase portraits were established for systems with damping and friction. Particularities on the switching line due to the discontinuous transition from static to kinetic friction were pointed out. Direction elements for equilibrium positions and hence direction fields for equilibrium zones were defined in order to characterize the equilibrium positions inside equilibrium zones, based on the response of the system to small perturbations. The bifurcation points of the direction field were established for a model, and the influence of the parameters of the system and the perturbation on the bifurcation points was determined.

Author (ESA)

N86-15983# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A NEW ENUMERATION SCHEME FOR THE KNAPSACK PROBLEM

Horacio Hideki Yanasse and Nei Yoshihiro Soma Jun. 1985 18 p refs Presented at the School of Combinatorial Optimization, Rio de Janeiro, Jul. 1985

(INPE-3563-PRE/769) Avail: NTIS HC A02/MF A01

A new enumeration scheme to solve the one dimensional knapsack problem motivated by some observations on number theory, more specifically on the determination of the number solutions of linear diophantine equations is presented. This new algorithm is pseudopolynomial and its special features provide a reduction in the computational memory requirements as compared with other exact methods.

Author

N86-15984# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

AN EXACT ALGORITHM FOR THE KNAPSACK PROBLEM [UM ALGORITMO EXATO PARA O PROBLEMA DA MOCHILA]

Horacio Hideki Yanasse and Nei Yoshihiro Soma Sep. 1985 9 p refs In PORTUGUESE; ENGLISH summary Presented at the 2nd ERMAC, Sao Jose dos Campos, Brazil, 16-17 May 1985

(INPE-3645-PRE/815) Avail: NTIS HC A02/MF A01

A new enumeration scheme to solve the one dimension knapsack problem is presented. This new algorithm is pseudo-polinomial and, given its special features, there is probably a reduction on the computational memory requirements when compared to other exact methods.

Author

N86-15985# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

LAPLACE TRANSFORMATION WITH REDUCE 2 [TRANSFORMADA DE LAPLACE NO REDUCE 2]

Frederico L. G. deFreitas (Univ. Federal de Pernambuco, Recife, Brazil) and Guilherme Bittencourt Sep. 1985 33 p refs In PORTUGUESE; ENGLISH summary Presented at the 2nd Encontro Regional de Matematica Aplicada e Computacional, Sao Jose dos Campos, Brazil, 16-17 May 1985

(INPE-3649-PRE/816) Avail: NTIS HC A02/MF A01

A system for Laplace transform analytic calculation is presented; its structure and some results obtained making use of the system are shown. The system was developed based on the symbolic manipulation capabilities of the REDUCE 2 program. The B-6800 INPE-CNPq computer was used. In order to perform the Laplace transformations, routines were implemented, in the RLISP Language, to expand the symbolic manipulation capabilities of the REDUCE 2 program.

Author

N86-15986# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

NONLINEAR CONTROL OF DISTRIBUTED PARAMETER SYSTEMS

J. A. M. FelippedeSouza Aug. 1985 7 p refs Presented at the 8th Congresso Nacional de Matematica Aplicada e Computacional, Florianopolis, Brazil, 16-20 Sep. 1985

(INPE-3623-PRE/807) Avail: NTIS HC A02/MF A01

The problem of control of nonlinear systems of the type z=Az + Nz + Bu, Z(0) = z sub 0, where A is linear, N is nonlinear, z is the state and u is the control is studied. The linear operator A is assumed to generate a strongly continuous semigroup S(t) on the state space Z. The problem of controllability is to find a control u(.) which drives the system from z sub 0 at t = 0 to a given desired state z sub d at t = T. Here we present the basic ideas of the results obtained when Z is a Hilbert space.

Author

N86-15987# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Dept. Mecanica Espacial e Controle.

CONTROL OF NONLINEAR DISTRIBUTED PARAMETER SYSTEMS

J. A. M. FelippedeSouza Aug. 1985 9 p refs Presented at the 4th Coloquio de Control Automatico of the Centro de Investigacion y Estudios Avanzados, Mexico City, Mexico, 3-6 Sep. 1985

(INPE-3624-PRE/808) Avail: NTIS HC A02/MF A01

Some results in controllability of nonlinear systems of the type z = Az + Nz + Bu, where A is linear, N is nonlinear, B is linear, z is the state and u is the control is presented. It is assumed that the dynamics of the linear part (i.e., z = Az) can be described in terms of a strongly continuous semigroup on an appropriate Banach space (the state space), so that this formulation includes distributed parameter systems and delay systems, as well as lumped parameter systems. Theoretical results in controllability are obtained by using fixed point theorems. It is considered the space X of functions from the interval (0,T) to Z (the possible trajectories of the system). In this setting, some mappings F:X approaches the limit of X are constructed and the solution of the problem of nonlinear controllability is obtained via the fixed points of such F's.

Author

N86-15988# Stanford Univ., Calif. Dept. of Computer Science.

CONSTRUCTING A PERFECT MATCHING IS IN RANDOM NC

R. M. Karp, E. Upfal, and A. Wigderson Mar. 1985 16 p

(Contract N00039-83-C-1036)

(AD-A157813; SU-STAN-CS-85-1043) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document shows that the problem of constructing a perfect matching in a graph is in the complexity class Random NC; i.e., the problem is solvable in polylog time by a randomized parallel algorithm using a polynomial-bounded number of processors. It is also shown that several related problems lie in Random NC. These include: Constructing a perfect matching of maximum weight in a graph whose edge weights are given in unary notation; Constructing a maximum-cardinality matching; Constructing a matching covering a set of vertices of maximum weight in a graph whose vertex weights are given in binary; and Constructing a maximum s-t flow in a directed graph whose edge weights are given in unary.

Author (GRA)

N86-15989# Stanford Univ., Palo Alto, Calif. Dept. of Statistics.

RANDOM SEQUENTIAL CODING BY HAMMING DISTANCE

Y. Itoh and H. Solomon 11 Jul. 1985 13 p

(Contract N00014-76-C-0475)

(AD-A158003; SU-TR-360) Avail: NTIS HC A02/MF A01 CSCL 12/1

Simple cubic random packing and random packing by Hamming distance are analyzed. Consider the packing density gamma sub d of dimension d by cubic random packing. From simulations up to dimension 11, gamma sub d + 1/gamma sub d seems to approach one. Simulation results for random packing by Hamming distance are obtained. For the case of Hamming distances of 2 or 3, d-gamma fits the simulation results of packing density where gamma is an empirical constant.

Author (GRA)

N86-15990# Tetra Tech, Inc., Arlington, Va.

A TARGET TRACKER USING A DOPPLER COMPENSATED CORRELATION TECHNIQUE Final Report

B. R. Eldridge 29 May 1985 57 p

(Contract N00014-81-C-0535)

(AD-A158087) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document is the final research report on the investigation of a mathematical algorithm to do target tracking, using Doppler compensated correlation techniques on input time series streams from several passive acoustic sensors. The algorithm was developed and programmed into a testbed on a VAX-750 computer and was tested using simulated time series data generated by the Tetra Tech Broadband Signal Simulator. Algorithm performance proved disappointing due to: (1) numerical instabilities induced by structural anomalies in the sample signal autocorrelation function; (2) the extreme sensitivity of objective function to choice of signal characteristics and processing parameters; and (3) computational intensity of the algorithm. Author (GRA)

N86-15991# Aerodyne Research, Inc., Billerica, Mass.
OUTER PRODUCT CALCULATIONS Monthly Progress Report, Nos. 7, 8, 9 & 10, 19 Mar. 1985 - 15 Jul. 1985
Jul. 1985 44 p
(Contract N00014-84-C-2387)
(AD-A158295; ARI-4662; MPR-7/8/9/10) Avail: NTIS HC A03/MF A01 CSCL 12/1

Several progress reports are included in one. The following topics are reported; constrained projection operators; relation between generalized inverses and projection methods; weighted features and subspace methods; and outer product expansions - approximate singular value decompositions. GRA

N86-15992# Oxford Univ. (England). Mathematical Inst.
NONLINEAR DIFFUSION EQUATIONS Final Technical Report, 26 Jan. - 26 Oct. 1984
J. B. McLeod Jun. 1985 28 p
(Contract DAJA37-81-C-0220; DA Proj. 1T1-61102-BH-57)
(AD-A158305) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report summarizes mathematical research in the physical and biological sciences. Topics include: Partial differential equations; Parabolic and elliptic equations; Diffusion processes; Convective systems; Nonlinear waves; Free boundary problems. GRA

N86-15993# University of Southern California, Los Angeles. Dept. of Electrical Engineering.
FURTHER INFORMATIONAL PROPERTIES OF THE NASH AND STACKELBERG SOLUTIONS OF LQG GAMES Final Report, Jun. 1982 - May 1984
G. P. Papavassilopoulos 21 May 1985 91 p
(Grant AF-AFOSR-0174-82)
(AD-A158569; Rept-53-4503-1797; AFOSR-85-0624TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

This paper considers a two-decision-maker problem where each decision maker has his own information and studies the impact of improving the information of only one decision maker. In a previous document an example of a two-decision-maker LQG static Nash game was considered and was shown for that particular example that, on the one hand, if one of the decision makers improves his own information by obtaining his opponent's information (while his opponent's information does not change) then he ends up with a higher Nash cost; on the other hand, if he improves his own information by getting an extra measurement not from his opponent (while his opponent's information does not change) then he might incur lower Nash cost. This paper proves that in a general two-decision-maker LQG static or dynamic Nash game, if one of the decision makers knows all his opponent's information, then more or better information for him alone is beneficial to him. In static games the authors prove that more information for one of the decision makes alone is beneficial to him provided that such information is orthogonal to both decision maker's information. GRA

N86-15994# Wisconsin Univ., Milwaukee.
SIEVES AND A FILTER FOR GAUSSIAN PROCESSES Research Progress Report
J. Beder 25 Apr. 1985 5 p
(Grant AF-AFOSR-0329-84)
(AD-A158762; AFOSR-85-0621TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Results are reported on the first two conjectures that were to be investigated as described in the research proposal. Conjecture 1 has been established and follow-on results are obtained. What remains to be investigated is the use of these results to make confidence statements and to test hypotheses. Results which establish the truth of conjecture 2 are also reported. Author (GRA)

N86-15995# Iowa Univ., Iowa City.
RESIDUES OF INTEGRALS WITH THREE-DIMENSIONAL MULTIPOLE SINGULARITIES, WITH APPLICATION TO THE LAGALLY THEOREM Interim Report
L. Landweber Jul. 1985 22 p
(Contract N00014-83-K-0136)
(AD-A158771; IIHR-290) Avail: NTIS HC A02/MF A01 CSCL 12/1

An important mathematical relation in the theory of three-dimensional irrotational flow is the Gauss-Green transformation between volume and surface integrals. A very useful result of this transformation, Green's third formula, requires, in its derivation, the evaluation of the limit of a singular integral over the surface of a sphere as the radius of the sphere approaches zero. Since, in this case, the singularity is due to the potential of a source at the center of the sphere, its limit may be called the residue of a source. Similarly, limits of integrals over the surface of a sphere of vanishingly small radius, with higher-order derivatives of the source potential in the integrand, will be called residues for multipoles. The latter occur in the derivation of the Lagally theorem for the force and moment acting on a body moving in an irrotational flow when multipoles are present in the hydrodynamic singularity system within the body. In contrast to the very simple derivation of the residue occurring in Green's third formula, the evaluation of the multipole residues was a challenging application of the theory of spherical harmonics. The derivations of a set of multipole residues, which were required but not included in the aforementioned references, is in this document. GRA

N86-15996# Maryland Univ., College Park. Dept. of Mathematics.
A GRAPHICAL SIMILARITY MEASURE FOR TIME SERIES MODELS
B. Kedem Apr. 1985 24 p
(Grant AF-AFOSR-0187-82)
(AD-A158869; TR-85-10; AFOSR-85-0680TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The purpose of this document is to introduce a graphical device useful as a measure of similarity or as a goodness of fit criterion for hypothesized time series models. It is based on the actual oscillation observed in time series as depicted by axis-crossings and higher order crossings. Higher order crossings (HOC) are axis-crossings of differenced time series and are closely linked to the spectral content of the series. In fact under the Gaussian assumption, to which we shall adhere, HOC determine the finite dimensional distributions up to a scale parameter given that the mean is zero. The main advantage of HOC is that they are easily obtained from an observed series and that only very few of them are needed, as the dicriminatory power in HOC usually diminishes with their order. Higher order crossings in time series discrimination were discussed in Kedem and Slud (1981), (1982), where a certain goodness of fit criterion is suggested, Here, however, the emphasis is on a graphical device rather than a single test statistic. This graphical method may be shown useful in answering the question Does a given time series oscillate as a certain hypothesized model? Some examples with real and simulated data demonstrate the use and potential of this method. GRA

N86-15997# Rensselaer Polytechnic Inst., Troy, N.Y.
NUMERICAL METHODS FOR SINGULARLY PERTURBED DIFFERENTIAL EQUATIONS WITH APPLICATIONS Annual Scientific Report, 1 Jun. 1984 - 31 May 1985
J. E. Flaherty Jun. 1985 29 p
(Grant AF-AFOSR-0192-80)
(AD-A158969; AFOSR-85-0719TR) Avail: NTIS

HC A03/MF A01 CSCL 12/1

During the period covered by this report the investigators continued their research on the development and application of adaptive numerical methods for singularly perturbed initial-boundary value problems for partial differential equations. They continued their analysis of the stability of mesh moving schemes for one-dimensional parabolic problems. They also developed a moving mesh scheme with local refinement for two-dimensional hyperbolic systems and are considering a similar scheme for parabolic problems. They are applying our methods to several interesting physical problems, such as, elastic-plastic solids, combustion, and a nonlinear Schrodinger equation which exhibits self-focusing.

Author (GRA)

N86-15998# Pittsburgh Univ., Pa. Dept. of Electrical Engineering.

SHIFT-VARIANT MULTIDIMENSIONAL SYSTEMS Final Research Report, 1 Feb. 1983 - 31 Mar. 1985

N. K. Boss 29 May 1985 111 p

(Grant AF-AFOSR-0038-83)

(AD-A158973; AFOSR-85-0724TR) Avail: NTIS

HC A06/MF A01 CSCL 12/1

To a great extent the techniques for analysis and restoration of images has been developed under the assumption that the system is linear shift-invariant (LSI). These techniques are successful in some cases because a system which is diffraction-limited or a system whose object plane undergoes uniform linear motion perpendicular to the system reference axis does indeed satisfy these assumptions. However, LSI systems are singled out for study mainly because of the widespread understanding of the Fourier Transform theory along with well-known fast algorithms for its implementation. In comparison with LSI systems, very little work has been done on linear shift-variant (LSV) systems. Most of the research on two dimensional LSV systems has been done on restoration techniques by means of coordinate transformations. This technique decomposes the LSV system into a distortion of the input plane followed by a shift-invariant operation and terminated by a distortion of the output plane. The primary objective of this research is to provide not only a mathematical structure for the state-space modeling of discrete LSV systems but to apply this model to the problems of efficient analysis and deconvolution of multidimensional systems.

GRA

N86-15999# Brown Univ., Providence, R. I. Div. of Engineering.

CONTROL AND IDENTIFICATION OF TIME VARYING SYSTEMS Annual Technical Report, 30 Jun. 1984 - 29 Jun. 1985

A. E. Pearson 26 Jul. 1985 9 p

(Grant AF-AFOSR-0230-82)

(AD-A159067; AFOSR-85-0690TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

Research is summarized for a projected integral equation error technique used in the parameter identification of differential-delay equation models, including the time delay estimation problem for received signals. Current research on a fresh look at the Shinbrot method of moment functionals is described relating to the modeling and identification of linear, bilinear and polynomial input-output differential systems. Current research is also described for the feedback stabilization of state delayed control systems using a reducing transformation technique.

Author (GRA)

N86-16000# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

STRONG REPRESENTATION OF WEAK CONVERGENCE

Z. D. Bai and W. Q. Liang Jul. 1985 40 p

(Contract F49620-85-C-0008)

(AD-A159078; TR-85-29; AFOSR-85-0683TR) Avail: NTIS

HC A03/MF A01 CSCL 12/1

It is well known that there is a big difference between the concepts of weak and strong convergence of random variables. In the area of limiting theory, it is of interest to study the difference as well as the link between the two concepts of convergence.

GRA

N86-16001# North Carolina State Univ., Raleigh. Center for Stochastic Processes.

EXTREME VALUE THEORY AND DEPENDENCE Technical Report, Sep. 1984 - Aug. 1985

M. R. Leadbetter Jul. 1985 8 p

(Contract F49620-82-C-0008)

(AD-A159138; TR-109; AFOSR-85-0692TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

The purpose of this paper is to give a very brief account of some of the essential ideas underlying classical extreme value theory, and to see how these are used (modified as necessary) for dependent cases. In particular it will be shown how the classical theory still applies for moderately dependent stationary sequences, but that under higher local dependence, clustering of high values occurs, requiring modifications of the theory especially as it involves order statistics other than the maximum. Underlying concepts (especially point process convergence results) are emphasized.

Author (GRA)

N86-16002# Ecodynamics Research Associates, Inc., Albuquerque, N. Mex.

ADAPTIVE GRID GENERATION USING ELLIPTIC GENERATING EQUATIONS WITH PRECISE COORDINATE CONTROLS Annual Report, 27 Jan. 1984 - 15 Aug. 1985

P. J. Roache 31 Jul. 1985 7 p

(Contract F49620-84-C-0079)

(AD-A159158; AFOSR-85-0708TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

The investigators are in the final stages of developing a toolkit of symbol manipulation codes for variational grid generation. They will present an invited paper on this work at an AIAA Aerospace Sciences Meeting. They have also discovered an unexpected folding of the grid for a design case using a popular grid generation code. A paper analyzing the problem was presented at the AIAA Computational Fluid Dynamics Meeting in July. The analysis has suggested practical values of relative weighting parameters for use in variational grid generation techniques. A paper has been submitted to the Journal of Applied Mathematics and Computation.

Author (GRA)

N86-16003# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

NON-UNIFORM BOUNDS OF NORMAL APPROXIMATION FOR FINITE-POPULATION U-STATISTICS

M. Baiqi and Z. Lincheng Jul. 1985 38 p Prepared in cooperation with China University of Science and Technology, Hofei

(Contract F49620-85-C-0008)

(AD-A159163; TR-85-26; AFOSR-85-0696TR) Avail: NTIS

HC A03/MF A01 CSCL 12/1

The nonuniform bounds of normal approximation for finite population U statistics are discussed. Statistical distribution methods are presented.

B.S.

N86-16004# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.

A PERTURBATION APPROACH TO ROBOT CALIBRATION Interim Technical Report

H. O. K. Kirchner, B. Gurumoorthy, and F. B. Prinz Apr. 1985 25 p

(AD-A159166; CMU-RI-TR-85-9) Avail: NTIS HC A02/MF A01 CSCL 12/1

The forward and reverse solutions of a manipulator with six joints are expanded up to second order in the 24 joint parameters. This paper attempts to establish a mathematical reference frame for geometric errors only. No attempt is made to quantify the relative contribution of geometric and non-geometric errors, since this ratio is application dependent and will also depend on the design of the manipulator itself. Since in high speed operations high positional accuracy is desirable, we address the question of how to cope with geometric deviations from the ideal manipulator configuration.

GRA

N86-16005# Washington State Univ., Pullman.
RAPIDLY CONVERGENT ALGORITHMS FOR NONSMOOTH OPTIMIZATION Annual Scientific Report, 15 Jul. 1984 - 14 Jul. 1985
R. Mifflin 14 Jul. 1985 6 p
(Grant AF-AFOSR-0210-83)
(AD-A159168; AFOSR-85-0713TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This research has led to new developments for solving nonlinear optimization problems involving functions that are not everywhere differentiable and/or are implicitly defined, such as those that arise from dual formulations of optimization models. A rapidly convergent, both in the theoretical and the practical sense, algorithm has been developed for the single variable case where generalized derivatives are available. It is being extended to the case where only function values are known. Some of the single variable results, including the concept of better than linear convergence, have been extended to the multivariable case. In order to solve efficiently the particular quadratic programming subproblems generated by the n-variable method a specialized QP algorithm has been developed. Author (GRA)

N86-16006# Naval Postgraduate School, Monterey, Calif.
LAPLACIAN SMOOTHING SPLINES WITH GENERALIZED CROSS VALIDATION FOR OBJECTIVE ANALYSIS OF METEOROLOGICAL DATA Technical Report, Oct. 1984 - Mar. 1985
R. Franke Aug. 1985 37 p
(AD-A159336; NPS53-85-0008) Avail: NTIS HC A03/MF A01 CSCL 12/1

The use of Laplacian smoothing splines (LSS) with generalized cross validation (GCV) to choose the smoothing parameter for the objective analysis problem is investigated. Simulated 500 mb pressure height fields are approximated from first-guess data with spatially correlated errors and observed values having independent errors. It is found that GCV does not allow LSS to adapt to variations in individual realizations, and that specification of a single suitable parameter value for all realizations leads to smaller rms error overall. While the tests were performed in the context of data from a meteorology problem, it is expected the results carry over to data from other sources. A comparison shows that significantly better approximations can be obtained using LSS applied in a unified manner to both first-guess and observed values rather than in a correction to first-guess scheme (as in Optimum Interpolation) when the first-guess error has low spatial correlation. GRA

N86-16007# Rome Univ. (Italy). Dipt. di Fisica.
THREE FAMILIES OF INTEGRABLE ONE-PARTICLE POTENTIALS
S. Wojciechowski (Manchester University, UK) 7 Feb. 1985 18 p refs Sponsored by UK Science and Engineering Research Council
(Preprint-440) Avail: NTIS HC A02/MF A01

A simple recursive description of three infinite families of integrable potentials of a natural hamiltonian system of n degrees of freedom is given. For each family a set of n rational integrals of motion in involution which depend quadratically on the momenta is found. This is the reminiscence of the fact that these hamiltonians are, basically, separable either in generalized elliptic or conical-spherical or generalized parabolic coordinates but are difficult to determine this way. Consequently, the potentials remain integrable when they are constrained to a quadric surface defined by constant values of separation variables. As such they include a Neumann system and a Jacobi problem of the geodesic motion on n-axial ellipsoid as particular cases. The constrained systems are described in a global way using rational integrals of motion. Author (ESA)

N86-16008# Rome Univ. (Italy). Dipt. di Fisica.
SOME SOLVABLE DYNAMICAL SYSTEMS
F. Calogero 26 Feb. 1985 4 p refs Presented at Giornata di Geometria Meeting, Rome, Italy, Jun. 1984 Submitted for publication
(Preprint-441) Avail: NTIS HC A02/MF A01

A class of dynamical systems, i.e., systems of coupled nonlinear ordinary differential equations (ODE) is introduced. For systems which can be integrated, it is shown that their solution is provided by the zeros of explicity known polynomials (depending on the initial conditions and time). Others are not completely integrable but allow drastic simplifications, such as the transition from a system of n nonlinear second-order ODEs to a single nonautonomous nonlinear first-order ODE. Author (ESA)

N86-16009# Rome Univ. (Italy). Dipt. di Fisica.
BACKLUND TRANSFORMATIONS: TOOLS TO FIND NOVEL INTEGRABLE EVOLUTION EQUATIONS
A. Degasperis 4 Mar. 1985 11 p refs Presented at Workshop on Rencontre Interdisciplinaire Problemes Inverses, Montpellier, France, 27 Nov.-1 Dec. 1984
(Preprint-443) Avail: NTIS HC A02/MF A01

Two techniques to search for novel evolution equations, starting from a given one, by using Backlund transformations, are given. The first technique is a method to reduce the number of dependent variables of a system of coupled evolution equations. The second technique is a way of associating to a given evolution equation (integrable by the spectral transform) another evolution equation (the modified equation). Author (ESA)

N86-16010# Rome Univ. (Italy). Dipt. di Fisica.
CONNECTANCE AND EQUIPARTITION THRESHOLDS IN HAMILTONIAN SYSTEMS
A. Giansanti, M. Pettini (Osservatorio Astrofisico di Arcetri, Florence), and A. Vulpiani 6 Mar. 1985 10 p refs
(Preprint-445) Avail: NTIS HC A02/MF A01

The effect of increasing connectance (i.e., number of interacting neighboring masses) on the equipartition threshold of a Fermi, Pasta, Ulam model with 32 mass points is considered. Increasing the number of interacting neighbor mass points from 2 to 3, 4, and 5 and keeping constant the effective strength of the nonlinear terms, no apparent effect on the critical energy for equipartition is observed. Author (ESA)

N86-16011# National Geodetic Survey, Rockville, Md.
VARIANCE COMPONENT ESTIMATION METHOD FOR SPARSE MATRIX APPLICATIONS
J. R. Lucas Jun. 1985 19 p
(PB85-234383; NOAA-TR-NOS-111-NGS-33) Avail: NTIS HC A02/MF A01 CSCL 12A

Methods for estimating variance components from the observation data used in a least squares adjustment are becoming important in geodesy because of the variety of data that need to be combined into a single adjustment. Unbiased estimators of the MINQUE (Minimum Norm Quadratic Unbiased Estimation) type have received the most attention, but these estimators have some shortcomings that make them unattractive in certain applications. In particular, they require the full inverse of the least squares normal equation matrix, thus limiting the use of sparse matrix methods so common to geodesy. An iterative estimation method is proposed which may not be unbiased, but produces reliable estimates in controlled numerical tests and is compatible with sparse matrix adjustments. Some results are presented which compare this estimator with MINQUE and iterated MINQUE when applied to a particular adjustment problem. GRA

N86-15427# Hokkaido Univ., Sapporo (Japan).
ACCURACY OF POLYNOMIAL APPROXIMATION OF QUASI-MINIMAX METHODS
Tsutomu Da-Te and Mayuka Kawaguchi *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 64 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15428# Hokkaido Univ., Sapporo (Japan).
ANALYSIS OF DROPS IN ACCURACY OF LEAST-SQUARES APPROXIMATION

Mayuka Hawaguchi and Tsutomu Da-Te *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 64 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15483# Joint Publications Research Service, Arlington, Va.
PSEUDOINVERSE RESTORATION OF BLURRED IMAGE IN UNIFORM MOTION
Si Xianyu, Zhang Guanshen, Zhang Shaoying, and Li Yongguo *In its* China Report: Science and Technology (JPRS-CST-85-040) 20 Nov. 1985 p 50-56 refs Transl. into ENGLISH from Journal of Sichuan Univ. Natural Science Edition (Chengdu, China), no. 2, 1985 p 44-49 (For primary document see N86-15478 06-31)
Avail: NTIS HC A06/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-16012# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MERITS AND DEMERITS OF THE MAXIMUM ENTROPY SPECTRAL ANALYSIS (MESA) METHOD
Rajarem P. Kane Jul. 1985 12 p refs Presented at the 2nd Encontro Regional de Matematica Aplicada e Computacional da SBMAC, San Jose dos Campos, Brazil, 16-17 May 1985 Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3590-PRE/787) Avail: NTIS HC A02/MF A01

From the analysis of an artificial sample, it is shown that the Maximum Entropy Spectral Analysis (MESA) method is far superior to the Blackman and Tukey method. However, MESA has certain demerits like peak-splitting of low periodicities when large Lengths of the Prediction Error Filter (LPEF) are used, as also frequency shifts (errors) as large as 20% for large periodicities. Also, amplitudes cannot be estimated correctly. Hence, it is recommended that only periodicities may be located by MESA and then a Multiple Regression Analysis be carried out to estimate the amplitude. Author

N86-16013# Florida State Univ., Tallahassee. Dept. of Statistics.
MEAN RESIDUAL LIFE: THEORY AND APPLICATIONS Interim Report
F. Guess and F. Proschan Jun. 1985 21 p
(Contract F49620-85-C-0007)
(AD-A158589; FSU-Statistics-M702; AFOSR-85-0630TR; AFOSR-85-178TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In the last two decades, reliabilists, statisticians, and others have shown intensified interest in the mean residual life (MRL) and derived many useful results concerning it. Given that a unit is of age t, the remaining life after time t is random. The expected value of this random residual life is called the mean residual life at time t. Since the MRL is defined for each time t, we also speak of the MRL function. THe MRL function is like the density function the moment generating function, or the characteristic function: for a distribution with a finite mean, the MRL completely determines the distribution via an inversion formula. Not only is the MRL used for parametric modeling but also for nonparametric modeling. Large non-parametric classes of life distributions such as decreasing mean residual life (DMRL) and new better than used in expectation (NBUE) have been defined using MRL. This paper defines the MRL function formally and survey some of the key theories. Its wide range of applications is also discussed. Author (GRA)

N86-16014# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
STOCHASTIC INTEGRATION FOR OPERATOR VALUED PROCESSES ON HILBERT SPACES AND ON NUCLEAR SPACES
H. Korezlioglu and C. Martias Dec. 1984 57 p
(Contract F49620-82-C-0009)
(AD-A158878; TR-85; AFOSR-85-0681TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

The representation of a nuclear space valued square integrable martingale in terms of another nuclear space valued square integrable martingale is given in terms of stochastic integrals of operator valued processes. The construction of the stochastic integral goes through that of operator valued processes on Hilbert spaces. A new approach is given for the Hilbertian case, so that only the integration of Hilbert-Schmidt operator valued processes is needed for the representation of square integrable martingales. Author (GRA)

N86-16015# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
DEGENERATE MULTIVARIATE STATIONARY PROCESSES: BASICITY, PAST AND FUTURE, AND AUTOREGRESSIVE REPRESENTATION
A. G. Miamee and M. Pourahmadi May 1985 40 p
(Contract F49620-82-C-0009)
(AD-A158879; TR-99; AFOSR-85-0675TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

An important problem in prediction theory of weakly stationary stochastic processes (WSSP) is to find conditions on the process, or equivalently on its spectral distribution F, so that the linear least square predictor of a future value of the process admits a mean-convergent series representation in terms of the past (observed) values of the process. Recently, using the notion of positivity of the angle between the past-present and the future subspaces of the process it was shown by Pourahmadi that the series representation of the predictor is possible under some weaker conditions. This was made possible by using the idea of angle due to Helson and Szego for a multivariate extension of this. However, these results hold under conditions which require the process to be full rank. The main purpose of this document is to consider the same problem, including their autoregressive representation, for the degenerate WSSP's. GRA

N86-16016# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
ON THE NUMBER OF BOOTSTRAP SIMULATIONS REQUIRED TO CONSTRUCT A CONFIDENCE INTERVAL
P. Hall Mar. 1985 16 p
(Contract F49620-82-C-0009)
(AD-A158880; TR-97; AFOSR-85-0678TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The purpose of this document is to make two points about the effect of the number of bootstrap simulations, B, on percentile-t bootstrap confidence intervals. The first point concerns coverage probability; the second, distance of the simulated critical point form the true critical point derived with B=infinity. In both cases the author has in mind applications to smooth statistics, such as the Studentized mean of a sample drawn from a continuous distribution. He indicates the change that have to be made if the distribution of the statistic is not smooth. GRA

N86-16017# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
STOCHASTIC INTEGRALS AND PROCESSES WITH INDEPENDENT INCREMENTS
W. N. Hudson Mar. 1985 61 p
(Contract F49620-82-C-0009)
(AD-A158939; TR-98; AFOSR-85-0679TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Stochastic integrals are defined using processes with independent increments as integrators. A simple and perhaps new method is given for obtaining approximating simple integrands. In the special case where the integrand is a stable motion of index p epsilon the integrand may have paths in Lp. Basic properties are established. Then the characteristic functions of integrals involving nonrandom integrands are computed and used to

establish necessary and sufficient conditions for the independence of such integrals. Author (GRA)

N86-16018# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ON THE ANGLE FOR STATIONARY RANDOM FIELDS Technical Report, Sep. 1984 - Aug. 1985
A. G. Miamee and H. Niemi Apr. 1985 23 p
(Contract F49620-82-C-0009)
(AD-A158982; TR-92; AFOSR-85-0677TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The angle between past and future for stationary random fields on the lattice points of the plane is defined and it is shown that in contrast with other problems related to the past of random fields the positivity of the angle between past and future is independent of different pasts which have been considered. Most of the known facts concerning the angle for stochastic processes have been extended to the case of random fields. Author (GRA)

N86-16019# Pittsburgh Univ., Johnstown, Pa. Center for Multivariate Analysis.
ON THE MATRIX CONVEXITY OF THE MOORE-PENROSE INVERSE AND SOME APPLICATIONS
D. G. Kaffes, M. B. Rao, T. Mathew, and K. Subramanyam Jul. 1985 18 p
(Contract F49620-85-C-0008)
(AD-A158992; TR-85-28; AFOSR-85-0697TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper gives necessary and sufficient conditions for the validity of an inequality. GRA

N86-16020# Pittsburgh Univ., Johnstown, Pa. Center for Multivariate Analysis.
INADMISSIBILITY OF THE BEST EQUIVARIANT ESTIMATORS OF THE VARIANCE-COVARIANCE MATRIX AND THE GENERALIZED VARIANCE UNDER ENTROPY LOSS
B. K. Sinha and M. Ghosh Jul. 1985 22 p
(Contract F49620-85-C-0008; Grant NSF DMS-82-18191)
(AD-A159059; TR-85-27; AFOSR-85-0698TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Based on a data matrix and an independent Wishart matrix estimators dominating the best equivariant estimators of sigma and (sigma) are obtained under two types of entropy loss. For simultaneous estimation of the mean vector and the variance covariance matrix of a multinormal population, a suitable entropy loss is developed and estimators dominating the pair consisting of the sample mean vector and the best multiple of the sample Wishart matrix are derived. A technique of SINHA is heavily exploited. GRA

N86-16021# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
MULTIPLE DECISION PROCEDURES FOR TUKEY'S GENERALIZED LAMBDA DISTRIBUTIONS
J. K. Sohn Aug. 1985 129 p
(Contract N00014-84-C-0167)
(AD-A159153; TR-85-20) Avail: NTIS HC A07/MF A01 CSCL 12/1

Selection and ranking (more broadly multiple decision) problems arise in many practical situations since it is now well-recognized that the classical tests of homogeneity usually do not provide the answers the experimenter wants. This thesis studies Tukey's lambda distributions as the underlying model for selection and ranking problems. It is known that the family of Tukey's generalized lambda distributions is very broad and contains most well-known distributions as special cases. Chapter 1 deals with selection and ranking problems based on sample medians for the symmetric lambda distributions and gives applications of the lambda family distributions. In Chapter 2, the problems of isotonic selection procedures for the family of lambda distributions and for logistic distributions are considered. Chapter 3 deals with the problem of choosing the optimal score function for different nonparametric procedures proposed by Nagel (1970) and Gupta and McDonald (1970). A Monte Carlo study is carried out. In Chapter 4, a two-stage elimination-type procedure under the Bayesian setting is proposed and its properties are studied. In particular, we use a stopping rule to construct a 100(1-2 alpha)% Highest Posterior Density Credible regions with a common width 2d for the unknown means of selected populations at stage 1. A Monte Carlo study is carried out to examine the performance of the proposed procedure. GRA

N86-16022# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
ON THE LEAST FAVORABLE CONFIGURATION OF A SELECTION PROCEDURE BASED ON RANKS
S. S. Gupta and T. Matsui Aug. 1985 26 p
(Contract N00014-84-C-0167)
(AD-A159154; TR-85-19) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considers two types of statistics based on the sums of combined (Wilcoxon type) ranks and vector (Friedman type) ranks. Underlying populations are supposed to belong to the location or scale parameter family of distributions. Two approaches - subset selection and indifference zone - of ranking and selection procedures based on these statistics are considered in an asymptotic framework for selecting the population with the largest parameter value. The least favorable configurations of parameters are discussed by computing the exact moments of these statistics and introducing an assumption of order relation between the gaps of parameters. Author (GRA)

N86-16023# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
A LOWER CONFIDENCE BOUND ON THE PROBABILITY OF A CORRECT SELECTION
W. C. Kim Aug. 1985 18 p Prepared in cooperation with Seoul National Univ., South Korea
(Contract N00014-84-C-0167)
(AD-A159164; TR-85-18) Avail: NTIS HC A02/MF A01 CSCL 12/1

In the problem of selecting the best of k populations, a natural rule is to select the population corresponding to the largest sample value of an appropriate statistic. As a retrospective analysis, a lower confidence bound on the probability of a correct selection is derived when the probability density function has the monotone likelihood ratio property under the location parameter setting. The result is applied to the normal populations with both known and unknown common variance. Tables to implement the confidence bound are provided. Author (GRA)

N86-16024# North Carolina State Univ., Raleigh. Center for Stochastic Processes.
ON DETERMINING THE PREDICTOR OF NON-FULL-RANK MULTIVARIATE STATIONARY RANDOM PROCESSES
A. G. Miamee Mar. 1985 20 p
(Contract F49620-82-C-0009)
(AD-A159165; TR-96; AFOSR-85-0682TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Algorithms for determining the generating function and the predictor for some non-full-rank multivariate stationary stochastic process are obtained. In fact it is shown that the well known algorithms given by Wiener and Masani (1958) for the full-rank case, are valid in certain non-full-rank cases exactly in the same form. Author (GRA)

N86-16025# Stanford Univ., Calif. Dept. of Statistics.
TESTS FOR A CHANGE-POINT
B. James, K. L. James, and D. Siegmund Aug. 1985 35 p
(Contract N00014-77-C-0306; Grant NSF MCS-80-24649; NR Proj. 042-373)
(AD-A159381; SU-TR-35) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem considered is that of testing a sequence of independent normal random variables with constant, known or unknown, variance for no change in mean versus alternatives with a single change-point. Various tests, such as those based on the

likelihood ratio and recursive residuals, are studied. Power approximations are developed by integrating approximations for conditional boundary crossing probabilities. A comparison of several tests is made, and the power approximations obtained are compared with Monte Carlo values. GR/

N86-16026# Tilburg Univ. (Netherlands). Subdept. of Social-Cultural Science.
A COMPUTER PROGRAM FOR ANALYZING LOGLINEAR MODELS WITH LATENT VARIABLES: LCAG [LCAG- EEN COMPUTERPROGRAMMA VOOR DE ANALYSE VAN LOGLINIAIRE MODELLEN MET LATENTE VARIABELEN]
J. A. P. Hagenaars and M. A. G. vanderWalle (Katholieke Hogeschool, Tilburg, Netherlands) 1985 19 p refs In DUTCH Presented at Symposium Statistical Software, Utrecht, Netherlands, 1983
Avail: NTIS HC A02/MF A01

A program (LCAG) to analyze latent-class-models, explaining relations between nominally measured variables from relations between these variables and an underlying, discrete, Latent Variable (LV), is described. The program is developed for statistic sociological purposes. The parameters are obtained using maximum likelihood ratio chi square or Pearsons chi square. To use LCAG to estimate parameters of any identifiable hierarchical loglinear model with LVs, as well as nonhierarchical models, two extensions to the Goodman algorithm are introduced. Possibilities to set up a hierarchical loglinear model for relations between the LVs and to adopt LVs within models, for which parameters must be estimated according to the modified path analysis approach, are elaborated. Tests show adequate model processing. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-16027# Florida Univ., Gainesville. Center for Mathematical System Theory.
RESEARCH IN APPLIED MATHEMATICS RELATED TO NONLINEAR SYSTEM THEORY Final Report, 10 Aug. 1981 - 9 Aug. 1984
R. E. Kalman Aug. 1985 11 p
(Contract DAAG29-81-K-0136)
(AD-A158330; ARO-18343.44-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Document includes a bibliography listing post doctoral research performed at the Center for Mathematics System Theory at the University of Florida. GRA

N86-16028# Texas Univ., Austin. Center for Cybernetic Studies.
THE EQUAL FLOW PROBLEM
I. Ali, J. Kennington, and B. Shetty Apr. 1985 42 p
(Contract N00014-82-K-0295; Grant AF-AFOSR-0278-83)
(AD-A159594; CCS-RR-511) Avail: NTIS HC A03/MF A01 CSCL 12/2

This paper presents a new algorithm to solve a network problem with equal flow wide constraints. The proposed solution technique is motivated by the desire to exploit the special structure of the side constraints and to maintain as much of the characteristics of pure network problems as possible. Our solution technique for the equal flow problem consists of solving two sequences of pure network problems. One sequence yields tighter lower bounds on the optimal value by considering the Lagrangean relaxation of the equal flow problem in which the side constraints are dualized. The second sequence yields upper bounds on the optimal value for the problem and maintains a feasible solution at all times. This sequence is obtained by considering a reformulation of the equal flow problem based on parametric changes in the requirements vector. The procedure has the added attractive feature that it provides a feasible solution which is known to be within a percentage of the optimal at all times. As such, the algorithm terminates when a solution with a prespecified tolerance on the objective function value is obtained. On NETGEN problems, using the first 150 arcs to form 75 equal flow side constraints, we found that the new algorithm is approximately 3 times faster than existing techniques and requires only 50% of the storage. GRA

N86-16029# Sheffield Univ. (England). Dept. of Control Engineering.
INTRODUCTION TO NONLINEAR SYSTEMS ANALYSIS AND IDENTIFICATION
S. A. Billings Jun. 1985 30 p refs Presented at Science and Engineering Research Council (SERC) Vacation School on Signal Processing for Control, Warwick, England, 15-20 Sep. 1985
(Grants SERC-GR/B/31163; SERC-GR/D/30587)
(RR-277) Avail: NTIS HC A03/MF A01

Methods for the statistical analysis of static and dynamic nonlinear systems are reviewed. Linearization methods, system identification algorithms, and stochastic control are discussed. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-16030# Rome Univ. (Italy). Dipt. di Fisica.
NONLINEAR EVOLUTION EQUATIONS ASSOCIATED WITH A RIEMANN-HILBERT SCATTERING PROBLEM
A. Degasperis, P. M. Santini, and M. J. Ablowitz (Clarkson Coll. of Technol., Potsdam, N.Y.) 24 Apr. 1985 14 p refs
(Contract N00014-76-C-0867; Grants NSF DMS-82-02117; AF-AFOSR-0005-84)
(Preprint-458) Avail: NTIS HC A02/MF A01

Nonlinear evolution equations associated with a Riemann-Hilbert scattering problem which reduces, in an appropriate limit, to the Zakharov-Shabat-AKNS scattering problem are considered. Constraints associated with the scattering problem and their impact upon the evolution equations are discussed. The direct linearization of the nonlinear evolution equations and an algorithm to construct an N-soliton solution are given. Author (ESA)

N86-16031# Rome Univ. (Italy). Dipt. di Fisica.
RELATION BETWEEN THE SUPERTABLEAUX OF THE SUPERGROUPS ORTHOSYMPLECTIC OSP (2 2) AND SUPERUNITY SU (1 2)
Michel Gourdin (Paris VI Univ., France) 6 May 1985 18 p refs
(Preprint-459) Avail: NTIS HC A02/MF A01

The classification and the interpretation of the Young supertableaux of the orthosymplectic group OSP (2 2) are given. A comparison is made with the supertableaux of the superunitary group SU (1 2) taking advantage of the isomorphism of the corresponding superalgebras. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-16032# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
TRIPLE PENDULUM FOR THE DEMONSTRATION OF NONLINEAR COUPLING [DRIEVOUDIGE SLINGER VOOR DE DEMONSTRATIE VAN NIET-LINEAIRE KOPPELING]
M. N. Baaijens and Nikolaus Rott (Eidgenoessische Technische Hochschule) 1983 56 p refs Partly in ENGLISH, DUTCH, and GERMAN
(Lab-Rept-763) Avail: NTIS HC A04/MF A01

The motions of a triple pendulum, showing strong coupling were simulated by a microcomputer. Multiple pendulums, providing examples of strong quadratic coupling were investigated. For individual titles, see N86-16033 through N86-16034.

N86-16033# Technische Hogeschool, Delft (Netherlands).
TRIPLE PENDULUM FOR THE DEMONSTRATION OF NONLINEAR COUPLING [DRIEVOUDIGE SLINGER VOOR DE DEMONSTRATIE VAN NIET-LINEAIRE KOPPELING]
M. N. Baaijens *In its* Triple Pendulum for the Demonstration of Nonlinear Coupling 1983 22 p ref In DUTCH (For primary document see N86-16032 06-70)
Avail: NTIS HC A04/MF A01

The motions of a triple pendulum were simulated by a microcomputer. The starting point was the Besseling program for rod constructions. The equations of motion showing strong coupling were numerically integrated, using the Runge-Kutta method. The iteration phase of the program takes a long time. The speed of input-output operations is a limiting factor for real-time representations. The most important computer programs are enclosed.
Author (ESA)

N86-16034# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
A MULTIPLE PENDULUM FOR THE DEMONSTRATION OF NONLINEAR COUPLING
Nikolaus Rott *In* Technische Hogeschool, Delft Triple Pendulum for the Demonstration of Nonlinear Coupling 1983 33 p refs Partly in ENGLISH, DUTCH, and GERMAN (For primary document see N86-16032 06-70)
Avail: NTIS HC A04/MF A01

Multiple pendulums, providing examples of strong quadratic coupling were investigated. The equations of motion were derived. A simple intuitive explanation of the strong coupling in the case of the 1:2 tuning is given. The strongest coupling occurs when the two pivot points lie on an horizontal axis, and when the frequency ratio is 1:2. A model which shows that the energy exchange between the two oscillating bodies is periodic is given; the frequency is proportional to the amplitude. Author (ESA)

N86-16035# Oak Ridge National Lab., Tenn.
FIRST-PRINCIPLES CALCULATION OF THE MAGNETIC PROPERTIES OF PARAMAGNETIC fcc IRON
D. D. Johnson, B. L. Gyorffy, F. J. Pinski, J. Staunton, and G. M. Stocks 1985 13 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Briston Univ., England, Warwick Univ., Coventry, England and Cincinnati Univ., Ohio
(DE-AC05-84OR-21400)
(DE85-017155; CONF-850890-15) Avail: NTIS HC A02/MF A01

Using the disordered local moment picture of itinerant magnetism, we present calculations of the temperature and volume dependence of the magnetic moment and spin-spin correlations for fcc Fe in the paramagnetic state. These calculations are based on the parameter-free, first principles approach of local spin density functional theory and the coherent potential approximation is used to treat the disorder associated with the random orientation of the local moments. DOE

N86-16036# Los Alamos National Lab., N. Mex.
COMPUTER SIMULATION OF NONEQUILIBRIUM PROCESSES
D. C. Wallace Jul. 1985 14 p Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Washington, 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015708; LA-UR-85-2473; CONF-850736-56) Avail: NTIS HC A02/MF A01

The underlying concepts of nonequilibrium statistical mechanics, and of irreversible thermodynamics, will be described. The question at hand is then, how are these concepts to be realized in computer simulations of many-particle systems. The answer will be given for dissipative deformation processes in solids, on three hierarchical levels: heterogeneous plastic flow, dislocation dynamics, an molecular dynamics. Applications to the shock process will be discussed. DOE

N86-15607# Joint Publications Research Service, Arlington, Va.
EFFECT OF CONDUCTOR PROFILE ON FORCE CHARACTERISTICS DUE TO MOTION OF A MAGNETIC FIELD SOURCE
Abstract Only
V. I. Astakhov and M. V. Bondarenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 57-58 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 11, Nov. 1984 p 8-12 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-16037 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A COMPUTER MODEL OF PERIPHERAL AUDITORY PROCESSING
M. P. Cooke May 1985 55 p refs
(NPL-DITC-58/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Research towards an analysis of the speech waveform based on human auditory processing is summarized. Signal transformations believed to occur in the peripheral auditory system are described. A computer model which implements phase-locking, two-tone suppression, and adaptation is presented. A variety of stimuli are used to test the response of the computer model. Parameter-controlled synthetic speech creates nonstationary and noisy data. The significant contribution of the auditory model to the representation of such stimuli is demonstrated. It is suggested that the model provides speech transformations which are robust and which emphasize perceptually important features contained in the waveform. Author (ESA)

N86-16038 Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
UNDERWATER SOUND COMMUNICATION
F. Schmitt Jun. 1985 54 p refs In GERMAN; ENGLISH summary
(Contract BMVg-GF-84/SuK-2.5)
(Rept-5-85; LFD-236) Copyright. Avail: Issuing Activity

Underwater acoustic signal transmission was investigated. The successful application of spread spectrum techniques in acoustic underwater transmission channels is controlled by the stochastic nature of the channel. The coherent gain losses due to the limited coherence time and coherence bandwidth of the channel were calculated for FM-chirp and PN-code modulated signals. Further gain losses occur due to the mismatch between the actual and the assumed relative speed between transmitter and receiver. The chirp signal is less sensitive to Doppler mismatch and thus requires fewer Doppler channels. The possibility of reducing the redundancy of speech signals and thus of reducing the stringent coherence constraints on the channel is discussed. Author (ESA)

N86-16039 Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
ESTIMATION OF THE TRAJECTORY PARAMETERS OF AN ACCELERATIONLESS TARGET FROM ANGLE MEASUREMENTS OF A SINGLE, STATIONARY, ACOUSTIC SENSOR. ERROR SOURCES AND THEIR INFLUENCE
F. Dommermuth Nov. 1984 44 p refs In GERMAN; ENGLISH summary
(Contract BMVg-GF-83/84-SuK-4.2)
(Rept-12-84; LFD-231) Copyright. Avail: Issuing Activity

The effects of a series of potential error sources on the estimation accuracy of the trajectory of an accelerationless target were investigated. The so-called retardation effect permits the estimation of all kinematic parameters from the angle measurements of a single, stationary, acoustic sensor. The investigated error sources do not allow to determine a dominating cause of

the disagreement between real and estimated trajectory parameters. Two essential error sources are the interference between the direct signal and the signal reflected by the Earth's surface, and the falsification of the angle due to a vertical wind gradient. The influence of accelerations on the estimation accuracy is determined by a simple model. The results show that a limitation of the sensor position to both horizontal microphone pairs is advantageous. Author (ESA)

N86-16040*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYTICAL STUDY OF ACOUSTIC RESPONSE OF A SEMI-REVERBERANT ENCLOSURE WITH APPLICATION TO ACTIVE NOISE CONTROL
Tony L. Parrott, David B. Schein (George Washington Univ., Hampton, Va.), and Doreen Gridley (Naval Avionics Center, Indianapolis, Ind.) Dec. 1985 48 p refs
(NASA-TP-2472; L-15944; NAS 1.60:2472) Avail: NTIS HC A03/MF A01 CSCL 20A

The acoustic response of a semireverberant enclosure with two interacting, velocity-prescribed source distributions was analyzed using standard modal analysis techniques with a view toward a better understanding of active noise control. Different source and enclosure dimensions, source separations, and single-wall admittances were studied over representative frequency bandwidths of 10 Hz with source relative phase as a parameter. Results indicate that power radiated into the enclosure agree qualitatively with the spatial average of the mean square pressure, even though the reverberant field is nondiffuse. Decreases in acoustic power can therefore be used to estimate global noise reduction in a nondiffuse semireverberant environment. As might be expected, parametric studies indicate that maximum power reductions of up to 25 dB can be achieved when secondary and primary sources are compact and closely spaced. Although less success is achieved with increasing frequency and source separation or size, significant suppression of up to 8 dB still occurs over the 1 to 2 Hz bandwidth. Author

N86-16041*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOCATION OF NOISE SOURCES USING A PHASE-SLOPE METHOD
Richard DeLoach and John S. Preisser Nov. 1985 49 p refs
(NASA-TP-2505; L-15793; NAS 1.60:2505) Avail: NTIS HC A03/MF A01 CSCL 20A

Two three-element microphone arrays have been used to predict the position of both pure-tone and broadband noise sources in an anechoic chamber under different ground impedance conditions. Source positions are predicted using the slope of phase-frequency plots between array elements. A phase-slope method for quantitatively assessing both the accuracy and precision of estimates of noise source location is introduced and illustrated. When the phase-slope method is used, there is higher accuracy and more precision in estimates of source location with a small ground impedance than with a large ground impedance. As would be expected, ground impedance effects are larger for low elevation angles than for high elevation angles. Author

N86-16042# Mississippi Univ., University. Physical Acoustics Research Lab.
A THEORETICAL INVESTIGATION OF ACOUSTIC CAVITATION
K. W. Commander and L. A. Crum 15 Jul. 1985 121 p
(Contract N00014-84-C-0193)
(AD-A158058; Rept-4-85) Avail: NTIS HC A06/MF A01 CSCL 20/1

Recent experiments have shown that when the acoustic driving frequency is near one of a bubble's harmonic resonances, the theoretical values predicted by the Rayleigh-Plesset equation are inconsistent with observed values. This inconsistency lead Prosperetti to consider the internal pressure term in the Rayleigh-Plesset equation in a more general manner. In the past the internal pressure of a bubble was assumed to be accurately predicted by a polytropic approximation. Prosperetti considered the internal pressure from the conservation equations, resulting in a much more accurate formulation. This study analyzes the two methods, showing where they agree and where they disagree. The new formulation also provides additional information about the internal thermodynamics of a bubble. Results are shown for the internal temperature of a cavitating bubble as a function of radial coordinate and time. Internal pressures for a variety of conditions are shown and are in good agreement with earlier predicted values. Different models of acoustic cavitation are examined using some of the recent techniques in dynamical systems. Feigenbaum trees were made for the two models. This method for analyzing an equation was shown to be very sensitive to the internal pressure term, and thus is an appropriate method for comparing different acoustic cavitation theories. GRA

N86-16043# Naval Postgraduate School, Monterey, Calif.
LOCALIZATION OF BURIED OBJECTS IN WATER-SATURATED SAND BY VARIABLE INCIDENCE ACOUSTIC PULSE REFLECTIONS M.S. Thesis
G. S. Bang Jun. 1985 57 p
(AD-A158064; AD-F630692) Avail: NTIS HC A04/MF A01 CSCL 17/1

The purpose of this thesis is to localize buried objects in water-saturated sand by variable incidence acoustic pulse reflections. In particular, thin aluminum plates are used to model the buried objects. The sound speed and the depth of the overlying sand layer are predicted by using the T sq minus X sq and the ray parameter methods. The experimentally computed results have an average 3.5% depth error. The calculated speed of sound in the water-saturated sand layer differed by 8.1% between the T sq minus X sq and the ray parameter methods. GRA

N86-16044# Texas Univ., Austin. Applied Research Lab.
THE EXPERIMENTAL INVESTIGATION OF THE INVERSE PROBLEM IN ROUGH SURFACE SCATTERING OF ACOUSTIC WAVES
R. S. Bailey Aug. 1985 100 p
(Contract N00014-80-C-0490)
(AD-A158070; AD-F630692; ARL-TR-85-6) Avail: NTIS HC A05/MF A01 CSCL 20/1

This study represents an inverse problems approach to rough surface acoustical scattering, the objective being to infer certain statistical characteristics of a randomly rough surface directly from the coherently scattered pressure field. Eckart's physical-acoustical scattering model is applied to derive relationships for the probability density function and correlation function of surface heights which can be inferred directly from the scattered pressure field. Signal processing techniques are used to obtain estimates of the probability density function and correlation functions from experimental data. The experimental measurements are made of the steady-state complex scattered pressure field from a single frequency small beamwidth source incident upon a pressure release model rough surface. Comparisons are made between the characteristics inferred from the scattered pressure and the actual surface characteristics. The ability of the signal processing techniques to accurately predict the known characteristics is then evaluated. GRA

N86-16045# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CAN AIRCRAFT NOISE LESS THAN OR EQUAL 115 TO dBA ADVERSELY AFFECT REPRODUCTIVE OUTCOME IN USAF WOMEN? M.S. Thesis
P. A. Brubaker Jun. 1985 42 p
(AD-A158322; AFIT/CI/NR-85-65T) Avail: NTIS HC A03/MF A01 CSCL 06/10

It has been suggested, mainly through animal studies, that exposure to high noise levels may be associated with lower birth weight, reduced gestational length and other adverse reproductive outcomes. Few studies have been done on humans to show this association. The Air Force employs pregnant women in areas where there is a high potential for exposure to high noise levels. This study proposes a method to determine if there is an association

between high frequency noise levels > or = 115 dBA and adverse reproductive outcomes through a review of records and self-administered questionnaires in a case-comparison design. Prevalence rates will be calculated and a multiple logistic regression analysis computed for the independent variables that can affect reproduction. GRA

N86-16046# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
ULTRASONIC MEASUREMENT OF PARTICLES IN A VISCOUS FLUID M.S. Thesis
L. E. Oslund Feb. 1985 153 p
(Contract N66314-70-A-0073)
(AD-A158989) Avail: NTIS HC A08/MF A01 CSCL 17/1

A fluid model has been designed and built to simplify the more complex study of particle dispersion in polymer melts. Focussed ultrasound is employed for maximum acoustic intensity within the focal zone for high resolution of particles between the diameter ranges of 100 - 10 microns. The theory of focussed radiators is discussed with emphasis on obtaining a minimum focal zone and beam width. The parameters necessary for particle detection in a viscous fluid are highlighted. A signal processing system has been designed and implemented to allow quick, accurate, and reliable data acquisition with speeds up to 10 KHz. Incorporated in this system is the use of state-of-the-art peak detectors which gate, digitize and store, for computer pick-up, the largest signal within the gated zone. Preliminary tests have shown that glass spheres between the range of 15 - 10 microns are detectable in silicone oil. Results of these tests have been plotted, as well as results from particles in the ranges of: 25 - 15, 35 25 micron glass beads and 32 micron polystyrene beads. GRA

N86-16047# Naval Postgraduate School, Monterey, Calif.
OPTIMUM FREQUENCY FOR PROPAGATION OF SOUND IN SHALLOW SOUND CHANNELS M.S. Thesis
W. L. Bradfield-Smith Jun. 1985 107 p
(AD-A159064) Avail: NTIS HC A06/MF A01 CSCL 20/1

Optimum frequency for propagation of sound in shallow sound channels was studied using two acoustic transmission loss models. The split-step Parabolic Equation model (a full-wave model) and the Fast Asymptotic Coherent Transmission loss model - version 9H (a ray-tracing model) - were tested against experimental data collected by Dosso and Chapman in the northeast Pacific Ocean. The models were found to be valid predictors of optimum frequency for the shallow sound channel observed by Dosso and Chapman. Both models were then used to predict optimum frequency for two sound velocity profiles obtained in a high-latitude deep ocean basin under summer conditions, exhibiting shallow sound channels. As expected, the split-step Parabolic Equation (PE) model adequately predicted optimum frequencies for these cases. The Fast Asymptotic Coherent Transmission loss model, version 9H (FACT 9H) model did not produce reasonable results for optimum frequencies. GRA

N86-16048# Texas Univ., Austin. Applied Research Lab.
THE BROADBAND NORMAL MODE MODEL PROTEUS
R. F. Gragg 1 Aug. 1985 28 p
(Contract N00014-83-K-0346)
(AD-A159091; ARL-TM-85-6) Avail: NTIS HC A03/MF A01 CSCL 20/1

The contractor, ARL: U Tex, developed the mormal mode model PROTEUS for use in analyzing ocean acoustic data. The model and its postprocessors simulate broadband propagation in range invariant environments. A wave theoretical appraoch was chosen to allow operation at low frequency in shallow water (< or approx. = 200 Hz, < or approx. = 300 M), where X ray theory may not be applicable, PROTEUS is a multifrequency extension, based on the original ARL: U Tex single frequency normal mode model NEMESIS in order to limit software development time while producing a reliable program with a familiar user interface. This report describes the foundations of the PROTEUS computer program and presents sample output products. The PROTEUS calculates a broadband set of normal modes for range invariant environments. Detection of a low frequency broadband sound source in shallow water has become a significant problem in underwater acoustics. Assessment of the environment's impact on such detection requires (in addition to a specification of the source and a choice of detection algorithm) some means of modeling the signal propagation. A wave theory propagation model such as a normal model is needed. At ranges of interest (> or approx. = 5 water depths) continuous spectrum contributions are nil, and the acoustic field can be constructed solely from the discrete modes. GRA

N86-16049# Aeronautical Research Labs., Melbourne (Australia).
ULTRASONIC TRANSIT TIME MEASUREMENTS USING FAST ANALOG TO DIGITAL CONVERSION AND A FAST FOURIER TRANSFORM BASED ALGORITHM
S. J. Rumble and J. G. Sparrow Mar. 1985 27 p
(AD-A159426; ARL-STRUC-TM-406) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper describes the application of a fast (100MHz) analog to digital voltage converter and a discrete fast Fourier transform based algorithm to the determination of ultrasonic transit times. The precision obtained was typically better than 1 nanosecond. Transit times over a range of frequencies (2-7MHz) have been measured using a broadband transducer excited by a chopped CW RF pulse. The frequencies chosen corresponded to those available from the discrete fast Fourier transform. Documented listings of the programs used are provided. GRA

N86-16050# Flow Research, Inc., Kent, Wash.
ARCTIC OCEAN BACKGROUND NOISE CAUSED BY RIDGING OF SEA ICE Final Report, 1 Oct. 1981 - 30 Sep. 1982
R. S. Pritchard Jul. 1983 40 p
(Contract N00014-82-C-0002; RR0-3205)
(AD-A159587; TR-266/07-83) Avail: NTIS HC A03/MF A01 CSCL 20/1

A new method is presented to explain how noise is generated under pack ice by ridging of the pack ice. The energy dissipated during the ridging process is assumed to be the proper measure of the noise source level. Noise source levels generated by ridging are simulated. Noise intensity at a specific site is calculated by summing signals from all these sources after accounting for propagation losses. Calculations are made to compare this simulated noise with observations for an experiment conducted during the winter of 1975 to 1976 in the Beaufort Sea. During a 120-day period, 46% of the intensity of the noise signal is explained using this process, and over several 20-day periods, in excess of 64% is explained. In addition to explaining a significant amount of energy and ambient noise, the model is attractive on physical grounds and properly explains lack of noise when winds are high but ice is strong enough to resist ridging. GRA

N86-16051# Ames Lab., Iowa.
ULTRASONIC CHARACTERIZATION OF POROSITY USING THE KRAMERS-KRONIG RELATIONS
J. H. Rose, D. K. Hsu, and L. Adler 1985 4 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation In Solids, Urbana, Ill., 3 Jun. 1985 Prepared in cooperation with Ohio State Univ., Columbus
(Contract W-7405-eng-82)
(DE85-017346; IS-M-561; CONF-8506125-7) Avail: NTIS HC A02/HC A01

A new algorithm is proposed to determine the volume fraction of pores in solids using the frequency dependent ultrasonic attenuation. The algorithm was developed by examining the Kramers-Kronig relation between the porosity induced ultrasonic attenuation and the change in sound velocity. The method is tested using data measured for several porous aluminum samples. DOE

N86-16052# Naval Ship Research and Development Center, Bethesda, Md.
AN ALGORITHM FOR ACTIVE ADAPTIVE CONTROL OF PERIODIC INTERFERENCE Final Report
R. D. Pierce May 1985 34 p

(AD-A156651; DTNSRDC-85/047) Avail: NTIS HC A03/MF A01 CSCL 12/1

An algorithm is presented for the active adaptive control of periodic interference. This algorithm is derived, its performance is theoretically analyzed, and the algorithm and its performance are verified by laboratory experiments. In these experiments, this control method is shown to reduce the periodic components by more than 40 dB. GRA

N86-16053# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Turbulenzforschung.

ON SECOND PROPAGATION IN RADIAL FAN CASINGS

Manfred Bartenwerfer and Teofani Gikadi (Technical Univ., Berlin) Feb. 1985 34 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-957)

(DFVLR-FB-85-32; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 11

Sound propagation in radial fan hollow casings was studied for cylindrical and spiral-shaped casings of the same volume and width. After measurement of the sound reflection through the different casings a monopole or dipole sound source of reduced expansion at the casing cut-off was introduced and the frequency responses in the intake and outflow canals determined. The influence of casing geometry and the flow in the casing on the rejection level and on the system frequency responses was determined. The applicability of the one-mode approximation for description of the frequency responses was verified. Torsional sound in the outflow canal can be reduced with a phase-variable sound source synchronous with the rotation frequency at the cut-off. Author (ESA)

N86-15621# Joint Publications Research Service, Arlington, Va.

EXPERIMENTAL INVESTIGATION OF ACOUSTIC WAVE ELECTRICAL EXCITATION IN ELECTROLYTE SOLUTION Abstract Only

A. N. Malakhov and V. V. Cherepennikov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 73 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 27, no. 10, Oct. 1984 p 1349-1352 (For primary document see N86-15561 06-33)

Avail: NTIS HC A05/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-16054*# Institute for Scientific Research, Stoneham, Mass.

MOLECULAR PROCESSES IN A HIGH TEMPERATURE SHOCK LAYER Semiannual Status Report, 1 May - 31 Oct. 1985

Steven L. Guberman [1985] 22 p refs

(Contract NCC2-308)

(NASA-CR-176357; NAS 1.26:176357; SASR-3) Avail: NTIS HC A02/MF A01 CSCL 20H

The development of techniques for the calculation of electron capture widths, electronic wave functions, cross sections and rates needed for the description of the dissociative recombination (DR) of molecular ions with electrons were described. The cross sections and rates were calculated by using harmonic oscillator wave functions for the ion and a delta function approximation for the continuum vibrational wave function in the repulsive dissociative channel. In order to obtain DR cross sections of quantitative accuracy, a computer program which solves the one dimensional nuclear motion wave equation was revised to calculate the cross sections and rates. The program and the new results are described. Included is a discussion of large windows found in the dissociative recombination cross sections from excited ion vibrational levels. These windows have not been previously reported in the literature. The magnitude of the DR cross sections for several dissociative routes are sensitive to the location of the crossing of the neutral and ion potential curves. Studies of the effects of basis set and CI wave function size on vertical excitation energies are described. Preliminary studies on N2 and O2 using large scale wave functions are also reported. G.L.C.

N86-16055# Berkeley Research Associates, Inc., Calif.

RESEARCH ON INTENSE ELECTRON BEAMS AND APPLICATIONS Final Report, 1 May 1983 - 30 Apr. 1984

Jul. 1984 89 p

(Contract N00014-83-C-2157)

(AD-A158234; PD-BRA-84-317R) Avail: NTIS HC A05/MF A01 CSCL 20/7

During this period, an extensive investigation of electron beam stability was carried out in the context of an easily formulated 2-D cold electron layer model. This work was carried on in close association with NRL personnel in conjunction with the special focus program, Advanced Accelerators. The modified betatron has been the subject of an intense investigation by NRL staff as a potential high current electron accelerator. Significant progress has been made in the understanding of the operation of this device and a large experimental effort designed to test this understanding is now well underway. Much of the work to date has been directed toward a formulation of the in situ beam dynamics, involving equilibrium and stability considerations, while other research has been directed toward solving the difficult injection problem. Once an equilibrium is established, which in general requires constraints on beam density and on the betatron field index, stability questions of two general types arise. GRA

N86-16056# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.

THE PARAMETERS OF ADIABATIC RAPID PASSAGE IN THE 0-0 HYPERFINE TRANSITION OF Rb-87

J. C. Camparo and R. P. Frueholz 24 Jun. 1985 44 p

(Contract F04701-83-C-0084)

(AD-A158562; TR-0084A(5945-05)-4; SD-TR-85-20) Avail: NTIS HC A03/MF A01 CSCL 20/8

When an electromagnetic field, coupling two levels of an atomic or molecular system, has its frequency swept across resonance, population reversal can occur as a result of the coherent transient phenomenon known as adiabatic rapid passage (ARP). For this phenomenon to occur, the frequency sweep rate is required to be rapid with respect to the relaxation processes occuring in the system, and at the same time slow enough so that the system can follow the frequency sweep adiabatically. The present investigations treat ARP in the 87Rb hyperfine transition, where optical pumping produces a population imbalance in the ground-state hyperfine levels, and where the influence of a microwave frequency swept across the hyperfine resonance is monitored by the transmitted intensity of the optical pumping laser. These parameters relate to how adiabatic and how rapid the passage through resonance must be in order to maximize the degree of population reversal. We find both experimentally and theoretically that the adiabaticity requirement is rather weak, and that once satisfied, it is more important to pass through the resonance rapidly. Furthermore, interpreting our results in the Bloch vector model f ARP, we find that the Bloch vector is only required to precess a half revolution about the effective field in order to follow a 90 degree change in the direction of that field. The applicability of the present results of ARP in general is discussed. GRA

N86-16057# Naval Postgraduate School, Monterey, Calif.

OBSERVATION OF MICROWAVE CERENKOV RADIATION AS DIFFRACTION PATTERN Technical Report

X. R. Maruyama, J. R. Neighbours, F. R. Buskirk, D. D. Snyder, and M. Vujaklija 1 Aug. 1985 21 p

(AD-A159337; NPS61-85-006) Avail: NTIS HC A02/MF A01 CSCL 20/7

Measurement of microwave Cerenkov radiation in air exhibits the diffraction pattern predicted in earlier work. The radiation appears only at harmonics of the frequency of periodic electron bunches. Angular distribution power measurements are presented for frequencies of 2.86, 5.71, 8.57 and 11 and 12 GHz corre-

sponding to the fundamental and the first three harmonics of an S band RF linac. GRA

N86-16058# Aerospace Corp., El Segundo, Calif. Defense Development Div.
MATERIAL SHIELDS AGAINST NEUTRAL ATOMIC PARTICLE BEAMS
S. W. Kash 12 Jul. 1985 24 p
(Contract F04701-83-C-0084)
(AD-A159445; TR-0084A(5435-04)-1; SD-TR-85-46) Avail: NTIS HC A02/MF A01 CSCL 18/6

A material shield designed to protect a spacecraft against an atomic particle beam will, of necessity, be quite massive; consequently, even modest fractional-weight savings would be significant. With this goal in mind, the particle stopping power and range in various materials were investigated. The lightest shield materials are compounds composed of hydrogen and other light elements. GRA

N86-16059# Lawrence Livermore National Lab., Calif.
COLLECTIVE ACCELERATOR FOR ELECTRON COLLIDERS
R. J. Briggs 13 May 1985 5 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract W-7405-eng-48)
(DE85-012878; UCRL-92673; CONF-850504-88) Avail: NTIS HC A02/MF A01

A recent concept for collective acceleration and focusing of a high energy electron bunch is discussed, in the content of its possible applicability to large linear colliders in the TeV range. The scheme can be considered to be a member of the general class of two-beam accelerators, where a high current, low voltage beam produces the acceleration fields for a trailing high energy bunch. DOE

N86-16060# AMAF Industries, Columbia, Md.
RESEARCH AND DEVELOPMENT OF AN AIMED MAGNETIC LEAD CURRENT DENSITY-MAGNETIC FIELD DIAGNOSTIC Final Report
[1985] 76 p
(DE85-014720; DOE/ER-53105/T2) Avail: NTIS HC A05/MF A01

This section of the report presents a diagnostics survey of sufficient quality to provide a clear definition of advanced diagnostic needs and the limitations of current approaches in addressing those needs. Special attention was given to the adequacy with which current diagnostics are interfaced to signal processing/data acquisition devices and systems. Critical evaluation of selected alternative diagnostic techniques for future R&D activities shall be presented. DOE

N86-16061# Lawrence Livermore National Lab., Calif.
TABLES OF MASSES, BINDING ENERGIES, HALF-LIVES AND NATURAL ABUNDANCES
R. J. Howerton 16 Jul. 1985 58 p
(Contract W-7405-eng-48)
(DE85-016344; UCID-20487) Avail: NTIS HC A04/MF A01

Tables of masses, binding energies and half-lives of the isotopes, and natural abundances and masses of the elements are presented. The masses and binding energies are taken from the 1977 Wapstra and Bos atomic mass tables. The half-lives and natural abundances are from the seventh edition of the Table of Isotopes. DOE

N86-16062# Oak Ridge National Lab., Tenn.
IMPROVING NEUTRON REACTION DATA THROUGH LINAC-BASED FLIGHT-TIME SPECTROMETRY
R. W. Peelle 1985 8 p Presented at the Annual Meeting of the American Nuclear Society, Boston, Mass., 9 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016417; CONF-850610-38) Avail: NTIS HC A02/MF A01

Pulsed neutron facilities based on electron linear accelerators (linacs) allow measurements of neutron cross sections from E sub n approx. 0.01 eV to e sub n > 20 MeV. This paper outlines the capabilities of such facilities and their role in upgrading the neutron cross-section data base. DOE

N86-16063# Oak Ridge National Lab., Tenn.
INTENSE e-BEAM INTERACTION WITH MATTER
R. H. Ritchie and O. H. Crawford 1984 19 p Presented at Navy CPB Materials Interaction Workshop, Silver Spring, Md., 24 Sep. 1984
(DE-AC05-84OR-21400)
(DE85-017093; CONF-8409264-1) Avail: NTIS HC A02/MF A01

This document describes work done in this period on certain nonlinear processes of potential importance at high energy densities in condensed matter, and on the theory of the electron slowing-down-cascade spectrum engendered in solids by e-beams. DOE

N86-16064# Lawrence Livermore National Lab., Calif.
MBE-4, A HEAVY ION MULTIPLE-BEAM EXPERIMENT
R. T. Avery, C. S. Chavis, T. J. Fessenden, D. E. Gough, T. F. Henderson, D. Keefe, J. R. Meneghetti, C. D. Pike, D. L. Vanecek, and A. I. Warwick May 1985 6 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016626; LBL-19620; CONF-850504-261) Avail: NTIS HC A02/MF A01

MBE-4, a heavy-ion multiple beam induction linac being built at LBL in FY85/86, will model many features of a much longer device. It will accelerate four space-charge-dominated cesium ion beams from, for example, 0.2 MeV, 5 mA/beam, 3.0 (MU)sec, 1.6 m length at injection to approx.0.8 MeV, 15 mA/beam, 1.0 (MU)sec, 1.1 m length at the exit. It will permit study of simultaneous focussing, acceleration, current amplification and emittance growth of multiple space-charge-dominated ion beams. Some features of this accelerator are described. DOE

N86-16065*# Los Alamos National Lab., N. Mex.
SUMMARY FROM WORKING GROUP ON MULTIPLE BEAMS AND FUNNELING
T. P. Wangler 1985 7 p Presented at the Workshop on High Brightness, High Current, High Duty Factor Ion Injectors, San Diego, Calif., 21 May 1985
(Contract W-7405-eng-36)
(DE85-015694; LA-UR-85-2556; CONF-8505164-6) Avail: NTIS HC A02/MF A01

The working group on Multiple Beams and Funneling discussed various topics related to multiple beams and funneling, including (1) design considerations for multiple-beam accelerators; (2) scaling of current, emittance, and brightness for multiple-beam systems; (3) funneling lines using either discrete components or a radiofrequency quadrupole (RFQ) funneling structure; and (4) alternatives to funneling. DOE

N86-16066# California Univ., Berkeley. Lawrence Berkeley Lab.
FRICTION IN NUCLEAR DYNAMICS
W. J. Swiatecki Mar. 1985 36 p refs Presented at the Symposium on Semiclassical Descriptions of Atomic and Nuclear Collisions, Copenhagen, Denmark, 25 Mar. 1985
(Contract DE-AC03-76SF-00098)
(DE85-011984; LBL-19222; CONF-850376-2) Avail: NTIS HC A03/MF A01

The problem of dissipation in nuclear dynamics is related to the breaking down of nuclear symmetries and the transition from ordered to chaotic nucleonic motions. In the two extreme idealizations of the perfectly Ordered Regime and the fully Chaotic Regime, the nucleus should behave as an elastic solid or an overdamped fluid, respectively. In the intermediate regime a complicated visco-elastic behavior is expected. The discussion is illustrated by a simple estimate of the frequency of the giant quadrupole resonance in the Ordered Regime and by applications of the wall and window dissipation formulae in the Chaotic Regime. DOE

N86-16067# Sandia National Labs., Albuquerque, N. Mex.
IFA-2 COLLECTIVE ION ACCELERATOR EXPERIMENTS
C. L. Olson, C. A. Frost, E. L. Patterson, J. P. Anthes, and J. W. Poukey 1985 16 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC04-76DP-00789)
(DE85-012358; SAND-85-0035C; CONF-850504-44) Avail: NTIS HC A02/MF A01

Ion acceleration has now been demonstrated with the IFA-2 collective ion accelerator system. The IFA-2 system is described, photoionization experiments are summarized, and ion results are presented. Using a 1 MeV electron beam and a 30 cm acceleration length, IFA-2 has produced 5 MeV H(+), 10 MeV D(+), and 20 MeV He(++). This means that accelerating fields of 33 MV/m over 30 cm have been achieved with a controlled collective accelerator for the first time. DOE

N86-16068# Defense Nuclear Agency, Washington, D.C.
SIGNIFICANCE OF SINGLE PARTICLE EFFECTS IN NEUTRAL BEAM WEAPON LETHALITY
B. Steverding and J. S. Browning 1985 2 p Presented at the Heart Conference, Monterey, Calif., 25 Jul. 1985 Prepared in cooperation with Sandia Labs., Albuquerque, New Mexico
(Contract DE-AC04-76DP-00789)
(DE85-012031; SAND-85-1139C; CONF-850756-2) Avail: NTIS HC A02/MF A01

This paper provides a rationale for assessing the response of microelectronics to single event effects caused by directed energy weapons utilizing beams of neutral particles. The current understanding of single particle vulnerabilities is summarized, and an extrapolation of these vulnerabilities outside of the experimental domain is presented. DOE

N86-16069# California Univ., Berkeley. Lawrence Berkeley Lab.
GGLP EFFECT FROM 1959 TO 1984
G. Goldhaber Apr. 1985 30 p refs Presented at the Local Equilibrium in Strong Interactions Phys. Meeting, Bad Honnef, West Germany, 1 Sep. 1894
(Contract DE-AC03-76SF-00098)
(DE85-011981; LBL-19417; CONF-8409204-3) Avail: NTIS HC A03/MF A01

The GGLP effect refers to the difference in opening angles of pion pairs for like and unlike pairs. This was found to be the effect of Bose-Einstein statistics for pions. The discovery of the effect in 1959, its interpretation in terms of Bose-Einstein statistics, and the use of the effect in pion interferometry are reviewed. DOE

N86-16070# Carnegie-Mellon Univ., Pittsburgh, Pa.
SEARCH FOR THE XI(2220) AT LEAR
D. W. Hertzog, P. D. Barnes, G. E. Diebold, G. Franklin, C. Maher, B. Quinn, J. Seydoux, J. Szymanski, K. Kilian, R. Besold et al 1985 6 p refs Presented at the International Conference on Hadron Spectroscopy, College Park, Md., Apr. 1985 Prepared in cooperation with European Organization for Nuclear Research, Geneva, Switzerland, ErlangenNuremberg Univ., West Germany, Freiburg Univ., West Germany, Illinois Univ., Champaign, Rice Univ., Houston, Tex., Commissariat a l'Energie Atomique, Gif-sur-Yvette, France, Uppsala Univ., Sweden and OEAW, Vienne, Austria
(DE85-014329; DOE/ER-03244/114; CONF-8504133-5) Avail: NTIS HC A02/MF A01

Since the revelation of the narrow resonance at 2220 MeV in the K anti K final states of the radiative decay J/Psi-deltaX at SLAC, much theoretical and experimental effort has been devoted to the understanding of this unusual object. Theoretical explanations range from the conventional to the exotic. The experimental evidence, however, rests solely on one experiment and is not of sufficient quality to distinguish among the intriguing possibilities. We describe an experiment which would be ideal to measure precisely the properties of the xi, including its mass, width, and angular momentum. DOE

N86-16071# Rome Univ. (Italy). Dipt. di Fisica.
DOES ONE NEED A FOURTH GENERATION OF LEPTONS
Maurizio Lusignoli 16 May 1985 13 p refs
(Preprint-461) Avail: NTIS HC A02/MF A01

It is argued that massive neutrinos with masses 0(eV) and 0(KeV) can be naturally incorporated in the standard model with only left-handed neutrinos by assuming the existence of a fourth lepton family and of an approximate global symmetry that keeps the neutrino masses almost degenerate in pairs. Besides the existence of a new heavy charged lepton, the model gives interesting predictions for neutrino experiments at accelerators and underground. Author (ESA)

N86-16072# Rome Univ. (Italy). Dipt. di Fisica.
NUCLEON STRUCTURE FUNCTIONS FROM NEUTRINO SCATTERING
M. Diemoz, F. Ferroni, and E. Longo 15 May 1985 119 p refs Submitted for publication
(Nota-Interna-851) Avail: NTIS HC A06/MF A01

Experimentation using neutrino probes to discriminate between quarks and antiquarks is reviewed. Beams, detectors, and data reduction are described. Extraction of structure functions from the data, including approximations and corrections involved, is outlined. Results on the structure functions are presented, and compared with charged lepton-production results, particularly the so-called EMC effect. Interpretation of experimental results in the framework of QCD is examined. The parametrization of the behavior of structure functions as determined by neutrino experiments for comparison with other experimental sources of information on the nucleon structure is summarized. Author (ESA)

N86-15590# Joint Publications Research Service, Arlington, Va.
INTRINSIC MAGNETIC FIELD OF ELECTRON BEAM Abstract Only
M. P. Zaft and S. I. Molokovskiy *In* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 41-42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1845-1848 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15591# Joint Publications Research Service, Arlington, Va.
STIMULATED EMISSION OF BOUNDED STRONG-CURRENT ELECTRON BEAM WITH LONGITUDINAL MAGNETIC FIELD MAGNETOSTATIC PUMPING Abstract Only
V. P. Grigoryev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1977-1984 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15592# Joint Publications Research Service, Arlington, Va.
TUBULAR STRONG-CURRENT RELATIVISTIC ELECTRON BEAM INSTABILITY Abstract Only
O. B. Ovsyannikova, F. F. Kamenets, and V. G. Leyman *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 43 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1985-1993 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15593# Joint Publications Research Service, Arlington, Va.
FASTER-THAN-LIGHT SOURCES IN ELECTRON BEAMS Abstract Only
B. G. Talkin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 43 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 10, Oct. 1984 p 1994-1997 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-16073# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
IN SEARCH OF HIGH J STATES IN THE HF(v, J) SYSTEM
M. A. Kwok, R. L. Wilkins, G. I. Segal, E. F. Cross, and R. H. Uenten 14 Jun. 1985 54 p
(Contract F04701-83-C-0084)
(AD-A158937; TR-0084A(5603)-2; SD-TR-85-21) Avail: NTIS HC A04/MF A01 CSCL 07/4

Populations in high rotational states of HF far from rotational-translational equilibrium have been observed in reactive fast flows in a large diameter flow tube. The high rotational states are assumed to be produced from the chemically generated, vibrationally excited HF(v, J) by direct V yields R intramolecular energy transfer collisions with ground-state H2, HF, or Ar species. In a chemical kinetic analysis it is shown that the results are consistent with the multiquantum V yields R energy-transfer mechanism for HF(v, J) + M proposed by R. L. Wilkins for HF(v, J) + HF and D. L. Thompson for HF(v, J) + Ar. Experimental studies are made by monitoring HF R-R spectral emissions between 9 to 22 micrometer with a sensitive bolometer. Author (GRA)

N86-16074# Chicago Univ., Ill.
TOPICS IN THEORETICAL PHYSICS Progress Report
1985 7 p refs
(Contract DE-FG02-84ER-45144)
(DE85-016734; DOE/ER-5144/T1) Avail: NTIS HC A02/MF A01

Progress is reported in these areas: supersymmetry and conformal invariance and new structures in two dimensional critical phenomena; spinor fields and new applications and techniques for studying Ising model correlation factors; superstring compactification and high energy physics applications for novel two dimensional critical points; ordered and disordered spatial structure in dynamical systems; and fermion-boson mass relations in BCS type theories. Research is proposed in covariant formulation of the superstring, topics in superconformal field theory and new structures in two dimensional critical phenomena, ordered and disordered spatial structure in dynamical systems, and field theory over Galois fields. DOE

N86-16075# Pacific Northwest Lab., Richland, Wash.
RADIATION EFFECTS IN ACTINIDE HOST PHASES
W. J. Weber and H. Matzke May 1985 15 p refs Presented at the International Conference on Radiation Effects in Insulators, Guildford, England, 15 Jul. 1985 Prepared in cooperation with Commission of the European Communities, Karlsruhe, West Germany
(Contract DE-AC06-76RL-01830)
(DE85-016273; PNL-SA-13093; CONF-850781-1) Avail: NTIS HC A02/MF A01

Three crystalline ceramic materials, which occur as host phases for the long-lived actinides in many nuclear waste formulations, were doped with Cm-244, and the effects of self-radiation damage from alpha decay on microstructure and physical properties were investigated. The irradiation-induced microstructure consisted of individual amorphous tracks from both the alpha-recoil particles and the spontaneous fission fragments. The eventual overlap of the tracks at higher doses leads to a completed amorphous state. This radiation-induced amorphization process results in a stored energy of approx. 125 J/g, 5 to 10% swelling, factor of 10 to 50 increase in leachability (aqueous dissolution), and in increase in fracture toughness. DOE

N86-16076# Lawrence Livermore National Lab., Calif.
RADIONUCLIDE MIGRATION PROJECT 1984 Progress Report
R. W. Buddemeier, comp. and D. Isherwood, comp. Apr. 1985 74 p
(Contract W-7405-eng-48)
(DE85-017383; UCRL-53628) Avail: NTIS HC A04/MF A01

The report discusses the hydrogeologic settings and histories of studies associated with the Cheshire (U20n), Cambric (U5e), Nash (UE2ce), Bilby (U3cn), Bourbon (U7n), and Faultless (UC1) Events. Radionuclide and some chemical data are presented for water samples from cavity or chimney wells associated with the Cheshire, Cambric, and Bilby Events, and from satellite wells at the Cambric, Nash, Bibly, Bourbon, and Faultless Event sites. The report also gives the results of studies of specific sampling or analytical methodologies. These studies demonstrated that the apparent migration of (155)Eu is an artfact of spectrometric misidentification of gamma- and X-ray peaks from other constituents. A potential problem with atmospheric contamination of samples collected with evacuated thief samples was also identified. Ultrafiltration techniques were applied to some of the Cheshire cavity samples collected, and preliminary results suggest that substantial amounts of activity may be associated with colloidal particles in the size range of 0.006 to 0.45 (MU)m. A study has begun of the recharge of effluent water from RNM-25 (Cambric satellite well) into the desert floor as a result of nine years of continuous pumping. This report gives the initial results of unsaturated zone studies showing the propagation of moisture and tritium fronts through the shallow soil. Geochemical modeling of the behavior of ruthenium and technetium was carried out, with particular emphasis on the identification of ionic species that would be potentially mobile under NTS ground-water conditions. The report compares the results with observations of ruthenium migration to the Cambric satellite well. DOE

N86-16077# Fermi National Accelerator Lab., Batavia, Ill.
TOM: A PROGRAM FOR INTERACTIVE LATTICE DESIGN
R. P. Johnson and F. Willeke Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Prepared in cooperation with Deutches Elektronen-Synchrotron, Hamburg, West Germany
(Contract DE-AC02-76CH-03000)
(DE85-016988; FNAL-TM-1331; CONF-850504-248) Avail: NTIS HC A02/MF A01

An interactive program to help design accelerator lattices and lattice insertions is described. Present limitations and directions of future development are indicated. DOE

N86-16078# Fermi National Accelerator Lab., Batavia, Ill.
PULSED SEPTUM MAGNET FOR THE FERMILAB ANTIPROTON SOURCE
J. A. Satti and S. D. Holmes Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-016993; FNAL-TM-1321; CONF-850504-259) Avail: NTIS HC A02/MF A01

A 2 meter curved pulsed septum magnet for use in the Fermilab Antiproton Source is described. The magnet produces a peak field of 6 kGauss at a current of 20,000 Amperes within a 0.4 msec long pulse. The field uniformity obtained is DELTA B/B < 0.2% out to 3.8 cm from the copper septum. Power enters the magnet from the center resulting in very simple ends and the magnet incorporates at 0.5 cm steel guard which reduces the field to < 1.4 Gauss in the zero-field region. The total septum thickness is 1.3 cm. The vacuum enclosure doubles as the stacking fixture for the magnet laminations allowing easy assembly of a magnetic with a 50 m radius of curvature. DOE

N86-16079# Fermi National Accelerator Lab., Batavia, Ill.
MEASURING THE ORBIT LENGTH OF THE TEVATRON
C. Kerns, Q. Kerns, and H. Miller Jun. 1985 4 p refs Presented at the Particle Accelerator Conf., Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-03000)

(DE85-017443; FNAL-TM-1330; CONF-850504-268) Avail: NTIS HC A02/MF A01

The orbit length in the Tevatron was measured when coasting beam was first obtained. The method was time-of-flight, using a vernier phase comparison between beam pickup signals and a synthesizer sine wave. Some effort was spent making a stable phase detector so that it would not be a limiting factor. The results exhibited a repeatability of a few Hz at 53 MHz, corresponding to a mean radius measurement to 0.1 mm. DOE

N86-16080# Oak Ridge National Lab., Tenn.
SELF-CONSISTENT ELECTRONIC STRUCTURE OF ALPHA-PHASE HUME-ROTHERY ELECTRON COMPOUND
G. M. Stocks and A. M. Boring 1985 22 p Prepared in cooperation with Los Alamos National Lab., New Mexico, Tennessee Univ., Knoxville, Cincinnati Univ., Ohio and Bristol Univ., England
(Contract DE-AC05-84OR-21400)
(DE85-017560; LA-UR-85-2061) Avail: NTIS HC A02/MF A01

We have performed charge self-consistent electronic structure calculations for the (alpha)-phase Hume-Rothery electron compound alloys Cu sib c Zn sub 1-c, Cu/sub c/Ga/sub -1c, and Cu sub c Ge sub 1-c having electron to atom ratios 1: 1, 1:2, and 1:3 for each alloy series. The calculations are based on the self-consistent-field Korringa-Kohn-Rostoker coherent-potential approximation (KKR-CPA). We show results for the densities of states and Fermi surface of these alloys; the behavior of these quantitites is quite different from that predicted on the basis of the rigid band model. We also show results for the ground state properties of the Cu sub c Zn sub 1-c alloys that were obtained on the basis of a recent generalization of the density functional theory to random alloys. The theory provides a basis for understanding the concentration variation of the lattice parameter (Vegards' Law) of Cu sub c Zn sub 1-c alloys at the microscopic quantum mechanical level. DOE

N86-16081# Argonne National Lab., Ill.
SUPERCONDUCTING LINACS: SOME RECENT DEVELOPMENTS
L. M. Bollinger 1985 38 p refs Presented at the 4th International Conference on Electrostatic Accelerator Technology and Associated Boosters, Buenos Aires, Argentina, 15 Apr. 1985
(Contract W-31-109-eng-38)
(DE85-014972; CONF-850470-7) Avail: NTIS HC A03/MF A01

The paper is a review of superconducting linacs that are of interest for heavy-ion acceleration. Most of the paper is concerned with energy boosters or projectiles from tandem electrostatic accelerators, the only application for which superconducting linacs are now used for heavy-ion acceleration. There is also a brief discussion of the concept of a superconducting injector linac being developed as a replacement of the tandem in a multi-stage acceleration system. Throughout, the emphasis is on the technology of the superconducting linac, including some attention to the relationships between resonator design parameters and accelerator performance characteristics. DOE

N86-16082# Stanford Linear Accelerator Center, Calif.
COMPUTATIONAL NEEDS FOR MODELLING ACCELERATOR COMPONENTS
H. Hanerfeld Jun. 1985 4 p refs Presented at the Conference on Computing in High Energy Physics, Amsterdam, Netherlands, 25 Jun. 1985
(Contract DE-AC03-76SF-00515)
(DE85-015262; SU-SLAC-PUB-3708; CONF-8506157-1) Avail: NTIS HC A02/MF A01

The particle-in-cell MASK is being used to model several different electron accelerator components. These studies are being used both to design new devices and to understand particle behavior within existing structures. Studies include the injector for the Stanford Linear Collider and the 50 megawatt klystron currently being built at SLAC. MASK is a 2D electromagnetic code which is being used by SLAC both on our own IBM 3081 and on the CRAY X-MP at the NMFECC. Our experience with running MASK illustrates the need or supercomputers to continue work of the kind described. DOE

N86-16083# Mound Lab., Miamisburg, Ohio.
DEMONSTRATION OF THE IN-FIELD USE OF CALORIMETRIC ASSAY FOR IAEA INSPECTION PURPOSES
W. W. Strohm, S. Fiarman, and R. B. Perry 1985 5 p refs Presented at the 26th Annual Meeting of the Institute of Materials Management, Albuquerque, New Mexico, 21 Jul. 1985 Prepared in cooperation with Argonne National Lab., Ill. and International Atomic Energy Agency, Vienna
(DE85-016448; MLM-3278(OP); CONF-850765-25) Avail: NTIS HC A02/MF A01

The second physical inventory verification (PIV) exercise for IAEA inspectors was conducted at a US MOX fabrication facility (WHC) under the auspices of BNL/ISPO in 1984. The IAEA bulk calorimeter was introduced into this exercise. Completely non-destructive calorimetric assay was performed using gamma-ray isotopic measurements. The calorimetric assay measurements on selected items from several strata were used to generate HLNC calibration curves completely independent of operator's values. Outliers from HLNC measurements were also measured by calorimetric assay to demonstrate an in-field alternative to withdrawing aliquots for chemical assay. This exercise demonstrated that the IAEA now has the capability of applying calorimetric assay for these purposes. DOE

N86-16084# Department of Energy, Washington, D. C. Office of Health and Environmental Research.
WORKSHOP ON RADIOBIOLOGICAL EFFECTIVENESS OF NEUTRONS
G. E. Stapleton, R. G. Thomas, and J. W. Thiessen Sep. 1985 36 p refs Workshop held at Germantown, Maryland, 9 Apr. 1985
(DE85-017577; CONF-8504162) Avail: NTIS HC A03/HC A01

The radiobiological effectiveness (RBE) of neutrons has become the subject of some heated discussions in both scientific and radiation-protection oriented communities. This has become especially so since the realization that neutron exposures of A-bomb survivors in Hiroshima were considerably lower than previously assumed, thus devaluating the importance of what we thought was a solid human data base. At the same time, more recent data from radiobiological research appeared to indicate that, at least for some biological endpoints, the RBE of neutrons at low doses and low dose rates was increased dramatically compared to the RBE at higher dose and dose rates. As a consequence, the protection of health against neutrons became a subject of some urgency. The objective of this workshop was to evaluate the existing data base in order to determine the need for additional research in this field. DOE

N86-16085# California Univ., Berkeley. Lawrence Berkeley Lab.
TRANSPORTABLE CHARGE IN A PERIODIC ALTERNATING GRADIENT SYSTEM
E. P. Lee, T. J. Fessenden, and L. J. Laslett May 1985 6 p refs
(Contract DE-AC03-76SF-00098)
(DE85-015664; LBL-19798; HIFAN-225) Avail: NTIS HC A02/MF A01

A simple set of formulas is derived which relate emittance, line charge density, matched maximum and average envelope radii, occupancy factors, and the (space charge) depressed and vacuum values of tune. This formulation is an improvement on the smooth limit approximation; deviations from exact (numerically determined) relations are on the order of + or - 2%, while the smooth limit values are in error by up to + or -30%. This transport formalism is used to determine the limits of transportable line charge density in an electrostatic quadrupole array, with specific application to the low energy portion of the High Temperature Experiment of Heavy Ion Fusion Accelerator Research. The line charge density limit is found to be essentially proportional to the voltage on the pole faces and the fraction of occupied aperture area. A finite

injection energy (> or = 2 MeV) is required to realize this limit, independent of particle mass. DOE

N86-16086# Brookhaven National Lab., Upton, N. Y.
MEAN FISSION NEUTRON SPECTRUM ENERGIES FOR (252) Cf AND FISSILE NUCLIDES, (233)U, (235)U, (239)Pu AND (241)Pu
N. E. Holden 1985 7 p refs Presented at the International Conference on Nuclear Data for Basic and Applied Science, Santa Fe, N. Mex., 13 May 1985
(Contract DE-AC02-76CH-00016)
(DE85-013298; BNL-NCS-36380; CONF-850507-38) Avail: NTIS HC A02/MF A01

The international standard for a neutron spectrum is that produced from the spontaneous fission of (252)Cf, while the thermal neutron induced fission neutron spectra for the four fissile nuclides, (233)U, (235)U, (239)Pu and (241)Pu, are of interest from the standpoint of nuclear reactors. There have been many data sets produced in recent years which deal with the shape of these spectra, particularly at both the low energy and the high energy portions of the curve. However, our interest here is in the average neutron energies of these spectra. We have tabulated all measurements for the five nuclides of interest. The individual measurements are recorded with the neutron energy range measured, the method of detection as well as the average neutron energy for each author. Fortunately, the measurements have been performed with a number of techniques, which allows one to estimate the systematic error from the spread in the results for the different techniques. An attempt has been made to renormalize results when the neutron spectrum used for normalization purposes has been given. In addition to the tables of mean energy measurements, we have also tabulated the measurements of the ratio of mean energies for pairs of fission neutron spectra. The following items were considered, where possible, in the analysis of the mean energies of the neutron spectra: the energy scale of the measurement, the determination of the detector efficiency, the sample size and the sample thickness and the scattering corrections made. The recommended mean energies for the spectra considered are shown. The uncertainty listed attempts to estimate the systematic error as well as merely the precision in each of the experiments. The recommended (E/sub n/) values or /sup 233,235/U, /sup 239,241/Pu, and (252)Cf are 2.02 + - 0.03 MeV, 1.98 + - 0.03 MeV, 2.06 + - 0.04 Mev, 2.05 + - 0.05 MeV, and 2.14 + - 0.03 MeV, respectively. DOE

74 OPTICS

Includes light phenomena.

N86-16087 Department of the Air Force, Washington, D.C.
INTERFACE ALIGNMENT SYSTEM Patent
P. J. Pomphrey, Jr., inventor (to Air Force) Issued 23 Jul. 1985 5 p Supersedes AD-D010222
(AD-D011896; US-Patent-4,530,602; US-Patent-Appl-SN-480156; US-Patent-Class-356-138) Avail: US Patent and Trademark Office CSCL 20/6

A novel optical alignment system and method is provided for detecting misalignment of the optical components of a high energy laser comprising a source of radiation, such as a HeNe laser, for providing an alignment beam to intersect the optical path of the high energy system, optical beam splitting means at the intersection of the alignment beam and optical path to direct a first portion of the alignment beam toward the target and a second portion to the high energy cavity, the second portion interacting with the high energy cavity to provide a return beam along the alignment beam axis, and means to display and view the return beam relative to the alignment beam axis. GRA

N86-16088 Department of the Air Force, Washington, D.C.
MULTI-COLOR X-RAY LINE SOURCE Patent
J. D. Eversole, inventor (to Air Force) Issued 11 Jun. 1985 9 p Supersedes AD-D010088
(AD-D011910; US-Patent-4,523,327; US-Patent-Appl-SN-455674; US-Patent-Class-378-124) Avail: US Patent and Trademark Office CSCL 20/6

An anode target is described which comprises a copper block having different elemental target materials bonded to segments of the circumference, which rotate past the electron emitting cathode, to provide different emission lines in sequence. Aluminum and silicon target materials produce lines which bracket the aluminum absorption edge, to detect small amounts of aluminum in the presence of these two lines. Silver and rhodium may be used to bracket the chlorine absorption edge. Author (GRA)

N86-16089*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WAVELENGTH ERROR ANALYSIS IN A MULTIPLE-BEAM FIZEAU LASER WAVEMETER HAVING A LINEAR DIODE ARRAY READOUT
Don M. Robinson, Carl L. Fales, Jr., and Milton W. Skolaut, Jr. Dec. 1985 46 p refs
(NASA-TM-87614; NAS 1.15:87614) Avail: NTIS HC A03/MF A01 CSCL 20F

An estimate of the wavelength accuracy of a laser wavemeter is performed for a system consisting of a multiple-beam Fizeau interferometer and a linear photosensor array readout. The analysis consists of determining the fringe position errors which result when various noise sources are included in the fringe forming and detection process. Two methods of estimating the fringe centers are considered: (1) maximum pixel current location, and (2) average pixel location for two detectors with nearly equal output currents. Wavelength error results for these two methods are compared for some typical wavemeter parameters. Author

N86-16090# University of Southern California, Los Angeles. Center for Laser Studies.
SUBNANOSECOND SHORT WAVELENGTH GENERATION USING OPTICAL FIBERS Final Report, 1 Jan. - 31 Dec. 1984
E. Garmire 15 Feb. 1985 17 p
(Contract F49620-84-C-0016)
(AD-A158769; AFOSR-85-0491TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

A one-year study of nonlinear optical effects in fibers using UV lasers investigated stimulated Raman scattering. Lines were seen due to quartz in fibers and due to organic liquids in liquid-filled capillaries. Benzene formed a waveguide, but in preliminary experiments only 1% was converted to stimulated Stokes scattering. Of particular interest was the discovery of Raman scattering of the nitrogen laser light from the nitrogen vibrational transitions within the laser itself. Such lines have never been reported before. Of additional interest was the multi-line spectral broadening of the stimulated Raman spectra observed from quartz fibers. The reason for this broadening remains to be investigated. Preliminary experiments were performed and apparatus designed which sets the stage for further research into the higher power UV properties of fibers. GRA

N86-16091# Yale Univ., New Haven, Conn.
DROPLET SIZE AND EVAPORATION RATE WITHIN A TWO-PHASE FLOW BY MORPHOLOGY-DEPENDENT RESONANCES IN THE OPTICAL SPECTRA Final Report, 15 Nov. 1981 - 31 Dec. 1984
R. K. Chang, B. T. Chu, and M. B. Long 10 Apr. 1985 28 p
(Contract F49620-82-K-0005)
(AD-A158931; AFOSR-85-0566TR) Avail: NTIS HC A03/MF A01 CSCL 21/4

In two-phase chemically reacting flows, the size, shape, and chemical content of fuel droplets affect combustion and their chemical by-products. A new in-situ and nonintrusive optical technique has been developed which provides highly accurate (one part in 10000 - 100,000) size and shape determination, as well as chemical speciation of the majority species forming the droplet. This all-optical technique uses the morphology-dependent resonances (MDRs) of spheres, spheroids, or any shape that enables

an internal wave to travel around a great circle with appropriate phase shift. These MDRs in the fluorescence spectra of dye-doped droplets flowing in a linear stream have also provided information on: (1) evaporation rate of interacting droplets flowing in the ambient or heated environment; (2) condensation rate of interacting droplets flowing in a saturated vapor; and (3) surface tension and bulk viscosity of individual droplets which have been perturbed by a laser beam so as to cause slight shape distortions, e.g., from spheres to oblate or prolate spheroids. MDRs can provide wavelength selective high Q optical feedback for the internally generated fluorescent and Raman radiation. By using this high optical feedback, lasing from individual dye-tagged droplets of approx. 20 micron radius has been achieved. The potential of using bright lasing droplets as markers in flow diagnostics is promising. Stimulated Raman scattering from individual droplets of approx. 20 micron radius has been achieved. GRA

N86-16092# Department of the Army, Washington, D. C.
LARGE MEMORY ACOUSTO-OPTICALLY ADDRESSED PATTERN RECOGNITION Patent Application
D. A. Gregory, J. G. M. Duthie, and L. L. Huckabee, inventors (to Army) Filed 1 Jul. 1985 14 p
(AD-D011861; US-Patent-Appl-SN-750611) Avail: NTIS HC A02/MF A01 CSCL 20/1

This patent application discloses a method of an apparatus for acousto-optically addressed pattern recognition using Vander Lugt matched filtering. In optical correlation a beam of light containing an image to be examined is directed to fall on a matched filter array that contains a representation of an object of interest. Critical alignment between the beam and a matched filter of the array is achieved by acousto-optical deflection of the light beam. A large number of matched filters can be addressed sequentially at very high sampling rates, thereby providing a large memory capability for coherent optical image processing. In the system an object beam containing an image of interest is directed to a plane of interest where the matched filter is located. An acousto-optical device located in the object beam path is driven by a signal generator at megahertz frequencies. The acousto-optical device converts the megahertz frequency signals to acoustic waves that affect the density of the optical path of the object wave, changing the index of refraction at a selected plane in this path. This spatial modulation of the index of refraction across the path of the wave causes the incident light to be deflected at selectable angles. By proper selection of the megahertz frequency driving signals these variable angles are selected to direct the Fourier transform of the object beam to selected ones of an array of matched filters at the focal plane, allowing rapid correlation of any incoming intelligence information on the object beam with prerecorded information stored in a filter array. GRA

N86-16093# Science Research Corp., Cambridge, Mass.
STIMULATED RAMAN SCATTERING IN THE ATMOSPHERE AND ITS IMPLICATION FOR FELs
31 Jan. 1985 26 p
(Contract W-7405-eng-48)
(DE85-016066; UCRL-15685) Avail: NTIS HC A03/MF A01

In this report we discuss the possibility of rotational Raman conversion of an FEL optical beam as it propagates through the atmosphere. Our report principally concerns itself with FEL characteristics representative of a linear induction accelerator. Under long pulse condition (t sub p greater than or equal to 50 ns) we predict a gain length product 30 sq. cm./MW at 400 nm for an optical path in the Zenith direction. The peak gain for shorter pulse lengths will be smaller than this value. For example, the peak gain for a 10 ns pulse decreases to 26 sq. cm./MW for power levels of MN/sq. cm. Assuming that a gain length product of 30 will result in Raman conversion of the FEL beam as it propagates through the atmosphere, our calculations indicate that a 50 ns beam, having a flux of 1 MN/sq. cm. will be Raman shifted. If the pulse length was decreased to 10 ns conversion should not occur. However, the shorter pulse will have less energy. Our preliminary results indicate that this problem should be investigated in greater detail to determine the optimal laser flux, pulse length, wavelength and pulse repetition rate for the ATA FEL. DOE

N86-16094# Rome Univ. (Italy). Dipt. di Fisica.
SELF-CONSISTENT APPROXIMATION FOR SQUEEZING GENERATION IN A NONLINEAR OPTICAL MEDIUM
Paolo Tombesi 16 Apr. 1985 12 p refs Sponsored by Max-Planck Inst.
(Contract NATO-SA-5-2-05-RG-919/83)
(Nota-Interna-845) Avail: NTIS HC A02/MF A01

By means of a self-consistent approximation it is shown that a system described by a general quadratic Hamiltonian with an added fourth-order term, could generate two-photon coherent states, which can reduce noise fluctuations in one of the quadrature components of the electromagnetic field (i.e., the squeezing effect) since the interaction time needed to observe relevant squeezing is considerably reduced. This property may be utilized to yield low-noise detection systems for gravitational wave detection. Author (ESA)

N86-15423# Hokkaido Univ., Sapporo (Japan).
ATHERMAL CONDITIONS OF OPTICAL ELEMENTS AND PROPERTIES OF OPTICAL MATERIALS
Teruhito Mishima, Kenji Hisadome, and Ichiro Sakuraba *In its* Bulletin of the Faculty of Engineering, Hokkaido Univ., No. 128 Oct. 1985 74 p refs In JAPANESE; ENGLISH summary (For primary document see N86-15420 06-31)
Avail: NTIS HC A06/MF A01

N86-15506# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF OPTICAL FILTERS ON CdSe-HgSe BASE Abstract Only
N. P. Gavaleshko, S. Yu. Paranchich, L. D. Paranchich, and V. G. Antoshchuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 58-59 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost Leningrad, USSR), no. 1, Jan. 1985 p 10-11 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15508# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ROUGHNESS OF ENDS OF FIBER OPTIC PLATES ON MODULATION TRANSFER COEFFICIENT Abstract Only
L. I. Vasin, A. V. Guzhevskaya, and D. K. Sattarov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 64 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 4, Apr. 1985 p 56-57 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15604# Joint Publications Research Service, Arlington, Va.
MEASURING RADIATION ELECTROCONDUCTIVITY OF SOLID DIELECTRICS EXPOSED TO PULSED IONIZING RADIATION Abstract Only
S. N. Makeyev and O. I. Shmid *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 54-55 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 12, Dec. 1984 p 48-51 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-16095 California Univ., Davis.
EXPERIMENTAL STUDIES OF L SHELL X-RAY EMISSION FROM HIGH DENSITY PLASMAS Ph.D. Thesis
Richard Earl Stewart 1985 374 p

Avail: Univ. Microfilms Order No. DA8514957

The emission spectrum of krypton ionized into the L shell is experimentally studied in a high density plasma discharge. Theoretical calculations are presented which predict the occurrence of electron density dependent effects on the spectrum due to multiple collisions between excited states in the density range produced in these discharges. The high temperature plasma was transiently formed for 2 to 10 nanoseconds in fast linear z-pinch devices at powers ranging from 5 x 10 to the 9 watts to 5 x 10 to the 12 watts by electromagnetic implosion of a column of krypton gas. The gas was seeded with small quantities of argon and phosphene impurities to produce K shell emission lines which were used to diagnose the plasma. The krypton radiation was analyzed using time resolved bent crystal X-ray framing cameras, and time integrated bent crystal X-ray spectrometers and grazing incidence XUV spectrometers. These were used to identify a large number (over 100) of previously unidentified or unobserved lines in Kr XXIV through Kr XXIX. Dissert. Abstr.

N86-16096# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PROCEEDINGS OF COLLABORATING RESEARCH MEETING ON DEVELOPMENT AND APPLICATIONS OF HIGH-POWER PARTICLE BEAMS
Kiyoshi Yatsui, ed. (Nagaoka Technological Univ.) Aug. 1985 201 p refs Meeting held in Nagoya, Japan, 13-14 Nov. 1984 (IPPJ-742) Avail: NTIS HC A10/MF A01

The Sixth Collaborating Research Meeting on Development and Applications of High-Power Particle Beams was held on November 13 and 14, 1984, at the Institute of Plasma Physics of Nagoya University, supported finanically by the Institute of Plasma Physics under a collaborating research program. An intense pulsed light ion beam and partly a relativistic electron beam were discussed in detail. During a two day meeting, twenty one papers or topics were presented particularly associated with pulse-power technology, beam focusing and transport, beam interaction with matter, target design, reactor, and so on. About thirty scientists and technicians including observers attended the meeting to present their research results or discuss the related topics. For individual titles, see N86-16097 through N86-16113.

N86-16097# Osaka City Univ. (Japan). Research Inst. for Atomic Energy.
INVESTIGATION OF DIODE PHYSICS USING AN ANNULAR MAGNETICALLY INSULATED ION DIODE OPERATED IN LONG PULSE MODE
Yoshiro Nakagawa *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 4-13 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The diode physics, especially correlation between ion beam divergence and irregularities on the cathode surface, of the magnetically insulated ion diode was investigated by using an annular magnetically insulated ion diode operated in long pulse mode. Experimentally observed divergence of the ion beam, deflection of ion direction of motion, spatial non-uniformity of the ion beam and large oscillation of the intensity of the ion beam in time can be attributed to the irregularities of electron sheath or the cathode plasma filamentation in the diode gap. Author

N86-16098# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
EXPERIMENTS ON CRYOGENIC PULSED ION SOURCES
Kazuhika Horioka, Tsutomu Takahashi, Hazime Kuwabara, Hitoki Yoneda, and Koichi Kasuya *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 14-22 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

A newly designed cryogenic diode, whose anode was cooled with liquid helium was developed. The anode was cooled down to 4 to 5 K, and a hydrogen ice frozen on it was used as a flashover ion source. Proton beams of current density 20A/sq cm at 200 kV were extracted with high purity and good reproducibility. Surface flashover processes of low temperature materials were investigated in connection with the cryogenic ion sources. Experiments on them show the strong influence of temperature on insulation strength. Author

N86-16099# Kobe Univ. of Mercantile Marine (Japan). Dept. of Nuclear Engineering.
MAGNETIC INSULATION IN AN ION DIODE WITH TOROIDAL MAGNETIC FIELD
Ichizo Ishigaki, Akira Kitamura, and Syukuro Yano *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 23-36 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The effects of the cathode geometry on the insulation characteristics in a magnetically insulated ion diode with a toroidal magnetic field have been studied experimentally. It is found that the leakage current of electrons into the anode can be reduced by enclosing the anode with a real cathode or with a virtual cathode in order to provide a nearly constant electric field around the anode. The virtual cathode is formed behind the anode for a diode configuration with a C-shaped real cathode placed only in the front side of the anode, and this is confirmed by measurements of the electron orbits and the space potential. These diodes predict the ion efficiency enhanced by a factor of about 2 and the anode damage reduced by a factor of 0.4, compared with those in the conventional planar diode. Author

N86-16100# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PULSE POWER TRANSPORT TO REB DIODE THROUGH SLENDER MITL
Morihiko Sato, Jun-ichi Mizui, and Hiroaki Yonezu *In its* Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 37-51 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

Direct electric power input to a pellet might be a most simple way for compression in inertial confinement fusion. One of crucial questions in this way is how much power can be transported to the pellet through a slender self-magnetically insulated transmission line (MITL) without a large loss. Experimental results show that the efficiency of pulse power transport is determined from a gap closure time caused by plasma expansion from the anode and the cathode surface of the MITL. It implies a shorter voltage pulse width (approx. 10 to 20 ns) is required for the case of a few mm gap length to attain a high transport efficiency. Author

N86-16101# Nagoya Univ. (Japan). Inst. of Plasma Physics.
GEOMETRIC COMPRESSION OF HOLLOW CYLINDER IN A COAXIAL RELATIVISTIC ELECTRON BEAM DIODE
Jun-ichi Mizui, Morihiko Sato, and Hiroaki Yonezu *In its* Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 52-60 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

Dynamic behaviors of a hollow cylindrical electrode were observed optically in a coaxial diode with circular-pinched electron flow. Motions of the thin cylinder irradiated by an electron beam are divided into an explosive and an ablative mode according to the electron stopping range. When the electron beam produces a surface plasma on the outer electrode, the thin inner electrode also collapses under the stagnation pressure produced by the expanding plasma. Author

N86-16102# Osaka Univ. (Japan). Inst. of Laser Engineering.
GENERATION OF ION BEAMS IN PLASMA FOCUS
Masahiro Yokoyama, Yoneyoshi Kitagawa, and Yoshiyuki Yamada *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 61-68 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The experimental results on generation of ion and electron beams in plasma focus devices and the models of particle acceleration and emission mechanism are summarized and reviewed. Author

N86-16103# Nagaoka Technological Univ., Niigata (Japan). Lab. of Beam Technology.
CHARACTERISTICS OF INTENSE PULSED ION BEAM EXTRACTED FROM DUAL-CURRENT-FEED MAGNETICALLY-INSULATED DIODE
E. Sai, Y. Shimotori, K. Aga, K. Masugata, M. Ito, and K. Yatsui *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 69-87 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

Experimental studies are presented on characteristics of an intense pulsed ion beam that is extracted from a flat or focusing type of dual-current-feed magnetically-insulated diodes. Energy spectra, proton ratio, divergence angle, and focusing properties are studied for various kinds of ion species in several parameter spaces. Author

N86-16104# Nagaoka Technological Univ., Niigata (Japan). Lab. of Beam Technology.
TIME-RESOLVED MEASUREMENT OF ENERGY AND SPECIES OF AN INTENSE PULSED ION BEAM
T. Matsuzawa, A. Takahashi, K. Masugata, M. Ito, and M. Matsui *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 88-101 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

A time-resolvable Thomson-parabola spectrometer is developed employing a microchannel plate image-intensifier, which acts as a high speed shutter (approx. 5 ns) by gating the applied voltage. Using such a spectrometer, the measurement of temporal behavior of beam energy for various ion species of an intense pulsed ion beam extracted from a dual-current-feed magnetically-insulated diode was achieved. The energy of protons is found to be in good agreement with the diode voltage. Author

N86-16105# Osaka City Univ. (Japan). Research Inst. for Atomic Energy.
OPERATION AT HIGH VOLTAGE AND POWER BRIGHTNESS OF ION BEAM ON CONICAL PINCHED ELECTRON BEAM DIODE
Yoshinobu Matsukawa *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 102-109 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

An operation of a conical pinched electron beam diode was studied at high anode voltage and a comparison of the power density of the ion beam from the point-like origin at the pinch region of this diode was discussed on various types of diode. Author

N86-16106# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
ANALYSIS OF MICROSCOPIC INSTABILITY FOR ROTATING LIB
Masaru Sato and Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 110-120 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The instability of a neutral hollow beam is investigated within the framework of the Vlasov-Maxwell equations. It is assumed that the hollow beam is thin with the radial thickness a which is much smaller than the major radius R sub 0, and that the equilibrium beam charge is neutralized by the background electron charge. The stability analysis is carried out for perturbations about the beam equilibrium distribution function F sup 0 sub B. The detailed instability properties are calculated for a variety of system parameters. Author

N86-16107# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
SIMULATION OF ION-BEAM IN MID
Tetsu Magamatsu, Shigeo Kawata, and Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 121-127 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

In recent LIB researches, it is considered that the most suitable system is the Magnetically Insulated Diode (MID) to generate the light ion beam. The ion beam and electron motions in MID A-K gap are treated. Author

N86-16108# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
NUMERICAL ANALYSIS FOR CURRENT NEUTRALIZATION OF ROTATING LIGHT ION BEAM
Takayuki Aoki, Shigeo Kawata, and Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 128-137 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The current neutralization fraction of Rotating LIB injected into a low density plasma (about 1 Torr) is investigated numerically. The beam space charge is easy to be almost neutralized by a redistribution of the background plasma. But if the Larmor radius of the plasma electron is much smaller than electron-ion collision mean-free-path, the return current induced in the plasma is limited to flow by the strong magnetic field associated with the intense LIB. Consequently the beam current cannot be neutralized so much. In this research, the macroscopic treatment of such a phenomenon is presented and the possibility of Rotating LIB propagation is also considered. Author

N86-16109# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
ALPHA-BURNING IN ICF TARGET
Kaori Kaki, Shigeo Kawata, and Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 138-148 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The effect of thermonuclear-product transport in an ICF target is usually calculated by two methods in hydrodynamic simulations of the target implosion. One is based on the diffusion theory and the other accurately describes the thermalization process of the products. Some achieved points of computation of alpha-burning effect in ICF target are presented through comparisons between two results calculated by each method. Author

N86-16110# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
TARGET IMPOSION IN LIB ICF
Shigeo Kawata and Keshiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 149-164 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

The LIB transportable window is described for the LIB transportation through the Z-discharged plasma channel. The numerical results of the LIB-target implosion are presented next by the computer analyses. Finally, the problem of numerical computing method is pointed out and the improved one is also presented. By the improved method, the numerical resolution of shock surface is improved and the shock is in one mesh. Author

N86-16111# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
RESEARCH FOR THERMAL BEHAVIOR OF LIQUID-METAL

WALL IN ICF REACTOR
Masaki Tsuruki, Shigeo Kawata, and Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 165-175 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

When an ICF reactor is designed, the first wall of the reactor chamber is an important problem. The thermal behavior of the liquid metal is investigated for the water fall type reactor. The liquid metal is used as the first wall. The safety of this type reactor is also discussed. Author

N86-16112# Keio Univ., Yokahama (Japan). Faculty of Science and Technology.
ON THE GROWTH RATE OF RAYLEIGH-TAYLOR INSTABILITY AT THE DECELERATING SHOCK FRONT
Yasumitsu Nakahama and Masatada Ogasawara *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 176-184 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

Consideration of the growth rate of the Rayleigh-Taylor instability at the decelerating shock front is made. The growth rate derived numerically by Murakami, Yabe and Niu has two characteristic features, i.e., (1) sharp decrease at some wavenumber, and (2) existence of a flat part different from the square foot of gk, where k and g are the wavenumber and the acceleration. The above (1) is explained by hydrodynamic flow behind the shock front. Confirmation of the existence of the constant term in the expression of the growth rate by Murakami, et al., is made, but the physical picture for this term is not clear yet. Author

N86-16113# Tokyo Inst. of Tech., Yokahama (Japan). Dept. of Energy Sciences.
PROPOSAL OF POWER PLANT BY LIB FUSION
Keishiro Niu *In* Nagoya Univ. Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams Aug. 1985 p 185-192 refs (For primary document see N86-16096 06-75)
Avail: NTIS HC A10/MF A01

A power plant which generates the output electric power of 0.8 GW is proposed here by using LIB fusion reactor. The target of LIB is biased by -1 MV in order to concentrate the ion beams on the target surface. Inside of the rotating reactor vessel is filled by the flibe which is used as the coolant and the tritium breeder. The flibe is chemically inactive and is easier for handling than the pure liquid lithium. Author

N86-16114# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MAGNETOHYDRODYNAMIC STABILITY OF SPHEREOMAK PLASMA IN TOROIDAL FLUX CONSERVER WITH RECTANGULAR CROSS SECTION. PART 2: APPLICATION OF MERCIER CRITERION
Shobu Kaneko (Tokyo Univ., Japan), Hiroaki Tsutsui (Tokyo Univ., Japan), Takeshi Miyazaki (Hitachi Ltd., Tokyo, Japan), and Masayoshi Taguchi (Tokyo Univ., Japan) Aug. 1985 20 p refs (IPPJ-743) Avail: NTIS HC A02/MF A01

The magnetohydrodynamic equilibrium states by Hill's vortex model and by the Coulomb-wave-function model are proved to be unstable. New MHD equilibrium configurations are determined by using another model for which dp/d psi=0 on the magnetic axis. Here p is the pressure and psi is the flux function. The values of the safety factor on the magntic axis, q sub axis are evaluated for these configurations. The MHD stability of these equilibrium states is investigated by the Mercier criterion. The values of the maximum beta ratio beta sub max are evaluated for this model. The optimized pressure distributions are determined by use of the Mercier criterion and the values of beta sub max are also evaluated for these pressure distributions. The values of beta sub max are shown to be at most 12%, if the condition q sub axis < 1 is required. Author

N86-16115# Naval Research Lab., Washington, D. C.
NONLINEAR ANALYSIS OF A RELATIVISTIC BEAM-PLASMA CYCLOTRON INSTABILITY Memorandum Report, Oct. 1984 - Sep. 1985
P. Sprangle and L. Vlahos 19 Sep. 1985 35 p
(RR0-1109)
(AD-A159159; NRL-MR-5595) Avail: NTIS HC A03/MF A01
CSCL 20/7

A self-consistent set of nonlinear and relativistic wave-particle equations are derived for a magnetized beam/plasma system interacting with electromagnetic cyclotron waves. In particular, the high frequency cyclotron mode interacting with a streaming and gyrating electron beam within a background plasma is considered in some detail. This interaction mode may possibly find application as a high power source of coherent short wavelength radiation for laboratory devices. The background plasma, although passive, plays a central role in this mechanism by modifying the dielectric properties in which the magnetized electron beam propagates. For a particular choice of the transverse beam velocity, i.e., speed of light/relativistic mass factor, the interaction frequency equals the nonrelativistic electron cyclotron frequency times the relativistic mass factor. For this choice of transverse beam velocity the detrimental effects of a longitudinal beam velocity spread is virtually removed. Power conversion efficiencies in excess of 18% are both analytically calculated and obtained through numerical simulations of the wave-particle equations. The quality of the electron beam, degree of energy and pitch angle spread, and its effect on the beam-plasma cyclotron instability is studied. GRA

N86-16116# Fermi National Accelerator Lab., Batavia, Ill.
ISOLATED DATA ACQUISITION SYSTEM FOR HIGH VOLTAGE APPLICATIONS
A. Waitz and A. Donaldson Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Prepared in cooperation with Fermi National Accelerator Lab., Batavia, Ill.
(Contract DE-AC02-76CH-03000)
(DE85-016984; FNAL-TM-1323; CONF-850504-247) Avail: NTIS HC A02/MF A01

This report describes the design and operation of a microcomputer controlled system for acquisition of both analog and binary data within the high voltage stages of a linac modulator. The system is comprised of a microprocessor Controller which communicates with the remote data acquisition circuits via an optical bus. The bus, which uses a 1 MHz Manchester II format, is configured as a loop, starting at the Controller, daisy-chaining the remote cards and terminating back at the Controller. Upon receiving a linac timing pulse, the Controller sends addressed commands to the individual remote cards and receives data back. It then passes this data to the linac control system through a Multibus connection. Each remote circuit can return 16 binary sense and 7 (12 bit) analog parameters within 270 microseconds. This speed is possible because of a pipelined design where one word is transmitted while another is being converted. A data conversion cycle is initiated when a remote data acquisition card receives the proper command and address from the controller. DOE

N86-16117# Fermi National Accelerator Lab., Batavia, Ill.
DEPENDENCE OF CHARGE COLLECTION DISTRIBUTIONS AND DOSE ON THE GAS TYPE FILLING THE IONIZATION CHAMBER FOR A p(66)Be(49) CLINICAL NEUTRON BEAM
M. Awschalom and R. K. T. Haken Jan. 1985 33 p refs
(Contract DE-AC02-76CH-03000)
(DE85-017366; FNAL-TM-1296) Avail: NTIS HC A03/MF A01

Measurements of central axis depth charge distributions (CADCD) in a P(66)Be(49) clinical neutron beam using A-150 TE plastic ionization chambers (IC) have shown that these distributions are dependent on the gas type filling the ICs. IC volumes from 0.1 to 8 cm(3) and nine different gases were investigated. Off axis ratios and build-up measurements do not seem to be as sensitive to gas type. The gas dosimetry constants given in the AAPM Protocol for Neutron Beam Dosimetry for air and methane based TE gases were tested for consistency in water and in TE

solution filled phantoms at depths of 10 cm, when used in conjunction with an IC having 5 mm thick walls of A-150. DOE

N86-16118# Los Alamos National Lab., N. Mex.
LASER PRODUCED PLASMA AFFECTS ON WELDING
16 Sep. 1985 4 p Presented at the 8th Annual Gas Discharge Conference, Oxford, 16 Sep. 1985
(Contract W-7405-eng-36)
(DE85-009638; LA-UR-85-994; CONF-850979-1) Avail: NTIS HC A02/MF A01

Acoustic data and high speed pictures indicate that a laser-supported combustion wave (LSCW) is generated and propagates away from the surface in the direction toward the laser. The high speed pictures also show that numerous plasmas are generated during one laser pulse. The optical data show that the number of plasmas generated and their initiation times depend upon laser power. The depth of penetration is also dependent upon the number of plasmas generated, with more plasmas producing more penetration. This latter fact supports the conclusion that the plasma improves the efficiency of the laser process. Thus, a plasma in the form of a laser supported combustion wave is generated and acts to convert the poorly absorbed laser radiation into blackbody radiation. The blackbody radiation has a broadband short wavelength spectrum which is readily absorbed by most materials. DOE

N86-16119# Los Alamos National Lab., N. Mex.
PLASMA HEATING EFFECTS DURING LASER WELDING
G. K. Lewis and R. D. Dixon 1985 11 p Presented at the 11th International Welding Fair, Essen, West Germany, 11 Sep. 1985
(Contract W-7405-eng-36)
(DE85-010778; LA-UR-85-1141; CONF-850975-1) Avail: NTIS HC A02/MF A01

Laser welding is a relatively low heat input process used in joining precisely machined components with minimum distortion and heat affects to surrounding material. The CO2 (10.6 (MU)m) and Nd-YAG (1.06 (MU)m) lasers are the primary lasers used for welding in industry today. Average powers range up to 20 kW for CO2 and 400 W for Nd-YAG with pulse lengths of milliseconds to continuous wave. Control of the process depends on an understanding of the laser-plasma-material interaction and characterization of the laser beam being used. Inherent plasma formation above the material surface and subsequent modulation of the incident laser radiation directly affect the energy transfer to the target material. The temporal and spatial characteristics of the laser beam affect the available power density incident on the target, which is important in achieving repeatability in the process. Other factors such as surface texture, surface contaminants, surface chemistry, and welding environment affect plasma formation which determines the weld penetration. This work involves studies of the laser-plasma-material interaction process and particularly the effect of the plasma on the coupling of laser energy to a material during welding. A pulsed Nd-YAG laser was used with maximum average power of 400 W. DOE

N86-16120# Los Alamos National Lab., N. Mex.
LASER INTRACAVITY ABSORPTION AS A PLASMA DIAGNOSTIC AID
G. A. Wurden 1985 6 p Presented at the 2nd International Symposium on Laser Aided Plasma Diagnostics, Culham, England, 10 Sep. 1985
(Contract W-7405-eng-36)
(DE85 015741; LA-UR-85-2659; CONF-8509127-2) Avail: NTIS HC A02/MF A01

Trace levels of lithium are detected on 100 (MU)sec timescales using an electrooptically tuned CW dye laser, in conjunction with a high resolution 0.03 A spectrometer/optical multichannel analyzer. The spectra of Li(7) resonance lines at 6708 A are analyzed for their Zeeman splitting patterns, after unfolding the effects of intracavity absorption (ICA) on the lineshape. For these timescales, a sensitivity to approx. 1 X 10 to the 7 lithium atoms/cc at a level of (Delta)I/I approx. 10% has been observed, corresponding to enhancement factors over single pass absorption of approx. 1000X. Intracavity enhancement of the line structure in the of the line, and a weak blue shift asymmetry have also been observed, but always in the presence of a central absorption feature. The 0.1 A instantaneous laser linewidth is usually scanned over a 1 A range, at frequencies up to 30 kHz. Ultimately this detection system will enclose a hot, dense fusion plasma intersecting an 80 keV, 10 mA neutral lithium beam to probe the plasma internal magnetic field structure, in a non-intrusive fashion. DOE

N86-16121# California Univ., Berkeley. Lawrence Berkeley Lab.
POWER COMBINERS/DIVIDERS FOR LOOP PICKUP AND KICKER ARRAYS FNAL STOCHASTIC COOLING RINGS
J. K. Johnson and R. Nemetz May 1985 6 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016562; LBL-19528; CONF-850504-258) Avail: NTIS HC A02/MF A01

The anti-proton accumulator and debuncher at FNAL will use stochastic methods to cool the beam. Pairs of quarter-wavelength directional-couple-r loops are used to detect and kick the beam. The loops are copper plates which are flush with the upper and lower wall of a rectangular beam pipe. The plates, when surrounded by a properly sized pocket, form a 100-ohm transmission-line directional coupler. As the beam passes, a signal which gives position and time information, is induced in the plates. But, because the signal levels are low (.5 picowatts power pair), a power combiner (usually several primary combiners feeding a secondary combiner) is used to combine the outputs of many loops. Subsequently, the combined signal is amplified, filtered and then fed into a divider, (that is, a combiner operating in reverse). The divider distributes the signal into a different set of loops which modify (kick) the beam's position. Since the loop couplers are arranged linearly, in arrays of various lengths, combiners also provide a convenient method of reducing the number of vacuum feedthroughs and preamplifiers and their related costs in performance and dollars. In this note we describe various stripline combiner systems that add the outputs of 4, 8, 16 or 32 loops. DOE

N86-16122# Columbia Univ., New York. Plasma Physics Lab.
LARGE ASPECT RATIO, HIGH-BETA TOKAMAK FUSION REACTOR
G. A. Navratil 1985 29 p
(Contract DE-AC02-76ET-53016)
(DE85-016654; DOE/ET-53016/87) Avail: NTIS HC A03/MF A01

This paper presents an analysis of a large aspect ratio (R/a about 9) tokamak reactor, with a circular plasma cross-section, operating in the high-beta second stability regime. Engineering advantages of such a system include good access, simple poloidal coil design with no coils inside the toroidal magnet set, low toroidal plasma current, and higher toroidal magnetic field on axis. MHD equilibra which are stable at high beta exist for this configuration. The gap between the first and second stable regimes of operation is narrowed considerably at high aspect ratio. Reactor designs based on present confinement scaling data are presented together with a description of a medium sized experiment which can explore the important physics questions associated with this attractive class of fusion reactor. DOE

N86-16123# Lawrence Livermore National Lab., Calif.
SOLUTION OF THE FIELD EQUATIONS FOR 2-D ELECTROMAGNETIC DIRECT IMPLICIT PLASMA SIMULATION
D. W. Hewett and A. B. Langdon 2 Jan. 1985 5 p Presented at the 11th International Conference on Numerical Simulation of Plasmas, Montreal, Canada, 25 Jun. 1985
(Contract W-7405-eng-48)
(DE85-016073; UCRL-92041; CONF-850659-1) Avail: NTIS HC A02/MF A01

A direct implicit particle-in-cell (PIC) simulation model with full electromagnetic (EM) effects has been implemented in 2-D Cartesian geometry. The model, implemented with the D1 time differencing scheme, was first implemented in a 1-D electrostatic

(ES) version to gain some experience with spatial differencing in forms suitable for extension to the full EM field in two dimensions. The implicit EM field solve is considerably different from the implicit ES code. The EM field calculation requires an inductive part as well as the electrostatic and the B field must be self-consistently advanced. DOE

N86-16124# Washington Univ., Seattle. Nuclear Physics Lab.
SUPERCONDUCTING RESONATORS FOR THE UNIVERSITY OF WASHINGTON BOOSTER LINAC
D. W. Storm, J. M. Brennan, and I. Ben-Zvi 1985 4 p refs Presented at the Particle Accelerator Conf., Vancouver, British Columbia, 13 May 1985 Prepared in cooperation State Univ. of New York, Stony Brook and Weizmann Inst. of Science, Rehovoth, Israel
(Contract DE-AC06-84ER-40124)
(DE85-017419; DOE/ER-40124/6; CONF-850504-271) Avail: NTIS HC A02/MF A01

We have developed two models of a 150 MHz quarter wave resonator - one with optimum beta = 0.10 and one with optimum beta = 0.21. These are lead-plated copper structures. The prototype beta = 0.10 resonator was tested successfully a year ago and gave average accelerating fields of 3.5 MV/m with 4.2 watts dissipated. It is quite similar to the resonator developed by the second and third authors. We have made and tested several more of this model. A prototype beta = 0.21 resonator has been completed, but weld flaws have prevented definitive tests. In order to minimize surface electric fields in the high-beta resonator, there were some modifications in the drift tube shape beyond those required to change the optimum beta. These quarter wave resonators have a wide transit time factor curve and are extremely rigid mechanically. Variations in eigen-frequency due to mechanical vibrations are less than 1 Hertz. Maximum attainable fields are limited by field emission. DOE

N86-16125# Sandia National Labs., Albuquerque, N. Mex.
PBFA-2 VACUUM SYSTEM DESIGN USING A LUMPED PARAMETER COMPUTER MODEL
J. S. Cap, L. X. Schneider, and J. D. Boyes 1985 16 p Presented at the 5th IEEE Pulsed Power Conference, Washington, D.C., 10 Jun. 1985
(Contract DE-AC04-76DP-00789)
(DE85-013117; SAND-84-2517C; CONF-850616-24) Avail: NTIS HC A02/MF A01

The PBFA-2 vacuum vessel which houses the power flow lines and ion diode presented a difficult engineering problem in analyzing the pressure distribution throughout the chamber. The vessel utilizes a typical construction of stacked lucite and aluminum rings with their associated high outgassing loads. The transmission lines are a series of stacked cones and toroids that form an interconnected network of annular pathways. Calculating the steady state pressure distribution required solving 30 simultaneous equations, and any transient solution was virtually impossible by hand. This paper describes a computer model developed using the direct analogy between fluid flow parameters and electrical parameters. This model can then be solved as a lumped parameter electrical circuit using the differential network analysis program, SCEPTRE. The overall design of the vacuum system, including the choice of helium cryopumps and water vapor cryopumps to handle the anticipated heavy water vapor load, is also discussed. DOE

N86-15442# Joint Publications Research Service, Arlington, Va.
SELF-QUENCHING STREAMER DISCHARGE CHARACTERISTICS AT EXTREME GAS COMPOSITIONS
You Tiejian, Yang Baozhong, and Chen Hongfang *In its* China Report: Science and Technology (JPRS-CST-85-038) 5 Nov. 1985 p 64-67 refs Transl. into ENGLISH from Zhongguo Kexue Jishu Daxue Xuebao (Hefei), v. 14, no. 2, Jun. 1984 p 295-297 (For primary document see N86-15438 06-31)
Avail: NTIS HC A06/MF A01

N86-15466# Joint Publications Research Service, Arlington, Va.
PLASMA PARAMETERS AT LOW LEVEL OF INTRINSIC MICROWAVE RADIATION Abstract Only
V. N. Kolesnikov and Yu. G. Tishchenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-009) 4 Sep. 1985 p 61 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 30, no. 1, Jan. 1985 p 102-105 Previously announced in IAA as A85-23561 (For primary document see N86-15452 06-31)
Avail: NTIS HC A06/MF A01

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-16126# Rockwell International Science Center, Thousand Oaks, Calif.
RESEARCH ON THE CRYSTAL GROWTH AND DIELECTRIC PROPERTIES OF HIGH PERMITTIVITY FERROELECTRIC MATERIALS Annual Report, 1 Mar. 1984 - 28 Feb. 1985
R. R. Neurgaonkar Jul. 1985 68 p
(Contract N00014-81-C-0463)
(AD-A157820; SC5345.5AR) Avail: NTIS HC A04/MF A01 CSCL 20/3

Millimeter wave measurements on tungsten bronze Sr0.6Ba0.4Nb2O6 (SBN:60) and Ba2-xSrxK1-yNayNb5O15(BSKNN) have shown a strong temperature dependence for permittivity and dielectric loss, with both decreasing at low temperature down to 77K for the electric field parallel to the polar axis. The observed changes in and perpendicular to the polar axis are much less, being only 30-40%. A temperature sensitive peak in the polar has been observed for some samples. First experimental determination of the millimeter wave dn/dE for SBN:60 single crystal has been demonstrated successfully at cryogenic temperature. These results are encouraging both for basic understanding of the mechanisms controlling millimeter wave susceptibilities in ferroelectric tungsten bronze as well as for practical device applications. It has been shown for SBN:60 that the large millimeter wave nonlinear response is retained at cryogenic temperature (dn3/dE3 = .0000005m/V at 77K) while the absorption is reduced by an order of magnitude. The experimental database has allowed, for the time, the construction of a modeling work based on coupling of the microwave field to acoustic phonons which is consistent with the observations. GRA

N86-16127# Wisconsin Univ., Madison. Dept. of Physics.
THIN SUPERCONDUCTING FILM CHARACTERIZATION BY SURFACE ACOUSTIC WAVES Research Progress Report, 30 Sep. 1984 - 22 Apr. 1985
M. Levy 22 Apr. 1985 11 p
(Grant AF-AFOSR-0350-84)
(AD-A158311; AFOSR-85-0528TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

Both the dc electrical resistivity and the attenuation of surface acoustic waves (SAW) were measured in the superconducting state of a granular lead film as a function of an applied magnetic field normal to the film plane. At 4.2 K the data appear to yield an upper critical of about 60 K Gauss and a lower critical field of about 20 K Gauss. A theoretical model that takes into account renormalization has been developed for explaining the SAW attenuation in a superconducting NbN film with a sheet resistivity of 30 k ohms/sq. Bulk ultrasonic measurements in the ferromagnetic superconductors Er(x)Ho(1-x)Rh4B4 indicate that spin phonon interaction increases in the superconducting state of these ternary compounds. Ultrasonic measurements in very pure vanadium single crystals provide low temperature data which yield a zero temperature energy gap 2 Delta(0) that is very close to the BCS value of 3.5 kT sub c but the data close to the superconducting transition temperature T sub c would yield 2 Delta

(0) = 4.2 kT sub c. A theoretical model is being investigated to ascertain if it will resolve this apparent discrepancy. GRA

N86-16128# Honeywell Systems and Research Center, Minneapolis, Minn.
SUPERLATTICE OPTICAL BISTABILITY RESEARCH Annual Report, 5 Jul. 1984 - 30 Jun. 1985
M. M. Tehrani and P. Chow 22 Jun. 1985 15 p
(Contract F49620-84-C-0071)
(AD-A158876; AFOSR-85-0656TR; AR-1) Avail: NTIS HC A02/MF A01 CSCL 20/6

This report describes work performed on a program for fabrication and characterization of nonlinear optical properties of HgCdTe superlattices. We determined early on that performing nonlinear optical experiments (i.e., optical phase conjugation and optical bistability) on such superlattices requires the fabrication of thick > or = 2 micron samples. The growth of thick superlattices with very thin individual layers, on the other hand, can best be accomplished by using an automated molecular beam epitaxy (MBE) system. We launched a major effort to automate our existing MBE system which is due for completion by the end of July 1985. This report also describes the automation design, software, and the computer-controlled hardware. GRA

N86-16129# Georgia Tech Research Inst., Atlanta.
INTEGRATED OPTOELECTRONIC CIRCUITS UTILIZING InGaAsP GROWN BY MOLECULAR BEAM EPITAXY Annual Report, 1 Jan. 1983 - 25 Nov. 1984
E. L. Meeks, C. J. Summers, and N. W. Cox 25 Nov. 1984 54 p
(Contract N00014-83-K-2017)
(AD-A159403) Avail: NTIS HC A04/MF A01 CSCL 20/12

A phosphorus source suitable for InP or quaternary MBE growth was developed and tested. The source cracks the P4 molecules sufficiently to greatly improve the phosphorus sticking coefficient; the flux can be monitored at all times during growth but the long term stability of the source as presently manufactured is not sufficient for quaternary alloy ratio control; and the source has a useful lifetime compatible with the requirements of good MBE layer growth. A duplicate arsenic source was also developed and tested. Indium phosphide layers have been grown with excellent room temperature mobility and the necessity of a cracking phosphorus source confirmed. Electrical and optical characterization of the layers indicate that the layers are highly compensated which is consistent with the poor quality of the background vacuum during growth. Little improvement can be anticipated in the present MBE system. Many quaternary layers have been grown with the new phosphorus and arsenic sources. The best layers grown on InP were matched to within 1.0%. It is expected that with the data obtained thus far, the lattice match can be consistently improved only with a positive, stable real time flux control on both the As and the P sources. A new MBE system for phosphorus compounds has been designed and is being fabricated. The new system can accommodate 1.5 in. diameter substrates, has sample rotation, and two stages of vacuum interlocking for sample introduction. GRA

N86-16130# California Univ., Los Angeles. Dept. of Materials Science and Engineering.
PREPARATION AND PROPERTIES OF TRANSITION METAL BETA ALUMINAS
J. D. Barrie, B. Dunn, O. M. Stafsudd, and G. C. Farrington Sep. 1985 7 p
(Contract N00014-83-K-0498)
(AD-A159408; TR-4) Avail: NTIS HC A02/MF A01 CSCL 20/2

Ion exchange techniques were used to produce a family of 3d transition metal Beta-alumina single crystals. Complete or nearly complete replacement was obtained for Cr3+, Mn2+, and Ni2+ compositions. Optical properties of the crystals were studied and both broad absorption and broad fluorescence bands were observed. Environmental exposure produced detrimental effects over long time periods, suggesting hydration of the conduction planes. The preparation of a new family of Beta aluminas by the substitution of 3d transition metal ions for Na+ ions has enabled us to begin investigating a new series of materials with potential as solid state tunable lasers. The optical properties of these materials compare favorably with those of materials previously studied, and the vast benefits of ion exchange as a preparation technique permit the synthesis of many samples covering a wide variety of active ion concentrations. Initial results with Cr3+ exchanged Beta alumina indicate that hydration effects may influence the optical properties of this material. GRA

N86-16131# Graz Univ. (Austria).
SUBMICRON PHONICS 1 Interim Report, Dec. 1984 - Mar. 1985
22 Mar. 1985 7 p
(Contract DAJA45-84-M-0394)
(AD-A159421; IR-2) Avail: NTIS HC A02/MF A01 CSCL 09/1

Theoretical prediction of the speed of Gallium Arsenide submicron-devices by considering for the first time possible effects of phonon disturbances on the electron-mobility is discussed. The displaced maxwellian model for hot electrons in the central valley of polar semiconductors was extended to include the detailed time-dependence of longitudinal optical (LO) phonon amplification in n-GaAs at room-temperature in the velocity-overshoot regime. Assuming a practically instantaneous adaption of the electrons to the LO-phonon built-up, which in turn is calculated from the time-dependent Phonon-Boltzmann-equation, the FORTRAN-code for spatially homogenous transport was developed and put to a first use. GRA

N86-16132# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
FUNDAMENTAL STUDIES AND DEVICE DEVELOPMENT IN BETA SILICON CARBIDE Semiannual Progress Report, 1 Mar. - 31 Aug. 1985
R. F. Davis 31 Aug. 1985 60 p
(Contract N00014-82-K-0182; DA Proj. RR0-2102)
(AD-A159446) Avail: NTIS HC A04/MF A01 CSCL 20/12

The research of this reporting period has involved the growth of large area thin films of Beta-SiC; the study of the effect of defects at the interface region on dopant getting; various aspects of doping via ion implantation, calculation of the critical energies to cause amorphization, etching of the resultant amorphous layer, and charge carrier activation during annealing; n(+)p junction development via ion implantation, and oxidation and reactive ion etching studies. GRA

N86-16133# Department of the Air Force, Washington, D.C.
SELECTIVE ANODIC OXIDATION OF SEMICONDUCTORS FOR PATTERN GENERATION Patent Application
B. Davari, inventor (to Air Force) Filed 1 Nov. 1984 31 p
(AD-D011889; US-Patent-Appl-SN-667306) Avail: NTIS HC A03/MF A01 CSCL 20/12

The present invention relates to GaAs integrated circuit technology, and in particular, to a novel means of controlling oxidation growth rate on anodically oxidized GaAs samples. This abstract discloses an apparatus and a method for selectively controlling anodic oxide growth on semiconductors for controlled electrochemical pattern generation incorporating use of a writing beam of a wavelength which encourages oxide and a bias beam at a wavelength which discourages oxide growth. The bias beam is projected on the semiconductor in electrolytic environment to prevent or retard oxide growth while oxide growth is accelerated at points of illumination by means of writing beam. GHA

N86-16134# Oak Ridge National Lab., Tenn.
SPIN DYNAMICS OF A Cu-Mn SPIN GLASS ALLOY
J. W. Cable, R. M. Nicklow, and Y. Tsunoda Jul. 1985 13 p
Presented at the International Conference on Neutron Scattering, Santa Fe, New Mexico, 19 Aug. 1985 Prepared in cooperation with Osaka Univ., Japan
(Contract DE-AC05-84OR-21400)
(DE85-016295; CONF-850871-4) Avail: NTIS HC A02/MF A01

Inelastic neutron scattering measurements were made on Cu-Mn spin-glass alloys to compare the spin dynamics associated

with the ferromagnetic and antiferromagnetic spin-pair correlations present in these alloys. These correlations give rise to elastic diffuse peaks at Q = (1, 0.5, 0) and 1, 0.5 + or - delta, 0), respectively. Constant-Q measurements on Cu-10% Mn and Cu-21% Mn at 295 K yield the same inverse relaxation times at these two positions in Q. These results indicate that composite ferro-antiferromagnetic-clusters exist both above and below T sub f and fluctuate in time while maintaining their spatial correlations. DOE

N86-16135# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
STRUCTURAL AND ELECTRICAL CHARACTERIZATION OF POLYCRYSTALLINE SEMICONDUCTOR MATERIALS
R. J. Matson and Y. S. Tsuo Jul. 1985 8 p Presented at the 2nd Spring Meeting of the Materials Research Society, San Francisco, California, 15 Apr. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012166; SERI/TP-213-2689; CONF-850421-13) Avail: NTIS HC A02/MF A01

Secondary electron imaging, electron channeling and electron-beam-induced current (EBIC) are used alternately in a scanning electron microscope to characterize and correlate the morphology, crystallographic orientation, and electronic quality (types and spatial distribution of defects) of individual grains in polycrystalline semiconductor samples. The technique is discussed in some detail, and a number of applications and results in the study of edge-supported-pulling (ESP) silicon sheet and low-angle silicon sheets (LASS) materials are reported. DOE

N86-16136# Los Alamos National Lab., N. Mex.
STRUCTURAL EXAMINATION OF IRIDIUM-BASED SINGLE-CRYSTAL PREPARATIONS
Keith Martin Azler and Raymond Brad Roof 1985 5 p Presented at the 34th Denver X-Ray Conference, Colorado, Aug. 1985
(Contract W-7405-eng-36)
(DE85-017550; LA-UR-85-2920; CONF-8508118-1) Avail: NTIS HC A02/MF A01

A high-temperature crystal growth experiment produced discrete single-crystal products of Al and IrSi. The preparation and examination of these phases is described. This project is part of a materials compatibility study relating to radioisotopic heat sources. These heat sources are comprised of a PuO2 fuel pellet encapsulated in an Ir alloy containment shell. Th is introduced as an additive within the Ir to maintain ductility. Si and P are picked up inadvertently in the fuel processing. The compatibility of the heat sources with Al is of interest because of potential interactions with the Al alloy hardware associated with the heat source environment. DOE

N86-16137# Sandia Labs., Albuquerque, N. Mex.
COMPARISON OF 2D MEMORY SEU TRANSPORT SIMULATIONS WITH EXPERIMENTS
J. S. Fu, R. Koga, and W. A. Kolasinski 1985 16 p Prepared in cooperation with Aerospace Corp., El Segundo, Calif.
(Contract DE-AC04-76DP-00789)
(DE85-016134; SAND-85-1680C) Avail: NTIS HC A02/MF A01

Single event upset (SEU) simulations in SRAM cells have been carried out and the results are compared to experimental data on 16K bit memories. The simulations consisted of simultaneous calculations of charge transport and transient circuit response for four cross-coupled CMOS transistors following the introduction of a sheet of excess carriers into the off p-channel drain. The experiments collected upset rates produced in the memories by 163 MeV argon ions directed normally to the chip surface. Agreement between experiment and calculation was achieved only when the p-channel transistors were integrated into a single block of silicon as the chip layout and scaling was done on the Auger coefficients to compensate for an inherent 2D effect, which artifically distorts the generation densities into the unmodeled dimension of the device width. DOE

N86-16138# Los Alamos National Lab., N. Mex.
OVERLAP OF ELECTRON CORE STATES FOR VERY HIGH COMPRESSIONS
G. Straub 1985 11 p refs Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Washington, 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015745; LA-UR-85-2598; CONF-850736-51) Avail: NTIS HC A02/MF A01

At normal density and for modest compressions, the electronic structure of a metal can be accurately described by treating the conduction electrons and their interactions with the usual methods of band theory. The core electrons remain essentially the same as for an isolated free atom and do not participate in the bonding forces responsible for creating a condensed phase. As the density increases, the core electrons begin to see one another as the overlap of the tails of wave functions can no longer be neglected. The electronic structure of the core electrons is responsible for an effective repulsive interaction that eventually becomes free-electron-like at very high compressions. The electronic structure of the interacting core electrons may be treated in a simple manner using the Atomic Surface Method (ASM). The ASM is a first-principles treatment of the electronic structure involving a rigorous integration of the Schroedinger equation within the atomic-sphere approximation. Solid phase wave functions are constructed from isolated atom wave functions and the band width W sub 1 and the center of gravity of the band C sub 1 are obtained from simple formulas. The ASM can also utilize analytic forms of the atomic wave functions and thus provide direct functional dependence of various aspects of the electronic structure. Of particular use in understanding the behavior of the core electrons, the ASM provides the analytic density dependence of the band widths and positions. DOE

N86-16139# Ames Lab., Iowa.
ELECTRONIC STRUCTURE OF RARE EARTH METALS AND INTERMETALLICS
B. N. Harmon 1985 8 p refs Presented at the International Conference on Rare Earth-Development and Applications, Beijing, China, 10 Sep. 1985
(Contract W-7405-eng-82)
(DE85-015523; IS-M-549; CONF-8509133-1) Avail: NTIS HC A02/MF A01

A review is given of recent progress in electronic structure determinations and in the development of new techniques for studies of electron-lattice coupling and magnetism. DOE

N86-16140# Sandia Labs., Albuquerque, N. Mex.
HETEROGENEOUS RESPONSE OF ALUMINUM AND LITHIUM NIOBATE TO SHOCK WAVES
F. C. Perry and D. D. Noack 1985 12 p Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Washington, 22 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-013963; SAND-85-0377C; CONF-850736-10) Avail: NTIS HC A02/MF A01

Heterogeneous shock effects were studied in aluminum (6061-T6) and single crystal lithium niobate (Z-cut) in the range 0.7 to 4.5 GPa by means of holographic interferometry. Heterogeneous yielding in lithium niobate was observed directly for the first time. In addition, nucleation or activation of defects were observed in both aluminum and lithium niobate. The single crystal data indicate that a defect-dominated fracture process constitutes a reasonable model for shock compression. The polycrystalline data suggest that similar pattern will prevail at a sufficiently high pressure. DOE

N86-16141# Rome Univ. (Italy). Dipt. di Fisica.
STATISTICAL MODEL FOR THE TRAPPING OF INTERSTITIALS BY SUBSTITUTIONAL (INTERSTITIAL) ATOMS IN SOLIDS
G. Cannelli (CNR, Rome), R. Cantelli (CNR, Rome), and F. Cordero 28 Feb. 1985 22 p refs
(Preprint-442) Avail: NTIS HC A02/MF A01

The distribution of interstitial atoms in a lattice containing trapping centers was studied using Fermi-Dirac statistics. It is assumed that the energies of free and trap sites are distributed according to density of state functions, and the populations of the various types of clusters were calculated as a function of concentration and temperature; cases in which types of clusters are prohibited were taken into account. The results are satisfactorily applied to internal friction to explain the anomalous relaxation observed in crystalline and amorphous metal-hydrogen (deuterium) systems. Author (ESA)

N86-16142# Rome Univ. (Italy). Dipt. di Fisica.
METAL-INSULATOR TRANSITION AND LANDAU FERMI LIQUID THEORY
Claudio Castellani and Carlo DiCastro 16 Apr. 1985 14 p refs (Nota-Interna-844) Avail: NTIS HC A02/MF A01

The discovery that interaction effects with disorder give anomalous correction terms to the normal Fermi liquid behavior of an electron system is discussed. In the pure disorder case the first quantum correction term due to the diffusion propagator in the particle-particle channel leads to a value equal to unity for the index specifying the power law behavior of the conductivity in terms of deviation from the critical impurity concentration. In the presence of either an external magnetic field or of magnetic impurities, this term is absent, and the leading higher order correction term due to the diffusion propagator in the particle-hole channel (diffusion) leads to a value of a half for the index. Explanations involving noninteracting electrons in disordered media, and correlation effects in nondisordered electron gas are reviewed. Author (ESA)

N86-15509# Joint Publications Research Service, Arlington, Va.
GENERATION OF ELECTROMAGNETIC RADIATION IN RADIO-FREQUENCY BAND IN SOLIDS EXPOSED TO LASER RADIATION Abstract Only
A. D. Pogrebnyak and S. V. Rakitin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 67 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 4, Apr. 1985 p 773-775 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

N86-15589# Joint Publications Research Service, Arlington, Va.
RATE OF WIDENING OF STRONG-FIELD DOMAIN IN SUPERCRITICALLY DOPED GUNN-EFFECT DEVICES Abstract Only
L. S. Chkhartishvili, Z. N. Chigogidze, and N. P. Khuchua *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 41-42 Transl. into ENGLISH from Radiotekhnika i Elektronika (Moscow, USSR), v. 29, no. 9, Sep. 1984 p 1820-1823 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15595# Joint Publications Research Service, Arlington, Va.
NEW TYPE OF IMPURITY DEFECTS IN SEMIINSULATING GALLIUM ARESENIDE Abstract Only
V. V. Voronkov, G. I. Voronkova, V. P. Kalinushkin, D. I. Murin, E. M. Omelyanovskiy, L. Ya. Parvova, A. M. Prokhorov, and V. I. Raykhshteyn *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 46 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1363-1366 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15596# Joint Publications Research Service, Arlington, Va.
PICOSECOND PHOTOCONDUCTIVITY OF INDIUM ARESENIDE Abstract Only
E. Adomaytis, Z. Dobrovolskis, and A. Krotkus *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 46 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1422-1424 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

N86-15597# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF RECRYSTALLIZATION AND REDISTRIBUTION OF IMPURITIES IN SEMICONDUCTORS EXPOSED TO MILLISECOND LASER RADIATION Abstract Only
S. G. Kiyak, A. K. Shukhostanov, G. V. Savitskiy, S. Zh. Gonov, and V. V. Gafiychuk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-006) 30 Apr. 1985 p 47 Transl. into ENGLISH from Fizika i Tekhnika Poluprovodnikov (Leningrad, USSR), v. 18, no. 8, Aug. 1984 p 1446-1448 Original language document was announced as N85-26302 (For primary document see N86-15561 06-33)
Avail: NTIS HC A05/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-16143 Maryland Univ., College Park.
A DELAYED RANDOM CHOICE QUANTUM MECHANICS EXPERIMENT USING LIGHT QUANTA Ph.D. Thesis
Oleg George Jakubowicz 1984 236 p
Avail: Univ. Microfilms Order No. DA8514538

Wheeler has often articulated during the past seven years several delayed choice Gendanken experiments which are intended to focus attention on the meaning of the elementary quantum phenomenon. Attempts to realize a delayed choice Gendanken xperiment in the spirit John Wheeler's thinking were undertaken. Short laser pulses attenuated to the single photon detection level are introduced into a Mach-Zehnder interferometer one at a time. There is a very fast completely random choice (yes/no) optical switch in one of the arms. Any photons in that arm would be reflected out and into a photomultiplier (PMT) if the optical switch decided to be closed. And any photon in the other arm would have equal probability of going into either of the PMTs that normally monitor interference. If the optical switch chooses to leave the pathway in its arm clear (open) then the photon must split at the beamsplitter and no photons will be detected in the PMT waiting for reflections out of that arm. Additionally, the phase of the interferometer may be set beforehand so that one PMT monitoring interference will register the photon and the other PMT monitoring interference will have zero probability of photon registration. The results are consistent with conventional quantum mechanics even if the decision to block or unblock one arm of the interferometer occurs after the single photon light pulse has passed the entrance beamsplitter of the interferometer. Dissert. Abstr.

N86-16144# Argonne National Lab., Ill.
ANL/STAR PROJECT: A NEW ARCHITECTURE FOR LARGE SCALE THEORETICAL PHYSICS COMPUTATIONS
A. M. Rushton 22 Jun. 1985 6 p Presented at the Computing in High Energy Physics Conference, Hamburg, Germany, 22 Jun. 1985
(Contract W-31-109-eng-38)
(DE85-014988; ANL/HEP-CP-85-64; CONF-8506158-1) Avail: NTIS HC A02/MF A01

The project reported consists of two phases, each of which has goals of substantial physics content on its own. In Phase 1, Star Technologies' ST-100 was selected as the array processor for the prototype coupled system and have installed one on a Vax 11/750 host. The goals with this system are to institute a substantial program in computational physics based on the power provided by this system and thereby to gain experience with both the hardware and software architecture of the ST-100. In Phase 2, a prototype is proposed consisting of two coupled array processors with shared memory to prove that this design can achieve high speed and efficiency in a readily extensible and cost

effective manner. This will implement all of the hardware and software modifications necessary to extend this design to as many as 64 (or more) nodes. The changes made are minimized in the standard system hardware and software; this drastically reduces the effort required to implement such a design. The architecture of the ST-100 is discussed and the physics program. The proposed design of the coupled system is also presented. DOE

N86-16145# Rome Univ. (Italy). Dipt. di Fisica.
CORRECTIONS TO UNIVERSAL SCALING FOR THE 2D NON-LINEAR SIGMA MODEL ON THE LATTICE
M. Falcioni and A. Treves (Instituto Nazionale di Fisica Nucleare, Frascati, Italy) 7 May 1985 4 p refs
(Preprint-460) Avail: NTIS HC A02/MF A01

The first nonuniversal term of the Beta function for the nonlinear sigma-model regularized on a lattice is calculated. This fixes the leading analytic corrections to the universal scaling behavior near the UV fixed point T = 0. The corrections are too small to explain the deviations from the renormalization group behavior observed in Monte Carlo simulations. Author (ESA)

N86-16146# Rome Univ. (Italy). Dipt. di Fisica.
PATH INTEGRAL APPROACH TO BIRTH-DEATH PROCESSES ON A LATTICE
L. Peliti 14 Mar. 1985 53 p refs
(Nota-Interna-843) Avail: NTIS HC A04/MF A01

The Fock space formalism for classical objects is cast in a path integral form and applied to general birth-death processes on a lattice. The introduction of suitable auxiliary variables allows random walks with memory and irreversible aggregation processes to be formulated in a Markovian way, which is treatable in this formalism. Field theories of such processes are recovered in the continuum limit. Implications of the method for their asymptotic behavior are discussed. Author (ESA)

N86-16147# Rome Univ. (Italy). Dipt. di Fisica.
STOCHASTIC THEORY OF EMISSION AND ABSORPTION OF QUANTA
M. Cini and M. Serva 18 Apr. 1985 31 p refs
(Nota-Interna-847) Avail: NTIS HC A03/MF A01

The possibility of constructing a stochastic field theory based on the assumption that for any normal mode of a given classical field, the corresponding action variable becomes a stochastic variable assuming only positive integer values in units of h is discussed. The proposed method reproduces the known properties of simple quantum field theoretical models with no need of probability amplitudes, which are quantities extraneous to classical probability theory. The probability transition rates, for simple states of the field, turn out to be those of simple Poisson processes. Author (ESA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-16148# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
BRIEF INTRODUCTION TO THE SOVIET CENTRAL RESEARCH INSTITUTE OF AERODYNAMICS
Y. Yongziao and Z. Ruqing 19 Aug. 1985 10 p Transl. into ENGLISH from Lixue Yushijian (China), v. 5, no. 3, 1983 p 57-58
(AD-A159103; FTD-ID(RS)T-0527-85) Avail: NTIS HC A02/MF A01 CSCL 20/4

The Central Research Institute of Aerodynamics is a composite research institute of aerodynamics having major activities on solving various practical problems of aerodynamics in addition to general research activities. Its main objectives are: promote research and development on various problems relating to aerodynamics and fluid dynamics; and, based on research results design department and provide assistance to related industries to solve problems on aerodynamics in research and applications. GRA

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-16149# Maryland Univ., College Park. Center for Productivity and Quality of Working Life.
FIELD TEST OF THE METHODOLOGY FOR GENERATING EFFICIENCY AND EFFECTIVENESS MEASURES Final Report, 1 Jul. 1981 - 31 May 1983
T. C. Tuttle, R. E. Wilkinson, and M. D. Matthews Aug. 1985 57 p
(Contract F33615-79-C-0019)
(AD-A158183; AFHRL-TP-84-54) Avail: NTIS HC A04/MF A01 CSCL 14/2

A field test in 24 Air Force organizations, eight each from Administration, Propulsion Maintenance, and Weather, of the methodology for generating efficiency and effectiveness measures (MGEEM) was conducted to evaluate: (1) the number and types of measures developed, (2) the acceptability of the process and its results to participants (e.g., unit commanders), (3) the cost effectiveness of measures in terms of their use of existing data, and (4) the extent to which independent application of the methodology in similar organizations produces similar sets of measures. For each organization, key results areas (KRAs) - categories of intended accomplishments - and quantitative efficiency and effectiveness indicators were developed for each KRA. Results showed that the MGEEM led to a usable number of indicators for each organization; however, there was a much larger percentage of effectiveness (86 to 95 percent) as opposed to efficiency indicators. The MGEEM process and its results were judged very acceptable to participants. The indicators generated were judged cost-effective to implement since approximately 80 - 90 percent made use of existing data. Finally, the indicators were found to have relatively low consistency from organization-to-organization within the three functional areas. Modifications of the MGEEM process are suggested to improve the consistency from site-to-site and to better set the stage for participants. Author (GRA)

N86-16150# Yale Univ., New Haven, Conn. Dept. of Computer Science.
PROBABILISTIC ANALYSIS OF A NETWORK RESOURCE ALLOCATION ALGORITHM. REVISION
N. A. Lynch, N. D. Griffeth, M. J. Fischer, and L. J. Guibas Apr. 1985 47 p
(Contracts N00014-82-K-0154; DAAG29-79-C-0155; DAAK70-79-D-0087; DAAG29-84-K-0058; Grants NSF MCS-79-24370; NSF MCS-81-16678; NSF MCS-82-00854; NSF MCS-83-06854; NSF DCR-83-02391)
(AD-A158970; Yaleu/DCS/TR-418-Rev) Avail: NTIS HC A03/MF A01 CSCL 12/2

A distributed algorithm is presented, for allocating a large number of identical resources (such as airline tickets) to requests which can arrive anywhere in a distributed network. Resources, once allocated, are never returned. The algorithm searches sequentially, exhausting certain neighborhoods of the request origin before proceeding to search at greater distances. Choice of search direction is made nondeterministically. Analysis of expected response time is simplified by assuming that the search direction is chosen probabilistically, that messages require constant time, that the network is a tree with all leaves at the same distance from the root, and that requests and resources occur only at leaves. It is shown that the response time is approximated by the number of messages of one that are sent during the execution of the algorithm, and that this number of messages is a nondecreasing function of the interarrival time for requests. Therefore, the worst case occurs when requests come in so far apart that they are

processed sequentially. The expected time for the sequential case of the algorithm is analyzed by standard techniques. This time is shown to be bounded by a constant, independent of the size of the network. It follows that the expected response time for the algorithm is bounded in the same way. Author (GRA)

N86-15448# Joint Publications Research Service, Arlington, Va.
LAUNCHERS, SATELLITES, MULTINATIONAL PLANS IN 1985 CHES BUDGET
In its West Europe Report: Science and Technology (JPRS-WST-85-024) 13 Aug. 1985 p 1-10 Transl. into ENGLISH from AFP Sciences (Paris), 28 Mar. 1985 p 24-32 (For primary document see N86-15447 06-31)
Avail: NTIS HC A04/MF A01

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-16151* NASA Scientific and Technical Information Facility, Baltimore/Washington International Airport, Md. 21240.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 26)
Jan. 1985 66 p
(NASA-SP-7039(26)-Sect-1; NAS 1.21:7039(26)-Sect-1) Avail: NTIS HC $10.00 CSCL 05B

Abstracts are provided for 172 patents and patent applications entered into the NASA scientific and technical information system during the period July 1984 through December 1984. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application. Author

N86-16152# Committee on Science and Technology (U. S. House).
THE ROLE OF TECHNICAL INFORMATION IN US COMPETITIVENESS WITH JAPAN
Washington GPO 1985 298 p refs Hearings before the Subcommittee on Science, Research and Technology, 99th Congr., 1st Sess., no. 27, 26-27 Jun. 1985
(GPO-51-564) Avail: Subcommittee on Science, Research and Technology

Hearings were held before the U.S. House of Representatives Subcommittee on science, research and technology. The role of technical information in US competetiveness with Japan was discussed. The strength of the US and Japan in selected high technology fields was compared. The shortage of Japanese language experts is attributed as one of the causes of a one way information flow from the US to Japan. The progress made on the availability of Japanese scientific information in the US, and the comparative strength of the US and Japan in selected high technology fields is investigated. E.A.K.

N86-16153# Navy Personnel Research and Development Center, San Diego, Calif.
IMPLEMENTATION OF MULTIFUNCTION INFORMATION SYSTEMS AT THREE NAVY FACILITIES Final Report, Jul. 1982 - Sep. 1983
J. P. Shepoah, V. N. Hulton, S. D. Ramras-Berlin, and T. T. Trinh Jan. 1985 40 p
(AD-A157797; NPRDC-TR-85-17) Avail: NTIS HC A03/MF A01 CSCL 05/1

The accelerated rate of the introduction of office technology systems in both the private and public sectors has had important effects on organizational functioning. In light of the developments and increased usage of this technology, it is important to address issues and problems that arise in the course of implementing these new systems. The objective of this investigation was to evaluate the impact of pilot projects employing multifunction information systems at three Navy facilities. The major aims of the study were to determine: (1) the receptiveness of organizational personnel toward the technological system, (2) pattern of usage of the systems, (3) the major factors impeding and facilitating operation of the system, (4) the impact of the systems on work performance, and (5) the organizational problems and issues associated with the introduction and implementation of the systems. A cross section of civil service personnel (39 support, 44 technical, and 35 managerial) involved with the implementation and/or use of the systems at the three sites was interviewed. The interviews were designed to obtain information about acceptance of the system, usage, system impact on performance, and system implementation problems. The results indicated that resistance to change was not a major problem in the introduction and implementation of these systems. Barriers encountered by members of the organization such as insufficient management commitment and lack of personnel and material resources were more serious problems. GRA

N86-16154# Massachusetts Inst. of Tech., Cambridge. Center for Information Systems Research.
QUEUEING NETWORK SYSTEMS WITH UNBALANCED FLOWS AND THEIR APPLICATIONS TO PERFORMANCE EVALUATION OF HIGHLY PARALLEL DISTRIBUTED INFORMATION SYSTEMS: REVISION
Y. R. Wang and S. E. Madnick Aug. 1984 42 p
(Contract N00039-81-C-0663)
(AD-A158052; CISR-M010-8408-14; CISR-TR-14) Avail: NTIS HC A03/MF A01 CSCL 09/2

A methodology is presented to compute performance measures for distributed information systems with unbalanced flows (i.e., number of transactions leaving a server is not the same as number of transactions entering that server) due to asynchronously spawned parallel tasks--an increasingly important phenomenon in modern information systems which has a significant effect on performance that cannot be analyzed by classical queueing network models. A decomposition method is applied to decompose the unbalanced flows. Formulas for open queueing networks with unbalanced flows due to asynchronously spawned tasks are developed. Furthermore, an algorithm based on Buzen's convolution algorithm is developed to test the necessary and sufficient condition for closed system stability as well as to compute performance measures. An average of less than four iterations is necessary for convergence with this algorithm. A study of the INFOPLEX data storage hierarchy has been conducted using this rapid solution algorithm and detailed simulations; highly consistent results were obtained. A cost effective software tool, using this methodology, has been developed to analyze an architectural design and to produce measures such as throughput, utilization, and response time so that the potential performance problems can be identified. Author (GRA)

N86-16155# Pacific Northwest Lab., Richland, Wash.
ASSURANCE PROGRAM FOR REMEDIAL ACTION (APRA) MICROCOMPUTER-OPERATED BIBLIOGRAPHY MANAGEMENT SYSTEM
R. D. Stenner, D. K. Washburn, and D. H. Denham Jun. 1985 68 p
(Contract DE-AC06-76RL-01380)
(DE85-008763; PNL-5527) Avail: NTIS HC A04/MF A01

Pacific Northwest Laboratory (PNL) provided technical assistance to the Office of Operational Safety (OOS) in developing their Assurance Program for Remedial Action (APRA). The APRA Bibliography Management System (BMS), a microcomputer-operated system designed to file, locate and retrieve project-specific bibliographic data, was developed to manage the documentation associated with APRA. The BMS uses APRABASE, a PNL-developed computer program written in dBASE II language, which is designed to operate using the commercially available dBASE II database software. This document describes the APRABASE computer program, its associated subprograms, and the dBASE II APRA file. A User's Manual is also provided in the

document. Although the BMS was designed to manage APRA-associated documents, it could be easily adapted for use in handling bibliographic data associated with any project. DOE

N86-16156# Oak Ridge Gaseous Diffusion Plant, Tenn.
MODELING NETWORK DATA STRUCTURES IN RELATIONAL-LIKE DATA BASE MANAGEMENT SYSTEMS
G. W. Scott 1985 15 p Presented at the Users Conference, Boston, Massachusetts, 22 Sep. 1985
(Contract DE-AC05-84OT-21400)
(DE85-015803; K/CSD/INF-85-6; CONF-8509235-2) Avail: NTIS HC A02/MF A01

This paper describes the implementation of a data base within the System 1022 environment that successfully models a network data structure. Issues and problems relative to the representation of many-to-many relationships among the data types in relational-like structures are discussed along with alternative solutions. Analysis procedures are described which led to the employment of a special System 1022 file that simulates the role of junction records in networks. A System 1022 data base to assist in the management of CAD/CAM system resources has been developed at Martin Marietta Energy Systems utilizing this concept and is used as a practical example of this approach to data representation. DOE

N86-16157# Sandia National Labs., Albuquerque, N. Mex.
SABIRS: USER REFERENCE AND SYSTEM DOCUMENTATION
R. M. Flaming and J. Bemesderfer Jul. 1985 45 p
(Contract DE-AC04-76DP-00789)
(DE85-016801; SAND-84-7154) Avail: NTIS HC A03/MF A01

The SABIRS is an acronym for Sandia Abbreviated Bibliographic Information Retrieval System. This document is both a reference for users and system documentation which would permit a simple installation in a small or medium sized library on virtually any computer system. DOE

N86-16158# Department of Energy, Washington, D. C. Energy Information Administration.
EPIC/JANUS USER'S GUIDE
Aug. 1985 221 p
(DE85-017027; DOE/NBM-50170/27) Avail: NTIS HC A10/MF A01

EPIC/JANUS, the Energy Information Administration's (EIA) Publication and Interactive Composition System, is a software system that allows text, tables, and graphics to be combined interactively in a single document. It automates the entire process of composition and production of camera-ready copy. EPIC is a machine-independent document management and translation system developed by EIA. JANUS is an interactive document composition system which actually formats and typesets a document. DOE

N86-16159# Los Alamos National Lab., N. Mex.
LOGICAL AND PHYSICAL DATABASE DESIGN WITH A FULL-TEXT ENVIRONMENT
C. D. Michelsen and D. F. Shafer 1985 11 p Presented at the 2nd IEEE International Conference on Data Engineering, Los Angeles, California, 4 Feb. 1985
(Contract W-7405-eng-36)
(DE85-015683; LA-UR-85-2329; CONF-850295-1) Avail: NTIS HC A02/MF A01

This paper describes the problems and solutions encountered in the design of logical and physical data bases within a full-text environment. A full-text environment can be defined as data bases that store both citation information as well as actual document text. The problems/solutions encountered were a result of the necessity to integrate distinct physical data bases into a single logical data base without the assistance of a data base management system that is capable of physical data base integration. DOE

N86-16160# Los Alamos National Lab., N. Mex.
CODE DEVELOPER'S GUIDE TO THE STYX LIAISON LIBRARY: A SOFTWARE INTERFACE FOR ACCESSING AND MANIPULATING STYX OPACITY DATA
G. W. Pfeufer Apr. 1985 103 p
(Contract W-7405-eng-36)
(DE85-014253; LA-10381-M) Avail: NTIS HC A06/MF A01

The Styx Liaison Library (STYXLL) is a new software interface under development on the Cray-1 and Cray X-MP computers at Los Alamos. STYXLL provides standardized techniques for accessing and manipulating gray and multi-group opacity data in Styx format. The first version of STYXLL provides interrogation methods for seeking a list of materials on a random-access Styx opacity file, and for determining the storage parameters of the data defined for these materials. In particular, the query procedures for the opacity files determine, for each requested material sound on the file, the first-word disk address, the number of words, and the internal storage substructure for the DS530 data structure (Rosseland absorption scattering opacities as a function of photon energy and material density and temperature, and Rosseland gray total opacities as a function of material density and temperature). Knowledge of these storage parameters simplifies data acquisition to a set of read specifications from a generic random-access file. A tutorial illustrates the use of the Styx Liaison Library and examines the output from the interrogation of Styx opacity files. DOE

N86-16161# Oak Ridge National Lab., Tenn.
VITAMIN-E 174N,38G GENERAL PURPOSE CROSS-SECTION LIBRARY
R. W. Roussin, J. E. White, and J. L. Bartley 1985 5 p refs Presented at the International Conference on Nuclear Data for Basic Aid and Applied Science, Santa Fe, N. Mex., 13 May 1985
(Contract DE-AC05-84OR-21400)
(DE85-013110; CONF-850507-37) Avail: NTIS HC A02/MF A01

VITAMIN-E, offering a different approach to obtaining multi-group cross sections for a wide range of radiation transport analyses, is now available from RSIC. DOE

N86-15475# Joint Publications Research Service, Arlington, Va.
CALL TO EXPAND INFORMATION NETWORK FOR BASIC RESEARCH
Joachim Kramer *In its* East Europe Report: Science and Technology (JPRS-ESA-85-033) 5 Nov. 1985 p 14-20 refs Transl. into ENGLISH from Das Hochschulwesen (East Berlin, East Germany), v. 33, no. 6, Jun. 1985 p 168-171 (For primary document see N86-15473 06-31)
Avail: NTIS HC A04/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-16162# Committee on Science and Technology (U. S. House).
NATIONAL SCIENCE FOUNDATION AUTHORIZATION, 1986
Washington GPO 1985 407 p Hearings on H.R. 1210 before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 4, 6, 20-21 Feb. 1985
(GPO-46-945) Avail: Subcommittee on Science, Research and Technology

The U.S. House of Representatives Committee on Science

and Technology held hearings on 1986 National Science Foundation (NSF) authorization. The different scientific programs for which authorization is sought are emphasized. They include education and training in science and engineering, biotechnology, and computers. The following NSF activities are highlighted: (1) mathematical and physical sciences; (2) engineering; (3) biological, behavioral, and social sciences; (4) astronomical, atmospheric, earth and ocean sciences; (5) scientific, technological, and international affairs; and (6) program development and management. E.A.K.

N86-16163# Committee on Commerce, Science, and Transportation (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION FOR FISCAL YEAR 1986
Washington GPO 1985 603 p Hearings before the Subcommittee on Science, Technology and Space of the Committee on Commerce, Science and Transportation, 99th Congress, 1st Session, 26 Feb., 27-28 Mar. and 3-4 Apr. 1985
(S-Hrg-99-102; GPO-47-861) Avail: Subcommittee on Science, Technology and Space

A Senate hearing was held and testimony heard relevant to appropriations for NASA. The authorization is for fiscal year 1986. G.L.C.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-16164*# Massachusetts Inst. of Tech., Cambridge. Automotive Lab.
A COMPUTER SIMULATION OF THE TURBOCHARGED TURBO COMPOUNDED DIESEL ENGINE SYSTEM: A DESCRIPTION OF THE THERMODYNAMIC AND HEAT TRANSFER MODELS Final Report
Dennis N. Assanis, Jack E. Ekchian, Rich M. Frank, and John B. Heywood Aug. 1985 106 p refs
(Grant NAG3-340; Contract DE-AI01-80CS-50194)
(NASA-CR-174971; DOE/NASA/0340-1; NAS 1.26:174971) Avail: NTIS HC A06/MF A01 CSCL 13F

A computer simulation of the turbocharged turbocompounded direct-injection diesel engine system was developed in order to study the performance characteristics of the total system as major design parameters and materials are varied. Quasi-steady flow models of the compressor, turbines, manifolds, intercooler, and ducting are coupled with a multicylinder reciprocator diesel model, where each cylinder undergoes the same thermodynamic cycle. The master cylinder model describes the reciprocator intake, compression, combustion and exhaust processes in sufficient detail to define the mass and energy transfers in each subsystem of the total engine system. Appropriate thermal loading models relate the heat flow through critical system components to material properties and design details. From this information, the simulation predicts the performance gains, and assesses the system design trade-offs which would result from the introduction of selected heat transfer reduction materials in key system components, over a range of operating conditions. Author

N86-16165*# General Electric Co., Philadelphia, Pa. Space Systems Div.
CERAMIC AUTOMOTIVE STIRLING ENGINE STUDY Final Report
S. Musikant, W. Chiu, D. Darooka, D. M. Mullings, and C. A. Johnson Jan. 1985 373 p refs
(Contracts DEN3-312; DE-AI01-85CE-50112)
(NASA-CR-174907; DOE/NASA/0312-1; NAS 1.26:174907) Avail: NTIS HC A16/MF A01 CSCL 13F

A conceptual design study for a Ceramic Automotive Stirling Engine (CASE) is performed. Year 1990 structural ceramic technology is assumed. Structural and performance analyses of the conceptual design are performed as well as a manufacturing and cost analysis. The general conclusions from this study are that such an engine would be 10-26% more efficient over its performance map than the current metal Automotive Stirling Reference Engine (ASRE). Cost of such a ceramic engine is likely to be somewhat higher than that of the ASRE but engine cost is very sensitive to the ultimate cost of the high purity, ceramic powder raw materials required to fabricate high performance parts. When the design study is projected to the year 2000 technology, substantinal net efficiency improvements, on the order of 25 to 46% over the ASRE, are computed. Author

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-16166# Michigan Univ., Ann Arbor. Dept. of Physics.
THE DETECTION OF FAINT SPACE OBJECT WITH SOLID STATE IMAGE DETECTORS Final Technical Report, 1 Jan. 1980 - 31 Jan. 1985
D. J. Hegyi 19 Mar. 1985 17 p
(Grant AF-AFOSR-0095-80)
(AD-A158594; AFOSR-85-0389TR) Avail: NTIS HC A02/MF A01 CSCL 03/1

The primary focus of research during this funding period has been to obtain information with the highest signal-to-noise ratio from faint astronomical sources using a charge-coupled device (CCD). The starting point of the investigation was to determine the optimal sampling function for CCDs considering the noise spectrum characteristics of real devices; the noise spectrum of most CCDs can be accurately described by a combination of 1/f and white noise. Then, a CCD system was constructed so that all operating parameters could be easily adjusted. Some unexpected improvements in performance were obtained by optimizing the operating temperature and increasing the number of electrode voltages which could be independently set compared to other CCD systems. The next phase of the investigation was to develop an image processing system to extract, in a statistically correct way, as much information as possible from astronomical images. The system was then applied to problems ranging from speckle interferometry to global cosmological tests including an investigation to determine the nature of the dark matter in the halos of spiral galaxies. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-16167*# National Science Foundation, Washington, D.C.
ANTARCTIC METEORITE NEWSLETTER, VOLUME 8, NUMBER 2
Aug. 1985 64 p refs Sponsored in part by NSF
(NASA-CR-176401; NAS 1.26:176401) Avail: NTIS

HC A04/MF A01 CSCL 03B

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. All sample requests will be reviewed by the Meteorite Working Group (MWG), a peer-review committee that guides the collection, curation, allocation, and distribution of the U.S. Antarctic meteorites. Issurance of samples does not imply a commitment by any agency to fund the proposed research. Requests for financial support must be submitted separately to the appropriate funding agencies. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation and all allocations are subject to recall. Author

N86-16168# London Univ. (England). School of Mathematical Sciences.

BLACK HOLES, PREGALACTIC STARS AND THE DARK MATTER PROBLEM

B. J. Carr Jun. 1985 40 p refs Prepared in cooperation with Fermi National Accelerator Lab., Batavia, Il.

(Contract DE-AC02-76CH-03000)

(DE85-015385; FNAL/C-85/86-A) Avail: NTIS HC A03/MF A01

We review the different ways in which black holes might form and discuss their various astrophysical and cosmological consequences. We then consider the various constraints on the form of the dark matter and conclude that black holes could have a significant cosmological density only if they are of primordial origin or remnants of a population of pregalactic stars. This leads us to discuss the other cosmological effects of primordial black holes and pregalactic stars. DOE

N86-16169# Sandia National Labs., Albuquerque, N. Mex.

SEARCH FOR POSITRON ANNIHILATION LINE AND CONTINUUM RADIATION FROM THE GALACTIC CENTER

C. J. MacCallum and M. Leventhal 1985 5 p Presented at the 19th International Cosmic Ray Conference, La Jolla, California, 11 Aug. 1985 Prepared in cooperation with Bell Labs., Murray Hill, N.J.

(Contract DE-AC04-76DP-00789)

(DE85-013964; SAND-85-1295C; CONF-850883-5) Avail: NTIS HC A02/MF A01

Our balloon-borne germanium (GAMMA)-ray telescope was flown over Alice Springs, Australia, on 1984 November 20 search for the 511 keV positron annihilation line from the Galactic Center. The measured line flux at Earth was (0.6 +- 4.4) x 10 to the minus 4 power photons per square centimeter per second indicating that the source was still in a low or off state. DOE

N86-16170# York Coll., Jamaica, N. Y.

COSMOGENIC NEUTRON-CAPTURE-PRODUCED NUCLIDES IN STONY METEORITES

M. S. Spergel, R. C. Reedy, O. W. Lazareth, and P. W. Levy 1985 55 p refs Presented at the 16th Lunar and Planetary Sciences Conference, Bordeaux, 16 Jul. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.

(Contract W-7405-eng-36)

(DE85-012689; LA-UR-85-1545; CONF-850760-1) Avail: NTIS HC A04/MF A01

The distribution of neutrons with energies below 15 MeV in spherical stony meteoroids is calculated using the ANISN neutron-transport code. The source distributions and intensities of neutrons are calculated using cross sections for the production of tritium. The meteoroid's radius and chemical composition strongly influence the total neutron flux and the neutron energy spectrum, while the location within a meteoroid only affects the relative neutron intensities. Meteoroids need to have radii of more than 50 g/sq cm before they have appreciable fluxes of neutrons near thermal energies. Meteoroids with high hydrogen or low iron contents can thermalize neutrons better than chondrites. Rates for the production of Co-60, Ni-59, and Cl-36 are calculated with evaluated neutron-capture cross sections and neutron fluxes determined for carbonaceous chondrites with high hydrogen contents, L-chondrites, and aubrites. For most meteoroids with radii < 300 g/sq cm, the production rates of these neutron-capture nuclides increase monotonically with depth. The highest calculated Co-60 production rate in an ordinary chondrite is 375 atoms/(min g-Co) at the center of a meteoroid with a 250 g/sq cm radius. The production rates calculated for spallogenic Co-60 and Ni-59 are greater than the neutron-capture rates for radii less than approx. 50-75 g/sq cm. Only for very large meteoroids and chlorine-rich samples is the neutron-capture production of Cl-36 important. DOE

N86-16171# Mound Lab., Miamisburg, Ohio.

PRECESSIONS OF THE EARTH AND THE BOHR ATOM

K. C. Jordan Jul. 1985 34 p

(Contract DE-AC04-76DP-00053)

(DE85-015612; MLM-3276) Avail: NTIS HC A03/MF A01

An alternative equation to the tidal theory equations of the precession of the Earth is developed. The new equation yields the correct lunisolar secular precession of 50.3" of arc/yr and has a variable solar component that explains the annual and semiannual variations in the Earth's rotation. The calculated effect of the lunar perigee on excess length of day (l.o.d.) agrees with observations on average l.o.d. during 313 lunar perigees. The l.o.d. values for each day from 1956 to 1979 were calculated from data obtained from the US Naval Observatory. The equation can be applied to the Bohr hydrogen atom and predicts that the electron will counterprecess at the orbital frequency in the first Bohr orbit, and at one-fourth the orbital frequency in the second Bohr orbit. DOE

N86-16172# Lawrence Livermore National Lab., Calif.

STELLAR CORE COLLAPSE AND SUPERNOVA

J. R. Wilson, R. Mayle, S. E. Woosley, and T. A. Weaver Apr. 1985 47 p refs Presented at the 12th Texas Symposium of Relativistic Astrophysics, Jerusalem, 17 Dec. 1984

(Contract W-7405-eng-48)

(DE85-017398; UCRL-92510; CONF-841238-1) Avail: NTIS HC A03/MF A01

Massive stars that end their stable evolution as their iron cores collapse to a neutron star or black hole have long been considered good candidates for producing Type 2 supernovae. For many years the outward propagation of the shock wave produced by the bounce of these iron cores has been studied as a possible mechanism for the explosion. For the most part, the results of these studies have not been particularly encouraging, except, perhaps, in the case of very low mass iron cores or very soft nuclear equations of state. The shock stalls, overwhelmed by photodisintegration and neutrino losses, and the star does not explode. More recently, slow late time heating of the envelope of the incipient neutron star has been found to be capable of rejuvenating the stalled shock and producing an explosion after all. The present paper discusses this late time heating and presents results from numerical calculations of the evolution, core collapse, and subsequent explosion of a number of recent stellar models. For the first time they all, except perhaps the most massive, explode with reasonable choices of input physics. DOE

N86-16173# Los Alamos National Lab., N. Mex.

POSSIBILITIES AT LAMPF FOR STUDYING NUCLEI OF ASTROPHYSICAL INTEREST

W. L. Talbert, Jr. and M. E. Bunker 1985 6 p Presented at TRIUMPF Accelerated Radioactive Beams Workshop, Parksville, British Columbia, 4 Sep. 1985

(Contract W-7405-eng-36)

(DE85-017526; LA-UR-85-3098; CONF-8509148-1) Avail: NTIS HC A02/MF A01

Nuclear data needs in astrophysics range from neutron capture cross sections of a number of stable or near-stable nuclei to decay and neutron binding-energy data for highly neutron-rich nuclei. LAMPF has the potential to contribute significantly to these needs. The new Los Alamos Neutron Scattering Center (LANSCE, aka WNR/PSR) offers world-class capabilities for neutron capture studies up to a MeV or so. The study of nuclei far from stability could be extended into some regions of astrophysical interest using a proposed HE-jet coupled mass separator system with a

target/production chamber in the LAMPF beam stop area. Specific examples of possible studies at each facility are presented. DOE

N86-16174# Lick Observatory, Santa Cruz, Calif.
THEORETICAL MODELS FOR TYPE 1 AND TYPE 2 SUPERNOVA
S. E. Woosley and T. A. Weaver 1985 28 p refs Presented at the 20th Recontre de Moriond, Les Arcs, France, 10 Mar. 1985 Prepared in cooperation with California Univ., Lawrence Livermore Lab.
(Contract W-7405-eng-48)
(DE85-016288; UCRL-92972; CONF-850375-19) Avail: NTIS HC A03/MF A01

Recent theoretical progress in understanding the origin and nature of Type I and Type II supernovae is discussed. New Type II presupernova models characterized by a variety of iron core masses at the time of collapse are presented and the sensitivity to the reaction rate (12)C((ALPHA), (GAMMA)) (16)O explained. Stars heavier than about 20 M (sub solar) must explode by a delayed mechanism not directly related to the hydrodynamical core bounce and a subset is likely to leave black hole remnants. The isotopic nucleosynthesis expected from these massive stellar explosions is in striking agreement with the Sun. Type I supernovae result when an accreting white dwarf undergoes a thermonuclear explosion. The critical role of the velocity of the deflagration front in determining the light curve, spectrum, and, especially, isotopic nucleosynthesis in these models is explored. DOE

N86-16175# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
COSMOGONIC SCENARIO
H. Alfven and G. Arrhenius May 1985 17 p refs
(TRITA-EPP-85-04; ISSN-0348-7539) Avail: NTIS HC A02/MF A01

A cosmogonic scenario, based on the fact that the Saturnian C ring and essential features of the B and A rings agree with the plasma cosmogony approach with an accuracy of 1% or better, and on the likely evolution of the solar system is proposed. This outlines the evolution of an interstellar cloud and the formation of stars surrounded by solar nebulae under the combined action of gravitational and electromagnetic forces. Matter falling in from the solar nebula towards the Sun is processed by electromagnetic processes and a plasma-planetesimal transition occurs. Planetesimals accrete to planets, and around planets the same process in miniature leads to the formation of satellites. The origin of comets is discussed. Author (ESA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-16176# Los Alamos Scientific Lab., N. Mex.
USE OF CHEMICAL EXPLOSIVES FOR EMERGENCY SOLAR FLARE SHELTER CONSTRUCTION AND OTHER EXCAVATIONS ON THE MARTIAN SURFACE
R. D. Dick, J. D. Blacic, and D. R. Pettitt 1985 15 p Presented at the Manned Mars Mission Workshop, Huntsville, Ala., 10 Jun. 1985
(Contract W-7405-eng-36)
(DE85-014131; LA-UR-85-1990; CONF-8506149-1) Avail: NTIS HC A02/MF A01

The necessity to shelter people on the Martian surface from solar flare particles at short notice and the need for long-term habitats with thick cosmic ray shielding suggests that explosives could be used effectively for excavation of such structures. Modern insensitive high explosives are safe, efficient, and reliable for rock breakage and excavation. Extensive Earth-bound experience leads us to propose several strategies for explosively-constructed shelters based on tunneling, cratering, and rock casting techniques. DOE

N86-16177*# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
FURTHER EXPLORATIONS OF COSMOGONIC SHADOW EFFECTS IN THE SATURNIAN RINGS
H. Alfven, I. Axnaes, N. Brenning, and P.-A. Lindqvist 1985 35 p refs Sponsored by NASA, Swedish Natural Science Research Council and National Science Foundation
(NASA-CR-176441; NAS 1.26:176441; TRITA-EPP-85-03; ISSN-0348-7539) Avail: NTIS HC A03/MF A01 CSCL 20I

The mass distribution in the Saturnian ring system is compared with predictions from the cosmogonic theory of Alfven and Arrhenius (1975) in which matter in the rings was once a magnetized plasma, with gravitation balanced by centrifugal force and by the magnetic field. As the plasma is neutralized, the magnetic force disappears and the matter can be shown to fall in to a distance 2/3 of the original. This supports the cosmogonic shadow effect, also demonstrated for the astroidal belt and in the large scale structure of the Saturnian ring system. The relevance of the comogonic shadow effect for parts of the finer structures of the Saturnian ring system is investigated. It is shown that many structures of the present ring system can be understood as shadows and antishadows of cosmogonic origin. These appear in the form of double rings centered around a position a factor 0.64 (slightly < 2/3) closer to Saturn than the causing feature. Author (ESA)

N86-15510# Joint Publications Research Service, Arlington, Va.
VENUS-15, VENUS-16 SYNTHETIC APERTURE RADAR ON VENUS SATELLITE ORBIT Abstract Only
A. F. Bogomolov, N. V. Zherikhin, and G. A. Sokholov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-85-011) 24 Oct. 1985 p 71 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 259-274 Original language document was announced in IAA as A85-34876 (For primary document see N86-15484 06-31)
Avail: NTIS HC A05/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-16178# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SHORT-LIVED SOLAR BURST SPECTRAL COMPONENT AT APPROXIMATELY < 100 GHz
P. Kaufmann, E. Correia, J. E. R. Costa, and A. M. Zodi Vaz Jun. 1985 11 p refs Sponsored in part by FINEP Submitted for publication
(INPE-3550-PRE/762) Avail: NTIS HC A02/MF A01

A new kind of burst emission component was discovered, exhibiting fast and distinct pulses (approx. 60 ms durations), with spectral peak emission at f approx. > 100 GHz, and onset time coincident to hard X-rays to within approx. < 128 ns. These features pose serious constraints for the interpretation using current models. One suggestion assumes the f approx. > 100 GHz pulses emission by synchrotron mechanism of electrons accelerated to ultrarelativistic energies. The hard X-rays originate from inverse Compton scattering of the electrons on the synchrotron photons. Several crucial observational tests are needed for the understanding of the phenomenon, requiring high sensitivity and high time resolution (approx. 1 ms) simultaneous to high spatial resolution (< 0.1 arcsec) at f approx. > 110 GHz and hard X-rays. Author

N86-16179# National Center for Atmospheric Research, Boulder, Colo.

SOLAR CORONAL WHITE LIGHT, Fe 10, Fe 14 AND Ca 15 OBSERVATIONS DURING 1984: AN ATLAS OF SYNOPTIC CHARTS
D. G. Sime, R. R. Fisher, and R. C. Altrock Mar. 1985 77 p refs Sponsored in part by NSF
(PB85-191013; NCAR/TN-251/STR) Avail: NTIS HC A05/MF A01 CSCL 03B

Synoptic observations of the solar corona in white light and in three emission lines (CaXV at 5964 A, FeXIV at 5303 A, and Fe X at 6374 A) were carried out during most of 1984 at the High Altitude Observatory's Mauna Loa Solar Observatory and at Sacramento Peak Observatory. These observations were partly in support of the scientific program of the repaired SMM spacecraft. The observations provide a record of the distribution and brightness of the hotter regions of the corona over the year. The authors present these data in the form of synoptic maps for each rotation during the year for the purpose of providing a context for the investigations which are to take place during the Joint Study of Coronal and Prominence Plasmas organized by Goddard Space Flight Center/NASA. In this way, they propose both to describe the data coverage achieved and summarize the large scale properties of the corona in this late descending phase of the solar cycle. GRA

N86-16180# National Center for Atmospheric Research, Boulder, Colo.
WHITE LIGHT SOLAR CORONA: AN ATLAS OF 1984 K-CORONAMETER SYNOPTIC CHARTS, DECEMBER 1983 - JANUARY 1985
R. Fisher, C. Garcia, E. Lundin, P. Seagraves, and D. Sime Mar. 1985 78 p refs Sponsored in part by NSF
(PB85-191021; NCAR/TN-246/STR) Avail: NTIS HC A05/MF A01 CSCL 03B

The synoptic observing project of the High Altitude Observatory's Coronal Dynamics Project began on 5 August 1980. The data obtained by the Mark-3 K-coronameter located at the Mauna Loa Solar Observatory, Hawaii, are published yearly in volumes of the White Light Solar Corona: An Atlas of K-coronameter Synoptic Charts. The reader will notice a segment of overlapped data at both the beginning and the end of each volume. This is necessary to provide a complete data set of Carrington rotations covering a specific time period because west limb passage occurs 14 days after east limb passage. This set of synoptic data should be regarded as a preliminary presentation in which no corrections have been made for the day-to-day variations in sky transmission and scattering of polarized light by the Earth's atmosphere. Author (GRA)

N86-16181# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 486, FEBRUARY 1985. PART 1 (PROMPT REPORTS): DATA FOR JANUARY 1985, DECEMBER 1984 AND LATE DATA
H. E. Coffey Feb. 1985 105 p 4 Vol.
(PB85-196715; SGD-586-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03B

Solar geophysics data is presented. Topics include the following: detailed index for 1984 to 1985; data for January 1985 - UWDS alert periods (Advance and world-wide, solar activity indices, solar flares, solar radio emission, inferred interplanetary magnetic field polarity. Mean solar magnetic field); data for December 1984 - (solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); late data - (solar radio emission December 1984, Pioneer XII interplanetary magnetic field magnitudes, geomagnetic indices November 1984, Interplanetary scintillation measurements of solar wind, cosmic rays August-November 1984 climax, huancayo, errata-cosmic rays, climax June 1984). GRA

N86-16182# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 586, FEBRUARY 1985. PART 2 (COMPREHENSIVE REPORTS). DATA FOR AUGUST 1984, MARCH - JUNE 1982 AND MISCELLANEA
H. E. Coffey Feb. 1985 158 p 4 Vol.
(PB85-196723; SGD-486-Pt-2) Avail: NTIS HC A08/MF A01 CSCL 03B

Solar geophysical data is presented. Topics include the following: detailed index for 1984-1985; data for August 1984 - (meudon carte synoptique, solar radio bursts at fixed frequencies, solar x-ray radiation from GOES satellite, mass ejections from the Sun, active prominences and filaments); data for March, April, May, June 1982 - (Solar flares March 1982, solar flares April 1982, solar flares May 1982, solar flares June 1982, number of flares August 1966 - June 1982). GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-16183# Lawrence Livermore National Lab., Calif.
EMISSION REGION OF GAMMA RAY BURSTS
E. P. Liang May 1985 6 p Presented at the 19th International Cosmic Ray Conference, La Jolla, Calif., 11 Aug. 1985
(Contract W-7405-eng-48)
(DE85-013198; UCRL-92734; CONF-850883-2) Avail: NTIS HC A02/MF A01

Within the last few years the years the rapid accumulation of gamma ray burst spectral data, especially those of KONUS and SMM, has made the confrontation between theories of the gamma ray emission mechanisms and observations much more urgent and challenging. At present the most viable model seems to be some combination of inverse Comptonization and sychrotron emission. In this paper we limit the acceptable parameter space of the emission region by taking into account the maximum set of observation constraints. We then apply these to two specific scenarios: surface emission versus magnetospheric emission and consider some observable predictions based on these scenarios. DOE

N86-16184# Los Alamos National Lab., N. Mex.
RECURRENT POPULATION 2 X-RAY TRANSIENTS - SIMILARITIES TO SU UMa CATACLYSMIC VARIABLES
W. Priedhorsky 1985 11 p refs Presented at the 9th North American Workshop on Cataclysmic Variables, Seattle, 24 Jun. 1985
(Contract W-7405-eng-36)
(DE85-014075; LA-UR-85-2252; CONF-8506143-1) Avail: NTIS HC A02/MF A01

Quasi-periodic outburst activity is not uncommon among Population 2 X-ray binaries. This paper reports observations of such activity in several sources, made by the Vela 5B X-ray monitor. Typical periods are 1/2 to 2 years with an rms scatter in interval time of approx. 10%. This activity is reminiscent of the superoutburst cycles of SU UMa CV's with respect to mean recurrence times, the variation of the recurrence times about their mean, and the total mass transferred during outburst. However, the outbursts in the X-ray sources have substantially longer duration, 50 to 100 days instead of approx. 10 days. The author suggests that SU UMa and X-ray transient outbursts may be caused by similar mass-transfer instabilities. DOE

99 GENERAL

N86-16185*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SEARCHING THE HORIZON: A HISTORY OF AMES RESEARCH CENTER, 1940-1976

Elizabeth A. Muenger 1985 314 p refs
(NASA-SP-4304; NAS 1.21:4304) Avail: NTIS MF A01; SOD HC $13.00 as 033-000-0096-6 CSCL 05D

A history of the Ames Research Center from 1940 to 1976 is presented. The evolution and some of the facility's accomplishments are recounted. G.L.C.

Typical Subject Index Listing

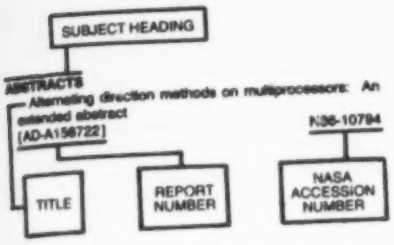

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Water resources data for California, water year 1983. Volume 3: Southern Central Valley Basins and the Great Basin from Walker River to Trucker River
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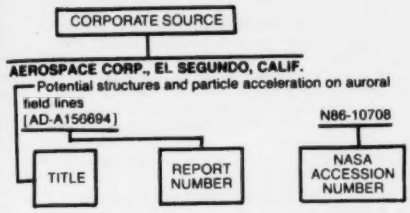

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LANDSAT-4 Thematic Mapper Modulation Transfer Function (MTF) evaluation
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ARMY AVIATION SYSTEMS COMMAND, MOFFETT FIELD, CALIF.
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Topical hazard evaluation program of Candidate Insect repellent AI3-35770 Hexahydro-1-((2-Methylcyclohexyl) Carbonyl)-1-H-Azepine
[AD-A158386] N86-15903
ARMY MILITARY PERSONNEL CENTER, ALEXANDRIA, VA.
A model of an expert computer vision and recognition facility with applications of a proportion technique
[AD-A158073] N86-15922
ARMY RESEARCH INST. FOR THE BEHAVIORAL AND SOCIAL SCIENCES, ALEXANDRIA, VA.
Human factors engineering design criteria for future systems. Report number 3: Design criteria evolving from the Multiple Multiple Rocket System (MLRS) operational test 3
[AD-A158316] N86-15916
ARMY RESEARCH INST. OF ENVIRONMENTAL MEDICINE, NATICK, MASS.
Human thermoregulatory responses to cold air are altered by repeated cold water immersion
[AD-A158871] N86-15904
ARMY TRAINING AND DOCTRINE COMMAND, FORT MONROE, VA.
Light helicopter family trade-off analysis. Volume 4: Appendix N
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Light helicopter family trade-off analysis. Volume 10: Appendices V, W, X, and Z
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Theoretical studies of two-dimensional effects in free electron lasers
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BASD: SIRTF Telescope Instrument Changeout and Cryogen Replenishment (STICCR) study
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Space station propulsion requirements study
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First-principles calculation of the magnetic properties of paramagnetic fcc iron
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Self-consistent electronic structure of alpha-phase Hume-Rothery electron compound
[DE85-017560] N86-16080
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Digital television routing systems: An introduction to integrated optical waveguide techniques and devices
[BBC-RD-1985/9] N86-15515
BRITISH LIBRARY LENDING DIV., BOSTON SPA (ENGLAND).
The movement of a cluster of particles subject to the effect of gravity and their sedimentation onto a plane horizontal surface
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Research into heat transfer by convection in the chamber of a furnace with relation to the angle at which a high velocity jet strikes a plane surface
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[DE85-015835] N86-15860
CALIFORNIA STATE DEPT. OF WATER RESOURCES, SACRAMENTO.
Water resources data for California, water year 1983. Volume 3: Southern Central Valley Basins and the Great Basin from Walker River to Trucker River
[PB85-232312] N86-15720
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Monitoring of hot water plume movements in an aquifer with borehole/surface resistivity measurements
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CAMBRIDGE UNIV. (ENGLAND).
Novel transport and recombination processes in semiconductors
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CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
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Electron reactions in model and biological systems
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CENTER FOR NAVAL ANALYSES, ALEXANDRIA, VA.
The relationship between material failures and flight hours: Statistical considerations
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CHICAGO UNIV., ILL.
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CIAD, ZOETERMEER (NETHERLANDS).
Expert systems in engineering practice
[ISBN-90-6818-018-5] N86-15977
CINCINNATI UNIV., OHIO.
First-principles calculation of the magnetic properties of paramagnetic fcc iron
[DE85-017155] N86-16035
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A preliminary report on some recent results in born inversion
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Search for the XI(2220) at Lear
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Radiation effects in actinide host phases
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COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION (U. S. SENATE).
National Aeronautics and Space Administration authorization for fiscal year 1986
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Space activities of the United States, Soviet Union and other launching countries/organizations, 1957-1984
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Correlations between signals from gravitational wave antennas in Rome and in Geneva
[PREPRINT-462] N86-15533
CORNELL UNIV., ITHACA, N.Y.
Cryogenic sample stage for the CAMECA IMS-3F ion microscope
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The experimental determination of the subsonic aerodynamic characteristics of an Ogive-Cylinder body including a comparison with theoretical estimates, volume 1
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DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA).
Visual sensitivities and discriminations and their roles in aviation
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DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON (ENGLAND).
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Significance of single particle effects in neutral beam weapon lethality
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Experience and performance in video games and its influence on aptitude tests in aviation psychology
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Control system design for cryogenic wind tunnel by performance vector performance
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[DFVLR-FB-85-36] N86-15739
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Nonlinear dynamics of a helicopter model in ground resonance N86-15284

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ECODYNAMICS RESEARCH ASSOCIATES, INC., ALBUQUERQUE, N. MEX.
Adaptive grid generation using elliptic generating equations with precise coordinate controls
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ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
Effect of optical injection on the optical properties of a (GaAl)As semiconductor laser: Optical bistability and four wave mixing
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EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND).
A multiple pendulum for the demonstration of nonlinear coupling N86-16034
ENERGY MATERIALS RESEARCH CO., BERKELEY, CALIF.
Development of radiative cooling materials, phase 3
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ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
SAR (Synthetic Aperture Radar) data collection and processing summary - 1984 SARSEX (SAR internal wave signature experiment) experiment
[AD-A159440] N86-15530
ERLANGEN-NUREMBERG UNIV. (WEST GERMANY).
Search for the XI(2220) at Lear
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EUROPEAN NUCLEAR ENERGY AGENCY, FRASCATI (ITALY).
Correlations between signals from gravitational wave antennas in Rome and in Geneva
[PREPRINT-462] N86-15533
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, GENEVA (SWITZERLAND).
Search for the XI(2220) at Lear
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GEOLOGICAL SURVEY, COLUMBUS, OHIO.
Water resources data for Ohio, water year 1984. Volume 2: St. Lawrence River Basin, statewide project data
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GEOLOGICAL SURVEY, SACRAMENTO, CALIF.
Water resources data for California, water year 1983. Volume 3: Southern Central Valley Basins and the Great Basin from Walker River to Trucker River
[PB85-232312] N86-15720
GEOLOGICAL SURVEY, TACOMA, WASH.
Water resources data for Washington, water year 1982. Volume 2: Eastern Washington
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On looking into the black box: Prospects and limits in the search for mental models
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Transient three phase, three component flow. Part 2: One-dimensional slip model, comparison theory-experiment [KFK-3926-PT-2] N86-15646
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LIBRARY OF CONGRESS, WASHINGTON, D. C.
Space activities of the United States, Soviet Union and other launching countries/organizations, 1957-1984
[GPO-46-504] N86-15330

LICK OBSERVATORY, SANTA CRUZ, CALIF.
Theoretical models for Type 1 and Type 2 supernova
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LOCKHEED-GEORGIA CO., MARIETTA.
Aircraft drag reduction technology: A summary N86-15267
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LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
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[AD-A158088] N86-15381

LONDON UNIV. (ENGLAND).
Black holes, pregalactic stars and the dark matter problem
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LOS ALAMOS NATIONAL LAB., N. MEX.
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[NASA-CR-174971] N86-16164

MASSACHUSETTS UNIV., AMHERST.
Mathematical problems in stability, control and reliability of random access communication systems
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MATERIALS RESEARCH LABS., ASCOT VALE (AUSTRALIA).
Use of ultrasonics to determine the crack size in high strength steel gun barrels
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MAX-PLANCK-INST. FUER AERONOMIE, KATLENBURG-LINDAU (WEST GERMANY).
Project HERO: Heating Rocket Experiments. The H and E field probe (HESO): In situ measurements of plasma parameters in the ionospheric plasma modified by electromagnetic waves of high intensity
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH (WEST GERMANY).
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
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MESSINA UNIV. (ITALY).
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METEOROLOGICAL OFFICE, BRACKNELL (ENGLAND).
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MICHIGAN UNIV., ANN ARBOR.
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MISSISSIPPI UNIV., UNIVERSITY.
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MISSOURI UNIV., ROLLA.
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NAGOYA UNIV. (JAPAN).
Proceedings of Collaborating Research Meeting on Development and Applications of High-Power Particle Beams
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NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY, BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT, MD. 21240.
NASA patent abstracts bibliography: A continuing bibliography. Section 1: Abstracts (supplement 26)
[NASA-SP-7039(26)-SECT-1] N86-16151

NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
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NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Review of the development of small- and medium-capacity gas turbines at the Motoren- und Turbinen Union
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[NASA-CP-2400] N86-15280
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[NASA-SP-4304] N86-16185

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
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[NASA-TP-2543] N86-15394

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
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NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
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NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Standard X-ray diffraction powder patterns
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Summaries of Center for Fire Research grants and in-house programs, 1985
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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
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White light solar corona: An atlas of 1984 K-coronameter synoptic charts, December 1983 - January 1985
[PB85-191021] N86-16180

NATIONAL GEODETIC SURVEY, ROCKVILLE, MD.
Variance component estimation method for sparse matrix applications
[PB85-234383] N86-16011

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
Solar-geophysical data number 486, February 1985. Part 1 (Prompt reports): Data for January 1985, December 1984 and late data
[PB85-196715] N86-16181
Solar-geophysical data number 596, February 1985. Part 2 (Comprehensive reports). Data for August 1984, March - June 1982 and miscellanea
[PB85-196723] N86-16182

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
A computer model of peripheral auditory processing
[NPL-DITC-58/85] N86-16037

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Antarctic Meteorite Newsletter, Volume 8, Number 2
[NASA-CR-178401] N86-16167

NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.
Severe storm electricity N86-15783

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report: Vieques Air Link, Inc., Britten-Norman BN-21-6 Islander, N589SA, Vieques, Puerto Rico, August 2, 1984
[PB85-901408] N86-15276

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
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NAVAL HEALTH RESEARCH CENTER, SAN DIEGO, CALIF.
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NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
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NAVAL OCEANOGRAPHIC OFFICE, BAY ST. LOUIS, MISS.
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NAVAL RESEARCH LAB., WASHINGTON, D. C.
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NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
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NAVAL SURFACE WEAPONS CENTER, SILVER SPRING, MD.
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NAVAL TRAINING EQUIPMENT CENTER, ORLANDO, FLA.
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NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER, SAN DIEGO, CALIF.
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NEW TECHNOLOGY, INC., HUNTSVILLE, ALA.
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NORTH DAKOTA STATE UNIV., FARGO.
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NORTHWESTERN UNIV., EVANSTON, ILL.
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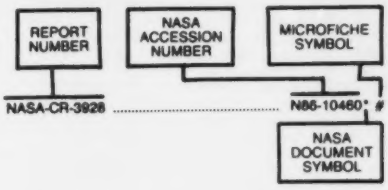

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Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 1046

Includes passenger and cargo air transport operations; and aircraft accidents.

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Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

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For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

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Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

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Includes aircraft handling qualities; piloting; flight controls; and autopilots.

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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

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Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 1051

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Includes powered and free-flight trajectories; and orbit and launching dynamics.

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Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

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Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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GEOSCIENCES

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LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

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Includes exobiology; and extraterrestrial life.

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PHYSICS

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SOCIAL SCIENCES

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

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REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

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COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-16186* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 193)
Nov. 1985 184 p
(NASA-SP-7037(193); NAS 1.21:7037(193)) Avail: NTIS HC $6.00 CSCL 01A

This bibliography lists 682 reports, articles and other documents introduced into the NASA scientific and technical information system in October 1985. Author

N86-16187*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VORTEX WAKE ALLEVIATION STUDIES WITH A VARIABLE TWIST WING
G. Thomas Holbrook, Dana Morris Dunham, and George C. Greene Nov. 1985 117 p refs
(NASA-TP-2442; L-15870; NAS 1.60:2442) Avail: NTIS HC A06/MF A01 CSCL 01B

Vortex wake alleviation studies were conducted in a wind tunnel and a water towing tank using a multisegmented wing model which provided controlled and measured variations in span load. Fourteen model configurations are tested at a Reynolds number of one million and a lift coefficient of 0.6 in the Langley 4- by 7-Meter Tunnel and the Hydronautics Ship Model Basin water tank at Hydronautics, Inc., Laurel, Md. Detailed measurements of span load and wake velocities at one semispan downstream correlate well with each other, with inviscid predictions of span load and wake roll up, and with peak trailing-wing rolling moments measured in the far wake. Average trailing-wing rolling moments are found to be an unreliable indicator of vortex wake intensity because vortex meander does not scale between test facilities and free-air conditions. A tapered-span-load configuration, which exhibits little or no drag penalty, is shown to offer significant downstream wake alleviation to a small trailing wing. The greater downstream wake alleviation achieved with the addition of spoilers to a flapped-wing configuration is shown to result directly from the high incremental drag and turbulence associated with the spoilers and not from the span load alteration they cause. Author

N86-16188# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
AIR AND SPACE FLIGHT. DREAM AND FACTS [LUFT- UND RAUMFAHRT. TRAUM UND WIRKLICHKEIT]
Ludwig Boelkow, K. vonGersdorff, and H. J. Ebert 1985 32 p In GERMAN Presented at the opening of the Air and Space Travel Hall of the Deutsches Museum, Munich, West Germany, 6 May 1984 and at Bayerischer Verdienstorden, 20 Jul. 1984
(MBB-Film-382) Avail: NTIS HC A03/MF A01

The history of man's conquest of the air and space with hot air balloons, subsonic and hypersonic aircraft, helicopters and gliders as well as rockets, space shuttles, and manned space flights is reviewed. Progress in aircraft and space technology is discussed. Author (ESA)

N86-16189# Rijksluchtvaartdienst, The Hague (Netherlands).
[ACTIVITIES REPORT IN AERONAUTICS] Annual Report, 1984 [JAARVERSLAG 1984]
1984 62 p In DUTCH
Avail: NTIS HC A04/MF A01

The activities of the Dutch Civil Aeronautics Board (CAB) are reviewed. Air traffic control, airfields, air transportation, aviation security, aviation school, national aeronautics and astronautics museum, and national aeronautics and astronautics laboratory are presented. Regional services in Europe; an aviation accident law; Maastricht airport; and recognition of industries by the CAB are discussed. Author (ESA)

N86-16190# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
PROBLEMS FOUND WHEN INTRODUCING NEW MATERIALS [PROBLEMES POSES PAR L'INTRODUCTION DES MATERIAUX NOUVEAUX]
G. Hilaire 29 Apr. 1985 34 p In FRENCH Presented at Journees de la Technologie 1984, Jonville, France, 5-6 Dec. 1984
(SNIAS-852-551-101; C-47-652-Ac/GH-AT) Avail: NTIS HC A03/MF A01

Aircraft specifications and design problems are discussed. The parameters guiding the choice of new materials are analyzed. Organic matrix composite materials, carbon or glass, aluminum lithium alloys, titanium alloys and metallic matrix composites are examined. The effect of a new material on the aircraft life and maintenance and operation cost is discussed. Fatigue problems and lithium alloys are studied. Author (ESA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-16191# Aeronautical Research Labs., Melbourne (Australia).
A FORTRAN PROGRAM FOR THE DETERMINATION OF UNSTEADY AIRFORCES ON GENERAL COMBINATIONS OF INTERFERING LIFTING SURFACES OSCILLATING IN SUBSONIC FLOW
W. Waldman 1985 92 p refs
(ARL-Struct-R-412; AR-003-987) Avail: NTIS HC A05/MF A01

The aeroelastic stability of an aircraft is an important consideration in the overall process of determining its airworthiness. When external bodies or stores are added to the wing of an aircraft, the dynamic characteristics of the aircraft will be changed. Due to the inertial, elastic and aerodynamic coupling between the wing and

its stores the flutter speed of the aircraft may be adversely affected. The aerodynamic coupling may be particularly important if the stores have aerodynamic surfaces, such as fins, that can generate large oscillatory aerodynamic forces. There are a number of computer programs which predict unsteady aerodynamic forces acting on oscillating lifting surfaces. These programs, which are based on the doublet lattice method of Albano and Rodden were optimized for simple interfering wing-tail-fin and control surface cases. They are not applicable to general combinations of interfering lifting surfaces. Thus a requirement exists for a computer program that can calculate unsteady aerodynamic forces for general configurations of interfering lifting surfaces, including a capability for dealing with store aerodynamics. Since the doublet lattice method is readily applicable to interfering and nonplanar lifting surfaces, it is used as the basis of a program capable of dealing with general configurations. The doublet lattice method is versatile and there are essentially no restrictions on the configurations that can be handled as long as an appropriate idealization can be developed. G.L.C.

N86-16192*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
THE EFFECTS OF ANISOTROPIC FREE-STREAM TURBULENCE ON TURBULENT BOUNDARY LAYER BEHAVIOR Report, 1 Jul. 1984 - 1 Jul. 1985
Fang Liang-Wei and Jon A. Hoffman Nov. 1985 43 p refs
(Grant NsG-2391)
Avail: NTIS HC A03/MF A01 CSCL 01A

The effects of near-isotropic and highly anisotropic free-stream turbulence on mean flow properties of the turbulence structure of turbulent boundary layers in a near zero pressure gradient flow has been experimentally evaluated. Turbulence levels vary from 0.5% to 8.0% and the momentum thickness Reynolds number varies from 800 to 1100. The results indicate that the effects of free-stream turbulence on the classical boundary layer properties for near-isotropic turbulence which have been published by other investigators are similar to the case of highly anisotropic turbulence fields, while the effects of free-stream turbulence on the properties of the turbulent structure within the boundary layer for the case of near-isotropic turbulence are quite different compared to the highly anisotropic case. Author

N86-16193*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF A HIGH-WING TRANSPORT CONFIGURATION WITH A OVER-THE-WING NACELLE-PYLON ARRANGEMENT
William P. Henderson and William K. Abeyounis Dec. 1985 93 p refs
(NASA-TP-2497; L-15959; NAS 1.60:2497) Avail: NTIS HC A05/MF A01 CSCL 01A

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to determine the effects on the aerodynamic characteristics of a high-wing transport configuration of installing an over-the-wing nacelle-pylon arrangement. The tests are conducted at Mach numbers from 0.70 to 0.82 and at angles of attack from -2 deg to 4 deg. The configurational variables under study include symmetrical and contoured nacelles and pylons, pylon size, and wing leading-edge extensions. The symmetrical nacelles and pylons reduce the lift coefficient, increase the drag coefficient, and cause a nose-up pitching-moment coefficient. The contoured nacelles significantly reduce the interference drag, though it is still excessive. Increasing the pylon size reduces the drag, whereas adding wing leading-edge extension does not affect the aerodynamic characteristics significantly. Author

N86-16194*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VALIDATION OF VISCOUS AND INVISCID COMPUTATIONAL METHODS FOR TURBOMACHINERY COMPONENTS
Louis A. Povinelli 1986 19 p refs Proposed for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany; sponsored by ASME
(NASA-TM-87193; E-2765; NAS 1.15:87193) Avail: NTIS HC A02/MF A01 CSCL 01A

An assessment of several three-dimensional computer codes used at the NASA Lewis Research Center is presented. Four flow situations are examined, for which both experimental data and computational results are available. The four flows form a basis for the evaluation of the computational procedures. It is concluded that transonic rotor flow at peak efficiency conditions may be calculated with a reasonable degree of accuracy, whereas, off-design conditions are not accurately determined. Duct flows and turbine cascade flows may also be computed with reasonable accuracy whereas radial inflow turbine flow remains a challenging problem. Author

N86-16195*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A NUMERICAL SIMULATION OF THE INVISCID FLOW THROUGH A COUNTER-ROTATING PROPELLER
Mark L. Celestina (Sverdrup Technology, Inc., Cleveland, Ohio), Richard A. Mulac (Sverdrup Technology, Inc., Cleveland, Ohio), and John H. Adamczyk 1986 23 p refs Proposed for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by ASME
(NASA-TM-87200; E-2855; NAS 1.15:87200) Avail: NTIS HC A02/MF A01 CSCL 01A

The results of a numerical simulation of the time-averaged inviscid flow field through the blade rows of a multiblade row turboprop configuration are presented. The governing equations are outlined along with a discussion of the solution procedure and coding strategy. Numerical results obtained from a simulation of the flow field through a modern high-speed turboprop will be shown. Author

N86-16196*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLOW FIELD SURVEY NEAR THE ROTATIONAL PLANE OF AN ADVANCED DESIGN PROPELLER ON A JETSTAR AIRPLANE
Kevin Robert Walsh 1985 29 p refs
(NASA-TM-86037; H-1226; NAS 1.15:86037) Avail: NTIS HC A03/MF A01 CSCL 01A

An investigation was conducted to obtain upper fuselage surface static pressures and boundary layer velocity profiles below the centerline of an advanced design propeller. This investigation documents the upper fuselage velocity flow field in support of the in-flight acoustic tests conducted on a JetStar airplane. Initial results of the boundary layer survey show evidence of an unusual flow disturbance, which is attributed to the two windshield wiper assemblies on the aircraft. The assemblies were removed, eliminating the disturbances from the flow field. This report presents boundary layer velocity profiles at altitudes of 6096 and 9144 m (20,000 and 30,000 ft) and Mach numbers from 0.6 to 0.8, and it investigated the effects of windshield wiper assemblies on these profiles. Because of the unconventional velocity profiles that were obtained with the assemblies mounted, classical boundary layer parameters, such as momentum and displacement thicknesses, are not presented. The effects of flight test variables (Mach number and angles of attack and sideslip) and an advanced design propeller on boundary layer profiles - with the wiper assemblies mounted and removed - are presented. Author

N86-16197*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MACH NUMBER AND FLOW-FIELD CALIBRATION AT THE ADVANCED DESIGN PROPELLER LOCATION ON THE JETSTAR AIRPLANE
Lannie D. Webb Dec. 1985 21 p refs
(NASA-TM-84923; H-1222; NAS 1.15:84923) Avail: NTIS HC A02/MF A01 CSCL 01A

Advanced design propellers on a JetStar aircraft were tested at NASA Ames Research Center's Dryden Flight Research Facility. A calibration of the flow field at the test location to obtain local Mach number and flow direction was performed. A pitot-static probe

and flow direction vane installation was installed and tested at Mach 0.3 to 0.8 and altitudes from 3000 m (10,000 ft) to 9100 m (30,000 ft). Local Mach number and flow direction relationships were obtained and related to their noseboom counterparts. Effects of varying angles of sideslip to + or - 3 deg. were investigated. Author

N86-16198*# Vigyan Research Associates, Inc., Hampton, Va.
AN INVESTIGATION AT STATIC CONDITIONS OF NONAXISYMMETRIC NOZZLE THRUST REVERSER PORT GEOMETRY INCLUDING EFFECTS OF ROUNDING AND ROTATING THE PORT CORNER
Dorothy G. Arbiter Nov. 1985 56 p refs
(Contract NAS1-17919)
(NASA-CR-178036; NAS 1.26:178036) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation has been conducted in the static test facility of the Langley 16-Foot Transonic Tunnel to determine the effects of rounding and rotating the port corner of a nonaxisymmetric thrust reversing port. High pressure air was used to simulate jet exhaust at nozzle pressure ratios up to 6.0. The investigation indicates that using a rounded corner in the reverser port passage increases the discharge coefficient significantly compared to that of a sharp cornered thrust reversing port. Incorporating a rotating cylinder into the rounded corner reverser port passage provides no additional increase at cylinder revolutions per minute up to 10,000. (Revolutions per minute of 390,000 were necessary to achieve a surface velocity equal to the duct velocity.) Highest levels of discharge coefficient are obtained by providing a large, round, cylindrical surface in the port upstream wall. Locating the reverser port in a constant area duct results in higher discharge coefficients than locating the port in a convergent duct. Author

N86-16199*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE DISTRIBUTIONS FROM HIGH REYNOLDS NUMBER TESTS OF A BOEING BAC 1 AIRFOIL IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
William G. Johnson, Jr. and Acquilla S. Hill Dec. 1985 271 p refs
(NASA-TM-87600; L-16010; NAS 1.15:87600) Avail: NTIS HC A12/MF A01 CSCL 01A

A wind-tunnel investigation designed to test a Boeing advanced-technology airfoil from low to flight-equivalent Reynolds numbers has been completed in the Langley 0.3-Meter Transonic Cryogenic Tunnel. This investigation represents the first in a series of NASA/U.S. industry two-dimensional airfoil studies to be completed in the Advanced Technology Airfoil Test program. Test temperature was varied from ambient to about 100 K at pressures ranging from about 1.2 to 6.0 atm. Mach number was varied from about 0.40 to 0.80. These variables provided a Reynolds number (based on airfoil chord) range from 4.4 X 10 to the 6th power to 50.0 X 10 to the 6th power. All the test objectives were met. The pressure data are presented without analysis in plotted and tabulated formats for use in conjunction with the aerodynamic coefficient data published as NASA TM-81922. At the time of the test, these pressure data were considered proprietary and have only recently been made available by Boeing for general release. Data are included which demonstrate the effects of fixed transition. Also included are remarks on the model design, the model structural integrity, and the overall test experience. Author

N86-16200# Sandia National Labs., Albuquerque, N. Mex.
SIX DEGREE OF FREEDOM SIMULATION OF FLUID PAYLOAD PROJECTILES USING NUMERICALLY COMPUTED FLUID MOMENTS
H. R. Vaughn, W. P. Wolf, and W. L. Oberkampf Jul. 1985 102 p
(Contract DE-AC04-76DP-00789)
(DE85-017183; SAND-85-1166) Avail: NTIS HC A06/MF A01

A flight trajectory simulation method has been developed for calculating a six degree of freedom motion of fluid filled projectiles. Numerically calculated internal fluid moments and experimentally known aerodynamic forces and moments are coupled to the projectile motion. Comparisons of predicted results with flight test data of an M483 155mm artillery projectile with a highly viscous payload confirm the accuracy of the simulation. This simulation clearly shows that the flight instability is due to the growth of the nutation component of angular motion caused by the viscous effects of the fluid payload. This simulation procedure, when used in conjunction with the previously developed method for calculating internal fluid moments, allows the designer to examine the effects of various liquid payloads and container geometries on the dynamic behavior of flight vehicles. DOE

N86-16201# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
SIMULATION OF FLOW AROUND A BLUNT BODY IN A SUPERSONIC STREAM
Liu Jun Mar. 1985 29 p
(PDR/CFDU/IC/20) Avail: NTIS HC A03/MF A01

The steady flow around a blunt body immersed in a uniform and two-dimensional supersonic stream was simulated by PHOENICS-84. The resulting solutions compare well with experimental data and with other numerical results. Author (ESA)

N86-16202# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
IMPLICIT FINITE-DIFFERENCE METHODS FOR THE CALCULATION OF UNSTEADY TRANSONIC POTENTIAL FLOW AROUND TWO-DIMENSIONAL AIRFOILS: A DISCUSSION
J. vanderVooren and H. Schippers 23 Sep. 1985 33 p refs
Submitted for publication
(NLR-MP-83063-U; B8566372) Avail: NTIS HC A03/MF A01

Mathematical modeling of unsteady transonic flow is discussed. Starting from the Euler equations, potential theory is derived and applied to the flow about a 2D airfoil. Motions considered include rigid body motions and deformations of the airfoil. The full-potential equation is formulated on curvilinear coordinates maintaining strong conservation form. Boundary conditions on the airfoil, wake conditions and radiation type far-field conditions are assessed. A numerical method based on time-linearization of the differential equation up to second order accuracy is presented. The resulting equation can be integrated numerically by an implicit locally one-dimensional split method. Approximation of spatial derivatives by fully conservative finite difference schemes employing mass-flux splitting for the capture of shocks is treated. Results for the steady flow about an airfoil illustrate that an Engquist-Osher type scheme at the sonic line is a prerequisite to rigorously suppress nonphysical expansion shocks. Author (ESA)

N86-16203# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AN EXPERIMENTAL INVESTIGATION OF THE ENTRAINMENT INTO A LEADING-EDGE VORTEX
N. G. Verhaagen and L. vanderSnoek 1984 60 p refs
(VTH-LR-332) Avail: NTIS HC A04/MF A01

The theoretical distribution of the velocity inside the rotational core of a leading-edge is derived using Stewartson and Hall's (1963) outer solution for the rotational core. From it the entrainment into and the circulation around the rotational core is derived. The theoretical results are compared with results from measurements on the leading-edge vortex of a sharp-edged unit aspect ratio delta wing. The measurements were performed for an angle of attack of 20 deg at 45 m/sec, corresponding to a Reynolds number of 2.5 million, based on centerline chord. A relation for the entrainment factor found in the literature is shown to be incorrect. Author (ESA)

N86-16204# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
APPLICATION OF TIME-LINEARIZED METHODS OF OSCILLATING WINGS IN TRANSONIC FLOW AND FLUTTER
M. H. L. Hounjet and J. J. Meijer 15 Aug. 1984 21 p refs
Presented at AGARD Specialists Meeting on Unsteady Aerodynamics and Aeroelastic Applications, Toulouse, France, 2-7 Sep.

1984 Sponsored by Royal Netherlands Air Force, The Hague
(NLR-MP-84077-U; B8569322) Avail: NTIS HC A02/MF A01

Unsteady aerodynamic loads in the transonic domain were obtained with time-linearized methods in which a so-called field panel method which accounts for a proper radiation of signals towards infinity is embedded. The methods are used to predict the unsteady loads and first harmonic pressure distributions on an airfoil and a transport type wing. Results are correlated with data of unsteady experiments and of other calculation methods. Transonic flutter applications to a fighter-type configuration are described. Author (ESA)

N86-16205# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CALCULATIONS OF TRANSONIC FLOWS AROUND SINGLE AND MULTIELEMENT AIRFOILS ON A SMALL COMPUTER
Z. Nowak 1984 32 p refs Sponsored by Netherlands Organization for the Advancement of Pure Research
(Rept-84-48) Avail: NTIS HC A03/MF A01

A method based on finite volume discretization of the full potential equation with artificial compressibility for calculating transonic flows around single and multielement airfoils is presented. The velocity potential is calculated on a succession of grids by the line-Newton method. For multielement airfoils, the channels between the component parts are treated with the line-Newton relaxation or underrelaxation procedure. The method is quite efficient for relatively coarse grids (size 21 x 64 or 17 x 64). For finer grids convergence could be improved by multigrid methods. A method for generating nearly orthogonal grids in double-connected regions using simple semianalytic formulas is given. The grids are strictly orthogonal at the inner boundary. Author (ESA)

N86-16206# European Space Agency, Paris (France).
INVESTIGATION OF THE AERODYNAMIC FORCES ON BLUFF BODIES AT HIGH REYNOLDS NUMBERS Final Report
Guenter Schewe Jun. 1985 37 p refs Transl. into ENGLISH of "Untersuch. der aerodynamischen Kraeft, die auf stumpfe Profile bei grossen Reynolds-Zahlen Wirken" Report DFVLR-Mitt-84-19 Goettingen, West Germany, 1984 Original report in GERMAN previously announced as ESA-94556
(ESA-TT-914; DFVLR-Mitt-84-19) Avail: NTIS HC A03/MF A01; original German version available from DFVLR, Cologne DM 13

Steady and unsteady forces acting on a circular cylinder, a square-section cylinder and an H-profile (Tacoma Bridge) were investigated in a pressurized wind tunnel (very high Reynolds numbers). The forces were measured by a piezo-multicomponent balance, which features a large dynamic range, low interference and a high natural frequency. The Reynolds number (Re) range between 20,000 and 7 million is investigated with the same circular cylinder and balance by merely varying flow velocity and air density. In the critical Reynolds number range, bistable asymmetric flow states which can be controlled by a very small perturbation are observed. The investigation of the square section reveals no strong Reynolds number effects in the range Re between 100,000 and 4 million. The Tacoma profile is shown to be aeroelastically unstable in torsion mode. Author (ESA)

N86-16574# Joint Publications Research Service, Arlington, Va.
IMPROVED METHOD FOR TRANSONIC FLOW CALCULATION PROPOSED
Luo Shifeng *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 24-33 refs Transl. into ENGLISH from Shuzhi Jisuan yu Jisuanji Yingyong (Beijing, China), v. 6, no. 1, Mar. 1985 p 57-64 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *65 Urban Technology and Transportation.*

N86-16207# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: MIDAIR COLLISION OF WINGS WEST AIRLINES BEECH C-99 (N666U) AND AESTHETEC INC., ROCKWELL COMMANDER (N112SM), NEAR SAN LUIS OBISPO, CALIFORNIA, AUGUST 24, 1984
24 Aug. 1984 52 p
(NTSB/AAR-85/07) Avail: NTIS HC A04/MF A01

At 1117:38 Pacific daylight time, on August 24, 1984, Wings West Airlines, Flight 628, a Beech C-99 (N6399U), and Aesthetec Inc., Rockwell Commander 112TC, N112SM, collided in midair near San Luis Obispo, California. The weather at the time of the collision was clear. Flight 628 had just departed San Luis Obispo County Airport en route to San Francisco International Airport, California, and was climbing on a westbound heading. The Rockwell Commander had departed Paso Robles, California, on a training flight and was descending toward the San Luis Obispo County Airport on an eastbound track. The airplanes collided head-on at an altitude of about 3,400 feet. The wreckage of both airplanes fell into an open field 8 nmi west northwest of the San Luis Obispo County Airport. All 17 persons, including the 2 pilots and 13 passengers onboard flight 628 and the 2 pilots onboard the Rockwell, were killed. The National Transportation Safety Board determines that the probable cause of this accident was the failure of the pilots of both aircraft to follow the recommended communications and traffic advisory practices for uncontrolled airports contained in the Airman's Information Manual to alert each other to their presence and to enhance the controller's ability to provide timely traffic advisories. Author

N86-16208*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOME COMPARISONS OF US AND USSR AIRCRAFT DESIGN DEVELOPMENTS
M. Leroy Spearman Dec. 1985 36 p refs Previously announced in IAA as A86-10930
(NASA-TM-87611; NAS 1.15:87611) Avail: NTIS HC A03/MF A01 CSCL 01C

A review is given of the design and development of some US and USSR aircraft. The emphasis is on the historical development of large aircraft-civil and military transports and bombers. Design trends are somewhat similar for the two countries and indications are that some fundamental characteristics are dictated more by ideological differences rather than technological differences. A brief description is given in a more or less chronological order of the major bomber aircraft, major civil and military transport aircraft, and the development of the air transport systems. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-16209 Civil Aviation Authority, London (England).
EVALUATION OF 23 INCH RADAR VIEWING UNIT FOR HEATHROW APPROACH CONTROL ROOM
Jul. 1985 24 p ref
(CAA-Paper-85011; Rept-516) Copyright. Avail: Issuing Activity

The possibility of replacing pairs of 16 in approach radar viewing units (RVU) by single 23 in units was assessed in a simulation with 20 air traffic controllers. The subjective and numerical evidence indicates that a single 23 inch RVU is an acceptable replacement. The lack of suitable range settings made it difficult for controllers to comment about the suitability of the RVU for the initial planning task. However, the indications are that the monitoring and sequencing tasks could be carried out satisfactorily. In the event of an RVU failure, a controller could maintain a radar service for a maximum of 5 min by sharing a neighboring RVU. Author (ESA)

N86-16210# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
AUTOMATIC NULL-STEERING ANTENNA SYSTEMS FOR NAVSTAR GLOBAL POSITIONING SYSTEM (GPS)
O. B. M. Pietersen 12 Jan. 1984 11 p refs In DUTCH; ENGLISH summary Presented at Dutch Electronics and Radio Society (NERG) Meeting on Subjects Related to Military Communication, 31 Jan. 1984 Submitted for publication
(NLR-MP-84007-U; B8566262) Avail: NTIS HC A02/MF A01

Null-steering antenna systems for user equipment in the NAVSTAR Global Positioning System are reviewed. The antenna pattern is adapted automatically to a scenario with jammers. While trying to continue the reception of the spread spectrum satellite signals, an attenuation of jamming signals is provided. Three methods leading to optimal weight factors, (direct matrix inversion, steepest descent, and perturbation method) are outlined.
Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-16211# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Stromingen.
FATIGUE LIFE MONITORING OF AIRCRAFT
J. B. deJonge 27 Oct. 1983 10 p In DUTCH; ENGLISH summary Presented at Netherlands Association of Aeronautical Engineers, 1 Dec. 1983
(NLR-MP-83069-U; B8568105) Avail: NTIS HC A02/MF A01

Methods for monitoring fatigue loads on aircraft structures are presented. As the actual service life deviates appreciably from design load spectrum assumptions, a reassessment of safe service life and inspection schedules are shown to be necessary. Simple counting accelerometer systems; multiparameter recording systems; and direct strain monitoring systems are discussed. Examples of combat aircraft and civil transport aircraft are presented. The interpretation of recorded loads in terms of accumulated fatigue damage is considered. Author (ESA)

N86-16653# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
AIRWORTHINESS FLIGHT TEST PROGRAM OF AN AIRCRAFT EQUIPMENT FAIRING
V. R. Miller and T. P. Severyn (4950th Test Wing, Wright-Patterson AFB, Ohio) *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 69-75 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-16212*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
FINDS: A FAULT INFERRING NONLINEAR DETECTION SYSTEM PROGRAMMERS MANUAL, VERSION 3.0
Roy E. Lancraft Dec. 1985 174 p refs
(Contract NAS1-16579)
(NASA-CR-177986; NAS 1.26:177986; Rept-6012) Avail: NTIS HC A08/MF A01 CSCL 01D

Detailed software documentation of the digital computer program FINDS (Fault Inferring Nonlinear Detection System) Version 3.0 is provided. FINDS is a highly modular and extensible computer program designed to monitor and detect sensor failures, while at the same time providing reliable state estimates. In this version of the program the FINDS methodology is used to detect, isolate, and compensate for failures in simulated avionics sensors used by the Advanced Transport Operating Systems (ATOPS) Transport System Research Vehicle (TSRV) in a Microwave Landing System (MLS) environment. It is intended that this report serve as a programmers guide to aid in the maintenance, modification, and revision of the FINDS software. Author

N86-16213# Eikonix Corp., Bedford, Mass.
EXTENDED AREA EXIT PUPIL VIEWER Final Technical Report, 5 Aug. 1983 - 5 Aug. 1985
B. Radl Aug. 1985 63 p
(Contract DACA76-83-C-0008)
(AD-A159364; EC/2129101; ETL-0399) Avail: NTIS HC A04/MF A01 CSCL 17/8

This report describes the process of designing and building a prototype extended area exit pupil viewer. This system will enable comfortable viewing of a projected stereo image. It works by enlarging the microscope's exit pupil, thus allowing head movement while maintaining stereo separation of the images. GRA

N86-16214# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
STRESS LEVEL TESTING OF ELECTRONICS, AVIONICS COMMUNICATIONS AND C3I EQUIPMENTS Final Report
30 Aug. 1985 28 p
(AD-A159395; TOP-6-1-002) Avail: NTIS HC A03/MF A01 CSCL 17/2

This Test Operations Procedure (TOP) describes test methods and techniques for measuring and evaluating the technical performance of a System Under Test (SUT) when the SUT is operated to and beyond specifications in order to determine its response to high levels of stimuli. The extremely short period allowed for the writing of this TOP along with the great diversity of potential systems to be tested has precluded the writing of a document which conclusively covers the topic of stress level testing. This document should be considered as a TOP which outlines the basic requirements and the basic test methodology for conducting stress level testing. This TOP includes only the electronics aspect of stress level testing. It does not consider the classical environmental and mechanical stress testing of materials; these types of stress testing are covered in MIL-STD-810D.
GRA

N86-16215# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN AND EVALUATION OF AN INSTRUMENTATION SYSTEM FOR MEASUREMENTS IN NONSTEADY SYMMETRICAL FLIGHT CONDITIONS WITH THE HAWKER HUNTER MK7
K. vanWoerkom 1984 83 p refs
(VTH-LR-308) Avail: NTIS HC A05/MF A01

A flight test instrumentation system with a sample of rate 400 measurements/sec, and 0.02% overall accuracy is de-

scribed. The system was used to perform nonsteady symmetric flight tests with a Hawker Hunter aircraft. The design and evaluation of transducers, signal conditioning, and the data collection system are outlined. The program demonstrates the technique of measuring performance characteristics as well as stability and control characteristics simultaneously in dynamic flight conditions.
Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-16216*# United Technologies Research Center, East Hartford, Conn.
OPTICAL AND PROBE DETERMINATION OF SOOT CONCENTRATIONS IN A MODEL GAS TURBINE COMBUSTOR Final Report
Wayne A. Eckerle and Thomas J. Rosfjord Jan. 1986 99 p refs
(Contract NAS 3-242233)
(NASA-CR-175030; NAS 1.26:175030) Avail: NTIS HC A05/MF A01 CSCL 21E

An experimental program was conducted to track the variation in soot loading in a generic gas turbine combustor. The burner is a 12.7-cm dia cylindrical device consisting of six sheet-metal louvers. Determination of soot loading along the burner length is achieved by measurement at the exit of the combustor and then at upstream stations by sequential removal of liner louvers to shorten burner length. Alteration of the flow field approaching and within the shortened burners is minimized by bypassing flow in order to maintain a constant linear pressure drop. The burner exhaust flow is sampled at the burner centerline to determine soot mass concentration and smoke number. Characteristic particle size and number density, transmissivity of the exhaust flow, and local radiation from luminous soot particles in the exhaust are determined by optical techniques. Four test fuels are burned at three fuel-air ratios to determine fuel chemical property and flow temperature influences. Particulate concentration data indicate a strong oxidation mechanism in the combustor secondary zone, though the oxidation is significantly affected by flow temperature. Soot production is directly related to fuel smoke point. Author

N86-16217# Johns Hopkins Univ., Laurel, Md. JANNAF Combustion Subcommittee.
RECOMMENDATIONS FOR REPORTING RAMJET COMBUSTION INSTABILITY TEST DATA
Douglas L. Davis, ed. (AFWAL) Sep. 1985 26 p refs
(Contract N00024-85-C-5301)
(AD-A161008; CPIA-Publ-420) Avail: NTIS HC A03/MF A01 CSCL 21/5

A technical panel of the Joint Army-Navy-NASA-Air Force (JANNAF) Combustion Subcommittee, presents guidelines for reporting high-frequency pressure oscillations in ramjets. Also included are brief engineering descriptions of the various techniques, including stochastic signal analysis, for presenting combustion instability data. Author

N86-16218*# Sverdrup Technology, Inc., Cleveland, Ohio.
PREDICTION OF THE STRUCTURE OF FUEL SPRAYS IN GAS TURBINE COMBUSTORS Final Report
Jian-Shun Shuen Dec. 1985 17 p refs Presented at the 24th Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986; sponsored by AIAA
(Contract NAS3-24105)
(NASA-CR-175028; E-2837; NAS 1.26:175028; AIAA-86-0450) Avail: NTIS HC A02/MF A01 CSCL 21E

The structure of fuel sprays in a combustion chamber is theoretically investigated using computer models of current interest. Three representative spray models are considered: (1) a locally homogeneous flow (LHF) model, which assumes infinitely fast interphase transport rates; (2) a deterministic separated flow (DSF) model, which considers finite rates of interphase transport but ignores effects of droplet/turbulence interactions; and (3) a stochastic separated flow (SSF) model, which considers droplet/turbulence interactions using random sampling for turbulence properties in conjunction with random-walk computations for droplet motion and transport. Two flow conditions are studied to investigate the influence of swirl on droplet life histories and the effects of droplet/turbulence interactions on flow properties. Comparison of computed results with the experimental data show that general features of the flow structure can be predicted with reasonable accuracy using the two separated flow models. In contrast, the LHF model overpredicts the rate of development of the flow. While the SSF model provides better agreement with measurements than the DSF model, definitive evaluation of the significance of droplet/turbulence interaction is not achieved due to uncertainties in the spray initial conditions. DOE

N86-16219*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPARISON OF CALCULATED AND EXPERIMENTAL CASCADE PERFORMANCE FOR CONTROLLED-DIFFUSION COMPRESSOR STATOR BLADING
Nelson L. Sanger and Raymond P. Shreeve (Naval Postgraduate School, Monterey, Calif.) 1986 22 p refs Presented at International Gas Turbine Conference and Exhibit, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by ASME
(NASA-TM-87167; E-2805; NAS 1.15:87167) Avail: NTIS HC A04/MF A01 CSCL 21E

The mid-span section of a previously reported controlled-diffusion compressor stator has been experimentally evaluated in cascade. Measurements are taken over a range of incidence angles for blade chord Reynolds numbers from 470,000 to 690,000. Blade chord length is 12.7 cm, aspect ratio is 2.0, and solidity is 1.67. Measurements include conventional cascade performance parameters as well as blade surface pressures. Computations are made for the inviscid flow field, surface boundary layers, and loss for several of the blade inlet angle conditions, are compared against corresponding data. Author

N86-16220*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
THERMODYNAMIC EVALUATION OF TRANSONIC COMPRESSOR ROTORS USING THE FINITE VOLUME APPROACH Annual Report, 20 Dec. 1984 - 19 Dec. 1985
John Moore, Stephen Nicholson, and Joan G. Moore Dec. 1985 118 p refs
(Grant NAG3-593)
(NASA-CR-176428; NAS 1.26:176428; JM/85-11) Avail: NTIS HC A06/MF A01 CSCL 21E

Research at NASA Lewis Research Center gave the opportunity to incorporate new control volumes in the Denton 3-D finite-volume time marching code. For duct flows, the new control volumes require no transverse smoothing and this allows calculations with large transverse gradients in properties without significant numerical total pressure losses. Possibilities for improving the Denton code to obtain better distributions of properties through shocks were demonstrated. Much better total pressure distributions through shocks are obtained when the interpolated effective pressure, needed to stabilize the solution procedure, is used to calculate the total pressure. This simple change largely eliminates the undershoot in total pressure down-stream of a shock. Overshoots and undershoots in total pressure can then be further reduced by a factor of 10 by adopting the effective density method, rather than the effective pressure method. Use of a Mach number dependent interpolation scheme for pressure then removes the overshoot in static pressure downstream of a shock. The stability of interpolation schemes used for the calculation of effective density is analyzed and a Mach number dependent scheme is developed,

combining the advantages of the correct perfect gas equation for subsonic flow with the stability of 2-point and 3-point interpolation schemes for supersonic flow. Author

N86-16221*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIMULATING A SMALL TURBOSHAFT ENGINE IN REAL-TIME MULTIPROCESSOR SIMULATOR (RTMPS) ENVIRONMENT
Edward J. Milner and Dale J. Arpasi Jan. 1986 25 p refs
Presented at the SCS Multiconference, San Diego, Calif., 23-25 Jan. 1986; sponsored by the Society for Computer Simulation
(NASA-TM-87216; E-2876; NAS 1.15:87216) Avail: NTIS HC A02/MF A01 CSCL 21E

A Real-Time Multiprocessor Simulator (RTMPS) has been developed at NASA Lewis Research Center. The RTMPS uses parallel microprocessors to achieve computing speeds needed for real-time engine simulation. This report describes the use of the RTMPS system to simulate a small turboshaft engine. The process of programming the engine equations and distributing them over one, two, and four processors is discussed. Steady-state and transient results from the RTMPS simulation are compared with results from a main-frame-based simulation. Processor execution times and the associated execution time savings for the two and four processor cases are presented using actual data obtained from the RTMPS system. Included is a discussion of why the minimum achievable calculation time for the turboshaft engine model was attained using four processors. Finally, future enhancements to the RTMPS system are discussed including the development of a generalized partitioning algorithm to automatically distribute the system equations among the processors in optimum fashion. Author

N86-16222# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
SPANWISE REDISTRIBUTION OF ENERGY AND LOSS IN AN AXIAL FLOW COMPRESSOR BY WAKE CENTRIFUGATION Final Report, 15 Sep. 1981 - 15 Mar. 1984
C. W. Whitfield and J. S. Keith May 1985 119 p
(Contract F33615-81-C-2090)
(AD-A159312; R84AEB460; AFWAL-TR-84-2109) Avail: NTIS HC A06/MF A01 CSCL 20/4

The objective of this program was to develop and codify a method for predicting the spanwise redistribution of energy and loss associated with rotor/stator wakes in an axial-flow compressor. The mechanisms considered were: (1) spanwise transport of wake fluid due to imbalance of the radial pressure gradient; and (2) accumulation/dilution of wake fluid at the inner and outer casing. The work consisted of developing computer modules that perform the above defined objectives. This report describes mathematical formulas derived for definition of the peak radial and streamwise velocity decrements/increments in a wake at a blade trailing edge and their decay with downstream distance. Comparisons with data show good agreement in most cases. In addition, the thickness, displacement thickness, and momentum thickness of the wake were calculated and used in the prediction of changes in the circumferential average flow solution caused by the migration of wake fluid across streamlines. GRA

N86-16223# Rolls-Royce Ltd., Derby (England).
THE MECHANICAL DESIGN OF GAS TURBINE BLADING IN CAST SUPERALLOYS
A. G. Dodd 27 Feb. 1985 47 p refs
(PNR-90247) Avail: NTIS HC A03/MF A01

The methods used for the mechanical design of hot gas turbine blading are discussed. A rapid mechanical assessment, done before the design proceeds further, is examined. The method gives an outline of the design specifying material choice, rim load on disks, cross sectional areas and mean level of cooling technology. Failure modes are discussed. It is suggested that they can be overcome by choosing a temperature and stress for each radial position. Blades are optimized by varying the required cooling technology or by changing the cross-sectional areas. Author (ESA)

N86-16224# Rolls-Royce Ltd., Derby (England). Mechanical Technology Dept.
AN ANALYSIS OF RIG TEST DISC FAILURES
G. Asquith 23 Jul. 1985 10 p refs
(PNR-90276) Avail: NTIS HC A02/MF A01

Life prediction criteria for hot gas turbine engine disks are examined. Safety is taken as the prime requirement in turbine design. Factors influencing the total life, and the prediction methods available are discussed. Engine size disk testing to cracking and failure is seen as the most reliable. This is equivalent to the mathematical Monte Carlo analysis. The tests also show which variables are most likely to be significant. Author (ESA)

N86-16225# Rolls-Royce Ltd., Derby (England).
CERTIFICATION OF AEROENGINES FITTED WITH FULL AUTHORITY DIGITAL CONTROL
V. A. Fisher 23 Jul. 1985 24 p Presented at Certification of Aerospace Propulsion Systems Seminar, Bangalore, India, 6-7 Mar. 1985
(PNR-90287) Avail: NTIS HC A02/MF A01

The problem of certifying electronic control systems as part of the aircraft engine is discussed. The certification is divided into verification and validation of the software and the hardware. Hardware testing includes environmental aspects such as temperature, vibration, electromagnetic compatibility, shock, sand and dust. Software by its very nature can only be presented to human perception by means of documentation. Author (ESA)

N86-16226# Rolls-Royce Ltd., Derby (England).
IS THE TRADITIONAL 150 HOUR ENDURANCE TEST OUTDATED?
R. Ebbs 23 Jul. 1985 30 p Presented at Certification of Aerospace Propulsion Systems Seminar, Bangalore, India, 6-7 Mar. 1985
(PNR-90288) Avail: NTIS HC A03/MF A01

Qualification tests necessary for the granting of aircraft engine type approval are discussed. The evolution of the 150 hr test is described. The shortcomings of these tests are analyzed, together with attempts to modify the tests to be more representative. The direction which the formal requirements are likely to take in the future is considered. Author (ESA)

N86-16227# European Space Agency, Paris (France).
HOT CORROSION IN AIRCRAFT ENGINES
Hans-Joachim Retzer-Scheibe Feb. 1985 242 p refs Transl. into ENGLISH of "Heissgaskorrosion in Flugtriebwerken" Cologne, West Germany, 1984 Original report in GERMAN previously announced as ESA-92820
(ESA-TT-887; DFVLR-Mitt-84-04) Avail: NTIS HC A11/MF A01; original German version available from DFVLR, Cologne DM 67

Hot corrosion behavior of high temperature materials, in particular heat resistant alloys used in aircraft gas turbines is reviewed. Corrosion phenomena of Ni-base and Co-base alloys were examined by burner rig tests, and protective coating systems were studied. It is found that the alloying constituents Cr, Ti, and Y improve the hot corrosion resistance while Fl, Mo, and W deteriorate the sulfurization resistance. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-16228*# Connecticut Univ., Storrs.
AN INVESTIGATION OF ADAPTIVE CONTROLLERS FOR HELICOPTER VIBRATION AND THE DEVELOPMENT OF A NEW DUAL CONTROLLER Final Report
Purusottam Mookerjee, John A. Molusis, and Yaakov Bar-Shalom Jan. 1985 162 p refs
(Grant NAG2-213)

(NASA-CR-177377; NAS 1.26:177377) Avail: NTIS HC A08/MF A01 CSCL 01C

An investigation of the properties important for the design of stochastic adaptive controllers for the higher harmonic control of helicopter vibration is presented. Three different model types are considered for the transfer relationship between the helicopter higher harmonic control input and the vibration output: (1) nonlinear; (2) linear with slow time varying coefficients; and (3) linear with constant coefficients. The stochastic controller formulations and solutions are presented for a dual, cautious, and deterministic controller for both linear and nonlinear transfer models. Extensive simulations are performed with the various models and controllers. It is shown that the cautious adaptive controller can sometimes result in unacceptable vibration control. A new second order dual controller is developed which is shown to modify the cautious adaptive controller by adding numerator and denominator correction terms to the cautious control algorithm. The new dual controller is simulated on a simple single-control vibration example and is found to achieve excellent vibration reduction and significantly improves upon the cautious controller. Author

N86-16229# European Space Agency, Paris (France).
FLIGHT DYNAMICS AND AIRCRAFT PILOTING
Jean-Claude Wanner May 1985 419 p refs Transl. into ENGLISH of "Dyn. du Vol et Pilotage des Avions" ONERA-P-1983-1 Paris, France, 1983 Revised
(ESA-TT-874; ONERA-P-1983-1; ONERA-P-1976-6-Rev) Avail: NTIS HC A18/MF A01

The principle of piloted vehicle mechanics is presented, and aircraft longitudinal movement is studied. Assuming that the pilot counters with his lateral controls any sideslip, and that the aircraft plane of symmetry is vertical, the trajectory is described in that same vertical plane. The natural modes (angle of attack oscillation, phugoid, aperiodic motion) of the small movements around straight and level flight, the response to the pilots commands, and equilibrium stability, are examined. Small lateral movements around straight and level flight and the aircraft response to lateral controls are considered. Small movements of the aircraft around stabilized level flight in rotation are also examined. The assumptions of separation of longitudinal and lateral movements around stabilized straight and level flight are validated. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-16230 Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
SIMULATION OF A SIX DEGREES OF FREEDOM FLIGHT SIMULATOR MOTION SYSTEM
G. J. Wierda 1 May 1982 47 p refs
(UA-00-39) Avail: Issuing Activity

A model of a single hydraulic actuator and controller developed to investigate nonlinearities in the servo valve transfer function to limit the amount of hardware in the simulation, was simplified by linearizing the square roots in the pressure-flow relationship. Six of the simplified models were coupled to obtain a simulation model of a complete six degrees of freedom motion system. A transformation and mass matrix to describe the dynamic equations were calculated for a motion system. Simulation results indicate high underdamped frequency components in the acceleration response of the actuators. It is shown that acceleration feedback rather than force feedback is preferred to damp the high frequency components. Author (ESA)

N86-16231# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PCM SIMULATOR [SIMULADOR PCM]
Pedro Manuel MartinsdeBarros and Ricardo Correia Lima Jul. 1985 16 p Presented at the 37th Reuniao Anual da SBPC, Belo Horizonte, Brazil, 10-17 July 1985
(INPE-3571-PRE/775) Avail: NTIS HC A02/MF A01

The PCM simulator is a device that generates baseband binary sequences of programmable length and pattern mainly to check decommutation systems. Thus, the simulator can be used not only to check decommutators but also to any equipment that needs, at the input, a programmable sequence of bits. The programming capacity varies according to the use. The PCM simulator of the MECB's earth stations generates superframes of 1 to 256 frames, each frame with 1 to 1024 8 bit words. There are 17 programmable words: 16 can be inserted in any address of the superframe, once per frame, or in up to 8 frames. The seventeenth is a fill. The generation is based in two tables: a compact one, which has all the information needed to build the frames; the other contains all the programmable words in the proper order, so that the desired sequence is obtained. The generation of this table and I/O operations are performed by a microprocessor based on the CPU 8085 INTEL. Author

N86-16232*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STUDY OF ICE ACCRETION ON ICING WIND TUNNEL COMPONENTS
James E. Newton and William Olsen 1986 24 p refs Presented at the 24th Aerospace Sciences Meeting, Reno, Nev., 6-8 Jan. 1986; sponsored by AIAA
(NASA-TM-87095; E-3828; NAS 1.15:87095) Avail: NTIS HC A02/MF A01 CSCL 01E

In a closed loop icing wind tunnel the icing cloud is simulated by introducing tiny water droplets through an array of nozzles upstream of the test section. This cloud will form ice on all tunnel components (e.g., turning vanes, inlet guide vanes, fan blades, and the heat exchanger) as the cloud flows around the tunnel. These components must have the capacity to handle their icing loads without causing significant tunnel performance degradation during the course of an evening's run. To aid in the design of these components for the proposed Altitude Wind Tunnel (AWT) at NASA Lewis Research Center the existing Icing Research Tunnel (IRT) is used to measure icing characteristics of the IRT's components. The results from the IRT are scaled to the AWT to account for the AWT's larger components and higher velocities. The results show that from 90 to 45 percent of the total spray cloud froze out on the heat exchanger. Furthermore, the first set of turning vanes downstream of the test section, the FOD screen and the fan blades show significant ice formation. The scaling shows that the same results would occur in the AWT. Author

N86-16233*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROGRESS IN THE LEWIS RESEARCH CENTER ALTITUDE WIND TUNNEL (AWT) MODELING PROGRAM
Carl C. Ciepluch, Richard R. Burley, Donald E. Groesbeck, and John C. Marek 1986 19 p refs Proposed for presentation at the 14th Aerodynamic Testing Conference, West Palm Beach, Fla., 5-7 Mar. 1986; sponsored by AIAA
(NASA-TM-87194; E-2850; NAS 1.15:87194) Avail: NTIS HC A02/MF A01 CSCL 14B

The rehabilitation of the Altitude Wind Tunnel (AWT) at the NASA Lewis Research Center is under study with the goal of providing a modern subsonic wind tunnel for conducting propulsion system/airframe integration, isolated propulsion system, propulsion acoustics and adverse weather tests. Because of the increased Mach number capability (from Mach 0.6 to 0.9 plus) and the incorporation of acoustic and adverse weather capabilities into an existing tunnel, the AWT rehabilitation represents a significant technical challenge. In order to reduce the risk associated with such an undertaking, and extensive AWT modeling program is being conducted to guide and verify the tunnel design. Significant

findings and progress in this modeling program are the subject of this paper. Author

N86-16234*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE CONSTRUCTION OF AIRFOIL PRESSURE MODELS BY THE PLATE METHOD: ACHIEVEMENTS, CURRENT RESEARCH, TECHNOLOGY DEVELOPMENT AND POTENTIAL APPLICATIONS
Pierce L. Lawing Sep. 1985 34 p refs
(NASA-TM-87613; NAS 1.15:87613) Avail: NTIS HC A03/MF A01 CSCL 14B

A method of constructing airfoils by inscribing pressure channels on the face of opposing plates, bonding them together to form one plate with integral channels, and contour machining this plate to form an airfoil model is described. The research and development program to develop the bonding technology is described as well as the construction and testing of an airfoil model. Sample aerodynamic data sets are presented and discussed. Also, work currently under way to produce thin airfoils with camber is presented. Samples of the aft section of a 6 percent airfoil with complete pressure instrumentation including the trailing edge are pictured and described. This technique is particularly useful in fabricating models for transonic cryogenic testing, but it should find application in a wide ange of model construction projects, as well as the fabrication of fuel injectors, space hardware, and other applications requiring advanced bonding technology and intricate fluid passages. Author

N86-16235# Duits-Nederlandse Windtunnel, Noordoostpolder (Netherlands).
GERMAN-DUTCH WIND TUNNEL (DNW). PRESENT AND FUTURE APPLICATIONS FOR INDUSTRIAL DEVELOPMENTS [DEUTSCH-NIEDERLAENDISCHER WINDKANAL (DNW). GEGENWAERTIGER UND KUENFTIGER EINSATZ FUER INDUSTRIELLE ENTWICKLUNGEN]
J. Barche 1983 43 p refs In GERMAN Presented at 3rd BMFT Statusseminar Luftfahrtforschung und Luftfahrttechnology, Hamburg, West Germany, 2-4 May 1983
Avail: NTIS HC A03/MF A01

The German-Dutch wind tunnel was designed to perform aerodynamic and aeroacoustic development investigations in the subsonic range. The wind tunnel is composed of closed test sections with transverse sections of 6 m x 6 m, 8 m x 6 m and 9.5 m x 9.5 m and with respective velocity of 150, 120, and 60 m/sec, and of open test sections with 8 m x 6 m entry surface and with a maximum velocity of 80 m/sec. The tunnel is applied for productive testing of aircraft, vehicles and civil engineering, for demonstration, calibration and system integration. Author (ESA)

N86-16236# Duits-Nederlandse Windtunnel, Noordoostpolder (Netherlands).
AEROACOUSTIC CALIBRATION OF THE GERMAN-DUTCH WIND TUNNEL (DNW) OPEN JET
R. Ross (National Aerospace Lab., Northeast Polder, Netherlands), J. W. G. vanNunen (National Aerospace Lab., Northeast Polder, Netherlands), K. J. Young (Boeing Commercial Airplane Co., Seattle, Wash.), R. M. Allen (Boeing Commercial Airplane Co., Seattle, Wash.), and J. C. A. vanDitshuizen 1983 102 p refs
(DNW-TR-82-03; D6-51501) Avail: NTIS HC A06/MF A01

The aerodynamic and acoustic quality of the German-Dutch Wind Tunnel open jet test section configuration was established. The flow quality is found to be excellent; for the core region angular deviations up to 0.1 deg, turbulence levels of 0.2% and dynamic pressure deviations of 0.5% are reported. Near the shear layer these values become higher. The anechoic quality meets reasonably high standards. The acoustic correction procedures for 1/3 octave analysis were checked. The usual shear layer correction has to be extended to correct for turbulence effects for high tunnel velocity, high frequency, and the most forward and the most rearward propagation angles from the sound source. This correction is independent of the position of the model in the flow and the type of sound source (tone or broadband). Author (ESA)

N86-16237# Duits-Nederlandse Windtunnel, Noordoostpolder (Netherlands).
ACOUSTIC EVALUATION OF THE GERMAN-DUTCH WIND TUNNEL (DNW) SHEAR LAYER CORRECTION USING A MODEL JET
W. H. Herkes (Boeing Commercial Airplane Co., Seattle, Wash.), F. G. Strout (Boeing Commercial Airplane Co., Seattle, Wash.), R. Ross (National Aerospace Lab., Northeast Polder, Netherlands), and J. C. A. vanDitshuizen 1983 140 p refs
(DNW-TR-82-04; D6-51502) Avail: NTIS HC A07/MF A01

Acoustic tests of a 6-cm model jet were conducted in the German-Dutch Wind Tunnel 6m by 8m free jet facility to evaluate a free jet shear layer correction procedure that adds an empirical correction to the previous theoretical correction. Static-flight effects on jet noise measured in the flow were used to evaluate the corresponding out-of-flow results. The experiment demonstrates that the procedure significantly improves the accuracy of the flight effects measured by the out-of-flow microphones. Comparisons of the out-of-flow free jet results to results obtained in closed wind tunnels and from aircraft flyovers show consistent trends. Author (ESA)

N86-16238# Duits-Nederlandse Windtunnel, Noordoostpolder (Netherlands).
AERODYNAMICAL CALIBRATION OF THE GERMAN-DUTCH WIND TUNNEL (DNW): A REVIEW OF TESTING TECHNIQUES AND RESULTS
Feb. 1983 7 p
(DNW-PA-82062) Avail: NTIS HC A02/MF A01

System checkout, performance measurement, and aerodynamical calibration of the German-Dutch Wind Tunnel are summarized. Mechanical and electrical system tests; flow quality measurements; static and dynamic performance assessment; temperature and pressure distribution measurement; and turbulence and spectral characteristics measurement are described. Author (ESA)

N86-16239# National Bureau of Standards, Gaithersburg, Md. Center for Building Technology.
PERFORMANCE REQUIREMENTS AND PRELIMINARY DESIGN OF A BOUNDARY LAYER WIND TUNNEL FACILITY Final Report
R. D. Marshall May 1985 68 p
(PB85-224418; NBSIR-85/3168) Avail: NTIS HC A04/MF A01 CSCL 14B

This report describes performance characteristics and design details of a boundary layer wind tunnel for suppporting research activities within the Center for Building Technology. Two preliminary designs, the first consisting of a conventional closed-circuit scheme in an over/under configuration and the second consisting of an open-circuit scheme with a pusher or blow-down configuration, are addressed. Author (GRA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-16240# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
COMPARISON OF ALTERNATIVE STRATEGIES OF RETURN TO THE MOON (CASTOR)
H. Hermann Koelle, Uwe Apel, and Bernd Johenning 10 Aug. 1985 40 p refs
(ILR-MITT-153) Avail: NTIS HC A03/MF A01

Strategies of constructing and supporting a permanent lunar base for 25 operational years with a crew of 6, 30, or 120 respectively were assessed. If initial development funding is available in 1991, beneficial occupancy of such lunar bases could occur in the 2001 to 2004 time bracket. The cost is estimated to

be on the order of 56, 65, and 106 billion 1985 $ respectively leading to a cost-effectiveness of 338, 83, and 33 million 1985 $ per lunar man-year for the alternatives. Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-16241# Naval Surface Weapons Center, Dahlgren, Va.
DIFFERENTIAL CORRECTION OF ORBITS BY KEPLER VERSUS CARTESIAN PARAMETERS Final Report
C. H. Seay Dec. 1984 17 p
(AD-A157868; AD-F350035; NSWC/TR-85-17) Avail: NTIS HC A02/MF A01 CSCL 22/3

Numerical integration of orbits of near Earth satellites is usually carried out in a Cartesian Coordinate System. When performing the differential correction of an initial orbit to match observations, the parameters of the solution are sometimes the corrections to the position and velocity vector of the satellite at epoch. At the Naval Surface Weapons Center, however, the parameters chosen are Kepler parameters modified to avoid singularity for circular orbits. The rate of convergence for a sample case was not found to be significantly different for the two parameterizations, but a significant gain in numerical accuracy was obtained with the set of Kepler parameters. GRA

N86-16242# Lawrence Livermore National Lab., Calif.
HARMONICALLY EXCITED ORBITAL VARIATIONS
T. Morgan Aug. 1985 11 p refs Presented at the International Astronautical Federation Congress, Stockholm, Sweden, 7 Oct. 1985
(Contract W-7405-eng-48)
(DE85-017102; UCRL-93154; CONF-8510146-1) Avail: NTIS HC A02/MF A01

Rephrasing the equations of motion for orbital maneuvers in terms of Lagrangian generalized coordinates instead of Newtonian rectangular Cartesian coordinates can make certain harmonic terms in the orbital angular momentum vector more readily apparent. In this formulation the equations of motion adopt the form of a damped harmonic oscillator when torques are applied to the orbit in a variationally prescribed manner. The frequencies of the oscillator equation are in some ways unexpected but can nonetheless be exploited through resonant forcing functions to achieve large secular variations in the orbital elements. Two cases are discussed using a circular orbit as the control case: (1) large changes in orbital inclination achieved by harmonic excitation rather than one impulsive velocity change, and (2) periodic and secular changes to the longitude of the ascending node using both stable and unstable excitation strategies. The implications of these equations are also discussed for both artificial satellites and natural satellites. For the former, two utilitarian orbits are suggested, each exploiting a form of harmonic excitation. DOE

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-16651# Sandia National Labs., Albuquerque, N. Mex.
ULTRA-HIGH-VELOCITY IMPACTS UTILIZING A ROCKET SLED AND AN EXPLOSIVELY ACCELERATED FLYER PLATE
R. A. Benham and W. R. Kampfe *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 51-55 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/2

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-16243*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERSONIC AERODYNAMIC CHARACTERISTICS OF SOME REENTRY CONCEPTS FOR ANGLES OF ATTACK TO 90 DEG
M. Leroy Spearman Nov. 1985 32 p refs
(NASA-TM-87645; NAS 1.15:87645) Avail: NTIS HC A03/MF A01 CSCL 22B

Past studies of reentry vehicles tested to high angles of attack (up to 90 deg) in the Mach number range from 2 to 4.6 are reviewed. Two basic planforms are considered: highly-swept deltas and circular. The delta concepts include variations in cross section (and thus volume) and in camber distribution. The effectiveness of various types of aerodynamic control devices is also included. The purpose of the paper is to examine the characteristics of the vehicles with a view toward the potential usefulness of such concepts in a flight regime that would include reentry from space into the atmosphere followed by a transition to sustained atmospheric flight. Author

N86-16244# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DETERMINATION OF NECESSARY COMMANDS FOR THE MOTION OF A ROCKET ON A GIVEN LINEAR TRAJECTORY IN THE ATMOSPHERE
A. Codoban 27 Aug. 1985 23 p Transl. into ENGLISH from Studii si Cercetari de Mecanica Aplicata (Romania), v. 42, no. 3, May - Jun. 1983 p 223-239
(AD-A159352; AD-E700020; FTD-ID(RS)T-1271-84) Avail: NTIS HC A02/MF A01 CSCL 09/2

The variation in time of the attack angle of the control surfaces of a rocket so that it is moving on a given linear trajectory in the atmosphere is determined in this paper. Variation of aerodynamic coefficients with the Mach number is considered as well as the variation in time (in the fuel combustion stage) of the moments of inertia and the position of the center of mass of the rocket. Air density and sound velocity are assumed variable with the altitude. A numerical calculation example solved with the algorithm presented in this paper is shown in the end. Author (GRA)

N86-16245# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
PRESENTATION OF AEROSPATIALE'S LAUNCHER GUIDANCE METHODS [PRESENTATION DES METHODES DE PILOTAGE DE LANCEUR DE L'AEROSPATIALE]
J. Dupont 1985 15 p In FRENCH Presented at Journees Statist. Ind., Luminy, France, 28-30 Jan. 1985
(SNIAS-852-422-109) Avail: NTIS HC A02/MF A01

The mathematical model of a launcher based on Lagrange coordinates and a description of the guiding system based on a linear quadratic Gaussian synthesis (LQG) are discussed. It is shown that while LQG gives good results and robustness, there are problems to be solved, including the choice of a reduced model, the possibility of reducing the gain of the quadratic criteria or of the noise covariance, and saturation of commands. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-16246*# Martin Marietta Aerospace, Denver, Colo.
SPACE SHUTTLE PROGRAM SOLID ROCKET BOOSTER DECELERATOR SUBSYSTEM Final Report
James W. Barnard Sep. 1985 89 p
(Contract NA8-32122)
(NASA-CR-178576; NAS 1.26:178576; DR-MA-6; SRB-DSS-MA6) Avail: NTIS HC A05/MF A01 CSCL 22B

The recovery of the Solid Rocket Boosters presented a major challenge. The SRB represents the largest payload ever recovered and presents the added complication that it is continually emitting hot gases and burning particles of insulation and other debris. Some items, such as portions of the nozzle, are large enough to burn through the nylon parachute material. The SRB Decelerator Subsystem program was highly successful in that no SRB has been lost as a result of inadequate performance of the DSS.
G.L.C.

N86-16247# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
FIRST GERMAN SPACELAB MISSION D1 REPORTS [ERSTE DEUTSCHE SPACELAB-MISSION D1-REPORT]
Jun. 1985 7 p In GERMAN
Avail: NTIS HC A02/MF A01

The D1 Spacelab mission scientific space freight was dispatched from Bremen to the NASA Cape Canaveral launching site on a Boeing 747 freight and on a Lockheed C5A Galaxy. The Spacelab standard racks were integrated into the space laboratory (level 3 integration) and the payload elements to be exposed to space environment on the launcher structure. Simulations of the functions with the Columbia space shuttle were tested. Mission phases under flight conditions were tested in the integration hall at MBB-ERNO. Fluid shift under weightlessness was studied by measuring the eye's internal pressures with a tonometer.
Author (ESA)

N86-16248# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
MANNED FLIGHT SAFETY [SECURITE DU VOL HABITE]
Jean-Claude Crenenet (CNES, Evry, France) and Christine Macadre 1985 15 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984 (SNIAS-852-422-106) Avail: NTIS HC A02/MF A01

An analysis for the development of the transfer functions necessary for space flight safety planning is presented. The study precedes the design of the material elements, based on an Ariane launching. The organization of the safety research team is discussed.
Author (ESA)

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-16249*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF INTERSATELLITE LINKS TO DOMESTIC SATELLITE SYSTEMS
Denise S. Ponchak and Rodney L. Spence 1986 17 p refs
Proposed for presentation at the 11th Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87215; E-2829; NAS 1.15:87215) Avail: NTIS HC A02/MF A01 CSCL 09F

The results of a study on intersatellite link (ISL) applications for domestic satellite communications are presented. It was determined if any technical, economic, or performance benefits could be gained by introducing intersatellite links into a domestic satellite communication network. Several key systems issues of domestic ISL's are addressed. These include the effect of a skewed traffic distribution on the selection of ISL satellite orbit locations, tolerable satellite spacing, and crosslink traffic-handling requirements. An ISL technology assessment is made by performing a parametric link analysis for several microwave and optical implementations. The impact of the crosslink on the end-to-end link performance is investigated for both regenerative and nonregenerative ISL architectures. A comparison is made between single satellite systems operating at C-, and Ku-bands and the corresponding ISL systems in terms of ground segment cost, space segment cost, and net link performance. Results indicate that ISL's can effectively expand the CONUS orbital arc, with a 60 GHz ISL implementation being the most attractive.
Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-16250*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DECOUPLED AND LINEAR QUADRATIC REGULATOR CONTROL OF A LARGE, FLEXIBLE SPACE ANTENNA WITH AN OBSERVER IN THE CONTROL LOOP
Harold A. Hamer, Katherine G. Johnson, and John W. Young Nov. 1985 74 p refs
(NASA-TP-2484; L-15913; NAS 1.60:2484) Avail: NTIS HC A04/MF A01 CSCL 22B

An analysis is performed to compare decoupled and linear quadratic regulator (LQR) procedures for the control of a large, flexible space antenna. Control objectives involve: (1) commanding changes in the rigid-body modes, (2) nulling initial disturbances in the rigid-body modes, or (3) nulling initial disturbances in the first three flexible modes. Control is achieved with two three-axis control-moment gyros located on the antenna column. Results are presented to illustrate various effects on control requirements for the two procedures. These effects include errors in the initial estimates of state variables, variations in the type, number, and location of sensors, and deletions of state-variable estimates for certain flexible modes after control activation. The advantages of incorporating a time lag in the control feedback are also illustrated. In addition, the effects of inoperative-control situations are analyzed with regard to control requirements and resultant modal responses. Comparisons are included which show the effects of perfect state feedback with no residual modes (ideal case). Time-history responses are presented to illustrate the various effects on the control procedures.
Author

N86-16251*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DYNAMIC MODELING AND ADAPTIVE CONTROL FOR SPACE STATIONS
Che-Hang Charles Ih and Shyh Jong Wang 15 Jul. 1985 301 p refs
(Contract NAS7-918)
(NASA-CR-176442; JPL-Pub-85-57; NAS 1.26:176442) Avail: NTIS HC A14/MF A01 CSCL 22B

Of all large space structural systems, space stations present

a unique challenge and requirement to advanced control technology. Their operations require control system stability over an extremely broad range of parameter changes and high level of disturbances. During shuttle docking the system mass may suddenly increase by more than 100% and during station assembly the mass may vary even more drastically. These coupled with the inherent dynamic model uncertainties associated with large space structural systems require highly sophisticated control systems that can grow as the stations evolve and cope with the uncertainties and time-varying elements to maintain the stability and pointing of the space stations. The aspects of space station operational properties are first examined, including configurations, dynamic models, shuttle docking contact dynamics, solar panel interaction, and load reduction to yield a set of system models and conditions. A model reference adaptive control algorithm along with the inner-loop plant augmentation design for controlling the space stations under severe operational conditions of shuttle docking, excessive model parameter errors, and model truncation are then investigated. The instability problem caused by the zero-frequency rigid body modes and a proposed solution using plant augmentation are addressed. Two sets of sufficient conditions which guarantee the globablly asymptotic stability for the space station systems are obtained. Author

N86-16252*# Alabama Univ., Huntsville.
ANALYSIS OF SATELLITE DRAG AND SPIN DECAY DATA Final Technical Report
Gerald R. Karr Sep. 1985 20 p
(Contract NAS8-35663)
(NASA-CR-178609; NAS 1.26:178609; UAH-456) Avail: NTIS HC A02/MF A01 CSCL 22A

Work was begun as an effort to obtain satellite drag and upper atmospheric wind data from a spinning spherical satellite to be launched from the space shuttle scheduled for the STS-11 flight. The satellite was an inflated sphere having high area-to-mass ratio which would result in measurable orbital decay due to aerodynamic drag forces experienced by the satellite in the Earth's upper atmosphere. The satellite would also experience a spin decay due to the aerodynamic torque acting to slow the satellite spinning. The original proposal was to develop data analysis procedures to be employed to extract the desired information. Work was performed concerning the data analysis procedure prior to the STS-11 launch; however, the major effort was to begin after the data had been obtained. Unfortunately, the launch of the inflatable sphere on STS-11 was a failure in that the sphere did not inflate properly and no data was obtained. The emphasis of the work planned under this effort was then changed to develop a proposal for a series of experiments similar to the one originally planned for STS-11. G.L.C.

N86-16253# Naval Surface Weapons Center, Dahlgren, Va.
SATELLITE DRAG PERTURBATIONS IN NONSINGULAR VARIABLES PRODUCED BY AN OBLATE DIURNAL ATMOSPHERE. PART 1: THEORY Final Report
A. D. Parks Oct. 1984 30 p
(AD-A157869; AD-F350036; NSWC/TR-84-353) Avail: NTIS HC A03/MF A01 CSCL 22/3

Analytic expressions are derived that describe the atmospheric drag induced decay rates for the semimajor axis and eccentricity for orbits of small eccentricity. The effects of both the oblate Earth figure and diurnal density variations are included in the development. Equations describing the effects of geopotential perturbations are also summarized. GRA

N86-16254# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
SPACECRAFT, STRAIGHT-TUBE EVAPORATOR DESIGN Final Report, 1 Jul. 1983 - 31 Mar. 1985
R. E. Eastman May 1985 85 p
(AF Proj. 240-2)
(AD-A158757; AFWAL-TR-85-3024) Avail: NTIS HC A05/MF A01 CSCL 13/1

Two-phase (liquid-vapor) heat transfer systems are being considered for use on future spacecraft cooling systems operating at high energy levels. The design of straight-tube evaporators was studied for this application. The forced convective boiling phenomenon was examined to determine the characteristics of boiling flow and possible effects of gravitational acceleration. Experiments with straight-tube evaporators indicated that pressure fluctuations caused by slug flow may hamper efforts to build two-phase cooling systems. Upstream orifices and twisted tape inserts were investigated to overcome this problem. A method was also developed to size an evaporator based on the best available correlation equations. Some errors were corrected for flow-boiling heat transfer equations found in the literature. GRA

N86-16255# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Dept. Essais Thermiques.
THE HIGH TEMPERATURE OXIDATING ATMOSPHERE TEST FACILITIES AT SNIAS [LES MOYENS D'ESSAIS HAUTE TEMPERATURE AMBIANCES OXYDANTES DE L'AEROSPATIALE]
Pierre Brunelot and Jean-Pierre Serranno 1985 22 p In FRENCH
(SNIAS-852-430-106; AQEE/T-7737/PB/MF) Avail: NTIS HC A02/MF A01

Facilities to test spacecraft heat shields are described. The reentry conditions are simulated by infrared radiation generators, arc image generators, and a plasma generator with an electrical power capacity of 42,000 KVA. The design of a second generation plasma generator and an oxygen controlled oxidating environment chamber are described. Prototypes are operational. Author (ESA)

N86-16639# General Electric Co., Philadelphia, Pa. Space System Div.
APPLICATION OF THE ITD ALGORITHM TO LANDSAT TRANSIENT RESPONSES
R. R. Kauffman *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 81-89 refs
(For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washingtonn, D.C. 20375 CSCL 22/2

N86-16643# Indian Space Research Organization, Bangalore. Structures Div.
LOW ORDER DYNAMIC MODELS OF INDIAN REMOTE SENSING SATELLITE
M. Sambasiva Rao, B. G. Prakash, and M. S. S. Prabhu *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 129-153 (For primary document see N86-16632 07-39)
Copyright. Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 22/2

N86-16654# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN UPDATE OF SPACECRAFT DYNAMIC ENVIRONMENTS INDUCED BY GROUND TRANSPORTATION
N. R. OConnell *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 77-85 refs
(For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-16256 Iowa Univ., Iowa City.
GEOCORONAL IMAGING WITH DYNAMICS EXPLORER Ph.D. Thesis
Richard Louis Rairden 1985 159 p
Avail: Univ. Microfilms Order No. DA8518866

The ultraviolet photometer of the University of Iowa spin-scan

auroral imaging instrumentation on board the Dynamics Explorer-1 satellite has returned numerous images of the geocorona from altitudes of 570 km to 23,300 km. The geocoronal emissions viewed arise from the resonant scattering of solar lyman-alpha radiation by the neutral hydrogen atoms which make up the Earth's tenuous exosphere. The geocoronal observations from 1981 through 1984 are compared to a spherically symmetric isothermal Chamberlain model of the exospheric density distribution. Model parameters are varied to obtain an acceptable fit. The radiative transfer equation is solved numerically for this multiple-scattering problem. Stellar intensities are monitored for inflight-calibration of the DE-1 instrument. The solar Ly alpha flux is estimated through concurrent measurements made by the SME satellite, supplemented by published values of ground observable solar indices. Dissert. Abstr.

N86-16257# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
SOME DESIGN CONSIDERATION ON A FAST, RELIABLE AND LOW-POWER MULTIPROCESSOR SYSTEM FOR IMAGE PROCESSING ON BOARD SCIENTIFIC SATELLITES
F. A. Gerritsen, A. Monkel, and H. F. A. Roefs 22 Nov. 1983 29 p refs Submitted for publication
(Contracts ESTEC-5047/82/NL-HP; NIVR-1987)
(NLR-MP-83071-U; B8568521) Avail: NTIS HC A03/MF A01

The design of an image compression and decompression system for use on board scientific satellites is discussed. The multiprocessor system is programmable with image compression/decompression algorithms to process image data at relatively high throughput rates with a relatively low power consumption. The system fits in a relatively small volume. Enhancement of the adaptability of the system to a range of scientific satellites is emphasized. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-16258*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RELIABILITY AND MASS ANALYSIS OF DYNAMIC POWER CONVERSION SYSTEMS WITH PARALLEL OF STANDBY REDUNDANCY
Albert J. Juhasz and Harvey S. Bloomfield 1985 16 p ref Presented at the 2nd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 14-16 Jan. 1985; sponsored by New Mexico Univ.
(NASA-TM-87189; E-2668; NAS 1.15:87189) Avail: NTIS HC A02/MF A01 CSCL 21F

A combinatorial reliability approach is used to identify potential dynamic power conversion systems for space mission applications. A reliability and mass analysis is also performed, specifically for a 100 kWe nuclear Brayton power conversion system with parallel redundancy. Although this study is done for a reactor outlet temperature of 1100K, preliminary system mass estimates are also included for reactor outlet temperatures ranging up to 1500 K. Author

N86-16259*# Little (Arthur D.), Inc., Cambridge, Mass.
LIQUID BELT RADIATOR DESIGN STUDY Final Report
W. P. Teagan and K. F. Fitzgerald Jan. 1986 53 p refs
(Contract NAS3-23889)
(NASA-CR-174901; NAS 1.26:174901) Avail: NTIS HC A04/MF A01 CSCL 22B

The Liquid Belt Radiator (LBR) is an advanced concept developed to meet the needs of anticipated future space missions. A previous study documented the advantages of this concept as a lightweight, easily deployable alternative to present day space heat rejection systems. The technical efforts associated with this study concentrate on refining the concept of the LBR as well as examining the issues of belt dynamics and potential application of the LBR to intermediate and high temperature heat rejection applications. A low temperature point design developed in previous work is updated assuming the use of diffusion pump oil, Santovac-6, as the heat transfer media. Additional analytical and design effort is directed toward determining the impact of interface heat exchanger, fluid bath sealing, and belt drive mechanism designs on system performance and mass. The updated design supports the earlier result by indicating a significant reduction in system specific system mass as compared to heat pipe or pumped fluid radiator concepts currently under consideration (1.3 kg/sq m versus 5 kg/sq m). Author

N86-16260# Los Alamos National Lab., N. Mex.
ANTI-MATTER PROPULSION: FEASIBILITY, STATUS AND POSSIBLE ENHANCEMENT
S. D. Howe 1985 13 p Presented at the Manned Mars Mission Workshop, Huntsville, Ala., 10 Jun. 1985
(Contract W-7405-eng-36)
(DE85-015716; LA-UR-85-2443; CONF-8506149-3) Avail: NTIS HC A02/MF A01

The possible use of advanced propulsion techniques must be considered if the currently envisioned launch date of the Manned Mars Mission were to be delayed until 2020 or later. Within the next 30 years, technological advances may allow such methods as beaming power to the ship, inertial-confinemant fusion, or mass-conversion of antiprotons to become feasible. Of the possible methods, the antiproton (anti-p), reaction offers the highest potential, the greatest problems, and the most fascination. An Isp of 5000 s would allow the currently envisioned ship to fly to Mars in 3 months and would require about one million pounds to be assembled in Earth orbit. Antiprotons are currently being produced in the world in amounts of about 10 to the 14th power particles per year. With sufficient effort, almost a mg/yr could be produced by the early 2000s. Current experiments plan to decelerate and capture about 10 to the 10th power or greater antiprotons in an electrostatic Penning trap. Such traps may provide a source of low energy anti-p's for development of better storage mechanisms suitable for propulsion. Recently, proposals have been investigated which would amplify the average energy released per anti-p used. The proposals entail using the anti-p's to produce inertial confinement fusion of a capsule or to produce negative muons which can catalyze fusion. By increasing the energy released per anti-p, the effective specific cost, $/joule, can be reduced to attractive levels. These two proposals and other areas of research can be investigated now and will help in assessing the feasibility of an anti-p engine. DOE

N86-16261# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
AGING OF ROCKET MOTORS
Anders Schwartz May 1985 32 p refs In SWEDISH; ENGLISH summary
(FOA-C-20573-D1(D3); ISSN-0347-3694) Avail: NTIS HC A03/MF A01

Storage effects on solid rocket propellants are discussed. Properties can change in such a way that the function of the motors can deteriorate. Physical and chemical aging can change the rheological properties of the propellants. At static firing of motors at different temperatures pressure and thrust were measured. When the propellant is case bonded, turning and cutting must be done in the motor case before test pieces can be made. Chemical aging may occur in double based propellants and in composite propellants. Data must be available on the temperature variations in the storage places; with the aid of these data, accelerated aging tests can be carried out at realistic temperatures, and to get a picture of how the propellant will change in the following years. Test methods were worked out and standardized. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-16262 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
TEMPERATURE FIXED POINTS 2. BENZOIC ACID TRIPLE-POINT CELLS
M. F. Vaughan and J. Butler Feb. 1985 25 p refs
(NPL-QU-71; ISSN-0309-3050) Copyright. Avail: Issuing Activity

The need for temperature fixed points close to 120C is recalled. Since one of the secondary reference points listed in the International Practical Temperature Scale of 1968 is the triple point of benzoic acid 122.37C, a fixed point based on this compound was developed. The production and evaluation of such benzoic acid triple point cells are described. The results indicate that the triple point of benzoic acid is 122.365C, + or - 0.005C. Several of the cells produced have fixed point temperatures close to this value. Author (ESA)

N86-16263 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
TEMPERATURE FIXED POINTS 3. PURITY OF ORGANIC COMPOUNDS
M. F. Vaughan Jun. 1985 21 p refs
(NPL-QU-72; ISSN-0309-3050) Copyright. Avail: Issuing Activity

A method for determining the purities of compounds of organic triple point cells having fixed points with repeatabilities of + or - 0.001C to + or - 0.0001C is described. It is based on the lowering of the freezing point, and requires little supervision. When triple point conditions (i.e., in the absence of atmospheric pressure and dissolved air) are used, purities of 99.999% can be determined. The method is used to monitor procedures for the purification of ethylene carbonate, diphenyl ether, benzoic acid, benzene, phenol, icosane, and 4-nitrotoluene. Author (ESA)

N86-16264# Pacific Northwest Lab., Richland, Wash.
ANALYSIS OF SEMI-VOLATILE ORGANIC COMPOUNDS USING SUPERCRITICAL FLUID METHODOLOGIES
B. W. Wright, E. K. Chess, C. R. Yonker, and R. D. Smith Jun. 1985 7 p Presented at the 5th Annual National Symposium on Recent Advances in the Measurement of Air Pollutants, Raleigh, N. C., 14 May 1985
(Contract DE-AC06-76RL-01830)
(DE85-016620; PNL-SA-13013S; CONF-850564-1) Avail: NTIS HC A02/MF A01

This study demonstrates the applicability of supercritical fluid chromatography (SFC) and analytical supercritical fluid extraction (SFE) for the analysis of semivolatile compounds. Mixtures of nitro-polycyclic aromatic hydrocarbons that are not ammenable to gas chromatography were separated using SFC with tentative compound identifications made by SFC-MS. Comparisons of analytical SFE of XAD-2 resin and NBS Urban Dust (SRM 1649) to conventional Soxhlet extraction are also discussed. DOE

N86-16265# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
KINETICS OF THE REACTIONS BETWEEN CH2(X3B1)-RADICALS AND SATURATED HYDROCARBONS IN THE TEMPERATURE RANGE 296 TO 705 K
T. Boehland (Hungarian Academy of Sciences, Budapest), S. Dobe, F. Temps, and H. Gg. G. Wagner May 1985 37 p refs
(MPIS-11/1985; ISSN-0436-1199) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

The kinetics of H-atom abstraction by 3CH2-radicals from saturated organic molecules is quantified. Experimental data for selected reactions of 3CH2 were analyzed to yield Arrhenius parameters for H-abstraction from different types of C-H bonds covering a wide range of bond energies. It is shown how the concurrent reactions of 1CH2 have to be taken into account. The results allow the prediction of rate constants for the reactions of 3CH2 with numerous reactants over a wide temperature range. They are especially useful for a separation of abstraction and addition channels in the reactions of 3CH2 with unsaturated hydrocarbons. The data obtained for the prototype radical CH2 contribute to the understanding of the chemistry of other carbenes. Author (ESA)

N86-16266# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
THE CONTRIBUTIONS OF INTERSYSTEM CROSSING AND REACTION IN THE REMOVAL OF CH2(a1A1) BY HYDROCARBONS STUDIED WITH LASER MAGNETIC RESONANCE (LMR)
T. Boehland, F. Temps, and H. G. G. Wagner May 1985 29 p refs Sponsored by Fonds der Chemie
(MPIS-10/1985; ISSN-0436-1199) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

The formation of ground state CH2 (X 3B1)-radicals in the collisional removal of CH2 (a1A1) by selected hydrocarbons was studied in the gas phase at room temperature using Laser Magnetic Resonance (LMR). The radicals were generated by excimer laser photolysis of CH2CO at 308 nm in the presence of varying concentrations of RH. The yields of CH2 (X3B1) produced by intersystem crossing were measured with the LMR. Presuming the primary quantum yield for CH2 (X3B1) formation in the CH2CO photodissociation to be 0, the branching ratios for intersystem crossing were found. For values >0 the results have to be regarded as upper limits. Hence, for all hydrocarbons studied, reactive quenching is the dominating CH2 (a1A1) removal pathway. Author (ESA)

24 COMPOSITE MATERIALS

Includes laminates.

N86-16267 Department of the Air Force, Washington, D.C.
CIRCUMFERENTIALLY WRAPPED CARBON-CARBON STRUCTURE Patent
G. A. Wallace and J. E. Zimmer, inventors (to Air Force) Issued 11 Jun. 1985 5 p Supersedes AD-D010974
(AD-D011904; US-Patent-4,522,883; US-Patent-Appl-SN-578335; US-Patent-Class-428-365) Avail: US Patent and Trademark Office CSCL 11/4

An improved carbon-carbon composite structure is described which consists essentially of a central core, a plurality of layers of circumferentially wrapped woven cotton fabric; and a carbon binder, wherein the central core consists essentially of a plurality of longitudinally oriented carbon fibers. There is also provided a method for fabricating an improved carbon-carbon nosetip preform for a reentry vehicle which consists essentially of providing at least one rigidized carbon rod to build up a desired thickness of fabric, impregnating the built-up structure with a suitable binder, carbonizing the binder and graphitizing the composite structure. There is further provided an apparatus for fabricating a nosetip preform which comprises a two-drum surface winder, one drum of which has a surface cover adapted to grip and propel a carbon fabric. GRA

N86-16268*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COMPUTED TOMOGRAPHY FOR NON-DESTRUCTIVE EVALUATION OF COMPOSITES: APPLICATIONS AND CORRELATIONS
B. Goldberg, L. Hediger, and E. Noel Aug. 1985 51 p refs
(NASA-TM-86529; NAS 1.15:86529) Avail: NTIS HC A04/MF A01 CSCL 11D

The state-of-the-art fabrication techniques for composite materials are such that stringent species-specific acceptance criteria must be generated to insure product reliability. Nondestructive evaluation techniques including computed tomography (CT), X-ray radiography (RT), and ultrasonic scanning (UT) are investigated and compared to determine their applicability and

limitations to graphite epoxy, carbon-carbon, and carbon-phenolic materials. While the techniques appear complementary, CT is shown to provide significant, heretofore unattainable data. Finally, a correlation of NDE techniques to destructive analysis is presented. Author

N86-16269*# Bjorksten Research Labs., Inc., Madison, Wis.
DEVELOPMENT OF A CONTINUOUS SPINNING PROCESS FOR PRODUCING SILICON CARBIDE - SILICON NITRIDE PRECURSOR FIBERS Final Report
[1985] 43 p
(Contract NAS8-34648)
(NASA-CR-178458; NAS 1.26:178458) Avail: NTIS HC A03/MF A01 CSCL 11D

An apparatus was designed for the continuous production of silicon carbide - silicon nitride precursor fibers. The precursor polymer can be fiberized, crosslined and pyrolyzed. The product is a metallic black fiber with the composition of the type C sub x Si sub y n sub z. Little, other than the tensile strength and modulus of elasticity, is known of the physical properties. E.R.

N86-16270*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. Aerospace Technologies Div.
AUTOCLAVE PROCESSING FOR COMPOSITE MATERIAL FABRICATION. 1: AN ANALYSIS OF RESIN FLOWS AND FIBER COMPACTIONS FOR THIN LAMINATE Final Report
T. H. Hou Nov. 1985 33 p refs
(Contract NAS1-18000)
(NASA-CR-178011; NAS 1.26:178011) Avail: NTIS HC A03/MF A01 CSCL 11D

High quality long fiber reinforced composites, such as those used in aerospace and industrial applications, are commonly processed in autoclaves. An adequate resin flow model for the entire system (laminate/bleeder/breather), which provides a description of the time-dependent laminate consolidation process, is useful in predicting the loss of resin, heat transfer characteristics, fiber volume fraction and part dimension, etc., under a specified set of processing conditions. This could be accomplished by properly analyzing the flow patterns and pressure profiles inside the laminate during processing. A newly formulated resin flow model for composite prepreg lamination process is reported. This model considers viscous resin flows in both directions perpendicular and parallel to the composite plane. In the horizontal direction, a squeezing flow between two nonporous parallel plates is analyzed, while in the vertical direction, a poiseuille type pressure flow through porous media is assumed. Proper force and mass balances have been made and solved for the whole system. The effects of fiber-fiber interactions during lamination are included as well. The unique features of this analysis are: (1) the pressure gradient inside the laminate is assumed to be generated from squeezing action between two adjacent approaching fiber layers, and (2) the behavior of fiber bundles is simulated by a Finitely Extendable Nonlinear Elastic (FENE) spring. Author

N86-16271*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHORT-WAVELENGTH BUCKLING AND SHEAR FAILURES FOR COMPRESSION-LOADED COMPOSITE LAMINATES Ph.D. Thesis
Mark J. Shuart Nov. 1985 227 p refs
(NASA-TM-87640; NAS 1.15:87640) Avail: NTIS HC A11/MF A01 CSCL 11D

The short-wavelength buckling (or the microbuckling) and the interlaminar and inplane shear failures of multi-directional composite laminates loaded in uniaxial compression are investigated. A laminate model is presented that idealizes each lamina. The fibers in the lamina are modeled as a plate, and the matrix in the lamina is modeled as an elastic foundation. The out-of-plane w displacement for each plate is expressed as a trigonometric series in the half-wavelength of the mode shape for laminate short-wavelength buckling. Nonlinear strain-displacement relations are used. The model is applied to symmetric laminates having linear material behavior. The laminates are loaded in uniform end shortening and are simply supported. A linear analysis is used to determine the laminate stress, strain, and mode shape when short-wavelength buckling occurs. The equations for the laminate compressive stress at short-wavelength buckling are dominated by matrix contributions. Author

N86-16272# Lawrence Livermore National Lab., Calif.
EFFECTS OF THERMAL EXPOSURE ON THE STRUCTURAL AND MECHANICAL INTEGRITY OF GRAPHITE FIBERS
J. A. Hodson, L. J. Gregory, and R. J. Morgan 5 Jul. 1985 15 p Presented at the 17th SAMPE National Technical Conference on Materials, Kiamesha Lake, N.Y., 22 Oct. 1985
(Contract W-7405-eng-48)
(DE85-014948; UCRL-90944; CONF-851034-1) Avail: NTIS HC A02/MF A01

Three polyacrylonitrile-based (PAN-based) carbon fibers have been examined with respect to their strength degradation following elevated-temperature exposure. Fibers were heat-treated at temperatures of 12000 C, 15000 C, 2000 C, and 25000 C for 10, 20 and 30 minutes. The nitrogen concentration was found to follow an Arrhenius-type plot and an activation energy of 16.7 kJ. mol.K was found for nitrogen evolution in carbon fibers. The Thornel 300 fiber was found to degrade at high heat treatment temperatures in contrast to the Celion 6000 and IM6 fibers, which did not suffer any degradation in strength at all. DOE

N86-16273# Rolls-Royce Ltd., Derby (England). Non-Metallics Labs.
THE MATERIAL DEVELOPMENT, COMPONENT MANUFACTURE, AND POST-SERVICE EVALUATION OF RB211-524 COWL DOORS UTILIZING CARBON FIBRE COMPOSITE MATERIALS
G. A. Owens 23 Jul. 1985 24 p refs
(PNR-90275) Avail: NTIS HC A02/MF A01

A lightweight engine element including carbon fiber reinforced epoxy composite skin bonded to aluminum alloy honeycombs is described. Material selection, mechanical property data and evaluation of the material's environmental resistance are discussed. Corrosion resistance of the honeycomb construction is considered. The effect of the operating conditions is assessed in 6000 hr tests. No significant structural deterioration is exhibited. Author (ESA)

N86-16274# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
MODELING OF TRANSIENT THERMAL TRANSFER IN ABLATIVE MATERIAL HEAT SHIELDING [MODELISATION DES TRANSFERTS THERMIQUES TRANSITOIRES DANS LES MATERIAUX DE PROTECTION THERMIQUE DEGRADABLES]
Ph. Pillois and A. Hordonneau 1985 11 p In FRENCH Presented at Club des Hautes Temp. Reunion, 24 Apr. 1985
(SNIAS-852-430-102) Avail: NTIS HC A02/MF A01

The design of heat shielding for civil or military space vehicles and its modeling and computerized simulation are discussed. The specifications of ablative materials are examined and three dimensional carbon fiber reinforced plastics are analyzed. The mechanisms of chemical and mechanical erosion are discussed. It is concluded that the choice of ablative heat shielding is linked to the type of mission, while the development of computerized models, manufacturing techniques, and test methods are essential to an efficient design. Author (ESA)

N86-16275# Societe Nationale Industrielle Aerospatiale, Paris (France).
STRUCTURE CHARACTERIZATION OF CARBON-CARBON COMPOSITES BY RAMAN MICROSPECTROMETRY [ETUDE DE LA STRUCTURATION DE COMPOSITES CARBONE-CARBONE A L'AIDE DE LA MICROSPECTROMETRIE RAMAN]
G. Rousseau 1985 13 p In FRENCH Presented at GFEC 85, 8-10 Sep. 1985
(SNIAS-852-430-108) Avail: NTIS HC A02/MF A01

Carbon-carbon composite raw materials, resulting composites

and their spectrometry are studied. The manufacturing procedure is described. A Microdil 28 spectrometer is used. Spectral resolution is 0.6 cm. The first order spectra are found in two distinct bands. The graphite composition may be deduced from it. It is shown that the crystal organization is a function of the original graphite raw material. Author (ESA)

N86-16276# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
NONDESTRUCTIVE INSPECTION: AN EFFICIENT INVESTMENT [LE CONTROLE NON DESTRUCTIF: UN INVESTISSEMENT RENTABLE]
Francois Albugues 1985 13 p In FRENCH Presented at 4th Journees des Materiaux Composites, Bordeaux, France, 14-15 May 1985
(SNIAS-852-430-110) Avail: NTIS HC A02/MF A01

Nondestructive methods and their application to composite materials inspection in the aircraft industry are reviewed. The methods include visual control, dimension control, radiography, thermography, ultrasonics, acoustic analysis, holographic interferometry, optical microscopy, optoelectronics, and microanalysis. Author (ESA)

N86-16277# Societe Nationale Industrielle Aerospatiale, Paris (France).
ARENYL: A SOLUBLE MOLD TECHNOLOGY [ARENYL: UNE TECHNOLOGIE DE MANDRIN SOLUBLE]
Frederic Goffeney 1985 5 p In FRENCH Presented at 4th Journees des Materiaux Composites, Bordeaux, France, 14-15 May 1985
(SNIAS-852-430-111) Avail: NTIS HC A02/MF A01

Application of Arenyl to composite materials molding for the aircraft industry is described. Arenyl is composed of polyvinyl alcohol (PVA) and sand, has good mechanical properties and may be disaggregated by water solution of the PVA. It is concluded that Arenyl offers a good solution to molding problems. Aircraft element examples are given. Author (ESA)

N86-16278# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Saptiaux.
STRUCTURAL DESIGN IN COMPOSITE MATERIALS [LOGICIEL DE CONCEPTIONS DE STRUCTURES BOBINEES]
Ph. Lalanne Apr. 1985 40 p refs In FRENCH Presented at Stage Calcul des Struct. en Materiaux Composites
(SNIAS-852-430-120) Avail: NTIS HC A03/MF A01

Computer aided design techniques are applied to structural design and illustrated by the case of a solid propellant ballistic missile second stage. The specifications and their translation in design parameters and computer program are discussed. The proposed system allows fast design changes and facilitates a finite element computation. The program details and the algorithms are analyzed. This automation of the design is shown to diminish consistently the design time and to increase its efficiency. Author (ESA)

N86-16279# Societe Nationale Industrielle Aerospatiale, Suresnes (France).
THE APPLICATIONS OF COMPOSITE MATERIALS IN THE AERONAUTICAL DOMAIN [LES APPLICATIONS DES COMPOSITES DANS LE DOMAINE AERONAUTIQUE]
G. Hellard, G. Hilaire, and M. Torres Apr. 1985 34 p In FRENCH
(SNIAS-852-551-103) Avail: NTIS HC A03/MF A01

The physical properties and the applications of composite materials to aircraft construction are described. Kevlar, carbon, and glass fiber properties are compared. Weight reduction and cost reduction are examined. Composite elements used in aircraft are described. Author (ESA)

N86-16280# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
AN OVERVIEW OF THE COMPUTER AIDED DESIGN AND MANUFACTURE OF ADVANCED COMPOSITES
J. C. Leon and G. M. Wells Feb. 1985 25 p
(AERE-R-11665) Avail: NTIS HC A02/MF A01

A computer aided design and manufacturing system for filament winding complex shaped fiber composite components has been developed and demonstrated. The basis of the system is a commercial 3-D surface modeller called Syatrid with which in-house application software has been integrated. The application software allows the definition and display of geodesic trajectories on the surface of a Systrid generated object and the generation of control data to enable a numerically controlled filament winding machine to place fiber along the chosen path. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-16281 Georgia Inst. of Tech., Atlanta.
NEW METHODS OF SUBLAMINATE ANALYSIS FOR COMPOSITE STRUCTURES AND APPLICATIONS TO FRACTURE PROCESSES Ph.D. Thesis
Erian Abdelmessih Armanios 1985 259 p
Avail: Univ. Microfilms Order No. DA8516405

Laminated composite structures exhibit mechanical properties which vary with orientation and have a variety of failure modes. Simple analytical models that include the essential modes of deformation exhibited by a laminated composite structure and are suitable to investigate their failure response are developed. The models are developed using an intuitive engineering approach and a modified Donnell Approach. The models are applied to selected practical configurations such as a compression specimen reinforced with end tabs. The analysis and design of a symmetric double cracked-lap-shear specimen provides insight into the delamination failure of laminated composite structures and engineering design data. A new look at energy release rate computations based on the crack closure method is presented and a new singular fitting method based on the finite element data is proposed. Dissert. Abstr.

N86-16282 Pennsylvania State Univ., University Park.
IMPLICATION OF LAMINAR FLAME STABILITY ON IGNITION OF COMBUSTIBLE GASES BY LINE HEAT SOURCES Ph.D. Thesis
Ming-Ming Yan 1985 192 p
Avail: Univ. Microfilms Order No. DA851122

The limiting ignition criterion based on the blow off limit of laminar flames stabilized in the wake or plume of line heat sources is examined. The effect of geometry of the heat source and the effect of free stream velocities on ignition limits are also considered. The results are relevant to problems of flame stabilization in combustors as well as the initiation of accidental fire and explosion. The theoretical analysis involves solution of the nonsimilar boundary layer equations for an ideal gas with a one step reaction while neglecting radiation. A deflagration wave is always stabilized at some point downstream of the source for these assumptions, but its position often shifts rapidly from near to far from the source over a limited range of reaction parameters. Measurements of the stabilization distance of laminar flames for three different wire sizes implies the flame stabilization above a heated wire is mainly due to the thermal effect and not a hydrodynamic effect. As the blow off limit is approached, a very small change of the source strength can result in the blow off of the flame. This trend is in agreement with the laminar wake/plume analysis. Dissert. Abstr.

N86-16283# National Bureau of Standards, Washington, D.C. Center for Fire Research.
AN EXPLORATION OF COMBUSTION LIMITATIONS AND

ALTERNATIVES TO THE NBS TOXICITY TEST METHOD
Barbara C. Levin, Vytenis Babrauskas, Emil Braun, Joshua Gurman, and Maya Paabo Nov. 1985 90 p refs Sponsored in part by the US Consumer Product Safety Commission
(NBSIR-85-3274) Avail: NTIS HC A05/MF A01

Some limitations and potential limitations of the NBS toxicity screening test method had been identified in earlier work. These limitations have now been explored in greater detail. Also investigated is an alternative combustion system, consisting of a radiant cone heater, identical to the one in the recently developed Cone Calorimeter, an enclosed combustion chamber, and a slightly revised variant of the animal chamber. The new animal chamber is so constructed that, prior to the insertion of the animals, it could be evacuated and then back-filled with a desired sampling of the combustion products. The radiant combustion system showed a different mix of capabilities and limitations compared to the cup furnace combustor in the existing test method. In the present project, the more detailed assessment of the cup furnace operation leads to the recommendation that there is no single, universally preferable combustion environment, but that the cup furnace is adequate for the intended purpose of providing toxicity screening. Author

N86-16284# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
INFRARED SPECTROSCOPY OF SINGLE AEROSOL PARTICLES
S. Arnold (Polytechnic Institute of N.Y., Brooklyn) and A. B. Pluchino 12 Dec. 1985 32 p refs
(ATR-85(8463)-1) Avail: NTIS HC A03/MF A01

A means is described for obtaining the infrared absorption spectrum of a single aerosol particle by photothermal modulation of visible scattered light near a structure resonance (structure resonance modulation spectroscopy). Author

N86-16285# State Univ. of New York at Buffalo, Amherst. Dept. of Chemistry.
ELECTROCHEMISTRY AT VERY SMALL ELECTRODES Final Report, 1 Jul. 1979 - 31 Mar. 1985
R. A. Osteryoung and J. G. Osteryoung Sep. 1985 8 p
(Contract N00014-79-C-0682)
(AD-A159368) Avail: NTIS HC A02/MF A01 CSCL 07/4

Work was carried out in three areas: (1) correlation of spectroscopy with the results of electrochemical experiments ion ionic liquids (molten salts); (2) studies of cathodic stripping voltammetry, primarily at silver electrodes studies of the behavior of microelectrodes; and (3) electrodes with micron dimensions. Results are summarized, primarily with reference to Technical Reports and journal publication. Author (GRA)

N86-16286# California Univ., Los Angeles.
ANALYSIS OF THE ABSORPTION SPECTRUM OF NEODYMIUM: SODIUM BETA ALUMINA
A. J. Alfrey, O. M. Stafsudd, B. Dunn, D. L. Yang, and L. Salmon Sep. 1985 29 p
(Contract N00014-83-K-0498)
(AD-A159437; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/2

Through an analysis of the absorption spectrum of Nd(3+) : Na Beta Alumina and derivation of Judd/Ofelt parameters, a model for the nearest neighbor crystal field of the Nd(3+) ion has been developed. The proposed model indicates that residual sodium in partially exchanged samples is responsible for distorting the symmetric orientation of conduction plane oxygen. This in turn induces a shift in the Nd ion within a sixfold symmetric arrangement of oxygen ions thereby inducing a linear field term in the crystal field parameters. This is responsible for the anomalous absorption strength in ND(3+) : Na Beta Alumina. Author (GRA)

N86-16287# Department of Energy, Washington, D. C.
SPOT TEST FOR 1,3,5-triamino-2,4,6-trinitrobenzene, TATB Patent Application
B. W. Harris, inventor (to DOE) (Los Alamos National Lab., N. Mex.) Filed 29 Nov. 1984 8 p
(Contract W-7405-eng-36)
(DE85-017725; US-Patent-Appl-SN-676149) Avail: NTIS HC A02/MF A01

A simple, sensitive and specific spot test for 1,3,5-triamino-2,4,6-trinitrobenzene, TATB, is described. Upon the application of the composition of matter of the subject invention to samples containing in excess of 0.1 mg of this explosive, a bright orange color results. Interfering species such as TNT and Tetryl can be removed by first treating the sample with a solvent which does not dissolve the TATB, but readily dissolves these interfering explosives. DOE

N86-16288# Los Alamos National Lab., N. Mex.
EXPERIMENTAL STUDIES OF ACTINIDES IN MOLTEN SALTS
J. G. Reavis Jun. 1985 41 p refs
(Contract W-7405-eng-36)
(DE85-015368; LA-10340) Avail: NTIS HC A03/MF A01

This review stresses techniques used in studies of molten salts containing multigram amounts of actinides exhibiting intense alpha activity but little or no penetrating gamma radiation. The preponderance of studies have used halides because oxygen-containing actinide compounds (other than oxides) are generally unstable at high temperatures. Topics discussed here include special enclosures, materials problems, preparation and purification of actinide elements and compounds, and measurements of various properties of the molten volts. Property measurements discussed are phase relationships, vapor pressure, density, viscosity, absorption spectra, electromotive force, and conductance. DOE

N86-16289# Oak Ridge National Lab., Tenn.
COMMENTS ON OPTIMIZATION
C. K. Bayne 1985 8 p Presented at the Chemometrics Research Conference, Gaithersburg, Md., 20 May 1985
(Contract DE-AC05-84OR-21400)
(DE85-017085; CONF-850574-1) Avail: NTIS HC A02/MF A01

Comments are made on Dr. S. N. Deming's paper on optimization in analytical chemistry. Optimization applications, strategies for screening experiments, and steepest ascent method are discussed. DOE

N86-16290# Sandia Labs., Albuquerque, N. Mex.
TIME-RESOLVED INFRARED SPECTRAL PHOTOGRAPHY STUDIES OF SHOCK-INDUCED CHEMISTRY IN CS2
A. M. Renlund, S. A. Sheffield, and W. M. Trott 1985 5 p refs Presented at American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016132; SAND-85-0511C; CONF-850736-53) Avail: NTIS HC A02/MF A01

Experiments using time-resolved infrared spectral photography (TRISP) in the 6 to 8.5 (MU)m range to study explosively driven shocks in liquid CS2 are described. In this range, the temporal resolution of the TRISP system is < 1 ns. We have shown that single-shot infrared absorption studies in shocked liquids are feasible with this technique; however, well-controlled planar shocks appear to be necessary for clear interpretation of dynamic spectral changes. DOE

N86-16291# Rockwell International Corp., Golden, Colo.
RECENT CHEMICAL RESEARCH PROJECTS IN PYROCHEMISTRY
J. L. Long 29 Apr. 1985 19 p Presented at the 9th Annual Actinide Separations Workshop, Richland, Wash., 22 May 1985
(Contract DE-AC04-76DP-03533)
(DE85-013215; RFP-3824; CONF-8505139-6) Avail: NTIS HC A02/MF A01

The purpose is to create, define parametric limits for, and transfer to the Pyrochemical Development group a pyrochemical (electrochemical) process for the recovery of spent anodes from plutonium electrorefining. The basis for this endeavor is the idea of modifying the character of spent anodes to obtain and maintian a liquid state during continued electrolytic depletion of plutonium. There are many alloying agents or combinations of alloying agents

which could be added. The one chosen for the initial work was gallium because of its low melting point and low vapor pressure. From the Pu-Ga phase diagram, a composition of approximately 78 atomic percent gallium (50 weight percent) was chosen for the first solubilization experiment. One hundred grams each of spent anode and gallium were heated under 490 grams of NaCl-KCl-MGCl2 to 740 C, held for one hour and stirred for one hour. Examination of the microstructure of the resultant cooled mixture indicated that 90% of the surface was a single phase containing near-equal concentrations of plutonium and gallium. The microstructure also contained inclusions of various impurities. DOE

N86-16292# Los Alamos National Lab., N. Mex.
USE OF ELECTRICAL CONDUCTIVITY EXPERIMENTS TO STUDY THE PHASE DIAGRAM OF CARBON
A. C. Mitchell, J. W. Shaner, and R. N. Keeler 1985 12 p Presented at the 10th High Pressure Conference on Research in High Pressure Science and Technology, Amsterdam, Netherlands, 8 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015718; LA-UR-85-2440; CONF-850759-10) Avail: NTIS HC A02/MF A01

Recent theoretical and experimental work on the properties of carbon at very high pressures indicates that the diamond phase may dominate the carbon phase diagram. The work of Yin and Cohen indicates that diamond may be the stable carbon phase to pressures as high as 20 Mbar. Recent work by Shaner, et al., is compatible with solid diamond on the Hugoniot at pressures up to 1.4 Mbar. Using previously developed techniques, we have carried out conductivity measurements on shock-compressed graphite to pressures in excess of 600 kbar and temperatures up to 5000 K. No diamond - liquid transition was observed under the experimental conditions achieved. DOE

N86-16293# Mound Lab., Miamisburg, Ohio.
METALLOGRAPHY OF TITANIUM BORIDE
C. S. Gustin and M. D. Kelly 1985 13 p Presented at the International Metallographic Society Conference, Denver, Colo., 21 Jul. 1985
(Contract DE-AC04-76DP-00053)
(DE85-016450; MLM-3281(OP); CONF-850753-5) Avail: NTIS HC A02/MF A01

Combustion synthesis is a self-propagating, high temperature thermal reaction which forms compounds from the component powders. Titanium and boron powders are reacted to form titanium boride compounds by this process. The extreme hardness of titanium boride and the need to resolve the microstructure for image analysis required special metallographic techniques. These special techniques and some of the resulting microstructural analysis are discussed. DOE

N86-16294# Los Alamos National Lab., N. Mex.
COHERENT ANTI-STOKES RAMAN SCATTERING IN BENZENE AND NITROMETHANE SHOCK-COMPRESSED TO 10 GPa
S. C. Schmidt, D. S. Moore, J. W. Shaner, D. L. Shampine, and W. T. Holt 1985 13 p refs Presented at the 10th High Pressure Conference on Research in High Pressure Science and Technology, Amsterdam, Netherlands, 8 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015682; LA-UR-85-2330; CONF-850759-11) Avail: NTIS HC A02/MF A01

The frequency shifts of the ring-stretching mode of shock-compressed liquid benzene and the CN stretching mode of nitromethane have been measured using coherent anti-Stokes Raman scattering. Shock pressures up to 11 GPa were achieved using a two-stage light gas gun. The frequency shifted Raman signal was generated using single pulse Nd:YAG and broadband-type lasers. DOE

N86-16295# Los Alamos National Lab., N. Mex.
SPECTROSCOPIC STUDIES OF CARBON DISULFIDE AT HIGH PRESSURE
S. F. Agnew, B. I. Swanson, and D. G. Eckhart 1985 10 p refs Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015725; LA-UR-85-2410; CONF-850736-52) Avail: NTIS HC A02/MF A01

The authors have identified the pressure for the onset of CS2 chemistry at ambient temperature and have correlated it with the several other indicators of increasing electronic interaction. They further explained the rather small shift of v1 and v3 with pressure as due to compensating effects of intermolecular repulsion and electronic ground-state mixing. Their measurement of the UV absorption edge with pressure matches that measured in an isothermal ramp shock and they have been able to estimate the temperature of a step shock at 2.4 GPa as well. There are further indications of various molecular and polymer species present as a result of their infrared work and the relative amounts of these species are affected by the temperature, pressure, and physical state of the CS2. DOE

N86-16296# Oak Ridge National Lab., Tenn. Atomic, Molecular and High Voltage Physics Group.
ISOTOPIC DEPENDENCES OF THE DIELECTRIC STRENGTH OF GASES: NEW OBSERVATIONS, CLASSIFICATION AND POSSIBLE ORIGINS
L. G. Christophorou, E. Rodrigo, E. Marode (Ecole Superieur d'Electricite, Gif-sur-Yvette, France), and F. Bastien (Ecole Superieur d'Electricite, Gif-sur-Yvette, France) 1985 4 p refs Presented at conference
(Contract DE-AC05-84OR-21400)
(DE85-017077; CONF-850979-2) Avail: NTIS HC A02/MF A01

The finding that the CH4/CD4 nonuniform field behavior is polarity dependent (i.e., the V sub s (dc breakdown voltage) of CD4 is lower than that of CH4 for negative polarity, just the opposite of that for positive polarity) is reported. The origins of the observed isotope effects and predicted new isotopic dependences of V sub s are discussed. The results on the V sub s of H2S and D2S for negative polarity are reported, confirming their predicted behavior. This suggests that the isotopic dependences of the V sub s of gases are apparently of more general occurence than hitherto recognized. Author

N86-16297# Oak Ridge National Lab., Tenn. Chemical Technology Div.
THE AQUEOUS CHEMISTRY OF IODINE
L. M. Toth, K. D. Pannell, and O. L. Kirkland 1984 11 p refs Presented at conference
(Contract DE-AC05-84OR-21400)
(TI85-016384; CONF-840701-28) Avail: NTIS HC A02/MF A01

The chemistry of iodine has been examined in aqueous solutions of pH 6 to 10 containing 2500 ppm boron as H3BO3 at temperatures up to 150C using absorption spectrophotometry to identify and monitor the iodine species present. Kinetic rate constants for the disproportionation of the HOI intermediate, 3HOI = IO3 - + 2I(-) + 3H(+), are measured as a function of pH even though no direct spectral evidence for HOI itself has been observed. An HOI partition coefficient >10,000 is estimated; results of ionic strength tests are consistent with HOI being present as an uncharged triatomic species in solution. Redox and radiation effects on the aqueous iodine chemistry are also described. Author

N86-16298# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
THE ROLE OF TRANSITION METALS IN OXY-RADICAL INDUCED OXIDATION PROCESSES IN BIOLOGICAL SYSTEMS
Benon H. J. Bielski and Diane E. Cabelli 1985 6 p Presented at conference
(Contract DE-AC02-76CH-00016; Grant NIH-R01-GM23656-09)
(DE85-017517; BNL-36893; CONF-8509146-1) Avail: NTIS HC A02/MF A01

Some recent work is described and it is discussed in view of the roles ascribed to transition metals in oxidative processes

involving active oxygen species. Some of these oxidative processes are suspected to occur in living systems where they can lead to deleterious effects. Therefore, great efforts have gone into the study of fundamental reactions/mechanisms believed capable of either initiating or, conversely, suppressing the initiation (superoxide dismutases, catalase, antioxidants, etc.) of such events. The nature and role of superoxide-driven Fenton chemistry in biological systems is considered. The reactivity of transition metal cations in higher oxidation states with biological compounds is also examined. Author

N86-16299# California Univ., Berkeley. Lawrence Berkeley Lab.
SEMICLASSICAL METHODS IN CHEMICAL DYNAMICS
W. H. Miller Mar. 1985 21 p refs Presented at the Symposium on Semiclassical Descriptions of Atomic and Nuclear Collisions, Copenhagen, Denmark, 25 Mar. 1985
(Contract DE-AC03-76SF-00098)
(DE85-014527; LBL-19687; CONF-850376-4) Avail: NTIS HC A02/MF A01

A general semiclassical (multidimensional WKB-type) approximation to quantum mechanics is reviewed. The principal feature of the approach is that it is able to incorporate the exact classical mechanics of the system and also the quantum principle of superposition. Applications to inelastic and reactive scattering, and to statistical mechanics and reaction rates are discussed. DOE

N86-16300# Union Carbide Corp., Tarrytown, N.Y. Molecular Sieve Dept.
IMPROVED CATALYSTS FOR LIQUID HYDROCARBON FUELS FROM SYNGAS Technical Progress Report, Apr. - Jun. 1985
1985 476 p
(Contract DE-AC22-84PC-70028)
(DE85-015537; DOE/PC-70028/T3) Avail: NTIS HC A21/MF A01

The objective of the contract is to consolidate the advances made during the previous contract in the conversion of syngas to motor fuels using Molecular Sieve-containing catalysts and to demonstrate the practical utility and economic value of the new catalyst/process systems with appropriate laboratory runs. Work on the program is divided into the following six tasks: (1) preparation of a detailed work plan covering the entire performance of the contract; (2) preliminary techno-economic assessment of the UCC catalyst/process system; (3) optimization of the most promising catalysts developed under prior contract; (4) optimization of the UCC catalyst system in a manner that will give it the longest possible service life; (5) optimization of a UCC process/catalyst system based upon a tubular reactor with a recycle loop; and (6) economic evaluation of the optimal performance found under Task 5 for the UCC process/catalyst system. Accomplishments are reported for Tasks 2 through 5. DOE

N86-16301# Utah Univ., Salt Lake City. Dept. of Chemistry.
LIGAND INTERMEDIATES IN METAL CATALYZED CO REDUCTION Final Technical Report, 1 Jul. 1982 - 30 Jun. 1985
J. A. Gladysz 1985 24 p
(Contract DE-AC02-82ER-13005)
(DE85-017047; DOE/ER-13005/1) Avail: NTIS HC A02/MF A01

The principal goal of this project is the preparation and physical and chemical characterization of stable complexes containing reactive ligand types believed to be intermediates in metal catalyzed CO and CO2 reduction. We report on: (1) the chemistry of formyl complexes; (2) synthesis and reactivity of (ALPHA)-hydroxyalkyl complexes; (3) synthesis and chemistry of formaldehyde complexes; (4) chemistry of formate complexes; (5) synthesis and crystal structure of a stable =CH2 complex; (6) coupling of coordinated =CH2 to H2C=CH2; (7) (ALPHA) vs (BETA) hydride abstraction in metal alkyls; (8) stereochemistry of (ALPHA)-hydride abstraction; (9) alkylidene to olefin rearrangements; (10) syntheses of acetylide and vinylidene (C2) complexes; and (11) acid/base chemistry of metal hydrides. DOE

N86-16302# Wisconsin Univ., Madison.
MECHANISTIC STUDIES RELATED TO THE METAL CATALYZED REDUCTION OF CARBON MONOXIDE TO HYDROCARBONS Final Report, 1 Apr. 1977 - 30 Jun. 1985
C. P. Casey Feb. 1985 26 p refs
(Contract DE-AC02-77ER-04222)
(DE85-017049; DOE/ER-04222/6) Avail: NTIS HC A03/MF A01

Studies of compounds related to proposed intermediates in the hydrogenation of carbon monoxide over homogeneous and heterogeneous catalysts have been carried out. The synthesis, structure, and reactions of metal formyl compounds have been investigated. The synthesis and desproportionation reactions of hydroxymethyl metal compounds have been explored. Reactions involving interconversion of n(5)- and n'-C5H5 organometallic compounds have been discovered. New synthetic routes to bimetallic compounds with bridging hydrocarbon ligands have been developed. The first bimetallic compound with a budging CH ligand has been prepared. The hydrocarbation reaction in which the CH bond of a bridging methylidyne complex adds across a carbon-carbon double bond has been discovered. New heterobimetallic compounds linked by a heterodifunctional ligand and heterobimetallic compounds with directly bonded early and late transition metals have been synthesized in a search for new CO hydrogenation catalysts. DOE

N86-16303# Illinois Univ., Chicago.
KINETICS OF ELEMENTARY ATOM AND RADICAL REACTIONS Progress Report
R. J. Gordon Aug. 1985 10 p
(Contract DE-AC02-77ER-04426)
(DE85-017167; DOE/ER-04426/8) Avail: NTIS HC A02/MF A01

Our research program is concerned with the rates and mechanisms of elementary gas phase reactions and energy transfer involving polyatomic molecules. We report here on three ongoing projects: (1) the reaction of oxygen atoms with hydrogen molecules; (2) the chemistry of NH radicals; (3) and the vibrational relaxation of highly excited SF6 molecules. DOE

N86-16304# Minnesota Univ., St. Paul. Dept. of Chemistry.
ELECTROCHEMICAL HYDROGENATION AND HYDROGENOLYSIS IN AQUEOUS MEDIA Annual Report, 1985
E. Kariv-Miller 1985 10 p
(Contract DE-RA22-84PC-70754)
(DE85-017208; DOE/PC-70754/T1) Avail: NTIS HC A02/MF A01

Studies with anthracene, phenanthrene and benzothiophene demonstrate that Birch like cathodic reduction of polycyclic aromatics is possible and good yields of highly reduced products are obtained. Two distinctive advantages of the cathodic method are that, as compared to solvated electron reductions, it uses water as the solvent and the hydrogen source, and that the product composition can be controlled by the amount of charge transferred. In addition to the convenient conditions, the results obtained with benzothiophene indicate that the cathodic reduction or reductive cleavage when both are possible reaction routes for a substrate. DOE

N86-16305# Brigham Young Univ., Provo, Utah. Dept. of Chemistry.
SUPERCRITICAL FLUID CHROMATOGRAPHY/SUPERSONIC JET SPECTROSCOPY Progress Report, 1 May 1985 - 31 Jul. 1985
M. L. Lee and S. R. Goates 1985 10 p
(Contract DE-FG22-83PC-60807)
(DE85-017241; DOE/PC-60807/T1) Avail: NTIS HC A02/MF A01

The flame ionization detector (FID) added during the last period was replaced with a new FID was installed directly on the extractor oven. Instead of using the usual aluminum heating block, heating tape was wrapped around the FID, allowing temperatures in excess of 450C to be reached. In addition, with the new FID, the capillary restrictor could be inserted to the tip of the jet, avoiding hot metal surfaces which were causing peak tailing and adsorption. However, with the restrictor at the base of the detector flame, the higher flow rates at higher pressures (> 95 atm) extinguished the flame.

This problem was alleviated by dropping the restrictor to several centimeters below the tip of the jet. With this arrangement, the column effluent was heated somewhat before entering the flame. Apparently, not the high flow rates, but the high degree of cooling of the CO2 was the reason the flame was extinguished. A number of stationary phases in the form of column packing materials were evaluated for their suitability for the chemical class separation of aliphatics, olefins, and aromatics. DOE

N86-16306# EIC, Inc., Norwood, Mass.
CATALYSIS OF DIRECT METHANOL ELECTRO-OXIDATION IN BUFFERED ELECTROLYTES Annual Technical Progress Report, 15 Jul. 1984 - 14 Jul. 1985
M. W. Rupich, S. B. Brummer, D. A. Galligan, and S. C. Kingsley Jun. 1985 41 p
(Contract DE-AC02-83ER-13066)
(DE85-017388; DOE/ER-13066/2) Avail: NTIS HC A03/MF A01

The development of a methanol-air fuel cell is studied. A detailed evaluation of concentrated aqueous K2CO3 solutions as the electrolyte is performed. The work presented here involves the electro-oxidation of methanol in the electrolyte with various potential electrocatalysts. DOE

N86-16307# California Univ., Berkeley. Lawrence Berkeley Lab.
ADSORPTION OF ENERGY IN PHOTOCATALYTIC REACTORS
G. A. Somorjai Jul. 1985 41 p Presented at the Fundamentals and Developments of Photocatalytic and Photoelectrochemical Processes Course, Erice, Italy, 20 May 1984
(Contract DE-AC03-76SF-00098)
(DE85-017639; LBL-17824; CONF-840571-1) Avail: NTIS HC A03/MF A01

The dissociation of water to hydrogen and oxygen requires energy delta G sub 298 = 228 kJ/mole. By irradiating a semiconductor with light of energy greater than this amount, one may produce electrons in the excited state and electron vacancies at the surface that can perform the photochemical reduction (2H(+) + 2e(-) YIELDS 2H YIELDS H2) and oxidation (2OH(-) + 2(+) YIELDS H2O2 YIELDS H2O + (1/2)O2). There are several semiconductors, SrTiO3, TiO2, CdS, and Fe2O3 among them, that can photodissociate water. Some possess sites for both reduction and oxidation, while others carry out the two processes at different surfaces. A reversible solid state reaction that involves changes in the transition metal and ion oxidation state must accompany the splitting of water. Platinum, rhodium, and ruthenium oxide, when deposited on the semiconductor, serve as catalysts that accelerate the water photodissociation. These additives accelerate the recombination of hydrogen and oxygen atoms, shift the semiconductor Fermi level to a more favorable position that improves the thermodynamic feasibility for the process, accelerate electron transport, and inhibit side reactions like the photoreduction of oxygen. Many of the elementary reaction steps leading to photoproduction of hydrogen and oxygen over SrTiO3 and Fe2O3 have been identified and will be discussed. DOE

N86-16308# Argonne National Lab., Ill.
EFFECT OF SWIRL ON THE DEVELOPMENT OF RECIRCULATION FLOW PATTERNS IN A SWIRL COMBUSTOR
U. S. Choi, G. F. Berry, and T. R. Johnson 1985 22 p refs Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-012105; CONF-851125-6) Avail: NTIS HC A02/MF A01

The development of flow patterns is of great interest in combustion applications because an understanding of many aspects of the combustion process can be realized from fluid flow considerations alone. For example, the importance of recirculating flows in promoting flame stability and combustion intensity and the effect of swirl on slag capture in a slagging combustor have been demonstrated. However, in order to accurately predict flow patterns in actual combustors, it is necessary to properly model the complicated three-dimensional geometry of the combustors. Although most existing coal combustor codes may have very sophisticated models of chemical reactions, turbulence, and heat/mass transfer in multiphase environments, they do not have the capability to model complex combustor geometry, which seriously limits the usefulness of the codes in predicting actual flow patterns in the combustor. In this paper, a swirl combustor with complex air input louvres has been modeled. The conservation equations of mass and momentum are written in the porous-media formulation by means of local volume averaging. The concept of cell surface permeability has been fully employed in cold-flow (isothermal) modeling of a swirl combustor with such louvres. This modeling technique is expected to significantly enhance the capability of existing combustor codes in predicting realistic performance characteristics. DOE

N86-16309# Midwest Research Inst., Golden, Colo.
AMORPHOUS SILICON MEASUREMENTS TASK FORCE Final Report
R. L. Hulstrom Aug. 1985 60 p
(Contract DE-AC02-83CH-10093)
(DE85-012174; SERI/SP-215-2784) Avail: NTIS HC A04/MF A01

This report documents the results of the Amorphous Silicon Measurements Task Force, a part of the Amorphous Silicon Research Project of the Solar Energy Research Institute. The task force was formed to make specific recommendations to the a-Si community that would lead to improving indoor and outdoor performance measurements and reporting of results. Approximately 30 recommendations were made, and they are contained in this report. DOE

N86-16310# Lawrence Livermore National Lab., Calif.
IN-BEAM SPECTROSCOPY USING THE (t,p) REACTION: RECENT RESULTS NEAR A = 100
E. A. Henry, R. J. Estep, R. A. Meyer, J. Kantele, D. J. Decman, L. G. Mann, R. K. Sheline, W. Stoeffl, and L. E. Ussery Sep. 1985 8 p Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985 Prepared in cooperation with Florida State Univ., Tallahassee.; Jyvaskyla Univ. (Finland); Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-48)
(DE85-017471; UCRL-93302; CONF-850942-20) Avail: NTIS HC A02/MF A01

Charged particle spectroscopy using the (t,p) reaction has been employed for more than two decades to study the low energy structure of nuclei. This reaction has contributed significantly to the elucidation of single-particle and collective phenomena for neutron rich nuclei in virtually every mass region. We have begun to use the (t,p) reaction in conjunction with in-beam (GAMMA)-ray and conversion-electron spectroscopy to bring additional understanding to low-energy nuclear structure. In this report we briefly discuss the experimental considerations in using this reaction for in-beam spectroscopy, and present some results for nuclei with mass near 100. DOE

N86-16311# Department of Energy, Washington, D. C.
LIQUID CHROMATOGRAPHY/FOURIER TRANSFORM IR SPECTROMETRY INTERFACE FLOW CELL Patent Application
C. C. Johnson and L. T. Taylor, inventors (to DOE) Filed Jan. 1985 34 p
(Contract DE-FG22-81PC-40799)
(DE85-017749; US-Patent-Appl-SN-689104) Avail: NTIS HC A03/MF A01

A zero dead volume (ZDV) microbore high performance liquid chromatography (MU HPLC)/Fourier transform infrared (FTIR) interface flow cell includes an IR transparent crystal having a small diameter bore therein through which a sample liquid is passed. The interface flow cell further includes a metal holder in combination with a pair of inner, compressible seals for directly coupling the thus configured spectrometric flow cell to the outlet of a MU HPLC column end fitting to minimize the transfer volume of the effluents exiting the MU HPLC column which exhibit excellent flow characteristics due to the essentially unencumbered, open-flow design. The IR beam passes transverse to the sample flow through the circular

bore within the IR transparent crystal, which is preferably comprised of potassium bromide (KBr) or calcium fluoride (CaF2), so as to minimize interference patterns and vignetting encountered in conventional parallel-plate IR cells. The long IR beam pathlength and lensing effect of the circular cross-section of the sample volume in combination with the refractive index differences between the solvent and the transparent crystal serve to focus the IR beam in enhancing sample detection sensitivity by an order of magnitude. DOE

N86-16312# Department of Energy, Washington, D. C.
APPARATUS AND METHOD FOR THE PREPARATION OF DIOXYGEN DIFLUORIDE Patent Application
W. H. Beattie, inventor (to DOE) Filed 30 Jan. 1985 12 p
(Contract W-7405-eng-36)
(DE85-017787; US-Patent-Appl-SN-696548) Avail: NTIS HC A02/MF A01

Dioxygen difluoride, O2F2, is prepared in high yield by microwave discharge of a flowing gas mixture of F2 with or without a carrier gas such as argon or helium with the subsequent reaction of the discharge products with molecular gaseous oxygen downstream from and outside of the region of discharge. The O2F2 product is collected by cryogenic trapping, and is free of oxygen difluoride impurity and ozone since the oxygen molecules are not dissociated before they react with the microwave discharge products. DOE

N86-16313# Department of Energy, Washington, D. C.
GLASS ELECTROLYTE COMPOSITION Patent Application
G. H. Kucera (Argonne National Lab., Ill.) and M. F. Roche, inventors (to DOE) (Argonne National Lab., Ill.) Filed Jan. 1985 12 p
(Contract W-31-109-eng-38)
(DE85-017750; US-Patent-Appl-SN-689735) Avail: NTIS HC A02/MF A01

An ionically conductive glass is disclosed for use as electrolyte in a high temperature electrochemical cell, particularly a cell with sodium anode and sulfur cathode. The glass includes the constituents Na2O, ZrO2, Al2O3 and SiO2 in selected proportions to be a single phase solid solution substantially free of crystalline regions and undissolved constituents. Other advantageous properties are an ionic conductivity in excess of 2 x 10 (-3) (ohm-cm) (-1) at 300 C and a glass transition temperature in excess of 500(0)C. DOE

N86-16314# Brookhaven National Lab., Upton, N. Y.
RECENT DEVELOPMENTS IN THERMOLUMINESCENCE KINETICS: APPLICATIONS TO OTHER THERMALLY STIMULATED PROCESSES
P. W. Levy Aug. 1985 9 p refs Presented at the 14th North American Thermal Analysis Society Conference (NATAS), San Francisco, Calif., 1 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE85-018482; BNL-36909; CONF-8509144-2) Avail: NTIS HC A02/MF A01

Recent thermoluminescence (TL) studies indicate that many kinetic properties are not in accord with the well known 1st and 2nd order TL kinetic equations. For example, the usual equations do not describe: (1) the shape of certain single glow peaks; (2) the shape of glow peaks in many glow curves containing more than one glow peak; and (3) the dependence of the peak temperature, the FWHM, the shape, and other properties on the pre-measurement dose. However, the properties of some single glow peaks are precisely described, or closely approximated by, the more general basic equation from which the usual 1st and 2nd order equations are obtained as special cases. Furthermore, glow curves containing more than one glow peak are described by a system of equations that includes interactions between different types of traps and is a straightforward extension of the general one peak equation. This system - called Interactive Kinetics - accounts for most properties, and explains many anomalies, associated with glow curves containing more than one glow peak. It is particularly convenient for computerized analysis procedures. Lastly, it is suggested that other thermally stimulated processes depend on analogous interactions and are describable by similar sets of kinetic equations that are convenient for computer analysis. DOE

N86-16315# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE TWO-FLUID MODEL OF TURBULENT COMBUSTION APPLIED TO AN IDEALISED ONE-DIMENSIONAL, UNSTEADY, CONFINED, PRE-MIXED FLAME
J. Z. Y. Wu Aug. 1984 59 p refs
(PDR/CFDU/IC/21) Avail: NTIS HC A04/MF A01

The two-fluid model of turbulent combustion was applied to a one-dimensional, unsteady, confined, premixed flame with idealized initial and boundary conditions. The results show that steady oscillations may occur after the steady-state flame is disturbed. A systematic, parametric study is performed to establish instability regions. The results indicate a possible mechanism of oscillatory burning in, for example, afterburner systems for aircraft jet engines. Author (ESA)

N86-16316# Research Triangle Inst., Research Triangle Park, N.C.
EVALUATION OF METHODS FOR ANALYSIS OF HUMAN FAT, SKIN, NAILS, HAIR, BLOOD AND URINE
L. Sheldon, M. Umana, J. Bursey, W. Gutknecht, and R. Handy Aug. 1985 366 p
(Contract EPA-68-03-3149)
(PB85-242790; EPA-600/8-85-018) Avail: NTIS HC A16/MF A01 CSCL 07D

The research program surveyed and evaluated the methods and procedures to identify and quantitate chemical constituents in human tissues and fluids including fat, skin, nails, hair, blood, and urine. These methods were evaluated to determine their ease and rapidity, as well as cost, accuracy, and precision. During this evaluation, the feasibility of correlating a preferred method with a specific tissue/fluid and with easily identifiable chemical characteristics, such as octanol-water partition coefficient, water solubility, vapor pressure, etc., was determined. The search strategy, as well as the literature evaluation focussed on analytical methods. GRA

N86-16317# National Bureau of Standards, Boulder, Colo. Chemical Engineering Science Div.
EXPERIMENTAL THERMAL CONDUCTIVITY VALUES FOR MIXTURES OF METHANE AND ETHANE Final Report
H. M. Roder and D. G. Friend Mar. 1985 43 p
(PB85-226066; NBSIR-85-3024) Avail: NTIS HC A03/MF A01 CSCL 07D

The experimental measurements of thermal conductivity as obtained in a transient hot wire apparatus for mixtures of methane and ethane are recorded. The measurements were made at temperatures between 140 and 330 K with pressures between 0.1 and 70 MPa. The density range is 0 to 24 mol/L, the mole fractions of methane are 0.69, 0.50, 0.35, and the total number of points recorded is 2476. Author

N86-16318# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
HEAT CAPACITY MEASUREMENTS ON PLUTONIUM PHOSPHIDE
R. O. A. Hall, A. J. Jeffery, J. A. Lee, M. J. Mortimer, and G. H. Lander (Argonne National Lab., Ill.) Apr. 1985 24 p
(AERE-R-11075) Avail: NTIS HC A02/MF A01

The heat capacity of plutonium phosphide PUP-202 has been measured using a transient method from 8.3K to 18K and using an adiabatic calorimeter from 11.4K to 303K. In the region of overlap the results for the two techniques agreed well. The heat capacity was of the normal sigmoid form with a large magnetic peak superimposed at (125.5 + or - 0.5)K, the Curie temperature. There is also a small anomaly of unknown origin at 17.5K. The parameters from the heat capacity analysis are given. DOE

N86-16319# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
THE EFFECTS OF AQUEOUS SILICA ON THE HYDROTHERMAL DISSOLUTION OF PEROVSKITE (CaTiO3)
S. Myhra, H. E. Bishop, and J. C. Riviere Apr. 1985 30 p
(AERE-R-11729) Avail: NTIS HC A03/MF A01

Perovskite (CaTiO3) has been exposed to hydrothermal chemical attack in H2O saturated with aqueous silica. Dependences on temperature (150 to 250 C) and on duration of attack (1 to 35 days) have been investigated. It was found that a modified surface layer was formed. The thickness of this layer ranged from a few monolayers to several hundred nanometers for the least and the most severe hydrothermal conditions, respectively. The compositions of the modified layer, as deduced by surface analytical techniques, suggest that: (1) alkaline earth species are leached initially, (2) there is a TiO2 rich reaction front at the interface between the modified layer and the perovskite bulk, and (3) sphene (CaTiSiO5) and SiO2 (gel) occur as significant precipitate phases in the modified layer. DOE

N86-16446# University of Electro-Communications, Tokyo (Japan).
CARBON-14 NMR SPECTRUM (68 MHz) OF 2,6-DINITROPHENOL IN CDCl3 AND THE TEMPERATURE VARIATION OF THE CHEMICAL SHIFTS IN REFERENCE TO INTRAMOLECUAR HYDROGEN BOND
Ariyuki Aihara and Kazuhiro Matsushita *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 61-65 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-16320# Electricity Council, London (England). Overseas Relations Branch.
ELECTRODEPOSITION OF LESS FREQUENTLY USED COATING METALS
A. Knoedler Aug. 1985 10 p refs Transl. into ENGLISH from Jahrbuch der Oberflaechentechnik (West Germany), v. 40, 1984 p 92-96
(BLL-OA-Trans-3248-(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The electrodeposition of some metal coatings is described. The metals discussed are aluminum, iron, cobalt, manganese, silicon, and indium. Very briefly mentioned are selenium, antimony, lead, titanium, rhenium, tungsten and uranium. An extensive bibliography is included. E.R.

N86-16321 Cincinnati Univ., Ohio.
ANISOTROPIC CONSTITUTIVE MODEL FOR NICKEL BASE SINGLE CRYSTAL ALLOYS: DEVELOPMENT AND FINITE ELEMENT IMPLEMENTATION Ph.D. Thesis
L. Thomas Dame 1985 136 p
Avail: Univ. Microfilms Order No. DA8518123

A tool was developed for the mechanical analysis of nickel base single crystal superalloys, specifically Rene N4, used in gas turbine engine components. This is achieved by developing a rate dependent anisotropic constitutive model and implementing it in a nonlinear three dimensional finite element code. The constitutive model is developed from metallurgical concepts utilizing a crystallographic approach. A non Schmid's law formulation is used to model the tension/compression asymmetry and orientation dependence in octahedral slip. Schmid's law is a good approximation to the inelastic response of the material in cube slip. The finite element implementation utilizes an initial strain method and twenty noded isoparametric solid elements. The ability to model piecewise linear load histories is included in the finite element code. Computed results from the finite element code are compared with experimental data for tensile, creep and cyclic tests at 760 C. The strain rate sensitivity and stress relaxation capabilities of the model are evaluated. Dissert. Abstr.

N86-16322 Drexel Univ., Philadelphia, Pa.
PROCESSING, MICROSTRUCTURE AND PROPERTY RELATIONSHIPS IN A POWDER METALLURGY HIGH SPEED STEEL Ph.D. Thesis
Au Syed Fareed 1985 229 p
Avail: Univ. Microfilms Order No. DA8516206

REX 25tm high speed steel, processed from rapidly solidified gas atomized powder, was studied in detail with respect to microstructure, strength, toughness, grindability, wear resistance and hardness at elevated temperatures. Powders were nitrogen gas atomized, screened to specific size fractions and consolidated to full density by hot isostatic pressing. The HIPed material was either heat treated or hot worked by forging prior to heat treatment. Two HIPing temperatures, two austenitizing temperatures and three tempering temperatures were evaluated. X-ray diffraction, optical and scanning electron microscopy were utilized to characterize the microstructure in the atomized and consolidated conditions. Atomized powders exhibit segregated structures, with MC and M2C carbides present in the form of an interconnected network. The proportion of MC carbides increases and the scale of microstructure is refined, with decreasing powder particle size. Traces of M6C carbides are observed in the coarse size fractions. Dissert. Abstr.

N86-16323 Connecticut Univ., Storrs.
ALUMINUM ION IMPLANTATION INDUCED PHASE CHANGES IN NICKEL Ph.D. Thesis
Munir Ahmed 1985 143 p
Avail: Univ. Microfilms Order No. DA8516171

Aluminum ions were implanted into nickel substrates to fluences ranging from 1 x 10 to the 19th power ions/sq m to 4 x 10 to the 22nd power ions/sq m. The substrate temperatures during implantation were fixed at selected temperatures between 25 C and 600 C. The composition versus depth profiles were determined as were the microstructures in the implanted layers. The phases observed during the room temperature implantation included the nickel solid solution with extended aluminum solubility, an HCP phase, beta prime-NiAl and an amorphous phase. The stability of the as-implanted microstructures obtained from room temperature implantation was investigated by aging the specimens at temperatures between 400 C to 800 C and for time intervals ranging from a few minutes to several hours. Both gamma prime and beta prime phases were observed in specimens implanted at elevated temperatures. These phases were fully ordered in the as-implanted state and the beta prime exhibited a texture similar to that which it exhibits in room temperature implanted specimens. Dislocation loops and voids were observed at lower fluences. The microstructures present below the implanted layers were investigated and their role in the subsequent phase transformations is discussed. Dissert. Abstr.

N86-16324 Oregon State Univ., Corvallis.
BIAXIAL FATIGUE BEHAVIOR OF COMMERCIALLY PURE TITANIUM TI-50A (GRADE 2) AND LOW-ALLOY TITANIUM TI-CODE 12 (GRADE 12) HEAT EXCHANGER MATERIALS Ph.D. Thesis
Benjamin Catulong Tobias 1985 178 p
Avail: Univ. Microfilms Order No. DA8518618

An experimental investigation was conducted to evaluate the biaxial fatigue behavior of commercially pure titanium Ti-50A and low-alloy titanium Ti-Code 12 heat exchanger materials. The biaxial state of stress was composed of an axial stress and a superimposed torsional stress, applied in a thin wall tubular specimen machined from titanium tubing. Torsional stress was applied independently using a torsion machine and a torque fixer assembly. The biaxial fatigue test under load control condition was done under fully reversed cycles equivalent to a biaxiality ratio of -1. The results are presented in terms of the various measured or calculated quantities versus number of cycles to fracture. Biaxial

fatigue curves were drawn through the experimental points corresponding to Weibull's mean life criterion. The four data points exhibit scatter that appears to be related to the applied stress amplitude. It was also found that a correlation exists between the magnitude of applied cyclic biaxial stress and fatigue life to failure. In addition, the results have been discussed taking existing failure criteria into account. Dissert. Abstr.

N86-16325 British Library Lending Div., Boston Spa (England).
THE EFFECT OF MELT COOLING SPEED ON THE STRUCTURE OF X-RAY EMISSION SPECTRA FOR NI58Nb42 ALLOY
V. V. Savin, Z. A. Samoilenk, and Yu. A. Skakov [1985] 4 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 154-155
(BLL-M-36452-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of melt cooling speed on the structure of X-ray emission spectra for Ni58Nb42 alloy was examined. The X-ray spectra for Ni58Nb42 alloy were analyzed under different processing methods. G.L.C.

N86-16326 British Library Lending Div., Boston Spa (England).
HIGH RESIDUAL MAGNETISATION OF Sm2Co17 SPRAY-COATED FILMS
I. P. Salo, Yu. D. Yagolkin, and V. V. Kotunov [1985] 4 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 155-156
(BLL-M-36453-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

As the result of experiments it can be concluded that residual magnetization in spray coated films is not the result of their crystallographic texture. Author

N86-16327 British Library Lending Div., Boston Spa (England).
DETERMINATION OF PHYSICAL YIELD STRENGTHS OF STEELS
L. N. Sokolov, V. N. Efimov, V. N. Demin, and V. V. Savitskii [1985] 6 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 47-49
(BLL-M-36426-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The numerical values of physical yield strengths can be determined from the hardening curves obtained with no indication of yield point for the forging and rolling temperature ranges, provided the principles of constancy of the relative hardening of hot-deformed austenite are used. The physical yield strengths found by such a method follow N.S. Kurnakov's rule. Author

N86-16328 British Library Lending Div., Boston Spa (England).
KINETICS OF THE EVAPORATION OF LIQUID NICKEL
Yu. V. Balkovoi, R. A. Aleev, V. K. Bakanov, V. A. Grigoryan, D. V. Zimin, and E. V. Butskii [1985] 8 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 43-46
(BLL-M-36425-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

Because the chemical composition of the steel is not routinely monitored in vacuum metallurgy, the sources of losses, particularly evaporation, must be taken into account. There is a lack of data on the kinetics of evaporation in nickel-based alloys. The results of research on the kinetics of evaporation of solid and liquid nickel at steelmaking temperatures are considered. Equations are presented for the relationship between the rate of evaporation of nickel and residual pressure, temperature and surface-active substances. A method for calculating the variation in the surface tension of an alloy is suggested based on data relating to the evaporation rate in a kinetic regime. Author

N86-16329 British Library Lending Div., Boston Spa (England).
EXPERIMENTAL INVESTIGATION OF AMOUNT OF SHEAR DEFORMATION OVER HEIGHT OF ROLLED WORKPIECE
V. K. Vorontsov, R. E. Gafarov, and V. V. Lashin [1985] 6 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebenykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 59-62
(BLL-M-36428-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

In view of the importance of shear deformation as a quantative characteristic of the strain state and ductility resource of the metal in processes of working by pressure, a series of experiments was conducted with lead-antimony testpieces employing the moire band method and tabulated the results for the changes in the geometric dimensions and irregular distribution of the shear deformation over the height of the testpieces. As distinct from previous research, it was found that the highest shear deformations occur in the intermediate layers of the workpiece rather than at the points of contact. Author

N86-16330 British Library Lending Div., Boston Spa (England).
ASSESSMENT OF FORMS OF EXISTENCE OF BORATE GROUPS ACCORDING TO ENERGIES OF PARTICLE INTERACTION
S. P. Kurlov, B. M. Lepinskikh, and O. I. Bukhtoyarov [1985] 8 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 4-8
(BLL-M-36422-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The Mullicen formula was used to calculate the energies of atomization of boron-oxygen complexes of different degrees of complexity. An examination was made of the equilibrium of boron-oxygen anions with ternary and quaternary coordinations. Author

N86-16331 British Library Lending Div., Boston Spa (England).
HIGH TEMPERATURE VAPOUR PRESSURES OF STAINLESS STEEL AND SOME PURE METALS FROM LASER-VAPORATION EXPERIMENTS
M. Bober and J. Singer Sep. 1985 13 p refs Transl. into ENGLISH from KfK Nachrichten (West Germany), 17th year, Jan. 1985 p 32-36
(BLL-WH-637-(9091-9F)) Avail: British Library Lending Div., Boston Spa, Engl.

For determination of the high temperature vapor pressures of nuclear fuels, several non-stationary methods of measurement had already been tested. A few methods are based on short-term surface evaporation of the material by laser heating under vacuum or under a diluted buffer gas atmosphere. The evaluation of these measurements does however require complex gas-dynamic corrections, which lead to relatively wide uncertainties in the vapor pressure data obtained. Accordingly a new method was developed, based on a quasi-stationary laser evaporation under a defined inert gas counter-pressure. The evaporation temperature is determined by analog with the classical boiling point method, this corresponding under the appropriate ambient pressure to the boiling point of the sample material. This method provides direct experimental vapour pressure values, the accuracy of which satisfies without additional corrections the requirements of reactor safety analysis. G.L.C.

N86-16332# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
ABNORMAL GRAIN GROWTH IN NIMONIC PE16 ALLOY AND ITS EFFECTS ON THE TENSILE PROPERTIES
J. Cook and A. C. Roberts Mar. 1985 10 p refs Presented at the BNES Conference on Nuclear Fuel Performance, 25-29 March 1985
(AERE-R-11640; AGR/FPWG/P(85)576;
Gen/TBSC/P(85)6170/A/1; PFR-Clad-Panel-Note-830) Avail: Issuing Activity

The susceptibility of Nimonic PE16 alloy to secondary recrystallization in the temperature range 1000 C to 1080 C was investigated. At annealing temperatures of 1060 C and above it is considered to be due to the dissolution or coarsening of Ti(CN) precipitates and enhanced by low levels (less than 5%) of cold work. Below 1060 C it is considered to be due entirely to low levels of cold work. Primary recrystallization occurred when the

level of cold work was raised to between 5 and 10%. Tensile data show that in general the total elongation increased and the 0.1 proof stress and U.T.S. decreased with annealing temperature. Author

N86-16333*# McDonnell-Douglas Research Labs., St. Louis, Mo.
STUDY ON EFFECTS OF POWDER AND FLAKE CHEMISTRY AND MORPHOLOGY ON THE PROPERTIES OF Al-Cu-Mg-X-X-X POWDER METALLURGY ADVANCED ALUMINUM ALLOYS Final Report
P. J. Meschter, R. J. Lederich, J. E. ONeal, and P. S. Pao Nov. 1985 108 p refs
(Contract NAS1-17107)
(NASA-CR-177946; NAS 1.26:177946; MDC-01227) Avail: NTIS HC A06/MF A01 CSCL 11F

The effects of alloy chemistry and particulate morphology on consolidation behavior and consolidated product properties in rapid solidification processed, powder-metallurgical Al-3Li-1.5Cu-1Mg-0.5Co-0.2Zr and Al-4.4Cu-1.5Mg-Fe-Ni-0.2Zr extrusions and forgings were studied. Microstructures and mechanical properties of both alloys are largely unaffected by particulate production method (vacuum atomization, ultrasonic atomization, or twin-roller quenching) and by particulate solidification rates between 1000 and 100,000 K/s. Consolidation processing by canning, cold compaction, degassing, and hot extrusion is sufficient to yield mechanical properties in the non-Li-containing alloy extrusions which are similar to those of 7075-Al, but ductilities and fracture toughnesses are inferior owing to poor interparticle bonding caused by lack of a vacuum-hot-pressing step during consolidation. Mechanical properties of extrusions are superior to those of forgings owing to the stronger textures produced by the more severe hot working during extrusion. The effects on mechanical properties of dispersoid size and volume fraction, substructural refinement, solid solution strengthening by Mg, and precipitate size and distribution are elucidated for both alloy types. Author

N86-16334*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL AGING EFFECTS IN REFRACTORY METAL ALLOYS
Joseph R. Stephens 1986 28 p refs Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13-15 Jan. 1986; sponsored by the American Nuclear Society
(NASA-TM-87210; E-2869; NAS 1.15:87210) Avail: NTIS HC A03/MF A01 CSCL 11F

The alloys of niobium and tantalum are attractive from a strength and compatibility viewpoint for high operating temperatures required in materials for fuel cladding, liquid metal transfer, and heat pipe applications in space power systems that will supply from 100 kWe to multi-megawatts for advanced space systems. To meet the system requirements, operating temperatures ranging from 1100 to 1600 K have been proposed. Expected lives of these space power systems are from 7 to 10 yr. A program is conducted at NASA Lewis to determine the effects of long-term, high-temperature exposure on the microstructural stability of several commercial tantalum and niobium alloys. Variables studied in the investigation include alloy composition, pre-age annealing temperature, aging time, temperature, and environment (lithium or vacuum), welding, and hydrogen doping. Alloys are investigated by means of cryogenic bend tests and tensile tests. Results show that the combination of tungsten and hafnium or zirconium found in commercial alloys such as T-111 and Cb-752 can lead to aging embrittlement and increased susceptibility to hydrogen embrittlement of ternary and more complex alloys. Modification of alloy composition helps to eliminate the embrittlement problem. Author

N86-16335# Royal Armament Research and Development Establishment, Fort Halstead (England).
THE EFFECT OF ALLOY STEEL DESIGN AND HEAT TREATMENT ON THE MECHANICAL PROPERTIES OF 3 1/4 NiCrMoV STEEL
T. D. Andrews, R. Hawkins, and S. R. Keown Apr. 1985 20 p
(AD-A159486; RARDE-1/85; DRIC-BR-95725) Avail: NTIS HC A02/MF A01 CSCL 11/6

This report describes work carried out to optimize the composition of 3 1/4 NiCrMoV steels through a stoichiometric balance of the carbon content with the carbide-forming elements Cr, Mo and V. Reduction of the carbon content to the stoichiometric level gives a steel having a very high Charpy upper shelf energy, but the grain refining effect of the carbides is lost and the impact transition temperature increases. An optimized steel containing a slight excess of carbon has been developed that gives a better strength/toughness combination than the commercial steel. Author (GRA)

N86-16336 Imperial Coll. of Science and Technology, London (England). Dept. of Metallurgy and Materials Science.
HOT CORROSION AND PROTECTION MECHANISMS OF MARINE GAS TURBINE MATERIALS, VOLUMES 1 AND 2
M. G. Hocking and V. Vasantasree 1985 132 p refs
(Contract ERIA/9/4/2037/0150-AMTE)
(BR96018-Vol-1/2) Avail: NTIS HC A07/MF A01

Experimental MCr AlX alloys were examined to establish an alloy composition range with improved resistance to low temperature (700 C) accelerated sulfur-induced corrosion, while maintaining adequate performance at high temperature (900 C). The detrimental effects of Ni at all levels and at especially high concentrations in causing accelerated attack at 700 C are confirmed. A variable tendency to thermal spalling of scales alloy to alloy is observed and good adherence is exhibited by an alloy containing Ti and Si; Ta is particularly effective in reducing the sulfide fraction in the scale and alloy matrix, while enhancing chromia formation. At 900 C, corrosion damage is much less with all of the materials than at 700 C. Results suggest that alloys for service in oxygen + sulfur containing environments at high and low temperatures can be developed. Author (ESA)

N86-16337# Naval Postgraduate School, Monterey, Calif.
MECHANICAL CHARACTERISTICS OF A SUPERPLASTIC ALUMINUM-10.2%Mg-0.1%Zr ALLOY M.S. Thesis
T. S. Hartmann Jun. 1985 98 p
(AD-A158959) Avail: NTIS HC A05/MF A01 CSCL 11/6

The elevated temperature mechanical characteristics of an aluminum-magnesium-zirconium alloy were studied. Thermomechanical processing consisted of solution treating and hot working at 440 C and then warm rolling at 300 C to 94% reduction. Subsequent treatments included annealing at 200 C for one hour, and recrystallizing for one minute at 440 C. Tensile testing of warm rolled, annealed, and recrystallized material was conducted at various strain rates and temperatures. The data was analyzed to determine strain-rate sensitivity coefficients and activation energies, in turn to be correlated with microstructural data concurrently obtained on this superplastic alloy. This material exhibits particularly good ambient properties in addition to the superplasticity. GRA

N86-16338# Naval Research Lab., Washington, D. C.
THE CORROSION BEHAVIOR OF A GRAPHITE FIBER/MAGNESIUM METAL MATRIX COMPOSITE IN AQUEOUS CHLORIDE SOLUTION Final Report, Dec. 1983 - Dec. 1984
P. P. Trzaskoma 19 Sep. 1985 19 p
(AD-A159121; NRL-MR-5640) Avail: NTIS HC A02/MF A01 CSCL 11/4

The corrosion behavior of a graphite fiber/magnesium composite has been studied in dilute chloride solutions by immersion, SEM, and electrochemical techniques. The composite consists of graphite fibers coated with magnesium alloy AZ91C pressed between thin foils of alloy AZ31B. Within five days immersion in 0.0001 N NaCl, severe localized corrosion develops at the edges of the material where there are exposed graphite fibers. The reaction is accompanied by visible hydrogen evolution over the entire surface and attack is through the foil covering into the underlying matrix material. Electrochemical measurements in a chloride solution of borated boric acid (pH 8.4, 1000 ppm C(-) reveal significant galvanic currents between the magnesium foil

and graphite fibers. These currents increase as the surface area ratio of graphite to magnesium increases. From this work it is concluded that galvanic interaction plays an important role in the aqueous corrosion of graphite/magnesium composites. GRA

N86-16339# Department of Energy, Washington, D. C.
PREPARING REFLECTIVE SUBSTRATE SURFACES FOR LASER TREATMENT Patent Application
F. F. Flick, inventor (to DOE) (Los Alamos National Lab., N. Mex.) Filed 21 Nov. 1985 7 p
(Contract W-7405-eng-36)
(DE85-017774; US-Patent-Appl-SN-673970) Avail: NTIS HC A02/MF A01

A coating of either copper oxide or felt tip pen ink is used on reflective copper or gold substrates to enhance laser beam coupling when the substrates are cut or welded with a laser. DOE

N86-16340# California Univ., Berkeley. Lawrence Berkeley Lab.
THEORETICAL ANALYSIS OF THE AGING RESPONSE OF Al-Li ALLOYS STRENGTHENED BY Al3Li PRECIPITATES
J. Glazer, T. S. Edgecumbe, and J. W. Morris, Jr. Jun. 1985 19 p Presented at the 3rd International Aluminum-Lithium Conference, Oxfordshire, England, 9 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE85-016570; LBL-19235; CONF-850777-1) Avail: NTIS HC A02/MF A01

The possibility of increasing the strength of aluminum-lithium alloys hardened principally by the delta' precipitates was investigated. The elastic theory of phase transformations was used to determine that the delta' precipitate is not expected to deviate from spherical morphology even at very large sizes. The theory of the critical resolved shear stress for dislocation glide through a random array of obstacles was used to predict a moderate strengthening increment if the precipitate size distribution could be made more uniform. Experimental and theoretical hardening curves for an experimentally determined precipitate size distribution were also compared. DOE

N86-16341# Argonne National Lab., Ill. Materials Science and Technology Div.
FRACTURE BEHAVIOR AND MICROSTRUCTURAL CHARACTERISTICS OF IRRADIATED ZIRCALOY CLADDING
H. M. Chung, F. L. Yaggee, and T. F. Kassner Jun. 1985 56 p Presented at the 7th International Conference on Zirconium in the Nuclear Industry, Strasbourg, France, 24-27 Jun. 1985 Sponsored in part by Nuclear Regulatory Commission, Washington, D.C.
(TI85-014094; CONF-850601-1) Avail: NTIS HC A04/MF A01

Zircaloy cladding tube specimens from commercial power reactor fuel assemblies have been deformed to fracture at 325 C by either the internal gas pressurization or the expanding mandrel technique in a helium or argon environment containing no fission product species. The fracture surfaces of 11 irradiated specimens fractured by internal gas pressurization were examined by scanning electron microscopy, and 7 specimens were found to contain various degrees of the pseudocleavage feature that is characteristic of pellet-cladding interaction failures. The specimens exhibited X-marks on the outer surface and brittle incipient cracks distributed on the inner surface, which are also characteristic of pellet-cladding interaction failures. Transmission/high voltage electron microscope examinations of the thin-foil specimens obtained from regions adjacent to the failure sites showed that the ductile failure specimens were characterized by a high density of dislocations which showed normal a + - type Burgers vectors. In contrast, the brittle-type specimens were characterized by comparatively few dislocations which formed substructures. These occurrences and their causes are discussed. Author

N86-16342# Oak Ridge National Lab., Tenn.
TEM-APFIM INVESTIGATION OF BORON-DOPED Ni3Al
J. A. Horton and M. K. Miller 1985 7 p Presented at the 32nd International Field Emission Symposium, Wheeling, W. Va., 15 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017154; CONF-850788-1) Avail: NTIS HC A02/MF A01

Boron additions to normally brittle Ni3Al result in room temperature ductilities over 50%. Little is presently known about the role of boron in strengthening the otherwise brittle grain boundaries. A TEM structural characterization of cast material shows a featureless microstructure while rapidly solidified material has substantial aluminum enrichments coupled with a bimodal APB distribution. Preliminary atom probe investigations of cast material found the boron in solution, with no evidence of clustering in the grain interiors. A small enrichment of boron was found at twin boundaries. DOE

N86-16343# Oak Ridge National Lab., Tenn.
ANNEALING STUDIES OF ALPHA-Al2O3 IMPLANTED WITH BROMINE
G. C. Farlow, C. J. McHargue, C. W. White, and B. R. Appleton Jul. 1985 16 p Presented at the International Conference on Radiation Effects in Insulators, Guildford, England, 15 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-015415; CONF-850781-2) Avail: NTIS HC A02/MF A01

Aluminum oxide was implanted with bromine and subsequently annealed at temperatures between 800 and 1500 C in a reducing atmosphere. Changes in the lattice damage and the impurity distribution were monitored at Rutherford backscattering and channeling (RBS-C) techniques. Changes in the topography were monitored by optical and secondary electron microscopy. The implantation resulted in the formation of an amorphous surface layer. Upon annealing, the bromine segregated to form bubbles which blistered releasing 90% of the bromine from the Al2O3 matrix. DOE

N86-16344# Syracuse Univ., N. Y. Dept. of Physics.
UHV-AES INVESTIGATION OF SULFUR SURFACE SEGREGATION IN PRECIOUS METAL WEAR TRACKS
J. N. Lloyd, R. W. Vook, and L. E. Pope 1985 16 p Presented at IEEE Holm Conference on Electrical Currents, Chicago, Ill., 30 Sep. 1985 Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE85-009103; SAND-84-2477C; CONF-850959-1) Avail: NTIS HC A02/MF A01

Cyclic sliding experiments of a palladium base (ASTM B540) alloy pin on a gold base (ASTM B541) alloy plate have been completed in an ultrahigh vacuum system that was backfilled to one atmosphere with spectroscopic grade helium. The elemental concentrations in the wear tracks were measured in situ by Auger electron spectroscopy before and after several thousand cycles were performed. The concentration of sulfur in the wear tracks showed an appreciable increase (a factor of 2.5 to 6.4) relative to off track regions. The sulfur enhancement was dependent on the number of sliding cycles. Residual gas analysis of the vacuum system atmosphere before introduction of the helium and analysis of the spectroscopic grade helium detected no sulfur containing gases; it is estimated that the partial pressure of sulfur containing gases was less than approx. 1 x 10 to the minus 7th power torr for all experiments, less than 0.2 ppB in the helium atmosphere. It is concluded that the sulfur originates in the bulk of the alloys. DOE

N86-16345# Lawrence Livermore National Lab., Calif.
HIGH-PRESSURE ION-THERMAL PROPERTIES OF METALS FROM AB INITIO INTERATOMIC POTENTIALS
J. A. Moriarty Jun. 1985 10 p refs Presented at the American Physics Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985
(Contract W-7405-eng-48)
(DE85-016079; UCRL-92899; CONF-850736-55) Avail: NTIS HC A02/MF A01

It has recently become possible for the first time to calculate ab initio two-ion and three-ion interatomic potentials in d-electron transition metals. The nature of these potentials for the third series metals is discussed. In the case of copper, where three-ion contributions may be neglected, application is made to the

ion-thermal component of the equation of state and to the calculation of melting on the shock Hugoniot. DOE

N86-16346# Illinois Inst. of Tech., Chicago.
DENDRITIC ZINC DEPOSITION FROM FLOWING ACIDIC SOLUTIONS Final Report
J. R. Selman and W. C. Hsie Mar. 1985 92 p
(Contract DE-AC03-76SF-00098)
(DE85-016484; LBL-19758) Avail: NTIS HC A05/MF A01

This report covers two topics of research related to the operation and design of zinc/halogen batteries: (1) mass transfer and speciation in concentrated zinc halide electrolytes; (2) growth of dendritic zinc deposits under conditions of well-defined convection. DOE

N86-16347# Lawrence Livermore National Lab., Calif.
DEPOSITION OF SELENIUM COATINGS ON BERYLLIUM FOILS, REVISION 1
E. D. Erikson, P. L. Tassano, R. H. Reiss, and G. E. Griggs 1984 14 p Presented at the 12th World Conference of the International Nuclear Target Development Society, Antwerp, Belgium, 25 Sep. 1984
(Contract W-7405-eng-48)
(DE85-016070; UCRL-91561-Rev-1; CONF-8409150-5-Rev-1) Avail: NTIS HC A02/MF A01

A technique for preparing selenium films on 50.8 micrometers thick beryllium foils is described. The selenium was deposited in vacuum from a resistance heated evaporation source. A water-cooled enclosure was used to minimize contamination of the vacuum system and to reduce the exposure of personnel to toxic and obnoxious materials. Profilometry measurements of the coatings indicated selenium thicknesses of 5.5, 12.9, 37.5, 49.8 and 74.5 micrometers. The control of deposition rate and of coating thickness was facilitated using a commercially available closed-loop programmable deposition controller. The X-ray transmission of the coated substrates was measured using a tritiated zirconium source. The transmissivities of the film/substrate combination are presented for the range of energies from 4 to 20 keV. DOE

N86-16348# Los Alamos National Lab., N. Mex.
EVALUATION OF ANELASTIC EVIDENCE FOR INTERSTITIAL SOLUTE BINDING IN bcc METALS
J. R. Cost and J. T. Stanley 1985 4 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985 Prepared in cooperation with Arizona State Univ., Tempe
(Contract W-7405-eng-36)
(DE85-015705; LA-UR-85-2481; CONF-8506125-6) Avail: NTIS HC A02/MF A01

A Direct Spectrum Analysis (DSA) technique has been applied to key internal friction and elastic after-effect data which are involved in the controversy over the existance of interstitial clustering in the refractory metals. It is found that at relatively high interstitial solute concentrations some of the Snoek peak broadening is due to relaxations that are distinct from the main relaxation. This finding supports the view that interstitial solutes have an interaction that produces clusters of interstitials. DOE

N86-16349# Argonne National Lab., Ill.
ANALYSIS OF THE EFFECTS OF CORROSION POTENTIAL AND IMPURITIES ON THE STRESS CORROSION CRACKING OF TYPE 304 STAINLESS STEEL
P. S. Maiya, T. F. Kassner, and W. E. Ruther Jun. 1985 17 p Presented at the 2nd International Symposium on Environmental Degradation of Materials in Nuclear Power Systems: Water Reactors, Monterey, Calif., 9-1 Sep. 1985; sponsored by ANS, AIME and NACE Sponsored in part by Nuclear Regulatory Commission
(TI85-014964; CONF-850902-2) Avail: NTIS HC A02/MF A01

Intergranular stress corrosion cracking (IGSCC) of sensitized Type 304 stainless steel (SS) has been a recurrent problem in the high-temperature water environment of boiling-water-reactors (BWRs) over the past two decades. The synergistic effects of environmental and material variables on stress corrosion cracking (SCC) of Type 304 SS are investigated at 289C by means of constant-extension-rate-tensile (CERT) tests at a strain rate of 1 x 10 to the -6 power/s. Correlations among environmental variables (dissolved oxygen and impurity concentrations, i.e., H2SO4, steady-state open-circuit electro-chemical potential) and the SCC susceptibility parameters are determined. The extensive results over a wide range of open-circuit corrosion potential conditions are analyzed by a model which accounts for the effects of environmental variables, microstructure (i.e., degree of sensitization) and strain rate. The results are consistent with a slip-dissolution mechanism for SCC. Furthermore, representation of the dependence of corrosion potential and average crack growth rate on the dissolved oxygen concentration of the water by a simple mathematical function, in conjunction with the theoretical model, permits predictions of both strain rate and environmental effects on the SCC susceptibility of sensitized Type 304 SS. Author

N86-16350# Argonne National Lab., Ill. Materials Science and Technology Div.
THE APPLICATION OF ULTRASONIC WAVES TO ASSESS GRAIN STRUCTURE IN CAST STAINLESS STEEL
D. S. Kupperman, K. J. Reimann, and J. Abrego-Lopez Apr. 1985 8 p Presented at the 11th World Conference on Nondestructive Testing, Las Vegas, Nev., 3-8 Nov. 1985 Sponsored in part by Nuclear Regulatory Commission Submitted for publication
(TI85-011475; CONF-851151-1) Avail: NTIS HC A02/MF A01

Ultrasonic inspection is difficult because the microstructure of CSS can vary considerably, from elastically isotropic with equiaxed, relatively small grains to elastically anisotropic with a columnar grain structure to a combination of the two. The results of experiments to characterize the microstructure of CSS by use of ultrasonic waves are discussed. Shear waves may be more effective for isotropic material, whereas longitudinal waves may be better for the anisotropic case because of beam focusing effects. Sound velocity and beam skewing can be measured accurately enough to characterize CSS even in thick walled reactor components. Author

N86-16351# Argonne National Lab., Ill.
PREDICTION OF ENVIRONMENTAL AND STRAIN-RATE EFFECTS ON THE STRESS CORROSION CRACKING OF AUSTENITIC STAINLESS STEELS
P. S. Maiya Mar. 1985 32 p Presented at the Symposium on Predictive Capabilities in Environmentally Assisted Cracking, 1985 Winter Annual Meeting of the American Society of Mechanical Engineers (ASME), Miami, Fla., 17-21 Nov. 1985 Sponsored in part by the Nuclear Regulatory Commission, Washington, D.C.
(TI85-012109; CONF-851125-3) Avail: NTIS HC A03/MF A01

The stress corrosion cracking (SCC) susceptibility of austenitic stainless steels in high-temperature water os controlled by environmental variables (e.g., dissolved oxygen, corrosion potential, impurities), microstructure (e.g., degree of sensitization), and strain rate. A phenomenological model based on the slip-dissolution mechanism and elastic-plastic fracture mechanics is presented to quantitatively describe the effects of both environment-related parameters and strain rate on SCC in constant extension rate tests. The model predictions are in good agreement with the results of tests performed on Types 304, 316, and 316NG stainless steel as different strain rates in a wide variety of environments relevant to boiling-water reactors. DOE

N86-16352# Pacific Northwest Lab., Richland, Wash.
PLATINUM-GROUP METALS FROM NUCLEAR REACTIONS AS A POSSIBLE RESOURCE
G. A. Jensen Mar. 1985 21 p Presented at the International Precious Metals Institute Conference and Exhibit, New York, N.Y., 10 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-016277; PNL-SA-12972; CONF-8506176-1) Avail: NTIS HC A02/MF A01

Spent nuclear fuels contain significant quantities of three of

the platinum-group metals (ruthenium, rhodium, and palladium), and a related element technetium, which is nearly absent in nature. Applications for ruthenium, rhodium, and palladium are well established. Since the supply of these and other platinum metals is largely from foreign sources, they are considered strategic materials. Existing and future spent nuclear fuels contain quantities of these platinum metals that exceed the United States reserve base. Technetium has properties similar to platinum metals and has unique, useful properties of its own. The technical feasibility of recovering and using fission product platinum metals (and technetium) extensively in industry depends on: thoroughly decontaminating platinum-group metals from all other radioactive materials in the waste stream; separating platinum-group metals from one another in very high purity; using applications where appropriate control of the residual radioactivity is possible; and whether or not the United States will recover or process spent fuel prior to repository storage. If the radioactivity must be removed, isotope separation or long term storage to allow decay of the contained radioisotopes may be possible. DOE

N86-16353# Allied Bendix Corp., Kansas City, Mo.
CHANNEL PLATING Final Report
M. E. Evans Aug. 1985 21 p
(Contract DE-AC04-76DP-00613)
(DE85-017246; BDX-613-3322) Avail: NTIS HC A02/MF A01

A process was developed for fabricating printed wiring boards with dense (closely spaced, narrow conductors) circuitry. The characteristics of epoxy-glass printed wiring board laminate clad with copper thicknesses of 0.005, 0.009, 0.013, 0.018, and 0.036 mm were compared. The circuitry was defined by a comparatively thick dry-film photoresist which effectively confines the subsequent copper plating for metallization of through-holes) within its channels. Laminate clad with 0.005 and 0.009-mm-thick copper was unsatisfactory because of metallic embedment in the epoxy surface following the etch removal of non-circuitry copper. Material clad with 0.013- and 0.018-mm-thick copper was superior to 0.036-mm cladding in maintaining the integrity of narrow conductors. The 0.018-mm-clad material was more readily available commercially than the 0.013 mm cladding, so the former was chosen for further exploitation. Physical and electrical properties of the laminate material under various environmental conditions were studied. The process that was developed (using laminate clad with 0.018-mm thick-copper, 0.076-mm-thick photoresist and a special ultraviolet light filter for channel perpendicularity) proved to be capable of producing printed wiring boards with 0.127-mm-wide conductors and spacing. A larger scale production feasibility assessment was conducted using printed wiring boards produced by the channel plating process with electronic components attached. DOE

N86-16354# Los Alamos National Lab., N. Mex.
TEMPERATURE KINETICS DURING SHOCK-WAVE CONSOLIDATION OF METALLIC POWDERS
R. B. Schwarz, P. Kasiraj, and T. Vreeland, Jr. 1985 17 p Presented at the EXPLOMET 1985 - International Conference on Metallurgical Applications of Shock Wave and High Strain-Rate Phenomena, Portland, Oreg., 28 Jul. 1985 Prepared in cooperation with International Business Machines Corp., San Jose, Calif. and California Institute of Technology, Pasadena
(Contract W-7405-eng-36)
(DE85-017567; LA-UR-85-2821; CONF-850770-9) Avail: NTIS HC A02/MF A01

Powders (60 (MU)m diam) of constantan and pure copper were compressed statically into cylindrical greens (20.3 mm diam, 5.3 mm long) with a flat interface separating the two powders. A 20-mm propellant gun was used to accelerate a flyer of Lexan, copper, or aluminum, and generate in the green a shock wave with front parallel to the Cu/constantan interface. The voltages between opposite ends of the greens were measured as a function of time and for shock pressures between 1.3 and 9.4 GPa. When the shock wave arrives at the Cu/constantan interface, the voltage signal shows an abrupt increase, which lasts between 45 and 81 ns and leads to a peak temperature T sub p. After this, the hotter and cooler parts of the compact equilibrate and the temperature decreases to a value T sub h. With increasing shock pressure, T sub h increases from 425 to 1215 K. The measurements of T sub h are in excellent agreement with the temperatures calculated from the measured flyer velocity, the Hugoniot for copper powder, and thermodynamic data for the flyer and powders. DOE

N86-16355# California Univ., Berkeley. Lawrence Berkeley Lab.
THERMOMECHANICAL PROCESSING OF A TWO-PHASE Al-Cu-Li-Zr ALLOY
J. Glazer and J. W. Morris, Jr. Jun. 1985 19 p Presented at the 3rd International Aluminum-lithium Conference, Oxfordshire, England, 9 Jul. 1985 Prepared in cooperation with California Univ., Berkeley
(Contract DE-AC03-76SF-00098)
(DE85-017644; LBL-19236; CONF-850777-3) Avail: NTIS HC A02/MF A01

The effect of large second-phase particles on the workability, mechanical properties, and response to thermochemical processing of an Al-2.49Cu-2.37Li-0.13Zr alloy was investigated. The solution-treated alloy was compared with a dispersoid-containing alloy fabricated by aging the base alloy at an intermediate temperature to bring out second-phase particles. Extensive deformation and short heat treatments that cause some of the solute to be incorporated into dispersoid particles were both found to be beneficial to the mechanical properties of the alloy. In specimens which failed intergranularly, the presence of dispersoid particles did not significantly affect the fracture properties. DOE

N86-16356# California Univ., Berkeley. Lawrence Berkeley Lab.
OBSERVATIONS OF PRECIPITATES IN (95)Pb-(5)Sn SOLDER
D. Frear and J. W. Morris, Jr. Jul. 1985 8 p Presented at the Joint Meeting of the Electron Microscopy Society of America and the Microbeam Analysis Society, Louisville, Ky., 5 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE85-017652; LBL-19979; CONF-850840-17) Avail: NTIS HC A02/MF A01

The electronic packaging of integrated circuit chips has been cited as the limiting factor in the performance and reliability of high speed data processing units. A very important part of the package is in the first level where solder bonds the IC chip to a ceramic carrier. The most commonly used first level solder is (95)Pb-(5)Sn. The importance of this solder connection instigated this study of the microstructure of (95)Pb-(5)Sn and its precipitates. DOE

N86-16357# Oak Ridge National Lab., Tenn.
PREPARATION, PROPERTIES, AND SOME RECENT STUDIES OF THE ACTINIDE METALS
R. G. Haire 1985 36 p refs Presented at the ACTINIDES 1985, Aix-en-Provence, France, 1 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017710; CONF-8509147-4) Avail: NTIS HC A03/MF A01

The actinide elements form a unique series of metals. The variation in their physial properties combined with the varying availability of the different elements offers a challenge to the preparative scientist. This article provides a brief review of selected methods used for preparing (micro)g to kg amounts of the actinide metals and the properties of these metals. In addition, some recent studies on selected actinide metals are discussed. DOE

N86-16358# Pacific Northwest Lab., Richland, Wash.
SOME RADIATION DAMAGE-STRESS CORROSION SYNERGISMS IN AUSTENITIC STAINLESS STEEL
R. H. Jones Feb. 1985 7 p Presented at the 2nd International Symposium on Environmental Degradation of Materials in Nuclear Power Systems--Water Reactors, Monterey, Calif., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017911; PNL-SA-12996; CONF-850902-4) Avail: NTIS HC A02/MF A01

Since radiolytic effects on stress corrosion cracking does not appear to be a major concern, an assessment of the effect of

radiation induced microstructure and microchemistry changes on stress corrosion has been undertaken. The results of two of these evaluations: (1) radiation enhanced creep effects on crack growth rates; and (2) radiation enhanced grain boundary P segregation and IGSCC, are reported in this paper. DOE

N86-16359# Mound Lab., Miamisburg, Ohio.
ELECTROCHEMICAL TECHNIQUES FOR THE ANALYSIS OF CORROSION IN STAINLESS STEEL COMPONENTS. THE 303 STAINLESS STEEL IN CONTACT WITH TATB
D. W. Firsich 21 Aug. 1985 16 p refs
(Contract DE-AC04-76DP-00053)
(DE85-016982; MLM-3286) Avail: NTIS HC A02/MF A01

Electrochemical techniques can be used to predict the corrosion characteristics of a metal in a specific environment. The basic electrochemical principles, experimental techniques, and a detailed study of their use in characterizing the corrosion behavior of a particular 303 stainless steel are presented. The results of the electrochemical corrosion investigation indicated that at room temperature, in a nitrogen atmosphere, using chloride free TATB, the introduction of moisture into the system will not promote significant corrosion. The good corrosion characteristics of 303 SS are lost only when it is exposed to mobile chloride ion, which causes serious pitting/crevice corrosion. The effects of various 303 SS surface finishes upon chloride corrosion resistance were examined; it was shown that a passivation treatment provided only limited protection from chloride attack, and that pitting tended to begin in regions of rougher surface finish. Suggestions for improving the corrosion properties of the system are advanced. DOE

N86-16360# Oak Ridge National Lab., Tenn.
ENGINEERING DATA BASES FOR REFRACTORY ALLOYS
R. H. Cooper, Jr. and W. O. Harms 1985 8 p refs Presented at the 2nd SP-100 Program Integration Meeting, Denver, Colo., 17 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017714; CONF-8509153-2) Avail: NTIS HC A02/MF A01

Refractory alloys based on niobium, molybdenum, tantalum, and tungsten are required for the multi-100kW(e) space nuclear reactor power concepts that have been assessed in the SP-100 Program because of the extremely high temperatures involved. A review is presented of the technology efforts on the candidate refractory alloys in the areas of availability/fabricability, mechanical properties, irradiation effects, and compatibility. Of the niobium-base alloys, only Nb-1Zr has a data base that is sufficiently comprehensive for the high level of confidence required in the reference-alloy selection process for the reactor concept to be tested in the Ground Engineering System (GES) Phase of the SP-100 Program. Based on relatively short-term tests, the alloy PWC-11 (Nb-1Zr-0.1C) appears to have significantly greater creep strength than Nb-1Zr; however, concerns as to whether this precipitation-hardened alloy will remain thermally stable during seven years of full-power reactor operation need to be resolved. Additional information on the reference GES alloy will be needed for the detailed engineering design of a space power system and the fabrication of prototypical GES test components. Expedient development and demonstration of an adequate total manufacturing capability will be required if a high risk of significant schedule slippages and cost overruns is to be avoided. DOE

N86-16361# National Bureau of Standards, Washington, D.C. Metallurgy Div.
SYSTEMATICS OF ALLOYING BEHAVIOR OF THE NOBLE METALS
L. H. Bennett and R. E. Watson 1985 13 p refs Presented at the 114th AIME Annual Meeting (includes Society of Mining Engineers), New York, N.Y., 24 Feb. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE86-000031; BNL-37029; CONF-850211-14) Avail: NTIS HC A02/MF A01

The noble metals (Cu, Ag and Au) often behave as a class in alloying with simple metals, metalloids, or transition metals, whether as hosts, in intermetallic compounds, or as dilute impurities. Examples are given of this behavior, as well as noting important differences between the three elements. Hyperfine effects (Knight shifts and isomer shifts), intrinsic elemental effects (electronegativity, structural maps, atomic volumes) and metallic glasses are reviewed. DOE

N86-16362# Cornell Univ., Ithaca, N.Y.
INITIAL STAGES OF OXIDATION OF METALS AND ALLOYS Final Report
J. M. Blakely Aug. 1985 15 p
(Contract DE-AC02-79ER-10501)
(DE86-000732; DOE/ER-10501/08) Avail: NTIS HC A02/MF A01

This project has dealt with the initiation of oxides on single crystal metal surfaces. We have studied the process from the submonolayer adsorption stage to multilayer continuous films. Experiments using LEED, Auger spectroscopy, ellipsometry and RBS have been carried out on Be and Ni single crystals and on Ni-Fe surfaces. DOE

N86-16363# Centre Technique des Industries Mecaniques, Senlis (France).
PASSIVATION OF FASTENER ZINC PROTECTION Final Report [PASSIVATION SUR ZINCAGE DE BOULONNERIE]
H. Bouvier, Ma. Laroche, and B. Sutter Apr. 1984 108 p In FRENCH
(CETIM-102-490) Avail: NTIS HC A06/MF A01

Commercial passivation processes are compared in order to obtain a corrosion resistance > 400 hr for first red staining in salt spray tests. The requirement of an automobile manufacturer was at the origin of this investigation. All 18 commercial processes are above the present 200 hr standard, and color, thickness and treatment times specified. The 400 hr result is not reached by any of the processes. Author (ESA)

N86-16364# Bureau of Mines, Rolla, Mo.
STRENGTHENING LOW-ALLOY MAGNESIUM SHEET BY STRAIN SOFTENING AND ANNEALING
M. M. Tilman, R. L. Crosby, and L. A. Neumeier 1985 20 p refs (PB85-240091; DI-BM-RI-8943) Avail: NTIS HC A02/MF A01 CSCL 11F

The Bureau of Mines conducted research to determine the feasibility of strengthening experimental magnesium-base sheet alloys by strain softening induced by controlled cold rolling followed by selective heat treatment. Relatively small alloying additions having potenital for producing strain softening were selected from metals that are readily available. Tensile properties comparable to mimimum properties of the most commonly used magnesium-base sheet alloy AZ31B, in the H24 condition (strain-hardened and partially annealed), were obtained in an Mg-1MM (mischmetal)-0.5Mn alloy after strain-softening rolling followed by heat treatment. Tensile properties of the experimental alloys in certainconditions are also compared with miminum tensile properties of other standard magnesium sheet alloys. Author (GRA)

N86-16365# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
PITTING CORROSION OF FERROUS ALLOYS
C. Westcott Jan. 1985 53 p
(AERE-R-11490) Avail: NTIS HC A04/MF A01

Failure can occur by a number of mechanisms, one of the most common being pitting corrosion. Pitting corrosion is known to occur in many alloy systems when in contact with a wide variety of environments. Pitting corrosion was investigated with a view to both understanding its mechanism, and preventing its occurrence. The majority of this work has been carried out on ferrous metals, reflecting their pre-eminent position as constructional materials, and their propensity to fail by pitting attack. The literature on this subject is reviewed. Observations in a variety of experimental methods commonly used to investigate pitting corrosion are discussed. The effects of material and environmental parameters

on the pitting process are discussed, and a number of proposed mechanism are described. Author

N86-16366# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
THE INVESTIGATION OF PLUTONIUM AND THORIUM SURFACE CONTAMINATION ON STEELS USING THE MARWELL NUCLEAR MICROPROBE
P. M. Pollard, J. W. McMillan, and F. C. W. Pummery Feb. 1985 38 p
(AERE-R-11698) Avail: NTIS HC A03/MF A01

The contamination of metal surfaces by actinides has been investigated, using the nuclear microprobe, by three analytical methods, namely, Rutherford backscattering, nuclear reaction and particle induced X-ray analysis. A sensitivity of ca 0.01 micro cm for thorium and plutonium on stainless steels was achieved using Rutherford backscattering which gave both areal and depth information. Correlations with the associated substrate elements were sought using nuclear reactions and particle induced X-ray analysis. Computer simulation of backscatter spectra was used to help postulate variations in composition with depth in a plutonium contaminated region. Electron probe analysis proved less sensitive than nuclear microprobe analysis for the measurement of thorium. Both thorium and plutonium contamination on stainless steel surfaces was found to be patchy and associated with optically observable features. Little or no contamination was observed on rolling marks and shallow scratches although light contamination does agglomerate at larger physical defects, possibly pits. Heavy plutonium contamination has been found to be associated with, and to penetrate into, light element inclusions. DOE

N86-16367# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
APPLICATION OF A MODEL FOR STRESS DRIVEN SEGREGATION TO HYDROGEN EMBRITTLEMENT
C. L. Briant and C. A. Hippsley May 1985 10 p
(AERE-R-11596) Avail: NTIS HC A02/MF A01

A model developed to describe the stress-assisted segregation of embrittling impurities to crack tips during stress-relief cracking at elevated temperatures has been applied to hydrogen assisted cracking. The model correctly predicted the form of the experimentally determined pressure and temperature dependence of hydrogen assisted crack growth, with realistic levels of calculated crack tip hydrogen coverage. DOE

N86-16368# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
THE SOLIDIFICATION AND TRANSFORMATION BEHAVIOUR OF A NIOBIUM-STABILISED AUSTENITIC STAINLESS STEEL WELD METAL
R. M. Boothby Mar. 1985 32 p
(AERE-R-11646) Avail: NTIS HC A03/MF A01

Microstructural examination of an autogeneous 17Cr-12Ni-1Mo-0.2Nb weld has revealed that solidification occurred as both primary ferrite and primary austenite. Compositional profiles in the weld, determined by STEM/EDX analysis, and calculated diffusion distances indicate that the transformation of delta-ferrite to austenite occurred by a diffusional process during cooling. Niobium stabilization appears to restrict M23C6 formation and promote the transformation of retained delta-ferrite to intermetallic phases, including sigma, chi, laves and R-phase, during subsequent elevated temperature ageing of the weld. DOE

N86-16369# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
METALLURGICAL OBSERVATIONS OF A FRENCH A508 CLASS 3 FORGING WITH RESPECT TO TRANSITION TOUGHNESS BEHAVIOUR
S. G. Druce, J. M. Titchmarsh, G. Jordan, and A. James Apr. 1985 46 p
(AERE-R-11626) Avail: NTIS HC A03/MF A01

A detailed chemical, microstructural and fractographic examination has been conducted on three large fracture toughness specimens chosen to represent the bounds of toughness at 5 C observed in a thick-section A508 Class 3 steel forging. Bulk and local chemical analyses show little variation between specimens and agreed well with data previously obtained from this and other similar forgings. Local regions of solidification segregation enriched with Mo, Mn, Ni, S, P, Si and Cr, and several square millimeters in section, were identified beneath the fracture plane of all three specimens, varying in number density and area fraction inversely with toughness. Microstructural analysis revealed a number of particle types, namely M3C, M2C, M23C6 and AlN, which had been observed previously in similar investigations on pressure vessel plates and forgings, together with an unidentified Mo-Fe phase not previously reported. Some variation in the particle types and size distribution occurred between specimens with higher densities of large M23C6 carbides and small Mo-Fe particles being associated with low toughness. DOE

N86-16370# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE INFLUENCE OF CARBIDE TRANSFORMATIONS ON THE GRAIN BOUNDARY SEGREGATION OF PHOSPHOROUS IN QUENCHED AND TEMPERED 2 1/4Cr-1 PERCENT Mo STEEL
G. Gage Mar. 1985 43 p
(AERE-R-11462; FRDCC/MWG(85)P112;
FRDCC/MWG/MPSG(85)P59) Avail: NTIS HC A03/MF A01

Auger electron spectroscopy has been used to study the grain boundary chemistry in a commercial 2 1/4%Cr-1%Mo steel following ageing at 500 C to promote the segregation of impurities. Particular attention has been focused on the influence of the prior tempering treatment on the development of segregation through its affect on the carbide population and matrix composition. Fracture of the prior austenite grain boundaries was associated with the enrichment of the four elements, phosphorus, molybdenum, chromium and carbon at this location. However, inert-ion sputtering experiments indicated that only phosphorus was present in a segregated form and the presence of others was attributed to the precipitation of molybdenum- and chromium-containing carbides on the boundaries. The segregation of the phosphorus was determined to be equilibrium in nature while its coverage of the grain boundaries following ageing at 500 C was demonstrated to be sensitive to prior tempering treatment. Prolonging the tempering treatment and/or lowering the tempering temperature promoted an increase in the propensity for phosphorus to segregate plus formation of the more stable alloy carbides, in particular the molybdenum-rich equilibrium carbide M6C. DOE

N86-16371# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
EFFECT OF STRENGTH AND PRECIPITATION ON THE MECHANISMS OF HYDROGEN EMBRITTLEMENT IN 2 1/4-Cr1Mo STEEL
M. I. Thomas and C. A. Hippsley Jan. 1985 28 p
(AERE-R-11474) Avail: NTIS HC A03/MF A01

The effect of material strength on the propensity to embrittlement by hydrogen of 2 1/4 CrMo steel was investigated. Tensile test pieces were quenched and tempered at 550C for up to 500 hours, after which, specimens were tested in the uncharged and electrolytically hydrogen charged condition. It was found that tensile strength remained virtually unaffected by the presence of hydrogen, although the reduction of area and strain to failure were severely affected. Examination of fracture surfaces revealed that specimens in the uncharged condition exhibited microvoid coalescence and shear modes, while hydrogen charged material exhibited brittle intergranular and cleavage modes at high strengths. Tempering to a lower strength level resulted in the complete disappearance of brittle modes and the appearance of a quasi-cleavage fracture mode which involved a significant degree of plastic deformation. This transition from brittle to ductile modes of hydrogen embrittlement was found to be coincident with the onset of M2C carbide precipitation. Author

N86-16372# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.

STRESS RELIEF CRACKING OF 9Cr STEELS CONTAINING 0 TO 2 PERCENT MOLYBDENUM
C. A. Hippsley, C. L. Briant (General Electric, Schenectady, N.Y.), and B. C. Edwards Feb. 1985 32 p
(AERE-4-11737; FRDCC/MWG/P(85)160; FRDC/MWG/MPSG/P(85)75; FRDC/MWG/FSG/P(85)25) Avail: NTIS HC A03/MF A01

The stress relief cracking (SRC) susceptibility of a range of 9Cr steels of varying Mo (0 to 2 wt%) and trace impurity content (P,S) have been assessed using a 4-point bend test procedure. Two distinct modes of cracking were identified in the P-doped 9Cr steel similar to those observed previously in commercial casts of 2 1/4 Cr 1MO. At low temperatures (550 to 650 C), a low ductility intergranular failure was produced, characterized by relatively high rates of crack growth < 10 to the minus 6 power (MS) and associated with the grain boundary segregation of trace impurities. At higher temperatures, a ductile intergranular fracture was produced. The addition of molybdenum to the steel had a marked effect on the SRC response, eliminating the lower temperature brittle mode of failure and reducing the tendency to form ductile cavities. It is considered that this is due to the formation of delta ferrite promoted by the molybdenum additions. The commercial 9Cr 1Mo steel studied only exhibited a slight degree of cavitational-type cracking in material quenched from a high peak temperature (1320 C). This material was much less susceptible to cracking than the wide range of alloy steels previously studied using the same experimental procedure. DOE

N86-16373# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
AN INTRODUCTION TO THE ac IMPEDANCE TECHNIQUE AND ITS APPLICATION TO CORROSION PROBLEMS
D. E. Williams and C. C. Naish Feb. 1985 26 p
(AERE-M-3461) Avail: NTIS HC A03/MF A01

An outline of the basis of the ac impedance technique is given, and some examples of its application to the study of corrosion processes described. The results are complex and can easily be over-interpreted. Noting the number of relaxation times and their value and observing the change in these and the extrapolated dc resistance with solution conditions is all that is needed, or justified. The technique clearly provides a powerful addition tool for probing the behavior of corroding systems. Author

N86-16374# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AGARD CORROSION HANDBOOK. VOLUME 1: CORROSION, CAUSES AND CASE HISTORIES
W. Wallace (National Research Council, Ottawa, Canada), D. W. Hoeppner (Toronto Univ.), and P. V. Kandachar (Fokker, Schiphol, Netherlands) Jul. 1985 205 p refs
(AGARD-AG-278-Vol-1; ISBN-92-835-1505-6) Avail: NTIS HC A10/MF A01

A need exists to keep aircraft operators and maintenance personnel aware of the science and technology of corrosion as it applies to aircraft structures. Information is provided on the aircraft operating environment, corrosion theory, common airframe materials and their response to corrosion, the detection of corrosion, and methods employed to control corrosion in aircraft structures and materials. Also given are case histories of the deterioration or failure of components in typical aircraft and the means of detection are detailed and the remedical action taken. Microbiological corrosion is also discussed. The handbook is intended to assist in the early diagnosis of developing corrosion problems and in the selection of appropriate corrective measures. Author

N86-16436# Joint Publications Research Service, Arlington, Va.
ELECTROPLATING PROCESS EQUIPMENT PROFILED
Karol Patorski and Jerzy Strzelecki *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 40-42 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 13-14 (For primary document see N86-16432 07-31) Avail: NTIS HC A04/MF A01

N86-16448# University of Electro-Communications, Tokyo (Japan).
COMPUTER CONTROLLED PREPARATION OF SEVERAL METAL COMPLEXES-1
Nobuhide Kokubu, Akira Yamasaki, Hiroya Shiraki, Hiroshi Togashi, Masaki Yasumoto, and Yasuhiro Yamanaka *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 81-85 In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32) Avail: NTIS HC A10/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-16375# Pennsylvania State Univ., University Park.
THE USE OF DELOCALIZED CARBANIONS IN THE PREPARATION OF NEW MONOMERS AND POLYMERS Ph.D. Thesis
Mitchell Blumenthal 1985 66 p
Avail: Univ. Microfilms Order No. DA8515998

The chemistry of delocalized carbanions was shown to offer considerable potential for the facile synthesis of new monomers, polymers and initiators. A series of monomers and polymers based on the substitution of 2,3-dimethyl-1,3-butadiene via the 2,3-dimethylene-1,3-dianion were synthesized. Included in these studies are the following: (1) Disubstituted butadienes and 1,-4-butanediols; (2) Monomer containing crown ethers; and (3) Delocalized carbanions were shown to be excellent anionic initiators with the number of growing chains from the site of initiation being equal to the charge on the carbanion. This represents a new procedure for preparing telechelic, linear and star polymers. In summary, the delocalized carbanion chemistry shown has led to the formation of a number of new monomers and polymers. Dissert. Abstr.

N86-16376 Massachusetts Univ., Amherst.
A MORPHOLOGICAL STUDY OF A SERIES OF MULTIARMED STAR BLOCK COPOLYMERS OF POLYISOPRENE AND POLYSTYRENE Ph.D. Thesis
David Brian Alward 1985 255 p
Avail: Univ. Microfilms Order No. DA8517075

An elucidation of the influence of molecular topology on the development of equilibrium phase separated morphologies in multi-armed star block coplymer systems is presented. Small angle X-ray scattering and electron microscopy were the principal techniques used to directly and indirectly probe the morphologies. The studies were augmented by transport measurements and dynamic mechanical thermal analysis. The samples studied were of constant composition with 30 weight percent polystyrene at the free of the arm and 70 weight percent polyisoprene at the center. The star molecules examined had 2, 4, 8, 12, or 18 arms, and total arm molecular weights of 2.3, 3.3 and 10 x 10 the 4. Dissert. Abstr.

N86-16377 Cincinnati Univ., Ohio.
PHOSPHOSILICATE GLASS FOR INTEGRATED OPTICS Ph.D. Thesis
Ahmed Naumaan 1985 226 p
Avail: Univ. Microfilms Order No. DA8518110

The use of phosphosilicate glass (PSG) films prepared by chemical vapor deposition is investigated for the fabrication of integrated optical waveguide structures. PSG layers deposited on V- grooves etched in silicon substrates were annealed in a furnace under a variety of conditions involving annealing ambients, temperatures and times. Laser annealing of PSG layers using a CO2 laser was also investigated. Laser heat treatment also resulted flow of the phosphosilicate glass. The scattered light intensity method and a three prism method for making loss measurements on waveguides are analyzed in terms of possible sources of error in making measurements as well as analyzing the data using regression procedures. Analysis of a closed loop

resonator with a tapered mode input coupler is presented. The fabrication procedure for the resonator design implemented using PSG channel waveguides is described and experimental evidence of resonant behavior is presented. Dissert. Abstr.

N86-16378 British Library Lending Div., Boston Spa (England).
DETERMINATION OF RHEOLOGICAL COEFFICIENTS OF SUPERPLASTIC MATERIALS
M. A. Tsepin, A. N. Ershov, and D. V. Yukhtanov [1985] 6 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR),
(BLL-M-36430-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The least-squares and coordinate descent methods were used to calculate the rheological coefficients of different alloys. Data from various mechanical tests were used as the initial data. Obtained dependences of dimensionless flow stresses on dimensionless deformation rate characterize quantitatively the main laws governing the influence of chemical composition, temperature, and grain size on the behavior of materials in the state of superplasticity. Author

N86-16379*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF A THIOETHER LUBRICANT BY INFRARED FOURIER MICROEMISSION SPECTROPHOTOMETRY
William R. Jones, Jr., Wilfredo Morales, and James L. Lauer (Rensselaer Polytechnic Inst., Troy, N.Y.) Jan. 1986 16 p refs
(NASA-TM-87195; E-2691; NAS 1.15:87195) Avail: NTIS HC A02/MF A01 CSCL 11H

An infrared Fourier microemission spectrophotometer is used to obtain spectra (wavenumber range, 630 to 1230 0.1 cm) from microgram quantities of thioether lubricant samples deposited on aluminum foil. Infrared bands in the spectra are reproducible and could be identified as originating from aromatic species (1,3-disubstituted benzenes). Spectra from all samples (neat and formulated, used and unused) are very similar. Additives (an acid and a phosphinate) present in low concentration (0.10 percent) in the formulated fluid are not detected. This instrument appears to be a viable tool in helping to identify lubricant components separated by liquid chromatography. Author

N86-16380*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTICALLY TRANSPARENT/COLORLESS POLYIMIDES
Anne K. StClair, Terry L. StClair, Wayne Slemp, and Keziban S. Ezzell (PRC Kentron Inc., Hampton, Va.) Dec. 1985 41 p refs Presented at 2nd International Conference on Polyimides, Oct. 30 - Nov. 1 1985, Ellenville, N.Y.; sponsored by Society of Plastics Engineers
(NASA-TM-87650; NAS 1.15:87650) Avail: NTIS HC A03/MF A01 CSCL 11B

Several series of linear aromatic polyimide films have been synthesized and characterized with the objective of obtaining maximum optical transparency. Two approaches have been used as part of this structure-property relationship study. The first approach is to vary the molecular structure so as to separate chromophoric centers and reduce electronic interactions between polymer chains to lower the intensity of color in the resulting polymer films. A second and concurrent approach is to perform polymerizations with highly purified monomers. Glass transition temperatures of thermally cured polyimide films are obtained by thermomechanical analysis and thermal decomposition temperatures are determined by thermogravimetric analysis. Transmittance UV-visible spectra of the polyimide films are compared to that of a commercial polyimide film. Fully imidized films are tested for solubility in common organic solvents. The more transparent films prepared in this study are evaluated for use on second-surface mirror thermal control coating systems. Lightly colored to colorless films are characterized by UV-visible spectroscopy before and after exposure to 300 equivalent solar hours UV irradiation and varying doses of 1 MeV electron irradiation. The effects of monomer purity, casting solvent and cure atmosphere on polyimide film transparency are also investigated. Author

N86-16381*# Dow Corning Corp., Midland, Mich.
ORGANOSILOXANE WORKING FLUIDS FOR THE LIQUID DROPLET RADIATOR Final Report
R. R. Buch and A. R. Huntress Dec. 1985 174 p refs
(Contract NAS3-24400)
(NASA-CR-175033; NAS 1.26:175033) Avail: NTIS HC A08/MF A01 CSCL 11G

Siloxane-based working fluids for advanced space radiators requiring direct fluid exposure to the space environment are evaluated. Isolation of five candidate fluids by vacuum distillation from existing siloxane polymers is discussed. The five fluids recovered include a polydimethylsiloxane, three phenyl-containing siloxanes, and a methylhexylsiloxane. Vapor pressures and viscosities for the five fluids are reported over the temperature range of 250 to 400 K. Use of thermal-gravimetric analysis to reliably estimate vapor pressures of 10 to the -8 power Pascals is described. Polydimethylsiloxane (PDMS) and polymethylphenylsiloxane (PMPS) are selected from the five candidate fluids based on favorable vapor pressure and viscosity, as well as perceived stability in low-Earth orbit environments. Characterization of these fluids by infrared spectroscopy, Si-29 NMR, gel-permeation chromatography, and liquid chromatography is presented. Both fluids consist of narrow molecular weight distributions, with average molecular weights of about 2500 for PDMS and 1300 for PMPS. Author

N86-16382# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
PERFLUOROPOLYALKYLETHER OIL DEGRADATION: INFERENCE OF FeF3 FORMATION ON STEEL SURFACES UNDER BOUNDARY CONDITIONS
D. J. Carre 1 Aug. 1985 24 p
(Contract F04701-83-C-0084)
(AD-A159261; TR-0084A(5945-03)-3; SD-TR-85-37) Avail: NTIS HC A02/MF A01 CSCL 11/8

The formation of iron fluoride (FeF3) through the interaction of Kaytox 143AB perfluoropolyalkylether (PFPE) oil with steel surfaces was investigated under boundary lubrication conditions. Ball-bearing rolling action was simulated by a specially designed wear-test apparatus that incorporated noncoaxial wear members to give a skid/roll ratio of approx. 0.16. The contact stress was 830,000,000 sq m (approx. 120,000 psi), and the speed was 1750 rpm. Under these conditions, FeF3 formation on the wear surfaces was inferred using X-ray photoelectron spectroscopic (XPS), Auger electron spectroscopic (AES), and secondary ion mass spectrometric (SIMS) surface analysis techniques. These findings support the hypothesis that, under the low oxygen environment of spacecraft Earth orbit, formation of FeF3 and subsequent FeF3 catalyzed degradation of PFPE can constitute an important PFPE degradation pathway under boundary lubrication conditions. GRA

N86-16383# Honeywell, Inc., New Hope, Minn. Ceramics Center.
CRACK PROPAGATION IN Z5U MULTILAYER DIELECTRICS Technical Report, 1 Jun. 1983 - 31 May 1984
K. D. McHenry and B. G. Koepke 1 May 1985 29 p
(Contract N00014-83-C-0141)
(AD-A159262; AD-E301788; TR-1) Avail: NTIS HC A03/MF A01 CSCL 11/2

It has been found that moisture has a deleterious effect in enhancing slow crack growth in Z5U multilayer ceramics similar to the effect shown in other ceramic materials. The enhancement of slow crack growth in the presence of moisture has been demonstrated for both parallel and perpendicular orientations of the multilayer structure with respect to the propagating crack. The application of dc electric fields to the multilayer ceramics either has no effect or serves to retard crack propagation depending upon the crack orientation with respect to the applied electric field. The fracture toughness or critical stress intensity factor as

measured by the double torsion testing technique has been found to vary with respect to orientation of the multilayer structure. Higher fracture toughness values are obtained when the macroscopic crack is forced to propagate in a direction perpendicular to the multilayer structure. GRA

N86-16384# Aeronautical Research Labs., Melbourne (Australia).
CHARACTERISTICS OF RAPID CURE MAGNETIC RUBBER INSPECTION FORMULATIONS
B. C. Bishop Apr. 1985 36 p
(AD-A159398; ARL-MAT-TM-390) Avail: NTIS HC A03/MF A01 CSCL 11/10

Magnetic rubber inspection (MRI) is a form of magnetic particle inspection. In this particular form the magnetic particles are suspended in a liquid rubber curing at room temperature. The rubber, after the addition of a catalyst and a stabilizer, is poured into, or around, the area to be inspected, where it may be contained, if necessary, by a specially constructed reservoir. A magnetic field, complying with the principles of magnetic particle inspection, is then applied to the part for a period of approximately 2 to 4 minutes, after which the rubber solution continues to cure to the solid state. The flexible solid rubber cast is then removed from the part and the surface of the cast is examined in detail, in the relevant areas, using a low-power binocular microscope. Evidence of surface and near-surface defects in the material with which the rubber was in contact during the curing/magnetization period appears at the surface of the cast as corresponding concentrations of magnetic particles. Over the last 10 years the magnetic rubber inspection method has proved very useful for the detection of very small (0.2mm surface length) fatigue cracks and other surface discontinuities (e.g., non-metallic inclusions) in magnetic materials. In many instances, it has been the only method whereby such defects could be detected non-destructively. The introduction of rapid-cure magnetic rubber inspection formulations has raised questions as to whether there may be some impairment of the sensitivity and reliability of the inspection technique relative to its performance with the well-established, slower curing formulation. This memorandum attempts to answer these questions. GRA

N86-16385# Materials Research Labs., Ascot Vale (Australia).
CONVERSION OF HYDRAULIC BRAKE SYSTEMS FROM POLYGLYCOL TO SILICONE BRAKE FLUID: RESIDUAL POLYGLYCOL REMAINING AFTER CONVERSION
P. J. Sanders and J. Barry Jun. 1985 20 p
(AD-A159501; MRL-TN-491) Avail: NTIS HC A02/MF A01 CSCL 11/8

Selected Australian Army vehicles were converted from polyglycol to silicone brake fluid using experimental flush-fill techniques. Performance trials and analysis of samples taken after conversion indicate that techniques associated with the conversion do not remote all polyglycol from the vehicles tested. Accordingly, the technical advantages possible from the use of silicone fluids are not achieved. Author (GRA)

N86-16386# Oak Ridge National Lab., Tenn.
FABRICATION OF CERAMIC-CERAMIC COMPOSITES BY CHEMICAL VAPOR DEPOSITION
D. F. Stinton, W. J. Laskey, R. J. Lauf, and T. M. Besmann 1984 17 p Presented at conference
(Contract DE-AC05-84OR-21400)
(DE85-000981; CONF-840171-1) Avail: NTIS HC A02/MF A01

Toughened ceramic composites were produced by the simultaneous chemical vapor deposition of two phases. Fracture toughness values were nearly double the value of SiC when CH3SiCl3 and TiCl4 vapors were used to produce SiC-TiSi2 composites. Other systems consisting of SiC and the metal or metal carbides of Ni, Cr, W, and Mo were examined. Equilibrium thermodynamic analyses of these systems were performed as a function of the chemical vapor deposition variables: temperature, total pressure, and reactant concentration. Thermodynamic calculations also indicated that SiC and TiC should be codeposited when CH3SiCl3, TiCl4, and a hydrocarbon are used as the coating gases. Author

N86-16387# Department of Energy, Washington, D. C.
METHOD OF FORMING A FOAMED THERMOPLASTIC POLYMER Patent Application
D. V. Duchane (Los Alamos National Lab., N. Mex.) and D. L. Cash, inventors (to DOE) (Los Alamos National Lab., N. Mex.) Filed 21 Nov. 1984 11 p
(Contract W-7405-eng-36)
(DE85-017772; US-Patent-Appl-SN-673968) Avail: NTIS HC A02/MF A01

A solid thermoplastic polymer is immersed in an immersant solution comprising a compatible carrier solvent and an infusant solution containing an icompatible liquid blowing agent for a time sufficient for the immersant solution to infuse into the polymer. The carrier solvent is then selectively extracted, preferably by a solvent exchange process in which the immersant solution is gradually diluted with and replaced by the infusant solution, so as to selectively leave behind the infustant solution permanently entrapped in the polymer. The polymer is then heated to volatilize the blowing agent and expand the polymer into a foamed state. DOE

N86-16388# Department of Energy, Washington, D. C.
INORGANIC-POLYMER-DERIVED DIELECTRIC FILMS Patent Application
C. J. Brinker (Sandia National Labs., Albuquerque, N. Mex.), K. D. Keefer (Sandia National Labs., Albuquerque, N. Mex.), and P. M. Lenahan, inventors (to DOE) (Sandia National Labs., Albuquerque, N. Mex.) Filed 25 Feb. 1985 45 p
(Contract DE-AC04-76DP-00789)
(DE85-017763; US-Patent-Appl-SN-704697) Avail: NTIS HC A03/MF A01

A method is disclosed for coating a substrate with a thin film of a predetermined porosity. The method comprises: depositing the thin film on the substrate from a non-gelled solution comprising at least one metal alkoxide of a polymeric network forming cation, water, an alcohol compatible with the hydrolysis and the polymerization of the metal alkoxide, and an acid or a base; prior to said depositing step, controlling the porosity and structure of said coating for a given composition of said solution exclusive of the acid or base component and the water component, by adjusting each of the water content, the pH, the temperature and the time of standing of said solution, increasing/decreasing the water content or the pH to increase/decrease the pore size of said coating, and increasing/decreasing the temperature or time of standing of said solution to increase/decrease the pore size of said coating; and curing said deposited film at a temperature effective for curing whereby there is obtained a thin film coating of a predetermined porosity on the substrate. DOE

N86-16389# Department of Energy, Washington, D. C.
SYNTHESIS OF NEW AMORPHOUS METALLIC SPIN GLASSES Patent Application
R. C. Haushalter, inventor (to DOE) (Argonne National Lab., Ill.) Filed 11 Feb. 1985 9 p
(Contract W-31-109-eng-38)
(DE85-017800; US-Patent-Appl-SN-700845) Avail: NTIS HC A02/MF A01

Amorphous metallic precipitates with the formula (M1) sub a (M2) sub b wherein M1 is at least one transition metal, M2 is at least one main group metal and the integers a and b provide stoichiometric balance are disclosed. The precipitates have a degree of local order characteristic of chemical compounds from the precipitation process and useful electrical and mechanical properties. DOE

N86-16390# National Bureau of Standards, Washington, D.C. Center for Building Technology.
MOLECULAR AND MICROSTRUCTURAL FACTORS AFFECTING MECHANICAL PROPERTIES OF POLYMERIC COVER PLATE MATERIALS
E. J. Clark Jul. 1985 65 p
(Contract DE-AI01-76PR-06010)
(DE85-016820; NBSIR-85-3197) Avail: NTIS HC A04/MF A01

The dependence of mechanical properties of polymers on various microstructural factors is reviewed. The microstructural and molecular factors considered are: molecular weight, crystallinity, crosslinking, branching, copolymerization, plasticization, orientation, and residual stresses. The types of mechanical properties considered are: direct loading, fatigue, creep, wear and abrasion, and environmental stress cracking. The effects of polymer deformation and fraction at the molecular level are discussed. Cracking, crazing, and shear yielding are described. Polymeric cover plate materials are discussed and their degradation reviewed. Methods to measure microlevel changes in polymers are identified. DOE

N86-16391# Mound Lab., Miamisburg, Ohio.
HIGH STRENGTH GLASS-CERAMIC TO METAL SEALS
L. D. Haws, D. P. Kramer, W. E. Moddeman, and G. W. Wooten 1985 41 p refs Presented at the American Institute of Chemical Engineers National Meeting, Seattle, Wash., 25 Aug. 1985
(Contract DE-AC04-76DP-00053)
(DE85-017422; MLM-3288(OP); CONF-850836-6) Avail: NTIS HC A03/MF A01

In many applications, ceramics are joined to other materials, especially metals. In such cases, interfacial strength is as important as the strength of each constituent material. Examples are presented for tailoring materials and processes to optimize the glass-ceramic to metal seal. Means for detecting defects, nondestructively, are also identified. DOE

N86-16392# Department of Energy, Washington, D. C.
FABRICATION OF LOW DENSITY CERAMIC MATERIAL Patent Application
T. T. Meek, R. D. Blake, and H. Sheinberg, inventors (to DOE) Filed 1985 11 p
(Contract W-7405-eng-36)
(DE85-017766; US-Patent-Appl-SN-668054) Avail: NTIS HC A02/MF A01

A precursor mixture and a method of making a low-density ceramic structural material are disclosed. The precursor mixture includes hollow microballoons, typically made of glass, together with a cementing agent capable of being cured by microwave irradiation. A preferred cementing agent is liquid hydrated potassium silicate, which is mixed with the glass microballoons to form a slurry. Upon irradiation the potassium silicate is dehydrated to form a solid porous matrix in which the microballoons are evenly distributed. Ground glass or other filling agents may be included in the slurry to enhance the properties of the final product. Low-density structural ceramics having densities on the order of 0.1 to 0.3 are obtained. DOE

N86-16393# National Bureau of Standards, Boulder, Colo.
ROUND ROBINS ON THE APPARENT THERMAL CONDUCTIVITY OF LOW-DENSITY GLASS FIBER INSULATIONS USING GUARDED HOT PLATE AND HEAT FLOW METER APPARATUS
J. G. Hust and C. M. Pelanne May 1985 131 p refs
(Contract DE-AC05-84OR-21400)
(DE85-017253; NBSIR-85-3026) Avail: NTIS HC A07/MF A01

This National Bureau of Standards report presents the results and the data analysis pertaining to these results for three round robins on the thermal performance of guarded hot plates and heat flow meters when measuring the thermal resistance properties of low density glass fibrous thermal insulations. The three round robins were carried out under the sponsorship of the American Society for Testing and Materials (ASTM) Subcommittee C-16.30 on Thermal Measurements and the Mineral Insulation Manufacturers Association (MIMA). The test results are compared to a reference equation and to each other to illustrate intralaboratory and interlaboratory reproducibility as well as the dependencies on temperature, density, plate emittance, specimen thickness, and fiber diameter. The study shows that, with good laboratory practices, interlaboratory agreement of about 2% is obtained. Over 300 test results obtained by 12 different laboratories are reported. This report also discusses the magnitude of the specimen thickness effect and its dependence on plate emittance. DOE

N86-16394# Lawrence Livermore National Lab., Calif.
VARIATION OF TRANSMITTANCE SPECTRA OF POROUS ANTIREFLECTION COATINGS WITH INDEX PROFILE
D. Milam and G. G. Peterson 30 May 1985 36 p Presented at the Boulder Damage Symposium, Colorado, 15 Oct. 1985
(Contract W-7405-eng-48)
(DE85-013976; UCRL-91430; CONF-8510101-1) Avail: NTIS HC A03/MF A01

Transmittance spectra were calculated for single-layer coatings with: (1) homogeneous refractive index; (2) index profiles that increase monotonically with distance into the coating; and (3) index profiles that rise in discrete steps. The calculations predict that large transmittance at tuned wavelengths can be obtained using any of these coating designs and known, porous silica coating materials. The spectral bandwidth of transmittance maxima increases when the index profile is altered from homogeneous to any profile whose index increases monotonically with thickness in the coating. Bandwidth is greatest for the linear-ramp coating whose index rises linearly from that of air to that of the substrate, but this design cannot currently be used because we are unable to fabricate silica coating material with the extremely large porosity needed to provide a coating index near unity at the air interface. For currently attainable fractional silica contents, estimated to be in the range 0.4 to 0.5, the optimum handwidth is provided by a coating with a single discrete step in its index profile. DOE

N86-16395# Oak Ridge National Lab., Tenn.
PREPARATION OF BACKTHINNED CERAMIC SPECIMENS
A. T. Fisher and P. Angelini 1985 2 p Presented at the Joint Meeting of the Electron Microscopy Society of America and the Microbeam Analysis Society, Louisville, Ky., 5 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016588; CONF-850840-12) Avail: NTIS HC A02/MF A01

Backthinned specimens of ion-implanted single-crystal Al2O3 have been prepared by first protecting the implanted surface with NaCl. This protects against contamination of the back surface by impurities sputtered during the ion milling step in the backthinning process. The specimens can then be analyzed using analytical electron microscopy. DOE (Author)

N86-16396# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SPECULARITY AND STABILITY OF SILVERED POLYMERS
A. W. Czanderna and P. Schissel Jul. 1985 13 p Presented at SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012156; SERI/TP-255-2743; CONF-850887-13) Avail: NTIS HC A02/MF A01

Silvered polymers have been studied for possible mirror applications in concentrators for solar thermal systems. The polymeric mirrors were prepared by vacuum evaporating or dc-sputtering silver onto several candidate polymers for use as second surface mirrors. Specularities were measured at 7 and 15 mrad acceptance angles at 660 nm. The specularity of silvered poymers depends strongly on ther topography and bulk properties of the polymer used. It is independent both of the deposition rate from 0.1 to 7 nm/s and from thermal evaporation and dc-sputtering processes. Silvered glass specularities are also independent of deposition rates from 0.1 to 45 nm/s and are typically 93% at 7 mrad. The specularity does not depend on the substrate temperatures during depositions for the range of 5 C to about 100 C. In some cases, a metallic film was deposited onto the silver before mounting onto a Corning 7809 glass substrate. Inconel backing of films from 35 to 150 nm thick does not reduce the specularity of silvered polymers at 15 mrad, but does accelerate the degradation of the multilayer combination during accelerated or real-time weathering. After measuring the solar-weighted hemispherical reflectance and the second surface specularity at 660 nm for acceptance angles of 15 and 7 mrad, the silvered

polymeric specimens were subjected to accelerated testing in a Weather-Ometer at 60 C, 80% relative humidity, and UV radiation, or in a QUV at 40 C, UV irradiation, and condensation cycles. Real-time testing has also been carried out in the suburban Denver Atmosphere. With exposure, all mirrors prepared show evidence for some or extensive optical and/or visual degradation. The relative durabilities of the various combinations studied are discussed in terms of the silvering method, polymer used, metallic backing for the silver, and adhesive used for mounting the silvered polymer onto a test substrate. DOE

N86-16397# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
POLYMER SYNTHESIS AND MODIFICATION RESEARCH DURING FY 1984
H. H. Neidlinger and P. Schissel Jul. 1985 73 p
(Contract DE-AC02-83CH-10093)
(DE85-012160; SERI/TR-255-2590) Avail: NTIS HC A04/MF A01

This paper reports on our evaluation and modification of polymeric glazings to protect silver mirrors. The mirrors were made using Corning 7809 glass as a substrate onto which a thin silver film is deposited. The modified polymeric films are then cast from solution onto the silver. The mirrors were characterized by measuring the hemispherical reflectance and the specular reflectance at 660 nm and selected acceptance angle (15 mr or 7 mr). The mirrors were exposed to environmental degradation using accelerated weathering devices and outdoor exposure. Empirical evidence has demonstrated that polymethylmethacrylate is a stable polymer in a terrestrial environment, but the polymer does not provide adequate protection for the silver reflector. The crucial role in degradation played by ultraviolet (UV) light is shown by several experimental results. We have demonstrated that UV stabilizers added to the polymer improve the weatherability of mirrors. The relative effectiveness of different stabilizers will be discussed in terms of the weathering modes, retention of optical properties, and effectiveness of the weathering modes, retention of optical properties, and effectiveness of the additives. DOE

N86-16398# Oak Ridge National Lab., Tenn.
FRACTURE TOUGHNESS OF ANISOTROPIC GRAPHITES
C. R. Kennedy and M. T. Kehne 1985 2 p Presented at the 17th Bien. Conference On Carbon, Lexington, Ky., 16 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016595; CONF-8506108-2) Avail: NTIS HC A02/MF A01

Fracture toughness measurements were made at 0, 30, 45, 60, and 90 degrees from the extrusion axis on a resonably anisotropic graphite, grade AGOT. It was found that the fracture toughness did not vary appreciably with orientation. An observed variation in strength was found to be the result of defect orientation. DOE

N86-16399# Union Carbide Corp., New York.
PROCEDURE FOR THE PRODUCTION OF LINEAR THERMOPLASTIC POLYMERS FROM THE BREAKDOWN PRODUCTS OF PYROLYSIS OF p-XYLENE-BIS-SULFONES
1985 21 p Transl. into ENGLISH of Dutch Patent No. 6611019 (Sept. 1964)
(Contract W-7405-eng-36)
(DE85-017024; LA-tr-85-37) Avail: NTIS HC A02/MF A01

This invention concerns the analysis of p-xylene-bis-sulfones. The invention concerns in particular the pyrolytic analysis of p-xylene-bis-sulfones and the polymers prepared by this process. Purpose of this invention is also to create p-xylylene polymers, where the vulnerable hydrogen atoms lying on the border of the aromatic ring are replaced by another more stable substitute, which increases the total stability of the polymers. Another object of the invention is to create a procedure for the preparation of p-xylylene polymers by suitable means. Another object of the invention is to produce (ALPHA), (ALPHA), (ALPHA)', (ALPHA)'-tetrafluor-p-xylylene polymers. DOE

N86-16400# New Mexico Inst. of Mining and Technology, Socorro. Center for Explosives Technology Research.
DYNAMIC COMPACTION OF SiC POWDER
Tamotsu Akashi, Victor Lotrich, Akira Sawaoka, and Edwin K. Beauchamp (Sandia National Labs., Albuquerque, N. Mex.) 1985 6 p Presented at conference
(DE85-016802; SAND-85-1647C; CONF-850736-60) Avail: NTIS HC A02/MF A01

Dynamic compaction techniques have considerable potential in the consolidation and fabrication of hard-to-density powder materials such as non-oxide ceramic materials. Consolidation of the powder materials by this technique involves the densification of the powder at the shock wave front followed by interparticle bonding which occurs during the shock-compression process. Recently, a series of shock-compaction experiments on fine SiC powder have been performed by Kondo, et al. Sintered compacts with densities of 97% of theoretical and micro-Vieker's hardness values of 2700 kg/sq. mm were produced. It was suggested that the disruptive effects, indicated by microstrain increase and crystallite size reduction, must remain in the compacted sample in order to obtain a well-bonded compact. The compaction mechanism of coarse SiC powder in the dynamic compaction process, which may be different from that of the fine powder, is studied. Author

N86-16401# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF CERAMIC TURBINE ROTORS
Yoshito Kobayashi, Norio Nakazawa, and Tohji Inagaki 1985 11 p Translated from Proceedings of the 13th Regular Gas Turbine Conference, June 1985 p 59-64 Prepared in cooperation with Mitsubishi Motors Corp., Tokyo, Japan
(Contract DE-AC05-84OR-21400)
(DE85-017021; ORNL-tr-5223) Avail: NTIS HC A03/MF A01

Mitsubishi Motor Company has been developing gas turbines for use in trucks and is, at the present time, conducting tests using metal turbines. Mitsubishi Motor Company has also performed engine tests at 1120(0)C turbine inlet temperature (TIT) using a metal air-cooled turbine. On the basis of these tests, the possibility of using gas turbines for high-performance automotive engines has been demonstrated. The only weak point was that fuel consumption was not economical when compared to that of current diesel engines. In order to eliminate this weakness, it is necessary for truck engines to raise the TIT to above 1250(0)C, and it is therefore essential that ceramics be used. Mitsubishi is developing gas turbines with ceramic turbine rotors, which hold the key to realization of high-efficiency gas turbines for use in automobiles and trucks. The hot spin test process for silicon nitride radial-flow turbine rotors is discussed. DOE

N86-16402# Oak Ridge National Lab., Tenn.
EVALUATION OF THE STRENGTH OF CERAMIC RADIAL TURBINE ROTORS
Masanori Sasaki, Takao Izumi, Seiji Ajiwa, and Takane Ito 1985 13 p Translated from Proceedings of the 13th Regular Gas Turbine Conference, June 1985 p 65-70 Prepared in cooperation with Nissan Motor Co. Ltd., Tokyo, Japan
(Contract DE-AC05-84OR-21400)
(DE85-017022; ORNL-tr-5224) Avail: NTIS HC A03/MF A01

The development of turbine rotors that are subjected to high temperature and centrifugal force is one of the most difficult development problems for ceramic parts used for ceramic gas turbines in passenger cars. One of the authors has attempted to evaluate the strength of a small silicon nitride turbine rotor on the basis of 3-point bar breaking strength using the Weakest Link Theory. A bar breaking test was conducted on a test piece cut out of the actual rotor. A spin strength evaluation was then attempted on the basis of the test results. After continual analysis of causes and improvements in the rotors that fail at a spin speed less than the predicted speed, a few insights have been gained that will contribute to the development of the ceramic radial turbine rotor. DOE

N86-16403# Tennessee Univ., Knoxville. Dept. of Chemistry.
STATISTICAL MECHANICS OF POLYMER SYSTEMS

Annual Report
J. Kovac 1 May 1985 8 p
(Contract DE-FG05-84ER-45114)
(DE85-017986; DOE/ER-45114/1) Avail: NTIS HC A02/MF A01

In the original proposal three areas of research were outlined: development of models for isolated polymer chain dynamics using projection operator techniques; study of the effect of entanglements on the dynamics polymer chains by means of computer simulation; and nonequilibrium thermodynamic and statistical mechanical theories of the glass transition. During the past eight months almost all of our efforts have been focused on computer simulation. The original single chain simulation algorithm has been extended to multiple chain systems in order to study the effects of interchain entanglements on the chain dynamics. In addition, we have performed a normal coordinate analysis of the dynamics of single chains in order to further elucidate the effect of excluded volume on the chain motion. The current status of our computer simulation research is described. A brief description of plans for research in theories of the glass transition is also given. DOE

N86-16404# Sandia National Labs., Albuquerque, N. Mex.
LINEAR THEORY FOR POROUS THERMOELASTIC MATERIALS
D. F. McTigue 10 Sep. 1985 52 p
(Contract DE-AC04-76DP-00789)
(DE86-000222; SAND-85-1149) Avail: NTIS HC A04/MF A01

A linear theory for fluid-saturated, porous, thermoelastic media is developed. The theory allows for compressibility and thermal expansion of both the fluid and solid constituents. An approach to solving boundary value problems is presented in which a diffusion equation with a temperature-dependent source term governs a combination of the mean total stress and the fluid pore pressure. In certain special cases, this reduces to a diffusion equation for the pressure alone. In addition, when convective heat transfer can be neglected, the temperature field can be determined independently, and the source term in the pressure equation is known. Drained and undrained limits are identified, in which fluid flow plays no role in the deformation. In the drained case, the medium behaves as a simple thermoelastic body with the properties of the porous skeleton with no fluid present. In the undrained limit, the fluid is trapped in the pores, and the material responds as a thermoelastic body with effective compressibility and thermal expansivity determined in part by the fluid properties. The theory is further specialized to plane and one-dimensional deformations, and several illustrative problems are solved. In particular, the one-dimensional heating of a half-space is explored for constant-temperature and constant-flux boundary conditions on the thermal field, and for drained (zero pressure) and impermeable (zero flux) conditions on the fluid pressure field. Finally, solutions are presented for constant heat flux delivered to a borehole for both drained and impermeable boundaries. The behavior of all of these solutions depends critically upon the ratio of the fluid and thermal diffusivities, with very large and very small values of this parameter corresponding to drained and undrained responses, respectively. DOE

N86-16405# Fermi National Accelerator Lab., Batavia, Ill.
CRYOGENIC COMPRESSIVE PROPERTIES OF BASIC EPOXY RESIN SYSTEMS
F. W. Markley, J. A. Hoffman, and D. P. Muniz Sep. 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-000647; FNAL-TM-1347; CONF-850814-11) Avail: NTIS HC A02/MF A01

The compressive properties of short cylindrical samples of many different epoxy resin systems have been measured at ambient temperature and at 77K. These are pure resin systems of known chemistry, without the inorganic fillers or fibrous reinforcements needed in final cryogenic systems. Of course, chemically incorporated modifiers such as flexibilizing resins have been included. These data should make possible inferences about cryogenic properties from molecular structures and provide specific data useful to formulators and end users. Measurements on some other plastics such as PTFE, Polyimides, and UHMWPE have been made for comparison purposes. DOE

N86-16406# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
CERAMIC MATERIALS FOR SENSOR WINDOWS
Knut-Fredrik Alm Sep. 1985 29 p refs In SWEDISH; ENGLISH summary
(FOA-C-20583-F9; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

Literature on high temperature ceramics suitable for electro-optic and electromagnetic windows was reviewed. About 20 ceramics, oxides, silicates, and (oxy-) nitrides have the properties to make them suitable as sensor windows. Important factors for the choice of these materials are: effectiveness in a narrow wavelength bandwidth; resistance to thermal shock such as the heat arising on adiabatic compression in nose cones; erosion resistance against rain and particles; and thermal expansion. Author (ESA)

N86-16407# National Bureau of Standards, Gaithersburg, Md. Inorganic Materials Div.
COMPUTERIZED FRZCTURE MECHANICS DATABASE FOR OXIDE GLASSES Final Technical Note
S. W. Freiman, T. L. Baker, and J. B. Wachtman Jun. 1985 95 p Prepared in cooperation with Rutgers - The State Univ., Piscataway, N.J.
(PB85-227080; NBS/TN-1212) Avail: NTIS HC A05/MF A01; SOD HC $3.50 as 003-003-02663-8 CSCL 11B

Values of critical fracture toughness, fracture energy, subcritical crack growth exponents and Young's modulus, are compiled and tabulated for a wide variety of oxide glasses. A computerized data retrieval system has been formulated to allow for selection of data by either glass composition, investigator, or experimental technique, and year. GRA

N86-16431# Joint Publications Research Service, Arlington, Va.
THERMAL CONDUCTIVITY OF POLYURETHANE FOAM AT LOW TEMPERATURE
Zhu Xian, Ji Yongfu, Bai Pinxian, and Han Yuanzhou *In its* China Report: Science and Technology (JPRS-CST-85-039) 13 Nov. 1985 p 44-62 refs Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 2, 30 Apr. 1984 p 54-65 Original language document was announced in IAA as A84-43357 (For primary document see N86-16429 07-31)
Avail: NTIS HC A07/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-16408# Coordinating Research Council, Inc., Atlanta, Ga.
1982 CRC FUEL RATING PROGRAM: ROAD OCTANE PERFORMANCE OF OXYGENATES IN 1982 MODEL CARS
Jul. 1985 205 p
(AD-A159127; CRC-541) Avail: NTIS HC A10/MF A01 CSCL 21/4

Because of the widespread interest in the use of alcohols and ethers as gasoline blending components, the present program was conducted to evaluate the effects of several oxygenates on gasoline octane performance and to evaluate the effects of car design features such as engine and transmission type. Five oxygenates were evaluated at two nominal concentrations, 5 and 10 volume percent, at both regular- and premium-grade octane levels: methanol (MeOH), ethanol (ETOH), isopropanol (IPA), tertiary butanol (TBA), and methyl tertiary butyl ether (MTBE). A

blend of 5 percent MeOH and 5 percent TBA was also tested at both octane levels. Twenty-eight unleaded fuels, including four hydrocarbon fuels, two hydrocarbon fuels plus toluene, and twenty-two oxygenated fuels, were rated in duplicate in thirty-eight cars using the Modified Uniontown Technique (CRC Designation F-28-75 described in Appendix C), plus some additional instructions. All testing was done on chassis dynometers. Ratings were obtained at full throttle with all thirty-eight cars, and at the most critical part-throttle condition (occurring with manifold vacuum of 4 in. Hg (13.5 kPa) or greater above the full-throttle vacuum) with nine cars. GRA

N86-16409# Sandia National Labs., Albuquerque, N. Mex.
MODELING AND COMPUTATION OF DEFLAGRATION-TO-DETONATION TRANSITION IN REACTIVE GRANULAR MATERIALS
M. R. Baer, R. E. Benner, R. J. Gross, and J. W. Nunziato 1985 31 p Presented at the 17th AMS-SIAM Summer Seminar in Applied Mathematics, Ithaca, N.Y., 30 Jun. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016160; SAND-85-0397C; CONF-8506169-1) Avail: NTIS HC A03/MF A01

In this paper, we present a multiphase flow model of the combustion of a gas permeable reactive granular material. In particular, we focus on a model of the physical-chemical processes associated with the transition from deflagration to detonation in granular explosives and propellants. Two numerical strategies are discussed that are aimed toward multidimensional computations. Comparison of our results with experimental data for the explosives CP and HMX suggests that a thermodynamically consistent model can describe the flame spread processes associated with convective burning, compressive deflagration, and detonation. DOE

N86-16410# Department of Energy, Washington, D. C.
SEMICONDUCTOR BRIDGE (SCB) IGNITER Patent Application
R. W. Bickes, Jr. (Sandia Labs., Albuquerque, N. Mex.) and A. C. Schwarz, inventors (to DOE) (Sandia Labs., Albuquerque, N. Mex.) Filed 19 Feb. 1985 40 p
(Contract DE-AC04-76DP-00789)
(DE85-017806; US-Patent-Appl-SN-702716) Avail: NTIS HC A02/MF A01

A semiconductor device is described which is capable of fast, low energy initiation (really detonation) of high explosives. A strongly crystalline structure is used having semiconductor properties such that it has a sharp inflection point at which the change from extrinsic to intrinsic conduction occurs, whereby resistivity decreases sharply. At this point, a shock wave is released capable of detonating a high explosive. This turnover point is allegedly controlled by controlling the doping level of the semiconductor and matching it with the desired autoignition temperature for the specific explosion involved. B.W.

N86-16411# Mound Lab., Miamisburg, Ohio.
MECHANISM OF FAILURE OF TWO PYROTECHNIC COMPONENTS
A. C. Munger and C. M. Woods 1985 21 p refs Presented at the International Pyrotechnics Society Symposium, Karlsruhe, West Germany, 3 Jul. 1985
(Contract DE-AC04-76DP-00053)
(DE85-017421; MLM-3291(OP); CONF-850742-2) Avail: NTIS HC A02/MF A01

An investigation of two unrelated pyrotechnic test device misfires revealed an ignition phenomenon that helps to explain the well-known necessity of maintaining good integrity between bridgewire and powder in hot-wire devices that use insensitive pyrotechnic powders. The factor common to both devices was the TiH/sub 1.65/:KC104 in a 33:67 weight percent ratio. This material is being used because of its high static insensitivity, a characteristic that makes good bridgewire contact mandatory for reliable ignition. Extensive work with a scanning electron microscope revealed that not only does the bridgewire require entrapment, but the initiation reaction gases must be contained within the immediate vicinity of the bridgewire or the initiation will not be sustained. Evidence is presented to document the phenomenon that caused the misfire of both components that were investigated. DOE

N86-16412# Sandia National Labs., Albuquerque, N. Mex.
MICROWAVE INTERFEROMETER TECHNIQUES FOR DETONATION STUDY
P. L. Stanton, E. L. Venturini, and R. W. Dietzel 1985 10 p refs Presented at the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018536; SAND-85-1928C; CONF-850706-31) Avail: NTIS HC A02/MF A01

Techniques have been developed to improve resolution in microwave interferometry of detonating explosives. Unwanted reflections in the measurement arm of the interferometer result in phase distortion of the recorded signal. By using tuning techniques, unwanted reflections can be virtually eliminated, and phase distortion is minimized, for some experimental conditions. The use of a quadrature detector and an intensity monitor also improve the resolution of the interferometer. Data obtained in several detonation experiments are presented and interpreted. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-16413*# Astro Aerospace Corp., Carpinteria, Calif.
HIGH-PERFORMANCE DEPLOYABLE STRUCTURES FOR THE SUPPORT OF HIGH-CONCENTRATION RATIO SOLAR ARRAY MODULES Final Report
Mehran Mobrem 31 Oct. 1985 79 p refs
(Contract NAS8-36043)
(NASA-CR-176394; NAS 1.26:176394) Avail: NTIS HC A05/MF A01 CSCL 13B

A study conducted on high-performance deployable structures for the support of high-concentration ratio solar array modules is discussed. Serious consideration is being given to the use of high-concentration ratio solar array modules or applications such as space stations. These concentrator solar array designs offer the potential of reduced cost, reduced electrical complexity, higher power per unit area, and improved survivability. Arrays of concentrators, such as the miniaturized Cassegrainian concentrator modules, present a serious challenge to the structural design because their mass per unit area (5.7 kg/square meters) is higher than that of flexible solar array blankets, and the requirement for accurate orientation towards the Sun (plus or minus 0.5 degree) requires structures with improved accuracy potentials. In addition, use on a space station requires relatively high structural natural frequencies to avoid deleterious interactions with control systems and other large structural components. The objective here is to identify and evaluate conceptual designs of structures suitable for deploying and accurately supporting high-concentration ratio solar array modules. R.J.F.

N86-16414# Naval Civil Engineering Lab., Port Hueneme, Calif.
HANDBOOK FOR MARINE GEOTECHNICAL ENGINEERING. DEEP OCEAN TECHNOLOGY Final Report, Oct. 1979 - Dec. 1983
K. Rocker, Jr. Mar. 1985 260 p
(AD-A157894; AD-E900470) Avail: NTIS HC A12/MF A01 CSCL 13/2

This handbook discusses the application of engineering techniques and scientific knowledge to the investigation of sea-floor materials, their characteristics, and their responses to foundation and mooring loads. Its primary thrust is with problems engineers will encounter beyond the continental shelf or below 600 feet, but the information is also applicable to shallow water tasks. GRA

N86-16415# Defense Mapping Agency, Washington, D.C.
SOME OPERATIONAL ASPECTS OF INERTIAL SURVEYING SYSTEMS Final Report
M. Macomber and L. Pfeifer Aug. 1985 7 p
(AD-A158956) Avail: NTIS HC A02/MF A01 CSCL 17/7

The surveying community has now accumulated about a decade of experience with the development, testing and operational use of inertial surveying systems. Tremendous progress has been made in identifying error sources and developing operational procedures to minimize or eliminate them, or devising means to correct for them. Even so, there remain three errors which are viewed as impediments to the efficient and effective application of inertial technology to precise surveying. The intent of this overview is to stimulate discussion and creative thought in order to hasten the development of some means of compensating for the underlaying problems. Author (GRA)

N86-16416# Allied Bendix Corp., Kansas City, Mo.
MULTIPLE LEAD-ELECTRICAL DISCHARGE MACHINING Final Report
R. W. Brockhoff Aug. 1985 32 p
(Contract DE-AC04-76DP-00613)
(DE85-016330; BDX-613-3285) Avail: NTIS HC A03/MF A01

Multiple lead-electrical discharge machining (ML-EDM) was investigated to develop the capability and demonstrate the feasibility of applying state-of-the-art electrical discharge machining (EDM) to the manufacturing of mechanical hardware. Two parts selected for the machining tests were a titanium component container and a stainless steel valve mounting plate. Numerous combinations of ML-EDM and conventional EDM tests were conducted on each part, and the results were evaluated for comparison. In all test cases, the cutting time savings of ML-EDM surpassed the conventional EDM by as much as 42%, and when compared to numerical control (NC) milling, a 75% reduction was achieved. A dimensional analysis revealed that the ML-EDM and conventional EDM were similar, but when compared to the NC milled parts, the ML-EDM parts were superior. When the surface finish comparisons were evaluated, the ML-EDM part surfaces were considerably better at higher material removal rates than those of the conventional EDM process. The investigation also revealed an important fact concerning the number of parts to be machined in a single setup. DOE

N86-16417# Sandia Labs., Albuquerque, N. Mex.
VACUUM ARC REMELTING: AN OVERVIEW
F. J. Zanner and L. A. Bertram 1985 41 p refs Presented at the 8th International Conference on Vacuum Art Metallurgy, Linz, Austria, 30 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016458; SAND-85-1509C; CONF-8509136-1) Avail: NTIS HC A03/MF A01

Vacuum arc remelting (VAR) is a casting process for producing uniform ingots. This paper discusses: arc physics and behavior, metal transfer and electrode gap measurement, boundary conditions on crucible wall, and pool dynamics and macrosegregation. Materials discussed are Inconel 718 and U-6% Nb alloy. DOE

N86-16418# Sandia National Labs., Albuquerque, N. Mex.
HAZARDS IN HIGH PRESSURE SYSTEMS
T. G. Priddy Aug. 1985 13 p refs
(Contract DE-AC04-76DP-00789)
(DE85-015490; SAND-85-1700) Avail: NTIS HC A02/MF A01

The High Pressure Systems Committee (HPSC) of the American Society of Mechanical Engineers is writing a set of rules and guides which will eventually be approved for treatment of safety concerns in high pressure operations. An introductory section of the proposed standard is being written to describe the hazards in high pressure. This paper is an edited version of the early draft of that section which is numbered 2000. Taking Section 2000 out of context (separately printing it from the remainder of the proposed standard) poses a possible misunderstanding in that high pressure is not necessarily synonymous with a lack of safety. There are many high pressure systems in operation with very acceptable safety records. However, when the potential for damage is great, it becomes more essential that safety be comprehensively engineered and practiced. Everyone concerned should be aware to some degree of the dangers that could happen in such operations. This paper is written in an attempt to share the concerns (appraisal of the risks) that members of the HPSC have for high pressure as interpreted and edited by this author. DOE

N86-16419# Allied Bendix Corp., Kansas City, Mo.
ECONOMICS OF FABRICATING PLASTIC PREFORMS BY ROBOTICS
E. M. Lundgren Aug. 1985 14 p
(Contract DE-AC04-76DP-00613)
(DE85-017247; BDX-613-3284) Avail: NTIS HC A02/MF A01

A robotic work cell consisting of a process robot, an automatic weigh feeder, and an existing plastic pill making machine was developed. This work cell was released September 13, 1983, for production use. Although the work cell was designed and planned for operation in an operator-unattended mode, renovation and rearrangement of the work area made it necessary to assemble the work cell in the Robot Application Center Annex and to implement its initial use in production as an operator-attended work cell. Because the work cell is located in an area distant from the normal work area, an operator cannot monitor this and other equipment conveniently. As of September 1, 1984, the plastic pill making robot work cell has produced 80,428 pills in 752.8 hours, a reduction of 683.4 hours from the 1436.2 hours manual operation would have required. The next step in the development of automated pill making will occur when the work cell is relocated into the production department with a new pill press. Projections for future savings of $20,866 annually are based on a reduction of 1448 labor hours. DOE

N86-16420# Oak Ridge National Lab., Tenn.
PERFORMANCE OF THE IFSMTF HELIUM REFRIGERATOR IN PARTIAL-ARRAY TESTS
S. W. Schwenterly, W. A. Fietz, R. E. Stamps, and J. F. Ellis 1985 10 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017312; CONF-850814-3) Avail: NTIS HC A02/MF A01

Performance of the International Fusion Superconducting Magnet Test Facility (IFSMTF) helium refrigerator in Partial Array Tests with three coils is described. The refrigerator was able to cool the coils and facility structure to 4.2 K in 20 days, with maximum temperature differentials of less than 50 K. Boiloff measurements were made for several components; only the lead dewars showed losses substantially higher than expected. Forced-flow cooling tests were also conducted. The coils and facility were warmed back to room temperature in 30 days. Several repairs and improvements were carried out. Results of another recent test on the refrigerator alone are reported. DOE

N86-16421# Fermi National Accelerator Lab., Batavia, Ill.
OPERATIONAL HISTORY OF FERMILAB'S 1500 W REFRIGERATOR USED FOR ENERGY SAVER MAGNET PRODUCTION TESTING
A. J. Bianchi, R. K. Barger, F. B. Johnson, K. J. McGuire, K. D. Pinyan, F. W. Wilson, and W. E. Cooper Sep. 1985 9 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-000641; FNAL-TM-1353; CONF-850814-17) Avail: NTIS HC A02/MF A01

The 1500 W helium refrigerator system utilizes two oil-injected screw compressors staged to feed a liquid nitrogen precooled cold box. Refrigeration is provided by two Sulzer TGL-22 magnetic/gas bearing turbines. The refrigerator feeds six magnet test stands via a 10,000 L dewar and subcooler equipped distribution box. The design of the controls has permitted the system to be routinely operated 24 hours/day, 7 days/week with only five operators. It

has operated approximately 90% of the 4.5 years prior to shutting down in 1984 for a period of 1 year to move the compressor skid. Scheduled maintenance, failures, repairs and holidays are about equal to the 10% off time. The equipment described was used to test approximately 1200 superconducting magnets for the Fermilab accelerator ring. The 7 year operating experience is presented as an equipment and technique review. Compressor hours currently exceed 42,000 and turbine hours exceed 39, 000 each. Failure rates, causes, preventive maintenance, monitoring practices and equipment, and modifications are examined along with notes on some of the more successful applications of technique and equipment. DOE

N86-16422# Fermi National Accelerator Lab., Batavia, Ill.
5cm, NO IRON SSC DIPOLE 12m MODEL CRYOSTAT THERMAL PERFORMANCE
R. J. Powers, J. D. Gonczy, J. Otavka, R. C. Niemann, A. Szymulanski, and J. L. Tague Sep. 1985 9 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-000642; FNAL-TM-1352; CONF-850814-15) Avail: NTIS HC A02/MF A01

A 12 m long model of a 5 cm costheta dipole cryostat has been constructed and its thermal performance measured. The model utilized heat intercepted fiberglass reinforced plastic posts to support the 12 m long, 4.5 K cold mass and the 10 and 80 K thermal shields. A superinsulation blanket system utilizing aluminized polyester with fiberglass mat spacing material was developed and installed on the 10 and 80 K thermal shields. The heat gain to 4.5, 10 and 80 K was measured. We have compared the results with the analytical predicted performance and it shows good agreement. The performance of the multilayer insulation system has been measured under several different system conditions and the results are reported. DOE

N86-16423# Sandia National Labs., Albuquerque, N. Mex.
DEPENDENCE OF CHARGE MATERIAL TEMPERATURE ON DIE TEMPERATURE DURING UNIAXIAL HOT PRESSING
R. H. Moore, R. G. Easterling, and J. R. Hellmann Aug. 1985 28 p refs
(Contract DE-AC04-76DP-00789)
(DE86-000828; SAND-85-0092) Avail: NTIS HC A03/MF A01

The temperature response of several hot press dies and their charge materials were monitored from room temperature to an elevated temperature range. Induction heated TZM dies, and resistance heated TZM, silicon carbides, and alumina dies were investigated. From the collected data, equations were derived which can be used to predict the charge temperature based on direct measurement of the die temperature. With induction heating, predicting in the 600 to 1300C range are hindered by large variations in the data. However, at 1400 to 1700C more precise predictions are possible. With resistance heating, highly precise predictions can be made throughout the 600 to 1200C range. DOE

N86-16424# Istituto Elettrotecnico Nazionale (Galileo Ferraris), Turin (Italy).
[ACTIVITIES REPORT IN ELECTRICAL SCIENCE] Annual Report, 1984
Apr. 1985 186 p refs
Avail: NTIS HC A09/MF A01

Research in acoustics; electromechanics; photometry; systems engineering; materials science; electrical metrology; and time, frequency and electromagnetic metrology is summarized. Television communication; image processing; standards; and calibration techniques are studied. Author (ESA)

N86-16425# Illinois Univ., Urbana-Champaign. Dept. of Civil Engineering.
MECHANISTIC DESIGN CONCEPTS FOR CONVENTIONAL FLEXIBLE PAVEMENTS Interim Report
R. P. Elliott and M. R. Thompson Feb. 1985 129 p Sponsored by Illinois State Dept. of Transportation, Springfield
(PB85-224517; UILU-ENG-85-2001; TE-Ser-42; FHWA/IL-85/208)
Avail: NTIS HC A07/MF A01 CSCL 13B

Mechanical design concepts for convetional flexible pavement (asphalt concrete (AC) surface plus granular base/subbase) for highways are proposed and validated. The procedure is based on ILLI-PAVE, a stress dependent finite element computer program, coupled with appropriate transfer functions. Two design criteria are considered: AC flexural fatigue cracking and subgrade rutting. Algorithms were developed relating pavement response parameters (stresses, strains, deflections) to AC thickness, AC moduli, granular layer thickness, and subgrade moduli. Extensive analyses of the AASHO Road Test flexible pavement data are presented supporting the validity of the proposed concepts. Author

N86-16426# Transportation Research Board, Washington, D.C.
RELIABILITY OF GEOTECHNICAL INSTRUMENTATION
W. H. Hansmire, V. C. McGuffey, J. B. Hannon, K. A. Jackura, and L. W. Abramson 1985 58 p
(PB85-235950; TRB/TRR-1044; ISBN-0-309-03814-6;
LC-85-13779) Avail: NTIS HC A04/MF A01 CSCL 08M

Several topics related to the reliability of geotechnical instrumentation are discussed. Reliability of pore pressure measurement; measurement of earth pressure; reliability of strain gauges and load cells for geotechnical engineering applications; some facts about long-term reliability of vibrating wire intruments; instrumentation reliability at Harvard Square Station; and instrumentation for load transfer in socketed pier foundations; are among the topics covered. Author

N86-16427# Pennsylvania Transportation Inst., University Park.
EVALUATION OF PAVEMENT TEXTURE Final Report, Sep. 1981 - Mar. 1984
J. J. Henry, J. C. Wambold, and X. Huihua Oct. 1984 77 p
(Contract DTFH61-81-C-00063)
(PB85-242550; PTI-8321; FHWA/RD-84/016) Avail: NTIS HC A05/MF A01 CSCL 13B

A system for pavement macrotexture measurement was evaluated. The system utilizes the principle of depolarization of reflected polarized light. The output of the system, the depolarized light number (DPN), is compared with other measures of pavement texture: sand-patch mean texture depth (MTD), British pendulum number (BPN), and outflow meter time (OFT) for 22 asphalt concrete sites and 5 portland cement concrete sites. The prediction of texture data from simultaneous measurements of ribbed and blank-tire skid resistance data was investigated. Using the two-tire data, it is possible to predict sand-patch mean texture depth (MTD) and Bristish pendulum number (BPN). Comparison of the two-tire data at accident sites demonstrates the potential to screen for wet weather accident sites by means of pavement surveys with the two tires. GRA

N86-16428# Transportation Research Board, Washington, D.C.
SURFACE PROPERTIES-VEHICLE INTERACTION
D. L. Huft, I. Her, S. K. Agrawal, R. A. Zimmer, and C. J. Bester 1984 62 p
(PB85-242576; TRB/TRR-1000; ISBN-0-309-03809-X;
LC-85-10046) Avail: NTIS HC A04/MF A01 CSCL 13B

Several topics related to the surface properties of aircraft runways are discussed. The South Dakota profilometer; development of a data acquisition method for noncontact pavement macrotexture measurement; the traction of an aircraft tire on grooved and porous asphaltic concrete; holes in the pavements; the effect of pavement type and condition on the fuel consumption of vehicles; the traction loss of a suspended tire on a sinusoidal road; the effect of vehicle and driver characteristics on the psychological evaluation of road roughness; the correlation of subjective panel ratings of pavement ride quality with profilometer-derived measures of pavement roughness; a microprocessor-based noncontact distance measuring control system, and, the representation of pavement surface topography in predicting runoff depths and hydroplaning potential are discussed. DOE

N86-16429# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
13 Nov. 1985 126 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-85-039) Avail: NTIS HC A07/MF A01

Various topics related to science and technology efforts in China are discussed. Solar observatories, polyurethane foam, pressure measurement, cyclotrons, and microcomputers are discussed. For individual titles, see N86-16430 through N86-16431.

N86-16430# Joint Publications Research Service, Arlington, Va.
AUTOMATIC GATHERING, PROCESSING OF MULTIPOINT PRESSURE DATA ANALYZED c34
Zhou Xinghua *In its* China Report: Science and Technology (JPRS-CST-85-039) 13 Nov. 1985 p 35-43 refs Transl. into ENGLISH from Tianjin Daxue Xuebao (Tianjin, China), no. 2, Dec. 1984 p 115-120 (For primary document see N86-16429 07-31)
Avail: NTIS HC A07/MF A01

A device using a TP801 microcomputer as its main unit, and microtransducers CYG, A/D converter (Multichannel Voltmeter PF 3), I/O interface circuit and miniprinter TP 801 as its accessories is discussed. The automatic gathering and processing of multipoint pressure data can be made according to the software and the measurement result can be printed in real time. It can replace the manual calculation of measuring multipoint pressure data with a multitube manometer. As a result, the measuring speed and accuracy can be greatly enhanced. Fitted with different transducers and accompanied with appropriate software, this device can also measure other physical quantities and process their appropriate data. Author

N86-16431# Joint Publications Research Service, Arlington, Va.
THERMAL CONDUCTIVITY OF POLYURETHANE FOAM AT LOW TEMPERATURE c27
Zhu Xian, Ji Yongfu, Bai Pinxian, and Han Yuanzhou *In its* China Report: Science and Technology (JPRS-CST-85-039) 13 Nov. 1985 p 44-62 refs Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 2, 30 Apr. 1984 p 54-65 Original language document was announced in IAA as A84-43357 (For primary document see N86-16429 07-31)
Avail: NTIS HC A07/MF A01

The heat-insulation mechanism of polyurethane foam is investigated. The relationship between the low-temperature thermal conductivity and certain parameters which can easily be measured at room temperature (such as density, fraction of closed cells, average cell diameter, and aging time, etc.) is determined. Calculations of the effective thermal conductivity based on room-temperature measurements and an analytical computational model yield results in agreement with experimental findings. Author

N86-16432# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
2 Dec. 1985 71 p Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-036) Avail: NTIS HC A04/MF A01

East Europe Report: Science and Technology (JPRS - ESA - 85 - 036), 2 December 1935, contains Science and Technology Reports from the literature of the following Eastern European countries: the German Democratic Republic, Hungary, Poland and Romania. Of particular interest in this issue are articles on robot production in Hungary, and silicon semiconductor, electroplating process equipment, and composite electric contact materials developments in Poland. For individual titles, see N86-16433 through N86-16437.

N86-16433# Joint Publications Research Service, Arlington, Va.
PROSPECTS OF MAKING, BUYING, USING ROBOTS VIEWED c37
Gitta Takacs *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 23-27 Transl. into ENGLISH from Figyelo (Budapest, Hungary), no. 39, 27 Sep. 1985 p 6 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

A number of Hungarian enterprises is now dealing with robot development. In general, the starting point is the purchase of a foreign license, the adaptation and further development of which serve as a basis for manufacture. For example, the Bakony Works is making simple assembly manipulators on the basis of a W. German license, the Mosonmagyarovar Metal Fittings Factory is making a manipulator system to serve die-casting machines, the Custom Machine Factory of the Csepel Works has begun manufacture of robots on the basis of a Japanese license, and the Rekard Agricultural Machine Manufacturing Enterprise in Gyor has purchased as Austrian license. For the time being large series manufacture--one thousand--is being done only in the Gyongyos factory of the Microelectronics Enterprise for a very special applications area, robots to move color television picture tubes, primarily for Soviet export. Elsewhere they are still at the prototype level, or have started with a series of only ten or so units, for the domestic and socialist market. At the end of 1983 the statistics indicated there were 40 robots in use in our country; at present about 70 are in operation, some of them work continually in manufacturing systems, and a good number of them are used for development or as reference systems for development. In the next ten years, some 1500 robots will be put into operation in Hungary. F.M.R.

N86-16434# Joint Publications Research Service, Arlington, Va.
VAMOS VIEWS NEEDS FOR ROBOT PRODUCTION c37
G. T. *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 30-34 Transl. into ENGLISH from Figyelo (Budapest, Hungary), no. 39, 27 Sep. 1985 p 7 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

A robot is the product of a relatively complex machine industry; where such a machine industry exists robots can be produced. This technological level can be called only moderate in Hungary. The newest robots operate with a precision of a tenth of a millimeter or better, with great speed and acceleration, with extraordinarily precise adjustment characteristic curves, free of vibration. The design strength in Hungary today is not sufficient to make one like that. The other condition is the price. Large technological robots still cost many tens of thousands of dollars, even a hundred thousand dollars. Operating these in Hungary could pay off only in very rare cases. A robot is no more complex a tool than a modern automobile, and in time there will be no need for it to cost more. Of course, to do this they must be manufactured in very large numbers and with a high level technology. If there is such a breakthrough it will appear in Hungary also, a few years later, just as it happened in the case of personal computers. F.M.R.

N86-16435# Joint Publications Research Service, Arlington, Va.
SILICON SEMICONDUCTOR DEVELOPMENTS c76
Andrzej Bukowski *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 38-39 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 3-4 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

New techniques for the manufacture of silicon monocrystals have been developed at the Institute of Electronic Materials Technology (ITME), some of which are presented, i.e., silicon monocrystals with a diameter of 100 mm; silicon monocrystals with a diameter of 76 mm: silicon monocrystals doped with phosphorous by the neutron transmutation method (ND-Di); and silicon epitaxial layers. Author

N86-16436# Joint Publications Research Service, Arlington, Va.
ELECTROPLATING PROCESS EQUIPMENT PROFILED c26
Karol Patorski and Jerzy Strzelecki *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 40-42 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 13-14 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

The design of the MINI automatic electroplating machines is the latest achievement of the ZUGIL Works in Wielun, Poland. These automatic electroplating machines are designed for the application of noble metal coatings on small-sized objects. The encapsulated switches to be electroplated using the program-controlled automatic electoplating machines are suspended from hangers or placed in drums or baskets and transferred automatically through all work stations, according to predetermined technological programs. The MINI automatic electroplating machines are designed and built on an individual (i.e., single-piece) basis, depending on the size of the objects to be electroplated, and on the required size, kind and thickness of the coating and on the electroplating technology employed. Author

N86-16437# Joint Publications Research Service, Arlington, Va.
COMPOSITE ELECTRIC CONTACT MATERIALS c33
Jacek Senkara and Jan Kowalczyk *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 48-49 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 9-10 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

Two-phase composite materials, i.e., a high-melting component combined with a material exhibiting good electrical and thermal properties find a wide range of application for the manufacture of small- and medium-load relays and switches. Composite contacts can be used in air circuit-breakers (W-Ag, Ag-Ni), oil circuit-breakers (W-Cu, Mo-Cn), vacuum-type switches (W-CuSb, CuCr), and also switches operating in an atmosphere of SF sub 6 (W-Cu). Present-day trends aimed at increasing operating reliability and extending the service life of electrical equipment are finding their expression in efforts being made to modify the classical composites with a veiw to imparting new properties to them by suitably changing their composition and structure. These trends are also aimed at reducing the consumption of noble metals and of strategically important ones. Modern materials engineering and metallurgical technologies are being used, including isostatic sintering or explosive forming. Owing to the high activity of the constituents, all processes are conducted under high vacuum or in pure reducing atmospheres. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-16438 Department of the Air Force, Washington, D.C.
MULTIPLEXED DATA STREAM MONITOR Patent
J. F. Gentry, inventor (to Air Force) Issued 9 Jul. 1985 9 p Supersedes AD-D010780
(AD-D011898; US-Patent-4,528,660; US-Patent-Appl-SN-559611; US-Patent-Class-370-80) Avail: US Patent and Trademark Office CSCL 17/2

A multiplexed data stream circuit is described which comprises a random memory stream which is transmitted together with a synchronization signal and a data clock. A counter circuit is reset by the synchronization signal and counts the data clock signals to accumulate counts uniquely identified accumulated count location is addressed in the random access memory to read the immediately preceding data state of the current signal and the immediately preceding data stream signal as read from the random access memory are compared by gating circuitry to identify characteristics of the data stream. State changes of the signals within the multiplexed data stream are identified if the gating circuitry comprises an EXCLUSIVE OR gate. Author (GRA)

N86-16439 Department of the Air Force, Washington, D.C.
RADIO FREQUENCY LENS ANTENNA Patent
R. E. Clapp, inventor (to Air Force) Issued 11 Jun. 1985 11 p Supersedes AD-D010416
(AD-D011906; US-Patent-4,523,198; US-Patent-Appl-SN-511697; US-Patent-Class-343-754) Avail: US Patent and Trademark Office CSCL 09/5

Multiple beam antennas are modified and improved through the use of lenses coupled together by hybrid junctions. A dual lens structure avoids circulators while permitting the lenses to be used both for transmission and for reception. A six lens structure provided perfect phase focusing utilizing an R-2R geometry with a Mobuis topology, giving 360 degrees of independent antenna beams from a single circular or cylindrical antenna array. Author (GRA)

N86-16440# University of Electro-Communications, Tokyo (Japan).
REPORTS OF THE UNIVERSITY OF ELECTRO-COMMUNICATIONS, VOLUME 36, NO. 1, SEPTEMBER 1985 (SERIAL NO. 58)
Sep. 1985 225 p refs In JAPANESE; ENGLISH summaries (ISSN-0493-4253) Avail: NTIS HC A10/MF A01

The reports of the University of Electro-Communications are divided into two sections: (1) Science and Technology and (2) Humanity and Social Science. Some articles from the first section are entitled: (1) lamp annealing of ion implanted GaAs; (2) two level quantization of grey level picture signals; (3) computer controlled preparation of several metal complexes; and (4) carbon dioxide in the atmosphere. Some titles from the second section are: (1) arabic science - Architecture and art; (2) the use of (E)th and (E)s in verb endings; and (3) notes on Johnson's Preface to Shakespeare. For individual titles, see N86-16441 through N86-16450.

N86-16441# University of Electro-Communications, Tokyo (Japan).
EXPERIMENTAL STUDY OF NARROW-BAND DIGITAL COMMUNICATION BY MEANS OF PREMODULATION LOW PASS FILTER
Tomohiko Ozaki, Koichi Usami, and Sonosuke Yamanaka *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 1-7 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

MSK (Minimum Shift Keying) is a very attractive modulation technique for the application of digital transmissions because of its relatively compact power spectrum and the constant envelope property. However, when MSK is applied to the digital mobiel radio communications, the adjacent channel interferences occur owing to the out of band radiation power. Therefore the narrower band digital modulation scheme is required. One of the method for narrowing the spectrum is to shape the modulating signals by LPF at the input of the MSK modulator. Some experimental results of MSK with Butterworth filter as the premodulation LPF is described. Author

N86-16442# University of Electro-Communications, Tokyo (Japan).
THE STUDY IN SUB E CLASS CONVERTER WITH SATURATING CORES c33
Toshimitsu Suzuki, Koichi Usami, and Sonosuke Yamanaka *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 9-13 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

Recently, for switching power supplies it is best to be smaller in size, with electronic equipments' miniaturization by IC technology. Sub E class dc-to-dc converter with a saturating core has the properties of high efficiency, small size. light weight and high reliability. Hence, the applications of switching regulater power supply to this technique are studied by many investigators. The results of an experiment in sub E class dc-to-dc converter with magnetic amplifier is presented. Author

N86-16443# University of Electro-Communications, Tokyo (Japan).
LAMP ANNEALING OF ION IMPLANTED GaAs c76
Haruzo Miyashita and Kotaro Okamoto *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 15-21 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

Halogen lamps are used to anneal Si implanted GaAs. SiO2/Al2O3 double layered capping is proved to be more effective than the conventional SiO2 capping. It also becomes apparent that optimal activation is established in shorter processing time for annealing of implanted side irradiation than for backside irradiation. Electron mobility of activated layers reflect the characteristics of the substrates and undoped LEC GaAs substrate shows highest mobility of 4,120 sq. cm./V.s. Author

N86-16444# University of Electro-Communications, Tokyo (Japan).
THE TWO LEVEL QUANTIZATION OF GRAY LEVEL PICTURE SIGNAL
Shuichi Itoh, Masahiro Ishii, Yasuo Fukamachi, and Ryuichi Saitoh *In its* Reports of the University of Electro-Communications, Volume 37, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 23-28 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

The methods for the quantization of gray level picture signal into two levels are discussed. With ordinary facsimile quantizer, input signal is applied to a comparator, where it is compared with a fixed threshold. But since this quantizer will hard limit the signal, the coding characteristics are very poor for half tone pictures and documents with tint background. Quantizers with fixed threshold, moving average threshold, dither threshold and their combinations were examined. Through simulations and experiments on actual facsimile equipment, it was determined that the combined system of moving average and dither threshold gives the best reproduction for photographic images of human face. Author

N86-16445# University of Electro-Communications, Tokyo (Japan). Dept. of Materials Science.
METHOD FOR PRECISELY COMPUTING MOLECULAR INTEGRALS OVER STOS WITH n=l c72
Noboru Suzuki *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 49-60 refs (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

Calculations of the relativistic effects in molecules by the use of the Dirac equation requires the evaluation of molecular integrals over atomic orbitals (AOs) with principal and azimuthal quantum numbers, n and l, of the same value. However, a method of precisely computing such molecular integrals has not yet been established. A method is given for precise evaluation of such diatomic molecular integrals by the use of Slater type orbitals (STOs) as AOs. Most types of those integrals can readily be evaluated by introducing an auxiliary integration function, -Ei(-alpha) where alpha is positive, into the established formulations able to calculate the diatomic molecular integrals over STOs with n>l. In evaluation of two electron two center Coulomb repulsion integrals, however, the division of the integration region into several parts is necessary because the charge density expressed by product of two n=l STOs centered at the same nucleus, varies very sharply near the nucleus. Author

N86-16446# University of Electro-Communications, Tokyo (Japan).
CARBON-14 NMR SPECTRUM (68 MHz) OF 2,6-DINITROPHENOL IN CDCl3 AND THE TEMPERATURE VARIATION OF THE CHEMICAL SHIFTS IN REFERENCE TO INTRAMOLECUAR HYDROGEN BOND c25
Ariyuki Aihara and Kazuhiro Matsushita *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 61-65 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

H-1 as well as Cl-13 NMR spectra, at 270 MHz and 68 MHz, respectively, were observed with 2,6-dinitrophenol and some related substances in order to get a further insight into the nature of intramolecular hydrogen bond formed therein. Temperature variation of the C-13 NMR signals of 2,6-dinitrophenol revealed an interesting feature in the chemical shifts of phenyl carbons which suggests a close relationship between chemical shift of carbons and pi-electron densities on the atoms being induced by formation and breakage of the intramolecular hydrogen bond. Author

N86-16447# University of Electro-Communications, Tokyo (Japan).
COMPUTER AS A MODEL AND COMPUTER AS A TOOL: CP/M-80 SIMULATOR ON VOS3/TSS c61
Kazumiti Numata and Yuichi Aida *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 67-74 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

The theme of the educational experiments were designed where two roles of computer are clearly separated. This theme, implementing the microprocessor and its operating system on large scale general purpose computer, was accepted with much interest and carried out under clear recognition of the object and means. The product completed by the additional works after regular course seems to suggest some possibility of this idea. The process of the work, the method of debugging and the problems come from the tool computer are reported. Author

N86-16448# University of Electro-Communications, Tokyo (Japan).
COMPUTER CONTROLLED PREPARATION OF SEVERAL METAL COMPLEXES-1 c26
Nobuhide Kokubu, Akira Yamasaki, Hiroya Shiraki, Hiroshi Togashi, Masaki Yasumoto, and Yasuhiro Yamanaka *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 81-85 In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

The simple computer controlled metal complex precipitation and filtration system was constructed simulating the usual laboratory experimental procedure, and practically applied to prepare several familar metal complexes in laboratory scale. The examined complexes are: (1) hexaamminecobalt(III), (2) aquapentamminecobalt(III) and (3) tetraamminecopper(II) complexes. Both tervalent cobalt (III) complexes were precipitated with aqueous potassium hexacyanoferrate(III). Tetraamminecopper(II) sulfate was precipitated by adding excess ethyl alcohol. Author

N86-16449# University of Electro-Communications, Tokyo (Japan).
CARBON DIOXIDE IN THE ATMOSPHERE c45
Nobuhide Kokubu, Sigeru Kumagai, and Akira Miyazaki *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 87-91 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

The results of airborne carbon dioxide determinations made from October 1969 to January 1970 around Tyohu city of Tokyo are reported. Carbon dioxide content was 340 to 510 ppm at Tyohu city, and 360 to 530 ppm at the heavy traffic road. Carbon dioxide content at the suburbs of Tokyo was 370 to 430 ppm. The results are mainly affected by human activities. The weather conditions also affect carbon dioxide content. Author

N86-16450# University of Electro-Communications, Nagano (Japan). Sugadaira Space Radiowave Observatory.
PHASE FLUCTUATION MEASUREMENT WITH HF-BAND VLBI SYSTEM AND ITS APPLICATION TO OBSERVATION OF JUPITER'S DECAMETRIC EMISSIONS
Ichiro Tomizawa *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 99-112 refs (For primary document see N86-16440 07-32)

Avail: NTIS HC A10/MF A01

The phase fluctuation of the HF-band VLBI system is measured by a simulation method, using a new type of phase processing in which the frequency range of phase fluctuation spectrum is expanded. The phase fluctuation of the VLBI system gives a certain threshold from which one can detect the source movement and the spectrum of phase fluctation originated from the density fluctuation of interplanetary plasma. It is concluded that the long duration and even low speed movement of source can be detected, and that the phase fluctuation spectrum can be also estimated by the present VLBI system as long as the input signal-to-noise ratio is greater than 10 dB. Author

N86-16451*# Princeton Synergetics, Inc., N.J.

EVALUATION OF SPACECRAFT TECHNOLOGY PROGRAMS (EFFECTS ON COMMUNICATION SATELLITE BUSINESS VENTURES), VOLUME 1 Final Report

Joel S. Greenburg, Carole Gaelick, Marshall Kaplan (Spacetech, Inc.), Janis Fishman, and Charles Hopkins (Econ, Inc., San Jose, Calif.) Sep. 1985 186 p refs 2 Vol.

(Contract NAS3-23886)

(NASA-CR-174978; NAS 1.26:174978) Avail: NTIS HC A09/MF A01 CSCL 17B

Commercial organizations as well as government agencies invest in spacecraft (S/C) technology programs that are aimed at increasing the performance of communications satellites. The value of these programs must be measured in terms of their impacts on the financial performane of the business ventures that may ultimately utilize the communications satellites. An economic evaluation and planning capability was developed and used to assess the impact of NASA on-orbit propulsion and space power programs on typical fixed satellite service (FSS) and direct broadcast service (DBS) communications satellite business ventures. Typical FSS and DBS spin and three-axis stabilized spacecraft were configured in the absence of NASA technology programs. These spacecraft were reconfigured taking into account the anticipated results of NASA specified on-orbit propulsion and space power programs. In general, the NASA technology programs resulted in spacecraft with increased capability. The developed methodology for assessing the value of spacecraft technology programs in terms of their impact on the financial performance of communication satellite business ventures is described. Results of the assessment of NASA specified on-orbit propulsion and space power technology programs are presented for typical FSS and DBS business ventures. R.J.F.

N86-16452*# Princeton Synergetics, Inc., N.J.

EVALUATION OF SPACECRAFT TECHNOLOGY PROGRAMS (EFFECTS ON COMMUNICATION SATELLITE BUSINESS VENTURES), VOLUME 2 Final Report

Joel S. Greenburg, Marshall Kaplan (Spacetech, Inc.), Janis Fishman, and Charles Hopkins (Econ, Inc., San Jose, Calif.) Sep. 1985 155 p 2 Vol.

(Contract NAS3-23886)

(NASA-CR-174979; NAS 1.26:174979) Avail: NTIS HC A08/MF A01 CSCL 17B

The computational procedures used in the evaluation of spacecraft technology programs that impact upon commercial communication satellite operations are discussed. Computer programs and data bases are described. R.J.F.

N86-16453*# Notre Dame Univ., Ind. Dept. of Electrical Engineering.

ERROR CONTROL TECHNIQUES FOR SATELLITE AND SPACE COMMUNICATIONS Semiannual Status Report, 1 Jun. 1985 - 31 May 1986

Daniel J. Costello, Jr. Jan. 1986 22 p refs

(Grant NAG5-557)

(NASA-CR-176568; NAS 1.26:176568) Avail: NTIS HC A02/MF A01 CSCL 17B

The performance anlaysis of NASA's telecommand systems was summarized. It is assumed that the decoded frames are scrambled prior to decoding by the outer code. The average decoded bit error rate are examined which allows the possibility of evaluating many different frame coding options. The capacity and cutoff rate of the outer channel formed by the combination of the actual physical channel and the inner encoder and decoder in a concatenated coding system were analyzed. The best combination of inner and outer codes to use in a concatenated coding system were determined. It was established that in general: (1) it is better not to interleave between the inner and outer codes; and (2) for a fixed overall code rate, it is better to use higher rate inner codes and lower rate outer codes. Inner convolutional codes are considered. The analysis is more difficult in this case because the inner decoder error events do not appear in blocks of fixed length but can be of many different lengths. Author

N86-16454*# Illinois Inst. of Tech., Chicago. Dept. of Electrical Engineering.

RELIABILITY AND THROUGHPUT ANALYSIS OF A CONCATENATED CODING SCHEME

Robert H. Deng and Daniel J. Costello, Jr. (Notre Dame Univ., Ind.) [1985] 35 p refs

(Grants NAG5-234; NAG5-557)

(NASA-CR-176570; NAS 1.26:176570) Avail: NTIS HC A03/MF A01 CSCL 17B

The performance of a concatenated coding scheme for error control in ARQ systems is analyzed for both random-noise and burst-noise channels. In particular, the probability of undetected error and the system throughput are calculated. In this scheme, the inner code is used for both error correction and error detection, and the outer code is used for error detection only. Interleaving/deinterleaving is assumed within the outer code. A retransmission is requested if either the inner code or the outer code detects the presence of errors. Various coding examples are considered. The results show that concatenated coding can provide extremely high system reliability (i.e., low probability of undetected error) and high system throughput. Author

N86-16455*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

TOPOLOGY DESIGN AND PERFORMANCE ANALYSIS OF AN INTEGRATED COMMUNICATION NETWORK

Victor O. K. Li, Y. F. Lam, T. C. Hou, and Joseph H. Yuen 15 Sep. 1985 50 p refs Prepared in cooperation with Univ. of Southern California, Pasadena

(Contract NAS7-918)

(NASA-CR-176447; JPL-Pub-85-67; NAS 1.26:176447) Avail: NTIS HC A03/MF A01 CSCL 17B

A research study on the topology design and performance analysis for the Space Station Information System (SSIS) network is conducted. It is begun with a survey of existing research efforts in network topology design. Then a new approach for topology design is presented. It uses an efficient algorithm to generate candidate network designs (consisting of subsets of the set of all network components) in increasing order of their total costs, and checks each design to see if it forms an acceptable network. This technique gives the true cost-optimal network, and is particularly useful when the network has many constraints and not too many components. The algorithm for generating subsets is described in detail, and various aspects of the overall design procedure are discussed. Two more efficient versions of this algorithm (applicable in specific situations) are also given. Next, two important aspects of network performance analysis: network reliability and message delays are discussed. A new model is introduced to study the reliability of a network with dependent failures. For message delays, a collection of formulas from existing research results is given to compute or estimate the delays of messages in a communication network without making the independence assumption. The design algorithm coded in PASCAL is included as an appendix. Author

N86-16456*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

CONSIDERATION OF RADAR TARGET GLINT FROM ST DURING OMV RENDEZVOUS

Malcolm W. McDonald, Lee B. Malone, and Edmund H. Gleason Sep. 1985 13 p refs
(NASA-TM-86533; NAS 1.15:86533) Avail: NTIS HC A02/MF A01 CSCL 17I

The nature of radar target glint and the factors upon which it depends when using the Hubble Space Telescope as a radar target is discussed. An analysis of the glint problem using a 35 MHz or 94 MHz radar on the orbital maneuvering vehicle is explored. A strategy for overcoming glint is suggested. Author

N86-16457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MONOLITHIC OPTICAL INTEGRATED CONTROL CIRCUITRY FOR GaAs MMIC-BASED PHASED ARRAYS
K. B. Bhasin, G. E. Ponchak, and T. J. Kascak 1985 17 p refs Presented at the Symposium on Optical and Electro-Optical Engineering, Cambridge, Mass., 15-20 Sep. 1985; sponsored by the Society for Photo-Instrumentation Engineering
(NASA-TM-87183; E-2835; NAS 1.15:87183) Avail: NTIS HC A02/MF A01 CSCL 09C

Gallium arsenide (GaAs) monolithic microwave integrated circuits (MMIC's) show promise in phased-array antenna applications for future space communications systems. Their efficient usage will depend on the control of amplitude and phase signals for each MMIC element in the phased array and in the low-loss radiofrequency feed. For a phased array contining several MMIC elements a complex system is required to control and feed each element. The characteristics of GaAs MMIC's for 20/30-GHz phased-array systems are discussed. The optical/MMIC interface and the desired characteristics of optical integrated circuits (OIC's) for such an interface are described. Anticipated fabrication considerations for eventual full monolithic integration of optical integrated circuits with MMIC's on a GaAs substrate are presented. E.A.K.

N86-16458*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPTICAL TECHNIQUES TO FEED AND CONTROL GaAs MMIC MODULES FOR PHASED ARRAY ANTENNA APPLICATIONS
K. B. Bhasin, G. Anzic, R. R. Kunath, and D. J. Connolly 1986 13 p refs Proposed for presentation at the 11th Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87218; E-2880; NAS 1.15:87218) Avail: NTIS HC A02/MF A01 CSCL 20N

A complex signal distribution system is required to feed and control GaAs monolithic microwave integrated circuits (MMICs) for phased array antenna applications above 20 GHz. Each MMIC module will require one or more RF lines, one or more bias voltage lines, and digital lines to provide a minimum of 10 bits of combined phase and gain control information. In a closely spaced array, the routing of these multiple lines presents difficult topology problems as well as a high probability of signal interference. To overcome GaAs MMIC phased array signal distribution problems optical fibers interconnected to monolithically integrated optical components with GaAs MMIC array elements are proposed as a solution. System architecture considerations using optical fibers are described. The analog and digital optical links to respectively feed and control MMIC elements are analyzed. It is concluded that a fiber optic network will reduce weight and complexity, and increase reliability and performance, but higher power will be required. Author

N86-16459*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A STUDY OF THE EFFECTS OF INTERFERENCE-REJECTION FILTERS ON FEEDBACK RADIOMETER SENSITIVITY
William D. Stanley (Old Dominion Univ., Norfolk, Va.) and Chase P. Hearn Dec. 1985 95 p
(NASA-TM-87651; NAS 1.15:87651) Avail: NTIS HC A05/MF A01 CSCL 14B

The trade-offs between sensitivity and interference immunity resulting from input bandpass filter losses in a noise-injection feedback radiometer are examined. Data are provided to permit the selection of an optimum filter configuration based on the independent variables of percentage bandwidth, q-factors, and desired band-edge rejection. E.A.K.

N86-16460*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANGULAR POWER SPECTRUMS AND THEIR RELATIONSHIP TO AUTOCORRELATION FUNCTIONS OF APERTURE ANTENNAS
C. R. Cockrell Oct. 1985 13 p refs
(NASA-TM-87630; NAS 1.15:87630) Avail: NTIS HC A02/MF A01 CSCL 20N

Normalized angular power spectrum representations have been derived for linear and circular aperture antennas in terms of their autocorrelation functions. Examples of their use are given. Author

N86-16461*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPENSATION OF REFLECTOR SURFACE DISTORTIONS USING CONJUGATE FIELD MATCHING
Roberto J. Acosta 1986 9 p refs Proposed for presentation at the International IEEE A/P-S Symposium and National Radio Science Meeting, Philadelphia, Pa., 9-13 Jun. 1986
(NASA-TM-87198; E-2852; NAS 1.15:87198) Avail: NTIS HC A02/MF A01 CSCL 20N

The feasibility of compensating for reflector surface distortions has been investigated. The performance characteristics (gain, sidelobe level, null location, beamwidth, etc.) of space communication reflector antenna systems degrade as the reflector surface distorts due to thermal effects from a varying solar flux. The technique reported here will maintain the design radiation performance independently of thermal effects on the reflector surface. With the advent of monolithic microwave integrated circuits (MMIC), a greater flexibility in array-fed reflector system design can be achieved. MMIC arrays provides independent control of amplitude and phase for each of many radiating elements of the feed array. The conjugate field matching technique provide a basis for obtaining the required element excitations under surface distortion for maintaining the design radiation performance. It is assumed that the surface characteristics (x, y, z, first derivatives, and second derivatives) under distortion are known. Author

N86-16462# Selenia S.p.A., Rome (Italy).
RIVISTA TECNICA SELENIA, VOLUME 9, NUMBER 2, 1985
Adriana Marzi, ed. 1985 43 p refs
Avail: NTIS HC A03/MF A01

The design of microwave ferrite devices; synthesis and evaluation of phase codes for pulse compression radar; the combined effect of infant mortality and installation plan on mean time between failure, and a rapid commutation duplexer with phase-related outputs are discussed. For individual titles, see N86-16463 through N86-16466.

N86-16463# Selenia S.p.A., Rome (Italy). Research Dept.
AN INTRODUCTION TO THE DESIGN OF MICROWAVE FERRITE DEVICES **c33**
Riccardo Roveda, Carlo diGregorio, and Nicola Scafuro *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 1-11 refs
(For primary document see N86-16462 07-32)
Avail: NTIS HC A03/MF A01

The properties of ferrimagnetic materials and their relationships with operation and performance of ferrite microwave devices are introduced. Susceptibility; dissipative magnet parameters; reactive magnet parameters; dielectric characteristics; circulators; phase shifters; filters; limiters; and isolators are discussed. Author (ESA)

N86-16464# Selenia S.p.A., Rome (Italy). Radar Dept.
SYNTHESIS AND EVALUATION OF PHASE CODES FOR PULSE COMPRESSION RADAR
Antonio Divito, Alfonso Farina, Gennaro Fedele, Gaspare Galati, and Flavio A Studer *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 12-24 refs (For primary document see N86-16462

07-32)
Avail: NTIS HC A03/MF A01

The synthesis of pulse compression radar signals is examined. A family of waveforms suitable for digital compression is identified in digital (or discrete) chirp. Such a code, obtained through sampling and quantization of known chirp waveforms, has attractive features such as relative insentitivity to frequency shift and low sidelobes. Within the digital pulse compression technique, with compression ratio higher than a few tens, digital chirp codes perform better than other codes. Author (ESA)

N86-16465# Selenia S.p.A., Rome (Italy).
THE COMBINED EFFECT OF INFANT MORTALITY AND INSTALLATION PLAN ON MEAN TIME BETWEEN FAILURE c38
Giuseppe Rosato and Lamberto Pescatori *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 25-33 (For primary document see N86-16462 07-32)
Avail: NTIS HC A03/MF A01

Models used during the dimensioning of the logistics support for supervisory systems, in particular in the TUT computer based supervisory and control system are illustrated. The combined effects of reliability growth and of the installation plan are analyzed. A model to determine the multiplicative factor of the steady state average failure rate in specified operating conditions is assessed. Author (ESA)

N86-16466# Selenia S.p.A., Rome (Italy). Research Dept.
RAPID COMMUTATION DUPLEXER WITH PHASE-RELATED OUTPUTS
Riccardo Roveda, Giuseppe Cattarin, Carlo diGregorio, and Umberto Parrucci *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 34-39 refs (For primary document see N86-16462 07-32)
Avail: NTIS HC A03/MF A01

Design criteria and the realization of an X-band waveguide rapid commutation duplexer, in production, are presented. By means of a digital TTL command it is capable of operating in three different conditions: all the power is conveyed to a single output; the poweer is equally divided between two in-phase outputs; and it is equally divided between two counter-phase outputs. In a monopulse radar this permits the electronic scanning of the antenna beam. Author (ESA)

N86-16467# Delta Information Systems, Inc., Horsham, Pa.
TEST AND EVALUATION OF VIDEO TELECONFERENCING AT 56 KBPS Final Report
Mar. 1985 128 p
(Contract DCA100-83-C-0047)
(AD-A156760; NCS-TIB-85-3) Avail: NTIS HC A07/MF A01 CSCL 17/2

The National Communications System is actively working with the CCITT and ANSI Standards organizations toward the establishment of a standard for video teleconferencing at ISDN communication rates below 1.544 Mbps (e.g. 384 kbps, 64 kbps, 56 kpbs), the 56 kpbs data race is of particular importance because AT&T has announced a circuit-switched data network operating at this rate which will use the public switched telephone network. The ubiguitous network will provide an excellent resource for future teleconferencing applications. Concurrent with the evolution of the switched 56 kbps data network. Although the animation distortion of these codes is more severe than the 1.544 Mbps codecs, it is likely that the image quality will be acceptable for many teleconference applications. The purpose of this project is to determine the acceptability of the video teleconference image quality when operating at 56 kbps. This was accomplished by installing a video teleconference system in an operational environment and evaluating the acceptability of the service. GRA

N86-16468# Rome Air Development Center, Griffiss AFB, N.Y.
SIDELOBE SECTOR NULLING WITH MINIMIZED PHASE PERTURBATIONS Report, Sep. 1984 - Jan. 1985
R. A. Shore and D. A. Pierre 10 Oct. 1985 22 p Sponsored by AF
(AD-A157058; RADC-TR-85-56) Avail: NTIS HC A02/MF A01 CSCL 09/5

A new phase-only pattern synthesis method was developed to lower the sidelobes of a given antenna pattern in a wide sector, while reducing pattern distortion elsewhere. The method consists of finding the phase perturbations that minimize a performance measure defined to be a weight sum of the average sector sidelobe power and the sum of squared weight perturbations. By varying the weights in the performance measure assigned to the sidelobe sector power and the weight perturbations, it is possible to shift the relative emphasis placed on the two objectives of reduced sidelobe power and small pattern distortion. The phase perturbations are obtained numerically using a nonlinear computer optimization code, since the equations obtained by equating to zero the partial derivatives are nonlinear and cannot be solved analytically. Curves are plotted showing the variation of the average sector sidelobe power, sum of the squared weight perturbations, gain in the look direction, and pattern null locations, with the ratio of the weights in the performance measure. Examples are shown of the patterns with reduced sidelobes that are obtained using this method. Author (GRA)

N86-16469# Naval Ocean Systems Center, San Diego, Calif.
THEORY AND CALCULATION FOR THE EFFECT OF A HOMOGENEOUS, CYLINDRICALLY SYMMETRIC DISTURBANCE ON ELF (EXTREMELY LOW FREQUENCY) PROPAGATION Research Report, Dec. 1984 - Jul. 1985
R. A. Pappert Jul. 1985 72 p
(99Q-MXBB)
(AD-A159348; NOSC/TR-1043) Avail: NTIS HC A04/MF A01 CSCL 20/14

A simple surface propagation model is commonly used to estimate the effects of ionospheric disturbances on extremely low frequency (ELF) propagation, Though often adequate, one shortcoming of the model is its failure to allow for excitation by the broad-side component of a horizontal dipole. That excitation can be quite significant in a sporadic-E environment, when the modal polarization can contain a substantial mixture of TE component. In this study a beginning is made on ELF propagation model development which allows for broadside excitation as well as a systematic allowance for height gain effects. The development is for a flat earth with a laterally homogeneous, cylindrically symmetric disturbance centered over the transmitter. The method utilizes normal-mode decomposition. Matching equations at the boundary of the disturbance are developed by evaluating height gain integrals, and it is shown that this method is tantamount to simply matching the ground vertical electric and azimuthal magnetic fields at the boundary. Results for a sporadic-E type environment indicate substantial departures from the surface propagation model and WKB predictions. GRA

N86-16470# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF COHERENT DIGITAL RECEIVERS THE PRESENCE OF COLORED NOISE INTERFERENCE M.S. Thesis
A. Hasarchi Jun. 1985 142 p
(AD-A159373) Avail: NTIS HC A07/MF A01 CSCL 09/4

Optimum receivers for detecting binary signals in additive colored Gaussian noise are analyzed and their performance evaluated in terms of bit error probabilities (Pe). Implementation and practical design implications of such receivers is discussed. Evaluation of Pe receivers that are optimum for additive white Gaussian noise (WGN) environments but due to jamming or friendly ECM interferers, must operate in a colored Gaussian noise environment has been carried out. It was generally found that such receivers do not perform significantly worse than receivers specifically designed to operate in a colored noise environment. Examples were considered in which the colored noise interference was modeled as the output of a one-pole filter driven by WGN. Additional work has been carried out on the jamming of binary (colored noise) receivers using a deterministic jammer model. While this modeling assumption needs to be refined, it has been demonstrated that a power constrained jammer can seriously

degrade the performance of a receiver designed to operate in a colored noise environment. Author (GRA)

N86-16471# Department of Energy, Washington, D. C.
PULSE-EXCITED, AUTO-ZEROING MULTIPLE CHANNEL DATA TRANSMISSION SYSTEM Patent Application
G. E. Fasching, inventor (to DOE) Filed 22 Feb. 1985 17 p
(DE85-017760; US-Patent-Appl-SN-704114) Avail: NTIS HC A02/MF A01

A multiple channel data transmission system is provided in which signals from a plurality of pulse operated transducers and a corresponding plurality of pulse operated signal processor channels are multiplexed for single channel FM transmission to a receiving station. The transducers and corresponding channel amplifiers are powered by pulsing the dc battery power to these devices to conserve energy and battery size for long-term data transmission from remote or inaccessible locations. Auto zeroing of the signal channel amplifiers to compensate for drift associated with temperature changes, battery decay, component aging, etc., in each channel is accomplished by means of a unique auto zero feature which between signal pulses holds a zero correction voltage on an integrating capacitor coupled to the corresponding channel amplifier output. Pseudo-continuous outputs for each channel are achieved by pulsed sample-and-hold circuits which are updated at the pulsed operation rate. The sample-and-hold outputs are multiplexed into an FM/FM transmitter for transmission to an FM receiver station for demultiplexing and storage in separate channel recorders. DOE

N86-16472# Brookhaven National Lab., Upton, N. Y.
NEW METHOD FOR PUMPING AN OPTICAL KLYSTRON
G. Vignola, R. R. Freemen, B. M. Kincaid, C. Pellegrini, A. Luccio, J. Murphy, J. Galayda, and A. VanSteenbergen 1985 14 p Presented at the Workshop on Coherent and Collective Propagation of Relativistic E-Beams and Electromagnetic Radiation, Villa Olmo, Italy, 13 Sep. 1984 Prepared in cooperation with Bell Telephone Labs., Murray Hill, N.J.
(Contract DE-AC02-76CH-00016)
(DE85-014821; BNL-36677; CONF-8409163-6) Avail: NTIS HC A02/MF A01

A novel method of operation for a transverse optical klystron (TIK) is proposed. The TOK is a device in which a relativistic electron beam produces tunable coherent radiation at short wavelengths by interacting with a powerful external laser and an undulator field. Here it is shown that by selecting the external laser wavelengths to be one of the harmonics in the undulator radiation spectrum, excellent output at short wavelength can be realized with significantly reduced performance requirements for the undulator magnet and the storage ring providing the electron beam. DOE

N86-16473# Lawrence Livermore National Lab., Calif.
ELF-VLF COMMUNICATIONS THROUGH-THE-EARTH Project Report, for calendar year 1984
H. M. Buettner, G. J. Burke, E. M. Didwall, G. Holladay, and R. J. Lytle Jun. 1985 89 p
(Contract W-7405-eng-48)
(DE85-015417; UCID-20473) Avail: NTIS HC A05/MF A01

We use computer models and experiments to explore the feasibility of communication between points underground and on the Earth's surface. Emphasis is placed on ELF-VLF electromagnetic propagation through the Earth; nominally, we investigated propagation in the 200 Hz-30 kHz frequency range. The computer modeling included calculations of the fields of a point electric or magnetic source in a homogeneous half space or a stratified Earth. Initial results for an insulated antenna of finite length are also considered. The experiments involved through-the-Earth transmissions at two locations in Pennsylvania, both of which had large formations of limestone. Initial results indicate that information rates as high as kbits/s may be possible for subsurface depths of 300 m or less. Accuracy of these estimated depends on the electromagnetic propagation constants of the rock, the noise characteristics, and modulation scheme. Although a nuisance for evaluating through-the-Earth propagation, the existence of subsurface metal conductors can improve the transmission character of the site. DOE

N86-16474# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Technology Div.
NUCLEAR ELECTROMAGNETIC PULSE AND THE ELECTRIC POWER SYSTEM
J. R. Legro and T. J. Reed 1985 27 p Presented at the Electrical Utility Engineering Conference, Pittsburgh, 12 May 1985
(Contract DE-AC05-84OR-21400)
(DE85-013600; CONF-8505173-1) Avail: NTIS HC A03/MF A01

A single, high-altitude nuclear detonation over the continental United States can expose large geographic areas to transient, electromagnetic pulse (EMP). The initial electromagnetic fields produced by this event have been defined as high-altitude electromagnetic pulse (HEMP). Later-time, low frequency fields have been defined as magnetohydrodynamic-electromagnetic pulse (MHD-EMP). Nuclear detonations at, or near the surface of the earth can also produce transient EMP. These electromagnetic phenomena have been defined as source region electromagnetic pulse (SREMP). The Division of Electric Energy Systems (EES) of the United States Department of Energy (DOE) has formulated and implemented a program Plan to assess the possible effects of the above nuclear EMP on civilian electric power systems. This unclassified research effort is under the technical leadership of the Oak Ridge National Laboratory. A brief perspective of EMP phenomenology and important interaction issues for power systems based on research performed by Westinghouse Advanced Systems Technology is given. DOE

N86-16475# Oak Ridge National Lab., Tenn.
SIMPLIFIED SOLUTIONS FOR PROBLEMS OF EMP-INDUCED CURRENTS IN BURIED CABLES
D. C. Agouridis and M. E. Buchanan 1985 5 p Presented at the Heart Conference, Monterey, Calif., 25 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016318; CONF-850756-3) Avail: NTIS HC A02/MF A01

The time waveform of currents, induced by EMP in buried cables, is determined numerically using a Fast Fourier Transform algorithm. The results are displayed graphically as a function of the electromagnetic properties of the ground and the distance of the cable below the surface. The solution is obtained by a procedure using graphs and simple calculations. DOE

N86-16476# Oak Ridge National Lab., Tenn.
SIMPLIFIED SOLUTION OF THE PROBLEM OF ELECTROMAGNETIC COUPLING TO TRANSMISSION LINES
D. C. Agouridis 1985 5 p Presented at the 22nd Annual Conference on Nuclear and Space Radiation Effects, Monterey, Calif., 22 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016319; CONF-850711-14) Avail: NTIS HC A02/MF A01

Electromagnetic waves induce distributed series voltage sources and shunt current sources in transmission lines. A solution of the response of the line driven by such sources is presented. This solution and the results are easy to understand and simple to use. The new solution has been applied to electromagnetic pulse (EMP) coupling problems. DOE

N86-16477# Department of Energy, Washington, D. C.
PHASE COMPARATOR APPARATUS AND METHOD Patent Application
F. E. Coffield, inventor (to DOE) Filed 1 Feb. 1985 24 p
(Contract W-7405-eng-48)
(DE85-017791; US-Patent-Appl-SN-697296) Avail: NTIS HC A02/MF A01

This invention finds especially useful application for interferometer measurements made in plasma fusion devices (e.g., for measuring the line integral of electron density in the plasma). Such interferometers typically use very high intermediate frequencies (e.g., on the order of 10 to 70 MHz) and therefore the phase comparison circuitry should be a high speed circuit with a linear

transfer characteristic so as to accurately differentiate between small fractions of interference fringes. DOE

N86-16478# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
NONSTATIONARY SIGNAL MODELING WITH APPLICATION TO BAT ECHO LOCATION
Yves Grenier Mar. 1985 37 p refs Presented at CNRS Colloquim on Systemes Sonar Aeriens Animaux, Lyon, 25 Feb.-1 Mar. 1985 Submitted for publication Sponsored in part by CNRS
(ENST-85C003; ISSN-0751-1337) Avail: NTIS HC A03/MF A01

Two classes of parametric estimators for the relief of a nonstationary signal were tested in an application to the analysis of bat echo location calls. The first class consists of autoregressive adaptive models. The second is characterized by the prior assumption of a time-variation of the model coefficient restricted to the space spanned by a known set of functions. These evolutionary models are split into autoregressive models, lattice filters, and log area models. Application of the models to three typical bat echo location calls shows the great accuracy of both classes. Author (ESA)

N86-16479# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
ELIMINATION OF RADAR NOISE AND SEQUENTIAL TARGET DETECTION: AN APPROACH TO PATTERN RECOGNITION AND ARRAY FILTERING Ph.D. Thesis [ELIMINATION DE FOUILLIS EN RADAR ET DETECTION SEQUENTIELLE DES CIBLES: UNE APPROCHE PAR LA RECONNAISSANCE DES FORMES ET LE FILTRAGE EN TREILLIS]
Jean-Francois Agnel 15 Mar. 1985 311 p refs In FRENCH
(ENST-85E003; ISSN-0751-1353) Avail: NTIS HC A14/MF A01

An adaptive sequential filter to eliminate background signatures in radar was studied. An autoregressive model of ground reflections is used to determine a compensating filter. Two models are studied. A global model includes learning of ground reflection data and real time recognition. The autoregressive model defines several representation spaces of the signal and leads to a parameter recognition of image patterns. The global model must be completed by adaptive sequential algorithms, resulting in simple tests showing environment changes or a target. The method presents a higher cost in data processing but is more efficient. Author (ESA)

N86-16480# Ecole Nationale Superieure des Telecommunications, Paris (France). Laboratoire d'Electronique et de Physique Appliquee.
STUDY OF A TELEVISION SIGNAL COMPRESSION SYSTEM Ph.D. Thesis [ETUDE D'UNE CHAINE DE COMPRESSION D'IMAGES DE TELEVISION]
Mohammad-Reza Haghiri 28 Jan. 1985 314 p refs In FRENCH
(ENST-85E004; ISSN-0751-1353) Avail: NTIS HC A14/MF A01

Techniques to increase television signal compression ratio are studied. A first order Gauss-Markov model is used to compute the spectrum of the composite signal. Signal sampling at a frequency lower than the sum of that of the subcarriers causes a deficiency in the higher frequency region of the luminance component comparable to a crosscolor effect. To obtain a rate reduction of up to 10 times, the coding techniques included orthogonal transformations. The introduction of adaptive methods permits a further reduction of coding flow. The result is a signal rate of 20 Mbits/sec for the whole video signal without loss of broadcasting quality. Author (ESA)

N86-16481# Uppsala Ionospheric Observatory (Sweden).
MEASUREMENTS OF HF BACKSCATTER CROSS SECTION FOR STRIATIONS CREATED BY IONOSPHERIC HEATING AT DIFFERENT POWER LEVELS
A. Hedberg, H. Derblom, G. Hamberg, B. Thide, H. Kopka, and P. Stubbe (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany) Apr. 1985 23 p refs Submitted for publication Sponsored by Deutsche Forschungsgemeinschaft and Swedish Natural Science Research Council
(UIO-SR-85-02) Avail: NTIS HC A02/MF A01

Ionospheric field-aligned irregularities induced by a heating facility were studied by HF backscatter radar. A power law relation between the received echo power and the stepwise changed heater power with an exponent varying between 1.5 and 1.9 is found. The radar cross section at 14 MHz is on the order of 35 to 55 dBsm, and a maximum volume cross section 0.00000036/m. Recording sequences for three different environmental ionospheric conditions are discussed. During favorable conditions backscatter echoes are observed at the lowest heater ERP of 14 MW. The cross section then saturates at 98 MW ERP and exhibits a pronounced decrease at higher heater ERP. During less favorable conditions the saturation level is not reached even at full power of 280 MW ERP. A correlation seems to exist between variations in the derived Hall current and the variation in cross section of the heater-induced field-aligned irregularities. Author (ESA)

N86-16482# Hollandse Signaalapparaten N. V., Hengelo (Netherlands).
AN ANALYTICAL MODEL FOR THE EVAPORATION DUCT, AND APPLICATION TO RADAR [EEN ANALYTISCH MODEL VOOR DE EVAPORATIE-DUCT EN DE TOEPASSING VOOR RADAR]
P. N. C. Nooy 7 Oct. 1983 192 p refs In DUTCH
Avail: NTIS HC A09/MF A01

An analytical model describing the evaporation-duct refraction of radar waves was developed. In order to make the model applicable to determine the radar range under duct conditions, the radar pattern function was synthesized using elementary point sources. It is shown that the exponential evaporation duct and the pattern synthesis provide a usable and fast procedure to predict radar performance in an evaporation duct. The range performance for a given antenna height depends strongly on target height. The range performance depends strongly on antenna height. Author (ESA)

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-16483 Department of the Air Force, Washington, D.C.
HIGH VOLTAGE GROUNDING DEVICE FOR PRESSURIZED EQUIPMENT Patent
J. W. Ogland, inventor (to Air Force) Issued 4 Jun. 1985 6 p Supersedes AD-D010774
(AD-D011901; US-Patent-4,521,656; US-Patent-Appl-SN-549532; US-Patent-Class-200-148B) Avail: US Patent and Trademark Office CSCL 09/5

A safety device is described for discharging high voltage circuits operated in pressurized containers. The device is positioned in pressurized containers. The device is positioned within an elbow or other protrusion through which passes the high voltage feed-through electrode. In one embodiment the grounding contact is automatically forced against the high voltage contact by the expansion of a bellows upon decompression of the container while in an alternate embodiment, the grounding contact is manually threaded against the high voltage contact. Author (GRA)

N86-16484 Department of the Air Force, Washington, D.C.
CLOCK DISTRIBUTION CIRCUIT FOR ACTIVE APERTURE ANTENNA ARRAY Patent
B. M. Bellman, inventor (to Air Force) Issued 4 Jun. 1985 6 p Supersedes AD-D010287
(AD-D011903; US-Patent-4,521,893; US-Patent-Appl-SN-487340; US-Patent-Class-375-107) Avail: US Patent and Trademark Office CSCL 17/2

A system is described for communicating a time reference or clock signal to a plurality of processors over substantial distances where propagation time between units is significant compared to the processing time. The timing signal is in the form of two continuous sinusoidal waves of different frequency but equal amplitude, which are added to give equal contributions in the resultant composite, two frequency, sum signal. The resulting waveform has sharply defined nulls occurring at the difference which are used as a precise time reference. Author (GRA)

N86-16485 Department of the Air Force, Washington, D.C.
SWITCH DEBOUNCE CIRCUIT Patent
F. A. Norris and D. J. Krile, inventors (to Air Force) Issued 11 Jun. 1985 5 p Supersedes AD-D010134
(AD-D011905; US-Patent-4,523,104; US-Patent-Appl-SN-468629; US-Patent-Class-307-207A) Avail: US Patent and Trademark Office CSCL 09/5

A circuit is described for eliminating transient pulses generated by bouncing mechanical contacts within a switch. A shift register accepts a series of binary input signals from the switch and propagates the signal out the register in parallel to a logic device for generating a resultant binary signal corresponding to the switch's debounced signal state. Author (GRA)

N86-16486*# ALPHATECH, Inc., Burlington, Mass.
ROBUST DETECTION-ISOLATION-ACCOMMODATION FOR SENSOR FAILURES Final Report
Jerold L. Weiss, Krishna R. Pattipati, Alan S. Willsky, John S. Eterno, and John T. Crawford Sep. 1985 220 p refs
(Contract NAS3-24078)
(NASA-CR-174797; NAS 1.26:174797; TR-213-1) Avail: NTIS HC A10/MF A01 CSCL 09C

The results of a one year study to: (1) develop a theory for Robust Failure Detection and Identification (FDI) in the presence of model uncertainty, (2) develop a design methodology which utilizes the robust FDI ththeory, (3) apply the methodology to a sensor FDI problem for the F-100 jet engine, and (4) demonstrate the application of the theory to the evaluation of alternative FDI schemes are presented. Theoretical results in statistical discrimination are used to evaluate the robustness of residual signals (or parity relations) in terms of their usefulness for FDI. Furthermore, optimally robust parity relations are derived through the optimization of robustness metrics. The result is viewed as decentralization of the FDI process. A general structure for decentralized FDI is proposed and robustness metrics are used for determining various parameters of the algorithm. Author

N86-16487*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESCRIPTION AND TEST RESULTS OF A VARIABLE SPEED, CONSTANT FREQUENCY GENERATING SYSTEM Final Report
Frank J. Brady Dec. 1985 18 p refs
(Contract DE-AI01-76ET-20320)
(NASA-TM-87181; DOE/NASA/20320-67; E-2830; NAS 1.15:87181) Avail: NTIS HC A02/MF A01 CSCL 09C

The variable-speed, constant frequency generating system developed for the Mod-0 wind turbine is presented. This report describes the system as it existed at the conclusion of the project. The cycloconverter control circuit is described including the addition of field-oriented control. The laboratory test and actual wind turbine test results are included. Author

N86-16488# Arizona State Univ., Tempe. Center for Solid State Science.
TRANSPORT OF ANION IMPURITIES THROUGH OXIDES Final Report, 1 Jul. 1981 - 30 Jun. 1985
J. B. Wagner, Jr. 2 Jul. 1985 42 p
(Contract DAAG29-81-K-0109)
(AD-A158445; ARO-18043.7-MS) Avail: NTIS HC A03/MF A01 CSCL 07/4

This research was divided into four interrelated parts. It was an outgrowth of an investigation on the corrosion of nickel in SO2+Ar and in SO2+SO3+Ar gas mixtures at 800 C. From the earlier studies it became clear that the transport properties of the sulfide, the oxidation of the sulfide itself and the transport properties of the duplex scale were needed data. In addition, the thermodynamics of the sulfides were needed. Accordingly the following research was performed: (1) Transport Properties of Ni3+ or - xS2 a) electrical conductivity b) chemnical diffusivity c) radio tracer sulfur diffusion; (2) Gibbs Free Energy of Ni3 + or - xS2 and Fe1-xS by Galvanci Cells; (3) Oxidation of Ni3 + or - xS2 in oxygen at 700 C; (4) Transport in NiO-Ni3S2 composites. In what follows, a brief summary of each research objective is presented followed by the publications and extended abstracts which contain the details. GRA

N86-16489# IIT Research Inst., Rome, N.Y.
IMPACT OF NONOPERATING PERIODS ON EQUIPMENT RELIABILITY Final Report, Feb. 1983 - Sep. 1984
D. W. Coit and M. G. Priore May 1985 440 p
(Contract F30602-83-C-0056)
(AD-A158843; RADC-TR-85-91) Avail: NTIS HC A19/MF A01 CSCL 20/3

The objective of this study was to develop a procedure to predict the quantitative effects of nonoperating periods on electronic equipment reliability. A series of nonoperating failure rate prediction models were developed at the component level. The models are capable of evaluating component nonoperating failure rate for any anticipated environment with the exception of a satellite environment. The proposed nonoperating failure rate prediction methodology is intended to provide the ability to predict the component nonoperating failure rate and reliability as a function of the characteristics of the devices, technology employed in producing the device, and external factors such as environmental stresses which have a significant effect on device nonoperating reliability. The prediction methodology is presented in a form compatible with MIL-HDBK-217 as an Appendix to the technical report. GRA

N86-16490# Naval Research Lab., Washington, D. C.
LONG PULSE E-BEAM CONTROLLED SWITCH: DESCRIPTION OF APPARATUS AND INITIAL RESULTS
J. Burton, V. E. Scherrer, R. J. Commisso, R. F. Fernsler, and I. M. Vitkovitsky 30 Aug. 1985 33 p
(AD-A159125; NRL-MR-5628) Avail: NTIS HC A03/MF A01 CSCL 09/5

There exists an interest in the application of externally controlled high pressure, volume discharges to high power switching. Important applications involve opening switches for both single and repetitively pulsed, high power, inductive generators. Such discharges have great potential for these applications because they can recover rapidly to the original highly resistive state of the gas once the external ionizing agent is removed. Several authors have reported on experiments and theoretical investigations in which an electron beam is used as the external agent to sustain the diffuse discharge. The design of an inductive store system that employs and electron-beam controlled switch to produce a 280 kV, 10 kA, 60 ns full width at half maximum pulse is described. Included in the design are the electron-beam generator, electron-beam diode, and electron-beam controlled switch. The voltage is generated across an open circuit load. These non-optimized results agree with predictions from a previously described design procedure. GRA

N86-16491# Mission Research Corp., Albuquerque, N. Mex.
MILLIMETER WAVE VIRCATOR Final Report, 1 Jan. 1982 - 31 Mar. 1985
D. J. Sullivan, D. E. Voss, R. J. Adler, K. O. Busby, and E. M. Bollen Jun. 1985 272 p
(Contract F49620-82-C-0014)
(AD-A159394; AMRC-R-692; AFOSR-85-0666TR) Avail: NTIS HC A12/MF A01 CSCL 09/1

The millimeter wave vircator has achieved a frequency in excess of 39.9 Ghz and a peak power of the order of 21 kilowatts (f > or = 26.35 GHz) for a pulse duration of as short as 5 ns

full width at half maximum. A new moderate voltage, high current density, field emission gun has been tested to a voltage, high current density, field emission gun as been tested to a voltage of 67 kV and an inferred current density of 7 kA/per sq cm. A new compact capacitive voltage monitor, similar to those commonly used in radar modulators, has been developed for short pulse, fast risetime, low to moderate impedance pulse lines. GRA

N86-16492# Pacific Northwest Lab., Richland, Wash.
OPTICAL PROPERTIES OF SOLID PARTICLE RECEIVER MATERIALS. 22: DIFFUSE REFLECTANCE OF NORTON MASTERBEADS AT ELEVATED TEMPERATURES
K. A. Stahl, J. W. Griffin, and R. B. Pettit 1985 18 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contracts DE-AC06-76RL-01830; DE-AC04-76DP-00789)
(DE85-015495; SAND-85-0413C; CONF-850887-15) Avail: NTIS HC A02/MF A01

An experimental system to measure the diffuse reflectance of a particulate sample over the wavelength range of 300 to 2500 nm and at elevated temperatures up to 1000 C was developed and implemented. A description of the experimental apparatus and measurement procedures, as well as optical reflectance data for Masterbeads, are presented. Using the high temperature measurement system, the diffuse reflectance of Masterbeads changed by less than 1% for sample temperatures from 150 C to 930 C. However, after heating a sample for 3 hours at 1000 C in air, the solar absorptance measured at room temperature decreased from an initial value of 0.93 to 0.89. DOE

N86-16493# Allied Bendix Aerospace, Kansas City, Mo.
USE OF THE FINITE ELEMENT METHOD FOR CALCULATING CAPACITANCE VALUES IN ELECTRICAL AND ELECTRONIC COMPONENTS
J. F. Mahoney Jul. 1985 25 p
(Contract DE-AC04-76DP-00613)
(DE85-016333; BDX-613-3321) Avail: NTIS HC A02/MF A01

Using the COSMIC/NASTRAN computer program, the Finite Element Method was applied to determine the capacitance of a specific diode. Preparatory work included literature searches of techniques used in industry and application of COSMIC/NASTRAN to electrostatic test cases. Capacitance values of the diode were calculated and a normalized voltage potential plot was generated. DOE

N86-16494# Sandia Labs., Albuquerque, N. Mex.
EMP-INDUCED, TIME-DOMAIN GRAZING SOLUTION FOR AN INFINITE WIRE OVER THE GROUND
K. C. Chen and K. M. Damrau May 1985 38 p
(Contract DE-AC04-76DP-00789)
(DE85-017298; SAND-85-0222) Avail: NTIS HC A03/MF A01

The EMP-induced, time-domain current waveform is obtained for an infinite wire over the ground under grazing incidence. In contrast to previous results, the maximum grazing current is found to be slightly larger when the ground conductivity is higher. Also, the grazing angle for maximum current is found to be smaller when the ground conductivity is higher. For a ground conductivity of 1/10 sq S/m, the maximum current is approximately a factor of five larger than typical value reported in the literature. A byproduct of this study is a simple formula of ground inductance for the transmission line mode. DOE

N86-16495# California Univ., Berkeley. Lawrence Berkeley Lab.
TECHNOLOGY BASE RESEARCH PROJECT FOR ELECTROCHEMICAL ENERGY STORAGE Annual Report, 1984
K. Kinoshita, ed. 23 Jun. 1985 134 p
(Contract DE-AC03-76SF-00098)
(DE85-016497; LBL-19545) Avail: NTIS HC A07/MF A01

The DOE Electrochemical Energy Storage Program is divided into two projects. (1) the exploratory technology development and testing (ETD) project and (2) the technology base research (TBR) project. The role of the TBR Project is to perform supporting research for the advanced battery systems under development by the ETD Project, and to evaluate new systems with potentially superior performance, durability and/or cost characteristics. The specific goal of the TBR Project is to identify the most promising electrochemical technologies and transfer them to industry and/or the ETD Project for further development and scale-up. This report summarizes the research, financial, and management activities relevant to the TBR Project in CY 1984. General problem areas addressed by the project include identification of new electrochemical couples for advanced batteries, determination of technical feasibility of the new couples, improvements in battery components and materials, establishment of engineering principles applicable to electrochemical energy storage and conversion, and the assessment of fuel-cell technology for transportation applications. Major emphasis is given to applied research which will lead to superior performance and lower life-cycle costs. The TBR Project is divided into three major project elements: exploratory research, applied science research, and air systems research. DOE

N86-16496# Sandia National Labs., Albuquerque, N. Mex.
ELECTRON FLOW AND IMPEDANCE OF AN 18-BLADE FRUSTUM DIODE
T. W. L. Sanford, J. R. Lee, J. A. Halbleib, J. P. Quintenz, R. S. Coats, W. A. Stygar, R. E. Clark, D. L. Faucett, D. Webb, and C. E. Heath Jul. 1985 37 p Prepared in cooperation with Pulse Sciences, Inc., San Leandro, Calif.
(Contract DE-AC04-76DP-00789)
(DE85-016200; SAND-84-1424) Avail: NTIS HC A03/MF A01

A new, large-area, high-uniformity, flash X-ray source that efficiently couples electrical energy to photon energy was successfully constructed and tested on the 1 MV, 2 MA electron accelertor SPEED. The source employs 18 individual blade-diodes arranged in the configuration of a frustum. Each blade was magnetically isolated on the real-cathode side of an anode foil, but not on the virtual-cathode side. The operation of the diode was heavily diagnosed using 24 Rogowski coils, a vacuum voltage monitor, pin diode detectors, an 80-element TLD array, and a fast-framing X-ray pinhole camera. The individual blade-diodes were found to exhibit line pinching, end-to-end pinching, and minimal electron reflexing through the Ta anode foil, with a radiation yield that agreed with Monte Carlo simulations. The end-to-end pinch location could be controlled by tapering the anode-cathode gap. The impedance depended on only the smallest spacing, and was independent of pinch location. DOE

N86-16497# Brookhaven National Lab., Upton, N. Y.
DEVELOPMENT OF SYNTHETIC TAPE INSULATION FOR BOTH CRYOGENIC AND AMBIENT TEMPERATURE POWER CABLES
E. B. Forsyth 1985 10 p Presented at the 18th Symposium on Electrical Insulating Materials, Tokyo, Japan, 30 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE85-015180; BNL-36690; CONF-8509124-1) Avail: NTIS HC A02/MF A01

This report is on the development of synthetic tape insulation for both cryogenic and ambient temperature power cables. The report begins with an explanation of electrical insulation for superconducting power cables, explaining three major methods of insulating: (1) gas insulated systems; (2) lapped tape insulated conductor impregnated with coolant; and (3) extruded polyethylene insulation. Advantages and disadvantages of the methods are briefly explained, and the development of ambient temperature insulation is also touched upon. DOE

N86-16498# Argonne National Lab., Ill.
Li-ALLOY/FeS CELL DESIGN AND ANALYSIS REPORT
E. C. Gay, R. K. Steunenberg, W. E. Miller, J. E. Battles, T. D. Kaun, F. J. Martino, J. A. Smaga, and A. A. Chilenskas Jul. 1985 183 p
(Contract W-31-109-eng-38)
(DE85-016238; ANL-84-93) Avail: NTIS HC A09/MF A01

This report contains historical information on the Li-alloy/FeS

system that will be useful in its future applications. This document includes the following: (1) the chemical and electrochemical reactions for the Li-alloy/FeS system, accomplishments in past cell development efforts, and performance attained by state-of-the-art cells vs performance goals; (2) detailed drawings of state-of-the-art cell designs, documentation of cell fabrication techniques, and comparisons of alternative types of cell components (such as BN felt vs MgO powder separators, stainless vs low-carbon steel cell housings) and fabrication techniques (such as vs uncharged electrodes); (3) results of posttest cell analyses, including cell failure mechanisms, electrode morphology and active material distribution, and in-cell corrosion rates; (4) data from trade-off studies between specific power and energy; (5) discussion of battery design considerations (e.g., volumetric energy density, battery charger, and high-efficiency thermal insulation); (6) results of cost studies, which include materials and manufacturing costs of cells and batteries and heating costs involved in battery operation; and (7) projections of cell designs having the greatest potential for meeting electric-vehicle performance requirements. DOE

N86-16499# Department of Energy, Washington, D. C.
DISK FILTER Patent Application
W. Bergman, inventor (to DOE) (California Univ., Livermore, Lawrence livermore Lab.) Filed 9 Jan. 1985 14 p
(Contract W-7404-eng-48)
(DE85-017752; US-Patent-Appl-SN-690023) Avail: NTIS HC A02/MF A01

An electric disk filter provides a high efficiency at high temperature. A hollow outer filter of fibrous stainless steel forms the ground electrode. A refractory filter material is placed between the outer electrode and the inner electrically isolated high voltage electrode. Air flows through the outer filter surfaces through the electrified refractory filter media and between the high voltage electrodes and is removed from a space in the high voltage electrode. DOE

N86-16500# Sandia National Labs., Albuquerque, N. Mex.
QUALIFICATION OF RADIATION-HARD DIELECTRICS FOR CAPACITOR APPLICATIONS
S. R. Kurtz, C. Arnold, Jr., and L. R. Edwards 1985 13 p Presented at the Conference on Electrical Insulation and Dielectrics, Amherst, N.Y., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-014640; SAND-85-0723C; CONF-8510114-1) Avail: NTIS HC A02/MF A01

Specific polymer dielectric materials have been identified that can be used to minimize the discharge of capacitors upon exposure to ionizing radiation. The testing procedures used to qualify the radiation-induced conductivity in capacitor dielectrics are discussed, and a comparison is made of various radiation-hard dielectrics that display low levels of radiation-induced conductivity. DOE

N86-16501# Los Alamos National Lab., N. Mex.
THERMIONIC INTEGRATED CIRCUITS: ELECTRONICS FOR HOSTILE ENVIRONMENTS
D. K. Lynn, J. B. McCormick, M. D.J. MacRoberts, D. K. Wilde, G. R. Dooley, and D. R. Brown 1985 19 p Presented at the 22nd Annual Conference on Nuclear and Space Radiation Effects, Monterey, Calif., 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015680; LA-UR-85-2336; CONF-850711-16) Avail: NTIS HC A02/MF A01

Thermionic integrated circuits combine vacuum tube technology with integrated circuit techniques to form integrated vacuum triode circuits. These circuits are capable of extended operation in both high-temperature and high-radiation environments. DOE

N86-16502# Sandia National Labs., Albuquerque, N. Mex.
CHARACTERIZATION OF DEB POWDERS AND PELLETS FOR CA/CaCr04 THERMAL BATTERIES
R. A. Guidotti and F. W. Reinhardt Jul. 1985 51 p
(Contract DE-AC04-76DP-00789)
(DE85-017250; SAND-83-2270) Avail: NTIS HC A04/MF A01

A detailed characterization study was conducted of catholyte or depolarizer-electrolyte-binder (DEB) mixes used in Ca/CaCrO4 thermal batteries. A number of the physical and chemical properties of powders and pellets of the DEB mixes were examined for correlation to electrochemical performance in 5-cell and, to a lesser extent, single-cell batteries. Powder characteristics evaluated included: chemical composition, segregation, flowability, bulk density, and BET surface area. Pellet characteristics evaluated included: break strength, forming force, electrolyte leakage at 400C after 0.5 h, and deformation at 530C under an applied pressure of 71 kPa (10.3 psi). Three series of DEB mixes were formulated at constant D/E weight ratios of 0.50, 0.64, and 0.80 to study the effect of SiO2 binder at concentrations of 8 to 12 wt%. Three additional series of DEB mixes were formulated at constant E/B weight ratios of 4.5, 5.5, and 6.5 to study the effect of CaCrO4 depolarizer at concentrations of 30 to 40 wt%. The BET surface area and chemical composition of DEB powders, and the electrolyte leakage and deformation of DEB pellets, could be correlated to the activated lives and pulse characteristics of the 5-cell batteries built with these mixes. DOE

N86-16503# Oak Ridge National Lab., Tenn.
THE ac RESPONSE OF FRACTAL INTERFACES
S. H. Liu, T. Kaplan, and L. J. Gray Aug. 1985 8 p Presented at the 5. International Conference on Solid-state Ionics, Lake Tahoe, Calif., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017307; CONF-850870-1) Avail: NTIS HC A02/MF A01

The small signal ac impedance of the interface between a blocking electrode and an aqueous or solid electrolyte often contains a constant-phase-angle (CPA) element whose impedance has the frequency dependence according to Z proportional to (j(LC omega)) sup eta. Recently it has been demonstrated experimentally that the exponent eta is intimately related to the roughness of the interface, with eta approaching 1 when the surface is made increasingly smooth. We propose to model the interface by a fractal called Cantor bar. The equivalent circuit of the model has the property of the CPA element with the exponent eta = 3 - ds, where 2 < ds < 3 is the fractal dimension of the interface. The model has been made more realistic by assuming random branching number and scaling ratio, and the relation between eta and ds remains the same. For real fractal surfaces the relation between eta and ds may hold approximately. DOE

N86-16504# Department of Energy, Washington, D. C.
THERMOACOUSTIC MAGNETOHYDRODYNAMIC ELECTRICAL GENERATOR Patent Application
J. C. Wheatley (Los Alamos National Lab., New Mexico), G. W. Swift, and A. Migliori, inventors (to DOE) Filed 16 Nov. 1984 15 p
(Contract W-7405-eng-36)
(DE85-017768; US-Patent-Appl-SN-672228) Avail: NTIS HC A02/MF A01

A thermoacoustic magnetohydrodynamic electrical generator includes an intrinsically irreversible thermoacoustic heat engine coupled to a magnetohydrodynamic electrical generator. The heat engine includes an electrically conductive liquid metal as the working fluid and includes two heat exchange and thermoacoustic structure assemblies which drive the liquid in a push-pull arrangement to cause the liquid metal to oscillate at a resonant acoustic frequency on the order of 1000 Hz. The engine is positioned in the field of a magnet and is oriented such that the liquid metal oscillates in a direction orthogonal to the field of the magnet, whereby an alternating electrical potential is generated in the liquid metal. Low-loss, low-inductance electrical conductors electrically connected to opposite sides of the liquid metal conduct an output signal to a transformer adapted to convert the low-voltage, high-current output signal to a more usable higher voltage, lower current signal. DOE

N86-16505# Oak Ridge National Lab., Tenn.
ZnO VARISTORS MADE FROM POWDERS PRODUCED UTILIZING A UREA PROCESS

E. Sonder, T. C. Quinby, and D. L. Kinser Sep. 1985 23 p
(Contract DE-AC05-84OR-21400)
(DE85-018076; ORNL/TM-9728) Avail: NTIS HC A02/MF A01

Small-grained oxide powders of uniform composition, ideally suited for varistor production, have been prepared as follows: ZnO and other components are dissolved in nitric acid. Urea is added and the mixture is heated to remove water and nitrates and to form solid melamine. The melamine is then calcined to burn off the organics and to produce fine oxide powders. Grain sizes, densities, and electrical characteristics have been measured for varistors fabricated from these powders by sintering or hot pressing. The densities and grain sizes increase with processing temperature, the nonlinearity coefficient depends primarily on composition, and the average voltage per barrier for sintered samples is approximately 2.5 eV. The breakdown field for hot-pressed samples is not uniform for different slices of the same varistor and depends on variables other than the grain size. DOE

N86-16506# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
METHODS FOR THE ANALYSIS OF LITHIUM-SILICON, IRON DISULFIDE THERMAL BATTERY MATERIALS
P. R. Krall 30 Sep. 1985 34 p
(Contract DE-AC04-76DP-00656)
(DE85-018331; GEPP-TIS-849) Avail: NTIS HC A03/MF A01

Analytical methods for the characterization of the lithium-silicon/iron disulfide thermal battery materials have been developed and evaluated. The standard procedures being used for the quality control testing of the battery materials are described in this report. These procedures are based on both classical chemical methods and instrumental methods of analysis. The materials characterized include lithium-silicon alloy, iron disulfide, catholyte material, separator material, calcium disilicide, depolarizer-electrolyte-binder material, electrolyte and electrolyte binder material. DOE

N86-16507# International Trade Administration, Washington, D.C. Nonferrous Metals Div.
STORAGE BATTERY MARKET: PROFILES AND TRADE OPPORTUNITIES
D. Stonfer Apr. 1985 55 p
(DE85-901842; NP-5901842) Avail: NTIS HC A04/MF A01

The export market for domestically produced storage batteries is a modest one, typically averaging 6 to 7% of domestic industry shipments. Exports in 1984 totalled about $167 million. Canada and Mexico were the largest export markets for US storage batteries in 1984, accounting for slightly more than half of the total. The United Kingdom, Saudi Arabia, and the Netherlands round out the top five export markets. Combined, these five markets accounted for two-thirds of all US exports of storage batteries in 1984. On a regional basis, the North American (Canada), Central American, and European markets accounted for three-quarters of total storage battery exports. Lead-acid batteries accounted for 42% of total battery exports. Battery parts followed lead-acid batteries with a 29% share. Nicad batteries accounted for 16% of the total while other batteries accounted for 13%. DOE

N86-16508# Oak Ridge National Lab., Tenn.
EVALUATION OF SEVERAL POLYMER FILMS FOR USE AS ELECTRICAL INSULATORS
H. E. McCoy, Jr. and C. R. Brinkman 1985 17 p Presented at the Electrical/Electronics Insulation Exposition, Boston, Mass., 30 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017088; CONF-8509141-1) Avail: NTIS HC A02/MF A01

Samples of polyethylene terephthalate, polycarbonate, polyparabanic acid, polyethersulfone, and polyimide were aged to 32,700 h in SF6. The temperatures evaluated were 70, 110, 135, and 160C. The influence of aging was determined by post-aging electrical breakdown tests, tensile tests, and density measurements. There was no indication that aging lowered the electrical breakdown voltage. The tensile properties were altered to some extent for all polymers, but large differences in behavior were noted. Density measurements on polyethylene terephthalate showed that the crystallinity of this material increased during aging. Surface crystal growth noted in the scanning electron microscope gave further evidence of morphological changes in this material. Creep tests were run on several polymers: polyethylene terephthalate had the lowest creep strength, and polyimide had the highest. Strain cycle experiments showed that when polyethylene terephthalate and aluminum were bonded together, the high thermal expansion of the aluminum could pull the polymer in two during thermal cycling. DOE

N86-16509# Pacific Northwest Lab., Richland, Wash.
RELIABILITY MODELLING SYSTEM FOR ANALYSIS OF ADVANCED BATTERY TECHNOLOGIES
C. H. Imhoff, C. J. Hostick, and R. K. Nakaoka May 1985 8 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017464; PNL-SA-13209; CONF-850808-22) Avail: NTIS HC A02/MF A01

Key considerations in evaluating the reliability of advanced battery technologies include the impact of cell failures on battery performance and cost. Pacific Northwest Laboratory developed interactive microcomputer based simulation models to help battery developers use cell reliability data to calculate the expected performance of new battery technologies. Key benefits of this model include its capability to estimate the effect of cell failures upon: (1) battery system discharge performance, (2) system cycle life, and (3) system economic performance (tradeoffs between capital investment and lifetime operating costs). DOE

N86-16510# Department of Energy, Washington, D. C.
MICROWAVE COUPLER AND METHOD Patent Application
C. E. Holcombe, inventor (to DOE) Filed 29 Nov. 1984 16 p
(Contract DE-AC05-84OR-21400)
(DE85-017728; US-Patent-Appl-SN-676342) Avail: NTIS HC A02/MF A01

The present invention is directed to a microwave coupler for enhancing the heating or metallurgical treatment of materials within a cold-wall, rapidly heated cavity as provided by a microwave furnace. The coupling material of the present invention is an alpha-rhombohedral-boron-derivative-structure material such as boron carbide or boron silicide which can be appropriately positioned as a susceptor within the furnace to heat other material or be in powder particulate form so that composites and structures of boron carbide such as cutting tools, grinding wheels and the like can be rapidly and efficiently formed within microwave furnaces. DOE

N86-16511# Pacific Northwest Lab., Richland, Wash.
MISSION AND STATUS OF THE US DEPARTMENT OF ENERGY'S BATTERY ENERGY STORAGE PROGRAM
J. E. Quinn, J. W. Hurwitch, A. R. Landgrebe, and S. G. Hauser May 1985 10 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017893; PNL-SA-13213; CONF-850808-23) Avail: NTIS HC A02/MF A01

The mission of the US Department of Energy's battery research program has evolved to reflect the changing conditions of the world energy economy and the national energy policy. The battery energy storage program supports the goals of the National Energy Policy Plan (FY 1984). The goals are to provide an adequate supply of energy at reasonable costs, minimize federal control and involvement in the energy marketplace, promote a balanced and mixed energy resource system, and facilitate technology transfer from the public to the private sector. This paper describes the history of the battery energy storage program and its relevance to the national interest. Potential market applications for battery energy storage are reviewed, and each technology, its goals, and its current technical status are described. The paper concludes by describing the strategy developed to ensure effective technology

transfer to the private sector and reviewing past significant accomplishments. DOE

N86-16512# Los Alamos National Lab., N. Mex.
GATED SIT VIDICON STREAK TUBE
D. L. Dunbar, G. J. Yates, and J. P. Black 1985 7 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Albuquerque, N. Mex.
(Contract W-7405-eng-36)
(DE85-017549; LA-UR-85-2928; CONF-850887-32) Avail: NTIS HC A02/MF A01

A recently developed prototype streak tube designed to produce high gain and resolution by incorporating the streak and readout functions in one envelope thereby minimizing photon-to-change transformations and eliminating external coupling losses is presented. The tube is based upon a grid-gated Silicon-Intensified-Target Vidicon (SITV) with integral Focus Projection Scan (FPS) TV readout. Demagnifying electron optics (m=0.63) in the image section map the 40-mm-diameter photocathode image unto a 25-mm-diameter silicon target where gains greater than or equal to 1000 are achieved with only 10 KV accelerating voltage. This is compared with much lower gains (approx.50) at much higher voltages (approx.30 KV) reported for streak tubes using phosphor screens. Because SIT technology is well established means for electron imaging in vacuum, such fundamental problems as backside thinning required for electron imaging unto CCDs do not exist. The high spatial resolution (approx.30 lp/mm), variable scan formats, and high speed electrostatic deflection (250 sq mm areas are routinely rastered with 256 scan lines in 1.6 ms) available from FPS readout add versatility not available in CCD devices. Theoretical gain and spatial resolution for this design (developed jointly by Los Alamos National Laboratory and General Electric Co.) are compared with similar calculations and measured data obtained for RCA 73435 streaks fiber optically coupled to: (1) 25-mm-diameter SIT FPS vidicons, and (2) 40-mm-diameter MCPTs (proximity-focused microchannel plate image intensifier tubes) fiber optically coupled to 18-mm-diameter Sb2S3 FPS vidicons. Sweep sensitivity, shutter ratio, and record lengths for nanosecond duration (20 to 200 ns) streak applications are discussed. DOE

N86-16513# Department of Energy, Washington, D. C.
LOW VOLTAGE SOLID-STATE LATERAL COLORATION ELECTROCHROMIC DEVICE Patent Application
C. E. Tracy (Midwest Research Inst., Golden, Colo.), D. K. Benson (Midwest Research Inst., Golden, Colo.), and M. R. Ruth, inventors (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 21 Dec. 1984 18 p
(Contract DE-AC02-83CH-10093)
(DE85-017742; US-Patent-Appl-SN-685177) Avail: NTIS HC A02/MF A01

A solid-state transition metal oxide device comprising a plurality of layers having a predisposed orientation including an electrochromic oxide layer. Conductive material including anode and cathode contacts is secured to the device. Coloration is actuated within the electrochromic oxide layer after the application of a predetermined potential between the contacts. The coloration action is adapted to sweep or dynamically extend across the length of the electrochromic oxide layer. DOE

N86-16514# Department of Energy, Washington, D. C.
LOG AMPLIFIER WITH POLE-ZERO COMPENSATION Patent Application
W. Brookshier, inventor (to DOE) (Argonne National Lab., Ill.) Filed Feb. 1985 14 p
(Contract W-31-109-eng-38)
(DE85-017796; US-Patent-Appl-SN-699878) Avail: NTIS HC A02/MF A01

A logarithmic amplifier circuit provides pole-zero compensation for improved stability and response time over 6 to 8 decades of input signal frequency. The amplifer circuit includes a first operational amplifier with a first feedback loop which includes a second, inverting operational amplifier in a second feedstock loop. The compensated output signal is provided by the second operational amplifier with the log elements, i.e., resistors, and the compensating capacitors in each of the feedback loops having equal values so that each break point is offset by a compensating break point or zero. DOE

N86-16437# Joint Publications Research Service, Arlington, Va.
COMPOSITE ELECTRIC CONTACT MATERIALS
Jacek Senkara and Jan Kowalczyk *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 48-49 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 9-10 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

N86-16442# University of Electro-Communications, Tokyo (Japan).
THE STUDY IN SUB E CLASS CONVERTER WITH SATURATING CORES
Toshimitsu Suzuki, Koichi Usami, and Sonosuke Yamanaka *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 9-13 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

N86-16463# Selenia S.p.A., Rome (Italy). Research Dept.
AN INTRODUCTION TO THE DESIGN OF MICROWAVE FERRITE DEVICES
Riccardo Roveda, Carlo diGregorio, and Nicola Scafuro *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 1-11 refs (For primary document see N86-16462 07-32)
Avail: NTIS HC A03/MF A01

N86-16925# Joint Publications Research Service, Arlington, Va.
SELF-TESTING AND REDUNDANCY IN VERY LARGE MEMORY MICROCIRCUITS
A. S. Berezin, Ye. M. Onishchenko, and S. V. Sushko *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 20 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 99-102 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16926# Joint Publications Research Service, Arlington, Va.
DESIGN OF MEMORY TESTS ON THE BASIS OF ANALYSIS OF SEQUENCES OF FUNCTIONAL OPERATORS
A. V. Grinshteyn and G. Kh. Novik *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 20-21 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 103-109 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16927# Joint Publications Research Service, Arlington, Va.
NOISE CHARACTERISTICS OF STROBOSCOPIC CONVERTERS BASED ON GALLIUM ARSENIDE INTEGRATED MICROCIRTCUITS
V. I. Staroselskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 22 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 162-168 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N86-16515 Dayton Univ., Ohio.
UNSTEADY HEAT TRANSFER IN HEAT PIPES Ph.D. Thesis
Jerry Edward Beam 1985 127 p
Avail: Univ. Microfilms Order No. DA8513704

The purpose was to investigate the unsteady heat transfer associated with a heat pipe during start up operation. Initial studies were conducted with a variety of heat pipe screen wick configurations in order to develop a mathematical expression for the flow velocity of a fluid inducted by the capillary structure of the wick. This mathematical model was solved first numerically and then simplified to provide a closed form solution. The results were compared with the experimental data and proved to provide consistent results with plus or minus 10%. A lumped parameter model of the heat pipe was next developed so that the transient operation of the heat pipe could be predicted. Upon evalaution of the model it was shown that the model and the experimental data agreed quite well in overall performance but an initial period of performance was identified where the experimental results differed significantly from the lumped parameter model. During this initial period of operation, large temperature gradients were observed, and it was theorized that the effect was a result of the interdependence of the hydrodynamics and the heat transfer characteristics of the heat pipe. Dissert. Abstr.

N86-16516 British Library Lending Div., Boston Spa (England).
CALCULATING THE INITIAL STAGE OF THE UNSYMMETRICAL HEATING OF A PLATE
Yu. V. Vidin [1985] 7 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 112-115
(BLL-M-36434-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The mathematics involved in working out an effective analytical method of calculating the unsymmetrical temperature fields in steel plates of infinite size during the initial stages of their heating by convection currents are presented. E.A.K.

N86-16517*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SECOND-ORDER CLOSURE MODELS FOR ROTATING TURBULENT FLOWS Final Report
Charles G. Speziale Oct. 1985 26 p refs Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178005; ICASE-85-49; NAS 1.26:178005) Avail: NTIS HC A03/MF A01 CSCL 20D

The physical properties of the commonly used second-order closure models are examined theoretically for rotating turbulent flows. Comparisons are made with results which are a rigorous consequence of the Navier-Stokes equations for the problem of a fully-developed turbulent channel flow in a rapidly rotating framework. It is demonstrated that all existing second-order closures yield spurious physical results for this test problem of rotating channel flow. In fact, the results obtained are shown to be substantially more unphysical than those obtained from the simpler K-epsilon and K-l models. Modifications in the basic structure of these second-order closure models are proposed which can alleviate this problem. Author

N86-16518*# Tennessee Univ. Space Inst., Tullahoma.
MEAN VELOCITY AND TURBULENCE MEASUREMENTS IN A 90 DEG CURVED DUCT WITH THIN INLET BOUNDARY LAYER Final Report, Apr. 1982 - Sep. 1984
R. A. Crawford, C. E. Peters, J. Steinhoff, J. O. Hornkohl, J. Nourinejad, and K. Ramachandran Dec. 1985 188 p refs
(Contract NAS3-23278)
(NASA-CR-174811; NAS 1.26:174811; UTSI/85-08) Avail: NTIS HC A09/MF A01 CSCL 02D

The experimental database established by this investigation of the flow in a large rectangular turning duct is of benchmark quality. The experimental Reynolds numbers, Deans numbers and boundary layer characteristics are significantly different from previous benchmark curved-duct experimental parameters. This investigation extends the experimental database to higher Reynolds number and thinner entrance boundary layers. The 5% to 10% thick boundary layers, based on duct half-width, results in a large region of near-potential flow in the duct core surrounded by developing boundary layers with large crossflows. The turbulent entrance boundary layer case at R sub ed = 328,000 provides an incompressible flowfield which approaches real turbine blade cascade characteristics. The results of this investigation provide a challenging benchmark database for computational fluid dynamics code development. Author

N86-16519*# Wisconsin Univ., Milwaukee. Dept. of Mechanical Engineering.
IMPROVEMENT OF THE SECOND- AND THIRD-MOMENT MODELING OF TURBULENCE: A STUDY OF REYNOLDS-STRESS CLOSURE MODEL Semiannual Progress Report, 15 Jul. 1985 - 15 Jan. 1986
R. S. Amano and P. Goel Jan. 1986 96 p refs
(Grant NAG3-546)
(NASA-CR-176478; NAS 1.26:176478; Rept-94E/2623E; TF/86/1) Avail: NTIS HC A05/MF A01 CSCL 20D

Four parts of the Reynolds-stress closure modeling are reported: (1) improvement of the k and epsilon equaitons; (2) development of the third-moment transport equation; (3) formulation of the diffusion coefficient of the momentum equation by using the algebraic-stress model of turbulence; and (4) the application of the Reynolds-stress model to a heat exchanger problem. It was demonstrated that the third-moment transport model improved the prediction of the triple-velocity products in the recirculating and reattaching flow regions in comparison with the existing algebraic models for the triple-velocity products. Optimum values for empirical coefficients are obtained for the prediction of the backward-facing step flows. A functional expression is derived for the coefficient of the momentum diffusion by employing the algebraic-stress model. The second-moment closure is applied to a heat transfer problem. The computations for the flow in a corrugated-wall channel show that the second-moment closure improves the prediction of the heat transfer rates by 30% over the k - epsilon model. E.A.K.

N86-16520# Maryland Univ., College Park. Center for Automation Research.
ON THE UNIQUENESS OF IMAGE FLOW SOLUTIONS FOR PLANAR SURFACES IN MOTION
M. Subbarao and A. M. Waxman Apr. 1985 39 p
(Contract DAAK70-83-K-0018; DARPA Order 3206)
(AD-A158705; CAR-TR-114; CS-TR-1485) Avail: NTIS HC A03/MF A01 CSCL 20/4

Two important results relating to the uniqueness of image flow solutions for planar surfaces in motion are presented here. These results relate to the formulation of the image flow problem by Waxman and Ullman which is based on a kinematic analysis of the image flow field. The first result concerns resolving the duality of interpretations that are generally associated with the instantaneous image flow of an evolving image sequence. It is shown that the interpretation for orientation and motion of planar surfaces is unique when either two successive image flows of one planar surface patch are given or one image flow of two planar patches moving as a rigid body is given. This document has proved this by driving explicit expressions for the evolving solution of an image flow sequence with time. These expressions can be used to resolve this ambiguity of interpretation in practical problems. The second result is the proof of uniqueness for the velocity of approach which satisfies the image flow equations for

planar surfaces derived in Waxman's and Ullman's document. In addition, it is shown that this velocity can be computed as the middle root of a cubic equation. These two results together suggest a new method for solving the image flow problem for planar surfaces in motion. Author (GRA)

N86-16521# Calspan Field Services, Inc., Arnold AFS, Tenn.
INVESTIGATION OF THE DEVELOPMENT OF LAMINAR BOUNDARY-LAYER INSTABILITIES ALONG A SHARP CONE Final Report, 12 - 15 Feb. 1985
J. C. Donaldson and S. A. Simons Apr. 1985 62 p Sponsored by Air Force
(AD-A159370; AEDC-TSR-85-V16) Avail: NTIS HC A04/MF A01 CSCL 20/4

Measurements of mean-flow and fluctuating-flow parameters were made in the boundary layer on a sharp 7-deg cone in an investigation of the stability of laminar boundary layers. The flow fluctuation measurements were made using hot-wire anemometry techniques. Flow field profiles and model surface conditions were also measured. The testing was performed at a free-stream Mach number of 8 for free-stream Unit-Reynolds numbers of 1.0, 2.0, and 3.0-million per foot. The test equipment and techniques and the data acquisition and reduction procedures are described. Analysis of the hot-wire anemometer data is beyond the scope of this report. GRA

N86-16522# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
SIMULATION OF TURBULENT BOUNDARY LAYER WALL PRESSURE FLUCTUATIONS Final Report, period ending 30 Sep. 1984
R. L. Ash and M. R. Khorrami Aug. 1985 34 p
(Contract N00014-82-K-0639)
(AD-A159400) Avail: NTIS HC A03/MF A01 CSCL 20/4

A Monte Carlo simulation of an unsteady, two-dimensional wall pressure field has been developed. The simulation has been evaluated in terms of the statistical properties measured in a variety of turbulent boundary layer experiments and the results are generally in good agreement. Since identifical pressure histories can be created using simulations, it has been possible to investigate the influence of receiver area (or microphone size) on the statistical measurements of identical pressure histories. Based on these simulations, it was possible to conclude that the root mean square pressure levels increase in a quasi linear manner as the receiver size decreases. The trend is in substantial agreement with the experiments of Bull and Thomas, but the threshold of the diameter effect and the magnitude of the r.m.s. increase may be controlled by flow phenomena that are either ignored or improperly simulated. The power spectra are insensitive to receiver size in the energy containing frequency interval. Two-point correlations first show higher correlations with decreasing receiver size, then show poorer correlations as the receiver size becomes small enough to sense fine scale phenomena. The authors believe this simulation computer program can be valuable in studying the response of complex or non-linear structures to quasi-random wall pressure fields. The ability to adjust resolution and simulated flow conditions arbitrarily make it a flexible tool in the analyzing and designing fluid-structural systems. GRA

N86-16523# Lawrence Livermore National Lab., Calif.
FREE-LAGRANGE METHODS FOR COMPRESSIBLE HYDRODYNAMICS IN TWO SPACE DIMENSIONS
W. E. Crowley 1 Mar. 1985 23 p refs Presented at Free-Lagrangian Methods Conference, Hilton Head Island, S.C., 4 Mar. 1985
(DE85-012946; UCRL-92385; CONF-850139-2) Avail: NTIS HC A02/MF A01

Since 1970 a research and development program in Free-Lagrange methods has been active at Livermore. The initial steps were taken with incompressible flows for simplicity. Since then the effort has been concentrated on compressible flows with shocks in two space dimensions and time. In general, the line integral method has been used to evaluate derivatives and the artificial viscosity method has been used to deal with shocks. Basically, two Free-Lagrange formulations for compressible flows in two space dimensions and time have been tested and both will be described. In method one, all prognostic quantities were node centered and staggered in time. The artificial viscosity was zone centered. One mesh reconnection philosphy was that the mesh should be optimized so that nearest neighbors were connected together. Another was that vertex angles should tend toward equality. In method one, all mesh elements were triangles. In method two, both quadrilateral and triangular mesh elements are permitted. The mesh variables are staggered in space and time as suggested originally by Richtmyer and von Neumann. The mesh reconnection strategy is entirely different in method two. In contrast to the global strategy of nearest neighbors, we now have a more local strategy that reconnects in order to keep the integration time step above a user chosen threshold. An additional strategy reconnects in the vicinity of large relative fluid motions. Mesh reconnection consists of two parts: (1) the tools that permits nodes to be merged and quads to be split into triangles etc. and; (2) the strategy that dictates how and when to use the tools. Both tools and strategies change with time in a continuing effort to expand the capabilities of the method. New ideas are continually being tried and evaluated. The successful ones stay in the code, and in some sense its intelligence increases with time. DOE

N86-16524# Oak Ridge National Lab., Tenn.
GAMMA STIRLING CONFIGURATION AND SIMULTANEOUS PRODUCTION OF SHAFT POWER AND HEAT PUMPING
J. L. Crowley, F. P. Griffin, and C. D. West 1985 23 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016314; CONF-850808-19) Avail: NTIS HC A02/MF A01

In an ideal gamma configuration Stirling engine, the volume of the cold end of the displacer varies 180(0) out of phase with that at the hot end; therefore, exactly as much heat must be rejected as the hot end absorbs. The power piston, moving with a different phase, produces mechanical energy, so the power piston cylinder must absorb heat for there to be an overall energy balance. In other words, the engine simultaneously produces mechanical power and pumps heat between the two sections of the compression space. Inclusion of a second regenerator, between the cold displacer cylinder and the power piston cylinder, can capture this heat flow; the resulting machine is a heat-actuated heat pump that also produces shaft power. Unlike the duplex Stirling heat pump, the new configuration has only one working space and produces a surplus of shaft power. DOE

N86-16525# Argonne National Lab., Ill.
INTERFACIAL AREA MODELING
M. Ishii 1985 35 p Presented at the International Workshop on Two-Phase Flow Fundamentals, Gaithersburg, Md., 23 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-014960; CONF-8509123-1) Avail: NTIS HC A03/MF A01

The interfacial transfer terms are the most important aspect of the two-fluid formulation modeling. However, there exist considerable difficulties in this area both in terms of experiments and modeling. The first step in the right direction is to consider that the interfacial transfer terms are proportional to the interfacial area concentration and driving force. This approach effectively separates the first-order geometrical effect on the interfacial transfers from the local driving forces. Hence more mechanistic modeling of the interfacial transfer terms becomes possible. In view of the importance of the interfacial area concentration, the available experimental data, measurement methods and modeling are reviewed and new directions are indicated. DOE

N86-16526# New York Univ., New York. Mathematics and Computing Lab.
COMPRESSIBLE RAYLEIGH-TAYLOR INSTABILITY OF SUPERSONIC ACCELERATED SURFACES
C. L. Gardner Jul. 1985 27 p refs
(Contract DE-AC02-76ER-03077)

(DE85-016185; DOE/ER-03077/264) Avail: NTIS HC A03/MF A01

The compressible Rayleigh-Taylor instability of a supersonic accelerated contact discontinuity between two gases is studied by numerically solving the two-dimensional Euler equations. The computed solutions exhibit a complicated set of nonlinear waves comprised of spike and bubble bow shocks, terminal shocks within the spike and bubble, Kelvin-Helmholtz rollup of the spike tip, and contact surface waves. The spike appears to attain a finite growth of aspect ratio approximately equal to 2. The propagation of a supersonic slab jet is also studied numerically, in order to compare and contrast the jet wave structure with that of the supersonic accelerated surface. DOE

N86-16527# Argonne National Lab., Ill.
FLOW INDUCED VIBRATION OF TWO CIRCULAR CYLINDERS IN CROSSFLOW
S. S. Chen 1985 46 p Presented at ASME vibration and Sound Conference, Cincinnati, Ohio, 10 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-006133; CONF-850926-1) Avail: NTIS HC A03/MF A01

The flow field around a pair of rigid circular cylinders is very complex and has been studied extensively. When either one or both cylinders vibrate, the flow field becomes significantly more complicated because of the interaction of ther fluid flow and the cylinder motion. An overview of the problem is presented, including different flow regimes, vortex-excited vibration, fluid elastic instability for two cyclinders in tandem, two cylinders side by side and two cylinders in staggered arrangement. A general formulation to study dynamic response under different conditions is outlined and future research needs are discussed. DOE

N86-16528# Utah Univ., Salt Lake City.
LABORATORY MEASUREMENTS OF A DIRECT-CONTACT HEAT EXCHANGER Final Subcontract Report
R. F. Boehn Jun. 1985 46 p
(Contract DE-AC02-83CH-10093)
(DE85-012146; SERI/STR-252-2678) Avail: NTIS HC A03/MF A01

Evaluations of a 0.62 m (24 in.) diameter direct contact tower heat exchanger have been made. The tower is a test bed designed to evaluate direct contact processes that might be used in a salt stratified solar pond power plant. In the present application, commercial grade normal pentane is boiled while in direct contact with hot water, with the water flowing downward and the pentane flowing upward. Of particular interest was the determination of the flooding limit in the tower. In all cases, a water inlet temperature of 85 C (185 F) was used. The pentane inlet temperature was approximately 30 C (86 F) and it varied somewhat with ambient temperature. Several values of tower operating pressure in the range of 1.2 atm to 3.2 atm were evaluated. Water and pentane flow rates were also varied to find their affect on flooding. In all cases the operating level of the tower was maintained at approximately 3.1 m (10 ft). An initial set of evaluations were made with a sparse egg-crate packing where the flow channels were aligned with the length of the column. Comparisons were then made with a simple spray tower configuration. Correlations of the flooding limits are given. The spray tower configuration showed higher performance before flooding. DOE

N86-16529# Sandia National Labs., Albuquerque, N. Mex.
DERIVATION OF FINITE ELEMENT CONDUCTIVITY AND CAPACITANCE MATRICES FOR 2- AND 3-DIMENSIONAL CONDUCTION HEAT TRANSFER
J. M. Nelsen Jun. 1985 43 p refs
(Contract DE-AC04-76DP-00789)
(DE85-014344; SAND-85-0479; TTC-0545) Avail: NTIS HC A03/MF A01

Current techniques commonly utilized in numerical heat transfer analysis carry imposed capability limitations. For example, finite difference formulated heat transfer analysis generally suffers from geometry restrictions. Similarly, finite element formulated heat transfer analyses typically linearize nonlinear transport mechanisms such as convection and radiation. This report considers the concept of beneficially linking the two methods, with the initial phase of such a hybridization derived in detail. DOE

N86-16530# California Univ., Berkeley. Lawrence Berkeley Lab.
RADIATIVE HEAT PUMPS USING NARROW-BANDGAP SEMICONDUCTORS
P. Berdahl Aug. 1985 12 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE85-017654; LBL-19174; CONF-850887-34) Avail: NTIS HC A02/MF A01

The Solid State Radiative Heat Pump (SSRHP) concept is introduced. It offers the potential to pump infrared radiation - for heating and cooling - with high second law efficiency. In particular, some of the limitations of Peltier-effect heat pumps can be circumvented. Two approaches for constructing SSRHP devices will be described. In one approach the device is a large-area p-n junction, similar to an ir (light) emitting diode. In the second approach one uses orthogonal electric and magnetic fields to alter equilibrium carrier concentrations of electrons and holes near the crystal surface, altering the ir emission due to electron-hole recombination radiation. This phenomenon is usually termed galvanomagnetic luminescence (GML). Either approach can be used to make radiative heat pumps. Materials suitable for SSRHP devices are narrow-bandgap semiconductors with direct bandgaps in the range of 0.03 to 0.3 eV for room temperature operation. Obvious candidates are InSb, Hg sub (1-x) Cd sub x/Te, and Pb/sub (1-x) Sn/sub x/Te. As a first step in the evaluation of InSb, our laboratory has made absolute spectral measurements of its galvanomagnetic luminescence. These and related measurements in Russia and Japan are discussed. DOE

N86-16531# Sandia National Labs., Albuquerque, N. Mex.
NORIA - A FINITE ELEMENT COMPUTER PROGRAM FOR ANALYZING WATER, VAPOR, AIR, AND ENERGY TRANSPORT IN POROUS MEDIA
N. E. Bixler Aug. 1985 125 p refs
(Contract DE-AC04-76DP-00789)
(DE86-000043; SAND-84-2057) Avail: NTIS HC A06/MF A01

NORIA is a finite element computer program that solves four nonlinear, parabolic, partial differential equations simultaneously. The four equations describe the transport of water, water vapor, air, and energy through partially saturated porous media. The numerical procedure uses the standard Galerkin finite element method to handle spatial discretization of two-dimensional domains with either planar symmetry or axisymmetry. Time integration is performed by a third-order predictor-corrector scheme that uses error estimates to automatically adjust time-step size so as to maintain uniform local time truncation error throughout the calculation. Thus, the user is not required to select time-step size except at the first time step. Nearly all material properties, such as permeability, can either be set to constant values or can be defined as functions of the dependent and independent variables by user-supplied subroutines. The gas phase is taken to be ideal. This report is intended primarily as a user's manual but also includes discussions of the theory of two-phase transport in porous media and the numerical procedure used in NORIA. DOE

N86-16532# Sandia National Labs., Albuquerque, N. Mex.
FINITE ELEMENT ANALYSIS OF AXISYMMETRIC OSCILLATIONS OF SESSILE LIQUID DROPS
N. E. Bixler and R. E. Benner 1985 13 p refs Presented at the 4th International Conference on Numerical Methods in Laminar and Turbulent Flow, Swansea, Engl., 8 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-010089; SAND-84-2184C; CONF-850745-10) Avail: NTIS HC A02/MF A01

Inviscid oscillations of sessile liquid drops are simulated by the Galerkin finite element method in conjunction with the time integrator proposed by Gresho, et al. Simulations are of drops in spherical containers which are subjected to imposed oscillations

of specified frequency and amplitude. Five equations govern drop response: (1) Laplace's equation for velocity potential within the drop; (2) a kinematic condition at the free surface; (3) a Bernoulli equation augmented to include gravity and capillary pressure at the free surface; (4) a kinematic condition at the solid surface; and (5) either a condition for fixed contact line or fixed contact angle. Each of these equations is modified to account for an accelerating frame of reference which moves the container. Normalized drop volume, contact angle, and gravitational Bond number are dimensionless parameters which control drop response to an imposed oscillation. Given a set of fluid properties, such as those for mercury, gravitational Bond number is uniquely defined by the container radius. Resonant frequencies and mode interaction are detected by Fourier analysis of a transient signal, such as free surface position at the pole of a spherical coordinate system. Results, especially resonant frequencies, are found to depend strongly on contact line condition. Calculation of resonant frequencies by eigenanalysis with Stewart's method is also discussed.
DOE

N86-16533# Argonne National Lab., Ill.
COMPARISON OF HEAT TRANSFER IN SOLAR COLLECTORS WITH HEAT PIPE VERSUS FLOW THROUGH ABSORBERS
J. R. Hull 1985 33 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-012121; CONF-851125-2) Avail: NTIS HC A03/MF A01

Analysis of heat transfer in solar collectors with heat pipe absorbers is compared to that for collectors with flow through absorbers. Both pumped and thermosiphon systems that produce hot water or other heated fluids are discussed. In these applications the heat pipe absorber suffers a heat transfer penalty compared with the flow through absorber, but in many cases the penalty can be minimized by proper design at the heat pipe condenser and system manifold. When the solar collector is used to drive an absorption chiller, the heat pipe absorber has better heat transfer characteristics than the flow through absorber.
DOE

N86-16534# Oak Ridge National Lab., Tenn.
DESIGN OF AN ADVANCED ABSORPTION HEAT PUMP FOR MINIMUM PAYBACK PERIOD
M. R. Patterson and H. Perez-Blanco 1985 29 p refs Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE85-013993; CONF-851125-7) Avail: NTIS HC A03/MF A01

Absorption heat pumps of the type analyzed here provide process heat from waste heat. A simulation model with optimization capability is now operational for an advanced sodium hydroxide-water absorption heat pump with a regenerative loop. In this type of heat pump, increasing the area of the heat exchangers increases the dollar value of the process heat output, but it also increases the capital cost. The designer is then faced with the decision of how to allocate the heat exchanger area among the several heat pump components for optimal economic benefits. The optimization feature of the program allows the user to minimize the payback period for recovery of the capital investment in the heat pump. The computer program employs proprietary software for the optimization. The program is relatively short, about 400 lines of FORTRAN, and can readily be used with different optimization subroutines if desired. Results from the model indicate that the payback period is short, about 1 to 2 years for the standard case. These predictions make this regenerative-loop heat pump an attractive cycle for further investigation.
DOE

N86-16535# Babcock and Wilcox Co., Lynchburg, Va.
THERMAL AND FLUID DESIGN OF A CERAMIC BAYONET TUBE HEAT EXCHANGER FOR HIGH-TEMPERATURE WASTE HEAT RECOVERY
M. Luu and K. W. Grant 1985 41 p refs Presented at the Industrial Heat Exchanger Technology Symposium, Pittsburgh, Pa., 6 Nov. 1985
(Contract DE-FC07-81ID-12296)
(DE85-017033; CONF-851106-1) Avail: NTIS HC A03/MF A01

A new ceramic recuperator has been developed to recover waste heat from high-temperature flue gas up to 2250F. The recuperator is comprised of a number of ceramic bayonet elements which are assemblies of two concentric tubes. The recuperator is a cross counterflow heat exchanger with both the inlet and the outlet plenums located at one end of the elements. As a result, the freely expanding elements greatly simplify the structure of the heat exchanger and eliminate thermal stress and stress related corrosion problems. Moreover, the relatively wide spacing between the elements would make them less likely plugged up by dirty flue gas. Thermal and fluid design of the recuperator requires an unconventional approach. The design of the recuperator and its major components is outlined here. Results from a prototype test indicated that the recuperator would function as predicted. The ceramic recuperator can effectively recover waste heat from high temperature flue gas.
DOE

N86-16536# Argonne National Lab., Ill.
TWO-PHASE GAS BUBBLE-LIQUID BOUNDARY LAYER FLOW ALONG VERTICAL AND INCLINED SURFACES
F. B. Cheung and M. Epstein 1985 8 p Presented at the 3rd International Meeting on Reactor Thermal Hydraulics, Newport, R.I., 15 Oct. 1985 Prepared in cooperation with Pennsylvania State Univ., University Park and Fauske and Associates, Inc., Burr Ridge, Ill.
(Contract W-31-109-eng-38)
(DE85-018462; CONF-851007-11) Avail: NTIS HC A02/MF A01

The behavior of a two-phase gas bubble-liquid boundary layer along vertical and inclined porous surfaces with uniform gas injection is investigated experimentally and analytically. Using argon gas and water as the working fluids, a photographical study of the two-phase boundary layer flow has been performed for various angles of inclination ranging from 45 deg to 135 deg and gas injection rates ranging from 0.01 to 0.1 m/s. An integral method has been employed to solve the system of equations governing the two-phase motion. The effects of the gas injection rate and the angle of inclination on the growth of the boundary layer have been determined. The predicted boundary layer thickness is found to be in good agreement with the experimental results. The calculated axial liquid velocity and the void fraction in the two-phase region are also presented along with the observed flow behavior.
DOE

N86-16537# Centre Technique des Industries Mecaniques, Senlis (France).
PARAMETRIC STUDY OF HOLES FOR ENERGY DISSIPATION IN NOZZLE DISCHARGE Final Report [ETUDE PARAMETRIQUE DES DETENDEURS A TROUS]
(CETIM-101-830) Avail: NTIS HC A03/MF A01

The optimization of a patent to determine the minimum secondary subsonic flow necessary to stabilize the main nozzle supersonic flow and to diminish the mixing zone is explored. The problem is of interest to the manufacturers of large turbines. The device is described. The flow is analyzed, concluding that it is possible to quantify the minimum subsonic flow to be injected to avoid violent shock in supersonic discharge. The results agree with experiment.
Author (ESA)

N86-16538# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
DRAG REDUCTION THROUGH BOUNDARY LAYER CONTROL: A REPORT ON EUROMECH 181
A. Bertelrud, G. Drougge, and M. T. Landahl 29 May 1985 22 p refs Colloquium held in Saltsjoebaden, Sweden, 29-31 Aug. 1984
(Contract STU-84-4563)
(FFA-TN-1984-60) Avail: NTIS HC A02/MF A01

Skin friction reduction by boundary layer control was discussed. Delay of transition; turbulent drag reduction; and modification of shock wave/boundary layer interaction are considered.
Author (ESA)

N86-16539# Rolls-Royce Ltd., Derby (England). Theoretical Science Group.
PREDICTION OF FLOW IN A ROTATING CAVITY WITH RADIAL OUTFLOW USING A MIXING LENGTH TURBULENCE MODEL
John W. Chew 23 Jul. 1985 13 p refs
(PNR-90290) Avail: NTIS HC A02/MF A01

Numerical solutions of the elliptic equations for turbulent flow in the cavity formed between two rotating disks with a radial outflow of coolant are presented. The results are compared with experimental data, predictions from the K-e model, and an integral solution. It is concluded that the mixing length model can be used for engineering design calculations. The applications are limited by slow convergence of the iterative solution method at high rotational speeds. Author (ESA)

N86-16540# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
SUBCHANNEL ANALYSIS WITH FLOW BLOCKAGES
L. Sabotinov May 1985 28 p refs
(PDR/CFDU/IC/22) Avail: NTIS HC A03/MF A01

The steady state single-phase three-dimensional flow in the rod bundle geometry of a nuclear pressurized water reactor was calculated with the PHOENICS 84 program. Flow blockages, which may occur under accident conditions, are simulated. Results show that PHOENICS-84 can be applied to calculation of the three-dimensional fields of velocities in fuel rod bundles containing complete flow blockages in cells. The code can treat recirculation zones. Author (ESA)

N86-16541# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
ON TWO-DIMENSIONAL SLOW VISCOUS FLOWS PAST OBSTACLES IN A HALF-PLANE
T. M. Fischer, G. C. Hsiao (Delaware Univ.), and W. L. Wendland (DFVLR, Goettingen, West Germany) Mar. 1985 15 p refs Submitted for publication
(Preprint-883) Avail: NTIS HC A02/MF A01

It is shown that, for a given cylinder with arbitrary cross section moving in the viscous, incompressible fluid parallel to a plane wall, the stationary linear hydrodynamic equations have a unique solution. The nonlinearity of the full Navier-Stokes problem is approximated by two terms in the asymptotic expansion for the solution of this problem with respect to small Reynolds numbers. The results extend those obtained for the three-dimensional case. Author (ESA)

N86-16542# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
THE EVOLUTION OF SIMPLE VORTEX SYSTEMS IN LIQUID HELIUM 2
W. Fiszdon (Polish Academy of Sciences, Warsaw), W. Poppe, and D. W. Schmidt Jan. 1985 62 p refs
(MPIS-1/1985; ISSN-0436-1199) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The evolution of the superfluid and normal vorticity distribution in liquid helium 2 in the axisymmetric case and nonaxisymmetric configurations was analyzed. Analytical calculations for the axisymmetric case and numerical analysis show the existence of at least two characteristic times, one for the growth or decay of the extrema of the distributions, the other corresponding to the spreading and/or the displacements of the extrema or centers of gravity of the vorticity distributions. This leads to different vorticity distribution topographies depending on their initial configurations. Author (ESA)

N86-16543# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.
INITIAL FLOW DEVELOPMENT DUE TO MARANGONI CONVECTION IN A MASS TRANSFER SYSTEM
H. A. Dijkstra and A. I. vandeVooren Sep. 1984 29 p refs
(TW-265) Avail: NTIS HC A03/MF A01

A linear stability analysis is used to investigate the onset of convection in a mass transfer system due to surface tension differences. Instead of a steady linear concentration distribution as basic state, a detailed analysis of the mass transfer due to diffusion in the initially motionless flow is performed. A time dependent basic concentration distribution is obtained. The critical wave number, at neutral stability, and the preferred wave number, with largest growth factor, are time dependent and decrease in time. Author (ESA)

N86-16544# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
PERFORMANCE EVALUATION OF EXPLICIT SHALLOW-WATER EQUATIONS SOLVER ON THE CYBER 205
F. W. Wubs Jun. 1985 15 p refs Submitted for publication Sponsored by Netherlands Foundation for Technical Research and Netherlands Organization for the Advancement of Pure Research
(CWI-NM-R8511; B8569858) Avail: NTIS HC A02/MF A01

The performance of an explicit method and an ADI method for the shallow-water equations is compared on a Cyber 205. A technique which stabilizes the explicit method in such a way that any desired time step is possible without the development of instabilities is discussed. Comparing the codes for two test models, the explicit methods are attractive on the Cyber 205. Proposals for the handling of irregular geometries are made. Author (ESA)

N86-16545# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
GENERALIZED APPROXIMATION METHODS FOR THE CALCULATION OF INCOMPRESSIBLE LAMINAR BOUNDARY LAYERS, PART 1 [GEGENERALISEERDE BENADERINGSMETHODEN VOOR DE BEREKENING VAN INCOMPRESSIBLE LAMINAIRE GRENSLAGEN, DEEL 1]
J. A. Zaat 1983 60 p refs In DUTCH 2 Vol.
(Rept-83-14-Pt-1) Avail: NTIS HC A04/MF A01

Two-dimensional incompressible laminar boundary layer flows are calculated using generalized approximation methods. The methods calculate the variable velocity profile coefficients of laminar incompressible boundary layers using a system of differential equations, the von Karman momentum equation, and/or the Wieghardt energy equation, together with boundary conditions at the wall. The generalized methods remove the discontinuity in the profile coefficients and substantially improve the boundary layer calculations. The methods are applied to obtain similarity solutions of two-dimensional boundary layer flows; they do not seem to be applicable in the transition domain between accelerated and decelerated flow. The computer program which calculates the similarity boundary layer profiles is given. Author (ESA)

N86-16546# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
GENERALIZED APPROXIMATION METHODS FOR THE CALCULATION OF INCOMPRESSIBLE LAMINAR BOUNDARY LAYERS, PART 2 [GEGENERALISEERDE BENADERINGSMETHODEN VOOR DE BEREKENING VAN INCOMPRESSIBELE LAMINAIRE GRENSLAGEN, DEEL 2]
J. A. Zaat 1983 60 p In DUTCH 2 Vol.
(Rept-83-15-Pt-2) Avail: NTIS HC A04/MF A01

Laminar boundary layer calculations are performed using the von Karman momentum equation and the Wieghardt energy equation and the first five, then the first seven boundary conditions at the wall. The theory of this calculations is explained. The calculation of the stretch factor, shear stress, and physical quantities are presented. The use of a step in the calculation procedure is described. The results show very good agreement with exactly calculated values in the domain of the accelerated as well as the decelerated flow. The ALGOL calculation programs are given. Author (ESA)

N86-16547# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A COMPARISON OF SEVERAL FINITE ELEMENT METHODS TO SOLVE STATIONARY NAVIER-STOKES EQUATIONS
A. Segal 1983 19 p refs
(Rept-83-19) Avail: NTIS HC A02/MF A01

The integrated solution approach, the penalty function approach, and the solenoidal approach for the finite element solution of the stationary Navier Stokes are compared. It is shown that the penalty function approach and the solenoidal approach compare favorably to the integrated solution method. For fine meshes the solenoidal approach appears to be the cheapest method. Author (ESA)

N86-16548# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
TRANSVERSE DISPERSION FROM AN ORIGINALLY SHARP FRESH-SALT INTERFACE CAUSED BY SHEAR FLOW
G. deJosselindeJong and C. J. vanDuyn 1984 50 p refs
(Rept-84-44) Avail: NTIS HC A03/MF A01

Motions of fluids of different densities in an aquifer were modeled. An exact solution for the development of the brackish region from an inclined, initially sharp interface between fresh and salt water was derived. Dispersion is described by reducing the coupled system consisting of equations describing the specific discharge rotations (which produce shear flow) due to the gradual density variations, and the dispersion, caused by the specific discharge distribution, to a system of ordinary differential equations of diffusion type. Author (ESA)

N86-16430# Joint Publications Research Service, Arlington, Va.
AUTOMATIC GATHERING, PROCESSING OF MULTIPOINT PRESSURE DATA ANALYZED
Zhou Xinghua *In its* China Report: Science and Technology (JPRS-CST-85-039) 13 Nov. 1985 p 35-43 refs Transl. into ENGLISH from Tianjin Daxue Xuebao (Tianjin, China), no. 2, Dec. 1984 p 115-120 (For primary document see N86-16429 07-31) Avail: NTIS HC A07/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-16549 Idaho Univ., Moscow.
SYSTEM THEORETIC MODELING OF HIGH-DENSITY DIGITAL MAGNETIC RECORDING Ph.D. Thesis
Richard Boyd Wells 1985 232 p
Avail: Univ. Microfilms Order No. DA8518199

This work is a system theoretic approach to modeling the recording process in high-density, digital, longitudinal magnetic recording systems. Observable properties of the system are discussed. The practice of inferential measurement of track average magnetization using phenomenological forms is discussed. It is shown that unless the total effective separation distance between head and medium is known, there will always exist an uncertainty in the length of the magnetic transition when inferential determinations of it are made. By using direct observations of the magnetic transition and a new measurement technique involving blind deconvolution it is possible to determine the depth of the dead layer in ferrite heads. The measurement of efficiency in ferrite heads is also discussed. It is shown that head efficiency may be determined from vector impedance measurements of the head if the permeability vs. frequency characteristics of the head material are known. Head efficiency measurements prove that head efficiency is relatively insensitive to frequency out to at least 10 MHz using commercial Mn-Zn ferrites. Dissert. Abstr.

N86-16550*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
ADVANCED MOISTURE AND TEMPERATURE SOUNDER (AMTS) STUDY Final Report
L. D. Kaplan, R. G. Isaacs, R. D. Worsham, and G. DeBlonde Jun. 1985 80 p refs
(Contract NAS5-27629)
(NASA-CR-177833; NAS 1.26:177833) Avail: NTIS HC A05/MF A01 CSCL 14B

Retrieval of tropospheric humidity profiles from satellite-based upwelling radiances are shown to be improved by using physical methods for obtaining first-guess profiles as well as for inverting the radiative transfer equation by relaxation. The first guess is based on an empirically verified hypothesis, from theoretical considerations, that the brightness temperature corresponding to the radiance should be approximately equal to the actual temperatue at a channel-invariant optical depth provided that the surface and stratospheric contributions to the radiance are small. Even greater improvement of retrieved humidity profiles can be accomplished by increasing the number of channels used and by selecting their spectral location and bandpass to obtain sharper independent weighting functions. For example, the AMTS system, with high resolution water channels at 1650, 1700, 1839, 1850 and 1930 cm, is shown to be capable of reducing the retrieved water vapor errors in 200 mb thick layers by a factor of two or three relative to the HIRS-2 system errors. Expected AMTS errors in tropical layer water content are particularly low, less than 20% at all levels, and of the order of 10% or less in the middle troposphere. B.W.

N86-16551*# Baylor Coll. of Medicine, Houston, Tex. Dept. of Medicine.
DEVELOPMENT OF TUNGSTEN-TANTALUM GENERATOR Final Report
Adrian LeBlanc, John Babich, and Satish G. Jhingran 1985 120 p refs
(Contract NAS9-16818)
(NASA-CR-171905; NAS 1.26:171905) Avail: NTIS HC A06/MF A01 CSCL 14E

The purpose of this project was to develop a useable tungsten (W)/tantalum (Ta) generator. Ta-178 is formed following the decay of its parent, W-178 (half-life: 21.7d) and has a half life of 9.3 minutes in turn yielding stable Hf-178. The decay of the parent isotope (W-178) occurs entirely by electron capture to the 9.3 minute Ta-178 state, without feeding the high spin Ta-178 isomer (half life 2.2 hours). In Ta-178 decay, 99.2% of the disintegrations proceed by electron capture and 0.18% by positron emission. Electron capture results in a 61.2% branch to the ground state of Hf-178 and 33.7% to the first excited state at 93 1KeV. The most prominent features of the radionuclide's energy spectrum are the hafnium characteristic radiation peaks with energies between 54.6 and 65.0 KeV. The radiation exposure dose of Ta-118 was calculated to be approximately one-twentieth that of Tc-99m on a per millicurie basis. A twenty-fold reduction in radiation exposure from Ta-178 compared with Tc-99m means that the usual administered dose can be increased three or four times, greatly increasing statistical accuracy while reducing radiation exposure by a factor of five. R.J.F.

N86-16552*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EARTH RADIATION BUDGET EXPERIMENT (ERBE) SCANNER INSTRUMENT ANOMALY INVESTIGATION
N. D. Watson, J. B. Miller, L. V. Taylor, J. B. Lovell, J. W. Cox, J. C. Fedors, L. P. Kopia, R. M. Holloway, and O. H. Bradley Oct. 1985 87 p
(NASA-TM-87636; NAS 1.15:87636) Avail: NTIS HC A05/MF A01 CSCL 13I

The results of an ad-hoc committee investigation of in-Earth orbit operational anomalies noted on two identical Earth Radiation Budget Experiment (ERBE) Scanner instruments on two different spacecraft busses is presented. The anomalies are attributed to the bearings and the lubrication scheme for the bearings. A detailed discussion of the pertinent instrument operations, the approach of the investigation team and the current status of the instruments now in Earth orbit is included. The team considered operational changes for these instruments, rework possibilities for the one

instrument which is waiting to be launched, and preferable lubrication considerations for specific space operational requirements similar to those for the ERBE scanner bearings. Author

N86-16553*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMAGE PROCESSING OF AERODYNAMIC DATA
Nettie D. Faulcon Dec. 1985 15 p refs
(NASA-TM-87629; NAS 1.15:87629) Avail: NTIS
HC A02/MF A01 CSCL 14B

The use of digital image processing techniques in analyzing and evaluating aerodynamic data is discussed. An image processing system that converts images derived from digital data or from transparent film into black and white, full color, or false color pictures is described. Applications to black and white images of a model wing with a NACA 64-210 section in simulated rain and to computed low properties for transonic flow past a NACA 0012 airfoil are presented. Image processing techniques are used to visualize the variations of water film thicknesses on the wing model and to illustrate the contours of computed Mach numbers for the flow past the NACA 0012 airfoil. Since the computed data for the NACA 0012 airfoil are available only at discrete spatial locations, an interpolation method is used to provide values of the Mach number over the entire field. Author

N86-16554# California Univ., Berkeley. Lawrence Berkeley Lab.
AFTERPULSE TIME SPECTRA OF HIGH-SPEED PHOTON DETECTORS
B. Leskovar 10 Jan. 1985 13 p refs Presented at the 7th International Congress and Exhibition on Laser Opto-Electronics, Munich, South Germany, 1 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE85-016631; LBL-18909; CONF-850715-1) Avail: NTIS
HC A02/MF A01

Recent progress of understanding of the afterpulse time spectra of high-speed photon detectors using photoemission and secondary emission processes is reviewed and summarized. Furthermore, the afterpulse time spectra of high-gain conventionally designed and microchannel plate photon detectors was investigated. Specifically, the devices studied included RCA 8850, RCA 8854 and ITT F 4129g photomultipliers. Descriptions are given of the measuring techniques. DOE

N86-16555# Los Alamos National Lab., N. Mex.
FAST FRAMING CAMERA WITH INDEPENDENT FRAME ADJUSTMENTS
G. A. Kyrala, J. S. McGurn, J. Calligan, and J. Pallone 1985 6 p Presented at the High Speed Photography, Videography, Photonics 3, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Los Alamos, N. Mex.
(Contract W-7405-eng-36)
(DE85-015751; LA-UR-85-2570; CONF-850899-1) Avail: NTIS
HC A02/MF A01

Researchers designed, built and tested a fast framing camera that works in the visible and short infrared region of the spectrum, from 300 nm to 850 nm. The camera has four separate channels. Each framing channel has its own individual trigger input and individually adjustable framing gate width. Each channel is spatially separate from the other channels as well, thus allowing for complete independence among the four channels. The output from the four channels in the camera is recorded on one piece of 4 in. by 5 in. sheet of film. Each channel has a circular recording format with a useful diameter of 18 mm. The channels are positioned on the corners of a square with a center to center spacing of 4.45 cm (1.75 in.). The camera utilizes commercially available gated intensified microchannel-plate tubes. The camera contains its own power supply and gating circuits. It required four gating inputs (12 volts). The electronics occupy a volume of 27 cm x 33 cm x 14 cm. The framing part occupies a volume of 21 cm x 25 cm x 5 cm. Characteristics of the camera, such as framing times, spatial modulation transfer functions, gate delay, and uniformity were studied utilizing a 35 picosecond long blue light pulse generated by a nitrogen-pumped dye-laser system. A pulsed semiconductor laser at 820 nm was used as well as for the setup. DOE

N86-16556# Sandia Labs., Albuquerque, N. Mex.
HIGH SPEED MULTI-CHANNEL DATA RECORDER TO REPLACE OSCILLOSCOPE DATA ACQUISITION SYSTEMS
G. J. Lockwood, J. Chang, W. F. Filter, C. O. Landron, D. J. Muron, B. T. Neyer, and L. E. Ruggles 1985 21 p Presented at SPIC International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-015158; SAND-85-0362C; CONF-850887-6) Avail: NTIS
HC A02/MF A01

We have developed and tested a photonic high speed analog data recording system that, when compared with conventional oscilloscope-based systems, offers greater economy, higher bandwidth, electrical isolation, and compactness. The basis of this approach is to record analog photonic signals rather than analog electrical signals. A key component is a prototype high speed multichannel data recorder (HSMCDR). It uses a picosecond streak camera with a digital readout to record multiple fiber-optic data channels, and a dedicated microcomputer to reduce and process that data. To record signals from analog electrical sensors, laser diode transmitters provide an interface to the HSMCDR. Interactive software written for the HSMCDR separates, calibrates, and plots up to 20 waveforms in the customary amplitude versus time format. The HSMCDR, its performance, applications in pulsed power experiments, and its impact in diagnostic technology is described. DOE

N86-16557# Los Alamos National Lab., N. Mex.
STATUS OF THE LOS ALAMOS ANGER CAMERA
P. A. Seeger and M. J. Nutter 1985 8 p refs Presented at the 8th Meeting of International Collaboration on Advanced Neutron Sources, Oxford, England, 7 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015666; LA-UR-85-2402; CONF-850762-2) Avail: NTIS
HC A02/MF A01

Results of preliminary tests of the neutron Anger camera being developed at Los Alamos are presented. This detector uses a unique encoding scheme involving parallel processing of multiple receptive fields. Design goals have not yet been met, but the results are very encouraging and improvements in the test procedures are expected to show that the detector will be ready for use on a small-angle scattering instrument next year. DOE

N86-16558# Los Alamos National Lab., N. Mex.
VISAR: INTERFEROMETER QUADRATURE SIGNAL RECORDING BY ELECTRONIC STREAK CAMERA
W. F. Hemsing 1985 8 p refs Presented at the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015701; LA-UR-85-2510; CONF-850706-30) Avail: NTIS
HC A02/MF A01

This short paper describes a demonstration to record the four quadrature signals from a push-pull VISAR velocity interferometer using an electronic streak camera. Optical fibers were used to transmit the interferometer outputs to the camera photocathode. Brightness variations of these signals were recorded on film during the experiment. Velocity information was later recovered from this record to give a continuous velocity history. Anticipated advantages over previous methods are increased time resolution, the ability to record multiple velocities simultaneously and greater dynamic range. DOE

N86-16559# Department of Energy, Washington, D. C.
MULTIPLE CHANNEL OPTICAL DATA ACQUISITION SYSTEM Patent Application
G. E. Fasching (DOE, Morgantown, W. Va.) and D. R. Goff, inventors (to DOE) (DOE, Morgantown, W. Va.) Filed 22 Feb. 1985 26 p
(DE85-017761; US-Patent-Appl-SN-704115) Avail: NTIS
HC A03/MF A01

A multiple channel optical data acquisition system is provided in which a plurality of remote sensors monitoring specific process variable are interrogated by means of a single optical fiber connecting the remote station/sensors to a base station. The remote station/sensors derive all power from light transmitted through the fiber from the base station. Each station/sensor is individually accessed by means of a light modulated address code sent over the fiber. The remote station/sensors use a single light emitting diode to both send and receive light signals to communicate with the base station and provide power for the remote station. The system described can power at least 100 remote station/sensors over an optical fiber one mile in length. DOE

N86-16560# Department of Energy, Washington, D. C.
ORGANIC METAL NEUTRON DETECTOR Patent Application
M. A. Butler (Sandia National Labs., Albuquerque, N. Mex.) and D. S. Ginley, inventors (to DOE) (Sandia National Labs., Albuquerque, N. Mex.) Filed 21 Nov. 1984 18 p
(Contract DE-AC04-76DP-00789)
(DE85-017773; US-Patent-Appl-SN-673969) Avail: NTIS HC A02/MF A01

A device is described for detection of neutrons. It comprises as active neutron sensing element, a conductive organic polymer having an electrical conductivity and a cross-section for said neutrons whereby a detectable change in conductivity is caused by impingement of said neutrons on the conductive organic polymer. It is responsive to a property of said polymer which is altered by impingement of said neutrons on the polymer; and means for associating a change in said alterable property with the presence of neutrons at the location of said device. DOE

N86-16561# Department of Energy, Washington, D. C.
IN-LINE BEAM CURRENT MONITOR Patent Application
C. A. Ekdahl, Jr. and C. A. Frost, inventors (to DOE) Filed 13 Nov. 1984 15 p
(Contract DE-AC04-76DP-00789)
(DE85-017767; US-Patent-Appl-SN-670777) Avail: NTIS HC A02/MF A01

An intense relativistic electron beam current monitor for a gas neutralized beam transport line includes a first foil for conducting plasma current to the wall where it is measured as it traverses an inductive loop formed by a cavity in the wall. An insulator foil separates the first foil from a second conducting foil which returns the current to the plasma environment. DOE

N86-16562# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
MODELS OF SIMPLE ULTRASONIC TRANSDUCERS [ENKELE MODELLEN VAN EENVOUDIGE ULTRASOON TRANSDUCENTEN]
H. F. M. Corstens 1984 42 p refs In DUTCH
(Rept-84-47) Avail: NTIS HC A03/MF A01

A mathematical description of the piezoelectric layer in a transducer was deduced, using the classical method of Mason. The mathematical Mason model is explained, and the resulting equivalent electrical circuits (lumped networks) of Mason for the transducer acting as emitter and as receiver are constructed. It is shown that a Krimboltz-Leedom-Matthaei scheme and a Mason scheme of a piezoelectric layer are mathematically equivalent in the case of even excitation. The transfer functions of the transducer, without adapting layers, are separately determined: as emitter and as receiver of an acoustic signal. The frequency response is numerically calculated for the combination of emitter and receiver, neglecting the damping of the acoustic signal in the transmission medium. Author (ESA)

N86-16658# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
DESIGN AND FIELD EXPERIENCE WITH THE WES 10 PERCENT BAR AIRBLAST AND SOIL STRESS GAGE
Charles E. Joachim and Charles R. Welch *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 135-147 (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/2

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-16563*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PERFORMANCE TEST OF LASER VELOCIMETER SYSTEM FOR THE LANGLEY 16-FOOT TRANSONIC TUNNEL
James F. Meyers, William W. Hunter, Jr., David E. Reubush, Cecil E. Nichols, Jr., Timothy E. Hepner (Army Aviation Systems Command, Hampton, Va.), and Joseph W. Lee Dec. 1985 38 p refs
(DA Proj. 1L1-61102-AH-45)
(NASA-TP-2502; L-15940; NAS 1.60:2502; AVSCOM-TR-85-B-4)
Avail: NTIS HC A03/MF A01 CSCL 20E

An investigation in the Langley 16-Foot Transonic Tunnel has been conducted in which a laser velocimeter was used to measure free-stream velocities from Mach 0.1 to 1.0 and the flow velocities along the stagnating streamline of a hemisphere-cylinder model at Mach 0.8 and 1.0. The flow velocity was also measured at Mach 1.0 along the line 0.533 model diameters below the model. These tests determined the performance characteristics of the dedicated two-component laser velocimeter at flow velocities up to Mach 1.0 and the effects of the wind tunnel environment on the particle-generating system and on the resulting size of the generated particles. To determine these characteristics, the measured particle velocities along the stagnating streamline at the two Mach numbers were compared with the theoretically predicted gas and particle velocities calculated using a transonic potential flow method. Through this comparison the mean detectable particle size (2.1 micron) along with the standard deviation of the detectable particles (0.76 micron) was determined; thus the performance characteristics of the laser velocimeter were established. Author

N86-16564# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif. Centrifuge Div.
APPLICATIONS OF PULSED-LASER TECHNIQUES AND THERMOGRAPHIC PHOSPHORS TO DYNAMIC THERMOMETRY OF ROTATING SURFACES
M. R. Cates, S. W. Allison, B. R. Marshall, L. A. Franks, T. J. Davies, M. A. Nelson, and B. W. Noel (Los Alamos National Lab., N. Mex.) Mar. 1985 21 p
(Contract DE-AC05-840R-21400)
(DE85-000403; E/TS-11-504) Avail: NTIS HC A02/MF A01

Stimulating fluorescence by synchronous application of pulsed ultraviolet laser light is used to measure surface temperatures of rotating objects. The temperature dependence of the lifetime of selected emission lines from a phosphor bonded to the surface provides temperature resolution in the room temperature range of about 0.3 deg C. The experimental technique includes fiber optics transfer of stimulating and signal light, timing circuitry, photomultiplier electronics, and waveform processing. DOE

N86-16565# Department of Energy, Washington, D. C.
PREDICTING THRESHOLD AND LOCATION OF LASER DAMAGE ON OPTICAL SURFACES Patent Application
W. Siekhaus, inventor (to DOE) (Lawrence Livermore National Lab., Calif.) Filed 4 Feb. 1985 28 p
(Contract W-7405-eng-48)
(DE85-017793; US-Patent-Appl-SN-697828) Avail: NTIS HC A03/MF A01

An apparatus is disclosed which is useful in the prediction of the damage threshold of various optical devices, the location of weak spots on such devices and the location, identification, and elimination of optical surface impurities. The apparatus comprises a focused and pulsed laser, a photo electric detector/imaging

means, and a timer. The weak spots emit photoelectrons when subjected to laser intensities that are less than the intensity actually required to produce the damage. The weak spots may be eliminated by sustained exposure to the laser beam. DOE

N86-16566# Los Alamos National Lab., N. Mex.
GALLIUM ARSENIDE PHOTOCATHODE FOR THE FREE ELECTRON LASER
S. C. Stotlar, R. W. Springer, B. Sherwood, and R. Cordi 1985 11 p refs Presented at the Southwest Conference on Optics, Albuquerque, N. Mex., 4 Mar. 1985
(Contract W-7405-eng-36)
(DE85-017557; LA-UR-85-2879; CONF-850345-32) Avail: NTIS HC A02/MF A01

The efforts of the FEL source have been concentrated on cesiated GaAs(100) wafers. These crystals have shown photoyield of < .1 to 9% quantum efficiency with the cesium and oxygen treatment. The work function and coverage curves exhibit the same properties as measured in the literature. The use of Auger Electron Spectroscopy and X-ray Photoelectron Spectroscopy have been instrumental in determining the surface cleanliness and the surface oxidation states. The sputtered surfaces have been investigated as a function of rare gas mass and sputter ion voltage, giving similar results to earlier literature values. Temperature annealing appears to be critical after sputter cleaning in achieving any significant photoyield. Contacts of Ag-Mn and Ni-Si have been deposited, heated, and analyzed using Auger Depth Profiling techniques. DOE

N86-16567# Los Alamos National Lab., N. Mex.
NUCLEAR STRUCTURE CONSIDERATIONS FOR GAMMA-RAY LASERS
D. Strottman, E. D. Arthur, and D. G. Madland 1985 23 p Presented at the Conference of IDA on Workshop for Gamma-Ray Lasers, Washington, D.C., May 1985
(Contract W-7405-eng-36)
(DE85-015737; LA-UR-85-2701; CONF-8505174-2) Avail: NTIS HC A02/MF A01

Initial results are presented in the investigation of the nuclear physics issues of gamma-ray lasers. These include the questions of what is known from existing experimental data, where does one optimally search for nuclei displaying simultaneously both closely lying levels and nuclear isomerism, and which theoretical models does one employ for systematic searches for candidate nuclei and for calculation of detailed candidate level properties. These three questions are addressed in the present paper. DOE

N86-16568# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
SELF-CONSISTENT KINETIC DESCRIPTION OF THE FREE ELECTRON LASER INSTABILITY IN A PLANAR MAGNETIC WIGGLER
R. C. Davidson and J. S. Wurtele May 1985 65 p
(Contract DE-AC02-78ET-51013)
(DE85-014139; MIT/PFC/JA-85-17) Avail: NTIS HC A04/MF A01

The linearized Vlasov-Maxwell equations are used to investigate detailed free electron laser (FEL) stability properties for a tenuous relativistic electron beam propagating in the z-direction through the planar wiggler magnetic field. The theoretical model neglects longitudinal perturbations and transverse spatial variations. For low or moderate electron energy, there can be a sizeable modulation of beam equilibrium properties by the wiggler field and a concomitant coupling of the k'th Fourier component of the wave to the components k + or - 2k0, k + or - 4k0,... in the matrix dispersion equation. In the diagonal approximation, investigations of detailed stability behavior range from the regime of strong instability (monoenergetic electrons) to weak resonant growth (sufficiently large energy spread). In the limit of ultrarelativistic electrons and very low beam density, the kinetic dispersion relation is compared with the dispersion relation obtained from a linear analysis of the conventional Compton-regime FEL equations. Finally, assuming ultrarelativistic electrons and a sufficiently broad spectrum of amplifying waves, the quasilinear kinetic equations appropriate to the planar wiggler configuration are presented. DOE

N86-16569# Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
LINEAR ANALOG SIGNAL AMPLIFICATION BY BACKWARD RAMAN SCATTERING
C. H. Lin and M. A. Nelson 1985 6 p Presented at the 5th International Conference on Integrated Optics and Optical Fibre Communication and 11th European Conference on Optical Communications, Venice, Italy, 1 Oct. 1985
(Contract DE-AC08-83NV-10282)
(DE85-017164; EGG-10282-2072; CONF-8510144-1) Avail: NTIS HC A02/MF A01

A flashlamp-pumped dye laser has been employed to amplify an analog optical signal by backward Raman scattering in a multimode graded-index fiber. A gain of 28.5 dB and excellent time profile fidelity was achieved. DOE

N86-16570# Lawrence Livermore National Lab., Calif.
HIGH-BANDWIDTH FIBER-OPTIC SYSTEM USING LASER-DIODE TRANSMITTERS
B. L. Pruett, F. Roeske, R. A. Jones, and K. G. Hagans Jul. 1985 8 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 16 Aug. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Goleta, Calif. and Mitre Corp., Bedford, Mass.
(Contract W-7405-eng-48)
(DE85-017272; UCRL-92196; CONF-850887-26) Avail: NTIS HC A02/MF A01

A system has been developed to transmit analog signals through 1-km-long fiber-optic cables having bandwidths up to 1.5 GHz. Semiconductor injection laser-diode transmitters operating at a wavelength of about 815 nm are directly modulated by electrical signals from radiation detectors. Graded-index optical fibers transmit the optical signals to a remote facility, where they are recorded on a single streak camera. DOE

N86-16571# Rockwell International Corp., Golden, Colo.
FIBER OPTIC APPLICATIONS ON THE CENTURY-DETROIT LASER INTERFEROMETER GAGES
G. W. Dutton 19 Aug. 1985 16 p
(Contract DE-AC04-76DP-03533)
(DE85-017350; RFP-3778) Avail: NTIS HC A02/MF A01

The application of fiber optics on the Century-Detroit laser inspection gages is investigated. The effects of directing the laser beam into the gagehead interferometer by fiber optics, and using fiber optics to transmit the interference fringe signal from the interferometer to the photodetectors are examined. Both incoherent (nonimage-transmitting) and coherent (image-transmitting) optical bundles are tested. Results of these tests showed that neither the imaging nor the nonimaging fiber optic cables can be used to carry the laser beam into the gageheads. However, either type of cable can be used successfully to transmit the created fringe pattern to the photodetectors. DOE

N86-16572# Rochester Univ., N. Y. Lab. for Laser Energetics.
X-RAY DIAGNOSTIC METHODS FOR LASER IMPLODED TARGETS
B. Yaakobi 1985 42 p Presented at the Spring College on Radiation in Plasmas, Trieste, Italy, 1 Jun. 1985
(Contracts DE-AI08-81DP-40133; DE-AS08-81DP-40128; DE-AC08-80DP-40124)
(DE85-017583; DOE/DP-40124/73; CONF-8506189-2) Avail: NTIS HC A03/MF A01

Some recently developed X-ray diagnostic methods for laser irradiated targets are described. The first section deals with a method based on the observation of absorption X-ray lines formed when a continuum from a hot imploded core traverses a cooler surrounding tamper. The absorption lines, of atomic species in a thin layer embedded in the target tamper, can yield the tamper temperature and rho delta R. The second section describes a

variety of X-ray devices, currently under development, which should be useful in diagnosing high-density laser compression experiments. These include Von-Hamos focusing crystal spectrograph, Laue spectrograph, achromatic and polychromatic imaging with Laue crystals and X-ray interferometry. DOE

N86-16573# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
10 Dec. 1985 147 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-85-041) Avail: NTIS HC A07/MF A01

Current topics of interest in various scientific and technical fields are reported on from the People's Republic of China. Topics discussed include: (1) physical science; (2) applied sciences; (3) environmental quality; (4) chemistry; (5) compuer science; and (6) physics. For individual titles, see N86-16574 through N86-16583.

N86-16574# Joint Publications Research Service, Arlington, Va.
IMPROVED METHOD FOR TRANSONIC FLOW CALCULATION PROPOSED c02
Luo Shifeng *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 24-33 refs Transl. into ENGLISH from Shuzhi Jisuan yu Jisuanji Yingyong (Beijing, China), v. 6, no. 1, Mar. 1985 p 57-64 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

The steady-state transonic flow field consists of the subsonic and supersonic regions. In the subsonic region, AF1 scheme is used, and in the supersonic region, AF2 scheme is used. The parameter in AF1 scheme is linearly variant with period. A lot of cases were calculated. Results indicate that the convergence rate of the type-dependent splitting scheme is very fast. Author

N86-16575# Joint Publications Research Service, Arlington, Va.
GEOMETRIC DEFINITION OF UNIFORM B-SPLINE CURVES c64
Shi Fazhong *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 34-44 refs Transl. into ENGLISH from Shuzhi Jisuan yu Jisuanji Yingyong (Beijing, China), v. 6, no. 1, Mar. 1985 p 49-56 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

J. H. Clark defined uniform B-spline curves and the standard uniform B-spline. He has not however, established the general forms. Based on Clark's work, the general geometric definition of uniform B-spline curves are established, the general formulas of uniform B-spline basic functions are derived, and a series of properties and formulas calculating the uniform B-spline basic function and uniform B-spline curves is obtained. Author

N86-16576# Joint Publications Research Service, Arlington, Va.
PASSIVE MODE-LOCKING OF AN XeCl* EXCIMER LASER
Cheng Xusan, Lou Qihong, and Wang Runwen *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 45-50 refs Repr. from Guangxue Xuebao (Shanghai, China), v. 5, no. 7, Jul. 1985 p 643-647 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

Mode locking of an XeCl excimer laser was achieved with napthtnalene and PPT for the first time, using a simple, compact soft focus light path; a pulse width of 3 ns, over 90 percent modulation, a total output energy of 6.3 mJ, and a spatial divergence angle of 2mrad in a pulse train of 4 to 5 distinct 3-ns spikes was obtained. Author

N86-16577# Joint Publications Research Service, Arlington, Va.
A COUMARIN C102 DYE LASER PUMPED BY A 308-NM XeCl LASER
Shangguan Cheng, Lin Yingyi, Wang Yiman, and Dou Airong *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 51-54 refs Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 8, 20 Aug. 1985 p 476-477 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

An experimental study of a coumarin C102 tunable dye laser pumped by a 308-nm XeCl excimer laser is described. The tuning range is from 4605 to 5010 angstroms and the tuning linewidth is about 1 angstroms. Author

N86-16578# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF LARGE-COLUME X-RAY PREIONIZED XeCl EXCIMER LASER
Lou Qihong, Cheng Xusan, Ding Aizheng, Wei Yunrong, Ding Zean, and Zheng Chengen *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 55-59 refs Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 8, 20 Aug. 1985 p 468-470 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

The characteristics of a large-volume XeCl excimer laser, including improved uniformity of X-ray preionization and unstable cavity output, were studied experimentally. A maximum pulse energy of 1.6 J was obtained. Author

N86-16579# Joint Publications Research Service, Arlington, Va.
SINGLE-MODE Ne3+ GLASS LASER DESCRIBED
Zhang Guifen *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 60-65 refs Transl. into ENGLISH from Guangxue Xuebao (Shanghai, China), v. 7, no. 7, Jul. 1984 p 585-589 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

A high-power single-mode output has been obtained from an unstable ring laser made of neodymium glass, using an LiF:F2 saturable absorber crystal as a Q switch. A preliminary discussion of the experimental results is presented. Author

N86-16580# Joint Publications Research Service, Arlington, Va.
USE OF MICROPROCESSOR FOR IMAGE PROCESSING c61
Liu Weixian, Sun Xuemei, and L. Kaili *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 69-73 Transl. into ENGLISH from Weijisuanji Yingyong (Beijing, China), v. 6, no. 2, Mar. 1985 p 47-49 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

One of the striking characteristics of image signal processing is the immense amount of data involved. In the past it was customary to associate digital image processing with large- and medium-sized computers. In recent years microcomputer technology has developed rapidly, and the capabilities and capacities of such computers have expanded rapidly, while their price has fallen continuously. The use of microcomputers to create various types of image processing systems is receiving increasingly serious consideration. An image processing system which is based on a Z-80 single board computer is described. G.L.C.

N86-16581# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER FAST FOURIER TRANSFORM SYSTEM DESCRIBED c61
Jiang Yinlin *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 74-83 refs Transl. into ENGLISH from Weijisuanji Yingyong (Beijing, China), v. 6, no. 2, Mar. 1985 p 18-24 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

The DPS-85 data collection and analysis system includes a rather powerful FFT (fast Fourier transform) processing capability which is lacking in ordinary microcomputer systems. As a result, it can be used not only as an ordinary microcomputer, but also as a simple FFT signal analyzer which is extremely well adapted for low-frequency signal processing. G.L.C.

N86-16582# Joint Publications Research Service, Arlington, Va.
FIELD DISTRIBUTION IN A BENT SINGLE-MODE OPTICAL FIBER c74
Bao Zhenwu *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 84-91 refs Transl. into

ENGLISH from Tianjin Daxue Xuebao (Tianjin, China), no. 4, Dec. 1984, p 97-102 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

An approximate equation for the field distribution of a bent single-mode fiber is presented. Measurements of the field distribution using the near-field pattern (NFP) method gave results in agreement with theoretical predictions. Author

N86-16583# Joint Publications Research Service, Arlington, Va.
KrCl-XeCl DOUBLE LASER OSCILLATION REPORTED
Ma Shusen, Yao Yongbang, Shan Xinxin, Zhu Jikang, Qin Yuying, Wang Guangchang, and Cai Lianxin *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 92-96 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, 20 Sep. 1985 p 521-523 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

Double laser oscillation from KrCl and XeCl on the same discharge pulse was obtained in a Kr-Xe-HCl-He gas mixture. The KrCl emission was about 12 ns later than the XeCl emission. The xenon partial pressure is critical to double oscillation. Author

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-16584 Ohio State Univ., Columbus.
NUMERICAL SOLUTION OF ELASTIC CONTACT PROBLEMS INCLUDING FRICTION Ph.D. Thesis
Kisu Lee 1985 171 p
Avail: Univ. Microfilms Order No. DA8518977

Several numerical methods to solve frictional contact problems have been proposed in recent years. These techniques have different degrees of sophistication and generality in the formulation as well as in the employed solution algorithm. However, a concrete demonstration of convergence of solution method is not found in the open literature. A numerically convergent method of solution is proposed for a class of frictional contact problems involving two or more elastic bodies. Convergence of the proposed solution algorithm is shown theoretically as well as numerically. The classical friction law of Coulomb is applied in an incremental fashion to the discrete equations that can be obtained by employing the finite element method. Applications to study the effect of friction on an interior crack under a general loading, the interaction of a crack and material interfaces, and thermal expansion of two or more dissimilar elastic bodies are presented. Dissert. Abstr.

N86-16585 Department of the Army, Washington, D. C.
MICROWAVE DRYING OF AMMONIUM PERCHLORATE GRINDING SPHERES Patent
D. C. Sayles, inventor (to Army) Issued 30 Apr. 1985 4 p
(AD-D011900; US-Patent-4,513,513; US-Patent-Appl-SN-550435; US-Patent-Class-34-1) Avail: US Patent and Trademark Office
CSCL 13/9

Disclosed is a method of microwave drying of ammonium perchlorate grinding spheres. A preferred embodiment of the method employs a tunnel oven in combination with a microwave generator having an appropriate power supply. The tunnel oven receives microwave energy through transmission ducts in communication with a channeling device to distribute microwave energy over the grinding spheres to be dried. A preheated air supply facilitates moisture removal from the tunnel oven after the moisture adhered or occluded to the grinding spheres' surfaces is evaporated from the grinding spheres as a result of molecular vibrations of the water molecules after they absorb the microwave energy. A predetermined microwave frequency range and a predetermined drying time are employed to more efficiently remove adhered or occluded moisture from carbide grinding spheres as compared to conventional convection drying. Author (GRA)

N86-16586*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
INVESTIGATION OF WELD JOINT DETECTION CAPABILITIES OF A COAXIAL WELD VISION SYSTEM
K. J. Gangl and J. L. Weeks Oct. 1985 22 p
(Contract NAS8-27980)
(NASA-CR-178537; NAS 1.26:178537) Avail: NTIS
HC A02/MF A01 CSCL 13H

This report describes the second phase of a series of evaluations of a vision-based welding control sensor for the Space shuttle Main Engine Robotic Welding System. The robotic welding system is presently under development at the Marshall Space Flight Center. This evaluation determines the factors influencing the minimum joint gap required for consistent detection of the weld joint. Author

N86-16587*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
INFLUENCE OF CONTROL PARAMETERS ON THE JOINT TRACKING PERFORMANCE OF A COAXIAL WELD VISION SYSTEM
K. J. Gangl and J. L. Weeks Oct. 1985 27 p
(Contract NAS8-27980)
(NASA-CR-178538; NAS 1.26:178538) Avail: NTIS
HC A03/MF A01 CSCL 13H

The first phase of a series of evaluations of a vision-based welding control sensor for the Space Shuttle Main Engine Robotic Welding System is described. The robotic welding system is presently under development at the Marshall Space Flight Center. This evaluation determines the standard control response parameters necessary for proper trajectory of the welding torch along the joint. Author

N86-16588# Department of Energy, Washington, D. C.
PROCESS FOR FORMING UNUSUALLY STRONG JOINTS BETWEEN METALS AND CERAMICS BY BRAZING AT TEMPERATURES THAT DO NOT EXCEED 750(0)C Patent Application
J. P. Hammond (Oak Ridge National Lab., Tenn.), S. A. David (Oak Ridge National Lab., Tenn.), and J. J. Woodhouse, inventors (to DOE) (Oak Ridge National Lab., Tenn.) Filed 4 Dec. 1984 19 p
(Contract DE-AC05-84OR-21400)
(DE85-017731; US-Patent-Appl-SN-677955) Avail: NTIS
HC A02/MF A01

This investion is a process for joining metals to ceramics to form very strong bonds using low brazing temperature, i.e., less than 750 C, and particularly for joining nodular cast iron to partially stabilized zirconia. The process provides that the cermaic be coated with an active metal, such as titanium, that can form an intermetallic with a low melting point brazing alloy such as 60Ag-30Cu-10Sn. The nodular cast iron is coated with a noncarbon containing metal, such as copper, to prevent carbon in the nodular cast iron from dissolving in the brazing alloy. These coated surfaces can be brazed together with the brazing alloy between at less than 750(0) C to form a very strong joint. An even stronger bond can be formed if a transition piece is used between the metal and ceramic. It is preferred for the transition piece to have a coefficient of thermal expansion compatible with the coefficient of thermal expansion of the ceramic, such as titanium. DOE

N86-16589# Department of Energy, Washington, D. C.
ABRASIVE SLURRY COMPOSITION FOR MACHINING BORON CARBIDE Patent Application
E. L. Duran, inventor (to DOE) (Los Alamos National Lab., N. Mex.) Filed 29 Nov. 1984 7 p
(Contract W-7405-eng-36)
(DE85-017722; US-Patent-Appl-SN-676045) Avail: NTIS
HC A02/MF A01

An abrasive slurry, particularly suited for use in drilling or machining boron carbide, consists essentially of a suspension of boron carbide and/or silicon carbide grit in a carrier solution consisting essentially of a dilute solution of alkylaryl polyether alcohol in octyl alcohol. The alkylaryl polyether alcohol functions

as a wetting agent which improves the capacity of the octyl alcohol for carrying the grit in suspension, yet without substantially increasing the viscosity of the carrier solution. DOE

N86-16590# Oak Ridge National Lab., Tenn.
END POINT POSITION CONTROL OF A SINGLE LINK, TWO-DEGREE-OF-FREEDOM MANIPULATOR WITH JOINT COMPLIANCE AND ACTUATOR DYNAMICS
M. G. Forrest-Barlach, S. M. Babcock, H. Singh, and M. J. Rabins 1985 10 p Presented at ASME International Computers in Engineering Conference and exhibition, Boston, Mass., 4 Aug. 1985 Prepared in cooperation with Wayne State Univ., Detroit, Mich.
(Contract DE-AC05-84OR-21400)
(DE85-016307; CONF-850862-4) Avail: NTIS HC A02/MF A01

One problem which limits the cycle time of typical industrial manipulators is the vibration which results if the modes of vibration of a manipulator with significant joint compliance are excited. In this paper the effects of joint compliance in a two-degree-of-freedom manipulator are modeled and a study of several possible controller structures is conducted for the problem of end point position control. Controller structures considered include independent joint control neglecting compliance and independent joint control including actuator dynamics and joint compliance. A nonlinear observer which reduces the number of state measurements required is developed. Simulation of various controllers is performed utilizing ACSL, Advanced Continuous Simulation Language. It is shown that the closed loop frequency response of the manipulator can be increased beyond the typical industrial limit of 50% of the manipulator's natural frequency while maintaining desirable response characteristics by considering the joint compliance in the design and providing suitable feedback measurements. Simulations suggest satisfactory performance can be obtained as high as the limit imposed by the manipulators unmodeled higher vibration modes. The effects of motor torque limiting are investigated via simulation. The results demonstrate that the advantage of including actuator dynamics and compliance in the design is maintained when practical torque limitations of the motors are considered. DOE

N86-16591# Lawrence Livermore National Lab., Calif.
INDENTATION OF A PLANE MEMBRANE WITH A RIGID PARABOLOID
W. W. Feng 7 Mar. 1985 9 p Presented at the International Conference on Non-Linear Mechanics, Shanghai, China, 28 Oct. 1985
(Contract W-7405-eng-48)
(DE85-012945; UCRL-92301; CONF-851096-1) Avail: NTIS HC A02/MF A01

The indentation of a rectangular nonlinear hyperelastic membrane by a rigid paraboloid is presented in this paper. The strain-energy-density function for the membrane is assumed to have the Mooney form. The total potential energy of the deformed membrane can be obtained by integration. Due to the presence of a rigid indentor, the total potential energy for a deformed membrane is subjected to an inequality constraint condition. A slack variable is introduced to convert the inequality constraint condition into an equality constraint condition. Furthermore, a substitutional method is used to eliminate one of the unknown variables. In order to solve for the remaining unknown variables, the Raleigh-Ritz method and the minimum potential energy principle are employed. The deformations of a square membrane under various degrees of indentation are presented. DOE

N86-16592# Tennessee Univ., Knoxville.
ROBOTIC DESIGN ANALYSIS BASED ON TELEOPERATED MANIPULATOR DATA COLLECTION
R. S. Stoughton and H. L. Martin 2 Jun. 1985 26 p Presented at the Robots 9 Conference, Detroit, Mich., 2 Jun. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE85-016404; CONF-8506106-2) Avail: NTIS HC A03/MF A01

Extensive data collection was performed on a servomanipulator system (TeleOperator Systems SM-229) to determine the motion range and mechanical power usage of the manipulator under direct human control. More than 50 hours of various manipulation operations were performed while joint positions and motor currents were recorded. Reduction of these data yielded histograms of the manipulator usage patterns revealing areas where future manipulator motion ranges and drive systems could be optimized. This report develops a graphical representation of mechanical power usage that relates torque and velocity to the total usage time. Methods of interpreting this representation are discussed and generalized for use in analyzing robotic systems. The resulting technique will allow designers to reevaluate an operating system and determine how to improve that system's design. DOE

N86-16593# Oak Ridge National Lab., Tenn.
WELDING STUDIES OF NICKEL ALUMINIDE AND NICKEL-IRON ALUMINIDES
M. L. Santella, S. A. David, J. A. Horton, C. L. White, and C. T. Liu Aug. 1985 38 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018168; ORNL-6194) Avail: NTIS HC A03/MF A01

Because welding is often used during the fabrication of structural components, one of the key issues in the development of nickel aluminides and nickel-iron aluminides for engineering applications is their weldability. The goals of this study were to characterize weldment microstructures and to identify some of the factors controlling weldability of ductile Ni3Al alloys. The alloys used in this initial study were Ni3Al containing 500 wppm boron and Ni3Al containing 10 at. % iron and either 500 wppm or 20 wppm boron. Full-penetration autogenous welds were made in sheet shock by the electron beam (EB) and gas tungsten arc (GTA) processes. The main process variables were travel speed and preheat. The as-welded coupons were examined visually and in detail by the usual optical and electron metallographic methods. Weldments of boron-doped Ni3Al were composed of nearly 100% ordered (GAMMA)' phase. Weldments of the nickel-iron aluminides were (GAMMA)' + (BETA)' phase mixtures, with martensitic (BETA)' distributed interdendritically in the fusion zone and decorating grain boundaries in the heat-affected zone. All welds made in this particular boron-doped Ni3Al alloy contained cracks. Weldability improved with the addition of iron, and defect-free welds were made in the nickel-iron aluminides by both EB and GTA welding. Nevertheless, the iron-containing alloys were susceptible to cracking, and their weldability was affected by boron concentration, welding speed, and (for GTA) gas shielding. Defect-free welds were found to have good tensile properties relative to those of the base metal. DOE

N86-16594# Department of Energy, Washington, D. C.
FLEXIBLE SWIVEL CONNECTION Patent Application
J. C. Hoh, inventor (to DOE) Filed 19 Feb. 1985 8 p
(Contract W-31-109-eng-38)
(DE85-017802; US-Patent-Appl-SN-702540) Avail: NTIS HC A02/MF A01

A flexible swivel boot connector for connecting a first boot shield section to a second boot shield section is described. This invention relates to connections between boot shields for remote manipulators. This invention provides a means for joining two boot shield sections which is not subject to failure due to the stresses of operation. DOE

N86-16595# Rolls-Royce Ltd., Derby (England).
THE TECHNICAL DEVELOPMENT OF COOLED GAS TURBINE BLADES
Sh. Robbins and H. Tubbs 23 Jul. 1985 85 p refs
(PNR-90292) Avail: NTIS HC A05/MF A01

The history of cooling technology development within Rolls Royce is presented. A list of patents is given. The described systems include those of Conway, Dart, Tyne, Spey and Avon engines. The technical problems related to cost, weight, stress, vibration and performance are discussed. Author (ESA)

N86-16596# Transportation Systems Center, Cambridge, Mass.
PROCEEDINGS: DIRECT FIXATION FASTENER WORKSHOP

Final Report
Jun. 1985 263 p refs Proc. held in Atlanta, Georgia, 8-9 Feb. 1985
(Grant DOT-UMTA-MA-06-0153)
(PB85-247625; DOT/TSC-UMTA-85-10; UMTA-MA-06-0153-85-3)
Avail: NTIS HC A12/MF A01 CSCL 13E

The report is a collection of papers and discussion transcripts from a workshop on direct fixation fastener systems (DFFSs), which are increasingly being used in the construction of modern rail systems and system extensions. A DFF is defined herein as a device anchored to a concrete slab in tunnels, aerial structures, and atgrade with a thick pad of elastomeric material bonded to a top (and sometimes bottom) metallic plate to which the rail is affixed by means of either bolts or resilient slips. Author (GRA)

N86-16597# Colorado State Univ., Fort Collins. Natural Resources Ecology Lab.
EFFECTS OF ACIDIC PRECIPATION ON THE NORTH AMERICAN CONTINENT
J. H. Gibson and R. A. Linthurst Aug. 1985 22 p refs
(PB85-239382; EPA-600/D-85-179) Avail: NTIS
HC A02/MF A01 CSCL 06F

Since the mid 70's there has been a growing concern in the U.S. and Canada about the widespread deposition of acidic materials from the atmosphere. A major response in both Canada and the U.S. has been the organization of nationwide monitoring programs to assess the geographic and temporal trends in chemical deposition and the initiation of surveys and research efforts to determine current and future impacts on aquatic and terrestrial systems. Surveys based on geological materials and soil types indicate sensitive areas in both countries. Gradual acidification of lakes and streams has seriously affected fish populations in some areas. Leaching of aluminum, heavy metals and plant nutrients from soils affect water quality and may have implications with respect to reduced forest productivity. Extensive programs are underway to determine the extent of potential damage to crops and economic losses. Author (GRA)

N86-16433# Joint Publications Research Service, Arlington, Va.
PROSPECTS OF MAKING, BUYING, USING ROBOTS VIEWED
Gitta Takacs *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 23-27 Transl. into ENGLISH from Figyelo (Budapest, Hungary), no. 39, 27 Sep. 1985 p 6 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

N86-16434# Joint Publications Research Service, Arlington, Va.
VAMOS VIEWS NEEDS FOR ROBOT PRODUCTION
G. T. *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 30-34 Transl. into ENGLISH from Figyelo (Budapest, Hungary), no. 39, 27 Sep. 1985 p 7 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-16598*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NDE OF STRUCTURAL CERAMICS
Stanley J. Klima and Alex Vary 1986 14 p refs Proposed for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsred by ASME
(NASA-TM-87186; E-2840; NAS 1.15:87186) Avail: NTIS
HC A02/MF A01 CSCL 14D

Radiographic, ultrasonic, scanning laser acoustic microscopy (SLAM), and thermo-acoustic microscopy techniques were used to characterize silicon nitride and silicon carbide modulus-of-rupture test specimens in various stages of fabrication. Conventional and microfocus X-ray techniques were found capable of detecting minute high density inclusions in as-received powders, green compacts, and fully densified specimens. Significant density gradients in sintered bars were observed by radiography, ultrasonic velocity, and SLAM. Ultrasonic attenuation was found sensitive to microstructural variations due to grain and void morphology and distribution. SLAM was also capable of detecting voids, inclusions and cracks in finished test bars. Consideration is given to the potential for applying thermo-acoustic microscopy techniques to green and densified ceramics. The detection probability statistics and some limitations of radiography and SLAM also are discussed. Author

N86-16599*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RELIABILITY OF SCANNING LASER ACOUSTIC MICROSCOPY FOR DETECTING INTERNAL VOIDS IN STRUCTURAL CERAMICS
Don J. Roth and George Y. Baaklini 1986 36 p refs Presented at the 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19-22 Jan. 1986; sponsored by the American Ceramic Society
(NASA-TM-87222; E-2864; NAS 1.15:87222) Avail: NTIS
HC A03/MF A01 CSCL 14D

The reliability of 100 MHz scanning laser acoustic microscopy (SLAM) for detecting internal voids in sintered specimens of silicon nitride and silicon carbide was evaluated. The specimens contained artificially implanted voids and were positioned at depths ranging up to 2 mm below the specimen surface. Detection probability of 0.90 at a 0.95 confidence level was determined as a function of material, void diameter, and void depth. The statistical results presented for void detectability indicate some of the strengths and limitations of SLAM as a nondestructive evaluation technique for structural ceramics. Author

N86-16600# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
SELECTION AND RANKING PROCEDURES IN RELIABILITY MODELS
S. S. Gupta and S. Panchapakesan Jul. 1985 49 p
(Contract N00014-84-C-0167)
(AD-A157864; AD-E440288; TR-85-16) Avail: NTIS
HC A03/MF A01 CSCL 12/1

Several procedures appropriate for selecting the best from K < or = 2) life length distributions are discussed. The selection problem is considered under the classical formulation using both the indifference zone and subset selection approaches, but mostly the latter. Under parametric models, procedures are described for selection from gamma, Weibull, and exponential (one-and two-parameter) distributions. Nonparametric procedures and distribution-free procedures are discussed for selection in terms of a specified quantile and reliability at an arbitrarily chosen point in time, respectively. Procedures for selection from restricted families are discussed with special reference to IFR and IFRA families. The procedures described in various cases mentioned above illustrate several modifications and generalizations of the basic goal. Author (GRA)

N86-16601# Rockwell International Corp., Golden, Colo.
FINITE ELEMENT MODELING OF PULSED EDDY CURRENT NDT PHENOMENA
B. Allen, N. Ida, and W. Lord 15 May 1985 5 p refs Presented at the 5th Conference on the Computation of Electromagnetic Fields, Ft. Collins, Colo., 3 Jun. 1985 Prepared in cooperation with Colorado State Univ., Fort Collins and Akron Univ. Ohio
(Contract DE-AC04-76DP-03533)
(DE85-013221; RFP-3835; CONF-850641-5) Avail: NTIS
HC A02/MF A01

Transient fields for nondestructive testing (pulsed eddy current methods) have been used experimentally for such applications as coating thickness measurements and the inspection of reactor fuel tubing. The lack of suitable models to facilitate understanding

of the interaction of the pulsed field with the test specimen has hindered a wider acceptance of the method as a tool in NDT. Two models, based on the finite element technique are described. The first model, used for repetitive pulse train sources makes use of the Fourier series of the source current to solve a steady state problem for each significant harmonic. The harmonic solutions are then summed to produce the total EMF in the pickup coil. The second model is used for single pulse application. The response is calculated using an iterative time stepping solution. In both cases axisymmetric geometries are studied using a magnetic vector potential formulation. Solutions are compared with experimental results. DOE

N86-16602# Lawrence Livermore National Lab., Calif.
RADIATION INTERACTIONS FOR TOMOGRAPHY, REVISION 1
A. S. Zolnay 20 May 1985 13 p Presented at the American Society of Nondestructive Testing Spring Conference, Washington, D.C., 11 Mar. 1985 Previously announced as N85-30799
(DE85-013792; UCRL-92271-Rev-1; CONF-8503121-1-Rev-1)
Avail: NTIS HC A02/MF A01

There are new requirements emerging in the field of tomography: the need for spatial resolution in the micrometer range, atomic species specificity, and quantitative density discrimination. DOE

N86-16603# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
SYSTEMS SAFETY, AN EXAMPLE OF APPLICATION [LA SECURITE DES SYSTEMES, UN EXEMPLE D'APPLICATION]
Michel Louet and Pierre Barrault (CR2A, Nanterre, France) 1985 22 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984
(SNIAS-852-422-107) Avail: NTIS HC A02/MF A01

The experience gained in the safety analysis of missiles onboard submarines is demonstrated for the case where a second stage falls during assembly. A probability analysis of all possible causes is given. It is concluded that the reliability of a system must be studied following the outlined method. Author (ESA)

N86-16604# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
PARAMETERS TO BE CONTROLLED FOR AEROSPACE ADHESIVE BONDED STRUCTURES [PARAMETRES A MAITRISER EN VUE D'UN COLLAGE STRUCTURAL AEROSPATIALE]
G. Hilaire and J. N. Dewas 21 Jun. 1985 20 p In FRENCH Presented at Journees SFM/AAAF sur les Problemes Mecaniques et Thermiques des Satellites Conference, Suresnes, France
(SINIAS-852-551-102; C-47-401) Avail: NTIS HC A02/MF A01

The quality control of adhesive bonded joints is discussed. The analysis includes the characterization of the materials to be bonded, the adhesive system parameters, the quality control of the surfaces to be bonded, the process control of manufacturing and polymerization, the final inspection, and space applications. Examples of adhesive uses in satellite structures are given. Author (ESA)

N86-16465# Selenia S.p.A., Rome (Italy).
THE COMBINED EFFECT OF INFANT MORTALITY AND INSTALLATION PLAN ON MEAN TIME BETWEEN FAILURE
Giuseppe Rosato and Lamberto Pescatori *In its* Rivista Tecnica Selenia, Vol. 9, No. 2, 1985 1985 p 25-33 (For primary document see N86-16462 07-32)
Avail: NTIS HC A03/MF A01

N86-16617# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AVIP AIR FORCE THRUST FOR RELIABILITY
John C. Halpin *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 5-19 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

N86-16619# LTV Aerospace and Defense Co., Dallas, Tex. Missiles and Advanced Programs Div.
A DECADE OF RELIABILITY TESTING PROGRESS
Robert N. Hancock *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 29-41 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

N86-16620# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CERT: WHERE WE HAVE BEEN, WHERE WE ARE GOING
Alan Burkhard *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 43-49 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N86-16605 Iowa Univ., Iowa City.
CORRELATION BETWEEN SHORT AND LONG FATIGUE CRACK GROWTH BEHAVIOR IN SAE 0030 CAST STEEL AND AISI 1020 HOT-ROLLED STEEL Ph.D. Thesis
Hyun Woo Lee 1985 171 p
Avail: Univ. Microfilms Order No. DA8518852

Constant amplitude fatigue crack growth behavior was investigated for physically short cracks (0.3 < or = a < 1 mm) and for long cracks (a > or = 2 mm) using SEN type specimens in SAE 0030 cast steel and AISI 1020 wrought steel with load ratios of R = 0.05, 1/2, and -1 at room temperature. A crack closure model which considered the residual plastic zone, fracture surface roughness and environmental effects was developed to correlate these two crack length ranges by introducing a transient crack length. It was found that the short cracks grew faster than long cracks based upon applied delta K with da/DN < or = 4 x 10 to the minus 8 power m/ cycle and the difference in growth rates between these two crack length ranges became greater with decreasing applied stress intensity factor range. The transient crack lengths where similitude with applied delta K existed were between 1 and 2 mm for all three load ratios and two steels. Applied threshold stress intensity factor ranges for short cracks were found to be about 40 to 55 percent smaller than the corresponding threshold stress intensity factor ranges for long cracks in both steels. Dissert. Abstr.

N86-16606 Rice Univ., Houston, Tex.
FINITE ELEMENT METHODS FOR PLATE BENDING Ph.D. Thesis
Young Wuk Kwon 1985 119 p
Avail: Univ. Microfilms Order No. DA8517219

The plate bending problem is one of the most fundamental problems in structural analysis. Numerical methods have been applied to this problem. Among those methods the finite element method has attracted much attention because of its general application to complex problems. However, the difficulty in satisfying the slope compatibility condition in a usual displacement-based finite element method has been a barrier to a plate bending problem. In this research the new mixed finite element equation is formulated using the Galerkin method to overcome the difficulty mentioned above. Unknowns are moments and a lateral displacement. This eliminates the difficulty of slope compatibility. Moments are obtained accurately at nodal points. This formulation includes shear deformations for thick plate problems and is extended for anisotropic and layered composite materials. In

addition, this study includes an elasto-plastic analysis of plate bending problems. Dissert. Abstr.

N86-16607 Connecticut Univ., Storrs.
THREE DIMENSIONAL CRACK ANALYSIS BY FINITE ELEMENT METHOD WITH BOUNDARY INTEGRAL METHOD AT CRACK TIP Ph.D. Thesis
Tae Moon Kim 1985 176 p
Avail: Univ. Microfilms Order No. DA8516198

Three dimensional crack analysis by the conventional finite element method requires very small elements concentrated at the crack tip region to account for singular behavior. In this approach the number of equations to be solved increases drastically as improvement in accuracy is desired. In the new approach developed in this dissertation, a large element is used at the crack tip by employing the boundary integral equation method to account for the singular behavior of the stress components. This results in a much smaller number of equations to be solved. The numerical results by the new approach are very accurate even though few elements are used along the crack front. Furthermore, this new approach can deal with three dimensional crack problems under different types of loading and different crack locations without any difficulty or additional modification. Dissert. Abstr.

N86-16608*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
A REFINED SHEAR DEFORMATION THEORY FOR THE ANALYSIS OF LAMINATED PLATES Annual Report, Mar. 1984 - Mar. 1985
J. N. Reddy Jan. 1986 37 p refs
(Grant NAG1-459)
(NASA-CR-3955; NAS 1.26:3955; VPI-E-85.26; AR-1) Avail: NTIS HC A03/MF A01 CSCL 20K

A refined, third-order plate theory that accounts for the transverse shear strains is presented, the Navier solutions are derived for certain simply supported cross-ply and antisymmetric angle-ply laminates, and finite-element models are developed for general laminates. The new theory does not require the shear correction factors of the first-order theory (i.e., the Reissner-Mindlin plate theory) because the transverse shear stresses are represented parabolically in the present theory. A mixed finite-element model that uses independent approximations of the generalized displacements and generalized moments, and a displacement model that uses only the generalized displacements as degrees of freedom are developed. The displacement model requires C sup 1-continuity of the transverse deflection across the inter-element boundaries, whereas the mixed model requires a C sup 0-element. Also, the mixed model does not require continuous approximations (between elements) of the bending moments. Numerical results are presented to show the accuracy of the present theory in predicting the transverse stresses. Numerical results are also presented for the nonlinear bending of plates, and the results compare well with the experimental results available in the literature. Author

N86-16609# Delaware Univ., Newark.
SHORT-WAVELENGTH BUCKLING AND SHEAR FAILURES FOR COMPRESSION-LOADED COMPOSITE LAMINATES Ph.D. Thesis
Mark J. Shuart Dec. 1985 228 p refs
Avail: NTIS HC A11/MF A01

The short wavelength buckling of multi-directional composite laminates loaded in compression is studied. Also investigated are the interlaminar shear failures due to short-wavelength imperfections and the inplane shear failures in these laminates. Author

N86-16610*# Akron Univ., Ohio. Dept. of Civil Engineering.
THERMOMECHANICAL CYCLIC HARDENING BEHAVIOR OF HASTELLOY-X M.S. Thesis
Paul A. Bartolotta Nov. 1985 54 p refs
(Grant NAG3-379)
(NASA-CR-174999; NAS 1.26:174999) Avail: NTIS HC A04/MF A01 CSCL 20K

Experimental evidence of thermomechanical history dependence on the cyclic hardening behavior of a representative combustor liner material Hastelloy-X is presented, along with a discussion about the relevant concept of thermomechanical path dependence. Based on the experimental results, a discussion is given on the inadequacy of formulating nonisothermal constitutive equations solely on the basis of isothermal testing. Finally, the essence of a mathematical representation of thermoviscoplasticity is presented that qualitatively accounts for the observed hereditary behavior. This is achieved by formulating the scaler evolutionary equation in an established viscoplastic theory to reflect thermomechanical path dependence. Although the necessary nonisothermal tests for further quantifying the thermoviscoplastic model have been identified, such data are not yet available. Author

N86-16611*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MASS BALANCING OF HOLLOW FAN BLADES
Robert E. Kielb 1986 15 p refs Proposed for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany, 8-12 Jun. 1985; sponsored by ASME
(NASA-TM-87197; E-2851; NAS 1.15:87197) Avail: NTIS HC A02/MF A01 CSCL 20K

A typical section model is used to analytically investigate the effect of mass balancing as applied to hollow, supersonic fan blades. A procedure to determine the best configuration of an internal balancing mass to provide flutter alleviation is developed. This procedure is applied to a typical supersonic shroudless fan blade which is unstable in both the solid configuration and when it is hollow with no balancing mass. The addition of an optimized balancing mass is shown to stabilize the blade at the design condition. Author

N86-16612*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIENCES WITH A PRELIMINARY NICE/SPAR STRUCTURAL ANALYSIS SYSTEM
Christine G. Lotts and William H. Greene Oct. 1985 39 p refs
(NASA-TM-87586; NAS 1.15:87586) Avail: NTIS HC A03/MF A01 CSCL 20K

Development of a new structural analysis system based on the original SPAR finite element code and the NICE system is described. The system is denoted NICE/SPAR. NICE was designed at Lockheed Palo Alto Research Laboratory and contains data management utilities, a command language interpreter, and a command language definition for integrating engineering computational modules. SPAR is a system of programs used for finite element structural analysis developed for NASA by Engineering Information Systems, Inc. It includes many complementary structural analysis and utility functions which communicate through a common database. The work on NICE/SPAR was motivated by requirements for a highly modular and flexible structural analysis system to use as a tool in carrying out research in computational methods and exploring new computer hardware. Analysis examples are presented which demonstrate the benefits gained from a combination of the NICE command language with the SPAR computational modules. Author

N86-16613*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRESS ANALYSIS OF 27% SCALE MODEL OF AH-64 MAIN ROTOR HUB
Robert V. Hodges Oct. 1985 49 p refs
(NASA-TM-87625; NAS 1.15:87625; AVSCOM-TR-85-B-8) Avail: NTIS HC A03/MF A01 CSCL 01C

Stress analysis of an AH-64 27% scale model rotor hub was performed. Component loads and stresses were calculated based upon blade root loads and motions. The static and fatigue analysis indicates positive margins of safety in all components checked. Using the format developed here, the hub can be stress checked for future application. Author

N86-16614*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF DEBOND GROWTH ON STRESS-INTENSITY FACTORS IN A CRACKED ORTHOTROPIC SHEET STIFFENED BY A SEMI-INFINITE ORTHOTROPIC SHEET
C. A. Bigelow Jan. 1986 26 p refs
(NASA-TM-87598; L-16027; NAS 1.15:87598) Avail: NTIS HC A03/MF A01 CSCL 20K

Stress-intensity factors are determined for a cracked infinite sheet adhesively bonded to a stringer, and debonding of the adhesive layer is predicted. The stringer is modeled as a semi-infinite sheet. Adhesive nonlinearity is also included. Both the sheet and stringer are treated as homogeneous, orthotropic materials. A set of integral equations is formulated and solved to obtain the adhesive shear stresses and crack-tip stress-intensity factors. Adhesive debonding is predicted using a rupture criterion based on the combined adhesive stresses. When the crack is not under the stringer, the debond extends along the edge of the stringer. When the crack tip is beneath the stringer, the debond grows to the end of the crack, then along the edge of the stringer. Stress levels required for debond initiation decrease as the crack tip is moved beneath the stringer. With a nonlinear adhesive, the debond initiates at higher applied stress levels than in linear adhesive cases. Compared with the linear adhesive solution, modeling a nonlinear adhesive causes the stress-intensity factor to increase when the bond is assumed to remain intact but causes the stress-intensity factor to decrease when debonding is included. Author

N86-16615*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIMPLIFIED CYCLIC STRUCTURAL ANALYSES OF SSME TURBINE BLADES
A. Kaufman and J. M. Manderscheid 1986 17 p refs Proposed for presentation at the Conference on Advanced High Pressure Oxygen/Hydrogen Propulsion Technology, Huntsville, Ala., 14-16 May 1986; sponsored by NASA Marshall Space Flight Center
(NASA-TM-87214; E-2873; NAS 1.15:87214) Avail: NTIS HC A02/MF A01 CSCL 20K

Anisotropic high-temperature alloys are used to meet the safety and durability requirements of turbine blades for high-pressure turbopumps in reusable space propulsion systems. The applicability to anisotropic components of a simplified inelastic structural analysis procedure developed at the NASA Lewis Research Center is assessed. The procedure uses as input the history of the total strain at the critical crack initiation location computed from elastic finite-element analyses. Cyclic heat transfer and structural analyses are performed for the first stage high-pressure fuel turbopump blade of the space shuttle main engine. The blade alloy is directionally solidified MAR-M 246 (nickel base). The analyses are based on a typical test stand engine cycle. Stress-strain histories for the airfoil critical location are computed using both the MARC nonlinear finite-element computer code and the simplified procedure. Additional cases are analyzed in which the material yield strength is arbitrarily reduced to increase the plastic strains and, therefore, the severity of the problem. Good agreement is shown between the predicted stress-strain solutions from the two methods. The simplified analysis uses about 0.02 percent (5 percent with the required elastic finite-element analyses) of the CPU time used by the nonlinear finite element analysis. Author

N86-16616# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN 55. PART 1: WELCOME, KEYNOTE ADDRESS, INVITED PAPERS, ISOLATION AND DAMPING AND DAMPING PRACTICES Monthly Report
Jun. 1985 169 p refs Proceedings of the 55th Symposium on Shock and Vibration, Dayton, Ohio, 22-24 Oct. 1984; sponsored by ASD 3 Vol.
(AD-A160263; SVIC-Bull-55-Pt-1) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Presented are the welcome address and the keynote address for the 55th symposium on shock and vibration. Also in this section appears invited papers on reliability, damping practics, and damping and isolation. Some article topics include: (1) Avionics Integrity Program (AVIP) air force thrust for reliability; (2) a decade of reliability testing; (3) a different view of viscous damping; (4) passive damping, sonic fatigue and the KC-135; (5) passive load control dampers; and (6) vibration and damping analysis of curved sandwich panels. For individual titles, see N86-16617 through N86-16631.

N86-16617# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AVIP AIR FORCE THRUST FOR RELIABILITY c38
John C. Halpin *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 5-19 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

An overview is given of the avionics integrity program. Some history is given as to how and why the program developed. The program concerns itself with the quality assurance and reliability of aircraft electronics. It is believed that the safety of avionics can be controlled by controlling the flaw size distribution and stress levels. Also preventive maintenance is briefly discussed. E.R.

N86-16618# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
DYNAMICS R AND D IN THE AFWAL STRUCTURES AND DYNAMICS DIVISION
James J. Olsen *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 21-27 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A brief overview of the recent accomplishments, current activities and plans for in-house R&D, contractual R&D and systems support in structural dynamics by the Air Force Wright Aeronautical Laboratories are given. Areas of specific concern are survivable structure, advanced aeronautical structural concepts, aircraft structural integrity, spacecraft structures, and structures and dynamics technology base. Several facilities for research and development in structural dynamics are briefly described. Author

N86-16619# LTV Aerospace and Defense Co., Dallas, Tex. Missiles and Advanced Programs Div.
A DECADE OF RELIABILITY TESTING PROGRESS c38
Robert N. Hancock *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 29-41 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

At the 45th shock and vibration symposium, which was held at the Dayton Convention Center in 1974, the S&V community was alerted to problems that existed in avionics reliability. A two year study described problems and some proposed fixes. The Air Force programs investigated many actions which are still in progress. The progress that has been made toward the solutions that were proffered at the 1974 meeting are reviewed and some of the tasks that still need development are listed. The problems that were disclosed in 1974 fell into both the technical and the administrative arenas. The latter will be mentioned where lack of action interferes with technical progress, the primary topic. Author

N86-16620# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CERT: WHERE WE HAVE BEEN, WHERE WE ARE GOING c38
Alan Burkhard *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 43-49 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/4

Combined Environment Reliability Test (CERT) is discussed

where it has been and where the technology is going. What led to the development of this technology is discussed, what has been accomplished, and then what kind of activities and ideas are underway to move beyond CERT. Why was it necessary to develop the concept now called CERT? What is CERT? A thumbnail tutorial on the development of CERT is given, the engineering process one goes through to develop a CERT profile and finally how one might go about applying CERT in a contractual situation. The technology perception challenges that the development and validation of CERT uncovered is described. These are the areas that future development and focus of development efforts need to be undertaken. Author

N86-16621# Stress Technology, Inc., Rochester, N.Y.
FACTORS AFFECTING THE FATIGUE LIFE OF TURBINE BLADES AND AN ASSESSMENT OF THEIR ACCURACY
Neville P. Rieger *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 51-69 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Estimation of blade fatigue life is an important aspect of turbomachinery design because blade life often determines the operational survivability of an engine. During design, blade life estimates provide a quantitative criterion against which the influence of different design features can be compared. Blade life estimation involves the synthesis of several existing technologies, and life estimates are influenced by the state of knowledge in each contributing technology area. Certain technologies such as blade finite element modeling are now highly developed. Modern blade models have been shown to provide very accurate results for steady stresses and natural frequencies. Other areas such as blade excitation, damping, and certain aspects of materials properties are presently in a more formative stage, though these techniques also have experienced promising developments in recent years. These developments are discussed in detail. Author

N86-16622# Dayton Univ., Ohio. Research Inst.
SPIN PIT TEST OF BLADED DISK WITH BLADE PLATFORM FRICTION DAMPERS
R. J. Dominio *In* Shock and Vibration Information Center The Shock and Information Bulletin 55, Part 1 Jun. 1985 p 71-79 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A turbine blade friction damping study, involving both analytical and experimental evaluations, was performed for a high speed bladed disk of the high pressure fuel turbopump of the space shuttle main engine. The recently completed experimental study involved spin pit testing of an instrumented bladed disk assembly. The study was performed to evaluate the effectiveness and operational characteristics of blade platform friction dampers designed to limit damaging resonance vibrations of the turbine blades in their lower order flexural vibration modes. The test program is described and the test results are presented. A brief comparison is made between the results of the analytical and experimental studies. Author

N86-16623# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Dept. of Aeronautics and Astronautics.
A DIFFERENNT VIEW OF VISCOUS DAMPING
P. J. Torvik and R. L. Bagley *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 81-83 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The linear viscous damper has proven to be an extremely useful concept in the modeling of vibration systems. One usually justifies the inclusion of such elements in models of mechanical systems through the following argument: Consider two flat plates (or cylinders), parallel, infinite in extent, and separated by a distance h. Assume that the region between the two plates (or cylinders) is filled with a Newtonian fluid of viscosity mu. Assume that one plate (cylinder) is displaced parallel to the other at a speed V, or, in terms of a displacement coordinate, x. Assume further that the resulting velocity distribution between the two plates (cylinders) is linear. Then, the average shear stress in the fluid is proportional to the average velocity gradients, or: sigma = mu v/h. If A represents the wetted area of the moving plate (cylinder), hen the resisting force on that surface is F = A sigma = A mu v/h. From this it is deduced that the value of a dashpot constant to be C = A mu/n. Author

N86-16624# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
TEMPERATURE SHIFT EFFECTS ON COMPLEX MODULUS
James A. Eichenlaub and Lynn C. Rogers *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 85-87 (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The first step in using viscoelastic materials to control vibration is the accurate determination of the material. Since polymer properties exhibit a strong dependence on frequency and temperature, it is necessary to characterize samples over a wide range of temperatures and frequencies. It is impractical to measure all points of interest in the temperature and frequency ranges, therefore, some type of curve fitting is required to allow extrapolation of data at other temperatures and frequencies. To plot the modulus and loss factor in two dimensions, these properties must be functions of one variable which contains the two independent variables mentioned. The two independent variables may be combined using a temperature shift parameter to give a reduced frequency. In most material tests, experimental data cannot be collected over a sufficiently wide frequency range to define the temperature shift parameter equation. Therefore, an alternate method of defining the shift parameter is required. A method of defining the temperature shift parameter equation when the frequency range is inadequate to find it by inspection of the experimental data is presented. Author

N86-16625# Dayton Univ., Ohio. Research Inst.
PASSIVE DAMPING, SONIC FATIGUE AND THE KC-135A
P. A. Graf, M. L. Drake, M. P. Bouchard, and R. J. Dominic *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 89-101 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

High noise levels occurring during maximum thrust takeoff have caused sonic fatigue cracking of the aft fuselage skin and stringers of the KC-135A aircraft. A program was conducted to solve this problem through the design and evaluation of a passive damping system for the aft fuselage of the KC-135A. A detailed description of the program results is presented. Author

N86-16626# General Electric Co., Philadelphia, Pa. Space Systems Div.
DESIGN OF INTEGRALLY DAMPED SPACECRAFT PANELS
C. V. Stahle and J. A. Staley *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 103-107 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The results of preliminary design and analysis studies of damped spacecraft equipment mounting panels is presented. Increased vibroacoustic reliability and reduced program development costs can be achieved by controlling spacecraft equipment vibration during launch. To reduce the significant number of anomalies which occur shortly after launch, component vibration requirements have been increased to provide larger margins. This has resulted in a large number of vibroacoustic test failures during qualification and acceptance tests. A $40 million cost saving is estimated using the OCTAVE code if the equipment vibration environment is reduced 50 percent for an operational satellite system using a NIL-STD-1540 test program. To realize this high

payoff, the RELSAT project was initiated to develop and demonstrate damping control of satellite launch vibration. A typical satellite equipment panel was selected and analyzed. Author

N86-16627# Dayton Univ., Ohio. Rsearch Inst.
A DIFFERENT APPROACH TO DESIGNED IN PASSIVE DAMPING
M. L. Drake *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 109-117 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

In the past, most damping applications were additive designs used to solve field problems. Today, designers are beginning to consider integral (designed in) damping systems. This change in emphasis in damping design will change the market in damping materials. Soon the damping material vendor will be supplying damping materials in bulk form (sheets, rolls, uncured gum) to the structural system manufacturers. Since the damping materials will be required in bulk form, the possibility of ordering a custom formulated material exists. A method is demonstrated which develops the required damping material properties, discuss formulation changes usable to adjust the damping material properties, and discuss the benefits of such design procedures. Author

N86-16628# Martin Marietta Aerospace, Denver, Colo.
ANALYSIS OF DAMPED TWIN TOWERS
C. W. White *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 119-129 refs (For primary document see N86-16616 07-39)
(Contract F33615-83-C-3222)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The procedure used to design two viscoelastically damped 60-ft tall generic test towers is presented. How the Modal Strain Energy (MSE) approach was used to identify favorable locations in these towers for viscoelastic structural members and for discrete viscoelastic damper mechanisms is described. The use of standard viscoelastic material (VEM) property data to design the discrete dampers is illustrated. Testing procedures and data reduction required for theoretical experimental correlation are described at both the VEM element and truss system levels. Author

N86-16629# Boeing Aerospace Co., Seattle, Wash.
PASSIVE LOAD CONTROL DAMPERS
David M. Eckblad and Patrick James Schirmer *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 131-138 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The need to accommodate greater nuclear groundshock threats for a larger and heavier missile/canister within an existing underground site has led to a unique damper requirement which is satisfied using the passive load control damper. The design approach to develop this passive load control damper is described. Details in modeling the passive load control damper value dynamics are given. Dynamic analysis is compared with various levels of tests, showing good correlation. Author

N86-16630# Vermont Univ., Burlington. Dept. of Mechanical Engineering.
RESPONSE OF A SYMMETRIC SELF-DAMPED PNEUMATIC SHOCK ISOLATOR TO AN ACCELERATION PULSE
M. S. Hundal and D. J. Fitzmorris *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 139-153 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Pneumatic damping offers several advantages in shock and vibration applications including cleanliness, light weight and few moving parts. Large deflections of pneumatic shock absorbers make their behavior nonlinear and thus difficult to analyze. The analysis and response of a symmetric pneumatic absorber with orifice damping is detailed. With proper design such an absorber can provide a response to a shock pulse similar to that of a linear absorber. The response to a rectangular acceleration pulse is determined, which is the most severe pulse shape for a given duration. Results are given in the form of graphs and empirical formulas which can be used for design. An important conclusion reached is that there is a tradeoff between optimum shock isolation and optimum damped response. Author

N86-16631# Indian Inst. of Tech., New Delhi. Dept. of Mechanical Engineering.
VIBRATION AND DAMPING ANALYSIS OF CURVED SANDWICH PANEL WITH VISCOELASTIC CORE
J. Vaswani, N. T. Asnani, and B. C. Nakra *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 1 Jun. 1985 p 155-166 refs (For primary document see N86-16616 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Equations of motion for flexural vibrations of curved sandwich panel, consisting of elastic face layers sandwiching a viscoelastic core were derived considering extension and bending deformations in the face layers and shear deformation in the core layer, using variational principles. A solution for panel with simply supported edges is taken in series summation form and the correspondence principle of linear viscoelasticity is applied for evaluating the resonant frequencies and associated system loss factors. Effects of the variations of the geometric and the material parameters on the resonant frequencies and the system loss factors are reported. Author

N86-16632# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN 55. PART 3: MACHINERY DYNAMICS, SYSTEM IDENTIFICATION AND STRUCTURAL ANALYSIS Monthly Report
Jun. 1985 175 p refs Proceedings of the 55th Symposium on Shock and Vibration, Dayton, Ohio, 22-24 Oct. 1984; sponsored by ASD 3 Vol.
(AD-A160265; SVIC-Bull-55-Pt-3) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

This report is part 3 of a three volume set The Shock and Vibration Bulletin. It contains information on machinery dynamics, system identification and structural analysis. Symposium topics discussed include: an integrated gear system dynamics analysis overbroad frequency range; coupled torsional-flexural vibration of a geared shaft system using finite element analysis; structural damage detection by the system identification technique; time domain modal analysis of a slotted cylindrical shell; model evaluation of spinal injury likelihood for various ejection system parameter variations; time domain mathematical modeling of elastic instabilities and large elastic-plastic deflections and approximating dynamic response in small arrays using polynomials parameterization and response surface methodology. For individual titles, see N86-16633 through N86-16645.

N86-16633# Westinghouse Electric Corp., Sunnyvale, Calif.
AN INTEGRATED GEAR SYSTEM DYNAMICS ANALYSIS OVER A BROAD FREQUENCY RANGE
L. K. H. Lu, W. B. Rockwood, P. C. Werner, and R. G. DeJong (Cambridge Collaborative, Inc., Boston, Mass.) *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 1-11 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

An integrated analytical scheme for Marine Gear System Dynamics is presented in this paper. The work can be divided into three parts: Gear excitation source prediction, response calculation in the low frequency range, and average response

estimation in the high frequency range. Various sources of gear mesh excitation are considered by Mark in his excellent analysis (1). However, for modern precision ground gears, the source of primary interest is likely to be that portion of the static transmission error whose frequency is the tooth meshing frequency. This is the case treated herein. In this work, the steady component of static transmission error and the first harmonic of mesh tone component of static transmission error are calculated from a solution of the mesh contact problem. A simplex algorithm proposed by Conry & Seirge (2) is used to solve the gear contact problem. Marine gear-turbine systems are comprised of individual components connected by bearings, mounts and gear tooth contacts. Methods best suited for response calculation of such a complex structure depend on the frequency range of interest as well as the properties of the methods. Author

N86-16634# Concordia Univ., Montreal (Quebec). Dept. of Mechanical Engineering.

COUPLED TORSIONAL-FLEXURAL VIBRATION OF A GEARED SHAFT SYSTEM USING FINITE ELEMENT ANALYSIS

S. V. Neriya, R. B. Bhat, T. S. Sankar *In* Shock and Vibration Information Center The Shock and Vibration Bulletin, Part 3 Jun. 1985 p 13-25 refs Sponsored in part by Natural Sciences and Engineering Research Council of Canada (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The coupled torsional-flexural vibration due to unbalance and geometrical eccentricity in the gears is studied. The coupling action is identified through the analysis of the gear motion and this effect is included in the finite element model of the system. The free vibration problem is solved to obtain the natural frequencies and mode shapes. Normal mode analysis is employed to obtain the dynamic response of the system to excitations arising from the mass unbalance and geometrical eccentricity in the gears. The response exhibits peaks not only at the system natural frequencies, but also at those frequencies which are related to the system natural frequencies through the gear ratio. The response spectra for various parametric combinations are presented and discussed. B.W.

N86-16635# Centre National de la Recherche Scientifique, Villeurbanne (France). Lab. de Mecanique des Structures.

INFLUENCE OF AN AXIAL TORQUE ON THE DYNAMIC BEHAVIOR OF ROTORS IN BENDING

R. Dufour, J. Dar Nagopian, and M. Lalanne *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 27-35 refs (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Today it is necessary to predict with great accuracy the dynamic behavior of rotating machinery components at the design stage. This paper focuses on the secondary affect on the dynamic characteristics of rotors in bending, introduced by axial torque. The influence of a constant and an harmonic exciting torque has been studied both experimentally and theoretically in this work. Author

N86-16636# Memorial Univ. of Newfoundland, St. Johns. Faculty of Engineering.

SENSITIVITY ANALYSIS OF THE LOCATIONS OF THE BALANCING PLANES OF AN UNBALANCED ROTOR-BEARING SYSTEM USING DYNAMIC CONDENSATION TECHNIQUE

S. Abuja and A. N. Sharon *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 37-55 refs (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

An analytical procedure for the dynamic balancing of multi-rotor systems supported on fluid-film bearings is presented. The model is developed based on the finite element method which includes the effects of translational, and rotational inertia, and gyroscopic moments using the consistent matrix approach in conjunction with the dynamic matrix reduction technique, the model analysis, and the least-square balancing techniques. The use of the matrix reduction technique for determining an equivalent reduced system for balancing, provides subsequent saving of both, the computational time and space, on the digital computer. Three distinct practical conditions are investigated in the present work which are: (1) the balancing of rotor disks at and below the critical speeds, (2) the effect of the location of the balancing planes on the rotor response, (3) the effect of the number of balancing planes on the rotor response. The balancing method is found to be quite effective, permitting safe rotor operation over the speed covering the three critical bending speeds. Author

N86-16637# Maryland Univ., College Park.

STRUCTURAL DAMAGE DETECTION BY THE SYSTEM IDENTIFICATION TECHNIQUE

J. C. S. Yang, T. Tsai, V. Pevlin, J. Chen, and W. H. Tsai *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 57-65 refs (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20735 CSCL 20/11

The research described in this paper, concerns the development of techniques with the potential to detect and track progressive fracture by observing changes in the identified system parameters: mass, stiffness and damping matrix elements. The method, called the system identification technique, has two steps: a process of retrieving the eigenvalues and eigenvectors during a dynamic response phase and the determination of mass, stiffness and damping matrices from these values. The proposed techniques was verified on cantilever beam continuous structure systems through finite element simulation and experimental studies. Results from both studies have indicated the feasibility of damage detection by identifying the structural system matrices. For a cantilever beam system, the location of crack type damage seems to be best identified by the flexibility matrix which is the inverse of the stiffness matrix. B.W.

N86-16638# Wisconsin Univ., Madison. Dept. of Engineering Mechanics.

TIME DOMAIN MODAL ANALYSIS OF A SLOTTED CYLINDRICAL SHELL

W. Q. Fong, P. Q. Zhang, and T. C. Huang *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 67-79 refs (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The modal parameters will change if a structure change from being perfect to being defective. This paper investigates a cylindrical shell with a longitudinal slot by the time domain method. The 11 sets of mode vectors, all of them nearly real modes, are investigated and the modal shapes are plotted. When the slotted shell is compared with the original perfect shell, it is found that several new mode vectors are created for the slotted shell, and the characteristics of the kept modes, the mode shapes of the perfect shell which remain for the slotted shell, will change also. Author

N86-16639# General Electric Co., Philadelphia, Pa. Space System Div.

APPLICATION OF THE ITD ALGORITHM TO LANDSAT TRANSIENT RESPONSES c18

R. R. Kauffman *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 81-89 refs (For primary document see N86-16632 07-39)

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 22/2

Frequency, damping, and three degree-of-freedom mode shapes were estimated from data transmitted from the oribiting LANDSAT-4 and LANDSAT-5 Earth observation spacecraft. The data was comprised of three channels of time history data corresponding to orthogonal rotations of the spacecraft. The data was processed using the Ibrihim Time Domain Technique. It was

found that multiple modes could be characterized per channel of data. Damping estimates are on the order of 0.2% for low frequency (> 3 Hz) modes and on the order of 0.5% for high frequency modes. Author

N86-16640# Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
THE IDENTIFICATION MATRIX AND CONVERGENCE OF PARAMETERS IN OFF-LINE SYSTEM IDENTIFICATION
Ken Tomita and Darrell A. Frohrib *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 91-97 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 02/11

The identification matrix characterizes the mathematical properties of a system's model in conjunction with an identification algorithm; uniqueness of obtained system parameters is guaranteed. The identification matrix is the second partial derivative of an error criterion with respect to system parameters. The matrix can be reformulated as part of the identification algorithm based on the least square identification concept. The identification matrix also relates least square identification to output distinction identifiability. Numerical examples of these roles of the identification matrix are presented. Author

N86-16641# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MODEL EVALUTION OF SPINAL INJURY LIKELIHOOD FOR VARIOUS EJECTION SYSTEM PARAMATER VARIATIONS c52
Eberhardt Privitzer *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 99-115 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 06S

The Air Force Aerospace Medical Research Laboratory's (AFAMRL) Head-Spine Model (HSM), a discrete element model of the human head-spine structure, is described. This model was developed to provide a mathematical means for the investigation of three-dimensional head-spine structure dynamic response and injury likelihood in impact environments and to serve as a design tool for the evaluation of crewmember-ejection system impact interactions. Results are presented from a study which involved the use of the HSM to evaluate the effects of variations in certain ejection system parameters on head-spine structure ejection response and injury likelihood. Author

N86-16642# Franklin Research Center, Philadelphia, Pa.
TIME DOMAIN MATHEMATICAL MODELING OF ELASTIC INSTABILITIES AND LARGE ELASTIC-PLASTIC DEFLECTIONS
Robert P. Brooks *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 117-127 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Mathematical modeling and computational techniques, based on an explicit time integration scheme, are presented for the calculation of elastic instabilities and large elastic-plastic deflections of beam elements. The equations are formulated to facilitate their introduction into time-domain computer programs. The simple models presented, demonstrate the phenomena for Euler, angle and lateral buckling, as well as plastic-buckling with strain-rate effects. This methodology can be implemented to analyze complex structures, consisting of members that may exhibit failure instability when subjected to large, short-duration loads. Author

N86-16643# Indian Space Research Organization, Bangalore. Structures Div.
LOW ORDER DYNAMIC MODELS OF INDIAN REMOTE SENSING SATELLITE c18
M. Sambasiva Rao, B. G. Prakash, and M. S. S. Prabhu *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 129-153 (For primary document see N86-16632 07-39)
Copyright. Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 22/2

Simple low order equivalent dynamic models of Indian Remote Sensing Satellite (IRS) are generated. The models consist of physical elements like springs, beams, etc., with lumped masses. Two decoupled models, one in longitudinal and the other in lateral direction, are generated representing the dynamic characteristics of the satellite adequately in the low frequency range of 0 to 100 Hz. A building-block approach is followed in systematically constructing the models. First, conceptual models are generated based on the study of load paths, models of vibration etc., from a detailed finite element analysis of IRS already made. The important spacecraft subsystem models are derived by simulating their base-fixed modes of interest using equivalent physical single degree of freedom systems by matching the frequencies and modal effective masses. This required a new approach in representing subsystems with multi-node interfaces for their equivalent masses and forces. Lastly the subsystem models are assembled and interface elements are tuned to match with the basic dynamic behavior of IRS as observed from detailed finite element analysis. B.W.

N86-16644# Tsinghua Univ., Beijing (China).
A DIRECT METHOD FOR ESTIMATING LOWER AND UPPER BOUNDS OF THE FUNDAMENTAL FREQUENCY
Dewen Jin, Walter D. Pilkey (Virginia Univ., Charlottesville), B. P. Wang (Texas Univ., Arlington), and Yohji Okada (Ibaraki Univ., Hirachi, Japan) *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 155-165 refs Sponsored in part by ONR, Arlington, Va. (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

When studying or designing a vibrating system, it is useful to have a quick estimate of frequencies, especially the fundamental frequency. The lower and upper bounds of the fundamental frequency provide the approximation and range of this frequency. This paper presents a direct method to get the lower and upper bounds of a fundamental frequency. In contrast to currently used approaches, the lower and upper bounds can be obtained simultaneously by this method. The method is applicable to discrete and continuous systems. For discrete systems this procedure involves substituting an assumed mode shape into the equations of motion, and then the bounds of the fundamental frequency are obtained by the enclosure theorem. For continuous systems, an initial distributed load is assumed instead of an initial modeshape. A simple formula for estimating the bounds of the fundamental frequency of a continuous beam is derived in this paper. This technique is especially appropriate for a system having a first modeshape which is easy to estimate. Several examples are presented to illustrate the method. Author

N86-16645# Virginia Univ., Charlottesville. School of Engineering and Applied Science.
APPROXIMATING DYNAMIC RESPONSE IN SMALL ARRAYS USING POLYNOMIAL PARAMETERIZATIONS AND RESPONSE SURFACE METHODOLOGY
K. P. White, Jr., H. C. Gabler, III, and W. D. Pilkey *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 167-173 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

This paper describes a method for deriving an approximate algebraic model which defines the performance of a dynamic system as a function of its response parameters. The method extracts essential response information from large amounts of test data or simulation output and stores this information in a single, small, two-dimensional array. This data compression provides for highly efficient storage of essential information in a form which is especially convenient for subsequent use in analysis, experimenta-

tion, model validation, or design optimization. The method is illustrated by an application to passenger-vehicle crashworthiness design optimization. Author

N86-16646# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION BULLETIN 55. PART 2: DYNAMIC TESTING, FLIGHT VEHICLE DYNAMICS, SEISMIC LOADS AND FLUID-STRUCTURE INTERACTION Monthly Report
Jun. 1985 202 p refs Proceedings of the 55th Symposium on Shock and Vibration, Dayton, Ohio, 22-24 Oct. 1984; sponsored by ASD 3 Vol.
(AD-A160264; SVIC-Bull-55-Pt-2) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

Several topics related to dynamic testing, flight dynamics, seismic loads, and fluid-structure interaction are discussed. Shock waves, earthquakes, impact tests, blast loads, aircraft reliability, ship hulls, and submerged bodies are among the topics covered. For individual titles, see N86-16647 through N86-16662.

N86-16647# Pacific Missile Test Center, Point Mugu, Calif.
TRIAXIAL VIBRATION SYSTEM
W. Douglas Everett and Thomas H. Helfrich *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 1-15 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

During the reliability tests of external stores the Pacific Missile Test Center has been successful in reproducing the in-service vibration experienced by the store when carried on a high performance jet aircraft. A combination of acoustic and mechanical excitation provides the appropriate vibration magnitude and spectrum. One of the advantages of using acoustic energy has been the simulation of the vibrational state simultaneously in three axes. In attempting to increase test capability to include stores carried on helicopters and other low speed platforms and to maintain a triaxial vibration capability, Pacific Missile Test Center is developing a test facility that will test a 500 pound store in the 0 to 500 Hertz frequency range with a stroke of 2 inches double amplitude. A review of existing low frequency triaxial vibration equipment was conducted, a preliminary design was completed, and individual component and initial developmental model tests were concluded. A description of the device, an overview of the effort to date, an analytical investigation of the motion, and an evaluation test plant was developed for a thorough evaluation of the device are discussed. Author

N86-16648# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
INITIAL DESIGN AND TESTING OF A UNIQUE HIGH FREQUENCY FATIGUE TEST SYSTEM
David I. G. Jones *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 17-26 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The development of a high-frequency resonant fatigue test system for investigating crack intiation and propagation behavior in test specimens under combined low cycle (LCF) and high cycle (HCF) loading is described. The system offers significant advantages in low cost and simplicity. Initial dynamic response predictions for the prototype system are discussed. Comparisons with experimental measurements are made. Plans for improvement and implementation of the system are briefly discussed. Author

N86-16649# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
INVESTIGATION OF MODES, FREQUENCIES AND FORCED RESPONSE OF A HIGH FREQUENCY FATIGUE TEST SYSTEM
Dantam Rao and David I. G. Jones *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 27-37 refs Sponsored in part by National Academy of Sciences - Natioal Research Council, Washington, D.C. (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A low cost, resonance based Fatigue Test System Prototype, designed for studying the crack-growth rates of turbine or disc blade materials under the combined action of a High Cycle Fatigue Load (HCF) and Low Cycle Fatigue Load (LCF), has been fabricated by the Materials Laboratory. Theoretical and experimental analysis of dynamic characteristics of this prototype structure are presented. The theoretical investigation of natural frequencies and modes is carried out by the finite element method using planar and solid elements available in NASTRAN. The experimental tests are conducted using a micro-computer based system STEPSINE (which plots the frequency response function in real time), with the HCF/LCF machine excited by stepped sine excitation. Accelerance response of the structure is also measured by a commercial dual channel FFT analyzer. The natural frequencies calculated by the finite element model are compared with experimental values measured by the STEPSINE system and FFT Analyzer. Factors affecting the accuracy and quality of the dynamic characteristics obtained by using these three methods are discussed. Author

N86-16650# Hughes Aircraft Co., Albuquerque, N. Mex. Engineering Center.
DATA ANALYSIS TECHNIQUES TO SUPPORT STRUCTURAL MODELING
J. W. Jeter and P. H. Merritt *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 39-49 refs (For primary document see N86-16646 07-39)
(Contract F29601-83-C-0042)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Finite element structural analysis of a complex system is generally restricted by the size of a structural model which can be realistically included in a computer analysis. Furthermore, practical problems are often lacking a definitive representation of the significant input for the model. The use of coherence analysis to attach both the problem of model complexity and the problem of input definition is discussed. The techniques utilized for simple and multiple coherence analysis are described, examples are presented, and the effects of the techniques on a practical analysis are discussed. The procedure has advantages which are applicable to most large scale applications of finite element modeling techniques. Author

N86-16651# Sandia National Labs., Albuquerque, N. Mex.
ULTRA-HIGH-VELOCITY IMPACTS UTILIZING A ROCKET SLED AND AN EXPLOSIVELY ACCELERATED FLYER PLATE c14
R. A. Benham and W. R. Kampfe *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 51-55 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/2

Well-controlled impacts of reentry vehicle nose tips with relatively thick targets at controlled inclination and at velocities above 14,000 fps can now be obtained using a newly developed testing method. The instrumented nose tip is mounted on a rocket sled and is accelerated to a velocity of more than 6000 fps. An explosively accelerated flyer plate (target) is driven toward the sled, at the proper angular orientation, at velocities of more than 8000 fps. Impact of the target and nose tip occurs at the combined velocities. Precise timing is required to produce the desired impact conditions and impact diagnostic information as well as output from the onboard instrumentation system. This method has been demonstrated in two experiments, with total test costs a fraction of that of the only other alternative-a rocket flight test. Author

N86-16652*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WATER IMPACT TESTING OF A FILAMENT WOUND CASE
A. A. Schmidt and D. A. Kross *In* Shock and Vibration Information Center The Shock and Vibration Bulletin, Part 2 Jun. 1985

p 57-67 ref (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A lightweight Filament Wound Case (FWC) Solid Rocket Booster (SRB) is being developed by NASA to increase the payload capability of the space shuttle. As with the steel boosters, the current plan is to recover the FWC SRB's after they impact the ocean at 65 to 85 ft/sec. As the boosters enter the ocean (nozzle first) the water moves away from the vehicle creating a cavity, which then collapses on the vehicle, and results in a significant loading event. To understand this loading event, tests were conducted on a quarter scale FWC model to measure cavity collapse pressure distributions, deflected shape and the effects of and conditions and pressure scaling. Author

N86-16653# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
AIRWORTHINESS FLIGHT TEST PROGRAM OF AN AIRCRAFT EQUIPMENT FAIRING c05
V. R. Miller and T. P. Severyn (4950th Test Wing, Wright-Patterson AFB, Ohio) *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 69-75 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 01/3

The results of an airworthiness flight test program of an aircraft equipment fairing are given. The objective of the tests was to insure the airworthiness of the aircraft with the installed fairing. The tests were conducted to determine the structural integrity of the modifications and their effects on the aircraft handling qualities. The tests were extended to allow more detailed data acquisition and analysis due to the problems encountered with flow separation, aerodynamic buffeting and noise-induced fatigue. The test indicated that the airspeed envelope of the aircraft be restricted while the fairing was installed, and that structural modifications to portions of the aircraft be made. Rigid inspection requirements were levied after each flight to detect any structural damage. Author

N86-16654# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AN UPDATE OF SPACECRAFT DYNAMIC ENVIRONMENTS INDUCED BY GROUND TRANSPORTATION c18
N. R. OConnell *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 77-85 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 22B

An update to a spacecraft transportation dynamic environments data base was developed based on data from recent transportation of spacecrafts. Vibration levels are significantly lower than those measured in 1966, while the shock response spectra are nearly the same. Ground shipping criteria and shipping practices, which have been very successful in preventing damage, are also summarized. Author

N86-16655# Illinois Inst. of Tech., Chicago. Dept. of Civil Engineering.
RELIABILITY OF STRUCTURES SUBJECTED TO MULTIPLE BLAST LOADS
A. Longinow, J. Mohammadi, and H. S. Napadensky (Illinois Inst. of Technology Research Inst., Chicago) *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 87-93 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The problems involved in predicting the response of structures when subjected to multiple blast loads are examined. In this formulation the structure is modeled as a single degree of freedom system with a resistance function which provides for an approximate degradation in its strength. The method considers uncertainties in both structural and blast load parameters. The blast load and resistance are assumed to be lognormally distributed. A failure probability is computed after each blast. Individual failure probabilities are combined to yield the probability of collapse. The method of analysis is described. Its application is illustrated by means of an example problem. Its limits of applicability and needs for further research are described. Author

N86-16656# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
DEVELOPMENT OF A SHEAR STATIC CALIBRATION DEVICE
Charles D. Little, Jr. *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 123-127 (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The definition of increasingly severe dynamic test environments from explosive laodings for defense and military structures has required pressure and stress measurements on the order of several kilobars. To facilitate these measurements a static fluid calibration device was developed which enables transducer calibration to the 3 kbar pressure level. The device is constructed of high-strength steels and is a totally self-contained unit, needing no further means for confinement. The strength and stiffness of the device is sufficient for safe and routine loading of areas up to 64.5 square centimeters (10 in.) for the rare working pressure. The hydraulic system is composed of a hand operated, low volume pump, stainless steel tubing, check valves, fittings, and an input pressure gage, all of which are nominally rated at 7 kbar. Transducers with body thicknesses ranging from 2.54 to 8.89 cm (1 to 3.5 in.) and diameters from 0.89 to 12.7 cm (3.5 to 5 in.) are accomodated by the present design. In addition to transducer calibration, the device provides a useful vehicle for experimental transducer varification through determination of nonlinear and hysteretic effects. Author

N86-16657# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D'ALEMBERT UNFOLDING OF HOPKINSON BAR AIRBLAST DATA
Howard C. White and Charles R. Welch *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 129-133 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Strain gaged Hopkinson Bars are being used to make airblast impulse measurements in high pressure (172 MPa (25 ksi) to 621 MPa (90 ksi)) explosive environments. The data obtained are researchers typically limited in time by the arrival of the reflected tensile wave from the dump end of the bar. For a bar 5.8 m (19 ft) long with a dump section of 4.0 m (13 ft), the record is approximately 1.6 msec long before the reflected wave is seen in the data. By manipulating that portion of the data that is effected by reflections, researchers can increase the useful data time length by a factor of two to four. A simple data unfolding procedure based on an elastic D'Alembert solution for stress waves in a bar is presented. Bar gage airblast data unfolded using this procedure and the impulse data from these records are also presented. Author

N86-16658# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
DESIGN AND FIELD EXPERIENCE WITH THE WES 10 PERCENT BAR AIRBLAST AND SOIL STRESS GAGE c35
Charles E. Joachim and Charles R. Welch *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 135-147 (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 14/2

A family of shock transducers based on the classical load-cell geometry, i.e., the elastic compression of a column, is currently under development at the waterways Experiment Station. The transducers include an airblast gage, a soil stress gage, and a

soil-structure interface stress gage. These gages operate at considerable higher pressure ranges than previous elastic shock transducers. The airblast gage has provided long term (over 10 msec) measurements in blast environments of over 600 MPa (6 kbar). The theoretical operating pressure range of the gages is approximately 1000 MPa (10 kbar) limited by the elastic limit of the gage body steel. The actual pressure range to date has been limited by acceleration induced failures of the strain gages and internal wiring. The transducer development, is described and some dynamic measurements produced from these gages are given. Author

N86-16659# Defence Research Establishment Suffield, Ralston (Alberta).
STRUCTURAL RESPONSE OF PANELS SUBJECTED TO SHOCK LOADING
R. Houlston and J. E. Slater *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 149-163 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

In combat operations, warships could be subjected to air blast and underwater shock loads capable of causing significant local damage. As part of a vulnerability and survivability study, the prediction and measurement of the structural response of ship panels to free field airblast explosions are investigated. Experiments with steel plates and a full scale stiffened panel are described in detail. Finite element modeling results are presented with a detailed correlation to experiment. Author

N86-16660# Naval Underwater Systems Center, Newport, R.I.
GENERALIZED DYNAMIC ANALYSIS OF INTERACTIVE FLUID-STRUCTURE TRANSIENT RESPONSE
J. E. Boisvert and B. E. Sandman *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 165-171 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A generalized classical analytical method is formulated for the solution to the response of submerged structures excited by transient forces. The approach is directly applicable to numerous problems where transient structural response in the presence of a heavy fluid medium is of fundamental interest. The proposed methodology, which captures the complete spectral distribution of frequency and wavenumber, is capable of describing response to unlimited space-time waveforms of transient loading. The methods employed in the development of a generalized analytical approach utilize a complete basis of functional influence coefficients in both the space and time domains. These influence functions are generated in terms of a series summation which represents the response under space-time impulses. Subsequently, a convolution integral of the actual space-time input distribution function with the influence functions provides the final resolution to the in-fluid structural response under any chosen or described form of the input loading. The implementation of this analytical approach is achieved without employing asymptotic assumptions or approximations of the relative fluid loading. The form of the analytical approach is directly applicable to the solution of submerged, transient response of any structure which can be characterized in terms of generalized, in-fluid dynamic influence functions. Author

N86-16661# Naval Postgraduate School, Monterey, Calif. Dept. of Mechanical Engineering.
ON THE FIELD EXPERIENCES OF UNDERWATER TESTING FOR A STIFFENED FLAT PLATE MODEL
T. R. Rentz and Y. S. Shin *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 173-191 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

An experimental investigation into the underwater shock-induced responses of a stiffened flat plate was conducted. An air-backed flat plate with externally machined rectangular stiffeners and a clamped boundary condition was subjected to shock wave loading by an eight pound TNT charge detonated underwater. The plate was instrumented to measure transient strains. The test structure acceleration and free field pressure were also measured. Pre-shot and post-shot calculations were performed using the EPSA (Elasto-Plastic Shell Analysis) code. Many lessons were learned and important factors to be considered in the testing are discussed. Author

N86-16662# Naval Ship Research and Development Center, Portsmouth, Va. Underwater Explosions Research Div.
ANALYSIS OF CAVITATION CAUSED BY SHOCK WAVE INTERACTION WITH A RESTRAINED MASS
Robert T. Handleton *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 2 Jun. 1985 p 193-203 refs (For primary document see N86-16646 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A method for obtaining the motion of a restrained mass loaded by an underwater shock wave is developed through an analysis of the opening and closing of cavitation at the mass. Without making energy assumptions beforehand, the derived motion of the mass is used to calculate the fraction of the incident shock wave energy absorbed by the restraint over a range of parameters. The energy study provides a basis for judgements of the fraction of incident energy absorbed by a yielding surface. Author

N86-16663# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
STRESS INTENSITY FACTORS AT RADIAL CRACKS OF UNEQUAL DEPTH IN PARTIALLY AUTOFRETTAGED, PRESSURIZED CYLINDERS Final Technical Report
S. L. Pu Jun. 1985 31 p
(AD-A157866; AD-E440288; ARLCB-TR-85018) Avail: NTIS HC A03/MF A01 CSCL 20/11

Stress intensity factors are estimated for radial cracks of unequal depths emanating from the inner surface of a partially autofrettaged cylinder subjected to various bore pressures. The approximate method developed for uneven radial cracks in a non-autofrettaged cylinder is applied to functional stress intensities. Linear superposition is then used to obtain the final stress intensity factors of uneven cracks due to a stress field which varies with the magnitude of bore pressure, the degree of autofrettage, and the elastic-plastic behavior of the cylinder material. The autofrettage residual stress reduces the level of stress intensity factors at inner radial cracks due to internal pressure, but has little effect on variations in stress intensity factors caused by changes in crack depth. GRA

N86-16664# Washington Univ., Seattle. Dept. of Mechanical Engineering.
DYNAMIC FRACTURE TOUGHNESS
A. S. Kobayashi, M. Ramulu, M. S. Dadkhah, K. H. Yang, and B. S. J. Kang Aug. 1985 26 p
(Contracts N00014-85-K-0187; N00014-76-C-0060)
(AD-A159382; UWA/DME/TR-85/53) Avail: NTIS HC A03/MF A01 CSCL 11/6

Dynamic fracture toughness versus crack velocity relations of Homalite-100, polycarbonate, hardened 4340 steel and reaction bonded silicon nitride are reviewed and discrepancies with published data and their probable causes are discussed. Data scatter in published data are attributed in part to the observed fluctuations in crack velocities. The results reaffirmed our previous conclusion that the dynamic fracture toughness versus crack velocity relation is specimen dependent and that the dynamic arrest stress intensity factor is not a unique material property. GRA

N86-16665# Air Force Systems Command, Wright-Patterson AFB, Ohio.
SOFTWARE FOR NUMERICAL CALCULATION OF TWO-DIMENSIONAL NONSTATIONARY FLUID ELASTICITY AND PLASTICITY PROBLEMS

M. Z. Qin, C. S. Xie, Q. M. Tan, and X. P. Lin 27 Aug. 1985 20 p Transl. into ENGLISH from Jisuan Yu Jisuanji Yingyong (China), v. 5, no. 3, 1984 p 129-137
(AD-A159392; FTD-ID(RS)T-0495-85) Avail: NTIS HC A02/MF A01 CSCL 20/11

This paper uses the HELP code to compile a LTDL program in BCY language. It is capable of solving plasticity and elasticity problems of a two dimensional nonstationary fluid (planar or axisymmetry problems), including multi-materials (metals and nonmetals). A great deal of calculation was performed to solve problems such as metal projectile penetration into steel target, high speed collision, surface explosion of high energy explosive, spherical explosion, collision of two rods, etc. Very useful results were obtained. This paper describes the capabilities and focal points of this software. GRA

N86-16666# Lawrence Livermore National Lab., Calif.
EVALUATION OF TEARING ENERGIES IN STYRENE-BUTADIENE RUBBERS
A. Goldberg, D. R. Lesuer, J. C. Stone, and J. Patt 25 Jun. 1985 63 p Prepared in cooperation with Army Tank-Automotive Command, Warren, Mich.
(Contract W-7405-eng-48)
(DE85-013240; UCID-20502) Avail: NTIS HC A04/MF A01

Tearing energies were obtained on samples removed from commercial tank-track pads and on a series of SBR laboratory formulations in which the carbon-black content varied from 0 to 40 wt %. The commercial materials were tested at a strain rate of 10/s with temperatures ranging from 22 to 140 C. The laboratory materials were tested also at both lower and higher strain rates and at -20 C. We evaluated the effect of temperature, strain rate, and carbon-black content on tearing energy, failure stress, and failure strain. The results, including the shape of the stress-strain curves, are discussed in terms of viscoelasticity, uncoiling of the long molecular chains, carbon-black rubber interactions, and knotty tearing. In the absence of knotty tearing and for carbon-black contents of 20 wt % or less the tearing energy, the failure stress, and failure elongation increased with either a decrease in temperature or an increase in carbon-black content. With the first appearance of knotty tearing, which occurred at 20 to 25 wt % carbon black, large increases in tearing energy and failure strength were obtained. DOE

N86-16667# Los Alamos National Lab., N. Mex.
THERMOELASTIC-PLASTIC FLOW AND DUCTILE FRACTURE IN SOLIDS
D. L. Tonks 1985 63 p
(Contract W-7405-eng-36)
(DE85-015699; LA-UR-85-2529) Avail: NTIS HC A04/MF A01

The main aim of these lectures is to develop the theory of elastic-plastic flow in solids, with application to a particular class of processes, namely those in which the dissipation of plastic work cannot be neglected. Examples of such processes are highspeed impact phenomena and cratering, shock compression, often shock release as well, and explosive deformation and welding. An important part of the development is to include the anisotropic elastic properties of a solid, and for this reason the theory applies to solids in general. On the other hand, it is possible that some of the results will have limited validity for nonmetals. The secondary aim of the lectures is to develop a general framework for ductile fracture, and describe the current practice in the field. Our theory is incremental in nature and suitable for integrating along a process in small timesteps as is done in hydrodynamic computer programs. A notational conflict arose, because in continuum mechanics the extensive quantities are taken per unit mass, while in thermodynamics they are usually per unit volume. The continuum mechanics normalization, i.e., per unit mass, is used throughout, with the result that uncommon factors of density show up in the thermodynamic equations. DOE

N86-16668# Los Alamos National Lab., N. Mex.
DECONVOLUTION ANALYSIS TO DETERMINE RELAXATION TIME SPECTRA OF INTERNAL FRICTION PEAKS
J. R. Cost 1985 5 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985
(Contract W-7405-eng-36)
(DE85-015702; LA-UR-85-2504; CONF-8506125-5) Avail: NTIS HC A02/MF A01

A new method for analysis of an internal friction vs temperature peak to obtain an approximation of the spectrum of relaxation time responsible for the peak is described. This method, referred to as direct spectrum analysis (DSA), is shown to provide an accurate estimate of the distribution of relaxation times. The method is validated for various spectra, and it is shown that: (1) it provides approximations to known input spectra which replicate the position, amplitude, width and shape with good accuracy, (2) it does not yield approximations which have false spectral peaks. DOE

N86-16669# Brookhaven National Lab., Upton, N. Y. Structural Analysis Div.
LIQUID STORAGE TANKS UNDER VERTICAL EXCITATION
A. J. Philippacopoulos 1985 6 p Presented at a conference
(TI85-012188; BNL-NUREG-36472; CONF-850670-19) Avail: NTIS HC A02/MF A01

Until recently, the hydrodynamic effects on liquid storage tanks induced by an earthquake excitation were basically treated for the horizontal component of the earthquake. Recent studies, however, showed that the hydrodynamic effects due to the vertical component of an earthquake may be significant. In these studies the tank is assumed to be fixed at the bottom. The hydrodynamic behavior of liquid storage tanks induced by vertical earthquake input excitation is discussed. First, the fluid-tank system is treated as a fixed-base system and a single formula is obtained for the coupled fluid-structure natural frequency. Second, additional interaction effects due to the foundation flexibility on the fluid-tank system are investigated. It is concluded that the foundation flexibility may have a significant effect on the hydrodynamic behavior of the liquid storage tanks under a vertical ground shaking. DOE

N86-16670# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
INTERNAL-VARIABLE BASED MODELS FOR ELEVATED TEMPERATURE FATIGUE AND DEFORMATION Annual Progress Report, 1 Jul. 1984 - 31 Jan. 1985
A. K. Miller 1985 116 p
(Contract DE-FG03-84ER-45119)
(DE85-014322, DOE/ER-45119/T1) Avail: NTIS HC A06/MF A01

This project addresses a major need within high-temperature, materials-limited energy technologies, namely, the need for science-based models which can predict deformation and fracture of the major component materials. These models, in turn, are necessary for evaluations of new alloys, for design optimization studies, and for demonstrations that the systems meet safety and reliability criteria. DOE

N86-16671# Lawrence Livermore National Lab., Calif.
VIBMAIN: ONE-DIMENSIONAL VIBRATION
C. Calder 1 Jul. 1985 47 p
(Contract W-7405-eng-48)
(DE85-017396; UCID-30200-83-7) Avail: NTIS HC A03/MF A01

A first engineering course in vibration is traditionally taught at the senior level and deals with the theory and concepts of a one-dimensional vibration system. Course content begins with free vibration of undamped and viscously damped systems. Coulomb-type (friction) damping is typically given only a cursory treatment because of the difficulty inherent in the discontinuous, passive friction force. Applied forcing functions are studied next beginning with harmonic functions followed by transient force inputs. In the study of transient forces, various numerical methods are typically introduced. The purpose of the code described here is to provide a numerical of solving all of the one-dimensional problems normally encountered in a vibrations course. This includes the classical problems which can be solved in closed-form but is especially directed at solutions for problems which might contain Coulomb

damping, nonlinear springs, a general forcing function, and/or base-excitation input. The code also serves to introduce the user to the power on numerical techniques and microcomputers in computer-aided engineering. The graphical output gives a clear picture of the dynamic response and illustrates the mathematical relationship between displacement, velocity, and acceleration. DOE

N86-16672# Los Alamos National Lab., N. Mex.
SCATTERING OF ELASTIC WAVES BY SMALL SURFACE-BREAKING OR SUBSURFACE CRACKS IN THREE DIMENSIONS
W. M. Visscher 1985 10 p Presented at the Review of Progress in Quantitative NDE, Williamsburg, Va., 23 Jun. 1985
(Contract W-7405-eng-36)
(DE85-017564; LA-UR-85-2840; CONF-8506110-2) Avail: NTIS HC A02/MF A01

The long-wavelength limit of elastic wave scattering by surface cracks in 3D is considered. It is shown that, if the crack is normal to the surface, the scattering can be described by two real parameters, one of which may be taken to be the crack size. The other therefore depends on shape, orientation, and burial depth. Many computed illustrations are given. It is concluded that the amount of information about cracks obtainable by low frequency elastic wave scattering is very limited. DOE

N86-16673# Rolls-Royce Ltd., Derby (England). X-Ray Diffraction Lab.
X-RAY RESIDUAL SURFACE STRESS MEASUREMENT IN AERO ENGINE MATERIALS
C. Baxter and K. Swift 23 Jul. 1985 26 p Presented at BSSM X-Ray Stress Group, Wolverhampton, England, 30 Apr. 1985
(PNR-90274) Avail: NTIS HC A03/MF A01

Critical elements of gas turbine engines such as nickel based superalloy turbine disks were examined by X-ray diffraction. A software package was developed. The program generates data in a tabular form. The data can be plotted on a suitable scale for visual peak assessment. Several routine choices are possible, including selection of a window for detailed analysis, removal of background, application of Lorentz, polarization and absorption correction factors, and evaluation of the slope of the plot by a least squares fit routine and use of this to calculate the residual elastic stress. Author (ESA)

N86-16674# Welding Inst., Cambridge (England).
FATIGUE TESTING OF TUBE TO NODE BUTT WELDS ENVISAGED FOR RAE BEDFORD FLIGHT SIMULATOR
T. D. Rosenberg Apr. 1985 30 p refs Prepared for Vickers PLC, Hampshire, England
(Rept-23480/2/85; BR95858) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out on tube to node butt welds under axial loads. Results indicate that the joints can be treated as Class F in the BS 5400 fatigue design rules for welded joints. Pressure drop and leak detection systems for crack detection during the operation of the structure were evaluated. The pressure drop system is found to be effective in detecting the presence of through-thickness cracking. The reserve static strength of a joint containing a single through-thickness crack was measured, and found to be equivalent to a nominal stress in excess of the yield strength of the parent material. Author (ESA)

N86-16675# Admiralty Marine Technology Establishment, Teddington (England).
COMPUTATION OF POWER FLOW IN POINT CONNECTED DYNAMICAL SYSTEMS
J. H. James Jul. 1985 14 p refs
(AMTE(N)-TM-85066; BR96713; AD-A159556) Avail: NTIS HC A02/MF A01

Power input by time-harmonic forces and power dissipated in a component subsystem are found from the displacements and reaction forces which are obtained numerically by a computer program for dynamic stiffness coupling. Power flow in a system consisting of a finite beam mounted on an infinite water loaded plate is given as a numerical example in order to demonstrate the usefulness of the program as a research tool for power flow calculations. Author (ESA)

N86-16676# Technical Research Centre of Finland, Espoo. Metals Lab.
MECHANICAL PROPERTIES OF SHIELDED METAL ARC (SMA) AND SUBMERGED ARC (SA) WELDED JOINTS FOR QUENCHED AND TEMPERED HIGH STRENGTH STEEL N-A-XTRA-70
Maretti Vilpas, Hannele Tihekari, and Risto Karppi Sep. 1985 29 p refs Sponsored by Finnish Ministry of Trade and Industry
(VTT-363; ISBN-951-38-2402-0; ISSN-0358-5077) Avail: NTIS HC A03/MF A01

Hardness, tensile and Charpy-V testing, and fracture mechanics results of shielded metal arc and submerged arc welded joints for quenched and tempered high-strength steel N-A-XTRA-70 (Site 690) are given. Results for joints welded with Ni-Cr-Mo alloyed filler materials using arc energies of 17 kJ/cm and 30 kJ/cm and preheat temperature of 170 C show that the weld metal strength and toughness properties are close to the base material values. Hardness varies in the range 278 to 337 HV5 for the weld metals and 295 to 476 HV5 for the heat affected zones of the joints. Weld metals show reasonably good transition behavior compared with the base material. Arc energy has no marked effect on the KJ transition behavior of the welds. Author (ESA)

N86-16677# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Werkstofftechnologie.
APPLICATION OF THE dc POTENTIAL DROP AND THE PARTIAL UNLOADING METHODS TO FRACTURE MECHANICS TESTS
J. Heerens, K.-H. Schwalbe, D. Hellmann, J. Knaack, and J. Mueller-Roos 1985 47 p refs Extended version of paper presented at ASTM Symposium on User's Experience with Elastic-Plastic Fracture Throughness Test Methods, Louisville, Kentucky, 20-22 1983 Sponsored by Deutsche Forschungsgeimschaft
(GKSS-85/E/16; ISSN-0344-9629) Copyright. Avail: NTIS HC A03/MF A01

The ability of the dc potential drop method and the partial unloading technique to measure crack growth and to detect initiation of crack growth was investigated using steels and aluminum alloys. It is found that both the methods can be recommended for the determination of the R-curve; however,, at small amounts of crack growth the dc potential drop method gives more consistent results. The initiation values Jo of J determined by fractography were compared with Jic as obtained by current practice. It is found that Jic is poorly related to initiation or to a specific amount of crack growth. A modification of the Jic procedure is proposed. Two contacting arrangements of the dc potential drop method were checked for initiation detection. Author (ESA)

N86-16678# Materials Quality Assurance Directorate, London (England). Materials Center.
STRESS-CRACKING OF POLYMETHYL METHACRYLATE BY POLYETHYLENE GLYCOLS OF DIFFERENT MOLECULAR WEIGHTS
S. Millington Mar. 1985 17 p refs
(MQAD-TP-893; BR95960) Avail: NTIS HC A02/MF A01

The critical strains of polymethyl methacrylate in contact with polyethylene glycols were measured using a constant strain method. It is found that the critical strain depends on the difference between the solubility parameters of the glycol and the polymer. The times to craze are shown to depend on the competing effects of molecular size and solubility parameter. Author (ESA)

N86-16679# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
AN EXPLORATIVE INVESTIGATION INTO NECKING PHENOMENA
E. vanderGiessen Sep. 1983 133 p refs
(Lab-Rept-754) Avail: NTIS HC A07/MF A01

Theoretical, numerical, and experimental aspects of necking phenomena in tensile tests are discussed. Using a fully abstract notation of vectors and tensors, foundations of nonlinear continuum mechanics, especially finite strain plasticity, are derived. The bifurcation problem governing the onset of axisymmetric necking in a circular cylindrical tube, made of an incompressible, isotropic hardening material, in uniaxial tension is analyzed. Necking in tubular specimens is studied numerically. The relatively stiff ends appear to have a considerable influence on the entire deformation history. The effect of compressibility together with kinematic hardening on necking in a plane strain tensile bar is studied numerically. Alternatives for the experimental analysis of necking phenomena are discussed. The applicability of elementary grid methods is limited by the ductility of the grid material.

Author (ESA)

N86-16680# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.

THE INFLUENCE OF OBLIQUE PLATE EDGES ON STRESS DISTRIBUTION [DE INVLOED VAN SCHEVE RANDEN AAN PLATEN OP DE SPANNINGSVERDELING]

E. vanderGiessen Oct. 1983 48 p refs In DUTCH

(Lab-Rept-756) Avail: NTIS HC A03/MF A01

The effect of free, oblique plate edges on the stress and deformation distribution in the neighborhood of such edges was studied. The torsion of a very broad plate strip with oblique edges was considered. Using the perturbation method an approximate solution of the torsion problem is established in the form of two (repeated) asymptotic series in the maximum deviation with respect to the straight edge and in the wavelength of the evolution of the edge. If in the neighborhood of the edge a relative error with respect to the plate theory solution is allowed, three corrections to that solution are found. These three corrections have a boundary layer character and take into account that the edge is free of stress, that the free edge is not perpendicular to the midplane, and that the position of the free, oblique edge is not constant along the edge of the plate. Author (ESA)

N86-16681# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.

AN APPROXIMATE CALCULATION OF HORIZONTAL CIRCULAR-CYLINDER PRESSURE VESSELS SUPPORTED BY RINGS. PART 1: REPORT [HORIZONTALE DRUKVATEN. EEN BENADERINGSBEREKENING VAN HORIZONTALE CIRKELCILINDRISCHE DRUKVATEN OP ONDERSTEUNINGSRINGEN. DEEL 1: RAPPORT]

G. D. vanderWeijde Oct. 1983 127 p refs In DUTCH 2 Vol.

(Lab-Rept-764-Pt-1) Avail: NTIS HC A07/MF A01

An approximate scaling calculation for horizontal pressure vessels on ring supports was performed. Three calculation methods (the complete linear scaling theory, the membrane theory and Zick's method) were applied to a reference geometry and vessel loading situation. The effect of the variation of a single parameter with respect to the reference situation is discussed. Stresses and displacements of the cylinder are calculated with a computer program, starting from the Simmonds differential equations and applying the linear scaling theory. The calculations are characterized by slow and fast damping solutions. The complete linear scaling theory is not usable for an arbitrary vessel geometry. The membrane theory allows an estimation of slowly damping solutions. Zick's method does not allow the calculation of a number of important stresses. Author (ESA)

N86-16682# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.

AN APPROXIMATE CALCULATION OF HORIZONTAL CIRCULAR-CYLINDRICAL PRESSURE VESSELS SUPPORTED BY RINGS. PART 2: ANNEXES [HORIZONTALE DRUKVATEN. EEN BENADERINGSBEREKENING VAN HORIZONTALE CIRKELCILINDRISCHE DRUKVATEN OP ONDERSTEUNINGSRINGEN. DEEL 2: AANHANGSELS]

G. D. vanderWeijde Oct. 1983 104 p In DUTCH 2 Vol.

(Lab-Rept-764-Pt-2) Avail: NTIS HC A06/MF A01

Approximate calculation of horizontal pressure vessels on ring supports was performed. Geometry of the vessel, definitions, and symbols are presented. Formulas following the complete linear scaling theory, the membrane theory, and Zick's methods were deduced. Calculation examples are given. Calculation results are tabulated. The computer program for horizontal vessels in Fourier components is presented. Author (ESA)

N86-16683# European Space Agency, Paris (France).

THE EXPERIMENTAL/ANALYTICAL DETERMINATION OF THE REAL NORMAL MODE PARAMETERS OF A STRUCTURE WITH LIMITED ACCESSIBILITY Ph.D. Thesis - Hanover Univ., West Germany

Norbert Niedbal Jun. 1985 148 p refs Transl. into ENGLISH of "Die experimentell-rechnerische Ermittlung der reellen Eingenschwingungsgroessen bei begrenzter Zugaenglichkeit der Struktur" Report DFVLR-FB-83-26 Goettingen, West Germany, 1983 Original report in GERMAN previously announced as ESA-91554 (ESA-TT-839; DFVLR-FB-83-26) Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne DM 42

Phase separation methods for the experimental determination of normal mode parameters are proposed. As opposed to the classical phase resonance method, these methods require no adjustment of the exciter forces. In the case of a structure with limited accessibility, such methods improve the experimental modal analysis. A phase separation method is selected and its reliability enhanced for the case of damping coupling. A method to transform complex normal mode parameters into real normal ones is presented. Author (ESA)

N86-16684# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.

SYSTEMS SAFETY APPLIED TO DESIGN: THE STUDY OF WALLS [LA SECURITE DES SYSTEMES APPLIQUEE EN CONCEPTION: L'ETUDE D'UNE PAROI]

P. Sarrat (ITBTP, Saint Remy les Chevreuse, France) and M. NKaoua 1985 20 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984

(SNIAS-852-422-105) Avail: NTIS HC A02/MF A01

Condensation on the inner surface of a wall composed of two structures with isolation material in between was studied. A preliminary analysis shows all possible causes of moisture accumulation on the internal face of the wall. A tree analysis follows. A quantitative treatment gives a reliability evaluation. The moisture formation probability is given for each case. Author (ESA)

42 GEOSCIENCES (GENERAL)

N86-16685# National Oceanic and Atmospheric Administration, Boulder, Colo.

MARGINAL ICE ZONE BIBLIOGRAPHY

Jun. 1985 199 p

(PB85-242493; GD-17) Avail: NTIS HC A09/MF A01 CSCL 08L

A major bibliography on sea ice, meteorology and oceanography in the marginal ice zone is provided. It has been recognized in the last few years that processes of air-ice-ocean interaction occurring near the boundary of ice-covered seas are of critical importance to our understanding of the mechanisms of seasonal ice growth and decay and short and long term anomalies in ice extent. Oil and gas exploration and development are increasingly being conducted in areas with seasonal ice cover and the ice margin is also a zone of high productivity by marine biota. Until recently, opportunities to conduct research in the marginal ice zone (MIZ) were limited by available technology, but a major international marginal ice zone experiment (MIZEX) is underway in the Bering Sea and the East Greenland Sea and results from this work are now beginning to appear in the literature. GRA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-16686 Washington Univ., Seattle.
THE PETROLOGY AND LOW-TEMPERATURE GEOCHEMISTRY OF THE SULFIDE-BEARING MAFIC-ULTRAMAFIC UNITS OF THE ACOJE MASSIF, ZAMBALES OPHIOLITE, PHILIPPINES: CHARACTERIZATION OF MINERAL AND FLUID EQUILIBRIA Ph.D. Thesis
Teofilo Aniag Abrajano, Jr. 1984 490 p
Avail: Univ. Microfilms Order No. DA8509031

The petrology and low-temperature geochemistry of the sulfide, native metal, and alloy-bearing lenses and layers near the base of this cumulate sequence (BCS) as they are exposed in the surface and subsurface workings was examined. The attainment of highly reducing conditions during hydration of ultramafic rocks, as exemplified in the BCS, is favored by: (1) stable or metastable involvement of olivine in the buffering reactions; (2) high Fe:Mg ratios in olivine and/or pyroxene; and (3) low silica activity during hydration. The textural occurrence and sulfur isotopic signature of the sulfides, and the bulk composition and mineralogy of the least altered sulfides support an initial magmatic origin, by liquid immiscibility, of the BCS sulfides. Dissert. Abstr.

N86-16687* National Aeronautics and Space Administration, Washington, D.C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES (ISSUE 47)
Oct. 1985 146 p
(NASA-SP-7041(47); NAS 1.21:7041(47)) Avail: NTIS HC $12.50 CSCL 05B

This bibliography lists 524 reports, articles and other documents introduced into the NASA scientific and technical information system between July 1 and September 30, 1985. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economical analysis. Author

N86-16688*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
DEVELOPMENT OF COMPUTER SOFTWARE TO ANALYZE ENTIRE LANDSAT SCENES AND TO SUMMARIZE CLASSIFICATION RESULTS OF VARIABLE-SIZE POLYGONS Final Report
Brian J. Turner, Principal Investigator, George M. Baumer, Wayne L. Myers, and Steven G. Sykes May 1981 29 p refs Original contains imagery. Original photographs may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-26106)
(E86-10020; NASA-CR-177826; NAS 1.26:177826;
PSU-IRLWR-RP-106/OR) Avail: NTIS HC A03/MF A01 CSCL 08B

The Forest Pest Management Division (FPMD) of the Pennsylvania Bureau of Forestry has the responsibility for conducting annual surveys of the State's forest lands to accurately detect, map, and appraise forest insect infestations. A standardized, timely, and cost-effective method of accurately surveying forests and their condition should enhance the probability of suppressing infestations. The repetitive and synoptic coverage provided by LANDSAT (formerly ERTS) makes such satellite-derived data potentially attractive as a survey medium for monitoring forest insect damage over large areas. Forest Pest Management Division personnel have expressed keen interest in LANDSAT data and have informally cooperated with NASA/Goddard Space Flight Center (GSFC) since 1976 in the development of techniques to facilitate their use. The results of this work indicate that it may be feasible to use LANDSAT digital data to conduct annual surveys of insect defoliation of hardwood forests. Author

N86-16689*# Maryland Univ., College Park. Remote Sensing Systems Lab.
[ACTIVITIES OF THE PILOT LAND DATA SYSTEM PROJECT] Interim Progress Report
Jayanta K. Sircar, Principal Investigator 15 Nov. 1985 5 p ERTS
(Grant NAG5-512)
(E86-10023; NASA-CR-176377; NAS 1.26:176377) Avail: NTIS HC A02/MF A01 CSCL 05B

The University of Maryland's Remote Sensing Systems Laboratory submitted to NASA/Goddard an interim progress report on the work being conducted within its Pilot Land Data System (PLDS) project. The Remote Sensing Systems Laboratory addressed the following tasks: (1) identify data types and data sources needed to describe the selected test sites in collaboration with Goddard's Hydrological Sciences Branch; (2) define the procedures necessary to access/acquire this data; (3) conduct meetings with the PLDS Systems Engineering Group to identify functional specification priorities for PLDS development; (4) assemble documentation on historical remotely sensed imagery and transfer of such information to the PLDS Data Management Group; (5) collect data identified by Goodard's Hydrological Sciences Branch for data set inventory in PLD; (6) develop a Workstation-PLDS system interface over high speed lines, (7) develop and test through a Phase I demonstration of a micro workstation to access PLDS; and (8) establish interdepartmental agreement of development of computer link for electronic access of water resources data from USGS. Author

N86-16690*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
STUDY OF SPECTRAL/RADIOMETRIC CHARACTERISTICS OF THE THEMATIC MAPPER FOR LAND USE APPLICATIONS Final Report, 21 Sep. 1982 - 20 Jun. 1985
William A. Malila, Principal Investigator and Michael D. Metzler Principal Investigator Sep. 1985 54 p refs Original contain imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-27346)
(E86-10025; NASA-CR-176269; NAS 1.26:176269;
ERIM-164000-19-F) Avail: NTIS HC A04/MF A01 CSCL 08

An investigation conducted in support of the LANDSAT 4 Image Data Quality Analysis (LIDQA) Program is discussed. Results of engineering analyses of radiometric, spatial, spectral, and geometric properties of the Thematic Mapper systems are summarized; major emphasis is placed on the radiometric analysis. Details of the analyses are presented in appendices, which contain three of the eight technical papers produced during the investigation; these three, together, describe the major activities and results of the investigation. For individual titles, see N86-16687 through N86-16694.

N86-16691*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
STUDY OF SPECTRAL/RADIOMETRIC CHARACTERISTICS OF THE THEMATIC MAPPER FOR LAND USE APPLICATIONS: OBJECTIVES, ACCOMPLISHMENTS, CONCLUSIONS, AND RECOMMENDATIONS Final Report
William A. Malila and Michael D. Metzler *In its* Study on Spectral Radiometric Characteristics of the Thematic Mapper for Land Use Applications Sep. 1985 p 1-4 refs ERTS (For primary document see N86-16690 07-43)
Avail: NTIS HC A04/MF A01 CSCL 05B

The objectives of this investigation are to quantify the performance of the Thematic Mapper, as manifested by the quality of its image data, in order to suggest improvements in data production and to assess the effects of the data quality on its utility for land resources applications. Analyses of radiometric, spatial, spectral and geometric effects, with primary emphasis on radiometric effects

are included. This effort is part of the LANDSAT 4/5 Image Data Quality Analysis (LIDQA) program sponsored by the NASA Goddard Space Flight Center. Author

N86-16692*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
CHARACTERIZATION OF LANDSAT-4 MSS AND TM DIGITAL IMAGE DATA
William A. Malila, Michael D. Metzler, Daniel P. Rice, and Eric P. Crist *In its* Study on Spectral/Radiometric Characteristics of the Thematic Mapper for Land Use Applications Sep. 1985 p 5-20 refs Repr. from IEEE Transactions on Geoscience and Remote Sensing, v. GE-22, no. 3, May 1984 p 177-191 Previously announced in IAA as A84-33526 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (For primary document see N86-16690 07-43)
(Contract NAS5-27254)
Avail: NTIS HC A04/MF A01 CSCL 05B

The launch of LANDSAT-4 in July 1982 represents a continuation in the remote sensing of earth resources. The 80-m spatial resolution provided by the Multispectral Scanner (MSS) on board the satellite is fine enough to resolve many natural features and land-use details in both rural and urban settings. The second sensor of the spacecraft, the Thematic Mapper (TM), introduce a new era of sensing with refined spatial resolution (30 m) and expanded spectral coverage (7 bands). This paper describes results from engineering studies of the characteristics of digital image data from the two LANDSAT-4 sensors are described. These studies form a part of the LANDSAT-4 Image Data Quality Analysis program (LIDQA). The image data were generally found to be of high quality and the TM provided several improvements over the MSS, in its spatial and spectral characteristics. Author

N86-16693*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
CHARACTERIZATION AND COMPARISON OF LANDSAT-4 AND LANDSAT-5 THEMATIC MAPPER DATA
William A. Malila and Michael D. Metzler *In its* Study on Spectral/Radiometric Characteristics of the Thematic Mapper for Land Use Applications Sep. 1985 p 21-37 refs Repr. from Photogrammetric Engineering and Remote Sensing, v. 51, no. 9, Sep. 1985 p 1315-1330 Previously announced in IAA as A85-47809 ERTS (For primary document see N86-16690 07-43)
Avail: NTIS HC A04/MF A01 CSCL 08B

Engineering analyses of Thematic Mapper (TM) image data have been conducted, giving particular attention to the radiometric characterization of the sensor. While the data in general were found to be excellent, anomalies do exist in the data from both LANDSAT-4 and LANDSAT-5 TM. A summary is provided of the LANDSAT-5 TM image data. Recent analyses of LANDSAT-5 TM data and comparisons of the radiometry of the two sensors are emphasized. One of the specific topics covered is within-line droop, a phenomenon whereby the signal levels of the sensor change systematically during the active scan. Attention is also given to scan-correlated level shifts, an effect which raises or lowers the signal level of all pixels in a scan line or set of scan lines. A comparison of LANDSAT-4 and LANDSAT-5 radiometric corrections is also discussed. Author

N86-16694*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
COMPARISON OF THE INFORMATION CONTENTS OF LANDSAT TM AND MSS DATA
William A. Malila *In its* Study on Spectral/Radiometric Characteristics of the Thematic Mapper for Land Use Applications Sep. 1985 p 39-48 refs Repr. from Photogrammetric Engineering and Remote Sensing, v. 51, no. 9, Sep. 1985 p 1449-1457 Previously announced in IAA as A85-47822 ERTS (For primary document see N86-16690 07-43)
Avail: NTIS HC A04/MF A01 CSCL 08B

A communications-theory approach is taken to analyze the dispersion and concentration of signal values in various data spaces, irrespective of specific class membership. Entropy is used to quantify information, and mutual information is used to measure the information represented by subsets of spectral variables. Several different comparisons of information content are made. These include comparisons of system design capacities, of data volumes occupied by agricultural data in the spaces defined by original bands and by transformed spectral (Tasseled Cap) variables, of the information contents of original bands and Tasseled Cap variables, and of the information contents of TM and MSS for the given agricultural data sets. Also, the effects of sample size, scene content, and quantization level are examined. Author

N86-16695# Geological Survey, Washington, D.C.
ESTIMATED USE OF WATER IN THE US IN 1980
Wayne B. Solley, Edith B. Chase, and William B. Mann, IV 1985 65 p refs
(GS-Circ-1001) Avail: NTIS HC A04/MF A01

Water use in the United States in 1980 was estimated to be an average of 450 bgd (billion gallons per day) of fresh and saline water for offstream uses - an 8% increase from the 1975 estimate and a 22% increase from the 1970 estimate. Average per capita use for all offstream uses was 2,000 gpd (gallon per day) of fresh and saline water, and 1,600 gpd of fresh water; this represents a slight increase since 1975. Although 1980 estimates of water use were higher than the 1975 estimates for all offstream categories, trends established during the periods 1970 to 1975 and 1975 to 1980 indicate a general slackening in the rate of increase of total withdrawals in comparison to the period 1965 to 1970. E.A.K.

N86-16696# Committee on Science and Technology (U. S. House).
LANDSAT COMMERCIALIZATION
Washington GPO 1985 84 p Hearing before the Comm. on Sci. and Technol., 99th Congr., 1st Sess., No. 30, 13 Jun. 1985 (GPO-49-336) Avail: Subcommittee on Natural Resources, Agriculture Research and Environment and Subcommittee on Space Science and Applications

Hearings were held in the U.S. House of Representatives by the Subcommittee on Natural Resources, Agriculture Research and Environment, and the Subcommittee on Space Science and application on the commercialization of the LANDSAT Program. The goal was to establish a commercial U.S. civil operation land-observing satellite program. E.A.K.

N86-16697*# Oklahoma Univ., Norman. Cooperative Inst. for Mesoscale Meteorological Studies.
DEVELOPMENT OF THE VARIATIONAL SEASAT DATA ANALYSIS TECHNIQUE Final Report
Yoshi K. Sasaki, Lang-Ping Chang, and James S. Goerss Dec. 1985 80 p refs
(Grant NAG5-289)
(NASA-CR-176471; NAS 1.26:176471) Avail: NTIS HC A05/MF A01 CSCL 05B

Surface winds are closely associated with the surface pressure gradient. The variational SEASAT data analysis technique was designed to improve the sea level pressure analysis in the data sparse areas. The SEASAT-derived surface wind data were compared with observations from the Joint Air Sea Interaction Experiment (JASIN) and it was found that the satellite-derived sea surface wind has an accuracy of up to + or - 2 m/s in speed and + or - 20 deg in direction. These numbers are considered characteristic of the retrieved SEASAT wind field. By combining the densely spaced SEASAT-derived wind data with the sparsely distributed sea-level pressure observation via a variational adjustment technique subject to some appropriate physical constraint(s), an improvement in the sea-level pressure analysis is expected. It is demonstrated that a simple marine boundary layer scheme in conjunction with a variational adjustment technique can be developed to help improve the sea-level pressure analysis by the SEASAT-derived wind of a limited-area domain in the ocean. E.A.K.

N86-16698# California Univ., Davis. Signal and Image Processing Lab.
A TUTORIAL ON CREATING A GRID CELL LAND COVER DATA FILE FROM REMOTE SENSING DATA Final Report
G. E. Ford, D. I. Meyer, and V. R. Algazi Jun. 1985 78 p
(Contract DACW05-83-C-0112)
(AD-A159365; SIPL-85-4; SIPL-TD-22) Avail: NTIS
HC A05/MF A01 CSCL 09/2

This document describes the procedures involved in linking a remote sensing system and a spatial data management system. Specifically, it identifies and describes a sequence of steps for the classification of LANDSAT multispectral scanner (MSS) data and the creation of a grid cell land cover data file. The resulting grid cell file can be merged into a Hydrologic Engineering Center (HEC) Spatial Analysis Methodology (SAM) spatial database. The procedures are also applicable to remote sensing data acquired from other sensor systems. The presentation is intended for those who are familiar with the SAM system and the characteristics and potential of remote sensor image data. Author (GRA)

N86-16699# Defense Mapping Agency, Washington, D.C.
RESULTS OF OPERATIONAL TESTING OF LASS-2 (LITTON AUTO-SURVEYOR SYSTEM) SYSTEMS Final Report, Aug. 1984 - May 1985
L. Pfeifer and R. Tyszka Sep. 1985 14 p
(AD-A159367) Avail: NTIS HC A02/MF A01 CSCL 08/5

The Defense Mapping Agency has been active in the field of inertial surveying since 1975. More recently, delivery was taken of two Litton Auto-Surveyor System 2 (LASS-2) units. This paper describes the testing carried out with these two systems over the Cheyenne IPS Test Course and presents a statistical analysis of the results obtained. New mathematical models for the RMS error of interpolated position and height as a function of traverse length are proposed. The Litton Auto-Surveyor System 2 is an upgraded version of the Position and Azimuth Determining System intended for applications in surveying and geodesy. The hardware features which set a LASS-2 apart from a PADS are: (1) gyros screened to tighter performance specifications; (2) modifications to the control/display unit (CDU); (3) addition of a digital tapedeck and associated interface electronics; and (4) a coat of paint change from olive drab to off-white which, aside from giving the LASS-2 a distinctive look, has the functional purpose of aiding with the management of heat dissipation. GRA

N86-16700# South Carolina Univ., Columbia. Dept. of Geography.
REMOTE SENSING FOREST BIOMASS FOR LOBLOLLY PINE USING HIGH RESOLUTION AIRBORNE SENSOR DATA
J. R. Jensen, M. E. Hodgson, and H. E. Mackey, Jr. 1985 30 p refs Presented at the Forest Land Applications Symposium, Seattle, Wash., 25 Jun. 1985 Prepared in cooperation with Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
(Contract DE-AC09-76SR-00001)
(DE85-017058; DP-MS-85-62; CONF-8506167-2) Avail: NTIS
HC A03/MF A01

The amount and spatial distribution of vegetation are important parameters useful in agriculture, forestry, wetland, and hydrologic research. Such data may be collected in situ by harvesting a sample of the vegetation and determining the amount of biological matter. This approach provides single point estimates which are expensive to collect and difficult to extend through space in order to map the geographic distribution of biomass. It is, however, possible in certain instances to obtain acceptable estimates of biomass by analyzing remotely sensed data. This paper describes the analysis of very high resolution, remotely sensed data of loblolly pine (Pinus taeda) in a controlled experiment in South Carolina. Loblolly pine was examined because it represents over 70% of the commercial forest in the southeastern United States. Pine plots located on both sandy and clay soils were treated with sewage sludge to provide 0, 445, or 890 kg of nitrogen per hectare. Indices of biomass from remote sensing data were significantly correlated with in situ biomass measurements made in each plot. A ratio of infrared (0.9 to 1.1. micron m) and red (065 to 0.70 micron m) channels yielded the best correlation between the remote sensing data and the in situ biomass measurements. In addition, remote sensing provided a quantitative map of the spatial distribution of the biomass in the forest plots. The indices of biomass from the remote sensing data were not sensitive to differences in soil type (sandy or clay). DOE

N86-16701# South Carolina Univ., Columbia. Dept. of Geography.
REMOTE SENSING INLAND WETLANDS: A MULTISPECTRAL APPROACH
J. R. Jensen, M. E. Hodgson, E. Christensen, H. E. Mackey, Jr., L. R. Tinney, and R. Sharitz 1985 36 p refs Prepared in cooperation with Du Pont de Nemours (E.I.) and Co., Aiken, S.C. and Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.
(Contract DE-AC09-76SR-00001)
(DE85-017060; DP-MS-85-68) Avail: NTIS HC A03/MF A01

Airborne Multispectral Scanner (MSS) data, large-scale aerial photography, and LANDSAT MSS and Thematic Mapper (TM) data is used to map a variety of wetland conditions along the Savannah River watershed in South Carolina. Predawn thermal infrared MSS imagery is analyzed to map the spatial distribution and migration of thermal effluent entering a portion of the Savannah River floodplain and the Savannah River below Augusta, Georgia. Daytime airborne MSS data are used to classify specific wetland vegetation types and associate them with their apparent (remotely sensed) temperature. Large scale, multiple data aerial photography are ideally suited to follow the growth of vegetational changes associated with the thermal discharges into the floodplain. LANDSAT MSS imagery obtained in the spring is used effectively to map the entire Savannah River watershed. LANDSAT TM imagery obtained in the summer is of limited use in regional wetland mapping. DOE

N86-16702# New Mexico State Univ., Las Cruces. Energy Inst.
AN EVALUATION OF THERMAL REMOTE SENSING AS A LOW-COST REGIONAL GEOTHERMAL EXPLORATION TECHNIQUE IN NEW MEXICO Final Report
Jack Whittier, Michael Inglis (New Mexico Univ., Albuquerque), and Thomas K. Budge (New Mexico Univ., Albuquerque) Mar. 1985 53 p
(DE85-901266; NMERDI-2-71-4221) Avail: NTIS
HC A04/MF A01

Airborne and satellite borne thermal infrared scanner data were analyzed for application in the exploration of geothermal resources in New Mexico. The location for this study was the East Mesa Geothermal Field near Las Cruces, New Mexico. Primary sensor was the Thermal Infrared Multispectral Scanner (TIMS) which obtained data at 10-meter resolution. Additional data for comparison came from the Heat Capacity Mapping Mission (HCMM) satellite which provided data at 600-meter resolution. These data were compared to the soils, vegetation, and geology of the area, as well as borehole temperature data in an attempt to explain temperature patterns and anomalies. Thermal infrared scanner data were found to be too sensitive to solar-induced temperature anomalies to directly reflect the presence of subsurface geothermal anomalies but may provide valuable supporting information for a geothermal exploration program. DOE

N86-16703# Geological Survey, Tacoma, Wash.
COLUMBIA GLACIER IN 1984: DISINTEGRATION UNDERWAY
M. F. Meier, L. A. Rasmussen, and D. S. Miller 1985 20 p
(TI86-900055; USGS-OFR-85-81) Avail: NTIS HC A02/MF A01

The Columbia Glacier is a large, iceberg-calving glacier near Valdez, Alaska. During this period the glacier terminated partly on Heather Island and partly on a submerged moraine shoal. It was suggested that if the glacier were to retreat from the stabilizing moraine shoal, a period of drastic retreat would ensue. The glacier terminus retreated from Heather Island, and retreat has accelerated each year, except during a period of anomalously low calving. Although the glacier has not terminated on Heather Island since 1978, a portion of the terminus remained on the crest of the moraine shoal until the fall of 1983. The feature receded more

than 300 m from the crest of the shoal, laters disappeared completely, leaving most of the terminus more than 2,000 meters behind the crest of the shoal. Recession of the glacier from the shoal has placed the terminus in deeper water, although the glacier does not float. The active calving face of the glacier now terminates in seawater that is about 300 meters deep at the glacier centerline. Rapid calving appears to be associated with buoyancy effects due to deep water at the terminus and subglacial runoff. DOE

N86-16704# Pacific Northwest Lab., Richland, Wash.
OPPORTUNITIES AND DIFFICULTIES ASSOCIATED WITH USING LANDSAT THEMATIC MAPPER DATA FOR DETERMINING SURFACE WATER TEMPERATURES
G. W. Wukelic, J. C. Barnard, G. M. Petrie, and H. P. Foote Jun. 1985 14 p refs Presented at the NASA LIDQU Final Symposium: LANDSAT Image Data Quality Analysis Meeting, Indianapolis, Ind., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017925; PNL-SA-13259; CONF-8509161-1) Avail: NTIS HC A02/MF A01

This paper describes results of research efforts to estimate surface-water temperatures using LANDSAT 4 and 5 TM thermal band data. Recent research involved the analysis of day- and night-time TM Band 6 data in both corrected (P tape) and uncorrected (A tape) formats. Results reported are for: (1) a reservoir reactor cooling system (PAR Pond) at the Department of Energy's (DOE) Savannah River Plant in Aiken, South Carolina, and (2) the Columbia River adjacent to the DOE's Hanford site in southeastern Washington State. Differences between LANDSAT-derived surface water temperatures and ground truth values before and after correcting for atmospheric effects (using LOWTRAN) are described. The results substantiate the consistent performance of the LANDSAT TM thermal sensor for providing potentially useful estimates of relative and absolute temperatures for large water bodies within and between TM scenes. In addition, technical difficulties encountered that currently limit routine use of such data for environmental monitoring, such as calibration, mixed pixel phenomena, and atmospheric effects are addressed. DOE

N86-16705# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTH CENTRAL REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 1 Final Report
Aug. 1985 563 p
(Contract DE-AC02-83CH-10139)
(DE86-000414; DOE/CH-8(1)-FINAL) Avail: NTIS HC A24/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in Minnesota, Wisconsin, and the Upper Peninsula of Michigan. For each of the states within the North Central Region, information is provided on the geologic disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, post-emplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major groundwater discharge zones, groundwater resources, state of stress, thickness of rock mass, and thickness of overburden. Information is presented on age, areal extent, shape, composition, texture, degree and type of alteration, thickness, and structural features associated with each rock body or complex. Regional seismic and tectonic information is presented, including patterns of earthquake occurrence, earthquake magnitudes, horizontal ground accelerations, and vertical crustal movements. Also included are discussions of the rock and mineral deposits or mines located within or near crystalline rock bodies; groundwater resources and regional hydrology; postulated changes in climate and the associated effects; and landforms, surface processes, and surficial materials on or near the rock bodies. A discussion is also presented of the relationship between the US Department of Energy Siting Guidelines (10 CFR 960) and the geologic disqualifying factor and regional screening variables to be used in the region-to-area screening process. DOE

N86-16706# Technische Hogeschool, Delft (Netherlands). Dept. of Geodesy.
NATIONAL REPORT OF THE NETHERLANDS, 1980 - 1984
G. H. Ligterink 1984 25 p refs Presented at 15th International Society of Photogrammetry and Remote Sensing International Congress, Rio de Janeiro, Brazil, 1984
Avail: NTIS HC A02/MF A01

Developments in photogrammetry, remote sensing, and image interpretation are outlined. Photogrammetric instruments, triangulation, and mapping are described. Educational activities are summarized. Author (ESA)

N86-16707# Geological Survey, Sacramento, Calif. Water Resources Div.
WATER RESOURCES DATA FOR CALIFORNIA, WATER YEAR 1983. VOLUME 4: NORTHERN CENTRAL VALLEY BASINS AND THE GREAT BASIN FROM HONEY LAKE BASIN TO OREGON STATE LINE Annual Report, 1 Oct. 1982 - 30 Sep. 1983
R. P. Fogelman, J. R. Mullen, W. F. Shelton, R. G. Simpson, and D. A. Grillo Mar. 1985 376 p Prepared in cooperation with California State Dept. of Water Resources, Sacramento, Calif.
(PB85-232320; USGS/WDR/CA-83/4-Vol-4;
USGS/WRD/HD-85/219-Vol-4) Avail: NTIS HC A17/MF A01 CSCL 08H

Water-resources data for the 1983 water year for California consists of: (1) records of stage, discharge, and water quality of streams; (2) stage and contents in lakes and reservoirs; and (3) water levels and water quality in wells. Discharge records for 153 gaging stations; stage and contents for 25 lakes and reservoirs; precipitation data for 2 stations; water quality for 7 stations; and water levels for 147 observation wells are presented. Also included is one low-flow partial-record station. GRA

N86-16708# Geological Survey, Nashville, Tenn. Water Resources Div.
WATER RESOURCES DATA FOR TENNESSEE, WATER YEAR 1984 Annual Report, 1 Oct. 1983 - 30 Sep. 1984
J. F. Lowery, P. H. Counts, H. L. Edmiston, and F. D. Edwards Mar. 1985 343 p Prepared in cooperation with Tennessee Dept. of Health and Environment, Nashville and Tennessee Valley Authority, Knoxville
(PB85-232338; USGS/WDR/TN-84/1; USGS/WRD/HD-85/216)
Avail: NTIS HC A15/MF A01 CSCL 08H

Water resources data for the 1984 water year for Tennessee consist of records of stage, discharge, and water quality of streams and springs; stage, contents, and water quality of lakes and reservoirs, and water levels and water quality of wells. The report contains discharge records for 91 gaging stations; stage only records for 2 lake gaging stations; elevation and contents for 28 lakes and reservoirs; water quality for 22 stations; and water levels for 32 observation wells. Also included are 93 crest-stage partial-record stations and 79 low-flow partial-record stations. Author (GRA)

N86-16709# Geological Survey, Columbus, Ohio. Water Resources Div.
WATER RESOURCES DATA FOR OHIO, WATER YEAR 1984. VOLUME 1: OHIO RIVER BASIN Annual Report, 1 Oct. 1983 - 30 Sep. 1984
H. L. Shindel, L. L. Stewart, and J. R. Kolva Apr. 1985 330 p
(PB85-233500; USGS/WRD/OH-84/1-Vol-1;
USGS/WRD/HD-85/222-Vol-1) Avail: NTIS HC A15/MF A01 CSCL 08H

Water resources data for the 1984 water year for Ohio consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of groundwater wells. Records for water discharge at 127 gaging stations, stage and contents at 4 lakes and reservoirs; water quality at 31 gaging stations, 32 wells, and 14 partial record sites; and water levels at 387 observation wells are given. Also included are data from 60 crest-stage partial-record stations and 4 miscellaneous sites. GRA

N86-16710# Geological Survey, Helena, Mont. Water Resources Div.
WATER RESOURCES DATA FOR MONTANA, WATER YEAR 1984. VOLUME 2: COLUMBIA RIVER BASIN Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
R. R. Shields, J. R. Knapton, M. K. White, M. A. Jacobson, and M. L. Kasman Apr. 1985 28 p
(PB85-235984; USGS/WRD/HD-85/227-Vol-2; USGS/WDR/MT-84/2-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 08H

Water resources data for the 1984 water year for Montana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells. Discharge records for 56 gaging stations; stage/contents for 3 lakes and reservoirs; water quality for 20 stations, 3 lakes; and water levels for 10 observation wells are given. Also included are 31 crest-stage partial-record stations and 20 smaller reservoirs. GRA

N86-16711# Geological Survey, Tacoma, Wash. Water Resources Div.
WATER RESOURCES DATA FOR WASHINGTON, WATER YEAR 1982. VOLUME 1: WESTERN WASHINGTON Annual Water-Data Report, 1 Oct. 981 - 30 Sep. 1982
Mar. 1985 325 p
(PB85-236826; USGS/WRD/HD-85/220-Vol-1; USGS/WDR/WA-82/1-Vol-1) Avail: NTIS HC A14/MF A01 CSCL 08H

Water resources data for the 1982 water year for Washington consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells and springs. Discharge records for 253 gaging stations; stage only records for 8 gaging stations; stage and contents for 37 lakes and reservoirs; water quality for 81 gaging stations; and water levels for 57 observation wells are given. Data for 33 crest-stage partial-record stations are included. GRA

N86-16712# Geological Survey, Menlo Park, Calif.
PRINCIPAL FACTS, ACCURACIES AND SOURCES FOR 1,951 GRAVITY STATIONS ON THE WINNEMUCCA 1 DEG BY 2 DEG QUADRANGLE, NEVADA
A. Wagini 1985 79 p
(PB85-235927; USGS/GD-85/005) Avail: NTIS HC A05/MF A01 CSCL 08E

Principal factors for 1,951 gravity stations on the Winnemucca 1 deg by 2 deg quadrangle, Nev., are described. The data are presented in tables according to source and include station name, latitude and longitude, elevation, observed gravity, accuracy code, free-air anomaly, simple Bouguer gravity anomaly, inner zone and total terrain corrections, complete Bouguer gravity anomaly, and residual isostatic gravity value. The principal facts are accompanied by base station descriptions and station location plots. Author (GRA)

N86-16713# Minnesota Univ., St. Paul. Water Resources Research Center.
FISCAL YEAR 1983 PROGRAM REPORT, WATER RESOURCES RESEARCH CENTER, UNIVERSITY OF MINNESOTA, REVISED
G. R. Blake 2 Apr. 1985 29 p
(Grant DI-14-08-0001-G-850)
(PB85-232924; USGS/G-850-01) Avail: NTIS HC A03/MF A01 CSCL 08H

The Fiscal Year 1983 Program Report of the University of Minnesota Water Resources Center presents a summary of activities for fiscal year 1983. It covers the period October 1, 1982 through September 30, 1984. The report describes the research activities of the Center, its involvement in training water scientists and its effort in transferring technologic information to potential users. Research progress reports of six sponsored projects are included in the report. Author (GRA)

N86-16714# Geological Survey, Bismarck, N. Dak. Water Resources Div.
WATER RESOURCES DATA FOR NORTH DAKOTA, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
Dec. 1984 395 p
(PB85-236305; USGS/WRD/HD-85/209; USGS/WDR/ND-83/1) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1983 water year for North Dakota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. The report contains discharge records for 112 gaging stations; stage only records for 17 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 109 gaging stations; 5 lakes, 29 wells, and water levels for 31 observation wells. Author (GRA)

N86-16715# Geological Survey, Carson City, Nev. Water Resources Div.
WATER RESOURCES DATA FOR NEVADA, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
H. R. Frisbie, R. J. LaCamera, M. M. Riek, and D. B. Wood Aug. 1958 256 p
(PB85-236313; USGS/WRD/HD-85/233; USGS/WDR/NV-84/1) Avail: NTIS HC A12/MF A01 CSCL 08H

Water-resources data published herein for the 1984 water year comprise the following records: Water discharge for 89 gaging stations on streams, canals, and drains; discharge data for 40 peak-flow stations and 3 low-flow stations on streams; stage and contents for 15 lakes and reservoirs; water levels for 312 observation wells; water-quality data for 67 stream, canal, and drain sites, 3 lakes and reservoir sites, and 3 wells. Author (GRA)

N86-16716# Bureau of Mines, Washington, D. C.
MINERALS YEARBOOK, 1983. VOLUME 2: AREA REPORTS, DOMESTIC
1985 607 p
(PB85-238822; BM-MYB-1983-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 08I

The volume of the 1983 Minerals Yearbook contains chapters on the mineral industry of each of the 50 States, the U.S. island possessions in the Pacific Ocean and the Caribbean Sea, and the Commonwealth of Puerto Rico. This volume also has a statistical summary. GRA

N86-16717# Geological Survey, Carson City, Nev. Water Resources Div.
WATER RESOURCES DATA FOR NEVADA, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
H. R. Frisbie, R. J. LaCamera, M. M. Riek, and D. B. Wood Dec. 1984 338 p
(PB85-210953; USGS/WRD/HD-85/206; USGS/WDR/NV-83/1) Avail: NTIS HC A15/MF A01 CSCL 08H

Water-resources data published herein for the 1983 water year comprise the following records for Nevada: water discharge for 109 gaging stations on streams, canals, and drains; discharge data for 35 peak-flow stations and 5 low-flow stations on streams; stage and contents for 21 lakes and reservoirs; water levels for 316 observation wells; water-quality data for 85 stream, canal, and drain sites, 12 lakes and reservoir sites, and 3 wells. Author (GRA)

N86-16718# Geological Survey, Lakewood, Colo.
WATER RESOURCES DATA FOR COLORADO, WATER YEAR 1983. VOLUME 3: DOLORES RIVER BASIN, GREEN RIVER BASIN AND SAN JUAN RIVER BASIN Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
J. T. Steinheimer, R. C. Ugland, H. E. Burch, and E. A. Wilson Jul. 1984 283 p
(PB85-210946; USGS/WRD/HD-84/37-Vol-3; USGS/WDR/CO-83/3-Vol-3) Avail: NTIS HC A13/MF A01 CSCL 08H

Water-resources data for Colorado for the 1983 water year consist of records of stage, discharge, and water quality of streams; stage, contents and water quality of lakes and reservoirs; and water levels and water quality of wells and springs. The report contains discharge records for 400 gaging stations, stage and contents of 23 lakes and reservoirs, 6 partial-record low-flow stations, peak flow information for 19 crest-stage partial record stations, and 20 miscellaneous sites; water quality for 132 gaging stations and 291 miscellaneous sites; and water levels for 55 observation wells. Author (GRA)

N86-16719# Geological Survey, Boston, Mass. Water Resources Div.
WATER RESOURCES DATA FOR NEW HAMPSHIRE AND VERMONT, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
F. E. Blackey, J. E. Cotton, and K. W. Toppin Dec. 1984 155 p
(PB85-210938; USGS/WRD/HD-85/210; USGS/WDR/NH/VT-83/1) Avail: NTIS HC A08/MF A01 CSCL 08H

Water-resources data for the 1983 water year for New Hampshire and Vermont consist of records of stage, discharge, and water quality of streams; stage and content of lakes and reservoirs; and ground-water levels. This report contains discharge records for 78 gaging stations, stage records for 4 lakes, month end contents for 25 lakes and reservoirs, water-quality data for 3 gaging stations, and water levels for 30 observation wells. Also included are data for 4 crest stage partial-record stations. Author (GRA)

N86-16720# Geological Survey, Harrisburg, Pa. Water Resources Div.
WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1983. VOLUME 1: DELAWARE RIVER BASIN Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
T. E. White, K. P. Gillespie, D. W. Speight, and R. L. Druther Oct. 1984 273 p Prepared in cooperation with Pennsylvania Dept. of Environmental Resources, Harrisburg and Philadelphia Water Dept., Pa.
(PB85-210020; USGS/WRD/HD-85/207-Vol-1; USGS/WDR/PA-83/1-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 08H

Water resources data for the 1983 water year for Pennsylvania consist of records of discharge and water quality of streams; elevation and contents of lakes and reservoirs; and elevation of tides; and water levels of ground-water wells. This volume contains records for water discharge at 68 gaging stations; elevation of tides at 5 gaging stations; water quality at 33 gaging stations; and water levels at 16 observation wells. Also included are data for 33 crest-stage, 62 low-flow, and 43 water-quality partial-record stations. Author (GRA)

N86-16721# Geological Survey, Columbia, S.C. Water Resources Div.
WATER RESOURCES DATA FOR SOUTH CAROLINA, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
C. S. Bennett, R. D. Hayes, J. W. Gissendanner, and H. E. Herlong Jan. 1985 355 p
(PB85-210573; USGS/WRD/HD-85/208; USGS/WDR/SC-83/1) Avail: NTIS HC A16/MF A01 CSCL 08H

Water resources data for the 1983 water year for South Carolina consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This volume contains records for water discharge at 77 gaging stations, stage only at 5 gaging stations, stage and contents at 11 lakes and reservoirs, water quality at 39 gaging stations, and water levels at 67 observation wells. Also included are data for 40 crest-stage partial-record stations. Author (GRA)

N86-16722# Illinois State Geological Survey, Champaign.
SUPPLEMENTAL GROUNDWATER SUPPLIES FOR SIX SMALL COMMUNITIES IN ILLINOIS
V. Poole and R. Vaiden 1985 42 p Sponsored in part by Illinois State Dept. of Transportation
(PB85-210029; IL/SGS/EGN-108) Avail: NTIS HC A03/MF A01 CSCL 08H

Many small Illinois communities that depend on groundwater to supply their municipal water systems experienced water shortages during the drought of 1976 to 1977. In this supplemental geophysical assessment of the aquifiers supplying groundwater to these towns, six communities were selected (on the basis of past shortages and projected needs) as sites for exploration programs to locate sites for new municipal wells. Electrical earth resistivity surveys were used extensively to evaluate the water-producing capacities of the glacial deposits and to provide a basis for recommendations for test-drilling locations. Author (GRA)

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-16723*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH-EFFICIENCY SILICON SOLAR-CELL DESIGN EVALUATION AND SENSITIVITY ANALYSIS
Anant R. Mokashi, Taher Daud, and Ram H. Kachare 15 Oct. 1985 55 p refs
(Contracts NAS7-918; DE-AI01-76ET-20356)
(NASA-CR-176445; JPL-Pub-85-46; DOE/JPL-1012-107; NAS 1.26:176445) Avail: NTIS HC A04/MF A01 CSCL 10A

A copy of Solar Cell Analysis Program in 1 Dimension (SCAPID) from Purdue University and a copy of Stanford University Process Engineering Model-II (SUPREM II) were obtained and made functional at the Jet Propulsion Laboratory. They are used as basic analytical tools for high-efficiency silicon solar cell design, evaluation, and sensitivity analysis. A brief description of the mathematical model used in the SCAPID program, including heavy doping effects, is presented. Results are compared with experimental data on representative high-efficiency cells. Sensitivity analysis of an 18.7% efficient cell reported in the literature is made with respect to key device parameters. The analysis indicates that a maximum efficiency of 20% is achievable. This efficiency is estimated by using: (1) cell thickness of 280 micrometers, with minority carrier lifetime on the order of 100 microsec; (2) complementary error function doping profile for 0.2 micrometers emitter thickness; (3) front-surface recombination velocity of 1000 cm/s. The back-surface field has a marginal effect in improving efficiency with minority carrier diffusion length less than cell thickness. Author

N86-16724*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SENSITIVITY ANALYSIS OF A PASSIVATED THIN SILICON SOLAR CELL
Anant R. Mokashi, Taher Daud, and Ram H. Kachare 1 Nov. 1985 35 p refs
(Contracts NAS7-918; DE-AI01-76ET-20356)
(NASA-CR-176446; JPL-Pub-85-48; DOE/JPL-1012-108; NAS 1.26:176446) Avail: NTIS HC A03/MF A01 CSCL 10A

A new high-efficiency silicon solar-cell design is analyzed. Innovative design features are incorporated to reduce losses. Bulk recombination losses are reduced by making the cell thin (100 micrometers). A back-surface reflector compensates for the optical absorption losses due to cell thinness. Both surfaces

(front and back) are considered to be passivated by a silicon dioxide layer to reduce the surface recombination velocities. Recommendation losses under the contacts are reduced by providing a heavily doped polysilicon layer between the metal and the silicon surface. This design is evaluated by using the Solar Cell Analysis Program in One Dimension (SCAPID), developed at Purdue University. Sensitivity analysis is performed with respect to key parameters such as cell thickness, back-surface recombination velocity and minority carrier lifetime. Practically achievable values for the surface recombination velocities at the front (S sub F) and at the back (S sub B) of 1000 cm/s, and the minority carrier lifetime (Tau) of 20 microsecs have been considered. The new cell design is evaluated and shown to be capable of achieving 20% efficiency. Considerable reduction of S sub F and S sub B and substantial improvement in Tau would be necessary to achieve cell efficiency greater than 20%. Author

N86-16725*# Jet Propulsion Lab., California Inst. of Tech., Pasadena

STIRLING ENGINE ALTERNATIVES FOR THE TERRESTRIAL SOLAR APPLICATION

J. Stearns Oct. 1985 118 p refs

(Contracts NAS7-918; DE-AM04-80AL-13137)

(NASA-CR-176450; JPL-Pub-85-70; DOE/JPL-1060-91; NAS 1.26:176450) Avail: NTIS HC A06/MF A01 CSCL 10B

The first phase of the present study of Stirling engine alternatives for solar thermal-electric generation has been completed. Development risk levels are considered to be high for all engines evaluated. Free-piston type and Ringbom-type Stirling engine-alternators are not yet developed for the 25 to 50-kW electrical power range, although smaller machines have demonstrated the inherent robustness of the machines. Kinematic-type Stirling engines are presently achieving a 3500 hr lifetime or longer on critical components, and lifetime must still be further extended for the solar application. Operational and technical characteristics of all types of Stirling engines have been reviewed with engine developers. Technical work of merit in progress in each engine development organization should be recognized and supported in an appropriate manner. Author

N86-16726*# TRW, Inc., Redondo Beach, Calif. Engineering and Test Div.

DESIGN, PERFORMANCE INVESTIGATION AND DELIVERY OF A MINIATURIZED CASSEGRAINIAN CONCENTRATOR SOLAR ARRAY Final Technical Report

Robert E. Patterson May 1985 86 p

(Contract NAS8-35635)

(NASA-CR-178571; NAS 1.26:178571; Rept-42977-6002-UT-00) Avail: NTIS HC A05/MF A01 CSCL 10A

A miniaturized Cassegrainian concentrator (MCC) solar array concept is being developed with the objective of significantly reducing the recurring cost of multikilowatt solar arrays. The desired cost reduction is obtained as a result of using very small high efficiency solar cells in conjunction with low-cost optics. In the MCC single element concept and panel concept, incident solar radiation is reflected from a primary parabolic reflector to a secondary hyperbolic reflector and finally to a 4-millimetr diameter solar cell. A light catcher cone is used to improve off-axis performance. An element is approximately 13-millimeters thick which permits efficient launch stowage of the concentrator system panels without complex optical component deployments or retractions. The MCC elements are packed in bays within graphite epoxy frames and are electrically connected into appropriate series-parallel circuits. A MCC single element with a 21 sq cm entrance aperture and a 20 percent efficient, 0.25 sq cm gallium arsenide solar cell has the same power output as 30-sq cm of 11-percent efficiency (at 68 C) silicon solar cells. The MCC concept provides the potential for a significant reduction in array cost due to a 99 percent reduction in required cell area and a 30 percent reduction in array area relative to planar array of equivalent power. Author

N86-16727# Pacific Northwest Lab., Richland, Wash.

PRELIMINARY ANALYSIS OF PATENT TRENDS FOR SODIUM/SULFUR BATTERY TECHNOLOGY

M. B. Triplett, C. Winter, and W. B. Ashton Jul. 1985 78 p

(Contract DE-AC06-76RL-01830)

(DE85-016091; PNL-5422) Avail: NTIS HC A05/MF A01

This document summarizes development trends in sodium/sulfur battery technology based on data from US patents. Purpose of the study was to use the activity, timing and ownership of 285 US patents to identify and describe broad patterns of change in sodium/sulfur battery technology. The analysis was conducted using newly developed statistical and computer graphic techniques for describing technology development trends from patent data. This analysis suggests that for some technologies trends in patent data provide useful information for public and private R and D planning. DOE

N86-16728# Pona (J.), Hillside, N.J.

INCREASING THERMAL EFFICIENCY OF SOLAR FLAT PLATE COLLECTORS

J. Pona [1985] 36 p

(Contract DE-FG42-81R2-05275)

(DE85-015636; DOE/R2-05375/T1) Avail: NTIS HC A03/MF A01

A study of methods to increase the efficiency of heat transfer in flat plate solar collectors is presented. In order to increase the heat transfer from the absorber plate to the working fluid inside the tubes, turbulent flow was induced by installing baffles within the tubes. The installation of the baffles resulted in a 7 to 12% increase in collector efficiency. Experiments were run on both 1 sq ft and 2 sq ft collectors each fitted with either slotted baffles or tubular baffles. A computer program was run comparing the baffled collector to the standard collector. The results obtained from the computer show that the baffled collectors have a 2.7% increase in life cycle cost (LCC) savings and a 3.6% increase in net cash flow for use in domestic hot water systems, and even greater increases when used in solar heating systems. DOE

N86-16729# Harvard Univ., Cambridge, Mass. Dept. of Chemistry.

STUDIES OF CHEMICAL VAPOR DEPOSITION OF AMORPHOUS SILICON AND TRANSPARENT ELECTRODES FOR SOLAR CELLS Final Report, 1 Apr. 1983 - 30 Sept. 1984

R. G. Gordon, S. Kurtz, J. Proscia, K. Gustin, J. Chapple-Sokol, and D. Strickler Aug. 1985 46 p

(Contract DE-AC02-83CH-10093)

(DE85-016848; SERI/STR-211-2695) Avail: NTIS HC A03/MF A01

This report presents results of research on atmospheric-pressure chemical vapor deposition (APCVD), a promising alternative deposition technique for preparing hydrogenated amorphous silicon for use in thin-film solar cells and for preparing transparent conductive electrode layers. The lack of ion bombardment, the observed high deposition rates, and the overall simplicity of the technology could mean a sizable cost reduction in the large-scale manufacturing of amorphous silicon solar cells. Solar cells with at least 8% efficiency should be possible with APCVD amorphous silicon. Titanium nitride films produced by APCVD were shown to provide low-resistance electrical contact to tin oxide and also to highly doped silicon (both p and n-type, crystalline and amorphous). DOE

N86-16730# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

OPTICAL PROPERTIES OF HIGH-TEMPERATURE MATERIALS FOR DIRECT ABSORPTION RECEIVERS

G. J. Jorgensen, P. Schissel, and R. W. Burrows Aug. 1985 10 p Presented at SPIC International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif. 18 Aug. 1985

(Contract DE-AC02-83CH-10093)

(DE85-012171; SERI/TP-255-2791; CONF-850887-24) Avail: NTIS HC A02/MF A01

Recent solar central receiver designs emphasize direct absorption receiver (DAR) concepts primarily because of their ability to absorb high flux densities. An attractive design utilizes molten salt as the transport/storage fluid, which is pumped to the receiver and allowed to flow over a high-temperature absorber surface. As the salt runs down the absorber surface in a thin film, concentrated solar flux heats the salt to 900 C, either directly (blackened fluid) or by convective heat transfer with the irradiated absorber (clear fluid). The feasibility of such a design depends on the optical efficiency of the absorber/fluid combination. The optical properties of candidate absorber materials and transport fluids are therefore required at appropriate elevated temperatures. Because such salts can be extremely reactive at high temperatures, it is important to measure optical properties as a function of exposure history of the salt/absorber. Optical characterization of a clear molten carbonate salt (Li2C)3-Na2CO3-K2CO3 ternary eutectic) and a high-temperature metal alloy (Inconel 600) has been carried out at elevated temperatures using a recently developed integrating sphere solar spectrometer. DOE

N86-16731# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
OPEN-CYCLE OCEAN THERMAL ENERGY CONVERSION (OTEC): STATUS AND POTENTIAL
D. Bharathan Aug. 1984 11 p Presented at US/India Binational Symposium on Solar Energy Research and Applications, Roorkee, India, 5 Aug. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012169; SERI/TP-252-2757; CONF-850858-2) Avail: NTIS HC A02/MF A01

Tropical oceans with a 20 C or more temperature difference between surface and deep water represent a vast resource of renewable thermal energy. One of the methods of harnessing this resource is an open-cycle Ocean Thermal Energy Conversion (OTEC) system utilizing steam evaporated from the surface water for powering the turbine. In this paper, the state of the art of research and component development, as related to heat and mass transfer processes, power production, noncondensable gas handling, and seawater flow hydraulics, are described through an illustrated preliminary design study of a 1-MW facility. DOE

N86-16732# Florida Univ., Gainesville. Department of Botany.
RENEWABLE ENERGY: ETHANOL FROM BIOMASS
J. Thomas Mullins and Christopher C. NeSmith Aug. 1985 29 p refs Prepared for Governor's Energy Office, Tallahassee, Fla.
(TI85-902211; NP-5902211; Rept-7) Avail: NTIS HC A03/MF A01

Information is provided on the current status of both promising and proven sources of renewable energy in the State of Florida. Available conversion technologies, federal and state governmental promotion efforts, and private sector utilization of renewable energy are reviewed. Issues and factors that may advance or inhibit the greater use of renewable energy sources are identified and discussed. The public and others in government can obtain a greater understanding of the contribution, renewable energy can make in limiting our dependence on imported petroleum and other fossil fuels, which are gradually being depleted. Author

N86-16733# Iowa State Univ. of Science and Technology, Ames. Microelectronics Research Center.
CONCENTRATOR SOLAR CELL RESEARCH
P. A. Basore Jun. 1985 40 p
(Contract DE-AC04-76DP-00789)
(DE85-013941; SAND-85-7004) Avail: NTIS HC A03/MF A01

Research related to concentrator solar cells has produced a new model for series resistance and the beginnings of a powerful device analysis code for personal computers. The Quasi-One-Dimensional series resistance model permits the evaluation and optimization of losses associated with the front surface collection grid of concentrator solar cells, including nonuniform illumination profiles. The Q-1-D model has been incorporated in a computer program for the IBM PC entitled GRIS. This program permits cell designers to rapidly determine the optimum grid pattern for circular point-focus solar cells. The interactive flexibility of the personal computer is also being utilized in the development of a one-dimensional solar cell device model which numerically solves the semiconductor electron and hole transport equations. When complete, this program will be used to analyze device performance and to test the predictions of various physical models against observed cell behavior. DOE

N86-16734# Roberts Consultants, Inc., Chevy Chase, Md.
STATUS OF THE DOE BATTERY AND ELECTROCHEMICAL TECHNOLOGY PROGRAM 5
R. Roberts Jun. 1985 182 p
(Contract DE-AC06-76RL-01830)
(DE85-015241; PNL-5448) Avail: NTIS HC A09/MF A01

The program consists of two activities, Technology Base Research (TBR) managed by the Lawrence Berkeley Laboratory (LBL) and Exploratory Technology Development and Testing (EDT) managed by the Sandia National Laboratories (SNL). The status of the Battery Energy Storage Test (BEST) Facility is presented, including the status of the batteries to be tested. ECS program contributions to the advancement of the lead-acid battery and specific examples of technology transfer from this program are given. The advances during the period December 1982 to June 1984 in the characterization and performance of the lead-acid, iron/nickel-oxide, iron/air, aluminum/air, zinc/bromide, zinc/ferricyanide, and sodium/sulfur batteries and in fuel cells for transport are summarized. Novel techniques and the application of established techniques to the study of electrode processes, especially the electrode/electrolyte interface, are described. Research with the potential of leading to improved ceramic electrolytes and positive electrode container and current-collectors for the sodium/sulfur battery is presented. Advances in the electrocatalysis of the oxygen (air) electrode and the relationship of these advances to the iron/air and aluminum/air batteries and to the fuel cell are noted. The quest for new battery couples and battery materials is reviewed. New developments in the modeling of electrochemical cell and electrode performance with the approaches to test these models are reported. DOE

N86-16735# Sandia National Labs., Albuquerque, N. Mex.
PV CONCENTRATOR ARRAY FIELD PERFORMANCE MEASUREMENT
A. B. Maish 1985 10 p Presented at the PV and Isolation Measurements Workshop, Vail, Colo., 1 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016193; SAND-85-1421C; CONF-850783-1) Avail: NTIS HC A02/MF A01

This paper discusses the procedures used to measure concentrator module and array performance at Sandia National Laboratories. It describes the method used to characterize efficiency as a function of two independent variables, direct normal insolation (DNI) and the heat sink temperature. It then investigates the uncertainty in the measured efficiency due to the choice of independent variables. The paper concludes with a review of some of the factors that must be considered in a model which used the array efficiency equation to estimate annual system energy production. DOE

N86-16736# Oak Ridge National Lab., Tenn.
COMPARATIVE STUDY OF WATER, ICE AND CLATHRATES FOR COOL STORAGE APPLICATIONS
J. J. Carbajo 1985 7 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016313; CONF-850808-18) Avail: NTIS HC A02/MF A01

Cool storage systems are needed in order to reduce the large summer peak loads of many electric utilities in the United States. Cool storage systems will use off-peak electricity during the summer night and will provide air conditioning during the day requiring very little on-peak electricity. This paper describes different cool storage systems and compares the following storage media: water, ice, Refrigerant-11 clathrate, Refrigerant-12 clathrate, Refrigerant-

21 clathrate, and mixed clathrates of Refrigerant-11 and Refrigerant-12. Direct- and indirect-charged as well as direct- and indirect-discharged systems are also compared. Hybrid systems (latent and sensible heat) including ice and water, clathrate and liquid, and clathrate and liquid and salts (to reduce the freezing temperature) are also studied. It is concluded that the most appealing system, from the technical and economical point of view, is a system using mixed clathrate, liquid and salt. DOE

N86-16737# Exxon Research and Engineering Co., Linden, N.J.
CIRCULATING ELECTROLYTE ZINC/BROMINE BATTERY TEST PROGRAM AND PROCEDURES
P. Grimes 1985 10 p Presented at the International Battery Testing Workshop, Heidelberg, West Germany, 1 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016996; SAND-85-7216C; CONF-851074-1) Avail: NTIS HC A02/MF A01

The Exxon circulating electrolyte zinc/bromine battery system is being co-developed by organizations in America, Europe, Japan, and Australia. The circulating electrolyte zinc/bromine battery systems have reached the multi-kilowatt hour capacity size ranges. Several 20-kWh and 30-kWh systems have been successfully tested in different modes of operation. Circulating electrolyte batteries use a test program procedure which considers the circulation system characteristics, in addition to the classical test procedures. DOE

N86-16738# Massachusetts Inst. of Tech., Brookhaven Station, N.Y. School of Chemical Engineering Practice.
EVALUATION OF THE PERFORMANCE AND APPLICATIONS OF A METAL HYDRIDE HYDROGEN COMPRESSOR
M. Klausner, J. McMillan, and D. Wickham Sep. 1984 99 p
(Contract DE-AC02-76CH-00016)
(DE85-017009; BNL-51895; MIT/BNL-84-2) Avail: NTIS HC A05/MF A01

Low-grade energy from geothermal, solar or industrial process heat sources may be utilized to power a metal hydride compressor. A four-stage compressor, containing rare-earth metal alloys, compressed 35 standard liters per minute (SLPM) of hydrogen from 0.35 MPa (45 psia) to 3.5 MPa (480 psia), using 680 kg/h (3 GPM) of 80 C water. A computer model was written to simulate compressor performance. The application of the compressor in power cycles (Brayton gas cycles), and the economics of compressor operation were examined. DOE

N86-16739# Arizona State Univ., Tempe. Coll. of Engineering and Applied Sciences.
DYNAMIC PERFORMANCE TESTING OF PROTOTYPE 3 TON AIR-COOLED CARRIER ABSORPTION CHILLER
R. R. Borst and B. D. Wood May 1985 241 p
(Contract DE-AC03-81CS-30572)
(DE85-017054; ERC-R-85013) Avail: NTIS HC A11/MF A01

The performance of a prototype three ton cooling capacity air-cooled lithium bromide/water absorption chiller was tested using an absorption chiller test facility which was modified to expand its testing capabilities to include air-cooled chillers in addition to water-cooled chillers. Temperatures of the three externally supplied fluid loops: hot water, chilled water, and cooling air, were varied in order to determine the effects this would have on the two principal measures of chiller performance: cooling capacity and thermal coefficient of performance (COP). A number of interrelated factors were identified as contributing to less than expected performance. For comparison, experimental correlations of other investigators for this and other similar absorption chillers are presented. These have been plotted as both contour and three-dimensional performance maps in order to more clearly show the functional dependence of the chiller performance on the fluid loop temperatures. DOE

N86-16740# Pacific Northwest Lab., Richland, Wash.
RESEARCH ON GEOTHERMAL CHEMISTRY AND ADVANCED INSTRUMENTATION
R. J. Robertus, D. W. Shannon, R. G. Sullivan, C. H. Kindle, and K. H. Pool Sep. 1985 7 p refs Presented at the Geothermal Program Review, Washington, D.C., 11 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017915; PNL-SA-13397; CONF-8509142-3) Avail: NTIS HC A02/MF A01

Research at the Pacific Northwest Laboratory (PNL) focuses on long-term geothermal power plant reliability. Past work concentrated on development of continuous high-temperature probes for monitoring process variables. PNL also completed a comprehensive handbook of brine treatment processes as they relate to injection well longevity. A recently completed study analyzed corrosion in the hydrocarbon system of a binary cycle plant. Over the two-year monitoring period, corrosion rates were less than 1 MPY in any part of the hydrocarbon system. The system was kept completely dry so the rates seem reasonable. Present projects include: (1) determination of gas breakout conditions at the Herber Binary Demonstration Plant operated by San Diego Gas and Electric Company; (2) generation of water mixing solubility data; (3) installation of prototype leak detectors at the Herber Plant; and (4) evaluation of state-of-the-art particle counters. DOE

N86-16741# Hawaii State Dept. of Planning and Economic Development, Honolulu.
GUIDEBOOK ON PHOTOVOLTAIC APPLICATIONS IN HAWAII
R. C. Richmond Oct. 1984 121 p
(DE85-902094; NP-5902094) Avail: NTIS HC A06/MF A01

The purpose of this Guidebook is to provide the reader with a general understanding of PV power systems, their components, materials and processes; to introduce and explain PV terminology; to provide guidelines for evaluating the appropriateness of photovoltaics in specific applications; to offer a method of system sizing; and to project the future potential impact of PVs in Hawaii. DOE

N86-16742# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
EXPERIMENTAL OBSERVATIONS OF DOUBLE DIFFUSIVE NATURAL CONVECTION IN SOLAR PONDS WITH NONLINEAR SALINITY PROFILES
A. T. Kirkpatrick, R. F. Gordon, and D. H. Johnson Apr. 1985 9 p Presented at the 6th Annual ASME Solar Energy Division Technical Conference, Las Vegas, Nev., 10 Apr. 1984 Prepared in cooperation with Midwest Research Inst., Golden, CO.
(Contract DE-AC02-83CH-10093)
(DE85-000515; SERI/TP-252-2677; CONF-840402-8) Avail: NTIS HC A02/MF A01

A solar pond can be used as a thermal energy source provided that convective instabilities do not occur. This paper experimentally examines the stability of a fluid layer with nonlinear salinity profiles. A nonlinear salt profile was set up in a 0.7m x 0.7m x 1.4m deep tank, and the water was heated by a solar radiation simulator. Three experiments were conducted, each over a time scale of about one week. An instability was produced in two of the experiments. The instabilities occurred at the location of the weakest salinity gradient, and were confined to a narrow depth, as predicted by theory. A local length scale was used to produce a stability parameter, the ratio of thermal to solute Rayleigh numbers. It is shown that for nonlinear solute gradients, the appropriate length scale is based on the radius of curvature of the salinity distribution. With this choice of a length scale, good agreement was found between theory and experiment for the onset of an instability. However, only fair agreement was obtained for the disturbance frequency. DOE

N86-16743# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
FILM FLOW CHARACTERISTICS FOR DIRECT ABSORPTION SOLAR RECEIVER SURFACES
T. A. Newell, K. Y. Wang, and R. J. Copeland Jul. 1985 9 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985 Prepared in cooperation with Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-83CH-10093)

(DE85-012175; SERI/TP-252-2770; CONF-851125-10) Avail: NTIS HC A02/MF A01

A direct absorption receiver (DAR) concept offers the potential of significantly higher operating temperatures than current receiver designs. However, one of the concerns about the successful operation of DAR lies in the stability of a thin liquid-film flowing over the receiver surface. This study investigates the characteristics of a thin water film flowing over both smooth and roughened surfaces under isothermal conditions. The purpose of the smooth surface measurement is to confirm the present results with data in the literature. The roughness is obtained by attaching screens to base surface. The study shows that surface roughness has significant effects on film thickness. A simple analytical model indicates that the wall-to-film heat transfer rate for the roughened surface will also be enhanced. DOE

N86-16744# Montclair State Coll., Upper Montclair, N.J.
PARABOLIC SOLAR SYSTEMS
W. L. Parsons, IV and W. Goetchius 1985 31 p
(Contract DE-FG42-80R2-05167)
(DE85-012219; DOE/R2-05167/T1) Avail: NTIS HC A03/MF A01

The further development of parabolic solar collectors to increase their efficiency and simplify their operation was the prime objective of this research project. Three primary objectives were pursued. The first of these was to investigate the simplest and most efficient techniques to build and mass-produce parabolic solar collectors. The second objective was to further develop and simplify absorber tubes used to collect and transfer the solar energy. Absorber tubes represented a significant area of this research project. The third objective was to develop accurate, low cost, and durable tracking systems for solar collectors. Solar tracking systems are covered including several schematic representations of various systems and designs. The testing systems and associated mechanisms for the designs discussed in this report are described. DOE

N86-16745# Brookhaven National Lab., Upton, N. Y.
LOW-COST THIN-MATERIAL SOLAR TECHNOLOGY, THE KEY TO A VIABLE ENERGY ALTERNATIVE
W. G. Wilhelm and B. D. Ripel Aug. 1985 15 p Presented at the US/India Binational Symposium on Solar Energy Research and Applications, Roorkee, India, 5 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000025; BNL-36815; CONF-850858-4) Avail: NTIS HC A02/MF A01

The creation of a solar technology based on a dramatic reduction in material intensity and greater simplicity of design is the result of a cost-guided research approach. It takes advantage of a progressive material science based on polymer films and unique construction methods that optimize material requirements, performance and durability. The current level of technical maturity has revealed a solar collector design that has the potential for a dramatic reduction in installed cost while maintaining high thermal performance and durability. In addition, the same methodology has guided total solar system designs with similar economies and performance advantages. DOE

N86-16746# Technical Research Centre of Finland, Espoo. Semiconductor Lab.
ANALYSIS AND MONTE CARLO SIMULATION OF LUMINESCENT SOLAR CONCENTRATORS
Arja Heinaemaeki Sep. 1985 48 p refs Sponsored by Finnish Ministry of Trade and Industry
(VTT-364; ISBN-951-38-244-X; ISSN-0358-5077) Avail: NTIS HC A03/MF A01

The applicability of inorganic materials for luminescent solar concentrators (LSCs) is investigated. The materials and the physical processes related to absorption and fluorescence are expounded and examples of materials suitable for LSCs are given. The operation of an LSC and the possible loss sources are considered. Efficiencies are defined. The Monte Carlo method is used to compare LSCs and to study how plate size, shape, and dye concentration affect the efficiencies. The efficiencies of inorganic LSCs are found to be low compared with those of organic ones, but can be improved, e.g., by codoping, material selection, and the use of multistack devices. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-16747 Pennsylvania Univ., Philadelphia.
TRACE METAL ACCUMULATION, DISTRIBUTION AND FLUXES IN FORESTS OF THE NORTHEASTERN UNITED STATES Ph.D. Thesis
Andrew Jay Friedland 1985 186 p
Avail: Univ. Microfilms Order No. DA8515377

Trace metals are released to the atmosphere from many anthropagenic activities and are returned to the Earth in precipitation and dry depositon. An analysis of the metal content of biomass and soil allowed an assessment of the presence of metals in forests. Forest floor was sampled at 78 sites in nine northeastern states in the USA and analyzed for Cu, Zn, Ni and Cd. Higher levels of trace metals occurred in the southern half of the study region. Earlier work identified that Pb accumulated in the forest floor of the high-elevation regions of New England. The distribution of Pb, Cu, Zn, Ni and Cd within the forest floor was studied at three different forested states in New England. The greatest concentration of Pb, Cu, Zn, Ni and Cd occurred in the Oe horizon of the forest floor in all three-forest. This is the zone of greatest biological activity in the forest floor. Cadmium behaved differently in all three forests. Because it receives relatively high rates of atmospheric deposition, Camels Hump in northern Vermont was studied in greater detail. Dissert Abstr.

N86-16748*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRBORNE LIDAR MEASUREMENTS OF AEROSOLS, MIXED LAYER HEIGHTS, AND OZONE DURING THE 1980 PEPE/NEROS SUMMER FIELD EXPERIMENT
Edward V. Browell, Scott T. Shipley, Caolyn F. Butler (Old Dominion Univ., Norfolk, Va.), and Syed Ismail (SASC Technologies, Inc., Hampton, Va.) Dec. 1985 197 p refs
(NASA-RP-1143; L-15943; NAS 1.61:1143) Avail: NTIS HC A09/MF A01 CSCL 13B

A detailed summary of the NASA Ultraviolet Differential Absorption Lidar (UV DIAL) data archive obtained during the EPA Persistent Elevated Pollution Episode/Northeast Regional Oxidant Study (PEPE/NEROS) Summer Field Experiment Program (July through August 1980) is presented. The UV dial data set consists of remote measurements of mixed layer heights, aerosol backscatter cross sections, and sequential ozone profiles taken during 14 long-range flights onboard the NASA Wallops Flight Center Electra aircraft. These data are presented in graphic and tabular form, and they have been submitted to the PEPE/NEROS data archive on digital magnetic tape. The derivation of mixing heights and ozone profiles from UV Dial signals is discussed, and detailed intercomparisons with measurements obtained by in situ sensors are presented. Author

N86-16749# Rijksluchtvaartdienst, The Hague (Netherlands).
REPORT OF THE WORKING GROUP FOR SENSITIVITY ANALYSIS AND ZONING CALCULATIONS (GAZOB) Final Report [EINDRAPPORT VAN DE WERKGROEP GEVOELIGHEIDSANALYSE ZONERINGSBEREKENINGEN (GAZOB)]
May 1985 91 p refs In DUTCH
Avail: NTIS HC A05/MF A01

The sensitivity of noise pollution calculations to the input data for Schiphol airport was analyzed. Noise pollution calculations for Schiphol airport are reviewed. For individual titles, see N86-16750 through N86-16751.

N86-16750# Rijksluchtvaartdienst, The Hague (Netherlands).
[ANALYSIS AND CONCLUSIONS OF THE WORKING GROUP FOR SENSITIVITY ANALYSIS AND ZONING CALCULATIONS (GAZOB)] Final Report
In its Report of the Working Group for Sensitivity Analysis and Zoning Calculations (GAZOB) May 1985 42 p In DUTCH (For primary document see N86-16749 07-45)
Avail: NTIS HC A05/MF A01

The sensitivity of noise pollution calculations to the input data system was analyzed in the area of Schiphol airport with a consideration for housing construction plans, based on the present runway system for the situation expected around 1990 and later. The analysis allows a better insight into the variation of factors which contributes to noise pollution calculations. The only free parameters for the choice of a zone contour are shown to be the fleet composition and the number of aircraft movements. The possible conditions in 1995 and 2000 are calculated and show a substantial noise reduction the planned improvements. It is concluded that a regional zoning for home construction based on the contours calculated for 1990 is justified. Author (ESA)

N86-16751# National Aerospace Lab., Amsterdam (Netherlands). Afdeling Vliegtuigen.
NOISE NUISANCE CALCULATIONS FOR SCHIPHOL AIRPORT ON BEHALF OF THE SENSITIVITY ANALYSIS AND ZONING CALCULATIONS WORKING GROUP (GAZOB) [GELUIDSBELASTINGBEREKENINGEN VOOR DE LUCHTHAVEN SCHIPHOL TBV DE WERKGROEP GAZOB]
H. J. Poutsma *In* Rijksluchtvaartdienst Report of the Working Group for Sensitivity Analysis and Zoning Calculations (GAZOB) May 1985 48 p refs In DUTCH (For primary document see N86-16749 07-45)
(Contract RB-RLD-1984/1985:5.2)
(NLR-TR-85034-U) Avail: NTIS HC A05/MF A01

Starting points and results of noise pollution calculations for the Schiphol airport are reviewed. Calculation procedure, aircraft data, runway structure, aircraft motions, and test flights are explained. The results of calculations are presented as noise pollution contours. Author (ESA)

N86-16752# Oak Ridge National Lab., Tenn.
ACID DEPOSITION AND THE ACIDIFICATION OF SOILS AND WATERS
J. O. Reuss and D. W. Johnson 1985 256 p
(Contract DE-AC05-84OR-21400)
(DE85-016544; DOE/OR-21400/T161) Avail: NTIS HC A12/MF A01

A conceptual model of acid deposition is presented consistent with established physiochemical principles and the bulk of available information. The authors seek to provide insight into probable long-term effects of acid deposition; a testable hypotheses; plus design and interpretation of the research. DOE

N86-16753# Geological Survey, Reston, Va.
WATER QUALITY OF THE TIDAL POTOMAC RIVER AND ESTUARY: HYDROLOGIC DATA REPORTS SUPPLEMENT, 1979 THROUGH 1981 WATER YEARS
Richard H. Coupe, Jr. and Wayne E. Webb 1984 356 p
(TI86-900061; USGS-OFR-84-132) Avail: NTIS HC A16/MF A01

This is a companion report to the U.S. Geological Survey 1979, 1980, and 1981 hydrologic Data Reports of the tidal Potomac River and estuary. The information included contains values of biochemical oxygen demand and specific-rate constants, incident-light and light-attenuation measurements; number of phytoplankton, fecal coliform and fecal streptococci; cross-sectional averages from field measurements of dissolved oxygen, pH, specific conductance, and temperature data; and cross-sectional averages of chlorophyll data. Sewage-treatment plant loads are also included. Author

N86-16754# Pacific Northwest Lab., Richland, Wash.
A METHOD TO CHARACTERIZE LOCAL METEOROLOGY FOR AIR POLLUTION STUDIES AND EMERGENCY RESPONSE NEEDS
C. G Lindsey and C. S. Glantz Oct. 1984 5 p refs Presented at the 4th Joint Conference on Applied of Air Pollution Meteorology, Portland, Oreg., 15-19 Oct. 1984
(Contracts DE-AC06-76RL-01380; NRC-FIN-B-2182)
(TI85-002538; PNL-SA-12122; CONF-851059-15) Avail: NTIS HC A02/MF A01

A simple weather-typing model has been used to correlate synoptic-scale atmospheric systems with local meteorology in shoreline and complex terrain environments. The climatological characteristics of local winds and stability criteria can be deduced by stratifying site data according to the prevailing synoptic features, season, and time of day. Synoptic conditions that control local meteorology and inhibit the formation of mesoscale circulations have been isolated. Similarly, synoptic systems that favor the development of the sea/lake land breeze or mountain/valley wind system have been determined. The characteristic response of the local meteorology to each type of system can be described once available data are stratified by the parameters given in the model. Author

N86-16755# Rhode Island Univ., Narragansett. Graduate School of Oceanography.
ELEMENTAL TRACERS OF SOURCE REGIONS OF CONTAMINANTS IN PRECIPITATION Third Quarterly Report, 1 Nov. 1984 - 31 Oct. 1985
K. A. Rahn 27 Aug. 1985 32 p
(Contract DE-FG22-84PC-71253)
(DE85-017182; DOE/PC-71253/3) Avail: NTIS HC A03/MF A01

The general directions of effort discussed in the second quarterly report are continuing satisfactorily: each rain at Narragansett is being collected and analyzed with its corresponding aerosol samples. The rain-sampling procedure is being improved. We have begun to cooperate with Dr. R. Borys of Colorado State University on a study of how the chemistry of snow and cloud water in northwestern Colorado is affected by cloud physics. We will present papers on the results of our DOE project at two conferences in late 1985. K. Rahn has been invited for a return visit to China in October and November 1985, for the express purpose of expanding a cooperative project concerned with using elemental tracers to determine source areas of acid rain in southwestern China. Each of these topics is discussed in detail. DOE

N86-16756# Lawrence Livermore National Lab., Calif.
CLIMATIC RESPONSE TO LARGE SUMMERTIME INJECTIONS OF SMOKE INTO THE ATMOSPHERE: CHANGES IN PRECIPITATION AND THE HADLEY CIRCULATION
S. J. Ghan, M. C. MacCracken, and J. J. Walton Aug. 1985 43 p refs Presented at the International Association for Meteorology and Atmospheric Physics, Honolulu, Hawaii, 5 Aug. 1985
(Contract W-7405-eng-48)
(DE86-000018; UCRL-92324; CONF-8508131-1) Avail: NTIS HC A03/MF A01

An atmospheric general circulation model (AGCM) has been initialized with a 150 Tg summertime injection of smoke from post-war fires over Europe, Asia and North America. The smoke is subject to large-scale and convective transport, dry deposition, coagulation and precipitation scavenging. The Hadley circulation is shown to respond in three stages. In the first stage, which lasts about one week depending on initial conditions, the Hadley circulation doubles in intensity. As the smoke spreads across the equator, and as the troposphere becomes more stable, the Hadley cell then weakens until it becomes actually weaker than in the control climate. In the final stage, as the smoke is removed, the Hadley cell gradually returns towards the control. Surface precipitation generally decreases as a result of the smoke. By the fourth week following the injection, zonal-mean surface precipitation in the tropics and summer hemisphere midlatitudes are about half of those in the control climate. The decrease is most notable over land, ocean precipitation being reduced only in the tropics. Penetrating convective precipitation is greatly reduced at all latitudes; large-scale precipitation is enhanced, becoming the dominant mode of precipitation in the simulation. Precipitation

scavenging is shown to be the dominant removal process for particles larger than one micron in diameter. As a result, the lifetime of large particles increases several-fold due to the reduction in precipitation and the self-lofting of the smoke. For particles smaller than one micron in diameter, precipitation scavenging is found to be a much less efficient removal mechanism than both coagulation, which is important during the first week following the injection, and dry deposition at later times. DOE

N86-16757# Rolls-Royce Ltd., Derby (England). Noise Technology Div.
AIRCRAFT NOISE CONTROL: PROSPECTS FOR THE 21ST CENTURY
M. J. T. Smith 23 Jul. 1985 10 p Presented at 52nd National Society for Clean Air Conference, Scarborough, England, Oct. 1985
(PNR-90272) Avail: NTIS HC A02/MF A01

The background, policies and prediction of the evolution of aircraft noise control technology are discussed. The probable world fleet composition through to the end of the century is analyzed. Domination of turbofan technology is foreseen by 1988. Examples of recent developments are examined for goals on the order of 95 to 100 dB. Author (ESA)

N86-16758# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
INITIALIZATION OF THE EULER MODEL MOMENT DISTRIBUTION (MODIS) WITH FIELD DATA FROM THE EPRI PLUME MODEL VALIDATION PROJECT
G. Petersen, D. Eppel, M. Lautenschlager, and A. Mueller 1985 22 p refs Presented at the 15th International Technical meeting on Air Pollution and its Applications, St. Louis, Mo., 15-19 Apr. 1985
(GKSS-85/E/18; ISSN-0344-9629) Avail: NTIS HC A02/MF A01

The Moment Distribution program was designed as an operational tool for modeling the dispersion of a point source under general atmospheric conditions. The concentration distribution is determined by calculating its crosswind moments on a vertical grid oriented in the main wind direction. The model contains a parametrization for horizontal and vertical diffusion coefficients based on a second order closure model. The Eulerian time scales determined by fitting measured plume cross sections are confirmed by comparison with data from the EPRI plume model validation project. Author (ESA)

N86-16759# Environmental Sciences Research Lab., Research Triangle Park, N.C. Meteorology and Assessment Div.
COMPARISON OF RAM (REGIONAL AIR MONITOR) MODEL ESTIMATES OF 1976 ST. LOUIS RAPS (REGIONAL AIR POLLUTION STUDY) MEASUREMENTS OF SULFUR DIOXIDE
D. B. Turner, J. S. Irwin, and A. D. Busse 1985 8 p Submitted for publication
(PB85-225639; EPA-600/J-85-072) Avail: NTIS HC A02/MF A01 CSCL 13B

Estimates from the model RAM were compared with actual SO2 measurements from 13 Regional Air Pollution Study (RAPS) sites in St. Louis for 1976, with particular emphasis on the second highest concentrations for the 1-h, 3-h, and 24-h averaging times; the average annual concentration; and the top 5% of the distribution for the 24-h concentrations. Although there was considerable scatter in the comparison of the second highest concentrations, only 8 of the 39 data points were outside the bounds of a factor of two, and although there was more underestimation by the model as the averaging time increased, no overall bias was seen. Exponential distributions fit the top 5% of the 24-h concentration distributions for all sites for both the estimated and measured concentrations. The distributions for the estimated and measured concentrations matched at 8 of the 13 sites. Author (GRA)

N86-16760# Environmental Research Lab., Gulf Breeze, Fla.
PROCEEDINGS OF THE WORKSHOP: BIODEGRADATION KINETICS
A. W. Bourquin, P. H. Pritchard, W. W. Walter, and R. Parrish Jun. 1985 171 p Proc. held at Navarre Beach, Fla., 18-20 Oct. 1983
(PB85-222651; EPA-600/9-85-018) Avail: NTIS HC A08/MF A01 CSCL 06A

Biodegradation Kinetics examined future directions and focus of scientific investigations of the kinetic aspects of microbial degradation rates of organic chemicals in natural environments. The following topics were presented: (1) statistical and experimental requirements for modeling decay curves; (2) the second order approach assumption, limitations and research needs; (3) factors controlling biodegradation rates in microbial communities; (4) application of uptake and mineralization kinetics; (5) relationships between chemical structure and biodegradation rates; and (6) extrapolation of laboratory biodegradation data to the field. The direction and extent of research required for the description of biodegradation rates of xenobiotic chemicals in natural environments is discussed. GRA

N86-16761# Sonoma Technology, Inc., Santa Rosa, Calif.
CHARACTERIZATION OF THE COMPOSITION AND THREE DIMENSIONAL DISTRIBUTION OF ACIDITY IN SOUTHERN CALIFORNIA CLOUDS Final Report
L. W. Richards, J. A. Anderson, D. L. Blumenthal, and J. A. McDonald Apr. 1985 156 p Sponsored by California State Air Resources Board, Sacramento
(PB85-223014; STI-90083-506-16FR; ARB-R-85-249) Avail: NTIS HC A08/MF A01 CSCL 04A

Samples of water and aerosol were collected and trace gas concentrations and other air quality parameters in stratus clouds both in the coastal and inland portions of the Los Angeles Basin were measured. Three flights were made in October and November 1983 and 3 in June 1984. The analytical procedures were designed to emphasize the determination of the concentrations of sulfur species and species which may play an important role in the chemistry of sulfur compounds. It was found that except in two isolated plumes, the conversion of sulfur dioxide to sulfate had gone to completion in the clouds and that a very effective oxidant, hydrogen peroxide, remained in excess in the cloud water. GRA

N86-16762# Florida Univ., Gainesville. Dept. of Soil Science.
EFFECTS OF ACID PRECIPITATION ON A TYPIC QUARTZIPSAMMENT SOIL IN FLORIDA
B. G. Volk and G. E. Byers Aug. 1985 22 p
(PB85-236495; EPA-600/D-85-175) Avail: NTIS HC A02/MF A01 CSCL 08M

The magnitude of leaching of nutrients from the soil surface to the water table and to a nearby drainage system depends on many factors unique to the site. The sensitive deep sands of Florida present an extreme case of low nutrient status and high water flux to great depth. In addition, water table characteristics, both physical and chemical, influence the horizontal flow vis-a-vis the vertical flows. The magnitude of leaching also depends on the nature of the ion, the depth being considered and the acid treatment. Readsorption of ions in the soil profile was shown to occur which further complicates the overall assessment of the real effect of acid rain. The effect of acid rain is not long lasting and the soils recover the normal soil leachate chemistry within 48 hours. GRA

N86-16763# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
INTERNATIONAL SULFUR DEPOSITION MODEL EVALUATION: 1980 STANDARD MODEL INPUT DATA SET
T. L. Clark, D. H. Coventry, B. K. Eder, C. M. Benkovitz, and V. A. Evans 1985 16 p Prepared in cooperation with the Department of the Environment, Ottawa, Ontario and Brookhaven National Lab., Upton, N.Y.
(PB85-210847; EPA-600/D-85-112) Avail: NTIS HC A02/MF A01 CSCL 04A

North American meteorological and sulfur emissions data for 1980 have been processed to serve as input data to regional acid deposition models participating in the International Sulfur

Deposition Model Evaluation (ISME) Project. Using these data sets, 15 regional acid deposition models are to simulate seasonal and annual ambient concentrations and dry and wet deposition amounts of sulfur dioxide and sulfate. As the main objective of the ISDME Project, simulated sulfur wet deposition amounts are to be compared to measurements at selected sites of five North American precipitation chemistry networks. Discussions focus on the data processing procedures and the 1980 model input data sets. GRA

N86-16764# Vermont Univ., Burlington. Water Resources Research Center.
CHARACTERIZATION OF ALUMINUM CHEMISTRY FOR ACID PRECIPITATION
D. R. Hemenway and B. Fitzgerald 1 Dec. 1984 28 p Sponsored in part by Geological Survey, Reston, Va.
(PB85-214542) Avail: NTIS HC A03/MF A01 CSCL 07D

Aluminum has come under increasing scrutiny as a toxic element either being released by acid precipitation interaction with soils or by being transported in the primary precipitation event. The study describes several analytical techniques for quantitatively evaluating the form of aluminum. A unique method of using molecular weight (mw) cut-off filtration and the 8-hydroxy quinulate extraction technique to assess monomeric aluminum speciation has been developed. A cut-off mw filter of 50,000 was found to be effective in separating monometric aluminum from other aged forms of polymeric species found in precipitation. GRA

N86-16449# University of Electro-Communications, Tokyo (Japan).
CARBON DIOXIDE IN THE ATMOSPHERE
Nobuhide Kokubu, Sigeru Kumagai, and Akira Miyazaki *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 87-91 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-16765 Washington Univ., Seattle.
A NUMERICAL STUDY OF THE DISTRIBUTION AND TRANSPORT OF OZONE IN THE STRATOSPHERE Ph.D. Thesis
Ben Jong-Dao Jou 1985 329 p
Avail: Univ. Microfilms Order No. DA8508062

A three-dimensional, semi-spectral, numerical model based on the primitive equations in the spherical, log-pressure coordinate system, is used to study the distribution and transport of ozone in the stratosphere. In the first part of the experiment, ozone transport by quasi-stationary, dissipative planetary waves and its role in maintenance of the zonal mean ozone distribution in the winter stratosphere is studied. Ozone budget is analyzed by using the transformed Eulerian-mean formulation. The mechanisms of ozone transport in the stratosphere can roughly be classified into three regimes in the vertical direction, according to the effectiveness of photochemical processes. In the upper stratosphere, the deviations of zonal mean ozone from its photochemical equilibrium state are found to be significant only near the latitudes where large meridional gradient of ozone photochemical relaxation rates are present. In the lower stratosphere, the net ozone change can be described fairly well by the residual mean circulation. Dissert. Abstr.

N86-16766 Wisconsin Univ., Madison.
THE VARIATIONAL FOUR-DIMENSIONAL ASSIMILATION OF ANALYSES USING FILTERED MODELS AS CONSTRAINTS Ph.D. Thesis
John Charles Derber 1985 162 p
Avail: Univ. Microfilms

A new variational four-dimensional data assimilation technique is developed using filtered models as constraints. The assimilation method uses standard nonlinear minimization techniques to iteratively find the solution to the constraining forecast model which best fits the data. The sensitivity of the method to various parameters is examined using a quasigeostrophic channel model. The method is relatively sensitive to the length of the assimilation interval. Temporally correlated errors are shown to substantially reduce the method's effectiveness. It is indicated that the use of an imperfect constraining model may not be very detrimental to the final analyses especially in the center of the analysis interval. A 10 level quasigeostrophic model is used to assimilate analyses created from satellite measured radiances for two cases. Little adjustment occurred in either case indicating the analyses correctly describe the atmospheric state or contain temporally correlated errors. However, the assimilation technique still produced realistic results. Generally, the assimilation technique appeared to be very well behaved and has the potential to be quite useful in numerical weather prediction. Dissert. Abstr.

N86-16767 Oregon State Univ., Corvallis.
AGE PROGRESSIVE VOLCANISM IN THE COMORES ARCHIPELAGO AND NORTHERN MADAGASCAR Ph.D. Thesis
Christina Marie Emerick 1985 235 p
Avail: Univ. Microfilms Order No. DA8514822

The Comores islands and Tertiary volcanic province of Northern Madagascar form a sub-linear trend of alkalic shield volvanoes across the northern Mozambique Channel. Potassium-argon dating of shield building lavas confirms an eastward increase in age of volcanism along the chain, consistent with a hotspot origin for the lineament. The rate of migration of the Somali Plate over the mantle source is approximately 45 mm/yr. This new geochronology for the Comores island chain is used to model the absolute motion of the Somali Plate for the last 10 million years. A systematic departure of the Somali Plate absolute motion from the African Plate absolute motion during this period represents a component of relative motion across the East African Rift at the rate of .330 deg/m.y., about an Euler pole located at 63.6 deg. S,2.3. deg. E. The geometry of older portions of the Comores and Reunion trends indicates that there was no significant relative motion between the African and Somali Plates prior to about 10 m.y. ago. Sequential reconstructions from 200-0 m.y. are presented. Dissert. Abstr.

N86-16768 Yale Univ., New Haven, Conn.
PATTERNS AND DYNAMICS OF LATE CRETACEOUS MARGINAL MARINE SEDIMENTATION; OVERTHRUST BELT, SOUTHWESTERN WYOMING Ph.D. Thesis
David Trowbridge Lawrence 1984 602 p
Avail: Univ. Microfilms Order No. DA8509715

A comprehensive surface and subsurface study of the Upper Cretaceous Hinshaw Member of the Hillard Shale, Lazeart Sandstone Member of the Adaville Formation, and Adaville Formation reveals a complex intertonguing of marine and nonmaine strata. Observations of the lithostratigraphy and facies of the Hinshaw-Adaville sequence provide the basis for a conceptual model of marginal marine foreland basin sedimentation. The distribution, thickness, geometry, and cyclicity of marginal marine strata were determined by: (1) geographic position relative to active distributary channels and channel margin facies; (2) differential compaction of subjacent sediments; (3) magnitude and geographic extent of transgressive-regressive pulses; (4) sediment load and subsidence; (5) number of transgressive-regressive pulses; and (6) thrust load; eustasy, and sediment input in the foreland basin adjacent to the Sevier orogenic belt. Thickness of strata, grain size and sand percent decrease away from channels, and thickness and lateral continuity of coal increase. Continuous processes produced nonrandom vertical sequences; random vertical sequences were produced by discontinuous processes. Dissert. Abstr.

N86-16769 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYSIS AND INTERPRETATION OF COMPRESSIONAL

(P-WAVE) AND SHEAR (SH-WAVE) REFLECTION SEISMIC AND GEOLOGIC DATA OVER THE BANE DOME, GILES COUNTY, VIRGINIA Ph.D. Thesis
Mark Joseph Gresko 1985 97 p
Avail: Univ. Microfilms Order No. DA8511939

Approximately 37 km of predominantly 24-fold p-wave Vibroseis data and 16 km of 24-fold SH-wave Vibroseis data were acquired the southern portion of the folded Appalachians near the Bane Dome in Giles County, Virginia. Data processing techniques included the application of newly developed methods for crossdip removal as well as the determination of static solutions in the case of time variant shifts within the data traces. Minimum-phase filter deconvolution was also applied for the removal of reverberating energy and multiples recorded on the SH-wave lines. V sub p/ V sub s ratios were used to aid in the determination of lithologies in the absence of bore-hole data. Interpreted thicknening of the Lower Cambriano to Upper Precambrian sequence beneath the Bane Dome appears to represent Eocambrian rifting. Faults generated at that time may now be reactivated by the present stress regime, causing earthquake activity in this area. Interpretation of the seismic data supports a duplex structure proposed for the Paleozoic rocks of the Bane Dome Complex within the Narrows thrust sheet of southwestern Virginia. Dissert. Abstr.

N86-16770 California Univ., Santa Barbara.
PALEOMAGNETISM OF THE MONTEREY FORMATION IN THE WESTERN TRANSVERSE RANGES, CALIFORNIA Ph.D. Thesis
John Scott Hornafius 1984 465 p
Avail: Univ. Microfilms Order No. DA8509432

Dolomites and limestones in the Monterey Formation generally possess either a stable primary magnetic remanence acquired prior to Plio-Pleistocene folding, or a stable secondary magnetic remanence acquired subsequent to Plio-Pleistocene folding. The primary remanence is carried by detrital magnetite, whereas the secondary remanence is carried by authigenic magnetite + or - hematite. A paleomagnetic investigation was conducted on dolomite beds in live stratigraphic sections of the middle and upper Miocene Monterey Formation exposed along the coastline between Santa Barbara and Point Conception (42 beds, 290 samples). Dolomites 14.8 to 15.8 m.y. old have a mean magnetic declination of 92 + or -7 deg., whereas dolomites 8 to 12 m.y. old have mean magnetic declination of 36 deg + or - deg. The consistent upsection decrease in magnetic declination within these stratigraphic sections is attributed to a rapid 56 + or - 10 deg clockwise rotation of the entire Santa Ynez Range between 15.2 and 10 m.y.b.p. Dissert. Abstr.

N86-16771 Pennsylvania Univ., Philadelphia.
PHANEROZOIC TECTONO-THERMAL HISTORY OF THE NUBIAN MASSIF, EASTERN DESERT, EGYPT, AND IT RELATIONSHIP TO THE OPENING OF THE RED SEA AS REVEALED BY FISSION-TRACK STUDIES Ph.D. Thesis
Gomaa Ibrahim Omar 1985 164 p
Avail: Univ. Microfilms Order No. DA8515431

Seventy-nine fission-track ages are reported on apatite, sphene, and zircon recovered from Eo-Cambrian to Cretaceous ring complexes and Precambrian granites, Eastern Desert, Egypt. With respect to the ring complexes, zircon and sphene ages are concordant with K/Ar and Rb/Sr emplacement ages, signifying rapid cooling following intrusion. Apatite ages, except for Abu Khruq, are significantly younger than the emplacement ages and are interpreted as uplift ages. Annealing of the apatite clocks is attributed to a combination of cauldron subsidence, sedimentary burial, and an increase in regional heat flow. Combining ages on the ring complexes and the granites suggests that, block faulting was important in the dynamics of the uplift history since early Late Paleozoic time. Four major blocks were identified in southeastern Egypt. Uplift along major faults affected blocks of regional dimensions. It appears that, the updoming preceding the rifting stage of the Red Sea took place in two stages: the earlier and more widespread phase occurred during Late Cretaceous, the later in Early Oligocene time. Total duration of the two stages prior to the initiation of the opening of the Red Sea was about 50 m.y. A time-table for events related to the rifting stage in the Eastern Desert is also presented. Dissert. Abstr.

N86-16772 Colorado State Univ., Fort Collins.
EXPERIMENTAL STUDY OF ALLUVIAL FANS Ph.D. Thesis
William E. Weaver 1984 538 p
Avail: Univ. Microfilms Order No. DA8515202

The role of geomorphic thresholds in the short term operation and long term evolution of alluvial fans was examined. A theoretical, cyclic pattern of alluvial fan evolution, involving apex sedimentation, followed by channel incision and a longer period of lateral channel migration and backfilling, was confirmed. The regularity and predictability of cyclic changes in spatial sedimentation patterns increased as mudflows became more important. When mudflows were the primary agent, apex slopes were steep and unstable under intervening streamflow conditions. It is suggested that the alluvial fans of an area will display a myriad of contrasting morphologic forms, even if they were not subject to a change in external conditions. Incongruous morphologic responses of fans in Idaho imply differing levels of landform stability existed at the last major change in conditions. Changes in external variables may affect the stability of alluvial fans by either physically altering the landform relative to an unchanging threshold value or by modifying the threshold value of one of the variables which controls fan response. Instead of controlling landform behavior, external stimuli act within the cyclic framework of landform development to merely hasten or delay the conclusion of one cycle and the initiation of the next. Dissert. Abstr.

N86-16773 Oregon State Univ., Corvallis.
NUMERICAL SIMULTION OF PLANETARY BOUNDARY-LAYER EVOLUTION AND MESOSCALE FLOW OVER IRREGULAR TERRAIN UNDER DAYTIME HEATING CONDITIONS Ph.D. Thesis
Kyozo Ueyoshi 1985 298 p
Avail: Univ. Microfilms Order No. DA8514829

The influence of irregular terrain on the evolution of the daytime planetary boundary layer (PBL) and meso-beta scale dry circulations is studied using two three-dimensional hydrostatic beta-coordinate models with different approaches for the PBL parameterizations; the 4-layer model uses the mixed-layer (bulk-layer) approach, while the 7-layer model uses the mixed-layer (bulk-layer) approach, while the 7-layer model adopts the eddy-diffusivity (multi-layer) approach. Numerical experiments are carried out under the conditions of a dry, sunny summer day with moderate prevailing westerly winds blowing over gently sloping idealized hills in a domain of 150 km on a side. The results from the two models are compared and their performances are evaluated. The behaviors of the mean PBL depth and inversion strength are analytically described using a simple one-point mixed-layer model. Counterclockwise rotation of the mean PBL winds with time observed in both model results can be explained only when the non-zero momentum flux at the PBL top is taken into account. Dissert. Abstr.

N86-16774 Rice Univ., Houston, Tex.
MULTIPLE FREQUENCY BACKSCATTER OBSERVATIONS OF HEAT-INDUCED FIELD-ALIGNED STRIATIONS IN THE AURORAL E REGION Ph.D. Thesis
Stephen T. Noble 1985 164 p
Avail: Univ. Microfilms Order No. DA8517228

The mechanisms by which high-power HF radio waves produce geomagnetic ield-aligned striations (FAS) in the auroral E region were examined. During periods of full power O-mode heating, striations having peak cross sections of 40 to 50 dBsm are observed. Striations are not detected during times of X-mode heating. When the heater output is varied a corresponding change in the cross section is measured. The magnitude of the change is most pronounced for heater level changes in the range 12.5 to 50% of full power. These cross sections are significantly larger than those measured at midlatitudes using the Arecibo heater. The growth and decay times of the striations are frequency

dependent. The growths are variable and can range up to a few seconds if the ionospheric conditions are only marginal for striation development. Dissert. Abstr.

N86-16775 California Univ., Los Angeles.
TECTONIC INTERPRETATION OF LEVELING DATA IN SOUTHERN CALIFORNIA Ph.D. Thesis
Chi-Ching Liu 1985 220 p
Avail: Univ. Microfilms Order No. DA8516824

Systematic errors, such as refraction error, rod calibration error, and magnetic effects on leveling instruments are always troublesome in leveling interpretations. Kukkamaki's refraction formula, which was developed in Europe, requires temperature observations on at least two different heights above the ground for each setup. But the leveling surveys before 1980 in southern California had temperature observations at only one height. A refraction test survey from Saugus to Vincent in southern California showed that Kukkamaki's formula is useful, However, some numerical parameters estimated from Europena temperature measurements, and commonly used in the U.S., are not appropriate for southern California. As a result, the magnitude at the refraction error has been underestimated until now. From temperature observations in the 1980 test survey, linear relationships were also found among temperature and its first and second derivatives. Dissert. Abstr.

N86-16776 Louisiana State Univ., Baton Rouge.
INVERSE SPECTRAL MODELING OF GEOPOTENTIAL FIELDS OVER SEDIMENTARY BASINS Ph.D. Thesis
Michael Terry Angelich 1985 126 p
Avail: Univ. Microfilms Order No. DA8517722

Interpretation of geopotential data using inverse spectral modeling techniques eliminates the ambiguous results produced by the standard forward-modeling approach. However, applying the spectral modeling procedures by hand is time-consuming and lacks precision. This study expands on current spectral analysis techniques by adding least-squares statistical rigor to the fitting of the chosen model. Automating the model fitting procedure allows an investigator to examine quickly many overlapping sections (windows) of mapped data. Successive overlapping of neighboring windows suggest a correlation between the ensemble-average depth solutions unique to each window is possibe. This technique was shown to be especially useful in Louisiana and west Mississippi, where the thick sedimentary cover and relatively smooth anomallous geopotential fields insure correlation between successive windows. The correlated depth solutions appear to correspond well with horizons located by seismic refraction and inferred from hydrocarbon exploration studies. Dissert. Abstr.

N86-16777 Rice Univ., Houston, Tex.
STRUCTURE OF THE NORTHERN SIERRA NEVADA, CALIFORNIA Ph.D. Thesis
William Jay Schmidt 1985 272 p
Avail: Univ. Microfilms Order No. DA8517233

Structural features on megascopic, mesoscopic, and microscopic scales have been examined in a study area located in the central portion of the northern Sierra Nevada (west of Lake Tahoe). Structures observed within the study area are correlated with regional deformational events of the northern Sierra Nevada. Although at least four regionally extensive deformational events have affected the rocks of the northern Sierra Nevada, the effect of only three events are recognized in the study area. Structures associated with post-Ordovician/Silurian and pre-late Devonian deformation were not identified due to overprinted of later deformational events. There is ample evidence supporting extensive late Paleozoic-early Mesozoic deformation in the study area. Structures from this event formed as the result of compressive deformation along a northwest-striking, east-dipping convergent plate boundary along the western margin of the Sierra province and may be related to the accretion of strike-slip motion may have existed along the plate boundary, the structures appear to be related to the normal component of convergence.
Dissert. Abstr.

N86-16778 California Univ., Santa Barbara.
APPLICATIONS OF IMAGING RADAR TO GEOLOGY Ph.D. Thesis
Micheal Irvin Daily 1985 339 p
Avail: Univ. Microfilms Order No. DA8517877

Tone, texture, and features imaged by radars were studied. A variety of computer image processing techniques were developed to reveal characteristics of these scences. Field checking of sites suggests links between the geology and the images. Tonal studies examine the effects of varying frequency polarization, and illumination geometry. Most surficial geologic units in Death Valley, California, are distinguishable by use of multifrequency, multipolarization radar data. Quaternary basalt flows in Idaho are separable by changing illumination geometry in the vertical plane, whereas desert fans and dunes show little tonal variation as function of changing illumination aximuth. Topographic texture is strongly enhanced by radar's unusual imaging physics computer image processing techniques prove useful in classifying and enhancing image texture. The classification technique, yield results in good agreement with those of human interpreters. The enhancement technique resolves a plunging anticline that was not evident on unprocessed imagery. Identification of features such as lineaments and large topographic highs is critically dependent on radar system parameters. A mathematical model of topography-induced distortion provides insight into the relationship between a radar image and the illuminated terrain. Imaging radar is shown to be a useful sensor for geologic mapping, especially when complementary data are present. Careful image processing, field checking of interpretations, and an understanding of radar imaging physics are critical to effective utilization of this unusual sensor. Dissert. Abstr.

N86-16779 Institut d'Aeronomie Spatiale de Belgique, Brussels.
RECENT STRATOSPHERIC NEGATIVE ION COMPOSITION MEASUREMENTS BETWEEN 45 AND 22 km ALTITUDE
E. Arijs, D. Nevejans, J. Ingels, and P. Frederick 1984 29 p refs Presented at 7th International Conference on Atmospheric Electricity, Albany, N.Y., 3-8 Jun. 1984 Submitted for publication Sponsored by Belgian National Science Foundation
(Aeronomica-Acta-A-283-1984) Avail: Issuing Activity

Negative ion composition in the stratosphere was measured between 22 and 45 km altitude with a balloon-borne quadrupole mass spectrometer. At high altitudes the ion spectra may be disturbed by contamination, whereas at low altitudes ion cluster break up is a severe problem. The relative abundances of the different ion mass peaks, mainly belonging to the N(O-)3 (HNO3) and HS(O-)4 (HNO3)m (H2SO4)l cluster families allow the derivation of concentrations of H2SO4. At 45 km an increased SO2 mixing ratio, possibly due to volcanic activities, is estimated. The data are discussed in terms of previous measurements and models. Sulfur chemistry is considered. Author (ESA)

N86-16780# Geological Survey, Washington, D.C.
GEOLOGIC DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTES: EARTH-SCIENCE PERSPECTIVES
J. D. Bredehoeft, A. W. England, D. B. Stewart, N. J. Trask, and I. J. Winograd 1985 20 p refs
(GS-Circ-779; LC-78-600019) Avail: NTIS HC A02/MF A01

The long term storage of radioactive waste and its geological, biological, physical, and chemical effects are considered. The development of acceptable waste repositories are outlined: (1) identification of sites that meet broad criteria for tectonic stability, slow ground-water movement, and long flow paths to the surface; (2) intensive subsurface exploration of such sites to determine the hydrologic and geologic conditions in and around the potential repository; (3) predictions of repository behavior based on the initial conditions and on various assumptions about the future; (4) evaluation of the risk associated with these predictions; and (5) a judgement whether these risks are acceptable. Some of the key earth-science questions involved in the first four steps are discussed. E.A.K.

N86-16781# Committee on Science and Technology (U. S. House).
THE INTERNATIONAL GEOSPHERE/BIOSPHERE PROGRAM,

1984
Washington GPO 1985 41 p refs Presented by the Subcommittee on Space Science and Applications to the Committee on Science and Technology, 99th Congress, 1st Session, Apr. 1985 (GPO-45-472) Avail: US Capitol, House Document Room

The present status of the International Geosphere/Biosphere Program (IGBP) is discussed. The IGBP will contribute to the understanding of the Earth as a system, and could deal with problems such as acid rain and the CO2 greenhouse effect. The IGBP will be an international and interdisciplinary study of the Earth as a system and the man induced and natural changes in that system. In the U.S. it will involve several Federal agencies and universities. E.A.K.

N86-16782# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
X-RAY MEASUREMENTS AT THE SOUTH ATLANTIC MAGNETIC ANOMALY
Osmar Pinto, Jr. and Walter D. Gonzalez Aug. 1985 30 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3603-PRE/794) Avail: NTIS HC A03/MF A01

Bremsstrahlung X-rays measured at Sao Jose dos Campos-Brazil on April 14 and December 18, 1981, with omnidirectional NaI (Tl) scintillation detectors on board stratospheric balloons, are discussed in the context of energetic electron precipitation at the South Atlantic Magnetic Anomaly (SAMA). During the event of April 14, 1981, an intensification in the X-ray flux was measured in association with a geomagnetically disturbed period. For the event of April 14, 1981, the integrated X-ray flux due to electron precipitation, in the energy interval of 30 to 150 keV, reached a value of -7.10-3 photon/sq cm/s/keV at -5 q/sq cm atmospheric depth. For the event of December 18, 1981, which occurred during a geomagnetically calm period, there was only an upper limit of 1/1000 photons/sq cm/s/keV, in the energy interval of 30 to 150 keV and at 5 g/sq cm., for any X-ray flux that was measured then, in association to electron precipitation. The measurements reported are compared to similar ones obtained in the past at the SAMA. E.A.K.

N86-16783# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THEORY OF THE ATMOSPHERIC SODIUM LAYER: A REVIEW
V. W. J. H. Kirchhoff Aug. 1985 46 p refs Presented at the 5th Symposium on Airglow and Auroral Excitations and Models, Prague, Czechoslovakia, 14-15 Aug. 1985; sponsored by International Association of Geomagnetism and Aeronomy Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Technologico
(INPE-3605-PRE/796) Avail: NTIS HC A03/MF A01

The laser radar technique allows sodium densities and the sodium emissions to be monitored simultaneously. These results are described, keeping a balance between theory and experiment. Evolution of the photochemical theory, the model for diurnal variations, the sodium source, tidal effects, and problems at the top of the layer are addressed. E.A.K.

N86-16784# International Council of Scientific Unions, Urbana, Ill. Scientific Committee on Solar-Terrestrial Physics.
MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP. VOLUME 15: BALLOON TECHNIQUES
D. G. Murcray, ed. (Denver Univ., Colo.) Jun. 1985 156 p refs (Contract NASw-3805)
(NASA-CR-178440; NAS 1.26:178440; MAP-HANDBOOK-15) Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Some techniques employed by investigators using balloons to obtain data on the properties of the middle atmosphere are discussed. Much effort has gone into developing instruments which could be used on small balloons to measure temperature and variable species. These efforts are discussed. Remote sensing techniques used to obtain data on atmospheric composition are described. Measurement of stratospheric ions and stratospheric aerosols are also discussed. For individual titles, see N86-16785 through N86-16790.

N86-16785# Atmospheric Environment Service, Downsview (Ontario).
THE MEASUREMENT OF TEMPERATURE, OZONE AND WATER VAPOUR
T. McElroy *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 1-36 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Because of the importance of knowing temperature and humidity structure in the troposphere for the purpose of weather forecasting, temperature and humidity measurements as a function of pressure have been made for many decades. Recently, studies of the structure of the upper atmosphere have become of general interest. Many methods are employed to make measurements of three important atmospheric parameters. Some of these were developed through the use of the stratospheric research balloon, or high altitude sounding balloon. A sampling of these measurement techniques, such as the frost point hydrometer, an aluminum oxide humidity sensor, cryogenic sampling, ultraviolet fluorescence measurements, solar infrared absorption measurement by spectrometer, and infrared radiometry, are described in detail. E.R.

N86-16786# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
MEASUREMENTS OF NEUTRAL CONSTITUENTS USING INFRARED AND VISIBLE REMOTE SENSING
N. Louisnard and S. Pollitt (National Physical Lab., Teddington, England) *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 37-70 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Remote sensing from balloon platforms by visible and infrared spectrometry has been extensively used for past 10 years to measure the concentration profiles of stratospheric species. A brief review of the instrumentation and method of analysis is made. Recent results concerning HCl, ClO, HF, NOx, HNO3, CO, CH4, H2O and O3 are presented. Author

N86-16787# Consiglio Nazionale delle Ricerche, Florence (Italy). Ist. di Recerca sulle Onde Elettromagnetiche.
MEASUREMENTS OF NEUTRAL CONSTITUENTS USING FAR INFRARED REMOTE SENSING TECHNIQUES
B. Carli and J. E. Harries (Rutherford Appleton Lab., Chilton, England) *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 71-89 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Since 1977 much progress has occured both in the direction of improvements in experimental measurement from balloons and in the area of theoretical studies of the far infrared spectrum. Recent experimental results of balloon measurements are discussed as is theoretical calculations and spectroscopic data of the far infrared spectrum. A dictorial representation of the far infrared spectrum of a selection of stratospheric constituents is presented and analyzed. E.R.

N86-16788*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MICROWAVE LIMB SOUNDER FOR STRATOSPHERIC MEASUREMENTS
J. W. Waters, J. C. Hardy, R. F. Jarnot, H. M. Pickett, and P. Zimmerman *In* International Council of Scientific Unions Middle

Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 90-123 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The balloon-borne Microwave Limb Sounder (BMLS) measures atmospheric thermal emission from millimeter wavelength spectral lines to determine vertical profiles of stratospheric species. The instrument flown to data operates at 205 BHz to measure ClO, O3, and H2O2. A 63 GHz radiometer is added to test the technique for determining tangent point pressure from the MLS experiment on the Upper Atmosphere Research Satellite (UARS). Many additional species is also measured by the BLMS. A radiometer at 270 GHz would provide measurements of HO2, NO2, HNO3, N2O, 16O18O16O, and HCN. With this addition the BMLS can test the current theory of O3 heavy ozone photochemical balance in the upper stratosphere. Author

N86-16789# Institut d'Aeronomie Spatiale de Belgique, Brussels.
MEASUREMENT AND IDENTIFICATION OF STRATOSPHERIC IONS
D. Nevejans, J. Ingels, and E. Arijs *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 124-138 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Recent progress in the technology of stratospheric ion mass spectrometry is described. The state of the art as well as some typical measuring problems and needs for future developments are briefly reviewed. Author

N86-16790# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
MEASUREMENTS OF STRATOSPHERIC AEROSOLS
D. J. Hofman *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, Volume 15 Jun. 1985 p 139-153 refs (For primary document see N86-16784 07-46)
Avail: NTIS HC A08/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The history of measurements of the stratospheric aerosol layer is briefly reviewed. Balloon-borne measurements played a major role both in the discovery of the layer and in the susequent study of its nature. Following this introduction, stratospheric aerosol sources and balloon-borne measurement techniques are reviewed. Finally, the current status of this research area is outlined with data obtained mainly by balloon-borne techniques. It is concluded that a great deal has been learned in the past five years, due mainly to the increase of the occurrence of major volcanic eruptions, which are the predominant source of stratospheric particles, but also due to the development of instrumentation and techniques which have seen considerable application on the balloon platform. Author

N86-16791*# Massachusetts Inst. of Tech., Cambridge.
ZONALLY AVERAGED MODEL OF DYNAMICS, CHEMISTRY AND RADIATION FOR THE ATMOSPHERE Semiannual Status Report, 1 Jun. - 30 Nov. 1985
Ka Kit Tung [1985] 73 p refs
(Grant NAGw-798)
(NASA-CR-176465; NAS 1.26:176465) Avail: NTIS HC A04/MF A04 CSCL 04A

A nongeostrophic theory of zonally averaged circulation is formulated using the nonlinear primitive equations on a sphere, taking advantage of the more direct relationship between the mean meridional circulation and diabatic heating rate which is available in isentropic coordinates. Possible differences between results of nongeostrophic theory and the commonly used geostrophic formulation are discussed concerning: (1) the role of eddy forcing of the diabatic circulation, and (2) the nonlinear nearly inviscid limit vs the geostrophic limit. Problems associated with the traditional Rossby number scaling in quasi-geostrophic formulations are pointed out and an alternate, more general scaling based on the smallness of mean meridional to zonal velocities for a rotating planet is suggested. Such a scaling recovers the geostrophic balanced wind relationship for the mean zonal flow but reveals that the mean meridional velocity is in general ageostrophic. Author

N86-16792*# Alaska Univ., Fairbanks. Geophysical Inst.
AURORAL IMAGING FROM SPACELAB 3 Yearly Report
Thomas J. Hallinan and Don Lind Nov. 1985 9 p refs
(Grant NAG5-635)
(NASA-CR-178452; NAS 1.26:178452; YR-1) Avail: NTIS HC A02/MF A01 CSCL 04A

A comprehensive set of video and photographic images of the aurora was acquired and analyzed from Spacelab 3. Since each pass of Spacelab covers several hours of local time during an elapsed time of only a few minutes, it was hoped that these images would provide additional insight into the local-time dependence of the auroral morphology. Spacelab 3 was launched on April 29, 1985 and auroral data were obtained during the period April 30 to May 5. Preparations made for the auroral experiment, the quality and quantity of the data obtained, the initial scientific results, and ideas for further inquiry suggested by the preliminary review of the data are discussed. Author

N86-16793*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
DYNAMICS EXPLORER GUEST INVESTIGATOR Final Report, 1 Aug. 1984 - 31 Oct. 1985
J. J. Sojka 31 Oct. 1985 21 p refs
(Grant NAG5-455)
(NASA-CR-176477; NAS 1.26:176477) Avail: NTIS HC A02/MF A01 CSCL 04A

The use of Dynamics Explorer (DE) data sets to model the auroral inputs for the time dependent ionospheric model (TDIM) is reported. The modelling requires DE-1 SAI images and simultaneous DE-2 LAPI particle data. The data sets allow the large scale relative auroral variations and local absolute energy flexes and characteristics energies to be defined. The images enabled global scale auroral modelling with 12 min. time resolution and the LAPI data presented a detailed energy flux and characteristic energy calibration of the image model. The auroral model is used as an input to the TDIM and studies ionospheric storms. E.A.K.

N86-16794*# Missouri Univ., Rolla.
STUDY OF THE LITHOLOGY, PETROLOGY AND ROCK CHEMISTRY FOR THE PYRAMID MOUNTAINS, NEW MEXICO
Sheldon Kerry Grant [1985] 21 p
(Contract NAS13-251)
(NASA-CR-176473; NAS 1.26:176473) Avail: NTIS HC A02/MF A01 CSCL 08G

Rock and soil samples were collected at 24 sites within the Pyramid Mountains of southwestern New Mexico. The site locations are specified as 10-acre plots within the Section, Township, and Range land survey system. Hand specimen are described. The specimen were analyzed by X-ray fluorescence. The technique is designed to obtain good analysis for silica. The other elements are run so that matrix factor logic can be used to adjust the silica intensities, and to compensate for the element interaction. E.A.K.

N86-16795*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLOBAL AURORAL RESPONSES TO MAGNETOSPHERIC COMPRESSIONS BY SHOCKS IN THE SOLAR WIND: TWO CASE STUDIES
J. D. Craven (Iowa Univ., Iowa City), L. A. Frank (Iowa Univ., Iowa City), C. T. Russell (California Univ., Los Angeles), E. J. Smith (California Inst. of Technology, Pasadena), and R. P. Lepping Apr. 1985 31 p refs Submitted for publication Original contains color illustrations
(Contract NAS5-25689; Grants NAG5-483; NGL-16-001-002; Contract N00014-76-C-0016)

(NASA-CR-177835; NAS 1.26:177835; U-OF-IOWA-85-11) Avail: NTIS HC A03/MF A01 CSCL 04A

The global auroral responses to shocks in the solar wind at Earth were studied. The z-component of the interplanetary magnetic field, Bz, is negative ahead and behind the first shock and positive for the second case. A sudden-commencement geomagnetic storm develops in each case, with maximum D sub st < 190 nT. An immediate auroral response is detected at all longitudes around the auroral oval, in which auroral luminosities increase by a factor of 2 to 3 with the first samples after each sudden commencement. The time delay in obtaining the first sample varies with local time from approx. 1 to 18 mins. No other significant variations in the aurora are associated with the immediate response. Beginning approx. 30 mins after each sudden commencement, the aurora becomes active and displays significant variations in its luminosity and spatial distribution. For Bz < 0 an intense substorm develops. A sun-aligned transpolar arc forms when Bz > 0, appearing first at local midnight as a polar arc and then lengthening sunward from the auroral oval across the polar cap to noon at an average speed of approx. 1 km/sec. E.A.K.

N86-16796*# National Aeronautics and Space Administration, Washington, D.C.

PRESENT STATE OF KNOWLEDGE OF THE UPPER ATMOSPHERE: AN ASSESSMENT REPORT

Jan. 1984 73 p

(NASA-TM-87559; NAS 1.15:87559) Avail: NTIS HC A04/MF A01 CSCL 04A

A program of research, technology, and monitoring of the phenomena of the upper atmosphere, to provide for an understanding of and to maintain the chemical and physical integrity of the Earth's upper atmosphere was developed. NASA implemented a long-range upper atmospheric science program aimed at developing an organized, solid body of knowledge of upper atmospheric processes while providing, in the near term, assessments of potential effects of human activities on the atmosphere. The effects of chlorofluorocarbon (CFC) releases on stratospheric ozone were reported. Issues relating the current understanding of ozone predictions and trends and highlights recent and future anticipated developments that will improve our understanding of the system are summarized. E.A.K.

N86-16797# Physical Dynamics, Inc., Bellvue, Wash.

STUDIES OF GRAVITY WAVE PROPAGATION IN THE MIDDLE ATMOSPHERE Annual Report, 11 Feb. 1984 - 11 Feb. 1985

T. J. Dunkerton 25 Mar. 1985 24 p

(Contract F49620-83-C-0061)

(AD-A158726; PD-NW-85-330R; AFOSR-85-0505TR) Avail: NTIS HC A02/MF A01 CSCL 04/1

Research represents an effort to understand the role of gravity waves in the general circulation of the atmosphere. Such waves exist on a wide range of scales and frequencies. In this report, we describe ray tracing of gravity waves of horizontal scales from 50 to 800 km, all of which are observed in the middle atmosphere and play an essential role in the transport of momentum and mixing of constituents. Also presented are numerical simulations of gravity wave, mean-flow interaction, focusing on two aspects of this process: saturation and self-acceleration. Model results are compared to the predictions of a semi-analytic model of gravity waves. Finally, the report concludes with a discussion of constituent mixing in gravity wave breakdown, and problems in this area meriting further study. GRA

N86-16798# Naval Postgraduate School, Monterey, Calif.

METHODOLOGY FOR THE CONDUCT OF A SEISMIC RISK MITIGATION STUDY M.S. Thesis

M. D. Huntzinger Jun. 1985 136 p

(AD-A158958) Avail: NTIS HC A07/MF A01 CSCL 08/11

The author presents a methodology for evaluating the seismic vulnerability of a bases facilities. The methodology starts with the determination of the mission important facilities to a base, the foundation of which is the importance of the missions they house. The results of which are used to determine the facilities that should be studied for their seismic vulnerability under contracts administered by Naval Facilities Engineering Command, Engineering Field Divisions. The methodology presents alternatives for evaluating the results of the engineering and seismic studies, culminating in a rank ordering of the seismic upgrading projects developed by these studies. GRA

N86-16799# Army Cold Regions Research and Engineering Lab., Hanover, N. H.

REVIEW OF METHODS FOR GENERATING SYNTHETIC SEISMOGRAMS

L. Peck Jun. 1985 48 p

(DA Proj. 4A1-61102-AT-24)

(AD-A159128; CRREL-85-10) Avail: NTIS HC A03/MF A01 CSCL 08/11

Various methods of generating synthetic seismograms are reviewed and examples of recent applications of the methods are cited. Body waves, surface waves, and normal modes are considered. The analytical methods reviewed include geometric ray theory, generalized ray theory (Cagniard-de Hoop method), asymptotic ray theory, reflectivity method, full wave theory, and hybrid methods combining ray theory and mode theory. Two numerical methods, those of finite differences and finite elements and a hybrid method containing finite differences with asymptotic ray theory are described. Limitations on the application or validity of the various methods stated. GRA

N86-16800# Science Applications International Corp., McLean, Va.

ACTIVE IONOSPHERIC GENERATION OF ELF/VLF WAVES Final Report

K. Papadopoulos, C. L. Chang, K. Ko, and C. Menyuk 15 Aug. 1985 96 p

(Contract N00014-84-C-0353)

(AD-A159359; AD-E700020; SAIC-85/1800) Avail: NTIS HC A05/MF A01 CSCL 04/1

During the past year our work supported by the ONR Contract N00014-84-C-0353 achieved many significant results concerning ionospheric generation of extremely low frequency/very low frequency (ELF/VLF) as well as ultra low frequency waves. A major breakthrough was our participation in an experiment using the Arecibo facility in which a preliminary proof of principle of two of the relevant concepts was produced. We highlight below some of our key results and refer the interested reader to the appendices for details. A novel process for generating ELF/ULF waves by using ionospheric heating was discovered and its applicability to auroral geometry was examined. The process relies on modulated E-region heating and does not depend on the presence of ambient ionospheric currents. GRA

N86-16801# Lawrence Livermore National Lab., Calif.

SIMPLIFIED SEISMIC PROBABILISTIC RISK ASSESSMENT: PROCEDURES AND LIMITATIONS

L. C. Shieh, J. J. Johnson, J. E. Wells, J. C. Chen, and P. D. Smith Aug. 1985 195 p

(TI85-016786; UCID-20438; NUREG/CR-4331) Avail: NTIS HC A09/MF A01

At the request of the U.S. Nuclear Regulatory Commission, the Lawrence Livermore National Laboratory developed a simplified seismic probabilistic risk assessment (PRA) methodology. The purpose of this methodology is to reduce the costs while adequately performing seismic probabilistic risk assessments of nuclear power plants. The development of the simplified seismic methodology is summarized and guidelines for applying the procedures are explained. The development effort is part of the scope of work of the Seismic Safety Margins Research Program (SSMRP). Development efforts included: the development of simplified methodology for estimating seismic response (including response correlation and random and modeling uncertainties) directly from free-field ground acceleration; the development of guidelines for event/fault trees to be used in simplified seismic PRAs; and analysis of the Zion Nuclear Power Plant, Zion, Illinois, using the simplified

methodology; and the issuance of a report giving procedure and guidelines for applying the simplified methodology. R.J.F.

N86-16802# Lawrence Livermore National Lab., Calif.
EARTHQUAKE SAFETY PROGRAM AT LAWRENCE LIVERMORE NATIONAL LABORATORY
G. E. Freeland Aug. 1985 11 p refs Presented at the DOE Natural Phenomena Hazards Mitigation Conference, Las Vegas, Nev., 7 Oct. 1985
(Contract W-7405-eng-48)
(DE85-017400; UCRL-93225; CONF-8510118-3) Avail: NTIS HC A02/MF A01

Within three minutes on the morning of January 24, 1980, an earthquake and three aftershocks, with Richter magnitudes of 5.8, 5.1, 4.0, and 4.2, respectively, struck the Livermore Valley. Two days later, a Richter magnitude 5.4 earthquake occurred, which had its epicenter about 4 miles northwest of the Lawrence Livermore National Laboratory (LLNL). Although no one at the Lab was seriously injured, these earthquakes caused considerable damage and disruption. Masonry and concrete structures cracked and broke trailers shifted and fell off their pedestals, office ceilings and overhead lighting fell, and bookcases overturned. Employee suddenly found themselves immersed in a site-wide program of repairing earthquake-damaged facilities, and protecting employees and the surrounding community from future earthquakes. Over the past five years, LLNL has spent approximately $10 million on its earthquake restoration effort for repairs and upgrades. The discussion there centers upon the earthquake damage that occurred, clean-up and restoration efforts, the seismic review of LLNL facilities, site-specific seismic design criteria, computer-floor upgrades, ceiling-system upgrades, unique building seismic upgrades, geologic and seismologic studies, and seismic instrumentation. GRA

N86-16803# Lawrence Livermore National Lab., Calif.
INTERPRETING GEOLOGICAL STRUCTURE USING KRIGING
N. Mao Jul. 1985 11 p refs Presented at the Society of Mining Engineers Fall Meeting, Albuquerque, N. Mex., 16 Oct. 1985
(Contract W-7405-eng-48)
(DE85-016439; UCRL-92423; CONF-851054-3) Avail: NTIS HC A02/MF A01

We applied kriging (geostatistics) to interpret the structure of basement rock in Yucca Flat, NTS from borehole data. The estimation error for 118 data is 81 m comparable with those based on both gravity and borehole data. Using digitized topographic data, we tested the kriging results and found that the model validation process (Thomas option) on data gave a fair representation of the overall uncertainty of the kriged values. DOE

N86-16804# Illinois State Geological Survey, Champaign. Dept. of Energy and Natural Resources.
STE. GENEVIEVE FAULT ZONE, MISSOURI AND ILLINOIS
W. John Nelson, Donald K. Lumm, and Howard R. Schwalb 1985 100 p
(TI85-901892; NUREG/CR-4333) Avail: NTIS HC A05/MF A01

The Ste. Genevieve Fault Zone crosses the northeast flank of the Ozark Dome in southeastern Missouri and extreme southern Illinois. The surface trace of faulting trends southeast and is approximately 120 miles (190 km) long. Major displacements are as much as 3,000 feet (900 m) downward to the northeast along a sharp monoclinal flexural, which is cut by one or more high-angle reverse faults. Smaller high-angle normal and reverse faults are found on both sides of the main zone. At both ends the Ste. Genevieve Fault Zone dies out into a monocline. Two periods of faulting occurred. The first was in late Middle Devonian time, and the second ran from latest Mississippian through early Pennsylvanian time, with possible minor post-Pennsylvanian movement. No displacements of Quaternary sediments have been detected, but small earthquakes occur from time to time along the Ste. Genevieve Fault Zone. Many faults in the zone appear capable of slipping under the current stress regime of east-northeast to west-southwest horizontal compression. It is concluded that the zone may continue to experience small earth movements, but catastrophic quakes similar to those at New Madrid in 1811 to 12 are unlikely. Author

N86-16805# Geological Survey, Menlo Park, Calif.
STRATIGRAPHY AND MAJOR ELEMENT GEOCHEMISTRY OF THE LASSEN VOLCANIC CENTER, CALIFORNIA
Michael A. Clynne 1984 203 p
(TI85-901785; USGS-OFR-84-224) Avail: NTIS HC A10/MF A01

Detailed geologic mapping of 200 sq km in and near Lassen Volcanic National Park, California and reconnaissance of the surrounding area, combined with reinterpretation of data in the literature, allow definition of the Lassen Volcanic Center and provide the stratigraphic framework necessary for interpretation of major-element chemical data. The Lassen Volcanic Center developed in three stages. Stages 1 and 2 produced Brokeoff Volcano, an andesitic composite cone that erupted mafic andesite to dacite 0.6 to 0.35 my ago. Volcanism then shifted in character and locale. Domes and flows of dacite and rhyodacite, and flows of hybrid andesite were erupted on the northern flank of Brokeoff Volcano during the period from 0.25 my ago to the present; these rocks comprise Stage 3 of the Lassen Volcanic Center. Rocks of the Lassen Volcanic Center are typical of subduction-related calc-alkaline volcanic rocks emplaced on a continental margin overlying sialic crust. Porphyritic andesite and dacite with high Al_2O_3, low TiO_2, medium K_2O, and FeO/MgO 1.5 to 2.0 are the most abundant rock types. DOE

N86-16806# Lawrence Livermore National Lab., Calif.
CALCULATION OF GRAVIMETRIC DENSITY CAUSED BY THREE-DIMENSIONAL STRUCTURE
J. R. Hearst, R. E. Carlson, and S. R. Clark Aug. 1985 27 p refs Presented at the 3rd Symposium on Containment of Underground Nuclear Explosions, Idaho Falls, Idaho, 10 Sep. 1985 Prepared in cooperation with EG and G, Inc., San Ramon, Calif.
(Contract W-7405-eng-48)
(DE85-018018; UCRL-92268, CONF-850953-6) Avail: NTIS HC A03/MF A01

The difficulty with calculating the gravitational effect of three-dimensional structure is not in the calculation itself, but in the description of the structure such that it fills all space and does not contain voids. We have solved this problem by using contour maps of subsurface boundaries between media of different density. The contour lines are digitized, and the digitized data are used to construct a function that is then evaluated over a fine grid surrounding the borehole. The algorithm used to construct the approximating function is a modification of Hardy's multiquadric method for interpolating scattered data. The edges of the grid are smoothed, and then extended to distances great enough to be effectively infinite in the gravity calculation. The gravity calculation uses an algorithm by Banerjee and Gupta for the calculation of the gravitational effect of a right rectangular prism. For each rectangle of the grid, the depth of the corners is averaged and used for the depth of one end of the prism. At each grid rectangle there are two prisms: one with the top at the top surface and the bottom at the contact surface, the other with the top at the contact surface and the bottom at the bottom surface. Two contact surfaces (describing three layers) can be used, in which case a third prism, with its ends on the two contact surfaces, is calculated. Gravimetric density is then calculated from the vertical gradient of gravity. DOE

N86-16807# Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Garmisch-Partenkirchen (West Germany). Inst. fuer Atmosphaerische Umweltforschung.
BALANCE OF THE TROPOSPHERIC OZONE AND ITS RELATION TO STRATOSPHERIC INTRUSIONS INDICATED BY COSMOGENIC RADIONUCLIDES Final Technical Report, 1 Nov. 1977 - 31 Jan. 1984
R. Reiter, H. J. Kanter, H. Jaeger, and K. Munzert 1985 22 p
(Contract DE-AC02-76EV-03425)
(DE86-000213; DOE/ET-03425/28-Pt-14) Avail: NTIS HC A02/MF A01

The objective was to clarify the effect of stratospheric intrusions on the tropospheric ozone budget. The correlation between stratospheric-tropospheric exchange and solar events was also investigated. Tropospheric ozone was recorded at three different levels. The radioisotopes (7)Be and radon daughter products (214)Pb and (214)Bi were used as tracers to identify the source of ozone. DOE

N86-16808# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1978 Progress Report
Nov. 1984 67 p refs
(ISBN-87-7478-242-8) Avail: NTIS HC A04/MF A01
The results of the standard observations carried out at the Godhavn magnetic laboratory during 1978 are presented. The measurements show hourly means and ranges. Annual mean values since 1926 are given. Author (ESA)

N86-16809# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1981 Progress Report
Nov. 1984 67 p refs
(ISBN-87-7478-245-2) Avail: NTIS HC A04/MF A01
The results of the standard observations carried out at the Godhavn magnetic laboratory during 1981 are presented. The measurements show hourly means and ranges. Annual mean values since 1926 are given. Author (ESA)

N86-16810# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1983 Progress Report
Nov. 1984 70 p refs
(ISBN-87-7478-240-1) Avail: NTIS HC A04/MF A01
The results of the standard observations carried out at the Godhavn magnetic laboratory during 1983 are presented. The measurements show hourly means and ranges. Annual mean values since 1926 are given. Author (ESA)

N86-16811# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
NARSSARSSUAQ GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1983 Progress Report
Jan. 1985 67 p refs
(ISBN-87-7478-250-9) Avail: NTIS HC A04/MF A01
The results of the standard observations carried out at the Narssarssuaq magnetic laboratory during 1983 are presented. The measurements show hourly means and ranges. Annual mean values for 1983 are given. Author (ESA)

N86-16812# Stockholm Univ. (Sweden). Arrhenius Lab.
ON THE PARAMETERIZATION OF SUBGRID SCALE OROGRAPHIC EFFECTS IN MODELS OF THE LARGE SCALE ATMOSPHERIC FLOW
Aake Johansson 24 Apr. 1985 52 p refs
(DM-44; ISSN-0349-0467) Avail: NTIS HC A04/MF A01
A parameterization scheme for handling the effects of subgrid scale orography, based on a linear model of the stationary, internal gravity wave field forced by orography is presented. Orographic features which influence the orographic forcing function in the model are discussed. A detailed data set of the topography is needed to produce the proper orographic forcing function. A test under realistic conditions was undertaken to evaluate the quantitative effects of the scheme. The results indicate that the scheme produces mean flow tendencies which are very much a function of the vertical structure of the atmosphere, showing that the scheme is very flow dependent. Time and space scales, and problems which may arise in the tropics are considered. Author (ESA)

N86-16813# Stockholm Univ. (Sweden). Arrhenius Lab.
A LOW-ORDER MODEL FOR MOIST CONVECTION
Xiang-yu Huang Jun. 1985 55 p refs
(DM-45; ISSN-0349-0467) Avail: NTIS HC A04/MF A01
A low-order model for two-dimensional atmospheric moisture convection is developed. Four components are chosen to represent the motion and temperature deviation fields. Condensation is introduced by using a simplified scheme and only the condensation heating is considered. Results from stability studies of the model show that the hysteresis effect from condensation can be observed. Author (ESA)

N86-16814# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
BRORFELDE GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1981 Progress Report
1985 35 p refs
(ISBN-87-7478-251-7) Avail: NTIS HC A03/MF A01
The results of the standard observations carried out at the Brorfelde magnetic laboratory during 1981 are presented. The measurements show hourly means and mean diurnal inequalities. Author (ESA)

N86-16815# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
BRORFELDE GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1982 Progress Report
1985 56 p refs
(ISBN-87-7478-252-5) Avail: NTIS HC A04/MF A01
The results of the standard observations carried out at the Brorfelde magnetic laboratory during 1982 are presented. The measurements show hourly means and diurnal variations. Author (ESA)

N86-16816# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
ATMOSPHERIC INFRARED BACKSCATTERING PROFILES: INTERPRETATION OF STATISTICAL AND TEMPORAL PROPERTIES
M. J. Post May 1985 113 p
(PB85-212934; NOAA-TM-ERL-WPL-122) Avail: NTIS HC A06/MF A01 CSCL 04A
The design, implementation, and calibration of NOAA's coherent, pulsed, Doppler lidar is described. This lidar was used to acquire 252 high-quality, independent measurements of atmosheric backscattering profiles from 4 to 80 km altitude over Boulder, Colorado, at a wavelength of 10.6 micrometers between May 1981 and May 1983, a period that includes the injection and removal of debris from the El Chichon eruptions. GRA

N86-16817# Arkansas Univ., Fayetteville. Dept. of Chemical Engineering.
DEVELOPMENT OF AN ATMOSPHERIC DISPERSION MODEL FOR HEAVIER-THAN-AIR-GAS MIXTURES, VOLUME 1 Final Report, Sep. 1980 - Feb. 1985
J. A. Havens and T. O. Spicer Feb. 1985 188 p
(Contract DTCG23-80-C-20029)
(PB85-228633; GRI-85/0133) Avail: NTIS HC A09/MF A01 CSCL 04A
The mathematical modeling techniques which have been used to predict atmospheric dispersion of heavy gases are reviewed and critiqued. These dispersion processes are characterized by three regimes or phases: near-field, negative buoyancy-dominated flow regime, intermediate-field, stably stratified shear flow regime, and far-field, passive turbulent diffusion regime. Mathematical models of laboratory and natural gravity currents are used to describe the negative buoyancy-dominated regime flow and dilution processes. The model concepts are consistent with the limiting passive behavior of demonstrated air pollution models. An interactive computer model for heavy gas dispersion (DEGADIS) is developed. Author (GRA)

N86-16818# Illinois State Geological Survey, Champaign.
DEPOSITIONAL ENVIRONMENTS AND CORRELATION PROBLEMS OF THE WEDRON FORMATION (WISCONSINAN)

IN NORTHEASTERN ILLINOIS: GUIDEBOOK
W. H. Johnson, B. J. Socha, A. K. Hansel, L. R. Follmer, and J. M. Masters 1985 98 p Prepared in cooperation with Illinois Univ., Urbana-Champaign
(PB85-210581; IL/SGS/GB-16) Avail: NTIS HC A05/MF A01 CSCL 08G

Glacial deposits and landforms in northeastern Illinois and investigations in this area have been central to the development of concepts of the Wisconsian glaciation. Various aspects of glacial depositional environments and stratigraphic and correlation problems of the Wedron Formation are discussed. The Wedron Formation, includes till and intercalated gravel, sand, and silt of the Woodfordian Substage (late Wisconsinan). It comprises the succession of Woodfordian deposits that extend upward from the basal contact with Morton Loess to the top of till below the Two Creeks deposit at Two Creeks, Wisconsin. GRA

N86-16819# Illinois State Geological Survey, Champaign.
SILURIAN GEOLOGY OF THE DES PLAINES RIVER VALLEY, NORTHEASTERN ILLINOIS
D. G. Mikulic, M. L. Sargent, R. D. Norby, and D. R. Kolata 1985 64 p
(PB85-210060; IL/SGS/GB-17) Avail: NTIS HC A04/MF A01 CSCL 08G

Silurian dolomites are among the most poorly understood rock units in the midwestern United States. These rocks have not attracted as much interest as those in other Paleozoic systems for several reasons. Destruction of primary fabric by dolomitization discourages sedimentological studies, carbonate buildups complicate local correlations. However, the development of large, deep quarries has advanced the understanding of the lithostratigraphy of Silurian rocks, particularly in northeastern Illinois, where the growth of the Chicago area has supported a large stone industry for the last 150 years. This field trip provides a good overview of Chicago-area Silurian geology. Author (GRA)

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-16820# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
THE 1985 ATLANTIC SEASONAL TROPICAL CYCLONE ACTIVITY AND VERIFICATION OF AUTHOR'S FORECAST
William M. Gray 25 Nov. 1985 8 p refs
Avail: NTIS HC A02/MF A01

This paper gives a brief summary of the tropical cyclone activity which occurred in the Atlantic in 1985 and verifies the author's (Gray, 1985a, 1985b) forecast of this activity that was issued on 28 May and updated on 27 July. This forecast was based on the author's previous research (Gray, 1983, 1984a, 1984b) which relates seasonal Atlantic hurricane activity to: (1) the El Nino (EN); (2) the Quasi-Biennial Oscillation (QBO) of equatorial 30 mb stratospheric wind; (3) the April to May and June to July Caribbean Basin-Gulf of Mexico Sea-Level Pressure Anomaly (SLPA), and (4) lower latitude Caribbean Basin 200 mb zonal wind anomaly. Information received by the author as of 28 May 1985 indicated that the 1985 hurricane season should have been an above average year with about 8 hurricanes (6 is average), 11 hurricanes and tropical storms (9 is average), and 35 hurricane days (25 is average). This forecast was updated on 27 July 1985 to the revised values of 7 hurricanes, 10 hurricanes and tropical storms and thirty hurricane days. The actual number of hurricanes which occurred in 1985 was 7 (1 above average); actual number of hurricanes and tropical storms was 11 (2 above average); and actual number of hurricane days was 29 (4 above average). Author

N86-16821# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DIURNALLY FORCED TROPICAL TROPOSPHERIC CIRCULATION OVER SOUTH AMERICA
Pedro LeitedaSilvaDias, Jose Paulo Bonatti, and Vernon Edgard Kousky Jun. 1985 43 p refs Submitted for publication
(INPE-3566-PRE/771) Avail: NTIS HC A03/MF A01

The impact of diurnally varying thermal forcing on the tropical circulation is studied with a linearized shallow water model on an equatorial beta plane. The mass and flow fields are interpreted as internal modes of a stratified model, based on the results of the projection of typical cumulus heating profiles. The projection of referred profiles is optimally described by a convergence/divergence pattern at high/low levels in the tropics with an equivalent depth on the order of 220 m. The effect of altering the size, latitude and internal mode representation of a bell shaped mass source is considered in terms of the energy partition between Kelvin, mixed Rossby-gravity and gravity intertial waves and Rossby waves. The 500 mb vertical motion fields associated with the diurnal evolution of the oscillatory solution are compared to those derived from the National Meteorological Center final Analysis over the tropical South America. Author

N86-16822# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PYRANOMETER COMPARISON AT INPE, ATIBAIA, IN AUGUST 1983
Jorgdieter Anhalt Jun. 1985 13 p refs
(INPE-3561-NTE/236) Avail: NTIS HC A02/MF A01

Pyranometers and Pyroheliometers are used for collecting meteorological data or solar collector tests. The calibration constants of these instruments vary with time and have to be recalibrated in certain intervals. The recalibration of four pyranometers and one pyrheliometer under tropic climate conditions using secondary standard instruments, and calibration standards together with data acquisition system are discussed. The results obtained can not be explained by the aging of these instruments. E.A.K.

N86-16823*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SEVERE STORMS BRANCH RESEARCH REPORT (APRIL 1984 APRIL 1985)
L. Dubach, ed. 1985 146 p
(NASA-TM-86238; Rept-86B0028; NAS 1.15:86238) Avail: NTIS HC A07/MF A01 CSCL 04B

The Mesoscale Atmospheric Processes Research Program is a program of integrated studies which are to achieve an improved understanding of the basic behavior of the atmosphere through the use of remotely sensed data and space technology. The program consist of four elements: (1) special observations and analysis of mesoscale systems; (20 the development of quanitative algorithms to use remotely sensed observations; (3) the development of new observing systems; and (4) numerical modeling. The Severe Storms Branch objectives are the improvement of the understanding, diagnosis, and prediction of a wide range of atmospheric storms, which includes severe thunderstorms, tornadoes, flash floods, tropical cyclones, and winter snowstorms. The research often shed light upon various aspects of local weather, such as fog, sea breezes, air pollution, showers, and other products of nonsevere cumulus cloud clusters. The part of the program devoted to boundary layer processes, gust front interactions, and soil moisture detection from satellites gives insights into storm growth and behavior. E.A.K.

N86-16824*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOIL TEMPERATURE EXTREMA RECOVERY RATES AFTER PRECIPITATION COOLING
Jean E. Welker Oct. 1984 22 p refs
(NASA-TM-86163; NAS 1.15:86163) Avail: NTIS HC A02/MF A01 CSCL 04B

From a one dimensional view of temperature alone variations at the Earth's surface manifest themselves in two cyclic patterns of diurnal and annual periods, due principally to the effects of diurnal and seasonal changes in solar heating as well as gains and losses of available moisture. Beside these two well known

cyclic patterns, a third cycle has been identified which occurs in values of diurnal maxima and minima soil temperature extrema at 10 cm depth usually over a mesoscale period of roughly 3 to 14 days. This mesoscale period cycle starts with precipitation cooling of soil and is followed by a power curve temperature recovery. The temperature recovery clearly depends on solar heating of the soil with an increased soil moisture content from precipitation combined with evaporation cooling at soil temperatures lowered by precipitation cooling, but is quite regular and universal for vastly different geographical locations, and soil types and structures. The regularity of the power curve recovery allows a predictive model approach over the recovery period. Multivariable linear regression models alloy predictions of both the power of the temperature recovery curve as well as the total temperature recovery amplitude of the mesoscale temperature recovery, from data available one day after the temperature recovery begins.
Author

N86-16825*# Engineering Analysis, Inc., Huntsville, Ala.
ATMOSPHERIC PHENOMENA DATA PROCESSING AND DISPLAY
Frank B. Tatom and Lynn R. Purser 30 Jul. 1985 22 p refs
(Contract NAS8-35979)
(NASA-CR-178448; NAS 1.26:178448; EAI-TR-85-004A) Avail: NTIS HC A02/MF A01 CSCL 04B

Several related efforts which deal with the analysis and display of data pertaining to various atmospheric phenomena are reported. Spectrometer data analysis, with refinements to the preexisting programs, is discussed. A discussion of a Monte Carlo simulation of a photon transfer problem is presented. Raw data gathered in the field by a high-flying U2 aircraft is usually pulse code modulated (PCM). Techniques to reduce the data into a computer-amenable format are described. Several utility programs and other work are outlined.
E.A.K.

N86-16826# Naval Postgraduate School, Monterey, Calif.
AN OBJECTIVE DETERMINATION OF TROPICAL CYCLONE WARNING POSITION M.S. Thesis
W. T. Curry Jun. 1985 59 p
(AD-A159390) Avail: NTIS HC A04/MF A01 CSCL 04/2

A technique has been developed to determine objectively the location of a tropical cyclone at warning time and reduce the short-term forecast errors due to errors in the warning position. The western North Pacific CLIPER (CLImatology and PEPsistence) forecast scheme is used to generate a potential track from each fix, and a smooth curve is fit to the future and past positions. When multiple fixes are available, weighting functions are applied to account for fix platform accuracy and time of receipt. A set of 836 cases from 30 storms during 1981 to 1983 was evaluated. Using the objective scheme, 16 of the 30 tropical cyclones had reduced warning position errors compared to the Joint Typhoon Warning Center official warning position. For 11 of the 30 storms, the objective warning positions resulted in more accurate 24-h forecasts with the CLIPER technique than the official warning positions. This technique appears to provide an efficient, interactive tool to the forecaster to use in establishing the warning position.
GRA

N86-16827# Naval Environmental Prediction Research Facility, Monterey, Calif.
AN APPLICATION OF DISCRIMINANT ANALYSIS TO A TROPICAL CYCLONE INTENSIFICATION FORECASTING ALGORITHM Final Report, Aug. 1984 - Jul. 1985
B. J. Cook Jul. 1985 40 p
(NR Proj. F59-551)
(AD-A159399; NEPRF-TR-85-02) Avail: NTIS HC A03/MF A01 CSCL 04/2

A stepwise screening discriminant analysis is used to develop an algorithm for forecasting tropical cyclone intensification. Some potential predictors used in the analysis are derived from FNOC (Fleet Numerical Oceanography Center) zonal wind analyses. Other potential predictors considered are simple climatological parameters and persistence of intensification. The potential predictors are screened by a stepwise discriminant analysis program to determine which significantly discriminate between three (intensifying, filling, and neither) intensification categories. The best discriminators are then used as predictors in an intensification forecasting algorithm. The algorithm is developed and tested on Western Pacific tropical cyclone data from the years 1974 to 1982. In addition to the independent test, stability of the algorithm is investigated and a test is conducted to compare forecasts produced by the algorithm with forecasts made by JTWC (Joint Typhoon Warning Center) and with forecasts of persistence of intensification. The algorithm shows skill relative to persistence and compares favorably with the official forecasts, although most of the differences between the scores are not significant. For this data set, JTWC did not forecast tropical cyclone intensification significantly better than the derived algorithm or persistence.
Author (GRA)

N86-16828# Massachusetts Univ., Amherst.
GRID POINT SURFACE AIR TEMPERATURE DATA SET FOR THE NORTHERN HEMISPHERE
P. D. Jones, S. C. B. Raper, B. Santer, B. S. G. Cherry, C. Goodess, P. M. Kelly, T. M. L. Wigley, R. S. Bradley, and H. F. Diaz Jul. 1985 256 p refs Prepared in cooperation with National Oceanic and Atmospheric Administration, Boulder, Colo. and East Anglia Univ. Norwich, England
(Contracts DE-AC02-81EV-10739; DE-AC02-79EV-10098)
(DE85-015609; DOE/EV-10098/2) Avail: NTIS HC A12/MF A01

A compilation of 2666 station records of monthly surface air temperature has been assembled for the Northern Hemisphere. In order to use these data to form a gridded data set for the Northern Hemisphere we have assessed, where possible, the homogeneity of each of these records. The results of this assessment are presented and stations are classed as immediately usable, corrected or uncorrectable. Full details of how this has been achieved for each station are presented in tabular form. Of the 2666 station records, 1584 were used to produce the gridded temperature data set. Temperature anomalies were calculated with respect to the appropriate monthly mean for the reference period 1951 to 1970 using the homogenized data. Anomalies at each point of a 5 deg latitude by 10 (deg) longitude grid were interpolated from the station data for each month for the period 1951 to 1984.
DOE

N86-16829# Lawrence Livermore National Lab., Calif.
TOWARD QUANTIFYING THE SOURCE TERM FOR PREDICTING GLOBAL CLIMATIC EFFECTS OF NUCLEAR WAR: APPLICATIONS OF URBAN FIRE CODES
T. A. Reitter, S.-W. Kang, and A. N. Takata 15 Jun. 1985 94 p refs
(DE85-017456; UCRL-53647) Avail: NTIS HC A05/MF A01

Calculating urban area fire development is critical to estimating global smoke production effects due to nuclear warfare. To improve calculations of fire starts and spread in urban areas, we performed a parameter sensitivity analysis using three codes. We applied improved versions of the codes to two urban areas: an infinite uniform city with only one type of building and the San Jose urban area. We varied parameters and compared affected fuel consumption and areas with a baseline case. The dominant parameters for the uniform city were wind speed, atmospheric visibility, frequency of secondary fire starts, building density, and window sizes. For San Jose, they were wind speed, building densities, location of ground zero, height of burst, window sizes, and brand range. Because some results are very sensitive to actual fuel distribution characteristics and the attack scenario, it is now possible to use a uniform city to represent actual urban areas. This was confirmed by a few calculations for the Detroit area as of the late 1960s. Many improvements are needed, such as inclusion of fire induced winds and debris fires, before results can be extrapolated to the global scale.
DOE

N86-16830# Brookhaven National Lab., Upton, N. Y.
CHEMICAL CONVERSIONS IN CLOUDS
S. E. Schwartz Jul. 1985 95 p refs Presented at the 2nd US-Dutch International Symposium on Aerosols, Williamsburg, Va.,

19 May 1985
(Contract DE-AC02-76CH-00016)
(DE86-000033; BNL-36923; CONF-8505106-1) Avail: NTIS HC A05/MF A01

Clouds constitute an extreme atmospheric aerosol in terms of particle size and condensed-phase mass. The large amount of liquid water in clouds as well as the high state of dispersion make clouds a potentially important medium for atmospheric reactions, depending upon thermochemical driving force and chemical kinetics of particular reactions. This paper presents the formalism for evaluating the rates of in-cloud reactions making use of laboratory-determined physical-chemical properties and assumed or measured reagent concentrations and other situational variables. Accurate description of these rates is sensitive to the mass-accommodation coefficient (ALPHA) (fraction of gas kinetic collisions at the air-water interface effective in transfering gaseous species to cloud droplets) if (ALPHA) $<$ 0.01. Little information pertinent to (ALPHA) is available for relevant solute gases. Attention is directed to reaction of SO2 and NO2 to form sulfuric and nitric acids, respectively, and to reactions involving oxidants (O3, H2O2) and free radicals (HO, HO2). Important in-cloud reactions identified include aqueous-phase oxidation of SO2 by H2O2 and O3 and gas-phase oxidation of NO2 by O3 followed by uptake of N2O5 or NO3 by cloudwater. DOE

N86-16831# Institute of Oceanographic Sciences, Wormley (England).
REPORT ON SEA LEVEL DATA COLLECTED DURING THE MEDALPEX EXPERIMENT FROM SEPTEMBER 1981 - SEPTEMBER 1982
L. J. Rickards 1985 174 p refs
(IOS-209) Avail: NTIS HC A08/MF A01

The Mediterranean Alpine Experiment (MEDALPEX) was undertaken to investigate the role of atmospheric forcing on the dynamics of the Western Mediterranean. Hourly values of sea level are collected from 29 sites for a 1 yr period. The data are tidally analyzed and low pass filtered, and nontidal fluctuations are investigated using principal component analysis. The low pass filtered data show a fairly good correlation with the passage of meteorological events, particularly the Adriatic Sea data. Principal components analysis suggests that the nontidal variations in sea level in the Western Mediterranean and the Adriatic Sea are decoupled over the period of MEDALPEX. A magnetic tape copy of the data set, including documentation, is available.
Author (ESA)

N86-16832# Royal Netherlands Meteorological Inst., De Bilt. Klimatologische Dienst.
HOW EXTREME WAS THE WEATHER AGAIN [HOE EXTREEM WAS HET WEER OOK WEER]
A. Denkema Apr. 1985 39 p In DUTCH
(KNMI-168; B8568884) Avail: NTIS HC A03/MF A01

Extreme values of weather data in the Netherlands since 1849 are listed. The data obtained at the weather station De Bilt concerning temperature, precipitation, and sunshine were used.
Author (ESA)

N86-16833# Royal Netherlands Meteorological Inst., De Bilt. Afdel. Fysische Meteorologie.
MESOGERS 1984, THE DATA SET OF STATION C8
A. C. M. Beljaars, W. A. A. Monna, and J. G. vanderVliet 1985 51 p refs
(KNMI-TR-68; ISSN-0169-1708; B8568882) Avail: NTIS HC A04/MF A01

Boundary layer characteristics over nonhomogeneous terrain in the Gers region of France were studied. Synoptic observations of wind speed and direction, dry bulb temperature, and dew point temperature; energy balance at 11m height (20 min averages); and doppler sodar data (20 min averages of horizontal wind, echo intensity, and standard deviation of the vertical wind component as a function of height recorded continuously) are presented. Odeh-Tadjbakhsh's conjecture is discussed.
Author (ESA)

N86-16834# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Dynamische Meteorologie.
THE AIR MASS TRANSFORMATION (AMT) MODEL: WINTER EXPERIMENTS [HET AMT-MODEL: WINTEREXPERIMENTEN]
R. C. vandenBerg and J. Reiff 1985 55 p refs In DUTCH; ENGLISH summary
(KNMI-TR-69; B8568883; ISSN-0169-1708) Avail: NTIS HC A04/MF A01

Experiments with the AMT model were performed in order to improve the model. The original model, which can describe the evolution of the atmospheric boundary layer is presented. It is obvious that the model's sensitivity to the choice of wind field is considerable. For the transition from a stable to an unstable boundary layer, a criterion based on the ratio of buoyancy to mechanical turbulence is introduced; it appears to be difficult to ascertain a precise value of this ratio. A comparison of 33 model temperature profiles with observed profiles indicates that processes can cause difficulties in the model with respect to the evaporation problem in a frost period without snow cover, the AMT results are slightly better for a reduced evaporation rate. Suggestions for improving the model are made. Author (ESA)

N86-16835# Royal Netherlands Meteorological Inst., De Bilt. Klimatologische Dienst.
STATISTICAL TESTS ON THE HOMOGENEITY OF SERIES OF SUNSHINE DURATION IN THE NETHERLANDS IN THE PERIOD 1951 - 1980
A. Denkema 1985 17 p refs In DUTCH; ENGLISH summary
(KNMI-TR-70; B8569402; ISSN-0169-1708) Avail: NTIS HC A02/MF A01

Homogeneity tests were applied to series of yearly sunshine duration measured at 35 stations in the Netherlands, in the period 1951 to 1980. Three methods for testing the homogeneity of series are treated: the von Neumann quotient, the maxima and minima of partial sums, and the Worsley test. Although the series of 13 stations shows evidence of nonhomogeneity, the magnitude proves to be too small to have an influence in practical applications. Author (ESA)

N86-16836# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Dynamische Meteorologie.
THE TEMPERATURE INVERSION OF THE NOCTURNAL BOUNDARY LAYER. A TEST OF SEVERAL TYPES OF PARAMETERIZATION [DE TEMPERATUURINVERSIE VAN DE NACHTELIJKE GRENSLAAG: EEN TEST VAN VERSCHILLENDE TYPEN PARAMETERISATIES]
A. vanPul and J. Reiff 1985 82 p refs In DUTCH; ENGLISH summary
(KNMI-TR-71; B8569403; ISSN-0169-1708) Avail: NTIS HC A05/MF A01

The temperature structure of the nocturnal boundary layer (NBL) and its height were investigated. The approach of Stull, which provides a sensible heat flux history length scale (H) based on the nocturnal heat flux is tested; H seems to be sufficient to define a common similarity shape for the potential temperature profile. This profile is tested for temperature profiles of a data set of 25 heights, at 3 different times. The exponential profile as well as the cubic profile proposed by Yamada give a good fit. A weak correlation between the inversion heights at two stations is determined. For the entire data set the correlation between the observed H and the estimated H, parameterized by Stull is weak, except for clear nights. Tests show that the Stull parameterization method of H does not work for early hours in the evening. It cannot be proven if Stull's proposed parameterization of the NBL evolution is better or worse than other parameterization schemes due to a lack of data. Author (ESA)

N86-16837# Royal Netherlands Meteorological Inst., De Bilt. Centrale Weerdienst.
THE AGRICULTURAL WEATHER REPORT FOR THE YSSELMEER POLDERS NETHERLANDS IN 1983 AND 1984: REPORT OF A PROJECT [HET LANDBOUWWEEBERICHT VOOR DE IJSSELMEERPOLDERS IN 1983 EN 1984: VERSLAG

VAN EEN PROJECT]
E. Schreuder 1985 24 p refs In DUTCH
(KNMI-TR-72; B8569404; ISSN-0169-1708) Avail: NTIS
HC A02/MF A01

The special weather report for the agriculture in the Ysselmeer polders is presented. This telephonic weather report for a limited and sharply determined area is described. The way in which the farmers used the information, and their generally positive judgment are outlined. The farmers were mainly interested in detailed precipitation and wind forecasts. A separate verification report shows that more detailed precipitation, wind, and sunshine forecasts are only meaningful and reliable for the first 6 hours.
Author (ESA)

N86-16838# National Weather Service, Garden City, N.Y.
MDR: PROCESSING MANUALLY DIGITIZED RADAR OBSERVATIONS, REVISED
M. R. Peroutka Jun. 1985 56 p
(PB85-220580; NOAA-NWS-ERCP-15-Rev) Avail: NTIS
HC A04/MF A01 CSCL 04B

Manually digitized radar (MDR) reads 7 hours of radar observations from the local data base and produces three graphics. The graphics are one, three and six hourly sums of MDR values or rainfall amounts. Convective and stratiform Z-r relations are provided along with the option for a user-defined relation. A program which can cull the digitized data from a number of radar observations and then put them into a usable form is described. GRA

N86-16839# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
INFERENCE OF FRONTAL TEMPERATURE CHANGE FROM THE OBSERVED WIND FIELD
D. W. VandeKamp May 1985 27 p
(PB85-221240; NOAA-TM-ERL-WPL-124) Avail: NTIS
HC A03/MF A01 CSCL 04B

Assuming steady state and neglecting viscosity, the equations balancing the inertial, and buoyancy terms in the equations of motion can be used to provide a relationship between the wind and temperature discontinuities in the atmosphere. If it is specified that the dynamic boundary condition be satisfied across a frontal discontinuity, a relationship between the slope and the magnitudes of the discontinuities is obtained known as the Margules Equation. The adequacy of the relationship for quantitatively inferring the magnitude of front-related temperature inversions from the wind field discontinuity and its temporal slope provided by the radar wind profilers is examined. GRA

N86-16840# National Weather Service, Garden City, N.Y.
TIMCHEK
G. G. Rigdon Jun. 1985 34 p
(PB85-221257; NOAA-WS-ERCP-33) Avail: NTIS
HC A03/MF A01 CSCL 04B

The program which checks the AFOS data program base to see if new data are in and if it will run a program for the Weather Service forecasting office the program can also be used to find out if the program has already been run, in which case it will not run the program again. The procedure is used to run various applications such as upper air plots, mesoanalysis programs, raob plots, surface plots, FT monitor program, NWWS roundup programs, the national verification programs, etc. The program allows the checking of the database at different times for new data. GRA

N86-16841# National Center for Atmospheric Research, Boulder, Colo.
CONVERSATIONS WITH BERNHARD HAURWITZ
G. W. Platzman Jun. 1985 192 p Sponsored in part by NSF, Washington, D.C. Prepared in cooperation with Chicago Univ., Ill.
(PB85-223063; NCAR/TN-257+PROC) Avail: NTIS
HC A09/MF A01 CSCL 04B

Interviews with Bernhand Haurwitz are presented. The purpose is to give a technical perspective on Bernhard Haurwitz's scientific work, as viewed by him in retrospect. GRA

N86-16842# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-JULY TO MID-AUGUST 1985, VOLUME 39, NUMBER 14, JULY 13, 1985
13 Jul. 1985 9 p
(PB85-230258) Avail: NTIS HC A02/MF A01 CSCL 04B

The precipitation and temperature weather outlook for periodic and seasonal variations for North America is given. Data is given in tabular form and is accompanied by meteorological charts. GRA

N86-16843# National Weather Service, Silver Spring, Md. Techniques Development Lab.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) MONITORY OF TERMINAL FORECASTS
D. J. Vercelli and G. A. Norman May 1985 33 p
(PB85-236388; NOAA-NWS-TDL-CP-85-1) Avail: NTIS
HC A03/MF A01 CSCL 04B

Aviation terminal forecasts (FT's) are issued three or four times per day, depending on location, for selected terminals within the area of responsibility of a Weather Service Forecast Office (WSFO). The FT's contain specific meteorological information on cloud heights and amount, visibility, weather, obstructions to vision, and wind. This information is considered to be the most important to aviation interest in and near the terminal area. A FORmula TRANslation (FORTRAN) program, described by this document, will assist the forecaster with this time-consuming weather-watch function by comparing the information in the FT's with the corresponding information on the surface airways observations. The FT monitoring program, called MONITR makes use of two sets of criteria to determine whether or not a problem exists with a particular FT. In both the amendment and alert cases, the forecaster still has the final responsibility to decide whether or not the FT should be amended. GRA

N86-16844# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-AUGUST TO MID-SEPTEMBER 1985, VOLUME 39, NUMBER 16, AUGUST 14, 1985
14 Aug. 1985 10 p
(PB85-243525) Avail: NTIS HC A02/MF A01 CSCL 04B

The report gives the precipitation and temperature weather outlook for periodic and seasonal variations for North America. GRA

N86-16845# National Academy of Sciences - National Research Council, Washington, D. C.
HURRICANES IWA, ALICIA AND DIANA, COMMON THEMES: A REPORT OF THE COMMITTEE ON NATURAL DISASTERS, 1984
1985 38 p
(Grant NSF CEE-82-19358)
(PB85-218220) Avail: NTIS HC A03/MF A01 CSCL 04B

The National Research Council has maintained the Committee on Natural Disasters-originally known as the Committee on Earthquake Inspection-since 1966. The goals of the committee are to collect perishable data on natural disasters while the data are still available, to provide conveniently available accounts of natural disasters, and to identify and recommend cases where more in-depth studies could improve engineering practice, preparedness, warning systems, public response, or recovery. At its annual meeting in November 1984 the committee decided the each year it should prepare a report presenting a generic analysis of one area of its work-postdisaster studies on earthquakes, hurricanes, tornadoes, floods, landslides, or volcanoes, as well as summarizing the committee's postdisaster study activities for the previous year. GRA

N86-16846# National Oceanic and Atmospheric Administration, Washington, D. C.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-JUNE TO MID-JULY 1985, VOLUME 39, NUMBER 2, JUNE 14,

1985
14 Jun 1985 9 p
(PB85-216547) Avail: NTIS HC A02/MF A01 CSCL 04B
The precipitation and temperature weather outlook for periodic and seasonal variations for North America is reported. GRA

N86-16847# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
METEOROLOGICAL EVENTS THAT PRODUCED THE HIGHEST GROUND-LEVEL CONCENTRATIONS DURING COMPLEX TERRAIN FIELD EXPERIMENTS
F. A. Schiermeier, T. F. Lavery, and D. C. DiCristofaro 1985 14 p Prepared in cooperation with Environmental Research and Technology, Inc., Concord, Mass.
(PB85-210854; EPA-600/D-85-114) Avail: NTIS HC A02/MF A01 CSCL 04B
The U.S. Environmental Protection Agency (EPA) is sponsoring the Complex Terrain Model Development project, a multi-year study to develop improved models for calculating ground-level air pollutant concentrations that result from large emission sources located in mountainous terrain. The project started with tracer and flow visualization experiments and fluid modeling for isolated, simple terrain features-Cinder Cone Butte (CCB), Idaho and the Hogback Ridge (HBR), New Mexico--and has progressed to the Full Scale Plume Study (FSPS), conducted at the Tracy Power Plant near Reno, Nevada during August 1984. The CCB and HBR experiments and related fluid modeling demonstrated the usefulness of the concept of a dividing-streamline height (Hs) in discriminating between essentially horizontal flow that goes around the sides of the terrain features and flow that goes up and over the terrain. An analysis of tracer gas concentrations showed that the highest concentrations occurred during direct impingement of plumes released at elevations near the height of the dividing streamline. GRA

N86-16848# National Severe Storms Forecast Center, Kansas City, Mo.
SEVERE THUNDERSTORM CASES OF 1984 Technical Memo, 1 Jan. 1984 - 31 Dec. 1984
J. E. Hales and H. G. Crowther May 1985 96 p
(PB85-210748; NOAA-TM-NWS-NSSFC-7) Avail: NTIS HC A05/MF A01 CSCL 04B
Severe thunderstorm occurrences are relatively infrequent in much of the United States. As a result, a forecaster only occasionally has an opportunity to forecast their development. This proves to be a problem, as certainly one of the more important factors in forecasting them is the level of experience an individual forecaster has. Realizing the importance that experience plays and difficulty involved for a meteorologist to study past cases, a summary was compiled of all the organized severe thunderstorm episodes of 1984. Included in each case were the times and locations of the severe weather along with specifics of the more noteworthy events. GRA

N86-16849# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
DIURNAL AND SPATIAL VARIABILITY OF LIGHTNING ACTIVITY IN CENTRAL FLORIDA DURING THE SUMMER
R. E. Lopez and R. L. Holle Mar. 1985 41 p
(PB85-210383; NOAA-TM-ERL-ESG-13) Avail: NTIS HC A03/MF A01 CSCL 04B
Lightning location data from central Florida for the summer months of 1983 are presented, to ascertain the diurnal development of space distributions of flash frequencies. The influence of the underlying topography and the resulting diurnal circulations on the time and place of lightning strokes are found to be substantial. In addition, the data show that lightning is relatively rare, and exhibits a very large day-today variability. The utility of the type of data employed to study the characteristics not only of lightning as such, but also of topographically induced convection in general is emphasized. GRA

N86-16850# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
CLIMATOLOGY AND CONDITIONAL CLIMATOLOGY OF SUMMER PRECIPITATION IN NORTHEAST COLORADO
G. M. Williams Apr. 1985 55 p
(PB85-210375; NOAA-TM-ERL-ESG-11) Avail: NTIS HC A04/MF A01 CSCL 04B
Selected climatology and conditional climatology summaries of summertime convective rainfall were compiled for northeasthern Colorado in support of a forecast experiment conducted in Boulder. Interesting diurnal trends appear in the data. Peak probabilities of rainfall are shown to occur from early afternoon in the foothills to early evening on the eastern plains. Moreover, climatologies conditioned on rain are much different from those conditioned on no rain, and they clearly demonstrate the short-lived nature of convective precipitation. GRA

N86-16851# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
SUMMARY OF METEOROLOGICAL PRODUCT USAGE DURING THE PROFS CONVECTION FORECAST EXERCISE OF 1983
D. C. Walker and P. Schultz Apr. 1985 28 p
(PB85-210367; NOAA-TM-ERL-ESG-12) Avail: NTIS HC A03/MF A01 CSCL 04B
During the summer of 1983, the Program for Regional Observing and Forecasting Services (PROFS) conducted is third convective season forecast exercise. One hundred and eight meteorological products including satellite and radar imagery, displays of data in contour and streamline formats, and plots of surface and upper air data were available to the forecasters on the PROFS workstation. Each product was available on one of four scales, each scale covering a specific, successively smaller, geographic area. Througout the exercise a record was kept of the number of times each product was selected by he workstation forecasters. Examination of the resulting product usage patterns reveals high use of image products and a preference for plotted observations over contour and streamline products. Products on the local scale were the most often used. Author (GRA)

N86-16852# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite, Data and Information Service.
DETECTION OF HIGH LEVEL TURBULENCE USING SATELLITE IMAGERY AND UPPER AIR DATA
G. P. Ellrod Apr. 1985 36 p
(PB85-208452; NOAA-TM-NESDIS-10) Avail: NTIS HC A03/MF A01 CSCL 04B
The primary cloud patterns observed in satellite imagery which relate to high altitude nonconvective turbulence are described. Relative frequencies, prevailing altitudes and intensities of each type are presented. Means of distinguishing turbulent from nonturbulent cloud signature based on both satellite imagery and upper wind data are also provided. GRA

N86-16853# National Weather Service, Silver Spring, Md. Office of Meteorology.
WATCH/WARNING VERIFICATION, 1982 AND 1983: FLASH FLOOD, WINTER STORM AND HIGH WIND
A. K. Campbell Jan. 1985 71 p
(PB85-204899; NOAA-TM-NWS-FCST-30) Avail: NTIS HC A04/MF A01 CSCL 04B
A limited program was begun in 1979 to develop a measure of watch/warning forecast performance for flash flood, winter storm and high wind. Weather Service forecast offices provide verification logs to national headquarters for this purpose. These logs consist of issue time, valid time, lead time, area, verification for watches and warnings, and events that occur in the absence of a watch or warning. A total of 438 flash flood, 186 winter weather and 111 high wind events were reported on the logs in 1982. In 1983 a total of 414 flash floods, 147 winter weather and 80 high wind events were reported on the logs. Collectively, 11 percent of those of thse events occurred without a watch or warning being issued. Of the total warnings disseminated 79 percent showed positive

verification, but 36 percent of those were issued with an event in progress. Author (GRA)

N86-16854# National Weather Service, Garden City, N.Y.
CERR: AN AVIATION VERIFICATION PROGRAM
M. R. Peroutka Apr. 1985 28 p
(PB85-204824; NOAA-NWS-ERCP-30) Avail: NTIS
HC A03/MF A01 CSCL 04B

Aviation verification statistics have been computed for Cleveland forecasters since 1980. For most of these years, the computations were done by hand, and a simple statistic had to be developed. The CERR program was developed soon after the National Verification Programs began to run, and it has replaced all the manual computations. The statistic chosen for verification was the average MOS category error. This statistic is simply the absolute value of the difference between the category forecast and the category observed. Scores are computed for each forecaster and guidance at each station for each period forecast. The percent improvement over guidance is also computed. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-16855*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE-DERIVED SEA SURFACE TEMPERATURE: WORKSHOP 3
15 Oct. 1985 181 p refs Workshop held in Pasadena, Calif., 22-24 Feb. 1984 Original contains color illustrations 3 Vol.
(Contract NAS7-918)
(NASA-CR-176455; JPL-Pub-85-63; NAS 1.26:176455) Avail: NTIS HC A09/MF A01 CSCL 08J

This is the third of a series of three workshops, sponsored by the National Aeronautics and Space Administration, to investigate the state of the art in global sea surface temperature measurements from space. Three workshops were necessary to process and analyze sufficient data from which to draw conclusions on the accuracy and reliability of the satellite measurements. In this workshop, the final two (out of a total of four) months of satellite and in situ data chosen for study were processed and evaluated. Results from the AVHRR, HIRS, SMMR, and VAS sensors, in comparison with in situ data from ships, XBTs, and buoys, confirmed satellite rms accuracies in the 0.5 to 1.0 C range, but with variable biases. These accuracies may degrade under adverse conditions for specific sensors. A variety of color maps, plots, and statistical tables are provided for detailed study of the individual sensor SST measurements. For individual titles, see N86-16856 through N86-16862.

N86-16856*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DATA SETS AND PRODUCTS
Jeffrey E. Hilland and Eni G. Njoku *In its* Satellite-Derived Sea Surface Temperature 15 Oct. 1985 12 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

Against background of spacecraft and in situ measurements, participants at the JPL workshops sought to review the sensor performance, understand the different SSt retrieval algorithms, evaluate the sensor SST accuracies, and discuss directions for future sensor development. The issue of utilization of satellite SSTs in climate, air sea interaction, and mesoscale oceanography studies was not the main focus of the workshops, but did have a bearing on the recommendations that arose from the discussions. More date were available for analysis with the acquisition of AVHRR (MCSST), HIRS/MSU, and VAS data sets. In Workshop 3 the acquisition and analysis fo data were completed, recommendations for future research and sensor development were discussed, and plans were made for eventual publication of results from the workshop series in the open literature. Author

N86-16857*# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite, Data, and Information Service.
ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) SENSOR COMPARISON CHARACTERISTICS
E. Paul McClain *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 17 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

Advantages and limitations of the AVHRR multichannel sea surface temperature (MCSST) detecting technique using NOAA satellites are discussed. The error characteristics of MCSST's from statistical tables and regional AVHRR error characteristics from global anomaly charts are also discussed. Some soruces of errors and positive findings are reviewed. E.R.

N86-16858*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RETRIEVAL OF SEA-SURFACE TEMPERATURES FROM HIRS2/MSU
Joel Susskind and D. Reuter *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 18 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

The methods used at the Goddard Laboratory for Atmospheres to retrieve sea surface temperatures from HIRS2/MSU data for the four months of the NASA sea surface temperature intercomparison workshop are described. Results are shown comparing anomaly fields produced using data from ships, AVHRR, HIRS2/MSU, SMMR AND VAS for the last three of these months. Fields from AVHRR and HIRS2 show the highest accuracy compared to ship fields. Errors in the HIRS2 fields appear more random while AVHRR data shows large area, spatially coherent errors. The random errors in the HIRS2 fields can be further reduced by performing the retrievals at a higher spatial resolution. Author

N86-16859*# Wisconsin Univ., Madison. Space Science and Engineering Center.
SEA SURFACE TEMPERATURES FROM VAS MSI DATA
John J. Bates *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 7 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

The results of the SST intercomparison workshop series are the first examination of monthly mean SSTs derived from MSI data provided by the VAS instrument on the GOES series satellites. The most significant change in deriving the SST's was the use of the three window channel algorithm in the processing of the July data as opposed to the use of only the two window channel algorithm for the March data. In addition, further satellite/buoy matches indicated that the triple window channel algorithm showed a smaller standard deviation than the two window channel algorithm and was less sensitive to the effects of volcanic aerosol contamination and low level inversion conditions. This is due to the smaller brightness temperature attenuation by aerosols and water vapor at 3.9 microns than at 11.0 and 12.6 microns. Thus, the decision was made to use the best product (i.e., the three window channel aglorithm) for processing the July data. Author

N86-16860*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
BLENDED SST FIELDS COMBINED SMMR/SHIP DATA (SUMMARY OF TECHNIQUE)
Thomas T. Wilheit and Daesoo Han (Systems and Applied Sciences Corp., Hyattsville, Md.) *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 5 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

All remote sensors have bias problems which vary in space and time. The infrared measurements are very sparse in cloudy

areas: the SMMR has coverage limitations due to the interference of land areas and only half time operation. If one simply averaged the data from these various sources, the combination of the biases and varying sampling would introduce artifacts into the analyzed product which would reflect the sampling and which could be quite misleading. The remote sensors provide reasonable estimates of gradients of SST over length scales greater than the sensor resolution but smaller than hemispheric. Ships can be considered unbiased but are poorly distributed on small scales except in the densest shipping lanes. An analysis scheme based on a suggestion by Holl was developed which exploits just this approximately complementarity to provide an improved SST analysis. The resulting accuracy appears to be in the required approx. 0.5 C range for the particular case of using SMMR and ship data to produce two degree latitude by two degrees longitude monthly analyses. Author

N86-16861*# Scripps Institution of Oceanography, La Jolla, Calif.
INTERCOMPARISON OF GLOBAL SST FIELDS DERIVED FROM SATELLITE SENSORS AND SHIP OBSERVATIONS
Stephen E. Pazan *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 13 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

Near global comparisons were made between binned forms of SST obtained from different instruments, ship meteorological observations, and the output of a meteorological model. Binning hereinafter means gridding by simple summation of data values in a bin, which in this study was a 2 deg. x 2 deg. box or a 10 deg. x 10 box surrounding a grid node. In the binned comparisons, the question is asked: are the binned data from two instruments drawn from the same population? The first two measures of statistical moments of the populations are used to test the hypothesis that they are. Comparisons were also attempted between raw forms of the various SST retrievals, using a structure function analysis. The results of this analysis were relatively uninteresting and are therefore omitted. Author

N86-16862*# Western Australian Inst. of Tech., Bentley. School of Physics and Geosciences.
REQUIREMENTS FOR SEA SURFACE TEMPERATURE GROUND TRUTH IN THE INDONESIAN REGION
John Penrose *In* JPL Satellite-Derived Sea Surface Temperature 15 Oct. 1985 2 p refs (For primary document see N86-16855 07-48)
Avail: NTIS HC A09/MF A01 CSCL 08J

The comparatively low density of ship and XBT observations in large areas of the Southern Hemisphere and the tropics limits the extent to which satellite SST estimates can be validated on a global basis. These limitations are discussed, and some recommendations for correction are given. E.R.

N86-16863*# Scripps Institution of Oceanography, San Diego, Calif. Marine Physical Lab.
ANALYSIS OF A METHOD FOR PRECISELY RELATING A SEAFLOOR POINT TO A DISTANT POINT ON LAND Annual Report, 15 May 1983 - 14 May 1985
F. N. Spiess, C. D. Lowenstein, and M. O. McIntyre May 1985 22 p refs
(Grant NAG5-320)
(NASA-CR-176474; NAS 1.26:176474) Avail: NTIS HC A02/MF A01 CSCL 08J

A study of the environmental constraints and engineering aspects of the acoustic portion of a system for making geodetic ties between undersea reference points and others on land is described. Important areas in which to make such observations initially would be from the California mainland out to oceanic points seaward of the San Andreas fault, and across the Aleutian Trench. The overall approach would be to operate a GPS receiver in a relative positioning (interferometric) mode to provide the long range element of the baseline determination (10 to 1,000 km) and an array of precision sea floor acoustic transponders to link the locally moving sea surface GPS antenna location to a fixed sea floor point. Analyses of various environmental constrants (tides, waves, currents, sound velocity variations) lead to the conclusion that, if one uses a properly designed transponder having a remotely controllable precise retransmission time delay, and is careful with regard to methods for installing these on the sea floor, one should, in many ocean locations, be able to achieve sub-decimeter overall system accuracy. Achievements of cm accuracy or better will require additional understanding of time and space scales of variation of sound velocity structure in the ocean at relevant locations. Author

N86-16864# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
STANDARDIZED WIND AND WAVE ENVIRONMENTS FOR NORTH PACIFIC OCEAN AREAS Final Report
W. T. Lee, S. L. Bales, and S. E. Sowby Jul. 1985 616 p
(AD-A159393; DTNSRDC/SPD-0919-02) Avail: NTIS HC A99/MF A01 CSCL 08/3

This report is a source document for specifying wind and wave conditions for the North Pacific Ocean. The data are derived from the U.S. Navy's Spectral Ocean Wave Model (SOWM) hindcast wind and wave climatology. Some initial efforts by the Navy to synthesize the hindcasts into design tools are presented in this report. The report provides seasonal and geographic distributions of wind and wave parameters and specifies mathematical models by which wave spectra, required by any ship seakeeping performance methodology, can be developed. Long-term extreme wave predictions for fatigue analysis are also discussed. Author (GRA)

N86-16865# Oregon State Univ., Corvallis. Coll. of Oceanography.
CARBONATE CHEMISTRY OF THE BERING SEA
C. T. A. Chen, C. L. Wei, and M. R. Rodman Sep. 1985 93 p
(Contract DE-AT06-81EV-10611)
(DE85-017884; DOE/EV-10611/5) Avail: NTIS HC A05/MF A01

Wintertime oxygen, pH, alkalinity and calcium profiles across the marginal ice zone of the central and southeastern Bering Sea shelf were analyzed and compared with summer data. During the winter, at water depths shallower than 75m, the water column is homogeneous and near freezing. Between the 75 and 200m isobaths the structure is essentially two-layered, a cool and fresh upper layer overlying a warmer, more saline bottom layer. The oxygen degree of saturation in most of the bottom mixed layer on the shelf in winter is higher than in the surface water in winter and the bottom water in summer. In summer the oxygen and carbonate data show extreme variability governed primarily by biological processes. Winter oxygen and carbonate data, however, do not scatter as much as the summer data and indicate conservative mixing of several sub-surface water masses. The winter surface water is undersaturated in both oxygen and carbon dioxide and seems to absorb oxygen, but little carbon dioxide, from the atmosphere. Alkalinity and calcium data show large river influence. All T/S and chemistry data indicate that the deep shelf water is a mixture of surface shelf water and surface Aleutian Basin water. Oxygen data indicate that the annual sea ice impedes, but does not stop, the air-sea exchange of gases. Excess CO_2 signal has been calculated based on our data and data from literature. The shelf water is saturated with excess CO_2 but it could not be detected below 1000 m in the Aleutian Basin. Altogether the Bering Sea contains 0.19 +- 0.05 x 10 to the 15th power g excess carbon. DOE

N86-16866# Institute of Oceanographic Sciences, Wormley (England).
GREAT METEOR EAST (DISTAL MADEIRA ABYSSAL PLAIN): GEOLOGICAL STUDIES OF ITS SUITABILITY FOR DISPOSAL OF HEAT-EMITTING RADIOACTIVE WASTES
R. C. Searle, P. J. Schultheiss, P. P. E. Weaver, M. J. Noel, R. B. Kidd, C. L. Jacobs, and Q. J. Huggett 1985 163 p refs Sponsored by UK Department of the Environment
(IOS-193; DoE/RW/84/32; DGR-481/179) Avail: NTIS HC A08/MF A01

Geological and geophysical studies were carried out in an

area of the Madeira Abyssal Plain to assess its suitability for the disposal of heat-emitting radioactive waste. The area appears to have many of the characteristics required for a disposal site, although few of these characteristics are the best that can be found in the world's oceans. The area is in a region of low volcanic and seismic activity, though quieter areas (especially with regard to volcanism) could be found. It is well away from major tectonic activity, but the sediments may be undergoing faulting at depth, possibly as a result of differential compaction. No evidence of high pore-water advection is found, but the possibility of it occurring along faults or through open burrows in the sediments needs to be explored. Although the reduced nature of the sediments may be advantageous in causing sorption of some anions, there is evidence of enhanced mobility of other ions. Author (ESA)

N86-16867# Institute of Oceanographic Sciences, Wormley (England).

BENTHIC BOUNDARY LAYER, IOS OBSERVATIONAL AND MODELLING PROGRAM Final Report, Jan. 1985

P. M. Saunders and K. J. Richards 1985 63 p refs Sponsored by UK Department of the Environment

(IOS-199; DoE/RW/85/027; DGR-481/176) Avail: NTIS HC A04/MF A01

Near bottom currents, measured at three sites in the NE Atlantic, reveal the eddying characteristics of the flow. At the boundaries of eddies benthic fronts form providing a path for upward displacement of the bottom water. The flux of heat into the bottom of the Iberian basin through Discovery Gap is deduced from year long current measurements. The flux is supposedly balanced by geothermal heating through the sea floor and diapycnal diffusion in the water. Diffusion within oceanic eddies is shown to obey a law found for atmospheric cyclones and anticyclones. Diffusion by eddies is determined largely by their energy. If a tracer is discharged from the sea bed the volume of sea water in which it is found increases with time and after 20 yr fills an ocean basin of 1000 km square to a depth of only 1 to 2 km. Author (ESA)

N86-16868# Institute of Oceanographic Sciences, Wormley (England).

S2EASoar CTD SECTIONS IN THE NORTHEAST ATLANTIC OCEAN COLLECTED DURING RRS DISCOVERY CRUISE 132

R. T. Pollard, D. Holford, and K. Sherrocks 1985 62 p refs (Contract EEC-CL115UK(H))

(IOS-200) Avail: NTIS HC A04/MF A01

Frontal CTD structures in an area of the Atlantic Ocean considered for radioactive waste disposal were surveyed. The data set consists of 1 sec averages of time, pressure, temperature, salinity, potential temperature, oxygen, Chlorophyll a, sigmatheta, latitude, longitude, and distance run along the SeaSoar track. Speed through the water is 4 m/sec, so that individual points are 4 m apart horizontally, and 1 m apart vertically. Down and up traces are used in all plots and there is a profile (down or up) every 1.5 km. The 1 sec data were averaged over 7.5 dbar pressure intervals to reduce the number of points plotted and accommodate the maximum number of points contourable in a computer run. Author (ESA)

N86-16869# Institute of Oceanographic Sciences, Wormley (England).

AN INSTRUMENT TO MEASURE DIFFERENTIAL PORE PRESSURES IN DEEP OCEAN SEDIMENTS: POP-UP-PORE PRESSURES (PUPPI)

P. J. Schultheiss, P. J. McPhail, A. R. Packwood, and B. Hart 1985 57 p refs Sponsored by UK Department of the Environment

(IOS-202; DoE/RW/84/165; DGR-481/179) Avail: NTIS HC A04/MF A01

A Pop-Up-Pore-Pressure-Instrument (PUPPI) to measure differential pore pressures in sediments was developed. The differential pressure is the pressure above or below normal hydrostatic pressure at the depth of the measurement. It is designed to operate in water depths up to 6000 m for periods of weeks or months and measures differential pore pressures at depths of up to 3 m into the sediments with a resolution of 0.05 kPa. It is a free-fall device with a lance which penetrates the sediments. This lance and the ballast weight is disposed when the PUPPI is acoustically released from the sea floor. When combined with permeability and porosity values of deep-sea sediments the pore pressure measurements made using the PUPPI suggest advection velocities as low as 8.8 mm/yr. The mechanical, electrical and acoustic systems are described together with data obtained from shallow and deep water trials. Author (ESA)

N86-16870# Institute of Oceanographic Sciences, Wormley (England).

GEOPHYSICAL INTERPRETATION OF THE STRUCTURE AND EVOLUTION OF THE JAN MAYEN RIDGE

C. D. Pelton 1985 38 p refs

(IOS-205) Avail: NTIS HC A03/MF A01

The Jan Mayen Ridge and its Southern Ridge Complex, part of a continental block which was rifted from the Greenland continental margin during the Mid-Eocene, was studied. Multichannel seismic data interpreted with published geophysical data permits work to be carried out on improved positions for the Southern Ridge Complex basement ridges. Isochron compilations are made for two important seismic events: Horizon A, which is mapped, and Horizon O which, with depth-to-basement values, is used to construct an improved total sediment thickness map. The change in spreading conditions along the eastern flank of the Jan Mayen Block is examined. A revised ocean/continent boundary for the Jan Mayen Block is derived. Author (ESA)

N86-16871# Institute of Oceanographic Sciences, Wormley (England).

MAGNETIC ANOMALIES IN THE NORTHEAST ATLANTIC

D. G. Roberts, M. T. Jones, and P. M. Hunter 1985 60 p refs

(IOS-207) Avail: NTIS HC A04/MF A01

A pair of geomagnetic anomaly charts printed on a Mercator projection at a scale of 1:2.4 million for the region of the northeast Atlantic from 32 to 62 N and from 0 to 31 W is presented. The charts are compiled from observations along ship's tracks up to 1975. Magnetic anomalies are calculated with respect to the International Geomagnetic Reference Field 1965.0. The charts complement are at the same scale as the bathymetric series Bathymetry of the northeast Atlantic published by the UK Hydrographic Department. Author (ESA)

N86-16872# Institute of Oceanographic Sciences, Wormley (England).

A REVIEW OF THE KNOWN BIOLOGICAL CHARACTERISTICS OF THE GREAT METEOR EAST SITE TOGETHER WITH A SAMPLING PROGRAM FOR A BIOLOGICAL SITE ASSESSMENT

H. S. J. Roe 1985 36 p refs Sponsored by UK Department of the Environment

(IOS-211; DoE/RW/85/080) Avail: NTIS HC A03/MF A01

Biological information on the Great Meteor East (GME) site in the Atlantic is reviewed. There is very little data available from depths below 2000 m. There is virtually no direct benthic information and none at all on the midwater/benthic boundary layer. Data from a wider geographic area are relevant to GME but the applicability of such data varies according to the hydrography. A sampling program which allows a comprehensive quantitative and qualitative assessment of the midwater and benthic ecosystems is outlined. Interactions between benthic and midwater communities just above the sea floor are emphasized. Author (ESA)

N86-16873# SES, Inc., Springfield, Va.

PATHWAYS AND FUTURE DIRECTIONS FOR ENVIRONMENTAL DATA AND INFORMATION USERS

Oct. 1984 433 p Proceedings of conference held in Denver, Colo., 19-22 Aug. 1984

(Contract NA83-SA-C-00754)

(PB85-233377; NESDIS-CONF-84-2) Avail: NTIS HC A19/MF A01 CSCL 08J

The interdisciplinary use of environmental data and information available from NOAA's National Environmental Satellite, Data, and Information Services (NESDIS) data centers are presented. Topical areas include activities as: (1) legal and insurance industries; (2) business, commodities, manufacturing, trave and recreation, (3) public and environmental health; (4) communications; (5) the marine environment, research and academia; disaster preparedness, and resource management. Future plans for on-line services and the technology transfer program of NOAA are described.GRA

N86-16874# National Oceanic and Atmospheric Administration, Washington, D. C. Oceanographic and Meteorological Labs.
ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY, FISCAL YEAR 1984 Annual Report
Jan. 1985 62 p
(PB85-218014) Avail: NTIS HC A04/MF A01 CSCL 08C

The mission NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) is to conduct a basic and applied research program in oceanography characteristics and processes of the ocean and the atmosphere both separately and as a coupled system. Oceanographic investigations center on the fluxes of energy, momentum, and materials through the air-sea interface; the transport and composition (thermal and chemical) of water in the ocean volume; and hydrothermal processes of mineralization at seafloor spreading centers. Meteorological research is carried out to improve the description, understanding, and prediction of hurricanes. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-16875*# Alabama Univ., Birmingham. Comprehensive Cancer Center.
PROTEIN CRYSTAL GROWTH RESULTS FROM SHUTTLE FLIGHT 51-F Final Report
Charles E. Bugg 17 Oct. 1985 7 p
(Contract NAS8-36611)
(NASA-CR-178540; NAS 1.26:178540) Avail: NTIS HC A02/MF A01 CSCL 06C

The protein crystal growth (PCG) experiments run on 51-F were analyzed. It was found that: (1) sample stability is increased over that observed during the experiments on flight 51-D; (2) the dialysis experiments produced lysozyme crystals that were significantly larger than those obtained in our identical ground-based studies; (3) temperature fluctuations apparently caused problems during the crystallization experiments on 51-F; (4) it is indicated that teflon tape stabilizes droplets on the syringe tips; (5) samples survived during the reentry and landing in glass tips that were not stoppered with plungers; (6) from the ground-based studies, it was expected that equilibration should be complete within 2 to 4 days for all of these vapor-diffusion experiments, thus it appears that the vapor diffusion rates are somewhat slower under microgravity conditions; (7) drop tethering was highly successful, all four of the tethered drops were stable, even though they contained MPD solutions; (8) the PCG experiments on 51-F were done to assess the hardware and experimental procedures that are developed for future flights, when temperature control will be available. Lysozyme crystals obtained by microdialysis are considerably larger than those obtained on the ground, using the identical apparatus and procedures. E.A.K.

N86-16876# Army Research Inst. of Environmental Medicine, Natick, Mass.
A SYSTEM OF RAT RESTRAINT USING A CONE-SHAPED, PLEXIGLASS AND STAINLESS STEEL ROD CAGE
G. J. Thomas, C. B. Matthew, W. T. Matthew, and R. Hubbard 1 Feb. 1985 19 p
(DA Proj. 3E1-62777-A-879)
(AD-A158428; USARIEM-T6/85) Avail: NTIS HC A02/MF A01 CSCL 14/2

A system of rat restraint was needed to allow maximum accessibility to the animal. This system, designed inhouse, is constructed of 3/8-in plexiglass and stainless steel rods. Several special design features, including the adjustment of size to accomodate a wide weight range of animals, are superior to commerical varieties. This system has been used extensively in two published studies and other uncompleted studies and has adapted well to many applications. GRA

N86-16877# Army Research Inst. of Environmental Medicine, Natick, Mass.
SIMULTANEOUS DETERMINATION OF FLUID SHIFTS DURING THERMAL STRESS IN A SMALL ANIMAL MODEL
M. J. Durkot, O. Martinez, D. Brooks-McQuade, and R. P. Francesconi Sep. 1985 21 p
(DA Proj. 3M1-61102-BS-10)
(AD-A159363; USARIEM-M-39/85) Avail: NTIS HC A02/MF A01 CSCL 06/19

We have developed methodology to measure simultaneously fluid redistribution among the major compartments during moderate and severe hypohydration. Total body water (TBW) was determined using tritiated water, extracellular fluid volume, (ECF) was measured using a single injection C-14 insulin technique, and plasma volume (PV) was determined by cardio-green dye dilution. Moderate (10% decrease in body weight) and severe (15%) hypohydration resulted in significant losses in TBW, ECF and PV. Plasma volume was decreased by approximately 25% in both groups, and other fluid compartments were differentially affected. For example, the moderately dehydrated group maintained PV by shifting fluid from the ECF and ISF (interstitial fluid) compartment while preserving the ICF (intracellular fluid) conversely, the severely dehydrated group maintained PV by redistributing fluid from both the ECF and ICF compartments. The data indicated that the initial response to fluid loss was the movement of fluid from the ECF pool to sustain both PV and ICF. In severely hypohydrated rats, PV was maintained at the expense of ICF. These experiments indicate that PV and ICF are maximally protected, probably to preserve the integrity of the cardiovascular system and to minimize organ injury. GRA

N86-16878# Texas Univ., Austin. Lab. of Radiation Biology.
PHYSICO-CHEMICAL STUDIES OF RADIATION EFFECTS IN CELLS Progress Report, 15 Feb. 1984 - 14 Feb. 1985
E. L. Powers 1985 13 p refs
(Contract DE-AS05-76EV-03408)
(DE85-0 4681; DOE/EV-03408/T1) Avail: NTIS HC A02/MF A01

The radioprotective effects of Hg(++) were investigated in Staphylococcus aureus and Pseudomonas aeruginosa bacteria having very different gc ratios in their DNA. A protective effect is seen in both with first order curves or at least in the k/sub L/ region of the breakpoints. However, it is curious that there is a distinct difference in the metal-free N2 baseline of Staphylococcus aureus compared to its EtOH metal-free N2 response while with Pseudomonas aeruginosa both the metal-free N2 baseline and its EtOH metal-free results are similar. In related studies a new radioprotective substance was evaluated in bacterial systems. Results showed that, in the presence of Rh(NH3)3C/3, the anoxic cell shows greater sensitivity than the oxygenated cell. This compound has considerable therapeutic promise providing it acts the same on mammalian cells. DOE

N86-16879# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
BIOLOGICAL EFFECTS OF MILLIMETER WAVES ON THE MOUSE
C.-O. Criborn, Ch. Henriksson, and L. D. Wernlund Aug. 1985 17 p refs In SWEDISH; ENGLISH summary
(FOA-C-50023-H1; ISSN-0347-7665) Avail: NTIS HC A02/MF A01

To study the effects of millimeter waves on respiration, rectal temperature, and of an acoustic reaction on mice, animals aged 60 to 70 days, weighing 25 to 30 g, were irradiated by 2 different

oscillators with a power intensity of 10 mW/sqcm at frequencies of 35 and 94,3 GHz. The absorbed irradiation was converted into heat which the mouse compensated for by decreased respiratory minute volume. The acoustic reaction was acutely affected in positive or negative direction depending on the frequency. The effects return to normal values 5 to 20 min after irradiation. No significant variation of the body temperature is noted.

Author (ESA)

N86-16880# National Academy of Sciences - National Research Council, Washington, D. C.
MODELS FOR BIOMEDICAL RESEARCH: A NEW PERSPECTIVE
1985 190 p
(Contract NO1-RR-3-2112)
(PB85-240067; ISBN-0-309-03538-4; LC-85-60945) Avail: NTIS HC A09/MF A01 CSCL 06E

Models for Biomedical Research provides a historical summary of the concept and use of models and their contributions to biomedical knowledge, evaluations of the utility of nonmammalian models, with particular attention to nonmammalian vertebrates, invertebrates, microorganisms, cell and tissue culture systems, and mathematical models. The report proposes a new perspective on the role of models, whereby they serve as sources of information that can be generalized to the total body of biological knowledge rather than directly, or only, to humans. In the course of the study six workshops were held to explore the use of models in various aspects of biomedical research. Summaries of the workshops are included as appendices to the report.

Author (GRA)

N86-16881# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
10 Dec. 1985 78 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UBB-85-025) Avail: NTIS HC A05/MF A01

Progress on research and developments in the Soviet life, biomedical, and behavioral sciences, is reported. Topics discussed include: aerotechnology, biochemistry, bionics, biotechnology, epidemiology, genetics, human factors engineering, immunology, medicine, laser effects, molecular biology, pharmacology, and toxicology, physiology, and public health. For individual titles, see N86-16882 through N86-16886.

N86-16882# Joint Publications Research Service, Arlington, Va.
ADVANCES IN NERVE CELL RESEARCH c52
Ye. Chazov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UB-85-025) 10 Dec. 1985 p 2-4 Transl. into ENGLISH from Pravda (Moscow), 16 Aug. 1985 p 6 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

All excitability which is dependent on the existence of molecular structure of the cell membrane, the ion channels, is discussed. The systems operation of living organisms depends on the fine coordination of the ion channel action. Ion channels contribute to initiation of cardiac and smooth muscle contraction, endocrine secreation of enyzmes and hormones, cell growth and division, and regulation of cell metabolism. Approches towards the development of methods to control the action of ion channels and the function of nerve cells are identified. E.A.K.

N86-16883# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF PEROXIDE OXIDATION OF LIPIDS DURING STRESS Abstract Only
E. M. Mikayelan and V. G. Mkhitaryan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-025) 10 Dec. 1985 p 11 Transl. into ENGLISH from Biologicheskiy Zhurnal Armenii (Yerevan, USSR), v. 38, no. 5, May 1985 p 393-398 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

The dynamics of peroxide oxidation of lipids (POL) was studied on white rats during acute stress of varying duration and during chronic stress. Alterations in formation and removal of lipoperoxides, the direction and intensity depending on the stage of stress and on tissue specificity are shown. During acute stress, POL intensified, especially in the heart. It is shown that alpha-tocopherol levels in blood and in erythocyte membranes dropped during acute stress, while they remained stable in the heart, liver and brain. Repeated stress intensified the POL and activated the glutathioneperoxidase-glutathionereductase system. Under chronic stress, the POL dimished, alpha tocopherol levels in tissues became lower in all phases of the stress, altering the structure and function of biomembranes and necessitating antioxidative prophylactic measures and therapeutic interventions because the cell metabolism was comprised. E.A.K.

N86-16884# Joint Publications Research Service, Arlington, Va.
PEPTIDES AND MEMORY c53
L. Ivchenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-025) 10 Dec. 1985 p 31-34 Transl. ENGLISH from Izvestiya (Moscow, USSR), 1 Aug. 1985 p 8 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

The function of the peptides on the mechanism of memory was investigated. It was shown that the hormones of the hypophysis - corticotropin and vasopressin, could be memory stimulants. It is found that peptide substances have a great influence on the central nervous system. The production of synthetic vasopressin is recorded. E.A.K.

N86-16885# Joint Publications Research Service, Arlington, Va.
MITOCHONDRIAL MANIFESTATIONS OF STRESS AND RESPONSE TO HORMONAL STIMULATION AND HYDROAEROIONS Abstract Only
M. N. Kondrashova and Ye. V. Grigorenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-025) 10 Dec. 1985 p 35 Transl. into ENGLISH from Zhurnal Obshchey Biologii (Moscow, USSR), v. 46, no. 4, Jul. - Aug. 1985 p 516-526 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

Hepatic and cerebral mitochondrical suspensions obtained from Wistar and August rats were studied to assess the effects of immobilization stress. The mitochondrial preparations exhibited manifestations of stardard biphasic response of physiological stress, which consisted of an initial enhancement of energy metabolism which was reflected in increased succinate oxidation and elevated respiratory rate. These changes were consonant with an initial upsurge in epinephrine release into the blood stream. With ongoing stress, succinate oxidation shows a corresponding increase accompanied, however, by greater increase in an antithetical process-inhibition of succinate dehydrogenase by oxalacetate and the products of serotonin oxidation. Treatment of the stressed animals with sightly charged negative hydroaeroions abrogated the latter effects, and resulted in an increase in mitochondrial respiration to above-background levels. The rapid change seen with the hydroaerions is ascribed to electrobiochemical mechanisms which is responsible for enzyme activation. E.A.K.

N86-16886# Joint Publications Research Service, Arlington, Va.
CYTOGENETIC CHANGES IN CELLS OF LETTUCE SEEDLINGS WITH EXPOSURE TO ACCELERATED CARBON ION BEAM
A. I. Vikhrov, Ye. Ye. Kovalev, Ye. N. Maksimova, L. V. Mevzgodina, and Yu. V. Potapov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-025) 10 Dec. 1985 p 62-68 refs Transl. into ENGLISH from Radiobiologiya (Moscow, (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

The effects of single hits on accelerated carbon ions in the lettuce seeds were studied. Data on the frequency of aberrant cells in lettuce seedlings as a function of the number of hits after exposure to C carbon ions are presented. The number of particles, which passed through the biological objects, and the dose values, received by each seed considering the contribution of secondary radiation in these doses, are presented. E.A.K.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-16887 Pennsylvania Univ., Philadelphia.
TRANSPORT OF ARTERIAL BLOOD GATES THROUGH HUMAN SKIN Ph.D. Thesis
James Edward Baumgardner 1985 149 p
Avail: Univ. Microfilms Order No. DA8515346

The physiology of the transport of arterial blood gases through human skin has important applications in non-invasive monitoring. A simple analytical model has been developed that relates flux of arterial gas through skin to arterial tension, skin blood flow, skin diffusional resistance, and skin metabolism. In addition, a mass specreal approach has been devised to accurately measure gas flux through human skin. Flux of helium and oxygen through human skin at constant temperature is well-described by the simple linear analytical model. Increasing surface temperature in the range 33-43 C results in a much larger increase in oxygen efflux than in helium efflux for intact skin. Skin perfusion was approximated from helium efflux for skin that had been stripped with cellophane tape. Estimates of skin perfusion compare favorably to previously reported values obtained by other techniques. Values for skin perfusion were combined with helium and oxygen data to calculate skin diffusion conductance. Dissert. Abstr.

N86-16888* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Nov. 1985 74 p
(NASA-SP-7011(277); NAS 1.21:7011(277)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 205 reports, articles, and other documents introduced into the NASA scientific and technical information system in October 1985. Author

N86-16889*# National Aeronautics and Space Administration. Ames Research Center Moffett Field, Calif.
ANIMAL STUDIES ON SPACELAB-3
C. Schatte, R. Grindeland, P. Callahan, G. Funk, W. Lencki (Matsco, Valley Forge, Pa.), and W. Berry Jan. 1986 7 p
(NASA-TM-88212; A-86113; NAS 1.15:88212) Avail: NTIS HC A02/MF A01 CSCL 06E

The flight of two squirrel monkeys and 24 rates on Spacelab-3 was the first mission to provide hand-on maintenance on animals in a laboratory environment. With few exceptions, the animals grew and behaved normally, were free of chronic stress, and differed from ground controls only for gravity-dependent parameters. One of the monkeys exhibited symptoms of space sickness similar to those observed in humans, which suggests squirrel monkeys may be good models for studying the space-adaptation syndrome. Among the wide variety of parameters measured in the rats, most notable was the dramatic loss of muscle mass and increased fragility of long bones. Other interesting rat findings were those of suppressed interferon production by spleen cells, defective release of growth hormone by somatotrophs, possible dissociation of circadian pacemakers, changes in hepatic lipid and carbohydrate metabolism, and hypersensitivity of marrow cells to erythopoietin. These results portend a strong role for animals in identifying and elucidating the physiological and anatomical responses of mammals to microgravity. Author

N86-16890*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF 9-HOUR TIME ZONE CHANGES ON FATIGUE AND CIRCADIAN RHYTHMS OF SLEEP/WAKE AND CORE TEMPERATURE
P. H. Gander, G. Myhre, R. C. Graeber, H. T. Andersen, and J. K. Lauber Dec. 1985 38 p refs
(NASA-TM-88197; A-86057; NAS 1.15:88197) Avail: NTIS HC A03/MF A01 CSCL 06S

Physiological and psychological disruptions caused by transmeridian flights may affect the ability of flight crews to meet operational demands. To study these effects, 9 Royal Norwegian Airforces P3-Orion crewmembers flew from Norway to California (-9 hr), and back (+9 hr). Rectal temperature, heart rate and wrist activity were recorded every 2 min, fatigue and mood were rated every 2 hr during the waking day, and logs were kept of sleep times and ratings. Subjects also completed 4 personality inventories. The time-zone shifts produced negative changes in mood which persisted longer after westward flights. Sleep quality (subjective and objective) and duration were slightly disrupted (more after eastward flights). The circadian rhythms of sleep/wake and temperature both completed the 9-hr delay by day 5 in California, although temperature adjusted more slowly. The size of the delay shift was significantly correlated with scores on extraversion and achievement need personality scales. Response to the 9-hr advance were more variable. One subject exhibited a 15-hr delay in his temperature rhythm, and an atypical sleep/nap pattern. On average, the sleep/wake cycle (but not the temperature rhythm), completed the 9-hr advance by the end of the study. Both rhythms adapted more slowly after the eastward flight. Author

N86-16891# Department of Energy, Washington, D. C.
IMPROVED MONOCLONAL ANTIBODIES TO HALODEOXYURIDINE Patent Application
M. Vanderlaan (Lawrence Livermore National Lab., Calif.), F. A. Dolbeare (Lawrence Livermore Lab., Calif.), J. W. Gray (Lawrence Livermore Lab., Calif.), and C. B. Thomas, inventors (to DOE) (Lawrence Livermore Lab., Calif.) Filed 18 Oct. 1983 33 p (Contract W-7405-eng-48)
(DE85-017764; US-Patent-Appl-SN-542967) Avail: NTIS HC A03/MF A01

The development, method of production, characterization and methods of use of two hybridomas, CldU-1 (ATCC Accession No. HB-8321) and CldU-2 (ATCC Accession No. HB-8320), are described. These secrete IgG1(K) immunoglobulins react with halodeoxyuridine (HdU or halodU) such as bromo, chloro, fluoro and iodo deoxyuridine (BrdU, CldU, FdU and IdU), whether these are free in solution or incorporated into single stranded DNA in whole cells. The antibodies do not react with naturally occurring free nucleic acids or with deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) polymers. These antibodies are suitable for use in enzyme immunoassays for free CldU, FdU, IdU and BrdU and for detecting cells with these nucleotides incorporated into them. The nomoclonal antibodies are useful in the detection of the sensitivity of tumor cells to specific chemotherapeutic agents, in the measurement of the rate of cellular DNA synthesis, in the measurement of the rate of proliferation of normal and malignant cells and in the detection of HPRT deficiency in cells. DOE

N86-16892# Department of Energy, Washington, D. C. Office of Energy Research.
HEALTH AND ENVIRONMENTAL EFFECTS OF COMPLEX CHEMICAL MIXTURES
1985 117 p Proceedings of Conference held in Chicago, Ill., 17 Jun. 1985
(DE85-016336; CONF-8506155) Avail: NTIS HC A06/MF A01

The Office of Health and Environmental Research (OHER) of the Department of Energy supports a broad long-term research program on human health and environmental effects from potential exposure to energy-related complex chemical mixtures. The program seeks basic mechanistic data on the effects of complex mixtures at the cellular, molecular, and whole animal levels to aid in predicting human health effects and seeks ecological data on biological and physical transformations in the mixtures, concentrations of the mixtures in various compartments of the environment, and potential routes for human exposure to these mixtures (e.g., food chain). On June 17 to 18, 1985, OHER held its First Annual Technical Meeting on the Complex Chemical Mixtures Program in Chicago, Ill. The primary purpose of the meeting was to enable principal investigators to report the research status and accomplishments of ongoing complex chemical mixture studies supported by

OHER. To help focus future research directions round table discussions were conducted. DOE

N86-16893# New York Univ., New York. Inst. of Environmental Medicine.
IN VIVO DETECTION, LOCALIZATION AND MEASUREMENT OF RADIONUCLIDES IN MAN: A DETECTION SYSTEM FOR THE LOCALIZATION AND MEASUREMENT OF SMALL AMOUNTS OF PHOTON EMITTERS Final Report
G. R. Laurer 1 Aug. 1985 41 p
(Contract DE-AC02-78EV-04957)
(DE85-017601; DOE/EV-04957/5; COO-4957-5) Avail: NTIS HC A03/MF A01

A new detector has been devised which, by providing a significant increase in geometric counting efficiency, allows a concurrent reduction in the amount of radioactivity needed to produce an image of the deposition site(s) of radionuclides in humans and/or experimental animals. Consisting of four wedge-shaped NaI(Tl) crystals in a unique geometrical arrangement, the crystals themselves function as the collimator generally employed in radionuclide imaging applications. The four crystals, when coupled, become a 4-crystal unit detector; joined so their active faces form the silhouette of a pyramid. The outside, vertically oriented, rectangular faces of each crystal are placed back-to-back with those of adjoining detectors. Thus, small or large arrays of the 4-crystal unit detectors may be assembled. In practice, the array of detectors will be moved in fixed, discrete steps over the source of radiation to be imaged. As a result of its shape, each count obtained from each crystal at each counting position is different, relative to its position above the source. The array of counts obtained in this manner is the raw spatial information. They are used in a system of linear, simultaneous equations which relate the position of the detectors to the counts obtained at each position. The solution of these equations - utilizing the predetermined point-source-response (PSR) function of the crystals - yields a two-dimensional image of the deposition site of the radioactivity. DOE

N86-16894# Societe Nationale Industrielle Aerospatiale, Paris (France).
CHARACTERIZATION OF YAG LASERS FOR OPHTHALMOLOGIC APPLICATIONS [CARACTERISATION DES LASERS YAG POUR L'OPHTALMOLOGIE]
A. P. Josse 1985 5 p In FRENCH Presented at Intern. Seminar on Caracterisation des LASERS YAG pour l'Ophtalmol., Lorient, France, 5-6 Sep. 1985
(SNIAS-852-430-107) Avail: NTIS HC A02/MF A01

The shock waves produced in a water medium by a YAG laser source are measured and visualized. The human eye optical system is simulated by an experimental set-up. A pulsed YAG laser with up to 1 J power is used. The time and space visualizations are based on the variation of the optical refraction index in the water. Time visualization by the Schlieren method allows measuring of the propagation velocity of the shock wave at various distances from the plasma initiation point. Photographs are included. Pressure is evaluated from velocity following the finite difference method. Author (ESA)

N86-16895# Health Effects Research Lab., Research Triangle Park, N. C.
BIOLOGICAL EFFECTS OF ELECTRIC FIELDS
R. D. Phillips Aug. 1985 31 p
(PB85-243467; EPA-600/D-85-174) Avail: NTIS HC A03/MF A01 CSCL 05R

Research concerned with the biological consequences of exposure to extremely-low-frequency radiation is reviewed. Epidemiological and clinicial studies and an examination of results of studies using experimental animals are summarized. Current concepts on possible mechanisms and future directions of research are presented. GRA

N86-16896# Resources for the Future, Inc., Washington, D. C.
AMBIENT OZONE AND HUMAN HEALTH: AN EPIDEMIOLOGICAL ANALYSIS, VOLUME 1 Final Report
P. R. Portney and J. Mullahy Aug. 1985 327 p refs
(Contract EPA-68-02-3583)
(PB85-245181; EPA-450/5-85-003A-Vol-1) Avail: NTIS HC A15/MF A01 CSCL 06E

The relationship between ozone and human health benefits was analyzed. The benefits for improved human health associated with possible alternative air quality standards for ozone are identified. GRA

N86-16641# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MODEL EVALUTION OF SPINAL INJURY LIKELIHOOD FOR VARIOUS EJECTION SYSTEM PARAMATER VARIATIONS
Eberhardt Privitzer *In* Shock and Vibration Information Center The Shock and Vibration Bulletin 55, Part 3 Jun. 1985 p 99-115 refs (For primary document see N86-16632 07-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 06S

N86-16882# Joint Publications Research Service, Arlington, Va.
ADVANCES IN NERVE CELL RESEARCH
Ye. Chazov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UB-85-025) 10 Dec. 1985 p 2-4 Transl. into ENGLISH from Pravda (Moscow), 16 Aug. 1985 p 6 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-16897# Air Force Academy, Colo.
PROCEEDINGS OF THE AIR FORCE CONFERENCE ON TECHNOLOGY IN TRAINING AND EDUCATION (TITE)
Apr. 1985 596 p Conference held in Colorado Springs, Colo., 15-19 April 1985
(AD-A157829) Avail: NTIS HC A25/MF A01 CSCL 05/9

Although the field of Artificial Intelligence has the potent enhance the Air Force's readiness and ability to respond to situations, too few people really known what it is, or what the Air Force. In addition, most educational programs in AI towards the PhD student and are very theoretical. At the Air Institute of Technology, we have developed an engineering in AI at the masters of science level. This program is one masters degree programs available. In addition this represent first programs to extract the engineering techniques from Artificial Intelligence. In this report, the above program described along with our philosophy and approach to teaching. GRA

N86-16898# Illinois Univ., Urbana. Computer-based Education Research Lab.
APPLICATION OF COMPONENT SCORING TO A COMPLICATED COGNITIVE DOMAIN
K. K. Tatsuoka and K. Yamamoto 15 May 1985 29 p
(Contract N00014-82-K-0604)
(AD-A157897; AD-E900470; CERL-85-2-ONR) Avail: NTIS HC A03/MF A01 CSCL 05/10

The recent development of cognitive psychology and science suggests that the lack of understanding of important structural relations between the entities in a problem-solving domain causes difficulties in learning. This study proposes a new scoring method by which the structural relations as well a processes used in subcomponents of the knowledge structure are taken into account when determining the scores. By so doing, a score of I derived by wrong reasons will be eliminated and patterns of zeros and ones will contain information closely associated with student's cognitive processes. The procedure is illustrated with basic electricity problems. GRA

N86-16899# Illinois Univ., Urbana. Computer-based Education Research Lab.
BUG DISTRIBUTION AND PATTERN CLASSIFICATION
K. K. Tatsuoka and M. M. Tatsuoka 15 Jul. 1985 34 p
(Contract N00014-82-K-0604)
(AD-A157898; AD-E900470; CERL-85-3-ONR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A model (called rule space) which permits measuring cognitive skill acquisition, diagnosing cognitive errors, detecting the weaknesses and strengths of knowledge possessed by individuals was introduced earlier. This study further discusses the theoretical foundation of the model by introducing Bug Distribution and hypothesis testing (Bayes' decision rules for minimum errors) for classifying and individual into his/her most plausible latent state of knowledge. The model is illustrated with the domain of fraction arithmetic and compared with the results obtained from a conventional Artificial Intelligence approach. GRA

N86-16900# Defence Research Information Centre, Orpington (England).
VARIATIONS IN STATE OF VIGILANCE DURING CONTINUOUS OPERATIONS AT A COMMAND POST
J. Fourcade, A. Buguet, R. Bugat, and C. Raphel Jul. 1985 36 p refs Transl. into ENGLISH from AGARD Conference Proceedings 16 p Proceedings of Conference No. 338, Sustained Intensive Air Operations: Physiological and Performance Aspects
(DRIC-T-7503; BR96591) Avail: NTIS HC A03/MF A01

The changes in mental and decision making abilities in personnel working at division command posts, during four maneuvers which took place continuously over several days were studied to appraise the problems which arise during continuous operations, and to give advice to commanders on the organization of the waking - sleeping rhythm at command posts and on arrangements which can be encouraged in order to facilitate the work and reduce mental load factors. Physiological, biochemical, and psychological implications of continuous operations are discussed. Author (ESA)

N86-16884# Joint Publications Research Service, Arlington, Va.
PEPTIDES AND MEMORY
L. Ivchenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-85-025) 10 Dec. 1985 p 31-34 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 1 Aug. 1985 p 8 (For primary document see N86-16881 07-51)
Avail: NTIS HC A05/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-16901*# Massachusetts Inst. of Tech., Cambridge. Man Machine Systems Lab.
EFFECT OF TIME SPAN AND TASK LOAD ON PILOT MENTAL WORKLOAD
S. L. Berg and T. B. Sheridan Jan. 1986 152 p refs
(Grant NAG2-227)
(NASA-CR-177388; NAS 1.26:177388) Avail: NTIS HC A08/MF A01 CSCL 05H

Two sets of simulations designed to examine how a pilot's mental workload is affected by continuous manual-control activity versus discrete mental tasks that included the length of time between receiving an assignment and executing it are described. The first experiment evaluated two types of measures: objective performance indicators and subjective ratings. Subjective ratings for the two missions were different, but the objective performance measures were similar. In the second experiments, workload levels were increased and a second performance measure was taken. Mental workload had no influence on either performance-based workload measure. Subjective ratings discriminated among the scenarios and correlated with performance measures for high-workload flights. The number of mental tasks performed did not influence error rates, although high manual workloads did increase errors. E.A.K.

N86-16902*# GARD, Inc., Niles, Ill.
CATALYTIC DISTILLATION WATER RECOVERY SUBSYSTEM
Pranas Budininkas and Firooz Rasouli Sep. 1985 104 p
(Contract NAS2-11687)
(NASA-CR-177382; NAS 1.26:177382) Avail: NTIS HC A06/MF A01 CSCL 06K

An integrated engineering breadboard subsystem for the recovery of potable water from untreated urine based on the vapor phase catalytic ammonia removal was designed, fabricated and tested. Unlike other evaporative methods, this process catalytically oxidizes ammonia and volatile hydrocarbons vaporizing with water to innocuous products; therefore, no pretreatment of urine is required. Since the subsystem is fabricated from commercially available components, its volume, weight and power requirements are not optimized; however, it is suitable for zero-g operation. The testing program consists of parametric tests, one month of daily tests and a continuous test of 168 hours duration. The recovered water is clear, odorless, low in ammonia and organic carbon, and requires only an adjustment of its pH to meet potable water standards. The obtained data indicate that the vapor phase catalytic ammonia removal process, if further developed, would also be competitive with other water recovery systems in weight, volume and power requirements. Author

N86-16903*# Economics Lab., Inc., St. Paul, Minn.
A STUDY TO DEFINE A SET OF REQUIREMENTS FOR CLEANSING AGENTS FOR USE IN THE SPACE STATION WHOLE BODY SHOWER Final Report
29 Oct. 1985 95 p
(Contract NAS9-17428)
(NASA-CR-171910; NAS 1.26:171910) Avail: NTIS HC A05/MF A01 CSCL 06K

The objective of this research is to define a set of requirements for a whole body cleansing agent to be used in the Space Station Whole Body Shower System. In addition, cleansing agent candidates are to be identified that are likely to satisfy requirements defined in the first part of the study. It is understood that the main reason for having a Whole Body Shower is to satisfy the physiological, psychological and social needs of the crew throughout the duration of duty in the Space Station. The cleansing agent must also be compatible with the vortex water/gas separator and the water reclamation system. To accomplish these goals the study was divided into six tasks. Author

N86-16904# Naval Postgraduate School, Monterey, Calif.
OPERATIONS RESEARCH TECHNIQUES FOR HUMAN FACTORS ENGINEERS M.S. Thesis
J. H. Lind Jun. 1985 193 p
(AD-A159384) Avail: NTIS HC A09/MF A01 CSCL 05/8

In this thesis a variety of operations research techniques and models that are applicable to human factors engineering problems are identified and classified according to the functions or purposes for which they are useful. Several of these techniques are described in sufficient detail for a human factors engineer to determine if they are applicable to a problem of interest. Uses for techniques are illustrated in military-related human factors settings, primarily related to the Navy's antiair warfare mission. References are provided for additional information on each technique.
Author (GRA)

N86-16905# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
OPERATOR ENVIRONMENT IN THE NINETIES
Hans Marmolin and Staffan Loef Apr. 1985 25 p refs In SWEDISH; ENGLISH summary
(FOA-A-50002-H2; ISSN-0281-0239) Avail: NTIS HC A02/MF A01

A program of research and development in man-information systems is outlined. Human factors engineering, display, dialog,

and design of decision aid systems from a man-machine approach are discussed. A program to ensure knowledge transfer and an effective dialog with possible users was created. Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-16906*# Sequoia Systems, Inc., Marlborough, Mass.
CARE 3, VERSION 4 ENHANCEMENTS
L. A. Bryant and J. J. Stiffler Nov. 1985 141 p refs
(Contract NAS1-17476)
(NASA-CR-177963; NAS 1.26:177963) Avail: NTIS HC A07/MF A01 CSCL 12A

The enhancements and error corrections to CARE III Version 4 are listed. All changes to Version 4 with the exception of the internal redundancy model were implemented in Version 5. Version 4 is the first public release version for execution on the CDC Cyber 170 series computers. Version 5 is the second release version and it is written in ANSI standard FORTRAN 77 for execution on the DEC VAX 11/700 series computers and many others. Author

N86-16907*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A SEPARABLE TWO-DIMENSIONAL DISCRETE HARTLEY TRANSFORM
Andrew B. Watson and Allen Poirson (Stanford Univ., Palo Alto, Calif.) Dec. 1985 14 p refs
(NASA-TM-88203; A-86071; NAS 1.15:88203) Avail: NTIS HC A02/MF A01 CSCL 12A

Bracewell has proposed the Discrete Hartley Transform (DHT) as a substitute for the Discrete Fourier Transform (DFT), particularly as a means of convolution. Here, it is shown that the most natural extension of the DHT to two dimensions fails to be separate in the two dimensions, and is therefore inefficient. An alternative separable form is considered, corresponding convolution theorem is derived. That the DHT is unlikely to provide faster convolution than the DFT is also discussed. Author

N86-16908# Argonne National Lab., Ill.
RESEARCH IN MATHEMATICS AND COMPUTER SCIENCES AT ARGONNE, APRIL 1 1984 - MARCH 31, 1985
G. W. Pieper 1985 50 p
(Contract W-31-109-eng-38)
(DE85-013852; ANL-85-24) Avail: NTIS HC A03/MF A01

The research activities in the Mathematics and Computer Science Division at Argonne National Laboratory for the period April 1, 1984, through March 31, 1985 are reviewed. Various projects carried out in four major areas of research: applied analysis, computational mathematics, software engineering, and advanced computing are discussed. Information on section staff, visitors, workshops, and seminars is given. DOE

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-16909 Cincinnati Univ., Ohio.
ON A COMPUTER VISION SYSTEM FOR MODELING OF SOLID OBJECTS FROM MULTIPLE 2-D IMAGE DATA Ph.D. Thesis
Chia Yung Han 1985 185 p
Avail: Univ. Microfilms Order No. DA8518129

To accommodate the lack of strong visual features in the image obtained without the constraints of planar surfaces and controlled lighting conditions, 3-D image analysis and 3-D model generation require a complex vision system model with the following capabilities: (1) to be able to select the areas of focus; (2) to have a robust segmentation methods to extract meaningful areas and their properties; (3) to have a geometrical modeling based on physics of image formation process and geometry of the camera, object and lighting sources, to constrain the relationship among data from multiple views; and (4) to have a smart or intelligent brain that has a knowledge representation to reduce the search space and to select most representative features that characterize efficiently a class of objects and to perform interpretation, geometrical reasoning, prediction and planning for subsequent views to be taken in order to incrementally refine the object model. A computer vision system model that embodies all above requirements is proposed. A robust image segmentation scheme and a 3-D model reconstruction scheme that satisfy both the second and the third requirements are implemented and presented. Dissert. Abstr.

N86-16910 Ohio State Univ. Columbus.
A MODULAR MICROPROCESSOR-BASED DATA ACQUISITION SYSTEM FOR COMPUTERIZED 3-D MOTION ANALYSIS Ph.D. Thesis
Michael Lee French 1985 213 p
Avail: Univ. Microfilms Order No. DA8518941

A camera computer interface system was developed for the purpose of obtaining three dimensional motion information from moving targets. The analysis of biomechanical kinematics is the primary intent of the system, human gait analysis in particular. The system was designed in modular form in that a single interface module is capable of interfacing a raster scan camera with a PDP-11/34 host computer. Each interface module is capable of accepting camera signals from one of two types of cameras. A total of five camera interface modules were developed, each incorporating an MC6800 microprocessor, and 64K workd dynamic RAM buffer. After data collection, the obtained coordinate and force information is stored on a flopply disk for subsequent processing. The results of this processing are plots of joint angles such as ankle angle and knee angle as well as plots of forces and torques at these joints. Dissert. Abstr.

N86-16911 Yale Univ., New Haven, Conn.
CHARGE-COUPLED ANALOG COMPUTER ELEMENTS AND THEIR APPLICATION TO SMART IMAGE SENSORS Ph.D. Thesis
Eric Roy Fossum 1985 352 p
Avail: Univ. Microfilms Order No. DA8509807

An analog processor based on the manipulation of discrete charge packets in a semiconductor is advocated. Such a processor shows promise for high density focal plane computing. The work focuses on the basic building blocks of the charge coupled computer, a charge packet differencer/replicator and a charge packet magnitude comparator. The former is implemented in a novel circuit in an inherently linear and compact way through the use of three-dimensional charge coupling. Also investigated was the bistable metal/tunnel-oxide/semiconductor (MTOS) junction. The application of this device as a charge packet magnitude comparator was explored by utilizing its hot electron impact

ionization internal positive feedback mechanism. The control circuitry integrated with the MTOS junction provided an oppportunity to investigate the internal charging and disharging currents of the thin oxide capacitor. Dissert. Abstr.

N86-16912 Johns Hopkins Univ., Baltimore, Md.
AN INSTRUMENT FOR EVALUATING THE USE OF SPEECH IN COMPUTER COMMUNICATION Ph.D. Thesis
Janan Arif Al-Awar 1985 227 p
Avail: Univ. Microfilms Order No. DA8518472

The usefulness of voice Input/Output (I/O) for computer systems can be determined through a set of defining characteristics. These characteristics can be divided into two main groups: (1) those conditions necessary for the viability of any voice communication system, and (2) additional features that may not be vital for the system, but if implemented, would greatly enhance its usability. A paper and pencil instrument for evaluating the usefulness of speech in user-computer communication was developed. The items in the instrument were obtained by identifying features that are considered imperative and/or desirable in either a voice input or voice output system. These features were assembled in three groups: items related to the users, items related to the tasks, and items related to the environment in which the system would be present. They were validated by an analysis of their contents, an empirical content validation study, and field observation studies of two operational voice systems. Finally, the effects of voice feedback on performance were investigated in a laboratory simulation experiment. Dissert. Abstr.

N86-16913*# College of William and Mary, Williamsburg, Va.
THE MYSTRO SYSTEM: A COMPREHENSIVE TRANSLATOR TOOLKIT Final Report
W. Robert Collins and Robert E. Noonan Jun. 1985 37 p refs
(Grant NsG-1435)
(NASA-CR-176350; NAS 1.26:176350) Avail: NTIS HC A03/MF A01 CSCL 09B

Mystro is a system that facilities the construction of compilers, assemblers, code generators, query interpretors, and similar programs. It provides features to encourage the use of iterative enhancement. Mystro was developed in response to the needs of NASA Langley Research Center (LaRC) and enjoys a number of advantages over similar systems. There are other programs available that can be used in building translators. These typically build parser tables, usually supply the source of a parser and parts of a lexical analyzer, but provide little or no aid for code generation. In general, only the front end of the compiler is addressed. Mystro, on the other hand, emphasizes tools for both ends of a compiler. G.L.C.

N86-16914*# System Development Corp., Hampton, Va.
MAGNETIC TAPE USER GUIDE
Agnes B. Evans and Lucia L. Lee Sep. 1985 57 p
(Contract NAS1-17300)
(NASA-CR-177993; NAS 1.26:177993) Avail: NTIS HC A04/MF A01 CSCL 09B

This User Guide provides a general introduction to the structure, use, and handling of magnetic tapes at Langley Research Center (LaRC). The topics covered are tape terminology, physical characteristics, error prevention and detection, and creating, using, and maintaining tapes. Supplementary documentation is referenced where it might be helpful. The documentation is included for the tape utility programs, BLOCK, UNBLOCK, and TAPEDMP, which are available at the Central Scientific Computing Complex at LaRC. Author

N86-16915# Stanford Univ., Calif.
DATA BASE MANAGEMENT
H. Solomon and E. H. Weinberg 31 Jul. 1985 307 p Proceedings of a conference held in Monterey, Calif., 1-2 Nov. 1984
(Contract N00014-76-C-0475)
(AD-A158285) Avail: NTIS HC A14/MF A01 CSCL 09/2

Stanford University and the Navy Center for International Science and Technology (NCIST) and Office of Naval Research Univ, located at the U.S. Naval Postgraduate School (NPGS) in Monterey jointly sponsored a Database Management Conference on November 1-2, 1984. Eleven speakers were invited to give talks over the two days to audiences numbering 25 to 35 workers in the field. These speakers covered a wide spectrum of specialties in database management. Topics were: Database Organization for statistical Data Analysis; Automating the study of Causal Relationships ... Large Time-Oriented Clinical Databases: The RX Project; CODA: A Concept Organization and Development Aide for the Research Environment; Information Management for Distributed Scientific Data; Put the Information in the Database Not the Program; Relevance of Machine Learning; Managing the Data Analysis Process; Remarks on Parallel Computer Architecture and Information Retrieval; Linking Science, Technology, and Economics Data; The World Brain Today: Scientographic Databases. What are they, How are the created and What are they used for? Beyond Storage Retrieval. Author

N86-16916# Ohio State Univ., Columbus.
A LISP MACHINE FACILITY FOR EXPERT SYSTEMS RESEARCH Final Report, 1 Aug. 1983 - 31 Jul. 1984
B. Chandrasekaran Aug. 1984 73 p
(Grant AF-AFOSR-0300-83)
(AD-A159126; AFOSR-85-0636TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

During the year, progress was made in a number of directions: (1) A better understanding of different types of problem solving that underlie expert reasoning was obtained; (2) Advances in representing design knowledge as plans in design specialists were made; (3) CSRL, the language for diagnostic expert system building that was designed in our Laboratory, was applied to the implementation of a diagnostic system for the fuel system of an automobile and directions for new constructs for the language were obtained; (4) A representation for functional understanding of how a device works was obtained, and methods of automatically generating diagnostic expert systems from this representation of a device were also obtained; (5) An analysis of how techniques and tasks can be matched in expert design was undertaken. Author (GRA)

N86-16917# Naval Postgraduate School, Monterey, Calif.
DESIGN AND IMPLEMENTATION OF A PERSONNEL DATABASE M.S. Thesis
B. Buyukoner and Y. Ozin Jun. 1985 157 p
(AD-A159388) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis deals with the design considerations for a personnel database system. It introduces the important concepts related to the analysis and design phases of a database system. Two types of data models, namely conceptual and implementation models, are described, particularly concentrating on the Semantic Data Model (SDM) for conceptual and the Relational Data Model for implementation. The Semantic Data Model is used to indicate the entities and relationships between those entities for the Personnel Database. After the completion of this process, the SDM design is converted into a corresponding relational database which is implemented using the ORACLE Database Management System. GRA

N86-16918# Lawrence Livermore National Lab., Calif.
DATA ACQUISITION WITH REAL-TIME PLOTS
G. Koide 9 Aug. 1985 12 p
(Contract W-7405-eng-48)
(DE85-017326; UCID-20494) Avail: NTIS HC A02/MF A01

A data acquisition system using an LST-11/23 microcomputer has 32 analog-to-digital channels of which the first four are available for real-time plots. The software is menu driven allowing a user to easily step through an experimental test. To calibrate each transducer, one of three options must be selected. They are shunt calibration, calibration with known inputs, and manually entering the offset and scale factor directly. After a test, post-experimental plots may be made. Any channel can be plotted against time or any other channel. Furthermore, more than one curve, up to a

maximum of four, can be drawn on any set of grids. Telescopic views of any portion of data are also possible. DOE

N86-16919# George Washington Univ., Washington, D.C. Inst. for Information Science and Technology.
STANDARD GRAPHICS AND MODELLING CLASSES OF THE IMAGYS LANGUAGE
J. B. H. Acquah Nov. 1984 20 p
(Contract DE-AS05-83ER-13122)
(DE85-013383; DOE/ER-13122/3) Avail: NTIS HC A02/MF A01

The base language which is partly described in GWU11ST84-50 provides only the essential facilities for constructing new classes of objects, and operators or implementing the dynamic processes. The detailed graphics facilities are built on top of these basic features. Some of the modeling and graphics classes defined as a starting point for writing interactive graphics programs are described. DOE

N86-16920# European Space Agency, Paris (France).
REASONS FOR NUMERICAL ERRCRS IN DIGITAL COMPUTERS
Ulrich Heidemann Jun. 1984 55 p refs Transl. into ENGLISH of "Ursachen fuer numerische Fehler auf Digitalrechnern" rept. DFVLR-Mitt-83-13 DFVLR, Brunswick, West Germany, 1983 Original language document was announced as N84-16839
(ESA-TT-840; DFVLR-Mitt-83-13) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne, West Germany DM 22

The execution of elementary mathematical operations on a digital computer and the errors arising using a well defined type of computer because basic mathematical laws may not be valid on digital computers, are outlined. Tools for estimating the effect of these errors on the final results are presented. Author (ESA)

N86-16921# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
EXPERIENCE OF CRAY-1
Bertil Brusmark and Anders Gustavsson Jun. 1985 73 p refs In SWEDISH; ENGLISH summary
(FOA-C-30392-E1; ISSN-0347-3708) Avail: NTIS HC A04/MF A01; Research Institute of National Defence, Stockholm KR 50

Architecture and use of the Cray-1 computer for scalar and vector calculus are described. The high operating capacity is obtained with the use of special vector-registers and a function-oriented hardware. There are separate registers and function units for scalar and vector operators. Vectors are processed by groups of 64. The storage devices allow a cycle period of 12.5 nsec. The capacity for matrix multiplication is illustrated by graphs. The applied software was selected from a synthetic aperture radar (SAR) processing package. Author (ESA)

N86-16922# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
OPTICAL SUPERCOMPUTERS AND MAGIC MIRRORS
Per Lindberg Jun. 1985 37 p refs In SWEDISH; ENGLISH summary Presented at 13th International Committee for Optics in Modern Science and Technology, Sapporo, Japan, 20-24 Aug. 1984
(FOA-C-30393-E1; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

Optical computing, imaging techniques, image processing, astronomical telescopes, measuring sensors, optical manufacturing, and human vision are discussed. Optical supercomputers will be faster and less susceptible to interference than electronic ones. Optical manufacturing and testing have a surprisingly good precision thanks to progress in ceramics and laser measuring devices. Author (ESA)

N86-16923# National Bureau of Standards, Gaithersburg, Md.
REFERENCE MODEL FOR DBMS (DATABASE MANAGEMENT SYSTEM) STANDARDIZATION
D. K. Jefferson and E. N. Fong May 1985 79 p
(PB85-225217; NBSIR-85/3173) Avail: NTIS HC A05/MF A01 CSCL 09B

Reference Model (RM) for database management system (DBMS) standardization. A Reference Model is a conceptual framework whose purpose is to divide standardization work into manageable pieces and to show at a general level how these pieces are related with each other. The proposed RM comprises a data mapping control system (DMCS) that retrieves and stores application data, application schemas, and data dictionary schemas. This DMCS is bounded by two interfaces: the data language (DL) interface which defines the services offered by the DMCS to various data management tools (DMT), and the internal data language (i-DL) interface which defines the services required by the DMCS from the host operating system. Two candidates for standardization: the DL and the -DL are proposed. GRA

N86-16924# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
28 Aug. 1985 79 p Transl. into ENGLISH from various Russian articles
(JPRS-UCC-85-005) Avail: NTIS HC A05

Numerous topics related to cybernetics, computers, and data processing technology are discussed. Self-testing and redundancy in very large memory microcircuits, the microfilming of scientific information, software implementation of a dialogue information retrieval system, and parallel searching in a distributed database are among the topics covered. For individual titles, see N86-16925 through N86-16933.

N86-16925# Joint Publications Research Service, Arlington, Va.
SELF-TESTING AND REDUNDANCY IN VERY LARGE MEMORY MICROCIRCUITS c33
A. S. Berezin, Ye. M. Onishchenko, and S. V. Sushko *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 20 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 99-102 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

Simplification of testing of very large scale integration (VLSI) random access memory (RAM) chips can be achieved by partially transferring the functions of testing to the chips themselves, i.e., self-testing. This allows simultaneous testing of all chips on a board. A VLSI memory chip with self-testing and on-chip redundancy is analyzed. A self-test is performed each time power is turned on and any defective locations are recorded in special additional memory locations on the chip. A test of length 4 N, where N is the number of locations in the accumulator, sufficient to determine failures of entire rows or columns, as well as locations which always contain a one or zero regardless of what has been recorded in them. Even a simple test of this type is quite effective. The use of tests revealing other types of errors makes power-on testing longer, reducing available machine time. Author

N86-16926# Joint Publications Research Service, Arlington, Va.
DESIGN OF MEMORY TESTS ON THE BASIS OF ANALYSIS OF SEQUENCES OF FUNCTIONAL OPERATORS c33
A. V. Grinshteyn and G. Kh. Novik *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 20-21 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 103-109 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

A method involving analysis of sequences of functional operators is used to derive a test which detect any combination of the subclass of defects in random access memory resulting from the mutual influence of arbitrary pairs of memory locations. The method is used to produce a minimal march requiring 30N operations. The method itself and the properties and types of sequences of functional operators can be used for more complex memory defect models as well. The properties of the sequences

of functional operators established allow estimation of the completeness of the testing achieved by existing tests. Author

N86-16927# Joint Publications Research Service, Arlington, Va.
NOISE CHARACTERISTICS OF STROBOSCOPIC CONVERTERS BASED ON GALLIUM ARSENIDE INTEGRATED MICROCIRCUITS **c33**
V. I. Staroselskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 22 Transl. into ENGLISH from Mikroelektronika (Moscow, USSR), no. 2, Mar.-Apr. 1985 p 162-168 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

The characteristics of strobe converters can be improved by making the input device as a gallium-arsenide-based integrated microcircuit, which allows some decrease in converter internal noise, by the use of a four-diode bridge circuit microwave band mixer, by the use of special accumulating condenser discharge circuits, by implementation of full accumulating condenser charging in the microwave band, by selection of the dimensions of microcircuit components, and by the achievement of extremely low leakage currents. An integrated microcircuit for the input device of a strobe converter is described. Sources and mechanisms of internal noise in the converter are analyzed and possibilities for minimizing the noise by optimal selection of amplifier-integrater bandwidth are discussed. Flicker noise in the output repeater is the major source of noise and can be decreased by full charging of the accumulating condenser during the strobe cycle, optimizing the bandwidth of the output amplifier and optimizing the topology of the field-effect transistor. Decreasing the integration time of the expanded pulse with the output amplifier can practically neutralize breakup and flicker noise of closed mixer diodes. Author

N86-16928# Joint Publications Research Service, Arlington, Va.
A NEW GENERATION OF ASPID INFORMATION RETRIEVAL SYSTEMS **c82**
G. K. Stolyarov, R. B. Grigyanets, and K. P. Kvachuk *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 25-27 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (USSR), no. 2, Mar-Apr. 1985 p 126.124 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

The Automated Keyword Information Retrieval System (ASPID) is the Soviets' continually developing family of information management software. It operates on large-scale, mini, and micro computers and is the largest system link for processing scientific technical, design, and organizational management information. Two new members of the ASPID family, ASPID-5/YeS and ASPID-7/SM, address the need for local and locally-distributed problem oriented information systems. Research at the laboratory for software systems at the Institute of Mathematics Academy of Sciences of the Belorussian SSR (AN BSSR) was completed in June 1984 for two new interactive document data retrieval systems, ASPID-5/YeS which runs on ES computers and ASPID-7/SM which runs on SM computers. ASPID-5/YeS was designed to create interactive document information retrieval systems on the ES computers and utilizes the newest domestic and foreign achievements in information system software. The system provides input, data base formatting, integrated storage, and keyword search and retrieval of free-form text as well as highly structured information. A number of the system's features are listed. Author

N86-16929# Joint Publications Research Service, Arlington, Va.
SEPARATE COMPILATION MECHANISM IN ADA LANGUAGE PROGRAMMING SYSTEM **c61**
A. B. Gorubov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 35 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 1, Jan.-Feb. 1985 p 16-25 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

The problem of separate compilation for the ADA language is studied, ignoring generic units. This reduces the problem to the performance of three tasks: (1) control of compilation sequence; (2) support of semantic analysis of connections between compilation units; and (3) use of compilation units from other program libraries. A method is suggested for considering connections between compilation units allowing the transition to be made from connections between names in compilation units to relationships among compilation units. The relationships are used to introduce the concept of recompile tactics, demonstrating that recompile sequence control can be reduced to the application of two such tactics. A method is suggested for using units from other program libraries based on access to them by reading, avoiding duplication of intermediate representation of compilation units in the library and transforming the quadratic variation of information volume concerning relationships among units in program libraries to a linear variation as a function of the number of such units. The mechanism of separate compilation described here is based on the use of libraries of intermediate tree-form representations of compilation units, divided by library files into relatively closely related internal and relatively weakly related external library segments. Author

N86-16930# Joint Publications Research Service, Arlington, Va.
PARALLEL SEARCH IN A DISTRIBUTED DATABASE **c82**
V. G. Kerbel *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 41 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 1, Jan-Feb. 1985 p 63-73 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

A study is made of parallel search in a homogeneous MIMD network assuming that the time required to transmit a request from machine to machine is negligible in comparison to the time required to process the request by each machine. Parallel data processing is studied as a function of the nature of data distribution among machines in the network and the rules of servicing of requests in the computer system. The effectiveness of parallel search rules in the distributed database is studied as a function of the time required to process a set of requests, the completeness of the database, processing of requests where data are duplicated, time required to process an individual request as the system services a flow of requests and real-time servicing of a flow of requests by the system. The results of the work confirm the hypothesis that it is efficient to perform group servicing parallel data search when the load on the system is low. As the system becomes saturated with request it is more effective to utilize pipeline servicing or pseudosequential search. Processing of a request in a single machine, then in the entire system, is justified only if the probability of finding the data in a single machine is known. The increase in this probability achieved by duplicating data does not decrease the time required to process a set of requests. Author

N86-16931# Joint Publications Research Service, Arlington, Va.
ADAPTATION OF STOCHASTIC SEARCH METHODS IMPLEMENTED IN A HOMOGENEOUS COMPUTING ENVIRONMENT UNDER CONDITIONS OF UNCERTAINTY **c82**
N. N. Volk, V. O. Groppen, and E. A. Trakhtengerts *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 45-46 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 5, Sep.-Oct. 1984 p 83-91 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

A study is made of the effectiveness of implementing the Monte Carlo method in a homogeneous computing environment with a common memory field, having m processor elements and v control devices. Each can control all processor elements. Problems which can be reduced to the search for a certain quantity z calculated on the basis of a continuous function F(x) defined over an interval (a,b) are studied. It is assumed that quantity z can be defined on the basis of quantities Zi computed by the same method using the same function F(x), defined in the interval (ai,bi), i = 1,2,...v. Adaptation is performed by redistribution of processor elements among branches during the course of search as information on the problem being solved is accumulated. An

ES-1020 OS 4.1 PL/1 simulation model was used to study the proposed method. Author

N86-16932# Joint Publications Research Service, Arlington, Va.
ONE SOFTWARE IMPLEMENTATION OF A DIALOGUE INFORMATION RETRIEVAL SYSTEM c82
B. Ya. Kavalerchik, F. V. Birger, and K. K. Loginov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 51 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

Many automated management systems, especially those created long ago, no means were provided for one-line data retrieval. One possible version of the design of a software dialogue information retrieval system using a YeS-7920 display is described. The basis of the software is a control program intended to allow multiple users to access the database of an automated management system simultaneously while protecting data integrity, allowing for easy error recovery and consuming minimum computer resources. Software includes a query program, dialogue controller, error handler and file handler. Full screen formatted output is supported. Dialogue information retrieval systems using the software structure suggested have been developed for several automated management systems and are in use at a number of computer centers. Author

N86-16933# Joint Publications Research Service, Arlington, Va.
MICROFILMING OF SCIENTIFIC AND TECHNICAL INFORMATION SOURCE DOCUMENTS WITH FEW COLORS c82
L. I. Brodolin, A. Z. Kan, S. I. Kuznetsova, and I. I. Marshak *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 52 Transl. into ENGLISH from Nauchno-Tekhnicheskaya Informatsiya Seriya I. Organizatsiya i Metodika Informatsionnoy Raboty (Moscow, USSR), no. 3, Mar. 1985 p 27-31 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

A study is made of the capabilities of monochrome microfilm apparatus for microfilming documents in which color is used to accent areas of text or diagrams, but in which precise reproduction of color is not essential. The quantitative characteristics of such originals passing through the microfilming service of the All-Union Institute of Scientific and Technical Information are described. Percentages of documents requiring additional processing to yield satisfactory microfilms in 50,000 pages of original documents are as follows: 1.1% originals with few colors, 0.4% full color originals, 0.9% originals in which color was highly significant. The use of color filters and exposure adjustment cannot always reproduce the information satisfactorily. Intermediate electrophotographic copying can be used to avoid information loss, but requires additional consumption of paper and copying equipment. The most flexible and promising means of correction of images is digital image processing, which will require obtaining the appropriate equipment from other organizations. Author

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-16934 North Carolina State Univ., Raleigh.
FOUNDATION TECHNIQUES FOR THE DEVELOPMENT OF A COMPUTER-AIDED ENGINEERING SYSTEM FOR AEROSPACE VEHICLES Ph.D. Thesis
Alan Wade Wilhite 1985 166 p
Avail: Univ. Microfilms Order No. DA8518287

Techniques were developed to support the construction of a computer-aided engineering system for aerospace vehicle analysis and design based on the analysis of past approaches to engineering integration and utilization of commercial database management systems. These techniques were bundled together to form a single system architecture. The system architecture consists of the engineering programs, a user interface for managing the system, a catalog system for maintaining data about the programs, data, and users, individual work areas for each engineer, and a global database that is used as a repository of all engineering data created for central use. A relational information system was developed for this system, and two utilities were developed for interactively editing the database and communicating data between the analysis programs. A sample problem is included to illustrate the system. Dissert. Abstr.

N86-16935 Brigham Young Univ., Provo, Utah.
HIGH PERFORMANCE INTERACTIVE GRAPHICS: ALLIANCE OF SOFTWARE WITH HARDWARE Ph.D. Thesis
Donald Ray Jones 1985 234 p
Avail: Univ. Microfilms Order No. DA8517511

The design and development of the program Dyna-MOVIE.BYU is described. DYNA-MOVIE.BYU is a unique blend of software (MOVIE.BYU) and hardware (Evans & Sutherland PS330) which provides a highly interactive program. Instantaneous geometric and viewing transformations allow for real-time, dynamic, calligraphic (line drawing) display of mathematical models. The data structure is presented specifically for the PS330, but may be generalized for implementation on other high performance devices. The associated function net programs which support the data structure from the hardware design is also described. The Watkins algorithm has been modified for the display of color by parts and color blended vectors. Animated sequences can be produced in either 3-D wire frame representation or with the hidden surfaces removed. Because, the PS330 is a calligraphic display device, the final picture can be saved in a MOVIE.BYU format file. This allows the user to choose a number of continuous-tone raster devices on which the model may be rendered. Dissert. Abstr.

N86-16936 Rice Univ., Houston, Tex.
A SINGLE INTERMEDIATE LANGUAGE FOR PROGRAMMING ENVIRONMENTS Ph.D. Thesis
Michael Alan Caplinger 1985 204 p
Avail: Univ. Microfilms Order No. DA8517183

Programming by the traditional methods of text editing and batch compilation is no longer necessary. The advent of the personal workstation and bitmap graphics allows us to construct integrated programming environments, which actively aid the programmer in viewing, creating, and debugging programs. But despite many attempts to build such environments for the widely used Algol family of languages, none is in production use today. Yggdrasil is an attempt to answer the question of how to build an effective IPE for Algol-like languages. It consists of a language-independent framework for editing and executing programs, and a language-dependent part driven by specifications. An Yggdrasil environment for a particular language is built by writing a specification for that language. The specification must define three fairly separate components of the language: its abstract syntax, its static semantics, and its execution semantics. The first two are used to enforce the static validity of the program as it is edited, while the third allows the system of execute the program via interpretation. Dissert. Abstr.

N86-16937 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A PASCAL IMPLEMENTATION OF THE DES ENCRYPTION ALGORITHM INCLUDING CIPHER BLOCK CHAINING
A. A. Aruliah, G. I. Parkin, and B. A. Wichmann Jun. 1985 41 p refs
(NPL-DITC-61/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

A program which implements the Data Encryption Standard algorithm with Cipher Block Chaining was written in Pascal on a BBC Micro. Non standard Pascal is kept to a minimum, facilitating implementation on any machine with Pascal. The program is designed to be functionally equivalent to that implemented in the Software Protection Device (SPD) developed for the Software

Protection Consortium. It is functionally equivalent to that in the SPD in that both meet with the NBS Standard but is not identical to it, the SPD implementation being considerably faster.
Author (ESA)

N86-16938 CIAD, Zoetermeer (Netherlands).
[ACTIVITIES REPORT IN COMPUTER APPLICATIONS IN ENGINEERING] Annual Report, 1984 [JAARVERSLAG 1984]
1984 39 p refs In DUTCH
Copyright. Avail: Issuing Activity

Activities in 1984 to stimulate the integration of Computer Aided Design/Manufacturing (CAD/CAM) in (mainly small and medium) Dutch companies. are listed. Small design systems, geometric modeling, technology export, mutual communication between CAD systems, microcomputers, expert systems, computer aided management, automation within the production organization, digitizing techniques, quality aspects of finite element method calculations, and computer applications in crack mechanics are discussed. In civil engineering, the automation of estimate and construction costs, and the use of computer models to determine the collapse of rubble-mound breakwaters are studied.
Author (ESA)

N86-16939 CIAD, Zoetermeer (Netherlands).
TEST OF AUTOCAD [TEST AUTOCAD]
J. J. Duivenvoorden and C. Tjallema 1984 20 p In DUTCH
(A-14; ISBN-90-6818-016-9) Copyright. Avail: Issuing Activity

An AutoCAD version 2.0 computer aided design (CAD) configuration, containing an IBM-PC/AT, a mathematical 80287 coprocessor, a Cambridge Computer Graphics MC1024 screen, and an HP-Plotter 7580B (A1), was tested. After base figure construction, two dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings, were executed. Line-strings, edgings, parameterized forms, accuracy, draw-speed, data storage efficiency, and coupling possibilities with other programs, were investigated. The data base management system was examined. Positive points are: product philosophy (much can be simply defined by the user himself); open product (ASC2 exchange files); accuracy; operation comfort; attribute ascription; and coupling possibilities with microcomputer database programs. Negative points are: lacking functions, such as circle tangents and splines; complicated layer manipulations; roundabout way to cut off lines; reflections and rescalings (text and measures were also reflected and rescaled); response time. Author (ESA)

N86-16940*# Software and Engineering Associates, Inc., Carson City, Nev.
ENGINEERING AND PROGRAMMING MANUAL: TWO-DIMENSIONAL KINETIC REFERENCE COMPUTER PROGRAM (TDK) Final Report
G. R. Nickerson, L. D. Dang, and D. E. Coats Apr. 1985 480 p refs
(Contract NAS8-35931)
(NASA-CR-178628; NAS 1.26:168628; SN-63) Avail: NTIS HC A21/MF A01 CSCL 09B

The Two Dimensional Kinetics (TDK) computer program is a primary tool in applying the JANNAF liquid rocket thrust chamber performance prediction methodology. The development of a methodology that includes all aspects of rocket engine performance from analytical calculation to test measurements, that is physically accurate and consistent, and that serves as an industry and government reference is presented. Recent interest in rocket engines that operate at high expansion ratio, such as most Orbit Transfer Vehicle (OTV) engine designs, has required an extension of the analytical methods used by the TDK computer program. Thus, the version of TDK that is described in this manual is in many respects different from the 1973 version of the program. This new material reflects the new capabilities of the TDK computer program, the most important of which are described. Author

N86-16941# National Aerospace Lab., Tokyo (Japan).
A STUDY OF THE CLUSTERING METHOD FOR A HUGE SATELLITE IMAGE: HISTOGRAM MODE METHOD
Kohtaro Matsumoto, Masao Naka, and Hiromichi Yamamoto 1985 50 p refs In JAPANESE; ENGLISH summary
(NAL-TR-854; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

The clustering technique is important as the unsupervised classifier in the realization of an automated satellite image analysis system. But rent cluster analysis methods are not suitable to deal with huge, multi-dimensional satellite images because of the dependency on initial partitions and the tremendous computational time required. To analize a huge satellite image, two new algorithms were developed, i.e., Multi-Layered Hashing Scheme and Histogram Mode Method. The first one is for the construction of a multi-dimensional histogram fro the huge satellite image data. And the second one is for deriving natural clusters from the histogram using the basic idea bove. The algorithms were implemented on the large scale pipeline computer (FACOM 230/75 APU), and have been successfully used. Some results are shown. Author

N86-16942*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PIFEX: AN ADVANCED PROGRAMMABLE PIPELINED-IMAGE PROCESSOR
Donald B. Gennery and Brian Wilcox 1 Feb. 1985 48 p refs
(Contract NAS7-918)
(NASA-CR-176444; JPL-Pub-84-97; NAS 1.26:176444) Avail: NTIS HC A03/MF A01 CSCL 09B

PIFEX is a pipelined-image processor being built in the JPL Robotics Lab. It will operate on digitized raster-scanned images (at 60 frames per second for images up to about 300 by 400 and at lesser rates for larger images), performing a variety of operations simultaneously under program control. It thus is a powerful, flexible tool for image processing and low-level computer vision. It also has applications in other two-dimensional problems such as route planning for obstacle avoidance and the numerical solution of two-dimensional partial differential equations (although its low numerical precision limits its use in the latter field). The concept and design of PIFEX are described herein, and some examples of its use are given. Author

N86-16943*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IPLIB (IMAGE PROCESSING LIBRARY) USER'S MANUAL
Nettie D. Faulcon, James H. Monteith, and Keith Miller Dec. 1985 217 p
(NASA-TM-87646; NAS 1.15:87646) Avail: NTIS HC A10/MF A01 CSCL 09B

IPLIB is a collection of HP FORTRAN 77 subroutines and functions that facilitate the use of a COMTAL image processing system driven by an HP-1000 computer. It is intended for programmers who want to use the HP 1000 to drive the COMTAL Vision One/20 system. It is assumed that the programmer knows HP 1000 FORTRAN 77 or at least one FORTRAN dialect. It is also assumed that the programmer has some familiarity with the COMTAL Vision One/20 system. Author

N86-16944*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF A KNOWLEDGE ACQUISITION TOOL FOR AN EXPERT SYSTEM FLIGHT STATUS MONITOR
James D. Disbrow (Systems Control Technology, Inc.), Eugene L. Duke, and Victoria A. Regenie Jan. 1986 12 p refs Presented at the AIAA 24th Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986
(NASA-TM-86802; H-1332; NAS 1.15:86802; AIAA-86-0240) Avail: NTIS HC A02/MF A01 Palo Alto, Calif.) CSCL 09B

Two of the main issues in artificial intelligence today are knowledge acquisition dion and knowledge representation. The Dryden Flight Research Facility of NASA's Ames Research Center is presently involved in the design and implementation of an expert system flight status monitor that will provide expertise and knowledge to aid the flight systems engineer in monitoring today's advanced high-performance aircraft. The flight status monitor can be divided into two sections: the expert system itself and the knowledge acquisition tool. The knowledge acquisition tool, the

means it uses to extract knowledge from the domain expert, and how that knowledge is represented for computer use is discussed. An actual aircraft system has been codified by this tool with great success. Future real-time use of the expert system has been facilitated by using the knowledge acquisition tool to easily generate a logically consistent and complete knowledge base.
Author

N86-16945*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. Dept. of Electrical and Computer Engineering.
MULTIPROCESSOR SPARSE L/U DECOMPOSITION WITH CONTROLLED FILL-IN Final Report
Gita Alaghband (Colorado Univ., Boulder) and Harry F. Jordan (Colorado Univ., Boulder) Oct. 1985 39 p refs Submitted for publication
(Contract NAS1-17070; Grant AF-AFOSR-1089-85)
(NASA-CR-178016; ICASE-85-48; NAS 1.26:178016) Avail: NTIS HC A03/MF A01 CSCL 09B

Generation of the maximal compatibles of pivot elements for a class of small sparse matrices is studied. The algorithm involves a binary tree search and has a complexity exponential in the order of the matrix. Different strategies for selection of a set of compatible pivots based on the Markowitz criterion are investigated. The competing issues of parallelism and fill-in generation are studied and results are provided. A technque for obtaining an ordered compatible set directly from the ordered incompatible table is given. This technique generates a set of compatible pivots with the property of generating few fills. A new hueristic algorithm is then proposed that combines the idea of an ordered compatible set with a limited binary tree search to generate several sets of compatible pivots in linear time. Finally, an elimination set to reduce the matrix is selected. Parameters are suggested to obtain a balance between parallelism and fill-ins. Results of applying the proposed algorithms on several large application matrices are presented and analyzed.
Author

N86-16946*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE HENRY DRAPER CATALOGUE (EDITION 1985)
Nancy G. Roman and Wayne H. Warren, Jr. Feb. 1985 32 p refs
(NASA-TM-87502; NSSDC/WDC-A-RS-84-18; NAS 1.15:87502) Avail: NTIS HC A03/MF A01 CSCL 09B

An updated, corrected and extended machine-readable version of the catalog is described. Published and unpublished errors discovered in the previous version was corrected; letters indicating supplemental stars in the BD have been moved to a new byte to distinguish them from double-star components; and the machine readable portion of The Henry Draper Extension (HDE) (HA 100) was converted to the same format as the main catalog, with additional data added as necessary.
Author

N86-16947 Admiralty Marine Technology Establishment, Teddington (England).
USER'S GUIDE FOR A FORTRAN COMPUTER PROGRAM TO CALCULATE PROPELLER BLADE SECTIONS, PART A
D. J. Atkins Jul. 1985 39 p
(AMTE(N)-TM-85061-Pt-A; BR96905-Pt-A) Copyright. Avail: NTIS HC A03/MF A01

A FORTRAN computer program, known as MMG3, which generates cylindrical, planar, or conical sections of propeller blades defined on conical surfaces is described. A data specification is given, with two test examples and details of implementation on an HP21MX system.
Author (ESA)

N86-16948# Centre de Recherches de l'Inst. Superieur Industriel Catholique du Hainaut (Belgium).
STRESSES AND DISPLACEMENTS IN A FOUR LAYERED SYSTEM WITH FIXED BOTTOM
F. VanCauwelaert 30 Apr. 1985 79 p
(Contract DAJA45-85-C-0013)
(AD-A156763; R/D-4928-EN-01) Avail: NTIS HC A05/MF A01 CSCL 09/2

This document describes research work necessary to fullfill the requirements of the contract that must lead to the establishment of a computer program to calculate all stressed and displacement in a four layered system with fixed bottom submitted to a series of loads. This report contains three parts: (1) A complete discussion of the interface conditions; (2) The demonstration that satisfying convergency can be obtained, and in the meantime overflow problems can be eliminated, if the equations are written in closeform although in a sufficient comprehensive form so that whole problem can still be overlooked but in such a way that all numerical problems can be solved; and (3) The complete algebraical analysis leading to the equations in extended form for an isotropic four-layered system. The analysis is also developed for a three-layered system to enable us to compare and to check the results with those obtained by means of reliable existing programs.
Author

N86-16949# Hydrologic Engineering Center, Davis, Calif.
WATER SUPPLY SIMULATION USING HEC-5
Aug. 1985 146 p
(AD-A158888; HEC-TRAINING-20) Avail: NTIS HC A07/MF A01 CSCL 13/2

This document is intended to assist users of computer program HEC-5 who are engaged in modeling surface water systems for water supply. Using a single reservoir operation for illustration, the document describes the input data needed to utilize a variety of analysis capabilities available in HEC-5. Input data for multiple reservoir systems are similar to those for single reservoirs but include certain data which specify the system linkages and operation. A description of this information is also included. Two Appendices are part of the document. One describes HEC-5 automatic reservoir sizing and the other provides program output for the examples used in the text.
Author (GRA)

N86-16950# Maryland Univ., College Park.
PARALLEL MATRIX COMPUTATIONS Interim Report, 9 Feb. 1983 - 16 May 1985
G. W. Stewart and D. P. OLeary 11 Apr. 1985 8 p
(Grant AF-AFOSR-0078-82)
(AD-A159252; AFOSR-85-0695TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The purpose of this effort is to develop realistic algorithms for matrix computations on parallel computers. It has been long observed that the usual algorithms of numerical linear algebra contain a great deal of inherent parallelism. For example, if the arithmetic operations that can be performed in parallel in Gaussian elimination are actually so executed, the time to decompose an nXn matrix is reduced from cu n to n only recently, with the emergence of cheap, small microcomputers, has it become feasible to exploit this parallelism on anything but a trivial scale there is under development a parallel system, called ZMOB, consisting of 256 micro-processors connected on a conveyor belt. This belt is so fast and its architecture is such that any two processors can communicate without interfering with the communications of other pairs of processors. Thus the ZMOB is an ideal tool for simulating an arbitrarily connected network of computers. This feature of the ZMOB is particularly useful in investigating parallel matrix algorithms. Interconnections between processors are expensive, and in a practical system one can assume only a limited amount of connectivity. The ZMOB provides a means of testing and comparing different types of interconnections, since all one has to do is use the rich connections provided by the ZMOB conveyor belt.
GRA

N86-16951# Army Industrial Base Engineering Activity, Rock Island, Ill.
MANUFACTURING METHODS AND TECHNOLOGY PROJECT SUMMARY REPORTS Semiannual Report, Jan. - Jun. 1985
Jun. 1985 131 p
(AD-A159360; AD-E700020) Avail: NTIS HC A07/MF A01 CSCL 13/8

This report contains summaries of 47 projects that were completed under the Army's Manufacturing Methods and Technol-

ogy (MMT) Program. The MMT program was established to upgrade manufacturing facilities used for the production of Army Materiel. The summaries highlight the accomplishments and benefits of the projects and the implementation actions underway or planned. Points of contact are also provided for those who are interested in obtaining additional information. GRA

N86-16952# Argonne National Lab., Ill.
AIMING TOWARD PERFECTION WITH POBSYS, A NEW SOFTWARE SYSTEM
J. Osudar, J. E. Parks, and N. M. Levitz 1985 7 p Presented at the International Topical Meeting on Computer Applied for Nuclear Power Plant Operation and Control, Pasco, Wash., 8 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-007986; CONF-850903-3) Avail: NTIS HC A02/MF A01

An integrated general-purpose software system, POBSYS, was developed that provides the foundation and tools for building a highly interactive system for carrying out detailed operating procedures and performing conventional process control, data acquisition, and data management functions. Features of the present system, which may be of particular interest to the problem of the man-machine interface include: (1) a multi-level safety system for fail-safe operation; (2) hierarchical operational control; (3) documented responsibility; (4) equipment status tracking; and (5) quality assurance checks on operations. The system runs on commerically available microprocessors and is presently in use in the destructive analysis of irradiated fuel rods from the Light Water Breeder Reactor. DOE

N86-16953# California Univ., Berkeley. Lawrence Berkeley Lab.
SOFTWARE TOOLS PROGRAMMER'S MANUAL
T. Breckon, V. Jacobson, C. Leres, V. Paxson, and N. Travis Apr. 1985 777 p
(Contract DE-AC03-76SF-00098)
(DE85-016421; LBL-PUB-3052) Avail: NTIS HC A99/MF A01

This manual covers programming tools available at the Lawrence Berkeley Laboratory. DOE

N86-16954# Sandia Labs., Albuquerque, N. Mex.
FORTRAN MULTITASKING LIBRARY FOR USE ON THE ELXSI 6400 AND THE CRAY XMP
G. R. Montry 16 Jul. 1985 61 p
(DE-AC04-76DP-00789)
(DE85-016223; SAND-85-1378) Avail: NTIS HC A04/MF A01

A library of FORTRAN-based multitasking routines has been written for the ELXSI 6400 and the CRAY XMP. This library is designed to make multitasking codes easily transportable between machines with different hardware configurations. The library provides enhanced error checking and diagnostics over vendor-supplied multitasking intrinsics. The library also contains multitasking control structures not normally supplied by the vendor. DOE

N86-16955# Argonne National Lab., Ill.
SYSTEMS ANALYSIS LANGUAGE TRANSLATOR (SALT): PROGRAMMER'S GUIDE
H. K. Geyer and G. F. Berry Mar. 1985 154 p
(Contract W-31-109-eng-38)
(DE85-016244; ANL/FE-85-4) Avail: NTIS HC A08/MF A01

The Systems Analysis Language Translator (SALT), a systems-analysis and process-simulation computer code for steady-state and dynamic systems, can also be used for optimization and sensitivity studies. The SALT code uses sophisticated numerical techniques, including a hybrid steepest-descent/quasi-Newtonian multidimensional nonlinear equation solver, sequential quadratic programming methods as optimizers, and multistep integration methods for both stiff and nonstiff systems or equations. Based on a preprocessor concept, the code uses precompiled component models, several flow types, and numerous thermodynamic and transport property routines. The SALT code has been used to study open-cycle and liquid-metal magnetohydrodynamic systems, fuel cells, ocean thermal energy conversion, municipal-solid-waste processing, fusion, breeder reactors and geothermal and solar-energy systems. This programmer's guide briefly describes the code, defines parameters used with the component models, and presents detailed examples of declaration structures to be used with these models. DOE

N86-16956# Sandia National Labs., Livermore, Calif.
TOPAZ: THE TRANSIENT ONE-DIMENSIONAL PIPE FLOW ANALYZER, USERS MANUAL
W. S. Winters Jul. 1985 54 p
(Contract DE-AC04-76DR-00789)
(DE85-017424; SAND-85-8215) Avail: NTIS HC A04/MF A01

TOPAZ is a user friendly computer code for modeling the one-dimensional-transient physics of multi-species gas transfer in arbitrary arrangements of pipes, valves, vessels, and flow branches. This document serves as a user's manual for the code, and should provide potential users with enough information to take advantage of many of the code's capabilities. Details regarding equations and numerics, example problems, applications, and modeling assumptions will be discussed in companion documents. DOE

N86-16957# Sandia National Labs., Albuquerque, N. Mex.
ECONOMICAL AND ROBUST ROUTINE FOR COMPUTING SPARSE JACOBIANS
D. E. Salane and L. F. Shampine May 1985 39 p
(Contract DE-AC04-76DP-00789)
(DE85-016829; SAND-85-0977) Avail: NTIS HC A03/MF A01

The numerical solution of a nonlinear system of algebraic or ordinary differential equations usually requires the formation of a Jacobian by finite differencing. In the solution of most problems, the Jacobian is evaluated repeatedly and at neighboring arguments. In this paper we will present a subroutine which is appropriate for forming Jacobians in such circumstances. The routine adjusts increments for differencing to control roundoff and truncation errors, but seldom requires more than one function evaluation to compute a column of the Jacobian. In addition, the routine takes advantage of sparsity in forming the Jacobian. This often leads to a significant reduction in the number of function evaluations required to compute the Jacobian. DOE

N86-16958# Lawrence Livermore National Lab., Calif.
GRAFL-2: USER ORIENTED SCIENCE GRAPHICS
B. McNamara and P. A. Willmann 18 Jun. 1985 34 p
(Contract W-7405-eng-48)
(DE85-017147; UCID-20467) Avail: NTIS HC A03/MF A01

GRAFL-II is a small set of plotting routines able to produce 95% of the 2-dimensional figures and plots in the scientific literature from your FORTRAN code. The routines and their arguments have been designed to give extensive control over this type of picture with the minimum of fuss. We offer these 28 routines as a standard for the FORTRAN-based front end to any graphics library. The routines have been implemented on the MFECC computers to run the GRAFLIB and VT80LIB systems developed at Livermore. Although some of the coding uses low-level GRAFCORE routines it is sufficiently well commented to be easily modified or rewritten to drive other graphics libraries and enable codes to be transported more easily. A partial translation to drive the CERN graphics system has been made for use at the International Center for Theoretical Physics, Trieste. DOE

N86-16959# Argonne National Lab., Ill.
USE OF MONITORS IN FORTRAN: A TUTORIAL ON THE BARRIER, SELF-SCHEDULING DO-LOOP, AND ASKFOR MONITORS, REVISION 1
E. L. Lusk and R. A. Overbeek Jun. 1985 56 p Previously announced as N85-14587
(Contract W-31-109-eng-38)
(DE85-017051; ANL-84-51-Rev-1) Avail: NTIS HC A04/MF A01

A set of macro libraries has been developed that allows programmers to write portable FORTRAN code for multiprocessors. This document presents, in tutorial form, the macros used to implement three common synchronization patterns: self-scheduling DO-loops, barrier synchronization, and the ask for monitor. DOE

N86-16960*# George Washington Univ., Washington, D.C. Inst. for Information Science and Technology.
THE LOOK-UP TABLE COMPILER
Charles F. McMath, James Acquah, and James D. Foley 24 May 1985 23 p
(Grant NAG1-538; Contract DE-AS05-83ER-13122)
(NASA-CR-176456; NAS 1.26:176456; DE85-013382; DOE/ER-13122/5) Avail: NTIS HC A02/MF A01 CSCL 09B

The roster extensions to the GSPC Core and certain aspects of GKS do provide a start of abstracting raster concepts, but provide only very low-level support for three of the hallmarks of many raster displays pixel matrixes, raster-op, and the look-up table. In 1982 a conceptual model of raster system architectures was developed, and a language was specified for defining operations on pixel matrixes which would be implemented by calculating the contents of a raster displays look-up table such that the effects of the operations would be seen on the display monitor. An implementation of the concepts found in a previous report is presented. Because the system generates look-up table contents from a language specification, the system is called the Look-up Table Complier. Author

N86-16961# Lawrence Livermore National Lab., Calif.
METHOD FOR SIMULATING RADIOGRAPHS USING A SOLID MODELER
G. Laguna 18 Mar. 1985 6 p Presented at the ASME International Computers in Engineering Conference and Exhibition, Boston, 4 Aug. 1985
(Contract W-7405-eng-48)
(DE85-012963; UCRL-92339; CONF-850862-3) Avail: NTIS HC A02/MF A01

A method for computer simulation of radiographs has been added to the Lawrence Livermore National Laboratory version (1) of the solid modeler TIPS-1 (Technical Information Processing System-1). We believe this to be the first implementation of simulated radiographs in any solid modeler. This new tool will enable the engineer to compare an actual radiograph of a solid to its computer-generated counterpart; any discrepancies between the two become candidates or flaws. Simulated radiographs can also be used: (1) to preview the placement of X-ray sources to focus on areas of concern before actual radiographs are made, and (2) to aid in the design of a system such that it is physically possible to obtain actual radiographs of critical areas. DOE

N86-16962# Los Alamos National Lab., N. Mex.
SPEEDUP PREDICTIONS ON LARGE SCIENTIFIC PARALLEL PROGRAMS
E. Williams and F. Bobrowicz 1985 5 p Presented at the International Conference on Parallel Processing, St. Charles, Ill., 20 Aug. 1985
(Contract W-7405-eng-36)
(DE85-010749; LA-UR-85-1391; CONF-850842-2) Avail: NTIS HC A02/MF A01

The amount of speedup that can be expected from large scientific parallel programs running on supercomputers is discussed. For insight into this problem the parallel processing environment currently existing on the Cray X-MP (a shared memory multiprocessor with at most four processors) is extended to a simulated N-processor environment, where N greater than or equal to 1. Several large scientific parallel programs from Los Alamos National Laboratory were run in this simulated environment, and speedups were predicted. A speedup of 14.4 on 16 processors was measured for one of the three most used codes at the Laboratory. DOE

N86-16963# Los Alamos National Lab., N. Mex.
EARLY HISTORY OF COMPUTER SIMULATIONS IN STATISTICAL MECHANICS
W. W. Wood 24 Jun. 1985 32 p Presented at the International School of Physics on Molecular Dynamical Simulation of Statistical Mechanics Systems, Varenna, Italy, 23 Jul. 1985 Prepared in cooperation with Carroll Coll., Helena, Mont.
(Contract W-7405-eng-36)
(DE85-014067; LA-UR-85-2292; CONF-850764-1) Avail: NTIS HC A03/MF A01

A history of the early use of the Monte Carlo is presented. DOE

N86-16964# Sandia National Labs., Albuquerque, N. Mex.
RECTILINEAR AREA ROUTING: A CHANNEL ROUTER APPROACH
J. A. Hudson, M. M. Wada, and R. Peters 1985 4 p Presented at the International Conference on Computer Design, Port Chester, N.Y., 7 Oct. 1985 Prepared in cooperation with Kirk-Mayer, Inc., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE85-014460; SAND-85-0724C; CONF-8510113-1) Avail: NTIS HC A02/MF A01

A final router has been developed which operates upon the rectilinear channel routing areas created by rectilinear macrocells. The router supports input and output pins on all sides of the rectilinear area. After the channel density estimation for the entire assembly is provided by a global router, the rectilinear area is partitioned into smaller rectangular regions which can be routed by applying traditional channel router methods. The regions are ordered, and a global routing of the nets within the rectilinear area is performed. The regions are routed individually while providing a smooth area routing. Algorithms for each phase of the final routing are described. Special rectilinear topological considerations are presented. The algorithms are implemented in Pascal on a DEC-SYSTEM 20 as a part of SLS Sandia layout system, a hierarchical layout system. DOE

N86-16965# Los Alamos National Lab., N. Mex.
USING COMPUTERS TO ANSWER FUNDAMENTAL QUESTIONS IN COMBUSTION THEORY: AN EXAMPLE FROM DROPLET COMBUSTION
R. D. Janssen and P. J. ORourke 1985 20 p refs Presented at the 17th AMS-SIAM Summer Seminar in Applied Mathematics, Ithaca, N.Y., 30 Jun. 1985
(Contract W-7405-eng-36)
(DE85-015681; LA-UR-85-2332; CONF-8506169-2) Avail: NTIS HC A02/MF A01

Many fundamental questions in combustion theory are either partially or totally intractable analytically. Thus, it is often desirable to use computed results to supplement information obtained by analytic means. We illustrate how computation can supplement analysis by examining the role of gas-phase unsteadiness in droplet vaporization and combustion. DOE

N86-16966# Bettis Atomic Power Lab., West Mifflin, Pa.
COMPUTATIONAL EFFICIENCY USING THE CYBER-205 COMPUTER FOR THE PACER MONTE CARLO PROGRAM
N. R. Candelore, C. M. Maher, and R. C. Gast Sep. 1985 12 p Presented at the Westinghouse Engineering Computer Applications Symposium, Monroeville, Pa., 7 Oct. 1985
(Contract DE-AC11-76PN-00014)
(DE85-017635; WAPD-T-2871; CONF-8510149-4) Avail: NTIS HC A02/MF A01

The use of the large memory of the CYBER-205 and its vector data handling logic produced speedups over scalar code ranging from a factor of 7 for unit cell calculations with relatively few compositions to a factor of 5 for problems having more detailed geometry and materials. By vectorizing the neutron tracking in PACER (the collision analysis remained in scalar code), an asymptotic value of 200 neutrons/cpu-second was achieved for a batch size of 10,000 neutrons. The complete vectorization of the Monte Carlo method as performed by Brown resulted in even higher speedups in neutron processing rates over the use of scalar code. Large speedups in neutron processing rates are beneficial not only to achieve more accurate results for the neutronics calculations which are routinely done using Monte Carlo, but also to extend the use of the Monte Carlo method to applications that were previously considered impractical because of large running times. DOE

N86-16967# California Univ., Berkeley. Lawrence Berkeley Lab.
INCORPORATION OF BOUNDARY CONDITION INTO THE PROGRAM POISSON
S. Caspi, M. Helm, and L. J. Laslett Aug. 1985 6 p Presented at the 9th International Conference on Magnet Technology, Zurich, Switzerland, 9 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE85-017668; LBL-19172; CONF-850920-1) Avail: NTIS HC A02/MF A01

Two dimensional Cartesian and axially-symmetric problems in electrostatics or magnetostatics frequently are solved numerically by means of relaxation techniques - employing, for example, the program POISSON. In many such problems the sources (charges or currents, and regions of permeable material) lie exclusively within a finite closed boundary curve and the relaxation process in principle then could be confined to the region interior to such a boundary - provided a suitable boundary condition is imposed onto the solution at the boundary. This paper discussed and illustrates the use of a boundary condition of such a nature, in order thereby to avoid the inaccuracies and more extensive meshes present when alternatively a simple Dirichlet or Neumann boundary condition is specified on a somewhat more remote outer boundary. DOE

N86-16968# Oak Ridge Y-12 Plant, Tenn.
VERIFICATION OF CAD-BASED DATA EXCHANGE
R. M. Wilson Sep. 1985 16 p
(Contract DE-AC05-84OS-21400)
(DE85-017985; Y/EN-1350) Avail: NTIS HC A02/MF A01

Maintaining data integrity during exchanges between CAD systems, inter-CAD exchange, becomes increasingly critical as CAD systems evolve into the primary repository for mechanical design data. Manufacturing's requirement for high confidence production data coupled with the unreliable performance of current transfer implementations necessitates the advance of inter-CAD data integrity verification. With the widening scope of applications utilizing CAD-based design data, verification techniques in addition to the current method of visual comparison need to be created in order to verify pictorial, mathematical and structural attributes. Simple post transfer verification can be augmented by the detailed testing of inter-CAD transfer methodologies and a diversity of data integrity analysis algorithms. DOE

N86-16969# Research Inst. of National Defence, Stockholm (Sweden).
THE POC COMPUTER AIDED SYSTEM FOR SITUATIONAL SURVEILLANCE OF LAKE TRAFFIC
Hans Marmolin, Carl-Eric Hedin, Ulf Berggrund, Beng Ahlstroem, Gunilla Derefeldt, and Christer Sahlin Apr. 1985 33 p refs In SWEDISH; ENGLISH summary
(FOA-A-50003-H2; ISSN-0281-0239) Avail: NTIS HC A03/MF A01

An interactive display system, developed for a military missile and ammunition test area, for surveillance of the traffic on a lake is described. The system integrates information from several sources into a uniform situational map, and provides the necessary facilities for guiding the traffic, and for analyzing and documenting the situation. Author (ESA)

N86-16970# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
STUDIES OF SEEKER ALGORITHMS FOR INFRARED SENSORS AGAINST SURFACE TARGETS
Anders Wallin Jun. 1985 24 p In SWEDISH; ENGLISH summary
(FOA-C-30389-E3; ISSN-0347-3708) Avail: NTIS HC A02/MF A01; Research Institute of National Defence, Stockholm KR 50

A simulation program was developed to study signal processing of low resolution images. By choosing suitable parameters, it is possible to process for target recognition. The program consists of segmentation and target acquisition. Segmentation finds a form of contrast of the target against the background: in the infrared area, the target often has a higher temperature. A linear or surface distortion (shrinkage) is then carried out, followed by a thresholding in accordance with given parameters. The basis of the target acquisition is made by extracting qualities for every target candidate. Author (ESA)

N86-16971# Research Inst. of National Defence, Linkoeping (Sweden).
OBJECT RECOGNITION USING THE HIERARCHICAL CHAMFER MATCHING ALGORITHM
Gunilla Borgefors Jun. 1985 42 p refs
(FOA-C-30395-E1; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm KR 50

The performance of the so-called hierarchical chamfer matching algorithm in the recognition of objects in digital gray-level images is described. The objects used are common tools. The algorithm is used for identifying and finding the location of the tools, in a number of images of varying complexity. Results show that the performance of the hierarchical chamfer algorithm is very satisfactory, even for complex scenes. Author (ESA)

N86-16972# Research Inst. of National Defence, Linkoeping (Sweden).
DISTANCE TRANSFORMATIONS IN DIGITAL IMAGES
Gunilla Borgefors Aug. 1985 64 p refs
(FOA-C-30401-E1; ISSN-0347-3708) Avail: NTIS HC A04/MF A01; Research Inst. of National Defence, Stockholm KR 50

Distance transformations, optimal in that the maximum difference from the Euclidean distance is minimized, are computed. Local neighborhoods of size up to 7x7 pixels are investigated. A distance transformation is presented. It is easily computed and has a maximum error of 2%. Six different distance transformations are used in three different applications: (1) computing the distance from an object; (2) computing pseudo-Dirichlet tessellations; and (3) smoothing binary images. The applications show that the choice of distance transformation is important, and that any of the six transformations may be the right choice. Author (ESA)

N86-16973# Oxford Univ. (England). Dept. of Engineering Science.
FAUST: USERS GUIDE
P. S. Tuffs and C. Mohtadi 1985 36 p
(OUEL-1582/85) Avail: NTIS HC A03/MF A01

Commissioning of a self-tuner using the FAUST package in one of three modes: Internal simulation, External Real-time control, and Two-task simulation is outlined. It is assumed that the user is already familiar with the particular algorithm used, and the guide is used as a means of reference. Author (ESA)

N86-16974# Oxford Univ. (England). Dept. of Engineering Science.
FAUST: PROGRAMMERS REFERENCE GUIDE
P. S. Tuffs and C. Mohtadi 1985 64 p
(OUEL-1583/85) Avail: NTIS HC A04/MF A01

A guide for programmers of self-tuning control algorithms who wish to install a new control law into the FAUST single-loop package is presented. A complete listing of all the variables in the FDB data base common-blocks and a lookup table for the examine and deposit run-time commands are given. A cross-reference list of the routines called by each subroutine in the FDB and STC algorithm executable modules is provided to aid the design of an overalay structure on machines which have a small amount of available memory, such as the LSI-11 under RT-11. Author (ESA)

N86-16975# Oxford Univ. (England). Dept. of Engineering Science.
PROTOTYPE POST PROCESSOR FOR A COMPUTER-AIDED COLD FORGING WORKPLANNING SYSTEM
P. Bariani and W. A. Knight 1985 48 p refs
(OUEL-1590/85) Avail: NTIS HC A03/MF A01

A computer aided procedure for the complete timing of automatic multistation cold heading machines, which is a typical post-processor in a suite of interactive programs for cold forging process planning was designed. In addition to timing the transfer system and station actions, the post-processor capabilities include the interactive design of nonstandard devices for blank gripping and automatic graphical proving of the timing plan against collisions, thus permitting a complete error-free timing table to be obtained as a final printout. Author (ESA)

N86-16976# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
A 3-D POISSON SOLVER BASED ON A CONJUGATE GRADIENT ALGORITHM
H. Kapitza and D. Eppel 1985 33 p refs
(GKSS-85/E/23; ISSN-0344-9629) Avail: NTIS HC A03/MF A01

A program for the solution of the three-dimensional Poisson Equation in Cartesian coordinates is described. The algorithm consists of a conjugate gradient technique accelerated by an incomplete Crout factorization of the matrix. There are no restrictions on the number of unequally spaced grid points in the three coordinate directions. The efficiency of the algorithm does not depend on a relaxation parameter and is superior to Red-Black-SOR. Author (ESA)

N86-16977# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
TWO ADA MATHEMATICAL FUNCTIONS PACKAGES FOR USE IN REAL TIME
J. Kok Jun. 1985 13 p ref Submitted for publication
(CWI-NM-R8512; B8569859) Avail: NTIS HC A02/MF A01

Two portable Ada packages for the provision of basic mathematical functions in a form suitable for real-time processing are proposed. The packages satisfy the requirements given in the Guidelines for the design of large modular scientific libraries in Ada with regard to services requested by real-time processes. Author (ESA)

N86-16978# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
AN INTRODUCTION TO PARALLELISM IN COMBINATORIAL OPTIMIZATION
G. A. P. Kindervater and J. K. Lenstra Feb. 1985 19 p refs Submitted for publication
(CWI-OS-R8501; B8569334) Avail: NTIS HC A02/MF A01

Literature on parallel computers and algorithms relevant for combinatorial optimization was surveyed. Theoretical and realistic machine models, and the complexity theory for parallel computations are discussed. Examples of polylog parallel algorithms and log space completeness results for P are given, and the use of parallelism in enumerative methods is reviewed. Author (ESA)

N86-16979# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
STOCHASTIC INTEGER PROGRAMMING BY DYNAMIC PROGRAMMING
B. J. Lageweg, J. K. Lenstra, A. H. G. RinnooyKan (Erasmus Univ., Rotterdam, Netherlands), and L. Stougie (Groningen Rijksuniv. Netherlands) Apr. 1985 23 p refs Submitted for publication
(CWI-OS-R8503; B8569336) Avail: NTIS HC A02/MF A01

Optimization models in stochastic programming are considered. The dynamic programming algorithms for two-stage scheduling, bin packing and multiknapsack problems are studied. The numerical results are compared with results obtained by heuristics for the scheduling and bin packing problem. The computational experience gives empirical insight into the shape of the value functions of stochastic integer programming problems and shows the existence of discontinuities and nonconvexities. The results can be regarded as a first theory for stochastic integer programming. Author (ESA)

N86-16980# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
MULTIGRID METHODS: DEVELOPMENT OF FAST SOLVERS
P. W. Hemker (Mathematical Center, Amsterdam, Netherlands), R. Kettler, P. Wesseling, and P. M. deZeeuw (Mathematical Center, Amsterdam, Netherlands) 1983 25 p refs Presented at International Multigrid Conference, Copper Mountain, Colo., 6-8 Apr. 1983
(Rept-83-05) Avail: NTIS HC A02/MF A01

Numerical and programming aspects of multigrid algorithms for the solution of discretized linear elliptic equations are discussed. The aim is to obtain software that is perceived and can be used like any standard subroutine for solving systems of linear equations. The user has to specify only the matrix and the right-hand-side, and remains unaware of the underlying multigrid method. A large class of equations can be solved efficiently in this way. The equation may be non self-adjoint, and its coefficients are arbitrary. The treatment of the convection-diffusion equation at high Peclet number is considered. A portable FORTRAN code, which vectorizes satisfactorily is outlined, and time statistics for a CYBER-205 are given. Author (ESA)

N86-16981# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A SIMPLIFIED THEORY FOR NONHERTZIAN CONTACT
J. J. Kalker 1983 12 p refs Presented at IAVSD-Meeting, Cambridge, Mass., 15-19 Sep. 1983
(Rept-83-22) Avail: NTIS HC A02/MF A01

A theory for contact formation and for frictional rolling, in which the contact area is not known in advance, and may be nonhertzian is proposed. The program first determines the contact area on the basis of the given total normal force, and then applies the FASTSIM algorithm in the contact area on the basis of the given creepages and the spin, to find the total tangential force. In the Hertzian case the program was compared with the 1982 FASTSIM program and it is found that the algorithms are equally accurate, but that the new program is three times slower than the old one. Author (ESA)

N86-16982# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
COMPUTER ASSISTED INSTRUCTION (CAI) SYSTEMS IN THE NETHERLANDS [COO-SYSTEMEN IN NEDERLAND]
Charles vanderMast 1984 36 p refs In DUTCH Sponsored by Stitching voor Onderzoek van het Onderwijs SVO, The Hague, Netherlands The Hague, Netherlands
(Rept-84-45) Avail: NTIS HC A03/MF A01

The state of the art of computer assisted instruction (CAI) systems in the Netherlands in 1984 is reviewed. An inventory of CAI material in the Netherlands is given. Starting from national and international developments it is was examined how fundamental and applied research and development have to be directed in order to enhance the knowledge of CAI and its possible significance for regular education in the Netherlands. Author (ESA)

N86-16983# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A CLASSROOM EDITOR FOR COMPUTER ASSISTED INSTRUCTION (CAI) [EEN KLASEDITOR VOOR COMPUTER ONDERSTEUND ONDERWIJS (COO)]
M. Lootens and C. vanderMast 1984 16 p refs In DUTCH
(Rept-84-46) Avail: NTIS HC A02/MF A01

A classroom editor for CAI material is described. The modular CAI-system Delft is equipped with a full-screen editor for teachers which allows modifications to existing CAI-material, in a simple way. The possibilities and the first experiences with this class editor are depicted. The design and implementation of the editor are described. The class editor is well accepted. It is very well suited to optimize existing CAI-material for the possibilities of a

certain type of screen. It is also suited to instruct teachers about the possibilities of CAI. Author (ESA)

N86-16984# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
INPUTTING CONSTRUCTIVE SOLID GEOMETRY REPRESENTATIONS FROM TWO-DIMENSIONAL ORTHOGRAPHIC ENGINEERING DRAWINGS
Ho Bin (South China Institute of Technology, Guangzhou, China) 1984 25 p refs
(Rept-84-49) Avail: NTIS HC A02/MF A01

An approach to inputting geometric representations of three-dimensional objects via two-dimensional orthographic views is introduced. The user has to identify, from an engineering drawing, the primitive volumes such as cuboids, cylinders and spheres, from which a model of the object is constructed. The identified primitives have to be input. Their dimensions and transformation parameters are derived by the program from a set of points input via a digitizer from two or three views of the object on a single drawing. Set operations for combining the primitives are input separately. Based on this input, the system produces a Constructive Solid Geometry (CSG) representation of the object. Input of a CSG representation appears simpler for the user and for the system than input of the object via a boundary representation in terms of points, lines, and faces. Author (ESA)

N86-16985# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A VISUAL DISPLAY FOR HIERARCHICAL CLASSIFICATION
Peter J. Rousseeuw 1985 30 p refs
(Rept-85-05) Avail: NTIS HC A03/MF A01

Representation of hierarchical classifications by the banner, a display based on the icicle plot of Kruskal and Landwehr (1983) is proposed. The banner is easy to program, can always be printed as a whole, and leads in a natural way to coefficients describing the cluster quality of the data set, i.e., the agglomerative coefficient and the divisive coefficient. Examples are given, and the relations with other graphical displays are sketched. Author (ESA)

N86-16986# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A NOTE ON THE PAY-OFF MATRIX IN MULTIPLE OBJECTIVE PROGRAMMING
Matthijs Kok and Jaap Spronk (Erasmus University) 1985 13 p refs
(Rept-85-06) Avail: NTIS HC A02/MF A01

Use of the pay-off matrix in multiple objective programming for the calculation of the ideal vector and the nadir vector is discussed. When the separate optimization of the individual goal variables does not result in unique optimal solutions, the corresponding nadir vector is not uniquely defined. Negligence of this phenomenon can have a serious effect on multiple objective programming methods. The notion of nadir vector is redefined to take account of the possibility of alternative optimal solutions. A procedure which generates this uniquely defined nadir vector is presented. Author (ESA)

N86-16987# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CLUSTERING LARGE DATA SETS
Leonard Kaufman (Brussels Univ., Belgium) and Peter J. Rousseeuw 1985 15 p refs
(Rept-85-13) Avail: NTIS HC A02/MF A01

The computer program CLARA for partitioning very large data sets is introduced. The number of calculations and memory requirements are of the order 0(n) where n is the number of objects. Clustering is carried out in two steps. A sample of n objects is drawn from the data set and clustered into k subsets using the k-medoid model, which also gives k representative objects. Then each object not belonging to the sample is assigned to the nearest of the k. This yields a clustering of the entire set of objects. A measure of the quality of this clustering is obtained by computing the average distance between all the objects of the data set and their representative objects. After m samples are clustered, the one for which the lowest average distance is obtained is selected. Author (ESA)

N86-16988# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
GEOMETRY MODELING IN COMPUTER AIDED DESIGN: AN OVERVIEW
C. D. Balch 1983 30 p refs
(Lab-Rept-755) Avail: NTIS HC A03/MF A01

Aspects of computer graphics which are relevant to geometry modeling of structures are discussed. Geometry representation schemes are described. Computational problems in the geometric modeling of solids are reviewed. Author (ESA)

N86-16989# European Space Agency, Paris (France).
MAXIMUM-LIKELIHOOD ESTIMATION OF PARAMETERS IN LINEAR SYSTEMS FROM FLIGHT TEST DATA. A FORTRAN PROGRAM
Ermin Plaetschke and David Brian Mackie Jun. 1985 94 p refs
Transl. into ENGLISH of "Maximum-likelihood-Schaetzung von Parametern linearer Systeme aus Flugversuchsdaten - ein FORTRAN-Program" Report DFVLR-Mitt-84-10, Brunswick, West Germany, 1984 Original report in GERMAN previously announced as N85-14586
(ESA-TT-896; DFVLR-Mitt-84-10) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 31

A program for the maximum-likelihood estimation of aerodynamic parameters in linear systems was developed. The mathematical background is outlined. A list of the input data and the flow charts of the main program and the maximum-likelihood subroutine are presented. Practical handling of the program and its options is demonstrated on two examples. The complete main program and comment listings of the subroutines are given. Author (ESA)

N86-16447# University of Electro-Communications, Tokyo (Japan).
COMPUTER AS A MODEL AND COMPUTER AS A TOOL: CP/M-80 SIMULATOR ON VOS3/TSS
Kazumiti Numata and Yuichi Aida *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 67-74 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

N86-16580# Joint Publications Research Service, Arlington, Va.
USE OF MICROPROCESSOR FOR IMAGE PROCESSING
Liu Weixian, Sun Xuemei, and Li Kaili *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 69-73 Transl. into ENGLISH from Weijisuanji Yingyong (Beijing, China), v. 6, no. 2, Mar. 1985 p 47-49 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

N86-16581# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER FAST FOURIER TRANSFORM SYSTEM DESCRIBED
Jiang Yinlin *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 74-83 refs Transl. into ENGLISH from Weijisuanji Yingyong (Beijing, China), v. 6, no. 2, Mar. 1985 p 18-24 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

N86-16929# Joint Publications Research Service, Arlington, Va.
SEPARATE COMPILATION MECHANISM IN ADA LANGUAGE PROGRAMMING SYSTEM
A. B. Gorubov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 35 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 1, Jan.-Feb. 1985 p 16-25 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

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Includes computer networks.

N86-16990 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
SEVENTH ANNOTATED BIBLIOGRAPHY OF RECENT PUBLICATIONS ON DATA SECURITY AND CRYPTOGRAPHY
W. L. Price Aug. 1985 24 p refs
(NPL-DITC-64/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Some 150 references concerning data security and cryptography are described and included in the seventh annotated bibliography of recent publications on data security and cryptography. Author (ESA)

N86-16991*# Computer Technology Associates, Inc., Columbia, Md.
GATEWAY DESIGN SPECIFICATION FOR FIBER OPTIC LOCAL AREA NETWORKS
29 Aug. 1985 61 p
(Contract NAS5-28583)
(NASA-CR-177823; NAS 1.26:177823) Avail: NTIS HC A04/MF A01 CSCL 09B

This is a Design Specification for a gateway to interconnect fiber optic local area networks (LAN's). The internetworking protocols for a gateway device that will interconnect multiple local area networks are defined. This specification serves as input for preparation of detailed design specifications for the hardware and software of a gateway device. General characteristics to be incorporated in the gateway such as node address mapping, packet fragmentation, and gateway routing features are described. Author

N86-16992# Los Alamos National Lab., N. Mex.
LINKED STATE MACHINES: COMPOSITION, VOLUME 2
H. K. Knudsen Apr. 1985 32 p
(Contract W-7405-eng-36)
(DE85-017946; LA-10400-MS-Vol-2) Avail: NTIS HC A03/MF A01

The composition of a linked state machine (LSM) is a procedure whereby the LSM can be re-represented or realized by an LSM that contains a smaller number of elementary state machines but has identical state behavior. The existence of a procedure for composition is one of the characterizing features of an LSM. A procedure for the composition of the special class of modified, marked Petri nets that are used to represent LSMs is given, and the properties of LSMs obtained through composition are derived. Next, staged or iterated composition is studied. Finally, procedures are derived for the composition of asynchronous LSMs. DOE

N86-16993# Oak Ridge National Lab., Tenn.
ANALYTICAL EVALUATION OF COMPUTER-BASED DECISION AIDS
R. A. Kisner 1985 8 p refs Presented at the International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control, Pasco, Wash., 8 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017157; CONF-850903-11) Avail: NTIS HC A02/MF A01

This paper introduces a method for evaluating decision aids for nuclear power plant operators. The method involves a two-stage process of classification and analytical evaluation of display form and content. The classification scheme relates each specific aid to one or more general decision-making tasks. Evaluation then proceeds using a normative top-down design process based on the classification scheme by determining or deducing how various design issues associated with this process were resolved by the designer. The result is an assessment of the understandability of the aid as well as identification of the training and display features necessary to ensure understandability. DOE

N86-16994# California Univ., Berkeley. Lawrence Berkeley Lab.
USING COOPERATIVE SIMULTANEOUS PARALLELISM IN NONHOMOGENEOUS MICROCOMPUTER CLUSTERS
J. Meng Oct. 1984 8 p refs Presented at the International Society for Mini and Microcomputers International Symposium on Applications of Microcomputers, New York, N.Y., 22 Oct. 1984
(Contract DE-AC03-76SF-00098)
(DE85-017638; LBL-17801; CONF-8410320-1) Avail: NTIS HC A02/MF A01

Based on our experience controlling different types of microprocessors in clusters through the central processor-memory connection, and based on our successful parallel operation of a cluster of minicomputer central processors, a MIDAS-like arrangement of different microcomputers in a cluster is useful in dealing with a variety of problems. The MIDAS-like arrangement refers to master-slave control of the cluster by a minicomputer and to data being passed through the cluster by connecting prefilled memories into and out of processor address space. We discuss how to connect the hardware into a cluster and conclude with descriptions of how to apply the hardware to selected diverse applications. DOE

N86-16995# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE ROSAT POSITION SENSITIVE PROPORTIONAL COUNTER (PSPL) SCIENTIFIC DATA PROCESSING REQUIREMENT DOCUMENT
B. Aschenbach, comp., H. Braeuninger, comp., U. Briel, comp., H. Fink, comp., G. Hasinger, comp., H. Hippmann, comp., E. Pfeffermann, comp., P. Predehl, comp., J. Schmitt, comp., and K. H. Stephan, comp. Jun. 1985 153 p
(MPE-IN-44; ISSN-0340-8922) Avail: NTIS HC A08/MF A01

The scientific concepts of the ROSAT mission and characteristics of the scientific payload are described to derive specifications for the scientific software system necessary to analyze the survey data and the data of the pointed observations provided by the Position Sensitive Proportional Counter. The specifications are complete at the level of knowledge 3 yr before launch. Author (ESA)

N86-16996# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.
NETWORKS OF MACHINES FOR DISTRIBUTED RECURSIVE COMPUTATIONS
Alain J. Martin (California Inst. of Technology, Pasadena, Calif.) and Jan L. A. vandeSnepscheut 1985 11 p refs
(CS-8502) Avail: NTIS HC A02/MF A01

Distributed computation viewed as a communicating processes is considered. A class of processor networks that admits a homogeneous distribution of processes and trivial routing is described. The problem of implementing a distributed computation is solved by two criteria which are characterized for networks of machines for distributed recursive computations. Author (ESA)

N86-16997# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
PARALLEL UNCONSTRAINED OPTIMIZATION METHODS
F. A. Lootsma 1984 35 p refs
(Rept-84-30) Avail: NTIS HC A03/MF A01

Unconstrained optimization for implementation on parallel computers is surveyed. Simultaneous evaluations of the function to be optimized are considered. Conjugate directions, homogeneous functions, variable-metric methods, and multidimensional searches are discussed. Trends in computational studies of parallel optimization algorithms are assessed. Author (ESA)

N86-16998# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
INTERCONNECTION STRATEGIES FOR TIGHTLY COUPLED MULTIPROCESSOR SYSTEMS
J. Hans Andriessen and Nikola A. Kasabov (Higher Institute of Mechanical and Electrical Engineers, Sofia, Bulgaria) 1985 17 p refs
(Rept-85-10) Avail: NTIS HC A02/MF A01

A combined parallel/sequential data exchange method is described. For systems with a large number of processors (of the

order of 1000 or 10,000) hardware requirements of the I/O-part of these processors are drafted. Low-level strategies (full-line and full-information type of connections) to connect a small number of processors are applied to high-level strategies (recursive segmentation and pipeline structures) to connect a large number of processors. Interconnection of large systems by these strategies is evaluated. For low-level interconnection, the full-information connection is better than full-line connection, for at the same cost of data exchange time it requires less external inputs and utilizes the inner cluster connection optimally. For high-level interconnection recursive segmentation is preferable to bidirectional double pipeline structures. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-16999 Toledo Univ., Ohio.
A MICROCOMPUTER BASED CLOSED LOOP SPEED CONTROLLER FOR AN INDUCTION MOTOR Ph.D. Thesis
Hamid Monazahian 1985 176 p
Avail: Univ. Microfilms Order No. DA8516745

The hardware and software techniques used to implement a microcomputer based, variable speed, closed loop induction motor drive system is described. The advantage of this system is that the inverter is digitally controlled and the motor is the only analog device in the system. The digital controller deices a pulse width modulated (PWM), inverter fed, three phase induction motor in the variable speed mode. Algorithms were implemented for maximum acceleration rate with improved efficiency. The PWM inverter accomplishes voltage and frequency adjustment in a single circuit. A set of six optimized PWM waveforms are generated by a microcomputer, which references look-up tables for the appropriate switching angles. The switching angles are precalculated prior to storage into memory, thus eliminating the need for real-time calculations. Frequency control is achieved by an 8 bit counter which is incremented by a progammable interval timer at a rate directly proportional to the desired motor frequency. Dissert. Abstr.

N86-17000 Carnegie-Mellon Univ., Pittsburgh, Pa.
FIDO: VISION AND NAVIGATION FOR A ROBOT ROVER Ph.D. Thesis
Charles Elving Thorpe 1984 146 p
Avail: Univ. Microfilms Order No. DA8517537

FIDO is a vision and navigation system for a mobile robot. Using only stereo vision, FIDO is capable of guiding a robot through clutter to reach a goal. FIDO stars with no preloaded map of the world, and needs no special preparation of the environment; it works in the real world rather than in a toy environment. Four of FIDO's major contributions are described. They are: (1) path relaxation; (2) interest operators; (3) constraints; and (4) parallel decomposition. Dissert. Abstr.

N86-17001 Johns Hopkins Univ., Baltimore, Md.
THE MOVEMENTS OF MULTILINK ROBOT ARMS IN TWO-DIMENSIONAL REGIONS Ph.D. Thesis
Vitit Kantabutra 1985 91 p
Avail: Univ. Microfilms Order No. DA8518494

An algorithm, requiring O(n) computation time, which moves an arm in a circle to any reachable configuration in O(n) moves is presented. Also given is an O(n) computation time algorithm that computes all the regions reachable by the joints of such an arm. This procedure is faster and intuitively simpler than the one given by Hopcroft, et al. Then an O(n) method of deciding the reachability of a configuration is offered in the case of a short-linked robot arm, with an end fixed positionwise, confined within a square. Following this, a linear time algorithm is established for determining whether a given point in a square can be reached by an end of an arm, when no end is fixed and no link is longer than a side of the square. Finally, an O(n cubed) algorithm is described that plans a course of motion with the minimum number of moves for an arm, with a mixed end, moving the obstacle-free plane so that the free end reaches a specified point. Dissert. Abstr.

N86-17002 British Library Lending Div., Boston Spa (England).
EXPERIENCE IN USING INDUSTRIAL ROBOTS AND AUTOMATIC MANIPULATORS
I. G. Barantsov, V. V. Vdovichenkov, and N. L. Dubinenko 1985 7 p Transl. into ENGLISH from Stal (USSR), no. 3, 1985 p 94-95
(BLL-M-36421-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

Experience in the introduction and increasing use of robots and automatic manipulators at a tube works is presented. The manufacture of enamelled cooking utensils and galvanized pails, is used as examples. Author

N86-17003# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
CONSTRAINT-BASED SCHEDULING IN AN INTELLIGENT LOGISTICS SUPPORT SYSTEM: AN ARTIFICIAL INTELLIGENCE APPROACH Annual Report, 15 Mar. 1984 - 14 Mar. 1985
M. S. Fox and S. F. Smith 15 Jul. 1985 15 p
(Contract F49620-82-K-0017)
(AD-A159043; AFOSR-85-0720TR) Avail: NTIS HC A02/MF A01 CSCL 06/4

This report summarizes the progress of research performed under AFOSR contract Number F49620-82-K-0017, titled Constraint-Based Scheduling in an Intelligent Logistics Support Syestem: An Artificial Intelligence Approach . During the contract renewal period from March, 1984 to March, 1985, the continued development of a theory of hierarchical, opportunistic constraint-directed reasoning for job shop scheduling has been the focus of our research. Specifically, we have conducted work in the areas or of opportunistic exploitation of constraints, and constaint-directed diagnosis. The former has led us to the use of multiple problem decompositions during schedule generation, while the latter has evolved toward development of a more broad based framework for reactive scheduling. An experimental software system call ISIS has continued it evolution and additional testing with simulated plant data has been performed. The design of a successor system called PHOENIX has been initiated. Author (GRA)

N86-17004# Oak Ridge National Lab., Tenn.
ROBOT INVERSE DYNAMICS ON A CONCURRENT COMPUTATION ENSEMBLE
J. Barhen 1985 16 p Presented at ASME International Computers in Engineering Conference and Exhibition, Boston, Mass., 4 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016306; CONF-850862-5) Avail: NTIS HC A02/MF A01

Advances in VLSI technology provide a strong incentive to configure the "brain" of future intelligent robots as concurrent computation ensembles. The design of real-time operating systems for such machines is an important objective of the CESAR program. This paper addresses the development of ROSES, a prototype software system intended to provide expert scheduling capabilities in mapping precedence-constrained task graphs onto a computation ensemble. This problem being strongly NP-completee, ROSES attempts to achieve near-optimal solutions by combining heuristic techniques (to handle time complexity) with special instances of abstract data structures (to handle space complexity). The technique is applied to the solution of the inverse dynamics equations of a robot arm and achieves high efficiency and proper load balance. Critical concepts in the longer-term development of a Virtual Time Intelligent Machine Operating System (IMOS/VT) are also discussed. DOE

N86-17005# Oxford Univ. (England). Dept. of Engineering Science.
SELF-TUNING CONTROL OF A DIFFICULT PROCESS

D. W. Clarke, P. S. Tuffs, and C. Mohtadi 1984 19 p refs
(OUEL-1550/84) Avail: NTIS HC A02/MF A01

A universal self tuning control method called Generalized Predictive Control (GPC) is assessed by comparative simulation to show its superiority over generalized minimum variance, LQG, and pole-placement self-tuning algorithms. The simulations demonstrate that GPC is effective and robust for a range of typical plant models without the restrictions imposed by the other methods, and it is capable of good control of particularly difficult processes such as nonminimum-phase oscillators. Author (ESA)

N86-17006# Oxford Univ. (England). Dept. of Engineering Science.
AN H-INFINITY-MINIMAX APPROACH TO THE DESIGN OF ROBUST CONTROL SYSTEMS. PART 2: ALL SOLUTIONS, ALL-PASS FORM SOLUTIONS AND THE BEST SOLUTION
Yung Kuan Foo and Ian Postlethwaite 1985 21 p refs
(OUEL-1585/85-Pt-2) Avail: NTIS HC A02/MF A01

All solutions to a robustness optimization problem are characterized as the solutions of a two-parameter interpolation problem. From this characterization it is shown that an all-pass form solution always exists as long as a solution exists. The possibility of using non all-pass form solutions is studied, and by introducing other optimization objectives (motivated by improvements in disturbance rejection and robust stability) the best solution is sought. Author (ESA)

N86-17007# Oxford Univ. (England). Dept. of Engineering Science.
MULTIVARIABLE CONTROL
Ian Postlethwaite 1985 22 p refs
(OUEL-1589/85) Avail: NTIS HC A02/MF A01

Multivariable control is introduced with an example (a helicopter model) to illustrate what is meant by a multivariable system and how such systems are modeled. The primary objectives of control and the feedback configurations which can be used to achieve them are discussed. Analysis techniques for assessing the significant properties of a control system design are summarized. Design methods for multivariable systems, and implications of digitally implemented controllers are reviewed. Author (ESA)

N86-17008# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.
A POINT SET MODEL OF THE NONDETERMINISTIC REPETITIVE CONSTRUCT
Wim H. Hesselink Nov. 1984 11 p refs
(CS-8501) Avail: NTIS HC A02/MF A01

A translation in set theoretic terms of Dijkstra-Scholten's results of the operational interpretation of extrema solutions is given. The criteria of weakest precondition and weakest liberal precondition are studied. A postulate of Dijkstra is reported. A point set of the nondeterministic repetitive construct is developed. Author (ESA)

N86-17009# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
AUCTIONS AND FAIR DIVISION
Eric vanDamme 1984 25 p refs
(Rept-84-50) Avail: NTIS HC A02/MF A01

The situation in which a single indivisible object has to be divided among a group of persons who claim equal rights to that object is considered. An auction is used to allocate the object and the proceeds of the auction are divided equally among the participants. This procedure gives rise to a game with incomplete information, of which it is shown that it has exactly one symmetric Nash equilibrium. An explicit formula for this equilibrium is derived and its properties are studied. It is shown that this method has serious drawbacks, since it can produce results that are not envy free, i.e., results in which one of the players prefers another's allocation to his own. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-17010 California Univ., Irvine.
THE FINITE ELEMENT ANALYSIS OF ELECTROMECHANICAL DEVICES WITH ANISOTROPIC PERMANENT MAGNETS Ph.D. Thesis
Magdy Mohammed Saeb 1985 128 p
Avail: Univ. Microfilms Order No. DA8516555

Finite element analysis is applied to solve the Poisson equation for a stationary magnetic field in an anisotropic and saturable magnetic medium typically encountered in electromechanical devices with anisotropic permanent-magnets. Finite element equations were formulated using a weighted residual standard Galerkin method. The Galerkin method is proved, through the application of certain theorems found in the literature, to be more general in nature than the Rayleigh-Ritz method. Dissert. Abstr.

N86-17011 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
PIECEWISE CHEBYSHEV SERIES
M. G. Cox Jul. 1985 13 p refs
(NPL-DITC-63/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Piecewise Chebyshev series for curve-fitting applications are discussed in respect of their historical role as a transition from the (whole range) Chebyshev series studied by Clenshaw, et al, in the 1950s and 1960s to the B-spline series used today. Author (ESA)

N86-17012*# Maryland Univ., College Park. Dept. of Civil Engineering.
APPLICATION OF A STOCHASTIC SNOWMELT MODEL FOR PROBABILISTIC DECISIONMAKING Final Report
Richard H. McCuen Nov. 1983 45 p refs
(Grant NAG5-223)
(NASA-CR-177828; NAS 1.26:177828) Avail: NTIS HC A03/MF A01 CSCL 12A

A stochastic form of the snowmelt runoff model that can be used for probabilistic decision-making was developed. The use of probabilistic streamflow predictions instead of single valued deterministic predictions leads to greater accuracy in decisions. While the accuracy of the output function is important in decision-making, it is also important to understand the relative importance of the coefficients. Therefore, a sensitivity analysis was made for each of the coefficients. Author

N86-17013# National Aerospace Lab., Tokyo (Japan).
GRID GENERATION BASED ON PANEL METHOD
Masashi Shigemi 1985 29 p refs In JAPANESE; ENGLISH summary
(NAL-TR-860; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

A method of grid generation around an obstacle is proposed. The obstacle is assumed to be in a potential flow, which is readily analyzed by the panel method. Grids are made up by drawing stream lines and equi-potential lines, and therefore, they are naturally body-fitted and orthogonal. Calculation of the potential which is induced by vortices is explained in some detail, since it often becomes the major source of errors in the application of this method. The grid, of either H-type or O-type, is generated by assuming the corresponding potential flow around the obstacle. The C-type grid can also be obtained as a particular case of the O-type grid. Further application of this method includes generation of grids which cover a region whose outer boundary is assigned, and the region around multi-element obstacles. Author

N86-17014*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A SIMULATION OF ROTOR-STATOR INTERACTION USING THE EULER EQUATIONS AND PATCHED GRIDS
Man Mohan Rai (Informatics General Corp.) Dec. 1985 10 p

refs
(NASA-TM-86821; A-85376; NAS 1.15:86821) Avail: NTIS HC A02/MF A01 CSCL 12A

An unsteady Euler code to study rotor-stator interaction problem was developed. The code uses patched grids that move relative to each other to simulate the motion of the rotor airfoils with respect to the stator airfoils. The Osher integration scheme is used in conjunction with an implicit relaxation approach. The scheme is second order accurate in space and time, and is also TVD in each spatial direction. The numerical results were found to be periodic in time, thus demonstrating the capability of the integration and zonal schemes in simulating periodic time dependent flow. The pressure contours obtained are almost oscillation free because of the TVD nature of the scheme. A new procedure was developed to simulate flows about bodies that move relative to each other. This capability should prove to be very useful in the areas of rotor-stator interaction, propeller-nacelle interaction, and helicopter rotor-fuselage interaction. Author

N86-17015# Naval Surface Weapons Center, Dahlgren, Va.
POWER SERIES SOLUTIONS FOR SLOWLY ROTATING POLYTROPES USING THE METHOD OF FROBENIUS Final Report
A. D. Parks Oct. 1984 22 p
(AD-A157867; AD-F350037; NSWC/TR-84-351) Avail: NTIS HC A02/MF A01 CSCL 12/1

The differential equations governing the structure of slowly rotating polytropes are derived and power series solutions to them are developed. Convergence characteristics of the series solutions are discussed and radii of convergence estimated. GRA

N86-17016# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
A MODELESS CONVEX HULL ALGORITHM FOR SIMPLE POLYGONS Interim Report
M. A. Peshkin and A. C. Sanderson May 1985 13 p
(AD-A159119; CMU-RI-TR-85-8) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document presents an order n algorithm which computes the convex hull of a two-dimensional non-self-intersecting polygon. The algorithm recovers much of the simplicity of the one presented by Sklansky and subsequently disproved. Unlike several algorithms which have been found since then, the modified algorithm executes a truly uniform (modeless) traversal of all the vertices of the polygon. This makes it possible to extend the algorithm to extract geometric information about the interior of the polygon. GRA

N86-17017# National Opinion Research Center, Chicago, Ill.
FULL-INFORMATION ITEM FACTOR ANALYSIS Final Report
R. D. Bock, R. Gibbons, and E. Muraki Aug. 1985 72 p Prepared in cooperation with Educational Testing Service, Princeton, N.J.
(Contract N00014-83-C-0283; NR Proj. F63-521)
(AD-A159135) Avail: NTIS HC A04/MF A01 CSCL 12/1

A method of item factor analysis based on Thurstone's multiple factor model and implemented by marginal maximum likelihood estimation and the EM algorithm is described. Statistical significance of successive factors added to the model is tested by the likelihood ratio criterion. Provisions for effects of guessing on multiple choice items, and for omitted and not reached items, are included. Bayes constraints on the factor loadings are found to be necessary to suppress Heywood cases. Numerous applications to simulated and real data are presented to substantiate the accuracy and practical utility of the method. Analysis of the power tests of the Armed Services Vocational Aptitude Battery shows statistically significant departures from unidimensionality in five of the eight tests. Author (GRA)

N86-17018# North Carolina State Univ., Raleigh.
FAST ALGORITHMS FOR STRUCTURAL OPTIMIZATION, LEAST SQUARES AND OTHER COMPUTATIONS Final Report, 15 Jul. 1984 - 14 Jul. 1985
R. J. Plemmons 19 Jul. 1985 8 p
(Grant AF-AFOSR-0255-83)
(AD-A159136; AFOSR-85-0714TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Fast algorithms for solving large-scale structural optimization and least squares problems are being investigated. An especially significant aspect of this work is the development and testing of parallel algorithms for alternatives to the often ill-conditioned stiffness equations approach in structural analysis on machines such as the Cray X-MP, the Denelcor HEP and the Intel Hypercube. The principal thrusts in this project on least squares methods have been in developing techniques for the solution of superlarge problems in a stable way, i.e., employing orthogonal factorization techniques, on multiprocessors. These computations involve various levels of parallelism, including domain decomposition as well as pipelining type schemes for orthogonal factorization. Author (GRA)

N86-17019# Stanford Univ., Calif. Lab. for Computational Statistics.
FULLY NONPARAMETRIC EMPIRICAL BAYES ESTIMATION VIA PROJECTION PURSUIT
M. V. Johns Aug. 1985 19 p
(Contract N00014-83-K-0472)
(AD-A159273; AD-E301788; LCS-TR-16) Avail: NTIS HC A02/MF A01 CSCL 12/1

The fully nonparametric formulation of the empirical Bayes estimation problem considers m populations characterized by conditional (sampling) distributions chosen independently by some unspecified random mechanism. No parametric constraints are imposed on the family of possible sampling distributions or on the prior mechanism which selects them. The quantity to be estimated subject to squared-error loss for each population is defined by a functional T(F) where F is the population sampling cdf. The empirical Bayes estimator is based on n iid observations from each population where $n > 1$. Asymptotically optimal procedures for this problem typically employ consistent nonparametric estimators of certain nonlinear conditional expectation functions. In this study a particular projection pursuit algorithm is used for this purpose. The proposed method is applied to the estimation of population means for several simulated data sets and one familiar real world data set. Certain possible extensions are discussed. Author (GRA)

N86-17020# Yale Univ., New Haven, Conn. Dept. of Computer Science.
ON THE SOLUTION OF A CLASS OF TOEPLITZ SYSTEMS
M. Chen Aug. 1985 16 p
(Contracts N00014-82-K-0814; DE-AC02-81ER-10996)
(AD-A159313; Yaleu/DCS/RR-417) Avail: NTIS HC A02/MF A01 CSCL 12/1

The solution of certain Toeplitz linear systems is considered in this paper. This kind of system is encountered when we solve certain partial differential equations by finite difference techniques and approximate functions using higher order splines. The methods presented here are more efficient than the Cholesky decomposition method and are based on the circulant factorization of the banded circulant matrix, the use of the Woodbury formula and algebraic perturbation method. Author (GRA)

N86-17021 Admiralty Marine Technology Establishment, Teddington (England).
GREEN'S FUNCTIONS OF THE REDUCED WAVE EQUATION BETWEEN PARALLEL PLANES
E. A. Skelton Apr. 1985 18 p refs
(AMTE(N)-TM85023; BR96421) Copyright. Avail: NTIS HC A02/MF A01

The Green's functions in the region between planes on which either Neumann or Dirichlet boundary conditions apply are obtained in the form of double Fourier series expansions. A closed form expression for the sound field in an axisymmetric water filled channel is obtained to illustrate the usefulness of the expansions. Problems associated with numerical evaluation are discussed and numerical examples are given. Author (ESA)

N86-17022# Argonne National Lab., Ill.
SOME REMARKS ON INVERSES OF SPARSE MATRICES
I. S. Duff, A. M. Erisman, C. W. Gear, and J. K. Reid Apr. 1985 11 p
(Contracts W-31-109-eng-38; DE-AC02-76ER-02383)
(DE85-015509; ANL/MCS-TM-51) Avail: NTIS HC A02/MF A01

We discuss some properties of the structure of the inverse of a sparse matrix. In particular, we show that the structural inverse of an irreducible sparse matrix is always full. We first show that Gaussian elimination always yields a full structural inverse and then show the result directly. We believe that our lemmas concerning Gaussian elimination are of interest in their own right. DOE

N86-17023# Los Alamos National Lab., N. Mex.
CAN MATHEMATICS EXPLAIN NATURAL INTELLIGENCE
J. Mycielski Jul. 1985 15 p
(Contract W-7405-eng-36)
(DE85-017948; LA-10492-MS) Avail: NTIS HC A02/MF A01

The author discusses four algorithms that have one thing in common with the brain; they learn to predict future events based on past experience. The first is the classical predictor x(sub t+h) + 3x(sub t) - 3x(sub t-h) + x(sub t-2h) for the values of a quadratic progression. The second predicts the values of linear functionals. The third predicts the vector outputs of an orthogonal operator. The fourth predicts the letters or morphemes of a text. The first, second, and fourth are simple enough so that mechanisms appropriate for the computations that they require could exist in our brains. The author proves estimates of the sum of the absolute squares of errors for the second and third algorithm. DOE

N86-17024# Brookhaven National Lab., Upton, N. Y.
GEOMETRY OF CHAOS
H. B. Stewart 14 Nov. 1984 26 p
(Contract DE-AC02-76CH-00016)
(DE85-016199; BNL-51892) Avail: NTIS HC A03/MF A01

Signals or measurements of chaotic dynamics have some aspect which passes every test for randomness: in this aspect chaos is as random as a coin toss. The evidence that such randomness can ocurr in simple deterministic dynamical systems has been accumulating over the past twenty years at an accelerating pace. The word chaos was first attached to this phenomena just ten years ago. The impact of this discovery could potentially touch every scientist concerned with understanding dynamic phenomena. To the pessimist it implies that even simple dynamical systems are unpredictable in detail except for the very short run. To the optimist, it means that an observed dynamic behavior which passes the strongest test for randomness may still have a simple explanation. Among the irregular behaviors which might be explained by deterministic dynamic models are a poorly tuned car engine, population fluctuations in an ecosystem of competing species, turbulence in fluids such as the oceans or the atmosphere, arrhymthia or fibrillation in a beating heart, a dripping faucet, and growth cycles in a national economy. DOE

N86-17025# California Univ., Berkeley. Lawrence Berkeley Lab.
NUMERICAL SOLUTION OF BOUNDARY CONDITION TO POISSON'S EQUATION AND ITS INCORPORATION IN THE PROGRAM POISSON
S. Caspi, M. Helm, and L. J. Laslett May 1985 6 p Presented at the Particle Accelerator Conf., Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016637; LBL-19483; CONF-850504-246) Avail: NTIS HC A02/MF A01

Two dimensional cartesian and axially-symmetric problems in electrostatics or magnetostatics frequently are solved numerically by means of relaxation techniques - employing, for example, the program POISSON. In many such problems the sources (charges or currents, and regions of permeable material) lie exclusively within a finite closed boundary curve and the relaxation process in principle then could be confined to the region interior to such a boundary - provided a suitable boundary condition is imposed onto the solution at the boundary. This paper discusses and illustrates the use of a boundary condition of such a nature in order thereby to avoid the inaccuracies and more extensive meshes present when alternatively a simple Dirichlet or Neumann boundary condition is specified on a somewhat more remote outer boundary. DOE

N86-17026# Sandia National Labs., Albuquerque, N. Mex.
MODEL RANDOMNESS INDUCED BY BOUNDARY CONDITIONS
T. L. Paez, L. J. Branstetter, and D. L. Gregory 1985 8 p Presented at the SAE Aerospace Technology Conference and Exposition, Long Beach, Calif., 14 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016999; SAND-85-0953C; CONF-8510150-1) Avail: NTIS HC A02/MF A01

The modal frequencies of a structure often exhibit random variation. This variation may be an important factor affecting structural response. This paper summarizes the results of a combined experimental and analytical study that considers modal frequency randomness arising from boundary condition random variation. It is shown that a simple measure of boundary condition characteristics can be used in connection with a finite element based analysis to estimate random variation in modal frequencies. A comparison between the experiment and the analysis confirms the accuracy of the analytical technique. DOE

N86-17027# Bettis Atomic Power Lab., West Mifflin, Pa.
RELAXATION PARAMETERS FOR THE IQE ITERATIVE PROCEDURE FOR SOLVING SEMI-IMPLICIT NAVIER-STOKES DIFFERENCE EQUATIONS
J. H. Anderson and L. A. Hageman Jun. 1985 21 p Presented at the Westinghouse Engineering Computer Applications Symposium, Monroeville, Pa., 7 Oct. 1985
(Contract DE-AC11-76PN-00014)
(DE85-017632; WAPD-T-2867; CONF-8510149-1) Avail: NTIS HC A02/MF A01

Numerical solutions of the time-dependent Navier-Stokes equations for a thermally expandable fluid require advancing the unknown flow variables in time by either an implicit, a semi-implicit, or an explicit procedure. Explicit methods require a modest amount of computational effort per time step but require excessively small timestep lengths to ensure numerical stability. On the other hand, implicit and semi-implicit schemes allow the use of large timestep lengths but suffer from increased computational complexities. Fully-implicit methods generate coupled systems of nonlinear equations that must be solved at each point in time, whereas semi-implicit procedures generate coupled systems of linear equations. The focus of this paper is on the use of a recently formulated iterative procedure, called the IQE method, for solving the linear systems produced by a semi-implicit method. The IQE method, for solving the linear systems produced by a semi-implicit method. The IQE method requires the use of a relaxation parameter (LC omega) which must be properly chosen to obtain the greatest rate of convergence. Using heuristic arguments, we develop a numerical procedure for estimating near-optimal values of (LC omega). Numerical test results are included. DOE

N86-17028# Bettis Atomic Power Lab., West Mifflin, Pa.
EFFICIENT ITERATIVE PRESSURE SOLUTION METHOD FOR TIME-DEPENDENT FLUIDS COMPUTATIONS
L. A. Hageman, M. M. Sussman, and B. E. Wiancko Jun. 1985 21 p Presented at the Westinghouse Engineering Computer Applications Symposium, Monroeville, Pa., 7 Oct. 1985
(Contract DE-AC11-76PN-00014)
(DE85-017633; WAPD-T-2868; CONF-8510149-5) Avail: NTIS HC A02/MF A01

Three-dimensional transient incompressible fluid flow computations at Bettis involve solution of a discrete Poisson equation for the pressure variable at each time level. The matrix coefficients depend only on the geometry and boundary conditions and do not change from timestep to timestep; however, the right hand side does change every timestep. Large numbers of timesteps

are anticipated. Iterative methods are necessary because of the size of the matrix problem. One purpose of this paper is to present alternative solution methods for the pressure variable. The candidate methods are judged on the basis of their suitability for efficient implementation on a vector processor and the potential for overlapping data transfer to and from disk with computation by the central processing unit. The most suitable method is the block red-black cyclic Chebyshev semi-iterative method. Another purpose of this paper is to discuss the implementation of the Chebyshev method. Considered are such topics as the selection of nearly optimal iteration parameters, monitoring of iteration data as the timesteps progress, the behavior of the iterations in reaching a steady solution (treated as a long time limit of a transient), and efficient vectorization for the Cyber-205 computer. Numerical results of tests of the methods will be presented. DOE

N86-17029# Lawrence Livermore National Lab., Calif.
SHAPE PRESERVING INTERPOLATION, REVISION 1
R. E. Carlson Aug. 1985 15 p Presented at the Institute of Mathematics and Its Applications: Conference on Algorithms for the Approximation of Functions and Data, Swindon, Engl., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE85-016947; UCRL-92986-Rev-1; CONF-850793-1-Rev-1) Avail: NTIS HC A02/MF A01

Fast, accurate interpolation algorithms are needed in virtually all areas of high speed scientific computing. As computer power has grown, physical, mathematical and computational models have become more complicated in an attempt to achieve more realistic simulations of the underlying physical processes. In the past an important criterion used to select an interpolation algorithm was the accuracy of a method as measured by the rate of convergence of the interpolant as the mesh size is decreased to zero. In attempting to increase fidelity to underlying physical processes, two phrases have come into vogue when describing interpolation methods: visually pleasing and shape preserving. Shape preserving refers to the preservation of one or more mathematical properties (called shape characteristics) during the interpolation process. These shape characteristics often represent physical properties of the system being modeled. This paper is about shape preserving interpolation methods as applied to solving real-world scientific problems. DOE

N86-17030# Washington Univ., Seattle. Dept. of Physics.
LOW-ENERGY LIMIT OF STRINGS
R. I. Nepomechie Jul. 1985 20 p
(Contract DE-AC06-81ER-40048)
(DE86-000541; DOE/ER-40048/21-P5) Avail: NTIS HC A02/MF A01

We investigate terms with four derivatives in the low-energy action of closed Bose strings. Our analysis is consistent with the possibility that the action involves only curvatures of an affine connection with torsion. The torsion is provided by the antisymmetric tensor gauge field. DOE

N86-17031# Rome Univ. (Italy). Dipt. di Fisica.
A CLASS OF SOLVABLE DYNAMICAL SYSTEMS
F. Calogero 4 Feb. 1985 19 p refs Presented at International Conference on Solitons and Coherent Structures, Santa Barbara, Calif., 11-16 Jan. 1985 Submitted for publication Sponsored by Italian Ministry of Public Education
(Preprint-439) Avail: NTIS HC A02/MF A01

A large class of integrable dynamical system which can be identified to n quantities X evolving in time according to an appropriate system of n coupled nonlinear ordinary differential equations with n zeros of a polynomial in X corresponding to a linear partial differential equation (PDE), is studied. The fact that this polynomial can be interpreted as solution of the linear second-order PDE and the corresponding evolution equations for the zeros of a polynomial, are discussed. The integrability of these dynamical system is demonstrated by exhibiting an explicit nonlinear mapping which is related to linear second-order PDE depending of zeros of a polynomial. A list of explicit examples of dynamical systems contained in this class is given. Author (ESA)

N86-17032# Fondazione Ugo Bordoni, Rome (Italy).
HARMONIC RETRIEVAL BY SIMULTANEOUS APPLICATION OF BURG'S AND PISARENKO'S METHODS
Giuseppe Martinelli (Rome Univ.), Gianni Orlandi (Rome Univ.), and Mario Salerno (Rome Univ.) Dec. 1983 11 p refs Sponsored by Ist. Superiore delle Poste e delle Telecomunicazioni
(FUB-53-1983) Avail: NTIS HC A02/MF A01

Parameter estimates for sinusoidal signals in additive noise for short data lengths is discussed. An approximate relation between the polynomials obtained by the constrained predictor and by Pisarenko's (1973) method is derived. This relation allows harmonic retrieval of the process using only Burg's (1975) method. The resulting algorithm is very efficient in terms of computational cost and accuracy. Author (ESA)

N86-17033# Fondazione Ugo Bordoni, Rome (Italy).
A NOTE ON THE REPRESENTATION OF INTEGERS AS A SUM OF DISTINCT FIBONACCI NUMBERS
Piero Filipponi Jan. 1985 12 p refs Sponsored by Ist. Superiore delle Telecomunicazioni
(FUB-1-1985) Avail: NTIS HC A02/MF A01

The fact that every positive integer can be represented uniquely as finite sum of distinct nonconsecutive Fibonacci numbers (F-addends), is considered. The asymptotic value of the average of F-addends and the probable least upper bound of F-addends, are given. The greatest lower bound of F-addends and the bound of the number of integers which are representables as F-addends, are estimated. Author (ESA)

N86-17034# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Statik.
THE USE OF FUNDAMENTAL SOLUTIONS OF LINEAR ELASTOSTATICS AS STARTING FUNCTIONS FOR THE CALCULATION OF HYBRID DISK AND BODY ELEMENTS Ph.D. Thesis [ZUR VERWENDUNG VON FUNDAMENTALLOESUNGEN DER LINEAREN ELASTOSTATIK ALS ANSATZFUNKTIONEN BEI DER BERECHNUNG HYBRIDER SCHEIBEN- UND KOERPERELEMENTE]
H. Zwanzger 1984 81 p refs In GERMAN
(Rept-3; D-17) Avail: NTIS HC A05/MF A01

A method for the establishment of stiffness matrices of finite disk and body elements with an arbitrary number of nodes, allowing in an extreme case to form a wing unit by a single element, is presented. Fundamental solutions of linear elastostatics were chosen as starting functions; they allow optimum freedom in the modeling of hybrid elements. The element stiffness matrices were obtained by variational calculus. The operational calculus theory in the function domain was applied for the interpretation of numerical phenomena. The disk and body elements were checked by modeling of typical rod statistics problems in two and three-dimensional structures. The possibility of hybrid macroelements to reproduce even complex stress fields is demonstrated by disk examples. Investigation of regular and singular fundamental solutions in connection with arbitrarily precise macroelements establishes a steady transition between the finite element method and the boundary element method. The numerical calculation shows that the singular fundamental solutions applied in the boundary element method can be completed by suited regular fundamental solutions. Author (ESA)

N86-17035# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.
A THEORY OF NONDETERMINISTIC DATA STRUCTURES
Wim H. Hesselink Feb. 1985 57 p refs
(CS-8503) Avail: NTIS HC A04/MF A01

A theory of data structures, in which correctness of an implementation can be formally verified, without imposing irrelevant restrictions to implementations, was developed using set theory. In order not to be forced to specify all details of an implementation, nondeterminism on the formal level is admitted,

particularly nondeterministic occurrences of error and overflow conditions. Error is introduced as a universal outlet after which the specifications fail. It turns out that axiomatic characterizations of data structures are completely undisturbed by the nondeterminism. The initial algebras lose their prerogatives. The universal models may be considered as terminal algebras. Author (ESA)

N86-17036# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON THE ODD-EVEN HOPSCOTCH SCHEME FOR THE NUMERICAL INTEGRATION OF TIME-DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS
J. H. M. tenThijeBoonkkamp and J. G. Verwer Jun. 1985 19 p refs Submitted for publication
(CWI-NM-R8513; B8569860) Avail: NTIS HC A02/MF A01

Via the equivalence to the combined leapfrog-Du Fort-Frankel method, the explicit expression of the critical time step for von Neumann stability for a class of multidimensional convection-diffusion equations is derived. This expression can be derived directly by applying a stability theorem due to Hindmarsh, et al, (1984). The time step is independent of the diffusion parameter and yet smaller than the critical time step for zero diffusion, but only in the multidimensional case. This phenomenon does not occur for the one-dimensional problem. The Du Fort-Frankel accuracy deficiency of the hopscotch scheme is overcome by global Richardson extrapolation in time. This device can always be used without reducing feasibility. Numerical examples to illustrate the outcome of the extrapolation are given. Author (ESA)

N86-17037# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
A GEOMETRIC APPROACH TO THE SINGULAR FILTERING PROBLEM
J. M. Schumacher Mar. 1985 18 p refs Submitted for publication
(CWI-OS-R8502; B8569335) Avail: NTIS HC A02/MF A01

The least-squares filtering problem for a stationary Gaussian process when the observation is not fully corrupted by white noise, the so-called singular case is studied. An optimal estimator is constructed consisting of an integrating part, which is, as in the regular case, computed from a spectral factorization or an equivalent matrix problem, and a differentiating part whose parameters are computed from a single matrix equation. This improves on older results which either work under restrictive assumptions, or describe the solution only as the result of a nested algorithm. Author (ESA)

N86-17038# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
GENUINELY POLYNOMIAL SIMPLEX AND NONSIMPLEX ALGORITHMS FOR THE COST FLOW PROBLEM
J. B. Orlin (MIT, Cambridge) May 1985 41 p refs
(Grant N00014-83-K-0220)
(CWI-OS-R8504; B8569337) Avail: NTIS HC A03/MF A01

Three algorithms for the minimum cost network flow problem are given. Two are genuinely polynomial dual simplex algorithms for the minimum cost network flow problem. The dual simplex algorithms presented are simplex pivot rules provably polynomial for the cost network flow problem. The fact that Edmond-Karp's method can be interpreted as the number of arithmetic operations which is independent of BIT(b) or BIT(c), is proved. A computational bound for the minimum cost network flow problem for sparse networks is given. Author (ESA)

N86-17039# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CONTINUATION AND NODAL PROPERTIES OF SOLUTIONS OF AN EIGENVALUE PROBLEM FOR ROTATING RODS
Ph. Clement and J. Descloux (Ecole Polytechnique Federale de Lausanne, Switzerland) 1984 39 p refs
(Rept-84-51) Avail: NTIS HC A03/MF A01

A nonlinear eigenvalue problem with boundary conditions is considered. A correct proof of the existence of trivial solutions for the integro-differential equation corresponding to Odeh-Tadjbakhsh's problem is given and one sentence of a nontrivial solution to Odeh-Tadjbakhsh's problem is proved. The fact that secondary bifurcations occur on the branches emanating from conditions of nonlinear eigenvalue problems related with Odeh-Tadjbakhsh's conjecture is discussed. Author (ESA)

N86-17040# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
SOME LIMIT RESULTS FOR AN ENERGY STORAGE MODEL
G. Hooghiemstra and C. L. Scheffer 1985 11 p refs
(Rept-85-01) Avail: NTIS HC A02/MF A01

The behavior of the stationary distribution of the temperature level in a tank used for the storage of solar energy is discussed. The fact that the Daley-Deng Conjecture is true, is proved. This solution is not so nice for practical applications since a Laplace Transform has to be inverted numerically. Limit results for an energy storage model are given. Author (ESA)

N86-17041# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CYCLONOMIAL COEFFICIENTS, PROPERTIES AND APPLICATIONS [CYCLONOMIALE COEFFICIENTEN, ENGENSCHAPPEN EN TOEPASSINGEN]
A. Snijders and C. Roos 1985 22 p ref In DUTCH
(Rept-85-11) Avail: NTIS HC A02/MF A01

Cyclonomial coefficients for the generation in lexicographic order of numbers for which the sum of the figures is constant were studied. Cyclonomial coefficients which are generalized binomial coefficients, are introduced. It is shown that every natural number can be represented as a sum of cyclonomial coefficients. This representation was used to number words successively in a so-called constant weight code. The resulting natural ordering of words proves to coincide with the usual lexicographic ordering. Author (ESA)

N86-17042# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
APPLICATION OF FINITE ELEMENTS TO SOLID GEOMETRY MODELING
C. D. Balch 1983 12 p refs
(Lab-Rept-752) Avail: NTIS HC A02/MF A01

A method of representing solids, based on a cell decomposition scheme in which the cells are taken to be finite elements with curved edges and faces is discussed. Object geometry is described by a finite element mesh, and simple geometric problems of surface contact and interference are solved. The method can be used with conventional finite element analysis procedures. Complex geometric forms with curved surfaces can be represented by a relatively small number of cells. The equations of cell (element) edges and faces can be cast in simple parametric form, enabling the implementation of the analytical approaches to be discussed. It is shown that isoparametric elements with curved edges can be applied to the solution of point inclusion in a solid and edge intersection. Computer implementations which utilize an interactive graphics system are described. Author (ESA)

N86-17043# National Center for Atmospheric Research, Boulder, Colo.
RECONSTRUCTING A FUNCTION BY CIRCULAR HARMONIC ANALYSIS OF ITS RADON TRANSFORM
R. M. Perry May 1985 27 p Sponsored in part by NSF, Washington, D.C.
(PB85-212322; NCAR/TN-255+STR) Avail: NTIS HC A03/MF A01 CSCL 12A

The image reconstruction problem in the standard two-dimensional case is determining a function f at each point the plane given the integrals of f along all straight lines in the plane. The integrals of f along straight lines comprise the Radon transform of f, a function defined for parametric coordinates denoting line orientations in the plane. The reconstruction problem obtains the

function f as a circular-harmonic expansion in polar coordinates, f(r, theta) = Summation (f sub m)(r)(e sup im(theta)), from a corresponding expansion of the Radon transform, g(s,phi) = Summation (g sub m)(s)(e sup iom(phi)) is considered. An integral transform giving each harmonic (f sub m) of the function f in terms of the corresponding harmonic (g sub m) of the Radon transform g is derived. The basis of a technique for reconstructing the function f as an expansion in the Fourier components (f sub m)(r)(e sup im(theta)), is obtained from the corresponding harmonics (g sub m) which are obtainable by Fourier analysis of the Radon transform g. GRA

N86-16575# Joint Publications Research Service, Arlington, Va.
GEOMETERIC DEFINITION OF UNIFORM B-SPLINE CURVES
Shi Fazhong *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 34-44 refs Transl. into ENGLISH from Shuzhi Jisuan yu Jisuanji Yingyong (Beijing, China), v. 6, no. 1, Mar. 1985 p 49-56 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-17044# South Carolina Univ., Columbia. Dept. of Mathematics and Statistics.
NONPARAMETRIC METHODS FOR HAZARD RATE ESTIMATION FROM RIGHT-CENSORED SAMPLES
D. T. McNichols and W. J. Padgett Aug. 1985 21 p Prepared in cooperation with Virginia Polytechnic Inst. and State Univ., Blacksburg
(Contract MIPR-ARO-139-85; Grant AF-AFOSR-0156-84)
(AD-A159131; TR-106; AFOSR-85-0691TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Nonparametric estimation of the hazard rate or failure rate is a frequent topic of investigation in the statistical literature because of its practical importance. Until quite recently, hazard rate estimation had been based on complete samples of independent identically distributed lifetimes. However, observations may be censored or truncated in many life testing situations. This occurs often in medical trials when the patients may enter treatment at different times and then either die from the disease under investigation or leave the study before its conclusion. A similar situation may occur in industrial life testing when items are removed from the test at random times for various reasons. It is of interest to be able to estimate nonparametrically the unknown hazard rate of the lifetime random variable from this type of data without ignoring or discarding the right-censored information. The purpose of this paper is to discuss nonparametric estimation of the hazard rate function for right-censored samples. The various types of estimators that have been proposed in the literature will be indicated and briefly discussed in Section 3. These include maximum likelihood estimators, kernel type estimators, Bayesian estimators, and histogram estimators. Due to their computational simplicity and other properties, the kernel-type hazard rate estimators will be emphasized. Results of Tanner (1983) and Tanner and Wong (1983, 1984) will be presented in Section 4 while the estimator considered by McNichols and Padgett (1981) will be discussed in Section 5. GRA

N86-17045# Oxford Univ. (England). Dept. of Engineering Science.
STATISTICAL BOUNDS ON MULTIVARIABLE FREQUENCY RESPONSE; AN EXTENSION OF THE GENERALIZED NYQUIST CRITERION
D. J. Cloud and B. Kouvaritakis May 1985 58 p refs
(OUEL-1581/85) Avail: NTIS HC A04/MF A01

Statistical bounds for model parameters and corresponding system frequency response limits are established. The results are extended to multivariable systems to produce an element by element characterization of system uncertainty. This uncertainty representation can be used to develop frequency response bounds on the eigenfunctions of perturbed multivariable systems, thus producing system gain and phase information via a generalized Nyquist analysis. An application of the technique using a two-input/two-output system is presented. Author (ESA)

N86-17046# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
MARKOV JUMP-DIFFUSSION MODELS AND DECISION-MAKING FREE FILTERING
H. A. P. Blom 24 Oct. 1983 22 p refs Presented at 6th International Conference on Analysis and Optimization of Systems, Nice, France, 19-22 Jun. 1984
(NLR-MP-83067-U; B8566529) Avail: NTIS HC A02/MF A01

Nonlinear filtering of Gaussian observations of a Markov jump-diffusion with an embedded Markov chain, that is described by Poisson measure is considered. The modeling potential of this class of Markov processes is illustrated by simple realistic examples. For the evolution of the conditional expectation of the Markov process, decomposed representations are given. They are used as a basis to obtain approximate filtering algorithms free of decision making mechanisms. The algorithms are discussed for the examples given. Author (ESA)

N86-17047# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
THE TOTAL TIME ON TEST PLOT AND THE CUMULATIVE TOTAL TIME ON TEST STATISTIC FOR A COUNTING PROCESS
R. D. Gill Mar. 1985 8 p refs
(CWI-MS-R8501; B8569329) Avail: NTIS HC A02/MF A01

Asymptotic null-hypothesis distribuition theory for the total time on test and the cumulative total time on test for a random stopped Poisson process with constant intensity, is developed. Large versions of the total time test plot and statistic for Brownian bridge, are given. Author (ESA)

N86-17048# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
ON ESTIMATING TRANSITION INTENSITIES OF A MARKOV PROCESS WITH AGGREGATE DATA OF A CERTAIN TYPE: OCCURRENCES BUT NO EXPOSURES
R. D. Gill Apr. 1985 26 p refs Submitted for publication
(CWI-MS-R8502-Rev; B8569330-Rev) Avail: NTIS HC A03/MF A01

A specific form of aggregate data is used to study finite-state space time-homogeneous Markov processes applied to models of movement of individuals. A method of estimation of the underlying Markov processes is reported. Results on the properties of this method applied to demography are given. Author (ESA)

N86-17049# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
SOME CURRENT DEVELOPMENTS IN DENSITY ESTIMATION
Piet Groeneboom Jun. 1985 28 p refs
(CWI-MS-R8503; B8569331) Avail: NTIS HC A03/MF A01

The best performance expected from monoparametric density estimators according to the criterion of minimax risk, is discussed. The relations between the metric entropy (massivity of a set) of the set of densities and the rate of convergence to zero of the minimax risk, are discussed. These relations can be used in approximation theory of bonds and rate convergence for minimax risk. Properties of minimax risk, local asymptotic minimax risk, and the behavior of a density estimator, are given. Author (ESA)

N86-17050# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
A SIMPLE TEST OF THE PROPORTIONAL HAZARDS ASSUMPTION
R. D. Gill and M. Schumacher Jul. 1985 45 p refs Sponsored in part by Deutsche Forschungsgemeinschaft

(CWI-MS-R8504; B8569332) Avail: NTIS HC A03/MF A01

Proportional hazard test procedures based on the observation that in nonproportional hazards situations different two-sample tests, e.g., the logrank and a generalized Wilcoxon test, can produce very different answers are proposed. The procedures use this discrepancy as a check of the proportional hazards assumption, and are based on the relationship between generalized linear rank tests and estimates of the proportionality constant. This implies that the test statistics can be interpreted in a very natural way and almost all computational effort has to be done anyway. A graphical method for comparing trends in series of events is presented. Author (ESA)

N86-17051# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.

ON ASYMPTOTIC INFERENCE ABOUT INTENSITY PARAMETERS OF A COUNTING PROCESS

Kacha O. Dzhaparidze Jul. 1985 18 p refs Presented at International Statistics Institute Centenary Session, Amsterdam, 12-22 Aug. 1985 Submitted for publication

(CWI-MS-R8505; B8569333) Avail: NTIS HC A02/MF A01

The Cox regression model is extended to the stochastic processes theory with a filtration by which the probability measure is completly defined by a compensator of predictable characteristics particulars. The asymptotic stability properties conjecture is confirmed. A refined characterization of the properties is reported. Author (ESA)

N86-17052# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.

SILHOUETTES: A GRAPHICAL AID TO THE INTERPRETATION AND VALIDATION OF CLUSTER ANALYSIS

Peter J. Rousseeuw 1984 30 p refs

(Rept-84-41) Avail: NTIS HC A03/MF A01

A graphical display for nonhierarchical cluster analysis is proposed. Each cluster is represented by a so-called silhouette, which is based on the comparison of its tightness and separation. This silhouette shows which objects lie well within their cluster, and which are in between clusters. The entire clustering is displayed by combining the silhouettes into a single plot, allowing an appreciation of the relative quality of the clusters and an overview of the data configuration. The average silhouette width provides an evaluation of clustering validity, and can be used to select an appropriate number of clusters. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-17053# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.

THE COMPLEXITY OF DYNAMIC/PERIODIC LANGUAGES AND OPTIMIZATION PROBLEMS

J. B. Orlin May 1985 22 p refs

(CWI-OS-R8505; B8569338) Avail: NTIS HC A02/MF A01

A characterization of the class PSPACE as those languages L for which each element x of L has a periodic certificate is given. The characterization leads to proofs that a large number of NP-complete problems have dynamic/periodic counterparts that are PSPACE-complete. The characterization is also useful in analyzing periodic scheduling problems that arise in workforce planning, transportation planning, and operations management. Author (ESA)

N86-17054# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.

ENERGY MODELING WITH MULTIPLE OBJECTIVES AND MULTIPLE ACTORS

M. Kok 1984 20 p refs

(Rept-84-43) Avail: NTIS HC A02/MF A01

A linear programming model of the energy supply system in the Netherlands was extended to handle multiple objectives and multiple actors. The extension helps to determine the margin of energy policy (this includes tradeoff information). The optimal policies of actors and (interest) groups can be determined in a structured way. It is a supply-side model: the final demand of the sectors of the economy is given exogeneously. It is a partial equilibrium model: there is no feedback of the solution (e.g., consumption of natural gas, coal, etc.; investments; balance of trade) to a model of the remainder of the economy. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-17055# Department of Energy, Washington, D. C. Scientific Computing Staff.

SUMMARIES OF THE FY 1984 AND FY 1985 APPLIED MATHEMATICAL SCIENCES RESEARCH PROGRAM

Jul. 1985 54 p

(DE85-016240; DOE/ER-0240) Avail: NTIS HC A04/MF A01

The purpose of this report is to provide a convenient compilation of summaries of the individual research projects that constitute the Applied Mathematical Science research subprogram managed by the Director, Scientific Computing Staff, Office of the Director of Energy Research, Department of Energy. This new office, organized in 1984, consists of the applied mathematical sciences research activity formerly under the Division of Engineering, Mathematical Geosciences, Office of Basic Energy Science, Office of Energy Research, and the management of the expanded National Magnetic Fusion Energy Computer Network formerly under the Office of Magnetic Fusion Energy. DOE

N86-17056# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.

WEAKLY COMPLETE CONES IN HARMONIC ANALYSIS [LES CONES FAIBLEMENT COMPLETS EN ANALYSE HARMONIQUE]

Erik G. F. Thomas 1984 18 p refs In FRENCH; ENGLISH summary

(ZW-8416) Avail: NTIS HC A02/MF A01

The cones of positive definite distributions from a Lie group are weakly complete and the union of metric caps. The Choquet method can then be applied to those cones, and to the convex sub-cones which are close. Classes such as the positive type central distribution play an important role in harmonic analysis. Theorems establishing these concepts are presented. Author (ESA)

N86-17057# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.

AUTOMORPHISMS OF COMPLETE LOCAL RINGS HAVING A LOGARITHM

C. Praagman 1984 20 p refs Sponsored by Netherlands Foundation for Mathematics and Netherlands Organization for the Advancement of Pure Research, Amsterdam, Netherlands

(ZW-8417) Avail: NTIS HC A02/MF A01

The fact that the existence of an arbitary rational iteration group, which contains a given automorphism of a complete local ring is equivalent to the existence of a logarithm of the automorphism, is proved. The proof is based on the fact that an automorphism which has iterative roots of arbitrary order lies in the image of the exponential map. The image of this exponential map on a plane algebroid curve is discussed. Author (ESA)

N86-17058# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.

ON A QUASI-PERIODIC HOPF BIFURCATION

B. L. J. Braaksma and H. W. Broer 1985 52 p refs

(ZW-8501) Avail: NTIS HC A04/MF A01

The differential equation of forced oscillators for small damping is studied. The quasi-periodic Hopf bifurcation for the model

problem of a quasi-periodic forced oscillator with fixed frequencies is reported as a solution of Stoker's problem. Author (ESA)

N86-17059# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
MULTIPLE GRID AND OSHER'S SCHEME FOR THE EFFICIENT SOLUTION OF THE STEADY EULER EQUATIONS
P. Hemker and S. P. Spekreijse Jun. 1985 25 p refs Submitted for publication
(CWI-NM-R8507; B8569856) Avail: NTIS HC A02/MF A01

An iterative method for the solution of the steady Euler equations for inviscid flow is developed. The system of hyperbolic conservation laws is discretized by a finite volume Osher-discretization. The iterative method is a multiple grid (FAS) iteration with symmetric Gauss-Seidel (SGS) as a relaxation method. Initial estimates are obtained by full multigrid. In the pointwise relaxation, the equations are kept in block-coupled form. Local linearization of the equations and the boundary conditions is considered. The efficient formulation of Osher's discretization of the 2D nonisentropic steady Euler equations and its linearization is presented. The efficiency of FAS-SGS iteration is shown for a transonic model problem. It appears that the rate of convergence is independent of the grid size and that for all mesh sizes the discrete system is solved up to truncation error accuracy in only two or three iteration cycles. Author (ESA)

N86-17060# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON THE ECONOMIZATION OF EXPLICIT RUNGE-KUTTA METHODS
B. P. Sommeijer Jun. 1985 20 p refs Submitted for publication
(CWI-NM-R8508; B8569857) Avail: NTIS HC A02/MF A01

A modification to explicit Runge-Kutta (RK) methods is proposed. Schemes which require less derivative-evaluations to achieve a certain order than classical RK methods are constructed. Examples of a second-order method requiring one evaluation, two third-order methods using one and two evaluations, and a fourth-order method which requires two evaluations are given. Numerical examples illustrate the behavior of the schemes. Author (ESA)

N86-17061# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
SPATIAL DISCRETIZATION OF HYPERBOLIC EQUATIONS WITH PERIODIC SOLUTIONS
P. J. vanderHouwen Jun. 1985 18 p refs Submitted for publication
(CWI-NM-R8514; B8569861) Avail: NTIS HC A02/MF A01

The Cauchy problem for hyperbolic equations for which the frequencies of the main Fourier components in the solution are located in a given frequency interval is investigated. Difference formulas for the spatial derivatives that are tuned to the given intervals of frequencies are constructed. Numerical examples illustrating the discretizations for linear and nonlinear problems are given. Author (ESA)

N86-17062# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON THE ZEROS OF THE RIEMANN ZETA FUNCTION IN THE CRITICAL STRIP: 4
J. vandeLune, H. J. J. teRiele, and D. T. Winter Jun. 1985 21 p refs
(CWI-NM-R8515; B8569862) Avail: NTIS HC A02/MF A01

The computation in order to show the first 1,500,000,001 zeros of Riemann's zeta function in the critical strip are simple and lie on the vertical with real part 1/2, are reported. The FORTRAN/COMPASS program for this computation was run on a CDC CYBER 175/750 computer to separate the zeros of zeta function in adequate intervals. The total CPU time used amounted to 900 hr on the CYBER 175/750 and 100 hr on the CYBER 205. Author (ESA)

N86-17063# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
STABILITY AND B-CONVERGENCE OF LINEARLY IMPLICIT RUNGE-KUTTA METHODS
W. H. Hundsdorfer Jul. 1985 20 p refs Submitted for publication
(CWI-NM-R8516; B8569863) Avail: NTIS HC A02/MF A01

Stability and convergence properties of linearly implicit Runge-Kutta methods applied to stiff semilinear systems of differential equations are studied. The stability analysis includes stability with respect to internal perturbations. All results are independent of the stiffness of the system. Author (ESA)

N86-17064# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
A STUDY OF B-CONVERGENCE OF RUNGE-KUTTA METHODS
K. Burrage (Auckland Univ., New Zealand), W. H. Hundsdorfer, and J. G. Verwer Jul. 1985 18 p refs
(CWI-NM-R8517; B8569864) Avail: NTIS HC A02/MF A01

The convergence analysis of implicit Runge-Kutta methods as applied to stiff, semilinear systems of the form $U(t)+g(t,U(t))$ is studied. A criterion which determines whether the order of optimal B-convergence is at least equal to the stage order or one order higher is developed. This criterion is studied for a number of classes of methods. Author (ESA)

N86-17065# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
THE NUMVEC FORTRAN LIBRARY MANUAL. CHAPTER: ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS (PDES). ROUTINE: MGZEB
W. M. Lioen Jul. 1985 21 p refs
(CWI-NM-R8518; B8569865) Avail: NTIS HC A02/MF A01

The NUMVEC FORTRAN Library routine MGZEB is described. The MGZEB solves 7-diagonal linear systems, that arise from 7-point discretizations of elliptic partial differential equations on a rectangle, using a multigrid technique with zebra relaxation as smoothing process. It is available in auto-vectorizable FORTRAN 77. Author (ESA)

N86-17066# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
CONDITIONAL AXIOMS AND ALPHA/BETA CALCULUS IN PROCESS ALGEBRA
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop Feb. 1985 30 p refs Submitted for publication Sponsored by ESPRIT
(CWI-CS-R8502; B8567085) Avail: NTIS HC A03/MF A01

The alphabet of finite and infinite terms in algebra of communicating processes with silent steps, and approximations of it (the alpha/beta calculus) are given. The alphabet is used to formulate conditional axioms. The usefulness of these axioms is demonstrated. Author (ESA)

N86-17067# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
MEAN INTEGRATED SQUARED ERROR OF KERNEL ESTIMATORS WHEN THE DENSITY AND ITS DERIVATIVE ARE NOT NECESSARILY CONTINUOUS
C. vanEeden (Montreal Univ., Quebec) Nov. 1984 15 p refs Submitted for publication Sponsored by Formation de Chercheurs et d'Action Concertee Program, Quebec
(Grant A-3114)
(CWI-MS-R8414; B8569341) Avail: NTIS HC A02/MF A01

The asymptotic behavior of the mean integrated squared error (MISE), the optimal value of MISE, the asymptotically minimum value of MISE, and the optimal kernel of a density function f of a finite number of random variables identically distributed, when f and its derivative are not necessarily continuous, are studied. Rosenblatt-Epanechinkov's results are extended to the case where the density function is not continuous. Author (ESA)

N86-17068# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
THERE IS NO FINITE CLASSIFICATION FOR HOMOGENEOUS QUADRATIC VECTOR FIELDS ON R CUBED, MODULI OF STABILITY
S. J. vanStrien and G. TavaresdosSantos (Pontifica Univ. Catolica do Rio de Janeiro, Brazil) 1985 36 p refs
(Rept-85-02) Avail: NTIS HC A03/MF A01

It is shown that there are an uncountable number of homogeneous quadratic vector fields on R cubed so that no two of these vector fields are topologically equivalent. A family of homogeneous quadratic vector fields Xa on R cubed depending on a parameter a is a member of (a1,a2) such if Xa is topologically equivalent to Xa' at the origin in R cubed, then a=a prime, is shown to exist. This family has a nonstabilizable modulus of stability on the two-jet level. Author (ESA)

N86-17069# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
GLOBAL UNIVALENCE THEOREMS AND THE JACOBIAN MATRIX
T. Parthasarathy (Indian Statistical Inst., New Delhi, India), G. Ravindran (Indian Statistical Inst., New Delhi, India), and S. J. vanStrien 1985 23 p refs
(Rept-85-03) Avail: NTIS HC A02/MF A01

An example in Rsq to show that Gale-Nikaido's (1965) result on global univalence may not be valid in convex regions even if the Jacobian is a P-matrix is given. An example to demonstrate that global univalence may not prevail in R cubed even if the Jacobian is a nonsingular and nonnegative matrix throughout R cubed is given. This example is based on a smooth mapping of Rsq into itself given by Gale-Nikaido. A set of sufficient conditions under which a differentiable map is globally one-one over a closed convex region in R to the nth power is outlined. The global univalence results of Gale-Nikaido, Garcia-Zanwill (1979) and Mas-Colell (1979) when the Jacobian is a weak P-matrix are strengthened using McAuley's (1966) results. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-17070# California Univ., Berkeley. Lawrence Berkeley Lab.
CSEM-STEEL HYBRID WIGGLER/UNDULATOR MAGNETIC FIELD STUDIES
K. Halbach, E. Hoyer, S. Marks, D. Plate, and D. Shuman Jun. 1985 5 p refs
(Contract W-7405-eng-48)
(DE85-016081; UCRL-15689) Avail: NTIS HC A02/MF A01

Current design of permanent magnet wiggler/undulators use either pure charge sheet equivalent material (CSEM) or the CSEM-Steel hybrid configuration. Hybrid configurations offer higher field strength at small gaps, field distributions dominated by the pole surfaces and pole tuning. Nominal performance of the hybrid is generally predicted using a 2-D magnetic design code neglecting transverse geometry. Magnetic measurements are presented showing transverse configuration influence on performance, from a combination of models using CSEMs, REC (H sub c = 9.3 KOe) and NdFe (H sub c = 10.7 kOe), different pole widths and end configurations. Results show peak field improvement using NdFe in place of REC in identical models, gap peak field decrease with pole width decrease (all results less than computed 2-D fields), transverse gap field distributions, and importance of CSEM material overhanging the poles in the transverse direction for highest gap fields. DOE

N86-17071# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
MAGNETIC EXCHANGE INTERACTIONS IN THE LINEAR CHAIN CHROMIUM (3) COMPOUNDS CATENA-FLUORO PHTHALO-CYANINATO CHROMIUM (3) AND CATENA-CYANOPHTHALO CYANINATO CHROMIUM (3) **Interim Technical Report**
M. Schwartz, W. E. Hatfield, M. D. Joesten, M. Hanack, and A. Datz 15 Jul. 1985 27 p
(Contract N00014-76-C-0816)
(AD-A157861; TR-24) Avail: NTIS HC A03/MF A01 CSCL 20/3

Magnetic susceptibility and magnetization studies on the linear chain chromium(3) compounds catena-fluorophthalo cyaninato-chromium(III), CrPcF n, and catena-cyanophthalo cyaninatochromium (3), CrPcCNn, reveal that the chromium (3) ions in CrPcFn and CrPcCNn are magnetically exchange coupled. The magnetic susceptibility data for CrPcFn may be fit with Heisenberg linear chain theory for antiferromagnetic exchange with J = -12.2/cm and g = 2.00. The magnetic susceptiblity data for CrPcCNn may be fit with Heisenberg linear chain theory for ferromagnetic exchange with J = 0.2/cm and g = 1.98. CrPcCNn provides the first example of ferromagnetic exchange in a linear chain of chromium (3) ions. The difference in the exchange interactions in CrPcFn and CrPcCNn may be understood in terms of the electronegativities of the bridges and in terms of the orbitals which transmit the superexchange interactions. GRA

N86-17072# California Univ., Berkeley. Lawrence Berkeley Lab.
CSEM-STEEL HYBRID WIGGLER/UNDULATOR MAGNETIC FIELD STUDIES
K. Halbach, E. Hoyer, S. Marks, D. Plate, and D. Shuman May 1985 6 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016635; LBL-19584; CONF-850504-245) Avail: NTIS HC A02/MF A01

Current design of permanent magnet wiggler/undulators use either pure charge sheet equivalent material (CSEM) or the CSEM-Steel hybrid configuration. Hybrid configurations offer higher field strength at small gaps, field distributions dominated by the pole surfaces and pole tuning. Nominal performance of the hybrid is generally predicted using a 2-D magnetic design code neglecting transverse geometry. Magnetic measurements are presented showing transverse configuration influence on performance, from a combination of models using CSEMs, REC (H sub c = 9.2 kOe) and NdFe (H sub c = 10.7 kOe), different pole widths and end configurations. Results show peak field improvement using NdFe in place of REC in identical models, gap peak field decreases with pole width decrease (all results less than computed 2-D fields), transverse gap field distributions, and importance of CSEM material overhanging the poles in the transverse direction for highest gap fields. DOE

N86-17073# Stanford Linear Accelerator Center, Calif.
MEASUREMENT PROBLEM IN PROGRAM UNIVERSE. REVISION
H. P. Noyes, C. Gefwert, and M. J. Manthey Jul. 1985 7 p refs Presented at the Symposium on the Foundations of Modern Physics, Joensuu, Finland, 16 Jun. 1985 Prepared in cooperation with Suomen Akatemia, Helsinki, Finland and New Mexico Univ., N. Mex.
(Contract DE-AC03-76SF-00515)
(DE85-017004; SU-SLAC-PUB-3537-Rev; CONF-850683-1-Rev) Avail: NTIS HC A02/MF A01

The measurement problem of contemporary physics is in our view an artifact of its philosophical and mathematical underpinnings. We describe a new philosophical view of theory formation, rooted in Wittgenstein, and Bishop's and Martin-Loef's constructivity, which obviates such discussions. We present an unfinished, but very encouraging, theory which is compatible with this philosophical framework. The theory is based on the concepts of counting and combinatorics in the framework provided by the combinatorial hierarchy, a unique hierarchy of bit strings which interact by an operation called discrimination. Measurement criteria incorporate c, h-bar and m/sub p/ or (not and) G. The resulting theory is discrete throughout, contains no infinities, and, as far as we have

developed it, is in agreement with quantum mechanical and cosmological fact. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-17074 New South Wales Univ., Kensington (Australia).
DETERMINATION OF ACOUSTICAL TRANSFER FUNCTIONS USING AN IMPULSE METHOD M.S. Thesis Abstract Only
John MacPherson Feb. 1985 2 p
Avail: Issuing Activity

The Transfer Function of a system may be defined as the relationship of the output response to the input of a system. Whilst recent advances in digital processing systems have enabled Impulse Transfer Functions to be determined by computation of the Fast Fourier Transform, there has been little work done in applying these techniques to room acoustics. Acoustical Transfer Functions have been determined for auditoria, using an impulse method. The technique is based on the computation of the Fast Fourier Transform (FFT) of a non-ideal impulsive source, both at the source and at the receiver point. The Impulse Transfer Function (ITF) is obtained by dividing the FFT at the receiver position by the FFT of the source. This quantity is presented both as linear frequency scale plots and also as synthesized one-third octave band data. The technique enables a considerable quantity of data to be obtained from a small number of impulsive signals recorded in the field, thereby minimizing the time and effort required on site. As the characteristics of the source are taken into account in the calculation, the choice of impulsive source is non-critical. The digital analysis equipment required for the analysis is readily available commercially. Author

N86-17075 Department of the Air Force, Washington, D.C.
TWO-DIMENSIONAL BULK ACOUSTIC WAVE CORRELATOR-CONVOLVER Patent
B. A. Auld, D. W. Pettibone, and J. D. Plummer, inventors (to Air Force) Issued 11 Jun. 1985 7 p Supersedes AD-D010275
(AD-D011908; US-Patent-4,523,293; US-Patent-Appl-SN-482377; US-Patent-Class-364-821) Avail: US Patent and Trademark Office CSCL 20/1

A two-dimensional bulk acoustic wave correlator-convolver having an acoustic mirror positioned two focal lengths from an integrated circuit-acoustic transducer array is discussed. The image, rather than the Fourier transform, of the input spatial distribution is returned to the transducer array by the mirror. Author (GRA)

N86-17076# Committee on Science and Technology (U. S. House).
NOISE REDUCTION TECHNOLOGY
Washington GPO 1985 135 p Hearing before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 16, 1 Apr. 1985
(GPO-48-026) Avail: Subcommittee on Transportation, Aviation and Materials

A congressional hearing was conducted and expert testimony heard concerning noise reduction technology as it applied to airports. G.L.C.

N86-17077*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF ADVANCED TURBOPROP AND CONVENTIONAL JET AND PROPELLER AIRCRAFT FLYOVER NOISE ANNOYANCE: PRELIMINARY RESULTS
David A. McCurdy Nov. 1985 30 p refs Presented at the 110th Acoustical Society American Conference, Nashville, Tenn., 4-8 Nov. 1985
(NASA-TM-87637; NAS 1.15:87637) Avail: NTIS HC A03/MF A01 CSCL 20A

A laboratory experiment was conducted to compare the flyover noise annoyance of proposed advanced turboprop aircraft with that of conventional turboprop and jet aircraft. The effects of fundamental frequency and tone-to-broadband noise ratio on advanced turboprop annoyance were also examined. A computer synthesis system is used to generate 18 realistic, time varying simulations of propeller aircraft takeoff noise in which the harmonic content is systematically varied to represent the factorial combinations of six fundamental frequencies ranging from 67.5 Hz to 292.5 Hz and three tone-to-broadband noise ratios of 0, 15, and 30 dB. These advanced turboprop simulations along with recordings of five conventional turboprop takeoffs and five conventional jet takeoffs are presented at D-weighted sound pressure levels of 70, 80, and 90 dB to 32 subjects in an anechoic chamber. Analyses of the subjects' annoyance judgments compare the three categories of aircraft and examine the effects of the differences in harmonic content among the advanced turboprop noises. The annoyance prediction ability of various noise measurement procedures and corrections is also examined. Author

N86-17078# Polar Research Lab., Inc., Carpinteria, Calif.
LONG TERM STATISTICAL MEASUREMENTS OF ENVIRONMENTAL ACOUSTICS PARAMETERS IN THE ARCTIC: AMBIENT NOISE LEVELS IN THE WEST GREENLAND SEA
B. M. Buck and D. W. Jaecks 13 Dec. 1984 644 p
(Contract N00014-84-C-0394)
(AD-A156818; PRL-TR-53; ARAS-1) Avail: NTIS HC A99/MF A01 CSCL 20/1

Propagation loss data were taken using manned ice camps and aircraft, and ambient noise levels were measured using arctic data buoys that operated through the NIMBUS 6 and NOAA series satellites. The present report addresses one of a total of six arctic geographic areas - the West Greenland Sea, and presents ambient noise levels taken evvery three hours at the synoptic weather times from nine data buoys that drifted through the area. These data buoys collect a very large amount of independent measurements that are impractical to present in raw form. Therefore, a first-level statistical analysis was performed to allow reporting and distribution. These data, along with other regularly available meteorological, oceanographic and ice data, should enable higher order analyses and modeling for both prediction and understanding the mechanisms of arctic background noise. The data buoys, while limited in some respects, offer the only present means of long-term, wide-area investigations of arctic ambient noise on a true statistical basis. GRA

N86-17079# Naval Postgraduate School, Monterey, Calif.
A MATCHED FILTER ALGORITHM FOR ACOUSTIC SIGNAL DETECTION M.S. Thesis
D. W. Jordan Jun. 1985 222 p
(AD-A158960) Avail: NTIS HC A10/MF A01 CSCL 17/1

This thesis is a presentation of several alternative acoustic filter designs which allow Space Shuttle payload experiment initiation prior to launch. This initiation is accomplished independently of any spacecraft services by means of a matched band-pass filter tuned to the acoustic signal characteristic of the Auxiliary Power Unit (APU) which is brought up to operating RPM's approximately five minutes prior to launch. These alternative designs include an analog filter built around operational amplifiers, a digital IIR design implemented with an INTEL 2920 Signal Processor, and an Adaptive FIR Weiner design. Working prototypes of the first two filters are developed and a discussion of the advantage of the 2920 digital design is presented. GRA

N86-17080# Oak Ridge Y-12 Plant, Tenn.
ULTRASONIC ANALYSIS OF KEVLAR-EPOXY FILAMENT WOUND STRUCTURES
W. D. Brosey 16 Jul. 1985 32 p Presented at the Society of Manufacturing Engineers: Filament Winding Technology, Anaheim, Calif., 10 Sep. 1985
(Contract DE-AC05-84OS-21400)
(DE85-017405; Y/DW-611; CONF-8509145-1) Avail: NTIS HC A03/MF A01

Composite structures are often desirable for their strength and

weight characteristics. Since composites are not as well characterized mechanically as metallic or ceramic structures, much work has been performed at the Oak Ridge Y-12 Plant to obtain that characterization and to develop methods of determining the mechanical properties of a composite nondestructively. Most of the work to date has been performed on nonenclosed structures. One notable exception has been the holographic evaluation of spherical Kevlar-epoxy composite pressure vessels. Several promising nondestructive evaluation techniques have been used to locate flaws and predict the integrity of the composite. Several of these include thermography, Moire interferometry, ultrasonic stress wave factor, ultrasonic C-scan image enhancement, radiography, and nuclear magnetic resonance. As a first step in this transfer and development of NDE techniques, known defects were placed within spherical Kevlar-epoxy, filament-wound test specimens to determine the extent to which they could be detected. These defects included Teflon shim-simulated delaminations, macrosphere-simulated voids, dry-band sets, variable tension, Kevlar 29 fiber instead of the higher strength Kevlar 40 fiber, and an alternate high-void-content winding pattern. Ultrasonic waveform analysis was performed in both the time and frequency domains to determine the detectability and locatability of structural flaws within the composite. Preparation has been made at Virginia Polytechnic Institute and State University and at the University of Delaware, to examine the specimens using various NDE techniques. This work is a compilation of interim project reports in partial fulfillment of the contracts between Virginia Polytechnic Institute and State University, the University of Delaware, and Y-12 Plant.
DOE

N86-17081# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
AEROACOUSTIC RESEARCH IN THE NETHERLANDS RELATED TO AIRCRAFT DEVELOPMENT
W. B. deWolf and S. L. Sarin 25 May 1985 11 p refs Presented at 14th ICAS Congr., Toulouse, France, 9-14 Sept. 1984 Sponsored by Netherlands Agency for Aerospace Programs
(NLR-MP-84049-U; B8568094; ICAS-84-5.8.2) Avail: NTIS HC A02/MF A01

For jet noise reduction the feasibility of a lined ejector nozzle for the Fokker F28 aircraft was investigated by scale model measurements using decomposed hydrogen peroxide or hot jet simulation. Thrust performance measurements were included. For the design of optimum acoustic liners a mathematical model was developed to represent the fan and engine duct acoustically, taking into account the sound generation by rotor wake/stator interaction. Acoustic measurements were performed in the engine inlet of a Fokker F28 aircraft during flight. Techniques and facilities were developed for accurate in-situ measurements of the impedance of acoustic liner materials under realistic conditions. The technique was also demonstrated in-flight. Large reductions of the propeller noise level inside the cabin of the Fokker F27 aircraft were obtained by dynamic vibration absorbers on the fuselage wall structure.
Author (ESA)

N86-17082# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE USE OF ULTRASONIC SH WAVES TO MEASURE RESIDUAL STRESSES IN TEXTURED MATERIALS
D. R. Allen and R. Langman Jan. 1985 36 p
(AERE-R-11573) Avail: NTIS HC A03/MF A01

Measurements of the angular dependence of the zero order SH wave velocity have been made in several rolled thin plate samples (approx. 1 mm) of aluminum, stainless steel, copper and brass. In each case the velocities for waves propagating along the rolling direction and transverse direction are the same to within experimental error despite the generally high levels of texture present in the samples studied. This supports the use of such an approach as a valid basis for a residual stress measurement technique. A texture model is proposed which predicts the variation of ultrasonic velocity with texture for a given material. The experimental results are found to be in agreement with the proposed model.
Author

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-17083 New South Wales Univ., Kensington (Australia).
STUCTURAL STUDIES OF SPIN CROSSOVER SYSTEMS Ph.D. Thesis Abstract Only
Anthony Thomas Baker 1984 3 p
Avail: Issuing Activity

A major intention was to structurally characterize iron (II) complexes which undergo thermally-induced spin-state transitions. In the course of the work, several compounds which display spin-transition properties were prepared. The ligands of these new complexes all incorporate a thiazolyl moiety and comparisons of the coordinating capacity of this heterocycle with other heterocyclic systems have been made.
Author

N86-17084# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE 2-D HYDROGEN MOLECULE USING AMO APPROXIMATION
E. A. deAndradaeSilva, I. C. daCunhaLima, and A. FerreiradaSilva Sep. 1985 15 p refs Submitted for publication
(INPE-3661-PRE/821) Avail: NTIS HC A02/MF A01

The eigenenergies of the hydrogen molecule are calculated in the Alternate Molecular Orbital (AMO) approximation. Emphasis is given to two-dimensional (2-D) systems. Results are compared for the 2-D and 3-D cases and also with the singlet state of the Variational Heitler-London (H-L) approximation. Unlike what is observed in 3-D, in 2-D it is found that in the ground state electrons are highly correlated and the double occupancy is inhibited.
Author

N86-17085# Connecticut Univ., Storrs.
IN SITU STUDIES OF ENERGY DEPOSITION BY ION BEAMS Final Technical Report, 1 Sep. 1980 - 31 Aug. 1983
J. I. Budnick, F. P. Lipschultz, F. Namavar, F. A. Otter, and T. W. Grudkowski 14 Jun. 1985 71 p Prepared in cooperation with United Technologies Corp., East Hartford, Conn.
(Contract N00014-80-C-0910)
(AD-A156932) Avail: NTIS HC A04/MF A01 CSCL 20/12

The results of initial surface acoustic wave studies on a variety of systems including lithium niobate ($LiNbO_3$), quartz (SiO_2), silicon on $LiNbO_3$ silicon on SiO_2 and silicon on sapphire, which have been subjected to ion implantation and to visible laser irradiation. In addition, results of ion beam mixing studies on the Aluminum-Silicon system are reported, as well as the application of nuclear resonance profiling to a study of the near surface aluminum distribution in silicon.
Author (GRA)

N86-17086# Chicago Univ., Ill.
POSSIBLE MECHANISMS OF ATOM TRANSFER IN SCANNING TUNNELING MICROSCOPY
R. Gomer Jul. 1985 9 p
(Contract N00014-77-C-0018)
(AD-A158660) Avail: NTIS HC A02/MF A01 CSCL 20/10

Various mechanisms for the sudden transfer of an atom from or to the tip of a scanning tunneling microscope are considered. It is concluded that thermal desorption could be responsible and also that quasi-contact in which the adsorbed atom is in effect touching both surfaces, which would still be separated from each other by 2-4 A can also lead to unactivated transfer via tunneling. For barrier widths as small as 0.5 A, however, tunneling becomes negligible.
GRA

N86-17087# Naval Research Lab., Washington, D. C.
THE LINDHARD, NIELSEN AND SCHARFF METHOD OF OBTAINING APPROXIMATE CROSS SECTIONS
G. P. Mueller 10 Sep. 1985 18 p
(AD-A159355; AD-E700020; NRL-MR-5624) Avail: NTIS HC A02/MF A01 CSCL 12/1

Scattering theory gives an exact expression for generating a differential cross section from a known inter-particle potential.

Conversely, if one has a cross section, there is an exact inversion process that yields the potential that is its counterpart. Lindhard, Nielsen and Scharff (LNS) developed an approximate method to generate cross sections. Their Thomas-Fermi cross section is widely used in atomic scattering and radiation damage calculations. In this report the author describes the three approximations that make up the LNS method and the corresponding (approximate) inversion process. Several examples are furnished, including ones that demonstrate the utility of starting with a cross section and using the simplified inversion process to generate the corresponding approximate potential. Author (GRA)

N86-17088# Naval Research Lab., Washington, D. C.
PHAZR: A PHENOMENOLOGICAL CODE FOR HOLEBORING IN AIR
J. M. Picone, J. P. Boris, M. Lampe, and K. Kailasanath 25 Sep. 1985 56 p
(ARPA Order 4395)
(AD-A159401; NRL-MR-5647) Avail: NTIS HC A04/MF A01 CSCL 20/8

This report describes a new code for studying holeboring by a charged particle beam, laser, or electric discharge in a gas. The coordinates which parameterize the channel are radial displacement (r) from the channel axis and distance (z) along the channel axis from the energy source. The code is primarily phenomenological that is, we use closed solutions of simple models in order to represent many of the effects which are important in holeboring. The numerical simplicity which we gain from the use of these solutions enables us to estimate the structure of channel over long propagation distances while using a minimum of computer time. This feature makes PHAZR a useful code for those studying and designing future systems. Of particular interest is the design and implementation of the subgrid turbulence model required to compute the enhanced channel cooling caused by asymmetry-driven turbulence. The approximate equations of Boris and Picone form the basis of the model which includes the effects of turbulent diffusion and fluid transport on the turbulent field itself as well as on the channel parameters. The primary emphasis here is on charged particle beams, and as an example, we present typical results for an ETA-like beam propagating in air. These calculations demonstrate how PHAZAR may be used to investigate accelerator parameter space and to isolate the important physical parameters which determine the holeboring properties of a given system. The comparison with two-dimensional calculations provide a calibration of the subgrid turbulence model. Author (GRA)

N86-17089# Brookhaven National Lab., Upton, N. Y.
REVERSIBLE ISING DYNAMICS
M. Creutz 1985 8 p Presented at the Conference on Advances in Lattice Gauge Theory, Coral Gables, Fla., 10 Apr. 1985
(Contract DE-AC02-76CH-00016)
(DE85-016059; BNL-36727; CONF-8504167-1) Avail: NTIS HC A02/MF A01

The author discusses a reversible deterministic dynamics for Ising spins. The algorithm is a variation of microcanonical Monte Carlo techniques and is easily implemented with simple bit manipulation. This provides fast programs to study non-equilibrium phenomena such as heat flow. DOE

N86-17090# California Univ., Berkeley. Lawrence Berkeley Lab.
LBL NEUTRALIZED BEAM FOCUSING EXPERIMENT
G. A. Krafft, C. H. Kim, and L. Smith May 1985 6 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016564; LBL-19529; CONF-850504-240) Avail: NTIS HC A02/MF A01

An intense neutralized Cs(+1) beam has been focused by an electrostatic polarization field induced by a solenoidal magnetic field of 10-25 gauss. This report describes the experiment and compares the results with the predictions of an analytic linearized fluid model and a particle-in-cell simulation which treats the motion of the warm electrons in detail. DOE

N86-17091# Stanford Linear Accelerator Center, Calif.
WORKSHOP ON e(+)e(-) PHYSICS AT HIGH LUMINOSITIES: PROCEEDINGS
May 1985 391 p Workshop held at Stanford, Calif., 30 Nov. 1984
(Contract DE-AC03-76SF-00515)
(DE85-016524; SU-SLAC-283; CONF-8411186-; CONF-8504155) Avail: NTIS HC A03/MF A01

Ten papers were read at the Workshop on the Physics of High Luminosity Electrons held at Stanford, California, on 30 November, 1984. The ten papers are abstracted and listed separately. DOE

N86-17092# Lawrence Livermore National Lab., Calif.
ATOM-IN-JELLIUM MODELS
D. A. Liberman 26 Apr. 1985 21 p Presented at the Limeil Laboratory of the French Atomic Energy Commission Meeting, Paris, France, 6 May 1985
(Contract W-7405-eng-48)
(DE85-016075; UCRL-92565; CONF-8505196-1) Avail: NTIS HC A02/MF A01

The author describes in this paper the atom-in-jellium calculations he has been doing over the last ten years. He tries to emphasize reasons for doing this sort of calculation and why he devised a model which is different in some respects from others. DOE

N86-17093# Florida State Univ., Tallahassee.
ENERGY TRANSFORMATION IN MOLECULAR ELECTRONIC SYSTEMS
M. Kasha 25 Jul. 1985 11 p refs
(Contract DE-AS05-78EV-05855)
(DE85-017187; DOE/EV-05855/8) Avail: NTIS HC A02/MF A01

Our new optical pumping spectroscopy allows the production and study of the unstable rate tautomer in its ground and excited states, including picosecond dynamic studies. Molecules under study here included 7-azaindole 3-hydroxyflavone, lumichrome, and other heterocyclics. New detailed molecular mechanisms for proton transfer are derived, especially with catalytic assisting molecules. A new proton-transfer laser of extraordinary efficiency has become a side dividend, possibly worthy of industrial development. The excited and highly reactive singlet molecular oxygen species (1) DELTA sub g has proven to be ubiquitous in chemical peroxide systems and in physically excited sensitizer-oxygen systems. Hyperbaric oxygen mechanisms in biology probably involve singlet oxygen. We have undertaken a spectroscopic study of trisdibenzoylmethane chelates of Al, Gd, Eu, and Yb trivalent ions. These chelates offer a variety of electronic behaviors, from Z-effects on (PI)--electron spin-orbital coupling (Al, Gd) to Weissman intramolecular energy transfer to 4f mestable levels (Eu, Gd). Elegant new spectroscopic resolution at 77K permits separation of tautomeric, parasitic self-absorption, dissociation, and cage effects to be resolved. DOE

N86-17094# Los Alamos National Lab., N. Mex.
LOW EMITTANCE GROWTH FUNNELING LINE: PRELIMINARY DESIGN AND BEAM DYNAMICS STUDY
F. W. Guy 1985 10 p Presented at the Workshop on High Brightness, High Current, High Duty Factor Ion Injectors, San Diego, Calif., 21 May 1985
(Contract W-7404-eng-36)
(DE85-015687; LA-UR-85-2189; CONF-8505164-5) Avail: NTIS HC A02/MF A01

A theoretical design study has resulted in a conceptual funneling-line design that has a transverse emittance growth limited to only 15% based on beam-dynamics calculations. Two 2-MeV, 100-mA proton beams are funneled from a two-channel, 212.5-MHz radio-frequency quadrupole (RFQ) to a single beam suitable for injection into a 425-MHz linac. The design uses permanent-magnet quadrupoles, dipoles, and combined-function elements. The low emittance growth is obtained by arranging the focusing strength, the periodic structure, and the bending elements so as to minimize

abrupt changes in the beam environmental with consequent charge redistribution and space-charge-caused emittance growth. DOE

N86-17095# Oak Ridge National Lab., Tenn.
EFFECTS OF TEMPERATURE ON DISSOCIATIVE AND NONDISSOCIATIVE ELECTRON ATTACHMENT
L. G. Christophorou, S. R. Hunter, J. G. Carter, and S. M. Spyrou 1985 26 p refs Presented at the Joint Symposium on Swarm Studies and Inelastic Electron-Molecule Collisions, Tahoe, Calif., 19 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016473; CONF-850776-1) Avail: NTIS HC A03/MF A01
Results of recent studies on the effects of temperature, T, on the dissociative and nondissociative electron attachment to molecules are presented and discussed. DOE

N86-17096# Brookhaven National Lab., Upton, N. Y.
STUDY FOR A 6 GeV UNDULATOR BASED SYNCHROTRON RADIATION SOURCE
G. Vignola, M. Barton, R. Blumberg, J. Galayda, S. Krinsky, A. Luccio, C. Pellegrini, A. VanSteenbergen, and J. Wang 1985 3 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-00016)
(DE85-012183; BNL-36444; CONF-850504-173) Avail: NTIS HC A02/MF A01
A partial study of a 6 GeV undulator based synchrotron radiation source for production of high brightness undulator radiation, in the A region, is presented. The basic lattice adopted for the storage ring is a hybrid FODO Chasman-Green lattice, making use of gradient in the dipoles. We discuss also the beam current limits and the injection parameters. DOE

N86-17097# Lawrence Livermore National Lab., Calif.
WHAT IS WRONG WITH THE CROMER-LIBERMAN ANOMALOUS SCATTERING FACTORS AND WHAT TO DO ABOUT THEM
D. A. Liberman 18 Mar. 1985 9 p Presented at New Direction in X-Ray Scattering Workshop, Asilomar, Calif., 3 Apr. 1985
(Contract W-7405-eng-48)
(DE85-012947; UCRL-92338; CONF-8504136-2) Avail: NTIS HC A02/MF A01
Some sources of error in the original Cromer-Liberman equation for anomalous X-ray scattering are discussed and possible corrections are suggested. G.L.C.

N86-17098# Argonne National Lab., Ill.
UNIFIED APPROACH TO PION ABSORPTION AND DOUBLE-CHARGE-EXCHANGE REACTIONS
T. S. H. Lee 1985 9 p refs Presented at the Workshop on DCX Reactions, Los Alamos, N. Mex., 10 Jan. 1985
(Contract W-31-109-eng-38)
(DE85-012107; CONF-850176-1) Avail: NTIS HC A02/MF A01
Pion absorption and DCX Reactions are studied by using a unified theory of NN and PI d scattering. It is shown that the theory can describe simultaneously the (PI +, pp), (PI -, pn) and (PI -, PI +) reactions of 3 He. The study of absorption on heavy nuclei indicates the importance of inelastic absorption processes. It is suggested that the DCX reaction on heavy nuclei also involves multi-step processes which cannot be solved within the conventional distorted-wave theory. DOE

N86-17099# Los Alamos National Lab., N. Mex.
RELATIVISTIC HYDRODYNAMICS, HEAVY ION REACTIONS AND ANTIPROTON ANNIHILATION
D. Strottman 1985 28 p Presented at the Cretan International Meeting on Subatomic Physics, Crete, Greece, 23 Jun. 1985
(Contract W-7405-eng-36)
(DE85-014069; LA-UR-85-2281; CONF-8506178-2) Avail: NTIS HC A03/MF A01
The application of relativistic hydrodynamics to relativistic heavy ions and antiproton annihilation is summarized. Conditions for validity of hydrodynamics are presented. Theoretical results for inclusive particle spectra, pion production and flow analysis are given for medium energy heavy ions. The two-fluid model is introduced and results presented for reactions from 800 MeV per nucleon to 15 GeV on 15 GeV per nucleon. Temperatures and densities attained in antiproton annihilation are given. Finally, signals which might indicate the presence of a quark-gluon plasma are briefly surveyed. DOE

N86-17100# Oak Ridge National Lab., Tenn.
ROLE OF INDIRECT PROCESSES IN ELECTRON-IMPACT IONIZATION OF MULTICHARGED IONS
D. C. Gregory 1985 11 p Presented at the 14th International Conference on the Physics of Electronic and Atomic Collisions, Palo Alto, Calif., 24 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016960; CONF-850701-1) Avail: NTIS HC A02/MF A01
Recent studies of electron impact ionization in this laboratory are discussed with emphasis on the role of indirect processes. Examples are used to illustrate the importance of excitation-autoionization (Ti sup 2+ and Al sup 2+), autoionizing metastable ions in the Na isoelectronic sequence, multiple ionization (triple ionization of Xe sup 6+), the relative importance of indirect ionization with increasing charge in the Mg isoelectronic sequence, and the extension of ionization measurements to higher-charged target ions (Fe sup 9+). DOE

N86-17101# Stanford Linear Accelerator Center, Calif.
LIMITING TECHNOLOGIES FOR PARTICLE BEAMS AND HIGH ENERGY PHYSICS
W. K. H. Panofsky Jul. 1985 8 p Presented at the SLAC Summer School on the Physics of High Energy Particle Accelerators, Stanford, Calif., 15 Jul. 1985
(Contract DE-AC03-76SF-00515)
(DE85-017003; SU-SLAC-PUB-3735; CONF-850771-2) Avail: NTIS HC A02/MF A01
Since 1930 the energy of accelerators had grown by an order of magnitude roughly every 7 years. Like all exponential growths, be they human population, the size of computers, or anything else, this eventually will have to come to an end. When will this happen to the growth of the energy of particle accelerators and colliders? Fortunately, as the energy of accelerators has grown the cost per unit energy has decreased almost as fast as has the increase in energy. The result is that while the energy has increased so dramatically the cost per new installation has increased only by roughly an order of magnitude since the 1930's (corrected for inflation), while the number of accelerators operating at the frontier of the field has shrunk. As is shown in the by now familiar Livingston chart this dramatic decrease in cost has been achieved largely by a succession of new technologies, in addition to the more moderate gains in efficiency due to improved design, economies of scale, etc. We are therefore facing two questions: (1) Is there good reason scientifically to maintain the exponential growth, and (2) Are there new technologies in sight which promise continued decreases in unit costs. The answer to the first question is definitely yes; the answer to the second question is maybe. DOE

N86-17102# Fermi National Accelerator Lab., Batavia, Ill.
DETERMINATION OF THE NUCLEON STRUCTURE USING THE WEAK NEUTRAL CURRENT
D. Bogert, R. Burnstein, R. Fisk, S. Fuess, J. G. Morfin, T. Ohska, L. Stutte, J. K. Walker, J. Bofill, and W. Busza Jul. 1985 10 p refs Presented at the 12th International Symposium on Lepton and Photon Interactions At High Energies, Kyoto, Japan, 19 Aug. 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge and Michigan State Univ., East Lansing
(Contract DE-AC02-76CH-03000)
(DE85-017360; FNAL/C-85/108-E; CONF-850819-4) Avail: NTIS HC A02/MF A01
An experimental determination of the neutral current structure functions of the nucleon is obtained by measuring the ratio of the neutral current x distribution to the charged current x distribution. The analysis is based on deep inelastic neutrino nucleon scattering

data gathered in a massive fine-grained neutrino detector exposed to a narrow band neutrino beam at Fermilab. DOE

N86-17103# Fermi National Accelerator Lab., Batavia, Ill.
DETERMINATION OF sin(2)theta/SUB w/ AND rho IN DEEP INELASTIC NEUTRINO-NUCLEON SCATTERING
D. Bogert, R. Burnstein, R. Fisk, S. Fuess, J. Morfin, T. Ohska, L. Stutte, J. K. Walker, J. Bofill, and W. Busza Jun. 1985 10 p refs Presented at the 12th International Symposium on Lepton and Photon Interactions At High Energies, Kyoto, Japan, 19 Aug. 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge and Michigan State Univ., East Lansing
(Contract DE-AC02-76CH-03000)
(DE85-017361; FNAL/C-85/107-E; CONF-850819-3) Avail: NTIS HC A02/MF A01

We have determined the electroweak parameters sin(2)theta/sub w/ and rho by a measurement of deep inelastic neutrino-nucleon scattering using a fine grained neutrino detector exposed to a narrow band neutrino beam at Fermilab. The unique sampling properties of our detector have permitted neutral current and charged current events to be unambiguously identified over a wide kinematic range, thereby allowing a determination of sin(2) theta/sub w/ and rho to be made with good statistics and small systematic errors. We have found sin(2)theta/sub w/ equals 0.246 plus or minus 0.012 plus or minus 0.013 in a single parameter fit. The details of the experimental and theoretical systematic errors are given. DOE

N86-17104# Oregon Univ., Eugene. Inst. of Theoretical Science.
THEORY OF ELEMENTARY PARTICLES Final Report
1985 51 p
(Contract DE-AT06-76ER-70004)
(DE85-017610; DOE/ER-70004/327) Avail: NTIS HC A04/MF A01

Progress is reported in these areas: soft X-ray Li laser pumped by synchrotron radiation; microbunching electron beams; laser acceleration of particles; generation of short risetime radiation pulses from electron storage rings; optimally effective X-ray gratings and zone plates; CP noninvariance, grand unification, and supersymmetry; hadron-nucleus collisions; quark-gluon plasma; polarization phenomena; the Drell-Yan process; supersymmetry phenomenology; Higgs particles; structure of cross-sections for sequential production and decay of spinning particles; flavor changing neutral currents. DOE

N86-17105# California Univ., Berkeley. Lawrence Berkeley Lab.
FINDING A RATIONAL NOMENCLATURE FOR MESONS AND BARYONS
R. M. Barnett, R. N. Cahn, G. Gidal, A. Rittenberg, T. G. Trippe, C. G. Wohl, G. P. Yost, F. C. Porter, J. J. Hernandez, and L. Montanet May 1985 9 p Presented at the International Conference on Hadron Spectroscopy, College Park, Md., 20 Apr. 1985 Prepared in cooperation with California Inst. of Tech., Pasadena, European Organization for Nuclear Research, Geneva, Switzerland, Helsinki Univ., Finland and Stanford Linear Accelerator Center, Menlo Park, Calif.
(Contract DE-AC03-76SF-00098)
(DE85-017646; LBL-19612; CONF-8504133-10) Avail: NTIS HC A02/MF A01

A history of the Particle Data Group's efforts to find a rational and systematic convention for naming mesons and baryons is given. Several versions of our proposal are reviewed, and name changes which would occur are summarized. DOE

N86-17106# Department of Energy, Washington, D. C.
IMPROVED LIQUID-FILM ELECTRON STRIPPER Patent Application
B. F. Gavin, inventor (to DOE) (California Univ., Berkeley. Lawrence Berkeley Lab.) Filed 1 Nov. 1984 20 p
(Contract DE-AC03-76SF-00098)
(DE85-017765; US-Patent-Appl-SN-667255) Avail: NTIS HC A02/MF A01

An improved liquid-film electron stripper particularly for high intensity heavy ion beams which produces constant regenerated, stable, free-standing liquid films having an adjustable thickness between 0.3 to 0.05 microns is discussed. The improved electron stripper is basically composed of at least one high speed, rotating disc with a very sharp, precision-like, ground edge on one side of the disc's periphery and with highly polished, flat, radial surface adjacent the sharp edge. A fine stream of liquid, such as oil, impinges at a 90(0) angle adjacent the disc's sharp outer edge. Film terminators, located at a selected distance from the disc perimeter are positioned approximately perpendicular to the film. The terminators support, shape, and stretch the film and are arranged to assist in the prevention of liquid droplet formation by directing the collected film to a reservoir below without breaking or interfering with the film. One embodiment utilizes two rotating discs and associated terminators, with the discs rotating so as to form films in opposite directions, and with the second disc being located down beam-line relative to the first disc. DOE

N86-17107# Argonne National Lab., Ill.
OPTICAL SPECTRA AND ELECTRONIC STRUCTURE OF ACTINIDE IONS IN COMPOUNDS AND IN SOLUTION
W. T. Carnall and H. M. Crosswhite Aug. 1985 154 p refs
(Contract W-31-109-eng-38)
(DE85-018310; ANL-84-90) Avail: NTIS HC A08/MF A01

This report provides a summary of theoretical and experimental studies of actinide spectra in condensed phases. Much of the work was accomplished at Argonne National Laboratory, but references to related investigations by others are included. Spectroscopic studies of the trivalent actinides are emphasized, as is the use of energy level parameters, evaluated from experimental data, to investigate systematic trends in electronic structure and other properties. Some reference is made to correlations with atomic spectra, as well as with spectra of the (II), (IV), and higher valence states. DOE

N86-17108# Argonne National Lab., Ill.
INTERPRETATIONS OF THE NUCLEAR DEPENDENCE OF DEEP-INELASTIC LEPTON SCATTERING
E. L. Berger Jun. 1985 60 p refs Presented at the Topical Seminar on Few and Many Quark Systems, San Miniato, Italy, 25 Mar. 1985
(Contract W-31-109-eng-38)
(DE85-018413; CONF-8503146-2) Avail: NTIS HC A04/MF A01

A review is presented of data and theoretical interpretations of A dependent effects observed in the deep inelastic scattering of neutrinos and charged leptons from nuclei. After a detailed summary of the experimental situation and survey of the broad spectrum of proposed explanations, I concentrate on the implications of a pion exchange model. This conventional nuclear physics approach provides a unified quantitative description of all features of the present data except, possibly, for the normalization at small x. The pion exchange model reproduces the magnitude and shape of the depression below unity of the ratio of structure functions F2/sup A/(x,Q(2))/F2/sup D/(x,Q(2)) for 0.2 < x < 0.6, observed in all experiments, its rise above unity as x (YIELDS) 1, and the weak enhancement of the antiquark distribution anti q/sup A/(x) demonstrated by the neutrino experiments. If the normalization of the European Muon Collaboration data is reduced by 5%, the model would be in fine agreement for all x. Expectations are presented for the A dependence of massive lepton pair production in hadron collisions. The review concludes with a list of desirable future experiments. DOE

N86-17109# Los Alamos National Lab., N. Mex.
EXPERIMENTS ON ETA-MESON PRODUCTION
J. C. Peng 1985 17 p refs Presented at the Hadronic Probes and Nuclear Interactions Conference, Tempe, Ariz., 11 Mar. 1985
(Contract W-7405-eng-36)
(DE85-010724; LA-UR-85-1511; CONF-8503120-7) Avail: NTIS HC A02/MF A01

Following a review of some highlights of eta-meson characteristics, the status of eta-meson production experiments is reviewed.

The physics motivations and first results of two LAMPF experiments on ((PI),eta) reactions are discussed. Possible future experiments are also discussed. DOE

N86-17110# Colorado State Univ., Fort Collins. Dept. of Physics.
HIGH-ENERGY NEUTRON SPECTROSCOPY ON F-ELECTRON OXIDES
S. Kern, C. K. Loong, and G. H. Lander 1985 10 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE85-017387; CONF-850871-8) Avail: NTIS HC A02/MF A01

Neutron inelastic scattering with the chopper spectrometers at IPNS has been used to measure, for the first time, the ground to excited crystal field transitions in PrO2 (130 meV), BaPrO3 (255 meV), and UO2 (approx.160 meV). From these measurements we deduce the values of V4 = A4 < r(4) > and compare both the absolute values and their variation with theoretical estimates. In the case of UO2 two peaks are seen, one at 155 and the other at 172 meV. This structure exists both below and above T sub N (30.8K) and we believe is caused by a dynamic Jahn-Teller effect that splits the excited GAMMA3 state. DOE

N86-17111# Brookhaven National Lab., Upton, N. Y.
HIGH ENERGY NUCLEAR COLLISIONS: PHYSICS PERSPECTIVES
H. Satz 1985 21 p refs Presented at the Workshop on Experiments for RHIC, Upton, N.Y., 15 Apr. 1985 Prepared in cooperation with Bielefeld Univ. (West Germany)
(Contract DE-AC02-76CH-00016)
(DE85-017511; BNL-36817; CONF-8504152-7) Avail: NTIS HC A02/MF A01

The main aim of relativistic heavy ion experiments is to study the states of matter in strong interaction physics. We survey the predictions which statistical QCD makes for deconfinement and the transition to the quark-gluon plasma. DOE

N86-17112# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH-SPIN PROPERTIES OF SOME NUCLEI AROUND A = 160
F. S. Stephens May 1985 18 p Presented at the Symposium on Nuclear Structure, Copenhagen, Denmark, 20 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-017653; LBL-19980; CONF-8505166-4) Avail: NTIS HC A02/MF A01

Two new types of behavior have been observed in (Er-156). The first is a terminating band ending on a 42+ fully aligned state. The second is a strong cross feeding among four negative parity bands, due most likely to a severe reduction or collapse of the neutron pairing. In (Er-156) we have found two sequences feeding the 38+ level; one slow and one fast. This suggests that some feeding goes through regions of oblate (or nearly so) shapes, and some does not. Lifetimes have been determined for levels around 30+ in (Yb-166), which seem to be longer than is easily explained. DOE

N86-17113# State Univ. of New York, Stony Brook.
ELASTIC SCATTERING OF NEUTRINOS BY ELECTRONS AND PROTONS
D. Hedin 1985 13 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000024; BNL-36912; CONF-850721-4) Avail: NTIS HC A02/MF A01

Measurements of the cross sections for neutrino and antineutrino elastic scattering by both electrons and protons are presented. These measurements were done at the Brookhaven AGS by the E734 Collaboration (Brookhaven/Brown/KEK/Osaka/Pennsylvania/Stony Brook). These results are then used to determine the weak mixing angle sin squared theta sub w. DOE

N86-17114# Washington Univ., Seattle. Nuclear Physics Lab.
COLLIDING-BEAMS POLARIZED ION SOURCE
T. A. Trainor, J. G. Douglas, D. Badt, C. Christiensen, A. Herron, D. Leach, J. Olsen, J. L. Osborne, and V. Zeps 1985 3 p refs Presented at the 6th International Symposium on Polarization Phenomena in Nuclear Physics, Osaka, Japan, 26 Aug. 1985
(Contract DE-AC06-81ER-40048)
(DE86-000534; DOE/ER-40048/146; CONF-850807-8) Avail: NTIS HC A02/MF A01

This ion source was to be purchased from ANAC, Inc., a New Zealand-based supplier of beam optics hardware and atomic beam polarized ion sources in December 1982. Shortly before scheduled delivery ANAC went into receivership. During 1983 little work was done on the project as various steps were taken by us, first to get the ion source completed at ANAC, and then, failing that, to obtain the existing parts. In early 1984 we began work to finish the ion source in Seattle. The project is nearly complete, and this article presents progress to date. DOE

N86-17115# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
OBSERVATION OF HADRONICALLY PRODUCED CHARMED F-MESONS
E. Belau (Institute of Nuclear Physics, Cracow, Poland), T. Boehringer (CERN, Geneva, Switzerland), M. Bosman (CERN, Geneva, Switzerland), V. Chabaud (CERN, Geneva, Switzerland), C. Damerell (Science Research Council, Chilton, England), C. Daum, G. deRijk, H. A. Dijkstra, A. Gillman (Science Council, England), and R. Gilmore (Bristol Univ., England) Jun. 1985 16 p refs Presented at International Conference on Hadron Spectroscopy, College Park, Md., 20-22 Apr. 1985
(NIKHEF-H/85-5; B8569272) Avail: NTIS HC A02/MF A01

Using the NA11 spectrometer, together with a telescope of high resolution microstrip detectors, 12 charmed F-meson decays into KK pi on an estimated background of 4 were measured. The average mass is (1972 + or - 2) MeV, the lifetime (3.1 + 1.2 or - 0.8) times 10 to the minus 13th power sec. Author (ESA)

N86-17116# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
CALCULATION OF THE DECAY mu(-)YIELDS e(-)e(+)e(-)nu SUB mu nu bar SUB C
Paul M. Fishbane (Virginia Univ., Charlottesville) and K. J. F. Gaemers Jun. 1985 21 p refs
(NIKHEF-H/85-8; B8569271) Avail: NTIS HC A02/MF A01

The family mixing process mu(-) yields e(-) e(+) e(-)nu sub mu nu bar sub e, encountered in the standard model of electroweak interactions was evaluated. The evaluation was used to check the results of Bardin et al (1972), to improve the statistics, and to provide a source for distributions. The process is evaluated with currents other than those of the standard model (SM), to provide an experimental check on the SM. Cases where the electron has a charged current V-A but the mu has a current V + alpha A, and where the muon and electron have charged currents of the form V + alpha A are considered. The SM is recovered in the limit alpha = minus 1. Author (ESA)

N86-16445# University of Electro-Communications, Tokyo (Japan). Dept. of Materials Science.
METHOD FOR PRECISELY COMPUTING MOLECULAR INTEGRALS OVER STOS WITH n=1
Noboru Suzuki *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 49-60 refs (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-17117# Fermi National Accelerator Lab., Batavia, Ill.
FERMILAB TEVATRON HIGH LEVEL RF ACCELERATING SYSTEMS
Q. Kerns, C. Kerns, H. Miller, S. Tawser, J. Reid, R. Webber, and D. Wildman Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(DE85-017445; FNAL-TM-1329; CONF-850504-264) Avail: NTIS HC A02/MF A01

Eight tuned RF cavities have been installed and operated in the F0 straight section of the Tevatron. Their mechanical placement along the beam line enables them to be operated for colliding beams as two independent groups of four cavities, group 1-4 accelerating antiprotons and group 5-8 accelerating protons. The only difference is that the spacing between cavities 4 and 5 was increased to stay clear of the F0 colliding point. The cavities can easily be rephased by switching cables in a low-level distribution system (fan-out) so that the full accelerating capability of all eight cavities can be used during a fixed target operations. Likewise, the cables from capacitive probes on each cavity gap can be switched to proper lengths and summed in a fan-back system to give an RF signal representing the amplitude and phase as seen by the beam separately for protons and antiprotons. Such signals have been used to phase lock the Tevatron to the Main Ring for synchronous transfer. DOE

N86-17118# Fermi National Accelerator Lab., Batavia, Ill.
STATISTICS OF DIPOLE STEERING IN THE TEVATRON
M. J. Syphers Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017438; FNAL-TM-1324; CONF-850504-265) Avail: NTIS HC A02/MF A01

Methods of calculating the expected rms orbit distortion and the expected peak orbit distortion for a large FODO synchrotron are described. An expression for the expected rms correction element dipole strength necessary to correct the closed orbit of a large FODO synchrotron is derived. The uncorrected closed orbit of the FNAL Tevatron accelerator is determined from beam position data and operational settings of the correction element diode magnets. The uncorrected orbit and correction element dipole strengths are compared to the results of the Tevatron design study. Use of these expressions for SSC lattices is discussed. DOE

N86-17119# Fermi National Accelerator Lab., Batavia, Ill.
DESIGN, INSTALLATION AND COMMISSIONING OF THE DO OVERPASS AT THE FERMILAB MAIN RING
R. Gerig, M. May, C. Moore, S. Ohnuma, S. Pruss, and F. Turkot Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-016986; FNAL-TM-1317; CONF-850504-249) Avail: NTIS HC A02/MF A01

In order to accommodate large detectors for anti pp studies at the Tevatron, the Main Ring has been modified to be non-planar. A 700 foot-long portion of the ring has been reworked to create an overpass which displaces the beam orbit upwards by 51 inches at the DO long straight section. The overpass region follows the screw geometry proposed by T. Collins. A set of four vertically bending dipoles were inserted into the Main Ring lattice; they are powered on a separate bus and operate at twice the current and field level of a standard bend. To make space for these vertical bends, at each vertical bend point two of the four standard dipoles in a half-cell are removed and the other two are powered at twice the current and field level of the rest of the ring. The vertical bends also have a set of trim coils powered by a separate supply so that any difference in the horizontal and vertical bending strengths can be compensated. The DO overpass was commissioned with beam in November to December 1984. The principal effect on beam dynamics predicted and observed is the introduction of momentum dispersion in the vertical dimension of peak value 1.9m. To preserve closed orbit quality during acceleration, the vertical bends must track the rest of the ring with a precision of better than 0.1%. The Main Ring-Tevatron complex has now been running the fixed-target program for four months; the impact of the DO overpass on accelerator performance has been minimal. DOE

N86-17120# Fermi National Accelerator Lab., Batavia, Ill.
LINEAR APERTURE CRITERIA FOR A STANDARD CELL LATTICE
N. M. Gelfand Jul. 1985 13 p
(Contract DE-AC02-76CH-03000)
(DE85-017365; FNAL-TM-1338) Avail: NTIS HC A02/MF A01

Among the parameters which need to be specified in the design of the SSC are the cell length (1 sub c) and the coil diameter (d sub c). The quality of the magnetic field of the bending magnets, reflected in both small multipole coefficients and a small sigma for these coefficients, improve as d sub c increases. Similarly the smaller beta resulting from a decreased 1 sub c results in an increased admittance (for a constant size beam pipe). Unfortunately increasing d sub c and or 1 sub c would result in increasing the cost of the SSC. It is not only desirable but necessary to understand how the performance of an accelerator depends on d sub c and 1 sub c so that we can have confidence that the SSC when built will work. It should be straightforward to know whether or not an accelerator, once built, works or not. There are, however, no well accepted tools or criteria for deciding whether or not a proposed design of an accelerator will provide acceptable performance. This is particularly so in the case of accelerators built of superconducting magnets in which the magnetic field is determined by the current distribution in the coils. DOE

N86-17121# Los Alamos National Lab., N. Mex.
LAMPF 2 CAPABILITIES FROM AN EXPERIMENTER'S VIEWPOINT
R. J. Macek 1985 35 p refs Presented at the Workshop on Nuclear and Particle Physics at Intermediate Energies with Hadrons (ICTP), Trieste, Italy, 1 Apr. 1985
(Contract W-7405-eng-36)
(DE85-015676; LA-UR-85-2352; CONF-8504169-1) Avail: NTIS HC A03/MF A01

LAMPF 2 has been proposed to extend the intensity frontier of nuclear and particle physics from about 1 GeV to 45 GeV. It is reviewed here with emphasis on capabilities of the experimental facilities. Major accelerator features, costs, and the choice of energy and current are also discussed. DOE

N86-17122# Mound Lab., Miamisburg, Ohio.
ENERGY RESPONSE OF THE DEPANGHER PRECISION LONG COUNTER
M. E. Anderson and J. DePangher 28 Aug. 1985 13 p refs
(Contract DE-AC04-76DP-00053)
(DE85-016980; MLM-3287) Avail: NTIS HC A02/MF A01

The location of the effective center of a long counter is energy dependent and, therefore, the energy response of the counter is a function of both energy and source-detector separation. This report reemphasizes this fact and includes a corrected version of the original energy response curve for the precision long counter. DOE

N86-17123# California Univ., Berkeley. Lawrence Berkeley Lab.
PROGRAM PLAN FOR THE MBE-4 MULTIPLE BEAM EXPERIMENT
R. T. Avery Feb. 1985 76 p
(Contract DE-AC03-76SF-00098)
(DE85-016489; LBL-19592) Avail: NTIS HC A05/MF A01

The technical description treats the arrangement of the injector

system (made up of an existing high voltage Marx generator, a new four-beam source array and a beam conditioning unit for matching and steering) and the accelerator apparatus which contains the 24 shaped-pulsed accelerating units. Flexibility in diagnostic capability and physics experiments has been maintained insofar as possible. DOE

N86-17124# Stanford Linear Accelerator Center, Calif.
PION-SKYRMION SCATTERING: COLLECTIVE COORDINATES AT WORK
M. E. Pekin Jun. 1985 22 p refs Presented at the Symposium on the Recent Developments in Quantum Field Theory, Copenhagen, Denmark, 6 May 1985
(Contract DE-AC03-76SF-00515)
(DE85-014957; SU-SLAC-PUB-3703; CONF-8505192-1) Avail: NTIS HC A02/MF A01

It is argued that the Skryme model, and more generally, the picture of the nucleon as a chiral soliton, can give a qualitatively correct picture of pion-nucleon scattering, considering both group-theoretic and more scheme-dependent results. The properties of the nucleon and its excited states in large-N quantum chromodynamics are discussed qualitatively. Then the pion-nucleon S-matrix is reduced. It is found that the model succeeds at the first level of calculation in producing many of the features of pion-nucleon scattering which are revealed by experiment, but that many aspects of the description need to be better understood, including the treatment of nonleading corrections near threshold and the inclusion of inelastic channels. DOE

N86-17125# Los Alamos National Lab., N. Mex.
TOWARD A MICROSCOPIC UNDERSTANDING OF THE INTERACTING BOSON MODEL OF NUCLEI
J. N. Ginocchio 1985 39 p refs Presented at the 3rd Capri Symposium on Symmetry and Supersymmetry in Nuclear and Subnuclear Physics, Capri, Italy, 20 May 1985
(Contract W-7405-eng-36)
(DE85-015735; LA-UR-85-2704; CONF-8505190-1) Avail: NTIS HC A03/MF A01

Fermion shell model Hamiltonians are constructed which have a class of eigenstates composed of monopole pairs and quadrupole pairs only. Since no boson approximation needs to be made, the Pauli principle is kept intact. Because the SO8 model has a one-to-one correspondence between the space spanned by the fermion states composed of the special monopole and quadrupole pairs of neutrons and protons and the space spanned by the monopole and quadrupole bosons, it is discussed in detail. Recent developments in the Sp6 model are also reported. These two models classify all the shell model states by the number of identical fermion pairs not coupled to coherent monopole or quadrupole pairs. It is suggested that light nuclei may combine features of both SU3 and SO6 symmetry simultaneously. DOE

N86-17126# Brookhaven National Lab., Upton, N. Y.
EXPERIMENTS IN THE FRAGMENTATION REGIONS
M. A. Faessler, P. D. Bond, and L. Remsberg 1985 15 p refs Presented at the Workshop on Experiments for RHIC, Upton, N.Y., 15 Apr. 1985 Prepared in cooperation with European Organization for Nuclear Research, Geneva, Switzerland
(Contract DE-AC02-76CH-00016)
(DE85-016063; BNL-36780; CONF-8504152-6) Avail: NTIS HC A02/MF A01

The fragmentation region is generally defined as the rapidity range where most of the valence partons of the incoming hadrons (or nuclei) are found after normal inelastic interactions. The disadvantages of the existing intersection region for fragmentation region studies are discussed and a slightly modified design is proposed which allows study of the fragmentation region. The considerations which led to the design of a spectrometer magnet are then outlined and some approaches to specific experiments are detailed. DOE

N86-17127# Duke Univ., Durham, N. C. Dept. of Physics.
STUDIES OF INTERACTIONS BETWEEN ELEMENTARY PARTICLES AND NUCLEI Progress Report
1 Aug. 1985 37 p
(Contract DE-AS05-76ER-03065)
(DE85-016572; DOE/ER-03065/50) Avail: NTIS HC A02/MF A01

Data analysis was performed on these four completed experiments: resonance production in (PI)(+)p interactions at 15.7 GeV/c, vector meson production from (GAMMA)p interactions at 20 GeV, particle-nucleus interactions at 100 GeV/, and a search for glueballs in (PI)(-)p yields nK sub s K sub s (PI) (0) at 25 GeV/c and a measurement of hyperon radiative decays. Progress is also reported on these experiments: charm particle production from pp interactions at 400 and 800 GeV/c, direct photon and charmonium production from 300 GeV/c ((PI) (+-), K(+1), p(+-)) d interactions, and a search for a quark-gluon plasma in anti pp collisions at (RADICAL)s - 2 TeV. DOE

N86-17128# Stanford Linear Accelerator Center, Calif.
LINEAR COLLIDERS: PROSPECTS 1985
J. Rees Jun. 1985 9 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract DE-AC03-76SF-00515)
(DE85-015259; SU-SLAC-PUB-3713; CONF-850721-1) Avail: NTIS HC A02/MF A01

We discuss the scaling laws of linear colliders and their consequences for accelerator design. We then report on the SLAC Linear Collider project and comment on experience gained on that project and its application to future colliders. DOE

N86-17129# Pacific Northwest Lab., Richland, Wash.
BETA FIELD MEASUREMENTS AT DOE FACILITIES
L. A. Rathbun, K. L. Swinth, D. L. Haggard, and R. A. Fox Apr. 1985 19 p Presented at the Health Physics Society Annual Meeting, Chicago, Ill., 26 May 1985
(Contract DE-AC06-76RL-01830)
(DE85-013277; PNL-SA-12887; CONF-8505103-5) Avail: NTIS HC A02/MF A01

Beta fields encountered at DOE facilities were characterized and the effects of mixed field radiations on various radiation monitoring devices studied. DOE

N86-17130# Oak Ridge National Lab., Tenn.
SPECIAL PURPOSE MATERIALS FOR MAGNETICALLY CONFINED FUSION REACTORS Annual Progress Report
May 1985 66 p
(Contract DE-AC05-84OR-21400)
(DE85-013529; DOE/ER-0113/4; APR-7) Avail: NTIS HC A04/MF A01

Special purpose materials for magnetically confined fusion reactors are examined as part of the fusion reactor materials program. G.L.C.

N86-17131# Los Alamos National Lab., N. Mex.
PREDICTING FUEL PERFORMANCE FOR SP-100 CONDITIONS
R. E. Baars 1985 8 p Presented at the 2nd SP-100 Program Integration Meeting, Denver, Colo., 17 Sep. 1985
(Contract W-7405-eng-36)
(DE85-017337; LA-UR-85-3005; CONF-8509153-1) Avail: NTIS HC A02/MF A01

This paper reports on methods for analyzing fuel designs proposed for the thermionic and thermoelectric concepts for SP-100 application. The proposed fuel design for the thermionic concept consisted of fully-enriched oxide fuel clad in chemical vapor deposition (CVD) tungsten, which also served as the emitter for the thermionic fuel element (TFE). The fuel density was 95% of theoretical with the linear heat rate flattened radially by removing fuel from the center of the fuel pellet. The fuel inner diameter varied from approx. 0.45 in. at the core center to zero at the edge of the core. The as-fabricated gap between fuel and emitter was 10 mils radial. The emitter thickness was 80 mils, and the outer diameter was 1.099 in. The LIFE-4 code was used for evaluation of this concept after extensive review of the code and

development of a procedure that corrects certain deficiencies noted in analysis of several tests. DOE

N86-17132# California Univ., Berkeley. Lawrence Berkeley Lab.
DEVELOPMENTS IN ACCELERATORS FOR HEAVY ION FUSION
D. Keefe May 1985 8 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-017645; LBL-19601; CONF-850504-278) Avail: NTIS HC A02/MF A01

The long term goal of Heavy Ion Fusion (HIF) is the development of an accelerator with the large beam power, large beam stored-energy, and high brightness needed to implode small deuterium-tritium capsules for fusion power. While studies of an RF linac/storage ring combination as an inertial fusion driver continue in Japan and Europe, the US program in recent times has concentrated on the study of the suitability of linear induction acceleration of ions for this purpose. Novel features required include use of multiple beams, beam current amplification in the linac, and manipulation of long beam bunches with a large velocity difference between head and tail. Recent experiments with an intense bright beam of cesium ions have established that much higher currents can be transported in a long quadrupole system than was believed possible a few years ago. A proof-of-principle ion induction linac to demonstrate beam current amplification with multiple beams is at present being fabricated at LBL. DOE

N86-17133# Fermi National Accelerator Lab., Batavia, Ill.
SUPERCOLLIDER PHYSICS
C. Quigg Mar. 1985 20 p refs Presented at the International Symposium on Physics of Proton-Antiproton Collision, Tsukuba, Japan, 13 Mar. 1985
(Contract DE-AC02-76CH-03000)
(DE85-012305; FNAL/C-85/46-T; CONF-8503151-3) Avail: NTIS HC A02/MF A01

The physics that can be explored with multi-TeV supercolliders is reviewed, including parton distributions, hadron jet production, the standard electroweak theory and minimal extensions to it, technicolor, supersymmetry, and compositeness. DOE

N86-17134# Brookhaven National Lab., Upton, N. Y.
APIPIS: THE ATOMIC PHYSICS ION-PHOTON INTERACTION SYSTEM
B. M. Johnson, K. W. Jones, M. Meron, and V. O. Kostroun 1985 7 p Presented at the 3rd Workshop on Electron Beam Ion Sources and Their Applications, Ithaca, N.Y., 20 May 1985 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC02-76CH-00016)
(DE85-018483; BNL-36925; CONF-8505203-2) Avail: NTIS HC A02/MF A01

A proposed new facility for the study of highly charged heavy ions is described. The basic elements of APIPIS, the Atomic Physics Ion-Photon Interaction System, are: (1) a source of multiply-charged ions; (2) a linear accelerator; (3) a synchrotron storage ring; and (4) a source of high brightness X-rays. The placement of a heavy ion storage ring at the X-ray ring of the National Synchrotron Light Source will provide unique opportunities for the study of photo-excitation of heavy ions. DOE

N86-17135# Brookhaven National Lab., Upton, N. Y.
X-RAY SPECTRA FROM THE CORNELL ELECTRON-BEAM ION SOURCE (CEBIS 1)
B. M. Johnson, K. W. Jones, V. O. Kostroun, E. Ghanbari, and S. W. Janson 1985 7 p ref Presented at the 3rd Workshop on Electron Beam Ion Sources and Their Applications, Ithaca, N.Y., 20 May 1985 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC02-76CH-00016)
(DE85-018484; BNL-36927; CONF-8505203-1) Avail: NTIS HC A02/MF A01

Radiation emitted from the Cornell electron beam ion source (CEBIS 1) has been surveyed with a Si(Li) X-ray detector. These spectra can be used to estimate backgrounds from electron bremsstrahlung and to evaluate the feasibility of atomic physics experiments using the CEBIS 1 source in this configuration. DOE

N86-17136# Brookhaven National Lab., Upton, N. Y.
USE OF GRADIENT MAGNETS IN LOW EMITTANCE ELECTRON STORAGE RINGS
G. Vignola 1985 14 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE85-018565; BNL-36867; CONF-850734-3) Avail: NTIS HC A02/MF A01

The use of gradient magnets for a low emittance electron storage ring is discussed and a magnetic lattice for a 6 GeV electron energy synchrotron radiation source adopting this feature is presented. DOE

N86-17137# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
[ACTIVITIES REPORT IN NUCLEAR AND HIGH ENERGY PHYSICS] Annual Report, 1984
1984 112 p refs
Avail: NTIS HC A06/MF A01

High energy physics research using particle accelerators is summarized. Electron scattering; experiments concerning pions, muons, and antiprotons; theoretical physics; radiochemistry; and technical aspects of the accelerators and associated equipment are discussed. Author (ESA)

N86-17138# Groningen Rijksuniversiteit (Netherlands). Kernfysisch Versneller Inst.
[ACTIVITIES REPORT OF THE INSTITUTE OF NUCLEAR PHYSICS] Annual Report, 1984
J. F. W. Jansen, ed. and R. A. R. L. Malfliet, ed. 1984 146 p refs
Avail: NTIS HC A07/MF A01

Research in experimental nuclear physics; theoretical nuclear physics; atomic and surface physics; nuclear solid state physics; nuclear medicine; environmental physics; and cyclotron based areas is summarized. Instrumentation and electronics, and data analysis and acquisition systems are described. Author (ESA)

74 OPTICS

Includes light phenomena.

N86-17139 Department of the Air Force, Washington, D.C.
METHOD AND APPARATUS FOR GENERATING A STRUCTURED LIGHT BEAM ARRAY Patent
J. Taboada and B. R. Altschuler, inventors (to Air Force) Issued 18 Jun. 1985 9 p Supersedes AD-D011590
(AD-D011899; US-Patent-4,523,809; US-Patent-Appl-SN-520356; US-Patent-Class-350-163) Avail: US Patent and Trademark Office CSCL 20/6

An apparatus is described for simultaneously generating a space volume-filling structural light beam array. It utilizes a prism assembly which refracts a laser light beam so as to partition it into four separate segments. The four segments produced the two-by-two rectangular beam array by coherent interference of the segments. Author (GRA)

N86-17140*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SINGLE SCATTERING FROM NONSPHERICAL CHEBYSHEV PARTICLES: A COMPENDIUM OF CALCULATIONS
Warren J. Wiscombe and Alberto Mugnai (Colorado State Univ., Fort Collins) Jan. 1986 292 p refs
(NASA-RP-1157; Rept-613; NAS 1.61:1157) Avail: NTIS HC A13/MF A01 CSCL 20F

A large set of exact calculations of the scattering from a class of nonspherical particles known as Chebyshev particles' has been

performed. Phase function and degree of polarization in random orientation, and parallel and perpendicular intensities in fixed orientations, are plotted for a variety of particles shapes and sizes. The intention is to furnish a data base against which both experimental data, and the predictions of approximate methods, can be tested. The calculations are performed with the widely-used Extended Boundary Condition Method. An extensive discussion of this method is given, including much material that is not easily available elsewhere (especially the analysis of its convergence properties). An extensive review is also given of all extant methods for nonspherical scattering calculations, as well as of the available pool of experimental data. Author

N86-17141*# Pittsburgh Univ., Pa.
A STUDY OF THE POLARIZATION OF LIGHT SCATTERED BY VEGETATION M.S. Thesis
Paul Norman Woessner 1985 94 p refs
(Grant NAG5-378)
(NASA-CR-176452; NAS 1.26:176452) Avail: NTIS HC A05/MF A01 CSCL 20F

This study was undertaken in order to better understand the factors that govern the polarization of light scattered from vegetation and soils. The intensity and polarization of light scattered by clover and grass in vivo and soil were measured at a number of different angles of incidence and reflectance. Both individual leaves and natural patches of leaves were measured. The light transmitted through the leaves was found to be negatively polarized. The light scattered from the upper leaf surface was found to be positively polarized in a manner which could be accounted for qualitatively but not quantitively by the Fresnel reflection coefficients modified by a shadowing function of the form cos sup2 (g/2), where g is the phase angle. Findings indicate that the polarization of light scattered by vegetation is a more complex process than previously thought, and that besides the surface-scattered component of light, the volume-scattered and multiply-scattered components also contribute significantly to the polarization. Author

N86-17142# California Univ., San Diego. Dept. of Electrical Engineering and Computer Sciences.
RESEARCH ON MATERIALS AND COMPONENTS FOR OPTO-ELECTRONIC SIGNAL PROCESSING Final Report, 1 Oct. 1979 - 30 Sep. 1984
W. S. C. Chang, J. M. Delavaux, S. Forouhar, C. C. Sun, and T VanEck 1 Oct. 1984 53 p
(Grant AF-AFOSR-0037-80)
(AD-A159122; AFOSR-85-0659TR) Avail: NTIS HC A04/MF A01 CSCL 20/6

Design of chirped grating lenses on optical waveguides for opto-electronic signal processing is presented in this report. Fundamental limitations of the performance of chirped grating lenses due to material properties, fabrication tolerance and design parameters are discussed. In addition, electro-absorption and electro-refraction properties in GaAs and InP semiconductors are presented. Cross modulation of optical radiations at two different wavelengths has been observed in GaAs. It has the potential of exhibiting optical and logic. GRA

N86-17143# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A REGULARIZED SOLUTION TO EDGE DETECTION
T. Poggio, H. Voorhees, and A. Yuille May 1985 24 p
(AD-A159348; AI-M-833) Avail: NTIS HC A02/MF A01 CSCL 20/8

The authors consider edge detection as the problem of measuring and localizing changes of light intensity in the image. Edge detection does not have a precisely defined goal. The word edge itself, which refers to physical properties of objects, is somewhat of a misnomer. Several years of experience have shown that the ideal goal of detecting and locating physical edges in the surfaces being imaged is very difficult and still out of reach. Edge detection has come to be defined as the first step toward this goal of detecting physical changes such as object boundaries. Other processes which operate on these measurements of intensity changes will then group boundaries and label and characterize them in terms of the properties of the 3-D surfaces. Intended in this narrow sense, edge detection - this first step in processing the image - is mainly the process that measures, detects and localizes changes of intensity. Derivatives must be estimated correctly to label the critical points in the image intensity array, characterize their local properties (are they minima or maxima or saddle points?) and thus relate them to the underlying physical process (are they shadow edges or depth discontinuities?). GRA

N86-17144# Sandia National Labs., Albuquerque, N. Mex.
BULKHEAD INTERFACE CHASSIS FOR OPTICAL FIBER PATCHING
M. George Jun. 1985 24 p
(Contract DE-AC04-76DP-00789)
(DE85-017320; SAND-85-0867) Avail: NTIS HC A02/MF A01

An optical fiber patch panel was designed to meet the changing needs of optical fiber communication link installations. This paper deals with the specification and construction details of the Bulkhead Interface Chassis patch panel. Included is ordering information for the commercial parts needed and shop drawings of the pieces to be machined. DOE

N86-17145# Los Alamos National Lab., N. Mex.
SYNCHROTRON BASED MEASUREMENTS OF THE SOFT X-RAY PERFORMANCE OF THIN FILM MULTILAYER STRUCTURES
D. R. Kania, R. J. Bartlett, and W. J. Trela 1985 21 p Presented at the Application of Thin Filmed Multilayered Structures To Figured X-ray Optics, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-015679; LA-UR-85-2349; CONF-8508104-1) Avail: NTIS HC A02/MF A01

Using synchrotron radiation, a measuring system has been developed to test the performance of layered synthetic microstructures (LSMs) from 50 to 500 eV. The measurement techniques are reviewed, and results are compared to theoretical predictions of LSM performance. DOE

N86-17146# Brigham Young Univ., Provo, Utah. Dept. of Physics and Astronomy.
IMAGE QUALITY OF FIGURED MULTILAYERED OPTICS
B. G. Peterson, L. V. Knight, and H. K. Pew 1985 12 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AS08-84DP-40199)
(DE85-017252; CONF-850887-27) Avail: NTIS HC A02/MF A01

The reflectivity and resolution of a multilayer structure is strongly affected by the roughness at the interfaces between two successive layers and by the amount that the constituent materials will diffuse into one another at the interfaces. Performance is also affected by the variations in individual layer thicknesses and by inhomogeneities in the materials. These deviations from the ideal multilayer will also affect the quality of the image from a figured multilayer optical element. The theory used to model the effects of non-ideal multilayers on the image quality of figured optics will be discussed. The relationship between image quality and multilayer structure quality will be illustrated with several examples. DOE

N86-17147# Colorado Univ., Boulder.
LIGHT SCATTERING STUDIES OF LOWER DIMENSIONAL COLLOIDAL PARTICLE AND CRITICAL FLUID SYSTEMS Final Progress Report
W. J. OSullivan and R. C. Mockler Aug. 1985 21 p
(Contract DE-AC02-82ER-13004)
(DE86-000212; DOE/ER-13004/3) Avail: NTIS HC A02/MF A01

We have completed a program of small angle scattering Rayleigh linewidth measurements on thin films of a 2,6-lutidine + water mixture. No statistically significant departures from three dimensional dynamic response were seen, although the conditions set by the theory of Calvo and Ferrell were met. We have applied digital image processing to evaluate fractal scale invariance in

two dimensional particle aggregates arising from the induced coagulation of colloidal particle monolayer crystals. Our system gives us the capability of calculating the pair correlation function for both small and very large (20,000 particles) particle clusters. We find evidence of an apparent crossover between kinetic clustering aggregation at small distances (about 20 particle diameters) to percolation or gel/sol transition-behavior at large distances. This is evident in both isolated clusters and in final state giant aggregates. We are carrying through a parallel program of computer calculations whose motivation is to assess the sensitivity of experimental measures of self similarity to cluster size and image resolution, and to generate efficient algorithms which can be applied to calculate fractal critical exponents other than the Hausdorff dimension. We have succeeded in measuring the surface tension of a water surface covered by a colloidal particle monolayer crystal, in both its repulsive-dipole and close-packed van der Waals phases. DOE

N86-17148# Royal Observatory, Edinburgh (Scotland).
THE UK SCHMIDT TELESCOPE OBJECTIVE PRISMS. PART 1: THEIR APPLICABILITY TO SOME MODERN RESEARCH PROJECTS
Ann Savage, Steven M. Beard (Edinburgh Univ.), and John B. Palmer (Edinburgh Univ.) 1985 24 p refs
(ISBN-0-902553-34-8-Pt-1) Avail: NTIS HC A02/MF A01

United Kingdom Schmidt Telescope (UKST) prism applications are summarized. Quasar searches over several square degrees yield sufficiently large samples to allow three-dimensional superclustering studies on 100 to 500 Mpc scales to be made. Surveys for emission-line galaxies and extragalactic HII regions are useful for detailed astrophysical studies on the populations of galaxies found. Surveys to probe the large scale distribution of galaxies, to detect voids and superclustering, are possible from UKST plates. Surveys for emission-line stars, particularly planetary nebulae in the Magellanic Clouds and H alpha emission stars in the Orion star formation region, are described. Detailed spectral classification is possible off the UKST prism plate material thus making searches for specific spectral classes relatively easy, and permitting all stars in large areas of sky to be spectrally classified. Author (ESA)

N86-16582# Joint Publications Research Service, Arlington, Va.
FIELD DISTRIBUTION IN A BENT SINGLE-MODE OPTICAL FIBER
Bao Zhenwu *In its* China Report: Science and Technology (JPRS-CST-85-041) 10 Dec. 1985 p 84-91 refs Transl. into ENGLISH from Tianjin Daxue Xuebao (Tianjin, China), no. 4, Dec. 1984 p 97-102 (For primary document see N86-16573 07-36)
Avail: NTIS HC A07/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-17149 California Univ., Berkeley.
LOCALIZED NONLINEAR ELECTROSTATIC WAVES IN THE AURORAL PLASMA Ph.D. Thesis
Earl Frederick Witt 1984 234 p
Avail: Univ. Microfilms Order No. DA8513046

A significant problem in auroral physics is understanding the process that accelerates auroral zone particles to kilovolt energies. Observations by the polar orbiting S3-3 satellite have identified two distinct types of localized electric field structures below 8000 km that are associated with the acceleration process. Groups of localized potential jumps along the magnetic field lines, called double layers, and associated symmetric potential wells or bumps, called solitary waves, have been observed to propagate along auroral field lines at speeds greater then 50 km/s. The electric field of these structures is directed along the magnetic field, and is small (< 15 mV/m). In contrast to these small amplitude structures, there are the slowly moving electrostatic shocks which consist of localized regions of intense (100 to 1000 mV/m) electric field that is directed at large angles to the magnetic field. To better understand the physics underlying these structures, several electrostatic models of these waves are developed. Dissert. Abstr.

N86-17150# Nagoya Univ. (Japan). Inst. of Plasma Physics.
IS THE DRIFT INSTABILITY RELATED TO H-MODE?
Kouichi Jimbo Oct. 1985 14 p refs
(IPPJ-745) Avail: NTIS HC A02/MF A01

The physical mechanism of the drift instability is reconsidered related to the H-mode in poloidal diverter tokamak plasma. The collisionless drift wave is stabilized as a result of the quasilinear modification of the ion velocity distribution function which includes the particle drift terms along the magnetic field in the scrape-off plasma near the separatcrix of the poloidal divertor tokamak. A freedom in the direction of magnetic field can stabilize the drift instability. The heat flux deposited to the divertor plate is expected to increase after H-mode transition. Author

N86-17151# Nagoya Univ. (Japan). Inst. of Plasma Physics.
STOPPING POWER THEORIES FOR CHARGED PARTICLES IN INERTIAL CONFINEMENT FUSION PLASMAS (EMPHASIS ON HOT AND DENSE MATTERS)
Shosuke Karashima, Tsutomu Watanable, Takako Kato, and Hiroyuki Tawara Sep. 1985 115 p refs
(IPPJ-AM-42) Avail: NTIS HC A06/MF A01

The theoretical approaches on the stopping power of the charged particles penetrating through matters are reviewed. Particular attention is paid to the problems of the energy losses of projectile ions in hot and dense plasmas in the study of inertial confinement fusion (ICF). General physical and mathematical treatments are also outlined. Author

N86-17152# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PARTICLE FLUXES IN THE BANANA REGIME DUE TO RF WAVE INJECTION
Masayoshi Taguchi Sep. 1985 13 p refs
(IPPJ-744) Avail: NTIS HC A02/MF A01

The radial particle fluxes for a two ion species plasma are investigated in an axisymmetric toroidal magnetic field. As a wave-absorption mechanism, the ion-cyclotron damping is considered. The inward and outward fluxes of plasma ions and impurity ions are induced by the RF wave injection when the condition U sub 0 B sub 0 > 0 is satisfied. Here U sub 0 is the phase velocity along the magnetic field and B sub theta is the poloidal magnetic field. Author

N86-17153# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ROTATIONAL STRUCTURE OF FIELD REVERSED CONFIGURATION (FRC) PLASMA PRODUCED BY THETA PINCH
Yoshiyuki Aso Aug. 1985 21 p refs Presented at the 37th Annual Meeting of SBPC, Belo Horizonte, Brazil, 10-17 Jul. 1985
(INPE-3622-PRE/806) Avail: NTIS HC A02/MF A01

The rotation of the plasma with a field reversed configuration (FRC) was observed in STP-L (Staged Theta Pinch-Linear) experiments in Nagoya University. The produced plasma in this experiment can be divided into three parts, i.e., the core plasma (FRC plasma), its surrounding halo plasma and the escaping guide plasma. The rotation of each plasma was measured from the Doppler shift of CV-spectral line, the relative ion current and the streak photographs, respectively. As a result, it is shown that the behavior of plasma rotation changes from the double structure to the triple structure when the plasma is all detached from the discharge tube, and that the FRC plasma in the early phase is rotating in the direction of electron diamagnetic current, even if the plasma touches at the discharge tube. Author

N86-17154# California Univ., Berkeley. Electronics Research Lab.
ON PLASMA THEORY AND SIMULATION Quarterly Progress

Report, 1 Jan. - 30 Jun. 1984
C. K. Birdsall 30 Jun. 1985 56 p
(Contracts N00014-77-C-0578; DE-AT03-76ET-53064; RRO-109)
(AD-A156747; QPR-1; QPR-2) Avail: NTIS HC A04/MF A01 CSCL 20/9

Topics include: (1) electron Bernstein wave investigations -- simulations of driving a plasma with these waves, just off perpendicular, has begun, obtaining the predicted damping rate. The objectives are understanding, with potential application to current drive or heating; (2) simulation of plasma-sheath region, including ion reflection -- using ion reflection at a wall of 70% causes a larger drop in wall sheath potential and an increase in the field at the wall. Reflection here means re-emission, i.e., a return as half-Maxwellian; (3) single ended plasma device, general behavior dc or ac -- this paper decribes simulations with various dc biases, showing both stable states (floating, negative bias) and unstable (moderate positive bias) with periodic current disruptions (relaxation oscillations) for both electron and ion rich sources; (4) single ended plasma device, unstable states -- this paper is more detail of the instabilities in showing J(t) and phase space for the ion-rich instability; (5) corrections to time-dependent Q-machine equilibria -- in the ion-rich source, negatively biased collector simulations, the classical analysis has an electron hole at the source. However, this hole is filled in the simulations, even when the number of particles is made very large (reducing fluctuations). The corresponding filled-hole analysis fits the measured potentials and (6) multifluid derivation of the Alfven ion-cyclotron linear dispersion relation. GRA

N86-17155# STD Research Corp., Arcadia, Calif.
HYPERVELOCITY PLASMAS WITH STRONG MHD (MAGNETOHYDRODYNAMIC) INTERACTIONS Final Technical Report, 1 Jun. 1983 - 31 May 1984
S. T. Demetriades and C. D. Maxwell Dec. 1984 60 p
(Contract F49620-83-C-0115)
(AD-A158867; STDR-84-29; AFOSR-85-0667TR) Avail: NTIS HC A04/MF A01 CSCL 20/9

Use of body forces to inject energy into a plasma offers certain advantages over simple energy addition by Ohmic heating. To achieve ever-increasing levels of energy per unit mass by this strategy requires detailed and thorough understanding of high-interaction magnetohydrodynamics (HIMHD) through realistic computer simulation. Such simulation is possible by the existing, HIMHD codes provided they undergo further validation in the high-interaction regime through systematic experiments. The present work has carried out a critical assessment of several methods for achieving high-interaction, high-magnetic Reynolds number MHD flows. It indicates that continuous flow (as contrasted to pulsed flow) plasmajet-drive MHD devices offer the greatest advantages and potential for validating the STD/MHD codes at high MHD interaction over a wide range of parameters with the greatest confidence. It has led to the definition of specific plasmajet-driven experiments, utilizing existing equipment, as the most effective way to carry out this task. GRA

N86-17156# Oak Ridge National Lab., Tenn.
FEDC TRADE STUDIES: UPGRADED CAPABILITY EXISTS TO EXAMINE COST/PERFORMANCE SENSITIVITIES FOR ALL TOKAMAK OPTIONS
C. A. Flanagan 1985 30 p Presented at the Ignition Studies Mission 2 Meeting, Los Angeles, Calif., 31 Jan. 1985
(Contract DE-AC05-84OR-21400)
(DE85-006919; CONF-850148-1) Avail: NTIS HC A03/MF A01

Information from the FEDC (Fusion Engineering Design Center) trade studies is presented in viewgraph form. The existance of upgraded capabilities to examine the cost/performance sensitivities of all tokamak options were examined. DOE

N86-17157# Washington Univ., Seattle. Nuclear Physics Lab.
UNIVERSITY OF WASHINGTON SUPERCONDUCTING BOOSTER LINAC
D. W. Storm, J. F. Amsbaugh, J. G. Cramer, H. E. Swanson, T. A. Trainor, R. Vandenbosch, W. G. Weitkamp, and D. I. Will 1985 4 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC06-84ER-40124)
(DE85-017418; DOE/ER-40124/5; CONF-850504-272) Avail: NTIS HC A02/MF A01

We have begun construction of a superconducting linac designed to accelerate ions from protons through about mass 60. Injected by out 9 MV-terminal tandem van de Graaff accelerator, the linac is expected to double the proton energy and quadruple the energies of heavier ions. The resonators are lead plated copper quarter wave structures. The overall layout and expected performance of the accelerator will be presented, along with a brief status report. DOE

N86-17158# Lawrence Livermore National Lab., Calif.
ACCELERATION OF COMPACT TORUS PLASMA RINGS IN A COAXIAL RAIL-GUN
C. W. Hartman, J. H. Hammer, and J. Eddleman 16 May 1985 5 p Presented at the 7th US Symposium on Compact Toroid Research, Santa Fe, N. Mex., 21 May 1985
(DE85-016069; UCRL-92689; CONF-8505100-18) Avail: NTIS HC A02/MF A01

We discuss here theoretical studies of magnetic acceleration of Compact Torus plasma rings in a coaxial, rail-gun accelerator. The rings are formed using a magnetized coaxial plasma gun and are accelerated by injection of B sub theta flux from an accelerator bank. After acceleration, the rings enter a focusing cone where the ring is decelerated and reduced in radius. As the ring radius decreases, the ring magnetic energy increases until it equals the entering kinetic energy and the ring stagnates. Scaling laws and numerical calculations of acceleration using a O-D numerical code are presented. 2-D, MHD simulations are shown which demonstrate ring formation, acceleration, and focusing. Finally, 3-D calculations are discussed which determine the ideal MHD stability of the accelerated ring. DOE

N86-17159# Oak Ridge National Lab., Tenn.
COMPACT DT FUSION SPHERICAL TORI AT MODEST FIELDS
Y. K. M. Peng 1985 5 p Presented at the Annual Meeting of the American Nuclear Society, Boston, Mass., 9 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016415; CONF-850610-37) Avail: NTIS HC A02/MF A01

A spherical torus is obtained by retaining only the indispensable components on the inboard side of a tokamak plasma, such as a cooled, normal conductor that carries current to produce a toroidal magnetic field. The resulting device features an exceptionally small aspect ratio (typically 2-to-1 elongation), and ramp-up and maintenance of the plasma current primary by noninductive means. The tokamak plasma takes on the spherical shape with a modest hole through the center, suggesting the name of spherical torus. This paper reviews the initial assessments of near-term DT fusion devices based on the spherical torus concept. DOE

N86-17160# Wisconsin Univ., Madison.
REVERSED FIELD PINCH: PROGRESS AND PROMISE
J. C. Sprott May 1985 15 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC02-76ET-53051)
(DE85-014865; DOE/ET-53051/85; CONF-850808-13) Avail: NTIS HC A02/MF A01

The Reversed Field Pinch (RFP) is a fusion reactor concept which, like the tokamak, confines the reacting plasma by the magnetic field produced in part by electrical currents flowing in the toroidally-confined plasma. Unlike the tokamak, the RFP requires very little externally-applied magnetic field, and thus offers the promise of a compact reactor with high power density which can be ohmically heated to ignition using non-superconducting magnet coils. Recent progress worldwide in RFP performance and physics understanding offers the promise of a new generation of devices which approach reactor conditions. DOE

N86-17161# Wisconsin Univ., Madison. Dept. of Nuclear Engineering.
COLLISIONAL EFFECTS ON COHERENT NONLINEAR WAVE PARTICLE INTERACTIONS AT CYCLOTRON HARMONICS
M. D. Carter, J. D. Callen, D. B. Batchelor, and R. C. Goldfinger Jun. 1985 39 p Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contracts DE-AC02-80ER-53104; DE-AC05-84OR-21400)
(DE85-016796; DOE/ER-53104/T3) Avail: NTIS HC A03/MF A01

When particle orbits are trapped very near a cyclotron harmonic resonance, the quasilinear concept of weakly perturbed, uncorrelated passages through resonance breaks down, and nonlinear effects become important. Numerical as well as analytic studies demonstrate that relativistic detuning of the resonance can be important for electrons even at low initial energies (approx. 20 eV) and that coupling to perturbed parallel motion can lead to strong interactions for values of the turning point where the wave frequency differs from a harmonic multiple of the bounce averaged gyrofrequency by an integral multiple of the bounce frequency. The resultant motion is described by large periodic energy excursions for which small angle Coulomb collisions or other randomization processes are required to realize net heating. Analytic formulae are derived describing the energy excursion behavior and heating in mildly relativistic limit. Also, a Monte Carlo numerical model of the collisional effects on the orbits has been employed to study electron heating at the second harmonic cyclotron resonance and to test the analytic results. In certain regimes of collisionality, a strong enhancement over quasilinear heating has been found. DOE

N86-17162# GT-Devices, Alexandria, Va.
MASS ACCELERATION IN A MULTI-MODULE PLASMA JET FOR IMPACT FUSION Final Report, 21 May 1984 - 21 May 1985
R. L. Burton, S. A. Goldstein, D. A. Tidman, D. W. Massey, N. K. Winsor, and F. D. Witherspoon Jul. 1985 55 p
(Contract DE-AC06-84DP-40202)
(DE85-015824; DOE/DP-40202/1) Avail: NTIS HC A04/MF A01

GT-Devices began work on multi-module mass accelerators for impact fusion in 1981. The technique employs sequentially switched high pressure plasma jets to accelerate a lightweight projectile in a circular barrel. The purpose of the work of the past 12 months was to improve the understanding of the plasma jet acceleration process, and to translate that understanding into verifiable results. Both goals have been accomplished. During the past year we conceived, designed, built and fired 325 shots on the Module Test Facility (MTF). This facility provided sufficient diagnostics to investigate a wide variety of geometries, plasmas and current pulses, so that rapid progress was made. DOE

N86-17163# Brookhaven National Lab., Upton, N. Y.
RELATIVISTIC HEAVY ION PHYSICS
O. Hansen 1985 7 p refs Presented at the Symposium on Nuclear Structure, Copenhagen, Denmark, 20 May 1985
(Contract DE-AC02-76CH-00016)
(DE85-017522; BNL-36789; CONF-8505166-3) Avail: NTIS HC A02/MF A01

In the fall of 1986, beams of heavy ions up to A = 40 at total energies up to E = 225 GeV/nucleon will become available for experiments at CERN (60 and 225 GeV/nucleon) and at Brookhaven (15.5 GeV/nucleon). Future experiments to look for quark confinement are discussed. DOE

N86-17164# Brookhaven National Lab., Upton, N. Y.
CAN ANTIBARYONS SIGNAL THE FORMATION OF A QUARK-GLUON PLASMA
U. Heinz, P. R. Subramanian, and W. Greiner 1985 13 p Presented at the Workshop on Experiments for RHIC, Upton, N.Y., 15 Apr. 1985 Prepared in cooperation with Johann-Wolfgang-Goethe-Univ., Franfurt am Main West Germany
(Contract DE-AC02-76CH-00016)
(DE85-012262; BNL-36620; CONF-8504152-1) Avail: NTIS HC A02/MF A01

We report on recent work which indicates that an enhancement of antibaryons produced in the hadronization phase transition can signal the existence of a transient quark-gluon plasma phase formed in a heavy-ion collision. The basis of the enhancement mechanism is the realization that antiquark densities are typically a factor 3 higher in the quark-gluon plasma phase than in hadronic matter at the same temperature and baryon density. The signal is improved by studying larger clusters of antimatter, i.e., light antinuclei like anti alpha, in the central rapidity region. The effects of the transition dynamics and of the first order nature of the phase transition on the hadronization process are discussed. DOE

N86-17165# Stanford Univ., Calif. High Temperature Gasdynamics Lab.
MAGNETOHYDRODYNAMIC POWER GENERATION Final Report, 9 Mar. 1984 - 8 Mar. 1985
C. H. Kruger, R. H. Eustis, M. Mitchner, S. A. Self, and T. Nakamura Jun. 1985 151 p
(Contract DE-AC22-84PC-70509)
(DE85-016429; DOE/PC-70509/T3) Avail: NTIS HC A08/MF A01

Experimental and theoretical research has been conducted to investigate phenomena expected to be important in the development of MHD power generation. The areas investigated were: Boundary layers and generator loss mechanisms, plasma nonuniformities and instabilities, investigation of rod electrodes, seed-slag interaction and the reactivity of coal, disk generators, and temperature diagnostic techniques for combustion MHD plasmas. Brief summaries of the principal results and their expected impact for large scale MHD generators are given: (1) Secondary flows driven by transverse Lorentz forces are predicted to be a major phenomenon in large-scale generators. We have studied this phenomenon by conducting experiments in a laboratory-scale facility in which a high magnetic interaction parameter for driving such secondary flows has been achieved by applying axial current and by maintaining low flow rates. The results of measurements of transverse velocities show that the resulting secondary flows consist of intense, large-scale vortices which convectively distort the cross-plane distribution of important plasma properties. (2) An experimental approach based on measurements of the phase difference of acoustic waves excited in an MHD generator has been successfully employed to detect changes caused by the magnetoacoustic interaction. Predictions for large-scale MHD generators, based upon this same theory, suggest that the possible detrimental effects of the magnetoacoustic interaction cannot be ignored, and must be given serious attention in the design of large-scale facilities. DOE

N86-17166# Brookhaven National Lab., Upton, N. Y.
SUMMARY OF THE WORKING GROUP ON THE CONSTRUCTION AND DEMONSTRATION OF A SIBERIAN SNAKE
L. G. Ratner and R. R. Raylman 1985 3 p Presented at a Workshop on Polarized Beams at the SSC, Ann Arbor, Mich., 10 Jun. 1985 Prepared in cooperation with Michigan Univ., Ann Arbor
(Contract DE-AC02-76CH-00016)
(DE85-016060; BNL-36782; CONF-8506173-2) Avail: NTIS HC A02/MF A01

It was recognized as long ago as the 1977 Ann Arbor Meeting on Higher Energy Polarized Proton Beams that a Siberian Snake should be built and tested in an operating accelerator. A program to accomplish this at Argonne National Laboratory (ANL) was part of a proposal to DOE to construct a small R and D accelerator at ANL. This was never implemented and between then and now many thoery papers have been written but no Proof of Principle Experiment (POPE) has been done. The present Ann Arbor workshop again strongly recommends that a POPE be implemented as soon as possible since it has important consequences for all of the new higher energy machines. This Demo Snake working group zeroed in on the Alternating Gradient Synchrotron (AGS) as the place where such a project could now be most effectively done. The AGS has a polarized beam and knowledgeable theoretical and experimental accelerator physicists who have been

working with polarized beams in accelerators for the last few years. Referring to the information contained in the introductory remarks to the working group on the characteristics of snake, we detail the necessary design for the AGS. DOE

N86-17167# Oak Ridge National Lab., Tenn.
SIMPLE PROCEDURE FOR ESTABLISHING IGNITION CONDITIONS IN TOKAMAKS
N. A. Uckan and J. Sheffield 1985 31 p Presented at the Workshop on Tokamak Start-Up, Problems and Scenarios Related to the Transient Phases of Long-Burn Operations, Erice, Italy, 14 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016149; CONF-850708-2) Avail: NTIS HC A03/MF A01

A method of establishing ignition conditions and plasma operating regimes over large regions of parameters space (r0/a, b/a, aB0(2)/q, etc.) under various physics assumptions (chi sub e, chi sub i, q sub psi, (beta sub crit, n sub crit, etc.) with a simple systematic global model is presented. Contour plots of ignition, supplementary power, and plasma heating and operating windows are generated. These are then used to analyze the potential physics design space, operating regimes, and plasma performance characteristics of small (R0 approx. 1 to 2 m), high field (B0 approx. 8 to 13 T) ignition experiments that are currently being considered by the US Tokamak Ignition Design Studies. DOE

N86-17168# Texas Univ., Austin. Inst. for Fusion Studies.
COMPRESSIBILITY EFFECTS ON IDEAL AND KINETIC BALLOONING MODES AND ELIMINATION OF FINITE LARMOR RADIUS STABILIZATION
M. Kotschenreuther Jul. 1985 69 p
(Contract DE-FG05-80ET-53088)
(DE85-017162; IFSR-172) Avail: NTIS HC A04/MF A01

The dynamics of ideal and kinetic ballooning modes are considered analytically including parallel ion dynamics, but without electron dissipation. For ideal modes, parallel dynamics predominantly determine the growth rate when beta is within approx. 30% of the ideal threshold, resulting in a substantial reduction in growth rate. compressibility also eliminates the stabilization effects of finite Larmor radius (FLR); FLR effects (when temperature gradients are neglected) can even increase the growth rate above the MHD value. Temperature gradients accentuate this by adding a new source of free energy independent of the MHD drive, in this region of ballooning coordinate corresponding in MHD to the continuum. Analytic dispersion relations are derived demonstrating the effects above; the formalism emphasizes the similarities between the ideal MHD and kinetic cases. DOE

N86-17169# Stanford Linear Accelerator Center, Calif.
FRACTIONAL CHARGE IN A NUT-SHELL
D. Boyanovsky and R. Blankenbecler Apr. 1985 4 p Presented at the Symposium on Anomalies, Geometry and Topology, Argonne, Ill., 28 Mar. 1985
(Contract DE-AC03-76SF-00515)
(DE85-013053; SU-SLAC-PUB-3652; CONF-8503141-1) Avail: NTIS HC A02/MF A01

We study the physics of charge fractionalization using simple methods. The strategy is to count the number of states of the theory with solitons relative to the same theory with trivial background fields. The interplay between high and low energy contributions is exposed and the topological properties clarified. DOE

N86-17170# Sandia National Labs., Albuquerque, N. Mex.
IMPORTANT CONCEPTS IN THE ASSEMBLY AND EARLY CHARACTERIZATION OF THE PBFA 2 ACCELERATOR
S. A. Goldstein, R. J. Clevenger, G. L. Donovan, G. T. Holman, R. R. Johnston, and D. R. Nations 1985 23 p Presented at the 5th IEEE Pulsed Power Conference, Washington, D.C., 10 Jun. 1985
(Contract DE-AC04-76DP-00789)
(DE85-012864; SAND-84-2170C; CONF-850616-19) Avail: NTIS HC A02/MF A01

Some of the concepts for orchestrating large numbers of events associated with accelerator assembly and characterization include: (1) structuring of activity into smaller workable and trackable packages, with associated subelements assigned to each section of the accelerator, (2) establishing detailed assembly and characterization documentation to assist in component testing and subsystem integration, (3) structuring the project team for efficient communication, identification of responsibility, and capability for problem and conflict resolution, and (4) developing technologies for receival, inventory, controlled storage, staging, and phased installation and testing of components and pieceparts. The application of these and other concepts to PBFA II, and the progress of accelerator assembly is discussed. DOE

N86-17171# Oak Ridge National Lab., Tenn.
SUBMILLIMETER WAVE PROPAGATION IN TOKAMAK PLASMAS
C. H. Ma, D. P. Hutchinson, P. A. Staats, K. L. VanderSluis, D. K. Mansfield, H. Park, and L. C. Johnson 1985 7 p Presented at the International Symposium on Antennas and EM Theory, Beijing, China, 25 Aug. 1985 Prepared in cooperation with Princeton Univ., N.J.
(Contract DE-AC05-84OR-21400)
(DE85-016292; CONF-8508113-1) Avail: NTIS HC A02/MF A01

The propagation of submillimeter-waves (smm) in tokamak plasmas has been investigated both theoretically and experimentally to ensure successful measurements of electron density and plasma current distributions in tokamak devices. Theoretical analyses have been carried out to study the polarization of the smm waves in TFTR and ISX-B tokamaks. A multichord smm wave interferometer/polarimeter system has been employed to simultaneously measure the line electron density and poloidal field-induced Faraday rotation in the ISX-B tokamak. The experimental study on TFTR is under way. Computer codes have been developed and have been used to study the wave propagation and to reconstruct the distributions of plasma current and density from the measured data. The results are compared with other measurements. DOE

N86-17172# Lawrence Livermore National Lab., Calif.
SUMMARY OF TMX-U RESULTS: 1984. VOLUME 2
T. C. Simonen, ed. 14 Dec. 1984 506 p
(Contract W-7405-eng-48)
(DE85-017287; UCID-20274-Vol-2) Avail: NTIS HC A22/MF A01

The following areas are covered in this volume: (1) TREQ code; (2) Fokker-Planck and Monte Carlo calculations; (3) vacuum and gas modeling; (4) TMX-U data analysis and formulary; (5) thermal barrier operation; (6) plasma stability; (7) MHD and beta limits; (8) If fluctuations; (9) central-cell ion-cyclotron microinstability; (10) end-cell ion-cyclotron microinstability; and (11) hot electron microinstability. In addition, discussions on the following technological developments are given: vacuum, magnet, fueling, heating, potential control technology, diagnostic systems, and computer systems. DOE

N86-17173# New York Univ., New York. Magneto-Fluid Dynamics Div.
SEMI-IMPLICIT METHOD FOR MHD COMPUTATIONS WITHOUT AN ALFVEN WAVE CFL RESTRICTION
D. S. Harned and D. D. Schnack May 1985 31 p
(Contract DE-AC02-76ER-03077)
(DE85-017374; DOE/ER-03077/247; MF-106) Avail: NTIS HC A03/MF A01

A semi-implicit method for solving the three-dimensional magnetohydrodynamic equations on long time scales is presented. Standard explicit methods must use time steps which are constrained by a Courant-Friedrichs-Lewy condition due to the fast compressional and shear Alfven motion. This semi-implicit method eliminates both of these restrictions so that very large time steps are permitted. The method is simple to implement and the computation time for one time step is essentially the same as for

explicit methods. Numerical test results in slab and cylindrical geometry are presented. DOE

N86-17174# Superwave Technology, Inc., Santa Clara, Calif.
DEMONSTRATION OF FEASIBILITY OF DEPOSITING SEMICONDUCTOR LAYERS USING MICROWAVE ENHANCED PLASMA TECHNIQUES Final Technical Report
1985 52 p
(Contracts NAS7-100; JPL-9-56828)
(NASA-CR-176458; DOE/JPL-956828-03; NAS 1.26:176458; DE85-011833) Avail: NTIS HC A04/MF A01

Manufacturing of low cost more efficient photovoltaic cells partly depends on the development of new process technologies, one of which is the deposition of thin films at relatively low substrate temperatures. Superwave Technology, in an effort to demonstrate the feasibility of microwave enhanced plasma as a means of producing better quality films, has successfully developed a simple but versatile system. The microwave enhanced plasma system developed has the capability of depositing various films of different compositions. This effort was directed towards deposition of silicon nitride film through gas phase plasma reaction. DOE

N86-17175# Lawrence Livermore National Lab., Calif.
COLLISION BROADENED RESONANCE LOCALIZATION IN TOKAMAKS EXCITED WITH ICRF WAVES
G. D. Kerbel and M. G. McCoy Aug. 1985 23 p Presented at the 3rd European Workshop on Problems in the Numerical Modeling of Plasmas, Varenna, Italy, 10 Sep. 1985
(Contract W-7405-eng-48)
(DE85-017829; UCRL-92608; CONF-8509162-1) Avail: NTIS HC A02/MF A01

Advanced wave models used to evaluate ICRH in tokamaks typically use warm plasma theory and allow inhomogeneity in one dimension. The authors have developed a bounce-averaged Fokker-Planck quasilinear computational model which evolves the population of particles on more realistic orbits. Each wave-particle resonance has its own specific interaction amplitude within any given volume element. These data need only be generated once, and appropriately stored for efficient retrieval. The wave-particle resonant interaction then serves as a mechanism by which the diffusion of particle populations can proceed among neighboring orbits. Collisions affect the absorption of RF energy by two quite distinct processes: In addition to the usual relaxation towards the Maxwellian distribution creating velocity gradients which drive quasilinear diffusion, collisions also affect the wave-particle resonance through the mechanism of gyro-phase diffusion. The local specific spectral energy absorption rate is directly calculable once the orbit geometry and populations are determined. The code is constructed in such fashion as to accommodate wave propagation models which provide the wave spectral energy density on a poloidal cross-section. Information provided by the calculation includes the local absorption properties of the medium which can then be exploited to evolve the wave field. DOE

N86-17176# Department of Energy, Washington, D. C.
STEADY-STATE INDUCTIVE SPHEROMAK OPERATION Patent Application
A. C. Janos (Princeton Univ., N.J.), S. C. Jardin, and M. Yamada, inventors (to DOE) Filed 20 Feb. 1985 37 p
(Contract DE-AC02-76CH-03073)
(DE85-017759; US-Patent-Appl-SN-703577) Avail: NTIS HC A03/MF A01

The inductively formed spheromak configuration (S-1) can be maintained in a highly stable and controlled fashion. The method described eliminates the restriction to pulsed spheromak plasmas or the use of electrodes for steady-state operation, and, therefore, is a reactor-relevant formation and sustainment method. DOE

N86-17177# Department of Energy, Washington, D. C.
TOKAMAK REACTOR FIRST WALL Patent Application
R. L. Creedon (GA Technologies, Inc., San Diego, Calif.), H. E. Levine, C. Wong, and J. Battaglia, inventors (to DOE) Filed 20 Nov. 1984 17 p
(Contract DE-AT03-76ET-51011)
(DE85-017771; US-Patent-Appl-SN-673450) Avail: NTIS HC A02/MF A01

A first wall construction for a tokamak reactor is disclosed. The wall comprises a series of hollow lobes, each with a pair of side wall portions with a curved end wall portion which extends between it. This invention relates to an improved first wall construction for a tokamak fusion reactor vessel, or other vessels subjected to similar pressure and thermal stresses. DOE

N86-17178# Kema (N. V.), Arnhem (Netherlands). Dept. of Physical Research.
ION DENSITY AND DIELECTRIC BREAKDOWN IN THE AFTERGLOW OF A HIGH-CURRENT ARC DISCHARGE
W. R. Rutgers, F. C. M. Verhagen, W. A. deZeeuw, and A. J. vanLoon, ed. 1984 16 p refs
(S/T-Rept-Vol-2-No-9; ISBN-90-353-0020-3; ISSN-0167-8590; B8569666) Avail: NTIS HC A02/MF A01

The ion density in the afterglow of a high-current atmospheric arc-discharge and electrical breakdown were investigated in atomic (argon), molecular (nitrogen) and electronegative (carbon dioxide) media. From the decay with time of the ion density, effective recombination coefficients can be calculated. When the ion density is reduced to values < 2 times 10 to the 17th power/cum the afterglow plasma changes from a resistive into a dielectric medium. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-17179 Michigan State Univ., East Lansing.
THEORY OF THE ELASTIC AND VIBRATIONAL PROPERTIES OF CENTRAL FORCE RANDOM NETWORKS Ph.D. Thesis
Edward Joseph Garboczi 1985 160 p
Avail: Univ. Microfilms Order No. DA8513898

Central force random networks which are generated by randomly removing bonds on a lattice are simple models with which to study the rigidity transition where the elastic moduli of a system go to zero as a function of decreasing mean connectivity. A simple constraint counting argument gives a prediction for the critical threshold p*, called the rigidity threshold, and f(p), the fraction of zero frequency modes, where p is the fraction of bonds present evidence from three different networks is presented that shows these predictions to be in excellent agreement with numerical simulations. Also it is shown that the elastic moduli for nearest neighbor central forces scale linearly with p, in excellent agreement with a simple effective medium theory. This coherent potential approximation based effective medium theory also gives a quite good description of the entire vibrational density of states for these same networks. Evidence is presented from both numerical simulation and effective medium theory that a fixed point exists-- the ratio of C sub 11/C sub 44 always converges to a constant along a given track in phase space independent of its starting value before removing bonds. Dissert. Abstr.

N86-17180 Oklahoma State Univ., Stillwater.
LASER SPECTROSCOPIC STUDIES OF IONS IN SOLIDS Ph.D. Thesis
Ali Muhammed Ghazzawi 1984 114 p
Avail: Univ. Microfilms Order No. DA8515262

Time-resolved site-selection spectroscopy is utilized to study spectral energy migration between Eu sup 2 + ions in RbMgF3:Euk sup 2 +, Mn sup 2 + crystal. Degenerate four-wave mixing (FWM) transient-grating spectroscopy is employed to study certain nonlinear processes in alexandrite (BeAl2O4:Cr sup 3 +) crystal. Excition diffusion is investigated in NdP5O14 by nondegenerate FWM transient-grating spectroscopy. In RbMgF3:Eu sup 2 + crystal, the results indicate that the transfer process between Eu

sup 2 + ions in three nonequivalent sites is consistent with electric dipole-dipole interaction and is enhanced by the thermal occupation of the upper crystal field component of the sensitizer. The microscopic origin of the different types of sites may be due to the presence of structural or chemical impurities in the lattice. The results imply that Eu sup 2 + ions are forming clusters in this host. The FWM signal efficiency in alexandrite varies quadratically with pump power for large pump beam crossing angles with some saturation at small angles. Dissert. Abstr.

N86-17181 Arizona Univ., Tucson.
A SEARCH FOR CHANGES IN THE BAND STRUCTURE OF EXTREMELY STRAIN-FREE Mg(Cd) CRYSTALS AS A FUNCTION OF ALLOYING, IN THE DILUTE LIMIT Ph.D. Thesis
John Carlton Kupfer 1985 122 p
Avail: Univ. Microfilms Order No. DA8514912

A study of a specific doublet of de Haas-van Alphen frequencies in pure Mg and very dilute Mg(Cd) alloys with the magnetic field aligned with the c-axis. The work involved three stages. First, the use of extremely strain-free crystals, temperatures down to 40 millidegree Kelvin, large amplitude modulation, and the fast Fourier transform allowed the components of this doublet to be well resolved. This resolution allowed measurement of the changes in the cross sectional area as a function of magnetic field orientation to verify the assignment of this doublet to the cap and monster arm junction at the top of the Brillouin zone. Third, with the magnetic field aligned with the c-axis, the splitting of this doublet offered a direct and sensitive indication of any symmetry breaking changes in the (0001) Fourier component of the ionic lattice potential in Mg upon the introduction of Cd. C. B. Friedberg's analysis of his electron interference lineshape data from the quantum interferometer in Mg had indicated that the energy of this band gap should increase by 40% with the introduction of 15 ppm Cd.
Dissert. Abstr.

N86-17182 Texas A&M Univ., College Station.
THEORY OF INTERFACE STATES AT SI/TRANSITION. METAL-SILICIDE INTERFACES Ph.D. Thesis
Hunhwa Lim 1985 151 p
Avail: Univ. Microfilms Order No. DA8514252

The Si/NiSi2(111) interface is of both fundamental and technological interest: From the fundamental point of view, it is the best characterized of all semiconductor/metal interfaces, with two well-determined geometries (A and B) involving nearly perfect bonding. Consequently, a theoretical treatment of this system makes sense as it would not for messier systems-and one can have some confidence that the theoretical predictions are relevant to experimental observations. From the technological point of view, Si/NiSi2 is representative of the class of semiconductor/metal interfaces that are currently of greatest interest in regard to electronic devices, Si/transition-metal-silicide interfaces. The calculations of this dissertation are for the intrinsic interface states of Si/NiSi2-A geometry. These calculations also provide a foundation for later studies of defects at this interface, and for studies of other related systems, such as CoSi2. The calculations employ empirical tight-binding Hamiltonian for both Si and NiSi2 (with the parameters fitted to prior calculations of the bulk band structures, which appear to be in agreement with the available experimental data on bulk Si and NiSi2). Dissert. Abstr.

N86-17183 Iowa State Univ. of Science and Technology, Ames.
THEORY OF FLUX-LINE CUTTING AND THE CRITICAL STATE IN TYPE-2 SUPERCONDUCTING Ph.D. Thesis
Antonio Pepez-Gonzalez 1985 166 p
Avail: Univ. Microfilms Order No. DA8514429

This thesis is divided into four related sections, each one dealing with an aspect of the response of type-2 superconducting materials subjected to applied magnetic fields which change in magnitude and generation. A general critical-state theory, which includes both flux pinning and flux-line cutting, is presented. The electromagnetic response of a type-2 superconducting slab subjected to a parallel, constant magnetic field whose direction undergoes either continuous rotation or periodic oscillation is investigated. B, J, and Evectorfied distributions during the approach to quasi-steady state of a slab subjected to a parallel rotating magnetic field are calculated. It is shown that, regardless of the specimen's magnetic history, flux-line-cutting B-consumption leads to a final state in which B has a diamagnetic profile near the surface of the specimen. Hysteretic losses in samples subjected to an oscillating magnetic field oriented at an arbitrary angle with respect to a bias field, both fields being parallel to the surface, are discussed. Dissert. Abstr.

N86-17184 Northeastern Univ., Boston, Mass.
TRANSPORT AND ELECTRONIC PROPERTIES OF METALLIC GLASSES Ph.D. Thesis
Ab Do Khalil Ibrahim 1985 176 p
Avail: Univ. Microfilms Order No. DA8516447

Infra-red optical reflectivity measurements from 0.02 to 2.5 eV were made on amorphous Ni sub (1-x) P sub x (0.15 < x < 0.27) and La sub (1-x) Al (0.2 < x < 0.45). Fits of the reflectivity data were made to Drude model, and the fitting parameters omega and 1/tau were extracted. For La-Al show a minimum at 35 at.% Al, while in Ni-P they were monotonically decreasing with P concentration. The optical conductivities extracted from these parameters were in good agreement with the DC data. The optical data indicated that the scattering mechanism in these systems is controlled by the density of states at the Fermi level. Overall behavior of the density of states at the Fermi energy was suggestive of a rigid band picture. Galvanomagnetic effect measurements on amorphous Ni-P samples indicate that both the apparent Hall coefficient and the transverse magnetoresistance change signs near 23 at.% P. However, the classical Hall coefficient was always negative, as in ordinary crystalline Ni, indicating that the electrons are the main contributor to the conduction in this system. We attribute the change of sign of R sub 0 = to the spontaneous Hall coefficient, implying the presence of free moments throughout the P concentration range. An estimate of the magnitude of the side jump scattering in the Ni-P system was the same as those based on the free electron approximation. Dissert. Abstr.

N86-17185 Department of the Air Force, Washington, D.C.
SIMULTANEOUS DOPED LAYERS FOR SEMICONDUCTOR DEVICES Patent
F. Z. Hawrylo, inventor (to Air Force) Issued 11 Jun. 1985 4 p
Supersedes AD-D009500
(AD-D011907; US-Patent-4,523,212; US-Patent-Appl-SN-357441; US-Patent-Class-357-17) Avail: US Patent and Trademark Office
CSCL 20/12

An indium phosphide semiconductor layer or layers are simultaneously doped with groups 2-6 elements such as zinc and selenium. These simultaneously (acceptor/-donor) doped layers offer improved characteristics when used as an ohmic contact capping layer of indium phosphide or as the active laser region in long wavelength light emitting diodes composed of indium phosphide. The simultaneous doping is achieved through the use of liquid phase epitaxy. Author (GRA)

N86-17186# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MILESTONES IN CRYSTAL GROWTH, THE ACCELERATED CRUCIBLE ROTATION TECHNIQUE (ACRT)
Hans J. Scheel Jul. 1985 16 p refs Submitted for publication
(INPE-3583-PRE/783) Avail: NTIS HC A02/MF A01

A personal account on the invention of the accelerated crucible rotation technique and its impact on crystal growth technology is presented. Author

N86-17187*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MECHANICAL TESTING OF LARGE THALLIUM DOPED SODIUM IODIDE SINGLE CRYSTALS
Henry M. Lee Sep. 1985 67 p refs
(NASA-TM-86518; NAS 1.15:86518) Avail: NTIS
HC A04/MF A01 CSCL 20L

The findings of mechanical tests performed on five thallium-doped sodium iodide [NaI(Tl)] crystals are presented. These crystals are all in the shape of circular flat plates, 20.0 in. in diameter an d0.5 in. thick. The test setup, testing procedure, and the test data are presented. Large crystals exhibit a high degree of material plasticity, as well as a much higher strength than previously anticipated, on the order of 500 psi. Also revealed from the testing is the fact that crystal with a large number of grain boundaries developed less plasticity, and therefore less permanent deformation, than those with fewer grain boundaries. Author

N86-17188# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
COMPREHENSIVE APPROACH TO MELT GROWTH OF 3-5 COMPOUND SEMICONDUCTORS WITH SPECIAL CONSIDERATION OF InP, InSb AND GaAs Final Report, 1 Feb. 1981 - 30 Nov. 1983
A. F. Witt Jun. 1985 32 p
(Contract F19628-81-K-0017)
(AD-A157881; RADC-TR-85-68) Avail: NTIS HC A03/MF A01 CSCL 20/12

The thrust of this research program was aimed at improving the chemical and crystalline perfection achievable with Liquid encapsulation (LEC) growth in compound semiconductors with special consideration of InP. To permit isolation and identification of systems specific (InP, InSb, GaAs, GaSb, etc.) and process specific (liquid encapsulation, high pressure) phenomena and effects, extensive use of model systems (e.g., InSb) was made. The approach taken to the quantitative investigation of growth and segregation in InP was based on interference contrast analyses on differentially etched crystal specimens. On the basis of the present investigation it is concluded that the achievement of a high degree of chemical and crystalline perfection for LEC growth of compound semiconductors at elevated pressures is contingent on rigorous heat transfer (thermal gradient) control within the hot zone, melt stabilization, and effective solid solution hardening (with elements which will not adversely affect the electronic properties of the solid matrix. GRA

N86-17189# Fairchild Camera and Instrument Corp., Palo Alto, Calif.
HOLE TRAPPING IN THERMAL OXIDES GROWN UNDER VARIOUS OXIDATION CONDITIONS USING AVALANCHE INJECTION IN POLY-SILICON GATE STRUCTURES Final Technical Report, Jul. 1982 - Mar. 1985
K. V. Anand, B. R. Cairns, and R. J. Strain 15 Mar. 1985 64 p
(Contract N00014-82-C-0686; ARPA Order 3721)
(AD-A158703; FAIRCHLD/RC/TR-85/01) Avail: NTIS HC A04/MF A01 CSCL 09/5

I/v data (where I is the dc current and v is the maximum value of the ac applied voltage across the device) was analyzed with respect to the theory and it was shown that the hole temperature not only depends on the substrate doping density and the electric field as measured by the Delta V subscript FB is not only a characteristic of the way that an oxide is grown and annealed, but it also depends on the quality of the substrate and its detailed thermal history. This substrate effect shows itself in the I/v characteristic of a particular device. If the dc current Idc was kept constant at a particular level (as was the case for our experiments), then the v value would represent the temperature of the hot carriers. Since the evidence suggests that the hot carriers generate trap levels, then any change in carrier temperature would reflect in Delta V subscript FB. These substrate related effects were found to be significant. GRA

N86-17190# Oak Ridge National Lab., Tenn.
ION DAMAGE CALCULATIONS IN CRYSTALLINE SILICON
O. S. Oen Jul. 1985 15 p Presented at the 11th International Conference on Atomic Collisions in Solids, Washington, D.C., 4 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016931; CONF-850813-2) Avail: NTIS HC A02/MF A01

Damage profiles in crystalline silicon produced by light Band heavy Bi ions with energies from 10 to 100 keV were studied using the computer program MARLOWE (version 12). The program follows not only the incident ion collision by collision, but also any Si target atom that is set into motion through an energetic collision. Thus, the transport effect of the complete cascade of recoiled target atoms is included in the damage profile. The influence of channeling was studied for Si(100) using beam tilt angles from the surface normal of 0, 3, and 7 deg. about the [001] or [011 axes. The effects of channeling on the damage profile are twofold: first, there is a large reduction of the central damage peak; second, there is a component of the damage profile that extends considerably deeper into the target than that found in conventional studies using a random target assemblage. The influence of amorphous overlayers of SiO2 on the damage and implantation profiles in the Si(100) substrate has also been investigated. DOE

N86-17191# Arizona Univ., Tucson.
ARTIFICIALLY LAYERED SUPERCONDUCTORS Progress Report
C. M. Falco 28 Nov. 1984 20 p
(Contract DE-AC02-83ER-45025)
(DE85-014443; DOE/ER-45025/6) Avail: NTIS HC A02/MF A01

The preparation and structure of artificial metallic multilayers and the superconducting properties of weak links in these materials are being studied. Materials being used are Ta/Mo and Nb/Mo. DOE

N86-17192# Litton Industries, Morris Plains, N.J. Airtron Div.
RESEARCH IN GARNET CRYSTAL (GSGG) DEVELOPMENT Final Report, 1 May 1984 - 31 Dec. 1984
R. F. Belt, R. Uhrin, and K. Vemuri Jan. 1985 95 p
(Contract DE-AC08-84DP-40198)
(DE85-016125; DOE/DP-40198/1) Avail: NTIS HC A05/MF A01

This program describes the crystal growth of neodymium and chromium doped simultaneously into the host crystal of gadolinium scandium gallium garnet (Nd(3+), Cr(3)+:Gd3(Sc,Ga)2 Ga3O12 or Nd,Cr:GSGG). Ten experimental boules were grown by the Czochralski method at a diameter of 1.0 to 1.2 inch. Special attention was given to congruently melting compositions, the Nd and Cr content, growth rate, atmosphere of growth, control of the solid liquid interface, and boule orientation. For each of our crystals a (0.25 x 3.00) inch cylindrical laser rod was extracted, fabricated, tested passively, and delivered to the Lawrence Livermore National Laboratory for active testing. At the same time, boule samples were examined for optical absorption, loss at 1.06(MU)m, refractive index birefringence, and other physical properties. Results have demonstrated that optical quality can approach that of Nd:YAG in rod form. The increased efficiency of Nd,Cr:GSGG was confirmed to be about 2 times that of Nd:YAG. We also show that 2 inch diameter crystal boules can be grown successfully. It appears that larger boules are feasible for slab laser experiments. DOE

N86-17193# Sandia National Labs., Albuquerque, N. Mex.
AUGER ELECTRON SPECTROSCOPY STUDIES OF BORON CARBIDE
H. H. Madden, G. C. Nelson, and W. O. Wallace 1985 11 p Presented at the International Conference on the Physics and Chemistry of Boron and Boron-Rich Borides, Albuquerque, N. Mex., 29 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017428; SAND-85-1687C; CONF-850786-2) Avail: NTIS HC A02/MF A01

Auger electron spectroscopy has been used to probe the electronic structure of ion bombardment (IB) cleaned surfaces of B9C and B4C samples. The shapes of the B-KVV and C-KVV Auger lines were found to be relatively insensitive to the bulk stoichiometry of the samples. This indicates that the local chemical environments surrounding B and C atoms, respectively, on the surfaces of the IB cleaned samples do not change appreciably in going from B9C to B4C. Fracturing the sample in situ is a way of producing a clean representative internal surface to compare with the IB surfaces. Microbeam techniques have been used to study a fracture surface of the B9C material with greater spatial resolution

than in our studies of IB surfaces. The B9C fracture surface was not homogeneous and contained both C-rich and B-rich regions. The C-KVV line for the C-rich regions was graphitic in shape. Much of the C-rich regions was found by IB to be less than 100 nm in thickness. The C-KVV line from the B-rich regions was carbidic and did not differ appreciably in shape from those recorded for the IB cleaned surfaces. DOE

N86-17194# Los Alamos National Lab., N. Mex.
COMMENTS CONCERNING THE CRYSTAL STRUCTURE OF B4C
A. C. Larson 1985 6 p refs Presented at the International Conference on the Physics and Chemistry of Boron and Boron-Rich Borides, Albuquerque, N. Mex., 29 Jul. 1985
(Contract W-7405-eng-36)
(DE85-017566; LA-UR-85-2833; CONF-850786-3) Avail: NTIS HC A02/MF A01

The crystal structure of B4C at approx.20 atom% carbon is reported. The space group is R 3m, hexagonal cell lattice constants are a=5.6039(4)A, c=12.0786(14)A, v=109.50A sup 3, Z=3, MU(MoKalpha)=0.05 mm(-1). The excess carbon above the stoichiometric composition of B13C2 replaces up to 1/6 of the boron in the rhombohedral boron site (B2). The results this refinement are reported and compared with earlier results reported on lower carbon samples. Evidence is that the icosahedron is essentially pure boron at and below carbon compositions of 13.3 a%. DOE

N86-17195# California Inst. of Tech., Pasadena. Lab. of Engineering Materials.
KINETICS OF GROWTH OF AN AMORPHOUS PHASE IN CRYSTALLINE ZIRCONIUM RHODIUM ALLOYS DURING REACTION WITH HYDROGEN
X. Yeh, I. and W. L. Johnson Aug. 1985 22 p
(Contract DE-AS03-81ER-10870)
(DE85-018061; DOE/EH-10870/157) Avail: NTIS HC A02/MF A01

The kinetics of amorphous phase formation during reaction of polycrystalline Zr/sub 75(+x)Rh sub 25-(x) (0 < x < 10 with hydrogen has been studied by X-ray diffraction, T. M and electron diffraction. The TEM micrographs show that amorphous phase grows at grain boundaries of polycrystalline Zr/sub 75+x/Rh/sub 25-x/. X-ray diffraction patterns vs reaction time shows that this growth has an Avrami index of one. The growth mechanism is discussed in terms of thermodynamics. DOE

N86-17196# Oak Ridge National Lab., Tenn.
NUMERICAL SIMULATION OF A HgCdTe SOLIDIFICATION PROCESS
V. Alexiades, G. A. Geist, and A. D. Solomon Aug. 1985 35 p
(Contract DE-AC05-84OR-21400)
(DE85-018089; ORNL-6127) Avail: NTIS HC A03/MF A01

The solidification of a cylindrical ingot of mercury-cadmium-telluride is modeled taking into account both heat conduction and solute diffusion. Values of the relevant thermophysical parameters of the pseudo-binary HgTe-CdTe are compiled. The model is implemented numerically by a finite-difference discretization and results of the simulation of a freezing experiment are reported. DOE

N86-17197# Brookhaven National Lab., Upton, N. Y.
SUPERCOMPUTERS AND QUANTUM FIELD THEORY
M. Creutz 1985 13 p refs Presented at the Kyoto International Symposium: The Jubilee of the Meson Theory, Kyoto, Japan, 15 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017844; BNL-36876; CONF-8508120-1) Avail: NTIS HC A02/MF A01

A review is given of why recent simulations of lattice gauge theories have resulted in substantial demands from particle theorists for supercomputer time. These calculations have yielded first principle results on non-perturbative aspects of the strong interactions. An algorithm for simulating dynamical quark fields is discussed. DOE

N86-17198# Lawrence Livermore National Lab., Calif.
NEUTRON IRRADIATION OF SUPERCONDUCTORS AND DAMAGE ENERGY SCALING OF DIFFERENT NEUTRON SPECTRA
P. A. Hahn, H. W. Weber, M. W. Guinan, R. C. Birtcher, B. S. Brown, and L. R. Greenwood Aug. 1985 9 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Argonne National Lab., Ill. and Technische Univ., Vienna, Austria
(Contract W-7405-eng-48)
(DE85-017834; UCRL-93186; CONF-850814-6) Avail: NTIS HC A02/MF A01

Three different neutron sources were used to irradiate identical sets of NbTi superconductors up to about half the lifetime dose of a superconducting magnet in a fusion reactor. Based on a careful source characterization of the TRIGA Mark-II reactor in Vienna, the spallation neutron source IPNS at Argonne and the 14 MeV neutron source RTNS-II at Livermore, the damage energy cross sections were calculated for four different types of NbTi alloys (42, 46.5, 49 and 54 wt % Ti). The experimental results on the variations of critical current densities j sub c with neutron dose are found to scale within the experimental uncertainties with the appropriate damage energy cross sections. This first explicit proof of damage energy scaling for j sub c-variations in superconductors is considered to be most valuable for the evaluation of radiation damage in superconductors under fusion reactor conditions. DOE

N86-17199# Oak Ridge National Lab., Tenn.
REFLECTANCE OF Co- AND Nb-DOPED BaTiO3 FOR PHOTON ENERGIES FROM 1.8 TO 70 eV
J. P. Goudonnet, G. Godefroy, T. Inagaki, P. Moretti, M. W. Williams, and E. T. Arakawa 1985 14 p refs Presented at the 6th International Meeting on Ferroelectricity, Kobe, Japan, 12 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018070; CONF-850880-3) Avail: NTIS HC A02/MF A01

The reflectance spectra of Co and Nb-doped BaTiO3 crystals have been measured for photon energies from 1.8 to 70 eV. For both types of crystal, structures observed in the 1.8 to 2.3 eV range can be attributed to the presence of residual impurities. Between 2.3 and 3.2 eV the peaks in the reflectance of the Co-doped crystal are found to be of an acceptor charge transfer type. For Nb-doped crystals structures appear at the bottom of the conduction band. For energies larger than 3.2 eV the spectra are characteristic of pure BaTiO3 crystals, in reasonable agreement with those determined by Baeuerle, et al., and calculated by Michel-Calendini and Moretti. DOE

N86-17200# Argonne National Lab., Ill.
CRYSTAL-FIELD SPECTROSCOPY OF UCl4 BY NEUTRON INELASTIC SCATTERING
P. Delamoye, J. C. Krupa, S. Kern, C. K. Loong, and G. H. Lander 1985 11 p refs Presented at the ACTINIDES '85, Aix-en-Provence, France, 1 Sep. 1985 Prepared in cooperation with Paris XI Univ., Orsay, France and Colorado State Univ., Fort Collins
(Contract W-31-109-eng-38)
(DE85-018403; CONF-8509147-7) Avail: NTIS HC A02/MF A01

The crystal-field level scheme of uranium tetrachloride has been the subject of a number of investigations by both optical and magnetic measurements. Agreement does not exist. To attempt to resolve this problem we have performed experiments with the pulsed neutron source at ANL which allows electronic spectroscopy to be extended to approx. 2000/cm(-1). Initially using incident energies of 400/cm we examined the gamma4 (ground state) to gamma5 (excited state) level with the sample at 10K. A very strong line is seen at 92 + or - 1/cm which is clearly the gamma4 (yields) gamma5' transition. This is in good agreement with a previous neutron study but in disagreement with the 110 to 120/cm

assignment by other techniques. On warming to 50K the peak position shifts to lower energy by approx. 4%, broadens, and decreases dramatically in magnitude to approx. 1/3 of its value at 10K. Boltzmann statistics would predict a decrease of only 20% on warming from 10 to 50K. We assume from this that a strong coupling occurs between the crystal-field and vibronic states. We have also used an incident energy of 2000/cm to search for the higher gamma5' state. This was found at 1125 + or - 3/cm, in good agreement with previous work. On warming the sample this gamma4 (yields) gamma5 transition strength rapidly diminishes. Since the phonon spectrum does not extend beyond approx. 300/cm, this behavior is most unusual. Because of this strong relaxational process, we have not been able to determine the positions of the other crystal-field levels. DOE

N86-17201# Illinois Univ., Urbana. Dept. of Physics.
NEUTRON SCATTERING INVESTIGATION OF MAGNETIC PHASE TRANSITIONS IN CoCl2-GRAPHITE INTERCALATION COMPOUNDS
D. G. Wiesler, M. Suzuki, H. Zabel, S. M. Shapiro, and R. M. Nicklow Aug. 1985 8 p refs Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y. and Oak Ridge National Lab., Tenn.
(Contract DE-AC02-76CH-00016)
(DE86-000022; BNL-36928; CONF-850890-18) Avail: NTIS HC A02/MF A01

The stage 2 CoCl2-graphite intercalation compound exhibits two magnetic phase transitions at T sub Cl (=8.0K) and T sub Cu (=9.1K). We have performed neutron scattering experiments on this compound which revealed at T < T sub Cl a spin structure in which the 2D ferromagnetic CoCl2-sheets are stacked antiferromagnetically along the c-axis with weak 3D correlation. The intermediate phase between T sub Cl and T sub Cu is purely 2D in character with ferromagnetic in-plane order. DOE

N86-17202# Brookhaven National Lab., Upton, N. Y.
INTERNAL-TIN-PROCESSED NB3Sn MULTIFILAMENTARY WIRES ALLOYED WITH Mg Zn + Ni, AND Ti THROUGH THE Sn CORE
T. Kuroda, M. Suenaga, C. J. Klamut, and R. Sabatini 1985 9 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000029; BNL-36944; CONF-850814-18) Avail: NTIS HC A02/MF A01

The influence on superconducting properties by alloying Nb3Sn with an alloyed Sn core in internal-tin-processed multifilamentary Nb3Sn wires was investigated for alloying elements, Mg, Ni + Zn, and Ti. The results indicate that the critical current densities, J sub c of the Mg, Ni, and Ni + Zn-alloyed wires were essentially identical to or less than those for the unalloyed control wires although small amounts of Mg, Ni and Zn were found in the Nb3Sn filaments. However, additions of Ti increased the J sub c of the wire considerably at intermediate as well as very high-magnetic fields. Results of detailed characterization of these wires for superconducting and metallurgical properties are reported. DOE

N86-17203# Sandia National Labs., Albuquerque, N. Mex.
HIGH PRESSURE RESEARCH: AN OVERVIEW AND RECENT PROGRESS
G. A. Samara 1985 51 p refs Presented at the 10th High Pressure Conference on Research in High Pressure Science and Technology, Amsterdam, Netherlands, 8 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000207; SAND-85-1747C; CONF-850759-14) Avail: NTIS HC A04/MF A01

A brief overview of high pressure science is presented. It is emphasized that the field is in the midst of a most exciting period brought about by (1) advances in apparatus and pressure range, (2) the availability of sophisticated microscopic probes, and (3) advances in theory and the coupling of theory and experiments. Examples of recent work in three areas are presented. These areas are (1) 3 to 5 strained-layer superlattices, (2) soft mode systems with dilute dipolar impurities, and (3) shock-induced chemical reactions. DOE

N86-17204# Sandia National Labs., Albuquerque, N. Mex.
CHEMICAL EFFECTS IN MATERIALS STUDIES USING AUGER ANALYSIS
R. R. Rye 1985 6 p . resented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000436; SAND-85-2092C; CONF-851174-5) Avail: NTIS HC A02/MF A01

Core-valence-valence Auger spectra (AES) afford a unique local view of valence electron structure. The direct involvement in the Auger process of both core and valence states means that the transition matrix element will have a large value only for that portion of the valence electron density which covers the same spatial extent as the core wave function. Thus, the information content of AES is local to the atomic site containing the initial core hole. Our approach in understanding the local information content of AES has been mainly experimental through the intercomparison of model systems, both molecular and solid. The use of molecules in this regard is particularly useful since the vast array of molecular species of known geometric and electronic structures allows one to both vary these properties in a systematic fashion to observe trends and to choose a molecule to probe a specific chemical question. DOE

N86-17205# Fermi National Accelerator Lab., Batavia, Ill. Materials Science Center.
ANNOTATED BIBLIOGRAPHY OF ELLIPSOMETRY AND OPTICAL PROPERTIES OF SOLIDS
T. M. Christensen May 1985 23 p
(Contract DE-AC02-79ER-10501)
(DE86-000586; DOE/ER-10501/T2) Avail: NTIS HC A02/MF A01

This bibliography is a partial listing of articles on various aspects of ellipsometry and the optical properties of solids. Additional references can be found in the review articles listed in the first section. The comments about the articles represent the author's particular interest in the article and are by no means intended as complete summaries or even statements of the author's key point in the article. The lack of comments on many of the articles represents the author's inconsistent note-taking or the completeness of the author's title in describing the article. The papers are divided into 10 topical sections and are alphabetized within each section. DOE

N86-17206# Brookhaven National Lab., Upton, N. Y.
SCALING RELATIONS IN DOMAIN GROWTH: NON-DIFFUSIVE 1ST ORDER TRANSFORMATIONS
J. D. Axe 1985 20 p refs
(Contract DE-AC02-76CH-00016)
(DE86-000631; BNL-37047) Avail: NTIS HC A02/MF A01

We review some elementary concepts and recent progress in the understanding of first order phase transformation kinetics in systems with nonconserved order parameters. Special emphasis is given to scaling relations for domain growth in both nucleation and growth and in later coarsening stages. DOE

N86-17207# Research Inst. of National Defence, Linkoeping (Sweden).
ADVANCES IN HIGH FREQUENCY APPLICATIONS OF SUPERCONDUCTING TUNNEL JUNCTIONS
Staffan Rudner and Tord Claeson (Chalmers Univ. of Technology) Jul. 1985 31 p refs
(FOA-C-30400-E; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm KR 50

The development of superconducting junction microwave components since 1980 is reviewed. Quantum noise limited

superconducting microwave devices such as the quasiparticle SIS mixer and the Josephson parametric amplifier are described.
Author (ESA)

N86-17208# United Kingdom Atomic Energy Authority, Harwell (England). Nuclear Physics Div.
CAPTURE CROSS-SECTIONS OF STRUCTURAL MATERIALS MEASURED WITH THE HARWELL LARGE LIQUID SCINTILLATOR
D. B. Gayther, B. Thom, M. C. Moxon, and J. E. Jolly Jan. 1985 17 p
(AERE-R-11583) Avail: NTIS HC A02/MF A01
A preliminary analysis of these measurements has been published in the Proceedings of the Specialist's Meeting on Neutron Data of Structural Materials for Fast Reactors (Pergamen Press, 1979). Since then the results have been subject to considerable revision, and additional measurements have been included in the analysis. Improvements have also been made in the determination of the detector efficiency for capture gamma-rays and its sensitivity to scattered neutrons. Final values for the parameters of the principal resonances observed in natural iron in the energy range 200 eV tp 40 keV are presented. Author

N86-16435# Joint Publications Research Service, Arlington, Va.
SILICON SEMICONDUCTOR DEVELOPMENTS
Andrzej Bukowski *In its* East Europe Report: Science and Technology (JPRS-ESA-85-036) 2 Dec. 1985 p 38-39 Repr. from Polish Technical Review (Warsaw, Poland), no. 2-3, 1985 p 3-4 (For primary document see N86-16432 07-31)
Avail: NTIS HC A04/MF A01

N86-16443# University of Electro-Communications, Tokyo (Japan).
LAMP ANNEALING OF ION IMPLANTED GaAs
Haruzo Miyashita and Kotaro Okamoto *In its* Reports of the University of Electro-Communications, Volume 36, No. 1, September 1985 (Serial No. 58) Sep. 1985 p 15-21 refs In JAPANESE; ENGLISH summary (For primary document see N86-16440 07-32)
Avail: NTIS HC A10/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-17209 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
THERMODIFFUSION FLOWS IN A SOLID WITH A DOMINANT CONSTITUENT
Jan Kubik Apr. 1985 59 p refs
(RUB-IFM-MITT-44) Copyright. Avail: Issuing Activity
Thermodiffusion flows in mixtures of (n) constituents, assuming that every part of the solid is occupied by particles of all constituents simultaneously are considered. By analyzing the balance equations, the limiting process from mixture theory to thermodiffusion is obtained. This is only possible given the existence of a mixture constituent with a dominant density. The field equations of the thermomechanics concerning thermodiffusion in solids are based on the balance equations relating to mass, impulse, energy and entropy. As special cases of the theory, entropic diffusion, kinematic diffusion, filtration in solids, and classical thermodiffusion in solids are obtained. Author (ESA)

N86-17210*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRELIMINARY STUDY OF GASEOUS NITROGEN-LIQUID OXYGEN MIXING AND SELF CLEANING
Allan J. Zuckerwar Dec. 1985 12 p
(NASA-TM-87658; NAS 1.15:87658) Avail: NTIS HC A02/MF A01 CSCL 20M
The penetration of gaseous nitrogen into liquid oxygen at a pressure of 150 psi was determined by monitoring the composition of the evaporating liquid in a nitrogen analyzer. For pressurization times of about 1 hr the penetration depth varies between 0.0024 and 0.018 in. at an evaporation rate of about 1 gal/day. These are small compared to the penetration depth of 22.2 in. measured in the 7-inch high temperature tunnel at a pressure of 1500 psi, pressurization time of 5 min, and evaporation rate of 121 gal/day.
Author

N86-17211# Lawrence Livermore National Lab., Calif.
DESTRUCTION OF THE FRACTIONAL QUANTUM HALL EFFECT BY DISORDER
R. B. Laughlin Jul. 1985 14 p refs Presented at the Yamada Conference on Electronic Properties of Two-dimensional Systems, Kyoto, Japan, 9 Sep. 1985
(Contract W-7405-eng-48)
(DE85-016948; UCRL-93152; CONF-8509143-1) Avail: NTIS HC A02/MF A01
It is suggested that Hall steps in the fractional quantum Hall effect are physically similar to those in the ordinary quantum Hall effect. This proposition leads to a simple scaling diagram containing a new type of fixed point, which is identified with the destruction of the fractional states by disorder. DOE

N86-17212# Massachusetts Inst. of Tech., Cambridge.
CHERN-SIMONS TERMS AND COCYCLES IN PHYSICS AND MATHEMATICS
R. Jackiw Dec. 1984 22 p refs Presented at the APS Particles and Fields Meeting, Sante Fe, N. Mex., 1 Nov. 1984
(Contract DE-AC02-76ER-03069)
(DE86-000567; CONF-8411203-1) Avail: NTIS HC A02/MF A01
Contemporary topological research in Yang-Mills theory is reviewed, emphasizing the Chern-Simons terms and their relatives. Three applications of the Chern-Simons terms in physical theory are described: (1) to help understanding gauge theories in even dimensional space-time; (2) gauge field dynamics in odd dimensional space-time; and (3) mathematically coherent description of even-dimensional gauge theories with chiral fermions that are apparently inconsistent due to chiral anomalies. Discussion of these applications is preceded by explanation of the mathematical preliminaries and examples in simple quantum mechanical settings. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-17213*# Tresp Associates, Inc., Silver Spring, Md.
THE 1985 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S SUMMER HIGH SCHOOL APPRENTICESHIP RESEARCH PROGRAM (SHARP) Final Report
29 Nov. 1985 65 p
(Contract NASw-4037)
(NASA-CR-176472; NAS 1.26:176472) Avail: NTIS HC A04/MF A01 CSCL 05I
In 1985, a total of 126 talented high school students gained first hand knowledge about science and engineering careers by working directly with a NASA scientist or engineer during the summer. This marked the sixth year of operation for NASA's Summer High School Apprenticeship Research Program (SHARP). The major priority of maintaining the high standards and success of prior years was satisfied. The following eight sites participated in the Program: Ames Research Center, Ames' Dryden Flight Research Facility, Goddard Space Flight Center, Goddard's Wallop Flight Facility, Kennedy Space Center, Langley Research Center, Lewis Research Center, and Marshall Space Flight Center. Tresp Associates served as the SHARP contractor and worked closely with NASA staff at headquarters and the sites just mentioned to plan, implement, and evaluate the program. Author

N86-17214# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
NEW DIRECTIONS IN TRAINING SIMULATION RESEARCH: GENERATING, HANDLING AND DELIVERING EMPIRICALLY BASED DECISION SUPPORT
M. J. Singer and R. T. Hays Jan. 1985 34 p
(DA Proj. 2Q2-63744-A-795)
(AD-A156797; AIR-RR-1389) Avail: NTIS HC A03/MF A01 CSCL 05/9

An overview is given of recently completed, ongoing, and planned research designed to provide empirically based decision support for training device and training system design. New empirical data on training device design and use, and handling data and delivering empirically based decision support are discussed. Author (GRA)

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

No abstracts in this category.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-17215 Case Western Reserve Univ., Cleveland, Ohio.
AN INVESTIGATION OF AUTOMATIC TERM WEIGHTING TECHNIQUES Ph.D. Thesis
Hyun-Hee Kim 1985 194 p
Avail: Univ. Microfilms Order No. DA8510124

The first objective is to devise a new term weighting technique which can be used to weight the significance value of each word stem in a test collection of documents on the subject of enteral hyperalimentation. The next objective is to evaluate retrieval performance of the proposed term weighting technique, together with four other weighting techniques, by conducting a set of experiments. These four term weighting techniques are the following: (1) Salton's term discrimination weighting technique; (2) Sparck Jones's inverse document frequency weighting technique; (3) Harter's compound poisson weighting technique using the method of moments; and (4) a modified Harter's compound poisson weighting technique utilizing the method of maximum likelihood. Dissert. Abstr.

N86-17216# Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
LIBRARIAN-RESEARCHER COOPERATION WITH A LIAISON PROGRAM
A. E. Ekkebus 1985 4 p Presented at the 76th Ann. Special Libraries Assoc. Conference, Winnipeg, Manitoba, 8 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016409; CONF-8506127-2) Avail: NTIS HC A02/MF A01

During the four years of the liaison program, changes that have resulted include an increase in levels of library activity especially literature searching (a 60% increase in three years), a willingness by researchers to make their information needs known, and the development of a responsive collection. Surveys of recipients of the literature searches have indicated high satisfaction of the search results. The liaison program encourages communication between the reference librarian and researcher and better enables the library to attain its objective of interpreting and meeting the information needs of its users. DOE

N86-17217# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Computer Science Research.
CHARACTERISTICS OF SCIENTIFIC DATABASES
Arie Shoshani, Frank Olken, and Harry K. T. Wong Aug. 1985 16 p Previously announced as N85-74814
(Contract DE-AC03-76SF-00098)
(DE85-010983; LBL-17582-Rev) Avail: NTIS HC A02/MF A01

The kinds of data and usage of scientific databases are examined and common characteristics among the different discplines identified. Most scientific databases do not use general purpose database management systems (DBMS,). The main reason is that they have data structures and usage patterns that cannot be easily accomodated by existing DBMs. The special database management needs of scientific databases are identified, and to directions pointed out for further research specifically oriented to these needs. The different types of scientific databases are discussed, and the properties identified for them existed. Examples applications are then analyzed with respect to the types of data and their characteristics, and summarized in two tables. Conclusions are drawn as to the preferable data management methods needed in support of scientific databases. Author

N86-17218# Sandia National Labs., Albuquerque, N. Mex.
PRODUCT DATA EXCHANGE STANDARD (PDES)
J. C. Kelly 1985 77 p Presented at the Federal Computer Conference, Washington, D.C., 9 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017637; SAND-85-1248C; CONF-8509155-1) Avail: NTIS HC A05/MF A01

PDES stands for Product Data Exchange Standard. A long-term project, chaired by Kalman Brauner of The Boeing Company, currently exists within the IGES Committee to develop PDES. This project has two primary objectives: (1) to develop an exchange standard for product data in support of industrial automation, and (2) to represent the US position in the International Standards Organization (ISO) arena relative to the development of a single worldwide standard for the exchange of product data. A new standard is being developed out of the belief that no existing standard can be extended to support industrial automation sufficiently well. Product Data is taken to be more general than product definition data. It includes data relevant to the entire life cycle of a product; manufacturing, quality assurance, testing, support, etc. Industrial product areas supported in previous exchange standards work within the IGES Committee includes mechanical, electrical, plant design, and AEC. While there is no inherent limitation in the PDES scope to these areas, it is naturally to be expected that these areas will be among the first to be addressed within PDES. Development of an exchange standard for product data involves settling on a set of logical structures to contain the product data information, and also settling on the manner in which these structures will be implemented in computer form. DOE

N86-17219# Allied Bendix Corp., Kansas City, Mo.
LABORATORY TECHNICAL INFORMATION SYSTEM: ANALYSIS PHASE
L. L. Holland Aug. 1985 29 p
(Contract DE-AC04-76DP-00613)
(DE85-018311; BDX-613-3272) Avail: NTIS HC A03/MF A01

The development of a Technical Information Management System for the Materials Evaluation Laboratory was undertaken to reduce the labor required to determine the flow of work within the laboratory, provide sample tracking, and to make the results of tests available to the requestor more quickly. The analysis phase of this development project is now complete. Structured Analysis and Information Analysis were used to reduce the total life cycle costs for the system. The deliverables produced during the analysis phase include data flow diagrams, process mini-specifications, data flow definitions, data element definitions, dialog definitions, the system record structure with navigational paths, and user implemen-

tation requirements. These deliverables comprise the functional system specification. It is easily understood by laboratory personnel, computer scientists, and supervision. The specification is also easily maintained to meet changing laboratory requirements. DOE

N86-17220# Allied Bendix Corp., Kansas City, Mo.
CLADS ANALYSIS DELIVERABLES, VOLUME 1 Final Report
L. L. Holland, W. G. Frede, M. E. Schleuter, S. E. Grant, H. H. Glass, and K. C. Atkinson Aug. 1985 394 p
(Contract DE-AC04-76DP-00613)
(DE85-018312; BDX-613-3273) Avail: NTIS HC A17/MF A01

The functional specification for the Laboratory Technical Information System is contained in Volumes 1 and 2 of the CLADS Analysis Deliverables. This specification is the result of applying Structured Analysis and Information Analysis to the Materials Evaluation Laboratory during the analysis phase of this project. Volume 1 includes 22 data flow diagrams (DFDs), a complete data dictionary containing data elements, data flows, and dialog definitions. Definitions also are included for 77 automated stores or files. These deliverables comprise the user's functional system specification and will be used as input to subsequent project phases, including software design. Volume 1 of the CLADS Analysis Deliverables contains Physical diagrams, Mini Specs, Automated Files, Manual Stores, and Dialog Definitions. DOE

N86-17221# Allied Bendix Corp., Kansas City, Mo.
CLADS ANALYSIS DELIVERABLES, VOLUME 2 Final Report
L. L. Holland, W. G. Frede, M. E. Schleuter, S. E. Grant, H. H. Glass, and K. C. Atkinson Aug. 1985 594 p
(Contract DE-AC04-76DP-00613)
(DE85-018313; BDX-613-3274) Avail: NTIS HC A25/MF A01

The functional specification for the Laboratory Technical Information System is contained in Volumes 1 and 2 of the CLADS Analysis Deliverables. This specification comes from applying Structured Analysis and Information Analysis to the Materials Evaluation Laboratory during the analysis phase of this project. Volume 1 includes 22 data flow diagrams (DFDs), a complete data dictionary containing data elements, data flows, and dialog definitions. Definitions also are included for 77 automated stores or files. These deliverables comprise the user's functional system specification and will be used as input to subsequent project phases, including software design. Volume 2 of the CLADS Analysis Deliverables covers Data Flow and Element Definitions. DOE

N86-17222# Sandia National Labs., Albuquerque, N. Mex.
SANDIA COMPUTERIZED SHOCK COMPRESSION BIBLIOGRAPHICAL DATABASE
J. S. Wilbeck, C. E. Anderson, J. C. Hokanson, J. R. Asay, D. E. Grady, R. A. Graham, and M. E. Kipp 1985 16 p Presented at the EXPLOMET '85 - International Conference on Metallurgical Applications of Shock Wave and High Strain-rate Phenomena, Portland, Oreg., 28 Jul. 1985 Prepared in cooperation with Winzen International, Inc., San Antonio, Tex. and Southwest Research Inst., San Antonio, Tex.
(Contract DE-AC04-76DP-00789)
(DE85-018542; SAND-85-0309C; CONF-850770-10) Avail: NTIS HC A02/MF A01

A searchable and updateable bibliographical database is being developed which will be designed, controlled, and evaluated by working technical experts in the field of shock-compression science. It will emphasize shock-compression properties in the stress region of a few tens of GPa and provide a broad and complete base of bibliographical information on the shock-compression behavior of materials. Through the operation of technical advisors, the database provides authoritative bibliographical and keyword data for use by both the inexperienced and expert user. In its current form, it consists of: (1) a library of journal articles, reports, books, and symposia papers in the areas of shock physics and shock mechanics; and (2) a computerized database system containing complete bibliographical information, exhaustive keyword descriptions, and author abstracts for each of the documents in the database library. DOE

N86-17223# Technische Hogeschool, Twente (Netherlands). Afdel. Transferpunt.
[ACTIVITIES REPORT IN KNOWLEDGE TRANSFER] Annual Report, 1984 [JAARVERSLAG 1984]
1984 18 p In DUTCH
Avail: NTIS HC A02/MF A01

Activities in the transfer of knowledge from university to society are outlined. The types of industries approaching the Transfer Point; part-time jobs for young entrepreneurs at the university; jobs for unemployed university graduates; the Dutch entrepreneur panel; public relations activities of the Transfer Point; international contacts; and Transfer Point consultations are discussed.
Author (ESA)

N86-16928# Joint Publications Research Service, Arlington, Va.
A NEW GENERATION OF ASPID INFORMATION RETRIEVAL SYSTEMS
G. K. Stolyarov, R. B. Grigyanets, and K. P. Kvachuk *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 25-27 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (USSR), no. 2, Mar-Apr. 1985 p 126.124 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16930# Joint Publications Research Service, Arlington, Va.
PARALLEL SEARCH IN A DISTRIBUTED DATABASE
V. G. Kerbel *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 41 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 1, Jan-Feb. 1985 p 63-73 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16931# Joint Publications Research Service, Arlington, Va.
ADAPTATION OF STOCHASTIC SEARCH METHODS IMPLEMENTED IN A HOMOGENEOUS COMPUTING ENVIRONMENT UNDER CONDITIONS OF UNCERTAINTY
N. N. Volk, V. O. Groppen, and E. A. Trakhtengerts *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 45-46 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 5, Sep.-Oct. 1984 p 83-91 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16932# Joint Publications Research Service, Arlington, Va.
ONE SOFTWARE IMPLEMENTATION OF A DIALOGUE INFORMATION RETRIEVAL SYSTEM
B. Ya. Kavalerchik, F. V. Birger, and K. K. Loginov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 51 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

N86-16933# Joint Publications Research Service, Arlington, Va.
MICROFILMING OF SCIENTIFIC AND TECHNICAL INFORMATION SOURCE DOCUMENTS WITH FEW COLORS
L. I. Brodolin, A. Z. Kan, S. I. Kuznetsova, and I. I. Marshak *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-005) 28 Aug. 1985 p 52 Transl. into ENGLISH from Nauchno-Tekhnicheskaya Informatsiya Seriya I. Organizatsiya i Metodika Informatsionnoy Raboty (Moscow, USSR), no. 3, Mar. 1985 p 27-31 (For primary document see N86-16924 07-60)
Avail: NTIS HC A05

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-17224*# IIT Research Inst., Chicago, Ill. Nonmetallic Materials and Composites.
LONG-TERM STABILITY AND PROPERTIES OF ZIRCONIA CERAMICS FOR HEAVY DUTY DIESEL ENGINE COMPONENTS Final Report
David C. Larsen and Jane W. Adams Sep. 1985 263 p refs
(Contracts DEN3-305; DE-AI01-80CS-50194)
(NASA-CR-174943; DOE/NASA/0305-1; NAS 1.26:174943) Avail: NTIS HC A12/MF A01 CSCL 13F

Physical, mechanical, and thermal properties of commercially available transformation-toughened zirconia are measured. Behavior is related to the material microstructure and phase assemblage. The stability of the materials is assessed after long-term exposure appropriate for diesel engine application. Properties measured included flexure strength, elastic modulus, fracture toughness, creep, thermal shock, thermal expansion, internal friction, and thermal diffusivity. Stability is assessed by measuring the residual property after 1000 hr/1000C static exposure. Additionally static fatigue and thermal fatigue testing is performed. Both yttria-stabilized and magnesia-stabilized materials are compared and contrasted. The major limitations of these materials are short term loss of properties with increasing temperature as the metastable tetragonal phase becomes more stable. Fine grain yttria-stabilized material (TZP) is higher strength and has a more stable microstructure with respect to overaging phenomena. The long-term limitation of Y-TZP is excessive creep deformation. Magnesia-stabilized PSZ has relatively poor stability at elevated temperature. Overaging, decomposition, and/or destabilization effects are observed. The major limitation of Mg-PSZ is controlling unwanted phase changes at elevated temperature. Author

N86-17225*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESEARCH AND TECHNOLOGY FISCAL YEAR 1985 REPORT Annual Report
Fred Speer Nov. 1985 136 p
(NASA-TM-86532; NAS 1.15:86532) Avail: NTIS HC A07/MF A01 CSCL 05A

A quarter of a century is but a moment on the cosmic calendar. Now that Marshall Space Flight Center has reached its 25th Anniversary, it seems just moments ago that President Dwight D. Eisenhower stood on these grounds and formally dedicated the George C. Marshall Space Flight Center in Huntsville, Alabama. The Fiscal Year 1985 Research and Technology Report reflects the wide spectrum of activities closely linked with the Center's mainstream spaceflight developments. Past accomplishments testify to the success of getting deeply involved in the science and technology of its projects - 32 Saturn launches, Pegasus, the Skylab missions, three High Energy Astronomy Observatory missions, the Apollo - Soyuz mission, and an accelerating schedule of successful Shuttle, Spacelab, and Shuttle payload missions. The Center continues to be involved in engineering development, scientific research, and technology. At the beginning of the second quarter century, the experience and dedication of the engineers and scientists, and the success of the collaboration with industry and academia will now be aimed at the next great endeavor, the Space Station. Author

N86-17226*# American Trucking Associations, Inc., Alexandria, Va.
FUTURE HEAVY DUTY TRUCKING ENGINE REQUIREMENTS Final Report
Larry W. Strawhorn and Victor A. Suski Mar. 1985 166 p refs
(Grant NAG3-457; Contract DE-AI01-80CS-50194)
(NASA-CR-174996; DOE/NASA/0457-1; NAS 1.26:174996) Avail: NTIS HC A08/MF A01 CSCL 13F

Developers of advanced heavy duty diesel engines are engaged in probing the opportunities presented by new materials and techniques. This process is technology driven, but there is neither assurance that the eventual users of the engines so developed will be comfortable with them nor, indeed, that those consumers will continue to exist in either the same form, or numbers as they do today. To ensure maximum payoff of research dollars, the equipment development process must consider user needs. This study defines motor carrier concerns, cost tolerances, and the engine parameters which match the future projected industry needs. The approach taken to do that is to be explained and the results presented. The material to be given comes basically from a survey of motor carrier fleets. It provides indications of the role of heavy duty vehicles in the 1998 period and their desired maintenance and engine performance parameters. Author

N86-17227*# Ecosystems International, Inc., Crofton, Md.
ASSESSMENT OF US INDUSTRY'S TECHNOLOGY TRENDS AND NEW TECHNOLOGY REQUIREMENTS Final Report
Oct. 1984 184 p
(Contract NASw-3674)
(NASA-CR-176479; NAS 1.26:176479) Avail: NTIS HC A09/MF A01 CSCL 05A

The utility and effectiveness of a novel approach (the Applications Development, or AD approach), intended to augment the efficiency of NASA's technology utilization (TU) through dissemination of NASA technologies and joint technology development efforts with U.S. industry is tested. The innovative AD approach consists of the following key elements: selection of NASA technologies appearing to have leading edge attributes; interaction with NASA researchers to assess the characteristics and quality of each selected technology; identification of industry's needs in the selected technology areas; structuring the selected technologies in terms of specifications and standards familiar to industry (industrial Spec. Sheets); identification and assessment of industry's interest in the specific selected NASA technologies, utilizing the greatly facilitated communication made possible by the availability of the industrial Spec. Sheets; and matching selected NASA technologies with the needs of selected industries. Author

N86-17228*# Rural Enterprises, Durant, Okla.
[RURAL ENTERPRISES, INCORPORATED REPORT OF SIGNIFICANT ACTIVITIES AND ACCOMPLISHMENTS] Quarterly Status Report, period ending 30 Sep. 1985
Oct. 1985 51 p
(Contract NASw-3963)
(NASA-CR-176362; NAS 1.26:176362) Avail: NTIS HC A04/MF A01 CSCL 05A

The ongoing activities of Rural Enterprises, Inc. are presented.

The function of Rural Enterprises is to bring innovation from its rudimentary conceptual stages to useful and productive ends by means of cooperation with government, business, and educational institutions. G.L.C.

N86-17229# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 39, NUMBER 10 Monthly Publication
L. E. Shaffer Oct. 1985 54 p
(AD-A159263; AD-E301788; ESN-39-10) Avail: NTIS HC A04/MF A01 CSCL 05/2

Among the subjects reported in this issue are: The European Assoc. for Research on Learning and Instruction--The intersection between problem solving, cognition-motivation interaction, and individual differences; Electrochemistry conferences; MODULEF--A modular finite element program package (France); Plansee Seminar--Progress in Powder Metallurgy; The closing of the Inst. for Oceanographic Sciences labs, Taunton, England, has led to the complete disbandment of the sedimentation group (SG) there--review of the SG's work in cohesive and noncohesive sediments and shelf sediment dynamics; A Review of the Present State of the Art at Fibre Optics '85; Optoelectronics at Univ. Coll., London; and Super-ACO Construction at Orsay -- An 800 MeV, 500 milliAngstrom synchrotron light source positron storage ring. GRA

N86-17230# Pacific Northwest Lab., Richland, Wash.
TECHNOLOGY TRANSFER IS OPPORTUNITY TRANSFER
T. M. Levinson, L. C. Schmid, and R. L. Watts Jun. 1985 11 p
Presented at the 10th Annual Meeting of the Technology Transfer Society, San Francisco, Calif., 24 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-016622; PNL-SA-12976; CONF-8506175-1) Avail: NTIS HC A02/MF A01

The management of intellectual property and the decision process of selecting federal technologies for transfer is approached from the perspective of how they can be packaged as business opportunities. The package is usually provided by a technologist who is the technology provider and the opportunity must be perceived as such by the business person. Thoughts are provided on the different perspectives of the technology provider and the technology seeker and the environment in which the transfer process occurs. The different perspectives and the environment can cause a disconnect between the research result and its uses. By using selection criteria based on the business person's perspective and by presenting the technology in terms of what it can become helps to mitigate this disconnect. DOE

N86-17231# Tennessee Valley Authority, Chattanooga. Div. of Energy Demonstrations and Technology.
ELECTRIC VEHICLE CHARGER TEST PLAN. REVISION 1
R. L. Driggans, R. W. Reese, and A. S. Keller May 1985 35 p
(DE85-901749; TVA/PE/EDT-85/10-Rev-1) Avail: NTIS HC A03/MF A01

This report describes the revised test plan developed under the battery charger testing work task of the Electric Power Research Institute (EPRI)/Tennessee Valley Authority (TVA) electric vehicle project. This test plan covers the tests performed and the procedures used to evaluate chargers. Measurements made during testing include (1) charger-induced distortion of input signals, (2) charger output characteristics, and (3) charger-induced radio frequency interference to communication equipment. Additionally, operating efficiencies are calculated and physical characteristics are noted. The testing is performed using precision volt-amp-watt meters, frequency counters, a digital storage oscilloscope, and a spectrum analyzer. DOE

N86-17232# Tennessee Valley Authority, Chattanooga. Div. of Energy Demonstrations and Technology.
TEST AND EVALUATION REPORT FOR THE BEDFORD CF ELECTRIC VAN
R. L. Driggans, G. D. Whitehead, and R. K. Buffett Apr. 1985 87 p
(DE85-901750; TVA/PE/EDT-85/11) Avail: NTIS HC A05/MF A01

The Bedford Van was tested in test track, chassis dynamometer, and urban-road settings. Vehicle dc energy consumption and driving range were measured on the SAE J227a C schedule driving cycle, the TVA urban driving route, and at constant speeds. Other tests measured the top speed, maximum acceleration, hill climbing, and braking performance of the vehicle. This report presents test results, data on vehicle operating characteristics, descriptions of the vehicle and components, and information on reliability during the test period. DOE

N86-17233# Netherlands Agency for Aerospace Programs, Delft.
[ACTIVITIES REPORT IN AIRCRAFT DEVELOPMENT AND ASTRONAUTICS] Annual Report, 1984 [VERSLAG VAN DE WERKZAAMHEDEN 1984]
1984 34 p in DUTCH
Avail: NTIS HC A03/MF A01

The Fokker 50 and the Fokker 100 aircraft development activities are reviewed. The data acquisition, recording, and evaluation system for flight tests with prototypes, the Airbus, and the Shorts SD 330/360 is described. Contributions to the IRAS-project; and ESA-programs (telecommunication satellites, Ariane, Eureca, microgravity, Earth observation, Spacelab, Columbus) are summarized. Author (ESA)

N86-17234# National Technical Information Service, Springfield, Va. Center for the Utilization of Federal Technology.
REPORT OF ACTIVITIES FROM FY 1983 - FY 1984 PURSUANT TO SECTION 2 OF THE STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT
Apr. 1985 288 p
(PB85-184026) Avail: NTIS HC A13/MF A01 CSCL 05D

Section 11(e) of the Stevenson-Wydler Technology Innovation Act of 1980 requires each Federal agency that operates or directs one or more Federal laboratories to report its technology transfer activities to the Center for the Utilization of Federal Technology (CUFT) every other year. The Center for the Utilization of Federal Technology has received reports from all ten agencies operating laboratories that fall within the scope of the Stevenson-Wydler Technology Innovation Act. In response to the request for changes that have occurred in an Agency's program since October 1, 1982, Agencies supplied information on the range of their ongoing technology transfer activities. This report highlights the progress being made in each Agency as their technology transfer programs have grown in the second biennial period since passage of the Stevenson-Wydler Technology Innovation Act of 1980. Author (GRA)

88 SPACE SCIENCES (GENERAL)

N86-17235*# Columbia Univ., New York.
MULTIDISCIPLINARY RESEARCH IN THE SPACE SCIENCES Final Technical Report
W. S. Broecker and G. W. Flynn 31 Dec. 1983 32 p refs
(Contracts NCC5-16; NCC5-28; NCC5-29)
(NASA-CR-176451; NAS 1.26:176451) Avail: NTIS HC A03/MF A01 CSCL 03C

Research activities were carried out in the following areas during this reporting period: (1) astrophysics; (2) climate and atmospheric modeling; and (3) climate applications of earth observations & geological studies. An ultra-low-noise 115 GHz receiver based upon a superconducting tunnel diode mixer has been designed and constructed. The first laboratory tests have yielded spectacular results: a single-sideband noise temperature of 75 K considerably more sensitive than any other receiver at this frequency. The receiver will replace that currently in use on the Columbia-GISS CO Sky Survey telescope. The 1.2 meter millimeter-wave telescope at Columbia University has been used

to complete two large-scale surveys of molecular matter in the part of the inner galaxy which is visible from the Northern hemisphere (the first galactic quadrant); one of the distant galaxy and one of the solar neighborhood. The research conducted during the past year in the climate and atmospheric modeling programs has been focused on the development of appropriate atmospheric and upper ocean models, and preliminary applications of these models. Principal models are a one-dimensional radiative-convective model, a three-dimensional global climate model, and an upper ocean model. During the past year this project has focused on development of 2-channel satellite analysis methods and radiative transfer studies in support of multichannel analysis techniques. B.W.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-17236 Rice Univ., Houston, Tex.
A SURFACE PHOTOMETRIC STUDY OF NGC 5138 Ph.D. Thesis
Robert Lee Pennington 1985 130 p
Avail: Univ. Microfilms Order No. DA8517230

Calibrated digital surface photometry in the standard UBV passbands has been used to prepare two dimensional maps to examine the structure and stellar populations in NGC 5128(Cen A). The main body of the galaxy exhibits colors and stellar populations slightly bluer than those of an old elliptical galaxy out to r approx. 176'. Beyond this radius, excess emission on the inner halo contributes significantly to the U passband only, probably due to line emission from material swept into the halo from the dust lane. Four large diffuse arcs have been detected on the B-V raster. The outermost two are in the northern hemisphere and have similar B-V colors of approx. -0.11. The innermost pair are on opposite sides of the nucleus at r approx. 107' with B-V = 0.08, suggesting that a ring or sphere may exist at this radius, centered on the nucleus. Dissert. Abstr.

N86-17237 Iowa Univ., Iowa City.
INFRARED PHOTOMETRY AND HIGH-RESOLUTION IMAGING OF OH/IR STARS Ph.D. Thesis
Michael L. Cobb 1985 202 p
Avail: Univ. Microfilms Order No. DA8518813

The infrared properties of the circumstellar shells surrounding several OH/IR stars were investigated by photometry and high-resolution imaging techniques. Filter photometry from 2 to 20 microns implies color temperatures in the 10 micron region ranging from 400 K to 600 K showing that the effective temperature decreases with increasing wavelength. The assumption that the 10 micron feature is intrinsic to the sources and due to opacity effects within the shell was investigated and found to be consistent. The high-resolution technique of speckle interferometry combined with the Know-Thompson image recovery algorithm is compared with that of the shift-add technique. The reconstructed images are dominated by a strong unresolved central source surrounded by a diffuse partially resolved shell. The wavelength dependence of the size of the emitting region and the ratio of the flux from the shell to the central component is found. The diameters are proportional to the wavelength of observation and the relative contribution of the shell increases with wavelength also. The infrared observations, when compared with the radio OH maps obtained from the VLA, imply a bipolar mass outflow. It appears that the infrared observations detect the polar lobes while the OH emission is confined to the equatorial region. Dissert. Abstr.

N86-17238 Massachusetts Univ., Amherst.
THE MASSACHUSETTS-STONY BROOK GALACTIC PLANE CO SURVEY: OBSERVATIONS, GALACTIC STRUCTURE AND CLOUD IDENTIFICATION Ph.D. Thesis
Dan Percival Clemens 1985 235 p
Avail: Univ. Microfilms Order No. DA8517090

The observing parameters for a galactic plane CO survey consisting of 40,551 spectra with 301 km s/1 coverage at 1km s/1 resolution are presented. The mostly 3 x 3' sky sampling with a 45 in. beam enables detection of virtually all galactic clouds larger than 10 to 20 pc in the northern plane. A rotation curve for the northern disk was determined. Large-scale streaming motions with characteristic velocities of 5 km s/1 and wavelengths of 2 kpc are identified. The LSR is found to have an azimuthal peculiar velocity of 7 + or - 1.5 km s/1 with respect to the molecular cloud system. A combination of appropriate (l,V) binning and cluster analysis were used to extract near and far-side emission parameters from the different angular width components present in latitude emission profiles. The face-on distribution of molecular ring feature. An automated cloud identification system was developed and used on the entire CO survey data set. The 112 clouds found in the select region using the automated means are compared to those found by Stark in a subset of this region using CO13. The agreement between the clouds is good. Dissert. Abstr.

N86-17239*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STAR FORMATION IN THE INNER GALAXY: A FAR-INFRARED AND RADIO STUDY OF TWO H2 REGIONS
D. F. Lester (Texas Univ., Austin), H. L. Dinerstein (Texas Univ., Austin), M. W. Werner, P. M. Harvey, N. J. Evans, II (Texas Univ., Austin), and R. L. Brown (National Radio Astronomy Observatory, Charlottesville, Va.) Dec. 1985 40 p refs
(NASA-TM-88184; Rept-86008; NAS 1.15:88184; Preprint-38)
Avail: NTIS HC A03/MF A01 CSCL 03A

Far-infrared and radio continuum maps have been made of the central 6' of the inner-galaxy H II regions G30.8-0.0 (in the W43 complex) and G25.4-02., along with radio and molecular line measurements at selected positions. An effort is made to understand far infrared wavelingths allow the dust temperature structures and total far infrared fluxes to be determined. Comparison of the radio and infrared maps shows a close relationship between the ionized gas and the infrared-emitting material. There is evidence that parts of G30.8 are substantially affected by extinction, even at far-infrared wavelengths. For G25.4-0.2, the radio recombination line and CO line data permit resolution of the distance ambiguity for this source. The confusion in distance determination is found to result from an extraordinary near-superposition of two bright H II regions. Using revised distances of 4.3 kpc for G26.4SE and 12 kpc for G25.4NW, that the latter, which is apparently the fainter of the two sources, is actually the more luminous. Though it is not seen on the Palomar Sky Survey, G25.4SE is easily visible in the 9532A line of [S III] and is mapped in this line. The ratio of total luminosity to ionizing luminosity is very similar to that of H II regions in the solar circle. Assuming a coeval population of ionizing stars, a normal initial mass function is indicated. Author

N86-17240*# Los Alamos National Lab., N. Mex. Group T-6.
HYDRODYNAMIC MODELS FOR NOVAE WITH EJECTA RICH IN OXYGEN, NEON AND MAGNESIUM
Sumner Starrfield, Warren M. Sparks, and James W. Truran (Illinois Univ., Chicago) [1985] 14 p refs
(Grants NAG5-481; NSF AST-83-14788; NSF AST-83-14415)
(NASA-CR-176475; NAS 1.26:176475) Avail: NTIS HC A02/MF A01 CSCL 03A

The characteristics of a new class of novae are identified and explained. This class consists of those objects that have been observed to eject material rich in oxygen, neon, magnesium, and aluminum at high velocities. We propose that for this class of novae the outburst is occurring not on a carbon-oxygen white dwarf but on an oxygen-neon-magnesium white dwarf which has evolved from a star which had a main sequence mass of approx. 8 solar masses to approx. 12 solar masses. An outburst was simulated by evolving 1.25 solar mass white dwarfs accreting hydrogen rich material at various rates. The effective enrichment of the envelope by ONeMg material from the core is simulated by enhancing oxygen in the accreted layers. The resulting evolutionary sequences can eject the entire accreted envelope plus core

material at high velocities. They can also become super-Eddington at maximum bolometric luminosity. The expected frequency of such events (approx. 1/4) is in good agreement with the observed numbers of these novae. Author

N86-17241# Los Alamos National Lab., N. Mex.
PERFORMANCE EVALUATION OF THE ANTARES REFERENCE TELESCOPE SYSTEM
J. R. Parker, G. L. Woodfin, and V. K. Viswanathan 1985 9 p Presented at the Southwest Conference on Optics '85, Albuquerque, N. Mex., 4-8 Mar. 1985
(Contract W-7405-eng-36)
(DE85-015733; LA-UR-85-2721; CONF-850345-29) Avail: NTIS HC A02/MF A01

The Antares Reference Telescope System is a complicated electro-optical-mechanical system whose main purpose is to enable positioning of targets used in the Antares Laser System to within 10 microns of a selected nominal position. To date, it has been used successfully to position targets ranging in size from 300 microns to 2 mm. The system consists of two electro-optical systems positioned in a nearly orthogonal manner. This cross telescope configuration facilitates accurate positioning in three planes. The results obtained so far in resolution and positioning of targets using this system are discussed. It is shown that a resolution of 200 lp/mm and a positioning precision of 25 microns can be obtained. Author

N86-17242# Royal Observatory, Edinburgh (Scotland).
THE UK SCHMIDT TELESCOPE OBJECTIVE PRISMS. 2: CATALOGUE OF OBJECTS AND TECHNICAL DATA
Ann Savage, J. Duncan Waldron, David H. Morgan, Susan B. Tritton, Russell D. Cannon, John A. Dawe, Mary T. Bruck (Edinburgh Univ.), Steven M. Beard (Edinburgh Univ.), and John B. Palmer (Edinburgh Univ.) 1985 68 p refs
(ISBN-0-902553-35-6-Pt-2) Avail: NTIS HC A04/MF A01

Galactic and extragalactic objects as they appear on UKST prism plates are described so that specific classes of objects can more easily be identified. Two spectral classification schemes, at dispersion 2400 A/mm at 4300 A, and 800 A/mm at 4300 A are described. The limitations of the prism combinations with respect to dispersion and resolution the effects of seeing and exposure time on the appearance of the spectra and the wavelength sensitivity responses of the two major emulsions in use, IIIa-J and the IIIa-F are discussed. Author (ESA)

N86-17243# Royal Observatory, Edinburgh (Scotland).
THE UK SCHMIDT TELESCOPE OBJECTIVE PRISMS. 3: ILLUSTRATIONS OF OBJECTIVE PRISM SPECTRA
Ann Savage, Duncan J. Waldron, Marjorie Fretwell, David H. Morgan, Susan B. Tritton, Russel D. Cannon, Mary T. Bruck (Edinburgh Univ.), Steven M. Beard (Edinburgh Univ.), and John B. Palmer (Edinburgh Univ.) 1985 28 p
(ISBN-0-902553-36-4-Pt-3) Avail: NTIS HC A03/MF A01

Galactic and extragalactic objects photographed by the UK Schmidt telescope objective prisms are presented. Faint stellar spectral type standard stars; emission-line quasars; stars mistaken for quasar candidates; absorption-line galaxies; emission-line galaxies; extragalactic HII regions; planetary nebulae; emission-line stars; Wolf Rayet, carbon, and M stars; and HD standard stars are shown. Author (ESA)

N86-17244# Groningen Rijksuniversiteit (Netherlands). Lab. for Space Research.
SHORT WAVELENGTH SPECTROMETER FOR THE INFRARED SPACE OBSERVATORY (ISO). A PROPOSAL TO THE EUROPEAN SPACE AGENCY
1985 88 p refs Sponsored in cooperation with Max-Planck Inst. fuer Extraterestrische, Garching, West Germany and Utrecht State Univ., Netherlands
Avail: NTIS HC A05/MF A01

A spectrometer for the Infrared Space Observatory, designed to operate in the wavelength region from 3 to 50 microns with resolutions ranging from 3000 to 100,000 is proposed. It can study interstellar matter, star formation and evolution, extragalactic systems, and the solar system. The wide wavelength range includes numerous atomic, ionic and molecular transitions as well as diffuse features. They provide tools for studies of the physical and chemical processes of regions optically hidden by interstellar dust. The high resolving power allows probing of kinematic processes objects ranging from galactic nuclei to planetary atmospheres. Line studies of extragalactic objects, out to distances equal to the Virgo cluster, can be carried out. Direct observation of ground state molecular hydrogen in the interstellar medium can be attempted. Author (ESA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-17245 Yale Univ., New Haven, Conn.
THE STRUCTURE OF BRIGHTEST CLUSTER GALAXIES Ph.D. Thesis
James Moeller Schombert 1984 208 p
Avail: Univ. Microfilms Order No. DA8514685

Faint surface photometry of bright ellipticals in the cores of galaxy clusters, combined with photometry from within the literature, produced a sample of 261 ellipticals in 63 clusters over a magnitude range of -18 > or = M sub v > or = -25. Fitting functions, particularly the r1/4 law and the Hubble-Oemier law, are applied to the data; however, results are ambiguous and have compelled the use of empirical quantities such as isophotal radii, characteristic surface brightnesses and integrated magnitudes determined directly from surface brightness profiles themselves to analyze structure. There is strong evidence to show that structure is a well correlated and mooth function of luminosity, and that generalized profiles can be constructed as templates to describe the average structure of ellipticals as one parameter (luminosity) family. BCMs (brightest cluster members) have particular traits that, as a class of objects, distinguishes them structurally from normal ellipticals. These differences can be attributed to enlarged charactristic radii, and shallow profile slopes. Dissert. Abstr.

N86-17246 State Univ. of New York, Stony Brook.
ELECTROMAGNETIC TORQUES AND ALIGNMENT OF NEUTRON STARS Ph.D. Thesis
Kim Kwee Ng 1985 93 p
Avail: Univ. Microfilms Order No. DA8518373

Certain consequences of the high magnetic field associated with a rotating neutron star were studied. A general equation for the electromagnetic torque on the star is formulated. This consists of two distinct contributions, i.e. a retardation torque and a magnetospheric torque acting on the star. The retardation torque results naturally from a mathematical treatment of the retardation correction to the magnetic field of the star. A torque obtained from a Taylor series expansion was identified as a third-order term and its component along the rotation axis is consistent with the classical decelerating torque known in the past. The magnetospheric torque which results from the currents in the magnetosphere, is identified and included in the calculation. There is, however, no anomalous effect on the alignment and spindown rate of the star. The calculation is extended to the quadrupole moment of the star. It is found that there is no effective aligning torque or anomalous spindown effect from the rotating quadrupole field of the star. The alignment of the star and a possible twisting motion about the dipole moment of the star are discussed. Dissert. Abstr.

N86-17247# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Astrophysik.
DISSOCIATIVE RECOMBINATION OF INTERSTELLAR IONS: ELECTRONIC STRUCTURE CALCULATIONS FOR HCO(+)
W. P. Kraemer and A. U. Hazi 2 Jul. 1985 16 p refs Presented at the NATO Advanced Study Institute on Molecular Astrophysics:

State of the Art and Future Directions, Garching, West Germany, 1 Jul. 1984 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE85-017261; UCRL-92919; CONF-8407142-1) Avail: NTIS HC A02/MF A01

A study of the interstellar formyl ion HCO(+) is the first attempt to investigate dissociative recombination for a triatomic molecular ion using an entirely theoretical approach. A number of fairly extensive electronic structure calculations that were performed to determine the reaction mechanism of the e-HCO(+) process are described. Similar calculations for the isoelectronic ions HOC(+) and HN2(+) are in progress. DOE

N86-17248# California Univ., Berkeley. Lawrence Berkeley Lab.
SUPERGRAVITY AND INFLATION
P. Binetruy Aug. 1985 27 p refs Presented at the 6th Workshop on Grand Unification, Minneapolis, Minn., 18 Apr. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000608; LBL-20092; CONF-8504178-1) Avail: NTIS HC A03/MF A01

The reasons that led to study supersymmetric models in the context of inflation are reviewed by setting up the constraints that candidates to an inflationary scenario must satisfy. The question is raised whether the groundstate of the new scalar field introduced, the inflation, breaks supersymmetry. This is discussed in connection with the so-called thermal constraint. Some problems about the study of thermal fluctuations are discussed. The different models available are reviewed and the way they address those issues. A discussion of baryon number generation and of the gravitation problem follows. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-17249 California Inst. of Tech., Pasadena.
THEORETICAL STUDIES OF 10'S ATMOSPHERE Ph.D. Thesis
Michael Earl Summers 1985 159 p
Avail: Univ. Microfilms Order No. DA8508475

A range of theoretical models of the compositional structure of Io's dayside atmosphere and ionosphere are developed. The dominant neutral gas, SO2, is provided by sublimation of surface frost. Photochemical processes lead to the build up of O, S, SO, and O2 as minor gasses near Io's surface while O becomes the dominant gas near the exobase. The vertical column density of O2 in all models considered is less than 10 to the 14th power/sq cm. The dayside ionosphere is formed as a result of ionization of neutral species by solar UV radiation. Charge exchange and rearrangement reactions are important for determining the ionic composition of the ionosphere. The dominant ion in the models considered is SO+. A number of charge exchange reactions are identified whose rates need to be better determined in order to refine the present model of the ionosphere. The best matches of the model ionospheres to that observed by the Pioneer 10 radio occultation experiment require atmospheric surface concentrations of SO2 in the range of 2.5 x 10 to the 9th power to 1 x 10 to the 11th power/cu cm, and an exospheric temperature in the range of 960 K to 1230 K. Dissert. Abstr.

N86-17250 George Washington Univ., Washington, D.C.
COMPRESSIONAL DEFORMATION AND TECTONIC EVOLUTION OF THE THARSIS REGION OF MARS Ph.D. Thesis
Thomas Robert Watters 1985 267 p
Avail: Univ. Microfilms Order No. DA8514513

The Tharsis region of Mars is dominated by volcanic and tectonic features. The major structural features observed throughout the region are ridges and faults. The Tharsis ridges are morphologically similar to ridges observed on the Moon, Mercury and the Columbia Plateau on Earth. The interpretation of the Columbia Plateau ridges as anticlinal folds forms a strong basis for the interpretation of the Tharsis ridges as compressional folds. The Tharsis ridge system is, to a first approximation, circumferentially oriented around the regional topographic high of northern Syria Planum. Ridge-fault crosscutting relations on the ridged plains indicate that the major ridge forming events in the Tharsis region were coincident with, and in many cases, prior to the extensional events that generated the faulting of the Tempe, Coprates and Memnonia regions and the rifting of Valles Marineris. Based on superposition relations, the compressional events that generated the ridges occurred after the emplacement of the ridged plains volcanic units and did not extend beyond the emplacement of the Syria Planum Formation or Tharsis Formation volcanic units. Dissert. Abstr.

N86-17251°# Massachusetts Univ., Amherst.
STUDIES OF RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES Semiannual Status Report, 1 Jun. - 30 Nov. 1985
William M. Irvine and F. Peter Schloerb 15 Jan. 1986 7 p
(Grant NGL-22-010-023)
(NASA-CR-176466; NAS 1.26:176466; SASR-37) Avail: NTIS HC A02/MF A01 CSCL 03B

The research emphasis during the period of this report has been on radio observations of comets, related to the International Halley Watch. Observations of the 18 cm lambda-doublet of OH have been carried out monthly. Both of the 1667 and 1665 MHz lines have been repeatedly detected for Comets Halley, Giacobini-Zinner, Thiele, and Hartley-Good. The first astronomical detection of the weak satellite line at 1720 MHz was made for P/Halley. These data promise to supply the highest signal-to-noise-ratio data over an extended period ever obtained for cometary radio observations. Analysis will provide gas production rates as a function of heliocentric distance and allow for detailed comparisons with the OH excitation model involving ultraviolet pumping. In the case of Halley, the lines appear quite symmetric, usually being centered within 0.1 km/s with respect to the nominal nuclear velocity. Line widths have been typically within 10% of 2 km/s. There is thus little evidence for asymmetric emission in the data obtained to date. It seems likely that non-steady-state models of the coma will be required to interpret the data. Evidence for significant departures from the LTE hyperfine ratios was found for Comet Giacobini-Zinner. Smaller, but nonetheless significant, deviations have been found for Comet Halley. B.W.

N86-17252°# Alaska Univ., Fairbanks.
OPTICAL OBSERVATIONS OF THE AMPTE ARTIFICIAL COMET AND MAGNETOTAIL BARIUM RELEASES Yearly Report
Thomas J. Hallinan, Hans Stenbaek-Nielsen, and Neal Brown Nov. 1985 17 p
(Grant NAG5-493)
(NASA-CR-176463; NAS 1.26:176463; YR-1) Avail: NTIS HC A02/MF A01 CSCL 03B

The first AMPTE artificial comet was observed with a low light level television camera operated aboard the NASA CV990 flying out of Moffett Field, California. The comet head, neutral cloud, and comet tail were all observed for four minutes with an unifiltered camera. Brief observations at T + 4 minutes through a 4554A Ba(+) filter confirmed the identification of the structures. The ion cloud expanded along with the neutral cloud at a rate of 2.3 km/sec (diameter) until it reached a final diameter of approx. 170 km at approx. T + 90 s. It also drifted with the neutral cloud until approx. 165 s. By T + 190 s it had reached a steady state velocity of 5.4 km/sec southward. A barium release in the magnetotail was observed from the CV990 in California, Eagle, Alaska, and Fairbanks, Alaska. Over a twenty-five minute period, the center of the barium streak drifted southward (approx. 500 m/sec), upward (24 km/sec) and eastward (approx 1 km/sec) in a nonrotating reference frame. An all-sky TV at Eagle showed a single auroral arc in the far North during this period. Author

N86-17253# Lawrence Livermore National Lab., Calif.
SHOCK TEMPERATURE MEASUREMENTS IN AMMONIA
H. B. Radousky, A. C. Mitchell, N. J. Nellis, and M. Ross Jul. 1985 7 p Presented at the American Physics Society Topical Conference on Shock Waves in Condensed Matter, Spokane, 22 Jul. 1985
(Contract W-7405-eng-48)
(DE85-014810; UCRL-92921; CONF-850736-27) Avail: NTIS HC A02/MF A01

Our first shock temperature measurements on a cryogenic target are reported for NH3. A new fast optical pyrometer and a cryogenic specimen holder for liquid NH3 were developed to measure shock temperatures of 4400 and 3600 K at pressures of 61 and 48 GPa. These conditions correspond to those in the ice layers in Uranus and Neptune. The shock temperature data are in reasonable agreement with an equation of state based on an intermolecular potential derived from NH3 Hugoniot data. DOE

92 SOLAR PHYSICS

includes solar activity, solar flares, solar radiation and sunspots.

N86-17254# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPARABLE ENERGY RELEASE RATES AT THE ORIGIN OF SMALL AND LARGE SOLAR BURSTS
P. Kaufmann Jun. 1985 6 p refs Sponsored in part by FINEP Submitted for publication
(INPE-3557-PRE/767) Avail: NTIS HC A02/MF A01

The discovery that the simplest impulsive solar bursts at microwaves and hard X-rays have time scales in the range of 10-100 milliseconds suggest that the energy release rates in such small events are comparable to rates attributed to large events. This condition may be reconciled to the concept that observed burst fluxes in solar events are the convolution of many fast primary energetic injections, at various repetition rates. Author

N86-17255*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Dept. of Physics and AStronomy.
THE HEAVY ION COMPOSITIONAL SIGNATURE IN 3He-RICH SOLAR PARTICLE EVENTS
G. M. Mason (Maryland Univ., College Park), D. V. Reames, B. Klecker (Max-Planck-Institut fuer Physik und Astrophysik, Munich, West Germany), D. Hovestadt (Max-Planck-Institute fuer Physik und Astrophysik, Munich, West Germany), and T. T. VonRosenvinge 7 Oct. 1985 53 p refs Submitted for publication
(Contract NAS5-28704; Grants NAGw-101; NGR-21-002-224/316; Contract FRG-RV-14-B8/74; Grant NSF ATM-84-07546)
(NASA-CR-177831; NAS 1.26:177831; PP-86-59) Avail: NTIS HC A04/MF A01 CSCL 03B

A survey of the approx. 1 MeV/nucleon heavy ion abundances in 66 He3-rich solar particle events was performed using the Max-Planck-Institut/University of Maryland and Goddard Space Flight Center instruments on the ISEE-3 spacecraft. The observations were carried out in interplanetary space over the period 1978 October through 1982 June. Earlier observations were confirmed which show an enrichment of heavy ions in HE3-rich events, relative to the average solar energetic particle composition in large particle events. For the survey near 1.5 MeV/nucleon the enrichments compared to large solar particle events are approximately He4:C:O:Ne:Mg:Si:Fe = 0.44:0.66:1.:3.4:3.5:4.1:9.6. Surprising new results emerging from the present broad survey are that the heavy ion enrichment pattern is the same within a factor of approx. 2 for almost all cases, and the degree of heavy ion enrichment is uncorrelated with the He3 enrichment. Overall, the features established appear to be best explained by an acceleration mechanism in which the He3 enrichment process is not responsible for the heavy ion enrichment, but rather the heavy ion enrichment is a measure of the ambient coronal composition at the sites where the He3-rich events occur. Author

N86-17256# Oak Ridge National Lab., Tenn.
FEASIBILITY OF Br-81(nu, e(-))Kr-81 SOLAR NEUTRINO EXPERIMENT
G. S. Hurst, S. L. Allman, C. H. Chen, S. D. Kramer, J. O. Thomson, and B. Cleveland May 1985 8 p refs Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with Tennessee Univ., Knoxville and Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC05-84OR-21400)
(DE85-016380; CONF-850605-4) Avail: NTIS HC A02/MF A01

Several ingenious solutions have been offered for the solar neutrino problem - a defect in the solar model, the appearance of a new type of neutrino physics, the Sun is no longer burning, etc. The range of these proffered solutions stresses the need for a new experiment to study the Sun. The modern pulsed laser now makes possible a new solar neutrino test which examines an independent neutrino source in the Sun. A recently proposed experiment would use the reaction Br-81(nu,e(-))Kr-81 to measure the flux of Be-7 neutrinos from the Sun. When Be-7 decays by electron capture to make Li-7, a neutrino is emitted at 0.862 MeV and the flux of these on the Earth is about 4 x 10 to the 9th power sq cm/s, according to the standard model. Therefore, an experiment based on Br-81(nu,e(-))Kr-81 which is sensitive to these lower energy neutrinos would be of fundamental importance. To the first order, the chlorine experiment detects the B-8 neutrinos while bromine detects the much more abundant Be-7 neutrino source. In practice, the proposed bromine experiment would be very similar to the chlorine radiochemical experiment, except that Kr-81 with a half-life of 200,000 years cannot be counted by decay methods. With an experiment of about the same volume as the chlorine experiment (380 cu m) filled with CH2Br2, the model predicts about 2 atoms of Kr-81 per day. The bromine experiment depends entirely on the RIS method, implemented with pulsed lasers, for its success. DOE

N86-17257# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
ULTRAVIOLET IRRADIANCE FROM NATURAL SOURCES
H. Kaase May 1985 20 p refs
(PTB-Opt-18; ISSN-0341-6712) Avail: NTIS HC A02/MF A01

Extraterrestrial UV irradiance from the Sun (spectral distribution and solar constant) based on WMO, NASA, EC, and CIE values is given. Global irradiance for various solar zenith angles at sea level and the AM 1.5 direct (NASA and EC) as well as direct and diffuse (ISO) sun irradiance for the UV spectral range is presented. Data are compared with measured values. Author (ESA)

N86-17258*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE ISEE-1 ULEWAT FLUX TAPE DESCRIPTION
G. M. Mason (Maryland Univ., College Park) and B. Klecker Jul. 1985 101 p refs
(Contracts NAS5-26739; BMFT-RV-14-B8/74; BMFT-010I-ZA-/WF/WRD-175/4)
(MPE-IN-43; ISSN-0340-8922) Avail: NTIS HC A06/MF A01

The ISEE-1 ULEWAT FLUX tapes of solar proton observations summarized over 1hr intervals are described. Three years of data fit onto one 1600 BPI 9-track magnetic tape. In making the tapes, corrections were made to the ULEWAT basic data tapes in order to, e.g., remove rate spikes and account for changes in instrument response, so that instrument fluxes can be calculated easily from the FLUX tapes without further consideration of instrument performance. Limitations and warnings about the use of the tapes are included. Author (ESA)

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-17259 Brandeis Univ., Waltham, Mass.
THE LARGE SCALE ANISOTROPY OF THE COSMIC MICROWAVE BACKGROUND RADIATION Ph.D. Thesis
Robert Karl Schaefer 1985 108 p
Avail: Univ. Microfilms Order No. DA8517051

Although the predicted moments of the distribution of the cosmic microwave background radiation in an inflationary universe have previously been calculated, the sensitivity of these moments of small changes in the conditions required by inflation had not been explored. In this thesis, formulae are presented for calculating the moments of the background radiation due to an arbitrary perturbation in the gravitational field of the early universe. It is found that only scalar (energy density) and tensor (gravitational wave) perturbations are important for his effect. Then numerical calculations are performed; first, to confirm the previous inflationary calculations which require a critical cosmological density and a Harrison-Zel'dovich scale invariant spectrum or perturbations, and second, to compute the values of the moments in universe with non-critical energy densities and different spectra (k + or - 1). The perturbations are caused by some random process which follows a Gaussian distribution, as this seems to be a reasonable feature of inflation to keep even in non-inflationary universe.
Dissert. Abstr.

N86-17260 Brandeis Univ., Waltham, Mass.
A RELATIVISTIC BLAST WAVE MODEL FOR OUTBURSTS IN QUASARS AND ACTIVE GALACTIC NUCLEI Ph.D. Thesis
Elizabeth Bennetts Hessel 1985 170 p
Avail: Univ. Microfilms Order No. DA8517037

A model for outbursts in quasars was developed. The shock follows the dynamics of relativistic spherical blast waves. The relativistic electrons in the shocked gas are assumed to have a relativistic Maxwellian energy distribution. The general behavior of these model outbursts is examined. The flux at early times has a broad spectrum; the flux peaks while optically thin at high frequencies as the peak in the Maxwellian radiation spectrum passes through. The flux peaks at low frequencies as the source becomes optically thin. Corresponding changes are seen in the peak flux and peak time behavior during the outburst. The shape of an outburst also depends on the angular size of the source and on how relativistic its motion is. Combined models in which the shock dynamics change during an outburst are also considered. One of the models is fit to outbursts in the quasar 3C454.3, and the corresponding physical quantities are derived. The energy requirements for these models are high, and the model flux does not completely follow the linear fall off observed. These blast wave models with peaked electron energy spectra do provide a good description of radio outbursts.
Author

N86-17261 Ohio State Univ., Columbus.
AN ANALYSIS OF THE BORAD EMISSION LINE PROFILES OF SEYFERT 1 GALAXIES Ph.D. Thesis
Daniel Michael Crenshaw 1985 123 p
Avail: Univ. Microfilms Order No. DA8518929

High signal-to-noise spectra of twelve Seyfert 1 galaxies were obtained to study the broad emission line profiles. The observations were made with the image dissector scanner on the Perkins 1.8-m telescope. Three contamination effects that tend to weaken the core or strength the wings of the H beta profile relative to the H alpha profile are considered: (1) stellar absorption features from the host galaxy can significantly lower the peak of the H beta profile and introduce structure and asymmetries into the profiles of H beta, H lambda and He 1 lambda 5876; (1) an extended shell of emission in the red wing of the H beta profile is due to Fe 11 and at least one other species; (3) the H alpha profile is at a better velocity resolution than the H beta profile in the spectra, which leads to a weaker core for the H alpha profile. The large range in H beta/H alpha and He 1/H beta for a given Seyfert 1 galaxy indicates that the broad-line region is not a thin spherical shell.
Author

N86-17262# Los Alamos National Lab., N. Mex.
COSMIC-RAY-PRODUCED GAMMA RAYS IN PLANETARY SURFACES
R. C. Reedy 1985 5 p refs Presented at International Conference on Nuclear Data for Basic and Applied Science Santa Fe, N. Mex., 13 May 1985
(Contract W-7405-eng-36)
(DE85-012750; LA-UR-85-1742; CONF-850507-26) Avail: NTIS HC A02/MF A01

A major priority of future NASA planetary missions is the determination of the elemental compositions of solar system objects. Gamma-ray spectroscopy will probably be used soon to determine the surface compositions of Mars and other solar system objects. Neutrons induced by the cosmic rays produce many of the important GAMMA-ray lines that escape from planets. Some measurements of the GAMMA rays produced by neutrons and protons with various energies have recently been made. However, many more nuclear measurements are still needed to plan for and to interpret the results from future planetary missions. Excitation functions for the production of GAMMA-ray lines by both neutrons and protons are needed in calculating the fluxes of GAMMA rays in and above a planet's surface. Thick-target irradiations with high-energy protons have simulated the production of (GAMMA) rays by the cosmic rays, and more simulations are planned. DOE

N86-17263# Pennsylvania Univ., Philadelphia. Dept. of Physics.
STUDY OF HIGH ENERGY PHYSICS UNDERGROUND
Oct. 1984 23 p
(Contract DE-AC02-81ER-40012)
(DE85-000824; DOE/ER-40012/T2) Avail: NTIS HC A02/MF A01

The Homestake Large Area Scintillation Detector consists of 140 tons of liquid scintlator in a hollow 8 m x 8 m x 16 m box surrounding the Brookhaven (37)C1 solar neutrino detector. The experiment is located at a depth of 4850 ft. (4200 m.w.e.) in the Homestake Gold Mine. Half of the detector is currently running; the full detector will be taking data by the fall of 1984. An extensive air shower is also currently under construction on the Earth's surface above the underground detector, consisting of 100 scintillators, each 3 sq m, covering approximately 0.8 km sq; the first portion of the surface array will also be providing data this fall. Together, the new Homestake detectors will be used to search for slow, massive magnetic monopoles; study the zenith angle distribution of neutrino-induced muons; search for neutrino bursts from the gravitational collapse of massive stars; measure the multiplicity and transverse momentum distributions of cosmic ray muons; and study the composition of the primary cosmic rays. The underground device and its capabilities as a monopole detector are described, followed by the surface array and the cosmic ray studies.
DOE

N86-17264# Chicago Univ., Ill.
PARTICLE PHYSICS AND COSMOLOGY
M. S. Turner and D. N. Schramm 1 Sep. 1985 69 p
(Contract DE-AC02-80ER-10773)
(DE85-014780; DOE/ER-10773/T1) Avail: NTIS HC A04/MF A01

During the past year, the research of the members of our group has spanned virtually all the topics at the interface of cosmology and particle physics. Some topics studied were inflationary Universe scenarios, astrophysical and cosmological constraints on particle properties, ultrahigh energy cosmic ray physics, quantum field theory in curved space-time, cosmology with extra dimensions, superstring cosmology, neutrino astronomy with large, underground detectors, and the formation of structure in the Universe.
DOE

99 GENERAL

N86-17265*# National Aeronautics and Space Administration. Kennedy (John F.) Space Center, Cocoa Beach, Fla.
RESEARCH AND TECHNOLOGY Annual Report, 1985
Nov. 1985 62 p
(NASA-TM-83099; NAS 1.15:83099) Avail: NTIS
HC A04/MF A01 CSCL 05A

As the NASA Center responsible for assembly, checkout, servicing, launch, recovery, and operational support of Space Transportation System elements and payloads, Kennedy Space Center is placing increasing emphasis on the Center's research and technology program. In addition to strengthening those areas of engineering and operations technology that contribute to safe, more efficient, and more economical execution of our current mission, we are developing the technological tools needed to execute the Center's mission relative to Space Station and other future programs. The Engineering Development Directorate encompasses most of the laboratories and other Center resources that are key elements of research and technology program implementation and is responsible for implementation of the majority of the projects in this Kennedy Space Center 1985 Annual Report. The report contains brief descriptions of research and technology projects in major areas of Kennedy Space Center's disciplinary expertise. Author

N86-17266*# National Aeronautics and Space Administration, Washington, D.C.
THE NINTH DR. ALBERT PLESMAN MEMORIAL LECTURE: THE FUTURE OF SPACE FLIGHT
Jesse W. Moore 1984 61 p Lecture held in Delft, Netherlands, 26 Oct. 1984
(NASA-TM-87558; NAS 1.15:87558) Avail: NTIS
HC A04/MF A01 CSCL 05D

The history of space flight is reviewed and major NASA programs (Mercury, Gemini, Apollo, Skylab, Apollo-Soyuz, Science and Applications, Space Shuttle, Space Station) are summarized. Developments into the early 21st century are predicted. Author (ESA)

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Typical Subject Index Listing

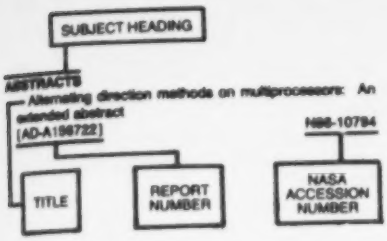

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A note on the pay-off matrix in multiple objective programming
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[CS-8503] N86-17035

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China report: Science and technology
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Reports of the University of Electro-Communications, volume 36, no. 1, September 1985 (serial no. 58)
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[JPRS-UCC-85-005] N86-16924
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[AD-A159273] N86-17019
Numerical solution of boundary condition to Poisson's equation and its incorporation in the program POISSON
[DE85-016637] N86-17025
The NUMVEC FORTRAN library manual. Chapter: Elliptic Partial Differential Equations (PDES). Routine: MGZEB
[CWI-NM-R8518] N86-17065
Measurement problem in Program Universe. Revision
[DE85-017004] N86-17073
PHAZR: A phenomenological code for holeboring in air
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Reversible Ising dynamics
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Submillimeter wave propagation in tokamak plasmas
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Sandia computerized shock compression bibliographical database
[DE85-018542] N86-17222

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Reliability of geotechnical instrumentation
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Drag reduction through boundary layer control: A report on Euromech 181
[FFA-TN-1984-60] N86-16538
Proceedings: Direct Fixation Fastener Workshop
[PB85-247625] N86-16596
The Shock and Vibration Bulletin 55. Part 2: Dynamic testing, flight vehicle dynamics, seismic loads and fluid-structure interaction
[AD-A160264] N86-16646
Proceedings of the Workshop: Biodegradation Kinetics
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Transport of anion impurities through oxides
[AD-A158445] N86-16488
CORROSION PREVENTION
Hot corrosion and protection mechanisms of marine gas turbine materials, volumes 1 and 2
[BR96018-VOL-1/2] N86-16336
Pitting corrosion of ferrous alloys
[AERE-R-11490] N86-16365
AGARD Corrosion Handbook. Volume 1: Corrosion, causes and case histories
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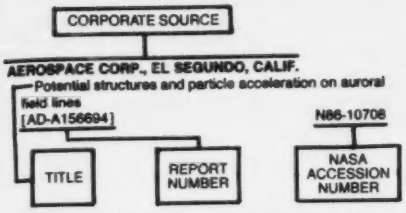

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Strengthening low-alloy magnesium sheet by strain softening and annealing
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Minerals yearbook, 1983. Volume 2: Area reports, domestic
[PB85-238822] N86-16718

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Temperature kinetics during shock-wave consolidation of metallic powders
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Water resources data for California, water year 1983. Volume 4: Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon state line
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Thermomechanical processing of a two-phase Al-Cu-Li-Zr alloy
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CALIFORNIA UNIV., LOS ANGELES.
Analysis of the absorption spectrum of neodymium: Sodium beta alumina
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CALIFORNIA UNIV., SAN DIEGO.
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Early history of computer simulations in statistical mechanics
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CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
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[CWI-NM-R8517] N86-17064
The NUMVEC FORTRAN library manual. Chapter: Elliptic Partial Differential Equations (PDES). Routine: MGZEB
[CWI-NM-R8518] N86-17065
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CENTRE DE RECHERCHES DE L'INST. SUPERIEUR INDUSTRIEL CATHOLIQUE DU HAINAUT (BELGIUM).
Stresses and displacements in a four layered system with fixed bottom
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CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, VILLEURBANNE (FRANCE).
Influence of an axial torque on the dynamic behavior of rotors in bending N86-16635

CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES, SENLIS (FRANCE).
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Evaluation of 23 inch radar viewing unit for Heathrow approach control room
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COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
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The International Geosphere/Biosphere Program, 1984
[GPO-45-472] N86-16781
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COMPUTER TECHNOLOGY ASSOCIATES, INC., COLUMBIA, MD.
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COORDINATING RESEARCH COUNCIL, INC., ATLANTA, GA.
1982 CRC fuel rating program: Road octane performance of oxygenates in 1982 model cars
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[DE85-018483] N86-17134

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Godhavn Geophysical Observatory: Magnetic results, 1978
[ISBN-87-7478-242-8] N86-16808
Godhavn Geophysical Observatory: Magnetic results, 1981
[ISBN-87-7478-245-2] N86-16809
Godhavn Geophysical Observatory: Magnetic results, 1983
[ISBN-87-7478-240-1] N86-16810
Narssarssuaq Geophysical Observatory: Magnetic results, 1983
[ISBN-87-7478-250-9] N86-16811
Brorfelde Geophysical Observatory: Magnetic results, 1981
[ISBN-87-7478-251-7] N86-16814
Brorfelde Geophysical Observatory: Magnetic results, 1982
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DEFENCE RESEARCH ESTABLISHMENT SUFFIELD, RALSTON (ALBERTA).
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
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Water resources data for Ohio, water year 1984. Volume 1: Ohio River Basin
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Water resources data for Pennsylvania, water year 1983. Volume 1: Delaware River Basin
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Water resources data for Montana, water year 1984. Volume 2: Columbia River Basin
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Water resources data for Colorado, water year 1983. Volume 3: Dolores River Basin, Green River Basin and San Juan River Basin
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Water quality of the tidal Potomac River and estuary: Hydrologic data reports supplement, 1979 through 1981 water years
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Water resources data for California, water year 1983. Volume 4: Northern Central Valley Basins and the Great Basin from Honey Lake Basin to Oregon state line
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GEOLOGICAL SURVEY, TACOMA, WASH.
Columbia glacier in 1984: Disintegration underway
[TI86-900055] N86-16703
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Estimated use of water in the US in 1980
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IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
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MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
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MICHIGAN STATE UNIV., EAST LANSING.
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[PB85-232924] N86-16713

MISSION RESEARCH CORP., ALBUQUERQUE, N. MEX.
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MISSOURI UNIV., ROLLA.
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Hurricanes Iwa, Alicia and Diana, common themes: A report of the Committee on Natural Disasters, 1984
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Aeronautical engineering: A continuing bibliography with indexes (supplement 193)
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
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Global auroral responses to magnetospheric compressions by shocks in the solar wind: Two case studies
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Computed tomography for non-destructive evaluation of composites: Applications and correlations
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NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
Implicit finite-difference methods for the calculation of unsteady transonic potential flow around two-dimensional airfoils: A discussion
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NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
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Round robins on the apparent thermal conductivity of low-density glass fiber insulations using guarded hot plate and heat flow meter apparatus
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Performance requirements and preliminary design of a boundary layer wind tunnel facility
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Computerized fracture mechanics database for oxide glasses
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Reference model for DBMS (database management system) standardization
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
An exploration of combustion limitations and alternatives to the NBS Toxicity Test Method
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Molecular and microstructural factors affecting mechanical properties of polymeric cover plate materials
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
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[PB85-210375] N86-16850
Summary of meteorological product usage during the PROFS convection forecast exercise of 1983
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
Monthly and seasonal weather outlook for mid-June to mid-July 1985, volume 39, number 2, June 14, 1985
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Detection of high level turbulence using satellite imagery and upper air data
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Advanced Very High Resolution Radiometer (AVHRR) sensor comparison characteristics N86-16857
Atlantic Oceanographic and Meteorological Laboratory, fiscal year 1984
[PB85-218014] N86-16874

NATIONAL OPINION RESEARCH CENTER, CHICAGO, ILL.
Full-information item factor analysis
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NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
Temperature fixed points 2. Benzoic acid triple-point cells
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Temperature fixed points 3. Purity of organic compounds
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NATIONAL SEVERE STORMS FORECAST CENTER, KANSAS CITY, MO.
Severe thunderstorm cases of 1984
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NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Report of activities from FY 1983 - FY 1984 pursuant to Section 2 of the Stevenson-Wydler Technology Innovation Act
[PB85-184026] N86-17234

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report: Midair collision of Wings West Airlines Beech C-99 (N666U) and Aesthetec Inc., Rockwell Commander (N112SM), near San Luis Obispo, California, August 24, 1984
[NTSB/AAR-85/07] N86-16207

NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
MDR: Processing manually digitized radar observations, revised
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NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
AFOS (Automation of Field Operations and Services) monitory of terminal forecasts
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Watch/warning verification, 1982 and 1983: Flash flood, winter storm and high wind
[PB85-204899] N86-16853

NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and seasonal weather outlook for mid-July to mid-August 1985, volume 39, number 14, July 13, 1985
[PB85-230258] N86-16842
Monthly and seasonal weather outlook for mid-August to mid-September 1985, volume 39, number 16, August 14, 1985
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NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Handbook for marine geotechnical engineering. Deep ocean technology
[AD-A157894] N86-16414

NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY, MONTEREY, CALIF.
An application of discriminant analysis to a tropical cyclone intensification forecasting algorithm
[AD-A159399] N86-16827

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
Theory and calculation for the effect of a homogeneous, cylindrically symmetric disturbance on ELF (Extremely Low Frequency) propagation
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NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Mechanical characteristics of a superplastic Aluminum-10.2%Mg-0.1%Zr alloy
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
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OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes, Volume 39, Number 10
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Water resources data for Pennsylvania, water year 1983. Volume 1: Delaware River Basin
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PHYSICAL DYNAMICS, INC., BELLVUE, WASH.
Studies of gravity wave propagation in the middle atmosphere
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PITTSBURGH UNIV., PA.
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PONA (J.), HILLSIDE, N.J.
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Evaluation of methods for analysis of human fat, skin, nails, hair, blood and urine
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RESOURCES FOR THE FUTURE, INC., WASHINGTON, D. C.
Ambient ozone and human health: An epidemiological analysis, volume 1
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ROME UNIV. (ITALY).
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ROYAL ARMAMENT RESEARCH AND DEVELOPMENT ESTABLISHMENT, FORT HALSTEAD (ENGLAND).
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ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, SCHIPHOL-OOST.
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ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
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The agricultural weather report for the Yaselmeer polders Netherlands in 1983 and 1984: Report of a project
[KNMI-TR-72] N86-16837

ROYAL OBSERVATORY, EDINBURGH (SCOTLAND).
The UK Schmidt telescope objective prisms. Part 1: Their applicability to some modern research projects
[ISBN-0-902553-34-8-PT-1] N86-17148
The UK Schmidt telescope objective prisms. 2: Catalogue of objects and technical data
[ISBN-0-902553-35-6-PT-2] N86-17242
The UK Schmidt telescope objective prisms. 3: Illustrations of objective prism spectra
[ISBN-0-902553-36-4-PT-3] N86-17243

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RURAL ENTERPRISES, DURANT, OKLA.
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Sandia computerized shock compression bibliographical database
[DE85-018542] N86-17222

SANDIA NATIONAL LABS., LIVERMORE, CALIF.
TOPAZ: The transient one-dimensional pipe flow analyzer, users manual
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SCIENCE APPLICATIONS INTERNATIONAL CORP., MCLEAN, VA.
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SCRIPPS INSTITUTION OF OCEANOGRAPHY, SAN DIEGO, CALIF.
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Rivista Tecnica Selenia, volume 9, number 2, 1985 N86-16452
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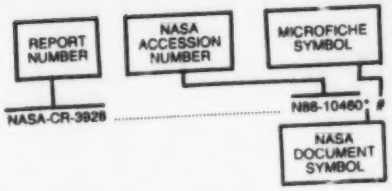

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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VOLUME 24 NUMBER 8 / APRIL 23, 1986

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For related information see also *34 Fluid Mechanics and Heat Transfer*

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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
For related information see also *14 Ground Support Systems and Facilities (Space).*

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Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.
For related information see also *09 Research and Support Facilities (Air).*

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For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 1224
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Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

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Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
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For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

45 ENVIRONMENT POLLUTION 1306
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47 METEOROLOGY AND CLIMATOLOGY 1316
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LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

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53 BEHAVIORAL SCIENCES 1322
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 1322
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55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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Includes mathematical modeling; network analysis; and operations research.

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PHYSICS

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Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

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Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **1359**
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82 DOCUMENTATION AND INFORMATION SCIENCE **1359**
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83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **N.A.**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **1360**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **1361**

89 ASTRONOMY **1362**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **1364**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **N.A.**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **1365**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **N.A.**
Includes cosmic radiation; and inner and outer earth's radiation belts.
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GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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NASA ACCESSION NUMBER

N86-10482*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

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COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included.

Author

VOLUME 24 NUMBER 8 / APRIL 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-17267# National Aerospace Lab., Tokyo (Japan).
PROCEEDINGS OF THE 2ND NAL SYMPOSIUM ON AIRCRAFT COMPUTATIONAL AERODYNAMICS
1984 321 p refs In JAPANESE and ENGLISH Symposium held in Tokyo, Japan, 5-6 Jul. 1984
(NAL-SP-3; ISSN-0289-260X) Avail: NTIS HC A14/MF A01

Various topics related to fluid flow are discussed. Supersonic flow, computational fluid dynamics, nozzle flow, axial flow turbines, and fuel combustion are among the topics covered. For individual titles, see N86-17268 through N86-17300.

N86-17268# Chiba Univ. (Japan).
SUPERSONIC FLOW ON AXISYMMETRIC BLUNT BODY c02
Nobuhide Nishikawa, Riichi Sakuma, and Yukihiko Inoue *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 1-8 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Inviscid supersonic flows around axisymmetric indented bodies are numerically analyzed by the implicit MacCormack scheme. The scheme has been developed for the strong conservative form of Euler equation. Grid generation by elliptic P.D.E. has been employed for relatively complicated body-shapes. The free stream Mach number ranged from 1.8 to 8.0. Various body shapes are treated such as a sphere, an indented body, and hemisphere cylinder. Some details of the formation of the scheme are described and it is observed that the method is highly efficient except for the region near the stagnation point. Author

N86-17269# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
AN INTERACTIVE DESIGN SYSTEM FOR WINGED SPACE VEHICLE c05
Yoshifumi Inatani, Takashi Abe, Haruo Hosokawa (Japan Information Service, LTD), and Jun Sakamoto (Japan Information Service, LTD) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 9-16 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A design system for use in the preliminary design phase of winged space vehicles is described. Although there are many items which must be taken into account in designing such a vehicle, the present system mainly contains the analysis of sizing, weight properties, low speed and hypersonic aerodynamic characteristics. This is because the key factors which determine the vehicle configuration are a large angle of attack capability at hypersonic speed and a moderate lift-drage ratio at low speed or during landing. Sub-programs in the system are those for generation of vehicle configuration and automatic paneling of body surface, hypersonic aerodynamics by the Newtonean flow approximation, low speed aerodynamics by the Boundary Integral Method, some other sub-systems for I/O and the graphic display of the results. The data handling between each sub-program is made by the designer with the time sharing system. An interactive approach for designing such a vehicle is accomplished by the system. Some results obtained through the design of M-type winged space vehicles are presented. Author

N86-17270# National Aerospace Lab., Tokyo (Japan).
RAREFIED GAS NUMERICAL WIND TUNNEL: MONTE CARLO SIMULATION c09
Katsuhisa Koura *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 17-27 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The rarefied gas numerical wind tunnel is under investigation using the Monte Carlo simulation (MCS) in order to simulate the rarefied gas flow around high-altitude flight bodies and space stations; the collision frequency method (CF-MCS) developed by Koura and the time counter method (TC-MCS) developed by Bird in the direct simulation method are applied. Some CF-MCS results are compared with the rigorous (numerical) solutions of the Boltzmann equation. These results agree within the statistical error with the rigorous solutions; therefore the accuracy of the CF-MCS is sufficiently ascertained. Some problems in the development of the rarefied gas numerical wind tunnel are discussed. Author

N86-17271# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF THE LEADING-EDGE SEPARATION VORTEX OVER DELTA WING c02
Kozo Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 27-34 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A thin-layer Navier-Stokes code capable of predicting steady state viscous flows is applied to complicated three-dimensional flow fields. The code is written in a generalized coordinate system, and a recently developed grid generation procedure is used for the flow-field discretization. Application is made to the vortical flow over a delta wing at high angle of attack, and the computed results are compared with experimental results. The results indicate that the present method can capture the physical phenomenon well. It is served that a leading-edge separation vortex is formed over the wing, as is a secondary separation vortex near the leading edge. The flow field behind the trailing edge is also well described. Author

N86-17272# Tsukuba Univ. (Japan).
CURRENT STATUS OF RESEARCH ON EVOLUTION OF LONGITUDINAL VORTICES IN WALL TURBULENCE c02
Shunichi Tsuge and Hiroshi Sakai *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 35-42 refs In JAPANESE; ENGLISH

summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Current methods of approach to the problem of longitudinal vortices prevailing in a viscous sublayer of wall turbulence are reviewed. Correlations among experimental, computational and theoretical methods are discussed and an alternative formalism to the problem is proposed. The formulation takes into account the uncertainty in their way of identifying turbulent vortices. A solution which is periodic in spanwise direction is obtained and its similarity to what is actually observed or computed through experiments or numerical simulations in a close proximity to the wall is discussed. Author

N86-17273# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF UNSTEADY FLOW AROUND AN AIRFOIL BY FINITE DIFFERENCE SOLUTION OF NAVIER-STOKES EQUATIONS c02
Satoru Ogawa and Tomiko Ishiguro *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A numerical procedure for solving the flow field generated by a moving body is presented based on a finite difference solution of Navier-Stokes equations. A conservation-law form of the equations in a general time-varying coordinate system is derived from the Cartesian expression by applying the concept of Lie derivatives. Specifically, a moving coordinate expression of the streamfunction-vorticity formulation is derived, and is used for the analysis of the dynamic-stall phenomenon of an oscillating airfoil in incompressible flow. A computation example is given for an NACA 0012 airfoil oscillating in pitch at an amplitude of 10 deg about a mean angle of attack of 15 deg with a reduced frequency of 0.4 pi and a Reynolds number of 20,000 based on the chord length and the uniform advance speed of the airfoil. Author

N86-17274# Kyoto Univ. (Japan). Dept. of Aeronautics.
FLOWS OF GAS-PARTICLE MIXTURES WITH SIZE-DISTRIBUTION c34
Ryuji Ishii *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 53-58 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The nozzle flow of gas-particle mixtures is treated by assuming a continuous distribution of particle sizes. A distribution function for the particle radii is introduced in order to take into account the continuous distribution of particle sizes. The flow regimes of interest include continuum, slip, transition and free-molecular flows. The rarefaction effect on the nozzle performance is also investigated in detail. Author

N86-17275# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF COMPUTATIONAL FLUID DYNAMICS AT NASA AMES RESEARCH CENTER c34
Mamoru Inouye *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 56-66 refs Previously announced in N85-12866 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Ames Research Center has the lead role among NASA centers to conduct research in computational fluid dynamics. The past, the present, and the future prospects in this field are reviewed. Past accomplishments include pioneering computer simulations of fluid dynamics problems that have made computers valuable in complementing wind tunnels for aerodynamic research. The present facilities include the most powerful computers built in the United States. Three examples of viscous flow simulations are presented: an afterbody with an exhaust plume, a blunt fin mounted on a flat plate, and the space shuttle. The future prospects include implementation of the Numerical Aerodynamic Simulation Processing System that will provide the capability for solving the viscous flow field around an aircraft in a matter of minutes. IAA

N86-17276# Tokyo Univ. (Japan). Dept. of Applied Physics.
DIRECT SIMULATION OF THE INCOMPRESSIBLE FLOW AT HIGH REYNOLDS NUMBER BY FINITE DIFFERENCE METHOD c02
Tetuya Kawamura *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 67-76 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A new upwind scheme for computation of incompressible flow has been developed. It was found that this scheme works well at high Reynolds numbers, even with a limited number of mesh points. By using this scheme, three different types of flows were computed. At first, a cavity flow was simulated at Re=5000, with a 41 x 41 grid, and the results agree very well with the computation with a 257 x 257 by Ghia et al. Secondly, a flow past a circular cylinder was simulated. Results of the detailed calculations of the impulsively started flow at Re=1200 are compared with corresponding experimental observations and the comparison is found satisfactory. A series of calculations of the flow around a circular cylinder with surface roughness was carried out over a Reynolds number range from 1000 to 100,000. Remarkable reduction of drag coefficient was observed, showing that a critical Reynolds number is obtained numerically in this calculation. Thirdly, a three-dimensional turbulent flow in a duct was simulated and large structures in the turbulent flow were captured by this scheme without any turbulence model. Agreement of statistical values with experiments was good. These results show that this scheme is very widely applicable and is robust and easy to program for any type of incompressible flow computations. Author

N86-17277# Ship Research Inst., Tokyo (Japan).
COMPUTATION OF THE TWO-DIMENSIONAL INCOMPRESSIBLE NAVIER-STOKES EQUATIONS USING AN IMPLICIT FACTORED METHOD c34
Yoshiaki Kodama *In* National Aerospace Lab. Proceedings of the 2nd NAL Computational Aerodynamics 1984 p 77-84 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An implicit factored scheme was used for solving the two-dimensional incompressible Navier-Stokes equations. Pseudo compressibility was introduced in the continuity equation. The non-conservation form was chosen for stability. Von Neumann stability analysis with a model scalr equation showed that the present scheme remains stable under arbitrary coordinate transformations, without adding any numerical dissipation term. Calculation was made for a backward-facing step flow with the Reynolds number Re = (U peak times H/nu = 58), where H is a step height. Convergence was obtained after about 300 iterations, using a non-dimensional time step delta t = 1.0. The calculated results show a reasonable tendency, except that small oscillations appear in the pressure distribution near the corner point. This phenomenon needs to be further investigated. Author

N86-17278# Metropolitan Coll. of Technology, Tokyo (Japan).
TRANSONIC INTERNAL FLOW ABOUT AN AIRFOIL OSCILLATING IN PITCH: COMPARISONS BETWEEN COMPUTATION AND EXPERIMENT c02
Toshimasa Shiratori and Yoshimichi Tanida (Tokyo Univ., Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 85-90 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

As a preliminary investigation into the relationship between the transonic flutter characteristics and the shock behavior of a transonic cascade, a numerical analysis using a finite-difference method was carried out for a cascade oscillating in pitch about its midchord anti-phase with each other and a zero stagger angle,

based on an assumption of inviscid flow. The computational method was examined by comparisons of computational results with experimental results of the shock wave periodic movements due to oscillation of the cascade, unsteady surface pressure and aerodynamic instability. Although quantitative differences in both results exists, which were caused by the presence of shock-boundary interaction in real phenomenon, the present computation was useful in the investigation of qualitative aspects of the shock wave behavior, aerodynamic instability and the relations between them. In such computation, it is necessary to make the computational mesh size small in comparison to the displacement of the shock wave. Author

N86-17279# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF FULLY THREE-DIMENSIONAL FLOW IN TRANSONIC TURBINE CASCADES c02
Masahiko Koya and Susumu Kotake *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 91-100 refs In JAPANESE; ENGLISH summary Original language document was announced in IAA as A84-46886 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

In order to calculate higher subsonic or transonic flows in highly three-dimensionally twisted turbine blade cascades, the finite volume integral method of solving the governing equations is implemented for the treatment of boundary conditions and the discretization scheme. The developed scheme reduces the discretization error associated with the distorted grid configuration of highly three-dimensional blades. With the developed method, flows in three typical turbine blade cascades have been calculated. The present scheme can be applied to fully three-dimensional flow through complete turbine stages. Author (IAA)

N86-17280# National Aerospace Lab., Tokyo (Japan).
FULLY-THREE DIMENSIONAL FLOW FIELD ANALYSIS THROUGH TURBINE STATES: APPLICATIONS OF TIME MARCHING METHOD c34
Tatsuo Araki, Atsuhide Suzuki, and Tadashi Kobayashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 101-108 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A time marching method for the analysis of transonic fully-three dimensional flow in turbine stages is described. A reasonable numerical treatment at the flow boundary between stator and rotor is applied, and a rotating co-ordinate system is used for the expression of the rotor flow field. For solving the differential equations, Denton's scheme is adopted, which allows considerable computer time savings. The method developed was used to determine the flow through a transonic axial flow turbine stage with a significantly diverging flow passage, and it showed that the two dimensional analysis methods or the quasi-three dimensional methods which assume axisymmetry are not appropriate for evaluating these stages. Detailed measurements were carried out using an experimental air turbine, which confirmed the validity of the analysis method. Good agreement is obtained between the predicted and measured flow field. Author

N86-17281# National Aerospace Lab., Tokyo (Japan).
NUMERICAL FLOW ANALYSIS FOR AXIAL FLOW TURBINE c34
Tomohiko Sato and Sunao Aoki *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 109-118 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Some numerical flow analysis methods adopted in the gas turbine interactive design system, TDSYS, are described. In the TDSYS, a streamline curvature program for axisymmetric flows, quasi 3-D and fully 3-D time marching programs are used respectively for blade to blade flows and annular cascade flows. The streamline curvature method has some advantages in that it can include the effect of coolant mixing and choking flow conditions. Comparison of the experimental results with calculated results shows that the overall accuracy is determined more by the empirical correlations used for loss and deviation than by the numerical scheme. The time marching methods are the best choice for the analysis of turbine cascade flows because they can handle mixed subsonic-supersonic flows with automatic inclusion of shock waves in a single calculation. Some experimental results show that a time marching method can predict the airfoil surface Mach number distribution more accurately than a finite difference method. One weakpoint of the time marching methods is a long computer time; they usually require several times as much CPU time as other methods. But reductions in computer costs and improvements in numerical methods have made the quasi 3-D and fully 3-D time marching methods usable as design tools, and they are now used in TDSYS. Author

N86-17282# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENTAL STUDY OF PRESSURE DISTRIBUTIONS ON THE ENDWALLS IN A TRANSONIC ANNULAR NOZZLE CASCADE c02
Toshiyuki Takagi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 119-130 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Static pressure measurements on the endwalls of a nozzle cascade were made in a single stage, transonic axial-flow turbine with variable nozzles. Tests were conducted at two nozzle-offset-angles, where the theoretical exit Mach numbers were between 0.94 and 1.32. The test results were compared with the solutions of the inviscid, compressible, two-dimensional flow on a blade-to-blade stream surface through a single blade row. Static pressures on the endwalls near the suction-side of the nozzle vane were higher than the calculated values. However, near the pressure-side of the nozzle vane the measured values coincided well with the calculated values. At the throat section there were not many great discrepancies between the measured values and the calculated values. Minimum pressure occurred downstream from the throat section between the two nozzle vanes, and the location changed with exit flow conditions. Periodicity of pressure distributions appeared downstream from the cascade and the exit flow was gradually uniform along the streamlines. Far downstream, the measured pressure distributions were in relatively good agreement with the calculated ones. Author

N86-17283# Fukui Univ. (Japan). Dept. of Mechanical Engineering.
NUMERICAL SIMULATION METHOD FOR COMBUSTION IN AN OXYHYDROGEN ROCKET MOTOR c20
Shiro Taki and Toshitaka Fuhwara (Nagoya Univ., Japan) *In* Natinal Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 131-140 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Numerical simulations of unsteady phenomena in the combustion chamber of an oxyhydrogen rocket motor were made in an attempt to develop a computer code for use in investigating such phenomena as vibrating combustion. The combustion in this system is controlled by diffusion, the effect of which works much slower than sound or pressure waves, so that diffusions are usually solved using the implicit finite difference method for unlimited time step size caused by stability criterion. However, the gases flow so fast, accompanied by unsteady pressure waves, that an explicit method is adopted to solve this problem. The way of modeling the turbulent diffusion combustion is very important in this simulation. The fine structures of turbulence and diffusion flame could not be calculated by a finite difference method because of the limited ability of computers. It is presumed that the size of the space difference should be less than or the same order as that of the small eddies. In the present example of simulation, eddy equations are not solved; rather the reasonable transport coefficients for small eddies are simply used. The results indicate the possibility of numerical

simulation of unsteady phenomena in an oxyhydrogen rocket motor, though it is till necessary to make comparisons with experiments to fix some parameters. Author

N86-17284# National Aerospace Lab., Tokyo (Japan).
A BASIC COMPUTER CODE FOR INDUSTRIAL BURNER DESIGNS. PART 1: CAPABILITY TEST IN ISOTHERMAL SWIRLING FLOWS c61
Kunihisa Eguchi and Shoichi Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 141-148 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The capability test of numerical simulation codes is described, focusing on the extensive comparison of LDV data and calculations in axisymmetric isothermal swirling flows which were created by a radial inflow air-swirler for use in a Stirling burner model. The numerical test suggests that as far as mean flow prediction is concerned, our computer code is adequate for Stirling burner design purpose. For further improvement in prediction accuracy of turbulence, the constants used in a standard two-equation turbulence model need to be modified for high temperature swirling flows with recirculation. Besides, additional source terms should be considered to deal with the effect of combustor geometries. Author

N86-17285# National Aerospace Lab., Tokyo (Japan).
INVESTIGATIONS ON EFFICIENT NUMERICAL METHOD FOR SUBSONIC LIFTING SURFACES c02
Shigenori Ando *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 149-162 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

This is an intermediate summary report on the numerical investigation of subsonic unsteady lifting surface. This work describes simple planar cases. Most of the results thus obtained would be fundamentally useful even for more complicated problems, such as non-planar wings or wings with finite thickness. The results are divided into the following three main parts: (1) Introduction of error-index parameters E, and development of an adaptive numerical method for lifting surfaces. (2) Improvement of numerical calculation of the subsonic kernel function. (3) Development of new, accurate, fast-converging numerical methods for lifting surfaces. For two-dimensional airfoils a DLM-C method has been developed. For finite span wings a finite aerodynamic element method (DSM-CLS) and two pressure mode methods (NAM, NAS) have been developed. Author

N86-17286# Mitsubishi Electric Corp., Kamakura (Japan).
DEVELOPMENT OF SUBSONIC COMPUTATIONAL AERODYNAMIC PROGRAM USING PANEL METHOD c02
Ryujirou Kurosaki and Masayuki Katayama *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 165-174 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

This paper presents the Subsonic Computational Aerodynamic Program (SUSCAP) that was developed as an effective design tool to reduce the cost and time of wind tunnel tests. This code is based on a potential flow Panel Method coupled with a vortex-sheets renewal technique. The main function of the code is aerodynamic coefficient estimation of a three dimensional flying object. Other functions are also added, that is, velocity estimation at arbitrary points apart from the boundary surface, and high subsonic flow simulation by Prandtl-Glauert transformation. In order to investigate the usefulness of the code in designing aerodynamic shapes, this code is applied to a Wing-Boby-Tail configuration and a cruciform missile configuration. Their pressure distributions and roll moments are calculated. Calculated results are compared with the measured data, and the agreement is found satisfactory. Author

N86-17287# National Aerospace Lab., Tokyo (Japan).
IMAGE PROCESSOR ARCHITECTURES AND A DATA-DRIVEN IMAGE PROCESSORE: TIP-1 c60
Tsutomu Temma *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 175-182 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Many high speed image processors have been developed to date. In this paper, these processors are classified from the view point of parallel implemenon of identical processor elements and pipeline implementation with many types of processor elements. These processors are designed not only for high speed processing capabilities but also for compactness in hardware size. An image processor TIP-1 (Template-controlled Image Processor-1) was proposed and has been developed as progressive architecture for pipeline mechanisms. TIP-1 architecture is presented and an advanced system, TIP-3, using VLS1 chips, is proposed. Author

N86-17288# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL GRID GENERATION USING ALGEBRAIC AND GEOMETRICAL TECHNIQUES c64
Takuya Matsuda and Eiji Shima *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 183-190 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Two methods for numerical grid generation are presented in this paper: an algebraic method using Akima's interpolation technique and a geometrical method using the Dalaunay network. Since these methods require only a very short computing time compared to techniques based on partial differential equations, it is possible to generate grids interatively even with a small computer. The algebraic method uses bivariate interpolation based on local proceduce, and can be easily extended to three dimensional grid generation. The geometrical method is based on a procedure which draws contour maps for arbitrary distributed points using the Voronoi tessellation and the Delaunay network. An efficient algolism for the Voronoi tessellation is also presented. Author

N86-17289# Kyoto Inst. of Tech. (Japan).
NUMERICAL ANALYSIS FOR STEADY TRANSONIC FLOWS PAST AN AIRFOIL USING AF SCHEME c02
Nobuyuki Satofuka and Hidetoshi Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 193-200 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An approximate factorization scheme has been developed for analyzing transonic flows past an airfoil. In this scheme, upwind differencing is used for introducing artificial viscosity in the supersonic region and central differencing is used in the subsonic region. The resulting simple two- and three-banded matrices are solved by the relaxation procedure. This scheme is fully implicit, and in principle can be combined with the solution adaptive method. In both sub- and super-critical cases, the computed surface pressure distributions for an NACA0012 airfoil are in good agreement with those obtained by other methods. Author

N86-17290# Kyoto Inst. of Tech. (Japan).
NUMERICAL SOLUTION OF VISCOUS COMPRESSIBLE FLOWS PAST AN AIRFOIL USING UNCONDITIONALLY STABLE EXPLICIT METHOD c02
Nobuyuki Satofuka and Yuusuke Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 201-212 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An unconditionally stable explicit method has been applied to compute compressible laminar flows past an NACA0012 airfoil. The method is based on a combination of central differencing for spatial derivatives with a rational Runge-Kutta time integration

scheme. Both transonic (M = 0.8) and supersonic (M = 2.0) flow cases have been calculated for various Reynolds numbers. Physically plausible results are obtained for each case within practically feasible CPU time. Author

N86-17291# Nihon Univ., Tokyo (Japan). College of Science and Technology.
NUMERICAL ANALYSIS ABOUT FLOW OVER AN AEROFOIL WITH A LARGE ANGLE OF ATTACK c02
Kiyoaki Ono *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 213-220 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

The results of numerical computations on the dynamic stall process of a two dimensional NACA0012 airfoil oscillating in pitch between 0 deg and 20 deg incidence angles are summarized. The uniform flow Mach number is set to 0.3. The Beam-Warming finite difference algorithm is applied to solve the time-averaged compressible Navier-Stokes, the laminar compressible Navier-Stokes and the Euler equations. The grid system is constructed based on a body-fitted curvilinear coordinate system for efficient unsteady flow computations. The computational results are compared with the experimental data. The process of the formation of the leading edge separation bubble, its convection along the airfoil surface and its shedding into the wake is fairly well simulated. But the abrupt drop of the lift coefficient is not detected in the computations. Judging from the pressure coefficient distribution, the Euler equations results give the best agreement with the experiment. It suggests that the effective local Reynolds number in the turbulent calculation is smaller than that in the actual flow field. A more precise estimation of the turbulence viscosity, the artificial one and the truncation error is necessary. Author

N86-17292# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL ANALYSIS OF TRANSONIC FLOW AROUND TWO-DIMENSIONAL AIRFOIL BY SOLVING NAVIER-STOKES EQUATIONS c02
Yi-Yun Wang and Toshi Fujiwara *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 221-228 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

An effective finite-difference scheme for solving full compressible Navier-Stokes equations was initiated by Beam and Warming. The purpose of this paper is to develop that technique and apply it to the calculation of a typical subsonic or transonic, inviscid or viscous steady flow. First, the strong conservation-law form of the Navier-Stokes equations is written in Cartesian coordinates, and then transformed into a general grid system. Following the Beam-Warming difference scheme, the parameter combination delta=1/2 and theta=1 is generally adopted. After introducing spatial factorization, second-order dissipative terms are added to the left-hand side, while fourth-order terms are added to the right-hand side; the fourth-order smoothing terms are changed to second-order terms at points adjacent to the boundaries. The numerical computations were carried out only for a typical NACA 0012 airfoil. The calculations start from uniform free-stream variables throughout the flow field. The boundary conditions in the far field are free-stream. The following four cases are calculated: (1) M sub infinity = 0.63 and alpha=0, causing an entirely subsonic flow, (2) M sub infinity = 0.63 and alpha=2 degrees, the highest velocity of upper surface being close to sonic; (3) M sub infinity = 0.75 and alpha=0, when supersonic regions appear but there are no shock waves, and (4) M sub infinity = 0.75 and alpha=2 degrees, generating a shock wave over the upper flow field. Author

N86-17293# National Aerospace Lab., Tokyo (Japan).
ANALYSIS OF HIGH REYNOLDS NUMBER TRANSONIC FLOW AROUND AN AIRFOIL c02
Nobuhiro Kawai and Naoki Hirose *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 229-234 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

High Reynolds number transonic flow around an airfoil is numerically analyzed. The implicit approximate factorization scheme is used for the Navier-Stokes equations with an algebraic eddy viscosity model of the turbulent boundary layer. The boundary conditions on the airfoil and along the wake cut are implicitly handled. Computed results of short bubble and shock-induced separation are demonstrated. Inviscid transonic flow around and airfoil is also numerically analyzed. The diagonal form of the implicit approximate factorization scheme is used for computational efficiency. Some of the results are compared with those of potential flow calculations. Author

N86-17294# National Aerospace Lab., Tokyo (Japan).
VALIDATION AND COMPARISON WITH EXPERIMENT OF A HIGH REYNOLDS NUMBER TRANSONIC FLOW AIRFOIL ANALYSIS CODE NSFOIL c02
Naoki Hirose, Nobuhiro Kawai, Keiko Oguchi, and Tomokazu Kodera *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 235-244 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Results of the two-dimensional Navier-Stokes code, NSFOIL, are compared with wind tunnel data. Pressure distributions for various airfoil geometries are evaluated with special emphasis given to the NACA 0012 airfoil. Reynolds number values from 1.0 to 2.0 to the 7th power and Mach numbers from 0.7 to 2.0 are considered. M.G.

N86-17295# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
THE COMPARISON OF THE TRANSONIC AIRFOIL CALCULATION BY NSFOIL WITH THE WIND TUNNEL TEST DATA AT HIGH REYNOLDS NUMBER c02
Junichi Miyakawa and Naoki Hirose (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 245-254 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Over the past decade, the progress in computational aerodynamics has been so tremendous that it can be said that designers in aircraft industries have obtained a tool for aerodynamics analysis other than wind tunnel test, which had been their only tool since the invention of the aircraft. The new technology has become an even more efficient design tool with the development of computer aided design systems for interactive processing. All of the practical aerodynamics codes, however, are inviscid or boundary-layer-corrected programs which are accurate enough for analyzing attached flows but not for separated flows. Severe design trade off for recent high performance aircraft has necessitated accurate numerical analysis of viscous separated flows. The high Reynolds number transonic airfoil analysis code NSFOIL, is expected to be a good candidate for this difficult task. This paper presents the NSFOIL computation of the transonic flow past a supercritical airfoil, along with a comparison with the experiment to show the effectiveness of the new code. Author

N86-17296# Kawasaki Heavy Industries, Ltd., Akashi (Japan).
THE ROLE OF COMPUTATIONAL FLUID DYNAMICS IN AERONAUTICAL ENGINEERING c34
Takashi Uchida, Tadamasa Jyonouchi, Keisuke Sawada, and Tohru Nohisa *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 255-270 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
(Rept-2) Avail: NTIS HC A14/MF A01

The task of aircraft design often favors a robust, low-cost computational method rather than a sophisticated one. Examples of such engineering methods currently in use are described in this paper. Included are a viscous-inviscid coupling procedure for

a 2-D airfoil at high angle of attack in incompressible flow, a vortex-lattice procedure for not-so-slender wings, and extensions of the FLO22 code so as to incorporate the fuselage- and fluid-viscosity effects. Author

N86-17297# Fuji Heavy Industries Ltd., Utsunomiya (Japan).
APPLICATION OF COMPUTATIONAL AERODYNAMICS TO WING DESIGN c05
Masaaki Makadate *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 271-278 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Recent progress in Computational Aerodynamics has enabled the engineers of aircraft manufacturers to utilize transonic aerodynamic analysis programs in designing wings. Effectiveness of control surfaces (spoiler, aileron), which is greatly influenced by the characteristics of the wing, is an important problem. This paper introduces application of transonic aerodynamic analysis programs to the computation of control surface effectiveness. B.W.

N86-17298# National Aerospace Lab., Tokyo (Japan).
A NUMERICAL SOLUTION OF THE TRANSONIC INTEGRAL EQUATION AND ITS APPLICATION TO THREE-DIMENSIONAL TRANSONIC WIND DESIGN c05
Susumu Takanashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 279-292 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A numerical solution of the transonic integral equations is presented for three-dimensional transonic wing design. The objective of the design problem is to determine the wing geometry which realizes a prescribed pressure distribution on the wing surface. This boundary value problem can be formulated by the transonic integral equations with artificial viscosity terms. The resulting integral equations are simplified by introducing an approximate function for the space velocity distribution which reduces the three-dimensional problem to a two-dimensional one. The uniqueness of solution is guaranteed by imposing an additional condition, i.e., the closure condition at the trailing edge. To facilitate numerical evaluation of the definite integrals the wing surface is divided into a number of small rectangular panels. As a result, the singular integral equations are converted to a system of linear equations which can easily be solved by standard numerical techniques. An extension of the integral equation method to more general and versatile design procedure is described, and some of the design results for a transonic sweptback wing with an isobar pattern are also presented. Author

N86-17299# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
A WING DESIGN BASED ON THE THREE-DIMENSIONAL TRANSONIC INVERSE METHOD AND THE COMPARISON WITH THE WIND TUNNEL TESTING DATA c05
Shigefumi Tatsumi and Susumu Takanashi *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 293-304 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

Along with the recent progress in computational aerodynamics, aircraft designers have paid great attention to inverse methods. Inverse methods, which determine wing geometries under prescribed target pressure distributions, are considered important design techniques because of the applicabilities of experience and knowledge of aircraft designers. Although several two-dimensional methods have already been established, there exist only a few reports about three-dimensional transonic inverse methods, and the three-dimensional technique has not been established yet. This report describes wing design by the three-dimensional transonic inverse method using the integral equation formulation which was developed by one of the authors. The method has the great advantage that various flow-solvers can be applied. Also wind tunnel testing was conducted with the design wing to investigate the capability of the method. The comparison of design and test results shows a good agreement and the method proves to be very effective in three-dimensional transonic wind design. Author

N86-17300# Nihon Univ., Tokyo (Japan).
THE ANALYSIS OF PRACTICAL TRANSONIC SWEPT WINGS WITH AND WITHOUT BOUNDARY LAYER EFFECTS c02
Koji Komatsu, Eiji Iida, Ryuma Kawamura, Naoki Hirose (National Aerospace Lab., Tokyo, Japan), and Kenichi Matsuno (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 305-312 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

A comparison of the result of numerical analysis with experimental data is made for the ONERA M-6 and the practical transonic wing model 720211. The Jameson-Caughey's transonic wing programs FLO22 and FLO27 are used. The wing aerodynamic characteristics with viscous effect are evaluated by taking into account the boundary layer friction drag. This drag is calculated by using a three-dimensional compressible boundary layer program for wings, BLAY. Finally, a viscous-inviscid interaction procedure for FLO27-BLAY is proposed, and a preliminary result is presented. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-17301 North Carolina State Univ., Raleigh.
NUMERICAL AND EXPERIMENTAL INVESTIGATION OF FORCED LAMINAR FREE SHEAR LAYERS AND TURBULENT SLOT INJECTION FLOWS Ph.D. Thesis
Roy Mitchel McInville 1985 132 p
Avail: Univ. Microfilms Order No. DA8518266

A compact finite-difference scheme is applied to the complete form of the governing conservation equations for a two-dimensional laminar mixing layer. The ability of this computational approach to model successfully the formation and interaction of the large scale vortical structures which dominate such flow fields is verified in the present study. Parameters which affect the spread rate of the mixing region are identified. Detailed investigation of the momentum transport processed associated with the large scales combined with an assessment of the relative magnitude of viscous effects indicates that the vortex interactions are essentially inviscid phenomena. Experimental investigations of turbulent slot injection flows indicate the ineffectiveness of conventional mixing layer control techniques for such configurations. The well-developed incoming turbulent boundary layer proves to be the dominating factor and only by altering its structure can changes be induced in the downstream evolution of the flow. Author

N86-17302 Cincinnati Univ., Ohio.
A STUDY OF HIGH REYNOLDS NUMBER LAMINAR SEPARATION Ph.D. Thesis
Alric Paul Rothmayer 1985 414 p
Avail: Univ. Microfilms Order No. DA8518150

Modern asymptotic theories of high Reynolds number viscous flows are integrated with the interacting boundary layer formulation in order to study both large and small scale laminar separation for two-dimensional incompressible viscous flows. An extension of a previously developed asymptotic theory is used to study the initial cross-over from massive separation to an attached flow in a single row unstaggered cascade. Analytic solutions are developed for the limit of small cascade spacing. From the analytic solutions

several interesting features of the cascade are examined; including multiple-solution branches and multiple regions of stall hysteresis. Viscous solution techniques based on the interacting boundary layer approach are then sought in order to calculate the flows described by the asymptotic theories. The classical Hilbert integral form of the interacting boundary layer equations are formulated and solved for small scale separation over thin single airfoils and cascades of airfoils. Author

N86-17303 Oregon State Univ., Corvallis.
WIND TURBULENCE INPUT MODEL FOR HORIZONTAL AXIS WIND TURBINES Ph.D. Thesis
Shuh-Ren Lin 1985 135 p
Avail: Univ. Microfilms Order No. DA8518607

In order to estimate wind turbine response characteristics in the presence of atmospheric turbulence, the important atmospheric sources for the force excitations felt by the wind turbine system must be identified and characterized. The goal of this research is to develop the wind turbulence input model for horizontal axis wind turbines. The wind turbulence inputs are determined in three basic modeling steps. First, the turbulent velocity field is assumed to be stationary, locally homogeneous, isotropic, and satisfying Taylor's frozen field hypothesis. The Von Karman model is used to characterize the correlation between velocity components at different spatial positions and at different times. In the second step, the spatial variation of the turbulence is approximated by a few terms in a series expansion. Here, uniform terms across the rotor disk, gradient terms which vary linearly across the disk, and terms which vary quadratically across the disk are retained. In the third step, the correlation of these turbulent velocity terms can be closely approximated by low order linear systems forced by white noise. Dissert. Abstr.

N86-17304 Lehigh Univ., Bethlehem, Pa.
VORTEX FORMATION FROM BLUFF AND THIN TRAILING-EDGES: THE INITIAL INSTABILITY Ph.D. Thesis
Mehmet Fevzi Unal 1985 202 p
Avail: Univ. Microfilms Order No. DA8516263

Instabilities from blunt and thin trailing-ends/edges are investigated. Particular attention is given to the formation of the large-scale vortex and its evolution in the region immediately downstream of the separation surface. Also of interest is the effect of an upstream influence from downstream edge, i.e., wedge, on the evolution of vortices from the separation surface. In this context, wakes from thin-trailing edges in presence of a downstream edge provide a reference case; when compared with wakes from bluff bodies, it reveals the physical grounds for relative insensitivity of bluff body wakes to upstream influence of downstream wake-edge interaction. In investigating these flows, several experimental techniques are employed: velocity measurements in the near-separation and near-wake regions; surface pressure measurements in the wake-edge interaction region; and flow visualization of the entire flow domain. Large-scale vortex formation from a bluff body, for example, a circular cylinder and/or a flat plate with a blunt trailing-end, over a tenfold range of Reynolds number, 440 < or = Re < or = 5040, arises from exponential amplification, to varying degrees, of the unstable shear layer separating from the body. Author

N86-17305 Engineering Sciences Data Unit, London (England).
ESTIMATION OF DRAG DUE TO INOPERATIVE TURBO-JET AND TURBO-FAN ENGINES USING DATA ITEM NOS. 81009 AND 84004
Jul. 1984 12 p Submitted for publication
(ESDU-84005; ISBN-0-85679-467-8; ISSN-0141-4054) Avail: ESDU

ESDU 84005 illustrates how data on windmilling drag and airflow and on spillage drag are used to predict the drag due to the inoperative engine. The data are respectively taken from ESDU 81009 and ESDU 84004, but other sources could be used. Where ESDU data are used the method is particular suited to cases where the particular engine, or intake, data are not available. Author

N86-17306 Royal Aircraft Establishment, Farnborough (England).
RECENT EXPERIENCE IN THE RAE 5 METER WIND TUNNEL OF A CHINA CLAY METHOD FOR INDICATING BOUNDARY LAYER TRANSITION
I. R. M. Moir 14 Aug. 1984 11 p refs
(RAE-TM-AERO-2007; BR94478) Avail: NTIS HC A02/MF A01

A flow visualization method using clay to study boundary layer transition on a slender body model at high Reynolds number in a pressurized, low speed wind tunnel is described. The method is based on the differential rate of evaporation, beneath laminar and turbulent boundary layers, of a liquid absorbed on a solid spread on the surface. The liquid has a similar refractive index to the solid so that the mixture appears to be transparent until evaporation takes place, when the color of the solid becomes visible. The solid layer consists of china clay powder mixture with chemicals to form a lacquer, which is sprayed on to the surface. When dry, this forms a semipermanent white absorbent film. A liquid sprayed on this film is absorbed by it, causing it to become transparent. The lacquer consists of Frigilene (100 ml), butyl acetate (100 ml), butyl alcohol (100 ml), xylene (50 ml), and china clay (100 mg). Author (ESA)

N86-17307 Royal Aircraft Establishment, Farnborough (England).
STUDIES OF THE FLOW FIELD NEAR A NACA 4412 AEROFOIL AT NEARLY MAXIMUM LIFT
R. C. Hastings and B. R. Williams 20 Dec. 1984 35 p refs
(RAE-TM-AERO-2026; BR96009) Avail: NTIS HC A03/MF A01

Measurements at Mach number 0.18 and chord-based Reynolds number 4.2 million on a constant-chord model having a NACA 4412 airfoil are compared with the results of flow field calculations. The measurements include static pressure distributions on the wing surface and on the wind tunnel walls above and below the mid-span section of the wing. The development of the upper surface boundary layer through separation (at 20% chord ahead of the trailing-edge) and on into the wake, was studied using laser anemometry. The flow field calculations are of the semi-inverse kind in which an inverse momentum-integral treatment of the shear flow, used to avoid difficulties at separation, is coupled to a direct solution of the inviscid flow problem. Results reveal the importance of shear flow in altering the disturbance introduced into the free stream by the airfoil. Measure and predictions agree well. Author (ESA)

N86-17308# National Aerospace Lab., Tokyo (Japan).
ESTIMATION OF DIVERGENCE AND FLUTTER BOUNDARIES ON SUPERSONIC PLATE WING MODELS FROM SUBCRITICAL RANDOM RESPONSES DUE TO AIR TURBULENCE
Yasukatsu Ando, Yuji Matsuzaki, Hiroshi Ejiri, and Takao Kikuchi 1985 17 p refs In JAPANESE; ENGLISH summary
(NAL-TR-856; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The National Aerospace Laboratory (NAL) method was applied to the response data which were obtained from subcritical flutter and divergence tests conducted in the NAL supersonic wind tunnel. Backward- and forward-swept wing models were used for the flutter and divergence tests, respectively. The stationary sampled time responses were modeled by both the autoregressive moving average (ARMA) and autoregressive (AR) processes. It has been shown that both flutter annd divergence boundaries in a supersonic flow range can well be estimated as those in the transonic flow region. Author

N86-17309# Royal Aircraft Establishment, Farnborough (England).
A RAPID METHOD FOR ESTIMATING EQUIVALENT PARABOLIC POLARS FROM WIND-TUNNEL TESTS
D. E. Lean and S. P. Fiddes 15 Apr. 1985 19 p refs
(RAE-TM-AERO-2034; BR96601) Avail: NTIS HC A03/MF A01

A method for obtaining a best fit parabolic drag polar from measured force results is presented. The method is used in estimating the blockage correction due to separated flow that must be applied to wind tunnel results. The method uses computer graphics to identify the part of the measured drag polar that may best be described by a parabola, and thus used as the basis for a curve fit. The method is fast, when compared to existing curve

fitting techniques, and suited to use with an on line data reduction system. Author (ESA)

N86-17310# Sandia National Labs., Albuquerque, N. Mex.
INTRODUCTION TO DEPLOYABLE RECOVERY SYSTEMS
J. Meyer Aug. 1985 31 p
(Contract DE-AC04-76DP-00789)
(DE86-000048; SAND-85-1160) Avail: NTIS HC A03/MF A01

This report provides an introduction to deployable recovery systems for persons with little or no background in parachutes but who are knowledgeable in aerodynamics. A historical review of parachute development is given along with a description of the basic components of most deployable recovery systems. Descriptions are given of the function of each component and of problems that occur if a component fails to perform adequately. Models are presented for deployable recovery systems. Possible directions for future work are suggested in the summary. DOE

N86-17311# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
INVERSE METHOD WITH GEOMETRY CONSTRAINTS FOR TRANSONIC AIRFOIL DESIGN
J. M. J. Fray, J. W. Slooff, J. W. Boerstoel, and A. Kassies 3 Jul. 1984 27 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984
(NLR-MP-84069-U; B8568525) Avail: NTIS HC A02/MF A01

An engineering method for the design of airfoils having a prescribed pressure distribution in subsonic or transonic flow is described. The method is based on an iterative procedure of residual-correction type. In each iteration step, the difference between a current and a target pressure distribution (residual) is determined by a fast (multigrid) finite volume full-potential code. Corrections to the geometry driving the pressure residual to zero are determined by a global, inverse, thin airfoil theory based method for the subsonic part of the flow field, and by a local, inverse wavy-wall theory based formula for the supersonic part of the flow field. The determination of the geometry correction is formulated as a minimization problem, in that pressure distribution and geometry requirements may be balanced in a weighted least squares sense. The capabilities of the method are illustrated by examples of airfoil designs. Author (ESA)

N86-17312# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
COMMENT ON THE YAW STABILITY OF A HORIZONTAL-AXIS WIND TURBINE AT SMALL ANGLES OF YAW
O. deVries 13 Sep. 1984 20 p refs Submitted for publication
(NPL-MP-84084-U; B8568527) Avail: NTIS HC A02/MF A01

Small-scale wind tunnel experiments on a wind turbine model revealed stable yawing moments at almost all operating conditions with the rotor in an upwind position with respect to the tower. It is shown that this positive yaw stability can be explained, at least at small angles of yaw, by the frozen vortex wake concept. Author (ESA)

N86-17313# Technische Hogeschool, Twente (Netherlands). Windmill Group.
SCALE MODEL OF THE SWD 5000 LW ROTOR WIND TUNNEL TESTS FOR DIFFERENT BLADE SETTING ANGLES
C. A. Busker Nov. 1983 26 p refs
(WM-074) Avail: NTIS HC A03/MF A01

The wind tunnel performance of a 1:3.33 scale model of the SWD 5000 LW windpowered pump rotor for different blade angle settings is described. Results are given as power and torque curves, and optimum blade angles with respect to maximum power and torque at startup were assessed. Results show that extension of the blades towards the center does not increase the starting torque. Author (ESA)

N86-17314# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
LOW SPEED AERODYNAMIC CHARACTERISTICS OF A TWO-DIMENSIONAL SAIL WING WITH ADJUSTABLE SLACK OF THE SAIL
R. G. denBoer 1984 38 p refs
(VTH-LR-307) Avail: NTIS HC A03/MF A01

Low speed aerodynamic characteristics of a very simple dacron airfoil were investigated in a low speed, low turbulence wind tunnel. The influence of the slack of the sail on the lift coefficient cl, drag coefficient cd, and cl/cd, was studied. Measurements were performed at chord Reynolds numbers 200,000, 300,000, and 500,000 at values of the angle of attack and slack of the sail where relatively high values of the ratio cl/cd occurred. Results show that the value (cl/cd)max of the airfoil exceeds the value (cl/cd)max of a similar configuration in which a rigid circular plate of 10% camber is used instead of a sail. Author (ESA)

N86-17315# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
SUBSONIC UNSTEADY AEROELASTICITY: THE POTENTIAL METHOD APPLIED TO LIFTING SURFACES Final Report [AEROELASTICITE INSTATIONNAIRE SUBSONIQUE. METHODE DU POTENTIEL POUR DES SURFACES PORTANTES]
J. P. Grisval and J. J. Angelini Apr. 1985 64 p refs In FRENCH
(Contract DRET-84-95-006)
(ONERA-RT-21/3064-RY-045-R) Avail: NTIS HC A04/MF A01

A method to compute the unsteady pressure distribution created by the harmonic vibration of a body in translation through a compressible fluid is presented. The method is based on the integral equation linking the wall perturbation potential to surface displacement in the subsonic domain. The theoretical expansion of this method to the lifting surface case is presented. Numerical results obtained for bodies with a wake are satisfactory. Application to complex bodies, taking element interaction into account is discussed. Author (ESA)

N86-17316# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
TRANSONIC WIND TUNNEL TESTS OF A SWEPT SUPERCRITICAL WING-BODY MODEL, PT 8 Final Report
Lars Torngren Feb. 1985 110 p ref
(Contracts FMV-F-K-82223-75-007-07-001;
FMV-F-K-82223-76-001-21-001; FMV-F-K-82223-80-001-21-001)
(FFA-TN-1982-24) Avail: NTIS HC A06/MF A01

Wind tunnel tests were carried out in the Mach number range 0.5 to 0.99 on a swept wing-body model. The investigation comprises six-component balance measurements, wing pressure measurements, and flow visualization. Wings with and without strakes, but with the same quarter-chord sweep of 35 deg were tested on a cylindrical and an area ruled body. Pressure measurements were only done on the wing with strakes. For the model with this wing, the effects of underwing and wingtip mounted stores were also studied. Author (ESA)

N86-17317# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
AN EXPERIMENTAL INVESTIGATION OF SUPERSONIC FLOW OVER AXISYMMETRIC AFTERBODIES WITH A CENTERED PROPULSIVE JET AT ANGLES OF ATTACK
Johan Agrell Mar. 1985 94 p refs
(Contracts FMV-F-K-84302-73-042-07-001;
FMV-F-K-82223-76-001-21-001)
(FFA-TN-1985-10) Avail: NTIS HC A05/MF A01

A wind tunnel investigation of the influence of angle of attack on the flow over 5 after-bodies equipped with an axisymmetric centered propulsive jet with a Mach number of 2.5 was made. The test was performed at Mach numbers 2.0 and 3.0 at angles of attack of 0, 3, 6, 10, and 15 deg. The jet pressure was high enough to force the flow to separate from the afterbody surface. Pressure measurement, Schlieren photography, and oil flow tests were used. The boundary layer was measured at 0, 3, and 6 deg angles of attack. The flow separation can be studied from the

pressure distribution and oil flow and Schlieren photographs.
Author (ESA)

N86-17318# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
A WIND TUNNEL INVESTIGATION OF THE EFFECT OF A PROPULSIVE JET ON CONTROLS LOCATED ON A CONICAL AFTERBODY IN SUBSONIC AND SUPERSONIC FREE STREAMS
Johan Agrell Apr. 1985 80 p refs
(Contracts FMV-F-K-81713-75-038-07-001; FMV-F-K-82223-76-001-21-001)
(FFA-TN-1985-11) Avail: NTIS HC A05/MF A01

The effect of a propulsive jet on controls located at two different positions on an afterbody was studied in a wind tunnel. The test was performed at Mach number 0.7, 0.9, 1.3, and 2.0 at angle of attack 9 deg. The controls were set at deflection angles 0, 10, and -10 deg. The jet pressure was high enough to influence the flow over the afterbody. Controls at the forward location are more loaded than the rear located ones, and they are less influenced by the jet. The influence of the jet tends to decrease the loads of the controls with increasing jet pressure ratio. Author (ESA)

N86-17319# Politecnico di Torino (Italy). Dipt. di Ingegneria Aeronautica e Spaziale.
RESULTS FOR ANALYTICAL TRANSONIC FLOW PATTERNS WITH WEAK SHOCK WAVES OVER CURVED WALLS WITH A CORNER
Gianfranco Chiocchia Jun. 1985 70 p refs
(STN-9) Avail: NTIS HC A04/MF A01

Numerical tables and diagrams for two dimensional transonic flow patterns are presented to provide test cases for computer programs. The flows are streams along curved walls presenting a slope discontinuity. The shock wave arises at the discontinuity point and was constructed through a procedure resting only on the irrotationality assumption. By considering weak shock waves, this assumption leads to negligeable errors, the amounts of which are also reckoned. The analytical relations describing the flows are outlined. Author (ESA)

N86-17320# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
APPLICATION OF A CONSTRAINED INVERSE METHOD IN THE AERODYNAMIC DESIGN OF A LOW SPEED WING-SLAT CONFIGURATION
J. A. vanEgmond, B. vandenBerg, and Th. E. Labrujere 30 Sep. 1983 36 p refs
(Contract NIVR-1901)
(NLR-TR-83123-U; B8569027) Avail: NTIS HC A03/MF A01

A system for computational design of multielement airfoils was developed. It solves the inverse aerodynamic problem in an approximate way. A priori specified aerodynamic requirements and geometric requirements are minimized in a least squares way, introducing weight factors to emphasize locally aerodynamic or geometric requirements. The system was applied to a wing with slat, exhibiting unfavorable drag characteristics. The design focused on the wing nose geometry at the slat intersection. To improve the drag characteristics a target pressure distribution was defined with a reduced suction level on the wing nose. The computations indicated that this target could be achieved with satisfactory approxiation (fulfilling at the same time a set of geometry requirements). This is confirmed by wind tunnel measurements. The tests also show a substantial drag reduction. Author (ESA)

N86-17321# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A SYSTEM FOR COMPUTER AIDED ANALYSIS AND DESIGN OF MULTIELEMENT AIRFOILS: MAD
Th. E. Labrujere 9 Oct. 1983 33 p refs
(Contracts NIVR-1819; NIVR-1944)
(NLR-TR-83136-U; B8569026) Avail: NTIS HC A03/MF A01

A program system for interactive analysis and design of multielement airfoils in incompressible viscous flow was developed. It applies three computational methods, one for the analysis of viscous flow, one for the analysis of inviscid flow around multielement airfoils, and one for the design of multielement airfoils in inviscid flow. The latter two methods are described. Features of the design method are illustrated by numerical results.
Author (ESA)

N86-17322# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A THEORETICAL EXPLORATION OF THE CAPABILITIES OF 2D FLEXIBLE WALL TEST SECTIONS FOR 3D TESTING
J. Smith 29 Feb. 1984 26 p refs
(NLR-MP-84018-U; B8569024) Avail: NTIS HC A03/MF A01

The applicability of two dimensional flexible solid wall test sections for three dimensional testing is theoretically investigated for linearized subsonic flow. The method uses known interference velocity distributions along a target line (derived from a method of images for this particular study). From these, wall shapes are calculated that reduce or eliminate the axial gradients of wall-induced upwash and blockage along this target line. The examples of residual wall interference presented show that these gradients, as well as the overall blockage level, can substantially be reduced by acceptable wall displacements and test section lengths, even for half model testing. Author (ESA)

N86-17323# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A SURVEY OF COMPUTATIONAL METHODS FOR SUBSONIC AND TRANSONIC AERODYNAMIC DESIGN
J. W. Slooff 3 Jul. 1984 71 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984
(NLR-MP-84066-U; B8569320) Avail: NTIS HC A04/MF A01

Computational methods for finding the detailed shape of (parts of) configurations of which the gross geometric characteristics are already determined in a preliminary, overall design process, and that, subject to constraints, have to meet given aerodynamic requirements, are reviewed. Methods for solving the classical inverse problem of aerodynamics and approaches using optimization techniques are emphasized. Methods limited to subsonic flow utilizing panel method technology, and methods based on finite difference/volume formulations for compressible, transonic flow are covered. The merits of the various computational approaches to the problem of aerodynamic design are compared.
Author (ESA)

N86-17268# Chiba Univ. (Japan).
SUPERSONIC FLOW ON AXISYMMETRIC BLUNT BODY
Nobuhide Nishikawa, Riichi Sakuma, and Yukihiko Inoue *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 1-8 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17271# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF THE LEADING-EDGE SEPARATION VORTEX OVER DELTA WING
Kozo Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 27-34 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17272# Tsukuba Univ. (Japan).
CURRENT STATUS OF RESEARCH ON EVOLUTION OF LONGITUDINAL VORTICES IN WALL TURBULENCE
Shunichi Tsuge and Hiroshi Sakai *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 35-42 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17273# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF UNSTEADY FLOW AROUND AN AIRFOIL BY FINITE DIFFERENCE SOLUTION OF NAVIER-STOKES EQUATIONS
Satoru Ogawa and Tomiko Ishiguro *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 43-52 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17276# Tokyo Univ. (Japan). Dept. of Applied Physics.
DIRECT SIMULATION OF THE INCOMPRESSIBLE FLOW AT HIGH REYNOLDS NUMBER BY FINITE DIFFERENCE METHOD
Tetuya Kawamura *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 67-76 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17278# Metropolitan Coll. of Technology, Tokyo (Japan).
TRANSONIC INTERNAL FLOW ABOUT AN AIRFOIL OSCILLATING IN PITCH: COMPARISONS BETWEEN COMPUTATION AND EXPERIMENT
Toshimasa Shiratori and Yoshimichi Tanida (Tokyo Univ., Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 85-90 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17279# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF FULLY THREE-DIMENSIONAL FLOW IN TRANSONIC TURBINE CASCADES
Masahiko Koya and Susumu Kotake *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 91-100 refs In JAPANESE; ENGLISH summary Original language document was announced in IAA as A84-46886 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17282# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENTAL STUDY OF PRESSURE DISTRIBUTIONS ON THE ENDWALLS IN A TRANSONIC ANNULAR NOZZLE CASCADE
Toshiyuki Takagi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 119-130 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17285# National Aerospace Lab., Tokyo (Japan).
INVESTIGATIONS ON EFFICIENT NUMERICAL METHOD FOR SUBSONIC LIFTING SURFACES
Shigenori Ando *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 149-162 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17286# Mitsubishi Electric Corp., Kamakura (Japan).
DEVELOPMENT OF SUBSONIC COMPUTATIONAL AERODYNAMIC PROGRAM USING PANEL METHOD
Ryujirou Kurosaki and Masayuki Katayama *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 165-174 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17289# Kyoto Inst. of Tech. (Japan).
NUMERICAL ANALYSIS FOR STEADY TRANSONIC FLOWS PAST AN AIRFOIL USING AF SCHEME
Nobuyuki Satofuka and Hidetoshi Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 193-200 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17290# Kyoto Inst. of Tech. (Japan).
NUMERICAL SOLUTION OF VISCOUS COMPRESSIBLE FLOWS PAST AN AIRFOIL USING UNCONDITIONALLY STABLE EXPLICIT METHOD
Nobuyuki Satofuka and Yuusuke Nishida *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 201-212 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17291# Nihon Univ., Tokyo (Japan). College of Science and Technology.
NUMERICAL ANALYSIS ABOUT FLOW OVER AN AEROFOIL WITH A LARGE ANGLE OF ATTACK
Kiyoaki Ono *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 213-220 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17292# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL ANALYSIS OF TRANSONIC FLOW AROUND TWO-DIMENSIONAL AIRFOIL BY SOLVING NAVIER-STOKES EQUATIONS
Yi-Yun Wang and Toshi Fujiwara *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 221-228 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17293# National Aerospace Lab., Tokyo (Japan).
ANALYSIS OF HIGH REYNOLDS NUMBER TRANSONIC FLOW AROUND AN AIRFOIL
Nobuhiro Kawai and Naoki Hirose *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 229-234 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17294# National Aerospace Lab., Tokyo (Japan).
VALIDATION AND COMPARISON WITH EXPERIMENT OF A HIGH REYNOLDS NUMBER TRANSONIC FLOW AIRFOIL ANALYSIS CODE NSFOIL
Naoki Hirose, Nobuhiro Kawai, Keiko Oguchi, and Tomokazu Kodera *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 235-244 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17295# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
THE COMPARISON OF THE TRANSONIC AIRFOIL CALCULATION BY NSFOIL WITH THE WIND TUNNEL TEST DATA AT HIGH REYNOLDS NUMBER
Junichi Miyakawa and Naoki Hirose (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 245-254 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17300# Nihon Univ., Tokyo (Japan).
THE ANALYSIS OF PRACTICAL TRANSONIC SWEPT WINGS WITH AND WITHOUT BOUNDARY LAYER EFFECTS
Koji Komatsu, Eiji Iida, Ryuma Kawamura, Naoki Hirose (National Aerospace Lab., Tokyo, Japan), and Kenichi Matsuno (National Aerospace Lab., Tokyo, Japan) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 305-312 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-17324# Committee on Science and Technology (U. S. House).
CONTROLLED IMPACT DEMONSTRATION (CID)
Washington GPO 1985 82 p Hearing before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 13, 2 Apr. 1985
(GPO-46-870) Avail: Subcommittee on Transportation, Aviation and Materials

A congressional hearing was conducted and expert testimony presented on the controlled impact demonstration. The experimental worth of crashing an airplane for the purpose of gaining hard data on crashworthiness was discussed. G.L.C.

N86-17325# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
HARDWARE/SOFTWARE FAILURE MODE EFFECT ANALYSIS (FMEA) APPLIED TO AIRPLANE SAFETY
J. B. J. vanBaal 31 Jul. 1984 9 p refs Presented at 1985 Annual Reliability and Maintainability, Philadelphia, Pa., 22-24 Jan. 1985
(NLR-MP-84073-U; B8568107) Avail: NTIS HC A02/MF A01

A systematic, analytical methodology for aircraft system safety assessment is explained. A try-out on a software controlled digital avionics system is summarized. Analysis of software components is emphasized. It is concluded that the same methodology can be applied to software and hardware. Conditions that have to be met to perform a successful hardware/software safety assessment are described. Author (ESA)

N86-17326# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abt. Verkehr.
[ACTIVITIES REPORT FOR THE WEST GERMAN CIVIL AIRPORTS. PART 1: TEXT] Annual Report, 1984 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 1: TEXT]
1984 63 p refs In GERMAN
(ISBN-3-87977-056-5-Pt-1) Avail: NTIS HC A04/MF A01

The 1984 statistics on the transport performance of West German international and regional airports and landing sites, including West Berlin, and of Austrian and Swiss airports are presented. Statistics on aircraft movements in line, charter, and group travel operations, on the number of passengers, on regional traffic, as well as airpost and freight traffic are collected. A statistical comparison regarding transport performance between West German airports and other European airports is made. Author (ESA)

N86-17327# Arbeitsgemeinschaft Deutscher Verkehrsflughaefen, Stuttgart (West Germany). Abt. Verkehr.
[ACTIVITIES REPORT FOR THE WEST GERMAN CIVIL AIRPORTS. PART 2: TABLES] Annual Report, 1984 [VERKEHRSLEISTUNGEN DER DEUTSCHEN VERKEHRSFLUGHAEFEN. 2: TABELLEN]
1984 81 p In GERMAN
(ISBN-3-87977-056-5-Pt-2) Avail: NTIS HC A04/MF A01

Tables for aircraft movements, commercial passenger traffic, freight traffic, and individual and total traffic of West German airports in 1984, as well as for regional transport airports and landing sites, for Austrian airports, and for Zurich and Basel airports are presented. Charts for air traffic long term development of West German international airports, for monthly distribution, and for the twelve-monthly change rate of passenger number are shown. Author (ESA)

N86-17328# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
THE DEICED SUPER PUMA
J.-P. Silvani 1985 10 p refs Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-104) Avail: NTIS HC A02/MF A01

The efficiency of helicopter ice protection systems was studied in flight test with natural icing conditions, in icing wind tunnel tests and analytically. The icing wind tunnel tests were intended to develop and validate air intake and horizontal stabilizer icing protections. Proper operation of all protections is verified in natural icing flight down to -20 C in continuous and intermittent icing conditions. Author (ESA)

N86-17329# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
SEARCH AND RESCUE (SAR) SYSTEM DEVELOPED AS PART OF THE CONTRACT SIGNED WITH THE IRISH AIR CORPS FOR THE SUPPLY OF 365 F DAUPHIN AIRCRAFT
S. Rioche 1985 15 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-105) Avail: NTIS HC A02/MF A01

A helicopter-borne search and rescue system, including a fully automatic guiding function and an electronic flight instrument system was developed. The first includes automatic search patterns and descent to hovering near the designated target, implemented by a navigation computer and a flight director computer. The second includes a display of horizontal situation parameters, attitude and radar. The versatility of the system makes it compatible with a wide variety of other requirements, both civil and military. Author (ESA)

N86-17330# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
SYSTEMS SAFETY: PHANTOM OR REALITY [SECURITE DES SYSTEMES: FANTOME OU REALITE]
Pierre Lavedrine 1985 10 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984
(SNIAS-852-422-103) Avail: NTIS HC A02/MF A01

The juridical aspects of manufacturer's liability in case of safety failure, particularly in the case of aircraft accidents, are discussed. The moral aspects and responsibilities of designers are examined. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-17331 Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
[ACTIVITIES IN AIR TRAFFIC CONTROL] Annual Report, 1984
Jun. 1985 50 p In GERMAN
Copyright. Avail: Issuing Activity

Measures to enhance air traffic safety and regularity, performance of air traffic services, operational problems, and air traffic incidents are discussed. Navigation and radiotelephony techniques, information transmission techniques, radar techniques, and air traffic control technical services are described. Activities of the office for passenger information, flight measurements, construction plans, education and advanced training, and cooperation in the framework of international aviation organization are summarized. Author (ESA)

N86-17332# Racal-Decca Ltd., Chessington (England). New Business and Advanced Development Div.

STUDY OF USER SEGMENT OF NAVSAT Final Report
R. Allan, P. Diederich, A. K. Johnston, A. Haddrell, J. E. Rowntree, S. S. D. Jones, and P. A. Matthews (Leeds Univ.) Paris ESA 1985 340 p refs
(Contract ESA-5231/82/F-RD(SC))
(ESA-CR(P)-2089) Avail: NTIS HC A15/MF A01

The Navsat civil satellite navigation system TDMA concept was assessed, the signal structure was refined, and methods of implementing receiver designs to serve as many classes of user as possible were considered. Applications and limitations of the system are discussed, and receiver and processing methods for air, marine, and land users are proposed. The proposed TDMA format is retained, while modifying the contents of each burst to assist a wider user base and to provide an accuracy/cost alternative to users. Each burst consists of a CW component, spread spectrum component, and application data component, transmitted simultaneously. The CW accuracy (150 to 200 m) is satisfactory for many users, but can be improved by using the spread spectrum to measure range distance to the satellites. Author (ESA)

N86-17333# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Traegheitsortung und Navigation.
CONSTRUCTION OF A MEASURING METHOD USING FIBER OPTICS AND AN LTN-90 LASER GYRO STRAPDOWN SYSTEM FOR BO-105 HELICOPTERS
Hans-Juergen Hotop and Hans-Peter Zenz May 1985 48 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-85-10; ISSN-0176-7739) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 19

A Modular Universal Data Acquisition System 2 (MUDAS 2) equipped with an LTN-90 laser gyro strapdown navigation system and with a fiber optic data bus for transmission of ARINC-429 signals was developed for onboard testing of navigation systems. It was tested on a BO-105 helicopter during flights for applicability on helicopters and flexibility in data acquisition and recording. The system was studied on long distance flights and on strong maneuver flights. Signals of the LTN-90 system were compared with the data of the Precision Automated Tracking System laser radar. Application of fiber optics for data transmission of bit serial signals (200 Hz NRZ Code) is proved. The LTN-90 navigation system designed for surface aircraft can be applied without loss of accuracy. Author (ESA)

N86-17334# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A SOPHISTICATED TRACKING ALGORITHM FOR AIR TRAFFIC CONTROL (ATC) SURVEILLANCE RADAR DATA
H. A. P. Blom 9 Jan. 1984 10 p refs Presented at International Conference on Radar, Paris, France, 21-24 May 1984
(NLR-MP-84004-U; B8566260) Avail: NTIS HC A02/MF A01

An algorithm based on martingale tools for application to sudden aircraft maneuvers in radar tracking was developed. It is a Markov jump-diffusion model. It provides very accurate state estimates during unchanged flight modes, very fast reaction and convergence after changes, and good estimates of its own accuracy. Comparison with an alpha-beta tracker, a Kalman based tracker, and a state-of-the-art tracker proves the superior performance of the algorithm. Author (ESA)

N86-17335# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
COMPARISON OF A JUMP-DIFFUSION TRACKER WITH A KALMAN TRACKER: AN EVALUATION WITH EMPHASIS ON AIR TRAFFIC CONTROL
H. A. P. Blom 30 Mar. 1983 39 p refs
(NLR-TR-83063-U; B8569022) Avail: NTIS HC A03/MF A01

Radar tracking algorithms are compared. A probabilistic approach to the tracking problem is a Markov jump-diffusion model for the aircraft dynamics, its control, and the radar measurements. From nonlinear filtering theory, a closed form description of the evolution of the conditional distribution of this Markov process can be obtained. This jump-diffusion filter, however, is infinite dimensional and approximations are necessary for algorithmic implementation. The indirect approach of approximating the jump-diffusion by a diffusion leads to a Kalman-like tracker. The approach of approximating the jump-diffusion filter directly leads to a bank of interacting Kalman-like trackers. Comparison for air traffic control shows that the jump-diffusion tracker performs considerably better than the Kalman tracker. Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-17336 Royal Aircraft Establishment, Farnborough (England).
STANDARDISED FATIGUE LOADING SEQUENCES FOR HELICOPTER ROTORS (HELIX AND FELIX). PART 1: BACKGROUND AND FATIGUE EVALUATION
P. R. Edwards, comp. and J. Darts, comp. 14 Aug. 1984 115 p refs 2 Vol.
(RAE-TR-84084; RAE-Mat/Struct-101-Pt-1; ICAF-1442-Pt-1; NLR-TR-84043-U-Pt-1; LBF-FB-167-Pt-1; IABG-TF-1425-Pt-1; BR95787) Avail: NTIS HC A06/MF A01

The background of the Helix and Felix standard loading sequences for the main rotors of helicopters with articulated and semirigid rotors respectively is outlined. The loading standards provide a convenient tool for providing fatigue data under realistic loading, which can immediately be compared with other data, and can be used to provide design data. Helix and Felix statistical content according to different counting methods and the results of fatigue tests used to assess them are presented. Author (ESA)

N86-17337 Royal Aircraft Establishment, Farnborough (England).
STANDARDISED FATIGUE LOADING SEQUENCES FOR HELICOPTER ROTORS (HELIX AND FELIX). PART 2: FINAL DEFINITION OF HELIX AND FELIX
P. R. Edwards, comp. and J. Darts, comp. 14 Aug. 1984 122 p refs 2 Vol.
(RAE-TR-84085; RAE-Mat/Struct-100-Pt-2; ICAF-1442-Pt-2; NLR-TR-84043-U-Pt-2; LBF-FB-167-Pt-2; IABG-TF-1425-Pt-2; BR95846) Avail: NTIS HC A06/MF A01

Full length and shortened versions of the Helix and Felix standard loading sequences for rotors of helicopters with articulated and semirigid rotors respectively are presented. The standards provide a convenient tool for providing fatigue data under realistic loading, which can immediately be compared with other data, and can be used to provide design data. The method of generation is extremely simple, although a considerable amount of data is required for the generation algorithm. A FORTRAN program and complete data tables in the correct format are given. Author (ESA)

N86-17338*# National Aeronautics and Space Administration, Washington, D.C.
AERODYNAMIC DESIGN TRENDS FOR COMMERCIAL AIRCRAFT
R. Hilbig and H. Koerner Jan. 1986 54 p refs Transl. into ENGLISH of conference paper "Aerodynamische Entwicklungerichtungen fuer Verkehrsflugzeuge" rept. DGLR-84-082 presented at the German Aerospace Society Annual Convention, 1984 p 1-53 Convention held in Hamburg, West Germany, 1-3 Oct. 1984 Original language document was announced in IAA as A85-40302 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77976; NAS 1.15:77976) Avail: NTIS HC A04/MF A01 CSCL 01C

Recent research on advanced-configuration commercial aircraft at DFVLR is surveyed, with a focus on aerodynamic approaches to improved performance. Topics examined include transonic wings with variable camber or shock/boundary-layer control, wings with

reduced friction drag or laminarized flow, prop-fan propulsion, and unusual configurations or wing profiles. Drawings, diagrams, and graphs of predicted performance are provided, and the need for extensive development efforts using powerful computer facilities, high-speed and low-speed wind tunnels, and flight tests of models (mounted on specially designed carrier aircraft) is indicated. T.K.

N86-17339# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France). Centre de Recherches du Bouchet.
FLEXIBLE INTERMEDIATE FILM WITH A LARGE TEMPERATURE RANGE FOR AERONAUTICAL UTILIZATION Final Report [FILM INTERCALAIRE SOUPLE A LARGE DOMAINE DE TEMPERATURE D'UTILISATION POUR L'AERONAUTIQUE]
Jacky Pattein 8 Jul. 1985 21 p In FRENCH
(Contract DRET-83-129)
Avail: NTIS HC A02/MF A01

Transparent polyurethane film was produced in order to obtain improved properties for stratified windshield manufacturing. The evaluation was carried out using 50 m of 40 cm wide film. A better flexibility, better behavior at low temperatures and better adhesion on glass are verified. The properties are superior to equivalent materials used for the same purpose. Author (ESA)

N86-17340# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
CRITICAL ANALYSIS OF TURBULENCE RESTITUTION FROM ACCELERATION MEASUREMENTS [ANALYSE CRITIQUE DE LA RESTITUTION DE LA TURBULENCE A PARTIR DE MESURES D'ACCELERATION]
G. Coupry Jan. 1985 34 p refs In FRENCH
(Contract STPA-84-95015)
(ONERA-RT-3/3567-RY-C40-R) Avail: NTIS HC A03/MF A01

Civil aircraft acceleration data were collected for an atmospheric turbulence data bank. Differences observed among the different types of aircraft are analyzed. The error analysis shows that these differences are not related to turbulence scale. However, the coefficients used to compute turbulence from acceleration appear inadequate. The Poisson statistical law is confirmed as suitable to describe turbulence distribution. Author (ESA)

N86-17341# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero der Nachrichten fuer Luftfahrer.
ENVIRONMENT-FRIENDLY PROPELLER AIRCRAFT WITH A MAXIMUM WEIGHT OF 5700 kg, AND MOTOR GLIDERS: PUBLICATION OF THE NOISE VALUES [UMWELTFREUNDLICHE PROPELLERFLUGZEUGE BIS 5700 KG HOECHSTMASSE UND MOTORSEGLER: VEROEFFENTLICHUNG DER LAERMWERTE]
31 Oct. 1983 25 p In GERMAN
Avail: NTIS HC A02/MF A01

The noise values (status October 31, 1983) of all prototypes and series of propeller aircrafts and motor gliders fulfilling the standard MfLII-47/75 or the noise protection requirements for aircraft LSL (April 23, 1981) are listed. Equipment, maximum permissible cruising power, maximum permissible number of revolutions, initial mass, temperature corrected noise level, power correction value, certified noise level, and noise threshold are given. Author (ESA)

N86-17342# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
DAMAGE-TOLERANT AIRCRAFT DESIGN
H. P. vanLeeuwen 23 Jan. 1984 30 p refs Presented at 5th European Conference on Fracture, Lisbon, Portugal, 17-21 Sep. 1984
(NLR-MP-84005-U; B8568522) Avail: NTIS HC A03/MF A01

Actions to be taken to realize a damage-tolerant aircraft structure and to have it certified are listed. Studies to define aircraft usage, missions; develop load spectra, sequences; select critical locations for an evaluation; develop stress spectra for those locations; determine environmental conditions for those locations; compile crack growth data for each material and environment; compile fracture toughness data; produce crack growth curves; determine residual strength; decide on inspection techniques; determine detectable crack length; and decide on inspection intervals are summarized. Full scale tests on an F-28 aircraft wing are described. Author (ESA)

N86-17343# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
HELICOPTER-SHIP QUALIFICATION TESTING
R. Fang, T. J. Hoekstra, and C. F. G. M. Hofman 18 Jun. 1984 19 p Submitted for publication
(NLR-MP-84062-U; B8568102) Avail: NTIS HC A02/MF A01

Helicopter-ship qualification tests are reviewed. The total program comprises wind-tunnel tests on a scale model of the ship, full scale wind climate tests on board the ship, shore-based helicopter flight tests in the low speed region, and helicopter flight tests on board the ship. The program leads to a safe and optimum operational availability of the helicopter on board the ship in terms of take-off, landing and deck handling capabilities as a function of relative wind and sea-state. Author (ESA)

N86-17344# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN AND FABRICATION OF AN ADVANCED COMPOSITE CELLULAR WING BOX
G. Romeo (Polytecnico di Torino, Italy) and W. H. M. vanDreumel 1984 23 p refs
(VTH-LR-315) Avail: NTIS HC A02/MF A01

A cellular integral structure was designed for the upper and lower panels of a wing box in order to realize a ribless structure. A small panel was manufactured and tested under uniaxial compression. A wing box (length 1300mm) was manufactured. Author (ESA)

N86-17345# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
LECTURE NOTES ON FATIGUE, STATIC TENSILE STRENGTH AND STRESS CORROSION OF AIRCRAFT MATERIALS AND STRUCTURES. PART 2: FIGURES
J. Schijve Aug. 1983 121 p refs
(VTH-LR-360-Pt-2; B8563474) Avail: NTIS HC A06/MF A01

Graphs, photographs, and figures from a report on aircraft materials and structures tests are presented. Author (ESA)

N86-17346# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
OPERATIONAL APPLICATION OF THE STALINS METHOD FOR MEASURING TAKE-OFF AND LANDING TRAJECTORIES
C. G. Kranenburg, A. Pool, and A. J. L. Willekens 15 Apr. 1983 55 p refs Revised
(Contract NIVR-1899)
(NLR-TR-83010-U; B8569023) Avail: NTIS HC A04/MF A01

The STALINS method to calculate the trajectories from the outputs of an inertial sensing system is described and compared with results obtained from onboard cameras and a radio altimeter from 200 takeoff and landing flight tests. The comparison shows that the STALINS method is at least as accurate as the other methods and meets its design goals. Author (ESA)

N86-17347# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THREE-DIMENSIONAL FLIGHT-PATH RECONSTRUCTION BY MEANS OF SPLINE APPROXIMATION
M. R. Best 30 Jul. 1985 67 p refs
(Contract NIVR-1816)
(NLR-TR-83091-U; B8568391) Avail: NTIS HC A04/MF A01

A method to reconstruct the flight path of a symmetric flight, by representing this path by a set of splines, was applied to a three-dimensional flight over a rotating Earth. Results are comparable in accuracy and computing time to the Kalman (square root information) smoother, but reduction in computing time seems feasible. Author (ESA)

N86-17348# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
ESTIMATION OF LOAD EXCEEDANCES OF AN AIRCRAFT UNDER CARRIAGE WITH NONLINEAR PROPERTIES EXCITED BY RANDOM RUNWAY UNEVENNESS
R. Noback 20 Mar. 1984 94 p refs
(Contract NIVR-1947)
(NLR-TR-84030-U; B8588529) Avail: NTIS HC A05/MF A01

Methods to describe a landing gear with nonlinear properties excited by random runway unevenness during taxiing were investigated. Calculations were compared to measured results from an analog computer simulation. The mean behavior, standard deviations, and power spectra can be described with a classic type of equivalent gain. Load exceedance curves can be approximated fairly well with conditional equivalent gains that depend on the output load level. Author (ESA)

N86-17349# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
OPTIMIZATION IN DESIGN PROCESSES: AN INFORMATICS POINT OF VIEW
R. F. vandenDam, J. W. Boerstoel, and H. A. M. Daniels 3 Aug. 1984 33 p refs Presented at International Conference on Inverse Design Concepts in Engineering Science (ICIDES), Austin, Tex., Oct. 1984 Submitted for publication
(NLR-MP-84074-U; B8569324) Avail: NTIS HC A03/MF A01

Optimization system development and the potential of mathematical optimization techniques in aeronautical engineering are discussed. The main requirements to be met by a general-purpose optimization system are given. Implementation is described, and examples of applications are presented. Author (ESA)

N86-17350# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
STRATEGIES FOR DYNAMIC MODELING OF A HELICOPTER STRUCTURE
Serge Durand and Victor Yana 1985 12 p refs Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-101) Avail: NTIS HC A02/MF A01

Helicopter dynamic modeling problems are studied using three principles: divide difficulties, correlate with test and simplify reality. The analytical procedures that were used include the finite element method, modal analysis, harmonic analysis and transient analysis. The method is applied to the tail section of the Ecureil helicopter. Good correlation between natural frequency modes as measured and calculated is obtained over nine vibrating modes. The forced response calculations allowed to find a solution to a problem of unbalance excitation caused by the tail rotor. Author (ESA)

N86-17269# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
AN INTERACTIVE DESIGN SYSTEM FOR WINGED SPACE VEHICLE
Yoshifumi Inatani, Takashi Abe, Haruo Hosokawa (Japan Information Service, LTD), and Jun Sakamoto (Japan Information Service, LTD) *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1985 p 9-16 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17297# Fuji Heavy Industries Ltd., Utsunomiya (Japan).
APPLICATION OF COMPUTATIONAL AERODYNAMICS TO WING DESIGN
Masaaki Makadate *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 271-278 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17298# National Aerospace Lab., Tokyo (Japan).
A NUMERICAL SOLUTION OF THE TRANSONIC INTEGRAL EQUATION AND ITS APPLICATION TO THREE-DIMENSIONAL TRANSONIC WING DESIGN
Susumu Takanashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 279-292 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17299# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
A WING DESIGN BASED ON THE THREE-DIMENSIONAL TRANSONIC INVERSE METHOD AND THE COMPARISON WITH THE WIND TUNNEL TESTING DATA
Shigefumi Tatsumi and Susumu Takanashi *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 293-304 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-17351*# Illinois Univ., Urbana-Champaign. Computer Systems Group.
ERROR PROPAGATION IN A DIGITAL AVIONIC PROCESSOR: A SIMULATION-BASED STUDY
D. Lomelino and R. K. Iyer [1986] 39 p refs
(Grant NAG1-613)
(NASA-CR-176501; NAS 1.26:176501) Avail: NTIS HC A03/MF A01 CSCL 01D

An experimental analysis to study error propagation from the gate to the chip level is described. The target system is the CPU in the Bendix BDX-930, an avionic miniprocessor. Error activity data for the study was collected via a gate-level simulation. A family of distributions to characterize the error propagation, both within the chip and at the pins, was then generated. Based on these distributions, measures of error propagation and severity were defined. The analysis quantifies the dependency of the measured error propagation on the location of the fault and the type of instruction/microinstruction executed. Author

N86-17352# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
THE APPLICATION OF SENSORS IN LIGHT TESTS
S. Storm vanLeeuwen 16 May 1984 12 p refs Presented at 2nd S and A Symposium, Enschede, Netherlands, 1-2 Nov. 1984
(NLR-MP-84056-U; B8568098) Avail: NTIS HC A02/MF A01

Evaluation of transducers used in flight test data collection systems is described. Needs for flight test transducers are discussed. Static laboratory tests, duration tests, environmental tests, and tests in laboratory aircraft are outlined. Pressure, temperature, position, acceleration, vibration, and sound transducers, and gyros are covered. Author (ESA)

N86-17353# Kollsman System-Technik G.m.b.H., Munich (West Germany).
DEVELOPMENT OF A PIEZOELECTRIC QUARTZ PRESSURE SENSOR FOR AVIONICS WITH EXCELLENT LONG TERM STABILITY (WITH FINAL DEMONSTRATION OF THE RESULTS ON A PROTOTYPE) Final Report, Nov. 1984
Matthias R. Risch Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-W-85-010; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

An accurate, stable pressure sensor was developed for avionics using quartz as a pressure-sensitive element, a copper-

beryllium beam balance for pressure transfer, calculators for digitization, and two identical high frequency piezoelectric surface wave resonators for improved accuracy. Sensor pressure and temperature dependence were tested. Pressure sensitivity changes with temperature, at 0.05% per C. As errors are < 0.1% for hysteresis, repeatibility, temperature hysteresis, and long term drift, the pressure sensor can be mass produced. Nonlinearity and temperature dependence are 1% but can be compensated with a microprocessor. Author (ESA)

N86-17354# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
RELIABILITY ASPECTS OF SOFTWARE FOR DIGITAL AVIONICS
G. J. Dekker 1985 95 p refs Revised
(Contract RB-RLB-1982-1-3.3)
(NLR-TR-82126-U; B8568394) Avail: NTIS HC A05/MF A01

Methods to develop reliable software based avionics systems, especially for safety critical functions, are reviewed. The differences between analog and digital systems, and the policy of the FAA to certify software based systems are presented. Methods to minimize the number of errors during software development, methods to remove as many errors as possible via testing, and methods to minimize the effect of remaining errors during operational flights are outlined. A safety analysis regarding common-mode failures is given. Reliability related techniques used by avionics manufacturers are discussed. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-17355# Washington Univ., St. Louis, Mo. School of Engineering and Applied Science.
EFFECT OF DYNAMIC STALL AND ELASTIC PARAMETERS ON THE FUNDAMENTAL MECHANISMS OF HELICOPTER VIBRATIONS Final Report, 1 Sep. 1983 - 31 Aug. 1985
D. A. Peters 1 Sep. 1985 11 p
(Contract DAAG29-83-K-0133)
(AD-A160022; ARO-20538.3-EG) Avail: NTIS HC A02/MF A01 CSCL 20/11

This research dealt with the modeling and solution of rotary-wing dynamics. In the modeling area, it deals with elastic-blade models, ways to introduce rotor-body coupling, aerodynamic behavior near blade-tips, and the modeling of dynamic stall. In solution strategies, we have concentrated on new and improved Floquet methods, on innovative trim methodologies (such as auto-pilot and periodic shooting), on efficient formulation of equations, and on lifting-line and lifting-surface meshes. GRA

N86-17356# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
MODELS AND IDENTIFICATION OF MATERIALS UNDER ONE AXE AND TWO AXES STRESS Final Report [MODELISATION ET IDENTIFICATION DES MATERIAUX SOUS SOLLICITATIONS UNIAXIALES ET MULTIAXIALES]
J. L. Chaboche, D. Nouailhas, D. Pacou, H. Policella, and S. Savalle Mar. 1985 62 p refs In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-54/1765-RY-044-R) Avail: NTIS HC A04/MF A01

Research in turbomachine blade design and life study is presented. Plastic and viscoplastic multiaxial behavior analysis is used in development of computer programs, particularly with the INC0718 high temperature alloy. A tensile and torsion test facility is adapted to work in the 500 to 700C temperature range. The adaptation includes high frequency induction heating and a capacitive linear and angular deformation measurement device. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-17357 Engineering Sciences Data Unit, London (England).
ESTIMATION OF SIDEFORCE, YAWING MOMENT AND ROLLING MOMENT DERIVATIVES DUE TO RATE OF YAW FOR COMPLETE AIRCRAFT AT SUBSONIC SPEEDS
Apr. 1984 52 p refs Submitted for publication
(ESDU-84002; ISBN-0-85679-463-5; ISSN-0141-397X) Avail: ESDU

ESDU 84002 demonstrates how methods given elsewhere in the Sub-series for estimating the contributions to the derivatives Y sub r, N sub r and L sub r due to individual major parts of the airframe (wing, bodies, flaps and fin) may be combined to provide values for the complete aircraft. The overall accuracy achieved is illustrated by correlation plots showing comparison of prediction with flight test and wind tunnel results drawn from many sources in the literature; for a diverse range of configurations broadly Y sub r is predicted within 0.05, N sub r within 0.025 and L sub r within 0.02. A simplified method for estimating complete aircraft yawing derivative values is also included. Author

N86-17358*# Kansas Univ., Lawrence. Flight Research Lab.
DEVELOPMENT OF A SENSITIVITY ANALYSIS TECHNIQUE FOR MULTILOOP FLIGHT CONTROL SYSTEMS Final Report
Alfredo Herrera Veillard, James Paduano, and David R. Downing Oct. 1985 162 p refs
(Contract NCC2-293)
(NASA-CR-166619; NAS 1.26:166619) Avail: NTIS HC A08/MF A01 CSCL 01C

This report presents the development and application of a sensitivity analysis technique for multiloop flight control systems. This analysis yields very useful information on the sensitivity of the relative-stability criteria of the control system, with variations or uncertainties in the system and controller elements. The sensitivity analysis technique developed is based on the computation of the singular values and singular-value gradients of a feedback-control system. The method is applicable to single-input/single-output as well as multiloop continuous-control systems. Application to sampled-data systems is also explored. The sensitivity analysis technique was applied to a continuous yaw/roll damper stability augmentation system of a typical business jet, and the results show that the analysis is very useful in determining the system elements which have the largest effect on the relative stability of the closed-loop system. As a secondary product of the research reported here, the relative stability criteria based on the concept of singular values were explored. B.W.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-17359*# Wyle Labs., Inc., Hampton, Va.
OPERATIONAL CONSIDERATIONS IN MONITORING OXYGEN LEVELS AT THE NATIONAL TRANSONIC FACILITY
M. A. Zalenski, E. L. Rowe, and J. R. McPhee Washington Dec.

1985 19 p
(Contract NAS1-16331)
(NASA-CR-3953; NAS 1.26:3953) Avail: NTIS HC A02/MF A01 CSCL 14B

Laboratory monitoring of the level of oxygen in sample gas mixtures is a process which can be performed with accurate and repeatable results. Operations at the National Transonic Facility require the storage and pumping of large volumes of liquid nitrogen. To protect against the possibility of a fault resulting in a localized oxygen deficient atmosphere, the facility is equipped with a monitoring system with an array of sensors. During the early operational stages, the system produced recurrent alarms, none of which could be traced to a true oxygen deficiency. A thorough analysis of the system was undertaken with primary emphasis placed on the sensor units. These units sense the partial pressure of oxygen which, after signal conditioning, is presented as a % by volume indication at the system output. It was determined that many of the problems experienced were due to a lack of proper accounting for the partial pressure/% by volume relationship, with a secondary cause being premature sensor failure. Procedures were established to consider atmospherically induced partial pressure variations. Sensor rebuilding techniques were examined, and those elements contributing to premature sensor failure were identified. The system now operates with a high degree of confidence and reliability. Author

N86-17360# Kema (N. V.), Arnhem (Netherlands). High Voltage Lab.
THE DESIGN OF SHIELDED ENCLOSURES, ESPECIALLY FOR HIGH-VOLTAGE LABORATORIES
P. C. T. vanderLaan (Technical Univ., Eindhoven, Netherlands), W. J. L. Jansen, E. F. Steennis, and A. J. vanLoon, ed. 1984 14 p refs
(S/T-Rept-Vol-2-No-11; ISBN-90-353-0022-X; ISSN-0167-8590; B8564312) Avail: NTIS HC A02/MF A01

It is argued that a shielded enclosure acts as a complicated receiving antenna for incoming electromagnetic waves, so it is incorrect to model an enclosure as a flat metallic sheet of infinite extent, as is done in the traveling wave concept to calculate shielding effectiveness. The field method and the circuit method are more useful calculation models, because they are based on currents circulating around the entire volume enclosed. The field method gives correct values, but is rather complicated. The circuit method offers more insight into the shielding mechanism, especially at low frequencies. The required attenuation is found by considering measuring circuits for the detection of partial discharges. The resulting attenuation is not only a matter of a correct choice of wall material and thickness, but also depends on the construction of doors and joints, and on filtering of the electrical supply. Author (ESA)

N86-17270# National Aerospace Lab., Tokyo (Japan).
RAREFIED GAS NUMERICAL WIND TUNNEL: MONTE CARLO SIMULATION
Katsuhisa Koura *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 17-27 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-17361# Royal Norwegian Council for Scientific and Industrial Research, Blindern. Space Activity Div.
[ACTIVITIES REPORT IN SPACE RESEARCH IN NORWAY] Annual Report, 1984
Arne Gundersen and Ann-Lisbeth Ruud Holtet 1984 56 p refs Original contains color illustrations
(SAD-125-T; ISBN-82-7224-091-2) Avail: NTIS HC A04/MF A01

Space physics, astrophysics, and life science research, and space-related test facilities are described. Spaceborne, rocket-borne, balloon-borne, and ground based experiments are summarized. Space plasmas; ERS-1 radar; auroras; the ionosphere; satellite imagery; stellar UV spectra; flare star photometry; stellar atmospheres; solar activity; IUE data; and gravity effects on plants are studied. Author (ESA)

N86-17362# MATRA Espace, Toulouse (France). Instrumentation Div.
BIO-OBSERVATION SUBSYSTEM (BOSS) FEASIBILITY STUDY Final Report
Paris ESA 24 Aug. 1984 64 p
(Contract ESA-5801/83/F-FC(SC))
(BOSS-010-MT; ESA-CR(P)-2083) Avail: NTIS HC A04/MF A01

The feasibility study on the Bio-Observation Subsystem (BOSS) planned for the second flight of the Spacelab Biorack as part of the microgravity program is summarized. A very centralized concept where BOSS replaces an incubator and allows use of video cameras connected to telemetry downlink for real time operations, film camera for transient phenomena recording, and a near-standard microscope is selected. An alternative concept to solve operational problems of the baseline design is also presented. The development plan is outlined. The feasibility of BOSS is demonstrated, and a design which meets essential objectives and minimizes impact on Biorack is proposed. Author (ESA)

N86-17363# Swedish Space Corp., Solna.
UTILIZATION OF THE SWEDISH EXPERIMENT MODULE WITHIN THE TEXUS 9/10 FLIGHT OPPORTUNITY Final Report
Rolf Joensson Paris ESA 19 Nov. 1984 62 p refs
(Contract ESA-5854/84/F-HEW)
(M5/7-14; ESA-CR(P)-2085) Avail: NTIS HC A04/MF A01

A module containing a high temperature mirror furnace (HTMF), a crystal growth facility (CGF), and a gradient furnaces assembly (GFA) was flown in the TEXUS 10 sounding rocket. Particle composites in alloys with high melting points; zone melting of germanium crystals; retention of a fine precipitate dispersion by gravity solidification; and directional solidification of Sn-Al alloys were studied. With the HTMF, both samples melted, revealing uniform distribution of tungsten particles in an Fe-Ni matrix. However, the isothermal treatment above the melting point had a shorter duration than expected due to the thermal overload of the payload. For the CGF, both samples melted. The floating zone experiments give substantial results on the mechanisms predominant in a liquid during zero-g conditions. For the GFA, one of three samples was processed under microgravity. Splitting the module into a HTMF-module with larger power and thermal capacity, and a calm module with CGF and GFA is recommended. Author (ESA)

N86-17364# Officine Galileo S.p.A., Florence (Italy). Space Activity Div.
BIO-OBSERVATION SUBSYSTEM, PHASE A STUDY, EXECUTIVE SUMMARY Final Report
G. Borghi, A. Mariani, and E. Nocentini Paris ESA Sep. 1984 42 p Revised
(Contract ESTEC-5802/83/F-FC(SC))
(Rept-648-DT-6-Issue-1; ESA-CR(P)-2081) Avail: NTIS HC A03/MF A01

A Spacelab system for observing biological effects of the space environment with low magnification for, e.g., small plants and insects, and high magnification for, e.g., human cells and bacteria, was defined. For the macroscopic system, an automatic photographic camera with a dedicated timer circuit to select time intervals is proposed. For microscopic observations, a video camera with dedicated recorder and direct link to the ground, and a cine camera without downlink are suggested. Fiber optics illuminators are recommended. Both systems can be integrated in the Biorack incubator. Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-17417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIATION EXPOSURE AND PERFORMANCE OF MULTIPLE BURN LEO-GEO ORBIT TRANSFER TRAJECTORIES
Sol H. Gorland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 383-389 refs Previously announced as N85-21228 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-17365# SATCOM International, Paris (France).
COMPARISON OF SPACE SEGMENTS FOR THE PROVISION OF FUTURE DATA RELAY SATELLITE SERVICES Executive Summary
P. Molette, P. SaintAubert, S. Gabriel (BAe), M. Marsili (Selenia Spazio), E. Saggese (Telespazio), and M. Langemann (Dornier) Paris ESA 15 Aug. 1984 30 p 2 Vol.
(Contract ESA-1571/83/NL-DG)
(SATCOM-092/PSA/AB/173/84-Vol-1; ESA-CR(P)-2066-Vol-1)
Avail: NTIS HC A03/MF A01

A European data relay satellite system was defined after studying user requirements and technological possibilities. The first generation system consists of 2 satellites in orbit (1 nominal, 1 spare used for peak demands), at 10 W and 5 E. They are medium class spacecraft platforms (1500 to 1750 kg at launch on Ariane). The recommended payload configuration includes a feeder link to the control station (no dissemination to user), a large S + Ka antenna for S and K band single access (2 channels), 2 small (0.9 m) antennas for S band multiple access. A small Ka antenna for medium data rate users may be added, but its real need requires further investigation. The second generation consists of 3 spacecraft in orbit located at 50 W, 5 E (spare used for peak loads) and 65 E. Author (ESA)

N86-17366# SATCOM International, Paris (France).
COMPARISON OF SPACE SEGMENTS FOR THE PROVISION OF FUTURE DATA RELAY SATELLITE SERVICES Final Report
P. Molette, P. SaintAubert, M. Chabrol, E. Millon, J. C. Flandrin, J. Boissieres, T. Duhamel, B. Tedaldi, R. Young (BAe), S. Gabriel (BAe) Aircraft Group) et al Paris ESA 15 Aug. 1984 296 p 2 Vol.
(Contract ESA-1-1571/83/NL-DG)
(SATCOM-092/PSA/AB/173/84-Vol-2; ESA-CR(P)-2066-Vol-2)
Avail: NTIS HC A13/MF A01

A European data relay satellite system was defined after studying user requirements and technological possibilities. The first generation system consists of 2 satellites in orbit (1 nominal, 1 spare used for peak demands), at 10 W and 5 E. They are medium class spacecraft platforms (1500 to 1750 kg at launch on Ariane). The recommended payload configuration includes a feeder link to the control station (no dissemination to user), a large S + Ka antenna for S and K band single access (2 channels), 2 small (0.9 m) antennas for S band multiple access. A small Ka antenna for medium data rate users may be added, but its real need requires further investigation. The second generation consists of 3 spacecraft in orbit located at 50 W, 5 E (spare used for peak loads) and 65 E. Author (ESA)

N86-17403# Martin Marietta Aerospace, New Orleans, La.
SHUTTLE DERIVED UNMANNED LAUNCH VEHICLE
D. N. Buell and J. R. Tewell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 229-236 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/2

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-17367# Committee on Science and Technology (U. S. House).
RESULTS OF SPACE SHUTTLE FLIGHT 51-A
Washington GPO 1985 24 p Hearing before the Committee on Science and Technology, 99th Congress, 1st Session, no. 7, 30 Jan. 1985
(GPO-44-770) Avail: Committee on Science and Technology

The Committee on Science and Technology of the U.S. House of Representatives met on 30 Jan. 1985 to discuss the results of Space Shuttle flight 51-A. Speaking for the Committee were Don Fuqua (Florida), Chairman, and Manual Lujan, Jr. (N. Mexico) and Ron Packard (California), members. Representing the Shuttle crew were Capt. (USN) Frederick Hauck, flight commander, accompanied by Commander (USN) David Walker, mission pilot, and Dr. Joseph Allen, Dr. Anna Fisher, and Dale Gardner, mission specialists. The successful 8-day mission was highlighted by two atellite deployments and two satellite retrievals. An equally important accomplishment as the attempt to grow organic crystals in a weightless environment. F.M.R.

N86-17409# Department of Transportation, Washington, D. C. Office of Commercial Space Transportation.
REGULATORY ASPECTS OF COMMERCIAL, SPACE TRANSPORTATION
H. R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 291-297 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/1

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-17368*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

MMIC ANTENNA TECHNOLOGY DEVELOPMENT IN THE 30/20 GIGAHERTZ BAND
J. Smetana, T. J. Kascak, and R. E. Alexovich 1986 22 p refs Proposed for presentation at 11th Annual Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87192; E-2848; NAS 1.15:87192) Avail: NTIS HC A02/MF A01 CSCL 09F

This paper presents a progress summary of NASA's efforts in developing 20 and 30 GHz GaAs MMIC devices and an advanced satellite communications antenna system using these devices. In the interest of preserving resources such as frequency spectrum and orbital space the antenna system is being developed with multiple fixed spot beams and multiple scanning spot beams. NASA set high goals for the MMIC development to pushc GaAs technology. These goals and the main features of the MMIC devices are discussed. Some packaging and characterization considerations are also discussed. The 20 GHz transmit antenna and 30 GHz receive antenna are being developed separately. The approach selected is to perform contractual configuration studies, purchase a 20-GHz experimental antenna system (EAS) and perform in-house evaluation. The features and key specifications of the EAS are discussed. Additional supporting technologies such as effects of coupling on modest sized arrays, MMIC matching techniques, in-house analytical capability, wideband and dual frequency microstrip patch array development, and MMIC packaging techniques are described. Some plans for future are also discussed. Author

N86-17369# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
LOCAL NETWORK INTERCONNECTION THROUGH A SATELLITE POINT TO MULTIPOINT LINK Ph.D. Thesis [INTERCONNEXION DE RESEAU LOCAUX A TRAVERS UNE LIAISON SATELLITE POINT-A-MULTIPOINT]
Otto Carlos MunizBandeiraDuarte 8 Jul. 1985 211 p refs In FRENCH
(ENST-85E007; ISSN-0751-1353) Avail: NTIS HC A10/MF A01

Four architectures to implement a point to multipoint satellite link protocol for communication services offered by the Telecom 1 satellite network are presented. A safe communication service with error correction and flow control facilities is described. It is shown that a time transparent communication system combines simplicity and cost advantages. Author (ESA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-17370*# National Aeronautics and Space Administration, Washington, D.C.
X-RAY SATELLITE Status Report, third quarter 1985
Dec. 1985 49 p Transl. into ENGLISH of "Roentgen Satellit Statusbericht; 3 Quartal" rept. DFVLR-WE2/9143 DFVLR, Cologne, West Germany, 30 Sep. 1985 p 1-72 Transl. by The Corporate Word, Ind., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77997; NAS 1.15:77997; DFVLR-WE2/9143) Avail: NTIS HC A03/MF A01 CSCL 22B

The 3rd Quarter Status Report on DFVLR's ROSAT project confirms that with regard to technical performance and costs the project is on schedule. The valid schedule for engineering model and flight model completion on May 7, 1985 leads to a launch date on October 30, 1987. Progress in each department is compared to and explained with regard to the milestone plan. Continued problems with the gold damping of the FM-mirror system and contamination of the sterile rooms where the mirrors are stored have led to postponement of milestone 7. It is not yet completely clear to what extent all successive milestones will be affected by this factor. Author

N86-17371# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPENSATING STRUCTURE AND PARAMETER OPTIMIZATION FOR ATTITUDE CONTROL OF A FLEXIBLE SPACECRAFT
Decio Castilho Ceballos Jun. 1985 24 p refs Submitted for publication
(INPE-3564-PRE/770) Avail: NTIS HC A02/MF A01

A Feedback Double Path Compensating (FDPC) control structure is considered for the attitude control of a flexible spacecraft, where vibration modes and modelling errors are present. Parameter optimization is applied for finding the controller, so as to have optimized behavior for a high order model. The second-order FDPC controller was tested for the one axis attitude control of a space-craft with flexible appendages, whose dynamics was approximated by a fourteenth-order linear invariant model. The results are found to be satisfactory. Author

N86-17372*# National Academy of Sciences - National Research Council, Washington, D. C. Ad Hoc Committee on Space Station Engineering and Technology Development.
SPACE STATION ENGINEERING AND TECHNOLOGY DEVELOPMENT. PROCEEDINGS OF THE PANEL ON PROGRAM PERFORMANCE AND ONBOARD MISSION CONTROL
1985 72 p Proceedings held in Washington, D.C., 6-7 Aug. 1985
(Contract NASw-4003)
(NASA-CR-176484; NAS 1.26:176484) Avail: NTIS HC A04/MF A01 CSCL 22B

An ad-hoc committee was asked to review the following questions relevant to the space station program: (1) onboard maintainability and repair; (2) in-space research and technology program and facility plans; (3) solar thermodynamic research and technology development program planning; (4) program performance (cost estimating, management, and cost avoidance); (5) onboard versus ground-based mission control; and (6) technology development road maps from IOC to the growth station. The objective of these new assignments is to provide NASA with advice on ways and means for improving the content, performance, and/or effectiveness of these elements of the space station program. G.L.C.

N86-17373*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A CONTROL SYSTEM DESIGN APPROACH FOR FLEXIBLE SPACECRAFT
Larry M. Silverberg (North Carolina State Univ., Raleigh) Nov. 1985 41 p refs
(NASA-TM-87599; NAS 1.15:87599) Avail: NTIS HC A03/MF A01 CSCL 22B

A control system design approach for flexible spacecraft is presented. The control system design is carried out in two steps. The first step consists of determining the ideal control system in terms of a desirable dynamic performance. The second step consists of designing a control system using a limited number of actuators that possess a dynamic performance that is close to the ideal dynamic performance. The effects of using a limited number of actuators is that the actual closed-loop eigenvalues differ from the ideal closed-loop eigenvalues. A method is presented to approximate the actual closed-loop eigenvalues so that the calculation of the actual closed-loop eigenvalues can be avoided. Depending on the application, it also may be desirable to apply the control forces as impulses. The effect of digitizing the control to produce the appropriate impulses is also examined. Author

N86-17374# Italspazio, Rome (Italy).
CONFIGURATION STUDY OF THE NAVSAT SYSTEM SATELLITES Final Report
C. Carnebianca, G. Mastini, and R. Rizzo Paris ESA Jan. 1985 277 p refs
(Contract ESA-5754/84/F-RD(SC))
(ITS-TR-011/85; ESA-CR(P)-2067) Avail: NTIS HC A13/MF A01

NAVSAT configurations using circular, geosynchronous, and highly eccentric orbits were studied. A civil navigation system based on a combination of satellites placed in geosynchronous and Molniya type orbits seems feasible. The proposed TDMA approach consists of a frame with nine bursts separated by a guard time of 105 msec to avoid overlap between bursts. Antipodal satellites share the same time slot. The down link frequency is 1.956 GHz. The satellite constellation consists of six navigation packages in geosynchronous orbit and 12 satellites in highly eccentric orbits. Each elliptic orbit inclined 63.4 deg with respect to the equatorial plane, carries two spacecraft. Three elliptic orbits present the apogee over the north pole and the other three over the south pole. The apogee and perigee altitude are 39,114 Km and 1250 Km respectively. The constellation guarantees a minimum of four visible satellites. Author (ESA)

N86-17375# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
MEASUREMENT OF THERMO-OPTICAL PROPERTIES OF THERMAL CONTROL MATERIALS
Jul. 1984 28 p refs
(ESA-PSS-01-709-Issue-1; ISSN-0379-4059) Avail: NTIS HC A03/MF A01

Equipment and procedure for determining the solar absorptance and total hemispherical emittance properties of thermal control materials are described. The size of samples required for measurements at ESTEC and the precautions to be taken are specified. Author (ESA)

N86-17376# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
TOWARDS DIGITAL COMPUTER SIMULATION OF THE DYNAMICS OF FLEXIBLE SPACECRAFT
P. Th. L. M. vanWoerkom 5 Oct. 1983 90 p refs
(Contract NIVR-1910)
(NLR-TR-83106-U; B8569032) Avail: NTIS HC A05/MF A01

A method based on a sequence of modified modal transformations for numerical simulation of the dynamics of flexible spacecraft equipped with actuators and sensors was developed. The spacecraft assembly is treated as a sampled data system, characterized by locally constant inputs and by outputs at discrete times. The result consists of a system of exact difference equations, which describes the transition of the spacecraft assembly state from one point in time to the next. In this manner, the usual numerical integration of the differential equations of the spacecraft assembly is replaced by exact, numerical, discrete propagation with difference equations. The associated time interval is determined mainly by measurement times, control update times, and measurement and system noise simulation requirements. Author (ESA)

N86-17418*# Martin Marietta Aerospace, Denver, Colo.
DESIGN OPTIMIZATION FOR A SPACE BASED, REUSABLE ORBIT TRANSFER VEHICLE
Larry Redd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 391-401 (For primary document see N86-17380 08-20)
(Contract NAS3-23858)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

N86-17419*# Boeing Aerospace Co., Seattle, Wash.
THE EFFECT OF ENGINE DESIGN CHARACTERISTICS ON ORBITAL TRANSFER VEHICLE PERFORMANCE
George R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 403-411 refs (For primary document see N86-17380 08-20)
(Contract NAS8-36107)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *08 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-17377# Kiruna Geophysical Inst. (Sweden).
THE HOT PLASMA SPECTROMETERS ON VIKING
Ingrid Sandahl, Rickard Lundin, and Lars Eliasson Feb. 1985 32 p refs
(KGI-Preprint-077; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

The hot plasma spectrometers on Viking V3 are described. The units measure the distribution function of electrons in the energy range 10 eV to 300 keV, of positive ions without mass separation in the energy range 1 eV to 40 keV, and of positive ions with mass separation in the energy range 1 eV to 70 keV, and mass range 1 to 150 amu/q. The spectrometers study acceleration of auroral electrons, upward flowing ion events, ionosphere - magnetosphere energy exchange due to charged particles, convection of thermal ions, and origin of the hot magnetospheric plasma. Author (ESA)

N86-17378# Societe Europeenne de Propulsion, Vernon (France). Space Dept.
SURFACE POTENTIAL MONITOR Final Report
C. Roulle Paris ESA 27 Aug. 1984 126 p refs
(Contract ESTEC-3663/78/NL-HP)
(SEP-TS/SE/RE/10418/84; ESA-CR(P)-2061) Avail: NTIS HC A07/MF A01

A monitor to measure electrostatic fields on spacecraft surfaces under geomagnetic substorm conditions is described. It uses a capacitance variation to translate the electrostatic field into an ac signal. Operating temperature is from minus 150 to plus 80 C; sensing electrostatic field is up to 50 kV/mm; front area is 2 x 2 sqcm; height = 2 cm. Vibration, thermal vacuum, and functional tests show that output is perfectly linear when compared with the signal of an external scanning probe. At cryogenic temperatures, a phase lock is needed to stay on resonant frequency and to stabilize or measure the vibration amplitude for any temperature. Author (ESA)

N86-17379# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
FUNCTIONAL BUILT-IN-TEST IN A PIPELINE IMAGE PROCESSOR
H. A. vaningenSchenau, A. Pleijsier, and A. Monkel 5 Mar. 1984 11 p Presented at AGARD Avionics Panel's 47th Symposium, on Design of Tactical Avionics Maintainability, Brussels, Belgium, 7-10 May 1984
(NLR-MP-84020-U; B8568089) Avail: NTIS HC A02/MF A01

A method for built-in-test (BIT) applied to the test of function modules of a pipelined image processor is described. The BIT is used as a support tool during the early stages of development and for integration and maintenance. The test method takes advantage of the microprocessors used to interface and control the processor modules. Test programs are inserted in the microprocessor software to test the image processor functionally with a similar data and control flow as in real-time operation. The result is a number of test pictures which can be interpreted in relation to the programmed functions of the image processing. Two-dimensional image formats are used to check the performance of the unit at one glance for several functions and parameter values. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-17380 Johns Hopkins Univ., Laurel, Md. Chemical Propulsion Information Agency.
THE 1985 JANNAF PROPULSION MEETING, VOLUME 1
Karen L. Strange, ed. Apr. 1985 522 p refs Meeting held in San Diego, Calif., 9-12 Apr. 1985 6 Vol.
(Contract N00024-85-C-5301)
(AD-A161084; CPIA-Publ-425) Avail: Chemical Propulsion Information Agency, Johns Hopkins Road, Laurel, Md. 20707 HC $78.98 CSCL 21/8

The Propulsion Meeting is sponsored by the Joint Army-Navy-NASA-Air Force (JANNAF) Interagency Propulsion Committee on an approximately annual basis. The objective of the meeting is to promote the exchange of technical information among the organizations active in the fields of missile, space, and gun propulsion technology. This is the first volume of a six-volume proceedings containing the unclassified, public-release papers presented at the 1985 JANNAF Propulsion Meeting. Topics include satellite propulsion technology, oxygen/hydrogen engines, solid motor component design and evaluation, and liquid propellant compatibility. For individual titles, see N86-17381 through N86-17431.

N86-17381# Morton Thiokol, Brigham City, Utah.
LOW COST CARBON/CARBON NOZZLES FOR SOLID ROCKET MOTORS
Frank Inman and Don Giedt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 1-13 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The technique for fabricating low cost multidimensional carbon/carbon rocket nozzle component preforms by the braiding process is discussed. The basic braiding process has been extended for fabricating ITE, exit cone and ITEC components by adding integral axial and radial graphite fiber elements to the basic biaxial braid architecture. The braided fiber preform is subsequently densified by conventional techniques to obtain a composite with an orthogonal 4-D or planar 3-D fiber construction where desired. The resultant process is highly suited for manufacturing near net thicknees and shape solid rocket nozzle components. The details associated with this processing technology development are presented. The details associated with triaxial and 4-D triaxial graphite fiber braiding for rocket nozzle componentry are discussed. Preform rigidization and densification techniques including CVD, HIPIC and LOPIC are reviewed. An assessment of the thermal structural material properties of the braided carbon/carbon composite are presented. The 4-D triaxial carbon/carbon material configured in a monolithic integral throat/exit cone (ITEC) design and tested on a Mortion Thiokol SUBROC motor is presented. The design of a full-scale exit cone employing a braided construction exist cone for test on a minuteman III Stage III motor is also discussed. Author

N86-17382# Naval Weapons Center, China Lake, Calif.
DETERMINING BEHAVIOR OF SOLID ROCKET MOTOR INTERNAL COMPONENTS USING DYNAMIC REAL-TIME RADIOGRAPHY
Donald J. Rogerson, Jr. *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 15-17 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

To better understand the dynamic internal component behavior of solid rocket motors the technique of real-time radiography is employed using a 9 MeV radiographic accelerator. To achieve this goal the real-time imaging equipment and the accelerator are placed in close proximity to the rocket motor and operated remotely during static firing. The engineering considerations of high-hazard environment, compromises of test hardware limitation, portability, and safety are discussed. Results of several tests and future considerations for expanding similar systems are discussed with emphasis on off-the-shelf technology. Author

N86-17383# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
CRACKED BALLISTIC GRAIN TESTS AND ANALYSIS c28
E. C. Francis and W. L. Hufferd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 19-36 refs (For primary document see N86-17380 08-20)
(Contract DAAH01-82-C-A121)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

A computer code developed to predict the interactive effects of ballistic pressure within a flaw and its pressure-induced growth in burning solid propellant grain is presented. The analysis system successfully combines a Fracture Mechanics and a finite element program with ballistic and crack combustion codes, in a system that generates the deformed and burnt profiles at each time during combustion. In this way, combustion-induced pressure loadings on the surface of the grain and inside the flaw, are taken into consideration; thus properly addressing the problem of combustion-induced fracture of solid propellant grains. This code is designed to discriminate between crack burn-out and runaway crack extension. The code has been modified to handle ignition transients caused by igniter variations and flame spreading effects. Analysis and testing of a cracked grain test motor design was conducted to verify the analysis assumptions and predictive capability. Author

N86-17384# Atlantic Research Corp., Gainesville, Va.
THRUST VECTOR TECHNOLOGY DEMONSTRATION
Catherine A. Yezzi, Carl W. Anderson, and Paul Donguy (Societe Europeenne de Propulsion, Bordeaux, France) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 37-43 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Atlantic Research Corporation (ARC), in a joint effort with Societe Europeenne de Propulsion (SEP) of France, funded the design and demonstration testing of advanced thrust vector control (TVC) concepts: one of these concepts was the supersonic splitline nozzle. The thrust vector control test was performed in the ARC multicomponent thrust stand with the baseline ballistic motor testing being performed in a standard (axial) thrust stand. The supersonic splitline nozzle is a very promising concept developed in the 1960's but abandoned due to material limitations; recent developments in nozzle materials justify further development of the concept. The supersonic splitline nozzle is a very attractive concept in that it offers vector deflection angle augmentation. An advanced lightweight, high temperature composite material manufactured by SEP was selected for use in both the throat and exit cone of the nozzle tested at ARC. Descriptions of motor and the thrust vector control system design, test set-up and test results are presented. Author

N86-17385# Morton Thiokol, Brigham City, Utah.
ELASTOMERIC BARRIER PULSE MOTORS
Charles R. Voris and J. W. Rabern *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 45-53 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The Wasatch Division of Morton Thiokol Inc., recently completed a series of 5.5 in. dia elastomeric barrier radial pulse motor tests that have highlighted some inherent problems with the concept and have demonstrated solutions to many of them. The first test was an utter failure. Our testing then included a

comprehensive series of component tests in a Pulse II simulator focusing on the Pulse II barrier and ignition design variations. This approach to developing the elastomeric barrier proved to be very effective. Once design and material problems were solved in a Pulse II simulator, a successful 2-pulse motor was demonstrated. The motor configuration and its genesis, the Pulse II simulator (known colloquially as the IBIS), and the ultimate motor design are described. Each step along the path of solving design and material problems is addressed. Author

N86-17386*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SMALL, TWO-STAGE, PARTIAL-ADMISSION TURBINE
R. F. Sutton (Rockwell International Corp., Canoga Park, Calif.), J. L. Boynton (Rockwell International Corp., Canoga Park, Calif.), and D. Scheer *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 55-62 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

The Rocketdyne Orbital Transfer Vehicle (OTV) cryogenic, rocket engine system, high pressure, liquid hydrogen turbopump was designed with a two-stage, partial-admission axial turbine. The turbine is basically two single-stage, partial-admission, subsonic impulse stages designed so the kinetic energy leaving the first-stage rotor is discharged directly into the second-stage nozzle at nominal operation to minimize staging losses. Very little data were available in the literature for this type of turbine design. Therefore, it was decided to test a full-size model of the turbine design using ambient-temperature gaseous nitrogen as the working fluid. The tester design features a variable orientation second-stage nozzle to determine the optimum circumferential location for highest performance. The tester also features the capability to vary the nozzle arcs of admission and incorporates quartz windows to study the flowfield upstream of the second-stage nozzle using a laser velocimeter. The test operations will probe the efficiency and flow characteristics for three arcs of admission and the effects of second-stage nozzle circumferential orientations over wide ranges of speed and pressure ratios as well as the interstage pressure distributions. Author

N86-17387*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
AN EXPERIMENTAL DATA BASE FOR MATERIAL SELECTION AND DESIGN OF HIGH-SPEED, HIGH-PRESSURE, OXYGEN TURBOMACHINERY
Len Schoenman (Aerojet TechSystems Co., Sacramento, Calif.) and Joel M. Stoltzfus *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 63-77 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23772)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

New technologies for space-based, reusable, throttleable, cryogenic, orbit transfer propulsion are being evaluated. A variable-thrust (200 to 3000 lbF), 2000 psi chamber pressure, LO2/LH2 engine has been selected to demonstrate the 20-hour, 500-restart life goal, and a specific impulse of 480 lbF-sec/lbM. The advanced design uses warm oxygen to power a fully integrated turbopump that delivers 4500 psi LO2. The selected engine cycle provides the following advantages over conventional expander cycle designs which use H2 to drive the LH2 and LO2 pumps; higher engine operating pressures and performance in a smaller envelope, lower turbine operating temperatures, elimination of interpropellant seals and purges, and an extended throttling range. The design approach and results of testing to characterize materials for use in high-pressure gaseous oxygen are discussed. Test methods include particle impact testing in a sonic-flow, hot GO2 streams and forced, high-speed friction rubbing testing. Materials are exposed to oxygen and nitrogen atmospheres at pressures of 100, 1000, and 3000 psi to identify separately the gas cooling effects from the metal oxidation effects at the rubbing surface. The selection of candidate design materials is based on an analytical parameter defined as the burn factor. Typical materials tested include carbon steel, stainless steel, nickel, copper, and monel alloys. Author

N86-17388# Hercules, Inc., Magna, Utah.
BOUYANT FLOW AND ITS EFFECT ON INTERNAL INSULATION PERFORMANCE: NUMERICAL APPROACH
S. P. Purcell and W. L. Daines *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 79-88 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A thorough understanding of the gas flow in the combustion chamber of a solid rocket motor (SRM) is crucial to the prediction of such phenomena as erosive propellant combustion, internal insulator performance, and particle (droplet) formation. Differences in internal insulator performance between static and flight tests is a common phenomenon. It is hypothesized that bouyancy plays a determining role in this difference. A coupled fluid/thermal analysis was performed to study the feasibility of numerically solving this problem. The calculational method was an explicit-implicit approach based on the Simplified Arbitrary Lagrangian Eulerian (SALE) computer program originally written by Los Alamos National Laboratory. Analysis results are presented in the form of flow velocity plots for both bouyant and nonbouyant cases. Results indicate that recirculation is predicted for the configuration chosen for study, and that this flow pattern substantially changes the gas environment in the region of the insulator in the forward dome and, hence, predicts a difference in insulator performance. Author

N86-17389# Hughes Aircraft Co., Canoga Park, Calif. Missile Systems Group.
FAST COOK-OFF TESTS OF THE AMRAAM AIR VEHICLE c28
G. W. Cox and R. Sharma *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 89-97 (For primary document see N86-17380 08-20)
(Contract F08635-82-C-0001)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

As a result of several catastrophic accidents aboard carriers, efforts have been directed toward making air launched ordnance resistant to detonation when engulfed in an aircraft fuel fire. MIL-STD-1648 specifies the criteria and procedures to be used in demonstrating an acceptable level of cook-off safety. The Hughes Aircraft Advanced Medium Range Air-to-Air Missile (AMRAAM) has been designed with a unique system to allow the missile propulsion system to meet these criteria. The Warhead and SAF also have protective features which ensure the safety of the missile system. Some of the fire safety features of the missile are described. The system that makes the AMRAAM probably the safest munition available for some time to come: the Thermally Initiated Venting System, TIVS is reviewed. An overview of the test plant to validate the system will be followed by results of the two successful all-up-around air vehicle tests. Author

N86-17390# Morton Thiokol, Brigham City, Utah.
FACTORS AFFECTING PI SUB k IN HTPB FORMULATIONS c28
M. M. Roland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 99-105 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The importance of temperature sensitivity in the design and performance of tactical rocket motors manifests itself in overall motor efficiency and cost. Pressure excursions may occur if the rate of energy release exceeds limits. The maximum expected operating pressure (MEOP) may be exceeded. To provide a margin of safety, a thicker case and additional insulation becomes necessary. This preventive measure adversely affects the performance of the rocket motor and increases the cost. Work done at Morton Thiokol, Inc. to identify factors that affect temperature sensitivity in HTPB formulations is described. A tactical missile

propellant (HTPB, 91 percent total solids) was used as the baseline. Small laboratory motors were prepared from 1-gal. mixes. These mixes were prepared with variations in coarse and fine AP particle size, Al particle size, and total aluminum content. Author

N86-17391# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF A GAS GENERATOR SYSTEM
C. W. Nelson and D. E. Kooker *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 107-121 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A small gas generator suddenly failed in acceptance tests after a string of successes. Intensive tests and rough calculations said that heat transfer to the cold surroundings, coupled with a change in burning-rate exponent at low pressure, caused the failure. Two math models, a lumped parameter model and a full one-dimensional fluid mechanics model were devised to explain the interaction among combustion, heat transfer, and fluid mechanics. The models predict that a reasonable estimate of heat loss does not, by itself, explain the failures. The success of an isolation venture can only be partially explained by heat transfer. Suspicion then rests on the assumption of equilibrium combustion thermodynamics at the very cold temperatures where the failures occurred. Variations with age and propellant batch are still not exonerated, even though the critical problem seems to have been solved. Author

N86-17392# Westinghouse Electric Corp., Sunnyvale, Calif.
MOONBURNER: AN ULTRA-HIGH WEB FRACTION GRAIN DESIGN c28
William M. Wood *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 123-130 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The development of a new ultra-high web fraction solid propellant grain design is described. The concept allows the design of progressive, regressive, or neutral burning grains with web fractions as high as 1.6 combined with high volumetric loading. The ultra-high web fraction feature allows the typical tactical or sounding rocket motor to burn for at least twice as long, with current propellants, as with previous grain designs. In addition, the pressure-vs-time profile can be tailored to be more rectangular, as is illustrated with a comparative overplot. Volumetric loading as high as 96% is achievable in some designs. A computerized mathematical model of the new grain design was created and exercised to obtain predictions of performance. This is presented, as well as plots of predicted chamber pressure-vs-time for a typical tactical sustainer motor. Experimental development of the concept, from initial motor tests up through static tests with up to 13.5 Lb sub m of propellant is detailed. The burning time of a 6.25 inch diameter motor was 54 seconds. Larger 13-inch diameter hardware under construction is also described. A small sounding rocket lights to 3 miles with 1 Lb sub m of propellant to larger tactical-sized rockets using a modified version of the new grain design that reach 65,000 feet altitude with up to 186 Lb sub m of propellant. To date, 27 five-inch diameter flightweight motors, each with 46.5 Lb sub m of propellant, have been fabricated. Twenty-four of these motors have been flown with a success rate of 92%. Potential applications of the design in solid propellant tactical and sounding rocket and ramjet motors are described. Author

N86-17393# Aerojet Tactical Propulsion Co., Sacramento, Calif.
THE 2.75 MINIMUM SIGNATURE BARRAGE ROCKET
R. L. Mitchell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 131-136 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A minimum signature 2.75 in. rocket motor utilizing MK 66 hardware was demonstrated with a series of static tests at Sacramento and flight tests at Yuma Proving Grounds. The major concerns were combustion stability, ignitability, and spin-induced burn rate enhancement. The static tests verified that the motor was stable and that reliable ignition was achieved at L*'s above 50. Flight test data verified insignificant burn rate enhancement with burn times equivalent to the static test values. Ranges achieved with a 15 lb payload configured with a von Karmen ogive were 16 to 17 kilometers. Author

N86-17394# Morton Thiokol, Brigham City, Utah.
USE OF PEEL VALUES IN STRUCTURAL ANALYSIS c39
S. J. Bennett and A. W. MacBeth *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 137-144 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

Peel values have been used extensively to evaluate the quality of a bond system but have had limited utility in structural analysis. This situation arose from the sensitivity of the peel value to material formulation changes, bond system processing, and material aging and, contrariwise, to the obscure meaning of the peel value. As a practical matter, low peel values have been associated with motor failures while high peel values appear to have a desirable degree of merit. Thus, peel testing is a commonly used bond evaluation method. An interpretation of the peel value has allowed its use in motor structural analysis. The interpretation and analytical results are presented. Author

N86-17395*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CORROSION OF METALS BY HYDRAZINE c26
E. A. Lawton, C. M. Moran, and S. DiStefano *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 145-153 refs (For primary document see N86-17380 08-20)
(Contract NAS7-918)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

The mechanism of corrosion of metals by hydrazine has been studied by the means of coupons in sealed ampoules and by electrochemical techniques. The variables considered were temperature, CO_2 impurity level, alloy composition and microcrystalline structures. The coupon studies, to date, verify that increasing temperature and the presence of molybdenum in stainless steels to the expected 3 percent level is not necessarily deleterious, contrary to published reports. The influence of microcrystalline structure and surface characteristics are more dominant effects. However, with Ti-6Al-4V, two different microcrystalline structures showed no significant differences. Corrosion rates of CRES 304 L in hydrazine have also been measured by several electrochemical techniques such as Tafel plots, polarization resistance and A. C. Impedance. This is the first documented work to show that A. C. Impedance can be used with non-aqueous solvents. Preliminary data correlated satisfactorily with the results of the coupon studies. Author

N86-17396*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECTS OF SURFACE PRETREATMENT AND NITROGEN TETROXIDE PURIFICATION ON THE CORROSION RATE OF TYPE 304L STAINLESS STEEL c26
G. D. Blue and C. M. Moran *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 155-159 refs Sponsored in part by NASA and AF (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

Corrosion rates of 304L stainless steel coupons in MON-1 oxidizer have been measured as a function of cleaning procedures employed, surface layer positions, propellant impurity levels, and

short-term exposure durations (14 to 90 days). Of special interest was propellant contamination by buildup of soluble iron, which may cause flow decay. Surface treatments employed were combinations of cleaning, pickling, and passivation procedures. Propellants used were MIL-SPEC MON-1 and several types of purified NTO (i.e., low water, low chloride) which may, at a later time, be specified as spacecraft grade. Pretest coupon surface analysis by X-ray photoelectron spectroscopy (XPS-ESCA) has revealed important differences, for the different cleaning procedures, in the make-up of the surface layer, both in composition and state of chemical combination of the elements involved. Comparisons will be made of XPS/ESCA data, for different cleaning procedures, for specimens before and after propellant exposure. Author

N86-17397*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOX/LH2 VANE PUMP FOR AUXILIARY PROPULSION SYSTEMS
Joseph A. Hemminger and Thomas E. Ulbricht *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 161-170 ref Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Positive displacement pumps offer potential efficiency advantages over centrifugal pumps for future low thrust space missions. Low flow rate applications, such as space station auxiliary propulsion or dedicated low thrust orbiter transfer vehicles, are typical of missions where low flow and high head rise challenge centrifugal pumps. The positive displacement vane pump for pumping of LOX and LH2 is investigated. This effort has included: (1) a testing program in which pump performance was investigated for differing pump clearances and for differing pump materials while pumping LN2, LOX, and LH2; and (2) an analysis effort, in which a comprehensive pump performance analysis computer code was developed and exercised. An overview of the theoretical framework of the performance analysis computer code is presented, along with a summary of analysis results. Experimental results are presented for pump operating in liquid nitrogen. Included are data on the effects on pump performance of pump clearance, speed, and pressure rise. Pump suction performance is also presented. Author

N86-17398# Marquardt Corp., Van Nuys, Calif.
BIPROPELLANT EARTH STORABLE ROCKET ENGINES FOR SATELLITES: A 1985 UPDATE
R. Carl Stechman *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 171-179 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Earth storable bipropellant rocket engines ranging from less than 1 lb up to greater than 1500 lbs were developed for use in satellites and maneuvering stages which provide high performance, long life and insensitivity to system induced operating parameters. The successful multiple program qualification of the R-4D demonstrates the reliability and capabilities of a multiple-doublet film cooled rocket engine. The development of multiple doublet boundary layer cooled engines in the 5 to 25 lb thrust range and the qualification of a flexure guided valve in either a single or dual seat configuration can satisfy most of the requirements of future satellites, transfer vehicles, and stages which require on-orbit attitude control and stationkeeping. Author

N86-17399# Ultramet, Pacoima, Calif.
OXIDATION RESISTANT COATINGS FOR REFRACTORY METALS c26
J. T. Harding, R. H. Tuffias, R. B. Kaplan, and Kurt Chandler (Air Force Rocket Propulsion Lab., Edwards AFB, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 181-187 refs (For primary document see N86-17380 08-20)
(Contract F04611-84-C-0043)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11/6

Ir, Rh, ZrO2 and HfO2 coatings were applied to Re, Nb, W and Mo structures by means of chemical vapor deposition, for the purpose of protecting the latter from oxidation at high temperature. Greatest success was achieved with iridium which forms an adherent coating which is effective to over 2000 C. Organometallics are used as starting compounds in the chemical vapor deposition process for the platinum group coatings. Work is in progress to coat the throats of moderate size rocket nozzles and to determine the degree of protection afforded. A design chart specifying the compatibility of the various coatings with the various substrates and the CVD process parameters peculiar to each is a major objective of this program. Author

N86-17400# Naval Weapons Center, China Lake, Calif.
LARGE-SCALE, COHERENT STRUCTURES AS DRIVERS OF RAMJET COMBUSTION INSTABILITIES
K. C. Schadow, J. E. Crump, V. A. Mahan, J. A. Nabity, K. J. Wilson, and E. Gutmark (Tel-Aviv Univ., Israel) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 189-202 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The relationship between flow instabilities and pressure oscillations was determined in nonreacting tests using hot-wire anemometry and combustion tests using high frequency response pressure transducers. Circular and triangular inlet ducts were studied. The preferred mode of the ducted circular jet determined the acoustic frequency which was excited during combustion. At a low preferred mode frequency (150 Hz), the bulk mode of the combustor was excited; at a higher frequency (1150 Hz) the first or second longitudinal mode of the combustor was dominant. In the triangular-inlet duct tests, the coherence and preferred mode energy were reduced. The effect on combustion instability is being studied. Author

N86-17401# United Technologies Corp., San Jose, Calif.
THRUST MEASUREMENTS FOR RAMJET PERFORMANCE DOCUMENTATION
G. F. Stromberg and R. W. King *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 203-211 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The current trend toward the development of high performance ramjet engines with swirl or nonuniform flow has led to an increased reliance on thrust measurements. Accurate thrust measurements are required because of the difficulty in obtaining combustor pressure measurements for non-uniform or swirling flow that are reliable for documenting engine performance. As a result, considerable attention has been given to the thrust measurement techniques that are used in ramjet test stands. The design philosophy that was used to develop the ramjet thrust measurement systems is presented and documentation of their accuracy is provided. Author

N86-17402# Lawrence Livermore National Lab., Calif.
INITIAL RESULTS FOR THE FAILURE STRENGTH OF A LOVA GUN PROPELLANT AT HIGH PRESSURES AND VARIOUS STRAIN RATES c28
Marc Costantino and Donald Ornellas *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 213-227 Sponsored in part by Army (For primary document see N86-17380 08-20)
(Contract W-7405-eng-48)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

The initial results for the failure strength of a LOVA gun propellant at high pressures and various train rates is presented. Right circular cylinder samples are loaded hydrostatically to pressures of up to 400 MPa (60,000 Psi) then, holding this confining

pressure constant, an additional axial load is applied to create a shear stress. Shear stress as a function of axial strain is measured and values at 3% and 5% axial strain are reported at strain rates of .0001, .01, .1, and 1000/s .0001/s at various confining pressures to 400 MPa. The strenght at .0001/s increases by more than a factor of six over 400 MPa with an increasing slope. Similar rates of increase are found for strain rates of .01 and .1/s. At 0.1 MPa confining pressure, the strength increases by almost a factor of 5 as the strain rate increases from .01 to 2.6(1000)/s. The implications of these data to gun propellant grain design and the vulnerability of LOVA propellants are discussed. Author

N86-17403# Martin Marietta Aerospace, New Orleans, La.
SHUTTLE DERIVED UNMANNED LAUNCH VEHICLE c15
D. N. Buell and J. R. Tewell *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 229-236 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/2

An unmanned launch vehicle derived using existing Space Transportation System (STS) components was studied. The vehicle incorporates a standard STS external tank and solid rocket boosters, a new payload module and a recoverable propulsion/avionics module housing the high cost avionics and propulsion systems. The main propulsion system is a cluster of three STS space shuttle main engines compatible with the STS launch pad. The orbital maneuvering system utilizes components and the reaction control system incorporates modified STS primary and vernier thrusters. A solid rocket propulsion system made up of six motors having a two second burn time is incorporated for decelerating the recoverable propulsion/avionics module to a soft landing. The sidemount shuttle derived launch vehicle can carry 147,000 pounds to a 150 nautical mile circular orbit from the Eastern Test Range of 104,000 pounds from the Western Test Range. With Centaur G-prime the payload capability to geosynchronous Earth orbit is 24,5000 pounds. Performance with an optimized upper stage and a stretched external tank was also investigated. Author

N86-17404*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CYCLIC STRUCTURAL ANALYSES OF ANISOTROPIC TURBINE BLADES FOR REUSABLE SPACE PROPULSION SYSTEMS
J. M. Manderscheid and A. Kaufman *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 237-245 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Turbine blades for reusable space propulsion systems are subject to severe thermomechanical loading cycles that result in large inelastic strains and very short lives. These components require the use of anisotropic high temperature alloys to meet the safety and durability requirements of such systems. To assess the effects on blade life of material anisotropy, cyclic structural analyses are being performed for the first stage high pressure fuel turbopump blade (HPFTB) of the space shuttle main engine (SSME). The blade alloy is directionally solidified MAR-M 246 alloy. The analyses are based on a typical test stand engine cycle. Stress-strain histories at the airfoil critical location are computed using the MARC nonlinear finite element computer code. Author

N86-17405*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED RESEARCH AND TECHNOLOGY PROGRAM FOR ADVANCED HIGH PRESSURE OXYGEN-HYDROGEN ROCKET PROPULSION
S. J. Marsik and S. F. Morea (NASA. Marshall Space Flight Center, Huntsville, Ala.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 247-256 refs Previously announced as N85-21231 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A research and technology program for advanced high pressure oxygen-hydrogen rocket propulsion technology is presently being pursued by the National Aeronautics and Space Administration (NASA) to establish the basic discipline technologies, develop the analytical tools, and establish the data base necessary for an orderly evolution of the staged combustion reusable rocket engine. The need for the program is based on the premise that the USA will depend on the Shuttle and its derivative versions as its principal Earth-to-orbit transportation system for the next 20 to 30 yr. The program is focused in three principal areas of enhancement: (1) life extension, (2) performance, and (3) operations and diagnosis. Within the technological disciplines the efforts include: rotordynamics, structural dynamics, fluid and gas dynamics, materials fatigue/fracture/life/ turbomachinery fluid mechanics, ignition/combustion processes, manufacturing/ producibility/nondestructive evaluation methods and materials development/evaluation/ An overview of the Advanced High Pressure Oxygen-Hydrogen Rocket Propulsion Technology Program Structure and Working Groups objectives are presented with highlights of several significant achievements. Author

N86-17406# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
NONINTRUSIVE SHAFT SPEED SENSOR c35
S. Barkhoudarian and L. Wyatt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 257-269 refs (For primary document see N8-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 14/2

A computerized literature search on nonintrusive/noncontacting speed sensing technologies was performed, resulting in 550 abstracts and 42 articles. Fourteen techniques were identified and theoretically analyzed, resulting in the recommendation of the Microwave, Infrared, and Magnetic technologies for experimental evaluation. Test results with a novel magnetic approach, consisting of a permanent magnet placed on the rotating shaft and a pickup coil placed on the housing, indicated detection of a strong signal from 3.5 inches at the lowest required speed (600 rpm), through a 1.75-inch thich Inconel plate. Test results with microwave and infrared speed sensing approaches indicated transmission of sufficient microwave and infrared energy for detection even through heavily bubble-laden water (15 percent cavitation). Although all three techniques demonstrated feasibility, the magnetic sensor was recommended for preliminary design, which indicated no technical obstacles. Author

N86-17407*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OXYGEN/HYDROCARBON COMBUSTION DEVICES TECHNOLOGY
C. R. Bailey *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 271-280 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A program was conducted to investigate ignition, combustion and heat transfer characteristics of liquid oxygen and RP-1 fuel applicable to large gas generator cycle booster engines. The program was part of a broad effort intended to generate a combustion devices technology base for both RP-1 and methane fuels and both gas generator and staged combustion engine cycles. Two gas generator injector designs were tested over a chamber pressure range of 1500 to 2300 R. Both configurations were evaluated for combustion efficiency, gas temperature profile and combustion stability. Thrust chamber firings were conducted using a platelet type main injector and a water cooled calorimeter combustion chamber. Test conditions ranged from 1700 to 2200 psia chamber pressure and from 2.0 to 2.8 mixture ratio. A program goal to reduce previously measured nozzle heating rates was achieved, but at the expense of combustion efficiency. Author

N86-17408*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED SEALS FOR LIQUID OXYGEN (LOX) TURBOPUMPS c37
W. Shapiro, R. Hamm, and J. A. Hemminger (NASA. Lewis Research Center, Cleveland, Ohio) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 281-290 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23260)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11A

Reliability, life and vehicle pay load can be enhanced by improved seals on space vehicle propulsion systems. Development of two types of fluid-film seals for application to advanced LOX turbomachines are summarized. The first is a floating ring, helium buffered seal whose function is to exclude intrusion of liquid oxygen (LOX) into the turbine drive. The other is a spiral groove, LOX, face-type configuration designed to break down pressure and minimize leakage of LOX. The Rayleigh-step, floating ring gas seals require low clearances to minimize leakage and stiff films to assure tracking excursions of the rotor and to overcome Coulomb friction between the rings and housings. The design and test results of these buffer seals are described. Results indicate significant performance improvement over seals used on contemporary engines. The possibilities of reducing helium storage requirements and thus increasing payload appear promising. A unique configuration of spiral groove LOX seal was required to avoid detrimental vaporization in the flow path. It was found that fluid turbulence and inertia influence groove geometry and in particular groove depth must be much greater than spiral groove seals using conventional fluids. Author

N86-17409# Department of Transportation, Washington, D. C. Office of Commercial Space Transportation.
REGULATORY ASPECTS OF COMMERCIAL, SPACE TRANSPORTATION c16
H. R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 291-297 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22/1

Expendable launch vehicles (ELV's), developed and constantly improved over more than two decades, represent a major national investment and resource needed to ensure continued U.S. leadership in this technology. The policy background preceding P.L. 98-575, The Commercial Space Launch Act, giving the Secretary of Transportation exclusive authority to issue licenses for commercial space launches and launch operations, is reviewed. The launch license process developed to implement the licensing of commercial launch sites, a more complex issue in the preliminary planning stage, is briefly discussed. The central issues involved in setting liability insurance levels for damage caused to persons or property by this commercial space activity, as required by the Act, are summarized. Thus, the framework for a regulatory environment which facilitates growth of this new industry is well underway. Author

N86-17410*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CLOSE-IN CHARACTERISTICS OF LH2/LOX REACTIONS
W. A. Riehl and L. J. Ullian (Eastern Space and Missile Command, Florida) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 299-308 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21I

In deriving shock overpressures from space vehicles employing LH2 and LOX, separate methods of analyses and prediction are recommended, as a function of the distance. Three methods of treatment are recommended. For the Far Field - where the expected shock overpressure is less than 40 psi (lambda = 5) - use the classical PYRO approach to determine TNT yield, and employ classical ordnance (Kingery) curve to obtain the overall value. For the Close-In Range, a suggested limit is 3D, or a zone from a distance of three times the tank diameter to the tank wall. Rather than estimate a specific distance from the center of explosion to the target, it is only necessary to estimate whether this could be within one, two, or three diameters away from the wall; i.e., in the 1, 2, or 3D zone. Then assess whether mixing mode is by the PYRO CBGS (spill) mode or CBM (internal mixing) mode. From the zone and mixing mode, the probability of attaining various shock overpressures is determined from the plots provided herein. For the transition zone, between 40 psi and the 3D distance, it is tentatively recommended that both of the preceding methods be used, and to be conservative, the higher resulting value be used. Author

N86-17411*# National Aeronautics and Space Administration. Johnson (Lyndon B.) Space Center,
COMPUTER SIMULATION OF ENVIRONMENTAL, HAZARD SCENARIOS IN SPACE c61
Robert H. Brown *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 309-319 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 09B

The development of the Advanced Computer Graphics Laboratory at NASA/JSC will enable NASA engineers to utilize state-of-the-art computer systems to simulate and analyze current and planned space missions. These systems utilize computer graphics to animate automated satellite rendezvous and docking, satellite servicing, tether operations, as well as remote manipulator activities and assembly of large space structures including the space station. These computer simulations enhance the engineering evaluation of possible hazardous scenarios in space by allowing users to view from any point in space these activities and determine if any potential problem could occur. Author

N86-17412# Arde, Inc., Mahwah, N.J.
REPORT ON KEVLAR -49 COMPOSITE PRESSURE VESSEL SAFETY TECHNOLOGY PROGRAM c39
D. Gleich *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 321-332 refs (For primary document see N86-17380 08-20)
(Contract F08606-84-C-0029)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

The objective of the program is to define the conditions under which a Kevlar -49 fiber overwrapped metal liner prestressed composite (PSC) tank used for high pressure gas storage fails safe if the metal liner suddenly ruptures during operation. Two sudden metal liner failure modes are investigated; liner unstable brittle crack growth/rupture and ductile, stable crack growth (leak before burst) failure mode. The PSC tankage studied is Kevlar -49 fiber overwrapped cryoformed 301 CRES spherical pressure vessels. The cryoformed 301 CRES liner selection is for convenience. The program output will relate to any liner material. Liner failure modes are defined and failure predictions under operating pressure load are made based on tankage dynamic response computer program calculations presuming a 2 percent fiber strain failure threshold. Full scale (16 inch diameter) and 10 inch diameter subscale spherical pressure vessels are tested. The sudden brittle liner failure mode is experimentally achieved by intentionally embrittling the liner by charging it with hydrogen gas for an extended time period and then subjecting it to operating pressure load. The ductile leak before burst, liner failure mode is induced by EDM machining defects in the liner inside surface and then operating pressure cycling it to produce crack wall break through and leak. Author

N86-17413# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
IMPROVED SPACE MOTOR DEMONSTRATION
R. J. Hall *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 333-343 (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

Improved payload performance may be available from existing space motors by virtue of technology retrofits within the basic design envelope of the existing motor. This approach was used to refit existing IUS SRM-2 inert hardware and demonstrate by test, technologies which, if applied to both stages of IUS, would result in a 17% payload capability increase. The primary design improvements relative to IUS which contributed to the performance increase in the Improved Space Motor (ISM) demonstration were the use of a higher energy propellant, a higher volume fraction grain design and a nozzle mounted consumable igniter. In addition, other technology and design improvements, applicable to the IUS and INTELSAT VI motor programs, were demonstrated. The ISM test results and the demonstrated improvements are reported.

Author

N86-17414# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

ROCKET MOTOR SLAG FORMATION. EFFECTS OF INTERNAL FLOW FIELD AND PROPELLANT GRAIN CONFIGURATION

V. E. Haloulakos *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 345-356 refs (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

A series of specific solid propellant rocket motors are evaluated and their slag mass accumulation potential assessed when operating in strong acceleration environments. It is shown that the configuration of the propellant burning surface during the last 10 seconds of burning has a very strong effect on slag formation. Motors with front-end burning grains at burnout have maximum slag retention potential whereas motors with the grain burning inside potential slag pockets, e.g., the buried nozzle cavities, do not accumulate any slag. The effects of the internal flow field are significant since they are the direct result of the grain configuration. It is concluded that if slag is a problem, then selective grain design will tend to minimize it or to eliminate it completely. Author

N86-17415# United Technologies Corp., San Jose, Calif. Chemical Systems Div.

IUS PROPULSION STATUS

Charles A. Chase and Douglas A. North *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 357-374 Previously announced in IAA as A84-40240 Prepared in cooperation with Boeing Aerospace Company, Seattle, Wash. (For primary document see N86-17380 08-20)

(Contract F04701-C-0040)

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On April 4, 1983 the second Inertial Upper Stage (IUS) flight vehicle was carried into low Earth orbit by the Shuttle Transportation System (STS-6). The first stage (SRM-1) successfully completed its mission to carry the IUS vehicle and TDRS payload to geosynchronous transfer orbit. However, during the second stage (SRM-2) burn an uncommanded change in thrust vector occurred which placed the TDRS into an incorrect orbit. The flight anomaly initiated an extensive investigation to establish the cause and corrective action. This paper addresses each phase of the investigation, including: (1) review of available flight data; (2) development of a fault tree; (3) evaluation of possible causes; (4) results of supporting analytical and component test efforts; (5) resulting enhanced design, processing, and acceptance test requirements; and (6) the motor test program that was initiated to verify analytical models of the design and establish the confidence needed to proceed with future flights. The results to date show that: (1) the most probable cause has been identified, (2) the analysis models have been verified via two full-scale motor firings, (3) all corrective actions have been initiated, (4) new flight hardware is in fabrication, and (5) the final confirmatory motor tests are being readied to complete the investigation/corrective action sequence of events.

Author

N86-17416*# General Dynamics/Convair, San Diego, Calif.

ORBITAL TRANSFER VEHICLE ENGINE INTEGRATION STUDY

W. J. Ketchum *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 375-382 Prepared in cooperation with Aerojet Techsystems Co., Sacramento, Calif. (For primary document see N86-17380 08-20)

(Contract NAS3-23772)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Industry studies were undertaken to establish the technology base for an advanced engine for Orbital Transfer Vehicles for mid-1990s IOC. This paper presents the results of a study conducted by General Dynamics Convair Division, under contract to Aerojet TechSystems Company for NASA-LeRC, to define requirements, interface conditions, and operational design criteria for new LO2/LH2 propulsion systems applicable to future Orbit Transfer Vehicles, and to assess the impacts of space basing, man rating, and low-g transfer on propulsion system design requirements. The primary study emphasis was to determine what the OTV engine thrust level should be, how many engines are required on the OTV, and how the OTV engine should be designed. This was accomplished by evaluating planned OTV missions and concepts to determine the requirements for the OTV propulsion system, conducting tradeoffs and comparisons to optimize OTV capability, and evaluating reliability and maintenance to determine the recommended OTV engine design for future development.

Author

N86-17417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

RADIATION EXPOSURE AND PERFORMANCE OF MULTIPLE BURN LEO-GEO ORBIT TRANSFER TRAJECTORIES c13

Sol H. Gorland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 383-389 refs Previously announced as N85-21228 Sponsored in part by NASA (For primary document see N86-17380 08-20)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Many potential strategies exist for the transfer of spacecraft from low Earth orbit (LEO) to geosynchronous (GEO) orbit. One strategy has generally been utilized, that being a single impulsive burn at perigee and a GEO insertion burn at apogee. Multiple burn strategies were discussed for orbit transfer vehicles (OTVs) but the transfer times and radiation exposure, particularly for potentially manned missions, were used as arguments against those options. Quantitative results concerning the trip time and radiation encountered by multiple burn orbit transfer missions in order to establish the feasibility of manned missions, the vulnerability of electronics, and the shielding requirements are presented. The performance of these multiple burn missions is quantified in terms of the payload and propellant variances from the minimum energy mission transfer. The missions analyzed varied from one to eight perigee burns and ranged from a high thrust, 1 g, acceleration, cryogenic hydrogen-oxygen chemical propulsion system for a continuous burn, 0.001 g acceleration, hydrogen, fueled resistojet propulsion system with a trip time of 60 days.

Author

N86-17418*# Martin Marietta Aerospace, Denver, Colo.

DESIGN OPTIMIZATION FOR A SPACE BASED, REUSABLE ORBIT TRANSFER VEHICLE c18

Larry Redd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 391-401 (For primary document see N86-17380 08-20)

(Contract NAS3-23858)

Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

Future NASA and DOD missions will benefit from high performance, reusable orbit transfer vehicles. With the advent of a space station, advanced engine technology, and various new vehicle concepts, reusable orbit transfer vehicles that provide significant economic benefits and mission capability improvements will be realized. Engine and vehicle design criteria previously have

lacked definition with regard to issues such as space basing and servicing, man-rating and reliability, performance, mission flexibility, and life cycle cost for a reusable vehicle. The design study described here has resulted in the definition of a reusable orbit transfer vehicle concept and subsequent recommendations for the design criteria of an advanced LO2/LH2 engine. These design criteria include number of engines per vehicle, nozzle design, etc. The major characteristics of the vehicle preliminary design include low lift to drag aerocapture capability, a main propulsion system failure criteria of fail operational/fail safe, and either two main engines with a high performance attitude control system for back-up or three main engines with which to meet this failure criteria. In addition, a maintenance approach has been established for the advanced vehicle concept. Author

N86-17419*# Boeing Aerospace Co., Seattle, Wash.
THE EFFECT OF ENGINE DESIGN CHARACTERISTICS ON ORBITAL TRANSFER VEHICLE PERFORMANCE c18
George R. Schmidt *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 403-411 refs (For primary document see N86-17380 08-20)
(Contract NAS8-36107)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 22B

The objective in maximizing performance for a space-based Orbital Transfer Vehicle (OTV) is to minimize the propellant required to successfully complete a given reference mission and thereby reduce launch and storage costs. Engine sizing studies were conducted which examined the effect of engine design characteristics on the total propellant required to accomplish the manned and unmanned OTV missions anticipated for the 1995 to 2010 time period. Two propellant combinations, O2/H2 and N2O4/MMH, were selected as baselines. Exotic combinations such as F2/H2 and O2/CH4 were also studied to identify potential benefits and growth capabilities. Parametric results showing the effects of engine thrust, number of engines, nozzle area ratio and payload requirements are presented for various reference missions. The results indicate that the optimum engine size and thrust are not significantly affected by detailed engine design characteristics. Author

N86-17420*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE STATION ADVANCED PROPULSION AND FLUID MANAGEMENT PROGRAM
R. J. Richmond and L. W. Jones *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 413-421 ref Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

In preparation for the development of a manned space station program of advanced technology and development to make new advanced propulsion options available for the initial space station in the 1990's is described. This paper reviews the objectives of the advanced technology and development program in propulsion, describes its origin and how it relates to the forthcoming development program. The advanced propulsion and fluid management systems to be investigated in the program are discussed along with the rationale for their selection. Finally, the systems test program is discussed. Author

N86-17421# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SPACE STATION PROPULSION APPROACHES AND TECHNOLOGY STATUS
S. A. Evans, J. M. Shoji, W. R. Bissell, K. N. Watts, and J. Graetch *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 423-433 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The space station places new demands upon propulsion in terms of component life times, maintenance ease, refill, reuse, and potential interaction with other on-board systems. Interaction with other systems can be active such as integration with the environmental control/life support system for fluid supply or passive such as the contamination created by thruster exhausts. The wide range of potential candidate approaches to space station propulsion are discussed from monopropellants to oxygen/hydrogen. Component requirements and technology status are evaluated for key components such as pumps, motor, thermal beds, and resistojets. Major issues such as in-space refill are summarized. Author

N86-17422*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE O SUB 2/H SUB 2 PROPULSION MODULE FOR PLANETARY SPACECRAFT INJECTION ENERGY AUGMENTATION
B. A. Palaszewski *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 435-443 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

A propulsion module to augment the Centaur G-Prime and the Aerobraked OTV (AOTV) injection energy (C sub 3) was studied. The characteristics and performance of a variety of Earth-storable and cryogenic propulsion systems are presented. A pump-fed, cryogenic O2/H2 propulsion system enables the elimination of a three-year delta V Earth gravity assist (delta VEGA) maneuver for several planetary missions currently under consideration by the NASA. This trip time reduction can significantly reduce mission support costs, reduce spacecraft (S/C) life requirements and potentially increase the probability of mission success. This study also shows that an O2/H2 propulsion module, developed for Centaur C sub 3 augmentation can be used with a space-based AOTV in the return mode, allowing the reuse of the high-value AOTV while still delivering the required high-injection energy for direct planetary missions. The propulsion module performance was estimated for a space shuttle delivery capability to LEO of 65,000 lb sub m and 75,000 lb sub m. The required minimum thrust level to minimize gravity losses was also determined. For several currently planned NASA planetary missions, the Centaur G-Prime injection energy is augmented by a delta VEGA maneuver. For these missions, direct injection by the Centaur cannot provide a shorter trip time than the delta VEGA injection trip time. Author

N86-17423*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR THERMAL PROPULSION FOR PLANETARY SPACECRAFT
J. C. Sercel *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 445-456 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

Previous studies have shown that many desirable planetary exploration missions require large injection delta-V. Solar Thermal Rocket (STR) propulsion, under study for orbit-raising applications may enhance or enable such high-energy missions. The required technology of thermal control for liquid hydrogen propellant is available for the required storage duration. Self-deploying, inflatable solar concentrators are under study. The mass penalty for passive cryogenic thermal control, liquid hydrogen tanks and solar concentrators does not compromise the specific impulse advantage afforded by the STR as compared to chemical propulsion systems. An STR injection module is characterized and performance is evaluated by comparison to electric propulsion options for the Saturn Orbiter Titan Probe (SOTP) and Uranus Flyby Uranus Probe (UFUP) missions. Author

N86-17424# Rocket Research Corp., Redmond, Wash.
ANALYSIS OF ELECTRIC PROPULSION CONCEPTS FOR NEAR-TERM MISSION APPLICATION
W. W. Smith and S. C. Knowles *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 457-467

refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/3

A study of near-term mission application of three electric propulsion technologies has been conducted. Surveys of existing and projected electric propulsion capabilities including system mass, power level, Isp and efficiency were utilized. Space system requirements for the next 10 years for stationkeeping, orbit transfer and orbit maneuvering were used to support mission analysis comparison. The three systems considered were the arcjet, inert gas ion and pulsed plasma thrusters. Propellants considered for arcjet systems included H2, NH3 and N2H4. Stationkeeping applications were compared on the bases of system mass, power requirements, duty cycles, and thruster lifetime. Orbit transfer applications comparison included STS lift capability and trip-time requirements. The results showed that arcjet systems provided the most effective means of meeting near-term low to moderate thruster requirements. Pulsed plasma thruster systems must be increased in thrust from the existing 1-mlbf thrust level to a minimum of 10-mlbf thrust level to perform stationkeeping of 5,000 lbm + satellites. Ion systems were found to have several limitations including high inert mass, very low thrust density and long lifetime requirements. Author

N86-17425*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VACUUM CHAMBER PRESSURE EFFECTS ON THRUST MEASUREMENTS
James S. Sovey, Paul F. Penko, Stanley P. Grisnik, and Margaret V. Whalen *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 469-474 refs Previously announced as N85-21259 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Tests were conducted to investigate the effect of vacuum facility pressure on the performance of small thruster nozzles. Thrust measurements of two converging-diverging nozzles with an area ratio of 140 and an orifice plate flowing unheated nitrogen and hydrogen were taken over a wide range of vacuum facility pressures and nozzle throat Reynolds numbers. In the Reynolds number range of 2200 to 12,000 there was no discernable viscous effect on thrust below an ambient to total pressure ratio of 1000. In nearly all cases, flow separation occurred at a pressure ratio of about 1000. This was the upper limit for obtaining an accurate thrust measurement for a conical nozzle with an area ratio of 140. Author

N86-17426*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPATIBILITY EXPERIMENTS OF FACILITIES, MATERIALS, AND PROPELLANTS FOR ELECTROTHERMAL THRUSTERS
Margaret V. Whalen, Stanley P. Grisnik, and James S. Sovey *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 475-484 refs Previously announced as N85-21260 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21H

Experiments were performed to determine the compatibility of materials and propellants for electro-thermal thrusters. Candidate propellants for resistojet propulsion include carbon dioxide, methane, hydrogen, ammonia, and hydrazine. The materials being examined are grain stabilized platinum for resistojets for space station and rhenium for high performance resistojets for satellites. Heater mass loss and deterioration of materials were evaluated. A coiled tube of platinum, with yttria dispersed throughout the base material to inhibit grain growth, was tested in carbon dioxide at 1300 C for 2000 hr. Post-test examination indicated the platinum-yttria heater would last over 100,000 hr with less than 10 percent mass loss. Short-term compatibility tests were conducted to test the integrity of the platinum-yttria in hydrogen, methane, carbon dioxide/methane mixtures and ammonia environments. In each of these 100 hr tests, the platinum-yttria mass change indicated a minimum coil life of 100,000 hr. Facility related effects were investigated in materials tests using rhenium heated to high temperatures. Vacuum facility water reduction was monitored using a mass spectrometer. In vacuum environments obtained using only diffusion pumping and those obtained with the assistance of cryogenic equipment there were mass gains in the rhenium heaters. These mass gains were the result of the high amount of oxygen and water contained in the gas. Propellant purity and preferred test facility environments are discussed. G.L.C.

N86-17427*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THERMAL ARCJET TECHNOLOGY FOR SPACE PROPULSION
T. J. Pivirotto and D. Q. King *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 485-494 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

Advanced space propulsion systems are required to meet projected Air Force needs through the year 2000. Most of these missions require a large, on-orbit impulse capability. High specific impulse (I sub sp) electric engines can provide this impulse while consuming relatively little propellant. An arcjet engine system, which operates in the range of 800 to 2000 s I sub sp, is a promising candidate to meet these projected Air Force mission needs. This electric propulsion system is ideally suited to missions currently under consideration, such as the Space-based Radar and other space platforms, because sufficient power is already installed for other functions on the spacecraft. Also, arcjet systems are attractive for NASA near-term, low-cost Mariner Mark II missions to Saturn and Uranus. Development of arcjet engines was an Air Force and NASA-sponsored activity that proceeded vigorously from its inception during the late 1950's up to the mid-1960's when the programs were terminated. This paper describes thermal arcjet technology as it was developed over two decades ago and points to the direction this technology development should proceed in the future. In particular, operation with storable propellants such as ammonia and hydrazine are considered. The performance, applicability and advantages of these systems in terms of increased payload and/or decreased trip times are discussed. Author

N86-17428# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SOLAR THERMAL ROCKET DESIGN AND FABRICATION
James M. Shoji, Irving Kaith, and Albert G. Pard *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 495-508 refs (For primary document see N86-17380 08-20)
(Contract F04611-80-C-0039)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/3

One potentially attractive propulsion concept offering significant payload gains for Low Earth Orbit (LEO) to higher orbits is solar thermal propulsion. Various solar thermal propulsion concepts have been evaluated and the windowless heat exchanger cavity concept was selected as the most viable near-term concept that could be used for proof-of-principle testing. A high performance ground test absorber/thruster design utilizing currently available materials and fabrication techniques was established, and detailed design drawings prepared. Due to the high temperatures involved, refractory metals such as rhenium, tungsten, molybdenum, and tantalum were required and presented challenges in fabrication and material joining. The material fabrication processes for these materials are in their infancy and require evaluation and development. The ground test absorber/thruster has been successfully fabricated and represents the first fully integrated solar rocket. Author

N86-17429*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

MICROWAVE ELECTRIC PROPULSION FOR ORBIT TRANSFER APPLICATIONS
Joel C. Sercel *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 509-518 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21C

A Microwave Electric Propulsion (MEP) concept is developed for an unmanned Orbit Transfer Vehicle (OTV). The concept is based on the use of beamed microwave power and on an extrapolation of ion thruster technology. Beamed microwave power transmission is discussed in terms of its relationship to spacecraft propulsion. Characteristics of an MEP OTV are determined and performance is evaluated by comparison to a variety of alternative propulsion systems for the completion of a ten-year mission model. Author

N86-17430*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
EXPLOSIVE DECOMPOSITION OF HYDRAZINE DUE TO RAPID GAS COMPRESSION c25
O. Briles (Sundstrand Corp., Rockford, Ill.), D. Hagemann (Sundstrand Corp., Rockford, Ill.), F. Benz, and T. Farkas (Rockwell International Corp., Downey, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 519-525 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 07C

Results from tests which attempt to determine conditions which cause explosive decomposition of hydrazine from rapid gas compression are described. Hydrazine was initiated by pressure in combination with shock waves from the pressurant gas. A new test method was developed at the White Sands Test Facility which subjects a gas bubble in contact with liquid hydrazine to pure adiabatic compression. Results from this new test method are compared to those from the U-tube method. Author

N86-17431# Ford Aerospace and Communications Corp., Palo Alto, Calif. Propulsion Engineering.
FLIGHT EXPERIENCE WITH AN INTEGRATED BIPROPELLANT PROPULSION SYSTEM: INSAT 1
Victor A. Moseley *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 527-531 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/8

The INSAT 1 communications, broadcast, and weather satellite was the first spacecraft program to utilize a fully integrated nitrogen tetroxidemonomethylhydrazine propulsion system to accomplish all propulsive maneuvers after injection into orbit. Two satellites in this series have been launched and a third is scheduled to fly on STS Mission 61H in 1986. The integrated bipropellant propulsion system was selected because its high performance and flexibility provided the needed mass capacity for the payloads within the constraints of Delta/PAM-D and STS/PAM-D launch vehicles. This propulsion concept has met all expectations, and has introduced mission options which provide increased overall performance and reliability. This paper provides an update of INSAT 1 flight experience and discusses lessons learned during the past three years of INSAT 1 flights. Author

N86-17432# European Space Agency, Paris (France).
PROCEEDINGS OF ESA SESSIONS AT THE 16TH IEEE ANNUAL POWER ELECTRONICS SPECIALISTS CONFERENCE
W. R. Burke, comp. May 1985 339 p refs In ENGLISH and FRENCH Conference held in Toulouse, France, 24-28 Jun. 1985 (ESA-SP-230; ISSN-0379-6566) Avail: NTIS HC A15/MF A01

Spacecraft power supplies; power converters and inverters; power system simulation; battery and solar array systems; power equipment; high voltage power systems; and power unit simulation were discussed. For individual titles, see N86-17433 through N86-17469.

N86-17433# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
MARECS AND ECS: THE FIRST FEW YEARS IN ORBIT
P. Leggett *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 1-10 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The MARECS/ECS power subsystem, and its in-orbit performance are described. The MARECS A, MARECS B2 and ECS 1 and 2 spacecraft have basically the same power subsystem and from the viewpoint of delivery of power to the users all perform in a totally nominal way. The bus voltage shows no tendency to drift and the loss of array sections does not disturb system operation. The modularity and redundancy incorporated in the power system enable an uninterrupted flow of regulated power to be maintained to users in spite of anomalies encountered on MARECS A. Modifications incorporated on subsequent spacecraft avoided the problems of MARECS A. The solar arrays appear to be degrading at a rate less than the typical values estimated and the batteries are now all controlled by an ampere hour technique which should provide a long lifetime for the power subsystem. Author (ESA)

N86-17434# MATRA Espace, Toulouse (France).
THE TELECOM 1 POWER SUBSYSTEM FROM DESIGN TO FLIGHT
H. Barde *In* ESA Proceeding of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 11-15 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The unregulated power subsystem of Telecom 1 is presented. Primary power is provided by a solar array. Solar array Sun tracking is ensured by the Bearing And Power Transfer Assembly (BAPTA) driven by the solar array drive electronics. Solar array power is routed on board through the BAPTA sliprings, where a diode network generates two main buses and a Sun bus, which is not battery supported during eclipse. Secondary power is derived from two NiCd batteries, each dedicated to a main bus. On sunlight, the batteries are not connected to the buses, hence the operating point is defined only by the solar array characteristic and spacecraft load. The power management unit houses the functions of battery connexion/disconnexion, battery charge and reconditioning, solar array power triming and power subsystem telemetry. A battery control unit ensures battery and cell voltage monitoring, as well as battery protection by end of charge and end of discharge signal generation. Author (ESA)

N86-17435# AEG-Telefunken, Wedel (West Germany).
ALTERNATING CURRRENT BUSES FOR LOW EARTH ORBITS: A VIABLE ALTERNATIVE
Gert Eggers *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 17-25 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The merits of ac buses as complements for large dc systems of space stations are outlined. Wave shapes for systems with frequencies around 400 Hz (as on Spacelab) are considered. When distribution losses are minimized, sinus represents the optimum for linear loads; square-waves for nonlinear (rectifier) loads. Square-waves which do not contain third harmonics can be used in three-phase systems. However, relations between phase and interlinked voltage are not as simple as for sinus. Due to filters not needed and modest rating of components, square-wave systems can be realized with minimum mass-impact and high efficiency. However, fast response to inrush currents and protection of switching semiconductors become difficult. The behavior of sinus systems can be easily predicted. If 3-phase 400 Hz systems are unacceptable because of mass impact, the multi-kHz range is recommended. Author (ESA)

N86-17436# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy). Space Div.
THE GIOTTO POWER SUPPLY SUBSYSTEM
E. Re *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 27-37 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The requirements and components of the Giotto power supply subsystem are described. Requirements are: transfer of electrical power between the solar array, the batteries, and spacecraft loads (including each experiment); main bus voltage control using shunt and battery discharge regulation; switching and protection electronics for the experiments, the heaters, and other spacecraft systems; transfer of power to the AOCMS, data handling subsystems, and the despin motor control electronics from dedicated converters; and provision of telecommand and telemetry functions to operate and monitor the system configuration and functioning. The major components are: power control unit; power distribution unit; four batteries; battery regulator units containing a battery discharge regulator and a battery charge regulator; data handling converter; service converter; and external power dumpers (dissipative elements of the shunt regulator). Author (ESA)

N86-17437# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE ERS-1 POWER SYSTEM
J. E. Haines, C. McCarthy, and A. Poncin (Etudes Techniques et Constructions Aerospatiales, Charleroi, Belgium) *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference dMay 1985 p 39-51 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The ERS-1 electrical power system is described. The power system is based on that of the SPOT platform and consists of a battery defined power bus together with a solar array shunt regulator able to control on battery recharge current and selectable end of charge voltage level. The system comprises a 2.1 kW beginning of life solar array, 4 parallel connected 24 Ahr batteries and a shunt regulator which effects the power control between the power source and energy storage system. The Power Distribution Unit (PDU) in the platform distributes power to the instruments via a second PDU integrated in the payload. Primary power is distributed by unregulated and regulated voltage power lines to the platform and payload users. Within the payload two high power buses exist, one dedicated to the high power amplifier of the Active Microwave Instrument, which requires a peak power of 1 kW, the other serves the remaining payload equipments. The platform consumes 300 W continuously. Author (ESA)

N86-17438# Centre National d'Etudes Spatiales, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.
DIGITAL STRUCTURE OF AN AUTOPILOTING FOR ASYNCHRONOUS MACHINE FED BY PULSE WIDTH MODULATION (PWM) CONVERTER
M. Grandpierre, M. Pietrzak-David, J. Faucher, and A. Habbadi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 55-60 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A digital command module for autopiloting an asynchronous, pulse width modulation (PWM) fed electric motor is described. The machine operates with variable frequency. It is shown that the presence of the microprocessor in the control structure greatly facilitates modulation modification to obtain the desired variation of the machine feeding voltage (PWM output). Test results demonstrate that appropriate operation of the system is assured in all four quadrants of the torque-speed plane (motor and generator operation). It can be used easily in the different applications of an autopiloted asynchronous machine as well as in speed variators and position control systems. Author (ESA)

N86-17439# Universidad Politecnica de Madrid (Spain). Dept. of Electronic Engineering.
MULTIPRIMARY WINDING INVERTER WITH LOW HARMONIC CONTENT
J. Carpio, M. Castro (Universidad Nacional de Educacion a Distancia, Madrid), S. Martinez (Universidad Nacional de Educacion a Distancia, Madrid), J. Peire, and F. Aldana *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 61-67 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A static power inverter design which features high efficiency, low distortion and low cost together with a wide protection range for domestic and solar applications is proposed. The prototype is a monophase static inverter with 24V dc battery input voltage and 220V ac output voltage, 50Hz frequency and 250VA output power. This inverter is based on an output multiprimary transformer which composes the output waveforms from four square waves delayed angle values, obtaining a total flux, which is the addition of all primary fluxes, in its secondary core. Total harmonic distortion is small, so output filtering is unnecessary. Author (ESA)

N86-17440# Selenia S.p.A., Rome (Italy).
A SYNCHRONIZED DC/DC CONVERTER FOR THE DATA TELEMETRY SYSTEM OF INTELSAT 6
Silvio Roccucci *In* ESA Proceedings of ESA Session at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 69-72 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A dc/dc converter with free running inverter was designed for the INTELSAT 6 data telemetry system. Synchronization of the inverter with feedback saturable transformer is achieved by forcing the transformer to operate in the same manner as the free-running inverter. The synchronization circuit consists of two transistors, two diodes, and a biasing and limiting resistor. The circuit is connected with a winding of the feedback saturable transformer. Tests show that the synchronization circuit meets specifications. Author (ESA)

N86-17441# Centre National d'Etudes Spatiales, Toulouse (France).
ANALYSIS OF A PARTICULAR WORKING MODE OF S3R TYPE REGULATOR
C Rouzies and P. Tastet *In*ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 73-81 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The over-commutation mode of an S3R type regulator (with series or shunt switches) is described. Its occurrence depends on payload power consumption when there is an integration in the regulation loop. In this mode several sections operate simultaneously and the form of the bus voltage ripple is modified. A theoretical study helped to simulate the phenomenon and to determine the level of power consumption inducing this behavior. Author (ESA)

N86-17442# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
SPACECRAFT ORBITAL POWER EVALUATION (SCOPE)
W. R. Duncumb and A. N. Casperd *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 85-92 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A FORTRAN program for analyzing the energy balance in a satellite power system during transfer orbit and other mission phases is presented. Piecewise integration is employed for computation of average battery current as the spacecraft spins, instead of calculus, to give full visibility of modeling techniques and provide data for plotting composite current and voltage waveforms. The program models a general power subsystems circuit which it solves for current, voltage and battery depth of

discharge at increments of spacecraft attitude and time. Flexibility, limitations and interpretation of results of the simulation method are discussed. Ways of defining battery capacity are explained to clarify the battery model. Author (ESA)

N86-17443# Lockheed Missiles and Space Co., Sunnyvale, Calif.
A NEW SMALL SIGNAL AC ANALYSIS TOOL FOR SPACE POWER SYSTEMS
J. E. Chen, J. C. Landi, L. M. Drablow, K. K. Saylors, and R. E. Corbett *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 93-99 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

An interactive, menu-driven computer program was developed to analyze the small signal performance of electrical power systems. The Small Signal AC (SSAC) program enables the analysis of an arbitrary power system configuration using generic components. A component may be specified in terms of canonical circuit parameters or by selecting the entire component from a library. New component models and empirical data can be incorporated in the SSAC analysis through the use of the general component options. The SSAC program computes bus impedances, two-port parameters, loop gains, and small signal transient responses. Author (ESA)

N86-17444# Shanghai Transit Co. (China).
CALCULATION METHODS FOR SHORT-CIRCUIT CURRENTS IN THREE-PHASE BRIDGE RECTIFIER CIRCUITS c33
Fan Yuan-wu *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 101-103 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Matrix methods were used to calculate external short circuit currents in three-phase bridge rectifiers. Transient short circuit currents of rectifiers with dc reactances and resistances can be calculated using the matrix methods. Author (ESA)

N86-17445# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TEMPERATURE DERIVATIVE BATTERY CHARGE CONTROL c33
H. J. N. Spruijt *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 107-122 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A battery charge termination technique for NiCd batteries which is especially effective in low Earth orbit is presented. End of charge termination is based on the temperature increase at end of charge using the temperature derivative detection principle. This makes the end of charge termination practically insensitive to environmental temperature, depth of discharge, and solar array charge current fluctuation, and guarantees predictable battery voltages, long battery cycle life, and minimum thermal dissipation. It also requires 30% less charging power compared to the conventinal voltage-limited charging technique. Author (ESA)

N86-17446# Toulouse Univ. (France).
USE OF IMPEDANCE MEASUREMENTS TO MODEL NICKEL-CADMIUM BATTERIES [EMPLOI DE MESURES D'IMPEDANCE POUR LA MODELISATION DES ACCUMULATEURS NICKEL-CADMIUM] c33
M. Comtat, P. Delorme, F. Baron (ESA/ESTEC, Noordwijk, Netherlands), and A. Capel (Thomson CSF, Toulouse, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 123-128 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Impedance measurements were performed on nickel-cadmium cells over a frequency range from 0.001 to 10,000 Hz. Impedance diagrams are obtained using a galvanostatic mode for a quasi equilibrium state with a zero constant current intensity and a superimposed alternative current of small amplitude. The results for a battery charged and discharged under standardized conditions are presented. An equivalent electric circuit that best fits the experimental results is proposed. Author (ESA)

N86-17447# Toulouse Univ. (France).
IMPROVEMENT OF THE PROCESS FOR ELECTROCHEMICAL IMPREGNATION OF NICKEL HYDROXIDE ELECTRODES [AMELIORATION DU PROCEDE D'IMPREGNATION ELECTROCHIMIQUE D'ELECTRODES D'HYDROXYDE DE NICKEL] c33
M. Comtat, B. Lafage, and J. Leonardi (Societe SAFT, Bordeaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 129-133 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Nickel hydroxide electrodes containing 11g/dsqm hydroxide, with capacities of 3.6 to 3.8 Ah/dsqm were prepared at 353 K by electrochemical impregnation. The reproducibility of the results is obtained by readjusting the pH before each preparation. The control of each electrode is done during two cycles of charge and discharge following the manufacture by a potential relaxation method. Author (ESA)

N86-17448# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE RESULTS OF SOME END OF LIFE TESTS ON THE OTS BATTERY c33
P. Leggett, H. Lechte, and A. Sepers *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 135-143 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Behavior of the OTS battery in orbit and on the ground are compared. The end-of-life tests on the in-orbit battery are described. The battery shows no degradation after > 5 yr in orbit. During this period, the battery was operated with a low overcharge factor (1.02) during eclipse seasons. For the majority of the noneclipse period trickle charge was used. Prior to each eclipse season deep reconditioning to below 0.6 V/cell, following equalization of the cells with the support of the battery protection unit, was carried out. The DOD is moderate with 50%, but the thermal environment is more severe than foreseen. The apparent absence of capacity degradation is thought to be due to a combination of low overcharge strategy, regular deep reconditioning and trickle charge, and a large ratio of actual to nameplate capacity at beginning of life. Author (ESA)

N86-17449# British Columbia Univ., Vancouver. Dept. of Electrical Engineering.
PHOTOVOLTAIC ARRAY SIMULATION
G. Liu and W. G. Dunford *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 145-153 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Two approaches to the simulation of photovoltaic arrays are compared. The first involves the use of a pilot panel and variable light source. In the second, characteristic array curves are stored in the memory of a microprocessor-based simulator. For the first approach, a stability analysis based on Popov's method is presented. Experimental results are presented for both systems. Type 1 is suitable where a field test of a particular panel type is required, while type 2 is suitable for experiments demanding fixed irradiation and temperature levels for a period of time. The experimental results are satisfactory in terms of steady state accuracy and feasibility. The stability analysis program enables the parameters to be adjusted in the type 1 simulator to assume the stability of the system. Author (ESA)

N86-17450# MATRA Espace, Toulouse (France).
AN ALTERNATIVE FOR SATELLITE POWER DISTRIBUTION
P. Ranzoli and F. H. Pedersen (Christian Rovsing Ltd.) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power

Electronics Specialists Conference May 1985 p 157-163 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The electrical system tradeoffs which led to the use of an ac power distribution for HIPPARCOS are exposed. The inverter and the ac/dc modules using power FET's and synchronous rectification are described. Based on HIPPARCOS experience, conclusions are drawn at system level and a philosophy for future satellites is proposed. Author (ESA)

N86-17451# Technische Hochschule, Aachen (West Germany). Inst. fuer Stromrichtertechnik und elektrische Antriebe.
RECOVERY CIRCUIT FOR SNUBBER ENERGY IN POWER ELECTRONIC APPLICATIONS WITH HIGH SWITCHING FREQUENCIES c33
J. C. Bendien, H. vanderBroeck, and G. Fregien *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electron. Specialists Conf. May 1985 p 165-170 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A simple circuit to regenerate turn-on snubber energy stored in an inductor is demonstrated. The efficient use of this circuit is given, if a power switching device switches high currents at high frequencies. The additional voltage stresses on the switching device are limited. The energy regenerated can be transmitted to any voltage source, (dc-voltage link, battery, basedrive-supply). The problem of dissipated power in snubber circuits is considerably reduced. The isolating dc/dc converter (SOI) is very simple and reliable. It works automatically and is suitable for transmission of several kW power. For application in a battery powered electric road vehicle drive, an SOI was designed. Its rated power is 450 W. Measurements show an efficiency up to 86%. Author (ESA)

N86-17452*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGNING HIGH FREQUENCY ac INDUCTORS USING FERRITE AND MOLYPERMALLOY POWDER CORES (MPP) c33
W. T. McLyman and Albert P. Wagner *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 171-175 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The major considerations in the design of high frequency ac inductors are reviewed. Two methods for designing the inductor: the area product method and the core geometry method, are presented. The two major effects of the inductor air gap, fringing flux power loss and increase of inductance, are discussed. Equations for the inductor design and a step-by-step design procedure are given. The use of a lumped air gap or a distributed air gap are discussed and a comparison of the losses resulting from these gaps, together with experimental results are presented. Author (ESA)

N86-17453# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy).
THE 230W TRAVELING WAVE TUBE AMPLIFIER (TWTA) POWER SUPPLY DESIGN c33
A. Gasparini and A. Bonati *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 179-185 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The electronic power conditioner (EPC) design for 230W RF 12 GHz traveling wave tubes is presented. Bus and tube interface problems, the technological aspects versus the very severe environmental requirements, and the protection philosophy are discussed. The EPC has to handle very high power (600 W), to provide outputs voltages up to 7.5 kV, and to guarantee high stability of output parameters inside a very large operating temperature range (minus 35 to plus 70 C). Efficiency is 87%. Author (ESA)

N86-17454# Selenia S.p.A., Rome (Italy).
A 20 GHz/30 W TRAVELING WAVE TUBE AMPLIFIER (TWTA) FOR OLYMPUS TRANSPONDER c33
S. Roccucci, C. Sciangula, and D. Adirosi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 187-197 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The Olympus direct broadcast television satellite traveling wave tube amplifier (TWTA) system design considerations affected by the special load interface characteristics on the TWT are reviewed. The high voltage power circuits; high voltage components and design; technological problems in compounding high voltage sections, grounding, and isolation; TWTA performance characteristics, including fault protection, stability and regulation problems; mechanical problems, efficiency; and weight are discussed. The design meets 28 W, 5.5 deg/dB specifications. Author (ESA)

N86-17455# Alcatel Thomson Espace, Courbevoie (France).
APPLICATION OF CURRENT-CONTROL MODULATOR (MC2) CONTROL FEEDBACK FOR 12 GHz 20 W ELECTRIC POWER CONDITIONER (EPC) FOR TELECOM SATELLITE c33
J. P. Desne and C. Peyrotte *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 199-206 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

An electronic power conditioner (EPC) for a 12 GHz 20 W traveling wave tube amplifier (TWTA) was designed. The EPC requirements are summarized, and the electrical design, which used current-control-modulator control is described. A simulation model is proposed. The high-voltage transformer, and hybrid module are described. Interfacing problems caused by the TWT, such as current cathode regulation and switching behavior, are presented. Author (ESA)

N86-17456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF HIGH-VOLTAGE, HIGH-POWER, SOLID STATE REMOTE POWER CONTROLLERS FOR AEROSPACE APPLICATIONS c33
John C. Sturman *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 207-216 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Two general types of remote power controllers (RPC's), which combine the functions of a circuit breaker and a switch, were developed for use in dc aerospace systems. Power-switching devices used in the designs are the gate-turnoff thyristor (GTO) and MOSFET. The RPC's can switch dc voltages to 1200 V and currents to 1000 A. Seven different units were constructed and subjected to laboratory and thermal vacuum testing. Two of these were dual units that switch both positive and negative voltages simultaneously. The RPC's using MOSFET's have slow turnon and turnoff times which limit surge currents and voltage spiking from high di/dt. The GTO's have much faster transition times. All RPC's have programmable overload tripout proportional to I sq T and microsecond tripout for large overloads. Author (ESA)

N86-17457# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DISCHARGE DETECTION IN HIGH VOLTAGE FLIGHT HARDWARE c33
J. C. J. Eeman *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 217-222 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A Faint Object Camera simulation circuit was built for discharge tests in air and poor vacuum, to draw up proposals for use of discharge detection sensors with flight hardware. It is found that high voltage coaxial cables ending in a floating box do not behave the same for large discharges as for corona-like discharges.

The high currents in large discharges exhibit a low source impedance while corona-like discharges represent a higher impedance. Large discharges at atmospheric pressure cause cable reflections and high-voltage excursions of opposite polarity. Discharges in poor vacuum are much slower to build up and do not cause reflections. For flight hardware, logarithmic compression seems unavoidable and signal conditioning for adaption to telemetry inputs needs to be developed. The selection criteria for voltage or current sensors are highly dependent on the amount of capacitance in a system, and on the required sensitivity.
Author (ESA)

N86-17458# Rockwell International Corp., Cedar Rapids, Iowa.
AN ANALYTICAL INVESTIGATION OF CURRENT-INJECTED CONTROL FOR CONSTANT-FREQUENCY SWITCHING REGULATORS c33
Daniel M. Mitchell *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 225-233 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

State-space averaging and linearization are applied to the control law of current-injected, constant-frequency switching regulators, resulting in a bona fide two-loop system representation. As a theoretical goal, first-order behavior can be achieved with no right-half-plane zeroes. Actual performance may be limited by switching frequency interference considerations. Author (ESA)

N86-17459# Politecnico di Milano (Italy). Inst. of Nuclear Engineering.
EXACT CONTINUOUS MODELS OF PULSE WIDTH MODULATION (PWM) REGULATORS IN BOTH CONTINUOUS AND DISCONTINUOUS CONDUCTION MODES c33
P. Maranesi and V. Varoli *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 235-238 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A model for pulse width modulation voltage-regulator dynamics in which the circuit is assumed to be a linear time-variant system, and width-modulation action in the output filter is represented by a suitable set of impulse generators applied at each switching instant, is presented. Once the feedback-loop is open, the comb function of its characteristic response can be expressed by a recursive matrix relation; the latter is Fourier-transformed, achieving the continuous function G-loop. In the discontinuous conduction mode, the procedure directly provides an analytic expression. The model requires minimum computing resources and runs on personal computers. Author (ESA)

N86-17460# Hasler Ltd., Bern (Switzerland).
POWER SWITCHING CELL MODELING: AN EASY WAY c33
A. S. Kislovski *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 239-244 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The notion of controlled quantity and analysis of the nature of cell output voltage are used to derive a cell model. At low perturbation frequencies physical considerations produce a model dominated by the average injected current and the capacitance of the output capacitor; at high perturbation frequencies analogous considerations lead to a model including the discrete injected current and the impedance of the output capacitor. In this way a cell model with extended frequency validity is obtained. The mathematics utilized in obtaining it is not more complex than that needed for the fundamental low-frequency, small-amplitude model. The model is suitable for cell systematization, and computerized tabulation. Author (ESA)

N86-17461# Sperry Rand Corp., St. Paul, Minn.
MODELING AND IMPLEMENTATION OF A DIGITALLY CONTROLLED POWER CONVERTER USING DUTY RATIO QUANTIZATION
C. P. Henze and N. Mohan (Minnesota Univ., Minneapolis) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 245-255 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Discrete proportional-integral-differential (PID) control, driven from a sampling digital error amplifier, was used to generate a quantized duty ratio control signal to provide dynamic output voltage regulation for switching dc-to-dc power converters. Since the sampling frequency of the PID controller is equal to the switching frequency of the power converter, the digital controller may be used at different switching frequencies without recompensation. Digital techniques are used to provide output current limiting, soft-start, undervoltage lockout, overvoltage shutdown, and power master-clear indication. The digital circuitry of a complete power converter control system could then be packaged into a single device. Duty ratio quantization produces low frequency quantization noise in the output voltage of the power converter. Quantization noise in an 8-bit system is found to be 30 dB below the main harmonic of the switching ripple. Author (ESA)

N86-17462# International Business Machines Corp., Poughkeepsie, N.Y.
IMPROVING THE RESPONSE TIME OF A SWITCHING REGULATOR USING SENSIT AND DESIGN/ASTAP c33
John D. Page and Terrence R. Scott *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 257-270 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

Circuit stability and response, as measured by the phase margin, and the frequency of the zero dB crossing were written in a form suitable for ASTAP program so that their sensitivities with respect to the statistically specified elements and parameters could be calculated automatically and their corresponding best and worst combinations determined automatically. The same performance criteria were also used in DESIGN/ASTAP to systematically improve the response of the control circuitry of the switching regulator while maintaining its stability, i.e., its phase margin, at 45 deg. Author (ESA)

N86-17463# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
TIME DOMAIN ANALYSIS OF AN S3R SYSTEM c33
L. G. VandenBerghe *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 271-278 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A sequential switching regulator was analyzed in the time domain. Program TRACE was developed to model the control loop thus enabling the analysis of fundamental parameters, including ripple voltage limits, switching frequency, proportional loop gain, effects of loop delays; and response to step off loads. The wide variety of input parameters results in a flexible model for verifying S3R systems. It is a useful design tool for determining loop parameters during the initial stages of design. Author (ESA)

N86-17464# Societe Crouzet, Valence (France).
DESIGN AND DEVELOPMENT OF A CURRENT LIMITED SOLID STATE HYBRID SWITCH c33
C. Neveu and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 281-285 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The design and development of the first of a family of hybrid, low power, current limited, spacecraft power supply solid state switches is presented. The thermal protection technique ensures the FET temperature never exceeds a predetermined threshold level under steady state and transient power dissipation operating modes. The design concept of the switch is described and a test method using an infrared thermal imaging technique, and test

results which validate the concept are included. Solid state switch developments using this design concept are discussed.
Author (ESA)

N86-17465# Christian Rovsing Ltd., Copenhagen (Denmark).
DESIGN AND DEVELOPMENT OF A PYROTECHNIQUE ARMING AND FIRING UNIT c28
M. Heisel and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 287-293 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A nondissipative pyrotechnic system consisting of an arm and a fire module is designed. The arm module contains an arm circuit based on two N-channel FET transistors. The first FET transistor is used as a switch, and the other forms part of a buck converter, which performs voltage and current regulation. The current measurement in the positive line of the buck converter is performed by a DOD, based on a Hall-effect current sensor. An over current protection circuit, an over voltage protection circuit, and an input under voltage protection circuit are added to the arm circuit for redundancy and safety protection. The fire module contains a fire circuit based on two N-channel FET transistors. The two transistors are both used as switches. A time-delay circuit makes it possible to stagger the ignition of one pyrotechnic device from 0 to 50 msec in proportion to another, although they are controlled by the same fire telecommand. The duration of the fire pulse command is controlled by the pulse stretching circuit, and can be between 10 and 40 msec. Author (ESA)

N86-17466# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.
STUDY OF A RESONANT CONVERTER USING POWER TRANSISTORS IN A 25 kW X-RAY TUBE POWER SUPPLY c33
Y. Cheron, H. Foch, and J. Salesses (Thomson C.G.R., Issy-les-Moulineaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 295-306 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A converter to feed an X-ray tube (25 kW, 140 KV) from the industrial mains power supply (380 V, 50 Hz) is described. The generator consists of an inverter using power transistors and a transformer-voltage multiplier set connected by a series resonant circuit. The control logic of the transistors gives them the dual properties of those of thyristors. An analytical study of this system allows the characteristics of the converter to be predetermined.
Author (ESA)

N86-17467# Alcatel Thomson Espace, Toulouse (France).
INFLUENCE OF THE BUS REGULATION ON TELECOMMUNICATION SPACECRAFT POWER SYSTEM AND DISTRIBUTION c32
A. Capel and D. Sullivan (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 307-318 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

The power systems and the electrical distribution of geosynchronous telecommunication spacecraft are evaluated through 13 examples. Results show that the reduction of the bus voltage range is a determinant factor to improve the electrical and mass performances of the power system. For actual power levels, improvements = 25% for solar array mass and 7.6% for the complete power system mass, while the electrical efficiency increases by 13.8% in sunlight and 12.7% in eclipse. A 50 V regulated bus provides 6.76% efficiency improvement, considering only switching components, distribution constitutes 7%. For converter mass, analysis shows that the bulky components of pulse width modulation units are affected by an increase of 70% to 110% depending on sampling frequency when the input voltage is submitted to a variation from 26.5 to 42.5 V. Absence of regulation of the distributed voltage implies an oversizing of the solar array of 25%, to avoid lock up conditions. Author (ESA)

N86-17468# MATRA Espace, Toulouse (France).
A COMPUTER ANALYSIS TOOL FOR EVALUATION OF SOLAR ARRAY DESIGN c61
B. Fleux and J. Masson (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 319-323 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A computer tool for evaluating solar array design through definition and/or recall of input design parameters, and output of partial or final results of performances of the simulated solar array was developed. Simulation capabilities include: modeling of a solar cell as a function of physical parameters, temperature and radiation fluxes (Si or Ga As); identification of solar cell parameters from a set of measured experimental curves; evaluation of the solar array curve as a function of cell assembly, orbital environment; evaluation of solar array mean power versus life time; and evaluation of operating point with respect to the load characteristic and orbital position. Author (ESA)

N86-17469# MATRA Espace, Toulouse (France).
MATPWR: A MISSION ANALYSIS TOOL FOR LEO SPACECRAFT POWER PROFILES COMPUTATION
B. Fleux, G. Lample, and P. Noel *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 325-331 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

A software tool to compute the power profiles for LEO spacecraft is presented. As outputs, the program delivers the power consumed (interfaced with power subsystem simulations) and analysis results: a report file, containing summarized results and statistics, and an output file compatible with an EARTHMAP visualization package. The tool was used for the ERS4 satellite. It can also be used for data relay satellites by replacing the power of the units by the data rate to transmit they require. Author (ESA)

N86-17470# United Kingdom Atomic Energy Authority, Culham (England).
LIQUID METAL FIELD EMISSION THRUSTERS AND ION SOURCES: A REVIEW Final Report
P. D. Prewett Paris ESA Jun. 1983 250 p refs
(Contract ESTEC-4462/80/NL-AK(SC))
(ESA-CR(P)-2078) Avail: NTIS HC A11/MF A01

The state of development and scientific understanding of liquid metal field emission propulsion systems is reviewed. Ion sources are also reviewed. The need for ion propulsion; the theory of ion emission from liquid metals under the action of high electric fields; and the elementary theory of hydrodynamic effects on surfaces subjected to electric stress are covered. Author (ESA)

N86-17283# Fukui Univ. (Japan). Dept. of Mechanical Engineering.
NUMERICAL SIMULATION METHOD FOR COMBUSTION IN AN OXYHYDROGEN ROCKET MOTOR
Shiro Taki and Toshitaka Fuhwara (Nagoya Univ., Japan) *In* Natinal Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 131-140 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE STATION POWER MANAGEMENT AND DISTRIBUTION
Fred Teren *In its* Space Photovoltaic Research and Technology 1985 1985 p 279-285 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-17471# Royal Aircraft Establishment, Farnborough (England).
REDUCTION OF ALIPHATIC NITROCOMPOUNDS ON NON-OXIDISED AND OXIDISED CARBON FIBRE ELECTRODES
E. Theodoridou, A. D. Jannakoudakis, and D. Jannakoudakis Feb. 1985 18 p refs Transl. into Zeitschrift fuer Physikalische Chemie, Neue Folge (West Germany), v. 134, 1983 p 227-242
(BR97661; RAE-Trans-2126) Avail: NTIS HC A02/MF A01

The reduction of aliphatic nitrocompounds is investigated on carbon fiber electrodes either nonmodified or modified by thermal, electrochemical and chemical oxidation. The nitroalkanes are reduced in water-methanolic buffer-solutions to alkylhydroxylamines through irreversible, diffusion controlled 4-electron-steps: in alkaline solutions the height of the reduction step decreases with time, due to the conversion of the molecules into electrochemically inactive aci-ions. In acetonitrile solutions nitroalkanes are reduced to the corresponding radical anions through irreversible 1-electron-steps, as is proved polarographically. The introduction of benzoic acid, lithium salts as well as of thermally oxidized carbon fibers - having carboxylic groups on their surface - in acetonitrile solutions facilitates the reduction of nitroalkanes to alkylhydroxylamines. The nitroalkanes are also reduced on electrochemically and chemically oxidized carbon fibers in relatively concentrated aqueous or acetonitrile solutions. Finally it was found, that nitroalkane molecules can be intercalated from the liquid state into electrochemically or chemically oxidized carbon fibers. The presence of these molecules in the graphite lattice is reflected through the reduction currents obtained. Author

N86-17472*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF ARGON AND HYDROGEN ON DEPOSITION OF SILICON FROM TETROCHLROSILANE IN COLD PLASMAS
R. R. Manory, R. Avni (Ben Gurion Univ. of tthe Negev, Beer Sheva, Israel), and A. Grill (Ben Gurion Univ. of the Negev, Beer Sheva, Israel) 1985 16 p refs Presented at Fall Meeting of the Materials Research Society, Boston, Mass., 2-7 Dec. 1985
(NASA-TM-87219; E-2820; NAS 1.15:87219) Avail: NTIS HC A02/MF A01 CSCL 07D

The roles of Ar and H2 on the decomposition of SiCl4 in cold plasma were investigated by Langmuir probes and mass spectrometry. Decomposition of the reactant by Ar only has been found to be very slow. In presence of H2 in the plasma SiCl4 is decomposed by fast radical-molecule reactions which are further enhanced by Ar due to additional ion-molecule reactions in which more H radicals are produced. A model for the plasma-surface interactions during deposition of mu-Si in the Ar + H2 + SiCl4 system is presented. Author

24 COMPOSITE MATERIALS

Includes laminates.

N86-17473 Royal Aircraft Establishment, Farnborough (England).
A REVIEW OF THE PHYSICAL AGEING OF EPOXY RESINS AND THEIR CARBON FIBRE COMPOSITES
W. W. Wright Dec. 1984 20 p refs
(RAE-TM-1051(MAT/STR); BR94907) Avail: NTIS HC A02/MF A01

Data on the physical aging of epoxy resins and of carbon fiber composites made from them are reviewed to assess the importance of the phenomenon for the aerospace use of composite materials. With cast resin there is a gradual change in mechanical properties on physical aging, leading to embrittlement and lower fracture toughness. For composites, there is a decrease in strain to failure and in the area under the stress-strain curve upon physical aging. The decrease in toughness is the most worrying feature from the aerospace viewpoint. The phenomenon must therefore be taken into account in using composite materials especially at temperatures approaching the glass transition point. Author (ESA)

N86-17474 Royal Aircraft Establishment, Farnborough (England).
EFFECT OF CARBON FIBER SURFACE TREATMENT ON MOISTURE ABSORPTION AND INTERLAMINAR SHEAR STRENGTH OF CARBON FIBRE/EPOXY RESIN COMPOSITES
Om K. Joshi 1 May 1984 34 p refs
(RAE-TR-84047; RAE-Mater/Struct-83; BR94905) Avail: NTIS HC A03/MF A01

Carbon fiber surfaces treated to eight different levels of the standard treatment were molded into unidirectional composites in an epoxy resin. The composites were immersed in boiling water or exposed to a hot humid environment (70C, 95% RH), and the water absorption, swelling, and interlaminar shear strength were measured. The reversibility of these effects was studied by drying the composites at 70C in a vacuum oven and by repeated hygrothermal cycling. More moisture is absorbed for the lower levels of surface treatment where the bond between the fiber and matrix is weaker. Studies of reversibility show that there is a greater probability of permanent damage for low fiber matrix bond strengths and for specimens immersed in boiling water. Author (ESA)

N86-17475*# Old Dominion Univ., Norfolk, Va.
ANALYSES OF QUASI-ISOTROPIC COMPOSITE PLATES UNDER QUASI-STATIC POINT LOADS SIMULATING LOW-VELOCITY IMPACT PHENOMENA Final Report
Ajit Dhundiraj Kelkar Aug. 1984 207 p refs
(Grant NGR-47-003-052)
(NASA-CR-176485; NAS 1.26:176485) Avail: NTIS HC A10/MF A01 CSCL 11D

In thin composite laminates, the first level of visible damage occurs in the back face and is called back face spalling. A plate-membrane coupling model, and a finite element model to analyze the large deformation behavior of eight-ply quasi-isotropic circular composite plates under impact type point loads are developed. The back face spalling phenomenon in thin composite plates is explained by using the plate-membrane coupling model and the finite element model in conjunction with the fracture mechanics principles. The experimental results verifying these models are presented. Several conclusions concerning the deformation behavior are reached and discussed in detail. Author

N86-17476*# North Carolina State Univ., Raleigh. Dept. of Physics.
EFFECTS OF HIGH ENERGY RADIATION ON THE MECHANICAL PROPERTIES OF EPOXY-GRAPHITE FIBER REINFORCED COMPOSITES Interim Report, 1 Jan. - 31 Dec. 1985
R. E. Fornes, R. D. Gilbert, and J. D. Memory [Dec. 1985] 263 p refs
(Grant NsG-1562)
(NASA-CR-176487; NAS 1.26:176487) Avail: NTIS HC A12/MF A01 CSCL 11D

In an effort to elucidate the changes in molecular structural and mechanical properties of epoxy/graphite fiber composites upon exposure to ionizing radiation in a simulated space environment, spectroscopic and surface properties of tetraglycidyl-4,4'-diamino diphenyl methane (TGDDM) red with diamino diphenyl sulfone (DDS) and T-300 graphite fiber were investigated following exposure to ionizing radiation. Cobalt-60 gamma radiation and 1/2 MeV electrons were used as radiation sources. The system was studied using electron spin resonance (ESR) spectroscopy, infrared absorption spectroscopy, contact angle measurements, and electron spectroscopy for chemical analysis. Author

N86-17477*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPECIMEN GEOMETRY EFFECTS ON GRAPHITE/PMR-15 COMPOSITES DURING THERMO-OXIDATIVE AGING
Kenneth J. Bowles and Anne Meyers (Medical Coll. of Ohio, Toledo) 1986 19 p refs Proposed for presentation at the 31st National

SAMPE Symposium and Exhibition, Las Vegas, Nev., 7-10 Apr. 1986
(NASA-TM-87204; E-2860; NAS 1.15:87204) Avail: NTIS HC A02/MF A01 CSCL 11D

Studies were conducted to establish the effects of specimen geometry on the thermo-oxidative stability and the mechanical properties retention of unidirectional Celion 12000 graphite fiber reinforced PMR-15 polyimide composites. Weight loss, flexural strength and interlaminar shear strength are measured at isothermal aging times as long as 1639 hr at a temperature of 316 C for three different specimen geometries. It is found that the three different types of specimen surfaces exhibit different values of weight loss/unit area. The mechanical properties retention is also found to be dependent on geometry for these composites. The interlaminar shear strength decreases significantly over the complete range of aging times. The flexural strength retention starts showing geometric dependency after about 1000 hr of aging at 316C. Weight loss fluxes, associated with the three different types of exposed surfaces, are calculated and used to develop an empirical mathematical model for predicting the weight loss behavior of unidirectional composites of arbitrary geometries. Data are presented comparing experimentally determined weight loss with weight loss values predicted using the empirical model.
Author

N86-17478# Virginia Univ., Charlottesville.
ELECTROCHEMICAL BEHAVIOR OF GRAPHITE FIBER-POLYMER COMPOSITES Final Report, 15 Jan. 1982 - 31 May 1985
G. E. Stoner and G. L. Cahen, Jr. 19 Aug. 1985 7 p
(Contract DAAG29-82-K-0053)
(AD-A160031; ARO-18489.1-MS) Avail: NTIS HC A02/MF A01 CSCL 11/4

Graphite fiber-polymer matrix composites containing about 40 w/o fibers have specific resistivities on the order of 1 to 10 ohm-cm. Such resistivity values are low enough for these materials to be considered for a wide range of electrochemical applications. Three graphite fiber-epoxy matrix composite electrodes were investigated in this study; a randomly oriented composite containing 38 v/o (50 w/o) pitchbased 15 micrometer diameter fibers, a parallel oriented composite containing 50 v/o (65 wo) PAN precursor 7 micrometer diameter fibers, and a perpendicularly oriented composite containing 50 v/o (65 w/o) PAN percursor 7 micrometer diameter fibers. For the purpose of comparison, three additional carbon containing electrodes were the purpose of comparison, three additional carbon containing electrodes were also investigated in this study, namely, pyrolitic carbon, anode-grade bulk graphite, and a specially prepared graphite fiber brush electrode containing 12 micrometer diameter pitch-based fibers. With the exception of the graphite fiber brush electrode, all electrodes were used in a stationary flat plate configuration, Cyclic voltammetry (between oxygen and hydrogen evolution) was performed on each carbon containing electroder in 1 N H_2SO_4, 30 w/o KOH, and 2M KCl. From the cyclic voltammograms, surface functional groups were identified, and the double layer capacitance was measured for each electrode. Chronoamperometry was used to study two diffusion-controlled electrode processes on each electrode.
GRA

N86-17479# Argonne National Lab., Ill.
DEVELOPMENT OF REFRACTORY COMPOSITES WITH IMPROVED FRACTURE TOUGHNESS
J. P. Singh, R. B. Poeppel, J. J. James, and J. J. Picciolo Aug. 1985 24 p refs
(Contract W-31-109-eng-38)
(DE86-000257; ANL/FE-85-1) Avail: NTIS HC A02/MF A01

The effects of unstabilized ZrO_2 and W inclusions on the fracture surface energy and thermal-shock resistance of $MgCr_2O_4$ have been characterized. The fracture surface energy for $MgCr_2O_4$-ZrO_2 composites was observed to depend on the agglomerate particle size, size distribution, and volume fraction of the ZrO_2 inclusions. Large, nonuniformly distributed ZrO_2 inclusions tended to produce a relatively small increase in the fracture surface energy of $MgCr_2O_4$. The fracture surface energy increased with increasing ZrO_2 content to a maximum value of 24.5 J/sq. m. at 16.5 vol % ZrO_2, and decreased as the ZrO_2 content increased further. The increase in fracture surface energy for $MgCr_2O_4$-W with increasing W content was monotonic for the range of composition studied (less than or equal to10.3 vol % W); a value of 26 J/m(2) was obtained for $MgCr_2O_4$-10.3% W composites. It is proposed that these fourfold increases in fracture surface energy result from the absorption of energy due to microcrack formation in the $MgCr_2O_4$ matrix, which results from the tensile stresses due to the mismatch in thermal expansion coefficient and/or elastic modulus between the matrix and inclusions. In addition, for $MgCr_2O_4$-ZrO_2 composites, a major cause of microcracking is the tetragonal yields monoclinic phase transformation of ZrO_2 and the associated volume expansion. Thermal quench experiments indicated substantial improvements in the thermal-shock resistance of $MgCr_2O_4$ with appropriate ZrO_2 and W additions.
DOE

N86-17480# Oxford Univ. (England). Dept. of Engineering Science.
EFFECT OF STRAIN-RATE ON THE TENSILE FAILURE OF WOVEN-REINFORCED POLYESTER RESIN COMPOSITES
L. M. Welsh and J. Harding 1985 12 p refs Submitted for publication Sponsored by UK Science and Engineering Research Council
(OUEL-1578/85) Avail: NTIS HC A02/MF A01

Tensile stress-strain curves at strain rates of 0.001, 10, and 1000/sec were obtained for carbon, Kevlar and glass fiber woven-reinforced polyester resin composites. The variation of modulus, tensile strength, and fracture strain with strain rate was determined. A change in the failure mode at the highest strain rates is observed for the glass but not the carbon of Kevlar reinforced composites.
Author (ESA)

N86-17481# Oxford Univ. (England). Dept. of Engineering Science.
DYNAMIC TENSILE RESPONSE OF UNIDIRECTIONALLY-REINFORCED CARBON EPOXY AND GLASS EPOXY COMPOSITES
L. M. Welsh and J. Harding 1985 17 p refs Submitted for publication Sponsored by UK Science and Engineering Research Council
(Grant AFOSR-84-0092)
(OUEL-1579/85) Avail: NTIS HC A02/MF A01

Tensile stress-strain curves at strain rates of 0.001, 10, and 1000/sec for unreinforced epoxy resin specimens and for low volume fraction model specimens unidirectionally reinforced with a single layer of glass or carbon fiber tows in the same epoxy resin were obtained. For CFRP specimens a small rate dependence of the modulus and the tensile strength is observed at impact rates of strain. This effect is greater than can be explained in terms of the rate sensitivity of the resin using the rule of mixtures approach. No effect of strain rate on the fracture appearance is detected, but there is a marked change in the fracture mode of GFRP specimens, similar to that for a satin weave GFRP material. At low and intermediate rates failure is controlled by the rate-dependent fracture strength of the glass fibers while, at impact rates, pull-out of fiber tows is the controlling mechanism. This suggests that there is a greater tendency for debonding between the fiber tows and the resin matrix at impact rates of strain.
Author (ESA)

N86-17482# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Betriebsbereich.
METALLIZING OF FIBER REINFORCED COMPOSITES [METALLISIEREN FASERVERSTAERKTER WERKSTOFFE]
R. Suchentrunk 23 Apr. 1985 38 p refs In GERMAN Submitted for publication
(MBB-Z-46/48) Avail: NTIS HC A03/MF A01

Metallization of fiber reinforced composites for protection against environmental conditions and for acquisition of functional surfaces achieved with foil adhesion, damping, sputtering, electroplating, thermal spraying, metal paint coating, adhesion of

preformed profiles, reductive silver mirror coating, and direct and indirect galvanic coating is discussed. Adhesion of the metal coatings to plastics is controlled qualitatively with the stripping and grating tests and quantitatively with peeling and front tensile tests. Industrial application of the metallizing methods for the production of fiber reinforced components are given. Author (ESA)

N86-17483# Institut fuer Fenstertechnik e.V., Rosenheim (West Germany).
INVESTIGATIONS CONCERNING THE AGING BEHAVIOR OF HEAT-INSULATED ALUMINUM COMPOSITE PROFILES Final Report, Dec. 1984
Thomas Einfeldt, Franz Feldmeier, Rudolf Heinrich, Josef Schmid, and Werner Stiell Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 86 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-086; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The aging behavior of heat-insulated aluminum composite profiles.and the changes resulting from external load were studied for damage prevention and heat protection of windows and fronts. A test program for assessment of profile aging and long time rupture behavior and for development of a procedure for system testing so as to provide the manufacturer with guidelines for optimal composite system development and manufacture was worked out. Systems with sufficient transverse tension load and without detectable shear strength may represent an economical solution. The results are relevant for other metal profile systems.
Author (ESA)

N86-17484# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
PHYSICAL CHEMICAL TESTS AND FEASIBILITY STUDY OF THE CIBA-GEIGY R6376 IM6 PREPREG [ESSAIS PHYSICO-CHIMIQUES ET DE FAISABILITE DU PREIMPREGNE CIBA GEIGY R6376-IM6]
J. Levesque and H. Mayer 31 Jan. 1985 35 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.749) Avail: NTIS HC A03/MF A01

The R6376-IM6 prepreg exothermal behavior, gel temperature, and gel point at constant temperature and with a temperature gradient for several aging times were studied. The feasibility study was done by manufacturing specimens including 5 steps with 20 plies each. No advantage is found when compared with other commercially available products. Author (ESA)

N86-17485# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
EVALUATION OF THE CIBA-GEIGY R6376 IM6 PREPREG [EVALUATION DU PREIMPREGNE CIBA GEIGY R6376-IM6]
J. Levesque and F. Henriot 21 Jan. 1985 74 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.649) Avail: NTIS HC A04/MF A01

The R6376-IM6 prepreg tensile and impact properties were compared with other commercially available products used in aircraft manufacturing. The comparisons do not show improvements over the currently used preimpregnated composites. Author (ESA)

N86-17486# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
STUDY OF COMPOSITE MATERIAL CURING MOLDS [ETUDE D'UN SOMMIER DE CUISSON EN MATERIAUX COMPOSITES]
S. Dellus 8 Feb. 1985 22 p In FRENCH
(Contract STPA-83-96-028)
(DGT-26.817) Avail: NTIS HC A02/MF A01

A composite mold to manufacture carbon reinforced expoxy matrix composite elements for the aircraft industry is studied. The working temperature for curing is 175C. The tests were carried out either using preimpregnated composites or manually impregnated composites. The study shows that the molds do not differ significantly from the models, that the deformation is low after several autoclave cycles, and that there are consistent advantages regarding weight and thermal inertia. Author (ESA)

N86-17487# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Lab. Techniques Nouvelles.
STATISTICS ON THE BASIC CHARACTERISTICS OF CARBON EPOXY COMPOSITES [STATISTIQUE SUR LES CARACTERISTIQUES DE BASE DES COMPOSITES CARBONE EPOXY]
F. Henriot and M. J. Levesque 7 Feb. 1985 54 p ref In FRENCH
(Contract STPA-83-96-028)
(DGT-27.039) Avail: NTIS HC A04/MF A01

Batches of aircraft preimpregnated composite elements were studied to determine the statistical dispersion of mechanical characteristics and to compare this dispersion with the dispersion among batches. The measurements of tensile strength and modulus show a coefficient of variation of 11.3% and 2% over all data sampled. Author (ESA)

N86-17488# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique des Materiaux.
RELATIONSHIP BETWEEN COMPONENTS AND PERFORMANCE OF COMPOSITE MATERIALS. PART 1: BSL914 MATRIX SYSTEMS [RELATIONS ENTRE CONSTITUANTS ET PERFORMANCE DES MATERIAUX COMPOSITES. PARTIE 1: SYSTEMES A MATRICES BSL 914]
C. Cavalli, M. C. Merienne, J. Ancelle, B. Bloch, D. Charrier, C. Marais, and P. Sigety Feb. 1985 91 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-1/3636-M-Pt-1) Avail: NTIS HC A05/MF A01

An epoxy resin was studied to detect the influence of the formulation on the final composite properties. Preimpregnation was performed in laboratory excluding any fiber finish. The 914 resin was analyzed using quantitative methods. The results presented include the mechanical properties of the fibers, measuring of the resin glass transition point, impact and tensile tests of conditioned composite specimen, and thermomechanical properties of composites. Author (ESA)

N86-17489# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes Materiaux non Metalliques.
ELEMENTARY CHARACTERIZATION OF THE RIGIDITE 5245C/IM6 PREIMPREGNATED CARBON FROM NARMCO U.S., TEST REPORT M3-449000, PART 2 Final Report [CARACTERISATION ELEMENTAIRE DU PREIMPREGNE CARBONE RIGIDITE 5245C/IM6 DE NARMCO U.S., PROCES VERBAL NO. M3-449000, PARTIE 2]
26 Mar. 1985 44 p In FRENCH 2 Vol.
(PV-M3-449000-Pt-2) Avail: NTIS HC A03/MF A01

A system composed of a high performance Hercules fiber and a polyimide resin was tested. The tensile strength is improved by up to 80% compared to epoxy matrix-normal fiber, but the flexion, peeling and compression tests show negative results. A large difference between tensile and compression strengths is deduced. Author (ESA)

N86-17490# Centre d'Essais Aeronautique Toulouse (France). Lab. de Chimie-Inflammabilite.
PHYSICAL CHEMICAL CHARACTERIZATION TESTS OF THE 5245C NARMCO PREIMPREGNATION RESIN, TEST REPORT M3-449000, PART 1 [ESSAI DE CARACTERISATION PHYSICO-CHIMIQUE DE LA RESINE DE PREIMPREGNE 5245C NARMCO, PROCES VERBAL NO. M3-449000, PARTIE 1]
25 Sep. 1984 31 p In FRENCH 2 Vol.
(PV-M3-449000-Pt-1) Avail: NTIS HC A03/MF A01

A carbon fiber prepreg was studied. Liquid chromatography shows three major components: an imide, an aromatic cyanate and analiphatic cyanate. A pH measurement shows the presence of an epoxy resin also. Colloidal silica is the mineral part of the formulation. The glass transition temperature, the polymerization enthalpy, and the degradation temperature are also given.
Author (ESA)

N86-17491# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
CERAMIC COMPOSITES MADE BY SOL-GEL PROCESSING
A. C. Pierre, D. R. Uhlmann (MIT, Cambridge, Mass.), and A. Hordonneau 1985 9 p refs Presented at a Conference, Orleans, France, 9-11 Sep. 1985
(SNIAS-852-430-103) Avail: NTIS HC A02/MF A01

Ceramic-ceramic composites were produced by immersing SiC or alumina fibers in an alumina or zirconia sol or gel. Drying and heat treatment completed the process. A good infiltration of the liquid sol between the fibers was expected, drying-gelling being performed on the sol with the fibers aligned unidirectionally. The appearance of the composites improves when the acid content used for the peptization of the sol decreases. Although the Al2O3 composites behave better, mechanical properties remain very poor after the heat treatment. Author (ESA)

N86-17492# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
APPLICATIONS OF HOLOGRAPHIC INTERFEROMETRY TO NONDESTRUCTIVE INSPECTIONS OF COMPOSITE MATERIAL STRUCTURES [APPLICATION DE L'INTERFEROMETRIE HOLOGRAPHIQUE AU CONTROLE NON DESTRUCTIF DE STRUCTURES EN MATERIAUX COMPOSITES]
F. Albugues 1985 12 p In FRENCH; ENGLISH summary Submitted for publication
(SNIAS-852-430-112) Avail: NTIS HC A02/MF A01

Nondestructive inspection of the structure of composite materials used in the aerospace industry is discussed. Defects such as peeling, bonding, inclusions, fiber distribution, and the range of usefulness of nondestructive tests such as acoustic inspection, X-ray inspection, infrared thermography and ultrasonic tests are reviewed. Holographic interferometry applications of pulsed lasers, the utilization of thermosensitive photographic film, and the realization of an automatic test bench for specimens up to 2m by 2m are described. Photographs of typical cases are presented. Author (ESA)

N86-17493# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
COMPOSITE MATERIALS: A SOURCE OF INNOVATION [LES MATERIAUX COMPOSITES: SOURCE D'INNOVATION]
Albert Phan 1985 7 p In FRENCH; ENGLISH summary Submitted for publication
(SNIAS-852-430-113) Avail: NTIS HC A02/MF A01

A composite materials design methodology based on the concept of user needs technical specifications is proposed. This results from an equilibrium between user requirements and the technological limitations for manufacturing a specified product. The advantages of such a specification are commented on. Author (ESA)

N86-17494# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
FATIGUE PERFORMANCE OF PRESTRESSED COMPOSITE PRESSURE VESSELS
A. Pradier and A. Flechais 1985 13 p ref Presented at AIAA/SAE/ASME 21st Joint Propulsion Conference Monterey, Calif., 8-11 Jul. 1985
(SNIAS-852-430-114) Avail: NTIS HC A02/MF A01

The fatigue performance data for a prestressed composite Kevlar 49/TI6AL4V pressure vessel are given and the fatigue behavior and the failure mode of the metallic liner are discussed. The evaluation permitted the restoration of the flow growth curve versus applied proof and service pressure cycles. The equatorial weld joint of the liner shows good fatigue performance. The results achieved are considerably better than the requirements for the TVSAT-TDF1 satellite. Author (ESA)

N86-17495# Societe Nationale Industrielle Aerospatiale, Paris (France).
ANALYSIS IN SIMULATED SPACE ENVIRONMENT OF COMPOSITE MATERIAL BEHAVIOR [ANALYSE EN AMBIANCE SPATIALE SIMULEE DU COMPORTEMENT DE MATERIAUX COMPOSITES]
Francois Albugues 1985 8 p refs In FRENCH; ENGLISH summary Presented at 1st Conf. Europeenne sur les Materiaux Composites
(SNIAS-852-430-116) Avail: NTIS HC A02/MF A01

A device to test in real time the evolution of mechanical properties in a simulated space environment is described. The reason for the choice of this test method and the parameters to be tested are discussed. The simulation chamber is under high vacuum and subjected to ultraviolet and particle radiation. Dynamic mechanical measurements are carried out using optical measurement instruments Author (ESA)

N86-17496# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
FILAMENT WINDING: AN INDUSTRIAL PROCEDURE [L'ENROULEMENT FILAMENTAIRE: UN PROCEDE INDUSTRIEL]
D. Cabanel 1985 11 p In FRENCH; ENGLISH summary
(SNIAS-852-430-117) Avail: NTIS HC A02/MF A01

Filament winding procedures in the aerospace industry are described. The advantages and applications of filament winding outside the aerospace industry are discussed. The possibilities of automation and the manufacturing of complex bodies are analyzed. Author (ESA)

N86-17497# Societe Nationale Industrielle Aerospatiale, Paris (France).
CERAMIC FIBER COMPOSITES: MANUFACTURING AND PERFORMANCES [COMPOSITES A FIBRES CERAMIQUES ET MATRICE SILICE: ELABORATION; PERFORMANCES]
G. Rousseau and J. Iron 1985 14 p refs In FRENCH Submitted for publication
(SNIAS-852-430-118) Avail: NTIS HC A02/MF A01

A procedure using silica hydrosols for impregnating a ceramic fiber structure is described. The ceramic fibers, such as SiC fibers, are assembled in a three dimensional structure. The impregnation is done using either classical silica hydrosols or a silicium alcohol compound solution. In the first case the performance improvement is not significant. In the second case tensile strengths of more than twice the strength of pure silica are reported. Author (ESA)

N86-17498# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
DESIGN OF NONAXYSYMMETRIC STRUCTURES (TURBOJET ENGINE NACELLE ELEMENT) Thesis [CONCEPTION DE STRUCTURES NON AXISYMETRIQUES (ELEMENTS DE NACELLE DE REACTEUR)]
J. Lamalle 1985 59 p refs In FRENCH
(SNIAS-852-430-119) Avail: NTIS HC A04/MF A01

The design of an air inlet covering with an average diameter of 2200 mm and length varying between 330 and 510 mm is discussed. The purpose it to show how an asymmetric element can be manufactured by filament winding, using composite materials. The choice of winding procedure is analyzed and all the manufacturing steps are described. The analytical verification of the behavior under external pressure gives results within the specifications. Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-17499 Central Electricity Generating Board, London (England). Translations Section.
ON RECOVERY OF PLATINUM FROM SPENT CATALYSTS
M. Yelyaskova, I. Sariev, S. Koralska, S. Aneva, M. Pankova, and

M. Yancheva [1985] 10 p refs Transl. into ENGLISH from Chem Techn, v. 34, no. 12, 1982 p 651-653
(CE-Trans-8042) Avail: Issuing Activity

Aluminum-based catalysts containing platinum are used in numerous processes in oil refining such as reforming, isomerization, hydro-cracking and selective hydrogenation. The platinum is finely dispersed on the alumina carrier which is frequently activated with halogens after a certain working period and after several regenerations, the activity of the contact materials irreversibly drops and the noble metal must be recovered so that new catalysts can be produced. The decisive factors for selecting a method for the recovery of platinum from spent catalysts are mainly the type and concentration of the contaminants, the possibilities for utilizing the waste products, the platinum yield, the costs of the technology etc. However, most of the methods known from the literature contain contradictory information. In the main those methods are recommended which are based on extracting the spent catalysts with strong mineral acids, alkalis or on treatment with phosgene or aluminum chloride. The methods based on chlorination and vaporization of the platinum are superior to the wet processes if the carrier can be reused directly, I.E. if the carrier is not subject to any significant changes during use and during the regenerations. G.L.C.

N86-17500# Royal Aircraft Establishment, Farnborough (England).
THE NATURE OF CHARGE CARRIERS IN ELECTRORHEOLOGICAL SUSPENSIONS
Z. P. Shulman and A. D. Matseputo Apr. 1985 7 p refs Transl. into ENGLISH from Teplo Massoperenos: Teor. Prakt Prilozh. (USSR), 1983 p 19-21
(BR97662; RAE-Trans-2137) Avail: NTIS HC A02/MF A01

Aluminum dihydrotripolyphosphate was studied at different levels of crystalline water and the electro-rheological effect and the conductivity of the sample was compared. Comparisons are made with MNR data and charge emission tests to conclude that proton migration is the basic mechanism in the polarization of the particles and therefore in the electro-rheological effect. Author

N86-17501# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
ACRYLONITRILE-BUTADIENE-STYRENE COPOLYMERS (ABS): PYROLYSIS AND COMBUSTION PRODUCTS AND THEIR TOXICITY, A REVIEW OF THE LITERATURE
Joseph V. Rutkowski and Barbara C. Levin Dec. 1985 63 p refs Sponsored in part by the US Consumer Product Safety Commission, Bethesda, Maryland
(NBSIR-85/3248) Avail: NTIS HC A04/MF A01

A review of the literature was undertaken to ascertain the current knowledge of the nature of the thermal decomposition products generated from ABS and the toxicity of these evolved products in toto. The literature review encompasses English language publications available through June 1984. This literature surveyed showed that the principal ABS thermooxidative degradation products of toxicologic importance are carbon monoxide and hydrogen cyanide. The experimental generation of these and other volatile products is principally dependent upon the combustion conditions and the formulation of the plastic. The toxicity of ABS thermal degradation products was evaluated by five methods. Lethality tests show that no apparent toxicological difference exists between the flaming mode and the non-flaming mode. The toxicity of ABS degradation products was found to be comparable to the toxicity of the thermal decomposition products of other common polymeric materials. Author

N86-17502*# Huntsville Hospital, Ala.
SAMPLE SELECTION AND TESTING OF SEPARATION PROCESSES Final Report, 19 Sep. 1983 - 31 Dec. 1985
Laurel J. Karr Dec. 1985 43 p refs Sponsored in part by Space Universities Research Association
(Contract NAS8-35593; NAS8-35334; NAS8-35362)
(NASA-CR-176569; NAS 1.26:176569) Avail: NTIS HC A03/MF A01 CSCL 07D

Phase partitioning, which has become an important tool for the separation and purification of biological materials, was studied. Instruments available for this technique were researched and a countercurrent distribution apparatus, the Biosheff MK2N, was purchased. Various proteins, polysaccharides and cells were studied as models to determine operating procedures and conditions for this piece of equipment. Results were compared with those obtained from other similar equipment, including a non-synchronous coil planet centrifuge device. Additionally, work was done with affinity ligands attached to PEG, which can further enhance the separation capabilities of phase partitioning. Author

N86-17503# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
SURFACE-ENHANCED RAMAN SPECTROSCOPY AS A PROBE OF ADSORBATE-SURFACE BONDING: SIMPLE ALKENES AND ALKYNES ADSORBED AT GOLD ELECTRODES Technical Report
M. L. Patterson and M. J. Weaver Aug. 1985 31 p
(Contract N00014-79-C-0670)
(AD-A160033; TR-52) Avail: NTIS HC A03/MF A01 CSCL 07/4

The interaction of various alkenes with gold electrodes has been studied using surface-enhanced Raman spectroscopy (SERS). Large decreases, from 70 to 140/cm, were observed in the C-C double bond and C triple bond C stretching frequencies upon absorption which are attributed to absorbate-surface bonding involving these groups. The potential dependence of these SERS frequencies suggests that the Pi yield s (sigma band) overlap is more prevalent than the d yields pi* (pi bond) interaction. Carbon-hydrogen stretching vibrations, nu(C-H), as well as other skeletal modes were also detected for the absorbates; paraffinic, olefinic, and aromatic nu(C-H) modes could readily be distinguished although acetylenic nu(CH) modes were too weak to be detected. Generally, the most intense SERS bands relative to those in the bulk-phase spectra are associated with vibrations of the carbon-carbon double or triple bonds. Attempts to examine SERS of absorbated acetylene were thwarted by a spontaneous surface reaction yielding a film of polyacetylene. GRA

N86-17504# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
THE ROLE OF SOLVENT REORGANIZATION DYNAMICS IN ELECTRON-TRANSFER PROCESSES. THEORY-EXPERIMENT COMPARISONS FOR ELECTROCHEMICAL AND HOMOGENEOUS ELECTRON EXCHANGE INVOLVING METALLOCENE REDOX COUPLES
T. Gennett, D. F. Milner, and M. J. Weaver Aug. 1985 38 p
(Contract N00014-79-C-0670)
(AD-A160034; TR-45) Avail: NTIS HC A03/MF A01 CSCL 07/4

Electrochemical Rate Constants and Activation Parameters are reported for the electron exchange of five metallocene couples and dibenzenechromium (I)/(O) in eight solvents at mercury electrodes. The solvents (acetonitrile, acetone, methylene chloride, formamide, N-methylformamide, N,N'-dimethylformamide, dimethylsulfoxide, and benzonitrile) were chosen so to provide substantial variations in their dynamical as well as dielectric properties. The metallocene couples are of the form M(Cp)2(+/o), where M = Fe, Co, or Mn, and Cp = cyclopentadiene or pentamethylcyclopentadiene. The inner-shell (i.e., bond distortional) barriers are calculated for the metallocene and arene couples from bond-distance and vibrational data to be small (< or approx, 0.25 kcal/mol) yet metal-dependent. Detailed comparisons of the observed solvent-dependent kinetics are made with the rate parameters calculated from contemporary theoretical treatments of outer-sphere electron transfer. Considerably better agreement between the experimental and theoretical kinetic parameters was obtained when the latter take into account the influence of solvent friction upon the barrier-crossing frequency. These results indicate that the conventional transition-state theory may not apply to electron-transfer reactions where the free-energy barrier is due chiefly to solvent reorganization, at least in high friction media where concerted solvent relaxation is slow. GRA

N86-17505# Oak Ridge National Lab., Tenn.
CORRELATIONS OF ACUTE TOXICITY OF METAL IONS AND THE COVALENT/IONIC CHARACTER OF THEIR BONDS
J. E. Turner, M. W. Williams, K. B. Jacobson, and B. E. Hingerty 1984 8 p refs Presented at the Symposium of QSAR in Toxicology and Xenobiochemistry, Praha, Czechoslovakia, 12 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE85-017094; CONF-8409263-1) Avail: NTIS HC A02/MF A01

We have investigated correlations between physiochemical properties of 24 metal ions and their acute toxicity in mice and Drosophila. A high correlation for a softness parameter suggests that the relative covalent/ionic character of the bonds formed by the metal ions may be important in determining their toxicity. This hypothesis is reinforced by model calculations of metal binding to dinucleotides in water. Since the nature of bonds depends on ligand electronegativity, we searched for correlations involving this parameter. Although electronegativity is useful for interpreting some aspects of metal ion behavior related to toxicity, it does not yield improved correlations. DOE

N86-17506# Denver Research Inst., Colo.
SAMPLE CONDITIONING AND STANDARD PREPARATION FOR SYNFUEL GAS ANALYSIS
J. R. Wallace and R. A. Nye Mar. 1985 25 p
(Contract DE-AS20-82LC-10845)
(DE85-010073; DOE/LC-10845/1828) Avail: NTIS HC A02/MF A01

A goal of the work carried out subsequent to the field test was thus to develop a method of collecting and conditioning a gas sample which obviated these concerns. The method was to avoid exposing the gas to any liquid condensate, and was to be insensitive to high loadings of suspended dust or droplets, and should not be affected by pressure fluctuations which inevitably occur in a process line. For this purpose a volumetric gas dilutor was developed. This system extracts a fixed volume of gas at constant pressure and temperature and dilutes it with another inert carrier gas. The critical component of this system was designed and tested in the laboratory as described in Section 2 of this report. Finally, a detailed design for a fieldworthy gas conditioning system was completed to the level of individual components and vendors. A summary of this design was provided to LETC in the June 1983 monthly report, but the system was not developed further. The volumetric dilution system also appears to be a valuable method for preparing gas standards in the range 0.1 ppM to ca. 20%. In much of this range the accuracy of this standard can be traceable to NBS standards. Dilution of a fluid by means of repetitive injections of a fixed volume into a diluent stream requires that the resulting concentration spikes be averaged over time. This chapter shows that a single mixing chamber is normally inadequate, but that a column of 5 to 20 plates or sub-volumes is optimum. DOE

N86-17507# Lawrence Livermore National Lab., Calif.
LEARNING ALGORITHMS IN THE INFRARED
T. Hirschfeld Jul. 1985 6 p Presented at the International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Ontario, 24 Jun. 1985
(Contract W-7405-eng-48)
(DE85-016441; UCRL-92444; CONF-8506118-4) Avail: NTIS HC A02/MF A01

The use of learning algorithms to automatically set up analytical procedures in the near IR leads to considerable statistical complexities when one attempts to refine and optimize the method. While current work employs an almost brute force approach using lots of signal/noise ratios, plenty of samples and well defined representative learning sample sets, backed up by plenty of trial and error research, vastly more efficient, more easily automated, and more reliable procedures are, in principle, possible. While no such complete understanding seems near at present (despite the overwhelming success of our so far crude approach to this spectroscopic technique), a number of insights derived from detailed considerations of the process will be discussed. These include procedures for avoiding optimization pitfalls, overall performance improvements exploiting the non-Gaussian error distribution of the results, simplified optimization routines, and procedures for internal data verification. DOE

N86-17508# Sandia National Labs., Albuquerque, N. Mex.
TOTAL NORMAL EMITTANCE MEASUREMENTS OF HIGHLY CONDUCTIVE, OPAQUE MATERIALS USING A SOLAR FURNACE
B. W. Marshall, Jr. and G. P. Mulholland 1985 4 p To be presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE85-016578; SAND-85-1648C; CONF-860406-1) Avail: NTIS HC A02/MF A01

This paper presents a method of measuring the total normal emittance of two highly conductive opaque materials with and without selective surface coatings and at elevated temperatures. The purpose of this work was to develop a method of measuring the thermophysical properties of materials at elevated temperatures which are subjected to highly concentrated solar flux at the Central Receiver Test Facility (CRTF) at Sandia. A horizontal axis solar furnace located at the CRTF was used to heat the samples to temperatures ranging from 373 to 973 degrees K (100 degrees C, to 700 degrees C) with all tests conducted in air. A Kendall MK-VI radiometer consisting of a cavity-type radiometer and a control unit was used to measure the total normal emittance from the samples. The emittance measurements for both copper and aluminum at 373 degrees and 473(0)K were found to be unreliable because of relatively high drift in the cavity-type radiometer system compared to the emitted energy at these temperatures. However, total normal emittance measurements of these materials at 573 degrees and above compare favorably with trends of published data. DOE

N86-17509# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
RAMAN SPECTROSCOPIC STUDY OF MOLTEN SALT ELECTROLYSIS OF LIGHT METALS
S. Y. Yoon Jan. 1985 43 p
(Contract DE-FG07-82CE-40545)
(DE85-017480; DOE/CE-40545/9) Avail: NTIS HC A03/MF A01

Production of aluminum and magnesium by electrolysis of molten salts is studied with Raman spectroscopy. The I.G. process and aluminum chloride alkali chloride process were selected for the study. By measuring Raman spectra for the pure molten MgCl2 it was confirmed that the experimental set-up is correct. Magnesium and aluminum were confirmed to exist in their electrolyte melts as tetrahedrally coordinated species. Raman spectra for MgCl2 and AlCl3 during electrolysis showed that it can be used as a reference for concentration change. Some result for the AlCl3 electrolysis gave a clue to the problem of the occurrence of new species. DOE

N86-17510# Sandia National Labs., Albuquerque, N. Mex.
PHOTODECOMPOSITION OF Mo(CO)6 ADSORBED ON Si(100)
J. R. Creighton 1985 5 p
(Contract DE-AC04-76DP-00789)
(DE85-017818; SAND-85-2041C) Avail: NTIS HC A02/MF A01

The photochemical decomposition of Mo(CO)6 layers physisorbed on Si(100) was investigated to determine the feasibility of molybdenum deposition and also to examine the photochemical reaction mechanism and efficiency. Temperature programmed desorption (TPD) was used to investigate the interaction of Mo(CO)6 with the silicon surface before and after irradiation. Auger spectroscopy was used to determine surface elemental composition before Mo(CO)6 adsorption and after photodecomposition. DOE

N86-17511# Brookhaven National Lab., Upton, N. Y.
LOW TEMPERATURE METHANOL SYNTHESIS CATALYST AND PROCESS DEVELOPMENT
R. Sapienza, W. Slegeir, D. Mahajan, M. Foran, T. OHare, and G. Skaperdas Apr. 1985 18 p refs Presented at the 10th Annual EPRI Contractors Conference on Coal Liquefaction, Palo Alto, Calif.,

23 Apr. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017837; BNL-36733; CONF-8504130-3) Avail: NTIS HC A02/MF A01

A new catalyst system for synthesis of methanol has been conceived and tested on the laboratory scale by the Fuels and Catalysis Division of the Brookhaven National Laboratory. The catalyst system is made up of mutually soluble liquid components and its novel nature permits operation at remarkably mild conditions. Rapid conversion of synthesis gas has been obtained in laboratory tests at about 100(0)C and pressures ranging from 300 to below 100 pounds per square inch absolute. Patent applications on the catalyst system have been filed and are being processed. The advantages of low temperature operation due to the catalyst are considered. Since the presence of some nitrogen does not affect the process, the use of air-blown gasification is suggested for economic effects. The development of continuous reactors is underway. DOE

N86-17512# Paducah Gaseous Diffusion Plant, Ky.
SEPARATION OF A GAS FROM A GAS MIXTURE
R. Benoit, J. Machefer, J. Mauvisseau, and P. Plurien 1985 10 p Transl. into ENGLISH of German Patent Specification 2,843,416, 12 Apr. 1979 Prepared in cooperation with Commissariat a l'Energie Atomique, Paris, France
(Contract DE-AC05-84OU-21400)
(DE85-018296; KY/tr-85-1) Avail: NTIS HC A02/MF A01

A process is claimed for the separation of a gas from a gas mixture in which this gas is the easiest condensable gas of the gas mixture. The gas mixture is brought into contact with at least one microporous barrier having a permeability of 100 to 1000 moles of air/sq. cm./min/cmHg and a pore strength of 10 to 100 A, that the partial pressure of the easiest condensable gas and/or the temperature of the gas mixture as function of the mean diameter of the barrier pores are regulated in such a way that it results in a capillary condensation of the condensable gas at the entrance of the barrier pores and in an escape of the condensed gas through the pores and through the barrier and in the subsequent collection of the condensed gas. DOE

N86-17513# Main (Charles T.), Inc., New York, N.Y.
CHEMISTRY OF CARBONYL SULFIDE Final Report, 1 Jul. 1984 - 30 Jun. 1985
C. C. Hinckley, L. V. Dunkerton, and J. Tyrrell Sep. 1985 16 p refs
(Contract DE-FC22-83FE-60339)
(DE85-018430; DOE/FE-60339/T20) Avail: NTIS HC A02/MF A01

The preparation, characterization and reactivity of carbonyl sulfide (OCS) and its metal complexes continues to be a major objective of this research. The reactions of metallic compounds with the OCS are directed towards developing efficient regioselective oxidative addition reactions. Present efforts are concentrated on the use of OCS in carbon-carbon bond-forming reactions in the presence of aluminum catalysts. Calculations directed towards an understanding of bonding and reactivity of OCS with transition metals have focused on Ti, Ni, Pt, and Pd (OCS) complexes. Another objective of this research project was preparation of lanthanide monothiocarbamate complexes and examination of the properties of the substances. Additional results are now available for the reaction of OCS with the ene reaction substrate–methylenecyclohexane catalyzed by diethylaluminum chloride. A set of complete spectral data is provided for these reaction products, including high-resolution electron impact mass spectral data, low-resolution chemical ionization mass spectral data, both (1)H and (13)C FT-NMR spectral data, and FT-infrared spectral data. Ab initio effective core potential calculations on the systems Ti(OCS), Ni(OCS), and Pt(OCS) have been completed. Ab initio all-electron calculations on the systems Ti(OCS), Ni(OCS), and TiH4(OCS) have been completed. Optimum and equilibrium structures, as well as electron distributions, have been obtained in all cases. Major program modifications, including the addition of an effective core potential prgram modifications, including the addition of an effective core potential program allowing both relativistic and non-relativistic calculations on elements up through the third transition metal series, have been completed. DOE

N86-17514# California Univ., Santa Barbara. Dept. of Chemical and Nuclear Engineering.
REACTION ENHANCEMENT OF HETEROGENEOUSLY CATALYZED REACTIONS BY CONCENTRATION FORCING Technical Progress Report, 1 Sep. 1984 - 15 Jul. 1985
R. G. Rinker 15 Jul. 1985 18 p
(Contract DE-FG03-84ER-13300)
(DE86-000220; DOE/ER-13300/T1) Avail: NTIS HC A02/MF A01

Highlights of progress accomplished during the period of September 1, 1984 to July 15, 1985 are summarized. The following tasks were performed: (1) Developed a phenomenological model for the reaction sequences in ammonia synthesis at pressures up to 150 psia that permit us to correctly predict the conversion performance of reactors which operate either at steady state or under cyclic (transient) conditions resulting from variations in feed composition such as in concentration forcing. (2) Conducted theoretical studies, both analytical and numerical, on the behavior of adsorption/desorption (A/D) models with Eley-Rideal kinetic steps under forced-concentration operating conditions in distributed systems such as fixed-bed plug-flow reactors. (3) Upgraded the fixed-bed reactor system and made design changes so that it can operate at pressures up to 1000 psia for continued mechanistic and behavioral studies of ammonia synthesis as well as methanol synthesis under conditions of concentration forcing of the feed. (4) Completed construction of a novel annular gradientless reactor facility (lumped system) for studying methanol synthesis from CO and H2 at steady state and under concentration forcing conditions for pressures up to 700 psia and temperatures up to 250(0)C. DOE

N86-17515# Lawrence Livermore National Lab., Calif.
REMOTE AND IN-SITU ANALYSIS
T. Hirschfeld Jul. 1985 27 p refs Presented at the Instrument Society of America International Conference and Exhibit, Philadelphia, Pa., 21 Oct. 1985
(Contract W-7405-eng-48)
(DE85-017397; UCRL-92467; CONF-851045-2) Avail: NTIS HC A03/MF A01

As analysis continues to move out from the laboratory into the factory, the high cost of multiple on-line instruments and the conservative technology needed for unattended operation in a hostile environment have become serious limitations. Remote measurements, using selective optical sensors (optrodes) at the end of a fiber optic network operated by a single central instrument, are a solution to these problems. They allow the instrument to stay in the benign environment and high support level of the laboratory, while the low cost sensors can be multiplied to provide extensive and cost effective monitoring. A further trend, as yet in its infancy, is the movement of analytical and diagnostic capability out from the production line into the product. A number of low cost disposable sensors for this application will be described. DOE

N86-17516# Brookhaven National Lab., Upton, N. Y.
SURVEY OF CHEMICAL SPECIATION OF TRACE ELEMENTS USING SYNCHROTRON RADIATION
B. M. Gordon 1985 14 p refs Presented at the 2nd International Symposium on the Biology and Toxicology of Metals Using Nuclear Analytical Methods, Upton, N.Y., 20 May 1985
(Contract DE-AC02-76CH-00016)
(DE85-017850; BNL-38868; CONF-8505112-2) Avail: NTIS HC A02/MF A01

Information concerning the chemical state of trace elements in biological systems generally has not been available. Such information for toxic elements and metals in metalloproteins could prove extremely valuable in the elucidation of their metabolism and other biological processes. The shielding of core electrons by binding electrons affects the energy required for creating inner-shell holes. Furthermore, the molecular binding and the symmetry of

the local environment of an atom affect the absorption spectrum in the neighborhood of the absorption edge. X-ray absorption near-edge structure (XANES) using synchrotron radiation excitation can be used to provide chemical speciation information for trace elements at concentrations as low as 10 ppM. The structure and position of the absorption curve in the region of an edge can yield vital data about the local structure and oxidation state of the trace element in question. Data are most easily interpreted by comparing the observed edge structure and position with those of model compounds of the element covering the entire range of possible oxidation states. Examples of such analyses are reviewed. DOE

N86-17517# Argonne National Lab., Ill.
LASER SPECTROSCOPY OF SPUTTERED ATOMS
D. M. Gruen, M. J. Pellin, C. E. Young, and W. F. Calaway 1985 34 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-018388; CONF-851174-3) Avail: NTIS HC A03/MF A01

The use of laser radiation to study the sputtering process is of relatively recent origin. Much has been learned from this work about the basic physics of the sputtering process itself through measurements of velocity and excited state distributions of sputtered atoms and the effects of adsorbates on substrate sputtering yields. Furthermore, the identification, characterization, and sensitive detection of sputtered atoms by laser spectroscopy has led to the development of in situ diagnostics for impurity fluxes in the plasma edge regions of tokamaks and of ultrasensitive methods (ppB Fe in Si) for surface analysis with ultralow (picocoulomb) ion fluences. The techniques involved in this work, laser fluorescence and multiphoton resonance ionization spectroscopy, will be described and illustrations given of results achieved up to now. DOE

N86-17518# Institut Franco-Allemand de Recherches, St. Louis (France).
MEASUREMENTS OF THE TWO PHASE FLOW IN THE NEIGHBORHOOD OF THE EXHAUST OF A 7.62 MM CALIBER GUN [MESSUNGEN AN DER ZWEI-PHASENSTROEMUNG IM AUSSTROEMUNGSBERFICH EINES GEWEHRS VOM KALIBER 7.62 MM]
H. Mach, U. Werner, and H. Masur 7 Jun. 1984 109 p refs In GERMAN
(ISL-R-110/84) Avail: NTIS HC A06/MF A01

The exit domain of a type G3, 7.62 mm caliber gun was analyzed using IR emission and absorption spectroscopy, in order to study the behavior of particles and combustion gases such as H2O, CO2, CO, OH, and K as far as they are important for the gun flash. The IR spectrum is mainly dominated by CO2 and H2O. Parameters characterzing the two phase flow (concentration, temperature, velocity, relaxation time, and particle size distribution) were determined using extinction and scattered light measurements, laser Doppler velocimetry, and particle collection techniques. The results confirm theoretical models describing the flow structure, and show that in the pressure region a particle pyrolysis takes places with additional formation of CO2. Author (ESA)

N86-17519# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abt. Waerme.
IGNITION BEHAVIOR OF SMALL HOT COMPONENTS IN FLAMMABLE ATMOSPHERES [ZUENDVERHALTEN KLEINER HEISSER BAUTEILE IN EXPLOSIONSFAEHIGER ATMOSPHAERE]
Dieter Markworth and Fritz Schebsdat Apr. 1985 34 p refs In GERMAN
(PTB-W-25; ISSN-0341-6739) Avail: NTIS HC A03/MF A01

The ignition behavior of small hot components was investigated in order to establish general safety criteria for industry. The measurements were performed using diethyl ether vapor/air mixtures, and sulfur carbon vapor/air mixtures which have very low ignition temperatures. The measured ignition temperatures are always higher then the values known from the test IEC 79-4. A relation between ignition temperature and the component surface and geometry is established, enabling a good assessment of the ignition behavior of small hot components. It is shown how groups consisting of a large number of such small components have to be treated. Author (ESA)

N86-17520# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
ULTRAVIOLET LASER-INDUCED PHOTOCONDENSATION IN THE BENZOL VAPOR PHASE Thesis [UV-LASER INDUZIERTE PHOTOKONDENSATION IN DER BENZOL-DAMPFPHASE]
M. Kauer Feb. 1985 83 p refs In GERMAN
(MPIS-4/1985; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

Benzol was photolyzed with a pulsed excimer laser at 248 nm and the resulting aerosol formation was analyzed with light scattering. At pulse laser energies > 30 mJ/sqcm multiple photon absorption arises, and mainly acetylene is produced. At lower laser energies biphenyl and phenylcyclohexadiene dominate. The lower saturation vapor pressure of the last two and their relatively high yields are the origin of photocondensation. The influence of temperature, benzol concentration, laser energies, and pressure are determined. As a result of oversaturated biphenyl-phenylcyclohexadiene vapors, homogeneous nucleus formation with ensuing condensation and coagulation occur. The growth of particles is discussed. A program for the calculation of scattering and extinction cross sections is given. Author (ESA)

N86-17521# Centre d'Essais Aeronautique Toulouse (France). Lab. Chimie-Inflammabilite.
DOSE OF PES (PLASTICIZER) IN A BSL914 RESIN USING DIFFERENT STANDARDS [DOSAGE DU PES (PLASTIFIANT) D'UNE RESINE BSL 914 (REPERE CEAT C76) A PARTIR D'ETALONS DIVERS]
5 Sep. 1985 21 p In FRENCH
(CEAT-NT-15/M/85) Avail: NTIS HC A02/MF A01

In order to verify a polyether sulfone (PES) plasticizer analysis method, the analysis was repeated using different solvent gradient solutions prepared in different ways, to detect the possible influence of a polar pollution. The results show that in the case of the 914 resin associated to AS4 or T300 fibers, the absence of fiber-PES interactions assures the validity of this method. Author (ESA)

N86-17430*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
EXPLOSIVE DECOMPOSITION OF HYDRAZINE DUE TO RAPID GAS COMPRESSION
O. Briles (Sundstrand Corp., Rockford, Ill.), D. Hagemann (Sundstrand Corp., Rockford, Ill.), F. Benz, and T. Farkas (Rockwell International Corp., Downey, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 519-525 refs Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 07C

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-17522 British Library Lending Div., Boston Spa (England).
ENHANCING THE IMPACT TOUGHNESS OF LOW ALLOY STEEL BY MICRO-ALLOYING AND MODIFICATION
V. I. Machikin, V. A. Kharchenko, and E. F. Dolzhenkova 1985 4 p ref Transl. into ENGLISH from Izv. VUZ Ch. Met. (USSR), no. 4, 1985 p 152-153
(BLL-M-36490-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The question of the replacement of the costly and difficult to obtain nickel in 10KhSND steel with a complex alloy and modification was examined. With optimization of the composition of the

steel the method of mathematical planning was employed – a full factor experiment was carried out. the constants of composition were taken as: 0.12-0.15% C, 0.40-0.60% Si, 0.9-1.1% Cr, 0.015-0.040% Al, 0.01-0.04% Ti. The manganese content was varied from 0.8-1.6%, copper 0.2-0.6% calcium 0.003-0.008%. From the results of mechanical experiments the coefficients of regression were calculated, their statistical significance examined, and the adequacy of the model checked. The analysis of the equations showed that for the steel proposed as a replacement for 10KhSND, the most favorable composition is the following: 0.12-0.15% C, 1.21.6%Mn,0.45-0.65% Si,0.9-1.1% Cr, 0.4-0.6% Cu, 0.01-0.04% Ti, o.003-0.008% Ca, 0.015-0.040% Al. Author

N86-17523 British Library Lending Div., Boston Spa (England).
INFLUENCE OF BORON ON DENDRITE STRUCTURE OF CAST METAL
N. A. Manyak, L. K. Manyak, and V. V. Akulov 1985 4 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 4, 1985 p 153-154
(BLL-M-36491-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The few published works on the influence of boron on dendrite structure are of a qualitative nature. In the present work an effort was made to obtain a quantitative assessment of the influence of boron on the dendrite composition of cast metal. The investigations were carried out on O9G2 steel in the cast (slabs 150 x 1000mm in cross-section) and hot-rolled (16mm thick sheets) states. For the purpose of eliminating the influence of other processing factors, metal from the same heat was subjected to comparative investigation after partial casting; the boron content of the metal was 0.0035-0.0040%. The following parameters were determined: the average thickness of the dendrite axes S; the density of the dendrite structure (DDS) as the ratio of the volume occupied by dendrites to the volume of the interdendrite regions; the degree of dispersion of the dendrite structure (DDISP), i.e., the number of dendrite axes in lcm; calculations were carried out in columnar and equizxed regions using an Epiquant structural analyser in semiautomatic mode. G.L.C.

N86-17524 British Library Lending Div., Boston Spa (England).
POWDER METALLURGY: TECHNOLOGY AND EQUIPMENT
A. E. Vdovin 1985 4 p Transl. into ENGLISH from Stal (USSR), no. 2, 1985 p 85-86
(BLL-M-36380-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Attention is drawn to a forthcoming international powder metallurgy exhibition to be held in Minsk from 26th March to 3rd April 1985. At Powder Metallurgy '85 the latest developments in this rapidly developing field of metallurgy will be on show. The exhibition will provide Soviet and Foreign specialists with an excellent opportunity to strengthen existing ties and to establish new contacts for long-term collaboration in the powder metallurgy field. Author

N86-17525 British Library Lending Div., Boston Spa (England).
SHAPE AND DEPTH OF THE CRYSTALLISATION FRONT IN STEEL INGOTS REMELTED BY THE ELECTROSLAG METHOD DETERMINED WITH THE AID OF RADIOACTIVE PHOSPHORUS
31 Oct. 1985 16 p refs Transl. into ENGLISH from Metalurgia (Romania) v. 35, no. 7, 1982 p 308-312
(BLL-DRIC-T-Tr-7561-(3623.66)) Avail: British Library Lending Division, Boston Spa, Engl.

The new mode of labelling metallic baths with Cu32P, which in combination with the autoradiographic method makes it possible to obtain a visual record on special film (on a 1 : 1 scale), the shape and dimensions of the solification front, as well as the direction of growth of the crystals and their dimensions, as a function of the metal remelting and cooling parameters, and hence to study the crystallization mechanism and the types of defects appearing during the solification process and their causes is presented. The method is also of general interest for other types of investigations (of a direct applicative nature or for basic research) in the field of the solidification of metals and alloys, offering technologists and research workers the possibility of directing and controlling solidification processes. Author

N86-17526 Metals Society, London (England).
INFLUENCE OF CATALYTIC ADDITIONS ON FERRIC-OXIDE REDUCTION
Yu. S. Karabasov et al Sep. 1985 7 p ref Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (Moscow), no. 5, 1984 p 13-16
(BLL-BISI-23009-(9022.060)) Avail: British Library Lending Div., Boston Spa, Engl.: UK £14.25, Overseas $33.75

The mechanism of the catalytic influence of alkali compounds (sodium and potassium hydroxides) on the reduction processes is considered with ferric oxide as the example. From the experimental results obtained by differential thermal analysis and the investigation of adsorption and crystal-lattice parameters it is concluded that the influence is due to the action of the catalysts on the adsorption properties of the surface. Author

N86-17527 Metals Society, London (England).
THE BORIDING OF REFRACTORY METALS
H. Krzyminskii Sep. 1985 13 p Transl. into ENGLISH from Harterei-Tech. Mitt. (West Germany), v. 28, no. 2, 1973 p 100-104
(BLL-BISI-23037-(9022.060)) Avail: British Library Lending Div., Boston Spa, Engl.: UK £13.00, Overseas $30.00

Boriding, the diffusion of boron into metallic surfaces, is aimed at producing wear-resistant surface layers on suitably stressed components. The chemical and metallurgical aspects of this technique have been the object of basic research for a long time. Various methods for producing layers of boride have been investigated for this purpose. Most effort has been devoted to the treatment of ferrous materials. Only a few attempts have been made to boride nonferrous metals. A method for producing acceptable layers of boride on a series of refractory metals is described. The constitution and properties of layers produced by this method are also described. Author

N86-17528 Oxford Univ. (England). Dept. of Engineering Science.
THE EFFECT OF QUENCHING RATE ON THE TEMPERATURE AND STRAIN-RATE SENSITIVITY OF URANIUM 2w/o MOLYBDENUM ALLOY
G. A. C. Boyd, J. Harding, P. A. Bleasdale, K. Dunn, and G. I. Turner 1985 10 p refs Submitted for publication Sponsored by UK Ministry of Defence Procurement Executive
(OUEL-1577/85) Copyright. Avail: Issuing Activity

The mechanical properties of a U2w/oMo alloy in the gamma-quenched, fast-gas-cooled and as-extruded states are compared at tensile strain rates from 0.001 to 2000/sec. Significantly higher stress levels are observed in the gamma-quenched specimen. The cooling rate from the gamma-region does not significantly affect overall strain rate dependence of the flow stress, which, for all 3 materials, increases by 20% over the strain rate range. The gamma-quenched material, however, shows a markedly higher flow stress, by 30%, at all strain rates, probably because of its finer microstructure. Although each material shows a ductility minimum at 2/sec, no effect of strain rate on the overall fracture mode is detected. Failure is by initiation and coalescence of voids (forming preferably in the fast-gas-cooled and the as-extruded materials) at prior gamma-grain boundaries or other microstructural interfaces. For the gamma-quenched material, evidence supports work at quasi-static rates where the fracture path is unrelated to microstructural features. Author (ESA)

N86-17529 Newcastle-upon-Tyne Univ. (England). Dept. of Metallurgy and Engineering Materials.
STRESS CORROSION CRACKING OF 316 STAINLESS STEEL IN HIGH TEMPERATURE WATER Interim Report
J. Congleton and R. N. Parkins Jan. 1985 16 p refs
(Contract ARE-2043/080)
(BR94397) Copyright. Avail: Issuing Activity

The regions of water chemistry for oxygen containing, chlo-

ride doped high temperature water, in which annealed type 316 stainless steel is immune from cracking were studied. Serious cracking is likely to occur at applied potentials > 150 mV (she) in 265 C water or in contaminated water producing an open circuit potential > 150 mV (she). A multitude of short cracks form on specimens tested at 265 C in low oxygen contents or at potentials < minus 200 mV (she). It is not known whether these cracks are self arresting or whether growth can be sustained under cyclic loading or conditions of localized straining.

Author (ESA)

N86-17530# National Aeronautical Establishment, Ottawa (Ontario). Structures and Materials Lab.

HIGH TEMPERATURE OXIDATION AND HOT CORROSION OF NICKEL AND COBALT BASED SUPERALLOYS

P. C. Patnaik Oct. 1985 37 p refs

(NAE-AN-33; NRC-25075) Avail: NTIS HC A03/MF A01

Oxidation and hot corrosion are often the two most important modes of degradation that superalloys undergo in a high temperature gas turbine atmosphere. In general, the corrosion resistance of superalloys has been sacrificed to achieve adequate high temperature strength. Therefore turbine blade and vane materials are often protected from these modes of degradation by the use of protective coatings. Three classes of coating materials based on aluminizing, chromizing and more recently siliconizing treatments are usually considered due to their resistance to oxidation, sulfidation (hot corrosion) processes. The oxidation and hot corrosion properties of superalloys and coating materials of relevance to aero gas turbine engine hot-section are reviewed, with particular emphasis on the interaction between gas phase or molten salt deposits and the substrate alloy/coating system. Recent theories on these processes are reviewed. Finally, the effects of erosion on the corrosion properties of superalloys and coatings are also discussed.

Author

N86-17531*# IIT Research Inst., Chicago, Ill.

CREEP-RUPTURE BEHAVIOR OF IRON SUPERALLOYS IN HIGH-PRESSURE HYDROGEN Final Report

S. Bhattacharyya and W. Peterman Dec. 1985 52 p refs

(Contracts DEN3-363; DE-AI01-77CS-51040)

(NASA-CR-175027; DOE/NASA/0363-1; NAS 1.26:175027; IITRI-M06136-9) Avail: NTIS HC A04/MF A01 CSCL 11F

The creep-rupture behavior of a newly developed cast alloy NASAUT 4G-Al with 15% Cr, 15% Mn, and 1.5% C was evaluated in 15 MPa H2 at 775 C and 825 C. The alloy is intended for automotive stirling heater head application. Rupture life, minimum creep rate, and time to 1% strain data were analyzed using the Orowan-Sherby-Dorn temperature compensated technique, and the 3500-h rupture life stress and stress to obtain 1% strain in 3500 h were estimated. The analyses indicated that 3500-h mean rupture stress at 775 C is 140 MPa, exceeding the design stress of 119 MPa. The predicted mean stress to 1% creep in 3500 h was 57.8 MPa and had a very wide scatter indicating a lack of reproducibility in the alloy structure. For a case alloy, NASAUT 4G-A1 indicated significant ductility with maximum elongation in the range of 6.0 to 13.6% at 775 C. Hydrogen did not seem to affect the stable carbides though some methane was noted in the chamber gas, presumably arising from chamber structural members of lesser stability. The microstructure contained some voids, pores, inclusions, and interdendritic separations, which caused the observed scatter in data.

Author

N86-17532# Korrosionsinstitutet, Stockholm (Sweden).

THE CORROSION PROPERTIES OF ALUMINUM BRONZES: A LITERATURE REVIEW Abstract Only

Folke Eriksson 1985 4 p

(KIS-1985-3E) Avail: NTIS HC A02/MF A01

Aluminum bronzes have been little used in Sweden compared with other countries such as the USA, the UK, West Germany and France. Today there are two standardized cast alloys of aluminum bronze in Sweden, SS 14 57 10 type CuAl10Fe3 och SS 14 57 16 type CuAl10Fe5Ni5, but experience of their corrosion resistance is limited. This review of the literature was started at the Swedish Corrosion Institute in order to gain an increased knowledge of the corrosion properties of aluminum bronzes. The review starts with a general description of the properties and uses of aluminum bronzes, and of the different types of alloys and their metallography, which have a great influence on the corrosion properties. The majority of the fifty-five references in the review of the literature deal with the corrosion of aluminum bronzes in seawater. They deal, among other factors, with the effect of composition of the material, flow rate of the water, pollutions in the water, temperature, galvanic corrosion and marine growth.

Author

N86-17533# Yale Univ., New Haven, Conn.

ELECTROMAGNETIC WAVE INTERACTIONS WITH METALLIC MICROPARTICLES: EXPERIMENTS WITH FIBERS AND FLAKES Final Report, 1 Jan. 1982 - 31 Mar. 1985

R. K. Chang Jun. 1985 15 p

(Contract DAAG29-82-K-0040)

(AD-A158468; ARO-18567.25-PH) Avail: NTIS HC A02/MF A01 CSCL 11/6

Metallic microstructures affect the surface electromagnetic intensity and the charge transfer between the metal and molecular adsorbates. Surface enhanced Raman scattering research has been conducted to further understand these two basic enhancement mechanisms on electrodes, colloids, powder, and S-1 photocathodes. Dielectric microstructures also affect the electromagnetic intensity, particularly inside the medium. In the case of optical fibers and liquid droplets, distinct morphology-dependent resonances can occur at specific ratios of the circumference to wavelength (size parameters). At these resonances, a dielectric microstructure can be conceptualized as an optical cavity. Both linear and nonlinear laser scattering phenomena have been investigated when the monochromatic incident radiation and/or the broadband internally generated inelastic radiation are commensurate with these morphology dependent resonances. Laser emission and stimulated Raman scattering from individual micron-size droplets have been observed for the first time. Author (GRA)

N86-17534# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

THE MECHANICAL PROPERTY DATA BASE FROM A COOPERATIVE PROGRAM ON FIRST GENERATION PM (POWDER METALLURGY) ALUMINUMS Final Report, Jun. 1982 - Aug. 1984

G. J. Petrak and M. A. Malas Aug. 1985 316 p

(AF Proj. 2418)

(AD-A159779; AFWAL-TR-85-4052) Avail: NTIS HC A14/MF A01 CSCL 11/6

Development of a mechanical property data base on first generation P/M structural aluminum alloys is detailed. P/M aluminum alloys tested were 7091 forgings, 7090 forgings, IN9021 forgings, 7091 extrusions, 7090 extrusions, IN9021 extrusions, 7091 plates, 7090 plates, and 7091 sheets. Basic mechanical property data consisted of tension, compression, shear, bearing and fracture toughness. Fatigue data was developed for both smooth and notched specimens. Constant amplitude fatigue crack growth rate data were obtained for all materials and spectrum tests were performed on most products. Corrosion characteristics were also obtained. All data developed by the participants are detailed.

Author (GRA)

N86-17535# General Electric Co., Philadelphia, Pa. Re-entry Systems Operation.

SELF-PROPAGATING REACTIONS FOR SYNTHESIS OF HIGH TEMPERATURE MATERIALS Final Report, Oct. 1983 - Sep. 1984

P. D. Zavitsanos and J. F. DAndrea Jun. 1985 102 p

(Contract DAAG46-83-C-0178; DA Proj. 1L2-63102-DO-71)

(AD-A159869; AMMRC-TR-85-15) Avail: NTIS HC A06/MF A01 CSCL 07/1

This effort was undertaken to investigate the basic aspects of the condensed phase titanium-boron reaction leading to the formation of high density and quality TiB2 under self-propagating

conditions. Candidate factors for controlling microstructure were addressed and were utilized as variables in series of runs which produced TiB2. The heat of formation of TiB2 was measured directly from the reacting elements in a modified bomb calorimeter; a change in entropy at 298F = 71.81 + or - 1.9 was determined which is sufficient to produce liquid TiB2 under adiabatic conditions. High density titanium diboride was prepared from elemental powders of titanium and boron through the self-propagation reaction process. By applying external pressure during the reaction period the product (TiB2) has been densified to 95 to 97% theoretical density. The microstructure and properties such as density, grain size, hardness, strength, toughness by indentation and modulus by elastic and sonic methods, are discussed as a function of variables such as starting stoichiometry, powder-particle size, mixing techniques and nucleation additives such as TiB2 powder. Author (GRA)

N86-17536# Los Alamos National Lab., N. Mex.
HIGH STRAIN RATE DEFORMATION IN FCC METALS AND ALLOYS
P. S. Follansbee 1985 34 p Presented at Explomet '85: International Conference on Metallurgical Applications of Shock-Wave and High-Strain-Rate Phenomena, Portland, Oreg., 28 Jul. - 1 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017533; LA-UR-85-3026; CONF-850770-8) Avail: NTIS HC A03/MF A01

The effect of strain rate, and particularly of high strain rates, on deformation mechanisms in materials is of fundamental interest to those who model and analyze dynamic loading. In many materials the strain rate sensitivity is known to increase dramatically when the strain rate is raised about approx. 100/s. This increase has been interpreted previously as a transmission in deformation mechanism from thermal activation control at low strain rate to dislocation drag control at high strain rate. In copper, copper-aluminum alloys and stainless steel, recent measurements have shown that the increased rate sensitivity found at high strain rates is not due to a transition in deformation mechanism but rather can be explained with standard thermal activation theory. These findings and their implications regarding the formulation of constitutive behavior will are presented. Author

N86-17537# Ames Lab., Iowa.
RARE EARTH CHEMICAL AND PHYSICAL METALLURGY
K. A. Gschneidner, Jr. 1985 6 p Presented at the International Conference on Rare Earth-Development and Applications, Beijing, China, 10 Sep. 1985
(Contract W-7405-eng-83)
(DE85-015536; IS-M-541; CONF-8509133-2) Avail: NTIS HC A02/MF A01

The current state of the rare earth field is reviewed in the areas of basic research, applied research and technology, and commerical utilization. The role of China and its influence, as viewed by an outsider, is briefly summarized. The quenching of spin fluctuations in exchange enhanced paramagnets is also reviewed. DOE

N86-17538# California Univ., Berkeley. Lawrence Berkeley Lab.
HYPERFINE FIELDS IN Fe-Ni-X ALLOYS AND THEIR APPLICATION TO A STUDY OF TEMPERING OF 9Ni STEEL
B. Fultz and J. W. Morris, Jr. Dec. 1984 53 p Presented at the International Chemical Congress of Pacific Basin Society, Honolulu, Hawaii, 16 Dec. 1984
(Contract DE-AC03-76SF-00098)
(DE85-011517; LBL-19369; CONF-841210-25) Avail: NTIS HC A04/MF A01

Hyperfine interactions due to solutes in Fe-Ni-X alloys were systematized, and interpreted with a model of linear response of hyperfine magnetic fields to magnetic moments. The effects of solutes on the (57)Fe hmf were used for chemical analysis of the austenite formed in 9Ni steel during tempering. Diffusion kinetics of the Ni and X solutes were found to play an important role in the formation of the austenite particles. DOE

N86-17539# Oak Ridge National Lab., Tenn.
COUPLED ELECTRON-NUCLEAR MAGNETISM AND NEUTRON DIFFRACTION
S. Kawarazaki and J. Arthur Jul. 1985 26 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Osaka Univ., Toyonaka (Japan)
(Contract DE-AC05-84OR-21400)
(DE85-016479; CONF-850871-5) Avail: NTIS HC A03/MF A01

It often occurs that, in a rare-earth compound having a singlet electronic ground state, a long-range magnetically ordered state is formed by coupling of the nuclear spins with the electrons through the hyperfine interaction, at millikelvin temperatures. Neutron scattering has been used to measure the details of the magnetization processes of both the electrons and the nuclear spins in the coupled state in PrSn3, HoVO4, and PrCu2. The polarized nuclear spins could be observed through spin dependent nuclear scattering by (141)Pr and (165)Ho. The experimental results for PrSn3 and HoVO4 can be explained very well based on mean field considerations. For PrCu2, a recent experiment indicates that a sinusoidal screw structure is realized simultaneously both in the electronic and nuclear spin systems of this material. DOE

N86-17540# Argonne National Lab., Ill.
DAMAGE-RATE GRADIENT EFFECTS ON RADIATION-INDUCED SEGREGATION AND PHASE STABILITY IN IRRADIATED ALLOYS
N. Q. Lam and P. R. Okamoto Jul. 1985 11 p Presented at the International Seminar on Solute Defect Interaction: Theory and Experiment, Kingston, Ontario, 5 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-016605; CONF-8508107-1) Avail: NTIS HC A02/MF A01

Recent studies have shown that significant compositional redistribution in irradiated alloys can be induced by the gradients in the atomic displacement rates resulting from nonuniform defect production, in addition to the commonly-observed solute segregation at defect sinks. This process gives rise to complex local phase transformations during light-ion bombardment or irradiation with focused electron beams in the high-voltage electron microscope. Results of our theoretical and experimental investigations of this phenomenon in Ni-Al and Ni-Si are discussed. The implications of the observed effect in a number of areas of materials science are assessed. DOE

N86-17541# SRI International Corp., Menlo Park, Calif.
INVESTIGATION OF ELECTROCHEMICAL CORROSION OF SEMICONDUCTORS Final Subcontract Report
K. W. Frese, Jr. and D. P. Summers Aug. 1985 49 p
(Contract DE-AC02-83CH-10093)
(DE85-016853; SERI/STR-211-2746) Avail: NTIS HC A03/MF A01

This final report describes the results for the sixth year of a research program concerning photoelectrochemical solar cells. Work for the first five years focused on the corrosion of semiconductors in electrolyte media. In the final phase, some different but related questions were considered: (1) adsorption and interface state properties of CdSe in alkaline sulfide media; and (2) electrodeposition of semiconductor thin films using the mass transport method of the rotating disk electrode. Impedance was measured on single-crystal n-CdSe electrodes in alkaline media. In the presence of NaOH, surface state densities were low. The flatband potential of n-CdSe was also measured as a function of sulfur-to-sulfide ratio. Cu, In, Se, Te, and Cd were electrodeposited with a rotating disk electrode. The stoichiometry of two elements in a binary semiconductor film was controlled by having appropriate concentrations in the electrolyte. Observed and calculated diffusion-controlled currents for CdTe deposition agreed within 1 to 2%. Results for CuInSe2 were not as good, probably because of insufficient cathodic bias. DOE

N86-17542# Oak Ridge National Lab., Tenn.
SURVEY OF PHYSICAL PROPERTY DATA FOR SEVERAL ALLOYS

R. E. Pawel and R. K. Williams Aug. 1985 40 p
(Contract DE-AC05-84OR-21400)
(DE85-018138; ORNL/TM-9616) Avail: NTIS HC A03/MF A01

This report summarizes an examination of physical property data available in the literature for six alloys of potential interest to the Toroidal Fusion Core Experiment in the Fusion Energy Program. The properties of thermal expansion, density, specific heat, electrical resistivity, and thermal conductivity were compiled for six alloys: Nitronic 33, a low-nickel, high manganese stainless steel; nickel-base Inconnel Alloys 625, 718, and X-750; and copper alloys C10400 and C17510. The temperatures of interest were 4-500 K for the Nitronic 33 and the Inconels, and 250-400 K for the copper alloys. Where data were lacking, estimates were made based on theory or comparisons with similar materials. DOE

N86-17543# Argonne National Lab., Ill.
INTERNAL FRICTION STUDY OF STRAIN AGING IN ALLOYS
R. B. Schwarz Jul. 1985 10 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985
(Contract W-31-109-eng-38)
(DE85-018367; CONF-8506125-10) Avail: NTIS HC A02/MF A01

Internal friction measurements were used to study strain aging in single crystals of Al-Mg and Cu-Al alloys as a function of temperature and aging time. In the absence of deformation-generated vacancies, solute segregation to dislocations starts at 200 and 300 K, respectively. Excess vacancies were generated in pure Al and Al-Mg alloys by in-situ plastic deformation at 120 K. With increasing temperature, solute segregation to dislocations starts in these alloys at 200 K, as in the absence of excess vacancies. The excess vacancies become mobile in pure Al and in the Al-Mg alloys at 250 K. It is concluded that the initial locking of dislocations by solutes occurs through a rearrangement of solutes near the dislocation cores and that in Al-Mg alloys, deformation-generated vacancies have little or no effect in this process. DOE

N86-17544# Pontifica Univ. Catolica do Rio de Janeiro (Brazil). Dept. de Engenharia Mecanica.
COMPARISON OF DIFFERENT ALGEBRAIC STRESS MODELS IN PREDICTING TEMPERATURE FLUCTUATIONS AND MEAN VELOCITY IN LIQUID-METALS
M. J. S. deLemos 1985 11 p Presented at the International Symposium on Refined Flow Modeling and Turbulence Measurements, Iowa City, Iowa, 16 Sep. 1985 Prepared in cooperation with Argonne National Lab., IL.
(Contract W-31-109-eng-38)
(DE85-018374; CONF-8509165-2) Avail: NTIS HC A02/MF A01

The present work consists of a numerical investigation comparing three algebraic stress closures for turbulence in predicting the variance of temperature fluctuations and mean velocity for flow of mercury. The models of Ljuboja and Rodi, Sha and Launder, and Lemos and Sesonske are used, as they handle differently the modeling of the dissipation rate of temperature fluctuations, and several terms in the algebraic equations for the turbulent fluxes. A sensitivity analysis on some constants of the latter model is also presented. Pipe flow with constant wall heat flux were the geometry and boundary condition. The range for Re was from 30000 to 60000, and the buoyancy parameter Ra/Re sq was varied from 10 to the -5 to 10 to the -4, where Ra is the Rayleigh number. The model of Lemos and Sesonske shows a substantial improvement in predicting temperature fluctuations, whereas predictions for the mean velocity show a weak dependence on the model used. Nevertheless, the model of Lemos and Sesonske gives results closer to available experimental data. DOE

N86-17545# Massachusetts Inst. of Tech., Brookhaven Station, N.Y. School of Chemical Engineering Practice.
LOCALIZED ELECTROCHEMICAL CORROSION OF NICKEL BASED ALLOYS
O. Oyeleye, M. Davidson, and D. Dudek Sep. 1984 74 p
(Contract DE-AC02-76CH-00016)
(DE86-000521; BNL-51910; MIT/BNL-84-3) Avail: NTIS HC A04/MF A01

The technique of monitoring open-circuit potential over time to study pitting corrosion of Alloy 600 was demonstrated at 95C. Chloride ion and oxygen levels were varied to determine the conditions required for pit initiation and propagation at 25C and 95C. Without applied potential pitting was not observed at 25C in solutions of up to 2.6 M NaCl. At 95C pit initiation occurred above 0.22 M NaCl for a nitrogen sparged system, 0.042 M NaCl for a contaminated air sparged system and 0.059 M for an O2 sparged system. At 95C pit initiation followed by propagation was observed at 0.22 M, 0.12 M and 0.11 M NaCl for the N2, air and O2 sparged systems, respectively. A theoretical model, using a hemispherical pit geometry and transport based on the Nernst-Einstein equation, was developed to predict changes in ion concentration, current and pit size. For a pit with an initial radius of 100 A, a fixed potential difference of 0.5 V and constant ionic diffusivities on the order of 10 to the minus 5 power/sq cm/sec, the model predicts that the solution within the pit will become saturated with metal chloride within 2 x to the minus 7 power seconds. The current density increases exponentially with time and reaches a maximum value of 7.2 x 10 to the 4th power A/sq cm at the point of saturation. DOE

N86-17546# Pacific Northwest Lab., Richland, Wash.
HEAVY METAL ALLOYS CONTAINING 30% TO 90% TUNGSTEN
W. E. Gurwell Jun. 1985 21 p refs Presented at the Annual Powder Metallurgy Conference, San Francisco, Calif., 14 Jul. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017896; PNL-SA-13071; CONF-850791-1) Avail: NTIS HC A02/MF A01

Tungsten-nickel-iron alloys containing 30% to 90% tungsten were rolled into sheet from billets produced by either liquid-phase or solid-state sintering. Compositions below 80% tungsten segregate during liquid-phase sintering. That is, gravity settling of the tungsten spheroids occurs, leaving a layer of matrix phase on top of the billet. For solid-state-sintered alloys in the annealed condition, impact toughness and tensile elongation were found to be directly related to the volume fraction of tough matrix phase. Liquid-phase-sintered alloys of 85% and 90% tungsten were tougher and more ductile than corresponding solid-state-sintered alloys. Ultimate strength of all annealed alloy was essentially the same, at about 120 ksi. All the alloys work harden rapidly during rolling and require frequent intermediate anneals. Solution-annealed 40% tungsten alloy was hardened by precipitation of a lamellar tungsten phase. Aging at 925(0)C for two hours increased hardness from 12 to 26 HRC. The aged alloy is tough, strong, and isotropic. An ultimate strength of 146 ksi and elongation of 32% were obtained. When the same alloy was cold rolled 30% after annealing, the ultimate strength was 164 ksi and elongation was 9%. DOE

N86-17547# Oak Ridge National Lab., Tenn.
RECENT DEVELOPMENTS CONCERNING SEGREGATION AND FRACTURE AT GRAIN BOUNDARIES
C. L. White 1985 22 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018106; CONF-851174-2) Avail: NTIS HC A02/MF A01

Certain trace impurities have long been known to embrittle grain boundaries in polycrystalline metals and alloys. In recent years a large body of evidence, directly connecting impurity segregation to intergranular failure, has become available. Indeed, it was conventional wisdom for a time that all intergranular failure could be attributed to segregation of embrittling impurities, and that all segregation degrades grain boundary cohesion. There have been several interesting experimental and theoretical developments during the last 5 to 10 years that run counter to this conventional wisdom, some of which may significantly advance our understanding of the mechanism by which impurities affect grain boundary cohesion. Several examples of beneficial grain boundary

segregants will be presented, and the relationship between segregation behavior and grain boundary cohesion will be discussed. DOE

N86-17548# Pacific Northwest Lab., Richland, Wash.
IRRADIATION EFFECTS ON SUBSTRUCTURE RELATED TO IRRADIATION SOFTENING
J. L. Brimhall and E. P. Simonen Apr. 1985 23 p Presented at the Workshop on the Relation Between Mechanical Properties and Micro-structure Under Fusion Irradiation Conditions, Ebeltoft, Denmark, 27 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-018224; PNL-SA-13194; CONF-8506165-3) Avail: NTIS HC A02/MF A01

The evolution of the dislocation microstructure during irradiation of a deformed Fe-2 1/4 Cr-1Mo ferritic alloy was characterized by two competing processes. At low temperature, the dislocation density increased due to loop formation and interaction. At higher temperature, the dislocation density decreased due to recovery and polygonization of the original tangled cell structure. The transition temperature which separates these two processes decreased with increasing degree of cold work. Radiation induced recovery of the deformation substructure was, however, only marginal compared to purely thermal-induced. The observed transition in microstructure with temperature correlated well with the transition from hardening at low temperatures to softening at high temperatures observed neutron irradiation. The dislocation evolution in cold-worked ferritic alloys is distant from that observed in cold worked austenitic alloys in that cold-worked or annealed starting conditions do not evolve to the same uniform dislocation density in the ferritic alloy as is observed in austenitic alloys. DOE

N86-17549# Rochester Univ., N. Y. Dept. of Mechanical Engineering.
DIFFUSIONAL CREEP OF MULTICOMPONENT SYSTEMS Final Report, 1 Feb. 1973 - 31 Jan. 1985
J. C.M. Li Apr. 1985 17 p
(Contract DE-AC02-76ER-02296)
(DE86-000184; DOE/ER-02296/30) Avail: NTIS HC A02/MF A01

Achievements are summarized in three areas: stressed solids, impression creep, and dislocation studies. DOE

N86-17550# Societe Creusot-Loire, Le Creusot (France). Centre de Recherches.
DEVELOPMENT OF A SINGLE PHASE SURFACE LAYER OF TIN ON STEEL [MISE AU POINT D'UN REVETEMENT MONO-PHASE DE TIN SUR ACIER]
Y. Charbonniere Jun. 1983 63 p In FRENCH
(Rept-1570) Avail: NTIS HC A04/MF A01

The surface treatment by chemical vapor deposition to generate a TIN high performance layer on normal or stainless steels is described. The steel is first nitrided by ionic diffusion and then exposed to 950 to 1000 C during 10 hr in the presence of a NH4Cl gas flow and titanium spheres of < 5 mm diameter. Extremely high surface hardness is obtained (> 4400 Vickers) and thickness of 10 to 20 microns. Adherence problems exist in the case of stainless steel. Author (ESA)

N86-17551# Societe Creusot-Loire, Le Creusot (France). Centre de Recherches.
STUDY OF THE SURFACE HEAT TREATMENT OF CUTTING TOOLS AND SAMPLES OF GROOVED CYLINDERS MADE BY A LASER BEAM. COMPARISON WITH AN ELECTRON BEAM [ETUDE DU TRAITEMENT THERMIQUE SUPERFICIEL D'OUTILS DE TRANCHAGE ET D'ECHANTILLONS DE CYLINDRES CANNELLES PAR FAISCEAU LASER. COMPARAISON AVEC LE FAISCEAU D'ELECTRONS]
M. Boulx and R. Leveque Sep. 1983 67 p refs In FRENCH
(Rept-1578) Avail: NTIS HC A04/MF A01

Hardening surface treatments using laser or electron beams were explored on different types of steels. A CO2 laser that could be focused down to 0.3 mm was used. Hardened layers approaching 1 mm are obtained, with Vickers hardness levels of 850 with laser and 720 with electron beam. The results are not so good with high speed steels. Author (ESA)

N86-17552# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France). Laboratoire Techniques Nouvelles.
METALLURGICAL AND ASSEMBLING FATIGUE CHARACTERIZATION OF THE ALLOYS 2214T451, 7010T73651 AND 2024T351 IN PLATES (50 TO 70 MM, 120 TO 125 MM) AND IN THICK FORGED BARS [CARACTERISATION METALLURGIQUE ET EN FATIGUE D'ASSEMBLAGE DES ALLIAGES 2214T451, 7010T73651 ET 2024T351 EN TOLES (50 A 70 MM, 120 A 125 MM) ET FORGES-TRACTIONNES]
F. Gourcuff 8 Oct. 1984 117 p In FRENCH
(Contract STPA-81-96-027)
(DGT-25.919) Avail: NTIS HC A06/MF A01

Aluminum alloys for aeronautical application were tested in tensile fatigue and crack propagation tests. The 7010T73651 alloy, which is to be used in the A320 aircraft, shows good tempering and static properties and good damage tolerance. The other two alloys, which are thought of as alternatives to alloys in current application, are acceptable substitutes. Author (ESA)

N86-17553# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.
SPECTRAL ANALYSIS AND METALLOGRAPHIC INVESTIGATIONS OF CORROSION AND PRECIPITATION PRODUCTS OF HIGH TEMPERATURE ALLOYS Thesis - Technische Hoschule, Aachen [SPEKTRALANALYTISCHE UND METALLKUNDLICHE UNTERSUCHUNGEN AN KORROSIONS- UND AUSSCHEIDUNGSPRODUKTEN VON HOCHTEMPERATURLEGIERUNGEN]
W. Mayer, M. Mazurkiewicz, and H. Nickel Feb. 1985 133 p refs In GERMAN; ENGLISH summary
(JUEL-1975; D-82; ISSN-0366-0885) Avail: NTIS HC A07/MF A01

The corrosion layers formed on samples of Inconel 617 and Incoloy 800 H in a synthetic process gas during different detention periods and a temperature range between 800 to 950 C were separated using an electrochemical procedure, and quantitatively analyzed. For the quantitative analysis of the corrosion products an inductively coupled plasma (ICP) was used as an excitation source for the spectroscopic analysis. The horizontal and vertical distribution of the line intensities and the matrix effects occurring during the analysis of the electrolyte solution were determined in inductively coupled N2/Ar and Ar/Ar-plasma systems. The ICP quantitative analysis data were compared with those of the metallographic postexamination of the formed corrosion layers as well as with the X-ray diffraction analysis and with microprobe measurements, showing that Inconel 617 and Incoloy 800 H have a parabolic growth law. Author (ESA)

N86-17554# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
DETERMINATION OF THE SUSCEPTIBILITY OF SILVER-PLATED COPPER WIRE/CABLE TO RED PLAGUE CORROSION
Jul. 1985 17 p refs
(ESA-PSS-01-720-Issue-1; ISSN-0379-4059) Avail: NTIS HC A02/MF A01

An accelerated screening test method to determine the suitability of silver-plated wire/cable materials, for use on ESA spacecraft and associated equipment is described. The test method, which also determines the suitability of the related fabrication processes, is based on the work of Anthony and Brown (1965). The environmental test system artificially promotes red plague corrosion under controlled laboratory conditions as a result of galvanic corrosion of the copper conductor core in locations where breaks or porosity exist in the silver plating. Author (ESA)

N86-17555# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes de Materiaux Metalliques.

INFLUENCE OF CORROSION PITS AND ENVIRONMENTAL MOISTURE ON THE FATIGUE BEHAVIOR OF 35 NCD 16 THR-ESR Test Report [INFLUENCE DE PIQURES DE CORROSION ET DE L'HUMIDITE AMBIANTE SUR LA TENUE EN FATIGUE DU 35NCD16 THR-ESR]
5 Aug. 1985 39 p In FRENCH
(M3-450900) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out using cylindrical steel specimens of Kt = 1.035 at a frequency of 165 Hz. The corrosion was obtained by chemical attack. The pitted specimens show a reduction of 40% to 85% in the extrapolated stress for 10 million cycles. The noncorroded specimens show a similar reduction in fatigue life when exposed to a 95% moisture atmosphere.
Author (ESA)

N86-17556# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes et de Materiaux Metalliques.
STUDY OF THE INFLUENCE OF PITTING CORROSION ON THE FATIGUE CHARACTERISTICS OF MARVAC 18 Test Report [ETUDE DE L'INFLUENCE DE LA CORROSION PAR PIQURES SUR LA TENUE EN FATIGUE DU MARVAC 18]
5 Aug. 1985 49 p In FRENCH
(M2-666500) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out in order to verify the effect of pitting corrosion found in a maraging steel of the Mirage 1 aircraft. The specimens were artificially corroded. Oligocyclic fatigue test conditions were ASTM CT 20 B specimens tested at 0.5 Hz frequency. The crack length was measured by the electric potential method. The results show a reduced fatigue life of as much as 1/10 of the original value for 0.002 to 0.003 mm pitting.
Author (ESA)

N86-17557# Centre Technique des Industries Mecaniques, St. Etienne (France).
APPLICATIONS OF MICROALLOYED STEELS TO STAMPING Final Report [APPLICATION DES ACIERS A DISPERSOIDES A L'ESTAMPAGE]
A. Durand Jun. 1985 71 p refs In FRENCH
(CETIM-13-K-301) Avail: NTIS HC A04/MF A01

The economic advantage of perlite formation during steel drawing, avoiding further heat treatment, is studied. The influence of the drawing ratio and drawing velocity are discussed. The lower cost and the low significance of drawing parameters allow the extension of this procedure to more complicated forging operations. A temperature of 500 or 600C could cause problems in forging, but solutions are possible. Microalloyed steels could be processed to obtain working loads of 1000 N/mmsq. Author (ESA)

N86-17558# Metallgesellschaft, A.G., Frankfurt am Main (West Germany). Metall-Lab.
PRESSING EFFECT AND STRESS CORROSION CRACKING OF AN EXTRUDED AlZnMgCu TYPE ALUMINUM ALLOY Final Report, Dec. 1983
Michael Renner and Peter Wincierz Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 92 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-087; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19.50

The effects of the texture and structure anisotropy of extruded AlZnMgCu aluminum alloys on the directional dependence of stress corrosion cracking were studied by testing rods with two different extrusion textures, and untextured material in hot hardening and cold conditions. The anisotropy of the mechanical properties and of the electrical conductivity are verified. Texture has little influence on the long duration creep rupture of the stress corrosion cracking. The directional dependence of the stress corrosion cracking behavior is explained with the anisotropy of matrix grains. Crack progress of embrittled grain boundaries through hydrogen is conditioned by the degree of complexity of the crack routes. Probes with greater width/thickness ratio have shorter duration due to the percentage of grain boundaries parallel to the stress direction.
Author (ESA)

N86-17559# Krupp (Fried.) G.m.b.H., Essen (West Germany). Entwicklung Magnettechnik.
DEVELOPMENT OF COBALT-FREE HIGH GRADE PERMANENT MAGNETS ON THE BASIS OF MnAl ALLOYS Final Report, Jun. 1984
Wilhelm Ervens Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 99 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-099; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21

Economical procedures based on plastic deformation of MnAl alloys used as ferromagnetic materials with various preferred directions were developed for manufacture of anisotropic cobalt-free high grade permanent magnets. A test stand for adaptation and measurement of the procedure parameters and of the degree of deformation was designed. The magnet values depend on alloy composition, deformation procedure, and deformation rate, degree and temperature. Good magnet values are attained at 700 C. The extrusion procedure results in axially oriented magnets with the best magnet values, the compression procedure in radially oriented magnets. The stamping procedure allows the setting of preferred directions. The thermal aging behavior and the MnAlc alloy corrosion resistance was studied. The manufacture of anisotropic MnAlc magnets is costly and depends on the cobalt availability conditions.
Author (ESA)

N86-17560# Centre Technique des Industries Mecaniques, Nantes (France).
INFLUENCE OF THE PRESENT PRACTICE OF HEAT STRAIGHTENING OF THICK STEEL PLATES (OVER 20 mm) ON THE MECHANICAL PROPERTIES Final Report [INFLUENCE DE LA PRATIQUE ACTUELLE DES CHAUDES DE RETRAIT SUR LES PROPRIETES MECANIQUES DE TOLES D'ACIERS D'EPAISSEUR SUPERIEURE A 20 MM]
R. Gaillard (Institut de Soudre) 27 Aug. 1985 48 p In FRENCH (Contract IS-83.1757)
(CETIM-100-840; IS-17-323) Avail: NTIS HC A03/MF A01

The influence on mechanical properties of use of heat to straighten or form thick steel plates was studied at maximum temperatures 1200, 1000 and 600 C. Local modifications of structure and hardness do not affect the general mechanical properties except for a nickel-vanadium alloy when subjected to the higher temperature ranges.
Author (ESA)

N86-17561# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
AMORPHOUS ALUMINUM HYDROXIDE GELS
A. C. Pierre and D. R. Uhlmann (MIT, Cambridge, Mass.) 1985 10 p refs Presented at a Conference, Montpellier, France, 12-14 Sep. 1985
(SNIAS-852-430-104) Avail: NTIS HC A02/MF A01

A model of the atomic structure of gels obtained from aluminum hydroxide sols is proposed. The sols are produced from aluminum-sec-butoxide in acidic media. The model is based on large angle X-ray diffraction and electron microscopy data. The model supposes a structure in which the bohemite planes are folded. The main interlayer peak would be rejected at small angles due to a large interlayer spacing, while the secondary peaks are wiped out due to the intercalation of water between the bohemite layers, which results in a first kind distortion.
Author (ESA)

N86-17562# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
GELATION OF ALUMINUM HYDROXIDE SOLS
A. C. Pierre and D. R. Uhlmann (MIT, Cambridge, Mass.) 16 Jan. 1985 43 p refs Presented at 85th Annual American Ceramics Society Meeting Submitted for publication
(SNIAS-852-430-19) Avail: NTIS HC A03/MF A01

The gelation of Al(OH)3 sols obtained from aluminum sec-butoxide is studied as a function of preparation conditions, including pH, temperature, and time of aging. A mechanism of gelation by the action of the anions of acids (NO3-) is proposed. Depending on temperature, it can lead to the building of extended Boehmite ribbons, an action favored by time, increasing anion content, decreasing water content. Below a given temperature it leads to the creation of polymeric structures trapping water to give a clear polymeric complex amorphous gel. Author (ESA)

N86-17563# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
CHEMICAL AND MICROSTRUCTURAL EFFECTS ON THE DIFFUSIONAL CREEP BEHAVIOUR OF AISI TYPE 316 STAINLESS STEEL
C. M. Shepherd, A. W. James, and J. M. Titchmarsh Jun. 1985 48 p
(AERE-R-11322) Avail: NTIS HC A03/MF A01

The creep behavior of AISI type 316 steel was investigated at low stresses in the temperature range 650 C to 750 C. Specimens in the form of helical coils were used to examine the effects of temperature, grain size, composition and aging on the creep rates. The precipitate microstructures were examined in detail using transmission electron microscopy. At 650 C there was no effect of changing the carbon, phosphorus or tin contents of the steels. The grain size dependence of the creep rate was much weaker than that predicted by the Coble equation (which predicts an inverse cube relationship with grain size). At 750 C the creep rates for the unaged, phosphorus doped and high carbon materials were lower than those for the dependence remained as predicted. The importance of grain boundary particles, both intermetallic and carbides, in reducing the creep rate was shown, particularly at small grain sizes. Author

N86-17564# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE INFLUENCE OF HEAT AFFECTED ZONE MICROSTRUCTURES ON THE DUCTILITY AND HYDROGEN EMBRITTLEMENT OF 9 PERCENT Cr 1 PERCENT Mo STEEL
N. P. Haworth (Sheffield City Polytechnic, England) and C. A. Hippsley Jun. 1985 50 p
(AERE-R-11473) Avail: NTIS HC A03/MF A01

The effects of internal hydrogen on the mechanical properties of a commercial 9% Cr 1% Mo steel were investigated. Studies were confined to three typical weld heat-affected-zone (H.A.Z.) microstructures in the air cooled and stress relieved conditions (dual phase, fully martensitic, and intercritical). Hydrogen was introduced into the material via an electrolytic charging process and conditions were obtained to simulate concentrations of hydrogen typically achieved during welding. The effect of hydrogen on mechanical properties was monitored via tensile testing and the fracture surfaces were examined using Scanning Electron Microscopy. The ductility of all H.A.Z. microstructures was reduced by internal hydrogen; the most pronounced effect was on material in the air cooled condition. Small quantities of delta-ferrite at grain boundaries proved to be most deletrious to the ductility of air cooled structures both before and after hydrogen charging. However, after stress relief, the fully martensitic structure was most susceptible to hydrogen embrittlement. Author

N86-17395*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CORROSION OF METALS BY HYDRAZINE
E. A. Lawton, C. M. Moran, and S. DiStefano *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 145-153 refs (For primary document see N86-17380 08-20)
(Contract NAS7-918)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

N86-17396*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECTS OF SURFACE PRETREATMENT AND NITROGEN TETROXIDE PURIFICATION ON THE CORROSION RATE OF TYPE 304L STAINLESS STEEL
G. D. Blue and C. M. Moran *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 155-159 refs Sponsored in part by NASA and AF (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11F

N86-17399# Ultramet, Pacoima, Calif.
OXIDATION RESISTANT COATINGS FOR REFRACTORY METALS
J. T. Harding, R. H. Tuffias, R. B. Kaplan, and Kurt Chandler (Air Force Rocket Propulsion Lab., Edwards AFB, Calif.) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 181-187 refs (For primary document see N86-17380 08-20)
(Contract F04611-84-C-0043)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11/6

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-17565 Massachusetts Univ., Amherst.
STRUCTURE-PROPERTY STUDIES IN THE DEFORMATION OF SEMI-CRYSTALLINE POLYMERS Ph.D. Thesis
Hoe Hin Chuah 1985 243 p
Avail: Univ. Microfilms Order No. DA8517069

Drawing behavior of a high pressure crystallized chained-extended polyethylene in solid-state extrusion was studied. Because of the reduced trapped entanglements at the fold surfaces and interlamellar links in this morphology, there was insufficient continuity to provide stress transfer for effective orientation. Draw efficiency increases to a maximum of 0.71 when the polyethylene is crystallized at higher undercoolings. Tensile moduli are found to be a unique linear function of molecule draw ratio, measured by thermal shrinkage, independent of the initial morphology, draw temperatures and techniques. Electron microscopy of the fracture surface replicas at low draw shows the coexistence of undeformed, tilted, partially drawn lamellae and the generated fibrillar structure. The observations are consistent with Peterlin's model of plastic deformation. The question of melting and recrystallization during deformation is studied by small-angle X-ray scattering of the drawn chain-extended polyethylene. The results show that melting and recrystallization do not occur for this morphology. Author

N86-17566 Royal Armament Research and Development Establishment, Fort Halstead (England).
MELT PROCESSABLE LIQUID CRYSTAL POLYMERS. PART 1: A REVIEW OF CURRENT DEVELOPMENTS
R. L. Tickner, P. Q. Flower, and J. Roberts Nov. 1984 14 p refs
(RARDE-MEMO-50/84-Pt-1; BR93987) Avail: NTIS HC A02/MF A01

Melt processable polymers based on liquid crystal technology are described. Compared with conventional thermoplastics, the polymers offer marked advances in mechanical properties because of the extremely high levels of molecular orientation arising from their liquid crystal structure, combined with unusual rheological, electrical and magnetic properties. Low molecular weight liquid crystal materials, and developments in their polymeric counterparts are reviewed. Author (ESA)

N86-17567 Sussex Univ., Brighton (England). School of Chemistry and Molecular Sciences.
OXYLUMINESCENCE STUDY OF THE DEGRADATION OF FILLED AND UNFILLED RUBBERS Final Report

N. C. Billingham and F. McCapra Dec. 1984 48 p refs
(Contract MOD-D/ER1/9/4/2120/046-AMTE-HH)
(BR94542) Avail: Issuing Activity

The measurement of extremely low levels of light accompanying the degradation of polymers in oxygen (oxyluminescence) to monitor aging in fabricated materials and predict lifetimes is discussed: Measurements on the emission from rubber samples, before and after vulcanization and in the presence of white and black fillers are described. Results show that it is possible to obtain useful data even from samples heavily filled with carbon black and that there is a correlation with aging and history of the samples. There is a consistent pattern in the way in which the oxyluminescence changes with sample aging. Author (ESA)

N86-17568# Korrosionsinstitutet, Stockholm (Sweden).
PLASTICS AND RUBBER IN DIFFERENT CHEMICAL ENVIRONMENTS: A SURVEY OF THEIR RESISTANCE TO CORROSION Abstract Only
Gunnar Bergman 1985 2 p
(KIS-1985-2E) Avail: NTIS HC A02/MF A01

Summarized in handbook form are the corrosion properties of some 20 main types of plastics and some 10 or so types of rubber. It is based on surveys made in the pulp and paper industry, searches in the literature, perusal of suppliers' information about materials, and the experience of the author and the working group of technicians from industry who are engaged in the work of the Swedish Corrosion Institute in the polymer field. Author

N86-17569# Kentucky Univ., Lexington. Dept. of Chemistry.
POLYNUCLEAR PYRAZOLYL-BRIDGED SPIRO SPECIES CONTAINING BORON AND METAL CENTERS Interim Technical Report
J. Bielawski, T. G. Hodgkins, W. J. Layton, K. Niedenzu, and P. M. Niedenzu Oct. 1985 21 p
(Contract N00014-83-K-0611)
(AD-A159647; UK/DC/TR-10) Avail: NTIS HC A02/MF A01 CSCL 07/3

A series of chain-type polynuclear pyrazolyl-bridged spiro species containing boron and metal centers has been prepared. Reaction of the tetrakis(1-pyrazolyl)borate ion, B(pz)4(Hpz = pyrazole), with one molar equivalent of a metal halide species LMX (L = nonreactive ligands(s); M = metal, e.g., Pd; X = halogen) yielded covalent compounds of the type (pz)2Bmu-pz2ML; and with two molar equivalents of LMX, trinuclear cationic species of the type LM(micron-pz)2B(micron-pz)2ML+ were obtained. Corresponding reactions using B-di(1-pyrazolyl)pyrazaboles gave the trinuclear R2Bmu-pz)2B(micron-pz)2ML+ (r = non-coordinating substituent) and tetranuclear LM(mu-Pz)2B(micron-pz) 2ML2(+) ions, respectively. Reaction of metal dihalides, MX2 (e.g., M = Zn, Pd, Pt), with B-(1-pyrazolyl)pyrazaboles yielded species of the types R2B(micron-pz)2B(micron-pz)2BMX2 and X2M(micron-pz)2B(micron-pz)2B(micron-pz)2M X2. In addition, the pentanuclear compound C12ZnB(micmicron-pz) 2B(micron-pz) 2Zn(micron-pz)2B (micron-pz)2ZnC12 was obtained from ZnB(pz)4 and ZnCl2. Author (GRA)

N86-17570# Oak Ridge National Lab., Tenn.
PLUTONIUM(4) HYDROUS POLYMER CHEMISTRY
L. M. Toth and K. E. Dodson 1985 6 p refs Presented at the Annual Meeting of the American Nuclear Society, Boston, Mass., 9 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016594; CONF-850610-43) Avail: NTIS HC A02/MF A01

The hydrous polymer chemistry of Pu(IV) in aqueous nitric acid solutions has been a subject of considerable interest for several years. This interest stems mainly from the fact that most nuclear fuel reprocessing schemes based on the Purex process can be hampered by the occurrence of polymer. As a result, an understanding and control of the parameters that affect polymer formation during reprocessing are studied. DOE

N86-17571# Lawrence Livermore National Lab., Calif.
CALCULATING THE VULNERABILITY OF SYNTHETIC POLYMERS TO AUTOIGNITION DURING NUCLEAR FLASH Final Report
R. Hickman and T. Reitter 1985 31 p refs
(DE85-016649; UCRL-53545) Avail: NTIS HC A03/MF A01

The purpose of our investigation was to determine if the rapid progression of fire to flashover conditions in a furnished room, observed in a 1953 nuclear weapons test at the Nevada Test Site (the Encore Event), might be typical behavior rather than an aberration. We placed special emphasis on fires that occurred in modern rooms, i.e., ones furnished with upholstery and drapery materials made from synthetic polymers. Examination of photochemical processes showed them to be an unlikely explanation. Out unlikel explanation. Our calculation of rapid radiant-heating behavior of a few materials demonstrated that fabrics and fabric-covered foams would exceed their autoignition temperature when exposed to a 25-cal/sq. cm. fluence from a 1-Mt air burst weapon. Because synthetic polymers have higher heating values and release heat faster during combustion than do the cellulosics used in the Encore experiment, early flashover should not be unexpected in contemporary households. However, the far-field thermal fluence required would be higher because of the absorption of thermal energy by windows and window coverings. Because of the complexity of the problem, carefully planned, full-scale experiments will be needed to finally answer the question. DOE

N86-17572# Materials Consultant Associates, Inc., Pickens, S.C.
CHEMICALLY BONDED CERAMIC MATERIALS FOR USE IN THERMAL ENERGY STORAGE DEVICES
D. A. Brosnan Aug. 1985 67 p
(Contract DE-AC05-84OR-21400)
(DE85-018078; ORNL/Sub-81-16953/1) Avail: NTIS HC A04/MF A01

Calcium aluminate cement and sodium polyphosphate bonded refractory concretes, i.e., castables, based on North Carolina olivine aggregates were developed for use in electric off peak or night storage heaters. The calcium aluminate cement bonded concretes exhibited no deterioration after 50 thermal cycles in a 15 kW room size storage heater. These cement bonded castables are limited to use below 1200(0)C when using the high iron (oxide) cements. The phosphate bonded concretes exhibited limited thermal shock damage after 50 thermal cycles, but this damage might be acceptable in storage core zones where temperatures exceed 1200(0)C due to the high refractoriness of the phosphate bonded compositions. Additions of high specific gravity minerals such as magnetite increased the bulk density of the concrete to equal that of conventionally fired (sintered) olivine brick. The performance of the storage heater with castable core components was similar to the heater's performance with a core constructed of conventionally fired brick. Concrete sections were cast directly about the heater's resistive elements without any deterioration of the concrete or effect on the heater's performance. These results demonstrate that simple concrete casting and curing steps can be employed to produce storage heater cores and that significant cost savings can be realized by using olivine concretes in storage devices as compared to the use of conventionally fired brick. DOE

N86-17573# Argonne National Lab., Ill.
CHEMICAL CHARACTERIZATION OF POLYETHYLENE RESINS AND POLYETHYLENE GAS PIPE
L. A. Raphaelian and D. G. Ettinger 1985 15 p Presented at the 9th Plastic Fuel Gas Pipe Symposium, New Orleans, La., 12 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-018346; CONF-851158-2) Avail: NTIS HC A02/MF A01

Three analytical techniques were used in this study to characterize chemically commercial polyethylene pipe samples: carbon-13 nuclear magnetic resonance (C-13 NMR) for looking at branching in the polyethylene, gas chromatography/mass spectrometry (GC/MS) for characterizing some of the low molecular weight components of polyethylene gas pipe, and X-ray diffraction (XRD) for determining the degree of crystallite orientation and crystallite size of the polyethylene within the polyethylene pipe matrix. Results are discussed. DOE

N86-17574# Centre Technique des Industries Mecaniques, Nantes (France).
STUDY ON THE MEASURING OF POLYMER RHEOLOGICAL PROPERTIES BY ADAPTING AN INJECTION MOLDING MACHINE Final Report [ETUDE D'UN MONTAGE D'ATELIER PERMETTANT D'OBTENIR LES COURBES RHEOLOGIQUES DES POLYMERS A L'AIDE D'UNE PRESSE A INJECTER]
M. Brierre 13 Feb. 1985 39 p refs In FRENCH
(CETIM-5-850-06) Avail: NTIS HC A03/MF A01

The theoretical and experimental study resulted in the development of the equivalent of a capillary viscometer adaptable to the output end of an injection molding machine. Two pressure meters and one thermocouple are used and its indications are continuously recorded. Faster and more reliable results are claimed. Data and curves obtained using a polystyrene polymer are presented. Author (ESA)

N86-17575# Centre Technique des Industries Mecaniques, Senlis (France).
MODIFICATION OF VULCANIZED ELASTOMER SURFACES TO DIMINISH ADHERENCE TO METALS Final Report [MODIFICATION DE L'ETAT DE SURFACE D'ELASTOMERS VULCANISES EN VUE DE DIMINUER LEUR ADHERENCE AUX METAUX]
Heraud, Jahier, Papirer, and Schultz Nov. 1984 60 p refs In FRENCH
(Contracts DRET-82-S-0937; DRET-82-S-0938; DRET-82-S-0939)
(CETIM-100340) Avail: NTIS HC A04/MF A01

Surface treatments to diminish surface adhesivity were explored in order to avoid utilization problems in mechanical assemblies such as valves, gaskets and pistons. Adhesion models are reviewed including the electric, wetting, rheological, and chemical adhesion models. Surface chemical treatments explored included fluor injection by low temperature plasmas, peroxide crosslinking, organomagnesium treatment, and SZC washing. The plasma treatment combines a reduction of the adherence with a conservation of the elastomer bulk properties. Author (ESA)

N86-17576# Centre Technique des Industries Mecaniques, St. Etienne (France).
THE HARDENING OF TECHNICAL ADHESIVES Final Report [MOYENS DE DURCISSEMENT DES ADHESIFS TECHNIQUES]
J. Zirah May 1985 68 p In FRENCH
(CETIM-101370) Avail: NTIS HC A04/MF A01

Industrial procedures to obtain the hardening of adhesives are reviewed. Direct heating, vapor phase heating, fluidized bed oven, pressure heating, thermoreactive heating, infrared effects, magnetic induction, dielectric heating, ultraviolet hardening, and beta radiation hardening of epoxy resins, polyurethanes, phenolics and polyimide resins are discussed. Author (ESA)

N86-17577# Elektroschmelzwerk Kempten G.m.b.H., Munich (West Germany).
DEVELOPMENT OF SILICON NITRIDE MATERIALS FOR CASTING OF SOLAR CELL SILICON Final Report, Sep. 1984
Klaus Hunold and Peter Matje Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 56 p refs In GERMAN; ENGLISH summary Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-069; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12

High-purity reaction bonded sintered cast materials were developed. Small grain sized silicon powders with a small amount of impurities, comparable to that of the starting powder, were produced by grinding and acid treatment of very pure silicon. Test samples and crucibles were formed by cold isostatic pressing and by slip casting. In both cases there were difficulties in the forming of larger crucibles. Test samples and crucibles of silicon powders of different grain size and purity and of Si/Si3N4-mixtures were nitrited. The degree of reaction is up to 98% with densities up to 2.80 g/cub cm. Laboratory tests show good results, but tests with larger crucibles by customers are not always satisfactory. Author (ESA)

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-17578# Midwest Research Inst., Golden, Colo.
ECONOMIC CONTRIBUTION OF LIGNINS TO ETHANOL PRODUCTION FROM BIOMASS
H. L. Chum, S. K. Parker, D. A. Feinberg, J. D. Wright, P. A. Rice, S. A. Sinclair, and W. G. Glasser May 1985 102 p refs
(Contract DE-AC02-83CH-10093)
(DE85-008814; SERI/TR-231-2488) Avail: NTIS HC A06/MF A01

Lignin, one of the three major polymeric components of biomass (16% to 33% by weight in wood), has the highest specific heat content. Therefore, it can be burned for process fuel. Compared to coal, its fuel value is 2.2 cents/lb. This report investigates markets for lignin utilization of higher value. After lignin isolation from the process, purchase of replacement fuel (coal was analyzed), lignin sale for the manufacture of solid materials or higher value octane enhancers was evaluated. Polymeric applications evaluated were: surfactants, asphalt, carbon black, adhesives, and lignin plastics; agricultural applications were briefly reviewed. These lignins would generate coproduct credits of 25 cents to 150 cents/gallon of ethanol respectively for 7.5 cents to 60 cents/lb lignin value (isolation and eventual modification costs were taken into account). Overall markets for these polymeric applications were projected at 11 billion lb/year by the year 2000. These projections are intensities of demand and not actual shipments of lignins. In addition, this report investigates the possibility of converting lignins into mixtures of methyls aryl ethers and methyl substituted-aryl ethers which are high value octane enhancers, fully compatible with gasoline. The report intends to show that if fuel ethanol production in the billions of gallons scale occurs lignin markets would not be saturated. DOE

N86-17579# Research Inst. of National Defence, Umea (Sweden).
MICROBIAL PROBLEM WITH STORAGE OF JET FUEL IN ROCK CAVERNS: DEVELOPMENT OF A PROCESS FOR PURIFICATION OF CORROSIVE JET FUEL
Roger Roffey Jun. 1985 97 p refs In SWEDISH; ENGLISH summary
(FOA-A-40051-B4; ISSN-0281-0220) Avail: NTIS HC A05/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 100

Literature concerning fuel desulfurizing is summarized and investigations on the use of compounds for purifying jet fuel by extraction or adsorption are reviewed. A process for the desulfurizing of a corrosive fuel with a high elemental sulfur content (1 to 5 mg/l) based on the use of powdered silver as adsorbant is described; adsorption capacity, and data for a full-scale compact plant (100 to 300 cub m fuel/hr), constructed as a mobile unit, enabling it to be transported to storage plants, are given. Cost estimates based on a silver consumption of 14 g per cub m fuel are presented. Author (ESA)

N86-17580# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France). Groupe Technique Poudres.
VISUALIZATION OF INTERIOR BALLISTIC PHENOMENA [VISUALISATION DES PHENOMENES DE BALISTIQUE INTERIEURE]
Herve Houdard, Michel Nicolas, and Jean Louis Paulin 11 Apr. 1985 26 p refs In FRENCH Presented at 8th International Ballistics Symposium, Orlando, Fla., 23-25 Oct. 1984
(Contract DRET-82-226; DRET-83-177)
(SNPE-NT-27/85/CRB/NP) Avail: NTIS HC A03/MF A01

A 3 mm aircraft gun was simulated using a model entirely manufactured in composite materials such as glass fibers and epoxy resins. The maximum pressure of 300 MPa, powder and projectile masses, and outlet velocity are the same as those of

the real gun. The choice of composite materials permitted the obtaining of X-ray images of the phenomena occurring inside the gun. The photographs show that this method is appropriate to visualize interior phenomena. Author (ESA)

N86-17581# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A REFERENCE SURVEY OF PYROLYSIS OF EXPLOSIVES
Annika Forsbeck Aug. 1985 63 p refs In SWEDISH; ENGLISH summary
(FOA-C-20580-D1; ISSN-0347-3694) Avail: NTIS HC A04/MF A01

Models which can predict critical temperature and time to explosion for different sizes and shapes of energetic materials are examined. Spontaneous initiation for different geometries (Semenov and Frank-Kamenetskii); comparison between numerical analyzing and experimental data; numerical models for enclosed explosives; tests with a nonenclosed spherical explosive; initiation with the an electronic beam or an incandescent wire; laser initiation; kinetics of exothermic reactions; solid phase kinetics; correspondance between kinetic data and theoretical equations; and Arrhenius parameters are reviewed. Author (ESA)

N86-17383# United Technologies Corp., San Jose, Calif. Chemical Systems Div.
CRACKED BALLISTIC GRAIN TESTS AND ANALYSIS
E. C. Francis and W. L. Hufferd *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 19-36 refs (For primary document see N86-17380 08-20)
(Contract DAAH01-82-C-A121)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17389# Hughes Aircraft Co., Canoga Park, Calif. Missile Systems Group.
FAST COOK-OFF TESTS OF THE AMRAAM AIR VEHICLE
G. W. Cox and R. Sharma *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 89-97 (For primary document see N86-17380 08-20)
(Contract F08635-82-C-0001)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17390# Morton Thiokol, Brigham City, Utah.
FACTORS AFFECTING PI SUB k IN HTPB FORMULATIONS
M. M. Roland *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 99-105 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17392# Westinghouse Electric Corp., Sunnyvale, Calif.
MOONBURNER: AN ULTRA-HIGH WEB FRACTION GRAIN DESIGN
William M. Wood *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 123-130 (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17402# Lawrence Livermore National Lab., Calif.
INITIAL RESULTS FOR THE FAILURE STRENGTH OF A LOVA GUN PROPELLANT AT HIGH PRESSURES AND VARIOUS STRAIN RATES
Marc Costantino and Donald Ornellas *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 213-227 Sponsored in part by Army (For primary document see N86-17380 08-20)
(Contract W-7405-eng-48)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 21/9

N86-17465# Christian Rovsing Ltd., Copenhagen (Denmark).
DESIGN AND DEVELOPMENT OF A PYROTECHNIQUE ARMING AND FIRING UNIT
M. Heisel and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 287-293 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-17582# Brookhaven National Lab., Upton, N. Y.
SPUTTER DEPOSITION SYSTEM FOR CONTROLLED FABRICATION OF MULTILAYERS
R. P. DiNardo, P. Z. Takacs, C. F. Majkrzak, and P. M. Stefan Jun. 1985 7 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017521; BNL-36742; CONF-850887-28) Avail: NTIS HC A02/MF A01

A detailed description of a sputter deposition system constructed specifically for the fabrication of X-ray and neutron multilayer monochromators and supermirrors is given. One of the principal design criteria is to maintain precise control of film thickness and uniformity over large substrate areas. Regulation of critical system parameters is fully automated so that response to feedback control information is rapid and complicated layer thickness sequences can be deposited accurately and efficiently. The use of either dc or RF magnetron sources makes it possible to satisfy the diverse material requirements of both X-ray and neutron optics. DOE

N86-17583# Los Alamos National Lab., N. Mex.
EXPERIMENTAL RESULTS ON A LOW-TEMPERATURE MAGNETIC REFRIGERATOR
J. A. Barclay, W. F. Stewart, W. C. Overton, R. J. Candler, and O. D. Harkleroad 1985 11 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017541; LA-UR-85-2987; CONF-850814-5) Avail: NTIS HC A02/MF A01

A Carnot-cycle magnetic refrigerator has been designed, built, and tested in the temperature range of approx. 4 K to approx. 15 K. Gadolinium gallium garnet in the rim of a wheel is the refrigerant. The wheel rim rotates through a gap between two superconducting Helmholtz coils that produce a magnetic field of up to 6 T. Helium gas is used as the heat-transfer fluid in the hot and cold regions of the wheel. The refrigerator performance has been measured in an open-cycle flow system because no suitable low-temperature helium gas pumps were available for closed loop circulation of helium gas. Over one watt of cooling power with a temperature span of several degrees was achieved. At low frequencies the cooling power and temperature changes of the refrigerator match the entropy-temperature data used in the design. Problems associated with friction and gas mixing limit the performance at frequencies above about 0.1 Hz. Separate friction measurements suggest that gas flow control is the dominant problem that needs to be solved before significant improvement in refrigerator operation can be expected. The present measured efficiency is about 20% of Carnot if the drive motor efficiency is ignored. With friction and other losses in the drive motor mechanism, the overall efficiency is approx. 1% of Carnot. DOE

N86-17584# Brookhaven National Lab., Upton, N. Y.
OPERATIONAL TESTS OF THE BNL 24.8 kW, 3.8 K HELIUM REFRIGERATOR
D. P. Brown, Y. Farah, R. J. Gibbs, A. P. Schlafke, J. H. Sondericker, K. C. Wu, M. Freeman, V. Ganni, R. Kowalski, and R. McWilliams

1985 8 p refs Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Koch Process Systems, Westborough, MA.
(Contract DE-AC02-76CH-00016)
(DE85-017851; BNL-36949; CONF-850814-9) Avail: NTIS HC A02/MF A01

The BNL 24.8 kW refrigeration system is completely installed and major portions of the acceptance tests have been completed. So far, the equipment tested has performed at or above design levels. The room temperature helium compressor station has been completely tested and accepted. The two-stage oil injected screw compressor system exhibited an isothermal efficiency of 57% while delivering a helium flow in excess of 4400 g/s. Data on the performance of the make-up gas cryogenic purifier is given. The refrigerator turbomachinery, 13 expanders and three cold compressors, has been tested at room temperature for mechanical integrity and control stability. The first cooldown to operating temperature will be attempted in late August, 1985. DOE

N86-17585# Oak Ridge National Lab., Tenn.
CORROSION OF MATERIALS IN ABSORPTION HEATING AND REFRIGERATION FLUIDS
J. C. Griess, J. H. DeVan, and H. PerezBlanco Jun. 1985 15 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018140; ORNL/TM-9646) Avail: NTIS HC A02/MF A01

The corrosion of metals and alloys in absorption refrigeration fluids has received little attention except for the behavior of steel and copper alloys in aqueous lithium bromide solutions. This report presents results of short-term corrosion tests on several materials in lithium bromide solutions as well as in other fluids of potential interest in advanced absorption machines. All materials tested had extremely high resistance to organic fluids, but in the aqueous systems some of the materials underwent localized attack. Type 304 stainless steel had acceptable corrosion resistance in most environments, but it underwent stress corrosion cracking in oxygen- or chromate-containing lithium bromide and even in the unstressed condition was subject to intergranular attack in hot concentrated caustic solutions. DOE

N86-17586# Societe Creusot-Loire, Le Creusot (France).
DEVELOPMENT OF A MANUFACTURING PROCEDURE TO PRODUCE COLD ROLLING CYLINDERS BY DEPOSING A HIGH ALLOY STEEL LAYER ON A NORMAL STEEL CYLINDER [DEVELOPPEMENT D'UN NOUVEAU PROCEDE DE FABRICATION DE CYLINDRES DE LAMINOIRS A FROID PAR DEPOT D'ACIER A HAUTES CARACTERISTIQUES SUR UNE AME EN ACIER]
A. Boucher Feb. 1984 57 p refs In FRENCH Original contains color illustrations
(Rept-1645) Avail: NTIS HC A04/MF A01

High speed steel was sprayed by a plasma system on to normal steel cylinders. A double arc plasma system was adopted. The first arc ionizes the gas between the anode and a tungsten electrode, while the second is established between the anode and the cylinder. Cylinders of up to 315 mm diameter are manufactured. The results show a good surface quality and an improved life. The existence of microporosities remains a problem. Author (ESA)

N86-17587# Centre Technique des Industries Mecaniques, Senlis (France).
SLOW MOTOR: ISO ROUND ROBIN TESTS Final Report [MOTEUR LENT. ESSAIS CIRCULAIRES ISO]
J. P. Lecerf and P. Meurice Nov. 1984 57 p In FRENCH
(CETIM-N-01270) Avail: NTIS HC A04/MF A01

A test procedure for a hydraulic slow speed motor by the constant flow and torque method to be verified in Germany, France, Denmark, United States, and Japan aiming to stablish an ISO test norm is proposed. The measured parameters and the instrumentation characteristics are detailed. The experimental results show that velocity variations increase with load, and are larger at lower fluid flow for a constant torque. The variations in feed pressure are small under variations of the load torque. The conclusion is that the method could be considered a base to work set an ISO standard. Author (ESA)

N86-17588# National Aerospace Lab., Amsterdam (Netherlands).
[ACTIVITIES REPORT IN AEROSPACE RESEARCH, WITH DATA CONCERNING THE SCIENTIFIC COMMITTEE NLR-NIVR, INTERNATIONAL COOPERATION CONCERNING AGARD, DNW, GARTEUR AND COOPERATION WITH INDONESIA] Annual Report, 1984 [VERSLAG OVER HET JAAR 1984. MET GEGEVENS OMTRENT DE WETENSCHAPPELIJKE COMMISSIE NLR-NIVR, DE INTERNATIONALE SAMENWERKING IN AGARD-, DNW-, ETW- EN GARTEUR-VERBAND, EN OMTRENT DE SAMENWERKING MET INODNESIE]
1984 145 p refs Partly in DUTCH and ENGLISH Original contains color illustrations
Avail: NTIS HC A07/MF A01

Aerodynamics, flight, structures and materials, space technology and remote sensing, informatics, environment, energy supply, and equipment, were studied. Research for the Fokker-50 and 100 projects and related development of a measuring, recording, and data processing system for aircraft are described. Damage tolerance of aircraft structures and materials such as carbon/epoxy laminates with outer plies of glass, Aramid and carbon fabric, titanium alloys, and carbon fiber composites, were investigated. Fluid physics research, spacecraft attitude control system tests, and thermal vacuum research were carried out. The development of a multispectral CCD scanner, synthetic aperture radar, and side-looking airborne radar, were studied. A program to integrate aerospace informatics disciplines is described. Air traffic noise calculations, and windpower utilization research were executed. A simulation system for the satellite navigation system NAVSAT was developed. A low-speed wind tunnel LST 3x2.25 was commissioned. Author (ESA)

N86-17648# Joint Publications Research Service, Arlington, Va.
ESTABLISHMENT AND USE OF TIME UNIFICATION SYSTEM FOR CIVIL AVIATION
M. M. Malyy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 30 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 28-30 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17650# Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING EMITTANCE OF THERMAL INSULATION MATERIALS AT LOW TEMPERATURES
L. Ya. Paderin, I. M. Baskin, and Yu. V. Filin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 33 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 39-40 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-17589 Polytechnic Inst. of New York, Brooklyn.
THE SCATTERING OF GAUSSIAN BEAMS INCIDENT ON A TRANSMITTING LAYER CONFIGURATION Ph.D. Thesis
1985 138 p
Avail: Univ. Microfilms Order No. DA8515844

The work presented here is a detailed investigation of the guidance and scattering of electromagnetic waves by lossless or lossy multilayered structures. Analytical results are obtained for the characteristic (surface and leaky) waves supported by a layer

placed between two different dielectric media, which thus form canonical asymmetrical duct, transition or gap configurations. It is found that such asymmetric structures may support four basic varieties of surface-wave fields and six varieties of leaky-wave fields. Four of the six leaky waves are novel and they account for leakage of energy into only one of the two media exterior to the central layer. These four varieties of novel leaky-wave fields cease to exist in the special case of symmetric structures, in which the two exterior media are identical. The behavior of the leaky waves in the duct geometry are somewhat different from those in the gap geometry, while the properties of the leaky-wave fields in the transition geometry may be either duct-like or gap-like depending on the physical parameters involved. Dissert. Abstr.

N86-17590 California Univ., San Diego.
CALCULATING RADAR DETECTION PROBABILITIES BY CONTOUR INTEGRATION Ph.D. Thesis
James Alexander Ritcey 1985 184 p
Avail: Univ. Microfilms Order No. DA8517914

Evaluating the performance of signal processing schemes often reduces to computing the error probability in a related hypothesis test. The main theme of this dissertation is to numerically evaluate radar signal processing schemes from contour integrals for error or tail probabilities. The tail probabilities are written as contour integrals that involve the moment generating function (m.g.f.) of the test statistic which obviates the evaluation of an indefinite integral of the density function. Since we are interested in decision thresholds far out on the tails of the distribution and test statistics which are the sum of a large number of processed pulse returns, an efficient numerical procedure is required. A numerical procedure is described that is based on the method of steepest descent and consists of numerical contour integration in the complex plane. After tracing the history of the algorithm, the numerical integration is described. The trapezoidal rule is employed and we obtain explicit bounds for the truncation error. A generic m.g.f. is used which is applicable in many detection problems. Some classical radar detectors are evaluated for both nonfluctuating and chi-squared fluctuating targets using saddlepoint integration. Dissert. Abstr.

N86-17591 Pennsylvania Transportation Inst., University Park.
BEAM STEERABLE MICROWAVE ANTENNA FOR AUTOMOTIVE RADAR APPLICATION Ph.D. Thesis
Vincent Paul McGinn 1985 215 p
Avail: Univ. Microfilms Order No. DA8516066

Research described herein reports on the techniques developed for documenting the performance of an experimental (baseline) forward looking collision avoidance automotive radar system. The system studied operates at a frequency of 36 Gigahertz and emits a beam stationary with respect to the vehicle. On-the-road testing has been accomplished and deficiencies are highlighted. Specifically, false alarms caused by highway guard rails and complex traffic situations are demonstrated in an 18-minute television production suitable for public broadcasting. The program utilizes panoramic views of actual driving situations accompanied by real time telemetry data representing vehicle dynamics and radar system response. Data gathered suggests performance enhancement (lower false alarm rate and improved resolution) through the use of a beam steerable antenna. Since the ultimate goal of perfecting an automotive collision avoidance radar system should be widespread consumer application, cost effectiveness is a necessity. To this end, a new microwave device and technique are suggested. Dissert. Abstr.

N86-17592 Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
THE PHYSIKALISCH-TECHNISCHE BUNDESANSTALT (PTB) TEST REGULATIONS. IMMUNITY FROM DISTURBANCE. METHODS TO TEST THE INFLUENCE OF ELECTROMAGNETIC DISTURBANCES ON MEASURING EQUIPMENT [PTB-PRUEFREGELN. STOERFESTIGKEIT. VERFAHREN ZUR PRUEFUNG DES EINFLUSSES EKELTROMAGNETISCHER STOERGROESSEN AUF MESSGERAETE]
Georg Bittner, Peter Thoma, and Wilhelm Eisfelder 1984 30 p refs In GERMAN
(ISSN-0341-7964) Copyright. Avail: Issuing Activity

The testing of the effects of external electromagnetic disturbances on measuring equipment is presented. The tests were conducted using electromagnetic disturbances as proposed in a guideline of the European Communities. The requirements for the test equipment, the test piece, the testing method and aids are discussed, including power supplies, battery supply, 50 Hz magnetic field, electrostatic discharges, and signal in and outputs. The test piece passes the test if, under the influence of external electromagnetic disturbances, the specified error bars are not exceeded or the error function is recognizable. The test results are listed. Author (ESA)

N86-17593 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
VISUALISATIONS OF SPEECH BASED ON A MODEL OF THE PERIPHERAL AUDITORY SYSTEM
D. Schofield Jul. 1985 33 p refs
(NPL-DITC-62/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Application of information available concerning the peripheral auditory system to automatic speech recognition, in particular to the initial processing of the acoustic signal was studied. Problems with conventional methods of signal analysis, and knowledge on the peripheral auditory system are reviewed. This knowledge is applied to modeling the system as far as the input to the nerve cells, using a filterbank approach. Visualizations of the results are included. It is concluded that the model could be used as the first stage of a two layer process, the second stage modeling effects within the nervous system. The visualizations also have promise as an alternative to spectral displays derived from digital block-mode processing. Author (ESA)

N86-17594*# California Univ., Los Angeles. Dept. of Electrical Engineering.
LOW COST VOICE COMPRESSION FOR MOBILE DIGITAL RADIOS Final Report
Jim K. Omura Jun. 1985 87 p
(Contract JPL-957030)
(NASA-CR-176490; NAS 1.26:176490) Avail: NTIS HC A05/MF A01 CSCL 17B

A new technique for low cost rubust voice compression at 4800 bits per second was studied. The approach was based on using a cascade of digital biquad adaptive filters with simplified multipulse excitation followed by simple bit sequence compression. G.L.C.

N86-17595*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TECHNOLOGY ACHIEVEMENTS AND PROJECTIONS FOR COMMUNICATION SATELLITES OF THE FUTURE
James W. Bagwell 1986 13 p refs Proposed for presentation at the 11th Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87201; E-2856; NAS 1.15:87201) Avail: NTIS HC A02/MF A01 CSCL 17B

Multibeam systems of the future using monolithic microwave integrated circuits to provide phase control and power gain are contrasted with discrete microwave power amplifiers from 10 to 75 W and their associated waveguide feeds, phase shifters and power splitters. Challenging new enabling technology areas include advanced electrooptical control and signal feeds. Large scale MMIC's will be used incorporating on chip control interfaces, latching, and phase and amplitude control with power levels of a few watts each. Beam forming algorithms for 80 to 90 deg. wide angle scanning and precise beam forming under wide ranging environments will be required. Satellite systems using these dynamically reconfigured multibeam antenna systems will demand greater degrees of beam interconnectivity. Multiband and multiservice users will be interconnected through the same space platform. Monolithic switching arrays operating over a wide range of RF and IF frequencies are contrasted with current IF switch technology

implemented discretely. Size, weight, and performance improvements by an order of magnitude are projected. Author

N86-17596# Naval Postgraduate School, Monterey, Calif.
THE USE OF FILTERS IN DIGITAL COHERENT RECEIVERS OPERATING IN A JAMMING AND NOISE ENVIRONMENT M.S. Thesis
D. Macone Jun. 1985 133 p
(AD-A159792) Avail: NTIS HC A07/MF A01 CSCL 20/14

The effectiveness of the use of front-end bandstop filters in coherent digital receivers versus previously derived optimum jammer waveforms is analyzed. The receivers studied are the binary frequency shift key (FSK) and the binary phase shift key (PSK) coherent (correlator) receivers. The filters analyzed for use against an optimum jammer are a single bandstop region ideal filter, and a second order single bandstop region real filter. General expressions in frequency domain form, are derived for the probability of error of coherent receivers with a front-end filter, then applied specifically to the performance of receivers operating in the presence of noise, jamming, and PSK or FSK modulation. Finally these results are presented in graphical form and, additionally, analyzed and interpreted. Author (GRA)

N86-17597# Georgia Inst. of Tech., Atlanta.
A STUDY OF THE SPIRAPHASE AND ANISOTROPIC SUBSTRATES IN MICROSTRIP ANTENNAS Interim Report, Dec. 1983 - Dec. 1984
J. J. H. Wang Aug. 1985 46 p
(Contract F19628-84-K-0010)
(AD-A159862; RADC-TR-85-146) Avail: NTIS HC A03/MF A01 CSCL 09/5

Two subjects are discussed in this interim report; the spiraphase antenna and the use of anisotropic substrates in microstrip antennas to decouple the radiation and scattering modes. It was observed that the spiraphase, a multiarm spiral structure can be used either as a reflector or directly as a transmit and/or receive antenna. The bandwidth of the reflector case is much more limited; however, improvements are possible by understanding the mechanism that limits the bandwidth. The broadband nature of the spiraphase used directly as a transmit and/or receive antenna was established. The development of spiraphase into a microstrip antenna is discussed. The use of anisotropic substrates, or other substrates with exotic materials, was found to be useful in decoupling the radiation and scattering modes in the microstrip antenna. This decoupling process is made possible because the use of anisotropic material nullified the foundation on which the reciprocity, or the equivalence of receiving and transmitting patterns of antenna rests. Author (GRA)

N86-17598# Oklahoma State Univ., Stillwater. School of Electrical and Computer Engineering.
AN ADAPTIVE APPROACH TO A 2.4 KB/S LPC SPEECH CODING SYSTEM Final Report
R. Yarlagadda, D. L. Soldan, R. D. Preuss, and L. D. 05Sims Hoy, C. S. Jul. 1985 255 p
(Contract F19628-81-K-0043)
(AD-A160312; RADC-TR-85-45) Avail: NTIS HC A12/MF A01 CSCL 17/2

The goal of this research was to investigate (1) Adaptive estimation methods for noise suppression and performance enhancement of Narrowband Coding Systems for speech signals and (2) Autoregressive spectral estimation in noisy signals for speech analysis applications. Various prefiltering techniques for improving linear predictive coding systems were investigated. Filter coefficients were varied to optimize each filter technique to remove noise from the speech signal. A new prefilter consisting of an adaptive digital predictor (ADP) with pitch period delay was developed and evaluated. The one-dimension filter approach was expanded upon to use a two-dimensional approach to suppress noise in the short time fourier transform domain. The two dimensional approach was found to have significant potential. Fast algorithms for efficient solution of the linear estimation problem and a new recursive linear estimator suitable for rapid estimation of a signal in noise were developed. GRA

N86-17599# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
CALCULATIONS OF TRANSIENT FIELDS IN THE FELIX EXPERIMENTS AT ARGONNE USING NULL FIELD INTEGRATED TECHNIQUES
H. C. Han, K. R. Davey, and L. Turner Aug. 1985 30 p Prepared in cooperation with Argonne National Lab., Ill.
(Contract DE-AS05-78ET-52025)
(DE85-017617; GTFR-60) Avail: NTIS HC A03/MF A01

The transient eddy current problem is characteristically computationally intensive. The motivation for this research was to realize an efficient, accurate, solution technique involving small matrices via an eigenvalue approach. Such a technique is indeed realized and tested using the null field integral technique. Using smart (i.e., efficient, global) basis functions to represent unknowns in terms of a minimum number of unknowns, homogeneous eigenvectors and eigenvalues are first determined. The general excitatory response is then represented in terms of these eigenvalues/eigenvectors. Excellent results are obtained for the Argonne Felix cylinder experiments using a 4 x 4 matrix. Extension to the 3-D problem (short cylinder) is set up in terms of an 8 x 8 matrix. DOE

N86-17600# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
CONTRIBUTIONS TO COMBINATION CODING: SUM ORDERING AND COVERING RADIUS Ph.D. Thesis [CONTRIBUTIONS AU CODAGE COMBINATOIRE: ORDRES ADDITIFS, RAYON DE RECOUVREMENT]
Antoine Lobstein Mar. 1985 156 p refs In FRENCH
(ENST-85E002; ISSN-0751-1353) Avail: NTIS HC A08/MF A01

Total order additive relationships are studied and related to knapsack coding methods. The generation of all sum ordering relations compatible with the same size total natural order relation is described. The minimum number of words for a code designed as K(n,t), with a length n and covering ratio t, is determined for linear and nonlinear codes. Bounds and error correcting codes are discussed Author (ESA)

N86-17601# Ferranti Ltd., Bracknell (England). System Problem Analysis Group.
ANALOGUE SAR SIGNAL PROCESSING: ARCHITECTURE AND TECHNOLOGY
D. J. Bonfield, K. M. Harvey, J. R. E. Thomas, and D. W. Cruse Paris ESA Mar. 1979 132 p refs
(Contract ESA-3400/79/NL-HP(SC))
(Rept-3881-Issue-1-Vol-2; ESA-CR(P)-1512) Avail: NTIS HC A07/MF A01

Analog implementation of SAR processing junctions, including sampling and time expansion, range correlation; prefiltering, including range migration correction; and azimuth correlation was studied. Prefiltering and azimuth correlation functions were breadboarded. For each processing function, alternative implementations are considered. Power consumption based on charge transfer device (CTD) technology was estimated. For the prefilter and azimuth correlator, promising architectures were explored in terms of the CTD and SAW devices available, to select practical solutions for breadboarding. Details of candidate devices are provided and each breadboard is described. For the prefilter breadboard an RSRE CCD Video Integrator was selected. For the azimuth correlator a Reticon type R5401 binary analog correlator was chosen. Author (ESA)

N86-17602# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
A MODEL FOR THE ANALYSIS OF ORTHOGONAL MODULATION METHODS FOR DIGITAL TRANSMISSION
Friedrich Roeder Jan. 1985 50 p refs In GERMAN; ENGLISH summary
(FI-445-TBr-23) Avail: NTIS HC A03/MF A01

A baseband model for simulation of orthogonal modulation systems and the explicit calculation of important parameters was derived. The model is explained using a digital radio relay transmission, but it is also applicable to data transmission on symmetrical lines using quadrature-amplitude-modulation methods as well as phase-shift-keying transmission in satellite communications. The signal to noise ratio loss for carrier phase deviation at the receiver end is exactly given for all essential transmission methods employing orthogonal modulation. The temporal eye opening and the jitter sensitivity of the systems are calculated. The transfer functions causing crosstalk in multipath propagation, vestigial and single-sideband transmission are derived. An equalizer circuit for compensation of the signal to noise ratio loss due to a carrier phase error on the receive side is presented and implemented. Author (ESA)

N86-17603# Fondazione Ugo Bordoni, Rome (Italy).
[REPORT ON THE JOINT ACTIVITIES OF THE UGO BORDONI FOUNDATION AND THE ISTITUTO SUPERIORE DELLE POSTE E DELLE TELECOMUNICAZIONI] Annual Report, 1984 [RELAZIONE SULL'ATTIVITA DI COLLABORAZIONE CON L'I.S.P.T. SVOLTA DALLA FONDAZIONE UGO BORDONI NEL 1984]
Feb. 1985 91 p refs In ITALIAN
Avail: NTIS HC A05/MF A01

Research in radiocommunication systems, cable communications systems and numerical systems is presented. Also, research on automatic communication systems for management and control, and laser and optoelectronic systems is summarized. Author (ESA)

N86-17604# Research Inst. of National Defence, Linkoeping (Sweden).
FREQUENCY HOPPING RADIO FOR HIGH FREQUENCIES: AN EXPERIMENTAL SYSTEM
Bjoern Johansson, Arne Lindblad, and Goesta Carlsson Apr. 1985 38 p refs In SWEDISH; ENGLISH summary
(FOA-C-30390-E2; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Investigations to find a research facility for studying the fine structure of the ionosphere, and for studying the principles of noiseless high frequency systems are summarized. An experimental HF hopping system for data transmission is described; the hop-rate is 100 hop/sec. The modules of the system, frequency hop routine, data program, software of the microprocessor, derivation of the program synchronization, detector, and demodulator units are reviewed. The system was submitted to a limited testing of the different functions, over an open antenna; no effective test run is reported. Author (ESA)

N86-17605# Research Inst. of National Defence, Linkoeping (Sweden).
ELECTROMAGNETIC PULSE (EMP): EXPOSURE OF MISSILE 56 IN EMP SIMULATOR SAPIENS
Torsten Dikvall Jun. 1985 35 p refs In SWEDISH; ENGLISH summary
(FOA-C-30398-A3; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

The effects on the electric field caused by the object (missile) in the SAPIENS electromagnetic pulse simulator were studied. A noticeable effect on the field strength is noted close to the object, due to the characteristics of the field. This effect also appears in real electromagnetic pulse environments. During these tests 200 pulses were distributed with good accuracy of reproduction. The SAPIENS is an outdoor device and tests carried out in winter show that weather has very little influence on results. Author (ESA)

N86-17606# Research Inst. of National Defence, Linkoeping (Sweden).
SAPIENS MEMO 9: THE DEPENDANCE OF THE ELECTRIC FIELD ON THE INDUCTANCE OF THE TERMINATION
Sven Garmland Jun. 1985 25 p refs In SWEDISH; ENGLISH summary
(FOA-C-30399-A3; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Measurements of the electric field in the EMP simulator revealed deviations from an ideal curve shape, the largest deviation coming from the termination of the simulator antenna. High frequency components radiate through the termination, and low frequency ones are terminated by a resistive load. The space in between, where the wavelength is equal to the dimension of the termination, presents difficulties; the inductance of the termination is crucial. By increasing the area of the lines connecting the resistors of the termination, the inductance can be reduced. It is shown how reflections from the termination can be diminished from 10% to 2% by replacing the lines with cylinders made of chicken-wire. Author (ESA)

N86-17607# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. HF-Verfahren.
A SYNTHETIC APERTURE RADAR SYSTEM SIMULATION MODEL: SARSIM
Timothy K. Pike Jul. 1985 51 p refs
(DFVLR-Mitt-85-11; ISSN-0176-7739) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 17

The SARSIM pulse-by-pulse radar simulator, producing as output the SAR image of the input target is described. For each physical element of the system, there is a corresponding software module. The software modules simulate the physical element characteristics except the linear gain of the element. This means that the overall model should be seen as a relative, rather than absolute, assessment tool. Simulation of a satellite SAR system is shown. Author (ESA)

N86-17608# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
THE POWER SPECTRAL DENSITY OF THE HDB2 AND THE HDB3 CODED SIGNALS
Guenter Morgenstern Dec. 1984 104 p refs In GERMAN; ENGLISH summary
(FI-44-TBr-96) Avail: NTIS HC A06/MF A01

Explicit mathematical relations for the power density spectra of HDB2 and HDB3-encoded signals were derived. The derivation started from the coding laws in the case of arbitrary and rectangular pulse shapes. The coding law was regarded as a block code including blocks of different lengths, the code table containing four alphabets. The similarity of the coding laws of HDB2 and HDB3-codes is reflected in the derivation of the spectral properties. The results are graphically represented. The representation is detailed enough to be also applicable to other zero-sequence substitution codes like CHBn. Author (ESA)

N86-17609# Wageningen Agricultural Univ. (Netherlands). Soil Survey Inst.
THE 1984 L-BAND RADAR EXPERIMENT. PART 1: GROUND TRUTH FLEVO (NETHERLANDS) 1984 M.S. Thesis
L. Stroosnijder, J. Stolp, and G. G. Lemoine 1984 86 p refs Original contains color illustrations
Avail: NTIS HC A05/MF A01

Ground truth of a polder area (7000 ha) was established for the SIR-B radar (which failed due to technical problems). A 10 km long light track of an airborne L-band scatterometer located diagonally over the test area is analyzed, resulting in soil moisture, surface roughness, and vegetation data. Data for 15 fields are determined as field averages of areas of 25 ha and may be considered representative for the 75 ha large fields. Analysis of the spatial dependency of soil moisture content, and the statistical accuracy of its determination, shows that 9 samples, distributed in a regular grid, produce a sufficiently accurate mean value over the 25 ha on each field. Author (ESA)

N86-17610# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Audiologie.

SPEECH PROCESSING FOR INTELLIGIBILITY IMPROVEMENT
G. Langhout Jul. 1985 58 p refs In DUTCH; ENGLISH summary
(IZF-1985-14; TDCK-93326) Avail: NTIS HC A04/MF A01

Literature on speech processing to enhance intelligibility in poor listening conditions was reviewed. As the perception of consonants is essential for intelligibility, relevant acoustic features were surveyed. Data from consonant spectra measurements and from listening experiments in which certain features of the consonants were varied were collected. The effects of disturbances, such as background noise and resonances, on intelligibility were investigated. Processing methods carried out on speech to improve its quality are summarized. Author (ESA)

N86-17611# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
[ACTIVITIES REPORT OF THE DEPARTMENT OF SYSTEMS AND COMMUNICATIONS, CNRS-UA 820] Scientific Report, 1984 [RAPPORT SCIENTIFIQUE, 1984]
Jun. 1985 113 p refs In FRENCH
(ENST-85D002; ISSN-0751-1345) Avail: NTIS HC A06/MF A01

Stochastic systems; digital systems; modeling techniques; numerical communication theory; pattern recognition and voice recognition; and signal processing architectures are studied. Author (ESA)

N86-17612# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
AREA COVERAGE OF RADIO NETWORKS: METHOD DESCRIPTION AND PROPAGATION MEASUREMENTS IN URBAN AREA
Stellan Nilsson Aug. 1985 29 p refs In SWEDISH; ENGLISH summary
(FOA-C-30397-E2; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

A method for measuring and characterizing the signal strength, in terms of coverage area, from a radio transmitter is described, and propagation results in the city, and surrounding countryside of a typical urban environment are reported. The measurements were performed at a frequency of 400 MHz. Computerized simulation and theoretical models (an attenuation model where the ground is supposed to be an undisturbed spherical surface, and a semiempirical model which proves to be the best fit for this study) are described. Author (ESA)

N86-17613# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
A PULSED 8 W FET POWER AMPLIFIER AT 9.4 GHz
Staffan Rudner and Carl-Gustaf Svensson Aug. 1985 32 p refs (FOA-C-30402-E; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

A pulsed transistor power amplifier to be used as a transmitter final stage in a close range radar system was developed. In the band 9.2 to 9.6 GHz the maximum output power varies between 7.0 and 8.1 W and the 1 dB compressed gain is between 12.6 and 16.3 dB. The amplifier operates with a pulsed drain voltage to minimize heat dissipation. For pulses shorter than 2 microsec and duty cycles below 10 %, no heating effects are seen. Pulse rise and fall time is 0.12 microsec. Author (ESA)

N86-17467# Alcatel Thomson Espace, Toulouse (France).
INFLUENCE OF THE BUS REGULATION ON TELECOMMUNICATION SPACECRAFT POWER SYSTEM AND DISTRIBUTION
A. Capel and D. Sullivan (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 307-318 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17641# Joint Publications Research Service, Arlington, Va.
RESEARCH ON PROPAGATION OF DECIMETRIC RADIOWAVES AT HIGH LATITUDES
V. N. Trottskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 1 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 39-41 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17642# Joint Publications Research Service, Arlington, Va.
ONE-CHANNEL ADAPTIVE ANTENNA FOR TROPOSHERE MICROWAVE RELAY LINES
O. P. Froiov and V. M. Tsirlin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1985 p 2 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 28-31 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-17614 California Univ., San Diego.
INTEGRATED OPTOELECTRONIC CIRCUITS AND THEIR MODULAR DESIGNS FOR RESIDUE NUMBER COMPUTATION Ph.D. Thesis
Sun-Yuan Huang 1985 141 p
Avail: Univ. Microfilms Order No. DA8515593

Integrated optoelectronic circuits (IOEC) have been fabricated in hybrid LiNbO3/Si substrates. Optical signals were carried in and out of the IOEC chip through optical fiber arrays. Interactions among guided light signals in the optical channels were achieved by blazed grating couplers and mode cutoff electrooptic modulators in LiNbO3, as well as etched mesa lateral phototransistors in Si. The rating couplers tapped the light signals from the optical channel waveguide, and the photodetectors converted the intercepted light signals into electrical currents. With a specially designed electrical routing or after the electronic signal processing in Si, the resulting current then changed the voltage applied to the electrooptic modulator via resistive contacts between the two substrates, thereby controlling the light output of the IOEC. Etched mesa Si lateral phototransistors (EMS-LPT) were designed for collecting and efficiently converting to photocurrent the optical energy deflected from the blazed grating couplers. By forming a localized photoactive region in the mesa, a high photogain of 110 was measured in the uniform base EMS-LPT and of 66 in the double diffused EMS-LPT. Dissert. Abstr.

N86-17615 Wyoming Univ., Laramie.
CLASS E FREQUENCY MULTIPLIERS Ph.D. Thesis
Robert E. Zulinski 1985 198 p
Avail: Univ. Microfilms Order No. DA8517873

The theoretical operation of class E frequency multipliers has been described without experimental verification by Kozyrev. To provide experimental verification, three class E frequency multipliers were designed according to the Kozyrev theory, and measured and theoretical performances were compared. In each case agreement is poor, showing errors over thirty percent, indicating the need for further research. New and complete analyses are performed on two class E circuits: that with a radio frequency (RF) choke in the d.c. supply lead, and that with an arbitrary but smaller reactance replacing the RF choke. For both cases the optimum operating point (100% efficiency at maximum power output capability) is determined for operation at any harmonic, including the first, and equations which yield the requisite component values and resulting operating parameters are given. These equations provide an easily used repeatable design method for constructing class E frequency multipliers. The theoretical design

methods exhibit excellent agreement with observed operation, with errors in the range of four to twelve percent. Dissert. Abstr.

N86-17616 Royal Aircraft Establishment, Farnborough (England).
AN EXPERIMENTAL VERIFICATION OF PREDICTED CURRENT AND VOLTAGE WAVEFORMS IN A THREE-PHASE FULL-WAVE RECTIFIED BRIDGE CIRCUIT WITH SOURCE RESISTANCE AND INDUCTANCE WHEN DRIVING A PURELY RESISTIVE LOAD
J. W. R. Cox and T. J. Riglar Nov. 1983 91 p refs
(RAE-TR-83084; RAE-RAD-NAV-129; BR95243) Copyright. Avail: Issuing Activity

Experimental verification of calculations which predict the current and voltage waveforms in a three-phase full-wave rectified bridge circuit is presented. The three-phase source is balanced, and the output impedance of each phase comprises a resistance in series with an inductance. The source voltages vary sinusoidally with time. The calculations are exact save for the approximation that the potential drop across the diodes is constant when they are conducting. Author (ESA)

N86-17617# Royal Signals and Radar Establishment, Malvern (England).
MICROWAVE SENSOR DESIGN USING CAD TECHNIQUES
D. Greenhalgh and S. J. Kidd Jun. 1985 30 p refs
(AD-A159518; RSRE-MEMO-3742; BR96714) Avail: NTIS HC A03/MF A01 CSCL 09/3

A computer aided design facility that enables microwave sensors to be designed and optimized is described. The facility consists of a suite of computer program modules, each of which emulates a typical radar subsystem and which may be linked with other modules to emulate a complete system. The sensor environment part of the facility includes target and clutter models. The sensor hardware part of the facility includes nonlinear effects, and the ability to interchange recorded and simulated signals. Author (ESA)

N86-17618# Royal Signals and Radar Establishment, Malvern (England).
MODELLING TRANSMISSION GATES IN ELLA
K. R. Milner and T. L. Thorp May 1985 21 p
(AD-A159557; RSRE-MEMO-3825; BR96524) Avail: NTIS HC A02/MF A01 CSCL 09/3

An algorithm for modeling transmission gates and its implementation in the hardware design and description language ELLA are discussed. Bidirectional and unidirectional models are considered. Author (ESA)

N86-17619# Naval Postgraduate School, Monterey, Calif.
COMPOSITE OPERATIONAL AMPLIFIERS AND THEIR USE IN IMPROVING BANDWIDTH, SPEED AND ACCURACY IN ACTIVE NETWORKS M.S. Thesis
M. A. Luczak Jun. 1985 178 p
(AD-A159819) Avail: NTIS HC A09/MF A01 CSCL 09/5

This research examines a unified approach to several of the problems associated with Operational Amplifiers (OAs), namely, speed, accuracy, and frequency dependent gain. The approach which is examined is the Composite Operational Amplifier(CNOA), where N=2, 3, or 4 single OAs. The CNOA is found to greatly extend the useful operating frequencies of the OA while maintaining low sensitivity to circuit element variations and a high degree of stability. It also provides a method for obtaining a fast and accurate OA. An additional feature of the CNOA is that can be implemented using current technology. A computer model for the single OA was created and validated, and provided the basis for proving the superiority of the CNOA. Theoretical and experimental results were used with these computer simulation results to fully substantiate the findings. (Theses) Author (GRA)

N86-17620# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
A DEVICE FOR COMPUTER-CONTROLLED POTENTIAL MODULATION IN ELECTROCHEMICAL FOURIER TRANSFORM INFRARED SPECTROSCOPY
D. S. Corrigan, D. Milner, and M. J. Weaver Aug. 1985 9 p
(Contract N00014-79-C-0670)
(AD-A159826; TR-47) Avail: NTIS HC A02/MF A01 CSCL 07/4

A circuit has been designed for the automatic control of potential modulation for subtractively normalized interfacial Fourier transform infrared spectroscopy (SNIFTIRS) using an IBM IR/90 series FTIR spectrometer. This device enables the potential modulation to remain synchronized with the spectral data collection under all conditions. Author (GRA)

N86-17621# Naval Postgraduate School, Monterey, Calif.
A CSMP COMMUTATION MODEL FOR DESIGN STUDY OF A BRUSHLESS dc MOTOR POWER CONDITIONER FOR A CRUISE MISSILE FIN CONTROL ACTUATOR M.S. Thesis
P. N. MacMillan Jun. 1985 106 p
(AD-A159855) Avail: NTIS HC A06/MF A01 CSCL 10/2

Recent improvements in rare earth magnets have made it possible to construct strong, lightweight, high horsepower dc motors. This has occasioned a reassessment of electromechanical actuators as alternatives to comparable pneumatic and hydraulic systems for use as flight control actuators for tactical missiles. A dynamic equivalent circuit model for the analysis of a small four pole brushless dc motor fed by a transistorized power conditioner utilizing high speed switching power transistors as final elements is presented. The influence of electronic commutation on instantaneous dynamic motor performance is particularly demonstrated and good correlation between computer simulation and typical experimentally obtained performance data is achieved. The model is implemented in CSMP language and features more accurate air gap flux representation over previous work. Hall effect sensor rotor position feedback is simulated. Both constant and variable air gap flux is modeled and the variable flux model treats the flux as a fundamental and one harmonic. Author (GRA)

N86-17622# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
IMPREGNANT COMPOSITION IN DISPENSER CATHODES
H. K. A. Kan and R. R. Seaver 12 Aug. 1985 22 p
(Contract F04701-83-C-0084)
(AD-A160044; TR-0084A(5945-02)-3; SD-TR-85-50) Avail: NTIS HC A02/MF A01 CSCL 09/1

The compositions of impregnants inside B-type dispenser cathodes containing barium calcium aluminates were examined by means of quantitative microprobe analysis. The impregnant inside the porous tungsten structure was supported with plastic in order to prevent damage when the cathode was sectioned. The impregnant compositions were found to be consistently deficient in CaO when compared to the nominal composition. Variations and reproducibility in composition are discussed. GRA

N86-17623# Argonne National Lab., Ill.
DETAILED DESIGN OF A 13 kA 13 kV dc SOLID-STATE TURN-OFF-SWITCH
W. F. Praeg 1985 7 p Presented at the IEEE-Industry Applications Society Annual Meeting, Toronto, Ontario, 6 Oct. 1985
(Contract W-31-109-eng-38)
(DE85-013874; CONF-851071-1) Avail: NTIS HC A02/MF A01

An experimental facility for the study of electromagnetic effects in the First Wall-Blanket-shield (FWBS) systems of fusion reactors has been constructed at Argonne National Laboratory (ANL). In a test volume of 0.76 cu m, a vertical, pulsed 5 kG dipole field (B < 320 kGa(-1)) is perpendicular to a 10 kG solenoid field. Power supplies of 2.75 MW at 550 V dc and 5.5 MW at 550 V dc and a solid-state switch rated at 13 kA and 13 kV (169 MW) control the pulsed magnetic fields. The total stored energy in the coils is 2.6 MJ. This paper describes the design and construction features of the solid-state switching circuit which turns off a dc of 13 kA in approximately 82 micros and holds off voltages of < 13 kV. DOE

N86-17624# Brigham Young Univ., Provo, Utah.
PHYSICAL AND CHEMICAL CHARACTERIZATION OF MULTI-

LAYERED STRUCTURES
J. M. Thorne, L. V. Knight, and B. G. Peterson 1985 8 p refs Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AS08-84DP-40199)
(DE85-016922; CONF-850887-19) Avail: NTIS HC A02/MF A01

It is important to know the physical and chemical properties of a multilayer if its performance is to be compared to theoretical predictions, or if guidance is needed for the production of superior multilayers. Accurate, nondestructive analytical methods, such as neutron activation analysis, are restricted to certain elements. Certain destructive methods, such as total carbon analysis by combustion, can be sensitive enough for use with very small samples. The method of choice depends upon sensitivity and specificity, both of which are discussed in this paper. DOE

N86-17625# Department of Energy, Washington, D. C.
SEMICONDUCTOR ELECTRODE WITH IMPROVED PHOTOSTABILITY CHARACTERISTICS Patent Application
A. J. Frank, inventor (to DOE) Filed 19 Feb. 1985 42 p Prepared in cooperation with Midwest Research Inst.
(Contract DE-AC02-83CH-10093)
(DE85-017805; US-Patent-Appl-SN-702715) Avail: NTIS HC A03/MF A01

An electrode is described for use in photoelectrochemical cells having an electrolyte which includes an aqueous constituent. The electrode consists of a semiconductor and a hydrophobic film disposed between the semiconductor and the aqueous constituent. The hydrophobic film is adapted to permit charges to pass therethrough while substantially decreasing the activity of the aqueous constituent at the semiconductor surface thereby decreasing the photodegradation of the semiconductor electrode. DOE

N86-17626# Oak Ridge National Lab., Tenn.
HIGH-FIELD ZnO VARISTORS: MICROSTRUCTURES AND PROPERTIES
R. J. Lauf, R. K. Williams, and F. T. Greenwald Jun. 1985 56 p
(Contract DE-AC05-84OR-21400)
(DE85-018136; ORNL-TM-9378) Avail: NTIS HC A04/MF A01

Zinc oxide varistors capable of supporting a high electric field before breakdown have been developed by use of sol-gel processing. Fine powders produced by the sol-gel technique can be fabricated into varistors by either hot pressing or pressureless sintering. Several model compositions were studied, including ZnO plus three additives and ZnO plus five additives. Sol-gel-derived materials were compared with conventional materials of the same nominal composition, and sintering was compared with hot pressing. Microstructural analysis and electrical measurements suggest that the benefits derived from sol-gel processing are related to the fine, uniform ZnO grain size and possibly to a more nearly optimum distribution of additives. DOE

N86-17627# Brookhaven National Lab., Upton, N. Y.
UHV PIEZOELECTRIC TRANSLATOR
T. Overslulzen and G. Watson 1985 10 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE85-018201; BNL-36904; CONF-850734-1) Avail: NTIS HC A02/MF A01

A UHV compatible piezoelectric translator has been developed to correct for angular misalignments in the crystals of a UHV X-ray monochromator. The unit is small, bakeable to 150C, and uses only ceramic materials for insulation. We report on the construction details, vacuum compatibility, mechanical properties, and uses of the device. DOE

N86-17628# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.
EFFECT OF CHARGE AND AERODYNAMIC PROPERTIES OF PARTICLES ON ELECTRIFIED FABRIC FILTRATION
G. S. Ballard, D. K. Hutchins, R. E. Ware, D. Cramer, G. Grayson, T. Foti, D. Wankum, I. Coffman, and M. K. Mazumder Sep. 1985 24 p
(Contract W-7405-eng-48)
(DE86-000013; UCRL-15622) Avail: NTIS HC A02/MF A01

An electrical-single particle aerodynamic relaxation time (E-SPART) analyzer employs a laser Doppler velocimeter for measuring motion of charged particles in an applied oscillatory electric field in order to simultaneously measure the aerodynamic diameter and electrostatic charge on a single particle. A modification has been made to incorporate both acoustic excitation and a dc electric field for simultaneous measurement of the aerodynamic diameter and electrical charge of particles so that measurement of particle size is possible even for uncharged particles. Other modifications include use of a frequency counting technique for measuring the drift velocity of the particle, thereby determining the particle charge, use of a Millikan apparatus only for calibrating electrical charge above q = 4, and optimization of the operation of the aerosol generator and an electrostatic charger for calibration. The analyzer optics are being modified for determining particle size down to 0.1 microns in diameter. Experimental data on particle size and charge measurement obtained after stabilizing the operating temperature of the phase locked loop demodulator are presented. DOE

N86-17629# Eagle-Picher Industries, Inc., Joplin, Mo.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF NICKEL-IRON BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1984
C. M. Lamb and E. P. Broglio Aug. 1985 40 p
(Contract W-31-109-eng-38)
(DE86-000520; ANL/OEPM-85-3) Avail: NTIS HC A03/MF A01

Progress and development of research on nickel-iron batteries used for electric vehicle propulsion are presented. The nickel plaque development effort continued toward achieving the thickness required to meet the program goals. New modules designed for high peak specific power were evaluated. Plate impregnation has been reduced to almost routine. The delivery of 1600 psi strength plaque from 3.0 to 4.0 mm in thickness is the single most important factor in the demonstration of 65 WH/Kg designs. Various additives to the electrolyte were evaluated. DOE

N86-17630# Department of Energy, Washington, D. C.
METHOD FOR SENSING AND MEASURING A CONCENTRATION OR PARTIAL PRESSURE OF A REACTANT USED IN A REDOX REACTION Patent Application
E. Findl, inventor (to DOE) (Brookhaven National Lab., Upton, N.Y.) Filed 21 Dec. 1984 26 p
(Contract DE-AC02-76CH-00016)
(DE85-017740; US-Patent-Appl-SN-685096) Avail: NTIS HC A03/MF A01

A method for sensing or measuring the partial pressure or concentration of an electroactive species used in conjunction with an electrolyte, the method being characterized by providing a constant current between an anode and a cathode of an electrolyte-containing cell, while measuring changes in voltage that occur between either the anode and cathode or between a reference electrode and one of the main electrodes of the cell, thereby to determine the concentration or partial pressure of the electro-active species as a function of said measured voltage changes. The method of the invention can be practiced using either a cell having only an anode and a cathode, or using a cell having an anode and a cathode in combination with a reference electrode. Accurate measurements of small concentrations or partial pressures of electro-active species are obtainable with the method of the invention, by using constant currents of only a few microamperes between the anode and cathode of the cell, while the concentration-determining voltage is measured. DOE

N86-17631# Research Inst. of National Defence, Linkoeping (Sweden).
MICROELECTRONIC IMAGE SENSORS: A REPORT FROM THE CHARGE TRANSFER DEVICE (CTD) TEAM AT FOA 3 Status

Report
Olof Ehgstroem, Sven-Tuve Persson, Haakan Pettersson, and Karl-Henrik Ryden May 1985 86 p refs
(FOA-C-30391-E1,E3; ISSN-0347-3706) Avail: NTIS HC A05/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Three concepts of microelectronic image sensors where the photo effects are based on the properties of interfaces between silicon and metal silicides or insulators were investigated. An infrared sensitive image sensor for the 3 to 5 micron wavelength range was prepared. The photosensitive elements, patterned as a 4 x 4 matrix, consist of palladium silicide Schottky-diodes. Addressing of the different picture elements is made from shift registers placed on the same silicon chip. A concept for the storage of optical information was created. The basic principle relies on the possibilities to store electrons in deep lying energy levels in an insulator layer grown on silicon. A metal-insulator-semiconductor device, where the possibility of interaction between two images at the insulator-semiconductor interface is utilized for image recognition, was derived. Author (ESA)

N86-17632# Thorn EMI, Hayes (England).
A HIGH POWER, PULSED MICROWAVE TUBE FOR A SYNTHETIC APERTURE RADAR ELECTRICAL MODEL. PHASE 2: MANUFACTURE AND TEST Final Report
S. Gabrielson, T. M. Gardiner, P. C. Lane, V. J. Matthews, D. Perring, G. Phillips, J. Saunders, and R. A. Tuck Paris ESA Sep. 1984 206 p refs
(Contract ESA-5070/82/NL-PD(SC))
(EVT-852; ESA-CR(P)-2059) Avail: NTIS HC A06/MF A01

Manufacture, evaluation, and improvement of a klystron electrical model for synthetic aperture radar are summarized. An electrically and mechanically satisfactory gridded cathode design, with 1A/sqcm current loading was produced. Permanent magnet (PM) and periodic permanent magnet (PPM) systems to focus the electron beam in the klystron are demonstrated. Unmodulated beam transmission with a PM is 99% when the tube is fitted with a coaxial output and 94% with a waveguide output; 99.5% transmission is obtained with a PPM system. A low height waveguide output line is shown to be adequate to handle the output power. Despite modifications to the collector end of the permanent magnet, which result in a nonoptimum focusing field and worse beam transmission, the efficiency of the tube is > or = 40%. Up to 1.5 kV depression on a single collector is demonstrated. Conversion efficiency can be improved by redesigning the magnet cap. Author (ESA)

N86-17633# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
IMPROVED SEPARATORS FOR SILVER-HYDROGEN CELLS
T. L. Markin and R. J. Bones Paris ESA Dec. 1984 243 p refs
(Contract ESA-5478/83/NL-BI(SC))
(AERE-R-11513; ESA-CR(P)-2082) Avail: NTIS HC A11/MF A01

The polyamide/cellophane composite separator employed in Ag/H2 cells was replaced by zirconia cloth separators coated with zirconia sol on the side facing the Ag electrode and impregnated with polyphenylene oxide (PPO). Cells containing standard and zirconia separator were given 750 charge/discharge cycles employing LEO cycling conditions at 20 then 30 C. At 30 C, the cell containing the zirconia cloth separator short circuits at cycle 680; the base line cell reaches 750 without a short circuit, although Ag concentration in the cellophane layers increases. The main problem with coated zirconia cloth is to ensure that the coating is pinhole free. The few areas where Ag diffuses through the cloth probably corresponded to pinholes or channels in the coating. This problem may be very difficult to overcome. Author (ESA)

N86-17634# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
THE ESA PREFERRED PARTS LIST
Jun. 1985 82 p
(ESA-PSS-01-603; ISSN-0379-4059) Avail: NTIS HC A05/MF A01

Preferred electronic components to be used in the selection, procurement, and application of components for ESA spacecraft and associated equipment are listed. Some parts listed are capacitors, electric connectors, crystal diodes, inductors and resistors. Author (ESA)

N86-17635# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany).
ANALYSIS OF DIELECTRIC LAYERS FOR VERY LARGE SCALE INTEGRATION (VLSI) APPLICATIONS, ESPECIALLY THE INFLUENCE OF STOICHIOMETRY AND HYDROGEN CONTENT ON THE PROPERTIES OF PLASMA NITRIDE LAYERS Final Report, Sep. 1981
Peter Eichinger and Peter Paduschek Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-059; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21.50

Analytical techniques using MeV light-ion scattering were applied for the determination of the atomic composition of dielectric layers. Quantitative depth profiling of hydrogen was performed by the proton-proton forward scattering technique. The influence of deposition and annealing parameters on the composition of plasma-enhanced chemical vapor deposition silicon nitride layers and amorphous silicon layers was determined. It is shown that the mechanical stress of the layers is correlated with the bonding of hydrogen. Author (ESA)

N86-17636# Kema (N. V.), Arnhem (Netherlands). Dept. of Electrical Research.
HIGH-VOLTAGE MEASUREMENTS USING DIGITAL TECHNIQUES
H. G. Tempelaar, C. G. A. Koreman, and A. J. vanLoon, ed. 1984 11 p refs
(S/T-Rept-Vol-2-No-8; B8562576; ISBN-90-353-0019-X; ISSN-0167-8590) Avail: NTIS HC A02/MF A01

A transportable data-acquisition system for the determination of transient phenomena during switching operations in high-voltage networks was developed. From voltage dividers with an insulation level appropriate for 420 kV networks, the signals are sent through light guides (amplitude modulated) to analog/digital converters. Current-measuring devices based on Rogowski coils are used with a frequency-modulated optical system, with the possibility to transfer data from high potential to ground level. To avoid disturbances due to high electromagnetic fields, the recording apparatus is placed in a Faraday cage. High-frequency rejection filters and an insulating transformer are inserted in the power line. A PDP 11/34 microcomputer is used for programming, processing and storage of data on disk drives. Results from measurements carried out in the high-voltage laboratory as well as during switching operations of unloaded lines, transformers and motors in the field are given. Author (ESA)

N86-17637# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
FEASIBILITY STUDY OF A DEVICE TO CONTROL AIRCRAFT ELECTROMAGNETIC PROTECTION [ETUDE DE FAISABILITE D'UN DISPOSITIF DE CONTROLE DES PROTECTIONS ELECTROMAGNETIQUES SUR AERONEFS]
R. C. Davidson and J. L. Boulay Mar. 1985 43 p refs In FRENCH
(Contract DRET-83-123)
(ONERA-RS-10/3466-PY) Avail: NTIS HC A03/MF A01

Electromagnetic transparence of aircraft structural elements is discussed. Laboratory measurements and parameters composing a wall transparence coefficient are studied. It is shown that an electric conductivity measurement device could be used to deduce the electromagnetic transmission rate. The device should be

developed from the CORAS transducer, which measures high range surface resistivity. Author (ESA)

N86-17638# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
A SINGLE-BALANCED MIXER FOR THE Ka BAND
Aake Bergquist Sep. 1985 22 p refs In SWEDISH; ENGLISH summary
(FOA-C-30407-E; ISSN-0347-3708) Avail: NTIS HC A02/MF A01; Research Institute of National Defence, Stockholm KR 50

Work with a single balanced millimeter wave mixer in the Ka band is described. The planar mixer uses ordinary, waveguide and microstrip, and finline as well as coplanar transmission lines. Measurements show that it has a minimum conversion loss of 5.8 dB and that the bandwidth at a conversion loss of 10 dB is 8GHz. Author (ESA)

N86-17639# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
STUDY OF SURFACE DISCHARGES Final Report [ETUDE DES DECHARGES DE SURFACE]
S. Larigaldie, A. Brunet, F. Faure, and J. P. Marque May 1985 75 p refs In FRENCH
(Contract DRET-84/001)
(ONERA-RF-10/7236-PY) Avail: NTIS HC A04/MF A01

The electric discharges on a dielectric surface at normal pressure, reduced pressure, and simulated space environment are studied. The experimental facilities are described, but only preliminary results are available. Tests on a teflon dielectric specimen show that the low intensity of the electric discharge makes necessary the use of light complifiers to obtain a good enough photograph. Measurements show that the accepted physical models hold. Author (ESA)

N86-17640# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ELECTRONICS AND ELECTRICAL ENGINEERING Abstracts Only
30 Nov. 1984 50 p Transl. into ENGLISH from various Russian articles
(JPRS-UEE-84-016) Avail: NTIS HC A03/MF A01

This journal of electronics and electrical engineering has articles in the areas of aerospace and electronic systems, antennas and propagation, broadcasting, control systems electromagnetic compatibility, instrumentation and measurements, and magnetics. Some representative titles are: (1) magnetic field of excitation winding in experimental cryogenic turbogenerators; (2) measurement of velocity of objects moving near large reflecting surfaces; (3) 400 channel commutator for measurement of energy distribution in laser beams; and (4) use of microprocessors in control devices of switch units. For individual titles, see N86-17641 through N86-17655.

N86-17641# Joint Publications Research Service, Arlington, Va.
RESEARCH ON PROPAGATION OF DECIMETRIC RADIOWAVES AT HIGH LATITUDES c32
V. N. Trottskiy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 1 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 39-41 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

In order to study Polar summers during anomalously high signal values affecting radio propagation, research was conducted on decimetric waves over a sea path of 433 km, using antennas with gains of 44 and 46.2 dB, and over a 357 km tundra and woodland path using 46.2 dB gain antennas. In order to evaluate the signals an attenuation factor was used consisting of a ratio of the observed signal to free space reference signals which shows possible antenna losses. Fluctuations and levels are plotted for the indicator. Comparison with meteorological data showed that anomalously high levels are caused by nonuniformities in the refractive index of the lower troposphere which acts as a waveguide when temperature inversions caused by continent sea air movements occur. Amplitude fluctuations are caused by waveguide changes and interference phenomena. The results of the method utilizing attenuation factor statistics are considered better than those of the International Radio Consultive Committee (CCIR). Author

N86-17642# Joint Publications Research Service, Arlington, Va.
ONE-CHANNEL ADAPTIVE ANTENNA FOR TROPOSHERE MICROWAVE RELAY LINES c32
O. P. Frolov and V. M. Tsirlin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1985 p 2 Transl. into ENGLISH from Elektrosvyaz (Moscow, USSR), no. 6, Jun. 1984 p 28-31 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Adaptive antennas improve the performance of troposphere microwave relay lines (TMRL) by reducing fading and eliminating competing signals. The signal steadiness gain is equivalent to an increase in the number of channels and grows with antenna aperture. A horn system containing adjustable gaps is considered with regulation by microprocessor control of the input signal, which is digitized and compared with reference values. The signal processing algorithm uses a linear relation for the criteria which is not always satisfied and can lead to errors. In April 1981 experiments were made with a one-channel antenna coupled to a TMRL with a relay path of 389 km, an antenna power of 43 dB and an aperture of 20 x 20 m2. The horn contained 64 controllable elements. The results showed that with low signal levels the gain was a factor of 2, the noise reduction for a one-component signal in comparison with a simple relay was 5-7 dB, the gain for a three-component signal was 3-4 dB, and interference elimination amounted to 4-8 dB. It is concluded that adaptive antennas should be used on TMRL. Protection of control elements against high transmitter power levels should be studied. Author

N86-17643# Joint Publications Research Service, Arlington, Va.
METROLOGICAL PROVISION FOR MEASUREMENT OF RELATIVE ENERGY DENSITY DISTRIBUTION OVER BEAM CROSS SECTION AND OF BEAM DIVERGENCE IN PULSE LASERS c36
A. F. Kotyuk, V. B. Korshikov, B. M. Stepanov, S. V. Tikhomirov, and V. A. Yakovlev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 24-25 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 13-14 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Etalons for pulse lasers and radiators with normative relative energy density distribution over the beam cross section were developed and built for inspection at both governmental and industrial levels. The normative relative energy density distribution is converted into a smooth bell function by means of an apodized diaphragm, the latter having a definite transmission characteristic and being placed inside the laser resonator cavity. This diaphragm is formed by two total reflection prisms joined at their hypotenuse facet of one prism being flat and that of the other prism being spherical. Single mode radiation enters the diaphragm in pulses with quasi-plane fronts, while a uniform pumping field is produced by stable interference mirrors consisting of reflective films on substrate wedges. The monitored radiation parameters include pulse duration and pulse form as well as laser beam divergence and energy, the latter being determined calorimetrically with an energy reference standard and with a photoelectric converter. The accuracy of thus reproducing an energy density distribution unit was analyzed and evaluated in terms of standard deviation and nonremovable systematic error, the latter having three components associated respectively with the optical density of the photographic film, measurement of the energy density distribution curve at the lower end of the dynamic range, and discretization of the photometric field. Author

N86-17644# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL COMMUTATORS OF ANALOG SIGNALS FOR MEASUREMENT OF ENERGY DISTRIBUTION OVER BEAM CROSS SECTION OF PULSE LASER c36

A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 25-26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 14-16 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Instruments of measuring the energy distribution over the beam cross section of a pulse laser are checked against standards which include a primary instrument transducer, usually of the magnetic type, in the etalons as well as in reference and operating meters. Measurement of the energy distribution in the case of monopulse lasers with nonreproducible process characteristics and unknown space distributions requires a sufficiently wide dynamic range. The commutator of signals must have a dynamic range of 55 to 65 dB. Existing multichannel commutators of analog signals are inadequate for this application. A comparative design and performance evaluation of special purpose multichannel commutators for this application reveals that electromechanical ones such as Shl relays are superior in terms of low bias voltage with contactors closed, high ratio of open resistance to closed resistance, small temperature drift, wide dynamic range, low crosstalk level, and high stability, while contactless ones such optrons or transistor-diode switches excell in high speed. Accordingly, one or another type of commutator must be selected and design for a given energy distribution measuring instrument, also taking into account the required precision and sensitivity of digital voltmeters used with these instruments. Author

N86-17645# Joint Publications Research Service, Arlington, Va.
THE 400-CHANNEL COMMUTATOR FOR MEASUREMENT OF ENERGY DISTRIBUTION IN LASER BEAM c36
V. L. Chereugin and A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 16-18 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

An experimental study of a 400 channel commutator for measurement and analysis of the energy distribution over the beam cross section of pulse lasers was made for the purpose of evaluating its performance characteristics. This commutator transfers electric signals sequentially from 400 channels to the input of a digital high precision voltmeter, signals of a magnitude ranging from a few microvolts to tens of volts and remaining constant during the switching period. Each commutator element is a step-by-step switch and the effect of its performance on the accuracy of voltmeter readings depends on the switching cycle as well as the commutation characteristics. These were tracked through a set of three relays and a digital voltmeter continuously selecting one of two strobe signals. The voltmeter readings were analyzed by equipment including a start-stop cycle setter, a shaper of control pulses for a control module, with two amplifiers and two commutator control windings, and were also printed out after passage through a matching circuit. Calculations based on the voltmeter output data and on the equivalent electrical circuit of the commutator elements, with a high ratio of open resistance to closed resistance, yield an error of 5 x .0001 to 5 x .001 at temperatures of 20 to 65 C or one channel operating alone with crosstalk from the other 399 channels. Author

N86-17646# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF ERROR OF MEASUREMENT OF RELATIVE ENERGY OR POWER DENSITY DISTRIBUTION OVER CROSS SECTION OF LASER BEAM ON SPACE FACTOR OF MULTIELEMENT RADIATION TRANSDUCER c36
Ya. T. Zagorskiy and Yu. V. Karabak *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 18-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Measurements of the relative energy or power density distribution in a laser beam with an instrument including a multielement radiation transducer contain an error which depends on many factors. One component of this error, unlike of the error in the case of the absolute energy or power density distribution, is associated with the degree of area discretization in the diaphragm in the field of vision. This error component depends on the relative energy or power density distribution in the laser beam and on the number of sensor elements in the transducer as well as on their shape and their spacing density over the receiver surface. The relation is established analytically for the general case of an n-element radiation transducer feeding output signals through a commutator to an analog to digital converter. Numerical calculations for three different forms of radiation transducer, with n = 9000, 256, 100 respectively, reveal that a decrease of the spacing density of sensor elements will decrease the energy or power at the transducer input and increase the error introduced by the analog to digital converter, and that an increase of the number of sensor elements otherwise under the same conditions will also increase this error. Author

N86-17647# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC INSTRUMENT FOR MEASURING RELATIVE ENERGY DENSITY DISTRIBUTION IN BEAMS OF PULSE LASERS c36
V. I. Arbekov, M. V. Ulanovskiy, Ya. T. Zagorskiy, A. M. Levi, and A. I. Glazov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27-28 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 21-22 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The relative energy density distribution over the beam cross section of pulse lasers can be measured with both high space resolution and high accuracy when a photoelectric transducer array is used for this purpose. Such a transducer combines high sensitivity with a wide dynamic range. Its photoreceiver stage is preceded by a fiber optic light collector and is followed by an integrator feeding into an analog memory. Both integrator and memory are energized from a power supply controllable by a multichannel commutator with analog to digital and digital to analog conversion. Use of fiber optics allows spacing of the transducer components so as to almost completely eliminate any coupling between channels. The spectral range of the light collector is 0.4 to 2.0 microns. The photoreceiver consists of commercially produced FD-8K silicon photodiodes, each serving as a current generator and loaded by the input impedance of the operational amplifier built with microcircuits which converts each photodiode current into a voltage proportional to the radiation pulse energy. Author

N86-17648# Joint Publications Research Service, Arlington, Va.
ESTABLISHMENT AND USE OF TIME UNIFICATION SYSTEM FOR CIVIL AVIATION c31
M. M. Malyy *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 30 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 28-30 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Precise and fail proof operation of the various services used by civil aviation throughout the territory of the USSR depends largely on synchronization, the latter requiring periodic indication of time scales and involving the concept of time unification. The principal users of a time unification system are the traffic control service and the flight crew. Since 1974 electromechanical hand-and-dial clocks in airports have been gradually replaced with modern signal clocks. Installation of secondary clocks in control towers, time encoding in the secondary clocks, and interfacing the clock room with the computer of the appropriate automatic control system are improvements made in the control tower. Time indicating and time keeping equipment is also installed in airplanes for tie-in with airports by means of radio signals over metric wave or decametric-wave communication channels. The necessary short range radio navigation system with the inclusion of satellites for transmittal of unified time information from airports to airplanes and equipment characterized by satisfactory technical accuracy and high stability with means for automatic or semiautomatic time

correction guaranteeing high reliability for a period of 10 years is produced. Author

N86-17649# Joint Publications Research Service, Arlington, Va.
MEASUREMENT OF VELOCITY OF OBJECT MOVING NEAR LARGE REFLECTING SURFACE
A. Ya. Ksenzenko *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 31-32 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 34-35 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

Velocity measurement with a portable Doppler meter at radio frequencies is evaluated from the standpoint of range and accuracy, specifically in the case of an object such as an automobile moving at a low altitude above and parallel to a road which constitutes a long reflecting surface. The instrument case contains the transmitter and the receiver so that both can be regarded as being located at the same point. In addition to the main signal which has traveled along the Doppler(transmitter)-object-Doppler(receiver) path, stray components appear in the receiver which have traveled three other paths, component reflected by extraneous stationary objects, and one component transferred from transmitter to receiver directly inside the instrument case. The analysis is based on Doppler theory, including the indeterminacy principle, and yields the resultant error caused by all these interference signals. An experimental study made at the 10,525 MHz frequency has revealed several other factors causing deviations from theory, the most significant ones being nonideal scattering by the object and unevenness of the surface. Beats produced by stray components also severely limit the accuracy of Doppler velocity measurements. Author

N86-17650# Joint Publications Research Service, Arlington, Va.
METHOD OF MEASURING EMITTANCE OF THERMAL INSULATION MATERIALS AT LOW TEMPERATURES
L. Ya. Paderin, I. M. Baskin, and Yu. V. Filin *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 33 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 39-40 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

The main difficulty in measuring the emittance of thermal insulation materials at temperatures below 500 K, namely interference from background radiation, was overcome in an experimental test stand consisting of a vacuum chamber with a mechanism which rotates the test specimen inside. The specimen in the form of a flat disk is held firmly in a retainer fastened to the lower end of the vertical motor shaft. The temperature of the specimen is regulated by a cooler and a disk of conducting material with a controllable heater between them, the metal disk ensuring that the surface of the insulation material remains isothermal. Both the cooler and metal disk are eccentric relative to the axis of rotation so as not to obstruct the path for the radiant flux from the specimen surface through holes in the retainer to the radiation receiver underneath. Temperature and radiant energy are measured under a pressure not exceeding .01 Pa, whereupon the emissivity is calculated according to the Stefan-Boltzmann law. There are two main systematic errors in the emissivity readings. The source of one error is reflection of the radiant flux into the receiver by hot components of the apparatus. The source of another error is cooling of segments of the specimen passes through the cold zone between shield and radiation meter. The two errors are in opposite directions and, therefore, compensate one another to a large extent. Author

N86-17651# Joint Publications Research Service, Arlington, Va.
MAGNETIZATION REVERSAL IN TRIAXIAL SINGLE-DOMAIN PARTICLES c70
Viktor Avramovich Kufa and Ivan Petrovich Stadnik *In its* USSR Report: Electronics and Electrical Engineerings (JPRS-UEE-84-016) 30 Nov. 1984 p 39 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 5-8 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

Magnetization reversal in triaxial single domain particles of magnetically hard materials such as the 52K11F alloy for hysteresis motors is analyzed for engineering design purposes. Because the characteristics of such a particle are determined by the orientation of the magnetic moment vector relative to the vector of the external magnetic field, the dependence of this orientation on the magnitude and the direction of the latter as well as on the original orientation is established here. The relation of the energy of a particle with the corresponding magnetic crystallographic anisotropy serves as a basis. Calculations are made in a rectangular system of coordinates whose axes coincide with the three directions of easy magnetization. The relations thus obtained reveal three ranges of original angle between the magnetic moment vector of the particle and the intensity vector of the applied external magnetic field. When this angle is small, increasing the intensity of the external magnetic field will cause the magnetic moment vector to rotate toward the magnetic field vector. This process is reversible. Further calculations yield both critical original angles and the critical magnitudes of the external magnetic field at which jumpwise rotation of the magnetic moment vector will occur. Author

N86-17652# Joint Publications Research Service, Arlington, Va.
DETERMINING SPATIAL ORIENTATION OF AXES OF ELLIPTICAL MAGNETIC FIELD c70
Leonid Mikhaylovich Rudnitskiy, Valeriy LVovich Frumin, Boris Avramovich Guyetskiy, and Nikolay Zekharovich Klimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 8-11 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The rotating magnetic field in induction motors is often elliptical, because of asymmetry of the polyphase line voltages or structural asymmetry in the machine. For an accurate analysis of electromechanical energy conversion in such a machine, one must then take into account the ellipticity of the magnetic field with the attendant nonuniformity of saturation. A generalized two field model of an induction motor is proposed for this purpose, with superposition of two mutually orthogonal elliptical pulsating fields in stator coordinates. The self inductances and the mutual inductances can be subsequently calculated on this basis. The spatial orientation of the two ellipses, specifically of their axes, needs to be determined first and this is done here for the most general case of an asymmetric machine with m stator phases and n rotor phases under asymmetric input voltages. The magnetizing force of any stator phase and any rotor phase is calculated accordingly, then the resultant magnetizing force and its space distribution. The major axis and the minor axis of the resultant ellipse correspond to the direction of the respectively maximum and minimum magnetizing force. Numerical results converging after six iterations are shown for a machine with m 3 stator phases and n = 2 rotor phases. Author

N86-17653# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD OF EXCITATION WINDING IN EXPERIMENTAL CRYOGENIC TURBOGENERATOR c70
Iosif Natanovich Grinbaum and Yuriy Nikolayevich Vvedenskiyk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40-41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 14-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The magnetic field of the excitation of winding in a cryogenic turbogenerator is evaluated on the basis of experimental data pertaining to a 2 MW machine. The magnetic field distribution was measured with 56 induction transduced mounted in three mutually orthogonal planes. Measurements were made with the superconducting excitation coils without a shield and with ferromagnetic external shield. Without a shield, the emf of the

transducers was recorded with a light beam oscillograph and the amplitudes of its first harmonic were calculated from the oscillograms. From these data were then calculated the longitudinal profiles of the three components (radial, tangential, axial) of the first harmonic of magnetic induction, all referred to the radial component in the center section at a distance of 0.25 m from the axis as the base. Corrections were made for imprecise orientation of the transucers, with an error of approximately 1 deg. The data pertaining to the super-conducting excitation coils with a shield were evaluated on an Argus-500 computer. A comparison of theoretically estimated experimental error and calculation error indicates that the experimental error is consistently smaller, these estimates corresponding to the maximum discrepancy, so that the results of this experimental study appear to be reliable. Author

N86-17654# Joint Publications Research Service, Arlington, Va.
REVERSIBLE COMPONENT OF MAGNETIC INDUCTION IN MAGNETICALLY SOFT MATERIALS DURING MAGNETIZATION REVERSAL c70
Yuriy Nikolayevich Maslov, Oleg Nikolayevich Khmaruk, and Viktor Vasilyevich Krokhim *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 45-50 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

The reversible component of magnetic induction in magnetically soft materials is evaluated as function of the magnetic field intensity. The analysis is based on two mechanisms operating during dynamic magnetization reversal: reversible movement of domain walls and reversible rotation of the magnetization vector within a domain. The material is assumed to be initially in a state corresponding to negative remanence and then magnetized by magnetic field pulses of various durations to various levels up to saturation in the positive direction with subsequent relaxation to a residual level, ensuring that the irreversible component of magnetic induction be the same after each pulse. The process corresponds to fourth and first quadrants of the hysteresis loop. Static characteristics are extended to dynamic conditions, also taking into account the distribution of magnetic induction over the volume of material with alternation of positive and negative maxima. Experimental data pertaining to 79 Moly Permalloy ribbon agree closely with theoretical calculations based on the Weiss model, which validates this method of analyzing dynamic magnetization reversal. Author

N86-17655# Joint Publications Research Service, Arlington, Va.
EQUIVALENT-CIRCUIT CALCULATIONS FOR BUILT-UP MAGNETIC STRUCTURES BY PROJECTION METHOD c70
Aleksandr Aleksandrovich Drozdov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 50-60 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

An equivalent circuit for a built-up multishell magnetic structure is developed by the method of projection. Such a structure contains three kinds of elements: segments of ferromagnetic material and joints between them with nonlinear characteristics and air gaps with linear ones. The gist of this method is to satisfy at each step any one of Kirchhoff's laws as well as the relation between magnetic flux and magnetizing force, and then correcting the circuit on the basis of Kirchhoff's other law. The algorithm of solving the systems of algebraic equations for both magnetic flux vector and magnetizing force vector is aided by matrix notation and an equivalent resistance grid. It includes the use of magnetization curves, piecewise linearized, one for the high-permeability core material and one for the low-permeability materials of the joints. The eleven steps of this algorithm have been formalized in a flow chart and programmed in ALGOL-60 for computers. Typical numerical results referring to the flux density distribution are identical to the results obtained for this example by the conventional method of linearization. Author

N86-17444# Shanghai Transit Co. (China).
CALCULATION METHODS FOR SHORT-CIRCUIT CURRENTS IN THREE-PHASE BRIDGE RECTIFIER CIRCUITS
Fan Yuan-wu *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 101-103 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17445# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TEMPERATURE DERIVATIVE BATTERY CHARGE CONTROL
H. J. N. Spruijt *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 107-122 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17446# Toulouse Univ. (France).
USE OF IMPEDANCE MEASUREMENTS TO MODEL NICKEL-CADMIUM BATTERIES [EMPLOI DE MESURES D'IMPEDANCE POUR LA MODELISATION DES ACCUMULATEURS NICKEL-CADMIUM]
M. Comtat, P. Delorme, F. Baron (ESA/ESTEC, Noordwijk, Netherlands), and A. Capel (Thomson CSF, Toulouse, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 123-128 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17447# Toulouse Univ. (France).
IMPROVEMENT OF THE PROCESS FOR ELECTROCHEMICAL IMPREGNATION OF NICKEL HYDROXIDE ELECTRODES [AMELIORATION DU PROCEDE D'IMPREGNATION ELECTROCHIMIQUE D'ELECTRODES D'HYDROXYDE DE NICKEL]
M. Comtat, B. Lafage, and J. Leonardi (Societe SAFT, Bordeaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 129-133 refs In FRENCH; ENGLISH summary (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17448# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE RESULTS OF SOME END OF LIFE TESTS ON THE OTS BATTERY
P. Leggett, H. Lechte, and A. Sepers *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 135-143 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17451# Technische Hochschule, Aachen (West Germany). Inst. fuer Stromrichtertechnik und elektrische Antriebe.
RECOVERY CIRCUIT FOR SNUBBER ENERGY IN POWER ELECTRONIC APPLICATIONS WITH HIGH SWITCHING FREQUENCIES
J. C. Bendien, H. vanderBroeck, and G. Fregien *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electron. Specialists Conf. May 1985 p 165-170 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17452*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGNING HIGH FREQUENCY ac INDUCTORS USING FERRITE AND MOLYPERMALLOY POWDER CORES (MPP)
W. T. McLyman and Albert P. Wagner *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 171-175 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17453# Fabrica Italiana Apparecchi Radio S.p.A., Milan (Italy).
THE 230W TRAVELING WAVE TUBE AMPLIFIER (TWTA)

POWER SUPPLY DESIGN
A. Gasperini and A. Bonati *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 179-185 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17454# Selenia S.p.A., Rome (Italy).
A 20 GHz/30 W TRAVELING WAVE TUBE AMPLIFIER (TWTA) FOR OLYMPUS TRANSPONDER
S. Roccucci, C. Sciangula, and D. Adirosi *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 187-197 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17455# Alcatel Thomson Espace, Courbevoie (France).
APPLICATION OF CURRENT-CONTROL MODULATOR (MC2) CONTROL FEEDBACK FOR 12 GHz 20 W ELECTRIC POWER CONDITIONER (EPC) FOR TELECOM SATELLITE
J. P. Desne and C. Peyrotte *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 199-206 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF HIGH-VOLTAGE, HIGH-POWER, SOLID STATE REMOTE POWER CONTROLLERS FOR AEROSPACE APPLICATIONS
John C. Sturman *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 207-216 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17457# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DISCHARGE DETECTION IN HIGH VOLTAGE FLIGHT HARDWARE
J. C. J. Eeman *In its* Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 217-222 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17458# Rockwell International Corp., Cedar Rapids, Iowa.
AN ANALYTICAL INVESTIGATION OF CURRENT-INJECTED CONTROL FOR CONSTANT-FREQUENCY SWITCHING REGULATORS
Daniel M. Mitchell *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 225-233 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17459# Politecnico di Milano (Italy). Inst. of Nuclear Engineering.
EXACT CONTINUOUS MODELS OF PULSE WIDTH MODULATION (PWM) REGULATORS IN BOTH CONTINUOUS AND DISCONTINUOUS CONDUCTION MODES
P. Maranesi and V. Varoli *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 235-238 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17460# Hasler Ltd., Bern (Switzerland).
POWER SWITCHING CELL MODELING: AN EASY WAY
A. S. Kislovski *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 239-244 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17462# International Business Machines Corp., Poughkeepsie, N.Y.
IMPROVING THE RESPONSE TIME OF A SWITCHING REGULATOR USING SENSIT AND DESIGN/ASTAP
John D. Page and Terrence R. Scott *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 257-270 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17463# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
TIME DOMAIN ANALYSIS OF AN S3R SYSTEM
L. G. VandenBerghe *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 271-278 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17464# Societe Crouzet, Valence (France).
DESIGN AND DEVELOPMENT OF A CURRENT LIMITED SOLID STATE HYBRID SWITCH
C. Neveu and D. P. Levins (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 281-285 (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

N86-17466# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Electrotechnique et d'Electronique Industrielle.
STUDY OF A RESONANT CONVERTER USING POWER TRANSISTORS IN A 25 kW X-RAY TUBE POWER SUPPLY
Y. Cheron, H. Foch, and J. Salesses (Thomson C.G.R., Issy-les-Moulineaux, France) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 295-306 refs (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N86-17656 Virginia Polytechnic Inst. and State Univ., Blacksburg.
VORTICITY SHEDDING OVER TWO-DIMENSIONAL BODIES
Ph.D. Thesis
Dimitrios Mathioulakis 1985 248 p
Avail: Univ. Microfilms Order No. DA8516159

The vorticity shedding characteristics in attached and separated regions were investigated over three configurations, namely a backward facing circular arc, an ellipse at an angle of attack and a pitching airfoil. A fully automated data acquisition system was developed, including a two-component Laser-Velocimetry system in backscatter mode, an accurately controlled traversing mechanism and a MINK-11 minicomputer. Two-component velocity measurements were obtained over the above mentioned bodies, with steady and unsteady free streams. Emphasis was concentrated on the separation region, the free-shear layers and the wake downstream of these bodies. Two inviscid vortex models were developed to predict two different flow phenomena, namely the separated flow over a circular cylinder started impulsively from rest and propagating stall over a linear stationary cascade.

Dissert. Abstr.

N86-17657 Lehigh Univ., Bethlehem, Pa.
RESPONSE OF VISCOELASTIC SLAB TO VISCOUS SLAB TO

VISCOUS FLUID FLOW Ph.D. Thesis
Cahit Ahmet Evrensel 1985 124 p
Avail: Univ. Microfilm Order No. DA8516249

The dynamics of harmonic wave trains on the interface between compliant coatings and boundary layer flows is explored theoretically. The coating is treated as an infinite, elastic or viscoelastic slab of finite thickness, bonded to a rigid half space. The viscoelastic behavior is modeled by an isotropic Voigt constitutive model. The first model studied uses a modified potential flow to approximate boundary layer flow. For this model, surface shear is assumed to be zero and the two media are coupled through normal stress and velocity in the vertical direction. The pressure-surface-elevation relation predicted by the potential flow theory is modified by empirical parameters such as amplitude coefficient and phase shift. As a second model, a two dimensional, perturbed boundary layer flow bounded by a viscoelastic slab is considered. The results obtained show that this model is capable of explaining most of the characteristics of the interaction mechanism between the viscoelastic slab and boundary layer flow. Dissert. Abstr.

N86-17658 Connecticut Univ., Storrs.
HORSESHOE VORTEX FORMATION AROUND A CYLINDER Ph.D. Thesis
Wayne Alan Eckerle 1985 299 p
Avail: Univ. Microfilms Order No. DA8516183

A turbulent boundary layer approaching a local obstruction, such as when annulus wall boundary layers encounter airfoils and support struts, creates a critical problem in gas turbine engines. The slower portion of the approaching boundary layer cannot negotiate the adverse pressure gradient generated by the obstruction and consequently separates from the endwall. The resulting flow field includes a horseshoe vortex that is swept downstream around the body. The separation affects both the local heat transfer coefficients and aerodynamic losses in the endwall region. This investigation evaluated the detailed flow processes that lead to the symmetric horseshoe vortex formation around a large-diameter cylinder. Test conditions included a freestream velocity of 30.5 m/sec, a Reynolds number based on cylinder diameter of 5.5 x 10 to the 5th power, and a boundary-layer thickness equal to 13 percent of the cylinder diameter. The final report presents endwall and cylinder surface flow visualizations, endwall and cylinder static pressure distributions, and five-hole probe measurements in the separation region. Dissert. Abstr.

N86-17659 State Univ. of New York, Stony Brook.
LAMINAR FORCED CONVECTIVE HEAT TRANSFER OF POWER LAW FLUIDS IN ISOSCELES TRIANGULAR DUCTS WITH PERIPHERAL WALL CONDUCTION Ph.D. Thesis
Jin-An Joseph Cheng 1984 344 p
Avail: Univ. Microfilms Order No. DA8513872

The results of an investigation are presented for non-Newtonian fluid heat transfer studies in noncircular ducts. Laminar fully developed flow of a purely viscous fluid is analyzed with two power law fluid models in isosceles triangular ducts. Three major components are covered: (1) The temperature distributions and heat transfer coefficients for a hydrodynamically and thermally fully developed newtonian fluid for the boundary condition of constant axial heat flux with peripheral wall conduction; (2) the velocity distributions and the relationship between the friction factor and the generalized Reynolds number for fully developed power law fluids, two rheological models, as well as Kozicki's geometric parameter method, are in agreement with Chang's experimental data within their ranges; and (3) The temperature distributions for a hydrodynamically and thermally fully developed power law fluid for constant axial heat flux with peripheral wall conduction.
Dissert. Abstr.

N86-17660 Clarkson Univ., Potsdam, N.Y.
FINITE ELEMENT ANALYSIS OF TRANSIENT FORCED CONVECTION AND CONJUGATE HEAT TRANSFER Ph.D. Thesis
Cyrus Aidun 1985 138 p
Avail: Univ. Microfilms Order No. DA8517666

A flexible and multipurpose computer code for the numerical solution of the transient, incompressible Navier-Stokes and energy equations is developed. The numerical method is based on Finite Element spatial discretization of the partial differential equations. A new semi-implicit time integration technique has been developed and used for the solution of the resulting system of ordinary differential equations. A fully implicit time integration technique has also been included as an additional option in the code. This method is applied to solve the transient heat transfer from a circular cylinder started impulsively from rest with sudden increase in the surface temperature. The evolution of the local and average heat transfer coefficients has been computed for various Reynolds numbers. The next problem considered is the heat transfer from a cylinder fluctuating in uniform cross flow. The results show that a time lag always exists between the heat transfer coefficient and the velocity fluctuation. In the next problem the solid and the adjacent fluid regions are considered simultaneously as a conjugate domain. Dissert. Abstr.

N86-17661 Pennsylvania State Univ., University Park.
A THEORETICAL AND EXPERIMENTAL STUDY OF NONCONDENSIBLE TURBULENT BUBBLY JETS Ph.D. Thesis
Tai-Yen Sun 1985 217 p
Avail: Univ. Microfilms Order No. DA8516099

A theoretical and experimental investigation of the transport properties and dispersion of bubbles in noncondensible turbulent bubbly round jets is described. Three two-phase models were developed to predict the flow and evaluated by comparison of predictions with measurements completed during this investigation. The three models are: (1) locally homogeneous flow (LHF) model, where slip between the phases was neglected; (2) deterministic separated flow (DSF) model, where slip was considered, but the effects of bubble interactions with turbulence were ignored; and (3) a stochastic separated flow (SSF) model, where effects of both interphase slip and bubble/turbulence interactions were considered. All three models used a k-epsilon-g turbulence model to specify turbulent properties of the continuous phase. Experiments considered bubbly air/water jets injected vertically upward in still water. The tests included three jets with initial volume fractions of 2.4%, 4.8% and 9.1%, and nearly monodisperse bubble diameters of 0.99, 1.04 and 1.08 mm, respectively, at the jet exit.
Dissert. Abstr.

N86-17662 Iowa Univ., Iowa City.
DEVELOPMENT OF A TWO-SCALE TURBULENCE MODEL AND ITS APPLICATION Ph.D. Thesis
Kanwerdip Singh 1985 254 p
Avail: Univ. Microfilms Order No. DA8518873

The use of second order closure turbulence model in predicting turbulent flows is known to be more successful than the classical mixing length model. However, it is found that if the turbulence constants are not altered or modified, the second order closure turbulence model is unable to predict satisfactorily for some flows such as round jet and wake flows. In order to improve the predictability of the second order closure model, the present work proposes to consider two turbulent scales in the modeling of turbulent flows. One of these scales is based on using the turbulent kinetic energy, k, and its dissipation rate, epsilon, to characterize the large energy containing eddies. The other scale is based on the dissipation rate, epsilon, and the kinematic viscosity, v, to characterize the small energy dissipating eddies. The second scale is based on the well known Kolmogorov hypothesis that dissipation of turbulent kinetic energy occurs primarily at small eddies. The turbulence model derived based on the concept of two different scales is called the two-scale turbulence model. The existing turbulence model which is modelled based on the one-scale concept of k and epsilon is called the one-scale turbulence model. The two-scale turbulence model is then applied to predict turbulent free shear flows and recirculating flows. Dissert. Abstr.

N86-17663 Engineering Sciences Data Unit, London (England).
FLUID TRANSIENTS IN PIPES. REDUCTION AND CONTROL OF PRESSURE SURGES IN LIQUIDS
Nov. 1984 89 p refs

(ESDU-84013; ISBN-0-85679-475-9; ISSN-0141-4011) Available as part of the ESDU sub-series on fluid mechanics, internal flow. For information on all ESDU validated engineering data, contact ESDU International, 251-259 Regent Street, London, W1R 7AD, England, or Suite 200, 1495 Chain Bridge Road, McLean, Va. 22101, USA

ESDU 84013 provides a simplified graphical method for predicting maximum pressure changes in liquid filled pipework systems that may be treated as one-line systems. The method applies to pressures induced by partial or total valve closure, covering all common valve types, or pump trips. Data are also given for the estimation of the size of air vessel, situated just downstream of a pump, to protect against excessive upsurge and downsurge pressure changes following pump trip. A computer program is included to analyze transients in one-line systems and does not use the simplifying assumptions necessary for the graphical data. Practical worked examples, illustrating the use of the methods, are included and guidance is given on the data required for a full fluid transients analysis going beyond the scope of ESDU 84013. Author

N86-17664 Engineering Sciences Data Unit, London (England).
LOW-FIN STAGGERED TUBE BANKS: HEAT TRANSFER AND PRESSURE-LOSS FOR TURBULENT SINGLE-PHASE CROSSFLOW
Jul. 1985 24 p refs
(ESDU-84016; ISBN-0-85679-478-3; ISSN-0144-402X) Available as part of the ESDU sub-series on heat transfer. For information on all ESDU validated engineering data, contact ESDU International, 251-259 Regent Street, London, W1R 7AD, England, or Suite 200, 1495 Chain Bridge Road, McLean, Va. 22101, USA

ESDU 84016 gives new correlations for calculating the external heat transfer and pressure loss for flow over low fin tube banks. Low fins are fins of limited height formed on the tube outside wall, typically by cold rolling. The correlations were derived from a regression analysis of experimental data from various sources covering 14 configurations. They are applicable for Reynolds numbers between 1000 and 800,000, fin densities of 11 to 32 fins per inch (425 to 1250 fins per meter), with heights of 0.03 to 0.1 inch (0.75 to 3 mm) on tubes of outside diameter 0.5 to 1.25 inch (13 to 40 mm). The method over 93 results predicts heat transfer coefficient with a standard deviation of 6.6 per cent and over 81 results predicts pressure drop with a standard deviation of 7.7 per cent. A practical worked example illustrates the use of the data. Author

N86-17665*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Mechanical and Aerospace Engineering.
LOW REYNOLD'S NUMBER BOUNDARY LAYERS IN A DISTURBED ENVIRONMENT Ph.D. Thesis - August, 1985 - Final Report
Dong-Kee Paik and Eli Reshotko Jan. 1986 96 p
(Grant NAG3-230)
(NASA-CR-175031; NAS 1.26:175031) Avail: NTIS HC A05/MF A01 CSCL 20D

Studies of flat plate boundary layer development were made in a low speed wind tunnel at turbulence levels from 2%to 7%. Only transitional and turbulent flows were observed in the range 280 < Re sub theta 700. The mean turbulent velocity profiles display law-of-the-wall behavior but have negligible wake component. The u' disturbance profiles compare well with those of other experiments, the peak value of u'/u sub tau being about 2.5. The effect of free-stream turbulence level on turbulent skin friction can be nicely correlated with those of other investigations on a plot of u sub e/u sub tau versus Re sub theta. A discussion on the u' spectra for the transitional boundary-layers is presented. Author

N86-17666# British Aerospace Aircraft Group, Preston (England). Wind Tunnel Dept.
HOT GAS LABORATORY TWIN NOZZLE CALIBRATION
A. P. Winstanley 1 Jul. 1985 37 p refs
(BAe-ARG-200) Avail: NTIS HC A03/MF A01

The quality of a twin nozzle flow is investigated. The assembly was manufactured to produce high temperature jet related data relevant to VSTOL aircraft when adapted to a wind tunnel hot gas facility. The twin nozzles are of an Ni-resistant flake cast iron construction whereas the standard 120 mm diameter single nozzle is a stainless steel, water-cooled fabrication. A calibration rake was used to acquire pressure and temperature data over an array of data points. The tests show that the construction method is satisfactory. The total pressure quality in the exit plane is good. A negative temperature gradient is found along the y axis. The nozzle reference pressure is a good indication of the average total pressure in the exit plane. Author (ESA)

N86-17667# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DEVELOPMENT OF A TWO-DIMENSIONAL/AXISYMMETRIC IMPLICIT NAVIER-STOKES SOLVER USING FLUX-DIFFERENCE SPLITTING CONCEPTS AND FULLY GENERAL GEOMETRY Final Report, 1 Mar. 1984 - 28 Feb. 1985
R. G. Hindman Sep. 1985 64 p Prepared in cooperation with Calspan Field Services, Inc., Arnold AFS, Tenn.
(AD-A159776; AEDC-TR-85-43) Avail: NTIS HC A04/MF A01 CSCL 20/4

Theoretical background and several basic test cases are presented for a new, time dependent Navier-Stokes solver for two-dimensional and axisymmetric flows. The goal of the effort is to invoke state-of-the-art computational fluid dynamics (CFD) technology to improve modeling of viscous phenomenal and to increase the robustness of CFD analysis. The original motivation was inadequate representation of supersonic ramp-induced separation by existing CFD codes. The present work addresses that inadequacy by using modern numerical methods which accurately model signal propagation in high-speed fluid flow. This technique solves the Navier-Stokes equations in general curvilinear coordinates in a four-sided domain bounded by a wall, and upper boundary opposite the wall, an inflow boundary, and an outflow boundary. The interior algorithm is a flux-difference splitting method similar to that of Yang, Lombard, and Bershader, but is blended into a second order, implicit factored delta form. With implicitly treated boundary conditions, the solution is performed using a block tridiagonal method followed by an explicit updating of the boundaries. The resulting scheme satisfies the global conversation requirement to within the order of accuracy of the algorithm. The grid is generated using a relaxation Poisson solver. A systematic and rigorous development of the complete method is presented. Initial steps in code validation include successful reproduction of Couette and Blasius solutions. GRA

N86-17668# Physical Dynamics, Inc., Bellvue, Wash.
EXPERIMENTAL GENERATION OF STRATIFIED SHEAR FLOWS Final Report, 15 Sep. 1984 - 14 Mar. 1985
D. P. Delisi 26 Aug. 1985 30 p
(Contract F49620-84-C-0092)
(AD-A160304; PD-NW-85-340R; AFOSR-85-0873TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

An annular, stratified flow tank was designed and built to study gravity wave, mean flow (critical layer) interactions. The tank contained stratified salt water, and an initial shear profile was generated by blowing air over the water surface. Internal gravity waves were generated by displacing the bottom floor of the tank in a known way. A preliminary critical layer experiment was performed to prove the feasibility of studying critical layer interactions in the experimental facility. Quantitative measurements of mean flow velocities, velocity perturbations, and vertical wavelengths were obtained. GRA

N86-17669# Oak Ridge National Lab., Tenn.
IMPLICIT MIXED INTERPOLATION FINITE ELEMENT ALGORITHM FOR TIME DEPENDENT VISCOUS FLOWS UTILIZING A FRONTAL SOLUTION TECHNIQUE
B. R. Becker and J. B. Drake 1985 29 p Presented at the 5th International Conference on Mathematical Modelling, Berkeley, Calif., 29 Jul. 1985

(Contract DE-AC05-84OR-21400)
(DE85-016357; CONF-850758-2) Avail: NTIS HC A03/MF A01

A finite element algorithm is described which implements the Galerkin approximation to the Navier-Stokes equations and incorporates five predominate features. Although none of these five features is unique to this algorithm, their orchestration, as described in this paper, results in an algorithm which is not only easy to implement but also stable, accurate, and robust, as well as computationally efficient. The zero stress natural boundary condition is implemented which permits calculation of the outflow velocity distribution. A nine-node, Lagrangian, isoparametric, quadrilateral element is used to represent the velocity while the pressure uses a four-node, Lagrangian, superparametric element coincident with the velocity element. The easily implemented, computationally efficient frontal solution technique is used to assemble the element coefficient matrices, impose the boundary conditions, and solve the resulting linear system of equations. An implicit backward Euler time integration rule provides a very stable solution method for time dependent problems. A Picard scheme with a relatively large radius of convergence is used for iteration of the non-linear equations at each time step. Results are given from the calculations of two dimensional, steady-state and time-dependent convection dominated flows of viscous incompressible fluids. DOE

N86-17670# Oak Ridge National Lab., Tenn.
VAPOR COMPRESSION HEAT PUMP SYSTEM FIELD TESTS AT THE TECH COMPLEX
V. D. Baxter 1985 32 p refs Presented at the Energy Sources: Conservation and Renewables, Washington, D.C., 27 Apr. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016364; CONF-8504174-1) Avail: NTIS HC A03/MF A01

The Tennessee Energy Conservation in Housing (TECH) complex has been utilized since 1977 as a field test site for several novel and conventional heat pump systems for space conditioning and water heating. Systems tested include the Annual Cycle Energy System (ACES), solar assisted heat pumps (SAHP) both parallel and series, two conventional air-to-air heat pumps, an air-to-air heat pump with desuperheater water heater, and horizontal coil and multiple shallow vertical coil ground-coupled heat pumps (GCHP). A direct comparison of the measured annual performance of the test systems was not possible. However, a cursory examination revealed that the ACES had the best performance. However, its high cost makes it unlikely that it will achieve widespread use. Costs for the SAHP systems are similar to those of the ACES but their performance is not as good. Integration of water heating and space conditioning functions with a desuperheater yielded significant efficiency improvement at modest cost. The GCHP systems performed much better for heating than for cooling and may well be the most efficient alternative for residences in cold climates. DOE

N86-17671# Department of Energy, Washington, D. C.
MAGNETICALLY FOCUSED LIQUID DROP RADIATOR Patent Application
T. E. Botts (Brookhaven National Lab., Upton, N.Y.), J. R. Powell (Brookhaven National Lab., Upton, N.Y.) , and R. Lenard, inventors (to DOE) Filed 10 Dec. 1984 27 p
(Contract DE-AC02-76CH-00016)
(DE85-017735; US-Patent-Appl-SN-679841) Avail: NTIS HC A03/MF A01

A magnetically focused liquid drop radiator for application in rejecting energy from a spacecraft is described. It is characterized by a magnetizable liquid or slurry disposed in operative relationship within the liquid droplet generator and its fluid delivery system, in combination with magnetic means disposed in operative relationship around a liquid droplet collector of the LDR. The magnetic means are effective to focus streams of droplets directed from the generator toward the collector, thereby to assure that essentially all of the droplets are directed into the collector, even though some of the streams may be misdirected as they leave the generator. The magnetic focusing means is also effective to suppress splashing of liquid when the droplets impinge on the collector. DOE

N86-17672# Lawrence Livermore National Lab., Calif.
ARTIFICIAL VISCOSITY Q ERRORS FOR STRONG SHOCKS AND MORE-ACCURATE SHOCK-FOLLOWING METHODS
W. F. Noh 19 Jul. 1985 32 p Presented at the International Conference on Fluid Dynamics, Reading, Engl., 1 Apr. 1985
(Contract W-7405-eng-48)
(DE85-017830; UCRL-93008; CONF-8504150-3) Avail: NTIS HC A03/MF A01

The artificial viscosity (Q) method for von Neumann-Richtmyer is a tremendously useful numerical technique for following shocks wherever and whenever they appear in the flow. We show that it must be used with some caution, however, as serious Q-induced errors (approx. =100%) can occur in some strong shock calculations. We investigate three types of Q errors: (1) Excess Q heating, of which there are two types: (a) excess Wall Heating on shock formation and (b) Shockless Q Heating; (2) Q errors when shocks are propagated over a non-uniform mesh; and (3) Q errors in propagating shocks in spherical geometry. As a basis of comparison, we use as our standard the Lagrangian formulation with Q = C0 sup 2 rho L sup 2 (u sub x) sup 2. This standard Q is compared with Noh's (Q and H) shock-following method, which employs an artificial heat-flux term (H) in addition to Q, and with the (non-Q) PPM method of Colella and Woodward. Both the (Q and H) and PPM methods (particularly when used with an adaptive shock-tracking mesh) give superior results for our test problems. In spherical geometry, Schulz's tensor Q formulation of the hydrodynamic equations proves to be most accurate. DOE

N86-17673# Argonne National Lab., Ill.
HEAT TRANSFER FROM A HIGH TEMPERATURE CONDENSABLE MIXTURE. 2: SEDIMENTATION OF FOG CONDENSATE
D. W. Condiff, D. H. Cho, and S. H. Chan 1985 9 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985 Prepared in cooperation with Wisconsin Univ., Milwaukee
(Contract W-31-109-eng-38)
(DE85-018377; CONF-850810-26) Avail: NTIS HC A02/MF A01

A kinematic wave analysis of fog sedimentation is employed to relate growth of a fog condensate deposit layer to radiation generated fog formation rates. The increase of surface radiation absorptivity with deposit layer thickness promotes a feedback mechanism for higher growth rates, which is evaluated in detail. DOE

N86-17674# Argonne National Lab., Ill.
CONDENSATION OF THE UNDERSIDE OF A HORIZONTAL SURFACE IN A CLOSED VESSEL
R. P. Stein, D. H. Cho, and G. A. Lambert 1985 8 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018379; CONF-850810-27) Avail: NTIS HC A02/MF A01

Heat transfer measurements were made for film condensation of steam on the underside of a horizontal surface in a closed vessel. Data were obtained as condensing heat flux vs. temperature difference at constant pressures and noncondensable gas (air) contents. Heat fluxes varied from about 0.04 to 0.8 MW/m sq. (13,000 to 250,000 Btu/h-ft sq.) and temperature differences from about 30 to 150(0)C. Pressures ranged from 0.31 MPa (45 psia) to 1.24 MPa (180 psia). Gas contents ranged from the maximum the system could contain at atmospheric pressure to negligible amounts. It appears that the effect of noncondensable gas can be correlated reasonably well based on a heat-mass transfer analogy. However, the data for negligible gas contents exhibit a significant effect of the system pressure which cannot be accounted for by existing correlations or models such as the one due to Gerstmann and Griffith. DOE

N86-17675# Pennsylvania Univ., Philadelphia. Dept. of Mechanical Engineering and Applied Mechanics.

ANALYSIS OF THE SOLAR POWERED/FUEL ASSISTED RANKINE CYCLE COOLING SYSTEM. PHASE 1: REVISION
N. Lior, K. Koai, and H. Yeh Apr. 1985 252 p
(Contract DE-AC03-78ET-20110)
(DE85-016173; DOE/ET-20110/5-Rev) Avail: NTIS HC A12/MF A01

The subject of this analysis is a solar cooling system which consists of a conventional open-compressor chiller, driven by a novel hybrid steam Rankine cycle. Steam is generated by the use of solar energy collected at about 100C, and it is then superheated to about 600C in a fossil-fuel fired superheater. The steam drives a novel counter-rotating turbine, some of the heat from it is regenerated, and it is then condensed. Thermal storage is implemented as an integral part of the cycle, by means of hot-water which is flashed to steam when needed for driving the turbine. For the solar energy input, both evacuated and double-glazed flat-plate collectors were considered. A comprehensive computer program was developed to analyze the operation and performance of the entire power/cooling system. Each component was described by a separate subroutine to compute its performance from basic principles, and special attention was given to the parasitic losses, including pumps, fans and pressure drops in the piping and heat exchangers, and to describe the off-design performance of the components. The thermophysical properties of the fluids used are also described in separate subroutines. Transient simulation of the entire system was performed on an hourly basis over a cooling season in two representative climatic regions (Washington, DC, and Phoenix, AZ) for a number of system configurations. DOE

N86-17676# Sandia National Labs., Albuquerque, N. Mex.
EXPERIMENTAL STUDY OF THE SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTION
D. W. Kuntz, V. A. Amatucci, and A. L. Addy 1985 7 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985 Prepared in cooperation with Illinois Univ., Urbana
(Contract DE-AC04-76DP-00789)
(DE85-016583; SAND-85-1779C; CONF-851125-9) Avail: NTIS HC A02/MF A01

An experimental investigation was conducted to study the interaction between a shock wave and a turbulent boundary layer. The boundary layer was formed on the floor of a wind tunnel operating with a free-stream Mach number of 2.94 and a Reynolds number based on boundary layer thickness of 3.1 x 10 to the 5th power. A 20 degree compression corner model was used to generate the interaction flowfield. Measurement techniques used in this investigation included Schlieren photography, surface static pressure measurement, surface streak pattern measurement, and laser Doppler velocimetry (LDV). The LDV was used to make two-color, two-component coincident velocity measurements within the redeveloping boundary layer downstream of the interaction. The results of the LDV measurements indicted that both the mean and turbulent flow properties of the boundary layer were significantly altered by the interaction, with large increases in the longitudinal turbulence intensity and Reynolds stress observed in the redeveloping boundary layer. DOE

N86-17677# Midwest Research Inst., Golden, Colo.
THERMAL STRATIFICATION IN DIRECT GAIN PASSIVE HEATING SYSTEMS WITH VARIABLE HEATING OF THE FLOOR AND ONE VERTICAL WALL
R. S. Anderson, E. M. Fisher, and M. S. Bohn Sep. 1985 8 p Presented at the SOLAR 1985, Raleigh, N.C., 15 Oct. 1985
(Contract DE-AC02-83CH-10093)
(DE85-016860; SERI/TP-252-2767; CONF-851030-6) Avail: NTIS HC A02/MF A01

This paper reports the results of an experimental study that used a 1/4-scale, water-filled test cell to examine the effect of the natural convection flows created by horizontal and vertical heated surfaces upon thermal stratification in a single-zone enclosure. The study covered the range from pure floor heating to pure wall heating, including various levels of combined floor and wall heating. The presence of a cold window or thermal storage surface was simulated by cooling the wall directly opposite the heated vertical wall. Flow visualization studies were carried out to determine the structure of the flow in the test cell. Correlations are reported for heat transfer, temperature distributions, and thermal stratification as a function of the relative amount of heating that was provided to the floor and wall of the test cell. The results of the study can be used to predict the flow patterns, energy transfer, and levels of thermal stratification that occur in direct gain solar systems that are dominated by natural convection. DOE

N86-17678# Florence Univ. (Italy). Ist. di Energetica.
QUASI THREE-DIMENSIONAL FINITE ELEMENT FLOW CALCULATION IN PUMPS
E. Carnevale, S. Giusti, G. Manfrida, and F. Martelli 1985 10 p refs Presented at 7th Scientific Society of Mechanical Engineers Conference on Fluid Machinery, Budapest, Hungary, 1983
Avail: NTIS HC A02/MF A01

Computer codes to solve meridional and blade-to-blade two-dimensional inviscid flow on turbomachine blades were developed. The codes interact between themselves to give a quasi three-dimensional picture of the flow. The codes are validated by checking predictions against experimental data on a centrifugal impeller. Author (ESA)

N86-17679# Florence Univ. (Italy). Ist. di Energetica
FLOW CALCULATION IN PUMP IMPELLERS BY FINITE ELEMENTS
F. Martelli and G. Manfrida 1985 11 p refs Presented at 7th Scientific Society of Mechanical Engineers Conference on Machinery, Budapest, Hungary, 1983
Avail: NTIS HC A02/MF A01

A finite element discretization and a formulation of the flow equations in the meridional-tangential abscissae domain were implemented to overcome the intrinsic nonlinearity of the flow equations on nonaxial turbine geometries and to deal with periodic boundaries ahead and after the blade. This enables a coupling of two-dimensional calculations of meridional flow surfaces with calculations of blade-to-blade surfaces to provide a quasi three dimensional image of the flow in turbomachines. Geometries from axial to centrifugal can be analyzed without discontinuities. A trailing edge closure analysis technique is used to predict impeller discharge angle. Author (ESA)

N86-17680# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
INVESTIGATION OF AN OBLIQUE SHOCK WAVE/LAMINAR BOUNDARY LAYER INTERACTION USING LASER DOPPLER VELOCIMETRY (LDV)
C. H. Boccadoro and J. F. Wendt Jun. 1984 64 p refs
(Grant AFOSR-83-0273)
(VKI-TN-152) Avail: NTIS HC A04/MF A01

The wholly laminar boundary layer separation associated with an incident shock wave was studied in a wind tunnel at Mach 2.20. Mean velocity profiles in and around the separation are measured using a laser Doppler velocimeter with Bragg cell. Reversed flow velocities of up to 4.2% of free stream and measurements to within 0.1 mm from the surface are obtained. Linear extrapolations of the zero-line velocities coincide with separation and reattachment points estimated from shadowgraph visualization. The measured flow field is shown to be free of large finite end effects by assessing model surface pressures with and without side plates installed. A limiting two-dimensional pressure distribution on center line is observed only when the distances between side plates exceeds more than twice that observed in comparable compression corner experiments. Velocity and surface pressure data compare very favorably with computational results obtained from a full two-dimensional Navier-Stokes code and with other experimental results. Author (ESA)

N86-17681# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
A TWO-DIMENSIONAL MODEL FOR BOILING IN AN ACTIVE

PARTICLE BED: BOIL
P.-H. Theunissen and J.-M. Buchlin Oct. 1984 39 p refs
(VKI-TN-153) Avail: NTIS HC A03/MF A01

In order to model two-dimensional boiling in an active particle bed, a two dimensional, steady state, isothermal model was assembled, starting from the mass, momentum, and energy conservation laws. The momentum balance includes capillary and gravity effects and two phase flow pressure losses. This physical description is translated into a mathematical model and implemented as a numerical code, BOIL, using an optimized numerical solving process. One and two-dimensional test cases are run to emphasize the effects of boundary conditions; heat source distribution; relative permeability laws; and Leverett function coefficient. Results allow a good level of confidence in BOIL. Two-dimensional effects of capillary forces are discussed.
Author (ESA)

N86-17682# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
AN IMPROVED PRESSURE ITERATION PROCEDURE FOR THE SOLA ALGORITHM APPLIED TO THE SOLUTION OF THE INCOMPRESSIBLE NAVIER-STOKES EQUATIONS
H. Andersson and C. Benocci Oct. 1984 53 p refs Sponsored by Royal Norwegian Council for Scientific and Industrial Research and Von Karman Institute for Fluid Dynamics
(VKI-TM-35) Avail: NTIS HC A04/MF A01

The SOLA solver for the incompressible Navier-Stokes equations was analyzed to assess its application to the subgrid modeling of turbulent flows. A possible source of inaccuracies in the iterative procedure for the determination of pressure is identified, and eliminated with a simple modification. Author (ESA)

N86-17683# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
UNSTEADY THREE-DIMENSIONAL SURFACE THEORY WITH THE FREE SURFACE EFFECT: SUPERCRITICAL CASE
Jacques Leclerc and Pierre Salauen 1984 207 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-933)
(ONERA-P-1984-1; ISSN-0078-379X) Avail: NTIS HC A10/MF A01

The unsteady linearized theory in the supercritical case is solved by the integral equation method. The Kernel originating in the potential of the Havelock source is expressed as a Fourier series with respect to the azimuth angle, the coefficients of which are simple integrals. It is shown that convergence disappears on the free-surface downstream, behind the integration point. An asymptotic approximation of the remainder is given. This provides a way of finding the singularity. The integral equation yielding the local lift coefficient is solved by a collocation method similar to that of Multhopp. Numerical results of horizontal and vertical vibrating plates moving horizontally are given. Author (ESA)

N86-17684# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THE STEADY LIFTING SURFACE THEORY WITH A FREE-SURFACE
Jacques Leclerc and Pierre Salauen 1984 38 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-934)
(ONERA-P-1984-2; ISSN-0078-379X) Avail: NTIS HC A03/MF A01

A method to solve the unsteady lifting surface problem is applied to steady surfaces with a free-surface. The local lifting coefficient appears as a solution to an integral equation of the first kind whose kernel, deduced from the Havelock source potential, is expanded in a Fourier series, with respect to the azimuth angle. Numerical applications such as the calculation of the lift and drag of a lifting wing, and hydrodynamic pressures in the case of turn of a ship are given. Author (ESA)

N86-17685# Southampton Univ. (England). Inst. of Sound and Vibration Research.
[ACTIVITIES REPORT OF THE INSTITUTE OF SOUND AND VIBRATION RESEARCH] Annual Report, Mar. 1985
1985 46 p refs
Avail: NTIS HC A03/MF A01

Research in fluid dynamics and acoustics (noise and vibration control); audiology and human effects (audiotory communication and hearing conservation); structures and machinery (automotive design); and shock analysis is summarized. Underwater acoustics; active noise control; aircraft noise; wind turbine noise; laminar flow fans; helmet design; and the acoustics of flow ducts were studied. Author (ESA)

N86-17686# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
PROGRESS IN THE DEVELOPMENT OF A TWO-FLUID MODEL OF TURBULENCE FOR NEAR-WALL FLOWS. PART 2: HEAT-TRANSFER CHARACTERISTICS OF A BOUNDARY LAYER
J. O. Ilegbusi Sep. 1984 25 p refs
(CFD/84/8-Pt-2) Avail: NTIS HC A02/MF A01

Heat transfer rates, velocity profiles, and temperature distributions for the turbulent incompressible flow of air over an isothermal flat plate were predicted with a two fluid model of turbulence. The constant expressing the conduction of heat between the two fluids is optimized with reference to mean flow data. This constant is employed with those established in an investigation of the hydrodynamics. Predictions compare well with experimental data, but the Stanton number is unpredicted along the plate, implying that the wall boundary condition should be improved. Author (ESA)

N86-17687*# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
TWO-FLUID MODELS OF TURBULENCE
D. Brian Spalding Apr. 1985 27 p refs Presented at NASA Langley Workshop on Theoretical Approaches to Turbulence, Hampton, Va., 10-12 Oct. 1984 Sponsored by NASA, UK Science and Engineering Research Council, UK Health and Safety Executive, US Army (European Office), UK Atomic Weapons Research Establishment and UKAEA
(NASA-CR-176419; NAS 1.26:176419; CFD/85/4) Avail: NTIS HC A03/MF A01

The defects of turbulence models are summarized and the importance of so-called nongradient diffusion in turbulent fluxes is discussed. The mathematical theory of the flow of two interpenetrating continua is reviewed, and the mathematical formulation of the two fluid model is outlined. Results from plane wake, axisymmetric jet, and combustion studies are shown. Author (ESA)

N86-17688# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE NUMERICAL CALCULATION OF PARTICLE-SIZE DISTRIBUTIONS IN 2D JETS AND BOUNDARY LAYERS
D. Brian Spalding Apr. 1985 39 p refs Previously announced as BL/TN/A/35
(CFD/85/6; BL/TN/A/35) Avail: NTIS HC A03/MF A01

The Parmix program for calculating particle size distributions in 2D jets and boundary layers is presented. Parmix is a development of Genmix 4, which allows the fuel to be supplied as a suspension of condensed phase particles in a gaseous stream. The particles are allowed to vary in size, by membership of one of five differently sized groups of particles. Larger sized particles move into the smaller sized groups as a result of vaporization or direct oxidation. The concentration of particles within each particle size group appears as a distinct variable of a differential equation.
Author (ESA)

N86-17689# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
LAMINAR FLOW IN A DRIVEN SQUARE CAVITY
Liu Jun and D. Brian Spalding, ed. Nov. 1984 30 p refs
(PDR/CFDU/IC/17) Avail: NTIS HC A03/MF A01

The PHOENICS code was employed to compute the steady two-dimensional viscous incompressible flow generated within a square cavity by a moving surface at the cavity open end. Results

with Reynolds numbers of 100 and 1000 are compared with published solutions. The comparisons demonstrate that close agreement for velocities and pressures is obtained. Author (ESA)

N86-17690# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
ONE-DIMENSIONAL PREDICTION OF THE INTERFACE MOTION SEPARATING TWO IMMISCIBLE FLUIDS ENCLOSED IN A LONG DUCT
F. R. Villasenor and D. Brian Spalding, ed. Oct. 1984 56 p refs (PDR/CFDU/IC/19) Avail: NTIS HC A04/MF A01

The numerical prediction for the time dependent interface location between two immiscible fluids is presented. The fluids have a small density difference and are contained in a closed duct of square cross section. The process starts when the duct, which is at first either horizontal or vertical, and at rest, is suddenly tilted. The problem is simulated by a one-dimensional, unsteady and laminar two phase model. The results are plausible and comparison with a simplified analytical solution is presented. Agreement is very good. Author (ESA)

N86-17691# Centre Technique des Industries Mecaniques, Senlis (France).
LIQUID FLOW CALIBRATION Final Report [ETALONNAGE DEBIMETRE POUR LIQUIDES]
J. P. Lecerf and P. Meurice 16 May 1984 52 p In FRENCH (CETIM-15-C-251) Avail: NTIS HC A04/MF A01

A flow calibrating method is proposed. The flowmeter is placed in a flow controlled hydraulic flow, and the time necessary to displace a hydraulic piston between electronically controlled positions is measured. The electronic measurement allows for an easy automation. The accuracy of the calibration is > 0.05% for flows between 0.1 and 600 lt/min. Author (ESA)

N86-17692# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
MODELS AND PREDICTION OF TURBULENT FLOW WITH PARTICLES [MODELISATION ET PREDICTION D'ECOULEMENTS TURBULENTS AVEC PARTICULES]
Roland Borghi 29 Nov. 1984 61 p refs In FRENCH (Contract DRET-83-34-134)
(ONERA-RTS-21/7135-EY) Avail: NTIS HC A04/MF A01

The diffusion of a particle cloud in a turbulent flow is studied in order to compare theory and experiment, to evaluate the influence of the particles in a fluid field, and to develop a computation of recycled flow. It is shown that two computation procedures are operational. The superdispersion of large particles is confusing. The Kolmogorov scale, turbulence anisotropy, and the influence of the particles on the turbulence are discussed. Author (ESA)

N86-17693# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Div. d'Aerodynamique Theorique.
COMPUTATION OF VISCOUS COMPRESSIBLE FLOW IN A TURBOMACHINE BLADE ARRAY Final Report [CALCUL D'ECOULEMENTS COMPRESSIBLES VISQUEUX DANS LES GRILLES D'AUBES]
L. Cambier Jan. 1985 53 p refs In FRENCH (Contract DRET-84-34-001)
(ONERA-RSF-27/7077-AY-408) Avail: NTIS HC A04/MF A01

A computer program for flow calculation in turbomachines was modified. The modular structure allows a partial computation. The program can deal with turbulence models. It was verified by computation of the shock wave/boundary layer interactions. The application to large Reynolds transonic flow in blade array with a treatment of the viscous wake, is outlined. Author (ESA)

N86-17694# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorbauelemente.
TEST OF A MEASURING INSTRUMENT COMPOSED OF TWO LOCAL FLOW TURBINES, TWO DRAG BODIES, A FULL FLOW TURBINE AND A TWO-BEAM DENSITOMETER, OF THE LARGE PRESSURIZED WATER REACTOR OFFNORMAL BEHAVIOR INVESTIGATION (LOBI) INSTRUMENTATION IN A TRANSIENT TWO-PHASE FLOW
H. John (Forshungsanstalt Ispra, Italy), E. Ohimer (Forschungsanstalt Ispra, Italy), W. Schulze (Forschungsanstalt Ispra, Italy), G. Weste, J. Reimann, and G. Eisele Jun. 1985 86 p refs In GERMAN; ENGLISH summary
(KfK-3877; EUR-9607-D; ISSN-0303-4003) Avail: NTIS HC A05/MF A01

A test section in the Large PWR Offnormal Behavior Investigations test instrumentation equipped with two local flow turbines, a two-beam gamma densitometer, two drag bodies, and a full flow turbine was tested for mass flow recording accuracy and for reliability in a test loop for unsteady two phase measuring method with a transient steam water flow (blowdown). Calculation of the mass flow from measurement signals and comparison of the results with the reference instrumentation measurements are presented. Refinement of the calculation models and improvement of the measuring accuracy and reliability of each instrument are recommended. Author (ESA)

N86-17695# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
LIMITATIONS IN VARIABLE CONDUCTANCE HEAT PIPE PERFORMANCE AND CONTROL PREDICTED BY THE CURRENT STEADY-STATE MODEL DEVELOPED AT NLR
A. A. M. Delil 23 Jan. 1984 12 p refs Presented at International Heat Pipe Conference, Tsukuba, Japan, 14-18 May 1984 (Contract NIVR-1833)
(NLR-MP-84009-U; B8568087) Avail: NTIS HC A02/MF A01

A uniaxial model for the transient performance of gas-loaded variable conductance heat pipes is discussed. The model has to be easily implementable in existing spacecraft thermal analyzer computer programs. A steady-state version of the model is available. It accounts for diffusion at the vapor/gas front (shown to be negligible), radial conduction in the wall and wick, and inertia and friction of the moving vapor. A parameter study was carried out to design a heat pipe and to define test conditions for the experimental verification of the model. Results illustrate that inertia and friction can induce considerable limitations in performance and control. Author (ESA)

N86-17696# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
MULTIGRID SOLUTION OF THE STEADY EULER EQUATIONS
P. W. Hemker and S. P. Spekreijse May 1985 16 p refs (CWI-NM-R8505; B8567081) Avail: NTIS HC A02/MF A01

A multigrid (MG) method for the approximation of steady solutions to the full two-dimensional Euler equations is described. The space discretization is obtained by the finite volume technique and Osher's approximate Riemann-solver. Symmetric Gauss-Seidel relaxation is applied to solve the nonlinear discrete system of equations. A multigrid method, the full approximation scheme, accelerates this iterative process. In two-dimensional test problems, (subsonic, transonic and supersonic) the multigrid iteration is applied to an initial estimate obtained by the FMG-technique (nested iteration). For the discretization on the different levels, a fully consistent sequence of nested discretizations is used. The prolongations and restrictions selected agree with this consistency. It turns out that the total amount of work required to obtain a solution that is accurate up to truncation error, corresponds to a small number of nonlinear Gauss-Seidel iterations. In transonic flow the rate of convergence of the MG-iteration appears independent of the number of cells in the discretization. Author (ESA)

N86-17697# Maritiem Research Inst. Nederland, Wageningen.
NUMERICAL SIMULATION OF FLOW AROUND CIRCULAR CYLINDERS AT HIGH REYNOLDS NUMBERS
J. J. W. vanderVegt and W. C. deBoom Jan. 1985 13 p refs (Z-50551; BOSS-1985) Avail: NTIS HC A02/MF A01

A numerical method to determine drag and lift forces on circular cylinders by modeling the unsteady flow field characterized by vortex shedding is presented. The computations are compared

with experimental data obtained from a verification test program. Comparison for a steady incoming flow at Reynolds number 32,000 shows that the method provides a good representation of the flow field, predicts the frequency of vortex shedding accurately, and yields reasonable predictions of the drag and lift force time histories. The method is also applicable for flow at high Reynolds numbers as long as the flow remains two-dimensional. The drag and lift force time histories show large variations throughout a test or between experiments. The magnitude of the drag force coefficient appears to be related to the envelope of the lift force. Relatively high drag forces are coupled with series of large lift force amplitudes. Author (ESA)

N86-17698# Technical Research Centre of Finland, Espoo. Nuclear Engineering Lab.
SIMULATION OF FLAME ACCELERATION IN UNCONFINED VAPOR CLOUD EXPLOSIONS
Lars Kjaeldman and Risto Huhtanen Aug. 1985 56 p refs
(VTT-RR-357; ISBN-951-38-2384-9; ISSN-0358-5077) Avail: NTIS HC A04/MF A01; Technical Research Centre of Finland, Espoo FIM 42

The feasibility of numerical simulation in accident and safety analysis of unconfined vapor cloud explosions, and simulation of flame acceleration phenomenon from published data of experiments were studied. Two explosion experiments were simulated with the PHOENICS-code. The flame acceleration, mainly due to the enhanced combustion from turbulence generation at obstacles in the flow regime, can be simulated. The computation gives correct order of magnitude for the maximum overpressure in both explosions, of which one was weak and the other strong. The differences between the computed results and experiments are discussed and suggestions on how to improve the simulation model are given. More simulations of explosions and detailed experimental information of the initial conditions and development of the explosions are needed before simulations can reliably be used in accident and safety analysis. Author (ESA)

N86-17699# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
A SURVEY OF NUMERICAL METHODS FOR THE CALCULATION OF INVISCID, POSSIBLY ROTATIONAL EULER FLOWS AROUND AERONAUTICAL CONFIGURATIONS
J. W. Boerstoel 11 Oct. 1983 20 p refs
(NLR-TR-83130-U; B8568392) Avail: NTIS HC A02/MF A01

Numerical methods for the calculation of inviscid Euler flows are reviewed. For aerodynamic applications, the existing methods are accurate and cheap enough. However, shocks and vortex sheets may have to be better modeled to achieve higher numerical accuracy. Computation times can be reduced by applying multigrid methods. Author (ESA)

N86-17700# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
BOUNDARY LAYER CALCULATIONS ON THE LEEWARD SURFACE OF A SLENDER DELTA WING AT INCIDENCE
A. C. deBruin 22 Dec. 1983 41 p refs
(NLR-TR-84001-U; B8569025) Avail: NTIS HC A03/MF A01

A 3D-boundary layer calculation method was used to predict the location of the secondary boundary layer separation on the leeward surface of a slender delta wing at incidence for fully laminar flow and forced boundary layer transition at the 50% semispan location. The behavior of the predicted boundary layer properties is qualitatively in good agreement with the experiment. A difference between the potential flow and experimental pressure distribution causes a discrepancy between the predicted and the experimentally observed location of secondary separation. It is expected that the potential flow pressure distribution can be improved when the leading edge and the secondary separation vortex sheet are correctly modeled in the potential flow calculation method. It is concluded that boundary layer calculations can provide valuable information for the location of the secondary separation line, to model the associated vortex sheet. Author (ESA)

N86-17274# Kyoto Univ. (Japan). Dept. of Aeronautics.
FLOWS OF GAS-PARTICLE MIXTURES WITH SIZE-DISTRIBUTION
Ryuji Ishii *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 53-58 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17275# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF COMPUTATIONAL FLUID DYNAMICS AT NASA AMES RESEARCH CENTER
Mamoru Inouye *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 58-66 refs Previously announced in N85-12866 (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17277# Ship Research Inst., Tokyo (Japan).
COMPUTATION OF THE TWO-DIMENSINAL INCOMPRESSIBLE NAVIER-STOKES EQUATIONS USING AN IMPLICIT FACTORED METHOD
Yoshiaki Kodama *In* National Aerospace Lab. Proceedings of the 2nd NAL Computational Aerodynamics 1984 p 77-84 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17280# National Aerospace Lab., Tokyo (Japan).
FULLY-THREE DIMENSIONAL FLOW FIELD ANALYSIS THROUGH TURBINE STATES: APPLICATIONS OF TIME MARCHING METHOD
Tatsuo Araki, Atsuhide Suzuki, and Tadashi Kobayashi *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 101-108 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17281# National Aerospace Lab., Tokyo (Japan).
NUMERICAL FLOW ANALYSIS FOR AXIAL FLOW TURBINE
Tomohiko Sato and Sunao Aoki *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 109-118 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17296# Kawasaki Heavy Industries, Ltd., Akashi (Japan).
THE ROLE OF COMPUTATIONAL FLUID DYNAMICS IN AERONAUTICAL ENGINEERING
Takashi Uchida, Tadamasa Jyonouchi, Keisuke Sawada, and Tohru Nohisa *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 255-270 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
(Rept-2) Avail: NTIS HC A14/MF A01

N86-17902# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: FACILITIES AND TECHNIQUES
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 49 p (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17903# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: HISTORICAL NOTES
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 13 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-17701 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
TEMPERATURE FIXED POINTS. 1: POSSIBLE DEVICES IN THE RANGE 0 TO 125 C
M. F. Vaughan Feb. 1985 32 p refs
(NPL-QU-70; ISSN-0309-3050) Copyright. Avail: Issuing Activity

The need for temperature fixed points in the temperature range 0 to 125 C for the calibration and calibration-checking of electronic thermometers based on thermistors, and small platinum resistance thermometers is shown. Metal, melting and freezing, cell, and organic compound triple-point cell devices are considered. The realization and maintenance of the fixed points are discussed to assess their use in the laboratory and the possibilities of operating the devices automatically. It is concluded that while metal cells may be easier to operate automatically, organic triple-point cells are easier to use in the laboratory and can be maintained for longer periods. While only one or two metals seem likely candidates for fixed points in the range considered, there is a very large number of possible organic compounds available.

Author (ESA)

N86-17702 Royal Aircraft Establishment, Farnborough (England).
A SMOKE GENERATOR FOR THE ABSOLUTE CALIBRATION OF GAS TURBINE ENGINE SMOKE SAMPLING AND MEASURING SYSTEMS
S. P. Girling and C. D. Hurley Jan. 1985 27 p refs
(RAE-TM-P-1044; BR95024) Avail: NTIS HC A03/MF A01

A smoke generator capable of producing a stable source of smoke over a prolonged period by pyrolysis of aviation kerosene was developed. The smoke levels and characteristics are representative of aircraft engine smoke. The smoke generator provides a means of assessing and calibrating smoke sampling and measurement systems. Accurate gravimetric calibration of SAE smoke number against carbon loading is described.

Author (ESA)

N86-17703*# Desert Research Inst., Reno, Nev. Atmospheric Sciences Center.
EVALUATION OF DATA OBTAINED FROM ATMOSPHERIC LASER DOPPLER VELOCIMETER Final Report
Thomas S. Keck and James W. Telford 20 Jun. 1985 24 p
(Contract NAS8-34731)
(NASA-CR-178474; NAS 1.26:178474) Avail: NTIS HC A02/MF A01 CSCL 14B

The Doppler lidar velocimeter produces a variety of kinds of data. Besides the line of sight velocity components, there are the reflected amplitudes and the Doppler widths. Computer graphics software for displaying these data was produced. Different methods of presentation are needed for the various items. A picture was produced as pictures are often the best way to gain understanding. The individual lidar scans form a crosshatch pattern. Thus one-dimensional measurements fit together to form a two-dimensional whole. A pair of velocity measurements at a point combine to form a wind measurement with direction and magnitude. This gives a forest of wind vectors. The goal is to find a recognizable pattern to these trees. Often it is necessary to show only part of the information. That is, show only the wind direction not its magnitude or reduce the wind to streamlines of air flow. In other cases data are reduced to contour plots. Just enough contour lines are included to show the picture described.

Author

N86-17704# Naval Submarine Medical Research Lab., Groton, Conn.
PROPOSED TRANSFER-FUNCTION TECHNIQUE FOR EARPHONE ANALYSIS Interim Report
J. S. Russotti, T. Santoro, G. B. Haskell, and R. Neal 20 Jun. 1985 19 p
(M09-33)
(AD-A160054; NSMRL-1052) Avail: NTIS HC A02/MF A01 CSCL 17/1

This research was prompted by the need to select a suitable headset for auditory processing of passive-sonar information. The selection of an accurate transducer for auditory processing of passive sonar signals requires accurate measurement of frequency response. No standard for such measurement exists. The method proposed here uses a modified Zwislocki acoustic coupler mounted in an anthropometrically and acoustically average mannikin, KEMAR, in order to simulate the acoustic load that an average human ear would place on the earphone element. A computerized signal-collection and -analysis system subtracted this transfer function from stored earphone-response data. Responses were averaged across samples of left and right earphone elements and across repeated measurements that sampled variability due to headset placement, seal around the ear, and headband tension. Analog plots of earphone frequency response were indistinguishable from computer regenerated plots of that same frequency response. Comparison of raw data and corrected data show the correction procedure to be within 0.2 dB of perfect accuracy. GRA

N86-17705# Essex Corp., Orlando, Fla.
PLAN FOR EVALUATION OF THE TRAINING POTENTIAL OF HELMET-MOUNTED DISPLAY AND COMPUTER-GENERATED SYNTHETIC IMAGERY Final Report, Jan. 1981 - Apr. 1985
K. S. Berbaum and R. S. Kennedy 29 Apr. 1985 59 p
(Contract N61339-81-C-0105)
(AD-A160299; EOTR-85-6) Avail: NTIS HC A04/MF A01 CSCL 05/9

This report describes a plan of empirical research to evaluate the training effectiveness of a helmet-mounted display (HMD), and of computer-generated synthetic imagery (CGSI), for low level flight, navigation, and target interaction. This HMD has been developed by the Advanced Simulation Concepts Laboratory of the Naval Training Equipment Center for use in the Navy Visual Technology Research Simulator (VTRS). Optics mounted on the pilots's helmet project a scene upon a retro-reflecting screen. Two computer-image generation (CIG) channels are incorporated which present a wide-angle, low-resolution, low-detail background and an area of interest (AOI) of high resolution and detail. Eye and head tracking are used to position the display so that the AOI is presented to the fovea. The goal of HMD is to present a scene to the pilot that is indistinguishable from the real world insofar as pilot performance is concerned. The evaluation plan describes training scenarios emphasizing low level flight and ground interaction, response parameters used in measuring pilot performance, psychological experiments comparing the training efficacy of various aspects of HMD and CGSI, post stimulation subjective measures of pilot comfort, and the logistics of the research plan itself.

GRA

N86-17706# Lawrence Livermore National Lab., Calif.
RESULTS OF PRIM GYROSCOPE TESTING: CONCLUSIONS REGARDING PRIM EFFECTS, SUPPLEMENT 1
R. H. Cornell Mar. 1985 2 p Presented at the 17th Ballistics Working Group Meeting, Livermore, Calif., 17 Oct. 1984
(Contract W-7405-eng-48)
(DE85-012933; UCRL-92356-Suppl-1) Avail: NTIS HC A02/MF A01

The effects of a Partially Restrained Internal Member in the XM785 projectile were determined. Small effects were observed during the small PRIM gyroscopic tests and of flight disturbances that are absent during the JB' tests.

E.A.K.

N86-17707# Lawrence Livermore National Lab., Calif.
COUPLING BETWEEN PLASTIC SCINTILLATORS AND LIGHT FIBERS FOR REMOTE DETECTION OF X-RAYS
T. S. Perry and J. J. Molitoris 18 Jul. 1985 6 p refs Presented

at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-48)
(DE85-016946; UCRL-92198; CONF-850887-20) Avail: NTIS HC A02/MF A01

Plastic scintillators can be coupled to light fibers to make small, simple, and inexpensive X-ray detectors. These detectors have been developed for use at the Nevada Test Site (NTS) for the remote detection of X-rays. Light produced in the scintillator can be transmitted by the fiber for several hundred meters to a photodetector, which is usually a streak camera or a photomultiplier tube. The use of a streak camera allows many channels to be recorded simultaneously. A parameter study has been done to measure the sensitivity of these detectors as a function of scintillator geometry, type of scintillator, coupling geometry, and X-ray energy. The results can be qualitatively explained by simple geometric theory. A recent use of these detectors at NTS was the measurement of an X-ray spectrum. System performance for this measurement will be reviewed. DOE

N86-17708# Department of Energy, Washington, D. C.
GATED STRIP PROPORTIONAL DETECTOR Patent Application
C. L. Morris (Los Alamos National Lab., N. Mex.), G. C. Idzorek (Los Alamos National Lab., N. Mex.), and L. G. Atencio, inventors (to DOE) (Los Alamos National Lab., N. Mex.) Filed 19 Feb. 1985 24 p
(Contract W-7405-eng-36)
(DE85-017757; US-Patent-Appl-SN-702751) Avail: NTIS HC A02/MF A01

A gated strip proportional detector includes a gas tight chamber which encloses a solid ground plane, a wire anode plane, a wire gating plane, and a multiconductor cathode plane. The anode plane amplifies the amount of charge deposited in the chamber by a factor of up to 10 to the 6th power. The gating plane allows only charge within a narrow strip to reach the cathode. The cathode plane collects the charge allowed to pass through the gating plane on a set of conductors perpendicular to the open-gated region. By scanning the open-gated region across the chamber and reading out the charge collected on the cathode conductors after a suitable integration time for each location of the gate, a two-dimensional image of the intensity of the ionizing radiation incident on the detector can be made. DOE

N86-17709# Department of Energy, Washington, D. C.
RECIRCULATING CROSS-CORRELATION DETECTOR Patent Application
W. H. Andrews, Jr. and M. J. Roberts, inventors (to DOE) Filed 18 Jan. 1985 14 p
(Contract DE-AC05-84OR-21400)
(DE85-017782; US-Patent-Appl-SN-692748) Avail: NTIS HC A02/MF A01

A digital cross-correlation detector is provided in which two time-varying signals are correlated by repetitively comparing data samples stored in digital form to detect correlation between the two signals. The signals are sampled at a selected rate converted to digital form, and stored in separate locations in separate memories. When the memories are filled, the data samples from each memory are first fed word-by-word through a multiplier and summing circuit and each result is compared to the last in a peak memory circuit and if larger than the last is retained in the peak memory. Then the address line to leading signal memory is offset by one byte to affect one sample period delay of a known amount in that memory and the data in the two memories are then multiplied word-by-word once again and summed. If a new result is larger than a former sum, it is saved in the peak memory together with the time delay. The recirculating process continues with the address of the one memory being offset one additional byte each cycle until the address is shifted through the length of the memory. The correlation between the two signals is indicated by the peak signal stored in the peak memory together with the delay time at which the peak occurred. The circuit is faster and considerably less expensive than comparable accuracy correlation detectors. DOE

N86-17710# Department of Energy, Washington, D. C.
IMPROVED FIBEROPTIC SPECTROPHOTOMETER Patent Application
P. P. Tans and D. A. Lashof, inventors (to DOE) Filed 2 Apr. 1985 22 p Prepared in cooperation with California Univ., Berkeley, Lawrence Berkeley Lab.
(Contract DE-AC03-76SF-00098)
(DE85-017792; US-Patent-Appl-SN-697824) Avail: NTIS HC A02/MF A01

The present invention allows for accurate spectrophotometric comparison of the Raman scattering from a sample gas with the Raman scattering from a known gas via a novel fiber optic network. The need for complicated electronic of optical circuit balancing, control, or error compensation circuitry is eliminated. The laser cavity is split into two regions, one of which houses the plasma discharge and produces laser power, and the other of which is adapted to house tubes containing the gas samples. Light from the laser source is beamed simultaneously through samples of the reference gas and the unknown gas, and Raman-scattered light is emitted. The Raman-scattered light from the known and unknown mixtures is then alternately passed through a fiber optic network where the various wavelengths are spatially mixed. The mixed light is then passed into a system of light detectors, each of which is adapted to measure one of the wavelengths of light representing a constituent element of the gases. When the test is complete, each gas sample can be assigned a Raman-scattered profile from the data consisting of the ratios each of the constituent elements bear to each other. DOE

N86-17711# Department of Energy, Washington, D. C.
MICROWAVE DETECTOR Patent Application
H. W. Meldner, R. Y. Cusson, and R. M. Johnson, inventors (to DOE) Filed Feb. 1985 17 p Prepared in cooperation with LLNL
(Contract W-7405-eng-48)
(DE85-017797; US-Patent-Appl-SN-699879) Avail: NTIS HC A02/MF A01

A microwave detector is provided for measuring the envelope shape of a microwave pulse comprised of high-frequency oscillations. A biased ferrite produces a magnetization field flux that links a B-dot loop. The magnetic field of the microwave pulse participates in the formation of the magnetization field flux. High-frequency insensitive means are provided for measuring electric voltage or current induced in the B-dot loop. The recorded output of the detector is proportional to the time derivative of the square of the envelope shape of the microwave pulse. DOE

N86-17712# Brookhaven National Lab., Upton, N. Y.
PRECISION CRYOGENIC TEMPERATURE DATA ACQUISITION SYSTEM
Y. Farah and J. H. Sondericker 1985 7 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017847; BNL-36969; CONF-850814-7) Avail: NTIS HC A02/MF A01

A Multiplexed Temperature Data Acquisition System with an overall precision of + or - 25 ppM has been designed using state-of-the-art electronics to accurately read temperature between 2.4 K and 600 K from pre-calibrated transducers such as germanium, silicon diode, thermistor or platinum temperature sensors. DOE

N86-17713# Los Alamos National Lab., N. Mex.
POSITION SENSITIVE GAS COUNTER READOUT SYSTEM
J. S. Kapustinsky, W. E. Sondheim, K. D. Bol, M. R. Clover, R. M. DeVries, N. J. DiGiacomo, and J. W. Sunier Aug. 1985 7 p refs
(Contract W-7405-eng-36)
(DE85-017953; LA-10494-MS) Avail: NTIS HC A02/MF A01

A position sensitive detector was designed for intermediate energy physics experiments covering a broad range of ejectiles from minimum ionizing pions through low energy protons and deuterons. Each detector provides two planes of both X and Y position information. This paper focuses on the Y system, an

individual anode wire readout design that amplifies and discriminates anode signals at the spectrometer, and then transmits the logic signals to a data acquisition trailer. The steps we took to insure reliable operation of the system are described. In addition to position identification, on-line displays of the data received from the anode wire readout system provide powerful diagnostic tools for determining the source location of detected events and the beam position relative to the spectrometer target. A routing unit, designed to allow the measurement of the X,Y coordinates of two particles hitting the detector simultaneously is also described.DOE

N86-17714# Brookhaven National Lab., Upton, N. Y.
HIGH FLUX PHOTON BEAM MONITOR
P. Mortazavi, M. Woodle, H. Rarback, D. Shu, and M. Howells 1985 16 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985 Prepared in cooperation with California Univ., Berkeley. Lawrence Berkeley Lab.
(Contract DE-AC02-76CH-00016)
(DE85-018202; BNL-36903; CONF-850734-2) Avail: NTIS HC A02/MF A01

We have designed two photon beam position monitors for use on our X-ray storage ring beam lines. In both designs, a pair of tungsten blades, separated by a pre-determined gap, intercepts a small fraction of the incoming beam. Due to photoemission, an electrical signal is generated which is proportional to the amount of beam intercepted. The thermal load deposited in the blade is transferred by a heat pipe to a heat exchanger outside the vacuum chamber. A prototype monitor with gap adjustment capability was fabricated and tested at a UV beam line. The results show that the generated electrical signal is a good measurement of the photon beam position. In the following sections, design features and test results are discussed. DOE

N86-17715# Argonne National Lab., Ill.
MUPPATS: A MULTIPARTICLE 3D IMAGING DETECTOR SYSTEM
A. Faibis, W. Koenig, E. P. Kanter, and Z. Vager 27 Aug. 1985 18 p Presented at the 11th International Conference on Atomic Collisions in Solids, Washington, D.C., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018451; CONF-850813-4) Avail: NTIS HC A02/MF A01

It has long been recognized that the foil-induced dissociation of fast molecular ions is a potentially powerful method to determine the stereochemical structures of the molecular projectiles. We have recently developed a detector system specifically designed for such experiments. The MUPPATS detector is a large-area multistep low pressure gas counter. The requirements of multiparticle detection with good position and time resolution leads to a rather complex data-readout and reduction scheme. The system relies on several state-of-the-art techniques, developed in high-energy physics during recent years, to dramatically reduce the cost of the MUPPATS detector. Preliminary results for several polyatomic molecular ions have already been obtained. Some new avenues of research opened up by this detector are also described. DOE

N86-17716# Dynaflow Software Systems B.V., Amsterdam (Netherlands).
SOFTWARE QUALITY METRICS OF THE FAINT OBJECT CAMERA (FOC) IMAGE PROCESSING SOFTWARE Final Report
J. Gras and I. Hamburg-Everts (Infonet Automation Services b.v.) Paris ESA 30 Jun. 1984 68 p Sponsored by Infonet Automation Services b.v.
(Contract ESA-4618/81/NL-PP)
(ESA-CR(P)-2039) Avail: NTIS HC A04/MF A01

The utility of software error counts and complexity measures in developing image processing software was assessed. The Rayleigh curve can be used as a predictor if the two parameters k, a, are known, but using a Rayleigh curve fit to data points at various stages of the Faint Object Camera image processing system project would have led to inaccurate predictions. Walston/Felix relations give simple global measures of a product which might prove useful as quality indicators. There is no evidence that complexity density can predict trouble spots in the code or detect problems associated with poor design decisions. The practical value of these metrics is limited and there appears to be no justification for stipulating maximum values of these metrics for a single module. Reliability models show promise for determining when a software system is sufficiently tested to allow release to the field. However, their use implies a test situation which emulates the situation in the field faithfully and may require a long (and expensive) test period. The models investigated appear low in predictive power.
Author (ESA)

N86-17717# Southampton Univ. (England). Inst. of Sound and Vibration Research.
THE APPLICATION OF OPTIMAL CONTROL METHODS TO THE DECONVOLUTION OF VELOCITY METER SIGNALS
P. M. Clarkson Apr. 1985 36 p refs
(ISVR-TR-128) Avail: NTIS HC A03/MF A01

Optimal control was applied to deconvolution of velocimeter signals, and a method for maintaining effective deconvolution when data are corrupted by noise was developed. The effects of inaccuracy in estimating velocimeter parameters were studied. Results show that the effects may be approximately described by the ratio of the system function of the true system to that of the estimate. For the velocimeter, the effects of miscalculation of the resonant frequency and the damping ratio are demonstrated. Miscalculation degrades the deconvolution in the region of the resonance but in other areas has a relatively slight effect.
Author (ESA)

N86-17718# General Electric Co. Ltd., Wembley (England) VLSI Process Research Lab.
IMPROVED BLUE RESPONSE CCD-MA357 DETECTORS Final Report
D. J. Burt Paris ESA Jan. 1985 24 p refs
(Contract ESTEC-4487/80/NL-HP(SC))
(GEC-16,879C; ESA-CR(P)-2069) Avail: NTIS HC A02/MF A01

Experiments to improve the blue response of the front-illuminated MA357 385x576 photoelement CCD by modifying the electrode structure such that a significant fraction of the sensitive area is free of polysilicon electrodes are summarized. Although successful in achieving improved response, with the quantum efficiency increasing from a few percent to 25% at a wavelength of 400 nm, this is at the expense of an unacceptable deterioration of charge transfer efficiency. More suitable structures utilizing the same basic principle are suggested. Author (ESA)

N86-17719# Research Inst. of National Defence, Linkoeping (Sweden).
ELECTRO-OPTICAL AERIAL RECONNAISSANCE CAMERA: AN EXPERIMENTAL SYSTEM USED IN A SIMULATED RECONNAISSANCE ENVIRONMENT
Bruno Engstroem, Bjoern Nilsson, and Sten Nyberg Jun. 1985 35 p refs In SWEDISH; ENGLISH summary
(FOA-C-30394-E1; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

A system for generating, storing, and handling of pictures taken with a line scanning CCD camera, used to collect pictures of simulated air reconnaissance scenes is described. A digital image analysis is presented. The analysis tries to distinguish more or less probable vehicles for the operator from the image; the objects (vehicles) are generally darker than the landscape. It is shown that the combination CCD-camera and a landscape model gives good image material for photoreconnaissance investigations.
Author (ESA)

N86-17720# Fraunhofer-Inst. fuer Festkoerpertechnologie, Munich (West Germany).
DEVELOPMENT OF SENSORS ON THE BASIS OF POLYCRYSTALLINE SILICON Final Report, Aug. 1983
Ernst Obermeier, Felix vonKienlin, and Ho-Jung Hwang Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985

156 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-068; ISSN-0340-7808) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32

Properties of polycrystalline silicon layers that are important for sensor applications were investigated. Layers were deposited from the gaseous phase through atmospheric pressure and low pressure chemical vaccuum deposition onto thermally oxidized single crystalline silicon wafers; doping was carried out by ion implantation. Electrical properties, temperature behavior, and strain sensitivity were investigated. It is found that the temperature coefficients of polysilicon resistors can be determined within broad limits (negative, positive, zero) through selection of the doping. The layers are characterized by a relatively high piezoresistive effect. Based on experimental results, polysilicon thin film sensors (temperature, pressure, flow) were developed. These sensors clearly demonstrate the advantages of polycrystalline silicon layers as a sensor material. Author (ESA)

N86-17721# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
PREPARATION OF THE HELIUM-COOLED GERMAN INFRARED LABORATORY (GIRL) INTERFEROMETER FOR SCIENTIFIC USE ON SPACELAB [VORBEREITUNG DES HELIUMGEKUEHLTEN GIRL-INTERFEROMETERS ZUM WISSENSCHAFTLICHEN EINSATZ AUF SPACELAB]
Peter Essenwanger Jul. 1985 95 p refs In GERMAN
(MPE-192; ISSN-0178-0719) Avail: NTIS HC A05/MF A01

Preparation of a helium-cooled Michelson interferometer for high resolution IR spectroscopy of astronomical sources on the Spacelab telescope GIRL is summarized. Molecular parameters are provided as a basis for astrophysical observations. Critical problems in the adjustment and calibration of the sensitive interferometer were solved in the laboratory: a retroreflector was adjusted and tested, and a gas cell was built and tested for the calibration. Author (ESA)

N86-17722# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
THE UTILIZATION OF FALSE COLOR AERIAL PHOTOGRAPHY FOR MACROPHYTE BIOMASS ESTIMATION IN THE OOSTERSCHELDE (THE NETHERLANDS) [HET GEBRUIK VAN FALSE COLOURLUCHTFOTOGRAFIE BIJ DE SCHATTING VAN DE MACROFYTENBIOMASSA IN DE OOSTERSCHELDE]
Christina Meulstee and Hein vanStokkom Jan. 1985 28 p refs In DUTCH
(MDLK-R-8509) Avail: NTIS HC A03/MF A01

The correlation between the biomass of sea grass and seaweed samples in a sidebranch of the Oosterscheide delta (Netherlands) and density ratios of this area on color infrared aerial photographs was investigated. As the Oosterscheide will become more divided from the North Sea after pier dam completion, an increase of macrophytes is expected. In an area where the weeds Ulva, Cheatomorpha, Entermorpha, Cladophora, Fucus vesuculosis, and the grasses Zostera noltii and Zostera marina are found, 53 biomass samples of a 0.054 sq m surface each were collected. The relation between covering degree and biomass was estimated. Using a transmission-densitometer adjusted to 3 to 1 mm, densities on 1:10,000 and 1:20,000 scale photographs were measured. A gage line was determined in a density-biomass diagram. The method is shown to be useful for an efficient, accurate biomass determination in the Oosterscheide. Author (ESA)

N86-17723# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
HEAT IMAGE GENERATORS: STATE OF AFFAIRS BY THE EXPLORATION OF SOME POSSIBILITIES
J. W. A. M. Alferdinck and D. vanNorren Aug. 1985 34 p refs In DUTCH; ENGLISH summary
(Contract A81/KL/116)
(IZF-1985-15; TDCK-93327) Avail: NTIS HC A03/MF A01

Two principles of heat image generators for testing cameras sensitive to natural heat radiation from a scene, the Bly-cell and a matrix of Peltier-elements (MPE) are considered. The Modulation Transfer Function (MTF) of the Bly-cell, which consists of a thin goldblack coated membrane suspended in vacuum, was measured with a forward looking infrared system (FLIR). The MTF appears to improve by decreasing the pressure from 760 Torr to 0.00016 Torr and by increasing the input irradiance from 110 to 2100 W/sq m. The MTF given by Bly is not reached. The theoretical possibility of an MPE is discussed and the cost as a function of the resolution is estimated. A heat image generator principle based on a liquid crystal light valve is discussed. Author (ESA)

N86-17724# Societe Crouzet, Valence (France). Dept. Capteurs.
ELASTIC WAVE GYROMETER Final Report [GYROMETRE A ONDES ELASRTIQUES]
H. Fima 24 Apr. 1984 25 p In FRENCH
(Contract DRET-83-056)
(Rept-26/5052) Avail: NTIS HC A02/MF A01

The feasibility of applying the parametric waves produced by two Rayleigh waves traveling in opposite directions to measure angular displacement is analyzed. An experimental device produced a small amplitude parametric wave. The analysis shows that the Coriolis acceleration changes only the amplitude of the parametric wave in a first order perturbation computation. Larger order perturbations are not studied since the sensitivity would be to small. Author (ESA)

N86-17725# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A PENDULUM IMPACTOR FOR MEASURING THE RESISTANCE OF MATERIALS TO JERK STRAINS
Torbjoern Svensson Jun. 1985 30 p In SWEDISH; ENGLISH summary
(FOA-C-20577-D4; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

An instrument for quantifying the strength of materials exposed to high rates of strain is described. It is composed of an impactor and a transmistter bar. Impact velocities are 100 to 400 times/sec. Normal tensile testing bars or special shaped testing bodies may be used. The dynamic properties of the instrument were determined by experiments and computer simulation. The response of the instrument is incorporated into a computer code which is used to transform the captured signals to highly accurate stress-strain diagrams. Author (ESA)

N86-17726# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
DESCRIPTION OF A NONDESTRUCTIVE FACILITY USING HOLOGRAPHIC INTERFEROMETRY
P. Barbier and C. LeFloch 1985 6 p Presented at 11th World Conference on Nondestructive Testing, Las Vegas, Nev., 3-8 Nov. 1985
(SNIAS-852-430-105) Avail: NTIS HC A02/MF A01

A holographic interferometry procedure to test aircraft engine use manufactured using composite materials was developed. The equipment includes a laser source, a reading laser, a holographic camera, a chamber in which a depression can be created, and a control panel. The camera is placed inside the structure and revolves through 180 deg to observe the front and rear areas. Photographs of holograms obtained on a sample are presented. A surface of 0.5 sq m may be inspected in 15 min. The economic advantages of the test method are discussed. Author (ESA)

N86-17727# Danish Meteorological Inst., Copenhagen.
EXPERIENCES WITH THE DECLINATION-INCLINATION (DI) FLUXGATE MAGNETOMETER INCLUDING THEORY OF THE INSTRUMENT AND COMPARISON WITH OTHER METHODS
E. Kring Lauridsen 1985 34 p refs
(DMI-Geophys-Papers-R-71; ISBN-87-7478-253-3) Avail: NTIS HC A03/MF A01

Experience with the DI-flux, a magnetometer made from a theodolite with a fluxgate sensor fixed along the telescope is

described. Selected positions where the sensor is perpendicular to the geomagnetic field are found. Declination and inclination can be calculated. The theory and practice of the instrument is treated. Results from six month comparisons with other methods confirm the accuracy of the DI-flux. Author (ESA)

N86-17406# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
NONINTRUSIVE SHAFT SPEED SENSOR
S. Barkhoudarian and L. Wyett *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 257-269 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 14/2

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-17728* City Coll. of the City Univ. of New York.
SPECTRAL AND TEMPORAL PROPERTIES OF THE ALPHA AND BETA SUBUNITS AND (ALPHA BETA) MONOMER ISOLATED FROM NOSTOC sp. USING PICOSECOND LASER SPECTROSCOPY Ph.D. Thesis
Aaron J. Dagen 1985 250 p
Avail: Univ. Microfilms Order No. DA8515616

The fluorescence decay profiles, relative quantum yield and transmission of the alpha, beta and (alpha beta) complexes from phycoerythrin isolated from the photosynthetic antenna system of Nostoc sp. and measured by single picosecond laser spectroscopic techniques is studied. The fluorescence decay profiles of all three complexes are found to be intensity independent for the intensity range investigated (approx. 4x10 to the 13th power to 4x10 to the 15th power photons/sq cm per pulse). The apparent decrease in the relative quantum yield of all three complexes as intensity increases is offset by a corresponding increase in the relative transmission. This evidence, along with the intensity independent fluorescence kinetics, suggests that exciton annihilation is absent in these complexes. The decay profiles are fit to models assuming energy transfer amongst fluorescing chromophores. The intraprotein transfer rate is found to be 100 ps in the alpha subunit, 666 ps in the beta subunit. Constraining these rates to be identical in the monomer results in explaining the monomer kinetics by an increase in the nonradiative rate of the f beta chromophore, an apparent result of aggregation effects. Dissert. Abstr.

N86-17729 Maryland Univ., College Park.
A STUDY OF CONTINUOUS WAVE LASING AND MODELOCKING IN A NEODYMIUM-PHOSPHATE GLASS CRYSTAL Ph.D. Thesis
Scott Arthur Strobel 1984 134 p
Avail: Univ. Microfilms Order No. DA8514588

Continuous wave or CW lasing in many crystals has proven impossible because of thermal loading effects. Especially prone are crystals with a large spectral bandwidth whereby lasing threshold is somewhat high. Crystals in the shape of rods and rectangular slabs have been tried successfully, and the results of stress calculations indicate the efficiency of the end pump geometry and how the stress distribution changes for the different crystal shapes. CW powers of more than 40 milliwatts at 1.054 microns have been obtained from the neodymium:phosphate glass crystal with an argon laser (5145 a) jump power of 1.4 watts. CW modelocked pulse trains were obtained by an active technique with an intracavity acousto-optic modulator. The modulation process turns out to be due to a combination of amplitude and phase modification. Modelocking with a saturable absorber (passive technique) is discussed and it is shown that because of the long lifetime of the gain medium further research to develop a reverse saturable absorber is necessary to optimize the passive technique. Dissert. Abstr.

N86-17730 Oregon Univ., Eugene.
LITHIUM SOFT X-RAY LASER Ph.D. Thesis
Hiroshi Watanabe 1985 157 p
Avail: Univ. Microfilms Order No. DA8514814

This study explores a possibility of producing coherent photons in soft X-ray region. Photons are to be emitted from lithium ions. The generated photon corresponds to the transition between the second excited state and the ground state of a singly ionized lithium ion. Creation of the excited state occurs in two separate steps. First, the first excited state of the lithium ion is created through the inner-shelf photoionization of a neutral lithium atom in its ground state. Second, the so-created first excited state of the lithium ion is lifted up to the second excited state which subsequently decays to the ground state of the lithium ion by spontaneous emission. One spontaneously decayed photon initiates subsequent stimulated emission of photons in coherent manner. The use of synchrotron generated high energy photons for inner-shell photoionization is emphasized. The required conditions for successful laser action area explicitly stated. Dissert. Abstr.

N86-17731*# Brown Univ., Providence, R. I.
THEORETICAL STUDIES OF RESONANCE ENHANCE STIMULATED RAMAN SCATTERING (RESRS) OF FREQUENCY DOUBLED ALEXANDRITE LASER WAVELENGTHS IN CESIUM VAPOR Semiannual Report
N. M. Lawandy 14 Jan. 1986 10 p refs
(Grant NAG5-526)
(NASA-CR-176464; NAS 1.26:176464) Avail: NTIS HC A02/MF A01 CSCL 20E

It is well known that the presence of a real atomic level which is nearly resonant with the pump field can greatly enhance the Raman emission cross section. In order to accurately calculate the Raman gain in systems where resonance enhancement plays a dominant role, expressions for the pump and signal susceptibilities must be derived. These expressions should be valid for arbitrary field strengths in order to allow for pump and signal saturation. In addition, the theory should allow for arbitrary longitudinal and transverse relaxation rates. This latter point is extremely vital for three level atomic systems such as the alkali earth metals since they do not have population reservoirs and can have widely varying spontaneous lifetimes on the three pertinent transitions. Moreover, the dephasing rates are strong functions of electron states and are therefore also different for the three coupled pairs of levels. These considerations are not as important when molecular systems are concerned since the large reservoir of rotational states serve to produce essentially equal longitudinal recovery rates for the population of the three levels. The three level system with three arbitrary longitudinal and transverse relaxation rates was solved. There is no need for setting either pair of rates equal and the expressions are valid for arbitrarily strong fields. Author

N86-17732# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
DEVELOPMENT OF SOLID STATE VIBRATIONAL LASERS Final Report, 1 Apr. 1984 - 31 Mar. 1985
A. J. Sievers 1 Aug. 1985 15 p
(Contract DAAG29-84-K-0034)
(AD-A159817; ARO-21574.1-PH) Avail: NTIS HC A02/MF A01 CSCL 20/5

Continuous-wave lasing in the 5 micrometers wavelength region has been obtained on the 2 to 1 vibrational transition of impurity CN- ions in KBr. Population inversion is produced by optical pumping of the weakly allowed first-overtone level of the molecule with a tunable (F2(+)) sub A color center laser. We have investigated the energy budget of this solid-state vibrational laser when the v = 2 upper laser level is pumped with a CW color center laser. Using pulsed fluorescence techniques and numerical simulations, we find that due to vibrational energy exchange between pairs of CN- ions in the v = 1 lower level, waste pump energy is recycled to the v = 2 upper level. Ideally the efficiency of this recycling scheme approaches unity, but due to energy transfer into higher vibrational levels, and because of spectral diffusion within the inhomogeneously broadened CN- profile, the

observed recycling efficiency is reduced. To our knowledge this is the first experiment demonstrating defeat of the Manley-Rowe limit. GRA

N86-17733# Hampton Inst., Va. Dept. of Physics and Engineering Studies.
INTENSE EXCITATION SOURCE OF BLUE-GREEN LASER
Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
K. S. Han 15 Oct. 1985 20 p
(Contract N00014-80-C-0957; NR Proj. RR0-1109)
(AD-A160303) Avail: NTIS HC A02/MF A01 CSCL 20/5

An intense and efficient excitation source for blue-green lasers useful for the space-based satellite laser applications, underwater strategic communication, and measurement of ocean bottom profile is being developed. The source in use, hypocycloidal pinch plasma (HCP), and a newly designed dense-plasma focus (DPF) can produce intense UV photons (200 to 300 nm) which match the absorption spectra of both near UV and blue green dye lasers (300 to 400 nm). During the current project period, the successful enhancement of blue-green laser output of both Coumarin 503 and LD490 dye through the spectral conversion of the HCP pumping light has been achieved with a converter dye BBQ. The factor of enhancement in the blue-green laser output energy of both Coumarin 503 and LD490 is almost 73%. This enhancement will definitely be helpful in achieving the direct high power blue-green laser (> 1 MW) with the existing blue green dye laser. On the other hand the dense-plasma focus (DPF) with new optical coupling has been designed and constructed. For the optimization of the DPF device as the UV pumping light source, the velocity of current sheath and the formation of plasma focus have been measured as function of argon or argon-deuterium fill gas pressure. Finally, the blue-green dye laser (LD490) has been pumped with the DPF device for preliminary tests. Experimental results with the DPF device show that the velocity of the current sheath follows the inverse relation of sq st. of pressure as expected. The blue-green dye (LD490) laser output exceeded 3.1 m at the best cavity tuning of laser system. This corresponds to 3J/1 cu cm laser energy extraction. GRA

N86-17734# Los Alamos National Lab., N. Mex.
DESIGN AND PERFORMANCE OF LARGE AREA MONOLITHIC ELECTRON GUNS FOR THE AURORA KrF LASER SYSTEM
M. Kang, L. A. Rosocha, V. O. Romero, F. W. VanHaaften, and J. P. Brucker 1985 14 p Presented at the 5th IEEE Pulsed Power Conference, Washington, D.C. 10 Jun. 1985
(Contract W-7405-eng-36)
(DE85-014112; LA-UR-85-2077; CONF-850616-68) Avail: NTIS HC A02/MF A01

Aurora is an inertial confinement fusion laser system using optical angular multiplexing and a chain of four cold cathode electron beam driven KrF laser amplifiers to produce 10 to 20 kJ of optical energy. Data on temporal measurements of cathode current, voltage, and spatial measurements of current density for representative e-guns are presented together with measurements on energy deposition in the laser gas medium. DOE

N86-17735# California Univ., Berkeley. Lawrence Berkeley Lab.
COLLECTIVE EFFECTS AND LATTICE IMPLICATIONS FOR AN FEL BYPASS RING
J. Bisognano, A. Jackson, and M. S. Zisman May 1985 6 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016563; LBL-19488; CONF-850504-243) Avail: NTIS HC A02/MF A01

Optimizing the performance of a single-pass free electron laser (FEL) in a storage ring requires a stored beam having both a relatively high volume density and a low momentum spread. These requirements place severe constraints on storage ring design due to the impact of both coherent and incoherent multiparticle phenomena. In this paper we present approximate scaling laws that elucidate the relative importance of various lattice parameters, and we will describe a systematic approach (embodied in the computer code ZAP) to parameter selection. DOE

N86-17736# Science Applications, Inc., Pleasanton, Calif.
TECATE: A CODE FOR ANISOTROPIC THERMOELASTICITY IN HIGH-AVERAGE-POWER LASER TECHNOLOGY, PHASE 1
Final Report
R. J. Gelinas, S. K. Doss, and N. N. Carlson 1 Jan. 1985 212 p
(Contract W-7405-eng-48)
(DE85-016067; UCRL-15677) Avail: NTIS HC A10/MF A01

This report describes a totally Eulerian code for anisotropic thermoelasticity (code name TECATE) which may be used in evaluations of prospective crystal media for high-average-power lasers. The present TECATE code version computes steady-state distributions of material temperatures, stresses, strains, and displacement fields in 2-D slab geometry. Numerous heat source and coolant boundary condition options are available in the TECATE code for laser design considerations. Anisotropic analogues of plane stress and plane strain evaluations can be executed for any and all crystal symmetry classes. As with all new and/or large physics codes, it is likely that some code imperfections will emerge at some point in time. DOE

N86-17737# Los Alamos National Lab., N. Mex.
MEASUREMENT OF FARADAY ROTATION IN TWISTED OPTICAL FIBER USING ROTATING POLARIZATION AND ANALOG PHASE DETECTION
G. I. Chandler, P. R. Forman, and F. C. Jahoda 1985 10 p Presented at SPIC International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif. 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-015704; LA-UR-85-2485; CONF-850887-17) Avail: NTIS HC A02/MF A01

We demonstrated phase modulation of rotating linearly polarized light by current-induced Faraday rotation in single mode optical fiber and used the technique to measure the current in ZT-40M, a Reversed-Field Pinch. We have also demonstrated the practicality of using twisted sensing fiber to overcome the problems associated with linear birefringence. DOE

N86-17738# Los Alamos National Lab., N. Mex.
METAL FILM DEPOSITION BY LASER BREAKDOWN CHEMICAL VAPOR DEPOSITION
T. R. Jervis 1985 39 p Presented at the NATO Advanced Study Institute, San Mianiato, Italy, 2 Sep. 1985
(Contract W-7405-eng-36)
(DE85-017554; LA-UR-85-2902; CONF-8509150-1) Avail: NTIS HC A03/MF A01

Dielectric breakdown of gas mixtures can be used to deposit homogeneous thin films by chemical vapor deposition with appropriate control of flow and pressure conditions to suppress gas phase nucleation and particle formation. Using a pulsed CO_2 laser operating at 10.6 microns where there is no significant resonant absorption in any of the source gases, we have succeeded in depositing homogeneous films from several gas phase precursors by gas phase laser pyrolysis. Nickel and molybdenum from the respective carbonyls and tungsten from the hexafluoride have been examined to date. In each case the gas precursor is buffered to reduce the partial pressure of the reactants and to induce breakdown. The films are spectrally reflective and uniform over a large area. Films have been characterized by Auger electron spectroscopy, X-ray diffraction, pull tests, and resistivity measurements. The highest quality films have resulted from the nickel depositions. Detailed X-ray diffraction analysis of these films yields a very small domain size (approx. 50 A) consistent with rapid quenching from the gas phase reaction zone. This analysis also shows nickel carbide formation consistent with the temperature of the reaction zone and the Auger electron spectroscopy results which show some carbon and oxygen incorporation (8% and 1% respectively). Gas phase transport and condensation of the molybdenum carbonyl results in substantial carbon and oxygen contamination of the molybdenum films requiring heated substrates, a requirement not consistent with the goals of the program to

maximize the quench rate of the deposition. Results from tungsten deposition experiments representing a reduction chemistry instead of the decomposition chemistry involved in the carbonyl experiments are also reported. DOE

N86-17739# Department of Energy, Washington, D. C.
DENSITY GRADIENT FREE ELECTRON COLLISIONALLY EXCITED X-RAY LASER Patent Application
E. M. Campbell (Lawrence Livermore National Lab., Calif.) and M. D. Rosen, inventors (to DOE) (Lawrence Livermore National Lab., Calif.) Filed 29 Nov. 1984 30 p
(Contract W-7405-eng-48)
(DE85-017726; US-Patent-Appl-SN-676338) Avail: NTIS HC A03/MF A01

An operational X-ray laser is provided that amplifies 3p-3s transition X-ray radiation along an approximately linear path. The X-ray laser is driven by a high power optical laser. The driving line focused optical laser beam illuminates a free-standing thin foil that may be associated with a substrate for improved structural integrity. This illumination produces a generally cylindrically shaped plasma having an essentially uniform electron density and temperature, that exists over a long period of time, and provides the X-ray laser gain medium. The X-ray laser may be driven by more than one optical laser beam. The X-ray laser has been successfully demonstrated to function in a series of experimental tests. DOE

N86-17740# Department of Energy, Washington, D. C.
APPARATUS FOR LASER BEAM PROFILE MEASUREMENTS Patent Application
N. P. Barnes and D. J. Gettemy, inventors (to DOE) Filed 30 Jan. 1985 10 p Prepared in cooperation with LANL
(Contract W-7405-eng-36)
(DE85-017789; US-Patent-Appl-SN-696549) Avail: NTIS HC A02/MF A01

Apparatus for measuring the spatial intensity profile of the output beam from a continuous-wave laser oscillator. The rapid and repetitive passing of a small aperture through the otherwise totally blocked output beam of the laser under investigation provides an easily interpretable, real-time measure of the intensity characteristics thereof when detected by a single detector and the signal generated thereby displayed on an oscilloscope synthronized to the motion of the aperture. DOE

N86-17741# Department of Energy, Washington, D. C.
EXCIMER LASER PHOTOTHERAPY FOR THE DISSOLUTION OF ABNORMAL GROWTH Patent Application
D. M. Gruen, C. E. Young, and M. J. Pellin, inventors (to DOE) Filed 19 Feb. 1985 18 p Prepared in cooperation with Argonne National Lab.
(Contract W-31-109-eng-38)
(DE85-017803; US-Patent-Appl-SN-702569) Avail: NTIS HC A02/MF A01

Removal of abnormal human tissue with reduced thermal damage is achieved by selecting a laser having a wavelength in the order of 290 to 400 nm, orienting a laser-transmitting glass member toward the abnormal tissue and directing the laser through the glass member at power densities, pulse rates, and times sufficient to cause multiphoton absorption and bond breaking by Coulomb repulsion rather than thermal destruction. The glass member may include a laser beam concentrator provided by a lens or cone at the tissue-treatment end to increase the beam energy per unit area and reduce the treatment area. DOE

N86-17742# Rochester Univ., N. Y. Lab. for Laser Energetics.
THERMAL TRANSPORT, MASS-ABLATION AND PREHEAT IN LASER-TARGET EXPERIMENTS
B. Yaakobi 1985 41 p Presented at the Spring College on Radiation in Plasmas, Trieste, Italy, 1 Jun. 1985
(Contract DE-AC08-80DP-40124)
(DE85-017584; DOE/DP-40124/74; CONF-8506189-1) Avail: NTIS HC A03/MF A01

Thermal transport in laser-target irradiation experiments has been studied by X-ray spectroscopic methods. Mass ablation rates and ablation pressures can be derived from these and other measurements. Even though the measurements from various laboratories do not always agree, a general picture seems to emerge: (1) thermal transport is less inhibited in spherical irradiation geometry, as compared with single beam irradiation of flat targets; (2) thermal transport tends towards a classical behavior, i.e., with no need to invoke flux inhibition, for short wavelength irradiation of large spherical targets, and (3) mass ablation rates are higher at shorter wavelength irradiation, even when compared at the same absorbed irradiance. DOE

N86-17743# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
A CO2 LASER SCINTILLOMETER FOR C(2) SUB n MEASUREMENTS OVER A MANY KILOMETER PATH
W. Kohsiek 1985 25 p refs
(KNMI-TR-67; ISSN-0169-1708) Avail: NTIS HC A02/MF A01

A CO2 laser scintillometer for the measurement of refractive index over pathlengths from 100 m to 10 km is described. Electronic adjustment procedures, calibration, and the operation region of the instrument are outlined. The scintillometer performs well in tests over path lengths of 449, 5900, and 9700 m. Author (ESA)

N86-17643# Joint Publications Research Service, Arlington, Va.
METROLOGICAL PROVISION FOR MEASUREMENT OF RELATIVE ENERGY DENSITY DISTRIBUTION OVER BEAM CROSS SECTION AND OF BEAM DIVERGENCE IN PULSE LASERS
A. F. Kotyuk, V. B. Korshikov, B. M. Stepanov, S. V. Tikhomirov, and V. A. Yakovlev *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 24-25 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 13-14 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17644# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL COMMUTATORS OF ANALOG SIGNALS FOR MEASUREMENT OF ENERGY DISTRIBUTION OVER BEAM CROSS SECTION OF PULSE LASER
A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 14-16 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17645# Joint Publications Research Service, Arlington, Va.
THE 400-CHANNEL COMMUTATOR FOR MEASUREMENT OF ENERGY DISTRIBUTION IN LASER BEAM
V. L. Chereugin and A. A. Kuznetsov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 26 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 16-18 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17646# Joint Publications Research Service, Arlington, Va.
DEPENDENCE OF ERROR OF MEASUREMENT OF RELATIVE ENERGY OR POWER DENSITY DISTRIBUTION OVER CROSS SECTION OF LASER BEAM ON SPACE FACTOR OF MULTIELEMENT RADIATION TRANSDUCER
Ya. T. Zagorskiy and Yu. V. Karabak *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 18-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17647# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC INSTRUMENT FOR MEASURING RELATIVE ENERGY DENSITY DISTRIBUTION IN BEAMS OF PULSE LASERS
V. I. Arbekov, M. V. Ulanovskiy, Ya. T. Zagorskiy, A. M. Levi, and A. I. Glazov *In its* USSR Report: Electronics and Electrical

Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 27-28 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 5, May 1984 p 21-22 (For primary document see N86-17640 06-33) Avail: NTIS HC A03/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-17744 British Library Lending Div., Boston Spa (England).
POSSIBILITIES OF PROTECTION FROM ABRASIVE AND ADHESIVE WEAR
G. Stahli [1985] 12 p refs Transl. into ENGLISH from Oberflache-Surface, Zurich, v. 8, 25 Jan. 1978 Presented at the Swiss Electrotech. Meeting, Zurich, 25 Jan. 1978
(BLL-Risley-Tr-5166-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

Wear research shows that wear of materials can be understood not as a materials property but as a property of a complex tribological system. Such a system comprises a base and counterface material with certain surface geometry and an intervening medium and an environment medium. The action of an external loading group produce very different wear mechanisms. Two primarily mechanical types of wear mechanism which combine in many cases of wear and the material possibilities of wear reduction are discussed. The importance of the type of wear present in particular cases to the evaluation of the wear resistance is shown. Giving a comparable view is in general possible with results from model wear tests under quite defined and simple conditions. The work is done at room temperature, relatively low stress (3 kg/sq m) and speeds of 25 m/min and without any lubrication to emphasize the effect of the materials. The results lead to a generally valid relationship and provide an ordered comparison for new materials and material treatments. E.A.K.

N86-17745 British Library Lending Div., Boston Spa (England).
UPSETTING OF VISCOPLASTIC MEDIUM BETWEEN TWO RIGID PLATES IN PRESENCE OF FRICTION
Yu. I. Blinov, V. V. Zaitsev, and S. B. Maksimov 1985 8 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 2, 1985 p 33-37
(BLL-M-36390-(5826.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A method which enables the solution of boundary value problems to be reduced to successive integration of linear fourth order equations is presented. By means of perturbation expansion, the boundary-value problem of compression of a viscoplastic medium during upsetting between two rigid plates is reduced to integration of a linear fourth-order equation. The coefficient of friction is used as the perturbation. The method can be used to calculate parameters of flow of viscoplastic lubricant in processes of mechanical working of metals. E.A.K.

N86-17746 Wayne State Univ., Detroit, Mich.
FAULT ANALYSIS IN DYNAMIC SYSTEMS WITH APPLICATION TO RECIPROCATING COMBUSTION ENGINES Ph.D. Thesis
Ali Amin Fahs 1985 205 p
Avail: Univ. Microfilms Order No. DA8514129

The problem of fault analysis can be divided into three parts: fault detection, diagnosis and location, and reconfiguration or repair. This study introduces two general approaches for fault analysis in dynamic systems, which are described by ordinary differential equations. The first approach requires continuous monitoring of the output variables of the system. Under normal conditions these variables follow a nominal time-history. Under abnormal condtions they deviate from this nominal history. Fault analysis is accomplished by measuring these deviations. The other approach involves the following: (1) development of an analytical model, (2) identification of model parameters, (3) and development of discriminant functions and decision rules for fault classifications. The two approaches are applied to fault analysis in a reciprocating combustion engine. The engine is a multivariate system of nonlinear nature. The design of an engine deficiency analyzer requires the extraction of useful information. Deficient engine operation affects the regularity of the instantaneous angular velocity of the flywheel. Dissert. Abstr.

N86-17747 British Library Lending Div., Boston Spa (England).
[A METHOD OF FABRICATING SILICON CARBIDE MOULDINGS]
31 Oct. 1985 11 p Transl. into ENGLISH of Japanese Patent (Application no. 81222, 1977)
(BLL-Risley-Tr-5206-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

The present invention relates to a method of fabricating silicon carbide mouldings. After the mixture comprising silicon carbide powder, carbon powder and thermally decomposed polyorganopolysilane is moulded, molten metallic silicon is allowed to penetrate into these mouldings. Although this method has the advantage that products of different shapes can be fabricated easily compared with the so-called hot press method where a mixture of, for example, SiC powder and magnesia powder are moulded using a hot press, since a temporary binding agent comprising an organic material is used, the primary moulding and the secondary moulding before penetration of the metallic silicon are of low strength and machining of high dimensional precision cannot be carried out at this stage. Moreoever, since mouldings where metallic silicon is allowed to penetrate into secondary mouldings and is converted to SiC have a Vickers hardness greater than 3200, there is the disadvantage that only diamond tools can be used for machining and the machining costs are high. Author

N86-17748*# Transmission Research, Inc., Cleveland, Ohio.
CONSTITUTIVE MODELLING OF LUBRICANTS IN CONCENTRATED CONTACTS AT HIGH SLIDE TO ROLL RATIOS Interim Report
J. L. Tevaarwerk Dec. 1985 85 p refs
(Contract DEN3-35)
(NASA-CR-175029; NAS 1.26:175029; IR-4) Avail: NTIS HC A05/MF A01 CSCL 11H

A constitutive lubricant friction model for rolling/sliding concentrated contacts such as gears and cams was developed, based upon the Johnson and Tevaarwerk fluid rheology model developed earlier. The friction model reported herein differs from the earlier rheological models in that very large slide to roll ratios can now be accommodated by modifying the thermal response of the model. Also the elastic response of the fluid has been omitted from the model, thereby making it much simpler for use in the high slide to roll contacts. The effects of this simplification are very minimal on the outcome of the predicted friction losses (less than 1%). In essence then the lubricant friction model developed for the high slide to roll ratios treats the fluid in the concentrated contact as consisting of a nonlinear viscous element that is pressure, temperature, and strain rate dependent in its shear response. The fluid rheological constants required for the prediction of the friction losses at different contact conditions are obtained by traction measurements on several of the currently used gear lubricants. An example calculation, using this model and the fluid parameters obtained from the experiments, shows that it correctly predicts trends and magnitude of gear mesh losses measured elsewhere for the same fluids tested here. Author

N86-17749# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF A GAS GENERATOR SYSTEM Final Technical Report
C. W. Nelson and D. E. Kooker Apr. 1985 37 p
(DA Proj. 1L1-61102-AH-43)
(AD-A156999; AD-E950724; BRL-TR-2648) Avail: NTIS HC A03/MF A01 CSCL 13/7

A small gas generator suddenly failed in acceptance tests after a string of successes. Intensive tests and rough calculations said that heat transfer to the cold surroundings, coupled with a

change in burning-rate exponent at low pressure, caused the failure. Two math models, a lumped parameter model and a full one-dimensional fluid mechanics model were devised to explain the interaction among combustion, heat transfer, and fluid mechanics. The models predict that a reasonable estimate of heat loss does not, by itself, explain the failures. The success of an isolation venturi can only be partially explained by heat transfer. Suspicion then rests on the assumption of equilibrium combustion thermodynamics at the very cold temperatures where the failures occurred. Variations with age and propellant batch are still not exonerated, even though the critical problem seems to have been solved.
GRA

N86-17750# Allied Bendix Corp., Kansas City, Mo.
ROBOTIC DEBURRING: A BIBLIOGRAPHY
L. K. Gillespie Jul. 1985 19 p Presented at the Deburring and Surface Conditioning Conference, Chicago, Ill., 26 Sep. 1985
(Contract DE-AC04-76DP-00613)
(DE85-015760; BDX-613-3317; CONF-8509132-1) Avail: NTIS HC A02/MF A01

A bibliography is presented on every known reference to robotic deburring. The majority of the citations represent full papers on the subject, however, a few represent only passing comments on the subject. The brief mentions are included because robotic deburring is still in its infancy, and the mere recognition that a robot is deburring sheet metal or plastics or some other equally unique citation is of itself noteworthy.
E.A.K.

N86-17751# Sandia National Labs., Albuquerque, N. Mex.
VACUUM ARC REMELTING: AN OVERVIEW
Frank J. Zanner and Lee A. Bertram 1985 41 p refs Presented at conference
(DE85-016458; SAND-85-1509C; CONF-8509136-1) Avail: NTIS HC A03/MF A01

Vacuum arc remelting (VAR) which is a casting process carried out in a vacuum with the aim of melting a consumable electrode in such a way that the new ingot has improved chemical and physical homogeneity is discussed. The historical use of VAR is outlined. From the 1940s to the present, the process was steadily improved by evolutionary design and shop practice, and is the most heavily capitalized process used in the world to produce superalloy, stainless steel, and high strength steel forging stock. The following areas are covered in chronological order: (1) arc physics and behavior; (2) metal transfer and electrode gap measurement; (3) boundary conditions on the crucible wall; and (4) pool dynamics and macrosegregation.
E.A.K.

N86-17752# Department of Energy, Washington, D. C.
FLUIDIZING DEVICE FOR SOLID PARTICULATES Patent Application
J. P. Diebold and J. W. Scahill, inventors (to DOE) Filed 27 Jun. 1984 19 p
(Contract DE-AC02-83CH-10093)
(DE85-006504; US-Patent-Appl-SN-625327) Avail: NTIS HC A02/MF A01

A flexible whip or a system of whips with novel attachments is suspended in a hopper and is caused to impact against fibrous and irregularly shaped particulates in the hopper to fluidize the particulates and facilitate the flow of the particulates through the hopper. The invention provides for the flow of particulates at a substantially constant mass flow rate and uses a minimum of energy.
DOE

N86-17753# Department of Energy, Washington, D. C.
MULTI-PORT VALVE ASSEMBLY Patent Application
S. F. Guggenheim, inventor (to DOE) (DOE, New York) Filed 16 Nov. 1984 23 p
(DE85-017769; US-Patent-Appl-SN-672229) Avail: NTIS HC A02/MF A01

A multiport fluid valve apparatus is used to control the flow of fluids through a plurality of valves and includes a web, which preferably is a stainless steel endless belt. The belt has an aperture therethrough and is progressed, under motor drive and control, so that its aperture is moved from one valve mechanism to another. Each of the valve mechanisms comprises a pair of valve blocks which are held in fluid-tight relationship against the belt. Each valve block consists of a block having a bore through which the fluid flows, a first seal surrounding the bore and a second seal surrounding the first seal, with the distances between the first and second seals being greater than the size of the belt aperture. In order to open a valve, the motor progresses the belt aperture to where it is aligned with the two bores of a pair of valve blocks, such alignment permitting a flow of the fluid through the valve. The valve is closed by movement of the belt aperture and its replacement, within the pair of valve blocks, by a solid portion of the belt.
DOE

N86-17754# Department of Energy, Washington, D. C.
MACHINE IMPARTING COMPLEX ROTARY MOTION FOR LAPPING A SPHERICAL INNER DIAMETER Patent Application
T. A. Carroll and H. H. Yetter, inventors (to DOE) Filed 30 Jan. 1985 14 p Prepared in cooperation with LANL
(Contract W-7405-eng-36)
(DE85-017790; US-Patent-Appl-SN-696550) Avail: NTIS HC A02/MF A01

An apparatus for imparting complex rotary motion is used to lap an inner spherical diameter surface of a workpiece. A lapping tool consists of a dome and rod mounted along the dome's vertical axis. The workpiece containing the lapping tool is held in a gimbal which uses power derived from a secondary takeoff means to impart rotary motion about a horizontal axis. The gimbal is rotated about a vertical axis by a take means while mounted at a radially outward position on a rotating arm.
DOE

N86-17755# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF A CONTINUOUS-FLOW FLUIDIC PUMP
S. M. Robinson Aug. 1985 167 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018152; ORNL/TM-9554) Avail: NTIS HC A08/MF A01

A study was made of a fluidic pump which utilizes gas pistons, a venturi-like reverse-flow-diverter, and a planar Y-type flow junction to produce a continuous flow of liquid from a system containing no moving parts. The study included an evaluation of the system performance and of methods for controlling the stability of the fluidic system. A mathematical model of the system was developed for steady-state operation using accepted theories of fluid mechanics. Although more elaborate models are needed for detailed design and optimization of specific systems, the model determined some of the main factors controlling the system performance and will be used in the development of more accurate models.
DOE

N86-17756# Pacific Northwest Lab., Richland, Wash.
IDENTIFICATION OF TRIBOLOGICAL RESEARCH AND DEVELOPMENT NEEDS FOR LUBRICATION OF ADVANCED HEAT ENGINES
L. L. Fehrenbacher and T. M. Levinson Sep. 1985 67 p
(Contract DE-AC06-76RL-01830)
(DE85-018154; PNL-5537) Avail: NTIS HC A04/MF A01

The continuous evolution of higher power density propulsion systems has always fueled the search for materials and lubricants with improved thermal and/or durability characteristics. Tribology of the upper cylinder region is the major technology roadblock in the path of the adiabatic diesel engine which has an energy reduction potential that exceeds that of all other engine development types. This tribology assessment resulted in the following major conclusions: (1) a low friction and a low wear seal between the ring belt and cylinder bore are the most critical tribology functions in the diesel combustion chamber; (2) development of solid lubrication systems will not satisfy the simultaneous low friction and low wear requirements in the upper cylinder area; and (3) development of separate upper cylinder liquid lubrication systems offers the most attractive design alternative for meeting the operational goals of future minimum cooled diesel engines.
DOE

N86-17757# Argonne National Lab., Ill.
HEAT TRANSFER IN INTERNAL COMBUSTION ENGINES
C. S. Wang and G. F. Berry Apr. 1985 20 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-011495; CONF-851125-5) Avail: NTIS HC A02/MF A01

A heat transfer model which uses quasi-steady heat flux relations to calculate the heat transfer from combustion gases through the cylinder wall to the coolant was developed. The convective heat transfer accounts for the physical problems of rotating and impinging axial flow inside the engine cylinder. The radiation heat transfer includes gas radiation (CO_2, H_2O and CO) and soot particle radiation. The wall temperatures can be accurately predicted from this model both for the gas and coolant sides of the cylinder walls. The heat transfer results for the motoring case of the present model are in good agreement with those from empirical correlations based on instantaneous heat flux data. The calculated radiation heat flux and gas emissivity show reasonable agreement with the existing data in the literature. DOE

N86-17758# Florence Univ. (Italy). Inst. of Energetics.
GAS TURBINES IN COGENERATION: OVERALL ANALYSIS AND NUMERICAL PREDICTIONS
G. Manfrida, S. S. Stecco, and A. Galletti (Turbotecnica SpA) 1985 7 p refs
Avail: NTIS HC A02/MF A01

A method for performance analysis of gas turbines for cogeneration applications is presented. Energy and energy balances allow presentation of data in terms of conventional or second-law parameters, as well as examination of the trends with respect to cycle variables and cogeneration options. The results show that even though gas turbines (and particularly regenerative solutions) are very flexible for cogeneration purposes, care has to be exercised in matching thermal energy production conditions and cycle variables in order to achieve optimal performance. Author (ESA)

N86-17759# Florence Univ. (Italy). Inst. of Energetics.
A RATIONAL EFFICIENCY ANALYSIS OF COMPARISONS AND TRENDS IN GAS TURBINES FOR COGENERATION
Sergio S. Stecco and Giampaolo Manfrida 1985 5 p refs Sponsored by Max-Planck Inst.
Avail: NTIS HC A02/MF A01

The performance of gas turbines in cogeneration is examined by a second-law approach. Cycle parameters for simple and regenerative design are investigated together with options for process or utility heat production. A reference electric power size of 4 MW is assumed. Results are presented as a set of parameters (electric power index, rational efficiency, coefficient of utilization). A parameter named versatility index indicates the broadness of the design thermal loads which can be handled by a gas turbine plant. Author (ESA)

N86-17760# Bundesministerium des Innern, Bonn (West Germany).
EVALUATION OF FUNCTIONAL EXPERIENCE WITH SAFETY VALVES Final Report, Jan. 1985 [AUSWERTUNG VON BETRIEBSERFAHRUNGEN MIT SICHERHEITSARMATUREN]
W. Bung, P. Hoemke, W. Oberender, H. Paul, and W. Reuter Jun. 1985 207 p refs In GERMAN
(BMI-1985-080; ISSN-0724-3316) Avail: NTIS HC A10/MF A01

Functional tests of safety valves for nuclear power reactors were statistically investigated. The 2076 functional tests were carried out on power-operated safety valves in a conventional power plant, with special regard to common-mode failures (CMF). The contributions to the risk of primary exhaust and safety valves are discussed. Concepts for the reliable opening and closing are presented. The results clearly show that CMF's play on important role in the nonavailability of controlled safety valves, especially in the control system. Author (ESA)

N86-17761# Centre Technique des Industries Mecaniques, Senlis (France).
TOOL WEAR MONITORING SYSTEMS Final Report [MATERIELS DE SURVEILLANCE DE LA DEGRADATION DES OUTILS]
J. C. Tanguy 3 Jun. 1985 42 p refs In FRENCH
(CETIM-100560) Avail: NTIS HC A03/MF A01

Tool wear detectors, contact detectors, shaft power controllers, load control, noise emission control, and vibration control components are reviewed. The service life of tools are determined. Author (ESA)

N86-17762# Centre Technique des Industries Mecaniques, Senlis (France).
HIGH SPEED STEEL WORKING TOOLS Final Report [OUTILS POUR L'USINAGE A GRANDE VITESSE DES ALLIAGES FERREUX]
Saint-Chely, Geslot, Lefebvre, and Letellier Jun. 1985 64 p In FRENCH
(CETIM-102360) Avail: NTIS HC A04/MF A01

High speed steel machining to be applied to high speed milling machining with acceptable tool life was explored. Experiments were carried out in lathe machining. The tool materials investigated included boron nitride, aluminum oxide, titanium carbide and silicon. A positive result is shown using boron nitride tools to machine cast iron, with a life of > 20 min at 2200 m/min. No positive results are obtained in steel machining. Author (ESA)

N86-17763# Kraftwerk Union A.G., Mulheim (West Germany). Bereich Gasturbinen.
DEVELOPMENT OF LOW-EMISSION GAS TURBINE COMBUSTION SYSTEMS Final Report, Mar. 1985
Peter Berenbrink, Vladimir Rosen, and Hans-Wilhelm Schabbehard Bundesministerium fuer Forschung und Technologie Bonn Jul. 1985 179 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-064; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.50

Gas turbine combustion systems with reduced emissions, in particular of nitrogen oxides, were developed. Diffusion flame burners were improved to reduce emissions, by modifications of the burner and fuel nozzle geometry and by wet NOx control. A premixing flame burner was developed. A calculation procedure for the prediction of the formation of pollutants in a gas turbine combustion chamber was derived. The NOx-emissions of the diffusion flame burner are reduced to one third, and with wet control to one tenth of those of the initial burner. For gaseous fuel a premixing flame burner with low NOx-emission is available, for liquid fuel more research is required. A procedure for flow field and chemical reaction calculations was developed. Author (ESA)

N86-17764# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.
WELD SEAM-TRACKING WITH AN OPTICAL SENSOR USING STRUCTURED LIGHT [LASNAADVOLGEN MET EEN OPTISCHE SENSOR, DIE GEBRUIK MAAKT VAN GESTRUCTUREED LICHT]
R. M. W. Notermans 1983 137 p refs In DUTCH; ENGLISH summary Original contains color illustrations
Avail: NTIS HC A07/MF A01

Two optical profile sensor principles for welding robots, based on the right angle projection of a light streak on the seam to transfer three-dimensional workpiece information, are presented. Using an HeNe-laser as light source and a video camera, and linear photoarray as sensors, an experimental set-up and an industrial prototype were examined. Realistic weld seam-tracking experiments were executed on a welding robot with two orthogonal degrees of freedom and extended control. Results show practicability of both sensor systems. Application in a welding problem in the off shore industry is discussed. Author (ESA)

N86-17765# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
SOME ASPECTS OF THE DYNAMIC BEHAVIOR OF AN ASSEMBLY ROBOT
K. C. P. Machielsen 1983 148 p refs
Avail: NTIS HC A07/MF A01

A mathematical model of the dynamic behavior of an assembly robot with five degrees of freedom, driven by four linear hydraulic servomotors and one vane-rotor type servomotor, was established for determining control strategies. The model is clearly structured due to a separate modeling of the arm mechanism and the servomotors. In modeling the arm mechanism, rigid body mechanics were assumed. The model is nonlinear, contains q time delays and is of the 25th order. The model was verified by comparing measured step responses of the robot with step responses of the model obtained via simulation. A modal analysis procedure was done to assess the validity of the assumption of rigid body mechanics. From the verification it follows that the model is suitable for determining control strategies. The assumption of rigid body mechanics is valid for low frequencies. A parameter sensitivity analysis of the actuator models reveals that the total model can be reduced to the 15th order. Author (ESA)

N86-17766# Groningen Rijksuniversiteit (Netherlands). Vrije Studierichting.
EFFICIENCY CALCULATION FOR GAS TURBINES: SEARCHING FOR SIMPLE RELATIONS BETWEEN THERMODYNAMIC EFFICIENCY OF A GAS TURBINE AND EFFICIENCY DETERMINING PARAMETERS [RENDEMENTS BEREKENING VOOR GASTURBINES: WAARIN GEZOCHT WORDT NAAR SIMPELE RELATIES TUSSEN HET THERMISCHE RENDEMENT VAN EEN GASTURBINE EN RENDEMENTS-BEPALENDE PARAMETERS]
1985 45 p refs In DUTCH
(SS-44) Avail: NTIS HC A03/MF A01

Relations between the thermodynamic efficiency and inlet temperature and compression ratio are determined for a simple gas turbine cycle, and for a regenerative cycle, using also a regenerative efficiency parameter. Investigating the optimal investment allocation with regard to production and utilization of steam and electricity in industry, heat-power cogeneration applications of (recuperative) gas turbines, combined with counterpressure steam turbines and/or boilers, are considered. These installations are described using a model in which thermodynamic efficiency is calculated as a function of several parameters. Based on the historical developments of turbine components, related to the parameters, a 58% efficiency improvement is predicted. Integration possibilities of gas turbines in heat-power installation are given. Author (ESA)

N86-17767# Centre Technique des Industries Mecaniques, St. Etienne (France).
HOOPS Final Report [FRETTAGE]
J. Chalier 3 Oct. 1984 54 p refs In FRENCH
(CETIM-13-N-243) Avail: NTIS HC A04/MF A01

Hooping procedures are discussed, including the principles and applications, the computation of the load limits and practical aspects of computation of contraction or expansion. Author (ESA)

N86-17768# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
HIGH PRESSURE GAS STORAGE TANKS: A COMPROMISE BETWEEN SAFETY REGULATIONS AND PERFORMANCES
P. Charpentier and G. Reuille 1985 8 p Presented at AIAA/SAE/ASME 21st Joint Propulsion Conference, Monterey, Calif., 8-11 Jul. 1985
(SNIAS-852-430-115) Avail: NTIS HC A02/MF A01

A prestressed gas tank with titanium alloy liner carbon fiber composite roving, is described and its characteristics are discussed. The 51l tank is intended for TVSAT-TDF1 satellite use in substitution of a titanium liner, aramid fiber roving. The titanium liner has a minimum thickness of 0.9 mm. The composite uses IM6 prepreg carbon from Hercules. Burst pressure is 600 bar. The performance factor is 121% better than the all-titanium tank and 50% better than the aramid fiber tank. Author (ESA)

N86-17769# National Bureau of Standards, Boulder, Colo.
DUCTILE-TO-BRITTLE TRANSITION IN STEEL WELDMENTS FOR ARCTIC STRUCTURES
F. ZiaEbrahimi Apr. 1985 66 p Sponsored in part by Minerals Management Service, Reston, Va.
(PB85-227098; NBSIR-85/3020) Avail: NTIS HC A04/MF A01 CSCL 13E

The development of fracture criteria for steel weldments in arctic structures is reported. The ductile-to-brittle transition behavior of a shielded metal-arc weld, typical of steel weldments in arctic structures, was studied. Fracture toughness, Charpy V-notch impact energy, and tensile properties were measured as a function of temperature throughout the ductile-to-brittle transition range. The effect of geometric dimensions on fracture toughness was studied for the three geometries of single-edge-notch-bend (SENB) specimens. The fracture surfaces of broken specimens are characterized by scanning electron microscopy (SEM). The microstructure of the multiple pass weldment is studied by optical microscopy. The mechanical properties of the steel weldment are compared to the base metal, an ABS grade EH36 steel in normalized condition. GRA

N86-17770# Transportation Research Board, Washington, D.C.
INTERNATIONAL SYMPOSIUM ON MECHANICAL PROPERTIES OF SPECIAL CONCRETE
C. N. MacDonald, V. Ramakrishnan, R. J. Stebbins, C. W. Josifek, and J. D. Jeniec 1985 65 p Symp. held in Washington, D.C., Jan. 1984
(PB85-234961; TRB/TRR-1003; ISBN-0-309-03812-X; LC-85-11564) Avail: NTIS HC A04/MF A01 CSCL 13C

The mechanical properties of special concrete are discussed. The following areas are reported: plastic and steel fiber-reinforced concrete applications; superplasticized fiber-reinforced concretes for the rehabilitation of bridges and pavements; epoxy-bonded, steel fiber-reinforced thin cementitious overlay at Orlando International Jetport, Florida; low-temperature curing of polymer methacrylate polymer concrete; evaluation of rapid-setting concretes; shear transfer in two-layer composite systems; steel fiber shotcrete for rehabilitation of concrete structures; properties of latex-modified shotcrete beneficial to concrete repairs; applications of permanent precast polymer concrete forms for concrete rehabilitation; and, composite concrete pavements with roller-compacted concrete. GRA

N86-17408*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED SEALS FOR LIQUID OXYGEN (LOX) TURBOPUMPS
W. Shapiro, R. Hamm, and J. A. Hemminger (NASA. Lewis Research Center, Cleveland, Ohio) *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 281-290 refs (For primary document see N86-17380 08-20)
(Contract NAS3-23260)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 11A

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-17771 Drexel Univ., Philadelphia, Pa.
ULTRASONIC FEATURE MAPPING FOR ANOMALY IDENTIFICATION IN COMPOSITE MATERIALS AND ADHESIVELY BONDED STRUCTURES Ph.D. Thesis
John Bruce Nestleroth 1985 178 p
Avail: Univ. Microfilms Order No. DA8517062

A nondestructive testing technique was developed called Feature Mapping (F-map) to detect and identify anomalies so that possible failure situations can be avoided without rejecting structurally good material, a feature being defined inn this work as a particular shape or area under a curve characteristic of an ultrasonic waveform in either time, frequency, or transfer function domain. F-mapping uses pulsed ultrasonic energy to interrogate the material, with the information in the received signal quantified into features. Two sample problems to demonstrate the utility of the F-map technique are presented. A fiber reinforced composite material sample problem describes identification procedures for three common anomaly types; porosities, delamination and inclusion. The adhesive bonding sample problem examines the surface preparation variation problem and also corrosive attack of detection in aluminum to aluminum bonded structures.

Dissert. Abstr.

N86-17772# Oak Ridge Y-12 Plant, Tenn.
IN-PROCESS ACOUSTIC EMISSION MONITORING OF LASER WELDS
J. W. Whittaker, T. M. Mustaleski, and K. D. Nicklas Jul. 1985 7 p Presented at the 2nd International Conference on Acoustic Emission, Lake Tahoe, Nev., 28 Oct. 1985 Previously announced in IAA as A86-12586
(Contract DE-AC05-84OS-21400)
(DE85-017184; Y/DW-592; CONF-851162-2) Avail: NTIS HC A02/MF A01

Acoustic emission (AE) monitoring systems were developed for monitoring in-process pulsed and continuous wave (CW) laser welds. Thin sheet, coupon welds and very small, complex geometry component welds were monitored. The results indicate that a linear relationship exists between AE energy production and weld penetration in pulsed welds. A second relationship was discovered which indicates that optimum laser-focus position can be determined from relative AE energy production. Finally, preliminary results indicate that beam/seam misalignment can be determined from the AE generated during welding.

DOE

N86-17773# Fraunhofer-Inst. fuer Zerstoerungsfreie Pruefverfahren, Saarbruecken (West Germany).
A CONCEPT FOR THE QUALITY ASSURANCE OF CERAMIC GAS TURBINE COMPONENTS USING NONDESTRUCTIVE TESTS Final Report, Aug. 1983
Klaus Goebbels, Holger Reiter, Walter Arnold, and Sigrun Hirsekorn Bonn Bundesministerium fuer Forschung und Technologie Aug. 1985 55 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-094; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11.50

Nondestructive testing (NDT) methods were developed for components made of high temperature and high strength ceramics, in a ceramic gas turbine program. The emphasis was on NDT methods for the detection of defects with linear dimensions between 10 and 100 micrometers. For the surface and volume defects, and the structure and stress measurement, three methods are summarized. Filmless high resolution radiography with microfocal X-ray tubes and projection technique testing is accomplished by cross section images of computer tomography with reduced resolution. Ultrasonic testing and ultrasonic microscopy with frequencies between 5 and 200 MHz are used for structure characterization (homogeneity) and stress measurement by low frequency (< or = 27 MHz) velocity measurements; detection of surface defects with surface waves; detection and characterization of volume defects with high frequency ultrasound vibration analysis (resonance frequency) is suitable for large sample series, and qualitative and integral characterization of components.

Author (ESA)

N86-17774# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
QUADRINOMIAL DISTRIBUTION FOR THE CHARACTERIZATION OF NONDESTRUCTIVE INSPECTION (NDI) RELIABILITY
J. H. Heida 27 Jun. 1984 17 p refs Presented at 3rd European Conference on Nondestructive Testing, Florence, Italy, 15-18 Oct. 1984
(NLR-MP-84064-U; B8568524) Avail: NTIS HC A02/MF A01

Inclusion of probability of detection (POD) and probability of recognition (POR) of flaws in characterization of nondestructive inspection (NDI) reliability is considered. Possible measures for this characterization are discussed using inspection results of a test specimen population of 200 identical 4340 steel aircraft landing gear components rejected from service because of crack indications or exceedance of the safe service life. It is concluded that it is doubtful whether the discussed parameters give an appropriate measure of NDI reliability; it is recommended to establish minimum values for the POD and POR at a specified confidence level.

Author (ESA)

N86-17775# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
RELIABILITY OF NONDESTRUCTIVE INSPECTION
J. H. Heida 7 Feb. 1985 33 p refs
(NLR-TR-84011-U; B8568528) Avail: NTIS HC A03/MF A01

The probability of detection (POD) of flaws in flawed specimens in nondestructive inspection (NDI) is discussed. Lower bound values of this probability at a given confidence level are calculated. Inspection sample size limits the applicability of statics, so data points are grouped in intervals of flaw size; four interval methods are discussed. An approach for the representation of NDI reliability using linear regression analysis is described. The quadrinomial distribution of the possible outcomes of NDI, with successful and unsuccessful inspections of flawed and unflawed specimens, is discussed. A probability of recognition (POR) is defined for the unflawed specimens. Both POD and POR must be included in a characterization of NDI reliability. It is doubted whether a single parameter gives an appropriate measure of NDI reliability; it is recommended to establish minimum values for both the POD and POR at a specified confidence level.

Author (ESA)

N86-17776# National Bureau of Standards, Gaithersburg, Md. Office of Nondestructive Evaluation.
NDE (NON-DESTRUCTIVE EVALUATION) PUBLICATIONS, 1982
L. Mordfin Jun. 1985 37 p
(PB85-244069; NBSIR-85/3183) Avail: NTIS HC A03/MF A01 CSCL 14B

This is the sixth in a series of bibliographies of NBS publications on nondestructive evaluation (NDE). It provides bibliographic citations, with selected abstracts, for 124 publications that appeared in the open literature, primarily during calendar year 1982. A detailed subject index is included as well as information on how copies of many of the publications may be obtained.

Author (GRA)

N86-17777# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE USE OF ULTRASONIC WAVE ATTENUATION TO MONITOR POLYMER AND COMPOSITE QUALITY
W. N. Reynolds, L. P. Scudder, and Helen Pressman Jun. 1985 14 p
(AERE-R-11704) Avail: NTIS HC A02/MF A01

Ultrasonic wave attenuation has been measured in a small range of polymeric materials over the frequency range 3.20 MHz, using a new rapid technique. It has been found that a 1% moisture ingress in an epoxy resin produces about a 10% increase in attenuation. Polyurethane additive can be monitored and assayed by the same method. Carbon fiber reinforced epoxys and PEEK show additional scattering with a wider statistical distribution. It is suggested that measurements of this kind could form the basis for monitoring the quality of a wide range of polymeric systems, both filled and unfilled and for detecting the occurrence of various types of defect and degradation. Further investigations would be required to establish the mechanisms involved in the effects observed.

DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-17778 British Library Lending Div., Boston Spa (England).
VIBRATIONAL STABILITY BEHAVIOUR OF ORTHOTROPIC PLATES IN STEEL ROADS BRIDGES: APPLICATION FOR FINANCIAL SUPPORT OF A RESEARCH PROJECT BY THE ECSC (EUROPEAN COAL AND STEEL COMMUNITY)
25 Sep. 1985 29 p refs Transl. into ENGLISH from West Germany Application (Darmstadt), 28 Jun. 1985
(BLL-Trans-3225-(9057.2451)) Avail: British Library Lending Div., Boston Spa, Engl.

The traffic loads and the stresses induced on steel road bridges were investigated. Actual traffic loads on steel road and railway bridges, and the stresses thereby induced in the bridge structures, to provide better principles for the development of design specifications for steel bridges and for standardizing existing specifications in Europe were compiled. New facts regarding traffic, distributions of the overall weights and axle loads of vehicles, and corresponding stress spectra are presented. Some components of steel bridge structures must withstand a very great number of load fluctuations, particularly the components of orthotropic carriageway slabs. It appears necessary, in design specifications for bridge structures, to include the aspects of operationally confirmed dimensioning to avoid unexpected fatigue damage to load-bearing components, and to avoid unnecessary overdimensioning of such parts. It is essential to make test results available that will permit the vibrational stability characteristic values, also in the range exceeding 2 -1000,000 alternating stresses, to be uniformly defined for the designing of road bridge structures. E.A.K.

N86-17779 Ohio State Univ., Columbus.
CRACK GROWTH IN AN ELASTIC-PRIMARY CREEPING MATERIAL Ph.D. Thesis
Ting-Chieh Chang 1985 198 p
Avail: Univ. Microfilms Order No. DA8510554

The asymptotic stress and strain fields near the tip of a slowly growing crack are derived for elastic-primary creeping materials. Asymptotic analysis based upon a continuum mechanics model, yields the nature of the near tip singular fields for anti-plane shear (Mode 3), plane stress and plane strain (Mode 1). The functional dependence of the crack tip singularity changes at n-p + 3. For n-p < 3, an inverse square root stress singularity takes place which is dependent upon the applied loads and the crack history. The steady state crack growth can not occur in an elastic-primary creeping material in this range. For n-p > 3, a new type of singular field is found for both steady state and nonsteady state crack growth. The problem of a quasistatically growing crack in elastic-primary creeping material is then analyzed for the cases of plane stain Model 1 and anti-plane shear Mode 3 under conditions of small scale yielding.
Dissert. Abstr.

N86-17780 Texas A&M Univ., College Station.
THE MECHANICS OF A NEAR-SURFACE CRACK UNDER UNIFORM PRESSURE OR SHEAR IN A TRANSVERSELY ISOTROPIC MEDIUM: WITH APPLICATIONS TO HYDRAULIC FRACTURE Ph.D. Thesis
George Aristotle Gazonas 1985 209 p
Avail: Univ. Microfilms Order No. DA8517790

The influence of material anisotropy (transverse isotropy) on half-plane surface tilt and displacement fields induced by a near-surface crack under uniform pressure or shear is investigated by solving a series of boundary value problems using: (1) Dual Integral Methods, (2) Fourier Transform/Green's Function Methods, and (3) Complex variable Methods. The solutions obtained by the various methods are compared and are found to be in excellent agreement. The complex variable solutions for: (1) the vertical displacements induced by a uniformly pressurized crack oriented parallel to the free-surface of a nearly isotropic half-plane, and (2) the surface tilts induced by a uniformly pressurized crack oriented perpendicular to the free-surface of a nearly isotropic half-plane concur with the solutions of Pollard and Hozhausen (1979), obtained using the Schwarz-Neumann Alternating Methods. It is shown that free-surface effects become negligible for depth to half-crack length ratios greater than four, d/a > 4. Surface tilts are highly nonunique, even in a nearly isotropic medium.
Dissert. Abstr.

N86-17781 South Carolina Univ., Columbia.
THE USE OF ACOUSTICAL CAUSTICS IN FRACTURE MECHANICS Ph.D. Thesis
Ifeanyi Charles Umeagukwu 1985 167 p
Avail: Univ. Microfilms Order No. DA8518058

A new experimental technique based on the acoustical method of caustics for the solution of surface deformation and crack body problems is discussed. The purpose of this research effort is to apply the caustic method to opaque materials, in particular to steel and aluminum specimens. Acoustical caustics technique has a definite advantage over the shadow optical method of caustics. This is because it could be used in reflection to measure the effect of surface deformation, and in transmission to measure both the integrated effect of the internal principal stresses and surface deformations. On the other hand, optical caustics cannot be used in transmission to quantify the cumulative effect of the body principal stresses and surface deformations in a nontransparent material.
Dissert. Abstr.

N86-17782 British Library Lending Div., Boston Spa (England).
ESTIMATION OF FLAW SIZE IN ULTRASONIC TESTING OF WELDS IN UNALLOYED AND LOW-ALLOY STEELS Ph.D. Thesis - Eidgenoessische Technische Hochschule, 1984
Xaver Edelmann 7 Nov. 1985 15 p Transl. into ENGLISH from Swiss Thesis
(BLL-Risley-Tr-5229-(9091.9F); ETH-7696) Avail: British Library Lending Division, Boston Spa, Engl.

The combination of differing ultrasonic techniques for flaw size estimation in intergranular stress corrosion cracking (IGSCC) in an austenitic weld is examined. Austenitic compounds place special demands on the ultrasonic technique. This study attempts to illustrate what can be achieved in appropriate use of static and dynamic amplitude evaluation as well as crack tip information. In a newly launched test series, EPRI put the emphasis on crack depth determination using ultrasonics. For a round robin test, suitable test specimens with IGSCC were prepared. Sixteen cuts from welded pipe sections of stainless steel of type 304 were chosen for the investigation. The pipe diameters were between 10' and 28' (254 and 711.2 mm). These samples with properties, dimensions and flaw patterns differing as much as possible were tested as a series, and for the evaluation a clearly defined part was designated as test area. Results indicate that the procedure in flaw size estimation should be characterized by the correct evaluation of the following possibilities: (1) combination of static and dynamic amplitude evaluation; (2) variation of sound field parameters; and (3) comparison of results with different frequencies and angles (if need be variable angle probes). B.W.

N86-17783 British Library Lending Div., Boston Spa (England).
FATIGUE IN A WELDED JOIN MADE BY PULSED MIG WELDING OF A 304 TYPE STAINLESS STEEL
Jose Alfredo Bello Barbosa, Sergio Neves Monteiro, and Carlos Albert Nolasco 7 Nov. 1985 15 p Transl. into ENGLISH of conference paper "Fadiga em Junta Soldada por MIG Pulsado de um Aco Inoxydavel 304" Presented at the 32nd Annual Conference of the ABM, 1977 p 1-16 Conference held at Sao Paulo, Brazil, Jul. 1977
(BLL-Risley-Tr-5233-(9091.9F); PTC-12/77) Avail: British Library Lending Division, Boston Spa, Engl.

This paper deals with analysis of the fatigue strength character-

istics of welded joints of AISI 304 type austenitic stainless steel, by using alternated bending tests. The welding method used was pulsed transfer MIG welding. The behavior of built up bead and ground off bead welds was determined. The possible effect of stress concentrations on the life of a component subject to fatigue was also analyzed. A metallographic study was also carried out to investigate the influence of delta ferrite, formed during welding, on the fatigue properties of the welds. Author

N86-17784 British Library Lending Div., Boston Spa (England).
STATIC AND FATIGUE STRENGTH OF EXPLOSION WELDED PLATES
G. Curti and A. Risitano 7 Nov. 1985 8 p Transl. into ENGLISH from Revista Italiana della Saldatura (Italy), v. 29, no. 1, 1977 p 1-7
(BLL-Risley-Tr-5232-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

The results of preliminary tests carried out in a research program, results, concerning explosive welds of AISI 304 L steel plates are compared with corresponding tests carried out on conventional butt seam welds of the same plates and on plates of base metal. Author

N86-17785 Leeds Univ. (England). Dept. of Mechanical Engineering.
HIGH STRAIN-RATE PROPERTIES OF MATERIALS Progress Report, 31 Dec. 1984
J. L. Sturges 1985 13 p refs
(Contract RARDE-2062/0111)
(BR94080) Avail: Issuing Activity

Commissioning of a test rig for high and intermediate strain rates is summarized. Retreatment of torsion specimens made in a special steel is outlined. The specimens failed to meet hardness values related to a tempering curve. Investigations showed that the failure of the specimens to harden is due to a mass effect, the tempering curve being determined from very small off-cuts. Water quenching produces the required hardness variation, but at a lower level than the original curve. Author (ESA)

N86-17786 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
DEVELOPMENT AND APPLICATION OF A DIRECT ALGORITHM ADAPTED TO THE DISCRETE FOURIER TRANSFORM FOR THE DETERMINATION OF THE MODAL PARAMETERS OF LINEAR VIBRATION SYSTEMS Thesis [ENTWICKLUNG UND ANWENDUNG EINES AN DIE DISKRETE-FOURIER-TRANSFORMATION ANGEPASSTEN DIREKTEN ALGORITHMUS ZUR BESTIMMUNG DER MODALEN PARAMETER LINEARER SCHWINGUNGSSYSTEME]
Dietmar Bouchard Feb. 1984 130 p refs In GERMAN: ENGLISH summary
(RUB-IFM-MITT-42) Copyright. Avail: Issuing Activity

An algorithm for the identification of vibration parameters using the discrete Fourier transform (DFT) was developed. The algorithm is based on an exact reconstruction of the DFT of an exponentially decreasing harmonic function which describes freely or periodically excited vibrations of a linear system with viscous damping. A special iteration algorithm allows to separate vibrations with closely neighboring eigenfrequencies. Numerical tests show the relationship between the uncertainties of the identified parameters and the disturbances accompanying the measurements. Applications of this algorithm to practical tests on simple models and machines are presented. Author (ESA)

N86-17787# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
WAVE PROPAGATION IN THICK DAMPED LAMINATED PLATES
D. J. Mead and R. Joannides Jan. 1985 88 p refs
(AASU-344) Avail: NTIS HC A05/MF A01

An approximate theory is presented for the plane wave motion in thick multilayered isotropic plates. The wave-speeds, wave-modes and the corresponding wave loss factors when some of the layers are damped were studied. Each layer is assumed to have longitudinal and transverse displacements which vary linearly through the layer thickness. Hamilton's Principle is used to set up corresponding equations of motion in terms of the four displacement coordinates which characterize the displacement of each layer. The whole set of equations so formed for a multiple-layered plate is reduced and simplified by making use of symmetry of the plate, and symmetry or antisymmetry of the wave motion. The single, triple and five-layered configurations are emphasized, and computed results are presented to show how the wave speeds and loss factors vary with wave number of motion. Approximate results are compared with results obtained from the exact theory of a single-layered plate, and with results from previously derived approximate theories. E.A.K.

N86-17788*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
CLOSURE OF FATIGUE CRACKS AT HIGH STRAINS Final Report
N. S. Iyyer and N. E. Dowling Dec. 1985 159 p refs
(Grant NAG3-438)
(NASA-CR-175021; NAS 1.26:175021) Avail: NTIS HC A08/MF A01 CSCL 20K

Experiments were conducted on smooth specimens to study the closure behavior of short cracks at high cyclic strains under completely reversed cycling. Testing procedures and methodology, and closure measurement techniques, are described in detail. The strain levels chosen for the study cover from predominantly elastic to grossly plastic strains. Crack closure measurements are made at different crack lengths. The study reveals that, at high strains, cracks close only as the lowest stress level in the cycle is approached. The crack opening is observed to occur in the compressive part of the loading cycle. The applied stress needed to open a short crack under high strain is found to be less than for cracks under small scale yielding. For increased plastic deformations, the value of sigma sub op/sigma sub max is observed to decrease and approaches the value of R. Comparison of the experimental results with existing analysis is made and indicates the limitations of the small scale yielding approach where gross plastic deformation behavior occurs. Author

N86-17789*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NONLINEAR BENDING-TORSIONAL VIBRATION AND STABILITY OF ROTATING, PRETWISTED, PRECONED BLADES INCLUDING CORIOLIS EFFECTS
K. B. Subrahmanyam (Toledo Univ., Ohio), K. R. V. Kaza, G. V. Brown, and C. Lawrence Jan. 1986 36 p refs Presented at Workshop on Dynamics and Aeroelastic Stability Modeing of Rotor Systems, Atlanta, Ga., 4-5 Dec. 1985; sponsored by Army and Georgia Inst. of Technology, Atlanta
(NASA-TM-87207; NAS 1.15:87207) Avail: NTIS HC A03/MF A01 CSCL 20K

The coupled bending-bending-torsional equations of dynamic motion of rotating, linearly pretwisted blades are derived including large precone, second degree geometric nonlinearities and Coriolis effects. The equations are solved by the Galerkin method and a linear perturbation technique. Accuracy of the present method is verified by comparisons of predicted frequencies and steady state deflections with those from MSC/NASTRAN and from experiments. Parametric results are generated to establish where inclusion of only the second degree geometric nonlinearities is adequate. The nonlinear terms causing torsional divergence in thin blades are identified. The effects of Coriolis terms and several other structurally nonlinear terms are studied, and their relative importance is examined. Author

N86-17790# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE DYNAMICS OF MECHANISMS WITH DEFORMABLE LINKS [DYNAMICA VAN MECHANISMEN MET VERVORMBARE SCHAKELS]
A. L. Schwab and K. vanderWerff Nov. 1983 111 p refs Partly

in ENGLISH and DUTCH
(Lab-Rept-758) Avail: NTIS HC A06/MF A01

A general calculation program (DYNAMO) for the analysis of the dynamic behavior of three-dimensional mechanisms with deformable links was developed. The kinematics of spatial mechanisms with multiple degrees of freedom was analyzed. A programming system (SPACAR) for the analysis of the motion of spatial mechanisms, including planar mechanisms, with rigid links was developed. For individual titles, see N85-17791 through N86-17793.

N86-17791# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE DYNAMICS OF MECHANISMS WITH DEFORMABLE LINKS [DYNAMICA VAN MECHANISMEN MET VERVORMBARE SCHAKELS]
A. L. Schwab *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 44 p In DUTCH (For primary document see N86-17790 08-39)
Avail: NTIS HC A06/MF A01

A finite element program (DYNAMO) for the analysis of the dynamic behavior of three-dimensional mechanisms with deformable links was developed. Characteristics properties of dry Coulomb friction are discussed. Results are reliable, but the calculation time is long, especially for second order transfer functions. The integration method based on the interpolation principle is satisfactory. Discontinuities in the acceleration do not pose problems.
Author (ESA)

N86-17792# Technische Hogeschool, Delft (Netherlands). Dept. of Mechanical Engineering.
FINITE ELEMENT KINEMATIC ANALYSIS OF SPATIAL MECHANISMS
K. vanderWerff *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 53 p refs Partly in ENGLISH and DUTCH (For primary document see N86-17790 08-39)
Avail: NTIS HC A06/MF A01

The kinematics of spatial mechanisms with multiple degrees of freedom was analyzed. The position and deformation of each mechanism element are described by position parameters. The rotation of mechanism components is described with Euler parameters. Finite elements to describe the kinematics of spatial mechanisms such as the space truss element, the space beam element, the hinge element, and the lambda element are presented. The general theory describing the motion of a mechanism composed of a number of finite elements assuming that the deformation parameters of all elements can be varied independently is presented. A computer program (SPACAR), based on this theory was developed.
Author (ESA)

N86-17793# Technische Hogeschool, Delft (Netherlands). Computer Aided Design of Mechanisms Group.
THE SPACAR PROGRAM SYSTEM FOR THE ANALYSIS OF THE MOTION OF SPATIAL MECHANISMS. USER MANUAL
K. vanderWerff *In its* The Dynamics of Mechanisms with Deformable Links Nov. 1983 13 p refs (For primary document see N86-17790 08-39)
(Lab-Rept-739) Avail: NTIS HC A06/MF A01

A finite element programming system for the analysis of the motion of spatial mechanisms, including planar mechanisms, with rigid links was developed. The SPACAR program system consists of: definition of the mechanism (topology and geometry), system preparation, and calculation of the transfer functions. Additional calculations have to be defined by the user. The approach is such that flexible link mechanisms can also be treated. Kinematic calculations, as well as dynamic and kinetostatic calculations can be carried out. It must be seen as a skeleton program which forms the basis of the user's application. How the modules of the skeleton program are called and how the necessary input must be prepared are described.
Author (ESA)

N86-17794# Lawrence Livermore National Lab., Calif.
VISCOSITY, GRANULAR-TEMPERATURE AND STRESS CALCULATIONS FOR SHEARING ASSEMBLIES OF INELASTIC: FRICTIONAL DISKS
O. R. Walton and R. L. Braun 25 Jun. 1985 44 p Presented at the 56th Annual Meeting of the Society of Rheology, Blacksburg, Va., 24 Feb. 1985
(Contract W-7405-eng-48)
(DE85-015173; UCRL-91756; CONF-850289-1) Avail: NTIS HC A03/MF A01

Employing nonequilibrium molecular-dynamics methods the effects of two energy loss mechanism on viscosity, stress, and granular-temperature in assemblies of nearly rigid, inelastic, frictional disks undergoing steady-state shearing are calculated. Energy introduced into the system through forced shearing is dissipated by inelastic normal forces or through frictional sliding during collisions resulting in a natural steady-state kinetic energy density (granular-temperature) that depends on the density and shear rate of the assembly and on the friction and inelasticity properties of the disks. The calculations show that both the mean deviatoric particle velocity and the effective viscosity of a system of particles with fixed friction and restitution coefficients increase almost linearly with strain rate. Particles with a velocity-dependent coefficient of restitution show a less rapid increase in both deviatoric velocity and viscosity as strain rate increases. Particles with highly dissipative interactions result in anisotropic pressure and velocity distributions in the assembly, particularly at low densities. At very high densities the pressure also becomes anisotropic due to high contact forces perpendicular to the shearing direction. The mean rotational velocity of the frictional disks is nearly equal to one-half the shear rate. The calculated ratio of shear stress to normal stress varies significantly with density while the ratio of shear stress to total pressure shows much less variation. The inclusion of surface friction (and thus particle rotation) decreases shear stress at low density but increases shear stress under steady shearing at higher densities.
DOE

N86-17795# Oak Ridge National Lab., Tenn. Heavy-Section Steel Technology Program.
DYNAMIC ANALYSES OF A CRACK RUN-ARREST EXPERIMENT IN A NONISOTHERMAL PLATE
B. R. Bass, C. E. Pugh, and H. K. Stamm (Institut fuer Reaktorbauelement Kernforschungszentrum, Karlsruhe, West Germany) Jun. 1985 11 p refs Presented at conference
(Contract DE-AC05-84OR-21400)
(TI85-016420; CONF-850670-22) Avail: NTIS HC A02/MF A01

In crack-arrest studies sponsored by the Heavy-Section Steel Technology (HSST) Program, a primary objective has been to produce fracture toughness data for reactor pressure vessel materials at temperatures approaching the Charpy upper-shelf regime. In these tests, a single-edge crack in a wide-plate is subjected to tensile loading initiates at low temperature and arrests in a region of increased fracture toughness. The gradient in toughness is achieved by applying a linear transverse temperature profile across the plate. The second test in this series for A 533 grade B class 1 steel involves crack initiation in cleavage followed by arrest at a temperature corresponding to Charpy upper-shelf behavior. The plate geometry, the material properties, and the instrumentation are discussed along with conditions and results for this test. Pretest static and elastodynamic analyses are described, and posttest analyses based on actual boundary conditions are shown to compare favorably with the observed run-arrest events.
DOE

N86-17796# Structural Mechanics Associates, Inc., Newport Beach, Calif.
ENGINEERING CHARACTERIZATION OF GROUND MOTION. TASK 2: EFFECTS OF GROUND MOTION CHARACTERISTICS ON STRUCTURAL RESPONSE CONSIDERING LOCALIZED STRUCTURAL NONLINEARITIES AND SOIL-STRUCTURE INTERACTION EFFECTS
R. P. Kennedy, R. H. Kincaid, and S. A. Short Mar. 1985 156 p refs Sponsored in part by Nuclear Regulatory Commission Prepared in cooperation with Woodward-Clyde Consultants, Walnut Creek, Calif.

(TI85-901169; NUREG/CR-3805-Vol-2) Avail: NTIS HC A08/MF A01

A two-task study on the engineering characterization of earthquake ground motion for nuclear power plant design is reported. The objective of this program is to develop recommendations for methods for selecting design response spectra or acceleration time histories to be used to characterize motion at the foundation level of nuclear power plants. Task 1 of the study developed a basis for selecting design response spectra taking into account the charcteristics of free-field ground motion found to be significant in causing structural damage. Task 2 incorporates additional considerations of effects of spatial variations of round motions and soil-structure interaction on foundation motions and structural response. The following results are presented: (1) effects of ground motion characteristics on structural response considering localized structural nonlinearities and soil-structure interaction effects; (2) empirical data on spatial variations of earthquake ground motions; (3) soil-structure interaction effects on structural response; and (4) summary of conclusions and recommendations based on Tasks 1 and 2 studies. GRA

N86-17797# Sandia National Labs., Albuquerque, N. Mex.
SHOCK RESPONSE SPECTRUM AT LOW FREQUENCIES
D. O. Smallwood 1985 20 p refs Presented at the 56th Shock and Vibration Symposium, Monterey, Calif., 22 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018273; SAND-85-1334C; CONF-8510156-1) Avail: NTIS HC A02/MF A01

This paper shows that for small damping the correct acceleration shock response spectrum will roll off with a slope of 6 dB/octave on a log-log plot. Some other suggestions examined are that the spectrum doesn't roll off at 12 dB/octave, zero offsets cause the spectrum to roll off at a slope different from 12 dB/octave, truncation errors cause the problem, and incorrect algorithms are being used to calculate the spectrum. DOE

N86-17798# California Univ., Berkeley. Lawrence Berkeley Lab.
SLOW CRACK GROWTH: MACROSCOPIC AND MICROSCOPIC ASPECTS
R. O. Ritchie Nov. 1984 74 p refs Presented at the 2nd National Conference on Fracture, Johannesburg, South Africa, 26 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE85-011165; LBL-18631; CONF-851140-1) Avail: NTIS HC A04/MF A01

Modern engineering design against fracture in safety-critical structures generally is based on the concept of defect- or damage-tolerance, where projected life is estimated in terms of the time for an assumed initial defect to propagate to some critical size. Accordingly, from a materials standpoint, increased resistance to failure can be achieved by retarding the sub-critical growth of cracks prior to final failure. In the current paper, an overview is presented of several recent advances in the understanding of the salient mechanisms of such slow crack growth, involving fracture under both monotonic and cyclic loading at ambient and elevated temperatures. DOE

N86-17799# Centro Informazioni Studi Esperienze, Milan (Italy).
CONTRIBUTION TO THE INTERPRETATION OF SLOW STRAIN RATE TECHNIQUE (SSRT) STRAIN RATE EFFECT ON BOILING WATER REACTOR (BWR) AISI 304SS IGSCC
G. Buzzanca, E. Caretta, L. Meini, R. Pascali (Italian Electricity Board), and C. Ronchetti 1984 23 p refs Presented at Conference on Environmentally Sensitive Cracking Problems in Nuclear Installations Containing High Temperature Water, Munich, West Germany, 18-20 Sep. 1984
(Contract ISMAT-200)
(CISE-2604) Avail: NTIS HC A02/MF A01

The effect of strain rate on stress corrosion cracking tests of boiling water reactor steels was assessed. The effect of sensitization, whose degree depends on carbon content and heat treatment is evident at high strain rate values only for high carbon and highly sensitized stainless steel. Less sensitized high carbon steel or lower carbon steel at the maximum possible sensitization show an ultimate tensile strength reduction only at slower strain rates. At the slowest strain rates results tend to reach a common constant value thus reducing the differences due to sensitization. The effects are similar for sensitized stainless steel in the presence of chemical environment with different aggressiveness. Results demonstrate that there are 3 strain rate ranges for the AISI 304SS IGSCC problem. Author (ESA)

N86-17800# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
STRUCTURAL RESPONSES IN A RANDOM ENVIRONMENT [REPONSE DES STRUCTURES A UN ENVIRONNEMENT ALEATOIRE]
Alain Girard Mar. 1985 73 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-932)
(CNES-NT-115) Avail: NTIS HC A04/MF A01

Random vibrations are statistically described and analyzed in the time domain and in the frequency domain. The principles of the determination of the structural response are given. The modal solution is presented, and applied to shaker and reverberating field excitation. To overcome the high frequency limitations of the method a statistical energy analysis is proposed. The use of simplifying assumptions facilitates calculation of the response of relatively complex structures, provided that the appropriate parameters are properly determined. Author (ESA)

N86-17801# Oxford Univ. (England). Dept. of Engineering Science.
MODELING OF THIN-WALLED SHELLS FOR BUCKLING INVESTIGATIONS BY ELECTROPLATING
C. Ruiz, V. K. Thompson, and P. R. Murray 1985 31 p refs Sponsored by SENER, UKAEA, Culham and British Gas
(OUEL-1562/85) Avail: NTIS HC A03/MF A01

The manufacture of accurate models for the study of buckling of thin walled shells by electrodepositing copper onto wax cores is described. Results for complete spherical shells, cylindrical shells of variable thickness with reinforcing rings, and complete toroidal shells with D-shaped cross section are presented. Shell diameters range from 126 to 275 mm with thicknesses between 0.04 and 1 mm. The simplicity of the electrocoating technique with copper anodes and the low cost of the equipment required are emphasized. Other advantages arise from the high accuracy that can be achieved, the absence of residual stresses, and the isotropy of the shell material. Direct scaling from model to full size structure is only possible when both fail in the same manner. This restricts the value of the experiment, which should be combined with mathematical analysis. Author (ESA)

N86-17802# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Mechanik.
STUDY OF PLATE IMPEDANCES
P. Hagedorn and K. Kelkel Paris ESA Apr. 1985 210 p refs (Contract ESTEC-5683/83/NL-PP(SC))
(ESA-CR(P)-2086) Avail: NTIS HC A10/MF A01

Expressions for impedances of rectangular and circular plates are derived by analytical and semianalytical methods. Physical interpretations of the mathematical formalism used and of the results are given. The impedances obtained are to be used in a distributed element program. It is shown that concentrated moments lead to infinite angular displacements in elastic plates. The concept of reduced multipoint impedance matrix is introduced. The circular plate with free boundary supported at a rigid, circular, central hub is solved in terms of Bessel functions. Results for the circular plate supported excentrically at a single point and the reduced multipoint impedances are given in terms of Bessel functions. The rectangular plate with free boundary leads to a far more complicated problem, for which solutions are given as double series, with good convergence obtained. The impedance expressions given for the rectangular and for the circular plate seem appropriate for use in the computation of the dynamics of composite structures. Author (ESA)

N86-17803# Sartorius G.m.b.H., Goettingen (West Germany).
APPLICATION OF SURFACE ACOUSTIC WAVE RESONATORS TO QUARTZ BENDING BEAMS AS INTEGRATED DILATION RECORDERS IN BALANCES (LOAD CELLS) Final Report, Oct. 1984
Christoph Berg, Matthias Eger, and Wolfgang Riss (Technische Univ., Brunswick) Bonn Bundesministerium fuer Forschung und Technologie Jul. 1985 49 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-058; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10.50

The influence of the stress of a surface acoustic wave resonator substrate on the resonant frequency was investigated with a view to its use as electrical measurement of the bending of a spring and hence as a means to determine the acting force or the weight. Quartz bending beams with surface acoustic wave resonators were designed, manufactured, and tested. The associated electronics were designed. However, it is not possible to achieve a resolution of at least 10,000 digits. Author (ESA)

N86-17804# Technische Hogeschool, Twente (Netherlands). Dept. of Mechanical Engineering.
FREE VIBRATIONS OF FINITE FLEXIBLE SHELLS AND TUBES IN AXIAL FLOW
D. H. vanCampen, P. J. M. vanderHoogt, and L. Hartsuiker 1985 8 p refs
Avail: NTIS HC A02/MF A01

A computational method describing the vibrational behavior of finite circular cylindrical shell and tube arrays subjected to liquid axial flow was developed. The results show a decrease of the eigenfrequencies of the system due to the hydrodynamic forces and coupling effects. Structural instability phenomena caused by axial flow velocity were investigated. Increasing the hydrodynamic coupling, i.e., increasing the number of bodies and decreasing their spacing, provokes instabilities at considerably lower fluid velocities. Author (ESA)

N86-17805# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AUTOMATIC CRACK LENGTH MEASUREMENTS BY THE ELECTRICAL POTENTIAL DROP METHOD WITH COMPUTER CONTROL
A. Burgers and P. D. Kempen 1984 28 p refs
(VTH-LR-309) Avail: NTIS HC A03/MF A01

A method for automatic crack length measurements in fatigue crack propagation tests is described. Using a constant electric current through the specimen, the electric potential drop near the crack and a reference potential drop on the same specimen away from this circle are measured. The ratio of the two potential drops is used for calculating the crack length. This is done by the same computer that controls the fatigue load, which allows fatigue load readjustments dictated by crack length. As a result of the automatic crack length measurements, tests can run overnight without attendance of personnel. Author (ESA)

N86-17806# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN OF HAT-STIFFENED COMPOSITE PANELS UNDER UNIAXIAL COMPRESSION AND SHEAR. MINIMUM MASS OPTIMIZATION BASED ON A SIMPLIFIED THEORY
G. Romeo (Polytecnico di Torino, Italy) 1984 46 p refs Sponsored by Technical Hogeschool, Delft
(VTH-LR-312) Avail: NTIS HC A03/MF A01

Literature on stiffened compression panels was reviewed, and a computer program for the evaluation of minimum-mass hat stiffened panels under uniaxial loads was written. In the analytical studies the mechanical properties of the graphite/epoxy material were considered to be linearly elastic and the lower stresses Young's modulus was used. Since a reduction of up to 20% is possible in compression, the 50% mass-saving derived from these results seems too optimistic. A reduced stress-dependent Young's modulus should be used and the tangent modulus theory applied. Better mass-savings are possible with higher hat height values, but these depend on wing airfoil thickness since the optimal distance from the bending neutral axis is required. Under uniaxial compression, a mass-saving up to 40% compared with test data on aluminum panels is evaluated. The fabrication process did not require complex tooling or a difficult production technique. However, complexity could arise for a correct nondestructive inspection of all parts of the panel, because of the closed stiffeners with inclined surfaces. Author (ESA)

N86-17807# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE EFFECT OF BLUNT NOTCHES AND SAW CUTS ON THE STATIC STRENGTH OF 2024-T3 AND 7075-T6 SHEET MATERIAL
J. Schijve and J. Snijder 1984 21 p refs
(VTH-LR-313) Avail: NTIS HC A02/MF A01

The effect of holes on the static strength of aluminum alloy sheets used in aircraft was tested. Sheet specimens with circular holes and slotted holes to cover a Kt range from 2 to 5, with notch root radius 2 or 5 mm were produced. The effect of the notches on the static net section failure stress is small, involving an average reduction at Kt = 3 of 8% and 1% for 2024-T3 and 7075-T6 respectively. The trends observed can be understood qualitatively from plasticity considerations. For saw cuts, the failure stress corresponds to net section yield for the 2024-T3 alloy, while for 7075-T6 a modified Feddersen diagram represents the results quite well. Author (ESA)

N86-17808# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
RESIDUAL STRENGTH OF BONDED STIFFENED PANELS: PREDICTION AND EXPERIMENTAL VERIFICATION
H. Vlieger May 1983 104 p refs
(Contract NIVR-312.2-1746)
(NLR-TR-83066-U; B8568530) Avail: NTIS HC A06/MF A01

Residual strength calculations on cracked panel configurations of various designs and provided with bonded stiffeners were carried out using the computer program BOND. Results are compared with residual strength tests on similar panels. Calculation results generally compare well but can be slightly unconservative, depending on panel configuration and material combination of sheet and stiffeners. The computer program is described. Author (ESA)

N86-17809# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
FATIGUE RATED FASTENER SYSTEMS IN ALUMINUM ALLOY STRUCTURAL JOINTS
H. H. vanderLinden 14 Jul. 1983 29 p refs Presented at 12th ICAF Symposium, Toulouse, France, 25-27 May 1983 Sponsored by Royal Netherlands Air Force Directorate of Material
(Contract NIVR-1892)
(NLR-MP-83045-U; B8569323) Avail: NTIS HC A03/MF A01

A fatigue rated fastener systems test program for aircraft is described. The program assesses fatigue lives of fastener systems in combination with hole preparation techniques using different joint geometries. Establishment of cost figures in relation to the fatigue performance and the development of a reference datum for the comparison of test results produced in different countries are included. For high load transfer single shear joints, joint designs and their double shear equivalent designs are compared. Evaluation includes testing under FALSTAFF loading and the measurement of load transfer and secondary bending using standard procedures. Fatigue test results of low load transfer, medium load transfer 1 1/2 dogbone, and high load transfer double shear specimens are also included. Procedures for measuring load transfer and secondary bending are illustrated using 1 1/2 dogbone specimens. Author (ESA)

N86-17810# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
THE ROTATING DISK AND THE YIELD CONDITIONS OF

TRESCA AND VON MISES [DE DRAAIENDE SCMYF EN HET VLOEICRITERIUM VAN TRESCA EN VON MISES]
A. L. Schwab N. 1983 39 p refs Partly in DUTCH and ENGLISH
(Lab-Rept-759) Avail: NTIS HC A03/MF A01

The yield conditions of Tresca and von Mises were applied to a rotating disk with constant thickness made of an isotropic elastic, perfectly plastic material. The application of the Tresca yield criterion reveals the difficulty that in a two dimensional treatment the plastic deformation is not compatible with a continuous radial displacement. It is shown that this difficulty does not occur when the von Mises criterion is applied. Author (ESA)

N86-17811# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
A DOUBLE-CURVED TRIANGULAR SHELL ELEMENT ALLOWING THE ANALYSIS OF SHELL PROBLEMS IN THE PLASTIC DOMAIN [EEN DUBBEL GEKROMD DRIEHOEKIG SCHAALELEMENT WAARMEE SCHAALVRAAGSTUKKEN IN HET PLASTISCHE GEBIED KUNNEN WORDEN GEANALYSEERD]
H. A. Lupker Sep. 1983 103 p refs In DUTCH
(Lab-Rept-761) Avail: NTIS HC A06/MF A01

A computer program for shell problems in the plastic domain whereby nonlinearity is neglected was developed. The starting point was the program for the linear-elastic Besseling-Ernst-Diepstraten (BED) finite element, and the development was based on displacement vectors and deformation tensors in terms of Cartesian components. The constitutive equations for elastic and plastic deformations were derived. The linearized elasticity problem and the plasticity problem for a shell were treated. A numerical verification is presented. The most important computer programs are enclosed. The program for the BED-elements, based on the incremental self-correcting solution procedure is suitable for plastic plate and shell problems when geometric nonlinearity is neglected. Author (ESA)

N86-17812# Centre Technique des Industries Mecaniques, St. Etienne (France).
ASSEMBLING WITH USE OF PERMANENT DEFORMATION Final Report [SERTISSAGE]
J. Chalier 3 Oct. 1984 12 p refs In FRENCH
(CETIM-13-N-283) Avail: NTIS HC A02/MF A01

Permanent joints such as riveted joints, made using plastic deformation of one of the elements, are studied in order to provide a user's guide useful to the designer to describe the operation. The principles and application of several types of joining procedures are examined. Author (ESA)

N86-17813# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. des Engins Tactiques.
NUMERICAL SIMULATION OF IMPACT TESTS AND COMPARISON OF BEHAVIOR LAWS [SIMULATION NUMERIQUE D'ESSAIS D'IMPACT ET COMPARAISON DE LOIS DE COMPORTEMENT]
Dominique Bois and Alain Grave 1985 14 p refs In FRENCH; ENGLISH summary
(SNIAS-852-320-101) Avail: NTIS HC A02/MF A01

A titanium alloy and two steels were impact tested. Johnson-Cook, Lindholn, and Bodner-Partom viscoplastic constitutive equations were tried as models using a Hemp code. The material constants are determined for each material on the results of Hopkinson bar tests. The models are evaluated by comparing computed results with data from Taylor tests. It is shown that the Bodner-Partom model is poorly adapted to deformation velocities larger than 10,000 per sec. The Johnson isotherm model and the Lindholn model are in good agreement with experimental data. Author (ESA)

N86-17394# Morton Thiokol, Brigham City, Utah.
USE OF PEEL VALUES IN STRUCTURAL ANALYSIS
S. J. Bennett and A. W. MacBeth *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 137-144 refs (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

N86-17412# Arde, Inc., Mahwah, N.J.
REPORT ON KEVLAR -49 COMPOSITE PRESSURE VESSEL SAFETY TECHNOLOGY PROGRAM
D. Gleich *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 321-332 refs (For primary document see N86-17380 08-20)
(Contract F08606-84-C-0029)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 20/11

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-17814*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CNPq/INPE-LANDSAT SYSTEM Report of Activities, 1 Oct. 1984 - 31 Aug. 1985
Jose Luiz deBarrosAguirre Sep. 1985 28 p Presented at the LANDSAT Ground Station Operators Working Group and LGSOWG Data Distribution and Marketing Working Group meetings, Washington, D.C., Sep. 1985 Sponsored by NASA ERTS
(E86-10019; NASA-CR-175884; NAS 1.26:175884;
INPE-3635-PRE/812) Avail: NTIS HC A03/MF A01 CSCL 05B

The current status of the Brazilian LANDSAT facilities operated by Instituto de Pesquisas Espaciais (INPE) and the results achieved during the period from October 1, 1984 to August 31, 1985 are presented. INPE's Receiving Station at Cuiaba, MT, operates normally the two tracking and receiving systems it has installed, the old one (1973) for Band S and the new one (February 1983) for dual S- and X-band. Both MSS and TM recording capabilities are functional. Support to the NASA Backup Plan for MSS data also remains active. Routine recordings are being made for LANDSAT-5 only, for both MSS and TM. Originally, MSS was recorded over the full acquisition range. However, since December, 1984, due to further reduction of operational expenses, both instruments are being recorded over Brazilian territory only. Author

N86-17815*# Murray State Univ., Ky. Mid-America Remote Sensing Center.
DETERMINATION OF THE UTILITY OF REMOTE SENSING DATA FOR LAND USE/COVER ANALYSIS IN THE LOWER APPALACHIA REGION: ASSESSING THE UTILITY OF REMOTE SENSING DATA FOR ARCHEOLOGICAL SITE RECOGNITION Final Report
N. V. Weber 15 Aug. 1983 48 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS13-200)
(E86-10021; NASA-CR-176435; NAS 1.26:176435) Avail: NTIS HC A03/MF A01 CSCL 05B

Thematic Mapper Simulator (TMS) data were gathered by NASA/ERL over a portion of the lower Ohio River and the middle Mississippi River valleys on April 11, 1982. CIR imagery accompanied the 10 and 30 meter resolution TMS data sets. This area is somewhat unique archeologically as there exists a

concentration of sites with major features such as mounds, earthworks, and villages. It was the primary purpose of this study to determine the utility of TMS data in identifying signatures which are distinctly archeological. TMS data were processed using the NASA/ERL software package ELAS. No signatures that were distinctly archeological were detected, due in large part to the complexity of the land cover and land use practices. However, as more sophisticated classification techniques were employed, the classes which were related to archeological features were narrowed. TMS data could certainly be of assistance to a trained archeologist/interpreter in narrowing an area which has to be field-surveyed as anomalous features can be recognized within a particular environmental context. Author

N86-17816*# Arizona Univ., Tucson. Optical Sciences Center.
SPECTRORADIOMETRIC CALIBRATION OF THE THEMATIC MAPPER AND MULTISPECTRAL SCANNER SYSTEM Quarterly Report, 1 Jun. - 31 Aug. 1985
Philip N. Slater and James M. Palmer, Principal Investigators
30 Sep. 1985 18 p ERTS
(Contract NAS5-27832)
(E86-10022;, NASA-CR-175861; NAS 1.26:175861; QR-11) Avail: NTIS HC A02/MF A01 CSCL 08B

The eleventh quarterly report on Spectroradiometric Calibration of the Thematic Mapper (Contract NAS5-27832) discusses calibrations made at White Sands on 24 May 1985. An attempt is made to standardize test results. Critical values used in the final steps of the data reduction and the comparison of the results of the pre-flight and internal calibration (IC) data are summarized. F.M.R.

N86-17817*# National Aeronautics and Space Administration, Washington, D.C.
SATELLITE REMOTE SENSING FOR ICE SHEET RESEARCH
R. H. Thomas, R. A. Bindschadler (NASA, Goddard Space Flight Center, Greenbelt, Md.), R. L. Cameron (NSF, Washington, D.C.), F. D. Carsey (JPL, Pasadena, Calif.), B. Holt (JPL, Pasadena, Calif.), T. J. Hughes (Maine Univ.), C. W. M. Swithinbank (British Antarctic Survey, Cambridge, England), I. M. Whillans (Ohio State Univ.), and H. J. Zwally (NASA, Goddard Space Flight Center, Greenbelt, Md.) Nov. 1985 40 p refs Original contains color imagery. Original photographs may be purchased from the EROS Data Center, Sioux Falls, S.D. 57187 ERTS
(E86-10024; NASA-TM-86233; Rept-85F0298; NAS 1.15:86233) Avail: NTIS HC A03/MF A01 CSCL 08L

Potential research applications of satellite data over the terrestrial ice sheets of Greenland and Antarctica are assessed and actions required to ensure acquisition of relevant data and appropriate processing to a form suitable for research purposes are recommended. Relevant data include high-resolution visible and SAR imagery, infrared, passive-microwave and scatterometer measurements, and surface topography information from laser and radar altimeters. Author

N86-17818# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CONTRIBUTIONS TO GEODESY, PHOTOGRAMMETRY, AND CARTOGRAPHY, SERIES 2
1985 180 p refs Original contains color illustrations
(ISSN-0469-4244) Avail: NTIS HC A09/MF A01

A system of computer programs for an astrogravimetric geoid determination is presented. Integration of remote sensing data and cartographic data bases into a land information system is discussed. For individual titles, see N86-17819 through N86-17820.

N86-17819# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A SYSTEM OF COMPUTER PROGRAMS FOR AN ASTROGRAVIMETRIC GEOID DETERMINATION
Juergen Brennecke *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2 1985 p 5-161 refs (For primary document see N86-17818 08-43)
Avail: NTIS HC A09/MF A01

Computer programs for determination of regional geoid surfaces using kernel function approximation and least squares adjustment are presented. Though the programs, written in FORTRAN 77, have a wider range of applications and options, the primary modification for astrogravimetric geoid computation including pre and postprocessing of data and results is stressed. Author (ESA)

N86-17820# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INTEGRATION OF REMOTE SENSING DATA AND CARTOGRAPHIC DATA BASES INTO A LAND INFORMATION SYSTEM
Wolfgang Goepfert *In its* Contributions to Geodesy, Photogrammetry, and Cartography, Series 2 1985 p 163-173 refs Original contains color illustrations (For primary document see N86-17818 08-43)
Avail: NTIS HC A09/MF A01

The need to assess simultaneously alphanumeric, vector, and raster (image) data for land information system applications is emphasized. The use of raster processing techniques is stressed. The data bases available and the land information system used at the German Geodesy Institute (Frankfurt) are presented. Applications are discussed and color examples are enclosed. Author (ESA)

N86-17821# Naval Ocean Systems Center, San Diego, Calif.
GRAPS: GRAPHICAL PLOTTING SYSTEM Final Report
R. T. Laird Jul. 1985 156 p
(AD-A159808; NOSC/TD-820) Avail: NTIS HC A08/MF A01 CSCL 09/2

This document describes operational and design aspects of the GRAphical Plotting System (GRAPS). It can be used both as an introductory guide to the system and as a reference for the experienced user. The GRAPS is a computer program that displays and plots graphs of various types produced on a computer. In addition, GRAPS allows a user to configure and save certain operational parameters of the system. The GRAPS can also be used to edit the text or label the data of graphs. This manual covers all aspects of GRAPS (GRAphical Plotting System). It will aid those interested only in the program's operation as well as those concerned with the program's design. The objective of this project was to implement, on a microcomputer, polar, Smith, linear-linear, linear-log, and log-log charts by using the BASIC language with multiple windows for display of numerical electromagnetics code (NEC) results. In addition, a PC-family screen display, matrix printer, and Hewlett-Packard (HP) pen plotter display of the above graph types were provided. GRA

N86-17822# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
SOUTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 3: PLATES Final Report
Aug. 1985 96 p
(Contract DE-AC02-83CH-10139)
(DE86-000416; DOE/CH-6(3)-Final) Avail: NTIS HC A05/MF A01

An index map; as well as maps of faults and ground acceleration; rock and mineral resources; and drainage basin and groundwater discharge zones. DOE

N86-17823# University Coll., London (England). Mullard Space Science Lab.
APPLICATIONS AND SCIENTIFIC USES OF ERS-1 RADAR ALTIMETER DATA Final Report
C. G. Rapley, H. D. Griffiths, V. A. Squire (Cambridge Univ.), J. G. Olliver (Oxford Univ.), A. R. Birks (Science and Engineering Research Council, Chilton, England), A. P. R. Cooper (Cambridge Univ.), A. M. Cowan (Cambridge Univ.), D. J. Drewry (Cambridge Univ.), M. R. Gorman (Cambridge Univ.), M. Guzkowska (Oxford Univ.) et al Paris ESA Feb. 1985 276 p refs
(Contract ESTEC-5684/83/NL-BI)
(ESA-CR(P)-2084) Avail: NTIS HC A13/MF A01

Applications of the ERS-1 pulse-limited radar altimeter dedi-

cated to observations of oceans and ice are discussed. Areas in which the ERS-1 altimeter is likely to be most effective are indicated. Status of the data analysis techniques and the limitations imposed by the design of the altimeter system are described. A concept for the use of altimeter data from lakes for climate research, and work on the altimetry of coastal regions are summarized. Author (ESA)

N86-17824# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
THE GRAL GRAPHIC SYSTEM FOR SITUATIONAL MAPS
Carl-Eric Hedin and Hans Marmolin Apr. 1985 43 p refs In SWEDISH; ENGLISH summary
(FOA-C-50007-H2; ISSN-0347-7665) Avail: NTIS HC A05/MF A01

A computerized presentation of situational maps built up from background information (land and water), static overlay information (such as roads and towns), and dynamic information depending on the situation is described. The techniques used are reviewed, e.g., image cards, run-length coded cards, coordinate transformation (image to page, page to viewport, and viewport to screen transformations). The low level routines used to build the system are outlined and the way to adapt the data for VAX 750 computer and VS11 storage is given. Author (ESA)

N86-17825# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
STUDY OF A LAND USE OF SYNTHETIC APERTURE RADAR, EXECUTIVE SUMMARY
Paris ESA Sep. 1984 13 p 2 Vol.
(Contract ESTEC-5778/83/NL-MS)
(ESA-CR(P)-2067-Vol-1) Avail: NTIS HC A02/MF A01

Characteristics of a SAR satellite and data interpretation system for land-use monitoring in Europe were investigated. Empirical data and surface and volume scattering theories do not allow clear definition of satellite parameters, due to lack of comprehensive datasets. Human and computer analysis are compared. Computer implementation of surface scattering models and a volume scattering model is described, and results of parametric and time-development studies are presented. User-defined requirements for a land use SAR are described. Criteria for manual interpretation of images are defined. Machine measures of texture are applied to SAR 580 data. Results indicate that human and machine estimates of texture differ because of speckle and that for crops, texture measures provide no more information than the mean backscatter. Image comparisons based on color compositing of smoothed and unsmoothed images are described, and the effects of filters compared. The methods are applied to multifrequency and multitemporal data. Author (ESA)

N86-17826# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
STUDY OF A LAND USE OF SYNTHETIC APERTURE RADAR. VOLUME 1: MAIN REPORT Final Report
Paris ESA Sep. 1984 196 p refs 2 Vol.
(Contract ESTEC-5778/83/NL-MS)
(ESA-CR(P)-2067-Vol-2) Avail: NTIS HC A09/MF A01

Characteristics of a SAR satellite and data interpretation system for land-use monitoring in Europe were investigated. Empirical data and surface and volume scattering theories do not allow clear definition of satellite parameters, due to lack of comprehensive datasets. Human and computer analysis are compared. Computer implementation of surface scattering models and a volume scattering model is described, and results of parametric and time-development studies are presented. User-defined requirements for a land use SAR are described. Criteria for manual interpretation of images are defined. Machine measures of texture are applied to SAR 580 data. Results indicate that human and machine estimates of texture differ because of speckle and that for crops, texture measures provide no more information than the mean backscatter. Image comparisons based on color compositing of smoothed and unsmoothed images are described, and the effects of filters compared. The methods are applied to multifrequency and multitemporal data. Author (ESA)

N86-17827# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Apparate.
DEVELOPMENT OF SCANNER DIGITAL IMAGE ACQUISITION FOR PHOTOGRAMMETRY [DIE ENTWICKLUNG DER ABTASTENDEN, DIGITALEN BILDAUFNAHME FUER DIE PHOTOGRAMMETRIE]
O. Hofmann 1985 17 p refs In GERMAN Presented at 70th Geburtstages von Professor Helmut Schmid, Zurich
(MBB-UA-876/85) Avail: NTIS HC A02/MF A01

A digital photogrammetric system (DPS) for geometrical assessment of pushbroom acquisition with a triple strip line camera, and for assessment of optomechanical, infrared and microwave scanners was developed. The strip model can be reconstructed using DPS with the image data alone, without external data, due to a geometrically accurate digital recording of the image point coordinates for each image point for computerized or visual image point identification. A stereo display panel is necessary for interactive correlation support, interpretation, and situation assessments. Author (ESA)

N86-17828# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
GEOMETRIC CORRECTION OF REMOTE SENSING IMAGES BY MEANS OF GROUND CONTROL POINTS [GEOMETRISCHE CORRECTIE VAN REMOTE SENSING BEELDEN MET BEHULP VAN GROUND CONTROL POINTS]
L. M. M. Veugen Nov. 1984 59 p refs In DUTCH
(MDLK-R-8429) Avail: NTIS HC A04/MF A01

Remote sensing images were geometrically corrected using a bivariate correction function method based on polynomials. A polynomial is built up from a linear combination of orthogonal polynomials, estimating unknown parameters by Ground Control Points (GCPs). Using this set-up, coefficients of the two polynomials (line and pixel number) are easily estimated, interpretation of significant polynomial terms is simplified, and statistical magnitudes are cleared up. To investigate the impact of number and position of the GCPs on the accuracy, an adjustment algorithm, statistical test magnitudes, and isoline plots were developed. Using simulation and a case study, the model is verified. Correction accuracy shows a high degree of robustness, provided that the GCPs are well distributed over the area. Author (ESA)

N86-17829# Rijkswaterstaat, The Hague (Netherlands). Meetkundige Dienst.
ANALYSIS OF THE RADIOMETRIC RELATION BETWEEN FALSE COLOR AERIAL PHOTOGRAPHS AND MULTISPECTRAL SCANNING (MSS) IMAGES [ANALYSE VAN DE RADIOMETRISCHE RELATIE TUSSEN FALSE COLOUR LUCHTFOTO'S EN MSS-BEELDEN]
Christina Meulstee, Hein vanStokkom, and Tis Veugen Dec. 1983 30 p refs In DUTCH
(MDLK-R-8337) Avail: NTIS HC A03/MF A01

The radiometric relation between color densities of color infrared aerial photographs and the radiation values of simultaneously taken multispectral scanner (MSS) images is analyzed. As aerial photographs possess good geometric, but relatively bad radiometric characteristics, while MSS images present the reverse, combination possibilities of reciprocal completion are investigated. Using a transmission densitometer with a 3 mm aperture, small areas of 1:2400 scale aerial photographs, are measured. Average radiation values/pixel of the analogous 49 pixel areas on the MSS images were calculated in the 550 to 600, 650 to 700, and 800 to 890 nm bands. The relation between photographs and images is examined for the nadir-point and using these data, for the scan direction, and at right and 45 deg angles to the scan direction. Information about film and development parameters, lens light incidence, and the angle dependent reflection of objects is obtained. Author (ESA)

N86-17830# International Training Centre for Aerial Survey, Enschede (Netherlands).
[ACTIVITIES REPORT IN REMOTE SENSING TRAINING] Annual Report, 1983
1983 36 p refs
Avail: NTIS HC A03/MF A01

International cooperation in training and research in photogrammetry; aerial photography; cartography; land resource surveys and rural development; Earth resources surveys; and urban surveys and human settlements analysis are described. Author (ESA)

N86-17831# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
HYDROLOGICAL DESCRIPTION OF A STUDY AREA AROUND PUMP STATION 'T KLOOSTER (THE NETHERLANDS); APPLICATION OF HYDROLOGICAL MODELS AND REMOTE SENSING [HYDROLOGISCHE BESCHRIJVING VAN EEN STUDIEGEBIED ROND HET POMPSTATION'T KLOOSTER; TOEPASSING VAN HYDROLOGISCHE MODELLEN EN REMOTE SENSING]
H. A. M. Thunnissen Jun. 1984 90 p refs In DUTCH
(Nota-1542) Avail: NTIS HC A05/MF A01

A one and three-dimensional model describing the (region-bound) hydrological condition of a gently undulating sandy landscape covered by grass and corn, was compared with daily crop evapotranspirations, derived from remote sensing data. Liquid transport in an unsaturated and saturated zone and actual evaporation of one place (and an area), was simulated. In 144 rectangles (25 ha) the water balance was determined. Using measured hydraulic potentials, and ground-water levels, results were tested. Crop-height dependent relations between daily crop evapotranspirations and crop-temperature increases with regard to potential evapotranspiration temperature, were mapped. Increases and crop heights were derived from thermal images, false color photographs, and field measurements. Thermal images are apt to test one-dimensional models; model calculations can determine if thermal image observed evapotranspiration reductions are due to ground water withdrawal. Author (ESA)

N86-17832# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
SIMPLE METHOD FOR THE DETERMINATION OF REGIONAL DAILY EVAPOTRANSPIRATION OF CROPS USING REMOTE SENSING [EENVOUDIGE METHODE VOOR DE BEPALING VAN DE REGIONALE DAGVERDAMPING VAN EEN GEWAS MET REMOTE SENSING]
H. A. M. Thunnissen Oct. 1984 43 p refs In DUTCH Original contains color illustrations
(Nota-1580) Avail: NTIS HC A03/MF A01

A relation between actual daily evapotranspiration and potential daily evapotranspiration and differences in crop temperatures (using the potential evapotranspiration temperature as reference), measured at noon, was derived. With this method, crop temperature differences derived from thermal images can be transformed directly into daily evapotranspiration differences. The TEGRA mathematical model for deriving daily evapotranspiration from the momentary one is discussed. The utilization of simple linear relations was investigated. Using TEGRA, a sensitivity analysis for crop, meteorological, and soil physical parameters was carried out. Using standard relations between relative daily evapotranspiration and crop heating, the thermal image was automatically transformed into an evapotranspiration map for high and medium high grassland and corn. Author (ESA)

N86-17833# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands). 01Hesen, H. W. M.
STUDY OF EFFECTS OF PUMP STATION OLDEN EIBERGEN (NETHERLANDS) ON AGRICULTURE USING REMOTE SENSING AND HYDROLOGICAL MODELS [BESTUDERING VAN EFFECTEN VAN HET POMPSTATION OLDEN EIBERGEN OP DE LANDBOUW MET REMOTE SENSING EN HYDROLOGISCHE MODELLEN]
Jul. 1984 86 p refs In DUTCH Original contains color illustrations
(Nota-1544) Avail: NTIS HC A05/MF A01

Utilization possibilities of remote sensing images for drought-damage application purposes in a shelving sandy area covered by grass and corn, were investigated; the impact of ground water withdrawal by the pump station was studied. False color photographs were used to define crop-species and quality. Using simulation to interpret thermal images, the relation between crop-temperature and daily evapotranspiration was determined and transformed into a evapotranspiration reduction map. Field measurements were used to determine crop height and coverage. The model was compared with a water balance. Comparing different parcels, pump station impact was determined. For corn, image calculations show good agreement with water balance results. For large-scale groundwater withdrawal, a rough indication of drought-damage is possible (depending on meteorological factors). Author (ESA)

N86-17834# Geological Survey, Oklahoma City, Okla. Water Resources Div.
WATER RESOURCES DATA FOR OKLAHOMA, WATER YEAR 1983 Annual Water-Data Report, 1 Oct. 1982 - 30 Sep. 1983
L. D. Hauth, J. K. Kurklin, and D. M. Walters Feb. 1985 277 p
(PB85-236289; USGS/WRD/HD-85/217; USGS/WDR/OK-83/1)
Avail: NTIS HC A13/MF A01 CSCL 08H

Water resources data for the 1983 water year for Oklahoma consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of streams; stage, contents, and water quality of lakes or reservoirs. This report contains discharge records for 117 gaging stations; stage and contents for 27 lakes or reservoirs; water quality for 39 gaging stations and 3 lakes. Also included are 39 crest-stage partial-record statons and 3 low-flow stations. Author (GRA)

N86-17835# Geological Survey, Lansing, Mich. Water Resources Div.
WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
J. B. Miller, J. L. Oberg, and T. Sieger May 1985 289 p
(PB85-237741; USGS/WRD/HD-85/229; USGS/WDR/MI-84/1)
Avail: NTIS HC A13/MF A01 CSCL 08H

Water resources data for the 1984 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. The report contains discharge records for 142 gaging stations; stage only records for 2 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 27 continuous-record stations; and water levels for 53 observation wells. Also included are 56 crest-stage partial-record stations and 22 low-flow partial-record stations. Author (GRA)

N86-17836# Geological Survey, Richmond Va. Water Resources Div.
WATER RESOURCES DATA FOR VIRGINIA WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
B. J. Prugh, F. J. Easton, and D. D. Lynch 1985 420 p
(PB85-242105; USGS/WDR/VA-84/1; USGS/WRD/HD-85/226)
Avail: NTIS HC A16/MF A01 CSCL 08H

Water resources data for the 1984 water year for Virginia consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This volume contains records for water discharge at 192 gaging stations; stage only at 1 gaging station; stage and contents at 10 lakes and reservoirs; water quality at 43 gaging stations and 5 wells; and water levels at 56 observation wells. Also included are data for 78 crest-stage partial-record stations. Author (GRA)

N86-17837# Geological Survey, Harrisburg, Pa.
WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1984. VOLUME 3: OHIO RIVER AND ST. LAWRENCE RIVER BASINS Annual Report, 1 Oct. 1983 - 30 Sep. 1984
J. B. Lescinsky, M. B. Coll, and R. W. Siwicki Jul. 1985 218 p

Prepared in cooperation with Pennsylvania Dept. of Environmental Resources, Harrisburg
(PB85-239606; USGS/WRD/HD-85/228; USGS/WDR/PA-84-3)
Avail: NTIS HC A10/MF A01 CSCL 08H

Water resources data for the 1984 water year for Pennsylvania consists of records discharge and water quality of streams; elevation and contents of lakes and reservoirs; and water levels of ground-water wells. Records for water discharge at 83 gaging stations; elevations and contents at 3 lakes and reservoirs; and water levels at 39 observation wells are included. Data for 3 crest-stage, 5 low-flow stations, 50 water quality and 85 ground water-quality partial record stations are presented. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-17838 Technische Hogeschool, Twente (Netherlands). Windmill Group.
[ACTIVITIES REPORT IN WINDMILL RESEARCH] Annual Report, 1982
1983 26 p refs
(WM-068) Copyright. Avail: Issuing Activity

Wind energy utilization research in the Netherlands is summarized. Cooperation with developing nations, notably Sri Lanka and Cape Verde, and the status of windpowered generators and pumps under development are described. Author (ESA)

N86-17839*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE PHOTOVOLTAIC RESEARCH AND TECHNOLOGY 1985: HIGH EFFICIENCY, SPACE ENVIRONMENT, AND ARRAY TECHNOLOGY
1985 282 p refs Conference held in Cleveland, Ohio, 30 Apr. - 2 May 1985
(NASA-CP-2408; E-2706; NAS 1.55:2408) Avail: NTIS HC A13/MF A01 CSCL 10A

The seventh NASA Conference on Space Photovoltaic Research and Technology was held at NASA Lewis Research Center, Cleveland, Ohio, from 30 April until 2 May 1985. Its purpose was to assess the progress made, the problems remaining, and future strategy for space photovoltaic research. Particular emphasis was placed on high efficiency, space environment, and array technology. For individual titles, see N86-17840 through N86-17872.

N86-17840*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
FUTURE AIR FORCE SPACE POWER NEEDS
Joseph F. Wise *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 17-21 ref (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The requirements for future power for AF satellite mission vehicles, fall into two categories. The first category is in the 1 to 50 kW range for missions of a continuous nature such as communication, navigation, surveillance, data relay and meteorology. The second category is in the multi-megawatt range for either continuous or burst power durations and are for other than solar power sources. Requirements for longer life and survivability in varying degrees are there for all systems. While the power levels do not appear difficult to achieve in view of the large array developments pursued by NASA Space Station technology, the other military requirements are very challenging and continue to be system drivers. The development of solar cells arrays should be in conjunction with other power supply technologies such as regulation and control components and energy storage subsystems. Author

N86-17841*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
OVERVIEW OF SERI'S HIGH EFFICIENCY SOLAR CELL RESEARCH
John P. Benner, Lee A. Cole, and Cecile M. Leboeuf *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 23-26 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The bulk of the research efforts supported by the Solar Energy Research Institute (SERI) High Efficiency Concepts area has been directed towards establishing the feasibility of achieving very high efficiencies, 30% for concentrator and more than 20% for thin film flat plate, in solar cell designs which could possibly be produced competitively. The research has accomplished a great deal during the past two years. Even though the desired performance levels have not yet been demonstrated, based on the recent progress, a greater portion of the terrestrial photovoltaics community believes that these efficiencies are attainable. The program will now allocate a larger portion of resources to low cost, large area deposition technology. The program is currently shifting greater emphasis on to the study of crystal growth in order to provide the understanding and tools needed to design a large area process. Author

N86-17842*# Spire Corp., Bedford, Mass.
FURTHER RESEARCH ON HIGH OPEN CIRCUIT VOLTAGE IN SILICON SOLAR CELLS
M. B. Spitzer and C. J. Keavney *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 27-39 refs Sponsored by part by DOE (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The results of a new research on the use of controlled dopant profiles and oxide passivation to achieve high open circuit voltage V sub oc in silicon solar cells is presented. Ion implantation has been used to obtain nearly optimal values of surface dopant concentration. The concentrations are selected so as to minimize heavy doping effects and thereby provide both high blue response and high V sub oc ion implantation technique has been successfully applied to fabrication of both n-type and p-type emitters. V sub oc of up to 660 mV is reported and AMO efficiency of 16.1% has been obtained. Author

N86-17843*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GALLIUM ARSENIDE SOLAR CELL EFFICIENCY: PROBLEMS AND POTENTIAL
V. G. Weizer and M. P. Godlewski *In its* Space Photovoltaic Research and Technology 1985 1985 p 41-50 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Under ideal conditions the GaAs solar cell should be able to operate at an AMO efficiency exceeding 27 percent, whereas to date the best measured efficiencies barely exceed 19 percent. Of more concern is the fact that there has been no improvement in the past half decade, despite the expenditure of considerable effort. State-of-the-art GaAs efficiency is analyzed in an attempt to determine the feasibility of improving on the status quo. The possible gains to be had in the planar cell. An attempt is also made to predict the efficiency levels that could be achieved with a grating geometry. Both the N-base and the P-base BaAs cells in their planar configurations have the potential to operate at AMO efficiencies between 23 and 24 percent. For the former the enabling technology is essentially in hand, while for the latter the problem of passivating the emitter surface remains to be solved. In the dot grating configuration, P-base efficiencies approaching 26 percent are possible with minor improvements in existing technology. N-base grating cell efficiencies comparable to those

predicted for the P-base cell are achievable if the N surface can be sufficiently passivated. Author

N86-17844*# Delaware Univ., Newark.
N/P GaAs CONCENTRATOR SOLAR CELLS WITH AN IMPROVED GRID AND BUSHBAR CONTACT DESIGN
Gregory C. DeSalvo, Ervin H. Mueller, and Allen M. Barnett *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 51-59 refs (For primary document see N86-17839 08-44)
(Grant NAG3-422)
Avail: NTIS HC A13/MF A01 CSCL 10A

The major requirements for a solar cell used in space applications are high efficiency at AMO irradiance and resistance to high energy radiation. Gallium arsenide, with a band gap of 1.43 eV, is one of the most efficient sunlight to electricity converters (25%) when the the simple diode model is used to calculate efficiencies at AMO irradiance, GaAs solar cells are more radiation resistant than silicon solar cells and the N/P GaAs device has been reported to be more radiation resistant than similar P/N solar cells. This higher resistance is probably due to the fact that only 37% of the current is generated in the top N layer of the N/P cell compared to 69% in the top layer of a P/N solar cell. This top layer of the cell is most affected by radiation. It has also been theoretically calculated that the optimized N/P device will prove to have a higher efficiency than a similar P/N device. The use of a GaP window layer on a GaAs solar cell will avoid many of the inherent problems normally associated with a GaAlAs window while still proving good passivation of the GaAs surface. An optimized circular grid design for solar cell concentrators has been shown which incorporates a multi-layer metallization scheme. This multi-layer design allows for a greater current carrying capacity for a unit area of shading, which results in a better output efficiency. Author

N86-17845*# Varian Associates, Palo Alto, Calif.
HIGH-EFFICIENCY AlGaAs-GaAs CASSEGRAINIAN CONCENTRATOR CELLS
J. G. Werthen, H. C. Hamaker, G. F. Virshup, C. R. Lewis, and C. W. Ford *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 61-68 refs (For primary document see N86-17839 08-44)
(Contract NAS3-23876)
Avail: NTIS HC A13/MF A01 CSCL 10A

AlGaAs-GaAs heteroface space concentrator solar cells have been fabricated by metalorganic chemical vapor deposition. AMO efficiencies as high as 21.1% have been observed both for p-n and np structures under concentration (90 to 100X) at 25 C. Both cell structures are characterized by high quantum efficiencies and their performances are close to those predicted by a realistic computer model. In agreement with the computer model, the n-p cell exhibits a higher short-circuit current density. Author

N86-17846*# Florida Univ., Gainesville.
EVALUATION OF AlSUBxGaSUB1-xSUBAs SOLAR CELLS
R. Y. Loo, G. S. Kamath, R. C. Knechtli, A. Narayanan, and S. S. Li (Florida Univ., Gainesville) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 69-76 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Single junction GaAs solar cells have already attained an efficiency of 19% AMO which could potentially be increased to approx 20%, with some optimization. To achieve the higher efficiency the concept of multibandgap solar cells which utilizes a wider region of the solar spectrum should be sed. One of the materials for fabricating the top cell in a multibandgap solar cell is AlGaAs because it is compatible with GaAs in bandgap and lattice match. This is a very important consideration from the materials technology point of view, and the viability of this approach is evaluated. Author

N86-17847*# Astrosystems International, Inc., Newark, Del. Astropower Div.
GaAsP ON GaP TOP SOLAR CELLS
James B. McNeely, Gerald H. Negley, and Allen M. Barnett *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 77-85 refs (For primary document see N86-17839 08-44)
(Contract F33615-84-C-2486)
Avail: NTIS HC A13/MF A01 CSCL 10A

GaAsP on GaP top solar cells as an attachment to silicon bottom solar cells are being developed. The GaAsP on GaP system offers several advantages for this top solar cell. The most important is that the gallium phosphide substrate provides a rugged, transparent mechanical substrate which does not have to be removed or thinned during processing. Additional advantages are that: (1) gallium phosphide is more oxidation resistant than the III-V aluminum compounds, (2) a range of energy band gaps higher than 1.75 eV is readily available for system efficiency optimization, (3) reliable ohmic contact technology is available from the light-emitting diode industry, and (4) the system readily lends itself to graded band gap structures for additional increases in efficiency. Author

N86-17848*# Chevron Research Co., Richmond, Calif.
VACUUM MOCVD FABRICATION OF HIGH EFFICIENCE CELLS
L. D. Partain, L. M. Fraas, P. S. McLeod, and J. A. Cape *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 87-95 refs Sponsored in part by Midwest Research Inst. and AFWAL (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Vacuum metal-organic-chemical-vapor-deposition (MOCVD) is a new fabrication process with improved safety and easier scalability due to its metal rather than glass construction and its uniform multiport gas injection system. It uses source materials more efficiently than other methods because the vacuum molecular flow conditions allow the high sticking coefficient reactants to reach the substrates as undeflected molecular beams and the hot chamber walls cause the low sticking coefficient reactants to bounce off the walls and interact with the substrates many times. This high source utilization reduces the materials costs power device and substantially decreases the amounts of toxic materials that must be handled as process effluents. The molecular beams allow precise growth control. With improved source purifications, vacuum MOCVD has provided p GaAs layers with 10-micron minority carrier diffusion lengths and GaAs and GaAsSb solar cells with 20% AMO efficiencies at 59X and 99X sunlight concentration ratios. Mechanical stacking has been identified as the quickest, most direct and logical path to stacked multiple-junction solar cells that perform better than the best single-junction devices. The mechanical stack is configured for immediate use in solar arrays and allows interconnections that improve the system end-of-life performance in space. Author

N86-17849*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
CONTROL OF SUPERLATTICE MORPHOLOGY IN GaAs SUB1-SUBxPSUBx CASCADE CELLS
A. E. Blakeslee and A. Kibbler *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 97-101 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Superlattices of GaAs(1-x)p(x) are being incorporated into cascade solar cell structures in order to reduce the dislocation density in the top cells and thus reduce recombination loss and increase output voltage. For a superlattice to effectively block the propagation of dislocations its average composition must be equal to that of the layer beneath it (from efficiency considerations for a cascade cell, the average composition should be about GaAs(.7)P (.3). When superlattices of this approximate composition were grown on GaAs by MOCVD, severe distortion of the crystal layers was observed. The essential features of this distortion are nonplanar morphology and accelerated etching in regions containing excess phosphorus and clusters of dislocations. Similar observations have been made with superlattices grown with two

other MOCVD systems, indicating that the problem is of fundamental technological significance, not just an artifact of one particular growth system. The nature of the distortion effect is described, and several strategies for preventing its occurrence are presented. Author

N86-17850*# Illinois Univ., Urbana. Dept. of Electrical Engineering.
SUPERLATTICES AND MULTILAYER STRUCTURES FOR HIGH EFFICIENCY SOLAR CELLS
M. Wagner and J. P. Leburton *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 103-109 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Possible applications of superlattices to photovoltaic structures are discussed. A new concept based on doping superstructures (NIPI) can be exploited to significantly reduce recombination losses in III-V compound solar cells. A novel multijunction structure with lateral current transport is proposed. A computer simulation has been performed which shows that by optimizing the multilayer structure, short circuit current is substantially increased with minimum drop in open circuit voltage. An additional advantage of the structure is enhanced radiation tolerance. It is anticipated that this multilayer structure can be incorporated in multibandgap cells to achieve high efficiencies. Author

N86-17851*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A POSSIBLE RADIATION-RESISTANT SOLAR CELL GEOMETRY USING SUPERLATTICES
Chandra Goradia (Cleveland State Univ., Ohio), Ralph Clark, and David Brinker (Cleveland State Univ., Ohio) *In its* Space Photovoltaic Research and Technology 1985 1985 p 111-118 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A solar cell structure is proposed which uses a GaAs nipi doping superlattice. An important feature of this structure is that photogenerated minority carriers are very quickly collected in a time shorter than bulk lifetime in the fairly heavily doped n and p layers and these carriers are then transported parallel to the superlattice layers to selective ohmic contacts. Assuming that these already-separated carriers have very long recombination lifetimes, due to their across an indirect bandgap in real space, it is argued that the proposed structure may exhibit superior radiation tolerance along with reasonably high beginning-of-life efficiency. Author

N86-17852*# Applied Solar Energy Corp., City of Industry, Calif.
EXPERIENCE WITH OMCVD PRODUCTION OF GaAs SOLAR CELLS
Y. C. M. Yeh, P. A. Iles, P. Ho, and K. S. Ling *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 119-125 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The projected promise of the OMCVD approach, i.e., to make high efficiency GaAs space cells, has been demonstrated. The properties and control of the deposited GaAs and AlGaAs layers and the uniformity of the post layer processing have been most satisfactory. In particular the control of the critical thin layers (p-GaAs, p-AlGaAs) has been impressive. Experience has also been gained in routine areas, connected with continuous operation at high capacity. There are still a few areas for improvement, to further increase capacity, and to anticipate and prevent mechanical equipment problems. Author

N86-17853*# Boeing Aerospace Co., Seattle, Wash.
BURST ANNEALING OF ELECTRON DAMAGE IN SILICON SOLAR CELLS
A. C. Day, W. E. Horne, M. A. Thompson, and C. A. Lancaster *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 127-134 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A study has been performed of burst annealing of electron damage in silicon solar cells. Three groups of cells consisting of 3 and 0.3 ohm-cm silicon were exposed to fluences of 2 x 10 to the 14th power, 4 x 10 to the 14th power, and 8 x 10 to the 14th power 1-MeV electrons/sq cm, respectively. They were subsequently subjected to 1-minute bursts of annealing at 500 C. The 3 ohm-cm cells showed complete recovery from each fluence level. The 0.3 ohm-cm cells showed complete recovery from the 2 x 10 to the 14th power e/sq cm fluence; however, some of the 0.3 ohm-cm cells did not recover completely from the higher influences. From an analysis of the results it is concluded that burst annealing of moderate to high resistivity silicon cell arrays in space is feasible and that with more complete understanding, even the potentially higher efficiency low resistivity cells may be usable in annealable arrays in space. Author

N86-17854*# State Univ. of New York, Buffalo.
I-V-T ANALYSIS OF RADIATION DAMAGE IN HIGH EFFICIENCY SI SOLAR CELLS
S. Banerjee, W. A. Anderson, and B. B. Rao *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 135-145 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A detailed analysis of current-voltage characteristics of N(+)-P/P solar cells indicate that there is a combination of different mechanisms which results in an enhancement in the dark current and in turn deteriorates the photovoltaic performance of the solar cells after 1 MeV e(-) irradiation. The increase in the dark current is due to three effects, i.e., bulk recombination, space charge recombination by deep traps and space charge recombination through shallow traps. It is shown that the increase in bulk recombination current is about 2 to 3 orders of magnitude whereas space charge recombination current due to shallow traps increases only by an order or so and no space charge recombination through deep traps was observed after irradiation. Thus, in order to improve the radiation hardness of these devices, bulk properties should be preserved. Author

N86-17855*# State Univ. of New York, Buffalo.
INFLUENCE OF DESIGN VARIABLES ON RADIATION HARDNESS OF SILICON MINP SOLAR CELLS
W. A. Anderson, S. Solaun, B. B. Rao, and S. Banerjee *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 147-158 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Metal-insulator-N/P silicon (MINP) solar cells were fabricated using different substrate resistivity values, different N-layer designs, and different I-layer designs. A shallow junction into an 0.3 ohm-cm substrate gave best efficiency whereas a deeper junction into a 1 to 4 ohm-cm substrate gave improved radiation hardness. I-layer design variation did little to influence radiation hardness. Author

N86-17856*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIATION DAMAGE IN HIGH-RESISTIVITY SILICON SOLAR CELLS
I. Weinberg, C. K. Swartz, and C. Goradia (Cleveland State Univ., Ohio) *In its* Space Photovoltaic Research and Technology 1985 1985 p 159-163 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

High-resistivity silicon solar cells exhibit reduced radiation damage when light is incident on the gridded back surface. Under back illumination, radiation damage decreases as cell resistivity increases; under front illumination, radiation damage increases as cell resistivity increases. Thin back-illuminated cells outperform conventional 10 omega cm 50 and 200 micron cells at low 1-MeV electron fluences. However, at higher fluences, the conventional cells exhibit superior radiation resistance. This is attributed to the low BOL diffusion lengths observed in the thin, sack-illuminated

cell. These results are discussed in terms of injected charge distributions, electric fields in the cell base, and the effects of a dominant boron-oxygen defect. E.A.K.

N86-17857*# Boeing Aerospace Co., Seattle, Wash.
PHOTON RADIATION EFFECTS ON CdS/CuInSe2 THIN FILM SOLAR CELLS
H. Dursch, W. Chen, and D. Rusell *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 165-170 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The unknown tolerance of CuInSe2 cells to proton irradiation, was tested. It was shown that CdS/CuInSe2 solar cells have an inherent tolerance to irradiation by 1 MeV electrons up to at least 2 x 10 to the 16th power electrons/sq cm. Eleven, unencapsulated, 1 sq cm cells deposited on alumina substrates were irradiated with 1 MeV protons at normal incidence. The cells were exposed to six fluences ranging from 2.5 x 10 to the 10th power protons/sq cm to 5.0 x 10 to the 13th power protons/sq cm. After each interval of exposure, the cells were removed from the radiation chamber to undergo current/voltage characterization. It is shown that none of the cells electrical characteristics exhibited any degradation up to and including a fluence of 1 x 10 to the 11th power protons/sq cm. At fluences greater than this, the damage to the CuInSe2 cells V sub oc and fill factor (FF) was more severe than that exhibited by the Isc. The CuInSe2 cells proved to be approximately a factor of 50 more resistant to 1 MeV proton irradiation than silicon or gallium arsenide cells. Annealing of a CuInSe2 cell at 225 deg C for 6 minutes restored it to within 95% of its initial efficiency. E.A.K.

N86-17858*# Florida Univ., Gainesville.
DLTS ANALYSIS OF RADIATION-INDUCED DEFECTS IN ONE-MeV ELECTRON IRRADIATED GERMANIUM AND AlSUB0.17GaSUB0.83As SOLAR CELLS
Sheng B. Li, C. G. Choi, and R. Y. Loo (Hughes Research Labs., Malibu, Calif.) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 171-179 refs (For primary document see N86-17839 06-44)
(Contract F33615-81-C-2058)
Avail: NTIS HC A13/MF A01 CSCL 10A

The radiation-induced deep-level defects in one-MeV electron-irradiated germanium and AlxGal-xAs solar cell materials using the deep-level transient spectroscopy (DLTS) and C-V techniques were investigated. Defect and recombination parameters such as defect density and energy levels, capture cross sections and lifetimes for both electron and hole traps were determined. The germanium and AlGaAs p/n junction cells were irradiated by one-MeV electrons. The DLTS, I-V, and C-V measurements were performed on these cells. The results are summarized as follows: (1) for the irradiated germanium samples, the dominant electron trap was due to the E sub - 0.24 eV level with density around 4x10 to the 14th power 1/cu cm, independent of electron fluence, its origin is attributed to the vacancy-donor complex defect formed during the electron irradiation; (2) in the one-MeV electron irradiated Al0.17Ga0.83 as sample, two dominant electron traps with energies of Ec-0.19 and -0.29 eV were observed, the density for both electron traps remained nearly constant, independent of electron fluence. It is shown that one-MeV electron irradiation creates very few or no new deep-level traps in both the germanium and AlxGa1-xAs cells, and are suitable for fabricating the radiation-hard high efficiency multijunction solar cells for space applications. E.A.K.

N86-17859*# Spectrolab, Inc., Sylmar, Calif.
DEPLETION LAYER RECOMBINATION EFFECTS ON THE RADIATION DAMAGE HARDNESS OF GALLIUM ARSENIDE CELLS
G. F. J. Garlick *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 181-187 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The significant effect of junction depletion layer recombination on the efficiency of windowed GaAs cells was demonstrated. The effect becomes more pronounced as radiation damage occurs. The depletion is considered for 1 MeV electron fluences up to 10 to the 16th power e/sq m. The cell modeling separates damage in emitter and base or buffer layers using different damage coefficients is reported. The lower coefficient for the emitter predicts less loss of performance at fluences greater than 10 to the 15th power e/sq cm. A method for obtaining information on junction recombination effects as damage proceeds is described; this enables a more complete diagnosis of damage to be made. E.A.K.

N86-17860*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF HUGHES GaAs CONCENTRATOR CELLS UNDER 1-MeV ELECTRON IRRADIATION
Henry B. Curtis and Clifford K. Swartz *In its* Space Photovoltaic Research and Technology 1985 1985 p 189-193 ref (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Several Hughes gallium arsenide (GaAs) concentrator cells were exposed to 1-MeV electrons at fluences up to 1x10 to the 15th power electrons/sq cm. Performance data were taken after several fluences, at two temperatures, and at concentration levels from 1 to approx. 150x AMO. Data at 1 sun and 25 deg C were taken with an X-25 xenon-lamp solar simulator. Data at concentration were taken using a pulsed solar simulator with the assumption of a linear relationship between short-circuit current and irradiance. The cells are 5 by 5 mm with a 4-mm diameter illuminated area. E.A.K.

N86-17861*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERPLANETARY EXPLORATION — A CHALLENGE FOR PHOTOVOLTAICS
Paul M. Stella *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 195-202 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Future U.S. interplanetary missions will be less complex and costly than past missions such as Voyager and the soon to be launched, Galileo. This is required to achieve a balanced exploration program that can be sustained within the context of a limited budget. Radioisotope thermoelectric generators (RTGs) have served as the power source for missions beyond the orbit of Mars. It is indicated that the cost to the user of these power sources will significantly increase. Solar arrays can provide a low cost alternative for a number of missions. Potential missions are identified along with concerns for implementation, and some array configurations under present investigation are reviewed. E.A.K.

N86-17862*# Aerospace Corp., Los Angeles, Calif.
TWO YEARS OF ON-ORBIT GALLIUM ARSENIDE PERFORMANCE FROM THE LIPS SOLAR CELL PANEL EXPERIMENT
R. W. Francis and F. E. Betz (Naval Research Lab., Washington, D.C.) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 203-215 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The LIPS on-orbit performance of the gallium arsenide panel experiment was analyzed from flight operation telemetry data. Algorithms were developed to calculate the daily maximum power and associated solar array parameters by two independent methods. The first technique utilizes a least mean square polynomial fit to the power curve obtained with intensity and temperature corrected currents and voltages; whereas, the second incorporates an empirical expression for fill factor based on an open circuit voltage and the calculated series resistance. Maximum power, fill factor, open circuit voltage, short circuit current and series resistance of the solar cell array are examined as a function of flight time. Trends are analyzed with respect to possible mechanisms which may affect successive periods of output power during 2 years of flight operation. Degradation factors responsible for the

on-orbit performance characteristics of gallium arsenide are discussed in relation to the calculated solar cell parameters. Performance trends and the potential degradation mechanisms are correlated with existing laboratory and flight data on both gallium arsenide and silicon solar cells for similar environments.
E.A.K.

N86-17863*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PASP: A HIGH VOLTAGE ARRAY EXPERIMENT
John Scott-Monck and Robert Morris (AFWAL, Wright-Patterson AFB, Ohio) *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 217-224 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

In the near future, Air Force mission payloads will require significant increases in power. Sophisticated sensing systems such as infrared focal plane detector arrays and radar will be employed by the Air Force to fulfill its strategic objectives. These payloads will demand that the power subsystem provide up to 50 kW at the end of mission life, more than an order of magnitude greater than is currently required. Some of these payloads must be flown in low-Earth polar orbits to satisfy mission objectives, and it is likely that large (500 to 600 sq m) solar photovoltaic arrays will operate in the low-Earth polar environment. The standard 28 volt power subsystem is not weight efficient for the array power levels being considered. The impact of the solar array operating voltage on the total weight of the array and the subsystem power conditioning and distribution components is illustrated. In the interest of reducing power subsystem weight, higher array operating voltages are considered. The problems which the higher array voltage present to the array designer are discussed. In order to provide a maximum return on the tremendous investment of resources required to develop and place these assets in orbit, they must be designed to operate effectively for extended periods of time. To achieve this, the system must be able to function in the threat-induced and natural space environment. E.A.K.

N86-17864*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
TESTING OF GALLIUM ARSENIDE SOLAR CELLS ON THE CRRES VEHICLE
Terry M. Trumble *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 225-229 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

A flight experiment was designed to determine the optimum design for gallium arsenide (GaAs) solar cell panels in a radiation environment. Elements of the experiment design include, different coverglass material and thicknesses, welded and soldered interconnects, different solar cell efficiencies, different solar cell types, and measurement of annealing properties. This experiment is scheduled to fly on the Combined Release and Radiation Effects Satellite (CRRES). This satellite will simultaneously measure the radiation environment and provide engineering data on solar cell degradation that can be directly related to radiation damage.
E.A.K.

N86-17865*# Aerospace Corp., Los Angeles, Calif.
THERMAL STRESS CYCLING OF GaAs SOLAR CELLS
Bruce K. Janousek, Robert W. Francis, and Jerry P. Wendt *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 231-238 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

A thermal cycling experiment was performed on GaAs solar cells to establish the electrical and structural integrity of these cells under the temperature conditions of a simulated low-Earth orbit of 3-year duration. Thirty single junction GaAs cells were obtained and tests were performed to establish the beginning-of-life characteristics of these cells. The tests consisted of cell I-V power output curves, from which were obtained short-circuit current, open circuit voltage, fill factor, and cell efficiency, and optical micrographs, spectral response, and ion microprobe mass analysis (IMMA) depth profiles on both the front surfaces and the front metallic contacts of the cells. Following 5,000 thermal cycles, the performance of the cells was reexamined in addition to any factors which might contribute to performance degradation. It is established that, after 5,000 thermal cycles, the cells retain their power output with no loss of structural integrity or change in physical appearance.
E.A.K.

N86-17866*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEMONSTRATED RESULTS OF WELDED AND SOLDERED INTERCONNECTIONS
Russell E. Hart, Jr. *In its* Space Photovoltaic Research and Technology 1985 1985 p 239-241 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Solar cell modules with welded and soldered interconnections were constructed using a flexible substrate material. These modules were thermally cycled between approx. 80 deg C at rates > 100 cycles/day to demonstrate survivability under simulated low Earth orbit (LEO) temperature conditions. The modules, cycled in an inert atmosphere, show durability for > 36,000 cycles. E.A.K.

N86-17867*# OCLI, Santa Rosa, Calif.
THIN FILM COATINGS FOR IMPROVED ALPHA/EPI
M. Eric Krisl and I. M. Sachs *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 243-255 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

New thin film coatings were developed for fused silica, ceria doped glass, and Corning 0211 microsheet which provide increased emissivity and/or decreased solar absorption. Emissivity is enhanced by suppression of the reststrahlen reflectance and solar absorption is reduced by externally reflecting the ultraviolet portion of the solar spectrum. Optical properties of these coatings make them suitable for both solar cell cover and thermal control mirror applications. Measurements indicate equivalent environmental performance to conventional solar cell cover and thermal control mirror products.
E.A.K.

N86-17868*# Communications Satellite Corp., Clarksburg, Md.
POWER REQUIREMENTS FOR COMMERCIAL COMMUNICATIONS SPACECRAFT
W. J. Billerbeck *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 257-278 refs (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Historical data on commercial spacecraft power systems are presented and their power requirements to the growth of satellite communications channel usage are related. Some approaches for estimating future power requirements of this class of spacecraft through the year 2000 are proposed. The key technology drivers in satellite power systems are addressed. Several technological trends in such systems are described, focusing on the most useful areas for research and development of major subsystems, including solar arrays, energy storage, and power electronics equipment.
E.A.K.

N86-17869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE STATION POWER MANAGEMENT AND DISTRIBUTION c20
Fred Teren *In its* Space Photovoltaic Research and Technology 1985 1985 p 279-285 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The power system architecture is presented by a series of schematics which illustrate the power management and distribution (PMAD) system at the component level, including converters, controllers, switchgear, rotary power transfer devices, power and data cables, remote power controllers, and load converters. Power distribution options, reference power management, and control

strategy are also outlined. A summary of advanced development status and plans and an overview of system test plans are presented. E.A.K.

N86-17870*# Research Triangle Inst., Research Triangle Park, N.C.
CELL RESEARCH AND TECHNOLOGY WORKSHOP
James Hutchby *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 287-288 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 01A

Four major areas in solar cell research and technology were considered. The areas were: (1) the silicon cell; (2) the GaAs cell; (3) the multibandgap cell; and (4) novel ideas. In each area material research issues, cell research issues, and the cell technology that needs development are considered. E.A.K.

N86-17871*# Boeing Aerospace Co., Seattle, Wash.
SPACE ENVIRONMENT WORKSHOP
W. E. Horne *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 289-292 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

Various environmental effects were ranked according to their perceived importance. The relative importance of any particular environment component is viewed within the context of the anticipated mission environment. The chart does serve as, an indication of the historically major environmental concerns for operating space power systems. E.A.K.

N86-17872*# TRW, Inc., Redondo Beach, Calif.
ARRAY TECHNOLOGY AND APPLICATIONS
Paul Goldsmith *In* NASA. Lewis Research Center Space Photovoltaic Research and Technology 1985 1985 p 293-294 (For primary document see N86-17839 08-44)
Avail: NTIS HC A13/MF A01 CSCL 10A

The role of photovoltaics (PV) in advanced missions and its use is discussed. Mission goals were analyzed and advanced concepts were tested. Costs were considered and the viability of the U.S. array industry is examined. E.A.K.

N86-17873# Scientific Consulting Services, Pullman, Wash.
MATHEMATICAL MODEL FOR THE DISTRIBUTION OF THE LONG-TERM EFFICIENCY OF PHASE-CHANGE MATERIALS AND ITS APPLICATION IN HEAT-STORAGE
S. C. Lowell and S. C. Saunders Aug. 1985 40 p
(Contract DE-AI01-76PR-06010)
(DE85-016451; NBS-GCR-85-492) Avail: NTIS HC A03/MF A01

The latent heat of transition of a phase-change material (PCM) like glauber's salt (sodium sulfate decahydrate, NA2 SO4.10 H2O) along with certain additives which are used as nucleating agents, can be utilized for thermal energy storage (TES) if the material is cycled through a temperature range which encompasses its transition temperature. A mathematical model for the degradation in the thermal performance of a salt hydrate phase change storage system is discussed. DOE

N86-17874# Mechanical Technology, Inc., Latham, N. Y.
BREADBOARD DEVELOPMENT OF A HYDRAULICALLY COUPLED FREE PISTON ENGINE HEAT PUMP COMPRESSOR
Thomas J. Marusak 1984 6 p
(DE85-005242; CONF-841231-13) Avail: NTIS HC A02/MF A01

The free piston Stirling engine (FPSE) was considered as a candidate for a thermally activated heat pump because of its potential for high efficiency coupled with long life and high reliability. The distinguishing features of the FPSE, one moving part and hermatic separation of the power cycle and refrigeration cycle working fluids, makes it ideally suited for a heat pump application. However, two major designs challenges have kept the FPSE in the realm of laboratory rather than product development. These challenges involve: effective control of a tuned resonant system over a wide range of loads and hermatic coupling of the driver and driven mechanical members. E.A.K.

N86-17875# Midwest Research Inst., Golden, Colo.
SOLAR THERMAL RESEARCH PROGRAM ANNUAL CONFERENCE
Apr. 1985 221 p Conference held at Denver, Colo., 20 Feb. 1985
(Contract DE-AC02-83CH-10093)
(DE85-002938; SERI/CP-251-2680; CONF-850252) Avail: NTIS HC A10/MF A01

Technical reports presented at the conference on research conducted in support of the Solar Thermal Research program are documented. Individual reports are abstracted and separately indexed for inclusion in the Energy Data Base. DOE

N86-17876# Sandia National Labs., Albuquerque, N. Mex.
SOLAR THERMAL TECHNOLOGY ANNUAL EVALUATION REPORT, FISCAL YEAR 1984
Jul. 1985 90 p Prepared in cooperation with Sandia National Labs., Livermore, Calif. and Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-83CH-10093)
(DE85-002950; DOE/CE-T13) Avail: NTIS HC A05/MF A01

This annual evaluation report provides the accomplishments and progress of government-funded activities initiated, renewed, or completed during Fiscal Year 1984 (FY 1984: October 1, 1983 through September 30, 1984). It highlights the program tasks conducted in-house by the participating national laboratories or under contract by industrial, academic, or other research institutions. The focus of the STT program tasks is research and development leading to the commercial readiness of four primary solar thermal concepts: (1) central receiver, (2) parabolic dish, (3) parabolic trough, and (4) hemispherical bowl. DOE

N86-17877# Midwest Research Inst., Golden, Colo.
ANALYSIS OF SIMULTANEOUS HEAT AND MASS TRANSFER IN SOILS BELOW SOLAR PONDS
C. M. Leboeuf Jun. 1985 7 p Presented at the INTERSOL 1985 Solar Energy--the Diverse Solution, Montreal, Quebec, 23 Jun. 1985
(Contract DE-AC02-83CH-10093)
(DE85-012163; SERI/TP-253-2744; CONF-850604-17) Avail: NTIS HC A02/MF A01

This paper examines thermal losses from a solar pond to the underlying soil. A model that includes coupled heat and moisture transport in soils and was originally developed for agricultural analysis is extended to solar pond performance analysis. The model describes a physical system in which soil particles and void spaces are assumed to be randomly arranged ellipsoids in a continuous medium of water or air. The general problem reduces to two coupled partial differential equations, one for heat transfer, the other for moisture transport. Using property data for a specific soil, we use the model to determine under what conditions the soil will dry in response to the imposed thermal source of the solar pond and to predict the effect the steady-state soil conditions will have on pond performance. Results of this study also apply to other fields in which a heat source is directly coupled to the ground. DOE

N86-17878# Sandia National Labs., Albuquerque, N. Mex.
PHOTOVOLTAIC ARRAY PERFORMANCE SIMULATION MODELS
D. F. Menicucci 1985 11 p Presented at the PV and Isolation Measurements Workshop, Vail, Colo., 1 Jul. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016542; SAND-85-1764C; CONF-850783-2) Avail: NTIS HC A02/MF A01

The experience of the solar industry confirms that despite recent cost reductions the profitability of photovoltaic (PV) systems is often marginal and the configuration and sizing of a system is a critical problem for the design engineer. Construction and evaluation of experimental systems are expensive and seldom justifiable. A mathematical model or computer simulation program is a desirable alternative, provided reliable results can be obtained. Sandia National Laboratories, Albuquerque (SNLA), has been

studying PV system modeling techniques in an effort to develop an effective tool to be used by engineers and architects in the design of cost-effective PV systems. This paper reviews two of the sources of error found in previous PV modeling programs, presents the remedies developed to correct these errors, and describes a new program that incorporates these improvements. DOE

N86-17879# Radiation Monitoring Devices, Inc., Watertown, Mass.
LOW COST, SPRAYED CuInSe2 SOLAR CELL RESEARCH Final Report, 15 Sep. 1982 - 30 Jun. 1985
M. R. Squillante, L. Moy, and G. Entine 1985 44 p
(Contract DE-AC02-82ER-13026)
(DE85-016953; DOE/ER-13026/T2) Avail: NTIS HC A03/MF A01

This research investigated a new spray pyrolysis technique for depositing cost effective, thin films of CuInSe2 for terrestrial solar cell applications. This process is attractive because of its inherent simplicity which has permitted large scale production of high quality, thin films at low cost of a variety of materials. This program was directed at determining the chemical and physical conditions required to produce high quality films and at characterizing and understanding the properties of the films produced. During this research effort, we investigated the spray solution chemistry, the deposition parameters, the film properties, and the characteristics of solar cell devices fabricated using the sprayed films. The results are very encouraging but further work is needed to fully examine the use of this unique deposition process in the manufacturing of CuInSe2 solar cells. DOE

N86-17880# Department of Energy, Washington, D. C.
TRANSMISSIVE METALLIC CONTACT FOR AMORPHOUS SILICON SOLAR CELLS Patent Application
A. Madan, inventor (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 29 Nov. 1984 21 p
(Contract DE-AC02-83CH-10093)
(DE85-017724; US-Patent-Appl-SN-676047) Avail: NTIS HC A02/MF A01

A transmissive metallic contact for amorphous silicon semiconductors includes a thin layer of metal, such as aluminum or other low work function metal, coated on the amorphous silicon with an antireflective layer coated on the metal. A transparent substrate, such as glass, is positioned on the light reflective layer. The metallic layer is preferably thin enough to transmit at least 50% of light incident thereon, yet thick enough to conduct electricity. The antireflection layer is preferably a transparent material that has a refractive index in the range of 1.8 to 2.2 and is approximately 550A to 600A thick. DOE

N86-17881# Department of Energy, Washington, D. C.
COMPOSITE MATERIALS FOR THERMAL ENERGY STORAGE Patent Application
D. K. Benson (Midwest Research Inst., Golden, Colo.), R. W. Burrows (Midwest Research Inst., Golden, Colo.), and Y. D. Shinton, inventors (to DOE) (Midwest Research Inst., Golden, Colo.) Filed Jan. 1985 40 p
(Contract DE-AC02-83CH-10093)
(DE85-017743; US-Patent-Appl-SN-688668) Avail: NTIS HC A03/MF A01

A composite material for thermal energy storage based upon polyhydric alcohols, such as pentaerythritol, trimethylol ethane (also known as pentaglycerine), neopentyl glycol and related compounds including trimethylol propane, monoaminopentaerythritol, diaminopentaerythritol and tris(hydroxymethyl)acetic acid, separately or in combinations, which provide reversible heat storage through crystalline phase transformations are discussed. These PCM's do not become liquid during use and are in contact with at least one material selected from the group consisting of metals, carbon, siliceous, plastic, cellulosic, natural fiber, artificial fiber, concrete, gypsum, porous rock, and mixtures thereof. Particulate additions such as aluminum or graphite powders, as well as metal and carbon fibers can also be incorporated therein. Particulate and/or fibrous additions can be introduced into molten phase change materials which can then be cast into various shapes. After the phase change materials have solidified, the additions will remain dispersed throughout the matrix of the cast solid. The polyol is in contact with at least one material selected from the group consisting of metals, carbon, siliceous, plastic, cellulosic, natural fiber, artificial fiber, concrete, gypsum, and mixtures thereof. DOE

N86-17882# Sandia National Labs., Albuquerque, N. Mex.
SANDIA GEOTHERMAL TECHNOLOGY PROGRAM: INTERACTIONS WITH OTHER DOE RESEARCH AND CSDP
R. K. Traeger 1985 11 p Presented at the Geothermal Program Review, Washington, D.C., 11 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017814; SAND-85-1871C; CONF-8509142-2) Avail: NTIS HC A02/MF A01

When the energy programs were initiated in the mid 1970's, Sandia management made a conscious decision to apply existing engineering expertise and capabilities in support of industry, government and university needs. A decision was made not to expend resources independently developing a panacea for the US energy ills. Consequently, exchange of information and technology with others occurred from the start prior to the Tech Transfer buzz words of the 1980's. The purpose of this paper is to briefly outline the Geothermal Technology Development (GTD)-supported Sandia programs. Then, the author will show how these programs interact with other energy programs at Sandia. Finally, the author will discuss the overall Continental Scientific Drilling Program, its status, and Sandia GTD interactions with CSDP. DOE

N86-17883*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LASER-ASSISTED SOLAR CELL METALLIZATION PROCESSING Quarterly Report, 1 Mar. - 30 Jun. 1985
A. Rohatgi, P. G. McMullin, and P. A. Palaschak 25 Jul. 1985 22 p
(Contracts NAS7-100; JPL-956615)
(NASA-CR-176457; NAS 1.26:176457; DE85-018032; DOE/NBM-5018032; QR-6) Avail: NTIS HC A02/MF A01 CSCL 10A

A new lens was installed in the laser; the laser power was lowered and solar cells were made at different power levels. The concentration of the silver neodecanoate solution was changed to reduce linewidth. A cell fabrication run was completed using low-resistivity float-zone silicon. Experiments were initiated to investigate the use of titanium organometallic film, which not only forms an AR coating with a 400(0)C hard bake, but may also help in bypassing front-metal evaporation because of high-reactivity of Ti with silicon. Progress in these areas is discussed. DOE

N86-17884# Oak Ridge National Lab., Tenn.
NUMERICAL STUDY OF THE PERFORMANCE OF LATENT HEAT STORAGE FOR SOLAR DYNAMIC POWER SYSTEMS
A. D. Solomon 1985 13 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018101; CONF-850808-24) Avail: NTIS HC A02/MF A01

A conceptual design of a space station power system based on a Brayton cycle and solar power has been developed. A key component of such a system is the thermal energy storage module, which is of crucial importance during periods of darkness. We have developed a computer program - FPAK1.F, simulating one possible storage design. We describe the code and using it, raise some questions about the system under study. DOE

N86-17885# Oak Ridge National Lab., Tenn.
RESULTS ON THE CHARACTERIZATION OF GAS HYDRATE FORMATION IN A DIRECT CONTACT HEAT PUMP COOL STORAGE SYSTEM
M. P. Temes Jul. 1985 167 p
(Contract DE-AC05-84OR-21400)
(DE85-018126; ORNL/TM-9212) Avail: NTIS HC A08/MF A01

This report describes an investigation of a latent cool storage system which employs a refrigerant gas hydrate as the storage medium. A refrigerant gas hydrate is a compound consisting of a refrigerant gas molecule contained within a crystalline water molecule cage. In this system, the storage component is incorporated directly into the refrigeration cycle, replacing the conventional evaporator. The refrigerant is used not only to form the gas hydrate, but also as a direct contact heat exchange fluid to remove heat from the storage tank. In this investigation, only the charging phase of the process was examined; that is, only the characteristics of the formation of gas hydrate were studied. The results of the tests showed that liquid refrigerant must be dispersed throughout the water in the storage tank during charging to obtain acceptance. DOE

N86-17886# Department of Energy, Washington, D. C.
ELECTROCHEMICAL STORAGE AND CONVERSION: BATTERIES AND FUEL CELLS
1985 14 p
(DE85-018177; DOE/CE-0152) Avail: NTIS HC A02/MF A01

A brief look at both recent and historical research and development efforts on electric batteries is presented. Both the primary (throw away) and secondary (rechargeable) batteries are investigated. Advanced batteries that will become available in the future are briefly discussed. DOE

N86-17887# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Neue Technologie.
TEST AND OPERATION PROGRAM STEP 100 (GERMAN-AUSTRALIAN SOLAR POWER PLANT IN MEEKATHARRA, WESTERN AUSTRALIA) Final Report, Jun. 1984
Eckart Hellweg and Gerd Hanselmann Bonn Bundesministerium fuer Forschung und Technologie Aug. 1985 48 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-077; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10

Operating experience with the combined solar-waste-heat plant STEP 100 is described. The test program, the boundary conditions, and the global behavior of the plant are reviewed. Collector field, waste heat system, storage system, and energy conversion system are described. The solar part yields satisfactory results. The waste heat recovery encountered problems caused by insufficient provision for interaction effects between the diesel and solar plants. Author (ESA)

N86-17888# Technische Hogeschool, Twente (Netherlands). Windmill Group.
THE CWD 4000 PROJECT (FORMERLY THT-1) Final Report
K. Kieft Feb. 1984 58 p refs
(WM-075) Avail: NTIS HC A04/MF A01

A wooden frame windmill development program is described. A technically feasible machine was produced, but it does not meet standardization specifications, so the project was abandoned. Author (ESA)

N86-17889# Technische Hogeschool, Twente (Netherlands). Windmill Group.
[ACTIVITIES REPORT ON THE TECHNICAL HIGHSCHOOL TWENTE (THT) CWD WINDMILL PROJECT] Annual Report, 1984
Sirp J. deBoer Feb. 1985 29 p refs
(WM-090) Avail: NTIS HC A03/MF A01

Consultancy services in wind energy in developing nations are summarized. Knowledge transfer, and research and development on windpowered pumps and generators are described. Author (ESA)

N86-17890# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
RESONANCE PRODUCTION IN GAMMA GAMMA COLLISIONS 2
F. C. Erne Feb. 1985 12 p refs Presented at 6th International Workshop on Photon-Photon Collisions, Tahoe, Calif., 10-13 Sep. 1984
(NIKHEF-H/85-2; B8563366) Avail: NTIS HC A02/MF A01

The assumption of vector dominance for both photons in gamma gamma-collisions is examined. The expectation that elastic scattering and charge-exchange reactions will occur from a variety of incoming vector mesons, with the attendant resonance formation and t-channel exchanges is considered. Data on vector-meson production and its Q sq dependence are analyzed to test this picture. Results suggest a variety of objects permitted by QCD, such as four-quark states and glueballs. Research on gamma gamma excitation of Charmonium states is reviewed. Author (ESA)

N86-17891# Siemens A.G., Munich (West Germany). Forschungslab.
AMORPHOUS SILICON SOLAR CELLS, PHASE 2 Final Report, Sep. 1983
Eberhard Guenzel, Wilfried Juergens, Helmold Kausche, Wolfgang Kruehler, Wilhelm Kusian, Matthias Moeller, Winfried Peters, Hans Pfleiderer, Rolf Plaettner, Bernhard Rauscher et al Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 179 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-084; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.50

Problems in the development of small and large amorphous silicon solar cells with 10% conversion efficiency as well as the electrical and optical measurement results are presented. The production and characterization of front layers with enlarged band distance for a-Si:H solar cells are reported. Cells with boron-doped aSiC:H window layers were produced with a glass SnO2 pin metal structure, with 9.8% efficiency. The effects of the substrate on the electrical cell properties, as well as the doping material concentrations and the residual gas effects in the glow discharge reactor were studied. Solutions to pinholes and structuration of large cells with selective laser etching were found. Cell aging behavior and degradation was studied by measuring the space charge limited current, spectral sensitivity, and diffusion lengths for investigation of the Staebler-Wronski effect on a-Si:H diodes. Author (ESA)

N86-17892# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Fachbereich Neue Technologie.
FIELD TEST OF AN AUTONOMOUS WIND-DIESEL POWER PLANT Final Report, Aug. 1983
Albert Fritzsche, Uwe Knoebel, and Wolfgang Ruckert Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 138 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-092; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

An autonomous power plant composed of a wind energy converter and a diesel generator was tested in laboratory and in the field to assess the wind energy supply as a noninfluenceable parameter in the regulation of the mono and bivalent operation of the power plant, for control of the dynamic behavior of the electrical components, for tuning of the regulation expenditure with comfort requirements, and for model evaluation of energy cost analysis. The interaction between meteorological, technical, economic and energy policy aspects was assessed. The relationship between economical use and comfort limits technical improvement. Development of the concept of a bivalent power supply with wind and diesel is recommended. Author (ESA)

N86-17893# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Unternehmensbereich Apparate.
DEVELOPMENT OF THIN-FILM SOLAR CELLS BASED ON AMORPHOUS SILICON Final Report, Dec. 1983

Gerhard Mueller and Gerhard Winterling Bonn, West Germany Bundesministerium fuer Forschung und Technologie Aug. 1985 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-096; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

The characteristics of a-Si:H layers and doped window layers under plasma decomposition conditions were studied and optimized by reducing optical absorption for development of cells with improved efficiency (up to 8%) and for mass production. The production of doped polycrystalline Si layers and SiC layers and their integration in the a-Si cell for heterocell formation were studied. The a-Si laboratory cell stability under prolonged illumination was analyzed. A 9% to 10% efficiency can be attained with further development of the heterocell structure and with improvement of red exploitation. Long term stability depends on the preparation conditions of a-Si and on the cell structure (light entry through the p+ or n+ layer). Amorphous Si cells with medium efficiency could be produced with acceptable long term stability by adequate selection of the cell structure (pin) and the fine doping of the i-layer. Recommendations for improvement of efficiency and long time stability and for time savings in the cell production and in the a-Si preparation are made. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-17894 British Library Lending Div., Boston Spa (England).
CONTINUOUS MEASUREMENT OF SODIUM AEROSOLS IN THE AIR
J. Unk, K. H. Kleiber, and E. Wollensack Jul. 1985 5 p Transl. into ENGLISH from Chemie-Ingenieur-Technik (West Germany), v. 57, no. 2, 1985 p 147-148
Avail: British Library Lending Div., Boston Spa, Engl.

For investigation of the properties of materials for reactor components under the influence of flowing sodium at high temperatures two test loops were set up. To achieve the best possible agreement of the experimental conditions with the actual operational conditions in the reactor the sodium in the test loops is heated and cooled to the appropriate temperatures. Cooling of the sodium takes place in the last stage through an air cooler of closed design. Analysis of possible accident conditions showed that a leak in the tubes of the sodium air cooler, through which sodium is flowing, cannot be detected by the operating personnel in the interior of the test building since the air used for cooling is sucked by a blower inside the building, conducted through the cladding of the air cooler and removed through a pipe over the roof. For the early and certain detection of a leak inside the sodium air cooler, the cooling air conducted above the roof must be monitored. Work was started to develop an exhaust air monitoring instrument of this nature. B.W.

N86-17895# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
POLLUTANT DISPERSAL
1985 420 p refs Presented at Lecture Series held in Rhode Saint Genese, Belgium, 11-15 Feb. 1985
(VKI-LS-1985-02) Avail: NTIS HC A18/MF A01

Pollutant dispersal in the atmosphere is discussed, including atmospheric boundary layer modeling; field trials, dispersion modeling; numerical techniques; dispersion of heavy gases; fluctuating wind effects; experimental facilities and techniques; historical notes; and application of three dimensional models to New York city. For individual titles, see N86-17896 through N86-17904.

N86-17896# Riso National Lab., Roskilde (Denmark).
ATMOSPHERIC BOUNDARY LAYER MODELING c47
N. O. Jensen *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 77 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Models of the atmospheric boundary layer are described. Stationary and horizontally homogeneous conditions are examined, describing the surface layer and then moving into the Ekman Layer. Models of simple cases of instationarity and inhomogeneity are described. Monin-Obukhof similarity, turbulence analyses, and mixed layer scaling are discussed. Author (ESA)

N86-17897# Nuclear Energy Centre, Mol (Belgium).
SENSITIVITY, APPLICABILITY AND VALIDATION OF BI-GAUSSIAN OFF- AND ON-LINE MODELS FOR THE EVALUATION OF THE CONSEQUENCES OF ACCIDENTAL RELEASES IN NUCLEAR FACILITIES Final Report c47
J. G. Kretzschmar, I. Mertens, and B. Vanderborght *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 79 p refs (For primary document see N86-17895 08-45)
(Contract SR-028-B)
(EUR-9385-EN) Avail: NTIS HC A18/MF A01

Tracer dispersion experiments using SF6 gas were performed and evaluated in order to verify atmospheric dispersion models. The tracer emission and sampling procedures are described. A gas cromatograph was used. Some of the experiments are well simulated by a Gaussian distribution, but others are not. A subjective optimization of the parameters of the fit was adopted. The uncertainty in the measurements of the wind speed as a function of height is discussed. The area covered by a plume as detected by the experiment is shown and compared to data from a simulation model. The deviations are discussed. Author (ESA)

N86-17898# Electricite de France, Chatou.
NUMERICAL TECHNIQUES AND DISPERSION MODELING c47
J. Y. Caneill and A. E. Saab *In* Von Karman Inst. for Fluid Dynamics. Pollutant Dispersal 1985 21 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Numerical solutions of the atmospheric transport-diffusion equation are discussed, and first and second order dispersion models are analyzed to describe the state of the art in Eulerian and quasi Lagrangian modeling of transport-diffusion of pollutants. An assessment of model performance demonstrates poor agreement between calculations and field observations for a variety of objective validation criteria. Author (ESA)

N86-17899# United Kingdom Atomic Energy Authority, Culcheth (England). Safety and Reliability Directorate.
DISPERSION OF HEAVY GASES
C. J. Wheatley *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 57 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

It is shown that chemical reactions, possibly involving atmospheric moisture can have a very strong influence on the density of heavy gas clouds. Consequences of heavy gas dispersion for safety are discussed. It is shown that field trials enable testing of the physical content of the model. Author (ESA)

N86-17900# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
FLUCTUATING WIND EFFECTS c47
S. Brown *In its* Pollutant Dispersal 1985 47 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The dispersion of a pollutant in a flow field that has large scale fluctuations was studied. The turbulent variables, velocity and concentration, are separated into three components and introduced in that form into the partial differential equation describing the pollutant dispersal. Correlations between the averages and between turbulent fluctuations are obtained. Wind

tunnel experiments measured the correlations in a controlled large scale fluctuation flow field. The measurement of the cross-correlation terms illustrates the convective nature of the transport when short time scales are considered. It is shown that the presence of large fluctuations does not greatly affect turbulent diffusion. Author (ESA)

N86-17901# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LAGRANGIAN MODELING OF TURBULENT DISPERSION c47
C. Benocci and D. Olivari *In its* Pollutant Dispersal 1985 41 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The dispersion of neutral or buoyant contaminants in turbulent flow is simulated by the release of marked particles whose trajectories can be determined following the theory of continuous stochastic processes. Guidelines for the implementation of stochastic theory in a practical computer program are given, with particular reference to the prediction of heavy gas dispersal in the atmospheric boundary layer. Comparison with experimental data demonstrates the feasibility of prediction of heavy gas dispersal from line sources using the model. Author (ESA)

N86-17902# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: FACILITIES AND TECHNIQUES c34
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 49 p (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

Modeling techniques for gas dispersion, free convection, drainage flows, boundary layer simulations under neutral, stable and unstable conditions, and regional simulation are discussed. The facilities at 13 research centers are summarized, detailing wind tunnel, tow tank, and wind over water or water channel equipment characteristics. The desired characteristics of modeling facilities are discussed through the analysis of problem areas. Author (ESA)

N86-17903# Central Electricity Research Labs., Leatherhead (England).
FLUID MODELING OF FLOW AND DISPERSION IN THE ATMOSPHERE: HISTORICAL NOTES c34
A. G. Robins *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 13 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The history of experimental fluid dynamics to the first half of the 20th century is summarized. The development of the meteorological sciences in the 20th century is commented on. Author (ESA)

N86-17904# San Jose State Univ., Calif. Dept. of Meteorology.
APPLICATION OF LINKED THREE-DIMENSIONAL PLANETARY BOUNDARY LAYER (PBL) AND DISPERSION MODELS TO NEW YORK CITY c47
R. Bornstein, U. Pechinger (Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, Austria), R. Street (Stanford Univ., Calif.), F. Ludwig (SRI International, Menlo Park, Calif.), S. Klotz (Stanford Univ., Calif), R. Salvador, L. J. Shien (IBM, Palo Alto, Calif.), and R. Miller *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 22 p refs Presented at 15th NATO/CCMS Conference, St. Louis, Mo., 16-20 Apr. 1985 (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

The two dimensional vorticity mode urban planetary boundary layer (PBL) model of Bornstein is extended to three dimensions and used to simulate sea breeze circulations in the coastal urban envelopment of New York city. The output from the PBL model is used as input to a modified form of the three dimensional Eulerian urban air pollution model developed by Shir and Shieh. The dispersion model is used to simulate the distribution of sulfur dioxide concentrations resulting from point and area source emissions into the sea breeze circulation. The models correctly simulate most of the qualitative features of the time varying polluted coastal urban boundary layer. Author (ESA)

N86-17905# Pacific Northwest Lab., Richland, Wash. Earth Sciences Dept.
ATMOSPHERIC DISPERSION MODELS AND THEIR LIMITATIONS
J. V. Ramsdell Jun. 1985 17 p Presented at the Health Physics Summer School, Evanston, Ill., 6 Jun. 1985
(Contract DE-AC06-76RL-01830)
(TI85-018522; PNL-SA-13230; CONF-8506136-2; NRC-FIN-B2001)
Avail: NTIS HC A02/MF A01

Atmospheric dispersion models generally have three uses when emergency response is considered: preincident planning, dispersion estimates during the incident, and postincident assessment. Atmospheric dispersion models for use during incidents, and their general concepts are discussed. The following areas are examined: (1) description of basic models and their underlying assumptions; (2) modeling limitations and constraints; and (3) model evaluation. E.A.K.

N86-17906# Oak Ridge National Lab., Tenn.
CHARACTERIZATION AND MITIGATION OF ORGANIC VAPORS
A. R. Hawthorne, T. G. Matthews, and R. B. Gammage 1985 11 p Presented at the Air Pollution Control Association Annual Meeting and Exhibition, Detroit, Mich., 16 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016410; CONF-850612-9) Avail: NTIS HC A02/MF A01

The more established methodology of pumped vapor collection on solid sorbents followed by gas chromatography or gas chromatography/mass spectrometry for characterizing emissions and resulting indoor concentrations of organic pollutants is reviewed. In addition, less frequently used alternative approaches that emphasize low-cost, rapid response methods of characterizing indoor organic pollutants are presented. Examples include a portable photoionization gas chromatograph and a nondestructive formaldehyde surface emission monitor. Highlights of an experiment in an unoccupied research house to evaluate the effectiveness of permeation barriers in reducing the formaldehyde emission rate from particleboard underlayment and the corresponding room concentrations are discussed. DOE

N86-17907# Pacific Northwest Lab., Richland, Wash.
ACID DEPOSITION SYSTEM (ADS) DATA BASE, DATA SUMMARY PROCEDURES AND STATISTICAL REPORTING OF SPATIAL PATTERNS AND TRENDS
A. R. Olsen and A. L. Slavich Sep. 1985 10 p Presented at the National Acid Precipitation Assessment Program Task Groups A Through D Peer Review, Boulder, Colo., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017910; PNL-SA-13358; CONF-8509108-1) Avail: NTIS HC A02/MF A01

Wet deposition data are being collected by many organizations in the United States and Canada. Each organization has selected field sampling and laboratory analysis protocols based on their objectives and has organized the resulting wet deposition data accordingly. The Acid Deposition System (ADS) for data storage and statistical reporting of wet deposition data has been designed and implemented to provide an integrated, centralized data repository for data collected by wet deposition monitoring networks in the United States and Canada. The purposes of ADS are (1) to facilitate access to deposition data collected by different networks, (2) to provide annual statistical summaries of available data, and (3) to perform analyses of spatial and temporal trends. The ADS data base has been designed and implemented to include the wet deposition data from the NTN, NADP, CANSAP, APN, APIOS, UAPSP, WISCONSIN and MAP3S networks. Other networks, with quality assured and documented data, are being added as they meet ADS data transfer requirements. The integration of networks requires careful definition of network data screening and

coding procedures to ensure the compatibility of data for the preparation of common statistical summaries. DOE

N86-17908# Pacific Northwest Lab., Richland, Wash.
INFLUENCE OF A LARGE SULFUR DIOXIDE POINT SOURCE ON MESOSCALE RAINWATER CHEMISTRY
A. J. Alkezweeny and N. S. Laulainen Aug. 1985 10 p Presented at the National Acid Precipitation Assessment Program Task Groups A Through D Peer Review, Boulder, Colo., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE85-018215; PNL-SA-13406; CONF-8509108-2) Avail: NTIS HC A02/MF A01

We are measuring the spatial and temporal variations in rainwater chemical composition at forty ground-level sites near (within 100 km) a large sulfur dioxide point source (a copper smelter). Simultaneous measurement of particulate chemical composition in the surrounding air both at ground level and in the plume as well as knowledge of sulfur dioxide emissions as a function of time allow us to estimate the contribution of this source to the total wet deposition downwind. Similar measurements of the chemical composition of rain and air after closure of this source will allow us to verify our estimates of the source's contribution to downwind rainwater chemistry. The closure of this relatively isolated source in an area with a clean background provides a unique opportunity to examine these source-receptor relationships and the models used to predict them. A key assumption in this work is that the variability in rainwater chemical composition due to both sampling and analysis procedures as well as meteorology of selected storms is small when compared with the spatial variability due to the smelter influence. Results to date indicate that is the case. To the extent that this source imposed variability is important for a number of chemical species, it should be possible to test a variety of deterministic and multivariate statistical models of precipitation scavenging and wet deposition. DOE

N86-17909# Argonne National Lab., Ill.
CLIMATOLOGICAL VARIABILITY IN THE EVALUATION OF COST EFFECTIVENESS OF EMISSION CONTROL STRATEGIES TO REDUCE ACID DEPOSITION
J. D. Shannon and D. G. Streets 1985 12 p refs Presented at the 15th International Technical Meeting on Air Pollution Modeling and Its Application, St. Louis, Mo., 15 Apr. 1985
(Contract W-31-109-eng-38)
(DE85-018375; CONF-8504135-3) Avail: NTIS HC A02/MF A01

Variations in emission reductions and control costs that derive from the sensitivity of cost-effective control strategies to climatological variability are evaluated. Sensitivity to meteorological conditions was conducted using six individual years of data, 1976 to 1981, together with a six-year averaged data set. Only single-target strategies were examined. That is, control of sulfur dioxide emissions is the mechanism for reduction of acidic deposition, and deposition of total sulfur as sulfate equivalent is the measure of effectiveness. DOE

N86-17910# Pacific Northwest Lab., Richland, Wash.
ACID RAIN: A PRIMER ON WHAT, WHERE, AND HOW MUCH
W. R. Barchet Apr. 1985 26 p Presented at the National Conference on Hazardous Wastes and Environmental Emergencies, Cincinnati, Ohio, 14 May 1985
(Contract DE-AC06-76RL-01830)
(DE85-017864; PNL-SA-13199; CONF-8505149-2) Avail: NTIS HC A03/MF A01

Acid rain is introduced by defining its components: wet and dry deposition. Data bases on precipitation chemistry from several monitoring networks are used to show where acid rain occurs. Precipitation chemistry and air quality data are used to discuss what is in acid rain. Maps of the deposition of the major constituents of wet deposition are presented to contrast the amount of material deposited (deposition) in acid rain with its composition (concentration). The interactions of acid rain with the surfaces on which it falls are used to trace the paths by which acid rain reaches surface and soil waters. Implications of acid rain effects are introduced but not discussed in detail. DOE

N86-17911# Oak Ridge National Lab., Tenn.
EFFECTS OF ACID RAIN ON FOREST NUTRIENT STATUS
D. W. Johnson, D. W. Cole, J. M. Kelly, J. W. Webb, D. D. Richter, and H. VanMiegroet Aug. 1985 48 p refs
(Contract DE-AC05-84OR-21400)
(DE85-018120; ORNL/TM-9729; Publ-2498) Avail: NTIS HC A03/MF A01

In five forest sites (three in eastern Tennessee and two in western Washington) the effect of natural carbonic acid production on soil leaching was equaled or exceeded by that of atmospheric acid inputs. In a nitrogen-fixing red alder site in Washington, however, internal leaching by nitrification and nitric acid formation far exceeded atmospheric H(+) inputs at any site. All other sites retained NO3(-), and soil SO4(2-) adsorption reduced the effectiveness of atmospheric H2SO4 inputs on soil leaching in two of the Tennessee sites and in the Washington red alder site. The very high natural leaching rates in the red alder stand have significantly acidified, and continue to acidify, that soil. At all other sites, base cation loss rates were not large enough to rapidly deplete soil exchangeable cation reserves, and no long-term significant soil acidification by acid deposition is foreseen. Furthermore, scarce or potentially limiting cations (such as Ca(2+) in one of the Tennessee sites) are being conserved despite accelerated leaching rates. Atmospheric sulfur inputs exceeded forest sulfur requirement in all five sites. Excess sulfur accumulated to a minor extent as SO4(2-) in vegetation, but soils were the major repository for excess SO4(2-). The greatly enhanced nitrogen status of the red alder stand appeared to have lowered SO4(2-) in both vegetation and soils at that site as compared to the adjacent nitrogen-poor Douglas-fir site. Decomposer invertebrates appeared to be affected negatively by unrealistically large applications of SO4(2-), either as KHSO4 or K2SO4. Forest floor buffering prevented large changes in pH with acid SO4(2-) treatments. Results indicate that effects of acid deposition on decomposer invertebrates are unlikely except at input levels much higher than ambient. DOE

N86-17912# Argonne National Lab., Ill.
OXYGEN-18 STUDY OF THE ATMOSPHERIC-AQUATIC LINKAGE IN THREE ADIRONDACK LAKE WATERSHEDS
B. D. Holt and R. Kumar 1985 14 p Presented at the Muskoka Conference: International Symposium on Acidic Precipitation, Toronto, Ontario, 15 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018355; CONF-850944-1) Avail: NTIS HC A02/MF A01

Twelve monthly measurements were made of the delta(18)O of the water and of the dissolved sulfates in inlet streams and in outlet streams of lakes in three watersheds in the Adirondack Park region of New York. The average delta(18)O/sub H2O/ of the surface waters (streams and lakes) of the three watersheds was well within the typical range of seasonally varying delta(18)O/sub H2O/ of precipitation water; however, the delta(18)O/sub SO4(2-)/ of the surface waters was significantly lower than the typical range of seasonally varying delta(18)O/sub SO4(2-)/ in precipitation water. Two possible causes for the apparent alteration of delta(18)O of the sulfates, during the water percolation of various ground strata in the ground link between the atmosphere and watershed lakes are: (1) bacteriological redox cycling, in which the sulfate is bacterially reduced, allowing isotopic equilibration between the HSO3(-) ion and associated water, before catalytic reoxidation by air back to sulfate; and/or (2) ion exchange, in which the soil strata, containing chemically fixed sulfate, behave as a column which is not yet in sulfate-ion equilibrium with the sulfate in atmospheric recharge water. DOE

N86-17913# Argonne National Lab., Ill.
VARIABILITY IN PATTERNS OF ACID DEPOSITION RESULTING FROM CLIMATOLOGICAL VARIABILITY
J. D. Shannon, B. M. Lesht, and P. J. Samson 1985 4 p Presented at the 9th Conference on Probability and Statistics in Atmospheric Sciences, Virginia Beach, Va., 9 Oct. 1985 Prepared in cooperation with Michigan Univ., Ann Arbor
(Contract W-31-109-eng-38)
(DE85-018392; CONF-851028-2) Avail: NTIS HC A02/MF A01

The Trajectory Regional Air Pollution (ASTRAP) model produces long-term, typically seasonally averaged atmospheric concentration fields and cumulative wet or dry deposition fields over scales of 100 km to continental distances for oxides of sulfur and nitrogen. Here we examine only oxides of sulfur. Twenty-four seasonal patterns over the United States and Canada of both wet and dry deposition of total sulfur have been simulated. In addition, six annual deposition fields have been produced from addition of the appropriate seasonal fields. Isopleths of six-year average seasonal and annual deposition have also been generated. DOE

N86-17914# Centro Informazioni Studi Esperienze, Milan (Italy).
PHYSIOCHEMICAL TRANSFORMATION OF RADIOACTIVE NUCLEI IN WATER ENVIRONMENTS [TRASFORMAZIONE CHIMICO-FISICA DI RADIONUCLIDI NEL MEZZO AMBIENTE]
G. Ciceri 1985 27 p refs In ITALIAN Presented at Corso di Radioecologia degli Ambienti Acquatici Conference, Como, Italy, 10-14 Jun. 1985 Sponsored by Ente Nazionale per l'Energie Electricca
(CISE-2694) Avail: NTIS HC A03/MF A01

Experimental methods used to evaluate the environmental effects of radioactive water pollution are discussed and the theoretical prediction of the long term distribution is examined. The kinetics of the different physiochemical processes determines most of the environmental impact. For example, Co 60 is mostly associated with suspended particles and disappears from the water mass by sedimentation. Author (ESA)

N86-17915# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS) IN 1981 [DE GELUIDSBELASTING ROND SCHIPHOL IN 1981]
J. F. W. Baarslag 4 May 1982 24 p refs In DUTCH
(Contract RB-RLD-82-4.1)
(NLR-TR-82034-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours, and areas within are mapped. Author (ESA)

N86-17916# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.
NOISE ASSESSMENT AROUND ROTTERDAM AIRPORT (THE NETHERLANDS) IN 1981 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ROTTERDAM IN 1981]
J. F. W. Baarslag 18 Jun. 1982 21 p refs In DUTCH
(Contract RB-RLD-82-4.1)
(NLR-TR-82059-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are discussed. The airport and its surroundings are projected on a flat reference surface, on which a network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using this information, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17917# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS): INDICATIVE ZONES [GELUIDSBELASTINGBEREKENING VOOR DE LUCHTHAVEN SCHIPHOL: INDICATIEVE ZONES]
H. J. Poutsma 15 Sep. 1982 20 p refs In DUTCH
(Contract RB-RLD-82-5.2)
(NLR-TR-82090-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around an airport are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17918# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND EELDE AIRPORT (THE NETHERLANDS): LEADING CONTOURS [GELUIDSBELASTINGBEREKENING VOOR DE LUCHTHAVEN EELDE: MAATGEVENDE CONTOUREN]
H. J. Poutsma 29 Oct. 1982 16 p refs In DUTCH
(Contract RB-RLD-82-5.2)
(NLR-TR-82111-U) Avail: NTIS HC A02/MF A01

Aircraft noise predictions around an airport for the year 2000 are presented. Airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17919# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND EELDE AIRPORT (THE NETHERLANDS) IN 1985 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN EELDE IN 1981]
J. F. W. Baarslag Dec. 1982 22 p refs In DUTCH
(Contract RB-RLD-84-4.1)
(NLR-TR-82135-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Eelde airport are presented. The airport and surroundings are projected on a flat reference surface, on which a 100 m mesh network of points is superimposed. Minium distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are calculated. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17920# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.
NOISE ASSESSMENT AROUND ZUID-LIMBURG AIRPORT (THE NETHERLANDS) IN 1981 AND 1982 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ZUID-LIMBURG IN 1981 EN 1982]
R. J. P. Dros and G. Bekebrede 31 Mar. 1983 26 p refs In DUTCH
(Contract RB-RLD-82/83-4.1)
(NLR-TR-83045-U) Avail: NTIS HC A03/MF A01

Aircraft noise assessment calculations around an airport are presented. Zuid-Limburg airport and its surrounding areas are projected onto a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these

data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolation between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17921# National Aerospace Lab., Amsterdam (Netherlands). Afd. Vliegtuigen.
NOISE ASSESSMENT AROUND SCHIPHOL AIRPORT (THE NETHERLANDS) IN 1982 [DE GELUIDSBELASTING ROND SCHIPHOL IN 1982]
J. F. W. Baarslag 26 Apr. 1983 22 p refs In DUTCH
(Contract RB-RLD-83-4.1)
(NLR-TR-83054-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Schiphol airport are presented. The airport and surroundings are projected ontp a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are determined. Using these data, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is calculated in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17922# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Vliegtuigen.
NOISE ASSESSMENT AROUND ROTTERDAM AIRPORT IN 1982 [DE GELUIDSBELASTING ROND DE LUCHTHAVEN ROTTERDAM IN 1982]
J. F. W. Baarslag 1 Sep. 1983 23 p refs In DUTCH
(Contract RB-RLD-83-4.1)
(NLR-TR-83105-U) Avail: NTIS HC A02/MF A01

Aircraft noise assessment calculations around the Rotterdam airport are presented. The airport and its surroundings are projected onto a flat reference surface, on which a 100 m mesh network of points is superimposed. Minimum distances between flight paths and points, maximum noise levels of aircraft per category, and lateral correction factors are calculated. Using this information, the number of flight motions, and night penalty factors of aircraft per category, the noise assessment is determined in cost units with a logarithmic aircraft noise pollution formula. Interpolating between points of equal assessment, noise assessment contours and areas within them are mapped. Author (ESA)

N86-17923# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
DEPOSITION OF SULFUR IN EUROPE: METHODS TO CONSTRUCT UNBIASED SOURCE-RECEPTOR MATRICES FROM DATA OF A LIMITED PERIOD (1976 - 1982). A METEOROLOGICAL CONTRIBUTION TO THE IIASA REGIONAL ACIDIFICATION INFORMATION AND SIMULATION (RAINS) MODEL
Joop F. denTonkelaar 1985 63 p refs
(KNMI-TR-66; B8566383) Avail: NTIS HC A04/MF A01

Subjective and objective methods for the construction of annual, seasonal and monthly standard source receptor matrices (SRM) for an atmospheric submodel which describes the atmospheric transport of SO2 emissions from the source areas and the dry and wet depositions in the receptor places, on an annual basis, are described. The methods used data for a 5 yr period, in accordance with the long term climatic frequency distribution of atmospheric circulations. A proposal for the construction of SRM's for (atmospheric) favorable and unfavorable seasons, 6 and 12-month periods, to be informed about the possible variance in the values of the standard SRM's is made. Author (ESA)

N86-17924# Kema (N. V.), Arnhem (Netherlands). Dept. of Environmental Research.
MEASURING THE ELECTRIC FIELD IN THE ATMOSPHERE IN CONNECTION WITH INVESTIGATIONS ON THE DISPERSION OF AIR POLLUTION
J. H. A. vanWakeren, A. J. Elshout, L. H. J. M. Janssen, and A. J. vanLoon, ed. 1984 12 p refs Original contains color illustrations
(S/T-Rept-Vol-2-No-10; ISBN-90-355-0021-6; ISSN-0167-8590; B8564311) Avail: NTIS HC A02/MF A01

An instrument to measure the strength of the electric field in the atmosphere was developed. This E-field meter was installed on a mobile platform, e.g., an aircraft or a van, makes it possible to locate the position and establish the dimensions of a stack plume. The meter is light, requires very little energy and is not expensive. It can be used in a humid atmosphere with fog or rain because it functions as an ammeter instead of a voltmeter. Author (ESA)

N86-17925# California Inst. of Tech., Pasadena. Environmental Quality Lab.
VISIBILITY MODEL VERIFICATION BY IMAGE PROCESSING TECHNIQUES Final Report, 25 Oct. 1982 - 31 Oct. 1984
S. M. Larson, G. R. Cass, K. J. Hussey, and F. Luce 31 Oct. 1984 105 p Sponsored by California State Air Resources Board, Sacramento
(PB85-222800; ARB-R-85-251) Avail: NTIS HC A06/MF A01 CSCL 13B

An image processing-based visibility model was applied to Los Angeles regional haze conditions, and methods were developed for testing the accuracy of this type of visibility modeling approach. An experimental program was executed in order to obtain a high quality set of the input data on aerosol properties and visual appearance required by the model. During the experiments, standard photographs were taken of chosen scenes on an extremely clean day and also under heavy smog conditions. The clean day image provides the substrate on which the visibility model calculations are performed. Pollutant properties measured on the heavy smog day are introduced into the model, and the results of the model calculations are displayed in the form of a synthetic photograph of the expected appearance of the heavy smog event. The synthetic smoggy image then is compared to a photograph taken of the actual smog event. Author

N86-17926# Environmental Protection Agency, Washington, D.C. Office of Acid Deposition, Environmental Monitoring, and Quality Assurance.
ACIDIC DEPOSITION PHENOMENON AND ITS EFFECTS: CRITICAL ASSESSMENT DOCUMENT Final Report
D. A. Bennett, R. L. Goble, and R. A. Linthurst Aug. 1985 182 p Prepared in cooperation with Clark Coll., Worcester, Mass., and N.C. State Univ., Raleigh
(PB85-233393; EPA-600/8-85-001) Avail: NTIS HC A09/MF A01 CSCL 06F

The Acidic Deposition Phenomenon and its Effects: Critical Assessment Document (CAD) is a summary, integration, and interpretation of the current scientific understanding of acidic deposition. It is firmly based upon The Acidic Deposition Phenomenon and its Effects: Critical Assessment Review Papers (CARP), PB85-100030 and PB85-100048, a multi-authored comprehensive critical review of the published scientific literature of the atmospheric phenomena and effects of acidic deposition, augmented by additional current scientific references. Evidence from disparate sections of the CARP are drawn together and interpreted. Reference is made, where possible, to CARP sections providing information for the CAD analyses; citations are made to additional references. Quotations and paraphrases of conclusions and observations from the CARP provide much of the material in the CAD. As such, they represent the conclusions of the CARP authors interpreted by the CAD authors. Some additional evidence has been developed by the CAD authors, and the conclusions drawn from this information are solely those of the CAD authors. GRA

N86-17927# California Univ., Riverside. Statewide Air Pollution Research Center.
ATMOSPHERIC FATES OF ORGANIC CHEMICALS: PREDICTION OF OZONE AND HYDROXYL RADICAL REACTION RATES AND MECHANISMS Final Report, Feb. 1982 - Feb. 1985
R. Atkinson, W. P. L. Carter, S. M. Aschmann, J. N. Pitts, and A.

M. Winer Aug. 1985 86 p
(PB85-241529; EPA-600/3-85-063) Avail: NTIS
HC A05/MF A01 CSCL 07E

The kinetic, mechanistic and product data available in the literature for the gas phase reactions of OH radicals and of O3 with organic compounds were evaluated and reviewed. An experimental program was carried out to obtain needed kinetic data for selected OH radical and O3 reactions. The data and the experimental techniques used are summarized and a priori predictive techniques for the estimation of OH radical and O3 reaction rate constants for organics for which experimental data are not available are discussed.

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-17928*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 1: KINEMATICS OF BASIN-RANGE INTRAPLATE EXTENSION Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986
Paul K. Eddington, Robert B. Smith, and Casper Renggli (Eidgenoessische Technische Hochschule, Zurich, Switzerland) Jan. 1986 57 p refs Submitted for publication
(Grant NAG5-164)
(NASA-CR-176498; NAS 1.26:176498) Avail: NTIS
HC A04/MF A01 CSCL 08G

Strain rates assessed from brittle fracture and total brittle-ductile deformation measured from geodetic data were compared to estimates of paleo-strain from Quaternary geology for the intraplate Great Basin part of the Basin-Range, western United States. These data provide an assessment of the kinematics and mode of lithospheric extension that the western U.S. Cordillera has experienced from the past few million years to the present. Strain and deformation rates were determined by the seismic moment tensor method using historic seismicity and fault plane solutions for sub-regions of homogeneous strain. Contemporary deformation in the Great Basin occurs principally along the active seismic zones. The integrated opening rate across the entire Great Basin is accommodated by E-E extension at 8 to 10 mm/a in the north that diminishes to NW-SE extension of 3.5 mm/a in the south. Zones of maximum lithospheric extension correspond to belts of thin crust, high heat flow, and Quaternary basaltic volcanism, suggesting that these parameters are related through mechanism of extension such as a stress relaxation, allowing bouyant uplift and ascension of magmas. Author

N86-17929*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 2: LITHOSPHERIC STRUCTURE, SEISMICITY, AND CONTEMPORARY DEFORMATION OF THE UNITED STATES CORDILLERA Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986
Robert B. Smith Jan. 1986 87 p refs Submitted for publication
(Grant NAG5-164)
(NASA-CR-176499; NAS 1.26:176499) Avail: NTIS
HC A05/MF A01 CSCL 08G

The structural evolution of the U.S. Cordillera has been influenced by a variety of tectonic mechanisms including passive margin rifting and sedimentation; arc volcanism; accretion of exotic terranes; intraplate magmatism; and folding and faulting associated with compression and extension processes that have profoundly influenced the lithospheric structure. As a result the Cordilleran crust is laterally inhomogeneous across its 2000 km east-west breadth. It is thin along the West Coast where it has close oceanic affinities. The crust thickens eastward beneath the Sierra Nevada, then thins beneath the Basin-Range. Crustal thickening continues eastward beneath the Colorado Plateau, the Rocky Mountains, and the Great Plains. The total lithospheric thickness attains 65 km in the Basin-Range and increases eastward beneath the Colorado Plateau. The upper-crust, including the crystalline basement of the Cordillera, has P sub G velocities of 6 km/s in the Basin-Range and Rio Grande Rift. Lower P sub G velocities of 5.4 to 5.7 km/s are associated with the youthful Yellowstone, Valles and Long Valley calderas and the Franciscan assemblage of the western coastal margin. Averaged crustal velocity reflects integrated tectonic evolution of the crust-thick silicic bodies, velocity reversals, and a thin crust produce low averaged velocities that are characteristic of a highly attenuated and thermally deformed crust. Author

N86-17930*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
A STUDY OF TECTONIC ACTIVITY IN THE BASIN-RANGE PROVINCE AND ON THE SAN ANDREAS FAULT. NO. 3: KINEMATICS OF GREAT BASIN INTRAPLATE EXTENSION FROM EARTHQUAKE, GEODETIC AND GEOLOGIC INFORMATION Final Technical Report, 15 Apr. 1981 - 31 Jan. 1986 M.S. Thesis
Paul Kendall Eddington Jan. 1986 275 p refs
(Grant NAG5-164)
(NASA-CR-176500; NAS 1.26:176500) Avail: NTIS
HC A12/MF A01 CSCL 08G

Strain rates assessed from brittle fracture, associated with earthquakes, and total brittle-ductile deformation measured from geodetic data were compared to paleostrain from Quaternary geology for the intraplate Great Basin of the western United States. These data provide an assessment of the kinematics and mode of lithospheric extension that the western U.S. Cordillera has experienced in the last 5 to 10 million years. Strain and deformation rates were determined by the seismic moment tensor method using historic seismicity and fault plane solutions. Contemporary deformation of the Great Basin occurs principally along the active seismic zones. The earthquake related strain shows that the Great Basin is characterized by regional E-W extension at 8.4 mm/a in the north that diminishes to NW-SE extension of 3.5 mm/a in the south. Zones of maximum extension correspond to belts of shallow crust, high heat flow, and Quaternary basaltic volcanism, suggesting that these parameters are related through an effect such as a stress relaxation allowing bouyant uplift and ascension of magmas. Author

N86-17931# Royal Aircraft Establishment, Farnborough (England).
THE EARTH'S ATMOSPHERE: IDEAS OLD AND NEW
D. G. King-Hele 19 Apr. 1985 42 p refs Previously announced in IAA as A85-49748
(RAE-TM-SPACE-351; BR96188) Avail: NTIS HC A03/MF A01

The modern view of the Earth's atmosphere, and past ideas between 350 BC and 1925 AD are surveyed. Author (ESA)

N86-17932# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
ROCK FAILURE CRITERIA FOR DESIGN OF UNDERGROUND STRUCTURAL SUPPORTS Final Report, for 1984 - 1985
G. A. Nicholson Sep. 1985 44 p
(DA Proj. 4A1-61101-A-91-D)
(AD-A159807; WES/MP/GL-85-19) Avail: NTIS
HC A03/MF A01 CSCL 13/13

This report describes an empirical constitutive model for underground excavations in rock which equates the deformation modulus to the ratio of the deviator stress to axial strain. The model requires failure criteria which define both the deviator stress at failure and strain at failure. Available failure criterion allows reasonable estimates of deviator stress for intact rock as well as rock mass. However, a failure criterion for estimating strains at failure for rock does not exist. Thus, this report examines the feasibility of developing a strain-based failure criterion for rock. Stress-strain responses for two rock types, sandstone and granite, were evaluated. Reasonable correlations were found to exist

between axial strain at failure normalized with respect to unconfined compressive axial strain at failure and the following: (1) maximum shear stress normalized with respect to the unconfined compressive strength; and (2) minor principal stress (confining stress) normalized with respect to the unconfined compressive strength.
Author (GRA)

N86-17933# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.
THE NORWEGIAN SEISMIC ARRAY (NORSAR) Semiannual Technical Summary, 1 Oct. 1984 - 31 Mar. 1985
L. B. Loughran Jul. 1985 123 p
(Contract F08606-84-C-0002; ARPA Order 1483)
(AD-A159820; NORSAR-CONTRIB-354) Avail: NTIS
HC A06/MF A01 CSCL 08/11

During this reporting period the Norwegian Seismic Array (NORSAR) Detection Processing System operated with an average uptime of 98.2%. A total of 1792 seismic events were reported by NORSAR in the period. Preliminary evaluation of the real time detection system for the NORESS array has shown an excellent P-wave detection performance at high signal frequencies. Such frequencies are commonly observed for all seismic events at regional distances, and for many teleseismic events, especially in Eurasia. The detection of secondary regional phases (Sn and Lg), which is important for the location procedure in the NORESS system, needs further refinement. A newly developed off-line interactive analysis package was applied to study in detail a NORESS data base of 18 regional events from Western Russia, and this study has shown that estimates of azimuth and phase velocity using F-k analysis are quite strongly dependent on the analysis frequency selected. A newly developed broadband spectral estimation technique gives promise of more stable estimates. Studies of travel time residuals using GSDN network data for both deep and shallow events indicated that the reference earth model needs to be modified, both with regard to the upper and lower mantle. A study of teleseismic P coda using NORSAR and NORESS data has given evidence to confirm the hypothesis that the coda is composed of on-azimuth P and off-azimuth Lg, the former being due to scattering of Lg to P near the source and the latter being due to scattering to P to Lg near the receiver.
GRA

N86-17934# Lawrence Livermore National Lab., Calif.
AN APPROACH TO THE QUANTIFICATION OF SEISMIC MARGINS IN NUCLEAR POWER PLANTS
R. J. Budnitz, P. J. Amico, C. A. Cornell, W. J. Hall, R. P. Kennedy, J. W. Reed, and M. Shinozuka Aug. 1985 303 p
(TI85-017151; UCID-20444; NUREG/CR-4334) Avail: NTIS
HC A14/MF A01

This report is the second report of the Expert Panel on Quantification of Seismic Margins. The objective of this report is to discuss progress to date in studying the issue of quantification of seismic margins in nuclear power plants. In particular, it deals with progress towards the establishment of review guidelines that would be useful in studying how much seismic margin exists. The guidelines themselves will be the subject of the next Panel report. The work presented in this report is the result of a detailed study of seismic Probabilistic Risk Assessments, historical earthquake performance of the nuclear and non-nuclear facilities, and test data, augmented by the individual experience and expertise of the Panel members. The major development discussed in this report is the HCLPF concept, which demonstrates margin by showing that there is a High Confidence of a Low Probability of Failure for a given earthquake size.
DOE

N86-17935# Pacific Northwest Lab., Richland, Wash.
ADVANCED TECHNIQUES FOR LITHOLOGIC AND FRACTURE ANALYSIS UTILIZING THEMATIC MAPPER AND TOPOGRAPHIC DATA
H. P. Foote, R. L. Thiessen, J. R. Eliason, and G. E. Wukelic Jun. 1985 12 p refs Presented at the NASA LIDQU Final Symposium: LANDSAT Image Data Quality Analysis Meeting, Indianapolis, Ind., 9 Sep. 1985 Prepared in cooperation with Washington State Univ., Pullman
(Contract DE-AC06-76RL-01830)
(DE85-016220; PNL-SA-13290; CONF-8509161-2) Avail: NTIS
HC A02/MF A01

Under the LIDQA program, the Pacific Northwest Laboratory has been evaluating selected energy-related applications of the LANDSAT Thematic Mapper (TM) data from a user-agency perspective. This paper describes techniques that have been developed to correct for topographic-induced shading on TM surface reflectance and to perform topographic analysis to define crustal fracture zones as aids to geologic studies. These techniques require the use of only digital terrain and TM data. The analysis techniques have been successfully applied to the Paiute Ridge Quadrangle in Nevada, demonstrating the utility of the techniques for geologic studies.
DOE

N86-17936# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT, VOLUME 1 Final Report
Aug. 1985 345 p
(Contract DE-AC02-83CH-10139)
(DE86-000406; DOE/CH-7(1)-Final) Avail: NTIS
HC A15/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major ground-water discharge zones, ground-water resources, state of stress, thickness of rock mass, and thickness of overburden. Information is presented on age, areal extent, shape, composition, texture, degree and type of alteration, thickness, and structural features associated with each rock body or complex. Regional seismic and tectonic information is presented, including patterns of earthquake occurrence, earthquake magnitudes, horizontal ground accelerations, and vertical crustal movements. Also included are discussions of the rock and mineral deposits or mines located within or near crystalline bodies; ground-water resources and regional hydrology; postulated changes in climate and the associated effects; and landforms, surface processes, and surficial materials on or near the rock bodies. A discussion is also presented on the relationship between the US Department of Energy (DOE) Siting Guidelines (10 CFR 960) and the geologic disqualifying factor and regional screening variables to be used in the region-to-area screening process.
DOE

N86-17937# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 2: APPENDIXES Final Report
Aug. 1985 333 p Document includes a Microfiche supplement
(Contract DE-AC02-83CH-10139)
(DE86-000406; DOE/CH-7(2)-Final) Avail: NTIS HC A01

This report presents available geological information pertinent to sitting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifing factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major ground-water discharge zones, ground-water resources, state of stress, thickness of rock mass, and thickness of overburden. Volume (2) of this report contain three appendices: Summary of Rock Body Characteristics; Glossary; and Mineral Resources Data.
DOE

N86-17938# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 3: PLATES Final Report
Aug. 1985 120 p
(Contract DE-AC02-83CH-10139)
(DE86-000418; DOE/CH-7(3)-Final) Avail: NTIS HC A06/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. For each of the states within the Northeastern Region, information is provided on the geologic disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geologic factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, state of stress, thickness of rock mass, and thickness of overburden. Volume 7(3) contains the following maps: index map; faults, ground acceleration, and in situ stress; rock and mineral resources; drainage basins and ground water discharge zones; ground water resources; and crystalline rock bodies. DOE

N86-17939# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
NORTH CENTRAL REGIONAL GEOLOGIC CHARACTERIZATION REPORT. VOLUME 2: PLATES Final Report
Aug. 1985 165 p
(Contract DE-AC02-83CH-10139)
(DE86-000419; DOE/CH-8(2)-Final) Avail: NTIS HC A08/MF A01

Volume 8(2) contains the following maps: Geologic map of the Lake Superior Region (Minnesota, Wisconsin, and northern Michigan); Index Map; Overburden Thickness; Faults and Ground Acceleration; Rock and Mineral Resources; Ground Water Basins and Potential Major Discharge Zones; and Ground Water Resource Potential. DOE

N86-17940# Sandia National Labs., Albuquerque, N. Mex.
MULTIWELL EXPERIMENT GEOPHYSICS PROGRAM Final Report
C. A. Searls Sep. 1985 72 p refs
(Contract DE-AC04-76DP-00789)
(DE86-001147; SAND-85-1013) Avail: NTIS HC A04/MF A01

Two Vertical Seismic Profile experiments and a Three-Dimensional Surface Seismic experiment were conducted at the Multiwell Experiment site in central Colorado to assess the applicability of seismic methods to mapping lenticular sand bodies of the Mesaverde group in the Piceance Basin. The data from these experiments were analyzed in conjunction with synthetic seismograms computed from well logs and additional geological data. This analysis demonstrated that the producing zones can be delineated once the seismic character of these zones is determined but the morphology of individual sand lenses cannot be mapped at the Multiwell Experiment site. Additionally, the extended vertical seismic profile technique was demonstrated to provide a very high resolution seismic technique for investigation of the region adjacent to an existing well. DOE

N86-17941# Kiruna Geophysical Inst. (Sweden).
GENERATION OF MAGNETIC FIELD ALIGNED CURRENTS, PARALLEL ELECTRIC FIELDS, AND INVERTED-V STRUCTURES BY PLASMA PRESSURE INHOMOGENEITIES IN THE MAGNETOSPHERE
K. Stasiewicz Dec. 1984 36 p refs Submitted for publication
(KGI-Preprint-073; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

Magnetic field aligned currents driven by plasma pressure inhomogeneities (plasma clouds) in the distant magnetosphere are analyzed. A parallel potential drop is found to be established in the upward current region whenever a spatial scale for the pressure gradient in the equatorial magnetosphere is $< 3goBi/Bo$, where go is a hot electron gyroradius in the equatorial magnetic field Bo, and Bi is the magnetic induction in the ionosphere. A theoretical derivation is given for the experimentally observed linear relation $T=AEp+To$ between the characteristic energy T of precipitating magnetospheric electrons and the peak energy Ep in inverted-V electron spectra. Three-dimensional potential structures accelerating electrons earthward are shown to be established beneath model clouds which could correspond to a large scale inverted-V structure and to a thin (1 km) auroral arc. Author (ESA)

N86-17942# Kiruna Geophysical Inst. (Sweden).
GENERATION OF MAGNETOSPHERIC RADIATION BY DECAY OF BERNSTEIN WAVES
Kjell Roennmark Jan. 1985 16 p refs
(KGI-Preprint-076; ISSN-0349-2656) Avail: NTIS HC A02/MF A01

The generation of nonthermal continuum radiation in the equatorial magnetosphere by nonlinear decay of electrostatic Bernstein waves with frequency near the upper hybrid frequency is considered. A decay process does not require the low frequency waves to be linearly unstable, which is compatible with the difficulties of observing low frequency turbulence associated with sources of myriametric radiation. Coalescence processes in practice are always incoherent, but a nonlinear decay can be coherent. The appearance of very narrow bands in the radiated spectrum can thus be explained by a decay process. A decay should be comparable to a coalescence process in terms of efficiency, but accurate estimates of the radiated power require theoretical work, based on good observations of particle distributions and wave spectra in the sources of myriametric radiation. Author (ESA)

N86-17943# Kiruna Geophysical Inst. (Sweden).
BOUNDARY LAYER PLASMAS AS A SOURCE FOR HIGH-LATITUDE, EARLY AFTERNOON, AURORAL ARCS
Rickard Lundin and David S. Evans (Space Environment Lab., Boulder, Colo.) Feb. 1985 44 p refs
(KGI-Preprint-079; ISSN-0349-2656) Avail: NTIS HC A03/MF A01

Simultaneous measurements of hot boundary layer plasma from PROGNOZ-7 and particle precipitation from the TIROS/NOAA satellite in nearly magnetically conjugate regions were used to study the dynamo process responsible for the formation of high latitude, early afternoon, auroral arcs. In PROGNOZ-7 observations in the dayside boundary layer at high latitudes, regions with injected magnetosheath plasma embedded in a halo of antisunward flowing magnetosphere plasma are frequent. Analysis of the injected magnetosheath plasma indicates that it also acts as a local source of EMF in the boundary layer. The process resembles that of a local MHD dynamo driven by the excess drift velocity of the injected magnetosheath plasma relative to the background magnetospheric plasma. It is shown that the large-scale morphology and the data intercomparison between PROGNOZ-7 and TIROS-N agree well with a local injection of magnetosheath plasma into the dayside boundary layer as the main dynamo process powering the auroral arcs. Author (ESA)

N86-17944# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
A METHOD FOR ESTIMATING ATMOSPHERIC STABILITY USING SODAR MEASUREMENTS
Lennart Thaning Apr. 1985 44 p refs In SWEDISH; ENGLISH summary
(FOA-E-40020) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

As a basis for calculating the atmospheric scattering of dangerous emissions, a method was developed using horizontal wind and standard deviation of the vertical wind fluctuations at 75 m height, measured by a triaxial Doppler sodar at the meteorological tower of a nuclear power plant. The stability scheme is uncertain at low wind speed due to the vertical standard deviation, interpreted as instrumental noise. Results obtained during the study indicate that this meteorological tower is situated too close

to the shore line to produce satisfactory results with on-shore wind when the sea and land temperature differ. Author (ESA)

N86-17945# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Infrarottechnik.
SOME ASPECTS OF THE ATMOSPHERIC RADIANCE MODEL OF LOWTRAN 6
Rudolf Richter May 1985 24 p refs
(DFVLR-FB-85-33; ISSN-0171-1342) Avail: NTIS HC A02/MF A01; DFVLR, Cologne, West Germany DM 9.50

Two radiance models within LOWTRAN 6 are compared: the zero-order scattering, as implemented in standard LOWTRAN, and the conservative scattering algorithm. The comparison is performed for horizontal and slant atmospheric paths in infrared window regions 3 to 5 microns and 8 to 14 microns. For paths of high optical depth the zero-order scattering model underestimates the atmospheric background radiation. The effect depends on the spectral region and the visibility. It is shown that an artifact, the radiance dip near the 90 deg zenith angle for slant paths from ground to space, does not occur in the conservative scattering model. Author (ESA)

N86-17946# Danish Space Research Inst., Lyngby.
WAVES WITH HARMONIC STRUCTURE BELOW AND ABOVE THE LOWER HYBRID RESONANCE (LHR) OBSERVED ON THE CLEFT ENERGETICS TRANSPORT AND ULTRAVIOLET RADIATION (CENTAUR) 35.001 AND 35.002 ROCKETS
T. Neubert, G. Holmgren (Uppsala Ionospheric Observatory, Sweden), E. Ungstrup, and K. Melgaard Mar. 1985 37 p refs Sponsored by Danish Space Board and Swedish Board for Space Activities
(DRI-2-85; ISSN-0109-6605) Avail: NTIS HC A03/MF A01

Measurements obtained from 0 to 10 kHz electric wave and 0 to 4.2 kHz electron density fluctuation rocket experiments are presented. Narrow banded signals with harmonic structure related to the proton gyrofrequency are observed below and above the lower hybrid frequency, from 2 to 10 kHz, modulated in frequency during a rocket spin typically by 2 kHz. The signals are generated by the presence of the payload in the plasma. The source of free energy remains unidentified, but may be a perpendicular ion beam emitted by or created by the presence of the payload, generating flute mode ion cyclotron harmonic waves. Bursts of harmonic waves are received below 2 kHz. The fundamental frequency of these emissions varies over a range from 47 to 700 Hz and is rarely at any of the characteristic frequencies of the plasma. Waves with a lower cutoff at the lower hybrid frequency are observed. The lower hybrid frequency estimated from magnetic field and density measurements and from the wave measurements agrees within 6% (500 Hz). Author (ESA)

N86-17947# National Geophysical Data Center, Boulder, Colo.
NATIONAL GEOPHYSICAL DATA CENTER Annual Report, fiscal year 1984
J. Coffman 1985 67 p
(PB85-248458) Avail: NTIS HC A04/MF A01 CSCL 05A

The first Annual Report prepared by NOAA's National Geophysical Data Center (NGDC) is presented. The topics covered include the following: (1) the national geophysical data center, (2) solar-terrestrial physics, (3) solid earth geophysics, (4) marine geology and geophysics; (5) national snow and ice data center; (6) support services; (7) fiscal year 1984 publications. GRA

N86-17948# Illinois State Geological Survey, Champaign.
SOURCES OF INFORMATION ON ENGINEERING GEOLOGY AND RELATED TOPICS FOR NORTHEASTERN ILLINOIS
W. G. Dixon 1985 25 p
(PB85-241933; IL/SGS/EGN-110) Avail: NTIS HC A02/MF A01 CSCL 08G

In 1964 the Engineering Geology Committee of the Soil Mechanics and Foundations Division of the Illinois Section of American Society of Civil Engineers prepared a Preliminary List of Sources of Information Covering Engineering Geology and Related Subjects for the Chicago Area. In 1972 the list was revised. Because more information has become available, the format of the list was changed for this revision. The addresses of all suppliers of information are now grouped together; new categories of information are added; and fewer individual publications are cited in lieu of lists of publications. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-17949 Engineering Sciences Data Unit, London (England).
WIND SPEED PROFILES OVER TERRAIN WITH ROUGHNESS CHANGES FOR FLAT OR HILLY SITES
Mar. 1985 64 p refs Submitted for publication
(ESDU-84011-A; ISBN-0-85679-473-2; ISSN-0141-4003) Avail: ESDU

ESDU 84011 provides a simplified method of estimating the variation of design wind speed (mean-hourly or gust values) with height above the ground and with terrain roughness. The data for flat terrain (which are based on relationships given in ESDU 82026 and 83045) are presented in the form of tables giving a factor (K) by which a reference wind speed at 10 m over open country terrain must be multiplied to give the wind speed at the required height over the site in question. K-factors are provided for a range of heights up to 400 m, gust averaging times and combinations of terrain roughness at the site with a single change in roughness at varying distances upwind of the site. It is also shown how the tabulated data can be used to generate wind speed profile data for multiple changes in terrain roughness. Additional data provide a wind speed correction for sites on hills, cliffs or escarpments. A program listing is included for repetitive calculations which gives wind speed profiles for multiple roughness changes and for flat or hilly sites. Author

N86-17950# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: RICHARDS-GEBAUR AFB, MISSOURI Data Summary Report, May 1975 - Apr. 1984
Jul. 1985 379 p
(AD-A159602; USAFETAC/DS-85/041) Avail: NTIS HC A17/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Richards-Gebaur AFB, Missouri is presented. This report is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B Precipitation is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using The Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-17951# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: MAXWELL AFB, ALABAMA Data Summary Report, Mar. 1975 - Feb. 1985
Jun. 1985 329 p
(AD-A159603; USAFETAC/DS-85/025) Avail: NTIS HC A15/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Maxwell AFB, Alabama is presented. This report is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather

observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17952# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY LISOCS. GILZE-RIJEN, NETHERLANDS Data Summary Report, Apr. 1975 - Mar. 1985
5 Aug. 1985 403 p
(AD-A159863; USAFETAC/DS-85/042) Avail: NTIS HC A18/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Glize-Rijen, Netherlands is presented. This summary similar to the revised uniform summary of surface weather observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: (1) weather conditions and atmospheric phenomena; (3) surface winds; (4) ceiling and visibility; (5) Psychrometric Summaries; and (6) pressure summaries. Note that part (2) precipitation, is omitted. See USAFETAC/TN-83/001(AD-A132186), an aid for using the revised uniform summary of surface weather observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-17953# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS, SPARREVOHN AFS, ALASKA Data Summary Report, Dec. 1976 - Nov. 1984
18 Sep. 1985 304 p
(AD-A159864; USAFETAC/DS-85/046) Avail: NTIS HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Sparrevohn AFS, Alaska is presented. The summary consists of: (1) weather conditions and atmospheric phenomena; (2) precipitation; (3) surface winds; (4) Ceiling and Visibility; (5) psychrometric summaries; and (6) pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the revised uniform summary of surface weather observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17954# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS, PEASE AFB, NEW HAMPSHIRE Data Summary Report, Mar. 1975 - Feb. 1985
5 Jul. 1985 480 p
(AD-A159865; USAFETAC/DS-85/026) Avail: NTIS HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Pease AFB, New Hampshire is presented. The summary consists of: (1) weather conditions and atmospheric phenomena; (2) precipitation; (3) surface winds; (4) ceiling and visibility; (5) psychrometric summaries; and (6) pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An aid for using the revised uniform summary of surface weather observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-17955# Naval Postgraduate School, Monterey, Calif.
ASSESSMENT OF THE PERFORMANCE OF AN IN-FIELD GAUSSIAN PLUME/PUFF MODEL FOR OVERWATER USE Report, for Sep. 1983 - Oct. 1984
C. E. Skupniewicz and G. E. Schacher Nov. 1984 55 p
(AD-A160032; NPS61-85-002) Avail: NTIS HC A04/MF A01 CSCL 15/2

A chemical hazard forecast computer model is tested for consistency with field data which was used in its development. The model's attempt to forecast puff dispersion, for which a parameterization has not been developed, are examined by comparison to relative dispersion data sets. The parameterizations developed from the NPS data set are compared to an independently derived set of parameterizations demonstrating the generic applicability of the model. It was found that the model predicts the total width over which a hazard might occur reasonably well but underpredicts the downwind hazard distance. This is due to lack of separate consideration of meander effects. GRA

N86-17956# Lawrence Livermore National Lab., Calif.
FORWARD AND BACKWARD TRAJECTORIES USING GRANTOUR: A PRELIMINARY STUDY FOR ARCTIC TRAJECTORIES
A. Tan, J. J. Walton, and M. C. MacCracken Aug. 1985 15 p
(Contract W-7405-eng-48)
(DE85-017875; UCID-20513) Avail: NTIS HC A02/MF A01

Traditional air trajectory models utilize various constant-pressure trajectory methods, known as isobaric trajectory models, although it has been recognized that isentropic trajectories would be more accurate when large temperature gradients are encountered. This study reports calculations of forward and backward trajectories using the LLNL GRANTOUR transport model. This model accounts for the vertical transport disregarded in the isobaric methods and accurately transports smoke with the three-dimensional wind field. Preliminary findings indicate that GRANTOUR trajectories, which actually follow the true parcel trajectory, are generally consistent with those obtained by the isentropic method, at least in the Arctic. DOE

N86-17957# Lawrence Livermore National Lab., Calif.
NATURAL PHENOMENA HAZARDS MODELING PROJECT. EXTREME WIND/TORNADO HAZARD MODELS FOR DEPARTMENT OF ENERGY SITES. REVISION 1
D. W. Coats and R. C. Murray Aug. 1985 74 p refs
(Contract W-7405-eng-48)
(DE85-018156; UCRL-53526-Rev-1) Avail: NTIS HC A04/MF A01

Lawrence Livermore National Laboratory (LLNL) has developed seismic and wind hazard models for the Office of Nuclear Safety (ONS), Department of Energy (DOE). The work is part of a three-phase effort aimed at establishing uniform building design criteria for seismic and wind hazards at DOE sites throughout the United States. This report summarizes the final wind/tornado hazard models recommended for each site and the methodology used to develop these models. Final seismic hazard models have been published separately by TERA Corporation. In the final phase, it is anticipated that the DOE will use the hazard models to establish uniform criteria for the design and evaluation of critical facilities. DOE

N86-17958# World Meteorological Organization, Geneva (Switzerland).
WORLD WEATHER WATCH: ON IMPLEMENTATION Status Report
1984 135 p refs
(WMO-639; ISBN-92-63-10639-8; SR-12) Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 25

The status of the World Meteorological Organization's Global Observing System, Global Data Processing System, and Global Telecommunication System is summarized. Monitoring of the operation of the World Weather Watch and Operational Information Service is reviewed. Author (ESA)

N86-17959# World Meteorological Organization, Geneva (Switzerland).
[ACTIVITIES REPORT IN WORLD METEOROLOGY] Annual Report, 1984
1985 234 p refs
(WMO-644; ISBN-92-63-10644-4) Avail: NTIS MF A01; print copy

available at WMO, Geneva

The status of the World Meteorological Organization's programs is reviewed. The World Weather Watch; World Climate Program; Research and Development Program; Applications of Meteorology Program; Hydrology and Water Resources Program; Education and Training; Technical Cooperation Program; regional activities; and external relations, and legal and administrative matters are covered. Author (ESA)

N86-17960# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

CHARACTERIZATION OF THE ELECTROMAGNETIC RADIATION PRECEDING LIGHTNING Ph.D. Thesis - Paris 6 Univ.

J. P. Moreau 1985 153 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-954)

(ONERA-NT-1985-1; ISSN-0078-3781) Avail: NTIS HC A08/MF A01

The static field variations and very high frequency radiation during the preliminary breakdown and stepper leader phases before the first return stroke of lightning are studied. Experimental data suggest that radiation is pulsed, and that extremely short pulses of a few nanosec exist, giving evidence of a spectrum with significant values in the VHF range. The VHF/UHF analysis yields fruitful information on the discharge, its initiation, its development and the physical processes involved at the head of the channel. Author (ESA)

N86-17961# Groningen Rijksuniversiteit (Netherlands). Vakgroep Systeem- en besliskunde.

PREDICTING WINDSPEED: A SYSTEM THEORETICAL APPROACH [VOORSPELLEN VAN WINDSNELHEDEN: EEN SYSTEEMTHEORETISCHE BENADERING]

Mark Geerts Jan. 1984 107 p refs In DUTCH; ENGLISH summary

(Rept-49) Avail: NTIS HC A06/MF A01

Wind predictors using system and control theory models were developed to solve integration problems of possibly strongly fluctuating windpower within a national electric power system. A Kalman filter and an autoregressive moving average predictor are compared with literature values. The one dimensional models deployed are too simple, but better results are possible with multidimensional models. Author (ESA)

N86-17962# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

ON-LINE SUPERPOSITION OF GEOGRAPHICAL DATA TO TIROS-N TYPE METEOROLOGICAL SATELLITE IMAGES

R. G. vanPopta 1985 44 p refs

(NLR-TR-82133-U; B8568393) Avail: NTIS HC A03/MF A01

A method by which geographical data are superposed in real time to the high resolution picture transmission imagery from the TIROS-N series satellites is described. The superposition of additional geographical data is important for an accurate position determination of image data. Computations necessary for the transformation, conversion, and sorting of the additional data are performed on-line (i.e., during a period of 5 min immediately before image production). The superposition is based on orbit predictions with a circular model, modified to decrease the geographical data position deviations in the image. Author (ESA)

N86-17963# Pacific Northwest Lab., Richland, Wash.

HANFORD 1964 ATMOSPHERIC BOUNDARY LAYER EXPERIMENT: MICROMETEOROLOGICAL AND TRACER DATA ARCHIVE. SET 002 DOCUMENTATION REPORT Final Report

C. S. Glantz, R. K. Woodruff, and J. G. Droppo Aug. 1985 25 p ref

(Contract EPA-68-02-4063)

(PB85-243145; EPA-600/3-85-055) Avail: NTIS HC A02/MF A01 CSCL 13B

An archive for micrometeorological and tracer dispersion data has been developed by Battelle, Pacific Northwest Laboratories for the U.S. Environmental Protection Agency. The archive is designed to make the results of extensive field tests readily accessible to EPA for model testing, development, and verification efforts. This report provides documentation for one of the archived data sets, the Hanford 1964 Atmospheric Dispersion Experiment. The aim of this effort is to archive invaluable data sets in a timely fashion before the necessary supporting information about the data becomes lost forever. The entries in this documentation report are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary table. Author (GRA)

N86-17964# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.

INSTALLATION OF AUTOMATED WEATHER OBSERVING SYSTEMS BY FAA (FEDERAL AVIATION ADMINISTRATION) AT COMMERCIAL AIRPORTS IS NOT JUSTIFIED

29 Jul. 1985 40 p

(PB85-241347; GAO/RCED-85-78; B-21770) Avail: NTIS HC A03/MF A01 CSCL 04B

Current surface weather observations at commercial airports which use equipment to measure or estimate nine weather elements meet or exceed the Federal Aviation Administration's (FAA's) operational requirements. These requirements are considered essential to provide airport and area aviation weather forecasts required by law and federal aviation regulations and are important in maintaining aviation safety at commercial airports. As part of its National Airspace System plan to automate air traffic control facilities in the United States by the year 2000, FAA plans to install 304 automated weather observing systems (AWOSs) costing $60 million at commercial airports across the country. It is found that AWOS performance does not meet FAA's operational requirements for four weather elements and is not cost-effective at commercial airports compared with the existing observer system. GRA

N86-17965# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

QUERY LANGUAGE FOR THE PROFILER DATA SYSTEM

V. J. Yaplee Boyle Jun. 1985 210 p

(PB85-240190; NOAA-TM-ERL-WPL-125) Avail: NTIS HC A10/MF A01 CSCL 04B

A set of atmospheric measuring instruments were developed. The atmospheric measuring instruments are called Profilers. Data from Profilers around the state of Colorado are brought back to a central computer. There was no user friendly interface for nonprogrammers as well as programmers to access Profiler data. It is believed that a query language is a useful utility to make available to users. An interpreter was developed to interface the user with the Profiler data base. The goal of the interpreter developed is to allow flexibility and make it easy and natural to use for any users with any level of computer expertise. GRA

N86-17966# National Environmental Satellite Service, Washington, D. C.

MONTHLY INFRARED IMAGERY ENHANCEMENT CURVES: A TOOL FOR NIGHTTIME SEA FOG IDENTIFICATION OFF THE NEW ENGLAND COAST

E. M. Maturi and S. J. Holmes May 1985 45 p

(PB85-237725; NOAA-TM-NESDIS-12) Avail: NTIS HC A03/MF A01 CSCL 04B

Detection of nighttime sea fog is possible by using enhanced infrared imagery and a pattern recognition technique. Enhancement curves were developed to delineate minimal temperature differences in the sea surface and sea fog cloud top temperature ranges. Monthly enhancement curves for the months April through October are presented. GRA

N86-17967# National Weather Service, Salt Lake City, Utah.

AOS (ADVANCED OPERATING SYSTEM) GRAPHIC TO GRID POINT CONVERSION AND DEPARTURE FROM NORMAL PROGRAMS

J. L. Anderson and M. A. Mathewson Aug. 1985 50 p

(PB85-248110; NOAA-NWS-WRCP-50) Avail: NTIS

HC A03/MF A01 CSCL 04B
The programs DEPART and GRIDNH are described. The GRIDNH produces files of gridded 500mb height data from AFOS graphics, while DEPART is used to produce the MRF departure from normal charts on AFOS. The departure from normal charts have already proved to be quite useful in an operational forecasting environment. The charts help forecasters to determine what global height features are the results of climatologically favored locations and which are true anomalies; in this way the departure charts facilitate the use of teleconnections. GRA

N86-17968# National Center for Atmospheric Research, Boulder, Colo.
UNCORRELATED NOISE IN TURBULENCE MEASUREMENTS
D. H. Lenschow and L. Kristensen May 1985 62 p Sponsored by NSF
(PB85-212314; NCAR/TN-254+STR) Avail: NTIS HC A04/MF A01 CSCL 04B
The error variance contributed by random, uncorrelated measurement noise can be merged with the error variance contributed by real variations in the atmosphere to obtain a single expression for the total error variance when the sampling time is much less than the integral scale of atmospheric variability. It is assumed that the measured signal is a representation of a variable that is continuous on the scale of interest in the atmosphere. The modeling results are confirmed by artificially modifying a test time series with Poisson noise and comparing the statistics from ten realizations of the modified series with the predicted error variances. GRA

N86-17896# Riso National Lab., Roskilde (Denmark).
ATMOSPHERIC BOUNDARY LAYER MODELING
N. O. Jensen *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 77 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17897# Nuclear Energy Centre, Mol (Belgium).
SENSITIVITY, APPLICABILITY AND VALIDATION OF BI-GAUSSIAN OFF- AND ON-LINE MODELS FOR THE EVALUATION OF THE CONSEQUENCES OF ACCIDENTAL RELEASES IN NUCLEAR FACILITIES Final Report
J. G. Kretzschmar, I. Mertens, and B. Vanderborght *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 79 p refs (For primary document see N86-17895 08-45)
(Contract SR-028-B)
(EUR-9385-EN) Avail: NTIS HC A18/MF A01

N86-17898# Electricite de France, Chatou.
NUMERICAL TECHNIQUES AND DISPERSION MODELING
J. Y. Caneill and A. E. Saab *In* Von Karman Inst. for Fluid Dynamics. Pollutant Dispersal 1985 21 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17900# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
FLUCTUATING WIND EFFECTS
S. Brown *In its* Pollutant Dispersal 1985 47 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17901# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
LAGRANGIAN MODELING OF TURBULENT DISPERSION
C. Benocci and D. Olivari *In its* Pollutant Dispersal 1985 41 p refs (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

N86-17904# San Jose State Univ., Calif. Dept. of Meteorology.
APPLICATION OF LINKED THREE-DIMENSIONAL PLANETARY BOUNDARY LAYER (PBL) AND DISPERSION MODELS TO NEW YORK CITY
R. Bornstein, U. Pechinger (Zentralanstalt fuer Meteorologie und Geodynamik, Vienna, Austria), R. Street (Stanford Univ., Calif.), F. Ludwig (SRI International, Menlo Park, Calif.), S. Klotz (Stanford Univ., Calif), R. Salvador, L. J. Shien (IBM, Palo Alto, Calif.), and R. Miller *In* Von Karman Inst. for Fluid Dynamics Pollutant Dispersal 1985 22 p refs Presented at 15th NATO/CCMS Conference, St. Louis, Mo., 16-20 Apr. 1985 (For primary document see N86-17895 08-45)
Avail: NTIS HC A18/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-17969# Naval Postgraduate School, Monterey, Calif.
ESTIMATION OF SEA-SURFACE WINDSPEED FROM WHITECAP COVER: STATISTICAL APPROACHES COMPARED EMPIRICALLY AND BY SIMULATION
I. G. OMuircheartaigh and D. P. Gaver Sep. 1985 59 p
(AD-A159816; NPS55-85-021) Avail: NTIS HC A04/MF A01 CSCL 04/2
In this work, several (5) statistical estimators for solving the typical remote sensing inverse problem are explained, illustrated and evaluated using both real data sets connecting surface windspeed and whitecap coverage and simulated data. The results suggests the superiority of some of these estimators. GRA

N86-17970# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
BIBLIOGRAPHY OF RESEARCH ON OCEAN FRONTS, 1964-1984 Final Report
L. B. Gilham, J. J. Mika, and D. A. Wissenburg Aug. 1985 58 p
(AD-A160040; NORDA-TN-303) Avail: NTIS HC A04/MF A01 CSCL 08/10
This report contains a bibliography of published papers describing research related to oceanic fronts. The citations cover research on physical, chemical and biological oceanographic studies of ocean fronts and also observations made by remote sensing. The papers listed cover the period from 1964 to 1984. A few earlier papers, considered classics, are also included. This bibliography was assembled as the first step in a program to study the dynamic chemical processes associated with ocean frontal boundaries. Over 750 citations are included. GRA

N86-17971# World Meteorological Organization, Geneva (Switzerland).
INTERNATIONAL LIST OF SELECTED, SUPPLEMENTARY AND AUXILIARY SHIPS
1985 403 p In ENGLISH and FRENCH
(WMO-47-ED-85) Avail: NTIS MF A01; hard copy available at WMO, Geneva, SWFR 37
The names, country of origin, instruments, operating conditions, number of radio operators, and call signs of ships in the World Meteorological Organization Observing Ship Scheme are listed. The method of obtaining sea surface temperature is indicated. Author (ESA)

N86-17972# European Space Agency, Paris (France). PIPOR Science Working Group.
A PROGRAM FOR INTERNATIONAL POLAR OCEANS RESEARCH (PIPOR) Final Report
B. Battrick, ed. and Erica Rolfe, ed. Sep. 1985 47 p refs Original contains color illustrations
(ESA-SP-1074) Avail: NTIS HC A03/MF A01
The importance of polar regions in atmospheric and oceanic circulation is outlined, and a polar regions research program is proposed. Real-time, high resolution satellite data on ice distribution and characteristics are essential to a variety of application areas. Synthetic aperture radar data must be acquired over the entire polar region in a quantity sufficient to monitor significant geophysical processes. For optimal all-weather monitoring of the polar regions, satellite SAR data must be coupled with passive microwave data

and augmented by measurements from in-situ, autonomous data-collection systems. Satellite observations must be validated through comparisons with measurements made by surface parties, airborne remote sensing, and submarines. Ocean buoy technology should be developed to provide expanded atmospheric and oceanic observations. High-quality hydrographic and geochemical measurements in the polar oceans will contribute significantly to understanding of ocean circulation. Modeling research in air - sea - ice interaction should be expanded. Author (ESA)

N86-17973# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solid Earth Geophysics.
TSUNAMIS IN PERU-CHILE
Jul. 1985 107 p
(PB85-247815; SE-39) Avail: NTIS HC A06/MF A01 CSCL 08C

Maps that show major geologic features of the entire region and locations of major coastal cities in Peru-Chile are presented. Each region includes five tables that contain the following information: (1) list of earthquakes that both occurred and generated tsunamis in the region; (2) effects in Peru-Chile of tsunamis generated in the region; (3) effects outside Peru-Chile of tsunamis generated in the region; (4) damage and number of deaths from tsunamis in the region; (5) coastal cities in the region that reported tsunamis from all sources. The chapters describing the above regions contain: bar graphs depicting the number of tsunamigenic earthquakes that occurred at each degree of latitude; maps showing the extent of affected coastline for several of the larger earthquakes; and maps showing areas throughout the Pacific Ocean Basin where major tsunamis were reported. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-17974 Admiralty Marine Technology Establishment, Portsmouth (England). Dockyard Lab.
THE EVALUATION OF COPPER COMPOUNDS AS POTENTIAL FUEL BIOCIDES
J. T. Gisborne, P. Robinson, and M. Shearman May 1984 8 p refs
(AMTE(M)-84520; BR94710) Avail: NTIS HC A02/MF A01

Copper oxide, acetate, nitrate, and sulfate compounds, envisaged as antifungal agents for fuel tank coatings, were tested for biocidal activity using bridged slide and test tube methods. High dose levels are required of each compound before the germination of the fungus Cladosporium resinae is inhibited. Author (ESA)

N86-17975# Naval Air Systems Command, Washington, D. C.
INVERSE FARADAY EFFECT IN HEMOGLOBIN DETECTED BY RAMAN SPECTROSCOPY: AN EXAMPLE OF MAGNETIC RESONANCE RAMAN ACTIVITY Final Report
T. W. Barrett 3 Jun. 1985 35 p
(AD-A159806; NADC-85074-60) Avail: NTIS HC A03/MF A01 CSCL 06/1

A complete polarization study of human oxy and carbonmonoxyhemoglobin A and S is reported for backscattered light in the resonance Raman light scattering situation with excitations in the long wavelength region, wavelength = 4579 A and 5815 A, and excitation in the short wavelength region, wavelength = 4579 A and 4880 A, as comparison. All four polarization components of the scattered light with respect to the two polarization conditions of linearly and circularly polarization of the incident light were measured. These were: (1) parallel; (2) perpendicular; (3) corotating; and (4) contrarotating. GRA

N86-17976# Minnesota Univ., Minneapolis. Immunobiology Research Center.
HLA-D: THE T CELL PERSPECTIVE
F. H. Bach, N. Ohta, A. Anichini, and N. L. Reinsmoen 1985 32 p
(Contracts N00014-85-K-0004; PHS-AI-17687)
(AD-A160019) Avail: NTIS HC A03/MF A01 CSCL 06/16

The introduction of the mixed leukocyte culture test (MLC) combined with the establishment of a one-way method of stimulation in MLC allowed the correlation of proliferative response in MLC with results of serological studies and the suggestion that reactivity in MLC is controlled by the major histocompatibility complex in man, now known as HLA. That the chromosomal region of HLA which controls the strongest stimulatory determinants for MLC (now known as the HLA-D region) was different from the class I encoding genes was already suggested in two early studies. Definitive evidence in this regard came from the studies of Yunis and Amos (1971). It is our purpose in this paper to discuss our current knowledge of the HLA-D region from the T cell perspective, an area that has been recently reviewed. The use of techniques that allow definition of determinants recognized by T lymphocytes and associated with HLA class II molecules has, thus, allowed definition of further polymorphisms not recognized with currently available/characterized serological reagents. Given the intimate relationship thought to exist between T lymphocyte recognition and major histocompatibility complex encoded molecules, definition of this LD (T lymphocyte defined), polymorphism may be of the greatest import. GRA

N86-17977# Minnesota Univ., Minneapolis.
CLONAL ANALYSIS OF HLA-DR AND -dQ ASSOCIATED DETERMINANTS: THEIR CONTRIBUTION TO dw SPECIFICITIES
N. L. Reinsmoen and F. H. Bach 1985 39 p
(Contract N00014-85-K-0004)
(AD-A160059) Avail: NTIS HC A03/MF A01 CSCL 06/16

In order to investigate the distribution of epitopes recognized by T cell clones directed against HLA class II products, bulk primed cell populations were generated using cells matched for class I determinants but disparate for class II determinants. Cells were cloned by single cell deposition (FACS IV) or limiting dilution (1 cell/3 wells), and assayed for proliferative and cytolytic function with panels of well-characterized cells. Our data indicate that determinants detected on both DR and DQ products are associated with the Dw type of the sensitizing cell showing that there is polymorphism recognized by T cells on both DR and DQ that is subtypic to the serologically defined specificities. Thus, it appears that the bulk T cell response is a composite of individual clones recognizing distinct determinants on these class II molecules. The implications of these findings for studies of HLA restricted recognition are discussed. GRA

N86-17978# Department of Energy, Washington, D. C.
METHOD FOR IMPROVING PRODUCT YIELDS IN AN ANIONIC METALLOPORPHYRIN-BASED ARTIFICIAL PHOTOSYNTHESIS SYSTEM Patent Application
J. A. Shelnutt, inventor (to DOE) Filed 29 Nov. 1984 27 p
(Contract DE-AC04-76DP-00789)
(DE85-017723; US-Patent-Appl-SN-676046) Avail: NTIS HC A03/MF A01

A method is disclosed improving product yields in an anionic metalloporphyrin-based artificial photosynthesis system for hydrogen generation. The method comprises forming an aqueous solution comprising an electron donor, methylviologen, and certain metalloporphyrins and metallochlorins, and irradiating said aqueous solution with light in the presence of a catalyst. In the photosynthesis process, solar energy is collected and stored in the form of a hydrogen. Ligands attached above and below the metalloporphyrin and metallochlorin plane are capable of sterically blocking photochemically inactive electrostatically bound (PI)-(PI) complexes which can develop. DOE

N86-17979# Argonne National Lab., Ill.
PROTEIN MAPPING AND THE PROBLEM OF COMPLEXITY IN MOLECULAR BIOLOGY
L. Anderson and N. Anderson 1985 7 p Presented at the Electrophoresis Forum, Munich, West Germany, 21 Oct. 1985
(Contract W-31-109-eng-38)
(DE85-018349; CONF-8510157-1) Avail: NTIS HC A02/MF A01

Two-dimensional electrophoretic protein mapping is now ten years old. Although it was evident to many in 1975 that a system for separating thousands of proteins would have a great effect on biology, the true parameters of this revolution are only now becoming apparent. This paper discusses what has been affected by the development of protein mapping, what the possibilities are now, why it has taken a decade to get this far. DOE

N86-17980# Medical Biological Lab. RVO-TNO, The Hague (Netherlands).
REPORT OF THE SYMPOSIUM ON BIOLOGICAL MONITORING OF EXPOSURE TO METALS AND OTHER INORGANIC COMPOUNDS [VERSLAG VAN HET SYMPOSIUM: BIOLOGICAL MONITORING OF EXPOSURE TO METALS AND OTHER INORGANIC COMPOUNDS]
P. C. Bragt 1985 12 p in DUTCH Symposium held in Miami, Fla., 30 Apr. - 2 May 1985
(MBL-1985-6; TDCK-93252) Avail: NTIS HC A02/MF A01

Metal concentration measurements in blood and urine, methods used, and social aspects within industrial sanitation, are discussed. Concentration measurements were done on Al, As, Cd, Cr, Hg, Ni, and Pb. Analysis methods such as inductively coupled plasma atomic emission spectrophotometry (ICP-AEA), and ICP electrothermal vaporization combination, ICP with cross flow nebulizer, inductively coupled argon plasma optical emission spectroscopy and Zeeman effect graphite furnace, were considered. Concerning an eventual legal status of biological monitoring, aspects of quality control were emphasized. Author (ESA)

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-17981# Medical Coll. of Ohio, Toledo. Dept. of Pathology.
BIOASSAY OF MILITARY RELEVANT COMPOUNDS FOR CARCINOGENIC ACTIVITY BY THE STRAIN A MOUSE LUNG TUMOR BIOASSAY Final Phase Report, Mar. 1983 - May 1984
G. D. Stoner Jan. 1985 17 p
(Contract DAMD17-81-C-1178; DA Proj. 3M1-61102-BS-10)
(AD-A156772) Avail: NTIS HC A02/MF A01 CSCL 06/5

Two dye compounds, C.I. Solvent Yellow 33 and a mixture of C.I. Solvent Green 3-C.I. Solvent Yellow 33, utilized in colored smoke grenades, were tested for carcinogenic potential in the strain A mouse lung tumor bioassay. The maximum tolerated dose for each dye was determined to be 25 mg/kg. At total doses of 600, 300 and 120 mg/kg, C.I. Solvent Yellow 33 and a mixture of C.I. Solvent Green 3-C.I. Solvent Yellow 33 did not produce an increase in the lung tumor response (i.e., the percentage of mice with lung tumors per mouse) when compared to vehicle (tricaprylin) controls. Therefore, at the dose levels administered both dyes are non-carcinogenic in the strain A mouse lung tumor bioassay under the conditions of the test. At necropsy, mice tested with either compound have significant quantities of accumulated dye in their tissues. This observation suggests that the dyes are either not metabolized or only partially metabolized by the animals. Author

N86-17982# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
A COMPARISON OF POSTMORTEM CORONARY ATHEROSCLEROSIS FINDINGS IN GENERAL AVIATION PILOT FATALITIES
C. F. Booze, Jr. and C. M. Staggs Aug. 1985 12 p
(AD-A159811; DOT/FAA-AM-85-6) Avail: NTIS HC A02/MF A01 CSCL 06/5

Autopsy reports of 710 pilots involved in fatal general aviation accidents and received by the FAA for the years 1980 to 1982 were reviewed to appraise the age-specific prevalence of coronary atherosclerosis among the autopsied group and compare findings with those of an earlier study of a similar pilot group. Sixty-nine percent of the autopsies on pilots killed in aircraft accidents indicated some degree of coronary atherosclerosis ranging from minimal to severe. This finding is higher than for a similar group of pilots studied during the years 1975 to 1977. However, only about 2.5% of the 1980 to 1982 study group were found to have severe coronary atherosclerosis, compared with 5% in the previous study. Prevalence of severe coronary atherosclerosis increased with age from 5.8 per 1,000 for ages less than 40 years to 73.9 for ages 50 years and above, also reflecting lower age-specific rates for severe coronary atherosclerosis than were found in the previous study. Recent emphasis on autopsy format and attention to sudden incapacitation is felt to have resulted in more accurate reporting for recent years. Prevalence of severe coronary atherosclerosis among the recently studied pilot group was less than that observed in an earlier study of a similar group. GRA

N86-17983# Harvard Univ., Boston, Mass. School of Public Health.
EXPEDIENT METHODS OF RESPIRATORY PROTECTION. 3: SUBMICRON PARTICLE TESTS AND SUMMARY OF QUALITY FACTORS
John M. Price, Douglas W. Cooper, and Charles S. Yee Jul. 1985 86 p refs
(TI85-018278; NUREG/CR-3537; NRC-A-1042; SAND-83-7450)
Avail: NTIS HC A05/MF A01

The efficacy of readily available materials, such as cotton fabrics, toweling, a surgical mask, and a single-use respirator, for providing emergency respiratory protection was evaluated by determining the filtration efficiency as a function of aerosol particle size over the size range of 0.001 to 5.0 micron and as a function of filtration face velocity. Filtration face velocity was set at 1.5, 5.0, and 15.0 sq cm. The equipment and procedures used to obtain efficiency measurements for particles 0.5 micron in diameter and smaller are described. Particles with diameters from 0.10 to 0.50 micron proved to be the most difficult sizes of particles to remove. Particles smaller than 0.10 micron were removed due to diffusion while particles larger than 0.50 micron were removed due to inertia and gravitational settling. Deposition of the smallest particles was favored by the use of low face velocities. A fractional efficiency curve was determined for each material at each velocity for comparison. Values of the quality factor were calculated. Quality factors were less for wet materials than for dry; less at high velocities rather than low; and best for the single-use respirator mask, next best for the surgical mask and often third best for the toweling. E.A.K.

N86-17984# Harvard School of Public Health, Boston, Mass.
ASSESSMENT OF INDIVIDUAL HUMAN EXPOSURES TO OZONE IN A HEALTH STUDY
D. T. Mage, M. Raizenne, and J. Spengler Aug. 1985 17 p refs
(PB85-245975; EPA-600/D-85-195) Avail: NTIS HC A02/MF A01 CSCL 06T

The minute dose of ozone delivered to the lower respiratory tract of a subject depends upon the ozone concentration inhaled, the minute volume (Ve 1/min) and the fraction of the inhaled ozone that penetrates the nasopharyngeal passages to enter the trachea. The ozone concentration (X) depends on the time of day and whether the subject is indoors or outdoors. The minute volume depends on the subject's age, sex, weight, and physical activity level. The fractional deposition of ozone depends on the concentration inhaled (X), the minute volume (Ve), and the mode of breathing (nasal or oronasal). These dependencies are reviewed and a calculation of a daily ozone dosage is presented for a prototypical 12-year old child at summer camp who varies his physical activities in indoor and outdoor settings over a 24-hour period. Author (GRA)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-17985# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany). Buero der Nachrichten fuer Luftfahrer.
INSTRUCTIONS FOR FLIGHT CREW MEMBERS AND FLIGHT CREW TRAINING AND EXAMINATION GUIDELINES OF THE WEST GERMAN FEDERAL BOARD OF TRANSPORT [VERORDNUNG UEBER LUFTFAHRTPERSONAL (LUFTPERSV) UND RICHTLINIEN DES BUNDESMINISTERS FUER VERKEHR FUER DIE AUSBILDUNG UND PRUEFUNG DES LUFTFAHRTPERSONALS]
Apr. 1984 124 p In GERMAN
(Rept-1) Avail: NTIS HC A06/MF A01

Regulations for obtaining flight authorization and for flight legitimacy for private aircraft pilots, for air navigators, and airline crew members, as well as certifications for onboard instruments and long distance flights were determined. The guidelines of the West German Federal Board of Transport for crew members' theoretical and practical training, and examinations in mathematics, physics, chemistry, and English were drawn up. Examples of the tests are given. Author (ESA)

N86-17986# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Vision Research Group.
PHOTOSIMULATION OF TARGET ACQUISITION IN THE PRESENCE OF SMOKE: A PILOT STUDY
J. M. Valeton and J. J. Vos Nov. 1984 19 p refs
(Contract A79/KL/151)
(IZF-1984-36; TDCK-79980) Avail: NTIS HC A02/MF A01

A quality measure derived from smoke screen hole statistics was related to the probability of target detection. A background scene (hilly landscape), a target (tank silhouette in 1 of 20 possible locations) and a smoke screen (strong homogeneous veil of light) were projected onto a screen. Observers searched the scene with a rotatable telescope (magnification x 1) and fired when a target was found. The smoke projector was switched on and off to produce sequences of holes and obscurations corresponding to a prescribed smoke screen quality. Results show that smoke quality is a good predictor of target screening; targets are found only when the sight passes over them; even relatively conspicuous targets do not attract enough attention to disrupt the regular search pattern; and search speed is strongly determined by target conspicuousness. Author (ESA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-17987 Admiralty Marine Technology Establishment, Portsmouth (England). Experimental Diving Unit.
PERFORMANCE COMPARISON OF THIRTY, TWO-STAGE DEMAND REGULATORS
I. A. Himmens Jan. 1984 25 p refs
(ARE(M6)-TM-83818; BR94139) Avail: NTIS HC A02/MF A01

Thirty, two-stage air demand regulators were tested. Only 2 meet the recommended limits for breathing resistance and work of breathing for the 3 ventilation rates at the maximum depth of 50 msw. A majority of the regulators exhibit rapid degradation of inhalation response at a ventilation rate of 62.5 l/min, beyond their respective maximum depths or as cylinder pressures approach 30 Bar. Author (ESA)

N86-17988 Royal Air Force Inst. of Pathology and Tropical Medicine, Aylesbury (England). Aircraft Equipment Group.
A WATERPROOF VENT VALVE FOR IMMERSION SUITS
G. Richardson Dec. 1984 20 p refs
(Rept-515; BR95132) Avail: NTIS HC A02/MF A01

An air vent valve for flight crew immersion suits was developed. Experiments show that the valve, closed by hydrostatic pressure, vents an immersion coverall undergoing rapid changes in altitude. Such a valve allows no water to enter the coverall during immersion in water with moderate wave motion or doing normal dinghy entry drills. Exploitation of the technique significantly improves comfort to users of air immersion coveralls at altitude. It prevents loss of insulation through collapse on descent. The advantages can be maintained without the risk of allowing water to enter the coverall. Extension of the principle to allow microclimatic ventilation by bellows action is suggested. Author (ESA)

N86-17989# Oak Ridge National Lab., Tenn.
ADVANCED SERVOMANIPULATOR DEVELOPMENT
D. P. Kuban 1985 41 p Presented at the France/US Department of Energy Meeting on Remote Systems Technology, Saclay, France, 2 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017720; CONF-8509156-2) Avail: NTIS HC A03/MF A01

The Advanced Servomanipulator (ASM) System consists of three major components: the ASM slave, the dual arm master controller (DAMC) or master, and the control system. The ASM is remotely maintainable force-reflecting servomanipulator developed at the Oak Ridge National Laboratory (ORNL) as part of the Consolidated Fuel Reprocessing Program. This new manipulator addresses requirements of advanced nuclear fuel reprocessing with emphasis on force reflection, remote maintainability, reliability, radiation tolerance, and corrosion resistance. The advanced servomanipulator is uniquely subdivided into remotely replaceable modules which will permit in situ manipulator repair by spare module replacement. Manipulator modularization and increased reliability are accomplished through a force transmission system that uses gears and torque tubes. Digital control algorithms and mechanical precision are used to offset the increased backlash, friction, and inertia resulting from the gear drives. This results in the first remotely maintainable force-reflecting servomanipulator in the world. DOE

N86-17990# Clarke Ambrose, Inc., Knoxville, Tenn.
HUMAN-MACHINE INTERFACES FOR TELEOPERATORS: AN OVERVIEW OF RESEARCH AND DEVELOPMENT AT THE OAK RIDGE NATIONAL LABORATORY. CONSOLIDATED FUEL REPROCESSING PROGRAM
J. V. Draper and M. J. Feldman 1985 23 p Presented at the France/U.S. Department of Energy Meeting on Remote Systems Technology, Saclay, France, 2 Sep. 1985 Prepared in cooperation with ORNL, Tenn.
(Contract DE-AC05-84OR-21400)
(DE85-017713; CONF-8509156-1) Avail: NTIS HC A02/MF A01

This paper surveys the contributions of human factors to the mission of the Remote Control Engineering (RCE) task over the last 6 years. These contributions can be divided into two areas, research efforts and design efforts. Some of the topics covered in human factors research are manipulator comparisons, investigation of viewing system characteristics, research into the effects of force reflection, and studies of crew size and task allocation. In the area of component design the human factors group was primarily responsible for the conceptual design of the Advanced Integrated Maintenance System (AIMS) control room, including all operator work stations and overall control room architecture. The human factors group also contributed to the design of the AIMS master controller handle. Recent research at the RCE task has centered on comparison of manipulator systems. This research was planned and conducted by the human factors group and other ORNL personnel. The research is aimed at evaluating three important characteristics of manipulator systems: system dynamics, force feedback, and human-machine interface. DOE

N86-17991# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

THE BIOMORPHIC MODEL OF THE HUMAN PILOT
O. H. Gerlach 1984 134 p refs
(VTH-LR-310) Avail: NTIS HC A07/MF A01

A mathematical model of the overt behavior of a human operator when controling an aircraft-like dynamic element in a closed loop situation is described. Since the aim is to achieve a close correspondence between the physiological and psychological processes going on in the human controller and their mathematical expression in the model, the latter is named the biomorphic model. The model refers only to single-display, single-axis control situations. A computer program selecting the free parameters in the model and calculating their characteristics is discussed.
Author (ESA)

N86-17992# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Thermofysiologie.
HEAT TRANSFER IN IMPERMEABLE CLOTHING: SWEAT PLAYS A ROLE AFTER ALL
F. J. G. vandeLinde, H. vanMiddendorp, and W. A. Lotens May 1985 19 p refs In DUTCH; ENGLISH summary
(Contract A81/K/041)
(IZF-1985-9; TDCK-93219) Avail: NTIS HC A02/MF A01

In a laboratory experiment with six subjects, the effective thermal insulation of a totally impermeable outfit was measured in two different conditions to prove that vapor transfer contributes to the total heat release of the subjects. In the first condition, condensation of evaporated sweat in the inside of the outer impermeable was made impossible, in the second condition such condensation was allowed. Processes of humid heat transfer inside the clothing cause a 40% decrease in effective insulation. Therefore, at ambient temperatures lower than skin temperature, heat stress is lower than expected on the basis of clothing insulation judged by thickness or determined in nonhumid situations.
Author (ESA)

N86-17993# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde.
A COMPUTER AIDED DESIGN (CAD) SYSTEM AS A TOOL FOR THE ERGONOMIST IN DEVELOPING MAN-MACHINE SYSTEMS
P. I. L. Moonen Jun. 1985 37 p refs In DUTCH; ENGLISH summary
(IZF-1985-10; TDCK-93253) Avail: NTIS HC A03/MF A01

The use of a Computer Aided Design (CAD) system in an anthropometric computer model is discussed. For its presentation function, ease of operation, interpretation, etc. are required. However, for the test function, ergonomic knowledge expressed in standards is demanded. The possibilities and limitations of an existing CAD system are discussed. The profit of the system concerning the test function is doubted, for ergonomic knowledge is rarely expressed in standards. In case of the realization of a test function, a substantial investment is required, justified only by frequent and large-scale use.
Author (ESA)

N86-17994# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Visuologie.
COLOR ON DISPLAYS. PART 1: THE PSYCHOPHYSICAL AND PHYSIOLOGICAL ASPECTS
J. Walraven Jun. 1985 71 p refs In DUTCH; ENGLISH summary
(IZF-1985-11; TDCK-93254) Avail: NTIS HC A04/MF A01

Aspects of color, important for display designers and human factors engineers, who use color for structuring, coding and/or accentuation of display information, are presented. The dimensions of color (perceptual and stimulus); discriminating between the aperture and object mode, color metrics and its applicability for display colors, perceptual artefacts, and the diminished color discrimination for small visual angles (small-field tritanopia), color in relation to accomodation problems (chromatic aberration, resting focus), and the problem of the display user with defective color vision are considered.
Author (ESA)

N86-17995# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
PSYCHOLOGICAL PROBLEMS ASSOCIATED WITH THE WEARING OF RESPIRATORY PROTECTIVE DEVICES: A REVIEW
Eva Mauritzson-Sandberg and Lennart Sandberg Jun. 1985 37 p refs In SWEDISH; ENGLISH summary Sponsored by Swedish Civil Defence Administration
(FOA-C-40216-C2; ISSN-0347-2124) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

Psychological reactions to wearing breathing apparatus were studied. Discomfort is found to be associated with restricted speech transmission, restricted field of view, and increased inhalation and exhalation resistance. A relatively rapid adaptation to the wearing of respirators is noted. Sensory deprivation and motivation are discussed.
Author (ESA)

N86-17996# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
HELICOPTER COCKPIT ORGANIZATION FOR NIGHT VISION
M. A. Veve 1985 8 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-103) Avail: NTIS HC A02/MF A01

Ultraviolet lighting associated with a yellow-green fluorescent paint was selected as a cockpit night vision system compatible with the use of light intensification goggles, when performing military missions at night. The characteristics of night vision goggles are reviewed. Ergonomic and safety aspects are discussed. The system proposed optimizes the cockpit lighting with regard to physiological properties of the human eye. The spectral output of the lighting system is separated from the spectral response of the image intensifier photocathode.
Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-17997*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PARTITIONING PROBLEMS IN PARALLEL, PIPELINED AND DISTRIBUTED COMPUTING Final Report
Shahid Bokhari Nov. 1985 34 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178023; ICASE-85-54; NAS 1.26:178023) Avail: NTIS HC A03/MF A01 CSCL 12A

The problem of optimally assigning the modules of a parallel program over the processors of a multiple computer system is addressed. A Sum-Bottleneck path algorithm is developed that permits the efficient solution of many variants of this problem under some constraints on the structure of the partitions. In particular, the following problems are solved optimally for a single-host, multiple satellite system: partitioning multiple chain structured parallel programs, multiple arbitrarily structured serial programs and single tree structured parallel programs. In addition, the problems of partitioning chain structured parallel programs across chain connected systems and across shared memory (or shared bus) systems are also solved under certain constraints. All solutions for parallel programs are equally applicable to pipelined programs. These results extend prior research in this area by explicitly taking concurrency into account and permit the efficient

utilization of multiple computer architectures for a wide range of problems of practical interest. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-17998*# Virginia Univ., Charlottesville. Dept. of Applied Mathematics.
RESEARCH IN COMPUTER SCIENCE Semiannual Report
James M. Ortega Jan. 1986 8 p
(Grant NAG1-242)
(NASA-CR-176486; NAS 1.26:176486; UVA/528209/AM86/108) Avail: NTIS HC A02/MF A01 CSCL 09B

Various graduate research activities in the field of computer science are reported. Among the topics discussed are: (1) failure probabilities in multi-version software; (2) Gaussian Elimination on parallel computers; (3) three dimensional Poisson solvers on parallel/vector computers; (4) automated task decomposition for multiple robot arms; (5) multi-color incomplete cholesky conjugate gradient methods on the Cyber 205; and (6) parallel implementation of iterative methods for solving linear equations. G.L.C.

N86-17999# Naval Ocean Systems Center, San Diego, Calif.
NOSC UNIBUS (TRADEMARK) UNIVAC INPUT/OUTPUT CONTROLLER
R. Mitchell Aug. 1985 50 p
(AD-A159802; NOSC/TD-822) Avail: NTIS HC A03/MF A01 CSCL 09/2

The NOSC-developed UNIBUS/UNIVAC compatible input/output Controller (IOC) is designed to provide any host computer supporting the Digital Equipment Corp. The UNIBUS configuration with an input/output (I/O) channel whose protocol, timing, and electrical interface specifications are compatible with standard NTDS FAST and Univac 1100 series I/O channels. In addition, true differential I/O operation is provided for use in systems where this is supported or where intercomputer grounding problems exist. The IOC can operate when connected to either a peripheral I/O device such as a line printer or a card reader (normal mode), or the I/O channel of another computer (intercomputer mode). The mode is software selectable. By using IOCs in multiple hosts, parallel intercomputer channels may be readily established between them. Unless specifically noted otherwise, the device connected to; the IOC will be referred to as the I/O subsystem regardless of the mode being used. The computer housing the IOC will be referred to as the host. GRA

N86-18000# Naval Postgraduate School, Monterey, Calif.
A GRAPH THEORETIC ALGORITHM FOR CONTOUR SURFACE DISPLAY GENERATION M.S. Thesis
M. Sahintepe Jun. 1985 154 p
(AD-A159822) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis develops a graph theoretic algorithm for contour surface display generation. The inadequacies of the currently published algorithms, with respect to contour line generation for a subgrid, are pointed out in a brief review of the available literature. The algorithm developed in this study, called the Large Contouring Tree Algorithm, gets rid of the cited inadequacies. The core component of the introduced algorithm is a two-dimensional contouring algorithm that operates on two-dimensional slices of a larger three-dimensional grid. The Large Contouring Tree Algorithm in the PASCAL programming language is presented in Appendix A. Author (GRA)

N86-18001# Allied Bendix Corp., Kansas City, Mo.
CAD-CAM DATABASE MANAGEMENT AT BENDIX KANSAS CITY
D. R. Witte May 1985 30 p Presented at the CAD/CAM Databases: Who's in Control?, San Francisco, Calif., 29-30 Apr. 1985
(Contract DE-AC04-76DP-00613)
(DE85-017579; BDX-613-3282; CONF-8504177-1) Avail: NTIS HC A03/MF A01

The Bendix Kansas City Division of Allied Corporation began integrating mechanical CAD-CAM capabilities into its operations in June 1980. The primary capabilities include a wireframe modeling application, a solid modeling application, and the Bendix Integrated Computer Aided Manufacturing (BICAM) System application, a set of software programs and procedures which provides user-friendly access to graphic applications and data, and user-friendly sharing of data between applications and users. The BICAM also provides for enforcement of corporate/enterprise policies. Three access categories, private, local, and global, are realized through the implementation of data management metaphors: the desk, reading rack, file cabinet, and library are for the storage, retrieval, and sharing of drawings and models. Access is provided through menu selections; searching for designs is done by a paging method or a search-by-attribute-value method. The sharing of designs between all users of Part Data is key. The BICAM System supports 375 unique users per quarter and manages over 7500 drawings and models. The BICAM System demonstrates the need for generalized models, a high-level system framework, prototyping, information-modeling methods, and an understanding of the entire enterprise. Future BICAM System implementations are planned to take advantage of this knowledge. DOE

N86-18002# Oak Ridge National Lab., Tenn.
PARALLEL CHOLESKY FACTORIZATION ON A HYPERCUBE MULTIPROCESSOR
G. A. Geist and M. T. Heath Aug. 1985 53 p
(Contract DE-AC05-84OR-21400)
(DE85-018121; ORNL-6190) Avail: NTIS HC A04/MF A01

Two types of message-passing parallel algorithms are developed for solving symmetric systems of linear equations on a hypercube multiprocessor. One type involves broadcast communication among processors, and the other involves communication along a ring of processors. Details are provided in the form of C-programs that implement the algorithms on a hypercube simulator and which should run with little modification on real hypercube hardware. Performance of the various algorithms is demonstrated by means of processor utilization graphs and parallel speedup curves. DOE

N86-18003# World Meteorological Organization, Geneva (Switzerland).
GUIDE TO THE AUTOMATION OF DATA-PROCESSING CENTERS
1985 110 p
(WMO-636; ISBN-92-63-10636-3) Avail: NTIS MF A01; print copy available at WMO, Geneva SWFR 20

The requirements for automation of data processing centers by meteorological services are specified. Project planning; computer system design; software development; contracts; computer installation; acceptance tests; staff selection and training; operation and maintenance of hardware and software; upgrading an already automated center; and data processing system configurations are covered. Author (ESA)

N86-18004# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
TECHNICAL OVERVIEW OF THE INFORMATION RESOURCE DICTIONARY SYSTEM
A. Goldfine and P. Konig Apr. 1985 135 p
(PB85-224491; NBSIR-85/3164) Avail: NTIS HC A07/MF A01 CSCL 09B

A technical overview of the computer software specifications for the Information Resource Dictionary System (IRDS) is presented. It summarizes the data architecture and the software functions and processes of the IRDS. The IRDS Specifications are a draft proposed American National Standard, a draft proposed U.S. Federal Information Processing Standard, and a Working Docu-

ment of the International Organization for Standardization (ISO), Subcommittee 21, Working Group 3. The overview also provides background information on the development of the draft proposed U.S. standards. GRA

N86-18005# Brighton Polytechnic (England). Dept. of Computing and Cybernetics.
NOVEL COMPUTER ARCHITECTURES FOR DATA STORAGE AND RETRIEVAL
F. N. Teskey 1985 49 p refs
(BLRDR-5845) Copyright. Avail: Issuing Activity

The aim of this report is to review selected novel computer architectures for data storage and retrieval and assess their implication for library and information work. The report is based on an examination of published literature and consultations with research workers, manufacturers and users of these machines in the U.K. The report outlines the particular data storage and retrieval requirements for library and information work, and discusses some of the novel systems that are currently being used in this field. A number of new architectures with possible application in this field are now being developed by research teams in the U.K. and the report contains descriptions of these projects. The report summarizes the possible applications of both the existing and proposed systems to library and information work, and suggests areas for future research and development. DOE

N86-17267# National Aerospace Lab., Tokyo (Japan).
IMAGE PROCESSOR ARCHITECTURES AND A DATA-DRIVEN IMAGE PROCESSORE: TIP-1
Tsutomu Temma *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 175-182 refs
In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-18006 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A NEW APPROACH TO THE DESIGN AND CONSTRUCTION OF PROTOCOL TESTERS
J. R. Pavel Mar. 1985 41 p refs
(NPL-DITC-54/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

A design for a distributed open system interconnection testing system and a methodology for building it are presented. The hierarchical design gives test definers better control of the point closest to the system under test. It can express the test at the octet level, or at the protocol phase level. The hierarchical design is suited to a bottom-up development methodology, allowing postponement of binding design commitments to the last possible stage. Being able to reassemble the building blocks of a test driver in different ways increases its flexibility and adaptability. The ability to produce prototypes of protocol data unit decoders using Prolog grammar clauses and so to produce protocol data unit decoders automatically by a parser generator based on attribute grammars should reduce the cost of producing testing systems significantly. A user interface to the hierarchical testing system for use as a development aid to protocol implementors is presented. Author (ESA)

N86-18007 CIAD, Zoetermeer (Netherlands).
TEST OF APPLICON BRAVO [TEST APPLICON BRAVO]
J. J. Duivenvoorden and C. Tjallema 1984 30 p In DUTCH
(A-13; ISBN-90-6818-017-7) Copyright. Avail: Issuing Activity

An Applicon Bravo computer aided design (CAD) configuration, containing a VAX-11/751 computer, CDC diskdrive, tape unit, 4650 wokstation, Calcomp plotter, and Tektronix Hardcopy-unit, was tested. The system is suited for mechanical and electrical purposes. After base-figure construction, two-dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings, were executed. Line-strings, edgings, parameterized forms, accuracy, draw-speed, data storage efficiency, and coupling possibilities with FORTRAN programs were investigated. An engine, a T-piece with flanges, and a ship's plating were modeled in three dimensions and combined. Two and three-dimensional integration was examined. For numerical control, pump-cylinder elaborations, were executed. Communication possibilities with other CAD-systems were examined. Positive points are: many functions; parts revisions are automatically transferred to compositions; screen; function response; powerful CPU's; well-established company. Negative points are: price; few line-types and shading possibilities; data storage efficiency; numerical control not optimal, lack of ship's plating thickness; the surface does not cover all coordinates. Author (ESA)

N86-18008# Royal Signals and Radar Establishment, Malvern (England).
SSMS: A SECURE SOFTWARE MANAGEMENT SYSTEM
G. D. Whitaker Nov. 1984 13 p ref
(AD-A159489; RSRE-MEMO-3777; BR96554) Avail: NTIS HC A02/MF A01

A system for managing computer software, documentation, etc., based on a central data base, a diary of system updates, and utility programs is described. Two data files are stored in a secure system username. One file, sysdiary, is a character file with an entry for every change to system software. The second, sysindex, is a binary (random access) file with an entry for each item of system software, system documentation, data files etc. It is only possible to append information to the end of sysdiary and this is only permitted from certain secure usernames. Thus, sysdiary provides a secure and complete record of system changes as and when they occur and, because it is updated automatically, there is no opportunity for forgetfulness. Only one utility can write to sysindex, and it may be run only from the same secure usernames. The username which owns sysindex and sysdiary is used to store copies of the source text of all system software. Author (ESA)

N86-18009# Naval Postgraduate School, Monterey, Calif.
REUSABLE SOFTWARE: TRADE-OFF ANALYSIS AND A NEW APPROACH M.S. Thesis
C. A. Murnan Jun. 1985 64 p
(AD-A159813) Avail: NTIS HC A04/MF A01 CSCL 09/2

Software reusability is seen as a resource which can assist in resolving the current software crisis. This thesis discusses issues that are relevant to the concept of reusable software. It reviews the definition of reusable software and presents software development scenarios to describe possible guidelines for performing a trade-off analysis in determining the pros and cons of incorporating reusable software concepts into a software product. The thesis also suggests the need for new and dramatically different methodologies to make software reusability a viable concept. Author (GRA)

N86-18010# RAND Corp., Santa Monica, Calif.
THE RAND-ABEL PROGRAMMING LANGUAGE: HISTORY, RATIONALE, AND DESIGN Interim Report
N. Shapiro, H. E. Hall, R. Anderson, and M. LaCasse Aug. 1985 54 p
(Contract MDA903-85-C-0030)
(AD-A159821; RAND/R-3274-NA) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report describes the motivations behind the development of the RAND-ABLE programming language and some of its novel features. RAND-ABEL was designed to meet the needs of the Rand Strategy Assessment Center, which is building a large system for automated war gaming in which separate rule-based models represent U.S., Soviet, and third-country behavior. To satisfy the requirements for speed and transparency, the language

was designed to be: (1) rapidly compilable and executable; (2) self-documenting; (3) understandable by nonprogrammer domain experts after modest instruction; (4) reasonably easy to learn and use, especially for modifying or incrementally extending existing code; (5) portable across different computers; and (6) well suited to development of large and complex rule-based simulations. Certain of its features are unique: the ability to express directly in RAND-ABEL source code such natural structures as decision tables (isomorphic with decision trees) and order tables, which lay out orders to be executed sequentially, and its novel declaration-by-example feature, which is useful for rule-based programs with enumerated variables and many distinct data types. RAND-ABEL has built-in support for a data dictionary for communication between separate modules. Author (GRA)

N86-18011# Naval Postgraduate School, Monterey, Calif.
A SYSTOLIC ARRAY IMPLEMENTATION OF A REED-SOLOMON ENCODER AND DECODER M.S. Thesis
S. S. McKenzie Jun. 1985 93 p
(AD-A159824) Avail: NTIS HC A05/MF A01 CSCL 09/2

A systolic array is a natural architecture for the implementation of a Reed-Solomon (RS) encoder and decoder. It possesses many of the properties desired for a special-purpose application: simple and regular design, concurrency, modular expansibility, fast response time, cost-effectiveness, and high reliability. As a result, it is very will suited for the simple and regular design essential for VLSI implementation. This thesis takes a modular approach to the design of a systolic array based RS encoder and decoder. Initially, the concept of systolic arrays is discussed followed by an introduction to finite field theory and Reed-Solomon error correction codes. Then it is shown how RS codes can be encoded and decoded with primitive shift registers and implemented using a systolic architecture. In this way, the reader can gain valuable insight and comprehension into how these entities are coalesced together to produced the overall implementation. Author (GRA)

N86-18012# Naval Postgraduate School, Monterey, Calif.
PROBABILISTIC ANALYSIS OF FAULT TREES USING PIVOTAL DECOMPOSITION M.S. Thesis
W. T. McCullers, III Jun. 1985 69 p
(AD-A159856) Avail: NTIS HC A04/MF A01 CSCL 12/1

In this thesis an algorithm is presented for computing the exact failure probability for binary systems represented as fault trees. This algorithm does not rely on cut sets. Instead, it applies recursive pivotal decomposition together with probabilistic structural reductions and modularization directly to the fault tree. A further capability of the algorithm is the sequential printing of equations to form a function for a specific fault tree which computes system failure probability given the basic event probabilities. Author (GRA)

N86-18013# Navy Personnel Research and Development Center, San Diego, Calif.
COMPUTER-MANAGED INSTRUCTION: CRYSTALLIZED AND FLUID INTELLIGENCE Technical Report, Mar. - Sep. 1984
F. Pat-Anthony Sep. 1985 32 p
(AD-A160017; NPRDC-TR-85-36) Avail: NTIS HC A03/MF A01 CSCL 09/2

Twenty-four measures crystallized intelligence (G sub c) and fluid intelligence (G sub f) were obtained for samples of graduates and failures of an innovative instructional situation in which computer-managed mastery learning was used to teach elementary electricity and electronics. Seven stepwise multiple discriminant analyses and associated statistics were computed to determine which linear combinations of G sub f and G sub c measures would optimally separate the two groups. Corresponding classification functions derived for the discriminant analyses were applied to the data to evaluate the effectiveness of differentiating failures and graduates. The results did not substantiate the hypothesis that G sub f measures would be associated more strongly with student success in a new instructional situation than would G sub c measures. Contrary to theory, the findings suggest that some unconventional educational environments are not necessarily dysfunctional for more able students. In these situations, they can just as easily exercise and exploit those skills developed and applied in more traditional instructional settings. GRA

N86-18014# Maryland Univ., College Park. Dept. of Computer Science.
CHARACTERIZING SOFTWARE WITH OBJECTIVE MEASUREMENTS
D. H. Hutchens May 1985 107 p
(Contract F49620-80-C-001)
(AD-A160018; TR-1504; AFOSR-85-0804TR) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis reports on a series of experimental studies performed to determine possible uses of objective software measurements in characterizing and evaluating software. This work revolves around two main themes. The first theme addresses the usefulness of metrices in evaluating the quality of software, particularly as it is related to the errors or changes required during development. It also contains information about how different programming techniques and individual programmers affect the analysis. The second thene addresses program modularity from the prespective of objective software measurements. A technique for automatically determining a hierarchy of modules for a system given its procedure interfaces is presented and evaluated on some class projects and some medium size production software. GRA

N86-18015# California Univ., Berkeley. Center for Pure and Applied Mathematics.
DEVELOPMENT OF AN ACCURATE ALGORITHM FOR EXP(Bt)
B. N. Parlett and K. C. Ng Aug. 1985 29 p
(Contract N00014-76-C-0013)
(AD-A160060; PAM-294) Avail: NTIS HC A03/MF A01 CSCL 09/2

This document describes a program to compute the exponential of a given n by n matrix B multiplied by a scalar tau that is to be thought of as representing time. The authors' primary goal has been to achieve as much accuracy as working precision permits without resorting to stimulated higher precision. The final product is more complicated than they anticipated at the outset. How these complications came to be expected is the theme of this story. The cases considered may be of interest to those who wish to use the matrix exponential in their work. The code acts simply on simple cases. This code is unlikely to be the last word on the computation of exp(Bt) since speed and simplicity deserve some recognition. For simplicity and generality this document considers only complex matrices and only those whose order n is small enough that four n by n arrays fit comfortably in the fast store. In practice the authors expect to have $n<100$. Recall that unless B has special structure, such as being block diagonal, its exponential will have no zero elements. GRA

N86-18016# Duke Univ., Durham, N. C. Dept. of Computer Science.
PERFORMANCE AND RELIABILITY ANALYSIS USING DIRECTED ACYCLIC GRAPHS Technical Report
R. A. Sahner and K. S. Trivedi 4 Apr. 1985 41 p
(Grant AF-AFOSR-0132-84)
(AD-A160313; CS-1985-9; AFOSR-85-0808TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

A computer powerful model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where events may occur serially, probabilistically, or concurrently. When a set of events occurs concurrently, the condition for the set of events to complete is that any specified number of the events must complete. This includes the special cases that one or all of the events complete. The distribution function associated with an event is assumed to have exponential polynomial form. Further generality is obtained by allowing these distributions to have a mass at the origin and/or at infinity. The distribution function for the time taken to complete the entire graph is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. GRA

N86-18017# Sandia National Labs., Albuquerque, N. Mex.
A COMPARISON OF UNCERTAINTY AND SENSITIVITY ANALYSIS TECHNIQUES FOR COMPUTER MODELS
Ronald L. Iman and Jon C. Helton Mar. 1985 116 p
(Contract DE-AC04-76DP-00789)
(TI85-013272; NUREG/CR-3904; SAND-84-1461) Avail: NTIS HC A06/MF A01

Uncertainty analysis and sensitivity analysis are important elements in the development and implementation of computer models for complex processes. Typically, there are many uncertainties associated with both the development and the application of such models. Understanding of these uncertainties and their causes is required to effectively interpret model behavior. Many different techniques have been proposed for performing uncertainty and sensitivity analyses. The objective of the present study is to compare several widely used techniques on three models having large uncertainties and varying degrees of complexity in order to highlight some of the problem areas that must be addressed in actual applications. The following approaches to undertainty and sensitivity analysis are considered: (1) response surface methodology based on input determined from a fractional factorial design; (2) Latin hypercube sampling with end without regression analysis; and (3) differential analysis. These techniques are compared on the basis of: (1) ease of implementation, (2) flexibility, (3) estimation of the cumulative distribution function of the output, and (4) adaptability to different methods of sensitivity analysis. With respect to these criteria, the technique using Latin hypercube sampling and regression analysis gives the best results overall.
Author

N86-18018# Sandia National Labs., Albuquerque, N. Mex.
A FORTRAN 77 PROGRAM AND USER'S GUIDE FOR THE CALCULATION OF PARTIAL CORRELATION AND STANDARDIZED REGRESSION COEFFICIENTS
Ronald L. Iman, Michael J. Shortencarier, and Jay D. Johnson Jun. 1985 51 p refs
(TI85-016573; NUREG/CR-4122; NRC-A-1339; SAND-85-0044) Avail: NTIS HC A04/MF A01

This document is for users of a computer program developed by the authors at Sandia National Laboratories. The computer program is designed to be used in conjunction with sensitivity analyses of complex computer models. In particular, this program is most useful in analyzing input-outp relationships when the input has been selected using the Latin hypercube sampling program developed at Sandia (Iman and Shortencarier, 1984). The present computer program calculates the partial correlation coefficients and/or the standardization regression coefficients from the multivariate input to, and output from, a computer model. These coefficients can be calculated on either the original observations or on the ranks of the original observations. The coefficients provide alternative measures of the relative contribution (importance) of each of the various inputs to the observed output variations. Relationships between the coefficients and differences in their interpretations are identified. If the computer model output has an associated time or spatial history then the computer program will generate a graph of the coefficients over time or space for each input-variable, output-variable combination of interest, thus indicating the importance of each input over time or space. The computer program is user-friendly and written in FORTRAN 77 to facilitate portability.
DOE

N86-18019# Los Alamos National Lab., N. Mex.
EPIC: AN ERROR PROPAGATION/INQUIRY CODE
Alice L. Baker 1985 6 p Presented at the 26th Annual Meeting of the Institute of Nuclear Materials Management, Albuquerque, N. Mex., 22-25 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015693; LA-UR-85-2565; CONF-850765-13) Avail: NTIS HC A02/MF A01

The use of the computer program EPIC (Error Propagation/Inquiry Code) will be discussed. EPIC calculates the variance of a materials balance closed about a materials balance area (MBA) in a processing plant operated under steady-state conditions. It was designed for use in evaluating the significance of inventory differences in the Department of Energy (DOE) nuclear plants. EPIC rapidly estimates the variance of a materials balance using average plant operating data. The intent is to learn as much as possible about problem areas in a process with simple straightforward calculations assuming a process is running in a steady-state mode. EPIC is designed to be used by plant personnel or others with little computer background. However, the user should be knowledgeable about measurement errors in the system being evaluated and have a limited knowledge of how error terms are combined in error propagation analyses. EPIC contains six variance equations; the appropriate equation is used to calculate the variance at each measurement point. After all of these variances are calculated, the total variance for the MBA is calculated using a simple algebraic sum of variances. The EPIC code runs on any computer that accepts a standard form of the BASIC language.
Author

N86-18020# Bettis Atomic Power Lab., West Mifflin, Pa.
TRANSL: A SUBROUTINE LIBRARY FOR PATRAN-G TRANSLATORS
K. M. Butler Jun. 1985 13 p
(Contract DE-AC11-76PN-00014)
(DE85-017634; WAPD-T-2869) Avail: NTIS HC A02/MF A01

This paper describes the capabilities of the TRANSL subroutine library. This library streamlines the development of interface programs which translate finite element engineering models developed using PATRAN G interactive graphics software to engineering analysis computer programs typically executed on large mainframe computers. PATRAN-G is a powerful graphics program which greatly simplifies the tasks of generating two- or three-dimensional geometry models, creating finite element grids, and applying boundary conditions. In order to convert a PATRAN-G model into a usable input deck for an engineering analysis program, a translator program must be available. Since each analysis program requires its own translator, this becomes a formidable programming task for an organization with many programs developed in-house. TRANSL is a versatile FORTRAN 77 subroutine library which has been written on the VAX 11/78X computer to perform activities which are common to any PATRAN-G translator, such as data storage and manipulation, file handling, and interactive communication with the user. This library has been found to greatly reduce the development time of translator. An example of a translator written for the fluid dynamics program FIDAP is presented in the paper.
DOE

N86-18021# Lawrence Livermore National Lab., Calif.
ORION: AN INTERACTIVE COLOR POST-PROCESSOR FOR TWO DIMENSIONAL FINITE ELEMENT CODES, REVISION 2
J. O. Hallquist and J. L. Levatin Aug. 1985 49 p refs
(DE85-017876; UCID-19310-Rev-2) Avail: NTIS HC A03/MF A01

This report is a user's manual for the post-processor, ORION. ORION reads the binary plot files generated by the two-dimensional finite element codes currently used at LLNL. Contour and color fringe plots of a large number of quantities may be displayed on meshes consisting of triangular and quadrilateral elements. ORION can compute strain measures, interface pressures along slide lines, reaction forces along constrained boundaries, and momentum. ORION runs on the CRAY-1 and VAX computers.
DOE

N86-18022# Oak Ridge National Lab., Tenn.
ALKACYCL: A BASIC COMPUTER PROGRAM FOR THE ANALYSIS OF ALKALI METAL RANKINE POWER CYCLES
J. C. Moyers Aug. 1985 34 p
(Contract DE-AC05-84OR-21400)
(DE85-018125; ORNL/TM-9693) Avail: NTIS HC A03/MF A01

The ALKACYCL is a computer program that analyzes Rankine power cycles utilizing an alkali metal as the cycle working fluid. Cycles may have from zero to three stages of regenerative feed heating. The program is written in BASICA language and can be used on an IBM-PC or PC-compatible computer with 128 kbytes of RAM. Output results include mass and energy balance informa-

tion, cycle efficiency, and sizes and weights for piping and feed heaters. Listing and sample program output are included. DOE

N86-18023# Lawrence Livermore National Lab., Calif.
MFTF-B LOAD-FLOW ANALYSIS: A MAINFRAME APPLICATION IMPLEMENTED ON A PERSONAL COMPUTER
J. H. Wilson and S. Goldberg Jul. 1985 13 p
(Contract W-7405-eng-48)
(DE85-018155; UCID-20452) Avail: NTIS HC A02/MF A01

We have successfully implemented load-flow analysis on the IBM PC-XT/370. This involved obtaining a large program written specifically for the IBM/370 mainframe and adapting it for use on the PC-XT/370. Our procedure was straightforward, and the results we have obtained have been excellent. The procedure described here is useful for updating a large number of mainframe IBM System/370 programs to run on the PC-XT/370, and yields a very powerful computational tool at a very attractive price. DOE

N86-18024# Sandia National Labs., Albuquerque, N. Mex.
MAKING IGES WORK FOR CAD/CAM DATA EXCHANGE
A. L. Ames and S. K. Fletcher 1985 6 p Presented at the CASA/SME Autofact 1985, Detroit, Mich., 4 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE85-015570; SAND-85-0124C; CONF-851164-1) Avail: NTIS HC A02/MF A01

This report outlines Sandia National Laboratories effort to integrate the CAE/CAD/CAM capabilities of three laboratories and six production plants in the DOE weapons complex with the Initial Graphics Exchange Specifications (IGES). The problems with IGES are addressed and solutions are explained. The implementation of the IGES concept is also outlined. DOE

N86-18025# Lawrence Livermore National Lab., Calif.
INTELLIGENT GATEWAY PROCESSORS AS INTEGRATORS OF CAD/CAM NETWORKS
V. E. Hampel, B. L. Garner, and J. R. Matthews Jul. 1985 26 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-7405-eng-48)
(DE85-016287; UCRL-93115; CONF-851125-8) Avail: NTIS HC A03/MF A01

The integration of dissimilar CAD/CAM hardware and software on local and geographically distributed networks is the major problem faced by large organizations today. We begin by examining the existing system for storage, retrieval, control, and distribution of design information at Lawrence Livermore National Laboratory (LLNL) and describe a new prototype Engineering Information System (EIS). We then discuss the Department of Energy neutral Data Exchange Format (DOE/DEF) for the sharing of mechanical drawings among DOE installations. Finally, we describe the potential role of the Intelligent Gateway Processor (IGP) as a transaction controller for engineering resources among contractors of the Air Force Logistics Command (AFLC). IGP capabilities include a unique interpreter-driven user interface which permits the installation and modification of resources and the translation of dissimilar data formats, commands, and protocols, in a unified manner while running non-stop. DOE

N86-18026# Hanford Engineering Development Lab., Richland, Wash.
SIMULATION IN COMPUTER ASSISTED INSTRUCTION
P. R. Gardner 16 Jan. 1985 21 p Presented at the 26th International Conference of the Association for the Development of Computer-Based Instructional Systems (ADCIS), Philadelphia, Pa., 26 Mar. 1985
(Contract DE-AC06-76FF-02170)
(DE85-018208; HEDL-SA-3268-FP; CONF-8503172-1) Avail: NTIS HC A02/MF A01

This package contains the slides/story boards and handouts to be used in a How-To session for new Computer Based Training authors to be presented at the 26th International Conference of the Association for the Development of Computer-Based Instructional Systems. DOE

N86-18027# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
CODES FOR WRITE-ONCE MEMORIES
Frans Merkx Sep. 1984 45 p refs
(ENST-84D004; ISSN-0751-1345) Avail: NTIS HC A03/MF A01

Storage media which consist of a number of write-once bit positions (wits) are considered. A wit initially contains a 0 that may be irreversibly overwritten with a 1. Such a storage medium is called a write-once memory or wom. Examples are punched cards or digital optical disks. With coding, it is possible to use a wom several times, up to a very high rate. An infinite class of wom codes is described. In this class, messages are identified with cosets of linear error-correcting codes. This construction is partially analyzed for binary Hamming codes using finite geometries. Results of simulations of the Hamming wom codes are given, and extensions are described. The Golay wom code is analyzed. Examples indicate connections between wom codes and error detecting codes and memory-protecting. Author (ESA)

N86-18028# Institute of Oceanographic Sciences, Wormley (England).
A STUDY OF ERS-1 RADAR ALTIMETER DATA PROCESSING REQUIREMENTS Final Report
T. H. Guymer, D. J. T. Carter, P. G. Challenor, M. A. Srokosz (University College, London), A. R. Tabor (Centre National pour l'Exploitation des Oceans), C. G. Rapley, N. F. McIntyre (University College, London), R. F. Scott (University College, London), H. D. Griffiths (University College, London), and P. Queffeulou Paris ESA Jan. 1985 268 p refs
(Contract ESA-5681/83/NL-BI)
(ESA-CR(P)-2073) Avail: NTIS HC A12/MF A01

Data processing for the ERS-1 radar altimeter over oceans and sea ice for fast delivery products (near real time processing, onboard or at the ground station) and off line products is discussed. Useful products are identified and, the status of algorithms for extracting the relevant geophysical parameters from sensor data is reviewed. Suggestions concerning retrievals from ERS-1 data taking into account differences between ERS-1 and SEASAT are made. Problems concerning the extraction of wind speed, and the effects of sea surface nonlinearities are considered, and parameters, including a wave period, are proposed. Implications for the overall radar altimeter ground segment philosophy, including the accessibility and dissemination of products and standardization of formats are outlined. Author (ESA)

N86-18029# MATRA Espace, Toulouse (France).
VALIDATION OF A SOFTWARE PACKAGE FOR COMMUNICATION SYSTEMS ANALYSIS AND DESIGN: THE TOPSIM 3 SOFTWARE Final Report
D. Galindo and H. Berthelot Paris ESA 25 Apr. 1985 36 p refs
(Contract ESTEC-5246/82/NL-PP(SC))
(ESA-CR(P)-2075) Avail: NTIS HC A03/MF A01

The TOPSIM 3 software package for communication system modeling and analysis was validated in a performance evaluation of the bit error rate of an on board regenerative repeater. The repeater consists of a 4 GHz modulator, with a 120 Mbps data rate, a transmit and receive filter, and a coherent demodulator, used in phase shift keying transmission links. The telemetry, tracking, and command subsystems of Telecom 1 were used to test phase locked loops, phase modulation, and digital devices. Of 19 tests, 14 are considered good, 4 acceptable, and 1 poor. Recommendations for improving TOPSIM are made. Author (ESA)

N86-18030# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafd. Informatica/Vliegtuigen.
COMPUTER AIDED DESIGN (CAD) AT THE NATIONAL AEROSPACE LABORATORY (NETHERLANDS) WITH THE ACCENT ON AIRCRAFT FLIGHT CONTROL SYSTEMS
W. Loeve and P. J. vanderGeest 24 Mar. 1983 41 p refs In DUTCH; ENGLISH summary Presented at Colloquium Meten en Regelen, Eindhoven, Netherlands, 13 Apr. 1984
(NLR-MP-84032-U; B8568090) Avail: NTIS HC A03/MF A01

The consequences of the integration of CAD-systems within the aircraft industry's infrastructure for information processing and organizational control are elucidated. The possibility to generate the required input for the systems and the usefulness of the output for the design process and ensuing activities are emphasized. It is shown that technical developments with respect to stability and control of aircraft result in the integration of control-technical aspects, alongside those of aerodynamics and structures, within the design process. The development of the tools for designing stability and control systems as part of this integration is described. Author (ESA)

N86-18031# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THE USE OF VECTOR COMPUTERS IN AERODYNAMIC COMPUTATIONS
M. E. S. Vogels and A. E. P. Veldman 9 May 1984 30 p refs In DUTCH; ENGLISH summary Presented at the Control Data B.V. Symposium Vectorprogramming, The Hague, Netherlands, 6 Oct. 1983
(NLR-MP-84051-U; B8568096) Avail: NTIS HC A03/MF A01

The costs of sequential software modifications to optimize the use of pipelining vector computers, especially for aerodynamic design processes, are assessed. Restructuring a Spacelab Payloads program describing liquid sloshing under microgravity conditions is tested on a CRAY-1 and a CYBER 205. It is concluded that to make their speed effective, changes to pre- and postprocessing peripheral equipment, software, and mathematical algorithms are needed. Author (ESA)

N86-18032# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
POSTPROCESSING NLR HIGH SPEED TUNNEL (HST) WIND TUNNEL DATA BY DATA BY MEANS OF ENGINEERING DATA INTERACTIVE PRESENTATION AND ANALYSIS SYSTEM (EDIPAS)
R. K. vanderDraai 12 Sep. 1984 38 p refs Presented at 62nd STA Meeting, Goettingen, West Germany, 10-12 Oct. 1984
(NLR-MP-84083-U; B8568526) Avail: NTIS HC A03/MF A01

Utilizing database, management, and interactive graphics techniques, the Engineering Data Interactive Presentation and Analysis System was designed, and made operational. Applications in the presentation and analysis of wind-tunnel results, including standard presentation of measurements; extensive postprocessing (data reduction); and interactive, creative sessions are outlined. Author (ESA)

N86-18033# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
ALGEBRAIC DEFINITION OF A SIMPLE PROGRAMMING LANGUAGE
J. A. Bergstra, J. Heering, and P. Klint Feb. 1985 105 p refs Sponsored by European Economic Communities
(CWI-CS-R8504; B8567087) Avail: NTIS HC A06/MF A01

The potential of algebraic specifications for defining programming languages and their processor was assessed by developing a specification for the toy programming language PICO. This specification describes in detail all necessary steps from entering a PICO program in its textual form to computing its value. A major part of this specification is devoted to general techniques for defining programming languages and does not depend on specific properties of PICO. The size of this specification (> 350 axioms) makes it mandatory to use modularization techniques. In the specification formalism polymorphism, infix operators, conditional equations, rules for import and export, and parameterization are tried. Author (ESA)

N86-18034# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
TRANSITION SYSTEMS, INFINITARY LANGUAGES AND THE SEMANTICS OF UNIFORM CONCURRENCY
J. W. deBakker, J. J. Ch. Meyer (Free Univ., Amsterdam, Netherlands), E. R. Olderog (Kiel Univ., West Germany), and J. I. Zucker (New York Univ., Buffalo) Mar. 1985 14 p refs Submitted for publication Sponsored by European Economic Communities
(CWI-CS-R8506; B8567089) Avail: NTIS HC A02/MF A01

Transition systems as proposed by Hennessy and Plotkin are defined for a series of three programming languages featuring concurrency. The first has shuffle and local nondeterminancy, the second synchronization merge and local nondeterminacy, and the third synchronization merge and global nondeterminacy. The languages are all uniform in the sense that the elementary actions are uninterpreted. Throughout, infinite behavior is taken into account and modelled with infinitary languages in the sense of Nivat. A comparison with denotational semantics is provided. For the first two languages, a linear time model suffices; for the third language a braching time model with processes in the sense of De Bakker and Zucker is described. In the comparison an important role is played by an intermediate semantics in the style of Hoare and Olderog's specification oriented semantics. A variant on the notion of ready set is employed. Precise statements relating the various semantics in terms of a number of abstraction operators are given. Author (ESA)

N86-18035# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
THE EFFICIENCY OF THE EQUATION INTERPRETER COMPARED WITH THE UNIVERSITY OF NEW HAMPSHIRE (UNH) PROLOG INTERPRETER
J. Heering and P. Klint Apr. 1985 16 p refs Submitted for publication Sponsored by European Economics Communities
(CWI-CS-R8509; B8567092) Avail: NTIS HC A02/MF A01

The Equation Interpreter (a rewrite rule interpreter) and the University of New Hampshire Prolog interpreter for transfroming algebraic specifications into executable prototypes are compared. The Prolog system, which does no preprocessing, performs surprisingly well compared with the Equation Interpreter, which has extensive preprocessing. The preprocessing time (tE) of the Equation Interpreter tends to become prohibitive. The trends in the measurements suggest that the Equation Interpreter outperforms Prolog on large sets of equations. It depends on the particular application which system should be chosen. In prototyping, the same program is probably executed only a few times. In that case, the disadvantage of considerable preprocessing time outweighs the advantage of the shorter execution time. If the number of executions is > no = tE-tp/TP-TE, where tP is Prolog preprocessing (i.e., 0), TP is Prolog execution time, TE is Equation Interpreter execution time, the large preprocessing time of the Equation Interpreter starts to pay off. Author (ESA)

N86-18036# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
INFINITE STREAMS AND FINITE OBSERVATIONS IN THE SEMANTICS OF UNIFORM CONCURRENCY (PRELIMINARY VERSION)
J. W. deBakker, J.-J. Ch. Meyer, and E.-R. Olderog Apr. 1985 15 p refs Submitted for publication Sponsored by European Economic Communities
(CWI-CS-R8508; B8567091) Avail: NTIS HC A02/MF A01

Two ways of assigning meaning to a programming language with uniform concurrency are compared. The language has uninterpreted elementary actions from which statements are composed using sequential composition, nondeterministic choice, parallel composition with communication, and recursion. The first semantics uses infinite streams in the sense which is a refinement of the linear time semantics of De Bakker, et al. The second semantics uses the finite observations of Hoare et al situated between the divergence and readiness semantics of Olderog and Hoare. It is shown that the two models are isomorphic and that this isomorphism induces an equivalence result between the two semantics. Author (ESA)

N86-18037# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
TIME-DRIVEN ALGORITHMS FOR DISTRIBUTED CONTROL
Paul M. B. Vitanyi Apr. 1985 31 p refs Submitted for

publication
(CWI-CS-R8510; B8567093) Avail: NTIS HC A03/MF A01

Distributed algorithms for clock synchronization, spanning tree construction and leader-finding in large store-and-forward networks of processors communicating by message passing are investigated. In the synchronization algorithm, the clocks are allowed to drift in value and speed; the message delivery delay is unknown and may change with time. The algorithm for distributed elections and distributed spanning tree construction uses times, yet is logically time-independent. Using time gives better performance in terms of message-passes and passed bits than is possible otherwise, and better performance than by any other known algorithm. The algorithm works correctly for any network topology, under any asynchronicity in the network, and assumes no global knowledge about the network. Author (ESA)

N86-18038# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT PROGRAM GUIDE (MIMO) SYSTEMS ACCORDING TO GUIDORZI
J. B. Meertens 12 Oct. 1983 37 p
Avail: NTIS HC A03/MF A01

A guide for changing or extending the GUI program for simulating the structures and parameters of a multi input multi output system is presented. It is conceived for the PDP 11/60 computer. Author (ESA)

N86-18039# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SUSTEMS ACCORDING TO GUIDORZI, PROGRAM GUIDE
J. B. Meertens 10 Oct. 1983 34 p
Avail: NTIS HC A03/MF A01

A user guide for the GUI program for simulating the structures and parameters of a multi input multi output system is presented. It is conceived for the PDP 11/60 computer. Author (ESA)

N86-18040# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
STRUCTURAL AND PARAMETRIC IDENTIFICATION OF MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEMS ACCORDING TO GUIDORZI. FURTHER DEVELOPMENTS AND APPLICATIONS
J. B. Meertens 1983 67 p refs
Avail: NTIS HC A04/MF A01

The method of Guidorzi for the estimation of multiple-input-multiple-output systems is extended with a D-matrix estimator and an estimator of the offset. The method is implemented in a program written for the PDP-11/60 system. Experiments with the program result in good reconstructions of the original outputs of the system. The experiments were run with predefined systems and with industrial systems. Performance in a noise disturbed situation in the first group of experiments shows that with the systems used (four and five dimensional state-vector) good estimation up to a signal-to-noise-ratio of 10dB is possible. The second group of experiments indicates the usefulness of the program for industrial systems. Author (ESA)

N86-18041# Research Inst. of National Defence, Stockholm (Sweden). Dept. 1.
THE VIDEDP MANUAL
Tord Beckman Jun. 1985 92 p refs In SWEDISH; ENGLISH summary
(FOA-C-10212-M4; ISSN-0281-0247) Avail: NTIS HC A05/MF A01

The VIDEDP program manual for printing texts editor VIDED, a system implemented on DEC-10 and DEC-2020 computers is presented. The program was written for Diablo and compatible printing terminals. With VIDEDP it is possible to make underlinings, write accents, use half-line feed for exponents and subscripts, print characters of different size, use Greek and other alphabets, mathematical symbols, frame text and tables, draw simple histograms, use different print wheels in the same text, and control character spacing and line spacing. Author (ESA)

N86-18042# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
CHANNEL CODING WITH THE (255, 255-2T) REED-SOLOMON CODES OVER CF (256)
H. J. Simons and H. F. A. Roefs 20 Dec. 1983 78 p refs
(Contract NIVR-1979)
(NLR-TR-83149-U; B8568395) Avail: NTIS HC A05/MF A01

The encoding and decoding algorithms of (255, 255-2T) Reed-Solomon codes over CF(256) are elaborated. Main computational elements are the discrete Fourier transform for syndrome and error locator computation, Euclid's algorithm for solving the key equation, and Horner's scheme for determining the error values. Computational complexity, in particular the number of multiplications and additions required as a function of T, is discussed. Simulations to demonstrate the quality of the obtained algorithms are presented. Author (ESA)

N86-17284# National Aerospace Lab., Tokyo (Japan).
A BASIC COMPUTER CODE FOR INDUSTRIAL BURNER DESIGNS. PART 1: CAPABILITY TEST IN ISOTHERMAL SWIRLING FLOWS
Kunihisa Eguchi and Shoichi Fujii *In its* Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 141-148 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

N86-17411*# National Aeronautics and Space Administration. Johnson (Lyndon B.) Space Center,
COMPUTER SIMULATION OF ENVIRONMENTAL, HAZARD SCENARIOS IN SPACE
Robert H. Brown *In* Johns Hopkins Univ. The 1985 JANNAF Propulsion Meeting, Volume 1 Apr. 1985 p 309-319 Sponsored in part by NASA (For primary document see N86-17380 08-20)
Avail: Chemical Propulsion Information Agency, Johns Hopkins Rd., Laurel, Md. 20707 HC $78.98 CSCL 09B

N86-17468# MATRA Espace, Toulouse (France).
A COMPUTER ANALYSIS TOOL FOR EVALUATION OF SOLAR ARRAY DESIGN
B. Fieux and J. Masson (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Sessions at the 16th IEEE Annual Power Electronics Specialists Conference May 1985 p 319-323 ref (For primary document see N86-17432 08-20)
Avail: NTIS HC A15/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-18043 Royal Signals and Radar Establishment, Malvern (England).
ON THE GARBAGE COLLECTION OF BLOCK STRUCTURED MEMORIES
S. R. Wiseman Mar. 1985 28 p refs
(RSRE-85006; BR95552) Avail: NTIS HC A03/MF A01

Scanning, copying, and reference counting garbage collection methods are considered for use in a system where the memory address space is shared by all users of a computer. The problems that arise from this requirement are described. It is shown that no one garbage collector solves all the problems. Author (ESA)

N86-18044 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
THE SCENARIO TEST DRIVER FOR THE ISO NETWORK CONVERGENCE PROTOCOL OVER X.25 (1980)
G. W. Cowin Jun. 1985 27 p refs Sponsored by UK Department of Trade and Industry's Electronics and Avionics Requirement

Board and the EEC
(NPL-DITC-55/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

An ISO network convergence protocol over X.25 (1980) assessment architecture is described. A software tool used to help develop the implementation of this architecture is outlined. This tool, known as the Scenario Test Driver, is an interactive alternative to the automatic test driver used for assessment, permitting closer observation of events. In conjunction with an assessment service, this tool assists implementors during development of their implementations, prior to the stage when formal assessment is appropriate. Author (ESA)

N86-18045 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
IMPLEMENTATION ASSESSMENT OF THE OSI NETWORK SERVICE. THE TEST RESPONDER SPECIFICATION
A. J. W. Carmichael, ed., P. W. Hobson, ed, and A. A. Sweetman, ed. Jun. 1985 148 p refs Sponsored by UK Department of Trade and Industry's Electronics and Avionics Requirements Board and the EEC
(NPL-DITC-56/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

The Test Responder component for use in assessing implementations of the ISO X.25 Convergence Protocol is defined. The Test Responder is implemented on the client's system and is used to provide a controllable and predictable Network Service User. The Test Responder could also provide a tool for use during the development of an implementation. Author (ESA)

N86-18046 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
OVERVIEW OF A TEST SUITE FOR THE ISO NETWORK CONVERGENCE PROTOCOL OVER X.25 (1980)
G. W. Cowin Jun. 1985 26 p refs Sponsored by UK Department of Trade and Industry's Electronic and Avionics Requirement Board and the EEC
(NPL-DITC-59/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Means to assess implementations of high-level protocols, and work directed at the ISO Network Convergence Protocol over X.25 (1980) are described. An architecture to perform such an assessment by running a series of tests exists and the minimum set of tests required to perform such an assessment is defined. Tests are categorized by the phases of the protocol concerned and have an associated name, each having a defined purpose and an expected result. A cross reference for test selection is supplied. Author (ESA)

N86-18047 CIAD, Zoetermeer (Netherlands).
TEST OF INTERGRAPH [TEST INTERGRAPH]
J. J. Duivenvoorden and C. Tjallema 1984 34 p refs In DUTCH
(A-11; ISBN-90-6818-014-2) Copyright. Avail: Issuing Activity

An Intergraph computer aided design (CAD) configuration, containing a VAX-11/751 computer, three disk drives, Interact workstation, Versatec V80 hardcopy unit, and Calcomp 960 plotter, was tested. The system is suited for mechanical, electrical, design plant, and mapping purposes. After base-figure construction, two-dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings were executed. Line-strings, edgings, parameterized forms, accuracy, design speed, data storage efficiency, coupling possibilities with FORTRAN programs, and data base management system performance, were investigated. An engine, a T-piece with flanges, and a ship's plating, were modeled in three dimensions and combined. The two and three-dimensional integration was examined. For numerical control, pump-cylinder elaborations were executed. Communication possibilities with other CAD-systems were examined. Positive points are: ergonomics; powerful hardware; speed; extension possibilities; multiapplication software; communication possibilities. Negative points are: slow test part execution; shading; frequent use of keyboard; alphanumeric data input; complex 3D-commands were not executed. Author (ESA)

N86-18048 CIAD, Zoetermeer (Netherlands).
TEST OF SUPERDRAFT [TEST SUPERDRAFT]
J. J. Duivenvoorden and P. vanSchaijk 1984 16 p In DUTCH
(A-12; ISBN-90-6818-015-0) Copyright. Avail: Issuing Activity

A Superdraft computer aided design configuration, containing an IBM PC computer, a Graphtec KD 4030 digitizer (A3), an FP 5301 plotter, and a monitor was tested. The system is suited for mechanical engineering. After base figure construction, two-dimensional draw manipulations, transformations, reflections, rotations, reductions, and rescalings were executed. An adapted draw-speed test was carried out. The system provides a lot of two-dimensional design possibilities for the low price. A number of functions might be improved to make the system more up-to-date. Frequent keyboard use is uncomfortable. Author (ESA)

N86-18049# Quail Group, Orem, Utah.
BENCHMARKING: GRAPHICS WORKSTATIONS
B. E. Brown and R. L. Judd 11 Sep. 1985 9 p Presented at the International Conference on Computer Workstations, San Jose, Calif., 11 Nov. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif. ssc lh075075
(Contract W-7405-eng-48)
(DE85-018182; UCRL-91032; CONF-851163-2) Avail: NTIS HC A02/MF A01

This paper reports on work being performed to benchmark a new breed of machines, the graphics workstations for scientific and engineering applications. We begin with the history of workstations and how they developed. Many different forces created the graphics workstation. Scientific and engineering calculations are traditionally performed by super computers in a computing center. The graphic workstation was introduced, and this technology was added to the computing environment. The answers we need are ... what can the workstations do and when do we remove the programs or parts of programs from supercomputers and place them on workstations. Benchmarks and what they can and cannot measure are discussed in this light. The particulars about graphics benchmarks and the operating system, including windows, are reviewed, then the benchmarks we are using are described and the results are presented. Since this work is never finished, future plans are also discussed. The emphasis of our work is toward scientific and engineering workstations connected with existing mainframe computers. In the industry today we hear the term JAWS (Just Another WorkStation) when a new workstation is introduced. What does the new product do beyond those on the market. In this paper we present ways to measure and tell the difference between workstations. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-18050 Kansas State Univ., Manhattan.
MICROPROCESSOR CONTROL OF WIND-DRIVEN INDUCTION GENERATORS Ph.D. Thesis
Robert David Richardson 1985 142 p
Avail: Univ. Microfilms Order No. DA8515968

This research proposes a design for a controller for a three-phase wind-driven induction generator using solid state electronics. Two modes of operation are described in this research. In one mode, the generator is operating with resistive heating loads and capacitors for excitation of the generator windings connected at the terminals. In the other mode, the generator is connected by two phases to a single-phase utility service with a balancing load connected to the other generator phase. The electronic design includes the use of a microprocessor and the methods of digital signal processing are used. A fast Fourier

Transform algorithm has been written in software for the microprocessor and has been used with the test apparatus to measure the operating parameters of the generator in the modes of operation that are suggested. A software algorithm flowchart for the controller is described, hardware to implement the controller is suggested, and the experimental data that suggested this design is presented. Dissert. Abstr.

N86-18051 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
NOTES ON LOGIC
D. J. Clapp Jul. 1985 51 p refs
(NPL-DITC-65/1985; ISSN-0262-5369) Copyright. Avail: Issuing Activity

Extensions to classical logic useful in knowledged-based computer systems are presented. Topological logic; many-valued logic; modal logic; temporal logic; nonmonotonic reasoning; relevant entailment logic; intensionality; Montague grammar and intentional logic; and presupposition are introduced. Author (ESA)

N86-18052# Argonne National Lab., Ill. Experimental Breeder Reactor 2 Div.
A COMBINATION OF ARTIFICIAL INTELLIGENCE AND PROCEDURAL LANGUAGE PROGRAMS IN A COMPUTER APPLICATION SYSTEM SUPPORTING NUCLEAR REACTOR OPERATIONS
Rex C. Stratton and George G. Town (Central Washington Univ.) 1985 7 p refs Presented at conference
(DE85-007937; CONF-850903-2) Avail: NTIS HC A02/MF A01

A computer application system is described which provides nuclear reactor power plant operators with an improved decision support system. This system combines traditional computer applications such as graphics display with artificial intelligence methodologies such as reasoned and diagnosis so as to improve plant operability. This paper discusses the issues, and a solution, involved with the system integration of applications developed using traditional and artificial intelligence languages. DOE

N86-18053# Los Alamos National Lab., N. Mex.
EXPERT SYSTEMS FOR DESIGN AND SIMULATION
J. Aldridge, J. Cerutti, W. Draisin, and M. Steuerwalt 1985 43 p Presented at the AIAA/NASA Symposium on Automation, Robotics and Advanced Computing for the National Space Program, Washington, D.C., 4 Sep. 1985
(Contract W-7405-eng-36)
(DE85-017565; LA-UR-85-2838; CONF-8509149-1) Avail: NTIS HC A03/MF A01

We discuss work in progress on two expert systems. We are developing systems that use artificial intelligence techniques to simplify the use of large simulation codes and to help design complicated physical devices. The simulation codes are used in analyzing and designing weapons, and the devices are themselves part of weapon systems. But we focus not only on the particular applications, but also on the broader issues common to design problems: large solution spaces and tentative reasoning. We also discuss some practical difficulties encountered during the project. One expert system provides an interface between users and several simulation codes. It checks input for errors, builds input files for the codes, and submits jobs to a central computing facility. The other expert system helps turn a description of a device into a particular design. Currently this expert system includes three major parts: a translator of descriptions into designs, a graphics interface that presents the design to the user and allows him to manipulate it, and a refiner of designs. The latter is the smartest part of the system, and the target of much of our present efforts. DOE

N86-18054# Oxford Univ. (England). Dept. of Engineering Science.
GENERALIZED PREDICTIVE CONTROL. PART 2: EXTENSIONS AND INTERPRETATIONS
D. W. Carke, C. Mohtadi, and P. S. Tuffs 1984 39 p refs
(OUEL-1557/84-Pt-2) Avail: NTIS HC A03/MF A01

Feedforward compensation and user chosen polynomials giving detuned model-reference, optimal Smith predictor and load disturbance tailoring objectives were added to the basic Generalized Predictive Control (GPC) algorithm. The role of the output and control horizons for processes with nonminimum phase, unstable and variable dead time models are explored. The robustness of the GPC approach to model over and underparameterization and to fast sampling rates is demonstrated by simulations. Author (ESA)

N86-18055# Oxford Univ. (England). Dept. of Engineering Science.
SELF-TUNING CONTROL: ALGORITHMS AND APPLICATIONS Ph.D. Thesis
P. S. Tuffs 1985 254 p refs Sponsored by UK Science and Engineering Research Council
(OUEL-1567/85) Avail: NTIS HC A12/MF A01

The long term integrity of a self tuning controller is considered. Minimum-variance and pole-placement control approaches are developed from a CARIMA model, rather than from CARMA representation of a process. This is shown to introduce integral action into the control laws, and produces estimation schemes with a zero mean structure. Data conditioning and control signal saturation are considered, and jacketting routines are proposed. Rules for commissioning a self tuning controller are introduced. Two variable forgetting factors are compared in simulation and on a full scale industrial process, and are shown to improve the reliability of a self tuning controller. Application studies which involve cascaded self tuning controllers are presented. Author (ESA)

N86-18056# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
AN EFFICIENT FILTER FOR ABRUPTLY CHANGING SYSTEMS
H. A. P. Blom 25 Jul. 1984 7 p refs Presented at 23rd IEEE Conference on Decision and Control, Las Vegas, Nev., 12-14 Dec. 1984
(NLR-MP-84071-U; B8568106) Avail: NTIS HC A02/MF A01

For a linear discrete time system with coefficients that are governed by an N-state Markov chain, e.g., an aircraft tracked by surveillance radar, a filtering algorithm is defined. It consists of a bank of N interacting Kalman-like filters which communicate with a filter for the Markov chain. When the transition probabilities of the Markov chain are zero, the interacting multiple model (IMM) algorithm reduces to the MM algorithm. Qualitative comparisons with the best other algorithms show an improvement of the ratio between performance and computational complexity up to a factor N. The performance of the IMM algorithm reaches, for small time lags, that of an N times more complex generalized pseudo Bayes algorithm. Author (ESA)

N86-18057# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.
DESIGN FOR A PATH CONTROL ALGORITHM OF A ROBOT ARM WITH EXTERNAL SENSOR CONTROL [ONTWERP VOOR EEN BAANREGELING VAN EEN ROBOT ARM ONDER STURING VAN EEN EXTERNE SENSOR]
J. M. Grotenbreg 1983 98 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A05/MF A01

A robot path control algorithm, which accepts sensor control, was designed, and tested for industrial robots for arc welding. The design uses the hierarchical control concept and is realized using a control computer system. The programs are written using PASCAL, extended for real time use. With this controller it is possible to let the end of the gripper or a tool of a demonstration robot move along a cartesian path. It is possible to control, in real time, the movement of the robot by a sensor simulator. Sensor information may be given in robot or cartesian coordinates. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-18058 Engineering Sciences Data Unit, London (England).
NONLINEAR SYSTEMS: AN INTRODUCTION TO DESCRIBING FUNCTIONS
Jul. 1984 50 p refs Submitted for publication
(ESDU-84009; ISBN-0-85679-471-6; ISSN-0141-3986) Avail: ESDU

ESDU 84009 introduces the use of Describing Functions (DF) to estimate the stability and the steady state response of autonomous closed loop nonlinear systems. The DF uses a single sinusoidal input to the nonlinear element and is herefore classified as a frequency response method. Five DF schemes are given and the characteristics of those DF's when used with eight common nonlinear (combinations of deadzone, saturation, ideal relay, hysteresis and backlash) defined graphically and by their algebraic expressions. Two practical worked examples of third order nonlinear systems illustrate the use of these DF's in stability investigations and show the accuracy with which they estimate the magnitude of the output. These DF's are also used to estimate the frequency and magnitude of a self sustaining, or limit-cycle, oscillation. Author

N86-18059 Technische Univ., Munich (West Germany). Inst. fuer Mathematik.
DIFFERENCE METHODS OF HIGHER ORDER FOR ELLIPTIC BOUNDARY VALUE PROBLEMS WITH CURVED BOUNDARIES [DIFFERENZENVERFAHREN HOHER ORDNUNG FUER ELLIPTISCHE RANDWERTPROBLEME MIT GEKRUEMMTEN RAENDERN]
Reinhard Foessmeier Oct. 1984 106 p refs In GERMAN; ENGLISH summary
(TUM-I8411) Copyright. Avail: Issuing Activity

Difference schemes for elliptic boundary value problems with curved boundaries were developed. The schemes yield solutions with an error expansion by even powers of the mesh size, like Kreiss' method for Dirichlet problems. Extrapolation yields solutions of high accuracy. A modular method for separate treatment of differential equation and boundary conditions is proposed. Low-order error terms occurring because of a joint between Dirichlet and Neumann type boundaries can be eliminated by local corrections. Author (ESA)

N86-18060*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE ALGORITHMS FOR RATIONAL SPLINE INTERPOLATION OF SURFACES
James R. Schiess Jan. 1986 27 p refs
(NASA-TP-2536; L-16045; NAS 1.60:2536) Avail: NTIS HC A03/MF A01 CSCL 20F

Two algorithms for interpolating surfaces with spline functions containing tension parameters are discussed. Both algorithms are based on the tensor products of univariate rational spline functions. The simpler algorithm uses a single tension parameter for the entire surface. This algorithm is generalized to use separate tension parameters for each rectangular subregion. The new algorithm allows for local control of tension on the interpolating surface. Both algorithms are illustrated and the results are compared with the results of bicubic spline and bilinear interpolation of terrain elevation data. Author

N86-18061*# Mississippi State Univ., State College. Dept. of Mathematics and Statistics.
INTERFACE PROCEDURES FOR OVERLAPPING GRIDS
C. Wayne Mastin [1985] 23 p refs
(Grant NsG-1577)
(NASA-CR-176460; NAS 1.26:176460) Avail: NTIS HC A02/MF A01 CSCL 12A

Interpolation at grid boundaries is studied for the purpose of solving partial differential equations using either implicit or conservative explicit finite-difference methods on multi-component overlapping grid systems. Author

N86-18062# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
HARMONIC ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS
Bjoern E. J. Dahlberg and Carlos E. Kenig 1985 125 p refs
(CTH-Math-1985-03; ISSN-0347-2809) Avail: NTIS HC A06/MF A01

Techniques for solving boundary value problems on Lipschitz domain are discussed. Partial differential equations systems applied to several topics are solved. Solution methods for L sup 2 and L sup p are contrasted. Harmonic measure analysis is outlined. For individual titles, see N86-18063 through N86-18064.

N86-18063# Chalmers Univ. of Technology, Goeteborg (Sweden).
DIRICHLET PROBLEM FOR LIPSCHITZ DOMAIN. THE SETUP
Bjoern E. J. Dahlberg *In its* Harmonic Analysis and Partial Differential Equations 1985 69 p refs (For primary document see N86-18062 08-64)
Avail: NTIS HC A06/MF A01

Boundary value problems (BVP) for linear elliptic partial differential equations (PDE) with constants coefficients in Lipschitz-domain, are considered. The BVP are solved in terms of integral equations. The fact that singular integral operators of Calderon-Zygmund Type are L sup p bounded for all p> or = 2 and invertibles, is proved. This method is applied to PDE expressed by BVP such as the Dirichlet problem, Neumann problem, clamped plate problem, elasticity problems and Stoke's equation. Author (ESA)

N86-18064# Minnesota Univ., Minneapolis. School of Mathematics.
RECENT PROGRESS ON BOUNDARY VALUE PROBLEMS ON LIPSCHITZ DOMAINS
Carlos E. Kenig *In* Chalmers Univ. of Technology Harmonic Analysis and Partial Differential Equations 1985 53 p refs Sponsored by NSF and Alfred P. Sloan Foundation (For primary document see N86-18062 08-64)
(Math-Rept-84-133) Avail: NTIS HC A06/MF A01

Boundary value problems (BVP) on Lipschitz domain (LD) are considered. The BVP is solved using Laplace's equation. Dahlberg's method (analysis of harmonic measure) and Layer potential method are applied. Partial differential equation systems on LD are studied. Systems of elastostatics and Stokes system of hydrostatics are discussed. The Dirichlet problem for biharmonic equations is solved. Author (ESA)

N86-18065# Stanford Univ., Calif. Information Systems Lab.
DIRECTION OF ARRIVAL ESTIMATION OF EIGENSTRUCTURE METHODS WITH UNKNOWN SENSOR GAIN AND PHASE
A. Paulraj and T. Kailath Mar. 1985 5 p
(Contract F49620-79-C-0058)
(AD-A160027; AFOSR-85-0756TR) Avail: NTIS HC A02/MF A01 CSCL 17/3

Direction of arrival estimation by eigenstructure methods requires knowledge of the array covariance matrix and an exact characterization of the array in terms of geometry, sensor gain and phase, etc. It often happens that the actual sensor gain and phase are preturbed from their assumed nominal values. If eigenstructure methods are applied with incorrect sensor parameters, the method essentially breaks down or at best gives poor results. We propose a new approach which uses information in the observed covariance matrix to correct for these effects. This method yields substantially improved performance, a fact illustrated by the results of computer simulations. GRA

N86-18066# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
DIFFERENTIAL METRICS IN PROBABILITY SPACES BASED ON ENTROPY AND DIVERGENCE MEASURES Technical Report
C. R. Rao Apr. 1985 23 p

(Contract F49620-85-C-0008)
(AD-A160301; TR-85-08; AFOSR-85-0864TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper discussed some general methods of metrizing probability spaces through the introduction of a quadratic differential metric in the parameter manifold of a set of probability distributions. These methods extend the investigation made in Rao (1945) where the Fisher information matrix was used to construct the metric, and the geodesic distance was suggested as a measurement of dissimilarity between probability distributions. The basic approach in this paper is first to construct a divergence or a dissimilarity measure between any two probability distributions, and use it to derive a differential metric by considering two distributions whose characterizing parameters are close to each other. One measure of divergence considered is the Jensen difference based on an entropy functional as defined in Rao (1982). Another is the f-divergence measure studied by Csiszar. The latter class leads to the differential metric based on the Fisher informatin matrix. The geodesic distances based on this metric computed by various authors are listed. GRA

N86-18067# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
EXPONENTIAL BOUND FOR ERROR PROBABILITY IN NN-DISCRIMINATION Technical Report
Z. D. Bai Apr. 1985 23 p
(Contract F49620-85-C-0008)
(AD-A160305; TR-85-15; AFOSR-85-0823TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let (theta,X) be a (1,2,...,s) x R to the d power-valued random vector and (theta sub 1, x sub 1),...,(theta sub n, x sub n) be iid. samples drawn from (theta,X). The so-called discrimination problem is to find a function of X, usually depending upon (theta sub n, x sub n),...,(theta sub, x sub n), which is used to predict the value of theta. One of the most frequently used approaches is the nearest neighbor discrimination rule. GRA

N86-18068# California Univ., Berkeley. Lawrence Berkeley Lab.
MAGNETIC CHARGE AND NON-ASSOCIATIVE ALGEBRAS
Murat Guenaydin and Bruno Zumino (California Univ., Berkeley) Feb. 1985 12 p Presented at the Symposium in Honor of G. C. Wick, Pisa, Italy, Oct. 1984 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE85-009931; LBL-19200) Avail: NTIS HC A02/MF A01

It was pointed out some time ago by Lipkin, Weisberger and Peshkin that the commutators of the velocities of an electron in the field of a print magnetic monopole appear to violate the Jacobi identity at the position where the monopole is located. More recently, a number of authors have observed that such a violation of the Jacobi identity could be related to the existence of a 3-cocycle on the three dimensional translation group for the electron and to a violation of associativity for finite translations. The main observation is that, even if the Jacobi identity is violated (at the Lie-algebra level), the Dirac quantization condition ensures that finite translations (obtained by exponentiation) are associatives in virtue of this quantization condition the phase which measures the degree of non-associativity of finite translations is always of the form exp[1n2w] - 1 where n is an integer. The question remains if it is actually possible that the Jacobi identity is violated. It has been pointed out that, in any formulation of the quantum-mechanical monopole problem in which the coordinates and the velocities of the electron are described by operators in a Hilbert space, the Jacobi identity cannot be violated, since it follows from associativity of the operators acting in a Hilbert space. This is described in some detail for the Dirac string formulation of the monopole problem as well as for the Wu-Yang formulation in terms of local sections. The Jacobi identity can only be violated if the coordinates and velocities of the electron are not operators but belong instead to a non-associative algebra. G.L.C.

N86-18069# Oak Ridge National Lab., Tenn. Engineering Physics and Mathematics Div.
ANOVA MODEL FITTING VIA SPARSE MATRIX COMPUTATIONS
George Ostrouchov 1985 12 p Presented at a conference
(Contract DE-AC05-84OR-21400)
(DE85-017070; CONF-8508115-1) Avail: NTIS HC A02/MF A01

Full matrix methods for fitting large unbalanced ANOVA models require enormous amounts of time and storage. The model matrix X (often called the design matrix) consists of dummy variables and is sparse, thus great reduction in time and storage can be achieved by viewing this as a sparse matrix problem. A method, based on orthogonal Givens factorization of a maximal rank set of sparse columns of X, for fitting a model and computing the residual sum of squares is presented. The selection of a maximal rank set of sparse columns is based on a description of linear dependencies between columns of X that is developed using a notation based on index sets associated with model terms. A comparison of the new algorithm to a full matrix algorithm on a set of models shows that both time and storage requirements are reduced by up to three orders of magnitude for large models and are competitive for small models. DOE

N86-18070# Oak Ridge National Lab., Tenn.
SOFTWARE FOR ROOTFINDING AND INTERPOLATION WITH RUNGE-KUTTA-SARAFYAN METHODS
S. Thompson Sep. 1985 123 p
(Contract DE-AC05-84OR-21400)
(DE85-018113; ORNL-6151) Avail: NTIS HC A06/MF A01

Mathematical software is described which implements Runge-Kutta methods of Sarafyan. Due to the embedded nature of the methods, it is possible to perform both rootfinding and interpolation in a very natural manner. The software described contains provisions for both rootfinding and interpolation. The ability to do rootfinding makes it possible to efficiently handle discontinuities and special events as well as other rootfinding tasks. The ability to do interpolation without negatively impacting the integration stepsize selection process makes it possible to handle the question of dense output in an efficient manner. Examples are presented to illustrate the types of problems which may be solved and to demonstrate the typical performance of the software. DOE

N86-18071# Sandia National Labs., Albuquerque, N. Mex.
SUBROUTINE PACKAGE FOR BESSEL FUNCTIONS OF A COMPLEX ARGUMENT AND NONNEGATIVE ORDER
D. E. Amos May 1985 25 p
(Contract DE-AC04-76DP-00789)
(DE86-000047; SAND-85-1018) Avail: NTIS HC A02/MF A01

The machine implementation of a Bessel function package, which was outlined in mathematical form in two previous documents, is described for Bessel functions H/sub (NU)//sup (1)/(z), H/sub (NU)//sup (2)/(z), I/sub (NU)/(z), J/sub (NU)/(z), K/sub (NU)/(z), Y/sub (NU)/(z) and Airy Functions Ai(z), Ai'(z), Bi(z), Bi'(z) with (NU) greater than or equal to 0 and (-)(PI) < arg z less than or equal to (PI). The less obvious aspects of the implementation are the main topics of interest. These topics include estimation of function magnitudes for underflow and overflow tests, scaling near underflow and overflow limits, the use of recurrence in connection with scaling, the use of machine constant routines and an error package for portability. DOE

N86-18072# Groningen Rijksuniversiteit (Netherlands). Inst. of Mathematics.
ALGORITHMIC ORBIT CLASSIFICATION FOR CONNECTED SOLVABLE GROUPS
Hartmut Buergstein and Wim H. Hesselink Aug. 1984 42 p refs
(ZW-8411) Avail: NTIS HC A03/MF A01

Normal forms for the orbits over the invertible upper triangular matrices in the strictly upper triangular matrices spaces of order n, for n < 8 are discussed. A computer algorithm for the combinatorical problem is given. A reduction method of the combinatorics of weights and roots is considered. A genuine solution is obtained in the case of n < 7; 8500 classes of the case n=8 give an approximative solution. Only 8 of those classes are marked. Author (ESA)

N86-18073# Helsinki Univ. of Technology, Espoo (Finland). Systems Theory Lab.
A STUDY OF THE BACK-AND-FORTH SHOOTING METHOD
Ph.D. Thesis
Timo Eirola Jan. 1985 41 p refs Sponsored by Emil Aaltonen Foundation, Foundation of Technology and Walter Ahlstroem Foundation
(Rept-A-3; ISBN-951-753-436-1; ISSN-0781-6480) Avail: NTIS HC A03/MF A01

Methods for solving two-point boundary value problems are reviewed and the stability of the initial-value problems associated with each method is discussed. Back-and-forth shooting method results are summarized. These include an application of the method to the test problems of Holt, modifications of the method, local convergence analysis, and a posteriori error analysis. The method is tested in nonlinear examples and compared with the Riccati method with quasi linearization. The quasi linearization method is slower. Author (ESA)

N86-18074# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
ON THE PREDICTION AND THE SPECTRAL FACTORIZATION OF STATIONARY PROCESSES IN THE BROAD SENSE WITH TWO DISCRETE PARAMETERS
Hayri Korezlioglu and Philippe Loubaton Feb. 1985 19 p refs In FRENCH; ENGLISH summary Submitted for publication
(ENST-85C002; ISSN-0751-1337) Avail: NTIS HC A02/MF A01

Linear prediction in the left half plane and related spectral factorization and decomposition are studied. Complex random variables are defined in a probabilistic space. The necessary and sufficient conditions of nondeterminism are given and proved. The four orthogonal components appearing in the decomposition obtained by the theorem are characterized. Author (ESA)

N86-18075# Oxford Univ. (England). Dept. of Engineering Science.
UNCERTAINTY ESTIMATION FROM SYSTEM IDENTIFICATION
A. P. Loh and I. Postlethwaite 1985 68 p refs Sponsored by UK Science and Research Engineering Council
(OUEL-1570/85) Avail: NTIS HC A04/MF A01

A method to estimate a model for the data generating mechanism and simultaneously obtain a measure of the uncertainty involved in the identification, given input-output records is discussed. It is assumed that the system is stable, finite dimensional, linear and time invariant, and that the inputs are uncorrelated zero mean stochastic processes. Spectral estimation (direct technique), where statistical solutions are proposed by first deriving the appropriate distribution functions and then computing the confidence regions for both the gain and phase corresponding to a particular confidence level at each frequency is used. Via the confidence regions, an estimate for the maximum singular value bound of the system can be obtained. General properties of the identification are highlighted, and it is shown how the modeling error may be identified physically, given that a nominal model is known a priori. Author (ESA)

N86-18076# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
POINT-LINE CHARACTERIZATIONS OF BUILDINGS
Arjeh M. Cohen Dec. 1984 21 p refs Presented at International Mathematics Summer Center (CIME) Meeting on Buildings and the Geometry of Diagrams, Como, Italy, 30 Aug. 1984
(CWI-PM-R8415; B8565121) Avail: NTIS HC A02/MF A01

Lie incidence system and Lie incidence structure are discussed. The construction method of shadow spaces of type B (a building of type M over an index I) over i (i element of I), is given. The analog of the coordinatization theorem for (other) buildings and the classification of geometries with spherical Coxeter diagram, are used. Veblen-Young theorem is proved. A shadow space determined by a building is characterized by the full shadow space (a particular projective space). Characterization theorems are proved. Tits geometry can be identified as a building. Axiomatic theory of shadow spaces is reported. Author (ESA)

N86-18077# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
ON THE HOLOMORPHIC CONTINUATION OF THE IWASAWA AND A RELATED DECOMPOSITION
E. P. vandenBan Jan. 1985 35 p refs Submitted for publication
(CWI-PM-R8502; B8565123) Avail: NTIS HC A03/MF A01

The holomorphic continuation of the complexification of a decomposition of a real semisimple adjoint Lie group, is studied. This decomposition generalizes the Iwasawa decomposition. The results are applied to the analysis on a semisimple symmetric space. Author (ESA)

N86-18078# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
STABILITY, MULTIPLICITY AND GLOBAL CONTINUATION OF SYMMETRIC PERIODIC SOLUTIONS OF A NONLINEAR VOLTERRA INTEGRAL EQUATION
S.-N. Chow (Michigan State Univ., East Lansing), O. Diekmann, and J. Mallet-Paret (Brown Univ.) Jan. 1985 35 p refs Submitted for publication
(Grant NSF MCS-82-01768)
(CWI-AM-R8502; B8565729) Avail: NTIS HC A03/MF A01

Results on existence, multiplicity, stability and global continuation of symmetric periodic solutions of nonlinear scalar Volterra convolution of real variable twice continuously derivable and the behavior in neigborhood of +1 and -1, are studied. Many open problems without Hopf bifurcations are reported. Author (ESA)

N86-18079# Rome Univ. (Italy). Dipt. di Fisica.
INTEGRABILITY OF TWO INTERACTING N-DIMENSIONAL RIGID BODIES
A. M. Perelomov (Institute of Theoretical and Experimental Physics, Moscow), O. Ragnisco, and S. Wojciechowski (Manchester University, UK) 25 Mar. 1985 10 p refs Sponsored by Italian Ministry of Education
(Preprint-450) Avail: NTIS HC A02/MF A01

A class of integrable Euler equations on the Lie algebra to (2n) describing two n-dimensional interacting rigid bodies is found. A Lax representation of equations of motion which depends on a spectral parameter is given and complete integrability is proved. The double Hamiltonian structure and the Lax representation of the general flow is discussed. Author (ESA)

N86-18080# Rome Univ. (Italy). Dipt. di Fisica.
CHIRAL SYMMETRY ON THE LATTICE WITH WILSON FERMIONS
Marco Bochicchio, Luciano Maiani, Guido Martinelli (CNR, Frascati, Italy), Giancarlo Rossi, and Massimo Testa (CNR, Rome) 28 Mar. 1985 45 p refs Sponsored by Italian Ministry of Education
(Preprint-452) Avail: NTIS HC A03/MF A01

The chiral properties of the continuum limit of lattice QCD with Wilson fermions are studied. It is shown that a partially conserved axial current satisfying the usual current algebra requirements can be defined. A proper definition of the chiral symmetry order parameter is given, and the chiral properties of composite operators are investigated. The implications of the analysis for the lattice determination of nonleptonic weak amplitudes are discussed. Author (ESA)

N86-18081# Rome Univ. (Italy). Dipt. di Fisica.
LIE-ISOTOPIC ALGEBRAIC APPROACH TO FORMAL NONPOTENTIAL SCATTERING THEORY
R. Mignani 16 Apr. 1985 15 p refs
(Preprint-456) Avail: NTIS HC A02/MF A01

A preliminary, formal approach to nonpotential scattering theory, based on the Lie-isotopic algebraic structure is given. In the time-dependent case, the central result is an equation for the isotopic evolution operator, which can be solved by a generalization of Magnus' expansion. In the time independent formalism, a purely algebraic isotopic version of Lippmann-Schwinger equations for the Moller operators and of the Born series is obtained. Author (ESA)

N86-18082# European Space Agency. European Space Operations Center, Darmstadt (West Germany).
AN OUTLINE OF THE PRACTICAL USE OF LIE SERIES
J. C. vanderHa and W. R. Burke, ed. (ESA, Paris) Paris ESA Apr. 1985 34 p refs
(ESA-STR-215; ISSN-0379-4067) Avail: NTIS HC A03/MF A01

Lie series are shown to arise naturally in the theory of differential equations when the solution is expanded in a time series. Properties of Lie series are illustrated. The theory is applied to the Kepler problem, resulting in a universal solution involving Stumpff functions. The usefulness of a Lie series approach in perturbation theory (particularly in celestial mechanics) is illustrated. It is demonstrated that the inherent automation of a Lie series approach facilitates the derivation of perturbation solutions, in particular the higher order contributions. Author (ESA)

N86-18083# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
FORMULATION OF A ONE-DIMENSIONAL BOUNDARY INTEGRAL EQUATION FOR THREE-DIMENSIONAL ELASTOSTATIC CORNER PROBLEMS [ZUR FORMULIERUNG EINER EINDIMENSIONALEN RANDINTEGRALGLEICHUNG FUER DREIDIMENSIONALE ELASTOSTATISCHE ECKENPROBLEME]
Hermann Bumb Mar. 1985 20 p refs In GERMAN
(Proprint-886) Avail: NTIS HC A02/MF A01

Numerical solutions for one-dimensional eigenvalue problems were improved using a boundary element method to solve equations of the three-dimensional elasticity theory and for more general corner problems. The singular Dirichlet and Neumann problems for the Laplace operator in a corner are formulated and reduced to a two-dimensional eigenvalue problem of the Laplace-Beltrami operator in a part of the unity sphere using Mellin transformation. This two-dimensional eigenvalue problem is reduced to a one-dimensional boundary integral equation which is formulated. The integral equations are given in stereographic coordinates. It is shown how results can be obtained for the elastic equations from the Laplace equation. Author (ESA)

N86-18084# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
AN AXIOMATIC THEORY OF HETEROGENEITY AND HOMOGENEITY
J. C. A. vanderLubbe 10 May 1985 35 p refs Submitted for publication
(NLR-MP-84054-U; B8568097) Avail: NTIS HC A03/MF A01

It is shown that developments in statistical information theory can contribute to the measurement of heterogeneity and homogeneity. They can lead to a more fundamental and unifying approach and bring together heterogeneity and homogeneity indices in one axiomatically founded theory. A generalized heterogeneity index is introduced axiomatically. Algebraic, analytic, and geometrical properties are investigated. The interpretation of these properties and the choice of the values of the parameters for practical applications are emphasized. Based on this generalized heterogeneity index, it is possible to give an axiomatic characterization for a class of homogeneity indices. The properties of this class are the reverse of those of the heterogeneity index. Potential measures for heterogeneity or homogeneity change are discussed. Author (ESA)

N86-18085# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
BIFURCATION AND STABILITY, A NUMERICAL APPROACH
E. Riks 3 Aug. 1984 36 p refs Presented at 1984 WAM Symposium on Innovative Methods for Nonlinear Problems, New Orleans, La., 11 Dec. 1984
(NLR-MP-84078-U; B8568108) Avail: NTIS HC A03/MF A01

It is shown how existing incremental-iterative procedures can be augmented so that they also deal with the determination of bifurcation points along a nonlinear equilibrium path and the computation of its post-bifurcation branch or branches. It is possible to make a connection with the classical perturbation theory and produce the so-called asymptotic solutions. With these approximations the stability or instability of the bifurcation point can be categorized prior to a continued computation along the branches. Additions of this kind are particularly useful for optimized shell structures where bifurcation buckling is often the critical failure mode. Author (ESA)

N86-18086# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
NUMERICAL INTEGRATION OF RETARDED DIFFERENTIAL EQUATIONS WITH PERIODIC SOLUTIONS
H. Arndt (Bonn Univ.), P. J. vanderHouwen, and B. P. Sommeijer Feb. 1985 15 p refs Submitted for publication
(CWI-NM-R8502; B8567078) Avail: NTIS HC A02/MF A01

The fact that minimax versions of linear multistep methods, derived for ordinary differential equations with periodic solutions, are suitable for the integration of retarded differential equations possessing a periodic solution, is proved. Examples of first order and second order equations are given and numerical results are compared with conventional methods. Author (ESA)

N86-18087# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
COMPUTATION OF ALL THE AMICABLE PAIRS BELOW 10 BILLION
H. J. J. teRiele Mar. 1985 45 p refs Submitted for publication
(CWI-NM-R8503; B8567079) Avail: NTIS HC A03/MF A01

A numerical method for amicable pairs numbers (APN) is described. This method gives all 1427 APN with smaller member below 10 billion. More than 800 new APN are given. Cohen's method for APN is improved. Author (ESA)

N86-18088# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
EXPLICIT RUNGE-KUTTA (-NYSTROEM) METHODS WITH REDUCED PHASE ERRORS FOR COMPUTING OSCILLATING SOLUTIONS
P. J. vanderHouwen and B. P. Sommeijer Apr. 1985 20 p refs
(CWI-NM-R8504; B8567080) Avail: NTIS HC A02/MF A01

Explicit Runge-Kutta (-Nystroem) RK(N) methods for the integration of first (and second) order differential equations having an oscillatory solution are constructed. Phase errors (or dispersion) of the dominant components in the numerical oscillations when these methods are applied to a linear, homogeneous test model are discussed. Several RK(N) methods which are dispersive of orders up to 10, whereas the (algebric) order of accuracy is only 2 or 3, are constructed. Application of these methods to semidiscretized hyperbolic equations and to equations describing free and weakly forced oscillations reveals that the phase errors can be significantly reduced. Author (ESA)

N86-18089# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
CONVERGENCE AND ORDER REDUCTION OF DIAGONALLY IMPLICIT RUNGE-KUTTA SCHEMES IN THE METHOD OF LINES
J. G. Verwer May 1985 18 p refs Submitted for publication
(CWI-NM-R8506; B8567082) Avail: NTIS HC A02/MF A01

Diagonally implicit Runge-Kutta discretizations of initial-boundary value problems in partial differential equations are studied. The derivation of bounds for the full discretization error under the assumption that the grid distances in space and time are independent parameters, is considered. The method of lines approach is used to exploit the B-convergence theory for Runge-Kutta schemes applied to stiff problems. Order reduction phenomena are emphasized. Numerical examples confirm theoretical results. It is shown that in partial differential equations, order reduction severely reduces the performances of higher order schemes. Author (ESA)

N86-18090# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
PREDICTOR-CORRECTOR METHODS FOR PERIODIC SECOND-ORDER INITIAL VALUE PROBLEMS

P. J. vanderHouwen and B. P. Sommeijer Jun. 1985 20 p refs Submitted for publication
(CWI-NM-R8509; B8567083) Avail: NTIS HC A02/MF A01

Predictor-corrector methods for the accurate representation of the eigenmodes in the solution of second-order differential equations without first derivatives are constructed. The methods have (algebraic) order 4 and 6, and phase errors of orders up to 10. For linear and weakly nonlinear problems where homogeneous solution components dominate, the methods are considerably more accurate than conventional methods. Author (ESA)

N86-18091# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
DISCRETIZATION OF HYPERBOLIC DIFFERENTIAL EQUATIONS WITH PERIODIC SOLUTIONS
P. J. vanderHouwen Jun. 1985 8 p refs Submitted for publication
(CWI-NM-R8510; B8567084) Avail: NTIS HC A02/MF A01

A method of lines applied to discretization of hyperbolic differential equations with periodic solutions, is considered. The resulting system of ordinary differential equations is solved. Difference operators which can be tuned to dominant frequencies are studied. Time interrogators for periodic solutions are discussed. A space discretization formula is given. Numerical experiments of fluid dynamics are reported. Author (ESA)

N86-18092# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
SYNTAX AND DEFINING EQUATIONS FOR AN INTERRUPT MECHANISM IN PROCESS ALGEBRA
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop Feb. 1985 49 p refs Submitted for publication Sponsored by European Economic Communities
(CWI-CS-R8503; B8567086) Avail: NTIS HC A03/MF A01

A mechanism to describe priorities in the algebra of communicating processes, whereby some actions have priority over others in a nondeterministic choice (or sum) is introduced. The mechanism can be used to model the working of interrupts in a distributed system. This is illustrated in an example. Author (ESA)

N86-18093# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Algorithms and Architecture.
IMPLEMENTATION OF A NEW PRIMALITY TEST
H. Cohen (Bordeaux Univ., Talence, France) and A. K. Lenstra Mar. 1985 32 p refs
(CWI-CS-R8505; B8567088) Avail: NTIS HC A03/MF A01

An implementation of the Cohen-Lenstra version of the Adleman-Pomerance-Rumely primality test is presented. Primality of prime numbers of up to 213 decimal digits can routinely be proved within 10 min, on a CDC 170/750, CDC 205, or Cray 1 computer. Author (ESA)

N86-18094# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
ON THE CONSISTENCY OF KOOMEN'S FAIR ABSTRACTION RULE
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop May 1985 42 p refs Submitted for publication Sponsored by Esprit Project METEOR
(CWI-CS-R8511; B8567094) Avail: NTIS HC A03/MF A01

A graph model for the algebra of communicating processes with silent steps (ACP), in which Koomen's fair abstraction rule holds, is constructed. An approximation induction principle, the recursive definition principle and recursive specification principle, are formulated. The fact that for the ACP each computably recursively definable process is finitely recursively definable is proved. This property does not hold when the abstraction in ACP is not used. Author (ESA)

N86-18095# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A GENERALIZED DIAGRAM FOR VARIOUS PARAMETER ESTIMATION METHODS; THE COHERENCE IN PSEUDO-LINEAR REGRESSION SCHEMES
A. J. W. vandenBoom and P. Eykhoff Jul. 1983 7 p refs
(ER-83/07) Avail: NTIS HC A02/MF A01

The relationships between recursive estimation schemes for single-input single-output systems are established by presenting a general diagram of which well-known estimators are special cases (least-squares, generalized least squares, extended matrix method, instrumental variable method, approximated maximum likelihood, implicit quasi-linearization, filtered instrumental variable estimator, (sub) optimal instrumental variable estimator and the instrumental variable variant of the extended matrix method). In the diagram, three important operations can be distinguished: noise filtering, model extension, and instrumental variable generation. It is shown that by proper combination of these three main operations, all the mentioned estimators can be constructed. Author (ESA)

N86-18096# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
WAVEFORM VECTOR QUANTIZATION: THE ALGEBRAIC APPROACH [LA QUANTIFICATION VECTORIELLE DE FORME D'ONDES: APPROCHE ALGEBRIQUE]
Jean-Pierre Adoul May 1985 54 p refs In FRENCH; ENGLISH summary Presented at Groupement des Acousticiens de Langue Franc. Seminar, Paris, France, 14 Feb. 1985 Submitted for publication
(ENST-85C004; ISSN-0751-1337) Avail: NTIS HC A04/MF A01

Vector and scalar quantization for Gaussian and uniform distributions are compared, demonstrating the superiority of the first even if the vector components are statistically independent. Spherical vector quantization is investigated. The norm and the vector orientation are quantified separately. Such a quantizer requires the specification of a set of normalized vectors which are possible rounded-off values for the orientation. Regular lattice points such as the hexagonal lattice in two dimensions offer the possibility of specifiying a large number of vectors of R exp m form a few basis vectors. Author (ESA)

N86-18097# Technische Hogeschool, Delft (Netherlands). Vakgroep Stromingsleer.
ON THE NUMERICAL EVALUATION OF BESSEL FUNCTIONS OF FIRST, SECOND AND THIRD KIND OF COMPLEX ARGUMENT AND INTEGER ORDERS
G. D. C. Kuiken Apr. 1985 7 p refs
(MEAH-54) Avail: NTIS HC A02/MF A01

The double precision of the Bessel functions of integer orders in the entire complex plane is discussed. The Hankel asymptotic expansions are used. Significant digits are lost in solution of Bessel's equation due to essential singularity at zero or due to truncation and round-off. Poisson's summation formulas are used to compute the Bessel equation of the first kind with arbitary small error. Author (ESA)

N86-18098# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
PERFORMANCE EVALUATION OF NONLINEAR OPTIMIZATION METHODS VIA PAIRWISE COMPARISON AND FUZZY NUMBER
F. A. Lootsma 1984 38 p refs Presented at NATO Advanced Study Institute on Computational Mathematical Programming, Bad Windsheim, West Germany, 23 Jul. - 2 Aug. 1984 Revised Submitted for publication
(Rept-84-40) Avail: NTIS HC A03/MF A01

The deterministic performance evaluation of nonlinear optimization methods is discussed. The concept of fuzzy numbers with triangular membership functions is given. The algebraic operations of fuzzy numbers can be interpreted as simple real numbers operations. A pairwise comparison using fuzzy estimates of the performance ratios to obtain fuzzy final scores of the methods under consideration is reported. The fuzzy performance evaluation by the ranking and rating of five methods for solving geometric programming problems is studied. Author (ESA)

N86-18099# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
AN AUTOMATIC PROOF PROCEDURE FOR SEVERAL GEOMETRIES (REPORT 1)
Th. Bruyn and H. L. Claasen 1984 54 p refs
(Rept-84-42; Rept-1) Avail: NTIS HC A04/MF A01

The projective geometry over a group of 2x2 matrices with real coefficients is considered. The procedures for proofs of theorems in several geometries which can be executed in a computer are given. The outlook for ruler and compass construction is assessed. The fact of Desargues' theorem is deduced from Papus' theorem is proved. Author (ESA)

N86-17288# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL GRID GENERATION USING ALGEBRAIC AND GEOMETRICAL TECHNIQUES
Takuya Matsuda and Eiji Shima *In* National Aerospace Lab. Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics 1984 p 183-190 refs In JAPANESE; ENGLISH summary (For primary document see N86-17267 08-01)
Avail: NTIS HC A14/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-18100# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
REALIZATION AND APPROXIMATION OF STATIONARY STOCHASTIC PROCESSES
Yehuda Avniel Feb. 1985 88 p
(Contract DAAG29-84-K-0005; Grant AF-AFOSR-0135-82; AF Proj. 2304)
(AD-A158996; LIDS-TH-1440; AFOSR-85-0674TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

To a multivariate stationary stochastic process, the author associates a scattering matrix S, which measures the interaction between the past and future of the process. This matrix valued function can be viewed as the generalized phase function associated with the spectral density. It determines the density up to congruency only for a completely non-deterministic sequence. Using the theory of Adamjan-Arov-Krein on extensions of Hankel operators, it is established that the Hankel operator H sub S determines the Laurent operator L sub S as its unique norm preserving lifting. Employing the Nagy-Foias theory on unitary dilations, or its dual, Lax-Phillips scattering operator model, a realization theory for equivalent classes of stationary sequences with the same density is developed. The minimal equivalence class of Markovian representations is induced by the coprime factorization of the scattering matrix. This presents a unified approach to stochastic and deterministic realization theory, with S as the analog of the frequency response function. Author (GRA)

N86-18101# Missouri Univ., Rolla. Dept. of Mathematics and Statistics.
POWER SERIES APPROXIMATIONS TO THE NULL DISTRIBUTIONS OF SOME CHI-BAR-SQUARE STATISTICS Interim Report
B. Singh and F. T. Wright Sep. 1985 23 p Prepared in cooperation with Memphis State Univ., Tenn.
(Contract N00014-80-C-0322)
(AD-A159785) Avail: NTIS HC A02/MF A01 CSCL 12/1

Some power series approximations to the exact null distribution of the Chi-bar-square statistic for several testing situations are developed using the first four cumulants of the null distributions, and their performance is investigated numerically. The series expansions use Laguerre polynomials and the associated gamma densities. Chi-bar-square statistics arise when testing the homogeneity of normal means with the alternative restricted by a partial ordering on the means and when testing the ordering against all alternatives. Approximations are provided for the case of a total order and a simple tree with equal, or nearly equal, sample sizes. The numerical investigations indicate the accuracy and usefulness of these approximations. Author (GRA)

N86-18102# Naval Postgraduate School, Monterey, Calif.
RANDOM PARAMETER MARKOV POPULATION PROCESS MODELS AND THEIR LIKELIHOOD, BAYES AND EMPIRICAL BAYES ANALYSIS
D. P. Gaver and J. P. Lehoczky Sep. 1985 29 p
(AD-A159812; NPS55-85-020) Avail: NTIS HC A03/MF A01 CSCL 12/1

Markov population stochastic processes are useful in describing repairman and logistics problems, networks of queues, pharmacological processes, and manpower situations. This paper considers statistical estimation problems arising for such mathematical models. Parameter estimation of an empirical Bayes nature, with limited shrinkage or discrepancy tolerant features is discussed and illustrated. Author (GRA)

N86-18103# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
BROWNIAN MOTION
I. Karatzas and S. E. Shreve Jul. 1985 447 p
(Contract DAAG29-84-K-0005)
(AD-A160020; LIDS-R-1485; ARO-20980.30-MA) Avail: NTIS HC A19/MF A01 CSCL 07/4

The most fundamental concepts in the theory of stochastic processes are the Markov property and the martingale property. This book is written for those who are familiar with both of these ideas in the discrete-time setting, and who now wish to explore stochastic processes in the continuous-time context. It has been our goal to write a systematic and thorough exposition of this subject, leading in many instances to the frontiers of knowledge. At the same time, we have endeavored to keep the mathematical prerequisities as low as possible, namely, knowledge of measure-theoretic probability and some acquaintance with discrete-time processes. The vehicle we have chosen for this task is Brownian motion, which we present as the canonical example of both a Markov process and a martingale in continuous time. We support this point of view by showing how by means of stochastic integration and random time change, all continuous martingales and a multitude of continuous Markov processes can be represented in terms of Brownian motion. This approach forces us to leave aside those processes which do not have continuous paths. Thus, the Poisson process is not a primary object of study, although it is developed to be used as a tool when we later study passage times of Brownian motion. GRA

N86-18104# American Inst. for Research, Washington, D.C.
FORECASTING DEVICE EFFECTIVENESS. VOLUME 3: ANALYTIC ASSESSMENT OF DEVICE EFFECTIVENESS FORECASTING TECHNIQUE Final Report, Aug. 1983 - Dec. 1984
A. M. Rose, A. W. Martin, and L. G. Yates Jun. 1985 85 p
(Contract MDA903-82-C-0414; DA Proj. 2Q2-63744795)
(AD-A160029; ARI-TR-681-Vol-3) Avail: NTIS HC A05/MF A01 CSCL 12/1

Several analytic procedures were conducted to address various aspects of the scalar properties of the Device Effectiveness Forecasting Technique (DEFT). These procedures included Monte Carlo simulations to assess the interpretation of DEFT output, sensitivity of DEFT parameters, comparison of outputs, stability, and interrater agreement. Results indicated that it would be necessary to incorporate assumptions regarding expected distributions of input variables in order to meaningfully interpret DEFT output. Also, the Monte Carlo analyses demonstrated the sensitivity of DEFT output scores to variations in inputs, and assessed the effects of various assumptions regarding measurement error on output scores. The interrater agreement issue was addressed by having several raters apply DEFT to the three actual training devices. Results indicated a high degree of consistency among raters for all devices for all levels of DEFT. GRA

N86-18105# Stanford Univ., Calif. Dept. of Physics.
THE INDEXING PROPERTIES OF AN ANCILLARY STATISTIC
A. Y. C. Kuk 28 Aug. 1985 22 p
(Contract N00014-76-C-0475)
(AD-A160030; TR-363) Avail: NTIS HC A02/MF A01 CSCL 12/1

The role of an ancillary statistic as an information and as a precision index is discussed. For transformation models, it can be shown that, in some sense, two samples with the same ancillary statistic value contain the same amount of information. For both transformation and exponential models, the variance of the conditional Fisher information is proportional to the square of the statistical curvature. It appears that the constancy of statistical curvature is related to the concept of exact precision index.
Author (GRA)

N86-18106# Stanford Univ., Calif. Dept. of Statistics.
HOW MANY BOOTSTRAPS?
R. Tibshirani 22 Aug. 1985 16 p
(Contract N00014-76-C-0475)
(AD-A160043; TR-362) Avail: NTIS HC A02/MF A01 CSCL 12/1

The bootstrap is a non-parametric method for assessing statistical accuracy. In approximating bootstrap quantities by Monte Carlo simulation, one must decide how many bootstrap samples to generate. This document proposes an adaptive sequential method that estimates the accuracy based on the current bootstrap samples. Bootstrap sampling is continued until the estimated accuracy is high enough. In the examples given, 100 to 300 bootstraps are sufficient for standard error and bias estimation, while 1000 bootstraps may be necessary for estimating a percentile.
GRA

N86-18107# Stanford Univ., Calif. Dept. of Operations Research.
MODIFIED CONFIDENCE INTERVALS FOR THE MEAN OF AN AUTOREGRESSIVE PROCESS
B. D. Titus Aug. 1985 108 p
(Contract DAAG29-84-K-0030; Grant NSF MCS-82-03483)
(AD-A160055; TR-9; ARO-20927.9-MA) Avail: NTIS HC A06/MF A01 CSCL 12/1

The author's motivation is to find asymptotically more accurate confidence intervals for the steady state mean of a simulated process. By this he means that the coverage probability error for the confidence intervals we derive should be of lower order than that of standard confidence intervals. There are several standard methods of setting confidence intervals in simulations, including the regenerative method, batch means, and time series methods. He focuses on improved confidence intervals for the mean of an autoregressive process, and as such our results are useful outside of a simulation setting.
GRA

N86-18108# South Carolina Univ., Columbia.
ON THE ASYMPTOTIC PROPERTIES OF A KERNEL-TYPE QUANTILE ESTIMATOR FROM CENSORED SAMPLES Technical Report
Y. O. Lio, W. J. Padgett, and K. F. Yu May 1985 17 p
(Grant AF-AFOSR-0156-84)
(AD-A160302; TR-104; AFOSR-85-0865TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In reliability and medical studies, it is often of interest to estimate various quantiles of the unknown lifetime distribution. In particular, the median lifetime and extreme quantiles are of interest to the experimenter in such studies. In many life testing and medical follow-up experiments, however, arbitrarily right-censored data arise, and it is important to be able to estimate the quantiles of interest based on the censored data. For such data, some kernel-type quantile estimators are considered in this paper which give smoother estimates than the usual product-limit quantile function.
GRA

N86-18109# Rome Univ. (Italy). Dipt. di Fisica.
A NEW PROPOSAL FOR THE DETERMINATION OF THE RENORMALIZATION GROUP TRAJECTORIES BY MONTE CARLO RENORMALIZATION GROUP METHOD
M. Falcioni, G. Martinelli (CNR, Frascati, Italy), M. L. Paciello (CNR, Rome), G. Parisi (CNR, Rome), and B. Taglienti 15 Apr. 1985 19 p refs
(Preprint-453) Avail: NTIS HC A02/MF A01

A method based on Schwinger-Dyson equations for calculating block renormalized couplings by Monte Carlo renormalization group is presented. A numerical study for the 2-dimensional 0(3) nonlinear sigma-model is done. Results show that the method can be safely used to determine the renormalization group trajectory at any values of the coupling constants, and can be applied to a variety of interesting cases including four-dimensional lattice gauge theories. However it seems unlikely that it can be used to determine the Beta function of the theory with the necessary accuracy. The total VAX 11/780 CPU time used to produce all the data is 170 hr.
Author (ESA)

N86-18110# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A MARKOVIAN MODEL, WITH STATE-DEPENDENT PARAMETERS, OF A TRANSACTIONAL SYSTEM SUPPORTED BY CHECKPOINTING AND RECOVERY STRATEGIES
V. F. Nicola and F. J. Kylstra 1985 19 p refs
Avail: NTIS HC A02/MF A01

A Markovian model of a transactional system supported with checkpointing and recovery strategies to guarantee reliable operation is considered. The model allows representations with state-dependent parameters. Algorithms for the computation of the state probabilities (and the performance variables) and their sensitivities with respect to the model parameters are presented. In the case of state-independent parameters, a state-space analysis approach for the derivation of analytic expressions for the performance variables is demonstrated. The optimization of performance criteria, such as the system availability and the mean response time of a transaction, is discussed.
Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-18111# Lawrence Livermore National Lab., Calif.
PARAMETRIC STUDY OF THE AMPLIFICATION FACTOR IN THE ENERGY BALANCE METHOD
R. C. Chun and T. Y. Chuang 1 Apr. 1985 27 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami Beach, Fla., 17-22 Nov. 1985 Sponsored in part by the Nuclear Regulatory Commission, Washington, D.C.
(TI85-010472; UCRL-92443; CONF-851124-2) Avail: NTIS HC A03/MF A01

This paper represents a parametric study of the amplification factor to account for rebound effects in the Energy Balance Method. Of the 66 distinct cases we chose for our parametric study, the amplification factor of 1.1 seems sufficient except in four borderline cases where the carbon steel pipes are small or have very small gaps between the pipes and the pipe whip restraints. We conclude that the amplification factor generally decreases as the parameters gap size, hinge-to-break distance and overhang increase.
DOE

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-18112# Rome Univ. (Italy). Dipt. di Fisica.
NONLINEAR EVOLUTION EQUATIONS ASSOCIATED WITH THE CHIRAL FIELD SPECTRAL PROBLEM
M. Bruschi and O. Ragnisco 16 Apr. 1985 32 p refs
(Preprint-455) Avail: NTIS HC A03/MF A01

The class of nonlinear evolution equations associated with the linear problem Psi x = Lambda A Psi is derived. It turns out that the chiral field equation, the nonlinear Klein-Gordon equations, the Heisenberg and Papanicolau spin chain models, the modified Boussinesq equation, and the Wadati-Konno-Ichikawa equations pertain to this class. The Backlund transformations for such a class are used to derive the one-soliton solution in a special case. Author (ESA)

N86-18113# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
AN INTRODUCTORY COMPARATIVE STUDY OF THE HOPF BIFURCATION METHOD AND THE DEE HARMONIC BALANCE METHOD [EEN INLIEDENDE STUDIE NAAR HOPH-BIFURCATIEMETHODE IN VERGELIJKING MET DEE METHODE VAN DE HARMONISCHE BALANS]
E. vanderGiessen Oct. 1983 39 p refs In DUTCH
(Lab-Rept-757) Avail: NTIS HC A03/MF A01

The Hopf bifurcation method and the harmonic balance method used to solve the hunting behavior when railroad vehicles exceed a critical speed were compared. Only 2x2-systems were considered. The Hopf bifurcation theory is explained. A conveyor problem was treated with both methods. The application of both methods in general, second order, autonomous, nonlinear differential equations was considered. The bifurcation point is calculated in the same way and with approximately the same effort with both methods. The periodic solutions in the neighborhood are much easier to find with the Hopf bifurcation method. Contrary to the Hopf bifurcation theory, the harmonic balance method does not give a decisive answer as to the stability of periodic solutions. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-18114# Lawrence Livermore National Lab., Calif.
CONCEPTUAL APPROACH TO THE DESIGN OF 50-TESLA HYPER-FIELD SUPERCONDUCTING MAGNETIC COILS
R. W. Hoard 26 Aug. 1985 20 p
(Contract W-7405-eng-48)
(DE85-017881; UCID-20511) Avail: NTIS HC A02/MF A01

Perhaps one of the principle advantages of the open-ended geometry afforded by the mirror fusion reactor designs, in contrast to that of the tokamak proposals, is the potential future upgradability of these systems to also encompass advanced fusion fuel cycles. This is the combined result of both the ability to convert the energy of the escaping charged particles directly into electricity and from a magnet design viewpoint; the much higher required containment field strengths (between 40 to 50 T in the mirror choke coils and approximately 12 T in the central cell magnets) dictate that the tokamak geometry lacks adequate real estate for structural support against the resulting electromagnetic stresses. The latter consideration is highlighted by F. Moon's report on the Virial Theorem, which states that the minimal amount of structural mass needed for a magnet scales as both the magnetic stored energy and a multiplicative factor that increases with the geometric complexity of the proposed magnet system. Solenoids are, of course, the simplest source of fields, which implies that if strengths of 40 to 50 T are indeed possible, we should first seek their production in this geometry. DOE

N86-18115# Arkansas Univ., Little Rock. Dept. of Electronics and Instrumentation.
REAL-TIME MEASUREMENT AND CALIBRATION OF PARTICLE CHARGE: A COMPARISON BETWEEN DMA AND E-SPART ANALYZER
D. Cramer, R. E. Ware, G. S. Ballard, and M. K. Mazumder Sep. 1985 7 p
(Contract W-7405-eng-48)
(DE86-000019; UCRL-15621) Avail: NTIS HC A02/MF A01

An electrical-single particle aerodynamic relaxation time (E-SPART) analyzer was used to measure, in real time, the electrostatic charge and aerodynamic size distributions of aerosol particles on an individual basis. A TSI Model 3071 differential mobility analyzer (DMA) was used to classify the test aerosol particles according to their electrical mobility as an independent means of charge calibration. Measurements were performed in a range of 0 to +-200 electronic charges. Experimental data show a close agreement between the electrostatic charge classification by DMA and the measurements obtained by the E-SPART analyzers. DOE

N86-18116# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
LORENTZ ANOMALY IN ARBITRARY DIMENSIONS
T. Matsuki Jan. 1985 8 p
(Contract DE-AS05-77ER-05490)
(DE86-001332; DOE/ER-05490/63) Avail: NTIS HC A02/MF A01

It is shown that the Lorentz invariance is broken in gauge theories of chiral Weyl fermions in flat space-time via one-loop quantum corrections. Abelian gauge fields contribute to this anomaly in even dimensions larger than or equal to four and non-Abelian gauge fields do in even dimensions larger than or equal to six. The anomaly is proportional to D/2 - 1 power to the charge, where D is a number of space-time dimensions. DOE

N86-18117# Vacuumschmelze G.m.b.H., Berlin (West Germany).
FAST MAGNETIC SYSTEMS, BASIC RESEARCH Final Report, Jun. 1983
Ludwig Erd, Hubert Hoefer, Dieter Maiwald, and Klaus Menzel Bonn, West Germany Bundesministerium fuer Forschung und Technologie Sep. 1985 167 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie, Bonn, West Germany
(BMFT-FB-T-85-102; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

Static and periodic field problems of electromechanical energy transducers were solved numerically using the vector potential with linear positioning motors with permanent magnetic excitation. Power loss and impedance values were calculated. The magnetostatic field distributions were numerically calculated for moving coil motors with magnetic retaining force. The flux dynamics and energy balance of solid and laminated magnet yokes were experimentally studied on fast clapper magnet systems for printers. The measured results show good agreement with the numerical results obtained with an automatic measuring equipment supported by computer systems. Author (ESA)

N86-18118# Stichting voor Fundamenteel Onderzoek der Materie, Amsterdam (Netherlands).
[ACTIVITIES REPORT IN FUNDAMENTAL RESEARCH ON MATTER (FOM)] Annual Report, 1983 [JAARBOEK '83]
1983 161 p refs Partly in DUTCH and ENGLISH
Avail: NTIS HC A08/MF A01

Nuclear, atomic, molecular, solid state, thermonuclear, plasma, theoretical high energy physics, and semiconductor research was carried out. The reciprocity of electrons and phonons and magnetic impurities was studied using a point-contact spectroscopy method. Transitions of internal energy levels of colliding particles in a radiation field (lasers), were investigated. Experiments concerning possibilities of a Bose-Einstein condensation of He3 quasi-particles gas dissolved in He4 superfluid, were carried out. An electroncyclotron emission polychromator, to study instabilities, gyrotron heating, and fuel injection in tokamak devices, was developed. Author (ESA)

N86-18119# Technische Physische Dienst TNO-TH, Delft (Netherlands).
[ACTIVITIES REPORT IN APPLIED PHYSICS] Annual Report, 1984 [JAARVERSLAG '84]
1984 61 p refs Partly in DUTCH and ENGLISH

Avail: NTIS HC A04/MF A01

Research concerning acoustics, heat, architecture, materials research, and (optical) instrumentation is presented; active noise control and acoustic path identification were investigated. Energy conservation, solar energy, and building physics activities were carried out. Ultraviolet absorbing glasses, glass fibers, sheet glass, and aluminium and silicon oxynitrides, were studied. Glass fiber based sensor and laser applications, and optical space-instrumentation are discussed. Signal processing, sensors, and integrated electronics applications were developed. Scale model experiments for flow induced noise and vibrations, caused by engines, ventilators, wind turbines, and propellers, were executed. A multispectral charge coupled device airborne scanner, with four modules (one for forward observations) is described. A ground radar, based on seismic exploration signal processing and used for the location of pipes, sewers and cables, was developed.

Author (ESA)

N86-17651# Joint Publications Research Service, Arlington, Va.
MAGNETIZATION REVERSAL IN TRIAXIAL SINGLE-DOMAIN PARTICLES
Viktor Avramovich Kufa and Ivan Petrovich Stadnik *In its* USSR Report: Electronics and Electrical Engineerings (JPRS-UEE-84-016) 30 Nov. 1984 p 39 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 5-8 (For primary document see N86-17640 08-31)
Avail: NTIS HC A03/MF A01

N86-17652# Joint Publications Research Service, Arlington, Va.
DETERMINING SPATIAL ORIENTATION OF AXES OF ELLIPTICAL MAGNETIC FIELD
Leonid Mikhaylovich Rudnitskiy, Valeriy LVovich Frumin, Boris Avramovich Guyetskiy, and Nikolay Zekharovich Klimov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 8-11 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17653# Joint Publications Research Service, Arlington, Va.
MAGNETIC FIELD OF EXCITATION WINDING IN EXPERIMENTAL CRYOGENIC TURBOGENERATOR
Iosif Natanovich Grinbaum and Yuriy Nikolayevich Vvedenskiyk *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 40-41 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 14-19 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17654# Joint Publications Research Service, Arlington, Va.
REVERSIBLE COMPONENT OF MAGNETIC INDUCTION IN MAGNETICALLY SOFT MATERIALS DURING MAGNETIZATION REVERSAL
Yuriy Nikolayevich Maslov, Oleg Nikolayevich Khmaruk, and Viktor Vasilyevich Krokhim *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 41-42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 45-50 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

N86-17655# Joint Publications Research Service, Arlington, Va.
EQUIVALENT-CIRCUIT CALCULATIONS FOR BUILT-UP MAGNETIC STRUCTURES BY PROJECTION METHOD
Aleksandr Aleksandrovich Drozdov *In its* USSR Report: Electronics and Electrical Engineering (JPRS-UEE-84-016) 30 Nov. 1984 p 42 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Elektromekhanika (Novocherkassk, USSR), no. 5, May 1984 p 50-60 (For primary document see N86-17640 08-33)
Avail: NTIS HC A03/MF A01

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-18120# Pennsylvania State Univ., University Park.
EFFECTS OF STRONG DIFFRACTION ON THE FOCUSING AND SCATTERING OF ACOUSTIC WAVES Ph.D. Thesis
Thomas Barton Gabrielson 1985 165 p
Avail: Univ. Microfilms Order No. DA8516027

In many wave propagation problems, diffraction is considered to be a second-order effect that diffuses the sharp shadows and focal surfaces predicted by ray theory. However, if the frequency is low enough so that the wavelength is comparable to the size of the focusing region, structured fields of significant level can be found in classical shadows and smooth, featureless enhancement can replace the sharp, multiple convergences common at higher frequencies. This thesis examines the effects of strong diffraction on refractive focusing of acoustic waves. In addition, signal fluctuations caused by perturbations of the refractive index are considered where the spatial extent of a particular perturbation patch is comparable to the wavelength. In order to study these strong diffraction effects, several tools are developed: a range-dependent finite-difference solution of the time-dependent wave equation is constructed and a method based on range-dependent normal-mode theory is developed that leads to a simple interpretation of the signal fluctuations and the underlying field structure.

Dissert. Abstr.

N86-18121*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SEPARATION OF AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY PLATES CONSTRUCTED OF CONVENTIONAL AND COMPOSITE MATERIALS WITH APPLICATIONS FOR PREDICTION OF INTERIOR NOISE PATHS IN PROPELLER DRIVEN AIRCRAFT Ph.D. Thesis
Michael C. McGary Jan. 1986 313 p refs
(NASA-TM-87414; NAS 1.15:87414) Avail: NTIS HC A14/MF A01 CSCL 20A

The anticipated application of advanced turboprop propulsion systems and use of composite materials in primary structure is expected to increase the interior noise of future aircraft to unacceptability high levels. The absence of technically and economically feasible noise source-path diagnostic tools has been a primer obstacle in the development of efficient noise control treatments for propeller driven aircraft. A new diagnostic method which permits the separation and prediction of the fully coherent airborne and structureborne components of the sound radiated by plates or thin shells has been developed. Analytical and experimental studies of the proposed method were performed on plates constructed of both conventional and composite materials. The results of the study indicate that the proposed method can be applied to a variety of aircraft materials, could be used in flight, and has fewer encumbrances than the other diagnostic tools currently available. The study has also revealed that the noise radiation of vibrating plates in the low frequency regime due to combined airborne and structureborne inputs possesses a strong synergistic nature. The large influence of the interaction between the airborne and structureborne terms has been hitherto ignored by researchers of aircraft interior noise problems. Author

N86-18122# Science Applications International Corp., McLean, Va.
STOCHASTIC MEASUREMENTS AND SYSTEMS IMPLICATIONS
J. L. Collins and R. R. Greene Jun. 1985 34 p
(Contract N00014-85-C-0084)
(AD-A159827; SAIC-85/1748) Avail: NTIS HC A03/MF A01 CSCL 20/1

The U.S. Navy is defining the baseline performance of the current SSN ASW suite in the Arctic operating environment. This suite includes the AN/BQQ-5 sonar suit (including the Towed Array, the sphere and other sensor and processor sub-systems),

communications subsystems and weapon systems (Mk 48 and ADCAP). An effective acoustic measurement program in the Arctic must support the evaluation of how well the different subsystems are able to carry out their assigned functions. Unique aspects of the operating environment in the Arctic include unusual noise properties, unusual transmission effects and an unusual sea surface. This report addresses those acoustic transmission effects which affect system performance due to fluctuations or spreads in the acoustic field space, angle time and frequency. GRA

N86-18123# Woods Hole Oceanographic Institution, Mass.
AN INVERSE METHOD FOR OBTAINING THE ATTENUATION PROFILE AND SMALL VARIATIONS IN THE SOUND SPEED AND DENSITY PROFILES OF THE OCEAN BOTTOM Ph.D. Thesis
S. D. Rajan May 1985 248 p
(Contract N00014-82-C-0152)
(AD-A159848; WHOI-85-30) Avail: NTIS HC A11/MF A01 CSCL 20/1

The acoustic properties of marine sediments have a direct effect on the propagation of sound in the ocean. In the frequency range of interest (50 to 500 Hz) the sediment can be modelled as a fluid. Assuming horizontal stratification of the ocean bottom, the acoustical parameters of interests are the compressional wave speed, the compressional wave attenuation and density as a function of depth. This thesis presents an inverse method, based on a perturbation technique, determining these parameters. A monochromatic source experiment is proposed because of the desirability of such an experiment for determining the acoustic properties of an anelastic medium. The input information is the plane wave reflection coefficient as a function of the angle of incidence at a fixed frequency. A nonlinear integral equation relating the variations of these acoustic properties from a known reference value to the plane wave reflection coefficient is derived and is then linearized using the Born approximation. The region of validity of the Born approximation is derived and, based on this, the optimum angular aperture for the input data is obtained. The linearized integral equation is a Fredholm integral equation of the first kind. An acceptable stable solution of the integration is obtained with noise free data show good agreement between the true profiles and the reconstructed profiles. GRA

N86-18124# Science Applications International Corp., McLean, Va.
ARRAY POSITIONING REQUIREMENTS
J. L. Collins 26 Jun. 1985 19 p
(Contract N00014-85-C-0084)
(AD-A159866; SAIC-85/1077) Avail: NTIS HC A02/MF A01 CSCL 17/1

The measurement of acoustic signals with large, line arrays which use free suspended hydrophones, must be concerned with the location of the hydrophones, if certain array measurements are to be accurate. This report discusses location error issues and suggests a hydrophone location technique and array design to meet the test objectives and data requirements. Author (GRA)

N86-18125# Yale Univ., New Haven, Conn. Dept. of Computer Science.
AN EXPLICIT SCHEME FOR THE PREDICTION OF OCEAN ACOUSTIC PROPAGATION IN THREE DIMENSIONS
T. F. Chan, D. Lee, and L. Shen Jul. 1985 6 p
(Contracts N00014-82-K-0184; DE-AC02-81ER10996)
(AD-A160053; YALEU/DCS/RR-411) Avail: NTIS HC A02/MF A01 CSCL 20/1

Because of excessive computation time, solving the parabolic equation in higher dimensions by means of implicit finite difference schemes seems to be impracticle even if the scheme is unconditionally stable. To economize the computation time and computer storage, a stable explicit finite difference scheme is introduced for the solution of the parabolic equation of the Schroedinger type. This explicit scheme involves five spatial points and is conditionally stable by introducing and additional dissipative term. The complete theory with respect to the stability is proved. An application to a three-dimensional ocean acoustic propagation problem is included to demonstrate its validity. GRA

N86-18126# Argonne National Lab., Ill.
DEVELOPMENT OF PASSIVE ACOUSTIC IMAGING FOR LARGE HEAT TRANSFER COMPONENTS
T. N. Claytor and D. A. Greene 1985 9 p Presented at the Ultrasonics International Conference, London, England, 2 Jul. 1985 Prepared in cooperation with General Electric Co., San Jose, Calif.
(Contract W-31-109-eng-38)
(DE85-018384; CONF-850794-1) Avail: NTIS HC A02/MF A01

A passive acoustic imaging system for acoustic source location with no restriction on source character is being developed for thermal-hydraulic components. The system is particularly useful in locating continuous or quasi-continuous acoustic emission sources such as leaks in steam generators or rapid rattling of tubes in steam generators. In the imaging system to be described, acoustic signals that emanate outward from the source, through the medium, are detected by an array of low-frequency accelerometers. These time domain functions are combined with a mesh mapping algorithm to produce a spatial image showing the location and intensity of the noise source. DOE

N86-18127# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SCATTERING OF AN ACOUSTIC FIELD BY A NONHOMOGENEOUS NONUNIFORM FLOW Ph.D. Thesis - Univ. de Technologie, Compeigne, France.
Alain Guedel 1985 162 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-935)
(ONERA-P-1985-1; ISSN-0078-379X) Avail: NTIS HC A08/MF A01

The scattering of a sound field propagating through a free jet mixing layer is analyzed. For a monochromatic incident wave, the main effects are the broadening of the lane with a modulation of the wave amplitude and phase. Parametric analysis was carried out in wind tunnel experiments, and theoretically by developing models using Born and Rytov's approximations. The experimental data are compared with the predictions associated with an experimental model of the turbulence of the propagation medium. Author (ESA)

N86-18128# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
TWO METHODS FOR CALCULATING ACOUSTIC WAVE PROPAGATION THROUGH AN INTERFACE Ph.D. Thesis - Compiegne Univ.
Come Crance 1985 87 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-955)
(ONERA-NT-1985-2; ISSN-0078-3781) Avail: NTIS HC A05/MF A01

An analytical method used to compute the waves of a pulse from an infinitely far or point source, reflected and transmitted at an infinite plane separating two media of different sound velocity and density, and to compute the reflection of an acoustical pulse on a plane described as a surface of acoustic impedence is presented. The second method is numerical. It is based on a fast Fourier transform algorithm, used to solve integrals of the Sommerfeld type. The results obtained are comparable to those obtained by the stationary phase method or by geometrical acoustical approximation. Author (ESA)

N86-18129# Metraflu, Ecully (France).
ANALYSIS OF THE NOISE EMITTED BY A TAIL ROTOR Final Report [ANALYSE DU BRUIT EMIS PAR UN FENESTRON]
Michel Roger, Francette Fournier, and Paul Becker 11 Jun. 1985 102 p refs In FRENCH
(Contract DRET-83-025)
Avail: NTIS HC A06/MF A01

A two pole tail rotor noise computation method was developed, and an experimental study of diffracting effects on the turbulence generated by the rotor was carried out. The computation

predicts the noise spectra of the tail rotor. The parametric study shows that the varying properties of the incident turbulence can give different spectra. The structure design can attenuate noise by up to 20 to 30 dB. Author (ESA)

N86-18130# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
SOUND EXCITATION DURING VORTEX-AIRFOIL INTERACTION
Rainer Timm 1985 120 p refs In GERMAN; ENGLISH summary
(MPIS-Mitt-80; ISSN-0374-1257) Avail: NTIS HC A06/MF A01

Two-dimensional vortex-airfoil interaction was investigated in experiments and compared with a theoretical model. In a wind tunnel a cylinder generates a Karman vortex street and in a shock tube an asymmetric airfoil generates a starting vortex. Downstream of these vortex generators an airfoil is located. The influence of the vortices on the airfoil flow was investigated by an interferometer. Strong pressure waves originate from the leading edge of the airfoil. The order of magnitude of their amplitude and directional characteristic are experimentally determined. The experimental vortex paths can neither be correctly predicted by the developed model nor by an existing theoretical potential model. Author (ESA)

N86-18131# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Audiology Group.
APPLICATION OF ACTIVE NOISE REDUCTION FOR HEARING PROTECTION AND SPEECH INTELLIGIBILITY IMPROVEMENT
H. J. M. Steeneken and G. Langhout May 1985 23 p refs
(Contract A81/K/145)
(IZF-1985-7; TDCK-93143) Avail: NTIS HC A02/MF A01

Increase of the sound attenuation of an ear protector or a headset by the application of an Active Noise Reduction (ANR) system is discussed. As a result, the risk of hearing damage is decreased, and the quality of the communication increased. Methods to quantify these effects are described. Two ANR systems were evaluated with the measuring methods. It is found that an additional attenuation of 17 dB can be obtained at frequencies < or = 500 Hz. It is concluded that the application of ANR systems is advantageous for hearing protection and speech communication in military environments. Author (ESA)

N86-18132# Metaalcompagnie Brabant B.V., Eindhoven (Netherlands).
NOISE PREVENTION [GELUIDSWERING]
1985 45 p In DUTCH
Avail: NTIS HC A03/MF A01

Methods for noise abatement are discussed. Noise nuisance, types of noise (continuous, fluctuating, intermittent, pulsed), and types of noise abatement (absorption, vibration damping, isolation) are defined. Rockwool panels, industrial ceiling panels, baffles, acoustic foam panels, vibration dampers, acoustic mats, sandwich panels, isolating cabins and walls, ear protectors, and curtains are presented. Author (ESA)

N86-18133# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
HELICOPTER INTERNAL NOISE TREATMENT. RECENT METHODOLGIES AND PRACTICAL APPLICATIONS
H. J. Marze and F. N. Dambra 1985 15 p Presented at 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(SNIAS-852-210-102) Avail: NTIS HC A02/MF A01

A methodology including helicopter noise diagnosis, definition of acoustic treatment best adapted for each panel structure, and the development, tests and improvements of internal noise treatments is set up. Noise spectra are obtained at several cabin locations and helicopter speeds. An array of noise transducers placed at 120 locations allows to set the acoustic power radiated by each structure subassembly. It is shown that the method gives a good representation the wave pattern, and it may provide sufficient detail to efficiently reduce the added weight of sound proofing treatments. Author (ESA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-18134 National Physical Lab., Teddington (England). Beta Ray Spectrometry Sub-Group.
AN INTERCOMPARISON OF MEASUREMENTS OF THE BETA SPECTRA OF 90Sr-90Y
P. Christmas May 1985 16 p refs
(NPL-RS(EXT)77; ICRM-S-14; ISSN-0142-7135) Copyright. Avail: Issuing Activity

Three laboratories measured the beta spectra of Sr-90-Y-90 using sources prepared from a common reference solution. The results confirm that considerable care is required to obtain accurate data, and suggest that further measurements of Sr-90-Y-90 should be made. Author (ESA)

N86-18135 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
NEUTRON DOSIMETRY INTERCOMPARISON AT THE NATIONAL PHYSICS LABORATORY
V. E. Lewis Jul. 1985 61 p refs
(NPL-RS(EXT)-79; ISSN-0143-7135) Copyright. Avail: Issuing Activity

Seven groups participated in a neutron dosimetry intercomparison. They used an Exradin tissue equivalent (TE) ionization chamber plus an energy compensated Geiger-Muller (GM) counter as the neutron insensitive device. Some groups used a magnesium/argon ionization chamber as well as the GM counter. The TE ionization chamber responses are consistent within the estimated random uncertainties, thus giving good agreement for the total doses. The GM counter responses are also consistent and this, combined with low and accurately known relative neutron dose sensitivities, results in good agreement for the separate neutron and photon dose components. However, the Mg/Ar devices, although nominally of the same type, produce wide variations in response which result in very inconsistent sets of values for the dose components. This suggests that the Mg/Ar chamber is not sufficiently accurate. Author (ESA)

N86-18136 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
AN AUTOMATED CHARGE MONITORING SYSTEM FOR THE NPL LINEAR ACCELERATOR
D. T. Burns Aug. 1985 16 p refs
(NPL-RS(EXT)80; ISSN-0143-7135) Copyright. Avail: Issuing Activity

An automated charge monitoring system for a linear accelerator electron beam was assembled for use at radiation intensities associated with industrial applications. The system is based on the fast integration of current signals from a toroidal pulse transforming coil wound around the accelerator flight tube. Efforts devoted to minimizing electromagnetic pickup in the signals, to impedance matching, and to correct earthing, giving a significant reduction in the noise level, are described. The system was tested by comparison of the total charge reading with the absorbed dose measured by high dose graphite and aluminum calorimeters. A typical series of irradiations yields a standard deviation of + or - 1 % in the ratio of total charge to absorbed dose. Author (ESA)

N86-18137# Oak Ridge National Lab., Tenn.
PHENOMENOLOGY OF NEW PARTICLE PRODUCTION IN HEAVY-ION COLLISIONS
A. B. Balantekin, C. Bottcher, M. R. Strayer, and S. J. Lee 1985 9 p refs Presented at the Atomic Theory Workshop on Relativistic and QED Effects in Heavy Atoms, Gaithersburg, Md., 23 May 1985 Prepared in cooperation with Yale Univ., New Haven, Conn.
(Contracts DE-AC02-76ER03074; DE-AC05-84OR-21400)
(DE85-016372; CONF-8505189-2) Avail: NTIS HC A02/MF A01

It is shown that the existence of sharp lines in the positron emission spectra observed in low-energy heavy-ion collisions is consistent with the production and subsequent decay of a neutral,

pseudoscalar particle with a mass of about 1.6 MeV and a lifetime of about 10(-13) sec. DOE

N86-18138# California Univ., Berkeley. Lawrence Berkeley Lab.
COMPOUND NUCLEUS STUDIES WITH REVERSE KINEMATICS
L. G. Moretto Jun. 1985 18 p refs Presented at the Conference on Nuclear Structure With Heavy Ions, Legnaro, Padova, Italy, 27 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016630; LBL-19806; CONF-8505172-3) Avail: NTIS HC A02/MF A01

Reverse kinematics reactions are used to demonstrate the compound nucleus origin of intermediate mass particles at low energies and the extension of the same mechanism at higher energies. No evidence has appeared in our energy range for liquid-vapor equilibrium or cold fragmentation mechanisms. DOE

N86-18139# Los Alamos National Lab., N. Mex.
GROUP REPRESENTATION MATRIX AND SCATTERING FROM NUCLEI
J. N. Ginocchio 1985 5 p Presented at the 14th International Colloquium on Group Theoretical Methods in Physics, Seoul, Korea, 26 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017527; LA-UR-85-3094; CONF-8508117-1) Avail: NTIS HC A02/MF A01

It is shown that the transition matrix for elastic and inelastic medium energy protons scattered from nuclei described by the interacting boson model is the SU6 group representation matrix. Closed form expressions for this transition matrix are derived for the special cases of a vibrational nucleus, a (GAMMA)-unstable rotor nucleus, and an axially symmetric rotor nucleus. DOE

N86-18140# Stanford Linear Accelerator Center, Calif.
RECENT RESULTS OF THE STUDY OF PHOTON-PHOTON COLLISIONS
J. C. Sens Aug. 1985 23 p refs Presented at the 5th International Conference on Physics in Collision, Autun, France, 3 Jul. 1985
(Contract DE-AC03-76SF-00515)
(DE85-018110; SU-SLAC-PUB-3754; CONF-850785-3) Avail: NTIS HC A02/MF A01

Results are reported on the production of two- and four-hadron final states, and on the formation of the eta, eta' and f mesons in photon-photon collisions. DOE

N86-18141# Pacific Northwest Lab., Richland, Wash.
NEW DELAYED NEUTRON PRECURSORS MEASURED AT TRISTAN
P. L. Reeder, R. A. Warner, M. D. Edmiston, R. L. Gill, and A. Piotrowski Sep. 1985 7 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985 Prepared in cooperation with Bluffton Coll., Ohio and Brookhaven National Lab., Upton, N.Y.
(Contracts DE-AC02-76CH-00016; DE-AC06-76RL-01830)
(DE85-017918; PNL-SA-13117; CONF-850942-19) Avail: NTIS HC A02/MF A01

Recent development of reliable, high intensity ion sources for the TRISTAN on-line mass separator facility has greatly expanded the number of very neutron-rich fission products available. Half-lives and delayed neutron emission probabilities are being measured for these nuclides with a high efficiency neutron counter. During the past year, previously unknown P sub n values have been measured for 11 precursors: (75)Cu, (100)Rb, sup 100 to 102 Sr, sup 100 to 102 Y, (148)Ba, and (149)La. DOE

N86-18142# Oak Ridge National Lab., Tenn.
EVOLUTION OF NUCLEAR SHAPES AT HIGH SPINS
N. R. Johnson 1985 8 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018074; CONF-850942-24) Avail: NTIS HC A02/MF A01

The dynamic electric quadrupole (E2) moments are a direct reflection of the collective aspects of the nuclear wave functions. For this, Doppler-shift lifetime measurements have been done utilizing primarily the recoil-distance technique. The nuclei with neutron number N approx. 90 possess many interesting properties. These nuclei have very shallow minima in their potential energy surfaces, and thus, are very susceptible to deformation driving influences. It is the evolution of nuclear shapes as a function of spin or rotational frequency for these nuclei that has commanded much interest in the lifetime measurements discussed here. There is growing evidence that many deformed nuclei which have prolate shapes in their ground states conform to triaxial or oblate shapes at higher spins. Since the E2 matrix elements along the yrast line are sensitive indicators of deformation changes, measurements of lifetimes of these states to provide the matrix elements has become the major avenue for tracing the evolving shape of a nucleus at high spin. Of the several nuclei we have studied with N approx. 90, those to be discussed here are sup 160,161/Yb and (158)Er. In addition, the preliminary, but interesting and surprising results from our recent investigation of the N = 98 nucleus, (172)W are briefly discussed. DOE

N86-18143# Illinois Inst. of Tech., Chicago. Dept. of Physics.
HEAVY PARTICLE PRODUCTION IN HIGH ENERGY HADRON COLLISIONS
J. C. Collins, D. E. Soper, and G. Sterman 1985 38 p refs Presented at the Oregon Workshop on Super High Energy Physics, Eugene, Oreg., 18 Mar. 1985 Prepared in cooperation with Argonne National Lab., Ill., Oregon Univ., Eugene, and State Univ. of New York, Stony Brook
(Contract W-31-109-eng-38)
(DE85-018354; CONF-8503175-1) Avail: NTIS HC A03/MF A01

We consider the problem of how to compute the cross section for producing heavy strongly interacting particles (quarks, gluinos, squarks...) in high energy hadron collisions, supposing that the heavy particle masses are large compared to 1 GeV. We use heavy quark production as an example. We consider several low order graphs in the kinematic region expected to produce the bulk of the total production cross section. Based on the structure of the low order graphs, we argue that the cross section can be reliably computed in QCD by using the same factorization formula that is used for jet production and W and Z production, but inserting the appropriate parton level cross sections for the heavy particle production. We emphasize that an analysis at all orders of perturbation theory is needed to reliably establish this conjecture. DOE

N86-18144# Argonne National Lab., Ill.
MODEL FOR CHARGE STATE DISTRIBUTIONS OF HEAVY COULOMB EXPLOSION FRAGMENT IONS
P. J. Cooney, A. Faibis, E. P. Kanter, W. Koenig, D. Maor, and B. J. Zabransky 1985 26 p Presented at the 11th International Conference on Atomic Collisions in Solids, Washington, D.C., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018363; CONF-850813-3) Avail: NTIS HC A03/MF A01

We have conclusively demonstrated the systematic shift of the distributions of final charge states, for Coulomb explosion fragments compared to isotachic monatomic ion beams. This shift includes both an enhanced yield of lower charge states (below the equilibrium mean) concomitant with a decrease in the yield of charge states above the mean and thus essentially preserves the shapes of the distributions. From the trends of the data, it was shown that this shift is attributable to an enhanced electron capture probability for ions emerging from the target foil as spatially correlated diatomic clusters. A simple model was presented relating the charge state distributions measured for molecular-ion impact to the equilibrium distribution measured for the case of impact by a monatomic ion beam. This model describes the apparent nonequilibration of the molecular-ion charge state distributions as a simple consequence of electron capture cross sections dependent upon the internuclear separations of the exiting cluster fragments. Because this separation is large compared to the orbital radius of captured electrons, the enhancement of the electron

capture cross sections can be treated as a weak perturbation of the potential at the position of the electron. Such an approximation allows the estimation of this enhancement. This model, though admittedly overly simplified, resolves the long-standing problem of understanding the distributions of final charge states when heavy diatomic molecular ions exit from solids. DOE

N86-18145# Argonne National Lab., Ill.
BASIC ASPECTS OF ION BEAM MIXING
R. S. Averback Jul. 1985 41 p refs Presented at the 7th International Conference on Ion Beam Analysis, Berlin, West Germany, 7 Jul. 1985
(Contract W-31-109-eng-38)
(DE85-018391; CONF-850716-4) Avail: NTIS HC A03/MF A01

Irradiation of solids with energetic particles results in the reorganization of constituent target atoms, i.e., ion beam mixing (IM). At low temperatures, IM is characterized by prompt (10(-10)s) diffusion processes which are localized in the vicinity of the displacement cascade. Mixing at low temperatures can cause the system to depart far from the equilibrium state. At elevated temperatures, the diffusion of radiation-induced defects extends the mixing to longer times and greater distances. These delayed IM processes tend to return the system toward equilibrium. Recent experimental progress has led to a qualitative understanding of the fundamental aspects of IM in both temperature regimes. This has been achieved through systematic measurements of the influences of temperature, dose, dose-rate, cascade energy density, and chemical interactions on IM. The results of these experiments will be reviewed and compared to IM models based on collisional, thermal spike, and radiation-enhanced diffusion processes. The relation of IM to other fundamental radiation damage effects will also be discussed. DOE

N86-18146# Argonne National Lab., Ill.
NEW RESULTS ON Bhabha SCATTERING AT 29 Gv
J. S. Loos and D. E. Wood 1985 9 p refs Presented at the Meeting of the Particles and Fields Division of the American Physical Society, Eugene, Oreg., 12 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018408; CONF-850869-1; CONF-850819-6) Avail: NTIS HC A02/MF A01

New results are given on Bhabha scattering at the center-of-mass energy of 29 GeV, based on a sample having an integrated luminosity of 165 pb(-1) observed in the High Resolution Spectrometer (HRS) at the PEP colliding beam facility. The measured differential cross sections are used to evaluate Standard Model parameters, lower bound limts on QED cutoff parameters, and lower bound limits on composite model parameters. DOE

N86-18147# Argonne National Lab., Ill.
HADRON PRODUCTION IN e(+)e(-) ANNIHILATION AT RADICAL s = 29 GeV
M. Derrick, E. Fernandez, R. Fries, L. Hyman, P. Kooijman, J. S. Loos, B. Musgrave, L. E. Price, J. Schlereth, and K. Sugano 1985 38 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985 Prepared in cooperation with Indiana Univ., Bloomington, Michigan Univ., Ann Arbor, Purdue Univ., West Lafayette, Ind., California Univ., Berkeley, Lawrence Berkeley Lab., and Stanford Linear Accelerator Center, Calif.
(Contract W-31-109-eng-38)
(DE85-018410; CONF-850721-3) Avail: NTIS HC A03/MF A01

Data from the High Resolution Spectrometer at PEP have been used to study the inclusive production of baryons and mesons. Time-of-flight measurements are used to identify the charged hadrons. Neutral hadrons are identified from effective mass peaks in their decay into two charged particles. Cross sections for charged pions, charged and neutral kaons, protons and lambda hyperons are given. Other inclusive production characteristics are presented. The cross section ratios to the point cross section are: R(K(0)) = 5.59 +- 0.19 +- 0.30, and for (LAMBDA)'s, R((LAMBDA)) = 0.762 +- 0.052 +- 0.064. The results, when compared to the Lund fragmentation model, give (us/ud)/(s/d) = 0.30 +- 0.10. DOE

N86-18148# Argonne National Lab., Ill.
THE np ELASTIC-SCATTERING EXPERIMENTS WITH POLARIZED NEUTRON BEAMS
J. S. Chalmers, W. R. Ditzler, D. Hill, J. Hoftiezer, K. Johnson, T. Shima, H. Shimizu, H. Spinka, R. Stanek, and D. Underwood 1985 4 p refs Presented at the 6th International Symposium on Polarization Phenomena in Nuclear Physics, Osaka, Japan, 26 Aug. 1985 Prepared in cooperation with Texas A&M Univ., College Station, Los Alamos National Lab., N. Mex., New Mexico State Univ., Las Cruces, Montana Univ., Missoula, and Washington State Univ., Pullman
(Contract W-31-109-eng-38)
(DE85-018454; ANL-HEP-CP-85-83; CONF-850807-7) Avail: NTIS HC A02/MF A01

Measurements of the spin transfer parameters, K/sub NN/ and K/sub LL/, at 500, 650, and 800 MeV are presented for the reaction p-vector d (YIELDS) n-vector pp at 0(0). The data are useful input to the NN data base and indicate that the quasi-free charge exchange (CEX) reaction is a useful mechanism for producing neutrons with at least 40% polarization at energies as low as 500 MeV. Measurements of np elastic scattering observables C/sub LL/ and C/sub SL/ covering 35 deg to 172 deg are performed using a polarized neutron beam at 500, 650, and 800 MeV. Preliminary results are presented. DOE

N86-18149# Lawrence Livermore National Lab., Calif.
DIFFICULTIES WITH INFERRING NEUTRON CROSS SECTIONS FROM CHARGED-PARTICLE REACTIONS
D. G. Gardner and M. A. Gardner May 1985 5 p refs Presented at the International Conference on Nuclear Data for Basic and Applied Science, Santa Fe, N. Mex., 13 May 1985
(Contract W-7405-eng-48)
(DE86-000020; UCRL-91742; CONF-850507-54) Avail: NTIS HC A02/MF A01

We have investigated problems associated with inferring cross sections for neutron reactions on unstable nuclei in the mass-90 region from charged-particle reactions on nearby stable targets. We conclude that effects due to precompound evaporation, isospin, and multiple reaction paths severely limit the circumstances under which charged-particle studies may be directly and easily converted to neutron cross sections of useful accuracy. DOE

N86-18150# Stanford Linear Accelerator Center, Calif.
APPLICATIONS OF QUANTUM CHROMODYNAMICS TO HADRONIC AND NUCLEAR INTERACTIONS
S. J. Brodsky and C. R. Ji Aug. 1985 92 p Presented at the Stellenbosch Advanced Course in Theoretical Physics (Quarks and Leptons), Stellenbosch, South Africa, 21 Jan. 1985
(Contract DE-AC03-76SF-00515)
(DE86-000054; SU-SLAC-PUB-3747; CONF-850179-1) Avail: NTIS HC A05/MF A01

The application of perturbative QCD and light-cone Fock methods to the structure of hadrons and nuclei and their exclusive and inclusive interactions at short distances are reviewed. DOE

N86-18151# Texas Univ., Austin. Inst. for Fusion Studies.
DRIFT MODES WITH DIFFERENTIAL ROTATION AND PASSING ELECTRONS
J. Liu, W. Horton, and J. Sedlak Jul. 1985 54 p
(Contract DE-FG05-80ET-53088)
(DE85-017243; DOE/ET-53088/195) Avail: NTIS HC A04/MF A01

The stability of drift modes in a radially bounded cylindrical model of the tandem mirror central cell is analyzed as a function of plasma rotation and passing electron density. Analytic solutions for solid-body rotation and variable wall-to-plasma radius are used to derive formulas for the threshold and cutoff values of the passing-to-trapped electron density ratio. For certain density ratios all low m modes are unstable for all solid body rotational speeds. The effect of shear in the rotational profiles is shown to be a

significant stabilizing effect on the rotationally-driven interchange instability. For typical profiles with the rotational velocity (UC OMEGA)(r) monotonically decreasing with radius, we show that for some parameters the rotational modes are stabilized by shear well before the onset of the shear-driven instabilities. DOE

N86-18152# Lawrence Livermore National Lab., Calif.
NUCLEAR SPIN POLARIZATION OF SOLID DEUTERIUM-TRITIUM
P. C. Souers. E. M. Fearon, E. R. Mapoles, J. R. Gaines, J. D. Sater, and P. A. Fedders 1985 28 p Presented at the 32th National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985 Prepared in cooperation with Ohio State Univ., Columbus and Washington Univ., St. Louis, Mo.
(Contract W-7405-eng-48)
(DE85-017279; UCRL-92700; CONF-851174-1) Avail: NTIS HC A03/MF A01

It appears that parallel alignment of deuteron and triton magnetic moments increases the cross section of the nuclear reaction T(d,n) He(4) by 50%, thereby promising a laser driver of perhaps half the original energy. Both brute-force and dynamic nuclear polarization are considered, and the many potential problems of the latter are considered. High nuclear polarization by the dynamic technique requires a small nucleus-to-unpaired electron ratio, a long longitudinal nuclear relaxation time and a short longitudinal electron relaxation time. Normal D-T is shown to be inadequate, and enriched and possibly very pure molecular DT will be required. The key variable is the nuclear relaxation time, which can either depend on the interaction with rotationally excited impurity molecules or on paramagnetic defects formed by the tritium radiation. Radiation-induced DT decomposition and rotational catalysis will combat one another to affect the DT purity. The expected atom density and fractionation effects are considered. There exists one frequency at which both D and T atoms can be pumped. DOE

N86-18153# Brookhaven National Lab., Upton, N. Y.
QUARK DYNAMICS OF N ANTI N ANNIHILATION
C. B. Dover 1985 27 p Presented at the Symposium on Medium Energy Nucleon and Antinucleon Scattering, Bad Honnef, F.R. Germany, 18 Jun. 1985 Prepared in cooperation with Paris 11, Orsay, France
(Contract DE-AC02-76CH-00016)
(DE85-017508; BNL-36821; CONF-8506162-2) Avail: NTIS HC A03/MF A01

It is argued that recent observations of strong L dependence and approximate selection rules in certain N anti N annihilation modes necessitate a description of the reaction mechanism in terms of quark-gluon degrees of freedom. DOE

N86-18154# Brookhaven National Lab., Upton, N. Y.
LARGE MAGNETIC SPECTROMETER GROUP
S. J. Lindenbaum and L. S. Schroeder 1985 46 p Presented at the Workshop on Experiments for RHIC, Upton, N.Y., 15 Apr. 1985 Prepared in cooperation with City Coll., N.Y. and California Univ., Berkeley. Lawrence Berkeley Lab.
(Contracts DE-AC03-76SF-00098; DE-AC02-76CH-00016)
(DE85-017512; BNL-36774; CONF-8504152-8) Avail: NTIS HC A03/MF A01

This working group concentrated its efforts on possible large magnetic spectrometers for studying charged particle production in high energy nucleus-nucleus collisions at RHIC. In particular, the major efforts of the group were divided into two parts: (1) one group concentrated on a detector for tracking charged particles near mid-rapidity only, while (2) the other group considered a device for tracking particles over as much of the 4(PI) solid angle as possible. Both groups were interested in being able to detect and track as wide a range of particles (primarily hadrons) as practical in order to isolate the possible production of a quark-gluon phase in central nucleus-nucleus collisions. DOE

N86-18155# Los Alamos National Lab., N. Mex.
ABC'S OF PION CHARGE EXCHANGE
W. R. Gibbs, W. B. Kaufmann, and P. B. Siegel 1985 20 p Presented at the Double Charge Exchange Workshop, Los Alamos, N. Mex., 10 Jan. 1985 Prepared in cooperation with Arizona State Univ., Tempe
(Contract W-7405-eng-36)
(DE85-017531; LA-UR-85-3054; CONF-850162-3) Avail: NTIS HC A02/MF A01

Calculations of pion single charge exchange using the PWIA and DWIA are presented. Emphasis is given to the effects of absorbtion and blocking. A microscopic calculation of the 0 deg. excitation and low energy angular distribution is in excellent agreement with the data. A fixed nucleon multiple scattering calculation of the pion double charge exchange reaction is presented. Various valence neutron wave functions are used, and the contributions of different spatial orientations of the last two neutrons to the reaction are examined. The DCX cross section is found to be very sensitive to the inclusion of correlations in the two-neutron wave function. Satisfactory agreement with DCX data on (14)C can be obtained using a nucleonic picture of the nucleus. DOE

N86-18156# Lawrence Livermore National Lab., Calif.
RADIOACTIVE ION BEAM RESEARCH AT LLNL
G. J. Mathews, R. W. Bauer, R. C. Haight, and K. E. Sale Aug. 1985 9 p refs Presented at the TRIUMF Accelerated Radioactive Beams Workshop, Parksvill, British Columbia, 4 Sep. 1985
(Contract W-7405-eng-48)
(DE85-018183; UCRL-93275; CONF-8509148-2) Avail: NTIS HC A02/MF A01

In this paper we discuss efforts underway at LLNL to develop the technology for the measurement of proton and alpha-particle reactions with unstable nuclei which are necessary for understanding the nucleosynthesis and energy generation in hot hydrogen-burning environments. DOE

N86-18157# Lawrence Livermore National Lab., Calif.
BRIGHTNESS MEASUREMENTS ON THE LIVERMORE HIGH BRIGHTNESS TEST STAND
G. J. Caporaso and D. L. Birx May 1985 14 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Previously announced in IAA as A85-10785
(Contract W-7405-eng-48)
(DE86-000016; UCRL-91914; CONF-850504-284) Avail: NTIS HC A02/MF A01

Two brightness measuring techniques which use small radius collimating pipes with or without axial magnetic fields are described. Their application to measure the brightness of an extracted 1-2 kA, 1-1.5 MeV electron beam is reported. The beam conditions necessary to insure the proper use of these techniques are specified. C.D.

N86-18158# Los Alamos National Lab., N. Mex.
STUDY OF OPTICAL TRANSITION RADIATION PRODUCED BY 30 TO 70 MEV ENERGY ELECTRONS: APPLICATION TO THE DIAGNOSTICS OF BEAMS WITH CHARGED PARTICLES. CHAPTER 2: DESCRIPTION OF THE EXPERIMENTAL DEVICE. CHAPTER 6: EXPERIMENTS WITH TRANSITION RADIATION INTERFERENCE Ph.D. Thesis - Paris-Sud Univ., Orsay, France, 1976
L. Wartski 1985 89 p Translation from Ph.D. Thesis, Paris-Sud Univ., Centre d'Orsay, 1976, pp 48-62, 80-116
(Contract W-7405-eng-36)
(DE86-001258; LA-tr-85-47) Avail: NTIS HC A05/MF A01

Our experimental work on transition radiation was essentially carried out on the 80 MeV electron Linear Accelerator of Saclay (AL80). A few experiments were also performed on the Linear Accelerator of Orsay and are described. To study the properties of this radiation and to explore its possible applications for the diagnosis of such relativistic particle beams, we placed the specimens to be irradiated in the electron path itself, at the output of the last accelerating section, or slightly in front of the operating space. DOE

N86-18159# Rome Univ. (Italy). Dipt. di Fisica.
NEUTRINOLESS DOUBLE BETA DECAY AND MULTIQUARK STATES IN NUCLEI
M. Lusignoli and M. G. Schepkin (Institute of Theoretical and Experimental Physics, Moscow) 21 Mar. 1985 23 p refs
(Preprint-449) Avail: NTIS HC A02/MF A01

The contribution to the nuclear matrix element of double beta decay due to the admixture of six-quark states in the nucleus is evaluated for the decay of Ca48, using MIT model six-quark bag wave functions. This contribution is dominant in the case of heavy Majorana neutrino exchange, and may also be important for a light Majorana neutrino. Author (ESA)

N86-18160# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION OF THE DYNAMICS OF SELECTIVELY ROTATION-VIBRATIONALLY EXCITED DIFLUOROMETHYLENE Thesis [UNTERSUCHUNG DER DYNAMIK VON SELEKTIV ROVIBRONISCH ANGEREGTEM DIFLUORMETHYLEN]
A. Wilms Mar. 1985 64 p refs In GERMAN
(MPIS-5/1985; ISSN-0436-1199) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The dynamics of vibrationally excited CF2 was investigated. Gaseous CF2 in the ground state is pumped into a vibration state by laser excitation. The induced fluorescence is spectrally and time resolved at pressures between 0.01 and 100 mbar. The laser allows a selective occupation of single rotation-vibration levels with defined rotation quantum numbers. This is shown by rotation analysis of highly resolved excitation spectra. The velocity constants of the disactivation of the selectively rotation-vibrationally excited CF2 are determined with nine different collision partners. The mechanism of the shock-induced depopulation of these rotation levels is determined with four different collision partners. Author (ESA)

N86-18161# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION OF THE FORMATION, IONIZATION, AND COLLISION DYNAMICS OF MICROCLUSTERS USING SCATTERING ANALYSIS Thesis [UNTERSUCHUNG DER BILDUNG, IONISATION UND STOSSDYNAMIK VON MIKROCLUSTERN DURCH STREUANALYSE]
Henning Meyer Apr. 1985 158 p refs In GERMAN
(MPIS-6/1985; ISSN-0436-1199) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

A microcluster investigation method which uses the scattering kinematics of clusters of different size in a collision process with a light target particle for mass selection and the identification of neutral particles is presented. Angle and velocity dependence of scattered intensities are measured. Microclusters of argon and ammonia with helium as collision partner are investigated. The measurements on the systems Arn-He provide precise data about the fragmentation process in the ion source during the electron collision for clusters with n < or = 6. The density of the species in the beam is also determined as a function of source conditions, pressure, and nozzle diameter. The collision-induced dissociation of Ar2-He is demonstrated; the trajectory calculations agree with the experiment. For the more strongly bound NH3-cluster a strong fragmentation in the ion source is found. The measurements also provide information about the scattering dynamics. The method can also be used for the analysis of other cluster species, and of photoinduced predissociation of clusters. Author (ESA)

N86-18162# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATIONS OF THE INTERACTION BETWEEN Na(3P) AND K(4S) USING MEASUREMENTS OF THE DIFFERENTIAL SCATTERING CROSS SECTION Thesis [UNTERSUCHUNGEN DER WECHSELWIRKUNG VON Na(3P) MIT K(4S) DURCH MESSUNG DIFFERENTIELLER STREUQUERSCHNITTE]
Rainer Liedtke Feb. 1985 99 p refs In GERMAN
(MPIS-7/1985; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

The interaction between the collision partners Na(3P) and 5(4S) was studied as a special case of alkali-alkali interaction in the thermal energy domain. The setup uses crossed molecular beams with, in the center, a part of the laser-excited Na-atoms; the laser light is at the same time a component of the detection system. Time-of-flight measurements following the pseudostatic method and differential cross section measurements following the digital lock-in method are performed; the scattered particles are detected by a quadropule mass filter. By varying the collision energy a broad experimental basis for the determination of the potential parameters is provided. The modified velocity selector substantially improves the bad intensity ratios. Previously determined potentials are extensively verified. Previously calculated differential cross sections do not agree with the measured structures. The complicated structure of the cubic rainbow scattering cannot unequivocally be determined. Author (ESA)

N86-18163# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
LARGE-t ELASTIC SCATTERING AND DIFFRACTION DISSOCIATION
J. Timmermans May 1985 21 p refs Presented at International Symposium on Physics of Proton-Antiprcton Collision, Tsukuba, Japan, 13-15 Mar. 1985
(NIKHEF-H/85-4; B8566780) Avail: NTIS HC A02/MF A01

Collider results on proton-antiproton elastic scattering at large values of the four-momentum transfer squared are presented. The results are compared with predictions of theoretical models of high-energy collisions. Single diffraction dissociation at the collider is also discussed. Author (ESA)

N86-18164# Stockholm Univ. (Sweden). Inst. of Physics.
THE RED BAND SPECTRUM OF GASEOUS CaH. MOLECULAR EQUILIBRIUM GROUND STATE CONSTANTS. TERM VALUES OF THE A(2)PI, B(2)SIGMA, AND X(2)SIGMA STATES
L.-E. Berg, L. Klynning, and H. Martin Jun. 1985 17 p refs
(USIP-85-13) Avail: NTIS HC A02/MF A01

The wave numbers of the term values of the A, B, and X states of Ca H molecule transitions are given. Molecular equilibrium constants of the X(2)Sigma ground state are presented. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N86-18165# Fermi National Accelerator Lab., Batavia, Ill.
NEW AND OLD ACCELERATORS: WHAT CAN THEY DO FOR ASTROPHYSICS
J. D. Bjorken Jul. 1985 10 p refs Presented at the Inner Space/Outer Space Conference, Batavia, Ill., 2 May 1984
(Contract DE-AC02-76CH-03000)
(DE85-013220; FNAL/C-85-100-A; CONF-8405155-8) Avail: NTIS HC A02/MF A01

The quantum numbers and energy spectrum of high energy accelerators and storage rings are described, along with some ways they may contribute to astrophysical issues. Some emphasis is given to the role of relativistic heavy-ion colliders in possibly providing laboratory samples of quark-gluon plasma. DOE

N86-18166# Fermi National Accelerator Lab., Batavia, Ill.
LOW LEVEL RF SYSTEM FOR THE FERMILAB TEVATRON
K. Meisner, H. Edwards, J. Fitzgerald, and Q. Kerns Jun. 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017440; FNAL-TM-1327; CONF-850504-266) Avail: NTIS HC A02/MF A01

This paper discusses the design philosophy, hardware, and operation of the Fermilab Tevatron low level rf system. Plans to extend the system for colliding beams physics are also presented. DOE

N86-18167# Fermi National Accelerator Lab., Batavia, Ill.
PROGRAMMABLE HIGH POWER BEAM DAMPER FOR THE TEVATRON
J. Crisp, R. Goodwin, R. Gerig, M. Johnson, A. Jones, C. Kerns, Q. Kerns, P. Lucas, D. Martin, and H. Miller Jun. 1985 4 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017441; FNAL-TM-1326; CONF-850504-270) Avail: NTIS HC A02/MF A01

A bunch-by-bunch beam damper has been developed for the Fermilab Tevatron. The system reduces betatron oscillation amplitudes and incorporates some useful machine diagnostics. The device is programmable via look-up tables so the output is an arbitrary function, on a bunch-by-bunch basis, of the beam displacement. We are presently using this feature to measure the betatron tune throughout the acceleration cycle. DOE

N86-18168# Fermi National Accelerator Lab., Batavia, Ill.
PROPOSALS FOR SYNCHROTRON LIGHT SOURCES
L. C. Teng Jun. 1985 6 p refs Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract DE-AC02-76CH-03000)
(DE85-017444; FNAL-TM-1325; CONF-850504-263) Avail: NTIS HC A02/MF A01

Ever since it was first applied in the 1960's synchrotron radiation from an accelerating electron beam has been gaining popularity as a powerful tool for research and development in a wide variety of fields of science and technology. By now there are some 20 facilities operating either parasitically or dedicatedly for synchrotron radiation research in different parts of the world. In addition there are another 20 facilities either in construction or in various stages of proposal and design. The experiences gained from the operating facilities and the recent development of insertion devices such as wigglers and undulators as radiation sources led to a new set of requirements on the design of synchrotron radiation storage rings for optimum utility. The surprisingly uniform applicability and unanimous acceptance of these criteria give assurance that they are indeed valid criteria derived form mature considerations and experiences. Instead of describing the design of each of these new facilities it is, thus, more effective to discuss these desirable design features and indicate how they are incorporated in the design using machines listed as examples. DOE

N86-18169# Indiana Univ., Bloomington. Dept. of Physics.
INDIANA UNIVERSITY HIGH ENERGY PHYSICS GROUP Technical Progress Report, 1 Dec. 1984 - 30 Nov. 1985
E. D. Alyea, B. B. Brabson, R. R. Crittenden, A. R. Dzierba, R. M. Heinz, H. J. Martin, and H. O. Ogren 1985 33 p
(Contract DE-AC02-84ER-40125)
(DE85-012000; DOE/CH-40125/3) Avail: NTIS HC A03/MF A01

The Indiana University High Energy Physics Group has been performing experiments at SLAC, Fermilab, and Brookhaven during the current contract year. We have also done design work and preliminary prototyping for a magnetic monpole search under the Gran Sasso Mountain. Studies of e(+)e(-) interactions at SLAC have produced many interesting results on charm production, quark fragmentation, tau production and decay, jets, and searches for new phenomena. Data on jet and dimuon production data were collected with the Multiparticle Spectrometer at Fermilab. Brookhaven data were used to do a spin parity analysis of the E Meson (glueball candidate). DOE

N86-18170# Argonne National Lab., Ill.
STATUS OF THE INTENSE PULSED NEUTRON SOURCE
J. M. Carpenter, B. S. Brown, R. L. Kustom, G. H. Lander, C. W. Potts, A. W. Schulke, and G. Wuestefeld 1985 28 p Presented at the International Collaboration on Advanced Neutron Sources, Oxon, England, 8 Jul. 1985 Prepared in cooperation with Kernforschungsanlage Juelich, West Germany
(Contract W-31-109-eng-38)
(DE85-018387; CONF-850795-5) Avail: NTIS HC A03/MF A01

Fortunately in spite of some premature reports of its impending demise, IPNS has passed the fourth anniversary of the first delivery of protons to the targets (May 5, 1981) and is approaching the fourth anniversary of its operation as a scattering facility (August 4, 1981). On June 10, 1984, the RCS delivered its one billionth pulse to the IPNS target - the total number of protons delivered to the targets amounted then to 75 stp cc of H2 gas. Since startup IPNS has improved steadily in terms of the performance of the Rapid Cycling Synchrotron, the source and its moderators and the scattering instruments, and a substantial and productive user program has evolved. This report summarizes the current status of the Intense Pulsed Neutron Source at Argonne National Laboratory. We include reference to recent accelerator operating experience, neutron facility operating experience, improvements to these systems, design work on the ASPUN high-current facility, booster target design, the new solid methane moderator, characterization of the room temperature moderators, and provide some examples of recent results from several of the spectrometers. DOE

N86-18171# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
SYSTEMS ANALYSIS OF SOLID FUEL NUCLEAR ENGINES IN CISLUNAR SPACE
Ulrich Thomas, H. H. Koelle, R. Balzer-Sieb, D. Bernau, J. Czarnitzki, A. Floete, D. Goericke, A. Lindenthal, R. Protsch, O. Teschner et al 15 Dec. 1984 106 p refs In GERMAN; ENGLISH summary
(ILR-Mitt-142) Avail: NTIS HC A06/MF A01

The use of nuclear engines in cislunar space was studied and the restrictions imposed on nuclear ferries by the chemical Earth to lower Earth orbit (LEO) transportation system were analyzed. The operating conditions are best met by tungsten-water-moderated reactors due to a high specific impulse and long durability. Specific transportation cost for LEO to geostationary orbit (GEO) and LEO to lunar orbit flights were calculated for a transportation system life of 50 yr. Average transportation costs are estimated to be 141 $/kg. No difference is made for both routes. An additional analysis of smaller and larger flight units shows only small cost reductions by employing larger ferries but a significant cost increase in case smaller flight units are used. Author (ESA)

N86-18172# Stockholm Univ. (Sweden). Inst. of Physics.
THE NA27 TRIGGER
R. Bizzarri (Rome Univ., Italy), E. DiCpua (Rome Univ., Italy), S. Falciano (Rome Univ., Italy), M. Iori (Rome Univ., Italy), G. Marel (Rome Univ., Italy), G. Piredda (Rome University), L. Zanello (Rome University), L. Haupt, S. Hellman, S. O. Holmgren et al May 1985 30 p refs
(USIP-85-10) Avail: NTIS HC A03/MF A01

A minimum bias trigger and a fiducial volume trigger were developed for an experiment in which a small rapid cycling hydrogen bubble chamber was exposed to 360 GeV/c pi(-) and 400 GeV/c proton beams. More than 3 million bubble chamber pictures were taken with a triggered cross section > 75% of the total inelastic cross section. Events containing charm particles were triggered with an efficiency of 98% + 2% - 3%. With the fiducial volume trigger, the probability for a picture to contain an interaction in the visible hydrogen increasing from 47.3% to 59.5% reducing film cost and processing effort by 20%. The improvement in data acquisition rate is shown to be negligible. Author (ESA)

N86-18173# Stockholm Univ. (Sweden). Inst. of Physics.
COMMUTATOR OF THE QUARK MASS MATRICES IN THE STANDARD ELECTROWEAK MODEL AND A MEASURE OF MAXIMAL CP-VIOLATION
C. Jarlskog Jun. 1985 15 p refs
(USIP-85-14) Avail: NTIS HC A02/MF A01

The structure of the quark mass matrices in the standard electroweak model is investigated. The commutator of the quark mass matrices is found to provide a convention independent measure of CP-violation. Maximal CP-violation is discussed. Experimental data indicate that CP is nowhere maximally violated.
Author (ESA)

N86-18174# Stockholm Univ. (Sweden). Inst. of Physics.
THE F MESON BACKGROUND AND F CANDIDATES IN 360 GeV c/PI(-) p AND pp INTERACTIONS
C. Fisher (Science and Engineering Research Council, Chilton, England), S. O. Holmgren, K. E. Johansson, I. Moa, and S. Nilsson
Jun. 1985 19 p refs
(USIP-85-15) Avail: NTIS HC A02/MF A01

The search for F meson decays in high energy hadron interactions, including misinterpreted D meson decays is reviewed. In a high resolution bubble chamber experiment, three events which give constrained kinematic fits to F decays were observed. However, other solutions are possible. Analysis difficulties in the presence of kinematic ambiguities and the absence of charged particle identification are discussed. Two of the three decays discussed are to modes where charged particle identification would not resolve D/F ambiguities. Author (ESA)

N86-18175# Stockholm Univ. (Sweden). Inst. of Physics.
TREATMENT OF STRANGE PARTICLE DECAYS OBSERVED IN THE UA5 STREAMER CHAMBERS
K. Jon-And and Ch. Walck Jul. 1985 45 p refs
(USIP-85-16) Avail: NTIS HC A03/MF A01

Decay vertex fits and momentum determination of strange particles observed in collider experiments are described. The precision of the evaluated quantities is discussed. Weighted fit methods, with constraints given by the kinematics of the decay, are shown to be advantageous compared to unweighted methods. Author (ESA)

74 OPTICS

Includes light phenomena.

N86-18176 California Univ., San Diego.
CROSSING CHANNEL WAVEGUIDE ELECTRO-OPTIC MODULATORS Ph.D. Thesis
Gary Evan Betts 1985 252 p
Avail: Univ. Microfilms Order No. DA8515589

A theoretical and experimental investigation of the integrated optical crossing channel waveguide electro-optic modulator (sometimes called a TIR modulator) is presented. This modulator basically consists of two intersecting channel waveguides (either single- or multi-mode) with an electrode pair in the intersection region. Some variations of the basic X intersection design are also studied. The dependence of performance upon various design parameters is reported. These modulators are potentially useful for several reasons, among which are: (1) they have a very simple structure; (2) multi-mode versions offer the possibility of increased linear dynamic range; (3) their short electrode length gives them a very wide bandwidth; and (4) versions with wide, multi-mode channels can improve optical power handling capability. A theoretical model based upon mode conversion during propagation through the device is used to analyze these modulators. Dissert. Abstr.

N86-18177 Rochester Univ., N. Y.
ANAMORPHIC GRADIENT INDEX LENS SYSTEMS Ph.D. Thesis
Joan Marie Stagman 1985 155 p
Avail: Univ. Microfilms Order No. DA8516488

Analytical tools and experimental techniques are developed and used to evaluate the importance of anamorphic gradient-index lens systems in optical design. A ray trace algorithm is formulated to calculate the paths of rays through anamorphic gradient-index media. The ray trace algorithm is based upon a power series expansion of the ray path and the index profile. Lenses are designed to couple light from a laser diode into a multimode optical fiber. Designs are formulated for lasers having various amounts of axial astigmatism. A twofold increase in the coupling efficiency beyond that of a butt-coupled system is achieved. Gradient-index samples having an anamorphic index profile are fabricated using the ion exchange technique. Diffusions into elliptical rods and plane slabs are performed. An ac shearing interferometer is constructed to measure the index of refraction profile of anamorphic gradient-index samples. Measurements are made of the phase variation across the sheared wavefront. The index of refraction profiles are constructed by numerical integration of the phase data.
Dissert. Abstr.

N86-18178 Rochester Univ., N. Y.
THE INTERACTION BETWEEN ELECTRIC DIPOLES AND WAVEGUIDING SURFACES AT OPTICAL FREQUENCIES Ph.D. Thesis
William Robert Holland 1985 178 p
Avail: Univ. Microfilms Order No. DA8516473

An electric dipole placed in close proximity to a surface exhibits optical properties that are very different from those of an isolated electric dipole. In the case of a conducting surface, classical theory predicts that the dipole will exhibit a resonance frequency shift, a change in its radiative decay rate, and coupling with a transverse magnetic surface wave at the metal-air interface (i.e., a surface plasmon). These effects have been observed, measured, and analyzed on a dipole/surface system which incorporates a high index dielectric layer between the dipole and the metal, thus forming a metal-acid waveguiding structure. Dissert. Abstr.

N86-18179*# Virginia Univ., Charlottesville.
INVESTIGATION OF THE QUANTUM EFFICIENCY OF OPTICAL HETERODYNE DETECTORS Final Report
T. E. Batchman Nov. 1984 44 p refs
(Grant NAG1-262)
(NASA-CR-176489; NAS 1.26:176489; UVA/528212/EE85/101)
Avail: NTIS HC A03/MF A01 CSCL 20F

The frequency response and quantum efficiency of optical photodetectors for heterodyne receivers is investigated. The measurements utilized two spectral lines from the output of two lasers as input to the photodetectors. These lines are easily measurable in power and frequency and hence serve as known inputs. By measuring the output current of the photodetector the quantum efficiency is determined as a function of frequency separation between the two input signals. An investigation of the theoretical basis and accuracy of this type of measurement relative to similar measurements utilizing risetime is undertaken. A theoretical study of the heterodyne process in photodetectors based on semiconductor physics is included so that higher bandwidth detectors may be designed. All measurements are made on commercially available detectors and manufacturers' specifications for normal photodetector operation are compared to the measured heterodyne characteristics. Author

N86-18180# Michigan Univ., Ann Arbor. Dept. of Electrical and Computer Engineering.
WHITE LIGHT OPTICAL INFORMATION PROCESSING Final Annual Report, 30 Sep. 1981 - 31 Dec. 1984
E. N. Leith 31 May 1985 110 p
(Grant AF-AFOSR-0243-81)
(AD-A160311; AFOSR-85-0853TR; AR-7) Avail: NTIS HC A06/MF A01 CSCL 20/6

Methods for optical processing and holography with light of reduced coherence are described, including the making of holographic optical elements in light of reduced spatial or temporal coherence, phase conjugation with light of reduced coherence, and Fourier transformation spatial matched filtering in spatially and temporally incoherent light. GRA

N86-18181# EG and G Energy Measurements, Inc., Las Vegas, Nev.
APPLICATIONS OF FIBER OPTIC COUPLERS TO DIAGNOSTIC EXPERIMENTS AT THE NEVADA TEST SITE

B. M. Whitcomb, V. N. Smiley, R. F. Flurer, and C. W. Colburn 1985 15 p Presented at the Conference on Fiber Optic Couplers, Connectors, and Splice Technology 2, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC08-83NV-10282)
(DE85-016787; EGG-10282-1087; CONF-8508102-1) Avail: NTIS HC A02/MF A01

Fused biconical tapered (FBT) fiber optics star couplers have been used in a variety of applications at the Nevada Test Site to provide increased signal dynamic range for recording devices. Problems which were observed resulted primarily from the modal selection processes which occur in FBT couplers. This paper describes the results of work performed to characterize a new type of splitter for the same applications. The new splitters, obtained commercially, were manufactured using reflection techniques rather than the FBT approach. The splitters exhibit virtually none of the modal problems inherent in the FBT couplers. DOE

N86-18182# Los Alamos National Lab., N. Mex.
NANOSECOND OPTICAL SHUTTERS
N. S. P. King, G. J. Yates, S. A. Jaramillo, T. S. Pagano, and J. P. Black 1985 13 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with EG and G, Inc., Goleta, Calif.; EG and G, Inc., Albuquerque, N.M.
(Contract W-7405-eng-36)
(DE85-017535; LA-UR-85-3022; CONF-850887-31) Avail: NTIS HC A02/MF A01

A comparison of gated optical shuttering responses for commercially available micro-channel plate image intensifier tubes (MCPTs) with the performance of a new design for improved optical shuttering is presented. Measurements of opacity, photocathode quantum efficiency, and shutter pulse propagation characteristics are discussed. DOE

N86-18183# Los Alamos National Lab., N. Mex.
REVIEW OF HIGH BANDWIDTH FIBER OPTICS RADIATION SENSORS
P. B. Lyons 1985 7 p refs Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017559; LA-UR-85-2863; CONF-850887-29) Avail: NTIS HC A02/MF A01

This paper summarizes the use of fiber optics or guided optical systems for radiation sensors. It is limited to passive systems wherein electrical is not required at the sensor location. However, electrically powered light sources, receivers and/or recorders may still be required for detection and data storage in sensor system operation. This paper emphasizes sensor technologies that permit high bandwidth measurements of transient radiation levels, and will also discuss several low bandwidth applications. DOE

N86-18184# Department of Energy, Washington, D. C.
OPTICAL SWITCH Patent Application
R. P. Reedy, inventor (to DOE) Filed 18 Jan. 1985 13 p Prepared in cooperation with LLNL
(Contract W-7405-eng-48)
(DE85-017783; US-Patent-Appl-SN-692760) Avail: NTIS HC A02/MF A01

An optical switching device is provided whereby light from a first glass fiber or a second glass fiber may be selectively transmitted into a third glass fiber. Each glass fiber is provided with a focusing and collimating lens system. In one mode of operation, light from the first glass fiber is reflected by a planar mirror into the third glass fiber. In another mode of operation, light from the second glass fiber passes directly into the third glass fiber. The planar mirror is attached to a rotatable table which is rotated to provide the optical switching. DOE

N86-18185# Lawrence Livermore National Lab., Calif.
SURFACE FINISH MEASUREMENTS OF DIAMOND-TURNED ELECTROLESS-NICKEL-PLATED MIRRORS
J. S. Taylor, C. K. Syn, T. T. Saito, and R. R. Donaldson 16 Aug. 1985 14 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-48)
(DE85-017833; UCRL-93245; CONF-850887-35) Avail: NTIS HC A02/MF A01

Surface roughness data are presented for a matrix of diamond-turned electroless-nickel samples having a combination of six phosphorous contents and four heat treatments. Roughness measurements were conducted with commercial optical and stylus profilometers (Wyko and Talystep). The results are discussed in terms of the material composition and heat treatment, plus other factors having an observed influence on the surface roughness. For the optimum material properties, full-length (665 (MU)m) restored 20X Wyko scans yielded values of better than 10A rms. DOE

N86-18186# Los Alamos National Lab., N. Mex.
IMAGING TECHNIQUES UTILIZING OPTICAL FIBERS AND TOMOGRAPHY
M. Wilke, N. S. P. King, N. Gray, D. Johnson, D. Esquibel, P. Nedrow, and S. Ishiwata 1985 9 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Los Alamos, N. Mex. and Edgerton, Germeshausen and Grier, Inc., Goleta, Calif.
(Contract W-7405-eng-36)
(DE85-017536; LA-UR-85-3021; CONF-850887-30) Avail: NTIS HC A02/MF A01

Two-dimensional, time-dependent images generated by neutrons, gamma rays, and X-rays incident on fast scintillators are relayed to streak and video cameras over optical fibers. Three dimensions, two spatial and one temporal, have been reduced to two, one in space and time utilizing sampling methods permitting reconstruction of a time-dependent, two-dimensional image subsequent to data recording. The manner in which the sampling is done optimized the ability to reconstruct the image via a maximization of entropy algorithm. This method uses four linear fiber optic arrays typically 30 meters long and up to 35 elements each. A further refinement of this technique collapses the linear array information into four single fibers by wavelength multiplexing. This permits economical transmission of the data over kilometer distances to the recording equipment. DOE

N86-18187# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Vision Research Group.
THE SMOKE TRANSMISSION AND REFLECTION THRESHOLD (START) MODEL; THE OLDEBROEK (NETHERLANDS) 2 TRIALS, MAY 1981 Final Report
J. M. Valeton Jan. 1985 31 p refs
(Contract A79/KL/151)
(IZF-1984-22; TDCK-79979) Avail: NTIS HC A03/MF A01

The contrast reduction caused by the effects of smoke and the natural atmosphere are analyzed. The minimum requirement for a smoke screen to make a target invisible is described in terms of a transmission threshold or a reflection threshold. The dependence of these thresholds on environmental parameters is described with the Smoke Transmission And Reflection Threshold model. A target is visible when the actual transmission is greater than the transmission threshold, or when the actual smoke reflection is below the reflection threshold. The transmission and reflection thresholds depend on distances in the field, inherent target contrast, visual range, and type of smoke. Prediction of the occurrence of holes, the perceptual quality of the smoke screen, and the reduction in effectiveness of weapons is discussed. Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-18188# Science Applications International Corp., La Jolla, Calif.
ASPECTS OF TURBULENCE IN NONLINEAR SYSTEMS, YEAR ONE Final Report, 1 Feb. - 31 Oct. 1985
E. A. Frieman and W. K. Hagan Jul. 1985 76 p
(Contract DE-AC03-84ER-13174)
(DE85-016253; SAIC-85/3070) Avail: NTIS HC A05/MF A01

Gyrokinetic theory was developed from a pragmatic point of view. Since our interest in gyrokinetic theory is to ultimately shed some light on drift wave turbulence and anomalous transport, we have tried from the outset to incorporate into our theory some of the characteristics of these phenomena as measured in experiments. This approach has led to a theory in which two time and two space scales naturally emerge. We were also led to express the full nonlinear distribution function as an equilibrium part and perturbation part, with the equilibrium being driven by the higher order interactions of the rapid fluctuations. DOE

N86-18189# Oak Ridge National Lab., Tenn.
3-D NONLINEAR MHD CALCULATIONS WITH DRIFT AND THERMAL FORCE EFFECTS
L. Garcia, H. R. Hicks, B. A. Carreras, L. A. Charlton, and J. A. Holmes Jul. 1985 30 p
(Contract DE-AC05-84OR-21400)
(DE85-018082; ORNL/TM-9499) Avail: NTIS HC A03/MF A01

A computer code (KITE) that solves a reduced set of magnetohydrodynamic (MHD) equations with diamagnetic and thermal force effects included has been constructed. It can use two different time integration schemes. A mostly-explicit time integration scheme is shown to be efficient for the nonlinear phase of tearing mode turbulence where numerical stability demands a small timestep. However, for linear calculations, or nonlinear ones in which the level of turbulence is low, a mostly-implicit approach is seen to be more efficient. The two numerical schemes yield the same solutions. Nonlinear MHD calculations in which the solutions are represented by a finite Fourier series allow one to study the dependence of the nonlinear solution on its permitted harmonic content. It is seen that for the three-dimensional (3-D), nonlinear, tearing mode disruption problem, the refinement of the solution by the addition of more modes leads to further destabilization. This contrasts to the rippling mode problem, in which the addition of modes is stabilizing. For the latter, a finite number of modes yields a converged solution that is a saturated state. This contrasting behavior reflects the basic physical mechanism of the nonlinear interaction in each case and not the particular numerical scheme used for the calculations. DOE

N86-18190# Oak Ridge National Lab., Tenn.
STOCHASTIC MODEL OF A FIRST-ORDER NONEQUILIBRIUM PHASE TRANSITION IN A MAGNETIC FUSION DEVICE
D. E. Hastings Aug. 1985 22 p
(Contract DE-AC05-84OR-21400)
(DE85-018139; ORNL/TM-9605) Avail: NTIS HC A02/MF A01

The ambipolar electric field in many nonaxisymmetric fusion devices is known to be a multivalued function. A master equation for the probability distribution of the electric field is developed for internal fluctuations, and a generalized Gibbs free energy is defined. As with a liquid-gas phase transition, the most probable value of the electric field is the one that minimizes the free energy. DOE

N86-18191# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH TEMPERATURE EXPERIMENT FOR ACCELERATOR INERTIAL FUSION
E. P. Lee May 1985 6 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC03-76SF-00098)
(DE85-016553; LBL-19602; CONF-850504-260) Avail: NTIS HC A02/MF A01

The High Temperature Experiment (HTE) is intended to produce temperatures of 50 to 100 eV in solid density targets driven by heavy ion beams from a multiple beam induction linac. The fundamental variables (particle species, energy, number of beamlets, current and pulse length) must be fixed to achieve the temperature at minimum cost, subject to criteria of technical feasibility and relevance to the development of a Fusion Driver. The conceptual design begins with an assumed (radiation-limited) target temperature and uses limitations due to particle range, beamlet perveance, and target disassembly to bound the allowable values of mass number (A) and energy (E). An accelerator model is then applied to determine the minimum length accelerator, which is a guide to total cost. The accelerator model takes into account limits on transportable charge, maximum gradient, core mass per linear meter, and head-to-tail momentum variation within a pulse. DOE

N86-18192# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
AXISYMMETRIC TANDEM MIRROR STABILIZED BY A MAGNETIC LIMITER
J. Kesner, R. S. Post, and B. Lane Jun. 1985 21 p Presented at the Tandem Mirror Reactor Concepts, Livermore, Calif., 22 Aug. 1985
(Contract DE-AC02-78ET-51013)
(DE85-017349; DOE/ET-51013/154; PFC/CP-85-5; CONF-8508121-1) Avail: NTIS HC A02/MF A01

In order to stabilize MHD-like, fast growing m = 1 fluctuations in the central cell of a tandem mirror we propose the introduction of a magnetic limiter. The magnetic limiter would create a ring null in the magnetic field. Electrons which enter the null can stream azimuthally and thereby short-circuit m = 1 fluctuations. Some pressure could be maintained on the separatrix flux surface by locating the null on a local magnetic maxima or by axial plugging. This scheme introduces the possibility of a fully axisymmetric tandem mirror. DOE

N86-18193# Georgia Inst. of Tech., Atlanta. Fusion Research Center.
ANALYSIS OF THE UNBALANCED NBI ROTATION EXPERIMENTS IN THE ISX-B, PLT AND PDX TOKAMAKS
W. M. Stacey, Jr., C. M. Ryu, and M. A. Malik Jul. 1985 25 p
(Contract DE-AS05-78ET-52025)
(DE85-017616; GTFR-59) Avail: NTIS HC A02/MF A01

The recently developed Stacey-Sigmar theory for toroidal momentum confinement, which is based upon neoclassical gyroviscosity, has been applied to the analysis of the unbalanced NBI rotation experiments in ISX-B, PLT and PDX. Measured steady-state rotation velocities, momentum confinement times inferred therefrom and momentum confinement times inferred from rotation decay after termination of NBI were compared with theoretical predictions. Good agreement between theory and experiment was obtained over a wide range of the parameters which enter the theory (R,Z,T,B). DOE

N86-18194# Sandia National Labs., Albuquerque, N. Mex.
NEON GAS PUFF Z-PINCH IMPLOSIONS ON PROTO-2
R. B. Spielman, R. J. Dukart, B. A. Hammel, D. L. Hanson, and M. A. Palmer 1985 8 p Presented at the 4th International Workshop on Plasma Focus Research, Warsaw, Poland, 9 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017636; SAND-85-1210C; CONF-850986-1) Avail: NTIS HC A02/MF A01

We have imploded annular neon gas puff Z-pinches on the 10 TW, 0.125 (UC OMEGA) Proto-2 accelerator. Proto-2 delivers a voltage pulse with a 50 ns FWHM to the 8.5 nH single-disk vacuum feed. Currents up to 4 MA were delivered to the load. We will describe the implosion and stagnation properties of the neon plasma. Time-resolved and time-integrated X-ray pinhole photographs and time-integrated spectra will be presented. DOE

N86-18195# Sandia National Labs., Albuquerque, N. Mex.
THERMAL SHOCK BEHAVIOR OF BERYLLIUM LIMITERS IN TOKAMAK FUSION DEVICES
R. D. Watson and J. B. Whitley Aug. 1985 7 p Presented at the 8th International Conference on Structural Mechanics in Reactor Technology, Brussels, Belgium, 19 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017815; SAND-84-1578C; CONF-850809-79) Avail: NTIS HC A02/MF A01

Thermal fatigue tests were performed on prototype beryllium limiter tiles for the JET tokamak using a 30 kW, 1 amp rastered electron beam system. A heat flux of 250 W/cm(2) was applied for 15 seconds to a tile 9.5 cm x 6.35 cm x 1 cm for a total of 10,000 cycles. The only damage to the tile was the formation of thermal fatigue microcracks on the heated surface. The depth of microcracking corresponds closely to the region of cyclic plasticity that was predicted by elastic-plastic finite elements stress analyses. The surface cracking did not cause gross structural failure; hence, the beryllium limiters in JET are expected to survive operation at 250 W/cm(2) for at least 10,000 plasma discharges. DOE

N86-18196# Texas Univ., Austin. Fusion Research Center.
ANTENNA ANALYSIS AND BOUNDARY CONDITIONS FOR ALFVEN WAVE STUDIES IN TOKAMAKS
D. W. Ross, Y. M. Li, S. M. Mahajan, and R. B. Michie Jul. 1985 21 p
(Contracts DE-AC05-78ET-53043; DE-AC05-76ET-53036; DE-AS05-85ER-53193)
(DE85-018011; DOE/ET-53193/1-274; FRCR-274) Avail: NTIS HC A02/MF A01

Previous studies of Alfven wave heating which employed kinetic theory are extended to take into account antenna configurations, in cylindrical geometry, consisting of arbitrary shell currents and their associated radial feeders. For each Fourier component of the form esp-i(l zeta - m theta), the shell current consists of a divergence-free part having the helicity of the mode (l,m), plus an orthogonal part requiring the feeders. It is shown, both analytically and by including the full current in the numerical code, that only the divergence-free part of the current contributes significantly to the plasma response and antenna loading. The important effect of the feeders is to cancel the contribution from the surface current perpendicular to the helicity. This explicitly verifies results reported previously. DOE

N86-18197# Maryland Univ., College Park. Lab. for Plasma and Fusion Energy Studies.
MARYLAND CONTROLLED FUSION RESEARCH PROGRAM. VOLUME 1
1985 71 p
(Contract DE-AC05-84ER-53170)
(DE85-018027; DOE/ER-53170/T2) Avail: NTIS HC A04/MF A01

This renewal proposal describes the University of Maryland research program on Magnetic Fusion Energy for a three-year period beginning January 1, 1986. This program consists of five tasks: (1) Plasma Theory; (2) Electron Cyclotron Emission Diagnostics for Mirror Machines; (3) Electron Cyclotron Emission Diagnostics on TFTR; (4) Atomic Physics; and (5) Magnetic Field Measurement by Ion Beams. The four separate tasks of continuing research (Tasks 1 to 4) and the new experimental task (Task 5) are described in detail. The task descriptions contain estimated budgets for CY 86, 87, and 88. DOE

N86-18198# Oak Ridge National Lab., Tenn.
NE-213-SCINTILLATOR-BASED NEUTRON DETECTION SYSTEM FOR DIAGNOSTIC MEASUREMENTS OF ENERGY SPECTRA FOR NEUTRONS HAVING ENERGIES GREATER THAN OR EQUAL TO 0.8 MeV CREATED DURING PLASMA OPERATIONS AT THE PRINCETON TOKAMAK FUSION TEST REACTOR
J. K. Dickens, N. W. Hill, F. S. Hou, J. W. McConnell, R. R. Spencer, and F. Y. Tsang Aug. 1985 82 p
(Contract DE-AC05-84OR-21400)
(DE85-018079; ORNL/TM-9561) Avail: NTIS HC A05/MF A01

A system for making diagnostic measurements of the energy spectra of greater than or equal to 0.8-MeV neutrons produced during plasma operations of the Princeton Tokamak Fusion Test Reactor (TFTR) has been fabricated and tested and is presently in operation in the TFTR Test Cell Basement. The system consists of two separate detectors, each made up of cells containing liquid NE-213 scintillator attached permanently to RCA-8850 photomultiplier tubes. Pulses obtained from each photomultiplier system are amplified and electronically analyzed to identify and separate those pulses due to neutron-induced events in the detector from those due to photon-induced events in the detector. Signals from each detector are routed to two separate Analog-to-Digital Converters, and the resulting digitized information, representing: (1) the raw neutron-spectrum data; and (2) the raw photon-spectrum data, are transmited to the CICADA data-acquisition computer system of the TFTR. Software programs have been installed on the CICADA system to analyze the raw data to provide moderate-resolution recreations of the energy spectrum of the neutron and photon fluences incident on the detector during the operation of the TFTR. A complete description of, as well as the operation of, the hardware and software is given in this report. DOE

N86-18199# Auburn Univ., Ala. Dept. of Physics.
EXPERIMENTAL STUDIES OF RADIO FREQUENCY WAVES AND CONFINEMENT IN THE AUBURN TORSATRON Progress Report
D. G. Swanson 15 Aug. 1985 73 p
(Contract DE-FG05-85ER-53192)
(DE85-017189; DOE/ER-53192/1) Avail: NTIS HC A04/MF A01

The first year of operation of the Auburn Torsatron has resulted in the majority of the basic operating systems becoming operational or nearly operational. The diagnostic systems now include two microwave interferometers, a monochrometer, several probes and photodiodes. The plasma is produced by any of three sources: electron cyclotron heating with a CW power of 1 kW, low frequency RF heating with power soon to come up to 10 kW CW, and a pulsed washer-stack gun. The magnetic field studies have mapped the field surfaces and several corrections have been made to center the plasma. The ion-cyclotron source and antenna are nearly ready for experiments to begin. DOE

N86-18200# GA Technologies, Inc., San Diego, Calif.
SIMULTANEOUS MEASUREMENT OF CURRENT AND PLASMA DENSITY PROFILES IN THE TEXT TOKAMAK
D. M. Thomas, W. P. West, and S. B. Zheng Aug. 1985 9 p Presented at the 2nd International Symposium on Laser Aided Plasma Diagnostics, Culham, England, 10 Sep. 1985 Prepared in cooperation with Texas Univ., Austin
(Contract DE-AC03-84ER-53158)
(DE85-017679; GA-A-18122; CONF-8509127-3) Avail: NTIS HC A02/MF A01

A method of obtaining information on the current density profile j(r) and relative plasma density n(r) in a tokamak is discussed. Both measurements rely on analysis of the fluorescence emitted by a high energy neutral lithium beam as it traverses the plasma. Superimposed on the neutral beam trajectory is a linearly polarized dye laser beam tuned to the Doppler-shifted (PI) component of the Zeeman-split resonance line. Thus the light emitted by the beam consists of laser-induced fluorescence as well as collisionally induced fluorescence. As the Zeeman components are polarized relative to the local magnetic field direction, rotation of the plane of polarization of the laser at frequency (LC OMEGA) will modulate the laser induced fluorescence at 2(LC OMEGA), since the resonance condition is satisfied for the (PI) components twice each cycle. Phase analysis of the modulated fluorescence relative to a reference phase taken from the laser polarization direction permits us to accurately measure the local magnetic field direction at various radial positions inside the plasma. The poloidal magnetic field structure, and hence the plasma current distribution, may be deduced from the direction of the magnetic field (equal to the direction of laser polarization at maximum fluorescence) and the known magnitude of the toroidal magnetic field. Similarly, the

relative plasma density at various r may be determined from a study of the collisionally induced fluorescence signal. DOE

N86-18201# Texas Univ., Austin. Inst. for Fusion Studies.
TWO AND THREE DIMENSIONAL PARTICLE SIMULATION MODELS FOR STUDY OF PLASMA MICROINSTABILITIES
R. D. Sydora, J. N. Leboeuf, and T. Tajima Sep. 1985 19 p
(Contract DE-FG05-80ET-53088)
(DE86-000238; DOE/ET-53088/206; IFSR-206) Avail: NTIS HC A02/MF A01

Two and three dimensional particle simulation models suitable for the study of low frequency instabilities in inhomogeneous magnetized plasmas are described. Using the guiding center approximation for electrons transverse to the magnetic field and exact electron dynamics parallel, as well as full ion dynamics, the necessary physics is included to study a class of microinstabilities known as drift waves (the universal mode). Applications of the model to studies of drift wave stability in sheared fields with single and multiple rational surfaces are discussed. DOE

N86-18202# Texas Univ., Austin. Inst. for Fusion Studies.
THREE DIMENSIONAL TOROIDAL MAGNETOHYDRODYNAMIC PARTICLE CODE
F. Brunel, J. N. Leboeuf, D. P. Stotler, H. L. Berk, and S. M. Mahajan Sep. 1985 16 p
(Contract DE-FG05-80ET-53088)
(DE86-000239; DOE/ET-53088/207; IFSR-207) Avail: NTIS HC A02/MF A01

The magnetohydrodynamic particle code has been developed to three dimensions in a cylindrical coordinate system in order to describe the plasma in a torus. To keep the noise level down, the finite differences are defined halfway between grid points and the magentic force is defined in a non-conservative manner. Two practical examples of using such a code for physics applications are reported: simulations of high amplitude Global Alfven Eigenmodes and stabilization of flute modes by a hot electron ring. DOE

N86-18203# Uppsala Ionospheric Observatory (Sweden).
[ACTIVITIES REPORT IN GEOPHYSICS] Annual Report, 1984
1985 45 p refs
(UIO-SR-85-01; ISSN-0349-2699) Avail: NTIS HC A03/MF A01

Research in space plasma physics, in particular high latitude ionospheric phenomena and phenomena related to the interaction of the ionosphere with the magnetosphere and with the neutral atmosphere is summarized. In situ experiments using sounding rockets and the Swedish Viking satellite are described. Ground-based, remote sensing experiments using radar and radio techniques, in particular EISCAT, backscatter radars, and equipment for observing stimulated electromagnetic emissions from heating experiments are outlined. Routine monitoring of ionospheric conditions was performed using ionosonde, riometer, and backscatter radar techniques. Author (ESA)

N86-18204# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
A DIFFERENCE PROCEDURE TO SOLVE QUASILINEAR PLASMA PHYSICS PARABOLIC SYSTEMS [UEBER DIFFERENZENVERFAHREN ZUR LOESUNG QUASILINEARER PARABOLISCHER SYSTEME AUS DER PLASMAPHYSIK]
Karl Graf Finck vonFinckenstein Apr. 1985 29 p refs In GERMAN
(Preprint-892) Avail: NTIS HC A03/MF A01

The convergence of a nonlinear difference procedure for quasilinear parabolic initial boundary value problems in cylindrical symmetry was investigated. Consistency considerations show that the linearizations are identical with a Newton iteration. The inverse difference operators can be estimated in such a way that linear difference equations are obtained for the errors, which substantially facilitates the convergence demonstration. The convergence of semidiscrete and discrete approximate solutions is treated. A numerical example shows that the application of two and three Newton iterations allows a substantially higher time interval and hence leads to a substantial computer time saving compared with linearization. Author (ESA)

N86-18205# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
CHANNEL DESIGN FOR CLOSED CYCLE MHD
G. K. Troost (FDO Engineering Consultants, Amsterdam), C. A. L. Kemper (FDO Engineering Consultants, Amsterdam), T. W. Verbruggen (FDO Engineering Consultants, Amsterdam), R. F. vanderWijngaart, J. P. F. Lindhout, and R. K. vanderDraai 14 May 1984 22 p refs Presented at 22 Symposium on Engineering Aspects of Magnetohydrodynamics, Starkville, Miss., Jun. 1984 Sponsored in part by Netherlands Bureau for Energy Research Projects
(NLR-MP-84053-U; B8569030; FDO-TPV-84-014) Avail: NTIS HC A02/MF A01

System design studies for medium scale power plants with a closed cycle MHD topping were performed. The studies show a potential for early commercialization of the direct energy conversion technology for coal and natural gas fired utility installations. As a first step towards the large scale application of MHD, this technology can demonstrate an economically high enthalpy extraction on an intermediate scale. The closed cycle MHD power train, particularly the generator, was studied and a basic design configuration was defined. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-18206 California Univ., Irvine.
THEORETICAL INVESTIGATIONS OF METAL SURFACES Ph.D. Thesis
Dave Arthur Campbell 1985 218 p
Avail: Univ. Microfilms Order No. DA8516543

Detailed numerical results for the energy of interaction between a static charge and a jellium surface and for the total energy of interation between two static charges placed in the surface region are presented. In the latter case some novel results were obtained showing the disappearance of the bulk oscillatory behavior in the total interaction energy as the two charges are brought from inside the metal surface and placed outside the jellium edge. Both response calculations are performed by first computing the static electron density response function in the random-phase approximation. The response function for non-interaction electrons is obtained on the basis of a computational method that renders the eigenfunctions psi sub nu (x) of the Kohn-Sham equations of a jellium slab in semi-analytical form. This method consists of expanding the dependence of psi bus nu (x) on the coordinate normal to the jellium surfaces in a sine series and solving a nonlinear matrix version of the Kohn-Sham self-consistent problem. Dissert. Abstr.

N86-18207 Pennsylvania State Univ., University Park.
COMPOSITIONAL VARIATION IN THE NEAR SURFACE LAYERS: AN ATOM PROBE STUDY OF SURFACE SEGREGATION IN ALLOYS Ph.D. Thesis
Matlub Ahmad 1985 81 p
Avail: Univ. Microfilms Order No. DA8515992

Layer by layer equilibrium composition depth profiles have been obtained for one Pt-Ir and five Pt-Rh alloys using the atom probe field ion microscope. A statistical reliable amount of data was taken and the depth profiles have true single atomic layer spatial in-depth resolution. All of the depth profiles obtained are for the (001) plane. Pt was found to segregate to the top two layers in Pt-Ir alloy and Rh segregates to the to top layer in Pt-Rh alloys after annealing at 700 deg C for 5 minutes. A diffusion kinetic effect has been observed for the Pt-Ir case from which diffusion parameters have been estimated. In both cases questions regarding sufficient thermodynamic equilibrium have been resolved with

proper testing. An additional feature of impurity segregation has been observed. A minute amount of sulfur in the bulk can aggregate to the surface and form an overlayer. Such overlayer coverage has been found to vary between 0.22 to 0.52 monolayer and this coverage increases with increasing surface Rh concentration. For each of the two different alloy systems a different nature of composition variation is observed in the near surface layer. In the Pt-Ir case the Pt concentration decays to the bulk value monotonically over two atomic layers. In the Pt-Rh case significant Rh depletion is observed in the second layer and the Rh concentration returns to the bulk value from the third layer on. Dissert. Abstr.

N86-18208 Royal Signals and Radar Establishment, Malvern (England).
ULTRA-FAST PHOTOCONDUCTIVE SWITCHES
R. J. Manning and J. R. Hill Nov. 1984 34 p refs
(RSRE-Memo-3784; BR94557) Avail: NTIS HC A03/MF A01

Photoconductive switches with sampling capabilities with an undeconvolved resolution of 15 psec were developed. Since the circuit response of the gaps is known, the ultimate resolution is determined by the photoconductive decay time of the carriers, which can be as low as 3 psec. Sampling speeds are limited by the circuit response. Improvements in circuit geometry, in particular the use of coplanar waveguide structures, should enhance the direct resolution significantly. The second limitation is the finite pulse duration of the laser. Shorter pulses (< 500 fsec) would improve the development of gating speeds between 1 and 3 psec. There does seem to be a limit to the implantation dose beyond which the switch characteristics change drastically. Author (ESA)

N86-18209# Royal Signals and Radar Establishment, Malvern (England).
NONLINEAR REFRACTIVE INDEX MEASUREMENTS OF ISOTROPIC LIQUID CRYSTALS
A. M. Scott, P. A. Madden, and F. C. Saunders May 1985 32 p refs
(AD-A159519; RSRE-MEMO-3770; BR96521) Avail: NTIS HC A03/MF A01

The nonlinear refractive index of liquid crystalline materials in the isotropic phase was measured. The materials show strong enhancement of the nonlinearity due to nematic like local ordering, and even materials which do not have a nematic-isotropic transition show this enhancement. Mixtures of liquid crystals and solvents also have an enhanced nonlinearity due to local ordering. Absorption of the laser beam causes expansion which reduces the refractive index and can counteract the refractive index change due to reorientation. Author (ESA)

N86-18210# Georgia Inst. of Tech., Atlanta. School of Physics.
CORRELATION AND COLLECTIVE MODES IN NARROW BAND MATERIALS Final Report, 1 Oct. 1984 - 30 Sep. 1985
M. W. Ribarsky 2 May 1985 25 p
(Grant AF-AFOSR-0023-80)
(AD-A160310; AFOSR-85-0879TR) Avail: NTIS HC A02/MF A01 CSCL 20/3

Correlation and collective modes have been studied for systems with quite localized valence or conductance bands. In particular this research has been concerned with localized electron-hole states and how they contribute with other excitations to the dynamical response of the system. Important aspects studied have been the effects of exciton or exciton-like states on superconducting properties, electron energy loss spectra and optical spectra. Initially the system studied has been CuCl for which a tight-binding model was used. The results show that strong effects due to localized excitations of d-band electrons greatly affect the dynamical response and the effective electron interaction. Off-diagonal matrix elements of the inverse dielecttric citation spectrum, producing exciton resonances in the band gap. The exciton resonance in the dynamical response is necessary to obtain the appropriate attractive effective electron interaction for superconductivity. Models have also been set up to relate the dynamical response including local field effects to the superconducting transition temperature and gap function. The strong localization effects also will affect the loss spectra and optical spectra. GRA

N86-18211# North Carolina Univ., Chapel Hill. Dept. of Physics and Astronomy.
CATASTROPHIC PLANAR DECHANNELING IN STRAINED-LAYER SUPERLATTICES
W. K. Chu, W. R. Allen, J. A. Ellison, and S. T. Picraux 1985 20 p refs Prepared in cooperation with New Mexico Univ., Albuquerque and Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE85-017160; SAND-85-0618C) Avail: NTIS HC A02/MF A01

Recently a catastrophic dechanneling effect has been discovered to occur when the wavelength of a planar-channeled ion beam matches the layer period of a strained-layer superlattice (SLS). We report continuum model calculations of planar channeled trajectories in strained-layer superlattices to obtain the depth dependence of the dechanneling due to the SLS structure for various incident angles. The calculations are in good agreement with the dechanneling measurements. In addition, features of the dechanneling versus depth calculation are found to be quite sensitive to the continuum potential near the planes and these features are experimentally resolvable. This work not only provides for the measurement of lattice strain in superlattices, but also enhances our understanding of planar channeling and suggests a new method for comparing the accuracy of various scattering potentials. DOE

N86-18212# Pacific Northwest Lab., Richland, Wash.
HEAVY ION INDUCED DAMAGE AND DISORDER IN INTERMETALLIC COMPOUNDS WITH THE B2 STRUCTURE
J. L. Brimhall and H. E. Kissinger Nov. 1984 9 p Presented at the Symposium on High Temperature Intermetallic Compounds, Boston, Mass., 26 Nov. 1984
(Contract DE-AC06-76RL-01830)
(DE85-006881; PNL-SA-12388; CONF-8411198-1) Avail: NTIS HC A02/MF A01

Although the B2-type intermetallic compounds, NiAl, FeAl, NiTi and FeTi all maintained a high degree of order during irradiation, metastable phase formation was observed. Dislocation loops and network developed in NiAl and FeAl during irradiation and a nickel rich, fcc phase, most likely disordered Ni3Al, formed in NiAl after high doses. The build-up of constitutional vacancies (excess vacancies on Ni sites) and subsequent elemental partitioning of Ni and Al can explain the formation of a nickel rich phase in NiAl. No metastable phases formed in FeAl. Dislocation loop structures did not develop in NiTi or FeTi, rather a transformation to an amorphous phase occurred at relatively low doses. The amorphous transformation results when the free energy of the crystal lattice containing a high defect concentration exceeds the free energy of the amorphous configuration. DOE

N86-18213# Brookhaven National Lab., Upton, N. Y.
FIRST ORDER PHASE TRANSFORMATIONS: SCALING RELATIONS FOR GRAIN SELF-CORRELATION FUNCTIONS
J. D. Axe, S. M. Shapiro, Y. Yamada, and N. Hamaya Jun. 1985 7 p refs Presented at the NATO Advanced Studies Conference on Scaling Phenomena in Disordered Systems, Geilo, Norway, 10 Apr. 1985 Prepared in cooperation with Osaka Univ., Toyonaka, Japan
(Contract DE-AC02-76CH-00016)
(DE85-017509; BNL-36704; CONF-8504153-2) Avail: NTIS HC A02/MF A01

At high pressure many alkali halides transform from the NaCl (B1) structure to the CsCl (B2) structure. We have recently studied this transformation in polycrystalline RbI, which transforms at a critical pressure, P sub c = 3.5 kbar. By observing the time development of the neutron diffraction pattern after sudden increase of hydrostatic pressure from P<P sub c to P>P sub c we directly deduced X(t), the fraction of the sample converted from metastable to stable phase, as a function of time. We showed that X(t) taken at different P could be approximately scaled onto a universal growth curve by introducing an adjustable characteristic

time tau(P) for each curve. The success of the Kolmogorov in fitting X(t) suggests that comparisons of model predictions with other experimental observables be made on the system. For example, by a trivial (in principle) extension of the neutron diffraction techniques described above, one might determine the broadening of the powder diffraction peaks due to finite grain size as a function of time throughout growth. This particle size broadening is related by Fourier transformation to the grain autocorrelation function, G sub s (r,t), which measures the ensemble average of the overlap of grains with themselves upon translation of the grain pattern by an amount r. We present some results of a study of the scaling properties of G sub s (r,t) for the Kolmogorov model for d=1 and d=2. Although the model is highly idealized, it is perhaps the simplest conceivable one which obeys correlation function scaling in early stages of growth and undergoes nontrivial saturation due to volume fraction effects in the late stages. DOE

N86-18214# Los Alamos National Lab., N. Mex.
QUANTUM RESONANCES IN PHYSICAL TUNNELING
M. M. Nieto and D. R. Truax 1985 11 p refs Presented at the Dynamics of Wave Packets in Molecular and Nuclear Physics, Consendonck, Belgium, 2 Jul. 1985 Prepared in cooperation with Copenhagen Univ., Denmark
(Contract W-7405-eng-36)
(DE85-017558; LA-UR-85-2881; CONF-850789-1) Avail: NTIS
HC A02/MF A01

It has recently been emphasized that the probability of quantum tunneling is a critical function of the shape of the potential. Applying this observation to physical systems, we point out that in principal information on potential surfaces can be obtained by studying tunneling rates. This is especially true in cases where only spectral data are known, since many potentials yield the same spectrum. DOE

N86-18215# Department of Energy, Washington, D. C.
METHOD OF SYNTHESIZING AND GROWING COPPER-INDIUM-DISELENIDE (CuInSe2) CRYSTALS Patent Application
T. F. Ciszek, inventor (to DOE) Filed 29 Nov. 1984 20 p
(Contract DE-AC02-83CH-10093)
(DE85-017729; US-Patent-Appl-SN-676343) Avail: NTIS
HC A02/MF A01

A process for preparing CuInSe2 crystals is described which involves includes melting a sufficient quantity of B2O2 along with stochiometric quantities of Cu, In, and Se in a crucible in a high-pressure atmosphere of inert gas to encapsulate the CuInSe2 melt and confine the Se to the crucible. Additional Se in the range of 1.8 to 2.2% over the stochiometric quantity is preferred to make up for small amounts of Se lost in the process. The melt can then be cooled slowly to form the crystal as direct solidification, or the crystal can be grown by inserting a seed crystal through the B2O3 encapsulate into contact with the CuInSe2 melt and withdrawing the seed upwardly to grow the crystal thereon from the melt. DOE

N86-18216# Department of Energy, Washington, D. C.
PROCESS FOR SELECTIVELY PATTERNING EPITAXIAL FILM GROWTH ON A SEMICONDUCTOR SUBSTRATE Patent Application
P. Sheldon and R. E. Hayes, inventors (to DOE) Filed Dec. 1984 18 p
(Contract DE-AC02-83CH-10093)
(DE85-017733; US-Patent-Appl-SN-678202) Avail: NTIS
HC A02/MF A01

Disclosed is a process for selectively patterning epitaxial film growth on a semiconductor substrate. The process includes forming a masking member on the surface of the substrate, the masking member having at least two layers including a first layer disposed on the substrate and the second layer covering the first layer. A window is then opened in a selected portion of the second layer by removing that portion to expose the first layer thereunder. The first layer is then subjected to an etchant introduced through the window to dissolve the first layer a sufficient amount to expose the substrate surface directly beneath the window, the first layer being adapted to preferentially dissolve at a substantially greater rate than the second layer so as to create an overhanging ledge portion with the second layer by undercutting the edges thereof adjacent the window. The epitaxial film is then deposited on the exposed substrate surface directly beneath the window. Finally, an etchant is introduced through the window to dissolve the remainder of the first layer so as to lift-off the second layer and materials deposited thereon to fully expose the balance of the substrate surface. DOE

N86-18217# Department of Energy, Washington, D. C.
IMPROVED METHOD OF PREPARING p-i-n JUNCTIONS IN AMORPHOUS SILICON SEMICONDUCTORS Patent Application
A. Madan, inventor (to DOE) Filed 10 Dec. 1984 24 p
(Contract DE-AC02-83CH-10093)
(DE85-017736; US-Patent-Appl-SN-679842) Avail: NTIS
HC A02/MF A01

A method of preparing p(+)-i-n(+) junctions for amorphous silicon semiconductors includes depositing amorphous silicon on a thin layer of trivalent material, such as aluminum, indium, or gallium at a temperature in the range of 200C to 250C. At this temperature, the layer of trivalent material diffuses into the amorphous silicon to form a graded p(+)-i junction. A layer of n-type doped material is then deposited onto the intrinsic amorphous silicon layer in a conventional manner to finish forming the p(+)-i-n(+) junction. DOE

N86-18218# Department of Energy, Washington, D. C.
NARROW BAND GAP AMORPHOUS SILICON SEMICONDUCTORS Patent Application
A. Madan (Midwest Research Inst., Golden, Colo.) and A. H. Mahan, inventors (to DOE) (Midwest Research Inst., Golden, Colo.) Filed 10 Jan. 1985 9 p
(Contract DE-AC02-83CH-10093)
(DE85-017753; US-Patent-Appl-SN-690218) Avail: NTIS
HC A02/MF A01

Disclosed is a narrow band gap amorphous silicon semiconductor comprising an alloy of amorphous silicon and a band gap narrowing element selected from the group consisting of Sn, Ge, and Pb, with an electron donor dopant selected from the group consisting of P, As, Sb, Bi and N. The process for producing the narrow band gap amorphous silicon semiconductor comprises the steps of forming an alloy comprising amorphous silicon and at least one of the aforesaid band gap narrowing elements in amount sufficient to narrow the band gap of the silicon semiconductor alloy below that of amorphous silicon, and also utilizing sufficient amounts of the aforesaid electron donor dopant to maintain the amorphous silicon alloy as an n-type semiconductor. DOE

N86-18219# Department of Energy, Washington, D. C.
REACTOR DESIGN FOR UNIFORM CHEMICAL VAPOR DEPOSITION-GROWN FILMS WITHOUT SUBSTRATE ROTATION Patent Application
M. Wanlass, inventor (to DOE) Filed 19 Feb. 1985 19 p Prepared in cooperation with Midwest Research Inst.
(Contract DE-AC02-83CH-10093)
(DE85-017804; US-Patent-Appl-SN-702692) Avail: NTIS
HC A02/MF A01

A quartz reactor vessel for growth of uniform semiconductor films includes a vertical, cylindrical reaction chamber in which a substrate-supporting pedestal provides a horizontal substrate-supporting surface spaced on its perimeter from the chamber wall. A cylindrical confinement chamber of smaller diameter is disposed coaxially above the reaction chamber and receives reaction gas injected at a tangent to the inside chamber wall, forming a helical gas stream that descends into the reaction chamber. In the reaction chamber, the edge of the substrate-supporting pedestal is a separation point for the helical flow, diverting part of the flow over the horizontal surface of the substrate in an inwardly spiraling vortex. DOE

N86-18220# Los Alamos National Lab., N. Mex.
RELAXATION-TIME SPECTRUM FOR A HYDROGEN RELAXATION PEAK IN A Nb-50-AT. %-V ALLOY
J. R. Cost, C. L. Snead, Jr., and J. Bethin 1985 5 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE85-017836; BNL-36858; CONF-8506125-9) Avail: NTIS HC A02/MF A01

Internal friction has been measured vs temperature from 15 to 350(0)K for equiatomic Nb-V alloys with up to 28 at. % H. A broad peak at roughly 125 K shows characteristics which strongly suggest that it is a reorientation peak. Detailed analysis using a newly developed method indicates the activation energy spectrum to be bell shaped and to be over the range 0.10 to 0.30 eV. A pre-exponential factor of 5 x 10(-13) is determined. DOE

N86-18221# Sandia National Labs., Albuquerque, N. Mex.
GaAs/In/SUB 0.25/Ga/SUB 0.75As/GaAs, MODULATION-DOPED, SINGLE, STRAINED QUANTUM-WELL FET
T. E. Zipperian and T. J. Drummond 1985 16 p Presented at the 12th International Symposium on Gallium Arsenide and Related Compounds, Karuizawa, Japan, 23 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018272; SAND-85-1068C; CONF-8509164-1) Avail: NTIS HC A02/MF A01

A new field-effect transistor structure utilizing a thin (8 nm) strained layer of In/sub 0.25/Ga/sub 0.75/As, modulation-doped above and below by Si-doped GaAs cladding layers, is described. The 1.8% bulk lattice mismatch between the In/sub 0.25/Ga/sub 0.75/As and GaAs is totally accommodated by coherent layer strain within the quantum well, without the generation of misfit dislocations. At room temperature and in the dark, the prototype device with a 2.9 micrometers gate length displayed a maximum, normalized, extrinsic transconductance of 92 mS/mm (V/sub DS/ = 1V). If device performance scales linearly with gate length to 1 micron, as do Al/sub x/Ga/sub 1-x/As/GaAs, single-interface MODFETs, this is the best room temperature performance reported to date for an In/sub x/Ga/sub 1-x/As channel, modulation-doped transistor. The transconductance of the device also proved to be almost constant with gate voltage, varying less than 13% over a 0.5V range at 77K. This is a direct result of the use of a thin quantum well as the conducting channel and implies that field-effect transistors with improved linearity at high current levels may now be fabricated. DOE

N86-18222# Argonne National Lab., Ill.
STRUCTURE OF HIGH-PRESSURE KNO3-4
T. G. Worlton, D. L. Decker, J. D. Jorgensen, and R. Kleb Jul. 1985 13 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018361; CONF-850871-11) Avail: NTIS HC A02/MF A01

Potassium nitrate has seven polymorphs in the pressure range to 40 kbar. The structures of the three phases obtainable at atmospheric pressure are known. Attempts to solve the structure of high pressure KNO3 phase 4 by X-ray diffraction have been unsuccessful. We have now solved this structure using time-of-flight neutron powder diffraction data taken at room temperature and 3.6 kbar on the SEPD at IPNS. High pressure KNO3-4 has the same space group and point group symmetry as the low pressure KNO3-2, but with different values for lattice parameters and atomic positions. The structure of KNO3-4 is orthorhombic Pnma with a = 7.4867(2), b = 5.5648(2), and c = 6.7629(2) with four formula units per unit cell. The K, N, and one O atom are in special positions (4c) and the other O atoms are in the general position (8d) just as in the atmospheric pressure phase. The O-N-O bond angles are 120.4(1) deg, and 119.3(2) deg. The N-O bond lengths are 1.228(3)A and 1.246(2)A. DOE

N86-18223# Argonne National Lab., Ill.
STRUCTURAL PHASE TRANSITION IN CeCu6
M. L. Vrtis, J. D. Jorgensen, and D. G. Hinks Aug. 1985 12 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Northwestern Univ., Evanston, Ill.
(Contract W-31-109-eng-38)
(DE85-018362; CONF-850871-10) Avail: NTIS HC A02/MF A01

The structure of CeCu6 has been studied at eight temperatures from 10K to 295K by time-of-flight neutron powder diffraction. The high temperature orthorhombic cell transforms to a monoclinic cell at 230K. Rietveld structural refinements at each temperature give details of the structural distortion associated with the transition. The space groups and the temperature dependence of the monoclinic strain are consistent with a second order transition driven by a soft acoustic phonon mode. However, small atom displacements perpendicular to the shear direction suggest that an optic mode may also be involved in the transition. DOE

N86-18224# Argonne National Lab., Ill.
NEW EXAMPLE OF SUPERCONDUCTING WALLS IN THE FERROMAGNET ErRh4B4
J. L. Genicon, J. P. Modondanon, R. Tournier, E. D. Dahlberg, and D. G. Hinks Jul. 1985 12 p refs Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Centre National de la Recherche Scientifique, Grenoble, France
(Contract W-31-109-eng-38)
(DE85-018398; CONF-850890-17) Avail: NTIS HC A02/MF A01

In the ferromagnetic state of ErRh4B4, a zero resistance is observed in the easy magnetization direction and a normal state resistance in the hard direction. These properties are characteristic of domain wall superconductivity. DOE

N86-18225# Argonne National Lab., Ill.
SYSTEMATIC VIEW OF OPTICAL ABSORPTION SPECTRA IN THE ACTINIDE SERIES
W. T. Carnall 1985 29 p refs Presented at the ACTINIDES '85, Aix-en-Provence, France, 1 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018406; CONF-8509147-8) Avail: NTIS HC A03/MF A01

In recent years sufficient new spectra of actinides in their numerous valence states have been measured to encourage a broader scale analysis effort than was attempted in the past. Theoretical modelling in terms of effective operators has also undergone development. Well established electronic structure parameters for the trivalent actinides are being used as a basis for estimating parameters in other valence states and relationships to atomic spectra are being extended. Recent contributions to our understanding of the spectra of 4+ actinides have been particularly revealing and supportive of a developing general effort to progress beyond a preoccupation with modelling structure to consideration of the much broader area of structure-bonding relationships. We summarize here both the developments in modelling electronic structure and the interpretation of apparent trends in bonding. DOE

N86-18226# Argonne National Lab., Ill.
FRACTAL BEHAVIOR OF ISOSETS AND TRAILS IN SUPERIONIC CONDUCTORS
P. Vashishta, I. Ebbsjoe, R. K. Kalia, and S. W. DeLeeuw Aug. 1985 5 p Presented at the 5th International Conference on Solid-State Ionics, Lake Tahoe, Calif., 18 Aug. 1985 Prepared in cooperation with Michigan State Univ., East Lansing
(Contract W-31-109-eng-38)
(DE85-018409; CONF-850870-4) Avail: NTIS HC A02/MF A01

Molecular dynamics simulations of ionic motion in Ag2S reveal fractal aspects of trails and isosets of Brownian motion. For silver ions in the superionic state, and silver and sulfur ions in the molten phase, fractal dimensionalities of isosets and trails are found to be anti D = 0.5 and D = 2, respectively. These results are consistent with anti D = 1 D(-1). DOE

N86-18227# Texas Univ., Austin.
POLAR FLUIDS: PHOTOEMISSION AND ELECTRONIC ENERGY

LEVELS Final Technical Report
Dec. 1984 12 p refs
(Contract DE-AS05-81ER-10890)
(DE85-016974; DOE/ER-10890/T1) Avail: NTIS HC A02/MF A01

We have measured the photoyield in pure ammonia using a pulsed technique. We have measured it as a function of bias, temperature, and photon energy, in order to study the density of electron states in NH3 and the photo-injection process into the ammonia. The photoyield versus reference potential shows a much greater range of response than previous CW techniques. We have observed a strong temperature dependence in the yield and a two slope behavior in the yield, observations which are consistent with our idea that there is a significant tail of localized states just below the conduction band in polar fluids. We have found a systematic variation in the decay mode of the injected current as a function of reference potential, temperature, and impurity concentration giving us a new tool with which to examine the photo-injection process. DOE

N86-18228# Syracuse Univ., N. Y.
CATALYTIC REACTIVITY OF THIN CRYSTAL SURFACES Progress Report
R. W. Vook and J. A. Schwarz Sep. 1985 11 p
(Contract DE-FG02-84ER-45139)
(DE85-018293; DOE/ER-45139/2) Avail: NTIS HC A02/MF A01

Our thin films appear to show lower uptake and a weaker bonding for O2 and CO adsorbates. One explanation can be postulated based on earlier reports of the interactions of these gases with bulk Pd, both single crystals and polycrystalline foils. The work of White and co-workers showed that oxygen adsorption behavior on new, polycrystalline Pd foils was significantly different from that of used foils, although both were judged clean by AES. They observed that the O2 adsorption rate on a new surface was slow, but after a long O2 exposure above 800 K, the amount increased; and they suggested that oxygen can be incorporated below the surface, thus modifying the activity of the surface metal atoms. They further postulated that differences of O2 adsorption phenomena on Pd surfaces may be caused by surface reconstruction during repeated heating cycles or by surface impurities which cannot be detected by AES. More recently Spicer and co-workers (1983) have confirmed these earlier suppositions. Our smooth-flat films appear to have few surface defects which allow gas incorporation in and/or below the surface. This feature might be responsible for their observed adsorptive properties and is likely also to be reflected in their catalytic properties. DOE

N86-18229# Argonne National Lab., Ill.
TRICRITICAL BEHAVIOR IN THE FERROMAGNETIC SUPERCONDUCTOR ErRh4B4
G. W. Crabtree, R. K. Kalia, D. G. Hinks, F. Behroozi, and M. Tachiki Aug. 1985 11 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018339; CONF-850890-16) Avail: NTIS HC A02/MF A01

A new tricritical point on the phase boundary between the superconducting vortex phase and the normal paramagnetic phase of ErRh4B4 is presented. The microscopic origin of the tricritical point and the expected tricritical behavior are briefly discussed. DOE

N86-18230# Argonne National Lab., Ill.
INELASTIC SCATTERING FROM AMORPHOUS SOLIDS
D. L. Price Aug. 1985 20 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018371; CONF-850871-16) Avail: NTIS HC A02/MF A01

The potential of inelastic neutron scattering techniques for surveying various aspects of the dynamics of amorphous solids is briefly reviewed. The recent use of the Intense Pulsed Neutron Source to provide detailed information on the optical vibrations of glasses is discussed in more detail. The density of states represents an averaged quantity which gives information about the general characteristics of the structure and bonding. More extensive information can be obtained by studying the detailed wavevector dependence of the dynamic structure factor. DOE

N86-18231# Argonne National Lab., Ill.
DISORDER AND TRANSPORT IN LITHIUM/ALUMINUM
J. D. Jorgensen, S. Susman, T. O. Brun, K. J. Volin, J. Faber, Jr., and R. DeJus Aug. 1985 9 p refs Presented at the 5th International Conference on Solid-state Ionics, Lake Tahoe, Calif., 18 Aug. 1985 Prepared in cooperation with Studsvik Science Research Lab., Nykoeping, Sweden
(Contract W-31-109-eng-38)
(DE85-018389; CONF-850870-3) Avail: NTIS HC A02/MF A01

Neutron powder diffraction measurements on (BETA)-LiAl have proven that the defects formed at high temperature are reciprocal pairs of antisite defects, Li/sub Al/ and Al/sub Li/. These reciprocal pairs are generated over the entire (BETA)-phase domain. The formation of the antisites is not due to an order-disorder transformation. The relation between the antisite defects and Li diffusion cannot be established directly from the present experiments. DOE

N86-18232# Argonne National Lab., Ill.
RHOMBOHEDRAL-TO-TRICLINIC PHASE TRANSITION IN BaMo6S8
J. D. Jorgensen and D. G. Hinks Jul. 1985 12 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018450; CONF-850871-14) Avail: NTIS HC A02/MF A01

The rhombohedral, R3 bar, to triclinic, P1 bar, transition in BaMo6S8 at 175K has been studied by neutron powder diffraction. The first order nature of the transition, as required by Landau theory, is suggested by the temperature dependence of the triclinic distortion; however, no volume discontinuity can be seen with the precision of this measurement. The triclinic structure is characterized by a distortion of the Mo6 octahedra and a shear of the axial sulfur atoms which allows the Ba ion to localize at the origin position. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-18233 Ruhr Univ., Bochum (West Germany). Inst. fuer Mechanik.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF A THERMOPLASTIC CONSTITUTIVE LAW Thesis [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN ZU EINEM THERMO-PLASTISCHEN STOFFGESETZ]
Uwe Zdebel Dec. 1984 161 p refs In GERMAN; ENGLISH summary
(RUB-IFM-MITT-43) Copyright. Avail: Issuing Activity

A thermoplastic constitutive law allowing combinations of isotropic and kinematic hardening as well as deviations from the normality rule was examined. Since the energy balance for thermomechanical processes is taken into account, the consistent connection to thermodynamic laws is guaranteed. The experimental verification of material parameters is described; it is performed by isothermal tension-torsion tests on thin-walled tubes at different temperatures. The materials functions allow the extension to nonisothermal (adiabatic) processes. The comparison between theoretical and exprimental results is not entirely satisfactory and demonstrates the remaining inconsistencies. Suggestions which could lead to a better description of the behavior of elastoplastic materials are made. Author (ESA)

N86-18234# Oak Ridge National Lab., Tenn.
THERMODYNAMIC PROPERTIES AND MICROSCOPIC STRUCTURE OF FLUIDS AND FLUID MIXTURES
E. Johnson 1985 15 p refs Presented at the 12th Annual Meeting of the National Organization of Black Chemists and Chemical Engineers, Minneapolis, Minn., 22 May 1985
(Contract DE-AC05-84OR-21400)
(DE85-016482; CONF-8505193-1) Avail: NTIS HC A02/MF A01

A closed set of exact equations is used to determine the pair distribution function and critical temperature of a number of lattice fluids. Since the equations used are closed and exact, in principle results which are as accurate as desired may be obtained. Most methods of statistical mechanics for treating fluids are based on approximate equations, so the accuracy of results obtained from them are limited. DOE

N86-18235# Colorado State Univ., Fort Collins. Dept. of Physics.
ABSOLUTE WAVELENGTH MEASUREMENT AND FINE STRUCTURE DETERMINATION IN (7)LI 2
E. Riis, H. G. Berry, O. Poulsen, S. A. Lee, and S. Y. Tang 1985 3 p refs Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with Aarhus Univ., Denmark
(Contract W-31-109-eng-38)
(DE85-018382; CONF-850605-5) Avail: NTIS HC A02/MF A01

The energy levels of two-electron atoms continue to provide rigorous tests of relativistic quantum theory, and of correlation effects within a multi-particle system. These interactions are determined perturbatively, with several approximations, and theoretical results often differ. It is critical to provide precise measurements of absolute wavelengths connecting these atomic energy levels to obtain a resolution of the precision of the different parts of such complex calculations. In this work, we report high precision optical measurements in the 1s2s (3)S - 1s2p (3)P multiplet of Li 2 using fast-beam laser spectroscopy. A collinear interaction using both parallel and antiparallel laser and ion beams allows both for precise elimination of large Doppler shifts, and for a strong kinematic narrowing of the observed resonances, as compared with thermal beam experiments. The wavelengths of the observed resonance fluorescence radiation are determined by comparing them with simultaneously recorded saturated absorption profiles of molecular iodine hyperfine components. In turn, the absolute wavelengths of the iodine lines are obtained from precisely calibrated Fabry-Perot etalon fringes in a separate experiment. The final precision of the Li 2 wavelengths is 5 parts in 10(9), which is at a level of precision of 80 ppM of the QED corrections in the transition. DOE

N86-18236# Sandia National Labs., Livermore, Calif.
MAXIMUM PERFORMANCE OF SOLAR HEAT ENGINES: DISCUSSION OF THERMODYNAMIC AVAILABILITY AND OTHER SECOND LAW CONSIDERATIONS AND THEIR IMPLICATIONS
R. F. Boehm Sep. 1985 23 p
(Contract DE-AC04-76DR-00789)
(DE85-018550; SAND-85-8229) Avail: NTIS HC A02/MF A01

A review of thermodynamic principles is given in an effort to see if these concepts may indicate possibilities for improvements in solar central receiver power plants. Aspects related to rate limitations in cycles, thermodynamic availability of solar radiation, and sink temperature considerations are noted. It appears that considerably higher instantaneous plant efficiencies are possible by raising the maximum temperature and lowering the minimum temperature of the cycles. Of course, many practical engineering problems will have to be solved to realize the promised benefits. DOE

N86-18237# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
GRAVITATIONAL COUNTERTERMS IN AN AXIAL GAUGE
T. Matsuki Jun. 1985 30 p
(Contract DE-AS05-77ER-05490)
(DE86-001329; DOE/ER-05490/66) Avail: NTIS HC A03/MF A01

All the counterterms of quantum Einstein gravity are calculated up to bilinear terms and one-loop order in an axial gauge as a sum of gauge-invariant and the Becchi-Rouet-Stora-invariant terms. Contrary to the de Donder gauge condition, ten out of thirty-three coefficients for counterterms remain undetermined in this gauge. Some relations among the counterterms, which satisfy the BRS invariance, are implicitly obtained in the course of the calculations. DOE

N86-18238# California Univ., Santa Barbara. Inst. for Theoretical Physics.
MARKOV TREE MODEL OF TRANSPORT IN AREA PRESERVING MAPS
J. D. Meiss and E. Ott Sep. 1985 34 p
(Contract DE-FG05-80ET-53088)
(DE86-000237; DOE/ET-53088/204; IFSR-204) Avail: NTIS HC A03/MF A01

Transport in an area preserving map with a mixture of regular and chaotic regions is described in terms of the flux through invariant cantor sets called cantori. A model retaining a discrete set of cantori approaching a boundary circle gives the Markov chain description of Hanson, Cary and Meiss. The inclusion of cantori surrounding island chains, and islands about islands, etc. gives a Markov tree model with a slower decay rate. The survival probability distribution is shown to decay asymptotically as a power law. The decay exponent agrees well with the computations of Karney and Chirikov and Shepelyanski. DOE

N86-18239# Rome Univ. (Italy). Dipt. di Fisica.
ULTRAVIOLET PROBLEM AND ANALYTICAL PROPERTIES OF CLASSICAL FIELD THEORIES
Roberto Livi (Florence University), Marco Pettini (Osservatorio Astrofisico di Arcetri, Florence), Stefano Ruffo (Florence University), and Angelo Vulpiani 25 Mar. 1985 24 p refs
(Preprint-451) Avail: NTIS HC A02/MF A01

The absence of ergodicity is investigated analytically and numerically for classical field theories and for Euler equations in two dimensions. In the latter case the arguments of Patrasciolu (1984) are extended to the inviscid two-dimensional fluid dynamical case. The risks of truncation introduced by a numerical simulation of continuous systems reflecting on the analytical properties of the solution of the field equation are discussed. It appears that ergodicity is a property only of the discretized problem. Results are tested on a simple model of a radiant cavity, which shows the absence of the ultraviolet catastrophe and the possibility of wrong interpretations of numerical simulations of field theory. Author (ESA)

N86-18240# Rome Univ. (Italy). Dipt. di Fisica.
TOWARDS A NONPOTENTIAL SCATTERING THEORY
R. Mignani 16 Apr. 1985 69 p refs
(Preprint-454) Avail: NTIS HC A04/MF A01

A formal approach to nonpotential scattering theory based on the generalization of the concept of scattering matrix to the Lie-isotopic and Lie-admissible case is presented. In the time-dependent formalism, the main task is the determination of the evolution operator, from which the S-matrix is found as a double infinite limit. In the time-independent approach, the isotopic Schroinger eigenvalue equation is solved by exploiting the properties of isotopic Green's operators, Lippmann-Schwinger equations and incoming and outgoing states, which are suitable generalizations of the conventional ones. The changes in cross sections due to nonpotential forces are explicitly worked out for simple cases. A purely algebraic approach to nonpotential scattering, based on the properties of the isowave operators, is presented. The Lie-admissible formulation of the main results is outlined. Author (ESA)

N86-18241# Rome Univ. (Italy). Dipt. di Fisica.
ON THE STOCHASTIC QUANTIZATION OF FIELD THEORY
G. Jona-Lasinio and P. K. Mitter (Paris University) 16 Apr. 1985 55 p refs Sponsored by CNR

(Preprint-457; LPTHE-84/36) Avail: NTIS HC A04/MF A01

A rigorous construction of a stochastic continuum P(Phi)2 model in finite Euclidean space-time volume is obtained by a weak solution of a nonlinear stochastic differential equation in a space of distributions. The resulting Markov process has continuous sample paths, and is ergodic with the finite volume Euclidean P(Phi)2 measure as its unique invariant measure. The procedure may be called stochastic field quantization. Author (ESA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-18242# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
METHODS FOR DESIGNING SOFTWARE TO FIT HUMAN NEEDS AND CAPABILITIES. PROCEEDINGS OF THE WORKSHOP ON SOFTWARE HUMAN FACTORS
N. S. Anderson and J. R. Olson May 1985 46 p Workshop held in Washington, D.C., Jun. 1983
(Grant N00014-85-G-0093)
(AD-A156647) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Committee on Human Factors of the Commission on Behavioral and Social Sciences and Education sponsored jointly by the Air Force Office of Scientific Research, the Army Research Institute for the Behavioral and Social Sciences, the Office of Naval Research, the National Aeronautics and Space Administration, and the National Science Foundation reports on software and human factors. The term software human factors refers to the process of designing software to be effective for human use, i.e., easy to learn and use, productive, and efficient. However, no specific efforts have been made to operationally define the objectives of software factors. The Workshop on Software Human Factors was convened in June 1983 in Washington, D.C. The workshop had three goals: to identify current methods used to design and evaluate human factors aspects of software, including overall design and methods for collecting on user performance; to ascertain what we know from software research results that we did not know 10 years ago; and to identify new research methods that are needed, both to develop design principles for software and to discover how users understand software systems. Author

N86-18243# National Aerospace Lab., Amsterdam (Netherlands).
[PERSONNEL ACTIVITIES REPORT IN AEROSPACE RESEARCH] Annual Report, 1984 [SOCIAAL JAARVERSLAG 1984]
1984 56 p In DUTCH Original contains color illustrations
Avail: NTIS HC A04/MF A01

The social aspects of NLR aerospace research are described. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-18244# Department of Energy, Oak Ridge, Tenn.
ENERGY DATA BASE: INTRODUCTION TO CONTENT AND STRUCTURE, REVISION 1
Sep. 1985 25 p
(DE84-017165; DOE/TIC-4608-Rev-1) Avail: NTIS HC A02/MF A01

Contents of this booklet are: introduction, history, compilation of the EDB, subject coverage, types of documents included, special collections in the EDB, data elements, indexing practices, additional documentation about the EDB, and current awareness publications compiled from the EDB. DOE

N86-18245# Lawrence Livermore National Lab., Calif.
BIBLIOGRAPHIC POST-PROCESSING WITH THE TIS INTELLIGENT GATEWAY: ANALYTICAL AND COMMUNICATION CAPABILITIES
H. D. Burton Sep. 1985 90 p
(Contract W-7405-eng-48)
(DE85-018153; UCID-20529) Avail: NTIS HC A05/MF A01

This report demonstrates the capabilities of the process functions of the TIS Intelligent Gateway. These functions support bibliometric analysis of a wide range of commercial and federal databases. Examples are provided of search output from five online search systems. Each set of citations was translated to a common format and then analyzed and reformatted using process. DOE

N86-18246# Oak Ridge National Lab., Tenn.
INFORMATION SYSTEMS DEVELOPMENT AIDS
M. L. Emrich and R. Bryant Aug. 1985 117 p
(Contract DE-AC05-84OR-21400)
(DE85-018161; ORNL/TM-9647) Avail: NTIS HC A06/MF A01

Information engineers use a variety of techniques, procedures and methodologies to specify, design, program, test, and maintain Information Systems. Various automated tools are available for assisting the information engineer in this work. This document seeks to provide a general overview of the development life-cycle process and of tools available for assisting in that process. DOE

N86-18247# Argonne National Lab., Ill.
DATABASES AND AUTOMATED REASONING
E. L. Lusk and R. A. Overbeek 1985 8 p Presented at the International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control, Pasco, Wash., 8 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018348; CONF-850903-17) Avail: NTIS HC A02/MF A01

The design of application systems incorporating automated reasoning technology requires an understanding of database design, familiarity with various types of automated reasoning methods, and an integrated view of the database and reasoning system. We describe here the relationship, based on the common language of first-order logic, between entity-relationship database design techniques and automated reasoning systems. We include a brief overview of logic programming, automated theorem proving, and production-rule systems as separate but related branches of automated reasoning. DOE

N86-18248# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Informatique.
PROPOSITIONS TO IMPLEMENT A COMPUTERIZED PRIVATE DOCUMENT RETRIEVAL SYSTEM. PRESENTATION OF THE PERSONALIZED DOCUMENTATION AID TOOL (OPAD) Ph.D. Thesis [PROPOSITIONS POUR L'ELABORATION DE SYSTEMES D'ASSISTANCE A LA DOCUMENTATION PERSONNELLE. PRESENTATION D'OUTIL PERSONNALISE

D'ASSISTANCE A LA DOCUMENTATION (OPAD)]
Benoit Pinta 27 Feb. 1985 259 p refs In FRENCH
(ENST-85E001; ISSN-0751-1353) Avail: NTIS HC A12/MF A01

The needs of research scientists were investigated in order to propose computerized assistance to their private documentation management. Indexing and data acquisition for this case are examined. The elaboration of a computer program, as well as all the elements composing a personalized documentation system are described. Author (ESA)

N86-18249# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PUBLICATIONS, CATALOG 1985
1985 27 p refs In FRENCH; ENGLISH summary
Avail: NTIS HC A03/MF A01

Documents published by ONERA since it was created in 1976 are listed. Subjects include aerodynamics, fluid mechanics, flight mechanics, aerothermodynamics, propulsion, combustion, communications, navigation, instrumentation, structural analysis, aeroelasticity, acoustics, laser, plasmas, environment, computer sciences, materials, solid state physics, and astronautics. Author (ESA)

N86-18250# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
FILMS, CATALOG 1985
1985 28 p In ENGLISH and FRENCH
Avail: NTIS HC A03/MF A01

An ONERA catalog of scientific films is presented. Films on aerodynamics, large wind tunnels, water tunnels, propulsion, structures, materials, rockets, missiles and space research are listed. Author (ESA)

N86-18251# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Algorithms and Architecture.
A DISTRIBUTED FILE SERVICE BASED ON OPTIMISTIC CONCURRENCY CONTROL
Sape J. Mullender (Vrije Univ., Netherlands) and Andrew S. Tanenbaum Apr. 1985 23 p refs
(CWI-CS-R8507; B8567090) Avail: NTIS HC A02/MF A01

Principles for a distributed file and data base system that leaves a large degree of freedom to users are presented. It can be used as an efficient storage medium for files, but also as a basis for a distributed data base system. An optimistic concurrency control mechanism, based on the simultaneous existence of several versions of a file or data base is used. Each version gives clients a consistent view of the contents of the file at the time of the version's creation. How this mechanism works, how it can be implemented and how serializability of concurrent access is enforced are shown. A garbage collector that runs independent of, and in parallel with the operation of the system is presented. Author (ESA)

N86-18252# National Aerospace Lab., Amsterdam (Netherlands). Informatics and Fluid Dynamics Div.
ENGINEERING DATA INTERACTIVE PRESENTATION AND ANALYSIS SYSTEM (EDIPAS): A GENERAL APPROACH TO ENGINEERING DATA MANAGEMENT AND ANALYSIS APPLIED TO WIND TUNNEL TESTING
R. K. vanderDraai and F. J. Heerema 8 Sep. 1983 41 p refs Submitted for publication
(NLR-MP-83057-U; B8566269) Avail: NTIS HC A03/MF A01

Utilizing database management and interactive graphics techniques, the Engineering Data Interactive Presentation and Analysis System (EDIPAS) was designed and implemented for aircraft development. Data management facilities are provided in EDIPAS to cope with the data transfer problem. Basic facilities to tailor analysis and presentation functions to the needs of various disciplines are available. Examples of application of EDIPAS for experiments in wind tunnels are given. Author (ESA)

N86-18253# Syracuse Univ., N. Y. School of Information Studies.
STUDY OF FREE-INDEX PHRASES Final Report
J. Katzer, R. N. Oddy, and P. Das-Gupta Jun. 1985 93 p
(Grant NSF IST-82-11348)
(PB85-240117; NSF/IST-85001) Avail: NTIS HC A05/MF A01
CSCL 05B

Results are presented of research undertaken to identify the defining characteristics of free-index phrases, to develop an algorithm to produce surrogate free-index phrases from the titles and abstracts of INSPEC documents, and to evaluate the performance of the surrogate phrases in comparison with the true phrases. Several methods were used to select surrogate free-index phrases, and each method was compared statistically and empirically agains the actual free-index cases. In no case did the surrogates perform as well, but no clearcut cause for the phenomenon was found. If implicit phrases-those found in the free-index representation but not directly in the title/abstract-are determined to be an important part of the free-index phrase representation, then attempts to produce surrogate phrases automatically must incorporate a thesaurus. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-18254# Lavery (Thomas J.), Memphis, Tenn.
HYBRID GAS/ELECTRIC VEHICLE
T. J. Lavery 1985 5 p
(Contract DE-FG44-81R4-10501)
(DE85-016736; DOE/R4-10501/T1) Avail: NTIS HC A02/MF A01

The purpose of this project was to build a long-range, parallel hybrid gas/electric vehicle capable of driving beyond the commuter capabilities of series hybrid vehicles. It was envisioned that since the gas engine would be able to independently propel the car when needed and that the electric motor would be capable of doing the same, then you have a very desirable situation where this car can operate much more cheaply on electricity for the short distance runs under approximately 60 miles and also be able to propel the vehicle via the gas engine on the long-distance trips. During the time the car would be operating in the gas engine mode, it would be also recharging the 16 deep cycle batteries via the electric motor now being used as a generator. Then, even on long-distance trips, the electric motor could be used, after having

been fully or partially recharged, to even further reduce cost per mile. DOE

N86-18255# Cambridge Univ. (England). Dept. of Engineering.
[ACTIVITIES REPORT OF THE DEPARTMENT OF ENGINEERING] Annual Report, 1983/84
1985 34 p refs
Avail: NTIS HC A03/MF A01
Research in acoustics, aerodynamics and fluid mechanics, engineering design methods, electrical engineering, information engineering, manufacturing engineering, materials science, mechanical engineering, soil mechanics, structural engineering, thermodynamics, and turbomachinery is summarized. Author (ESA)

N86-18256# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
A REVIEW OF SPACE-RELATED THERMOPHYSICAL RESEARCH AT NLR
A. A. M. Delil 21 Jun. 1984 9 p refs Presented at 14th International Symposium on Space Technology and Science, Tokyo, Japan, 27 May - 1 Jun. 1984
(NLR-MP-84063-U; B8568103) Avail: NTIS HC A02/MF A01
Research concerning the thermal conductivity of (anisotropic) sheet materials, and of metallic and CFRP honeycomb sandwich panels; the thermal resistance of joints, interstice materials; the design and manufacture of a test rig for measuring the thermal conductance of loaded rotating bearings in a vacuum environment; the thermal modeling of rotating space mechanisms and the compilation of a handbook for the modeling of such mechanics; the thermal performance of multilayer insulation blankets for spacecraft; and constant and variable conductance heat pipes is summarized. Author (ESA)

N86-18257# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
STUDY ON A CITY'S SAFETY: POITIERS (FRANCE) [ETUDE DE LA SECURITE D'UNE VILLE: POITIERS]
Jacques Theys (Ministere de l'Environnement) and Odile Rocher 1985 21 p In FRENCH Presented at 3rd Seminaire Europeen sur la Securite des Systemes, Cannes, France, 19-21 Sep. 1984
(SNIAS-852-422-104) Avail: NTIS HC A02/MF A01
Safety in a city is examined utilizing methods developed in the aerospace industry. Poitiers (France) was chosen as a typical example of a middle sized city. A city safety model and the problems are discussed. No solutions are proposed since the study is limited to a description of the problem, including floods, pollution, ice formation, and fog. Author (ESA)

88 SPACE SCIENCES (GENERAL)

N86-18258# Helsinki Univ. of Technology, Espoo (Finland). Radio Lab.
PROCEEDINGS OF THE 19TH FINNISH ASTRONOMERS' DAYS
Seppo Urpo, ed. 1984 72 p refs Conference held in Espoo, Finland, 5 Jun. 1984 Sponsored by Elorg-Data and Nokia Elektroniikka
(Rept-S-162; ISBN-951-753-454-X; ISSN-0355-5712) Avail: NTIS HC A04/MF A01
Solar research; cosmology; development of galaxies and stars; optical properties of stars; dark clouds; molecular line radiation; radio radiation of quasars; and instrumentation in radio astronomy were discussed. For individual titles, see N86-18259 through N86-18270.

N86-18259# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CYCLIC MEAN FLOWS IN THE SUN AS A PROBE OF THE DYNAMO ACTION c92
Ilkka Tuominen, Fritz Krause (Academy of Sciences, Potsdam, East Germany), Guenther Ruediger, and Heikki Virtanen *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 2-16 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01
The observational evidence for variable mean flows (the differential rotation and meridional circulation) in the solar convection zone is explored, to understand them as a reaction of the cyclic magnetic field of the solar alpha omega dynamo to the flow. It is concluded that the observed properties of the variable flows in relation to the magnetic field can be a natural consequence of the dynamo excitation mechanism. These properties can be used to investigate the dynamo and the convection zone. Author (ESA)

N86-18260# Helsinki Univ. of Technology, Espoo (Finland).
RESULTS OF SOLAR RESEARCH STUDIES AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION c92
Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 17-21 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01
Radiometers (12 to 80 GHz) were used for solar observations. Results on active regions; quasi periodic fluctuations; periodic fluctuations; S-component; pole sources; microwave bursts; millisecond bursts; limb sources; Type 1 noise storms; and Type 3 bursts are summarized. Author (ESA)

N86-18261# Helsinki Univ. of Technology, Espoo (Finland).
SOLAR 160 MIN OSCILLATION AT MICROWAVE c92
Harri Teraesranta *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 22-25 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01
Solar 160 min oscillations were observed for a total of 98 hr with a radio telescope at 37 GHz. Although a lot of data was collected, the result is not clear as the oscillations are only seldom detected. Other periods than 160 min are frequently dominant, e.g., 120 and 80 min. As the observing material does not support even the detecting of the oscillation, the phase and order of the 160 min oscillations remain unknown. Author (ESA)

N86-18262# Turku Univ. (Finland). Observatory.
HOW DO GALAXIES MAKE SPIRAL ARMS: STOCHASTIC VERSUS GRAVITATIONAL c90
Gene Byrd *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 26-31 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01
The stochastic theory and the density wave theory of spiral patterns in disk galaxies are discussed. The stochastic mechanism is nongravitational, involving ejected shells from supernovae and star formation. The density wave results from the mutual gravitational interactions of the disk stars. Two armed spirals are best explained by the density wave theory. Small scale spurs in two armed spirals and chaotic spirals with many shorter arms are the domain of the stochastic mechanism. Computer simulations explain velocity disturbances seen ahead of the spur extending from NGC206 in M31 as effects of the spur induced gravitationally by the NGC206 gas complex. Such orbiting complexes can induce not only spurs near themselves but also density peaks elsewhere in the disk. Other gas complexes might form at these peaks to carry on the role of disturber. Thus small scale spurs may be gravitationally created extending the domain of the gravitational spiral arm mechanism to small scale and chaotic spiral structure. Author (ESA)

N86-18263# Helsinki Univ. (Finland).
COMPARISON OF OPTICAL EXTINCTION AND MOLECULAR LINE INTENSITIES IN THE CHAMAELEON 1 DARK CLOUD c09
Mikko Toriseva and Kalevi Mattila *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days

1984 p 36-39 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Star counts of the Cha 1 dark cloud were made. The extinction obtained is AB < or = 8m at the center of the cloud. Comparison of the H2CO and OH molecular line intensities with the extinction reveals a good correlation, and a similarity to the results for the Taurus dark cloud. Author (ESA)

N86-18264# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CORRELATED VARIABILITY IN THE W49N WATER MASER SOURCE c90
Tarja Liljestroem *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 40-44 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The 1.35 cm H2O emission line of the rotational transition 6 sub 16 to 5 sub 23 was observed with a 13.7 m radio telescope from November 1980 to October 1983. The time variation characteristics of H2O maser emission during a long time span in regions of recent or ongoing star formation were investigated. Results for W49N, the most powerful water maser source in our Galaxy are presented. In March 1983 W49N showed a particularly strong outburst reaching a luminosity of 0.3 in a single 40 kHz wide H2O line. Author (ESA)

N86-18265# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
COMPUTERS AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION c89
Niklas Holsti *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 45-48 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Computers used for controlling a radio telescope and receivers, and for data reduction are described. The computers are connected in master-slave pairs for command and data transfers. Two HP-2100, a TRS-80, a Commodore Pet, and a Modcomp-7821 are used. Author (ESA)

N86-18266# Helsinki Univ. of Technology, Espoo (Finland).
ANALOG TO DIGITAL (A/D) CONVERSION AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION c89
Kari Kuittinen, Erkki Oinaskallio, and Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 49-52 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

An analog to digital converter was constructed for a radio telescope. The 16 channel, 14 bit converter is in normal operation. Author (ESA)

N86-18267# Helsinki Univ. of Technology, Espoo (Finland).
CRYOGENIC MILLIMETER WAVE RECEIVER FOR THE METSAEHOVI RADIO TELESCOPE c89
Arto Lehto and Antti Raeisaenen *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 53-55 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

A cooled Schottky mixer receiver with DSB noise temperature of 80 to 140 K in the frequency range 75 to 95 GHz was built for radio astronomical observations. The quasioptical beam switching and calibration system is followed by a cooled low-noise mixer and FET amplifier at 1.4 GHz. The receiver is used for quasar and molecular line measurements and antenna tests with a 13.7 m radio telescope. Author (ESA)

N86-18268# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
OPTICAL STUDY OF SHARPLESS 252 (NGC 2175) c89
Lauri Haikala *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 56-59 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The HII region-molecular cloud complex Sharpless 252 and the stars associated with it were studied by Fabry-Perot interferometry, photography, photoelectric UBVRI photometry and polarimetry, and photographic UBVR photometry. A three-dimensional model of S 252 and the discrete radio sources was constructed. It is concluded that a galactic density wave induced Rayleigh-Taylor instability is the probable star forming mechanism in S 252. Author (ESA)

N86-18269# Helsinki Univ. of Technology, Espoo (Finland).
OBSERVATIONS OF EXTRAGALACTIC RADIO SOURCES AT 8 AND 13.5 MM c93
E. Salonen, S. Haarala (Turku Univ., Finland), H. Teraesranta, H. Lehto (Turku Univ., Finland), S. Urpo, and M. Valtonen (Turku Univ., Finland) *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 62-65 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

The flux densities of 19 quasars and BL Lac-type objects were observed continuously. About 1800 observations were made of 19 sources, 17 show significant variations. Observation results of 3C 273, BL Lac, and OJ 287 at frequencies 22 and 37 GHz, including results of CAO, are presented. Author (ESA)

N86-18270# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
RED SHIFT RADIATION: A MAJOR ELECTROMAGNETIC RADIATION MEASUREMENT c93
T. Jaakola *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 66-69 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

Red shift radiation (RR) i.e., energy absorbed by the red shift effect in quasars and released as electromagnetic radiation, is proposed as the common factor of red shift, background radiation, and quasars. This unity depend only on the premises that there are local quasars and that the Universe is static. Quasar and 3 K radiation spectra both have peaks in the millimeter wavelengths. The flux variations in quasars there are stronger than in the longer wavelengths. Because the RR-radiation in quasars arises along steep temperature and red shift gradients in an anisotropic field, no thermal spectrum can be expected. For intergalactic RR, the source of the primary radiation is the homogeneous, isotropic and constant Universe; RR is in thermic equilibrium and must have a blackbody spectrum (but observed slightly deformed by the red shift). As most of the radiation is in the microwave background originated by the RR, the RR is the major radiation mechanism in the Universe. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-18271# South African Astronomical Observatory, Cape Province.
SOUTH AFRICAN ASTRONOMICAL OBSERVATORY CIRCULAR NO. 9
1985 115 p refs
(SAAOC-9) Avail: NTIS HC A06/MF A01

Circulars of the South African Astronomical Observatory, No. 9, 1985, contains articles on the following: Infrared Observations of Novae; Photometry and Radial Velocities of 27 Southern Galactic Cepheids; Optical and Infrared Photometry of Southern Early-Type Shell Stars and Pre-main-sequence Variables; Photometry of R. Coronae Borealis and Hydrogen-deficient Carbon Stars (1982-3); and Photometry and Identification Charts for NGC 6067. For individual titles, see N86-18272 through N86-18276.

N86-18272# South African Astronomical Observatory, Cape Province.
INFRARED OBSERVATIONS OF NOVAE

R. M. Catchpole, I. S. Glass, G. Roberts, J. Spencer Jones, and P. A. Whitelock *In its* South African Astronomical Observatory Circular No. 9 1985 p 1-3 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Infrared observations of novae which have been obtained at SAAO on various occasions over the past few years are presented. To date, the literature contains relatively new infrared studies of novae, and the question of why dust emission develops in some of these systems and not others remains unanswered. The data presented here, combined with similar observations from other establishments, should add to the general picture of nova development in the infrared. Author

N86-18273# South African Astronomical Observatory, Cape Province.
PHOTOMETRY AND RADIAL VELOCITIES OF 27 SOUTHERN GALACTIC CEPHEIDS
Iain M. Coulson and John A. R. Caldwell *In its* South African Astronomical Observatory Circular No. 9 1985 p 5-54 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Some 950 radial velocities and about 1100 UBV(RI) sub c photometric measures of 27 Galactic Cepheids with R > 9d are presented. Pulsation periods are redetermined and light and color curves are produced by aligning the older photometry with new data using suitable zero-point adjustments. The new radial velocities prove to be of a much higher quality than the rather limited amount of similar data available from the literature, and so only the new data have been used in the production of the velocity curves. Parametric representations of these curves are presented in preparation for analysis in a future paper. Author

N86-18274# South African Astronomical Observatory, Cape Province.
OPTICAL AND INFRARED PHOTOMETRY OF SOUTHERN EARLY-TYPE SHELL STARS AND PRE-MAIN-SEQUENCE VARIABLES
D. Kilkenny, D. C. B. Whittet (Lancashire Polytechnic, Preston, England), J. K. Davies (Lancashire Polytechnic, Preston, England), A. Evans (Keele Univ., England), M. F. Bode (Keele Univ., England), E. I. Robson (Lancashire Polytechnic, Preston, England), and R. M. Banfield *In its* South African Astronomical Observatory Circular No. 9 1985 p 55-86 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

A catalogue of optical and infrared photometry is presented covering the epoch 1980 to 1984 for a sample of 53 pre-main-sequence stars and other emission-line objects, mainly of early spectral type. The JHKL data are generally simultaneous with optical photometry in either the UBVRI or Stromgren uvby systems, and the H beta index is used as a photometric monitor of spectrum variability. This catalogue will form a valuable data set for future studies of the nature and origin of variability in this class of object. Author

N86-18275# South African Astronomical Observatory, Cape Province.
PHOTOMETRY OF R CORONAE BOREALIS AND HYDROGEN-DEFICIENT CARBON STARS, 1982-3
D. Kilkenny, I. M. Coulson, J. D. Laing, J. Spencer Jones, and C. Engelbrecht *In its* South African Astronomical Observatory Circular No. 9 1985 p 87-96 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

Photoelectric UBVRI and uvby observations are presented for 4 hydrogen-deficient carbon stars, 12 known or suspected R Coronae Borealis stars and the probably related objects DY Cen and MV Sgr. Author

N86-18276# South African Astronomical Observatory, Cape Province.
CCD PHOTOMETRY OF GALACTIC CLUSTERS CONTAINING CEPHEID VARIABLES. PAPER 3: PHOTOMETRY AND IDENTIFICATION CHARTS FOR NGC 6067
Alistair Walker and Iain M. Coulson *In its* South African Astronomical Observatory Circular No. 9 1985 p 97-110 refs (For primary document see N86-18271 08-89)
Avail: NTIS HC A06/MF A01

B and V band photometry obtained with the UCL-SAAO CCD Camera is presented for 1019 stars in NGC 6067 and 196 stars in an adjacent field. Author

N86-18277*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OBSERVATIONS OF THE J = 10 MANIFOLD OF THE PURE ROTATIONAL BAND OF PHOSPHINE ON SATURN
M. R. Haas (Mycol, Inc., Sunnyvale, Calif.), E. F. Erickson, D. Goorvitch, D. D. McKibbin, and D. M. Rank (California Univ., Santa Cruz) Jan. 1986 29 p refs
(NASA-TM-86851; Rept-85434; Preprint-Ser-042; NAS 1.15:86851) Avail: NTIS HC A03/MF A01 CSCL 03A

Saturn was observed in the vicinity of the J = 10 manifold of the pure rotational band of phosphine on 1984 July 10 and 12 from NASA's Kuiper Airborne Observatory with the facility far-infrared cooled grating spectrometer. On each night observations of the full disk plus rings were made at 4 to 6 discrete wavelengths which selectively sampled the manifold and the adjacent continuum. The previously reported detection of this manifold is confirmed. After subtraction of the flux due to the rings, the data are compared with disk-averaged models of Saturn. It is found that PH3 must be strongly depleted above the thermal inversion (approx. 70 mbar). The best fitting models consistent with other observational constaints indicate that PH3 is significantly depleted at even deeper atmospheric levels (< or = 500 mbar), implying an eddy diffusion coefficient for Saturn of 10 to the 4 cm sq/sec. Author

N86-18278# Argonne National Lab., Ill.
COMMENT ON AN UNUSUAL EVENT IN THE E594 DETECTOR FROM THE DIRECTION OF CYGNUS X-3
M. C. Goodman 1985 6 p Presented at the 19th International Cosmic Ray Conference, La Jolla, Calif., 11 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018341; CONF-850883-9) Avail: NTIS HC A02/MF A01

A small array located near the 80 m sq. E594 neutrino detector at Fermilab had a two week run. The author makes two comments related to ultra high energy gamma ray physics. The first regards the question of angular resolution from muons. In general, the angle of a muon will not reflect the angle of the shower for reasons which include transverse momentum at production, multiple scattering in the atmosphere, multiple scattering in the detector and detector angular resolution. In multiple muon events, the angle between each muon and the average muon angle samples all of these deviations. Therefore, this is a good measure of the angular resolution of the shower using the muons on an event by event basis. The second comment regards an unusual event from Cygnus X-3. DOE

N86-18279# Rome Univ. (Italy). Dipt. di Fisica.
PRELIMINARY RESULTS OF THE STUDY OF ULTRAVIOLET BACKGROUND WITH IUE
G. Auriemma, F. Bochicchio, A. Frenkel, and F. Massa 15 Mar. 1985 16 p refs Presented at 3rd Rome Meeting on Astrophysics on Cosmic Background Radiation and Fundamental Physics, Rome 11-15 Dec. 1984
(Preprint-447) Avail: NTIS HC A02/MF A01

The UV background at high galactic latitude was obtained from IUE data. Results confirm previous observations for line emission and continuum. An interpretation of the peculiar shape of the continuum as due to the radiative decay of a cosmic relic particle with a mass of 15 eV and a lifetime < 10 to the 17th power years is considered. Predictions on the lifetime of massive neutrinos in the Glashow-Weinberg-Salam model indicates that this particle could not be identified with the ordinary neutrino. Lifetimes for neutrinos compatible with the upper limit can be obtained in the models of mirror leptons. The distribution in the

Universe of these particles seems to be related to the large scale matter distribution as observed in the Local Supercluster. This particle could be clusterized in the halo around the Supercluster with a density enhancement factor of 5. Author (ESA)

N86-18280# Amsterdam Univ. (Netherlands). Dept. of Physics and Astronomy.
DETERMINATION OF SPECTRAL DISTRIBUTIONS AND INSTRUMENTAL MAGNITUDES OF PLANETS
J. W. Hovenier, G. Cornet, P. Stammes, and W. R. Burke, ed. (ESA, Paris) Paris ESA Mar. 1985 108 p refs
(ESA-STR-214; ISSN-0379-4067) Avail: NTIS HC A06/MF A01

An algorithm for calculating instrumental magnitudes in the 300 to 1100 nm range for the Moon and all planets except Pluto is presented. A survey and literature compilation was made to produce best estimates for the spectral distributions of the light reflected by each object. The results, together with error estimates, are presented in tables. The spectral distributions form the basis for the algorithm which provides magnitudes for the disk integrated light, as a function of the object selected, phase angle, and distances to the Sun and observer. Information to enable the calculation of the output signal of an ideal slit sensor scanning the disk of an object is provided. Author (ESA)

N86-18263# Helsinki Univ. (Finland).
COMPARISON OF OPTICAL EXTINCTION AND MOLECULAR LINE INTENSITIES IN THE CHAMAELEON 1 DARK CLOUD
Mikko Toriseva and Kalevi Mattila *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 36-39 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18265# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
COMPUTERS AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Niklas Holsti *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 45-48 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18266# Helsinki Univ. of Technology, Espoo (Finland).
ANALOG TO DIGITAL (A/D) CONVERSION AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Kari Kuittinen, Erkki Oinaskallio, and Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 49-52 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18267# Helsinki Univ. of Technology, Espoo (Finland).
CRYOGENIC MILLIMETER WAVE RECEIVER FOR THE METSAEHOVI RADIO TELESCOPE
Arto Lehto and Antti Raeisaenen *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 53-55 (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18269# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
OPTICAL STUDY OF SHARPLESS 252 (NGC 2175)
Lauri Haikala *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 56-59 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-18281# Lawrence Livermore National Lab., Calif.
NUCLEAR ASTROPHYSICS AWAY FROM STABILITY
G. J. Mathews, W. M. Howard, K. Takahashi, and R. A. Ward Aug. 1985 13 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE85-018188; UCRL-92470; CONF-850942-26) Avail: NTIS HC A02/MF A01

Explosive astrophysical environments invariably lead to the production of nuclei away from stability. An understanding of the dynamics and nucleosynthesis in such environments is inextricably coupled to an understanding of the properties of the synthesized nuclei. In this talk a review is presented of the basic explosive nucleosynthesis mechanisms (s-process, r-process, n-process, p-process, and rp-process). Specific stellar model calculations are discussed and a summary of the pertinent nuclear data is presented. Possible experiments and nuclear-model calculations are suggested that could facilitate a better understanding of the astrophysical scenarios. DOE

N86-18282# European Space Agency, Paris (France).
AD ASTRA HIPPARCOS. THE EUROPEAN SPACE AGENCY'S ASTROMETRY MISSION
M. A. C. Perryman, comp. and Norman Longdon, comp. Jun. 1985 50 p Original contains color illustrations
(ESA-BR-24; ISSN-0250-1589) Avail: NTIS HC A03/MF A01

The HIPPARCOS spaceborne astrometry program is summarized. The primary experiment on board the satellite will measure the positions, proper motions and parallaxes of 100, 000 preselected stars to within 0.002 arcsec for positions and parallaxes and 0.002 arcsec a year for proper motions. A second experiment, Tycho, which will exploit the data produced by the satellite's attitude measurement system, will yield astrometric and photometric data of lower precision, but for a very much larger number of stars. The star positions measured by Hipparcos will provide a uniform reference system of unprecedented precision, of considerable importance for studies of the Earth's motion, as a framework for studies of the Solar System, and as a reference for studies in ground and space-based astronomy. As well as providing a high-precision reference system, the accurate measurement of stellar positions, and how they vary with time, will give the basic data necessary for calculating distances to the stars within our Galaxy, and information on the large and small scale stellar motions within it. Author (ESA)

N86-18262# Turku Univ. (Finland). Observatory.
HOW DO GALAXIES MAKE SPIRAL ARMS: STOCHASTIC VERSUS GRAVITATIONAL
Gene Byrd *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 26-31 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18264# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CORRELATED VARIABILITY IN THE W49N WATER MASER SOURCE
Tarja Liljestroem *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 40-44 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

No abstracts in this category.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-18283# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
SOLAR WIND CONTROL OF THE POLAR CUSP
E. Friis-Christensen 1985 39 p refs Presented at AGU Chapman Conference on Solar Wind-Magnetosphere Coupling, Pasadena, Calif., 12-15 Feb. 1985
(DMI-Geophys-Papers-B-72; ISBN-87-7478-254-2) Avail: NTIS HC A03/MF A01

Observations of the distribution of particles, electric fields, and currents in the polar cusp, particularly aspects which enable a comparison between ground-based and space-based observations are discussed. The cusp is characterized by intense fluxes of very low energy electrons, but a definition of the cusp based upon this characteristic is insufficient to exclude other sources like the dayside extension of the plasma-sheet boundary layer. The location of the cusp is partly controlled by Bz. For northward interplanetary magnetic field (IMF), observations support a polar cusp and polar cap convection pattern dominated by an extra two-cell pattern for all By. The relative sizes of the two cells, however, is related to the sign and magnitude of By. For southward IMF the prenoon sector shows a double convection reversal for By <0 compared to a single for By >0. Space and ground-based observations support models of two IMF controlled convection cells. Author (ESA)

N86-18259# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
CYCLIC MEAN FLOWS IN THE SUN AS A PROBE OF THE DYNAMO ACTION
Ilkka Tuominen, Fritz Krause (Academy of Sciences, Potsdam, East Germany), Guenther Ruediger, and Heikki Virtanen *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 2-16 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18260# Helsinki Univ. of Technology, Espoo (Finland).
RESULTS OF SOLAR RESEARCH STUDIES AT THE METSAEHOVI (FINLAND) RADIO RESEARCH STATION
Seppo Urpo *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 17-21 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18261# Helsinki Univ. of Technology, Espoo (Finland).
SOLAR 160 MIN OSCILLATION AT MICROWAVE
Harri Teraesranta *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 22-25 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-18269# Helsinki Univ. of Technology, Espoo (Finland).
OBSERVATIONS OF EXTRAGALACTIC RADIO SOURCES AT 8 AND 13.5 MM
E. Salonen, S. Haarala (Turku Univ., Finland), H. Teraesranta, H. Lehto (Turku Univ., Finland), S. Urpo, and M. Valtonen (Turku Univ., Finland) *In its* Proceedings of the 19th Finnish Astronomers' Days 1984 p 62-65 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

N86-18270# Helsinki Univ. (Finland). Observatory and Astrophysics Lab.
RED SHIFT RADIATION: A MAJOR ELECTROMAGNETIC RADIATION MEASUREMENT
T. Jaakola *In* Helsinki University of Technology Proceedings of the 19th Finnish Astronomers' Days 1984 p 66-69 refs (For primary document see N86-18258 08-88)
Avail: NTIS HC A04/MF A01

99 GENERAL

No abstracts in this category.

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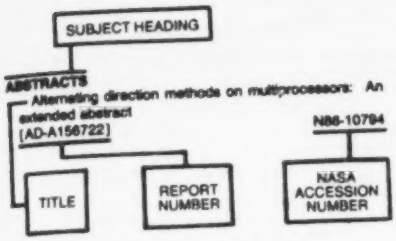

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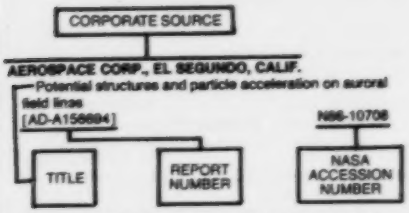

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Water resources data for Pennsylvania, water year 1984. Volume 3: Ohio River and St. Lawrence River Basins
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Water resources data for Michigan, water year 1984
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Water resources data for Virginia water year 1984
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Study of a land use of synthetic aperture radar, executive summary
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Study of a land use of synthetic aperture radar. Volume 1: Main report
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Progress in the development of a two-fluid model of turbulence for near-wall flows. Part 2: Heat-transfer characteristics of a boundary layer
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Measurements of the two phase flow in the neighborhood of the exhaust of a 7.62 mm caliber gun
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Photosimulation of target acquisition in the presence of smoke: A pilot study
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The 1985 JANNAF Propulsion Meeting, volume 1
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR report: Electronics and electrical engineering
[JPRS-UEE-84-016] N86-17640
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Report of the symposium on biological monitoring of exposure to metals and other inorganic compounds
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Bioassay of military relevant compounds for carcinogenic activity by the strain A mouse lung tumor bioassay
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NAGOYA UNIV. (JAPAN).
Numerical analysis of transonic flow around two-dimensional airfoil by solving Navier-Stokes equations N86-17292
NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
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NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
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NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
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Fatigue rated fastener systems in aluminum alloy structural joints
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[NLR-TR-82059-U] N86-17916
Noise assessment around Schiphol airport (the Netherlands): Indicative zones
[NLR-TR-82090-U] N86-17917
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[NLR-TR-82111-U] N86-17918
Noise assessment around Eelde airport (the Netherlands) in 1985
[NLR-TR-82135-U] N86-17919
Noise assessment around Zuid-Limburg Airport (the Netherlands) in 1981 and 1982
[NLR-TR-83045-U] N86-17920
Noise assessment around Schiphol airport (the Netherlands) in 1982
[NLR-TR-83054-U] N86-17921
Noise assessment around Rotterdam airport in 1982
[NLR-TR-83105-U] N86-17922
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[NLR-TR-82133-U] N86-17962
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[NLR-MP-84054-U] N86-18084
Bifurcation and stability, a numerical approach
[NLR-MP-84078-U] N86-18085
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[NLR-MP-84053-U] N86-18205
Personnel activities report in aerospace research N86-18243
Engineering Data Interactive Presentation and Analysis System (EDIPAS): A general approach to engineering data management and analysis applied to wind tunnel testing
[NLR-MP-83057-U] N86-18252
A review of space-related thermophysical research at NLR
[NLR-MP-84063-U] N86-18256

NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
Proceedings of the 2nd NAL Symposium on Aircraft Computational Aerodynamics
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NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Ductile-to-brittle transition in steel weldments for arctic structures
[PB85-227098] N86-17769

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Acrylonitrile-Butadiene-Styrene copolymers (ABS): Pyrolysis and combustion products and their toxicity, a review of the literature
[NBSIR-85/3248] N86-17501
NDE (Non-Destructive Evaluation) publications, 1982
[PB85-244069] N86-17776
Technical overview of the information resource dictionary system
[PB85-224491] N86-18004

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Uncorrelated noise in turbulence measurements
[PB85-212314] N86-17968

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.
Monthly infrared imagery enhancement curves: A tool for nighttime sea fog identification off the New England Coast
[PB85-237725] N86-17966

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
National Geophysical Data Center
[PB85-248458] N86-17947

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Query language for the Profiler data system
[PB85-240190] N86-17965
Tsunamis in Peru-Chile
[PB85-247815] N86-17973

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
Visualisations of speech based on a model of the peripheral auditory system
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Temperature fixed points. 1: Possible devices in the range 0 to 125 C
[NPL-QU-70] N86-17701

A new approach to the design and construction of protocol testers
[NPL-DITC-54/85] N86-18006
The scenario test driver for the ISO network convergence protocol over X.25 (1980)
[NPL-DITC-55/85] N86-18044
Implementation assessment of the OSI network service. The test responder specification
[NPL-DITC-56/85] N86-18045
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[NPL-RS(EXT)80] N86-18136

NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
AOS (Advanced Operating System) graphic to grid point conversion and departure from normal programs
[PB85-248110] N86-17967

NAVAL AIR SYSTEMS COMMAND, WASHINGTON, D. C.
Inverse Faraday effect in hemoglobin detected by Raman spectroscopy: An example of magnetic resonance Raman activity
[AD-A159806] N86-17975

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
Bibliography of research on ocean fronts, 1964-1984
[AD-A160040] N86-17970

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
GRAPS: Graphical Plotting System
[AD-A159808] N86-17821
NOSC UNIBUS (Trademark) UNIVAC Input/Output controller
[AD-A159802] N86-17999

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
The use of filters in digital coherent receivers operating in a jamming and noise environment
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[AD-A159812] N86-18102

NAVAL SUBMARINE MEDICAL RESEARCH LAB., GROTON, CONN.
Proposed transfer-function technique for earphone analysis
[AD-A160054] N86-17704

NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
Determining behavior of solid rocket motor internal components using dynamic real-time radiography
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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER, SAN DIEGO, CALIF.
Computer-managed instruction: Crystallized and fluid intelligence
[AD-A160017] N86-18013

NEW MEXICO STATE UNIV., LAS CRUCES.
The np elastic-scattering experiments with polarized neutron beams
[DE85-018454] N86-18148

NEW MEXICO UNIV., ALBUQUERQUE.
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211

NEWCASTLE-UPON-TYNE UNIV. (ENGLAND).
Stress corrosion cracking of 316 stainless steel in high temperature water
[BR94397] N86-17529

NIHON UNIV., TOKYO (JAPAN).
Numerical analysis about flow over an aerofoil with a large angle of attack N86-17291
The analysis of practical transonic swept wings with and without boundary layer effects N86-17300

NORTH CAROLINA STATE UNIV., RALEIGH.
Numerical and experimental investigation of forced laminar free shear layers and turbulent slot injection flows N86-17301
Effects of high energy radiation on the mechanical properties of epoxy-graphite fiber reinforced composites
[NASA-CR-176487] N86-17476
Acidic deposition phenomenon and its effects: Critical assessment document
[PB85-233393] N86-17926

NORTH CAROLINA UNIV., CHAPEL HILL.
Catastrophic planar dechanneling in strained-layer superlattices
[DE85-017160] N86-18211

NORTHWESTERN UNIV., EVANSTON, ILL.
Structural phase transition in CeCu6
[DE85-018362] N86-18223

NUCLEAR ENERGY CENTRE, MOL (BELGIUM).
Sensitivity, applicability and validation of bi-Gaussian off- and on-line models for the evaluation of the consequences of accidental releases in nuclear facilities
[EUR-9385-EN] N86-17897

O

OAK RIDGE NATIONAL LAB., TENN.
Correlations of acute toxicity of metal ions and the covalent/ionic character of their bonds
[DE85-017094] N86-17505
Coupled electron-nuclear magnetism and neutron diffraction
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Recent developments concerning segregation and fracture at grain boundaries
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Plutonium(4) hydrous polymer chemistry
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Corrosion of materials in absorption heating and refrigeration fluids
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High-field ZnO varistors: microstructures and properties
[DE85-018136] N86-17626
Implicit mixed interpolation finite element algorithm for time dependent viscous flows utilizing a frontal solution technique
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Vapor compression heat pump system field tests at the TECH complex
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Recirculating cross-correlation detector
[DE85-017782] N86-17709
Development of a continuous-flow fluidic pump
[DE85-018152] N86-17755
Dynamic analyses of a crack run-arrest experiment in a nonisothermal plate
[TI85-016420] N86-17795
Numerical study of the performance of latent heat storage for solar dynamic power systems
[DE85-018101] N86-17884
Results on the characterization of gas hydrate formation in a direct contact heat pump cool storage system
[DE85-018126] N86-17885
Characterization and mitigation of organic vapors
[DE85-016410] N86-17906
Effects of acid rain on forest nutrient status
[DE85-018120] N86-17911
Advanced servomanipulator development
[DE85-017720] N86-17989
Human-machine interfaces for teleoperators: An overview of research and development at the Oak Ridge National Laboratory. Consolidated Fuel Reprocessing Program
[DE85-017713] N86-17990

Parallel Cholesky factorization on a hypercube multiprocessor
[DE85-018121] N86-18002
ALKACYCL: A basic computer program for the analysis of alkali metal Rankine power cycles
[DE85-018125] N86-18022
ANOVA model fitting via sparse matrix computations
[DE85-017070] N86-18069
Software for rootfinding and interpolation with Runge-Kutta-Sarafyan methods
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Phenomenology of new particle production in heavy-ion collisions
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[DE85-018074] N86-18142
3-D nonlinear MHD calculations with drift and thermal force effects
[DE85-018062] N86-18189
Stochastic model of a first-order nonequilibrium phase transition in a magnetic fusion device
[DE85-018139] N86-18190
NE-213-scintillator-based neutron detection system for diagnostic measurements of energy spectra for neutrons having energies greater than or equal to 0.8 MeV created during plasma operations at the Princeton Tokamak Fusion Test Reactor
[DE85-018079] N86-18198
Thermodynamic properties and microscopic structure of fluids and fluid mixtures
[DE85-016482] N86-18234
Information Systems development aids
[DE85-018161] N86-18246

OAK RIDGE Y-12 PLANT, TENN.
In-process acoustic emission monitoring of laser welds
[DE85-017184] N86-17772

OCLI, SANTA ROSA, CALIF.
Thin film coatings for improved alpha/epi N86-17867

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Subsonic unsteady aeroelasticity: The potential method applied to lifting surfaces
[ONERA-RT-21/3064-RY-045-R] N86-17315
Critical analysis of turbulence restitution from acceleration measurements
[ONERA-RT-3/3567-RY-C40-R] N86-17340
Models and identification of materials under one axe and two axes stress
[ONERA-RT-54/1765-RY-044-R] N86-17356
Relationship between components and performance of composite materials. Part 1: BSL914 matrix systems
[ONERA-RT-1/3636-M-PT-1] N86-17488
Feasibility study of a device to control aircraft electromagnetic protection
[ONERA-RS-10/3466-PY] N86-17637
Study of surface discharges
[ONERA-RF-10/7236-PY] N86-17639
Unsteady three-dimensional surface theory with the free surface effect: Supercritical case
[ONERA-P-1984-1] N86-17683
The steady lifting surface theory with a free-surface
[ONERA-P-1984-2] N86-17684
Models and prediction of turbulent flow with particles
[ONERA-RTS-21/7135-EY] N86-17692
Computation of viscous compressible flow in a turbomachine blade array
[ONERA-RSF-27/7077-AY-408] N86-17693
Characterization of the electromagnetic radiation preceding lightning
[ONERA-NT-1985-1] N86-17960
Scattering of an acoustic field by a nonhomogeneous nonuniform flow
[ONERA-P-1985-1] N86-18127
Two methods for calculating acoustic wave propagation through an interface
[ONERA-NT-1985-2] N86-18128
Publications, catalog 1985 N86-18249
Films, catalog 1985 N86-18250

OFFICINE GALILEO S.P.A., FLORENCE (ITALY).
Bio-observation subsystem, phase A study, executive summary
[REPT-648-DT-6-ISSUE-1] N86-17364

OHIO STATE UNIV., COLUMBUS.
Crack growth in an elastic-primary creeping material
N86-17779
Nuclear spin polarization of solid deuterium-tritium
[DE85-017279] N86-18152

OKLAHOMA STATE UNIV., STILLWATER.
An adaptive approach to a 2.4 kb/s LPC speech coding system
[AD-A160312] N86-17598

OLD DOMINION UNIV., NORFOLK, VA.
Analyses of quasi-isotropic composite plates under quasi-static point loads simulating low-velocity impact phenomena
[NASA-CR-176485] N86-17475

OREGON STATE UNIV., CORVALLIS.
Wind turbulence input model for horizontal axis wind turbines N86-17303
OREGON UNIV., EUGENE.
Lithium soft X-ray laser N86-17730
Heavy particle production in high energy hadron collisions
[DE85-018354] N86-18143
OSAKA UNIV., TOYONAKA (JAPAN).
Coupled electron-nuclear magnetism and neutron diffraction
[DE85-016479] N86-17539
First order phase transformations: Scaling relations for grain self-correlation functions
[DE85-017509] N86-18213
OXFORD UNIV. (ENGLAND).
Effect of strain-rate on the tensile failure of woven-reinforced polyester resin composites
[OUEL-1576/85] N86-17480
Dynamic tensile response of unidirectionally-reinforced carbon epoxy and glass epoxy composites
[OUEL-1579/85] N86-17481
The effect of quenching rate on the temperature and strain-rate sensitivity of uranium 2w/o molybdenum alloy
[OUEL-1577/85] N86-17528
Modeling of thin-walled shells for buckling investigations by electroplating
[OUEL-1562/85] N86-17801
Generalized predictive control. Part 2: Extensions and interpretations
[OUEL-1557/84-PT-2] N86-18054
Self-tuning control: Algorithms and applications
[OUEL-1567/85] N86-18055
Uncertainty estimation from system identification
[OUEL-1570/85] N86-18075

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PACIFIC NORTHWEST LAB., RICHLAND, WASH.
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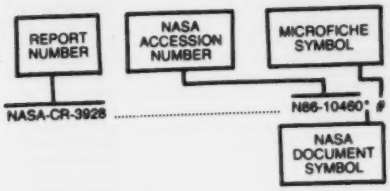

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) **1367**

02 AERODYNAMICS **1367**

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY **1370**

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION **1371**

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE **1371**

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION **N.A.**

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER **1373**

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL **N.A.**

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) **1373**

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) **1374**

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13 ASTRODYNAMICS **1375**

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) **1375**

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES **1376**

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION **N.A.**

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING **1376**

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For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE **1377**

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION **1378**

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER **1390**

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **1390**
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **1391**
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25 INORGANIC AND PHYSICAL CHEMISTRY **1393**
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For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS **1397**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **1408**
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **1412**
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For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

31 ENGINEERING (GENERAL) **1413**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **1414**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING **1418**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER **1423**
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY **1429**
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39 STRUCTURAL MECHANICS **1439**
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GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
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42 GEOSCIENCES (GENERAL) **N.A.**

43 EARTH RESOURCES **1442**
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For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **1444**
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

45 ENVIRONMENT POLLUTION **1448**
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46 GEOPHYSICS 1450
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For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 1461
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48 OCEANOGRAPHY 1469
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LIFE SCIENCES

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51 LIFE SCIENCES (GENERAL) 1471
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52 AEROSPACE MEDICINE 1473
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53 BEHAVIORAL SCIENCES 1476
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 1478
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) 1478

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62 COMPUTER SYSTEMS 1488
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63 CYBERNETICS 1490
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For related information see also *54 Man/System Technology and Life Support*.

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Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 1518
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 1519
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 1520
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84 LAW AND POLITICAL SCIENCE N.A.
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85 URBAN TECHNOLOGY AND TRANSPORTATION 1522
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

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89 ASTRONOMY 1522
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 1523
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91 LUNAR AND PLANETARY EXPLORATION 1525
Includes planetology; and manned and unmanned flights.
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Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION N.A.
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99 GENERAL 1527

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-18284# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
4 Dec. 1985 67 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-85-014) Avail: NTIS HC A04

USSR Reports - Transportation (JPRS-UTR-85-014), 4 Dec. 1985, contains reports on Civil Aviation, Motor Vehicles and Highways, Rail Systems, and Maritime and River Fleets. Of particular interest in this issue are articles on air traffic control radar problems, and the use of laser technology to resurface worn aircraft parts. For individual titles, see N86-18285 through N86-18286.

N86-18285# Joint Publications Research Service, Arlington, Va.
TRASSA SYSTEM INTRODUCTION CAUSES VARIOUS PROBLEMS c04
T. Boyarskiy *In its* USSR Report: Transportation (JPRS-UTR-85-014) 4 Dec. 1985 p 3-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 31 Aug. 1985 p 3 (For primary document see N85-18284 09-01)
Avail: NTIS HC A04

The TRASSA air traffic control system is designed to control air movement out to a radius of a few hundred kilometers. The system is built on a new, specially created electronic apparatus connected by communication channels with remote sites, dispersed in various directions, and the coordination of all its multitude of elements turned out to be a very difficult task. Moreover in the process of performance testing, design shortcomings were revealed -- results of both the scientists, whose ideas were more or less realized in the project, not taking their work far enough, and errors by the manufacturing plant. This plant, in particular, gave inaccurate data to the designers regarding the heat release of the future electronic apparatus. As a result in turns out that the apparatus, once installed at each work station, will use no less than 1 kWh of electricity per hour. There are eight such work stations, and in the and the air conditioning equipment suggested to the designers turned out to be ineffective. Design changes and additional work were required. Author

N86-18286# Joint Publications Research Service, Arlington, Va.
AVIAREMONT'S EFFORTS TO INTRODUCE LASER TECHNOLOGY c36
Yu. Kolesnikov *In its* USSR Report: Transportation (JPRS-UTR-85-014) 4 Dec. 1985 p 5-7 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Sep. 1985 p 3 (For primary document see N86-18284 09-01)
Avail: NTIS HC A04

To reduce the high cost of aircraft parts replacement, the Aviaremont Plant of Irkutsk plans to use lasers to resurface worn parts to save them from the scrap heap. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-18287# National Research Council of Canada, Ottawa (Ontario). High Speed Aerodynamics Lab.
SUBSONIC WALL INTERFERENCE CORRECTIONS FOR HALF-MODEL TESTS USING SPARSE WALL PRESSURE DATA
M. Mokry Nov. 1985 35 p refs Presented at the Euromech Colloquium No. 187 on Adaptive Wall Wind Tunnels and Wall Interference Correction Methods, Goettingen, West Germany, 15-17 Oct. 1984
(LR-616, NRC-25132) Avail: NTIS HC A03/MF A01

A method is described for correcting subsonic wind tunnel measurements on half-models in ventilated test sections, operated at subcritical flow conditions at the walls. For perforated walls, the boundary values of the streamwise component of the wall interference velocity are obtained from static pressures measured by a few longitudinal pressure tubes or rails attached to the walls and from the estimated farfield of the model in free air. The sparse boundary data is extended by means of streamwise smoothing and transverse interpolation. The streamwise velocity correction is derived from the doublet panel solution of an interior Dirichlet problem and the transverse corrections by integrating the irrotational flow conditions. The evaluated corrections to Mach number and angle of attack, presented as contour plots in the wing plane, provide insight into the correctability of the test results. Examples are given for a transport aircraft half-model tested in the NAE high speed wind tunnel. Applicability of the method at supercritical flow conditions at the model is examined on experimental and computational data of a high aspect ratio wing. Author

N86-18288# National Aerospace Lab., Tokyo (Japan).
WIND-TUNNEL INVESTIGATION OF THE PRESSURE DISTRIBUTION AND DEDUCED CHARACTERISTICS OF SEMI-CIRCULAR CYLINDER IN THE VICINITY OF CRITICAL REYNOLDS NUMBER
Naoto Takizawa, Noriaki Okada, and Akihito Iwasaki [1985] 43 p refs In JAPANESE; ENGLISH summary
(NAL-TR-871; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

Two-dimensional semi-circular cylinders have been tested over a Reynolds number range from 67,000 to 600,000 and over angles of attack of + or - 90 deg, to measure pressure distributions and to deduce forces, stagnation, separation and other characteristics. Tests were conducted in the NAL instrument wind-tunnel, the NAL gust wind-tunnel and the Fuji Heavy Industries fume wind-tunnel. The wind-tunnel-boundary correction was specialized by the concept of effective model-height and wake-width. Below an angle of attack of 40 deg, pressure distributions about the upper- and lower-surface were similar to the circular cylinder and the flat plate respectively and showed considered difference between sub-

and super-critical Reynolds number. The lift and drag coefficient range were -0.85 approx. 1.5, 0.4 approx. 2.28 at sub-critical and 0 approx. 2.02, 0.1 approx. 2.37 at super-critical. Features were as follows: Near -60 deg, force coefficient curves, except the chord force, were concave. Near 25 deg, lift coefficient showed a maximum value of 2.02 at super-critical Reynolds number. At 40 deg aprrox. 50 deg, upper suction double peak and negative chord force (but 5 deg approx. 50 deg at super-critical) were shown. At 60 deg approx. 90 deg, pressure distributions over the upper surface showed a low hat shape. Author

N86-18289*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPRESSIBLE, UNSTEADY LIFTING-SURFACE THEORY FOR A HELICOPTER ROTOR IN FORWARD FLIGHT
Harry L. Runyan and Hsiang Tsi Dec. 1985 21 p refs
(NASA-TP-2503; L-15976; NAS 1.60:2503) Avail: NTIS HC A02/MF A01 CSCL 01A

A lifting-surface theory has been developed for a helicopter rotor in forward flight for compressible and incompressible flow. The method utilizes the concept of the linearized acceleration potential and makes use of the doublet lattice procedure. Calculations demonstrating the application of the method are given in terms of the lift distribution on a one-bladed rotor, a two-bladed rotor, and a rotor with swept-forward and swept-back tips. Also, the lift on a rotor vibrating in a pitching mode at 4 per revolution is given. Compressibility effects and interference effects for a two-bladed rotor are discussed. Author

N86-18290# National Aerospace Lab., Tokyo (Japan).
FLOW QUALITY OF NAL TWO-DIMENSIONAL TRANSONIC WIND TUNNEL. PART 4: CHARACTERISTICS OF FLOW CONTROL
Hitoshi Miwa, Mamoru Sato, Yasuo Oguni, and Hiroshi Kanda Jun. 1985 67 p refs In JAPANESE; ENGLISH summary
(NAL-TR-862; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

The result of a flow control experiment conducted at the National Aerospace Laboratory (Japan) blowdown type two-dimensional transonic wind tunnel are described. This tunnel can be operated over a wide pressure range to change the test Reynolds number. The main features of the operation and control of this tunnel are the application of the precharged starting procedure for establishing high Reynolds number flow and the adoption of the closed-loop Mach number control which acts effectively in a short running time. It is found that high Reynolds number tests can be safely conducted and the flow duration can be increased by applying the precharged starting procedure. And also the closed-loop Mach number control showed excellent Mach number repeatability within an error of + or - .001 at each run. An attempt to expand the operating envelope was successful with satisfying control accuracy. Author

N86-18291*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AERODYNAMIC CHARACTERISTICS OF AN AIR-EXCHANGER SYSTEM FOR THE 40- BY 80-FOOT WIND TUNNEL AT AMES RESEARCH CENTER
Vernon J. Rossow, Gene I. Schmidt, Larry A. Meyn, Kimberley R. Ortner, and Robert E. Holmes Jan. 1986 68 p refs
(NASA-TM-88192; A-86036; NAS 1.15:88192) Avail: NTIS HC A04/MF A01 CSCL 01A

A 1/50-scale model of the 40- by 80-Foot Wind Tunnel at Ames Research Center was used to study various air-exchange configurations. System components were tested throughout a range of parameters, and approximate analytical relationships were derived to explain the observed characteristics. It is found that the efficiency of the air exchanger could be increased (1) by adding a shaped wall to smoothly turn the incoming air downstream, (2) by changing to a contoured door at the inlet to control the flow rate, and (3) by increasing the size of the exhaust opening. The static pressures inside the circuit then remain within the design limits at the higher tunnel speeds if the air-exchange rate is about 5% or more. Since the model is much smaller than the full-scale facility, it is not possible to completely duplicate the tunnel, and it will be necessary to measure such characteristics as flow rate and tunnel pressures during implementation of the remodeled facility. The aerodynamic loads estimated for the inlet door and for nearby walls are also presented. Author

N86-18292*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PERFORMANCE CHARACTERISTICS OF AN ISOLATED COANNULAR PLUG NOZZLE AT TRANSONIC SPEEDS
Charles E. Mercer and James R. Burley, II Dec. 1985 148 p refs
(NASA-TM-87606; L-16008; NAS 1.15:87606) Avail: NTIS HC A07/MF A01 CSCL 01A

The Langley 16-Foot Transonic Tunnel was used to evaluate the performance characteristics of a coannular plug nozzle at static conditions (Mach number of 0) and at Mach numbers from 0.65 to 1.20. Jet total pressure ratio was varied from 1.0 (jet off) to 10.0. Thirty-seven configurations generated by the combination of three geometric variables - plug angle, shroud boattail length (fixed exit radius), and shroud extension length - were tested. Author

N86-18293# Naval Research Lab., Washington, D. C.
FULL PSEUDOSPECTRAL SOLUTION TO THE EULER EQUATIONS OF MOTION FOR AIRFOIL FLOW AT TRANSONIC SPEEDS Memorandum Report
L. Sakell 30 Sep. 1985 16 p
(DA Proj. RR0-21)
(AD-A159714; NRL-MR-5674) Avail: NTIS HC A02/MF A01 CSCL 20/4

The unsteady Euler equations of motion are solved for by full pseudospectral computational techniques. Flows about a five percent half thick biconvex airfoil are obtained. Subcritical and supercritical cases are treated. GRA

N86-18294# Army Research and Technology Labs., Moffett Field, Calif. Aeromechanics Lab.
CALCULATION OF HELICOPTER AIRFOIL CHARACTERISTICS FOR HIGH TIP-SPEED APPLICATIONS
W. J. McCroskey, J. D. Baeder, and J. O. Bridgeman 17 May 1985 16 p Presented at the 41st Annual Forum for the American Helicopter Society, Fort Worth, Tex., 15-17 May 1985
(AD-A160694) Avail: NTIS HC A02/MF A01 CSCL 20/4

In this paper, we have applied a new aerodynamic tool to the study of helicopter airfoil characteristics. We have shown that the computed airloads reproduce completely the experimental behavior of representative airfoils across the transonic regime. In addition, the computational details of the flow fields, the surface pressure distributions, and the viscous-layer characteristics enable us to trace the evolution of the physical changes that occur as m infinity or Re increases. Descriptions of the complicated development of shock waves, shock-induced separation supplement the information that has been obtained heretofore in wind tunnels. In validating our calculations and assessing the accuracy of the results, including extensive grid-refinement studies and comparisons with data from numerous wind tunnels, we have defined more precisely the capabilities and limitations of the code ARC2D. This important aspect of the investigations can complement wind-tunnel tests, by providing flow-field details that are difficult to measure and by extending the range of flow parameters beyond the capabilities of existing wind tunnels. The code has now progressed from a purely research stage to almost a production stage, where it can be run by specialists in the helicopter industry. GRA

N86-18295# Aeronautical Research Labs., Melbourne (Australia).
TWO-DIMENSIONAL HELMHOLTZ FLOW ABOUT A FLAT PLATE AND RELATED SHAPES
T. Tran-Cong and C. A. Martin May 1985 39 p
(AD-A160806; ARL-Aero-TM-372) Avail: NTIS HC A03/MF A01 CSCL 20/4

Various configurations of two-dimensional Helmholtz flow about a flat plate are obtained with a free streamline theory using the flow inside a semi-circular disc. The flow can vary continuously

from fully-attached Joukowski flow to the commonly-known fully-separated Helmholtz flow. Variations of the technique give the flow about flat plates with flaps and other related configurations. GRA

N86-18296# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE CONFORMAL REPRESENTATION OF THE NACA 642A015 PROFILE [DE CONFORME AFBEELDING VAN HET PROFIEL NACA 642A015]
J. J. H. Blom Apr. 1984 51 p refs In DUTCH
(VTH-M-502) Avail: NTIS HC A04/MF A01

In order to construct a wind tunnel model of the symmetric NACA 642A015 airfoil profile, a Timman based airfoil transformation method was used. A smoother and tighter contour profile is obtained. The number of profile coordinates (z-plane) is brought up to 100 points, equidistantly situated on the circle contour (zeta-plane). Adjacent coordinates are calculated using Schoenberg interpolation polynomials. Author (ESA)

N86-18297# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE FUNCTION e TO THE POWER SIGMA (THETA) AND THE VELOCITY DISTRIBUTION AROUND EPPLER PROFILES [OVER DE FUNKTIE E TO THE POWER SIGMA (THETA) EN DE SNELHEIDS-VERDELING OM EPPLER-PROFIELEN]
J. J. H. Blom Jun. 1984 25 p refs In DUTCH
(VTH-M-514) Avail: NTIS HC A02/MF A01

For the airfoil profiles, E205, E664 and 1098, the e to the power sigma (theta) function and the velocity distribution for some angles of attack is given. The conformal representation is given in 60 points, equidistantly situated on the circle contour (zeta-plane). From the given velocity distribution, the ratio between velocities in the circle plane (zeta) and the profile plane (z), is easily derived. With e to the power sigma (theta), the velocity distribution for every desired angle of attack is determined. Author (ESA)

N86-18298# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
WEIGHTING SYSTEM CALIBRATION 1982. PART 1: TEXT AND APPENDICES [IJKING WEEGSYSTEEM 1982. DEEL 1: TEKST EN BIJLAGEN]
F. L. M. Kok Sep. 1983 219 p refs In DUTCH 2 Vol.
(VTH-M-515-1) Avail: NTIS HC A10/MF A01

A six component weighting system for a low speed wind tunnel, its adjustment, and its calibration are briefly described. The processing of the calibration data is treated. Forces and moments are executed upon the system by fixing loads to one or more drawbars. Using these loads, the factors and coefficients of the calculation model are determined. Comparing real and calculated forces and moments, the desired accuracy of the model is judged. For the x-direction force (resistance) and the y-axis moment (mostly diving moment), the required accuracy is not met. Author (ESA)

N86-18299# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
WEIGHTING SYSTEM CALIBRATION 1982. PART 2: TABLES AND FIGURES [IJKING WEEGSYSTEEM 1982. DEEL 2: TABELLEN EN FIGUREN]
F. L. M. Kok Sep. 1983 157 p In DUTCH 2 Vol.
(VTH-M-515-2) Avail: NTIS HC A08/MF A01

Results of wind tunnel balance calibrations are presented. Author (ESA)

N86-18300# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE FUNCTIONS e TO THE POWER SIGMA (THETA) AND tau (THETA) AND THE VELOCITY DISTRIBUTION AROUND LIGHTHILL PROFILES [OVER DE FUNKTIES E TO THE POWER SIGMA (THETA) EN TAU (THETA) EN DE SNELHEIDS-VERDELING OM LIGHTHILL-PROFIELEN]
J. J. H. Blom Aug. 1984 35 p refs In DUTCH
(VTH-M-520) Avail: NTIS HC A03/MF A01

The Lighthill method was compared with the Timman method and the low drag airfoil profile GU 25-5(11)8. The path of the functions e to the power sigma (theta) and tau (theta) as well as the velocity distribution for some angles of attack is given. The Lighthill method is used for the design of a series of low-drag profiles. The table of coordinates of such a profile appears to contain enough information to derive the functions used by Timman (e to the power sigma and tau) from those used by Lighthill (e log q-zero and chi). Author (ESA)

N86-18301# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
CALCULATION OF THE EXTERNAL NACELLE SURFACE FOR SINGLE AND DOUBLE STREAM JET ENGINES FOR CIVIL AIRCRAFT [DE BEREKENING VAN HET OMSPOELD GONDEL-OPPERVLAK VAN ENKEL- EN DUBBELSTROOM STRAALMOTOREN VOOR CIVIELE VLIEGTUIGEN]
E. Torenbeek and G. H. Berenschot Jan. 1983 40 p refs In DUTCH
(VTH-M-445) Avail: NTIS HC A03/MF A01

Simple formulas to be used in the conceptual design phase of civil aircraft for the calculation of principal dimensions and external surface of nacelles for single and double stream engines with turbocompressors are derived and verified. Nacelle surfaces of 35 engines, used in existing or planned aircraft, are determined to verify the formulas. Missing essential dimensions, such as inlet diameter and nacelle length, are referred to performance magnitudes such as bypass ratio and propulsion. Introducing (semi-) static relations, formulas whose applicability depends on available data are derived. An accuracy of 6.5% is reached; the most simple formula has a standard deviation of 12%. Author (ESA)

N86-18302# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE INTERPOLATION METHOD OF SCHOENBERG AND THE CALCULATION OF PROFILE COORDINATES [OVER DE INTERPOLATIE-METHODE VAN SCHOENBERG BIJ DE BEREKENING VAN PROFIELCOOERDINATEN]
J. J. H. Blom Feb. 1983 13 p refs In DUTCH
(VTH-M-452) Avail: NTIS HC A02/MF A01

Relations for the Schoenberg interpolation method are given. Offering a smooth profile contour, Schoenberg interpolation polynomials were used in a Timman based conformal airfoil transformation method. A number of polynomials, built up from at most third degree curves, is used over joining intervals, which are continuous in the interval end points. The profile contour coordinates (z-plane) must be equidistantly located on the circle contour (zeta-plane). Author (ESA)

N86-18303# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE LONGEST CHORD OF THE FIRST MULLER PROFILE [OVER DE LANGSTE KOORDE VAN HET EERSTE PROFIEL VAN MUELLER]
J. J. H. Blom Oct. 1983 20 p refs In DUTCH
(VTH-M-486) Avail: NTIS HC A02/MF A01

Using literature data, the coordinates, front point, and longest chord, defined as the largest distance between the sharp profile back edge and a point of the profile contour (= the front point) of the Muller wing profile were determined. A simpler transformation function for profile parameters, such as tail angle, curvature, and thickness, used in a Timman based iterative airfoil transformation program, is provided by Muller. Before profile forms can be compared with each other, a normalization on the longest chord is required. The tangent to the contour in the front point is at right angle to the longest chord. For so-called classical profile families, relations indicating exactly the front point can be derived. Author (ESA)

N86-18304# Eidgenoessisches Flugzeugwerk, Emmen (Switzerland). Research and Testing Dept.
PARAMETRIC DETERMINATION OF LIFT INTERFERENCE FOR THREE-DIMENSIONAL MODELS IN THE EMMEN (SWITZER-

LAND) AIRCRAFT WORKS WIND TUNNEL
Gerard Capitaine 31 Aug. 1984 35 p refs In GERMAN; ENGLISH summary
(F+W-FO-1740) Avail: NTIS HC A03/MF A01

Wind tunnel wall interference effects on the flow around a model were investigated for correction of the test values. A FORTRAN 77 program is developed for determination of the lift interference correction with specific slit parameters and porosity parameters for a three-dimensional compressible flow in a rectangular test section with slotted top and botton walls and closed vertical walls. The numerical procedure is applied to entire configurations and semiconfigurations. The results are plotted on charts to determine the variations of the lift correction and streamline curvature factors for different slit parameters. Author (ESA)

N86-18305# Eidgenoessisches Flugzeugwerk, Emmen (Switzerland). Research and Testing Dept.
LIFT INTERFERENCE CORRECTIONS FOR THREE-DIMENSIONAL TUNNELS WITH POROUS WALLS
Gerard Capitaine 10 Sep. 1984 39 p refs In GERMAN; ENGLISH summary
(F+W-FO-1742) Avail: NTIS HC A03/MF A01

Slits and porosity factors for the four-slot wall configuration of the wind tunnel test section, and determination of blocking and lift interference corrections as functions of slit and porosity parameters were investigated. A computer program based on the theory of the linearized subsonic flow and developed for determination of wall interference corrections is applied to a rectangular test section with closed vertical walls. The computer program completes von Vaucheret's correction method for three-dimensional models in high subsonic fields. The transonic wind tunnel is calibrated using homothetic calibration models for determination of the wall interference and for improvement of the approximation value for test section slit and porosity factors. Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-18306# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
GENERAL AVIATION CRASHWORTHINESS PROJECT, PHASE 3: ACCELERATION LOADS AND VELOCITY CHANGES OF SURVIVABLE GENERAL AVIATION ACCIDENTS Safety Report, 1972-1981
4 Sep. 1985 189 p
(NTSB/SR-85/02) Avail: NTIS HC A09/MF A01

This report is the last in a series of three issued by the National Transportation Safety Board as a result of its General Aviation Crashworthiness Program. Its purpose is to provide information to support changes in crashworthiness design standards for seating and restraint systems in general aviation airplanes. Phase One presents a methodology for documenting impact severity. Phase Two presents specific data on survivable accidents which demonstrate that if all occupants wear shoulder harnesses, fatalities are expected to be reduced by 20 percent. Eighty-eight percent of the seriously injured persons in survivable crashes are expected to experience significantly fewer life-threatening injuries. The Phase Three report provides analytical results of actual crashes. The values of acceleration loads and velocity changes that occupants can sustain in survivable, modern general aviation airplane accidents are defined. This report also discusses specific crashworthiness problems including sea/restraint systems that failed, shoulder harnesses that were not worn, and inadequate or nonexistent seat stroking ability. Author

N86-18307# Naval Research Lab., Washington, D. C.
THE AIRCRAFT ICING ENVIRONMENT IN WINTERTIME, LOW CEILING CONDITIONS Final Report
N. B. Guttman, R. K. Jeck, M. R. Henderson, and M. D. Mueller 28 Oct. 1985 74 p
(AD-A160578; NRL-MR-5650) Avail: NTIS HC A04/MF A01 CSCL 09/2

Radiosonde (Raob) temperature and humidity data were used to deduce the vertical distribution of clouds and aircraft icing conditions near Washington, D.C. when low ceilings (- or < 1000 ft)(0/3 km) occurred along with surface temperatures near freezing. Automated predictions of the vertical distribution of icing probability, type, and severity were generated from the Raob data. The technique employs a U.S. Air Force method that has been computerized by one of the authors (RKJ) for use on Hewlett Packard model 9845 computers. The predictions were compared with pilot reports from the vicinity and reasonable agreement was found. GRA

N86-18308# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ELECTRONIC INDEX OF ARTICLES PERTAINING TO AIR FORCE TRANSPORTATION IN THE POST-WORLD WAR 2 ERA, WITH ABSTRACTS OF SELECTED ARTICLES M.S. Thesis
F. R. Anible Sep. 1985 41 p
(AD-A160837; AFIT/GLM/LSM/85S-1) Avail: NTIS HC A03/MF A01 CSCL 15/5

This thesis designed and compiled an electronic index system to catalog articles in military, transportation, and aviation periodicals published during the period 1947 through 1957 and pertaining to transportation and its relationship to the U.S. Air Force. The system consists of a Master Index giving the title, author, publication, and date of over 1,000 articles, with abstracts of selected articles. Separate alphabetical Author, Title, and Subject Indexes are cross-referenced to the Master Index through a simple numerical code system. The indexes are stored on 5-1/4 inch flexible magnetic diskettes which are placed in pockets fastened into the front and back covers of the copy of the thesis kept in the Library of the School of Systems and Logistics, Air Force Institute of Technology. The articles indexed are those dealing with transportation modes and vehicles owned, operated, used, contracted, and leased by the Air force operations. In addition, source pertaining to the interface of Air Force airlift operations and operations of other services are included. GRA

N86-18309# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMATS, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 1 OF 1984 ACCIDENTS
18 Jun. 1985 402 p
(PB85-916920; NTSB/AAB-85/20) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent Continent $160.00/year; all others write for quote CSCL 01B

Selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984 are given. The 200 general aviation and air carrier accidents represent a random selection. The facts, conditions, circumstances and probable cause(s) for each accident are given. Additional statistical information is tabulated by type of operation and type of aircraft. GRA

N86-18310# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT US CIVIL AND FOREIGN AVIATION, ISSUE 2 OF 1984 ACCIDENTS
12 Jul. 1985 406 p
(PB85-916921; NSTB/AAB-85/21) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent $160.00/year; all others write for quote CSCL 01B

Selected aircraft accident reports are given in a brief format. The accidents occurred in U.S. civil and foreign aviation operations during calendar year 1984. The 200 general aviation and air

carrier accidents represent a random selection. The facts, conditions, circumstances and probable causes(s) for each accident are given. Additional statistical information is tabulated by type of operation and type of aircraft. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-18311# National Aerospace Lab., Tokyo (Japan).
CALIBRATION OF AN ON-GROUND AIRCRAFT TRACKING RADAR BY AERIAL PHOTOGRAMMETRY
Kenji Yazawa, Toshiharu Inagaki, Takatsugu Ono, and Toichi Oka Jun. 1985 42 p refs In JAPANESE; ENGLISH summary
(NAL-TR-861; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

An on-ground tracking radar is calibrated for obtaining the accurate position of an aircraft during flight testing. The calibration was performed by aerial photogrammetry for estimating the position and the attitude of an aircraft compared with synchronized data from tracking radar. The accuracy of aerial photogrammetry using a non-metric camera is less than 0.2% of the flight altitude from ground. The accuracy corresponds to an angle of 0.01 degree at 1000m height and 10km distance from the radar. It is comparable to the resolution of the radar. Author

N86-18312# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
PROBABILISTIC EVALUATION OF INDIVIDUAL AIRCRAFT TRACKING TECHNIQUES M.S. Thesis
R. L. Wilkinson Sep. 1985 146 p
(AD-A160146; AFIT/GSM/ENS/85S-32) Avail: NTIS HC A07/MF A01 CSCL 01/3

A study was conducted in order to demonstrate a technique for comparing the outputs of various individual aircraft tracking (IAT) systems. There were two objectives: (1) to determine the distribution of structural lives that could be expected based on a single IAT scenario, and (2) to evaluate the feasibility of replacing the current universal IAT safety factor with specific statistical calculations that consider the strengths and weaknesses of each IAT system. The ultimate goal of this thesis was to begin the transition of individual aircraft tracking from a deterministic approach to a stochastic one. A simulation was performed which included twelve aircraft, each flying five different load history variations at three gross weights. Initial structural damage was assumed based on a reset flaw size after nondestructive inspection. Structural lives were normally distributed with a mean of approximately 4700 flight hours. The cracks present at the one-half lifetime depot inspection were lognormally distributed. Using these distributions, the probabilities of structural failure were calculated for several inspection intervals. Repeating this process for other IAT scenarios would allow a direct comparison of various IAT systems. Eventually, such a process could lead to individual system safety factors, rather that the current universal safety factor. GRA

N86-18313# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
THE INTELLIGIBILITY OF NON-VOCODED AND VOCODED SEMANTICALLY ANOMALOUS SENTENCES
M. A. Mack and B. Gold 26 Jul. 1985 39 p
(Contract F19628-85-C-0002)
(AD-A160401; TR-703; ESD-TR-85-211) Avail: NTIS HC A03/MF A01 CSCL 05/7

This document is devoted to an analysis of the intelligibility of semantically anomalous sentences presented in four acoustically different conditions: (1) natural speech, no noise; (2) vocoded speech, no noise; (3) vocoded speech, noise added to the pitch track; (4) vocoded speech, noise to the spectrum. One objective was to analyze the specific types of errors in each condition. The other objective was to compare results of this analysis with results obtained from the Diagnostic Rhyme Test (DRT). Results revealed that intelligibility was quite good in conditions (1) and (2), relatively poor in (3), and quite poor in (4) -- results consistent with DRT data. Further, about 60% of all errors were phonemic, while 40% were syntactic and semantic. We conclude that information in the spectrum is more critical than information in the pitch track, that most errors affect the phonological component when intelligibility is poor and context is uncertain, and that the DRT is an appropriate though perhaps insufficient test of speech intelligibility. Author (GRA)

N86-18314# Royal Signals and Radar Establishment, Malvern (England).
BOLTZMANN MACHINES AND ARTIFICIAL INTELLIGENCE
D. G. Bounds Jun. 1985 28 p
(AD-A160644; RSRE-MEMO-3826; DRIC-BR-97007) Avail: NTIS HC A03/MF A01 CSCL 17/7

Ackley, Hinton and Sejnowski have recently proposed an algorithm, named a Boltzmann Machine, which is capable of learning to recognize the underlying structure in a set of patterns presented to it. The main purposes of this memorandum are: to introduce Boltzmann Machines to those who are not familiar with them; to outline how Boltzmann Machines may prove useful in the knowledge acquisition problem in artificial intelligence; to report some new results for a model problem; and to sketch out the relationship between Boltzmann Machines and the spin-glass problem. GRA

N86-18315# Transportation Systems Center, Cambridge, Mass.
MONITORING OF GPS (GLOBAL POSITIONING SYSTEM) SYSTEM PERFORMANCE Final Report, Mar. 1984 - Mar. 1985
J. Vilcans Jun. 1985 128 p Sponsored in part by Department of Transportation, Washington, D.C. and Special Programs Administration
(PB85-242980; DOT-TSC-RSPA-85-3) Avail: NTIS HC A07/MF A01 CSCL 17G

The Global Positioning System (GPS), a worldwide satellite-based navigation system developed by the Department of Defense, is scheduled to become operational in late 1988. The system has the potential to become the primary radionavigation system for the United States. This study is an assessment of GPS system integrity and navigation performance using monitored satellite signals and processed navigation data, as well as the analyzed data content of advisory and health messages. Improvements to the integrity of a basic GPS system using additional signal processing, aiding, and enhanced monitoring techniques are discussed. Author (GRA)

N86-18285# Joint Publications Research Service, Arlington, Va.
TRASSA SYSTEM INTRODUCTION CAUSES VARIOUS PROBLEMS
T. Boyarskiy *In its* USSR Report: Transportation (JPRS-UTR-85-014) 4 Dec. 1985 p 3-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 31 Aug. 1985 p 3 (For primary document see N86-18284 09-01)
Avail: NTIS HC A04

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-18316# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
EFFECTIVENESS OF FATIGUE LIFE ENHANCING FASTENERS

IN THE DESIGN AND REWORK OF AIRCRAFT STRUCTURES Final Report, Feb. 1982 - Feb. 1985
P. A. Kozel 28 Feb. 1985 31 p
(F41-420)
(AD-A159676; NADC-85112-60) Avail: NTIS HC A03/MF A01 CSCL 13/5

Fatigue life data were obtained for four different types of fatigue life enhancing (FLE) fasteners installed in new uncracked holes and in reworked, pre-cracked holes. The first condition represented a new design where the FLE fasteners are installed during production. The second condition represented a structural rework in which fastener holes are reamed to a larger size to remove fatigue or fretting damage but might still contain a small undetected crack. Results showed that the FLE fasteners produced approximately the same overall fatigue life in the new design and the rework condition and provided a significant increase in life compared to conventional non-FLE fasteners. Tests were performed with 7075-T6 aluminum alloy under spectrum loading typical of a Navy fighter/attack type of aircraft. For the rework condition, the pre-crack size was limited to .03 inch (.76mm). Flush head fasteners were used in all tests. GRA

N86-18317# Army Aviation Research and Development Command, Moffett Field, Calif. Aeroflightdynamics Directorate.
EFFECTS OF BLADE-TO-BLADE DISSIMILARITIES ON ROTOR-BODY LEAD-LAG DYNAMICS
M. J. McNulty 1985 29 p
(AD-A160497) Avail: NTIS HC A03/MF A01 CSCL 01/3

Small blade-to-blade property differences are investigated to determine their effects on the behavior of a simple rotor-body system. An analytical approach is used which emphasizes the significance of these effects from the experimental point of view. It is found that the primary effect of blade-to-blade dissimilarities is the appearance of additional peaks in the frequency spectrum which are separated from the conventional response modes by multiples of the rotor speed. These additional responses are potential experimental problems because when they occur near a mode of interest they act as contaminant frequencies which can make damping measurements difficult. The effects of increased rotor-body coupling and a rotor shaft degree of freedom act to improve the situation by altering the frequency separation of the modes. Author (GRA)

N86-18318# Mechanical Technology, Inc., Latham, N. Y.
INTERACTIVE EFFECTS OF HIGH- AND LOW-FREQUENCY LOADING ON FATIGUE Final Technical Report, 1 Sep. 1982 - 31 Dec. 1984
A. Petrovich May 1985 158 p
(Contract F33615-82-C-5056)
(AD-A160601; MTI-85TR48; AFWAL-TR-85-4045) Avail: NTIS HC A08/MF A01 CSCL 20/11

This report describes the results of a program to measure and model the controlling mechanisms of fatigue and creep-crack growth behavior of a typical aircraft engine disk material under high frequency/low frequency loading cycles. The goal of the program is to provide a basis for damage-tolerant design of aircraft engine components under combined high and low frequency loading. Author (GRA)

N86-18319# Army Research and Technology Labs., Moffett Field, Calif.
AN INVESTIGATION OF THE USE OF BANDWIDTH CRITERIA FOR ROTORCRAFT HANDLING-QUALITIES SPECIFICATIONS
C. L. Blanken, C. C. Bivens, and M. S. Whalley 1985 15 p
Presented at the International Conference, Rotorcraft Basic Research, American Helicopter Society, Research Triangle Park, N.C., 19-21 Feb. 1985
(AD-A160664) Avail: NTIS HC A02/MF A01 CSCL 01/1

The objective of this study was to investigate bandwidth concepts for deriving rotorcraft handling-qualities criteria from data obtained in two simulator experiments conducted at the Aeromechanics Laboratory. The first experiment was an investigation of the effects of helicopter vertical-thrust-response characteristics on handling qualities; the second experiment investigated the effects of helicopter yaw-control-response characteristics. In both experiments, emphasis was on low-speed Nap-of-the-Earth (NOE) tasks. GRA

N86-18320# Aeronautical Research Labs., Melbourne (Australia).
THE TEST LOADS SEQUENCES APPLIED TO THE CT4 FULL SCALE FATIGUE TEST
L. R. Gratzer Jun. 1985 25 p
(AD-A160736; ARL-STRU-TM-415) Avail: NTIS HC A02/MF A01 CSCL 01/1

This document presents an outline of the derivation of the test load sequences applied to the CTA full scale fatigue test. GRA

N86-18321# Aeronautical Research Labs., Melbourne (Australia).
RESONANCE FATIGUE TEST OF THE EMPENNAGE OF A CT4 AIRCRAFT
I. Anderson and L. Molent Jun. 1985 36 p
(AD-A160749; ARL/STRUC-TM-412) Avail: NTIS HC A03/MF A01 CSCL 01/3

A resonance fatigue test was carried out on the rear fuselage and empennage of a CT4 aircraft. The structure was supported in a reaction frame, and was excited at the resonant frequency of the fuselage torsional mode (9 Hz) by electromagnetic shakers connected to the tailplane. The loading spectrum applied was based on strain sequence data obtained from flight trials. Regular inspections of the structure were carried out, and several areas on the rear fuselage and empennage were identified as being prone to fatigue damage. GRA

N86-18322# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
PRELIMINARY AIRWORTHINESS EVALUATION OF THE AH-1S (MODERNIZED COBRA) WITH THE HELLFIRE, TOW, AND STINGER MISSILES INSTALLED Final Report, 17 May - 27 Jul. 1984
R. MacMullin, G. T. Downs, E. Tavares, J. S. Lawrence, and L. L. Todd Oct. 1984 188 p
(AD-A160862; USAAEFA-84-11) Avail: NTIS HC A09/MF A01 CSCL 01/2

The aircraft was operated at gross weights up to 10,400 lb, up to 11,340 feet density altitude and at a lateral center of gravity (cg) range from one inch right to approximately three inches left. The asymmetric loadings were caused by the various combinations of armament configurations. The change in equivalent flat plate area compared to the clean aircraft for each configuration varied as a function of airspeed. At 130 knots true airspeed (KTAS), the increased flat plate area was 4.2 square feet for the Launcher configuration, 4.8 square feet for the TOW configuration, 6.6 square feet for the Hellfire and Hellfire/TOW configurations, and 7.8 square feet for the Stinger/Hellfire/TOW configuration. The increase in flat plate area for the Stinger/Hellfire/TOW configuration reduced maximum level flight speed for normal rated power by approximatley 8 KTAS. With the exception of the two armament related shortcomings listed below, the handling qualities and the reactions to system failures of the AH-1S (MC) were not significantly changed by the asymmetric loading of the various armament configurations. Four shortcomings were noted and follow in decreasing order of importance: (1) the high left rolling response to a sudden engine failure at power settings above 75% torque; (2) the undesirable maneuvering stability characteristics above 1.4 g's; (3) insufficient left pedal margin available in right sideward flight above 10 knots in the Hellfire and Hellfire/TOW configurations; and (4) insufficient left pedal margin available for ball-centered forward flight below 30 KCAS in the armament configurations with left lateral cf offset. A CAUTION is recommended for inclusion in the operator's manual. GRA

N86-18323# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
19 Dec. 1985 110 p Transl. into ENGLISH from various Russian articles

(JPRS-UTR-85-015) Avail: NTIS HC A06

Developments in transportation are reported from the Soviet Union. Among the topics discussed are: (1) civil aviation; (2) motor vehicles and highways; (3) rail systems; (4) maritime and river fleets; (5) ports and transshipment centers; (6) intersector network development; and (7) experimental systems. For individual titles, see N86-18324 through N86-18325.

N86-18324# Joint Publications Research Service, Arlington, Va.
SUKHOY DESIGN BUREAU BUILDS SPORT PLANE MADE OF PLASTIC
V. Belikov *In its* USSR Report: Transportation (JPRS-UTR-85-015) 19 Dec. 1985 p 4-5 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 16 Aug. 1985 p 3 (For primary document see N86-18323 09-05)
Avail: NTIS HC A06

The design and construction of the Soviet Su-26 aircraft is discussed. The Su-26 is a sports aircraft which makes extensive use of plastic materials in its construction. G.L.C.

N86-18325# Joint Publications Research Service, Arlington, Va.
FEATURES OF PLANNED IL-96-300, IL-114 AIRCRAFT
Genrikh Vasilyevich Novozhilov *In its* USSR Report: Transportation (JPRS-UTR-85-015) 19 Dec. 1985 p 6-11 Transl. into ENGLISH from Pravda (Moscow, USSR), 27 Oct. 1985 p 6 (For primary document see N86-18323 09-05)
Avail: NTIS HC A06

In accordance with the tradition, the general designer directly guides any new aircraft up to the conclusion of state testing, but this does not mean that he stops watching the aircraft closely during operation as well. Such an aircraft is now in the Experimental Design Bureau imeni S. Ilyushin--the Il-96-300 long-range mainline passenger aircraft. It is designed to carry 300 passengers, baggage, mail and freight on long-distance routes--up to 9,000 kilometers--with heavier passenger flows. Provision is being made for use of the aircraft on international routes, including those up to 11,000 kilometers in length. G.L.C.

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-18326 New South Wales Univ., Sydney (Australia). School of Chemical Engineering and Industrial Chemistry.
CATALYTIC COMBUSTION OF GAS TURBINES: PROCESS MODELLING AND KINETIC STUDY OF ISO-OCTANE OXIDATION Ph.D. Thesis Abstract Only
Thomas Wha Seung Ahn 1983 3 p
Avail: Issuing Activity

Mathematical models have been developed to predict the behavior of monolith catalytic combustor operating under typical gas turbine conditions. The models are both for transient and steady-state operation, and account for: (1) homogeneous and heterogeneous reactions; (2) convective heat and mass transport; (3) conduction and radiation heat transfer in solid phase; and (4) variations of velocity and property in gas phase. Gas velocity and physical property variations along the monolith have an important effect on model predictions. Although radiation and conduction significantly effect temperature profiles, they have little influence on overall conversion. A comparison of model predictions with limited experimental data available shows encouraging agreement. Author

N86-18327# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AXIAL COMPRESSOR REVERSED FLOW PERFORMANCE Ph.D. Thesis
R. N. Gamache May 1985 454 p
(AD-A160773; AD-E401375; AFIT/CI/NR-85-108D) Avail: NTIS HC A20/MF A01 CSCL 13/7

The results of an analytical study of compression system forced response and an experimental investigation of the reversed flow performance of a three-stage axial-flow compressor are presented. A one dimensional lumped parameter description of the dynamics of a simple compression system was found to be capable of simulating the circumstances under which the imposition of a periodic external excitation can force a normally surging compression system into a small amplitude oscillation about the nonrecoverable stall point. This forced oscillation can then decay into a system stagnation upon termination of the external excitation. It was also found, however, that predictions of compression system forced response behavior were heavily dependent upon the model used for defining compressor post-stall performance, both steady state and transient, especially in the reverse flow and mass flow and shutoff operating regimes. The complete set of pressure rise and torque characteristics of a three-stage axial-flow compressor are presented. Two stable stalled flow modes have been observed in the multi-stage axial compressor builds tested: (1) rotating stall, and (2) full annulus stalled flow. The transition to each of the two stalled modes is accompanied by a discontinuous drop in overall time-averaged pressure rise and torque performance. Although a large hysteresis is associated with the unstall-rotating stall transition (which occurs at a relatively large positive flow coefficient), the transition from rotating stall to the annulus stall mode (which occurs at a negative flow coefficient near shutoff) has no hysteresis. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

No abstracts in this category.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-18328*# National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL FACILITIES CATALOGUE. VOLUME 2: AIR-BREATHING PROPULSION AND FLIGHT SIMULATORS
Frank E. Penaranda and M. Shannon Freda Dec. 1985 242 p 2 Vol.
(NASA-RP-1133; NAS 1.61:1133) Avail: NTIS HC A11/MF A01

CSCL 14B

Volume two of the facilities catalogue deals with Airbreathing Propulsion and Flight Simulation Facilities. Data pertinent to managers and engineers are presented. Each facility is described on a data sheet that shows the facility's technical parameters on a chart and more detailed information in narratives. Facilities judged comparable in testing capability are noted and grouped together. Several comprehensive cross-indexes and charts are included. Author

N86-18329*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CURRENT WIND TUNNEL CAPABILITY AND PLANNED IMPROVEMENTS AT LEWIS RESEARCH CENTER
David N. Bowditch [1986] 24 p refs Prepared for presentation at the 14th Aerodynamic Testing Conference, West Palm Beach, Fla., 5-7 Mar. 1986; sponsored by AIAA
(NASA-TM-87190; E-2844; NAS 1.15:87190) Avail: NTIS HC A02/MF A01 CSCL 14B

As the propulsion and power generation center of NASA, Lewis has designed its wind tunnels for propulsion research. Therefore, the 8 by 6 Foot Supersonic Wind Tunnel and the 10 by 10 Foot Supersonic Wind Tunnel provide the capability to test operating propulsion systems from Mach 0.4 to 3.5. The 9 by 15 Foot Wind Tunnel can investigate propulsion installation problems at the lower takeoff and landing speeds and provides an excellent anechoic environment to measure propeller and fan noise. The Lewis Central Air System provides steady air supplies to 450 psi, and exhaust to 3 in. of mercury absolute, which are available to the wind tunnels for simulation of jets and engine induced flows. The Lewis Icing Research Tunnel is the largest in the free world that can produce icing conditions throughout the year. Rehabilitation of the Altitude Wind Tunnel at Lewis would allow testing of propulsion systems in the upper left hand corner which would be a unique capability. Also, in a mothballed state at Lewis, the Hypersonic Tunnel Facility could provide the best simulation of nonvitiated Mach 5-7 test conditions available. Studies are currently being made of the Lewis facilities to identify enhancements of their research potential for the 1990's and beyond. Author

N86-18330# National Aeronautical Establishment, Ottawa (Ontario).
CALIBRATION AND USE OF FIVE-HOLE FLOW DIRECTION PROBES FOR LOW SPEED WIND TUNNEL APPLICATION
R. H. Wickens and C. D. Williams Jul. 1985 49 p
(AD-A160262; NAE-AN-29; NRC-24468) Avail: NTIS HC A03/MF A01 CSCL 14/2

This note describes a method of calibration and use of five-hole flow direction probes. When used in complex three-dimensional mixed flows, the probe will furnish flow directions, velocity components and total pressures. The method described in this note is intended for the use of the wind tunnel project engineer in determining flow direction characteristics of various model configurations. GRA

N86-18331# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ANALYSIS OF HEAT-TRANSFER MEASUREMENTS FROM TWO AEDC WIND TUNNELS ON THE SHUTTLE EXTERNAL TANK Final Report, 1 Oct. 1982 - 30 Nov. 1983
K. W. Nutt Oct. 1985 82 p Prepared in cooperation with Calspan Field Services, Inc., Arnold AFS, Tenn.
(AD-A160406; AEDC-TR-84-3) Avail: NTIS HC A05/MF A01 CSCL 20/13

Previous aerodynamic heating tests were conducted in the AEDC/VKF Supersonic Wind Tunnel (A) to aid in defining the design thermal environment for the Space Shuttle external tank. The quality of these data has been under discussion because of the effects of low tunnel enthalpy and slow model-injection rates. Recently the AEDC/VKF Hypersonic Wind Tunnel (C) was modified to provide a Mach 4 capability that has significantly higher tunnel enthalpy with more rapid model-injection rates. Tests were conducted in Tunnel C at Mach 4 to obtain data on the external tank for comparison with Tunnel A results. Data were obtained on a 0.0175-scale model of the Space Shuttle Integrated Vehicle at Re/ft = 4 million with the tunnel stagnation temperature varying from 740 to 1440 R. Model attitude varied from an angle of attack of -5 to 5 deg and an angle of sideslip of -3 to 3 deg. One set of data was obtained in Tunnel C at Re/Ft = 69 million for comparison with flight data. This report presents data comparisons betwen the two tunnels for numerous regions on the external tank. Tunnel-to-flight data comparisons are presented for a small number of locations on the nose of the external tank. GRA

N86-18332# Royal Aircraft Establishment, Farnborough (England).
THE MINITUFT SURFACE FLOW VISUALISATION METHOD: EXPERIENCE OF USE IN THE RAE 5m PRESSURISED LOW-SPEED WIND TUNNEL
D. G. Dobney, P. Hanson, and S. P. Fiddes Apr. 1985 21 p
(AD-A160715; RAE-TM-AERO-2038; DRIC-BR-96537) Avail: NTIS HC A02/MF A01 CSCL 14/2

The development and use of a minituft surface flow visualization technique in the RAE 5m Pressurized Low-Speed Wind Tunnel is described. The method uses very fine nylon monofilaments to show surface flow direction. These tufts are made visible by coating them in a fluorescent dye and then illuminating them with a powerful ultra-violet light source. Because of their small size, a large number of tufts may be used without interfering with the flow to a great extent. However, it is shown that if accurate force measurements are required, then it is advisable to test the model in the absence of tufts. GRA

N86-18333# Air Force Human Resources Lab., Brooks AFB, Tex.
FLIGHT TRAINING SIMULATORS. EFFECTS OF TERRAIN ACCURACY ON SIMULATED RADAR IMAGE QUALITY Interim Technical Paper, Sep. 1984 - May 1985
P. M. Crane Sep. 1985 18 p
(AF Proj. 614)
(AD-A160905; AFHRL-TP-85-28) Avail: NTIS HC A02/MF A01 CSCL 17/9

This experiment evaluated the effect of terrain vertical accuracy on the quality and perceived training effectiveness of simulated radar images. Seven Air Force navigators judged the quality and training value of digital radar landmass imagery produced at six different levels of terrain vertical accuracy. Each image represented the simulated ground mapping radar image of a mountainous area viewed from an altitude of 10,000 feet. The results indicated that: (1) increasing terrain vertical accuracy above the current production standard did not significantly increase either the judged quality of the imagery or its perceived training value; and (2) decreasing terrain vertical accuracy below the current production standard significantly increased either the judged quality of the imagery or the perceived training value of the imagery. Although the results of this experiment do not provide any justification for more stringent accuracy requirements, it is recommended that this experiment be replicated using lower altitude imagery in which the effects of terrain evaluation are more pronounced. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-18334*# Wyle Labs., Inc., Huntsville, Ala.
ACCOMMODATION REQUIREMENTS FOR MICROGRAVITY SCIENCE AND APPLICATIONS RESEARCH ON SPACE STATION Interim Report, 24 May - 24 Dec. 1985
Mark L. Uhran, Lawrence R. Holland, and William O. Wear Dec. 1985 225 p
(Contract NAS3-24654)
(NASA-CR-175038; NAS 1.26:175038; JN67801) Avail: NTIS HC A10/MF A01 CSCL 22A

Scientific research conducted in the microgravity environment of space represents a unique opportunity to explore and exploit

the benefits of materials processing in the virtual absence of gravity induced forces. NASA has initiated the preliminary design of a permanently manned space station that will support technological advances in process science and stimulate the development of new and improved materials having applications across the commercial spectrum. A study is performed to define from the researchers' perspective, the requirements for laboratory equipment to accommodate microgravity experiments on the space station. The accommodation requirements focus on the microgravity science disciplines including combustion science, electronic materials, metals and alloys, fluids and transport phenomena, glasses and ceramics, and polymer science. User requirements have been identified in eleven research classes, each of which contain an envelope of functional requirements for related experiments having similar characteristics, objectives, and equipment needs. Based on these functional requirements seventeen items of experiment apparatus and twenty items of core supporting equipment have been defined which represent currently identified equipment requirements for a pressurized laboratory module at the initial operating capability of the NASA space station. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-18335# Ballistic Research Labs., Aberdeen Proving Ground, Md.
POLAR MOMENTS AND BALLISTIC PROPERTIES OF TRI-FOIL PENETRATORS Final Technical Report
D. N. Hansen Sep. 1985 25 p
(DA Proj. 1L1-62618-AH-80)
(AD-A159870; BRL-TR-2677) Avail: NTIS HC A02/MF A01 CSCL 19/4

Early design tools for tri-foils involved the use of ersatz structures for analysis purposes. This paper presents a method that employs the actual shape to calculate the polar moments of inertia relative to a rod of equal cross sectional area. The method also degrades at its extrema into two logical shapes for this calculation, namely the circle and the equilateral triangle. A ballistic test was performed on a tri-foil having an effective aspect ratio of 14. Performance comparisons with a rod of aspect ratio 16 shows the ballistic performance of the tri-foil to be of the same order but marginally poorer. Systems considerations using tri-foils could make the tri-foil more attractive than the rod. GRA

N86-18336# Air Force Armament Lab., Eglin AFB, Fla.
ESTIMATING THE MAGNUS MOMENT EFFECT ON STABILITY OF 30-mm BOOMED PROJECTILES Final Technical Report, Dec. 1984 - Feb. 1985
R. H. Byers and K. Cobb Aug. 1985 36 p
(AF Proj. 250-2)
(AD-A160003; AD-E801207; AFATL-TR-85-69) Avail: NTIS HC A03/MF A01 CSCL 19/4

This report documents the results obtained from a comparison of free-flight spark range tests and PRODASMAGNUS computer stability results for 30mm spin stabilized projectiles. Two configurations were considered, each with the same boom diameter of 0.5, 1.0 inch and 1.25 inch boom lengths. The results show that PRODASMAGNUS can accurately predict the effects of a boom's presence on projectile stability. GRA

N86-18337# Ballistic Research Labs., Aberdeen Proving Ground, Md.
PNS (PARABOLIZED NAVIER-STOKES) COMPUTATIONS FOR SPINNING AND FIN-STABILIZED PROJECTILES AT SUPERSONIC VELOCITIES
P. Weinacht, B. J. Guidos, L. D. Kayser, and W. B. Sturek Sep. 1985 42 p
(DA Proj. 1L1-62618-AH-80)
(AD-A160393; BRL-MR-3464) Avail: NTIS HC A03/MF A01 CSCL 19/4

The Parabolized Navier-Stokes (PNS) computational technique has been applied to calculate the three-dimensional viscous flow about a standard spinning projectile and a long L/D finned projectile. The results for the spinning projectile are compared with past PNS computations and wind tunnel pressure and force measurements in order to benchmark the update version of the code. Excellent agreement is found and the improvements to the code are shown to provide greater computational efficiency. Results are then presented for the finned projectile configuration and comparison made with predictions from an inviscid code and values from a data base compiled from range firings. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-18338*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DEVELOPMENT AND APPLICATION OF DYNAMIC SIMULATIONS OF A SUBSONIC WIND TUNNEL
John R. Szuch, Gary L. Cole, Robert C. Seidel, and Dale J. Arpasi [1986] 16 p refs Prepared for presentation at the 14th Aerodynamic Testing Conference, West Palm Beach, Fla., 5-7 Mar. 1986; sponsored by AIAA
(NASA-TM-87211; E-2870; NAS 1.15:87211) Avail: NTIS HC A02/MF A01 CSCL 14B

Efforts are currently underway at NASA Lewis to improve and expand ground test facilities and to develop supporting technologies to meet anticipated aeropropulsion research needs. Many of these efforts have been focused on a proposed rehabilitation of the Altitude Wind Tunnel (AWT). In order to insure a technically sound design, an AWT modeling program (both analytical and physical) was initiated to provide input to the AWT final design process. This paper describes the approach taken to develop analytical, dynamic computer simulations of the AWT, and the use of these simulations as test-beds for: (1) predicting the dynamic response characteristics of the AWT, and (2) evaluating proposed AWT control concepts. Plans for developing a portable, real-time simulator for the AWT facility are also described. Author

N86-18339# Air Force Geophysics Lab., Hanscom AFB, Mass.
STS (SPACE TRANSPORTATION SYSTEM) LAUNCH-INDUCED VIBRATION FORECASTS FOR VANDENBERG AFB
J. C. Battis 7 Oct. 1985 9 p
(AF Proj. 7600)
(AD-A160561; AD-E301825; AFGL-TR-85-0227) Avail: NTIS HC A02/MF A01 CSCL 16/1

Launch-induced vibration environment forecasts have been made for locations in major Ground Support System (GSS) structures at the Vandenberg AFB Shuttle launch facility (V23). These forecasts were made by coupling a model for the Shuttle rocket acoustics with observed vibrations of GSS structures due to charge detonations over the Launch Mount. The forecasts indicate that launch environments at two locations will exceed levels of concern established for this study. First, the potential exists for pounding between the Payload Changeout Room (PCR) and the transfer tower of the Payload Preparation Room (PPR). Second, accelerations exceeding 1 g are forecast for the floor of the Orbiter Functional Simulator Room (OFS) in the Administration Building (AB). At all other locations motion levels were found to be significantly below the criteria established for the respective sites. Author (GRA)

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-18340*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TELESCOPING SPACE STATION MODULES
Robert D. Witcofski Jul. 1984 14 p
(NASA-TM-86253; NAS 1.15:86253) Avail: NTIS
HC A02/MF A01 CSCL 22B

A design concept is described wherein telescoping space station modules would be utilized to nearly double the useful volume onboard a station. Methods for utilizing the concept to obtain enchanced protection from space debris and radiation are described. The amenability of the concept to variation in station configuration, assembly, and disassembly is discussed. A modification of the concept which could provide flexibility in the manner in which the Shuttle Orbiter is docked with the station and enhance collision avoidance during such maneuvers is described. Author

N86-18866# Space Vector Corp., Northridge, Calif.
HIGH-ALTITUDE RECOVERY PROGRAM (HARP)
R. E. Scarboro, E. F. McKenna (Air Force Geophysics Lab., Bedford, Mass.), and R. E. Jacobs (Air Force Geophysics Lab., Bedford, Mass.) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 345-349 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18867# Centro Tecnico Aerospacial, San Jose dos Campos (Brazil). Inst. de Atividades Espaciais.
ROCKET MOTOR CASES IN 300 M STEEL: A PIONEER DEVELOPMENT PERFORMED IN THE BRAZILIAN SPACE PROGRAM
J. Boscov, P. Damanet, O. Pereira (Electrometal Acos Finos S/A, Sumare, Brazil), A. A. Guimaraes (Electrometal Acos Finos S/A, Sumare, Brazil), and E. M. Vieira (Electrometal Acos Finos S/A, Sumare, Brazil) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 351-359 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18868# Saab-Space A.B., Linkoeping (Sweden).
THE SAAB SPINNING ROCKET ATTITUDE CONTROL (SPIN-RAC): AN ATTITUDE CONTROL SYSTEM FOR OBTAINING LOW IMPACT DISPERSION
L. Hal. and A. Helmersson *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 361-364 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-18364# Technische Univ., Munich (West Germany).
THE MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) MISSIONS AND GEOSCIENTIFIC RESULTS
J. Bodechtel, D. Meissner (MBB G.m.b.H., Ottobrunn, West Germany), P. Seige (DFVLR), H. Winkenbach (DFVLR), and J. Zilger *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 87-90 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-18341*# Ohio State Univ., Columbus. ElectroScience Lab.
THE ROLE OF SERVICE AREAS IN THE OPTIMIZATION OF FSS ORBITAL AND FREQUENCY ASSIGNMENTS
Curt A. Levis, Cou-Way Wang, Yoshikazu Yamamura, Charles H. Reilly, and David J. Gonsalvez Dec. 1985 31 p refs
(Grant NAG3-159)
(NASA-CR-176488; NAS 1.26:176488; TR-716548-3) Avail: NTIS
HC A03/MF A01 CSCL 17B

A relationship is derived, on a single-entry interference basis, for the minimum allowable spacing between two satellites as a function of electrical parameters and service-area geometries. For circular beams, universal curves relate the topocentric satellite spacing angle to the service-area separation angle measured at the satellite. The corresponding geocentric spacing depends only weakly on the mean longitude of the two satellites, and this is true also for elliptical antenna beams. As a consequence, if frequency channels are preassigned, the orbital assignment synthesis of a satellite system can be formulated as a mixed-integer programming (MIP) problem or approximated by a linear programming (LP) problem, with the interference protection requirements enforced by constraints while some linear function is optimized. Possible objective-function choices are discussed and explicit formulations are presented for the choice of the sum of the absolute deviations of the orbital locations from some prescribed ideal location set. A test problem is posed consisting of six service areas, each served by one satellite, all using elliptical antenna beams and the same frequency channels. Numerical results are given for the three ideal location prescriptions for both the MIP and LP formulations. The resulting scenarios also satisfy reasonable aggregate interference protection requirements. Author

N86-18342*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COMPARISON OF 8.415-, 32.0- AND 565646-GHz DEEP SPACE TELEMETRY LINKS
R. M. Dickinson 15 Oct. 1985 71 p refs
(Contract NAS7-100)
(NASA-CR-176532; JPL-Pub-85-71; NAS 1.26:176532) Avail: NTIS HC A04/MF A01 CSCL 09F

An economic and performance comparison is made of spacecraft telecommunication links at 8.415, 32.0, and 565646 GHz (0.53-micron wavelength) for the return of 3.43 x 10 to the 11th power bits from a Saturn Orbiter/Titan Probe mission in year 2000. Technical performance and costs for both ends of the links are included. Spacecraft antenna or telescope efficiencies, pointing losses, ground-based or Earth-orbiting relay terminals efficiencies, noise temperatures, recurring and nonrecurring engineering, and maintenance and operations costs are modeled. Weather effects, dc-to-RF or laser power conversion efficiencies, gravity and other environment distortions gain reductions, and the cost of pointing and tracking are analyzed. The effort is focused primarily on the microwave frequency links. There are large uncertainties in the cost results, but conclusions indicate that for a mid-1990's launch, the Ka-band system is as cost effective as X-band. The Ka-band system has a data rate advantage as compared to the X-band system for the same dc power input to the spacecraft. The magnitude of the advantage is a complex function of the weather at the DSN stations and the elevation angle of the ground antenna. A simple numerical comparison of the advantage is difficult and curves are provided. The optical frequency link is more costly based on the launch-to-orbit costs for the orbiting terminal. A more detailed study of the optical system is recommended to quantify astrometric tracking benefits and improve the accuracy of the cost estimate. Author

N86-18343*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BIT ERROR RATE TESTING OF A PROOF-OF-CONCEPT MODEL BASEBAND PROCESSOR
John B. Stover and Gene Fujikawa Jan. 1986 41 p refs
(NASA-TM-87206; E-2861; NAS 1.15:87206) Avail: NTIS HC A03/MF A01 CSCL 09F

Bit-error-rate tests were performed on a proof-of-concept baseband processor. The BBP, which operates at an intermediate frequency in the C-Band, demodulates, demultiplexes, routes, remultiplexes, and remodulates digital message segments received from one ground station for retransmission to another. Test methods are discussed and test results are compared with the Contractor's test results. Author

N86-18344# Naval Research Lab., Washington, D. C.
ASTRO-ARRAY: A SPACE-BASED, COHERENT RADIO INTERFEROMETER ARRAY
K. W. Weiler, J. H. Spencer, and K. J. Johnston 31 Oct. 1985 49 p
(RR0-3406)
(AD-A160763; AD-E401375; NRL-MR-5657) Avail: NTIS HC A03/MF A01 CSCL 03/2

With the proven techniques of radio astronomy and the rapidly advancing technology of space science, it is clear that the expansion of radio astronomy arrays beyond the limits of the Earth's surface is called for. Therefore, a preliminary discussion of the design and capability of a purely space based array is presented. The science which can be done with such a high resolution, high sensitivity radio telescope array is discussed and a number of the parameters of a system are developed. A coherent interferometer array is possible with reasonable extensions of present technology and such a telescope will lead to major advances in the areas of astrometry, the study of radio stars and radio supernovae, the investigation of astronomical masers, and the determination of the properties of the Milky Way nucleus and the active regions of normal galaxies, radio galaxies, and quasars. It is clear that an array of high orbit radio antennas linked to the low orbit space station represents the next logical step in the progression to continually higher resolution and sensitivity for radio astronomy. GRA

N86-18345# European Space Agency, Paris (France).
THE OTS: SIXTH YEAR IN ORBIT Progress Report
Feb. 1985 164 p
Avail: NTIS HC A08/MF A01

The Orbital Test Program and operational uses of OTS, particularly for European television transmission, before its use by EUTELSAT ended in December 1983 are described. The performance of spacecraft subsystems is reviewed. End of service tests were conducted, and the satellite proceeded, fully functional in virtually all aspects, into its seventh year in orbit; it continues to provide long-life data, while having, in 1983, overlapped the entry into service of the European communications satellite ECS-F1. Author (ESA)

N86-18346# European Space Agency, Paris (France).
THE OTS: SEVENTH YEAR IN ORBIT Progress Report
D. Howle, comp., L. vanHoltz, P. Leggett, S. Strijk, E. Ashford, and H. Agterhuis, comp. Aug. 1985 75 p
Avail: NTIS HC A04/MF A01

The performance during the seventh year in orbit of the OTS spacecraft subsystems is described. The satellite proceeded fully functional in virtually all aspects throughout its seventh year in orbit and continues to provide long-life data. Following successful execution of the main part of the end of service test program on subsystems, a few of the most risky ones e.g., thermal control coatings, and attitude control are still outstanding and the satellite is kept available for additional technological platform tests before being boosted out of the geosynchronous orbit. Author (ESA)

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-18347*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN ANALYTICAL INVESTIGATION OF A CONCEPTUAL DESIGN FOR THE STATION TRANSVERSE BOOM ROTARY JOINT STRUCTURE
Mark S. Lake and Harold G. Bush Jan. 1986 34 p refs
(NASA-TM-87665; NAS 1.15:87665) Avail: NTIS HC A03/MF A01 CSCL 22B

A study was conducted to define an annular ring, discrete roller assembly concept for the space station transverse boom rotary joint. The concept was analyzed using closed-form and finite element techniques, to size structural members for a range of joint diameters and to determine necessary equivalent stiffnesses for the roller assemblies. Also, a mass study of the system was conducted to determine its practicality, and maximum loads in the joint were identified. To obtain the optimum balance between high stiffness and low structural mass in the design of the rotary joint, it is necessary to maximize the diameter of the annular ring within operational constraints (i.e., shuttle cargo bay size). Further, a rotary joint designed with the largest possible ring diameter will result in minimum operational loads in both the roller assemblies and the transition truss members while also allowing minimum design stiffnesses for the roller assemblies. Author

N86-18348*# Martin Marietta Aerospace, Denver, Colo.
SPACE STATION COMMON MODULE POWER SYSTEM NETWORK TOPOLOGY AND HARDWARE DEVELOPMENT
David M. Landis Apr. 1985 21 p
(Contract NAS8-36583)
(NASA-CR-178587; NAS 1.26:178587; MCR-85-621-000) Avail: NTIS HC A02/MF A01 CSCL 22B

Candidate power system newtork topologies for the space station common module are defined and developed and the necessary hardware for test and evaluation is provided. Martin Marietta's approach to performing the proposed program is presented. Performance of the tasks described will assure systematic development and evaluation of program results, and will provide the necessary management tools, visibility, and control techniques for performance assessment. The plan is submitted in accordance with the data requirements given and includes a comprehensive task logic flow diagram, time phased manpower requirements, a program milestone schedule, and detailed descriptions of each program task. Author

N86-18349# Hughes Research Labs., Malibu, Calif.
FLIGHT MODEL DISCHARGE SYSTEM Report, Sep. 1983 - Oct. 1984
R. R. Robson and W. S. Williamson Mar. 1985 100 p
(Contract F19628-83-C-0143)
(AD-A160434; AFGL-TR-85-0044; SR-1) Avail: NTIS HC A05/MF A01 CSCL 20/3

A breadboard design for a Flight Model Discharge System (FMDS) to prevent charging of spacecraft in geosynchronous orbit has been performed. Operational characteristics of the entire system are presented, including the electrostatic analyzer, surface potential monitor, transient pulse monitor, plasma source, and microprocessor-based controller. Design considerations that led to the final system configuration are also presented. GRA

N86-18350# Air Force Geophysics Lab., Hanscom AFB, Mass.
CRRES/SPACERAD (COMBINED RELEASE AND RADIATION EFFECTS SATELLITE/SPACE RADIATION EFFECTS PRO-

GRAM) EXPERIMENT DESCRIPTIONS Environmental Research Papers, 1 Oct. 1984 - 15 Jan. 1985
M. S. Gussenhoven, E. G. Mullen, and R. C. Sagalyn 24 Jan. 1985 196 p
(AD-A160504; AFGL-TR-85-0017; AFGL-ERP-906) Avail: NTIS HC A09/MF A01 CSCL 22/1

The Space Radiation Effects (SPACERAD) Program is a comprehensive space program whose purposes, among other things, are to: (1) measure radiation-induced single event upsets (SEUs) and total-dose degradation of state-of-the-art microelectronic devices (to include VHSIC and GaAs devices) in a known space environment; (2) space qualify advanced technology microelectronic devices for operational DOD satellite systems; and (3) update the static models of the radiation belts and develop the first dynamic models of the high energy particle populations in the near-Earth environment. To accomplish these goals, AFGL has developed a space experiment complement consisting of a microelectronics experiment package (MEP), dosimeters, energetic-particle detectors, space plasma detectors, and wave and field (electric and magnetic) instruments. The experiments are to be flown as a package on the Joint Air Force/NASA Combined Release and Radiation Effects Satellite (CRRES) in FY87. The MEP will record SEUs and radiation degradation as a function of orbital position, particle type, device geometry, device technology, device material, device operating conditions, etc. The other instrumentation will be used to simultaneously measure the space environment. This document gives a brief description of the SPACERAD Program and the instruments to be flown on CRRES. GRA

N86-18842# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
THE TETHERED SATELLITE SYSTEM PROJECT
M. Dobrowolny *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 211-216 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18860*# National Aeronautics and Space Administration, Washington, D.C.
EXTENDING THE CAPABILITIES OF SOUNDING ROCKET CLASS EXPERIMENTS
J. A. Glaab *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 315-320 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18872*# Stanford Univ., Calif. Space, Telecommunications and Radioscience Lab.
SPACE RESEARCH IN THE ERA OF THE SPACE STATION
P. M. Banks *In* ESA The Seventh ESA Symposium On European Rocket and Balloon Programs and Related Research 1985 p 377-379 Sponsored in part by ESA (For primary document see N86-18811 09-46)
(Grant NAGw-235)
Avail: NTIS HC A18/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-18351# European Space Agency, Paris (France).
PROCEEDINGS OF THE EARSeL/ESA SYMPOSIUM ON EUROPEAN REMOTE SENSING OPPORTUNITIES: SYSTEMS, SENSORS, AND APPLICATIONS
Norman Longdon, comp. and Olga Melita, comp. Jun. 1985 267 p refs Partly in ENGLISH and FRENCH Proc. held in Strasbourg, 31 Mar. - 3 Apr. 1985; sponsored by Council of Europe, Commission of the European Communities, CNES and Strasbourg University
(ESA-SP-233; ISSN-0379-6566) Avail: NTIS HC A12/MF A01

Remote sensing platforms and sensors; collection, processing, and dissemination of remotely sensed data in Europe; Spacelab Metric Camera experiments; the Modular Opto-electronic Multispectral Scanner; and remote sensing applications to thematic mapping, pollution monitoring, archaeology, and geology were discussed. For individual titles, see N86-18352 through N86-18387.

N86-18352# Mullard Space Science Lab., Dorking (England).
A RADAR ALTIMETER AND THE VALIDATION OF ITS DATA PRODUCTS OVER ICE SURFACES c35
N. F. McIntyre, R. J. Powell (Science Research Council, Chilton, England), and V. A. Squire (Scott Polar Research Inst., Cambridge, England) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 3-11 refs Sponsored by UK National Environment Council and UK Science and Engineering Research Council (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A 13.81 GHz pulsed radar altimeter was flown on a Convair 990 during the Marginal Ice Zone Experiment in the Bering Sea and Greenland Sea. It was used in 10 different operating modes involving combinations of transmit/receive polarizations, nadir-pointing horn antennas and a steerable parabolic antenna. Averaging of returned pulses over nonuniform surfaces was studied in a program to validate altimeter data products over ice surfaces. Correlations of altimeter waveforms with helicopter photography indicate that algorithms for extracting concentration and other sea ice parameters are feasible. Coverage of previously surveyed profiles may also enable better characterization of ice sheet surfaces. The application of results is useful for geophysical interpretation of ERS-1's radar altimeter. Author (ESA)

N86-18353# Marconi Space Systems Ltd., Portsmouth (England).
THE ERS-1 ACTIVE MICROWAVE INSTRUMENTATION (AMI) DESIGN CONSTRAINTS
F. G. Sawyer and D. J. Q. Carter *In* ESA Proceedings of EARSeL /ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 13-19 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The requirements for the ERS-1 Active Microwave Instrument (AMI) to act as a wind scatterometer, a wave scatterometer and an imaging radar are considered. For the second two instruments the AMI is configured to operate as a synthetic aperture radar and performance requirements in these two modes are very similar; for the first instrument it is configured to operate as a noncoherent pulsed radar. Design constraints resulting from function requirements, on-board radar components, the ERS-1 platform and interfaces, and ground processing equipment are considered. Author (ESA)

N86-18354# Marconi Co. Ltd., Chelmsford (England).
THE DEVELOPMENT OF AUTOMATIC METHODS FOR HANDLING SAR IMAGES OVER LAND c35
S. Quegan, N. J. Veck, A. Wright, D. Cruse, and J. Skingley *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 23-29 refs Sponsored by ESA (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Aspects of image handling relevant to a SAR producing images over land, particularly for monitoring agriculture and forestry, are discussed. Identification of ground cover type (classification); change detection; and change interpretation are considered. Segment-growing methods, algorithm performance, and thin line detection as part of the segmentation process are treated. After segmentation, shape and texture of segments can be measured. Work on the former and a comparison of man and machine perceptions of texture are described. Registration requires feature extraction, and results indicate that automatic correlation methods appear viable for speckled images. Calibration, classification, and interpretation of change require more experimental data,

and merging of data from sources apart from the SAR.
Author (ESA)

N86-18355# Florence Univ. (Italy). Dipt. di Ingegneria Electronica.
DATA COMPRESSION TECHNIQUES FOR REMOTE SENSING DATA HANDLING c60
V. Cappellini and E. Delre *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 31-36 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The application of high efficiency data reduction techniques to remote sensing data processing is presented. Data compression techniques such as using adaptive space sampling, prediction-interpolation, differential pulse code modulation, delta modulation, digital filtering, and transformations (Fourier, Walsh, Haar, Karhunen-Loeve) are reviewed. A technique using the discrete cosine transform, implemented in a fast form is presented. The efficiency of the techniques is evaluated by taking into account the compression ratio, the peak error, and the root-mean-square error with implementation complexity and cost. Results obtained by applying techniques to remote sensing images are reported. Author (ESA)

N86-18356# Valencia Univ. (Spain). Dept. of Thermology.
USE OF SATELLITE IMAGES IN THE DESIGN OF A STANDARD METEOROLOGICAL STATION NETWORK c47
V. Caselles and J. Melia *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 37-40 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The design of the standard meteorological stations of the National Institute of Meteorology of Spain within a thermally heterogeneous area was studied, using temperature and thermal inertia images from the HCMM satellite. The accuracy of the temperature values obtained by correcting the apparent temperature images supplied by satellites depends on the representativity of the places in which a measurement in situ of the temperature is made. It is concluded that although some of the stations are adequately located, others should be relocated. Author (ESA)

N86-18357# Katholieke Universiteit te Leuven (Belgium). Remote Sensing Lab.
APPLICATION OF METEOSAT DATA FOR REMOTE SENSING OF EARTH RESOURCES: EARSEL WORKING GROUP 7 REPORT c47
R. Gombeer *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 43-44 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Algorithms to map rainfall, net radiation, evapotranspiration, soil moisture availability, thermal inertia, and germination were developed, using METEOSAT data and standard reports from synoptic weather and rainfall stations in arid zones. The algorithms were applied to a test area in Mali to map and monitor these variables during a test period of 18 days at the beginning of the growing season. Results demonstrate the ability of METEOSAT to provide consistent surface meteorological maps over large areas, and unique information in areas where ground stations are scarce or existing measurements unreliable. Results on rainfall, evapotranspiration, germination and biomass were represented in color maps. Author (ESA)

N86-18358# Bristol Univ. (England).
SATELLITE REMOTE SENSING IN HYDROLOGY c43
R. W. Herschy (ESA/ESTEC, Noordwijk, Netherlands), E. C. Barrett, and J. N. Roozekrans (Environmental Analysis and Remote Sensing, Delft, Netherlands) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 47-53 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The needs of satellite remote sensing techniques for hydrology and water management were studied. The status of remote sensing in hydrology is described and existing and future satellite systems are discussed. Further requirements of satellite sensors for hydrology and water management are considered. The results of a questionnaire to 150 European hydrologists are summarized and the hydrological requirements from satellite remote sensing presented. Author (ESA)

N86-18359# Politecnico di Milano (Italy). Ist. di Topografia, Fotogrammetria e Geofisica.
OUTSTANDING RESULTS FROM ONE YEAR'S ACTIVITIES OF THE ESA METRIC CAMERA WORKING GROUP c35
G. Togliatti *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 57-61 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Results of the Spacelab Metric Camera experiment on STS-9 in photogrammetry: (precision, triangulations, point identification and mapping, orthophotos); thematic interpretations; and geological interpretation are summarized. Performance is fairly satisfactory in topographic mapping and in geological and thematic applications, with shortcomings in features identification, mainly due to poor lighting conditions and absence of image motion compensation. The metric accuracy of the images is very good, and in several cases better than expected. Author (ESA)

N86-18360# Technische Univ., Hanover (West Germany). Inst. for Photogrammetry and Engineering Surveys.
AEROTRIANGULATION WITH SPACELAB METRIC CAMERA IMAGES c35
K. Jacobsen and H. Engel *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 63-67 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The geometric conditions of the photogrammetric handling of the Spacelab Metric Camera images are described. Two bundle block adjustments with photos taken by the camera result in sufficient accuracy levels. Unlike usual aerial photographs, Earth curvature has to be respected by adjustment in an orthogonal coordinate system. Author (ESA)

N86-18361# Technische Univ., Hanover (West Germany). Inst. for Photogrammetry and Engineering Surveys.
LINE MAP PRODUCTION WITH METRIC CAMERA DATA c35
G. Konecny and W. Schuhr *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 69-73 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The way to derive empiric exposure functions for optimal picture quality and to get the Modulation Transfer Function (MTF) from edge analysis; and photogrammetric evaluations of Spacelab Metric Camera imagery to derive line maps and quasi line maps are dealt with. It is possible to derive sufficient information from high altitude photography to estimate an empiric solar angle and diaphragm depending empiric exposure function for space photography. From edge analyses the MTF shows 40 line pairs per mm for extremely high constrast, which is equivalent to 10 m pixel size on the ground. The imagery is sufficient for topographic mapping on scales of 1:100 000, and meets all requirements of a reference data base for medium scale mapping purposes. Conventional line maps derived from photogrammetric evaluation with analytical plotters and quasi line maps from digital edge-enhanced Metric Camera imagery are promising for map production in developing countries. Author (ESA)

N86-18362# Institut National de la Recherche Agronomique, Paris (France).
USE OF METRIC CAMERA FOR LANDSCAPE UNITS: DESCRIP-

TION AND MAPPING c35
Colette M. Girard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 75-78 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Data from a Spacelab Metric Camera flight in winter over France were used to describe landscape units. The use of stereoscopy enabled the description of data concerning geomorphology, which was not possible when using LANDSAT images. The color infrared film enabled to distinguish and evaluate vegetation. The high resolution permitted to evaluate the field size and the presence of hedges. The main types of land use were recognized and the comparison of landscape units with government publications is encouraging. Author (ESA)

N86-18363# Technische Univ., Munich (West Germany). Lehrstuhl fuer Geographie und Geographische Fernerkundung.
ANALYSIS OF THE METRIC CAMERA MC-BW FOR LAND USE CLASSIFICATION AND LAND USE HAZARD MANAGEMENT (THEMATIC MAPPING OF METRIC CAMERA SPACELAB BLACK AND WHITE PHOTOGRAPHS) c35
H. G. Gierloff-Emden *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 79-84 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Metric Camera (MC) photographs were analyzed concerning land use and classification, and thematic mapping in test areas in Chihahua, Mexico. Ground check was carried out in the test areas (not at the same time as the flight). Results show that an MC-image could serve as auxiliary means for thematic mapping in scales around 1:100,000 and smaller scales of larger areas. Author (ESA)

N86-18364# Technische Univ., Munich (West Germany).
THE MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) MISSIONS AND GEOSCIENTIFIC RESULTS c16
J. Bodechtel, D. Meissner (MBB G.m.b.H., Ottobrunn, West Germany), P. Seige (DFVLR), H. Winkenbach (DFVLR), and J. Zilger *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 87-90 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The Modular Optoelectronic Multispectral Scanner was designed for regional and global optical remote sensing applications. It was mounted on the Shuttle Pallet Satellite aboard STS-7 and STS-11. The missions served the technological space verification of the sensor and the demonstration of geoscientific and application-oriented experiments in worldwide distribution areas. Author (ESA)

N86-18365# Technische Univ., Munich (West Germany). Inst. fuer Allgemeine und Angewandte Geodaesie.
RADIOMETRIC CORRECTION OF MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) CCD IMAGES c35
J. Henkel, K. Bothmann (MBB G.m.b.H., Munich, West Germany), and G. Suessenguth (MBB G.m.b.H., Munich, West Germany) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 91-92 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A method to calibrate the sensors of the MOMS-CCD line arrays is discussed. A linear approach is used for absolute and relative calibration. To correct absolutely, preflight calibration data are used. To correct relatively, the variances and mean values are equalized. The absolute calibration corrects most of the sensor differences in gain and offset. Due to the difference of preflight and in-flight circumstances, remaining radiometric distortion is corrected with the relative calibration. Author (ESA)

N86-18366# Karlsruhe Univ. (West Germany). Inst. fuer Photogrammetry and Topography.
FUTURE MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) DEVELOPMENTS: DISCUSSION OF IMPROVEMENTS AND POSSIBILITIES TO BE EXPECTED FOR GEOLOGICAL APPLICATIONS c43
J. Bodechtel (Technische Univ., Munich, West Germany) and H. Kaufmann *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 93-96 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

On the basis of digital terrain models and corresponding thematic mapper data, the impact of MOMS instrument developments like Stereo-MOMS and SWIR-MOMS are discussed to optimize parameters especially for geology applications. Choice and width of bands, and application oriented processing concepts are considered. Author (ESA)

N86-18367# Institute for Land and Water Management Research, Wageningen (Netherlands).
EVAPORATION IN DESERTS: PHYSICAL ASPECTS AND REMOTE SENSING TECHNIQUES c47
M. Menenti *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Oppportunities: Systems, Sensors, and Applications Jun. 1985 p 99-106 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Physical processes which contribute to evaporation of bare soil under desert conditions are discussed. A combination equation to calculate actual evaporation when the evaporation front is located below the soil surface is presented. It is shown that thermal convection of soil air in the top soil can occur and that heat and vapor flow can be contrary, because of the density gradient induced by vapor production. The concept of thermal admittance of the surface is discussed in relation to the thermal properties of soil layers. Knowledge of the thermal properties of the soil layers is needed, since soil heat flux is the driving force for evaporation when it takes place below the soil surface. The application of satellite data to study these processes is discussed, and a case-study in the Lybian desert is presented. The relevance of groundwater losses by evaporation for a proper appraisal of groundwater resources in deserts is emphasized. Author (ESA)

N86-18368# Exmoor National Park Dept., Dulverton (England).
REMOTE SENSING FOR ENVIRONMENTAL MANAGEMENT OF BRITISH NATIONAL PARKS: REVIEW AND PREVIEW c43
L. F. Curtis *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 107-114 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Land cover maps and environmental quality assessment in National Parks in England and Wales are discussed. Remote sensing platforms used include autogyros, aircraft, and satellites. The role of color and infrared color photography increased. The development of image analysis of Multispectral Scanner (MSS) and Thematic Mapper (TM) data results in a major improvement in the operational capability of satellite data. The use of ratio (vegetation index) and image enhancement techniques for Exmoor National Park is described and work in other National Parks is reviewed. Proposals for further studies include comparative studies using MSS, TM and SPOT data. Author (ESA)

N86-18369# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany).
AN OPTICAL MULTISENSOR COMBINING MID IR LASER SCANNER, AND NEAR IR MULTISPECTRAL SCANNER (LIMES) c35
F. Lehmann, C. Werner, and W. Wiesemann (Battelle Inst.) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 115-119 refs (For primary document see

N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The application possibilities of thermal infrared laser spectroscopy for remote sensing were investigated in laboratory and flight campaigns. For the flight measurements, a profiling laser spectrometer with 2 tunable CO2 lasers was used. In the laboratory, the reflection spectra of minerals, soils, rocks, vegetation, water, moistened surfaces and oil spills on water were taken. Flight measurements (soil, rock surfaces, water, irrigated field, vegetation, asphalt) agree with the laboratory results (in-situ measurements). Based on these results, a program for the development of an optical multisensor, combining mid IR laser scanner and near IR-multispectral scanner was started. Author (ESA)

N86-18370# Consiglio Nazionale delle Ricerche, Florence (Italy). Ist. di Ricerca sulle Onde Elettromagnetiche.
REMOTE SENSING OF OIL ON SEA: LIDAR AND PASSIVE IR EXPERIMENTS c36
F. Castagnoli, G. Cecchi, L. Pantani, I. Pippi, B. Radicati, C. Susini, P. Mazzinghi, and A. Barbaro *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 121-126 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A compact system for detecting and monitoring oil pollution on the sea from light aircraft using passive infrared remote sensing was developed. Lidar marine environment and pollution monitoring potential was assessed in the laboratory. The low-power airborne system is suitable for day and night operations in quite good weather. It performs a real time detection of the oil, a mapping of the spill, and an identification of its thickest parts. A suitable Lidar system can be composed by an XeCl excimer laser with small dimensions, a low energy consumption, and 50 mJ energy per pulse. The detection system does not require an optical multichannel analyzer, but it is possible to operate with only three interferential filters: one for Raman scattering signal, the others for fluorescence signals, which are sufficient to identify the oil class. Author (ESA)

N86-18371# Institut Francais du Petrole, Rueil-Malmaison. Div. de Teledetection Marine.
OPERATIONAL REMOTE SENSING OF OIL SLICKS AT SEA BY MICROWAVE RADIOMETRY c32
A. Wadsworth and P. Piau *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 127-130 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Active microwave radiometry for oil spill thickness and volume estimation in the seas around France are reviewed. The technical solutions and the integration into an operational system are considered. Operating limits and development possibilities are discussed. Author (ESA)

N86-18372# Institut Francais du Petrole, Rueil-Malmaison.
SYNTHETIC APERTURE RADAR IMAGING OF THE SEA SURFACE DURING THE PROMESS EXPERIMENT
P. Piau and L. Gray (Canadian Center for Remote Sensing, Ottawa) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 131-138 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The PROMESS experiment carried out wind and wave measurements on the sea surface with radars operating in the C-band, as with the Active Microwave Instrument aboard ERS-1. A good range of wave heights (ranging from 1 to 7 m) and wind speeds were encountered. The SAR 580 performed measurements with different azimuth angles in C and X-bands simultaneously. Images were obtained from a digital processor and from an optical one. The two sets of images were processed with Fourier and speckle removal technics. The wave length and direction of the long waves is determined with good accuracy. One day featured two wave systems at the same time with different wave lengths and directions. The two systems are well separated and measured by the SAR. The shape of the equivalent monodirectional wave spectrum obtained is very close to the one measured by the waverider. Author (ESA)

N86-18373# Joint Research Centre of the European Communities, Ispra (Italy).
THE JOINT RESEARCH COMMITTEE (JRC) PROGRAM ON REMOTE SENSING c43
S. R. GallideParatesi *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 141-150 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The European Economic Communities' Program on Remote Sensing for 1984 to 1987 is oriented towards land and marine applications to contribute to the feasibility study and concept of an advanced information system for agriculture, and of an advanced coastal pollution monitoring system, both using satellite and/or aircraft remote sensing data to be integrated with conventional data. Projects are: Rural Land Use Applied to European Less Favored Areas; Food Agriculture Resources in Sahelian Countries; and Coastal Transport of Pollutants and Oil Characterization by Laser-induced Fluorescence. Exercices of oil detection at sea are organized. A feasibility study on the use of space remotely sensed data as an aid to management of natural disasters is outlined. Author (ESA)

N86-18374# Royal Aircraft Establishment, Farnborough (England). National Remote Sensing Center.
EUROPEAN REMOTE SENSING: FUTURE NEEDS IN EDUCATION c80
Richard K. Bullard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 151-156 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The education of people in Europe in the subject remote sensing is discussed. The range of education should extend from primary to tertiary and beyond to the public at large. The promotional role of education is to bring remote sensing to public attention in a less formal way and to achieve this there is a need for wide publicity including the press, television, radio, articles in journals and newspapers, videos, books, and slide sets. The cost of promotion may be directly related to the product while the reaction and response to it from the media and the public interest depend partly on its continuing inclusion in National programs and the justification of its applications. Author (ESA)

N86-18375# University Coll., London (England). Dept. of Electrical Engineering.
GEOPHYSICAL RADAR ALTIMETERS FOR THE 1990'S
H. D. Griffiths and C. G. Rapley *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 157-165 refs Sponsored by ESA (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Satellite-borne altimeter concepts for altimetric mission are described. These include developments in on-board adaptive processing algorithms and advances in radar hardware technology, which allow significantly-increased coverage of land and land ice surfaces. Beam-limited altimeters overcome the fundamental disadvantages of pulse-limited instruments over these surfaces, and allow considerably lower transmitter powers, though at the expense of large antenna structures and severe spacecraft pointing constraints. Concepts for antenna signal processing utilizing multiple antenna beams to give increased spatial coverage as well as improved performance over nonocean surfaces are presented. Author (ESA)

N86-18376# Centre National d'Etudes Spatiales, Toulouse (France).
THE VARAN-S: AN AIRBORNE SYNTHETIC APERTURE RADAR FOR RESEARCH IN MICROWAVE REMOTE SENSING c32
D. Vaillant *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 167-174 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The VARAN-S X-Band side-looking airborne radar was designed to simulate satellite-borne radar images to prepare microwave remote sensing users for future satellite data analyses, and to help in the development of satellite-borne SAR. It was experimented in real aperture mode during the Marginal Ice Zone experiment. The VARAN-S is planned to work in SAR mode. The digital raw data, recorded on-board over a swath width > 10 km, gives 3 m resolution without multilook, or 9 m using 9 looks. Two polarizations (H and V) are available. Author (ESA)

N86-18377# Marconi Co. Ltd., Great Baddow (England).
TECHNIQUES FOR ACHIEVING WIDE SWATH COVERAGE WITH SPACEBORNE SAR SYSTEMS
M. A. Brown and D. J. Smith *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 175-180 refs (For primary document see N86-18351 09-19)
(Contract ESTEC-5672/83/NL-GM(SC))
Avail: NTIS HC A12/MF A01

Designs for increasing SAR coverage beyond 200 km are discussed using figures for ERS-1 as baseline. The technological demands of each concept are assessed. Although for the extended antenna system the critical area is antenna technology, processing also needs to include multiple range looks. Squinted SAR systems require significantly more complex processing, increased pulse bandwidth, and slightly longer antennas. These two systems provide continuous coverage of a wide swath unlike the others which only cover discrete swaths. The multiple receive beam technique requires little new technology except for signal reception where two (or more) antennas or complex multiple beam formation is required. The dual pulse system requires large amounts of power which could prove difficult to produce. The multiple SAR systems require isolation of separate systems and storage and deployment of two antennas. Author (ESA)

N86-18378# Naples Univ. (Italy). Faculty of Engineering.
DIFFERENT PROBLEMS OF SPACE STEREOSCOPIC OBSERVATION
A. Moccia and S. Vetrella *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 181-187 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Geometric aspects connected to along and cross-track stereoscopic observation from space using solid state linear arrays are discussed. In considering along-track viewing, the procedure adopted to simulate the geometric observation from the fore and aft sensors is described, and residual geometric errors, present in each pair of homologous ground lines, are examined. It is shown that the nature of the residual geometric errors, deriving mainly from the different projections of the fore and aft cameras on the Earth's ellipsoid, requires per line and per pixel corrections of the stereoscopic pair. For cross-track viewing, the geometric errors deriving from the perspectives relative to different orbits are computed. These perspectives cause a rotation between the steroscopic pair, and a considerable tangential scale distortion. The need to elaborate preprocessing systems which take into account the development of satellite position and attitude determination systems and use few ground control points is emphasized. Author (ESA)

N86-18379# European Space Agency, Paris (France).
SPACE STATION: ESA VIEWS ON REQUIREMENTS FOR EXPERIMENTAL AND OPERATIONAL EARTH OBSERVATION MISSIONS c43
G. Duchossois *In its* Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 189-199 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The requirements of spaceborne experimental and operational Earth observations are reviewed, and an unmanned polar platform element, composed preferably of two platforms in adequately phased orbits is recommended as part of the European contribution to the US Space Station. Possible configuration and resources capabilities for such platforms are provided, together with candidate payloads. Author (ESA)

N86-18380# Centre National de la Recherche Scientifique, Valbonne (France). Centre de Recherches Archeologiques.
REMOTE SENSING AND ARCHAEOLOGICAL RESEARCH IN THESSALY, GREECE. NEW PROSPECTS IN ARCHAEOLOGICAL LANDSCAPE c43
E. Barisano and B. Helly *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 203-209 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The use of satellite data in archaeological research in Thessaly (Greece) in a methodological study to determine the interpretation processes concerning spatial imagery is described. The study involved determining the physical factors in order to understand the ancient spatial organization in the lower Enipeus valley, connected with the distribution and density of identified sites with signs of human occupation. An archaeological prospection strategy was formulated from spectral, textural, and structural indicators deduced from satellite data in the eastern plain of Larisa (ancient lake Karla). Author (ESA)

N86-18381# Consiglio Nazionale delle Ricerche, Milan (Italy). Remote Sensing Dept.
SNOW MAPPING FROM LANDSAT IMAGERY c47
G. Bolzan, P. A. Brivio, L. Cillerai, A. DellaVentura, and A. Rampini *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 211-216 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A dedicated system for the analysis of satellite images and snow cover measures drawing, and multispectral scanner results obtained by its application to a series recorded over Cordevole River basin test site (Italy) are presented. The system includes procedures for the processing, classification, and display of the images, allowing the analyst to drive and control the whole process. Comparison between snow maps automatically compiled and photointerpretation maps shows a good agreement. Author (ESA)

N86-18382# Milan Univ. (Italy). Dept. of Earth Sciences.
LONG LINEAR FEATURES OBSERVED ON THE ALPINE OROGEN AND THEIR COMPARISON WITH SOME GEOPHYSICAL DATA c48
R. Cassinis, C. M. Marino, and F. Pinali *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 217-219 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A map of linear features observed on the Alpine orogen was drawn on 1:1,000,000 scale, using multitemporal and multispectral satellite imagery (MSS LANDSAT). The total field, containing linears with L > or = 15 km, was filtered in length and azimuth, obtaining different maps (6 azimuthal and 1 of long linears with L > or = 50 km. The filtered maps were compared with geophysical data having a similar uniformity of information and drawn on the same scale. All maps were analyzed according to geological domains. It is believed that the long linears are the surface reflection of deep crustal structures. Author (ESA)

N86-18383# Catania Univ. (Italy). Dept. of Engineering.
MONITORING OF GROUND FRACTURES CAUSED BY VOLCANIC ERUPTIONS USING REMOTE SENSING TECHNIQUES c46
A. L. Geraci, G. LaRosa, T. Caltabiano (CNR, Catania, Italy), and E. LoGiudice (CNR, Catania, Italy) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 221-227 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

During the 1983 eruption of Mt Etna in Sicily, an investigation using remote sensing techniques was carried out over the southern side of the volcano to look at the linear development and the thermal behavior of ground fractures connected with active vents. The survey used thermal infrared imagery. It is proved that this kind of investigation makes it possible to locate thermal active fractures in the ground in active volcanic areas. It is possible to determine the length and direction of the fractures. It is also useful for the surveillance, study, and clearer representation of the eruption. Author (ESA)

N86-18384# Centre National d'Etudes Spatiales, Toulouse (France).
GEOMETRIC RECTIFICATION AND PHOTOGRAMMETRIC RECONSTRUCTION OF SPOT IMAGES [RECTIFICATION GEOMETRIQUE ET RESTITUTION PHOTOGRAMMETRIQUE DES IMAGES SPOT] c35
H. Guichard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 229-233 In FRENCH (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

The use of SPOT satellite imagery for mapping is described. The geometric resolution of SPOT images make them suitable for 1:50,000 scale maps. The mathematical modeling of a scene, and the rectification and triangulation procedures are outlined. Tests on a 600 km long segment (10 scenes) show accuracy better than 10 km, compared to ground truth, using 10 reference points. Author (ESA)

N86-18385# Mullard Space Science Lab., Dorking (England).
THE ERS-1 OBSERVATIONS OF LAKES FOR CLIMATE RESEARCH c47
I. M. Mason, C. G. Rapley, F. A. Street-Perrott (Oxford Univ.), and M. Guzkowska (Oxford Univ.) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 235-241 refs Sponsored by ESA and UK Science and Engineering Research Council (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

Prospects for remote sensing of lake volume fluctuations for climate research using ERS-1 are reviewed. The importance of monitoring lake volumes for climate and paleoclimate research, and how closed lakes respond to climate are considered. It is shown that it is necessary to monitor levels and areas simultaneously, which can be achieved using the Radar Altimeter (RA) and the Along Tracking Scanning Radiometer (ATSR) on ERS-1. For any frequency band the ATSR and RA can measure small (< 10 %) aridity variations. The ATSR has virtually global coverage, and with a reasonably long repeat track period (35 days) the RA could measure up to 100 closed lakes globally and many more open ones. The ERS-1 can provide an important climate record on a global scale. Author (ESA)

N86-18386# Science Research Council, Chilton (England). Rutherford Appleton Lab.
RELATIVE VERTICAL POSITIONING USING GROUND-LEVEL TRANSPONDERS WITH THE ERS-1 ALTIMETER
R. J. Powell *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 243-246 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

A technique for using the ERS-1 altimeter to measure the relative vertical position of land-based transponders and the ocean geoid on 2000 km long segments of the satellite ground track is proposed. The absolute position accuracy is similar to that of the laser tracking stations, relative accuracy may be of the order of a few centimeters, and measurements of changes in transponder elevation during the 3 yr satellite life may be at the sub-centimeter level. The opportunity for such measurements is provided by exploiting together very accurate range measurements made to ground-based transponders and the demonstrated constancy of form of satellite short-arc orbits repeated over an identical ground track. Altimetric vertical position measurements of this accuracy make possible techniques for altimeter calibration, sea-state bias measurements, orbit measurement and seismic/geodetic study. Author (ESA)

N86-18387# Mullard Space Science Lab., Dorking (England).
THE ERS-1 ALTIMETER TRACKER PERFORMANCE SIMULATION
C. G. Rapley, N. F. McIntyre, R. F. Scott, A. P. R. Cooper (Scott Polar Research Inst., Cambridge, England), E. Novotny (Scott Polar Research Inst., Cambridge, England), A. R. Birks (Science Research Council, Chilton, England), and H. D. Griffiths (Univ. Coll., London, England) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 247-251 refs (For primary document see N86-18351 09-19)
(Contract ESA-5684/83/NL-BI)
Avail: NTIS HC A12/MF A01

An Altimeter Performance Simulator (APS) which permits the generation of simulated sequences of echo waveforms, and models the response of a radar altimeter tracker to them is presented. Results for the ERS-1 oceans mode tracking analytic waveforms representative of returns from the open ocean and sea ice, and its response to echo sequences synthesis are shown. Extensions of the APS include the addition of the ERS-1 ice tracking mode and the development of models representing coastal regions, land, and transitions from one surface type to another. Author (ESA)

N86-18388# European Space Agency, Paris (France).
THE EUROPEAN ASTROMETRY SATELLITE HIPPARCOS: SCIENTIFIC ASPECTS OF THE INPUT CATALOG PREPARATION
T. D. Guyenne, comp. and J. Hunt, comp. Aug. 1985 275 p refs Partly in ENGLISH and FRENCH Colloquium held in Aussois, France, 3-7 Jun. 1985; cosponsored by CNES, CNRS, ESA, Inst. National d'Astronomie et de Geophysique, Observatoire de Paris-Meudon, Matra-Espace
(ESA-SP-234; ISSN-0379-6566) Avail: NTIS HC A12/MF A01

The status of the Hipparcus project; data reduction; stellar data based and HIPPARCOS; integration of proposed into the Input Catalog; photometric aspects of Input Catalog preparation; variable, binary, and multiple stars; observation of stars in very dense areas; minor planets; astrometric aspects; ground based measurements; the TYCHO experiment; and links to radio and extragalactic objects for the reference system were discussed. For individual titles, see N86-18389 through N86-18434.

N86-18389# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE PRESENT STATUS OF THE HIPPARCOS PROJECT c60
M. A. C. Perryman and M. Schuyer *In its* The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 13-22 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Evolution of HIPPARCOS satellite hardware and software is outlined. Improvements to the star observing strategy and attitude control and reconstitution programs are described. Work on the field-of-view diameter optimization; image dissector tube selection; star mapper detectors, filters, and dichroics; the modulating grid; and the beam combiner is summarized. In-orbit calibrations; inertial

reference initialization; and data exchange formats and contents are considered. Author (ESA)

N86-18390# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
PERFORMANCES OF HIPPARCOS OPTICAL TELESCOPE
G. Ratier *In its* The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 23-26 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The optical configuration of the HIPPARCOS satellite is recalled, and the telescope assembly and focal plane assembly are described. Basic parameters of the mission are reviewed in light of the angle stability; telescope distortion stability; and residual chromaticity. Calibration activities performed prior to launch are indicated. Author (ESA)

N86-18391# Lund Observatory (Sweden).
THE HIPPARCOS DATA REDUCTIONS: PRINCIPLES AND LIMITATIONS c60
L. Lindegren *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 31-36 refs Sponsored by Swedish Board for Space Activities (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The scientific data reductions for HIPPARCOS are described. The mathematical models representing the objects, instrument, attitude motion, and detection process are discussed. The basic star model is an unresolved point source with uniform space motion. Within the hierarchic data processing built on these models, a fraction (15%) of improper observations can be accomodated, requiring more complex models. These may include double and multiple stars, single stars disturbed by veiling glare, and minor planets. Author (ESA)

N86-18392# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
STATUS OF THE FUNDAMENTAL ASTRONOMY BY SPACE TECHNIQUES (FAST) DATA PROCESSING CHAIN [ETAT D'AVANCEMENT DE LA CHAINE DE TRAITEMENT DES DONNEES DU CONSORTIUM FAST] c60
J. L. Falin and J. Kovalevsky *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 37-41 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Algorithms for the data reduction of the HIPPARCOS satellite are described. The organization and the structure of the software development are summarized. The main features of the reduction chains and data reduction scheme are presented. Simulations of the data flow of the satellite are presented. Author (ESA)

N86-18393# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
THE STELLAR DATA CENTER (CDS) AND HIPPARCOS: AFTERTHOUGHTS c60
C. Jaschek *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 47-48 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Activities of the Stellar Data Center in Strasbourg (France) in terminology, star indexing, and the HIPPARCOS project are reviewed. Author (ESA)

N86-18394# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
PRESENTATION OF THE ASTRONOMICAL DATA BASE SET OF IDENTIFICATIONS, MEASUREMENTS, AND BIBLIOGRAPHY FOR ASTRONOMICAL DATA (SIMBAD) c60
M. Wenger *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 49-53 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

An astronomical data base, offering on-line query, consisting of a cross-identifications dictionary for astromonical object names, observational data, and bibliographical references collected since 1950, for 600,000 stars and 70,000 galaxies is presented. Use in the HIPPARCOS project is described. Author (ESA)

N86-18395# Observatoire de Paris-Meudon (France).
PRESENT STATUS OF THE INPUT CATALOG c60
A. E. Gomez and F. Crifo *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 57-61 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The HIPPARCOS Input Catalog will contain 100,000 stars. About 700,000 stars (with redundancies), from 214 proposals, were received, and 60,000 stars were added for the survey; but, for different reasons (stars deleted by proposers, unsuitable proposals, etc.) only 520,000 stars were considered. The procedure to handle these stars and merge them into a unique list without repetitions is described. This work progressed very quickly thanks to the intensive use of the SIMBAD Data Base. The present status of the list which integrates 99% of the proposed stars (including the survey) is given as well as statistics on magnitude and sky and spectral type distributions. The next step to construct the first version of the Input Catalog is discussed using two examples of realistic lists. This analysis shows that the inclusion of faint stars has to be reviewed carefully. Author (ESA)

N86-18396# Observatoire de Paris-Meudon (France).
THE INCA DATA BASE: SUB-BASE FROM SET OF IDENTIFICATIONS, MEASUREMENTS AND BIBLIOGRAPHY FOR ASTRONOMICAL DATA (SIMBAD) c60
D. Morin and F. Arenou *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 63-66 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The INCA Data Base contains all proposed HIPPARCOS stars, including survey stars (around 210,000 stars). It is a subset of the SIMBAD data base. Information contained within the INCA Data Base for SIMBAD stars and non SIMBAD stars (data taken from SIMBAD and specific INCA data being progressively added during the preparation of the mission) is described. The SIMBAD software as well as specific INCA software are mentioned. Author (ESA)

N86-18397# Observatoire de Paris-Meudon (France).
DEFINITION OF THE SURVEY c60
F. Crifo, C. Turon, and M. Grenon (Geneva Observatory) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 67-70 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The need to define a limiting magnitude for the 60,000 bright stars, regularly distributed over the whole sky, requested in the HIPPARCOS Input Catalog for satellite real time attitude determination and data reduction is discussed. The limiting magnitude of this survey should be clearly defined in order to preserve further statistical uses of the sample. The limiting magnitude will be a function of galactic latitude and spectral types. The behavior of various spectral types through the first step simulation process (use of the pressures) is studied; the influence of other proposals on survey star selection is pointed out. Author (ESA)

N86-18398# Geneva Observatory (Switzerland).
SIMULATIONS: THE ROLE PLAYED BY STATIC PRESSURES c60
B. Nicolet and M. Creze (Observatoire de Besancon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 75-77 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

A fast procedure to evaluate the pressure borne by a star S proposed for HIPPARCOS is proposed. The pressure is the quotient of the sum of target-times for stars with a better priority than S in a neighborhood of S by the available observing time in this neighborhood. Although rather crude, this concept proves to be very useful for refined simulations and to prepare programs of ground-based observations. Author (ESA)

N86-18399# Observatoire de Besancon (France).
OPTIMIZING THE INPUT CATALOG THROUGH SIMULATIONS **c60**
A. Creze *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 79-82 ref (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Three simulation packages and an iterative process were developed to assist the choice of 100,000 stars from 250,000 candidates for the HIPPARCOS Input Catalog. Star densities and observing time allocations are initially imposed from overall a priori considerations (ecliptic latitude, total observing time) but, after iterations, when trying to include high priority stars, distortions to the a priori distributions are imposed. Distortions can create bad observability conditions so that target accuracy is not reached. The larger the accepted deviations to target accuracies, the closer the star selection will match scientific targets. It is possible to control pressure threshold modifications to set accuracy degradation limits. Author (ESA)

N86-18400# Observatoire de Paris-Meudon (France).
EXPECTED FULFILLMENTS OF OBSERVATION PROPOSALS VERSUS ESA PRIORITY **c60**
C. Turon, B. Nicolet (Geneva Observatory), and M. Creze (Observatoire de Besancon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 83-86 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The results of the HIPPARCOS mission static simulation on L3-1 are examined with respect ot ESA priority levels, magnitudes, and proposals. The fulfillment of survey, International Reference Star Program, and stars for extragalactic links is studied. The main trends are strong drops in fulfillment with ESA priority and with magnitude. The effect on proposals of these two tendencies is shown, and actions suggested. Author (ESA)

N86-18401# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
ASTROPHYSICAL ASPECTS OF THE CONTENTS OF THE INPUT CATALOG **c60**
D. Egret and E. Gomez (Observatoire de Paris-Meudon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 87-90 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Aspects of the astrophysical contents of the HIPPARCOS Input Catalog are illustrated through comparison of the complete merged file L3 with the file L3/SIM obtained from the first simulation. The upper part of the HR diagram; the red nearby stars; the distance scale; problems of galactic structure; old population stars; and binary stars with known orbit are considered. Analysis shows, besides a general satisfactory percentage of inclusion for most important programs, an important limitation affecting the faintest red stars, good candidates for parallaxes, but penalized by the observing strategy. Author (ESA)

N86-18402# Centre National d'Etudes Spatiales, Toulouse (France).
THE HIPPARCOS INPUT CATALOG (INCA): SIMULATION OF OBSERVATIONS OVER A LONG PERIOD [HIPPARCOS-INCA: SIMULATION DES OBSERVATIONS SUR UNE LONGUE PERIODE] **c60**
J.-C. Feaugas *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 91-96 refs In FRENCH (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Preparation of a HIPPARCOS simulation catalog; the observation simulation programs; and sample results (maps, statistics) are discussed. The program for allocating observing time is outlined. Static pressure and ESA priority attribution of selected and rejected stars are shown. Number of observations as a function of priority, pressure, and magnitude is given. Author (ESA)

N86-18403# Observatoire de Besancon (France).
OPTIMIZING THE OBSERVING STRATEGY THROUGH SIMULATIONS **c60**
M. Creze, M. Chareton, and E. Oblak *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 97-99 ref (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The HIPPARCOS onboard observing strategy was simulated assuming various policies for assigning values to parameters. Simulations work all along the mission for small test regions. The efficiency of the policy is assessed by the final distribution of accuracy amongst test stars. Results suggest that simple rules of parameter allocation may partly correct the distortion of the observing strategy response on dense fields. Additional optimization based on time dependent parameters and special rules for overcrowded fields are discussed. Author (ESA)

N86-18404# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
EXISTING DATA ON CANDIDATE STARS FOR THE HIPPARCOS INPUT CATALOG: PRESENT STATUS AND DEVELOPMENTS [LES DONNEES EXISTANTES POUR LES ETOILES CANDIDATES AU CATALOGUE D'ENTREE: STATUT ACTUEL ET DEVELOPPEMENTS] **c60**
D. Egret *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 105-107 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The analysis and the compilation of photometric and astrophysical data for the HIPPARCOS Input Catalog stars is described. Statistics regarding the number of available measurements for the HIPPARCOS stars in the main catalogs of astrophysical interest are given. Author (ESA)

N86-18405# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
PHOTOMETRIC DATA RELATED TO THE FORMATION OF THE INPUT CATALOG **c60**
J.-C. Mermilliod and M. Mermilliod *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 111-112 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Files for the photometric systems presenting a significant number of stars with respect to the formation of the Input Catalog were obtained: UBV, uvby, WUBVL, DDO, RO systems. The processing of the UBV data is described. No quantitative information is given as concerns the available photometric data for the Input Catalog since the intersection is not done. Author (ESA)

N86-18406# Geneva Observatory (Switzerland).
STANDARD STARS FOR THE ON-ORBIT PHOTOMETRIC PAYLOAD CALIBRATION **c60**
M. Grenon *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 113-116 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The needs on photometric data for the HIPPARCOS prelaunch, mission and postmission phases are presentd. The new observations tend to optimize the mHp prediction as well as the

derivation of physical stellar parameters complementary to HIPPARCOS astrometric results. The observing programs are defined according to spectral type, magnitude, declination, and right ascension intervals adapted to the selected photometric system, telescope size and site, and observing period.
Author (ESA)

N86-18407# Geneva Observatory (Switzerland).
NEW GROUND-BASED PHOTOMETRIC OBSERVATIONS c35
M. Grenon *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 117-122 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

It is shown that using existing ground based photometric data it is feasible to produce a set of secondary standard stars for HIPPARCOS photometric calibrations, with a density over the sky sufficient for monitoring the short and long-term variations of the main mission detection chain. The final accuracy on Hp is slightly lower than required for red stars, i.e., 0.03 instead of 0.02, whereas that on (B-V) is better with se = 0.01 mag. The faint standards problem can be solved by ground based observations prior to satellite launch. The Tycho calibration should not present any difficulty regarding standard availability as the expected number of standards is more than double when the conditions on pressure and Input Catalog inclusion are relaxed.
Author (ESA)

N86-18408# Universite des Sciences et Techniques du Languedoc, Montpellier (France). Lab. d'Astronomie.
SPECIFIC PROBLEMS RELATED TO VARIABILITY c90
M.-O. Mennessier *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 127-129 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The discordance between the predicted and observed maxima and minima of stellar luminosity is discussed. A sample of light curves observed for 30yr shows how they deviate from the mean curves. About 1200 HIPPARCOS stars present a large amplitude of variability and their luminosity can be lower than the threshold of the satellite detection during a part of their period. These problems limit the capacities of observation according to the types of variability.
Author (ESA)

N86-18409# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
CORRECTION OF VEILING GLARE IN HIPPARCOS OBSERVATIONS [LES CORRECTIONS DE L'EFFET DE VOILE (VEILING GLARE) DANS LES OBSERVATIONS HIPPARCOS]
M. Froeschle, J. Kovalevsky, and F. Mignard *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 133-136 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The impact of veiling glare on HIPPARCOS Input Catalog and data reduction is discussed. The expected number of veiling glare stars as a function of the magnitude of the program star for a unique field of view and for the combined fields is investigated. An algorithm to process observations perturbed with veiling glare, which allows the five parameters of the program star to be obtained is outlined. The structure of the algorithm leads to an estimation of the phase extraction allowing for the signal of the perturbing star and the uncertainty of its actual position on the IFOV. The results are plotted as contour lines in a (Delta m,r) diagram giving the degradation of the phase determination with respect to the theoretical accuracy which could be obtained were the star unaffected by veiling glare.
Author (ESA)

N86-18410# Observatoire de Marseille (France).
STARS IN THE DIRECTION OF THE MAGELLANIC CLOUDS c90
L. Prevot *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 137-139 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The use of HIPPARCOS to estimate of systemic tangential motions of the Magellanic Clouds (MC) is discussed. In the most favorable case, it is possible to detect motions of 250 to 300 km/sec on the basis of a 2.5 yr mission. If obtained, these data would allow to correct the rotation of the LMC for its transverse motion, to assess possible two-body structure of the SMC, and to investigate the nature of the inter-Clouds bridge and the reality of a connection between the LMC and the Galaxy.
Author (ESA)

N86-18411# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
SELECTION OF STARS IN OPEN CLUSTERS FOR THE HIPPARCOS MISSION c90
J.-C. Mermilliod *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 141-143 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

As a result of examination of all HD and DM stars located in the field of open clusters proposed for observation with the HIPPARCOS satellite, it is shown that the proportion of cluster stars really observable is only 36%. Therefore, a severe selection has to be made, and the criteria adopted are described. Statistics on the number of requested and of retained stars per cluster are also presented. Fainter stars are not included in the analysis.
Author (ESA)

N86-18412# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
THE HIPPARCOS PROPER MOTIONS FOR OPEN STAR CLUSTERS c90
R. Wielen and C. Dettbarn *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 145-148 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Use of HIPPARCOS to provide proper motions of open star clusters for studies of galactic kinematics and evolution is discussed. In order to derive the proper motion of a whole cluster, a few members (typically three) of a cluster have to be observed by HIPPARCOS. The selection criteria used are described. Over 800 stars in 212 open clusters were selected and proposed to ESA.
Author (ESA)

N86-18413# Belgian Royal Observatory, Uccle.
CONCERNS, REALIZATIONS AND PROSPECTS OF THE SUBGROUP DOUBLE STARS OF THE HIPPARCOS INPUT CATALOG (INCA) CONSORTIUM c90
J. Dommanget *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 153-159 refs Sponsored by Belgian Fonds de la Recherche Fondamentale Collective (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The problems related to the double and multiple stars in the HIPPARCOS Input Catalog are discussed on the basis of different categories of binaries that may be recognized in a first approximation from the point of view of HIPPARCOS. The reasons for the realization of a specific catalog of the components of double and multiple stars are given as well as details on how it is being established.
Author (ESA)

N86-18414# Belgian Royal Observatory, Uccle.
NEW WIDE DOUBLE STARS IN THE HIPPARCOS INPUT CATALOG c90
O. Nys *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 161-163 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The identification of all double stars in the HIPPARCOS Input Catalog is described. By using a Catalog of the Components of

Double and Multiple stars (CCDM) established on the basis of the Index (1976,5), 22,952 of the 206,999 entries of the provisional list L2-V were identified. In order to ensure that all double and multiple stars existing in the L2-V list are properly detected, the list of all couples of entries of the L2-V, showing separations < 100' was compiled. Comparison of this list with the CCDM identified L2-V stars reveals 2,124 pairs of stars which do not exist in the CCDM. Examination shows that : 224 pairs are redundancies left in the L2-V list; 300 pairs have insufficiently accurate positions to make possible their consideration, and 1,300 real wide double stars are found. Author (ESA)

N86-18415# Belgian Royal Observatory, Uccle.
OBSERVABILITY OF SPECTROSCOPIC DOUBLE STARS BY HIPPARCOS [OBSERVABILITE PAR HIPPARCOS DES ETOILES DOUBLES SPECTROSCOPIQUES] **c90**
J. Dommanget *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 165-170 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Spectroscopic binaries were proposed for observation by HIPPARCOS. Their admittance in the Input Catalog is subordinated to the behavior of their photocenters of which the orbital oscillation on the sky must remain inside narrow limits bound to the accuracy of the HIPPARCOS observation technique. It is shown that at least 90% of the known spectroscopic orbital binaries fulfill this requirement. Author (ESA)

N86-18416# Bureau des Longitudes, Paris (France).
MINOR PLANETS IN THE HIPPARCOS PROGRAM [PETITES PLANETES DU PROGRAMME HIPPARCOS] **c91**
A. Bec-Borsenberger *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 175-177 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Seven proposals for HIPPARCOS concerning 63 minor planets were accepted by ESA. Owing to the motion of these objects, their positions are entered into the Input Catalog as ephemerides. These ephemerides are computed by numerical integration; the initial conditions are published orbital elements. A Chebychev polynomial representation is used for the coordinates and the magnitude of the minor planets. The ephemerides were compared with 500 observations. For some minor planets the O-C are > 1.5'. For improving the integration constants by least squares method, the observations of three observatories were compared with the observations published by the Minor Planet Center in Cincinnati. The magnitude epheremis is computed by the classical formula, but it is possible to include in rhe program the procedure for calculation of magnitude. Author (ESA)

N86-18417# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.
COMPLEMENTARY ASTROMETRIC OBSERVATIONS OF MINOR PLANETS AT BARCELONA **c91**
J. Nunez, C. Jordi, J. Calaf, and J. M. Codina (Observatorio Fabra) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 179-181 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

A program of astrometric observations of the minor planets included in the HIPPARCOS mission is described. The reduction method, the accuracy reached in each hemisphere, and results are presented. It is shown that the minor planets included in the list of 20 selected minor planets of the Institute for Theoretical Astronomy in Leningrad have accurate ephemerides, but new observations are needed for the other ones. Author (ESA)

N86-18418# Astronomische Rechen-Institut, Heidelberg (West Germany).
THE ASTRONOMISCHES RECHEN-INSTITUT (ARI) CATALOG OF ASTROMETRIC DATA FOR THE HIPPARCOS INPUT CATALOG **c60**
U. Bastian and T. Lederle *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 185-188 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The collecting and synthesizing of accurate astrometric parameters for as many stars as possible for the production of a catalog of astrometric data is described. The astrometric part of the HIPPARCOS Input Catalog is an extract from this catalog. The role of the catalog for HIPPARCOS and possible uses beyond HIPPARCOS are discussed. Author (ESA)

N86-18419# Astronomische Rechen-Institut, Heidelberg (West Germany).
ASTROMETRIC DATA FOR NEARBY STARS **c90**
H. Jahreiss *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 189-191 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The state of the compilation of a Catalog of Nearby Stars is described. This catalog will contain all known stars with trigonometrically and/or photometrically and spectroscopically determined distances nearer than 25 pc. Astrometric parameters (positions and proper motions) relevant for the final inclusion of the stars in the HIPPARCOS Input Catalog are stressed. Author (ESA)

N86-18420# Bordeaux Univ. (France).
ONLY TWO YEARS LEFT TO SUPPLY ACCURATE POSITIONS TO THE HIPPARCOS NONASTROMETRIC STARS **c90**
Y. Requieme *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 193-195 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Observational tests were carried out on provisional lists of HIPPARCOS nonastrometric stars. Difficulties are reviewed and work to clear up the L3NA list is described. Accurate positions for all the nonastrometric stars during the period 1985.5 to 1987.5 can be supplied but only if perfect coordination between the different 4000 A teams and with the other tasks is strictly secured. Plans to achieve the task in due time are proposed. Author (ESA)

N86-18421# Royal Greenwich Observatory, Hailsham (England).
CARLSBERG AUTOMATIC TRANSIT CIRCLE OBSERVATIONS FOR INCA **c90**
L. V. Morrison and P. Gibbs *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 197-199 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

For the HIPPARCOS mission, the Carlsberg Automatic Transit Circle (CATC) of the La Palma observatory is observing 2700 stars between 0 and -25 deg which have little or no astrometric history. The list mainly comprises BD/CD positions which have an accuracy of 1'. The CATC program also includes 143 radio stars, 858 stars for linking extragalactic sources for ground based astrometry, and 15,000 SAO stars with poor positions. Author (ESA)

N86-18422# Copenhagen Univ. (Denmark).
MERIDIAN OBSERVATION OF THE FAINT STARS PROPOSED FOR HIPPARCOS **c90**
E. Hoeg *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 201-202 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

It is proposed to release the whole list of 210,000 stars proposed for HIPPARCOS so that meridian observers could obtain positions, especially of those non-HIPPARCOS stars which are too faint for observation with TYCHO. Only half of the proposed stars can be accomodated in the final observing list. The other

half is, however, also a sample of stars for which it would be of great astrophysical and astrometric interest to obtain positions and proper motions. Author (ESA)

N86-18423# Naval Observatory, Washington, D.C.
THE STATUS OF THE SRS **c90**
J. A. Hugues and C. A. Smith *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 203-205 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The current status of the Southern Reference Stars (SRS) Program insofar as it may impact upon the Input Catalog for HIPPARCOS is reviewed. The background of the program, scientific considerations regarding the reference system, and a meeting of the SRS committee are described. Author (ESA)

N86-18424# Observatoire de Haute Provence, Forcalquier (France).
RADIAL VELOCITIES FOR HIPPARCOS WITH THE FEHRENBACH OBJECTIVE PRISMS [VITESSES RADIALES POUR HIPPARCOS AVEC LES PRISMES-OBJECTIFS DE FEHRENBACH] **c35**
C. Fehrenbach, R. Burnage, and M. Duflot (Observatoire de Marseille) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 213-216 refs In FRENCH (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

A 60 cm objective prism was used to obtain stellar radial velocities for the HIPPARCOS mission. An 18 cm prism, and a spectrograph were also used. Data for hot stars (< or = F5) of magnitude < 9.5 are collected. Author (ESA)

N86-18425# Geneva Observatory (Switzerland).
RADIAL VELOCITY MEASUREMENTS OF LATE-SPECTRAL-TYPE STARS **c90**
M. Mayor *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 217-218 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Two spectrometers yielded 25,000 measurements for 10,000 stars likely to be included in the Input Catalog for the HIPPARCOS mission. The measurements represent 20% of the total of cold stars of the catalog. The programs covered deficient F-stars, evolved F-stars, the solar neighborhood, halo stars, late spectral supergiant stars, and dwarfs and giants in open clusters. Author (ESA)

N86-18426# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.
COMPLEMENTARY PHOTOMETRIC OBSERVATIONS FOR HIPPARCOS **c90**
J. Torra, F. Figueras, J. M. Paredes, G. Rossello, and F. Sala *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 219-221 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The results for 5 colors U, B, V, R, I photometry of 90 stars belonging to Gliese's Catalog of Nearby Stars or to its supplements and not having a complete set of photometric data are presented. The observational program was undertaken to enlarge the photometric data necessary for the HIPPARCOS mission through a list of stars which by their special interest should be included in the HIPPARCOS observing list. Author (ESA)

N86-18427# Copenhagen Univ. (Denmark).
OVERVIEW OF TYCHO DATA ANALYSIS **c90**
E. Hoeg *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 225-230 refs Sponsored by Danish Space Board (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

In TYCHO data analysis (2 million stars) photon counts are processed to detect slit transits exceeding a certain signal-to-noise ratio. These detections or transits, collected from, e.g., 6 months of observation, are identified with stars of a TYCHO Input Catalog (TIC) in a subsequent process. A limiting magnitude of (B+V)/2 = 11-0 is expected within small areas of 12 x 12 arcsec sq centered on each TIC position, corresponding to a TYCHO output catalog of at least 500,000 stars. The typical accuracy of a mean value in the output catalog is 0.03 arcsec and 0.03 mag for TYCHO astrometry and photometry, respectively. Author (ESA)

N86-18428# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
THE TYCHO INPUT CATALOG AND THE GUIDE STAR CATALOG OF THE SPACE TELESCOPE **c60**
D. Egret *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 231-233 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

The identification of the stars observed by TYCHO is based on an a priori catalog of stars, the TYCHO Input Catalogue (TIC) complete to B = 12.5 and containing 2 million stars. The main source for TIC is the Guide Star Catalog (GSC) being produced for the Space Telescope, which is expected to be complete up to 15th magnitude. It will be cross-identified (for the bright part) with the SIMBAD database. The production and the contents of the TIC is presented and the possible use of the GSC for checking the coordinate of the final HIPPARCOS Input Catalog is discussed. Author (ESA)

N86-18429# Cambridge Univ. (England). Inst. of Astronomy.
REPORT BY SUBGROUP 2130 (LINK TO EXTRAGALACTIC REFERENCE OBJECTS) **c90**
A. N. Argue *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 237-240 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Methods for linking the positions and proper motions of stars measured by HIPPARCOS to a quasi-inertial system based on extragalactic objects are reviewed. The core catalog of extragalactic objects is a list of 235 radio sources. Virtually every source in this list is optically too faint for direct measurement by HIPPARCOS so that the link must be established indirectly using large ground based telescopes or the Hubble Space Telescope. Bright optical quasars and the Lick and Tautenburg photographic measurements of proper motions of stars relative to galaxies also provide useful links for proper motions (rotation stoppers). Certain radio stars and masers are directly observable by HIPPARCOS. Those having suitable radio and optical properties provide a very powerful method of linkage. Author (ESA)

N86-18430# Astronomische Rechen-Institut, Heidelberg (West Germany).
A CRITICAL EXAMINATION OF RADIO STAR DATA **c90**
H. G. Walter, C. deVegt (Hamburger Sternwarte), and Th. Kleine (Hamburger Sternwarte) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 241-245 refs (For primary document see N86-18388 09-19)
(Contracts BMFT-01000421; BMFT-01000138)
Avail: NTIS HC A12/MF A01

Data on 275 objects subdivided into confirmed, suspected, and potential radio stars was examined for selection of stars which under HIPPARCOS observing conditions promise results accurate enough to compete with positions and proper motins expected from radio interferometric techniques. Optical suitability is assessed by apparent magnitude and by taking into account the effects of very narrow binary components, but also of those several seconds of arc apart. Stars showing strong magnitude variations combined with long periods of the light curve are considered objects deserving special caution, as are masers due

to possible noncoincidence of radio spots and optical emission centers. Radio suitability is inferred from the estimated total fluxes unless details on the radio structure are known. The consequences of the step by step application of the criteria on number and distribution of the radio star in the current list established for HIPPARCOS observations are illustrated. Author (ESA)

N86-18431# Hamburger Sternwarte (West Germany).
RELATING THE HIPPARCOS REFERENCE FRAME TO THE RADIO REFERENCE FRAME VIA VERY LARGE ARRAY (VLA) MEASUREMENTS OF THE PRECISE POSITION OF STELLAR RADIO EMISSION **c89**
C. deVegt (Naval Research Lab., Washington D.C.), K. J. Johnston, and D. P. Florkowski (Naval Observatory, Washington D.C.) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 247-249 refs (For primary document see N86-18388 09-19)
(Contract BMFT-01000138)
Avail: NTIS HC A12/MF A01

Use of precise radio positions for a large number of stars from the Very Large Array for HIPPARCOS is proposed. From the emission of 100 stars relative to background extragalactic radio sources, the HIPPARCOS reference frame can be related statistically to the radio reference frame at the fraction of a mas level. Using radio stars, the two principal problems of the linking process, i.e., determining residual rotation and position zero point, can be solved. Techniques, and results from measurements are discussed. The lack of observations in the Southern Hemisphere is considered. Author (ESA)

N86-18432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MILLIARCSECOND STRUCTURES, VLBI AND OPTICAL POSITIONS OF 8 HIPPARCOS RADIO STARS **c90**
J.-F. Lestrade, R. A. Preston, Y. Requieme (Observatoire de Bordeaux), M. Rapaport (Observatoire de Bordeaux), and R. L. Mutel (Iowa Univ.) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 251-253 refs Sponsored by NASA (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01 CSCL 22B

Mark 3 VLBI observations show evidence for complex radio structures on the milliarcsecond angular scale of 8 HIPPARCOS radio stars. Their VLBI positions and optical positions measured with the automatic meridian circle in Bordeaux are presented. Comparison between the optical and VLBI positions of these stars shows that the JPL VLBI reference frame and the FK4 fundamental catalog are aligned at the level of precision of the optical measurements (0".05). Author (ESA)

N86-18433# Barcelona Univ. (Spain). Dept. de Fisica de la Tierray del Cosmos.
RADIO OBSERVATIONS OF HIPPARCOS STARS **c89**
R. Estalella, J. M. Paredes (Inst. Nacional de Tecnico Aeroespacial, Madrid), and A. Rius *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 255-257 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

Use of radio stars to link the HIPPARCOS reference frame to extragalactic objects through VLBI observations is discussed. An observational program monitoring flux density of radio stars was carried out. From a preliminary list of radio stars with optical characteristics suitable for HIPPARCOS observation objects with good characteristics for VLBI observation were selected, mainly RSCVn stars. The NASA DSN 64 m antenna in Madrid was used for stimultaneous flux density determination at 13 and 3.6 cm or at 2 circular polarizations at 3.6 cm. A total of 30 radio stars were observed. Radaio stars are found to be circular polarized up to 20%. Author (ESA)

N86-18434*# Texas Univ., Austin.
USING SPACE TELESCOPE TO TIE THE HIPPARCOS AND EXTRAGALACTIC REFERENCE FRAMES TOGETHER
P. D. Hemenway, R. L. Duncombe, W. H. Jefferys, and P. J. Shelus *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 261-263 refs (For primary document see N86-18388 09-19)
(Grant NAGw-233)
Avail: NTIS HC A12/MF A01 CSCL 22B

Hubble Space Telescope observations will be made to tie the HIPPARCOS Instrumental System (HIS) to extragalactic objects, to determine the overall rotation of the HIS with respect to a set of extragalactic objects; to compare the HIS to an accurate radio reference frame; and to look for motions in the optical centroids of compact extragalactic objects at the level of 0.001 arcseconds per year. About 75 radio sources and extragalactic objects will be chosen from the initial group of 414 pairs. The egos will have their positions and proper motions determined relative to the HIPPARCOS Input Catalog stars. The candidate stars are being screened by ground based speckle interferometry to select a final set. Author (ESA)

N86-18435# Air Force Geophysics Lab., Hanscom AFB, Mass.
REAL TIME: AUTOMATIC VEHICLE POTENTIAL DETERMINATION FROM ESA MEASUREMENTS. PART 1. THE COUNT RATIO ALGORITHM
S. L. Spiegel, R. J. Saistrick, N. A. Saflekos, M. S. Gussenhoven, and H. A. Cohen 8 May 1985 20 p
(AF Proj. 7661)
(AD-A160459; AFGL-TR-85-0103(1); AFGL-ERP-916(1)) Avail: NTIS HC A02/MF A01 CSCL 09/2

The problem of spacecraft charging at high altitudes is an important one for Air Force applications; indeed a major effort (SCATHA Project) has been undertaken to understand this phenomenon. Quite simply, when a space vehicle at geosynchronous orbit, interacting with its plasma environment, acquires a high negative potential (of the order of 1/2 kV), it is possible that onboard instrumentation will be damaged by electrical discharge between differentially charged surfaces of the spacecraft. Thus it is important to activate a discharge mechanism as soon as a dangerously high potential develops. This means it is necessay to have a reliable method of determining the real time vehicle potential, or more specifically, distinguishing whether or not the potential has reached or exceeded critical levels. An algorithm incorporating an onboard microprocessor to analyze data obtained by the vehicle, and determine the extent of charging, is desirable. Computational simplicity and speed are important considerations in the design of such an algorithm. Examination of data from the P78-2 satellite has indicated that electrostatic analyzer (ESA) ion count data, could serve as input to an algorithm designed to fulfill the aforementioned objectives. The development and testing of one such algorithm, referred to as the count ration algorithm, are described. GRA

N86-18436# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
SPACELAB SPECIAL: STS 51-F/SL-2
Jul. 1985 16 p In GERMAN Original contains color illustrations
Avail: NTIS HC A02/MF A01

Testing of the Spacelab unmanned pallet version and subsystems and of the unmanned supply service module IGLU with check of junctions between the orbit and Spacelab system and of the interaction between carrier and payload are described. Spacelab uses as development and test laboratory for processes and materials; as operational platform for remote Earth observation, meteorology, communication, and navigation; and as test and measurement platform for space investigations (atmosphere, astrophysics, and solar physics) are outlined. A pallet; the German mission D1; and EURECA as an economical exploitation program for long unmanned space missions are presented. Author (ESA)

N86-18437# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
SPACELAB SPECIAL: EURECA
Jul. 1985 10 p In GERMAN Original contains color illustrations

Avail: NTIS HC A02/MF A01

The European Retrievable Carrier EURECA designed for payload elements and experiments in weightlessness in materials science and life sciences, in remote Earth observation, astrophysics, and in fundamental research is presented. The EURECA and Shuttle Pallet Satellite can be applied for a rendezvous mission demonstration and for docking tests without changes in weight, volume, and dimensions. The Navigation Experiment payload for investigation of atomic timing device behavior for on-board and ground clock synchronizing was delivered to the D1 integration team. The NASA mission experts' training and preparations are presented. Flight assessment shows high precision. Author (ESA)

N86-18438# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ACTIVE MAGNETOSPHERIC PARTICLE TRACER EXPLORERS (AMPTE) ION RELEASE MODULE (IRM): FLIGHT EXPERIENCE AFTER 7 YEAR MISSION [AMPTE-IRM: FLUGERFAHRUNGEN NACH EINJAEHRIGER MISSION]
B. Haeusler (DFVLR, Bonn), O. H. Bauer, G. Haerendel, F. Melzner, and J. Stoecker Sep. 1985 29 p refs In GERMAN Presented at DGLR Jahrestagung, Munich, 30 Sep.-2 Oct. 1983
(MPI-IN-45; ISSN-0340-8922) Avail: NTIS HC A03/MF A01

The AMPTE program and its scientific goals are explained. The organization and execution of the project are presented. The mission of the three AMPTE satellites and the experiments onboard AMPTE-IRM are described. Satellite-mechanical aspects, thermal concept, and electronics are explained. Problems which occurred during the flights are presented. Author (ESA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N86-18439# Electromagnetic Launch Research, Inc., Cambridge, Mass.
METALLIC INDUCTION REACTION ENGINE Final Report, 1 Jul. 1983 - 30 Jun. 1984
P. P. Mongeau and D. P. Hart 28 Dec. 1984 143 p
(Contract F49620-83-C-0126)
(AD-A160137; EML-85-AF001; AFOSR-85-0773TR) Avail: NTIS HC A07/MF A01 CSCL 21/3

Advances in electrical propulsion technology have inspired a variety of approaches for orbit raising propulsion. One such technique, the metallic induction reaction engine, uses a solid metallic reaction mass rather than a gas or plasma to achieve high thrust density and efficiency. The reaction mass is inductively accelerated by a magnetic pulse coil, thereby eliminating the problems of erosion and wear. The basic mechanisms and limits of the conversion of electrical energy into kinetic energy by the metallic induction reaction engine are analyzed. To facilitate this, a single shot experimental engine was constructed and operated over one hundred times, including several tests with conversion efficiencies greater than 50%. Further analyses were performed by developing a numerical model. The velocity and current predicted by this model agree to within 15% of the experimental data over the entire range of operation. Extrapolation to higher performance operation has revealed that there are adverse coupling effects and circuit impedance effects which can limit the ultimate performance of the metallic induction reaction engine. GRA

N86-18440# Dayton Univ., Ohio.
ANTIPROTON ANNIHILATION PROPULSION Final Report, 1 Apr. 1984 - 31 Jan. 1985
R. L. Forward Sep. 1985 212 p
(Contract F04611-83-C-0046)
(AD-A160734; UDR-TR-85-55; AFRPL-TR-85-034) Avail: NTIS HC A10/MF A01 CSCL 21/3

Antiproton annihilation propulsion is a new form of space propulsion, where milligrams of antimatter are used to heat tons of reaction fluid to high temperatures. The hot reaction fluid is exhausted from a nozzle to produce high thrust at high specific impulse. This study was to determine the physical, engineering, and economic feasibility of antiproton annihilation propulsion. The conclusion of the study is that antiproton propulsion is feasible, but expensive. Because the low mass of the antimatter fuel more than compensates for its high price, comparative mission studies show that antimatter fuel can be cost effective in space, where even normal chemical fuel is expensive because its mass must be lifted into orbit before it can be used. Antiproton annihilation propulsion is mission enabling, in that it allows missions to be performed that cannot be performed by any other propulsion system. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-18441*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE-RETARDANT DECORATIVE INKS FOR AIRCRAFT INTERIORS
D. A. Kourtides, Z. Nir (Makhteshim, Ltd., Beersheeba, Israel), and J. A. Mikroyannidis (Patras Univ., Greece) Dec. 1985 14 p refs
(NASA-TM-88198; A-85414; NAS 1.15:88198) Avail: NTIS HC A02/MF A01 CSCL 07C

Commercial and experimental fire retardants were screened as potential fire retardants for acrylic printing inks used on aircraft interior sandwich panels. The fire retardants are selected according to their physical properties and their thermostabilities. A criterion for selecting a more stable fire retardant is established. Thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) are used to determine thermostabilities. Results show that the fire retardant formulations are more thermally stable than the acrylic ink control. It is determined that an ink formulation containing a brominated phenol and carboxy-terminated butadiene acrylonitrile which has been modified with a brominated polymeric additive (BPA), yields the highest limiting oxygen index (LOI) of all the compounds tested. All of the fire-retardant formulations have a higher oxygen index than the baseline acrylic ink. Author

N86-18442*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GRAPHITE FIBER INTERCALATION: BASIC PROPERTIES OF COPPER CHLORIDE INTERCALATED FIBERS
Donald A. Jaworske and John D. Miller (Kenyon Coll., Gambier, Ohio) 1986 16 p refs Presented at the Spring Meeting of the American Physical Society, Las Vegas, Nev., 31 Mar. - 4 Apr. 1986
(NASA-TM-87217; E-2877; NAS 1.15:87217) Avail: NTIS HC A02/MF A01 CSCL 07D

In situ resistance measurements were used to follow the intercalation of copper chloride in pitch-based fibers. Subsequent single fiber resistivity measurements reveal a large range of resistivities, from 13 to 160 micro-ohms cm. Additional density measurements reveal a bimodal distribution of mass densities. The dense fibers have lower resistivities and correspond to the stage III compound identified by X-ray diffraction. Neither resistivity nor density correlate with diameter. Both energy dispersive spectroscopy and mass density data suggest that excess chlorine resides in the intercalated fiber, resulting in a stoichiometry of C4.9n CuCl2.5 (where n is the stage number) for the denser fibers. Finally, thermogravimetric analysis shows a 33 percent loss in mass upon heating to 700C. This loss in mass is attributed to loss of both chlorine and carbon. Author

N86-18443# Texas Dept. of Water Resources, Austin. Dept. of Chemistry.
PREPARATION OF P-N-H AND p-p COMPOUNDS FROM A SILYLATED AMINO(METHYLENE) PHOSPHINE
B. L. Li and R. H. Neilson 3 Oct. 1985 17 p
(Contract N00014-79-C-0632)
(AD-A159829; TCU/DC/TR-85-01) Avail: NTIS HC A02/MF A01 CSCL 07/2

Secondary amines react with the silylated amino(methylene)-phosphine (Me3Si)2NP=CHSiMe3 doublebond (1) by a complex process involving Si-N bond cleavage as well as addition tot he P-C doublebond. Thus, treatment of 1 with Et2NH yields either the N-H phosphine Me3SiN(H)P(NEt2)CH2SiMe3 (2) or the unexpected P super V-pIII product Me3SiN-doublebond P(NEt2)(CH2Me3)-P(CH2SiMe3)N(SiMe3)2 (3), depending upon the reaction stoichiometry. In two separate experiments with mechanistic implications: (a) 2 was prepared from the reaction of Et2NH with (Me3Si)2NP(NEt)CH2SiMe3 (la), the presumed intermediate in the Et2NH/1 reaction, and (2) 3 was prepared directly by addition of the N-H compound 2 to the (methylene)phosphine 1. Compound 2 is smoothly oxidized by CCl4 to the P-chlorophosphoranimine Me3SiN-P(Cl)(NEt2)CH2SiMe3 doublebond (4) or deprotonated by n-BuLi. The ambident anion thus formed reacts with the chlorophosphines Ph2PCl and (Me3Si)2NP(Cl)CH2SiMe3 to yield the P-P products Me3SiN-doublebond P(NEt2)(CHSiMe3)-PPh2 (5) and compound 3, respectively. Author (GRA)

N86-18444# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials
VISCOSITY RISE DURING FREE RADICAL CROSSLINKING POLYMERIZATION WITH INHIBITION
V. M. Gonzalez-Romero and C. W. Macosko 1985 9 p
(Contract DAAG29-83-K-0149)
(AD-A159842; ARO-20678.7-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

A study of the viscosity rise during free radical crosslinking polymerization is presented. Techniques were developed for monitoring isothermal viscosity rise during fast polymerization reactions. The chemical system used was composed of a dimethacrylate resin in styrene monomer, t-butyl perbenzoate initiator, and hydroquinone as the inhibitor. When reduced viscosity is plotted versus conversion, data at all temperatures collapsed into a single curve. A theoretical equation is suggested for the time required to reach the gel point in free radical crosslinking polymerization with inhibition. This equation showed good agreement with experimental observations. Author (GRA)

N86-18445# Howard Univ., Washington, D. C. Laser Chemistry Div.
PRODUCTION OF CN (A2pi I) IN THE PHOTOLYSIS OF ACETONITRILE AT 158 NM
J. B. Halpern and X. Tang 30 Sep. 1985 21 p
(Contracts N00014-80-C-0305; DE-AS05-76ER-05056; Grant NSF CHE-82-19255)
(AD-A160175; ONR-TR-18) Avail: NTIS HC A02/MF A01 CSCL 07/5

The primary product of the photolysis of acetonitrile and d sub 3- acetonitrile in the first Rydberg system absorption at 158 nm is shown to be CN (A superscript 2 pi sub i). Near collision free measurements of the quantum state distributions in the A superscript 2 Pi sub i v' = 0 level detect little rotational excitation in the CN fragment. The population of the V' = 1 level of the CN (A superscript 2 pi sub i) state is less than 10% of that in the v' = 0 level. The occupation of the Pi sub 3/2 and pi sub 1/2 manifolds seems to be statistical. GRA

N86-18446# Suntech, Inc., Marcus Hook, Pa.
SYNTHESIS OF SYNTHETIC HYDROCARBONS VIA ALPHA OLEFINS Final Report, 17 Aug. 1981 - 31 Dec. 1984
G. L. Driscoll and S. J. G. Linkletter May 1985 96 p
(Contract F33615-81-C-5058)
(AD-A160386; AFWAL-TR-85-4066) Avail: NTIS HC A05/MF A01 CSCL 11/8

Alpha olefins have been used for some timo as a starting point to produce oligomers in the C20 -C40(+) range. As lubricants, these materialsl exhibit unique properties in some respects, while in others, are demonstratively poorer than lubricants derived from mineral oils. Thermal and oxidative stability of commercially available decene oligomer is compared to oligomer prepared by anionic catalylsis. The latter oligomers show somewhat improved stabilities as well as more well-defined isomeric hydrocarbon species. Thermal stressing of oligomers at 350 C in and atmosphere of hydrogen and, alternatively, deuterium, suggest that thermal decompostion is a true bulk property. Normal alkanes were observed as decomposition products, while only small amounts of deuterium were found in the decompostion products, suggesting that radical recombination is a predominate mechanism. NMR analysis of oligomer prepared form 1 decene-2-C-13 with boron trifluoride catalyst suggests that oligomerization involves secondary carboniumn ions resulting from a rapid isomerization of the alpha olefin. Anionic addition (telomerization) of ethylene to mesitylene and meta xylene yields straight chain alkyl, aromatic oils in which the chain length, structure and point of attachment to the aromatic ring can be controlled. These oils exhibited characteristic poor oxidation stability, however, hydrogenation of the aromatic ring in the m-xylene telomer produced a marked improvement in oxidation stability producing an oil equivalent to polydecene. GRA

N86-18447# Chemical Research and Development Center, Aberdeen Proving Ground, Md.
VAPOR PRESSURE OF METHYLPHOSPHONIC DICHLORIDE: A COMPENDIUM Special Publication, May - Aug. 1984
A. Brozena and D. Fielder Sep. 1985 13 p
(DA Proj. 1L1-62706-A-553)
(AD-A160613; CRDC-SP-85012) Avail: NTIS HC A02/MF A01 CSCL 07/3

Vapor-pressure data for methylphosphonic dichloride from many sources are reviewed and analyzed to obtain a best-fit predictive Antoine equation. Also given are the heat of vaporization and volatility at various temperatures. Zeffert published an Antoine equation for dichlor in 1960. However, no experimental data were given in the report. Several British technical reports contained some experimental vapor pressure data for dichlor, and several Edgewood Arsenal contractor reports also contained vapor-pressure data for the compound. The data from these various sources were combined into a set and evaluated, using Penski and Latour's method of computation. Zeffert's equation was used to calculate values for his experimental data and these values were used when all data were combined into a set. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N86-18448*# Boeing Commercial Airplane Co., Seattle, Wash.
THE 737 GRAPHITE COMPOSITE FLIGHT SPOILER FLIGHT SERVICE EVALUATION Report, May 1981 - Dec. 1984
Randy L. Coggeshall Jul. 1985 84 p refs
(Contract NAS1-11668)
(NASA-CR-172600; NAS 1.26:172600; D6-53021; Rept-8) Avail: NTIS HC A05/MF A01 CSCL 11D

The flight service experience of 111 graphite-epoxy spoilers on 737 transport aircraft and related ground based environmental exposure of graphite-epoxy material specimens is covered. Spoilers have been installed on 28 aircraft representing seven major airlines operating throughout the world. An extended flight service evaluation program of 15 years is presently underway. As of December 1984, a total of 2,092, 155 spoiler flight hours and 2,954,814 spoiler landings had been accumulated by this fleet. Author

N86-18449*# Boeing Commercial Airplane Co., Seattle, Wash.
ENVIRONMENTAL EXPOSURE EFFECTS ON COMPOSITE

MATERIALS FOR COMMERCIAL AIRCRAFT Report, Apr. 1982 - Mar. 1985
Randy L. Coggeshall Nov. 1985 82 p refs
(Contract NAS1-15148)
(NASA-CR-177929; NAS 1.26:177929; D6-53020) Avail: NTIS HC A05/MF A01 CSCL 11D

The effects of environmental exposure on composite materials are determined. The environments considered are representative of those experienced by commercial jet aircraft. Initial results have been compiled for the following material systems: T300/5208, T300/5209, and T300/934. Future results will include AS-1/3501-6 and Kevlar 49/F161-188. Specimens are exposed on the exterior and interior of 737 airplanes of three airlines, and to continuous ground-level exposure at four locations. In addition, specimens are exposed in the laboratory to conditions such as: simulated ground-air-ground, weatherometer, and moisture. Residual strength results are presented for specimens exposed for up to five years at five ground-level exposure locations and on airplanes from one airline. Author

N86-18450# California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering Sciences.
CONSTRUCTION OF NON-LINEAR MODEL FOR BINARY METAL-MATRIX COMPOSITES Annual Report, 1 Jul. 1984 - 30 Jun. 1985
H. Murakami and G. A. Hegemier Aug. 1985 104 p
(Contract N00014-84-K-0468)
(AD-A159721) Avail: NTIS HC A06/MF A01 CSCL 11/4

The research is conducted in response to the need for microstructural-based theories which furnish increased simulation capabilities of metal-matrix composite structures in both static and dynamic regimes with a minimum of model parameters to be experimentally determined. The objective of the research is to develop a nonlinear model of binary metal-matrix composites that will provide greater accuracy than existing models in linear and nonlinear regimes for static and dynamic loading. Furthermore, in an effort to accommodate practical structural configurations a plate theory is developed for fiber-reinforced composite plates. The progress made during the first year's effort toward achieving the above objectives includes: (1) the development and validation of a linear mixture model which accounts for effective moduli and harmonic wave dispersion, (2) testing of methodologies for including nonlinear material responses, and (3) a significant improvement of existing laminated composite theories to account for inelastic responses driven by in-plane strains. Author (GRA)

N86-18451# Drexel Univ., Philadelphia, Pa. Ultrasonics Research Lab.
ULTRASONIC I-SCAN INSPECTION OF COMPOSITE MATERIALS Final Report, 9 May 1983 - 9 May 1984
J. L. Rose, J. B. Nestleroth, and K. Subramanian 13 Sep. 1985 102 p Original contains color illustrations
(Contract N68335-83-C-0739; F41-461)
(AD-A159974; NAEC-92-190) Avail: NTIS HC A06/MF A01 CSCL 17/1

Composites are being used in high-strength, low-weight applications such as the aircraft industry. Difficulties arise in the nondestructive testing and evaluation of these materials because of their fibrous nature. Therefore, a study was connected to evaluate, improve, and optimize ultrasonic techniques for the detection of programmed delaminations and other defects in graphite/epoxy composite laminates. A pulse echo testing mode was used and C-scan results were analyzed. To overcome the limits of traditional C-scan, F-scanning (Feature scanning) was also used. This method examines many characteristic features of the ultrasonic waveform such as amplitude, frequency shifts, etc. Feature scanning has the potential to precisely locate and characterize the defects. Micrographic analyses were made to determine defective and good areas for correlation with the results obtain in the F-scan process. The results of the C-scan, F-scan, and photomicrographs showed an excellent correlation. Specific conclusions are drawn to assist future operators in conducting consistent and reliable C-scans. Situations where F-scanning might be suitable are also reviewed. Author (GRA)

N86-18452# Illinois Univ., Chicago.
THREE-DIMENSIONAL STRESS SINGULARITIES IN ANISOTROPIC MATERIALS AND COMPOSITES Final Report, 15 Mar. 1983 - 15 Aug. 1984
N. Somaratna and T. C. T. Ting Aug. 1985 65 p
(Contract DAAG46-83-K-0159)
(AD-A160433; AMMRC-TR-85-24) Avail: NTIS HC A04/MF A01 CSCL 12/1

A general numerical procedure is presented for determining the 3-dimensional stresses singularities in anisotropic materials and composites. The geometry near the singular point can be represented by a conical wedge whose lateral surface is generated by straight lines passing through the wedge apex. The shape S sub 1 of the cross section of the conical wedge at any constant radial distance defines the geometry of the 3-dimensional singular point in the material. If S sub 1 consists of two regions each occupied by a different material, we have a 3-dimensional composite conical wedge. A finite element scheme based on variational principles is used to find the order of stress singularities at the wedge apex. The method can be applied to any shape of S sub 1. Several examples are presented. For comparisons with the existing numerical schemes for isotropic materials, the method is applied to special geometry and to isotropic materials. It is shown that the 8 node higher order isoparametric elements employed here is very efficient in obtaining a fairly accurate result. GRA

N86-18453# Illinois Univ., Chicago. Dept. of Civil Engineering Mechanics and Metallurgy.
DEVELOPMENT OF A REDUCED MINDLIN HYBRID STRESS THIN MULTILAYER PLATE ELEMENT WITH APPLICATION TO EDGE CONTACT PROBLEMS Final Report, 15 Aug. 1981 - 15 Jun. 1983
R. L. Spilker and D. M. Jakobs Aug. 1985 152 p
(Contract DAAG46-82-K-0004; DA Proj. 8X3-63304-D-215)
(AD-A160453; AMMRC-TR-85-23) Avail: NTIS HC A08/MF A01 CSCL 04/2

A hybrid-stress formulation of isoparametric elements for the analysis of thin multilayer laminated composite plates is presented, and is applied to edge contact analyses. The element displacement behavior is characterized by laminate reference surface inplane and transverse displacements and laminate non-normal cross-section rotations; as a result, the number of degrees of freedom is independent of the number of layers. All components of stress are included and are related to a set of laminate stress parameters, the number of which is independent of the number of layers. Attention is restricted here to thin laminates: for thin laminates it is shown that the contributions of transverse shear stress and transverse normal stress to the internal complementary strain energy can be neglected. As a result, a modified stiffness-formation-algorithm can be used which provides a significant improvement in computation efficiency. The formulation is used to develop an 8-node isoparametric thin multilayer plate element. The resulting element is naturally invariant, of correct rank, and non-locking in the thin plate limit. Element performance is documented here for several illustrative examples. GRA

N86-18454# Societe Nationale Industrielle Aerospatiale, Paris (France). Product Div.
DRILLING RISERS FOR GREAT WATER DEPTHS: ADVANTAGE FOR MASS REDUCTION BY MEANS OF COMPOSITE MATERIALS
P. Odru (Institut Francais du Petrole, Gnenoble, France) and J. C. Guichard 1985 12 p refs Presented at Deep Offshore Technology (DOT) Conference, Sorrente, Italy, 21 Oct. 1985
(SNIAS-852-430-101) Avail: NTIS HC A02/MF A01

Composite material lines processed from carbon and glass fiber composites were manufactured in pieces of 15 m length and then fitted to an operational drilling riser, in parallel with the working lines. A reduction of dynamic stress was expected. The

lines were routinely subjected to 10,000 psi. The results prove satisfactory for high pressure lines. However, the greater fragility of composite hardware versus steel is a factor to be considered when handling the riser. Author (ESA)

N86-18519# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF CARBON-GLASS PLASTIC MATERIAL UNDER PURE FLEXURE Abstract Only
I. G. Zhigyn, G. A. Pavlov, V. G. Gorban, and V. A. Polyakov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 12 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov, (Riga, USSR), no. 3, May - Jun. 1985 p 417-422 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18520# Joint Publications Research Service, Arlington, Va.
COMPARATIVE CREEP ANALYSIS OF UNIDIRECTIONALLY ORIENTED COMPOSITE MATERIALS WITH VARIOUS KINDS OF REINFORCED FIBERS Abstract Only
E. Z. Plume *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 13 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 431-436 Original language document was announced in IAA as A85-44170 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18521# Joint Publications Research Service, Arlington, Va.
STRESSED-STRAINED STATE OF TRIPLE-LAYER HONEYCOMB PANELS WITH CARBON-PLASTIC SHEATHS Abstract Only
V. T. Shcherbakov, V. S. Vedneva, Yu. V. Kirillov, and V. M. Muratov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 14 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 486-491 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-18455 British Library Lending Div., Boston Spa (England).
INVESTIGATION OF TEMPERATURE DEPENDENCE OF GROWTH RATE OF OXIDE FILMS ON TANTALUM BY METHOD OF INTERFERENCE INDICATION
E. S. Vorontsov, V. F. Zabrovskaya, and A. N. Korneeva 1985 7 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 2, 1985 p 1-4
(BLL-M-36385-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

An investigation was made of the temperature dependence of the growth rate of interference-color red oxide films on tantalum in an atmosphere of air and water vapor. Use of the method of interference indication enabled differential values of the apparent activation energy to be obtained for different stages of development of the studied process. Author

N86-18456 British Library Lending Div., Boston Spa (England).
SURFACE CHARACTERISTICS AND MOLAR VOLUME OF FeCl2-MeCl (Me = Li, Na, K, Rb, Cs) SYSTEMS
B. P. Burylev and V. M. Milman 1985 8 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya, no. 4, 1985 p 104
(BLLD-M-36470-(5828.4)) Avail: Issuing Activity

The method of maximum pressure in a gas bubble was used to investigate the face tension and density of ferrous chloride-chlorides of alkali metals systems. The dependence of the surface characteristics of these systems on composition and temperature was established. Isotherms of the molar volume, the molar surface, the change in the Gibbs energy of surface formation, and the concentration of components in the surface layer were calculated. The improvement in the mechanical properties and structural characteristics of pig iron when created with salts is connected with surface and interphase phenomena. Author

N86-18457# Naval Research Lab., Washington, D. C.
TEMPORAL STABILITY OF OXIDIZER SOLUTIONS: A SURVEY OF CANDIDATE DECON MATERIALS IN SEAWATER Memorandum Report
R. E. Pellenbarg and D. A. Dotson 30 Sep. 1985 19 p
(NR Proj. F64-561)
(AD-A159734; NRL-MR-5668) Avail: NTIS HC A02/MF A01 CSCL 07/4

Aqueous solutions (0.1 N or less) of various potential decon agents were examined for long term stability in seawater at 6 C, 23 C, and 70 C. The following compounds were tested: the hypochlorite salts of sodium, calcium, and lithium; sodium dichloroisocyanuarate; the peroxygen compounds sodium perborate, sodium peroxydisulfate, hydrogen peroxide, and magnesium monoperoxyphthalate. The inorganic hypochlorite solutions were stable for up to 4 days at 6 and 20 C. The solutions were unstable at 70 C, deteriorating markedly in as little as 12 hours. The isocyanurate solutions were stable at low and ambient temperatures, but decomposed within 3 to 4 hours at 70 C. The perborate and peroxide solutions showed stability at all temperatures for up to 24 hours. The peroxydisulfate solutions decomposed rapidly at 70 C, and the magnesium monoperoxyphtalate solutions were unstable at all temperatures, decomposing within 0.5 hours. These solution stability data, monitored by iodometric titrimetry, provide information on the long term stability of potential decontamination fluids formulated with seawater. These data are of importance, should one or more of the examined candidates prove efficacious for decontamination applications. GRA

N86-18458# Naval Research Lab., Washington, D. C.
TEMPORAL STABILITY OF SOLID OXIDIZERS AT HIGH TEMPERATURE AND HUMIDITY Memorandum Report
R. E. Pellenbarg and D. A. Dotson 30 Sep. 1985 11 p
(NR Proj. F64-561)
(AD-A159735; NRL-MR-5672) Avail: NTIS HC A02/MF A01 CSCL 11/6

Chemical Warfare/Biological Warfare (CW/BW) decontamination operations may rely on aqueous solutions prepared from stored solid oxidizers. Needed are data defining the shipboard storage stability of candidate oxidizers. Therefore, the stability of a series of potential decontaminants has been examined at high temperature (90 + C) and humidity (95 + % R.H.). The loss of oxidizing capacity in aliquots of the oxidizers was followed with time by iodometric titration. Calcium hypochlorite lost over 99% of its oxidizing capacity in less than two days, whereas lithium hypochlorite retained one-third oxidizing capacity for approximately twenty days. Sodium perborate, and sodium persulfate were very hygroscopic and unstable with time. H-48 decomposed in approximately two days, while sodium isocyanurate lost about 80% of its oxidizing capacity in two weeks. The data presented documents severe stability problems of one sort or another with all the materials tested, although overall the sodium isocyanurate appeared to be the more stable candidate under extreme conditions. In any case, packaging and storage considerations are shown to be important for any potential decontaminant to be stored under environmentally severe conditions. GRA

N86-18459# Princeton Univ., N. J. Dept. of Chemical Engineering.
COMPLEX MOLECULAR MOTIONS IN BULK HARD SEGMENT POLYURETHANES: A DEUTERIUM NMR STUDY Technical Report
A. Kintanar, L. W. Jelinski, I. Gancarz, and J. T. Koberstein 30 Sep. 1985 42 p Prepared in cooperation with Bell Telephone Labs.,

Inc., Murray Hill, N.J.
(Contract N00014-84-K-0534)
(AD-A159760; TR-2) Avail: NTIS HC A03/MF A01 CSCL 07/4

Solid state deuterium NMR spectroscopy is used to characterize molecular motion in two specifically deuterated polyurethane hard segment polymers. The polyurethanes consist of 4,4'-diphenylmethane diisocyanate (MDI) chain extended with (2,2,3,3-d subscript 4) butanediol (BDO), and 2,4 toluene diisocyanate (TDI) chain extended with (2,2,3,3-d subscript 4) butanediol. Lineshape and relaxation T subscript 1 data were obtained as a function of temperature. The results indicate a broad distribution of motional correlation times, in both materials. In the semicrystalline MDI-BDO polymer, the distribution divides cleanly into two components that are attributable to the crystalline and amorphous regions of the material. In the TDI-BDO polymer, there is only a single broad distribution in keeping with the completely amorphous nature of this material. The results also show that the predominant large-scale motion of the alkyl chain is a gauche-trans conformational hop. The central methylene carbons of the butanediol undergo librations about their equilibrium positions, in addition to the large scale conformational transitions. Above approx. 60 C, additional larger-scale diffusion of the entire butanediol moiety occurs within a cone of semiangle approx. 15. The results are consistent with the existence of kinked conformations in the alkyl chain of this material. Author (GRA)

N86-18460# Army Medical Bioengineering Research and Development Lab., Fort Detrick, Md.
AUTOMATED ION CHROMATOGRAPHY Technical Report, for Period Ending 1983
S. H. Hoke and L. J. Baxter Jun. 1985 14 p
(DA Proj. 3A1-61101-A-91-C)
(AD-A159764; USAMBRDL-TR-8501) Avail: NTIS HC A02/MF A01 CSCL 07/4

An ion chromatograph and an automatic sampler have been interfaced with a data station and a minicomputer. This arrangement allows for ease of operation and automatic integration of chromatographic peaks, calculations, and storage and retrieval of data. It also permits the use of special analytical techniques which could not easily be performed manually. Three applications of this configuration are discussed: anionic stripping of interfering ions, simplified determination of phenoxy acid herbicides, and computer-aided comparisons of simultaneously-processed chromatogram calibrations. Author (GRA)

N86-18461# Naval Research Lab., Washington, D. C.
EFFECTS OF CURVATURE AND DILUTION ON UNSTEADY, PREMIXED, LAMINAR FLAME PROPAGATION
K. Kailasanath and E. S. Oran 30 Sep. 1985 22 p
(AD-A159934; NRL-MR-5659) Avail: NTIS HC A02/MF A01 CSCL 21/2

We have used a time-dependent, one-dimensional, Lagrangian model to study laminar flames in stoichiometric hydrogen-oxygen mixtures diluted with nitrogen. For stoichiometric hydrogen-air mixtures we have seen that spherically expanding flame first decelerates until the velocity reaches a minimum value, and then it accelerates. For large radii, the burning velocity approaches the planar burning velocity. These same trends are also observed as the amount of diluent is increased. With increasing dilution, the flames reach their minimum velocities at larger times and larger radii. These observations are explained on the basis of flame stretch. The spherical geometry results are compared to be results from another set of calculations in planar flame in the same mixture. In both planar and spherical geometries, the effect of increasing the dilution is to lower the burning velocities. Since the burning velocity is smaller in the spherical geometry, the flame is less than that of a planar flame in the same mixture. In both planar and spherical geometries, the effect of increasing the dilution is to lower the burning velocities. Since the burning velocity is smaller in the spherical geometry, the flame can be extinguished (or quenched) with less dilution in the spherical geometry than in the planar geometry. We also discuss the implications of these results to laminar flame quenching and flammability limits. Author (GRA)

N86-18462# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
COMPARISON BETWEEN SURFACE-ENHANCED RAMAN AND SURFACE INFRARED SPECTROSCOPIES FOR STRONGLY PERTURBED ADSORBATES: THIOCYANATE AT GOLD ELECTRODES
D. S. Corrigan, J. K. Foley, P. Gao, S. Pons, and M. J. Weaver Aug. 1985 20 p Prepared in cooperation with Utah Univ., Salt Lake City
(Contract N00014-79-C-0670)
(AD-A159954; TR-46) Avail: NTIS HC A02/MF A01 CSCL 07/4

The potential-dependent C-N stretching mode, v sub CN, for thiocyanate adsorbed at the gold-aqueous interface is examined by both surface-enhanced Raman spectroscopy (SERS) and subtractively normalized interfacial Fourier transform infrared spectroscopy (SNIFTIRS). Both SERS and SNIFTIRS exhibit a v sub CN frequencies were very similar (within ca. 5/cm) for the SNIFTIRS at smooth and electrochemically roughened gold, as well as for SNIFTIRS and SERS on the latter surface. This suggests that the SERS-active sites do not differ substantially from the preponderant sites sensed by SNIFTIRS. Some features of the SER spectra suggest that N- as well as S-bound adsorbed thiocyanate exists at far negative potentials. Author (GRA)

N86-18463# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
SURFACE-ENHANCED RAMAN SPECTROSCOPY AS A PROBE OR ADSORBATE-SURFACE BONDING: BENZENE AND MONOSUBSTITUTED BENZENES ADSORBED AT GOLD ELECTRODES
P. Gao and M. J. Weaver Aug. 1985 31 p
(Contract N00014-79-C-0670)
(AD-A159978; TR-51) Avail: NTIS HC A03/MF A01 CSCL 07/4

Surface-enhanced Raman spectra of benzene and eight monosubstituted benzenes adsorbed at gold electrodes have been examined in order to probe the nature of adsorbate-surface bonding for simple aromatic molecules. Benzene appears to adsorb flat via pi adsorbate-surface interactions as evidenced by the significant (20 to 30/cm) downshifts in the symmetric rig breathing mode (v sub 1) and the absence of other ring modes in the SER spectra. Similar results were obtained using gold surfaces prepared by electroplating or anodic-cathodic potential sweeps in chloride, although much more stable SERS was obtained by using the latter procedure. The ring substituents -CHD3, -CH(CH3)2, -C(CH3)3, -Cl, -Br, -CN, -NO2, -COO(-) and -CHO were chosen so to provide steric perturbations or alternative binding modes to the metal surface. With the alkyl, benzoate, and aldehyde substituents, small yet significant (ca. 5 to 15/cm) decreases in the v sub 12 and v sub 18a characteristic ring modes along with band broadening were observed upon adsorption, consistent with attachment via the benzene ring. For the halogen substituents, smaller such downshifts were obtained along with the appearance of low-frequency modes associated with halogen-surface vibrations, implicating the role of substituent bonding in the adsorption. For the nitrile and nitro substituents, the ring modes were unaltered in frequency or bandshape upon adsorption while intense internal substituent modes were observed. GRA

N86-18464# California Univ., San Diego, La Jolla.
INTERACTION EFFECTS IN PREMIXED TURBULENT COMBUSTION Final Report, 1 Mar. 1982 - 30 Sep. 1985
P. A. Libby 24 Sep. 1985 4 p
(Contract N00014-79-C-0355)
(AD-A160077) Avail: NTIS HC A02/MF A01 CSCL 21/2

The research has been concerned with two topics in premixed turbulent combustion. One relates to a continuation of the research on the discovery of new mechanisms for turbulent transport and turbulence generation arising from the interaction of

mean force fields due to gradients of either pressure or shear stresses and density variations. These earlier studies consider infinite planar flames and since the mechanisms in question are confined to the flames themselves, the question arises as to their applied significance and importance in determining global features of turbulent flows consisting of two regions of uniform density on each side of a flame. To examine this question we have extended the analysis to provide a unified theory for the description of all three regions. The second topics relates to the consideration of the length and time scales of the temperature field in a premixed turbulent flame. The time history of the temperature at a point within such a flame involves alternately high and low values corresponding respectively to the passage of products and reactants. By appropriate normalization such a history can be made into a telegraph signal whose statistical characteristics provide information on the time scales of the temperature field. We have shown that an analysis of these characteristics leads to a model for an important quantity in the phenomenology of premixed turbulent combustion, namely the mean rate of chemical reaction. GRA

N86-18465# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
SURFACE ENHANCEMENT FACTORS FOR RAMAN SCATTERING AT SILVER ELECTRODES. ROLE OF ADSORBATE-SURFACE INTERACTIONS AND ELECTRONIC STRUCTURE
M. J. Weaver, S. Farquharson, and M. A. Tadayyoni Aug. 1985 31 p
(Contract N00014-79-C-0670)
(AD-A160120; TR-44) Avail: NTIS HC A03/MF A01 CSCL 07/4

The integrated Raman band intensities for internal vibrational modes of various adsorbates at roughened silver electrodes are combined with surface concentrations obtained electrochemically to yield surface Raman scattering cross sections. These data together with the corresponding bulk-phase Raman intensities provide estimates of the degree of enhancement of the vibrational bands at the silver surface with respect to the bulk medium, i.e., the surface enhancement factors (SEF). For surface-attached thiocyanate, isothiocyanate-bridged Cr(III) complexes, and also for Cr(III) and Co(III) hexammines that are electrostatically attracted to chloride-coated silver, SEF values are obtained that are relatively insensitive to both the vibrational mode and the adsorbate, even though substantial (up to 500 fold) variations are observed in the Raman cross sections. This finding applies to stretching modes involving nonbridging ammine groups as well as to bridging thiocyanate modes, although the frequencies of the latter, but not of the former, are perturbed strongly by the silver surface. Comparisons were also made between Raman cross sections, surface enhancement factors, and excitation profiles for pyrazine-pentaammineosmium(III) and (II) to explore the influence of electronic resonance since the Os(II) form displays an intense charge-transfer band in the vicinity of the laser wavelengths (460-650 nm) employed. A pronounced peak in the Os(II) excitation profile, absent for Os(III), is obtained that is markedly (ca. 100 nm) red shifted for the adsorbed versus bulk complex. GRA

N86-18466# Texas Univ., El Paso. Dept. of Electrical Engineering.
MOLECULAR TRANSMISSION BAND MODELS FOR THE UNIFORMLY MIXED AND THE TRACE GASES
J. H. Pierluissi and C. E. Maragoudakis 31 Dec. 1984 144 p
(Contract F19628-82-C-0078)
(AD-A160442; AFGL-TR-84-0320; SR-1) Avail: NTIS HC A07/MF A01 CSCL 04/1

This report deals with the theory, development and validation of molecular transmission band models for the uniformly mixed nitric oxide methane, carbon monoxide, oxygen, and carbon dioxide, and for the trace nitrogen oxide, nitrogen dioxide, ammonia, and sulfur dioxide gases. The models were specifically designed for direct incorporation into the LOWTRAN atmospheric transmission code. The transmission function adopted for each gas, acting individually consists of a double exponential function defined by three gas dependent parameters and a single spectrally-dependent parameter. All of these parameters were determined optimally through a numerical procedure that generally incorporates line-by-line and measured transmittance spectra. The resulting nine models were defined at 5/cm intervals throughout their absorber bands, for transmittance calculations of 20/cm spectral resolution at typical atmospheric conditions. Averaged vertical mixing ration profiles for these gases were obtained for direct use with the 33-level standard atmospheric models in the calculation of slantpath transmittance. Comparisons are presented between line-by-line and measured transmittance spectra, and between these spectra, and model calculations using LOWTRAN 6. GRA

N86-18467# Naval Academy, Annapolis, Md. Dept. of Physics.
CONDUCTIVITY, DSC, FTIR, AND NMR STUDIES OF POLY (VINYL ACETATE) COMPLEXED WITH ALKALI METAL SALTS
J. J. Fontanella and M. C. Wintersgill 1 Sep. 1985 15 p
(Contract N00014-85-AF-00001)
(AD-A160450) Avail: NTIS HC A02/MF A01 CSCL 07/3

Electrical conductivity, differential scanning calorimetry, and nuclear magnetic resonance studies have been carried out on poly(vinyl acetate) after the addition of various lithium salts. In the case of lithium triflate, the resultant polymer is poly(vinyl alcohol). Relatively large conductivities are observed after initial preparation, but these decrease with time when the material is in vacuum. The conductivities exhibit approximately Arrhenius behavior and increases with salt concentration. In addition to the conductivity, NMR, FTIR, and DSC results are presented. All results are interpreted in terms of the model of Wissbrun and Hannon where water is the solvating species. Author (GRA)

N86-18468# Los Alamos National Lab., N. Mex.
SPECTROSCOPIC STUDIES OF CARBON DISULFIDE AT HIGH PRESSURE Annual Report, 1 Apr. 1984 - 31 Mar. 1985
B. I. Swanson and S. F. Agnew Jul. 1985 11 p
(Contract N00014-84-F-0043)
(AD-A160456) Avail: NTIS HC A02/MF A01 CSCL 07/4

Recent work on the transient absorption spectra induced by the dynamic shock-loading of carbon disulfide has shown a shock-induced shift of the UV absorption edge up to a pressure of 8.0 to 9.0 GPa followed by irreversible chemistry in which the CS2 becomes opaque. This document describes the spectroscopic link between shock-induced and the static high pressure experiments for CS2. We have used diamond-anvil cells and a combination of Raman, infrared, and UV-vis-NIR absorption spectroscopies to analyze the behavior of CS2 in the pressure range 0.2 to 10.0 GPa and have compared one of these spectroscopic observables, the UV-absorption edge shift prior to the onset of irreversible chemistry, with that measured in the shock experiment. The absorption-edge shift as a function of high pressure is reported for carbon disulfide for the range 1.8 to 8.3 GPa. The absorption edge shift compares favorably with the isothermal ramp-wave results of other workers. The absorption edge shift with a temperature of the step-shock experiments of 220 C versus 350 C was predicted on the basis of previous EOS calculations. The libron modes show strong dependence on crystal orientation at high pressure and an irreversible polymerization is noted at 8.3 GPa. The CS2 product shows some of the infrared characteristics of Bridgeman's Black, which has been formed at 185 C and 5.5 GPa. The rather small pressure-induced shift of V sub 1 and V sub 3 is explained on the basis of compensating effects involving intermolecular repulsive versus electronic overlap between adjacent CS2's. GRA

N86-18469# Georgia Univ., Athens. Dept. of Chemistry.
CHEMICAL APPLICATIONS OF TOPOLOGY AND GROUP THEORY. TWENTY 8-VERTEX POLYHEDRA AND THEIR REARRANGEMENTS
R. B. King 14 Oct. 1985 24 p
(Contract N00014-84-K-0365)
(AD-A160589; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/4

There are 257 combinatorially distinct eight-vertex polyhedra, of which 14 are deltahedra. Of the 14 deltahedra only the

bisdisphenoid, commonly known as the D2d or triangular dodecahedron, both lacks tetrahedral chambers and can be formed by the hybridization of only s,p, and d orbitals. Degenerate single and symmetrical parallel multiple diamond-square-diamond processes involving the 14 eight-vertex deltahedra are tabulated. Among the eleven such processes (six single, two symmetrical double, one fully symmetrical triple, and two fully symmetrical quadruple) those relating the bisdisphenoid to the 4,4-bicapped trigonal prim and square antiprism are of current chemical significance. Single, double, and quadrupole dsd rearrangements of the bidisphenoid are depicted as topologically equivalent cubes with added diagonals so that the pivot faces are faces of the underlying cube and the dsd processes involve shifting only the positions of selected diagonals without disturbing the 12 edges of the underlying cube. GRA

N86-18470# Southern Research Inst., Birmingham, Ala.
THERMAL AND MECHANICAL PROPERTIES OF CALCIUM LANTHANUM SULFIDE Final Report
J. R. Koenig Apr. 1985 71 p
(Contract N00014-83-K-0195)
(AD-A160611; SORI-EAS-85-401-5267-I-F) Avail: NTIS HC A04/MF A01 CSCL 20/6

The purpose of this effort was the determination of the mechanical and thermal properties of specimens fabricated from calcium lanthanium sulfide (CaLa2S4) by Raytheon Company, Research Division. The test matrix used was designed to obtain sufficient information for comparative design studies and screening of the material with emphasis on those properties which are anticipated to be most critical for a thermostructural environment. The thermal stress resistance was investigated using thermal expansion, thermal conductivity, specific heat and flexure. Sensitivity studies conducted on this class of materials show the critical properties which control the thermal stress response for the general heating rates and geometries of interest here to be the thermal expansion, tensile strength or strain to failure and the ratio of the high temperature compressive modulus to low temperature tensile modulus. The other properties measured have a second order effect on the thermal stress response, but are important for other critical responses. GRA

N86-18471# Air Force Academy, Colo.
MNDO CALCULATIONS OF IONS IN CHLOROALUMINATE MOLTEN SALTS Interim Report, Jan. - Dec. 1984
L. P. Davis, C. J. Dymek, Jr., J. J. P. Stewart, H. P. Clark, and W. J. Lauderdale 4 Sep. 1985 7 p
(AD-A160620; FJSRL-JR-85-0009) Avail: NTIS HC A02/MF A01 CSCL 07/4

We have performed MNDO calculations on the anions in molten chloroaluminate salts. Calculated geometries for AlCl4- and Al2Cl7- agree in most respects with available data. The vibrational spectrum of Al2Cl7- calculated by MNDO is consistent with the observed IR spectrum and leads to assignment of C2 symmetry for this ion. The 27Al NMR exchange reaction between the two anions was also studied. The calculated energy of activation in the most realistic model used was 13 kcal/mol compared to the experimental value of 10 kcal/mol. GRA

N86-18472# New Hampshire Univ., Durham. Dept. of Phyics.
Te2 CHEMILUMINESCENCE FROM ALKALI ATOM-TeCl4 REACTIONS Interim Technical Report
K. K. Lin, L. C. Balling, and J. J. Wright 29 Oct. 1985 10 p
(Contract N00014-83-K-0533)
(AD-A160913; ONR-TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/5

The gas phase reaction between alkali atoms and TeCl4 produces chemiluminescence from the A state of Te2. The observed transitions are from V' = 0 - 5 of the A state to V = 3 - 20 of the X state. Author (GRA)

N86-18473# Pittsburgh Univ., Pa. Dept. of Physics and Astronomy.
BINARY LIQUID GELS
J. V. Maher 1985 14 p refs Presented at the Workshop on the Physics of Finely-Divided Matter, Les Houches, France, 1 Mar. 1985
(Contract DE-FG02-84ER-45131)
(DE85-014953; CONF-8503178-2) Avail: NTIS HC A02/MF A01

A recent paper reported the fabrication of several binary liquid gels, swollen gels whose solvent is a binary liquid mixture near its critical temperature. One might expect novel features for such gels since the presence of polymer strands spaced on average at something like the gel pore size should inhibit hydrodynamic degrees of freedom in the liquid's phase separation and the polymer strands in turn should have a preference for one of the separated liquid phases. The minimum effect one might expect is a slowing down of the gravitationally induced late stages of spinodal decomposition by the mechanical presence of the polymer network. Much more dramatic effects would be expected if the polymer plays a more active role and forms a ternary thermodynamic system with the solvents. Our observation is that the polymer strands interact with the liquid mixture strongly enough to frustrate the phase separation and dramatically alter the light scattering properties of the system in the critical region; however, the interaction is sufficiently weak that light scattering does not resemble that expected of a ternary system. DOE

N86-18474# Lawrence Livermore National Lab., Calif.
PICOGRAM FT-IR: ULTRAMICROSAMPLING AND GC-IR
T. Hirschfeld Jul. 1985 6 p Presented at the International Conference on Fourier and Computerized Infrared Spectroscopy, Ottawa, Canada, 24 Jun. 1985
(Contract W-7405-eng-48)
(DE85-016440; UCRL-92445; CONF-8506118-3) Avail: NTIS HC A02/MF A01

The commonality between ultramicrosampling and GC-IR is far deeper than the desire for picogram detection levels in both cases. Both techniques also need small area light spots: in ultramicrosampling, for spatial resolution; and in GC-IR, to match limited sample volumes. Fast response is needed for real-time measurements on the fly GC-IR, and for mapping analysis of extended samples in a finite line in ultramicrosampling. And finally, the fly fast processing is required for real-time recognition of significant success in GC-IR (presence of peaks) and in ultramicrosampling (presence of local anomalies in sample). A small FT-IR interferometer benefiting from the counter-Jacquinot advantage, immersion optics for microsampling and optimized sample cells for GC-IR, high efficiency sources and detectors and the systematic application of information theory to data processing algorithms can be used to bring both these techniques into the middle picogram domain. DOE

N86-18475# Pennsylvania Univ., Philadelphia.
CATALYTIC HYDROGENATION OF CARBON MONOXIDE Progress Report, 15 Sep. 1984 - 14 Sep. 1985
B. B. Wayland Sep. 1985 5 p
(Contract DE-AC02-83ER-13133)
(DE86-001547; DOE/ER-13133/2) Avail: NTIS HC A02/MF A01

The principal objective of this program is to learn how to utilize the unique porperties of Rhodium porphyrins in achieving catalytic hydrogenation of carbon monoxide at mild conditions. Rhodium porphyrins react with H2 and CO at pressures less than one atmosphere to produce the first intermediate in the hydrogenation of CO and provide a realistic opportunity to participate in the catalytic hydrogenation of CO at low gas pressures. Several catalytic schemes are porposed which take advantage of the unique reactivity of Rhodium porphyrins coupled with the aldehyde-like character of the metallo formyl intermediate. Multifunctional catalysts that utilize Rhodium porphyrins and a second catalyst known to promote the hydrogenation of aldehydes are particularly promising candidates for achieving low pressure hydrogenation of CO. Solvent effects will be explored as one means for tuning the thermodynamic and kinetic parameters for optimum catalytic behavior. Comparative studies used in identifying the essential features required to obtain a catalyst system based on metallo macrocycles. DOE

N86-18476# Bureau of Mines, Amarillo, Tex. Helium Field Operations.
ANALYSIS FOR IMPURITIES IN HELIUM USING THE HELIUM IONIZATION DETECTOR, REPORT OF INVESTIGATIONS 1985
C. A. Seitz 1985 37 p
(PB85-245157; BM-RI-8941; LC-84-600325) Avail: NTIS HC A03/MF A01 CSCL 14B

The Bureau of Mines report describes a chromatographic method for analyzing impurities in helium that utilizes a helium carrier gas containing 25 to 30 ppm Ne. An example of the effect of trace amounts of nitrogen, methane, and moisture on the detector's response is shown. The added neon in the carrier does away with irregularities of the analysis that were experienced when the carrier contained up to 3 ppm Ne. The addition of 25 to 30 ppm Ne causes a loss of sensitivity, but the remaining sensitivity is adequate for routine analyses. The high-neon carrier allows positive and more linear responses for eight impurities: neon, hydrogen, argon, oxygen, nitrogen, methane, carbon dioxide, and ethane. Neon concentration levels of 0.02 to 125 ppm in helium carrier gases were studied. Author (GRA)

N86-18838# Saab-Space A.B., Linkoeping (Sweden).
ADVANCED MIRROR FURNACE FOR LONG ROD SAMPLES
H. Grunditz *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 183-187 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-18477 British Library Lending Div., Boston Spa (England).
THE APPLICATION OF CHROMIUM CARBIDE TO THE SURFACE OF IRON AND STEELS
A. F. Terentiev, V. F. Loskutov, and V. G. Khizhniak 1985 4 p ref Transl. into ENGLISH from Izv. VUZ Chem. Met. (USSR), no. 4, 1985 p 152
(BLL-M-36489-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The production, composition and properties of chromium carbide on the surface of iron and steel was studied. It is shown that the introduction of a carburizing agent during the process of application of carbide layers can increase the thickness and microhardness of the layers. E.R.

N86-18478 British Library Lending Div., Boston Spa (England).
PROSPECTS FOR DEVELOPING A TECHNOLOGY FOR PRODUCING CORROSION RESISTANT STEEL
S. Z. Afonin, P. I. Yugov, and V. S. Brezhneva [1985] 6 p Transl. into ENGLISH from Stal (USSR) p 35-36
(BLL-M-36460-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A session of the steelmelting section of the Scientific and Technical Society for Ferrous Metallurgy considers the prospects for developing a technology for producing corrosion resistant steel by the argon-oxygen and gas-oxygen refining methods. These methods were proved to have considerable advantages over the normal technology. Recommendations are made regarding the further extension of research into the new technologies. Author

N86-18479 British Library Lending Div., Boston Spa (England).
EFFECTS OF MICRO-ALLOYING ON THE FATIGUE CRACK RESISTANCE OF STRUCTURAL STEEL
K. N. Sokolov, I. E. Silaeva, and V. A. Kharchenko [1985] 5 p Transl. into ENGLISH from Iz. (USSR) p 151-152
(BLL-M-36488-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Tests were made to find the fatigue crack resistance of a structural steel containing nickel and vanadium. Crack resistance was found to be higher than that of equivalent steel not containing those elements. Author

N86-18480 Central Electricity Generating Board, London (England). Translations Section.
A STUDY OF METAL ADHESION
T. Kayaba and Y. Kato [1985] 19 p refs Transl. into ENGLISH from Nippon Kikai Gakkai Rombunshu, v. 37, no. 301, Sep. 1971 p 1755-1760
(CE-Trans-8026) Avail.: Issuing Activity

Experimental results from metal-metal adhesion were analyzed. The adhesion coefficients of aluminum, lead and zinc obtained from heating experiments in air increase with decreasing load; excepting some of the data for lead, the relation can be expressed by a simple formula. The relationship between degree of intrusion of the contact surface and load was deduced on the assumption that projections obeying a normal distribution make plastic contact. The relation obtained showed that intrusion is greater the smaller the load, implying that, when the load is small, there is greater apparent deformation of the projections per unit load. The relation between adhesion coefficient and temperature for aluminum and lead in heating experiments conducted in air may be expressed in simple form. A relation of this kind should also exist for other metals, in which case the activation energy for adhesion will be useful in assessing the adhesiveness of materials. Author

N86-18481 British Library Lending Div., Boston Spa (England).
TASKS OF ACCELERATING SCIENTIFIC AND TECHNICAL PROGRESS IN METAL SCIENCE OF HIGH-GRADE STEELS
S. A. Golovanenko 1985 22 p Transl. into ENGLISH from Stal, no. 4, 1985 p 73-78 Presented at the All-Union Conference for Heads of Specialized Councils of VAK SSSR and Representatives of Industry, USSR
(BLL-M-36465-(5828.4)) Avail: Issuing Activity

A general review of tasks and possible methods of scientific and technical progress in the field of metal science of high grade steels are analyzed. Carbon and low-alloy steels of high volume use, structural steels for engineering, corrosion resistant steels, high temperature, thermally stable, and heat resistant steels and alloys, and tool steels are discussed. The need for improvement in the grade range of steels and in the process of developing and assimilating new grades of steel is indicated. Author

N86-18482 British Library Lending Div., Boston Spa (England).
TESTING OF STEEL 03Kh11N10M2T1-VD FOR SPRINGS OF INERTIA SAFETY BELTS
V. B. Lenyashin, V. P. Pavlov, and I. Ya. Sokol 1985 5 p refs Transl. into ENGLISH from Stal (USSR), no. 4, 1985 p 72-73
(BLL-M-36464-(5828.4)) Avail: Issuing Activity

Narrow strip of cobalt free maraging steel 03Kh11N10M2T1-VD was tested to establish the possibility of using this material for manufacture of the springs of safety belts. Comparative examination indicates that this steel ensures a higher spring life than the currently used high alloy austenitic-martensitic steel 12KhN-MKTYu. Author

N86-18483 British Library Lending Div., Boston Spa (England).
CERTAIN FEATURES OF FINE STRUCTURE IN Fe-Ni ALLOYS
I. V. Sidash and A. G. Savchenko [1985] 4 p refs Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 152
Avail: British Library Lending Div., Boston Spa, Engl.

Nuclear gamma resonance spectroscopy was used to investigate an Fe-Ni alloy of equiatomic composition in the deformed state, after high temperature annealing, and after different low temperature annealing schedules. It was concluded that the alloy is inhomogeneous in composition. There are high iron regions similar in composition to the stoichiometry on Ni3Fe with the degree of order in them depending on the treatment schedule. Regions with an Ni-Fe type short range order were revealed. E.R.

N86-18484 British Library Lending Div., Boston Spa (England).
STRUCTURAL CHANGES IN FERRITE-AUSTENITE STEEL

O3Kh26N6 DURING HOT TORSION
S. V. Lobatkin, M. Ya. Pakhomova, and I. D. Arinushkin [1985] 4 p Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii Chernaya Metallurgiya (USSR), no. 3, 1985 p 153-154 (BLL-M-36451-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

The correspondence of ferrite to austenite components in the steel was studied with regard to torsion deformation and the preservation of superplasticity. The structure of the steel was investigated with torsion deformation on a seteram torsion machine with a special arrangement for rapid cooling of the samples. The correspondence of phases in the composition of the steel does not depend on the course of heating and was defined by the final temperature. Metallographic and electron microscope studies of the structure of steel after hot torsion allowed the establishment of the fact that at temperature intervals of 850 to 1200 C steel ferrite softens by the mechanism of dynamic recrystallization, while austenite softens by the mechanism of dynamic polygonization. E.R.

N86-18485 British Library Lending Div., Boston Spa (England).
TREATMENT OF METAL POWDERS IN ATTRITION MACHINES
V. N. Plechev, Zh. I. Dzneladze, V. F. Lykova, R. P. Shchegoleva, and I. P. Zakharova [1985] 9 p refs Transl. into ENGLISH from Stal (USSR), no. 3, 1985 p 78-82
(BLL-M-36420-(5282.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

An attrition machine was used to grind metal powders poduced by the calcium hybride method and to change their macro- and micromorphology in order to make them suitable for use as components of the fillers of paint and varnish coatings and enamels. Tests were conducted on powders of chromium, Ni-Cr alloy PKh20N80, and ferroaluminum high resistance alloys PKh25Yu6 and PKh25Yu10. The influence was studied of treatment in argon and in ethyl alcohol in an attrition machine on the chemical composition and particle size distribution of powders, their specific surface, and their bulk density, and also on the magnitudes of the coherent scattering units, microdistortions, and dislocation density. It was established that treatment in ethyl alcohol in an attrition machine is an effective method of grinding powders and changing the shape of particles. Author

N86-18486 British Library Lending Div., Boston Spa (England).
EVALUATION OF THE FATIGUE STRENGTH OF AUSTENITIC STEELS AT TEMPERATURES OF 293 AND 77 K
G. A. Styepanov 2 Dec. 1985 8 p Transl. into ENGLISH from the book "K Otsenke Ustalostnoi Prochnosti Austenitnykh Stalei pri Temperaturakh 293 i 77 K" USSR, Nauka
(BLL-Risley-Tr-5231-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

The effects of temperature on the fatigue strength of austenitic steels is evaluated. Of special concern is the strength of welded seams. By complex alloying with manganese and nitrogen and a simultaneous reduction in nickel content, it is possible to increase not only the static but also the cyclic strength of austenitic steels at room and cryogenic temperatures. The presence of welding in the event of subsequent heat treatment of welded parts being impossible, destroys the effect achieved. E.R.

N86-18487 British Library Lending Div., Boston Spa (England).
EXAMPLES OF THE APPLICATION OF TITANIUM NITRIDE COATINGS ON 6-5-2 STEEL TOOLS FOR CUTTING STEELS WITH CONTROLLED INCLUSIONS
D. Robat and J. Bellot 7 Nov. 1985 13 p Transl. into ENGLISH from Traitement Thermique (Paris, France), no. 184, Jun. - Jul. 1984 p 33-37
(BLL-Risley-Tr-5221-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

Observations made confirm the significance of the nature of the tool-metal link in the general problem of metal cutting. The results obtained with the coated high speed steel tool, summarized in the table form, show that it was possible, at low cutting speeds, to find the phenomena of anti-wear deposition already observed on carbide tools at higher cutting speeds. The nature of these deposits and their stability field also confirmed the value of simultaneous control of inclusions of sulphides and oxides in steels to achieve high machinability in a very wide range of cutting speeds. Author

N86-18488 British Library Lending Div., Boston Spa (England).
CONTRIBUTION TO THE STUDY OF TITANIUM NITRIDE AND CARBIDE COATINGS OBTAINED BY PHYSICAL VAPOUR DEPOSITION (PVD) ON 6-5-2 STEEL TOOLS
P. Jacquot, J. M. Poirson, H. Michel, M. Gantois, and J. P. Peyre 7 Nov. 1985 15 p refs Transl. into ENGLISH from Traitement Thermique (Nancy, France) no. 184, Jun. - Jul. 1984 p 25-30
(BLL-Risley-Tr-5220-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

Among the many compounds suitable for coating tools, deposition has so far mainly been of TiN and possibly TiC. Titanium nitride and carbide obtained in the form of very thin coatings are more and more frequently being used for the wear resisting properties they confer on high speed steel tools. Their thickness does not generally exceed 5 microns, so that their physico-chemical and mechanical characterization is difficult, and demands the use of numerous additional physical analysis techniques. The process which is being developed is presented and its use on a pilot scale for depositing pure metals, alloys or interstitial compounds is described. Its use for producing deposits of TiN and TiC on steel, and some physical, chemical and mechanical characteristics of the products obtained is given. Author

N86-18489 Department of the Air Force, Washington, D.C.
METHOD FOR MAKING ALLOY ADDITIONS TO BASE METALS HAVING HIGHER MELTING POINTS Patent
H. B. Bomberger and F. H. Froes, inventors (to Air Force) Issued 13 Aug. 1985 3 p Supersedes AD-D011403
(AD-D011928; US-Patent-4,534,938; US-Patent-Appl-SN-640916; US-Patent-Class-420-590) Avail: US Patent and Trademark Office CSCL 11/6

This document describes a method for adding alloying elements having relatively low boiling points to base metal shaving relatively high melting points. The base metal is combined with the melting point-lowering metal; or metalloid and to this mixture is added the desired alloying metal or metals. No special equipment is required for this method. The first metals included within the scope of this invention are selected from the group consisting of Ba, Ca, Li, Mg and An. Each of these metals has a relatively low boiling point and, with the exception of Zn, a relatively low density. The more refractory base metals included within the scope of this invention are selected from the group consisting of IB, IVB, VB, VIB and VIII of the Periodic Table of the Elements. Of particular interest are Cu from IB, Ti and Zr from IVB, Nba and Ta from VB, Cr and W from VIB and Fe, Co and Ni from VIII. GRA

N86-18490 Department of the Air Force, Washington, D.C.
METHOD FOR REFINING MICROSTRUCTURES OF BLENDED ELEMENTAL POWDER METALLURGY TITANIUM ARTICLES Patent
D. Eylon and F. H. Froes, inventors (to Air Force) Issued 20 Aug. 1985 4 p Supersedes AD-D011177
(AD-D011936; US-Patent-4,536,234; US-Patent-Appl-SN-617447; US-Patent-Class-148-133) Avail: US Patent and Trademark Office CSCL 11/6

This document describes a method for improving the microstructure of an article made by powder metallurgy of blended elemental titanium powder which comprises beta-solution heat treating the article at a temperature approximately equal to the beta-transus of the equivalent alloy, rapidly cooling the article, annealing the article at a temperature about 10 to 20% below the beta-transus and air cooling to room temperature. The resulting article has a fine alpha plate structure in a matrix of discontinuous beta phase. Author (GRA)

N86-18491 Department of the Air Force, Washington, D.C.
METHOD FOR REFINING MICROSTRUCTURES OF PRE-

ALLOYED POWDER METALLURGY TITANIUM ARTICLES Patent
D. Eylon and F. H. Froes, inventors (to Air Force) Issued 13 Aug. 1985 4 p Supersedes AD-D011162
(AD-D011944; US-Patent-4,534,808; US-Patent-Appl-SN-617445; US-Patent-Class-148-133) Avail: US Patent and Trademark Office CSCL 11/6

This patent discloses a method for improving the microstructure of an article made by powder metallurgy of prealloyed titanium powder which comprises beta-solution heat treating the article at a temperature approximately equal to the beta-transus of the equivalent alloy, rapidly cooling the article, annealing the article at a temperature about 10 to 20% below the beta-transus and air cooling to room temperature. The resulting article has a fine alpha plate structure in a matrix of discontinuous beta phase. GRA

N86-18492# Missouri Univ., Rolla.
OPTICAL PROPERTIES OF THE METALS Al, Co, Cu, Au, Fe, Pb, Ni, Pd, Pt, Ag, Ti AND W IN THE INFRARED AND FAR INFRARED Contractor Report, May 1982 - May 1984
M. A. Ordal, L. L. Long, R. J. Bell, S. E. Bell, and R. R. Bell Sep. 1985 55 p
(Contract DAAK11-82-C-0052; DA Proj. 121-62622-A-552)
(AD-A159736; CRDC-CR-84011) Avail: NTIS HC A04/MF A01 CSCL 15/2

Infrared optical constants collected from the literature are tabulated. Many measurements of the optical constants of metals have been made, primarily at near infrared, visible and ultraviolet wavelengths. Sievers and his coworkers have measured Au and Pb in the far infrared. We have compiled this data and have tabulated the real and imaginary parts of the dielectric function, epsilon sub 1 and epsilon sub 2, respectively, the index of refraction, n, and the extinction index, k, for each metal in the infrared. Drude model parameters giving a reasonable fit to the data are given for Au, Ag, Cu, Al, Pb, and W. In general, the Drude model is not expected to be appropriate for transition metals in the near and middle infrared, but a good fit to the measurements can be obtained for W with a Drude model dielectric function. A table of epsilon sub 1, epsilon 2, n and k is given for each metal, calculated from the Drude model using parameters obtained from fitting the measured values. GRA

N86-18493# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
THE DENSIFICATION OF MOLYBDENUM AND MOLYBDENUM ALLOY POWDERS USING HOT ISOSTATIC PRESSING Final Technical Report
J. Barranco, I. Ahmad, S. Isserow, and R. Warenchak Aug. 1985 66 p Presented at the TMS-AIME Meeting, Detroit, Mich., 16-20 Sep. 1984
(AD-A159886; AD-E440299; ARLCB-TR-85025) Avail: NTIS HC A04/MF A01 CSCL 11/6

This study was conducted to determine a superior erosion resistant gun barrel liner material with improved properties at higher temperatures. Four categories of powders were examined: (1) TZM spherical containing 0.5 titanium, 0.08 zirconium, and 0.02 carbon (wt. % nominally), balance molybdenum (Mo), produced by REP (Rotating Electrode Process), PREP (Plasma Rotating Electrode Process), and PMRS (Plasma Melted and Rapidly Solidified); (2) Mo reduced 2 and 5 microns; (3) Mo-0.1% cobalt, co-reduced; (4) Mo-5 wt. % alumina (Al_2O_3), dispersion strengthened. Hot Isostatic Pressing (HIP) densification occurred at 15-30 Ksi, 1300-1600 C, for 1.5 to 3.0 hours. The TZM REP/PREP powders (220/74 microns) were not fully densified even at 1600 C, 30 Ksi, 3 hours. Point particle contact prevented complete void elimination. TZM PMRS powder (24.7 microns) achieved 99 percent of theoretical density while maintaining a small grain size (10.4 ASTM eq.) Bend deflection and fracture energies were approximately three times those for PREP powder at a bend rupture strength of about 1 Ksi. Mo reduced and Mo-0.1% Co powders showed less (or the same) ductility with increasing HIP temperatures. Fractures were intergranular with decreased bend rupture and compression strength. The Mo-5Al_2O_3 powder maintained a fine grain size (13 ASTM eq.), but with fracture energies usually less than 0.6 in.-lbs. Included are results from bending and compression testing with metallographic and fracture mode interpretation. GRA

N86-18494# Kansas State Univ., Manhattan.
INVESTIGATION OF RAPIDLY QUENCHED RARE EARTH IRON ALLOYS FOR PERMANENT MAGNETS Final Technical Report
G. C. Hadjipanayis Jun. 1985 5 p
(Contract N00014-83-K-0290)
(AD-A159946) Avail: NTIS HC A02/MF A01 CSCL 11/6

In early 1985 the potential of FeNd (Pr) B (Si) alloys for permanent magnet development was demonstrated. The progress under consideration was initiated in April 1983, to study the properties of these materials in more details and in particular to understand the origin of magnetic hardening by correlating the magnetic properties with the microstructure determined by transmission electron microscopy. The magnetic properties of melt-spun Fe-R-B alloys have been examined in the whole rare-earth series. The tetragonal $Fe_{14}R_2B$ phase occurs in all alloys studied except in Eu and Yb containing alloys. The Curie temperature of this phase increases from about 170C in $Fe_{14}CeB$ to 375 for $Fe_{14}Gd_2B$ and then decreases for the heavier rare-earths and is only 320 C in $Fe_{14}Ho_2B$. In heavy rare-earths, a second phase with a higher Curie temperature approx. (470 C) has also been observed. The nature of this phase is not yet known. The magnetic hysteresis properties of melt-spun Fe-light rare-earth-boron alloys were examined and maximum coercivities were found to scale with the anisotropy fields. GRA

N86-18495# Naval Dental Research Inst., Great Lakes, Ill.
OPTICAL SURFACE ROUGHNESS AND SELECTIVE ETCHING OF INTERDENDRITIC REXILLIUM III PHASES(S)
J. R. Kelly and V. P. Thompson Aug. 1985 29 p
(DA Proj. M00-95)
(AD-A159949; NDRI-PR-85-08) Avail: NTIS HC A03/MF A01 CSCL 11/6

Reflection of light from electrolytically etched casting alloys is empirically related to the incident light angle, viewing and solid cone angles, absorption and the root mean square surface and solid cone angles, absorption and the root mean square surface roughness. These factors were evaluated for the further development of a fiber optic photometer to quantitate base metal etching. Dental laboratory etching variables studied include: current density, sulfuric acid and methanol concentrations, temperature, etch time and aging of the etch solution. Resin tensile bond strengths and reflection values were correlated by regression analysis. Peak light intensity occurs above the angle of incidence. Increasing the viewing solid cone angle enhanced reflection sensitivity. Reflection measurements showed current density, acid concentration, etch time and temperature to be critical in controlling the selective removal of interdendritic phase(s). Bond strength values tended to be related to reflection values for some sets of castings. Bond strength values, however, were much lower overall than expected. A significant relationship between clinically meaningful bond strengths and reflection values remains to be determined. GRA

N86-18496# Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Metallurgy and Materials Science.
THE ROLE OF METALLURGICAL VARIABLES IN CONTROLLING HYDROGEN EMBRITTLEMENT
I. M. Bernstein Oct. 1985 20 p
(Contract N00014-75-C-0265)
(AD-A160446; TR-20) Avail: NTIS HC A02/MF A01 CSCL 11/6

The evidence for trapping by mobile and stationary defects in ferrous alloys is reviewed and new results presented to demonstrate that the trap theory of hydrogen embrittlement can rationalize the many different ways by which hydrogen modifies subsequent properties. GRA

N86-18497# Texas Univ., Austin. Dept. of Chemistry.
CO HYDROGENATION AND ADSORPTION STUDIES ON SUP-

PORTED NICKEL SMSI CATALYSTS Technical Report, 1 Jan. - 31 Dec. 1985
S. M. Fang, J. M. White, T. J. Campione, and J. G. Ekerdt 1985 13 p
(Contract N00014-83-K-0582)
(AD-A160522; TR-42) Avail: NTIS HC A02/MF A01 CSCL 07/2

The uptake of CO by Ni/TiO2 and Ni/Ti2O3 was investigated at 25 and 125 C following low-temperature (LT = 250 C) and high-temperature (HT = 450 C) reduction. Infrared spectroscopy was used to identify the onset of nickel carbonyl (Ni(CO)4) formation under various conditions of temperature and pressure. The CO uptake data were modeled using the Langmuir equation for isothermal adsorption. Monolayer coverages and equilibrium constants for CO adsorption were obtained from the uptake data. Carbon monoxide monolayer coverages were not affected by the reduction temperature of either Ni/TiO2 or Ni/Ti2O3. Methanation activity at 275C was approximately a factor of 2 greater for the Ni/TiO2 (LT) than the NiTO2 (HT) catalyst. This correlated well with the relative strength of the CO-metal surface bond, which also decreased by a factor of approximately 2. These findings suggest that the enhanced methanation rate observed on TiO2 supported catalysts is not due to the presence or absence of a strong metal-support interaction condition of the TiO2 but to other properties of TiO2 as compared to other supports. Author (GRA)

N86-18498# Georgia Univ., Athens. Dept. of Chemistry.
METAL CLUSTER TOPOLOGY: APPLICATIONS TO GOLD AND PLATINUM CLUSTERS
R. B. King 21 Oct. 1985 11 p
(Contract N00014-84-K-0365)
(AD-A160637; TR-7) Avail: NTIS HC A02/MF A01 CSCL 07/4

The graph-theory derived approach for metal cluster bonding is extended to gold and platinum clusters including spherical and toroidal centered gold clusters and stacked triangle platinum clusters; the latter appear to be novel examples of Moebius systems. GRA

N86-18499# Texas Univ., Austin. Dept. of Chemistry.
SPECTROSCOPY OF METAL/TITANIA SYSTEMS Technical Report, 1 Jan. - 31 Dec. 1985
Y. M. Sun, D. N. Belton, and J. M. White 15 Oct. 1985 11 p
(Contract N00014-83-K-0582)
(AD-A160696; TR-39) Avail: NTIS HC A02/MF A01 CSCL 07/4

Thin film models of catalysts known to show strong metal support interactions were investigated. These consist of vapor-deposited Pt or Rh on TiO2 films prepared in ultrahigh vacuum by oxidation of Ti(000 + or -). TDS, AES and static SIMS were used to characterize the surfaces before and after thermal treatment in vacuum and with or without chemisorbed CO. The results indicate that heating in vacuum to near 750K leads to migration of a reduced form of titania to the metal film surface, accompanied by suppression of CO and hydrogen chemisorption. In 1 to 2 ML metal films with no surface titania species, no significant suppression of hydrogen chemisorption is seen, indicating that surface segregation alone is not responsible for the changes in hydrogen chemisorption extent and energetics. GRA

N86-18500# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.
EFFECT OF HEAT TREATMENT ON MECHANICAL PROPERTIES AND MICROSTRUCTURE OF FOUR DIFFERENT HEATS OF ASTM A710 STEEL Final Report
G. E. Hicho, C. H. Brady, L. C. Smith, and R. J. Fields Sep. 1985 58 p
(AD-A160831; DTNSRDC/SME-CR-05-85) Avail: NTIS HC A04/MF A01 CSCL 11/6

A710 is a high strength low alloy steel whose strength is a result of both a fine grained microstructure and a dispersion of copper precipitates. For these reasons, the tensile and impact properties of an A710 plate depend as much on the thermo-mechanical history of each plate as on the chemistry of each heat. Since plates shipped from steel suppliers are frequently heat treated under different conditions, it is difficult to attribute property differences to chemistry variations rather than to heat treatment variations or vice versa. Heat to heat property differences must be determined for a specific, known heat treatment. This report describes the variability in the mechanical properties of four plates (representing four heats of steel) that have received known, and carefully controlled, heat treatments at the National Bureau of Standards. The sensitivity of these properties to heat treatment variations within each heat of steel is also reported here. Optical and electron metallographic techniques were used to determine as-received and heat treated microstructures. Scanning electron fractography was used to ascertain the fracture mechanism in the tensile and impact tests. This report also contains two appendices in which splitting fracture and microchemistry observations in A710 are discussed. Author (GRA)

N86-18501# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE BENEFITS OF RECYCLING SILVER: A PRECIOUS METAL M.S. Thesis
M. C. Doyle Sep. 1985 69 p
(AD-A160895; AFIT/GLM/LSM/85S-20) Avail: NTIS HC A04/MF A01 CSCL 11/6

Acquiring precious metals is an important issue within the Department of Defense when producing and sustaining major weapons systems. Due to precious metal shortages, effective deployment of the national defense preparedness program is in jeopardy in case of serious or continuous national emergency. The overall objective of this research study was to explore and determine the benefits of silver recycling. An extensive literature review was necessary to understand the Defense Logistics Agency Precious Metals Recovery Program. Through extensive research of the Precious Metals Recovery Program, it is evident that there are substantial cost savings which transfer into huge benefits resulting from recycling silver. Precious metals are vital in satisfying the United States' contractual and specification requirements needed for strategic arms, ammunition and equipment. Recycling silver is a valid way of satisfying these requirements. Author (GRA)

N86-18502# Rockwell International Corp., Golden, Colo. Rocky Flats Plant.
MICROSTRUCTURE AND PROPERTIES OF SELECTED HIGH STRENGTH FERRITIC WELD METALS
S. P. Abeln, G. S. Huppi, E. L. Brown, D. K. Matlock, and G. R. Edwards 1985 23 p Presented at the International Metallographic Society Conference, Denver, Colo., 21 Jul. 1985 Prepared in cooperation with Colorado School of Mines, Golden
(Contract DE-AC04-76DP-03533)
(DE85-015107; RFP-3856; CONF-850753-4) Avail: NTIS HC A02/MF A01

The fusion zone microstructures of bead on plate welds made on 19mm high strength low alloy (HSLA) steel plates with yield strengths greater than 550MPa (80ksi) were characterized employing optical and transmission electron microscopy. Weld metal composition was varied by base plate and consumable selection. Quantitative metallographic analysis of the weld metal was performed following the International Institute for Welding (IIW) guidelines. Details of the microstructure were further evaluated with the transmission electron microscope. In addition to the ferritic constituents in low alloy steels, significant amounts of retained austenite were present. The microstructural variations are correlated with limited mechanical property data. DOE

N86-18503# Energy Research Corp., Danbury, Conn.
CORROSION RESISTANT MATERIALS IN MCFC ENVIRONMENT Technical Quarterly Progress Report No. 3, Apr. - Jun. 1985
1985 29 p refs
(Contract DE-AC21-84MC-21186)
(DE85-017808; DOE/MC-21186/T1; TQPR-3) Avail: NTIS HC A03/MF A01

Corrosion behavior of several alloys has been studied under MCFC exposure conditions. Corrosion tests indicate that the selected higher alloys show protective oxidation and oxide adherence during the thermal cyclic tests, whereas lower alloy steels show localized corrosion and oxide spalling. The oxide formed on high chromium steels containing nickel and rare earth additives shows a uniform growth and uneven metal-scale interface development, whereas a smooth interface has been observed for lower alloy steels. Tests on single alloy materials during the dual atmosphere test indicate that oxides formed in the fuel gas atmosphere act as a barrier against hydrogen corrosion of the metal in the oxidant gas atmosphere. Low temperature conductivity measurements indicate a purely resistive nature of the oxide, demonstrating a dense, uniform oxide layer. Further high temperature measurements are in progress. DOE

N86-18504# Lawrence Livermore National Lab., Calif.
RAPIDLY SOLIDIFIED MICROSTRUCTURES IN EUTECTIC ALLOYS
L. E. Tanner, L. Jacobson, and R. Gronsky 23 Aug. 1985 4 p Presented at the Joint Meeting of the Electron Microscopy Society of America and the Microbeam Analysis Society, Louisville, Ky., 5 Aug. 1985
(Contract W-7405-eng-48)
(DE85-018187; UCRL-93299; CONF-850840-18) Avail: NTIS HC A02/MF A01

Microstructures were studied in Al-0.5 at. % Be, Al-5 at. % Be, Al - 4 at. % Be, Cu-0 eutectic, and Fe-Mn-S eutectic. DOE

N86-18505# Argonne National Lab., Ill.
PRECIPITATION OF Kr AFTER IMPLANTATION INTO Al
R. C. Birtcher and W. Jaeger Sep. 1985 14 p Presented at the 7th International Conference on Ion Beam Analysis, Berlin, West Germany, 7 Jul. 1985
(Contract W-31-109-eng-38)
(DE85-018344; CONF-850716-3) Avail: NTIS HC A02/MF A01

Transmission electron microscopy (TEM) was used to perform a systematic study of the microstructural evolution in Al as a function of the fluence received during 65 keV Kr(+) ion implantation at room temperature. At the lower fluences (2 x 10(16) to 2 x 10(19) Kr(+)m(-2)), isolated dislocation loops and the evolution of a dislocation network was observed by TEM. Above fluences of 10(19) Kr(+)m(-2), the microstructure is dominated by a high density of Kr bubbles whose average size increases with dose. The appearance of additional electron diffraction reflections indicates that the majority of the bubbles contain solid fcc Kr that is epitaxially aligned with the fcc Al matrix. Above fluences of 2 x 10(20) Kr(+)m(-2) an increasing fraction of the Kr is in a liquid or gas-like phase. The thermal stability of the microstructure, characteristic of the different fluence regimes, was investigated up to 640(0)C by in situ TEM annealing experiments. DOE

N86-18506# Oak Ridge National Lab., Tenn.
EFFECT OF ION IMPLANTATION ON SUBSEQUENT EROSION AND WEAR BEHAVIOR OF SOLIDS
C. J. McHargue 1985 24 p Presented at the North Atlantic Treaty Organization Advanced Study Institute, Heraklion Crete, Greece, 16 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-000088; CONF-8509175-1) Avail: NTIS HC A02/MF A01

The removal of material from a solid surface by mechanical forces is influenced by material properties (hardness, fracture toughness, yield strength, surface free energy) as well as system parameters (force, velocity of loading, environment). Ion implantation can modify many of the material properties either by directly affecting the deformation characteristics or indirectly by affecting the chemical or phase composition at the surface. The various forms of wear and erosion are analyzed to determine the material and system parameters which control material removal. The effects of implantation on these critical parameters are noted and examples of changes in surface topography under various test conditions are discussed. DOE

N86-18507# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
SURFACE STRESS MODIFICATION FOR REPAIR OF STRESS-RELIEVED CARBON STEEL FABRICATIONS
C. F. Jenkins 1985 19 p refs Presented at the ASM Metals Congress: International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-000563; DP-MS-85-3; CONF-8510160-1) Avail: NTIS HC A02/MF A01

Pitting corrosion was observed in welded carbon steel tanks which had been stress relieved to improve resistance to stress corrosion cracking. Successful repair required the development of a cleaning and repair method which would not increase residual tensile stresses at the steel surface. An experimental study indicated that uniform residual tensile stresses of 27.6 to 34.5 megapascals (4000 to 5000 psi) remained in the plate after the original stress relief. Grinding, shot peening, and grit blasting were evaluated. In laboratory tests, metal grit blasting changed the average residual stresses at the surface to 34.5 to 69 megapascals (5000 to 10,000 psi) compressive. Moreover, the depth of the compressive zone was substantial - perhaps 138 megapascals (20,000 psi) at 0.25 mm (0.010 inch). This is beneficial and will contribute to an increase in resistance to stress corrosion cracking. The repair technique employed on the tanks consisted of blast cleaning the entire surface to a uniform Class II finish with minimum change in the configuration of the pits. DOE

N86-18508# Sandia National Labs., Albuquerque, N. Mex.
CHARACTERIZATION OF MULTILAYER CU FILMS ON RU(0001)
J. E. Houston and C. H. F. Peden 1985 6 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000861; SAND-85-2067C; CONF-851174-8) Avail: NTIS HC A02/MF A01

We have recently undertaken studies of the structural and electronic properties of this important model bimetallic system and the present paper discusses LEED results exploring the structural aspects of thin Cu films on the Ru(0001) surface. In addition, we present Angular-Resolved Ultra-violet Photoemission Spectroscopy (ARUPS) results which show the first experimental evidence for an interface state for the Cu/Ru surface alloy. DOE

N86-18509# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
CADMIUM ZINC SULFIDE/COPPER INDIUM DISELENIDE MODULE DESIGN AND COST ASSESSMENT
B. Jackson Sep. 1985 99 p
(Contract DE-AC02-83CH-10093)
(DE85-016854; SERI/TR-216-2633) Avail: NTIS HC A05/MF A01

The report presents the results of a cadmium zinc sulfide/copper indium diselenide. The primary objective of the research was to clarify several of the technical issues facing the technology development. The design work focused on a large four-foot-square module suited for utility or large scale commercial applications. Cost estimates were developed from detailed descriptions of each manufacturing process step. DOE

N86-18510# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MATERIALS SCIENCE AND METALLURGY
5 Dec. 1985 121 p Transl. into ENGLISH of various Russian articles
Avail: NTIS HC A06

Current technology in materials science and metallurgy from the U.S.S.R. is reported. Among the topics presented are: (1) analysis and testing; (2) coatings; (3) composite materials; (4) corrosion; (5) ferrous metals; (6) nonferrous metals; (7) non-metallic materials; (8) preparation; (8) treatments; (9) welding, brazing and soldering; and (10) extractive metallurgy and mining. For individual titles, see N86-18511 through N86-18544.

N86-18511# Joint Publications Research Service, Arlington, Va.
A DEVICE FOR TESTING METAL HARDNESS AT HIGH TEMPERATURES Abstract Only
V. I. Zmiyevskiy, Ye. P. Zamilatskiy, and G. N. Smirnov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 4 Transl. into ENGLISH from Zavodskaya Laboratoriya (Moscow, USSR), v. 31, no. 8, Aug. 1985 p 81-82 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

This device consists of a vacuum chamber equipped with a heating unit, a load device, a specimen loading mechanism, a lifting mechanism, and a work platform. Design modifications in the specimen loading mechanism and in the work platform have made it possible to securely load and hold the specimen being tested in the center of the work platform. The loading mechanism was made in the form of two coaxially rotating disks. Rods of varying length are incorporated into the surface of the platform to hold the specimen. The lifting mechanism consists of an electric motor with a reduction gear and a screw mechanism for ease in handling the specimens. This device is capable of consecutive testing of 15 cylindrical specimens 16 millimeters in diameter within a temperature range of 293 to 2200 K. Each specimen can be pricked 300 to 400 times without having to renew the hermetic seal of the chamber. This device was used to test various refractory materials such as 5VTs niobic alloys. Some of the properties tested were hardness, tensile strength, and yield stress as functions of temperature. A practically linear reduction in hardness was observed with an increase in temperature. The other functions behaved in similar fashion. The correlation curves for tensile strength and hardness as a function of temperature were similar to curves obtained from experimental results. This device demonstrated that it can eficiently and reliably evaluate metal hardness at elevated temperatures. Author

N86-18512# Joint Publications Research Service, Arlington, Va.
KINETICS OF DEFORMATION AND DAMAGE ACCUMULATION IN CONCENTRATION ZONES UPON NONISOTHERMAL LOW-CYCLE LOADING Abstract Only
A. G. Kazantsev, A. P. Gusenkov, and A. N. Chernykh *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 4-5 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 19-24 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Data are presented on durability of specimens of steel type 15Kh2MFA with elastic stress concentration coefficients of 2.5 and 3.5 under nonisothermal loading. Specimens used had gage sections 1.5 mm thick and 40 mm wide, with sharp side notches and circular central apertures. The specimens were heated in a low-inertia furnace with type KGM quartz-halogen lamps. The specimens were held in water-cooled clamps. Test temperatures varied from 100 to 500 C. The number of cycles to failure was found to depend on the phase of application of the temperature cycle to the loading cycle. Durabilities with loading and temperature in phase were close to the data for a constant temperature of 500 C. In counterphase, the number of cycles to failure averaged two to five times higher. In all cases the divergence of durability calculated considering quasistatic damage accumulation from experimental durability values did not exceed the corresponding divergence of smooth specimens. The differences in durabilities with isothermal and nonisothermal loading conditions resulted only from the deformation properties of the material in the temperature range studied. Author

N86-18513# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF STRESS CONCENTRATION ON FATIGUE AND CORROSION-FATIGUE PROPERTIES OF VAL10 ALUMINUM CASTING ALLOY AND AK6 ALUMINUM FORGING ALLOY Abstract Only
A. V. Karlashov, V. M. Polishchuk, A. D. Gnatyuk, and V. M. Beletskiy *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 5 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 24-29 Original language document was announced in IAA as A85-48367 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Experimental data are presented on the effect of a corrosive environment and stress concentration on the fatigue resistance of cast (VAL1:00) and wrought (AK6) aluminum alloys. It is found that the fatigue resistance of VAL10 depends on the porosity of the casting. In the case of AK6 alloy, the anisotropy of its fatigue properties associated with the texture orientation is insignificant. A 1-mm notch reduces the fatigue life of AK6 by 36-40 percent, irrespective of the est base. For notched specimens of VAL10, the decrease in fatigue life is 24 to 40 percent depending on the test base. V.L. (AIAA)

N86-18514# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF TEMPERATURE ON MICROPLASTICITY AND CYCLICAL STRENGTH OF 1201 ALLOY Abstract Only
G. V. Seregin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 6 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 29-31 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A study was made of the influence of test temperature on microplasticity and fatigue durability of aluminum alloy type 1201. Diagrams of cyclical deformation of cylindrical specimens by tortion were compiled to study the microplastic properties of the alloy. Microplasticity parameters produced by this method were compared with results of fatigue testing of flat specimens by extension. Microdeformation by tortion was conducted at 77, 173, 223, 292, 323, 373, 423 and 473 K, with a deformation rate of 10 to the -5/s. The fraction stress preventing movement of dislocations was found to be practically independent of test temperature. There is a safe cycle stress amplitude for which the cyclical durability of the specimens approaches infinity. At temperatures above room temperature, this amplitude has little to do with test temperature and correlates well with friction stress. Author

N86-18515# Joint Publications Research Service, Arlington, Va.
LOW-CYCLE FATIGUE AND CRACK RESISTANCE OF BOILER PIPES AND STEAM LINES MADE OF 12Kh1MF STEEL Abstract Only
V. G. Zelenskiy, A. V. Fedoseyenko, V. A. Sarkisyan and V. V. Sevryugin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 6 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 6 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A study is made of the characteristics of low-cycle fatigue and crack resistance of 12Kh1MF steel by testing specimens and actual sections of steam lines made from a single batch of pipe with 194 mm outside diameter and wall 36-39 mm thickness. Low-cycle fatigue and crack resistance tests were performed, plus standard long-term strength tests and tests of chemical composition and mechanical properties. The test results all corresponded to the technical requirements for steam lines and were average for this type of steel. At all stress levels, failure occurred without deformation. The ratio of the number of load cycles to failure after formation of cracks to the total number of cycles to failure was 0.2 to 0.5, varying with the stress level. Crack development rate in steam lines during testing with mean crack depth 13 to 17 mm was significant, 1.76 to 3.5 x .0 mm per cycle. Author

N86-18516# Joint Publications Research Service, Arlington, Va.
STUDY OF CRACK RESISTANCE OF CORROSION-RESISTANT GLASS-REINFORCED PLASTICS BY ACOUSTICAL EMISSION METHODS Abstract Only
V. N. Naumets, A. T. Nikiforov, I. S. Guz, V. V. Bulakh, L. T. Berezhnitskiy, and L. V. Nagirnyy *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 7 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 35-39 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The crack resistance of corrosion-resistant glass-reinforced plastics (CRGRP), the resistance of the material to formation of cracks and resistance to propagation of existing cracks, is determined by an acoustical emissions method. Studies were performed on flat wedge-shaped specimens. Composite specimens were exposed in the unstressed state to aqueous solutions of alkali and hydrochloric acid by immersion in the corrosive media in glass desiccators contained in heat chambers. The specimens were tensile-tested before and after exposure to the corrosive media. Acoustical emission signals were recorded in analog form in the 100 to 2,000 kHz band. The signals were used to establish the stages of formation and propagation of cracks for all types of CRGRP. The experiments indicate that the theoretical defined variation between coefficients expressing the rate of formation and of development of cracks in CRGRP composites needs further study. Author

N86-18517# Joint Publications Research Service, Arlington, Va.
CONTACT FATIGUE UPON LOW-CYCLE LOADING OF WC-Co HARD ALLOYS DESIGNED FOR PRESSURE WORKING OF METALS Abstract Only
V. A. Falkovskiy, M. V. Kuralina, G. G. Travushkin, and Yu. Ye. Tyablikov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 7 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Results are presented from studies of contact fatigue with continuous recording of damage upon compression loading of hard alloys designed for the manufacture of punching dyes. New alloys were studied, made of high temperature powders -- large grain materials with tungsten carbide grain size 3.5-4.0 microns (VK10KS, VK15KS and VK20KS) and medium grain with grain size 2.2 to 2.5 microns (VK15S). For comparison, the standard alloy VK20 with grain size 2.2 to 2.5 microns was also studied. The longest life between reworking was that of VK15-S (about 990,000 stamps). The test method allows an approximation under laboratory conditions of the actual loading conditions of the dyes, permitting prediction of the behavior of the alloy under operating conditions. All of the alloys made with high temperature tungsten and tungsten carbide powders had better resistance to microfracture than the VK20 alloy based on low-temperature powder. Author

N86-18518# Joint Publications Research Service, Arlington, Va.
DEFORMATION AND VARIABLE LOADING OF METAL-POLYMER TWO-LAYER PLATES Abstract Only c27
V. V. Moskvitin and E. I. Starovoytov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 11 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 409-416 Original language document was announced in IAA as A85-44168 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A new formulation of the problem concerning the variable loading of metal-polymer plates is examined, with allowance made for transverse deformation in the polymer layer. Physical equations of state are used which describe the viscoelastoplastic properties of the metal and the nonlinearly viscoelastic properties of the polymer, allowing for the presence of zones with linear material properties during deformation. The problem of arbitrary variable loading is reduced to that of determining the deformation of a plate in the case of loading from the natural state, with specific boundary value problems solved by the method of successive approximation. The bending problem for a circular two-layer metal-polymer plate is solved analytically and numerically to illustrate the proposed approach. V.L. (AIAA)

N86-18519# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF CARBON-GLASS PLASTIC MATERIAL UNDER PURE FLEXURE Abstract Only c24
I. G. Zhigyn, G. A. Pavlov, V. G. Gorban, and V. A. Polyakov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 12 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 417-422 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A representative series of hybrid composite plastic materials, namely combinations of T-P-GVS-9 glass cloth and LU-P-0.2 carbon tape with PN-609-27 polyester resin as binder, was tested for load capacity under pure flexure depending on the volume (thickness) ratio and the distribution of components. The feasibility of testing such materials by simple methods applicable to nonhomogeneous beams was studied. The test specimens were 3.2 to 3.5 mm thick plates consisting of carbon-fiber and glass-fiber layers, the carbon fibers oriented parallel to the cloth substrate and impregnated with resin. These plates were vacuum-pressed in special molds for uniform buildup of pressure from the center to the edges so as to ensure a stable thickness of monolayers with the maximum volume fraction of reinforcement. Three kinds of structures were thus produced and tested: (1) double-layer plates with a carbon-fiber upper layer and a glass-fiber lower layer; (2) symmetric triple-layer plates with a glass-fiber layer between two carbon-fiber layers of same thickness; (3) asymmetric triple-layer plates with a glass-fiber layer between two carbon-fiber layers of different thicknesses. In each case increasing the thickness of the carbon-fiber layers at the expense of the glass-fiber so as to maintain the same total plate thickness was found to increase the effective modulus of elasticity and the load capacity of the plate. A symmetric triple-layer plate was, moreover, found to have consistently a higher load capacity than an asymmetric one. The experimental data correlate well with theoretical values of the modulus of elasticity based on the relations of beam mechanics with known physical properties of the materials and geometrical dimensions of the layers. Author

N86-18520# Joint Publications Research Service, Arlington, Va.
COMPARATIVE CREEP ANALYSIS OF UNIDIRECTIONALLY ORIENTED COMPOSITE MATERIALS WITH VARIOUS KINDS OF REINFORCED FIBERS Abstract Only c24
E. Z. Plume *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 13 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 431-436 Original language document was announced in IAA as A85-44170 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The paper is concerned with the effect of the component parameters and reinforcement ratio on the creep behavior of unidirectionally reinforced composites under tension in the direction of reinforcement, under tension in the transverse direction, and under shear. For composites reinforced with glass, carbon, boron, and organic fibers, the possibility of describing creep curves for various loading conditions using a single normalized scalar function of time is investigated. V.L. (AIAA)

N86-18521# Joint Publications Research Service, Arlington, Va.
STRESSED-STRAINED STATE OF TRIPLE-LAYER HONEY-COMB PANELS WITH CARBON-PLASTIC SHEATHS Abstract Only c24
V. T. Shcherbakov, V. S. Vedneva, Yu. V. Kirillov, and V. M. Muratov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 14 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 486-491 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The load capacity of triple-layer flat and cylindrical panels containing a low-modulus honeycomb filler between two high-modulus carbonplastic sheaths is determined theoretically and from experimental data, following an analysis of their stressed-strained state under a compound four-point flexural and axial compressive loads. Tests were performed on girders, which are much more easily clamped and tested in tension or compression than plain panels with relatively thin carbon-plastic sheaths. Calculations were made by the finite method, including a triangular triplelayer panel as a special finite element, according to the FRONT program. The data thus obtained, including the effective moduli of elasticity

and Poisson ratios, cover three reinforcement schemes: (+ or - 30 deg/0 deg sub 1/2)s, (+ or - 45 deg/0 deg sub 1/2)s, (+ or - 60 deg/ 0 deg sub 1/2)s with 0.65 or 0.63 mm thick sheaths and correspondingly 5 or 10 mm high filler. Anisotropic carbon filler KMU-4L and orthotropic fillers of PSP-2N polystyrene foam, aluminum, and paper were considered for both testing and calculations. Author

N86-18522# Joint Publications Research Service, Arlington, Va.
CORROSION RESISTANCE OF JOINTS MADE BY DIFFUSION WELDING Abstract Only c37
A. A. Mikheyev, N. F. Kazakov, and A. V. Finkelshteyn *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 16 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev, USSR), no. 8, Aug. 1985 p 59-61 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The corrosion of joints obtained by diffusion welding is studied. The significance of the diffusion process responsible for formation of the heterogeneous seam metal structure is determined. The influence of technological welding parameters on corrosion resistance of joints is studied. The corrosion resistant steel type 12Kh18N10T and the magnetic alloy 49K2F, containing 48 to 50% Co, 1.7 to 2.1% V, remainder iron was examined. Bimetallic joints of these materials are widely used in industry. Specimens were welded at 1170, 1220, 1270 and 1320 K, pressure 9.8 MPa, welding time 20 minutes. It was determined that the degree and nature of the change of electrode potential in the welding zone are determined to a great extent by electrode composition, i.e., are dependent on diffusion processes. Microscopic X-ray spectral analysis showed that the diffusion of chromium and titanium from the corrosion resistant steel into the magnetic alloy leads to the formation of a transition zone between the two metals with corrosion resistance higher than that of the magnetic alloy. The corrosion resistance of the joint is influenced by other factors than diffusion as well, resulting from thermal deformation processes during welding. An increased tendency toward corrosion is observed in welded joints obtained at temperatures less than 1270 K, a result of insufficient development of diffusion processes at the lower temperatures. Author

N86-18523# Joint Publications Research Service, Arlington, Va.
INCREASING THE CORROSION RESISTANCE OF WELDED JOINTS IN A85 ALUMINUM Abstract Only
M. I. Zotov, I. V. Dovbishchenko, and A. I. Trush *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 17 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev, USSR), no. 8, Aug. 1985 p 62-64 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A comparison is presented of the effectiveness of various methods of eliminating edge incomplete melting defects in explosively welded lap joints in A85 aluminum. Methods compared include melting of the defect area by manual and mechanized argon-arc welding in combination with cold hardening of the metal and without cold hardening, as well as mechanical working. The criterion of effectiveness of the method was the corrosion resistance of joints in 50% nitric acid at the boiling point, test time 20 hours. Melting of the edges with mechanized argon-arc welding and subsequent cold hardening of the melted metal is judged effective. Elimination of defects by mechanical working can prevent extension of corrosion along the straight interface edge. If the plate which is thrown by the explosion contains 0.22% iron and 0.1 silicon, its corrosion resistance decreases, making this composition unsuitable for nitric acid production equipment. Author

N86-18524# Joint Publications Research Service, Arlington, Va.
EFFECT OF MEDIUM pH ON HYDROGEN PERMEABILITY OF PASSIVATING FILMS AND RATE OF GROWTH OF CORROSION CRACKS IN 40KhN STEEL Abstract Only
I. N. Dmytrakh and R. S. Grabovskiy *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 17-18 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 22-25 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Scholarly opinion holds that hydrogen embrittlement is the key force behind formation of corrosion cracks in high-durability steels under static loads. Electrochemical reactions on the surface related to the pH factor of a corrosive medium are a contributing factor. The connection between medium pH and hydrogen permeability of the passive layer at the electrolyte-metal interface is discussed. Highly durable, rigid 40KhN tempered at 860 C was subjected to an aqueous solution of NaCl with pH of 6.5 to 6.7. Tests were conducted at 25 C. Static corrosion resistance to cracking was studied by pure bending under load. Experimental results indicated that the pH of the medium not only played a role in hydrogen formation, but also altered the hydrogen permeability of passive films at the medium-metal interface. As pH increased, hydrogen permeability declined, especially in the range of $3<pH<4$. Development of corrosion cracks was analogous. Author

N86-18525# Joint Publications Research Service, Arlington, Va.
ROLE OF MARTENSITE CONVERSION IN HYDROGEN EMBRITTLEMENT OF UNSTABLE AUSTENITE STEELS Abstract Only
G. G. Maksimovich, I. Yu. Tretyak, L. M. Ivaskevich, and T. V. Slipchenko *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 18 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1983 p 29-32 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The plasticity and durability of unstable austenite steels depend on the intensity of martensite conversions during deformation; these processes are regulated by alloying parameters and mechanical and thermomechanical factors. The present article reports on features of deformation martensite conversions and hydrogen embrittlement of 12Kh18N10T and 06Kh18N5G9AB steels with various procedures for hydrogen application. Samples tempered at 1273 K, some of which were hydrogenated at 35 MPa and 623 K for 5 hours were subjected to short-term tension. Phase transformations during hydrogen embrittlement were attributed to preliminary deformation in air at room temperature at 10 to the -4/s. Results showed that martensite conversion in 12Kh18N10T steel began at about 20% deformation regardless of test conditions. A correlation between changes in the quantity of alpha-martensite and the degree of embrittlement is suggested. In 06Kh18N5G9AB steel, martensite conversion in hydrogenated samples was more intensive, so that relaxation limits were reached more quickly. Its plasticity did not decline appreciably in an external hydrogen medium, but fell noticeably after prior hydrogenation during tension in either a hydrogen or a neutral medium. This steel had better durability and plasticity than the 12Kh18N10T steel. Author

N86-18526# Joint Publications Research Service, Arlington, Va.
EFFECT OF INHIBITORS ON ELECTROCHEMICAL CONDITIONS DURING TESTS OF SPECIMENS OF 40 Kh STEEL FOR STATIC CORROSION CRACKING RESISTANCE Abstract Only
L. V. Ratych and I. M. Slobodyan *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 19 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 32-37 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Study of inhibitors of corrosion cracking that retard both the initiation and spread of cracks has been based on tests of cracking resistance without consideration of surface electrochemical factors. Various inhibiting mechanisms affecting electrochemical conditions on the surface and at the top of stationary cracks were studied. The methodology involved drilling holes for capillaries that contained an antimony oxide pH indicator and an agar-agar conductive mixture for electrolyte contact. Corrosion tests were made on 40 Kh steel, which has 0.44% C, 0.45 Mn, 0.22 Si, 0.022 P, 0.020 S, and 0.79% Cr. After oil hardening at 860 C and subsequent tempering at 200 C for a total of two hours, inhibitors with anode action ($K_2Cr_2O_7$ and $NaNO_2$) or cathode

action ($ZnSO_4$) were tested on the steel specimens. Results showed that in distilled water, the pH factor gradually declined while the differences in electrical potential increased, intensifying corrosive processes. Significant amounts of anodic-action inhibitors (more than 0.04 M of potassium bichromate, and 0.1 M of sodium nitrite) were required in order to prevent formation of atomic hydrogen and subsequent embrittlement. Regardless of the concentration, zinc sulfate increased H_2 formation and resultant corrosion. Author

N86-18527# Joint Publications Research Service, Arlington, Va.
PHOTON EMISSION IN DEFORMATION AND FAILURE OF METALS Abstract Only
A. A. Tupik, N. P. Valuyev, and A. Ya. Belenkiy *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 19-20 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 51-57 (For primary document see N86-18510 09-26)
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The present article reports on study of the temporal features of photon emission and its possible physical mechanisms. The procedure used involved registration of electromagnetic radiation, light isolation, and thermostatic control. Samples in the form of parallelepipeds were scored to provide a starting point for cracking, then loaded symmetrically while the physical factors enumerated above were measured. All of the steels and ferrous alloys tested, as well as other elements with varying chemical activity and bonding energy, showed evidence of the electromagnetic radiation, in the spectral range of 300 to 1100 nm for steels and 650 to 1500 nm for alloy D16. No special radiation was associated with the failure of the metals, since any radiation caused by the failure of interatomic bonds and dislocation motion was simultaneous. Optical radiation related to chemsorption is discussed. Definitive resolution of the question of the origin of radiation during deformation of metals requires further research. Author

N86-18528# Joint Publications Research Service, Arlington, Va.
CRACKING RESISTANCE OF POLYCARBONATE AND POLYMETHYLMETHACRYLATE AT HIGH LOADING RATES Abstract Only c27
A. S. Yeremenko, S. A. Novikov, V. A. Sinitsyn, and A. A. Girin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 20 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 80-83 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Recently the linear mechanics of failure have received considerable attention in regard to the failure characteristics of polymer materials, whose mechanical properties depend greatly on temperature and rate factors in loading. The present article reports on a method for high-speed testing of crack resistance using a Hopkinson compound rod (HCR) and a special split-axis specimen. The HCP provided a diagram of load-shift in the compressed rod in traditional tests. In the present tests, disks of polymethyle methacrylate (PMMA) and polycarbonate (PK-1) were examined in a temperature range of -15 + or - 1 to +20 + or - 1 C, with regulation of the loading rate, and simultaneous analysis of splitting. A linear correlation was observed until the sudden failure. The dependency at -15 C is shifted to the right, indicating the rate of temperature increase as load increases in PMMA. Author

N86-18529# Joint Publications Research Service, Arlington, Va.
EFFECT OF HARDENING TREATMENTS ON MICROFLUIDITY OF STEELS AND BRONZES Abstract Only
I. I. Ilinskiy *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 21 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 83-86 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The present article reports on study of the effects of heat treatment, including annealing, hardening, hardening tempering, plastic deformation and low-temperature strain aging on microfluidity. One to three stages of deformation tempering were noted in the range of residual deformation of 4.10 to the minus 7 power to 1.10 to the minus 4 power for the test materials. The amount of carbon was a key to the parameters examined. The first stage of microfluidity was observed in armco-steel, while it did not appear in 45, 65G or U8A steel. Up to a certain level, plastic flow was connected to the heterogeneous formation of dislocations and shifts in edge components. In a third stage, microfluidity is defined by the separation of dislocations from impurity clouds, activation of helical components and the development of transverse slippage. Deformation aging of steels markedly increased the critical microfluidity tension (20+150%) and the rate of deformation hardening at stage 2 (9+12%) (the lower values indicate natural aging). Critical microfluidity tension approached the yield point. In contrast to steels, bronzes showed increased resistance to deformation at all stages of microfluidity. Author

N86-18530# Joint Publications Research Service, Arlington, Va.
IRREPLACEABLE METAL
Aleksandr Ivanovich Tselikov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 22-28 Transl. into ENGLISH from Khimiya i Zhizn (Moscow, USSR), no. 7, Jul. 1985 p 2-7 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Recently developed ferrous-metallurgical processes and rolling methods developed in the USSR are discussed. These make it possible to produce massive machine-building machines not by traditional chip-removal machining techniques, but by pressure-working techniques. The economic advantages of these techniques in machine building are explained. B.W.

N86-18531# Joint Publications Research Service, Arlington, Va.
TRIBOTECHNICAL CHARACTERISTICS OF BALL BEARING STEEL AFTER CHROMIZING Abstract Only
G. L. Oganesyan and G. N. Dubinin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 42-43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Chernaya Metallurgiya (Moscow, USSR), no. 8, Aug. 1985 p 89-93 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The present article reports on the effect of chromizing on the tribotechnical features of ShKh15 and 55M5FA steels. A gas method of chromium saturation in a mixture of 50 percent Cr, 47 percent Al_2O_3 and 3 percent NH_4Cl at 850 to 1000 C was used, with a saturation time of 1 to 9 hours. Since the extreme hardness of the carbide layer of test bearings ensured high wear resistance, a corresponding study was made of specimens of the test steels that had undergone chromizing at 950 C for 6 hours, and residual tension in the diffusion zone was determined to correlate the results of the various combinations tested. The data obtained showed that increasing the relative wear resistance of the test steels correlated with increased residual tension of compression and electron emission, thus confirming the importance of both structural and energy states of bearing surfaces in determining wear resistance. Chromizing of ShKh15 steel at 950 C for 6 hours brought about worsened mechanical properties, such as impact strength, but at 850 C, and with subsequent standard heat treatment, those properties improved. For 55SM5FA steel, the process at 950 C, with subsequent standard heat treatment, brought an 18% improvement in impact strength. Author

N86-18532# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ELASTIC-STRESS STATE CREATED BY COATINGS ON THE MAGNETIC PROPERTIES OF THE ALLOY Fe-3 PERCENT Si Abstract Only
R. B. Puzhevich, V. G. Borisenko, and V. K. Chistyakov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 43 Transl. into ENGLISH from Izvestiya Akademii Nauk: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 8, Aug. 1985 p 1576-1580 (For primary document see N86-18510

09-26)
Avail: NTIS HC A06

A study is made of the influence of tensile stress on magnetic properties of the alloy Fe-3%Si as a function of the degree of textural perfection (110) [001], amplitude of magnetic induction upon remagnetization of the material, surface status and specimen thickness. Several groups of specimens measuring 0.30 to 0.35 x 30 x 280 mm with different values of magnetic inducation sub 2500. The value of this parameter was used to judge the degree of perfection of the texture. The effectiveness of the influence of elastic tensile stresses on decreasing magnetic losses in the alloy increases with an increase in textural perfection, crystalline size, amplitude of magnetic inducation used in magnetization of the material and a decrease in specimen thickness. The influence of a magnesium silicate oxide layer on magnetic losses is ambiguous. It is characteristic that losses increase with imperfect crystallographic texture and decrease in a highly textured material. With the proper composition of phosphate electric insulating coatings, the tensile stress created in the matrix and resulting decrease in magnetic losses increase with increasing coating formation temperature. Author

N86-18533# Joint Publications Research Service, Arlington, Va.
PAINTING STAINLESS STEEL WITH ALTERNATING CURRENT Abstract Only
N. V. Mogorin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 49 Transl. into ENGLISH from Elektronnaya Obrabotka Materialov (Kishinev, USSR), no. 4, Jul. - Aug. 1983 p 24-27 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Stainless steels with relatively thick oxide films for protection and appearance receive wide use. The present article reports on a simplified electrolyte with reduced temperature in a variable asymmetrical flow by using a 5% solution of sulfuric acid. Increases in the capacitor current along with increased frequency and reduced polarization resistance caused the electrode to function as a condensor, with a significant decline in Faraday current. This phenomenon was used in testing electrodes with thin oxide films. Films on steel Kh25 formed at a potential of +0.3 V in a 50 Hz current were composed of Fe3O4 oxide. The electronogram for the film on Kh20N80 was amorphous, with no crystalline structure. The films appeared to be highly resistant to corrosion and had an attractive appearance. Author

N86-18534# Joint Publications Research Service, Arlington, Va.
EFFECT OF PROLONGED HIGH TEMPERATURE AGING ON OPERATING PROPERTIES OF 15Kh1M1F STEEL Abstract Only
A. P. Smirnova, I. I. Mints, and M. M. Shteynberg *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 56 Transl. into ENGLISH from Teploenergetika (Moscow, USSR), no. 6, Jun. 1985 p 45-47 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The effect of prolonged aging was assessed for hot-rolled 15Kh1M1F steel (0.16% C, 0.35% Si, 0.64% Mn, 1.47% Cr, 0.95% Mo, 0.29% V, 0.022% S and 0.020% P). The structure was examined at room temperature, prior to aging at 600 C for 10 to the 9th power hours. X-ray analysis showed no recrystallization. Short-term tests showed that durability decreased slightly while plasticity was retained, impact strength was cut at normal temperature but increased somewhat at 560 C, and the cold brittleness threshold increased markedly. Further testing showed the emergence of reversible temper brittleness in the test steel, which was not attributed to emission of Mo2C particles, but was related to molybdenum loss by the alloy. Aging weakened the effect of the structural state on long-term durability of the material, and aging at 600 C for 10 to the 4th power hours caused a marked decrease in the impact strength of the test steel. Author

N86-18535# Joint Publications Research Service, Arlington, Va.
ULTRAPURE ALUMINUM
V. Stantso *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 58-63 Transl. into ENGLISH from Khimiya i Zhizn (Moscow, USSR), no. 8, Aug. 1985 p 2-6 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Metallurgical production methods used in the development of ultrapure aluminum are investigated. The advantages of ultrapure aluminum are highlighted. Purity has an effect on such properties as electrical conductivity plasticity and chemical stability. The technique of zone melting which has long been used to produce high-purity metal is explained. B.W.

N86-18536# Joint Publications Research Service, Arlington, Va.
EFFECT OF GRAPHITE COCRYSTALLIZATION GROWTH OF DIAMOND SINGLE CRYSTALS IN METAL-CARBON SYSTEM Abstract Only
V. A. Laptev, A. V. Pomchalov, L. D. Belimenko, and M. I. Samoylovich *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 78-79 Transl. into ENGLISH from Noerganicheskiye Material (Moscow, USSR), v. 21, no. 8, Aug. 1985 p 1316-1320 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A study of diamond crystallization in a metal-carbon system was made in order to determine the effect of attendant graphite crystallization on the process. A special series of experiments was performed under conditions favoring spontaneous growth of diamond single crystals, at temperatures of 1150 to 1250 C under pressures of 4.2 to 4.5 GPa. Polycrystalline graphite served as the source of carbon, and binary alloys of Ni, Mn, Co served as solvents. Residual graphite after the process was mechanically separated, whereupon three groups of specimens were further examined: (1) specimens of graphite which had been in contact with the molten metal and did not contain any diamond; (2) specimens of metal, mainly in the form of 0.05 to 0.8 mm thick film, separating diamond from the carbon sources; and (3) specimens taken from the reaction zone and containing metal as well as diamond and recrystallized graphite. Subsequent microstructural examination revealed an inhibiting effect of graphite crystallization on spontaneous growth of diamond single crystals during synthetic production of the latter, with a high probability of graphite single crystals also forming in the process. Author

N86-18537# Joint Publications Research Service, Arlington, Va.
PROPERTIES OF TiC POWDERS PRODUCED FROM TITANIUM OR TITANIUM-ALLOY CHIPS Abstract Only
S. S. Kiparisov, Yu. V. Levinskiy, O. V. Padalko, A. P. Petrov, and I. P. Deulina *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 85 Transl. into ENGLISH from Poroshkovaya Metallurgiya (Kiev, USSR), no. 8, Aug. 1985 p 12-16 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A low-cost method of producing TiC powders has been developed, namely from titanium or titanium-alloy chips by carbidizing them in two stages in graphite crucibles. This was done experimentally with chips of VT-1, VT-3-1, and VT-20 titanium alloys under three different conditions: (1) under vacuum; (2) in an argon atmosphere; and (3) in a hydrogen atmosphere. Granulometric analysis of the product, after comminution of the sintered mass by tumbling for 15 min with hard-alloy balls in a vibrator-mill containing ethyl alcohol as immersion fluid, revealed an approximately same grain size distribution regardless of the process condition, with the mean size of most carbide grains respectively 7.9, 8.2, and 8.3 micrometer. Chemical analysis revealed an approximately same content of bound carbon regardless of the process condition, and slightly less bound carbon but much more detrimental free carbon in carbide produced in a hydrogen atmosphere. This leaves an argon atmosphere or vacuum as suitable alternatives. The levels of oxygen and nitrogen as well as those of bound and free carbon under those conditions were found to be comparable, whether VT-3-1 or VT-20 chips or technically pure titanium or VT-1 alloy chips had been used. B.W.

N86-18538# Joint Publications Research Service, Arlington, Va.
DEFORMATION OF Al-Cu POWDER BODIES DURING LIQUID-PHASE SINTERING Abstract Only
A. P. Savitskiy, G. N. Romanov, and L. S. Martsunova *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 86 Transl. into ENGLISH from Poroshkovaya Metallurgiya (Kiev, USSR), no. 8, Aug. 1985 p 39-43 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A dilatometric study of Al-Cu powders was made for monitoring the volume changes at various temperatures during the sintering process. Powder of ACD-1 aluminum was mixed with powder of electrolytic copper, the latter added in amounts of 1 to 6 wt.% and its grain size not exceeding 50 micrometer, producing a mixture with an initial porosity of 21 to 23%. Temperature and volume were recorded synchronously, also continuously each, for measurement of volume changes over the critical 560 to 640 C temperature range. The results reveal expansion followed by shrinkage at higher temperatures and expansion with negligible or no subsequent shrinkage at lower temperatures. Copper plays a significant role in the volume changes, diffusion of copper atoms from the melt into aluminum particles being the principal mechanisms and the solubility of copper in aluminum being limited. The behavior of these powder mixtures during sintering depends, accordingly, on the copper content in accordance with the Al-Cu constitution diagram: shrinkage never follows expansion at temperatures which correspond to equilibrium within the solid-solution (alpha-phase) range and shrinkage always follows expansion at temperatures which correspond to coexistence of both solid and liquid phases. Author

N86-18539# Joint Publications Research Service, Arlington, Va.
IMPROVING PERFORMANCE OF HARD-ALLOY PLATES BY THERMOMAGNETIC ABRASION TREATMENT Abstract Only
V. Ya. Shiyuko, T. Ya. Gridasova, V. Ye. Oliker, A. F. Zhornyak, L. A. Karpova, and A. A. Zlenko *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 88-89 Transl. into ENGLISH from Poroshkovaya Metallurgiya (Kiev, USSR), no. 8, Aug. 1985 p 65-70 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The performance of polyhedral plates made of hard alloys with high-resistance coatings, and thus not remachinable, is greatly enhanced by magnetic-abrasive polishing. This treatment not only smoothens and straightens the cutting edges while ensuring the proper rounding radius, but particularly lengthens the tool life and reduces the failure rate associated with chipping. The efficiency of this treatment can, in turn, be enhanced by ensuring a sufficiently large difference between hardness of the abrasive tool component and hardness of the treated material. Increasing the hardness of the former is not practical, inasmuch as the limit has already been approached with inclusions of extra-hard refractive compounds and the use of diamond grains is uneconomical because of their high cost and weak bonding to a ferromagnetic matrix. This combined thermomagnetic-abrasion treatment was evaluated experimentally on plates made of TN20, KNT16, T5K10, T15K6, VK6, VK8 alloys with Fe-TiC, Fe-ZrC, Fe-NbC, Fe-WC, Fe-WC-TiC, Fe-Al2O3 magnetic-abrasive powders. Author

N86-18540# Joint Publications Research Service, Arlington, Va.
A NEW FOLYMER FOR THE HEAT-TREATMENT SHOP AND THE OPERATING ROOM c27
M. G. Voronkov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 90-92 Transl. into ENGLISH from Khimiya i Zhizn (Moscow, USSR), no. 7, Jul. 1985 p 8-9 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The Irkutsk Institute of Organic Chemistry of the Siberian Department, USSR Academy of Sciences, has long been investigating water-soluble high-molecular compounds. One of the results of this work is the synthesis of a new polymer based on polyacrylic acid: an incomplete ferric salt of polyacrylic acid with an iron content of 0.05-0.5 percent. Its formula is: -(CH2-CHCOOH) sub m·-(CH2CHCOOFe sup x (1/x) sub n, where m > 150; x = 2 and 3; n = 50-100. The new polymer is called PK-2. Practical applications for PK-2 are discussed. Author

N86-18541# Joint Publications Research Service, Arlington, Va.
SURFACE HARDENING OF GAS TURBINE ENGINE VANES IN AN ULTRASONIC FIELD Abstract Only
V. K. Yatsenko, I. A. Stebelkov, V. F. Pritchenko, S. B. Mikhaylov, and Yu. P. Kichayev *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 96 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 8, Aug. 1985 p 68-71 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

The effectiveness of hardening of gas turbine vanes by surface plastic deformation in an ultrasonic field is largely determined by the selection of the optimal conditions. The optimal conditions for surface hardening refer to the conditions of deformation providing sufficient durability of the vanes under alternating loadings and the capability to withstand impact bending loads when foreign objects enter the engine. Tests of the fatigue properties of specimens of VT8 and EP718 alloys were undertaken to determine the optimal hardening conditions. Specimens were hardened in an ultrasonic field using balls 2.35 and 1.3 mm in diameter in a special ultrasonic device for ten minutes. Fatigue testing of cantilever mounted specimens was conducted in a type VEDS-200 vibrating test stand on the basis of 10 to the 7th power cycles until the appearance of macroscopic cracks. The greatest effect was observed upon hardening of VT8 or EP718 by 1.3 mm diameter balls. The use of 2.35 mm diameter balls actually decreased the endurance of VT8 by 2%. Strain hardening does not actually increase the resistance of the vanes to impact loading. Author

N86-18542# Joint Publications Research Service, Arlington, Va.
INFORMATION-MEASUREMENT SYSTEM FOR ULTRASONIC TESTING OF WELDED JOINTS Abstract Only c37
O. A. Mitrofanov, V. P. Radko, V. V. Benkovskiy, and I. A. Anop *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 97 Transl. into ENGLISH from Avtomaticheskay Svarka (Kiev, USSR), no. 8, Aug. 1985 p 68-70 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

Studies have shown that the probability of detecting defects such as oxide films and others which produce very small returns in ultrasonic defectoscopy can be increased by statistical processing of a file of echo signals recorded on the defectoscope. This method has been implemented on an Elektronika-60 microcomputer and UD-10UA ultrasonic defectoscope which is controlled by the computer. A flowchart of the testing algorithm and a structural diagram of the interconnection of the devices in the system are presented. The operation of the system is described for testing of a welded joint in a sheet structure. The system for detecting and recording defects has been tested experimentally and found to operate satisfactorily. Author

N86-18543# Joint Publications Research Service, Arlington, Va.
PRODUCTION OF VACUUM-TIGHT JOINTS IN MATERIALS BY DIFFUSION WELDING Abstract Only c37
G. V. Konyushkov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 98 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev, USSR), no. 8, Aug. 1985 p 25-28 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

A study is made of the production of vacuum-tight joints in materials or the electronics industry by diffusion welding. It is found that increasing the vacuum while maintaining a primarily reducing atmosphere intensifies the removal of oxide films at temperatures below 800 C and improves contact formation conditions for diffusion welding. Under conditions typical for diffusion welding pores are healed and crystals deformed, decreasing hydrogen permeability by at least an order of magnitude. Blowing of a mixture of helium and hydrogen through gaps between parts to be welded during welding makes it possible to determine the moment when a joint becomes vacuum-tight. Author

N86-18544# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CHEMICAL COMPOSITION OF FLUX ON DUCTILITY OF SEAM METAL IN ELECTROSLAG WELDING Abstract Only c37
M. D. Modzhuk, M. B. Roshchin, and N. N. Potapov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 98-99 Transl. into ENGLISH from Avtomaticheskay Svarka (Kiev, USSR), no. 6, Aug. 1985 p 57-58 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

In order to determine the influence of chemical composition of flux on composition of type 10GN2MFA steel, electroslag remelting of electrodes was performed in a crystallizer using three experimental fluxes plus type OF-6 standard flux. The SiO2 content in the experimental fluxes was 12, 19 and 31%, the CaF2 content 47, 39 and 28%. The content of CaO an Al2O3 in all fluxes was 18 and 22%, respectively. The experimental fluxes had higher SiO2 and lower CaF2 content than type OF-6 flux. The use of fluxes with higher silica content resulted in the formation of silicate inclusions such as spessartite, mullite, etc., in the surfaced metal, which do not cause stresses upon heating as does alumina. This helps to increase the ductility of the metal of the seam upon repeated heating. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-18545# Texas Univ., Austin.
PLASTICIZATION OF GLASSY POLYMERS BY CO(2)
J. S. Chiou, J. W. Barlow, and D. R. Paul 1985 7 p Repr. from Journal of Applied Polymer Science, v. 30, 1985 p 2633-2642
(Contract DAAG29-84-K-0138)
(AD-A159772; ARO-21387.3-CH) Avail: NTIS HC A02/MF A01 CSCL 11/9

A technique is described which uses differential scanning calorimetry to estimate the glass transition of polymers containing a dissolved gas. The technique is simple and appears to give reliable results. The effects of CO2 sorption at pressures up to 25 atm were examined in detail for poly(methyl methacrylate) and its blends with poly(vinylidene fluoride). Less extensive results for polystyrene, polycarbonate, poly(vinyl chloride), and poly(ethylene terephthalate) are also given. Reductions in T sub g, of up to 50 C are observed. A theoretical relation by Chow predicts results in reasonable agreement with the experimental data. These findings are relevant to various applications such as membrane separation processes for gases. Author (GRA)

N86-18546# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
DEVELOPMENT OF CAPSULAR ADHESIVE SYSTEMS AND EVALUATION OF THEIR STABILITY Final Scientific Report, 15 Sep. 1983 - 15 Sep. 1984
C. Murillo, O. R. Gutierrez, P. Matute, and J. A. Penaranda 26 Jul. 1985 90 p
(Grant AF-AFOSR-0340-83)
(AD-A159913; EOARD-TR-85-09(D)) Avail: NTIS HC A05/MF A01 CSCL 11/1

During the initial phase of this program, studies on microencapsulation of adhesive systems were conducted in which the capsule shells are made from the own encapsulated material. Encapsulation trails were conducted on anaerobic adhesives and epoxy resins. The resulting capsular adhesives were characterized. Comparative adhesion tests were performed with encapsulated and unencapsulated sytems. Author (GRA)

N86-18547# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
BLOCK COPOLYMERS OF ISOTACTIC POLYPROPYLENE AND 1,4 POLYBUTADIENE Technical Report
M. A. Drzewinski and R. E. Cohen 24 Sep. 1985 20 p
(Contract N00014-77-C-0311)
(AD-A160147; TR-16) Avail: NTIS HC A02/MF A01 CSCL 07/3

Two block copolymers of isotactic polypropylene and 1,4 polybutadiene were synthesized using techniques involving a transformation from anionic to Ziegler-Natta polymerization mechanisms. The yield of block copolymer was about fifteen percent (weight basis) in both polymerizations, the remainder being unreacted polybutadiene from the first block synthesis. Molecular characterization experiments and model reactions were consistent with a block-like structure for the copolymers; definitive evidence for the proposed molecular structure was obtained through transmission electron microscopy which clearly revealed microphase-separated morphologies characteristic of block copolymers. Author (GRA)

N86-18548# Rutgers - The State Univ., Piscataway, N. J. High Pressure Materials Research Lab.
AGEING-TIME DEPENDENCE OF MECHANICAL PROPERTIES OF AN ELASTOMERIC GLASS Interim Technical Report
K. D. Pae, K. Vijayan, and C. L. Tang 1 Oct. 1985 11 p
(Contract N00014-82-K-0608)
(AD-A160261; TR-4) Avail: NTIS HC A02/MF A01 CSCL 11/2

Compressive stress-strain curves of two different glasses of a polyurethane based elastomer have been obtained at 3 Kbar and -5.5 C as a function of ageing time. The glasses were formed by two different perturbation jumps of pressure and temperature. The shape and the size of the curves depended on the path and ageing time. Young's modulus increased with ageing time and represents a good mechanical parameter for determining relaxation of polymer glasses. GRA

N86-18549# Rutgers - The State Univ., Piscataway, N. J. High Pressure Materials Research Lab.
EFFECT OF SIMPLE STRESS ON THE GLASS TRANSITION OF POLYMERS AT HIGH PRESSURE Interim Technical Report
K. D. Pae, C. L. Tang, and K. Vijayan 1 Oct. 1985 31 p
(Contract N00014-82-K-0608)
(AD-A160282; TR-5) Avail: NTIS HC A03/MF A01 CSCL 11/10

Experimental studies showed the yield strength in tension, compression, and shear in the rubbery and the glassy states increased with increasing hydrostatic pressure. Moreover, the Young's modulus also increased with pressure and the amount of the increase across the glass transition temperature (T sub g) at a given pressure can be as large as three orders of magnitude in case of elastomers. An extension of Gibbs-Dimarzio theory is proposed to account for the effect of applied stress on the glass transition temperature of glass forming polymers. When a simple stress, such as tensile, compressive or shear stress, is applied to a polymer, the T sub g will decrease, compared to the polymer without applied stress. A glass forming polymer in the vicinity of the transition would behave differently than what than what is predicted by rubber elasticity. The Young's modulus increases with increasing pressure range but the increase is rather small at very high pressure range. GRA

N86-18550# SRI International Corp., Menlo Park, Calif.
NEW POLYMERIC MATERIALS EXPECTED TO HAVE SUPERIOR PROPERTIES FOR SPACE-BASED USE Final Report, Apr. 1981 - Jun. 1983
D. B. Cotts and Z. Reyes Jul. 1985 222 p
(Contract F19628-81-C-0075)
(AD-A160285; RADC-TR-85-129) Avail: NTIS HC A10/MF A01 CSCL 11/9

The properties of electrically conducting, semiconducting and semiinsulating polymers were surveyed and their conduction mechanism, mechanical properties, and suitability for spacebased use evaluated. Correlations between molecular structure, conductivity, and mechanical properties were drawn, and a comprehensive

model of electrical conductivity in organic polymers was formulated. Although the most widely studied electrically conducting polymers are not robust enough for most space-based uses, several commercial materials, including pyrolyzed Kapton and polyvinyl carbazole, appear to have the necessary combination of electrical, thermal, and mechanical properties. The main obstacle to the selection of new or modified materials for spacecraft use is the lack of strength, thermal stability, and radiation resistance--not their conductivity. Several synthesis procedures are identified that would raise the value of these properties to acceptable levels for materials that have the required electrical properties. The wide range of data reported in the literature can be reconciled by a theory of conductivity in which the limiting feature is the rate at which electrons are transferred between localized charges states. Some of the new polymers identified by this model have been prepared. They possess relatively high electrical conductivities and, unlike the majority of electrically conducting polymers, are processable in organic solvents. GRA

N86-18551# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
DIELECTRIC ANALYSIS OF THERMOSET CURE Technical Report, 1 May 1984 - 7 Oct. 1985
S. D. Senturia and N. F. Sheppard, Jr. 7 Oct. 1985 73 p
(Contract N00014-84-K-0274)
(AD-A160291; TR-4) Avail: NTIS HC A04/MF A01 CSCL 11/9

Measurements of dielectric properties have been used to monitor chemical reactions in organic materials for more than fifty years. This review addresses the application of dielectric measurements to thermosetting polymers including basic dielectric properties, the methods used to measure these properties, key experimental artifacts that must be understood by the investigator, the physical origin of those artifacts, and a survey of the current published literature with emphasis on the correlations between dielectric properties and other physical properties of the material. GRA

N86-18552# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
DEVELOPMENT OF A SANDED EXPANSIVE SALT GROUT FOR REPOSITORY SEALING APPLICATION Final Report
A. D. Buck, J. A. Boa, Jr., and D. M. Walley Aug. 1985 38 p
(AD-A160431; WES/MP/SL-85-11) Avail: NTIS HC A03/MF A01 CSCL 18/7

A sanded version of the basic BCT 1-F expansive salt grout was developed by the US Army Engineer Waterways Experiment Station in early 1983 for use in a test by Terra Tek in the Fall of 1983 in Salt Lake City. This grout is known as TT83. Initial laboratory tests showed this mixture had adequate workability, impermeability, strength, and positive volume change. There were problems with flow when this material was batched for the Terra Tek test. Later investigation indicated this was probably due to use of different equipment with lower mixing capacity. Specimens made from this grout show over 0.1 percent expansion at an age between 56 and 90 days and about 0.3 to 0.4 at 1 year; expansion testing is being continued at 6-month intervals. It was concluded that this mixture is probably satisfactory for use in repository sealing applications in a salt rock horizon. GRA

N86-18553# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
THERMAL STABILITY OF CERTAIN HYDRATED PHASES IN SYSTEMS MADE USING PORTLAND CEMENT Final Report
A. D. Buck, J. P. Burkes, and T. S. Poole Aug. 1985 79 p
(Contract DE-AI97-81ET46633)
(AD-A160443; WES/MP/SL-85-7) Avail: NTIS HC A05/MF A01 CSCL 11/2

As part of the study of hydraulic-cement system for use in possible underground isolation of nuclear wastes, this study was made to determine the temperature stability of ettringite and chloroaluminate. Either or both of these phases may be expected in a hydraulic cement system depending on the presence of salt. (NaCl). The study of ettringite was made using 15 mixtures that contained portland cement, plaster, 2 levels of water, and in some mixtures, 1 of 6 pozzolans (3 fly ashes, 1 slag, a silica fume, a natural pozzolan), plus a 16th mixture with anhydrous sodium sulfate replacing plaster ($CaSO_4 \cdot 1/2H_2O$). Specimens were made and stored at 23, 50, and 75 C or 23, 75, and 100 C (all four temperatures in one case) for periodic examination by X-ray diffraction for phase composition and ettringite stability, and testing for compressive strength and restrained expansion. A more limited study of the stability of chloroaluminate was made along the same lines using fewer mixtures, salt instead of plaster, and higher temperatures plus some pressure. It was found that while some ettringette was decomposed at 75 C, depending on the composition of the mixture, all ettringite was undetectable by X-ray diffraction at 100 C, usually within a few days. The evidence indicates that the ettringite became amorphous and no significant test phases formed in its place. Since there was no corresponding loss in strength or reduction in volume, this loss of ettringite crystallinity was considered to be damaging. Based on much more limited data, chloroaluminate was found to decompose between 130 C at 25 psi and 170 C at 100 psi; no significant phases replaced it. GRA

N86-18554# National Bureau of Standards, Gaithersburg, Md. Polymers Div.
CHEMICAL MODIFICATION OF POLY(ETHYLENE IMINE) FOR POLYMERIC ELECTROLYTE
C. K. Chiang, G. T. Davis, C. A. Harding, and T. Takahashi 1 Oct. 1985 13 p
(Contract N00014-85-F-0022)
(AD-A160482; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/3

Linear PEI has been chemically modified in an attempt to prevent formation of a crystalline complex without altering its ability to dissolve salts and conduct ions. Three main systems were investigated: (1) poly(N-acetylethylene imine), (2) partially quaternized PEI with ethyl or butyl groups, and (3) PEI cross linked with diepoxyoctane. Dissolution of salt was followed by X-ray diffraction on the mixtures and changes in T sub g as determined by DSC. In all cases, the crystallinity was destroyed but conductivity of salt containing polymer was not improved. However, lightly cross linked PEI exhibits much improved mechanical properties and the incorporation of .05 mole NaI/mole of monomer yields a conductivity of .00005 S/cm at 100 C. Author (GRA)

N86-18555# Washington State Univ., Pullman. Dept. of Physics.
FRACTO-EMISSION FROM POLYMERS Annual Technical Report, Jun. 1984 - Jun. 1985
J. T. Dickinson 15 Oct. 1985 125 p
(Contract N00014-80-C-0213)
(AD-A160510) Avail: NTIS HC A06/MF A01 CSCL 07/4

Crack propagation through an insulating material or at an interface produces regions of high electronic and chemical activity on the freshly created surfaces. This activity causes the emission of particles, i.e., electrons, ions, and neutral species, as well as photons, from the surfaces both during and after crack propagation. This emission is called fracto-emission (FE), and in many ways serves as a probe of the electronic and chemical activity of the fracture surfaces. In this report we present our results on: the fracto-emission from model propellents with a variety of formulations, the fracto-emission from a metal-polymer interface with and without an externally applied electric field, the photon and radiowave emission from peeling pressure sensitive adhesives, the detection of atom and molecular emission (neutral charge) emitted from the fracture of inorganic single crystals, and a study of the effect of electron bombardment of single fibers of a polymer, kevlar-49. In addition, we discuss briefly the work in progress in several areas related to the above projects: the fracto-emission mechanisms from single crystal inorganics, the neutral emission from both polymers and inorganics, the fracto-emission from explosive crystals, a number of interfacial failure studies (including the fracture of particulate-filled binders), and further work in the area of radiation induced fracture. GRA

N86-18556# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
POLYPHOSPHAZENES WITH ETHERIC SIDE GROUPS: PROSPECTIVE BIOMEDICAL AND SOLID ELECTROLYTE POLYMERS Interim Technical Report
H. R. Allcock, P. E. Austin, T. X. Neenan, J. T. Sisko, and P. M. Blonsky 15 Oct. 1985 18 p Prepared in cooperation with Pennsylvania State Univ., University Park, Pa.
(Contract N00014-80-C-0532)
(AD-A160549; TR-011) Avail: NTIS HC A02/MF A01 CSCL 07/3

Poly(organophosphazenes) have been synthesized with alkyl-ether-alkoxy groups attached to the phosphorus atoms of the skeleton. These species are water-stable and either water-soluble or hydrophilic polymers. Specific members of this series form complexes with metal salts, which are excellent solid electrolyte materials. Mixed substituent polymers with hydrophobic trifluoroethoxy and alkyl-ether alkoxy side groups have also been prepared and these are of interest as membranes and biomedical materials. Author (GRA)

N86-18557# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
CHARACTERIZATION OF FOUR CLASS H HIGH SULFATE-RESISTANT PORTLAND CEMENTS Final Report
A. D. Buck and R. E. Reinhold Sep. 1985 15 p
(Contract DE-AI97-81ET-46633)
(AD-A160551; WES/MP/SL-85-9) Avail: NTIS HC A02/MF A01 CSCL 11/2

As part of the materials selection process for underground repository sealings of nuclear wastes, all available Class H high sulfate-resistant (HSR) portland cements that were commercially available in the United States in 1981 were obtained for testing and evaluation. Four such cements were found. The Class H designation is that used by the American Petroleum Institute; the HSR type is similar to a Type V portland cement as described in ASTM C 150 in that it is intended to impart high sulfate resistance to the cement by the absence or near absence of calculated tricalcium aluminate. Each cement was characterized by a combination of chemical-physical testing and X-ray diffraction examination; it was concluded that all were generally similar and could be interchanged if such a need arose. GRA

N86-18558# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
DEVELOPMENT OF A SANDED NONSALT EXPANSIVE GROUT FOR REPOSITORY SEALING APPLICATION Final Report
A. D. Buck Aug. 1985 28 p
(Contract DE-AI97-81ET-46633)
(AD-A160594; WES/MP/SL-85-6) Avail: NTIS HC A03/MF A01 CSCL 11/2

A sanded version of expansive BCT 1-FF nonsalt grout was developed for use in the 1984 Terra Tek test in Salt Lake City, Utah. For that reason this grout is also known as TT84. Ability to maintain workability (flow) over a 2-hr time period was required in addition to adequate strength, adequate expansion, and low permeability of the hardened material. Laboratory testing also included sealing and exposure to elevated temperature as variables for expansion testing; permeability testing of a combined grout-anhydrite specimen to evaluate this contact surface was also done. Since the test specimen did not perform as well as expected in the Terra Tek test, a fragment of that grout was also examined in the laboratory. All test data generated at WES were satisfactory for this grout. Concern was raised about whether in field use the compressed wall rock will elastically deform so as to accommodate slight contraction of the expansion grout mixture that will probably occur due to cooling after the rise in temperature due to heat of hydration or shrinkage due to drying or both in an actual field installation. It was recommended that periodic monitoring for expansion be continued and should be started to follow changes, if any, in phase composition and microstructure of the grout with time. GRA

N86-18559# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
CHARACTERIZATION OF SEVERAL PLASTERS AND ONE RETARDER FOR REPOSITORY SEALING MIXTURES Final Report
A. D. Buck, J. P. Burkes, and R. E. Reinhold Sep. 1985 29 p
(Contract DE-AI97-81ET-46633)
(AD-A160595; WES/MP/SL-85-10) Avail: NTIS HC A03/MF A01 CSCL 18/7

Samples of plasters (i.e., calcium sulfate hemihydrate, $CaSO_4 \cdot 1/2H_2O$) from six sources and one plaster retarder from a different source were obtained and characterized by a combination of chemical and physical testing and by petrographic examination. The petrographic examination included X-ray diffraction, optical microscopy, differential thermal analysis, and scanning electron microscopy procedures. The intent of this work was twofold. One purpose was to determine if plaster per se could be used as an ingredient for cementitious mixtures intended for repository sealing applications, Previous experience had been with use of a proprietary admixture that contained plaster. The second purpose was to determine one or more methods of distinguishing between the alpha and beta forms of calcium sulfate hemihydrate. GRA

N86-18560# Cincinnati Univ., Ohio. Dept. of Materials Science and Engineering.
SAXS (SMALL ANGLE X-RAY SCATTERING) STUDY OF MICELLE FORMATION IN MIXTURES OF BUTADIENE HOMOPOLYMER AND AND STYRENE-BUTADIENE BLOCK COPOLYMER. PART 2: EFFECTS OF BLOCK LENGTHS
D. Rigby and R. J. Roe 1 Nov. 1985 41 p
(Contract N00014-85-K-0245)
(AD-A160656; TR-2) Avail: NTIS HC A03/MF A01 CSCL 07/4

The small-angle X-ray scattering technique is utilized to determine the characteristics of micelles formed in the mixtures containing a low molecular weight polybutadiene and a styrene-butadiene diblock copolymer. Three different block copolymers of about the same overall molecular weight but with differing lengths of the two blocks are utilized. The observed scattering curve is fitted with a calculated one based on a model of polydisperse micelles interacting with each other according to the Percus-Yevick hard-sphere fluid approximation. The following quantities characterizing the structure of the micelle are evaluated as a function of temperature and copolymer concentration: the average radius of the core, the polydispersity of the core radius, the apparent hard-sphere radius of interaction, the critical micelle concentration, the degree of swelling of the core, and the number density of the micelles. The critical micelle concentration decreases as the proportion of styrene in the copolymer increases. The size of the micelles of a given copolymer remains independent of concentration but shows a moderate variation with temperature, especially immediately before the final dissolution temperature. GRA

N86-18561# Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF BARRIER COATINGS ON THE CURE RATE AND FLUID RESISTANCE OF POLYSULPHIDE SEALANTS
J. Day Oct. 1984 25 p
(AD-A160728; RAE-TM-MAT/STR-1045; DRIC-BR-94620, Avail: NTIS HC A02/MF A01 CSCL 11/3

Two commercial barrier coating materials based on polyurethane and nitrile (acrylonitrile-butadiene copolymer) were used in conjunction with two of the most commonly used integral fuel tank polysulphide sealants (catalysed with either dichromate or lead dioxide). The rate and degree of cure were only slightly reduced when either barrier coating was applied. Neither coating appeared to offer any improvement in fuel resistance but significant improvements were noted in the resistance of barrier coated sealants to the ingress of water. After 44 days at 40 C water uptake of dichromate cured sealant was reduced form 1.26% to 6% by barrier coating with polyurethane. A similar effect was noted with the lead dioxide cured sealant although not to the same degree since this material is inherently more resistant to water than the dichromate cured sealant. There is some doubt about

the long term performance of the polyurethane barrier coating as samples appeared to embrittle on ageing. Author (GRA)

N86-18562# Naval Research Lab., Washington, D. C.
DEUTERATED POLYMERS: CHEMICAL AND PHYSICAL PROPERTIES AND FUTURE PROSPECTS Interim Report, Jan. - May 1985
J. E. Campana and D. N. Heller 16 Oct. 1985 41 p
(AD-A160762; AD-E401375; NRL-8922) Avail: NTIS HC A03/MF A01 CSCL 11/9

In this report the benefits derived from new materials based on fully deuterated polymers are assessed; the chemical and physical properties of deuterated polymers are reviewed exhaustively. The new properties of the deuterated polymers, according to the scientific literature, are identified and used to stimulate the production of new devices, technologies, products, and materials for special applications. The literature search conducted: identifies each area of science in which deuterated polymers have been used, identifies the purpose and results of such work, and abstracts pertinent data on chemical and physical properties from the studies reviewed. Numerous tables compare the measured properties of a variety of polymers studied, and their deuterated and partially deuterated similarities are presented. Polymer properties related to optical fibers, pyrolytic and oxidative stability, structure, and neutron stopping power are discussed. The goals of this review are to highlight the reported differences in properties between deuterated and undeuterated polymers. In some cases, the potential benefits of these differences will be clear; and indeed, some related work has been carried out with specific applications in mind. Generally, it is expected that the data will serve to suggest further development, or to provoke imaginative responses to existing materials needs. GRA

N86-18563# Army Materials and Mechanics Research Center, Watertown, Mass.
COMMENTARY ON US ARMY STANDARD TEST METHOD FOR FLEXURAL STRENGTH OF HIGH PERFORMANCE CERAMICS AT AMBIENT TEMPERATURE Final Report
G. D. Quinn, F. I. Baratta, and J. A. Conway Aug. 1985 20 p
(AD-A160873; AMMRC-TR-85-21) Avail: NTIS HC A02/MF A01 CSCL 14/2

The Army recognizes the potential applicability of the new ceramics to such systems as heat engines and missile radomes. One of the major obstacles to the use of ceramic materials as structural entities, devices, or component parts of military end items has been a definite lack of design data. The reliability of design data for ceramics is generally conceded to be of relatively low order as compared with such materials as metals and plastics. Part of this problem can be traced to the lack of standardization of test methods for high performance ceramics. This document was developed as a standard test method which will reduce experimental error and will greatly enhance the reproducibility and consistency of strength data for Army systems. The standard is intended for, but not limited to, usage wtih monolithic ceramics such as alumina, silicon nitride, and silicon carbide. Th. value of flexural data for design is discussed in this report. Background information and considerations that led to the standard are presented. GRA

N86-18564# Sandia National Labs., Albuquerque, N. Mex.
EFFECTS OF ARSENIC DOPING ON THE SOLIDIFICATION DYNAMICS OF PULSED LASER MELTED SILICON
M. O. Thompson, P. S. Peercy, and J. Y. Tsao 1985 7 p refs Presented at the Materials Research Society Fall Meeting, Boston, Mass., 25 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE85-006107; SAND-85-0069C; CONF-851120-1) Avail: NTIS HC A02/MF A01

The effects of arsenic doping on the solidification dynamics during pulsed melting of silicon have been studied using the transient conductance technique. At As concentrations below 1 at. %, the incorporation of As into the Si lattice results in negligible differences in the solidification dynamics. Between 2 and 7 at. % As, however, the interface velocity is dramatically modified as the liquid-solid interface crosses the As containing region. These velocity changes are consistent with a reduced melting temperature for Si-As alloys. For concentrations of 11 at. % As, the depression in the melting temperature is sufficient to allow the surface to solidify while considerable melt remains buried within the sample. At 16 at. %, the melting temperature is drastically reduced and internal nucleation of melt occurs prior to normal surface melting. DOE

N86-18565# Tennessee Univ., Knoxville. Dept. of Chemistry.
DUAL MECHANISM BIFUNCTIONAL POLYMERS FOR THE COMPLEXATION OF LANTHANIDES AND ACTINIDES
S. D. Alexandratos, D. R. Quillen, and W. J. McDowell 1985 20 p Presented at the 4th Symposium on Separation Science and Technology for Energy Applications, Knoxville, Tenn., 20 Oct. 1985 Prepared in cooperation with ORNL, Tenn.
(Contracts DE-AS05-83ER-13113; DE-AC05-84OR-21400)
(DE86-000094; CONF-851011-1) Avail: NTIS HC A02/MF A01

Phosphinic acid ion exchange/redox resins are synthesized by the reaction between polystyrene beads and phosphorus trichloride followed by base hydrolysis. The reaction requires a temperature of 73(0)C for full functionalization to occur. The effect of lower functionalization temperatures on resin acid capacity was determined and the concomitant effect on ion exchange investigated. The acid capacity was found to vary from 1.09 mequiv/g to 4.79 mequiv/g in the functionalization temperature range studied (15(0)C to 73(0)C). The percent resin sites loaded with zinc ions is independent of the actual capacity but the time to attain that percent loading increases from 5 minutes to 60 minutes as the absolute amount of zinc loaded increases. The extracting ability of the phosphinic acid resin for europium, thorium, uranium, americium, and plutonium was examined as a function of acid concentration from acid nitrate solutions both at varying and constant ionic strength. The phosphinic resins show better extraction for these ions than the sulfonic resins, especially from high acid solution (4M HNO3) due to the superior coordination ability of the phosphoryl oxygen. They also show a much higher selectivity for the ions tested over sodium. For example, under conditions where sulfonic resins absorb 53% of the plutonium in solution, the phosphinic acid resins absorb 99%. DOE

N86-18566# Los Alamos National Lab., N. Mex.
PROCEDURE FOR MANUFACTURING POLY (ACETYLENE) FOILS
H. Naarmann, K. Penzien, and P. Simak 1985 13 p Translation of German Patent no. 3207857 (September 15, 1983) Prepared in cooperation with Badische Anilin-und Soda-Fabrie A.G., Ludwigshaften am Rhein, West Germany
(Contract W-7405-eng-36)
(DE86-001259; LA-tr-85-46) Avail: NTIS HC A02/MF A01

A procedure for manufacturing poly (acetylene) foils with layer thicknesses from 2 to 20,000 (MU)m by polymerization of acetylene with active transition metal catalysts on solid carrier surfaces is disclosed, characterized by the application of a solution containing a catalyst with a viscosity between 50 and 10,000 mPa.s measured at 20 C with a polymerization temperature between -15 and +150 C. The viscosity is adjusted through polysiloxane, polymers of aluminium trialkyls, or polymers of titanium acid esters. The temperature is situated between 15 and 50 C. DOE

N86-18567# Marquette Univ., Milwaukee, Wis.
POLYMER-BASED CATALYSTS Final Technical Report, 1 Jul. 1984 - 28 Feb. 1985
S. L. Regen Feb. 1985 5 p
(Contract DE-AC02-77ER-04446)
(DE85-007904; DOE/ER-04446/1) Avail: NTIS HC A02/MF A01

Research supported under this grant has involved: (1) the synthesis of polystyryltri-n-butylphosphine and an evaluation of its efficacy as a catalyst, as a reagent, and as a ligand, and (2) the introduction of ghost vesicles as a new and unique class of polymer colloids to be used as packaging material for the encapsulation of metal colloids, enzymes, and other catalysts. DOE

N86-18568# Oak Ridge National Lab., Tenn.
CERAMIC TECHNOLOGY FOR ADVANCED HEAT ENGINES PROJECT Semiannual Progress Report, Oct. 1984 - Mar. 1985
Sep. 1985 160 p
(Contract DE-AC05-84OR-21400)
(DE86-001365; ORNL/TM-9673) Avail: NTIS HC A08/MF A01

A five-year project plan was developed with extensive input from private industry. The objective of the project is to develop the industrial technology base required for reliable ceramics for application in advanced automotive heat engines. The project approach includes determining the mechanisms controlling reliability, improving processes for fabricating existing ceramics, developing new materials with increased reliability, and testing these materials in simulated engine environments to confirm reliability. Although this is a generic materials project, the focus is on structural ceramics for advanced gas turbine and diesel engines, ceramic bearings and attachments, and ceramic coatings for thermal barrier and wear applications in these engines. DOE

N86-18518# Joint Publications Research Service, Arlington, Va.
DEFORMATION AND VARIABLE LOADING OF METAL-POLYMER TWO-LAYER PLATES Abstract Only
V. V. Moskvitin and E. I. Starovoytov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 11 Transl. into ENGLISH from Mekhanika Kompozitnykh Materialov (Riga, USSR), no. 3, May - Jun. 1985 p 409-416 Original language document was announced in IAA as A85-44168 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18528# Joint Publications Research Service, Arlington, Va.
CRACKING RESISTANCE OF POLYCARBONATE AND POLYMETHYLMETHACRYLATE AT HIGH LOADING RATES Abstract Only
A. S. Yeremenko, S. A. Novikov, V. A. Sinitsyn, and A. A. Girin *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 20 Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (Kiev, USSR), v. 21, no. 4, Jul. - Aug. 1985 p 80-83 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18540# Joint Publications Research Service, Arlington, Va.
A NEW POLYMER FOR THE HEAT-TREATMENT SHOP AND THE OPERATING ROOM
M. G. Voronkov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 90-92 Transl. into ENGLISH from Khimiya i Zhizn (Moscow, USSR), no. 7, Jul. 1985 p 8-9 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18577# Hokkaido Univ., Sapporo (Japan). Dept. of Applied Chemistry.
PREPARATION OF MICA GLASS-CERAMICS BY CRYSTALLIZATION OF FLUORPHLOGOPITE-FLUORMUSCOVITE GLASS
Kohei Kodaira, Hiroaki Fukuda (Nippon Mining Co. Ltd., Japan), Shiro Shimada, Toru Matsushita, and Atsumu Tsunashima (Akita Univ., Japan) *In its* Memoirs of the Faculty of Engineering, Hokkaido Univ., Vol. 16, No. 4(No. 73) Dec. 1985 p 329-335 refs (For primary document see N86-18575 09-31)
Avail: NTIS HC A07/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-18569 Auburn Univ., Ala.
VORTEX SHEDDING FROM SOLID ROCKET MOTOR PROPELLANT INHIBITORS Ph.D. Thesis
Ping-Huei Shu 1985 85 p
Avail: Univ. Microfilms Order No. DA8518413

A mathematical model is presented for investigating the vortex shedding caused by the protrusion of inhibitors into the flow field of a solid rocket motor (SRM). For the model, the time-dependent Navier-Stokes equations are solved with the assumption of incompressible, two-dimensional flow using a finite difference technique. For laminar flow, explicit solutions are obtained using a vorticity-transport equation in place of the Navier-Stokes equations. The solutions are obtained from primitive equations using a semi-implicit, pressure-correction method. To verify the theoretical results, cold flow tests are conducted to determine experimentally the vortex shedding frequency under both laminar and turbulent flow conditions. For both laminar and turbulent flow models, the vortex shedding frequencies were determined using a stroboscope and yarn tufts fastened to one inhibitor. Upstream conditions were measured by hot wire and hot-film anemometers for laminar and turbulent low, respectively. Author

N86-18570# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CRITICAL ANALYSIS OF NITRAMINE DECOMPOSITION DATA: ACTIVATION ENERGIES AND FREQUENCY FACTORS FOR HMX AND RDX DECOMPOSITION Final Technical Report
M. A. Schroeder Sep. 1985 132 p
(DA Proj. 1L1-61102-AH-43)
(AD-A160543; BRL-TR-2673) Avail: NTIS HC A07/MF A01 CSCL 19/1

There is currently considerable interest in the use of nitramine oxidizers in gun and rocket propellants due to their desirable properties, such as absence of noxious combustion products, high specific impulse and impetus, and thermal stability. The most commonly used nitramine oxidizers are RDX (also known by such names as hexogen or cyclonite) and HMX. (Octogen). A literature review is presented, on kinetic parameters for thermal decomposition of HMX and RDX in the homogeneous vapor, liquid, and dissolved states. The decomposition apparently fits first-order kinetics, and suggested values for Arrhenius parameters for HMX and RDX decomposition in the gaseous and liquid phases, and for decomposition of RDX in solution in TNT are given. The possible importance of autocatalysis is pointed out as are some possible complications that may be encountered in interpreting, extending or extrapolating kinetic data for these compounds from measurements carried out below their melting points to the higher temperatures and pressures characteristic of combustion. The mechanistic implications of the activation energies and frequency factors are discussed. GRA

N86-18571# Naval Research Lab., Washington, D. C.
THERMOCHEMICAL MODEL CONVERSION AND USAGE IN ENERGETIC MATERIALS APPLICATIONS
E. Powell and R. B. Boggs 30 Sep. 1985 31 p
(AD-A160651; NRL-MR-5681) Avail: NTIS HC A03/MF A01 CSCL 09/2

The software described in this document is an adaptation of the coded model of propellant combustion developed at Naval Weapon Center (NWC) China Lake. The program is known as the Propellant Evaluation Program. (PEP). The PEP simulation is a Fortran implementation of an equilibrium model for solid fuel combustion under the processes of constant pressure, adiabatic combustion and isentropic, adiabatic expansion. This code was converted for usage on a Prime 9955 minicomputer system from an original copy of version 11978 from NWC. The CRL adaptation does not presently include all of the original I/O capabilities, but rather is structured toward the most simple and direct approach to input setup and execution. At present all I/O is terminal oriented with individual files available for lineprinter or hardcopy. The conversion has been made from Univac 1108 FORTRAN IV to F77. Notable steps in the conversion are described in Appendix 1.

The thermochemical model is useful in calculations of a variety of high-temperature thermodynamic properties and performance levels for solid fuel propellants. It has been employed in various flare development programs as well in its original application of solid fuel motor characterization. The program will handle a maximum of twelve chemical elements in the initial conditions and track up to two hundred combustion products in the end state. GRA

N86-18572# Ballistic Research Labs., Aberdeen Proving Ground, Md.
REFLECTED IMPULSE NEAR SPHERICAL CHARGES Final Technical Report
N. J. Huffington, Jr. and W. O. Ewing Sep. 1985 59 p
(DA Proj. 1L1-61102-AH-43)
(AD-A160797; BRL-TR-2678) Avail: NTIS HC A04/MF A01 CSCL 19/4

Experiments were performed at small scaled distances using the impulse plug technique in an effort to resolve discrepancies between empirical data for reflected impulse and results derived using the HULL hydrocode. Scaled normally reflected impulse data are provided for scaled distances in the range 0.06 to 0.20 m/cu. rt. kg (0.15 to 0.50 ft/cu. rt. lb). GRA

N86-18573# Los Alamos National Lab., N. Mex.
BINDER STUDY FOR HMX/TATB EXPLOSIVES
J. A. Sanchez Sep. 1985 5 p
(Contract W-7405-eng-36)
(DE86-001235; LA-10437-MS) Avail: NTIS HC A02/MF A01

Comparisons were made on Estane, Kraton G, and Kraton G with HyVac Oil for sensitivity and performance in plastic-bonded HMX/TATB formulations. Data obtained on sensitivity, performance, and processability suggest that Estane is superior, so it will be used in further studies. The goal of this study is to develop a relatively insensitive high explosive with a sensitivity between that of RX-26-AF and of PBX 9502. DOE

N86-18574# Department of Energy, Upton, N.Y.
DOE EXPLOSIVE SAFETY MANUAL, REVISION 2
Aug. 1985 95 p
(DE86-001154; DOE/EV-06194/3-Rev-2) Avail: NTIS HC A05/MF A01

This manual is applicable to all DOE facilities engaged in operations involving the development, manufacturing, handling, storage, transportation (on-site), processing, or testing of explosives. Assemblies containing explosives are also covered. It contains guidelines and standards for these operations in order to safeguard personnel and to prevent property damage. Criteria established by this manual are specific to high explosives but also apply to propellants and pyrotechnics when these materials can undergo explosive reactions. The standards of this manual deal with the operations involving explosives and the safe management of such operations. Design criteria for facilities used in conjunction with explosives operations are addressed only indirectly. Design criteria for explosives facilities are contained in DOE 6430.1, General Design Criteria Manual. It is not intended that existing physical facilities be changed arbitrarily to comply with this manual's provisions, except as required by law. The standards are presented as either mandatory or advisory. Mandatory standards, denoted by the words shall, must, or will, are requirements that must be followed unless written authority for deviation is granted as an exemption by the DOE. Advisory standards denoted by should are standards that may be deviated from with a waiver granted by facility management. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-18575# Hokkaido Univ., Sapporo (Japan).
MEMOIRS OF THE FACULTY OF ENGINEERING, HOKKAIDO UNIVERSITY, VOLUME 16, NO. 4(NO. 73)
Dec. 1985 139 p refs
(ISSN-0368-9379) Avail: NTIS HC A07/MF A01

A brief review of engineering research conducted by the faculty of Hokkaido University is presented. The major topics discussed were: (1) collocation methods for static and dynamic analysis of shells of revolution; and (2) preparation of mica glass ceramics. For individual titles, see N86-18576 through N86-18577.

N86-18576# Hokkaido Univ., Sapporo (Japan). Dept. of Civil Engineering.
COLLOCATION METHOD FOR STATIC AND DYNAMIC ANALYSIS OF SHELLS OF REVOLUTION c39
Takashi Mikami and Jin Yoshimura *In its* Memoirs of the Faculty of Engineering, Hokkaido Univ., Vol. 16, No. 4(No. 73) Dec. 1985 p 317-328 refs (For primary document see N86-18575 09-31)
Avail: NTIS HC A07/MF A01

The static and dynamic analysis of shells of revolution using the collocation method is described. The proposed method in which the collocation points are taken at the roots of orthogonal polynomial is used to descretize the space-variable. The versatility and accuracy are illustrated through several numerical examples. The method appears to be easy to formulate and simple to use. Author

N86-18577# Hokkaido Univ., Sapporo (Japan). Dept. of Applied Chemistry.
PREPARATION OF MICA GLASS-CERAMICS BY CRYSTALLIZATION OF FLUORPHLOGOPITE-FLUORMUSCOVITE GLASS c27
Kohei Kodaira, Hiroaki Fukuda (Nippon Mining Co. Ltd., Japan), Shiro Shimada, Toru Matsushita, and Atsumu Tsunashima (Akita Univ., Japan) *In its* Memoirs of the Faculty of Engineering, Hokkaido Univ., Vol. 16, No. 4(No. 73) Dec. 1985 p 329-335 refs (For primary document see N86-18575 09-31)
Avail: NTIS HC A07/MF A01

Transparent and clear glasses were prepared from fluorphlogopite-fluormuscovite system mixtures. Mica crystals were precipitated in the glass by later heat treatment. The mica crystals were identified as fluorphogopite by X-ray powder diffraction patterns. An interlocking microstructure of mica was observed at above 800 C. The density of crystallized glass increased with the increasing heat treatment temperatures. The density crystallized glass increased with the increasing heat treatment temperatures. The density attained a maximum at about 900 C. Author

N86-18578# Sandia Labs., Albuquerque, N. Mex.
THEORY FOR DYNAMIC COMPACTION OF WET POROUS SOLIDS
D. S. Drumheller Aug. 1985 41 p
(Contract DE-AC04-76DP-00789)
(DE85-017596; SAND-85-1128) Avail: NTIS HC A03/MF A01

Partially saturated porous media exhibit complex behavior including plastic distortion, irreversible crushing of pores, and dilatancy. Pressure produced by compression of the pore fluid has a strong influence on these phenomena and greatly alters the response observed in the wet solid from that observed in the dry solid. These phenomena are described within the framework of a theory for immiscible mixtures. It shows how a material representation originally derived for the hydrostatic compaction of a dry solid can be generalized to wet solids subjected to both distortional and volumetric deformation. Results of stress wave calculations are compared to data obtained from a field test in which high explosive was detonated in a formation of partially saturated ashfall tuff. DOE

N86-18579# Washington Univ., Seattle.
ULTRAVIOLET DISINFECTION OF WATER FOR SMALL WATER SUPPLIES
D. A. Carlson, R. W. Seabloom, F. B. DeWalle, T. F. Wetzler, and J. Engeset Jul. 1985 127 p
(PB85-239960; EPA-600/1-85-092) Avail: NTIS HC A07/MF A01 CSCL 13B

In the study ultraviolet radiation was considered as an alternative means of disinfection of small drinking water supplies. A major impetus for the study was the large increase in waterborne disease episodes in the United States whose etiologic agent, Giardia lamblia, was found to be highly resistant to conventional chlorination. While the germicidal effect of sunlight has long been known, it has been found that artificial UV radiation with a wavelength of 253.7 nm, can be produced by low pressure mercury vapor lamps. The inactivation of microorganisms by UV radiation is based upon photochemical reactions in DNA which result in errors in the coding system. Inactivation of microorganisms due to exposure to UV is proportional to the intensity multiplied by the time of exposure.
Author (GRA)

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-18580 Polytechnic Inst. of New York, Brooklyn.
PROPAGATION OF ELECTROMAGNETIC WAVES IN TWO DIMENSIONALLY PERIODIC MEDIA Ph.D. Thesis
Tian-Lin Dong 1985 103 p
Avail: Univ. Microfilms Order No. DA8515847

The propagation of electromagnetic waves in two dimensionally periodic structure is systematically investigated, to provide the basic theory for two dimensionally modulated dielectric waveguide. A canonical two dimensionally periodic medium of infinite extent, whose dielectic constant varies sinusoidally in two orthogonal directions, is first examined. The charact solutions are represented exactly by a double Fourier series which is known as the Floquet solution. The harmonic amplitudes of the Floquet solution are determined by a five-term recurrence relation in the vector form, properly taking into account the hybrid-mode nature of the propagation problem. The five-term recurrence relation is then treated by different approaches so that clear physical pictures and practical numerical methods can be obtained. The characteristic solutions for two dimensionally periodic medium are then applied to the boundary-value problem of multi-layer dielectric waveguides containing a finite layer of periodic medium. As an example, the guidance characteristics are then carried out. Besides the canonical medium as a model, more general two dimensionally periodic medium are also discussed. Dissert. Abstr.

N86-18581 Ohio State Univ., Columbus.
PLANE WAVE SCATTERING BY THIN LINEAR DIELECTRIC-COATED WIRES AND DIELECTRIC STRIPS: A MOMENT METHOD APPROACH WITH PHYSICAL BASIS FUNCTIONS Ph.D. Thesis
William Joseph Kent 1985 218 p
Avail: Univ. Microfilms Order No. DA8518971

The scattering current induced on two important classes of structures was analyzed using a method first introduced by Richmond. Each structure requires only the oppositely directed wave modes, the number of modes is fixed, and independent of length. Each mode generates a far field which can completely dominate the fields of the other modes in certain angular sectors. For high to moderate (grazing) incidence angles, the fields in the direction of incidence are usually dominated by one of the surface wave modes for any structures over a few wavelengths long. The surface waves are normally slow. The analysis method has several advantages: (1) it can be used to find the currents for certain structures with one large dimension quite rapidly, and (2) each basis function can be interpreted physically and can be pictured as a distinct radiating mode. The impedance matrices for the two cases are reported. Current distributions and far field results are given for plane wave incidence. Dissert. Abstr.

N86-18582 British Broadcasting Corp., Kingswood (England). Engineering Div.
AN INVESTIGATION OF BAND 2 FIELD STRENGTHS: THE NORTHAMPTON EXPERIMENT
G. H. Taylor Jun. 1985 14 p refs
(BBC-RD-1985/6) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

Field strength measurements of several transmitters received within a 10 km by 10 km square are reported. A total of some 24,000 measurements were made, each receiving location being characterized by 240 field strength measurements. The work forms part of a series of studies intended to improve the BBC's field strength prediction program and to form a contribution to CCIR Rec. 370 and Rep. 239. The measurements are made at 10 meters and 4 meters above the ground and also with aerials mounted on a car roof. A figure of 11 dB is suggested as the average height gain factor between reception with car roof whip and halo aerials, and two element aerials at 10 meters above ground. Author

N86-18583 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL AUDIO EDITING
G. W. McNally, P. S. Gaskill, and A. J. Stirling Aug. 1985 29 p refs
(BBC-RD-1985/10) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

Contrasting editing methods particularly in broadcasting are reviewed and the requirements of digital audio editing are explored. A hierarchy of editing strategies with varying degrees of sophistication is proposed. The simplest is to cut the tape and use error concealment and electronic crossfading to smooth the splice. In a more advanced option, the concept of separate cut-point and edit-point is introduced, using an auxiliary data track to control a jump over the splice. The top level is a disc-based strategy which gives the user a flexible, nondestructive editing technique with advanced rehearsal facilities not possible with conventional methods. An experimental disc-based editor is developed. The design philosophy and implementation of this editor and a simulation of its performance are described. The man-machine interface, data formatting, systems level design and the software engineering of the project are reported. E.A.K.

N86-18584 Department of the Navy, Washington, D. C.
FREQUENCY DOMAIN NON-LINEAR SIGNAL PROCESSING APPARATUS AND METHOD FOR DISCRIMINATION AGAINST NON-GAUSSIAN INTERFERENCE Patent
R. F. Dwyer, inventor (to Navy) Issued 16 Jul. 1985 8 p Supersedes AD-D011068
(AD-D011931; US-Patent-4,530,076; US-Patent-Appl-SN-508649; US-Patent-Class-367-135) Avail: US Patent and Trademark Office CSCL 17/1

Apparatus and method for discriminating against non-Gaussian noise. Analog signals from an array of sensors are converted to real and imaginary digital representations and processed such that non-Gaussian noise is separated from signals of interest. The processor uses estimates of Kurtosis and quantiles from either past or adjacent frequency components to construct non-linear elements, which are then used to process remaining signal data to improve the signal-to-noise ratio thereof by removing non-Gaussian noise therefrom. Author (GRA)

N86-18585*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ANALYSIS OF BI-DIRECTIONAL USE OF FREQUENCIES FOR SATELLITE COMMUNICATIONS
Wayne A. Whyte, Jr., Edward F. Miller, Thomas Sullivan (ORI, Inc., Landover, Md.), and John E. Miller (ORI, Inc., Landover, Md.) [1986] 19 p refs Prepared for presentation at the 11th Annual Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by AIAA
(NASA-TM-87226; E-2894; NAS 1.15:87226) Avail: NTIS HC A02/MF A01 CSCL 17B

The bi-directional use of frequencies allocated for space

communications has the potential to double the orbit/spectrum capacity available. The technical feasibility of reverse band use (RBU) at C-band (4 GHz uplinks and 6 GHz downlinks) is studied. The analysis identifies the constraints under which both forward and reverse band use satellite systems can share the same frequencies with terrestrial, line of sight transmission systems. The results of the analysis show that RBU satellite systems can be similarly sized to forward band use (FBU) satellite systems. In addition, the orbital separation requirements between RBU and FBU satellite systems are examined. The analysis shows that a carrier to interference ratio of 45 dB can be maintianed between RBU and FBU satellites separated by less than 0.5 deg., and that a carrier to interference ratio of 42 dB can be maintained in the antipodal case. Rain scatter propagation analysis shows that RBU and FBU Earth stations require separation distances fo less than 10 km at a rain rate of 13.5 mm/hr escalating to less than 100 km at a rain rate of 178 mm/hr for Earth station antennas in the 3 to 10 m range. Author

N86-18586*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPUTATION OF THE RADIATION CHARACTERISTICS OF A GENERALIZED PHASED ARRAY
Roberto J. Acosta Jan. 1986 29 p refs
(NASA-TM-87185; E-2836; NAS 1.15:87185) Avail: NTIS HC A03/MF A01 CSCL 20N

With the advent of monolithic microwave integrated circuit (MMIC) technology, the phased array has become a key component in the design of advanced antenna systems. Array-fed antennas are used extensively in today's multiple beam satellite antennas. A computer program based on a very efficient numerical technique for calculating the radiated power (Romberg integration), directivity, and radiation pattern of a phased array is described. The formulation developed is very general, and takes into account arbitrary element polarization, E- and H-plane element pattern, element location, and complex element excitation. For comparison purposes sample cases have been presented. Excellent agreement has been obtained for all cases. Also included are a user guide and a copy of the computer program. Author

N86-18587# Naval Postgraduate School, Monterey, Calif.
A RESOURCE CONFLICT RESOLUTION PROBLEM FORMULATED IN CONTINUOUS TIME
D. P. Gaver, G. Fayolle, and A. Weiss Aug. 1985 32 p
(RR0-1405)
(AD-A159675; NPS55-85-018) Avail: NTIS HC A03/MF A01 CSCL 17/2

In many situations involving data transmission from diverse sources there can be conflict for a limited number of channels or other facilities. Uncoordinated attempts by several sources to use a single facility can result in collision, the destruction of all participants in the collision, meaning the loss of the transmission, and hence the need for re-transmission. An important problem concerns the development of workable procedures for alleviating the conflict and corresponding message delay problems. Often such problems are viewed as occurring in discrete time: slots of equal length occur in temporal succession, and each slot can handle just one packet of data at a time, if two or more packets try to use the same slot simultaneously, a collision occurs that somehow must be resolved. A recent paper analyzed a stack protocol for handling such a situation, but there are many other proposals. This report is concerned with some simple models for a single facility (channel), and for contention or conflict resolution. The models are formulated in a continuous-time manner: messages, or numbers of packets constituting messages, are long, meaning that they occupy many consecutive slots on the average if a single transmission is occurring. GRA

N86-18588# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE EFFECTS OF VOCAL VERSUS MANUAL RESPONSE MODALITIES ON MULTI-TASK PERFORMANCE Interim Report
G. R. Griffin and J. D. Mosko Feb. 1985 17 p
(F56-526)
(AD-A159830; NAMRL-1312) Avail: NTIS HC A02/MF A01 CSCL 05/10

The increasing complexity of display and control instrumentation in modern high performance aircraft has the potential to overload the human operator and result in diminished system performance. Interactive voice technology has been proposed as a method to reduce the high workload placed on the pilots of military aircraft. This report presents the results of an experiment designed to evaluate the effects on human performance of vocal versus manual response modalities on single and multiple tasks simulating some conditions of flight. Results indicated a significant increase in performance precision on a psychomotor task when a vocal, rather than a manual response mode was used on the simultaneous performance of multiple tasks. These results suggest that human performance on visually oriented multiple tasks requiring simultaneous execution may be improved if some of the work effort can be performed using a vocal input/output. GRA

N86-18589# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SPEECH RECOGNITION: ACOUSTIC, PHONETIC AND LEXICAL End of Fiscal Year Report, 1 Oct. 1984 - 30 Sep. 1985
V. W. Zue 1 Oct. 1985 6 p
(Contract N00014-82-K-0727; ARPA Order 4585)
(AD-A160008) Avail: NTIS HC A02/MF A01 CSCL 05/7

Our long-term research goal is the development and implementation of speaker-independent continuous speech recognition systems. It is our conviction that proper utilization of speech-specific knowledge is essential for advanced speech recognition systems. With this in mind, we have continued to make progress on the acquisition of acoustic-phonetic and lexical knowledge. We have completed the development of a continuous digit recognition system. The system was constructed to investigate the utilization of acoustic phonetic knowledge in a speech recognition system. Some of the significant development of this study includes a soft-failure procedure for lexical access, and the discovery of a set of acoustic-phonetic features for verification. We have completed a study of the constraints provided by lexical stress on word recognition. We found that lexical stress information alone can, on the average, reduce the number of word candidates from a large dictionary by more than 80%. In conjunction with this study, we successfully developed a system that automatically determines the stress pattern of a word from the acoustic signal. GRA

N86-18590# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision.
MINIMIZING THE NUMBER OF CLUSTERS IN MOBILE PACKET RADIO NETWORKS M.S. Thesis
A. K. Parekh Oct. 1985 86 p
(Contract N00014-84-K-0357; DARPA Order 3045)
(AD-A160127; LIDS-TH-1502) Avail: NTIS HC A05/MF A01 CSCL 17/2

Linked-cluster architectures have been suggested in the literature for organizing the radios of a stationless mobile Packet Radio Network (PRN). Existing algorithms for achieving such architectures do not attempt to minimize the number of clusters and gateway nodes, aims which we claim are essential to the implementation of any multiple access scheme. The problem is formulated on graphs in three different ways, all of which are NP-complete. It is also shown that epsilon-polynomial time algorithms are not likely to exist. A simple centralized heuristic, Greedy is analyzed in terms of its worst case fractional error. It is then argued that no efficient heuristic is likely to be significantly better in terms of worst-case performance. Two distributed linked-cluster algorithms are presented. GRA

N86-18591# La Jolla Inst., Calif. Center for the Study of Nonlinear Dynamics.
THEORETICAL STUDIES AND DATA ANALYSIS OF WAVE PROPAGATION IN RANDOM MEDIA Final Technical Report,

1 Dec. 1983 - 30 Sep. 1985
S. M. Flatte 15 Sep. 1985 150 p
(Contract MDA903-83-C-0515; ARPA Order 4852)
(AD-A160150; LJI-R-85-350) Avail: NTIS HC A07/MF A01 CSCL 12/1

The objective of this work was to develop a general theoretical framework for calculating fluctuations of signals on waves propagated through random media (WPRM) and to apply this framework to sound through the ocean; light through the atmosphere; radio waves through the ionosphere, solar wind, or interstellar plasma; and any other similar case of waves propagating through continuous media. Comparison with real data is an important aspect of the effort. The two most common signals sent on a carrier are the phase and amplitude of a nearly monochromatic wave. If enough bandwidth is available, one can send a pulse, and one can speak of the intensity and arrival time of that pulse. The technical problem is then to explain the statistical behavior of the intensity and arrival time in terms of medium fluctuations, where the medium is described statistically, usually by a power spectrum covering a large dynamic range of scales. GRA

N86-18592# Arizona Univ., Tucson.
SAGUARO: A DISTRIBUTED OPERATING SYSTEM BASED ON POOLS OF SERVICERS Annual Technical Report, 1 Jan. - 31 Dec. 1984
G. R. Andrews and R. D. Schlichting 26 Mar. 1985 4 p
(Grant AF-AFOSR-0072-84)
(AD-A160183; TR-84; AFOSR-85-0821TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The progress achieved during the first year of the integrated Saguaro distributed operating system project is presented. The major accomplishments were the completion of the initial design and preliminary implementation of several system components, the subsequent refinement of the user interface and the file system, and the investigation into the use of a universal type system to type data and specify interfaces in the operating system. GRA

N86-18593# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
METRIC CALIBRATION OF THE MILLSTONE HILL L-BAND RADAR
E. M. Gaposchkin 19 Aug. 1985 67 p
(Contract F19628-85-C-0002)
(AD-A160362; TR-721; ESD-TR-85-173) Avail: NTIS HC A04/MF A01 CSCL 17/9

The precision Lageos orbit is used for near real time calibration of the Millstone Hill Radar 1 MHz chirped frequency domain tracker. With independent tracking data, the range calibration is given to approx. 1 m, with Millstone data the range calibration is given to approx. 5 m. The range rate is unbiased measurement, with an accuracy of approx. 1 mm/sec. The azimuth and elevation are calibrated to 0.020 deg and 0.002 deg respectively. Tables of calibration constants are given. GRA

N86-18594# Rome Air Development Center, Griffiss AFB, N.Y.
ATMOSPHERIC MULTIPATH PROPAGATION OVER A LONG TERRESTRIAL LINE-OF-SIGHT PATH
U. H. W. Lammers and R. A. Marr Apr. 1985 64 p
(DA Proj. 460-0)
(AD-A160392; RADC-TR-85-79) Avail: NTIS HC A04/MF A01 CSCL 17/2

Measurements of atmospheric multipath propagation were conducted over an 87.6-km test path in the New England area. Characteristic of this program are (1) the pathlength and its potential for propagation effects not normally found on shorter commercial communication links and (2) an effort to explore the propagation mechanism through coordinated measurements of meteorological and wave parameters. The height difference of 178.6 m between transmitting and receiving antennas was the lowest available to retain line-of-sight clearance at this pathlength and yet produce maximum interaction with stratified regions of enhanced refractivity gradient. Radiosonde derived refractivity profiles were obtained at several locations along the test path when propagation conditions warranted this. Dual receiving systems measured multiple wavefront angles of arrival and delay differences. A 29-ft antenna, continuously scanning in elevation, provided angular patterns with 0.15 resolution at the operating frequency of 15. GRA

N86-18595# Navy Experimental Diving Unit, Panama City, Fla.
EVALUATION OF THE OCEAN TECHNOLOGY SYSTEM'S MK 1-S WIRELESS SURFACE UNIT, MK 1 DCI TWO DIVER AIR RADIO, MK 1-D-A WIRELESS DIVER UNIT, MK 1-D-H HARD-WIRE DIVER UNIT AND MK 1-D/S UNIT
B. E. Reyle May 1985 53 p
(AD-A160480; NEDU-6-85) Avail: NTIS HC A04/MF A01 CSCL 17/2

The OTS was evaluated for intelligibility, reliability and human engineering. The test subjects possessed various levels of experience with wireless or hardwire communication and SCUBA. The conditions under which the equipment was tested varied. Surface air temperatures ranged from 37 to 85 F; water temperatures from 65 to 80 F; and water depths from 8 feet of seawater (FSW) to greater than 60 FSW. The tests were conducted inside a circular 30 foot deep ascent tower, in shallow open bay water, and finally in an open ocean environment. The equipment was evaluated in areas of both high and low noise levels on the surface as well as in water. The OTS produced an overall intelligibility of 89.24% during manned open water testing using the Modified Rhyme Test (MRT) as the evaluation criteria, with a minimum effective range of 330 yards at 12 FSW and at least 875 yards, although it appears that the range of the MK 1-D-A is somewhat greater. Human engineering aspects of the OTS were found to be more than satisfactory, with no material failures encountered during testing. It is interesting to note that whenever the equipment required minor adjustments, these could be effected by the diver in the water (on the surface) and in most cases in less than 5 minutes. The amount of maintenance required on the OTS was minimal. GRA

N86-18596# Science Applications International Corp., McLean, Va.
DUST INDUCED ELECTRO-MAGNETIC NOISE (DIEMN) Technical Report, 1 Mar. - 31 Oct. 1984
D. P. Bacon and D. P. Cherin 5 Nov. 1984 22 p
(Contract DNA001-83-C-0117)
(AD-A160565; AD-E301825; SAIC-84/1402; DNA-TR-84-401) Avail: NTIS HC A02/MF A01 CSCL 20/14

A review of the data and theory related to DIEMN has been conducted and a strawman hypothesis of the phenomenon proposed. This hypothesis has been used to consider the probable features of DIEMN at the MINOR SCALE high explosive event. GRA

N86-18597# Army Engineer Topographic Labs., Fort Belvoir, Va.
THIRD-ORDER CO-OCCURRENCE TEXTURE ANALYSIS APPLIED TO SAMPLES OF HIGH RESOLUTION SYNTHETIC APERTURE RADAR IMAGERY Technical Report, Jan. - Jun. 1984
R. A. Hevenor Aug. 1985 38 p
(DA Proj. 4A1-61101-A-91-D)
(AD-A160640; ETL-0396) Avail: NTIS HC A03/MF A01 CSCL 17/9

A third-order co-occurrence texture analysis technique was applied to samples of synthetic aperture radar imagery. This technique was applied to four classes of terrain features on selected samples of radar imagery. The four classes considered were forests, cities, agricultural fields, and water. A fracture vector was computed from samples of each class. A linear feature selection technique was applied for dimensionality reduction, and a pseudo-inverse classifier was developed. This classifier was applied to the original training samples as well as to other samples from the same imagery. GRA

N86-18598# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ELECTROMAGNETIC MEASUREMENTS OF MULTI-YEAR SEA

ICE USING IMPULSE RADAR
A. Kovacs and R. M. Morey Sep. 1985 33 p
(Contract DE-AI21-83MC-20022)
(AD-A160737; CRREL-85-13) Avail: NTIS HC A03/MF A01 CSCL 17/9

Sounding of multi-year sea ice, using impulse radar operating in the 80- to 500-MHz frequency band, has revealed that the bottom of this ice cannot always be detected. This paper discusses a field program aimed at finding out why this is so, and at determining the electromagnetic (EM) properties of multi-year sea ice. It was found that the bottom of the ice could not be detected when the ice structure had a high brine content. Because of brine's high conductivity, brine volume dominates the loss mechanism in first-year sea ice, and the same was found true for multi-year ice. A two-phase dielectric mixing formula, used by the authors to describe the EM properties of first-year sea ice, was modified to include the effects of the gas rockets found in the multi-year sea ice. This three-phase mixture model was found to estimate the EM properties of the multi-year ice studied over the frequency band of interest. The latter values were determined by: (1) verified sounding to a subsurface target of known depth, where the two-way travel time of the EM wavelet in the ice is measured; (2) cross-borehole transmission, where the transit time of the EM wavelet is measured through a known thickness of sea ice; and (3) a wide-angle or common-depth-point reflection method. Preliminary findings also indicate that a representative value for the apparent bulk dielectric constant of multiyear sea ice over 2 1/2 m thick is 3.5. GRA

N86-18599# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EFFECTS OF NOISE AND WORKLOAD ON A COMMUNICATION TASK
D. H. Orrell, II May 1985 81 p
(AD-A160743; AFIT/CI/NR-85-101T) Avail: NTIS HC A05/MF A01 CSCL 17/2

Communication is of vital importance in the cockpit today. It is essential for pilots to be able to understand the messages sent to them. A major requirement of any aircraft voice communication system is the ability to deliver intelligible speech. In a loose sense, intelligibility may be defined as the understanding of spoken words (Webster, 1979). Several language factors affect intelligibility including vocabulary size, word frequency (familiarity) effects, number of response alternatives, number of syllables, phonetic elements and context (Webster, 1972). Other external considerations include equipment or design features and environment (Webster and Allen, 1972). With such a wide range of sources of influence, it is easy to understand the need for a reliable intelligibility test. One such test found to be particularly useful in studying the effects of aircraft noise has been the Modified Ryhme Test (MRT). GRA

N86-18600# IIT Research Inst., Chicago, Ill.
EXTREMELY LOW FREQUENCY (ELF) COMMUNICATIONS SYSTEM ECOLOGICAL MONITORING PROGRAM. SUMMARY OF 1984 PROGRESS Technical Report, 1 Jan. - 31 Dec. 1984
J. E. Zapotosky Jul. 1985 66 p
(Contract N00039-84-C-0070)
(AD-A160793; IITRI-E06549-18) Avail: NTIS HC A04/MF A01 CSCL 17/2

A long-term program is being conducted to monitor for possible effects from the operation of the U.S. Navy's ELF Communications System to resident biota and their ecological relationships. Monitoring studies were selected through a peer-reviewed, competitive bidding process in mid-1982; studies were initiated in late summer of that year. Currently, 16 general types of organisms from three major ecosystems in the ELF Communications System are being examined. During 1984, the Program continued and extended those major activities initiated in 1983, consisting of site selection, the characterization of critical study aspects, and, to a lesser degree, the validation of assumptions made in the original proposals. Progress is summarized for the 11 projects that comprise the Program as well as for the support activities of IIT Research Institute. GRA

N86-18601# Delta Information Systems, Inc., Horsham, Pa.
DEVELOPMENT OF A VIDEO TAPE TO TEST TELE-CONFERENCING CODECS Final Report
23 Aug. 1985 39 p
(Contract DCA100-83-C-0047)
(AD-A160798; NCS-TIB-85-2) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report covers the design and production of a video tape for testing motion codecs. It is part of a program for comparative evaluation of motion codecs used for teleconferencing at 1.544 Mbs. The specific purpose of the tape is to provide pictorial material which may occur during both government and commercial teleconferences and which simultaneously stresses the capabilities of each codec sufficiently so that differences in performance will become apparent. The choice of material must lead to a completely impartial evaluation without favoring any particular algorithm, and must not be constrained by any present limitation of teleconferencing which will not exist in the future. GRA

N86-18602# Delta Information Systems, Inc., Horsham, Pa.
TEST AND EVALUATION OF TELECONFERENCING VIDEO CODECS TRANSMITTING AT 1.5 MBps Final Report
Aug. 1985 58 p
(Contract DCA100-83-C-0047)
(AD-A160845; NCS-TIB-85-5) Avail: NTIS HC A04/MF A01 CSCL 17/2

This report covers the testing and ranking of motion codecs for teleconferencing operating at 1.544 Mbps. The tests utilized the motion codec test tape previously identified in NCS TIB 85-2 (Development of a Video Tape to Test Teleconferencing Codecs) and follows the methodology previously developed in NCS TIB 85-1 (Development of Methodology to test Video Codecs used in Teleconferencing). Codecs developed by four manufacturers were tested; this included all units which were available as regular products before the end of November 1984. Since the results of these tests are likely to have considerable impact on the manufacturers, extreme care was taken to ensure are absolute impartiality and fairness in the procedure. Manufacturers' representatives actively participated in all testing and provided assurance that the results were representative of the performance capability of their equipment. The subjective evaluation and ranking of the codecs employed all possible safeguards against external influences by test equipments or test arrangements and against any personal prejudice of the evaluators. GRA

N86-18603# Los Alamos National Lab., N. Mex.
COMMUNICATING ACROSS BARRIERS AT HOME AND ABROAD
J. W. McDonald 1985 8 p Presented at Forum 85, Helsingor, Denmark, 26 Aug. 1985
(Contract W-7405-eng-36)
(DE85-015729; LA-UR-85-2740; CONF-85-864-2) Avail: NTIS HC A02/MF A01

This paper intends to catalyze the exchange of experience among technical communicators in meeting the challenge of communicating across a multitude of barriers: linguistic, disciplinary, cultural, political, intellectual, and emotional. DOE

N86-18604# Argonne National Lab., Ill.
COUPLING BETWEEN EDDY CURRENTS AND RIGID BODY ROTATION: ANALYSIS, COMPUTATION, AND EXPERIMENTS
T. Q. Hua and L. R. Turner 1985 5 p Presented at the 5th Conference on the Computation of Electromagnetic Fields, Fort Collins, Colo., 3 Jun. 1985
(Contract W-31-109-eng-38)
(DE85-013877; CONF-850641-3) Avail: NTIS HC A02/MF A01

Computation and experiment show that the coupling between eddy currents and the angular deflections resulting from those eddy currents can reduce electromagnetic effects such as forces, torques, and power dissipation to levels far less severe than would be predicted without regard for the coupling. This paper explores the coupling effects beyond the parameter range that has been explored experimentally, using analytical means and the eddy-

current computer code EDDYNET. The paper also describes upcoming FELIX experiments with cantilevered beams. DOE

N86-18605# Office of Radiation Programs, Las Vegas, Nev.
DEVELOPMENT OF A SYSTEM TO MEASURE THE RESPONSE TIME OF MICROWAVE SURVEY INSTRUMENTS TO ROTATING RADAR ANTENNA PATTERNS
P. A. Monheiser Jun. 1985 82 p
(PB85-230217; EPA-520/6-85-019) Avail: NTIS
HC A05/MF A01 CSCL 14B

The report describes the development of a system which simulates rotating radar fields in a controlled environment. The measured time variations of the field generated by a real, rotating radar antenna were first recorded using a computer controlled spectrum analyzer. The data acquired were then used to modulate a carrier wave field in the laboratory to simulate the rotating radar far-field. Finally, response of a thermocouple based microwave hazard survey meter to this field was measured. GRA

N86-18606# AGL, Inc., Pacific Grove, Calif.
NUMERICAL MODELING STUDY OF GAIN AND DOWNWARD RADIATION FOR SELECTED FM AND VHF-TV BROADCAST ANTENNA SYSTEMS
R. W. Adler and S. Lamont Jun. 1985 578 p
(PB85-238046; EPA-520/6-85-018) Avail: NTIS
HC A25/MF A01 CSCL 09E

A modeling study was conducted for the purpose of examining RF radiation exposure levels caused by downward pointing radiation from commercial FM and TV broadcast antenna arrays. The Numerical Electromagnetic Code was used for radiation pattern calculations. Manufacturers' data and measurements were used to provide dimensional information for the computer models. Generic types of FM antennas were identified and their radiation characteristics were presented with emphasis of the reconfiguration of array geometries for purposes of reducing downward directed radiation fields. The population super-turnstile VHF TV element was also modeled. Gain curves for various interelement spacings were developed for arrays containing 2 through 16 elements. GRA

N86-18371# Institut Francais du Petrole, Rueil-Malmaison. Div. de Teledetection Marine.
OPERATIONAL REMOTE SENSING OF OIL SLICKS AT SEA BY MICROWAVE RADIOMETRY
A. Wadsworth and P. Piau *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 127-130 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18376# Centre National d'Etudes Spatiales, Toulouse (France).
THE VARAN-S: AN AIRBORNE SYNTHETIC APERTURE RADAR FOR RESEARCH IN MICROWAVE REMOTE SENSING
D. Vaillant *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 167-174 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-18607 Department of the Air Force, Washington, D.C.
SCHOTTKY BARRIER INFRARED DETECTOR AND PROCESS Patent
P. W. Pellegrini, C. E. Ludington, A. Golubovic, and M. M. Weeks, inventors (to Air Force) Issued 6 Aug. 1985 6 p Supersedes AD-D010223
(AD-D011925; US-Patent-4,533,933; US-Patent-Appl-SN-447599; US-Patent-Class-357-15) Avail: US Patent and Trademark Office CSCL 17/5

A Schottky barrier diode formed of iridium-silicon material having a frequency response encompassing the 3.0 to 5.0 micrometer infrared band. The bandwidth, uniformity of response and silicon base material of such diodes renders them ideally suited for use in large scale focal plane arrays associated with infrared cameras. Author (GRA)

N86-18608 Department of the Air Force, Washington, D.C.
METHOD OF MAKING SELF-ALIGNED IGFET Patent
F. L. Schuermeyer, inventor (to Air Force) Issued 6 Aug. 1985 6 p Supersedes AD-D009769
(AD-D011926; US-Patent-4,532,695; US-Patent-Appl-SN-394591; US-Patent-Class-29-571) Avail: US Patent and Trademark Office CSCL 09/1

The IGFET is formed on a GaAs wafer which is coated with a layer of Si3N4 and a SiO2 layer. The SiO2 is etched away in transistor areas, and ion implanting provides channel doping. A gate of refractory metal such as Mo is deposited and delineated. The gate and the SiO2 act as masks for ion implantation of the source and drain. The refractory metal gate allows subsequent annealing at high temperatures to active the ion implanted species. Author (GRA)

N86-18609 Department of the Air Force, Washington, D.C.
OPTICAL ELECTROMAGNETIC RADIATION DETECTOR Patent
W. J. Miceli and J. E. Ludman, inventors (to Air Force) 6 Aug. 1985 6 p Supersedes AD-D010788
(AD-D011929; US-Patent-4,533,829; US-Patent-Appl-SN-511592; US-Patent-Class-250-227) Avail: US Patent and Trademark Office CSCL 09/3

An optical electromagnetic radiation detector is invented having a probe for receiving nearby electromagnetic radiation. The probe includes a loop antenna connected to a pair of transparent electrodes deposited on the end surfaces of an electro-optic Fabry-Perot interferometer. When the loop antenna picks up the presence of electromagnetic radiation, a voltage will be developed across the crystal of the electro-optic Fabry-Perot interferometer thereby changing the optical length of the interferometer. A beam of light from a remote location is transmitted through an optical fiber onto the Fabry-Perot interferometer. The change in optical length of the Fabry-Perot interferometer alters the intensity of the beam of light as its is reflected from the Fabry-Perot interferometer back through the optical fiber to the remote location. A beamsplitter directs this reflected beam of light onto an intensity detector in order to provide an output indicative of the variations in intensity. The variations in intensity are directly related to the strength of the electromagnetic radiation received by the loop antenna. GRA

N86-18610 Department of the Air Force, Washington, D.C.
ELECTRICAL METHOD OF MAKING CONDUCTIVE PATHS IN SILICON Patent
C. H. Lane, inventor (to Air Force) Issued 13 Aug. 1985 4 p
(AD-D011945; US-Patent-4,534,100; US-Patent-Appl-SN-393169; US-Patent-Class-29-586) Avail: US Patent and Trademark Office CSCL 09/5

This patent discloses a method of forming an electrical conductive path between parallel surfaces of a substrate wherein a pulsed voltage, non-current limited, power supply causes aluminum to electromigrate between at least two opposing points to form an alloy with silicon of the substrate. Electronic devices can be thus placed upon opposite sides of the substrate for purposes of packaging, shielding, etc. GRA

N86-18611# Lockheed Missiles and Space Co., Sunnyvale, Calif.
INVESTIGATION OF HIGH SPEED ICs IN InP USING MIS

STRUCTURES Final Report, 18 Apr. 1983 - 30 Jul. 1984
D. K. Kinell Oct. 1984 57 p
(Contract N66001-82-C-0290)
(AD-A159652; LMSC-F007736) Avail: NTIS HC A04/MF A01 CSCL 09/5

A 3x3 digital multiplier IC has been developed using InP MISFET technology. A modified enhancement/depletion circuit approach with source follower input transistors was selected for use on the basis of being tolerant to process variations. In a self test mode of the multiplier, multiply times of 11 ns were observed. GRA

N86-18612# Naval Postgraduate School, Monterey, Calif.
ELECTRON IRRADIATION OF p-TYPE MERCURY CADMIUM TELLURIDE M.S. Thesis
D. G. Morral Jun. 1985 67 p
(AD-A159737) Avail: NTIS HC A04/MF A01 CSCL 20/12

30 MeV electrons were used to irradiate samples of p-type Hg1-x CdxTe to study radiation induced changes in conductivity versus temperature. Samples were held below 95 K while irradiated with doses between 4 x 10 to the 13th power electrons/sq cm and 6 x 10 to the 15th power electrons/sq cm. Little or no changes in conductivity were detected for the lower dose levels. Conductivity steadily decreased with increasing dose level, showing a 50% decline at 100 K for the maximum dose. The decrease in conductivity was smaller at higher temperatures. Approximately two hour post-irradiation temperature excursions up to 300 K, resulted in a 25% restoration of the conductivity at 100 K. The mobility of the samples, irradiated at the maximum dose level showed a 3 to 6 fold increase, while the majority carrier concentration decreased by a factor of 7 to 10 times the pre-irradiation values. All samples irradiated with dose levels above 1 x 10 to the 15 power electrons/sq cm, converted from p to n-type at 295/K, but remained p-type at 77 K. It was hypothesized that radiation induced donor defect levels in the conduction band were responsible for the reported changes. Author (GRA)

N86-18613# Hughes Research Labs., Malibu, Calif.
NONLINEAR MATERIALS FOR THE MILLIMETER SPECTRAL REGION Final Report, 1 Feb. 1982 - 28 Feb. 1985
M. B. Klein, B. A. Wechsler, and D. Rytz Jul. 1985 64 p
(Contract N00014-82-C-0226)
(AD-A159834) Avail: NTIS HC A04/MF A01 CSCL 20/3

Nonlinear materials offer great promise for use in devices such as phase shifters, modulators, switches, and frequency multipliers at frequencies above 50 GHz. State-of-the-art phase shifters (using ferrites) and power sources are inefficient at high frequencies. By contrast, the efficiencies for electro-optic phase shifting and harmonic generation increase with frequency, and devices based on these effects offer high-speed, low-loss operation over a wide spectral range. Ferroelectrics are particularly promising for nonlinear and electro-optic applications at millimeter wavelengths, because their large linear polarizability leads to large electro-optic and nonlinear coefficients. The major challenge in developing ferroelectric materials for these applications is reduction of absorption losses. In this work we have evaluated and measured both intrinsic and extrinsic contributions in our samples, and have shown that the intrinsic factors dominate. Perovskites were identified as the most promising class of materials, including BaTiO3, PbTiO3, KNbO3, and KTa1-xNbxO3(KTN). The material we chose to investigate is BaTiO3, with a few mole percent SrTiO3 added to stabilize the high temperature cubic phase. The resulting material, Ba1-xSrxTiO3 or BST, has properties which differ only slightly from BaTiO3. GRA

N86-18614# Naval Postgraduate School, Monterey, Calif.
DIGITAL PHASE-LOCKED LOOP SPEED CONTROL FOR A BRUSHLESS dc mOTOR M.S. Thesis
M. G. Wise Jun. 1985 74 p
(AD-A159977) Avail: NTIS HC A04/MF A01 CSCL 10/2

Speed control of d.c. motors by phase-locked loops (PLL) is becoming increasingly popular. Primary interest has been in employing PLL for constant speed control. This thesis investigates the theory and techniques of digital PLL to speed control of a brushless d.c. motor with a variable speed of operation. Addition of logic controlled count enable/disable to a synchronous up/down counter, used as a phase-frequency detector, is shown to improve the performance of previously proposed PLL control schemes. GRA

N86-18615# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
RECONSTRUCTION OF MULTIDIMENSIONAL SIGNALS FROM ZERO CROSSINGS Ph.D. Thesis
S. R. Curtis Jun. 1985 95 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285)
(AD-A160062) Avail: NTIS HC A05/MF A01 CSCL 17/2

This thesis addresses the problem of reconstruction of multidimensional signals from zero crossing or threshold crossing information. The basic theoretical result shows that most two-dimensional, periodic, bandlimited signals are uniquely specified wtih zero crossings or with crossings of an arbitrary threshold. This result also applies to finite length signals and to situations where only a discrete set of zero crossing points are available. Additional results show that signals of higher dimensions and nonperiodic signals are also uniquely specified with zero crossings or threshold crossings. By applying the duality of the Fourier transform in a straight-forward way, it is also shown that finite-length signals are uniquely specified with zero crossings (or sign formation) in the Fourier domain under analogous sets of conditions. A problem distinct from that of uniquely specifying signals with zero crossings is that of developing specific algorithms for recovering signals from zero crossing information once it is known that the signals satisfy the appropriate constraints. Two algorithms for recovering signals from zero crossings or threshold crossings are presented and one is successfully used to recover example images from threshold crossings. The thesis concludes with suggestions for future research including possible applications of these results. GRA

N86-18616# California Univ., Santa Barbara. Inst. for Polymers and Organic Solids.
PHOTOGENERATION OF CONFINED SOLITON PAIRS (BI-POLARONS) IN POLYTHIOPHENE Technical Report
Z. Vardeny, E. Ehrenfreund, O. Brafman, M. Nowak, and H. Schaffer 1 Oct. 1985 19 p
(Contract N00014-85-K-0098)
(AD-A160157; IPOS-ONR-1) Avail: NTIS HC A02/MF A01 CSCL 20/8

From photoinduced absorption and light induced electron spin resonance, we demonstrate that the dominant photocarriers generated in polythiophene with excitation above the energy gap E sub g are charged bipolarons (spin zero). The observation of bipolarons B superscript 2 + or - rather than polarons P superscript + or - as the dominant photoexcitations demonstrates that the Coulomb contribution ot the bipolaron energy U sub B is sufficeitly small that P superscript + or + P superscrit + or - yields B superscript + or -2. From the analysis of the spectra, we find U sub B E sub g yields 0.12. approx. Author (GRA)

N86-18617# Texas Univ., Austin.
ON THE OPTIMALITY OF DATA PROCESSORS FOR SIGNAL DETECTION OVER A CLASS OF CONTAMINATED NOISES Interim Report, 1 Oct. 1980 - 30 Sep. 1985
D. R. Halverson and G. L. Wise 30 May 1985 7 p Presented at the 2nd Annual Conference, Communication, Control, and Computing, Monticello, Ill., 3-5 Oct. 1984
(Grant AF-AFOSR-0047-81)
(AD-A160213; AFOSR-85-0775TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

We consider the effect induced on the data processor of a signal detection system when the underlying noise distribution functions are varied about their nominal values. We first consider the detection of a time varying deterministic signal in additive noise, and then extend our results to a more general situation in which the signal possesses a random amplitude. Our results characterize a class of contaminants of an arbitrary nominal

distribution over which the data processor can be designed using the nominal distribution, and it is seen, for example, that such a class can contain distribution functions which can differ greatly from the nominal distribution. GRA

N86-18618# Xerox Webster Research Center, N.Y.
CHEMICAL BONDING, INTERDIFFUSION AND ELECTRONIC STRUCTURE AT InP, GaAs, AND SI-METAL INTERFACES Summary Report, 1 Oct. 1984 - 30 Sep. 1985
L. J. Brillson 1 Oct. 1985 266 p
(Contract N00014-80-C-0778)
(AD-A160403) Avail: NTIS HC A12/MF A01 CSCL 20/12

An experimental program investigates the interface electronic states and band structure at Germanium Arsenides, Indium Phosphides and Silicon-metal interfaces formed by chemical reaction and interdiffusion at room temperature, elevated temperatures, as well as following pulsed-laser annealing; uses soft X-ray photoemission spectroscopy (SXPS) and Auger electron spectroscopy (AES)/depth profiling to characterize atomic redistribution and new chemical bonding near the surfaces and interfaces on an atomic scale; refines the technique of cathodoluminescence spectroscopy (CLS) for investigations of new compound and defect formation at buried metal-semiconductor interfaces; and employs temperature-dependent current-voltage and capacitance-voltage measurements to characterize the electronic properties and spatial distribution of interface states of metal-InP interfaces prepared and processed under carefully controlled conditions. The work can be grouped into four areas: (1) chemical and electronic structure of buried III-V and II-VI compound semiconductor-metal interfaces, (2) localized chemical reactions at Aluminum interfaces with III-V compound semiconductors promoted by pulsed-laser annealing as well as laser-induced oxidation of Si, (3) eletrical characterization of the UHV-prepared Al-InP (110) interface, and (4) control of competitive Ti-Si and Ti-SiO2 interfacial reactions by rapid thermal annealing. GRA

N86-18619# Perkin-Elmer Corp., Danbury, Conn. Electro-optical Div.
MANUFACTURING METHODS AND TECHNOLOGY (MANTECH) PROGRAM: SUPPLEMENT. QUALIFICATION TESTING OF INFRARED DETECTORS Final Report, 28 Feb. - 31-Dec 1984
H. G. Sippach Dec. 1984 84 p
(Contract DAAK20-82-C-0878)
(AD-A160455; USAAVRADCOM-83-F-14-SUPPL) Avail: NTIS HC A05/MF A01 CSCL 17/5

The purpoe of the CLIN 0009 option to the main program was to fabricate optical filters and window assemblies and combine them with detectors fabricated during the pilot run to produce complete hermetically-sealed interdigitated Indium Arsenide detectors. GRA

N86-18620# Pennsylvania State Univ., University Park. Park Materials Research Lab.
PIEZOELECTRIC AND ELECTROSTRICTIVE MATERIALS FOR TRANSDUCER APPLICATIONS Annual Report, 1 Jan. - 31 Dec. 1984
L. E. Cross, R. E. Newnham, G. R. Barsch, and J. V. Biggers May 1985 327 p
(Contract N00014-82-K-0339)
(AD-A160465) Avail: NTIS HC A15/MF A01 CSCL 09/1

This report covers work accomplished on the second year of contract No. N00014-82-K0339 for the study of Piezoelectric and Electrostrictive Materials for Transducer Applications. The work accomplished covers a rather wide range of topics and for convenience, it is divided into four major sub-topics: (1) composite materials, (2) electrostriction, (3) conventional piezoelectrics, and (4) preparative studies. GRA

N86-18621# Massachusetts Inst. of Tech., Cambridge. Lab. for Electronics.
RLE (RESEARCH LABORATORY OF ELECTRONICS) PROGRESS REPORT NUMBER 127 Report, 1 Jan. - 31 Dec. 1984
J. Allen and R. Birgeneau Jan. 1985 276 p
(Contract DAAG29-83-K-0003)
(AD-A160477; PR-127) Avail: NTIS HC A13/MF A01 CSCL 09/5

This report, No. 127 in a series of Progress Reports issued by the Research Laboratory of Electronics, contains the customary annual statement of research objectives and summary of research for each group. The report covers the period Jan. 1 to Dec. 31, 1984, and the source of support is indicated for each project. The listing of personnel in the back of the book includes only members of the laboratory during 1984. GRA

N86-18622# California Univ., San Diego. Dept. of Electrical Engineering and Computer Sciences.
THE EFFECT OF BULK TRAPS ON THE INP (INDIUM PHOSPHIDE) ACCUMULATION TYPE MISFET (METAL-INSULATOR-SEMICONDUCTOR FIELD-EFFECT TRANSISTOR)
L. G. Meiners 1985 43 p
(Contract N00014-82-K-2032)
(AD-A160536) Avail: NTIS HC A03/MF A01 CSCL 20/12

The enclosed reports represent work performed at USCD on Contract N00014-82-K-2032 entitled Surface and Interfacial Properties of InP and provides a full account of the results obtained during the contract period: May 1, 1984 through April 31, 1985. The paper, Space charge-limited currents and trapping in semi-insulating InP, has now been published in Electron. Device Letters, volume EDL-6, page 356 (1985). The manuscript, Effect of bulk traps on the InP accumulation type MISFET, will be presented as an invited talk at the fall meeting in the Journal of the Electrochemical Society. Author (GRA)

N86-18623# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
FURTHER RESULTS FROM APPLICATION OF THE ISOBASIS DESIGN TECHNIQUE OF DISTURBANCE MINIMIZING CONTROL TO A LINEAR, TIME-INVARIANT SECOND-ORDER STATE SET-POINT REGULATOR WITH TIME-VARYING EXTERNAL DISTURBANCE
W. L. McCowan Dec. 1984 92 p
(AD-A160545; AD-E950760; AMSMI/RG-85-10-TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

Further results on the application of the isobasis design technique of disturbance minimization control to a linear, time-invariant state set-point regulator with time-varying external disturbance inputs are presented. A second-order plant is used as an example. The performance of a disturbance minimizing controller designed using the isobasis technique is presented and is compared to results obtained from a controller designed under the assumption that the external disturbance is constant and to results when no disturbance minimizing control is used. Examples of the utility of time-varying external disturbances are presented in the Appendix. Author (GRA)

N86-18624# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
MICROWAVE SEMICONDUCTOR RESEARCH - MATERIALS, DEVICES AND CIRCUITS Annual Technical Report, 1 May 1984 - 30 Apr. 1985
L. F. Eastman, D. W. Woodard, S. D. Mukherjee, G. W. Wicks, and J. M. Ballantyne Oct. 1985 38 p
(Contract F49620-84-C-0060)
(AD-A160581) Avail: NTIS HC A03/MF A01 CSCL 20/12

This program covers the growth and assessment of gallium arsenide and related compounds alloys for use in microwave, millimeter wave, and optical devices. It also covers the processing of the material into devices, the testing of the devices, and the theoretical modeling of carrier transport in these devices. Both molecular beam epitaxy (MBE) and organometallic vapor phase epitaxy (OMVPE) are used for growth. GRA

N86-18625# Maryland Univ., College Park. Dept. of Physics and Astronomy.
DEVELOPMENT OF ELECTRONIC CONTROL OF A SUPERCONDUCTING GRAVITY GRADIOMETER Final Technical Report,

20 Jun. 1984 - 20 Apr. 1985
H. J. Paik and J. P. Richard Sep. 1985 22 p
(Contract DACA72-84-C-0004)
(AD-A160641; ETL-0397) Avail: NTIS HC A02/MF A01 CSCL 09/5

This report discusses the development of a three-axis superconducting gravity gradiometer and a six-axis superconducting accelerometer for geological and navigational applications. GRA

N86-18626# Georgia Inst. of Tech., Atlanta.
MODELING CROSSTALK ON PRINTED CIRCUIT BOARDS Phase Report, Feb. - Dec. 1984
C. R. Paul and W. W. Everett, III Jul. 1985 172 p
(Contract F30602-81-C-0185)
(AD-A160657; RADC-TR-85-107) Avail: NTIS HC A08/MF A01 CSCL 20/14

The modeling of crosstalk on printed circuit boards is investigated. The emphasis is on simple models for use in CAD/CAM codes. Several simple models are developed. Their predictions are assessed for typical printed circuit board dimensions and interfering signals. The model predictions are compared to those of conventional lumped-circuit iterative models as well as experimental results. Also included are similar results for a ribbon cable. GRA

N86-18627# University of Southern California, Marina del Rey. Information Sciences Inst.
PROTOTYPING AND SMALL-VOLUME PARTS THROUGH MOSIS (MOS IMPLEMENTATION SYSTEM)
G. Lewicki Nov. 1985 11 p
(Contract MDA903-81-C-0335)
(AD-A160735; ISI/RS-85-160) Avail: NTIS HC A02/MF A01 CSCL 20/12

Since 1980, the Information Sciences Institute of the University of Southern California has been managing DARPA's MOS Implementation System (MOSIS) for their VLSI design research community. This paper describes the interrelated activities carried out by designers, MOSIS, and fabricators to generate custom integrated circuit parts. The various MOSIS-supported technologies are listed, and a plan for MOSIS to develop a quality assurance methodology is discussed. GRA

N86-18628# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ELECTROSTATIC UNBALANCES OF TRANSMISSION LINES M.S. Thesis
J. Nowikowski Aug. 1985 117 p
(AD-A160742; AFIT/CI/NR-85-102T) Avail: NTIS HC A06/MF A01 CSCL 10/2

The research done in this thesis is focused on the problem of reducing electrostatic unbalances that are inherent in transmission lines. The solution is threefold and will be presented in that fashion. First, the unbalance can be modified by varying the conductor size. Secondly, an unbalance can be reduced by adding ground wires. Lastly, the unbalances can be changed by rearranging the phase sequence. Author (GRA)

N86-18629# Oregon Graduate Center for Study and Research, Beaverton.
TRANSIENT VELOCITY ASSESSMENT IN GALLIUM ARSENIDE, AND OF OTHER GaAs CHARACTERISTICS RELATED TO DEVICE FUNCTIONS Final Technical Report, Aug. 1984 - Aug. 1985
J. S. Blakemore and R. E. Kremer 22 Oct. 1985 107 p
(Contract MDA903-84-K-0374; ARPA Order 5020)
(AD-A160786; Rept-71-521-SA-2) Avail: NTIS HC A06/MF A01 CSCL 20/14

The final report for a 12-month program containing four tasks in two general areas of concern for GaAs device technology. Task 1 was to assemble and evaluate literature and other databases concerning high speed operation as assisted by velocity overshoot or ballistic transport; a bibliography of 232 items appears with this Report. Task 2 involved assessment of the probability of achieving ballistic or other maximized electron speed with various sub-micron geometry GaAs devices, and the report here emphasizes the higher probability of eventual success with vertically-oriented devices, especially HBTs. Task 3 involved literature and other database assessment for EL2 and other extrinsic properties of GaAs; it is noted here that, despite intense study by many, the atomic nature of EL2 is not determined, and that research on the high temperature defect chemistry of GaAs is desirable. Task 4 involved mapping measurements of EL2 and other properties of SI GaAs wafers, and the part of our work carried out in support of DARPA needs is described. GRA

N86-18630# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A COMPARATIVE EVALUATION OF THE RELIABILITY IMPROVEMENT IN LINE REPLACEABLE UNITS WARRANTED UNDER THE F-16 RELIABILITY IMPROVEMENT WARRANTY M.S. Thesis
S. J. Lemke Sep. 1985 98 p
(AD-A160830; AFIT/GLM/LSP/85S-44) Avail: NTIS HC A05/MF A01 CSCL 09/3

This thesis examined the effects a reliability improvement warranty (RIW) had on the actual operational reliability of the warranted avionics equipment. To accomplish this, the most comprehensive DOD application of RIW to date, the F-16 RIW, was investigated. This study was designed to answer the question of whether or not a warranted weapons system was significantly more reliable than it would have been without the warranty. Specifically, the observed mean flight hours between failures (MFHBFs) and the observed reliability growths of the warranted F-16 equipment were compared to those of functionally similar non-warranted F-15 equipment. Also, the reliability growth of the F-16 warranted equipment was compared to that of other non-warranted F-16 equipment. The AMSAA Reliability Growth Model was used as a basis for the reliability growth analyses. Comparable life cycle time periods for each aircraft were studied, using AFM 66-1 D056 failure and flight time data. The results of the investigation indicated that, in general, the observed MFHBFs of the F-16 warranted equipment were statistically greater than the MFHBFs of the equivalent F-15 equipment. The same could not be concluded for the reliability growths of the F-16 and equivalent F-15 equipment. However, the reliability growth of the warranted F-16 equipment was found to be statistically greater than the reliability growth of the non-warranted F-16 equipment. Author (GRA)

N86-18631# Lockheed Missiles and Space Co., Palo Alto, Calif.
REACTION PROFILES IN POROUS ELECTRODES Final Report
T. Katan and P. J. Carlen May 1985 80 p
(Contract DE-AC03-76SF-00098)
(DE85-016512; LBL-19727) Avail: NTIS HC A05/MF A01

An experimental program was conducted to ascertain causes of alkaline zinc electrode shape change and to determine the development of reaction profiles within the pores of porous zinc electrodes. Various analog electrochemical cells were operated to isolate and evaluate the individual processes occurring during charge and discharge. It was found that both edge effects and osmosis can be responsible for the shape change phenomenon. DOE

N86-18632# Department of Energy, Washington, D. C.
RECIRCULATING ELECTRIC AIR FILTER Patent Application
W. Bergman, inventor (to DOE) (Lawrence Livermore National Lab., Calif.) Filed 9 Jan. 1985 12 p
(Contract W-7405-eng-48)
(DE85-017751; US-Patent-Appl-SN-690022) Avail: NTIS HC A02/MF A01

An electric air filter cartridge has a cylindrical inner high voltage electrode, a layer of filter material, and an outer ground electrode formed of a plurality of segments moveably connected together. The outer electrode can be easily opened to remove or insert filter material. Air flows through the two electrodes and the filter material and is exhausted from the center of the inner electrode. DOE

N86-18633# Sandia National Labs., Albuquerque, N. Mex.
Ag/AgCl REFERENCE ELECTRODE IN THIONYL CHLORIDE ELECTROLYTES
F. M. Delnick and W. R. Cieslak Jul. 1985 15 p
(Contract DE-AC04-76DP-00789)
(DE85-016221; SAND-85-0014) Avail: NTIS HC A02/MF A01

Thionyl chloride is the active cathode and electrolyte solvent in Li/SOCl2 primary battery systems. To evaluate charge-transfer reactions in this solvent system, a reference electrode is required. This report describes the fabrication and characterization of Ag/AgCl microreference electrodes that can be used in SOCl2 battery electrolytes. DOE

N86-18634# Sandia National Labs., Albuquerque, N. Mex.
ELECTRO-THERMOMIGRATION AS AN ELECTRICAL OVER-STRESS FAILURE MECHANISM
D. G. Pierce 1985 6 p Presented at the 7th Annual Electrical Overstress/Electrostatic Discharge Symposium, Minneapolis, Minn., 10 Sep. 1985
(DE85-009839; SAND-85-0719C; CONF-850980-1) Avail: NTIS HC A02/MF A01

A critical review of electrothermomigration as an EOS/ESD failure mechanism is presented. The paper focuses on the physical basis of the failure mechanism, the strength of the driving forces, and the effects of pulse attributes such as polarity on electrothermomigration. Recommendations or experiments to better understand this phenomenon are given. DOE

N86-18635# Argonne National Lab., Ill.
MAGNETICALLY CONFINED KINETIC-ENERGY STORAGE RING: A NEW FUNDAMENTAL ENERGY-STORAGE CONCEPT
J. R. Hull and W. W. Schertz 1985 26 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-007982; CONF-850808-1) Avail: NTIS HC A03/MF A01

A new, fundamental type of energy storage device which has the potential for low cost diurnal storage of electrical energy is introduced. The magnetically confined kinetic energy storage ring (MCKESR) stores kinetic energy as mass circulated at high velocity around a circular loop. The constraining force necessary to keep the circulating mass (essentially a ring) from flying apart is provided by radial, inwardly directed forces exerted along the parameter of the loop by magnetic fields. The magnets and ring are contained in a tunnel, which may be buried in the ground. Levitational support against gravity is also provided by magnetic fields. Electrical energy insertion or extraction is similar to that for a synchronous motor/generator. Major advantages of the MCKESR concept are that large devices seem feasible and that costs are inversely related to size. The use of superconducting magnets should result in a very high energy recovery efficiency. DOE

N86-18636# California Univ., Berkeley. Lawrence Berkeley Lab.
DEGRADATION OF BETA" ALUMINA ELECTROLYTES Final Report
L. C. DeJonghe Jul. 1985 117 p
(Contract DE-AC03-76SF-00098)
(DE85-015300; EPRI-EM-4151) Avail: NTIS HC A06/MF A01; also available from Research Reports Center, Box 50490, Palo Alto, Calif. 94303

Increasing electrolyte reliability during cell operation is a major challenge facing developers of beta batteries. Laboratory experiments have shown that subcritical crack growth in beta 2 alumina electrolytes decreases cell durability. However, adding zirconia to beta 2 alumina increases its toughness and eliminates exaggerated grain growth that may lead to early cell failures. DOE

N86-18637# Sandia National Labs., Albuquerque, N. Mex.
NEW MULTIPLE SHEET RESISTANCE TECHNOLOGY FOR THIN FILM CIRCUITS
D. Norwood 1985 6 p Presented at the International Symposium on Microelectronics, Anaheim, Calif., 11 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE85-016459; SAND-85-0458C; CONF-851175-1) Avail: NTIS HC A02/MF A01

A process has been developed to obtain thin film circuits having multiple sheet resistances for resistors. With additional levels of photoprocessing, the conductor underlayers of titanium and palladium can be processed into resistors having sheet resistivities of 1 and 10 ohms per square. This technology does not require changes to the standard metallization processes and conventional tantalum-nitride (Ta2N) resistor processing remains the same. The titanium-palladium resistors evaluated in this study are stable, well-behaved resistors having a large power dissipation capability; they can be laser trimmed to close tolerances. However, the higher Temperature Coefficient of Resistance (TRC) does limit their use in some circuit applications. DOE

N86-18638*# International Fuel Cells Corp., South Windsor, Conn.
PHOSPHORIC ACID ELECTRIC UTILITY FUEL CELL TECHNOLOGY DEVELOPMENT Monthly Technical Progress Report, Jun. 1985
R. D. Breault, T. A. Briggs, J. V. Congdon, R. L. Gelting, G. J. Goller, W. L. Luoma, M. W. McCloskey, A. P. Mientek, J. J. OBrien, and S. A. Randall 1985 22 p Sponsored in part by NASA. Lewis Research Center
(Contract DE-AC21-83FE-60338)
(NASA-CR-176496; NAS 1.26:176496; DE85-017819; DOE/FE-60338/T7; FCR-7333P; MTPR-26) Avail: NTIS HC A02/MF A01 CSCL 09C

Improved cross pressure tolerance has been demonstrated for electrodes containing impregnated seals. Electrodes, cooler assemblies, separator plates and reactant manifolds for the third 10-ft(2) short stack were completed. Assembly of the third 10-ft(2) short stack was initiated. DOE

N86-18639# California Univ., Berkeley. Lawrence Berkeley Lab.
INVESTIGATION OF Re-X GLASS CERAMIC FOR ACCELERATION INSULATING COLUMNS
A. Faltens and S. Rosenblum May 1985 5 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Prepared in cooperation with Varian Associates, Inc., Palo Alto, CA.
(Contract DE-AC03-76SF-00098)
(DE86-000598; LBL-19526; CONF-850504-285) Avail: NTIS HC A02/MF A01

In an induction linac the accelerating voltage appears along a voltage-graded vacuum insulator column which is a performance limiting and major cost component. Re-X glass ceramic insulators have the long-sought properties of allowing cast-in gradient electrodes, good breakdown characteristics, and compatibility with high vacuum systems. Re-X is a glass ceramic developed by General Electric for use in the manufacture of electrical apparatus, such as vacuum arc interrupters. We have examined vacuum outgassing behavior and voltage breakdown in vacuum and find excellent performance. The housings are in the shape of tubes with type 430 stainless steel terminations. Due to a matched coefficient of thermal expansion between metal and insulator, no vacuum leaks have resulted from any welding operation. The components should be relatively inexpensive to manufacture in large sizes and appear to be a very attractive accelerator column. We are planning to use a standard GE housing in our MBE-4 induction linac. DOE

N86-18640# California Univ., Berkeley. Lawrence Berkeley Lab.
MAGNET CABLE MANUFACTURING
J. Royet Jul. 1985 19 p Presented at the Cable Fabrication Workshop, Berkeley, Calif., 27 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000607; LBL-20129; CONF-8508132-1) Avail: NTIS HC A02/MF A01

The superconducting magnets used in the construction of particle accelerators are mostly built from flat, multistrand cables with rectangular or keystoned cross sections. The superconducting strands are mostly circular but a design of a cable made of preflattened wires was proposed a few years ago under the name

of Berkeley flat; such cable shows some interesting characteristics. Another design consists of a few smaller precabled wires (e.g., 6 around 1). This configuration allows smaller filaments and a better transposition of the current elements. The Superconducting Super Collider project involves the largest amount of superconducting cable ever envisaged for a single machine. Furthermore, the design calls for exceptional accuracy and improved characteristics of the cable. A part of the SSC research and development program is focused on these important questions. In this paper we emphasize the difference between the conventional cabling and wires with superconducting. A new concept for the tooling will be introduced as well as the necessary characteristics of a specialized cabler. DOE

N86-18641# Sandia National Labs., Albuquerque, N. Mex.
GaP/Al/SUB x/Ga/SUB 1-x/P HETEROJUNCTION SEMICONDUCTOR CONTROLLED RECTIFIER FOR HIGH-TEMPERATURE ELECTRONIC APPLICATIONS
T. E. Zipperian and L. R. Dawson 1985 19 p Presented at the 12. International Symposium on Gallium Arsenide and Related Compounds, Karuizawa, Japan, 23 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000204; SAND-85-1067C; CONF-8509164-2) Avail: NTIS HC A02/MF A01

Useful, three-terminal, solid-state switching action over the temperature range from 23 to 550(0)C has been demonstrated for mesa-isolated, liquid-phase epitaxial, n(+)n(+)pn(-)p(+), GaP/Al sub 0.35/Ga sub 0.65/P/GaP/GaP/Gap, heterojunction, semiconductor controlled rectifier (HSCR) structures. This is the highest temperature at which solid-sate p-n-p-n switching action has ever been demonstrated in any material system. Some bistable switching was observed to temperature as high as 580(0)C. These results provide evidence that the GaP/AlGaP heterojunction system is an excellent technology for electronic components operated at high temperature. DOE

N86-18642# Lawrence Livermore National Lab., Calif.
PHENOMENOLOGY OF ELECTROMAGNETIC COUPLING, PART 2
R. J. King, A. P. Ludwigsen, and K. S. Kunz Aug. 1985 91 p
(Contract W-7405-eng-48)
(DE86-000838; UCID-20215-Pt-2) Avail: NTIS HC A05/MF A01

This report is the second of a planned series which summarize efforts at Lawrence Livermore National Laboratory relating to phenomenology studies of back door coupling from several MHz to 10's of GHz. These studies are pertinent to high altitude EMP (HEMP), enhanced HEMP and microwave coupling. Part 1 dealt with coupling through apertures into large free-standing cavities having, at most, one interior cable. An overview of the effort is given, and a summary of the effects observed in Part 1. The main effort since Part 1 has been devoted to Facilities Development, development of an interior coupling decomposition model and coupling experiments. Projected future effort is discussed. DOE

N86-18643# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
SYMMETRIC FIN-LINES
Aake Bergquist Oct. 1985 37 p refs In SWEDISH; ENGLISH summary
(FOA-C-30408-E; ISSN-0347-3708) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

Symmetric fin-lines (of single side and double side design) were analyzed to deduce useful formulas for the most important parameters of these transmission lines. Results of attenuation measurements on fin-lines in the superhigh and extremely high frequency ranges are outlined. Limit wavelength, effective dielectric constant, characteristic impedance, losses in the metal walls, dielectric losses, attenuation factor, the maximum transferable effect, and bandwidth of the lines are discussed. Author (ESA)

N86-18644# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
OUT-OF-BAND RESPONSE OF REFLECTOR ANTENNAS
D. A. Hill Apr. 1985 76 p Sponsored in part by DNA, Washington, D.C.
(PB85-224476; NBSIR-85/3021) Avail: NTIS HC A05/MF A01 CSCL 09E

The response of reflector antennas to out-of-band frequencies has been analyzed using physical optics. A simple approximate expression has been obtained for the effective aperture, and the expression yields both the receiving pattern and the frequency dependence of the on-axis gain. The theory has been compared with published out-of-band measurements, and the pattern agreement is good, but the measured gain falls below the theory. The discrepancy is caused by mismatch loss has been analyzed theoretically. The basic physical optics model for symmetrical reflectors has been extended to include offset and dual reflectors, reflector surface roughness, and transient excitation. Author (GRA)

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-18645# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
COLLISION OF MACH REFLECTIONS WITH A 90 DEG RAMP IN AIR AND CO2
J.-C. Li and I. I. Glass Oct. 1985 90 p refs Sponsored in part by Natural Sciences and Research Council of Canada
(Contract DNA001-83-C-0266; Grant AF-AFOSR-82-0096)
(UTIAS-290; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

The collision of nonstationary oblique-shock-wave Mach-reflections with a perpendicular ramp on a 20 deg.-wedge was investigated interferometrically and numerically. Over 100 experiments were conducted in the UTIAS 10 cm x 18 cm Hypervelocity Shock Tube with three different ramp heights. Single-Mach reflection (SMR) in air, complex-Mach reflection (CMR) in air and double-Mach reflection (DMR) in carbon dioxide were studied at incident shock Mach numbers M sub s of 2.40, 3.94 and 5.77, respectively. After the collision of the Mach stem with the perpendicular ramp, very complex interactions occurred among shock waves, nonstationary rarefaction waves, quasi-steady expansion waves, contact surfaces and boundary layers. These interactions were studied using infinite-fringe interferometric-techniques. The isopycnics were evaluated and are presented and discussed for the various reflection processes. Based on the self-similarity of the shock-wave-diffraction process and the results of three-shock theory, a reasonable treatment of discontinuous surfaces is given and combined with the fluid-in-cell numerical-method to solve the flow fields for the single-Mach reflection case. A comparison of the numerical results with the experimental isopycnics shows fair agreement, especially near the leading edge of the wedge. DOE

N86-18646*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTS FOR THE DETERMINATION OF CONVECTIVE DIFFUSION HEAT/MASS TRANSFER TO BURNER RIG TEST TARGETS COMPARABLE IN SIZE TO JET STREAM DIAMETER
Gilbert J. Santoro and Sueleyman A. Goekoglu (Case Western Reserve Univ., Cleveland, Ohio) 1986 30 p refs Proposed for presentation at the 1986 Winter Annual Meeting of the American Society of Mechanical Engineers, Anaheim, Calif., 30 Nov. - 5 Dec. 1986
(NASA-TM-87196; E-2794; NAS 1.15:87196) Avail: NTIS HC A03/MF A01 CSCL 20D

The application of a recently formulated vapor transport theory to predict deposition rates of corrosive salts from alkali-seeded

combustion gases of a small-capacity, high-velocity, atmospheric-pressure burner rig was hampered by the relatively large dimensions of the cylindrical deposit collector compared to the diameter of the combustion gas stream. The relative dimensions lead to a highly nonadiabatic combustion gas flow around the collector and necessitate two series of experiments. In the first series, mass transfer coefficients are determined by utilizing the naphthalene sublimation technique. The second series of experiments determines the dilution effect on the sodium species concentrations due to the entrainment of ambient air. This second series involves the measurement of the temperature variation along the surface of the collector under steady state conditions. Vapor deposition rates are determined exploiting this information and the results are found to compare favorably with experimentally obtained rates. Author

N86-18647*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STUDY OF JOURNAL BEARING DYNAMICS USING 3-DIMENSIONAL MOTION PICTURE GRAPHICS
David E. Brewe and Donald J. Sosoka [Nov. 1985] 8 p Presented at the ASEE Engineering Design Graphics Division Midyear Meeting, West Lafayette, Ind., 24-26 Nov. 1985
(NASA-TM-87205; E-2862; NAS 1.15:87205; USAAVSCOM-TR-86-C-3) Avail: NTIS HC A02/MF A01 CSCL 20D

Computer generated motion pictures of three dimensional graphics are being used to analyze journal bearings under dynamically loaded conditions. The motion pictures simultaneously present the motion of the journal and the pressures predicted within the fluid film of the bearing as they evolve in time. The correct prediction of these fluid film pressures can be complicated by the development of cavitation within the fluid. The numerical model that is used predicts the formation of the cavitation bubble and its growth, downstream movement, and subsequent collapse. A complete physical picture is created in the motion picture as the journal traverses through the entire dynamic cycle. Author

N86-18648*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE CONTROL OF COMPRESSIBLE FLOWS ON A CURVED SURFACE Final Report
Lucio Maestrello, Paresh Parikh (Vigyan Research Associates, Inc., Hampton, Va.), Alvin Bayliss (Exxon Corporate Research Science Labs.), and Eli Turkel (Tel-Aviv Univ., Israel) Nov. 1985 29 p refs
(Contracts NAS1-17070; NAS1-18107; NAS1-17252)
(NASA-CR-178018; ICASE-85-52; NAS 1.26:178018) Avail: NTIS HC A02/MF A01 CSCL 20D

The effect of localized, time periodic surface heating and cooling over a curved surface is studied. This is a mechanism for the active control of unstable disturbances by phase cancellation and reinforcement. It is shown that the pressure gradient induced by the curvature significantly enhances the effectiveness of this form of active control. In particular, by appropriate choice of phase, active surface heating can completely stabilize and unstable wave. Author

N86-18649*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MATCHED ASYMPTOTIC EXPANSIONS TO SIMILARITY SOLUTIONS OF SHOCK DIFFRACTION Final Report
Eduard H. Rubetian Nov. 1985 33 p refs Submitted for publication
(Contract NAS1-17070; Grant NSF MCS-82-01599)
(NASA-CR-178022; ICASE-85-53; NAS 1.26:178022) Avail: NTIS HC A03/MF A01 CSCL 20D

Formal asymptotic expansions with differently scaled variables are matched to obtain a uniform approximation to the similarity solution of the shock-wedge diffraction problem. Author

N86-18650*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MARCHING ITERATIVE METHODS FOR THE PARABOLIZED AND THIN LAYER NAVIER-STOKES EQUATIONS
Moshe Israeli Dec. 1985 28 p refs
(Contract NAS1-17070)
(NASA-CR-178028; ICASE-85-60; NAS 1.26:178028) Avail: NTIS HC A03/MF A01 CSCL 20D

Downstream marching iterative schemes for the solution of the Parabolized or Thin Layer (PNS or TL) Navier-Stokes equations are described. Modifications of the primitive equation global relaxation sweep procedure result in efficient second-order marching schemes. These schemes take full account of the reduced order of the approximate equations as they behave like the SLOR for a single elliptic equation. The improved smoothing properties permit the introduction of Multi-Grid acceleration. The proposed algorithm is essentially Reynolds number independent and therefore can be applied to the solution of the subsonic Euler equations. The convergence rates are similar to those obtained by the Multi-Grid solution of a single elliptic equation; the storage is also comparable as only the pressure has to be stored on all levels. Extensions to three-dimensional and compressible subsonic flows are discussed. Numerical results are presented. Author

N86-18651*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADAPTING A NAVIER-STOKES CODE TO THE ICL-DAP Final Report
Chester E. Grosch Dec. 1985 42 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178034; ICASE-85-61; NAS 1.26:178034) Avail: NTIS HC A03/MF A01 CSCL 20D

The results of an experiment are reported, i.e., to adapt a Navier-Stokes code, originally developed on a serial computer, to concurrent processing on the CL Distributed Array Processor (DAP). The algorithm used in solving the Navier-Stokes equations is briefly described. The architecture of the DAP and DAP FORTRAN are also described. The modifications of the algorithm so as to fit the DAP are given and discussed. Finally, performance results are given and conclusions are drawn. Author

N86-18652# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
COMPUTATIONAL FLUID DYNAMICS, VOLUME 1
1985 329 p refs Presented at Lectures Series held in Rhode Saint Genese, Belgium, 25-29 Mar. 1985 2 Vol.
(VKI-LS 1985-04-Vol-1) Avail: NTIS HC A15/MF A01

Methods for the simulation of complex flows are reviewed. Finite element calculations of Newtonian and nonNewtonian flow; solutions of time dependent Navier-Stokes equations; and simulation using unstructured meshes are discussed. For individual titles, see N86-18653 through N86-18659.

N86-18653# Universite Catholique de Louvain (Belgium).
BASIC EQUATIONS OF FLUID MECHANICS
M. J. Crochet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 20 p (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

Navier Stokes and Boussineseq equations for steady state and transient conditions are discussed. The constitutive equations relative to isothermal and nonisothermal flow are developed. Classical boundary conditions, nondimensional parameters governing viscous flow, and the basic equations in plane and axisymetric flow are given. Author (ESA)

N86-18654# Universite Catholique de Louvain (Belgium).
INTRODUCTION TO FINITE ELEMENTS
M. J. Crochet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 45 p refs (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

The basic principles for one and two dimensional finite element problems are developed from variational principles. The method

of weighted residuals is examined and applied to the heat equation. The shape functions used in fluid mechanics problems are reviewed and numerical integration is discussed. Author (ESA)

N86-18655# Universite Catholique de Louvain (Belgium).
FINITE ELEMENT CALCULATION OF GENERALIZED NEWTONIAN FLOW
M. J. Crochet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 30 p refs (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

The application of the finite element method to the numerical solution of Navier-Stokes equations and of generalized newtonian flow is reviewed. The concept of weak form of the Navier-Stokes equations is developed. The choice of shape functions for triangular and quadrilateral elements is discussed. Author (ESA)

N86-18656# Universite Catholique de Louvain (Belgium).
FINITE ELEMENT METHODS FON NON-NEWTONIAN FLOWS
M. J. Crochet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 28 p refs (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

The viscoelastic flow problem is reviewed and the numerical techniques used in simulating nonnewtonian flow process are summarized. Differential and integral flow types are considered. The loss of convergence occurring at a certain value of the Weissenberg number is discussed. It is believed that finite element methods are not yet able to tackle the high Weissenberg number problem. Author (ESA)

N86-18657# Lawrence Livermore National Lab., Calif.
ADVECTION-DIFFUSION
P. M. Gresho *In* Von Karman Inst. of Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 60 p refs (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

The velocity is first assumed to be known, leaving for later the problem of computing the velocity field itself. A weak form to the equation and a formulation of the approximate solution are discussed. A matrix form of the algebraic equations is presented. A thermohydraulic example is given. Explicit and implicit methods used to solve the nonsteady case are considered including explicit Euler, lumped mass, intermediate approaches, and implicit methods for time integration. Examples in one and two dimensions are presented. Author (ESA)

N86-18658# Lawrence Livermore National Lab., Calif.
THE TIME-DEPENDENT INCOMPRESSIBLE NAVIER-STOKES EQUATIONS VIA FINITE ELEMENT METHOD (FEM)
P. M. Gresho *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 46 p refs (For primary document see N86-18652 09-34)
Avail: NTIS HC A15/MF A01

Solutions for the Navier-Stokes and Boussinesq equations for laminar flow are presented. The finite element approach is discussed and methods to solve the time-dependent case are described. A simulation performed with the given method compares favorably with other solutions, although the computational cost is high. Author (ESA)

N86-18659# Institut National de Recherche d'Informatique et d'Automatique, Valbonne (France).
STEADY EULER SIMULATIONS USING UNSTRUCTURED MESHES
A. Dervieux *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 1 1985 81 p refs (For primary document see N86-18652 09-34)
(Contract DRET-84-014)
Avail: NTIS HC A15/MF A01

Computational methods for unstructured meshes are discussed. A synthesis between finite element, finite difference and finite volume methods is attempted. Synthesis schemes including centered or upwind schemes, Lax-Wendroff or method of lines, and explicit or implicit schemes are considered. Accuracy and efficiency of the schemes are compared with test problems using coarse meshes and simplified geometry: a channel with circular bump and a NACA 0012 aircraft. The upwind first order accurate schemes presented are cost effective and the linearization for the construction of implicit schemes is straightforward. The second order upwind scheme does not need to tune any parameter to obtain the results. Author (ESA)

N86-18660# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
COMPUTATIONAL FLUID DYNAMICS, VOLUME 2
1985 314 p refs Presented at Lecture Series held in Rhode Saint Genese, Belgium, 25-29 Mar. 1985 2 Vol.
(VKI-LS-1985-04-Vol-2) Avail: NTIS HC A14/MF A01

Simulation of complex flows is reviewed. Compact finite difference methods for solving incompressible flow around oscillating bodies; theory of spectral methods; application of spectral methods to compressible and uncompressible fluid dynamics; and the concept of information in scientific computing are discussed. For individual titles, see N86-18661 through N86-18664.

N86-18661# Ecole Nationale Superieure de Mecanique, Nantes (France).
COMPACT FINITE DIFFERENCE METHODS FOR SOLVING INCOMPRESSIBLE NAVIER-STOKES EQUATIONS AROUND OSCILLATING BODIES
Y. Lecointe and J. Piquet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 2 1985 218 p refs (For primary document see N86-18660 09-34)
Avail: NTIS HC A14/MF A01

Unsteady two dimensional problems are solved from the Navier-Stokes equation written in the vorticity-stream function formulation to minimize the storage required. The numerical methods discussed include discretization algorithms for the vorticity equation, unfactorized forms, generation of boundary-fitted coordinates, mapping based on a Poisson equation, and conformal mapping. The numerical results examples include the impulsively started cylinder problem, the free vortex shedding problem, study of superimposed motion of a circular cylinder, impulsively started airfoil, and study of the motions of an airfoil. The symmetric patterns around impulsively started cylinders compare successfully with visualizations. Flow around an aircraft is discussed. To keep acceptable CPU times when simulating turbulent processes, the choice is between zero equation models like the Cebeci-Smith mixing length model, and two equation models like the k-epsilon model. Author (ESA)

N86-18662# Tel-Aviv Univ. (Israel).
THEORY OF SPECTRAL METHODS
David Gottlieb and E. Turkel *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 2 1985 36 p (For primary document see N86-18660 09-34)
Avail: NTIS HC A14/MF A01

The construction of spectral approximations to time dependent mixed initial boundary value problems is described. The Fourier methods include the Galerkin method and the pseudospectral method. The polynomial methods include a Galerkin method, a pseudospectral Chebyshev method, a pseudospectral Legendre method, and a Tau-Legendre method. A theory of the approximations of the solutions and its derivatives is presented. A stability analysis of pseudospectral schemes is included. Author (ESA)

N86-18663# Tel-Aviv Univ. (Israel).
APPLICATION OF SPECTRAL METHODS TO COMPRESSIBLE AND INCOMPRESSIBLE FLUID DYNAMICS
David Gottlieb *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 2 1985 20 p (For primary document see N86-18660 09-34)
Avail: NTIS HC A14/MF A01

The implementation of spectral methods in flow problems is discussed. Time-marching techniques for hyperbolic equations,

iteration techniques for elliptic problems, spectral multigrid methods, and shock waves are considered. Theoretical aspects of the application of spectral methods to incompressible flow problems are included. Implicit time differencing and implicit time splitting are discussed. It is shown that spectral methods are efficient tools to deal with turbulence problems. Author (ESA)

N86-18664# Tel-Aviv Univ. (Israel).
THE CONCEPT OF INFORMATION IN SCIENTIFIC COMPUTING
David Gottlieb, S. Abarbanel, and E. Tadmor *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Vol. 2 1985 37 p refs (For primary document see N86-18660 09-34)
Avail: NTIS HC A14/MF A01

The spectral approximation of discontinuous problems is discussed to show that when the solution is a complicated function the grid point value approximation is not acceptable, and to suggest different ways for the realization of the solution in such cases. The information contained and how to extract it is discussed for the case of a linear hyperbolic operator with variable coefficients and a discontinuous function. A smoothing procedure is outlined and its efficiency is demonstrated. A differential method for extracting information is described. It is shown that the use of digital filters to overcome the Gibbs phenomenon is applicable to this type of problem. Author (ESA)

N86-18665# California Univ., Berkeley. Lawrence Berkeley Lab.
MESH REFINEMENT ANALYSIS OF THE FLOW OF A MAXWELL FLUID THROUGH AN ABRUPT CONTRACTION
R. Keunings Apr. 1985 14 p refs Presented at the 4th International Conference on Numerical Methods in Laminar and Turbulent Flow, Swansea, England, 8 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE85-012230; LBL-19468; CONF-850745-9) Avail: NTIS HC A02/MF A01

We address the outstanding problem affecting the numerical simulation of viscoelastic flows, namely the existence of a critical value of the elastic parameter beyond which no discrete solution can be obtained. An extensive mesh refinement analysis conducted on a CRAY X-MP supercomputer indicates that limit points observed in the discrete solutions have a numerical origin. DOE

N86-18666# Naval Ship Research and Development Center, Bethesda, Md.
MEASURED SIMILARITY PROPERTIES OF EDDY VISCOSITY AND MIXING LENGTH IN THREE-DIMENSIONAL TURBULENT STERN FLOWS Final Report
T. T. Huang May 1985 35 p
(ZRO-2301)
(AD-A156644; DTNSRDC-85/038) Avail: NTIS HC A03/MF A01 CSCL 20/4

A comprehensive set of experimental turbulence data is presented for the stern region of simple three dimensional models having 1:1, 2:1, and 3:1 elliptic transverse cross sections. Direct measurements of Reynolds stresses, turbulence kinetic energy, and mean velocity profiles are made by X hot film anemometry. The values of eddy viscosity and mixing length are obtained from he measured Reynolds stresses and the mean velocity gradient. The experimentally determined distributions of eddy viscosity and mixing length in the thick stern boundary layers are found to be smaller than values which have been proposed for thin boundary layers. Because eddy viscosity and mixing length models play an important role in stern boundary layer calculations, a revised empirical mixing length model, which is assumed to be proportional to the square root of the effective turbulence area, is proposed. GRA

N86-18667# Hydrologic Engineering Center, Davis, Calif.
ROLE OF SMALL COMPUTERS IN TWO-DIMENSIONAL FLOW MODELING
D. M. Gee Oct. 1985 16 p Presented at the American Society of Civil Engineers Hydraulics Division Specialty Conference, Hydraulics and Hydrology in the Small Computer Age, 12-17 Aug. 1985, Orlando, Fla.
(AD-A159666; HEC-TP-106) Avail: NTIS HC A02/MF A01 CSCL 09/2

The computational aspects and computer usage history of numerical simulations of horizontal, free surface, steady or unsteady two-dimensional flow fields are described. The focus is on a particular numerical model (RMA-2) that has been in use and development at the Hydrologic Engineering Center (HEC) and elsewhere for the past decade. RMA-2 solves the complete Reynold's equations for turbulent flow in two dimensions using the finite element method. Terms describing bottom friction, surface wind, and Coriolis forces are included. Details of the governing equations and solution technique are thoroughly documented elsewhere. RMA-2 may be used as a driver for sediment transport and water quality simulations as well as for computing hydrodynamic information only. GRA

N86-18668# Pennsylvania State Univ., University Park. Applied Research Lab.
DYNAMIC CHARACTERISTICS OF THE 48-INCH WATER TUNNEL DRIVE PUMP
K. Ravindra 26 Aug. 1985 15 p
(Contract N00024-79-C-6043)
(AD-A159904; ARL/PSU/TM-85-149) Avail: NTIS HC A02/MF A01 CSCL 13/11

In this report, the dynamic characteristics of the 48-inch water tunnel drive pump are determined using the theory of unsteady flow around a two-dimensional cascade of airfoils developed by Ohashi (1). This analysis assumes that the axial surge velocity is uniform across the face of the impellar. It is found that the magnitude plot of the dynamic characteristics is similar to that of a simple control lag element whereas the phase plot looks quite different. The solidity of the rotor in the present analysis need not be large as assumed in previous investigations. GRA

N86-18669# Hydrologic Engineering Center, Davis, Calif.
ONE-DIMENSIONAL MODEL FOR MUD FLOWS
D. R. Schamber and R. C. MacArthur Oct. 1985 15 p
(AD-A159921; HEC-TP-109) Avail: NTIS HC A02/MF A01 CSCL 08/13

A transient, one-dimensional model for dynamic flood routing of mud flows is presented. The governing equations of mass and momentum conservation incorporate laminar flow resistance effects and utilize a power law expression to represent the cross-sectional geometry of the channel. The equations are solved by the method of characteristics on fixed time lines and program execution is performed on a micro-computer. Numerical results are compared with published experimental data for a laminar flow, dambreak problem of a viscous oil. Author (GRA)

N86-18670# Lawrence Livermore National Lab., Calif.
ADAPTIVE GRIDDING IN TWO DIMENSIONS FOR OPTIMAL ACCURACY AND EFFICIENCY Report, Mar. 1984 - Aug. 1985
E. J. Kansa 19 Aug. 1985 9 p
(Contract MIPR-ARO-124-84)
(AD-A159943; ARO-20585-1-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Very accurate one and two dimensional shock calculations were made using moving grids, mesh refinements, consistent derivative formation, and Riemann solvers for interaction shocks. All calculations were done explicitly with no artificial viscosity. Error free 2D shocks were propagated using a grid velocity found by a rotation into direction of the maximum gradient and subsequent translation on to a frame which appeared steady. Author (GRA)

N86-18671# Universal Energy Systems, Inc., Dayton, Ohio.
DOUBLE WALL ARTERY HEAT PIPE Final Report, Oct. 1981 - Sep. 1983
R. Ponnappan Jun. 1985 127 p
(Contract F33615-81-C-2058)
(AD-A160012; UES-727-TR-83-001; AFWAL-TR-85-2041) Avail: NTIS HC A07/MF A01 CSCL 13/1

The Universal Energy Systems, Inc., is conducting Advanced

Heat Pipe Concepts and Two Phase Flow Heat Transfer Research for the enhancement of the transport capacity of heat pipes for space systems. A new composite wick concept called the Double-Wall artery has been developed for which the design requirements and calculations are discussed here in detail. A proof-of-the-concept copper-water heat pipe prototype unit, 1.2 m long and 22.2 mm diameter (OD) was fabricated and tested successfully. A nominal axial transport capacity of 1600 W m and radial heat flux density of 16 W/sq cm were achieved. This device was simpler to fabricate and had superior performance compared to several other counter-current vapor/liquid flow wick demonstrated 25 W sq cm of radial heat flux with a temperature drop of less than 10 C. Results of steady state thermal performance tests under no tilt, favorable and adverse tilt and liquid overfill/underfill conditions are reported. Condenser cooling methods included bath and evaporative types. Further modifications and improvements are also discussed. GRA

N86-18672# Pennsylvania State Univ., University Park. Applied Research Lab.
THE ROLE OF EIGENSOLUTIONS IN NONLINEAR INVERSE CAVITY-FLOW-THEORY, REVISION
B. R. Parkin 10 Jun. 1985 67 p
(Contract N00024-79-C-6043)
(AD-A160424; ARL/PSU/TM-85-97) Avail: NTIS HC A04/MF A01 CSCL 20/4

The method of Levi Civita is applied to an isolated fully cavitating body at zero cavitation number and adapted to the solution of the inverse problem in which one prescribes the pressure distribution on the wetted surface and then calculates the shape. The novel feature of this work is the finding that the exact theory admits the existence of a point drag function or eigensolution. While this fact is of no particular importance in the classical direct problem, we already know from the linearized theory that the eigensolution plays an important role. In the present discussion, the basic properties of the exact point-drag solution are explored under the simplest of conditions. In this way, complications which arise from nonzero cavitation numbers, free surface effects, or cascade interactions are avoided. The effects of this simple eigensolution on hydrodynamic forces and cavity shape are discussed. Finally, we give a tentative example of how this eigensolution might be used in the design process. GRA

N86-18673# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
DEMONSTRATION OF A JACOBI POLYNOMIAL REPRESENTATION OF A KRONECKER DELTA FUNCTION
R. A. Farrell, E. P. Gray, and R. W. Hart Sep. 1985 15 p
(Contract N00024-85-C-5301)
(AD-A160460; JHU/APL/TG-1350) Avail: NTIS HC A02/MF A01 CSCL 12/1

A formula derived by Noble has been generalized to obtain an expansion of the Kronecker delta function as an infinite series involving the products of two Jacobi polynomials. For the inviscid, incompressible flow of rotating fluid shells confined between concentric, spherical, rigid, co-rotating boundaries one needs this proof. GRA

N86-18674# Hydrologic Engineering Center, Davis, Calif.
SUBDIVISION FROUDE NUMBER Technical Paper
D. H. Schoellhamer, J. C. Peters, and B. E. Larock Oct. 1985 16 p
(AD-A160486; HEC-TP-110) Avail: NTIS HC A02/MF A01 CSCL 08/8

A Froude number that is applicable to subdivisions of a cross section is developed assuming one-dimensional flow. The subdivision Froude number is shown to be an accurate index of the flow regime in subdivisions of a cross section. An imaginary Froude number in a flood plain indicates that the velocity is increasing with depth and that a one-dimensional flow assumption may be invalid. Mixed flow regimes at a cross section which invalidate assumptions associated with the standard step method can be recognized with the subdivision Froude number. A total of 193 cross section-discharge combinations were tested with a modified version of HEC2; 11 had a mixed flow regime and 36 had at least 1 imaginary Froude number. Author (GRA)

N86-18675# Ben Gurion Univ. of the Negev, Beersheva (Israel).
THE EFFECT OF SURFACE CONDITIONS ON THE MACH REFLECTION PHENOMENON Final Report, 1 Mar. - 31 Aug. 1985
G. Ben-Dor Sep. 1985 73 p
(Contract DAJA45-83-C-0046; DA Proj. 1L1-61102-BH-57)
(AD-A160535) Avail: NTIS HC A04/MF A01 CSCL 20/4

The aim of the present study was to study both experimentally and analytically the effect of the surface conditions on the shock reflection phenomenon. In general, the study was divided into two parts: (1) the reflection of a planar shock wave over rough surfaces, and (2) the reflection of a planar shock wave over a liquid surface. GRA

N86-18676# Sandia National Labs., Albuquerque, N. Mex. Fluid and Thermal Sciences Dept.
STAGNATION-POINT HEAT TRANSFER FROM JET FLAMES
J. E. Shepherd 1985 18 p Presented at the 1985 ASME/AIChe Heat Transfer Conference, Denver, Colo., 4-7 Aug. 1985 Submitted for publication
(Contract DE-AC04-76DP-00789)
(TI85-011376; SAND-85-2258C) Avail: NTIS HC A02/MF A01

We have experimentally measured the stagnation-point heat transfer rate from hydrogen diffusion flames to a cool (340 K) gauge in adiabatic ceiling. The hydrogen source was an axisymmetric jet and could be diluted with either nitrogen or steam. The total heat flux on the centerline was measured with a Gardon gauge as a function of ceiling height about the source. Height was varied from 10 to 100 source diameters for jets initially 6.4 mm in diameter. The heat transfer rate was studied as a function of diluent type and amount of diluent in the jet. DOE

N86-18677# Spectra Technology, Inc., Bellevue, Wash.
DEVELOPMENT OF HIGH EFFECTIVENESS DROPLET HEAT EXCHANGERS Final Report
W. J. Thayer, III, K. M. Sekins, and A. P. Bruckner 15 Apr. 1985 274 p
(Contract DE-AC06-81ER-10918)
(DE85-013352; DOE/ER-10918/1) Avail: NTIS HC A12/MF A01

An experimental and analytical investigation has been carried out to assess the feasibility of developing high effectiveness, high temperature droplet heat exchangers and to identify practical applications for this type of direct contact heat exchanger. The droplet heat exchanger (DHX) concept studies uses a counterflowing gas and droplet configuration, uniformly sized droplets or particles, and a uniform dispersion of droplets in gas to achieve high heat exchanger effectiveness. Direct contact between the heat transfer media eliminates the solid heat transfer surfaces that are used in conventional heat exchangers and is expected to make very high temperature heat transfer practical. Low temperature simulation tests and analysis have been used to demonstrate that uniformly sized droplets can be generated over a wide range of fluid properties and operating conditions appropriate for high temperature droplet heat exchanger applications. One- and two-dimensional, two-phase flow and heat transfer computer models have been developed and used to characterize both individual component configurations and overall DHX heat transfer rates and effectiveness. The computer model and test data began to diverge as the operating pressure was increased, indicating a need for more general transport rate correlations and a better understanding of the two-phase flows that govern DHX operation. DOE

N86-18678# Sandia National Labs., Albuquerque, N. Mex.
LASER INTERFEROMETER MEASUREMENTS OF REFRACTIVE INDEX IN SHOCK-COMPRESSED MATERIALS
J. L. Wise and L. C. Chhabildas 1985 15 p Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985

(Contract DE-AC04-76DP-00789)
(DE85-015505; SAND-85-0310C; CONF-850736-43) Avail: NTIS HC A02/MF A01

Laser interferometer systems provide a means for probing the refractive index of transparent specimens subjected to dynamic compression. Previous interferometer measurements of optical properties under shock loading are reviewed for polymethyl methacrylate, fused silica, sapphire, nitromethane, and an aqueous solution of zinc chloride; various degrees of departure from Gladstone-Dale behavior are noted for these materials. In addition, a detailed summary of recent optical studies of lithium fluoride (LiF) is provided. Interferometer data from plate-impact experiments verify sustained LiF transparency for Hugoniot stresses to at least 115 GPa, and establish the variation of LiF refractive index for shock amplitudes ranging from 1.58 to 115 GPa. The refractive-index data for LiF agree with earlier static and shock-wave data, and exhibit a pronounced deviation from predictions based on the Gladstone-Dale, Lorentz-Lorenz, and Drude relations. A modified form of the Gladstone-Dale relation is presented which correctly models the latest LiF measurements. Potential applications of LiF and other window materials to dynamic high-pressure experimentation are discussed. DOE

N86-18679# Pittsburgh Univ., Pa. Dept. of Physics and Astronomy.
FINGERING PATTERNS IN HELE-SHAW FLOW
J. V. Maher 1985 6 p Presented at the Workshop on the Physics of Finely-Divided Matter, Les Houches, France, 1 Mar. 1985
(Contract DE-FG02-84ER-45131)
(DE85-014952; CONF-8503178-1) Avail: NTIS HC A02/MF A01

The formation of fingers through the Saffman-Taylor instability in Hele-Shaw flow presents one of the simplest of pattern formation problems. The flow is governed by the Poisson equation and thus should have a close formal connection through its similarity to the random walk problem to diffusion limited aggregation (DLA). This poses the fascinating simulation problem of how much and which physical properties must be added to the essentially fractal DLA problem to mock up the interfacial conditions which produce the smooth fingering patterns seen in the Saffman-Taylor flow. The experimental work presented in this paper exploits the well-established critical properties of binary mixtures to vary the crucial viscosity contrast parameter more precisely and over a greater range than ever before. In addition the temporal development of the nonlinear pattern is determined more accurately than in most earlier work. DOE

N86-18680# Brookhaven National Lab., Upton, N. Y.
THERMAL CONDUCTANCE OF METALLIC INTERFACE IN VACUUM
P. Mortazavi and D. Shu 1985 2 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Previously announced in IAA as A86-10767
(Contract DE-AC02-76CH-00016)
(DE85-017860; BNL-36759; CONF-850504-261) Avail: NTIS HC A02/MF A01

A review of the background, method of measurement, and results of thermal conductance of metallic interface in vacuum is presented. Accurate conductance measurements are required for materials used in intercepting and stopping intense radiation beams. Measurement results of thermal conductance as a function of contact pressure for copper, beryllium copper and a combination of the two with platinum/indium pieces inserted between the interface are given. It is found that the conductance rate depends considerably on the surface condition, the material properties, and the uniform contact pressure. It is also found that the conductance rate of beryllium copper, which increased by 30 percent with the insertion of a platinum pinhole piece, increases with an increase in contact pressure, but the rate is smaller when compared with copper alone due to a lower thermal conductivity and also a greater hardness of beryllium copper. As the hardness of the insertion piece decreases, the conductance increases considerably. F.J.

N86-18681# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Transport Theory and Mathematical Physics.
TRANSPORT THEORY AND FLUID DYNAMICS Progress Report, 1 Dec. 1984 - 30 Nov. 1985
W. Greenberg and P. F. Zweifel 1985 16 p
(Contract DE-AS05-80ER-10711)
(DE85-018042; DOE/ER-10711/5) Avail: NTIS HC A02/MF A01

We report progress in various areas of applied mathematics relevant to transport theory under the subjects: abstract transport theory, explicit transport models and computation, and fluid dynamics. We present a brief review of progress during the past year and personnel supported, and we indicate the direction of our future research. DOE

N86-18682# Connecticut Univ., Storrs.
RADIATIVE HEAT TRANSFER UNDER TRANSIENT CONDITIONS
P. G. Klemens Oct. 1985 32 p
(Contract DE-AC05-84OR-21400)
(DE86-001240; ORNL/Sub-84-89634/1) Avail: NTIS HC A03/MF A01

A theoretical model for transient radiative heat transfer through low-density fibrous or particulate insulation is discussed. Calculations are reported for the ratio of scattered to total radiation when one boundary of a region at constant temperature undergoes an instantaneous temperature increase. The scattered radiation does not transfer energy to the insulation and exceeds 10% of the total radiation for fiber diameters of less than about 4 (MU)m at low density. Calculations for spherical particles at low density also show scattered radiation exceeding 10% of total radiation for diameters less than about 7 (MU)m. The scattered fraction of initial radiative transfer is negligible in both cases for fractional densities greater than 0.03. DOE

N86-18683# National Bureau of Standards, Gaithersburg, Md.
WORKSHOP ON FUNDAMENTAL RESEARCH ISSUES IN ORIFICE METERING
G. E. Mattingly, E. A. Spencer, and M. Klein Sep. 1984 176 p Workshop held in Gaithersburg, Md., 9-10 Jun. 1983 Sponsored in part by the National Engineering Lab., East Kilbride, Scotland and NSF, Washington, D.C.
(Contract GRI-5083-260-0838)
(PB85-226280; GRI-84/0190) Avail: NTIS HC A09/MF A01 CSCL 14B

An international workshop on orifice metering research is reported. This workshop, sponsored jointly by the Gas Research Institute, the National Engineering Laboratory in the United Kingdom, and the National Bureau of Standards (NBS) with assistance from the National Science Foundation, convened 100 attendees from 10 countries at NBS-Gaithersburg, MD on June 9 to 10, 1983. Attendees represented a broad range of interests and fluid measurements capabilities from theoretical and computational-numerical modelers and experimental fluid dynamicists to meter manufacturers and orifice users. Attendees listed problem areas in orifice metering practice, discussed research projects to respond to these, and prioritized these efforts according to their perceived potential to improve orifice metering. An extensive bibliography is included. GRA

N86-18684# Thermo Electron Corp., Waltham, Mass.
OPEN-CYCLE VAPOR COMPRESSION HEAT PUMP Final Report, Jan. 1979 - Jan. 1985
F. E. Becker and A. E. Ruggles Mar. 1985 78 p
(Contract GRI-5011-342-0094)
(PB85-222529; TE4224-41-85; GRI-85/0064) Avail: NTIS HC A05/MF A01 CSCL 13A

Large quantities of low-grade energy in the form of low-pressure steam and low-temperature heat are often discharged to the environment by industry. The practical and economical recovery of energy from these sources is often limited by the number of applications that can directly use low-temperature heat. Thermo Electron has developed an open-cycle steam heat pump system capable of the direct recovery and upgrading of low-grade waste

energy. The system compresses low-pressure waste steam (or steam made from sources of low-temperature waste heat) to produce high-pressure steam suitable for use in industrial processes. A prototype system has been developed that is capable of recovering and recompressing up to 10,000 lb/hr of waste steam, while using only 50 percent of the fuel that would be required to produce comparable steam in a boiler. Author (GRA)

N86-18635# Battelle Inst., Frankfurt am Main (West Germany).
MATERIALS SCIENCE RESEARCH IN ROCKETS, ESPECIALLY IN THE FIELDS OF FLUID PHYSICS AND OF METALLIC DISPERSIONS
D. Langbein *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 157-164 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-18685 Department of the Air Force, Washington, D.C.
X-RAY GONIOMETER Patent
H. W. Smith, inventor (to Air Force) Issued 6 Aug. 1985 4 p
Supersedes AD-D010042
(AD-D011927; US-Patent-4,534,050; US-Patent-Appl-SN-448162; US-Patent-Class-378-81) Avail: US Patent and Trademark Office
CSCL 14/2

An X-ray goniometer is provided which comprises, a pair of wooden endplates held in a parallel, adjustably spaced relationship by a plurality of connecting dowel rods, a rotatable support mounted to each endplate, each support being rotable about a common axis perpendicular to the endplates, for supporting each end of the specimen, and means to position the supports in any given angular orientation about the axis. Means may be included to adjust the spacing between endplates and between each support and the axis. Author (GRA)

N86-18686 Department of the Air Force, Washington, D.C.
HYBRID SCHOTTKY INFRARED FOCAL PLANE ARRAY Patent
C. E. Ludington, inventor (to Air Force) 20 Aug. 1985 5 p
Supersedes AD-D010086
(AD-D011934; US-Patent-4,536,658; US-Patent-Appl-SN-455715; US-Patent-Class-250-578) Avail: US Patent and Trademark Office CSCL 17/5

A two dimensional focal plane array of Schottky internal emission photodiodes which sense radiation in their metallic regions on a silicon substrate for infrared imaging. The array is designed for mating with multiplexing circuitry via hybrid bump bonding techniques. GRA

N86-18687 Department of the Air Force, Washington, D.C.
RANDOM TIMER Patent
F. A. Palvolgyi, inventor (to Air Force) Issued 13 Aug. 1985 7 p
Supersedes AD-D010533
(AD-D011937; US-Patent-4,535,466; US-Patent-Appl-SN-521803; US-Patent-Class-377-54) Avail: US Patent and Trademark Office
CSCL 14/2

The timer generates a selected number of control pulses per hour, at unpredictable (pseudo-random) intervals, for use with a time lapse video tape recorder user for time studies. The hour is divided into equal intervals to provide the number of samples required per hour, and one trigger pulse is generated randomly timed within each interval. A noise generator drives a counter whose outputs are loaded with every nth clock pulse into an N-stage shift register. The contents of the shift register are shifted out serially at the clock frequency. Author (GRA)

N86-18688 Department of the Navy, Washington, D. C.
ANALOG INCLINATION DATA SYSTEM Patent
L. E. Wolfe and R. K. Howard, inventors (to Navy) Issued 30 Jul. 1985 4 p
(AD-D011940; US-Patent-4,531,299; US-Patent-Appl-SN-592038; US-Patent-Class-33-366) Avail: US Patent and Trademark Office
CSCL 13/10

This invention relates to a means for taking roller path inclination data as part of a weapons alignment sequence. And more particularly to a servo-accelerometer sensor and signal conditioning circuitry capable of detecting very small angular displacements. In order for a ship at sea to launch weaponry with the desired accuracy, part of the weapons system alignment sequence requires taking roller path inclination data so that all elements of the system will be referenced to the same reference plane. Ships at sea, however, are subject to pitch and roll; which motions affect the angular position of the ship with respect to the true vertical. Since the alignment of the weapon systems is done at night which is the time that ship and temperature conditions are the most stable, the human error factor is large. Eye fatigue from marking a small bubble in a vial is a great cause of error. Also mental arithmetic suffers in the early morning hours, and many recording errors or calculations have caused reversed plots of data or wrong entries. Bubble devices are an acceptable means of taking roller path inclination data if the allowable element tolerance is within the accuracy of the bubble device. GRA

N86-18689# Air Force Packaging Evaluation Agency, Wright-Patterson AFB, Ohio. Materials Engineering Branch.
EVALUATION OF IRREVERSIBLE HUMIDITY INDICATOR Final Report, Oct. 1984 - May 1985
A. K. Lo 14 Aug. 1985 10 p
(AD-A159840; DSTZT-85-R-01) Avail: NTIS HC A02/MF A01
CSCL 04/2

The performance characteristics of Irreversible Humidity Indicators were evaluated in a constant temperature/humidity chamber at various combinations of temperature and humidity conditions. The test results revealed significant information on its actuation threshold value and the degree of influence on the threshold value of these data will provide useful guidelines to field personnel who use the indicators and will also be used to establish requirements in procurement specifications. The purpose of this study was to evaluate the subject indicator under different sets of humidity and temperature conditions to: (1) establish the threshold value at ambient conditions, (2) determine the effect of temperature and humidity on actuation time, and (3) develop indicator performance characteristics required to establish procurement specifications requirements. GRA

N86-18690# Air Force Academy, Colo.
THE 3He NUCLEAR GYROSCOPE Final Report, Nov. 1980 - Jul. 1985
G. L. Shaw Aug. 1985 66 p
(AF Proj. 2301)
(AD-A159924; FJSRL-TR-85-0003) Avail: NTIS
HC A04/MF A01 CSCL 17/7

The 3He nuclear gyroscope is a single species cryogenic device which can be instrumented as a three degree of freedom gyroscope. Sensitivities to dynamic terms can be molded, measured and compensated by generation of cross axis magnetic fields. The magnetic field generation scheme is the equivalent of putting the gyro on a stabilized platform but requires no moving parts. Such a gyroscope would be most useful integrated with other cryogenic instruments in a high accuracy all cryogenic inertial measurement unit. GRA

N86-18691# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
INDEPENDENT RESEARCH AND DEVELOPMENT: INFRARED

SENSOR TECHNOLOGY PROGRAM TEST PLAN
R. W. Bruns, J. H. Panesci, W. J. Tropf, and L. B. Weckesser
May 1985 37 p
(Contract N00024-85-C-5301)
(AD-A160061; JHU/APL/TG-1349) Avail: NTIS HC A037/MF A01 CSCL 17/3

The use of infrared (IR) guidance in high-performance, endoatmospheric missiles requires basic research and technology development to ensure survival adequate performance in the high-temperature environment of high-speed flight. This technology program combines development of both an analytical and an experimental capability to answer fundamental feasibility questions, to gather basic data, and to develop the capability to evaluate performance overall flight regimes. This test plan describes the experimental work to be conducted during 1985. Included are descriptions of the principal test facility, measurement instrumentation, and data recording used in the program. Aerothermal and optical performance measurements will be made on a test article (model) with an uncooled, hemispherical window. Mach 5 flow and heat-transfer rates representative of flight speeds from Mach 5 to Mach 6.5 and altitudes from 50,000 to 100,000 ft will be used. Test conditions, measurements and data reporting are described. GRA

N86-18692*# Maryland Univ., College Park. Center for Automation Research.
HYPOTHESIS INTEGRATION IN IMAGE UNDERSTANDING SYSTEMS Interim Report
V. S. S. Hwang, L. S. Davis, and T. Matsuyama Jun. 1985 103 p
(Contracts NAS9-16664; F49620-83-C-0082)
(NASA-CR-176510; NAS 1.26:176510; AD-A160129; CAR-TR-130; CS-TR-1513; AFOSR-85-0876TR) Avail: NTIS HC A06/MF A01 CSCL 14/5

The goal of this research is to develop a robust control strategy for constructing image understanding systems (IUS). This paper proposes a general framework based on the integration of related hypotheses. Hypotheses are regarded as predictions of the occurrences of objects in the image. Related hypotheses are clustered together. A composite hypothesis is computed for each cluster. The goal of the IUS is to verify the hypotheses. We constructed an image understanding system, SIGMA, based on this framework and demonstrated its performance on an aerial image of a suburban housing development. GRA

N86-18693# Cornell Univ., Ithaca, N.Y. Baker Lab.
EVALUATION OF ION MICROSCOPIC SPATIAL RESOLUTION AND IMAGE QUALITY Technical Report
M. T. Bernius, Y. C. Ling, and G. H. Morrison 16 Sep. 1985 4 p
(Contract N00014-80-C-0538)
(AD-A160155; TR-16) Avail: NTIS HC A02/MF A01 CSCL 14/2

This study of factors that influence image quality in the ion microscope will motivate modification of the existing configuration in order to improve the lateral resolution and the absolute sensitivity. The micro-test patterns provide an absolute scale of image evaluation and thus are used to characterize the imaging capabilities of the SIMS analyzer. The efforts anticipate the decreasing dimensions of the next generation of submicron structures. Author (GRA)

N86-18694# Texas Univ., Austin. Lab. for Image and Signal Analysis.
[PROGRAM OF RESEARCH IN COMPUTER VISION, IMAGE PROCESSING AND ARCHITECTURES FOR IMAGE PROCESSING] Final Report, 1 Dec. 1982 - 31 Jan. 1985
J. K. Aggarwal Jan. 1985 31 p
(Contract F49620-83-K-0013)
(AD-A160248; AFOSR-85-0824TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Laboratory for Image and Signal Analysis conducts a broad program of research in computer vision, image processing and architectures for image processing. During the period of this report, several projects were completed including those on positioning and tracking of objects moving in space, parallel image processing, 3-D representation and recognition from range data and a normalized quadtree representation. A new approach to the problem of tracking of objects in space is formulated which is significantly simpler and robust in solution. Previously available quadtree description of objects is modified to develop a new description called normalized quadtree representation. This representation is found to be compact as well as useful in the recognition of objects. A methodology for analysis of architectures for parallel image processing is proposed. Our research advocates an application-drive approach for using parallel architectures for image processing. GRA

N86-18695# Naval Research Lab., Washington, D. C.
AN OPTICAL WAVEGUIDE HUMIDITY DETECTOR Memorandum Report, Apr. - Oct. 1984
D. S. Ballantine and H. Wohltjen 31 Oct. 1985 28 p
(AD-A160577; NRL-MR-5666) Avail: NTIS HC A03/MF A01 CSCL 14/2

An optical waveguide humidity detector is described that is reliable and inexpensive. It utilizes a cobalt chloride/poly(vinyl pyrrolidone) film on the surface of a thin walled glass capillary waveguide, and monitors the absorption change at 660 nm as the waveguide is exposed to H2O(g). The humidity response is an S-shaped curve with the inflection point between 65% and 80% RH; location of inflection point is correlated with CoCl2 and PVP concentration in the film. The effects of reagent concentration and film thickness on detector response are described. GRA

N86-18696# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.
TRANSLATION, ROTATION, SCALE AND ASPECT INVARIANT MATCHED FILTER AND SCENE COMBINATION
D. A. Gregory and J. C. Kirsch Jun. 1985 24 p
(AD-A160623; AD-E950759; AMSMI/RR-85-2-TR) Avail: NTIS HC A02/MF A01 CSCL 05/8

An interesting pattern has been discovered, which when used as the input scene to a Vander Lugt type correlator, possesses almost complete invariance to the usual problems associated with pattern recognition. The scene may be translated, rotated, scaled, or tilted without total loss of the correlation signal. This, of course, is a specialized scene, but interesting applications for such a pattern do exist. Author (GRA)

N86-18697# Electronics Research Lab., Adelaide (Australia).
INFRARED DETECTOR RESEARCH METAL FILM BOLOMETER DETECTORS. PART 3: PREPARATION AND PERFORMANCE
K. C. Liddiard, J. Hlava, and P. D. Girdler Mar. 1985 64 p
(AD-A160768; AD-E401375; ERL-0333-TR-Pt-3) Avail: NTIS HC A04/MF A01 CSCL 14/2

This report describes the preparation and performance of metal film bolometer infrared detectors using a versatile fabrication technology for both single-element detectors and focal plane arrays. Detectors are prepared on conventional semiconductor-grade silicon substrates and extensive use is made of state-of-the-art microcircuit manufacture techniques. A detectivity of approx. 2 x 10 to the 8th power cm sq root of Hz. per watt and speed of response of < or = to 1 ms can be achieved, for detector element sizes as small as 50 micron. Recipients are warned that information contained in this document may be protected by patent rights. Author (GRA)

N86-18698# Aeronautical Research Labs., Melbourne (Australia).
PRELIMINARY STUDY OF HOLOGRAPHIC INTERFEROMETRY APPLIED TO CARBON FIBRE SPECIMENS
B. L. Lawrie Aug. 1985 13 p
(AD-A160770; AD-E401375; ARL/Struc-TM-419) Avail: NTIS HC A02/MF A01 CSCL 11/5

Holographic interferometry has been used to examine two carbon fiber compression specimens with known defects. Photographs of the reconstructed images of the specimens clearly indicate the location of the defects. GRA

N86-18699# California Univ., Irvine. Dept. of Mechanical Engineering.
AIRCRAFT MEASUREMENTS AND COORDINATION IN FASINEX Semiannual Progress Report
C. Friehe 10 Jul. 1985 6 p
(Contract N00014-85-K-0190)
(AD-A160789) Avail: NTIS HC A02/MF A01 CSCL 01/3

As of July 10, 1985, the following progress was made on the proposal work: (1) wind and turbulence measurements on NRL Navy RP3A aircraft, BUNO 149670: (a) Radome pressure transducers purchased and installed with radome tubing, and wiring, test flights were performed to determine if pressure signals are active, (b) data system for aircraft tested, borrowed from National Center for Atmospheric Research (NCAR), Boulder, Colorado and shipped to NRL and made operational in the laboratory; (c) various environmental sensors obtained from USN China Lake, CA, for the NRL RP3A: Barnes infrared meterological radiometers; parts of dew point system; (2) FASINEX Aircraft Coordination: (a) site visit made to NAS Bermuda, facilities will be provided for transient FASINEX aircraft by NAS Bermuda; (b) cooperative agreement for joint use of NCAR Electra research aircraft by GALE and FASINEX projects worked out; (c) attended GALE planning meeting as FASINEX representative. GRA

N86-18700# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
COMPARISON OF TWO MTF MEASUREMENT METHODS: SINE-WAVE VERSUS EDGE GRADIENT ANALYSIS M.S. Thesis
J. R. Cadou Jul. 1985 97 p
(AD-A160800; AFIT/CI/NR-85-136T) Avail: NTIS HC A05/MF A01 CSCL 14/5

A comparison of the sine-wave and edge gradient MTF (Modulation Transfer Functions) measurement methods, on a photographic black and white film, was performed. A statistical test, a CMT (Cascade Modulation Transfer) acutance test, and a graphical comparison showed that there was no significant difference between the two measurement methods. This was true for the film processed to have large adjacency effects, as well as for the film processed to have no adjacency effects; however, the agreement was slightly better for the latter process. The research also showed that aligning the midpoints of the edge traces, normalizing the individual edge traces, and then averaging several edge traces significantly reduced grain noise, and produced a superior representative edge for MTF analysis. A new adaptive damping filter also proved quite successful in the suppression of grain noise without degrading the MTF measurement. The combination of averaging several edge traces, and then using the adaptive filter, produced excellent MTF results from the edge traces. GRA

N86-18701# Air Force Weapons Lab., Kirtland AFB, N. Mex.
A DIGITAL MICROBAROGRAPH SYSTEM Final Report, Jul. 1983 - Oct. 1984
R. E. Reinke May 1985 54 p
(AF Proj. 8809)
(AD-A160914; AFWL-TR-84-142) Avail: NTIS HC A04/MF A01 CSCL 14/2

Off-site low pressure airblast measurements are required on almost every high-explosive simulation test. Existing analog equipment which has been used for many years to make these measurements possesses several drawbacks in terms of excessive weight and power requirements and relatively narrow dynamic range of the paper and ink strip chart recording method. By making minor modifications to off-the-shelf recorders and pressure transducers, a digital microbarograph system has been developed which exhibits significant advantages over existing analog equipment in terms of weight, power requirements and dynamic range. Field and laboratory testing of the digital system over the past year has proven it to be a reliable and versatile alternative to existing systems. GRA

N86-18702# Pacific Northwest Lab., Richland, Wash.
LOW-COST MICROPROCESSOR CONTROLLED SHADOWBAND RADIOMETER
J. J. Michalsky, B. A. LeBaron, and L. C. Harrison Jun. 1985 6 p Presented at INTERSOL 1985 - Solar Energy: the Diverse Solution, Montreal, Canada, 23 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-016614; PNL-SA-13094; CONF-850604-15) Avail: NTIS HC A02/MF A01

This paper describes the second phase in the development of a low-cost microprocessor-controlled rotating shadowband radiometer at PNL. The initial work, to develop a solar photometer, resulted in a mechanical design that is adopted for the solar radiometer with only minor changes. The goals of this effort are: (1) to improve the data acquisition system; and (2) to derive corrections for the silicon cell-based pyranometer that would allow measurements of total horizontal, diffuse horizontal, and direct normal solar radiation approaching first-class instrumentation accuracy at a fraction of the cost. Significant progress on temperature, cosine and spectral corrections is achieved. DOE

N86-18703# Illinois Univ., Urbana. Dept. of Physiology and Biophysics.
FLUORESCENCE SPECTROPHOTOMETERS Progress Report
H. Robinson 1985 48 p refs
(Contract DE-AC02-80ER-10701)
(DE85-010686; DOE/ER-10701/T2) Avail: NTIS HC A03/MF A01

This report describes the ongoing development of a portable field double-flash kinetic fluorescence spectrophotometer to be used in the analysis of photosynthetic electron transport processes and in reaction kinetics of photosystem 2. DOE

N86-18704# Pennsylvania State Univ., University Park.
TEST PLAN FOR HIGH TEMPERATURE/HIGH PRESSURE ACOUSTIC AGGLOMERATOR
12 Aug. 1985 16 p Prepared in cooperation with Aerojet Energy Conversion Co., Sacramento, Calif.
(Contract DE-AC21-84MC-20107)
(DE85-017221; DOE/MC-20107/T3; TR-4) Avail: NTIS HC A02/MF A01

This test plan describes the testing to be done on the high temperature, high pressure acoustic agglomerator (HTHP AA) at Penn State University's High Intensity Acoustic Laboratory on Department of Energy Contract No. DE-AC21-84MC20107. The test plan includes three phases of testing: (1) preliminary checkout of HTHP AA Facility without the Siren Sound Source; (2) Siren Sound Source Testing in HTHP AA Facility; and (3) high-temperature, high-pressure agglomeration testing. DOE

N86-18705# Brookhaven National Lab., Upton, N. Y.
DEVELOPMENTS IN GAS DETECTORS FOR SYNCHROTRON X-RAY RADIATION
J. Fischer, V. Radeka, and G. C. Smith Sep. 1985 22 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001207; BNL-37041; CONF-850734-11) Avail: NTIS HC A02/MF A01

New results on the physical limitations to position resolution in gas detectors for X-rays (approx. =3 to 20 keV) due to the range of photoelectrons and Auger electrons are discussed. These results were obtained with a small gap detector in which position readout was accomplished by using a very low noise centroid finding technique. A description is given of position sensitive detectors for medium rates (a few x 10(5) photons per second), using delay line readout, and for very high rates (approx. =10(8) photons per second), using fast signal shaping on the output of each anode wire. DOE

N86-18706# Commerce Dept., Washington, D.C.
HUMIDITY SENSING AND MEASUREMENT EMPLOYING HALOGENATED ORGANIC POLYMER MEMBRANES Patent Application
P. H. Huang, inventor (to Dept. of Commerce) Filed 5 Aug. 1986 26 p
(PB85-246866; US-Patent-Appl-SN-762740) Avail: NTIS

HC A03/MF A01 CSCL 14B

Thin films of hygroscopic, halogenated organic polymer having pendant groups of a relatively strong acidic type (e.g., sulfonic groups) and pendant groups of a relatively weak acidic type (e.g., carboxylic groups) are employed for humidity sensing by electronic, acoustics, and optical techniques. GRA

N86-18707# Commerce Dept., Washington, D.C.
ACOUSTIC SCINTILLATION LIQUID FLOW MEASUREMENT Patent Application
S. F. Clifford and D. M. Farmer, inventors (to Dept. of Commerce) Filed 2 Jul. 1985 29 p
(PB85-243608; US-Patent-Appl-SN-751118) Avail: NTIS HC A03/MF A01 CSCL 14B

This invention relates to fluid flow measurement, and, more particularly, relates to acoustic scintillation fluid flow measurement. A system and method are disclosed for acoustic scintillation liquid flow measurement. Measurement is carried out by acoustic beams transmitted perpendicular to the direction of the component of liquid flow to be measured. GRA

N86-18352# Mullard Space Science Lab., Dorking (England).
A RADAR ALTIMETER AND THE VALIDATION OF ITS DATA PRODUCTS OVER ICE SURFACES
N. F. McIntyre, R. J. Powell (Science Research Council, Chilton, England), and V. A. Squire (Scott Polar Research Inst., Cambridge, England) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 3-11 refs Sponsored by UK National Environment Council and UK Science and Engineering Research Council (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18354# Marconi Co. Ltd., Chelmsford (England).
THE DEVELOPMENT OF AUTOMATIC METHODS FOR HANDLING SAR IMAGES OVER LAND
S. Quegan, N. J. Veck, A. Wright, D. Cruse, and J. Skingley *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 23-29 refs Sponsored by ESA (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18359# Politecnico di Milano (Italy). Ist. di Topografia, Fotogrammetria e Geofisica.
OUTSTANDING RESULTS FROM ONE YEAR'S ACTIVITIES OF THE ESA METRIC CAMERA WORKING GROUP
G. Togliatti *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 57-61 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18360# Technische Univ., Hanover (West Germany). Inst. for Photogrammetry and Engineering Surveys.
AEROTRIANGULATION WITH SPACELAB METRIC CAMERA IMAGES
K. Jacobsen and H. Engel *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 63-67 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18361# Technische Univ., Hanover (West Germany). Inst. for Photogrammetry and Engineering Surveys.
LINE MAP PRODUCTION WITH METRIC CAMERA DATA
G. Konecny and W. Schuhr *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 69-73 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18362# Institut National de la Recherche Agronomique, Paris (France).
USE OF METRIC CAMERA FOR LANDSCAPE UNITS: DESCRIPTION AND MAPPING
Colette M. Girard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 75-78 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18363# Technische Univ., Munich (West Germany). Lehrstuhl fuer Geographie und Geographische Fernerkundung.
ANALYSIS OF THE METRIC CAMERA MC-BW FOR LAND USE CLASSIFICATION AND LAND USE HAZARD MANAGEMENT (THEMATIC MAPPING OF METRIC CAMERA SPACELAB BLACK AND WHITE PHOTOGRAPHS)
H. G. Gierloff-Emden *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 79-84 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18365# Technische Univ., Munich (West Germany). Inst. fuer Allgemeine und Angewandte Geodaesie.
RADIOMETRIC CORRECTION OF MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) CCD IMAGES
J. Henkel, K. Bothmann (MBB G.m.b.H., Munich, West Germany), and G. Suessenguth (MBB G.m.b.H., Munich, West Germany) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 91-92 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18369# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany).
AN OPTICAL MULTISENSOR COMBINING MID IR LASER SCANNER, AND NEAR IR MULTISPECTRAL SCANNER (LIMES)
F. Lehmann, C. Werner, and W. Wiesemann (Battelle Inst.) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 115-119 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18384# Centre National d'Etudes Spatiales, Toulouse (France).
GEOMETRIC RECTIFICATION AND PHOTOGRAMMETRIC RECONSTRUCTION OF SPOT IMAGES [RECTIFICATION GEOMETRIQUE ET RESTITUTION PHOTOGRAMMETRIQUE DES IMAGES SPOT]
H. Guichard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 229-233 In FRENCH (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18407# Geneva Observatory (Switzerland).
NEW GROUND-BASED PHOTOMETRIC OBSERVATIONS
M. Grenon *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 117-122 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18424# Observatoire de Haute Provence, Forcalquier (France).
RADIAL VELOCITIES FOR HIPPARCOS WITH THE FEHRENBACH OBJECTIVE PRISMS [VITESSES RADIALES POUR HIPPARCOS AVEC LES PRISMES-OBJECTIFS DE FEHRENBACH]
C. Fehrenbach, R. Burnage, and M. Duflot (Observatoire de Marseille) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985

p 213-216 refs In FRENCH (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18863# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
COMPOSITE MIRRORS AND STRUCTURES FOR BALLOON TELESCOPES
B. Abt and G. Helwig *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 329-334 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-18708 Department of the Air Force, Washington, D.C.
TRANSVERSE FLOW CW ATOMIC IODINE LASER SYSTEM Patent
L. A. Schlie and R. D. Rathge, inventors (to Air Force) Issued 13 Aug. 1985 8 p Supersedes AD-D011098
(AD-D011933; US-Patent-4,535,457; US-Patent-Appl-SN-593759; US-Patent-Class-372-58) Avail: US Patent and Trademark Office CSCL 20/5

A transverse flow continuous wave atomic iodine laser system uses a closed cycle fuel system to operate in a continuous mode. An elliptical pump cell having a Hg arc lamp cooled by deionized water irradiates with UV energy C3F7I gas to produce excited atomic iodine. A transverse flow section attached to the pump cell channels C3F7I gas into a laser cell where lasing occurs. The flow section has upstream and downstream flow cavities, triangular shaped, that channel the laser gas. A diffuser and flow straighteners are placed in these cavities to make velocity across the transverse laser axis as uniform as possible so as to produce very stable laser gain output. GRA

N86-18709 Department of the Navy, Washington, D. C.
ZINC-DIFFUSED NARROW STRIPE AlGaAs/GaAs DOUBLE HETEROSTRUCTURE LASER Patent
Y. Z. Liu, C. S. Hong, P. D. Dapkus, and J. J. Coleman, inventors (to Navy) Issued 14 May 1985 7 p Supersedes AD-D009990
(AD-D011943; US-Patent-4,517,674; US-Patent-Appl-SN-413596; US-Patent-Class-372-45) Avail: US Patent and Trademark Office CSCL 20/5

This document describes a zinc-diffused narrow stripe AlGaAs/GaAs double heterostructure laser device and a method of making the same. A double heterostructure layered structure including a p-type GaAs active layer sandwiched between two n-type AlGaAs confinement layers is formed on a substrate. A p-type zinc diffused stripe region having a U-shaped diffusion front extends longitudinally between two reflective surfaces located on respective ends of the device and extends vertically from the surface of the upper confinement layer down to at least the surface of intersection between the active layer and the lower confinement layer. In a method of forming the device, the various layers are formed by epitaxial growth or by metalorganic chemical vapor deposition. The stripe region is formed by diffusing zinc from a source through a slot in a diffusion mask. The zinc diffused into the device is driven in by heating the device in the absence of the zinc source. Author (GRA)

N86-18710# Naval Postgraduate School, Monterey, Calif.
LASER DAMAGE TO SPHERICAL TARGETS M.S. Thesis
C. O. Stephenson Jun. 1985 62 p
(AD-A159717) Avail: NTIS HC A04/MF A01 CSCL 20/5

Previous research has investigated laser beam interaction with flat surfaces. Those studies have generated theoretical foundations for cratering, plasma formation and expansion, and electric and magnetic field dynamics. This thesis applies previously developed theory to understanding damage to spherical targets of 1 millimeter diameter and smaller. The targets analyzed were irradiated on one side with 300 picosecond iodine laser pulses (6 X 10 to the 15th power w/sq cm. Direct laser beam damage and surface damage to areas remote from the focal spot were analyzed. Time-resolved pinhole photography, X-ray spectroscopy, and electron microscope photography were used to determine sequence, mode and severity of damage. Finally, a model for the creation and spread of the laser-produced plasma around the sphere is formulated, taking into account plasma pressure gradients, magnetic fields and hot-electron transport. GRA

N86-18711# Rochester Univ., N. Y. Dept. of Electrical Engineering.
HIGH VOLTAGE PICOSECOND PULSE GENERATION UTILIZING LASERS Final Report
R. Heintz, F. I. Tseng, and T. K. Sarkar 23 Jul. 1985 14 p
(Contract N00014-84-C-0179)
(AD-A159923) Avail: NTIS HC A02/MF A01 CSCL 20/5

A mod-locked Q-switched Nd:YAG laser is used to generate a train of light pulses of approximately 70 picoseconds duration. The energy in these laser pulses are of the order of 2 milli-joules. The train of pulses are then passed through a switchout so that a single pulse is selected. This single pulse then strikes a chromium doped GaAs semiconductor switch which then conducts. If a high voltage supply is connected to one end of the switch and a load is connected to the other end, then the load will observe an electrical pulse which is half the amplitude of the d.c. voltage and of the order of 100 to 200 picosecond duration. The width of the electrical pulse is determined by the width of the laser pulse and of the characteristics of the transmission line over which the GaAs is mounted. Author (GRA)

N86-18712# Naval Postgraduate School, Monterey, Calif.
MOLECULAR BACK FLOW FROM THE EXHAUST PLUME OF A SPACE-BASED LASER M.S. Thesis
S. E. McCarty Jun. 1985 55 p
(DARPA Order 4573)
(AD-A159998; AD-E401386; NPS67-85-003) Avail: NTIS HC A04/MF A01 CSCL 20/5

Back flow from the exhaust of a chemical laser in low Earth orbit may be detrimental to the integrity and operation of the selfsame system. Difficulties arise in the calculation of exhaust plume properties and molecular flux as the gas expands from continuum to free-molecular flow. The solution of the governing Boltzmann equation is exceedingly complex; similarly, numerical solutions such as the Direct Simulation Monte Carlo technique required prohibitive amounts of computer processing time. This thesis presents an alternate method of the assessment of molecular flux in which the continuous transition from viscous to collisionless flow is approximated by a suitably defined breakdown surface. The molecular flux incident on a given area of the spacecraft surface is determined by integration of flux from all significant portions of the breakdown surface. Results are presented for exhaust plumes of various stagnation and exit plane conditions emanating from an axisymmetric ring nozzle. GRA

N86-18713# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF LASER INDUCED SURFACE DAMAGE IN GLASS M.S. Thesis
R. D. Uyak Jun. 1985 53 p
(AD-A160009) Avail: NTIS HC A04/MF A01 CSCL 11/2

Laser-induced plasma surface damage in a transparent dielectric is investigated. The possible occurrence of unipolar arcing as a damage mechanism in nonconductors is examined. Experiments were conducted using a neodymium glass laser in a Q-switched mode to create a hot plasma. The plasma damage on both entrance and exit surfaces was examined. The morphology of damage is qualitatively analyzed. Several theories are applied in explanation of the damage obtained. The appearance of micropitting at the periphery of the laser impact area of the targets indicates the possible occurrence of unipolar arcing as a damage mechanism. Other damage mechanisms include thermal stress,

electron avalanche, particle deposition, and micropitting from particle inclusions or surface imperfections. GRA

N86-18714# Stanford Univ., Calif. Lab. of Physics.
LASER PHYSICS AND LASER TECHNIQUES Interim Scientific Report, 1 Mar. 1984 - 28 Feb. 1985
A. E. Siegman, R. Trebino, J. E. Fouquet, and P. M. Fauchet 14 May 1985 35 p
(Contract F49620-84-C-0041)
(AD-A160143; AFOSR-85-0882TR) Avail: NTIS
HC A03/MF A01 CSCL 20/12

Research involving femtosecond-process measurement in the frequency domain, laser surface transformations and damage mechanisms, the study of specific quantum-well structures, and the development of optical beam expanders were completed. In particular, attempts to suppress troublesome thermal-grating effects in frequency-domain measurements of femtosecond processes produced two entirely different and successful techniques, each of which yields other advantages as well. Our studies of laser-solid interactions have led to a better understanding of transient electronic processes in very dense and hot electron-hole plasma in semiconductors and of the formation of single-lase-beam-induced spontaneous surface ripples on a multitude of solid materials. Our time-resolved studies of GaAs/AlxGa1-xAs quantum well structures successfully measured the photoluminescence decay times of carriers in structures grown by both molecular beam epitaxy and metalorganic chemical vapor deposition. Much was learned about the nature of nonradiative recombination dynamics in these structures. Results consistency indicated that the fundamental radiative recombination coefficient, B, in quantum wells is quite small. Optimal designs were developed for achromatic prism beam expanders, based on a remarkedly simple and elegant theoretical analysis. GRA

N86-18715# Naval Research Lab., Washington, D. C.
SURFACE INFRARED REFLECTION-ABSORPTION SPECTROSCOPY USING A TUNABLE DIODE LASER
J. E. Butler, V. M. Bermudez, and J. L. Hylden 1 Oct. 1985 22 p
(AD-A160145; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/4

Single-reflection infrared reflection-absorption spectra (IRRAS) of adsorbates on surfaces have been obtained using a tunable diode laser radiation source. Surface sensitivity is achieved through the use of polarization modulation, and the high brightness of the laser light source has made possible the observation of vibrational modes at energies much lower than those accessible with conventional blackbody sources. Results are presented for the chemisorption of oxygen on polycrystalline aluminum showing surface (580/cm) and subsurface (890/cm) Al-O stretching modes at sub-monolayer coverage. Author (GRA)

N86-18716# Princeton Univ., N. J. Plasma Physics Lab.
POPULATION INVERSION AND GAIN MEASUREMENTS FOR X-RAY LASER DEVELOPMENT IN MAGNETICALLY CONFINED PLASMA COLUMN IN FISCAL YEAR 1984 Annual Report
S. Suckewer 20 Mar. 1985 30 p
(Grant AF-AFOSR-0025-84)
(AD-A160186; AFOSR-85-0809TR) Avail: NTIS
HC A03/MF A01 CSCL 20/5

This report covers X-ray laser development in magnetically confined plasmas, as well as in expanding recombining plasma columns using time resolved soft X-ray monochromators. Experiments with both solid and gas targets resulted in gain measurements for hydrogen-like Carbon(6+) (CVI) ions and population inversion measurements for lithium-like Neon(8+) (NeVIII) ions. Our most recent results, involving carbon disc targets in a 90 k Gauss field with a 300 Joule carbon dioxide laser pulse, in which a one-pass gain of kl 6.5 (enhancement of stimulated emission over spontaneous emission about 100) was obtained for CVI 182A are presented. Results of a gain kl = 3.0 (k approx. 7.5/cm) for thick carbon fiber targets are also presented. Population inversions of NeVIII ions as a function of initial gas pressure are also discussed, as well as an overview of the instrumentation, experimental setup, and target configurations used. GRA

N86-18717# Aerodyne Research, Inc., Billerica, Mass.
SPECTROSCOPIC DIAGNOSTICS TO SUPPORT ADVANCED MICROELECTRONIC FABRICATION TECHNIQUES Annual Technical Report, 1 Apr. 1984 - 1 Apr. 1985
J. C. Wormhoudt and A. C. Stanton 30 Apr. 1985 34 p
(Contract F49620-84-C-0036)
(AD-A160192; ARI-RR-469; AFOSR-85-0810TR) Avail: NTIS
HC A03/MF A01 CSCL 14/2

This is the first annual report on a program to develop laser spectroscopic diagnostics for detection of gas phase species important in fabrication processes for advanced semiconductor materials. It has two objectives, to obtain quantitative spectroscopic data for these molecules, and to apply diagnostics to model fabrication systems. This report summarizes progress in the areas of investigation identified in the first year: chlorine atom detection using an infrared tunable diode laser, which will also be used to instrument a plasma etching reactor, and infrared and laser induced fluorescence spectroscopic studies of SiF2, CF2, and SiH2. GRA

N86-18718# Visidyne, Inc., Burlington, Mass.
PROJECT ABLE: (ATMOSPHERIC BALLOONBORNE LIDAR EXPERIMENT) Final Report, 22 Sep. 1981 - 22 Feb. 1985
O. Shepherd, G. Aurilio, R. D. Bucknam, A. G. Hurd, and W. H. Sheehan 25 Mar. 1985 97 p
(Contract F19628-81-C-0165)
(AD-A160372; VI-824; AFGL-TR-85-0064) Avail: NTIS
HC A05/MF A01 CSCL 17/8

Project ABLE (Atmospheric Balloonborne Lidar Experiment) is part of the A.F. Geophysics Laboratory's continuing interest in developing techniques for making remote measurements of atmospheric quantities such as density, pressure, temperatures, and wind motions. The system consists of a balloonborne lidar payload designed to measure neutral molecular density as a function of altitude from ground level to 70 km. The lidar provides backscatter data at the doubled and tripled frequencies of a Nd:YAG laser, which will assist in the separation of the molecular and aerosol contributions and subsequent determination of molecular and aerosol contributions and subsequent determination of molecular density vs altitude. The object of this contract was to fabricate and operate in a field test a balloonborne lidar experiment capable of performing nighttime atmospheric density measurements up to 70 km altitude with a resolution of 150 meters. The payload included a frequency-doubled and -tripled Nd:YAG laser with outputs at 355 and 532 nm; a telescoped receiver with PMT detectors; a command-controlled optical pointing system; and support system, including thermal control, telmetry, command, and power. Successful backscatter measurements were made during field operations which included a balloon launch from Roswell, NM and a flight over the White Sands Missile Range. GRA

N86-18719# Oak Ridge National Lab., Tenn.
STUDIES OF COMPOUND STATES OF NEGATIVE IONS USING LASER BEAMS Summary Report, 12 Oct. 1984 - 30 Sep. 1985
R. N. Compton and G. D. Alton 15 Aug. 1985 55 p
(Contracts N00014-85-F-0011; DE-AC05-84OR21400; RR0-1103)
(AD-A160483) Avail: NTIS HC A04/MF A01 CSCL 07/4

This research involves experimental studies of compound states of negative ions using laser beams. Negative ion beams of stable (H-, O-, etc.) and metastable (He-, Be-, Ca-, etc.) species are generated by double charge exchange from positive ion beams colliding with alkali vapor. Measurements of the photodetachment and autodetachment spectra for these ions provide new information on compound state energy levels. In addition experiments are underway to study the collisions of electrons with atoms in strong laser fields. Many theoretical predictions have been presented recently on this subject. These experiments should provide the first tests of such predictions. GRA

N86-18720# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
LASER PUMPED FREQUENCY STANDARDS Final Report, Mar. 1980 - Aug. 1984
S. Ezekiel Aug. 1985 21 p
(Contract F19628-80-C-0077)
(AD-A160606; RADC-TR-85-147) Avail: NTIS HC A02/MF A01 CSCL 14/2

The objective of the research program is an investigation into the feasibility of using the stimulated resonance Raman effect in an atomic beam for time and frequency standards, as well as spectroscopic applications in the microwave to the far infrared frequency range. GRA

N86-18721# Naval Weapons Center, China Lake, Calif.
ANALYTIC REDUCTION OF THE MONOSTATIC LIDAR MULTIPLE BACKSCATTERING INTEGRAL Technical Publication, 1983 - 1984
D. T. Gillespie Aug. 1985 34 p
(Contract AFOSR-MIPR-84-00007)
(AD-A160624; AD-E900508; NWC-TP-6605) Avail: NTIS HC A03/MF A01 CSCL 20/6

This report presents a detailed derivation of Eqs.(44) and (49) from Eq.(43) in the article Stochastic-Analytic Approach to the Calculation of Multiply Scattered Lidar Returns, which was written by the same author and published in Journal of the Optical Society of America A, Vol. 2, August 1985, pp. 1307-24. GRA

N86-18722# Naval Research Lab., Washington, D. C.
NONLINEAR ANALYSIS OF UBITRON/FREE-ELECTRON LASER AMPLIFIERS IN THREE-DIMENSIONS
A. K. Ganguly and H. P. Freund 8 Oct. 1985 41 p
(AD-A160631; NRL-MR-5669) Avail: NTIS HC A03/MF A01 CSCL 20/5

The nonlinear evolution of the Free-Electron Laser/Ubitron amplifier is investigated numerically for a configuration consisting of helical wiggler and an axial guide magnetic fields. A set coupled nonlinear differential equations is derived in three-dimensions which governs the self-consistent evolution of either the TE or TM modes in a loss-free cylindrical waveguide and the trajectories of an ensemble of electrons. The initial conditions are chosen to model the adiabatic injection of a cold, cylindrically symmetric electron beam into an interaction region in which the wiggler amplitude rises slowly from zero to a constant level in ten wiggler periods. Both self-field and space charge effects have been neglected in the formulation, and the analysis is valid for the High-Gain Compton regime of operation. Numerical simulations are conducted to model an amplifier operating in the neighborhood of 35 GHz, and for electron beam energies of energies of 250 KeV and 1 MeV. The growth rate in the linear regime prior to saturation is found to be in substantial agreement with the predictions based on a linear theory of the instability, and the saturation efficiency is consistent with that expected on the basis of simple, heuristic phase-trapping arguments. Substantial enhancements in the efficiency are found to occur due to the presence of the axial guide field. GRA

N86-18723# Los Alamos National Lab., N. Mex.
PARTICLE-IN-CELL SIMULATIONS OF THE LASERTRON
Michael E. Jones and William K. Peter 1985 4 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13-16 May 1985
(Contract W-7405-eng-36)
(DE85-012698; LA-UR-85-1352; CONF-850504-114) Avail: NTIS HC A02/MF A01

The lasertron is a device for producing intense, very short, pulsed ectron beams. The current is not space-charge limited and follows the laser intensity. The electron pulse is then accelerated out of the device by a constant voltage. In the RF lasertron, the diode becomes an RF cavity. This improves the breakdown characteristics of the device, allowing higher voltages to be applied and hence higher currents to be obtained. The calculations are aimed at producing a 10 nC electron beam with an emittance of less than 40 mm-mrad or use in free-electron laser experiments. A class of electrode shapes was obtained which in the absence of space charge produces no emittance growth. These shapes were studied with the particle-in-cell simulation model ISIS, and the electrodes which produce minimum emittance including the effect of space charge were determined. Unique emittance problems associated with the time dependence of the beam pulse are studied and conditions for reducing these effects are discussed. Author

N86-18724# California Univ., Berkeley. Lawrence Berkeley Lab.
PARTIALLY COHERENT X-RAYS FROM MODERN STORAGE RINGS
D. Attwood, K. Halbach, and K. J. Kim Nov. 1984 7 p refs Presented at the Workshop on VUV and X-ray Sources, Washington, D.C., 9 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE85-011157; LBL-19354; CONF-851139-1) Avail: NTIS HC A02/MF A01

Several routes to the development of ideal soft X-ray sources are now being actively pursued. These include atomic lasers, free electron lasers (FELs), and storage ring (synchrotron) undulators. For short wavelength (XUV) applications, FELs and undulators are very closely related, each being dependent on the development of well controlled (low emittance) electron storage rings, with energies of order 0.5 to 1.5 GeV beam energy, and many period magnetic structures, referred to as undulators. The major thrust of this article is that undulators provide the only sure route to coherent soft X-rays in the near term, that they are tuneable throughout the region of interest, and that they will serve a multitude of users, in disparate fields of science and technology, albeit at a large central research facility. DOE

N86-18725# Department of Energy, Washington, D. C.
DIAGNOSTIC APPARATUS AND METHOD FOR USE IN THE ALIGNMENT OF ONE OR MORE LASER MEANS ONTO A FIBER OPTICS INTERFACE Patent Application
S. A. Johnson (Lawrence Livermore Lab., Calif.) and R. R. Shannon, inventors (to DOE) (Lawrence Livermore Lab., Calif.) Filed 18 Jan. 1985 16 p
(Contract W-7405-eng-48)
(DE85-017756; US-Patent-Appl-SN-692747) Avail: NTIS HC A02/MF A01

Diagnostic apparatus for use in determining the proper alignment of a plurality of laser beams onto a fiber optics interface is disclosed. The apparatus includes a lens assembly which serves two functions, first to focus a plurality of laser beams onto the fiber optics interface, and secondly to reflect and image the interface using scattered light to a monitor means. The monitor means permits indirect observation of the alignment or focusing of the laser beams onto the fiber optics interface. DOE

N86-18726# Jackson State Univ., Miss.
LASER INDUCED FLUORESCENCE OF TRAPPED MOLECULAR IONS
B. C. Hale and J. Perkins 1985 3 p refs
(Contract DE-AS05-83ER-13134)
(DE85-016898; DOE/ER-13134/2) Avail: NTIS HC A02/MF A01

The chemistry of molecular ion reactions is important to many processes such as plasmas and combustion systems. Also, many practical devices such as lasers depend upon the existence of ions. However, the amount of spectroscopic and dynamical information on ionic processes is very limited. For instance, at the present time only about sixty molecular ions have been observed spectroscopically and only a few of these have been studied in great detail. The specific aim of this research is to obtain spectroscopic measurements of molecular ions, such as CO(+), CN(+), NH(+), and NH2(+), confined in an R-F quadrupole trap. DOE

N86-18286# Joint Publications Research Service, Arlington, Va.
AVIAREMONT'S EFFORTS TO INTRODUCE LASER TECHNOLOGY

Yu. Kolesnikov *In its* USSR Report: Transportation (JPRS-UTR-85-014) 4 Dec. 1985 p 5-7 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Sep. 1985 p 3 (For primary document see N86-18284 09-01)
Avail: NTIS HC A04

N86-18370# Consiglio Nazionale delle Ricerche, Florence (Italy). Ist. di Ricerca sulle Onde Elettromagnetiche.
REMOTE SENSING OF OIL ON SEA: LIDAR AND PASSIVE IR EXPERIMENTS
F. Castagnoli, G. Cecchi, L. Pantani, I. Pippi, B. Radicati, C. Susini, P. Mazzinghi, and A. Barbaro *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 121-126 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-18727 Carnegie-Mellon Univ., Pittsburgh, Pa.
EFFECTS OF TWO-PHASE FLOW IN SHAFT SEALS Ph.D. Thesis
Richard Maxwell Beeler 1985 145 p
Avail: Univ. Microfilms Order No. DA8517513

Fluid flow in shaft seals is analyzed with special attention given to the effects of phase change in the fluid due to vaporization. These effects are extremely important in a wide range of applications, from the cryogenic LOX turbo-pump seal used in the space shuttle, to ordinary water pump seals. Three models for axisymmetric flow in radial face shaft seals are presented. A steady state heat transfer model is presented which relates the temperature and heat flux profiles for an arbitrary number of radial nodes in the fluid film. A model for steady laminar flow in radial face shaft seals is developed. A numerical solution procedure is described and examples are presented for water assuming a discrete boiling location. Models for steady turbulent flow in radial face seals and annular ring seals are developed. A numerical solution procedure is described and examples are presented for liquid oxygen with high leakage rates typical of rocket turbo-pumps. Choking occurs at the seal exit for typical leakage rates. Heat addition through viscous dissipation due to shaft rotation significantly increase the amount of vaporization. A model for squeeze-film damping is developed with complete solutions for pressure and load support for an incompressible liquid. Expressions for the transient variation of fluid properties in the two-phase and vapor regions are presented. Dissert. Abstr.

N86-18728 Department of the Air Force, Washington, D.C.
MODULAR AIR SHUT-OFF VALVE Patent
J. J. Buckley and W. T. Scott, inventors (to Air Force) Issued 13 Aug. 1985 6 p Supersedes AD-D010489
(AD-D011935; US-Patent-4,534,538; US-Patent-Appl-SN-512083; US-Patent-Class-251-62) Avail: US Patent and Trademark Office CSCL 13/1

A modular air shut-off valve, particularly useful within the air conditioning environmental control system of an aircraft, is provided. It consists of a housing sized for insertion into a duct of the air conditioning system, a vane pivotally mounted within the housing for pivotal movement between open and closed positions and having flexible portions along its edges contacting the housing in the closed position for providing a resilient seal and to allow pressure relief in the event of overpressure within the duct. Author (GRA)

N86-18729 Department of the Navy, Washington, D. C.
ANTISTATIC PACKAGING MATERIAL AND STEEL SUBSTRATES PACKAGED THEREWITH Patent
M. K. Bernett, D. C. Weber, and H. Ravner, inventors (to Navy) Issued 2 Jul. 1985 11 p Supersedes AD-D011069
(AD-D011939; US-Patent-4,526,832; US-Patent-Appl-SN-534477; US-Patent-Class-428-336) Avail: US Patent and Trademark Office CSCL 13/4

This patent describes a novel antistatic packaging material and method employing a fluorine(+)-implanted electroactive polymer. The implanted polymer contacts the surface of the substrate and conducts away any static charge that may exist upon the substrate. GRA

N86-18730# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
OPTIMIZATION OF MECHANISMS FOR FORCE GENERATION BY USING PULLEYS AND SPRING Interim Report
T. Okada Sep. 1985 38 p
(AD-A159944; CMU-RI-TR-85-14) Avail: NTIS HC A03/MF A01 CSCL 13/8

A mechanism is described for achieving a desired force/motion relationship. The mechanism employs two hinged arms with pulleys and springs. In comparison to active force-control methods, the device is compact, energy saving, and robust. The device is ideally suited to miniature devices and, in a recent application, has been used in a mobile robot for inspecting pipes. The relationship between the motion of the mechanism and its output force is analyzed using both analytical and approximate techniques to determine the optimum configuration and the dimensions of the various components. In the final design, experimental results demonstrate the superiority of noncircular eccentric pulleys over conventional pulleys for producing a specified force/motion curve. GRA

N86-18731# Purdue Univ., West Lafayette, Ind. School of Industrial Engineering.
THE SCIENCE OF AND ADVANCED TECHNOLOGY FOR COST-EFFECTIVE MANUFACTURE OF HIGH PRECISION ENGINEERING PRODUCTS. VOLUME 2: MECHANICS OF TWO AXES PASSIVE PRECISION LEVEL MONITOR FOR MACHINE TOOLS Final Report, 1 Jan. 1983 - 1 May 1984
J. D. York and J. Modrey May 1985 111 p
(Contract N00014-83-K-0385)
(AD-A160140) Avail: NTIS HC A06/MF A01 CSCL 20/6

A mechanism is proposed as a means of passively leveling an optical assembly about two horizontal axes within a tolerance of one arc-second. The mechanism is designed so that it will stimulate a spherical pendulum for input motions up to 100 arc-seconds. In order to insure the operation of the mechanism and establish the proper geometry, three analytical models were developed. Planar and spatial models which assumed rigid links with pin joints and a planar model assuming deformable links with pin and clamped joints were studied. These results are compared with experimental data gathered for three geometry combinations. It is shown that the results from the planar and spatial analytics agree to within 10%, with the spatial model predicting less error. Hence, the less complicated planar analysis may be performed with little loss in accuracy. Neither rigid link models compare well with the experimental data, with as much as an 80% discrepancy in some cases. When deformable links are included in the planar model, the results are within 16% of the experimental results. This indicates that the resistance to bending at the points can not be neglected in modeling and mechanism to act like a spherical pendulum, and guidelines are established for the design. GRA

N86-18732# Purdue Univ., West Lafayette, Ind.
MECHANICS OF A TWO AXES PASSIVE PRECISION LEVEL MONITOR FOR MACHINE TOOLS: VOLUME 2 Final Report, 1 Jan. 1983 - 1 May 1984
J. D. York and J. Modrey May 1985 108 p
(Contract N00014-83-K-0385)
(AD-A160151) Avail: NTIS HC A06/MF A01 CSCL 14/2

A mechanism is discussed as a means of passively leveling an optical assembly about two horizontal axes within a tolerance of one arc-second. The mechanism is made so that it will stimulate a spherical pendulum for input motions up to 100 arc-seconds. In

order to insure the operation of the mechanism and establish the proper geometry, three analytical models were developed. Planar and spatial models which assumed rigid links with pin joints and a planar model assuming deformable links with pin and clamped joints were studied. These results are compared with experimental data gathered for three geometry combinations. Results show that the planar and spatial analytics agree to within 10%, with the spatial model predicting less error. Hence, the less complicated planar analysis may be performed with very little loss of accuracy. Neither rigid link models compare well with the experimental data, with as much as an 80% discrepancy in some cases. When deformable links are included in the planar model, the results are within 16% of the experimental results. This indicates that the resistance to bending at the points can not be neglected in modeling and mechanism to act like a spherical pendulum, and guidelines are established for the design. GRA

N86-18733# California Univ., Berkeley. Dept. of Mathematics.
LANCZOS ALGORITHM APPLIED TO MODAL ANALYSIS OF VERY LARGE STRUCTURES Final Report, 1 Aug. 1984 - 1 Aug. 1985
B. N. Parlett, P. S. Jensen, and T. Erickson 10 Aug. 1985 27 p
(Contract F49620-84-C-0090)
(AD-A160210; AFOSR-85-0795TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

The general theory of the Lanczos algorithm for large symmetric eigenproblems is presented. This work was extended to apply to the large generalized symmetric eigenanalysis problem. This effort implements the results of the past research for application to large generalized problems arising in structural analysis. GRA

N86-18734# Naval Civil Engineering Lab., Port Hueneme, Calif.
LONG-TERM, DEEP OCEAN TEST OF CONCRETE SPHERICAL STRUCTURES. RESULTS AFTER 13 YEARS Technical Report, Mar. 1978 - Nov. 1984
R. D. Rail and R. L. Wendt Jul. 1985 70 p
(AD-A160232; NCEL-TR-915) Avail: NTIS HC A04/MF A01 CSCL 11/2

In 1971, a long-term, deep-ocean test was started on 18 pressure-resistant, hollow concrete spheres, 66 inches in outside diameter by 4.12 inches in wall thickness. The spheres were placed in the ocean near the seafloor at depths from 1,840 to 5,075 feet. Over a 13 year period, annual inspections of the spheres using submersibles have provided data on time-dependent failure and permeability. After 5.3 years of exposure, three spheres were retrieved from the ocean for laboratory testing, and after 10.5 years two more spheres were retrieved and tested. This report is the third report in a series describing and summarizing the findings from the ocean and laboratory tests. Data on concrete compressive strength gain, short-term implosion strength of the retrieved spheres, and permeability and durability of the concrete were obtained. The data have shown that concrete exhibits good behavior for ocean applications. High quality, well-cured concrete can be expected to gain and maintain strength when submerged in seawater under high pressure. Concrete is a durable material in the deep ocean; neither deterioration of the concrete matrix nor corrosion of reinforcing steel are problems, even though the concrete becomes saturated with seawater. Uncoated concrete has a very low rate of premeation of seawater through the concrete and even this small flow can be prevented by a waterproofing coating. Author (GRA)

N86-18735# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
SURFACE CREEP OF MINERAL OIL ON INNER RING OF MOMENTUM WHEEL BEARING
P. D. Fleischauer and H. D. Marten 19 Aug. 1985 29 p
(Contract F04701-83-C-0084)
(AD-A160746; TR-0084A(5945-03)-1; SD-TR-85-52) Avail: NTIS
HC A03/MF A01 CSCL 11/8

Lubricant distribution on the inner ring of an inner-ring rotating bearing may depend on the creep of oil from the bearing raceway up onto the land and subsequent transfer to retainer surfaces. To study creep patterns for a bearing spinning at speeds up to 9000 rpm, a fixture was built so that the motion of the oil could be observed and photographed using ultraviolet stimulated luminescence of the oil. Oil was supplied by and impregnated wick that was allowed to rub against what would normally be the ball track in the raceway (the balls were not present). The oil was observed to migrate up the curved surface until it reached the corner of the raceway. A bead of oil would form at that corner. In one case oil actually creep across the land. The oil bead thickness was a function of speed, but at 9000 rpm should be approximately 0.12 mm (0.005 in). Author (GRA)

N86-18736# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A ROBUST LAYERED CONTROL SYSTEM FOR A MOBILE ROBOT
R. A. Brooks Sep. 1985 28 p
(Contracts N00014-82-K-0334; N00014-80-C-0505)
(AD-A160833; AI-M-864) Avail: NTIS HC A03/MF A01 CSCL 09/2

We describe a new architecture for controlling mobile robots. Layers of control system are built to let the robot operate at an increasing level of competence. Layers are made up of asynchronous modules which communicate over low bandwidth channels. Each module is an instance of a fairly simple computational machine. Higher level layers can subsume the roles of lower levels by suppressing their outputs. However, lower levels continue to function as higher levels are added. The result is a robust and flexible robot control system. The system is intended to control a robot that wanders the office areas of our laboratory, building maps of its surroundings. In this paper, we demonstrate the system controlling a detailed simulation of the robot. GRA

N86-18737# Southwest Research Inst., San Antonio, Tex.
STUDY OF FAN-AIRPUMP APPLICABILITY TO TWO-STAGE AIR CLEANER SYSTEMS Final Technical Report
M. B. Treuhaft Jun. 1985 74 p
(Contract DAAE07-84-C-R045)
(AD-A160838; SWRI-03-8070; TACOM-TR-13118) Avail: NTIS
HC A04/MF A01 CSCL 13/1

An experimental program was conducted to evaluate applicability of the fan-airpump concept as applied to military air cleaner systems and vehicles. Technical feasibility and potential use were evaluated through laboratory testing which defined fan-airpump performance characteristics and investigated the performance envelope of the fan-airpump concept when applied to the 2-1/2 and 5-ton truck. Economic feasibility was assessed by comparing projected fan-airpump life cycle cost factors with similar cost factors associated with blower motor systems. Because it has no moving part, requires no lubrication, and is practically maintenance, free, the use of a fan-airpump to develop the scavenge flows required by two-stage air cleaner systems would alleviate the problems caused by unreliable blower motors or marginal exhaust aspirator replacements. As a result, the fan-airpump could become a major component for improving reliability and operational readiness for many vehicles operating with two-stage air cleaner systems. GRA

N86-18738# Department of Energy, Washington, D. C.
IMPROVED CYCLING CRYOPUMP Patent Application
T. H. Batzer (Lawrence Livermore Lab., Calif.) and W. R. Call, inventors (to DOE) (Lawrence Livermore Lab., Calif.) Filed Dec. 1984 21 p
(Contract W-7405-eng-48)
(DE85-017732; US-Patent-Appl-SN-678148) Avail: NTIS
HC A02/MF A01

The present invention is designed to achieve continuous high efficiency cryopumping of a vacuum vessel by improving upon and combining in a novel way the cryopumping in a novel way the cryopumping methods. The invention consists of a continuous operation cryopump, with movable louvers, with a high efficiency pumping apparatus. The pumping apparatus includes three cryogenic tubes. They are constructed of a substance of high thermal conductivity, such as aluminum and their exterior surfaces

are cryogenic condensing surfaces. Through their interior liquid or gaseous helium from two reservoirs can be made to flow, alternately promoting extreme cooling or allowing some warming. DOE

N86-18739# Pacific Northwest Lab., Richland, Wash.
ASSESSMENT OF GOVERNMENT TRIBOLOGY PROGRAMS
M. B. Peterson and T. M. Levinson Sep. 1985 280 p
(Contract DE-AC06-76RL-01830)
(DE86-001121; PNL-5539) Avail: NTIS HC A13/MF A01

An assessment has been made to determine current tribology research and development work sponsored or conducted by the government. Data base surveys and discussions were conducted to isolate current projects sponsored primarily by 21 different government organizations. These projects were classified by subject, objective, energy relevance, type of research, phenomenon being investigated, variables being studied, type of motion, materials and application. An abstract of each project was prepared which included the classification, sponsor, performing organization and a project description. It was found that current work is primarily materials oriented to meet military requirements. Other than the high temperature programs very few of the tribology projects accomplish energy related objectives. DOE

N86-18740# Kernforschungszentrum, Karlsruhe (West Germany).
CLAMPING AND POSITIONING SYSTEM TO BE APPLIED FOR THE MANUFACTURING OF SMALL AND MEDIUM SIZED BATCHES ON NUMERICAL CONTROL (NC) MACHINES
H. Bald, W. Eversheim, A. Fuerst, R. Koch, F. Lock, T. Pfeifer, H.-D. Schoellhorn, and M. Weck Aug. 1985 133 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie Prepared in cooperation with Technische Hochschule, Aachen, West Germany and Forkardt (Paul) G.m.b.H and Co., Kg., Dusseldorf, West Germany
(KfK-PFT-95) Avail: NTIS HC A07/MF A01

The sheet ball positioning technique for accurate and rapid workpiece assembly on numerically controlled (NC) machines for mass production in small and medium batches was analyzed regarding workpiece geometry and clearance with respect to the support surface, flexible layout modification and machining operations (milling and boring). The effects of the workpiece shape on the clamping device and of the machining operations on the positioning device are investigated. The relationship between force and penetration depth, positioning accuracy, and shearing are studied. Further automation of the clamping device is achieved with a clamping bridge assembly adaptable on NC milling and boring machines and with hybrid units. The flexible sheet ball positioning technique can be economically applied for parts production and assembly with simpler checks and parts dimensioning. Rational workpiece production depends on product design, parts shape, work preparation, facility design and NC machine programming. Author (ESA)

N86-18741# Kernforschungszentrum, Karlsruhe (West Germany).
DEBURRING OF METAL WORKPIECES WITH DIRECTED HIGH PRESSURE WATER JETS. BASIS AND APPLICATION LIMITS
K. Przyklenk, M. Schlatter, R. Thiel, and P. Willems Aug. 1985 252 p refs In GERMAN; ENGLISH summary Prepared in cooperation with Daimler Benz A.G., Stuttgart, West Germany, Festo Maschinefabrik, Esslingen, West Germany, Mahle G.m.b.H., Stuttgart, West Germany and Woma Apparatebau, Duisburg, West Germany
(KfK-PFT-107) Avail: NTIS HC A12/MF A01

Application of high pressure water jets in metal workpiece deburring operations was investigated regarding pressure range and water mass flow rate on a jet cutting facility equipped with a high pressure pump and on a cleaning facility. The effects of the water jets on aluminum workpieces are analyzed. The effects of the pump pressure changes in width and depth on the workpiece area and of the nozzle diameter variation are studied. Mathematical results show good agreement with experimental results. Sound and humidity emissions are measured for noise reduction and safety measure recommendations. Thermal chemical deburring, electrochemical deburring, and wet jet cutting are compared with high pressure water jet deburring. High pressure water jets can be applied for a large range of deburring operations. Author (ESA)

N86-18742# Southwest Research Inst., San Antonio, Tex.
EMISSION CHARACTERIZATION OF A 2-STROKE HEAVY-DUTY DIESEL COACH ENGINE AND VEHICLE WITH AND WITHOUT A PARTICULATE TRAP Final Report, 20 Apr. 1982 - 28 May 1983
T. L. Ullman and C. T. Hare Mar. 1985 138 p
(Contract EPA-68-03-3073)
(PB85-239770; EPA-460/E-84-015) Avail: NTIS HC A07/MF A01 CSCL 13B

Diesel soot or smoke has been regarded as a nuisance pollutant and potential health hazard, especially in congested urban areas where diesel buses operate. Exhaust emissions from a DDAD 6V-71 coach engine and a similarly-powered 1980 GMC RTS-II coach, fitted with a non-catalyzed particulate trap, were characterized over various Federal Test Procedures for heavy-duty engines, including an experimental test cycle for buses. Regeneration was accomplished using an in-line burner in the exhaust to raise the engines' idle exhaust gas temperature from 120 to 700 C. trap testing included approximately 15 hours of engine operation and 100 miles of bus operation. Particulate emissions were reduced by an average of 79 percent and smoke emissions were nil using the trap. The effect of the trap on regulated and other unregulated emissions were generally minimal. Author (GRA)

N86-18522# Joint Publications Research Service, Arlington, Va.
CORROSION RESISTANCE OF JOINTS MADE BY DIFFUSION WELDING Abstract Only
A. A. Mikheyev, N. F. Kazakov, and A. V. Finkelshteyn *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 16 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev, USSR), no. 8, Aug. 1985 p 59-61 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18542# Joint Publications Research Service, Arlington, Va.
INFORMATION-MEASUREMENT SYSTEM FOR ULTRASONIC TESTING OF WELDED JOINTS Abstract Only
O. A. Mitrofanov, V. P. Radko, V. V. Benkovskiy, and I. A. Anop *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 97 Transl. into ENGLISH from Avtomaticheskay Svarka (Kiev, USSR), no. 8, Aug. 1985 p 68-70 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18543# Joint Publications Research Service, Arlington, Va.
PRODUCTION OF VACUUM-TIGHT JOINTS IN MATERIALS BY DIFFUSION WELDING Abstract Only
G. V. Konyushkov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 98 Transl. into ENGLISH from Avtomaticheskaya Svarka (Kiev, USSR), no. 8, Aug. 1985 p 25-28 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

N86-18544# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CHEMICAL COMPOSITION OF FLUX ON DUCTILITY OF SEAM METAL IN ELECTROSLAG WELDING Abstract Only
M. D. Modzhuk, M. B. Roshchin, and N. N. Potapov *In its* USSR Report: Materials Science and Metallurgy (JPRS-UMS-85-009) 5 Dec. 1985 p 98-99 Transl. into ENGLISH from Avtomaticheskay Svarka (Kiev, USSR), no. 8, Aug. 1985 p 57-58 (For primary document see N86-18510 09-26)
Avail: NTIS HC A06

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

No abstracts in this category.

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-18743 British Library Lending Div., Boston Spa (England).
FATIGUE BEHAVIOUR OF AISI 304 L STAINLESS STEEL ELEMENTS, BUTT WELDED BY THE ELECTRON BEAM PROCESS
G. Curti, M. Orlando, and A. Risitano 7 Nov. 1985 10 p Trans. into ENGLISH from Rivista Italiana della Saldatura (Italy), v. 36 no. 2, 1984 p 83-87
(BLL-Risley-Tr-5234-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

Tests performed on test pieces taken from AISI 304 L stainless steel tubes, butt welded by the electron beam process are reported. The following test results are given, compared and discussed: static tensile tests, hardness measurements, impact strength tests and fatigue tests, either on unwelded test pieces or on welded test pieces, undressed and dressed. E.A.K.

N86-18744 Engineering Sciences Data Unit, London (England).
ELASTIC BUCKLING OF THIN-WALLED UNSTIFFENED CIRCULAR CYLINDERS UNDER BENDING, AXIAL COMPRESSION AND INTERNAL PRESSURE
May 1984 13 p refs Submitted for publication
(ESDU-84006; ISBN-0-85679-468-6; ISSN-0144-2805; ISSN-0141-4097) Avail: ESDU

ESDU data item 84006 provides data for the prediction of the extreme fiber stress at buckling of a cylinder under a bending moment alone or under combined bending moment and axial compression. The effect of internal pressure on buckling stress for cylinders under bending is included. The data are given as curves obtained by correlating a large number of experimental data drawn from diverse sources and therefore take account of realistic irregularities. The influence of the nonlinear or Brazier effect due to progressive ovalization of the cylinder cross-section under a bending moment is considered, and an equivalent extreme fiber stress calculated at collapse. A practical worked example illustrates the use of the data. Author

N86-18745 Engineering Sciences Data Unit, London (England).
ESTIMATION OF r.m.s. STRAIN IN LAMINATED SKIN PANELS SUBJECT TO RANDOM ACOUSTIC LOADING
Jul. 1984 38 p Submitted for publication
(ESDU-84006-A; ISBN-0-85679-470-8; ISSN-0141-3916) Avail: ESDU

A computer program is provided for the estimation of r.m.s. surface strains in rectangular laminated skin panels. It applies to specially-orthotropic plates having principal axes of orthotropy parallel to the plate edges. A precise definition of this class of plates is given in ESDU 83035. The calculation procedure is particularly applicable to fiber-reinforced composite laminated plates. The computer program evaluates r.m.s. strains parallel to the shorter (or curved edge, if the plate is curved) at the mid points of the longer edges and at the plate center. The analysis is a simplified normal mode method assuming a single mode (fundamental) response but uses empirically derived correction factors. A good correlation is shown between predictions using the method and available experimental results extracted from the literature. Full listings of the program in BASIC and FORTRAN IV are included. Author

N86-18746 Engineering Sciences Data Unit, London (England).
BUCKLING OF THIN-WALLED UNSTIFFENED CIRCULAR CYLINDERS UNDER TORSION AND PRESSURE
Aug. 1984 14 p refs Submitted for publication
(ESDU-84012; ISBN-0-85679-474-0; ISSN-0144-2805; ISSN-0141-4097) Avail: ESDU

Graphs enable the buckling stress to be predicted of the cylinders when subjected to torsion alone. All cylinder lengths are covered, from infinitely long, through cylinders whose buckling is affected by their length but not by the end conditions, down to short cylinders where both length and end conditions influence buckling. The transitions between the three cases were established by a statistical analysis of the results of 168 tests extracted from the literature. The effect of internal or external pressure on buckling is treated, as is the influence of material plasticity. The data also relate to ring-stiffened cylinders, the cylinder length then being the ring spacing. A practical worked example illustrates the use of the information. Author

N86-18747# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 7
Monthly Report
Judith Nagle-Eshleman, ed. Jul. 1985 119 p refs
(AD-A160321) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Various experimental and theoretical research along with literature surveys in the field of shock and vibration are presented. Topics include earthquake resistant structural methods and wind effects on structures. For individual titles, see N86-18748 through N86-18749.

N86-18748# California Univ., Berkeley.
ASEISMIC BASH ISOLATION
J. M. Kelly *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 17, No. 7 Jul. 1985 p 3-14 refs (For primary document see N86-18747 09-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Developments in research and implementation in aseismic base isolation since May, 1981 are discussed. The considerable increase in research has been both theoretical and experimental and has been conducted at an increasing number of centers. There has been a concomitant increase in the implementation of technology. Several new buildings have utilized various forms of base isolation system. These recent developments are described. Author

N86-18749# Hong Kong Polytechnic, Kowloon.
WIND-EXCITED BEHAVIOR OF STRUCTURES 4
D. J. Johns *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 17, No. 7 Jul. 1985 p 17-34 refs (For primary document see N86-18747 09-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Recent literature on wind-excited behavior of structures is reviewed. Among the phenomena considered are those due to vortex shedding, galloping, flutter, divergence, and turbulence. Theoretical and experimental (model and full-scale) studies are included, as are techniques to alleviate wind-excited behavior. Author

N86-18750*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ESTIMATING THE R-CURVE FROM RESIDUAL STRENGTH DATA
Thomas W. Orange 1985 17 p refs Presented at the International Conference and Exhibition on Fatigue, Corrosion Cracking, Fracture Mechanics and Failure Analysis, Salt Lake City, Utah, 2-6 Dec.

1985; sponsored by the American Society for Metals
(NASA-TM-87182; E-2832; NAS 1.15:87182) Avail: NTIS HC A02/MF A01 CSCL 20K

A method is presented for estimating the crack-extension resistance curve (R-curve) from residual-strength (maximum load against original crack length) data for precracked fracture specimens. The method allows additional information to be inferred from simple test results, and that information can be used to estimate the failure loads of more complicated structures of the same material and thickness. The fundamentals of the R-curve concept are reviewed first. Then the analytical basis for the estimation method is presented. The estimation method has been verified in two ways. Data from the literature (involving several materials and different types of specimens) are used to show that the estimated R-curve is in good agreement with the measured R-curve. A recent predictive blind round-robin program offers a more crucial test. When the actual failure loads are disclosed, the predictions are found to be in good agreement. Author

N86-18751# University Coll., London (England).
DEVELOPMENT AND DESIGN OF AN ADVANCED DIRECTIONAL SHEAR Interim Technical Report
J. Robin and F. Arthur Sep. 1985 49 p
(Contract DAJA45-85-C-0006)
(AD-A159647) Avail: NTIS HC A03/MF A01 CSCL 04/2

A prototype shear apparatus of the type known as a Directional Shear Cell has been designed. The purpose of the prototype is the shearing of undisturbed soil samples at stress levels normal in engineering practice with completely controlled rotation of principal stress directions through 0 deg to 360 deg in the plane of strain. Factors affecting the design are listed and discussed to explain the form of the resulting design. The design is presented in some detail, but without working drawings. Testing will be automatic; stress paths; including undrained and cyclic paths, will be imposed under computer control and boundary strains will be processed automatically. In addition it will be possible to determine strain distributions in samples by either radiography or photography. GRA

N86-18752# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
ANALYSIS OF ELASTIC-PLASTIC BALL INDENTATION TO MEASURE STRENGTH OF HIGH STRENGTH STEELS Final Technical Report
J. H. Underwood, G. P. OHara, and J. J. Zalinka Aug. 1985 38 p Presented at SEM Spring Conference, Experimental Mechanics, Las Vegas, Nev., 9-13 Jun. 1985
(AD-A159882; AD-E440298; ARLCB-TR-85029) Avail: NTIS HC A03/MF A01 CSCL 11/6

Ball indentation experiments were performed with A723 steel of 1000 to 1200 MPa ultimate strength. Results were compared with conventional tension tests and with an elastic-plastic finite element model of the ball indentation. Finite element analysis showed the ball indentation process to be insensitive to friction effects. Comparison of indentation and conventional tests showed that slip-line field analysis closely predicts the ball contact stress. Indentation tests gave an accurate measure of ultimate tensile strength under the following conditions: using a large ball size and a fixed ratio of indentation depth to ball size; ignoring initial ball contact; accounting for directional material properties; accounting for extraneous system deflections. GRA

N86-18753# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
DEFLECTION IN TAPERED CANTILEVER BEAMS DEFLECTION (GAP OPENING) IN DOUBLE CANTILEVER TYPE FRACTURE TOUGHNESS SPECIMENS Final Technical Report
B. Avitzur Aug. 1985 45 p
(AD-A159887; AD-E440297; ARLCB-TR-85027) Avail: NTIS HC A03/MF A01 CSCL 20/11

When an otherwise homogeneous material under stress contains small defects (i.e., internal cracks and/or voids), the stresses at parts of the material-defect interface significantly exceed the ones anticipated at that location in the absence of such irregularities. Consequently, a structural member, otherwise calculated to safely sustain the applied loads, might unpredictably fail. That branch of engineering which intends to account for such stress-raisers is known as fracture mechanics. Fracture mechanics studies have found that different materials (and even the same material when loaded in different orientations) reflect different sensitivity to such stress-raisers - a material property known as fracture toughness. Test samples and testing procedures have been devised in order to qualify this material property. The relation between the applied load and its displacement (or gap opening) at the point of crack growth is being used herein to determine (compute) material fracture toughness. While the equations derived for the stress field near the edge of a defect in an otherwise uniform field assume an infinite volume of material to surround the (relatively) very small defect, the crack to width and/or height in these laboratory size testing samples is definitely a finite one. This report offers a mathematical relation between the applied load and that part of the deflection (gap opening) which is due to the cantilever-like part of the sample, for that class of fracture toughness test specimens which can be described as double cantilever. A beam theory approach is used. GRA

N86-18754# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering and Mechanics.
FINITE ELEMENT MESH FOR A COMPLETE SOLUTION OF A PROBLEM WITH A SINGULARITY
J. G. Malone, P. G. Hodge, Jr., and R. Plunkett Jun. 1985 22 p
(Contract N00014-75-C-0177)
(AD-A159890; AEM-H2-3) Avail: NTIS HC A02/MF A01 CSCL 09/2

The purpose of this paper has been to show that a finite-element method using only constant-strain triangular elements can be used in a problem with a stress singularity to obtain a complete solution for stress, strain, and displacement at and economical cost in computing. The method does not require and a priori knowledge of the nature of the singularity. The result has been acheived by using and easily-generated mesh scheme which is centered at the point of singularity. The particular problem of a plate with a centered crack in a state of plane stress was chosen because and exact analytical solution was available against which to measure the accuracy of our solution. The finite element solution was obtained by using a mesh yields stress and strain field values which are accurate at distances from the crack tip as small as 0.000001 times the crack length using only reasonable number of degrees of freedom. GRA

N86-18755# General Dynamics/Fort Worth, Tex. Fort Worth Div.
DEVELOPMENT OF FATIGUE AND CRACK PROPAGATION DESIGN AND ANALYSIS METHODOLOGY IN A CORROSIVE ENVIRONMENT FOR TYPICAL MECHANICALLY-FASTENED JOINTS. VOLUME 3: PHASE 2 DOCUMENTATION Final Report, Sep. 1982 - Oct. 1984
S. D. Manning, R. P. Wei, and D. E. Gordon Oct. 1984 369 p
(Contract N62269-81-C-0268; NR Proj. F41-400)
(AD-A160378; NADC-83126-60-Vol-3) Avail: NTIS HC A16/MF A01 CSCL 11/6

A workable corrosion fatigue (CF) analysis methodology has been developed for mechanically-fastened joints. The methodology includes the strain-life approach for predicting time-to-crack-initiation (TTCI) and the deterministic crack growth approach for predicting crack propagation. Guidelines are presented for acquiring the experimental data and for implementing the CF analysis. The CF analysis methodology was evaluated for 7075-T7651 aluminum, three load spectra, two environments (i.e., dry air and 3.5% NaCl), and three different bolt load transfer levels (i.e., 0%, 20%, and 40%). GRA

N86-18756# Aeronautical Research Labs., Melbourne (Australia).
REVIEW OF ULTRASONIC VELOCITY METHODS OF DETERMINING RESIDUAL STRESS
S. J. Rumble and J. G. Sparrow May 1985 22 p

(AD-A160769; AD-E401375; ARL/Struc-TM-416) Avail: NTIS HC A02/MF A01 CSCL 20/11

Residual stress is the stress remaining in a body when all external forces have been removed. Residual stresses can occur as a result of fabrication, assembly, load history, heat treatment or welding. They may be compressive or tensile, and often contribute to the occurrence of component failure. The contribution of these stresses to premature structural failure has long been recognized. However their measurement has usually been difficult and in many cases not possible. Recognition of the benefits of knowing the value of residual stresses has led to recent efforts to improve the capability of known methods of measuring them and to the development of new techniques. The residual stresses in a body can be divided into two classes depending on the extent of the stress. In typical engineering materials, residual microstresses extend over a few grains, whereas residual macrostresses which are most amenable to the practical measurement methods discussed in this paper. It notes that while velocity methods have not been refined to the stage of practical use, they show considerable promise. The theoretical basis, and the experimental techniques of the ultrasonic methods are reviewed with emphasis on the separation of the competing effects of texture and stress on ultrasonic velocity. GRA

N86-18757# Brookhaven National Lab., Upton, N. Y. Dept. of Nuclear Energy.

DYNAMIC ANALYSIS OF SYSTEMS HAVING LARGE DAMPING VARIATIONS

A. J. Philippacopoulos 1985 8 p refs

(TI85-012190; BNL-NUREG-36471) Avail: NTIS HC A02/MF A01

In the earthquake response analysis of structures in which the damping characteristics between the varies significantly the standard mode superposition method cannot be used. Several approximations have been proposed that allow the application of the modal superposition method for cases in which the damping matrix is not orthogonal with respect to the modal shapes. The most commonly used approximation is based on a composite damping value which is employed in the modal equations. This value is a weighted average of the damping values of the individual components of the structural model. An investigation of the errors introduced by the composite damping in the response of simple structures is presented. The results given can be used for benchmarking the approximations in more complex systems for which composite damping solutions are employed. DOE

N86-18758# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. National Engineering Lab.

LIFE EXTENSION OF COMPONENTS WITH HIGH CUMULATIVE FATIGUE USAGE

W. L. Server 1985 9 p

(TI85-014631; EGG-M-16385; CONF-850713-2) Avail: NTIS HC A02/MF A01

The current ASME Boiler and Pressure Vessel Code fatigue design approach has significant margins of safety as evidenced by fatigue data on full-scale vessels. In order to extend qualification (life) of components which have reached the Code design usage limit of unity, improved criteria are needed which address crack initiation and propagation separately such that safe operation of these components is ensured. The fatigue initiation phase is composed of two processes: initial microcracking of internal particles or accumulation of local strain (cyclic slip) creating discontinuities which form microcracks, and the growth of the microcracks in a noncontinuum manner. The microcracks which initiate will eventually grow to a size in which continuum mechanics apply, and fracture mechanics concepts have been employed. The later propagation to failure of a component is also composed of two parts, continuum crack growth in a stable manner and eventual unstable fracture of the remaining ligament of material. This paper reviews the current status of technology in assessing initiation and propagation relative to the current design Code and suggests areas of improvement to cover extended life of high usage factor components. DOE

N86-18759# Pacific Northwest Lab., Richland, Wash.

FLUID STRUCTURAL RESPONSE OF AXIALLY CRACKED CYLINDERS

M. R. Garnich and F. A. Simonen Mar. 1985 7 p Presented at the 1985 Pressure Vessels and Piping Conference, New Orleans, La., 23-27 Jun. 1985

(Contract DE-AC06-76RL-01830)

(TI85-016275; PNL-SA-12542; NRC-B-2510; CONF-850670-24) Avail: NTIS HC A02/MF A01

The fluid structural (FS) response of a cylindrical pressure vessel to a suddenly occurring longitudinal through-wall crack is predicted. The effects of vessel internals and depressurization of the compressed water on dynamic crack opening displacements are investigated. A three dimensional structural finite element model is used as a basis for the development of a two dimensional FS model. A slice of the vessel taken at the crack midspan and normal to the cylinder axis is modeled. Crack opening displacements are compared between the 2D and 3D models, between the different assumptions about fluid depressurization, and between the static and dynamic solutions. The results show that effects of dynamic amplification associated with the sudden opening of the crack in the cylinder are largely offset by the local depressurization of the fluid adjacent to the crack. E.A.K.

N86-18760# State Univ. of New York, Stony Brook. Dept. of Materials Science and Engineering.

SXRF STUDIES OF BULK CRACK-TIP PLASTIC RELAXATION

J. C. Bilello 1985 3 p refs Presented at the Fundamental Aspects of Fracture, Gatlinburg, Tenn., 4 Nov. 1985

(Contract DE-FG02-84ER-45098)

(DE85-018013; DOE/ER-45098/10; CONF-851104-1) Avail: NTIS HC A02/MF A01

Synchrotron X-ray fractography (SXRF) has been developed as a nondestructive probe of the plastic relaxation zone accompanying bulk fracture in semi-brittle crystals. This method uses white beam synchrotron x-radiation impinging on the cleavage surface of a fractured sample at grazing angle incidence. Topographs are collected in the 2 theta =90(0) with information obtained about the bulk microstructure down to the first extinction depth, i.e., approximately 5 to 10 micrometers below the surface. In comparison with other fractography methods such as, Berg-Barrett topography, optical and Scanning Electron Microscopy, SXRF offers some unique advantages. These include the ability to assess the bulk microstructure associated with crack initiation and propagation coupled with extremely high data collection rates. SXRF data taken at Daresbury, UK, Stanford SSRL and Brookhaven NSLS will be compared with the more conventional fractography methods. DOE

N86-18761# Los Alamos National Lab., N. Mex.

THERMOELASTIC-PLASTIC FLOW IN SOLIDS

D. C. Wallace Jun. 1985 38 p

(Contract W-7405-eng-36)

(DE86-001230; LA-10119) Avail: NTIS HC A03/MF A01

The aim of this monograph is to develop the theory of elastic-plastic flow in solids, with application to a particular class of processes, namely those in which the dissipation of plastic work cannot be neglected. Examples of such processes are high-speed impact phenomena and cratering, shock compression, often shock release as well, and explosive deformation and welding. An important part of the development is to include the anisotropic elastic properties of a solid, and for this reason the theory applies to solids in general. On the other hand, the prototype solid which the author has specifically in mind is metals, and so it is possible that some of the results will have limited validity for nonmetals. The theory is valid in principle for complex flow, compression and/or tension, and unstable flow as well, although the presence and growth of cracks and voids is not explicitly included. A notational conflict arose, because in continuum mechanics the extensive quantities are taken per unit mass, while in thermodynamics they are usually per unit volume. The continuum mechanics normalization is used throughout, with the result that uncommon factors of density show up in the thermodynamic equations. DOE

N86-18762# Los Alamos National Lab., N. Mex.
HIGH STRAIN RATE APPROX.10(6)/s RESPONSE OF 304 STAINLESS STEEL AT VARIOUS STRAINS
K. A. Johnson and K. P. Staudhammer 1985 29 p Presented at the EXPLOMET '85 - International Conference on Metallurgical Applications of Shock Wave and High Strain-Rate Phenomena, Portland, Oreg., 28 Jul. 1985
(Contract W-7405-eng-36)
(DE86-000795; LA-UR-85-3486; CONF-850770-11) Avail: NTIS HC A03/MF A01

The effect of high strain rate at controlled strain levels has been investigated on 304 stainless steel. This study implements a radial shock loading design with a reliable specimen recovery. Strains were measured by plating circle grids on a split anvil design and measured after shock loading. The strain levels were controlled by varying the momentum trap geometries. The shock wave profile impinging and traveling through the specimen as obtained by hydrocode calculations is in fact a shear wave. This shock loading design yields a specimen with a gradient of shock levels up to 1.7 Mbars at a pulse duration of less than one microsecond. The pressure range is achieved nominally independent of the strain level. With this strain pressure independence we were able to study the amount of strain induced (ALPHA)'-martensite generally associated with 304 stainless steel deformation experiments. DOE

N86-18763# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION: MACHINE GAS METAL ARC WELDING OF CARBON STEEL
C. H. Wodtke and D. R. Frizzell Aug. 1985 11 p
(Contract DE-AC05-84OR-21400)
(DE86-001492; ORNL/M-6) Avail: NTIS HC A02/MF A01

Procedure WPS-110-ASME-1 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for machine gas metal arc welding of carbon steels (P-1-1), in thickness range 0.280 to 0.75 inch; filler metal is E70S-3 (F-6, A-1); shielding gas is 95-5 argon-oxygen. DOE

N86-18764# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION: GAS TUNGSTEN ARC WELDING OF ALUMINUM ALLOYS 1XXX AND 3003
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 9 p
(Contract DE-AC05-84OR-21400)
(DE86-001508; ORNL/M-22) Avail: NTIS HC A02/MF A01

Procedure WPS-1001 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of aluminum alloys 1060, 1100, and 3003 (P-21), in thickness range 0.062 to 0.5 in.; filler metal is ER1100 (F-21); shielding gas is argon. DOE

N86-18765# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION: GAS TUNGSTEN ARC WELDING OF NICKEL-CHROMIUM-IRON AND NICKEL-CHROMIUM-MOLYBDENUM
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 13 p
(Contract DE-AC05-84OR-21400)
(DE86-001517; ORNL/M-31) Avail: NTIS HC A02/MF A01

Procedure WPS-1303-ASME-8 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of nickel-chromium-iron, N06600 (P-43), with filler metal ERNiCrFe-5 (F-43); and nickel-chromium-molybdenum, N06625 (P-43), with filler metal ERNiCrMo-3 (F-43); thickness range is 0.020 to 0.432 in.; shielding gas is argon. DOE

N86-18576# Hokkaido Univ., Sapporo (Japan). Dept. of Civil Engineering.
COLLOCATION METHOD FOR STATIC AND DYNAMIC ANALYSIS OF SHELLS OF REVOLUTION
Takashi Mikami and Jin Yoshimura *In its* Memoirs of the Faculty of Engineering, Hokkaido Univ., Vol. 16, No. 4(No. 73) Dec. 1985 p 317-328 refs (For primary document see N86-18575 09-31) Avail: NTIS HC A07/MF A01

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-18766*# Purdue Univ., West Lafayette, Ind. Lab. for Applications of Remote Sensing.
CHARACTERIZATION OF VEGETATION BY MICROWAVE AND OPTICAL REMOTE SENSING Semiannual Status Report, Aug. 1985 - Jan. 1986
C. S. T. Daughtry, Principal Investigator, K. J. Ranson, and L. L. Biehl Jan. 1986 15 p refs ERTS
(Grant NAGw-799)
(E86-10012; NASA-CR-176405; NAS 1.26:176405) Avail: NTIS HC A02/MF A01 CSCL 02C

Two series of carefully controlled experiments were conducted. First, plots of important crops (corn, soybeans, and sorghum), prairie grasses (big bluestem, switchgrass, tal fescue, orchardgrass, bromegrass), and forage legumes (alfalfa, red clover, and crown vetch) were manipulated to produce wide ranges of phytomass, leaf area index, and canopy architecture. Second, coniferous forest canopies were simulated using small balsam fir trees grown in large pots of soil and arranged systematically on a large (5 m) platform. Rotating the platform produced many new canopies for frequency and spatial averaging of the backscatter signal. In both series of experiments, backscatter of 5.0 GHz (C-Band) was measured as a function of view angle and polarization. Biophysical measurements included leaf area index, fresh and dry phytomass, water content of canopy elements, canopy height, and soil roughness and moisture content. For a subset of the above plots, additional measurements were acquired to exercise microwave backscatter models. These measurements included size and shape of leaves, stems, and fruit and the probability density function of leaf and stem angles. The relationships of the backscattering coefficients and the biophysical properties of the canopies were evaluated using statistical correlations, analysis of variance, and regression analysis. Results from the corn density and balsam fir experiments are discussed and analyses of data from the other experiments are summarized. M.G.

N86-18767# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
TOWARD A SURFACE SKETCH
J. Ponce and M. Brady Apr. 1985 32 p
(Contracts N00014-80-C-0505; N00014-77-C-0389)
(AD-A159693; AI-M-824) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper reports progress toward the development of a representation of significant surface changes in dense depth maps. The authors call the representation the Surface Primal Sketch by analogy with representations of intensity changes, image structure, and changes in curvature of planar curves. They describe an implemented program that detects, localizes, and symbolically describes: steps, where the surface height function is discontinuous; roofs, where the surface is continuous but the surface normal is discontinuous; smooth joints, where the surface normal is continuous but a principal curvature is discontinuous and changes sign; and shoulders, which consist of two roofs and correspond to a step viewed obliquely. The performance of the program on range maps of objects of varying complexity is illustrated. Author (GRA)

N86-18768# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
RECURSIVE GRADIENT ESTIMATION USING SPLINES FOR NAVIGATION OF AUTONOMOUS VEHICLES Final Technical Report
C. N. Shen Jul. 1985 44 p Presented at the 2nd Army Conference, Applied Mathematics and Computing, Troy, N.Y., 22-24 May 1984
(AD-A159883; AD-E440295; ARLCB-TR-85022) Avail: NTIS HC A03/MF A01 CSCL 17/7

Terrain gradient estimation is needed for navigation of an autonomous vehicle in climbing the hills. The in-path and cross-path terrain slopes are estimated from the set of corresponding range slopes. A two-dimensional recursive smoothing algorithm using polynomial splines in the third dimension is developed for this purpose. Approximations are introduced in the sub-optimal system so that the computation time increases only linearly with the size of the two-dimensional data. GRA

N86-18769# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
MILITARY HYDROLOGY. REPORT 8: FEASIBILITY OF UTILIZING SATELLITE AND RADAR DATA IN HYDROLOGIC FORECASTING
B. T. Miers and G. L. Huebner Sep. 1985 69 p
(DA Proj. 4A7-62719-AT-40)
(AD-A160615; WES/MP/EL-79-6-8) Avail: NTIS HC A04/MF A01 CSCL 08/8

The army that has the capability of predicting hydrologic conditions throughout the battlefield area would have a tactical advantage on both offense and defense. Such a capability, though, is dependent on a means for accurately monitoring and forecasting precipitation, the dominant driving element for dynamic hydrologic phenomena such as soil moisture and streamflow. In the context of a tactical environment with its associated constraints, the potential utility of satellites and radars was evaluated. It was concluded that, in the 1980s time frame, only the weather radar can provide rainfall estimates meeting requirements of the military hydrologist. Common components and operational characteristics of existing radar systems are discussed, and a set of general specifications for a tactical weather radar system is included. GRA

N86-18770# Geological Survey, Denver, Colo.
IDENTIFICATION AND CHARACTERIZATION OF HYDROLOGIC PROPERTIES OF FRACTURED TUFF USING HYDRAULIC AND TRACER TESTS, TEST WELL USW H-4, YUCCA MOUNTAIN, NYE COUNTY, NEVADA
J. R. Erickson and R. K. Waddell 1985 41 p refs
(Contract DE-AI08-78ET-44802)
(DE85-902212; USGS/WRI-85-4066) Avail: NTIS HC A03/MF A01

Test well USW H-4, located on the eastern edge of Yucca Mountain, Nye County, Nevada, penetrates volcanic tuffs through which water moves primarily along fractures. Data, collected from hydrologic and tracer tests and an acoustic-televiewer log, were used to quantify intrawell-bore flow directions and rates, permeability distribution, fracture porosity, and orientations of the hydraulic-conductivity ellipsoid for the test well. Borehole temperature data collected during a pumping test were used to identify 33 locations at which water was entering the hole. These results correlated well with results from radioactive-tracer surveys and packer tests of isolated intervals. Iodine-131 was used as a tracer under nonpumping conditions to study flow within the borehole, and to identify fractures that produced or accepted water. Water within the borehole was moving down from above and up from below toward the interval between 2500 and 3070 feet. Inflow and outflow were detected in the two most permeable zones in the borehole; however, the nondetection of it in the other test intervals may have resulted from monitoring periods that were too short. In the uppermost permeable zone, water moved down from above 2365 feet and exited the borehole between 2365 to 2375 feet; freshwater entered the borehole between 2380 and 2385 feet and moved downward. The probable shape and orientation of the hydraulic-conductivity ellipsoid were calculated from fracture frequency and orientation data. The plane containing the two larger principal axes of the ellipsoid strikes approximately north 23(0) east and is nearly vertical. These two axes are approximately the same magnitude and are five to seven times larger than the smallest axis. Fracture porosity is about 0.0001 to 0.001, as estimated from the cubic law for hydraulic conductivity of fractures. DOE

N86-18771# Geological Survey, Augusta, Maine. Water Resources Div.
WATER RESOURCES DATA FOR MAINE, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
C. R. Haskell, W. P. Bartlett, W. B. Higgins, and W. J. Nichols May 1985 155 p
(PB85-240265; USGS/WRD/HD-85/232; USGS/WDR/ME-84/1)
Avail: NTIS HC A08/MF A01 CSCL 08H

Water resources data for the 1984 water year for Maine consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of wells. The report contains discharge records for 53 gaging stations; stage only for 2 gaging stations; contents for 17 lakes and reservoirs; water quality for 11 gaging stations; and water levels for 17 observation wells. Author (GRA)

N86-18772# National Park Service, Homestead, Fla. Everglades National Park.
GEOLOGIC STRUCTURE OF THE SURFICIAL AQUIFER SYSTEM UNDERLYING EVERGLADES NATIONAL PARK AND BIG CYPRESS NATIONAL PRESERVE Technical Report, 1930 - 1984
M. Jarosewich and J. Wagner Aug. 1985 51 p
(PB85-247609; SFRC-85/02) Avail: NTIS HC A04/MF A01 CSCL 08H

Well logs from 67 existing deep wells in southern Florida were used to determine the stratigraphy, depth, and extent of the Surficial Aquifer System underlying Everglades National park and the Big Cypress National Preserve, Florida. Four geologic cross sections were prepared along well transects within the park and preserve to profile the aquifer system. The profiles reveal considerable heterogeneity in the lithologies but suggest two distinct zones. The premeable upper zone and the more permeable beds of the lower zone were considered to be hydrologically connected; thus, the two zones were treated as comprising a Surficial Aquifer System. Presence of a regionally continuous green clay bed of the lower Tamiami formation was verified, and it was considered the base of the aquifer system. Depth of this bed was determined for the 67 wells, and a contour map of depth of the base of the Surficial Aquifer System was constructed for Dade, Coolier, and northern Monroe counties. Author (GRA)

N86-18358# Bristol Univ. (England)
SATELLITE REMOTE SENSING IN HYDROLOGY
R. W. Herschy (ESA/ESTEC, Noordwijk, Netherlands), E. C. Barrett, and J. N. Roozekrans (Environmental Analysis and Remote Sensing, Delft, Netherlands) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 47-53 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18366# Karlsruhe Univ. (West Germany). Inst. fuer Photogrammetry and Topography.
FUTURE MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS) DEVELOPMENTS: DISCUSSION OF IMPROVEMENTS AND POSSIBILITIES TO BE EXPECTED FOR GEOLOGICAL APPLICATIONS
J. Bodechtel (Technische Univ., Munich, West Germany) and H. Kaufmann *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 93-96 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18368# Exmoor National Park Dept., Dulverton (England).
REMOTE SENSING FOR ENVIRONMENTAL MANAGEMENT OF BRITISH NATIONAL PARKS: REVIEW AND PREVIEW
L. F. Curtis *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 107-114 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18373# Joint Research Centre of the European Communities, Ispra (Italy).
THE JOINT RESEARCH COMMITTEE (JRC) PROGRAM ON REMOTE SENSING
S. R. GallideParatesi *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 141-150 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18379# European Space Agency, Paris (France).
SPACE STATION: ESA VIEWS ON REQUIREMENTS FOR EXPERIMENTAL AND OPERATIONAL EARTH OBSERVATION MISSIONS
G. Duchossois *In its* Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 189-199 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18380# Centre National de la Recherche Scientifique, Valbonne (France). Centre de Recherches Archeologiques.
REMOTE SENSING AND ARCHAEOLOGICAL RESEARCH IN THESSALY, GREECE. NEW PROSPECTS IN ARCHAEOLOGICAL LANDSCAPE
E. Barisano and B. Helly *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 203-209 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-18773*# United Technologies Corp., South Windsor, Conn. Power Systems Div.
ONSITE 40-KILOWATT FUEL CELL POWER PLANT MANUFACTURING AND FIELD TEST PROGRAM Interim Report
Feb. 1985 162 p refs
(Contracts DEN3-255; DE-AI31-80ET-17088)
(NASA-CR-174988; DOE/NASA/0255-1; NAS 1.26:174988; FCR-6868) Avail: NTIS HC A08/MF A01 CSCL 10B

A joint Gas Research Institute and U.S. Department of Energy Program was initiated in 1982 to evaluate the use of fuel cell power systems for on-site energy service. Forty-six 40 kW fuel cell power plants were manufactured at the United Technologies Corporation facility in South Windsor, Connecticut, and are being delivered to host utilities and other program participants in the United States and Japan for field testing. The construction of the 46 fully-integrated power plants was completed in January 1985 within the constraints of the contract plan. The program has provided significant experience in the manufacture, acceptance testing, deployment, and support of on-site fuel cell systems. Initial field test results also show that these experimental power plants meet the performance and environmental requirements of a commercial specification. This Interim Report encompasses the design and manufacturing phases of the 40 kW Power Plant Manufacturing and Field Test program. The contract between UTC and NASA also provides UTC field engineering support to the host utilities, training programs and associated manuals for utility operating and maintenance personnel, spare parts support for a defined test period, and testing at UTC of a power plant made available from a preceding program phase. These activities are ongoing and will be reported subsequently. Author

N86-18774*# AeroVironment, Inc., Monrovia, Calif.
DEVELOPMENT AND TESTING OF TIP DEVICES FOR HORIZONTAL AXIS WIND TURBINES Final Report
G. W. Gyatt and P. B. S. Lissaman May 1985 86 p refs
(Contracts DEN3-341; DE-AI01-76ET-20320)
(NASA-CR-174991; DOE/NASA/0341-1; NAS 1.26:174991; AV-FR-85/802) Avail: NTIS HC A05/MF A01 CSCL 10A

A theoretical and field experimental program has been carried out to investigate the use of tip devices on horizontal axis wind turbine rotors. The objective was to improve performance by the reduction of tip losses. While power output can always be increased by a simple radial tip extension, such a modification also results in an increased gale load both because of the extra projected area and longer moment arm. Tip devices have the potential to increase power output without such a structural penalty. A vortex lattice computer model was used to optimize three basic tip configuration types for a 25 kW stall limited commercial wind turbine. The types were a change in tip planform, and a single-element and double-element nonplanar tip extension (winglets). A complete data acquisition system was developed which recorded three wind speed components, ambient pressure, temperature, and turbine output. The system operated unattended and could perform real-time processing of the data, displaying the measured power curve as data accumulated in either a bin sort mode or polynomial curve fit. Approximately 270 hr of perormance data were collected over a three-month period. The sampling interval was 2.4 sec; thrus over 400,000 raw data points were logged. Results for each of the three new tip devices, compared with the original tip, showed a small decrease (of the order of 1 kW) in power output over the measured range of wind speeds from cut-in at about 4 m/s to over 20 m/s, well into the stall limiting region. Changes in orientation and angle-of-attack of the winglets were not made. For aircraft wing tip devices, favorable tip shapes have been reported and it is likely that the tip devices tested in this program did not improve rotor performance because they were not optimally adjusted. Author

N86-18775*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MOD-2 WIND TURBINE FIELD OPERATIONS EXPERIMENT Final Report
Larry H. Gordon Dec. 1985 17 p refs
(Contract DE-AI01-76ET-20320)
(NASA-TM-87233; DOE/NASA/20320-69; E-2901; NAS 1.15:87233) Avail: NTIS HC A02/MF A01 CSCL 10A

The three-machine, 7.5 MW Goodnoe Hills located near Goldendale, Washington and is now in a research/experimental operations phase that offers a unique opportunity to study the effects of single and multiple wind turbines interacting with each other, the power grid; and the environment. Following a brief description of the turbine and project history, this paper addresses major problem areas and research and development test results. Field operations, both routine and nonroutine, are discussed. Routine operation to date has produced over 13,379,000 KWh of electrical energy during 11,064 hr of rotation. Nonroutine operation includes suspended activities caused by a crack in the low speed shaft that necessitated a redesign and reinstallation of this assembly on all three turbines. With the world's largest cluster back in full operation, two of the turbines will be operated over the next years to determine their value as energy producer. The third unit will be used primarily for conducting research tests

requiring configuration changes to better understand the wind turbine technology. Technical areas summarized pertain to system performance and enhancements. Specific research tests relating to acoustics, TV interference, and wake effects conclude the paper. Author

N86-18776*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUMMARY OF TOWER DESIGNS FOR LARGE HORIZONTAL AXIS WIND TURBINES
G. R. Frederick (Toledo Univ., Ohio) and J. M. Savino 1986 21 p refs Presented at the Energy-Source Technology Conference and Exhibition, New Orleans, Louisiana, 23-27 Feb. 1986; sponsored by the American Society of Mechanical Engineers
(NASA-TM-87166; E-2803; DOE/NASA/20320-68; NAS 1.15:87166) Avail: NTIS HC A02/MF A01 CSCL 10A

Towers for large horizontal axis wind turbines, machines with a rotor axis height above 30 meters and rated at more than 500 kW, have varied in configuration, materials of construction, type of construction, height, and stiffness. For example, the U.S. large HAWTs have utilized steel truss type towers and free-standing steel cylindrical towers. In Europe, the trend has been to use only free-standing and guyed cylindrical towers, but both steel and reinforced concrete have been used as materials of construction. These variations in materials of construction and type of construction reflect different engineering approaches to the design of cost effective towers for large HAWTs. Tower designs are the NASA/DOE Mod-5B presently being fabricated. Design goals and requirements that influence tower configuration, height and materials are discussed. In particular, experiences with United States large wind turbine towers are elucidated. Finally, current trends in tower designs for large HAWTs are highlighted. Author

N86-18777*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Solar Thermal Power Systems Project.
PUBLICATIONS OF THE JPB SOLAR THERMAL POWER SYSTEMS PROJECT 1976 THROUGH 1985
P. Panda, comp., V. Gray, comp., and C. Marsh, comp. 1 Sep. 1985 93 p
(Contracts NAS7-918; JPL Proj. 5105-160; Contract DE-AM04-80AL-13137)
(NASA-CR-176533; JPL-Pub-85-52; NAS 1.26:176533; DOE/JPL-1060-87) Avail: NTIS HC A05/MF A01 CSCL 10B

Bibliographical listings are documentation products associated with the Solar Thermal Power Systems Project carried out by the Jet Propulsion Laboratory from 1976 to 1986. Documents are categorized as conference and journal papers, JPL external reports, JPL internal reports, or contractor reports (i.e., deliverable documents produced under contract to JPL). Alphabetical listings by titles are used in the bibliography itself to facilitate location of the document by subject. Two indexes are included for ease of reference; an author index; and a topical index. Author

N86-18778# Naval Postgraduate School, Monterey, Calif.
SOLAR SIMULATION LABORATORY DESCRIPTION AND MANUAL M.S. Thesis
K. T. Mabie Jun. 1985 66 p
(AD-A159729; NPS67-85-006) Avail: NTIS HC A04/MF A01 CSCL 10/2

This research project consisted of writing a manual for testing solar cells. It was written for students in the Space Operations and Space Engineering curricula at the Naval Postrgraduate School. A location was selected and equipment was purchased for the construction. The manual begins with a introduction to solar cell theory. The individual components of the solar power laboratory are discussed in detail and their integration into a system is described. The system was designed for automated data acquisition. An IBM PC/XT is the central point of the system. Two computer programs written in IBM BASIC are included for the user with a complete discussion of each. GRA

N86-18779# National Bureau of Standards, Gaithersburg, Md. Polymers Div.
POLYMER ELECTROLYTE BASED ON POLY(ETHYLENE IMINE) AND LITHIUM SALTS
C. K. Chiang, G. T. Davis, C. A. Harding, and T. Takahashi 1 Oct. 1985 16 p
(Contract N00014-85-F-0022)
(AD-A160381; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

The dissolution of lithium salts in linear poly(ethylene imine) has been investigated because of its possible role as a solid electrolyte in lithium batteries. Lithium salts included in the study are LiF, LiCl, LiBr, LiI, LiSCN, LiCl104 and LiBF4. When cast from solution in a common solvent, a uniform mixture is obtained (expect for the case of LiF). Interaction of the salt and polymer can be characterized by observing a loss in crystallinity of the polymer and an increase in the glass transition temperature. At concentrations of salt below 10 mole percent, the polymer can slowly recrystallize at room temperature, but at higher concentrations the mixture remains amorphous for an indefinite period of time. DC conductivity at room temperature is about .0000001 S/cm but increases to .001 S/cm at 150 C. Author (GRA)

N86-18780# Trane Co., LaCrosse, Wis.
EVALUATION OF ADVANCED DESIGN CONCEPTS FOR ABSORPTION HEAT PUMPS
Floyd C. Hayes and Robert J. Modahl 1984 14 p Conference held at appropriate place and time
(DE85-005090; CONF-841231-9) Avail: NTIS HC A02/MF A01

The status of an advanced absorption heat pump program is presented. The evaluation, development, and proof testing of advanced absorption refrigeration cycles which are applicable to residential and commercial space conditioning systems is reviewed. Phase 1 of the program involved the analytical evaluation of cycles and fluids, and the selection of a preferred concept for breadboard demonstration is Phase 2. Direct firing with natural gas, and working fluids whose properties are reasonably well known were tested. Target COP's were 1.6 at 47 F and 1.2 at 17 F in the heating mode, and 0.7 at 95 F in the cooling mode. Including the effect of flue losses. An air cooled system for commercial applications was studied. DOE

N86-18781# Sandia National Labs., Albuquerque, N. Mex. Geothermal Research Div.
PRELIMINARY CONSIDERATIONS FOR EXTRACTION OF THERMAL EFFECT FROM MAGMA
C. E. Hickox and J. C. Dunn 1985 7 p refs
(Contract DE-AC04-76DF-00789)
(DE85-009341; SAND-85-0650C) Avail: NTIS HC A02/MF A01

Simplified mathematical models are developed to describe the extraction of thermal energy from magma based on the concept of a counter-flow heat exchanger inserted into the magma body. Analytical solutions are used to investigate influence of the basic variables on electric power production. Calculations confirm that the proper heat exchanger flow path is down the annulus with hot fluid returning to the surface through the central core. The core must be insulated from the annulus to achieve acceptable wellhead temperatures, but this insulation thickness can be quite small. The insulation is effective in maintaining the colder annular flow below expected formation temperatures so that a net beat gain from the formation above a magma body is predicted. The analynes show that optimum flow rates exist that maximize electric power production. These optimum flow rates are functions of the heat transfer coefficients that describe magma energy extraction. Author

N86-18782# National Bureau of Standards, Gaithersburg, Md. Building Equipment Div.
THE PERFORMANCE OF A RESIDENTIAL HEAT PUMP OPERATING WITH A NONAZEOTROPIC BINARY REFRIGERANT MIXTURE Interim Report
David Didion and William Mulroy 1984 8 p refs Presented at a conference
(DE85-005245; CONF-841231-16) Avail: NTIS HC A02/MF A01

Results of laboratory measurement of the performance change of a substantially unmodified residential heat pump designed for

222 when charged with a non azeotropic, binary mixture of R1381 and R152a is presented. Results are presented for various sizes of fixed expansion devices. The effect of gliding temperature in the saturation zone was found to be small. The effect of compositions shift by flash distillation in the accumulator was found to measurably improve low temperature heating performance. It was further observed that some system modification (such as the addition of a receiver) could have further enhanced this low temperature heating performance improvement. DOE

N86-18783# Westinghouse Electric Corp., Pittsburgh, Pa. Thermohydraulic Systems.
DUAL-STROKE HEAT PUMP FIELD PERFORMANCE
S. E. Veyo 1984 11 p Conference held at appropriate time and place
(DE85-005247; CONF-841231-12) Avail: NTIS HC A02/MF A01

Two nearly identical proprototype systems, each employing a unique dual-stroke compressor, were built and tested. One was installed in an occupied residence in Jeannette, Pa. It has provided the heating and cooling required from that time to the present. The system has functioned without failure of any prototypical advanced components, although early field experience did suffer from deficiencies in the software for the breadboard micro processor control system. Analysis of field performance data indicates a heating performance factor (HSPF) of 8.13 Stu/Wa, and a cooling energy efficiency (SEER) of 8.35 Scu/Wh. Data indicate that the beat pump is oversized for the test house since the observed lower balance point is 3 F whereas 17 F La optimum. Oversizing coupled with the use of resistance heat ot maintain delivered air temperature warmer than 90 F results in the consumption of more resistance heat than expected, more unit cycling, and therefore lower than expected energy efficiency. Our analysis indicates that with optimal mixing the dual stroke heat pump will yield as HSFF 30% better than a single capacity heat pump representative of high efficiency units in the market place today for the obeerved weather profile. DOE

N86-18784# North Wind Power Co., Inc., Moretown, Vt.
NEW YORK STATE POLICE REMOTE COMMUNICATIONS SITE SMALL WIND ENERGY CONVERSION SYSTEM Final Report
Mar. 1985 21 p
(TI85-901683; NYSERDA-85-3; Rept-515-RIER-RER-83) Avail: NTIS HC A02/MF A01

This report concludes a year-long demonstration and study of the use of a North Wind Model HR2 wind energy conversion aystem to supply the power for a remote New York State Police microwave repeater site at Mt. Morris in the Adiroundack Mountains. Data were collected on a multi-channel digital strip chart recorder which provided a printout of the real-time relation between windspeed, power output, battery capacity and voltage, and contribution from backup power. These data proved that the site could be run on wind power alone and predictions can now be made on the performance of an HR2 or similar wind system at other sites. DOE

N86-18785# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SILVER/GLASS MIRRORS FOR SOLAR THERMAL SYSTEMS
A. Czanderna, K. Masterson, and T. M. Thomas Jun. 1985 69 p
(Contract DE-AC02-83CH-10093)
(DE85-000537; SERI/SP-271-2293) Avail: NTIS
HC A04/MF A01

The principal objective of this document is to review the state-of-the-art of the design, manufacture, testing, and performance of silver/glass mirrors for solar thermal systems applications. This document treats each of these topics: the fundamentals of silver/glass mirrors, the desired and actual mechanical and optical properties of silver/glass mirrors, the research literature on the physics and chemistry of silver/glass mirrors, present testing procedures and results for solar mirrors, and a summary of the float glass manufacturing process for fabricating commercial silver/glass mirrors. DOE

N86-18786# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
RESEARCH PROGRESS IN THE DOE/SERI AMORPHOUS SILICON RESEARCH PROJECT
E. Sabisky, W. Wallace, B. Stafford, K. Sadion, and W. Luft Apr. 1985 8 p
(DE85-006796; SERI/RR-211-2707) Avail: NTIS
HC A02/MF A01

The Amorphous Silicon Research Project (ASRP), established at the Solar Energy Research Institute (SERI) in 1983, is responsible for all USDOE government-supported research activities in the field of amorphous silicon photovoltaics. The objectives and research directions of the project have been established by a Five-Year Research Plan developed at SERI in cooperation with the Department of Energy in 1984. In order to accomplish project goals, research is performed by a combination of: (1) multi-year programs consisting of multi-disciplinary research teams based on strong government/industry partnerships: and (2) basic research performed in university, government, and industrial laboratories. A summary of recent research progress in the ASRP program is presented. DOE

N86-18787# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
AMORPHOUS SILICON CONCEPTUAL MODULE DESIGN AND COST ESTIMATE
L. Mrig and B. Jackson Aug. 1985 86 p
(Contract DE-AC02-83CH-10093)
(DE85-012177; SERI/RR-216-2668) Avail: NTIS
HC A05/MF A01

A 10% efficient, amorphous silicon module of monolithic construction was conceptualized and costed. The design study successfully defined a module structure amenable to large-scale structures. Narrow, series-connected cells deposited on 4-ft(2) glass substrates and running the width of the module were consistent with material design constraints and module operating requirements. Series connections were made by a thin film of metal on the back of each cell and a transparent conductive oxide (TCO) film on the front. In a laser scribing study, spectral analyses were made to determine the best wavelengths of light to use in scribing TCO, while minimizing the impact on the glass substrate. Relatively thin scribing widths were possible at speeds consistent with commercial production schedules. Each step in module production was described in terms of the parameters that determine costs, assuming a 200-MW/y facility in 1995. Results indicate that with continued government support photovoltaic research, the outlook is excellent for low module production costs based on current conceptual designs. DOE

N86-18788# Argonne National Lab., Ill.
ADVANCED TUBULAR EVACUATED SOLAR COLLECTOR WORKSHOP, SUMMARY
1985 124 p Workshop held at Argonne, Ill., 15 Feb. 1985
(Contract W-31-109-eng-38)
(DE85-018366; CONF-8502104-Summ) Avail: NTIS
HC A06/MF A01

A summary of a workshop on advanced tubular evacuated solar collectors is presented. Workshop topics include stationary concentrating collectors, extrusion of glass tubes, selective surface coatings, reflectors, heat pipe absorbers, getters and outgassing, tube assembly and design and installation. DOE

N86-18789# Martin Marietta Aerospace, Denver, Colo.
MOLTEN SALT ELECTRIC EXPERIMENT (MSEE): PHASE 1 REPORT. VOLUME 3
Aug. 1985 565 p
(Contract DE-AC04-76DR-00789)
(DE86-001120; SAND-85-8175-Vol-3) Avail: NTIS
HC A24/MF A01

The Molten Salt Electric Experiment (MSEE) conducted at the Central Receiver Test Facility (CRTF) located in Albuquerque, New Mexico, is the first large-scale demonstration in the United States of the technical feasibility of operating a solar central receiver

power plant with molten nitrate salt as the receiver heat transfer fluid and thermal storage medium. This report documents the design, construction, and checkout (Phase 1) of the project. This final report consists of three volumes. In this third volume the documentation generated to support the MSEE is presented, including topics such as the test plan, failure modes analysis, master control subsystem specifications, heat trace, and stability analysis. DOE

N86-18790# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
STATUS OF THE LIGHT-INDUCED EFFECT IN AMORPHOUS SILICON MATERIAL AND IN a-Si SOLAR CELLS
E. S. Sabisky Sep. 1985 36 p
(Contract DE-AC02-83CH-10093)
(DE85-016857; SERI/RR-211-2800) Avail: NTIS HC A03/MF A01

This report contains a description of the status of research on the light-induced change that occurs in hydrogenated amorphous silicon solar cells and material (the Staebler-Wronski effect). We can observe this effect in solar cells made of a-Si material when cell efficiency drops rapidly in the initial stage of optical exposure and then exhibits a much slower decay or no subsequent change. Because long-term stability is one of the primary parameters that impact the application options open to photovoltaic systems, the light-induced effect must be resolved. It may be possible to develop device structures that will minimize this effect. DOE

N86-18791# Los Alamos National Lab., N. Mex.
SP-100 LOW MASS SHIELD DESIGN
D. E. Carlson 1985 10 p Presented at the 2nd SP-100 Program Integration Meeting, Denver, Colo., 17 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000787; LA-UR-85-3140; CONF-8509153-5) Avail: NTIS HC A02/MF A01

The shielding considerations for an unmanned space reactor system are somewhat different from those for a terrestrial reactor. An unmanned operation in space implies that only a shadow shield, rather than a 4(PI) one, is required to protect payload hardware that typically can tolerate 10(4) to 10(6) times more radiation than can a human crew. On the other hand, the system mass, of which the radiation shield can be a significant fraction, is a severe constraint for space reactors and not normally a problem with terrestrial ones. The object of this paper is to briefly summarize advancements made on various aspects of low mass shield design for space reactors, including materials and their arrangements, geometric factors and their potential impact on system design optimization, and proposed new configuration concepts for further mass reduction. DOE

N86-18792# Martin Marietta Aerospace, Denver, Colo.
MOLTEN SALT ELECTRIC EXPERIMENT (MSEE): PHASE 1 REPORT. VOLUME 2
Aug. 1985 347 p
(Contract DE-AC04-76DR-00789)
(DE86-001119; SAND-85-8175-Vol-2) Avail: NTIS HC A15/MF A01

The Molten Salt Electric Experiment (MSEE) conducted at the Central Receiver Test Facility (CRTF) located in Albuquerque, New Mexico, is the first large-scale demonstration in the United States of the technical feasibility of operating a solar central receiver power plant with molten nitrate salt as the receiver heat transfer fluid and thermal storage medium. This report documents the design, construction, and checkout (Phase 1) of the project. This final report consists of three volumes. In this second volume, the historical development of the MSEE program and a summary of the test activities and results are presented. DOE

N86-18793# Midwest Research Inst., Kansas City, Mo.
SOLERAS: PHOTOVOLTAIC POWER SYSTEMS PROJECT. RURAL SOLAR APPLICATIONS, PROJECT SUMMARY Final Report
1985 15 p
(Contract DE-AC02-83CH-10093)
(DE86-001260; MRI/SOL-0100) Avail: NTIS HC A02/MF A01

The Saudi Solar Village Project photovoltaic system is described, consisting of 160 arrays, a computerized control system, 1100 kW of electrical storage in lead-acid batteries, and an automatic weather data gathering system. Satisfactory overall system performance is reported. Performance degradation due to dust on the array lenses was determined. Field operational problems are discussed. DOE

N86-18794# Oak Ridge National Lab., Tenn.
ANTIREFLECTION COATINGS FOR PLANAR SILICON SOLAR CELLS
G. E. Jellison, Jr. and R. F. Wood Sep. 1985 216 p
(Contract DE-AC05-84OR-21400)
(DE86-001428; ORNL/TM-9717) Avail: NTIS HC A10/MF A01

Calculations are presented for the effect of various antireflection coatings on silicon solar cells. In particular, the relationship of different quantum efficiencies and illumination spectra to the optimum film thickness(es) and to the maximum collectible current is examined. It is found that the ratio of the collectible current to the maximum possible current (with the reflectivity = 0 over the entire solar spectrum) is larger if the solar cell has a poor spectral quantum efficiency and/or the illumination spectrum is peaked (such as from an ELH lamp). Single- and double-layer coatings are examined, and it is found that the double-layer coatings are less sensitive to errors in the coating thicknesses, as well as yielding more collectible current. A series of tables of optimum thicknesses, curvatures, and maximum fractions of collectible currents can be found in the appendix. DOE

N86-18795# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DESIGN METHOD FOR THE CALCULATION OF PERFORMANCES AND FLAP MOVEMENT OF FLEXIBLE WIND TURBINE BLADES [ONTWERPMETHODE VOOR DE BEREKENING VAN PRESTATIES EN KLAPBEWEGING VAN FLEXIBELE WINDTURBINEBLADEN]
Th. vanHolten and J. L. Kooman Feb. 1983 42 p refs In DUTCH
(VTH-M-453) Avail: NTIS HC A03/MF A01

Performances, flap movements and loads of so-called flexible wind turbine blade were calculated in cases of right flow, flow with a velocity gradient, and oblique flow. The helicopter rotor based calculation method is simplified, and proves useful for first design estimates. The blades are schematized into intransformable blades attached to the hub using hinges with a spring stiffness such that the rotating natural frequency of the model blade flap movement is equal to the real blade natural frequency. Author (ESA)

N86-18796# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
OUTPUT CALCULATIONS OF THE GIROMILL WIND TURBINE [OPBRENGSTBEREKENINGEN GIROMILL-WINDTURBINE]
G. J. W. vanBussel Sep. 1983 29 p refs In DUTCH
(VTH-M-484) Avail: NTIS HC A03/MF A01

Based on test data from a wind turbine test field, the performance of a three bladed vertical axis wind turbine with a cyclic blade angle adjustment was calculated. The effect of the replacement of a 1000 rpm generator by a 750 rpm generator on the output of an erected turbine, is calculated. The modification is considered to reduce vibration. The effect of revolving variations on the output is examined. The losses of power are high. An increase of power seems possible if design modifications, such as the switching-off of the adjustment mechanism during normal operation, are carried out. Author (ESA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-18797# Missouri Univ., Rolla. Dept. of Physics.
THE OPTICAL CONSTANTS OF SMOKE MATERIALS (NATURALLY OCCURRING MINERALS) PLUS IRON AND GRAPHITE IN THE MILLIMETER AND SUBMILLIMETER Contractor Report May 1982 - May 1984
R. J. Bell, R. W. Alexander, Jr., L. L. Long, M. A. Ordal, and R. Paul Sep. 1985 103 p
(Contract DAAK11-82-C-0052)
(AD-A160614; CRDC-CR-85057) Avail: NTIS HC A06/MF A01 CSCL 08/7

Optical constants were measured for seven minerals from 20 to 400 cm (to the minus 1 power). These data were combined with those of Dr. Querry from the University of Missouri-Kansas City to cover the 20 to 4000 cm (to the minus 1 power) range. Such optical constants are needed to calculate the transmission in the millimeter and submillimeter of soil aerosols in the atmosphere and to assess the value of soil aerosols as obscurants. These optical constants were obtained by Kramers-Kronig analysis of reflectance spectra of pressed powder pellets. The optical constants of iron, aluminum and graphite were obtained from reflectance spectra measured in our laboratory and that of Dr. Querry to cover the region from 20 cm (to the minus 1 power to 20,000 cm (to the minus 1 power). Literature values were tabulated for 10 additional metals. These optical constants are needed for evaluation of metallic chaffs and powders as obscurants. Other techniques for measuring optical constants of metals in the millimeter and submillimeter were evaluated. GRA

N86-18798# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SUITABILITY OF POLYVINYL CHLORIDE PIPE FOR MONITORING TNT, RDX, HMX, AND DNT IN GROUNDWATER
L. V. Parker, T. F. Jenkins, and B. T. Foley Aug. 1985 32 p
(AD-A160733; CRREL-SP-85-12; AMXTH-TE-TR-85037) Avail: NTIS HC A03/MF A01 CSCL 13/2

A number of samples of commercial PVC groundwater monitoring pipe, which varied in schedule, diameter or manufacturer, were placed in contact with low concentrations of aqueous solutions of TNT, RDX, HMX and 2,4-DNT for 80 days under nonsterile conditions. Results indicated that there was some loss of TNT and HMX in the presence of PVC pipe compared to glass controls but that for the most part concentrations of analyte were equivalent between types of pipe. A second experiment was performed to determine if the losses were due solely to sorption or if biodegradation was also a factor. This experiment was done under a variety of groundwater conditions by varying salinity, initial pH and dissolved oxygen. The only case where there was increased loss of any substance because of the presence of PVC pipe was in the TNT solution under nonsterile conditions. This increased loss was thought to be associated with increased microbial degradation rather than sorption. Therefore, given the length of time of this experiment and the small amount of loss attributable to sorption, PVC groundwater monitoring pipe is acceptable for monitoring groundwater for these munitions. Several samples of PVC pipe were also leached with groundwater for 80 days and no detectable interferences were found by reversed phase HPLC analysis. GRA

N86-18799# Naval Ocean Systems Center, San Diego, Calif.
ECOLOGICAL-EVALUATION OF ORGANOTIN-CONTAMINATED SEDIMENT Final Report, Mar. - Jun. 1984
M. H. Salazar and S. M. Salazar Jul. 1985 25 p
(AD-A160748; NOSC/TR-1050) Avail: NTIS HC A02/MF A01 CSCL 06/6

A standard dredged material bioassay was conducted with high levels of organotins to assess the toxicity and bioavailability of organotins associated with sediment and to determine if this sediment would qualify for ocean disposal. This study concluded that high levels of organotins in sediments do not a priori indicate a significant adverse impact on the marine environment after ocean disposal. The sediment tested would qualify for ocean disposal under the present guidelines administered by the Environmental Protection Agency and the Army Corps of Engineers. Particulate-phase tests were conducted with Acanthomysis sculpta (mysid), Citharichthys stigmaeus (flatfish), and Acartia tonsa (copepod). Solid-phase tests were conducted with A. sculpta, Macoma nasuta (clam), and Neanthes arenaceodentata (polychaete worm). The bioassay also included an estimate of the potential for bioaccumulation of cadmium, chromium, copper, mercury, silver, pesticides, PCBs, petroleum hydrocarbons, and organotins. Survival was high in all particulate-phase and solid-phase tests. GRA

N86-18800# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
METHYLENE CHLORIDE SAMPLING WITH PASSIVE DOSIMETERS UNDER STEADY-STATE AND TRANSIENT CONDITIONS M.S. Thesis
F. B. Liebhaber, Jr. 1985 86 p
(AD-A160794; AFIT/CI/NR-85-130T) Avail: NTIS HC A05/MF A01 CSCL 06/9

This thesis investigates the application of passive charcoal dosimeters to monitor concentrations of methylene chloride vapors. Monitoring the workplace air for methylene chloride vapors requires the collection of air samples in the worker's breathing zone during the work day. The work day exposure usually fluctuates and the air samples must be integrated over periods of several hours or more. This sample integration determines the time-weighted average (TWA) concentration. TWA exposures assist the industrial hygienist in assessing the healthfulness of the occupational environment and are used for compliance purposes by comparison with established 8-hour time-weighted average standards. This study examined the methylene chloride sampling and retention abilities of passive dosimeters and their subsequent TWA determinations. To evaluate their performance, three commercially available dosimeters were exposed to known concentration profiles of methylene chloride. This comparison was done under laboratory conditions to minimize the differences in actual badge exposure. There are five hypotheses to be tested. Each hypotheses tests the central issue: passive dosimetry is an accurate method to sample fluctuating occupational exposures to methylene chloride. GRA

N86-18801# Naval Ocean Systems Center, San Diego, Calif.
TOXICITY OF AQUEOUS FILMFORMING FOAMS TO MARINE ORGANISMS: LITERATURE REVIEW AND BIOLOGICAL ASSESSMENT Final Report, period ending Oct. 1982
S. M. Salazar Jul. 1985 41 p
(AD-A160874; NOSC/TD-825) Avail: NTIS HC A03/MF A01 CSCL 06/6

This document summarized information from literature regarding the toxicity of aqueous filmforming foams (AFFF) and presents results of supplementary toxicity tests using AFFF and appropriate marine organisms. Aqueous filmforming foams (AFFF) are used regularly by the Air Force and Navy in training exercises at fire-fighting schools and, when necessary, for fuel/oil fire control aboard ship. The AFFFs are a combination of fluorocarbons, surfactants, and solubilizers. The usage of AFFF and the disposal of AFFF-laden wastewater have the potential for an adverse impact on the environment. The results of this study suggests that the dispersion of AFFF agents in the marine environment should not have a significant impact on marine life. Dilution of the 6-percent solution used for fire-fighting operations by wave and tidal activity results in concentrations that can be considered mildly toxic or nontoxic to marine life. The FC-78oB AFFF is not toxic to the marine algo Dunaliella at concentrations up to 4.0 gm/liter. The estimated 96-hour LC50 for brine shrimp, Artemia salina, is between 4.0 and 6.0 gm/liter. These LC50 concentrations are in the range of those reported for other marine and freshwater organisms. GRA

N86-18802# Argonne National Lab., Ill.
PRACTICAL ASPECTS OF MEASURING DRY DEPOSITION
M. L. Wesely and B. B. Hicks 1985 6 p refs Presented at the

PA/USGS/EPRI Workshop on Acid Deposition Monitoring and nalysis, Raleigh, N.C., 30 Apr. 1985 Prepared in cooperation ith National Oceanic and Atmospheric Administration, Oak Ridge, enn.
Contract W-31-109-eng-38)
DE85-018465; CONF-8504158-2) Avail: NTIS HC A02/MF A01

The dry deposition of atmospheric trace substances is the ransfer of substances to the surface of the earth by all processes xcluding those aided directly by precipitation. These include the ertical turbulent transfer of trace gases and fine particles and he gravitational settling of large particles in the lower atmosphere. To address the dry deposition of acidic substances, we need to consider the major sulfur and nitrogen substances, which include SO2, HNO3 vapor, NO2, particulate sulfate, and particulate nitrate. Others often considered are NO, PAN, and organic sulfates. Ozone should be added to this list because it is a substance that is often linked to harmful effects on surface vegetation and materials, and its effects are frequently intermingled with effects of airborne sulfur and nitrogen substances. Here, our discussion will be confined mainly to SO2, HNO3, NO2, particulate sulfur, particulate nitrate and O3. These contaminants do not include all substances of general importance in evaluating acid deposition, because the numerous substances involved in chemical transformations that modify the acidic chemical species before being deposited are not addressed. DOE

N86-18803# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
DISPERSION EXPERIMENTS USING SHORT-TERM RELEASES OF AN ATMOSPHERIC TRACER
A. H. Weber and R. J. Kurzeja 1985 13 p refs Presented at the 7th Symposium on Turbulence and Diffusion of the AMS, Boulder, Colo., 12 Nov. 1985
(Contract DE-AC09-76SR-00001)
(DE85-018519; DP-MS-85-40; CONF-851177-4) Avail: NTIS HC A02/MF A01

The Mesoscale Atmospheric Transport Studies (MATS) experiments were undertaken to provide a data base for determining the accuracy of mesoscale atmospheric dispersion model predictions for short term releases. This paper describes the MATS experiments and compares observed dispersion parameters with theory. The movement of the sulfur hexaflouride cloud has been compared with wind sensors placed at several different elevations. The observed sigma-y values are also compared with theory and found to agree well with Pasquill's (1976) method. The aim in the MATS experiments has been to achieve as many scientific goals as possible while answering the fundamental question of model accuracy. The MATS experiments provide information on cros: wind and downwind spread of material. The horizontal spread is obtained by a crosswind system of samplers and downwind spread can be determined by using several arcs. Unfortunately, budget considerations restricted the sampling to a single arc at about 30 km downwind from the release point. Despite this limitation, downwind dispersion results were obtained by collecting a sequence of continuous, relatively-short-time-samples as the plume moved downwind. It was assumed that the structure of the plume changed slowly as it moved across the sampling arc. DOE

N86-18804# Argonne National Lab., Ill.
DEVELOPMENT OF COMBINED NITROGEN OXIDE/SULFUR OXIDE ENVIRONMENTAL-CONTROL TECHNOLOGY
J. B. L. Harkness and R. D. Doctor 23 Aug. 1985 80 p
(Contract W-31-109-eng-38)
(DE86-001301; ANL/ECT-14) Avail: NTIS HC A05/MF A01

Using a statistically designed series of batch experiments, we investigated simultaneous desulfurization and denitrification of flue gas from coal-fired boilers. Our results were consistent with mechanisms in which NO (nitrogen monoxide) and NO2 (nitrogen dioxide) are coscrubbed as HNO2 (nitrous acid), which reacts with SO2 (sulfur dioxide) as [HSO3(-)] (the bisulfite ion) to form hydroxylamine-N-sulfonates. Significant pathways for aqueous-phase denitrification were available at pH values between 4 and 9, with an optimum at a pH value of 6.9. This report shows how these mechanisms operated in a variety of scrubber technologies, so that successful control strategies can be developed. Four desulfurization chemistries were ranked in terms of their denitrification potential, in the following order: double-alkali > citrate > Dowa. A synthetic flue gas containing nitrogen blended with carbon dioxide (14.5%), oxygen (5.1%), SO2 (1500 or 3000 ppM), NO (475 or 450 ppM), NO2 (25 or 50 ppM), and water vapor (8%) was fed at 100 L/min (standard) to a 3.6-L batch sparger. Additives investigated included FeSO4 (ferrous sulfate), Fe(II)EDTA, Cu(II)EDTA, Fe(II)NTA, Fe(OH)2 (ferrous hydroxide), NH4OH (ammonium hydroxide), and N2H4 (hydrazine), where EDTA signifies ethylenediaminetetraacetic acid and NTA signifies nitrilotriacetic acid. Of these additives, Fe(II)EDTA performed best as an enhancer of NO sub x (nitrogen oxides) removal. DOE

N86-18805# Los Alamos National Lab., N. Mex.
SUBSURFACE TRANSPORT OF CONTAMINANTS FROM ENERGY PROCESS WASTE LEACHATES Final Report
L. E. Wangen, A. M. Martinez, and M. M. Jones Aug. 1985 17 p refs
(Contract W-7405-eng-36)
(DE86-001225; LA-10502) Avail: NTIS HC A02/MF A01

This report describes recent progress in research related to the subsurface transport of inorganic solutes through soils and soil mineral components. The purposes of this research are to assist in the development of capabilities for predicting subsurface solute transport of chemically complex mixtures and to investigate the effects of chemical speciation on the transport of chemical components. This report includes results of studies on the adsorption of nickel and cadmium by a high iron oxide soil, effects of cyanide on adsorption and transport through goethite of nickel, and the effect of oxidation state on selenium mobility. DOE

N86-18806# Rockwell International Corp., Golden, Colo.
DEVELOPMENT OF A ROOM AIR MONITOR SYSTEM AND WORKPLACE TRANSURANIC AEROSOL MEASUREMENT SYSTEM
W. H. Tyree and D. Balmer Aug. 1985 15 p
(Contract DE-AC04-76DP-03533)
(DE86-001563; RFP-3882) Avail: NTIS HC A02/MF A01

The design of the room air monitor consists of a filter medium housed in a separate fixture connected directly to a vacuum system. A 1700 mm(2) detector is housed in front of the filter medium to detect the presence of alpha particles emitted from the material collected by the filter medium. Several versions of the system have been built and used in production areas at the Rocky Flats Plant. A Workplace Transuranic Aerosol Measurement System with improved sensitivity for stack monitoring is also reported. The tasks for the development of these two systems are listed, and cost estimates and tentative schedules are summarized. Drawings illustrating these systems are also given. DOE

N86-18807# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
MICROBIAL DEGRADATAION OF OIL IN THE MARINE ENVIRONMENT
Anders Edlund, Anders Norqvist, Roger Roffey, and Sten-Aake Fredriksson Jul. 1985 35 p refs In SWEDISH; ENGLISH summary Sponsored by Swedish National Board for Technical Development
(FOA-C-40219-B4; ISSN-0347-2124) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm KR 50

Microbial degradation of Arabian light crude and fuel oils No 1 and 5 was studied during 1 yr on a beach. Weathered oils were spread out on field plots and nitrogen and phosphorus compounds were added to part of the plots. The rate of degradation as measured with gas chromatographic analyses on plots where nutrients were added shows that a considerable amount of saturates are degraded after 30 days. After 1 yr an almost complete degradation of saturates and aromatics is observed on plots supplied with nutrients, but accumulation of hard to split aromatic fractions in oil No. 1 is noted. Laboratory tests show a fourfold

increase of biodegradation in water samples when nutrients are added. Author (ESA)

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-18808# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RADIATIVE FLUX PARAMETERIZATIONS IN A BOUNDARY LAYER MODEL
Sergio Henrique Franchito, Nelson Arai, and Jose Paulo Bonatti Sep. 1985 34 p refs
(INPE-3647-RPE/484) Avail: NTIS HC A03/MF A01

Software for atmospheric radiative heating and cooling using the parameterization of Kuo and Qian was developed. This parameterization was introduced in a simple planetary boundary layer model, substituting the Brunt's and Chang's parameterization for long and short wave radiation, respectively, in the first version of the model. Experiments using both parameterizations are made and the results seem to be in a good agreement with real data. Author

N86-18809# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AIRGLOW O2(1 SIGMA) ATMOSPHERIC BAND AT 8645 ANGSTROM AND THE ROTATIONAL TEMPERATURE OBSERVED AT 23 DEG S
H. Takahashi, Y. Sahai, and P. P. Batista Sep. 1985 21 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3631-PRE/811) Avail: NTIS HC A02/MF A01

Regular observations of the O2(1 sigma, 0-1) atmospheric band at 864A (O2S(0,1)) and the rotational temperature, together with the OH(94,4) band and OI 5577A airglow emissions, using multichannel tilting filter type photometers, have been carried out at Cachoeira Paulista (22.7 deg S, 45.0 deg W), Brasil, since February 1983. The O2(0,1) band intensities occasionally vary from 200 to 1000 Rayleighs during a night. Covariations in nocturnal and seasonal variation with the OI 5577A emission were observed. The temperatures determined from the P branch of the O2A(0,1) band vary between 180 K and 230 K. The amplitude of the nocturnal temperature variation is sometimes larger than that determined from the OH emission, and the phase of the variation, on some occasions, leads that of the OH. Author

N86-18810*# California Univ., Los Angeles. Dept. of Earth and Space Sciences.
DISLOCATION MODEL FOR ASEISMIC FAULT SLIP IN THE TRANSVERSE RANGES OF SOUTHERN CALIFORNIA
Abe Cheng, David D. Jackson, and Mitsuhiro Matsuura (Tokyo Univ., Japan) [1985] 36 p refs
(Grant NAG5-447)
(NASA-CR-176493; NAS 1.26:176493) Avail: NTIS HC A03/MF A01 CSCL 08G

Geodetic data at a plate boundary can reveal the pattern of subsurface displacements that accompany plate motion. These displacements are modelled as the sum of rigid block motion and the elastic effects of frictional interaction between blocks. The frictional interactions are represented by uniform dislocation on each of several rectangular fault patches. The block velocities and fault parameters are then estimated from geodetic data. Bayesian inversion procedure employs prior estimates based on geological and seismological data. The method is applied to the Transverse Ranges, using prior geological and seismological data and geodetic data from the USGS trilateration networks. Geodetic data imply a displacement rate of about 20 mm/yr across the San Andreas Fault, while the geologic estimates exceed 30 mm/yr. The prior model and the final estimates both imply about 10 mm/yr crustal shortening normal to the trend of the San Andreas Fault. Aseismic fault motion is a major contributor to plate motion. The geodetic data can help to identify faults that are suffering rapid stress accumulation; in the Transverse Ranges those faults are the San Andreas and the Santa Susana. Author

N86-18811# European Space Agency, Paris (France).
THE SEVENTH ESA SYMPOSIUM ON EUROPEAN ROCKET AND BALLOON PROGRAMS AND RELATED RESEARCH
T. D. Guyenne, comp. and J. Hunt, comp. 1985 411 p refs in ENGLISH and FRENCH Symposium held in Leon, Norway, 5-11 May 1985; sponsored by ESA and Royal Norwegian Council for Scientific and Industrial Research
(ESA-SP-229; ISSN-0379-6566) Avail: NTIS HC A18/MF A01

The following topics are discussed: The middle atmosphere at high latitudes in winter; the magnetosphere and ionosphere and auroral studies; the middle atmosphere at high latitudes in summer; astrophysics; material sciences; ionospheric/magnetospheric physics active experiments; the middle atmosphere and lower thermosphere at latitudes below 60 deg; the high latitude middle atmosphere and lower thermosphere in winter; ionospheric/magnetospheric physics magnetospheric studies; and technology related to rocket, balloon, and ground-based experiments. For individual titles, see N86-18812 through N86-18875.

N86-18812# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.
SCIENTIFIC BALLOON AND SOUNDING ROCKET PROGRAM IN GERMANY
A. F. Dahl and M. Otterbein (Bundesministerium fuer Forschung und Technologie, Bonn, West Germany) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 5-9 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The West German sounding rocket projects include astronomy, aeronomy, magnetospheric research, and material science under microgravity. The scientific balloon projects emphasize astronomy and aeronomy. Author (ESA)

N86-18813# Centre National d'Etudes Spatiales, Paris (France).
THE FRENCH SOUNDING ROCKET AND BALLOON SPACE RESEARCH PROGRAM [LE PROGRAMME FRANCAIS DE RECHERCHE SPATIALE EN FUSEES-SONDES ET EN BALLONS]
S. Coutin and J. L. Fellous *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 11-14 In FRENCH (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

French sounding rocket programs include astronomy and solar physics, aeronomy and meteorology, and materials science. Balloon programs study space biology and physiology, geomagnetism, stratospheric composition and wave propagation, and magnetospheric convection. Author (ESA)

N86-18814# Bern Univ. (Switzerland). Inst. fuer Physik.
SWISS SCIENTIFIC BALLOON AND SOUNDING ROCKET EXPERIMENTS 1983-1985
E. Kopp *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 15-17 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The Swiss sounding rocket and balloon program investigates chemistry and composition of the middle atmosphere, and astrophysics (Sun, planets). Sources and sinks of night sky ionospheric ions; solar constant; vertical distribution of O3, NO2, NO3, and aerosols in the night stratosphere; SO2 in the Venus atmosphere; and solar temperature are studied. Author (ESA)

N86-18815# Swedish Space Corp., Solna.
THE SWEDISH SOUNDING ROCKET AND BALLOON PROGRAM
K. Lundahl *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 19-22 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The Swedish sounding rocket and balloon program covers geophysics, astrophysics, and materials science in microgravity. The program studies magnetosphere and ionosphere physics, including measurements of charged particles and electrical and magnetic fields; upper atmosphere physics and chemistry, including studies of the composition of the atmosphere at altitudes of 80 to 150 km; astrophysics, comprising studies of stars and galaxies in the ultraviolet and infrared; and materials science in microgravity, comprising experiments in solidification of alloys, and diffusion processes in liquid metals. Author (ESA)

N86-18816# Bergen Univ. (Norway). Dept. of Physics.
THE NORWEGIAN SCIENTIFIC BALLOON AND SOUNDING ROCKET PROGRAM 1985-1988
F. Soeraas and A. Gundersen (Royal Norwegian Council for Scientific and Industrial Research, Oslo) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 23-30 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The Norwegian sounding rocket program covers magnetospheric and ionospheric physics; modification experiments in the polar ionosphere; and processes and dynamics of the neutral atmosphere at high latitudes. The balloon program studies interrelations between precipitating particles, fields and waves by coordinated ground-based observations at geomagnetically conjugate regions in Iceland and in Antarctica; small-scale spatial distribution of energetic electron precipitation; and substorms. Both programs are supported by ground-based observations, including EISCAT. Author (ESA)

N86-18817# Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
LARGE-SCALE STRUCTURE OF THE MIDDLE ATMOSPHERE DURING THE WINTER 1983/84
K. Petzoldt *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 33-39 refs (For primary document see N86-18811 09-46)
(Contract DFG-La-372/13-2)
Avail: NTIS HC A18/MF A01

The circulation of the stratosphere and mesosphere in the winter 83/84 is shown as an example of the dynamical processes which lead to the fluctuations in the middle atmosphere over high latitudes. Winds and temperatures measured by rockets, radiosondes, and satellites during the MAP/WINE campaign are combined. The coupling of the atmosphere over high latitudes with the transient planetary waves over middle and low latitudes can be seen by the flux of wave activity. The connected eddy heat and momentum transports are essential for the interaction with the mean zonal wind. Author (ESA)

N86-18818*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va. Inst. of Physics.
THE MIDDLE ATMOSPHERE ABOVE ANDOYA NORWAY DURING THE WINTER 1983/84 AS DERIVED FROM METROCKETS AND OH NIGHTGLOW OBSERVATIONS
W. Meyer (Bonn Univ., West Germany), R. Gerndt (Wuppertal Univ., West Germany), C. R. Philbrick (Air Force Geophysics Lab., Hanscom AFB, Mass.), and F. J. Schmidlin *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 41-47 refs (For primary document see N86-18811 09-46)
(Grants BMFT-WRK-0275; DFG-Za-83/2; DFG-Of-12/1)
Avail: NTIS HC A18/MF A01

A total of 110 wind measurements were performed in the middle atmosphere above Andoya (69N, 16E) during the MAP/WINE Campaign from December 2, 1983 to February 23, 1984 using 57 inflatable passive falling spheres, 33 datasondes, 18 foil clouds and 2 instrumented active spheres. Temperature profiles were derived from 42 falling spheres, 26 datasondes and 2 active spheres. Near-mesopause temperatures were determined from OH nightglow observations. Synthesized charts of the temperatures as well as the zonal and meridional wind components between 0 and 90 km altitudes are presented. The temperature measurements indicate the occurrence of several minor and one major stratospheric warming, the latter being observed over Andoya at the end of the launch series. Author (ESA)

N86-18819*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
THE IMPORTANCE OF PRECISION RADAR TRACKING DATA FOR THE DETERMINATION OF DENSITY AND WINDS FROM THE HIGH-ALTITUDE INFLATABLE SPHERE
F. J. Schmidlin and W. R. Michel (Dayton Univ. Research Institute, Wallops Island, VA) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 49-54 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Analysis of inflatable sphere measurements obtained during the Energy Budget and MAP/WINE campaigns led to questions concerning the precision of the MPS-36 radar used for tracking the spheres; the compatibility of the sphere program with the MPS-36 radar tracking data; and the oversmoothing of derived parameters at high altitudes. Simulations, with winds having sinusoidal vertical wavelengths, were done with the sphere program (HIROBIN) to determine the resolving capability of various filters. It is concluded that given a precision radar and a perfectly performing sphere, the HIROBIN filters can be adjusted to provide small-scale perturbation information to 70 km (i.e., sinusoidal wavelengths of 2 km). It is recommended that the HIROBIN program be modified to enable it to use a variable length filter, that adjusts to fall velocity and accelerations to provide wind data with small perturbations. Author (ESA)

N86-18820# Bonn Univ. (West Germany). Inst. fuer Physik.
INTERCOMPARISON OF WIND MEASUREMENTS PERFORMED WITH METROCKETS
W. Meyer *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 55-60 refs (For primary document see N86-18811 09-46)
(Grants DFG-Za-83; BMFT-WRK-275)
Avail: NTIS HC A18/MF A01

Falling sphere and chaff clouds tracked by monopulse radar were compared to assess the accuracy of wind measurement techniques. The accuracy of the horizontal wind speed derived from the radar track of meteorological rocket payloads depends on the equilibrium fall velocity of the payloads and the precision of tracking them by the radar. For inflatable passive falling spheres both effects lead to a growing wind error with increasing height requiring long filters in the upper mesosphere. Wind profiles derived from slowly descending foil clouds are used to optimize the filter length for sphere wind reduction. The interpretation of sphere wind data at mesospheric heights is discussed. Author (ESA)

N86-18821# Bonn Univ. (West Germany). Inst. fuer Physik.
WIND CORNERS AND WIND STRATA IN THE MESOSPHERE
U. vonZahn, W. Meyer (Max-Planck Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), and H.-U. Widdel *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 61-68 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

During the project MAP/WINE 18 mesospheric wind profiles were obtained above Andoya (69N; 16E) from radar tracking of the descent trajectory of foil clouds. As expected for the winter high-latitude mesosphere, most of the profiles show the winds to be highly variable in speed and direction. An unexpected feature of the observed wind shears is their property to frequently concentrate the changes in wind direction into very shallow altitude

layers, designated wind corners. They are characterized by large directional gradients and a small vertical thickness. The latter is narrow in comparison to wind strata immediately on top and below the corners where little or no change of wind direction occurs.
Author (ESA)

N86-18822# Oslo Univ. (Norway). Inst. of Physics.
OZONE MEASUREMENTS DURING MAP/WINE
S. H. H. Larsen *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 69-72 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The values of total amount of atmospheric ozone over Oslo during MAP/WINE (November 1983-March 1984) are presented. Very low values appear in February and March compared to a zonal mean. Values of total ozone measured at Hohenpeissenberg, Churchill, and Resolute are presented. A longitude variation seems to exist. Results based on balloon ascents at Hohenpeissenberg are given. The results emphasize the need to make ozone sonde ascents further north.
Author (ESA)

N86-18823# Bergen Univ. (Norway). Dept. of Physics.
THE COORDINATED EISCAT AND BALLOON OBSERVATIONS (CEBO): EXPERIMENT AND RESULTS
S. Ullaland (Tromso Univ., Norway), T. Hansen, and W. Riedler (Austrian Academy of Sciences) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 75-79 refs Original contains color illustrations (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Two balloons were launched 80 km south of Tromso during the August 1984 high altitude wind turnaround. The first balloon measured during two nights, the second one during one night, simultaneously with the continuous operation of the EISCAT UHF system in a moderately disturbed geophysical situation. The EISCAT antenna was directed to a point 55 km above the current position of the balloons. Upper atmosphere phenomena associated with auroral particle precipitation were studied. Results show that a very close correlation exists between > 30 keV precipitating electrons (derived from the balloon measurements) and electron density measured by EISCAT.
Author (ESA)

N86-18824# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
ON THE INFLUENCE ON HIGH-LATITUDE CONVECTION PATTERNS OF POLARIZATION ELECTRIC FIELDS
G. Marklund, M. A. Raadu, and P. A. Lindqvist *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 81-88 refs Sponsored by Swedish Board of Space Activities (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

It is shown how the high-latitude convection pattern may be modified by substorm-enhanced polarization electric fields. These are generated when the flow of Birkeland currents associated with ionospheric conductivity gradients is limited. Such Birkeland currents are fed mainly by the enhanced Pedersen current in the evening and morning sectors of the auroral oval and by the enhanced Hall current around local midnight. As current limitation increases, the ionospheric potential, represented by a symmetric two-cell pattern, rotates clockwise and deforms as does the associated Birkeland current distribution which attains a symmetric shape relative to the noon-midnight magnetic meridian. The resulting patterns are shown to agree well with observations. A pronounced westward intrusion of the equipotential contours occurs in the auroral oval, and may be associated with the Westward Traveling Surge.
Author (ESA)

N86-18825# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
PLASMA INSTABILITIES IN THE AURORAL E-REGION
K. Schlegel *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 89-94 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The physical mechanisms of the plasma gradient drift instability, the modified two stream instability, and the ion cyclotron instability are reviewed. The observable quantities which characterize these plasma instabilities are discussed. Measurements of these quantities from ground based and in-situ experiments are presented. Suggestions for further research in this field are given, particularly with respect to rocket experiments.
Author (ESA)

N86-18826# Science Research Council, Chilton (England).
ARE PARALLEL ELECTRIC FIELDS REALLY THE CAUSE OF AURORAL PARTICLE ACCELERATION?
D. S. Hall, D. A. Bryant, and T. Edwards *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 95-97 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Measurements at altitudes of 1RE of electric fields, perpendicular to the magnetic field, with magnitudes larger than the ambient fields, and the electric fields necessary to produce an inverted-V electron stream are compared. It is concluded that the magnetic-field-aligned potential differences associated with the measured electric fields do not play a major role in the electron acceleration. It is also found that there is a contradiction if the parallel electric fields, invoked to account for the acceleration of precipitating electrons, are also invoked to account for the simultaneous acceleration of ions away from the Earth.
Author (ESA)

N86-18827# Science Research Council, Chilton (England).
ACCELERATION OF AURORAL ELECTRONS BY LOWER-HYBRID WAVES
D. A. Bryant, R. Bingham, and D. S. Hall *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 99-102 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

An acceleration process in which the plasma sheet electrons acquire the energies necessary to produce auroral arcs and other discrete form auroras through resonant acceleration by lower-hybrid waves is considered. The form and magnitude of the acceleration are found to agree with observation, indicating that the process is important. It is clear that the wave intensities observed in the Earth's magnetosphere, specifically those of lower-hybrid waves, are capable of accelerating plasma sheet electrons to the degree necessary to produce auroral arcs and other discrete forms of aurora requiring power densities = 100 mW/sqm.
Author (ESA)

N86-18828# Kiruna Geophysical Inst. (Sweden).
SCATTERING OF ELECTRONS IN THE EQUATORIAL PLANE DURING A PULSATING AURORA
I. Sandahl and L. Eliasson *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 103-109 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The scattering of electrons in the equatorial plane during a pulsating aurora was investigated using wave and particle data from GEOS-2 and particle data from a sounding rocket. Most of the scattering appears to take place through the Doppler shifted gyroresonance with whistler mode waves. According to first order theory the pitch angle scattering from large to small pitch angles is accompanied by a loss of energy from the electrons. A model calculation is performed to find the equatorial plane electron distribution from the precipitating particle distribution. The calculated distribution agrees well with GEOS-2 observations except at large pitch angles.
Author (ESA)

N86-18829# Auroral Observatory, Tromso (Norway).
NONISOTROPIC TEMPERATURE DISTRIBUTIONS IN THE AURORAL F-REGION AS MEASURED WITH EISCAT

U. P. Loevhaug, A. Brekke, N. Bjoernaa, and T. Hansen *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 111-114 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The EISCAT UHF system measured ion temperatures at 240, 270, and 300 km altitude. Results show that nonmaxwellian ion velocity distributions occur in the auroral F-region. The ion temperature enhancements are caused by Joule heating. However, without measurements of the neutral wind it is not possible to state if a bi-Maxwellian description is appropriate or if a stronger deviation from the Maxwellian ion velicity distribution is present.
Author (ESA)

N86-18830# Bern Univ. (Switzerland). Inst. fuer Physik.
THE COLD ARCTIC MESOPAUSE PROJECT (CAMP) CAMPAIGN 1982
E. Kopp, F. Bertin (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), L. G. Bjoern (Swedish Space Corp., Solna), P. H. G. Dickinson (Science and Engineering Research Council, Chilton, England), C. R. Philbrick (Air Force Geophysical Lab., Hanscom AFB, Mass), and G. Witt (Stockholm Univ., Sweden) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 117-123 refs Sponsored by Swedish Space Corporation, Solna, Sweden, Bundesministerium fuer Forschung und Technologie, Bonn, UK Science and Engineering Research Council, London, Swiss National Science Foundation, Bern, US Airforce Geophysical Laboratory, Bedford, MD, Suomen Akatemia, Helsinki, CNRS, Paris, Max-Planck Gesellschaft, Norges Almenvitenskapelige Forskningsraad, and Naturvetenskapeliga Forskningsraadet, Stockholm (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

During the Cold Arctic Mesopause Project rockets were launched during a period of noctilucent cloud (NLC) sighting. The NLC height was 83 + or - 1 km. A high magnetic disturbance was present. High positive ion densities were measured in the lower inosphere. The temperature measurements show that their profiles in the stratosphere and lower mesosphere are near the values predicted by high latitude summer models. At altitudes between 83 to 94 km a wave structure with temperature minima of 139, 114, and 111 K is observed. The 138 K temperature minimum is located at the height of the observed NLC. Positive and negative ion composition measurements were obtained from rocket flights. Atomic oxygen was measured between 65 to 135 km. Nitric oxide densities are inferred from positive ion composition measurements.
Author (ESA)

N86-18831# Bern Univ. (Switzerland). Inst. fuer Physik.
SUPER COLD ARCTIC MESOPAUSE PROJECT (CAMP): A RESEARCH PROJECT TO INVESTIGATE THE POLAR MIDDLE ATMOSPHERE IN SUMMER WITH ROCKET LAUNCHES FROM 65 DEG-80 DEG N
E. Kopp, C. R. Philbrick (Air Force Geophysical Lab., Bedford, Mass.), G. E. Thomas (Colorado Univ., Boulder), and G. Witt (Stockholm Univ., Sweden) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 125-136 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A Cold Arctic Mesopause Project for summer to study the structure and dynamics of the middle atmosphere (50 to 150 km) above the north polar region is proposed. It should concentrate on measurements of water vapor, ozone and temperature and their variability as a function of time, and geomagnetic and meteor shower activity; formation, particle size and density, transport and life time of noctilucent cloud (NLC) particles; dynamics and temperature and their effects on ice particle growths and the distribution of minor constituents including the ionospheric plasma; and electric fields, charged aerosols, and massive positive and negative ions in the vicinity of NLC. In situ measurements from rockets, grouped in two to three salvos should be supported by ground, airborne and satellite remote sensing experiments.
Author (ESA)

N86-18832# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Lab. de Physique Stellaire et Planetaire.
SOLAR PHYSICS FROM SPACE **c92**
P. Lemaire *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 139-143 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Spaceborne observations of the solar interior, the solar surface and the inner atmosphere, and the outer solar atmosphere are reviewed. Data from satellites, rockets, and balloons are combined with ground based observations and theoretical explanations. Global characteristics of the Sun (such as activity and magnetic fields, corona and solar winds, and oscillations) are recognized as a feature of stellar evolution. Unsatisfactory mechanisms to explain these characteristics are under study. Observations to improve theory, including the SOHO and Einstein observatories, are discussed.
Author (ESA)

N86-18833# Oslo Univ. (Norway). Inst. of Theoretical Astrophysics.
THE ENERGY BALANCE IN THE SOLAR CHROMOSPHERE-CORONA TRANSITION ZONE **c92**
O. Kjedseth Moe, T. Andreassen, O. Andreassen, P. Maltby, J.-D. F. Bartoe (Hulburt (E. O.) Center for Space Research, Washington, D.C.), and G. E. Brueckner (Hulburt (E. O.) Center for Space Research, Washington, D.C.) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 145-149 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The significance of high resolution studies of the solar chromosphere and transition zone in order to understand the transport of energy and momentum to the corona is pointed out. The terms of the energy equation are discussed in relation to observable quantities such as UV line intensities and wavelength shifts. An example of an observation of the fine structure of the transition zone in an active region using the High Resolution Telescope and Spectrograph UV rocket-borne instrument is given.
Author (ESA)

N86-18834# Oslo Univ. (Norway). Inst. of Theoretical Astrophysics.
EXCITATION MECHANISMS IN THE ATMOSPHERES OF YELLOW AND RED GIANT AND SUPERGIANT STARS **c90**
O. Engvold, O. Kjeldseth Moe, E. Jensen, and P. Joraas *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 151-154 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Far ultraviolet emission line spectra of 16 cool giant and supergiant stars were obtained with the IUE satellite. The bright emission lines in the spectra of the stars are produced primarily through radiative excitation. The formation of chromospheric lines of O I and S I is discussed. The spectra of stars with Teff > or = 4300 K contain emission lines formed at temperatures of 80,000 and 100,000 K, which implies that these stars must have transition regions and hot coronas.
Author (ESA)

N86-18835# Battelle Inst., Frankfurt am Main (West Germany).
MATERIALS SCIENCE RESEARCH IN ROCKETS, ESPECIALLY IN THE FIELDS OF FLUID PHYSICS AND OF METALLIC DISPERSIONS **c34**
D. Langbein *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 157-164 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Ground and rocket experiments in fluid physics are reviewed. The shape of liquid interfaces, the liquid motion due to wetting and thermal interface convection, and diffusion growth and

coagulation are considered. The impact of these effects on the separation of immiscible metallic alloys is discussed. Author (ESA)

N86-18836# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.
CRYSTAL GROWTH FURNACE DEVELOPED FOR FLOATING ZONE EXPERIMENTS IN SOUNDING ROCKETS c76
T. Carlberg, M. Liljendahl, R. Joensson (Swedish Space Corp., Solna), and P. Holm (Swedish Space Corp., Solna) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 165-172 refs Sponsored by ESA and Swedish Board for Space Activities (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A mirror furnace with parabolic reflectors for floating zone experiments was developed for sounding rocket flight. The mechanical design of the furnace and the sample mounting technique are described. Temperature profiles in a sample are calculated, and the results used in programming of the electronic control system, which also is described. Flight results and applications are outlined. Author (ESA)

N86-18837# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.
ON THE MECHANISM OF PRECIPITATION OF PORES IN MELTS AND PRODUCTION OF METALLIC FOAM UNDER REDUCED GRAVITY c76
H. Shahani and H. Fredriksson *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 173-182 refs Sponsored by Swedish Board for Space Activities (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Aluminum samples containing rounded hydrogen pores were remelted under reduced gravity and reduced ambient pressure. Due to reduced buoyancy forces, pores which expanded during remelting remained in the samples until solidification was completed and metallic foam was produced. The results of the experiments and a theoretical treatment of the nucleation, growth, and expansion of the pores are presented. Findings indicate that the existence of foreign particles in the melt is necessary for the nucleation of such pores and that pore size increases with the initial hydrogen content of the melt. The existence of dendritic net in the melt promotes production of metallic foam by reducing collision and by reducing the escape of bubbles. Samples with 4%Ti treated at 1 atm hydrogen and remelted at 0.2 atm achieve a reduction in density of up to 50%. Author (ESA)

N86-18838# Saab-Space A.B., Linkoeping (Sweden).
ADVANCED MIRROR FURNACE FOR LONG ROD SAMPLES c25
H. Grunditz *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 183-187 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A mirror furnace was designed for short duration microgravity applications in sounding rockets, making it necessary to have a very rapid furnace, in heating up and cooling down performances. A concept with as low thermal mass as possible was chosen. To fulfil the very strict requirements on isothermal conditions (+ or - 0.1C along the total sample length, up to 200 mm) the furnace is equipped with 3 linear-elliptical mirror arrays, each provided with a set of 10 halogen lamps. The lamps are individually controlled to give the correct temperature profile in the sample, which is equipped with up to 15 thermocouples, used in a microprocessor control loop. Author (ESA)

N86-18839# Norwegian Defence Research Establishment, Kjeller.
HIGH-FREQUENCY (HF) WAVE ACTIVITY OBSERVED BEAM INJECTOR FROM A ROCKET-BORNE ELECTRON ACCELERATOR c75
P. Ingsoey, J. Troeim, and M. Majewski (Austrian Academy of Sciences, Graz) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 191-196 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Data from a rocket experiment during which a 10 keV electron beam carrying a current of 10 to 100 mA was injected into the ionospheric plasma are presented. During the pulses, continuous HF emission was observed near two times the electron gyrofrequency. Transient emissions, associated with the beginning of the pulses, were observed near the upper hybrid frequency. The amplitude of the continuous emission was studied as a function of the beam current and perpendicular distance Dt between the antenna and the magnetic field line on which the accelerator was located. It is found that the amplitude of the continuous emission increase exponentially with the beam current, and decrease fast as Dt exceeds 30 m. Author (ESA)

N86-18840*# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
EXAMINATION OF NONADIABATIC EFFECTS DURING AN ELECTRON BEAM EXPERIMENT IN THE IONOSPHERE c75
K. Wilhelm *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 197-204 refs Sponsored by NASA, DFVLR, and Canadian National Research Council (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Prompt and delayed echo fluxes and superacceleration of electrons were observed during the sounding rocket flight Several Coordinated Experiments using an electron accelerator. Magnetospheric electric fields parallel to the magnetic field were investigated. The degree of nonadiabatic behavior of the injected electron beam and the return flux was examined. It is shown that the region of strong beam-plasma interaction is limited to 300 km in length along the magnetic field but that backscatter or energetic electrons could occur from much larger distances. By appraising the difference in transit times of 1.9 and 3.9 keV electrons it is established that a continuous backscatter model operating out to several thousand kilometres is not consistent with the observations. Author (ESA)

N86-18841# Saab-Space A.B., Linkoeping (Sweden).
THE S19 GUIDED SOUNDING ROCKET S38 TRIGGER OPTIMIZED REPETITION (TOR)
L. Hall and T. Forsell *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 205-210 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The S38 sounding rocket guided by the SSC S19 guidance system measured the impact of sudden local artificial disturbance in the lower ionosphere. The payload consisted of diagnostic instruments, ejectable nosecone, boom systems, service modules, S19 guidance system and recovery system in the mother section, and 2 daughters containing cesium charges. The daughters were separated on the up-leg using high velocity separation systems. An eight-spring separation system was chosen to minimize the tip-off disturbances and the module length. Two artificial clouds were created by detonating the daughters on separate altitudes. The mother flew through the clouds giving measurement values outside and in the clouds. Author (ESA)

N86-18842# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
THE TETHERED SATELLITE SYSTEM PROJECT c18
M. Dobrowolny *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 211-216 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The Tethered Satellite System project consists in flying a subsatellite tethered to a space shuttle orbiter at variable distances up to 100 Km from the shuttle. An electrodynamic mission with the tether made up of conducting material and an atmospheric mission using a tether of insulating material are planned. For the

atmospheric mission, the tethered satellite orbit is at 130 km altitude, allowing information to be collected from an area where a free flying satellite would soon be lost due to atmospheric drag. The electrodynamic mission uses the potential difference induced by the tether in active space plasma physics experiments.
Author (ESA)

N86-18843# Science Research Council, Chilton (England). Rutherford Appleton Lab.
ENERGIZATION OF ELECTRONS FOLLOWING ION RELEASE IN THE SOLAR WIND c92
D. A. Bryant, D. S. Hall, and C. P. Chaloner *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 217-220 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
Barium ions were released in the solar wind on the dawn flank of the Earth's magnetosphere as one of the active experiments of the three-satellite AMPTE mission. The ensuing perturbation to solar wind flow resulted in the energization of solar wind electrons. This phenomenon is investigated to understand the heating mechanism in this event and following releases of lithium ions also in the solar wind. Energization appears in all cases to be energy selective suggesting a resonant acceleration by plasma waves excited by the releases. Author (ESA)

N86-18844# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
LABORATORY SIMULATION OF THE ELECTRODYNAMIC INTERACTION OF THE TETHERED SATELLITE WITH THE IONOSPHERE c75
J.-P. Lebreton, C. Bonifazi (CNR, Frascati, Italy), H. Arends, M. Hamelin (CNRS, Orleans, France), R. Debrie (CNRS, Orleans, France), and M. Dobrowolny (CNR, Frascati, Italy) *In its* The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 221-225 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
The I-V characteristics of a spherical body of 10 cm diameter were investivated in a large plasma chamber in which the plasma environment of the electrodynamic tethered satellite is well reproduced. The relative velocity of the plasma with respect to the test body is 8 km/sec. Floating potential profiles are measured upstream and downstream of the test body. The measurements are made for a range of normalized body potential between -1000 and +400. The influence of an axial magnetic field on the sheath potential profile and on the current collecting capability of the body is investigated. The experimental results, compared to theoretical models, indicate a key role of the Earth's magnetic field in the interaction of the tethered satelite with ionospheric plasma. Author (ESA)

N86-18845# Centre National d'Etudes Spatiales, Toulouse (France).
USE OF SATELLITE DATA TO MONITOR HIGH-ALTITUDE WINDS c47
A. Soubrier *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 229-232 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
A satellite experiment in Brazil monitored and forecast large scale changes in high altitude circulation. Substantial information on the process of wind turnaround in the Southern Hemisphere was gathered, and a very good correlation with high altitude soundings performed from the ground is found. Author (ESA)

N86-18846# Observatoire de Bordeaux, Flirac (France).
GROUND-BASED MICROWAVE OBSERVATIONS OF MESOSPHERIC OZONE: INTERCOMPARISON WITH MEASUREMENTS OBTAINED BY OTHER TECHNIQUES
J. delaNoe, C. Turati, and A. Baudry *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 233-237 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
Ozone measurements at 110,836 GHz were obtained with a radio telescope. From such measurements it is possible to derive the integrated ozone content above 38 km and the vertical profile of the ozone distribution. Such a profile compares well with profiles obtained simultaneously during the MAP/GLOBUS campaign by a balloon-borne microwave receiver at higher frequency (184 GHz) and by a Dobson spectrophotometer operated in the short Umkehr method. Diurnal variations of the ozone content are also studied.
Author (ESA)

N86-18847# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
PROJECT MAP/GLOBUS NOx: COORDINATED OBSERVATIONS OF NITROGEN OXIDES IN THE MIDDLE ATMOSPHERE
J. P. Pommereau *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 239-242 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
A campaign to study nitric oxides in the middle atmosphere is described. It uses balloons, satellites, and ground observations and takes place at the balloon facility at Aire sur l'Adour (France). The measurement strategy is oriented toward the evaluation of the sum of all NOx species in the stratosphere and the partition between them. Author (ESA)

N86-18848# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
STRATOSPHERIC WATER-VAPOR MEASUREMENTS ON BOARD LONG-DURATION BALLOONS
F. Goutail and J. P. Pommereau *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 243-246 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
An infrared Montgolfiere balloon (MIR) was designed for long duration flight in the Intertropical Convergent Zone (ITCZ) to study the so-called Stratospheric Fountain, i.e., water vapor in the lower stratosphere originating from tropospheric air injection. It is suspected that the Stratospheric Fountain mainly occurs in the equatorial region, above the anvils of the highest cumulonimbus clouds of the world in the Micronesian aerea. The MIR appears to be adequate to perform measurements above the ITCZ in the Stratospheric Fountain. Water-vapor in situ observations below this vehicle are demonstrated to be feasible, although the data recorded during a test flight show the experiment to require refinements. It may be possible to investigate the tropospheric water-vapor, ozone and NOx injection into the stratosphere in the Fountain area. Author (ESA)

N86-18849# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
COMPARISON BETWEEN ST RADAR AND IN SITU BALLOON MEASUREMENTS c47
F. Dalaudier, J. Barat, F. Bertin (Centre National d'Etudes et Telecommunications, Saint Maur des Fosses, France), E. Brun (Toulon Univ., France), M. Crochet (Toulon Univ., France), and F. Cuq (Toulon Univ., France) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 247-251 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01
A campaign for simultaneous observation of troposhere and lower stratosphere is described. The backscattered signal from refractive index turbulence and mean temperature gradients is compared with velocity and temperature measurements made in the same region by a balloon. The campaign studied the physics of radar measurements and aspect sensitivity (modification of the signal strength with the radar tilt). The vertical backscattered power was compared with the temperature gradient as measured by the

fine temperature probe. The oblique signal was compared with turbulent velocity and temperature structures as seen by ionic anemometers and fine temperature probes. Despite difficulties in comparing due to the different spatiotemporal characteristics of the two instruments, clear correlations appear. Author (ESA)

N86-18850# Institut d'Astrophysique, Cointe-Ougree (Belgium).
OZONE AND NITROGEN OXIDES IN THE MIDDLE ATMOSPHERE: A THREE-DIMENSIONAL MODEL SIMULATION
G. Brasseur and K. Rose (Freie Univ., Berlin, West Germany) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 255-258 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The behavior of ozone and nitrogen oxides in the lower stratosphere is simulated by a three dimensional primitive equation model. The effects of the planetary waves and their propagation in the winter hemisphere are considered together with the most important chemical and photochemical reactions involved in the Ox, HOx and NOx system. The model shows that ozone is transported counterclockwise around the asymmetric polar vortex leading to larger values at high latitudes. It produces sharp gradients in the NOx mixing ratio in regions near 60 to 70 deg latitude in good agreement with observations of NO2. Author (ESA)

N86-18851# Bonn Univ. (West Germany). Inst. fuer Physik.
TURBULENT PARAMETERS OF THE LOWER THERMOSPHERE AS DETERMINED BY MASS SPECTROMETER DURING THE MAP/WINE CAMPAIGN
F.-J. Luebken, Ch. Puetz, and U. vonZahn *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 259-265 refs (For primary document see N86-18811 09-46)
(Contract BMFT-01-OE-031-0)
Avail: NTIS HC A18/MF A01

During the MAP/WINE campaign small scale fluctuations (for scales from 10 to 500 m) of the nitrogen number densities were measured in the altitude range from 90 to 115 km above Andoya (69 N, 16 E) by the Bonn University Gas Analyzer for Turbulence and Turbopause Investigations (BUGATTI). Altitude profiles of turbulent parameters such as spectral index, mean turbulent velocity, and energy dissipation rate are derived from a spectral analysis of the density fluctuations observed during the MAP/WINE experiments M-T5 and M-T6. The results for the flight M-T6 of BUGATTI are presented. Author (ESA)

N86-18852# Bonn Univ. (West Germany). Inst. fuer Physik.
ON THE COMPARISON OF TURBULENT PARAMETERS AND EDDY COEFFICIENTS IN THE LOWER THERMOSPHERE
U. vonZahn and Ch. Puetz *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 267-270 refs (For primary document see N86-18811 09-46)
(Contract BMFT-WRK-0275-01-OE-047-0)
Avail: NTIS HC A18/MF A01

Techniques to measure turbulence in the lower thermosphere are reviewed. The instantaneous properties of turbulence in the lower thermosphere (e.g., turbulent velocities and density fluctuations) can be measured in-situ by smoke trails, instrumented falling spheres, ion probes, and mass spectrometers. Information on turbulent processes may also be gained by studying the composition of the lower thermosphere. In contrast to density fluctuations, however, compositional profiles can provide quantitative information on only the long term average of turbulent activity. Compositional profiles are sensitive to the presence of vertical bulk motions. Author (ESA)

N86-18853# Norwegian Defence Research Establishment, Kjeller.
SPECTRAL CHARACTERISTICS OF POSITIVE ION-CURRENT FLUCTUATIONS MEASURED BY ION PROBES
T. A. Blix, E. V. Thrane, and O. Andreassen *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 271-273 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Ion-current fluctuations as determined by ion-probes flown during the MAP/WINE campaign were investigated using Fourier analysis. The spectral characteristics as a function of height are shown, and the results are compared with similar investigations. Possible evidence for an inner microscale which indicates a transition from an inertial to a viscous range is presented. Author (ESA)

N86-18854# Norwegian Defence Research Establishment, Kjeller.
TURBULENCE CHARACTERISTICS AS DETERMINED BY CROSS CORRELATION ANALYSIS
T. A. Blix and E. V. Thrane *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 275-278 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

During the Energy Budget Campaign two spherical gridded electrostatic probes were successfully released from the mother payload in each of two rocket-salvoes. The probes measured positive ion-current in the altitude range 60 to 150 km with a time resolution of 0.5 msec (sampling frequency 2000 Hz), corresponding to a spatial resolution better than 0.6 m taking the rocket velocity into account. The probes were ejected sideways from the main payload, in opposite directions, with a relative separation speed in the range 5 to 10 m/sec. The ion-currents measured by the probes are cross-correlated after spin effects are removed from the data. Author (ESA)

N86-18855# Auroral Observatory, Tromso (Norway).
THE MAP/WINE ELECTRON DENSITY PROFILES IN THE D AND E REGIONS: A COMPARISON OF EISCAT, PRE ROCKET DATA
C. Hall, T. A. Blix (Norwegian Defence Research Establishment, Kjeller), A. Brekke, M. Friedrich (Technical Univ., Graz, Austria), T. Hansen, S. Kirkwood (EISCAT Scientific Association, Kiruna, Sweden), J. Roetigger (Arecibo Observatory, Puerto Rico), and E. Thrane (Norwegian Defence Research Establishment, Kjeller) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 279-284 refs Sponsored by Royal Norwegian Council for Scientific and Industrial Research (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Data obtained during the MAP/WINE campaign by EISCAT, partial reflection radar (PRE) ionosonde, and M-T series rockets yielded electron and positive ion density profiles in the D and E-regions. The profiles are compared and differences discussed. The possibility of using the PRE facility to complement the EISCAT UHF radar to obtain better D-region electron density measurements is examined. Author (ESA)

N86-18856# Wuppertal Univ. (West Germany). Dept. of Physics.
MEASUREMENTS OF MINOR CONSTITUENTS INFRARED EMISSIONS IN THE MIDDLE ATMOSPHERE DURING MAP/WINE CAMPAIGN
K. U. Grossmann, H. G. Brueckelmann, and P. Schwabbauer *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 285-290 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Mesospheric temperatures, ozone concentrations, and water vapor concentrations were determined in January and February at high latitudes (70 N) during the MAP/WINE campaign. All parameters are found highly variable in time and as function of altitude. Ozone densities in the lower mesosphere are apparently controlled much more by dynamic processes than by photochemistry. Nitric oxide 5.3 micron and carbon dioxide 15 micron band radiances measured in the lower thermosphere under conditions of an extremely low atomic oxygen content give insight into non-LTE cooling processes at these altitudes. Author (ESA)

N86-18857# Bonn Univ. (West Germany). Inst. fuer Physik.
THE SODIUM LAYER ABOVE ANDOYA, NORWAY, AS OBSERVED BY LIDAR FROM JANUARY THROUGH APRIL 1984
V. Klein and U.-P. Hoppe *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 291-295 refs (For primary document see N86-18811 09-46)
(Contract DFG-Ho-858/1)
Avail: NTIS HC A18/MF A01

Sodium densities in the 80 to 100 km height region above Andoya (69N, 16E) were determined by a ground-based lidar. The height resolution is 500 m and the time resolution 10 min at best. Absolute density variation within the layer over a time period of 3 months and short-term fluctuations of the sodium density as downward propagating wavelike perturbations with average phase velocities of 0.3 m/sec through the layer are reported.
Author (ESA)

N86-18858# Science Research Council, Chilton (England).
PLASMA VARIATIONS AT THE DAYSIDE MAGNETOPAUSE
D. S. Hall, D. A. Bryant, and C. P. Chaloner *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 299-304 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Plasma variations at the dayside magnetopause are studied using electron measurements from the UK spacecraft of the AMPTE mission. It is found that boundary instabilities within a layered transition region cannot account for the observations. Although a clear distinction cannot be made between the effects of flux transfer events and modulation of the magnetopause, it is found that the latter more readily accounts for all aspects of the data.
Author (ESA)

N86-18859# Observatoire de Paris-Meudon (France).
GEOMAGNETIC ACTIVITY AND SOLAR CYCLE c92
P. A. Simon and J. P. Legrand (INSU Mesure, Saint-Maur, France) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 305-311 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The relationships with the sunspot cycle and solar origin of solar phenomena which contribute to geomagnetic activity are discussed. Shock event activity has a loose link, if any, with the sunspot number but a quite definite cycle behavior. The temporary expansion of polar wind streams generate the so-called recurrent geomagnetic activity just before a sunspot minimum. The remaining activity is related to the distribution around the Sun and to the time evolution of the densest coronal regions (coronal streamers and heliosheet) which are the sources, in the ecliptic plane, of the slow undisturbed wind of the quiet days, and of the low density areas in between which are the origin in the ecliptic plane of the fluctuating wind activity.
Author (ESA)

N86-18860*# National Aeronautics and Space Administration, Washington, D.C.
EXTENDING THE CAPABILITIES OF SOUNDING ROCKET CLASS EXPERIMENTS c18
J. A. Glaab *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 315-320 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A low cost, Shuttle launched short duration free-flyer, known as Spartan that can accommodate sounding rocket class experiments for up to 40 hr of data collection time was developed. A family of retrievable carriers is under construction to accommodate payloads from X-ray astronomy, solar physics, UV astronomy, and studies of Halley's comet. The capabilities, rationale, design, and mission operations of the carriers is discussed.
Author (ESA)

N86-18861# Centre National d'Etudes Spatiales, Toulouse (France).
LONG-DURATION FLIGHTS USING INFRARED MONTGOLFIERES c47
P. Malaterre *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 321-323 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A series of long-duration stratospheric balloon flights was carried out using infrared Montgolfiers. An IR Montgolfier is a hot-air balloon that captures solar radiation and IR Earth radiation as a heat source. A flight to study gravity waves lasted 52 days. Other uses include atmospheric data acquisition and radiation budget investigations.
Author (ESA)

N86-18862# Centre National d'Etudes Spatiales, Toulouse (France).
TECHNICAL AND OPERATIONAL IMPROVEMENTS AT FRENCH BALLOON LAUNCHING CENTERS
P. Vincent *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 325-328 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The operational activities of the Balloon Launching Centers at Aire-sur-l'Adour and Gap-Tallard in France are outlined. Developments in balloons and balloon equipment and technology for scientific experiments are reviewed. Results of the international MAP/GLOBUS campaign during which 13 flights were successfully carried out in 20 days are mentioned.
Author (ESA)

N86-18863# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
COMPOSITE MIRRORS AND STRUCTURES FOR BALLOON TELESCOPES c35
B. Abt and G. Helwig *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 329-334 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Development of composite sandwich antenna reflectors for ground and space applications is recalled. With the ability to almost replicate the surface figure accuracy of the tooling used for manufacture of reflectors and mirrors, the area between communications antennas and optical telescopes can be covered by metallized CFRP sandwich mirrors. Results on panels optically tested demonstrate the required performance for the 3 m balloon-borne telescope for far infrared and submillimeter astronomy.
Author (ESA)

N86-18864# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
DEVELOPMENT AND IMPLEMENTATION OF AN MC68000/VME MICROCOMPUTER FOR PAYLOAD SUPPORT SYSTEMS c60
J. Turner *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 335-338 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A microcomputer system based on the Motorola MC68000 microprocessor and the VME bus was developed as a series of single Europa format cards and applied to space and airborne experiment projects. The microcomputer operates either as a front end processor to a general purpose minicomputer, or as a stand alone system. The development and implementation of the system applications in simulation and data acquisition, and its potentials as a flight processor are outlined.
Author (ESA)

N86-18865# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
TWO GENERATIONS OF MICROCOMPUTER-BASED PROGRAM UNITS FOR SOUNDING ROCKET ATTITUDE CONTROL SYSTEMS c61
J. How *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 339-343 (For primary document see N86-18811 09-46)

Avail: NTIS HC A18/MF A01

Sophisticated, flexible program units to control complex sounding rocket attitude maneuvers were developed. An initial development based on the 8085 microprocessor and a later development based on the 8031 micro-controller are described. Both systems provide analog output voltages for attitude offset, analog voltage inputs to monitor completion of maneuvers, and ditigal input/output for experiment handshake and telemetry monitoring. The micro-controller system also includes a watch dog timer to ensure all events are completed by a specific time. Author (ESA)

N86-18866# Space Vector Corp., Northridge, Calif.
HIGH-ALTITUDE RECOVERY PROGRAM (HARP) c15
R. E. Scarboro, E. F. McKenna (Air Force Geophysics Lab., Bedford, Mass.), and R. E. Jacobs (Air Force Geophysics Lab., Bedford, Mass.) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 345-349 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

A system for recovering sounding rocket payloads from water was developed. The combination recovery and flotation system can recover a payload weighing 1000 pounds (453.5 Kg) and float this submerged weight for 24 hr. Drop tests, including tests from aircraft, are satisfactory. Author (ESA)

N86-18867# Centro Tecnico Aerospacial, San Jose dos Campos (Brazil). Inst. de Atividades Espaciais.
ROCKET MOTOR CASES IN 300 M STEEL: A PIONEER DEVELOPMENT PERFORMED IN THE BRAZILIAN SPACE PROGRAM c15
J. Boscov, P. Damanet, O. Pereira (Electrometal Acos Finos S/A, Sumare, Brazil), A. A. Guimaraes (Electrometal Acos Finos S/A, Sumare, Brazil), and E. M. Vieira (Electrometal Acos Finos S/A, Sumare, Brazil) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 351-359 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The 300 M steel was selected for rocket motor cases. Engineering models of motor cases with 550 mm and 1000 mm diameters, tempered/quenched for a strength level of 1850 MPa were qualified. A flight of a SONDA 4 with these motor cases is successful. Author (ESA)

N86-18868# Saab-Space A.B., Linkoeping (Sweden).
THE SAAB SPINNING ROCKET ATTITUDE CONTROL (SPINRAC): AN ATTITUDE CONTROL SYSTEM FOR OBTAINING LOW IMPACT DISPERSION c15
L. Hall and A. Helmersson *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 361-364 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The Spining Rocket Attitude Control system, (SPINRAC) system for three-stage sounding rocket impact dispersion reduction is described. The SPINRAC points the spin-stabilized third stage to a predetermined attitude, prior to ignition. The SPINRAC uses a roll-stabilized gyro platform for inertial attitude information, processes the signals in a microcomputer, and uses a cold-gas system for actuation. Using control theory the guidance time can be kept small and thrust force low. Typically a reorientation angle of 20 deg and a coning half-angle of 10 deg is controlled to an accuracy of 0.4 deg 3-sigma value within 20 sec. Using the SPINRAC on a three-stage sounding rocket (Black Brant X, Skylark 12) makes it possible to reach apogee altitudes of 1000 km while maintaining low impact dispersion. Author (ESA)

N86-18869# Observatoire de Paris-Meudon (France).
SOLAR CORONAL HOLES OBSERVED WITH THE NANCAY (FRANCE) METER RADIOHELIOGRAPH c92
P. Lantos and C. Alissandrakis (Athens Univ., Greece) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 367-368 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Radioheliograph observations of the Sun at meter wavelengths provide maps of the structures of the middle corona. Coronal holes with low temperature and density are well observed in equatorial regions and near the poles as deep depressions in brightness temperature. This provides a set of data to study solar wind and geomagnetic activity origin. Author (ESA)

N86-18870# Observatoire de Paris-Meudon (France).
FORECASTING SOLAR FLARES AND GEOMAGNETIC STORMS AT MEUDON (FRANCE) c92
P. A. Simon and P. Lantos *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 369-370 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Methods to forecast solar flares and geomagnetic storms are reviewed, and geomagnetic activity in 1986-87 is forecast. The next sunspot cycle is likely to reach its peak in 1989-1990 with a maximum sunspot number close to 100. As a consequence the next geomagnetic minimum is expected to be quite low with an annual aa value of 12 gamma (Ap = 8) in 1986 and 1987. Experiments requiring geomagnetic disturbance will be difficult to perform with only 60 disturbed days a year. During the remaining time, the geomagnetic field will be quiet with a large number (195) of very quiet days. It will the first opportunity to study a very quiet ionosphere or magnetosphere since 1934 (184 very quiet days) or 1923 (244 very quiet days) but definitely more active than in 1901 (314 very quiet days). Author (ESA)

N86-18871# Norwegian Defence Research Establishment, Kjeller.
MIDDLE ATMOSPHERE TURBULENCE AS DETERMINED BY ION PROBES
T. A. Blix, E. V. Thrane, and O. Andreassen *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 371-375 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

During the MAP/WINE campaign, 7 electrostatic ion-probes were successfully launched from Andoya Rocket Range (69 N 16 E). The probes were mounted at the front of the payloads and measured positive ion-current with a time resolution of 0.4 msec (sampling frequency 2441.4 Hz), corresponding to a spatial resolution better than 0.5 m taking the rocket velocity into account. Height profiles of turbulent velocities, energy dissipation rates, and eddy diffusion coefficients are derived and compared with similar data obtained during the Energy Budget Campaign. Author (ESA)

N86-18872*# Stanford Univ., Calif. Space, Telecommunications and Radioscience Lab.
SPACE RESEARCH IN THE ERA OF THE SPACE STATION c18
P. M. Banks *In* ESA The Seventh ESA Symposium On European Rocket and Balloon Programs and Related Research 1985 p 377-379 Sponsored in part by ESA (For primary document see N86-18811 09-46)
(Grant NAGw-235)
Avail: NTIS HC A18/MF A01

The major elements of the NASA manned space station are described, and science activities it could be used for are suggested. The core facilities include at least two major laboratory modules with supporting utilities, including habitation accommodations, docking facilities, power and heat rejection units, and external space and support for attached payloads. A vertically oriented structure, called the Power Tower, is being studied. Scientific accommodations inside the modules include major facility instrumentation for a variety of microgravity research projects, with initial emphasis upon materials research and life sciences. The second element is composed of free-flying satellites operating in orbits near the core station. The third element consists of satellites in polar orbits. One or more large, multi-instrument platforms are planned for Earth observation and solar-terrestrial processes research. Author (ESA)

N86-18873# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
SIMULTANEOUS FINE STRUCTURE OBSERVATION OF WIND AND TEMPERATURE PROFILES BY THE ARECIBO (PUERTO RICO) 430 MHz RADAR AND IN SITU MEASUREMENTS c47
D. Thomas, F. Bertin, M. Petitdidier, H. Teitelbaum (Ecole Polytechnique, Palaiseau, France), and R. F. Woodman (Instituto Geofisico del Peru, Lima) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 381-384 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Results of a coordinated troposphere/lower stratosphere sounding campaign including 430 MHz radar and balloon borne experiments are analyzed. The radar operates in the altitude range 6 to 24 Km with a time resolution of 1 min and an altitude resolution of 150 m. The balloons are equipped with sonic anenometer, and temperature and pressure sensors. The campaign studied the interaction between waves and turbulence in the tropical troposphere and lower stratosphere, and scattering mechanisms contributing to clear air radar echoes. Results show good correlation between radar echo profile, the step-like structure observed in the potential temperature profile, and wind shears. Author (ESA)

N86-18874# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
SOME ASPECTS OF THE RAPID SPATIOTEMPORAL VARIATIONS OF STRATOSPHERIC OZONITY
P. Aimedieu *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 385-388 refs In FRENCH; ENGLISH summary (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

The study of the fine vertical structure of stratospheric ozonity profiles, by gas phase (olefines as reactants) chemiluminescent ozometer, reveal the existence of thin layers of mixing ratio equilibrium. Average thickness = 300 m, distance between layers = 600 m. In these layers a fine structure (1 m) gives, by statistical treatment, an estimation of the outer scale of turbulence and the Thorpe scale (= 5 m). Author (ESA)

N86-18875# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
SATELLITE MEASUREMENTS OF STRATOSPHERE CONSTITUENTS IN THE TRACE STATE [MESURES SATELLITAIRES DE CONSTITUANTS STRATOSPHERIQUES A L'ETAT DE TRACE]
A. Girard and D. Cariolle (Etablissement d'Etudes et de Recherches Meteorologiques, France) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 389-392 refs In FRENCH (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

Satellite measurement of minor constituants of the middle atmosphere (ozone excepted) are reviewed. Infrared absorption studies (including 2 on Spacelab) and visible spectrum measurements of NO2 are discussed. Author (ESA)

N86-18876# Hawaii Inst. of Geophysics, Honolulu.
GENERATION OF VERTICALLY INCIDENT SEISMOGRAMS
L. N. Frazer, D. L. Bates, and A. J. Rudman Sep. 1985 73 p
(Contract N00014-82-C-0380)
(AD-A159695; HIG-CONTRIB-1643) Avail: NTIS HC A04/MF A01 CSCL 08/11

An algorithm for synthetic seismograms following the method of Kennett (1981) has been implemented in FORTRAN 77. Computations proceed in the frequency domain and then are Fourier inverted. Reflections of normally incident waves and their multiples are plotted on a Versatec plotter. The algorithm allows easy adjustment to other plotting protocols. A brief outline of the theory and a program listing (VISP) with examples are included. Author (GRA)

N86-18877# Air Force Geophysics Lab., Hanscom AFB, Mass.
REPRESENTATION OF TOPOGRAPHY IN SPECTRAL MODELS
C. H. Yang 23 Sep. 1985 8 p
(AF Proj. 231-0)
(AD-A159917; AFGL-TR-85-0214) Avail: NTIS HC A02/MF A01 CSCL 08/2

Various ways of representing topography that is a part of a global spectral model have been examined using the notions of error-in-synthesis and error-in-reproduction in measuring accuracy and fidelity. The trapezoidal and Gauss-Legendre quadratures are employed in conjunction with different truncations in the numerical computation of the transformations. The results have led to the following conclusions: (1) the model terrain is best defined by the set of spectral coefficients in a truncation range that is commensurate with the model resolution; (2) The model terrain in the real domain should be defined on the Gaussian latitudes as the transform of the spectral coefficients using the Gauss-Legendre quadrature; (3) smoothing by a spectral truncation alone is not sufficient to insure the accuracy either in synthesis or in reproduction. GRA

N86-18878# Pennsylvania State Univ., State College. Coll. of Earth and Mineral Sciences.
CALCULATION OF SOURCE AND STRUCTURE PARAMETERS AT REGIONAL AND TELESEISMIC DISTANCES Final Technical Report, 1 Jan. 1983 - 3 Mar. 1985
C. A. Langston and R. J. Greenfield 31 May 1985 107 p
(Contract F49620-83-K-0019; ARPA Order 4397; AF Proj. 2309)
(AD-A160138; AFOSR-85-0753TR) Avail: NTIS HC A06/MF A01 CSCL 17/10

Teleseismic SV waves have been generally ignored in wave propagation and source studies because of known complications in wave propagation for structure near the source and near the receiver. The validity of common optic ray and WKBJ seismogram methods for computing SV synthetic seismograms is examined by computing synthetic seismograms using these techniques and comparing them to SV synthetics produced from a wavenumber integration technique. Both ray methods give a poor approximation to the wave propagation for distances less than 60 deg. Diffracted Sp and the SPL wave interfere with near source phases, such as S, pS, and sS for a shallow seismic source, producing anomalously high amplitudes and complex waveforms in agreement with observational experience. Because of the Moho Sp and diffracted Sp phases, the vertical component of motion shows greater distortion, relative to the ray theory result, than does the radial component of motion. Ray theory appears to be appropriate for the initial 20 seconds of the SV wavetrain from a shallow source for ranges greater than 60 deg. SV waves from deep sources are less affected by diffracted Sp and SPL than SV from shallow sources. GRA

N86-18879# Rockwell International Science Center, Thousand Oaks, Calif.
NONLINEAR WAVE PROPAGATION STUDY Semiannual Technical Report, 1 Dec. 1984 - 31 May 1985
J. R. Bulau and B. R. Tittman Jul. 1985 44 p
(Contract F49620-83-C-0065; DARPA Order 4400)
(AD-A160179; SC5361.8SA; AFOSR-85-0792TR; SATR-3) Avail: NTIS HC A03/MF A01 CSCL 08/7

In this document we report the results of combined high amplitude tensile and compressive loading experiments on four different rock types: Westerly granite, Boise sandstone, Berea sandstone, and Indiana limestone. The details of the stress-strain hysteresis loops are examined, with emphasis on investigating the elastic and inelastic properties of rocks at nonlinear amplitudes in both tension and compression. The results indicate that the mechanical behavior of rocks can be significantly different in compression than in tension and that the onset of nonlinear effects with increasing strain may not be the same for compressive loads as for tensile loads. All available evidence indicates that the primary relaxation mechanism at nonlinear amplitudes between 10 to the minus 6th power strain and 0.0001 strain involves intergranular friction. More experimental work in this area will shed light on the

issue of linearity vs nonlinearity at intermediate strains, and also will provide realistic detailed information about rock rheology for the numerical modeling of near-field seismic pulse propagation.
Author (GRA)

N86-18880# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
STUDY OF LARGE AEROSOL PARTICLES Final Report, 1 Dec. 1981 - 28 Feb. 1984
D. J. Hofmann and J. M. Rosen 3 May 1985 38 p
(Contract F19628-82-K-0016)
(AD-A160379; AFGL-TR-85-0096) Avail: NTIS HC A03/MF A01 CSCL 04/1

This report develops a stratospheric aerosol optical model which is based on a size distribution determined from direct measurements and additionally constrained to be consistent with large data sets of independently measured macroscopic aerosol properties such as mass and backscatter. The period under study covers background as well as highly disturbed volcanic conditions and an altitude interval ranging from the tropopause to about 30 km. The predictions of the model are used to interpret and intercompare diverse types of stratospheric aerosol measurements.
GRA

N86-18881# Analytic Sciences Corp., Reading, Mass.
ANALYSIS AND SIMULATION OF MULTISENSOR GRAVITY SURVEYS: VOLUME 1 Final Report, Jun. 1977 - Mar. 1981
J. D. Goldstein 15 Apr. 1985 171 p
(Contract F19628-77-C-0152)
(AD-A160388; TR-4423-4; AFGL-TR-81-0018(1)) Avail: NTIS HC A08/MF A01 CSCL 08/5

A new general methodology is developed for the determination of the statistics of multisensor survey residual gravity. The method is ideally suited for the design of multisensor surveys to achieve a desired level of gravity recovery accuracy. Survey types considered consist of any combination of satellite radar altimetry, high-low satellite-to-satellite tracking, shipborne or land-based gravimetry and airborne gravimetry. Several examples of the results obtained with the methodology are included.
Author (GRA)

N86-18882# Nova Univ., Dania, Fla.
DETAILED SPHERICAL-HARMONIC REPRESENTATION OF THE EARTH'S GRAVITY FIELD AND TIDAL EFFECTS FROM ALTIMETRIC ADJUSTMENTS Final Report, 1 Jan. 1982 - 31 Dec. 1984
G. Blaha Feb. 1985 95 p
(Contract F19628-82-K-0007)
(AD-A160419; AFGL-TR-85-0076) Avail: NTIS HC A05/MF A01 CSCL 08/5

Two second-phase techniques have been developed based on the results of the global spherical-harmonic treatment of altimetric data. One of these techniques has been documented as the point-mass adjustment, and the other has been described under the name of modified collocation with noise. The term modified does not concern the philosophy of the least-squares collocation with noise, but, rather, its specific application aimed at describing a smoothed-out gravity field, in which the part of the signal beyond the desired smoothing level is pushed into the realm of noise. The primary task consists in representing collocation results in terms of the spherical-harmonic expansion of the geopotential. In particular, an equilateral grid of geoid undulations (referring to a higher order surface than an ellipsoid) predicted through the modified collocation with noise at the smoothing level (n',n') can be utilized in a numerical integration algorithm, eventually producing an (n', n') set of spherical-harmonic coefficients consistent with the collocation results. The conditions under which the consistency requirement is satisfied are analyzed in computer simulations. As the most important outcome of these simulations, the familiar rule of thumb is singled out as an accurate and clearcut indicator of the highest degree and order spherical-harmonic model (N, N) which can still faithfully represent the gravity field as described by a discrete set of data – here an equilateral grid of geoid undulations. This rule stipulates that N=180 180 deg/theta deg, where theta deg symbolizes the grid interval in angular measure.
GRA

N86-18883# Analytic Sciences Corp., Reading, Mass.
A STATISTICAL GRAVITY MODEL FOR NORTHERN TEXAS Report, May - Oct. 1984
J. V. White 19 Nov. 1984 25 p
(Contract F19628-83-C-0053)
(AD-A160474; Rept-4423-5; AFGL-TR-85-0037; SR-3) Avail: NTIS HC A02/MF A01 CSCL 12/1

A statistical gravity field model has been developed for northern Texas, where the Gravity Gradiometer Survey System (GGSS) will be tested. The model is described in this report using both round-Earth and flat-Earth Attenuated White Noise (AWN) formulations. The model is fitted to all worldwide and local gravity-field information that is applicable to the GGSS test site. In addition, a discrete approximation to the AWN model is described, which can be used to compute simulated GGSS survey data and the surface truth data for the test area. It is expected that the AWN model and the derived simulated data will be useful for optimizing, testing, and validating GGSS data processing algorithms and software.
Author (GRA)

N86-18884# Air Force Geophysics Lab., Hanscom AFB, Mass.
PROFILES OF TEMPERATURE AND DENSITY BASED ON 1 AND 10 PERCENT EXTREMES IN THE STRATOSPHERE AND TROPOSPHERE Air Force Surveys in Geophysics 1983 - 1984
A. J. Kantor and P. Tattelman 27 Dec. 1984 61 p
(AF Proj. 6670)
(AD-A160552; AFGL-TR-84-0336; AFGL-AFSG-447) Avail: NTIS HC A04/MF A01 CSCL 04/1

Vertical profiles of temperature and density have been developed based on 1 and 10 percent warm and cold temperatures and 1 and 10 percent high and low densities occurring at the worst locations in the world (except Antarctica) during the worst month. The profiles, from the surface to 80 km, are based on extremes that occur at 5, 10, 20, 30, and 40 km. For example, one of the temperature profiles developed was based on a 10 percent warm temperature at an altitude of 20 km; thus, it represents meteorological conditions typically associated with this extreme. Ten such warm profiles (5 levels by 2 percentiles) and 10 cold profiles have been constructed from 14 years of rawinsonde and rocketsonde observations. Internally consistent hydrostatic profiles of density associated with these temperature profiles are provided. Twenty analogous density (and associated temperature) profiles also have been developed from extreme densities occurring at these altitudes. Thus, a set of realistic profiles (rather than envelopes) of temperature and density associated with extremes at specified levels in the troposphere and stratosphere are available for altitudes up to 80 km.
GRA

N86-18885# Weston Geophysical Corp., Westboro, Mass.
SIMULATED GROUND RESPONSE USING NONLINEAR ELASTIC MODULI Final Report, 17 Aug. 1984 - 14 Feb. 1985
G. M. Jones and V. J. Murphy 15 Mar. 1985 59 p
(Contract F19628-84-C-0130)
(AD-A160590; AFGL-TR-85-0065) Avail: NTIS HC A04/MF A01 CSCL 08/13

This report discusses procedures for the extrapolation of low-strain seismic measurements made at a specific site to predict the site response under earthquake loading conditions. Because of the nonlinear relation between stress and strain exhibited by soils at strain levels exceeding about 0.000001, a program to determine dynamic soil properties at low to high strain levels and at different depths in the soil column at the site is required. Utilizing recent advances in field measurement techniques, this goal can be best accomplished with a combination of in situ geophysical methods, including surface reflection and refraction methods; cross-hole and down-hole techniques utilizing impulsive and vibratory sources; and dynamic loading methods involving monitoring of in-place deformation. Knowledge of the variation with strain level and other factors of equivalent moduli and damping at a site

may enable frequency-dependent scaling rules to be developed for the computation of high-strain response from microseismic response curves. This procedure can be evaluated by performing field measurements at sites for which comprehensive strong motion data bases are already available. Author (GRA)

N86-18886# Battelle Memorial Inst., Argonne, Ill. Office of Crystalline Repository Development.
SOUTHEASTERN REGIONAL GEOLOGIC CHARACTERIZATION REPORT: VOLUME 1 Final Report
Aug. 1985 515 p
(Contract DE-AC02-83CH-10139)
(DE86-000409; DOE/CH-6(1)-Final) Avail: NTIS
HC A22/MF A01

This report presents available geologic information pertinent to siting a repository for high-level nuclear waste in crystalline rock in central Maryland; noncoastal Virginia, North Carolina, and South Carolina; and northern Georgia. For each of the states within the Southeastern Region, information is provided on the geological disqualifying factor and the geologic regional screening variables to be used in region-to-area screening. The geological factor and variables include deep mines and quarries, rock mass extent, postemplacement faulting, suspected Quaternary faulting, seismicity, rock and mineral resources, major ground-water discharge zones, ground-water resources, state of stress, thickness of rock mass, and thickness of overburden. Information is presented on the age, areal extent, shape, composition, texture, degree and type of alteration, thickness, and structural features associated with each rock body or complex. Regional seismic and tectonic information is presented, including patterns of earthquake occurrence, earthquake magnitudes, horizontal ground accelerations, and vertical crustal movements. Also included are discussions of the rock and mineral deposits or mines located within or near crystalline bodies; ground-water resources and regional hydrology; postulated changes in climate and the associated effects; and landforms, surface processes, and surficial materials on or near the rock bodies. DOE

N86-18887# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
CSDP: THE SEISMOLOGY OF CONTINENTAL THERMAL REGIMES Final Technical Report, 1 Jan. 1975 - 31 Dec. 1984
K. Aki Feb. 1985 13 p
(Contract DE-AC02-76ER-02534)
(DE86-000214; DOE/ER-02534/T1) Avail: NTIS
HC A02/MF A01

Research progress is reported in the development of new seismological tools to define and characterize the geometry, mechanical construction and mass transport process of a geothermal system, and their application to various geothermal systems including the Fenton Hill Hot Dry Rock System, New Mexico, Kilauea and Kilauea Iki, Hawaii, Mt. St. Helens, Washington, and Long Valley, California. DOE

N86-18888# National Weather Service, Salt Lake City, Utah.
SUNRISE/SUNSET
G. R. Lusky Aug. 1985 24 p
(PB85-239029; NOAA-NWS-WRDCP-51) Avail: NTIS
HC A02/MF A01 CSCL 03A

The computer program, SUN, allows the user to produce annual, monthly, or daily tables of sunrise and sunset data for any number of stations around their area of interest. This should make it quite easy to rapidly disseminate accurate information to those public interests requesting such data. These are the two main benefits of the program - speed and accuracy of information. GRA

N86-18362# Milan Univ. (Italy). Dept. of Earth Sciences.
LONG LINEAR FEATURES OBSERVED ON THE ALPINE OROGEN AND THEIR COMPARISON WITH SOME GEOPHYSICAL DATA
R. Cassinis, C. M. Marino, and F. Pinali *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 217-219 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18363# Catania Univ. (Italy). Dept. of Engineering.
MONITORING OF GROUND FRACTURES CAUSED BY VOLCANIC ERUPTIONS USING REMOTE SENSING TECHNIQUES
A. L. Geraci, G. LaRosa, T. Caltabiano (CNR, Catania, Italy), and E. LoGiudice (CNR, Catania, Italy) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 221-227 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-18889 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS FROM THE GERMAN METEOROLOGICAL SERVICE. NUMBER 168: A ONE-DIMENSIONAL NUMERICAL MODEL FOR THE PREDICTION OF FOG [BERICHTE DES DEUTSCHEN WETTERDIENSTES. NR. 168: EIN EINDIMENSIONALES NUMERISCHES MODELL ZUR NEBELVORHERSAGE]
Sigrid Hacker-Thomae (Bonn University) 1985 49 p refs In GERMAN; ENGLISH summary
(ISBN-3-88148-217-2; ISSN-0072-4130) Copyright. Avail: Issuing Activity

A one-dimensional model for the prediction of radiation fog is presented. The model domain (between -1, and 2800 m height) was resolved by a nonequidistant grid. For the atmosphere, the temperature, moisture, liquid water, and wind are predicted; for the soil, only the temperature is predicted. Since the model is developed under the aspect of operational applicability, completeness and simplicity are aimed at. Therefore, the model equations are closed by eddy diffusion coefficients which can however take into account thermal and dynamic stability. Simulations are compared with observations. It is shown that the model simulates the course of spread, and therefore the onset of fog reasonably well, but underestimates the decrease of soil surface temperature. The choice of soil parameters proves to be important. Sensitivity tests show that the quality of the prediction is distinctly predetermined by the input data, thus reducing the possibilities for operational applicability considerably. Author (ESA)

N86-18890*# New York Univ., New York. Dept. of Applied Science.
APPLICATION OF SOLAR MAX ACRIM DATA TO ANALYZE SOLAR-DRIVEN CLIMATIC VARIABILITY ON EARTH Final Report
Martin I. Hoffert 24 Jan. 1986 13 p refs
(Grant NAG5-503)
(NASA-CR-176483; NAS 1.26:176483; NYU/86-146) Avail: NTIS
HC A02/MF A01 CSCL 04B

Langley, in the late nineteenth century, attempted to measure solar irradiance over an extended period of time in order to detect changes. The problem with this and other early attempts was that ground based measurements are not sufficiently accurate to measure solar irradiance fluctuations, which are on the order of 0.1%. It was not until the Active Cavity Radiometer Irradiance Monitor (ACRIM) experiment on the NASA Solar Maximum Mission (SMM) was launched in 1980 that continuous data with precision 0.1% was available. G.L.C.

N86-18891# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: TINKER AFB, OKLAHOMA Data Summary Report, Apr. 1974 - May 1984
May 1985 464 p
(AD-A159643; USAFETAC/DS-85/012) Avail: NTIS

HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Tinker AFB, Oklahoma, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18892# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: DAVIS-MONTHAN AFB, ARIZONA Data Summary Report, Dec. - Apr. 1985

Jul. 1985 512 p

(AD-A159644; USAFETAC/DS-85/040) Avail: NTIS

HC A22/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Davis-Monthan AFB, Ariz., consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18893# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: FORT RUCKER AIN, ALABAMA Data Summary Report, Jan. 1974 - Dec. 1[illegible]

May 1985 455 p

(AD-A159645; USAFETAC/DS-85/016) Avail: NTIS

HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Fort Rucker AW, Alabama, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18894# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: BREMEN INTERNATIONAL, WEST GERMANY Data Summary Report, Sep. 1974 - Aug. 1984

Jan. 1985 368 p

(AD-A159656; USAFETAC/DS-85/003) Avail: NTIS

HC A16/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Bremen Intl., West Germany is presented. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-18895# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F: USAF ACADEMY AFD, COLORADO Data Summary Report, Sep. 1977 - Aug. 1984

Feb. 1985 249 p

(AD-A159657; USAFETAC/DS-85/004) Avail: NTIS

HC A11/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: USAF Academy AFD, Colorado. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-18896# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: GENERAL BILLY MITCHELL FIELD, WISCONSIN Data Summary Report, Jan. 1974 - Dec. 1983

Dec. 1984 425 p

(AD-A159658; USAFETAC/DS-84/038) Avail: NTIS

HC A18/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for General Billy Mitchell Field, Wisconsin, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18897# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: LITTLE ROCK AFB, ARKANSAS Data Summary Report, Dec. 1974 - Nov. 1984

May 1985 471 p

(AD-A159659; USAFETAC/DS-85/017) Avail: NTIS

HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Little Rock AFB, Arkansas, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18898# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: SHAW AFB, SUMTER, SOUTH CAROLINA Data Summary Report, Jul. 1974 - Jun. 1984

Dec. 1984 391 p

(AD-A159660; USAFETAC/DS-84/042) Avail: NTIS

HC A17/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Shaw AFB, Sumter, South Carolina is presented. The summary consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132 186), An Aid for Using the

Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18899# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: VICENZA, ITALY Data Summary Report, Jan. 1974 - Dec. 1983
Apr. 1985 365 p
(AD-A159661; USAFETAC/DS-85/019) Avail: NTIS
HC A16/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Vicenza, Italy is presented. The summary consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18900# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: AVIANO AB, ITALY Data Summary Report, Jan. 1974 - Dec. 1983
Dec. 1984 383 p
(AD-A159662; USAFETAC/DS-84/037) Avail: NTIS
HC A17/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Aviano AB, Italy is presented. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18901# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: MINNEAPOLIS - ST. PAUL, MINNESOTA Data Summary Report, Jan. 1974 - Dec. 1983
Dec. 1984 381 p
(AD-A159663; USAFETAC/DS-84/036) Avail: NTIS
HC A17/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Minneapolis - St. Paul, Minnesota is presented. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18902# Oregon State Univ., Corvallis. Radiation Center.
GIEBELSTADT AIN GERMANY (WEST). LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS): PARTS A, C-F Data Summary Report, Aug. 1974 - Jul. 1984
Feb. 1985 255 p
(AD-A159664; USAFETAC/DS-85/005) Avail: NTIS
HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Giebelstadt Ain West, Germany is presented. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-18903# Oregon State Univ., Corvallis.
SOESTERBERG, NETHERLANDS. LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS): PARTS A, C-F Data Summary Report, Jun. 1975 - May 1985
Aug. 1985 279 p
(AD-A159665; USAFETAC/DS-85/044) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Soesterberg, Netherlands is presented. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-18904# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
RIYADH, SAUDI ARABIA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F Data Summary Report, Jan. 1977 - Dec. 1984
Jun. 1985 484 p
(AD-A159667; USAFETAC/DS-85/024) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Riyadh, Saudi Arabia is presented. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-18905# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: ALTUS AFB, OKLAHOMA Data Summary Report, Mar. 1975 - Feb. 1985
Sep. 1985 303 p
(AD-A159668; USAFETAC/DS-85/047) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Altus AFB, Oklahoma is presented. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18906# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: HICKAM AFB, HAWAII Data Summary Report, Jan. 1974 - Dec. 1983
Apr. 1985 412 p
(AD-A159730; USAFETAC/DS-85/014) Avail: NTIS
HC A18/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for: Hickman, AFB, Hawaii. Summary consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18907# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: MUIR AAF, HARRISBURG, PENNSYLVANIA Data Summary Report, Dec. 1974 - Nov. 1984
Jun. 1985 479 p
(AD-A159731; USAFETAC/DS-85/021) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for: Muir AAF, Harrisburg, Pennsylvania. Summary consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18908*# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: KI SAWYER AFB, MICHIGAN Data Summary Report, Jul. 1974 - Jun. 1984
Oct. 1984 486 p
(AD-A159732; USAFETAC/DS-84/034) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for: KI Sawyer AFB, Michigan. Summary consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-18909# Boeing Military Airplane Development, Seattle, Wash.
ATMOSPHERIC ELECTRICITY HAZARDS THREAT ENVIRONMENT DEFINITION Interim Report, Aug. 1982 - Mar. 1984
B. G. Melander and W. W. Cooley Aug. 1985 155 p
(Contract F33615-82-C-3406)
(AD-A159739; AFWAL-TR-85-3052) Avail: NTIS
HC A08/MF A01 CSCL 01/2

This document provides definition of the atmospheric electricity threat environment as part of the Atmospheric Electricity Hazards Protection (AEHP) program. This issue contains an initial atmospheric electricity threat to be used for aircraft based on measurement of: (1) the lightning threat at the ground, and (2) the static electrification threat at altitude. The experimental basis for this threat is critically reviewed. Recommendations are made for future work in atmospheric electricity environments to refine and improve understanding of aircraft AEH environments. GRA

N86-18910# National Center for Atmospheric Research, Boulder, Colo.
MICROBURST WIND SHEAR MODELS FROM THE JOINT AIRPORT WEATHER STUDIES (JAWS) Final Report
W. Frost, H. P. Chang, K. L. Elmore, and J. McCarthy Jun. 1985 198 p
(Contract DTFA01-82-Y-10513)
(AD-A159758; DOT/FAA/PM-85/18) Avail: NTIS
HC A09/MF A01 CSCL 04/2

Multiple Doppler radar data collected during the Joint Airport Weather Studies (JAWS) Project is used to synthesize the three-dimensional wind in the region of a microburst. A six-degree-of-freedom numerical aircraft model having characteristics similar to Boeing 727 series aircraft is used to investigate jet transport aircraft response to microburst winds during simulated approaches and departures. Simple pilot control laws are used to adjust thrust, pitch, roll, and yaw so as to maintain given approach or departure parameters. Generally, when horizontal wind shear along the approach or departure path is .0001/s or greater, the model is unable to maintain the desired approach path and suffers a significant reduction in climb performance during a go-around or departure. Although the mean wind shear along a path gives a good qualitative measure of the wind shear threat to a jet transport, different paths with similar mean shears can yield markedly different results, as do the same paths with similar mean shears can yield markedly different results, as do the same paths through the microburst at different times, emphasizing the fine temporal and spatial scale of microburst winds. Finally, during the approximate 30 s period required for the aircraft to traverse the region of highest horizontal shear, time variations in the microburst wind field are shown to insignificantly affect the modelled flight path because the traverse period is a short time compared to the life time of a microburst. GRA

N86-18911# Naval Postgraduate School, Monterey, Calif.
A COMPUTER PROGRAM TO MODEL THE Cn2 OPTICAL TURBULENCE CHARACTERISTICS OF A GIVEN ATMOSPHERE, ITS CONVERSION TO IBM FORTRAN AND UTILIZATION M.S. Thesis
N. J. Padula Jun. 1985 67 p
(AD-A159762) Avail: NTIS HC A04/MF A01 CSCL 09/2

This thesis describes the conversion of a computer program form FORTRAN IV used by the CDC computer to FORTRAN IV compatible with the Naval Postgraduate School IBM 3033 system. The converted program, called TURB2, estimates the magnitude of the refractive index structure parameter, sq Cn(z), for a dry atmosphere in horizontal layers. The altitudes of the layers depend upon the corresponding altitudes of conventional meteorological rawinsonde balloon data. The data input is a formatted file called TURB2 DATAIN and the output consists of the value of dry sq Cn at each altitude along with a graph of log Cn2 vs altitude. Author (GRA)

N86-18912# Air Weather Service, Scott AFB, Ill.
CATALOG OF AIR WEATHER SERVICE TECHNICAL DOCUMENTS
Jul. 1985 138 p
(AD-A159881; AD-E440298; AWS/TC-85/001) Avail: NTIS
HC A07/MF A01 CSCL 04/2

This catalog lists technical documents produced by or for the Air Weather Service and its subordinate units. Documents listed include technical reports, technical notes, data summaries, project reports, special studies, forecaster memos, follow-on training programs, microcomputer programs, and hand calculator programs. It includes availability data, ordering instructions, historical section. GRA

N86-18913# Air Weather Service, Scott AFB, Ill.
THE OPERATIONAL METEOROLOGY OF CONVECTIVE WEATHER. VOLUME 2: STORM SCALE ANALYSIS Final Report
C. A. Doswell, III Apr. 1985 252 p
(AD-A159919; AWS/TN-85/001-Vol-2) Avail: NTIS

HC A12/MF A01 CSCL 04/2

This document deals primarily with fundamental aspects of convective meteorology. In order to present storm-scale meteorology, a wide range of topics are considered. Certain subjects, like precipitation physics, are examined at some length in order to provide the basic physical understanding of how thunderstorms work. A classification scheme is introduced for convective storms. This scheme allows the reader to make certain physical distinctions in the way storms are organized and will allow one to infer how the storms behave. GRA

N86-18914# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

CONVECTIVE CLOUD CLIMATOLOGIES CONSTRUCTED FROM SATELLITE IMAGERY

M. A. Klitch, J. F. Weaver, F. P. Kelly, and T. H. VonderHaar Mar. 1985 14 p Previously announced in IAA as A85-34430

(Grant AF-AFOSR-0162-82)

(AD-A159969; AFOSR-85-0843TR) Avail: NTIS

HC A02/MF A01 CSCL 04/2

Composites of satellite imagery are constructed for various hours and various summer months on Colorado State University's interactive processing system. Simple averages of visible wavelength imagery are considered as well as averages of bispectrally classified data. The classified images use both visible wavelength and infrared wavelength data to identify probable deep convection. Results reveal the diurnal convective cycle over the Rocky Mountains and high plains in greater detail than has been previously possible. The convective frequency composites are compared with precipitation averages and differences between normal versus severe weather patterns are discussed. Practical forecasting applications for the composited data are suggested and discussed. Author (GRA)

N86-18915# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

CENTRAL AMERICAN CLIMATOLOGY Final Report

T. J. Whiteside Apr. 1985 162 p

(AD-A159989; USAFETAC/TN-85/002) Avail: NTIS

HC A08/MF A01 CSCL 04/2

A presentation of climatological information for the Central American region from Guatemala and Belize southward through Panama. Includes narrative descriptions of Central American climate and weather, to include major synoptic features, precipitation, psychrometrics, cloudiness, visibility, surface winds, thunderstorms, fog, and haze. Also includes astronomical, tidal, and seismic data. Includes contoured climatological charts and climatological data tables. Primarily addresses surface weather data, but includes some upper atmospheric data. Author (GRA)

N86-18916# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

LOW-LEVEL WIND SYSTEMS IN THE WARSAW PACT COUNTRIES Final Report

W. E. McCollom, K. R. Walters, R. W. Coyle, E. L. Smith, and G. E. Elder Mar. 1985 58 p

(AD-A160144; USAFETAC/TN-85/001) Avail: NTIS

HC A04/MF A01 CSCL 04/2

This technical note provides a comprehensive survey of local wind systems in the Warsaw Pact and adjacent NATO and neutral countries. The region surveyed is divided into two geographical areas that cover most of Europe. Local winds are named and related to listed meteorological definitions. Distinctive wind characteristics are identified for the specific local wind or for its locale. Maps showing distribution and location of local wind systems are included. Additional local wind names are listed. Locally-named winds are defined and described. GRA

N86-18917# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.

U.S. NAVY CLIMATIC STUDY OF THE CARIBBEAN SEA AND GULF OF MEXICO. VOLUME 1: WEST CARIBBEAN SEA AND CENTRAL AMERICAN WATERS

Sep. 1985 220 p

(AD-A160159) Avail: NTIS HC A10/MF A01 CSCL 04/2

This climate study consists of monthly charts and tables of: (1) clouds, (2) visibility-tables, (3) ceiling-visibility (mid range), (4) wind-visibility-cloudiness, (5) scalar mean wind speed, (6) wind speed < and > or = 34 knots, (7) wind speed 11 to 21 and 22 to 33 knots, (8) air and sea temperature (9) surface wind roses, (10) wave height-isopleths, (11) wave height-tables, and (12) surface currents (seasonal), and station climatic summaries. Author (GRA)

N86-18918# Weather Wing (2nd), APO New York. 09012

THE EUROPEAN LFM-STYLE FORECAST AIDS Final Report

H. D. White, III, M. Adams, and D. G. McGrew 8 May 1985 29 p

(AD-A160166; Rept-2WW/TN-85/001) Avail: NTIS

HC A03/MF A01 CSCL 04/2

The purpose of this publication is to provide you, the forecaster, with guidance on how to use the 2nd Weather Wing's LFM Style facsimile products. The authors have gone an extra step to briefly review the basic meteorology, apply it to the models, and then provide guidelines. For this reason, this Technical Note (TN) has much wider application than just for the facsimile products. It touches on and aspect forecasters are most likely to forget; fax charts are just tools, and as such are only as good as we make them. As is true in most professions weather forecasters have come to rely heavily on computer products - almost to the point of blind acceptance. Yet, attitudes should be to consider computer-generated products as a friendly colleague who, although keenly analytical, is prone to making real blunders when presented with bad data. For this reason, the concepts of initialization and continuity are reviewed first. The remaining sections cover how to use the specific fields on the LFM package in detail great enough to be used as a reference to charts in general. This TN can assist you in setting up your LAFP in that reasons for specific entries on your TAF Worksheet can be drawn from these charts. GRA

N86-18919# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.

FRONTAL PASSAGE DATA FROM THE SOUSY-VHF-RADAR Final Report, 1 Mar. 1983 - 28 Feb. 1985

D. T. Farley Aug. 1985 61 p

(Grant AF-AFOSR-0100-83)

(AD-A160211; AFOSR-85-0852TR) Avail: NTIS

HC A04/MF A01 CSCL 04/2

Experiments have shown that there may be advantages in using a spaced antenna method instead of a Doppler method for measuring wind profiles, particularly for systems with small dimensions of the type likely to be used in operational wind profiling. The comparison between radar and radiosonde data have shown good agreement, indicating that the features seen in the radar reflectivity data are characteristic of frontal temperature structure and not associated with precipitation or local convection. Experiments show that a VHF radar operated continuously can provide synoptically meaningful meteorological data and is capable of high time resolution data required by future numerical methods. Author (GRA)

N86-18920# Air Force Geophysics Lab., Hanscom AFB, Mass.

AVIATION WEATHER FORECASTS BASED ON ADVECTION: EXPERIMENTS USING MODIFIED INITIAL CONDITIONS AND IMPROVED ANALYSES Environmental Research Papers, Oct. 1983 - Oct. 1984

H. S. Muench and D. A. Chisholm 21 Jan. 1985 62 p

(AF Proj. 6670)

(AD-A160369; AFGL-TR-85-0011; AFGL-ERP-904) Avail: NTIS

HC A04/MF A01 CSCL 04/2

Previous experiments had shown that upper-level wind flows could be used to advect surface weather parameters to produce short range (0 to 15 hours) forecasts. However, to achieve scores better than persistence, allowance had to be made for stationary weather patterns and also for diurnal changes in weather

conditions. Two new forecast experiments were prepared and carried out, using data from 12 cases during March 1983. First, data were edited and adjusted to reduce effects of local conditions (altitude, surface roughness), and then were advected. Finally, the adjustment was removed. The forecasts using a 500 mb space-averaged flow with modified initial conditions produced improved advection forecasts, with some parameters better than persistence and MOS (Model Output Statistics) for 2 to 7 hours. In the second experiment, an improved objective-analysis procedure was introduced, one based on the Barnes approach, which uses one-half degree (about 45 km) resolution and previous analysis as a first guess. (Prior analyses were 1 degree, single pass, Cressman-type analyses). These improved analyses resulted in a somewhat better score for 1 to 3 hours (using a change-advection technique), but were slightly worse at longer periods. Apparently, the small-scale patterns recovered by the improved analyses were largely either short-lived or stationary. These conditions would not lead to better advection forecasts. Further examination revealed that those parameters most difficult to resolve in the objective analyses (visibility, ceiling, and wind speed) also had the lowest forecast skill scores for persistence. GRA

N86-18921# Air Force Geophysics Lab., Hanscom AFB, Mass.
SOME MICROPHYSICAL PROCESSES AFFECTING AIRCRAFT ICING Final Scientific Report, 1 Oct. 1981 - 30 Sep. 1984
H. J. Sweeney and I. D. Cohen 8 May 1985 45 p
(AD-A160375; AFGL-TR-85-0100; AFGL-ERP-914) Avail: NTIS
HC A03/MF A01 CSCL 04/2

This report summarizes work done as part of the aircraft icing probabilities program. It contains a look at icing in layer-type clouds, a comparison of Particle Measuring System (PMS)2-D data from two flights. and a look at additional data obtained from researchers in the Federal Republic of Germany. The parameters measured in a warm and cold layer-type cloud near Peoria, IL are analyzed and compared. Liquid water content (LWC), cloud depth, particle diameter and particle concentration are compared. Variations of these parameters are compared. In mature clouds, where droplet sizes are approximately equal, the LWC is directly related to the number concentration. The icing rate, LWC and droplet size all increase as a function of height above cloud base. Synoptic patterns and PMS 2-D data obtained on two flights are compared. The first flight, made near Greensboro, NC was in an area of heavy precipitation. The large particles present produced very little icing. The other flight, near Flint, MI was in an area which was experiencing only spotty precipitation. The aircraft, however, experienced moderate icing. Data gathered on aircraft observations in the Federal Republic of Germany are examined. The data show that in strong icing situations, there are many particles with diameters of 10 to 20 microns. The results match those obtained by our research flights. GRA

N86-18922# Systems and Applied Sciences Corp., Vienna, Va.
OBJECTIVE ANALYSIS AND PREDICTION TECHNIQUES - 1984 Report, 1 Dec. 1983 - 30 Nov. 1984
A. M. Gerlach 30 Nov. 1984 171 p
(Contract F19628-82-C-0023)
(AD-A160377; AFGL-TR-84-0328; SR-8) Avail: NTIS
HC A08/MF A01 CSCL 04/2

This report summarizes weather research in several technical areas: numerical weather prediction, development and joint testing of two objective analysis methods (optimum interpolation and fitting procedure) for AFGL global spectral models; improved specification of moisture initial conditions, study of relocatable limited area models; mesoscale forecasting, error analysis of LFM-II forecasts during winter seasons; boundary layer meteorology specialized computer programs for studies of tropospheric scatter propagation, atmospheric chemical dispersion modeling, and microwave refractive structure determination; radar meteorology; studies of single-Doppler detection of synoptic-scale wind anomalies; detection algorithm for gust front shear; development of mesocyclone detection-classification algorithm; detection of mesocyclone percursors; detection of aircraft icing regions; satellite meteorology; studies of satellite viewing angle bias in RTNEPH IR data; studies of MDR data correlation with satellite imagery; development of microprocessor-based satellite data ingest system; system design (hardware, software) for McIDAs upgrade; climatology; data processing studies for vertical temperature-density profiles for MIL STD 210 revision; and data products for investigating VHR satellite sensor capabilities for improved small cumulus detection. Author (GRA)

N86-18923# Air Force Geophysics Lab., Hanscom AFB, Mass.
IN-FLIGHT TURBULENCE DETECTION Final Scientific Report, 10 Oct. 1983 - 30 Sep. 1984
A. R. Bohne 8 Mar. 1985 61 p
(DA Proj. 667-0)
(AD-A160380; AFGL-TR-85-0049; AFGL-ERP-909) Avail: NTIS
HC A04/MF A01 CSCL 04/2

A limited set of radar and aircraft data acquired during the 1981 and 1982 Joint Agency Turbulence Experiment are used to compare incoherent and coherent radar methods for atmospheric turbulence severity estimation. Time series of ground-based radar in-phase and quadrature signal return data are processed by Doppler (Fast Fourier Tranform) and incoherent (R-meter with and without noise correction) methods to determine Doppler spectrum variance. These variance data serve as input to a turbulence algorithm to derive estimates of turbulence severity. These estimates are then compared with in-situ aircraft measurements. Results show the order of preference for the radar methods is Doppler, R-meter with noise correction, and R-meter without noise correction. The R-meter without noise correction method must be considered unreliable since it results in large overestimates of turbulence severity when the signal to noise ratio is less than about 12 dB. The R-meter with noise correction method generally duplicates well the results derived from Doppler analysis and may be considered a reasonable alternative when Doppler capability is not available. GRA

N86-18924# Air Force Geophysics Lab., Hanscom AFB, Mass.
JOINT AGENCY TURBULENCE EXPERIMENT Final Report, 1 Oct. 1981 - 30 Sep. 1984
A. R. Bohne 21 Jan. 1985 218 p
(AF Proj. 6670)
(AD-A160420; AFGL-TR-85-0012; AFGL-ERP-905) Avail: NTIS
HC A10/MF A01 CSCL 17/9

Doppler radar and aircraft data acquired during the 1981 and 1982 observation seasons are discussed. Time histories of Doppler radar mean velocity and spectrum variance data acquired while tracking an instrumented aircraft during 34 thunderstorm penetrations are presented. Time histories and analysis of turbulence severity, as determined from these radar and aircraft data, are also presented. Whereas use of radar mean velocity in structure function analysis results in underestimation of the actual turbulence severity, radar methods based upon Doppler spectrum variance successfully detect regions of turbulence hazardous to aircraft. The variance-based method, employing a modeled turbulence energy spectrum with a maximum finite eddy size, is found most effective when the turbulence outer scale lies in the range of 1 to 4 km. Classification of turbulence severity as light, moderate, heavy, or severe with a single outer scale value was unreliable. However, classification into composite severity classes, where a composite class combined two or more individual severity classes, was found to be a successful approach for locating hazardous and nonhazardous turbulence regions. Data also show Doppler spectrum variance to be poorly correlated with shear of the radial wind. This shear, resulting from nonturbulence storm structure generally contributed less than 10% of the turbulence contribution to Doppler spectrum variance and could generally be neglected when estimating turbulence severity. GRA

N86-18925# Air Force Geophysics Lab., Hanscom AFB, Mass.
A COMPARISON OF MOISTURE VARIABLES IN THE VERTICAL INTERPOLATIONS OF A 4-D ASSIMILATION SYSTEM Annual Scientific Report, 1 Oct. 1983 - 30 Sep. 1984
K. Mitchell and C. H. Yang 11 Apr. 1985 99 p
(AF Proj. 2310)

(AD-A160464; AFGL-TR-85-0090; AFGL-ERP-910) Avail: NTIS HC A05/MF A01 CSCL 12/1

A fundamental activity of numerous numerical weather predictions centers is objective analysis of the global atmosphere. Typically the objective analysis is a product of a four-dimensional global data assimilation system. Such a system includes objective analysis, initialization, and global forecast model components. It is common for the objective analysis to be performed on constant pressure surfaces, while the forecast model operates on the standard sigma coordinate or a close variant. This necessitates vertical interpolations between pressure surfaces and sigma-coordinate surfaces before and after the forecast. This study shows that the choice of moisture variable and interpolation method in the vertical interpolation can be crucial to preserving a reasonable moisture distribution in humidity assimilations. The use of relative humidity, dewpoint (T sub d), and specific humidity are tested in four two-point interpolation methods including linear, logarithmic, exponential, and power law. The standard use of logarithmic interpolation, is shown to be a suitable choice when vertically interpolating RH or T sub d, but a singularly poor choice when interpolating Q. GRA

N86-18926# Texas A&M Univ., College Station. Dept. of Oceanography.
AN INVESTIGATION OF HURRICANE-INDUCED FORERUNNER SURGE IN THE GULF OF MEXICO Final Report
M. Bunpapong, R. O. Reid, and R. E. Whitaker Sep. 1985 221 p
(Contract DACW39-82-K-0001)
(AD-A160635; CERC-TR-85-5) Avail: NTIS HC A10/MF A01 CSCL 08/3

A system of coupled, normal mode equations describing a two-layer ocean basin of variable depth was derived form the quasi-hydrostatic equations of motion using a general form of the method of Veronis and Stommel (1956). A finite difference, time marching, numerical model for the normal mode equations, employing and Alternating Direction Implicit (ADI) scheme, on a space-staggered grid has been developed. The model is quasi-linear and allows for variable bathymetry and variable Coriolis parameter. The model domain includes the Gulf of Mexico and the Cayman Sea with a resolution of 15'. A no-flow condition is taken at all solid boundaries and the inverted barometer term is used to stipulate barotropic height anomalies on the open boundaries. Hurricanes Carla (1961) and Allen (1980) are used as historical storms to verify the model by comparing numerical and observed hydrographs. A parametric study utilizing three forward speeds, two radii to maximum winds, and five paths characterizing Gulf hurricanes is presented. The results of the study show that volume transports through Florida and Yucatan Straits consisted of in-phase (both in or both out) and out-of-phase components. GRA

N86-18927# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DEVELOPMENT AND VALIDATION OF A VERTICALLY TWO-DIMENSIONAL MESOSCALE NUMERICAL MODEL M.S. Thesis
M. K. Walters Aug. 1985 78 p
(AD-A160741; AFIT/CI/NR-85-105T) Avail: NTIS HC A05/MF A01 CSCL 04/2

In this thesis a vertical, two dimensional, grid-point mesoscale model is developed, using the equations of motion and thermodynamics in a dry flow. A nondimensional vertical coordinate is used. The hydrostatic assumption is made. To avoid the sensitivity of the continuity equation, several derived equations are used based on the first law of thermodynamics, the pressure tendency equation, and the top boundary condition, which was that the vertical motion was zero at the top boundary. These derived equations include the equation for prediction of density, Richardson's equation for vertical motion, and the pressure tendency at the top of the model. A simplified calculation of dry, subgrid convection is made to prevent instability. The equations are integrated using explicit finite differences with a time step of 2 minutes. GRA

N86-18928# Bohan (Walter A.) Co., Park Ridge, Ill.
NAVY TACTICAL APPLICATIONS GUIDE. VOLUME 5, PART 2: INDIAN OCEAN (ARABIAN SEA/BAY OF BENGAL) WEATHER ANALYSIS AND FORECAST APPLICATIONS
R. W. Fett, W. A. Bohan, and R. E. Englebretson Feb. 1985 235 p
(Contract N00228-84-C-3207)
(AD-A160781; NEPRF-TR-85-01-Vol-5-Pt-2) Avail: NTIS HC A11/MF A01 CSCL 04/2

Case studies describing regional environmental analysis and forecast applications are based on satellite data and conventional meteorological observations for the Indian Ocean area are presented. Topics include Northeast Monsoon, Southwest Monsoon, coastal zone phenomena, and ocean-atmosphere interaction. The studies provide insights into identifiable patterns of weather development that occur frequently, so that once the basic pattern is recognized at an early stage this information can be used for improved weather analysis and forecasting. GRA

N86-18929# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LIDAR MULTIPLE SCATTERING/DEPOLARIZATION IN STRATUS CLOUDS M.S. Thesis
R. L. Petrilla 1985 77 p
(AD-A160899; AFIT/CI/NR-85-142T) Avail: NTIS HC A05/MF A01 CSCL 04/2

The contributions of multiple scattering to backscattered depolarization ratios in stratus clouds were investigated using a linearly-polarized ruby lidar system from a site on the southern California coast. The effects of the receiver field of view, lidar elevation angle, the transmitter/receiver beam misalignment on depolarization ratios were investigated. Results for a 1 mrad transmitter beam width indicate that a receiver field of view of 3 mrad returns an almost threefold increase in backscattered depolarization ratios as opposed to a 1 mrad field of view. The effects caused by changing the elevation angle appear to be related to the cloud base. Deliberate beam alignment produces significant alterations in the lidar returns, demonstrating the importance of maintaining proper alignment. In the future, the lidar should be used in conjunction with in situ microphysical observations and a program of theoretical studies to assess the degree to which the lidar data can be related to specific stratus cloud properties. Author (GRA)

N86-18930# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CASE STUDIES OF THE STRUCTURE OF THE ATMOSPHERIC BOUNDARY LAYER ENTRAINMENT ZONE Ph.D. Thesis
T. D. Crum 1985 266 p Original contains color illustrations
(AD-A160911; AFIT/CI/NR-85-129D) Avail: NTIS HC A12/MF A01 CSCL 04/2

The structure of the atmospheric entrainment zone, an interfacial layer betweeen the convective boundary layer and the stable air aloft, is studied using data obtained during Boundary Layer Experiment 1983 in Oklahoma. Coincident high resolution aircraft and lidar observations provided a unique picture of the daytime continental entrainment zone. Fast-response Lyman alpha hygrometer output voltages from the aircraft are calibrated to yield meteorological units of humidity. Humidity values indicative of surface layer air are observed at all levels within rising thermals, and the corresponding top-hat humidity cross sections suggest little lateral entrainment. Two approaches are taken to describe the humidity structure of the entrainment zone. The first uses the linear mixing character of specific humidity. This yields vertical profiles of the proportion of surface layer air that are described well by the cumulative distribution function of asymmetrical double exponential functions. The second approach models frequency distributions of three types of air in the entrainment zone: unmixed free atmosphere (dry); unmixed surface layer air (moist); and a mixture of these two. These results can be useful in cloud models and for future studies of the boundary layer. GRA

N86-18931# Brookhaven National Lab., Upton, N. Y.
ORGANICS AS OXIDANTS, REDUCTANTS AND INHIBITORS IN CLOUDS AND PRECIPITATION

R. L. Tanner, J. S. Gaffney, Y. N. Lee, and T. J. Kelly 1985 9 p refs Presented at the Air Pollution Control Association Annual Meeting, San Francisco, Calif., 25 Jun. 1984
(Contract DE-AC02-76CH-00016)
(DE85-018490; BNL-36931; CONF-840612-19) Avail: NTIS HC A02/MF A01

The occurrence of relatively low molecular weight, partially oxidized hydrocarbon species in atmospheric water phases was reviewed. These compounds include aldehydes and their corresponding carboxylic acids, alkyl hydroperoxides and peroxyacids, and peroxyacyl nitrates. The implications of their occurrences in atmospheric water relative to deposition processes and potential ecological effects are discussed. DOE

N86-18932# Department of Energy, Washington, D. C.
CARBON DIOXIDE AND CLIMATE: SUMMARIES OF RESEARCH IN FY 1985
Sep. 1985 106 p
(DE86-000044; DOE/ER-0202/1) Avail: NTIS HC A06/MF A01

Descriptions are provided for all projects funded by DOE under annual contracts in FY 1985. Each description contains the project's title, 3-year funding history, the contract period over which the funding applies, the name(s) of the principal investigator(s), the institution conducting the projects, and the project's objectives, products and approach. Project descriptions are categorized within the report according to each one's emphasis relative to the six principal program area: carbon cycle, climate and first detection, vegetation response, indirect effects, scientific interface, and integration and evaluation. DOE

N86-18933# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Meteorologische Fernerkundung.
CALCULATION OF ICE ACCRETION ON CYLINDRICAL RODS ACCORDING TO BAIN'S MODEL, AND COMPARISON WITH EXPERIMENTAL RESULTS
Werner Fuchs (Geophysikalische Beratungsstelle Roth, West Germany), Klaus-Peter Schickel, Josef Kaluza (Geophysikalische Beratungsstelle, Cochem, West Germany), and Kurt Uwira (Bundesamt fuer Wehrtechnik und Beschaffung, Landsberg/Lech, West Germany) Jul. 1985 81 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-970)
(DFVLR-FB-85-46; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 25.50

Bain's model for the calculation of ice accretion rates was compared with meteorological flight data. The Bain model for the determination of the ice accretion rate on cylindrical rods is extended to the calculation of the accretion shape and velocity in pure water clouds. Ice accretion is measured on an aircraft during flights in stratus clouds. By taking into account the energy balance estimate of Ludlam for the calculation of an upper bound on the spontaneously freezing supercooled liquid water content (LWC), good agreement between the calculated and measured ice accretion is obtained. The effect of higher LWC's on the ice accretion is not proportional, as theory shows. Author (ESA)

N86-18934# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Lasertechnik.
LASER DOPPLER WIND PROFILE MEASUREMENTS ABOVE SEA LEVEL
Christian Werner, Friedrich Koepp, Eugen Biselli, and Elfriede Biselli May 1985 60 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-971)
(DFVLR-FB-85-48; ISSN-0171-1342) Avail: NTIS HC A04/MF A01

A laser Doppler anemometer on a research platform determined the wind profile above the surface of the North Sea. The measured profiles show nearly constant wind velocities between the sea surface and 100 m height. No logarithmic wind profile is measured. The influence of the platform on the measurements is determined. The influence of the tidal movement is corrected. The laser Doppler anemometer is the only measuring system which allows the simultaneous measurement of wind and water surface velocity. The turbulence is also measured. Author (ESA)

N86-18935# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR AUGUST 1985, VOLUME 39, NUMBER 15, JULY 30, 1985
30 Jul. 1985 10 p
Avail: NTIS HC A02/MF A01 CSCL 04B

The precipitation and temperature weather outlook for periodic and seasonal variations for North America is given. Data is presented in tables and meteorological charts. GRA

N86-18936# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
WEATHER RESEARCH PROGRAM Annual Report, FY 1984
Jan. 1985 28 p
(PB85-246940) Avail: NTIS HC A03/MF A01 CSCL 04B

The Weather Research Program (WRP) conducts research to increase the understanding and improve the prediction of mesoscale weather systems. The research emphasis is on the genesis, evolution, and structure of convectively driven systems. The scale of interest extends from individual thunderstorms to large mesoscale precipitation systems. WRP is actively involved in transferring research findings and related weather prediction techniques to the National Weather Service and other user groups. GRA

N86-18356# Valencia Univ. (Spain). Dept. of Thermology.
USE OF SATELLITE IMAGES IN THE DESIGN OF A STANDARD METEOROLOGICAL STATION NETWORK
V. Caselles and J. Melia *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 37-40 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18357# Katholieke Universiteit te Leuven (Belgium). Remote Sensing Lab.
APPLICATION OF METEOSAT DATA FOR REMOTE SENSING OF EARTH RESOURCES: EARSEL WORKING GROUP 7 REPORT
R. Gombeer *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 43-44 (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18367# Institute for Land and Water Management Research, Wageningen (Netherlands).
EVAPORATION IN DESERTS: PHYSICAL ASPECTS AND REMOTE SENSING TECHNIQUES
M. Menenti *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Oppportunities: Systems, Sensors, and Applications Jun. 1985 p 99-106 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18381# Consiglio Nazionale delle Ricerche, Milan (Italy). Remote Sensing Dept.
SNOW MAPPING FROM LANDSAT IMAGERY
G. Bolzan, P. A. Brivio, L. Cillerai, A. DellaVentura, and A. Rampini *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 211-216 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18385# Mullard Space Science Lab., Dorking (England).
THE ERS-1 OBSERVATIONS OF LAKES FOR CLIMATE RESEARCH
I. M. Mason, C. G. Rapley, F. A. Street-Perrott (Oxford Univ.), and M. Guzkowska (Oxford Univ.) *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 235-241 refs Sponsored by ESA and UK Science and Engineering Research

Council (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18845# Centre National d'Etudes Spatiales, Toulouse (France).
USE OF SATELLITE DATA TO MONITOR HIGH-ALTITUDE WINDS
A. Soubrier *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 229-232 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18848# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
STRATOSPHERIC WATER-VAPOR MEASUREMENTS ON BOARD LONG-DURATION BALLOONS
F. Goutail and J. P. Pommereau *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 243-246 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18849# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
COMPARISON BETWEEN ST RADAR AND IN SITU BALLOON MEASUREMENTS
F. Dalaudier, J. Barat, F. Bertin (Centre National d'Etudes et Telecommunications, Saint Maur des Fosses, France), E. Brun (Toulon Univ., France), M. Crochet (Toulon Univ., France), and F. Cuq (Toulon Univ., France) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 247-251 refs (For primary document see N86-18811, 09-46)
Avail: NTIS HC A18/MF A01

N86-18861# Centre National d'Etudes Spatiales, Toulouse (France).
LONG-DURATION FLIGHTS USING INFRARED MONTGOLFIERES
P. Malaterre *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 321-323 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18873# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
SIMULTANEOUS FINE STRUCTURE OBSERVATION OF WIND AND TEMPERATURE PROFILES BY THE ARECIBO (PUERTO RICO) 430 MHz RADAR AND IN SITU MEASUREMENTS
D. Thomas, F. Bertin, M. Petitdidier, H. Teitelbaum (Ecole Polytechnique, Palaiseau, France), and R. F. Woodman (Instituto Geofisico del Peru, Lima) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 361-384 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-18937# Naval Postgraduate School, Monterey, Calif.
NONLINEAR PARAMETRIC WAVE MODEL COMPARED WITH FIELD DATA M.S. Thesis
J. L. B. S. de Melo Jun. 1985 63 p
(AD-A160004) Avail: NTIS HC A04/MF A01 CSCL 08/3

Wave spectra calculated using the Parameterized Nonlinear Wave Solution developed by Le Mehaute et al., (1984) are compared with field data acquired at Leadbetter beach, Santa Barbara, California. The parameterized solution satisfies the nonlinear free surface boundary conditions to a specified degree of accuracy and is expressed in terms of a converging truncated Fourier series. The wavenumber, surface profile and wave orbital velocities are determined by the wave height and wave period at the local depth of water. Spectral components are compared between the model results and field data. Good agreement is observed for waves corresponding to Ursell numbers ranging from 25 to 75. For large Ursell numbers (strong nonlinear effects) the parameterized model underestimates the data. GRA

N86-18938# Naval Civil Engineering Lab., Port Hueneme, Calif.
ASSESSMENT OF CROSS-BERTH CIRCULATION AT CHARLESTON NAVAL STATION Final Report, Oct. 1983 - Sep. 1984
J. A. Bailard, S. Jenkins, and F. Dellaripa Aug. 1985 41 p
(AD-A160015; NCEL-TN-1729) Avail: NTIS HC A03/MF A01 CSCL 08/8

Cross-berth circulation and discrete water properties were monitored during a 2-day period at Charleston Naval Station. The resulting measurements were used to evaluate the suitability of using scour jet arrays or barrier curtains to reduce the rate of sedimentation in berthing areas. However, additional study of these technologies is recommended; in particular, full-scale tests of a spatial scour jet array and barrier curtain should be conducted at separate berths. GRA

N86-18939# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
ACTIVE AND PASSIVE REMOTE SENSING OF ICE Semiannual Progress Report, 1 Feb. - 31 Jul. 1985
J. A. Kong Jul. 1985 8 p
(Contract N00014-83-K-0258)
(AD-A160075) Avail: NTIS HC A02/MF A01 CSCL 08/12

During this period we have: (1) developed a two-layer anisotropic random medium model to exploti the anisotropic effect of sea ice for active and passive microwave remote sensing, (2) used the Feynman diagrammatic technique in selectively summing and infinite perturbation series to include multiple scattering effects due to secularities that occur in the series for long-distance propagation, (3) extended the study of the two-layer anisotropic random medium model to a layer of isotropic random medium on top of a layer of anisotropic random medium in order to simulate the snow-covered ice fields for active microwave remote sensing, (4) used the strong fluctuation theory and the fluctuation-dissipation theorem to calculate the brightness temperature from a bounded layer of random discrete scatters with the zeroth and first order approximations, and (5) participated in the microwave sea ice measurement program at the Cold Regions Research and Engineering Laborataory (CRREL) in New Hampshire. Author (GRA)

N86-18940# Computer Genetics Corp., Wakefield, Mass.
RAMAN BACKSCATTERING TECHNIQUE FOR THE REMOTE MEASUREMENT OF SUBSURFACE TEMPERATURE AND SALINITY. VOLUME 1: REVIEW
B. Caputo and D. A. Leonard Dec. 1984 29 p
(Contract N00014-81-C-0725)
(AD-A160095) Avail: NTIS HC A03/MF A01 CSCL 08/10

This report describes the current status of research on the laser Raman technique for the remote sensing of subsurface ocean temperature and salinity. It summarizes the state of the art as it relates to current Navy requirements, showing what it can be used for now, and what further work is required to develop the technique to its full potential. Volume 1, this document provides a management summary of the research program carried out by the contractor. Ships, aircraft and satellites provide alternative and complimentary strategies for measuring the parameters of the marine environment. Subsurface temperature and salinity data obtained from ships and aircraft can be relatively comprehensive and accurate, but it is discrete and separated in time and space. The aim of the current research is to develop the capability to provide ships and aircraft with cost effective remote sensing instrumentation that can provide accurate and continuous subsurface temperature and salinity coverage. The spatial frequencies that would be available, on a quasi-synoptic basis (especially from aircraft), would significantly overlap with those available from

satellite observations of the sea surface, thus enabling comparisons and allowing predictive statements to be developed. GRA

N86-18941# Coastal Engineering Research Center, Vicksburg, Miss.
OCEANOGRAPHIC AND METEOROLOGICAL CONDITIONS DURING A SHIP MOORING FORCE STUDY Final Report
C. Mason, W. E. Grogg, Jr., and E. W. Bichner Aug. 1985 38 p
(AD-A160194; CERC-MP-85-6) Avail: NTIS HC A03/MF A01 CSCL 08/3

The objectives of this experiment were to determine mooring loads on cables mooring a ship in the open and to collect data on the environmental forces (waves, currents, and wind) producing these loads. Waves and current data collected about 3 km from shore at Duck, North Carolina, are summarized. Six-hourly wave heights, periods, and spectra; 15-min average values of current speed and direction; and wind speed and direction are presented for the period between 1900 hours 14 November, 1983 and 1430 hours 17 November, 1983. The response of the coastal wave and current fields to passage of a local wind system is illustrated. GRA

N86-18942# Naval Postgraduate School, Monterey, Calif.
HYDROGRAPHIC DATA FROM THE OPTOMA (OCEAN PREDICTION THROUGH OBSERVATIONS, MODELING AND ANALYSIS) PROGRAM: OPTOMA16, 20 MAY - 23 JUNE 1985 Report, for Oct. 1982 - Aug. 1985
P. A. Wittmann, E. A. Kelley, Jr., and C. N. K. Mooers Aug. 1985 133 p
(AD-A160270; NPS68-85-023) Avail: NTIS HC A07/MF A01 CSCL 08/10

The OPTOMA (Ocean Prediction Through Observations, Modeling and Analysis) Program, seeks to understand the mesoscale (fronts, eddies, and jets) variability and dynamics of the California Current System and to determine the scientific limits to practical mesoscale ocean forecasting. To help carry out the aims of this project, a series of cruises has been planned in two subdomains off northern and central California. Data acquired during Leg MI, Leg MII and Leg A include expendable bathythermographic data and current temperature density data profiles. Bucket surface temperature and water samples for salinity were taken at most CTD stations. These surface values were used for calibration purposes as well as contributions to the data base. Leg A also acquired continuous 2 m thermosalinograph measurements, continuous meteorological data such as atmospheric pressure at a height of 2 m and wind speed and direction at a height of 20 m, and acoustic Doppler velocity data. GRA

N86-18943# Naval Postgraduate School, Monterey, Calif.
OPTOMA (OCEAN PREDICTION THROUGH OBSERVATIONS, MODELING AND ANALYSIS) PROGRAM INTERIM REPORT: THE AIRBORNE OCEAN THERMAL STRUCTURE MAPPING PROJECT Report, for Feb. 1983 - Feb. 1985
M. C. Colton and C. N. K. Mooers Aug. 1985 106 p
(AD-A160283; NPS68-85-008) Avail: NTIS HC A06/MF A01 CSCL 08/10

The Ocean Prediction Through Observation, Modeling and Analysis (OPTOMA) Program goals are to develop an ocean descriptive predictive system for studying and forecasting the evolution of ocean mesoscale features and the California Current System. Attainment of these goals requires the establishment of a broad-base ocean observing and monitoring system that includes, hydrographic research cruises, moored arrays, and remotely sensed data, etc. To forecast the evolution of the oceanic flow field, the observing system must include a means of obtaining real-time, synoptic maps for the initialization and verification of the dynamic model(s) used. P3 flights to deploy airborne expendable bathythermographs are a clear choice for frequent mappings. Since Feb., 1983 six OPTOMA missions have been flown. A total of 325 AXBTs have been successfully deployed off the northern and central California coasts. Data analysis reinforce recent discoveries about the character of the California Current System: the current regime is highly variable in nature and is comprised of cool anomalies, mesoscale eddies, 'squirts' and jets, current filaments and fronts. An airborne digital data acquisition system, built around an HP9816 microprocessor and a Sippican MK9 digitizing unit, digitizes the AXBT audio signal, then stores the profiles on diskette. GRA

N86-18944# Air Force Geophysics Lab., Hanscom AFB, Mass.
TIME DURATIONS OF RAIN RATES EXCEEDING SPECIFIED THRESHOLDS
R. O. Berthel and V. G. Plank 24 May 1985 66 p
(AF Proj. 6670)
(AD-A160463; AFGL-TR-85-0122; AFGL-ERP-918) Avail: NTIS HC A04/MF A01 CSCL 04/2

Rainfall may hamper military operations in ways as diverse as the visual detection of enemy movements to the attenuation of sophisticated, electro-optical, weapon-guidance systems. Thus, it would obviously be advantageous to have the ability to predict probable rain-rate intensities from forecast information or, for planning purposes, from climatological data. The rain investigation detailed in this report was conducted with the objective of developing a method for estimating durations and occurrences of rates of specified intensities. The data base consisted of 185 events taken from 31 days of rain-rate measurements. The rate variability of each event was mathematically defined and we found that the individual variabilities did not depend upon the amount of rain or the length of time rainfall occurred. Analysis revealed that variability could be expressed as a percentage of time that rain rates were equal to or exceeded specified threshold levels that were relative to their mean values and could be described by an equation set. Although the diversity of the data negated all attempts to estimate the frequency that specific rate intensities occurred, it was shown that averaged rain-rate date (< or = 10 min) changed predictably with relative measures. Thus, the authors deduced a method by which rain-rate variability, in terms of the percentage of time the rates are > or = intensity levels relative to their means, may be estimated from knowledge or deduction of two parameters, the mean and maximum rates. Author (GRA)

N86-18945# Computer Genetics Corp., Wakefield, Mass.
REVIEW OF THE RAMAN BACKSCATTERING TECHNIQUE FOR THE REMOTE MEASUREMENT OF SUBSURFACE TEMPERATURE AND SALINITY: VOLUME 1 Summary Report
B. Caputo and D. A. Leonard Dec. 1984 29 p
(Contract N00014-81-C-0725)
(AD-A160466) Avail: NTIS HC A03/MF A01 CSCL 17/5

This document is a summary report which describes the current status of research on the laser Raman technique for the remote sensing of subsurface ocean temperature and salinity. The report, in three volumes, summarizes the state of the art as it relates to current Navy requirements, showing what it can be used for now, and what further work is required to develop the technique to its full potential. This document provides a management summary of the research program carried out by Computer Genetics Corporation over a number of years with support provided by several Government agencies including ONR, NRL, NASA and NOAA. The aim of current research is to develop the capability to provide ships and aircraft with cost effective remote sensing instrumentation that can provide accurate and continuous subsurface temperature and salinity coverage. The spatial frequencies that would be available, on a quasi-synoptic basis (especially from aircraft), would significantly overlap with those available from satellite observations of the sea surface, thus enabling comparisons and allowing predictive statements to be developed. The work to date has shown, by means of theoretical calculations, laboratory experiments, and field studies, that polarization Raman spectroscopy is feasible for the remote sensing of ocean temperature to a few tenths of a degree to depths of 50 to 100 meters in the open ocean. GRA

N86-18946# Naval Research Lab., Washington, D. C.
A SEMIEMPIRICAL MODEL FOR DOPPLER SPECTRAL FEATURES OF MICROWAVE RADAR SEA SCATTER Interim

Report, Jun. - Oct. 1984
D. B. Trizna 16 Oct. 1985 32 p
(AD-A160576; NRL-8911) Avail: NTIS HC A03/MF A01 CSCL 17/9

A semiempirical, fetch-dependent model is developed for Doppler spectral features of low grazing angle microwave radar sea scatter and is fit to data previously published in the literature. The model introduces this fetch dependence to account for the scatter in plots of the shift of the peak of the radar sea scatter Doppler spectrum data vs measured wind and surface parameters. First, constants for the model are determined by empirically curve fitting generalized versions of J. Darbyshire's fetch model equations to surface truth data (wind speed, wave height, and wave period), plotted in various combinations against one another, for 24 different experimental conditions. These constants are then applied to equations representing the Doppler shift of the peak of the sea scatter spectrum in terms of the surface truth data. Curves parametric in fetch, which are determined from these equations, are then superimposed over plots of the measured radar Doppler peak shifts vs the surface truth. It is found that these curves lie near the same groups of points in these plots of radar data vs surface truth, as the modified Darbyshire curves did for surface truth sets against one another. GRA

N86-18947# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
DIRECTIONAL WAVE MEASUREMENT AND ANALYSIS Final Report
R. J. Lai and R. J. Bachman Sep. 1985 44 p
(ZF43421001; SF59557695)
(AD-A160760; AD-E401375; DTNSRDC/SPD-1167-01) Avail: NTIS HC A03/MF A01 CSCL 08/3

A directional wave analysis computer program has been developed to analyze the measured directional wave data from an ENDECO Wave-Track buoy. Due to the nature of the buoy, the direction components must be adjusted in order to apply a conventional wave slope analysis. The choice of a Wave-Track buoy stems from the requirement of a light-weight, easy to handle directional sensing wave buoy. The results can be used to validate the directional spread of wave energy produced by the Spectral Ocean Wave Model (SOWM). Also, the resulting directional spread of energy, as produced by the buoy, may now be used with ship motions to produce ship response amplitude operator (RAO's), or combined with ship RAO's to estimate ship motions. The equations are developed to account for buoy motions in a current and in shallow water. Although electronic phase shifts have been adjusted, it is still necessary to develop some analytical solution to compensate for hydrodynamic responses and phase shifts. The analyzed results include frequencies, energy densities, Fourier coefficients, first and second harmonic mean wave directions and root mean square (rms) spreading. Also included is the directional spreading of energy calculated by four different methods. Results have agreed well with other wave measuring buoys as detailed in other sources. Author (GRA)

N86-18948# Washington Univ., Seattle. School of Oceanography.
PHYSICAL OCEANOGRAPHIC CHARACTERISTICS OF THE NARES PLAIN REGION OF THE WESTERN NORTH ATLANTIC
S. C. Riser Aug. 1985 157 p
(Contract DE-AC04-76DP-00789)
(DE86-000059; SAND-85-7186) Avail: NTIS HC A08/MF A01

This document is a summary and synthesis of physical oceanographic observations available from the Nares Abyssal Plain region of the western North Atlantic Ocean. The observations mainly include historical Nansen bottle data obtained from the National Oceanographic Data Center (NODC); conductivity, temperature, and depth (CTD) data and bottom radon data both taken during the Transient Tracers in the Ocean (TTO) experiment; and expendable bathythermograph (XBT) data, moored current/temperature meter data, and SOFAR float data all collected during POLYMODE. Several other, less complete, data sets have also been examined. These data sets have been combined in order to assess the overall physical oceanographic environment of the Nares Plain region. DOE

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-18949*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 3 Final Report
Lydia Razran Hooke, ed., Mike Radtke, ed., Victoria Garshnek, ed., Joseph E. Rowe, ed., and Ronald Teeter, ed. Dec. 1985 102 p
(Contract NASw-3676)
(NASA-CR-3922(03); NAS 1.26:3922(03)) Avail: NTIS HC A06/MF A01 CSCL 06B

This is the third issue of NASA's USSR Space Life Sciences Digest. Abstracts are included for 46 Soviet periodical articles in 20 areas of aerospace medicine and space biology and published in Russian during the second third of 1985. Selected articles are illustrated with figures and tables from the original. In addition, translated introductions and tables of contents for seven Russian books on six topics related to NASA's life science concerns are presented. Areas covered are adaptation, biospherics, body fluids, botany, cardiovascular and respiratory systems, endocrinology, exobiology, gravitational biology, habitability and environmental effects, health and medical treatment, immunology, life support systems, metabolism, microbiology, musculoskeletal system; neurophysiology, nutrition, perception, personnel selection, psychology, radiobiology, and space physiology. Two book reviews translated from the Russian are included and lists of additional relevant titles available in English with pertinent ordering information are given. Author

N86-18950*# National Aeronautics and Space Administration, Washington, D.C.
SUMMARIES OF 1984-85 NASA SPACE-GRAVITATIONAL BIOLOGY ACCOMPLISHMENTS
Thora W. Halstead, comp., F. Ronald Dutcher, comp. (George Washington Univ., Washington, D.C.), and Linda G. Pleasant, comp. (George Washington Univ., Washington, D.C.) Dec. 1985 135 p refs
(Contract NASw-3165)
(NASA-TM-88379; NAS 1.15:88379) Avail: NTIS HC A07/MF A01 CSCL 06B

Individual technical summaries of research projects of NASA's Space/Gravitational Biology Program are presented. The summaries for each project include a description of the research, a listing of the accomplishments, and an explanation of the significance of the accomplishments. Bibliographies for each project are also included. Author

N86-18951# Army Medical Research Inst. of Infectious Diseases, Fort Detrick, Md.
METABOLISM OF T-2 MYCOTOXIN BY CULTURED CELLS
L. R. Trusal 18 Sep. 1985 20 p
(DA Proj. 3M1-61102-BS-12)
(AD-A159678; AD-E801193) Avail: NTIS HC A02/MF A01 CSCL 06/20

T-2 mycotoxin is a small (i.e. 466 daltons), non-protein toxin. We studied its metabolism in Chinese hamster ovary (CHO) cells, African green monkey kidney (VERO) cells, human fibroblasts, and L-cells. Confluent cells were exposed to (3H)-T-2(0.01 micrograms/ml) for 1 hr at 37 C. CHO and VERO cells metabolized T-2 a greater extent than the other two cell types. In CHO, fibroblast and L-cells, the major metabolite was HT-2 toxin while, in VERO cells, an unknown metabolite, more polar than T-2, was the major metabolite. Cell and media extracts of CHO and VERO cells revealed smaller amounts of T-2 triol, T-2 tetraol and several unknowns. In both cell types, metabolites were detected in labeled media by 1 hr and in increasing amounts in

unlabeled media by 4 hr. Under the above conditions, 37 to 58% of the radioactivity remained as T-2 toxin after 4 hr in both cell types. The data suggest that some cultured cell lines possess enzyme systems capable of limited metabolism of T-2 mycotoxin to a variety of known and as yet unidentified metabolites. GRA

N86-18952# OPTRA, Inc., West Peabody, Mass.
RAPID IDENTIFICATION OF MICRO-ORGANISMS Final Report, 5 Apr. 1982 - 31 May 1985
M. Hercher, K. Mead, and H. M. Shapiro 26 Aug. 1985 27 p
(Contract DAAG29-82-C-0011)
(AD-A159945; ARO-18828.2-LS-S) Avail: NTIS HC A03/MF A01 CSCL 06/13

Flow cytometric parameters for the rapid identification of micro-organisms have been investigated. These include fluorescent and incident light scatter signals indicative for: (1) cell size, (2) cell structure, (3) DNA content, (4) RNA content, (5) total protein, (6) surface antigens, (7) intracellular enzyme, activity and 8) viability (by membrane potential criteria). Several simplified instrumentation techniques for flow cytometry were also successfully explored. GRA

N86-18953# State Univ. of New York, Brooklyn.
IMMUNOMODULATION BY PROTEINS OF BORDETELLA PERTUSSIS Annual Report, No. 1, 1 Aug. 1984 - 31 Jul. 1985
B. M. Sultzer and J. P. Craig 30 Aug. 1985 11 p
(Contract N00014-84-K-0693)
(AD-A160078) Avail: NTIS HC A02/MF A01 CSCL 06/5

A selected number of immunobiologically active polypeptides have been found to be closely associated with, but separable from the lipopolysaccharide endotoxin (LPS) in the outer membrane of Gram-negative bacteria. Initially these endotoxin associated proteins (EP) from Bordetella pertussis, Salmonella typhi and Vibrio cholerae were found to enhance the immune response to cholera enterotoxin after immunization with cholera toxiod. At the cellular level, B. pertussis EP (PEP) is a mitogen and polyclonal activator of antibody producing B-lymphocytes of C3H/HeJ mouse lymphocytes which are unresponsive to LPS. PEP can adjuvant in vitro the production of IgM antibody to cholera toxin and sheep erythrocytes by mouse splenic lymphocytes. In control experiments we have shown that the activity of PEP cannot be neutralized by the cationic polypeptide polymyxin B which specifically neutralizes the lipid A component of LPS that is responsible for the simulating properties of LPS. In addition, our tests indicate PEP does not contain any detectable lymphocytosis promoting factor (LPF) activity. Preliminary experiments have shown that extracts of B. pertussis which contain both LPS and associated proteins are protective in the standard mouse model used for testing the efficacy pertussis vaccines. GRA

N86-18954# Minnesota Univ., Minneapolis.
MOLECULAR APPROACHES TO SELECTIVE IMMUNIZATION Final Report, 15 Oct. 1984 - 31 Jul. 1985
F. H. Bach 30 Sep. 1985 6 p
(Contract N00014-85-K-0004)
(AD-A160141) Avail: NTIS HC A02/MF A01 CSCL 06/1

The sequence polymorphism underlying T lymphocyte recognition as related to the DR alpha beta dimer has been studied using cDNA libraries. DR beta genes form homozygous typing cells expressing the same serologically-defined DR antigen but differing in their Dw subtype, have allowed the pinpointing of single amino acid differences underlying this allotypic variation in some combinations, and two to three amino acid differences in others. Author (GRA)

N86-18955# Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
MAGNETIC-FIELD HAZARDS BIBLIOGRAPHY, 2ND EDITION
D. H. Sliney and R. Bishop Sep. 1985 31 p
(AD-A160154) Avail: NTIS HC A03/MF A01 CSCL 20/3

The purpose of this bibliography was to prepare in the interest of providing a source of references for those interested in the biological effects and the evaluation of hazards associated with magnetic fields. This is the second published edition of Magnetic-Fields Hazards Bibliography. The 364 references are divided into groups as shown in the Table of contents: measurement techniques, environmental levels, and applications in sciences and industry, biological studies at the molecular, cellular and subvertebrate level, biological studies: vertebrates, and biological studies: man and neural effects. GRA

N86-18956# Minnesota Univ., Minneapolis.
SEQUENCE POLYMORPHISM OF HLA-DR BETA 1 ALLELES RELATING TO T CELL-RECOGNIZED DETERMINANTS
J. S. Cairns, J. M. Curtsinger, C. A. Dahl, S. Freeman, and B. J. Alter 1985 14 p
(Contract N00014-85-K-0004; Grants PHS-AI-17687; PHS-AI-18326; PHS-AI-19007)
(AD-A160237) Avail: NTIS HC A02/MF A01 CSCL 06/3

HLA class II molecules are a highly polymorphic family of dimeric cell surface proteins primarily involved in regulating T cell responses to extrinsic antigens. To define regions of class II molecules involved in T cell recognition, we have compared sequences of three HLA-DR Beta cDNA clones obtained from cells that all express the same serologically defined determinants but differ in terms of T cell-recognized specificities. The comparisons indicate that very few (one to four) nucleotides differ between what are almost certainly alleles of the DR beta 1 Locus. All differences were in the first domain of the molecule and all localized to a region from amino acids 71-86. Since all differences were found only in this region of the molecules, and since DR alpha chains seem to be relatively nonpolymorphic, these positions in the DR beta chain must play a major role in influencing T cell recognition of the DR molecule. Serological and molecular cloning experiments have shown that there are three families of class II molecules within the HLA complex, termed DP, DQ, and DR. For the DR4-DRw53 haplotype which we have studied, within the DR family, one alpha and three complete beta genes are known; one beta gene is a pseudogene. At least two DR alpha beta dimers are expressed. GRA

N86-18957# North Dakota State Univ., Fargo. Dept. of Zoology.
IDENTIFICATION AND QUANTIFICATION OF THE WATER-SOLUBLE COMPONENTS OF JP-4 AND A DETERMINATION OF THEIR BIOLOGICAL EFFECTS UPON SELECTED FRESH-WATER ORGANISMS Final Technical Report, 30 Sep. 1978 - 27 Feb. 1984
J. D. Bramner and R. L. Puyear 1 Jul. 1985 14 p
(Grant AF-AFOSR-3709-78)
(AD-A160271; AFOSR-85-0743TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

This final technical report includes a brief summary of research performed, results obtained, graduate students supported and theses written. One paper published was of a technical nature and describes the use of reverse-phase C-18 minicolumns for concentrating water soluble hydrocarbons derived from JP-4 jet fuel. Another technical paper using the same technique as the first was used to concentrate water soluble hydrocarbons produced by running an outboard motor in water. Analytical methods used for hydrocarbon separation and identification was GC, GC/MS and HPLC. The toxicity of toluene on the fathead minnow was the basis of three papers and a Ph.D. Thesis. It was found that the embryo was as sensitive to toluene than was the protolarvae or adult fish. This was determined using 96-hr LC50 tests. An MS thesis was written on the effects of toluene on gill structure in the fathead minnow adult. Little effect of toluene on gill structure was noted. A comparative study on the effects of administration of benzene, toluene and xylene isomeres on their in vitro metabolism and various drug metabolizing enzymes in rat liver, and the covalent binding of toluene to rat liver microsomes has resulted in one Ph.D. Thesis and the preparation of three manuscripts for publication. GRA

N86-18958# Massachusetts Inst. of Tech., Cambridge. Lab. of Neuroendocrine Regulation.

USE OF TYROSINE OR FOODS TO AMPLIFY CATECHOLAMINE RELEASE Interim Technical Report, 30 Sep. 1983 - 29 Sep. 1984
R. J. Wurtman 12 Jun. 1985 13 p
(Grant AF-AFOSR-0366-83)
(AD-A160274; AFOSR-85-0742TR) Avail: NTIS
HC A02/MF A01 CSCL 06/1

An experimental system using rat caudate slices was used to measure the effects of tyrosine on neuronal activity. Studies demonstrated the importance of adequate tyrosine in sustaining dopamine release and provide the first evidence that when sufficient experimental tyrosine is not provided, its level within catecholaminergic nerve terminals actually declines. The data suggest that when a group of such neurons undergoes sustained activity, its requirements for tyrosine increase dramatically. In such circumstances, normal levels of plasma tyrosine may be inadequate to sustain function. Author (GRA)

N86-18959# Armed Forces Radiobiology Research Inst., Bethesda, Md.
HEMATOPOIESIS IN CONVENTIONAL MICE AFTER WOUND TRAUMA
G. D. Ledney; L. K. Steel, H. M. Gelston, Jr., W. E. Jackson, III, and E. D. Exum 1985 5 p
(AD-A160436; AFRRI-SR85-23) Avail: NTIS HC A02/MF A01 CSCL 06/5

Macrophages, granulocytes, and platelets serve in wound debridement, bacterial neutralization, and homeostasis. Replacement of such cells may involve perturbations in the clonogenic cell populations responsible for replenishing specific adult cell populations. For example, the human blood granulocyte progenitor cell compartment is increased following abdominal hysterectomy. In mice, skin wound trauma produced changes in the proliferative cell compartments of the hematopoietic tissues 24 hrs after injury. In this study we report: (1)some of our findings on the hematopoietic clonogenic cell changes in conventional mice after trauma, and (2) circulating substances which may mediate these changes. GRA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-18960* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 279)
Jan. 1986 69 p
(NASA-SP-7011(279); NAS 1.20:7011(279)) Avail: NTIS
HC $8.00 CSCL 06E

This bibliography lists 175 reports, articles, and other documents introduced into the NASA scientific and technical information system in December 1985. Author

N86-18961# School of Aerospace Medicine, Brooks AFB, Tex.
NIGHT VISION MANUAL FOR THE FLIGHT SURGEON Special Report, Mar. 1984 - Aug. 1985
T. J. Tredici and R. E. Miller, II Aug. 1985 45 p
(AF Proj. 775-5)
(AD-A159720; USAFSAM-SR-85-3) Avail: NTIS
HC A03/MF A01 CSCL 17/8

The Ophthalmology Branch, at the USAF School of Aerospace Medicine, has initiated a program to extensively study night visual performance. Some of the objectives of this program are to develop a simple, rapid, and accurate night vision screening device; establish norms for flying personnel; evaluate training and enhancement techniques; determine the effects of various nutrients and drugs; and investigate image-intensifying devices--i.e., night vision goggle (NVG). An additional objective is to update the educational level of USAF flight surgeons, base optometrists, and ophthamologists about the aeromedical aspects of night vision and the new NVG technology. This manual was designed to provide useful information to the medical personnels that provide direct support to operational units. GRA

N86-18962# Oak Ridge National Lab., Tenn. Biology Div.
CHEMICAL CHARACTERIZATION AND TOXICOLOGIC EVALUATION OF AIRBORNE MIXTURES: TUMORIGENICITY STUDIES OF DIESEL FUEL-2, RED SMOKE DYE AND VIOLET SMOKE DYES IN THE SENCAR MOUSE SKIN TUMORIGENESIS BIOASSAY SYSTEM Final Technical Report, 1982 - 1983
T. J. Slaga, L. L. Triplett, and R. J. M. Fry Sep. 1985 29 p
(Contract DE-AC05-84OR21400; DA Proj. 3E1-61102-BS-04)
(AD-A159728; ORNL/TM-9752) Avail: NTIS HC A03/MF A01 CSCL 06/20

The tumorigencities of Diesel Fuel-2, Red Smoke Dye and Violet Smoke Dye were tested in the SENCAR Mouse Skin Bioassay System. The Diesel Fuel-2 gave a significant tumor response when tested as a tumor promoter but negative results when tested as a complete carcinogen. There were no tumor responses to either the Red or Violet Smoke Dyes when tested as complete carcinogens. Although a few tumors occurred in the Red and Violet Smoke Dye tumor initiation studies, the response was not significantly different from that of the controls. GRA

N86-18963# Retina Foundation, Boston, Mass. Eye Research Inst.
EYE MOVEMENTS AND SPATIAL PATTERN VISION Annual Report, 1 Feb. 1984 - 31 Jan. 1985
L. E. Arend 28 Feb. 1985 25 p
(Contract F49620-83-C-0052)
(AD-A160408; AFOSR-85-0741TR) Avail: NTIS
HC A02/MF A01 CSCL 06/16

Low contrast, low spatial frequency luminance sawtooth patterns look like luminance staircases, with no brightness changes over the shallower luminance slope. Brightness measurements at corresponding points in different cycles of these patterns showed substantial illusory brightness differences. Other measurements showed that the illusion is not confined to strictly subthreshold luminance gradients, but occur with slightly suprathreshold gradients as well. In models which attempt to explain these illusions the visual system integrates over the thresholded gradient of the stimulus distribution. The integration encounters problems due to curl introduced by the nonlinear threshold operator. Brightness measurements indicated that these problems have a visual counterpart, further support for the models. Several new illusions were found to result from this nonlinear threshold for spatial gradient. Inconsistencies in the spatial integrals performed by the visual system result in multistable brightness perceptions for some patterns. GRA

N86-18964# Human Engineering Labs., Aberdeen Proving Ground, Md.
PRACTICAL APPLICATION OF BASIC RESEARCH ON IMPULSE NOISE HAZARD Final Report
G. R. Price Jan. 1985 12 p
(AD-A160432; HEL-TM-1-85) Avail: NTIS HC A02/MF A01 CSCL 06/19

To assess impulse noise hazard accurately, procedures should be based on the physiological mechanisms underlying hearing loss. Information from basic research studies is relevant in three areas. First, there is a spectrally dependent critical level above which loss mechanisms change from amode that is probably metabolically based to one that is mechanically based. Stimulation at and above this second mode should be avoided. Second, in spite of the regulatory trend ignoring the time pattern of stimulation, studies continue to indicate at that intermittency ameliorates the effect of noise, producing less effect for a given amount of energy in the exposure. Lastly, a variety of sources can be interpreted as indicating that meters designed to rate hazard should have: a rise-time capability in the vicinity of 20 microseconds; a dynamic range of over 100 dB; and employ a frequency weighting function such as A-weighting, although the shape is not critical due to the

relatively sharp tuning of the ear and the generally flat noise spectra commonly encountered in the work place. GRA

N86-18965# Army Research Inst. of Environmental Medicine, Natick, Mass.
PREDICTION MODELING OF PHYSIOLOGICAL RESPONSES AND HUMAN PERFORMANCE IN THE HEAT
K. B. Pandolf, L. A. Stroschein, L. L. Drolet, R. R. Gonzalez, and M. N. Sawka Sep. 1985 29 p
(DA Proj. 3E1-62777-A-879)
(AD-A160513; USARIEM-M-1/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

Over the last two decades, the Military Ergonomics Division of the US Army Research Institute of Environmental Medicine has been establishing the data base and developing a series of predictive equations for deep body temperature, heart rate and sweat loss responses of clothed soldiers performing physical work at various environmental extremes. This document describes the attempt to program these predictive equations on various desk top and hand held calculators with the express purpose of developing a comprehensive heat stress model for predicting soldier performance to work, clothing and the environment. This model deals with the interaction of various multi-disciplinary factors such as: (1) the theoretical physics of heat transfer, (2) the biophysics of clothing, (3) the physiology of metabolic heat production, distribution and elimination, and (4) related meteorological considerations. The primary physiological inputs are deep body (rectal) temperature and sweat loss while the predicted outputs are the expected physical work-rest cycle, the maximum single physical work time if appropriate, and the associated water requirements. This document presents the mathematical basis employed in the development of the various individual predictive equations of our heat stress model. In addition, our current heat stress prediction model as programmed on the HP 41 CV is discussed from the standpoint of proprietary in meeting the Army's needs and therefore assisting in military mission accomplishment. GRA

N86-18966# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
THE BEGINNINGS OF AIRBORNE WEIGHTLESSNESS RESEARCH Final Report
H. J. VonBeckh Jan. 1985 67 p
(AD-A160575; NADC-85016-60) Avail: NTIS HC A04/MF A01 CSCL 06/19

After World War II an increasing number of aeromedical investigators became interested in the medical problems of space flight, particularly its most challenging aspect: weightlessness. Until 1950 their efforts remained limited to theoretical deliberations and predictions. Beginning in the early fifties, however, researchers began actively to experiment with weightlessness aboard aircraft in vertical diving flights and later by flying Keplerian parabolic trajectories. H.J. von Beckh made the first weightlessness experiments in aircraft with humans and test animals (water turtles) which were published at the 4th International Astronautical Congress in Zurich and in the Journal of Aviation Medicine. Von Beckh's experiments showed that the subjects during weightlessness had by no means a strong fall reflex, as predicted by Haber and Gerathewohl in their theoretical paper, in which they evoked the Weber-Fechner Law. The disorientation and lack of neuromuscular coordination occurs only in the first seconds of weightlessness. Later, the control of the vision sense makes aiming movement possible. The incidence of motion sickness was moderate in the weightlessness flights with the Fighter aircraft Fiat G55 and the F 94 C, because the subjects were tied down in the seat and avoided head movements. Later, in the flights with the cargo aircraft C 131, the incidence was considerably higher, because the subjects could move freely and were even allowed to make somersaults. In a later paper (1959) von Beckh showed that weightlessness decreases the acceleration tolerance. This was reconfirmed many years later when the astronauts suffered orthostatic hypotension after their return to the Earth. GRA

N86-18967# Army Research Inst. of Environmental Medicine, Natick, Mass.
FACTORS WHICH ALTER HUMAN PHYSIOLOGICAL RESPONSES DURING EXERCISE-HEAT ACCLIMATION
K. B. Pandolf, M. N. Sawka, and Y. Shapiro Sep. 1985 22 p
(AD-A160580; USARIEM-M-41/85) Avail: NTIS HC A02/MF A01 CSCL 06/14

Researchers generally agree that high aerobic fitness achieved through physical training will reduce the physiological strain to exercise in the heat, but does not replace the benefits of an exercise-heat acclimation program. In addition, high aerobic fitness is hypothesized as a major factor in the small decay and rapid re-acclimation of individuals after they ceased exercising in hot environments. However, recent work from our laboratory suggests that improved aerobic fitness by physical training must be associated with significant elevations in core temperature during the training process in order to improve exercise-heat tolerance. Two recent studies comparing men and women with similar aerobic fitness indicate no major physiological differences between genders in both humid and dry heat for cardiovascular and thermoregulatory responses to these environments either before or after acclimation. Our laboratory has reported that after exercise-heat acclimation under wet conditions (mild or hot), females tolerate the heat in a more efficient fashion than males while under hot-dry conditions males seem to be at some physiological advantage. Even fewer studies are reported which evaluate physiological differences in heat tolerance to exercise in relation to age. In general, exercise-heat tolerance is reduced in pre-pubertal children (boys and girls) and older adults (men and women) compared to young men and women. However, aerobically fit older adults seem to have far fewer decrements in the performance of exercise in the heat than less fit older adults. GRA

N86-18968# Minnesota Univ., Minneapolis.
DNA AND PROTEIN STUDIES OF HLA CLASS 2 MOLECULES: THEIR RELATIONSHIP TO T CELL RECOGNITION
M. Segall, J. S. Cairns, C. A. Dahl, J. M. Curtsinger, and S. Freeman 1985 29 p
(Contracts N00014-85-K-0004; PHS-AM-31342)
(AD-A160704) Avail: NTIS HC A03/MF A01 CSCL 06/1

The HLA-D region, encoding class 2 antigens, was first defined based on studies of mixed leukocyte culture (MLC) (Bain, et al. 1964; Bach and Hirschhorn, 1964). In our studies with colleagues (Amos and Bach, 1968; Bach et al., 1969), we were able to suggest that a genetic region encoding molecules that stimulate proliferation in MLC may be linked to, but separate from, the HLA-A and -B loci, i.e., a region such as HLA-D; definitive studies in this regard (Yunis and Amos, 1971) established the existence of the HLA-D region. Great advances have been made in our understanding of this region in recent years utilizing both the tools of molecular genetics and studies of proteins encoded by HLA-D genes. A critical bridge that has not yet been completed concerns the relationship of class II genes and protein products to determinants recognized by T lymphocytes, i.e., the cells responding in MLC. Although the emphasis in this review will be on studies of proteins and of DNA, an introduction to this article also includes our current state of knowledge regarding definition of class II products with T lymphocytes. The inclusion in this volume of several articles on the same topic allows a measure of comfort with such an approach. GRA

N86-18969# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
GLUCOCORTICOID ANTAGONISM BY ENDOTOXIN: BIOLOGICAL EFFECTS DURING STRESS AND BASIS FOR INHIBITION OF PHOSPHOENOLPYRUVATE CARBOXYKINASE M.S. Thesis
W. B. Huff Aug. 1985 133 p
(AD-A160740; AFIT/CI/NR-85-116T) Avail: NTIS HC A07/MF A01 CSCL 06/20

Bacterial endotoxins produce a variety of pathophysiologic effects by inducing the release of humoral factors from cells of the reticuloendothelial system, primarily macrophages. This study focusses on one particular factor, glucocorticoid antagonizing factor

(GAF). Antagonism was augmented when mice were subjected to conditions of stress where adrenoglucocorticoids are necessary for survival. Mice were sensitized to both toxic endotoxin and irradiated detoxified endotoxin during the stress of cold, heat, and tourniquet shock. Endotoxin, as well as detoxified endotoxin, induced the release of GAF from cells of the RES. Treatment of mice with this GAF-rich serum also resulted in their sensitization to stress. Survival of LPS-poisoned animals subjected to stress could be improved when exogenous hydrocortisone was given prior to the administration of exogenous GAF-rich serum or prior to the release of endogenous GAF in response to endotoxin. Naloxone, a B-endorphin antagonist, failed to increase the survival rate of animals under the experimental conditions investigated.
GRA

N86-18970# Army Research Inst. of Environmental Medicine, Natick, Mass.
PLATELET-ENDOTHELIAL FUNCTION IN RELATION TO ENVIRONMENTAL TEMPERATURE Final Report, 1 May 1982 - 1 Mar. 1984
S. P. Bruttig, G. D. Draper, and M. P. Hamlet Mar. 1984 28 p
(DA Proj. 3E1-61101-BS-10)
(AD-A160744; USARIEM-T-6/84) Avail: NTIS HC A03/MF A01 CSCL 06/5

Thromboembolic phenomena are commonly observed in frostbite injury to the microvasculature. Large blood vessel endothelium was used to assess any alterations in platelet-endothelial interaction resulting from low environmental temperatures. Media from bovine endothelial cells (37, 24, 4C) did not cause or enhance platelet aggregation. Yet ADP (120 micrometers) stimulated aggregation of all platelet samples. Bovine and porcine endothelial cells were incubated at 37, 24, 4, and 0.5 C with homologous platelets suspended in Tyrodes at 37, 24, 4, and 0.5 C with homologous platelets suspended in Tyrodes buffer plus albumin, and the rate of ADP-stimulated platelet aggregation was compared with control platelets. Bovine venous endothelial cells (at 37 C) inhibited platelet aggregation more strongly than aortic endothelial cells. This inhibition was blocked by aspirin (7 mM) and was independent of environmental temperature. Porcine endothelial cells also inhibited platelet aggregation. This inhibition (maximal at 37 C) was significantly attenuated by temperatures < or = 24 C. A significant loss of inhibition of platelet aggregation could lower the threshold at which parenchymally-derived nucleotides or other substances from damaged cells can cause aggregation. Thus, in porcine endothelial cells > bovine endothelial cells, a possible mechanism for the thromboembolic action of cold is suggested.
Author (GRA)

N86-18971# New York Blood Center, N.Y.
THE PRODUCTION OF RhO(D) NEGATIVE ERYTHROCYTES Annual Report, 1 Jul. 1984 - 30 Jun. 1985
J. Goldstein 24 Jun. 1985 8 p
(Contract N00014-84-C-0543)
(AD-A160775; AD-E401375) Avail: NTIS HC A02/MF A01 CSCL 06/1

Attempts are being made to modify or destroy the Rh (D) antigen under conditions which will produce Rh negative erythrocytes of transfusable quality. To this end the effects of various lipase and membrane perturbants are being examined. Isolation and biochemical characterization of the D antigen is also being undertaken in order to gather information which will help formulate ways of modifying its expression.
GRA

N86-18972# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN EXPERIMENTAL TRIAL TO TEST THE EFFICACY OF TEMAZEPAM TO INDUCE SLEEP AND IMPROVE SUBSEQUENT PERFORMANCE DURING PARTIAL SLEEP DEPRIVATION AND CIRCADIAN RHYTHM DESYNCHRONOSIS M.S. Thesis
J. E. McGhee Jun. 1985 58 p
(AD-A160795; AFIT/CI/NR-85-126T) Avail: NTIS HC A04/MF A01 CSCL 06/15

This thesis presents a strategy for reducing jet lag induced performance degradations by resetting rhythms during prolonged rapid transmeridian flight is studied. Thirty-four aircrew member passengers on a C-141 flight were given temazepam or placebo during the flight from Oklahoma to Saudi Arabia for induction of sleep in a period compatible with sleep cycle at the destination, but out-of-sync with previous patterns set at home station. Mental performance and circadian rhythm patterns were tested per-flight, inflight and post-flight by several measurements including a computerized performance battery. The results indicated that in the temazepam group performance was improved to near baseline levels. The restorative power of temazepam induced sleep during a period of partial sleep deprivation and temazepam's ability to reset circadian rhythms prior to arrival in the new time zone were demonstrated.
GRA

N86-18973# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STUDY OF THE FLIGHT ENVIRONMENT COMPONENT OF AIRCREW FATIGUE IN STUDENT NAVIGATORS M.S. Thesis
D. R. Douville Jun. 1985 66 p
(AD-A160796; AFIT/CI/NR-85-128T) Avail: NTIS HC A04/MF A01 CSCL 06/19

One approach to understanding the causes of aircrew fatigue is to devide them into: (1) those related to the unique demands of aircrew tasks or workload, and (2) those related to the unique environment of flight. The pilot not only has to navigate, make radio calls and negotiate instrument landings, but he must do it all in a noisy, vibrating, constantly moving environment. Most studies in aircrew fatigue focus on the workload part of the equation. The study described in this proposal is an attempt to define that part of aircrew fatigue which is due to the flight environment. It also attempts to determine changes in body chemistry produced by the flight environment which might be associated with aircrew fatigue. Navigator students in training at Mather Air Force Base, California fly training missions of similar duration and quality in T-43 aircraft and ground simulators. The difference in fatigue and body chemistries after flights in these two settings represent that which is due to the difference in environments. Using student navigators as subjects, blood samples would be taken before and after: (1) a five hour T-43 (Boeing 737) flight, and (2) a five hour ground simulator mission. Changes in a panel of 26 blood chemistries (including plasma osmolality and carboxyhemoglobin) for each setting would be compared for significant differences. Fatigue would be assessed in each setting using: (1) a subjective fatigue questionnaire, (2) hours of sleep following the mission, and (3) performance (academaic score).
GRA

N86-18974# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SOME NONOCCUPATIONAL ASPECTS OF SENSORINEURAL LOSS OF HEARING ACUITY: A PROPOSED DESIGN FOR STUDY M.S. Thesis
T. Varley Jun. 1985 42 p
(AD-A160799; AFIT/CI/NR-85-127T) Avail: NTIS HC A03/MF A01 CSCL 06/19

Although the adverse effects of occupationally associated noise on hearing have been well documented, review of the recent literature revealed few studies which have carefully measured the role of nonoccupational loud sound in sensorineural hearing loss. This thesis will measure the strength of association of sensorineural deafness and avocational noise by calculating the odds ratio in a case-comparison design. The prevalence of avocational loud noise activities of a group of 200 cases diagnosed as having sensorineural deafness at retirement from the United States Air Force will be compared with the prevalence of avocational loud noise activities of a group of nondeaf Air Force retirees who have been matched for age, service occupation, family history of hearing loss, personal history of hearing loss and known causes of otic dysfunction. Limitations of the study and anticipated results are discussed.
GRA

N86-18975# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A PROPOSAL FOR A LONGITUDINAL STUDY TO ASSESS THE HAZARDS OF RADIATION IN SPACE FLIGHT M.S. Thesis
G. I. Reeves Jun. 1985 47 p
(AD-A160801; AFIT/CI/NR-85-125T) Avail: NTIS

HC A03/MF A01 CSCL 06/5

This thesis involves the establishment of a registry of all United States astronauts, past and future, plus nonastronaut controls. The registry will record the incidences of malignant neoplastic disease and diabetes mellitus, and the space radiation exposure received. Data will be carefully analyzed to see if there is a dose-related increase in these diseases related to the exposure to ionizing radiation, with an eventual goal of establishing reliable risk estimates related to dose received. The history of cancer related to radiation exposure is summarized, and the space radiation environment briefly described. Physiological changes accompanying space flight and their potential effects on radiation tolerance and carcinogenesis are discussed. The reasons why data from animal experiments and human occupational, medical, and nuclear weapon exposure cannot be extrapolated to the long term health risks of astronauts are discussed at length, and the study instruments for establishing a long term descriptive surveillance study are described. Author (GRA)

N86-18976# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A MODEL OF INHALED GAS AND VAPOR TRANSPORT IN THE HUMAN LUNG Ph.D. Thesis
M. L. Shelley 1985 134 p
(AD-A160829; AFIT/CI/NR-85-143D) Avail: NTIS
HC A07/MF A01 CSCL 06/16

The transport of inhaled gas or vapor in the human lung is theoretically modeled to determine the fraction of inhaled gas or vapor absorbed through the bronchial walls in the conductive zone and the fraction entering alveolated space and undergoing blood/gas exchange. An iterative-analytical approach is used, rather than a numerical one, to generate a large amount of data over a wide range of gas or vapor solubilities and diffusivities. The model applies to gases or vapors of low solubility. Simple analytical expressions are fitted to model results, expressing fractional bronchial absorption and alveolar uptake in terms of gas or vapor solubility and diffusivity. Typical physiological parameters are assumed and only physical properties of the gas or vapor are required for input. Methods are presented which allow estimation of these input values. GRA

N86-18977# Naval Health Research Center, San Diego, Calif.
REVIEW OF DUODENAL AND GASTRIC ULCER Final Report
F. C. Garland and E. D. Gorham Mar. 1985 23 p
(AD-A160919; NAVHLTHRSCHC-85-9) Avail: NTIS
HC A02/MF A01 CSCL 06/5

Duodenal and gastric ulcer are chronic often recurring conditions that in the past were grouped together as peptic ulcer. Many diverse environmental and genetic factors, which create an imbalance between secretion of acid and pepsin by the stomach and the resistance of the gastrointestinal mucosa may lead to the development of a duodenal or gastric ulcer. Incidence trends and risk factors for these two diseases are different. Reported mortality and hospitalization rates declined markedly for duodenal ulcer from 1970 to 1978, but remained relatively stable for gastric ulcer over the same time period. Recent changes in treatment and diagnosis may account for much of this decline. Several environmental factors associated with duodenal or gastric ulcer have been identified. The principal risk factor for duodenal ulcer is cigarette smoking. Less certain associations with diet, emotional stress, coffee consumption, and occupation have also been reported. Risk of gastric ulcer is also increased by cigarette smoking. Aspirin use, however, is the strongest reported risk factor for gastric ulcer. Uncertain associations between gastric ulcer and alcohol consumption have also been reported. Separate familiar aggregation of duodenal and gastric ulcer indicates that genetic mechanisms leading to the development of these diseases are also distinct. Inheritance patterns for hyperpepsinogenemia I, the Zollinger-Ellison syndrome and several other genetic conditions predisposing to the development of either duodenal or gastric ulcer have been described. GRA

N86-18978# Pennsylvania Univ., Philadelphia. Cerebrovascular Research Center.
DETERMINATION OF THE LUMPED CONSTANT AND THE KINETIC CONSTANTS FOR DEOXYGLUCOSE AND FLUORO-DEOXYGLUCOSE IN MAN
J. H. Greenberg, M. Reivich, A. Alavi, A. Wolf, J. Fowler, J. Russell, C. Arnett, R. R. MacGregor, C. Y. Shiue, and H. Atkins 1985 2 p Presented at the 12th International Symposium on Cerebral Blood Flow and Metabolism, Lund, Sweden, 16 Jun. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE86-000317; BNL-36937; CONF-8506187-2) Avail: NTIS
HC A02/MF A01

If both the time course of the arterial plasma radionuclide concentration and the brain tissue radionuclide concentrations are known, it is possible to calculate the kinetic constants (k1*, k2*, k3*, k4*) of the glucose analogue. In a series of male subjects, arterial blood samples were obtained at frequent intervals immediately following the bolus administration of F-18-FDG and then at less frequent intervals for up to 5 hours after the radionuclide administration. The tissue time course was obtained by making positron emission tomographic scans every three minutes for 30 minutes and then at less frequent intervals for 5 hours. These images were used to construct the time course of (18)F activity in gray and white matter structures. Using these values for the lumped constants and the kinetic constants, the values obtained for the global metabolic rate for glucose in two series of young male subjects were 4.99 + or - 0.23 and 5.55 + or - 0.37 mg/100 g/min when C-11-DG and F-18-FDG were used as tracers respectively. DOE

N86-18979# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
FIRST GERMAN SPACELAB MISSIONS, NO. 6 [ERSTE DEUTSCHE SPACELAB-MISSION]
Aug. 1985 9 p In GERMAN
Avail: NTIS HC A02/MF A01

The German Spacelab Mission D1 crew; D1 scientific investigations of weightlessness and microgravity effects on fluids, cell functions and development processes, and human body; navigation; crew training (simulation and flight program); and commercial spin-offs of space flights are discussed. Author (ESA)

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-18980# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A COMPARISON OF DICHOTIC LISTENING TASK SCORING METHODS
G. R. Griffin and J. D. Mosko Mar. 1985 18 p
(M00-96)
(AD-A159920; NAMRL-SR-85-4) Avail: NTIS HC A02/MF A01
CSCL 05/10

In a recent evaluation of two dichotic listening tasks (DLTs) as predictors of performance in Naval Aviation Undergraduate Pilot Training, results based on one of five scoring methods were presented. The purpose of this report is to provide DLT performance scores using all five scoring methods for comparative purposes to determine the scoring system most economical and efficient for automated scoring and, most sensitive to individual and mean differences. Five scoring methods are described which vary primarily in their treatments of errors, and in their consideration of the importance of sequence effects. Five independent analyses of previously reported data were performed. Results were nearly invariant across all five methods; i.e., intercorrelations among scores across scoring techniques exceeded 0.90. Two of the scoring methods are recommended for purposes of standardizing future analyses of DLT performance, one because of its simplicity

nd ease of application and the other, because it may have reater sensitivity to differences in individual performance. GRA

N86-18981# Naval Submarine Medical Research Lab., Groton, Conn.
HE EFFECTS OF BIMODAL PRESENTATION OF STIMULI AND OISE ON TARGET DETECTION Interim Report
. J. Lewandowski and D. A. Kobus 1 Aug. 1985 13 p
AD-A160122; NSMRL-1058) Avail: NTIS HC A02/MF A01 CSCL 7/4

Twenty men are presented background noise and target timuli in either the visual or auditory modality, or in both at once. uditory and visual detection thresholds were lowest when unctionally redundant targets were presented simultaneously in oth modalities. It appeared that two redundant signals collectively mproved sensitivity and reduced uncertainty regarding a choice esponse, thus enabling a reduction in detection threshold. Detection threshold to a single target was not negatively affected when attention was divided between two modalities and noise presented in both. The finding of improved detection in each modality of the bimodal condition is consistent with the coactivation explanation of bimodal facilitation and supports the advantage of a bimodal input approach in tasks such as sonar, radar, and air traffic control. GRA

N86-18982# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.
PHYSICAL FITNESS AS A MODERATOR OF COGNITIVE WORK CAPACITY AND FATIGUE ONSET UNDER SUSTAINED COMBAT-LIKE OPERATIONS Technical Report, Aug. 1982 - Mar. 1983
R. J. Pleban, D. A. Thomas, and H. L. Thompson Jun. 1985 20 p
(DA Proj. 2Q1-62717-A-790)
(AD-A160417; ARI-TR-687) Avail: NTIS HC A02/MF A01 CSCL 06/14

A study was devised to investigate the role of physical fitness in moderating both cognitive work capacity and fatigue onset under sustained combat operations. Sixteen male ROTC cadets were followed through a two-and-a-half-day Pre Ranger Evaluation exercise. Prior to the actual start of the exercise the cadets' overall level of physical fitness was assessed by using five fitness indices (Harvard Step Test, chinups, pushups, situps, and two-mile run). Cognitive performance and subjective measures of fatigue state were assessed at regular intervals before, during, and one day after the exercise. The results suggest that fitness may attenuate decrements in cognitive work capacity for certain tasks requiring prolonged mental effort, particularly as the cumulative effects of sleep loss and other stressors begin to mount. Similarly, the results of this study suggest that as overall stress levels increase, fitness may have a beneficial effect in moderating fatigue rate. Fitness did not significantly enhance the recovery process with respect to cognitive work capacity, and actually appeared to hinder recovery from fatigue. GRA

N86-18983# Dunlap and Associates, Inc., Norwalk, Conn.
SYSTEM DEVELOPMENT AND EVALUATION TECHNOLOGY: STATE OF THE ART OF MANNED SYSTEM MEASUREMENT Final Report, 1980 - 1982
J. M. Edwards, R. F. Bloom, and P. A. Brainin Feb. 1985 85 p
(Contract MDA903-80-C-0345; DA Proj. 2Q2-63743-A-794)
(AD-A160418; Rept-293-8; ARI-RN-85-20) Avail: NTIS HC A05/MF A01 CSCL 05/8

This report is an up-to-date assessment of the state of the art of manned system measurement. The assessment is based in part on the material presented in the Task 3a report-Review of Manned System Measurement Literature. This report employs a topic outline compatible with the overall measurement model being developed under the present contract. The model is sufficiently representative and comprehensive so that all significant comments and authors have a place in its structure. One of the important uses of this report is the identification of current measurement capabilities and limitations, so that requirements and priorities for the improvement of system-oriented measurement can be delineated. In this review, it became apparent, for example, that measurement models need to be further developed, supported with appropriate human performance data, refined through more consistent and comprehensive applications, and validated by independent corroborations of some kind. Futhermore, the general sense of impracticality, and the need for simplifying assumptions in some cases, strongly suggests a requirement for improving the efficiency of measurement models by reducing the magnitude of effort required in their application. It is envisioned that much time, effort, and money can be saved, irrelevant measurements can be avoided, meaningfulness and utility can be enhanced, and additional applications of the models can be found if several key improvements are made. GRA

N86-18984# Naval Submarine Medical Research Lab., Groton, Conn.
MULTIMODAL VERSUS UNIMODAL INFORMATION PROCESSING OF WORDS Interim Report
L. J. Lewandowski, S. Hursh, and D. A. Kobus 29 Jul. 1985 14 p
(AD-A160517; NSMRL-1056) Avail: NTIS HC A02/MF A01 CSCL 17/1

Sonarmen are constantly confronted with information presented simultaneously through different sensory modalities. Verbal information is one type of input to which they are exposed. Little is known regarding the effect of undirected attention when verbal information is presented simultaneously to the auditory and visual modality. The question of interest is how to unimodal and multimodal presentation conditions differentially affect performance? The superiority of any particular modality depends upon the task requirements, response demands and the complexity of the stimuli. Multimodal stimulation facilities the RT of the slower unimodal presentation while providing little if any facilitates to the faster unimodal approach. Sonarmen are exposed to various types of information. Reports of this study and previous studies have shown that the results are task dependent. Therefore, it is important to determine how different types of stimuli interact with modes of presentation and affect sonar performance. GRA

N86-18985# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
BEYOND ASSOCIATIONS: STRATEGIC COMPONENTS IN MEMORY RETRIEVAL Technical Report, Jun. 1983 - Jul. 1985
L. M. Reder 3 Oct. 1985 44 p
(Contract N00014-84-K-0063; Grant NSF BNS-03711; RR0-4206)
(AD-A160783; TR-85-3-ONR) Avail: NTIS HC A03/MF A01 CSCL 05/10

There are two dominant approaches to understanding human memory, one in the tradition of Ebbinghaus, the other in the tradition of Bartlett. The former approach views learning as the formation of associations, while in the latter views memory as the process of reconstruction of fragments based on prior knowledge. These positions are often considered antithetical: Ebbinghaus was concerned with laws of memory and tried to control for prior knowledge; Bartlett was concerned with how our world knowledge interacts with learning and memory. This paper argues that one can collect data that supports either position because people can adopt one of several memory strategies. Data are reviewed that ilustrate that the same knowledge structure can produce dramatically different results, depending on the strategies that operate on that structure. Author (GRA)

N86-18986# Tennessee Univ., Knoxville. Dept. of Psychology.
PLAUSIBILITY FUNCTIONS OF IOWA VOCABULARY TEST ITEMS ESTIMATED BY THE SIMPLE SUM PROCEDURE OF THE CONDITIONAL P.D.F. APPROACH
F. Samejima Dec. 1984 198 p
(Contract N00014-81-C-0569)
(AD-A160850; RR-64-1-ONR) Avail: NTIS HC A09/MF A01 CSCL 05/10

Simple Sum Procedure of the Conditional P.D.F. Approach

was applied for estimating the plausibility functions of the distractors of the Iowa Vocabulary Test items. In so doing, the normal ogive model was adopted for the correct answers of those items, and those items were used as the substitute for the old test. The group of subjects consists of 2,364 students who took the Level 11 tests in 1971 through 1977. The results indicate the existence of informative distractors for certain test items. The model validation study accompanied to it indicates that for most items the normal ogive model is suitable. GRA

N86-18987# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN INVESTIGATION INTO EFFECTS OF ENVIRONMENTAL CHANGES ON LOCUS OF CONTROL M.S. Thesis
S. A. Answay Sep. 1985 66 p
(AD-A160861; AFIT/GLM/LSB/85S-2) Avail: NTIS
HC A04/MF A01 CSCL 05/10

Past research suggest that relationships exist between Type A personality, stress, and coronary heart disease. This thesis determined that Type A individuals are inclined to experience more stress than Type B individuals in similar situations. A relationship was found between Type A behavior and internal locus of control indicating that individuals with internal locus of control are more likely to be Type A personalities than type B personalities. Relationships were also found among Type A behavior, internal locus of control, and assertiveness indicating that Type A individuals are more assertive than Type B individuals. Family inventory was inversely related to locus of control inferring that internal locus of control individuals are more satisfied with their personal relationships than are external locus of control individuals. Because family inventory was also inversely related to stress, when stress is present in one area of an internal locus of control individuals' life, the individual looks to other areas of his life for satisfaction. No relationship was found between stress and assertiveness indicating that assertive individuals deal more effectively with stressful situations. This investigation also determined that as the environment changes to a more structured rigid environment, the individual shifts from an internal to an external locus of control. These determinations were based on statistical analysis using Pearson Correlations, Paired t-Tests, and Regression Analysis. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-18988 Department of the Navy, Washington, D. C.
SERVO OPERATED ANTI-G SUIT PRESSURIZATION SYSTEM Patent
R. J. Crosbie and P. R. Edwards, inventors (to Navy) Issued 13 Aug. 1985 7 p Supersedes AD-D011468
(AD-D011932; US-Patent-4,534,338; US-Patent-Appl-SN-613497; US-Patent-Class-128-1) Avail: US Patent and Trademark Office
CSCL 06/17

A servo operated system for controlling pressurization of an aircraft pilot's anti-G suit during high energy maneuvers has a servo operated control valve and a feedback loop controller for minimizing pressure lag in the suit. The controller has dual modes of operation: one for normal flight conditions and one for combat flight conditions. The normal flight mode provides nominal G-protection while the combat mode provides faster response by prepressurizing the anti-G suit to a base level and lowering the G-force threshold. While in the combat mode, the crewman may select an adjustment pulsating signal to be superimposed on the prepressurization level to obtain additional comfort. Alternatively, he may select a superimposed pulsating signal which is synchronized with his own heartbeat to reinforce the pumping action of the heart. GRA

N86-18989# Naval Coastal Systems Center, Panama City, Fla.
DESIGN GUIDELINES FOR CARBON DIOXIDE SCRUBBERS, REVISION A
M. L. Nuckols, A. Purer, and G. A. Deason Jul. 1985 77 p
(AD-A160181; NCSC-TECH-man-4110-1-83-Rev-A) Avail: NTIS
HC A05/MF A01 CSCL 06/11

Design data and guidelines are presented to help predict the performance of axial flow carbon dioxide canister designs using alkali metal hydroxide absorbers. The design data are derived from a large series of laboratory tests conducted at the Naval Coastal Systems Center to isolate the effects of environmental and goemetric parameters on canister absorption efficiency. Sample canister designs are considered to demonstrate the use of the derived data to predict effective canister life and pressure drop levels. Alternative techniques for the sorption of carbon dioxide are also reviewed. GRA

N86-18990*# California Univ., San Diego. Space Inst.
INDEPENDENT STUDY OF AUTOMATION AND ROBOTICS FOR THE NATIONAL SPACE PROGRAM BY THE AUTOMATION AND ROBOTICS PANEL
25 Feb. 1985 138 p
(Grant NAGw-629)
(NASA-CR-176523; NAS 1.26:176523; DE85-902185; CSI-85-01)
Avail: NTIS HC A07/MF A01 CSCL 05H

Methods are suggested for promoting continual growth in space station automation and robotics. Initial operation capability (IOC) space station design criteria are emphasized that will allow for ever-increasing levels of automation. The required technology advancement in robotics are described. The need is explained for improved human-machine interfaces, manipulators and sensors, and their combination with Earth developed robot technology into hybrid systems. The needed research base in computer science, artificial intelligence, and applied mathematics is discussed. Effects on private and Government Sectors are explained. It is shown that the Station will provide broader opportunities in time, space and society. Organizational recommendations are given for meeting Congressional goals for space station automation and robotics. DOE

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-18991*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIGRID METHOD FOR NEARLY SINGULAR AND SLIGHTLY INDEFINITE PROBLEMS Final Report
Achi Brandt (Weizmann Inst. of Science, Rehovot, Israel) and Shlomo Taasan Nov. 1985 37 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-84-0070)
(NASA-CR-178026; ICASE-85-57; NAS 1.26:178026) Avail: NTIS
HC A03/MF A01 CSCL 12A

This paper deals with nearly singular, possibly indefinite problems for which the usual multigrid solvers converge very slowly or even diverge. The main difficulty is related to some badly approximated smooth functions which correspond to eigenfunctions with nearly zero eigenvalues. A correction to the usual coarse-grid equations is derived, both in the correction scheme and in the full approximation scheme. The performance of the new algorithm

using this correction is essentially as that of usual multigrid for definite problems. Author

N86-18992*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FACTORIZATION AND REDUCTION METHODS FOR OPTIMAL CONTROL OF DISTRIBUTED PARAMETER SYSTEMS Final Report
John A. Burns and Robert K. Powers Nov. 1985 104 p refs
Submitted for publication Prepared in cooperation with Virginia Polytechnic Inst. and State Univ., Blacksburg
(Contracts NAS1-17070; NAS1-18107; Grants NSF ECS-81-09245; AF-AFOSR-85-0287)
(NASA-CR-178033; ICASE-85-58; NAS 1.26:178033) Avail: NTIS HC A06/MF A01 CSCL 12A

A Chandrasekhar-type factorization method is applied to the linear-quadratic optimal control problem for distributed parameter systems. An aeroelastic control problem is used as a model example to demonstrate that if computationally efficient algorithms, such as those of Chandrasekhar-type, are combined with the special structure often available to a particular problem, then an abstract approximation theory developed for distributed parameter control theory becomes a viable method of solution. A numerical scheme based on averaging approximations is applied to hereditary control problems. Numerical examples are given. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-18993 Department of the Air Force, Washington, D.C.
BEAM ADDRESSED MEMORY SYSTEM Patent
C. G. Kirkpatrick, M. S. Adler, and G. E. Possin, inventors (to Air Force) Issued 6 Aug. 1985 4 p Supersedes AD-D010491
(AD-D011930; US-Patent-4,534,016; US-Patent-Appl-SN-512070; US-Patent-Class-365-128) Avail: US Patent and Trademark Office CSCL 09/2

A beam addressed memory system for digital memory recording and reading which comprises and electron beam generating and focusing subsystem, an electron detecting subsystem, electronic control and interface circuit means is invented. A storage medium consisting essentially of a cross-linkable polymeric film having an implanted surface layer of heavy metal ions is described. Author (GRA)

N86-18994# Princeton Univ., N. J. Dept. of Electrical Engineering and Computer Science.
DIGITAL SIGNAL PROCESSING Final Report, 1 Apr. 1982 - 30 Jun. 1985
J. B. Thomas and K. Steiglitz 23 Aug. 1985 11 p
(Contract DAAG29-82-K-0095)
(AD-A159889; ARO-18985.26-EL) Avail: NTIS HC A02/MF A01 CSCL 09/2

Research has focused on digital signal processing algorithms especially on VLSI implementation and complexity issues and on digital signal processing in and unsure noise environment. Virtually all of the important research results were reported in journal articles and conference papers. Author (GRA)

N86-18995# Yale Univ., New Haven, Conn. Dept. of Computer Science.
PARALLEL DIRECT METHODS FOR SOLVING BANDED LINEAR SYSTEMS Research Report
Y. Saad and M. H. Schultz Aug. 1985 25 p
(Contract N00014-82-K-0184)
(AD-A160148; YALEU/DCS/RR-387) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper proposes several implementations of Gaussian elimination for solving banded linear systems on multiprocessors. Three simple computer architectures are considered: a multiprocessor ring, a grid array and a hypercube, This complexity analysis fully accounts for communication delays by using simple mathematical models where both latency and actual transfer times are incorporated. When the number of processors is small relative to the bandwidth of the system a row interleaved implementation of Gaussian elimination algorithm is attractive. Otherwise, a two-dimensional grid is essential for achieving higher speed-up. The hypercube architecture gives the smallest communication latency times. Author (GRA)

N86-18996# Duke Univ., Durham, N. C. Dept. of Computer Science.
RELIABILITY EVALUATION OF FAULT-TOLERANT MULTI-PROCESSOR SYSTEMS Interim Report
K. S. Trivedi 14 May 1985 8 p
(Grant AF-AFOSR-0132-84)
(AD-A160234; AFOSR-85-0783TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The major issues involved in modeling modern computer systems can be broadly classified into those arising form the model construction, model reduction and solution, and in the interpretation of the model solution. Modeling languages such as fault trees, the PMS notation, and Extended Stochastic Petri Nets can be valuable in simplifying the task of model construction. The goal of the languages is to provide well defined constructs to the user and let the modeling package automatically generate the details of the underlying stochastic model. The language constructs should correspond closely to the system constructs, and yet should produce a concise representation. Specifying the relevent details of the system being modeled can require a tremendous number of states to be considered (in excess of 100,000). Techniques must be developed to reduce the model to one that is computationally tractable, and then to solve the reduced model in a computationally efficient manner. Once the solution is obtained, it must be interpreted carefully. The errors introduced by the model reduction step and in the solutions must be bounded, and sensitivity of the solution with respect to input parameters should be estimated. Author (GRA)

N86-18997# Washington Univ., Seattle. Dept. of Computer Science.
UW/NW (UNIVERSITY OF WASHINGTON/NORTHWEST) VLSI CONSORTIUM Semiannual Technical Report, 19 Mar. - 30 Sep. 1985
L. Snyder Oct. 1985 20 p
(Contract MDA903-85-K-0072; ARPA Order 4560)
(AD-A160292; TR-85-10-03; SATR-1) Avail: NTIS HC A02/MF A01 CSCL 09/5

This document reports on the research activities of the University of Washington/Northwest VLSI Consortium for the period 19 March 1985 to 30 September 1985 under sponsorship of the Defense Advanced Research Projects Agency, under contract number MDA903-85-K-0072, program code number 5D30. GRA

N86-18998# Systems and Applied Sciences Corp., Vienna, Va.
USERS GUIDE FOR NORMAL MODE OBJECTIVE ANALYSIS OF GLOBAL DATA ASSIMILATION
S. L. Tung 1 Mar. 1985 64 p
(Contract F19628-82-C-0023)
(AD-A160373; AFGL-TR-85-0042; SR-9) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report is a manual for using the codes that produce the normal mode objective analysis of global data. It describes the procedures for running the codes and provides software documentation. Run streams for the AFGL global spectral model and non-linear normal mode initialization in relation to the analysis procedure are also included. The manual is designed to accompany code listings available from the author. Author (GRA)

N86-18999# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

FINAL EVALUATION OF THE LIGHT PEN AS THE KEY COMPONENT IN A MICROCOMPUTER-BASED SIMULATOR Research Note, Feb. 1984 - Jul. 1985
B. W. Thomas and J. E. Schroeder Sep. 1985 31 p
(DA Proj. 2Q2-63743-A-794)
(AD-A160461; ARI-RN-85-90) Avail: NTIS HC A03/MF A01 CSCL 09/2

The US Army Research Institute's Fort Benning Field Unit is currently developing a low-cost, part-task simulator/trainer that will train different weapon systems. The Multipurpose Arcade Combat Simulator (MACS) uses a specially designed light pen as the key component to determine where a weapon is aimed. In a previous study, Schroeder and Cook (1983) investigated the effects of a number of variables on the reliability of a prototype light pen (e.g., ambient light, glare, distance from the monitor to the light pen, screen brightness, screen color, equipment warm-up, and trigger switch closure). Subsequently, the light pen hardware was improved. The major purpose of the present work was to replicate the earlier light pen evaluation with the newly improved light pen. A second goal was to assess the accuracy of the new light pen on two different microcomputers. The new light pen was found to be significantly more reliable than its predecessor on both microcomputers and well within the acceptable limits of accuracy for a marksmanship. GRA

N86-19000# Syracuse Univ., N. Y. Computer Applications and Software Engineering.
[RESEARCH ON COMPUTER ARCHITECTURE AND LOGIC DESIGN] Interim Report, 1 Oct. 1984 - 30 Jun. 1985
B. J. Strait 30 Jun. 1985 10 p
(Grant AF-AFOSR-0065-85)
(AD-A160598; AFOSR-85-0875TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The DOD University Research Instrumentation grant together with cost sharing by Syracuse University and grants/discounts from equipment manufacturers has created a sizable research facility of Syracuse, including a VAX 11/780 system, 4 AED graphics terminals, a Hewlett Packard Drafting plotter and an Imager Laser printer. Research projects being supported include New Generation Knowledge Processing, Concurrent Computer Architectures for Unification Operations, Construction of a Multiprocessor Reduction Machine for the Support of Logic Programming, Logic Programming and Knowledge Base Maintenance and An Initial Architecture for the Solution of the Partial-Match Retrieval Problem in the Context of Logic Programming. Author (GRA)

N86-19001# System Development Corp., San Diego, Calif.
INTERACTIVE GRAPHICS UTILITY FOR ARMY NEC (NUMERICAL ELECTROMAGNETICS CODE) AUTOMATION (IGUANA): USER'S GUIDE Final Report
J. Strauch and S. Thompson Sep. 1985 137 p
(Contract N66001-83-D-0094)
(AD-A160605; NOSC-CR-308) Avail: NTIS HC A07/MF A01 CSCL 09/2

The Interactive Graphics Utility for Army NEC Automation (IGUANA) is a system designed to reduce the time required for antenna model evaluation by providing partial automation to both the data entry and the data display processes. Previous to this system, the use of existing Numerical Electromagnetics Code (NEC) for antenna evaluation required a lengthy, tedious and error-prone process involving manual measurement of three-dimensional coordinates of each significant point of the desired input structure from scale drawings (generally only Top and Side Views are available), and manual entry via keyboards. The input structures are in the form of wire models. The NEC code requires that each wire be entered individually with both end points, radius and segmentation. Complex models often required several weeks of effort to correct measurement and keyboard errors. IGUANA is provided as an aid to NEC input preparation and output display - it performs no antenna evaluations itself. This User's Guide has been prepared to explain the capabilities, functions, and operation of IGUANA. GRA

N86-19002# Logistics Management Inst., Bethesda, Md.
MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL: FUNCTIONAL DESCRIPTION
R. W. Hartt and D. J. OConnor Oct. 1985 88 p
(Contract MDA903-85-C-0139)
(AD-A160610; LMI-DL503) Avail: NTIS HC A05/MF A01 CSCL 09/2

The Microcomputer-based Local Automated Model (MicroLAM) project will demonstrate the integration of a local collection management system with access to remote bibliographic data bases. Through an intelligent gateway processor, users of the system will be able to access a local catalog and the Defense Technical Information Center (DTIC) Technical Reports (TR) data base simultaneously. The system will consist of a commercial software package (for local collection management) integrated with a subset of the Lawrence Livermore National Laboratory (LLNL) Technology Information System (an intelligent gateway). The intelligent gateway permits sharing of bibliographic resources between the network of technical libraries and information centers within the Department of Defense (DoD) and the DOD technical information clearinghouse -- DTIC. Contained in this functional description are summary description, detailed characteristics and operating environment of the system, as well as the cost factors and development schedule of the LAM project. GRA

N86-19003# System Development Corp., San Diego, Calif.
INTERACTIVE GRAPHICS UTILITY FOR ARMY NEC (NUMERICAL ELECTROMAGNETICS CODE AUTOMATION (IGUANA): COMPUTER PROGRAM PACKAGE Final Report
J. Strauch and S. Thompson Sep. 1985 22 p
(Contract N66001-83-D-0094)
(AD-A160652; NOSC-CR-307) Avail: NTIS HC A02/MF A01 CSCL 09/2

The Interactive Graphics Utility for Army NEC Automation (IGUANA) is a system designed to reduce the time required for antenna model evaluation by providing partial automation to both the data entry and the data display processes. Previous to this system, the use of existing Numerical Electromagnetics Code (NEC) for antenna evaluation required a lengthy, tedious, and error-prone process involving manual measurement of three-dimensional coordinates of each significant point of the desired input structure from scale drawings (generally, only top and side views are available), and manual entry via keyboard. The input structures are in the form of wire models. The NEC code requires that each wire be specified individually by defining the x, y, and z coordinates of both end points, the wire radius, and the segmentation for each wire. Complex models often required several weeks of effort to specify, check, and to correct measurement and keyboard errors. IGUANA has been developed as an aid to NEC input preparation and output display - it performs no antenna evaluations itself. This version of IGUANA produces input acceptable only for the NEC Method of Moments code. GRA

N86-19004# Edgerton, Germeshausen and Grier, Inc., Los Alamos, N. Mex.
OPERATION MANUAL CORRTEX 3 RECORDER
L. Pirkl, D. M. Holt, and C. F. Virchow Apr. 1985 490 p
(Contract DE-AC08-83NV-10282)
(DE85-014872; EGG-10282-5011) Avail: NTIS HC A21/MF A01

This document describes the CORRTEX 3 Recorder, including its performance characteristics, operating procedures, circuit descriptions, and calibration procedure. This ruggedized microprocessor controlled unit, in conjunction with an appropriate transducer, is designed to measure shock propagation characteristics in remote environments and under severe operating conditions and to retain the digitized data for extended periods of time. Appendices to this document are also included, with detailed listings of the appropriate control and processing software. DOE

N86-19005# Lawrence Livermore National Lab., Calif.
INGRID: A THREE-DIMENSIONAL MESH GENERATOR FOR MODELING NONLINEAR SYSTEMS

W. Stillman and J. O. Hallquist Jul. 1985 227 p
ontract W-7405-eng-48)
E86-000749; UCID-20506) Avail: NTIS HC A11/MF A01
INGRID generates complete input files for the codes DYN-D, NIKE3D, FACET, and TOPAZ3D. Geometries are described marily using index space concepts which came from the program GEN. The ideas used in INGEN were reworked into a new ethod which is both simple and powerful. Interactive graphics in GRID are patterned after TAURUS, a three-dimensional post-ocessor, and MAZE, a two-dimensional mesh generator. Much the coding from MAZE is directly incorporated in INGRID. DOE

86-19006# Kernforschungsanlage, Juelich (West Germany). entralinst. fuer Angewandte Mathematik.
VESTIGATIONS OF THE ACCESS TO THE MAIN MEMORY F VECTOR PROCESSOR SYSTEMS Thesis - Technische ochschule, Aachen [UNTERSUCHUNGEN VON ZUGRIFFEN UF DEN ARBEITSSPEICHER IN VEKTOR-ECHNERSYSTEMEN]
/. Oed Jun. 1985 120 p refs In GERMAN; ENGLISH ummary
IUEL-1994; - ISSN-0366-0885; D-82) Avail: NTIS C A06/MF A01
The access to the main memory of a vector processor ystem was investigated with analytical models, measurements n a double processor system CRAY X-MP, and simulations. Single rocessor systems and multiprocessor systems with shared emory are investigated. Long sequences of accesses to memory ells whose addresses differ from each other by a constant istance, as they typically appear in vector processors are mphasized. The conditions under which an access flow with a istance d1 and two access flows with distances d1 and d2 can, ithout conflict, enter a multifold memory with different sections, re determined. Author (ESA)

N86-18355# Florence Univ. (Italy). Dipt. di Ingegneria Electron-ca.
DATA COMPRESSION TECHNIQUES FOR REMOTE SENSING DATA HANDLING
/. Cappellini and E. Delre *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 31-36 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

N86-18389# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE PRESENT STATUS OF THE HIPPARCOS PROJECT
M. A. C. Perryman and M. Schuyer *In its* The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 13-22 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18391# Lund Observatory (Sweden).
THE HIPPARCOS DATA REDUCTIONS: PRINCIPLES AND LIMITATIONS
L. Lindegren *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 31-36 refs Sponsored by Swedish Board for Space Activities (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18392# Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
STATUS OF THE FUNDAMENTAL ASTRONOMY BY SPACE TECHNIQUES (FAST) DATA PROCESSING CHAIN [ETAT D'AVANCEMENT DE LA CHAINE DE TRAITEMENT DES DONNEES DU CONSORTIUM FAST]
J. L. Falin and J. Kovalevsky *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 37-41 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18393# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
THE STELLAR DATA CENTER (CDS) AND HIPPARCOS: AFTERTHOUGHTS
C. Jaschek *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 47-48 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18394# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
PRESENTATION OF THE ASTRONOMICAL DATA BASE SET OF IDENTIFICATIONS, MEASUREMENTS, AND BIBLIOGRAPHY FOR ASTRONOMICAL DATA (SIMBAD)
M. Wenger *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 49-53 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18395# Observatoire de Paris-Meudon (France).
PRESENT STATUS OF THE INPUT CATALOG
A. E. Gomez and F. Crifo *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 57-61 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18396# Observatoire de Paris-Meudon (France).
THE INCA DATA BASE: SUB-BASE FROM SET OF IDENTIFICATIONS, MEASUREMENTS AND BIBLIOGRAPHY FOR ASTRONOMICAL DATA (SIMBAD)
D. Morin and F. Arenou *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 63-66 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18397# Observatoire de Paris-Meudon (France).
DEFINITION OF THE SURVEY
F. Crifo, C. Turon, and M. Grenon (Geneva Observatory) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 67-70 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18398# Geneva Observatory (Switzerland).
SIMULATIONS: THE ROLE PLAYED BY STATIC PRESSURES
B. Nicolet and M. Creze (Observatoire de Besancon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 75-77 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18399# Observatoire de Besancon (France).
OPTIMIZING THE INPUT CATALOG THROUGH SIMULATIONS
A. Creze *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 79-82 ref (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18400# Observatoire de Paris-Meudon (France).
EXPECTED FULFILLMENTS OF OBSERVATION PROPOSALS VERSUS ESA PRIORITY
C. Turon, B. Nicolet (Geneva Observatory), and M. Creze (Observatoire de Besancon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 83-86 (For primary document see

N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18401# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
ASTROPHYSICAL ASPECTS OF THE CONTENTS OF THE INPUT CATALOG
D. Egret and E. Gomez (Observatoire de Paris-Meudon, France) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 87-90 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18402# Centre National d'Etudes Spatiales, Toulouse (France).
THE HIPPARCOS INPUT CATALOG (INCA): SIMULATION OF OBSERVATIONS OVER A LONG PERIOD [HIPPARCOS-INCA: SIMULATION DES OBSERVATIONS SUR UNE LONGUE PERIODE]
J.-C. Feaugas *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 91-96 refs In FRENCH (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18403# Observatoire de Besancon (France).
OPTIMIZING THE OBSERVING STRATEGY THROUGH SIMULATIONS
M. Creze, M. Chareton, and E. Oblak *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 97-99 ref (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18404# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
EXISTING DATA ON CANDIDATE STARS FOR THE HIPPARCOS INPUT CATALOG: PRESENT STATUS AND DEVELOPMENTS [LES DONNEES EXISTANTES POUR LES ETOILES CANDIDATES AU CATALOGUE D'ENTREE: STATUT ACTUEL ET DEVELOPPEMENTS]
D. Egret *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 105-107 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18405# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
PHOTOMETRIC DATA RELATED TO THE FORMATION OF THE INPUT CATALOG
J.-C. Mermilliod and M. Mermilliod *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 111-112 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18406# Geneva Observatory (Switzerland).
STANDARD STARS FOR THE ON-ORBIT PHOTOMETRIC PAYLOAD CALIBRATION
M. Grenon *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 113-116 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18416# Astronomische Rechen-Institut, Heidelberg (West Germany).

THE ASTRONOMISCHES RECHEN-INSTITUT (ARI) CATALOG OF ASTROMETRIC DATA FOR THE HIPPARCOS INPUT CATALOG
U. Bestian and T. Lederle *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 185-188 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18428# Observatoire de Strasbourg (France). Centre de Donnees Stellaires.
THE TYCHO INPUT CATALOG AND THE GUIDE STAR CATALOG OF THE SPACE TELESCOPE
D. Egret *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 231-233 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18864# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
DEVELOPMENT AND IMPLEMENTATION OF AN MC68000/VME MICROCOMPUTER FOR PAYLOAD SUPPORT SYSTEMS
J. Turner *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 335-338 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-19007 New South Wales Univ., Kensington (Australia).
COMPUTER SYSTEM MODELLING USING A COMMERCIAL SOFTWARE PACKAGE Abstract Only
Edith Csontos 1984 2 p
Avail: Issuing Activity

This project was undertaken to model a computer system using queueing network models implemented in a commercially available software package BEST1/MVS (BGS Systems). A base-line model was constructed from measured data with a supplementary package CAPTURE/MVS. The validated base-line model was converted to describe a planned, new configuration including two loosely coupled CPU-s and additional, faster disks. The workload was split between the two systems and several assumptions were accepted regarding system overheads. The new models were then used to predict the performance parameters of the new configuration. Author

N86-19008*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PARTITIONING AND PACKING MATHEMATICAL SIMULATION MODELS FOR CALCULATION ON PARALLEL COMPUTERS
Dale J. Arpasi and Edward J. Milner [1986] 38 p refs Prepared for Presentation at the 1986 International Conference on Parallel Processing, St. Charles, Ill., 19-22 Aug. 1986; sponsored by Pennsylvania State Univ. and IEEE Computer Society
(NASA-TM-87170; E-2808; NAS 1.15:87170) Avail: NTIS HC A03/MF A01 CSCL 09B

The development of multiprocessor simulations from a serial set of ordinary differential equations describing a physical system is described. Degrees of parallelism (i.e., coupling between the equations) and their impact on parallel processing are discussed. The problem of identifying computational parallelism within sets of closely coupled equations that require the exchange of current values of variables is described. A technique is presented for identifying this parallelism and for partitioning the equations for parallel solution on a multiprocessor. An algorithm which packs the equations into a minimum number of processors is also described. The results of the packing algorithm when applied to a turbojet engine model are presented in terms of processor utilization. Author

N86-19009*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOME PROPERTIES OF n-DIMENSIONAL TRIANGULATIONS
C. L. Lawson 15 Jun. 1985 35 p refs
(Contract NAS7-918)
(NASA-CR-176535; JPL-Pub-85-42; NAS 1.26:176535) Avail: NTIS HC A03/MF A01 CSCL 09B

A number of mathematical results relevant to the problem of constructing a triangulation, i.e., a simplicial tessellation, of the convex hull of an arbitrary finite set of points in n-space are described. The principal results achieved are: (1) a set of n+2 points in n-space may be triangulated in at most 2 different ways; (2) the sphere test defined in this report selects a preferred one of these two triangulations; (3) a set of parameters is defined that permits the characterization and enumeration of all sets of n+2 points in n-space that are significantly different from the point of view of their possible triangulation; (4) the local sphere test induces a global sphere test property for a triangulation; and (5) a triangulation satisfying the global sphere property is dual to the n-dimensional Dirichlet tesselation, i.e., it is a Delaunay triangulation. Author

N86-19010*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REDUCTION OF THE EFFECTS OF THE COMMUNICATION DELAYS IN SCIENTIFIC ALGORITHMS ON MESSAGE PASSING MIMD ARCHITECTURES Final Report
Joel H. Saltz, Vijay K. Naik, and David M. Nicol Jan. 1986 38 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178044; ICASE-86-4; NAS 1.26:178044) Avail: NTIS HC A03/MF A01 CSCL 09B

The efficient implementation of algorithms on multiprocessor machines requires that the effects of communication delays be minimized. The effects of these delays on the performance of a model problem on a hypercube multiprocessor architecture is investigated and methods are developed for increasing algorithm efficiency. The model problem under investigation is the solution by red-black Successive Over Relaxation [YOUN71] of the heat equation; most of the techniques described here also apply equally well to the solution of elliptic partial differential equations by red-black or multicolor SOR methods. Methods for reducing communication traffic and overhead on a multiprocessor are identified and results of testing these methods on the Intel iPSC Hypercube reported. Methods for partitioning a problem's domain across processors, for reducing communication traffic during a global convergence check, for reducing the number of global convergence checks employed during an iteration, and for concurrently iterating on multiple time-steps in a time-dependent problem. Empirical results show that use of these models can markedly reduce a numewrical problem's execution time. Author

N86-19011# Naval Postgraduate School, Monterey, Calif.
PERFORMANCE EVALUATION OF THE JRS AUTOMATIC MICROCODE GENERATING SYSTEM M.S. Thesis
T. J. Newton Jun. 1985 121 p
(AD-A159671) Avail: NTIS HC A06/MF A01 CSCL 09/2

The purpose of this thesis was to evaluate the performance of microcode automatically generated from a high level language. The performance of the generated microcode was compared to the performance of Fortran code on the VAX 11/780 to see if any increase in throughput could be attained by using the microcoded version. The factors affecting the automatic generation of microcode: compaction, optimization, cost, and machine independence are discussed. This is followed by a definition of the testing areas, description of the tests, and a description of the performance evaluation methods. The tests showed that the automatically generated microcode does not always out perform FORTRAN. In general, the FORTRAN code was better for mathematical calculations while the automatically generated microcode was better for bit manipulation and sorting/searching type applications. Author (GRA)

N86-19012# Naval Postgraduate School, Monterey, Calif.
A SURVEY OF PROPERTIES OF RELATIONS WHICH HAVE THE CONFLUENCE PROPERTY M.S. Thesis
U. Ozkan Jun. 1985 62 p
(AD-A159673) Avail: NTIS HC A04/MF A01 CSCL 12/1

The confluence property arises in a number of areas of Computer Science; from its origins in the lambda-calculus to its use in the theory of abstract data types and term rewriting systems. Its abstract properties and its application to a number of problems, such as algebraic specifications of abstract data types and term rewriting systems, are surveyed here. In the first chapter, surveys the historical work that brought the Church-Rosser property into the literature. The second chapter introduces the idea of confluence and its relation to the Church-Rosser property. The rest of this chapter is on theorems related to confluence. The third chapter discusses the algebraic specification of abstract data types which provides the background to move into the study of term rewriting systems which is the second part of the third chapter. The last chapter discusses an algorithm for showing that a given axiom set (as rewrite rules) is confluent. This procedure is called the Knuth-Bendix completion algorithm. GRA

N86-19013# Naval Postgraduate School, Monterey, Calif.
ON THE INTEGRATION OF LOGIC PROGRAMMING AND FUNCTIONAL PROGRAMMING M.S. Thesis
R. E. Rhodes Jun. 1985 72 p
(AD-A159751) Avail: NTIS HC A04/MF A01 CSCL 09/2

Two programming paradigms, logic programming and functional programming, are discussed in detail with emphasis on the particular advantages and disadvantages of each paradigm. The integration of these two programming paradigms is explored based on the notion that declarative sorts of knowledge (facts and logical relationships) should be expressed in a declarative way, and that procedural sorts of knowledge (manipulation, control, and utilization of knowledge) should be expressed in a procedural way. Toward this end, the conceptual framework for an integrated language is established, and the basic features of the language are outlined. Author (GRA)

N86-19014# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Applications.
A MODIFIED FRONTAL TECHNIQUE SUITABLE FOR PARALLEL SYSTEMS Technical Report
R. G. Melhem Jul. 1985 21 p
(Contract N00014-85-K-0339)
(AD-A159769; ICMA-85-84) Avail: NTIS HC A02/MF A01 CSCL 12/1

Frontal techniques offer the potential for processing the assembly and the factorization phases of finite element analysis in parallel systems. However, the rows of the stiffness matrix are assembled and factored in different orders, thus depriving frontal solvers of the uniformity desired in parallel processing. On the other hand, band solution techniques handle the factorization phase in a very uniform way but do not interleave assembly and factorization. This paper, suggests a technqiue that borrows from both frontal and band solvers those characteristics that are advantageous for parallel processing. Moreover, book keeping and data manipulation are simpler in the suggested technique than in the classical frontal method. This makes the suggested technique also attractive for sequential systems. Author (GRA)

N86-19015# Naval Postgraduate School, Monterey, Calif.
ALGORITHMIC STUDY ON SYSTOLIC ARRAY STRUCTURES M.S. Thesis
L. J. de Souza Jun. 1985 196 p
(AD-A160006) Avail: NTIS HC A09/MF A01 CSCL 09/2

Computation bound problems impose a severe burden the CPU. In order to speed up computation, specific problems that are identified as the main burden can be done using parallel processing. In this way, the time consuming tasks can be executed on specially tailored hardware. This hardware is designed to implement an algorithm-oriented parallel-processing structure that works more efficiently than the CPU for these specific tasks. This thesis is a study of the mapping of the algorithms onto a kind of structure called systolic array. The development and utilization of a software tool designed to assist on such analysis is presented here. This tool, named Systolic Array Graphics Simulator (SYSGRAS), has the capability to represent any type of systolic array, no matter how complex the cells and structure are. Because of the capability of SYSGRAS, an interactive computer program

simulator, the study of systolic arrays is simplified. The complexity of the time-space relationships is analyzed with the help of some color-graphics techniques. The visualization of the data interaction is thus enhanced and the user is alleviated from the burden of keeping track of partial results and can dedicate attention to the processing algorithm. Author (GRA)

N86-19016# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
REPLICATION AND FAULT-TOLERANCE IN THE ISIS SYSTEM, REVISED
K. P. Birman Mar. 1985 27 p
(Contract MDA903-85-C-0124; Grant NSF DCR-84-12582)
(AD-A160039; CU-CSD-TR-85-668) Avail: NTIS HC A03/MF A01

The ISIS system transforms abstract type specifications into fault-tolerant distributed program implementations while insulating users from the mechanisms used to achieve fault-tolerance. This paper discusses techniques for obtaining a fault-tolerant implementation from a non-distributed specification and for achieving improved performance by concurrently updating relicated data. The system itself is based on a small set of communication primitives, which are interesting because they achieve high levels of concurrency while respecting higher level ordering requirements. The performance of distributed fault-tolerant services running on this initial version of ISIS is found to be nearly as good as that of nondistributed fault-intolerant ones. Author (GRA)

N86-19017# Scientific Systems, Inc., Cambridge, Mass.
COMPUTER-AIDED DESIGN OF ROBUST DECENTRALIZED CONTROLLERS Final Report, Sep. 1984 - May 1985
H. C. Razavi, R. K. Mehra, and M. Vidyasagar Aug. 1985 57 p
Prepared in cooperation with Waterloo Univ., Ontario
(Contract F33615-84-C-3619)
(AD-A160118; AFWAL-TR-85-3046) Avail: NTIS HC A04/MF A01 CSCL 01/3

Significant progress was made on all of the tasks proposed for the Phase 1 (feasibility) effort. In addition to the four tasks that were originally proposed, a new subtask on simultaneously stabilizing controllers was included, and a model of a flexible structure was used for which two types of fault tolerant controllers were designed. The concept of fixed modes was extended to that of a decentralized fixed determinant and significant new results for characterizing fixed determinants were obtained. A characterization of all decentralized controllers was obtained based on which conditions for the existence of robust decentralized controllers were derived, in case of a two channel system. Finally, an iterative solution (of nonlinear programming type) was proposed for optimal decentralized filtering of a two-channel system. In this way a firm foundation was laid in Phase 1 based on which a state-of-the-art approach to computer-aided design of robust decentralized control problems can be carried out. Author (GRA)

N86-19018# California Univ., Berkeley. Center for Pure and Applied Mathematics
DEVELOPMENT OF AN ACCURATE ALGORITHM FOR EXP(BT): APPENDIX
B. N. Parlett and K. C. Ng Aug. 1985 54 p
(AD-A160121; PAM-294-APP) Avail: NTIS HC A04/MF A01 CSCL 09/2

One sample program (with its output) and 18 subroutines are listed in this appendix. GRA

N86-19019# Maryland Univ., College Park. Center for Automation Research.
ON USING INVERTED TREES FOR UPDATING GRAPH PROPERTIES
S. Pawagi and I. V. Ramakrishnan May 1985 21 p
(Contracts F49620-83-C-0082; N00014-84-K-0530; Grant NSF ECS-84-04399)
(AD-A160135; CAR-TR-117; CS-TR-1492; AFOSR-85-0822TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Fast parallel algorithms are presented for updating connected components and bridges of an undirected graph when a minor change has been made to the graph, such as addition or deletion of vertices and edges. The matching model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper require O (log n) time and use C (n-squared) processors. These algorithms are efficient when compared to previously known algorithms for finding connected components and bridges that require O(log squared n) time and use 0 (n-squared) processors. The previous solution is maintained using an inverted tree (a rooted tree where a node points toward its parent) and after a minor change the new solution is rapidly computed from this tree. GRA

N86-19020# Maryland Univ., College Park. Dept. of Computer Science.
COMPARING THE EFFECTIVENESS OF SOFTWARE TESTING STRATEGIES
V. R. Basili and R. W. Selby, Jr. May 1985 73 p
(Grant NsG-5123; Contract F49620-80-C-0001)
(NASA-CR-176511; NAS 1.26:176511; AD-A160136; CS-TR-1501; AFOSR-85-0805TR) Avail: NTIS HC A04/MF A01 CSCL 09B

This study compares the results of code reading, functional testing, and structural testing in three aspects of software testing: fault detection effectiveness, fault detection cost, and classes of faults detected. Thirty two professional programmers and 42 advanced students applied the three techniques to four unit-sized programs in a fractional experimental design. The major results of this study are the following: (1) With the professional programmers, code reading detected more software faults and had a higher detection rate than did functional or structural testing, while functional testing detected more faults than did structural testing, but functional and structural testing were not different in fault detection rate, (2) In one advanced student subject group, code reading and functional testing were not different in faults found, but were superior to structural testing, while in the other advanced student subject group there was no difference among the techniques. (3) With the advanced student subjects, the three techniques were not different in fault detection rate. (4) Number of faults observed, fault detection rate, and total effort in detection depended on the type of software tested. (5) Code reading detected more interface faults than did the other methods. (6) Functional testing detected nor control than did the other methods. (7) When asked to estimate the percentage of faults detected, code readers gave the most accurate estimates while functional testers gave the least accurate estimates. Appendix B includes the source code for the word. GRA

N86-19021# Stanford Univ., Calif. Information Systems Lab.
AN EFFICIENT, RLS (RECURSIVE-LEAST-SQUARES) DATA-DRIVEN ECHO CANCELLER FOR FAST INITIALIZATION OF FULL-DUPLEX DATA TRANSMISSION
J. M. Cioffi and T. Kailath Jun. 1985 6 p
(Contract F49620-79-C-0058)
(AD-A160177; AFOSR-85-0762TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

Computationally efficient Recursive-Least-Squares (RLS) procedures are presented specifically for the adaptive adjustment of the Data-Driven Echo Cancellers (DDECs) that are used in voiceband full-duplex data transmission. The methods are shown to yield very short learning times for the DDEC while they also simultaneously reduce computational requirements to below those required for other least-square procedures, such as those recently proposed by Salz (1983). The new methods can be used with any training sequence over any number of iterations, unlike any of the previous fast-converging methods. The methods are based upon the Fast Transversal Filter (FTF) RLS adaptive filtering algorithms that were independently introduced by the authors of this paper; however, several special features of the DDEC are introduced and exploited to further reduce computation to the levels that would be required for slower-converging stochastic-gradient solutions. Several trade-offs between computation, memory,

learning-time and performance are also illuminated for the new initialization. Author (GRA)

N86-19022*# Maryland Univ., College Park. Dept. of Computer Science.
QUANTITATIVE EVALUATION OF SOFTWARE METHODOLOGY
V. R. Basili Jul. 1985 22 p
(Grant NsG-5123; Contract F49620-80-C-0001)
(NASA-CR-176522; NAS 1.26:176522; AD-A160202; CS-TR-1519; AFOSR-85-0803TR) Avail: NTIS HC A02/MF A01 CSCL 09B

This paper presented a paradigm for evaluating software development methods and tools. The basic idea is to generate a set of goals which are defined into quantifiable questions which specify metrics to be collected on the software development and maintenance process and product. These metrics can be used to characterize, evaluate, predict and motivate. They can be used in an active as well as passive way by learning from analyzing the data and improving the methods and tools based upon what is learned from that analysis. Several examples were given representing each of the different approaches to evaluation. Author (GRA)

N86-19023# Michigan Univ., Ann Arbor. Supercomputer Algorithm Research Lab.
CONFLICT SENSITIVITY OF ALGORITHMS. PART 1: A CRAY X-MP STUDY Interim Report
D. A. Calahan 15 Mar. 1985 27 p
(Grant AF-AFOSR-0096-84)
(AD-A160206; SARL-7-Pt-1; AFOSR-85-0764TR-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

The delay of algorithm execution due to memory conflicts in a 16-processor CRAY X-MP extension is considered. The association between memory access delays of reads and writes, and delays in the resultant algorithm execution is studied by defining an incremental algorithm delay sensitivity and relating it to simulated large-delay and random variations. It is shown that, by division algorithms with zero incremental sensitivity, library software highly resistant to large delays may be achieved in a multiprocessor X-MP. Author (GRA)

N86-19024# Yale Univ., New Haven, Conn. Dept. of Computer Science.
FOUNDATIONS OF KNOWLEDGE FOR DISTRIBUTED SYSTEMS
M. J. Fisher and N. Immerman Sep. 1985 10 p
(Contract N00014-82-K-0154; Grant NSF DCR-84-05478)
(AD-A160233; TR-426) Avail: NTIS HC A02/MF A01 CSCL 09/2

Halpern and Moses present an interesting discussion of knowledge and common knowledge and common knowledge for distributed systems. They argue that while common knowledge is desirable, it is unattainable in certain settings. They suggest a hierarchy of weakened versions of common knowledge and discuss when these can be achieved. One difficulty with the Halpern and Moses paper is that it is informal and the concepts dealt with are not rigourous defined. Given one interpretation, their theorems are true as claimed, but given another, the opposite occurs, as we show with appropriate counterexamples. Thus, their theorems are not wrong in spirit, but the concepts are subtle and the terms must be more carefully defined. This paper gives quite general and precise definitions of distributed protocol, knowledge and common knowledge. It also provides precise settings and rigorous proofs for many of the results in Halpern's and noses' paper. This paper proposes some alternate definitions in which the same results become false. The authors desire to develop a way to design clear distributed algorithms and write clear proofs about them. GRA

N86-19025# Maryland Univ., College Park. Dept. of Computer Science.
PARALLEL MATRIX COMPUTATIONS Interim Report, Apr. 1984 - Apr. 1985
G. W. Stewart and D. P. OLeary Apr. 1985 14 p
(Grant AF-AFOSR-0078-82)
(AD-A160240; AFOSR-85-0820TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This project concerns the design and analysis of algorithms to be run in a processor-rich environment. It focuses primarily on algorithms that require no global control and that can be run on systems with only local connections among processors. The properties of these algorithms both theoretically and experimentally are investigated. The experimental work is done on the ZMOB, a working parallel computer operated by the Laboratory for Parallel Computation of the Computer Science Department at the University of Maryland. The emphasis is on two areas: (1) Dense problems from numerical linear algebra; and (2) The iterative and direct solution of sparse linear systems. GRA

N86-19026# Naval Postgraduate School, Monterey, Calif.
A PERFORMANCE MEASUREMENT METHODOLOGY FOR SOFTWARE MULTIPLE-BACKEND DATABASE SYSTEMS Report, for Feb. 1983 - Feb. 1985
J. R. Vincent Jun. 1985 142 p
(AD-A160284) Avail: NTIS HC A07/MF A01 CSCL 09/2

Software multiple-backend database systems provide high-performance, cost-effective database management support for systems with very large and growing databases. One backend computer, called the backend controller (or, briefly, controller), controls transaction processing of the remaining backend computers, i.e., backends, and interfaces with the host computers. These systems are designed to provide performance-gain and capacity-growth potential by increasing the number of backends connected to their controllers. This thesis develops a comprehensive methodology for the performance evaluation of multiple-backend database systems. It also applies this methodology to develop a test-database set and test-transaction mix for the evaluation of the multi-backend database system, MBDS. Author (GRA)

N86-19027# Softech, Inc., Waltham, Mass.
Ada (TRADE NAME) PORTABILITY GUIDELINES Final Report
F. Pappas Mar. 1985 74 p
(Contract F33600-84-D-0280)
(AD-A160390; Rept-3285-2-208/1; ESD-TR-85-141) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report presents the results of a study in using Ada to write portable programs. These programs with little or no modification, can be used in different target environments than those for which they were originally written. Ordinarily, a different target environment means a different computer, although the difference may instead be in the target operating system or peripherals. Software portability is one of the main cost-saving benefits anticipates with the use of Ada. Support for portability was a major goal in the design of the Ada language. However, portability does not come automatically with the use of Ada; programs written without specific attention to portability will not in general be portable. This report presents guidelines to be followed in order to produce code that is portable. A major goal in undertaking this study was support for development of a highly-portable Ada implementation of the JINTACCS Automated Message Preparation System (JAMPS). However, the guidelines are equally applicable to any program requiring portability. The guidelines are designed to permit an office conducting an acquisition to supply them to contractors as direction or guidance. They may also be useful in evaluating the portability of an existing implementation. GRA

N86-19028# University of Southern California, Marina del Rey. Information Sciences Inst.
CONTROLLING PRODUCTION FIRING: THE FCL LANGUAGE
L. Friedman Sep. 1985 18 p
(Contract MDA903-81-C-0335)
(AD-A160423; ISI/RS-85-159) Avail: NTIS HC A02/MF A01 CSCL 09/2

While implementing a diagnostic expert system, FAITH, a new language, FCL (Faith Control Language), was developed for

controlling the firing of productions. FCL greatly simplifies the task of the user to direct this firing in a coherent and purposeful way without sacrificing some of the main advantages enjoyed by production systems. One of the interesting features of the language is the use of declarative forms to direct the firing of proper production sequences in a diagnostic expert system. Declarative forms which represent circuit diagrams and problem families control goal-directed processes like tracing through circuits and searching for symptoms to confirm or deny closely related problems. Because we have the FCL facility at our disposal, we have been able to incorporate a larger than usual number of diagnostic strategies in FAITH, with the assurance that they will be employed under the right circumstances. Author (GRA)

N86-19029# Ballistic Research Labs., Aberdeen Proving Ground, Md.
MAXIMUM BOUNDED ENTROPY: APPLICATION TO TOMOGRAPHIC RECONSTRUCTION Final Technical Report
B. R. Frieden and C. K. Zoltani Apr. 1985 36 p
(DA Proj. 1L1-61102-AH-43)
(AD-A160429; BRL-TR-2650) Avail: NTIS HC A03/MF A01 CSCL 14/5

We have investigated a new image restoring algorithm which utilizes maximum bounded entropy (MBE). It incorporates prior knowledge of both a lower and upper bound of the signal in the unknown object. Its outputs are maximum probable estimates of the object, under the following conditions: (1) the photons forming the image behave as classical particles; (2) the object is assumed to be biased toward a flat, gray scene in the absence of image data; (3) the object is modeled as consisting of high-gradient foreground details riding on top of a smoothly varying background that must be estimated in a separate step; and (4) the image noise is Poisson. The proposed MBE estimator algorithm maximizes the sum of entropies of occupied photon sites. The result is an estimate of the object that is restricted to values inside the prescribed bounds. The algorithm was applied to the reconstruction of rod cross sections from tomographic viewing. In such a problem, the object consists only of upper-and lower-bound values, We found that in the example only four projections were needed to provide a good reconstruction, and that 20 projections allowed the partial resolution of a single pixel-wide crack in one of the rods. GRA

N86-19030# Softech, Inc., Waltham, Mass.
GUIDELINES FOR A MINIMAL Ada RUNTIME ENVIRONMENT Final Report
V. Grover Jan. 1985 67 p
(Contract F33600-84-D-0280)
(AD-A160451; Rept-3285-2-208/5; ESD-TR-85-139) Avail: NTIS HC A04/MF A01 CSCL 09/2

The study is intended to define the characteristics of an Ada Runtime Environment that effectively supports the development of real-time applications. The study was undertaken with the specific objective of supporting the selection of a runtime environment for the JINTACCS Automated Message Preparation System (JAMPS) program, but provides results useful in any real-time system acquisition program. A major goal of the JAMPS Ada software acquisition is to develop highly portable and reusable implementation that can be used in many different military systems. This goal impacts the selection and use of the runtime environment, as dependence on particular features of the runtime environment (either for functionality or performance) limits portability to only those systems providing the same features. This results in the concept of a minimal set of runtime environment features necessary to support JAMPS. Implementing JAMPS with dependence only on these features will allow portability within the class of systems providing those features. This report identifies such a minimal set of environment features. GRA

N86-19031# Litton Mellonics Systems Development Div., Fort Benning, Ga.
AN ANALYTIC PROCESS MODEL FOR SYSTEMS DESIGN AND MEASUREMENT Final Report
R. F. Bloom, J. F. Oates, Jr., J. W. Hamilton, and W. A. Leaf Feb. 1985 209 p Prepared in cooperation with Dunlap and Associates, Inc., Darien, Conn.
(Contract MDA903-80-C-0345; DA Proj. 2Q2-63743-A-794)
(AD-A160472; ARI-RN-85-17) Avail: NTIS HC A10/MF A01 CSCL 05/8

The objective of this model development effort is to provide a uniform, thorough, adaptive and efficient procedure to help derive design specifications and effectiveness measures for any planned or existing human-machine system, especially a training system. This report describes results of the second year of work, in which the analytic process model was developed in greater detail, applied in a sample fashion to an existing system (the Bradley Infantry Fighting Vehicle Training System) and a newly planned system (the Army 9mm Handgun Training System, and placed onto an Apple II computer for demonstrating its potential for computer-aided applications. The sample applications and procedures are documented, and recommendations are made to complete development of the model, its application procedures, and the manner of its dissemination to Army users. Author (GRA)

N86-19032# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
ROUTINES
P. E. Agre May 1985 30 p
(Contracts N00014-77-C-0389; N00014-80-C-0505)
(AD-A160481; AI-M-828) Avail: NTIS HC A03/MF A01 CSCL 05/11

Regularities in the world give rise to regularities in the way in which we deal with the world. That is to say, we fall into routines. THe author has been studying the phenomena of routinization, the process by which institutionalized patterns of interaction with the world arise and evolve in everyday life. Underlying this evolution is a dialectical process of internalization: First you build a model of some previously unarticulated emergent aspect of an existing routine. Armed with an incrementally more global view of the interaction, you can often formulate an incrementally better informed plan of attack. A routine is not a plan in the sense of the classical planning literature, except in the theoretical limit of this process. The author is implementing this theory using running arguments, a technique for writing rule-based programs for intelligent agents. Because a running argument is compiled into TMS networks as it proceeds, incremental changes in the world require only incremental recomputation of the reasoning about what actions to take next. The system supports a style of programming, dialectical argumentation, that has many important properties that recommend it as a substrate for large AI systems. One of these might be called additivity: an agent can modify its reasoning in a class of situations by adducing arguments as to why its previous arguments were incorrect in those cases. GRA

N86-19033# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
FAST FOURIER TRANSFORM (FFT) SUBROUTINE FOR DETERMINING FREQUENCY RESPONSE DATA FOR DIGITAL SIMULATIONS
L. Beach Jan. 1985 25 p
(AD-A160546; AD-E950763; AMSMI/RG-85-15-TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A FFT (Fast Fourier Transform) computer subroutine using VAX-11 FORTRAN has been written to perform the FFT. The FFT algorithm used to write the FFT subroutine is an in-place, decimation in frequency, Radix-2 algorithm originally proposed by Gentlemen and Sande. The subroutine can be linked with a system simulation to provide the frequency spectrum impulse data as a part of the system simulation. The FFT subroutine is a very useful, fast computational algorithm which can be used with any digital system simulation when frequency spectrum processing is needed in the calculation of the system's frequency response. This report outlines the development and checkout of the FFT and computer subroutine. Author (GRA)

N86-19034# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
A SURVEY OF PUBLIC DOMAIN SOFTWARE FOR MICROCOMPUTERS Final Report
B. L. Harvey Aug. 1985 59 p
(AD-A160603; DTNSRDC/CMLD-85-12) Avail: NTIS HC A04/MF A01 CSCL 09/2

This document was written to help microcomputer users become aware of the types and the vast amount of public-domain software currently available. It does not include all the software available and inclusion is not meant to be a certification of merit. All software included in this document, however, has been tested by Users Services. Many useful microcomputer programs are available through the public domain. These programs are distributed to users free of charge. Some authors, however, do solicit donations for their programs. Many of the public-domain programs parallel or surpass commercially marketed software. It is sometimes difficult for the user to distinguish between a software package that will suit his or her needs or one that will never be used. This is true of both commercial products and public-domain products. The use of public-domain software can eliminate some of the expense of purchasing programs that may not be suitable for your needs. GRA

N86-19035# Royal Signals and Radar Establishment, Malvern (England).
A GARBAGE COLLECTOR FOR A LARGE DISTRIBUTED ADDRESS SPACE
S. R. Wiseman Jun. 1985 18 p
(AD-A160645; RSRE-85009; DRIC-BR-97054) Avail: NTIS HC A02/MF A01 CSCL 09/2

An on the fly garbage collector for a distributed block structured address space is described. The time taken to recover reasonable amounts of garbage is reduced by recursively structuring the distributed system. This makes is practical to consider a distributed computer system with a single address space. Author (GRA)

N86-19036# Delta Information Systems, Inc., Horsham, Pa.
SCAN LINE DIFFERENCE COMPRESSION ALGORITHM SIMULATION STUDY Final Report
Aug. 1985 89 p
(Contract DCA100-83-C-0047)
(AD-A160846; NCS-TIB-85-6) Avail: NTIS HC A05/MF A01 CSCL 09/2

The purpose of this task was to investigate the efficiency and potential operational effectiveness of the Scan Line Difference Compression (SDLC) algorithm presented in Appendix A of the report. Delta Information Systems (DIS) performed a software simulation study of the SLDC algorithm. The software was run using selected CCITT binary standard images as input, and the results were compared with those of the MODREAD II compression algorithm run with the same input data. The MODREAD II algorithm was chosen for the comparison because it is the most effect compression technique currently available. GRA

N86-19037# Delta Information Systems, Inc., Horsham, Pa.
SIMULATION AND EVALUATION OF THE AT AND T PROPOSED PATTERN RECOGNITION ALGORITHM FOR GROUP 4 FACSIMILE Final Report
D. Bodson 11 Jun. 1985 76 p
(Contract DCA100-83-C-0047)
(AD-A160864; NCS-TIB-85-4) Avail: NTIS HC A05/MF A01 CSCL 17/2

CCITT is actively working toward the standardization of Group 4 facsimile. One of the key elements of this CCITT recommendation shall be the compression algorithm for encoding the transmitted facsimile signal. A preliminary standard for this coding technique has been established consisting of and extension of the Group 3 Modified READ Code (MRC). Several investigators have studied a class of more advanced compression techniques which recognize recurring patterns (such as textual characters) and transmit a short ASCII-like code to represent such a symbol. The compression for this type of coding algorithm exceeds that for the basic Group 4 algorithm by a significant degree. Since these compression techniques normally require an error free environment, which is available in Group 4 Facsimile, AT&T has submitted a specific proposal (Appendix B) to the CCITT for the design of such a pattern recognition coding technique. The purpose of this effort was to simulate and evaluate the AT&T proposal. GRA

N86-19038# Hanford Engineering Development Lab., Richland, Wash.
NCSMEMO, AN IBM PC PROGRAM USING dBASE 3 TO CROSS-REFERENCE LETTERS
D. L. Klave and C. A. Rogers Aug. 1985 41 p
(Contract DE-AC06-76FF-02170)
(DE85-018210; HEDL-7557) Avail: NTIS HC A03/MF A01

NCSMEMO is a database management system consisting of six command files written in Ashton-Tate's dBASE 3 programming language. NCSMEMO provides a method of cross-referencing Nuclear Criticality Safety Memoranda to facilitate locating information based on keywords and provides an abstract of each memo. The primary benefit of NCSMEMO is its ability to quickly search through abstracts of over 470 memos and locate those which apply to specific keywords. NCSMEMO is menu driven for ease of use. DOE

N86-19039# Oak Ridge National Lab., Tenn.
AUTOMATING SENSITIVITY ANALYSIS OF COMPUTER MODELS USING COMPUTER CALCULUS
E. M. Oblow and F. G. Pin 1985 17 p refs Presented at the 7th Annual DOE LLWMP Participants Information Meeting, Las Vegas, Nev., 10 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018095; CONF-8509121-6) Avail: NTIS HC A02/MF A01

An automated procedure for performing sensitivity analyses has been developed. The procedure uses a new FORTRAN compiler with computer calculus capabilities to generate the derivatives needed to set up sensitivity equations. The new compiler is called GRESS - Gradient Enhanced Software System. Application of the automated procedure with direct and adjoint sensitivity theory for the analysis of non-linear, iterative systems of equations is discussed. Calculational efficiency consideration and techniques for adjoint sensitivity analysis are emphasized. The new approach is found to preserve the traditional advantages of adjoint theory while removing the tedious human effort previously needed to apply this theoretical methodology. Conclusions are drawn about the applicability of the automated procedure in numerical analysis and large-scale modelling sensitivity studies. DOE

N86-19040# Los Alamos National Lab., N. Mex.
DEBUGGING IN A PARALLEL ENVIRONMENT
H. J. Wasserman and J. H. Griffin 1985 8 p refs Presented at the IEEE Conference on Software Maintenance, Washington, D.C., 11 Nov. 1985
(Contract W-7405-eng-36)
(DE85-010775; LA-UR-85-1142; CONF-851141-1) Avail: NTIS HC A02/MF A01

This paper describes the preliminary results of a project investigating approaches to dynamic debugging in parallel processing systems. Debugging programs in a multiprocessing environment is particularly difficult because of potential errors in synchronization of tasks, data dependencies, sharing of data among tasks, and irreproducibility of specific machine instruction sequences from one job to the next. The basic methodology involved in predicate-based debuggers is given as well as other desirable features of dynamic parallel debugging. DOE

N86-19041# Argonne National Lab., Ill.
FACTORS AFFECTING MANUFACTURING COSTS OF COMPLEX SYSTEMS, AND THE ROLE OF NEW TECHNOLOGIES IN REDUCING THESE COSTS
J. R. Gabriel Apr. 1985 14 p
(Contract W-31-109-eng-38)
(DE85-018557; ANL/MCS-TM-52) Avail: NTIS HC A02/MF A01

A mathematical measure of complexity is defined for a

manufactured object. It is shown that although a nuclear power station and a medium-sized computer are about equally complex, one costs 10,000 times more than the other. This report considers some especially troublesome problems in the nuclear industry that might account for part of this difference. Ways are suggested to use new technologies, particularly automated reasoning tools, to solve such problems. DOE

N86-19042# Argonne National Lab., Ill.
ANL USER'S GUIDE TO ACCESSING THE ENERGY RESEARCH CRAY X-MP COMPUTER
P. J. Bertoncini, M. A. Gallo, and A. R. Hinds Aug. 1985 59 p
(Contract W-31-109-eng-38)
(DE85-018558; ANL/TM-430) Avail: NTIS HC A04/MF A01

The ANL User's Guide to Accessing the Energy Research Cray X-MP Computer is for ANL researchers who have authorization to use the Energy Research Cray X-MP computer at the National Magnetic Fusion Energy Computer Center (NMFECC) at Lawrence Livermore National Laboratory. It primarily addresses the alternatives presently available at Argonne for accessing the Energy Research Cray X-MP computer at NMFECC and indicates any corresponding prerequisites. The Guide complements and draws information from documents distributed by NMFECC, especially EZACCESS (October 24, 1984) and National Magnetic Fusion Energy Computer Center Summaries of Utility Routines Available on the CRAY Computers (MFECC-020006). The Computing Services Document Distribution Counter does not stock these NMFECC documents because NMFECC policy is to change these online documents so frequently that printed copies quickly become obsolete. DOE

N86-19043# Illinois Univ., Urbana. Dept. of Computer Science.
FRED: A PROGRAM DEVELOPMENT TOOL
J. Shilling Sep. 1985 22 p
(Contract DE-AC02-76ER-02383)
(DE86-000857; UIUCDCS-R-85-1224; UILU-ENG-85-1736; COO-2383-0111) Avail: NTIS HC A02/MF A01

The structured, screen-based editor FRED is introduced. FRED provides incremental parsing and semantic analysis. The parsing is based on an LL(1) top-down algorithm which has been modified to provide follow-the-cursor parsing and soft templates. The languages accepted by the editor are LL(1) languages with the addition of the Unknown and preferred production non-terminal classes. The semantic analysis is based on the incremental update of attribute grammar equations. We briefly describe the interface between FRED and an automated reference librarian system that is under development. DOE

N86-19044# Oak Ridge National Lab., Tenn.
NEW METHOD FOR ESTIMATING ISOTOPIC RATIOS FROM PULSE-COUNTING MASS SPECTROMETRIC DATA
C. K. Bayne and D. H. Smith 1985 17 p Presented at the American Statistical Association for Joint Statistical Meetings, Las Vegas, Nev., 5 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-000095; CONF-8508115-5) Avail: NTIS HC A02

An alternative method is proposed for improving isotopic ratio estimates. This method mathematically models pulse-count data and uses iterative reweighted Poisson regression to estimate model parameters to calculate the isotopic ratios. This computer-oriented approach provides theoretically better methods than conventional techniques to establish error limits and to identify outliers. DOE

N86-19045# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AN INTRODUCTION TO THE APPLICATION OF COMPUTER AIDED DESIGN (CAD) TO THE PREDESIGN OF AIRCRAFT AND THE DESIGN OF AIRCRAFT STRUCTURES AT THE AEROSPACE SECTION [EEN INTRODUKTIE TOT DE TOEPASSING VAN CAD IN HET VOORONTWERPEN VAN VLIEGTUIGEN EN HET ONTWERPEN VAN VLIEGTUIGKONSTRUKTIES AAN DE AFDELING DER LUCHTVAART- EN RUIMTEVAARTTECHNIEK]
C. Bil and A. Rothwell Mar. 1984 31 p refs In DUTCH
(VTH-M-512) Avail: NTIS HC A03/MF A01

Equipment and software of a CAD plant are described and research in aircraft and aircraft structures design is surveyed. Possibilities to integrate an aircraft design and analysis system, the graphical design system MEDUSA, and GIFTS, a program generating calculation models from drawings of existing structures, are outlined. The aim is to create a pilot design system comparable with industrial CAD activities in the preconceptual phase. Author (ESA)

N86-19046# National Bureau of Standards, Gaithersburg, Md. Center for Building Technology.
USER'S MANUAL FOR DIVISION 746'S IMAGE PROCESSING SYSTEM
D. P. Bentz, J. W. Martin, M. E. McKnight, E. J. Embree, and M. E. Batts Jul. 1985 33 p Prepared in cooperation with Paratech, Washington, D.C.
(PB85-242394; NBSIR-85/3207) Avail: NTIS HC A03/MF A01 CSCL 09B

An image analysis system has been developed which allows the user to evaluate images in either an interactive or a batch mode. The manual provides instructions for assessing the imaging system (hardware and software) and describes the structure and function of each of the available commands. The imaging software is for an 80826 based minicomputer operating under a multi-user operating system with five imaging boards. The interactive run time environment is menu driven. To execute the imaging system in batch format, commands of a specific structure are placed into a datafile from which they are subsequently read and executed one at a time. Author (GRA)

N86-18865# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Hauptabt. Angewandte Datentechnik.
TWO GENERATIONS OF MICROCOMPUTER-BASED PROGRAM UNITS FOR SOUNDING ROCKET ATTITUDE CONTROL SYSTEMS
J. How *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 339-343 (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

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Includes computer networks.

N86-19047# National Aerospace Lab., Tokyo (Japan).
CONCEPTUAL DESIGN OF A DATA BASE FOR NUMERICAL SIMULATOR
Takayuki Aki 1985 23 p refs In JAPANESE; ENGLISH summary
(NAL-TR-869; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Construction of a numerical simulator is one of the recent significant projects at the National Aerospace Laboratory of Japan. The numerical simulator is a large computer system which is composed of a supercomputer, large capacity files, and other device control systems including TSS terminals. One of the most important features of the numerical simulator is its ability to control a data base. This data base contains a large amount of wind tunnel data, results of numerical simulations, geometric information from test models, and so on. The design procedure for such a large and complicated data base is displayed. From this display, the total information about the data base for the numerical simulator can be clarified. Author

N86-19048# Georgia Inst. of Tech., Atlanta.
MICROPROCESSOR LOCAL COMPUTER NETWORK EVALUATION Final Report, 1 Jan. 1983 - 29 Jun. 1984
P. H. Enslow, Jr., J. L. Hamond, and J. H. Schlag 15 Apr. 1985 66 p
(Contract DAAK70-79-D-0087; DA Proj. SX7-62725-DY-10)
(AD-A159914; AIRMICS-ISEC-ASBG-84-2) Avail: NTIS

HC A04/MF A01 CSCL 09/2

This report describes a project that uses a microprocessor local computer network (MLCN) to emulate local area networks which use random access protocols. Specifically, the project is concerned with verifying the ability of the MLCN to emulate local networks which use CSMA/CD (carrier sense multiple access with collision detection). Author (GRA)

N86-19049# Michigan Univ., Ann Arbor. Supercomputer Algorithm Research Lab.

MEMORY CONFLICT SIMULATION OF A MANY-PROCESSOR CRAY ARCHITECTURE. PART 1: A CRAY X-MP STUDY Interim Report

D. A. Calahan and K. B. Ellitoo, III 1 Mar. 1985 50 p

(Grant AF-AFOSR-0096-84)

(AD-A160205; SARL-6-Pt-1; AFOSR-85-0765TR-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

The performance of three FORTRAN kernels and two assembly kernels (including two linear algebra kernels) is simulated for a CRAY X-MP multiprocessor architecture of up to 16 processors and 256 memory banks. The effects of variations on the X-MP-2 memory conflict resolution protocol, including X-MP-4 protocol, are studied. Author (GRA)

N86-19050# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, Va.

THE HEWLETT-PACKARD HP-41CV HAND-HELD COMPUTER AS A MEDIUM FOR TEACHING MATHEMATICS TO FIRE CONTROL SYSTEMS REPAIRERS Final Report, Jan. - Jun. 1984

J. A. Boldovici and T. D. Scott Oct. 1984 71 p

(AD-A160440; ARI-RR-1408) Avail: NTIS HC A04/MF A01 CSCL 09/2

A comparison was conducted between the performance of two groups of 30 fire control systems repairers after completing the mathematics part of the 45G10 course. The evaluation was designed by one of the cooperating military agencies, and the authors analyzed the resulting data. One group of repair personnel used the Hewlett-Packard HP-41CV hand-held computer in training. The other group recieved conventional training, without computers. The difference between the two groups' performance on an end-of-training mastery test was not statistically significant. Flaws in the evaluation design prevented determining whether the findings of no difference between the groups' performance was due to the kinds of training (computer and conventional) or to: (1) Differences between entry-level mastery of course material by the two groups. (2) Different amounts of training by the two groups. (3) An end-of-course test which was not difficult to reveal proficiency differences between the two groups. Several recommendations were made for designing and conducting future evaluations. The main recommendations were that: (1) Test scores for untrained persons be obtained, against which the scores of trained people can be compared. (2)Records be kept of the amounts of practice by each member of the compared groups. (3) End-of-course tests be difficult enough to reveal differences between good and mediocre performances. An experimental design was presented for future use which uses a no-training control-group, separates the effects of amount and kind of training, and is likely to detect proficiency differences. GRA

N86-19051# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.

ACCESS TO INTER-ORGANIZATION COMPUTER NETWORKS Ph.D. Thesis

D. L. Estrin Aug. 1985 263 p

(Contract N00014-83-K-0125)

(AD-A160855; MIT/LCS/TR-345) Avail: NTIS HC A12/MF A01 CSCL 05/1

Much has been written about the automation of factory and office functions. An important aspect of this automation is the ability to communicate and share resources among different physical machines, different administrative and production functions, and different geographic sites. When two or more distinct organizations interconnect their internal computer networks they form an Inter-Organizational Network (ION). IONs support the exchange of computer aided design/computed aided manufacturing data between manufacturers and subcontractors, software distribution from vendors to users, customer input to suppliers' order-entry systems, and the shared use of expensive computational resources by research laboratories, as examples. This thesis analyzes the organization implications of using computer networks for inter-organization communication, and the technical implications of interconnecting networks across organization boundaries. This thesis demonstrates the value of the bimodal approach to system design and analysis in which the author asks both how industry and organization contexts shape a new technology, as well as how a new technology affects the organization and industry contexts in which it is applied. GRA

N86-19052# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

THE DESIGN AND IMPLEMENTATION OF AN OPERATING SYSTEM FOR THE IBM PERSONAL COMPUTER M.S. Thesis

A. J. Deese, Jr. Dec. 1984 62 p

(AD-A160875; AFIT/CI/NR-85-145T) Avail: NTIS HC A04/MF A01 CSCL 09/2

This thesis documents the design and implementation of an operating system, designated PCOS, developed in order to provide a pedagogical aid which could be used to provide students with a better understanding of operating system principles. PCOS (Personal Computer Operating System) is intended to be a simple yet functional operating system which students can analyze, modify, and extend. PCOS was designed and implemented on an IBM Personal Computer. However, the strategy used to structure PCOS along with the algorithms used to implement PCOS are applicable to most contemporary computer systems. This thesis presents the requirements and design criteria which were used to guide the design of PCOS. The decisions made during the design of PCOS are discussed. The algorithms and data structures used to implement PCOS are discussed. Further development of PCOS is also discussed. Author (GRA)

N86-19053# Sandia National Labs., Albuquerque, N. Mex.

CONVERSION OF AN IC DESIGN CAPABILITY FROM A MAINFRAME TO A WORKSTATION ENVIRONMENT

D. W. Palmer and J. A. Wisniewski 1985 16 p Presented at the International Conference on Computer Workstations, San Jose, Calif., 11 Nov. 1985

(Contract DE-AC04-76DP-00789)

(DE85-015488; SAND-85-1611C; CONF-851163-1) Avail: NTIS HC A02/MF A01

Over the last eighteen months, Sandia National Laboratories has converted its IC design facility from a mainframe to a workstation environment. Although advertised as turn-key systems, it was found that augmentation of vendor software with in-house developed software much enhanced Sandia specific integrated circuit design capabilities. The advantages of the workstation approach for sophisticated CAD tool users are discussed. The complete hardware, software and networking environment and its capacity and capability are discussed. DOE

N86-19054# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

DESCRIPTION OF THE LOW SPEED WIND TUNNEL LABORATORY COMPUTER [BESCHRIJVING VAN DE LABORATORIUM-COMPUTER VAN DE LAGE SNELHEIDS WINDTUNNEL]

F. L. M. Kok Sep. 1983 14 p In DUTCH

(VTH-M-489) Avail: NTIS HC A02/MF A01

Ends for which an HP1000 computer in routine wind tunnel work is used, and expected developments are outlined. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-19055 Oregon State Univ., Corvallis.
DISTRIBUTED ARCHITECTURE AND FAST PARALLEL ALGORITHMS IN REAL-TIME ROBOT CONTROL Ph.D. Thesis
Eli Eliyahu Binder 1985 224 p
Avail: Univ. Microfilms Order No. DA8518586

Control algorithms for accurate and fast moving robots require the use of the complete dynamic model of the robot. The complete dynamic model takes into account the nonlinearity and coupling terms of the whole structure. The time of computing the dynamic equations determines whether they are usable in practical applications. Reducing the computation time can be achieved by simplifying the dynamic model, simplifying the calculations, and improving the computer's computation speed. The proposed solution is a distributed computer architecture, and new fast parallel algorithms which allow efficient utilization of the computers. This architecture has several advantages: modularity, reliability, spatial distribution, and speed. Because of the serial nature of the dynamic calculations, it is difficult to achieve efficient utilizations of the multiple computers. With the new algorithms, motion, and force values, which must be passed between the computers, are replaced by predicted values. The predicted information is acquired from values calculated in previous sample intervals. This allows efficient use of the computers and increases the computation speed of the control algorithms. Dissert. Abstr.

N86-19056# Naval Research Lab., Washington, D. C.
AUTOMATIC PROCESSING OF NAVY MESSAGE NARRATIVE Interim Report
E. Marsh, J. Froscher, R. Grishman, H. Hamburger, and J. Bachenko 21 Aug. 1985 23 p
(F21-241)
(AD-A159670; NRL-8893) Avail: NTIS HC A02/MF A01 CSCL 09/4

An experimental system that employs techniques of computational linguistics and artificial intelligence to extract information from Navy messages is described. The long-term goal of this work is to develop capabilities that will enable systems to handle a broad spectrum of messages, from highly formatted messages with little English description to messages consisting entirely of English narrative. In this report, an experimental system that takes the first step towards automated understanding of Navy messages is constructed and implemented. The system extracts informational content from reports about shipboard equipment failure and uses the content to assign a distribution list to each message and to generate a summary of the equipment failure. The system can be extended to other Navy message types and used for other military applications. This approach, called information formatting, uses an explicit grammar of English and a classification of the semantic relationships within the domain to derive a tabular representation of the information in a message narrative. Prototype knowledge bases for distribution and summarization are implemented in OPS5 and use the information format to automatically construct a distribution list and summary. A comparison of computer-generated summaries with those obtained manually show good agreement, indicating that it is possible to automatically process message narrative and generate appropriate, and ultimately useful, summaries. GRA

N86-19057# Pattern Analysis and Recognition Corp., McLean, Va.
COMBINING DECISION ANALYSIS AND ARTIFICIAL INTELLIGENCE TECHNIQUES. AN INTELLIGENT AID FOR ESTIMATING ENEMY COURSES OF ACTION Final Report, Jan. 1984 - Mar. 1985
P. E. Lehner, J. R. McIntyre, L. Adelman, K. Gates, and P. Luster Aug. 1985 60 p
(Contract MDA903-83-C-0311; DA Proj. 2Q1-62717-A-790)
(AD-A159846; ARI-RN-85-87) Avail: NTIS HC A04/MF A01 CSCL 15/7

AI/ENCOA is a prototype decision aid designed to assist Army tactical intelligence analysts in evaluating alternative Enemy Courses of Action. AI/ENCOA combines the use of additive Multi-attribute Utility (MAU) models for course of action evaluation with rule-based procedures for assigning parameter values (scores and weights) to the MAU model. AI/ENCOA is composed of two parts: a generic software package that implements a combined AI/MAU architecture, and two COA rule bases for evaluating different types of possible enemy COAs. The present final report summarizes the technical progress made in developing AI/ENCOA. GRA

N86-19058# Systems Control Technology, Inc., Palo Alto, Calif.
ADAPTIVE DECENTRALIZED CONTROL Final Report, Jun. 1981 - Jul. 1984
B. Friedlander Apr. 1985 126 p
(Contract F49620-81-C-0051)
(AD-A160187; SCT-5400-03; AFOSR-85-0791TR) Avail: NTIS HC A07/MF A01 CSCL 12/1

This Final Report summarizes the results of a research effort directed towards the development of adaptive decentralized control systems. The adaptive controller in such a system must operate in the presence of unmodeled dynamics. An input-output approach was developed for analyzing the global stability and robustness properties of adaptive controllers under such circumstances. Conditions for guaranteeing global stabiltiy of the error system associated with the adaptive controller, and ensuring boundedness of the adaptive gains, were derived. GRA

N86-19059# California Univ., Irvine. Dept. of Information and Computer Science.
METHODS OF CONCEPTUAL CLUSTERING AND THEIR RELATION TO NUMERICAL TAXONOMY Interim Report, Jan. - Jun. 1985
D. Fisher and P. Langley 22 Jul. 1985 39 p
(Contract N00014-84-K-0345)
(AD-A160221; UCI-ICS-85-26; UCI-ICS-TR-3) Avail: NTIS HC A03/MF A01 CSCL 12/1

Artificial Intelligence (AI) methods for machine learning can be viewed as forms of exploratory data analysis, even though they differ markedly from the statistical methods generally connoted by the term. The distinction between methods of machine learning and statistical data analysis is primarily due to differences in the way techniques of each type represent data and structure within data. That is, methods of machine learning are strongly biased toward (symbolic as opposed to numeric) data representations. We explore this difference within a limited context, devoting the bulk of our paper to the explication of conceptual clustering, and extension to the statistically based methods of numerical taxonomy. In conceptual clustering the formation of object clusters is dependent on the quality of higher-level characterizations, termed concepts, of the clusters. The form of concepts used by existing conceptual clustering systems (sets of necessary and sufficient conditions) is described in some detail. This is followed by descriptions of several conceptual clustering techniques, along with sample output. We conclude with a discussion of how alternative concept representations might enhance the effectiveness of future conceptual clustering systems. GRA

N86-19060# Denver Research Inst., Colo. Social Systems Research and Evaluation Div.
ARTIFICIAL INTELLIGENCE IN MAINTENANCE: SYNTHESIS OF TECHNICAL ISSUES Interim Report, Jan. 1984 - Jan. 1985
J. J. Richardson, R. A. Keller, R. A. Maxion, P. G. Polson, and K. A. DeJong Oct. 1985 85 p
(Contract F33615-82-C-0013)
(AD-A160863; AFHRL-TR-85-7) Avail: NTIS HC A05/MF A01 CSCL 05/1

The principal subdisciplines of AI (e.g., expert systems, problem solving, planning, and natural language understanding) are

presented as well as the larger systems engineering issues. In a chapter devoted to automated systems for managing hardware failures, the components of the failure cycle (detection, diagnosis, and repair) are described in tandem with machine approaches and applicable AI methodology. In this report, effective improvement in military maintenance is viewed to be dependent not only on automated systems but also on the development of human resources and the organizational context of maintenance. Evidence and information are provided to support the recommendation that it is possible to build more effective and less costly automated diagnostic systems only if these systems exploit human problem-solving capabilities. Four hypothetical examples of advanced systems and a comparison of human vs. machine strengths and weaknesses as problem solvers are outlined. Five research and development recommendations for the use of AI in maintenance conclude that: (1) there is a good match between the need for improved maintenance and the emerging science of AI, (2) AI research should be guided by a policy of integrated diagnostics, (3) field evaluations of AI applications should focus on organizational impact as well as technical issues, (4) programs should be targeted at both fielded systems and systems under development, and (5) basic research should investigate cooperative human-machine device diagnosis problem solving and the coordination of the specification- and symptom-based approaches. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-19061 New South Wales Univ., Sydney (Australia). School of Electrical Engineering.
BOUNDS ON INTERACTION IN MULTIVARIABLE SYSTEMS AND A DESIGN METHOD FOR LOW INTERACTION Ph.D. Thesis Abstract Only
Matthew P. Ford Nov. 1984 3 p
Avail: Issuing Activity

Closed-loop time-domain interaction is a major concern in multivariable systems. Various methods exist for determining stability and designing the response of the diagonal outputs but little has been published about the determining factors of closed-loop interaction. A relationship between time domain and frequency domain interaction which takes into account output scaling and duration is defined. From his the desirable shape of frequency domain interaction is deduced. Two sets of theorems are then presented which relate open-loop plant properties to closed-loop frequency domain interaction. One set covers the Nyquist Array methods of design while the other covers the Characteristic Locus based methods. Author

N86-19062*# Hawaii Univ., Manoa. Dept. of Electrical Engineering.
A CASCADED CODING SCHEME FOR ERROR CONTROL
Lin Shu and Tadao Kasami (Osaka Univ., Japan) 10 Dec. 1985 58 p refs
(Grant NAG5-407)
(NASA-CR-176513; NAS 1.26:176513) Avail: NTIS
HC A04/MF A01 CSCL 12A

A cascade coding scheme for error control is investigated. The scheme employs a combination of hard and soft decisions in decoding. Error performance is analyzed. If the inner and outer codes are chosen properly, extremely high reliability can be attained even for a high channel bit-error-rate. Some example schemes are evaluated. They seem to be quite suitable for satellite down-link error control. Author

N86-19063*# Mississippi State Univ., State College.
TRANSFORMATION OF TWO AND THREE-DIMENSIONAL REGIONS BY ELLIPTIC SYSTEMS Semiannual Status Report, 15 May - 14 Nov. 1985
C. Wayne Mastin and Joe F. Thompson 14 Jan. 1986 16 p refs
(Grant NsG-1577)
(NASA-CR-176476; NAS 1.26:176476) Avail: NTIS
HC A02/MF A01 CSCL 12A

A natural grid is defined on any parameterized curve or surface by selecting an equi-spaced set of parameter values. Redistributing the grid points can be accomplished by defining a new parametrization. Reparameterization techniques are introduced and applied in the construction of computational grids. Author

N86-19064*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONVERGENCE TO STEADY STATE OF SOLUTIONS OF BURGERS' EQUATION Final Report
Gunilla Kreiss (Royal Inst. of Tech., Stockholm, Sweden) and Heinz-Otto Kreiss (California Inst. of Tech., Pasadena) Dec. 1985 31 p refs Submitted for publication
(Contracts NAS1-17070; N00014-83-K-0422; Grant NSF DMS-83-12264)
(NASA-CR-178017; ICASE-85-50; NAS 1.26:178017) Avail: NTIS
HC A03/MF A01 CSCL 12A

Consider the initial boundary value problem for Burgers' equation. It is shown that its solutions converge, in time, to a unique steady state. The speed of the convergence depends on the boundary conditions and can be exponentially slow. Methods to speed up the rate of convergence are also discussed. Author

N86-19065*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE NUMERICAL VISCOSITY OF ENTROPY STABLE SCHEMES FOR SYSTEMS OF CONSERVATION LAWS Final Report
Eitan Tadmor (Tel-Aviv Univ., Israel) Nov. 1985 31 p refs
(Contract NAS1-17070; Grants NSF DMS-85-03294; DAAG29-85-K-0190)
(NASA-CR-178021; ICASE-85-51; NAS 1.26:178021) Avail: NTIS
HC A03/MF A01 CSCL 12A

Discrete approximations to hyperbolic systems of conservation laws are studied. The amount of numerical viscosity present in such schemes, is quantified and related to their entropy stability by means of comparison. To this end, conservative schemes which are also entropy conservative are constructed. These entropy conservative schemes enjoy second-order accuracy; moreover, they admit a particular interpretation within the finite-element frameworks, and hence can be formulated on various mesh configurations. It is then shown that conservative schemes are entropy stable if and only if they contain more viscosity than the mentioned above entropy conservative ones. M.G.

N86-19066*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACCURACY OF SCHEMES FOR THE EULER EQUATIONS WITH NON-UNIFORM MESHES Final Report
E. Turkel, S. Yaniv (IAI, Israel), and U. Landau (IAI, Israel) Dec. 1985 22 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178038; ICASE-85-59; NAS 1.26:178038) Avail: NTIS
HC A03/MF A01 CSCL 12A

The effect of non-uniform grids on the solution of the Euler equations is analyzed. A Runge-Kutta type scheme based on a finite volume formulation is considered. It is shown that for arbitrary grids the scheme can be inconsistent even though it is second-order accurate for uniform grids. An improvement is suggested which leads to at least first-order accuracy for general grids. Test cases are presented in both two- and three-space dimensions. Applications to finite difference and implicit algorithms are also given. M.G.

N86-19067# Yale Univ. Observatory, New Haven, Conn. Dept. of Computer Science.
ON THE SOLUTION OF CIRCULANT LINEAR SYSTEMS
M. Chen Jul. 1985 24 p
(Contracts N00014-82-K-0814; DE-AC02-81ER10996)
(AD-A159841; YALEU/DCS/RR-401) Avail: NTIS

HC A02/MF A01 CSCL 12/1

The solution of linear systems having circulant coefficient matrices is considered in this paper. This kind of system occur in many applications: prediction, time series analysis, spline approximation, difference solution of partial differential equations, etc. The methods presented here are more efficient than the Toeplitz type methods and are based on the fast Fourier transform as well as the circulant factorization of the banded circulant matrices.

Author (GRA)

N86-19068# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.

A LOCAL REFINEMENT FINITE ELEMENT METHOD FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS Final Technical Report

J. E. Flaherty and P. K. Moore Aug. 1985 24 p Presented at the 2nd Army Conference, Applied Mathematics and Computing, Troy, N.Y., 22-25 May 1984

(AD-A159885; AD-E440300; ARLCB-TR-85028) Avail: NTIS

HC A02/MF A01 CSCL 12/1

We discuss an adaptive local refinement finite element method for solving initial-boundary value problems for vector systems of partial differential equations in one space dimension and time. The method uses piecewise bilinear rectangular space-time finite elements. For each time step, grids are automatically added to regions where the local discretization error is estimated as being larger than a prescribed tolerance. We discuss several aspects of our algorithm, including the tree structure that is used to represent the finite element solution and grids, an error estimation technique, and initial and boundary conditions at coarse-fine mesh interfaces. We also present computational results for a simple linear hyperbolic problem, a problem involving Burgers' equation, and a model combustion problem. GRA

N86-19069# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.

ON THE MAXIMUM-WEIGHT CLIQUE PROBLEM

E. Balas, V. Chvatal, and J. Nesetril Jun. 1985 30 p

(Contract N00014-82-K-0329; Grant NSF ECS-82-05425)

(AD-A159953; MSRR-518; WP-7-85-86) Avail: NTIS

HC A03/MF A01 CSCL 12/1

The authors introduce several new classes of graphs on which the maximum-weight clique problem is solvable in polynomial time. Their common feature, and the central idea of their algorithms, is that every clique of these graphs is contained in some member of a polynomial-sized collection of induced subgraphs that are complements of bipartite graphs. Their approach is quite general, and might conceivably yield many other classes of graphs along with corresponding polynomial time algorithms.

Author (GRA)

N86-19070# North Carolina Univ., Chapel Hill. Chapel Hill Center for Stochastic Processes.

POISSON-STABILITY AS A UNIFYING FACTOR FOR MAX-STABILITY AND SUM-STABILITY Technical Report, Sep. 1984 - Aug. 1985

L. de Haan and J. Pickands, III Jun. 1985 51 p

(Contract F49620-82-C-0009)

(AD-A160132; TR-101; AFOSR-85-0878TR) Avail: NTIS

HC A04/MF A01 CSCL 12/1

The theory of nonnormal sum-stable random variables, vectors and processes is, by now, well developed. An analogous theory is that of max-stability. We show that both theories are, in their entireties, consequences of the theory of stable Poisson point processes on multidimensional spaces. GRA

N86-19071# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

MOVING AVERAGE MODELS WITH BIVARIATE EXPONENTIAL AND GEOMETRIC DISTRIBUTIONS

N. A. Langberg and D. S. Stoffer Mar. 1985 25 p

(Contract F49620-85-C-0008; Grant AF-AFOSR-0113-84)

(AD-A160178; TR-85-07; AFOSR-85-0862TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

Two classes of finite and infinite moving average sequences of bivarite random vectors are considered. The first class has bivariate exponential marginals while the second class has bivariate geometric marginals. The theory of positive dependence is used to show that in various cases the two classes consist of associated random variables. Association is then applied to establish moment inequalities and to obtain approximations to some joint probabilities of the related bivariate point processes. GRA

N86-19072# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

AN EXTENSION OF SPITZER'S INTEGRAL REPRESENTATION THEOREM WITH AN APPLICATION

A. A. Alzaid, C. R. Rao, and D. N. Shanbhag Apr. 1985 13 p

(Contract F49620-85-C-0008)

(AD-A160184; TR-85-11; AFOSR-85-0856TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

Using a new approach, an extended version of Spitzer's integral representation for stationary measures of a discrete branching process is obtained. This result is used to provide a complete solution to a problem in damage models satisfying a generalized Rao-Rubin condition. Author (GRA)

N86-19073# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mathematical Sciences.

A TWO-DIMENSIONAL MESH MOVING TECHNIQUE FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS Interim Report

D. C. Arney and J. E. Flaherty Apr. 1985 52 p

(Contract DAAG29-82-K-0197; Grant AF-AFOSR-0192-80)

(AD-A160204; AFOSR-85-0826TR) Avail: NTIS

HC A04/MF A01 CSCL 12/1

This document discusses an adaptive mesh moving technique that can be used with a finite difference or finite element scheme to solve initial-boundary value problems for vector systems of partial differential equations in two space dimensions. The mesh moving technique is based on an algebraic node movement function determined from the geometry and propagations of regions having significant discretization error indicators. This procedure is designed to be flexible, so that it can be used with many existing finite difference and finite element methods. To test the mesh moving algorithm, it was implemented in a system code with and initial mesh generator and a MacCormack finite difference scheme on quadrilateral cells for hyperbolic vector systems of conservation laws. Results are presented for several computational examples. The moving mesh scheme reduces dispersive errors near shocks and wave fronts and thereby reduces the grid requirements necessary to compute accurate solutions while incereasing computational efficiency. Author (GRA)

N86-19074# Wisconsin Univ., Madison. Dept. of Computer Sciences.

NUMERICAL ANALYSIS Annual Report, 15 Jun. 1984 - 14 Jun. 1985

S. Parter 15 Jun. 1985 6 p

(Grant AF-AFOSR-0275-82)

(AD-A160207; AFOSR-85-0763TR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

A proposal emphasized research on iterative methods for the solution of discrete elliptic boundary-value problems. A topic of special interest is the study of multigrid iterative methods. Three reports were completed during this period: (1) on MGR (v) multigrid methods; (2) multigrid and MGR (v); methods for diffusion equations; and (3) a note on convergence of the multigrid V-cycle. Two have been accepted for publication, and one has just been submitted. GRA

N86-19075# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

AN APPLICATION OF THE PERRON-FROBENIUS THEOREM TO A DAMAGE MODEL PROBLEM

A. A. Alzaid, C. R. Rao, and D. N. Shanbhag Apr. 1985 14 p

(Contract F49620-85-C-0008)
(AD-A160208; TR-85-13; AFOSR-85-0858TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

Using the Perron-Frobenius theorem, it is established that if (X, Y) is a random vector of non-negative integer valued components such that Y < or = X almost surely and two modified Rao-Rubin conditions hold, then under some mild assumptions the distribution of (X,Y) is uniquely determined by the conditional distribution of Y given X. This result extends the recent unpublished work of Shanbhag and Taillie (1979) on damage models. GRA

N86-19076# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
LIMITING BEHAVIOR OF THE NORM OF PRODUCTS OF RANDOM MATRICES AND TWO PROBLEMS OF GEMAN-HWANG
Z. D. Bai and Y. Q. Yin Nov. 1984 25 p
(Contract F49620-85-C-0008)
(AD-A160209; TR-84-46; AFOSR-85-0817TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

In the theory of large random matrices, now to dominate the norm of a random matrix is a very important problem. This paper considers a different type of random matrices, namely -W to the k power, i.e., a power of a square random matrix with iid entries. The first result in this paper is the limit as n approaches infinity of the absolute value of (W/sq rt. n) to the k power is < or = (1+k)(sigma to the k power) where n is the size of W and here sigma-sq. is the variance of the entries of W. We assume only the existence of the 4-th moment of the entries of W. From this result it is easy to show that the spectral radius of W sq rt n is not greater then -sigma with probability 1. This result is known only for iid N(O,-sigma-sq) case. In proving the above result, a new kind of graphs has to be discussed carefully, and the truncation method used in Yin-Bai-Krishnaiah is also important here. GRA

N86-19077# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
STRUCTURAL PROPERTIES OF RANDOMIZED TIMES Interim Report
A. F. Karr and A. O. Pittenger Dec. 1984 37 p Prepared in cooperation with Maryland Univ. Baltimore
(Grant AF-AFOSR-0029-82)
(AD-A160214; TR-421; AFOSR-85-0814TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

Suppose a measure mu dominated a measure eta in the ordering induced by the excessive functions of a transient Markov process. Rost shows that eta can be represented as the distribution of the process stopped at a randomized optional time and started with initial distribution mu. This paper introduces the shift operator to the class of randomized optional times, inducing the class of randomized quasi-terminal times and that of randomized terminal times. It analyzes the algebraic properties of these classes and obtain some compactness results for the class of randomized quasi-terminal times. Some applications, including remplissage by hitting times are presented. Author (GRA)

N86-19078# Brown Univ., Providence, R. I. Div. of Engineering.
ON STRUCTURE DETERMINATION FOR POLYNOMIAL INPUT-OUTPUT DIFFERENTIAL SYSTEMS
A. E. Pearson 13 Mar. 1985 10 p
(Grant AF-AFOSR-0230-82)
(AD-A160225; AFOSR-85-0781TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The problem of structure determination for a deterministic class of polynomial input-output differential systems is formulated as a minimum norm-discrete time optimal control problem. The order of the differential equation and the degrees of the polynomials involving the input-output variables play the role of multiple discrete-times while the coefficient parameters play the role of a discrete control variable. The basis of the parameter identification techniques is Shinbrot's method of moment functionals using linear combinations of commensurable sinusoids as the modulating functions. Given the system input-output data on a finite time interval, the underlying computations involve calculating a finite set of Fourier series coefficients or moments formed from the data, which can be efficiently carried out via and FFT algorithm, followed by a sequence of singularity tests performed on a controllability type Gram determinant that arises for the formulation. GRA

N86-19079# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
NEW MEASURES OF DIVERSITY
M. Ahmad Jun. 1985 25 p
(Contract F49620-85-C-0008)
(AD-A160273; TR-85-23; AFOSR-85-0748TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The problem of measuring diversity within populations and dissimilarity or similarity between populations has been extensively treated in the literature. Diversity within populations and dissimilarity between populations have been measured and interpreted differently. The choice of a diversity measure essentially depends on the context of a problem, however any diversity measure satisfying certain basic conditions can be used for partioning the total variability into a number of additive components, each of which can be used to test a certain null hypothesis or estimate a component of the variability. Rao outlined a general procedure called Analysis of Diversity which is similar to the Analysis of Variance for quantitative data. In this direction Light and Margolin Anderson and Landis have studied the Gini-Simpson index of diversity while Nayak has extended their results for Quadratic Entropy introduced by Rao. This paper proposes three new measures of diversity and study related inference problems. GRA

N86-19080# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ROLE OF AUXILIARY VARIATE AND ADDITIONAL DATA IN DENSITY ESTIMATION
M. Ahmad and R. S. Singh May 1985 33 p
(Contract F49620-85-C-0008)
(AD-A160287; TR-85-21; AFOSR-85-0748TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

Some new estimators of a univariate probability density function f(y) of a random variable Y, based on a set of observations taken from a bivariate joint density beta(x,y) of Y and a suitably chosen concomitant variable X, have been investigated. Asymptotic unbiasedness, mean square consistency, asymptotic normality and rates of convergence have been established. A related problem of estimation of a conditional density has also been studied. GRA

N86-19081# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
HERMITIAN AND NONNEGATIVITY PRESERVING SUBSPACES
T. Mathew Jul. 1985 15 p
(Contract F49620-85-C-0008)
(AD-A160294; TR-85-25; AFOSR-85-0751TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The concepts of Hermitian preserving and nonnegativity preserving subspace of complex square matrices are introduced. Characterizations of such subspaces are obtained and applications are discussed. GRA

N86-19082# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
A NOTE ON ASYMPTOTIC JOINT DISTRIBUTION OF THE EIGENVALUES OF A NONCENTRAL MULTIVARIATE F MATRIX
Z. D. Bai Nov. 1984 17 p
(Contract F49620-85-C-0008)
(AD-A160422; TR-84-49; AFOSR-85-0813TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

In an article written by HSU, the proof of the basic Lemma 3 is based on Lemma 1 which is wrong. The aim of this document is to correct the proof of Lemma 3 and consequently to ensure the main theorem in Hsu's work. Author (GRA)

N86-19083# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
COMPUTATION OF SPHERICAL HARMONICS AND APPROXIMATION BY SPHERICAL HARMONIC EXPANSIONS
W. Freeden Feb. 1985 139 p
(Contract F19628-82-K-0017)
(AD-A160445; OSU/DGSS-362; AFGL-TR-85-0063; SR-7) Avail: NTIS HC A07/MF A01 CSCL 12/1

A technique is developed for generating spherical harmonics by exact computation (in integer mode) thereby circumventing any source of rounding errors. Essential results of the theory of spherical harmonics are recapitulated by intrinsic properties of the space of homogeneous harmonic polynomials. Exact computation of (maximal) linearly independent and orthonormal systems of spherical harmonics is explained using exclusively integer operations. The numerical efficiency is discussed. The development of exterior gravitational potential in a series of outer (spherical) harmonics is investigated. Some numerical examples are given for solving exterior Dirichlet's boundary-value problems by use of outer (spherical) harmonic expansions for not-necessarily spherical boundaries. GRA

N86-19084# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
LIMITING PROPERTIES OF LARGE SYSTEMS OF RANDOM LINEAR EQUATIONS Interim Report
Z. D. Bai Oct. 1985 22 p
(Contract F49620-85-C-0008)
(AD-A160593; TR-84-41; AFOSR-85-0859TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

S. Geman and Chi R. Hwang proposed a kind of algebraic systems of equations and proved the law of large numbers for its solution. In this paper, the conditions to ensure these results are significantly weakened for the law of large numbers. Also, the central limit theorem is shown. For both the law of large numbers and the limit theorem, the only needed assumption is that the random variables have finite second moment. Author (GRA)

N86-19085# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
COMPUTING VISIBLE-SURFACE REPRESENTATIONS
D. Terzopoulos Mar. 1985 64 p
(Contract N00014-75-C-0643)
(AD-A160602; AI-M-800) Avail: NTIS HC A04/MF A01 CSCL 12/1

The computational framework offered in this paper addresses, in a unified way, certain visual information processing tasks involved in the representation of visible surfaces. Particular emphasis is placed on utilizing highly parallel, cooperative processing to integrate surface shape information over multiple visual sources, to fuse it across a multiplicity of spatial resolutions, and to maintain the global consistency of the resulting distributed shape representations. The issues are first investigated in terms of a surface reconstruction model rooted in mathematical physics. This formal analysis is augmented by an empirical study of the resulting algorithms, which feature multiresolution iterative processing within hierarchical surface shape representations. The approach is guided by current knowledge of how humans perceive visible surfaces, while applications in machine vision provide a testbed for the algorithms. GRA

N86-19086# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE BAYESIAN APPROACH TO RECURSIVE STATE ESTIMATION: IMPLEMENTATION AND APPLICATION Ph.D. Thesis
S. C. Kramer 1985 130 p
(AD-A160838; AFIT/CI/NR-85-139D) Avail: NTIS HC A07/MF A01 CSCL 12/1

In Bayesian estimation, the objective is to calculate the complete density function for an unknown quantity conditioned on noisy observations of that quantity. This work considers recursive estimation of a nonlinear discrete-time system state using successive observations. The formal recursion for the density function is easily written, but generally there is no closed form solution. The numerical solution proposed here is obtained by modifying the recursion and using a simple piece-wise constant approximation to the density functions. The critical part of the algorithm then becomes a discrete linear convolution that can be realized using FFT's. GRA

N86-19087# Bettis Atomic Power Lab., West Mifflin, Pa.
VECTORIZATION OF DIFFUSION COMPUTATIONS IN THE PRESENCE OF PERIODIC BOUNDARY CONDITIONS
I. K. Abu-Shumays May 1985 23 p Presented at the Westinghouse Engineering Computer Applications Symposium, Monroeville, Pa., 7 Oct. 1985
(Contract DE-AC11-76PN-00014)
(DE85-017631; WAPD-T-2865; CONF-8510149-2) Avail: NTIS HC A02/MF A01

Solutions of very large three-dimensional elliptic diffusion problems are very expensive in terms of storage requirements and computational cost even on today's supercomputers. Effective utilization of translational or rotational periodic boundary conditions, when applicable, can substantially reduce cost. Implementation of periodic boundary conditions however is not straightforward and special care should be exercised to avoid loss of computational efficiency. Application of periodic boundary conditions perturbs the overall matrix structure of the underlying discretized diffusion equations and may adversely affect standard computational methods. For simplicity, this study is restricted to the solution of two-dimensional diffusion problems. The numerical solution methods considered are the point Chebyshev and line cyclic Chebyshev iterative methods. It is straightforward to implement periodic boundary conditions within the framework of the highly vectorizable point Chebyshev iterative method. This paper presents alternative approaches for implementing periodic boundary conditions within the framework of the line cyclic Chebyshev iteration method. In the process, the method of odd-even cyclic reduction as applied to vectorization of the solution of tridiagonal systems is generalized to apply to special sparse predominantly tridiagonal matrix equations. For two-dimensional problems, it is demonstrated numerically on a CYBER 205 for model situations that the resulting line cyclic Chebyshev iterative method is computationally superior to the highly vectorizable point Chebyshev iterative method. The superiority of the line cyclic Chebyshev method over the point Chebyshev method is expected to hold for more complex problems with general mesh triangulations. DOE

N86-19088# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
EFFECTIVE LAGRANGIAN FOR THE LINEAR SIGMA MODEL AT M/SUB SIGMA/ (YIELDS) INFINITY
L. H. Chan 1985 11 p
(Contract DE-AS05-77ER-05490)
(DE86-001328; DOE/ER-05490/67) Avail: NTIS HC A02/MF A01

A new functional integration method is developed for integrating out the heavy chiral scalar field in the linear sigma model to render a finite chiral invariant effective Lagrangian in the one-loop approximation after proper renormalization at m sub sigma (YIELDS) infinity. In addition to the minimal nonlinear sigma model term, the effective Lagrangian also contains a finite chiral invariant quantum correction term with four derivatives. DOE

N86-19089# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
A MARKOV CHAIN APPROACH TO PERIODIC QUEUES
Soeren Asmussen and Hermann Thorisson 1985 20 p refs
(CTH-Math-1985-10; ISSN-0347-2809) Avail: NTIS HC A02/MF A01

The GI/G/1 queues in an environment which is periodic are considered. The fact that results of limit theorems for periodic queues are extended to GI/G/1 queues in a periodic environment is reported and short proofs by advanced methods are given. The hypothesis that the arrival process in the GI/G/1 periodic queues is a Poisson arrival process, is used. The Harris ergodicity is fidelity

for GI/G/1 periodic queues. Numelin's results concerning Lindley processes on Markov chains are reinspected. Author (ESA)

N86-19090# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept of Mathematics.
VALUES IN THE INTERIOR OF THE L SUP 2 MINIMAL SOLUTIONS OF THE DELTA DELTA BAR EQUATION IN THE UNIT BALL OF C SUP n
Mats Andersson 1985 16 p refs
(CTH-Math-1985-11; ISSN-0347-2809) Avail: NTIS HC A02/MF A01

The delta delta bar equation in the unit ball on n-dimensional complex space is discussed. The formulas for the values in the interior of the square integrable minimal solutions are given. The fact that these formulas generalize previously known formulas for the boundary value problems of the same solution is reported. A known result concerning weighted Nenralina classes is obtained. Author (ESA)

N86-19091# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept of Mathematics.
THE L SUP p ESTIMATES FOR THE NONLINEAR SPACE-HOMOGENEOUS BOLTZMANN EQUATION
Tommy Gustafsson 1985 62 p refs
(CTH-Math-1985-12; ISSN-0347-2809) Avail: NTIS HC A04/MF A01

The nonlinear, space-homogeneous Boltzmann equation with the molecular forces, which include inverse k:th power forces with k > 5 and angular cut-off, is discussed. The estimates for p-integrable solutions of Boltzman equations are studied. The fact that there exists a unique solution for this equation for p > 1 and p depending on positive constants related to molecular forces is proved. Carleman's method is used and the Maslora-Tchubenko results are extended. Author (ESA)

N86-19092# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
AN ADAPTIVE FILTER FINITE ELEMENT METHOD FOR LINEAR ELLIPTIC PROBLEMS
Kenneth Eriksson and Claes Johnson 1985 30 p refs
(CTH-Math-1985-13; ISSN-0347-2809) Avail: NTIS HC A03/MF A01

A finite element method algorithm for linear elliptic problems is reported. The fact that the automatic procedure produces a sequence of successively refined meshes with a final mesh on which a given error tolerance is satisfied, is discussed. The refinement for the error tolerance is determined by locally estimating the size of certain derivatives of the exact solutions. This algorithm is justified in a model case. Author (ESA)

N86-19093# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
CRITICAL BEHAVIOR OF SOME MEASURE-VALUED PROCESSES
Klaus Fleischmann (Academy of Sciences, Berlin, East Germany) 1985 27 p refs
(CTH-Math-1985-14; ISSN-0347-2809) Avail: NTIS HC A03/MF A01

Self-similar random processes are considered. A class of self-similar random fields is constructed starting from a branching model. Properties of this class of self-similar random fields are discussed. The fact that there is a self-similar field which is infinitely divisible but not stable or Gaussian, is proved. Author (ESA)

N86-19094# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
CLASS GROUPS OF ORDERS AND CHOW GROUPS OF THEIR BRAUER-SEVERI SCHEMES
Per Salberger 1985 26 p refs
(CTH-Math-1985-15; ISSN-0347-2809) Avail: NTIS HC A03/MF A01

The canonical fibration between a integral scheme X over a Dedekind domain R and a regular integral separated scheme of dimension one (Dekekind scheme), are considered. Results for the close relation between the o-cycles on X and the locally free modules over quaternion R-orders are proved. The fact that there exists an isomorphism between conic bundle surfaces and quaternions orders is proved. The Colliot-Thelene theorem and Coray's results about 0-cycles are generalized. The Brauer-Severi schemes (B-S) of maximal orders in Central Simple algebra of index > 2, are discussed. The finiteness properties about Chow groups of their B-S are reported. Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-19095*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A STOCHASTIC MODEL FOR PARTICLE IMPINGEMENTS ON ORBITING SPACECRAFT
Leonard W. Howell, Jr. Jan. 1986 43 p refs
(NASA-TP-2550; NAS 1.60:2550) Avail: NTIS HC A03/MF A01 CSCL 12A

A general methodology for simulating particle impingements on orbiting spacecraft is developed. Major steps in the modeling process are presented as (1) modeling objective, (2) construction of the spacecraft geometrical model, (3) simulation of the particles in the space environment, (4) particle impact and subsequent events of interest, and (5) results of the simulation. A simulation of the expected meteoroid impingements on the Hubble Space Telescope and the resulting angular momentum transfers which can cause telescope pointing disturbances is given to illustrate these methods. Author

N86-19096*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE SURE RELIABILITY ANALYSIS PROGRAM
Ricky W. Butler Feb. 1986 44 p refs
(NASA-TM-87593; L-16005; NAS 1.15:87593) Avail: NTIS HC A03/MF A01 CSCL 14D

The SURE program is a new reliability analysis tool for ultrareliable computer system architectures. The program is based on computational methods recently developed for the NASA Langley Research Center. These methods provide an efficient means for computing accurate upper and lower bounds for the death state probabilities of a large class of semi-Markov models. Once a semi-Markov model is described using a simple input language, the SURE program automatically computes the upper and lower bounds on the probability of system failure. A parameter of the model can be specified as a variable over a range of values directing the SURE program to perform a sensitivity analysis automatically. This feature, along with the speed of the program, makes it especially useful as a design tool. Author

N86-19097# Forest Products Lab., Madison, Wis.
AN EQUATION FOR ONE-SIDED TOLERANCE LIMITS FOR NORMAL DISTRIBUTIONS
C. L. Link Aug. 1985 4 p
(AD-A159831; FSRP-FPL-458) Avail: NTIS HC A02/MF A01 CSCL 12/1

An equation that does not require tables is given to determine a one-sided tolerance limit for the 100 Pth percentile of a normal distribution with confidence 1-gamma for any sample size n. This equation gives accuracy to approximately three or more significant digits when compared to tabled values. Thus it is possible to develop an automated procedure for determining tolerance limits that is not restricted to tabled values. Author (GRA)

N86-19098# Missouri Univ., Rolla. Dept. of Mathematics.
BOUNDS ON DISTRIBUTIONS ARISING IN ORDER RESTRICTED INFERENCE: THE PARTIALLY ORDERED CASE Interim Report
F. T. Wright Sep. 1985 30 p

(Contract N00014-80-C-0322)
(AD-A159872) Avail: NTIS HC A03/MF A01 CSCL 12/1

In testing hypotheses involving order restrictions on a collection of parameters, distributions arise which are mixtures of chi-squared or beta distributions. In general, the mixing coefficients are quite intractable even for a moderate number of populations. Stochastic upper and lower bounds are obtained for mixtures which arise in Bartholomew's tests for homogeneity of normal means with the alternative restricted by a quasi ordering. These bounds are applicable in the dual-testing situation, that is in testing the order restriction as a null hypothesis; in testing order restrictions in exponential families, Poisson intensities and multinomial parameters; and in some nonparametric settings. These can also be applied to obtain the least favorable configuration for testing equality of two multinomial populations with a stochastic ordering alternative. Author (GRA)

N86-19099# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.

ESTIMATION OF POPULATION PROPORTION AND OF PROBABILITIES OF MISCLASSIFICATION FROM IMPERFECT BINOMIAL DATA BY COMPARISON WITH RESULTS OF A STANDARD METHOD OF KNOWN IMPERFECTION Technical Report, Sep. 1984 - Sep. 1985

N. L. Johnson and S. Kotz Aug. 1985 13 p Prepared in cooperation with North Carolina Univ., Chapel Hill
(Contract N00014-84-K-0301)
(AD-A159926; UM/MSS/85/7) Avail: NTIS HC A02/MF A01 CSCL 12/1

Observations from inspection by a test method and a standard method are combined to provide estimators of population proportion, and of probabilities of misclassification for the test method. Results of Hochberg and Tenenbein (1983) and of Albers and Veldman (1984) are extended to the case where the standard method is not perfect, but its misclassification probabilities have known values. Both moment and maximum likelihood estimators are considered and some asymptotic properties of the resulting estimators are compared. Author (GRA)

N86-19100# North Carolina State Univ., Raleigh. Raleigh Dept. of Industrial Engineering.

A METHODOLOGY FOR COMPUTATION REDUCTION FOR SPECIALLY STRUCTURED LARGE SCALE MARKOV DECISION PROBLEMS

F. Y. Ding, T. J. Hodgson, and R. E. King Jan. 1985 28 p
(Contract N00014-84-K-0046)
(AD-A159950; NCSU-IE-TR-85-3) Avail: NTIS HC A03/MF A01 CSCL 12/1

Markov Decision Processes deal with sequential decision making in stochastic systems. Existing solution techniques provide powerful tools for determining the optimal policy set in such systems, however, many practical problems have extremely large state and action spaces making them computationally intractable. Typically, the state variable definition is n-dimensional and the number of states expands at a rate proportional to the power of n. For such large problems, the need for large amounts of random access memory and computation time restricts the ability to obtain solutions. The purpose of this paper is to both present a methodology which facilitates the solution of large scale problems, and provide computational results indicating the value of the approach. Author (GRA)

N86-19101# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

THE STRONG CONSISTENCY OF ERROR PROBABILITY ESTIMATES IN NN DISCRIMINATION

Z. D. Bai Oct. 1984 21 p
(Contract F49620-85-C-0008)
(AD-A160016; TR-84-43; AFOSR-85-0807TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Since 1971, T.J. Wagner introduced an error probability estimate in NN (Nearest Neighbor) discrimination rule and proved the weak convergency of this estimate. The problem of strong consistency is not yet solved. This paper shows the exponential convergence rate of this estimate. Hence, the strong consistency of this estimate holds automatically. Author (GRA)

N86-19102# Florida State Univ., Tallahassee. Dept. of Statistics.

STATISTICAL ASPECTS OF RELIABILITY, MAINTAINABILITY AND AVAILABILITY Annual Report, 1 Oct. 1984 - 30 Sep. 1985

M. Hollander and F. Proschan Oct. 1985 12 p
(Contract F49620-85-C-0007)
(AD-A160126; AFOSR-85-0794TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

During this period, a total of 11 research papers were issued, five papers were published in scientific journals or volumes, and 12 papers are in press of accepted for publication. The research performed under this contract developed theory, concepts, and methods in reliability, availability, and maintainability in a variety of topic areas. Some of the topic areas treated include: optimum assembly of systems; multistate system theory; testing whether a new item is stochastically longer-lived than an item of specified age; nonparametric estimation of a discrete survival function when observations are censored, yielding a smoother estimate than the standard Kaplan-Meir method estimate; measuring the effect of increased censorship on an estimate of a life distribution; a generalization of total positivity; characterization of discrete IFR distributions based on coincidences among order statistics; extension of Schur functions and majorization to the continuous case; testing whether new is better than used of a specified age with randomly censored data; further multivariate probability inequalities using Schur functions and increasing in arrangement functions; simultaneous estimation of coherent system survival function and component survival functions using censored data; development of maintenance models in which maintenance actions are subject to random error; and development of new Markov stochastic processes corresponding to notions of IFR, IFRA, etc. GRA

N86-19103# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

CHARACTERIZATION OF DISCRETE PROBABILITY DISTRIBUTIONS BY PARTIAL INDEPENDENCE

A. A. Alzaid, C. R. Rao, and D. N. Shanbhag May 1985 19 p
(Contract F49620-85-C-0008)
(AD-A160130; TR-85-16; AFOSR-85-0860TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

If X and Y are random variables such that P (X > Y) = 1 and the conditional distribution of Y given X is binomial, then Moran (1952) showed that Y and (X-Y) are independent if X is Poisson. This document extends Moran's result to a more general type of conditional distribution of Y given X, using only partial independence of Y and X-Y. This provides a generalization of a recent results of Janardhan and Rao (1982) on the characterization of generalized Polya-Eggenberger distribution. A variant of Moran's theorem is proven which generalizes the results of Patil and Seshadri (1964) on the characterization of the distribution of a random variable x based on some conditions on the conditional distribution of Y given X and the independence of Y and X-Y. GRA

N86-19104# Massachusetts Univ., Amherst. Dept. of Mathematics and Statistics.

CONSTRUCTION OF EXPONENTIAL MARTINGALES FOR COUNTING PROCESSES Technical Report, 15 May 1984 - 14 May 1985

W. A. Rosenkrantz 3 Apr. 1985 13 p
(Grant AF-AFOSR-0167-82)
(AD-A160189; AFOSR-85-0868TR; TR-10) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let N(t) be a counting process with continuous compensator A(t) and f(t) a bounded predictabler process. If E(exp(2/f/N(t))) < infinity and E(exp (2(1 + exp/f/)A (t)) < infinity then it is shown that z(+) = exp (-integral from 0 to t (f(u)dN(u)) - integral from 0

$\int_0^t$ (exp (-f(u)) - 1)dA(u) is a martingale. This is a partial extension of a theorem of Kabanov, Liptser, Shiryaev (1980) who assumed A(t) < or = but did not assume A(t) is continuous. GRA

N86-19105# North Carolina Univ., Chapel Hill. Dept. of Statistics.
THE LIMITING DISTRIBUTION OF LEAST SQUARES IN AN ERRORS-IN-VARIABLES LINEAR REGRESSION MODEL Technical Report, Sep. 1984 - Aug. 1985
L. J. Gleser, R. J. Carroll, and P. P. Gallo Apr. 1985 28 p
(Contract F49620-82-C-0009)
(AD-A160190; MMS-1577; AFOSR-85-0869TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

There is a substantial literature concerning linear regression when some of the predictors (independent variables) are measured with error. Such models are of importance in econometrics (instrumental variables models), psychometrics (correction for attenuation, models of change), and in instrumental calibration studies in medicine and industry. Recent theoretical work concerning maximum likelihood estimation in such models appears in Healy (1980), Fuller (1980), and Anderson (1984), while Reilly and Patino-Leal (1981) take a Bayesian approach. In an applied context, an investigator may either overlook the measurement errors in the predictors, or choose the classical ordinary least squares (OLS) estimator of the parameters because of its familiarity and ease of use. Certainly, the methodology of classical least squares theory (confidence intervals, multiple comparisons, tests of hypotheses, residual analysis) is considerably more developed than the corresponding errors-in-variables methodology, particularly in samples of moderate size. In this paper, it is shown that under reasonable regularity conditions such linear combinations are (jointly) asymptotically normally distributed. GRA

N86-19106# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematics.
INFERENCE FOR STATIONARY RANDOM FIELDS GIVEN POISSON SAMPLES
A. F. Karr Jan. 1985 12 p
(Grant AF-AFOSR-0029-82)
(AD-A160191; TR-422; AFOSR-85-0812TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

This paper examines some questions of statistical inference -- specifically, estimation of the mean and covariance function, as well as linear state estimation -- for stationary random fields observable only at the points of a (likewise) Poisson process. Given a d-dimensional random field and a Poisson process independent of it, suppose that it is possible to observe only the location of each point of the Poisson process and the value of the random field at that (randomly located) point. Nonparametric estimators of the mean and covariance function of the random field - based on observation over compact sets of single realizations of the Poisson samples are constructed. Under fairly mild conditions these estimators are consistent (in various senses) as the set of observation becomes unbounded in a suitable manner. The state estimation problem of minimum mean squares reconstruction of unobserved values of the random field is also examined. GRA

N86-19107# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
THE AMOUNT OF NOISE INHERENT IN BANDWIDTH SELECTION FOR A KERNEL DENSITY ESTIMATOR Technical Report, Sep. 1984 - Aug. 1985
P. Hall and J. S. Marron May 1985 31 p
(Contract F49620-82-C-0009)
(AD-A160235; TR-100; AFOSR-85-0631TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

Any practical method of constructing a bandwidth must depend only on a statistical sample, and should produce some sort of estimate of this bandwidth. The purpose of this paper is to show that there a well-defined limits to the accuracy of all data-driven bandwidth estimates. Put another way, there is an unbridgeable gap between the minimum integrated square error attained using a optimal bandwidth and the minimum achievable integrated square error using a data-driven bandwidth estimate. GRA

N86-19108# Northwestern Univ., Evanston, Ill.
MARKOV PROCESSES APPLIED TO CONTROL, REPLACEMENT AND SIGNAL ANALYSIS Progress Report, 1 Jun. 1983 - 31 May 1984
E. Cinlar 26 Apr. 1985 8 p
(Grant AF-AFOSR-0189-82)
(AD-A160238; AFOSR-85-0832TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

This is an account of the work accomplished between 1 June 1983 and 31 May 1984. Work is reported on eight topics: deformation of solids, reliability, seminar on stochastic processes, text on stochastic processes, stability of dependent random variables, mean exit time of Brownian motion with drift, harmonic measure of a small geodesic sphere, and mean exit time for a tubular neighborhood. GRA

N86-19109# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
PRINCIPAL COMPONENT ANALYSIS UNDER CORRELATED MULTIVARIATE REGRESSION EQUATIONS MODEL
P. R. Krishnaiah and S. Sarkar Apr. 1985 30 p
(Contracts F49620-85-C-0008; F49620-82-K-0001)
(AD-A160266; TR-85-09; AFOSR-85-0855TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

The motivation behind the study in this paper is to derive some asymptotic results useful in the area of principal component analysis under the CMRE model. The object of the principal component analysis is to select a small number of important linear combinations of the variables which will best describe the variation among experimental units. In this paper, the authors consider the problem of testing for the equality of the last few eigenvalues of the covariance matrix under correlated multivariate regression equations models. Asymptotic distributions of various test statistics are derived when the underlying distribution is multivariate normal. Some of the distribution theory is extended to the case when the underlying distribution is elliptically symmetric. GRA

N86-19110# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
MODIFIED NONPARAMETRIC KERNEL ESTIMATES OF A REGRESSION FUNCTION AND THEIR CONSISTENCIES WITH RATES
R. S. Singh and M. Ahmad Apr. 1985 28 p
(Contract F49620-85-C-0008)
(AD-A160267; TR-85-12; AFOSR-85-0857TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

The theory of regression is concerned with the prediction of the value of a variable, called the response or dependent variable, at a given value of another (correlated) variable, called the predictor or independent variable. Prediction is needed in several practical situations. For example, an agriculturist wants to know the yield of wheat at an amount of a specified fertilizer, a meteorologist wants to forecast weather several hours ahead on the basis of previous atmospheric measurements and a physician is interested in determining the weight of a patient in terms of the number of weeks he or she has been on a diet. In this document, two sets of modified kernel estimates of a regression function are proposed: one when a bound on the regression function is known and the other when nothing of this sort is at hand. Explicit bounds on the mean square errors of the estimators are obtained. Pointwise as well as uniform consistency in mean square and consistency in probability of the estimators are proved. Speed of convergence in each case is investigated. GRA

N86-19111# North Carolina Univ., Chapel Hill. Dept. of Statistics.
COVARIATE MEASUREMENT ERROR IN LOGISTIC REGRESSION Technical Report, Sep. 1984 - Aug. 1985
L. A. Stefanski and R. J. Carroll Apr. 1985 27 p Prepared in cooperation with Cornell Univ., Ithaca, N.Y.

(Contract F49620-82-C-0009; Grant AF-AFOSR-0080-80)
(AD-A160277; AFOSR-85-0867TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

In a logistic regression model when covariates are subject to measurement error the naive estimator, obtained by regressing on the observed covariates, is asymptotically biased. This document introduces a bias-adjusted estimator and two estimators appropriate for normally distributed measurement errors; a functional maximum likelihood estimator and an estimator which exploits the consequences of sufficiency. The four proposals are studied asymptotically under conditions which are appropriate when the measurement error is small. A small Monte-Carlo study illustrates the superiority of the measurement-error estimators in certain situations. GRA

N86-19112# Duke Univ., Durham, N. C.
AN AGGREGATION TECHNIQUE FOR THE TRANSIENT ANALYSIS OF STIFF MARKOV SYSTEMS Interim Report
K. S. Trivedi Jul. 1985 34 p
(Grant AF-AFOSR-0132-84)
(AD-A160286; AFOSR-85-0744TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

An approximation algorithm for systematically converting a stiff Markov chain onto a non-stiff chain defined over a smaller state space is given. The algorithm unifies and extends earlier approaches to the problem in the context of transient analysis. The algorithm is illustrated using two examples. GRA

N86-19113# Duke Univ., Durham, N. C. Dept. of Computer Science.
SPADE (SERIES PARALLEL DIRECTED ACYCLIC GRAPH EVALUATOR): A TOOL FOR PERFORMANCE AND RELIABILITY EVALUATION, REVISION
R. A. Sahner and K. S. Trivedi Jul. 1985 30 p
(Grant AF-AFOSR-0132-84)
(AD-A160289; CS-1984-15; AFOSR-85-0745TR) Avail: NTIS
HC A03/MF A01 CSCL 09/2

A model for the stochastic analysis of directed acyclic graphs is developed. These graphs represent event-precedence networks where the distribution function associated with an event is assumed to be a variant of the phase-type distribution. Events may occur sequentially, probabilistically, or concurrently. The distribution function of the graph execution time is computed in a semi-symbolic form. Applications of the model for the evaluation of concurrent program execution time and to the reliability analysis of fault-tolerant systems are discussed. GRA

N86-19114# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
ESTIMATION OF PALM MEASURES OF STATIONARY POINT PROCESSES
A. F. Karr May 1985 15 p
(Grant AF-AFOSR-0029-82)
(AD-A160516; TR-433; AFOSR-85-0815TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

Estimators of the Palm measure of a stationary point process on a finite-dimensional Euclidean space are developed and shown to be strongly uniformly consistent. From them, similarly consistent estimators of reduced moment measures, the spectral measure, the spectral density function and the underlying probability measure itself are derived. Normal and Poisson approximations to distributions of estimators are presented. Application is made to the problem of combined inference and linear state estimation. Author (GRA)

N86-19115# Stanford Univ., Calif. Dept. of Statistics.
ASSESSING SYSTEM RELIABILITY USING CENSORING METHODOLOGY
H. Doss, S. Freitag, and F. Proschan 12 Sep. 1985 19 p
(Contract N00014-76-C-0475)
(AD-A160616; SU-TR-364) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document describes a problem which is of practical and theoretical importance in reliability. Under study is a coherent structure consisting of n independent components. The structure is observed continuously until it fails. For components failing before or at system failure time, we observe complete lifelengths; for components still functioning at system failure time we observe censored lifelengths. For the system we observe system lifelength. From a sample of m such structures we wish to estimate the system lifelength distribution. As far as we know, this problem has not been solved or even treated in the literature. In this paper we propose an estimator of the system lifelength distribution. as a by-product, we also obtain estimates of the mean and quantiles of the system lifelength and of all the corresponding quantities for component lifelengths. In Section 2 we give several asymptotic results concerning the estimators. In Section 3 we present and discuss two boot-strap schemes that are used in small samples to assess the variability of our estimates and to construct confidence intervals. GRA

N86-19116# Massachusetts Inst. of Tech., Cambridge. Lab. of Electronics.
MAXIMUM ENTROPY POLE-ZERO ESTIMATION
B. R. Musicus and A. M. Kabel Aug. 1985 96 p
(Contract N00014-81-K-0742; Grant NSF ECS-80-07102)
(AD-A160655; TR-510) Avail: NTIS HC A05/MF A01 CSCL 12/1

Maximum Entropy has been suggested by numerous authors as a good objective measure for optimally modeling the power spectrum of a wide-sense stationary random process. This documents describes a new Maximum Entropy pole-zero spectrum estimation method. The mathematical model is designed to achieve the maximum possible entropy subject to constraints on the first few correlation and cepstral values. The solution, which is in the form of an ARMA model, is based on solving a generalized, symmetric, almost-Toeplitz eigenvalue problem. The authors characterize the existence, uniqueness, stability and minimum phase properties of the solution, and categorize all possible occurrences of canceling pole-zero pairs. A search procedure based on a fast Levinson-like algorithm is given for estimating the model, and examples are presented to illustrate its performance. A special case of the method gives a model estimate similar to that of Pisarenko's harmonic retrieval problem. GRA

N86-19117# Washington Univ., Seattle. Dept. of Chemistry.
GENERALIZED RANK ANNIHILATION FACTOR ANALYSIS Interim Technical Report
E. Sanchez and B. R. Kowalski 15 Oct. 1985 19 p
(Contract N00014-75-C-0536)
(AD-A160651; TR-34) Avail: NTIS HC A02/MF A01 CSCL 12/1

The method of rank annihilation is shown to be a particular case of a more general method for quantitation in bilinear data arrays such as LC/UV, GC/MS or emission-excitation fluorescence. Generalized rank annihilation is introduced as a calibration method that allows for simultaneous quantitative determination of all the analytes of interest in a mixture of unknowns. Only one calibration mixture is required. The bilinear spectra of both unknown and calibration sample must be obtained. Bilinear target factor analysis is introduced as a projection of a target bilinear matrix onto another principal component bilinear matrix space. GRA

N86-19118# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
SEMICONTINUOUS PROCESSES IN MULTIDIMENSIONAL EXTREME VALUE THEORY
Tommy Norberg 1985 47 p refs Sponsored by Swedish Natural Science Research Council
(CTH-Math-1985-7; ISSN-0347-2809) Avail: NTIS
HC A03/MF A01

The structure of the large values attained by a stationary random process indexed by a one-dimensional parameter in terms of semicontinuous processes is studied. The fact that Gaussian fields with continuous parameter may possess very erratic sample

paths is proved. The concreted asymptotic results for those Gaussian fields are given. Author (ESA)

N86-19119# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
WEAK LIMITS OF PROBABILITY MEASURES ON METRIC SCHAUDER SPACES
Harald Bergstroem 1985 13 p refs
(CTH-Math-1985-17; ISSN-0347-2809) Avail: NTIS HC A02/MF A01

The Schauder spaces are defined. The probability measures on Schauder spaces are considered. The weak limits of sequences of probability measures on metric Schauder spaces are studied. The fact that C-spaces and D-spaces are Schauder spaces is proved and the fact that each Banach space is a metric Schauder space with respect to infinite product space of real numbers is also proved. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-19120# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
TIME SCALE DECOMPOSITION: THE ROLE OF SCALING IN LINEAR SYSTEMS AND TRANSIENT STATES IN FINITE-STATE MARKOV PROCESSES Interim Report
X. C. Lou, R. Rohlicek, P. G. Coxson, G. C. Verghese, and A. S. Willsky 21 Mar. 1985 8 p
(Contract DAAG29-84-K-0005; Grant AF-AFOSR-0135-82)
(AD-A160185; LIDS-P-1445; AFOSR-85-0833TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper reports on recent work on time scale decomposition and aggregation of large-scale linear systems containing weak couplings and finite-state Markov processes containing rare transitions. This work builds on that of Coderch, et. al.. The focus of the work is on the asymptotic approximation of the linear system. Author (GRA)

N86-19121# Air Force Geophysics Lab., Hanscom AFB, Mass.
A PARAMETERIZED PROCEDURE FOR DETERMINING REAL HEIGHT FROM IONOGRAMS BY USE OF GENERALIZED PARABOLIC PROFILES Physical Sciences Research Papers
M. M. Klein 8 May 1985 26 p
(AF Proj. 2310)
(AD-A160383; AFGL-TR-85-0101; AFGL-PSRP-669) Avail: NTIS HC A03/MF A01 CSCL 12/1

In previous reports an analytic procedure was developed for determining real heights from ionograms by directly solving the integral relation between real height and virtual height. The real height could then be obtained by a direct integration of the virtual height over the range of frequencies encountered. In a later report the method was applied to typical ionograms; the required integration being performed numerically. In addition, a simplified procedure was developed in which and ionogram could be fitted to a parametric series of polynomials and the integration required for determination of real height performed analytically. This report generalizes this procedure by modeling electron density provides in terms of a parameterized series of generalized parabolic profiles. The profiles are then converted to virtual height or ionogram form. The real height corresponding to a given ionogram is obtained by comparison of the ionogram with the parameterized profiles. Since the real height for a given paramterized profile is related in a very simple way to its virtual height, the integration process required for the previous polynominal method is hereby avoided. In additions, since the parabolic profile has a vertical slope at the maximum electron density, it provides a better fit to ionospheric data than a polynomial. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-19122# Naval Research Lab., Washington, D. C.
RADIATIVE LIFETIMES AND KINETIC STUDIES OF METASTABLE NO(+)(a 3 SIGMA(+)) AND O2(+)(a 4 pi SUB u)
A. OKeefe and J. R. McDonald 1985 38 p
(AD-A159759) Avail: NTIS HC A03/MF A01 CSCL 20/8

The lowest energy metastable electronic states of the nitric oxide and molecular oxygen cations have been studied using Fourier Transform mass Spectrometry. Using very low neutral reactant pressures and ion trapping periods of up to several seconds, the radiative relaxation rate of the metastable ion becomes competitive with its reaction rate. In this fashion both kinetic information and the radiative lifetime of the metastable state are obtained. The measured rate constants for the reactions of NO+(a3sigma+) with CO2 (k = 1.0 + or - 0.2 x 2 to the -10 cc/sec) and of 02+(a 4 piu) with Ar (k = 4.9 + or - 1.5 x 10 to the -10 cc/sec) are in agreement with earlier results. The measured lifetimes of the NO+ metastable (sigma = 1.45 sec) and the O2+ metastable (sigma = 0.22 sec) are discussed using a four state spin-orbit coupling model which predicts metastable radiative lifetimes which agree reasonably well with the experimental values. Author (GRA)

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-19123 New South Wales Univ., Kensington (Australia).
HIGH VELOCITY GAS JET NOISE CONTROL Abstract Only
Athol Day 1985 3 p
Avail: Issuing Activity

The physics of jet noise generation, and some of the principal applications and methods of jet noise control are described. Jet noise generation due to the nozzle size, discharge velocity, gas density, jet shape, etc., is well documented by scientific literature, complete with mathematical formulae for noise level prediction. Worked examples are provided. G.L.C.

N86-19124 Department of the Navy, Washington, D. C.
MICROBENDING FIBER OPTIC ACOUSTIC SENSOR Patent
N. Lagakos and W. J. Trott, inventors (to Navy) Issued 16 Jul. 1985 15 p Supersedes AD-D009899
(AD-D011938; US-Patent-4,530,078; US-Patent-Appl-SN-387633; US-Patent-Class-367-149) Avail: US Patent and Trademark Office CSCL 17/1

A point hydrophone according to a first preferred embodiment of the present invention includes two opposed pistons which are subjected to an acoustic pressure wave. In response to the pressure wave, the opposed pistons push a pair of deformer plates against an optical fiber to deform the fiber thereby intensely modulating an optical signal passing through the fiber. An extended hydrophone according to a second preferred embodiment of the present invention includes an optical fiber wound in a helical groove formed in a cylindrical surface. A plurality of parallel axial slots are located in a spaced-apart relationship to each other at positions about the cylindrical surface and are oriented in parallel with the axis of the cylindrical surface. Each axial slot intersects with the helical

groove at a plurality of locations and has a depth greater than the depth of the groove. An applied acoustic pressure wave forces the fiber into the axial slots thus deforming the fiber and thereby intensely modulating an optical signal passing through the fiber in response to the acoustic pressure. Depth equalization means are included for each embodiment. Author (GRA)

N86-19125*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LABORATORY EXPERIMENTS ON ACTIVE SUPPRESSION OF ADVANCED TURBOPROP NOISE
James H. Dittmar Dec. 1985 18 p refs
(NASA-TM-87129; E-2740; NAS 1.15:87129) Avail: NTIS HC A02/MF A01 CSCL 20A

The noise generated by supersonic tip speed propellers may be a cabin environment problem for future propeller-driven airplanes. Active suppression from speakers inside the airplane cabin has been proposed for canceling out this noise. The potential of active suppression of advanced turboprop noise was tested by using speakers in a rectangular duct. Experiments were first performed with sine wave signals. The results compared well with the ideal cancellation curve of noise as a function of phase angle. Recorded noise signals from subsonic and supersonic tip speed propellers were than used in the duct to deterthe potential for canceling their noise. The subsonic propeller data showed significant cancellations but less than those obtained with the sine wave. The blade-passing-tone cancellation curve for the supersonic propeller was very similar to the subsonic curve, indicating that it is potentially just as easy to cancel supersonic as subsonic propeller blade-passing-tone noise. Propeller duct data from a recorded propeller source and spatial data taken on a propeller-drive airplane showed generally good agreement when compared versus phase angle. This agreement, combined with the similarity of the subsonic and supersonic duct propeller data, indicates that the area of cancellation for advanced supersonic propellers will be similar to that measured on the airplane. Since the area of cancellation on the airplane was small, a method for improving the active noise suppression by using outside speakers is discussed. Author

N86-19126# Naval Postgraduate School, Monterey, Calif.
DESIGN AND TESTING OF HARDWARE IMPROVEMENTS OF AN ACOUSTIC SOUNDER M.S. Thesis
W. L. Richards Jun. 1985 52 p
(AD-A159672) Avail: NTIS HC A04/MF A01 CSCL 20/1

The application of lasers in military communications and weapons systems accentuate the need for instruments capable of measuring the fine dynamic structure of the atmosphere. One of the most useful tools available for the probing of the atmosphere is the acoustic sounder. Commercial grade acoustic sounders, such as the Aeroviroment model number 300 cannot collect atmospheric data with the quality needed for laser propagation research. The usable range of the Aerovironment model 300 acoustic sounder is less than 500 meters. Many laser systems need atmospheric information at altitudes of 1 to 2 kilometers and higher. The objective of this thesis was to upgrade an existing acoustic sounder to increase the range and improve the quality of the receiver-processor. A serious deficiency of the Aerovironment model number 300 is the poor coupling of the acoustic transducer to the feedhorn. This thesis involved a complete redesign and experimental test of the transducer feedhorn using two different horn styles as well as making the horn removable and easily changeable. GRA

N86-19127# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
FLIGHT OPERATIONS NOISE TESTS OF EIGHT HELICOPTERS
S. A. Yoshikami Aug. 1985 697 p
(AD-A159835; FAA/EE-85-7) Avail: NTIS HC A99/MF A02 CSCL 01/3

This document presents acoustical data and flight path information acquired during the FAA/HAI Helicopter Flight Operations Noise Test Program. As-measured noise levels of the Aerospatiale 365N, Agusta 109A, Bell 206L-1 and 222A, Hughes 500D, MBB BK117, Robinson R22, and Sikorsky S76 are presented for various enroute and heliport flight operations. These operations include level flyovers at two altitudes, normal takeoffs, normal and constant-glideslope approaches, various types of noise abatement approaches, level flight turns and hover (IGE and OGE). The acoustical data are accompanied by radar tracking data and cockpit instrument panel information which document the operational procedures flown, and meteorological measurements to permit data corrections for nonstandard atmospheric conditions. This helicopter operational noise data base can be used in enroute and heliport land use planning, heliport environmental studies and planning guidelines, pilot familiarization and training, verification of noise prediction and estimating methods, and lateral attenuation studies. GRA

N86-19128# Catholic Univ. of America, Washington, D.C. Dept. of Physics.
[ACOUSTIC RESEARCH REPORT] Report, for 1 Oct. 1984 - 30 Sep. 1985
H. Ueberall 17 Jul. 1985 25 p
(Contract N00014-76-C-0430; RR0-11008)
(AD-A159900) Avail: NTIS HC A02/MF A01 CSCL 20/1

A recent investigation has shown that the spectrum of the resonance frequencies of plates can be obtained by ultrasonic pulse techniques. By physically analyzing the distortion of the reflected wave trains, a method was developed through which the parameters of the plate resonances, and hence the physical constants of the plate material, can be determined by ultrasonic means. The physical origin of the plate resonances was elucidated, and it was shown how the observed rining of ultrasonic resonances is caused by multiple internal reflections in the plate. A series of backscattering experiments employing wavetrains with carrier frequency on or off a resonance was interpreted this way, with perfect agreement between theory and experiment. Author

N86-19129# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
DEFECTS AND MATERIALS CHARACTERIZATION BY ANALYSIS OF ULTRASONIC SIGNALS. STUDY OF A TECHNIQUE TO MEASURE ULTRASONIC ATTENUATION Final Report
C. Valdecantos and J. Miguel May 1985 68 p
(Grant AF-AFOSR-0340-83)
(AD-A159927; EOARD-TR-85-09(C)) Avail: NTIS HC A04/MF A01 CSCL 14/2

The objective of this work is to explore the actual possibilities of a Nondestructive testing (NDT) technique to be applied in laboratory conditions, as a first stage, in order to make measurements of mechanical and elastic parameters on metals. Classic test of measurement of acoustic velocity and attenuation is useful to compute Young modulus or Poisson ratio, but these parameters have no wide technological usefulness. Much more interesting are others parameters such as yield strength, tensile strength, or fracture toughness. This is of particular interest in view of the cost of destructive test to assess it. From the NDT techniques, ultrasonics seems, at a first look, a good way to intend. Ultrasonics is, first of all, a dynamic test because material is forced to transmit stress through the crystal structure. Present work describes some experiments carried out at INTA's Ultrasonic Laboratory in order to set up a technique able to take absolute attenuation measurements over a range of frequencies from 15 to 60 MHz, typically. GRA

N86-19130# Texas Univ., Austin. Applied Research Lab.
AN EXPERIMENTAL INVESTIGATION OF ACOUSTIC PROPAGATION IN SATURATED SANDS WITH VARIABLE FLUID PROPERTIES
R. D. Costley, Jr. May 1985 106 p
(Contract N00014-80-C-0490)
(AD-A159930; ARL-TR-85-14) Avail: NTIS HC A06/MF A01 CSCL 20/1

The Biot-Stoll theory describes the propagation of acoustic waves in a saturated, unconsolidated porous medium. The expressions for the attenuation and phase velocity derived from

this theory depend explicitly on the viscosity, density, and bulk modulus of the pore fluid. An experiment has been designed to determine the dependence of attenuation and phase velocity on these properties of the pore fluid. The phase velocity and attenuation of compressional waves were measured using a mixture of water and glycerine as the interstitial fluid. The theoretical background is reviewed and the experimental procedure is discussed in detail. The results, along with comparisons with the Biot-Stoll theory, are then presented. The choices of the theoretical parameters are discussed and their relation to the fit of the theory to the data. The Biot-Stoll theory is shown to adequately describe the effects of the fluid properties on acoustic wave propagation in saturated sediments, at least for compressional waves of the first type. GRA

N86-19131# Naval Surface Weapons Center, Silver Spring, Md.
SOUND TRANSMISSION INTO SHELLS DOUBLY EXCITED BY INCIDENT WAVES AND BY ARBITRARY SURFACE FORCING FUNCTIONS Final Report, for FY84
G. C. Gaunaurd and J. Barlow 15 Jan. 1985 115 p
(AD-A159936; NSWC/TR-85-42) Avail: NTIS HC A06/MF A01 CSCL 20/1.

We develop the fundamental exact analytical and computational model required to study the transmission of incident plane sound waves into submerged elastic cylindrical shells subjected to arbitrary loads on their outer surface. We use the superposition principle in this linear problem to separate the contributions to the internally transmitted field caused by the incident wave from that of the surface load. This basic model uses the exact (2-D) formulation of elastodynamics to describe the shell motions, and that of general linear acoustics to describe the wave motion in the inner and outer fluids. We display the isobaric contours of the internally transmitted pressure fields, exhibiting their caustics and their progressive development as the frequency is increased within the band $0<k3a<10$. The contour plots are generated for all the possible combinations of loading and insonification conditions with a view toward computing an advantage ration which measures the gains that would result from sensing the internally transmitted field, rather than the field external to the shell. This advantage ratio is shown always to be greater than unity and; in many cases, much greater than unity. We performed a detailed computational study to quantitatively determine the effect of shell thickness, stiffness, and general material composition, on the sound fields transmitted into the loaded shells. This analysis makes the work valid for various metals and for shell relative-thickness between 1% and 20%, which is a range covering most practical cases. GRA

N86-19132# SACLANT ASW Research Center, La Spezia (Italy).
MULTIPLE BEAMFORMING
W. M. X. Zimmer 1 Jul. 1985 30 p
(AD-A159979; SACLANTCEN-SM-181) Avail: NTIS HC A03/MF A01 CSCL 20/1

Beamforming techniques are generally based on the assumption that the received signal arrives from a single source. In a realistic situation, however, there is more than one source present and these sources can interact with each other in the beamformer. This paper describes a method that allows us to form multiple beams in order to steer the receiver toward two or more sound sources simultaneously. The main advantage of this procedure is that it includes the full interactions of the different sources in the beamformer. It describes a multiple beamformer in which the interaction of different sources is included in the algorithm. The maximum likelihood principle is used to find the different source amplitude and bearing estimates. The performance of the algorithm is compared for varying conditions with the Cramer-Rao lower bound. Two pre-processors necessary and suitable to ensure globally optimized results are derived from the ideas of Pisarenko and Prony. Finally, a post-processor is proposed to evaluate the success of the multiple beamformer. GRA

N86-19133# Hawaii Applied Research, Inc., Honolulu.
A STUDY TO DETERMINE THE MERIT OF OCEAN BOREHOLE SYSTEMS FOR ACOUSTIC DETECTION Final Technical Report
F. Duennebier, C. McCreery, D. Harris, R. Cessaro, and C. Fisher 31 Jul. 1985 85 p
(Contract N00014-84-C-0464)
(AD-A160149) Avail: NTIS HC A05/MF A01 CSCL 17/1

Data obtained by an ocean borehole experiment at 44 deg N, 160 deg E was analyzed in order to evaluate the detection capability of a borehole seismic system as compared to an ocean bottom system. Absolute noise levels for the complete duration of the 64-day experiment were also determined, indicating the borehole site to be one of the quietest sites in the world. This report presents results of analysis of active and passive seismic signals and background noise recorded on an ocean subbottom (OSS-IV) and ocean bottom seismometers (OBS), for the purpose of determining their relative merits for acoustic detection. Results from OSS-IV noise and signal propagation studies document the increase in signal fidelity and signal-to-noise ratio obtained at this site. Attenuation analysis of short line data indicates that loss at OSS-IV is more than expected from spherical spreading, but the low noise level of the instrument makes it sensitive to sources in the ocean for long ranges. GRA

N86-19134# Naval Submarine Medical Research Lab., Groton, Conn.
AN ANALYSIS OF STIMULUS DETERMINANTS OF TARGET DETECTION IN PBB (PASSIVE BROADBAND) DISPLAYS Interim Report
J. DiVita 1 Aug. 1985 33 p
(AD-A160203; NSMRL-1057) Avail: NTIS HC A03/MF A01 CSCL 17/1

Targets on passive broadband sonar displays may be detected on the basis of three distinct stimulus attributes--target contrast, target marking density, and grouping of similar brightnesses. Previous research has failed to isolate and systematically manipulate these variables. Methods of doing so are proposed in order to determine which of these stimulus attributes underlie target detection. Enhancing the proper variables should improve target detection. GRA

N86-19135# Pennsylvania State Univ., University Park. Applied Research Lab.
EFFECTS OF INFLOW CONDITIONS ON DISCRETE FREQUENCY NOISE GENERATED BY SMALL, AXIAL FLOW FANS
K. B. Washburn and G. C. Lauchle Sep. 1985 149 p
(AD-A160579; PSU/ARL/TR-85-001) Avail: NTIS HC A07/MF A01 CSCL 13/1

Discrete frequency acoustic radiation is generated by subsonic axial flow fans through both steady and unsteady blade loading. Steady loading is a function of pumping requirement, and unsteady loading is generated by spatially periodic inflow distortions. The latter effect is the dominant generation mechanism when small fans are used to cool electronic equipment. Fans mounted to exhaust out of a device ingest distortions created by all objects within the unit. This work represents an empirical survey of noise generated by small axial flow cooling fans in the presence of upstream obstructions and various inlet configurations. The obstructions include a cylinder, a thin rectangle, a thick rectangle, and an electronic card gate model. Each of these represents obstructions found in a typical installation. Simple and modified inlet baffles, finger guards, and honeycomb flow straighteners are investigated. Design recommendations are offered to minimize discrete tone generation. These include aerodynamic shaping of unaviodable obstructions, a minimum axial distance of 0.3 fan radii for obstructions in the inlet, the avoidance of blockage in lateral inflow and the use of an inlet baffle to smooth inlet distortions. Account is taken of the spatial restictions of typical installations. GRA

N86-19136# Massachusetts Inst. of Tech., Lexington.
DISTRIBUTED SENSOR NETWORKS Semiannual Technical Summary Report, 1 Oct. 1984 - 31 Mar. 1985
R. T. Lacoss 26 Sep. 1985 32 p

(Contract F19628-85-C-0002; ARPA Order 3345; AF Proj. 5D30; AF Proj. 5T10)
(AD-A160596; ESD-TR-85237) Avail: NTIS HC A03/MF A01 CSCL 17/2

The Distributed Sensor Networks (DSN) program is aimed at developing and extending target surveillance and tracking technology in systems that employ multiple spatially distributed sensors and processing resources. Such a system would be made up of sensors, data bases, and processors distributed throughout an area and interconnected by an appropriate digital data communication system. The detection, tracking, and classification of low flying aircraft has been selected to develop and evaluate DSN concepts in the light of a specific system problem. A DSN test bed has been developed and is being used to test and demonstrate DSN techniques and technology. The overall concept calls for a mix of sensor types. The initial test-bed sensors are small arrays of microphones at each node augmented by TV sensors at some nodes. This Semiannual Technical Summary (SATS) reports results for the period 1 October 1984 through 31 March 1985. Progress in the development of distributed tracking algorithms and their implementation in the DSN test-bed system is reviewed in Section II. Test-bed versions of distributed acoustic tracking algorithms now have been implemented and tested using simulated acoustic data. This required developing a solution to a basic distributed tracking problem: the information feedback problem. Target tracks received by one node from another node often implicitly include information that originally was obtained from the receiving node.
GRA

N86-19137# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF A DIGITAL TECHNIQUE FOR FREQUENCY TRANSPOSITION OF SPEECH M.S. Thesis
V. DiGirolamo Sep. 1985 100 p
(AD-A160832) Avail: NTIS HC A05/MF A01 CSCL 09/2

Frequency transposition is the process of raising or lowering the frequency content (pitch) of an audio signal. The hearing impaired community has the greatest interest in the applications of frequency transposing. Though several analog and digital frequency transposing hearing aid systems have been built and tested, this thesis investigates a possible digital processing alternative. Pole shifting, in the z-domain, of an autoregressive (all pole) model of speech was proven to be a viable theory for changing frequency content. Since linear predictive coding (LPC) techniques are used to code, analyze and synthesize speech, with the resulting LPC coefficients related to the coefficients of an equivalent autoregressive model, a linear relationship between LPC coefficients and frequency tranposition is explored. This theoretical relationship is first established using a pure sine wave and then is extended into processing speech. The resulting speech synthesis experiments failed to substantiate the conjectures of this thesis. However, future research avenues are suggested that may lead toward a viable approach to transpose speech.
Author (GRA)

N86-19138# Texas Univ., Austin. Austin Applied Research Lab.
GENERATION OF UNDERWATER SOUND BY A MOVING HIGH-POWER LASER SOURCE
Y. H. Berthelot 1 Aug. 1985 218 p
(Contract N00014-82-K-0425)
(AD-A160900; ARL-TR-85-21) Avail: NTIS HC A10/MF A01 CSCL 20/1

The generation of underwater sound by high-power laser pulse is analyzed both theoretically and experimentally. The mechanism of sound generation is the thermal expansion of the water caused by heat imparted by the laser. The basic physical properties of such a laser-induced thermoacoustic source are investigated with a time domain approach which is valid in the nearfield of the source. Results are then extended to the case of a thermoacoustic source moving at subsonic, transonic, or supersonic velocities on the surface of the water. Special attention is paid to the case of a source moving at a velocity close to the speed of the sound in the water, because, at such a velocity, high pressure transients can be generated, making the thermoacoustic mechanism of sound generation more attractive for practical applications. Experimental results were obtained with a laser system providing up to 5 joules of energy over a pulse duration of approximately 1 ms, during which the intensity was modulated at a single frequency between 5 and 80 kHz. The laser emitted either in the infrared region of the spectrum or in the visible region of the spectrum. Most of the experimental results presented in this study were obtained with the infrared Neodymium: Glass laser. Four kinds of results were obtained: pressure waveforms, directivity patterns, sound level dependence on source velocity, and spreading curves. In general, the experimental results are in good agreement with the theoretical predictions.
GRA

N86-19139# Pacific Northwest Lab., Richland, Wash.
ACOUSTIC EMISSION/FLAW RELATIONSHIP FOR IN-SERVICE MONITORING NUCLEAR PRESSURE VESSELS Progress Report, Oct. 1984 - Mar. 1985
P. H. Hutton and R. J. Kurtz 1985 26 p
(TI85-016647; NUREG/CR-4300-Vol-1; PNL-5511-Vo-1) Avail: NTIS HC A03/MF A01

Technical progress in developing continuous acoustic emission (AE) monitoring of nuclear reactor pressure boundaries for flaw detection is discussed in this report. The period covered is October 1, 1984, to April 1, 1985. Topics include final analysis of ZB-1 vessel test data, preparation for continuous AE monitoring of Watts Bar Unit 1 reactor during operation, AE signal pattern recognition development, and development of an ASTM standard for application of continuous AE monitoring to pressure boundaries. DOE

N86-19140# Argonne National Lab., Ill. Components Technology Div.
CHARACTERIZATION OF ACOUSTIC EMISSION SIGNALS GENERATED BY WATER FLOW THROUGH INTERGRANULAR STRESS CORROSION CRACKS
T. N. Claytor and D. S. Kupperman May 1985 6 p Presented at the 2nd International Conference on Acoustic Emission, Lake Tahoe, Nev., 28 Oct. - 1 Nov. 1985; sponsored by Acoustic Emission Working Group Sponsored in part by Nuclear Regulatory Commission, Washington, D.C.
(TI85-014970; CONF-8510159-1) Avail: NTIS HC A02/MF A01

A program is under way at Argonne National Laboratory (ANL) to develop an independent capability to assess the effectiveness of current and proposed techniques for acoustic leak detection (ALD) in reactor coolant systems. The program will establish whether meaningful quantitative data on flow rates and leak location can be obtained from acoustic signatures of leaks due to intergranular stress corrosion cracks (IGSCCs) and fatigue cracks, and whether these can be distinguished from other types of leaks. DOE

N86-19141# Argonne National Lab., Ill.
COMPARISON OF X-RAY COMPUTED TOMOGRAPHY, THROUGH-TRANSMISSION ULTRASOUND, AND LOW-kV X-RAY IMAGING FOR CHARACTERIZING GREEN-STATE CERAMICS
R. A. Roberts, W. A. Ellingson, and M. W. Vannier Jun. 1985 8 p refs Presented at the 15th Symposium on Nondestructive Evaluation, San Antonio, Tex., 23 Apr. 1985 Prepared in cooperation with Washington Univ., St. Louis, Mo.
(Contract W-31-109-eng-38)
(DE85-018370; CONF-8504119-2) Avail: NTIS HC A02/MF A01

Green-state $MgAl_2O_4$ compact disk specimens have been studied by X-ray computed tomography (CT), through-transmission pulsed ultrasound, and low-kV X-ray imaging to compare the abilities of these nondestructive evaluation (NDE) methods to detect flaws and density variations. X-ray computed tomographic images were obtained from a 125-kV (peak) imaging system with a 512 x 512 matrix and a pixel size of 100 (MU)m. A 3- to 10MHz focused-beam ultrasonic transducer was used, together with special immersion techniques, to obtain topographical maps of acoustic attenuation and phase velocity; a 30 x 30 matrix was used in the ultrasonic scans. A 35-kV X-ray system with high-

solution type RR film was used to obtain conventional radiographs. Large-scale nonuniform density gradients were detected with CT and ultrasonics in supposedly uniform ceramic disks. In addition, inclusions in the green-state samples were detected by all three methods, with each method providing certain advantages. The influence of grain structure and other ceramic powder characteristics will be examined in the future. DOE

N86-19142# Argonne National Lab., Ill.
ACOUSTIC DETECTION OF CAVITATION IN A PROTOTYPE CENTRIFUGAL PUMP
Y. S. Cha 1985 6 p Presented at the International Symposium on Propeller and Cavitation, Wuxi, Jiangsu, China, 1 Apr. 1985
(Contract W-31-109-eng-38)
(DE85-018447; CONF-8504180-1) Avail: NTIS HC A02/MF A01

This paper describes the results of acoustic detection, using a submerged hydrophone, of cavitation in a prototype centrifugal pump. The experimental results show that the high-frequency (> 10 kHz) noise provides a better means of detecting light and moderate pump cavitation conditions as compared with low-frequency cavitation noise that was not easily distinguished from the background noise. Another important observation was that cavitation noise started to increase sharply when the NPSH value was reduced to some critical value which seemed to coincide with the point where the head started to decrease for all the tests. Noise at higher frequency bands exhibited quite different behavior from that at low frequencies. For a high NPSH value, the high-frequency noise amplitude increased slightly as the NPSH value was decreased while the head remained constant. The high-frequency noise started to increase sharply as soon as the head began to decrease until somewhere near the 3% headdrop point. The noise level then decreased and increased again over a very narrow band of NPSH value. This phenomenon was observed in some other pump tests reported in the literature. A qualitative interpretation was provided to explain this behavior. DOE

N86-19143# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
REPORT OF NOISE MEASUREMENTS WITH 2 DIFFERENT MICROPHONE DISPOSITIONS ON AIRPLANE TYPE CESSNA F 172L [VERSLAG VAN GELUIDSMETINGEN MET TWEE VERSCHILLENDE MICROFOONOPSTELLINGEN AAN HET VLIEGTUIGTYPE CESSNA F 172L]
D. M. vanPassen Apr. 1984 28 p refs In DUTCH
(VTH-M-510) Avail: NTIS HC A03/MF A01

The noise level of a Cessna F 172L in stationary symmetric horizontal engine flight at 1000 feet height was measured 14 times using 2 microphones placed above a white-sprayed aluminum plate and 1.2 m height above grassland, both horizontally directed to the arriving airplane. The measurements were carried out to determine the variation in noise certification measurements, and to verify a model for the determination of ground impact. The A-weighted noise spectra levels of the plane in overhead position are measured and averaged after flight height deviation corrections. Author (ESA)

N86-19144# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
COMPARISONS BETWEEN ULTRASONIC BULK SHEAR WAVE VELOCITIES IN TEXTURED STEEL WITH APPLICATION TO THE MEASUREMENT OF RESIDUAL STRESS
D. R. Allen Jan. 1985 17 p
(AERE-R-11559) Avail: NTIS HC A02/MF A01

Accurate comparisons of the ultrasonic shear wave velocities, for various modes of propagation in textured mild steel plate, are reported. The results indicate that the use of such comparisons forms a valid basis of potential methods for measuring residual stress in bulk mild steel plates. DOE

N86-19145# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
STUDIES OF LASER-GENERATED ULTRASONIC WAVEFORMS AT DIFFERENT ORIENTATIONS
C. B. Scruby Apr. 1985 14 p
(AERE-R-11686) Avail: NTIS HC A02/MF A01

The ultrasonic waveforms generated by a pulsed laser incident on a steel plate are studied at an oblique orientation as a function of laser energy and compared with the results at the epicenter. There is a steady increase in compression wave amplitude with energy when passing from thermoelastic to ablation regimes, the waveform exhibiting a compressive pulse throughout, in a contrast to the epicenter where there is a large increase in amplitude and change of pulse shape. It is concluded that the thermoelastic and ablation sources are comparable in generation efficiency per unit laser energy, except close to the epicenter, and that the chief effect of raising the power density is to vary the angular distribution of ultrasonic energy. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-19146 Central Electricity Generating Board, London (England).
NUCLEAR SAFETY TECHNOLOGY AND PUBLIC ACCEPTANCE
F. Kienle 14 Nov. 1985 8 p ref Transl. into ENGLISH from Atom and Strom (West Germany), v. 29, no. 5, 1983 p 131-132
(BLL-CE-Trans-8123(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

In the years 1976 to 1982 officialdom intensified the safety regulations in German nuclear power plants out of all proportion, without actually bringing about a recognizable plus in safety or indeed a greater acceptance by the public of the peaceful use of nuclear energy. Although the risk to employees of nuclear power plants and to the population living in their vicinity is substantially smaller than the dangers of modern civilization, the general public still regards with concern the consequences of radioactive exposure and the hazards to later generations from long-life radionuclides. The task for the coming years must be to maintain the safety standard now attained, while simultaneously reducing those exaggerated individual requirements in order to establish a balance in safety precautions. Additionally, a proposal put forward by Sir Walter Marshall, Chairman of the CEGB, should be pursued, i.e., to put the presumed risks of nuclear energy into their correct perspective in the public eye using comprehensible comparisons such as the risks from active or passive smoking. This cannot be accomplished by quoting abstract statistics. Author

N86-19147# Colorado Univ., Boulder.
ANNUAL GASEOUS ELECTRONICS CONFERENCE (37TH): PROGRAM AND ABSTRACTS
12 Oct. 1984 129 p Conference held at Boulder, Colo., 9-12 Oct. 1984
(Contract N00014-84-F-0137)
(AD-A159928) Avail: NTIS HC A07/MF A01 CSCL 09/5

This document contains articles on: Ion transport; Electron collisions; Lasers; Glows and switching; Workshop on ion-molecule reactions; Ion-molecule reactions; Argon and SF6 arcs; Posters. Mostly discharges; Silane discharges; Metal halide and mercury arcs; Workshop on RF discharges; Electron transport; Thermal arc sprays; Glow diagnostics; Posters. Mostly atomic and molecular; Spark development; Ionization processes; and Invited papers. GRA

N86-19148# Georgia Inst. of Tech., Atlanta. School of Physics.
ASSOCIATION/DISSOCIATION PROCESSES IN DENSE GASES
Annual Technical Report, 1 Jul. 1984 - 30 Jun. 1985
M. R. Flannery 16 Aug. 1985 81 p
(Grant AF-AFOSR-0233-84)
(AD-A160236; GIT-85-001; AFOSR-85-0793TR) Avail: NTIS HC A05/MF A01 CSCL 07/4

A new basic microscopic theory of association/dissociation processes in dense gases has been developed. Expressions for

the time-dependent rates R (subscript A, D)(t) for the association/dissociation of atomic or molecular species A and B in a gas M are formulated in terms of the net probability P sub i (superscript A, D) for association/dissociation of bound energy level i of the pair (A-B). A new Variational Principle for these rates is proposed and is applied to ion-ion recombination, as a benchmark, with very successful results. The diffusional theory is examined and it is shown that highly accurate results can be obtained for general mass systems provided the new basic expression introduced here for R (sub (A,D))(t) is adopted. The microscopic basis of the mascroscopic Debye-Smoluchowski Equation (DSE) is examined and analytical expressions for rates are derived for general interactions between A and B. A valuable relationship between the rates of recombination appropriate to the cases of ions generated with uniform frequency within a reaction volume and ions which approach each other from infinite separation is derived. GRA

N86-19149# Ohio State Univ., Columbus. Dept. of Chemistry.
PROCEEDINGS OF THE 40TH SYMPOSIUM ON MOLECULAR SPECTROSCOPY Final Report
I. N. Rao 21 Jun. 1985 169 p Proceedings held at Columbus, Ohio, 17-21 Jun. 1985
(Grant AF-AFOSR-0145-85)
(AD-A160415; AFOSR-85-0799TR) Avail: NTIS HC A08/MF A01 CSCL 07/4

Recent years have witnessed the development of powerful experimental techniques that have allowed the observation of finer details of molecular spectra with a resolution not conceived as possible even in the recent past. Therefore, in interpreting the laboratory data it has become necessary to re-examine the theory. Document provides abstracts of all 275 papers presented at the symposia. GRA

N86-19150# National Bureau of Standards, Washington, D.C. National Measurement Lab.
TRIPLY DIFFERENTIAL STUDIES OF ATOMIC AND MOLECULAR PHOTOIONIZATION USING SYNCHROTRON RADIATION Final Report, 1 Jun. 1980 - 30 Sep. 1985
A. C. Parr and J. L. Dehmer 17 Oct. 1985 17 p
(Contract N00014-85-F-0016; DA Proj. RR0-1103)
(AD-A160587) Avail: NTIS HC A02/MF A01 CSCL 07/4

Basic studies of photoionization processes in atoms and molecules have been carried out using triply differential (differential in incident wavelength, ejected electron energy, and ejection angle) photoelectron spectroscopy with synchrotron radiation as the excitation source. Measurements have been conducted in the vacuum ultraviolet wavelength range up to h(mu) approximately 35 eV on a variety of atomic and molecular systems. Photoelectron branching ratios (partial photoionization cross sections) and photoelectron angular distributions were obtained for all accessible states. Several novel physical effects were discovered including (1) shape-resonance-induced vibrational effects in molecular photoionization, (2) autoionization-induced-vibrational effects in molecular photoionization, (c) polarization of fluorescence following molecular photoionization, (4) photoelectron spectra of selected rare gas clusters, (5) continuum-continuum-coupling effects in photoionization of Nitrogen and Sulfur hexafluoride, etc. Triply differential photoionization data on a variety of atoms and molecules were produced. A second-generation, state-of-the-art triply differential photoelectron spectrometer was developed and put into operation. GRA

N86-19151# Massachusetts Inst. of Tech., Cambridge. Lab. of Electronics.
FORCES ON NEUTRAL ATOMS DUE TO ELECTROMAGNETIC FIELDS Annual Summary Report, 1 Sep. 1984 - 31 Aug. 1985
D. E. Pritchard 23 Oct. 1985 6 p
(Contract N00014-83-K-0695)
(AD-A160719) Avail: NTIS HC A02/MF A01 CSCL 07/4

Progress Report discusses design and construction of a new large bore (3 in.) atom slower and trap which will use cryogenics both to produce ultra-low vacuums and to enable use of superconducting magnet technology. The vacuum and cryogenic dewar is under construction, the longitudinal magnets have been built, and the trap magnet has been successfully tested. Considerable effort was also devoted to major renovations of our laboratory space including installation of a 18 in. hole to the newly acquired laboratory space below our laser lab this will permit use of a vertical configuration for the apparatus, which is roughly 5 meters long. GRA

N86-19152# Smithsonian Astrophysical Observatory, Cambridge, Mass.
EXPERIMENTAL STUDIES IN MOLECULAR FRAGMENTATION: PROCESSES, ENERGETICS AND DIAGNOSTICS Final Report, 1 Jan. 1983 - 31 Mar. 1985
J. L. Kohl Sep. 1985 60 p
(Contract N00014-83-K-0134)
(AD-A160745) Avail: NTIS HC A04/MF A01 CSCL 07/5

Developed is a new technique and apparatus for studying photodestruction processes in molecules. Proof of method experiments have been carried out using H2(+) as the prototypical molecule. A paper describing this work has been submitted to the Review of Scientific Instruments. Application of the method to polyatomics and more than two fragments per dissociation event has been investigated. Beams of the ions of nitromethane and its fragments have been produced in sufficient quantities fo experimentation using our technique. The absorption spectrum of nitromethane has been measured in the range 190 to 300 nm with 0.001 nm resolution. A feasibility study of induced fluorescence experiments to determine the spectra of polyatomic free radicals has been carried out. Experiments on the photodissociation of CH(+) and OH(+) and CH have been initiated. GRA

N86-19153# Georgia Univ., Athens. Dept. of Chemistry.
CHEMICAL APPLICATIONS OF TOPOLOGY AND GROUP THEORY. 19: THE EVEN PERMUTATIONS OF THE LIGANDS IN FIVE-COORDINATE COMPLEXES VIEWED AS PROPER ROTATIONS OF THE REGULAR ICOSAHEDRON
R. B. King and D. H. Rouvray 14 Oct. 1985 23 p
(Contract N00014-84-K-0365)
(AD-A160747; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/3

The 60 even permutations of the ligands in the five-coordinate complexes, ML5, form the alternating group A5, which is isomorphic with the icosahedral pure rotation group I. Using this idea, it is shown how a regular icosahedron can be used as a topological representation for isomerizations of the five-coordinate complexes, ML5, involving only even permutations if the five ligands L correspond either to the five nested octahedra with vertices located at the midpoints of the 30 edges of the icosahedron or to the five regular tetrahedra with vertices located at the midpoints of the 20 faces of the icosahedron. However, the 120 total permutations of the ligands in five-coordinate complexes ML5 cannot be analogously represented by operations in the full icosahedral point group Ih, since Ih is the direct product I x C2 whereas the symmetric group S5 is only the semi-direct product. In connection with previously used topological representations on isomerism in five coordinate complexes, it is noted that the automorphism groups of the Petersen graph and the Desargues-Levi graph are isomorphic to the symmetric group S5 and to the direct product S5 x S2, respectively. Applications to various fields of chemistry are briefly outlined. GRA

N86-19154# York Univ., Downsview (Ontario). Dept. of Chemistry.
INTRAMOLECULAR COUPLING IN METAL-FREE BINUCLEAR PHTHALOCYANINES
E. S. Dodsworth, A. B. P. Lever, P. Seymour, and C. C. Leznoff May 1985 44 p
(Contract N00014-84-G-0201)
(AD-A160784; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/4

The electronic absorption and emission spectra of a series of mononuclear and binuclear metal-free phthalocyanine species are reported. The binuclear species are linked through a benzene ring by a bridge of 0,1,2,4 or 5 atoms. The spectroscopic data for the

nuclear species, are analysed in terms of exciton coupling between the two halves of the molecule. Intramolecular coupling seen to depend upon the nature of the bridging link. In some ses a cofacial conformation is possible; this gives rise to aracteristic long-lived emission near 750 nm. GRA

86-19155# California Univ., Berkeley. Lawrence Berkeley Lab.
EASUREMENTS OF STABILITY LIMITS FOR A SPACE-HARGE-DOMINATED ION BEAM IN A LONG A.G. TRANSPORT HANNEL
L. G. Tiefenback and D. Keefe May 1985 6 p Presented at he Particle Accelerator Conference, Vancouver, British Columbia, 3 May 1985
Contract DE-AC03-76SF-00098)
DE85-016636; LBL-19647; CONF-850504-241) Avail: NTIS HC A02/MF A01

The Single Beam Transport Experiment at LBL consists of 32 electrostatic quadrupole lenses arranged in a FODO lattice. Five further lenses provide a matched beam from a high-current high-brightness cesium source for injection into the FODO channel. We call the transport conditions stable if both the emittance and current remain unchanged between the beginning and end of the channel, and unstable if either the emittance grows or the current decreases because of collective effects. We have explored the range of single-particle betatron phase advance per period from sigma0 = 45 to 150 deg to determine the stability limits for the space-charge depressed phase advance, sigma. No lower limit for sigma (down to 7(0)) has been found at sigma0 = 60(0), whereas limits have clearly been identified and mapped in the region of sigma0 above 90 deg. DOE

N86-19156# Argonne National Lab., Ill. Physics Div.
A SUPERCONDUCTING HEAVY ION INJECTOR LINAC
K. W. Shepard 1985 5 p Presented at the IEEE 1985 Particle Accelerator Conference, Vancouver, British Columbia, 13-16 May 1985
(Contract W03101980eng-38)
(DE85-013897; CONF-850504-176) Avail: NTIS HC A02/MF A01

A conceptual design for a low velocity .007 < v/c < .07 superconducting heavy-ion linac is reviewed. This type of linac may have significant cost and performance advantages over room-temperature linacs, at least for applications requiring modest beam currents. Some general features of the design of very-low velocity superconducting accelerating structures are discussed and a design for a 48.5 MHz, v/c < .0009 structure, together with the status of a niobium prototype, is discussed in detail. Preliminary results of a beam dynamics study indicate that the low velocity linac may be able to produce heavy-ion beams th time-energy spreads of a few KeV-nsec. DOE

N86-19157# Fermi National Accelerator Lab., Batavia, Ill.
THE LAST HURRAH FOR QUARKONIUM PHYSICS: THE TOP SYSTEM
E. Eichten Feb. 1985 42 p refs Presented at 1984 SLAC Summer School
(DE85-012304; FNAL/C-85/29-T; CONF-850768-1) Avail: NTIS HC A03/MF A01

This year marks the tenth anniversary of the discovery of the J/psi. During this time much experimental data and theoretical understanding has been accumulated for heavy quark systems. Heavy quark systems have a very clean spectroscopy which allows precision measurements of all the basic properties of the states (mass, spin, parity, and change conjugation, as well as transition and decay rates. In particular, the analysis of the observed spectrum of (C, anti c) and (B, anti b) resonances has provided important insight into the physics of heavy quark-antiquark (quarkonium) systems. In addition to these systems, the low-lying states with associated new flaor (i.e. one heavy quark and one light quark system) have been observed for the (C, anti u), (C, anti d), (C, anti s), (B, anti u), and (B, anti d) systems. DOE

N86-19158# Sandia National Labs., Albuquerque, N. Mex.
ELECTRO-OPTICAL KERR EFFECT VOLTAGE MEASUREMENTS ON MULTI-MEGAVOLT PULSED POWER ACCELERATORS
G. R. Allen, H. P. Davis, B. T. Neyer, D. J. Muron, J. Chang, and R. E. Hebner 1985 4 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985 Prepared in cooperation with National Bureau of Standards, Washington, D.C.
(Contract DE-AC04-76DP-00789)
(DE85-016580; SAND-85-0354C; CONF-850887-23) Avail: NTIS HC A02/MF A01

We have developed a highly accurate, non-perturbing, non-invasive voltage monitor for multi-megavolt measurements in water using the electro-optic Kerr effect. The strong electric field causes the normally isotropic water to become linearly birefringent, with the birefringence axis aligned along the field. A beam polarized at 45(0) with respect to the electric field will experience a phase difference in the parallel and perpendicular components by an amount proportional to the square of the electric field. Measuring the phase change gives an accurate and precise value of the electric field. DOE

N86-19159# Los Alamos National Lab., N. Mex.
ANTIPROTON ANNIHILATIONS IN NUCLEI
P. L. McGaughey, K. D. Bol, M. R. Clover, R. M. DeVries, N. J. DiGiacomo, J. S. Kapustinsky, G. R. Smith, J. W. Sunier, W. E. Sondheim, and Y. Yariv 1985 9 p refs Presented at the Hadronic Probes and Nuclear Interactions Conference, Tempe, Ariz., 11 Mar. 1985 Prepared in cooperation with Grenoble-1 Univ., France and Fribourg Univ., Switzerland
(Contract W-7405-eng-36)
(DE85-010729; LA-UR-85-1481; CONF-8503120-6) Avail: NTIS HC A02/MF A01

Recent results from LEAR experiment PS187 are presented. Preliminary data for the inclusive production of (PI)(+), K(+), and p from the annihilation of 180 MeV antiprotpns in (28)Si and (238)U are compared with predictions of intranuclear cascade calculations. Proton and pion production data are well reproduced by the calculations, but kaon yields at low momenta appear to be strongly suppressed in the experimental data. DOE

N86-19160# Argonne National Lab., Ill.
FRACTAL BEHAVIOR OF SINGLE-PARTICLE TRAJECTORIES AND ISOSETS IN ISOTROPIC AND ANISOTROPIC FLUIDS
R. K. Kalia, P. Vashishta, and S. W. deLeeuw Aug. 1985 7 p Presented at the 9. International Workshop on Condensed Matter Theories, San Francisco, Calif., 5 Aug. 1985 Prepared in cooperation with Michigan State Univ., East Lansing
(Contract W-31-109-eng-38)
(DE85-018343; CONF-8508135-1) Avail: NTIS HC A02/MF A01

Molecular dynamics simulations for a variety of systems in 2 spatial dimensions reveal fractal behavior associated with trajectories and isosets of single particle motion. The fractal dimensions of trajectories and isosets are 2 and 0.5, respectively, irrespective of the nature of the interparticle interaction or thermodynamic state of the system. Recently, we have investigated the fractal behavior of diffusing Ag ions in the superionic phase of Ag2S. MD calculations have shown that the Ag ions diffuse anisotropically along certain directions in the lattice of S particles. Fractal dimensions D and anti D for Ag ions are again 2 and 0.5, respectively. These results confirm the universal nature of fractal dimensions of trails and isosets. DOE

N86-19161# Argonne National Lab., Ill.
DISTORTION OF He EMISSION LINES AFTER FAST-ION COLLISIONS
P. W. Arcuni 1985 8 p refs Presented at the Workshop on Autoionization of Atoms and Small Molecules, Argonne, Ill., 2 May 1985 Prepared in cooperation with Chicago Univ., Ill.
(Contract W-31-109-eng-38)
(DE85-018347; CONF-850560-6) Avail: NTIS HC A02/MF A01

After excitation by fast ions (velocity = 2 to 5 au) the emission

line profiles of doubly-excited helium atoms are observed to differ significantly from the normal shape of Beutler-Fano resonances. This difference is attributed to the Coulomb interaction between the emitted electron and the ion used to excite the atom. We explain the effect quantitatively with a simple classical model combined with a post-collision-interaction theory. DOE

N86-19162# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
SMALL ANGLE NEUTRON SCATTERING DATA ON CEMENTS WITH POZZOLANIC ADDITIVES
D. Pearson, A. J. Allen, and R. A. J. Sambell Mar. 1985 24 p
(AERE-R-11609) Avail: NTIS HC A02/MF A01

Small angle neutron scattering has been used to demonstrate that the reaction between reactive silicas and calcium hydroxide in ordinary portland cement (the so-called pozzolanic reaction) does produce additional material. This additional material is microstructurally similar to calcium silicate hydrate gel, the normal cementitious phase in hydrated cement. Increase in temperature is shown to increase the rate of production of gel ascribed to the pozzolanic reaction. In addition, the rate of compressive strength development at different curing temperatures is shown not to be directly related to the amount of gel which is produced. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-19163# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
THE USE OF ELECTRON BEAM POSITION MODULATION IN AUGER DEPTH PROFILE ANALYSIS Technical Report
M. S. Leung and G. W. Stupian 1 Sep. 1985 24 p
(Contract F04701-83-C-0084)
(AD-A159712; TR-0084A(5945-02)-2; SD-TR-85-60) Avail: NTIS HC A02/MF A01 CSCL 14/2

By combining Auger analysis with ion etching, the scanning Auger microprobe (SAM) provides three-dimensional composition information not readily obtainable from other analytical methods. As this technique is being applied to the analysis of microelectronic devices with increasingly smaller dimensions, two major limitations become evident: (1) features of interest in microelectronic circuits are often comparable in size to the beam diameter of commercial Auger microprobes, and (2) the electron beam tends to drift on the specimen surface because of mechanical instability and differential thermal expansion. Because Auger Depth profiling requires relatively low sputter rates for good depth resolution, depth profiles of small features can be seriously degraded by beam drift. In this report, we describe a technique that will eliminate the error and uncertainty caused by beam instability. In our technique, the analyzing beam is scanned repetitively across the feature to be profiled, and the Auger signal is synchronously detected at the scan frequency. The resultant Auger signal magnitude is shown to be unaffected by beam drift when compared to conventional detection methods. Author (GRA)

N86-19164# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
HEAT PIPE SPACE NUCLEAR REACTOR DESIGN ASSESSMENT. VOLUME 1: DESIGN STATUS OF THE SP-100 HEAT PIPE SPACE NUCLEAR REACTOR SYSTEM Final Report, 5 May 1982 - 27 Mar. 1985
V. F. Dean, M. S. El-Genk, D. L. Y. Louie, and D. M. Woodall Aug. 1985 52 p
(Contract F29601-82-K-0055)
(AD-A160279; NE-101(85)AFWL-144-1-Vol-1;
AFWL-TR-84-126-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 18/9

This document reviews the design status of the SP-100, heat pipe space nuclear reactor system. It also identifies those systems and components requiring additional research to support continued SP-100 system development. The heat pipe reactor was designed to produce 100 KWe of continuous power in a space environment. The design constraints include an expected system operation time of 7 years and a maximum weight of approx. 3000 kg. The reactor, employing an unclad, highly enriched uranium dioxide core, operates as a fast reactor, and is cooled by high temperature molybdenum – 13 percent rhenium, heat pipes with lithium working fluid. Electric power is generated by thermoelectric converters, with the bulk of the thermal energy rejected to space by a radiator panel system. GRA

N86-19165# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
HEAT PIPE SPACE NUCLEAR REACTOR DESIGN ASSESSMENT. VOLUME 2: FEASIBILITY STUDY OF UPGRADING THE SP-100 HEAT PIPE SPACE NUCLEAR POWER SYSTEM Final Report, 5 May 1982 - 27 Mar. 1985
M. S. El-Genk and J. T. Seo Aug. 1985 132 p
(Contract F29601-82-K-0055)
(AD-A160280; NE-108(85)AFWL-144-Vol-2;
AFWL-TR-84-126-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 18/9

This report investigated the feasibility of upgrading the power of the Heat Pipe Space Nuclear Reactor (HPSNR) system design. The report has also discussed the four primary methods for power upgrading: Increasing the thermal power output to the reactor core, pulse-mode operation, improving the heat rejection, and improving the thermal-to-electric energy conversion. GRA

N86-19166# Los Alamos National Lab., N. Mex.
NEW MESON-NUCLEUS DYNAMICS FROM STUDIES OF (PION, ETA MESON) (PION, 2 PION)
L. C. Liu 1985 11 p Presented at the 4th International Conference on Nuclear Reaction Mechanisms, Varenna, Italy, 10-15 Jun. 1985
(Contract W-7405-eng-36)
(DE85-012753; LA-UR-85-1952; CONF-8506120-1) Avail: NTIS HC A02/MF A01

During the past ten years, significant progress has been made in understanding the role of the delta(1232) in nuclear physics. Most of the information on delta-nucleus dynamics was obtained from direct studies of pion-nucleus interactions at pion kinetic energies between 30 and 300 MeV. As the energy of a pion incident on a nucleon increases, various production channels in pi N collisons become important. Consequently, understanding these production processes in nuclei represents a natural first step in our pursuit of the high-energy frontier of nuclear physics. In this brief talk, I shall focus my discussion on (Pi, 2 Pi) and (Pi, nu) reactions which are the two most important production channels at pion kinetic energies below 1 GeV. DOE

N86-19167# Sandia National Labs., Albuquerque, N. Mex. Waste Management Systems Div.
DEVELOPMENT OF PERFORMANCE ASSESSMENT METHODOLOGY FOR NUCLEAR WASTE ISOLATION IN GEOLOGIC MEDIA
E. J. Bonano, M. S. Y. Chu, R. M. Cranwell, and P. A. Davis 1985 14 p Presented at a conference
(Contract DE-AC04-76DP-00789)
(TI85-017813; SAND-85-0456C; CONF-851232-1) Avail: NTIS HC A02/MF A01

The burial of nuclear wastes in deep geologic formations as a means for their disposal is an issue of significant technical and social impact. The analysis of the processes involved can be performed only with reliable mathematical models and computer codes as opposed to conducting experiments because the time scales associated are on the order of tens of thousands of years. These analyses are concerned primarily with the migration of radioactive contaminants from the repository to the environment accessible to humans. Modeling of this phenomenon depends on

a large number of other phenomena taking place in the geologic porous and/or fractured medium. These are ground-water flow, physicochemical interactions of the contaminants with the rock, heat transfer, and mass transport. Once the radionuclides have reached the accessible environment, the pathways to humans and health effects are estimated. A performance assessment methodology for a potential high-level waste repository emplaced in a basalt formation has been developed for the U.S. Nuclear Regulatory Commission. DOE

N86-19168# Geological Survey, Denver, Colo.
GEOLOGIC AND HYDROLOGIC CHARACTERIZATION AND EVALUATION OF THE BASIN AND RANGE PROVINCE RELATIVE TO DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTE. PART 3: GEOLOGIC AND HYDROLOGIC EVALUATION
M. S. Bedinger, K. A. Sargent, and B. T. Brady 1985 31 p
(TI85-901876; USGS-CIRC-904C-Pt-3) Avail: NTIS HC A03/MF A01

This report describes the first phase in evaluating the geology and hydrology of the Basin and Range Province for potential suitability of geohydrologic environments for isolation of high-level radioactive waste. The evaluation of the Province applies the guidelines, discussed in Part 1 (Bedinger, Sargent, and Reed, 1983) of this report to the geologic and hydrologic information compiled for the Province in Part 2 (Sargent and Bedinger, 1983). The geologic and hydrologic factors considered in the Province evaluation include distribution of potential host rocks, tectonic conditions and data on ground-water hydrology. Potential host media considered include argillaceous rocks, tuff, basaltic rocks, granitic rocks, evaporites, and the unsaturated zone. The tectonic factors considered are Quaternary faults, late Cenozoic volcanics, seismic activity, heat flow, and late Cenozoic rates of vertical uplift. Hydrologic conditions considered include length of flow path from potential host rocks to discharge areas, interbasin and geothermal flow systems and thick unsaturated sections as potential host media. Author

N86-19169# California Univ., Berkeley. Lawrence Berkeley Lab. Central Design Group.
AN ESTIMATE OF THE CONTRIBUTIONS OF BELLOWS TO THE IMPEDANCES AND BEAM INSTABILITIES OF THE SSC
Joseph Bisognano and King Yuen Ng Jul. 1985 17 p Prepared in cooperation with Fermi National Accelerator Lab., Batavia, Ill.
(DE85-017363; FNAL-TM-13402) Avail: NTIS HC A02/MF A01

Between sections of the vacuum chamber, bellows are needed to compensate for thermal expansion and transverse offsets. For beampipe made of stainless steel with a coefficient of linear expansion 19 x 10 to the -6 C and a temperature variation of approx. 316 C, the allowance for bellows is approx. 1.2% of the total length of the beampipe, if we assume that the bellows are 50% compressible. This implies 1.08 km of bellows for Design A of the SSC which has a circumference of 90 km. DOE

N86-19170# Fermi National Accelerator Lab., Batavia, Ill.
TEVATRON EXTRACTION MICROCOMPUTER
L. Chapman, D. A. Finley, M. Harrison, and W. Merz Jun. 1985 4 p Presented at the 1985 Particle Accelerator Conference (NPS), Vancouver, British Columbia, 13-16 May 1985
(DE85-016985; FNAL-TM-1322; CONF-850504-25) Avail: NTIS HC A02/MF A01

Extraction in the fErmilab Tevatron is controlled by a multiprocessor Multibus microcomputer system called QXR (Quad extraction Regulator). QXR monitors several analog beam signals and controls three sets of power supplies: the bucker and pulse magnets at a rate of 5760 Hz, and the QXR magnets at 720 Hz. QXR supports multiple slow spills (up to a total of 35 seconds) with multiple fast pulses intermixed. It linearizes the slow spill and bucks out the high frequency components. Fast extraction is done by outputting a variable pulse waveform. Closed loop learning techniques are used to improve performance from cycle to cycle for both slow and fast extraction. The system is connected to the Tevatron clock system so that it can track the machine cycle. QXR is also connected to the rest of the Fermilab control system, ACNET. Through ACNET, human operators and central computers can monitor and control extraction through communications with QXR. The controls hardware and software both employ some standard and some specialized components. This paper gives an overview of QXR as a control system; another paper summarizes performance. DOE

N86-19171# Argonne National Lab., Ill.
CONCEPTUAL DESIGN OF THE ARGONNE 6-GEV SYNCHROTRON LIGHT SOURCE
Y. Cho, E. Crosbie, T. Khoe, M. Knott, S. Kramer, R. Kustom, R. Lari, R. Martin, G. Mavrogenes, and J. Moenich 1985 3 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Prepared in cooperation with Fermi National Accelerator Lab., Batavia, IL.
(Contract W-31-109-eng-38)
(DE85-018419; ANL-HEP-CP-85-37; CONF-850504-282) Avail: NTIS HC A02/MF A01

The Argonne National Laboratory Synchrotron Light Source Storage Ring is designed to have a natural emittance of 6.5 x 10(-9) m for circulating 6-GeV positrons. Thirty of the 32 long straight sections, each 6.5-m long, will be available for synchrotron light insertion devices. A circulating positron current of 300 mA can be injected in about 8 min. from a booster synchrotron operating with a repetition time of 1.2 sec. The booster synchrotron will contain two different RF systems. The lower frequency system (38.97 MHz) will accept positrons from a 360-MeV linac and will accelerate them to 2.25 GeV. The higher frequency system (350.76 MHz) will accelerate the positrons to 6 GeV. The positrons will be produced from a 300-MeV electron beam on a tungsten target. A conceptual layout is shown. DOE

N86-19172# Earth Technology Corp., Houston, Tex.
EVALUATION OF GEOLOGIC AND GEOPHYSICAL TECHNIQUES FOR SURFACE-TO-SUBSURFACE PROJECTIONS OF GEOLOGIC CHARACTERISTICS IN CRYSTALLINE ROCK
Jul. 1985 313 p refs
(Contract DE-AC02-83CH-10139)
(DE86-000221; BMI/OCRD-22) Avail: NTIS HC A14/MF A01

Granitic and gneissic rock complexes are being considered for their potential to contain and permanently isolate high-level nuclear waste in a deep geologic repository. The use of surface geologic and geophysical techniques has several advantages over drilling and testing methods for geologic site characterization in that the techniques are typically less costly, provide data over a wider area, and do not jeopardize the physical integrity of a potential repository. For this reason, an extensive literature review was conducted to identify appropriate surface geologic and geophysical techniques that can be used to characterize geologic conditions in crystalline rock at proposed repository depths of 460 to 1,220 m. Characterization parameters such as rock quality; fracture orientation, spacing; and aperture; depths to anomalies; degree of saturation; rock body dimensions; and petrology are considered to be of primary importance. Techniques reviewed include remote sensing, geologic mapping, petrographic analysis, structural analysis, gravity and magnetic methods, electrical methods, and seismic methods. Each technique was reviewed with regard to its theoretical basis and field application; geologic parameters that can be evaluated; advantages and limitations, and, where available, case history applications in crystalline rock. Available information indicates that individual techniques provide reliable information on characteristics at the surface, but have limited success in projections to depths greater that approximately 100 m. A combination of integrated techniques combines with data from a limited number of boreholes would significantly improve the reliability and confidence of early characterization studies to provide qualitative rock body characteristics for region-to-area and area-to-site selection evaluations. DOE

N86-19173# Los Alamos National Lab., N. Mex.
DEVELOPMENT OF TECHNOLOGY FOR THE DESIGN OF SHALLOW LAND BURIAL FACILITIES AT ARID SITES
J. W. Nyhan, W. V. Abeele, B. J. Drennon, W. J. Herrera, E. A.

Lopez, G. J. Langhorst, E. A. Stallings, R. D. Walker, and J. L. Martinez 1985 21 p Presented at the 7th Annual DOE LLWMP Participants Information Meeting, Las Vegas, Nev., 10 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000759; LA-UR-85-3278; CONF-8509121-15) Avail: NTIS HC A02/MF A01

The Los Alamos field research program involving technology development for arid shallow land burial (SLB) sites is described. Field data are presented for an integrated field experiment, which was designed to test individual SLB component experiments related to erosion control, biobarriers, and subsurface capillary and migration barriers. Field tests of biointrusion barriers at waste disposal sites and in experimental plots are reported. The results of a joint DOE/NRC experiment to evaluate leaching and transport of sorbing (Cs, Sr, Li) and nonsorbing (I, Br) solutes in sandy silt backfill are presented for steady-state and unsteady-state flow conditions. A capillary barrier experiment performed in a large caisson (3-m diameter, 6.1 m deep) is described and a year's worth of field data is presented. DOE

N86-19174# Los Alamos National Lab., N. Mex.
STATUS OF CORRECTIVE MEASURES TECHNOLOGY FOR SHALLOW LAND BURIAL AT ARID SITES
W. V. Abeele, J. W. Nyhan, B. J. Drennon, E. A. Lopez, W. J. Harrera, and G. J. Langhorst 1985 21 p refs Presented at the 7. Annual DOE LLWMP Participants Information Meeting, Las Vegas, Nev., 10 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000760; LA-UR-85-3277; CONF-8509121-16) Avail: NTIS HC A02/MF A01

The field research program involving corrective measure technologies for arid shallow land burial sites is described. Soil erosion and infiltration of water into a simulated trench cap with various surface treatments was measured and compared with similar data from agricultural systems across the United States. Report of field testing of biointrusion barriers continues at a closed-out waste disposal site at Los Alamos. Final results of an experiment designed to determine the effects of subsidence on the performance of a cobble-gravel biobarrier system are reported, as well as the results of hydrologic modeling activities involving biobarrier systems. DOE

N86-19175# Los Alamos National Lab., N. Mex.
MAGNETIC MEASUREMENTS ON THE RING DIPOLES AND QUADRUPOLES FOR THE LOS ALAMOS PROTON STORAGE RING
R. Schermer, I., B. Blind, A. J. Jason, and G. A. Sawyer 1985 5 p refs Presented at the 9th International Conference on Magnet Technology, Zurich, Switzerland, 9 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000785; LA-UR-85-3155; CONF-850920-4) Avail: NTIS HC A02/MF A01

This paper discusses magnetic measurements and shimming performed on the ring dipoles and quadrupoles for the Los Alamos Proton Storage Ring (PSR). For the dipoles, point-by-point field maps were obtained using a search coil that could be scanned over a three-dimensional grid. By appropriate machining of removable end blocks, all magnet lengths were adjusted to within 0.01% of a nominal value and all integrated multipoles were set within tolerance. Integrated fields of 20 PSR quadrupoles were measured using a rotating Morgan Coil and a digital spectrum analyzer. The magnets were shimmed to specifications by adjusting steel bolts threaded through the field clamps. DOE

N86-19176# Los Alamos National Lab., N. Mex.
NONINTERCEPTIVE BEAM DIAGNOSTICS
D. D. Chamberlin 1985 9 p refs Presented at the Workshop on High Brightness, High Current, High Duty Factor Ion Injectors, San Diego, Calif., 21 May 1985
(Contract W-7405-eng-36)
(DE86-000791; LA-UR-85-2941; CONF-8505164-8) Avail: NTIS HC A02/MF A01

The need for accurate real-time diagnostics is critical for high-power particle beams. This paper describes the present level of development of noninterceptive devices for these beams. Discussion will be related to diagnostic measurements as they occur along the beamline, from ion-source performance through presentation to an RFQ and measures of the RFQ output, using the CW beam at Los Alamos as a guide. DOE

N86-19177# Rockefeller Univ., New York.
EXPERIMENTAL STUDIES OF ELEMENTARY PARTICLE INTERACTIONS AT HIGH ENERGIES Technical Progress Report
1 Oct. 1985 15 p
(Contract DE-AC02-81ER-40033)
(DE86-001101; DOE/ER-40033/94) Avail: NTIS HC A02/MF A01

Data analysis continued on an experiment at CER ISR concerning e(+)e(-) pairs. Experimentation at the CERN S anti p pS collider is reported that addresses the production of neutral pions and of photon pairs from proton-antiproton collisions. Work is reported on the Collider Detector at Fermilab (CDF), as well as a program at Lawrence Livermore Laboratory on electron neutrino mass. DOE

N86-19178# Maryland Univ., College Park. Dept. of Chemistry.
NUCLEAR EXPERIMENTS Annual Progress Report
A. C. Mignerey Oct. 1984 50 p
(Contract DE-AS05-76ER-05172)
(DE85-004881; DOE/ER-05172/0023) Avail: NTIS HC A03/MF A01

Separate abstracts were prepared for 6 entries in this report. DOE

N86-19179# California Univ., Berkeley. Lawrence Berkeley Lab.
NUCLEAR SCIENCE DIVISION Annual Report, 1 Oct. 1983 - 30 Sep. 1984
J. Mahoney, ed. May 1985 263 p
(Contract DE-AC03-76SF-00098)
(DE85-013312; LBL-18635) Avail: NTIS HC A12/MF A01

Individual sections of this report are abstracted separately. DOE

N86-19180# Oak Ridge National Lab., Tenn.
REPORT OF THE WORKSHOP ON LOW-TEMPERATURE NEUTRON IRRADIATION
1985 35 p Presented at the Workshop on Low Temperature Neutron Irradiation, Oak Ridge, Tenn., 29 May 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge
(DE85-018118; CONF-8505182-Summ) Avail: NTIS HC A03/MF A01

This Workshop was held at Oak Ridge National Laboratory May 29 to 31, 1985, to aid in preparing for the use of the National Low-Temperature Neutron Irradiation Facility (NLTNIF), which is being built at the Bulk Shielding Reactor at Oak Ridge National Laboratory and is scheduled to be ready for experiments late in 1985. NLTNIF will be operated as a user facility, with no cost to users for the irradiations for approved experiments. Purposes of the Workshop were to review research areas for which NLTNIF can be used, and to provide necessary experimental details about the facility for potential users. One day consisted of a series of presentations on scientific topics relevant to NLTNIF. Summaries of these talks are included in this report. DOE

N86-19181# Oak Ridge National Lab., Tenn.
ALLOY DEVELOPMENT FOR IRRADIATION PERFORMANCE Semiannual Progress Report, period ending 31 Mar. 1985
Jul. 1985 229 p
(Contract DE-AC05-84OR-21400)
(DE85-018142; DOE/ER-0045/14) Avail: NTIS HC A11/MF A01

Separate abstracts were prepared for each of the 31 included sections. DOE

N86-19182# Pennsylvania Univ., Philadelphia. Dept. of Materials Science and Engineering.
TEMPERATURE DEPENDENCE OF THE MAGNETIC CORRELATION IN AMORPHOUS SPIN GLASS (Ni-Mn)75P16B6Al3 DETER-

MINED BY NEUTRON SCATTERING
W. Yu, T. Egami, M. E. Chen, J. D. Axe, and K. V. Rao 1985 9 p refs Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y. and Royal Inst. of Tech., Stockholm, Sweden
(Contract DE-AC02-76CH-00016)
(DE85-018487; BNL-36884; CONF-850890-19) Avail: NTIS HC A02/MF A01

Neutron scattering experiments were carried out on amorphous Ni sub 1-x-Mn sub x 75p1bB6Al3 (x = 0,0.4) at different temperatures. A strong diffraction peak at around 1.7 A(-1) was found for the sample with x = 0.4, but not for the one with x = 0. This peak is mostly due to the short range ordering of Ni and Mn, but also in part due to magnetic correlations among the Mn spins. The temperature dependence of the magnetic correlation satisfactorily explains the temperature dependence of the resistivity of this sample. DOE

N86-19183# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
ASSESSMENT OF NEUTRON REQUIREMENTS AND POTENTIAL SOURCES FOR FUSION DEVELOPMENT Final Report
J. W. Davis May 1985 249 p Sponsored by EPRI
(EPRI Proj. 1969-4)
(DE85-901723; MDC-E-3015) Avail: NTIS HC A11/MF A01

The particular aims of this project were to (1) identify the anticipated critical failure modes for fusion components exposed to high neutron flux, (2) determine the minimum acceptable number of simple material property tests which would be required for acceptance of a material for use in these components, (3) identify appropriate neutron sources for this testing, and (4) identify and define appropriate subscale tests which address the problem of interactive material effects in these components. The high-flux components examined in this study were limited to the first wall, breeder and breeder structure. Eleven critical failure modes for these components were identified and ranked. Materials properties relevant to each of these failure modes were identified and ranked, and material property test matrices were devised. The minimum number of irradiated materials tests identified for the first wall materials under consideration (PCA, HT-9 and V-15Cr-5Ti) was found to be 904, a significant decrease from earlier studies. The minimum number of irradiated tests identified for the various breeder materials (Li2O, LiAlO2, Liquid Li, and Liquid Li-Pb) was 260. EBR-II, HFIR and FFTF were identified as the most appropriate fission-based sources for fusion materials testing. DOE

N86-19184# Oak Ridge National Lab., Tenn.
INCORPORATION OF RADIOHALOGENS VIA VERSATILE ORGANOMETALLIC REACTIONS: APPLICATIONS IN RADIOPHARMACEUTICAL CHEMISTRY
P. C. Srivastava, M. M. Goodman, and F. F. Knapp, Jr. 1985 7 p refs Presented at the 2nd International Symposium on the Synthesis and Application of Isotopically Labeled Compounds, Kansas City, Mo., 3 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-000087; CONF-8509173-1) Avail: NTIS HC A02/MF A01

Factors that must be considered for the design of radiohalogen-ated radio-pharmaceuticals include the stability and availability of the substrate, the physical half-life of the radiohalogen and the in vivo stability of the radiolabel. Vinyl and phenyl radiohalogen bonds show more in vivo stability than the alkyl radiohalogen bonds. Consequently, a variety of methods suitable for the synthesis of tissue specific radiopharmaceuticals bearing a vinyl or phenyl radiohalogen have been developed involving the synthesis and halogenation of metallovinyl and phenyl intermediates. The halogens and metallation reactions include iodine and bromine and alanation, boronation, mercuration, stannylation, and thallation, respectively. DOE

N86-19185# California Univ., Berkeley. Lawrence Berkeley Lab.
LAWRENCE BERKELEY LABORATORY MAGNETIC-MOMENT SORTING SYSTEM
D. H. Nelson, P. J. Barale, M. I. Green, and D. A. VanDyke Jul. 1985 6 p Presented at the 9th International Conference on Magnet Technology, Zurich, Switzerland, 9 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000610; LBL-19292; CONF-850920-2) Avail: NTIS HC A02/MF A01

The Magnetic Measurements Engineering Group at Lawrence Berkeley Laboratory (LBL) has designed and built, and is currently using, a Magnetic-moment Measurement and Sorting System (MMSS). The MMSS measures magnetic moments of permanent-magnet material and sorts the material according to selected criteria. The MMSS represents the latest application of the LBL General Purpose Magnetic Measurement Data Acquisition System reported on a MT-8. We describe the theoretical basis for the MMSS, the analog and digital components, and a unique method of calibrating the MMSS using only measured electrical quantities. We also discuss the measurement and sorting of permanent-magnet material to be incorporated in beam-line elements (dipoles and quadrupoles) in the Lawrence Livermore National Laboratory Advanced Test Accelerator Beam Director. DOE

N86-19186# Brookhaven National Lab., Upton, N. Y.
IF YOU LIKE LOW P/SUB T/ MULTIPARTICLE PHYSICS, YOU'LL LOVE NUCLEUS-NUCLEUS INTERACTIONS OR Do E/SUB T/ DISTRIBUTIONS OBEY KNO SCALING IN HIGH ENERGY pp AND NUCLEUS-NUCLEUS COLLISIONS
M. J. Tannenbaum 1985 10 p refs Presented at the International Symposium on Multiparticle Dynamics, Kiryat Anavim, Israel, 1 Jun. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000633; BNL-37046; CONF-8506194-3) Avail: NTIS HC A02/MF A01

Measurements of neutral transverse energy spectra in p-p, d-d and (ALPHA)-(ALPHA) interactions at the CERN ISR are presented. The source of transverse energy is the emission of relatively low P sub T particles distributed uniformly. Analysis of the (ALPHA)(ALPHA) data in terms of multiple nucleon-nucleon collisions is most convenient when Gamma distributions are used to represent the spectral shapes. This distribution bears a strong relationship to the Negative Binomial Distribution which describes multiplicity distributions in pp and p anti p interactions over the full available energy range. Extensive analysis of the data is presented in terms of Nuclear Models. However, the best fit to the pp and (ALPHA)(ALPHA) data is a single Gamma distribution scaled by the mean value. This property is also known as KNO scaling. DOE

N86-19187# Department of Energy, Upton, N.Y.
OVERVIEW OF DOE/ONS CRITICALITY SAFETY PROJECTS
R. W. Barber, B. P. Brown, and C. M. Hopper 1985 17 p Presented at the Topical Meeting on Criticality Safety and the Storage of Fissile Material, Jackson, Wyo., 9 Sep. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-001334; CONF-850917-6) Avail: NTIS HC A02/MF A01

The evolution of Federal involvement with nuclear criticality safety has traversed through the 1940's and early 1950's with the Manhattan Engineering District, the 1950's and 1960's with the Atomic Energy Commission, the early 1970's with the Energy Research and Development Administration, and the late 1970's to date with the US Department of Energy. The importance of nuclear criticality safety has been maintained throughout these periods. However, criticality safety has received shifting emphases in research and applications, promulgations of regulations and standards, origins of fiscal support and organization. In June 1981 the Office of Nuclear Safety was established in response to a Department of Energy study of the impact of the March 1979 Three Mile Island accident. The organizational structure of the ONS, its program for establishing and maintaining a progressive nuclear criticality safety program, and associated projects, and current history of ONS's fiscal support of program projects is presented. With the establishment of the ONS came concomitant missions to develop and maintain nuclear safety policy and

requirements, to provide independent assurance that nuclear operations are performed safely, to provide resources and management for DOE responses to nuclear accidents, and to provide technical support. In the past four years, ONS has developed and initiated a continuing Department Nuclear Criticality Safety Program in such areas as communications and information, physics of criticality, knowledge of factors affecting criticality, and computational capability. DOE

74 OPTICS

Includes light phenomena.

N86-19188 Delaware Univ., Newark.
A TWO-FLOW MODEL TO SIMULTE THE INTERACTION OF IRRADIANCE WITH A SUBMERGED PLANT CANOPY Ph.D. Thesis
Steven Gary Ackleson 1985 158 p
Avail: Univ. Microfilms Order No. DA8517685

A model is developed to simulate the natural light field around and within a canopy of submerged aquatic plants. From a remote sensing point of view, techniques or monitoring earth resources, have steadily shifted since the early 1970's photography to orbiting multispectral scanners. However, in order to design the optimum sensor for detecting submerged features and to accurately interpret the acquired imagery, a thorough understanding of the radiative transfer processes is required. The same is true for estimating productivity. The model is constructed within the confines of the two-flow approach by combining two similar models--one developed for optically shallow water and the other designed for terrestrial plant canopies. The model is qualitatively assessed for accuracy and physical correctness by comparisons with other models of known accuracies, by conducting a sensitivity analysis of all canopy related parameters and by applying the model to several real world problems. The results indicate that the model yields qualitatively accurate results and that, for the most part, physical realities are preserved. Dissert. Abstr.

N86-19189 Indiana Univ., Bloomington.
DESIGN, CONSTRUCTION AND INITIAL APPLICATION OF A LOW-LIGHT-LEVEL IMAGING DETECTOR Ph.D. Thesis
Arne Anthon Henden 1985 221 p
Avail: Univ. Microfilms Order No. DA8516616

A slow-scan (8 seconds per frame) television system utilizing a silicon-intensified target (SIT) vidicon has been constructed. Such a TV system, used in a two-dimensional (imaging) mode, permits the accurate measurement of the light intensity from extremely faint astronomical objects. The system consists of a detector head/offset guider assembly that mounts on the telescope; a camera control unit that supplies the analog vidicon voltages and performs video conditioning; and a Z80 microcomputer that controls the data acquisition procedure. The system accommodates several different types of vidicons. Computer software was written to control the data acquisition and to perform image processing. Examples are given of the application of this system to cluster photometry, narrowband photography, and spectroscopy. A detailed study of the nuclear region of the galaxy NGC 2903 is presented. Dissert. Abstr.

N86-19190 Department of the Navy, Washington, D. C.
POLYCHROMATIC TIME-INTEGRATING OPTICAL PROCESSOR FOR HIGH-SPEED AMBIGUITY PROCESSING Patent
J. N. Lee, inventor (to Navy) Issued 23 Jul. 1985 9 p Supersedes AD-D010376
(AD-D011942; US-Patent-4,531,195; US-Patent-Appl-SN-495028; US-Patent-Class-364-822) Avail: US Patent and Trademark Office CSCL 20/6

A signal processor for generating the ambiguity integral using a modulatable, broadband, incoherent lightsource, a multiplicity of acousto-optic cells and diffraction gratings, and a two-dimensional time-integrating photodetector array. The various colors of the source spectrum are shifted by differing radio frequencies. These modified spectral components are also modulated by and input signal and serve as input sources for performing a multiplicity of correlations using an acoustooptic cell with an unknown Doppler-shifted signal. The answer is displayed on a two-dimensional time-integrating photodetector array where the spectral components are dispersed within the columns. The row corresponding to the color that has been properly frequency-compensated will contain the correlation or ambiguity peak, thereby identifying the Doppler component. Position within the row determines range. Author (GRA)

N86-19191# Naval Ocean Systems Center, San Diego, Calif.
THE EFFECTS OF HYDROSTATIC PRESSURE ON OPTICAL FIBERS (FISCAL YEAR 1983 REPORT) Research Report, Oct. 1982 - Oct. 1983
N. Kamikawa Apr. 1985 34 p
(F66-512)
(AD-A159915; NOSC/TR-1023) Avail: NTIS HC A03/MF A01 CSCL 20/6

This report stems from a project tasked to investigate experimentally the effects of deep-ocean hydrostatic pressure on (polymer-coated) optical fiber transmission. It was concluded that optical fibers could be designed so that pressure equivalent to a 6-km (20,000-ft) ocean depth does not increase fiber losses. This conclusion was based on an axial compression model and experiments performed on polymercoated graded-index fibers. Defects in the coating were identified as additional causes of loss increase. Defectively coated fibers exhibited very large excess loss in hydrostatic environments. This report summarizes work performed in FY 83. A pressure model and fiber and coating material experiments are described and conclusions and recommendations stated. GRA

N86-19192# Honeywell Corporate Material Sciences Center, Bloomington, Minn.
OPTICAL INTERARRAY PROCESSING Final Report, 1 Jul. 1983 - 28 Feb. 1985
P. R. Haugen 7 Nov. 1985 55 p
(Contract N00014-83-C-0554)
(AD-A160256) Avail: NTIS HC A04/MF A01 CSCL 17/1

The objective of this contract was to design, fabricate, and test an optical processor to perform an ambiguity function to detect relative time delay and frequency shift between a pair of passive sonar receivers. The optical architecture used in this program is the unique linear phase shifter (LIPS) architecture which was developed at Honeywell. The support electronics for the optical processor were designed around a PDP-11/23 minicomputer. The PDP-11/23 controls the functions of the optical processor, stores input and output data, and provides I/O to an outside Host computer. Real sonar data on synthetic calibration data were processed to demonstrate the functionality of the system. Overall, the objectives of this program were completed. The result of this program was the development of an optical processing system capable of supporting different optical architectures or processing scenarios. Using a minicomputer controller gives the system the required flexibility to handle different tasks. The LIPS optical architecture used for this program is capable of running at 500 frames/seconds if it were not I/O limited at the detector output. This rate corresponds to approximately a 10 giga-multiply/adds per second processing rate. The electronic I/O limited the processing rate to approximately 5 frames/second. GRA

N86-19193# GTE Labs., Inc., Waltham, Mass.
CALCULATION OF H2O FAR-WING ABSORPTION WITHIN THE SINGLE-PERTURBER APPROXIMATION Final Report, Dec. 1981 - Jan. 1985
R. W. Davies and S. F. Fahey Feb. 1985 67 p
(AF Proj. 2310)
(AD-A160405; AFGL-TR-85-0033) Avail: NTIS HC A04/MF A01 CSCL 07/4

Calculations of H2O self-broadening have been carried out for near and far-wing absorption. For the far-wing case, the calculations

are based on the single perturber approximation. Only collisions involving continuum states of the two-body system are considered, and an uncoupled-line approximation is assumed. An isotropic interaction potential is included exactly, while anisotropic interactions are treated in perturbation theory. For the anisotropic interaction, both dipole-dipole and dipole-quadrupole collisions are considered in detail. Results of the present calculations indicate, in the near wings, that the dipole-dipole interaction is strongly dominant. As one progresses to the far wings, it is found that the dipole-quadrupole and (by implication) the higher-order multipole interactions become increasingly important. The general indications are that the far-wing absorption is dominated by strong, short-ranged interactions which require detailed analysis. GRA

N86-19194# Aerospace Corp., El Segundo, Calif.
SPECTRALLY SELECTIVE SHUTTER MECHANISM
E. F. Cross, G. D. Wiemokly, O. L. Gibb, and W. A. Garber 9 Sep. 1985 44 p
(Contract F04701-83-C-0084)
(AD-A160619; TR-0084A(5930-01)-2; SD-TR-85-48) Avail: NTIS HC A03/MF A01 CSCL 20/6

Several state-of-the-art detection and image systems require synchronous high-speed shuttering of incoming irradiance. This shuttering action is necessary in many instances to increase signal-to-noise ratio, obtain high-speed (low-retention) imagery, and provide single-event observations. Presently, this type of snap-shot imagery is approximated by rotating chopper wheel methods that sweep an aperture across the focal plane. At faster aperture rates, these mechanical chopper systems become more complex and maintenance of image fidelity is very difficult. This novel, spectrally selective shutter mechanism provides true snap-shot imagery. Despite some limitations, such a mechanism is ideally suited to high flux, high background, and rapidly changing imaging visualization, and can be used to monitor flow visualization, chemiluminescence phenomena, and laser operation. The optomechanical technique described in this report uses the rotation of one or two narrowband spectral filters to provide open-shutter times in the millisecond range. The resulting performance of the two-filter assembly is governed by the physical principle that increasing angular tilt of a narrowband interference filter that causes the bandpass parameter to shift progressively toward shorter wavelengths. GRA

N86-19195# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.
CLEAR-AIR TRANSMISSION IN THE 8 TO 12-MICROMETER BAND AT SELECTED STATIONS
D. A. Stewart Aug. 1985 49 p
(AD-A160625; AD-E950767; AMSMI/RR-85-1-TR) Avail: NTIS HC A03/MF A01 CSCL 20/6

Horizontal atmospheric transmission of energy in the 8 to 12-micrometer band is examined for distances of 1, 2, 3, 5, 7, and 10 km in four geographical regions. The only absorber to be considered is water vapor because it absorbs much more energy than any other molecular constituent of the atmosphere. Annual means are approximately 80 percent transmission along 1-km path at 5 German stations, at Osan, Korea, and at the Middle Eastern stations of Baghdad, Iraq, and Jerusalem, Israel. Annual means at Tel Aviv, Israel, and Dhahran, Saudi Arabia, are a few percent lower, and the annual mean at Tehran, Iran, is a few percent higher. Annual mean transmissions in Central America are below 70 percent for a 1-km path at low-lying coastal stations and generally below 75 percent throughout the region. The annual cycle is weak in Central America, very strong at Osan, and intermediate at the remaining stations. The report also contains tables of monthly and annual standard deviations of transmission for paths of 1, 2, 3, 5, 7, and 10 km. Author (GRA)

N86-19196# Mississippi Univ., University. Acoustics Research lab.
STUDY OF OPTICAL SOUND GENERATION AND AMPLIFICATION Annual Report
H. E. Bass, L. A. Crum, and F. D. Shields 1 Nov. 1985 15 p
(Contract N00014-84-C-0193; RR0-1108)
(AD-A160758; AD-E401375; PARGUM-85-05) Avail: NTIS HC A02/MF A01 CSCL 20/1

This project involves four separate tasks with the following titles: (1) Generation of low frequency sound from optical pulses; (2) Propagation of sound through a gas with an overpopulation of vibrationally excited states; (3) Opto-acoustic studies in liquids, and (4) Nonlinear oscillation of gas bubbles. The first three tasks, funded by the physics division of ONR, represent a three pronged study of the generation of sound by the absorption of light. The fourth task, funded by the mathematics division of ONR, is a continuing study of cavitation in liquids. GRA

N86-19197# Sandia National Labs., Albuquerque, N. Mex.
PROBLEM SOLVING WORKSHOP 2: SELECTING OBJECTIVE LENSES
1985 16 p
(DE85-014471; CONF-850772-1) Avail: NTIS HC A02/MF A01

The purpose of this workshop is to demonstrate how we select lens systems for experiments at our facility. Different layouts and different types of experiments will provide different constraints, but the basic lens seletion problems will be similar. Most of our work involves the use of explosives and (usually) lens systems are protected. This protection is a wall of concrete five-feet thick with a four-inch armor plate facing. Two two-inch thick laminated windows are air spaced from each other and provide access for the optical path is four inches by eight inches and is approximately six feet from the protected (camera) side of the wall. DOE

N86-19198# Brookhaven National Lab., Upton, N. Y.
DESIGN OF THE NSLS INFRARED BEAM LINE MIRROR NO. 1
R. Alforque, P. Z. Takacs, M. Shleifer, J. Colbert, and J. Williams 1985 15 p refs Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985 Prepared in cooperation with Comarco, Inc., Ridgecrest, Calif.
(Contract DE-AC02-76CH-00016)
(DE85-018481; BNL-36902; CONF-850734-7) Avail: NTIS HC A02/MF A01

The mechanical design of the Infrared Beam Line Mirror No. 1 (IRBL M1) at the NSLS facility was done with the aid of finite element modeling. Preliminary heat load calculations indicated that the Gaussian peak power density incident on M1 is about 345.8 w/sq. cm. The thermal gradient due to this concentrated high heat density striking M1 may result in undesirable distortions that can seriously impair its function. In addition, the thermal stress might reach levels beyond the yield strength of the mirror thereby compromising its structural integrity. Hence, a finite element model was developed to study the associated thermal and structural problems. The generation of the finite element mesh was done with the PREP7 module of ANSYS. After applying the appropriate parameters and boundary conditions, a thermal analysis was performed and the results were passed into the structural model in order to obtain the displacement/stress solution. A similar finite element model was analyzed using SUPERTAB and SUPERB of SDRC's IDEAS. DOE

N86-19199# Brookhaven National Lab., Upton, N. Y.
EVALUATION TECHNIQUES FOR X-RAY MIRRORS AND SYSTEMS USING VISIBLE LIGHT
P. Z. Takacs and J. Colbert Sep. 1985 8 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001206; BNL-37049; CONF-850734-10) Avail: NTIS HC A02/MF A01

Severely diffraction-broadened visible light images from grazing incidence optical systems are measured and analyzed using a diffraction integral model to predict slope errors and image quality at XUV wavelengths. DOE

N86-19200# Oak Ridge National Lab., Tenn.
LUMINESCENCE FROM METALS AND INSULATORS
O. H. Crawford 1985 12 p Presented at the Penetration

Phenomena Workshop, Oak Ridge, Tenn., 14 Apr. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001339; CONF-850484-3) Avail: NTIS HC A02/MF A01

The term luminescence is normally applied to light emission that is not explainable by the mechanisms discussed by the other speakers in this meeting. Specifically, it is not transition radiation, surface plasmon radiation, or bremsstrahlung. One normally thinks of luminescence as arising from one-electron transitions within a medium. This talk consists of an overview of luminescence from condensed matter under irradiation by either energetic particles or photons. The author begins with organic molecules, where luminescence is best understood, and then discusses inorganic insulators and metals. Finally, the dependence of yield upon projectile species and velocity is discussed, and predictions are made concerning the relative effectiveness of electrons, protons, and hydrogen atoms in exciting luminescence. DOE

N86-19201# Oak Ridge National Lab., Tenn.
OPTICAL FUNCTIONS OF SILICON AT ELEVATED TEMPERATURES DETERMINED BY POLARIZATION MODULATION ELLIPSOMETRY
G. E. Jellison, Jr. and F. A. Modine Oct. 1985 44 p
(Contract DE-AC05-84OR-21400)
(DE86-001427; ORNL/TM-9718) Avail: NTIS HC A03/MF A01

The optical functions of silicon are presented as a function of photon energy for elevated temperatures between 20 and 700 degrees C. The optical functions presented include the complex dielectric function, the complex refractive index, the reflectance, and the absorption coefficient. DOE

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-19202# Nagoya Univ. (Japan). Inst. of Plasma Physics.
POLOIDAL ROTATION OF REVERSED FIELD PINCH PLASMA
H. Arimoto, K. I. Sato, A. Nagata, S. Masamune, Y. Aso, K. Ogawa, S. Yamada, A. Matsuoka, H. Oshiyama, and T. Tamaru Nov. 1985 14 p refs
(IPPJ-749) Avail: NTIS HC A02/MF A01

The poloidal rotation of Reversed Field Pinch Plasma is clearly observed by the measurements of magnetic fluctuations and of Doppler shift of impurity lines. RFP plasma rotates in the direction of the electron diagmagnetic drift to the toroidal field at the wall. Time behaviors of rotation frequency are examined. The rotation begins immediately after setting up RFP configuration and reaches maximum value before the peak current. Author

N86-19203# Nagoya Univ. (Japan). Inst. of Plasma Physics.
HELICAL FLUCTUATION IN REVERSED FIELD PINCH (RFP) PLASMA
H. Arimoto, A. Magata, K. I. Sato, S. Masamune, Y. Aso, K. Ogawa, S. Yamada, A. Matsuoka, H. Oshiyama, and T. Tamaru Nov. 1985 14 p refs
(IPPJ-748) Avail: NTIS HC A02/MF A01

The overall behaviors of helical fluctuations in RFP plasma are examined. Immediately after the RPF configuration is set up, ordered helical fluctuation begins to occur, and at the nearly same time toroidal flux enhancement propagates towards the direction of electron current flow. In this phase m = 1, n = approx. 10 to 12 modes, where m and n are poloidal and toroidal mode numbers, are generated in positive flux region. In the current termination phase, m = 2 mode is dominant. Author

N86-19204# Nagoya Univ. (Japan). Inst. of Plasma Physics.
CURRENT DRIVE BY FAST MAGNETOSONIC WAVES NEAR THE LOWER HYBRID FREQUENCY IN THE JIPP T-IIU TOKAMAK
K. Ohkubo, Y. Hamada, Y. Ogawa, A. Mohri, R. Akiyama, R. Ando, Y. Hirokura, E. Kako, K. Kawahata, Y. Kawasumi et al Oct. 1985 17 p refs
(IPPJ-746) Avail: NTIS HC A02/MF A01

Current drive by fast magnetosonic waves is successfully performed in the JIPP T-IIU tokamak by means of a four-element dipole antenna array with Faraday shield. The plasma current of about 40 kA is sustained by RF power of about 50 kW in the low density plasma of 2 to 4 x 10 to the 12th power/cu cm with an efficiency comparable to that of the slow wave current drive. A clear density limit for fast magnetosonic current drive exists contrary to theoretical expectations based on linear wave propagation. Author

N86-19205# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MAGNETOHYDRODYNAMIC STABILITY OF SPHEROMAK PLASMA IN SPHEROIDAL FLUX CONSERVER: APPLICATION OF MERCIER CRITERION
Shobu Kaneko and Atsushi Kamitani Nov. 1985 25 p refs
(IPPJ-747) Avail: NTIS HC A02/MF A01

The magnetohydrodynamic (MHD) equilibrium configurations of spheromak plasmas in a spheroidal flux conserver are determined by use of a pressure distribution whose derivative dp/d psi vanishes on the magnetic axis, and by use of an optimized distribution. Here p is the pressure and psi is the flux function. These equilibria are shown to be stable for symmetric modes. The stability for localized modes is investigated by the Mercier criterion. The values of the maximum beta ratio are evaluated for both pressure distributions and are shown to become about two times larger by optimization. If the condition, g(axis) < 1, is required, the values of the maximum beta ratio are found to be less than 30%. The oblate spheroidal flux conserver is shown to be better than the toroidal conserver with a rectangular cross section from the standpoint of stability. M.G.

N86-19206# Kiruna Geophysical Inst. (Sweden).
DISPERSION SURFACES AND ION WAVE INSTABILITIES IN SPACE PLASMAS
Mats Andre Jun. 1985 202 p refs
(KGI-Preprint-190; ISSN-0347-6405) Avail: NTIS HC A10/MF A01

Plasma wave dispersion surfaces; the relationship between whistlers, chorus, hiss, saucers, broadband electrostatic noise and the resonance cone; waves below the proton gyrofrequency in a multicomponent plasma; electrostatic ion waves generated by ion loss-cone distributions in the magnetosphere; ion waves generated by streaming particles; and resonant generation of ion waves on auroral field lines by positive slopes in ion velocity space are discussed. For individual titles, see N86-19207 through N86-19211.

N86-19207# Kiruna Geophysical Inst. (Sweden).
DISPERSION SURFACES
Mats Andre *In its* Dispersion Surfaces and Ion Wave Instabilities in Space Plasmas Jun. 1985 34 p refs (For primary document see N86-19206 09-75)
(KGI-Preprint-067; ISSN-0349-2656) Avail: NTIS HC A10/MF A01

The dispersion relation of linear waves in a nonrelativistic, collisionless and homogeneous magnetized plasma is solved numerically. Electrostatic and electromagnetic waves with frequencies from below the ion gyrofrequency to above the electron gyrofrequency are studied for all angles of propagation. Modes occurring in a cold plasma and waves dependent on thermal effects are included. Dispersion surfaces, i.e., plots of frequency versus wave vector components, are presented for plasma models. This presentation shows all interesting waves clearly and reveals how different modes are related. The dispersion surfaces can be used as an aid, for example, when comparing wave observations and theory, and they may help to avoid confusing nomenclature. Author (ESA)

N86-19208# Kiruna Geophysical Inst. (Sweden).
ON THE RELATIONSHIP BETWEEN WHISTLERS, CHORUS, HISS, SAUCERS, BROADBAND ELECTROSTATIC NOISE AND

THE RESONANCE CONE
Mats Andre *In its* Dispersion Surfaces and Ion Wave Instabilities in Space Plasmas Jun. 1985 14 p refs (For primary document see N86-19206 09-75)
(KGI-Preprint-081; ISSN-0349-2656) Avail: NTIS
HC A10/MF A01

Using dispersion surfaces (plots of frequency versus wave vector components) it is shown that whistlers, hiss, chorus, and saucers in space plasmas often correspond to one wave mode. Broadband electrostatic noise can also propagate in this mode. Since electromagnetic theory for all angles of propagation relative to the ambient magnetic field is used, the smooth transition between electrostatic and electromagnetic waves can be described in terms of a gradual change of the wave vector. To give an example of an instability over a wide range of wave vectors, a beam of auroral (keV) electrons is introduced. The highest temporal and spatial growth rates caused by such a beam can occur at the plasma frequency. However, a dispersion surface may be used to give simple arguments showing that in an inhomogeneous plasma, the strongest emissions may occur below the plasma frequency.
Author (ESA)

N86-19209#. Kiruna Geophysical Inst. (Sweden).
WAVES BELOW THE PROTON GYROFREQUENCY IN A MULTICOMPONENY PLASMA
Mats Andre and Tord Oscarsson *In its* Dispersion Surfaces and Ion Wave Instabilities in Space Plasmas Jun. 1985 71 p refs (For primary document see N86-19206 09-75)
(KGI-PREPRINT-189; ISSN-0347-6405) Avail: NTIS
HC A10/MF A01

The wave modes below the proton gyrofrequency in a homogeneous, nonrelativistic multicomponent plasma are studied. The dispersion relation and the dielectric tensor are discussed. Numerical methods are used to study the propagation properties and the polarization for all angles of propagation relative to the ambient magnetic field. Analytical dispersion equations are used. Modes close to multiples of ion gyrofrequencies are considered. Results reveal that waves destabilized by ion distributions with temperature or loss-cone anisotropies can propagate in nearly any direction. The largest growth rates are found for parallel propagation, but many loss-cone distribution give emissions only for propagation at angles of > 45 deg off the ambient magnetic field. Hot particle distributions may influence temporal growth and group velocity, and thus cause nonconvective instabilities. High temperature distributions may also, even when they are anisotropic, significantly increase damping in regions of frequency wave vector space.
Author (ESA)

N86-19210# Kiruna Geophysical Inst. (Sweden).
ELECTROSTATIC ION WAVES GENERATED BY ION LOSS-CONE DISTRIBUTIONS IN THE MAGNETOSPHERE
Mats Andre *In its* Dispersion Surfaces and Ion Wave Instabilities in Space Plasmas Jun. 1985 17 p refs (For primary document see N86-19206 09-75)
(KGI-Preprint-082; ISSN-0349-2656) Avail: NTIS
HC A10/MF A01

It is shown that electrostatic ion waves can be resonantly destabilized in the presence of cool electrons, and that these emissions often occur close to multiples of the ion frequency. Ion loss-cone distributions may nonresonantly destabilize emissions near the lower hybrid frequency. For wave vectors strictly perpendicular to the ambient magnetic field, these emissions may be harmonically spaced by the ion gyrofrequency, but an investigation of all propagation angles shows that the waves often are broadband. In connection with these nonresonant instabilities, negative energy modes can occur. These modes may lead to explosive instabilities when they nonlinearly interact with other waves.
Author (ESA)

N86-19211# Kiruna Geophysical Inst. (Sweden).
RESONANT GENERATION OF ION WAVES ON AURORAL FIELD LINES BY POSITIVE SLOPES IN ION VELOCITY SPACE
M. Andre, M. Temerin (California Universtiy, Berkeley), and D. Gorney (Aerospace Corp., Los Angeles) *In its* Dispersion Surfaces and Ion Wave Instabilities in Space Plasmas Jun. 1985 24 p refs (For primary document see N86-19206 09-75)
(KGI-Preprint-083; ISSN-0349-2656) Avail: NTIS
HC A10/MF A01

Simultaneous observations of wave spectra and particle velocity distributions obtained by the S3-3 satellite on auroral field lines are studied. Emissions below the lower hybrid frequency occur just below multiples of the proton gyrofrequency. At higher frequencies the observed spectra show peaks just above such multiples. The ion and electron distributions are modeled, and numerical methods are used to calculate the corresponding spatial wave growth rates. This growth agrees well with the observed emissions. The major source of free energy is a positive slope perpendicular to the ambient magnetic field in the ion velocity distribution.
Author (ESA)

N86-19212# Stanford Univ., Calif. High Temperature Gasdynamics Lab.
FUNDAMENTAL PROCESSES IN PARTIALLY IONIZED PLASMAS Annual Scientific Report, 1 Feb. 1984 - 31 Jan. 1985
C. H. Kruger, M. Mitchner, and S. A. Self Mar. 1985 62 p
(Grant AF-AFOSR-0108-83)
(AD-A160011; AFOSR-85-0811TR) Avail: NTIS
HC A04/MF A01 CSCL 20/9

This report describes progress during the second year of a research program on the Fundamental Processes in Partially Ionized Plasmas conducted in the High Temperature Gasdynamics Laboratory at Stanford University. This research is directed to three major areas: recombination in molecular plasmas, discharge effects (plasma electrode interaction) and interaction of discharges and fluid dynamics. Recombination and ionization are fundamental processes that play a role in nearly all applications and natural phenomena that involve partially ionized plasma. Under the present program, experiments have been designed and theoretical analyses conducted to obtain a better knowledge of the rates of electron recombination in the presence of molecular species. Studies are continuing of the near-electrode region and the processes by which current is transferred between the plasma and the electrodes. The first stage of theoretical modeling of these processes has now been completed and published. A study of the interaction of discharges and fluid dynamics has measured the significant secondary flows caused by the interaction of a magnetic field with a current-carrying plasma.
GRA

N86-19213# Tennessee Univ., Knoxville. Plasma Science Lab.
[RESEARCH ON PLASMA PHYSICS] Annual Progress Report, 15 Mar. 1984 - 14 Mar. 1985
J. R. Roth 30 Apr. 1985 273 p
(Grant AF-AFOSR-0093-81)
(AD-A160425; UTK-PSL-85-3; AFOSR-85-0870TR) Avail: NTIS
HC A12/MF A01 CSCL 20/9

This annual progress describes work done under AFOSR Contract 81-0093 during the period from March 15, 1984 to March 14, 1985. The experimental program accomplished extensive measurements of RF emissions from the classical Penning discharge which is operated in the UTK Plasma Science Laboratory. RF emissions were observed over a wide frequency range, megahertz to more than 1 gigahertz. These emissions appear to be incoherent; the emitted radiation intensity is approximately proportional to the electron number density. An important accomplishment underlying these RF emission measurements was the development a calibrated, broadband antenna with an approximately 100 megahertz to 1.2 gigahertz.
GRA

N86-19214# Stanford Univ., Calif. Space, Telecommunications and Radioscience Lab.
SIMULATIONS OF FUSION PLASMAS BY A 3-D, E-M PARTICLE CODE Final Report, 1 Jan. - 31 Dec. 1984
O. Buneman and L. R. O. Storey Mar. 1985 5 p
(Contract DE-FG03-84ER-53169)
(DE85-008642; DOE/ER-53169/T1) Avail: NTIS

HC A02/MF A01

The work described in the present report arose out of a proposal submitted to the U.S. Department of Energy in August 1983. It was for renewal of the then existing Contract No. DE-AS03-7GSF0032G titled Simulations of fusion plasmas by a 3-D, E-M particle code. Under this contract, in previous years, the Principal Investigator and his students had developed a fully electromagnetic particle code that was then - and still remains, to the best of our knowledge - the most advanced code of its kind in existence. This TRI-dimensional STANford code, now called TRISTAN, follows the motion of about 5 x 10 to the 6 particles in a cubical volume divided up into 128 cells, i.e., each side of the cube is divided into 128 units. TRISTAN is written in ASSEMBLER language for the Cray-1 computer, and is carefully optimized. See Buneman, et al., (1980) for an account of the ideas that have gone into this code. DOE

N86-19215# Oak Ridge National Lab., Tenn.
RADIO FREQUENCY VACUUM FEEDTHROUGHS FOR HIGH-POWER ICRF HEATING APPLICATIONS
T. L. Owens, F. W. Baity, D. J. Hoffman, and J. H. Whealton 1985 6 p Presented at conference
(Contract DE-AC05-84OR-21400)
(DE85-016391; CONF-850310-117) Avail: NTIS HC A02/MF A01

Frequently, high-power pulsed ion cyclotron range of frequency experiments are limited by breakdown at the vacuum feedthrough. This paper describes the development and testing of vacuum feedthroughs to increase both reliability and capability. The ultimate goal of the program is to develop a continuous-wave feedthrough for the next generation of fusion experiments. A feedthrough concept currently under investigation consists of a simple, cylindrical alumina ceramic brazed between tapered coaxial conductors. A prototype has been tested to voltage levels in excess of 100 kV for 100-ms pulses and 70 kV for 5-s pulses at 28 MHz. Insertion-voltage-standing-wave ratios are < 1.15:1 for frequencies below 450 MHz. An upgraded water-cooled version being fabricated for use on TEXTOR will be described. DOE

N86-19216# Oak Ridge National Lab., Tenn.
TORSATRON EQUILIBRIUM AND STABILITY STUDIES
T. C. Hender, B. A. Carreras, L. A. Charlton, L. Garcia, H. R. Hicks, J. A. Holmes, and V. E. Lynch Aug. 1985 44 p
(Contract DE-AC05-84OR-21400)
(DE85-018088; ORNL/TM-9587) Avail: NTIS HC A03/MF A01

Equilibrium and stability results are presented for the Advanced Toroidal Facility (ATF) device. The results of three-dimensional equilibrium calculations and free boundary average method calculations are shown to be in good agreement with previous fixed boundary average method results. These favorable comparisons serve as a valuable validation of the simple and computationally efficient fixed boundary average method. Stability calculations for the free boundary average method equilibria are also in good agreement with fixed boundary calculations, showing instability only when the plasma is shifted inward with an applied vertical field. DOE

N86-19217# Argonne National Lab., Ill.
PLASMA CURRENT PROFILE SHAPING WITH RF-CURRENT DRIVE
D. A. Ehst and K. Evans, Jr. 1985 15 p Presented at the Workshop on Tokamak Start-up - Problems and Scenarios Related To the Transient Phases of Long-Burn Operations, Erice, Italy, 14 Jul. 1985
(Contract W-31-109-eng-38)
(DE85-018414; CONF-850708-3) Avail: NTIS HC A02/MF A01

Calculations of RF current drive in a toroidal geometry are presented. The result is self-consistent in that the tokamak magnetic field generated by the RF-driven current is used to compute the wave trajectory and spatial damping in the plasma. In the next section we derive the quasilinear theory in an axisymmetric torus. In Section 3 we describe a numerical solution to this problem and investigate RF-generated equilibria in a reactor-relevant geometry (A = 6.0; major radius, R0 = 5.25 m; elongation k = 1.6; triangular boundary). By suitably adjusting the RF/plasma parameters a wide range of equilibria can be created. Although we have not optimized our RF-generated equilibria (in particular, we are limited at present to a narrow spectrum) we find evidence that equilibria can be sustained which should lead to attractive tokamak reactors. DOE

N86-19218# Los Alamos National Lab., N. Mex.
HAMILTONIAN STRUCTURES UNDERLYING MHD EQUILIBRIA
P. J. Channell Jul. 1985 14 p
(Contract W-7405-eng-36)
(DE86-001236; LA-10460-MS) Avail: NTIS HC A02/MF A01

We point out that MHD equilibria can be considered to be the images of either the phase space of a two degree of freedom time independent integrable Hamiltonian system or of a one degree of freedom time periodic integrable Hamiltonian system. DOE

N86-19219# Maryland Univ., College Park. Dept. of Physics and Astronomy.
HIGH ENERGY ACCELERATOR AND COLLIDING BEAM USER GROUP Progress Report, 1 Mar. 1984 - 28 Feb. 1985
Oct. 1984 103 p
(Contract DE-AC05-76ER-02504)
(DE85-008093; DOE/ER-02504/423) Avail: NTIS HC A06/MF A01

Separate abstracts were prepared for 9 sections in this report. DOE

N86-19220# Texas A&M Univ., College Station. Cyclotron Inst.
CYCLOTRON-BASED NUCLEAR SCIENCE Progress Report, 1 Apr. 1984 - 31 Mar. 1985
D. H. Youngblood Aug. 1985 135 p
(Contracts DE-FG05-84ER13262; DE-AS05-80ER-10565)
(DE85-017620; DOE/ER-10565/10) Avail: NTIS HC A07/MF A01

Separate abstracts were prepared for 49 sections in this report. DOE

N86-19221# Argonne National Lab., Ill.
MULTI-FUNCTION RING MAGNET POWER SUPPLY FOR RAPID-CYCLING SYNCHROTRONS
W. F. Praeg 1985 4 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract W-31-109-eng-38)
(DE85-018395; CONF-850504-283) Avail: NTIS HC A02/MF A01

Ring magnet power supply (RMPS) circuits that produce a wide range of magnet current waveshapes for rapid-cycling synchrotrons (RCS) are described. The shapes range from long flat-tops separated by a biased dual frequency cosine wave to those having a flat-bottom (injection), followed by a lower frequency cosine half wave (acceleration), a flat-top (extraction), and a higher frequency cosine half wave (magnet reset). Applications of these circuits for proposed synchrotrons are outlined. Solid-state switching circuits and the results of proof-of-concept tests are shown. DOE

N86-19222# Argonne National Lab., Ill.
IPNS GROOVED, SOLID METHANE MODERATOR
J. M. Carpenter, A. W. Schulke, T. L. Scott, D. G. Wozniak, B. E. Benson, and B. D. Leyda 1985 11 p Presented at the International Collaboration on Advanced Neutron Sources, Oxon, England, 8 Jul. 1985 Prepared in cooperation with Energy Research and Generation, Inc., Oakland, Calif.
(Contract W-31-109-eng-38)
(DE85-018401; CONF-850795-4) Avail: NTIS HC A02/MF A01

There are two motives for using cold moderators in pulsed neutron sources: (1) to provide higher fluxes of long-wavelength neutrons; and (2) to extend the epithermal range with its short pulse structure to lower energies. For both these purposes solid methane, operated at the lowest possible temperatures, is the best material we know of. Two problems accompany the use of

solid methane in high power sources, namely heat transport in view of the low thermal conductivity of solid methane, and deterioration due to radiation damage. We have designed a system suitable to operate in IPNS, subject to nuclear heating of about 25 W, which incorporates an aluminum foam matrix to conduct the heat from within the moderator. We report the results of the first few months' operation and of a few tests that we have performed. DOE

N86-19223# Universities Research Association, Berkeley, Calif. Superconducting Super Collider Central Design Group.
TECHNICAL ADVISORY ON SSC SITE CRITERIA AND CATALOG OF SITE INFORMATION NEEDS
15 Jun. 1985 54 p
(Contract DE-AC03-76SF-00098)
(DE86-000218; DOE/SF-00098/T9; SSC-15) Avail: NTIS HC A04/MF A01

The Superconducting Super Collider, or SSC, is a proposed scientific instrument for the study of the fundamental nature of matter. In the SSC two 20-TeV beams of protons will be accelerated and counter circulated on an approximately circular path. The protons will be made to collide at six locations where detectors can be placed to count and measure the products of the collisions. These collisions, twenty times more energetic than in any existing facility, will enable scientists to probe deeper into the heart of matter in the quest for a deeper understanding of the universal forces of nature. The goal of the SSC project is to create a scientific laboratory in high energy physics whose facilities are unique. Ultimately the success of that laboratory will be measured by its scientific discoveries, measurements, interpretations, and innovations. Toward that end the accelerator-collider must be constructed to high standards at minimum cost and maximum effectiveness. Preparations must be made for future operations and a scientific-technical staff attracted and maintained. The chosen site must accommodate all of these factors. This document summarizes siting criteria for the SSC and enumerates site-specific information important to the evaluation of potential sites. This document is not a call for site proposals but a technical report prepared for the information and use of the Department of Energy (DOE). DOE

N86-19224# California Univ., Berkeley. Lawrence Berkeley Lab.
SUPERCONDUCTING MATERIALS FOR THE SSC
R. Scanlan, J. Royet, and C. E. Taylor Aug. 1985 13 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000618; LBL-19394; CONF-850814-25) Avail: NTIS HC A02/MF A01

The proposed Superconducting Supercollider presents several new challenges with regard to materials for dipole magnets. One design requires a NbTi superconductor with J sub c (5T) greater than 2400 A/mm(2), whereas the Tevatron recently completed at Fermilab required a J sub c (5T) greater than or equal to 1800 A/mm(2). In addition, the high field design requires a conductor with a filament diameter of about 2.5 (MU)m, if correction coils are to be eliminated. Finally, the high field design utilizes a 30-strand cable which again is a significant increase from the 23-strand cable used in the Tevatron. This paper describes the results of recent R and D programs aimed at meeting the stringent material requirements for the SSC. DOE

N86-19225# Los Alamos National Lab., N. Mex.
THERMAL PLASMA CHEMICAL SYNTHESIS OF POWDERS
G. J. Vogt and L. R. Newkirk 1985 14 p Presented at the 168th Meeting of the Electrochemical Society, Las Vegas, Nev., 13 Oct. 1985
(Contract W-7405-eng-36)
(DE86-000793; LA-UR-85-3495; CONF-851048-6) Avail: NTIS HC A02/MF A01

Thermal plasma processing has been increasingly used to synthesize submicron powders of high-purity ceramics and metals. The high temperatures generated with the plasma provide a vapor phase reaction zone for elements with high boiling points and refractory materials. An overview is presented on the general plasma technology used in synthesis and on the properties of plasma powders. DOE

N86-18839# Norwegian Defence Research Establishment, Kjeller.
HIGH-FREQUENCY (HF) WAVE ACTIVITY OBSERVED BEAM INJECTOR FROM A ROCKET-BORNE ELECTRON ACCELERATOR
P. Ingsoey, J. Troeim, and M. Majewski (Austrian Academy of Sciences, Graz) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 191-196 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18840°# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
EXAMINATION OF NONADIABATIC EFFECTS DURING AN ELECTRON BEAM EXPERIMENT IN THE IONOSPHERE
K. Wilhelm *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 197-204 refs Sponsored by NASA, DFVLR, and Canadian National Research Council (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18844# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
LABORATORY SIMULATION OF THE ELECTRODYNAMIC INTERACTION OF THE TETHERED SATELLITE WITH THE IONOSPHERE
J.-P. Lebreton, C. Bonifazi (CNR, Frascati, Italy), H. Arends, M. Hamelin (CNRS, Orleans, France), R. Debrie (CNRS, Orleans, France), and M. Dobrowolny (CNR, Frascati, Italy) *In its* The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 221-225 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-19226 Pennsylvania Univ., Philadelphia.
STUDIES OF STRUCTURE AND TRANSPORT IN QUASI-ONE DIMENSIONAL CONDUCTORS Ph.D. Thesis
Ki-Bong Lee 1985 180 p
Avail: Univ. Microfilms Order No. DA8515402

The structures of quasi-one dimensional materials (TaSe4)2I and polythiophene, and the electronic properties of Hg3-delta AsF6 were studied experimentally by X-ray diffraction and by the low field magnetoresistance and Hall effect measurements, respectively. From an extensive X-ray diffraction study of the charge density wave (CDW) phase in (TaSe4)2I, the superstructure satellites at 2q in addition to the reported satellites at q = + or - 0.05, + or - 0.05, + or - 0.085 were observed. The results imply that the CDW lattice modulation with polarization almost perpendicular to q and they demonstrate the existence of CDW domains. The crystallinity and crystal structure of chemically coupled polythiophene was investigated by X-ray scattering measurements. Heat treatment at elevated temperatures leads to significant increases in crystallinity and coherence length, indicative of chain growth. The cylindrical Fermi surface of Hg3-delta AsF6 which results from perpendicular sets of weakly coupled one dimensional chains, is found both experimentally and theoretically to lead to a strong enhancement of the low field magnetoresistance, and to a logarithmic dependence on the magnetic field. Dissert. Abstr.

N86-19227# Chicago Univ., Ill. James Franck Inst.
LATTICE DYNAMICS OF RARE GAS MULTILAYERS ON THE Ag(111) SURFACE. THEORY AND EXPERIMENT Interim Technical Report
K. D. Gibson, S. J. Sibener, B. M. Hall, D. L. Mills, and J. E. Black Aug. 1985 65 p Prepared in cooperation with California Univ., Irvine and Brock Univ., St. Catharines, Ontario
(Contract N00014-77-C-0240)
(AD-A159718; TR-9) Avail: NTIS HC A04/MF A01 CSCL 20/2

We discuss the lattice dynamics of argon, krypton and xenon overlayers on the Ag(111) surface. We consider monolayer, bilayer, trilayer, and twenty-five layer films of each of these adsorbates. Data are also presented on the dispersion relation of selected branches of the phonon spectra of these overlayers. The data have been obtained by the method of angle-resolved inelastic He scattering. Several models of the lattice dynamics are compared with the data. It is concluded that the gas phase potentials proposed by Barker and co-workers prove suitable for a description of lateral interactions between the adsorbates, within the accuracy of the available data, provided that the phonon spectra are calculate for a lattice with the experimentally determined lattice constants. GRA

N86-19228# Chicago Univ., Ill. James Franck Inst.
INVESTIGATION OF THE SPATIALLY ANISOTROPIC COMPONENT OF THE LATERALLY AVERAGED MOLECULAR HYDROGEN/AG(111) PHYSISORPTION POTENTIAL Interim Technical Report
K. B. Whaley, C. F. Yu, C. S. Hogg, J. C. Light, and S. J. Sibener Aug. 1985 93 p
(Contract N00014-77-C-0240)
(AD-A159726; TR-7) Avail: NTIS HC A05/MF A01 CSCL 20/10

A detailed investigation of the spatially anisotropic component of the laterally averaged molecular hydrogen/Ag(111) physisorption potential is presented. Experimentally derived rotationally inelastic transition probabilities for H2, D2, and HD, taken as a function of collision energy, are compared with those resulting from close-coupled quantum scattering calculations. These calculations utilize exponential-3 and variable exponent parameterizations of the laterally averaged isotropic potential which reproduce the experimental bound state resonance spectra for p-H2 and o-D2 on Ag(111). Complementary information is obtained by analyzing the magnetic sub-level splittings for physisorbed J = 1 n-H2, using diffractive selective adsorption resonance energies calculated with first order perturbation theory. Theoretical predictions for HD/Ag (111) rotationally mediated selective adsorption resonances are also compared with previously reported experimental results, which show well resolved J-dependent energy shifts resulting in part from the orientational anisotropy of the potential. The results obtained in this study indicate that both the attractive and repulsive parts of the anisotropic potential exhibit only a weak orientation dependence, in agreement with recent theoretical predictions for this system. GRA

N86-19229# Chicago Univ., Ill. James Franck Inst.
DETERMINATION OF THE SURFACE PHONON DISPERSION RELATIONS FOR MONOLAYER, BILAYER, TRILAYER AND THICK Kr(111) FILMS PHYSISORBED ON Ag(111) BY INELASTIC He SCATTERING Interim Technical Report
K. D. Gibson and S. J. Sibener Aug. 1985 17 p
(Contract N00014-77-C-0240)
(AD-A159761; TR-8) Avail: NTIS HC A02/MF A01 CSCL 20/12

Angle and velocity resolved inelastic He scattering has been used to study how the surface dynamics of thin rare gas films evolve on a layer-by-layer basis. Surface phonon dispersion relations for ordered 1,2,3 and 25 layer Kr films physisorbed on Ag(111) are presented along TM across the entire Brillouin zone. The monolayer data are dispersionless, indicative of an Einstein oscillator mode. In comparison, the 25 layer film has a well developed Rayleigh wave, typical of a thick crystal surface. Excitation linewidths for monolayer Kr, which vary across the zone, are also briefly discussed. GRA

N86-19230# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Sciences.
SURFACE AND INTERFACIAL PROPERTIES OF InP Final Report, 1 May 1984 - 31 Apr. 1985
L. G. Meiners and H. H. Wieder 31 Apr. 1985 44 p
(Contract N00014-82-K-2032)
(AD-A159912) Avail: NTIS HC A03/MF A01 CSCL 20/12

Calculations of the effect of bulk traps on the time dependence of the channel current in InP accumulation-type MISFET's are reported. It is shown that a uniform density of deep acceptors in the bulk material given rise to a decay in the channel current which decays approximately linearly as a function of the logarithm of time. If capture of the electrons is assumed to occur by a nonradiative multiphonon emission procession, then the temperature dependence that is obtained agrees with experimental results. The energy level and the density of the deep acceptor Fe (1+) trap involved in space-charge-limited current (SCLC) flowing in semi-insulating (SI) InP was deduced from I-V measurements and a model employing either the low-field Hall mobility or the high-field saturated electron velocity v subscipt s. The modified model based on v subscript s, yields the Fe3(+) energy level, D sub 1 = 0.6eV, and the trap density N sub t = 3 X 10 to the 15th power/cc, consistent with data obtained by other means. GRA

N86-19231# Cornell Univ., Ithaca, N.Y. Materials Science Center.
GEOMETRIC STRUCTURE AND SURFACE VIBRATIONAL RESONANCES: THE BCC Fe(3) SURFACE Interim Technical Report
J. A. Stroscio, M. Persson, C. E. Bartosch, and W. Ho 2 Oct. 1985 18 p
(Contract N00014-82-K-0576)
(AD-A159916; TR-15) Avail: NTIS HC A02/MF A01 CSCL 20/12

The influence of strong multiple interplanar forces is shown to give rise to a new class of surface vibrational resonances on metal surfaces as a result of higher harmonic terms in the bulk phonon dispersion relations. This effect is illustrated with the bcc F3(111) surface where a surface resonance is observed at 21 meV by high resolution electron energy loss specatroscopy, in excellent agreement with predictions by surface lattice dynamics calculations. Author (GRA)

N86-19232# Chicago Univ., Ill.
HELIUM SCATTERING STUDIES OF THE SURFACE STRUCTURE AND DYNAMICS OF RARE GAS CRYSTALS
K. D. Gibson and S. J. Sibener Aug. 1985 34 p
(Contract N00014-77-C-0240)
(AD-A159942; TR-10) Avail: NTIS HC A03/MF A01 CSCL 20/12

This report reviews experiments involving He scattering from the surfaces of ordered rare gas overlayers physisorbed on Ag(111). The series of rare gases studied were Ar, Kr, and Xe. The measurements were performed on thin film structures which were grown on a layer-by-layer basis, from monolayer to thick film, in order to study how the surface properties changed with increasing distance from the substrate. Three types of experiments are discussed; elastic diffraction, selective adsorption, and inelastic single phonon scattering by angle-resolved time-of-flight. These experiments, taken together, provide a broad overview of the static and dynamic surface properties of rare gas overlayers. They also provide information about the forces which govern the adatom-adatom and adatom-substrate interactions. GRA

N86-19233# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
EFFECTS OF CRYSTALLITE ORIENTATION ON THE OXIDATION OF MoS2 THIN FILMS
P. D. Fleischauer and T. B. Stewart 9 Sep. 1985 26 p

(Contract F04701-83-C-0084)
(AD-A160617; TR-0084A(5945-03)-2; SD-TR-85-63) Avail: NTIS HC A03/MF A01 CSCL 07/4

Thin films of MoS2 have been prepared, by RF sputter deposition, with different microstructures that show markedly different susceptibilities to oxidation or other environmental degradation. The films were exposed to air atmospheres of variable relative humidity, and the extent of oxidation was measured by means of Auger electron (AES) and X-ray photoelectron (XPS) spectroscopies. The morphologies of the films were determined by transmission electron microscopy. Depths of oxidation of the thin films were calculated from changes in AES peak-to-peak height ratios and in XPS peak intensity ratios through the use of standard escape-depth models for attenuation of electron emission by a layer of reacted material (in the present case, MoO3). The results show that MoS2 films whose crystallites are oriented with their basal planes at random angles to the plane of the substrate surface (designated Type I films) are oxidized to depths equal to or greater than 300 A, whereas films whose crystallite basal planes are coplanar with (parallel to) the substrate surface (Type II films) are oxidized to a maximum depth of 10 to 15 A. These results are interpreted in terms of relative reactivities of edge versus basal planes of the MoS2 crystallites. GRA

N86-19234# Oak Ridge National Lab., Tenn.
SELF-CONSISTENT ELECTRONIC STRUCTURE OF ALPHA-PHASE HUME ROTHERY ELECTRON COMPOUND ALLOYS Cu SUB c Zn SUB1-c, Cu SUB cGa SUB1-c, AND Cu SUB c Ge SUB1-c
G. M. Stocks, A. M. Boring (Los Alamos National Lab., N. Mex.), D. M. Nicholson (Tennessee Univ., Knoxville), F. J. Pinski (Cincinnati Univ., Ohio), D. D. Johnson (Cincinnati Univ., Ohio), J. S. Faulkner, and G. L. Gyorffy (Bristol Univ., England) 1985 22 p Submitted for publication
(Contract W-7405-eng-36)
(DE85-017560; LA-UR-85-2861) Avail: NTIS HC A02/MF A01

We have performed charge self-consistent electronic structure calculations for the a-phae Hume-Rothery electron compound alloys Cu sub c Zn sub 1-c, Cu sub c Ga sub 1-c, and Cu sub c Ge sub 1-c having electron to atom ratios 1:1, 1:2, and 1:3 for each alloy series. The calculations are based on the self-consistent-field Korringa-Kohn-Rostoker coherent-potential approximation (KKR-CPA). We show results for the densities of states and Fermi surface of these alloys; the behavior of these quantities is quite different from that predicted on the basis of the rigid band model. we also show results for the ground state properties of Cu sub c Zn sub 1-c alloys that were obtained on the basis of a recent generalization of the density functional theory to random alloys. The theory provides a basis for understanding the concentration variation of the lattice parameter (Vegards' Law) Cu sub c Zn sub 1-c alloys at the microscopic quantum mechanical level. DOE

N86-19235# Sandia National Labs., Albuquerque, N. Mex.
EFFECT OF HYDROSTATIC PRESSURE ON DEFECT ANNEALING IN SEMICONDUCTORS
C. E. Barnes and G. A. Samara 1985 6 p refs
(Contract DE-AC04-76SF-00789)
(DE85-015149; SAND-84-2487C) Avail: NTIS HC A02/MF A01

We report the first study of the effect of hydrostatic pressure on the annealing of defects in Si and GaAc. It is shown that the application of hydrostatic pressure enhances the annealing rate in these materials. Analysis of the data yields the lattice volume relaxation accompanying annealing. DOE

N86-19236# Argonne National Lab., Ill.
LAYERED MAGNETIC SUPERLATTICES
I. K. Schuller Aug. 1985 6 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-018368; CONF-851174-4) Avail: NTIS HC A02/MF A01

The properties of non-lattice matched layered magnetic superlattices are strongly affected by the layering process. D.C. Magnetization measurements exhibit thin film effects and light scattering observation of the magnon spectra shows the existence of superlattice effects. Nuclear magnetic and ferromagnetic resonance experiments imply the existence of a variety of local fields depending on the distance from the interface. DOE

N86-19237# Brookhaven National Lab., Upton, N. Y.
NEUTRON DIFFRACTION STUDIES OF THIN FILM MULTILAYER STRUCTURES
C. F. Majkrzak 1985 30 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000208; BNL-36822; CONF-850871-15) Avail: NTIS HC A03/MF A01

The application of neutron diffraction methods to the study of the microscopic chemical and magnetic structures of thin film multilayers is reviewed. Multilayer diffraction phenomena are described in general and in particular for the case in which one of the materials of a bilayer is ferromagnetic and the neutron beam polarized. Recent neutron diffraction measurements performed on some interesting multilayer systems are discussed. DOE

N86-19238# California Univ., Berkeley. Lawrence Berkeley Lab.
BINDING BETWEEN CARBON ATOMS AND VACANCIES IN PLATINUM
U. Dahmen and K. H. Westmacott Aug. 1985 24 p Presented at the International Seminar on Solute Defect Interaction: Theory and Experiment, Kingston, Ontario, 5 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000624; LBL-20072; CONF-8508107-2) Avail: NTIS HC A02/MF A01

Evidence for a large binding energy (greater than or equal to0.5 eV) between interstitially dissolved carbon atoms and vacancies has been obtained from three types of experiment on platinum. This paper reviews the evidence for the precipitation, diffusion and ordering of carbon atom/vacancy pairs and discusses some implications of strong vacancy/impurity binding. DOE

N86-19239# United Kingdom Atomic Energy Authority, Harwell (England).
THIN FILMS AND INTERFACES: UKAEA CONFERENCE ON MATERIALS ANALYSIS BY PHYSICAL TECHNIQUES, 32ND CONFERENCE IN THE SERIES FORMERLY KNOWN AS THE DIFFRACTION ANALYSIS CONFERENCE-ATOMIC ENERGY ESTABLISHMENT
B. A. Bellamy, ed. and A. E. Hughes, ed. Feb. 1985 29 p Conference held at Winfrith, England, 13-15 Nov. 1984
(AERE-R-11655) Avail: NTIS HC A03/MF A01

Papers presented at the Conference cover the application of physical methods of analysis to problems concerned with the composition and microstructure of thin films and interfaces. Topics covered include oxidation, corrosion, protective coatings, fracture surfaces, nuclear fuels, activity deposition and metal semiconductor interfaces. Invited papers were presented on acoustic microscopy and on photoelectron spectroscopy of radioactive materials. DOE

N86-19240# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
NEUTRON DIFFRACTION METHODS FOR THE STUDY OF RESIDUAL STRESS FIELDS
A. J. Allen, M. T. Hutchings, C. G. Windsor, and C. Andreani (II Universita Degli Studi di Roma, Italy) Jun. 1985 63 p
(AERE-R-11630) Avail: NTIS HC A04/MF A01

A technique is described for the measurement of the residual stress tensor averaged over a specified volume within a component. The method involves measurement of the small shifts of the lattice spacing using high resolution neutron diffraction. The stress is inferred from these measurements of the strain, and the theory of the relationship between the two quantities is described including the effects of crystalline anisotropy. The various types of high resolution neutron diffractometer suitable for the work are de-

scribed. Experimental results validating the method are given for a simple bent bar of mild steel of known strain, a plastically strained mild steel bar, and a mild steel tube of known torsional strain. Examples of the method in practical use are given by a cracked fatigue test specimen, a double V test weld and a weld joining a tube to a plate. A more detailed discussion appropriate to the anisotropic response of a polycrystalline sample under elastic and plastic strain is illustrated by measurements on many different Bragg reflections from a plastically strained mild steel bar. DOE

N86-18836# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.
CRYSTAL GROWTH FURNACE DEVELOPED FOR FLOATING ZONE EXPERIMENTS IN SOUNDING ROCKETS
T. Carlberg, M. Liljendahl, R. Joensson (Swedish Space Corp., Solna), and P. Holm (Swedish Space Corp., Solna) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 165-172 refs Sponsored by ESA and Swedish Board for Space Activities (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18837# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Casting of Metals.
ON THE MECHANISM OF PRECIPITATION OF PORES IN MELTS AND PRODUCTION OF METALLIC FOAM UNDER REDUCED GRAVITY
H. Shahani and H. Fredriksson *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 173-182 refs Sponsored by Swedish Board for Space Activities (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-19241 Arizona Univ., Tucson.
QUANTUM THEORY OF MULTIWAVE MIXING Ph.D. Thesis
David Allen Holm 1985 197 p
Avail: Univ. Microfilms Order No. DA8517498

A theory describing how one or two strong classical waves and one or two weak quantum mechanical waves interact in a two-level medium is formulated and applied. The theory unifies many topics in quantum optics, such as resonance fluorescence, saturation spectroscopy, modulation spectroscopy, the build up of laser and optical bistability instabilities, and phase conjugation. The theory is based on a quantum population pulsation approach that resembles the semiclassical theories, but is substantially more detailed. Calculations are performed to include the effects of inhomogeneous broadening, spatial hole burning, and Gaussian transverse radiations. The resonance fluorescence spectrum in a high fitness optical cavity is analyzed in detail, demonstrating how stimulated emission and multiwave processes alter the spectrum from the usual three peaks. The effects of quantum noise during the propagation of weak signal and conjugate fields in phase conjugation and modulation spectroscopy are studied. Analysis demonstrates that quantum noise affects not only the intensities of the signal and conjugate, but also their relative phase, and in particular a quantum limit to the semiclassical theory of FM modulation spectroscopy. The corresponding theory for the two-photon, two-level medium is also derived. This yields the first calculation of the two-photon resonance fluorescence spectrum. Because of the greater number of possible interactions in the two-photon two-level model, the theoretical formalism is considerably more complex, and many effects arise that are absent in the one-photon problem. Dissert. Abstr.

N86-19242# California Univ., Berkeley. Lawrence Berkeley Lab.
UNIFICATION OF QUANTUM THEORY AND CLASSICAL PHYSICS
H. P. Stapp Jul. 1985 6 p Presented at the Symposium on the Foundations of Modern Physics, Joensuu, Finland, 16 Jun. 1985 (Contract DE-AC03-76SF-00098)
(DE86-000600; LBL-20039; CONF-850683-3) Avail: NTIS HC A02/MF A01

A program is described for unifying quantum theory and classical physics on the basis of the Copenhagen-interpretation idea of external reality and a recently discovered classical part of the electromagnetic field. The program effects an integration of the intuitions of Heisenberg, Bohr, and Einstein. DOE

N86-19243# Bielefeld Univ. (West Germany). Research Center Bielefed-Bochum Stochastics.
THE PHI 2 TO THE 4TH POWER EQUATIONS OF MOTION. PART 1: SIGN AND SPLITTING PROPERTIES. DEFINITION OF PHI LAMBDA-SUBSETS
Marietta Manolessou Jun. 1985 75 p refs
(Rept-52-A-Pt-1) Avail: NTIS HC A04/MF A01

The equations of motion for the polynomial interactions of degree 4 in two-dimensional space are considered. The fact the equations of motion for the completely amputated connected Green's functions (Schewing functions) for two dimensional momento space have a nontrivial solution is proved. Fixed point method is used. The precise relation of perturbative series with Phi-iteration is not studied. There is no contradiction between the divergence of perturbative series and the convergence of Phi-iteration. Author (ESA)

N86-19244# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
ON THE BOLTZMANN EQUATION IN UNBOUNDED SPACE FAR FROM EQUILIBRIUM AND THE LIMIT OF ZERO MEAN FREE PATH
Leif Arkeryd 1985 17 p refs
(CTH-Math-1985-16; ISSN-0347-2809) Avail: NTIS HC A02/MF A01

The Boltzmann equation for a prototype model of rarefied neutral gases in full space or bounded containers driven by binary collisions are considered. The fact that mild Loeb solutions of the Boltzman equation in unbounded space under natural initial conditions of finite mass, energy, and entropy exist when the initial values are close enough to the equilibrium value, is proved. The Maxwellian behavior in the limit of zero mean free path is also proved. Author (ESA)

N86-19245# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
SPACE-TIME MEANS AND NONLINEAR KLEIN-GORDON EQUATIONS
Philip Brenner 1985 33 p refs
(CTH-Math-1985-19; ISSN-0347-2809) Avail: NTIS HC A03/MF A01

The space-time means and nonlinear Klein-Gordon equations are considered. An improved version of previous results on the boundedness of certain space-time integrals of solutions of nonlinear Klein-Gordon equations is presented. The fact that there exists everywhere defined scattering operators with the same bounds on the nonlinearity at infinity is proved. Author (ESA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-19246# Texas Christian Univ., Fort Worth. Dept. of Psychology.
BASIC SKILLS RESOURCE CENTER: DEVELOPMENT AND

VALUATION OF COMPUTER-BASED LEARNING STRATEGY RAINING MODULES Final Report, Jul. 1982 - Aug. 1984
. F. Dansereau, T. R. Rocklin, A. M. ODonnell, V. I. Hythecker, nd C. O. Larson May 1985 51 p
ontract MDA903-82-C-0169; DA Proj. 2Q1-62722-A-791)
AD-A160421; ARI-RN-85-54) Avail: NTIS HC A04/MF A01 SCL 09/2

The overall goal of this project was to develop computer-ased learning strategy training modules designed to facilitate the cquisition and application of technical information. These modules ombine the strengths of two promising instructional techniques: omputer-assisted instruction and cooperative learning (peer utoring). Over the course of this project we have developed and ormally evaluated three modules designed to improve cognitive trategies during text processing: Summarization (paraphrase/ nagery), Structured Summarization (DICEOX), and Networking. We ave also developed and informally evaluated a module designed o improve affective strategies. The results of these evaluations ndicate that this training approach is effective for simple and omewhat familiar strategies (i.e., paraphrase/imagery). Suggesions are provided for improving the effectiveness of this training y extending training time and integrating the modules. The icrocomputer provides strategy instructions, and provides expert ontent and process feedback and reinforcement to the learner. GRA

N86-19247# Naval Postgraduate School, Monterey, Calif.
STRUCTURED EXIT INTERVIEWS USING MDS (MULTIDIMENSIONAL SCALING)
R. R. Read Sep. 1985 46 p
(AD-A160469; NPS55-85-024) Avail: NTIS HC A03/MF A01 CSCL 09/2

The main purpose of this report is to introduce the technique of MDS (Multidimensional Scaling) as a tool for organizing, enhancing, and structuring information that may be obtained from students during their exit interviews. More specifically the report is concerned with the question of measuring and summarizing the student's perception of the instructional treatment they received while at NPS. The administration is obliged to monitor this process and MDS offers a dynamic and yet structured way to manage this problem. Moreover, it will be seen that the technique is a subtle one which allows the discovery of new factors that influence the perception process. It has the potential of providing a way to separate unwanted effects. Recent advances in computer input technology make feasible the data collection component that is inherent in the application of the MDS technique. The student may link to a user friendly computer program which will request information of the proper kind. Responses are input by moving the cursor to the proper position and striking an appropriate key. (The use of a touchscreen or a mouse would be even better.) When finished, the respondent can send his input to a central file where it is merged with input from other sources and processed. The use of the console for the administration of a questionnaire allows much information to be gathered in a reasonably short period of time. The type of information requested and the way it is analyzed are the main issues treated herein. GRA

N86-19248# Chicago Univ., Ill. Center for Decision Research.
WHY BOTHER WITH EXPERIMENTS?
R. M. Hogarth May 1985 48 p
(Contract N00014-84-C-0018)
(AD-A160634; TR-16) Avail: NTIS HC A03/MF A01 CSCL 14/4

A generalization is a working hypothesis, typically expressed in the form of cause-effect relations. In the social sciences, generalizations decay because: (1) it is difficult to identify appropriate cause-effect relations, and (2) such relations are sensitive to the influences of environmental conditions. Whereas scientists should be realistic in their aspirations to create generalizable knowledge, much can be done to improve performance through the use of formal models and experimentation. It is particularly important that theories permit comparisons between models and data at multiple levels involving processes, environmental conditions, and predictions. Scientists should avoid and the extremes of models without data and data without models. Instead, models would be subjected to strong empirical tests via predictions (rather than tests of statistical significance), and the competing predictions of alternatives. In addition to suggesting what experimental evidence should be collected, models also serve the important function of determining when data collection would be of little value. The nature of experimental evidence is considered from three viewpoints: (1) asymmetries in the way data and models interact in affecting conclusions; (2) apparent but illusory conflicts between the goals of internal and external validity; and (3) the importance of conducting experiments despite poor prospects of creating knowledge that can be generalized. GRA

N86-18374# Royal Aircraft Establishment, Farnborough (England). National Remote Sensing Center.
EUROPEAN REMOTE SENSING: FUTURE NEEDS IN EDUCATION
Richard K. Bullard *In* ESA Proceedings of EARSeL/ESA Symposium on European Remote Sensing Opportunities: Systems, Sensors, and Applications Jun. 1985 p 151-156 refs (For primary document see N86-18351 09-19)
Avail: NTIS HC A12/MF A01

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-19249# Science Applications International Corp., McLean, Va. Behavioral Sciences Research Center.
AN ANNOTATED BIBLIOGRAPHY OF LITERATURE INTEGRATING ORGANIZATIONAL AND SYSTEMS THEORY
E. G. Davis, G. D. Foster, E. Kirchner-Dean, and R. W. Swezey Sep. 1985 341 p
(Contract MDA903-79-C-0699; DA Proj. 2Q1-62722-A-791)
(AD-A160912; SAI-82-03-178; ARI-RN-85-95) Avail: NTIS HC A15/MF A01 CSCL 05/1

This annotated bibliography presents a summary of articles on organizational and systems theory up to and including 1980. The articles are divided into three categories: (1) systems theory, (2) organizational behavior, effectiveness and development and (3) simulation and training. The primary purpose of this report is to examine the literature in this area to identify the dimensions of organizational structure and processes that are related to various organizational outcomes. It is suggested that the identification of these dimensions can lead to increased effectiveness of simulation and training programs. Author (GRA)

N86-19250# Oak Ridge Gaseous Diffusion Plant, Tenn.
MANAGING ENVIRONMENTAL PROJECTS WITH THE AID OF COMPUTERS. REVISION 1
L. F. Arrowood 1985 6 p Presented at the 1022/1032 Users Conference, Boston, Mass., 22 Sep. 1985
(Contract DE-AC05-84OT-21400)
(DE85-018290; K/CSD/INF-85/8-Rev-1; CONF-8509135-1-Rev-1)
Avail: NTIS HC A02/MF A01

Computer programs have been implemented for the Health, Safety, Environment, and Accountability Division at the Y-12 Plant to assist managers in tracking project milestones and reporting progress on environmental activities throughout the facility. By invoking external graphics software routines within FORTRAN programs, users can generate schedule milestone charts which use information retrieved from databases. In addition to its graphics capabilities, this database management system provides many reports which identify those milestones due for completion within a specific time period; these can be broken down further by the responsible project manager or government agency. The increasing use of such integrated systems can be seen as further evidence of the efficacy of the computer as a management tool DOE

N86-19251# Sandia National Labs., Albuquerque, N. Mex.
ESTABLISHING A SUCCESSFUL MANAGEMENT INFORMATION SYSTEM FOR PROJECT MANAGEMENT
D. M. Johnston 1985 8 p Presented at the Project Management Institute Seminar, Denver, Colo., 7 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018543; SAND-84-2401C; CONF-8510154-2) Avail: NTIS HC A02/MF A01

This paper presents the process we followed to achieve a successful management information system. Like many other organizations who decide to utilize a computer system to provide usable management information to aid in decision making, we found ourselves instead entangled in myriad of data items and details and complex and convoluted software programs, but no achievement of any management information, i.e., that which could be applied to aid in decision making. Since I have observed that this condition occurs in many organizations, our experience may provide insight to others struggling with nonexistent or cumbersome management information systems and guide them in the formulation of an effective MIS. DOE

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-19252 Cincinnati Univ., Ohio.
A MECHANISM FOR NATURAL LANGUAGE DATABASE Ph.D. Thesis
Richard Allen Feinauer 1985 367 p
Avail: Univ. Microfilms Order No. DA8518098

The purpose of this dissertation is to investigate the capabilities of a transportable natural language database query methodology that has only a surface level understanding of the user's query and uses a relational logical schema as the basis of its world model. A secondary goal of this dissertation is to explore the usefulness of explicit optimization techniques in a natural language database query methodology. The basic features of the methodology described in this dissertation and implemented in a test system called DRIVER are an Analyzer that converts the user's query into a relational algebra statement and an Evaluator which converts the relational algebra statement into the data manipulation language of the target database management system and presents the answer to the user. The Analyzer contains five components. They are: a Word Role Identifier, a Phase Segmenter, a Phrase Analyzer, a Query Generator, and a User Dialog. Each component transforms the query into a form which is closer to the relational algebra statement than its input. The Analyzer has four external sources of information. They are: a query grammar, a world model, a query complexity measure, and the user. Dissert. Abstr.

N86-19253 Texas Univ., Dallas.
ENTITY-BASED DATA BASE MANAGEMENT SYSTEMS Ph.D. Thesis
Robert Pershing Brazile 1985 103 p
Avail: Univ. Microfilms Order No. DA8516506

A data base management system (DBMS) which supports one of the three popular data models (hierarchical, network and relational) uses a record-based technique for implementing a data base design. This is advantageous when the data being stored is homogeneous, but the technique is not as well suited towards implementing data bases with particularly diverse properties and data types. An alternative technique, the entity-based technique, is presented which allows the design of the data base to be described and implemented as entities and relationships. The advantages of defining and maintaining the conceptual view of the data base with entities and relationships are discussed and examples are given to illustrate these advantages. A system to support the entity-based design technique can be implemented in two ways: (1) write an interface to an existing data base management system; (2) implement a data base management system explicitly for the entity-based technique. A set of primitive binary relations is presented which will support the concept of entity-based design. Dissert. Abstr.

N86-19254 Illinois Inst. of Tech., Chicago.
A COMPARISON OF MULTI-KEY FILE STRUCTURES AND ASSOCITIVE RETRIEVAL ALGORITHMS FOR DATABASE APPLICATIONS Ph.D. Thesis
Dennis Albert Beckley 1985 181 p
Avail: Univ. Microfilms Order No. DA8517569

The advent of many applications requiring associative retrieval poses serious problems for a database designer trying to choose an appropriate multikey file structure for the multikey retrieval algorithms. This thesis attempts to supply the database designers with experimental observations for some of the best-known multikey structures: inverted lists, quad-trees, and K-d trees. A methodology for file structure comparison with experimentation is also provided. A series of experiments compare the retrieval performance of these structures with each other as well as with flat files for five query classes: exact match, partial match, range search, nearest neighbor, and best match. Algorithms for all of these query classes are given for each file structure; when not available in the literature, they were created. The experiments were run on a large commercial IBM mainframe using a database of half a million characters, the Michael Reese Hospital Stroke Registry. The strategy for the file structure comparison requires query class usage statistics and relative metric weights from the data base designer. Dissert. Abstr.

N86-19255# Defense Technical Information Center, Alexandria, Va.
DEFENSE TECHNICAL INFORMATION CENTER CATALOGING GUIDELINES
G. B. Martens Oct. 1985 102 p Previously announced as N84-22503
(AD-A160100; DTIC/TR-85/10; DTIC/TR-84/1 dated Jan 84) Avail: NTIS HC A06/MF A01 CSCL 05/2

The guidelines for descriptive cataloging is a procedure manual published by the Defense Technical Information Center. It outlines the cataloging information to be included in the data fields for computer input of technical documents. The text is arranged numerically, by field number, and includes Appendices A through I. Changes to the security classification fields have been added to implement DoD 5200.1-R, Information Security Program Regulation. The rules and procedures in these guidelines are an adaptation of Guidelines for Descriptive Cataloging of Government Scientific and Technical Reports, published March 1978, as AD-A050 900. GRA

N86-19256# Commerce Energy NASA Defense Information Cataloging Committee, Washington, D.C.
GUIDELINES FOR DESCRIPTIVE CATALOGING OF REPORTS: A REVISION OF COSATI STANDARD FOR DESCRIPTIVE CATALOGING OF GOVERNMENT SCIENTIFIC AND TECHNICAL REPORTS
1985 101 p Revised
(AD-A160409; AD-F250248) Avail: NTIS HC A06/MF A01 CSCL 05/2

Revised COSATI guidelines developed to maximize standardization of descriptive cataloging entries are defined. The rules presented govern the form of the essential cataloging elements for reports processed by the major federal information processing agencies: U.S. Department of Commerce, U.S. Department of Energy, National Aeronautics and Space Adminstration, and U.S. Department of Defense. The elements are: accession number, organization name, organizational code, title (unclassified), subtitle or descriptive note, personal author, publication date, pagination (for printed documents), funding number, report number, availability, supplementary note, and security classification. Additional elements

of information and retrieval such as subject fields and groups, descriptors/subject terms, and abstract are also included within the scope of this standard. The guidelines are intended to provide users with a form of citation and index entries consistent within the products of the various information systems, and to facilitate the exchange of bibliographic information among the federal information processing agencies in the technical report literature field without costly duplicative effort, especially for machine-readable media. GRA

N86-19257# Argonne National Lab., Ill.
COMPUTING SERVICES WRITING AND EDITING STANDARDS
C. Caruthers and A. Heiberger Aug. 1985 105 p
(Contract W-31-109-eng-38)
(DE85-018547; ANL/TM-429) Avail: NTIS HC A06/MF A01

This report provides information that will enable writers to produce better documents consistent with Computing Services standards in less time. This document provides advice for organizing and writing technical information clearly and concisely, and it explains Computing Services usage standards. Applying the principles in this document will speed the writing, editing, review, and revision process in Computing Services. DOE

N86-19258# Department of Energy, Oak Ridge, Tenn.
RESOURCE DIRECTORY OF DOE INFORMATION ORGANIZATIONS, REVISION 2
M. W. Jared, ed. Oct. 1985 193 p
(Contract DE-AS05-80TC-11258)
(DE84-015655; DOE/TIC-4616-Rev-2) Avail: NTIS HC A09/MF A01

This Directory, the 1985 update of DOE/TIC-4616, is a guide to 199 information components of the Department of Energy (DOE) and is arranged by organization. When applicable, individual offices are listed hierarchically. Organization and personal name indexes are included. DOE

N86-19259# Department of Energy, Oak Ridge, Tenn.
INTERNATIONAL ENERGY R AND D REPRESENTED IN THE ENERGY DATA BASE, 1984
C. E. Stuber, ed. Oct. 1985 29 p
(DE85-016029; DOE/TIC-11624) Avail: NTIS HC A03/MF A01

One of the goals of the OSTI international information program is to maximize the availability and usage of foreign scientific and technical information within the DOE and its contractor organizations. This publication provides an outline of the OSTI international program, with emphasis on activities in 1984. In addition, the international energy R and D information acquired through this program in 1984 and available for access via the Energy Data Base (EDB) is analyzed by country of publication, type of literature, and subject matter. The basis for this analysis is country of publication because country of publication determines coverage responsibility for the exchange agreements included in the OSTI international program. Of course, the specific research facility and country where the research was performed are also included in each research summary exchanged, and these data elements are available for interrogation and analysis in EDB. DOE

N86-19260# Lawrence Livermore National Lab., Calif.
TEXT COMPRESSION USING WORD TOKENIZATION
G. Long, I. Morrison, and D. Barnett 11 Sep. 1985 21 p
(Contract W-7405-eng-48)
(DE86-000832; UCID-20526) Avail: NTIS HC A02/MF A01

This document describes a text compression scheme, its associated algorithms, and their implementation in the C programming language. The algorithms described only work for textural data. The current code and associated data dictionary are slanted toward general English language text such as technical reports and/or newspaper articles. With minor modifications to the code and by using special purpose dictionaries, the same algorithms could be used to compress special purpose text files such as compiler source listings. We achieve compression ratios of better than fifty percent and the routines are very fast. Typical applications produce significant reduction in data storage space and effectively double the transmission rate of documents between computers. DOE

N86-19261# Minnesota Univ., St. Paul. Water Resources Research Center.
POLICY AND ORGANIZATIONAL CONSIDERATIONS FOR IMPROVING TRANSFER OF UNIVERSITY RESEARCH INFORMATION AND EFFECTING AVAILABILITY OF EXPERTISE TO STATE AGENCIES
G. R. Blake Jul. 1984 41 p
(Grant DI-14-08-0001-G-850)
(PB85-232932; USGS/G-850-22) Avail: NTIS HC A03/MF A01 CSCL 05A

The troubled state of financing of the Water Resources Research Center (WRRC) precipitated a review of the WRRC, its role, its relation to other water resources units or programs in the University, its administrative structure and its financing. An ad hoc committee appointed by the University Vice President reported back with its recommendations on the role of WRRC, in research, in coordination, and in communication and outreach. The ad hoc report was supportive of the need for strengthening and financially supporting an expanded role for RRC. The University administration sensing a need for developing a coordinated mission for Natural Resources on its various colleges and campuses took action to set up a structure for that purpose. This consisted of appointing an Executive Council, a technical advisory committee and four resources sub-committees of which the Water Resources Subcommittee was one. GRA

N86-19262# National Library of Medicine, Bethesda, Md. MEDLARS Management Section.
BASICS OF SEARCHING MEDLINE: A GUIDE FOR THE HEALTH PROFESSIONAL
Jul. 1985 206 p
(PB85-232650; NLM/MED-85/05) Avail: NTIS HC A10/MF A01 CSCL 06E

The Guide is designed to acquaint the health professional with the basic concepts and skills involved in using MEDLARS to retrieve information from its primary database, MEDLINE. It may be used in a formal training course or as a self-paced learning tool. After carefully reading the Guide and practicing searches on the special training database, INTROMED, the health professional will have enough knowledge to perform author searches as well as simple subject searches in MEDLINE. For more complicated searches, the health professional may wish to consult an experienced librarian or search analyst. GRA

N86-19263# National Academy of Engineering, Washington, D.C.
INFORMATION TECHNOLOGIES AND SOCIAL TRANSFORMATION Final Report
B. R. Guile 1985 183 p
(PB85-240521; ISBN-0-309-03529-5; LC-85-4830) Avail: NTIS HC A09/MF A01 CSCL 05B

Information technologies are perhaps the most aggressive technologies of the current age, generating progress, change, and turbulence in many branches of industry and in the lives of organizations and individuals. The symposium that produced this volume brought scholars of technology and society together with technologists, social scientists, and representatives from the industrial, legal, and public sectors to discuss the interaction of information technology with social institutions. The topics addressed including a review of recent developments and likely futures in information technology, a comparison of information technology to historical developments in other technologies, and discussion of the interaction of information technology with businesses, homes, property rights in information, and various hierarchies of social organization. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-19264*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERVIEW OF FREE-PISTON STIRLING SP-100 ACTIVITIES AT THE NASA LEWIS RESEARCH CENTER
Jack G. Slaby [1986] 25 p refs Prepared for Presentation at the 3rd International Stirling Engine Conference, Rome, Italy, 23-27 Jun. 1986
(Contract DE-AI05-82OR-1005)
(NASA-TM-87224; E-2834; DOE/NASA/1005-8; NAS 1.15:87224) Avail: NTIS HC A02/MF A01 CSCL 10B

An overview of the National Aeronautics and Space Administration (NASA) Lewis Research Center (LeRC) SP-100 free-piston Stirling engine activities is presented. These activities are being conducted in support of the Department of Defense (DOD), Department of Energy (DOE), and NASA. The space-power technology effort, under SP-100, addresses the status of the 25 kWe Space Power Demonstrator Engine (SPDE). Another facet of the SP-100 project covers the status of an endurance test. Dynamic balancing of the SPDE engine is discussed along with a summary covering the parametric results of a study showing the relationship between power-converter specific weight and efficiency both as a function of Stirling engine heater to cooler temperature ratio. Design parameters and conceptual design features are presented for a 25 kWe, single-cylinder free-piston Stirling space-power converter. And finally, a description of a hydrodynamic gas bearing concept is presented. Author

N86-19265*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STIRLING POWERED VAN PROGRAM OVERVIEW Final Report
Richard K. Shaltens 1986 16 p refs Presented at the International Congress and Exposition, Detroit, Mich., 24-28 Feb. 1986; sponsored by the Society of Automotive Engineers
(Contract DE-AI01-85CE-50112)
(NASA-TM-87227; DOE/NASA/50112-62; E-2896; NAS 1.15:87227) Avail: NTIS HC A02/MF A01 CSCL 13F

The Stirling Powered Van Program (SPVP) is a multilayer, multiphase program to evaluate the automotive Stirling engine (ASE) in Air Force vans under realistic conditions. The objective of the SPVP is to have a manufacturer and end user(s) (i.e., on the path to commercialization) of the second-generation Mod II ASE upon completion of the Automotive Stirling Engine Program in 1987. In order to meet this objective, the SPSV must establish Stirling performance, integrity, reliability, durability, and maintainability. This paper reviews the ASE Program background leading to the Van Program and focuses on plans for evaluating the kinematic Stirling engine in Air Force vans. Also discussed are the NASA technology transfer to industry that have been accomplished and those which are currently being developed. Author

N86-19266# Aerospace Research Applications Center, Indianapolis, Ind. Dept. of Administration.
INDIANAPOLIS TECHNICAL INNOVATION PROGRAM: PROGRAM RESULTS Final Report
E. W. Waltz Oct. 1984 42 p
Avail: NTIS HC A03/MF A01 CSCL 05A

A technical innovation program conducted by the City of Indianapolis to solve City operational programs, reduce costs, and improve service productivity is discussed. Program objectives are listed, and include: to execute all program activities within the regular decision-making and budgeting processes of the City government; and to subject the program plans, budget, and results to a review and evaluation by the City-County Council. During the first year of the program, a combustion engineering analysis of the City's waste sludge incinerator operations was performed; the analysis formed the technical basis for a pilot project to demonstrate how a new operating technology could reduce fuel consumption and improve the incinerator's efficiency. Indianapolis achieved a fuel savings of about $800,000 per year, and also significantly reduced particulate emissions. Author (GRA)

88 SPACE SCIENCES (GENERAL)

N86-19267*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY IMAGE CONVERSION TASK Final Report
Michael D. Martin, Carol L. Stanley, and Gaylin Laughlin 15 Sep. 1985 219 p refs
(Contract NAS7-918)
(NASA-CR-176534; JPL-Pub-85-50; NAS 1.26:176534) Avail: NTIS HC A10/MF A01 CSCL 03B

The Planetary Image Conversion Task group processed 12,500 magnetic tapes containing raw imaging data from JPL planetary missions and produced an image data base in consistent format on 1200 fully packed 6250-bpi tapes. The output tapes will remain at JPL. A copy of the entire tape set was delivered to US Geological Survey, Flagstaff, Ariz. A secondary task converted computer datalogs, which had been stored in project specific MARK IV File Management System data types and structures, to flat-file, text format that is processable on any modern computer system. The conversion processing took place at JPL's Image Processing Laboratory on an IBM 370-158 with existing software modified slightly to meet the needs of the conversion task. More than 99% of the original digital image data was successfully recovered by the conversion task. However, processing data tapes recorded before 1975 was destructive. This discovery is of critical importance to facilities responsible for maintaining digital archives since normal periodic random sampling techniques would be unlikely to detect this phenomenon, and entire data sets could be wiped out in the act of generating seemingly positive sampling results. Reccomended follow-on activities are also included. Author

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-19268*# Radiometrics, Inc., Huntsville, Ala.
STAR FIELD SIMULATOR Final Report

31 Oct. 1985 24 p
(Contract NAS8-35830)
(NASA-CR-178612; NAS 1.26:178612) Avail: NTIS
HC A02/MF A01 CSCL 03A

A Star Field Simulator has been developed to serve as a source of radiation for the ASTRO Star Tracker. The star tracker and simulator are components of a motion compensation test facility located at Marshall Space Flight Center in Huntsville, Alabama. Preflight tests and simulations using various levels of guide stars are performed in the test facility to establish performance of the motion compensation system before being used in a flight environment. The ASTRO Star Tracker operates over a wide dynamic range of irradiance corresponding to visual stellar magnitudes of -0.8 to 8. A minimum of three simulated guide stars with variable magnitudes are needed to fully test the Star Tracker performance under simulated mission conditions. Author

N86-18431# Hamburger Sternwarte (West Germany).
RELATING THE HIPPARCOS REFERENCE FRAME TO THE RADIO REFERENCE FRAME VIA VERY LARGE ARRAY (VLA) MEASUREMENTS OF THE PRECISE POSITION OF STELLAR RADIO EMISSION
C. deVegt (Naval Research Lab., Washington D.C.), K. J. Johnston, and D. R. Florkowski (Naval Observatory, Washington D.C.) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 247-249 refs (For primary document see N86-18388 09-19)
(Contract BMFT-01000138)
Avail: NTIS HC A12/MF A01

N86-18433# Barcelona Univ. (Spain). Dept. de Fisica de la Tierray del Cosmos.
RADIO OBSERVATIONS OF HIPPARCOS STARS
R. Estalella, J. M. Paredes (Inst. Nacional de Tecnico Aeroespacial, Madrid), and A. Rius *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 255-257 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-19269 Johns Hopkins Univ., Baltimore, Md.
THE ABSOLUTE FLUXES OF SIX HOT STARS IN THE ULTRVIOLET (912 - 1600 ANGSTROMS) Ph.D. Thesis
Thomas Nee Woods 1985 119 p
Avail: Univ. Microfilms Order No. DA8518544

Six hot stars were observed on 1984 March 2 from a Black Brant V sounding rocket. The absolute fluxes from gamma sup 2 Vel, zeta Pup, alpha CMa gamma Ori, beta Tau, and epsilon Per were measured in the spectral region between 912 A and 1600 A at 10 A resolution. Comparisons with revised Voyager 1 and Voyager 2 Ultraviolet Spectrometer data (Holberg 1984) and previous sounding rocket data (Brune et al. 1979) are evaluated. In general, the two sounding rocket experiments are in good agreement, and the revised Voyager data and the sounding rocket data are in agreement except at wavelengths below 1000 A. Comparisons with stellar models (Kurucz 1979) are presented showing discrepancies near 1200 A and below 1000 A. Determination of interstellar absorption using the data on these stars proved to be unsatisfactory due partly to the inaccuracies of the stellar models; however, a list of hot stars suitable for deriving the interstellar extinction is included to aid future extreme ultraviolet experiments, such as the Hopkins Ultraviolet Telescope (HUT). Dissert. Abstr.

N86-19270 Ohio State Univ., Columbus.
SUPERMASSIVE STAR FORMATION: THE EARLY PHASES Ph.D. Thesis
Michael Preston Merilan 1985 219 p
Avail: Univ. Microfilms Order No. DA8518990

The evolution of nonrotating, nonmagnetic, dust-free supermassive protostellar clouds is examined with emphasis on the potential for formation of supermassive objects. The inhibiting roles of turbulence induced fragmentation, radiation pressure, radiative heating, and HLL region formation are also considered. A hybrid Eulerian scheme is applied to solve the classical and post-Newtonian coupled partial differential equations of hydrodynamics in conservation form. Radiative transfer and shocks are treated by the diffusion approximation and artificial viscosity. Cloud model parameters are chosen to satisfy the Jeans criterion. Compared to conventional mass clouds, the supermassive clouds (with initially constant temperatures and densities) are strongly gravitationally dominated relative to their thermal energy content. A highly nonhomologous, supersonic collapse results which parallels the early evolution of low mass protostellar clouds. Author

N86-19271 Princeton Univ., N. J.
COMPACT CONFIGURATIONS WITHIN SMALL EVOLVING GROUPS OF GALAXIES Ph.D. Thesis
Gary Allan Mamon 1985 287 p
Avail: Univ. Microfilms Order No. DA8518639

Small virialized groups of galaxies are evolved with a gravitational N-body code, where the galaxies and a diffuse background are treated as single particles, but with mass and luminosity profiles attached, which enbles the estimation of parameters such as internal energies, half-mass radii, and the softened potential energies of interaction. The numerical treatment includes mergers, collisional stripping, tidal limitation by the mean-field of the background (evaluated using a combination of instantaneous and impulsive formulations), galaxy heating from collisons, and background heating from dynamical friction. The groups start out either as dense as appear the groups in Hickson's (1982) catalog, or as loose as appear those in Turner and Gott's (1976a) catalog, and they are simulated many times (usually 20) with different initial positions and velocities. Dense groups of galaxies with massive dark haloes coalesce into a single galaxy and lose their compact group appearance in approximately 3 group half-mass crossing times, while dense groups of galaxies without massive haloes survive themerger instability for 15 half-mass crossing times (in a more massive background to keep the same total group mass). Author

N86-19272 Massachusetts Univ., Amherst.
CORRELATION ANALYSIS OF THE TAURUS MOLECULAR CLOUD COMPLEX Ph.D. Thesis
Steven Carl Kleiner 1985 261 p
Avail: Univ. Microfilms Order No. DA8517120

Autocorrelation and power spectrum methods have been applied to the analysis of the density and velocity structure of the Taurus Complex and Heiles Cloud 2 as traced out by C-130 J = 1 yields 0 molecular line observations obtained with the 14m antenna of the Five College Radio Astronomy Observatory. Statistically significant correlations in the spacing of density fluctuations within the Taurus Complex and Heiles 2 were uncovered. The length scales of the observed correlations correspond in magnitude to the Jeans wavelengths characterizing gravitational instabilities within (1) interstellar atomic hydrogen gas for the case of the Taurus complex, and (2) molecular hydrogen for Heiles 2. The observed correlations may be the signatures of past and current gravitational instabilities frozen into the structure of the molecular gas. A velocity gradient of 0.25 km/s is detected across the core of the Complex, which as a whole appears to be in virial equilibriu. Autocorrelation analysis of the remaining, non-systematic, gas motions sets an upper limit of 0.6 pc to the correlation length of turbulence within the Taurus Complex. This limit is shown to be inconsistent with suggestions that a lossless cascade (i.e., a Kolmogorov spectrum) of turbulent motions pervades the dense interstellar medium. Author

N86-19273 Rice Univ., Houston, Tex.
THE CYGNUS LOOP SUPERNOVA REMNANT: NEW OBSERVA-

TIONS AND A FRAMEWORK FOR UNDERSTANDING ITS STRUCTURE AND EVOLUTION Ph.D. Thesis
John Jeffrey Hester 1985 275 p
Avail: Univ. Microfilms Order No. DA8517205

New observational data on the Cygnus Loop supernova remnant (SNR) include: (1) a detailed high resolution comparison of X-ray and optical emission for a field in the SE; (2) a map of the [O III] electron temperature; and (3) CCD imagery of the NE limb in the light of four emission lines. A wide range of new and existing observations of the Loop are for the first time interpreted ithin the context of a single physical description. The Cygnus Loop is not an evaporative SNR evolving into an ISM, nor are tiny cloudlets necessary to explain its morphology. The data show the Cygnus Loop to be evolving into a medium consisting primarily of an intercloud phase. Evaporation of clouds cannot account for the X-ray data. The brightest X-ray emission in the Loop comes just interior to young optical emission, and the gas has a pressure of at least six times the average for the Loop. The X-ray data can be explained within the context of the large cloud picture by the combined effects of (1) a denser than average intercloud medium nears clouds (2) inertial pressurization of the X-ray emitting shell behind rapidly decelerating portions of the blast wave and (3) strong compression of the hot gas by reflected and bow shocks around clouds. Author

N86-18408# Universite des Sciences et Techniques du Languedoc, Montpellier (France). Lab. d'Astronomie.
SPECIFIC PROBLEMS RELATED TO VARIABILITY
M.-O. Mennessier *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 127-129 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18410# Observatoire de Marseille (France).
STARS IN THE DIRECTION OF THE MAGELLANIC CLOUDS
L. Prevot *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 137-139 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18411# Lausanne Univ. (Switzerland). Inst. d'Astronomie.
SELECTION OF STARS IN OPEN CLUSTERS FOR THE HIPPARCOS MISSION
J.-C. Mermilliod *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 141-143 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18412# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
THE HIPPARCOS PROPER MOTIONS FOR OPEN STAR CLUSTERS
R. Wielen and C. Dettbarn *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 145-148 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18413# Belgian Royal Observatory, Uccle.
CONCERNS, REALIZATIONS AND PROSPECTS OF THE SUBGROUP DOUBLE STARS OF THE HIPPARCOS INPUT CATALOG (INCA) CONSORTIUM
J. Dommanget *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 153-159 refs Sponsored by Belgian Fonds de la Recherche Fondamentale Collective (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18414# Belgian Royal Observatory, Uccle.
NEW WIDE DOUBLE STARS IN THE HIPPARCOS INPUT CATALOG
O. Nys *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 161-163 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18415# Belgian Royal Observatory, Uccle.
OBSERVABILITY OF SPECTROSCOPIC DOUBLE STARS BY HIPPARCOS [OBSERVABILITE PAR HIPPARCOS DES ETOILES DOUBLES SPECTROSCOPIQUES]
J. Dommanget *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 165-170 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18419# Astronomische Rechen-Institut, Heidelberg (West Germany).
ASTROMETRIC DATA FOR NEARBY STARS
H. Jahreiss *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 189-191 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18420# Bordeaux Univ. (France).
ONLY TWO YEARS LEFT TO SUPPLY ACCURATE POSITIONS TO THE HIPPARCOS NONASTROMETRIC STARS
Y. Requieme *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 193-195 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18421# Royal Greenwich Observatory, Hailsham (England).
CARLSBERG AUTOMATIC TRANSIT CIRCLE OBSERVATIONS FOR INCA
L. V. Morrison and P. Gibbs *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 197-199 (For primary document see N86-18388 09-19)
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N86-18422# Copenhagen Univ. (Denmark).
MERIDIAN OBSERVATION OF THE FAINT STARS PROPOSED FOR HIPPARCOS
E. Hoeg *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 201-202 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18423# Naval Observatory, Washington, D.C.
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J. A. Hugues and C. A. Smith *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 203-205 (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18425# Geneva Observatory (Switzerland).
RADIAL VELOCITY MEASUREMENTS OF LATE-SPECTRAL-TYPE STARS
M. Mayor *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 217-218 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18426# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.
COMPLEMENTARY PHOTOMETRIC OBSERVATIONS FOR HIPPARCOS
J. Torra, F. Figueras, J. M. Paredes, G. Rossello, and F. Sala *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 219-221

refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18427# Copenhagen Univ. (Denmark).
OVERVIEW OF TYCHO DATA ANALYSIS
E. Hoeg *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 225-230 refs Sponsored by Danish Space Board (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18429# Cambridge Univ. (England). Inst. of Astronomy.
REPORT BY SUBGROUP 2130 (LINK TO EXTRAGALACTIC REFERENCE OBJECTS)
A. N. Argue *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 237-240 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18430# Astronomische Rechen-Institut, Heidelberg (West Germany).
A CRITICAL EXAMINATION OF RADIO STAR DATA
H. G. Walter, C. deVegt (Hamburger Sternwarte), and Th. Kleine (Hamburger Sternwarte) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 241-245 refs (For primary document see N86-18388 09-19)
(Contracts BMFT-01000421; BMFT-01000138)
Avail: NTIS HC A12/MF A01

N86-18432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MILLIARCSECOND STRUCTURES, VLBI AND OPTICAL POSITIONS OF 8 HIPPARCOS RADIO STARS
J.-F. Lestrade, R. A. Preston, Y. Requieme (Observatoire de Bordeaux), M. Rapaport (Observatoire de Bordeaux), and R. L. Mutel (Iowa Univ.) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 251-253 refs Sponsored by NASA (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01 CSCL 22B

N86-19278*# Stanford Univ., Calif.
COMMENTS ON TECHNIQUES FOR SPECTRAL DECONVOLUTION
Philip H. Scherrer *In its* Contributions to Proceedings from the NATO Advanced Research Workshop on the Seismology of the Sun and the Distant Stars Sep. 1985 p 19-22 refs (For primary document see N86-19275 09-92)
Avail: NTIS HC A02/MF A01 CSCL 03B

N86-18834# Oslo Univ. (Norway). Inst. of Theoretical Astrophysics.
EXCITATION MECHANISMS IN THE ATMOSPHERES OF YELLOW AND RED GIANT AND SUPERGIANT STARS
O. Engvold, O. Kjeldseth Moe, E. Jensen, and P. Joraas *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 151-154 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-19274*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTROCRYSTALLIZATION IN MICROGRAVITY
Charles E. May Jan. 1986 22 p refs
(NASA-TM-87202; E-2857; NAS 1.15:87202) Avail: NTIS HC A02/MF A01 CSCL 03B

Electrocrystallization under microgravity conditions is proposed as a potential method of crystallization that would be almost completely free of fluid convection. Such crystallization may result in purer, more perfect, and larger crystals than is possible under normal gravity conditions. Observations made and data collected during the crystallization process under convection-free conditions should add to our knowledge of the crystallization process. The proposed method would allow easy comparison of crystals growth in space with those grown under normal gravity conditions. Nine types of electrocrystallization are presented: an example of each is discussed. Electrocrystallization is compared with the compartmental crystallization method used by 3M Corporation in recent shuttle experiments. Author

N86-18416# Bureau des Longitudes, Paris (France).
MINOR PLANETS IN THE HIPPARCOS PROGRAM [PETITES PLANETES DU PROGRAMME HIPPARCOS]
A. Bec-Borsenberger *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 175-177 refs In FRENCH; ENGLISH summary (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

N86-18417# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.
COMPLEMENTARY ASTROMETRIC OBSERVATIONS OF MINOR PLANETS AT BARCELONA
J. Nunez, C. Jordi, J. Calaf, and J. M. Codina (Observatorio Fabra) *In* ESA The European Astrometry Satellite HIPPARCOS: Scientific Aspects of the Input Catalog Preparation Aug. 1985 p 179-181 refs (For primary document see N86-18388 09-19)
Avail: NTIS HC A12/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-19275*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
CONTRIBUTIONS TO PROCEEDINGS FROM THE NATO ADVANCED RESEARCH WORKSHOP ON THE SEISMOLOGY OF THE SUN AND THE DISTANT STARS
Sep. 1985 24 p refs
(Grant NGR-05-020-559; Contract N00014-76-C-0207; Grant NSF ATM-77-20580)
(NASA-CR-176470; NAS 1.26:176470; SU-CSSA-ASTRO-85-23)
Avail: NTIS HC A02/MF A01 CSCL 03B

Advanced research results on the seismology of the Sun and distant stars is presented. Topics presented include: (1) detection of global convective wave flows; (2) observation of low degree p-mode oscillations; and (3) techniques for spectral deconvolution. For individual titles, see N86-19276 through N86-19278.

N86-19276*# Stanford Univ., Calif.
THE DETECTION OF GLOBAL CONVECTIVE WAVE FLOWS ON THE SUN
Philip H. Scherrer, Richard Bogart, J. Todd Hoeksema, and Hirokazu Yoshimura (Tokyo Univ., Japan) *In its* Contributions to Proceedings from the NATO Advanced Research Workshop on the Seismology of the Sun and the Distant Stars Sep. 1985 p 1-10 refs (For primary document see N86-19275 09-92)
Avail: NTIS HC A02/MF A01 CSCL 03B

Global convective flows in the solar convection zone have been predicted by theoretical interpretations of the global-scale ordering of magnetic fields and activity centers and by theoretical analyses of rotating convection zones. Direct evidence of these flows in the photosphere has not previously been found despite

several long-term efforts. The signatures of such flows have now been detected by analyzing the daily series of low-resolution Dopplergrams obtained at the Wilcox Solar Observatory at Stanford University. The signatures are patterns of alternating east and west flows with amplitudes on the order of 25 m/s and longitudinal extent of about 30 degrees. The patterns move across the disc at approximately the solar rotation rate and have lifetimes of at least several rotations. Boundaries of the fast and slow flows are often associated with large magnetic active regions. Author

N86-19277*# Stanford Univ., Calif.
OBSERVATIONS OF LOW-DEGREE P-MODE OSCILLATIONS IN 1984
Harald M. Henning and Philip H. Scherrer *In its* Contributions to Proceedings from the NATO Advanced Research Workshop on the Seismology of the Sun and the Distant Stars Sep. 1985 p 11-18 refs (For primary document see N86-19275 09-92)
Avail: NTIS HC A02/MF A01 CSCL 03B

Analysis of Stanford differential velocity observations has been extended through the 1984 observing season. Excellent quality observations were obtained in 1984 on 38 days in a 49 day interval from June 20th through August 7th. The power spectrum of this data has been examined and improved frequency determinations have been made for p-modes of degree 2 through 5 and order 5 through 34. Of special interest are the modes of the lower orders, n ranging from 5 to 10, which have not been identified previously. Author

N86-19278*# Stanford Univ., Calif.
COMMENTS ON TECHNIQUES FOR SPECTRAL DECONVOLUTION c90
Philip H. Scherrer *In its* Contributions to Proceedings from the NATO Advanced Research Workshop on the Seismology of the Sun and the Distant Stars Sep. 1985 p 19-22 refs (For primary document see N86-19275 09-92)
Avail: NTIS HC A02/MF A01 CSCL 03B

Current observational questions in asteroseismology require high spectral resolution that can be only be obtained with observations spanning many days or months. The primary constraint in the full utilization of single mid-latitude observing sites is the presence of diurnal data gaps. Several methods for removing the effect of these gaps in the spectral obtained from velocity observations have been suggested. In the case of data coverage of less than 50%, none of the methods considered has been successful at unambiguously recovering the true spectrum from test spectra with realistic complexity. The limitations of these methods and their applicability to the helioseismology problem is discussed. Author

N86-19279*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE HARD X-RAY BURST SPECTROMETER EVENT LISTING, 1980 - 1985
Brian R. Dennis, Larry E. Orwig, Alan L. Kiplinger, Bernard R. Gibson, G. Shelby Kennard, and A. Kimberley Tolbert 1985 146 p
(NASA-TM-86236; Rept-86B0023; NAS 1.15:86236) Avail: NTIS HC A07/MF A01 CSCL 03B

This event listing is a comprehensive reference for the hard X-ray bursts detected with the Hard X-Ray Burst Spectrometer on the Solar Maximum Mission from the time of launch on February 14, 1980 to September 1985. Over 8000 X-ray events were detected in the energy range from 30 to approx. 500 keV with the vast majority being solar flares. The listing includes the start time, peak time, duration and peak rate of each event. Author

N86-18832# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Lab. de Physique Stellaire et Planetaire.
SOLAR PHYSICS FROM SPACE
P. Lemaire *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 139-143 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18833# Oslo Univ. (Norway). Inst. of Theoretical Astrophysics.
THE ENERGY BALANCE IN THE SOLAR CHROMOSPHERE-CORONA TRANSITION ZONE
O. Kjedseth Moe, T. Andreassen, O. Andreassen, P. Maltby, J.-D. F. Bartoe (Hulburt (E. O.) Center for Space Research, Washington, D.C.), and G. E. Brueckner (Hulburt (E. O.) Center for Space Research, Washington, D.C.) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 145-149 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18843# Science Research Council, Chilton (England). Rutherford Appleton Lab.
ENERGIZATION OF ELECTRONS FOLLOWING ION RELEASE IN THE SOLAR WIND
D. A. Bryant, D. S. Hall, and C. P. Chaloner *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 217-220 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18859# Observatoire de Paris-Meudon (France).
GEOMAGNETIC ACTIVITY AND SOLAR CYCLE
P. A. Simon and J. P. Legrand (INSU Mesure, Saint-Maur, France) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 305-311 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18869# Observatoire de Paris-Meudon (France).
SOLAR CORONAL HOLES OBSERVED WITH THE NANCAY (FRANCE) METER RADIOHELIOGRAPH
P. Lantos and C. Alissandrakis (Athens Univ., Greece) *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 367-368 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

N86-18870# Observatoire de Paris-Meudon (France).
FORECASTING SOLAR FLARES AND GEOMAGNETIC STORMS AT MEUDON (FRANCE)
P. A. Simon and P. Lantos *In* ESA The Seventh ESA Symposium on European Rocket and Balloon Programs and Related Research 1985 p 369-370 refs (For primary document see N86-18811 09-46)
Avail: NTIS HC A18/MF A01

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

No abstracts in this category.

99 GENERAL

N86-19280*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RESEARCH AND TECHNOLOGY: 1985 ANNUAL REPORT OF THE LYNDON B. JOHNSON SPACE CENTER

Dec. 1985 78 p

(NASA-TM-58272; S-552; NAS 1.15:58272) Avail: NTIS HC A05/MF A01 CSCL 05A

Johnson Space Center accomplishments in new and advanced concepts during 1985 are highlighted. Included are research funded by the Office of Aeronautics and Space Technology; Solar System Exploration and Life Sciences research funded by the Office of Space Sciences and Applications; and Advanced Programs tasks funded by the Office of Space Flight. Summary sections describing the role of the Johnson Space Center in each program are followed by one-page descriptions of significant projects. Descriptions are suitable for external consumption, free of technical jargon, and illustrated to increase ease of comprehension. Author

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Typical Subject Index Listing

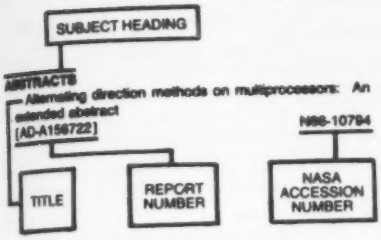

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7051).

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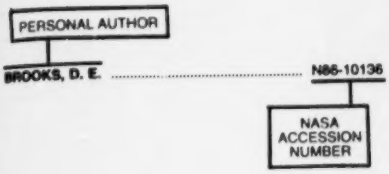

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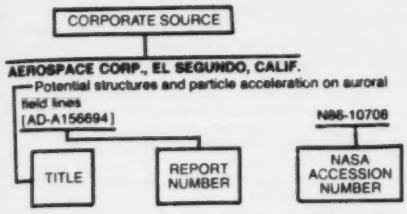

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COMMERCE ENERGY NASA DEFENSE INFORMATION CATALOGING COMMITTEE, WASHINGTON, D.C.
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DOE explosive safety manual, revision 2
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GRENOBLE-1 UNIV. (FRANCE).

Antiproton annihilations in nuclei
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical facilities catalogue. Volume 2: Airbreathing propulsion and flight simulators
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Summaries of 1984-85 NASA space-gravitational biology accomplishments
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Aerospace medicine and biology: A continuing bibliography with indexes (supplement 279)
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Research and technology: 1985 annual report of the Lyndon B. Johnson Space Center
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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
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[DE85-015149] N86-19235
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Night vision manual for the flight surgeon
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Computer-aided design of robust decentralized controllers
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SHOCK AND VIBRATION INFORMATION CENTER (DEFENSE), WASHINGTON, D. C.
The Shock and Vibration Digest, volume 17, no. 7
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SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Experimental studies in molecular fragmentation: Processes, energetics and diagnostics
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Drilling risers for great water depths: Advantage for mass reduction by means of composite materials
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Ada (trade name) portability guidelines
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Thermal and mechanical properties of calcium lanthanum sulfide
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SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
Study of fan-airpump applicability to two-stage air cleaner systems
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New polymeric materials expected to have superior properties for space-based use
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Contributions to Proceedings from the NATO Advanced Research Workshop on the Seismology of the Sun and the Distant Stars
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Immunomodulation by proteins of bordetella pertussis
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Interactive Graphics Utility for Army NEC (Numerical Electromagnetics Code) Automation (IGUANA): User's guide
[AD-A160605] N86-19001
Interactive Graphics Utility for Army NEC (Numerical Electromagnetics Code Automation (IGUANA): Computer program package
[AD-A160652] N86-19003
SYSTEMS AND APPLIED SCIENCES CORP., VIENNA, VA.
Objective analysis and prediction techniques - 1984
[AD-A160377] N86-18922
Users guide for normal mode objective analysis of global data assimilation
[AD-A160373] N86-18998
SYSTEMS CONTROL TECHNOLOGY, INC., PALO ALTO, CALIF.
Adaptive decentralized control
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T

TECHNISCHE HOCHSCHULE, AACHEN (WEST GERMANY).
Clamping and positioning system to be applied for the manufacturing of small and medium sized batches on Numerical Control (NC) machines
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Weighting system calibration 1982. Part 1: Text and appendices
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Report of noise measurements with 2 different microphone dispositions on airplane type Cessna F 172L
[VTH-M-510] N86-19143
TECHNISCHE UNIV., BERLIN (WEST GERMANY).
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Plausibility functions of Iowa vocabulary test items estimated by the simple sum procedure of the conditional P.D.F. Approach
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Basic skills resource center: Development and evaluation of computer-based learning strategy training modules
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Collision of Mach reflections with a 90 deg ramp in air and CO2
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Evaluation of advanced design concepts for absorption heat pumps
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TRANSPORTATION SYSTEMS CENTER, CAMBRIDGE, MASS.
Monitoring of GPS (Global Positioning System) system performance
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U

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL (ENGLAND).
Comparisons between ultrasonic bulk shear wave velocities in textured steel with application to the measurement of residual stress
[AERE-R-11559] N86-19144
Studies of laser-generated ultrasonic waveforms at different orientations
[AERE-R-11686] N86-19145
Small angle neutron scattering data on cements with pozzolanic additives
[AERE-R-11609] N86-19162
Thin Films and Interfaces: UKAEA Conference on Materials Analysis by Physical Techniques. 32nd Conference in the series formerly known as the Diffraction Analysis Conference-Atomic Energy Establishment
[AERE-R-11655] N86-19239
Neutron diffraction methods for the study of residual stress fields
[AERE-R-11630] N86-19240
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Onsite 40-kilowatt fuel cell power plant manufacturing and field test program
[NASA-CR-174988] N86-18773
UNIVERSAL ENERGY SYSTEMS, INC., DAYTON, OHIO.
Double wall artery heat pipe
[AD-A160012] N86-18671
UNIVERSITE CATHOLIQUE DE LOUVAIN (BELGIUM).
Basic equations of fluid mechanics N86-18653
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Finite element calculation of generalized Newtonian flow N86-18655
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UNIVERSITE DES SCIENCES ET TECHNIQUES DU LANGUEDOC, MONTPELLIER (FRANCE).
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UNIVERSITY OF SOUTHERN CALIFORNIA, MARINA DEL REY.
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VARIAN ASSOCIATES, PALO ALTO, CALIF.
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Transport theory and fluid dynamics
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Project ABLE: (Atmospheric Balloonborne Lidar Experiment)
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VON KARMAN INST. FOR FLUID DYNAMICS, RHODE-SAINT-GENESE (BELGIUM).
Computational fluid dynamics, volume 1
[VKI-LS-1985-04-VOL-1] N86-18652
Computational fluid dynamics, volume 2
[VKI-LS-1985-04-VOL-2] N86-18660

W

WASHINGTON STATE UNIV., PULLMAN.
Fracto-emission from polymers
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Ultraviolet disinfection of water for small water supplies
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Physical oceanographic characteristics of the Nares Plain region of the western North Atlantic
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UW/NW (University of Washington/Northwest) VLSI Consortium
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WASHINGTON UNIV., ST. LOUIS, MO.
Comparison of X-ray computed tomography, through-transmission ultrasound, and low-kV X-ray imaging for characterizing green-state ceramics
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WATERLOO UNIV. (ONTARIO).
Computer-aided design of robust decentralized controllers
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The European LFM-style forecast aids
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WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.
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WESTON GEOPHYSICAL CORP., WESTBORO, MASS.
Simulated ground response using nonlinear elastic moduli
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WISCONSIN UNIV., MADISON.
Numerical analysis
[AD-A160207] N86-19074

WOMA APPARATEBAU, DUISBURG (WEST GERMANY).
Deburring of metal workpieces with directed high pressure water jets. Basis and application limits
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WUPPERTAL UNIV. (WEST GERMANY).
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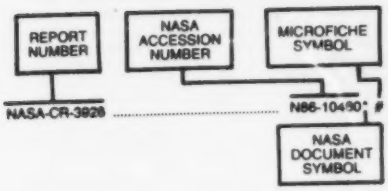

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AERE-R-11609 ..... N86-19162 #
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AFGL-AFSG-447 ..... N86-18884 #

AFGL-ERP-904 ..... N86-18920 #
AFGL-ERP-905 ..... N86-18924 #
AFGL-ERP-906 ..... N86-18350 #
AFGL-ERP-909 ..... N86-18923 #
AFGL-ERP-910 ..... N86-18925 #
AFGL-ERP-914 ..... N86-18921 #
AFGL-ERP-916(1) ..... N86-18435 #
AFGL-ERP-918 ..... N86-18944 #

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AFGL-TR-84-0328 ..... N86-18922 #
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AFGL-TR-85-0122 ..... N86-18944 #

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AFGL-TR-85-0227 N86-18339 #

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AFIT/GLM/LSB/85S-2 N86-18987 #

AFIT/GLM/LSM/85S-1 N86-18308 #
AFIT/GLM/LSM/85S-20 N86-18501 #

AFIT/GLM/LSP/85S-44 N86-18630 #

AFIT/GSM/ENS/85S-32 N86-18312 #

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AFWAL-TR-85-2041 N86-18671 #
AFWAL-TR-85-3046 N86-19017 #
AFWAL-TR-85-3052 N86-18909 #
AFWAL-TR-85-4045 N86-18318 #
AFWAL-TR-85-4066 N86-18446 #

AFWL-TR-84-126-VOL-1 N86-19164 #
AFWL-TR-84-126-VOL-2 N86-19165 #
AFWL-TR-84-142 N86-18701 #

AI-M-800 N86-19085 #
AI-M-824 N86-18767 #
AI-M-828 N86-19032 #
AI-M-864 N86-18736 #

AIRMICS-ISEC-ASBG-84-2 N86-19048 #

AMMRC-TR-85-21 N86-18563 #
AMMRC-TR-85-23 N86-18453 #
AMMRC-TR-85-24 N86-18452 #

AMSMI/RG-85-10-TR N86-18623 #
AMSMI/RG-85-15-TR N86-19033 #

AMSMI/RR-85-1-TR N86-19195 #
AMSMI/RR-85-2-TR N86-18696 #

AMXTH-TE-TR-85037 N86-18798 #

ANL-HEP-CP-85-37 N86-19171 #

ANL/ECT-14 N86-18804 #

ANL/MCS-TM-52 N86-19041 #

ANL/TM-429 N86-19257 #
ANL/TM-430 N86-19042 #

ARI-RN-85-17 N86-19031 #
ARI-RN-85-20 N86-18983 #
ARI-RN-85-54 N86-19246 #
ARI-RN-85-87 N86-19057 #
ARI-RN-85-90 N86-18999 #
ARI-RN-85-95 N86-19249 #

ARI-RR-469 N86-18717 #
ARI-RR-1408 N86-19050 #

ARI-TR-687 N86-18982 #

ARL-AERO-TM-372 N86-18295 #

ARL-STRU-TM-415 N86-18320 #

ARL-TR-85-14 N86-19130 #
ARL-TR-85-21 N86-19138 #

ARL/PSU/TM-85-97 N86-18672 #
ARL/PSU/TM-85-149 N86-18668 #

ARL/STRUC-TM-412 N86-18321 #
ARL/STRUC-TM-416 N86-18756 #
ARL/STRUC-TM-419 N86-18698 #

ARLCB-TR-85022 N86-18768 #
ARLCB-TR-85025 N86-18493 #
ARLCB-TR-85027 N86-18753 #
ARLCB-TR-85028 N86-19068 #
ARLCB-TR-85029 N86-18752 #

ARO-18828.2-LS-S N86-18952 #
ARO-18985.26-EL N86-18994 #
ARO-20585-1-MA N86-18670 #
ARO-20678.7-CH N86-18444 #
ARO-21387.3-CH N86-18545 #

AV-FR-85/802 N86-18774* #

AWS/TC-85/001 N86-18912 #

AWS/TN-85/001-VOL-2 N86-18913 #

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BBC-RD-1985/10 N86-18583

BLL-CE-TRANS-8123(9022.09) N86-19146

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BLL-M-36420-(5282.4F) N86-18485
BLL-M-36451-(5828.4F) N86-18484
BLL-M-36460-(5828.4) N86-18478
BLL-M-36464-(5828.4) N86-18482
BLL-M-36465-(5828.4) N86-18481
BLL-M-36488-(5828.4) N86-18479
BLL-M-36489-(5828.4) N86-18477

BLL-RISLEY-TR-5220-(9091.9F) N86-18488
BLL-RISLEY-TR-5221-(9091.9F) N86-18487
BLL-RISLEY-TR-5231-(9091.9F) N86-18486
BLL-RISLEY-TR-5234-(9091.9F) N86-18743

BLLD-M-36470-(5828.4) N86-18458

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BNL-NUREG-36471 N86-18757 #

BNL-36759 N86-18680 #
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CRDC-CR-84011 ..... N86-18492 #
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CRDC-SP-85012 ..... N86-18447 #

CRREL-SP-85-12 ..... N86-18798 #

CRREL-85-13 ..... N86-18598 #

CS-TR-1492 ..... N86-19019 #
CS-TR-1501 ..... N86-19020 #
CS-TR-1513 ..... N86-18692* #
CS-TR-1519 ..... N86-19022* #

CS-1984-15 ..... N86-19113 #

CSI-85-01 ..... N86-18990* #

CTH-MATH-1985-7 ..... N86-19118 #
CTH-MATH-1985-10 ..... N86-19089 #
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DFVLR-FB-85-46 ..... N86-18933 #
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DNA-TR-84-401 ..... N86-18596 #

DOE/CH-6(1)-FINAL ..... N86-18886 #

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DOE/ER-0202/1 ..... N86-18932 #
DOE/ER-02504/423 ..... N86-19219 #
DOE/ER-02534/T1 ..... N86-18887 #
DOE/ER-04446/1 ..... N86-18567 #
DOE/ER-05172/0023 ..... N86-19178 #
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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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E10	28.00	56.00
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02 AERODYNAMICS 1529
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.
For related information see also *34 Fluid Mechanics and Heat Transfer*

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For related information see also *Aeronautics*

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CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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LIFE SCIENCES

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55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

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Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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PHYSICS

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SOCIAL SCIENCES

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SPACE SCIENCES

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Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 1700
Includes planetology; and manned and unmanned flights.
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92 SOLAR PHYSICS 1701
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 1702
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

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99 GENERAL N.A.

Note: N.A. means that no abstracts were assigned to this category for this issue.

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

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REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

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A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included.

Author

VOLUME 24 NUMBER 10 / MAY 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-19281* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 195)
Jan. 1986 113 p
(NASA-SP-7037(195); NAS 1.21:7037(195)) Avail: NTIS HC A06 CSCL 01A

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02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-19282 Illinois Univ., Urbana-Champaign.
FLUCTUATING PRESSURE AND VELOCITY FIELDS IN THE NEAR FIELD OF A ROUND JET Ph.D. Thesis
Paul Hsin-Pei Chang 1985 216 p
Avail: Univ. Microfilms Order No. DA8521737

A new analysis algorithm for analyzing signals of a triple-wire anemometer probe is presented which describes the performance of the hot-wire probe and shows the ambiguity in interpretation of the three effective cooling velocities for a range of flow vector directions. Jorgensen's (1971) cooling law for cylinders inclined to the flow vector is adopted. Inverted velocity vectors are multiple but a uniqueness domain, within which the vector coinciding with the true velocity vector can be singled out, is defined. Samples of linearized voltages were taken in the turbulent shear layer of a 6.35 cm diameter jet and analyzed by the algorithm. The results appear to support the methodology of the algorithm. The mechanisms that cause some of the samples to reside outside the realizable domain are discussed. A dynamic test in terms of pressure-velocity correlation in an unsteady irrotational flow was performed for the bleed-type pressure transducer. Pressure-velocity correlations calculated from the unsteady Bernoulli equation agree closely with direct measurements with the pressure transducer. Dissert. Abstr.

N86-19283 Purdue Univ., West Lafayette, Ind.
AN EXPERIMENTAL INVESTIGATION OF PROPELLER WAKES USING A LASER DOPPLER VELOCIMETER Ph.D. Thesis
R. M. Sundar 1985 196 p
Avail: Univ. Microfilms Order No. DA8520081

This report presents a detailed investigation of the performance and flowfield of three single rotation propellers. These propellers were designed to demonstrate the efficiency improvements attainable by using proplets and biblades. Direct measurement of thrust by a parallelogram balance and power by measuring the input to the propulsion unit (dc motor) was used to determine the efficiency of the propellers. The force measurements demonstrated that the use of proplets did produce an efficiency improvement under high loading conditions in static operation as well as with forward speed. The improvement in static thrust by using proplets was comparable with that of a shrouded propeller. The flow field in the wake of the propellers was investigated with an LDV system. The measured velocity field is compared with the theoretical velocity field. Biot-Savarts' law was applied to the theoretically assumed vortex geometry in the wake to determine the theoretical velocity field. Dissert. Abstr.

N86-19284# Committee on Science and Technology (U. S. House).
HIGH SPEED AERONAUTICS
Washington GPO 1985 195 p Hearing before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congress, 1st Session, no. 21, 24 Jul. 1985
(GPO-51-341) Avail: Subcommittee on Transportation, Aviation and Materials

Testimonies on the research and development of hypersonic speed aviation is presented. The effect of high speed aircraft on space flight is noted. The need to press forward in this research in order to keep up with other countries is emphasized. Budgetary requirements are also considered. E.R.

N86-19285# National Aeronautical Establishment, Ottawa (Ontario). High Speed Aerodynamics Lab.
ANALYSIS OF EXPERIMENTAL DATA FOR A 21% THICK NATURAL LAMINAR FLOW AIRFOIL, NAE68-060-21:1
D. J. Jones and M. Khalid Oct. 1985 56 p refs
(NAE-AN-34; NRC-25076) Avail: NTIS HC A04/MF A01

Results obtained from wind tunnel tests on a 21% thick supercritical airfoil capable of sustaining long runs of laminar flow on both surfaces are presented. The measured drag levels are superior to those of any model previously tested in this facility and are comparable to classical NACA and modern NASA NLF airfoils. Author

N86-19286# National Aerospace Lab., Tokyo (Japan).
AERODYNAMIC TRANSFER FUNCTIONS FOR A FINITE WING IN INCOMPRESSIBLE FLOW
Hiroshi Matsushita 1985 58 p refs In JAPANESE; ENGLISH summary
(NAL-TR-867; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

The aerodynamic transfer functions for a wing with a control surface in an incompressible flow are presented analytically using Laplace transform technique. The aerodynamic transfer function for an airfoil can be analytically represented with the generalized Theodorsen function as circulatory parts and the rational function as noncirculatory parts. The aerodynamic transfer function for a finite wing is obtained in a closed form which includes the

nonrational function called a modified circulation. A modified circulation function shows a finite wing effect and is governed by an integro-differential equation, which can be solved efficiently by numerical computation. These results extend the simple harmonic theory to a general transient motion. With the expression thus obtained, the characteristics of the aerodynamic transfer function for a finite wing clearly show that it should have a branch point at the origin and have no singularities along the negative real axis. Transient aerodynamic forces in time domain such as an indicial lifts are obtained by inverse Laplace transforming the present results. Comparison of these results with the other methods and the experimental values shows a good agreement. Author

N86-19287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED WIND-TUNNEL INVESTIGATION OF THE EFFECT OF STRAKES AND NOSE MACHINES ON LATERAL-DIRECTIONAL STABILITY OF A FIGHTER CONFIGURATION
Jay M. Brandon Washington Feb. 1986 33 p refs
(NASA-TM-87641; L-16051; NAS 1.15:87641) Avail: NTIS HC A03/MF A01 CSCL 01A

A series of low-speed static wind-tunnel force tests were conducted on a 0.15-scale model of a modern high-performance fighter aircraft. The tests identified the use of nose chines to enhance stability at high angles of attack. Results of this investigation showed that the strake was the major contributor to directional instability. The destabilizing forces were created by two mechanisms: (1) adverse flow in the region of the vertical tail, and (2) forces generated on the fuselage ahead of the center of gravity. Properly designed nose chines effectively negated the adverse flow near the vertical tail and created stabilizing forces on the forebody in the range of the stall angle of attack. Author

N86-19288*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOADS AND AEROELASTICITY DIVISION RESEARCH AND TECHNOLOGY ACCOMPLISHMENTS FOR FY 1985 AND PLANS FOR FY 1986
J. E. Gardner and S. C. Dixon Jan. 1986 125 p
(NASA-TM-87676; NAS 1.15:87676) Avail: NTIS HC A06/MF A01 CSCL 01A

The Langley Research Center Loads and Aeroelasticity Division's research accomplishments for FY85 and research plans for FY86 are presented. The rk under each branch (technical area) will be described in terms of highlights of accomplishments during the past year and highlights of plans for the current year as they relate to five year plans for each technical area. This information will be useful in program coordination with other government organizations and industry in areas of mutual interest. Author

N86-19289*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A TWO-DIMENSIONAL NUMERICAL STUDY OF THE FLOW INSIDE THE COMBUSTION CHAMBERS OF A MOTORED ROTARY ENGINE
T. I.-P. Shih (Florida Univ., Gainesville), S. L. Yang (Florida Univ., Gainesville), and H. J. Schock 1986 16 p refs Presented at the SAE International Congress and Exposition, Detroit, Mich., 24-28 Feb. 1986
(Grant NAG3-363)
(NASA-TM-87212; E-2871; NAS 1.15:87212; SAE-860615) Avail: NTIS HC A02/MF A01 CSCL 01A

A numerical study was performed to investigate the unsteady, multidimensional flow inside the combustion chambers of an idealized, two-dimensional, rotary engine under motored conditions. The numerical study was based on the time-dependent, two-dimensional, density-weighted, ensemble-averaged conservation equations of mass, species, momentum, and total energy valid for two-component ideal gas mixtures. The ensemble-averaged conservation equations were closed by a K-epsilon model of turbulence. This K-epsilon model of turbulence was modified to account for some of the effects of compressibility, streamline curvature, low-Reynolds number, and preferential stress dissipation. Numerical solutions to the conservation equations were obtained by the highly efficient implicit-factored method of Beam and Warming. The grid system needed to obtain solutions were generated by an algebraic grid generation technique based on transfinite interpolation. Results of the numerical study are presented in graphical form illustrating the flow patterns during intake, compression, gaseous fuel injection, expansion, and exhaust. Author

N86-19290*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF AREA RATIO ON THE PERFORMANCE OF A 5.5:1 PRESSURE RATIO CENTRIFUGAL IMPELLER
Lawrence F. Schumann (Army Aviation Research and Technology Activity, Cleveland, Ohio), David A. Clark (Army Aviation Research and Technology Activity, Cleveland, Ohio), and Jerry R. Wood 1986 40 p refs Proposed for presentation at the 31st International Gas Turbine Conference and Exhibition, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by the American Society of Mechanical Engineers
(NASA-TM-87237; E-2190; NAS 1.15:87237; USAAVSCOM-TR-85-C-21; TR-85-C-21) Avail: NTIS HC A03/MF A01 CSCL 01A

A centrifugal impeller which was initially designed for a pressure ratio of approximately 5.5 and a mass flow rate of 0.959 kg/sec was tested with a vaneless diffuser for a range of design point impeller area ratios from 2.322 to 2.945. The impeller area ratio was changed by successively cutting back the impeller exit axial width from an initial value of 7.57 mm to a final value of 5.97 mm. In all, four separate area ratios were tested. For each area ratio a series of impeller exit axial clearances was also tested. Test results are based on impeller exit surveys of total pressure, total temperature, and flow angle at a radius 1.115 times the impeller exit radius. Results of the tests at design speed, peak efficiency, and an exit tip clearance of 8 percent of exit blade height show that the impeller equivalent pressure recovery coefficient peaked at a design point area ratio of approximately 2.748 while the impeller aerodynamic efficiency peaked at a lower value of area ratio of approximately 2.55. The variation of impeller efficiency with clearance showed expected trends with a loss of approximately 0.4 points in impeller efficiency for each percent increase in exit axial tip clearance for all impellers tested. Author

N86-19291# Naval Surface Weapons Center, Silver Spring, Md.
GENERATION OF THE STARTING PLANE FLOWFIELD FOR SUPERSONIC FLOW OVER A SPHERICALLY CAPPED BODY
T. Hsieh and F. J. Priolo 9 May 1985 286 p
(AD-A161117; NSWC/TR-84-484) Avail: NTIS HC A13/MF A01 CSCL 20/4

This report describes a fast method to provide a three dimensional starting flowfield to be used in a space-marching-type calculation for the afterbody flowfield of spherically capped missiles at incidence in supersonic flight speed. Utilizing the property of spherical symmetry of the flowfield about a sphere, three dimensional starting plane flowfield may be interpolated from the results of an axisymmetric flowfield about a sphere, which is available from an existing computer program (NOSTIP) with considerably less computing time. The analysis of the interpolation method, examples and listings of computer programs for the axisymmetric and the three dimensional starting plane flowfields about a sphere in the Mach number range from 1.5 to 10 and angle of attack between 0 to 35 degrees are presented. Author (GRA)

N86-19292# National Aeronautical Establishment, Ottawa (Ontario).
WIND TUNNEL CALIBRATION OF A PMS (PARTICLE MEASURING SYSTEMS) CANISTER INSTRUMENTED FOR AIRFLOW MEASUREMENT
J. I. MacPherson Sep. 1985 64 p
(AD-A161124; NAE-AN-32; NRC-24922) Avail: NTIS HC A04/MF A01 CSCL 20/6

Measurements of cloud particle images and concentrations using laser spectrometers housed in pods mounted on the wings or fuselages of research aircraft can be affected by the distortion of the airflow about the aircraft. The Flight Research Laboratory has developed a pod with a Rosemount 858 5-hole probe and pressure transducers to measure airflow angles and velocities at typical mounting locations on cloud physics research aircraft. This report documents the results of an extensive wind tunnel calibration of this pod to determine the factors relating the differential pressure measurements to the flow angles and velocities, and in particular to account for the effects of the canister itself on these measurements. Author (GRA)

N86-19293# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE SEPARATED FLOW OVER A DELTA WING AT HIGH SUBSONIC AND TRANSONIC SPEEDS
J. A. Moeller, W. J. Bannik, and P. G. Bakker Dec. 1984 16 p refs, Original contains color illustrations
(VTH-M-527) Avail: NTIS HC A02/MF A01

Wind tunnel results on the separated flow over a delta wing at high subsonic Mach numbers (0.55 to 0.85) were obtained for the validation of computer codes based on the Euler flow quations. The two models tested were of the same planform with flat upper surfaces and sharp leading edges, and cropped delta wings with 65 deg leading edge sweep. The larger model had a fuselage extending in front of the wing apex. It was used to study the flow by means of surface oil flow visualization, Schlieren pictures, and 5 hole directional probe flow field surveys at angles of incidence of 0, 5, 15, and 20 deg. With the smaller model, that had no fuselage, vortex breakdown was studied by Schlieren pictures. This model could reach a maximum angle of incidence of 35 deg. Author (ESA)

N86-19294# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ELEMENTS OF THE AERODYNAMIC THEORY OF CYCLOGYRO WING SYSTEMS WITH CONCENTRATOR EFFECTS
R. Coene Oct. 1983 91 p refs
(VTH-LR-338) Avail: NTIS HC A05/MF A01

The fluid dynamics of cyclogyro wing systems are analyzed, based on two-dimensional potential flow theory. General expressions for flows associated with circular distributions of bound vorticity are derived. The forces and moments exerted by the flow on the bound vortices are calculated in their relation with the mass flux and the ground effect. The mean flows generated by wings with constant circulation are used as the environment in which energy exchange related to the shedding of vorticity can take place efficiently. Concentrator effects in the propeller and the turbine case are emphasized. For a wing system operating as a turbine with concentrator effects, the Lanchester-Betz limit for the conversion efficiency, 16/17, is invalid and can be increased. Wing systems operating as a propeller can generate thrust more efficiently when concentrator effects occur. Author (ESA)

N86-19295# Eidgenoessisches Flugzeugwerk, Emmen (Switzerland). Research and Testing Dept.
FLOW VISUALIZATION USING MINITUFTS FOR WIND TUNNELS [SICHTBARMACHUNG DER STROEMUNG DURCH MINITUFTS FUER WINDKANAELE]
Bernard Zurschmitten 10 Dec. 1984 11 p In GEORGIAN
(F+W-FO-1753) Avail: NTIS HC A02/MF A01

A method for visualization of the flow on and around a model in wind tunnel aerodynamic investigations was developed. Fine Nylon 66 monofilaments colored with fluorescent formic acid were stuck to a rudder configuration illuminated with UV photoflash lamps. The filaments were photographed with a lens equipped with a UV filter. The use of a videocamera for flow photography is discussed. Author (ESA)

N86-19296# Institut Franco-Allemand de Recherches, St. Louis (France).
DENSITY MEASUREMENTS IN A TUBE BEHIND A PROJECTILE. SIMULATION IN A SHOCK TUBE [DICHTEMESSUNGEN IM LAUF HINTER EINEM PROJEKTIL. EINE SIMULATION IM STROSSROHR]
F. Seiler 28 Nov. 1984 29 p refs In GERMAN
(Contract BMVg-T/R-760/E-0007/E1-707)
(ISL-CO-237/84) Avail: NTIS HC A03/MF A01

Interior ballistics flows were simulated in a high pressure shock tube. Projectiles were accelerated in a rectangular measuring tube by the high pressure of the shock wave which is frontally reflected on the projectile. The density in the gas flow behind the projectile was measured by a differential interferometer and a Michelson inteferometer. The measurements show that this differential interferometer fails in the higher pressure ranges. The gas density behind the projectile increases towards the tube wall, within a boundary layer of maximum 1 mm. The mechanisms responsible for the erosion of a gun barrel occur in this layer are discussed. Experimental results in gun barrels are not obtainable with sufficient precision or not obtainable at all due to measuring-technical reasons. Therefore, the simulation of interior ballistics flows in a so-called gun simulator is very important. These model experiments make it possible to investigate gun barrel flows under well defined conditions with known measuring methods. Author (ESA)

N86-19297# Institut Franco-Allemand de Recherches, St. Louis (France).
EXPERIMENTAL AND THEORETICAL STUDY OF INCOMPRESSIBLE FLOW AROUND A WING PROFILE WITH A SPOILER. CONTRIBUTIONS OF LASER VELOCIMETRY AND THE DVORAK METHOD Final Report [ETUDE EXPERIMENTALE ET THEORIQUE DE L'ECOULEMENT AUTOUR D'UN PROFIL D'AILE MUNI D'UN SPOILER D'EXTRADOS EN REGIME INCOMPRESSIBLE; CONTRIBUTION DE LA VELOCIMETRIE LASER ET DE LA METHODE DVORAK]
P. Meyer, G. Koerber, and R. Kauffmann 9 Jul. 1984 133 p refs In FRENCH
(Contract DRET-82-318)
(ISL-R-116/84) Avail: NTIS HC A07/MF A01

The RA16-SCI supercritical profile with spoiler was studied using two dimensional laser velocimetry. The measuring method is described. Experimental results for 3 incidences (10, 20 and 40 deg) and for a three-dimensional configuration are presented. A numerical computing method for separated flow is adapted to the spoiler case. Two types of separations are observed: a single recirculation bubble at 10 deg and the coexistence of two bubbles for 20 and 40 deg. The two components of the velocity field are obtained with good space resolution. The separated flow and the turbulent flow are described with enough detail and reproductibility. Author (ESA)

N86-19298# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
TECHNICAL EVALUATION REPORT ON THE FLUID DYNAMICS PANEL SYMPOSIUM ON AERODYNAMICS AND ACOUSTICS OF PROPELLERS
Ph. Poisson-Quinton (ONERA, Chatillon, France) Jul. 1985 43 p refs
(AGARD-AR-213; ISBN-92-835-1508-0) Avail: NTIS HC A03/MF A01

The Advisory Report contains a review and evaluation of the material presented at the AGARD Fluid Dynamics Panel Symposium on Aerodynamics and Acoustics of Propellers held in Toronto, Canada, 1 to 4 October 1984. Also included are related information from other sources and an excellent discussion of the state of art of modern propeller design and performance is presented. This Advisory Report was produced at the request of the Fluid Dynamics Panel of AGARD. Author

N86-19299# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
TRANSONIC UNSTEADY AERODYNAMICS AND ITS AEROELASTIC APPLICATIONS
Jun. 1985 51 p Proceedings of the 59th Meeting of the Structures and Materials Panel, Toulouse, France, 2-7 Sep. 1984

(AGARD-CP-374-Add-1; ISBN-92-835-1501-3) Avail: NTIS HC A04/MF A01

The 59th meeting of the AGARD Structures and Materials Panel (SMP) was held on 3 to 7 September 1984 in Toulouse, France. It included a specialists' conference to discuss the latest methods of predicting transonic unsteady airloads for oscillating surfaces and flutter. Also considered were aeroelastic applications, many of which were made to standard configurations selected for the SMP cooperative program. The 16 papers and the round table discussion are summarized in some detail for coordination with AGARD's Fluid Dynamics Panel and Fluid Mechanics Panel. Author

N86-19300# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
TWO-DIMENSIONAL TURBULENT SEPARATED FLOW
Rogert L. Simpson (Virginia Polytechnic Inst. and State Univ., Blacksburg) and A. D. Young, ed. Jun. 1985 107 p refs
(AGARD-AG-287-Vol-1) Avail: NTIS HC A02/MF A01

Many different flow cases with nominally two-dimensional turbulent separated flow regimes are discussed. Because of intermittent flow reversal and backflow near the wall, directionally sensitive measurement techniques such as hot-wire, pulsed-wire and laser anemometry are discussed. Experimentally-observed structure of detached flows on streamlined surfaces and around sharp-edged corners is discussed for steady and unsteady incompressible and compressible cases where large-scale structures dominate the flow behavior. A number of differential and integral calculation methods are discussed. Traditional attached flow turbulence models do not describe attached flows well and methods which include experimentally-observed features of detached flow parameters seem to perform best. Author

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-19301*# Old Dominion Univ., Norfolk, Va. Dept. of Electrical Engineering.
DESIGN OF INFRASOUND-DETECTION SYSTEM VIA ADAPTIVE LMSTDE ALGORITHM Final Report, period ending 31 Dec. 1984
Camille S. Khalaf and John W. Stoughton Nov. 1984 139 p refs
(Contract NAS1-17099)
(NASA-CR-176531; NAS 1.26:176531) Avail: NTIS HC A07/MF A01 CSCL 01C

A proposed solution to an aviation safety problem is based on passive detection of turbulent weather phenomena through their infrasonic emission. This thesis describes a system design that is adequate for detection and bearing evaluation of infrasounds. An array of four sensors, with the appropriate hardware, is used for the detection part. Bearing evaluation is based on estimates of time delays between sensor outputs. The generalized cross correlation (GCC), as the conventional time-delay estimation (TDE) method, is first reviewed. An adaptive TDE approach, using the least mean square (LMS) algorithm, is then discussed. A comparison between the two techniques is made and the advantages of the adaptive approach are listed. The behavior of the GCC, as a Roth processor, is examined for the anticipated signals. It is shown that the Roth processor has the desired effect of sharpening the peak of the correlation function. It is also shown that the LMSTDE technique is an equivalent implementation of the Roth processor in the time domain. A LMSTDE lead-lag model, with a variable stability coefficient and a convergence criterion, is designed. Author

N86-19302# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ENHANCED EJECTION SEAT PERFORMANCE WITH VECTORED THRUST CAPABILITY Final Report, 1 Mar. - 1 Dec. 1982
Lanny A. Jines and Edward O. Roberts Aug. 1985 110 p
(AF Proj. 2402)
(AD-A161052; AFWAL-TR-84-3026) Avail: NTIS HC A06/MF A01 CSCL 01/3

The SAFEST Computer Program and the EASIEST Computer Program were used to predict improved escape performance capabilities resulting from a vectored thrust control system. A parametric study is identified and the results described to quantitatively establish enhanced performance envelope growth of the state-of-the-art ejection seat with an advanced controllable vectored thrust propulsion capability. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-19303 New South Wales Univ., Kensington (Australia).
SIGNAL PROCESSING IN THE AIRBORNE RECEIVER OF THE INTERSCAN MICROWAVE LANDING SYSTEM Abstract Only
D. L. Dillon Mar. 1985 3 p
Avail: Issuing Activity

The history and evolution of microwave landing system (MLS) is reviewed. The strategy by which the various MLS functions are sequentially transmitted in accordance with a standardized signal-in-space format is described, making possible the interoperability of ground and airborne subsystems of widely differing sophistication. The meaning of MLS error, its causes and the rationale for the accuracy requirements of the MLS are discussed. The overall task to be performed by the airborne MLS subsystem and the MLS receiver are surveyed. The impact on the processing on MLS signals by interfering propagation effects is considered, together with a review of some MLS signal processing methodologies. A preferred technique is identified. The question of the required sampling rate to implement the signal processing digitally is considered, and a pulse centroid-detection algorithm is described. E.A.K.

N86-19304* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
VIDEO PROCESSOR FOR AIR TRAFFIC CONTROL BEACON SYSTEM Patent
Frank Byrne, inventor (to NASA) Issued 10 Sep. 1985 5 p Filed 28 Sep. 1982
(NASA-Case-KSC-11155-1; US-Patent-4,540,986;
US-Patent-Appl-SN-425201; US-Patent-Class-343-6.8-R) Avail: US Patent and Trademark Office CSCL 17G

A circuit is disclosed for use in a transponder located in an aircraft or the like for identifying a true side lobe suppression signal being transmitted by a ground located transmitted system. The true side lobe suppression signal includes at least pulses P1 and P2. The circuit causes the transponder to produce reply signal upon the amplitude of the P1 pulse being a predetermined ratio to said P2 pulse. The circuit includes a pair of transistors with a capacitor connected to the output of the second transistor. The pulses P1 and P2 are supplied to the base electrode of the first transistor. Pulse P1 turns on the two transistors and charges the capacitor to a predetermined level so that when the second pulse P2 arrives, it does not turn on a transistor when it is equal to or less than the first pulse P1.

Official Gazette of the U.S. Patent and Trademark Office

N86-19305# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
AUTOMATIC LANDING THROUGH THE TURBULENT PLANETARY BOUNDARY LAYER
Shangxiang Zhu Nov. 1985 305 p refs
(UTIAS-289; ISSN-0082-5255) Avail: NTIS HC A14/MF A01

A statistical approach to automatic landing in turbulent planetary boundary layer is presented which is valuable for use in aircraft design and the analysis of terminal operation safety, also useful in design of autoland systems. The linearized equations of motion for an aircraft following a glide slope and an exponential curved path in the presence of wind shear and turbulence are developed. The effects of gust gradients on the motion were considered. The wind is modeled as a multi-dimensional random process, characterized by the mean wind shear and the turbulence. In the planetary boundary layer the mean wind is adequately described by a power law and by Weibull wind speed distribution. The turbulence is assumed locally isotropic. The modified von Karman model adequately represents correlations along an approach-flare trajectory. The forces and moments are considered to depend linearly on uniform gust and gust gradient components which are obtained by Etkin's four-point method which utilizes the air velocity at 4 points on the aircraft. As a test base, an autopilot of a jet transport for the approach and flare was designed. The Random Choice Direct Search technique was employed to find a set of optimal feedback gains for the auto-flare control system.
Author

N86-19306*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH DYNAMIC GPS RECEIVER VALIDATION DEMONSTRATION Final Report
William J. Hurd, Joseph I. Statman, and Victor A. Vilnrotter 31 Oct. 1985 208 p refs
(Contract NAS7-918)
(NASA-CR-176530; JPL-Pub-85-74; NAS 1.26:176530) Avail: NTIS HC A10/MF A01 CSCL 17G

The Validation Demonstration establishes that the high dynamic Global Positioning System (GPS) receiver concept developed at JPL meets the dynamic tracking requirements for range instrumentation of missiles and drones. It was demonstrated that the receiver can track the pseudorange and pseudorange rate of vehicles with acceleration in excess of 100 g and jerk in excess of 100 g/s, dynamics ten times more severe than specified for conventional High Dynamic GPS receivers. These results and analytic extensions to a complete system configuration establish that all range instrumentation requirements can be met. The receiver can be implemented in the 100 cu in volume required by all missiles and drones, and is ideally suited for transdigitizer or translator applications.
Author

N86-19307# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
DIRECT PASSIVE NAVIGATION: ANALYTICAL SOLUTION FOR PLANES Memorandum Report, Sep. 1984 - Jul. 1985
Shahriar Negahdaripour Aug. 1985 15 p
(Contract N00014-75-C-0643)
(AD-A161046; AI-M-863) Avail: NTIS HC A02/MF A01 CSCL 17/7

This paper derives a closed form sloution for recovering the motion of an observer relative to a planar surface directly from image brightness gradients. The optical flow is not computed as an intermediate step, only the spatial and temporal intensity gradients at a minimum of eight points. A linear matrix equation is solved for the elements of a 3x3 matrix. The eigenvalue decomposition of its symmetric part is then used to compute the motion parameters and the plane orientation.
GRA

N86-19308# Mitre Corp., McLean, Va.
POTENTIAL APPLICATIONS OF MULTIPLE INSTRUMENT APPROACH CONCEPTS AT 101 U.S. AIRPORTS
A. C. Silva and J. N. Barrer Sep. 1985 150 p
(Contract DTFA01-84-C-00001)
(AD-A161155; MTR-85W65; FAA-DL5-85-2) Avail: NTIS HC A07/MF A01 CSCL 01/5

Concepts for conducting multiple IFR Approaches to airports include: (1) Independent and Dependent parallel approaches at reduced runway separations. (2) Converging approaches to non-intersecting and to intersecting runways. (3) Triple arrival streams to parallel and non-parallel runways. (4) The application of these concepts to the use of separate short runways and segregated traffic streams. This report summarizes a survey of 101 U.S. Airports to determine potential applications of the above concepts. The survey identified many potential applications of each of the concepts using existing runways: (1) Parallel approaches - 25 airports; (2) Converging approaches - 74 airports; (3) Triple approaches - 6 airports; and (4) Use of separate short runways -60 airports.
GRA

N86-19309# National Bureau of Standards, Boulder, Colo. Electromagnetic Technology Div.
VOR (VERY-HIGH-FREQUENY OMNIDIRECTIONAL RANGE) CALIBRATION SERVICES
N. T. Larsen, D. F. Vecchia, and G. R. Sugar Apr. 1985 179 p refs
(PB85-228393; NBS-TN-1069) Avail: NTIS HC A09/MF A01; SOD HC $6.50 as 003-003-02652-2 CSCL 17G

The National Bureau of Standards has designed, constructed, and evaluated a standard for the support of very-high-frequency omnidirectional range (VOR) air navigation aids. The standard consists of two instruments: (1) a digital waveform signal generator for the composite VOR audio waveform, and (2) a standard phasemeter based on time series analysis of the waveform. Experimental results, a statistical analysis of them, and the principal software listings are included.
GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.
For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-19310* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROSPACE VEHICLE Patent
L. Robert Jackson and Allan H. Taylor, inventors (to NASA) Issued 10 Dec. 1985 10 p Filed 9 Jan 1984
(NASA-Case-LAR-13155-1; US-Patent-4,557,444; US-Patent-Appl-SN-469371; US-Patent-Class-244-172; US-Patent-Class-244-158-R; US-Patent-Class-244-158-A) Avail: US Patent and Trademark Office

A dual structure aerospace vehicle is described which has an aeroshell structure and an internally disposed separable and reusable integral tank/thrust structure. The tank/thrust structure is inuslated for cryogenic fuels and the cavity within aeroshell is insulated from the tank/thrust structure. An internal support ring within the cavity serves as an attachment for lugs on the tank/thrust structure via double hinges. The aft end of tank/thrust structure is provided with rocket engines and exit nozzles with a trunnion supporting the tank/thrust structure within the aeroshell.
Official Gazette of the U.S. Patent and Trademark Office

N86-19311*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE REMOTE SENSING OF CLOUD PROPERTIES FROM SATELLITE INFRARED SOUNDER DATA
Hwa-Young M. Yeh Feb. 1984 52 p refs
(NASA-TM-86059; NAS 1.15:86059) Avail: NTIS HC A04/MF A01 CSCL 01C

A method for remote sensing of cloud parameters by using infrared sounder data has been developed on the basis of the parameterized infrared transfer equation applicable to cloudy atmospheres. The method is utilized for the retrieval of the cloud

height, amount, and emissivity in 11 micro m region. Numerical analyses and retrieval experiments have been carried out by utilizing the synthetic sounder data for the theoretical study. The sensitivity of the numerical procedures to the measurement and instrument errors are also examined. The retrieved results are physically discussed and numerically compared with the model atmospheres. Comparisons reveal that the recovered cloud parameters agree reasonably well with the pre-assumed values. However, for cases when relatively thin clouds and/or small cloud fractional cover within a field of view are present, the recovered cloud parameters show considerable fluctuations. Experiments on the proposed algorithm are carried out utilizing High Resolution Infrared Sounder (HIRS/2) data of NOAA 6 and TIROS-N. Results of experiments show reasonably good comparisons with the surface reports and GOES satellite images. Author

N86-19312*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GROUND VIBRATION TEST RESULTS FOR DRONES FOR AERODYNAMIC AND STRUCTURAL TESTING (DAST)/ AEROELASTIC RESEARCH WING (ARW-1R) AIRCRAFT
Timothy H. Cox and Glenn B. Gilyard Jan. 1986 36 p refs
(NASA-TM-85906; H-1261; NAS 1.15:85906) Avail: NTIS HC A03/MF A01 CSCL 01C

The drones for aerodynamic and structural testing (DAST) project was designed to control flutter actively at high subsonic speeds. Accurate knowledge of the structural model was critical for the successful design of the control system. A ground vibration test was conducted on the DAST vehicle to determine the structural model characteristics. This report presents and discusses the vibration and test equipment, the test setup and procedures, and the antisymmetric and symmetric mode shape results. The modal characteristics were subsequently used to update the structural model employed in the control law design process. Author

N86-19313*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DYNAMICS AND CONTROLS FLIGHT TESTING OF THE X-29A AIRPLANE
Joseph Gera Jan. 1986 13 p refs Presented at the 24th AIAA Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986
(NASA-TM-86803; H-1333; NAS 1.15:86803; AIAA-86-0167) Avail: NTIS HC A02/MF A01 CSCL 01C

A brief description of the flight control system of the X-29A forward-swept-wing flight demonstrator is followed by a discussion of the flight test techniques and procedures in the area of flight dynamics and control. These techniques, which evolved during the initial few months of flight testing, are based on integrating flight testing with simulation and analysis on a flight-by-flight basis. A limited amount of flight test results in dynamic stability and handling qualities is also presented. Author

N86-19314*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HOVER AND FORWARD FLIGHT ACOUSTICS AND PERFORMANCE OF A SMALL-SCALE HELICOPTER ROTOR SYSTEM
C. Kitaplioglu and P. Shinoda 13 Sep. 1985 29 p Prepared in cooperation with Army Aviation Research and Development Command, Moffett Field, Calif., and City Univ., London, Engl.
(NASA-TM-88584; NAS 1.15:88584; AD-A160661) Avail: NTIS HC A03/MF A01 CSCL 20A

A 2.1-m diam., 1/6-scale model helicopter main rotor was tested in hover in the test section of the NASA Ames 40- by 80- Foot Wind Tunnel. Subsequently, it was tested in forward flight in the Ames 7- by 10-Foot Wind Tunnel. The primary objective of the tests was to obtain performance and noise data on a small-scale rotor at various thrust coefficients, tip Mach numbers, and, in the later case, various advance ratios, for comparisons with similar existing data on full-scale helicopter rotors. This comparison yielded a preliminary evaluation of the scaling of helicopter rotor performance and acoustic radiation in hover and in forward flight. Correlation between model-scale and full-scale performance and acoustics was quite good in hover. In forward flight, however, there were significant differences in both performance and acoustic characteristics. A secondary objective was to contribute to a data base that will permit the estimation of facility effects on acoustic testing. GRA

N86-19315# JAI Associates, Mountain View, Calif.
AERODYNAMICS OF TWO-DIMENSIONAL BLADE-VORTEX INTERACTION
G. R. Srinivasan, W. J. McCroskey, and J. D. Baeder 1985 20 p Previously announced in IAA as A85-40685
(Contract DAAG29-85-C-0002)
(AD-A160662) Avail: NTIS HC A02/MF A01 CSCL 01/3

A computational procedure and some numerical results of unsteady interaction of a helicopter rotor blade with a Lamb-like vortex of finite viscous core in subsonic and transonic flows is presented. The interaction considered here is one of the limiting cases of a more complex interaction typically encountered on helicopter rotor blade. In this limit, the interacting flow field is considered to be unsteady but two-dimensional. Accordingly, unsteady, two-dimensional, thin-layer Navier-Stokes equations are solved using a prescribed-vortex method (also called perturbation method) for the cases of stationary and moving rotor blades encountering a moving vortex passing the blades. The numerical results are compared with the recent experimental data of Caradonna et al. for the latter case. The comparison shows that for the transonic cases, the flow field is dominated by the presence of the shock waves, with strong indications of unsteady time lags in the shock-wave motions and shock-wave strengths, and of important three-dimensional effects. For subcritical-flow cases, however, the unsteady lag effects on the basic rotor blade are absent, and three-dimensional effects appear to be negligible, unlike the supercritical case. The subcritical calculations are in good agreement with the experimental data. GRA

N86-19316# Army Aviation Systems Command, St. Louis, Mo.
CORRELATION OF RESULTS OF AN OH-58A HELICOPTER COMPOSITE TAIL BOOM TEST WITH A FINITE ELEMENT MODEL
Nick Calapodas and Keith Hoff Sep. 1985 32 p
(DA Proj. 1L1-62209-AH-76)
(AD-A161062; USAAVSCOM-TR-85-D-15) Avail: NTIS HC A03/MF A01 CSCL 01/3

The results of testing an OH-58A composite tail boom and comparing its static and dynamic characteristics with those obtained from finite element analyses are presented in this report. Static load versus deflection data were used to verify the stiffness representation of the finite element model. Ground vibration test data were used to evaluate frequency and modal responses obtained from analysis. Discussions of each test configuration, including data analysis methodology and correlation results, are presented. Differences between measured static deflections and finite element analysis calculated deflections range from 6 to 12 percent. Natural frequency differences between test and analysis were less than 5 percent for the first and second elastic modes. Problems encountered during the testing and the impact on correlation are also discussed. GRA

N86-19317# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ESTIMATION OF A Kt-VALUE BY COMPARING DIFFERENT NOTCH GEOMETRIES
J. Schijve May 1983 11 p refs
(VTH-M-469) Avail: NTIS HC A02/MF A01

The Kt-value of a small hole near a larger notch is estimated by comparing other geometries for which Kt-values are available or can be estimated with confidence. De SaintVenant's principle is employed for the comparative analysis of approximately similar geometries. The estimate gives a value accurate to within 5%. Author (ESA)

N86-19318# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
FLIGHT TEST EVALUATION OF THE NETHERLANDS FLIGHT

INSPECTION AIRCRAFT
D. Geels 14 May 1984 43 p refs Presented at 3rd International Flight Inspection Meeting, Ottawa, Ontario 28 May-1 Jun. 1984
(NLR-MP-84052-U; B8571448) Avail: NTIS HC A03/MF A01

Flight test evaluation of a flight inspection aircraft (Cessna Citation 500) equipped with position sensors, calibrated navaids receivers and a fully automatic data acquisition and data processing system for the real-time calibration and inspection of radionavigation and instrument landing systems was carried out. For the evaluation and acceptance of the en-route part of the system, a small, light-weight flexible data acquisition system was installed. Using a specially developed software package, high accuracy position reference data was computed off-line to demonstrate the CFIS navaids en route calibration performance and to determine the overall navigation accuracy of the flight inspection and navigation system during the calibration flights. The distance measuring equipment position reference method, the function and the operational principle of the flight inspection system, additional test equipment, and the data processing are described.
Author (ESA)

N86-19319# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
DETERMINATION OF LIMITATIONS FOR HELICOPTER SHIPBORNE OPERATIONS
C. F. G. M. Hofman and R. Fang 15 Aug. 1984 14 p Presented at 10th European Rotorcraft Forum, The Hague, Netherlands, 28-31 Aug. 1984 and RINA International Symposium on Air Threat at Sea, London, England, 11-14 Jun. 1985
(NLR-MP-84072-U; B8572249) Avail: NTIS HC A02/MF A01

The organization of helicopter-ship qualification trials based on experience with trials with various helicopter types on different classes of ships is discussed. Procedures applied are described and illustrated. Author (ESA)

N86-19320# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Dept.
COMPUTATIONAL METHODS FOR THE IMPROVEMENT OF DYNAMIC ANALYTICAL MODELS OF AEROSPACE STRUCTURES
H. H. Ottens 2 Nov. 1984 37 p refs In DUTCH; ENGLISH summary
(Contract NIVR-1053)
(NLR-TR-84126-U) Avail: NTIS HC A03/MF A01

Methods to improve dynamic analytical models were surveyed. Matrix correction methods for the improvement of mass and stiffness matrices (Barman, Baruch, Chen) and parameter correction methods for the improvement of mass, damping, and stiffness submatrices (Collins, Natke) are discussed. Author (ESA)

N86-19836# Joint Publications Research Service, Arlington, Va.
IMPROVING COMMERCIAL AIRCRAFT TRAINING SIMULATORS
V. Goryachev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 48-49 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 10 Sep. 1985 p 3 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-19321# New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
HORIZONTAL DISPLAY FOR VERTICAL FLIGHT: A DIRECTION OF MOTION EXPERIMENT
Eddie J. Trujillo and Stanley N. Roscoe May 1985 48 p
(Contract N00014-81-K-0439)
(AD-A161113; BEL-85-1/ONR-85-1) Avail: NTIS HC A03/MF A01 CSCL 01/4

As a part of a research program to investigate advanced concepts for downward and forward-looking integrated displays, an experiment was conducted to determine optimum direction-of-motion relationships for a new way of presenting altitude and vertical rate information superposed on a downward-looking navigation and tactical situation display. Altitude was represented by the size of an octagon that could either dilate or constrict to indicate increasing altitude, and vertical rate was indicated by the outward or inward flow of four rate-field patterns emanating from the center of the display toward the 45, 135, 225, and 315-degree compass positions. The five factors in this experiment were altimeter and vertical rate-field direction of motion, subject ability level, aircraft vertical control order, and vertical flight course. Performance on four vertical flight profiles indicated that the out is up relationship yields superior vertical control, both in terms of control reversals and log RMS tracking precision, whereas the out is down mode results in more accurate control in the horizontal plane. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-19322# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF COMBUSTION PRESSURE OSCILLATIONS IN BYPASS CONFIGURED SOLID FUEL RAMJETS M.S. Thesis
D. C. Rigterink Sep. 1985 50 p
(AD-A160880) Avail: NTIS HC A03/MF A01 CSCL 21/2

An experimental investigation of the mechanisms involved in combustion pressure oscillations in bypass flow configured solid fuel ramjets was conducted. Testing was done using cylindrically perforated polymethylmethacrylate fuel grains in solid fuel ramjet with 180 deg opposed dumps into a plenum ahead of an axial dump combustor inlet. Bypass flow into the aft mixing chamber was accomplished using two dumps located either 180 deg or 90 deg apart, perpendicular to the centerline. Split inlet feed line lengths into the plenum were varied with no apparent change of the dominant pressure oscillation frequency of approximately 167 Hz for bypass tests. Hot wire measurements indicated that in the short-coupled axial inlet, there were no dominant vortex shedding frequencies in the separation/shear layer or at the reattachment point on the fuel grain wall. The observed pressure oscillation frequency did not appear to be related to vortex shedding from the inlet jet. Coupling of the driving disturbance from bypass flow could possibly be with a longitudinal mode of the combustor or a Helmholtz mode involving the head section plenum.
Author (GRA)

N86-19323# Eidgenoessisches Flugzeugwerk, Emmen (Switzerland). Research and Testing Dept.
PERFORMANCE COMPUTATION OF TURBOFAN AND TURBOJET ENGINES IN OFF-DESIGN CONDITIONS
Georges Bridel 11 Oct. 1984 28 p refs In GERMAN; ENGLISH summary
(F+W-FO-1746) Avail: NTIS HC A03/MF A01

A prediction method of underload performance of turbojet and turbofan engines based on gas dynamic relations was developed using mass flow rate, compression ratio, turbine inlet temperature, thrust, and fuel consumption. More precise prediction results can be obtained by incorporating compressor efficiency. A BASIC computer program is described and results are compared with

existing data. Up to a throttling coefficient of 50% of the maximum thrust, the deviation with respect to the measured values falls within + or - 20%. The specific fuel consumption is improved in underload medium range but is increased at high throttling coefficients. Accuracy improvement is achieved with introduction of variable compressor and turbine efficiency. Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-19324*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPARISON OF PILOT EFFECTIVE TIME DELAY FOR COCKPIT CONTROLLERS USED ON SPACE SHUTTLE AND CONVENTIONAL AIRCRAFT
Cynthia M. Privoznik and Donald T. Berry Feb. 1986 20 p refs
(NASA-TM-86030; H-1222; NAS 1.15:86030) Avail: NTIS HC A02/MF A01 CSCL 01C

A study was conducted at the Dryden Flight Research Facility of NASA Ames Research Center (Ames-Dryden) to compare pilot effective time delay for the space shuttle rotational hand controller with that for conventional stick controllers. The space shuttle controller has three degrees of freedom and nonlinear gearing. The conventional stick has two degrees of freedom and linear gearing. Two spring constants were used, allowing the conventional stick to be evaluated in both a light and a heavy configuration. Pilot effective time delay was obtained separately for pitch and roll through first-order, closed-loop, compensatory tracking tasks. The tasks were implemented through the space shuttle cockpit simulator and a critical task tester device. A total of 900 data runs were made using four test pilots and one nonpilot (engineer) for two system delays in pitch and roll modes. Results showed that the heavier conventional control stick had the lowest pilot effective time delays. The light conventional control stick had pilot effective time delays similar to those of the shuttle controller. All configurations showed an increase in pilot effective time delay with an increase in total system delay. Author

N86-19325*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT TEST OF A RESIDENT BACKUP SOFTWARE SYSTEM
Dwain A. Deets, Wilton P. Lock, and Vincent A. Megna (Draper (Charles Stark) Lab., Cambridge, Mass.) Jan. 1986 12 p refs Submitted for publication
(NASA-TM-86807; H-1338; NAS 1.15:86807) Avail: NTIS HC A02/MF A01 CSCL 01C

A new fault-tolerant system software concept employing the primary digital computers as host for the backup software portion has been implemented and flight tested in the F-8 digital fly-by-wire airplane. The system was implemented in such a way that essentially no transients occurred in transferring from primary to backup software. This was accomplished without a significant increase in the complexity of the backup software. The primary digital system was frame synchronized, which provided several advantages in implementing the resident backup software system. Since the time of the flight tests, two other flight vehicle programs have made a commitment to incorporate resident backup software similar in nature to the system described in this paper. Author

N86-19326# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
DETERMINATION OF PERFORMANCE AND STABILITY CHARACTERISTICS FROM DYNAMIC MANEUVERS WITH A TRANSPORT AIRCRAFT USING PARAMETER IDENTIFICATION TECHNIQUES
J. H. Breeman, L. J. J. Erkelens, and A. M. H. Nieuwpoort 14 Mar. 1984 23 p refs Presented at AGARD Flight Mechanics Panel Symposium on Flight Test Technology, Lisbon, Portugal, 2-5 Apr. 1984
(Contract NIVR-1816)
(NLR-MP-84024-U; B8572246) Avail: NTIS HC A02/MF A01

A flight test program was executed with the Fokker F28 transport aircraft to investigate whether it is possible to determine performance and stability characteristics from dynamic maneuvers using parameter identification techniques, with sufficient accuracy for certification purposes. A research moving base flight simulator was used to select an optimal set of maneuvers. Flight test data was analyzed, using the two-step method which starts by reconstructing the aircraft flight path as the first step, followed by calculation of aerodynamic coefficients using regression analysis techniques. The flight test results compared with results derived from conventional test programs show that the goal is reached. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-19327# National Aerospace Lab., Tokyo (Japan).
NONEQUILIBRIUM EFFECTS AND PRODUCTION OF NOx IN HIGH TEMPERATURE WIND TUNNELS
Riichi Matsuzaki and Noriaki Hirabayashi 1985 26 p refs In JAPANESE; ENGLISH summary
(NAL-TR-874; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

Detailed investigations of nonequilibrium properties in nozzle-flows of an arc-heated wind tunnel and a hypersonic wind tunnel at NAL are performed. In particular, the production of NOx (NO, NO2, and N2O) is estimated in the nozzle-flows. It is shown that the main constituent of NOx at the exit of the nozzles is NO. However, in the exhaust gases of the arc-heated wind tunnel, the concentration of NOx is as much as 10,000 ppm at usual conditions of operation; the concentrations of NO and NO2 are shown to be in the same order. In order to explain the production of NO2 in the exhaust gases of the arc-heated wind tunnel, oxidation of NO is estimated by taking account of the pressure recovery in a chamber, and the isothermal compression in a rotary pump of the vacuum system. The latter model, termed compression model, is shown to be able to predict the production of a high concentration of NO2. In the hypersonic wind tunnel, it is shown that the concentration of NOx in the exhaust gas is of the order of 100 ppm under usual; operating conditions, and the main constitute is inferred to be NO. Author

N86-19328# National Aerospace Lab., Tokyo (Japan).
A PRESSURE MEASURING SYSTEM USING ELECTRONICALLY SCANNED PRESSURE SENSORS (ESP) INSTALLED IN A TRANSONIC BLOWDOWN WIND TUNNEL
Toshimi Fujita, Katsuichi Murota, and Koichi Suzuki Oct. 1985 52 p refs In JAPANESE; ENGLISH summary
(NAL-TR-883; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

A pressure measuring system using electrically scanned pressure sensors (ESP) was installed in a transonic blowdown wind tunnel, and tested to see how effective an ESP system is in enhancing data productivity when compared with the scanivalve system. Results are presented of studies in which linearity, stability and repeatability characteristics of the ESP system were examined. It is shown that the deviation of the system output from linearity is less than 0.25% of the full-scale value (FS), that the thermal zero shift is of negligible magnitude, and that the repeatability is the repeatability is also quite satisfactory. The time needed for the measurements of pressures on and about an airfoil model is 8 seconds where as it has been 43 seconds with the Former scanivalve system. The data transfer time continues to be

disproportionate - 35 seconds - as long as the data processing unit is unchanged. Concurrent improvement in the data processing unit is necessary if the maximum benefit is to be obtained from the installation of an ESP system. E.A.K.

N86-19329*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPROVED MEMORY LOADING TECHNIQUES FOR THE TSRV DISPLAY SYSTEM
Wesley C. Easley, William A. Lynn, and David G. McLuer Jan. 1986 34 p refs
(NASA-TM-87649; NAS 1.15:87649) Avail: NTIS HC A03/MF A01 CSCL 14B

A recent upgrade of the TSRV research flight system at NASA Langley Research Center retained the original monochrome display system. However, the display memory loading equipment was replaced requiring design and development of new methods of performing this task. This paper describes the new techniques developed to load memory in the display system. An outdated paper tape method for loading the BOOTSTRAP control program was replaced by EPROM storage of the characters contained on the tape. Rather than move a tape past an optical reader, a counter was implemented which steps sequentially through EPROM addresses and presents the same data to the loader circuitry. A cumbersome cassette tape method for loading the applications software was replaced with a floppy disk method using a microprocessor terminal installed as part of the upgrade. The cassette memory image was transferred to disk and a specific software loader was written for the terminal which duplicates the function of the cassette loader. Author

N86-19330*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE ROLE OF A REAL-TIME FLIGHT SUPPORT FACILITY IN FLIGHT RESEARCH PROGRAMS
Archie L. Moore Jan. 1986 14 p refs Presented at the AIAA Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986
(NASA-TM-86805; H-1335; AIAA-86-0166; NAS 1.15:86805) Avail: NTIS HC A02/MF A01 CSCL 14B

This paper presents some of the approaches taken by the NASA Western Aeronautical Test Range (WATR) of Ames Research Center to satisfy the ever-increasing real-time requirements of research projects such as the F-14, F-15, advanced fighter technology integration (AFTI) F-16, YAV-88, and the X-29A. The approaches include the areas of data acquisition, communications (video and audio), real-time processing and display, data communications, and tracking. Author

N86-19331# Alabama A & M Univ., Normal. Dept. of Physics.
ANALYSIS OF FLUID FLOW AT VERY HIGH REYNOLDS NUMBER AROUND SMOOTH AND ROUGH CIRCULAR CYLINDERS Final Report
S. S. R. Murty, M. C. George, and B. Shih Jul. 1985 256 p
(Contract N00014-83-K-0351)
(AD-A160351) Avail: NTIS HC A12/MF A01 CSCL 20/4

Wind tunnel tests were performed in the 12-ft pressure wind tunnel at NASA Ames Research Center during the months of May and June 1982. The model is an instrumented circular cylinder of 31.65 cm (12.46 in) diameter. Surface roughness was varied using wire mesh screens. Steady pressures, unsteady pressures, and boundary layer profiles were measured in these tests. The data pertaining to these experiments were summarized in a previous report. The collected experimental data have been analyzed during the present contract period. The task of analyzing voluminous amount of data stored on magnetic tapes by NASA was divided between Alabama A&M Univ. and Physical Research Inc. who has been a participating subcontractor. The results of the analysis of the steady pressure distributions are given in Part 1 of this document and the analysis of the boundary layer profiles and the corresponding plots are given in Part 2. GRA

N86-19332# Eidgenoessisches Flugzeugwerk, Emmen (Switzerland). Research and Testing Dept.
FLOW QUALITY IN LARGE WIND TUNNELS: A SIMPLE METHOD FOR QUANTIFICATION OF MEAN FLOW INHOMOGENEITIES
Felix Hirt 12 Nov. 1984 40 p In GERMAN; ENGLISH summary
(F+W-FO-1749) Avail: NTIS HC A03/MF A01

A computational procedure for determination of jet angle and dynamic pressure influencing the wind tunnel test section flow quality and for quantification of flow inhomogeneity on a configuration causing systematic measurement errors was developed. The extent of these errors is determined with the least squares method. The procedure was applied to a modified wind tunnel model. The contribution of jet angle and dynamic pressure to measurement errors was analyzed as well as the correlation between jet angle and torpedo and sting geometry in the wind tunnel center. The procedure was applied to a wing configuration for determination of flow quality and for improvement of the measuring instrument. The procedure could be applied in industrial measurements. Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-19333*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE DISTRIBUTIONS OBTAINED ON A 0.10-SCALE MODEL OF THE SPACE SHUTTLE ORBITER'S FOREBODY IN THE AEDC 16T PROPULSION WIND TUNNEL
Paul M. Siemers, III and Martin W. Henry (Analytical Mechanics Associates, Hampton, Va.) Washington Jan. 1986 442 p refs
(NASA-TM-87653; NAS 1.15:87653) Avail: NTIS HC A19/MF A01 CSCL 22A

Pressure distribution test data obtained on a 0.10-scale model of the forward fuselage of the Space Shuttle Orbiter are presented without analysis. The tests were completed in the AEDC 16T Propulsion Wind Tunnel. The 0.10-scale model was tested at angles of attack from -2 deg to 18 deg and angles of side slip from -6 to 6 deg at Mach numbers from 0.25 to 1/5 deg. The tests were conducted in support of the development of the Shuttle Entry Air Data System (SEADS). In addition to modeling the 20 SEADS orifices, the wind-tunnel model was also instrumented with orifices to match Development Flight Instrumentation (DFI) port locations that existed on the Space Shuttle Orbiter Columbia (OV-102) during the Orbiter Flight Test program. This DFI simulation has provided a means of comparisons between reentry flight pressure data and wind-tunnel and computational data. Author

N86-19334*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE DISTRIBUTIONS OBTAINED ON A 0.10-SCALE MODEL OF THE SPACE SHUTTLE ORBITER'S FOREBODY IN THE AMES UNITARY PLAN WIND TUNNEL
Paul M. Siemers, III and Martin W. Henry Jan. 1986 486 p
(NASA-TM-87654; NAS 1.15:87654) Avail: NTIS HC A21/MF A01 CSCL 22B

Pressure distribution test data obtained on a 0.10-scale model of the forward fuselage of the Space Shuttle Orbiter are presented without analysis. The tests were completed in the Ames Unitary Wind Tunnel (UPWT). The UPWT tests were conducted in two different test sections operating in the continuous mode, the 8 x 7 feet and 9 x 7 feet test sections. Each test section has its own Mach number range, 1.6 to 2.5 and 2.5 to 3.5 for the 9 x 7 feet and 8 x 7 feet test section, respectively. The test Reynolds number ranged from 1.6 to 2.5 x 10 to the 6th power ft and 0.6 to 2.0 x 10 to the 6th power ft, respectively. The tests were conducted in support of the development of the Shuttle Entry Air Data System (SEADS). In addition to modeling the 20 SEADS orifices, the wind-tunnel model was also instrumented with orifices to match Development Flight Instrumentation (DFI) port locations that existed on the Space Shuttle Columbia (OV-102) during the Orbiter Flight

test program. This DFI simulation has provided a means for comparisons between reentry flight pressure data and wind-tunnel and computational data. Author

N86-19335# Mitre Corp., Bedford, Mass.
NATIONAL SECURITY ISSUES SYMPOSIUM, 1984. SPACE, NATIONAL SECURITY, AND C3I (COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE) HELD AT BEDFORD, MASSACHUSETTS ON 25-26 OCTOBER 1984 Final Report
S. Rolph, D. Courtoy, B. Donovan, S. Gilbert, and T. Keeley May 1985 134 p Symp. held at Bedford, Mass., 25-26 Oct. 1984
(Contract F19628-84-C-0001)
(AD-A160356; MITRE-M85-3; ESD-TR-85-267) Avail: NTIS HC A07/MF A01 CSCL 22/1

The following topics were discussed at the National Security Issues Symposium held at Bedford, Mass., 25-26 Oct. 1984: The U.S. Use of Space; The U.S.S.R. Use of Space; Treaties and Legal Issues; A Defense Department Perspective; The U.S. Air Force Space Program; The U.S. Navy Space Program; The U.S. Army Space Program; An Industrial Perspective; Space Challenges; Practical Perspectives on a Space Defense Program; An Air Force Perspective; Space Defense; The Space Station; The Potential for Arms Control; Verification; The Impact of New Technologies; The Strategic Defense Initiative; and A European Perspective. GRA

N86-20183# Joint Publications Research Service, Arlington, Va.
INTERVIEW WITH COSMONAUTS KIZIM AND SOLOVYEV
G. I. Vorobyev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 63-70 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 16-22 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20184# Joint Publications Research Service, Arlington, Va.
BLAGOV ON DEVELOPMENT OF COSMONAUT EVA PROGRAMS
V. D. Blagov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 71-79 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 2-8 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20185# Joint Publications Research Service, Arlington, Va.
COMMENTS ON SOVIET-FRENCH PROJECT FOR GAMMA-1 ORBITAL TELESCOPE
G. Alimov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 80-82 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 10 Mar. 1985 p 2 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20217# Joint Publications Research Service, Arlington, Va.
INTERVIEW WITH KOVTUNENKO, VEGA PROJECT HEAD
M. Rebrov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 107-113 Transl. into ENGLISH from Krasnaya Zvedzda (Moscow, USSR), 20 Jul. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20218# Joint Publications Research Service, Arlington, Va.
RESULTS ON INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 Abstract Only
V. I. Moroz, V. M. Linkin, and D. Ertel *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 114-115 Transl. into ENGLISH from Uspekhi Fizicheskikh Nauk (Moscow, USSR), v. 146, no. 2, Jun. 1985 p 346-348 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20272# Joint Publications Research Service, Arlington, Va.
LIST OF RECENT SOVIET SPACE LAUNCHES
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 169-171 Repr. from TASS (Moscow, USSR) (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-19336*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL INVESTIGATION OF THE DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT (PHASE 2) Quarterly Report, 22 Jun. - 21 Sep. 1985
Enrico Lorenzini, David A. Arnold, Mario D. Grossi, and Gordon E. Gullshorn Oct. 1985 36 p refs
(Contract NAS8-36606)
(NASA-CR-178607; NAS 1.26:178607; QR-2) Avail: NTIS HC A03/MF A01 CSCL 22A

The deployment maneuver of three axis vertical constellations with elastic tethers is analyzed. The deployment strategy devised previously was improved. Dampers were added to the system. Effective algorithms for damping out the fundamental vibrational modes of the system were implemented. Simulations of a complete deployment and a subsequent station keeping phase of a three mass constellation is shown. Author

N86-20188# Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR INTEGRATING EQUATIONS FOR ELEMENTS OF INTERMEDIATE SATELLITE ORBIT Abstract Only
N. V. Yemelyanov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 84-85 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 590-597 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20195# Joint Publications Research Service, Arlington, Va.
ONE CASE OF DETERMINATION OF ELEMENTS OF INTERMEDIATE ORBIT Abstract Only
Ye. L. Lukashevich *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 90-91 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 308-310 Original language document was announced in IAA as A85-35245 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20196# Joint Publications Research Service, Arlington, Va.
ANALYTICAL EVALUATIONS OF ACCURACY IN DETERMINING AND PREDICTING PARAMETERS OF ARTIFICIAL EARTH SATELLITE MOTION USING ALTIMETER MEASUREMENT DATA Abstract Only
M. P. Nevolko and Ye. L. Mosin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 91 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 310-314 Original language document was announced in IAA as A85-35246 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20198# Joint Publications Research Service, Arlington, Va.
EVOLUTION OF ALMOST CIRCULAR ORBITS OF 12-HOUR ARTIFICIAL EARTH SATELLITES Abstract Only
M. A. Vashkovyak *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 93 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 3-15 Original language document was announced in IAA as A85-28483 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20199# Joint Publications Research Service, Arlington, Va.
COMPARISON OF CONDITIONALLY PERIODIC SOLUTIONS WITH RESULTS OF NUMERICAL INTEGRATION IN PROBLEM

OF TRANSLATIONAL-ROTATIONAL SATELLITE MOTION Abstract Only
A. A. Zlenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 93-94 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 16-25 Original language document was announced in IAA as A85-28484 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20200# Joint Publications Research Service, Arlington, Va.
OBLIQUE REGULAR SATELLITE MOTIONS AND SOME FINE EFFECTS IN MOTION OF MOON AND PHOBOS Abstract Only
Yu. V. Barkin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 94-95 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 26-36 Original language document was announced in IAA as A85-28485 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20201# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF OPTIMUM TRAJECTORIES FOR ORBITAL INSERTION FROM ANY POINT OF WHICH DESCENT INTO ATMOSPHERE IS POSSIBLE WITH STIPULATED RESTRICTIONS Abstract Only
V. A. Ilin and A. S. Filatyev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 95 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 37-48 Original language document was announced in IAA as A85-28486 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20202# Joint Publications Research Service, Arlington, Va.
APPLICATION OF RELATIVISTIC THEORY TO PROBLEMS OF SPACE VEHICLE TRAJECTORY MEASUREMENTS Abstract Only
V. S. Chaplinskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 96 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 49-62 Original language document was announced in IAA as A85-28487 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20210# Joint Publications Research Service, Arlington, Va.
NUMERICAL INVESTIGATIONS OF RESONANCE INEQUALITIES OF LOW ORBIT ARTIFICIAL EARTH SATELLITES Abstract Only
V. L. Travin and S. N. Yashkin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 102 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 53-57 Original language document was announced in IAA as A85-19996 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20211# Joint Publications Research Service, Arlington, Va.
DETERMINING SATELLITE ORBIT FROM TWO VELOCITY VECTORS Abstract Only
I. V. Onkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 102-103 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 57-61 Original language document was announced in IAA as A85-19997 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20212# Joint Publications Research Service, Arlington, Va.
USE OF DOPPLER EFFECT IN DETERMINING ANGULAR COORDINATES OF ARTIFICIAL EARTH SATELLITE Abstract Only
R. Durdyyev and A. Ibrayimov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 103 Transl. into ENGLISH from Izvestiya Akademii nauk Turkmenskoy SSR: Seriya Fiziko-Tekhnicheskikh, Khimicheskikh i Geologicheskikh Nauk (Ashkhabad, USSR), no. 2, Mar. - Apr. 1985 p 31-35 Original language document was announced in IAA as A85-10644 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-19337# Los Alamos National Lab., N. Mex.
THE FORGE: A SHORT PULSE X-RAY DIAGNOSTIC DEVELOPMENT FACILITY
G. L. Stradling, T. R. Hurry, E. R. Denbow, M. M. Selph, and F. P. Ameduri 1985 6 p Presented at the SPIE 29th Annual Technical Symposium, San Diego, Calif., 19-23 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017339; LA-UR-85-3002; CONF-850887-33) Avail: NTIS HC A02/MF A01

A new short pulse X-ray calibration facility has been brought on line at Los Alamos. The facility is being used for the development, testing and calibration of fast X-ray diagnostic systems. The X-ray source consists of a moderate size, subnanosecond laser focused at high intensity on an appropriate target material to generate short pulses of X-ray emission from the resulting plasma. Dynamic performance parameters of fast X-ray diagnostic instruments, such as X-ray streak cameras, can be conveniently measured using this facility. E.A.K.

N86-19706# Mullard Space Science Lab., Dorking (England).
THE UK ERS DATA CENTRE
C. G. Rapley *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 177-179 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19707# Centre National d'Etudes Spatiales, Paris (France). Earth Sciences and Applications Div.
THE CERSAT/AVISO/ALGOS: THE FRENCH PROGRAM FOR A COHERENT OCEANOGRAPHIC DATA BASE
B. Nutten *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 181-183 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

No abstracts in this category.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-19338# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A MODEL FOR EVALUATING COMMUNICATIONS SATELLITE INTEROPERABILITY M.S. Thesis
T. C. Gill 1985 133 p
(AD-A160750; AFIT/CI/NR-85-103T) Avail: NTIS HC A07/MF A01 CSCL 22/2

A model with which emergency communications planners can evaluate the potential interoperability of satellite systems is described. Based on minimum communications requirements set forth by the Commercial Satellite Survivability Task Force of the National Telecommunications Advisory Committee, the model addresses the technical considerations involved in system interoperability and provides the basis for further study. This paper addresses the need for finding techniques to implement an interoperable network of commercial satellites to augment our national security/emergency preparedness communications. Commercial satellite networks play an increasingly important role in providing essential communications during peacetime. They offer the means to quickly restore damaged or destroyed communications to isolated parts of the country during times of national security stress. However, the use of different technical methods by system operators presents major roadblocks to network interoperability. GRA

N86-19339# Naval Postgraduate School, Monterey, Calif.
COMPUTER SIMULATION OF DIGITAL SIGNAL MODULATION TECHNIQUES IN SATELLITE COMMUNICATIONS M.S. Thesis
C. D. Carlson Sep. 1985 292 p
(AD-A160823) Avail: NTIS HC A13/MF A01 CSCL 09/2

Tutorial on digital signal modulation techniques used in satellite communications is presented and includes computer simulation of those digital signal modulation techniques introduced. The purpose is to introduce digital signal modulation techniques and through the use of computer simulation, generate statistics which represent the characteristics of the FFT for the respective signal type. Further, an analysis of the statistics of the FFT's is conducted to determine if there is any relationship between the components of the FFT of the different signals. The statistic used to investigate this possible relationship is the F-distribution. The computer simulation is written and conducted in the FORTRAN programming language. A copy of the program, results of the simulation and the statistical analysis conducted are included in the appendices. GRA

N86-19340# Naval Postgraduate School, Monterey, Calif.
PRECISE MARINE POSITIONING USING THE GLOBAL POSITIONING SYSTEM (GPS) M.S. Thesis
Rahyono Sep. 1985 41 p
(AD-A160824) Avail: NTIS HC A03/MF A01 CSCL 17/7

The development of the Global Positioning System (GPS) has led to the possibility of positioning marine platforms with great accuracy. Position computations made from GPS observations aboard a ship and the evaluation of the accuracy and precision of a Texas Instruments TI-4100 GPS Receiver at sea in a low dynamic mode are described. The observed pseudoranges were corrected and smoothed by Doppler count, and then were used to compute position using an eight-state Kalman filter. A comparison is made between the ship's position obtained by GPS receiver and by Del Norte Trisponders. Data covering a period of 3600 s were processed and compared, yielding a total of 3171 s of data points from both positioning systems, which consisted of 2740 s of data with four satellites present and 431 s of data with three satellites. The mean of the root-mean-square differences between launch positions determined by mean of GPS satellites and by Trisponder was found to be + or - 11 m when four satellites were available and + or - 21 m when only three were present. Some 29 percent of the time, the GPS positions and Trisponders positions had similar accuracy. GRA

N86-19341# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
STUDY OF THE USE OF LIGHTWEIGHT SHIPBORNE TERMINALS FOR MARITIME SATELLITE TELECOMMUNICATIONS Final Report
J. Hagenauer (DFVLR, Oberpfaffenhofen, West Germany), M. Haerter (DFVLR, Oberpfaffenhofen, West Germany), H. Oettl (DFVLR, Oberpfaffenhofen, West Germany), D. Salzer (DFVLR, Oberpfaffenhofen, West Germany), R. Schweikert (DFVLR, Oberpfaffenhofen, West Germany), G. Bommas, B. Fritsch, W. Klages, N. Klimmek, W. Laub et al Sep. 1982 30 p refs
(Contracts ESA-4786/81-NL-MD; ESA-4701/81-NL-MD)
(ESA-CR(P)-2115) Avail: NTIS HC A03/MF A01

Smaller and less expensive satellite terminals are studied in order to cover a larger fraction of the world's commercial and yachting fleets. The problem of increased multipath propagation effects is analyzed together with system alternatives to reduce its incidence. The alternatives include antenna types, transmission power, bit rates, modulation schemes and forward correcting codes. Four light weight terminal types are described. Two operate with broad pencil beams and the others with hemispheric antennas. Multipath losses of one of the models are compensated by forward error correcting coding. Final selection requires experimental verification. Author (ESA)

N86-19342# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
UTILIZATION OF DIELECTRIC RESONATORS TO IMPLEMENT HYPERFREQUENCY FILTERS FOR TELECOMMUNICATION [UTILISATION DE RESONATEURS DIELECTRIQUES POUR LA REALISATION DE FILTRES HYPERFREQUENCES DESTINES AUX SATELLITES DE TELECOMMUNICATIONS]
Michel Chaubet (Limoges Univ., France), Pierre Guillon (Limoges Univ., France), and Christian Boschet Sep. 1985 26 p refs In FRENCH; ENGLISH summary
(CNES-NT-117) Avail: NTIS HC A03/MF A01

A hyperfrequency filter with elliptical transfer function was developed for communication satellites because of weight and size advantages. Losses at 4 GHz are 0.0001. The resonator is included in a microstrip structure. The finite difference method was used to compute couplings appearing in a filter synthesis. A computer program to compute all parameters was developed. Experiments show that improvements are necessary. Author (ESA)

N86-20209# Joint Publications Research Service, Arlington, Va.
USE OF DIFFERENTIAL VERY LONG BASELINE RADIOINTERFEROMETRY IN ASTRONAVIGATION Abstract Only
L. R. Kogan, L. I. Matveyenko, and V. I. Kostenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 101 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 167-174 Original language document was announced in IAA as A85-28499 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-19343 Washington Univ., Seattle.
ROBUST CONTROL DESIGN METHODOLOGY WITH APPLICATION TO LARGE SPACE STRUCTURES Ph.D. Thesis
Warren L. Eastman 1985 199 p
Avail: Univ. Microfilms Order No. DA8521582

The development of compensators for large space structures is posed as a problem in robust control system design. A methodology is developed for the design of compensators which shape the system loop gain singular values. The frequency-shaped control and estimation theory of Gupta, as reformulated by Kim for measurement frequency-shaping, has been extended to include frequency-shaping of the control law. It is shown that zeroes of the control law shaping filter become transmission zeroes of the compensator, and this result completes the duality of the frequency-shaped regulator and estimator. To design control systems with desired loop gain characteristics, a recursive eigenstructure assignment procedure was developed. By use of this algorithm, optimal regulators and estimators with assigned eigenvalues can be designed. With a modification of the usual regulator-estimator design method, the compensator can be designed with specific eigenvalues. When frequency-shaping is incorporated into the compensator, this eigenvalue assignment feature allows the compensator to retain both the poles and the zeroes of the shaping filter. Eigenstructure assignment of the compensator specifically shapes the loop gains and can be used for robustness enhancement. This capability is demonstrated for several control systems, including one for a large space structure. Dissert. Abstr.

N86-19344*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLUIDIC MOMENTUM CONTROLLER Patent Application
Ronald S. Maynard, inventor (to NASA) Filed 24 Sep. 1985 33 p
(NASA-Case-MSC-20906-1; NAS 1.71:MSC-20906-1; US-Patent-Appl-SN-779742) Avail: NTIS HC A03/MF A01 CSCL 22B

Large angular control moments and torques are developed by controllably circulating a relatively small mass of liquid through small diameter pipes describing a large diameter loop. The loop, by thus generating and storing angular momentum, can thereby provide efficient cancellation of periodic, nonaccumulating, externally induced rotational disturbances. The loop is preferably located on or near the periphery of a structure which is to be thus stabilized. NASA

N86-19345# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EQUIVALENT CONTINUUM FINITE ELEMENT MODELLING OF PLATE-LIKE SPACE LATTICE STRUCTURES Ph.D. Thesis
S. E. Lamberson Aug. 1985 140 p
(AD-A160879; AFIT/CI/NR-85-111D) Avail: NTIS HC A07/MF A01 CSCL 22/2

A method involving finite element modelling of an equivalent continuum formulation based on matching the strain energy and kinetic energy is developed for truss type lattices with pinned joints. The method is shown to give modal results consistent with those obtained using detailed finite element modelling of the pin jointed space lattice structure, even for structures with fairly small numbers of repetitions of an identical unit cell. Feedback controllers using reduced system models derived from these modal results using Modal Cost Analysis are shown to perform as well as controllers designed using the detailed analysis results. A micropolar plate continuum model of large plate-like repetitive space lattice structures with rigid joints are derived. A plate finite element is based on this continuum model with micropolar rotations and transverse shear deformations included as nodal degrees of freedom. The natural frequencies and mode shapes are calculated using this element for a free floating hexahedral plate-like space lattice structure. These natural frequencies and mode shapes are compared to those calculated using a detailed finite element model (with every structural member modelled by a beam-column element) for several sets of frame member cross sectional properties. The static deflections of a centrally loaded and corner supported rectangular plate-like space lattice structure are also obtained and compared these two types of structural models. GRA

N86-19346# Dynamic Controls, Inc., Dayton, Ohio.
LINEAR ACTUATOR FOR LARGE SPACE STRUCTURE Final Report, Mar. 1983 - May 1984
Gavin D. Jenney and John A. Anderson 11 Sep. 1985 31 p
(Contract F33615-83-C-3601)
(AD-A161227; AFWAL-TR-85-3078) Avail: NTIS HC A03/MF A01 CSCL 22/2

The impending use of large structures in space has created a requirement controlling their alignment. Structures used for energy gathering, such as antennas or solar energy concentrators, must maintain accurate mechanical alignment in order to operate at maximum efficiency. This paper describes a linear actuation approach designed to meet the alignment requirements of space structures. The approach is based upon using a fluid pump to expand and contract two chambers enclosed by metal bellows. The general configuration is valid for a wide range of force, rate and stroke requirements required for different structure designs. GRA

N86-19347# Royal Netherlands Aircraft Factories Fokker, Amsterdam.
DEPLOYABLE RADIATOR STUDY Final Report
A. F. J. Morgownik 18 Mar. 1983 195 p refs 2 Vol.
(Contracts ESTEC-4437/80-NL-AK(SC); NIVR-2326)
(FOK-TR-R-85-0265-Vol-1; ESA-CR(P)-2109-Vol-1) Avail: NTIS HC A09/MF A01

A radiator for the space platform of the Columbus Space Station program is studied. A preliminary design of a 10 kW deployable radiator with two phase flow heat pipes feeder line is presented. A preference is found for a folding rigid panel concept, which has a lower mass for up to 20 kW. A strong preference for a parallel condenser network is shown. A flow performance analysis of the parallel feeder system gives a pressure drop of 0.1 bar, well within the specifications. The condensers are located on the heat pipe evaporators, in the middle of the heat pipes. In this way a four times higher capacity per heat pipe is obtained. The developed feeder system design requires no bends in the heat pipes. Author (ESA)

N86-19348# Royal Netherlands Aircraft Factories Fokker, Amsterdam.
SPACE STATION STUDY: THERMAL CONTROL
A. F. J. Morgownik 27 Feb. 1985 99 p refs 2 Vol.
(Contracts ESTEC-4437/80-NL-AK(SC); NIVR-2326)
(FOK-TR-R-85-019-Vol-2; ESA-CR(P)-2109-Vol-2) Avail: NTIS HC A05/MF A01

The heat rejection of the space platform of the Columbus Space Station program is analyzed in order to establish guidelines for further studies. A preliminary heat rejection capability of 125 W/sq m is determined. It is found that the integration of feeder lines in the radiator panels leads to a high reliability against meteoroid impact. Investigation of potential heat pipe layouts results in a preference for using low to moderate transport capacity heat pipes (10 to 100 Wm). A preliminary comparison of three types of coating shows that white silicate paint results in highest radiation efficiency, even when degrading is taken into account. Author (ESA)

N86-20179# Joint Publications Research Service, Arlington, Va.
FEOKISTOV REVEALS DETAILS OF SALYUT-7

REACTIVATION
K. Feokistov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 1-6 Transl. into ENGLISH from Pravda (Moscow, USSR), 5 Aug. 1985 p 3; 8 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20180# Joint Publications Research Service, Arlington, Va.
PREPARATION OF COSMONAUTS FOR SALYUT-7 REACTIVATION MISSION
Yu. Glazkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 10-13 Transl. into ENGLISH from Pravda (Moscow, USSR), Sep. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20181# Joint Publications Research Service, Arlington, Va.
SOYUZ T-13 LANDS WITH COSMONAUTS DZHANIBEKOV AND GRECHKO
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 50 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 27 Sep. 1985 p 1 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20182# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON 237 DAY EXPEDITION TO SALYUT-7
S. A. Bovin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 54-62 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 9-15 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20235# Joint Publications Research Service, Arlington, Va.
CHANGE IN ANGULAR POSITION OF SPACECRAFT BY SYSTEM OF FLYWHEEL MOTORS WITH NONZERO INITIAL KINETIC MOMENT Abstract Only
K. B. Alekseyev and O. V. Zlodyreva *In its* USSR Report: Space (JPRS-USP-86-0010 13 Jan. 1986 p 129 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 3, May - Jun. 1985 p 2-7 Original language document was announced in IAA as A85-44809 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20236# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF AERODYNAMIC MOMENT ON GRAVITATIONAL ORIENTATION REGIME FOR SALYUT-6, SOYUZ COMPLEX Abstract Only
V. A. Sarychev and V. V. Sazonov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 130 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 63-83 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-19349*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR TERRESTRIAL OBSERVATORY SPACE STATION WORKSHOP REPORT
W. T. Roberts, ed. Washington Jan. 1986 41 p refs Workshop held in Huntsville, Ala., 6 Jun. 1985
(NASA-CP-2411; M-505; NAS 1.55:2411) Avail: NTIS HC A03/MF A01 CSCL 14B

In response to a need to develop and document requirements of the Solar Terrestrial Observatory at an early time, a mini-workshop was organized and held on June 6, 1985. The participants at this workshop set as their goal the preliminary definition of the following areas: (1) instrument descriptions; (2) placement of instrumentation on the IOC Space Station; (3) servicing and repair assessment; and (4) operational scenarios. This report provides a synopsis of the results of that workshop. For individual titles, see N86-19350 through N86-19365.

N86-19350*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOFT X-RAY TELESCOPE (SXRT)
Ron Moore *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 3 Previously announced as N85-34159 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The soft X-ray telescope (SXRT) will provide direct images of the solar corona with spatial resolution of about 1 arcsecond. These images will show the global structure of the corona, the location and area of coronal holes, and the presence of even the smallest active regions and flares. The good spatial resolution will show the fine scale magnetic structure and changes in these phenomena. These observations are essential for monitoring, predicting, and understanding the solar magnetic cycle, coronal heating, solar flares, coronal mass ejections, and the solar wind. These observations complement those of the White Light Coronagraph and Ultra-Violet Coronal Spectrometer; the SXRT will detect active regions and coronal holes near the east limb, thereby giving a week or more of advanced warning for disturbed geomagnetic conditions at Earth. The instrument consists of a grazing incidence collecting mirror with a full-disk film camera at the primary focus, and a secondary relay optic that feeds a CCD camera with a field of view about the size of an average active region. Author

N86-19351*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SUSIM)
Ron Moore *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 4 Previously announced as N85-34160 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The solar ultraviolet spectral irradiance monitor (SUSIM) measures the ultraviolet flux from the entire Sun with high absolute accuracy over the wavelength range 120 to 400 nm with a resolution of 0.1 nm. SUSIM consists of two identical double dispersion scanning spectrometers with 5 photodiodes, 2 photon counters, and a deuterium lamp calibration source, all sealed in a canister pressurized to 1.1 atmosphere of argon. One spectrometer is used almost continuously during sunlight, the other is used once per day as a calibration check. The observations will yield improved absolute measurements of the ultraviolet solar fluxes, provide an accurate reference for studies of variability of the solar fluxes on the time scales of the solar cycle and longer, and measure shorter term changes as well. These measurements complement the ACR measurements of the total solar irradiance. The data will be used to study the physical behavior of the Sun and the Earth's atmosphere, weather, and climate. Author

N86-19352*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WHITE LIGHT CORONAGRAPH (WLC) AND ULTRA-VIOLET CORONAL SPECTROMETER (UVCS)
Ron Moore *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 5 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The WLC and UVS together reveal the corona and the roots of the solar wind from 1.5 to 6 solar radii from sun center. The WLC measures the plasma density and spatial structure of the corona and coronal mass ejections at a plasma density and spatial structure of the corona and coronal mass ejections at a resolution of about 20 arcsec. The UVCS in combination with the WLC measures the temperature and radial outflow speed of the coronal plasma. These instruments will detect mass ejections from active

regions and high speed solar wind streams from coronal holes a few days before the source regions rotate onto the face of the Sun, thus giving a week or more of advanced warning for disturbed geomagnetic conditions at Earth. Author

N86-19353*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HIGH RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)
Ron Moore *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 6 Previously announced as N85-34162 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The major objectives of the high resolution telescope and spectrograph (HRTS) are: (1) the investigation of the energy balance and mass balance of the temperature minimum, chromosphere, transition zone, and corona in quiet regions on the Sun as well as in plages, flares, and sunspots; (2) the investigation of the velocity field of the lower corona to study the origin of the solar wind; and (3) the investigation of preflare and flare phenomena. The HRTS instruments consists of a telescope, an ultraviolet spectrograph, an ultraviolet spectroheliograph, and an H alpha slit display system, all housed in a thermal control cannister mounted on an instrument pointing system. Author

N86-19354*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ACTIVE CAVITY RADIOMETER (ACR)
Ron Moore *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 7 Previously announced as N85-34163 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The active cavity radiometer (ACR) measures the total solar irradiance to determine the magnitude and direction of variations in the total solar radiative output. The ACR is an electrically self calibrating cavity pyroheliometer capable of measuring the total solar irradiance with an absolute accuracy better than 0.2% and capable of detecting changes in the total irradiance smaller than 0.001%. The data will be used to study the physical behavior of the Sun and the Earth's climate. Author

N86-19355*# TRW, Inc., Redondo Beach, Calif.
WAVES IN SPACE PLASMAS (WISP)
William W. L. Taylor *In* NASA. George C. Marshall Space Flight Center Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 8-9 Previously announced as N85-34164 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

Waves in space plasmas (WISP) utilizes powerful radio transmitters and sensitive receivers to probe the secrets of the magnetosphere, ionosphere and atmosphere. The scientific objective is to achieve a better understanding of the physical processes occurring in these regions. For example, audio frequency radio waves will be radiated from the long WISP antenna, will travel to the outer reaches of the magnetosphere, and will interact with Van Allen belt particles, releasing some of their energy which amplifies the waves. Study of this interaction will give a better understanding of a major magnetospheric process, wave-particle interactions. Radio waves from WISP at higher frequencies (AM radio and beyond) will be reflected by the ionosphere and will, for example, advance our understanding of bubbles in the equatorial ionosphere which affect satellite communications. Author

N86-19356*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS: SEPAC
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 10-11 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The SEPAC instruments consist of an electron accelerator, a plasma accelerator, a neutral gas (N2) release device, particle and field diagnostic instruments, and a low light level television system. These instruments are used to accomplish multiple experiments: to study beam-particle interactions and other plasma processes; as probes to investigate magnetospheric processes; and as perturbation devices to study energy coupling mechanisms in the magnetosphere, ionosphere, and upper atmosphere. Author

N86-19357*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL AND EXPERIMENTAL BEAM PLASMA PHYSICS (TEBPP)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 12-13 Previously announced as N85-34166 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01

The theoretical and experimental beam plasma physics (TEBPP) consists of a package of five instruments to measure electric and magnetic fields, plasma density and temperature, neutral density, photometric emissions, and energetic particle spectra during firings of the particle injector (SEPAC) electron beam. The package is developed on a maneuverable boom (or RMS) and is used to measure beam characteristics and induced perturbations field (< 10 m) and mid field (> 10 m to 100 m) along the electron beam. The TEBPP package will be designed to investigate induced oscillations and induced electromagnetic mode waves, neutral and ion density and temperature effects, and beam characteristics as a function of axial distance. Author

N86-19358*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RECOVERABLE PLASMA DIAGNOSTICS PACKAGE (RPDP)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 14-15 Previously announced as N85-34167 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The recoverable plasma diagnostics package (RPDP) is an ejectable and recoverable satellite with flight and ground support systems so that it can be utilized in three modes: attached to an remote manipulator system; tethered; or as a subsatellite. The satellite is well instrumented with particle and field diagnostic as well as optical sensors to: investigate the dynamics of the natural environment or ejected perturbations from particle beams; measure the characteristics and propagation of electrostatic and electromagnetic waves; study wave particle interactions; and study natural properties of the magnetosphere, ionosphere, and upper atmosphere. Author

N86-19359*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ELECTRODYNAMIC TETHER
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 16-17 Previously announced as N83-29490 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The electrodynamic tether consists of a satellite deployed to a distance of 20 km by an electrically conducting tether. The space station hardware consists of a 12 meter deployment boom, satellite cradle, tether reel and motor, and other tether support systems. The electrodynamic tether will be used to perform a variety of wave experiments by exciting a wide spectrum of low frequency waves in the ionospheric plasma. The system can also be used to artificially generate and study field aligned currents and associated plasma effects. Hydromagnetic waves generated by the passage of the system through the space plasma are of particular interest in space plasma are of particular interest in space plasma research. Author

N86-19360*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
IMAGING SPECTROMETRIC OBSERVATORY (ISO)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 18 Previously announced as N85-34169 (For primary document see N86-19349 10-19)

Avail: NTIS HC A03/MF A01 CSCL 14B

The imaging spectrometric observatory (ISO) is discussed. The objectives of this instrument are to measure the spectral signatures of a large range of minor constituents, metastable, and excited species of both atomic and molecular ions, and neutrals in the atmosphere (from the stratosphere to the upper thermosphere). The instrument is composed of five identical spectrometers, each restricted to a given spectral range between 20 and 1200 nanometers designed for high speed operation as an imaging device. Each module is an imaging scanning spectrometer with coincident 0.5 x 0.007 degree field of view. Author

N86-19361*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (AEPI)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 19 Previously announced as N85-34170 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The atmospheric emission photometric imaging (AEPI) consists of a dual channel, low light level video system with a filter wheel to isolate the emissions of interest, mounted on a stabilized, two axis gimbal system for pointing and control. The objectives are to produce images of various atmospheric emissions to: investigate ionospheric transport processes; observe induced emissions from artificial particle injection; measure electron impact cross sections of atmospheric species; study natural aurora at high spatial and temporal resolutions and in the ultraviolet. Author

N86-19362*# Southwest Research Inst., San Antonio, Tex.
MAGNETOSPHERIC MULTIPROBES (MMP/CHEMSAT)
Jim Burch *In* NASA. George C. Marshall Space Flight Center Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 20-21 Previously announced as N85-34171 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The magnetospheric multiprobes (MMP) are a set of ejectable, self contained, limited lifetime free flyers which are designed to make plasma diagnostic measurements at multiple locations within telemetry range of the space station's coorbiting platform and polar platform. When configured as CHEMSATs, one or more MMP's will conduct chemical releases as tracers or modifiers of the local plasma and field environment, while diagnostic measurements are made from other MMP's and from the nearby platform. The probes will be battery powered and will have lifetimes of a few days to several weeks. Up to 12 probes would be placed on the coorbiting platform and the polar platform every six months and two years respectively for use in the campaign mode of operation. Author

N86-19363*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WIDE ANGLE MICHELSON DOPPLER IMAGING INTERFEROMETER (WAMDII)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 22-23 Previously announced as N85-34172 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The wide angle Michelson Doppler imaging interferometer (WAMDII) is a specialized type of optical Michelson interferometer working at sufficiently long path difference to measure Doppler shifts and to infer Doppler line widths of naturally occurring upper atmospheric Gaussian line emissions. The instrument is intended to measure vertical profiles of atmospheric winds and temperatures within the altitude range of 85 km to 300 km. The WAMDII consists of a Michelson interferometer followed by a camera lens and an 85 x 106 charge coupled device photodiode array. Narrow band filters in a filter wheel are used to isolate individual line emissions and the lens forms an image of the emitting region on the charge coupled device array. Author

N86-19364*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
VEHICLE CHARGING AND POTENTIAL (VCAP)
Bill Roberts *In its* Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 24-25 Previously announced as N85-34173 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The vehicle charging and potential (VCAP) payload includes a small electron accelerator capable of operating in a pulsed mode with firing pulses ranging from 600 nanoseconds to 107 seconds (100 milliamps at 1000 volts), a spherical retarding potential analyzer - Langmuir probe, and charge current probes. This instrumentation will support studies of beam plasma interactions and the electrical charging of the spacecraft. Active experiments may also be performed to investigate the fundamental processes of artificial aurora and ionospheric perturbations. In addition, by firing the beam up the geomagnetic field lines of force (away from the Earth) investigations of parallel electric field may be performed. Author

N86-19365*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INITIAL PLACEMENT OF STO INSTRUMENTS
In its Solar Terrestrial Observatory Space Station Workshop Report Jan. 1986 p 26-37 refs Previously announced as N85-34174 (For primary document see N86-19349 10-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

The current plans for the placement of the Solar Terrestrial Observatory (STO) space station will make use of each of the currently planned space station elements - the manned space station, the polar platform, and the coorbiting platform. A designation of the instrument placement on each element along with a summary of the mass, volume, power and data requirements which these instrument will impose is provided in tabular form. R.J.F.

N86-19366# Battelle Inst., Frankfurt am Main (West Germany).
ORBITING LIDARS FOR ATMOSPHERIC SOUNDING Final Report
M. Endemann, H. Grassl (Kiel Univ., West Germany), P. Schluessel (Freie Univ.), K. Labitzke (Technische Univ., Munich), H. Quenzel (Technische Univ., Munich), E. Thomalla (Technische Univ., Munich), and K. Nodop Dec. 1984 279 p refs 2 Vol.
(Contract ESTEC-5186/82-NL-HP)
(BLeV-R-65.498-5-Vol-1; ESA-CR(P)-2112-Vol-1) Avail: NTIS HC A13/MF A01

The conceptual design of a spaceborne lidar instrument is refined, its performance is simulated, and the measurement utility for weather forecasting is assessed. The instrument features a modular design and can be developed in consecutive stages. The input of the improved initial data on the accuracy of weather forecasting is discussed. It is shown that an improvement in long term weather forecasts can be expected. Simulations of the backscatter lidar as well as of the more advanced humidity, temperature and pressure profiles are detailed. Backscatter measurement accuracy is adequate for the relevant situations, but the profiling applications are difficult to realize from the envisaged orbit height of 800 km. A lower orbit near 250 km is required to achieve the desired horizontal resolution. Author (ESA)

N86-19367# Battelle Inst., Frankfurt am Main (West Germany).
ORBITING LIDARS FOR ATMOSPHERIC SOUNDING. VOLUME 2: REALIZATION OF LABORATORY LASER CONFIGURATIONS Final Report
M. Endemann, E. Hansen, and H. Hoeffgen Apr. 1985 80 p refs 2 Vol.
(Contract ESTEC-5186/82-NL-HP)
(BLeV-R-65.498-6-Vol-2; ESA-CR(P)-2112-Vol-2) Avail: NTIS HC A05/MF A01

Investigations concerning the design of a solid state transmitter laser for a spaceborne lidar are presented. Wavelength is to be 700 to 800 nm. Tunability is advantageous. Q-switching operation is discussed. The properties of Alexandrite, an experimental crystal material, are described. Thermal pumping is the reason for improved performance at high temperature. Initial tests with the laboratory laser show shortcomings, including the optical quality

of the Alexandrite laser rod, the fact that the used pump cavity was not optimized and the operating conditions of the noble gas flash lamps which make it necessary to explore lamps life for those conditions. The presented simulation computer program is considered as the first step to a refined program that can be used in the performance prediction of solid state lasers.
Author (ESA)

N86-19368# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
GOES X-RAY SENSOR INFLIGHT RELATIVE CALIBRATION
H. A. Garcia Mar. 1985 28 p
(PB85-221091; NOAA-TM-ERL-SEL-72) Avail: NTIS HC A03/MF A01 CSCL 14B

Whole disk, continuum X-ray measurements in two bandwidths 1/2 - 4A and 1 - 8A are simultaneously observed by two GOES satellites, spatially separated in longitude by about 60 degrees. Ideally solar X-rays should register the same measurement at both satellites but because of instrumental peculiarities and different ambient particle environments the actual measurements recorded are slightly different. A computer program processes one minute averaged measurements obtained from GOES archive data tapes to formulate the linear transformation parameters that relate the X-ray measurements of the primary satellite to those of the secondary satellite. A set of two parameters consisting of a constant offset and proportionality factor is determined for each of the four dynamic ranges for which data is available. Measurements are processed singly and sequentially by means of a Kalman filter to obtain continuously updated values for the unknown model parameters.
GRA

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-19369 Auburn Univ., Ala.
ACCELERATION EFFECTS IN SOLID PROPELLANT ROCKET MOTORS Ph.D. Thesis
Mark Thomas Langhenry 1985 66 p
Avail: Univ. Microfilms Order No. DA8518408

The performance variations due to acceleration loads imposed on spinning solid propellant rocket motors are investigated. The four potentially most significant modes of acceleration-induced phenomena are identified from a study of the literature and modeled. The four modes are a mechanical mode which deal with deformations of the propellant and case; a thermodynamic mode which covers acceleration induced combustion phenomena; a stress mode which covers the stressed propellant effect on burn rate; and a gay dynamic mode which deals with changes in gas flow in the chamber and through the nozzle. Simplified models of each mode are developed or taken from the literature and are added to an internal ballistics evaluation computer program. The resulting analysis is the first to include all of the modes. In order to do this an original analysis of the mechanical and stress modes was necessary. However, the analysis shows that the stress mode is not important for the circular perforated grains studied. The other effects are shown to have significant influence on solid rocket motor performance. The magnitude of the different mode effects are such that one may not be ignored over the others as has been done in the past. The results of the analysis are compared to published rocket motor data. The comparisons indicate an erosive burning effect that is a function of spin rate. A quantitative explanation of the erosive effect is presented.
Author

N86-19370 Alabama Univ., Huntsville.
UNSTEADY FLAME ZONE COMBUSTION RESPONSE OF SOLID PROPELLANT ROCKET MOTORS Ph.D. Thesis
Pil-Kyu Kim 1985 229 p
Avail: Univ. Microfilms Order No. DA8519062

The main purpose of the present study is, therefore, to investigate the role of radiative heat transfer upon combustion instability as determined from response function calculations. The formulation is based on the Arrhenius law with a single step forward chemical reaction, idealized two-dimensional mean flow, and impressed arbitrary acoustic wave incidences. Premixed, laminar flame, multi-dimensional radiative heat transfer in participating media will be considered in this study. The response function calculations are ideally carried out using finite elements. Analytical boundary conditions at the flame edge and decomposition zones are implemented via the Lagrange multipliers in finite elements. To this end, the multi-dimensional, nonlinear, time-dependent, simultaneous equations are expanded with the relevant boundary conditions into first and second order perturbations. All excited frequencies are calculated by means of eigenvalue analyses and the combustion response functions corresponding to these frequencies are determined.
Dissert. Abstr.

N86-19371# National Aerospace Lab., Tokyo (Japan).
START TRANSINET ANALYSIS OF TURBOPUMP-FED LOX/LH2 ROCKET ENGINE (LE-5)
Akio Kanmuri, Yoshio Wakamatsu, Takashi Shimura, Kyoichiro Toki, and Yoshihiro Torii 1985 35 p refs In JAPANESE; ENGLISH summary
(NAL-TR-868; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

The first Japanese LOX/LH2 rocket engine (LE-5) employs a turbopump-fed gas generator cycle system. The LE-5 engine starts up in such an unique method that the power of the turbopump system is at first built up by a coolant bleed cycle followed by a gas generator cycle. A computer program for the start transient simulation has been developed and it has been utilized for analysing start-up characteristics of the LE-5 engine. The outline of the computer program and the analytical results are discussed here. The results of the analysis have been effectively used for the setting of the firing test condition and for the termination of the engine start sequence in each phases of the development. The results of the simulation are also compared with the experimental results.
Author

N86-19372# Space and Missile Test Center, Patrick AFB, Fla.
DIFFUSION MODELING IN SUPPORT OF THE SPACE SHUTTLE Final Report, 1984 - 1985
Billie F. Boyd and Clinton R. Bowman, Jr. 14 Oct. 1985 16 p
(AD-A160963; ESMC-TR-85-04) Avail: NTIS HC A02/MF A01 CSCL 21/2

The requirements for a computer model to forecast the diffusion of rocket exhaust during launches of the Space Shuttle are discussed.The REEDM computer code includes basic mathematical expressions for atmospheric dispersion models, cloud-rise models and models for calculating the gravitational deposition of acid drops. Inputs are vehicle and other source parameters, meteorological parameters defining the state of the planetary boundary layer (including turbulence parameters) and physical properties of the rocket exhaust cloud. During launches of the Space Shuttle, the rocket engines emit large quantities of exhaust products, which combine with water from the sound suppression system and result in the formation of a large hot acid cloud near ground level. The cloud grows rapidly through entrainment and, shortly after ignition, it lifts off the ground and rises to its stabilization height. Typically the top of the stabilized cloud produced by the Space Shuttle is more than 2 kilometers above ground level. By convention, this cloud is referred to as the ground cloud. The rocket engines of the ascending vehicle also leave an exhaust trail which extends through the troposphere and beyond. The REEDM computer program is designed to calculate peak concentration, dosage and surface deposition (resulting from both gravitational settling and precipitation scavenging) of ground cloud constituents downwind from normal launches and launch failures.
GRA

N86-19373# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON PARAMETERS OF A SUPERSONIC COMBUSTION CHAMBER WITH ORGANIZATION OF COMBUSTION AT THE FLAME FRONT
E. L. Solokhin, V. A. Mironenko, and V. I. Ivanov 25 Oct. 1985 18 p Transl. into ENGLISH from Trudy, Ufimskiy Aviatsionnyy Institut, Voprosy Teorii i Rascheta Rabochikh Protsessov Aviatsionnykh Dvigately (USSR), no. 30, 1972 p 60-70
(AD-A161176; FTD-ID(RS)T-0900-84) Avail: NTIS HC A02/MF A01 CSCL 21/2

In some engineering problems, it is necessary to burn fuel in the combustion chamber with supersonic flow. As a rule, the scheme of organization of the process in such a chamber presupposes a separate accompanying feed of fuel and oxidant in which combustion of fuel takes place in a diffusion flame front. In this article we give theoretical results of the investigation of a supersonic combustion chamber in which combustion of the fuel mixture takes place in a oblique flame front stabilized by an external source (analogous to the subsonic combustion chambers of ramjets). The possibility of the existence of such an oblique flame front in a supersonic flow of fuel mixture was previously proved experimentally. GRA

N86-19374# Los Alamos National Lab., N. Mex.
ANTI-MATTER PROPULSION: FEASIBILITY, STATUS AND POSSIBLE ENHANCEMENT
Steven D. Howe 1985 13 p Presented at the Manned Mars Mission Workshop, Huntsville, Ala., 10-14 Jun. 1985 Submitted for publication
(Contract W-7405-eng-36)
(DE85-015716; LA-UR-85-2443; CONF-8506149-3) Avail: NTIS HC A02/MF A01

Anti-protons are currently being produced in the world in amounts of about 10 to the 14th power particles per year. With sufficient effort, almost a mg/yr (6 x 10 to the 20th power) could be produced by the early 2000s. Current experiments plan to decelerate and capture about 10 to the 10th power or greater antiprotons in a electrostatic Penning trap. Such traps may provide a source of low energy antiprotons for development of better storage mechanisms suitable for propulsion. Proposals were investigated which would amplify the average energy released per antiprotons used. The proposals entail using the antiprotons to produce inertial confinement fusion of a capsule or to produce negative muons which can catalyze fusion. By increasing the energy released per antiprotons, the effective specific costs, $/joule, can be reduced to attractive levels. These two proposals and other areas of research can be investigated now and will help in assessing the feasibility of a antiprotons engine. Author

N86-19375# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
COMBUSTION OF FOUR COMPOSITE PROPELLANTS AT SUBATMOSPHERIC PRESSURES
H. F. R. Schoyer and P. A. O. G. Korting Aug. 1983 72 p refs Prepared in cooperation with Prins Maurits Lab. TNO, Rijswijk, Netherlands
(VTH-LR-399; PML-1983-135) Avail: NTIS HC A04/MF A01

The combustion behavior of 4 composite propellants was investigated in the pressure region between 20 and 140 kPa and at temperature of -40, 25 and 50 C. The experimental technique is based upon a cigarette burning rocket motor connected to a vacuum system. All four propellants display a De Vieille burning rate law. The burning rate is strongly affected by composition, pressure, and temperature. Combustion instability predominantly occurs at pressures below 50 kPa. Frequency spectra, pressure amplitudes versus mean pressure, and frequency versus mean pressure were determined for all 12 cases. The propellant response function was estimated. From all propellants, ICT 201 seems to be the least susceptible to oscillatory combustion. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-19376* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MALEIMIDO SUBSTITUTED AROMATIC CYCLOTRIPHOSPHAZENES Patent
Devendra Kumar, George M. Fohlen, and John A. Parker, inventors (to NASA) Issued 29 Oct. 1985 22 p Filed 11 Apr. 1984
(NASA-Case-ARC-11428-1; US-Patent-4,550,177;
US-Patent-Appl-SN-499126; US-Patent-Class-548-413;
US-Patent-Class-260-927-N; US-Patent-Class-564-113;
US-Patent-Class-428-410; US-Patent-Class-528-310) Avail: US Patent and Trademark Office CSCL 07C

4-Aminophenoxy cyclotriphosphazenes are reacted with maleic anhydride to produce maleamic acids which are converted to the maleimides. The maleimides are polymerized. By selection of starting materials (e.g., hexakis amino or trisaminophenoxy-trisphenoxy-cyclo-triphosphazenes), selection of molar proportions of reactants, use of mixtures of anhydrides and use of dianhydrides as bridging groups a variety of maleimides and polymers are produced. The polymers have high limiting oxygen indices, high char yields and other useful heat and fire resistant properties making them useful as, for example, impregnants of fabrics. NASA

N86-19377# Kentucky Univ., Lexington.
MODELING OF EQUILIBRIUM GAS ADSORPTION FOR MULTI-COMPONENT VAPOR MIXTURES Contractor Report, Aug. 1983 - Aug. 1984
P. J. Reucroft, K. B. Patel, W. C. F. Russell, and R. Sekhar Aug. 1985 40 p
(Contract DAAK11-82-K-0016)
(AD-A159632; CRDC-CR-85040) Avail: NTIS HC A03/MF A01 CSCL 07/4

Adsorption data has been obtained for CHCl3/CCl4 binary vapor mixtures on BPL-activated carbons and interpreted in terms of the Dubinin-Polanyi equation. The kinetics of adsorption for CHCl3/CCl4, n-hexane/benzene and CH2Cl2/CHCl3 binary vapor mixtures have been determined on BPL-activated carbon and interpreted in terms of the Wheeler equation. Author (GRA)

N86-19378# Chicago Univ., Ill. Dept. of Chemistry.
ENERGETIC MATERIALS FROM CUBANE Interim Report, 1 Aug. 1984 - 31 Jul. 1985
Philip E. Eaton Sep. 1985 23 p
(Contract N00014-84-K-0645)
(AD-A160966) Avail: NTIS HC A02/MF A01 CSCL 07/3

Cubanes are exceptionally strained compounds with high heats of formation. They are also very dense. The combination of these two properties along with proper substituents on the cubane nucleus should lead to highly energetic materials useful as explosives and propellant additives. Cubane-1,4-dicarboxylic acid can be fairly easily prepared from readily available starting materials; however, the methodology for the preparation of more highly substituted cubanes--those necessary for the proposed use--has not yet been developed. It is the purpose of this project to develop and investigate approaches to such highly substituted cubanes. This progress report describes work accomplished during the first year of the contract. Before starting on the present contract, we had discovered that it was possible to use amide groups on the cubane nucleus to activate adjacent positions for lithiation. Further, we had shown that such ortho-lithiated cubanes could be intercepted with mercury salts to produce cubyl mercurials. The carbon-mercury bond in such compounds was shown to be reactive toward iodine; the final result being the production of cubyl iodides. Thus, as shown in the overall scheme (illustrated overleaf), we succeeded in preparing and characterizing 2,7-diiodo-1,4-bis(N,N-diisopropylcarboxamido)cubane, the first tetrasubstituted cubane. GRA

N86-19379# Brookhaven National Lab., Upton, N. Y.
STUDIES INVOLVING THE REDUCTION OF SOD-Cu(2+) BY CO2(-) RADICALS
D. E. Cabelli and H. J. Bielski 1985 6 p refs Presented at the 4th International Conference on Superoxide and Superoxide Dismutase, Rome, Italy, 1 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001204; BNL-36894; CONF-8509146-2) Avail: NTIS HC A02/MF A01

Pulse radiolysis and other radiolytic techniques have proven very potent tools in the elucidation of the mechanism of O2(-) dismutation by superoxide dismutases (SOD). Some recent work in this laboratory involved a systematic study of the reduction of SOD-Cu(2+) (bovine liver) by CO2(-) radicals and the kinetics of the interaction between the resultant SOD-Cu(+) and peroxide, a process that is known to inactivate the enzyme and thought to generate a bound OH radical. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-19380* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TOUGHENING REINFORCED EPOXY COMPOSITES WITH BROMINATED POLYMERIC ADDITIVES Patent
Zohar Nir (National Academy of Sciences/National Research Council, Washington, D.C.) and William J. Gilwee, Jr., inventors (to NASA) Issued 29 Oct. 1985 12 p Filed 12 May 1983 Sponsored by NASA
(NASA-Case-ARC-11427-1; US-Patent-4,550,129;
US-Patent-Appl-SN-493865; US-Patent-Class-523-433;
US-Patent-Class-523-445; US-Patent-Class-523-66468;
US-Patent-Class-525-527; US-Patent-Class-525-423;
US-Patent-Class-528-102; US-Patent-Class-528-103) Avail: US Patent and Trademark Office CSCL 11D

Cured polyfunctional epoxy resins including tris(hydroxyphenyl) methane triglycidyl ether are toughened by addition of polybrominated polymeric additives having an EE below 1500 to the pre-cure composition. Carboxy terminated butadiene acrylonitrile rubber is optionally present in the precure mixture as such or as a pre-formed copolymer with other reactants. Reinforced composites, particularly carbon reinforced composites, of these resins are disclosed and shown to have improved toughness. NASA

N86-19381 Cornell Univ., Ithaca, N.Y.
INELASTIC DEFORMATION AND MICROSTRUCTURAL ANALYSIS OF TRANSITION METAL CARBIDES Ph.D. Thesis
Vivek Madan Sura 1985 210 p
Avail: Univ. Microfilms Order No. DA8516936

The densification behavior of (Ti, V)C alloys was studied by hot-pressing experiments. The effects of temperature and composition on final porosity, grain size and phases present were determined. The diffusion coefficients determined from densification data agree well with the grain boundary diffusion coefficient of carbon. This observation, combined with microstructural evidence, indicates that the final stage of densification is controlled by rain boundary diffusion of carbon and/or metal. The enhanced densification and grain growth in VC rich samples are attributed to the presence of second phase material along the grain boundaries. The rapid interdiffusion of Ti and V in (Ti, V)C to form a single phase, raises the possibility of faster diffusion along the migrating boundaries in contrast to the stationary boundaries. Dissert. Abstr.

N86-19382 Purdue Univ., West Lafayette, Ind.
SYNTHESIS AND ELECTRICAL CHARACTERIZATION OF DOPED BETA-ALUMINA COMPOUNDS Ph.D. Thesis
Danny Ray White 1985 314 p
Avail: Univ. Microfilms Order No. DA8520089

A series of first row transition metal doped beta and stabilized beta double prime alumina compounds were prepared to study the role of the dopant ion on the structure and stability of the beta-aluminas, as well as its effect on the resultant materials ionic conductivity. The majority of these compounds were synthesized by a skull melting technique, in which crystals are grown by slow cooling the melt from -2000 C. It was found that only cobalt, nickel, and zinc formed doped beta-alumina compounds. However, the resultant boules of these materials were a heterogeneous mixture of both the doped beta and stabilized beta phases. Characterization of these compounds with respect to their composition, structure, and distribution of the dopant ions was also performed. Electrical characterization, in the form of ionic conductivity measurements, were made via A.C. bridge/complex plane analysis, and phase synchronous detection/computer modeling methods. Dissert. Abstr.

N86-19383# National Aeronautical Lab., Bangalore (India). Structures Div.
DIFFUSION STUDIES ON ADVANCED FIBRE HYBRID COMPOSITES
R. Gopalan and M. V. V. Murthy Apr. 1985 23 p refs
(NAL-TM-ST-8508) Avail: NTIS HC A02/MF A01

The moisture diffusion characteristics of simple (E-glass, Graphite and Kevlar) and hybrid (E-Glass-Graphite, Graphite-Kevlar and Kevlar-E-Glass) unidirectional composites have been studied at 296 K and 343 K under water immersion conditions. The equilibrium moisture content (Mm) and diffusion coefficient (Dx) of Kevlar fiber composite are respectively as high as 5 and 10 times that of E-glass/Graphite fiber composites. It is shown that it is possible to evaluate the diffusion characteristics Mm and Dx of hybrid composites from the corresponding values of their simple composites. The experimental data for simple and hybrid composites comprising both impermeable and/or permeable fiber composites show good correlations with the analytical Fickian Diffusion plot. The effect of edge coating on the moisture absorption is quite significant in the permeable fiber composites. E.A.K.

N86-19384# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Strukturmechanik.
MECHANICAL PROPERTIES AND DAMAGE MECHANISMS OF CARBON FIBER-REINFORCED COMPOSITES. TENSION LOADING
Jun. 1985 415 p refs
(DFVLR-FB-85-45; ISSN-0171-1342) Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

The fracture properties and the damage mechanisms of unnotched and notched graphite/epoxy laminates were investigated. The response of unidirectional and multidirectional stacking sequences under increasing static tension loading, constant amplitude cyclic tension and thermal fatigue loading, and the relationships between damage state and residual stiffness and strength at four different environmental conditions were examined. Global laminate properties were compared with macro and microscopic modes of failure. For individual titles, see N86-19385 through N86-19399.

N86-19385# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
TEST FACILITIES c39
R. Prinz and K. Schmidt *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 17-32 (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Facilities for static, cyclic thermal, and cyclic mechanical load tests on 1800 flat carbon fiber reinforced composite specimens are described. Environment simulation facilities are outlined. • Author (ESA)

N86-19386# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
TEST SPECIMENS
M. Gaedke *In its* Mechanical Properties and Damage Mechanisms

of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 33-40 (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Quality control on prepregs used in a test program of carbon fiber reinforced laminates extending over several years is described. Manufacturing parameters, and recording of information on stacking, dimensions, etc., are outlined. Author (ESA)

N86-19387# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
NONDESTRUCTIVE EVALUATION
J. Block and R. Schuetze *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 41-54 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Radiographic, ultrasonic, acoustic emission, and grating reflection techniques used for nondestructive evaluation of carbon fiber reinforced composites are described. Combined radiographic and ultrasonic techniques can cover most of the interesting aspects of damage propagation by yielding well-focused photographs and scans. Acoustic emission analysis is particularly suited for the resolution of the damage progression process with respect to time and time-dependent parameters. The grating reflection technique yields photographs showing the surface deformations of the specimens. Author (ESA)

N86-19388# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
ANALYSIS TOOLS
L. vonBonin and H. Eggers *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 55-67 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

The statistical data treatment and computer programs used in handling large numbers of test results and assessment of stress distributions leading to damage propagation of fracture of carbon fiber reinforced laminates are described. To overcome computing costs with standard finite element programs, the LAMINA program was initiated. Its basic component is a triangular hybrid plate element with degrees of freedom for bending and membrane action as well as for normal and shearing stresses on its upper and lower surfaces. A special condensation scheme produces multilayer plate elements and substructures so that arbitrarily stacked laminates can be modelled in great detail with a relatively small number of degrees of freedom. Failure progression criteria are appended to the system of simultaneous equations such that damage propagation tracking does not require repeated triangulation of the global stiffness matrix. Author (ESA)

N86-19389# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RESPONSE OF STATICALLY TESTED UN-NOTCHED SPECIMENS
M. Gaedke *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 69-124 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Properties of unidirectional plies for three fiber-matrix systems of carbon fiber reinforced epoxies were studied to form the basis for the analytical prediction of the response of multidirectional laminates. The predictions include the elastic moduli, first ply failure, and tensile strength of the laminates, and take into account the state of prestress induced by temperature and moisture. Additional tests were performed with multidirectional laminates to validate the analytical predictions and to support the failure analysis. Author (ESA)

N86-19390# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RESPONSE OF STATICALLY TESTED NOTCHED SPECIMENS
H. Eggers and L. Kirschke *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 125-190 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

The significance of notches in carbon fiber-reinforced epoxy resins was assessed in quasi-static tension tests with unidirectional on-axis and off-axis specimens as well as multidirectional specimens containing either a single central notch or two symmetrical notches at the edges. Numerical calculations were performed to establish failure criteria for incorporation into the computer program LAMINA. Using the finite element programs ASKA and LAMINA, the states of stress at the crack tips in unidirectional laminates were analyzed for different crack lengths at load intensities under which crack extension was observed. The critical stress intensity factors (K1 and 2) were established. The strain energy release rate concept is found to be the most promising. Using this approach it is possible to identify the total energy release rate as well as its separation into components, associated with the two crack opening modes, from which K1 and 2 are obtained. Author (ESA)

N86-19391# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RESPONSE OF MECHANICALLY FATIGUED UN-NOTCHED SPECIMENS
H. C. Goetting *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 191-215 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Tensile fatigue tests of unidirectional, angle-ply and multidirectional laminates were performed under four different environmental conditions to investigate the influence of temperature and moisture on the fatigue strength and on the damage mechanisms of unnotched carbon fiber-reinforced laminates. Results show that the fatigue properties of matrix-controlled laminates are sensitive to temperature and moisture, whereas the more fiber-controlled laminates show no significant degradative effects. However, the fatigue performance of carbon fiber-reinforced laminates under worst-case environments clearly exceeds that of metallic materials even in the presence of large data scatter. Author (ESA)

N86-19392# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RESPONSE OF MECHANICALLY FATIGUED NOTCHED SPECIMENS
L. Kirschke and G. Kress *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 217-238 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

The residual strength and stiffness of notched laminates under cyclic loading were studied. Damage progression in on-axis unidirectional test specimens with two symmetrical edge notches under increasing numbers of load cycles with R = 0.1 was determined. Tests with multidirectional laminates containing unloaded circular holes at the center of the test section were examined. Matrix cracks and delaminations in and between adjacent plies of the laminates were observed. Strength and stiffness measurements after prescribed numbers of load cycles with R = 0.1 show that the global stiffness of the test specimens diminishes whereas the residual static strength increases until shortly before failure. The strength increase is attributed to the relief of local stress due to the crack formation and progression in the plies of the laminate around the hole. Author (ESA)

N86-19393# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RESPONSE OF THERMALLY FATIGUED UN-NOTCHED SPECIMENS
W. Hartung *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 239-260 refs (For primary document see N86-19384

10-24)
Avail: NTIS HC A18/MF A01

In order to assess the effects of thermal cycling in a typical space environment on the mechanical properties of carbon fiber reinforced composites, and to study the potential mechanisms of damage, a test program was performed with + or - 45 deg, 2 s laminates prepared from five different fiber-resin systems. Test specimens were evaluated prior to and after exposure to various numbers of thermal cycles, in vacuum, between +100C and -160C. Test results show that strength degradations of up to 20% occur in epoxy-based laminates, and much more in the polyimide-based laminates, accompanied by corresponding stiffness degradations. Both types of degradation are traced to matrix cracking and to interface deterioration. Author (ESA)

N86-19394# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
STRAIN CAPABILITIES AND STRAIN RATE EFFECTS IN EPOXY RESINS AND LAMINATES
J. Block and H. Twardy *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 261-296 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Ranges of strain capability required to exploit the potential of carbon fibers in laminates were investigated using unidirectional rings with a variety of matrix formulations and fiber types under ambient conditions. By increasing the matrix failure strain from 1.5% to 2.5%, strength improvements between 14% and 54% are possible. The sensitivity of the strength and stiffness properties of the test specimens to different strain rates was studied. The tests show that for strain rates > 1.0% per sec, the strength values of the test specimens remain constant regardless of the ductility of the matrix. The majority of the tests were accompanied by acoustic emission analyses. Assuming that the acoustic energy release is an indicator for the fracture phenomenon as such, ideal or less ideal fracture sequences can be identified by comparison of the integrated energy release at prescribed deformation states. Author (ESA)

N86-19395# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
RADIATIVE AND OXIDATIVE EFFECTS
G. Niederstadt *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 297-304 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Deterioration of carbon fiber reinforced epoxy resins was studied. Simulation of electron beam irradiation as experienced during the service life of a spacecraft structure in a typical geostationary orbit shows that neither the tensile strength nor the elongation to failure of 1 mm thick laminates are impaired after 300 million rads. A slight reddish tint on the laminate surfaces may indicate optical property changes. The long-time exposure of test specimens to open atmospheric conditions in 75 m and 1600 m elevation reveals matrix cracks and deteriorations of the laminate surfaces, due to UV-B type irradiation, and the presence of moisture and oxygen. Tensile strength diminishes to 90% of the initial strength after an irradiation dose equivalent to three calendar years. An oxidative effect is observed on specimens subjected to a sustained temperature of 120C in the presence of air. The measured weight loss of 914C/T300-laminates is 3.3% after 28,900 hr. At 100C, the rate of weight loss is considerably less. Author (ESA)

N86-19396# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
FRACTOGRAPHICAL INVESTIGATIONS
P. Nitsch *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 305-339 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Rupture of individual fibers, microcracks in the matrix, and loss of adhesion at the fiber-matrix interface of laminates made of carbon fiber reinforced epoxy resins were studied by fractography. The topography of the fracture surfaces of the tension-loaded neat resin is seen to depend on the curring process and moisture content. Microcracks form in curing cycles with low heating rates. Curing cycle and moisture content affect the strain capability of the resin. With a known curing cycle it is possible to deduce the moisture content of a specimen or, with a known moisture content, the nature of the curing cycle. In fiber-reinforced laminates the influence of curing cycles, test temperature, and moisture content on the matrix microstructure and on the fiber-matrix interface are identifiable. An attempt to qualify the fiber-matrix adhesion in terms of the mean length of the pulled-out fibers is promising. Author (ESA)

N86-19397# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
FRACTURE MECHANICS ASPECTS
H. W. Bergmann and H. Eggers *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 341-349 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

Limits of fracture mechanics principles developed to describe the initiation and progression of cracks in isotropic and homogeneous materials when applied to fiber-reinforced laminates are discussed. Instead of a single crack, a damage zone develops in which the laminate progressively deteriorates. Fissuring and meandering cracks extending through the thickness of the material form only shortly before ultimate failure, i.e., after the useful life of the laminate. Damage mechanics must describe behavior of damaged zones in fiber-reinforced structures prior to ultimate failure. Generally accepted concepts of damage mechanics are rare. Individual mechanisms of damage progression are known but their contributions, single or in combination, to the total state of damage are not well understood. Research is directed toward the definition of characteristic strength parameters for carbon fiber reinforced resins by a combination of analysis and test. Author (ESA)

N86-19398# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
EVALUATION OF FRACTURE MODELS
J. Awerbuch *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 351-371 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

In order to assess the range of applicability and the accuracy of fracture models, the notch sensitivity of composite laminates containing centrally located holes and straight cracks, and subjected to uniaxial loading was reviewed. Eleven fracture models were evaluated against experimental data. Experimental notched strength parameters were compared with the predictions of each fracture model. Author (ESA)

N86-19399# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
MECHANISMS OF FRACTURE
R. Prinz *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 373-411 refs (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

The development of fatigue damage in unnotched multidirectional laminates was investigated under tension and compression cycling to gain insight into the mechanisms of the failure processes. During and after fatigue loading specimens were examined for damage growth using light microscopy, scanning electron microscopy, ultrasonic C-scans and X-radiography. Matrix cracking and edge delaminations are found to be the dominant types of

defects. Under fatigue loading these defects propagate due to unfavorable interlaminar stresses to the point where the specimens ultimately fail by short buckling or shearing. The test effort was accompanied by finite element calculations for the assessment of the state of stress in critical zones. A damage growth model for edge delaminations which correlates well with the test results was developed. Author (ESA)

N86-19400# Illinois Univ., Urbana. Dept. of Ceramic Engineering.
INFLUENCE OF ALUMINA ON THE STRUCTURE AND MECHANICAL PROPERTIES OF YTTRIA STABILIZED ZIRCONIA COMPOSITES Final Report, 10 Jan. 1984 - 10 Jan. 1985
R. C. Buchanan and W. W. Davison 22 Jul. 1985 33 p
(Contract N00014-80-K-0969)
(AD-A159994; TR-11) Avail: NTIS HC A03/MF A01 CSCL 11/4

Composite structure of yttria (4.5 wt%) stabilized zirconia (YSZ) with added Al2O3 (0.3-7.5 wt%) have been investigated. They show fracture toughness (KIc) and strength (MOR) values in excess of 9.0 MPa X the square root of M and 500 MPa respectively more than twice that normally reported for YSZ samples of like composition. Starting materials used were floated Al2O3 and precipitated YSZ powders (approx. 99 9% purity) of average partical size 0.03 micrometers. The powders were washed, dispersed, ball milled, spray dried, dry pressed and the resultant compacts sintered at 1300 C/8 h. Microstructures obtained were of uniform grain size (0.2-0.4 micrometers) with discrete Al2O3 inclusions, approximately the same size as the YSZ grains, dispersed throughout the composite structure. The strengthening mechanism involved dissipation of strain energy by plastic deformation of the Al2O3 inclusions in the YSZ matrix. Variation in the mechanical properties and structure of the composite as a function of added Al2O3 was correlated with DC conductivity, X-ray diffraction and lattice parameter data. The X-ray data showed splitting of the main peaks indicating a primarily tetragonal phase. Lattice parameter changes with increasing Al2O3 were attributed to direct substitution of Al(3+) for Zr(4+) ions at low Al2O3 (0.325 wt%) content resulting in increased oxygen vacancies, higher conductivity and lower activation energy. GRA

N86-19401# Army Materials and Mechanics Research Center, Watertown, Mass.
THERMAL ANALYSIS CHARACTERIZATION OF ELASTOMERS AND CARBON BLACK FILLED RUBBER COMPOSITES FOR ARMY APPLICATIONS Final Report
R. E. Sacher, D. P. Macaione, and R. E. Singler Jun. 1985 37 p
(AD-A160825; AMMRC-TR-85-14) Avail: NTIS HC A03/MF A01 CSCL 11/10

A number of elastomeric based materials used in Army tank track pads have been analyzed by a variety of thermal analysis techniques which include thermogravimetric analysis, differential scanning calorimetry, thermomechanical analysis, and dynamic mechanical analysis. These measurements have been developed to yield data concerning the chemical composition of the complex elastomer system, the cure chemistry and conversion of the rubber, the glass transition temperature(s) of the elastomers, the tensile storage modulus as a function of temperature, and the use of thermogravimetric analysis as a quality control procedure for track pads. GRA

N86-19402# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
IMPACT CHARACTERIZATION OF NEW COMPOSITE MATERIALS Final Report
Lee W. Gause and Leonard J. Buckley Feb. 1985 147 p
(AD-A160953; NADC-85023-60) Avail: NTIS HC A07/MF A01 CSCL 11/4

Dropped-weight instrumented impact tests were used in conjunction with ultrasonic C-scan inspection to characterize the impact response of several new graphite-fiber composite material systems. The AS4/Hercules 3501-6 graphite/epoxy was compared to the newer AS4/Hercules 2220-1, Celion High Strain/Narmco 5425 and IM6/Narmco 5445C systems in the 250 F (121 C) service category. Material tested in the XAS/Hysol 9102 and HX/Hexcel 1516 graphite/bismaleimides. A material ranking is given along with measured impact parameters and impact energy versus damage relationships. The impact behavior of all four 250 F (121 C) were similar except IM6/5245C had the highest impact resistance. The bismaleimides had similar incipient damage levels as the epoxies but were more easily punctured. Impact resistance of the five 350 F (177 C) systems were similar except T300/130B had the lowest impact resistance. GRA

N86-19403# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IMPREGNATION OF ALUMINIUM-ALLOY COMPOUNDS WITH CARBON MATERIALS
L. Jingxiu 24 Oct. 1985 8 p Transl. into ENGLISH from Runhua Yu Mifeng (China), no. 2, 1983 p 40-41
(AD-A161179; FTD-ID(RS)T-1488-84) Avail: NTIS HC A02/MF A01 CSCL 11/4

Sintered porous carbon substrate is mainly composed of graphite, coke and pores. It can be used as a substrate for composite materials. The composite material of carbon and aluminum alloy can be made by immersing the compressed and sintered carbon substrate in molten aluminum alloy under a fixed pressure, which forces the molten alloy to flow into the pores of the substrate. The surface of the material under such compressed condition should have a stress of 5 to about 15 Kg/sq mm. GRA

N86-19404# Denver Univ., Colo. Dept. of Engineering.
DAMAGE PROGRESSION IN FIBER COMPOSITES DURING REPEATED LOADING Final Report
M. A. Hamstad 15 Apr. 1985 19 p
(Contract W-7405-eng-48)
(DE85-017282; UCRL-15708) Avail: NTIS HC A02/MF A01

Preliminary tests to study the damage progression during load cycling of Kevlar 49/epoxy tensile strands are reported. Only a preliminary analysis of the data was accomplished. DOE

N86-19405# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
RELAXATION DUE TO TEMPERATURE, MOISTURE AND EXTERNAL LOADING: PRELIMINARY RESULTS
M. L. C. E. Verbruggen Nov. 1983 43 p refs
(VTH-M-491) Avail: NTIS HC A03/MF A01

The influence of temperature, moisture, and external loading on the internal stress distribution of ARRAL was examined by measuring the radius of a specimen after chemical milling one sheet away. There is a discrepancy between the theoretical and measured internal stress distribution as a result of the prestrain process, whereby the real stresses are higher than calculated. Large individual differences between specimens milled out of one plate after prestraining indicate a nonuniform stress distribution in the plate as a result of the prestrain process. No relaxation is observed after up to 12 weeks of exposure, independent of the environment, temperature level and external loading condition, except for 1 case (70 C, wet, unloaded). Author (ESA)

N86-19406# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE MOISTURE ABSORPTION OF ARALL COMPARED TO CARBON AND ARAMID REINFORCED COMPOSITES
M. L. C. E. Verbruggen May 1984 18 p ref
(VTH-M-506) Avail: NTIS HC A02/MF A01

Moisture absorption of ARALL, carbon fiber reinforced plastic (CFRP), and aramid fiber reinforced plastic (AFRP) are compared, based on diffusion coefficients. The roles of the fibers, material thickness, and diffusion barriers (aluminum sheets in ARALL configuration) in the general absorption mechanism are emphasized. For thin skins, ARALL has a negligible moisture absorption rate compared to composites and no difference in absorption rate is present between CFRP and AFRP. The absorption process is resin dominated. For larger thickness, the fibers have a serious contribution in the absorption behavior of the material (AFRP higher

absorption rate than CFRP) and the advantage of ARALL compared to composites is decreasing. Author (ESA)

N86-19407# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE INELASTIC RATIO OF ARALL
M. L. C. E. Verbruggen May 1984 8 p
(VTH-M-507) Avail: NTIS HC A02/MF A01

The inelastic ratio (IR) of ARALL was determined in bending tests on four configurations with varying length, width, thickness, fiber orientation, and number of layers. The IR is 65%, differences between the configurations are negligibly small. The small difference in IR between specimens with fibers in length and width direction is the result of the different elastic-plastic behavior of the specimens. The elastic part of the force-displacement curve is controlled by the Young's modulus of the specimens which is a function of the composition of the material. With increasing deflection, the stresses in the aluminum sheets are identical for all specimen configurations (the total stresses are not) so the deflection at which plastic deformation occurs is identical for all configurations. Specimens with fibers in width direction have a plastic behavior controlled by the aluminum sheets and can be regarded as ideal plastic. The elastic contribution of the fibers of specimens with fibers in length direction on the force-deflection curve in the plastic range is considerable, giving a lower IR. Author (ESA)

N86-19408# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
RELAXATION DUE TO TEMPERATURE, MOISTURE AND EXTERNAL LOADING Final Report
M. L. C. E. Verbruggen Sep. 1984 16 p refs
(VTH-M-522) Avail: NTIS HC A02/MF A01

The influence of temperature, moisture, and external loading on the internal stress distribution of ARRAL was examined by measuring the radius of a specimen after chemical milling one sheet away. After 56 weeks exposure no significant relaxation is detected, except for specimens exposed at a 70 C, distilled water environment, which show relaxation whereby the dominant influence of the moisture is present in a continuous increase of the radius (decrease of the internal stresses) from the center to the edges of the specimen. Because of initial manufacture problems (the prestrain process did not result in a homogeneous distribution of the internal stresses) and experimental problems of controlling the chemical milling process, the scatter in the data is considerable. The results should therefore only be used on a qualitative base and show that similar tests are only valid if large test series are introduced over long exposure periods to eliminate the encountered problems. Author (ESA)

N86-19409# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
PRESTRAIN PROCESS OR ARALL
M. L. C. E. Verbruggen and R. Reumerman Sep. 1984 23 p ref
(VTH-M-523) Avail: NTIS HC A02/MF A01

The homogeneity of the stress distribution in ARALL as the result of the prestrain process is examined as well as the influence of clamping conditions on this homogeneity. The usefulness of an inspection method of the prestrain process by chemical milling is investigated. Tests show that the prestrain process results in a homogeneous distribution of the internal stresses along the ARALL-sheet. Inadequate clamping causes deviations in the stress distribution near the clamping edges of the specimen. Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-19410 New South Wales Univ., Kensington (Australia).
SHOCK TUBE STUDIES OF HYDROCARBON PYROLYSIS Ph.D. Thesis Abstract Only
Ronald James Denning Dec. 1984 2 p
Avail: Issuing Activity

The high temperature pyrolysis of methane, ethylene, propane, ethyl iodide and 1,3-butadiene as mixtures of > 1% in argon were studied behind reflected shock waves over the temperature range 1400 to 2300 K, dependent on the hydrocarbon being studied, at densities of (2.5 to 4.9) x 1/100000 mol/cu cm. The reaction was followed by simultaneous time-resolved spectroscopy at 216 nm where methyl radical absorbs and 239 nm. The observed absorption profiles were modelled by using forward and reserve reaction rate constants which use the Gear predictor-corrector method for solving stiff differential equations. The absorption spectrum of cis-1,3-butadiene and the vinyl radical were determined between 210 and 260 nm at 1400 K for cis-1,3-butadiene and at 1350 K for the vinyl radical. The cis-1,3-butadiene shows a maximum at 240 nm with a molar absorption coefficient of 1.24 x 10,000 sq cm/mol. Vinyl radical also has a maximum at 240 nm with a molar absorption coefficient of 1.8 x 10,000 sq cm/mol. E.A.K.

N86-19411 New South Wales Univ., Kensington (Australia).
ANALYTICAL AND STRUCTURAL STUDIES OF CARBOHYDRATES M.S. Thesis Abstract Only
Grace Ya-Ling Teng [1984] 3 p ref
Avail: Issuing Activity

Three separate areas of carbohydrate analysis are examined: (1) Oligosaccharide separation on reversed-phase HPLC columns has been examined using a range of aqueous solvents. Addition of surfactants, tetramethyl urea, and organic solvents to the mobile phase causes faster elution of oligosaccharides and allows the separation of the larger oligomers in an acceptable time. Addition of neutral inorganic salts increases the retention factors. The mechanism operating in the separations approximates that invoked in the solvophobic theory of reversed phase chromatography. (2) The methyl glycosides of maltotriose, isomaltose and isomaltotriose have been prepared by their treatment with 1% methanolic HCl at room temperature. Isolated glycosides were characterization. (3) Some methods of methylation have been performed on various carbohydrates, including confirmation of the structure of a pentasaccharide obtained by the enzymic hydrolysis of a dextran. F.M.R.

N86-19412 New South Wales Univ., Kensington (Australia).
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY OF METAL DIETHYLDITHIOCARBAMATE COMPLEXES M.S. Thesis Abstract Only
Aung Kyaw Htoon Mar. 1985 3 p
Avail: Issuing Activity

High Performance Liquid Chromatography (HPLC) of diethyldithiocarbamates was studied with emphasis on the metals Ni(2), Co(2), Cr(3), Se(4), Cu(2), Hg(2), Pb(2), Cd(2), Zn(2), As(3), Fe(3) and Mn(2). These chelates were studied with various mobile phases containing ligand, EDTA and buffers using a variety of columns. It was found that Ni(2), Co(3), Cr(3), Se(4), Cu(2) and Hg(2) chelates were stable enough for trace analysis work. The remainder of the metal chelates examined showed decomposition on the column. The optimal mobile phase for the separation of these six stable chelates was methanol-acetonitrile-water on a 10 micrometers C18 Radial Pak column, or methanol-tetrahydrofuran-water on a 5 micrometers C18 Resolve column. Under these conditions, problems were encountered with elevated baselines, particularly

with the Hg(2) chelate when acetonitrile was present as part of the mobile phase. In addition, instability of the Cu(2) chelate in tetrahydrofuran was observed and difficulty was encountered in resolving Cu(2) and Se(4) chelates. These problems are overcome when an alternative mobile phase of methanol-water is used with a 10 micrometer C18 micro Bondapak column for the separations of Ni(2), Co(3), Cr(3), Cu(2) and Hg(2) with ultraviolet detection.
E.A.K.

N86-19413* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVICE AND METHOD FOR FRICTIONALLY TESTING MATERIALS FOR IGNITABILITY Patent
Frank J. Benz (Lockheed Engineering and Management Services, Inc., Las Cruces, N. Mex.), Randall C. Shaw (Lockheed Engineering and Management Services, Inc., Las Cruces, N. Mex.), and David S. Dixon, inventors (to NASA) Issued 31 Dec. 1985 7 p Filed 17 Jan. 1984 Sponsored by NASA
(NASA-Case-MSC-20622-1; US-Patent-4,561,784;
US-Patent-Appl-SN-571616; US-Patent-Class-374-8;
US-Patent-Class-73-7; US-Patent-Class-374-46;
US-Patent-Class-422-78; US-Patent-Class-436-155;) Avail: US Patent and Trademark Office CSCL 21P

Test apparatus for determining ignition characteristics of various metal in oxidizer environments simulating operating conditions for materials is invented. The test apparatus has a chamber through which the oxidizing agent flows, and means for mounting a stationary test sample therein, a powered, rotating shaft in the chamber rigidly mounts a second test sample. The shaft is axially movable to bring the samples into frictional engagement and heated to the ignition point. Instrumentation connected to the apparatus provides for observation of temperatures, pressures, loads on and speeds of the rotating shaft, and torques whereby components of stressed oxygen systems can be selected which will avoid accidental fires under working conditions. NASA

N86-19414 Illinois Univ., Urbana.
EXPERIMENTAL AND THEORETICAL STUDIES OF NUCLEAR GENERATION OF OZONE AND ITS PHOTOLYSIS INTO SINGLET DELTA OXYGEN Ph.D. Thesis
Hani Elsayed Elsayed-Ali 1985 294 p
Avail: Univ. Microfilms Order No. DA8521758

A series of measurements of ozone yield in nuclear induced oxygen ion and O2-SF6 discharges are reported. The discharges were created by bombardment with energetic particles from the B10(n, alpha)7Li reaction. Continuous irradiation at dose rates of 10 to the 15th power to 10 to the 17th power eV/cu cm/s and pulsed irradiation (approx. 10 ms FWHM) at a peak dose rate of approx. 10 to the 15th power to 10 to the 17th power eV/cu cm/s 10 to the 20th power eV/cu cm/s were conducted. At the lower dose rates, SF6 addition generally increased the ozone yield due to the slowing of ozone destruction by negative oxygen and ozone ions. In contrast, at the high dose rates. SF6 addition decreased the observed ozone concentration due to its suppression of atomic oxygen formation by ion-ion recombination. A numerical model was developed and applied to experimental conditions. The steady-state ozone concentration was found to be limited by the reaction O3 - + O3 yields 2O2 + O2 - for which a rate coefficient of approx. 1 x to the minus 12 cu cm/s gives a good fit to the experimental data. A simplified analytical model of steady-state conditions was used to predict model sensitivity to various parameters. In addition to dose rate effects, pressure and temperature effects on ozone production were discussed.
Dissert. Abstr.

N86-19415 Illinois Univ., Urbana-Champaign.
THE EFFECT OF HYDROGEN ON THE MICROSTRUCTURE OF SILICON CARBIDE Ph.D. Thesis
Gary Scott Fischman 1985 233 p
Avail: Univ. Microfilms Order No. DA8521764

The effect of hydrogenation on the microstructure of a pressureless sintered silicon carbide was studied. Samples which were annealed in a 40:60 mole% H2Ar atmosphere at 1400 C for 50 hours were microstructurally compared with unannealed samples and samples that had been annealed in a similar manner but using an argon atmosphere. The results were also compared with microstructural results obtained from in situ studies using both hydrogen and argon atmospheres. These results were compared with a thermodynamic model which was constructed using a free energy minimization technique. The observed effects of hydrogenation were surface decarburization and amorphization throughout the silicon carbide material. Other observations include the thermally induced growth of microcrystalline silicon and accelerated amorphization around the silicon microcrystals in samples used in hydrogen in situ studies. An analysis of the microstructure of the reference material was also performed. Dissert. Abstr.

N86-19416# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
A REVIEW OF THE LITERATURE ON THE GASEOUS PRODUCTS AND TOXICITY GENERATED FROM THE PYROLYSIS AND COMBUSTION OF RIGID POLYURETHANE FOAMS
Maya Paabo and Barbara C. Levin Dec. 1985 114 p refs Sponsored in part by the US Consumer Product Safety Commission, Bethesda, Md.
(NBSIT-85-3224) Avail: NTIS HC A06/MF A01

The literature on rigid polyurethane foam has been reviewed with an emphasis on the gaseous products generated under various thermal decomposition conditions and the toxicity of those products. Carbon monoxide (CO) and hydrogen cyanide (HCN) were the predominant toxicants found among more than 100 other gaseous products. The generation of CO and HCN was found to increase with increasing combustion temperatures. Many test methods were used to assess the acute inhalation toxicity of combustion products from various rigid polyurethane foams. Lethality, incapacitation, physiological, and biochemical parameters were employed as biological end points. In general, the combustion products generated from rigid polyurethane foam in the flaming mode appear to be more toxic than those produced in the non-flaming mode. The LC sub 50 values for 30 minute exposures ranged from 10 to 17 mg/1 in the flaming mode and were greater than 34 mg/1 in the non-flaming mode. With the exception of one case in which a reactive type phosphorus containing fire retardant was used, the addition of fire retardants to rigid polyurethane foams does not appear to generate unusual toxic combustion products. Author

N86-19417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A THIN FILM DEGRADATION STUDY OF A FLUORINATED POLYETHER LIQUID LUBRICANT USING AN HPLC METHOD
Wilfredo Morales 1986 27 p refs Proposed for presentation at the 1986 Annual Meeting of the American Society of Lubrication Engineers, Toronto, Ontario, 12-15 May 1986
(NASA-TM-87221; E-2886; NAS 1.15:87221) Avail: NTIS HC A03/MF A01 CSCL 07D

A High Pressure Liquid Chromatography (HPLC) separation method was developed to study and analyze a fluorinated polyether fluid which is promising liquid lubricant for future applications. This HPLC separation method was used in a preliminary study investigating the catalytic effect of various metal, metal alloy, and ceramic engineering materials on the degradation of this fluid in a dry air atmosphere at 345 C. Using a 440 C stainless steel as a reference catalytic material it was found that a titanium alloy and a chromium plated material degraded the fluorinated polyether fluid substantially more than the reference material. Author

N86-19418*# Howard Univ., Washington, D. C. Laser Chemistry Div.
PHOTODISSOCIATION DYNAMICS OF SMALL MOLECULES
W. M. Jackson and H. Okabe 4 Oct. 1985 97 p
(Grants NAGw-446; NG-5071; Contract N00014-80-C-0305)
(NASA-CR-176512; NAS 1.26:176512; AD-A160329; ONR-TR-19)
Avail: NTIS HC A05/MF A01 CSCL 07E

The recent advancement of photodissociation dynamics of about 60 small molecules has been presented. The emphasis is placed on the primary photochemical process and the energy

partitioning in photofragments. Compounds discussed in this report include: Hydrogen-oxygen Compounds; Aldehydes, Ketones and Acids; Group Six Triatomic Oxides; Nitrogen-Oxygen Compounds; Nitrogen-Hydrogen Compounds; Cyanide Compounds; Sulfur containing Compounds; Halogen containing Compounds; Acetylenic Compounds. GRA

N86-19419# Pacific Northwest Lab., Richland, Wash.
INVESTIGATE LASER INDUCED DAMAGE IN OPTICAL COATINGS USING TIME RESOLVED RAMAN SPECTROSCOPY Final Report, Jan. - Nov. 1984
G. J. Exarhos Aug. 1985 41 p
(Sponsored by Air Force)
(AD-A160887; AFWL-TN-84-72) Avail: NTIS HC A03/MF A01 CSCL 20/6

Raman spectroscopy is shown to be a viable and rapid technique for characterization of laser induced damage in thin dielectric coatings of fused silica substrates. Unequivocal identification of crystalline and amorphous phases can be discerned from measured vibrational spectra. A two laser (damage-probe) technique has been developed for in situ analysis of laser coatings. Raman measurements made at long times following pulsed laser damage serve to characterize the equilibrium damage state and can be used to spatially profile the damage zone. Time resolved measurements acquired within nanoseconds following laser induced damage to optical coatings are studied by these and related Raman experiments from which mechanistic information can also be inferred. The primary mechanism of failure in titanium dioxide (TiO2) coatings results from crystalline phase changes induced thermally or by multiphoton excitation processes. A similiar failure mode is predicted for other oxidic coatings such as zirconium dioxide (ZrO2) which can exist in different room temperature stable phases. GRA

N86-19420# SRI International Corp., Menlo Park, Calif.
PRODUCTION AND PROPERTIES OF METASTABLE AUTODETACHING NEGATIVE IONS Final Scientific Report, 15 May 1982 - 14 Jun. 1985
James R. Peterson and Michael J. Coggiola 20 Aug. 1985 27 p
(Contract F49620-82-K-0030)
(AD-A161256; SRI-MP-203; AFOSR-85-0925TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Experimental work has been directed primarily determining properties of metastable autodetaching negative ions, with a smaller effort directed to their production in beams, as well as the production and photodetachment of Li(-) beams. Properties of particular concern were the photodetachment cross sections, energy levels, and autodetachment lifetimes. Detailed studies have been made of resonant structures in the photodetachment of He(-) and Li(-) negative ions. Some previously reported metastable ions were found to be probably nonexistent, while others were given the first experimental proof, and one unpredicted species (He2(-)) was discovered. A long-lived auto-detaching form of OH(-) was also observed. Total neutralization cross sections were measured as functions of beam energy for Li(+) in Mg, Ca, Sr, and Ba, and cross sections were calculated for Li(+) + Ca. Author (GRA)

N86-19421# Amdretech Corp., Houston, Tex.
PROCESS FOR RECOVERING HYDROGEN AND ELEMENTAL SULFUR FROM HYDROGEN SULFIDE Final Report, Jul. 1981 - Jun. 1984
W. C. Chen 1984 204 p
(Contract DE-FG01-81CS-15065)
(DE85-002663; DOE/CS-15065/T1) Avail: NTIS HC A10/MF

This report presents a new process for recovering hydrogen and elemental sulfur from hydrogen sulfide. The process consists of two chemical reactions, namely: (1) H2S + I2 YIELDS 2 HI sub (aq)/ + S, and (2) 2 HI sub (g)/ YIELDS H2 + I2. Both experimental and economic studies are performed. The experimental study identifies optimal conditions under which the process is to be operated. The economic study develops the costs and assesses the commercial feasibility of the process. In the experimental study, five areas are tested: H2S absorption-reaction, sulfur recovery and purification, dehydration of hydriodic acid, decomposition of hydrogen iodide, and corrosion tests. The results show that H2S can be removed down to less than 10 ppM in the offgas of the absorber-reactor. In the economic study, process flowsheets operated under optimal conditions are developed. Capital investments for the new plant are estimated to be about $12 million. Payout time is about 6.4 years. The new process, if commercialized, would replace the existing H2S disposal process which includes: (1) H2S removal and recovery, (2) the Claus plant, and (3) Claus tail gas treatment. DOE

N86-19422# Brookhaven National Lab., Upton, N. Y.
NEW EXPERIMENTAL TECHNIQUES TO BE AWARE OF
N. E. Holden 1985 5 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001169; BNL-NCS-36963; CONF-8508138-1) Avail: NTIS HC A02/MF A01

Some years ago, the Commission on Atomic Weights asked its Subcommittee on the Assessment of Isotopic Composition (SAIC), to keep it informed of new techniques that might eventually impact on its work. The Subcommittee never formally reported to the Commission because at the time, no techniques exceeded in accuracy that of thermionic emission mass spectrometry now in use to determine isotopic abundance values. This paper attempts to provide a status report on those other techniques in the field which may or may not eventually exceed the accuracy of thermionic emission mass spectrometry. This is merely an early warning system for the use of Commission members, who might not necessarily become aware of these other techniques in any other way. There are some general categories for these techniques and the author discusses very briefly the papers, which have been published over the years, in each of the categories. Those categories are gamma-ray and alpha spectrometry, activation analysis, laser techniques, infrared spectrometry, resonance ionization mass spectrometry, electron paramagnetic resonance (EPR) hyperfine structure techniques, emission spectrometry and ion microprobe mass spectrometry. DOE

N86-19423# Brookhaven National Lab., Upton, N. Y.
SHORT HISTORY ON THE NOMENCLATURE OF CHEMICAL ELEMENTS
N. E. Holden 1985 5 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001192; BNL-NCS-36950; CONF-8508138-9) Avail: NTIS HC A02/MF A01

This paper looks at some aspects in the nomenclature of the chemical elements. A detailed history is available in the book by Weeks (M. E.Weeks, Discovery of the Elements, Fifth Edition, Journal of Chemical Education, 1945). A review of some of these aspects might help shed light on the present perplexing problem facing the Inorganic Nomenclature Commission, i.e., the problem of trivial names for the heavy elements, whose discovery has been contested by rival groups. Since each of these groups claim primacy, while rejecting the alternative claims of their rivals, is history of any help in solving this dilemna. The following conclusions can be drawn from this discussion. The problem with more than one name for an element is not a new or unique situation. Perhaps it is time to reevaluate the generally accepted solutions. Since new elements are no longer being discovered but are being synthesized, maybe the old formula of allowing the first person to find the element be given the right to name it should be abandoned. It had been suggested previously that a list of names appropriate for elements be drawn up and the Commission could put a number of these in place. Then, when a newly synthesized element is verified, the new discoverer would be allowed to contribute a name into the list for some of the future elements. DOE

N86-19424# Colorado State Univ., Fort Collins.
HETEROBIMETALLIC COMPLEXES FOR CO REDUCTION Annual Progress Report, 1 Mar. 1985 - 30 Sep. 1985
J. K. Stille 1 Oct. 1985 12 p

(Contract DE-FG02-85ER-13340)
(DE86-002147; DOE/ER-13340/1) Avail: NTIS HC A02/MF A01

Goal is to synthesize certain homogeneous heterobimetallic catalysts, containing both an early and a late transition metal, that will reduce carbon monoxide selectively under mild reaction conditions. A Pd dimer containing methyl and one Pd and hydride on the other has been isolated and shown to rapidly insert CO. This complex eliminates acetaldehyde. Complexes containing combinations of early (Nb, Mo, W) and late (Fe, Co, Rh) transition metals that could be expected to activate carbon monoxide most effectively are primary targets. A complex containing methyls on adjacent Fe and W has been synthesized and the crystal structure determined. An analagous complex containing methyl on Fe and hydride on W exists only as a transient intermediate, generating methane with the formation of a Fe-W bond. The synthesis of dinuclear complexes containing NbH3 and Re(CO)3 is in progress. DOE

N86-19425# Oak Ridge National Lab., Tenn.
ISPO TASK A-109: EVALUATION OF QUADRUPOLE MASS SPECTROMETERS AS ON-SITE INSPECTION DEVICES
D. H. Smith, H. S. McKown, and J. A. Carter Nov. 1985 15 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002558; ORNL/TM-9639; ISPO-231) Avail: NTIS HC A02/MF A01

Two quadrupole mass spectrometers, a Balzers model 311 supplied by the Pernicka Corporation and a Finnigan-MAT THQ thermal ionization instrument, have been evaluated for potential application as on-site inspection devices for use by the International Atomic Energy Agency. Neither was deemed satisfactory for the intended purpose, and further refinement of either instrument will be necessary before a recommendation for acquisition can be made. DOE

N86-19426# California Univ., Riverside. Statewide Air Pollution Research Center.
EXPERIMENTAL PROTOCOL FOR DETERMINING HYDROXYL RADICAL REACTION RATE CONSTANTS FOR ORGANIC COMPOUNDS: ESTIMATION OF ATMOSPHERIC REACTIVITY Interim Report
J. N. Pitts, A. M. Winer, S. M. Aschmann, W. P. L. Carter, and R. Atkinson Jul. 1985 55 p
(PB85-238558; EPA-600/3-85-058) Avail: NTIS HC A04/MF A01 CSCL 07D

An experimental protocol for the determination at room temperature of rate constants for the reactions of hydroxyl radicals with organic chemicals in the gas phase is described in detail. This protocol provides a basis for evaluating the reactivity of organic substances which are emitted into the environment and which are consumed primarily by reaction with hydroxyl radicals. The experimental technique is based upon monitoring the disappearance rates of the test compound and of a reference organic in irradiated methyl nitrite-NO-organic-air mixtures. GRA

N86-19913*# Niigata Univ. (Japan). Dept. of Civil Engineering.
WET-OXIDATION WASTE MANAGEMENT SYSTEM FOR CELSS
Yukio Takahashi and Haruhiko Ohya (Yokohama National Univ., Japan) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 77-84 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 07B

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-19427 Tulane Univ., New Orleans, La.
THEORY OF METAL SURFACE FIELD EVAPORATION Ph.D. Thesis
Edward Richard McMullen 1985 159 p
Avail: Univ. Microfilms Order No. DA8515173

The effects of intense positive electric fields applied to two metal surfaces are addressed. In particular, the outward shifting of the surface layer in response to the fields, the redistribution of electronic charge within the metal initiated by the fields, and prediction of the minimum field strength which will produce evaporation of the surface monolayer of positive charge and attendant electrons are investigated. Density functional theory, a powerful method of treating the inhomogeneous electron gas, is the theoretical approach taken. Its utility and success within the local density approximation have been proven for many systems, diverse in size and nature, including the metal surface. By positioning the surface monolayer at a particular separation measured along the surface normal and calculating the surface energy from the semi-self-consistent electronic density generated via the Schrodinger equation with a one-electron effective potential, and repeating the procedure for other separations, an energy-displacement curve for a particular applied field can be mapped. A minimum in the curve for fields less than the least required for field evaporation locates the equilibrium position of the surface layer. The minimum will just disappear for the critical field. Author

N86-19428 California Univ., Irvine.
CREEP BEHAVIOR AND SUBSTRUCTURE OF Al AND Al-Zn ALLOYS AFTER STRESS-REDUCTION Ph.D. Thesis
Mostafa Sinnary Mostafa 1985 165 p
Avail: Univ. Microfilms Order No. DA8516551

The creep behavior of metals and alloys of the metal class following the stress reduction is studied. Stress-reduction and uninterrupted experiments were conducted on Al, Al-2wt%Zn, and Al-5wt%Zn in the temperature range of 0.61 TM to 0.99 Tm, where Tm is the melting point, and at a normalized stress range extending from 2 x .0001 G to 2 x .001 G. Stress reduction ratios tau sub 1 is the reduced stress, ranging from 0.05 to 0.75 were used. The stress exponent inferred from stress-reduction experiments, n*, was compared with that obtained from uninterrupted tests, n. On the basis of this comparison, three regions of behavior, depending on temperature were identified. The three temperature domains, identifying the three types of behavior (normal, mixed, and abnormal), shift to higher temperatures as Zn concentration in Al increases. It is suggested that the discrepancy between n* and n at intermediate temperatures (small reductions) and low temperatures (all reductions) may arise from impurity atom segregation at subboundaries and their interference with subboundary migration after the stress reduction. Dissert. Abstr.

N86-19429 Drexel Univ., Philadelphia, Pa.
A FUNDAMENTAL STUDY OF P/M PROCESSED ELEVATED TEMPERATURE ALUMINUM ALLOYS Ph.D. Thesis
M. K. Premkumar 1985 228 p
Avail: Univ. Microfilms Order No. DA8517064

Power processing, involving controlled atomization and hot consolidation, provides a means for fabricating improved dispersion strengthened aluminum alloys for elevated temperature service. To this end, microstructure-processing-property relationships in rapidly solidified Al-Fe-Ni alloys with FeNiAlg dispersoid volume fractions of 0.19, 0.25 and 0.32 were determined. Specifically, the emphasis was on microstructural stability, elevated temperature tensile behavior and creep response. Air atomized powder was consolidated to full density by vacuum hot pressing and/or hot extrusion. In addition, one powder composition was mechanically alloyed. Powder and consolidate were characterized by means of optical and transmission electron microscopy, scanning electron microscopy, X ray diffraction and differential scanning calorimetry. Ambient and elevated temperature tensile tests and creep tests were conducted at temperatures up to 400 C. Dissert. Abstr.

N86-19430 Carnegie Inst. of Tech., Pittsburgh, Pa.
KINETIC STUDY OF THE NITROGEN REACTION WITH LIQUID IRON ALLOYS Ph.D. Thesis
Peter C. Glaws 1985 146 p refs

Avail: Univ. Microfilms Order No. DA8517521

The modified Sieverts' and the isotope exchange technique were employed in the current investigation of the kinetics of the nitrogen reaction with liquid iron solutions at 1600 C. It was found that the presence of the surface active element sulfur, significantly retards the rate of the nitrogen reaction up to approximately 0.2 wt pct, where in Fe-S alloys the reaction rate levels off and becomes independent of sulfur concentration. Agreement between results from both modified Sieverts' and isotope exchange experiments, performed on Fe-S alloys in which both techniques provide a high degree of accuracy, indicates that the dissociation of the nitrogen molecule is the rate limiting step in the intrinsic chemical reaction mechanism of nitrogen absorption. Chromium in solution with liquid iron increases the rate of nitrogen dissolution. While nickel and carbon were shown to have no significant effect on the kinetics. The rate promoting effect of chromium in Fe-Cr-S alloys is, in part, due to the rate of N2 dissociation being faster on the chromium surface sites than on iron surfaces sites. A mathematical model based on a mixed interfacial reaction and liquid phase mass transfer controlled rate for nitrogen absorption into liquid iron alloys was developed. The calculated absorption curves are in good agreement with current and previous experimental data. Dissert. Abstr.

N86-19431 New South Wales Univ., Kensington (Australia).
A STUDY OF TUNGSTEN (001) SURFACE USING LOW ENERGY ELECTRON DIFFRACTION AND OTHER ELECTRON SPECTROSCOPIES Abstract Only
Marion Anne Stevens Kalceff Dec. 1984 3 p
Avail: Issuing Activity

The properties of the clean Tungsten (001) surfaces and the effects of the common absorbates Hydrogen and Oxygen were investigated using the techniques of low energy electron diffraction, auger electron spectrocopy and characteristic electron energy loss spectroscopy. The origins of features observed in characteristic energy loss spectra, very low energy secondary electron emission spectra and low energy Auger spectra, are deduced and compared with recent relevant independently obtained theoretical data and with other, sometimes conflicting, analyses. The use of these spectroscopies as monitors of surface cleanliness is evaluated. In particular a previously unreported emission, observed during oxygen adsorption, is attributed to an Auger transition involving the oxygen 2s and 2 p adsorbate levels. Author

N86-19432 Alabama Univ., University.
AN ANALYSIS AND EVALUATION OF THE DYNAMIC FLOW FUNCTION OF METALS UNDER IMPACT Ph.D. Thesis
Moon Saeng Kim 1985 115 p
Avail: Univ. Microfilms Order No. DA8519395

The objective of this research is to analyze and evaluate the dynamic flow function of metals under impact loading at both high strain rate (over 1000/s) and large strain (over 100%). A test method for dynamic compression of metal disc is described. A long steel striker (20 inches long, 1 inch diameter) impacts a small copper specimen placed on a massive anvil. The velocity of the striker face and the force on the anvil are measured during the impact period. From these primitive data the axial stress, strain, and strain rate of the disc are obtained. The strain rate is determined by the striker velocity divided by the specimen height. This gives a slightly increasing strain rate over most of the deformation period. Strain rates of 100 to 10,000 per second are achieved. Attainable final strans are 150%. Dissert. Abstr.

N86-19433 Brown Univ., Providence, R. I.
RF SPUTTERING OF COPPER INDIUM SELENIDE THIN FILMS Ph.D. Thesis
Christopher John Case 1985 123 p
Avail: Univ. Microfilms Order No. DA8519817

Thin films of copper indium selenide were prepared by RF sputtering. A novel cathode was designed and constructed to ensure that the sputtering target remained cool and did not decompose. The sputtering targets were prepared by reacting stoichiometric mixtures of the elements in evacuated sealed quartz ampoules. Copper indium selenide films sputtered on substrates between 400 C and 500 C exhibited the chalcopyrite structure while films sputtered on substrates above and below this temperature had the sphalerite structure. The composition of the films as determined by EDAX was closest to stoichiometric at a substrate temperature of 420 C. Pulsed nmr measurements were performed on bulk copper indium selenide. The spin-lattice relaxation occurs via a two-phonon Raman process at temperatures below 550 K and the process is dominated by copper diffusion above this temperature. The activation energy for copper diffusion was found to be 0.64 eV, about one half the value obtained by motional narrowing studies of copper indium sulfide. Dissert. Abstr.

N86-19434 Cornell Univ., Ithaca, N.Y.
ACOUSTIC EMISSION SOURCE CHARACTERIZATION OF FATIGUE CRACKS IN 7075-T6 ALUMINUM ALLOY THIN PLATE Ph.D. Thesis
Chi-Ping Chen 1985 146 p
Avail: Univ. Microfilms Order No. DA8517002

Acoustic emission signals were recorded and analyzed from cracks that were generated by fatigue loading in a compact tension specimen of 7075-T6 aluminum alloy thin plate. The location of each AE source was assumed to be at the crack tip, and the crack length at the time of each signal was measured by both electrical and optical methods. The signals for each acoustic emission event were simultaneously recorded at multiple transducers. For the data analysis, a moment tensor representation of a dynamic crack was assumed and its validity investigated. Each component of the moment tensor was assumed to have the same time dependence. Hence, for a linear system, the response of the structure is the convolution of a source time function with a linear combination of the Green's functions, where each has a coefficient equal to the magnitude of the corresponding moment tensor component. If the response and the Green's functions are given, the moment tensor can be obtained by signal deconvolution. Dissert. Abstr.

N86-19435*# Clarkson Univ., Potsdam, N.Y. Dept. of Chemical Engineering.
STUDY OF EUTECTIC FORMATION Final Report, 3 May 1982 - 2 Aug. 1984
William R. Wilcox, G. F. Eisa, V. Baskaran, and Donald C. Richardson Aug. 1984 33 p refs
(Contract NAS8-34887)
(NASA-CR-178705; NAS 1.26:178705) Avail: NTIS
HC A03/MF A01 CSCL 11F

A theory was developed for the influence of convection on the microstructure of lamellar eutectics. Convection is predicted to produce a coarser microstructure, especially at low freezing rates and large volume fractions of the minority phase. Similary convection is predicted to lower the interfacial undercooling, especially at low freezing rates. Experiments using spin-up/spin-down were performed on the Mn-Bi eutectic. This stirring had a dramatic effect on the microstructure, not only making it coarser but at low freezing rates also changing the morphology of the MnBi. The coarsering persisted to moderately high freezing rates. At the lowest freezing rate, vigorous stirring caused the MnBi to be concentrated at the periphery of the ingot and absent along the center. Progress was made on developing a technique for revealing the three-dimensional microstructure of the MnBi eutectic by time-lapse videotaping while etching. Author

N86-19436# Army Materials and Mechanics Research Center, Watertown, Mass.
COMPARISON OF BALLISTIC PERFORMANCE OF A SPLIT HEAT OF ESR AND VAR 4340 STEEL Final Report
C. F. Hickey, Jr., T. S. Thomas, and A. A. Anctil Jul. 1985 30 p
(DA Proj. 1L1-62105-AH-84)
(AD-A160924; AD-F630624; AMMRC-TR-85-20) Avail: NTIS
HC A03/MF A01 CSCL 19/4

A split argon-oxygen decarburized (AOD) heat of 4340 steel was used to compare the relative effectiveness of the VAR (Vacuum Arc Remelting) and ESR (Electroslag Remelting) processes on ballistic performance. Forgings of VAR and ESR

4340 steel were rolled into plates with thicknesses of 0.64, 0.81, 0.96, 1.12, and 1.27 cm (0.25, 0.32, 0.38, 0.44, and 0.50 inch). Plates were heat treated to a tempered martensite microstructure by oil quenching and then tempering at 163, 171, 191, or 204 C (325, 340, 375, or 400 F). The protection limit (V sub 50) for a .50 caliber AP M2 threat was determined for ESR and VAR 4340 steel plates of several thickness-tempering temperature combinations. Results indicate that over the thickness range studied the protection limit for ESR 4340 steel tempered at 171 C (340 F) is equal to or greater than that of the VAR 4340 steel. Also, within the tempering temperature range studied the 171 C (340 C) temper provides the greatest protection against the .50 caliber threat for 0.64-cm (0.25 inch) thick ESR 4340 steel plates. There is a greater tendency for VAR processed 0.64-cm (0.25 inch) thick plates tempered at 163 and 171 C (325 and 340 F) to crack when impacted by this threat then comparable ESR processed plates. Further, for both ESR and VAR 4340 steel plates tempered at 171 C (340 F) it is found that the penetration mechanism gradually changes from petalling to plugging as plate thickness increases. GRA

N86-19437# Naval Research Lab., Washington, D. C.
ELECTROCHEMICAL PROPERTIES OF PALLADIUM AND PLATINUM PHOSPHINE COMPLEXES
J. M. Calvert, B. H. Berrie, R. J. Nowak, and J. C. Cooper 30 Sep. 1985 35 p
(AD-A160996; NRL-MR-5660) Avail: NTIS HC A03/MF A01 CSCL 07/4

The electrochemistry of 11 palladium (II) and platinum (II) complexes of the type ML2X2(L = P, N, or C-donor; X = Cl or I) was examined by cyclic voltammetry in nonaqueous solution. Electrochemical reduction was irreversible and was coupled with loss of X(-). Equilibria between the metal complexes and added L significantly altered the observed electrochemistry. Reduction peak potentials for a homologous series of complexes qualitatively reflected expected ligand field strengths. Agreement was also found between the optical d-d transition energy and the electrochemical reduction potential for selected complexes. Trans-isomers were harder to reduce than cis-isomers by about 300 mV. A shift of approximately 400 mV to more negative potentials was determined for the reduction of Pt(II) for complexes with identical coordination environments. Saturation of the solution with carbon dioxide had no effect on the cyclic voltammetric behavior of the complexes. GRA

N86-19438# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Metallurgical Engineering.
DISPERSION STRENGTHENING Annual Letter Report
George S. Ansell and Gary Judd 1 Oct. 1985 6 p
(Contract N00014-85-K-0058)
(AD-A161089) Avail: NTIS HC A02/MF A01 CSCL 11/6

The purpose of this program is to develop a fundamental understanding of the role of finely dispersed second phase particles upon the properties of crystalline solids. The scope of this work has been directed towards studying the strengthening behavior of nickel-base superalloys, the strength of ferrous martensite, and the kinetics of the austenite to martensite transformation. The studies have focussed on the fundamental aspects of these two-phase systems that appear to control the structural characteristics and mechanical response of these important classes of engineering materials. GRA

N86-19439# Naval Postgraduate School, Monterey, Calif.
THE VARIATION IN THE SUBGRAIN SIZE IN ALUMINUM DEFORMED TO LARGE STEADY-STATE CREEP STRAINS M.S. Thesis
Paul P. Mieszczanski Sep. 1985 51 p
(AD-A161239) Avail: NTIS HC A04/MF A01 CSCL 11/6

Pure metals(and many alloys) deformed at high (creep) temperatures strain-harden. This hardening is associated with an increase in the density of randomly arranged (forest) dislocations and subsequent formation of a three-dimensional network of low-angle dislocation boundaries (subgrains). Eventually a material reaches a steady-state condition, and hardening and recovery processes are balanced. A controversy exists as to which of these features is primarily responsible for creep resistance or strength. During steady-state deformation, the feature responsible for creep strength is expected to be invariant with strain. Some stainless steel work suggested that the subgrain size changes during steady-state. Therefore, it is believed that subgrain strengthening is not dominant in this material. Aluminum specimens are deformed to transmission electron microscopy to determine the average subgrain size. GRA

N86-19440# Lawrence Livermore National Lab., Calif.
AUSTENITIC STAINLESS STEELS FOR CRYOGENIC SERVICE
E. N. C. Dalder and M. C. Juhas 19 Sep. 1985 109 p
(Contract W-7405-eng-48)
(DE86-001304; UCRL-92882) Avail: NTIS HC A06/MF A01

Presently available information on austenitic Fe-Cr-Ni stainless steel plate, welds, and castings for service below 77 K are reviewed with the intent (1) of developing systematic relationships between mechanical properties, composition, microstructure, and processing, and (2) of assessing the adequacy of these data bases in the design, fabrication, and operation of engineering systems at 4 K. DOE

N86-19441# Cincinnati Univ., Ohio. Dept. of Materials Science and Metallurgical Engineering.
MICROSTRUCTURAL AND MICROMECHANICAL RESPONSE IN AUSTENITIC STAINLESS STEEL OVERLAYS ON LOW ALLOY STEEL PLATE Final Technical Report, 1 Jul. 1982 - 30 Sep. 1984
E. Rosa, P. Choi, and J. Moteff 10 Jun. 1985 147 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002163; UC/MSME-22279-12) Avail: NTIS HC A07/MF A01

E309/Modified 2-1/4Cr-1Mo, E347/Standard 2-1/4Cr-1Mo, and E347/E309/Standard 2-1/4Cr-1Mo weld overlays mechanical properties were investigated by microhardness means at room and elevated temperature. A method devised by Boeklen in Germany was employed to obtain the relative ductility from the indentation profile. Uniform elongations gathered from tensile tests performed at high temperatures showed a strong correlation with the ductility parameter obtained from indentations made on specimens of the same material of corresponding temperatures. Tabor's and Cahoon's models were employed and the ultimate tensile strength gathered from tensile tests performed at high temperature also showed a strong correlation with corrected values calculated from hot hardness indentations made at similar temperatures. The microindentations allowed point by point characterization of the several zones that compose the overlay weld. The characterization coupled to the methods employed in this investigation allows the assessment of both strength and uniform deformation parameters on localized areas. It has been shown that the technique used to deposit the welds on the base metal can substantially affect the weld response to plastic deformation. The point to point evaluation of the ductility parameter across the weld zone has shown that an oscillating pattern with a well defined period and amplitude is observed. Room temperature hardness evaluation after long time exposure to 1275(0)F (690(0)C) has shown that the weld and heat affected zones (HAZ) of the single layer material decreases with exposure time. In the double layer the bottom weld (E309) shows a hardness decrease, while the top weld (E347) shows a hardness increase. Calculation of the average ductility parameters over each zone has shown that the parameter for the HAZ decreases with increasing exposure times. DOE

N86-19442# Brown Univ., Providence, R. I. Div. of Engineering.
COMBINED MACROSCOPIC AND MICROSCOPIC APPROACH TO THE FRACTURE OF METALS Comprehensive Progress Report, 1979 - 1985
R. J. Asaro, J. Gurland, A. Needleman, and C. F. Shih Jul. 1985 90 p
(Contract DE-AC02-80ER-10556)

(DE86-002286; DOE/ER-10556/105) Avail: NTIS HC A05/MF A01

Effective finite element procedures for fully plastic crack analysis have been developed. The solutions obtained satisfy stringent consistency relations. They are a key ingredient in the engineering analysis of loss of stability by crack growth of flawed structures. For the prediction of crack growth rates under high temperature conditions, small and finite-deformation solutions have been obtained for the analysis of time-dependent stress and strain fields associated with the sudden loading of tensile cracks in elastic-nonlinear viscous materials. A relationship was developed between flow localization and void nucleation and growth, useful in certain cases of failure by shear localization. Finite strains numerical analysis gives an initial picture of shear-based development at a critical crack tip. In accounting for the variation of plane strain fracture toughness with heat treatment of AISI 4340 steels, it was shown that particle spacing is of primary importance in controlling toughness. A comprehensive model was developed for void nucleation at particle-matrix interfaces in particle strengthened steels. A study of deformation and fracture of dual-phase steels has shown that their exceptional ductility is related to the unfavorable conditions of void initiation and growth at deforming martensite particles. Thermodynamic models, which describe cohesion loss at interfaces due to absorption, can be applied to the transition from brittle to ductile behavior of polycrystals. In 1015 and 1045 steels, hydrogen accelerates the processes of void initiation and void growth without changing the actual mechanism of rupture. DOE

N86-19443# Oak Ridge National Lab., Tenn.
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A 3 Cr-1.5 Mo STEEL
R. L. Klueh and A. M. Nasreldin Sep. 1985 42 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002564; ORNL-6206) Avail: NTIS HC A03/MF A01

Tensile and impact properties were determined for an alloy steel (3 wt % Cr-1.5 wt % Mo-0.1 wt % V-0.1 wt % C) considered a candidate for elevated-temperature pressure-vessel applications. The steel was tested in two heat-treated conditions: normalized and tempered and quenched and tempered. Mechanical properties were determined for various tempering conditions (time and temperature) as described by a tempering parameter. Similar tempering treatments for the quenched and the normalized steels led to similar strengths. However, for the lowest tempering parameter used, the impact properties for the quenched-and-tempered steel exceeded those for the normalized-and-tempered steel, resulting in an excellent ductile-brittle transition temperature (-70(0)C) and upper-shelf energy (225 J) for the quenched-and-tempered steel at a high strength (770 MPa ultimate tensile strength). Further tempering reduced the strength of the steel in both heat-treated conditions. The impact properties of the quenched steel were only slightly changed by further tempering, but those of the normalized steel improved, eventually equaling those of the quenched-and-tempered steel. Transmission electron microscopy showed that the quenched steel formed carbide-free acicular bainite and that the normalized steel formed granular bainite. The results indicate that properties might be optimized by proper heat treatment. DOE

N86-19444# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF THE ANNNI MODEL TO LONG-PERIOD SUPERSTRUCTURES IN SOME NOBLE METAL ALLOYS
D. deFontaine, A. Finel, S. Takeda, and J. Kulik Aug. 1985 15 p Presented at the 114th AIME Annual Meeting (includes Society of Mining Engineers), New York, N.Y., 24 Feb. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000625; LBL-20044; CONF-850211-16) Avail: NTIS HC A02/MF A01

The phenomenon of long-period superstructures in ordered alloys is analyzed in terms of the ANNNI model. New ground state results are presented and applied to the case of one-dimensional periodic antiphase structures in Cu3Pd. The difference between systems with diffuse antiphase domain boundaries (as in Cu3Pd) and sharp boundaries (as in Ag3Mg) is discussed and is argued to be due to the influence of the strength of the effective transverse pair interactions compared to that of the axial interactions along the long-period direction. Atomic resolution transmission electron micrographs are presented for Cu3Pd and Ag3Mg, which clearly illustrate the distinction. DOE

N86-19445# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
BONDLINE CORROSION PROPERTIES OF ARALL IN SALT SPRAY ENVIRONMENT Final Report
M. L. C. E. Verbruggen Dec. 1983 16 p refs
(VTH-M-495) Avail: NTIS HC A02/MF A01

Long term environmental tests on ARALL are summarized. No severe bondline corrosion is encountered up to 519 days of salt spray exposure. The peel strength of the adhesives continuously decreases with increasing exposure. After 519 days of exposure, losses of 30% to 50% in peel strength can be expected. No bondline corrosion is expected if all pretreatments are carefully executed. The appearance of an adhesive interface is favorable for ARALL compared with monolytic materials. If corrosion appears (and it is very hard to prevent any corrosion), the adhesive acts as a barrier and only a limited area is affected in contradiction with monolithic materials where through tickness corrosion is dangerous. Because of its composition (fibers as adhesive), the prepreg used in ARALL is a superior barrier compared with pure adhesives. Author (ESA)

N86-19446# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
11 Feb. 1986 77 p refs Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-003) Avail: NTIS HC A05/MF A01

This issue is devoted entirely to the science and technology of powder metallurgy in Japan. Some topics of interest are: (1) Development of titanium alloys; (2) Powder metallurgy process described; (3) Advantages of metal sintering; and (4) Conductive oxides described. For individual titles, see N86-19447 through N86-19452.

N86-19447# Joint Publications Research Service, Arlington, Va.
POWDERED, SINTERED ALLOY MATERIALS DESCRIBED: DEVELOPMENT OF TITANIUM ALLOYS
Michio Yamazaki and Hidehiro Onodera *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 1-12 refs Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 25-31 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

As part of a system for the next generation, in parallel with the development of titanium alloys to meet the target performance of strength relative to high temperature (tensile strength/specific gravity), ductility and superplasticity properties, technological advances are studied for the manufacture of products such as compressor rotors with high yield, using superplasticity processing through powder metallurgy techniques. Techniques of alloy development as well as development status are explained, together with an outline of production techniques for components being studied at the Central Research Institute of Mitsubishi Metal Corporation. Author

N86-19448# Joint Publications Research Service, Arlington, Va.
POWDERED METALLURGY PROCESS DESCRIBED
Tatsuo Fujita and Tadao Hirano *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 13-21 Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 32-26 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

The powder metallurgy process (P/M process) with rapidly solidified powder is studied. In chilling, a number of elements became soluable at an oversatulation point and crystallized to a new metastable phase. Compared with the conventional ingot

metallurgy process (I/M process), the following characteristics of the P/M process are expected to contribute to improving material properties: in chilling, precipitates are finely distributed; and because of its powdered form mixing or dispersing with other powders and fibers is comparatively easy. Although a variety of P/M alloys of the iron type have been developed and made available for practical use by making use of these characteristics, there are virtually no P/M alloys of the aluminum type. The manufacturing firms by whom the authors are employed have been engaged in the research and development of aluminum powder alloys mainly to obtain high strength and abrasion resistance. Last year, mass production and distribution of an aluminum powder alloy called SHORIK began. Its manufacturing process, properties, and examples of applications are explained. Author

N86-19449# Joint Publications Research Service, Arlington, Va.
ADVANTAGES OF METAL SINTERING
Mineo Onoda *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 21-32 refs Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 37-44 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

Sintered mild magnetic materials fall roughly into two categories; the metal type and the oxide type (ferrite). With less magnetic flux density and much higher electric resistance than the metal type, the oxide type is suited for use in the high frequency region. On the other hand, the metal type, which was studied has high saturated magnetic flux density, but high watt loss, so it is used exclusively in direct current applications. For applications requiring high magnetic flux density in the high frequency region, laminated products of silicon steel sheets are used. Machining methods that provide a high degree of freedom in terms of design and economy are being sought for mild magnetic parts. It is against this background that a second look is being taken at sintered mild magnetic parts. Author

N86-19450# Joint Publications Research Service, Arlington, Va.
DEVELOPING ABRASION-RESISTANT CERAMICS c27
Tadahiko Watanabe *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 33-41 Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 45-49 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

Lately, research and development of ceramics for structural use in machines has gained momentum. The development of ceramics by making use of their heat and corrosion resistant properties is studied. In addition to these properties, ceramics are very hard, strong, and light weight. Development of high abrasion resistance ceramics is possible by taking advantage of these properties. If such ceramics could be developed, applications in auto parts such as cams, tappets and valve seats, abrasion resistant tools such as wire drawing dies, and abrasion-resistant materials such as injection molding nozzles will be possible. Problems to look at when developing such very hard ceramics for use as machine parts material, will be ease of working and their ability to braze with metals. Price will naturally be a matter for serious consideration as well. Ceramics of the carbo-nitride titanium type which are introduced are good electric conductors, so that electro-spark machining is possible regardless of hardness. Silver brazing can be performed at relatively low cost, so it is considered useful in ceramics used for machine structural purpose. Author

N86-19451# Joint Publications Research Service, Arlington, Va.
TITANIUM DIOXIDE PROPERTIES DESCRIBED
Shin-ichiro Kobayashi, Kenji Yajima, and Fukuji Suzuki *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 41-53 refs Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 50-55 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

Titanium dioxide is known as white powder. The titanium compounds developed by the authors are black, although they are a type of titanium oxide. The main component is titanium monoxide, hitherto considered unstable in the atmosphere. The key to creating titanium black is the stabilizing of titanium monoxide by adding a small quantity of nitrogen. Development of unique applications not only as a black pigment but as a new material, different from titanium dioxide, is anticipated. Author

N86-19452# Joint Publications Research Service, Arlington, Va.
CONDUCTIVE OXIDES DESCRIBED c33
Hiroyoshi Takagi, Jyunzoh Tasaki, and Iopei Nakagawa *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 53-74 refs Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 56-66 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

Oxides used to be thought of as insulating materials. Lately, this point of view has changed, so that any oxide containing a transition element is first suspected of being an electric conductor. Some oxides have electric conductivity equal to that of silver or copper at room temperature. Even superconductive materials are available today. Depending on the source of conductivity, conductive oxides are generally divided into three types: (1) those that conduct electricity through electron (or positive hole) migration; (2) ion conductors that conduct through iron migration; and (3) mixed conductors which combine the action of (1) and (2). Conductive oxides have diverse applications depending on the way their functions are permitted to work. A multiplicity of materials are being researched and developed. It is not possible to cover all these materials. Some properties of a few electromagnetic materials, catalyst materials, and ion conductive materials studied are explained. Applications utilizing their physical properties and functions are outlined by referring to recent literature. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-19453 Illinois Inst. of Tech., Chicago.
MECHANICAL PROPERTIES OF DUCTILE ORGANIC FIBER POLYMERIC MATRIX COMPOSITES Ph.D. Thesis
Abraham Mazor 1985 272 p
Avail: Univ. Microfilms Order No. DA8517582

The strengthening and deformational mechanisms of a novel composite made of epoxy resins reinforced with ductile high strength thermoplastic fibers, e.g., PET and Nylon are investigated. The behavior of the uniaxial composite has been studied under static and dynamic loading. A new parameter, Damage Initiation Time (DIT), is defined in this study to denote the composite strain at the onset of failure under impact loading. The effect of constitutent properties (e.g., matrix ductility, fiber type and fiber volume fraction) on composite behavior have been determined. Scanning electron microscopy, radiography, and water absorption methods have been conducted to study the onset of internal damage and failure mechanisms in the composite. Experiments have shown that for composite consisting of a ductile matrix, the composite tensile stress-strain behavior can be predicted by the rule-of-mixtures. The composite fracture is fiber controlled and the composite ductility, under static and dynamic loading, is almost constant and not affected by fiber content. Author

N86-19454 New South Wales Univ., Kensington (Australia). School of Chemical Engineering.
ZIEGLER-NATTA POLYMERIZATION OF BUTADIENE Abstract Only
John Alexander Joseph Honig Feb. 1985 3 p
Avail: Issuing Activity

Butadiene polymerization using a homogeneous Ziegler-Natta catalyst system was studied. Various levels of cobalt octoate, diethylaluminum chloride and water, as well as monomer concentration and reaction temperature were used. The effects of such

changes in reaction conditions upon production of polybutadiene was closely monitored. Conversion, microstructure and molecular weight development were measured. The applicability of prevailing mechanistic hypotheses was assessed, and some of the more common proposals, including chain transfer to monomer or aluminum alkyl, were found to be inappropriate. Chain transfer to cobalt occurred and while catalyst deactivation and chain cleavage were present, they only became apparent at very high conversions. A reaction scheme involving re-use of active centers, combined with termination, is proposed. Author

N86-19455* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METAL PHTHALOCYANINE INTERMEDIATES FOR THE PREPARATION OF POLYMERS Patent
Bappalige N. Achar (National Academy of Sciences/National Research Council, Washington, D.C.), George M. Fohlen (National Academy of Sciences/National Research Council, Washington, D.C.), and John A. Parker (National Academy of Sciences/National Research Council, Washington, D.C.) Issued 11 Jun. 1985 10 p Filed 15 Sep. 1983 Sponsored by NASA Division of US-Patent-Appl-SN-415880, US-Patent-4,456,268, filed 8 Sep. 1982
(NASA-Case-ARC-11405-2; US-Patent-4,522,755;
US-Patent-Appl-SN-514117; US-Patent-Class-260-245.75;
US-Patent-Class-260-245.9; US-Patent-Class-528-327) Avail: US Patent and Trademark Office CSCL 11B

Metal 4, 4', 4'',-tetracarboxylic phthalocyanines (MPTC) are prepared by reaction of trimellitic anhydride, a salt or hydroxide of the desired metal (or the metal in powdered form), urea and a catalyst. A purer form of MPTC is prepared than heretofore. These tetracarboxylic acids are then polymerized by heat to sheet polymers which have superior heat and oxidation resistance. The metal is preferably a divalent metal having an atomic radius close to 1.35A. NASA

N86-19456* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS OF END-CAPPING A POLYIMIDE SYSTEM Patent
Terry L. StClair and Harold D. Burks, inventors (to NASA) Issued 12 Nov. 1985 5 p Filed 11 Sep. 1984
(NASA-Case-LAR-13135-1; US-Patent-4,552,931;
US-Patent-Appl-SN-649328; US-Patent-Class-525-432;
US-Patent-Class-525-436; US-Patent-Class-528-179;
US-Patent-Class-528-182; US-Patent-Class-528-185;
US-Patent-Class-528-352; US-Patent-Class-528-353) Avail: US Patent and Trademark Office CSCL 07D

A process of endcapping a polyimide system with an endcapping agent in order to achieve a controlled decrease in molecular weight and melt viscosity along with predictable fracture resistance of the molded products is disclosed. The uncapped system is formed by combining an equimolar ratio of 4,4'-bis(3,4-dicarboxyphenoxy) diphenylsulfide dianhydride (BDSDA) and 1,-bis(aminophenoxy)benzene (APB) dissolved in bis(2-methoxyethyl)ether. The endcapped system is formed by dissolving APB in bis-(2-methoxyethyl)ether, adding the BDSDA. By varying the amount of endcapping from 0 to 4%, molecular weight is decreased from 13,900 to 8660. At a processing temperature of 250 C, there is a linear relationship between molecular weight and viscosity, with the viscosity decreasing by two orders of magnitude as the molecular weight decreased from 13,900 to 8660. NASA

N86-19457* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH TEMPERATURE RESISTANT POLYIMIDE FROM TETRA ESTER, DIAMINE, DIESTER AND N-ARYLNADIMIDE Patent
Ruth H. Pater, inventor (to NASA) Issued 24 Dec. 1985 8 p Filed 13 Oct. 1982
(NASA-Case-LEW-13864-1; US-Patent-4,560,742;
US-Patent-Appl-SN-434087; US-Patent-Class-528-342;
US-Patent-Class-528-229; US-Patent-Class-528-322;
US-Patent-Class-528345) Avail: US Patent and Trademark Office CSCL 11B

The invention described relates to improved polyimide resins which are noted for their high thermal and oxidative stability, high strength at elevated temperatures and which exhibit many other outstanding physical and chemical properties, especially useful in high temperature applications. The polyimides are prepared by the reaction, with application of heat of a mixture of monomers comprising: (1) a dialkyl or tetraalkyl ester of an aromatic tetracarboxylic acid, (2) and aromatic diamine, (3) a monoalkyl or dialky ester of a dicarboxylic acid, and (4) a N-arylnadimide such as N-phenylnadimide. Polyimides of monomers (1), (2) and (3) are known. NASA

N86-19458* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OXIDATION PROTECTION COATINGS FOR POLYMERS Patent
Michael J. Mirtich, James S. Sovey, and Bruce A. Banks, inventors (to NASA) 24 Dec. 1985 6 p Filed 11 Sep. 1984
(NASA-Case-LEW-14072-1; US-Patent-4,560,577;
US-Patent-Appl-SN-649330; US-Patent-Class-427-38;
US-Patent-Class-427-248.1; US-Patent-Class-204/298;
US-Patent-Class-204-192-R; US-Patent-Class-204-192-C;
US-Patent-Class-204-192-D; US-Patent-Class-428-702;
US-Patent-Class-428-473.5; US-Patent-Class-428-446) Avail: US Patent and Trademark Office CSCL 11B

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about 4 volume percent polymer to provide flexibility. A coil of polymer material moves through an ion beam as it is fed between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface. NASA

N86-19459 Harvard Univ., Cambridge, Mass.
EMBRITTLEMENT OF METALLIC GLASSES Ph.D. Thesis
Tsai-Wei Wu 1985 264 p
Avail: Univ. Microfilms Order No. DA8520303

Ductile fracture of metallic glasses is accompanied by extensive local plastic flow. Brittle fracture is promoted by a number of factors: composition, low testing temperature, high strain rate and, most characteristically, annealing (below the crystallization temperature). An extensive study on the embrittlement of amorphous Fe79.3B16.4Si4.0C0.3, including bending tests (both at elevated and low temperatures), tensile tests, fractography, small angle X-ray scattering (SAXS) and differential scanning calorimetry (DSC) is presented. The bending test is ideally suited for determining the ductile-to-brittle transition temperature. The combination of tensile tests and fractography allowed the observation of the ductile-to-brittle transition as a function of strain rate. An isoconfigurational theory was developed for characterizing the kinetics of free volume annihilation during a thermal process. Dissert. Abstr.

N86-19460 State Univ. of New York, Stony Brook.
STRUCTURE AND PROPERTIES OF PLASMA-SPRAYED CERAMIC COATINGS Ph.D. Thesis
Narayansamy Ravi Shankar 1984 302 p
Avail: Univ. Microfilms Order No. DA8513874

Plasma-sprayed ceramic coatings are increasingly being used in a variety of applications. Among these, ZrO2 based thermal barrier coatings (TBC) are often used in applications involving thermal cycling such as in the case of gas turbine engines. Coating failure under these severe conditions is due to factors which include stresses resulting from the thermal expansion mismatch between the ceramic coating and the metallic substrate, residual stresses, adhesion and interfacial reactions, coating composition, and phase transformations. The effects of these factors on the integrity of ZrO2-based and other oxide coatings are examined. Acoustic emission (AE) was used to study a variety of plasma sprayed oxide coatings subjected to thermal cycling in the range 25 to 650 C. Coating adhesion and failure was examined using the tensile adhesion test (TAT) with simultaneous AE monitoring. Contributing to the stresses, during thermal treatment, in the

ZrO2-Y2O3 coatings is the tetragonal-to-monoclinic phase transformation. Dissert. Abstr.

N86-19461*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROCESS FOR PREPARING PHTHALOCYANINE POLYMERS Patent Application
Bappaige N. Achar (NAS-NRC, Washington, D.C.), George M. Fohlen, and John A. Parker, inventors (to NASA) Filed 12 Jul. 1985 22 p
(NASA-Case-ARC-11511-2; NAS 1.71:ARC-11511-2; US-Patent-Appl-SN-754362) Avail: NTIS HC A02/MF A01 CSCL 11B

Imide-linked bisphthalonitrile compounds are prepared by combining a dicyano aromatic diamine and an organic dianhydride to produce an amic acid linked bisphthalonitrile compound. The amic acid linked bisphthalonitrile compound is dehydrocyclized to produce the imide-linked bisphthalonitrile compounds. The imide-linked bisphthalonitrile compounds may be polymerized to produce a phthalocyanine polymer by heating the imide-linked bisphthalonitrile compound, either alone or in the presence of a metal powder or a metal salt. These compounds are useful in the coating, laminating and molding arts. The polymers are useful in composite matrix resins where increased fire resistance, toughness and resistance to moisture are required, particularly as secondary structures in aircraft and spacecraft. NASA

N86-19462*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYENAMINES FROM AROMATIC DIACETYLENIC DI-KETONES AND DIAMINES Patent Application
Paul M. Hergenrother, Robert G. Bass (Virginia Commonwealth Univ., Richmond), John W. Connell (Virginia Commonwealth Univ., Richmond), and Mark S. Sinsky, inventors (to NASA) (Virginia Commonwealth Univ., Richmond) Filed 15 May 1985 17 p
(NASA-Case-LAR-13444-1-CU; NAS 1.71:LAR-13444-1-CU; US-Patent-Appl-SN-734366) Avail: NTIS HC A02/MF A01 CSCL 11B

The synthesis and characterization of several polyenamine ketones are discussed wherein conjugated diacetylenic diketones and aromatic diamines are used as a route to the formation of high molecular weight polyenamine ketones which exhibit good mechanical properties and can be cast into creasible films. Typical polymerization conditions involved the reaction of stoichiometric amounts of 1,4- or 1,3-PPPO and a diamine at 60 to 130 C in M-cresol at (w/w) solids content of 8 to 26% for a specified period of time under a nitrogen atmosphere. Novel polyenamine ketones were prepared with inherent viscosities as high as 1.99 d1/g and tough, clear amber films with tensile strengths of 12,400 psi and tensile moduli of 397,000 psi were cast from solutions of the polymers in chloroform. In most cases, the elemental analyses for the polynamine ketones, shown, agree within + or - 0.3% of the theoretical values. NASA

N86-19463*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OXIDATION PROTECTING COATINGS FOR POLYMERS Patent Application
Michael J. Mirtich, James S. Sovey, and Bruce A. Banks, inventors (to NASA) Filed 31 Jul. 1985 11 p
(NASA-Case-LEW-14072-2; NAS 1.71:LEW-14072-2; US-Patent-Appl-SN-761235) Avail: NTIS HC A02/MF A01 CSCL 11B

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about 4 volume percent polymer to provide flexibility. A coil of polymer material moves through an ion beam as it is fed between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface. NASA

N86-19464*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Civil Engineering.
ANALYSIS OF THE TRANSIENT BEHAVIOR OF RUBBING COMPONENTS Final Report
Mongi Ben Quezdou and R. L. Mullen 19 Feb. 1986 51 p refs (Grant NAG3-369)
(NASA-CR-176546; NAS 1.26:176546) Avail: NTIS HC A04/MF A01 CSCL 11G

Finite element equations are developed for studying deformations and temperatures resulting from frictional heating in sliding system. The formulation is done for linear steady state motion in two dimensions. The equations include the effect of the velocity on the moving components. This gives spurious oscillations in their solutions by Galerkin finite element methods. A method called streamline upwind scheme is used to try to deal with this deficiency. The finite element program is then used to investigate the friction of heating in gas path seal. Author

N86-19465*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HOW TO EVALUATE SOLID LUBRICANT FILMS USING A PIN-ON-DISK TRIBOMETER
Robert L. Fusaro 1986 22 p refs Proposed for presentation at the 1986 Annual Meeting of the American Society of Lubrication Engineers, Toronto, Ontario, 12-15 May 1986
(NASA-TM-87236; E-2909; NAS 1.15:87236) Avail: NTIS HC A02/MF A01 CSCL 11/4

Over the years, the author has evaluated and compared hundreds of solid lubricant films using a pin-on-disk tribometer. The intent of this paper is to describe to the reader experimental techniques and some of parameters that have been observed to be important for the evaluation and development of new solid lubricant films. Pin-on-disk tribometers will be described and discussed as will experimental methods for evaluating solid lubricant materials. Methods of preparing surfaces for the coating of the thin films and different methods for applying the films will be reviewed. Factors that affect solid lubricant performance will also be discussed. Two different macroscopic mechanisms of solid lubricant film wear exist. These will be characterized schematically, and methods of measuring wear will be examined. Author

N86-19466# Texas A&M Univ., College Station. Dept. of Chemistry.
ELECTRONICALLY CONDUCTIVE COMPOSITE POLYMER MEMBRANES
R. M. Penner and C. R. Martin 20 Sep. 1985 31 p
(Contract N00014-82-K-0612)
(AD-A159708; TR-10) Avail: NTIS HC A03/MF A01 CSCL 11/9

We have recently described the preparation and properties of ionically conductive Nafion-impregnated Gore-tex (NIGT) composite membranes. In this paper we describe electronically conductive composite membranes prepared by electropolymerizing either pyrrole or thiophene within the ionically conductive NIGT membrane. These composites have the mechanical properties of the host membrane yet the electronic conductivity of the NIGT/polypyrrole composite membrane is essentially identical to that of polypyrrole. For comparison, we have also attempted to electropolymerize pyrrole in nafion membranes and films and in bare Gore-tex and poly(vinyl chloride)-impregnated Gore-tex. We have found that the rate of polymerization of pyrrole at a NIGT-coated Pt electrode is higher than the rate at bare Pt. The origins of this rate enhancement are probed. GRA

N86-19467# Texas Univ., Austin. Dept. of Chemistry.
A SIMS STUDY OF THE INFLUENCE OF LOW LEVELS OF SILICON AND CALCIUM ON THE ADSORPTION PROPERTIES OF O2 ON Pt(111) Technical Report, 1 Jan. - 31 Dec. 1985
S. Akhter, C. M. Greenlief, H.-W. Chen, and J. M. White 15 Oct. 1985 17 p Submitted for publication
(Contract N00014-83-K-0582)
(AD-A160699; TR-43) Avail: NTIS HC A02/MF A01 CSCL 07/4

Surface impurity levels of Calcium, Silicon and Aluminum at or below the detectability limits of AES were followed in SIMS and

correlated with oxygen adsorption on Pt (111). It is shown that oxidation of Silicon to SiOx, monitored by the rise in SIMS Si+ ion intensity, takes place above 5400K during oxygen TPD. SiOx starts decomposing above 1100K and can be reduced within 200 sec by 2x10 to the minus 8th power torr of H2 at 1200K. The oxygen adsorbed/desorbed in a TPD cycle depends on the immediate history of the impurity levels on the surface. SiOx presence correlates with an increase in the overall oxygen sticking coefficient. These results highlight the importance of impurity levels below AES detectability and suggest pretreatment methods for obtaining better reproducibility. GRA

N86-19468# State Univ. of New York at Buffalo, Amherst. Dept. of Chemistry.
MOLECULAR MECHANICS OF POLYMERIC INTERACTIONS Final Report, 15 Feb. 1982 - 14 Feb. 1985
Paras N. Prasad Feb. 1985 9 p
(Grant AF-AFOSR-0118-82)
(AD-A161095; AFOSR-85-0917TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

Three interfacial methods have been used to produce thin polymeric films. These are reactions at solid-gas interface, Langmuir-Blodgett, and electrochemical polymerization. The reaction at solid-gas interface involved the use of a thin monomeric film, vacuum deposited, which was subsequently exposed to a strong Lewis acid such as AsF5 in a controlled atmosphere. Two new polymers were produced: polyfuril and polyazulene. Coherent thin films of poly bis(p-toluene sulfonate) diacetylene were successfully formed by modified Langmuir-Blodgett techniques using two methods: photopolymerization of the monomer film at the gas/liquid interface and then transfer to a solid substrate; and transfer of the monomer film to the solid substrate and subsequent photopolymerization on the substrate itself. The area of polymerization of the electrode/solution interface in an electrochemical cell is highly active because of the prospect to produce high quality electroactive polymers of controlled ultrasubmicron thickness. Polyazulene was formed by anodic polymerization of azulene. Chemical doping will increase the electrical conductivities of several polymers as well as induce conformational changes in some polymers. The nature of the iodine-nylon 6 complex was by resonance Raman spectroscopy. This work revealed the presence of both I3 minus and I5 minus species. The non-linear electroacoustic effect in organic materials was investigated by the novel technique of phonon echo. The phonon echo was investigated for the d-tartaric acid and its diammonium salt as well as for the Rochelle salt by using the two-pulse technique. GRA

N86-19469# Hughes Research Labs., Malibu, Calif.
FABRICATION OF LOW-LOSS HALIDE GLASS FIBERS Final Report, 1 Jun. 1983 - 30 Sep. 1984
J. Wysocki Sep. 1985 28 p
(AD-A161111) Avail: NTIS HC A03/MF A01 CSCL 11/2

The primary objective of this program was to develop ultralow-loss fibers for use in long-distance Navy communications systems. Materials that would transmit in the infrared, as well as fiber drawing processes for these materials. Major emphasis has been placed on fabrication of chloride and fluoride-chloride glasses. These glasses were subsequently doped with a sulfide. Heavy-metal fluoride glasses, which are generally considered to be viable for IR fiber fabrication, are being prepared. For the present program, two different compositions of CdF2-CdCl2-BaF2 were prepared and subsequently doped with either CdS or ZnS. Impure starting materials, devitrification, and steep viscosity curves combined to limit fiber fabrication. Continuation of research aimed at the growth of single crystal KRS-5 fibers is also discussed. By using single-crystal fibers, both the intrinsic predicted low loss of this material and a reduction in the aging process of fibers extruded from the material were anticipated. GRA

N86-19470# Princeton Univ., N. J. Dept. of Chemical Engineering.
HYDROGEN BONDING IN POLYURETHANES: PRELIMINARY RESULTS OF SIMULTANEOUS DSC-FTIR (DIFFERENTIAL SCANNING CALORIMETER-FOURIER TRANSFORM INFRARED SPECTROSCOPY) EXPERIMENTS
Jeffrey T. Koberstein, Irene Gancarz, and Thomas C. Clarke 11 Nov. 1985 27 p
(Contract N00014-84-K-0534)
(AD-A161223; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/3

The hydrogen bonding behavior of segmented polyurethane elastomers and model hard segment compounds has been examined by performing simultaneous differential scanning calorimeter (DSC) and Fourier Transform Infrared Spectroscopy (FTIR) measurements. In model hard segments of 4,4'-diphenylmethane diisocyanate (MDI) extended with (2,2,3,3-d4) butanediol (BDO), and 2,4-toluenediisocyanate also chain extended with BDO, the spectra show a linear decrease in the apparent degree of hydrogen bonding over most of the temperature range. In the case of MDI-BDO, there is thus no clear correlation between DSC multiple endotherms and the degree of hydrogen bonding. Examination of an elastomer containing 70% bwt. of MDI/BDO hard segment and polyether soft segment however reveals a transition in the degree of hydrogen bonding coincident with an endotherm whose origin has been previously ascribed to the onset of a microphase mixing transition. This result clearly demonstrates that thermally induced morphological changes can affect markedly the hydrogen bonding behavior of polyurethanes. The study also illustrates that chemical changes occur during a typical DSC thermogram. In particular, reversal of the polyurethane reaction equilibrium is evidenced by emergence of an isocyanate absorbance band at high temperatures for all materials. GRA

N86-19471# FilmTec Corp., Minneapolis, Minn.
NONFOULING COATINGS FOR THIN FILM COMPOSITE MEMBRANES Final Report
J. Y. Koo, J. M. Reitz, J. E. Cadotte, and R. J. Petersen Mar. 1985 107 p
(Grant DI-14-08-0001-22888)
(PB85-247971) Avail: NTIS HC A06/MF A01 CSCL 07A

Polymers containing sulfonate groups were synthesized and evaluated as fouling-resistant coatings for reverse osmosis membranes. The Film Tec FT-30 membrane was used as the substrate. Best results were obtained with a coating of poly(sodium stryene-sulfonate-co-chloromethyl-styrene) crosslinked with an acid catalyst. In laboratory tests with feedwaters containing tannic acid, this coating showed much lower fouling rates compared with uncoated FT-30 controls. However, initial membrane fluxes were also lowered considerably just by the act of applying this coating, so that comparative fluxes of the final fouled membranes were not particularly different. For example, using a standardized test condition (200 psi, 25C, 0.2 percent sodium chloride feed containing 500 ppm tannic acid, pH 7 adjusted with phosphoric acid, 18 hour test), uncoated FT-30 controls exhibited a typical initial flux of 15 gfd and final flux of 5.5 gfd; coated membranes showed a typical initial flux of 11 gfd and a final flux of 6.0 gfd. GRA

N86-19450# Joint Publications Research Service, Arlington, Va.
DEVELOPING ABRASION-RESISTANT CERAMICS
Tadahiko Watanabe *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 33-41 Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 45-49 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

N86-19487# Joint Publications Research Service, Arlington, Va.
CERAMICS STRATEGY OF ASAHI GLASS REPORTED
A. Araki *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 24-28 Transl. into ENGLISH from Nikko Material (Tokyo, Japan), Apr. 1985 p 12-15 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-19472# National Aerospace Lab., Tokyo (Japan). HMX Propellant Research Group.
THE FUNDAMENTAL STUDY OF HMX COMPOSITE PROPELLANT AND ITS PRACTICAL APPLICATION
Sep. 1985 58 p refs In JAPANESE; ENGLISH summary
(NAL-TR-875; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Synthetic research on HMX composite propellants is described, from the fundamental investigation of propellant burning mechanisms to the demonstration firing test of a full-scale apogee motor. First, the safety and physical properties were examined. By using a new bonding-agent between HMX and HTPB binder for HMX composite propellants, detonability was held in the same manner as the standard propellant without HMX, and some mechanical properties were improved. Second, burning experiments of various HMX/binder strands were made and from these results the mechanism of lowering the burning rate of HMX composite propellants was discussed. Third firing tests of small-scale rocket motors were conducted under the atmospheric condition for obtaining fundamental combustion characteristics. An example of these characteristics is the absence of combustion instability. Finally, a full-scale (76mm dia.) spherical motor was tested by means of the high altitude test facility. The specific impulse under the vacuum condition was 2.90KN.s/kg(296kgf.s/kg) at a nozzle expansion ratio of 70. Author

N86-19473# Southwest Research Inst., San Antonio, Tex. Belvoir Fuels and Lubricants Research Facility.
STUDY OF FUEL DETERIORATION AND ADDITIVE-INHIBITION Interim Report, 1 Oct. 1983 - 30 Sep. 1984
George H. Lee, III and Leo L. Stavinoha Jul. 1985 40 p
(Contract DAAK70-85-C-0007)
(AD-A161173; BFLRF-193) Avail: NTIS HC A03/MF A01 CSCL 21/4

This interim report summarizes research in support of defining distillate fuel deterioration and additive inhibition. Primary text emphasis is placed on data generated during FY84 involving adherent insolubles, peroxide number, bromine number, and elemental analysis for fuels aged under accelerated conditions. A series of 18 experiments using 3 fuels and 4 additives are reported with primary emphasis on a reference diesel fuel used for engine tests. Observations discussed in the report are summarized as conclusions and recommendations for FY85 ongoing research. GRA

N86-19474# Naval Postgraduate School, Monterey, Calif.
COMPUTER-CONTROLLED IMAGE ANALYSIS OF SOLID PROPELLANT COMBUSTION HOLOGRAMS USING A QUANTIMET 720 AND A PDP-11 M.S. Thesis
Marvin P. Shook Sep. 1985 149 p
(AD-A161212) Avail: NTIS HC A07/MF A01 CSCL 21/2

This thesis describes the implementation of a computer-controlled image analyzer to obtain particle size information from holograms of rocket engine combustion products. The two machines utilized were a Quantimet 720 Image Analyser and a DEC PDP-11 digital computer. The machines are described in terms or their hardware, software, and interface. Preliminary results are included and indicate that the present system is incapable of obtaining the desired particle information from a hologram. The causes for this, as well as their resolution are discussed. Author (GRA)

N86-19475# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CLOSED CHAMBER BURNING CHARACTERISTICS OF NEW VHBR (VERY HIGH BURNING RATE) FORMULATIONS Memorandum Report, Jan. - Sep. 1984
Kevin J. White, Donald G. McCoy, J. O. Doali, William P. Aungst, and Roger E. Bowman Oct. 1985 41 p
(DA Proj. 1L1-61102-AH-43)
(AD-A161250; BRL-MR-3471) Avail: NTIS HC A03/MF A01 CSCL 21/2

Combustion studies were carried out on VHBR propellants in order to determine formulation and fabrication parameters that control the burning characteristics of these compounds. Formulation parameters such as type of fuel, oxidizer, type and percent of binder, oxidizer/binder ration and percent of theoretical maximum density were varied and the effects on combustion were studied using both a closed chamber and an optically transparent bomb. Although numerous facets of the combustion mechanisms remain unclear, the following picture has emerged for the specific formulations studied. The first phase of combustion is a relatively slow porous burning that proceeds down throughout the sample. The original form of the sample remains, although the residue is porous and is filled with hot combustion products. Depending on the composition, percent theoretical density and sample confinement, a transition to a very rapid combustion takes place throughout the entire sample, accompanied by some deconsolidation. For some conditions (composition or confinement) this second phase does not occur. The transition pressure to and the velocity of the second phase varies with the formulation parameters. GRA

N86-19476# Institut Franco-Allemand de Recherches, St. Louis (France).
STUDIES OF THE COMBUSTION OF SOLID PROPELLANTS UP TO 1000 MPa
D. Grune 13 Feb. 1985 24 p Presented at 1st Meeting for Information Exchange on Internal Ballistic Research, Weil am Rhein, West Germany, 22-25 May 1985
(ISL-CO-201/85) Avail: NTIS HC A02/MF A01

Solid propellant burning at pressures of 600 MPa and higher was investigated using a high pressure vessel designed to carry out burning rate measurements. Higher pressures are desirable to improve gun design. The high pressure bomb has a 400cc chamber and can withstand pressures of over 1000 MPa. Equations of state were calculated using an Abel equation obtained by fitting the measurements up to 450 MPa and using a 3 term Virial equation with coefficients obtained from measurements of up to 450 MPa pressure. The differences observed strongly depend on the type of propellant, and better fits are obtained using the Virial equation. At loading densities > 0.44 g/cc a considerable change in burning behavior is observed. Maximum deviation from theoretical data is found at 400 MPa. Author (ESA)

N86-19477# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Dept. de Petroleo y Materiales Functionales y Protectivos.
UTILIZATION OF LIQUIFIED PETROLEUM GAS (LPG) IN COMPRESSION IGNITED MOTORS [UTILIZACION DE GASES LICUADOS DEL PETROLEO (GLP) A MOTORES DE COMPRESION IGNICION]
Jose Estaire Alonso 1985 11 p refs In SPANISH
Avail: NTIS HC A02/MF A01

Performance tests were carried out on a commercial diesel motor. Several gas compositions were tried, including 97% C3, 32% propane, 68% butane, and mixed olefines with 45% olefins. The motor is a Pagaso with 11,945 cc and 148 kW power. The results show that only slight mechanical modifications are necessary and that no significant power variation are related to changes in fuel composition. Smell, smoke, and pollutants are greatly reduce by the utilization of the liquified gas. Author (ESA)

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-19478 New South Wales Univ., Kensington (Australia).
[DESIGN USE AND CONSTRUCTION OF STRESSED SKIN

INSULATING PANEL STRUCTURES WITH SPECIAL REGARD TO THEIR USE WITH COLD STORAGE CONTROLLED ENVIRONMENTS] Abstract Only
J. C. Wanty Mar. 1985 3 p
Avail: Issuing Activity

The techniques currently employed in the design use and construction of stressed skin insulating panel structures are studied, with particular reference to cold stores and freezers, utilizing steel sheathed polystyrene panels. Author

N86-19479* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SEQUENTIALLY DEPLOYABLE MANEUVERABLE TETRAHEDRAL BEAM Patent
Martin M. Mikulas, Jr. (General Research Corp., Santa Barbara, Calif.) and Robert F. Crawford, inventors (to NASA) (General Research Corp., Santa Barbara, Calif.) Issued 10 Dec. 1985 9 p Filed 8 Sep. 1983 Sponsored by NASA
(NASA-Case-LAR-13098-1; US-Patent-4,557,097; US-Patent-Appl-SN-530339; US-Patent-Class-52-646; US-Patent-Class-52-632; US-Patent-Class-52-637; US-Patent-Class-52-648; US-Patent-Class-16-242; US-Patent-Class-16-390; US-Patent-Class-403-64; US-Patent-Class-403-171) Avail: US Patent and Trademark Office CSCL 20K

A tetrahedral beam that can be compactly stowed, sequentially deployed, and widely manipulated to provide a structurally sound yet highly maneuverable truss structure is comprised of a number of repeating units of tandem tetralhedral sharing common sides. Fixed length battens are jointed into equilateral triangles called batten frames. Apexes of adjacent triangles are interconnected by longerons having a mid-point folding hinge. Joints, comprised of gussets pivotabley connected by links, permit two independent degrees of rotational freedom between joined adjacent batten frames, and provide a stable structure from packaged configuration to complete deployment. The longerons and joints can be actuated in any sequence, independently of one another. The beam is suited to remote actuation. Longerons may be provided with powered mid-point hinges enabling beam erection and packaging under remote control. Providing one or more longerons with powered telescoping segments permits the shape of the beam central axis to be remotely manipulated so that the beam may function as a remote manipulator arm.
Official Gazette of the U.S. Patent and Trademark Office

N86-19480# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
ASET-B: A ROOM FIRE PROGRAM FOR PERSONAL COMPUTERS
William D. Walton Dec. 1985 41 p refs Sponsored in part by National Park Service, Washington, D.C. and Department of Health and Human Services, Washington, D.C.
(NBSIR-85-3144-1) Avail: NTIS HC A03/MF A01

ASET-B, a personal computer program for predicting the fire environment in a single room, is presented. ASET-B solves the same differential equations as the previously developed computer program, ASET (Available Safe Egress Time), using a simpler numerical technique. ASET-B requires as input the height and area of the room, the elevation of the fire above the floor, a heat loss factor, and a fire specified in terms of heat release rate. The program predicts the thickness and the temperature of the hot smoke layer as a function of time. ASET-B is written in BASIC and is not subject to copyright. The program and its use are described. Included are a listing of the program, program variable name listing and a sample run. A discussion of user modifications also is given. Author

N86-19481# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
USER'S GUIDE FOR FAST
William D. Walton, Steven R. Baer, and Walter W. Jones Dec. 1985 35 p refs
(NBSIT-85-3284) Avail: NTIS HC A03/MF A01

FAST is a multicompartment zone type computer model which predicts the smoke hazard development in each compartment based on a description of the compartments and the fire. A FORTRAN program has been written for the model. This user's guide provides a detailed description of the data input requirements and the output produced by version 17 of the program. Also included are sample program input and output. Author

N86-19482# Naval Civil Engineering Lab., Port Hueneme, Calif.
DEVELOPMENT OF A SELF-TUNING CONTROLLER FOR HVAC (HEATING, VENTILATING, AND AIR CONDITIONING) SYSTEMS Final Report, Oct. 1982 - Nov. 1984
R. E. Kirts and I. L. Chien Aug. 1985 41 p
(DA Proj. Z03-71)
(AD-A160328; NCEL-TN-1731) Avail: NTIS HC A03/MF A01 CSCL 13/1

A self-tuning control algorithm suitable for application to many processes, including those of heating, ventilating, and air conditioning, was developed and tested. Initial experimental evaluation indicates that the controller may be applicable to a variety of common HVAC processes. Self-tuning controls can improve process efficiency and reduce maintenance. GRA

N86-19483# Stan and Associates, Inc., Dayton, Ohio.
UNDERSTANDING HVAC (HEATING, VENTILATING AND AIR CONDITIONING) CONTROLS FOR BETTER ENERGY EFFICIENCY
R. Stan, S. Tuma, and J. Harms 1985 109 p
(PB85-247518; ENR/BE-85/01) Avail: NTIS HC A06/MF A01 CSCL 13A

The manual provides a reference on heating, ventilating and air conditioning (HVAC) systems and controls, and gives an understanding of how existing systems controls work and can be operated to enhance their energy efficiency. The text also covers how new systems can be selected to minimize energy use. The eighth chapter manual covers the topics of basic control systems, psychrometrics, basic HVAC configurations, control strategies, pneumatic control operation, electronic controls and their calibration and energy conservation opportunity (ECO) retrofits for increased efficiency. Author

N86-19484# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
27 Jan. 1986 122 p refs Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-002) Avail: NTIS HC A06/MF A01

Areas of discussion in this issue of Japanese science and technology include electronics, energy, new materials, basic technology research, and transportation. Some article titles include: (1) Moonlight project promotes energy saving technology; (2) Production, application of piezoelectric ceramics described; (3) Capitilizing on available information; and (4) Reasons for automobile export restrictions explained. For individual titles, see N86-19485 through N86-19489.

N86-19485# Joint Publications Research Service, Arlington, Va.
MOONLIGHT PROJECT PROMOTES ENERGY-SAVING TECHNOLOGY c44
Akira Ishihara *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 8-15 Transl. into ENGLISH from Denki To Gasu (Tokyo, Japan), Jun. 1985 p 17-21 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

In promoting energy saving, development of energy conservation technologies aimed at raising energy efficiency in the fields of energy conversion, its transportation, its storage, and its consumption is considered, along with enactment of legal actions urging rational use of energies and implementation of an enlightenment campaign for energy conservation to play a crucial role. Under the Moonlight Project, technical development is at present

being centered around the following six pillars: (1) large scale energy saving technology; (2) pioneering and fundamental energy saving technology; (3) international cooperative research project; (4) research and survey of energy saving technology; (5) energy saving technology development by private industry; and (6) promotion of energy saving through standardization. Heat pumps, magnetohydrodynamic generators and fuel cells are discussed. Author

N86-19486# Joint Publications Research Service, Arlington, Va.
PRODUCTION, APPLICATION OF PIEZOELECTRIC CERAMICS DESCRIBED c33
Jiro Inoue *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 16-23 refs Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Apr. 1985 p 1-4 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

Besides ceramics, piezoelectric materials include single crystals such as quartz, thin film such as zinc oxide, and high polymers such as polyvinylidene fluoride. Among these, lead zirconium titanate and other piezoelectric ceramics, as well as quartz, are most often used. This is because piezoelectric ceramics have the following characteristics: (1) can be moded into the desired size and form; (2) excellent in mass productivity and low in cost; (3) have large k, electric mechanical coupling constant, making it possible to control mechanical Q (Qm) and epsilon; and (4) have good temperature property and chronological stability. The production method and various applications of piezoelectric ceramics are outlined. Author

N86-19487# Joint Publications Research Service, Arlington, Va.
CERAMICS STRATEGY OF ASAHI GLASS REPORTED c27
A. Araki *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 24-28 Transl. into ENGLISH from Nikko Material (Tokyo, Japan), Apr. 1985 p 12-15 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

Progress in nonpressure sintering method first utilized in 1980, as contrasted to the conventional sintering/baking hot press method where baking and hardening are done under external physical pressure is presented. This new method, as indicated by its name, bakes and hardens without adding pressure and has made it possible to mass produce products of complex form or large size for which the hot press method is not suitable. Following this development, high purity particulate crystals of silicon nitrite based on Chemical Vapor Deposition was developed to refine the raw material powder. Other materials and processes are discussed. Author

N86-19488# Joint Publications Research Service, Arlington, Va.
CAPITALIZING ON AVAILABLE INFORMATION c60
Jiro Hiraishi *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 63-70 Transl. into ENGLISH from Kogyo Gijutsu (Tokyo, Japan), Jun. 1985 p 30-35 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

Where research of chemical technology is concerned, needs for data bases are very intense because of the multiple characteristics of diverse substances to be handled. Of the data bases, fact data bases are presently the focus of concern in the relevant sector, along with the CAD systems. Building up of data bases is strived for in connection with such fact data bases as the structure of molecules, thermochemical and thermodynamic properties, properties related to chemical engineering including viscosity, and safety or toxicity of substances. Spectral data, meanwhile, has played the role of the pioneer in the activity of building up the fact data base; the reason is that the spectral data has served greatly in the analysis of chemical structure and qualitative and quantitative analysis of organic compounds and that putting in order the spectral data for many of the compounds has been needed in the course of development of petroleum chemistry. The data build-up activity for spectral data has a long history and for infrared spectral data, in particular. The build up of a spectral data base system is discussed. Author

N86-19489# Joint Publications Research Service, Arlington, Va.
ASSESSMENT OF FINE CERAMICS
In its Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 35-91 Transl. into ENGLISH from Kogyo Gijutsu (Tokyo, Japan), Jun. 1985 p 42-45 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

New materials are apparently still in initial stages of development and technologically immature in many aspects. They involve many problems to be solved if they are to develop in future. This is due to the fact that the development of new materials, and particularly those for structural materials, absolutely requires building up knowledge of the relevant basic research to be carried out over long years, and building up reliable data, not just an improvement on existing technologies. Testing and assessment which is indispensable in securing reliable data, with fine ceramics being used as the example is discussed. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-19490 Ohio State Univ., Columbus.
PERFORMANCE OF RESONANT RADAR TARGET IDENTIFICATION ALGORITHMS USING INTRA-CLASS WEIGHTING FUNCTIONS Ph.D. Thesis
Ahmad Mustafa 1985 226 p
Avail: Univ. Microfilms Order No. DA8518995

The use of calibrated resonant-region radar cross section (RCS) measurements of targets for the classification of large aircraft is discussed. Errors in the RCS estimate of full scale aircraft flying over an ocean, introduced by the ionospheric variability and the sea conditions were studied. The Weighted Target Representative (WTR) classification algorithm was developed, implemented, tested and compared with the nearest neighbor (NN) algorithm. The WTR-algorithm has a low sensitivity to the uncertainty in the aspect angle of the unknown target returns. In addition, this algorithm was based on the development of a new catalog of representative data which reduces the storage requirements and increases the computational efficiency of the classification system compared to the NN-algorithm. Experiments were designed to study and evaluate the characteristics of the WTR- and the NN-algorithms, investigate the classifiability of targets and study the relative behavior of the number of misclassifications as a function of the target backscatter features. The classification results and statistics were shown in the form of performance curves, performance tables and confusion tables. Author

N86-19491 British Broadcasting Corp., Kingswood (England). Engineering Div.
DBS PAY TELEVISION: PICTURE SIGNAL SCRAMBLING
M. J. Knee Oct. 1985 16 p refs
(BBC-RD-1985/12) Avail: Issuing Activity

Picture signal scrambling methods suitable for a direct broadcast by satellite DBS MAC pay television channel are described. They use a technique known as rotation scrambling, which is shown to meet the likely requirements for picture quality, security against piracy, scrambling effectiveness and cost. The methods have been tested using experimental equipment and the results have led to an agreement within the EBU to incorporate them into the MAC specification. E.A.K.

N86-19492 New Mexico State Univ., Las Cruces.
SCATTERING AND ATTENUATION OF MILLIMETER WAVELENGTH RADIATION BY SNOW Ph.D. Thesis

1985 138 p
Avail: Univ. Microfilms Order No. DA8519958

A finite element computer model for single particle scattering is applied to the problem of scattering and absorption of polarized millimeter wave (MMW) radiation by individual dry snowflakes. Several snow crystal shapes are examined at broadside and edge on orientations relative to the direction of incidence of the MMW plane wave. Equivalence of the scattering characteristics of the snow crystals with those of solids of revolution is approximated through the use of well known effective refractive index mixing rules. The accuracy of the equivalence criteria is also discussed. Monodispersions of randomly distributed snowflakes of identical shape and orientation are first studied, and a damped periodic oscillation of the polarized transmitted intensities with distance is predicted. Random orientation effects in snowflake monodispersions are also examined with the propagation theory employed here. The effect of crystal shape upon the forward-propagating MMW radiation in oriented monodispersions with identical number densities is displayed. Dissert. Abstr.

N86-19493*# Ohio State Univ., Columbus. Dept. of Electrical Engineering.
ENGINEERING CALCULATIONS FOR COMMUNICATIONS SATELLITE SYSTEMS PLANNING Interim Report, 16 Jul. 1984 - 15 Jul. 1985
C. H. Reilly, C. A. Levis, C. Mount-Campbell, D. J. Gonsalvez, C. W. Wang, and Y. Yamamura 1985 46 p refs
(Grant NAG3-159)
(NASA-CR-176555; NAS 1.26:176555; Rept-716548-2) Avail: NTIS HC A03/MF A01 CSCL 17B

Computer-based techniques for optimizing communications-satellite orbit and frequency assignments are discussed. A gradient-search code was tested against a BSS scenario derived from the RARC-83 data. Improvement was obtained, but each iteration requires about 50 minutes of IBM-3081 CPU time. Gradient-search experiments on a small FSS test problem, consisting of a single service area served by 8 satellites, showed quickest convergence when the satellites were all initially placed near the center of the available orbital arc with moderate spacing. A transformation technique is proposed for investigating the surface topography of the objective function used in the gradient-search method. A new synthesis approach is based on transforming single-entry interference constraints into corresponding constraints on satellite spacings. These constraints are used with linear objective functions to formulate the co-channel orbital assignment task as a linear-programming (LP) problem or mixed integer programming (MIP) problem. Globally optimal solutions are always found with the MIP problems, but not necessarily with the LP problems. The MIP solutions can be used to evaluate the quality of the LP solutions. The initial results are very encouraging. Author

N86-19494*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RADIOFREQUENCY TESTING OF SATELLITE SEGMENT OF SIMULATED 30/20 GHz SATELLITE COMMUNICATIONS SYSTEM
Regis F. Leonard and Robert Kerczewski (Analex Corp., Cleveland, Ohio) Nov. 1985 26 p refs
(NASA-TM-87163; E-2797; NAS 1.15:87163) Avail: NTIS HC A03/MF A01 CSCL 17B

A laboratory communications system has been developed that can serve as a test bed for the evaluation of advanced microwave (30/20 GHz) components produced under NASA technology programs. The system will ultimately permit the transmission of a stream of high-rate (220 Mbps) digital data from the originating user, through a ground terminal, through a hardware-simulated satellite, to a receiving ground station, to the receiving user. This report contains the results of radiofrequency testing of the satellite portion of that system. Data presented include output spurious responses, attainable signal-to-noise ratios, a baseline power budget, usable frequency bands, phase and amplitude response data for each of the frequency bands, and the effects of power level variation. Author

N86-19495# JAYCOR, San Diego, Calif.
CONCEPTS FOR NEAR CONTINUOUS RECEPTION OF VHF (VERY HIGH FREQUENCY) SIGNALS USING METEOR BURST PROPAGATION Final Technical Report, 18 Sep. 1984 - 17 May 1985
F. Felber, H. Davis, R. Stahl, R. Wheeler, and D. Wright 15 Jul. 1985 103 p
(Contract N00014-84-C-0730)
(AD-A159891; JAYCOR-J200-85-875/2393) Avail: NTIS HC A06/MF A01 CSCL 17/2

The objective of this program, as given in the original JAYCOR proposal, has been to design experiments leading to the verification of diversity reception techniques for tactical C2 signal collection. The results of this design effort are summarized in this final report. The experimental program that has been designed is referred to in this report as the VHF Reception Program -- Phase 2. Similarly, the program that has just been completed is referred to as the Phase 1 program. In the Phase 1 program, we have identified three key physics issues concerning diversity reception of meteor path propagation. These issues are: What is the gain vs. beamwidth tradeoff on a single receiver antenna? Can independent meteor propagation paths be obtained at a single location using multiple receiver antennas? and What spatial separation is needed to obtain independent paths from a common volume? GRA

N86-19496# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Sciences.
EXACT PERFORMANCE ANALYSIS OF THE CENSORED MEAN-LEVEL DETECTOR IN A MULTIPLE-TARGET ENVIRONMENT
J. A. Ritcey 15 Jul. 1985 34 p
(Grant AF-AFOSR-0343-82)
(AD-A160349; AFOSR-85-0752TR) Avail: NTIS HC A03/MF A01 CSCL 17/9

The censored mean-level detector (CMLD) is an alternative to the mean-level detector that achieves robust detection performance in a multiple-target environment by censoring several of the largest samples of the maximum-likelihood estimate of the background noise level. Here we derive exact expressions for the probability of detection of he CMLD in a multiple-target environment when a fixed number of Swerling II targets are present. The primary target is modelled by Swerling case II, and only single-pulse processing is analyzed. Optimization of the CMLD parameters is considered, and a comparison to other detectors is presented. GRA

N86-19497# Naval Postgraduate School, Monterey, Calif.
TROPO: A MICROCOMPUTER BASED TROPOSCATTER COMMUNICATIONS SYSTEM DESIGN PROGRAM M.S. Thesis
E. M. Siomacco Sep. 1985 162 p
(AD-A160877) Avail: NTIS HC A08/MF A01 CSCL 17/2

This thesis presents a microcomputer based, computer-aided design program for tactical military tropospheric scatter radio systems. The program has the capability of predicting the system performance and reliability for both analog (FM/FDM) and digital troposcatter radiolinks for both analog (FM/FDM) and digital tropospheric ducting. A height gain computational model for specific elevated tropospheric ducts is derived from statistical radiosonde data. A terrain profile plot, real time radiosonde data analysis, and the probability of error for digital radiolinks are provided as program options. GRA

N86-19498# Delta Information Systems, Inc., Horsham, Pa.
DEVELOPMENT OF A METHODOLOGY TO TEST VIDEO CODECS USED IN TELECONFERENCING Final Technical Information Bulletin
23 Aug. 1985 53 p
(Contract DCA100-83-C-0047)
(AD-A160878; NCS-TIB-85-1) Avail: NTIS HC A04/MF A01 CSCL 17/2

The purpose of this report is to define a test methodology for the evaluation of motion television codecs for teleconferencing applications. The results of this evaluation will serve as a guideline for the future preparation of specifications for codecs of this type.

The principle characteristics of the codecs include the following: (1) utilize digital communication channels, (2) operate at a data rate of 1.544 Mbps, (3) provide color capability, and (4) provide motion capability. The specific objective of the tests describes is to rank the codecs tested in order of performance. The reason that new tests are being developed is that there are presently no agreed upon test procedures for that purpose. The tests described will utilize a specifically prepared video tape containing still and motion sequences designed specifically for the evaluation of this type of codec. These sequences will be passed through the codecs and the output recorded on video tape. The evaluation and grading of each codec will be on a subjective, comparative basis. GRA

N86-19499# Pacific-Sierra Research Corp., Los Angeles, Calif.
LOCALIZED ELF PROPAGATION ANOMALIES Final Technical Report, Mar. - Dec. 1984
E. C. Field, Jr. and C. R. Warber Jun. 1985 60 p
(Contract N00014-84-C-0214)
(AD-A160965; PSR-1441) Avail: NTIS HC A04/MF A01 CSCL 20/14

Two methods are used to analyze extremely low frequency (ELF) propagation near lateral nonhomogeneities in the earth-ionosphere waveguide. The first, a full-wave integral equation, is accurate although expensive to solve and the second, a two-dimensional ray trace, is only semiquantitative, but provides physical insight. Both methods are applied to several model solar proton events (SPEs), including one based on the 23 November 1982 event, which is of special interest because simultaneous measurements of ELF signal anomalies and incident proton fluxes are available. Calculations predict a region of weak field near the Gulf of Alaska, where a submarine-borne receiver measured an unusually severe signal loss. That behavior is caused by lateral refraction, which bends the signal away from the gulf and into the disturbed polar cap, where the phase velocity of the TEM mode is lowest. The theory also predicts a region of strong field just inside the polar cap boundary, but no data are available to test that result. Localized regions of weak or strong fields will occur on links where the great-circle path is nearly tangent to a boundary between large zones with different waveguide phase velocities. Author (GRA)

N86-19500# Naval Research Lab., Washington, D. C.
SOUNDER-UPDATED STATISTICAL MODEL PREDICTIONS OF MAXIMUM USABLE FREQUENCY FOR HF SKY WAVE PREDICTIONS
M. H. Reilly and M. Daehler 30 Oct. 1985 24 p
(AD-A161041; NRL-MR-5677) Avail: NTIS HC A02/MF A01 CSCL 20/14

Measured solar parameters, such as sunspot number or 10.7 cm flux, have traditionally been used as inputs to drive statistical model predictions of maximum usable frequencies (MUFs) on HF radio sky wave paths of interest. Much greater accuracy can be obtained by using ionospheric sounder inputs to drive or update statistical model predictions, and this is demonstrated here using oblique-incidence sounder data from the DoD Solid Shield exercises on May 12-14, 1981. From analysis of ionograms collected for several paths every fifteen minutes, it is found that deployment of a reasonable number of sounders in a large area, in order to update the simple statistical model, MINIMUF, yields MUF prediction capability on unsounded communication paths in the area within 0.4 MHz rms error. This value is obtained from real-time updating and a spatial interpolation process developed here, whereby data at sounder control points is interpolated to ionospheric reflection points for communication paths of interest. The results from the interpolation are found to be at least 20-30% more accurate than updating at any one of the nearby sounder control points. The updating procedure applies under day and night conditions, and also works well in a forecasting mode (not real-time), where it is found to work better in this case than a statistical trend line approach for daytime forecasting. Author (GRA)

N86-19501# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
RELIABLE COMMUNICATION IN AN UNRELIABLE ENVIRONMENT, REVISION
Kenneth P. Birman and Thomas A. Joseph Sep. 1985 35 p
(Contract MDA903-85-C-0124; Grant NSF DCR-84-12582; ARPA Order 5378)
(AD-A161125; CU-CSD-TR-85-694-Rev) Avail: NTIS HC A03/MF A01 CSCL 17/2

We report on the design and correctness of a communication facility for a distributed computer system. The facility provides a variety of broadcast protocols, which are used to transmit messages reliably to sets of destination processes. These protocols attain high levels of concurrency while respecting application-specific ordering constraints. They also ensure that processes observe consistent orderings of events, including process failures and recoveries. A review of several uses for the protocols in a large fault-tolerant program illustrates the simplification of higher-level algorithms made possible by our approach. Author (GRA)

N86-19502# Stanford Univ., Calif. Space Telecommunications and Radioscience Lab.
AN AUTOMATIC SYSTEM FOR GLOBAL MONITORING OF ELF AND VLF RADIO NOISE PHENOMENA Technical Report, 1 Mar. 1981 - 1 Mar. 1985
Bruce R. Fortnam Jun. 1985 102 p
(Contract N00014-81-K-0382)
(AD-A161148; E450-1) Avail: NTIS HC A06/MF A01 CSCL 17/2

A new system has been developed for automatically monitoring and recording electromagnetic noise in the ELF and VLF (10-32,000 Hz) frequency band. Eight stations are under construction, to be installed at different sites around the world in order to map the geographic distribution of noise levels. This system is called the ELF/VLF Radiometer to emphasize the attention paid during its design and installation to making accurate absolute field strength measurements. The sensing instruments installed at each site consist of two dual-channel receivers, each with two crossed loop antennas. The ELF receiver covers the frequency range 10 to 500 Hz, and the VLF receiver the range 300 to 32,000 Hz. A bank of 16 narrowband (5% bandwidth) filters is used to monitor the energy present at selected frequencies throughout the range of both receivers. The output of these filters is continuously sampled by a computerized recording system, and statistical averages are computed on-site and recorded on digital tape, along with a sample of the raw digital data. GRA

N86-19503# Naval Postgraduate School, Monterey, Calif.
A VHF-FM DIGITAL SELECTIVE CALLING SYSTEM MATHEMATICAL MODEL USING GRADE OF SERVICE CRITERIA M.S. Thesis
James W. Decker Sep. 1985 118 p
(AD-A161185) Avail: NTIS HC A06/MF A01 CSCL 17/2

This thesis presents a mathematical model of a maritime VHF-FM Digital Selective Calling (DSC) System using grade of service as a criterion to determine if a single DSC channel can accommodate both distress and commercial calling. The model calculates the probability of a call being delayed, the average delay of a call, the probability of a call being answered within a certain time frame, and the throughput for the random access calling systems of ALOHA, Slotted ALOHA, Slotted ALOHA with Capture. GRA

N86-19504# Naval Postgraduate School, Monterey, Calif.
COMMUNICATIONS PROTOCOLS FOR MICROCOMPUTER-BASED WORKSTATIONS: A DESIGNAND IMPLEMENTATION OF AN ELECTRONIC BULLETIN BOARD SYSTEM (NPS-BBS) M.S. Thesis
In S. Park Sep. 1985 92 p
(AD-A161214) Avail: NTIS HC A05/MF A01 CSCL 17/2

The area of research for this thesis is to develop communications protocols required to support electronic mail and data transfer service through voice graded telephone lines using modems. This

thesis concentrated on prototyping an IBM-PC based Electronic Bulletin Board System (NPS-BBS). Major features of NPS-BBS include electronic mail and data transfers as well as electronic notepad, on-line conversation, and running BBS under a multitasking operating system with Multilink between remote and distributed microcomputer based workstations. GRA

N86-19505# Technische Hogeschool, Delft (Netherlands). Vensterqroep: Microgolven/Watergolven.
ANALYSIS METHOD FOR SPECKLE IN RADAR IMAGERY SYSTEMS [EEN ANALYSEMETHODE VAN SPECKLE IN BEELDVORMENDE RADARSYSTEMEN]
H. C. Peters Jul. 1985 36 p refs In DUTCH
(Rept-I85.68220.001; BCRS-85-01) Avail: NTIS HC A03/MF A01

Expressions for the speckle spectrum of airborne radar imagery systems related to the autocorrelation function of the position dependant echo strength of the soil were derived. In the characteristics of speckled images obtained with coherent microwaves, statistical information concerning the object texture, relative to the sensor, is stored. After nonlinear elaboration by a quadratic detector, the intensity is written as the sum of median effect and speckle fluctuations. Based on a Gauss antenna diagram and pulse function, an expression for the median effect spectrum, related to the echo strength spectrum, is found via a spatial low pass filter. Speckle spectrum expressions in x- and y-direction related to the echo dispersion function of the surface are found. Author (ESA)

N86-19506# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
MEASURING RESULTS IN KNOWING. ELECTROMAGNETIC INTERFERENCE MEASURING METHODS: REQUIREMENTS, PROCEDURES AND EQUIPMENT
C. Wagemaker 17 Jan. 1985 7 p In DUTCH; ENGLISH summary
Presented at Electromagnetic Interference Workshop, Amsterdam, Netherlands, 22 Mar. 1984; sponsored by Netherlands Inst. of Registered Engineers
(NLR-MP-85008-U; B8571444) Avail: NTIS HC A02/MF A01

General requirements, measuring methods, and procedures for electromagnetic interference measuring receivers and generators to identify narrowband and broadband signals through performing conducted and radiated emission tests, including susceptibility level tests are discussed. Author (ESA)

N86-19507# Bureau of Mines, Pittsburgh, Pa.
LOW-COST FSK (FREQUENCY-SHIFT KEYING) MODERN NETWORK FOR POLLED COMMUNICATION SYSTEMS Information Circular
R. A. Watson 1985 31 p refs
(PB85-236446; DI-BM-IC-9021) Avail: NTIS HC A03/MF A01 CSCL 17B

A frequency-shift keying (FSK) modulator-demodulator (modem) network has een devised for the mine-monitoring systems. This network permits an unlimited number of remote stations to communicate with one central station over the same pair of wires. The network operates at a speed of 4,800 Bd at distances up to 5 miles. The development and operation of the modems are described. The theory of operation, schematic diagrams, and printed circuit board layouts are provided. Although the modems were built for a specific application, a more general use is discussed whereby the network would operate with a typical serial channel format. GRA

N86-19508# Micro Communications, Inc., Manchester, N.H.
ELEMENT PATTERN MEASUREMENTS ON FM ANTENNA Final Report
Jun. 1985 331 p
(Contract EPA-68-03-3054)
(PB85-242436; Rept-1310; EPA-520/6-85-017) Avail: NTIS HC A15/MF A01 CSCL 09E

Data obtained from measurements of the elevation radiation patterns of five commercial FM radio broadcast antenna elements is reported. Pattern measurements were performed with the elements supported by a dielectric mast and when mounted on a section of triangular tower. Measurements were accomplished for the elevation plane throughout 360 degrees of elevation and at azimuthal angles separated by 45 degrees to fully characterize the effect of the tower on the elevation plane pattern. GRA

N86-19509# National Telecommunications and Information Administration, Washington, D.C. Inst. for Telecommunication Sciences.
STUDY OF INTERFERENCE FIELDS IN A DUCTING ENVIRONMENT
G. A. Hufford and D. R. Ebaugh Jun. 1985 49 p
(PB85-242998; NTIA-85-177) Avail: NTIS HC A03/MF A01 CSCL 17B

In a cooperative program, the Federal Communications Commission and the Institutue of Telecommunication Sciences have begun a study of interference fields that may arise in a ducting environment. This report gives some preliminary thoughts on how enhanced signal levels might be modeled and describes a measurement program that operated in Southern California. Comparisons are made between some of the first-order statistics of the data and two of the possible models and show that there still remains a large gap between our modeling abilities and reality. GRA

N86-19510# Federal Communications Commission, Washington, D. C. Office of Plans and Policy.
SPECTRUM MANAGEMENT POLICY IN THE UNITED STATES, AN HISTORICAL ACCOUNT
J. O. Robinson Apr. 1985 144 p
(PB85-204550; FCC/OPP/WP81-06) Avail: NTIS HC A07/MF A01 CSCL 17B

The report recounts the early history of spectrum management by federal regulation culminating in the Radio Act of 1927 which, with little change, became Title III of the Communications Act of 1934. Using the land mobile radio services as a case study, the results of spectrum management by regulation are reviewed. It was found that long delay in arriving at management decisions, especially in the matter of spectrum allocation, has been a prominent feature of regulation. This delay has been due primarily to the inability of the regulatory process to acquire the necessary information on which to base decisions with the public interest as the sole criterion. This delay has resulted in social costs in the form of foregone spectrum use. The report concludes that the deficiencies cited are inherent in regulated spectrum management and that they will persist unless market forces are permitted significantly to influence spectrum management decisions. GRA

N86-20186# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF INVESTIGATING STAR SYSTEMS BY RADAR Abstract Only
O. N. Rzhiga *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 83 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 500-505
(For primary document see N86-20178 10-88)
Avail: NTIS HC A03

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-19511 Utah Univ., Salt Lake City.
AN INTEGRATED MULTIPLE-SENSOR CHEMICAL TRANSDUCER Ph.D. Thesis
Richard Blaine Brown 1985 251 p
Avail: Univ. Microfilms Order No. DA8518395

The main goal of this work has been improving transducer accuracy. This is accomplished by replacing the single transistor of CHEMFETs with an on-chip voltage-follower amplifier, and by integrating eight of these circuits onto a multiple-sensor transducer, which realizes the following features: (1) Eight transducers and control circuitry are included on a 54 x 140 mil chip. (2) The voltage-output circuit allows sensing with the solution at ground potential, and provides high-speed, on-chip multiplexing, so that only seven connections are made to the instrumentation. (3) Matched input transistors provide inherent compensation for variations in temperature, and the symmetrical design of the circuit reduces sensitivity to light. (4) Internal feedback improves input and output impedances and transfer function stability by more than three orders of magnitude. (5) The chip provides all of the data needed to implement multi-dimensional signal processing algorithms for separating desired signals from those of interfering chemicals. Dissert. Abstr.

N86-19512 New South Wales Univ., Kensington (Australia).
FINITE WORDLENGTH CONSIDERATIONS IN THE IMPLEMENTATION OF DIGITAL FILTERS Abstract Only
Subramanian Sridharan Mar. 1985 3 p
Avail: Issuing Activity

Several new approaches to improve the finite wordlength (FWL) performance of digital filter structures are presented. To reduce the coefficient wordlength, a new scheme is proposed, in which use is made of the error arising uantization of the filter coefficients, to correct the output of the filter. to reduce the state wordlength, a scheme is proposed, in which the state quantization residue is split into two parts (bit-sliced), and processed by separate feedback networks. The correction schemes for coefficients and states can be implemented with less hardware compared to conventional methods of implementing extended precision arithmetic. Furthermore, the inherent parallelism of the proposed schemes permit high speed implementations. Application of the technique to several different filter structures is demonstrated. Author

N86-19513 New South Wales Univ., Kensington (Australia). School of Electrical Engineering.
POWER SUPPLIES FOR PARTIAL DISCHARGE TESTING OF POWER CAPACITORS Abstract Only
John James Fick Mar. 1985 3 p
Avail: Issuing Activity

Power capacitors are important components in modern power systems. Power supplies that permit the detection of partial discharges in this equipment class as a diagnostic test are investigated. Tunable air-cored coils for achieving resonant conditions at power frequency are considered, but rejected in this research program because of size and cost. Very low frequency testing has been investigated by previous researchers, primarily for machine testing, is seen as a viable alternative, subject to the demonstration of suitable equipment, both to generate suitable V.L.F. voltages and to facilitate partial discharge measurement. An approach is presented relying upon an originally developed charge transfer procedure, that satisfies both requirements concurrently. Author

N86-19514 New South Wales Univ., Kensington (Australia).
THE DYNAMIC BRAKING OF INDUCTION MOTORS Abstract Only
Brian Hickman 1985 2 p
Avail: Issuing Activity

The dynamic braking of induction motors is investigated with particular emphasis on the use of zero-sequence connections. The braking performance using both ac and dc supplies is compared. A mathematical model is developed to predict both the transient and steady-state zero-sequence braking performance. To ensure accurate calculations, a model is constructed to allow for the variation of secondary parameters with frequency due to the skin effect. A method for determining the zero-sequence parameters using locked rotor variable frequency data is presented. To measure the transient acceleration torque of the machine, a rotational accelerometer is developed from a small single-phase induction motor. Good correlation between measured and calculated results is achieved during switching transients for both current and torque. Author

N86-19515* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
JFET REFLECTION SOCILLATOR Patent
Leonard L. Kleinberg, inventor (to NASA) Issued 12 Nov. 1985 6 p Filed 27 May 1980
(NASA-Case-GSC-12555-1; US-Patent-4,553,110; US-Patent-Appl-SN-153240; US-Patent-Class-331-116-FE; US-Patent-Class-331-117-FE) Avail: US Patent and Trademark Office CSCL 09C

A high frequency oscillator circuit is provided using a low cost junction type field effect transistor (T sub 1) with a tuned circuit connected to its gate. The frequency of operation is determined by the tuned circuit and the capacitance reflected from the source to the gate. The transistor is matched to the frequency of operation so that this frequency falls within the roll-off portion of the transistor's transconductance verses frequency curve, preferably somewhat above the 3 db point in frequency. Phase shift necessary to sustain oscillation occurs due to the operation of the transistor in the roll-off portion of the curve and the addition of a phase shifting network (R sub 1, C sub 1) at the source.
Official Gazette of the U.S. Patent and Trademark Office

N86-19516* National Aeronautics and Space Administration. Pasadena Office, Calif.
LASER ACTIVATED MTOS MICROWAVE DEVICE Patent
Joseph Maserjian, inventor (to NASA) (California Inst. of Tech., Pasadena, Calif.) Issued 23 Jul. 1985 5 p Filed 14 Oct. 1983
(NASA-Case-NPO-16112-1; US-Patent-4,531,143; US-Patent-Appl-SN-542232; US-Patent-Class-357-23.6; US-Patent-Class-357-30; US-Patent-Class-357-58; US-Patent-Class-357-59) Avail: US Patent and Trademark Office CSCL 09A

A light-activated semiconductor device usable as an optoelectronic switch, pulse generator or optical detector is provided. A semiconductor device is disclosed which provides back-to-back metal-thin oxide-silicon (MTOS) capacitors. Each capacitor includes a thin, light-absorptive aluminum electrode which overlies a thin oxide layer and a lightly doped region implanted in an intrinsic silicon substrate.
Official Gazette of the U.S. Patent and Trademark Office

N86-19517*# National Aeronautics and Space Administration. Pasadena Office, Calif.
CATHODE FOR PRIMARY BATTERY Patent Application
Shiao-Ping S. Yen, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 24 May 1985 21 p
(Contract NAS7-918)
(NASA-Case-NPO-16397-1-CU; NAS 1.71:NPO-16397-1-CU; US-Patent-Appl-SN-751643) Avail: NTIS HC A02/MF A01 CSCL 10C

A composite electrode for a Li-SOCl2 primary battery is formed of a porous layer of an elastomer binder such as chlorinated polyethylene containing a dispersion of conductive carbon particles. Primary Li-SOCl2 cells containing the porous chlorinated polyethylene binder-carbon electrode provide much higher capacity than cells containing polytetrafluorethylene-carbon electrodes probably due to the presence of more pores with more uniform size in the chlorinated polyethylene composite electrode. NASA

N86-19518*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIATION-HARD ANALOG-TO-DIGITAL CONVERTERS FOR SPACE AND STRATEGIC APPLICATIONS
Michael K. Gauthier and Armando Roberto V. Dantas 15 Nov. 1985 30 p refs Sponsored in part by Navy
(Contract NAS7-918)
(NASA-CR-176536; JPL-Pub-85-84; NAS 1.26:176536) Avail: NTIS HC A03/MF A01 CSCL 09A

During the course of the Jet Propulsion Laboratory's program

to study radiation-hardened analog-to-digital converters (ADCs), numerous milestones have been reached in manufacturers' awareness and technology development and transfer, as well as in user awareness of these developments. The testing of ADCs has also continued with twenty different ADCs from seven manufacturers, all tested for total radiation dose and three tested for neutron effects. Results from these tests are reported. Author

N86-19519# University of Southern California, Los Angeles. Computer Research Inst.
AREA ESTIMATION OF VLSI INTEGRATED CIRCUITS
F. J. Kurdahi and A. C. Parker 24 Jul. 1985 61 p
(Contract DAAG29-83-J-K047)
(AD-A160335; CRI-85-05; ARO-20637.7-EL) Avail: NTIS HC A04/MF A01 CSCL 09/5

In this report, we present the problem of estimating the area of digital integrated circuits. This problem is important for reasons of chip yield, floor planning and design turnaround time. Area estimation is to be done at different levels of hierarchy. A model is presented for estimating the dimensions of the random logic blocks of a chip, given the description of these blocks as their constituent cells and their interconnections. We will pursue this research towards building a complete area estimation system which can handle different layout methodologies, can perform estimation at higher levels of design description (namely the Register-Transfer level), and be a useful aid to floorplanning and total layout as part of the ADAM system. GRA

N86-19520# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
DEVELOPMENT OF A SYSTEM TO PRODUCE SEMICONDUCTOR INSULATOR MULTI-LAYER STRUCTURES
D. J. Dumin 26 Sep. 1985 29 p
(Contract N00014-84-K-2015)
(AD-A160350) Avail: NTIS HC A03/MF A01 CSCL 07/1

The development of Silicon-on-Sapphire (SOS) and Silicon-on-Insulator (SOI) technologies has led to applications of these technologies in high speed circuits, high density circuits, circuits with freedom from 4-layer latch-up, and radiation hard circuits. There has been significant effort aimed at commercialization of these processes. One of the major problems limiting wide spread use of SOS is the high cost of the sapphire substrate. Many attempts to produce lower cost SOI substrates using ion implantation of insulating materials and various annealing techniques to improve the crystallinity of poly crystal silicon layers have been attempted. An alternate technique to produce SOI materials has been to grow multiple heteroepitaxial silicon-insulator-silicon layers on silicon or sapphire substrates and use these layers for the fabrication of integrated circuits. Several insulators have been used in these structures. There is a continuing search for an optimum insulator to use in multiple silicon-insulator structures. One insulator that has been used for these multiple heteroepitaxial layers is boron phosphide. The purpose of the present work was to design and build an epitaxial reactor capable of growing silicon and boron phosphide layers on silicon and sapphire substrates and to use this reactor to grow layers of silicon and boron phosphide on silicon substrates. GRA

N86-19521# Rhode Island Univ., Kingston. Dept. of Mathematics.
DETECTION PERFORMANCE OF THE CIRCULAR CORRELATION COEFFICIENT RECEIVER
L. Pakula and S. Kay Sep. 1985 30 p
(Contract N00014-84-K-0527)
(AD-A160352) Avail: NTIS HC A03/MF A01 CSCL 17/9

The complex circular correlation detector is analyzed for the case of one complex sinusoid in complex white Gaussian noise. The distribution function of the squared modulus of the circular serial correlation coefficient is found when no signal is present, allowing computation of the detection threshold. For small data records, as is typical in radar applications, the performance of the correlation coefficient detector is compared to a standard DFT detector. The correlation detector outperforms the DFT detector for some sinusoidal frequencies but performs more poorly for others. The correlation detector is also shown to be a constant false alarm rate receiver and requires less computation and storage than an FFT. GRA

N86-19522# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
RESTRUCTURABLE VLSI PROGRAM Semiannual Technical Summary Report, 1 Oct. 1984 - 31 Mar. 1985
Gerald C. OLeary 31 Mar. 1985 36 p
(Contract F19628-85-C-0002; ARPA Order 3797)
(AD-A160935; ESD-TR-85-206) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report describes work performed on the Restructurable VLSI Program sponsored by the information Processing Techniques Office of the Defense Advanced Research Projects Agency during the period 1 October 1984 through 31 March 1985. GRA

N86-19523# Naval Postgraduate School, Monterey, Calif.
VIBRATION ISOLATION OF A MICROPHONE M.S. Thesis
Charles D. Stehle Sep. 1985 93 p
(AD-A161018; AD-F620003) Avail: NTIS HC A05/MF A01 CSCL 09/1

A microphone vibration isolation system using a bungee elastic suspension, designed for use in a system (NASA Project G-313) to measure the ambient noise in the Space Shuttle's payload bay during launch is described. The isolator's transmissibility was measured using a computer controlled shaker table system programmed to simulate the Shuttle's vibrational spectrum in 21 third octave bands between 20 and 2000 Hertz. Static deflection and transient response measurements verified the axial and radial transmissibility measurements. Free decay measurements were made at 5, 20, and 65 C. The isolator's natural frequency of 15 Hertz represents a substantial improvement over the isolator used previously whose lowest resonance was above 100 Hertz. Test procedures and calibration data for three microphones are included. Author (GRA)

N86-19524# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering.
INTERFACE CHEMISTRY OF TERNARY SEMICONDUCTORS: LOCAL MORPHOLOGY OF THE Hg(1-x)CdxTe-Cr INTERFACE Interim Report
A. Franciosi, P. Philip, and D. J. Peterman 15 Oct. 1985 29 p
(Contract N00014-84-K-0545)
(AD-A161034) Avail: NTIS HC A03/MF A01 CSCL 07/4

Synchrotron Radiation Photoemission studies of interfaces prepared in situ on cleaved substrates show atomic interdiffusion with Cr/Hg and Cr/Cd exchange reactions taking place at room temperature for Cr coverages less than 2A. Correspondingly, dissociated Te is released at the surface. A subsurface region 10-13 A thick is formed in which Cr atoms replace all of the Hg atoms and at least 20% of the Cd atoms. Below this subsurface the semiconductor maintains the bulk stoichiometry and the initial surface band bending. Author (GRA)

N86-19525# Naval Postgraduate School, Monterey, Calif.
GENERATION OF AN OPTIMUM HIGH SPEED HIGH ACCURACY OPERATIONAL AMPLIFIER M.S. Thesis
Patrick Gariano, Jr. Sep. 1985 139 p
(AD-A161080) Avail: NTIS HC A07/MF A01 CSCL 09/5

This research examines and discusses the feasibility of utilizing Composite Operational Amplifiers to overcome the inherent inability of IC op-amps to simultaneously perform in a very fast, very accurate mode. Composite operational amplifiers, known to provide enhanced stability, decreased sensitivity to circuit element variations, and an extended operating frequency range, can now be used to generate and operational amplifier that concurrently exhibits both high speed and high accuracy. The composite op-amp is the only generalized method known to produce and op-amp that is both very fast and very accurate. This has never before been achievable in a simple individual entity. Author (GRA)

N86-19526# Naval Postgraduate School, Monterey, Calif.
VLSI (VERY LARGE SCALE INTEGRATED CIRCUITS) DESIGN WITH THE MACPITTS SILICON COMPILER M.S. Thesis
Robert C. Larrabee Sep. 1985 266 p
(AD-A161098) Avail: NTIS HC A12/MF A01 CSCL 09/2

An analysis of the MacPitts silicon compiler is presented. The emphasis of the analysis is on the interrelationshp between algorithmic syntax and resulting circuit structure. Errors inherent to the silicon compiler are investigated, and corrections to the errors are proposed. Author (GRA)

N86-19527# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
S.M KIROV TOMSK POLYTECHNIC INSTITUTE
K. A. Khorkov 28 Oct. 1985 5 p Transl. into ENGLISH from Elektrichestvo (USSR), no. 10, Oct. 1967 p 93
(AD-A161189; FTD-ID(RS)T-0158-85) Avail: NTIS HC A02/MF A01 CSCL 09/5

On 21 April 1965, K. A. Khor'kov defended his dissertation on the topic Questions of Design of a Pulse Power Oscillator. A procedure for computing the parameters of a pulse power oscillator with allowance for the characteristics of its operation is developed and experimentally confirmed, and recommendations are given for selection of optimum values of parameters for which the power of the impulse excited oscillator is maximum at given dimensions. A procedure for computing harmonic oscillations, including tooth ripples, at critical efficiency and the current of the impulse excited oscillator is developed and experimentally confirmed. A procedure for computing power, energy and machine constant of the impulse excited generator is developed by means of which it is possible to select optimum relationships between the main dimensions of the unit and compute the volume of the active part of the impulse excited oscillator. GRA

N86-19528# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
PHASE AND AMPLITUDE MEASUREMENTS OF INDIVIDUAL DIPOLES OF 450-800 MHz, 9-ELEMENT ARRAY
H. E. King, Jimmy L. Wong, Thomas M. Plummer, and William C. Wysock 30 Sep. 1985 41 p
(Contract F04701-83-C-0084)
(AD-A161232; TR-0084A(5925-06)-3; SD-TR-85-58) Avail: NTIS HC A03/MF A01 CSCL 20/14

The results of phase and amplitude measurements of individual dipoles in a 9-element (3 x 3 configuration) array are presented. The 3 x 3 array, designed for 450 to 800 MHz operation, consists of 9 open-sleeve dipoles. Using sweep frequency measurement techniques, the phase and amplitude characteristics of each individual dipole are compared to the center element for both vertical and horizontal polarizations. GRA

N86-19529# Illinois Univ., Urbana. Coordinated Science Lab.
A STUDY OF CROSSTALK AND DISTORTION OF HIGH SPEED PULSES IN DIGITAL CIRCUITS
S. Castillo and R. Mittra Mar. 1985 60 p
(Contract N00014-84-C-0149)
(AD-A161261; R-1033; IU-UILU-ENG-85-2208) Avail: NTIS HC A04/MF A01 CSCL 20/14

Crosstalk and distortion of high speed pulses due to multiple reflections are studied. The moment method is used to solve for the currents and charges on a set of parallel microstrip transmission lines. Next, these solutions are employed to construct the capacitance and inductance matrices for the system. A modal analysis of an n-line transmission line system is used to evaluate the dependence of crosstalk on line spacing and inpute pulse risetime. Other results are given which demonstrate the difficulty of obtaining accurate data for poorly matched loads. GRA

N86-19530# Argonne National Lab., Ill.
MICROCOMPUTER CONTROLLED CURRENT SHARING EXPERIMENTS WITH PARALLEL CONVERTORS
Robert L. Kustom and James J. Skiles (Wisconsin Univ., Madison) 1985 5 p Sponsored in part by Wisconsin Electric Utilities Foundation
(DE85-013854; ANL-HEP-CP-85-61) Avail: NTIS HC A02/MF A01

Power conditioning circuits for a Superconductive Magnetic Energy Storage (SMES) coil will require many parallel SCR devices because the operating current is planned to be as high as a few hundred thosand amperes. In order to maintain current balance in the parallel units, a microcomputer controlled system that adjusts the delay angle of individual units is envisioned. Studies and tests on an 8-H model with two parallel 9 kVA bridge circuits are described. Author

N86-19531*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF SPECIMEN PREPARATION ON THE ELECTROMAGNETIC PROPERTY MEASUREMENTS OF SOLID MATERIALS WITH AN AUTOMATIC NETWORK ANALYZER
Edward R. Long, Jr. Washington Feb. 1986 22 p
(NASA-TM-87628; L-16061; NAS 1.15:87628) Avail: NTIS HC A02/MF A01 CSCL 09C

Effects of specimen preparation on measured values of an acrylic's electomagnetic properties at X-band microwave frequencies, TE sub 1,0 mode, utilizing an automatic network analyzer have been studied. For 1 percent or less error, a gap between the specimen edge and the 0.901-in. wall of the specimen holder was the most significant parameter. The gap had to be less than 0.002 in. The thickness variation and alignment errors in the direction parallel to the 0.901-in. wall were equally second most significant and had to be less than 1 degree. Errors in the measurement f the thickness were third most significant. They had to be less than 3 percent. The following parameters caused errors of 1 percent or less: ratios of specimen-holder thicknesses of more than 15 percent, gaps between the specimen edge and the 0.401-in. wall less than 0.045 in., position errors less than 15 percent, surface roughness, hickness variation in the direction parallel to the 0.401-in. wall less than 35 percent, and specimen alignment in the direction parallel to the 0.401-in. wall mass than 5 degrees. Author

N86-19532# Lawrence Livermore National Lab., Calif.
MECHANISM OF CURRENT MODULATION BY OPTIC PHONON EMISSION IN HETEROJUNCTION TUNNELING EXPERIMENTS
C. B. Hanna, E. S. Hellman, and R. B. Laughlin 27 Aug. 1985 57 p refs Prepared in cooperation with Stanford Univ., Calif.
(Contract W-7405-eng-48)
(DE86-002152; UCID-20530) Avail: NTIS HC A04/MF A01

We explain recent observations by Hickmott, et al., of sequential longitudinal optic phonon emission in tunneling currents of GaAs-Al sub x/Ga sub 1-x As heterojunctions in terms of inhomogeneous tunneling and a magnetopolaronic mass correction. DOE

N86-19533# Department of the Army, Washington, D. C.
MILLIMETER WAVE-INFRARED BLOCH OSCILLATOR/DETECTOR Patent Application
G. J. Iafrate (Department of the Army, Washington, D.C.), R. J. Malik (Department of the Army, Washinton, D.C), and T. R. AuCoin, inventors (to Army) (Department of the Army, Washington, D.C.) Filed 5 Sep. 1985 43 p
(AD-D011950; US-Patent-Appl-SN-772971) Avail: NTIS HC A03/MF A01 CSCL 09/5

This invention relates generally to semiconductive devices and more particularly to planar doped barrier and superlattice devices. An electronic oscillator being operable to detect millimeter wave and infrared frequency output signals over the range of 1-1000GHz consists of a semiconductor device having a structure comprised of a first planar doped barrier region separated from a second planar doped barrier region by a superlattice region. Upon the application of a uniform electric field, the first planar doped barrier region operates as a means for injecting electrons into the superlattice region which then traverse to the second planar doped barrier region which operates as means for receiving the electrons. During transit through the superlattice region, the electrons undergo an oscillatory motion thereby making possible the detection

of signals whose frequency is a function of the applied voltage and the periodic spacing of the superlattice. GRA

N86-19534# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
THE POWER DENSITY SPECTRA OF SOME nB(n+1)B BLOCK CODED SIGNALS
Guenter Morgenstern Mar. 1985 111 p refs In GERMAN; ENGLISH summary
(FI-44-TBr-98) Avail: NTIS HC A06/MF A01

Power density spectra of nB(n+1)B block coded signals were investigated. The coding laws of right 1B2B block codes, including the Miller code, CMI code, Manchester code and DMI code, and of a 3B4B and a 5B6B block code were compiled according to a general criterion as nB(n+1)B block codes. A 1B2B block code called AMAZI code was proposed. The power density spectra of the signals coded according to these codes were calculated for arbitrary pulse shapes and for rectangular pulses of the entire symbol length. Explicit formulas were derived and plotted. All calculations and results refer to binary input sequences where both amplitudes are equally probable and where the amplitudes of different binary elements are statistically independent. Author (ESA)

N86-19535# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
SIMULATION OF THE TRANSMISSION BEHAVIOR OF A GLASS FIBER SECTION, EXCLUSIVELY WITH THE HELP OF A SIMULATION PROGRAM SYSTEM FOR THE ANALYSIS OF ELECTRONIC CIRCUITS [SIMULATION DES UEBERTRAGUNGSVERHALTENS EINER GLASFASERUEBERTRAGUNGSSTRECKE MIT AUSSCHLIESSLICHER HILFE EINES SIMULATIONSPROGRAMMSYSTEMS ZUR ANALYSE ELEKTRONISCHER SCHALTUNGEN]
Gerhard Zesch Mar. 1985 94 p refs In GERMAN
(FI-441-TBr-3) Avail: NTIS HC A05/MF A01

The simulation of the transmission behavior of a glass fiber transmission section using a digital computer, and the required preparations are described. The simulation was performed only with the help of a program system for the analysis of electronic circuits. The starting points for the simulation were the circuit plans of the emitter and receiver electronics, and the results of measurements on parts of the section. Calculations were performed to experimentally demonstrate the possibility of a section simulation with the chosen simulation procedure. The calculations show that processes which are difficult to measure or inaccessible to measurements can be represented and evaluated by the present simulation. The calculated results agree with practical results. Author (ESA)

N86-19536# Institute for Telecommunication Sciences, Boulder, Colo.
EFFECTS OF NARROW-BAND FILTERS ON THE OUTPUT ENALYTICAL EXTENSION OF THE BEDROSIAN-RICE FORMULATION
D. Middleton Apr. 1985 20 p
(PB85-216067; NTIA-CR-85-34) Avail: NTIS HC A02/MF A01 CSCL 09E

The problem of determining the wave-form distortion produced by a (symetrical) narrow-band linear filter when an off-tune, simultaneously amplitude- and angle-modulated carrier is introduced, is analytically solved by an extension of the Bedrosian-Rice approach. Here, both the instantaneous angle and envelope of the resulting narrow-band output are determined. The results provide a basis for numerical calculations and extension to the more complex problem of interference effects produced by multiple inputs of the above type. GRA

N86-19537# Science Applications International Corp., La Jolla, Calif.
JTECH(JAPANESE TECHNOLOGY EVALUATION PROGRAM) PANEL REPORT ON OPTO- AND MICROELECTRONICS Final Report
H. Wieder and W. Spicer May 1985 251 p refs
(Contract TA-83-SAC-02254; Grant NSF PRA-85-13755)
(PB85-242402; JTECH-TAR-8403; NSF/PRA-85012) Avail: NTIS HC A12/MF A01 CSCL 09E

The panel report evaluates and compares research and development (R&D) in Japan and the U.S. in solid state electronics and opto-electronics. Analysis reveals trends which, when extrapolated, suggest that quantum mechanically-based dimensionally constrained devices and integrated circuits may represent the most significant future electronic and electro-optic data and signal processing options. The Japanese are shown to be aggressive in acquiring, improving, and implementing these technologies, whose conceptual aspects were developed in the U.S. Presently, the United States' scientific and technological efforts concerning the future generation of solid state electronics are slightly ahead of Japan's; however, the Japanese are trying to maintain their adaptive product-oriented R and D while at the same time encouraging original creative fundamental and applied research on all aspects of solid state electronics and electro-optics. Continuous monitoring of trends in microelectronics is recommended. GRA

N86-19452# Joint Publications Research Service, Arlington, Va.
CONDUCTIVE OXIDES DESCRIBED
Hiroyoshi Takagi, Jyunzoh Tasaki, and Ippei Nakagawa *In its* Japan Report: Science and Technology (JPRS-JST-86-003) 11 Feb. 1986 p 53-74 refs Transl. into ENGLISH from Kogyo Zairyo (Tokyo, Japan), v. 32, no. 13, Dec. 1984 p 56-66 (For primary document see N86-19446 10-26)
Avail: NTIS HC A05/MF A01

N86-19486# Joint Publications Research Service, Arlington, Va.
PRODUCTION, APPLICATION OF PIEZOELECTRIC CERAMICS DESCRIBED
Jiro Inoue *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 16-23 refs Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Apr. 1985 p 1-4 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-19538 Tulane Univ., New Orleans, La.
APPLICATIONS OF THE FORMAL VARIATIONAL CALCULUS TO THE EQUATIONS OF FLUID DYNAMICS Ph.D. Thesis
John Michael Verosky 1985 116 p
Avail: Univ. Microfilms Order No. DA8515178

The Formal Variational Calculus is applied to the equations of fluid dynamics. In particular, it is shown that the equations for one-dimensional isentropic compressible flow have infinitely many higher order symmetries and a first order conservation law. The notion of a generalized fluid equation is introduced and is shown that the incompressible fluid equations inherit their Hamiltonian structure from the compressible ones. Finally, the behavior of certain Hamiltonian structures under a change in dependent variables is examined. Author

N86-19539 New South Wales Univ., Kensington (Australia).
PRECIPITATION OF CALCIUM CARBONATE AND ITS IMPACT ON HEAT EXCHANGERS OF COOLING WATER SYSTEMS Abstract Only
Cheng Hoong Kuo Nov. 1984 3 p
Avail: Issuing Activity

The solubility of calcium carbonate decreases with increasing temperature. It can therefore precipitate in cooling water systems, causing a loss of thermal efficiency. In order to be relevant to

cooling water systems, the calcium carbonate precipitation was studied in an unseeded batch stirred reactor. Three crystallographic forms of calcium carbonate were observed in the experiments covering a wide range of degrees of supersaturation, stirring speeds and temperatures. The interfacial energies of calcite and vaterite were calculated. An empirical expression for secondary nucleation incorporating power was derived. The mechanism of crystallization was established as surface-reaction controlled and the kinetics expressed by the Davies and Jones equation. This led to the calculation of overall growth rate constants of calcite and vaterite. Scaling in the heat exchangers was studied at pilot plant scale by a test rig constructed to model the Lake Liddell power station cooling water system. The threshold Langelier Index for scaling to occur was found to be 1.40 and 1.25 with ion pair consideration. This indicates that the traditional +1.0 Langelier Index recommended for power station cooling water practice is justified. The threshold Langelier Index calculated at the heat transfer surface temperature was 1.69 and 1.52 with ion pair consideration. M.G.

N86-19540 New South Wales Univ., Kensington (Australia).
A FOURIER APPROXIMATION METHOD FOR STEADY WAVES OVER TWO LAYERS OF FLUID OF DIFFERENT DENSITIES Abstract Only
Percy Pison Hibbinga Gessa Mar. 1985 3 p
Avail: Issuing Activity

Rienecker and Fenton's (1981) numerical method for steady water waves is extended to investigate the effects of varying densities on surface gravity waves for a two layer model. There are no analytical approximations made and a finite Fourier series is used to give a set of non-linear equations which can be solved by Newton's method. The necessary derivatives needed in the Jacobian matrix are evaluated numerically, making the coding rather simpler. The results obtained for the homogeneous fluid agree closely when compared with known results for wave speed from Cokelet (1977). Author

N86-19541 State Univ. of New York, Buffalo.
THE GENERATION OF CAPILLARY INSTABILITIES BY EXTERNAL DISTURBANCES IN A LIQUID JET Ph.D. Thesis
Stewart James Leib 1985 95 p
Avail: Univ. Microfilms Order No. DA8518762

The receptivity problem in a circular liquid jet is considered. A time harmonic axial pressure gradient is imposed on the steady, parallel flow of a jet of liquid emerging from a circular duct. Using a technique developed in plasma physics a causal solution to the forced problem is obtained over certain ranges of Weber number of a number of mean velocity profiles. This solution contains a term which grows exponentially in the downstream direction and can be identified with a capillary instability wave. Hence it is found that the externally imposed disturbances can indeed trigger instability waves in a liquid jet. The amplitude of the instability wave generated relative to the amplitude of the forcing is computed numerically for a number of cases. Dissert. Abstr.

N86-19542 Illinois Univ., Urbana-Champaign.
RADIATION HEAT TRANSFER IN ANISOTROPICALLY SCATTERING MEDIA Ph.D. Thesis
HaeOk Lee 1985 215 p
Avail: Univ. Microfilms Order No. DA8521814

Radiation heat transfer in anisotropically scattering media is considered. Scaling laws are formulated to predict the radiant heat flux in anisotropically scattering, one-dimensional planar media. The accuracy in scaling the radiative heat flux in isothermal, homogeneous media is shown to be excellent. The radiant scaling laws are applied to combined mode heat transfer problems which require the solution of the energy equation for the temperature profile. The average incident radiation which represents the radiation contribution to the energy equation, is accurately scaled by the multilayer solution technique. The heat flux and the temperature distributions are predicted accurately. A single scattering experiment is developed to study anisotropically scattering media in the infrared. The stationary detection system measures the angular scattered energy at selected wavelengths. Direct comparison of the experimental phase function data with Mie theory calculations is presented for a test medium of soda-lime glass beads with a known size distribution and published refractive indices. The computations predict scatterin phase functions and asymmetry factors based upon Mie theory for any size distribution and optical properties. The good agreement in the phase functions and the asymmetry factors validate the experimental setup. Dissert. Abstr.

N86-19543 Rensselaer Polytechnic Inst., Troy, N.Y.
NUMERICAL ANALYSIS AND OPTIMAL CONTROL OF FLUID TRANSIENTS DUE TO VALVE OPERATIONS Ph.D. Thesis
Roger Cheng-Fang Hsiao 1985 175 p
Avail: Univ. Microfilms Order No. DA8519496

Transient-state flow of highly compressible liquids through closed conduits with linearly elastic walls are described by a set of quasi-linear, hyperbolic, partial differential equations. Two numerical methods, Richtmyer and MacCormack methods with modifications, are introduced to analyze the transient flows due to valve operations. These two-step methods yield conditionally stable computation and second-order accuracy. The details of these methods as well as characteristics methods for a typical single pipeline system are presented and compared. It is shown that with the largest possible grid-mesh ratio these second-order methods provide better accuracy than characteristics method does for those piping system whose friction losses are relatively important and whose fluid is highly compressible. Characteristics method yields unstable computation for such a system. Transient flow caused by valve operations can be controlled by operating the valve in a proper manner. A control system approach to determine this optimal valve control is presented also. Dissert. Abstr.

N86-19544 Illinois Univ., Urbana-Champaign.
EXPERIMENTAL AND MATHEMATICAL MODELING OF THE INTERACTION OF A PERTURBED FREE SHEAR LAYER WITH A FLAT PLATE Ph.D. Thesis
Parviz Merati 1985 179 p
Avail: Univ. Microfilms Order No. DA8521834

A mathematical model which predicts the upstream effects of the impingement of shear layers on a solid boundary located in the linear region of the shear layer is developed. The model is compared with experimental results. The experimental results and the model suggest that the oscillations that are most amplified are those whose feedback signals from the disturbance plate are nearly in phase with the wave at the splitter plate separation edge. This causes the frequency of the oscillations to gradually decreases as the plate is moved downstream. This drop continues until a certain impingement length is reached where the oscillations can not sustain themselves and by addition of an extra wavelength between the splitter plate and plate leading edge, the phase condition is again satisfied. The effect of a plate located in the nonlinear region on the flowfield of a shear layer is investigated experimentally. This phase of the study places emphasis on the three main regions of the shear layer flow interacting with a plate: the impingement region, the plate region and the wake region. Dissert. Abstr.

N86-19545 Purdue Univ., West Lafayette, Ind.
MELTING AROUND A MIGRATING HEAT SOURCE
Mohammed Karim Moallemi 1985 341 p
Avail: Univ. Microfilms Order No. DA8520051

The problem of melting around a migrating heat source which arises in applications such as nuclear technology, geophysics and materials processing was studied. Experiments were performed with horizontal cylindrical heat sources (with either constant surface temperature or constant surface heat flux) which were designed to descend while melting the phase-change material surrounding it. The experiments with n-octadecane provided phenomenological understanding as well as quantitative data on the flow field and melting around the descending source. Important transport mechanisms were identified and the domain and extent of their

influence were investigated. Approximate analytical and numerical solution methods were developed based on realistic models inferred from the experiments. Conduction was found to be the dominant heat transfer mechanism around the lower stagnation point of the source where the source and the solid are separated by a thin melt layer. Dissert. Abstr.

N86-19546 Harvard Univ., Cambridge, Mass.
A CLASS OF INSTABILITIES ASSOCIATED WITH STREAMWISE VORTICITY Ph.D. Thesis
Carl Frederick Kemp Pearson 1985 169 p
Avail: Univ. Microfilms Order No. DA8520267

An investigation of the evolution and stability of streamwise vortical structures imbedded in shearing flows has been undertaken. An exact similarity solution for the alteration of the streamwise velocity field under the influence of a viscous, diffusing vortex is presented. A numerical scheme developed to analyze the linear stability of the derived flowfields is described; validation of the approach in flows whose stability is known is undertaken. The method is then applied to the problem of the stability of the actual vortex induced flow field; linear instability with strong analogies to classical two dimensional inviscid theory is found over a range of relevant physical parameters. The relevance of the calculation to the observed instabilities of coherent vortical structures in turbulent flows is discussed. Dissert. Abstr.

N86-19547 Louisiana State Univ., Baton Rouge.
THE VELOCITY AND SHAPE OF GAS SLUGS RISING IN VERTICAL TUBES AND RECTANGULAR SLOTS Ph.D. Thesis
Henry Valma Nickens 1984 310 p
Avail: Univ. Microfilms Order No. DA8515148

The rise of a large gas bubble, or slug, through a closed, vertical, liquid filled channel of infinite length was investigated by means of potential flow theory. Three channel geometries are considered: circular tube, two dimensional rectangular channel and three dimensional rectangular slot. The effect of interfacial surface tension is explicitly accounted for by application of the Kelvin-LaPlace equation, thus making the bubble shape and integral part of the solution. For the circular tube of radius R and diameter D, the solution is expressed in terms of the Stokes Stream Function which consists of an infinite Bessel Function series. The resultant equations were solved numerically for the first six terms in the series. Dissert. Abstr.

N86-19548 Rensselaer Polytechnic Inst., Troy, N.Y.
A SIMPLIFIED APPROACH TO LAMINAR SEPARATION BUBBLES Ph.D. Thesis
Cynthia M. Poslusny 1985 258 p
Avail: Univ. Microfilms Order No. DA8519510

A simple method is developed for modeling the flow and heat transfer in steady two-dimensional laminar boundary layer flows containing thin separation bubbles. The boundary layer in the local interactive region is divided into two1 layers: a viscous region near the wall and a quasi-inviscid rotational layer. The streamline which divides these two regions is somewhat arbitrary at the outset; but numerous calculations and comparisons with interacting boundary layer and triple-deck results show that, within a certain range based on the length scale of the problem, the results are insensitive to its choice. The viscous layer establishes a simple relationship between the pressure distribution and either the wall shear stress or streamline variation. Investigions of solutions to these equations show that certain constraints must be satisfied by a pressure distribution at and between separation and reattachment, thus demonstrating why difficulties are encountered in calculating through separation with a fixed pressure distribution. Furthermore, the general features of the solutions which can be obtained through an inverse method of solution be qualitatively typical of separated flows. When this model is applied to several basic geometries, solution of the nonlinear ordinary differential equation for the pressure and that for the outer elliptic flow which includes the displacement effect of the boundary layer requires only several seconds of computation time yet yields results for the boundary layer quantities of interest that agree well with results of detailed numerical investigations. Dissert. Abstr.

N86-19549 Notre Dame Univ., Ind.
A NUMERICAL INVESTIGATION OF VISCOUS, INCOMPRESSIBLE FLOW PAST AN AXISYMMETRIC BODY WITH AND WITHOUT SPIN Ph.D. Thesis
Kurt Francis Weber 1985 141 p
Avail: Univ. Microfilms Order No. DA8520690

This study deals with a preliminary investigation of the effects of spin on the axisymmetric flow past a body of revolution. The study has its genesis larger problem of Magnus forces on spinning bodies at angle of attack. However, the fundamental behavior that arises when a spinning body is placed in a uniform stream is still not well understood; therefore, the problem of axisymmetric flow with spin was undertaken. The body consists of a 3-caliber cant-ogive blunted by a spherical nosecap, a 2-caliber cylindrical section, and a 1-caliber boattail. Numerical solutions of the compressible laminar Navier-Stokes equations are obtained using a modified version of the implicit-explicit method developed by MacCormack in 1981. The benchmark problem is the nonspinning body in uniform flow at a Reynolds number of 1.14. The results show that the modified method performs well and allows time steps that are in order of magnitude greater than those permitted by explicit stability criteria. Dissert. Abstr.

N86-19550 California Inst. of Tech., Pasadena.
EFFECTS OF A PERIODIC DISTURBANCE ON STRUCTURE AND MIXING IN TURBULENT SHEAR LAYERS AND WAVES Ph.D. Thesis
Frederick Allen Roberts 1985 226 p
Avail: Univ. Microfilms Order No. DA8519561

Large scale structure and mixing processes are investigated in chemically reacting wakes and shear layers to which a periodic disturbance is applied. A diffusion limited acid base reaction is employed to directly measure the extent of mixing. Optical diagnostics used include laser absorption and laser induced fluorescence. Absorption of laser light by reacted product provides a measure of cross stream average product. Fluorescence was measured to obtain the product distribution across the layer. Forcing artificially extends the lifetime of vortices whose size is consistent with the disturbance wavelength. Amalgamation of smaller vortices is enhanced over that in the natural layer until the frequency locked scale is achieved. At high Reynolds number product measurements show reduction of product with forcing. At moderate Reynolds numbers, on the other hand, there is an increase in product when forced. The differences are related to the different effects of forcing on entrainment, composition ratio and secondary structure. Dissert. Abstr.

N86-19551 Lehigh Univ., Bethlehem, Pa.
THE VISCOUS FLOW INDUCED NEAR A WALL BY COUNTER-ROTATING VORTEX PAIRS AND VORTEX LOOPS Ph.D. Thesis
Seyhan Ersoy 1985 352 p
Avail: Univ. Microfilms Order No. DA8516248

Vortex motion above walls is observed in a variety of physical situations. All of the vortex flows considered in this study are related to more complex vortex flows observed in a diverse variety of physical situations. The boundary layer induced by a pair of counter-rotating rectilinear vortices in motion above a plane in an otherwise stagnant fluid is addressed. A symmetric situation is considered where both vortices are equidistant from the wall. An asymmetric situation is considered where a counter-rotating pair approaches the wall at angle of attack. The calculated results for the boundary layer flow reveal a variety of unusual and complex unsteady separation effects; in most cases, the numerical solutions ultimately show strong localized and explosive boundary layer growth. The calculated results suggest that a boundary layer eruption is to be expected once a vortex pair is close to the wall. The motion of three-dimensional vortex loops which have a plane of symmetry is considered. Dissert. Abstr.

N86-19552 Rensselaer Polytechnic Inst., Troy, N.Y.
AN EXPERIMENTAL STUDY IN LEADING EDGE SEPARATING-REATTACHING BOUNDARY LAYER FLOWS Ph.D. Thesis
William James Bellows, Jr. 1985 247 p
Avail: Univ. Microfilms Order No. DA8519483

Laminar separation and turbulent reattachment was investigated. The study was conducted on a simple, two-dimensional geometry in a low speed wind tunnel facility. A recently developed constant heat flux surface, instrumented with thermocouples, was used to acquire local heat transfer coefficients. Velocity, temperature, and turbulence intensity profiles were measured using a hot wire sensor as a dual purpose anemometer and resistance thermometer. A precise examination of the reattaching flow lead to the conclusion that the flow was in a highly nonequilibrium state, resulting in heat transfer rates greater than predicted by equilibrium theories or computer codes. The conclusion to be reached is that the use of a simple turbulent heat transfer mechanism at reattachment is incorrect. The key to revising such near equilibrium models is to account for the higher turbulence and shear stress levels and their downstream decay.
Dissert. Abstr.

N86-19553# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
SOME ASPECTS OF SHOCK-WAVE RESEARCH
I. I. Glass Jan. 1986 114 p refs Presented at the 24th AIAA Aerospace Sciences Meeting, Reno, Nev., 7 Jan. 1986
(UTIAS-Review-48; AIAA-86-0306; ISSN-0082-5247) Avail: NTIS HC A06/MF A01

Examples are given of shock-wave phenomena on Earth and in space. A specific shock-wave research problem, namely, pseudostationary oblique shock-wave reflections in perfect and imperfect gases is presented. Consideration is given to what has been achieved to date by using two- and three-shock theory to predict what type of reflection results when a planar shock wave M sub s, in a shock tube, collides with a sharp compressive wedge of angle, theta sub w. Experimental (interferometric and other optical) data are presented in (M sub s, theta sub w)-plots for argon, nitrogen, oxygen, air carbon-dioxide, Freon 12 and sulfurhexafluoride, in order to check the validity of the analytically predicted regions and transition lines of the four types of reflection (RR, SMR, CMR, DMR). Some disagreements are noted and discussed. Our interferometric isopycnic data are also compared with state-of-the-art computational results from a solution of the inviscid Euler equations using a CRAY I computer. Good agreement was obtained, yet, it would be important to obtain new data by solving the Navier-Stokes equations, as well as the rate equations for imperfect-gas excitations, in order to judge the improvement obtained with real-flow interferograms.
Author

N86-19554*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WAVE PHENOMENA IN A HIGH REYNOLDS NUMBER COMPRESSIBLE BOUNDARY LAYER Final Report
Alvin Bayliss (Exxon Corporate Research Science Labs.), Lucio Maestrello, Paresh Parikh (Vigyan Research Associates, Inc., Hampton, Va.), and Eli Turkel Nov. 1985 26 p refs Presented at Workshop on Stability of Time-Dependent and Spatially Varying Flows Submitted for publication
(Contracts NAS1-17070; NAS1-18107; NAS1-17919)
(NASA-CR-178025; ICASE-85-56; NAS 1.26:178025) Avail: NTIS HC A03/MF A01 CSCL 20D

Growth of unstable disturbances in a high Reynolds number compressible boundary layer is numerically simulated. Localized periodic surface heating and cooling as a means of active control of these disturbances is studied. It is shown that compressibility in itself stabilizes the flow but at a lower Mach number, significant nonlinear distortions are produced. Phase cancellation is shown to be an effective mechanism for active boundary layer control.
Author

N86-19555*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A MODEL FOR THE INFLUENCE OF PRESSURE ON THE BULK MODULUS AND THE INFLUENCE OF TEMPERATURE ON THE SOLIDIFICATION PRESSURE FOR LIQUID LUBRICANTS
Bo O. Jacobson and Pascal Vinet 1986 21 p refs Proposed for presentation at the 1986 AMSE/ASLE Tribology Conference, Pittsburgh, Pa., 19-22 Oct. 1986
(NASA-TM-87230; E-2833; NAS 1.15:87230) Avail: NTIS HC A02/MF A01 CSCL 20D

Two pressure chambers, for compression experiments with liquids from zero to 2.2 GPa pressure, are described. The experimentally measured compressions are then compared to theoretical values given by an isothermal model of equation of state recently introduced for solids. The model describes the pressure and bulk modulus as a function of compression for different types of lubricants with a very high accuracy up to the pressure limit of the high pressure chamber used (2.2 GPa). In addition the influence of temperature on static solidification pressure was found to be a simple function of the thermal expansion of the fluid.
Author

N86-19556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STARVATION EFFECTS ON THE HYDRODYNAMIC LUBRICATION OF RIGID NONCONFORMAL CONTACTS IN COMBINED ROLLING AND NORMAL MOTION
M. K. Ghosh, B. J. Hamrock (Ohio State Univ., Columbus), and D. E. Brewe (Army Aviation Research and Technology Activity, Cleveland, Ohio) 1986 28 p refs
(NASA-TM-87174; E-2817; NAS 1.15:87174;
USAAVSCOM-TR-85-C-20) Avail: NTIS HC A03/MF A01 CSCL 20D

The effect of inlet starvation on the hydrodynamic lubrication of lightly loaded rigid nonconformal contacts in combined rolling and normal motion is determined through a numerical solution of the Reynolds' equation for an isoviscous, incompressible lubricant. Starvation is effected by systematically reducing the fluid inlet level. The pressures are taken to be ambient at the inlet meniscus boundary and Reynolds' boundary condition is applied for film rupture in the exit region. Results are presented for the dynamic performance of the starved contacts in combined rolling and normal motion for both normal approach and separation. During normal approach the dynamic load ratio (i.e. ratio of dynamic to steady state load capacity) increases considerably with increase in the inlet starvation. The effect of starvation on the dynamic peak pressure ratio is relatively small. Further, it has been observed that with increasing starvation, film thickness effects become significant in the dynamic behavior of the nonconformal contacts. For significantly starved contacts the dynamic load ratio increases with increase in film thickness during normal approach and a similar reduction is observed during separation. A similar effect is noted for the dynamic peak pressure ratio.
Author

N86-19557*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICATION OF CFD TO AEROTHERMAL HEATING PROBLEMS
Michele G. Macaraeg Jan. 1986 13 p refs Presented at the 24th AIAA Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986
(NASA-TM-87670; NAS 1.15:87670) Avail: NTIS HC A02/MF A01 CSCL 20D

Numerical solutions of the compressible Navier-Stokes equations by an alternating direction implicit scheme, applied to two experimental investigations are presented. The first is cooling by injection of a gas jet through the nose of an ogive-cone, and the second is the aerothermal environment in the gap formed by the wing and elevon section of a test model of the space shuttle. The simulations demonstrate that accurate pressure calculations are easily obtained on a coarse grid, while convergence is obtained after the residual reduces by four orders of magnitude. Accurate heating rates, however, require a fine grid solution, with convergence requiring at least a reduction of six orders of magnitude in

the residual. The effect of artificial dissipation on numerical results is also assessed. E.A.K.

N86-19558*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TWO-PHASE FLOWS AND HEAT TRANSFER WITHIN SYSTEMS WITH AMBIENT PRESSURE ABOVE THE THERMODYNAMIC CRITICAL PRESSURE
R. C. Hendricks, M. J. Braun (Akron Univ., Ohio), and R. L. Mullen (Case Western Reserve Univ., Cleveland, Ohio) 1986 8 p refs
Proposed for presentation at the 8th International Heat Transfer Conference, San Francisco, Calif., 17-22 Aug. 1986
(NASA-TM-87228; E-2897; NAS 1.15:87228) Avail: NTIS HC A02/MF A01 CSCL 20D

In systems where the design inlet and outlet pressures P sub amb are maintained above the thermodynamic critical pressure P sub c, it is often assumed that heat and mass transfer are governed by single-phase relations and that two-phase flows cannot occur. This simple rule of thumb is adequate in many low-power designs but is inadequate for high-performance turbomachines, boilers, and other systems where two-phase regions can exist even though P sub amb > P sub c. Heat and mass transfer and rotordynamic-fluid-mechanic restoring forces depend on momentum differences, and those for a two-phase zone can differ significantly from those for a single-phase zone. By using a laminar, variable-property bearing code and a rotating boiler code, pressure and temperature surfaces were determined that illustrate nesting of a two-phase region within a supercritical pressure region. The method of corresponding states is applied to bearings with reasonable rapport. E.A.K.

N86-19559# AETA Corp., Dover, N.H.
LIQUID-VAPOR FLOW REGIME TRANSITIONS FOR USE IN DESIGN OF HEAT TRANSFER LOOPS IN SPACECRAFT: AN INVESTIGATION OF TWO-PHASE FLOW IN ZERO GRAVITY CONDITIONS Final Report, 21 Sep. 1984 - 21 Mar. 1985
T. W. Lovell May 1985 125 p
(Contract F33615-84-C-3413)
(AD-A159646; AFWAL-TR-85-3021) Avail: NTIS HC A06/MF A01 CSCL 20/4

The behavior of viscous (or low velocity) two-phase vapor-liquid flow under zero gravity was simulated in the laboratory by using two immiscible fluids of equal density flowing together in a one inch diameter glass tube. The fluids used were Polypropylene Glycol (PPG) which simulated the liquid phase and water which simulated the vapor phase. Various tests were conducted varying flow rates and entrance conditions. Four existing flow regime models were analyzed, modeled on a computer, and extrapolated to predict zero-gravity conditions. The flow regimes were the Horizontal Dukler-Taitel, Vertical Dukler-Taitel, Vertical Weisman and Horizontal Weisman. None of these models when extrapolated to zero-g conditions agreed well with the lab data, and some of the observed flow regimes were not predicted at all. GRA

N86-19560# Naval Postgraduate School, Monterey, Calif.
THE EFFECTIVENESS OF HEAT EXCHANGERS WITH ONE SHELL PASS AND THREE TUBE PASSES M.S. Thesis
M. S. OHare Jun. 1985 205 p
(AD-A159706) Avail: NTIS HC A10/MF A01 CSCL 20/13

Heat exchangers with one shell pass and n tube passes are often referred to as 1-n exchangers. The heat transfer literature contains many references to studies of 1-n exchangers when n is even but apparently little work has been done with respect to the 1-n exchanger when n is odd. This thesis greatly expands the theoretical study of 1-n exchangers with n being odd. While a completely closed form solution was found to be unfeasible, a polynomial approximation has been developed that yields the effectiveness (epsilon) of the two possible arrangements of the 1-3 exchanger as a function of the capacity rate ratio (R) and the number of transfer units (N sub tu). It is also shown that the effectiveness of the arrangement with two counterflow and one parallel flow tube side passes exceeds that of some of the 1-n exchangers with n even. GRA

N86-19561# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
TURBULENT NONCONDENSING AND CONDENSING GAS JETS IN LIQUIDS Final Report, 15 Dec. 1984 - 31 Jul. 1985
T. Y. Sun, S. G. Chuech, R. N. Parthasarathy, and G. M. Faeth Aug. 1985 43 p
(Contract N00014-85-K-0148)
(AD-A160326) Avail: NTIS HC A03/MF A01 CSCL 20/4

Gas injection into liquids is a fundamental multiphase flow which has several direct applications, e.g., stored chemical energy propulsion systems (SCEPS), direct-contact condensers, gas dissolution systems, reservoir destratification systems and nuclear-reactor pressure suppression systems. Stability of these flow is enhanced when an underexpanded jet is used; therefore, the interaction of supersonic wave structures with liquids in turbulent flow is also an issue. The objective of this phase of the study was to develop test apparatus relating to underexpanded air jets in air and turbulent subsonic gas jets in liquids. The air-jet-in-air apparatus was assembled and flow visualization tests were completed using continuous and spark Schlieren photography. Test apparatus for gas injection in liquids was assembled. Tests were also undertaken to study injector stability. Test results showed that jet instability for subsonic (adapted) flow could be controlled by placing a screen across the jet exit and controlling gas release at the surface or the bath (which can cause undesirable pressure fluctuations in the bath). For stable jets, the liquid/gas interface is continous near the jet exit and its position is influenced by the degree of underexpansion. A bubble cloud was observed near the interface, and it is also probable that a drop cloud in present as well. Analysis of this flow for subsonic jet exit conditions was implemented using the locally homogeneous flow approximation of multiphase flow. GRA

N86-19562# Calspan Advanced Technology Center, Buffalo, N.Y.
NON-REACTING MIXING COMPONENTS. REVISION 1 Final Report, Nov. 1979 - Aug. 1985
C. Padova Sep. 1985 164 p
(Contract F04611-80-C-0011)
(AD-A160894; CALSPAN-6632-A-3-Rev-1; AFRPL-TR-85-066-Rev-1) Avail: NTIS HC A08/MF A01 CSCL 20/4

Detailed measurements of pressure, temperature and gas composition in coflowing streams have been obtained for a variety of relative Mach numbers and density ratios. These measurements were aimed to provide a comprehensive data base from which compressibility corrections can be calculated for the turbulence models used in the JANNAF Standard Plume Flowfield Model (SPF). Using a short-duration testing technique, low altitude non-reacting plume flowfields were simulated in which compressible turbulent mixing of coaxial supersonic jets occurred in a preevacuated altitude chamber. A ratio of the mixing jet diameters of 13:1 was obtained using an apparatus consisting of a 3-inch exit diameter nozzle/supply within the large-scale Calspan Ludwieg Tube. GRA

N86-19563# Wisconsin Univ., Madison. Mathematics Research Center.
CONCAVITY OF SOLUTIONS OF THE POROUS MEDIUM EQUATION Technical Summary Report
Philippe Benilan and Juan L. Vazquez Aug. 1985 27 p
(Contract DAAG29-80-C-0041)
(AD-A160969; MRC-TSR-2851) Avail: NTIS HC A03/MF A01 CSCL 12/1

The flow of a gas through a porous medium is governed by a degenerate quasilinear parabolic equation. It is known that the nonnegative solutions to this equation possess a lower bound for the second derivative of the pressure in the spatial variables. This bound plays an important role in the mathematical treatment and is related to the entropy of the flow. Since the solutions exhibit interfaces across which v sub x jumps positively, no upper bound is possible globally for v sub xx. Nevertheless it is proven that the concavity of v(.,t) in the region where v is positive is preserved in time. This is in itself an interesting geometric property of the

solution. It also allows one to obtain precise information about the asymptotic behavior of the flow. GRA

N86-19564# Wisconsin Univ., Madison.
ON THE SECONDARY BIFURCATION OF THREE DIMENSIONAL STANDING WAVES Technical Summary Report
Thomas J. Bridges Jul. 1985 56 p
(Contract DAAG29-80-C-0041)
(AD-A160971; MRC-TSR-2839) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper contains and analysis of the complex set of periodic solutions which may occur in a fluid filled vessel of rectangular cross section. A previous analysis by Verma and Keller found only simple eigenvalues for the linearized problem. It is shown herein that at critical values of the vessel aspect ratio double eigenvalues occur. Eight nonlinear solution branches are emitted from these double eigenvalues. The solutions along the various branches are derived, and the results displayed graphically. It is shown that irregular waves occur along some of these branches. In an interesting development, Bauer, Keller, and Reiss, in their analysis of shell buckling, showed that the splitting of multiple eigenvalues may lead to secondary bifurcation. This theory is applied to the nonlinear standing wave problem herein, and it is shown that secondary bifurcation does occur in the neighborhood of the double eigenvalue. A perturbation method is used to find the secondary bifurcation points, and the solutions along the secondary branches, in the neighborhood of their respective branch points, are found. The neighborhood around the critical aspect ratios is substantial, suggesting that secondary branching may occur in a variety of vessels with rectangular cross section. This theory offers an explanation of the irregular waves often observed in the sloshing of fluid in a rectangular vessel. GRA

N86-19565# Wisconsin Univ., Madison. Mathematics Research Center.
THE MOTION OF ELLIPSOIDS IN A SECOND ORDER FLUID Technical Summary Report
Sangtae Kim Sep. 1985 27 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A160973; MRC-TSR-2864) Avail: NTIS HC A03/MF A01 CSCL 12/1

The rigid body motion of an ellipsoid in a second order fluid (SOF) under the action of specified (time independent) external forces and torques have been obtained to first order in the Weissenberg number by inverting the resistance relations for the force an torque under specified rigid body motions. The reciprocal theorem of Lorentz was used to bypass the calculation of the O(W) velocity field. The results agree with known analytic solutions for SOF with the secondary to primary normal stress ratio of -1/2. The solution procedure was also tested by computing the torque on a translating prolate spheroid with aspect ratios ranging from slender bodies to near-spheres. One result is that for a SOF with zero secondary normal stress (Weissenberg fluid), previous asymptotic results for near-spheres were found to be accurate even at fairly large aspect ratios. New results of nondegenerate ellipsoids suggest that the orientation (as monitored by Euler angles) and trajectory of sedimenting, nonaxisymmetric particles such as ellipsoids provide useful information on the rheology of the suspending fluid. Author (GRA)

N86-19566# Wisconsin Univ., Madison. Mathematics Research Center.
CALIBRATION OF HOLE-PRESSURE MEASUREMENTS IN NON-NEWTONIAN FLOW BY NUMERICAL METHODS Technical Summary Report
David S. Malkus Sep. 1985 17 p
(Contract DAAG29-80-C-0041; Grants AF-AFOSR-0141-85; NSF MCS-79-03542; NSF MCS-81-02089; NSF MCS-83-01433)
(AD-A160974; MRC-TSR-2863) Avail: NTIS HC A02/MF A01 CSCL 12/1

The crossed-triangle macroelement has been identified as and ideal element for Newtonian fluid flow calculations involving fluids with integral constitutive equations. In spite of an instability of the pressure approximation, these elements have been shown to have convergent velocities in Stokes flow, and there is strong evidence that pressure-smoothing schemes recover accurate pressures. Earlier studies by the author of Newtonian flow over transverse slots at low Reynolds numbers showed that excellent results could be obtained using the element. Studies of non-Newtonian flows in the same geometry showed good qualitative agreement with laboratory experiment but led to some puzzling predictions of the pressure difference between the top and bottom of the slot (the hole-pressure). In this paper, those puzzling predictions are reexamined, and the deviations from expectation are reinterpreted. They appear to make physical sense and have important ramifications for the calibration of devices which measure the primary normal-stress difference by continuous measurement of the hole-pressure. Author (GRA)

N86-19567# Wisconsin Univ., Madison. Mathematics Research Center.
A FAST ALGORITHM FOR NON-NEWTONIAN FLOW Technical Summary Report
David S. Malkus Sep. 1985 14 p
(Contract DAAG29-80-C-0041; Grants AF-AFOSR-0141-85; NSF MCS-79-03542; NSF MCS-81-02089)
(AD-A160977; MRC-TSR-2860) Avail: NTIS HC A02/MF A01 CSCL 12/1

The goals of the project described here are twofold: (1) to turn an existing pilot algorithm for the steady flow of non-Newtonian memory fluids into a robust and efficient algorithm; (2) render enhancements of the method's current capabilities computationally feasible such enhancements include fully coupled thermal dependence, material compressibility, and free surface flows. The pilot algorithm is a finite element method whose novelty lies in its computation of the stress field in a nonlinear iteration scheme. The stress at a point is a nonlocal functional of the current velocity iterate, and the pilot method has demonstrated the feasibility of reliable computation with such constitutive equations. Before the method can take its place as a reliable scientific and engineering tool, intensive effort must be made to reduce the computational cost in the manner described here. Author (GRA)

N86-19568# Wisconsin Univ., Madison. Mathematics Research Center.
A GLOBAL THEORY OF INTERNAL SOLITARY WAVES IN TWO-FLUID SYSTEMS Technical Summary Report
C. J. Amick and R. E. L. Turner Sep. 1985 95 p
(Contract DAAG29-80-C-0041; Grants NSF DMS-82-03338; NSF MCS-82-00406)
(AD-A160979; MRC-TSR-2861) Avail: NTIS HC A05/MF A01 CSCL 12/1

The study of single-crested progressing gravity waves was initiated over a century ago with the observations by Russell of what he termed solitary waves, which progressed without change of form over a considerable distance on the Glasgow-Edinburgh Canal. The mathematical analysis of this wave motion on the surface of water, begun in the nineteenth century, has undergone a rapid development in the last three decades, due to the scattering theory for the Korteweg-de Vries equation, which models the motion of long waves due to the development of techniques in nonlinear analysis allowing for the analysis of finite amplitude motions. The work on surfce waves has many parallels in the study of waves in fluids with variable density. In the case of a heterogeneous fluid with a free upper surface, gravity waves still occur, in analogy with surface waves in a fluid of constant density. What is distinctive about a fluid with density stratification, however, is the presence of waves which are predominantly due to the stratification and not to the free surface. These waves, called internal waves, exist in a heterogeneous fluid even when it is confined between horizontal boundaries, a configuration which precludes gravity waves in a fluid of constant density. This paper is concerned with progressing solitary gravity waves in a system consisting of two fluids of differing densities confined in a channel of unit depth and infinite horizontal extent. GRA

N86-19569# Naval Postgraduate School, Monterey, Calif.
THE EFFECTIVENESS OF HEAT EXCHANGERS WITH ONE SHELL PASS AND FIVE TUBE PASSES M.S. Thesis
Lawrence E. Hess Sep. 1985 122 p
(AD-A161019; AD-F620003) Avail: NTIS HC A06/MF A01 CSCL 13/1

Heat exchangers with one shell pass and n tube passes are often referred to as 1-n exchangers. The heat transfer literature contains many references to studies of 1-n exchangers when n is even but apparently, other than a single study and some work pertaining to the 1-3 exchanger at the Naval Postgraduate School, little work has been done with respect to the 1-n exchangers with n is odd. Ths thesis expands upon the study of 1-n exchangers with n being odd. While a completely closed form solution was found to be unfeasible, a polynomial approximation has been developed that yields the effectiveness (epsilon) of the two possible arrangements of the 1-5 exchanger as a function of the capacity rate ratio (R) and the number of transfer units (N sub tu). This will enable the analyst to consider exchangers where the inlet to and outlet from the tubes are at opposite ends of the exchanger. GRA

N86-19570# Naval Postgraduate School, Monterey, Calif.
EFFECT OF SMALL PRESSURE DISTURBANCES ON THE BREAKDOWN OF ROUND LAMINAR AND TURBULENT JETS M.S. Thesis
Zacharias Z. Gikas Sep. 1985 100 p
(AD-A161149) Avail: NTIS HC A05/MF A01 CSCL 20/4

The effect of small sinusoidal perturbations on the breakdown of circular water jets issuing from long tubes was investigated experimentally to examine how the mean velocity profile for a fully developed laminar, transitional and turbulent flow as well as the frequency affects the mechanism of breakdown of the jet flow. Observations using a high frequency stroboscope were recorded using a high speed photographic technique, for the most distinctive phenomena observed, for three selected Reynolds numbers corresponding to laminar, transitional and turbulent flow. Markedly different behavior of flow breakdown and droplet formation was observed for each of these flows as frequency waveform or phase angle was altered. GRA

N86-19571# Naval Postgraduate School, Monterey, Calif.
OSCILLATING FLOW ABOUT CIRCULAR CYLINDERS AT LOW KEULEGAN-CARPENTER NUMBERS M.S. Thesis
Nathan Q. S. Yuen Sep. 1985 40 p
(AD-A161186) Avail: NTIS HC A03/MF A01 CSCL 20/4

The in-line force and the resulting drag and inertia coefficients for smooth and rough circular cylinders immersed in a sinusoidally oscillating flow at low Keulegan-Carpenter numbers (K) have been determine experimentally and compared with those obtained theoretically by Stokes and Wang. In addition, flow visualization experiments were carried out with oscillating cylinders in a water table and the stability of the flow was investigated. The results have shown that for very low values of K, the flow about the cylinder is laminar, attached, and stable and the drag coefficient is nearly identical to that predicted theoretically. At a critical K, the flow becomes unstable to Taylor-Gortler vortices and the drag coefficient jumps to a higher value. Subsequently, the flow separates, becomes turbulent and results in a minimum drag coefficient. The subsequent increases in drag are attributed to vortex shedding. The inertia coefficient agrees with that obtained theoretically in the range where the flow is laminar. GRA

N86-19572# California Univ., Berkeley. Dept. of Mechanical Engineering.
NUMERICAL SIMULATION OF BUOYANT TURBULENT FLOW Final Report
J. A. C. Humphrey, F. S. Sherman, and W. M. To Aug. 1985 169 p
(Contract DE-AC04-76DR-00789)
(DE85-017392; SAND-85-8180) Avail: NTIS HC A09/MF A01

Two models have been developed for predicting low Reynolds number turbulent flows in the free and mixed convection regimes. One, the KEM model, is based on the notion of eddy diffusivities for momentum and heat. The other, the ASM model, is based on algebraic relations derived for the anisotropic turbulent fluxes by suitable truncation of the parent transport equations. Both formulations apply to variable property flows with high overheat ratios. A comparison between measurements and predictions for the case of the vertical plate shows that both models yield fairly accurate results for the mean flow and heat transfer. As a result, only the simpler of the two models, the KEM, was used to predict the cavity flows. Predictions for the case of the vertical flat plate show excellent agreement with measurements of mean velocity, temperature and Nusselt number. Nearwall results predicted by both models reveal the existence of a 1/3 power-law dependence. Regions of negative buoyant and shear production of turbulence kinetic energy are clearly revealed by the calculations. Author

N86-19573# Lawrence Livermore National Lab., Calif.
HARMONIC GENERATION OF ION WAVES DUE TO BRILLOUIN BACKSCATTERING
K. Estabrook, W. L. Kruer, and M. G. Haines 22 May 1985 13 p refs Presented at the CECAM Workshop Transport, Interactions and Instabilities in Laser-Plasmas, Orsay, France, 24 Sep. 1984 Prepared in cooperation with Imperial Coll. of Science and Technology, London
(Contract W-7405-eng-48)
(DE85-016072; UCRL-92739; CONF-8409229-3) Avail: NTIS HC A02/MF A01

We report results of simulations of stimulated Brillouin backscatter in which we see the second spatial harmonic of the ion density fluctuation and compare with linear, fluid theory. We also describe examples of the competition between Raman and Brillouin backscatter. DOE

N86-19574# Pittsburgh Univ., Pa. Dept. of Chemical and Petroleum Engineering.
ANALOGY APPLICATION TO NONUNIFORM GAS-SOLID FLOWS Quarterly Report
G. E. Klinzing Sep. 1985 22 p refs
(Contract DE-FG22-85PC-81504)
(DE86-002072; DOE/PC-81504/T1; QR-1) Avail: NTIS HC A02/MF A01

This report describes the measurement of high pressure solid/gas flow with a Micro-Motion meter, analyzes the effects of system-parameters on Micro-Motion signals, establishes calibration curves and pressure-drop correlations for the Micro-Motion flow-meter. The study shows that this meter could be used in measuring solid/gas flows inside a 0.0095 m, diameter pipe at high pressures, especially at solid loadings greater than 10. When the solid loading (pound of coal/pound of gas) was less than or equal to 10, pressure-drop tends to indicate a phase separation and a probable change in flow regime within the Micro-Motion Meter, which could have occurred at the meter's U-bend. (2,mn DOE

N86-19575# Tennessee Univ. Space Inst., Tullahoma. Space Inst.
THEORETICAL STUDIES OF RECIRCULATING DUCT FLOWS FOR THE UTSI MHD COMBUSTOR DESIGN
J. J. Lee, R. J. Schulz, and M. A. Scott Sep. 1985 96 p refs
(Contract DE-AC02-79ET-10815)
(DE86-000695; DOE/ET-10815/107) Avail: NTIS HC A05/MF A01

A theoretical investigation of duct flows is reported that is an extension of previous work with heat transfer and a more complex geometry considered. The program developed is general and is capable of predicting recirculating turbulent flow in either a two-dimensional Cartesian or an axisymmetric coordinate system. This is accomplished through definition of the stream function using the classic Von Mises transformation and the restructuring of the component Navier-Stokes equations into the governing equations for transport of vorticity. Such a technique is standard in computational fluid dynamics and provides a powerful means

of analyzing recirculating flows wherein the explicit dependency of the flow upon pressure is eliminated. An iterative, general finite-difference solution procedure suitable for two-dimensional elliptic flows in complex geometries is then used to solve the nonlinear partial-differential equations. The program computes the following variables in the region of interest: stream function and vorticity; axial, radial, and swirl velocity components; pressure, density and temperature; turbulent kinetic energy and its dissipation rates; axial and radial heat transfer rates. The objective of the present document is to present details of the computational solution procedure and to provide a qualitative understanding of the effects of the flow Reynolds number, the core jet width, the duct angle, the swirl velocity, the turbulent intensity and the jet position. DOE

N86-19576# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE ANALYTICAL SOLUTION OF THE TWO DIMENSIONAL ACTUATOR SURFACE PROBLEM
G. Schouten Dec. 1983 54 p refs
(VTH-LR-311) Avail: NTIS HC A04/MF A01

A conformal mapping which maps the locally exact regular solution for the spiraling flow around the edge of an actuator surface with constant load onto the square root flow around the sharp edge of a half infinite plane wall is derived. Two generalizations of this mapping are constructed to allow the treatment of two idealized flow problems, both involving the constant load distribution. A numerical computation for the actuator surface problem was performed. The results show the shape of the shed vortex sheets and the streamline pattern, including the stagnation points on the free vortex sheets. The mapping procedure is satisfactory in that it shows how the spiraling regular solution of Schmidt and Sparenberg (1977) can be fitted in the framework of standard analytical techniques for the solution of flow problems. However, it does not lead to simpler solutions of the flow problems considered. Author (ESA)

N86-19577# Institut Franco-Allemand de Recherches, St. Louis (France).
GAS THERMOMETRY USING FOURIER ROTATIONAL COHERENT ANTI-STOKES RAMAN SCATTERING
Th. Lasser, E. Magens, and A. Leipertz 26 Mar. 1985 15 p refs Presented at 4th CARS Workshop, Rouen, France, 4-5 Feb. 1985
(ISL-CO-202/85) Avail: NTIS HC A02/MF A01

Periodic forms of rotational spectra were investigated to extend the application of gas thermometry. Fourier analysis offers a possibility for data reduction and a rapid temperature evaluation procedure. A recursion formula which is a direct consequence of the periodicity of the rotational spectra is presented. Neglected linewidth and laser contributions can be taken into consideration by a simple convolution with the corresponding expressions. The computation of the rotational spectra of nitrogen with 1024 data points reduced to 64 channels is shown. Two procedures, windowing and shifting down the higher frequency components, are included in the method. In the temperature range 300 to 900K the envelopes are well reconstructed. Their maximum position are clearly temperature dependent and allow a simple and rapid temperature evaluations. Author (ESA)

N86-19578# Institut Franco-Allemand de Recherches, St. Louis (France).
NUMERICAL TREATMENT OF THE YOUNG INTERFERENCE FRINGES IN THE PRESENCE OF SPECKLE [TRAITEMENT NUMERIQUE DE FRANGES D'INTERFERENCE D'YOUNG EN PRESENCE DE SPECKLE]
J. Schwab and P. Raymond 9 Nov. 1984 48 p refs In FRENCH
(Contract DRET-81-626)
(ISL-R-128/84) Avail: NTIS HC A03/MF A01

A numerical analysis to determine fringe configuration and orientation is presented. The two dimensional very fast Fourier transform is utilized. Two examples concerning laser chronophotography in instantaneous fluid velocities are included. The feasibility of the method is demonstrated, but limitations remain for the automatic computer processing, since it takes 30 min computation to visualize the results. Author (ESA)

N86-20062# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF A MODEL OF FLOW OF STREAM OF STRATIFIED FLUID ABOUT A BODY Abstract Only
K. A. Bezhanov and A. M. Ter-Krikorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 10 Transl. into ENGLISH from Doklady Akademii Nauk SSR (Moscow, USSR), v. 279, no. 6, Dec. 1984 p 1345-1348 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-19579 British Library Lending Div., Boston Spa (England).
EXPERIENCE IN USE OF VD-ZIP EDDY-CURRENT DEFECTOSCOPE FOR INSPECTION OF TUBES
S. S. Anoprienko and L. I. Bekhter [1985] 3 p Transl. into ENGLISH from Stal (USSR), no. 3, 1985 p 63
(BLL-M-36417-(5828.4F)) Avail: British Library Lending Div., Boston Spa, Engl.

It is reported that no complaints have been received from customers in the case of tubes inspected with a BD-ZIP eddy-current defectoscope over a period of two years operation. The defectoscope power supply is from a converter with a work current frequency of 16 kHz and reliably detects not only longitudinal defects but also defects lying at an angle to the contour of the tube. Author

N86-19580* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TEMPERATURE AVERAGING THERMAL PROBE Patent
Lou F. Kalil and Victor Reinhardt, inventors (to NASA) Issued 3 Dec. 1985 4 p Filed 31 Jan. 1983
(NASA-Case-GSC-12795-1; US-Patent-4,556,327; US-Patent-Appl-SN-462508; US-Patent-Class-374-115; US-Patent-Class-374-120; US-Patent-Class-374-163) Avail: US Patent and Trademark Office CSCL 14B

A thermal probe to average temperature fluctuations over a prolonged period was formed with a temperature sensor embedded inside a solid object of a thermally conducting material. The solid object is held in a position equidistantly spaced apart from the interior surfaces of a closed housing by a mount made of a thermally insulating material. The housing is sealed to trap a vacuum or mass of air inside and thereby prevent transfer of heat directly between the environment outside of the housing and the solid object. Electrical leads couple the temperature sensor with a connector on the outside of the housing. Other solid objects of different sizes and materials may be substituted for the cylindrically-shaped object to vary the time constant of the probe.
Official Gazette of the U.S. Patent and Trademark Office

N86-19581* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PORTABLE 90 DEGREE PROOF LOADING DEVICE Patent
Richard G. Bird (Rockwell International Corp., Downey, Calif.) and Leo A. Berson, inventors (to NASA) (Rockwell International Corp., Downey, Calif.) Issued 10 Dec. 1985 8 p Filed 3 May 1983 Sponsored by NASA
(NASA-Case-MSC-20250-1; US-Patent-4,557,149; US-Patent-Appl-SN-491113; US-Patent-Class-73-862.54;

US-Patent-Class-73-862.01) Avail: US Patent and Trademark Office CSCL 14B

A hydraulically actuated device is described for applying a test load to a bearing or the like to prove the integrity of its mounting or staking within a bore in a housing such as gear case. To accommodate limited access situations, the device is constructed in a right angle configuration in which a hydraulic cylinder applies axial pressure to a first thrust rod assemly which includes a first thrust rod through a threated spindle driving a linearly translated cam. Cam follower wheel transfers the translation to a second thrust rod assembly which includes a horizontal shaft and a spindle within a cross-arm housing portion and a tubular housing portion. The same second thrust direction applies the bearing loading in either of two directions depending upon the shape of the interface parts. The interface parts can bear on the bearing from either side with respect to the bearing mounting structural part.

Official Gazette of the U.S. Patent and Trademark Office

N86-19582# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MODERN USES OF LANGMUIR PROBES
Francis F. Chen Nov. 1985 25 p refs
(IPPJ-750) Avail: NTIS HC A02/MF A01

The Langmuir probe is adaptable to measurements in strong RF and strong magnetic fields such as exist in many fusion related experiments. Some new techniques, mostly untested, are described which could be developed to overcome the difficulties of this diagnostic method. Author

N86-19583# National Aerospace Lab., Tokyo (Japan).
STUDY ON THE DIGITAL POSITION TRANSDUCER WITH OPTICAL TIME-DELAY PULSE
Mitsuyoshi Mayanagi Sep. 1985 40 p refs In JAPANESE; ENGLISH summary
(NAS-TR-878; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A rotary optical position transducer employing a pulse technique time-multiplexor has been studied during the development of a Fly-By-Light (FBL) for the aircraft control system, the aim of which is to offer inherent resistance to environments of electromagnetic interference (EMI), electromagntic pulse (EMP) and lightening. The conventional absolute-type optical digital transducer causes difficulty in the interface technique between the transducer and other devices such as a computer. The transducer system described in this paper, which consists of a rotary position transducer unit, a fiber-optic cable, a light source unit, and an electronics interface unit, can improve this interface technique. The rotary transducer unit is an electrically passive device that is connected through optical fibers to the light source unit and the electronics interface unit, and that has many advantages of fiber-optic techniques. This paper studies basic problems in the development of the rotary transducer system. In particular, a basis for optimizing illumination irradiance and photo-detector characteristics is given, and the intrinsic performance of the transducer is quantitatively examined. Author

N86-19584# National Aerospace Lab., Tokyo (Japan).
NONINTERACTING CONTROL OF DYNAMICALLY TUNED DRY GYRO
Hirokimi Shingu and Masao Otsuki 1985 42 p refs In JAPANESE; ENGLISH summary
(NAL-TR-857; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A new design concept of a rebalance control circuit useful both for the improvement of response characteristics and the removal of interaction is desribed. It is shown that an interaction between input and output of Tuned Dry Gyro (TDG) is caused by angular acceleration. A Direct Rebalance Loop (DRL), which is an additional circuit, has been developed, and its utility evaluated quantitatively by simulation. It is shown, as an example of response characterstics improvement by DRL, that larger amplifier gain can be adopted under stable conditions, and that settling time and overshoot decrease remarkably. However, it is also found that DRL is ineffective in reducing interaction. In order to resolve the problems, a method of reducing such interaction by using sub-torquers with the main torquers is proposed. The transfer function of the loop between the signal generator and the subtorquer (NIL) is derived analytically so as to remove the interaction. Next, it is examined to see what degree of interaction can be removed by the use of NIL, and as an instance of numerical simulation, it is shown that the interaction can be reduced by less than one tenth at input frequencies of 0 to 40 Hz. Finally, it is concluded that a fundamental design concept of a noninteracting control has been established. Author

N86-19585*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR CELL CALIBRATION FACILITY VALIDATION OF BALLOON FLIGHT DATA: A COMPARISON OF SHUTTLE AND BALLOON FLIGHT RESULTS
B. E. Anspaugh, R. G. Downing, and L. B. Sidwell 15 Oct. 1985 36 p refs
(Contract NAS7-918)
(NASA-CR-176528; JPL-Pub-85-78; NAS 1.26:176528) Avail: NTIS HC A03/MF A01 CSCL 14B

The Solar Cell Calibration Facility (SCCF) experiment was designed and built to evaluate the effect of the Earth's upper atmosphere on the calibration of solar cell standards. During execution of the experiment, a collection of carefully selected solar cells was flown on the shuttle, and reflown on a high-altitude balloon, then their outputs were compared. After correction to standard temperature and intensity values of 28 C and an Earth-Sun distance of 1 AU, the solar cell outputs during the two flights were found to be identical. The conclusion is therefore that the high-altitude balloon flights are very good vehicles for calibrating solar cells for use as space flight reference standards. Author

N86-19586*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RESULTS OF THE 1985 NASA/JPL BALLOON FLIGHT SOLAR CELL CALIBRATION PROGRAM
B. E. Anspaugh and R. S. Weiss 15 Dec. 1986 41 p ref
(Contract NAS7-918)
(NASA-CR-176527; JPL-Pub-85-88; NAS 1.26:176527) Avail: NTIS HC A03/MF A01 CSCL 14B

The 1985 solar cell calibration balloon flight was successfully completed on July 12, 1985, meeting all objectives of the program. Fifty-seven modules were carried to an altitude of 115,000 ft (35.0 km). The calibrated cells can now be used as reference standards in simulator testing of cells and arrays. Author

N86-19587# Membrane Technology and Research, Inc., Menlo Park, Calif.
NEW MEMBRANE PRECONCENTRATION DEVICES FOR TRACE VAPOR DETECTION SYSTEMS PHASE 1 Final Report
D. Armstrong, R. W. Baker, and J. Mohr 1985 23 p
(Contract DAAK70-84-C-0078)
(AD-A161042) Avail: NTIS HC A02/MF A01 CSCL 07/1

This report describes the results of a six month feasibility program to develop a membrane vapor concentration device. The device would be used to concentrate trace organic vapors in air prior to introduction to a detector instrument. In this way the complexity and cost of the instrumentation required to detect vapors emitted from hidden explosives could be reduced. The membrane concentrator involves the use of ultrathin silicone rubber composite membranes contained in a novel separation cell. Toluene was used as a model organic vapor for explosive vapors. The membrane system was able to obtain enrichments of as much as 50-fold with toluene at pressure ratios of less than 10 across the cell. However, the time to reach this degree of concentration was excessively long at 200 minutes. It appears that large amounts of the organic vapor are sorbed onto and into the membrane and adhesives of the membrane cell. It was not possible to overcome this sorption effect and reduce the system's lag time to a more useful value. Thus, this membrane concentration device does not appear to be a practical preconcentrator for a trace vapor detection instrument. GRA

N86-19588# Naval Postgraduate School, Monterey, Calif.
INITIAL DEVELOPMENT OF A LASER ALTIMETER M.S. Thesis
Joseph P. Gilio Sep. 1985 68 p
(AD-A161048) Avail: NTIS HC A04/MF A01 CSCL 14/2

A design study was carried out of a small, expendable, self-contained laser altimeter for overwater operation at low altitude. A .904 micrometer Gallium Arsenide laser was used to build a prototype transmitter/ receiver at a cost of less than $600 and small enough to fit inside a 5 inch diameter cylinder, 5 inches long. Tests at a height of 120 feet above the surface of a lake resulted in a signal-to-noise ratio of 6, and validated the trade-off equation used in this study. A second test model, with design improvements incorporated, is predicted to yield a SNR of over 20 for an altitude of 150 meters. GRA

N86-19589# Naval Postgraduate School, Monterey, Calif.
CONTROL SYSTEMS FOR A DUAL MOTOR HIGH SPEED MOTION PICTURE CAMERA M.S. Thesis
Edward Y. Brewster Sep. 1985 150 p
(AD-A161071) Avail: NTIS HC A07/MF A01 CSCL 14/5

This thesis studies the control of a dual motor high speed motion picture camera. This camera is a modification of the one motor cameras presently in use today. First the system model is developed and then the control system is examined for the ideal tachometer. Next, nonideal characteristics of the tachometer signal as derived from an optical tachometer are discussed. Included in this section is the need to have pretensioning prior to the filming and deceleration at the end of the filming. The remainder of the thesis examines phase locked loop techniques for speed control of the high speed camera. Author (GRA)

N86-19590# Harvard Univ., Cambridge, Mass.
SEQUENTIAL PROCESSES IN IMAGE GENERATION: AN OBJECTIVE MEASURE Technical Report, 1 Apr. - 31 Oct. 1985
Stephen M. Kosslyn, Carolyn B. Cave, and David A. Provost 31 Oct. 1985 66 p
(Contract N00014-85-K-0291)
(AD-A161200; TR-6) Avail: NTIS HC A04/MF A01 CSCL 05/10

Are visual mental images of objects created a part at a time? This paper reports an new objective technique that was developed to answer questions such as this one. The results of using this technique indicated that images of upper case letters are formed segment by segment, in roughly the order in which most people draw the letters. These results were shown not to be artifact of how people scan over images once they are formed, and could not have been due to experimenter-expectancy effects. In addition, the results indicated that subjective estimates of mental image generation time are quite close to those obtained using objective measures. GRA

N86-19591# Rochester Univ., N. Y.
PARAMETERS OF VARIOUS TYPES OF LIGHT GUIDES FOR LARGE AREA SCINTILLATION COUNTERS
C. P. Cheng and H. W. Zheng Aug. 1985 20 p Presented at the 12th International Symposium on Lepton and Photon Interactions At High Energies, Kyoto, Japan, 19 Aug. 1985 Prepared in cooperation with National Lab. for High Energy Physics, Oho, Japan
(Contract DE-AC02-76ER-13065)
(DE86-000638; DOE/ER-13065/429; CONF-850819-9) Avail: NTIS HC A02/MF A01

The properties of a variety of different light guides used in conjunction with a large area scintillator have been studied. The performance of a Y7 wavelength-shifter bar, a fishtail, a separated twisted and an all area coupled twisted lucite light guide were compared. Various parameters of the counters, including the number of photoelectrons, the detection efficiency, the attenuation length, the time resolution and the effective light velocity were measured. The detection efficiency for minimum ionizing particles is near 100% for each of the four types of light guides. The best performance was found for the all area coupled twisted guide. For this, we observe an average of 50 photoelectrons per minimum ionizing particle and a mean time resolution (sigma) of 0.4ns. The absorption length for scintillation light in Y7 was determined and a decay time spectrum consisting of two exponential components has been measured. A Monte Carlo simulation of photon transmission in the counters has been done; the measured results on the performance of the various counter configurations agree well with the predictions of the simulation. DOE

N86-19592# Department of the Army, Washington, D. C.
METHOD OF PROTECTING A RADIOCHROMIC OPTICAL WAVEGUIDE DOSIMETER FROM ADVERSE TEMPERATURE EFFECTS Patent Application
S. Kronenberg, inventor (to Army) (Department of the Army, Washington, D.C.) Filed 26 Sep. 1985 16 p
(AD-D011949; US-Patent-Appl-SN-780347) Avail: NTIS HC A02/MF A01 CSCL 06/18

A radiochromic optical waveguide dosimeter is protected from the adverse temperature effects of exposure in the desired operational temperature range of -40 C to +60 C by flattening the round plastic tubing to be used for the fabrication of the dosimeter until the tubing attains an elliptical cross section and then fabricating the dosimeter from the tubing having the elliptical cross section. Author (GRA)

N86-19593# Institut Franco-Allemand de Recherches, St. Louis (France).
MEASUREMENT OF THE LOCAL CONCENTRATION IN A CO2 FREE JET USING SPONTANEOUS RAMAN DIFFUSION [MESURE DE LA CONCENTRATION LOCALE DANS UN JET LIBRE DE CO2 AU MOYEN DE LA DIFFUSION RAMAN SPONTANE]
L. Bobin and G. Brom 17 Sep. 1984 41 p refs In FRENCH
Original contains color illustrations
(ISL-R-117/84) Avail: NTIS HC A03/MF A01

A laser Doppler velocimeter and a Raman diffusion measuring device were used simultaneously on a CO2 free jet discharging in air. The velocity profiles, the average concentrations and the turbulent fluctuations were measured. Local instantaneous flow was determined as well as the proportion of air in the flow. The air increases linearly with distance. For this case the air concentration increase is 25 % of the jet initial flow for a length increase equivalent to an initial diameter. Author (ESA)

N86-19594# Institut Franco-Allemand de Recherches, St. Louis (France).
UTILIZATION OF MICROCHANNEL PLATES IN X-RAY CRYSTALLOGRAPHY Final Report [VERWENDUNG VON MICROCHANNELPLATES IN DER ROENTGENKRISTALLOGRAPHIE]
T. Ebding 31 Dec. 1984 17 p refs In GERMAN
(Contract BMVg-T/R-760/E-0015/E-1715)
(ISL-R-124/84) Avail: NTIS HC A02/MF A01

An X-ray detector using a microchannel plate (MCP) was developed and utilized in X-ray crystallography. The tests show that this detector is more sensitive than a system scintillator-film, and that the main problem of scintillator and film, namely the possibly small distance to the sample for intensity reasons, does not occur with an MCP which detects the different X-ray quanta and has practically no dark current. This advantage is particularly interesting for X-ray crystallography on hollow-charge where the excited shock wave is susceptible to destroy a detector in the immediate vicinity. It is shown that image processing methods allow a better evaluation of the information available in the diagrams. The weak intensity line K beta 200, which is not visible with the eye on the X-ray image, is represented with the help of a computer. Author (ESA)

N86-19595# Unisearch Associates, Inc., Concord (Ontario).
INITIAL TESTING OF THE TUNABLE DIODE LASER ABSORPTION SPECTROMETER FOR MEASURING NO2 AND HNO3 IN DIESEL ENGINE EXHAUST Final Report
G. W. Harris, G. I. Mackay, and H. I. Schiff 1 Feb. 1985 52 p

(PB85-212967; CRC/APRAC/CAPE-30-81-04) Avail: NTIS HC A04/MF A01 CSCL 14B

The Unisearch tunable diode laser absorption spectrometer designed for tropospheric air monitoring (TAMS-2B) was used at the Ontario Research foundation Diesel Dynamometer test facility to make preliminary investigations on the ability of the TAMS-2B to make real time measurements of NO2 and HNO3 in diesel engine exhaust. The results indicated that the TAMS-2B was well suited to making such measurements so long as Teflon filters were employed to remove particles from the exhaust gas stream. The data indicate that at least part of this slow response was due to effects associated with the exhaust train and the dilution tunnel rather than with the TAMS2-B inlet system. GRA

N86-19629# Technische Hogeschool, Delft (Netherlands). Dept. of Applied Physics.
SENSORS: VISION AND TACTILE
Frans C. A. Groen and Piet W. Verbeek *In* AGARD Artificial Intelligence and Robotics Sep. 1985 17 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

N86-19631# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Electrical, Computer, and Systems Engineering.
THE SENSING AND DISPLAY OF THREE-DIMENSIONAL INFORMATION WITH EMPHASIS ON SOLID MODELLING: STATUS AND APPLICATIONS
Lester A. Gerhardt *In* AGARD Artificial Intelligence and Robotics Sep. 1985 8 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

N86-19642# Joint Publications Research Service, Arlington, Va.
MAGNETOCARDIOGRAPHY
A. Ruvinskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 64-67 Transl. into ENGLISH from Leninskoye Znamya (Moscow, USSR), 21 Jul. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-19596*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LONG GAIN LENGTH SOLAR PUMPED BOX LASER Patent Application
Russell J. DeYoung, inventor (to NASA) Filed 18 Jun. 1985 9 p (NASA-Case-LAR-13256-1; NAS 1.71:LAR-13256-1; US-Patent-Appl-SN-745973) Avail: NTIS HC A02/MF A01 CSCL 20E

A solar pumped laser has its lasing path lengthened by forming a square loop in the lasing path by means of bending mirrors. Solar radiation is collected and concentrated into a donut shaped intensity pattern. This intensity pattern is directed onto the lasing path such that there is a maximum fit of the solar intensity pattern to the square loop laser cavity. NASA

N86-19597# Texas A&M Univ., College Station. Dept. of Physics.
VELOCITY RESOLVED SCATTERING OF ATOMIC HYDROGEN FROM SURFACES Final Report, 1 Aug. 1980 - 31 May 1985
E. S. Fry and D. G. Naugle 1 Oct. 1985 5 p
(Contract N00014-80-C-0806; RR0-1102)
(AD-A160888; ABL-1) Avail: NTIS HC A02/MF A01 CSCL 20/5

A stabilized single frequency cw Nd-YAG has been designed and built. It has been used to injection lock a high power pulsed Nd-YAG laser. The system has been used to produce ultraviolet tuneable, narrow linewidth radiation at 2430A. It is used for two photon excitation of atomic hydrogen. Applications of the latter are discussed, e.g. as a probe for studies of atom-surface scattering and of neutral hydrogen atom detection in fusion plasmas. GRA

N86-19598# Ben Gurion Univ. of the Negev, Beersheva (Israel). Dept. of Physics.
POTENTIAL VISIBLE CHEMICAL LASERS VIA INTERACTIONS OF SINGLET MOLECULAR OXYGEN WITH HEAVY METAL ATOMS AND OXIDES Final Report, 15 Mar. 1984 - 15 Mar. 1985
Rosenwaks Salman 5 Nov. 1985 10 p
(Grant AF-AFOSR-0087-84)
(AD-A161174; EOARD-TR-86-01) Avail: NTIS HC A02/MF A01 CSCL 20/5

The present research has been the first part of a continued effort to thoroughly study the kinetics and spectroscopy of the heavy-atoms/singlet oxygen mixtures. The measurements were conducted in a flowing afterflow reactor to which a metal evaporation furnace and a singlet oxygen generator are interfaced. The atoms studied so far were Pb and Bi. The results of the measurements show that significant electronic excitation of metal atoms, metal dimers and metal oxides can be obtained via multiple collisions with singlet molecular oxygen. Laser induced fluorescence measurements in Pb/O2 mixtures corroborates the mechanism for PbO formation previously suggested in this laboratory. Mechanisms for production of excited species in Bi/O2 are inferred from the dependence of the emission intensity from these species on (Bi) and (Bi2). In particular, it is suggested that the strong emission from Bi(2D3/2) must originate from energy transfer from O2(l sigma) which, in turn, is produced via multiple collisions of O2(l delta) with Bi2. The results of the present research are encouraging regarding the prospects of obtaining significant concentrations of atomic and molecular species via multiple collision with singlet molecular oxygen. Author (GRA)

N86-19599# Aerospace Corp., El Segundo, Calif.
KINETICS OF THE H2-NF2 SYSTEM
J. B. Koffend, Carrol E. Gardner, and Raymond F. Heifner, III 28 Sep. 1985 43 p
(Contract F04701-83-C-0084)
(AD-A161220; TR-0084A(9990)-2; SD-TR-85-55) Avail: NTIS HC A03/MF A01 CSCL 07/5

The reaction of hydrogen atoms with NF2 was studied in a flow tube using pulsed KrF laser initiation of H2/NF2/Ar mixtures at 440 K. The quantum yield for NF(a) production from the 249 nm photolysis of NF2 was determined to be 0.10 + or - 0.05. Several important reactions in this system were investigated, and rate coefficients were determined at 440 K. A value of (1.03 + or - 0.20) x 10 to the -30th power cm to the 6th power/sq. molecule -sec was obtained for the three-body recombination of F atoms with NF2 and Ar. Rate constants for the relaxation of HF(v = 2) and HF(v = 3) by NF2 are (9.7 + or - 1.0) x 10 to the -14th power and (2.5 + or - 0.5) x 10 to the -13th power cc/molecule-sec, respectively. Study of the quenching of NF(a) by NF2 yields a rate coefficient of (2.7 + or -1.0) x 10 to the -16th power cc/molecule-sec. Evidence is presented that indicates the disproportionation of NF(a) is three orders of magnitude slower than that of ground state NF. Modeling results are presented which agree well with experimental data. GRA

N86-19600# Lawrence Livermore National Lab., Calif.
SPECIFIC HEAT LOADING IN Nd:GLASS LASERS
W. F. Krupke Aug. 1985 20 p
(Contract W-7405-eng-48)
(DE86-002151; UCID-20531) Avail: NTIS HC A02/MF A01

The specific thermal load parameter, chi, for xenon flashlamp-pumped Nd:glass gain media is written as a function of neodymium concentration, pump pulse duration, and energy extraction efficiency. The currently available data on radiative and nonradiative decay probabilities of several commercial Nd:glasses are used to calculate and graph specific thermal load parameter values. By factoring these results into performance scaling relationships for zig-zag and disk lasers, specific Nd:glasses can be selected for optimized laser performance. DOE

N86-20063# Joint Publications Research Service, Arlington, Va.
THE MECHANISM UNDERLYING DESTRUCTION OF POLYMERS BY RADIATION FROM PULSE-PERIODIC CO2 LASER Abstract Only
G. G. Gladush, Ye. B. Levchenko, V. G. Nizev, and R. D. Seydgazov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 12 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2294-2300 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20064# Joint Publications Research Service, Arlington, Va.
FINDING AND DEVELOPING GALLIUM-GARNET ACTIVE LASER MEDIA Abstract Only
Ye. V. Zharikov, S. P. Kalitin, V. V. Laptev, A. A. Mayer, and V. V. Osiko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 14 Transl. into ENGLISH of Akademiya Nauk SSSR, Inst. Obshchey Fiziki, Fizika Tverdogo Tela, Laboratoriya Fiziki Tverdogo Tela (Moscow, USSR) p 1-28 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20065# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF STIMULATED MANDELSHTAM-BRILLOUIN SCATTERING OF FOCUSED BEAMS IN THE REPETITIVE-PULSE MODE Abstract Only
R. R. Buzyalis, A. S. Dementyev, and E. K. Kosenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 May 1986 p 15 Transl. into ENGLISH from Litovskiy Fizicheskiy Sbornik (Vilnius, USSR), v. 25, no. 1, Jan. - Feb. 1985 p 68-79 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20066# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF AMPLIFICATION AND LASING SPECTRUM OF TEA-LASER EMPLOYING MIXTURE OF ISOTOPE-SUBSTITUTED CARBON DIOXIDE MOLECULES Abstract Only
V. O. Petukhov, N. N. Sazhina, V. S. Starovoytov, S. A. Trushin, N. V. Cheburkin, S. K. Chekin, and V. V. Churakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 2, Feb. 1985 p 416-419 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20068# Joint Publications Research Service, Arlington, Va.
NONLINEAR ATTENUATION OF PULSED LASER RADIATION ALONG A NEAR-SURFACE ATMOSPHERIC PATH
N. A. Blinov, I. A. Leontyev, Ye. G. Ryzhkov, V. L. Semenov, V. P. Sinelnikov, S. S. Fillippov, and N. V. Cherburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 33-36 refs Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 10, Oct. 1985 p 2147-2149 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-19601 Carnegie-Mellon Univ., Pittsburgh, Pa.
GRASPING AND THE MANIPULATION FOR AUTOMATED MANUFACTURING Ph.D. Thesis
Mark Robert Cutkosky 1985 182 p
Avail: Univ. Microfilms Order No DA8513679

An instrumented, controllable wrist is presented for use with a large industrial robot. The wrist is designed for fine motions that require compliance or adaptation to an existing geometry. Experiments focus on tasks that require communication between the robot arm and wrist. The results suggest that it is still appropriate to treat the wrist and robot separately and to take advantage of the simplicity that a distributed control system affords. Before active robot hands can be put to use in the manufacturing environment, formidable problems in analysis and control must be resolved. A first step is to construct a mathematical model of an active gripper handling a tool or a workpiece. A method is presented for determining mechanical properties of a grasp and predicting how the grasp will behave in response to task-induced forces and motions. Dissert. Abstr.

N86-19602 Central Electricity Generating Board, London (England).
WELDING OF UNALLOYED/LOW-ALLOY STEEL TO AUSTENITIC STAINLESS STEEL, PART 2
14 Nov. 1985 16 p refs Transl. into ENGLISH from Hitsuastekniikka (Finland), no. 3, 1980 p 76-87
(BLL-CE-Trans-8219-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The structural materials used for power station components comprise both ferritic low-alloy and austenitic high-alloy steels. The temperature above which the oxidation resistance and creep resistance of low-alloy Cr-Mo-steels are no longer adequate is approx. 530-550 C, depending on the working pressure. For components operating above this temperature, austenitic stainless steels are used, in which case welded joints must be made between dissimilar steels. Welding of low-alloy steels and austenitic stainless steels does not in itself create real problems. Problems have arisen due to reduced strength of the low-alloy steel caused by diffusion of carbon and thermal stresses which have developed between the weld seam and on the low-alloy steel, due to the different thermal expansion characteristics. This survey examines the manufacturing methods of the above welds in general, setting out experimental work on the characteristics of welds on an AISI 347 type steel and a heat resistant 2 1/4 Cr-Mo steel carried out at the metallurgical laboratory. B.W.

N86-19603* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS FOR ADAPTING AN END EFFECTOR DEVICE REMOTELY CONTROLLED MANIPULATOR ARM Patent
Keith H. Clark, inventor (to NASA) Issued 8 Oct. 1985 7 p Filed 30 Sep. 1983
(NASA-Case-MFS-25949-1; US-Patent-4,545,723;
US-Patent-Appl-SN-538063; US-Patent-Class-414-730;
US-Patent-Class-901-31; US-Patent-Class-901-50) Avail: US Patent and Trademark Office CSCL 13I

Apparatus for adapting a general purpose and effector device to a special purpose and effector is disclosed which includes an adapter bracket assembly which provides a mechanical and electrical interface between the end effector devices. The adapter bracket assembly includes an adapter connector post which interlocks with a diamond shaped gripping channel formed in closed jaws of the general purpose end effector. The angularly intersecting surfaces of the connector post and gripping channel prevent any relative movement there between. Containment webs constrain the outer finger plates of the general purpose jaws to prevent pitch motion. Electrical interface is provided by conical, self aligning electrical connector components carried by respective ones of said end effectors.
Official Gazette of the U.S. Patent and Trademark Office

N86-19604* National Aeronautics and Space Administration. Pasadena Office, Calif.
MEMORY METAL ACTUATOR Patent
Carl F. Ruoff, inventor (to NASA) (JPL, Pasadena, Calif.) Issued 19 Nov. 1985 7 p Filed 26 Aug. 1983 Sponsored by NASA
(NASA-Case-NPO-15960-1; US-Patent-4,553,393;
US-Patent-Appl-SN-527613; US-Patent-Class-60-528;
US-Patent-Class-60-527; US-Patent-Class-337-140) Avail: US Patent and Trademark Office CSCL 13I

A mechanical actuator can be constructed by employing a plurality of memory metal actuator elements in parallel to control the amount of actuating force. In order to facilitate direct control by digital control signals provided by a computer or the like, the

actuating elements may vary in stiffness according to a binary relationship. The cooling or reset time of the actuator elements can be reduced by employing Peltier junction cooling assemblies in the actuator.
Official Gazette of the U.S. Patent and Trademark Office

N86-19605* National Aeronautics and Space Administration. Pasadena Office, Calif.
JOINT FOR DEPLOYABLE STRUCTURES Patent
Norwood D. Craighead, II (JPL, Pasadena, Calif.), Richard J. Preliasco (JPL, Pasadena, Calif.), and Timothy D. Hult, inventors (to NASA) (JPL, Pasadena, Calif.) Issued 17 Dec. 1985 6 p
Sponsored by NASA
(NASA-Case-NPO-16038-1; US-Patent-4,558,967;
US-Patent-Appl-SN-469864; US-Patent-Class-403-113;
US-Patent-Class-403-120; US-Patent-Class-16-294) Avail: US Patent and Trademark Office
A joint is described for connecting a pair of beams to pivot them between positions in alignment or beside one another, which is of light weight and which operates in a controlled manner. The joint includes a pair of fittings and at least one center link having opposite ends pivotally connected to opposite fittings and having axes that pàss through centerplates of the fittings. A control link having opposite ends pivotally connected to the different fittings controls their relative orientations, and a toggle assemly holds the fittings in the deployed configuration wherein they are aligned. The fittings have stops that lie on one side of the centerplane opposite the toggle assembly.
Official Gazette of the U.S. Patent and Trademark Office

N86-19606* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPLIANT HYDRODYNAMIC FLUID JOURNAL BEARING Patent
Edward L. Warren, inventor (to NASA) Issued 12 Nov. 1985 6 p
Filed 24 Apr. 1984
(NASA-Case-LEW-13670-1; US-Patent-4,552,466;
US-Patent-Appl-SN-603374; US-Patent-Class-384-103;
US-Patent-Class-384-106) Avail: US Patent and Trademark Office
An air bearing structure is described that prevents destructive bending moments within the top foil. Welds are eliminated by mounting the top bearing foil in the bearing cartridge sleeve without using a space block. Tabs or pins at the end of the top bearing foil are restrained by slots or stops formed in the cartridge sleeve. These structural members are free to move in a direction normal to the shaft while being restrained from movement in the direction of shaft rotation.
Official Gazette of the U.S. Patent and Trademark Office

N86-19607 Alabama Univ., Huntsville.
A CREEP-RUPTURE MODEL FOR FILAMENT-WOUND SPHERICAL PRESSURE VESSELS Ph.D. Thesis
Jan Davis Dozier 1985 125 p
Avail: Univ. Microfilms Order No. DA8519061
The creep-rupture model is that of a quasi-isotropic filament-wound spherical pressure vessel subjected to sustained internal pressurization. As relaxation of the viscoelastic matrix material occurs, the circumferential strain increases, thus causing an increase in microcracks until a critical condition is attained. To account for this internal damage, relationships between increasing maximum circumferential strain and decreasing transverse modulus are defined. The elastic viscoelastic correspondence principle is employed: for a given magnitude of internal pressure, the associated elastic solution is obtained in closed form through the application of Laplace transformation. This solution is inverted back into the time domain by the multidata method to yield, after a certain number of iterations, the time-dependent maximum circumferential strain. Failure is based upon the maximum strain criterion. Dissert. Abstr.

N86-19608 Cornell Univ., Ithaca, N.Y.
TRAJECTORY CONTROL AND OBSTACLE AVOIDANCE FOR ROBOT MANIPULATORS WITH BOUNDED INPUTS Ph.D. Thesis
1985 96 p
Avail: Univ. Microfilms Order No. DA8516953
A non-linear controller is developed in this thesis that considers the complete non-linear system dynamics. In addition, the control allows for bounds on the system inputs, such as limited input torque from the joint motors. The control is based upon the application of an Optimal Decision Strategy, a pointwise optimization process. This results in the design of the control being reduced to the solution of a quadratic programming problem at each sample point. The robustness of the control scheme to unmodeled dynamics is examined and a robust control is presented. A real-time implementation of this control is developed for a three degree of freedom robot manipulator. The control is implemented using 16 bit microprocessor and is programmed in a high level language. The manipulator dynamics are computed using the Euler-Lagrange formulation and the control system is run with a sample period of 16 milliseconds. Dissert. Abstr.

N86-19609 Michigan Univ., Ann Arbor.
THERMO-MECHANICAL CONTACT OF TWO SLIDING HALF-PLANES AND RELATED PROBLEMS Ph.D. Thesis
Alexander Azarkhin 1985 109 p
Avail: University Microfilms Order No. DA8520862
The present dissertation is submitted as a collection of four manuscripts. In the first two papers, the time dependent contact problem of a non-conducting half-plane sliding on the surface of a conductor with heat generation at the interface due to friction is studied. The conducting body is slightly rounded to give a Hertzian initial pressure distribution. One algorithm developed is based on the statement of the problem in terms of appropriate Green's functions. Numerical results show that, if the ratio of the initial size of the area of contact to that in the steady state is less than some critical value, the area of contact and the pressure distribution change smoothly toward the steady state. In the third paper, the partial contact of a thin-walled circular cylinder transmitting a longitudinal eccentrically applied force and a rigid half-space is studied. In the fourth paper, an algorithm is developed which reduces the problem of elastic stability for a complicated domain to a set of problems for simple subdomains. Dissert. Abstr.

N86-19610*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD FOR FORMING HERMETIC SEALS Patent Application
Brian D. Gallagher, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 15 Aug. 1985 15 p
(Contract NAS7-918)
(NASA-Case-NPO-16423-1-CU; NAS 1.71:NPO-16423-1-CU;
US-Patent-Appl-SN-765978) Avail: NTIS HC A02/MF A01 CSCL 11A
A firmly adherent film of bondable metal, such as silver, is applied to the surface of glass or other substrate by decomposing a layer of a solution of a thermally decomposable metallo-organic deposition (MOD) compound such as silver neodecanoate in xylene. The MOD compound thermally decomposes into metal and gaseous by-products. Sealing is accomplished by depositing a layer of bonding metal, such as solder or a brazing alloy, on the metal film and then forming an assembly with another high melting point metal surface such as a layer of Kovar. When the assembly is heated above the temperature of the solder, the solder flow wets the adjacent surfaces and forms a hermetic seal between the metal film and metal surface when the assembly cools. NASA

N86-19611*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DUAL MOTION VALVE WITH SINGLE MOTION INPUT Patent Application
Robert R. Belew, inventor (to NASA) Filed 3 Jul. 1985 17 p
(NASA-Case-MFS-28058-1; NAS 1:71:MFS-28058-1;
US-Patent-Appl-SN-751691) Avail: NTIS HC A02/MF A01 CSCL 13I

A dual motion valve (A) includes two dual motion valve assemblies with a rotary input which allows the benefits of applying both rotary and axial motion to a rotary sealing element with a plurality of ports. The motion of the rotary sealing element during actuation provides axial engagement of the rotary sealing element with a stationary valve plate which also has ports. Fluid passages are treated through the valve when the ports of the rotary sealing element are aligned with the ports of the stationary valve plate. Alignment is achieved through rotation of the rotary sealing element with respect to the stationary valve plate. The fluid passages provide direct paths which minimize fluid turbulence created in the fluid as it passes through the valve (A). NASA

N86-19612*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
UNIVERSAL CLAMP Patent Application
John P. Clancy, inventor (to NASA) (McDonnell-Douglas Corp., Houston, Tex.) Filed 23 Oct. 1985 16 p
(NASA-Case-MSC-20549-1; NAS 1.71:MSC-20549-1;
US-Patent-Appl-SN-790596) Avail: NTIS HC A02/MF A01 CSCL 13I

A mechanical force actuator which is light weight and manipulatable and utilizes linear motion for push or pull forces is presented. The mechanical force producing mechanism comprises a linear actuator mechanism and a linear motion shaft mounted parallel to one another. The linear motion shaft is connected to a stationary or fixed housing and to a movable housing where the movable housing is mechanically actuated through actuator mechanism by either manual means or motor means. The housings are adapted to releasably receive a variety of jaw or pulling elements adapted for clamping or prying action. The stationary housing is adapted to be pivotally mounted to permit an angular position of the housing to allow the tool to adapt to skewed interfaces. The actuator mechanism is operated by through a gear train to obtain linear motion of the actuator mechanism. NASA

N86-19613*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PRELOADABLE VECTOR SENSITIVE LATCH Patent Application
William R. Acres, inventor (to NASA) Filed 3 Oct. 1985 21 p
(NASA-CASE-MSC-20910-1; NAS 1.71:MSC-20910-1;
US-Patent-Appl-SN-783888) Avail: NTIS HC A02/MF A01 CSCL 13E

A preloadable vector-sensitive latch which automatically releases when the force vector from a latch member reaches a specified release angle is presented. In addition, it contains means to remove clearance between the latched members and to preload the latch to prevent separation at angles less than the specified release angle. The latch comprises a triangular main link, a free link connected between a first corner of the main link and a yoke member, a housing, and an actuator connected between the yoke member and the housing. A return spring bias means connects the main link to a portion of the housing. A second corner of the main link is slidably and pivotally connected to the housing via a slot in a web portion of the housing. The latch housing has a rigid docking ring alignable with a mating locking ring which is engageable by a locking roller journalled on the third corner of the triangular main link. NASA

N86-19614*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APPARATUS AND METHOD OF CAPTURING AN ORBITING SATELLITE Patent Application
William D. Harwell and Dale A. Gardner, inventors (to NASA) Filed 7 Nov. 1985 24 p Div. of US-Patent-Appl-SN-132364, US-Patent-4,404,793, filed 20 Mar. 1980
(NASA-Case-MSC-20979-1; NAS 1.71:MSC-20979-1;
US-Patent-Appl-SN-796053) Avail: NTIS HC A02/MF A01 CSCL 13E

Apparatus and method of capturing an orbiting spacecraft by attaching a grapple fixture are discussed. A probe is inserted into an opening, such as rocket nozzle, in the spacecraft until a stop on the probe mechanism contacts the spacecraft, a lever is actuated releasing a spring loaded rod which moves axially along the probe removing a covering sleeve to expose spring loaded toggle fingers which pivot open engaging the side of the opening. The probe is shortened and tensioned by turning a screw thread, pressing the fingers inside of the opening to compress the spacecraft between the toggle fingers and the stop. A grapple fixture attached to the probe, which is thus secured to the spacecraft, is engaged by appropriate retrieval means such as a remote manipulator arm. NASA

N86-19615# National Aerospace Lab., Tokyo (Japan).
THE PERFORMANCE OF A CRYOGENIC PUMP FOR THE TWO-PHASE FLOW CONDITION
Hitoshi Yamada, Mitsuo Watanabe, Satoshi Hasegawa, and Kenjiro Kamijo Aug. 1985 12 p refs In JAPANESE; ENGLISH summary
(NAL-TR-870; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

An experimental investigation was carried out in order to obtain the performance characteristics of a cryogenic pump under a two-phase flow condition. The experiment used an oxygen pump with an inducer and liquid nitrogen as the test fluid. The vapor volumetric fraction at the pump inlet was calculated with an assumption of a constant enthalpy process across an orifice which was used to generate the two-phase flow at the pump inlet. The results showed that the pump head rise did hardly decrease even when the vapor friction became about 40 percent at the pump inlet. The two-phase flow at the pump inlet was confirmed by a visual observation through a transparent plastic section. It was also found that the adiabatic efficiency for the two-phase flow provided a good agreement with the pump efficiency, which was determined by using torques, outlet flow rates and the pressure difference between the pump inlet and outlet. Author

N86-19616*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT ON INTERFERENCE FITS ON ROLLER BEARING FATIGUE LIFE
Harold H. Coe and Erwin V. Zaretsky Jan. 1986 24 p refs
(NASA-TM-87165; E-2516; NAS 1.15:87165) Avail: NTIS HC A02/MF A01 CSCL 13I

An analysis was performed to determine the effects of inner-ring speed and press fits on roller bearing fatigue life. The effects of the resultant hoop and radial stresses on the principal stresses were considered. The maximum shear stresses below the Hertzian contact were determined for different conditions of inner-ring speed and load, and were applied to a conventional roller bearing life analysis. The effect of mean stress was determined using Goodman diagram approach. Hoop stresses caused by press fits and centrifugal force can reduce bearing life by as much as 90 percent. Use of a Goodman diagram predicts life reductions of 20 to 30 percent. The depth of the maximum shear stress remains virtually unchanged. Author

N86-19617*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
UNIQUE VARIABLE POLARITY PLASMA ARC WELDING FOR SPACE SHUTTLE
R. J. Schwinghamer Oct. 1985 25 p refs
(NASA-TM-86536; NAS 1.15:86536) Avail: NTIS HC A02/MF A01 CSCL 13I

Since the introduction of the Plasma Arc Torch in 1955 and subsequent to the work at Boeing in the 1960's, significant improvements crucial to success have been made in the Variable Polarity Plasma Arc (VPPA) Process at the Marshall Space Flight Center. Several very important advantages to this process are given, and the genesis of PA welding, the genesis of VPPA welding, special equiment requirements, weld property development, results with other aluminum alloys, and the eventual successful VPPA transition to production operations are discussed. Author

N86-19618*# California Univ., Los Angeles. School of Engineering and Applied Science.

SEPARATOR PLUGS FOR LIQUID HELIUM
Jeffrey M. Lee, S. W. K. Yuan, W. A. Hepler, and T. H. K. Frederking
Oct. 1984 54 p refs
(Contract NCC2-305)
(NASA-CR-176545; NAS 1.26:176545; UCLA-ENG-8436) Avail: NTIS HC A04/MF A01 CSCL 11A

Work performed during Summer 1984 (from June to Sept. 30) in the area of porous media for use in low temperature applications is discussed. Recent applications are in the area of vapor - liquid phase separation, pumping based on the fountain effect and related subsystems. Areas of potential applications of the latter are outlined in supplementary work. Experimental data have been developed. The linear equations of the two-fluid model are inspected critically in the light of forced convection evidence reported recently. It is emphasized that the Darcy permeability is a unique throughput quantity in the porous media application areas whose use will permit meaningful comparisons of data not only in one lab but also within a group of labs doing porous plug studies. Author

N86-19619# California Univ., Berkeley. Dept. of Mechanical Engineering.
NORMAL AND OBLIQUE IMPACT OF CYLINDRO-CONICAL AND CYLINDRICAL PROJECTILES ON METALLIC PLATES Final Report, Jun. 1982 - Jan. 1984
W. Goldsmith and S. A. Finnegan Jun. 1985 115 p
(Contract DAAG29-80-K-0052)
(AD-A159686; AD-E900496; NWC-TP-6479) Avail: NTIS HC A06/MF A01 CSCL 19/4

An experimental program has been undertaken to study the phenomenon of both normal and oblique impact of cylindro-conical and cylindrical projectiles on metallic plates, a domain where almost no test data is available. Hard-steel strikers of 12.7-micrometer nominal diameter and either 60-degree conical or blunt tips and blunt soft aluminum cylinders of the same diameter were fired at 2024-0 aluminum targets with thicknesses from 1.78 to 25.4-micrometer and at both mild steel and medium carbon steel with thicknesses up to 19.05-micrometer. Initial velocities ranged from about 20 to 1025 m/s, achieved with the aid of a pneumatic cannon at low speeds and a powder gun in the upper velocity range. Initial target obliquity was varied from normal to 50 degrees. GRA

N86-19620# SRI International Corp., Menlo Park, Calif.
MODELING AND PLANNING ROBOTIC MANUFACTURING Final Report
Peter C. Cheeseman and William T. Park Mar. 1985 34 p
(Contract N00014-83-C-0649)
(AD-A161014; AD-F620003) Avail: NTIS HC A03/MF A01 CSCL 13/8

EXPLAN is a general-purpose automatic control system that uses domain-specific knowledge to guide its choices at every step. EXPLAN was debugged using an extended blocks world domain, which is a simplification of typical robot pick-and-place operations. EXPLAN is based on a new knowledge representation that associates a symbolic time interval and a truth value of true or false with every proposition about the world. As it builds a plan, EXPLAN uses these truth values and time intervals to discover all harmful interactions that could occur between parallel actions and to order these actions to remove potential conflicts. EXPLAN uses this explicit representation of truth values and time intervals to describe preconditions for actions, as well as the actions themselves. This allows EXPLAN to reason efficiently about temporal relationships that occur during planning. This is a different approach from that used with state-change operator representations, which are the basis of many other artificial intelligence (A1) planning systems. GRA

N86-19621# Brunswick Corp., Lincoln, Nebr. Defense Div.
FEASIBILITY STUDY ON THE DESIGN OF REINFORCED PLASTIC COMPONENTS FOR THE LVTP (7) VEHICLE SHAFTS Final Report, May - Dec. 1984 on Phase 1
Jim McGee, Brian Spencer, and David Shy Dec. 1984 114 p
(Contract DAAG46-83-C-0025; DA Proj. 1L1-62105-AH-84)
(AD-A161024; AMMRC-TR-84-27) Avail: NTIS HC A06/MF A01 CSCL 13/6

This document pertains to a feasibility study in the design and manufacture of a composite drive shaft and propeller shaft for the LVTP (7) amphibious vehicle. The report shaft contains an analysis of the present steel shaft design and the two design approaches to a composite drive shaft. The first is a two piece drive shaft; the second is a combined single drive shaft eliminating several other parts. The design section includes the design of a joint to interface between the steel couplings and the composite shaft. The second part of this study is a manufacturing analysis of the production of 2,000 shafts for the actual retrofitting of the vehicle. It includes individual sections on fabrication, machining, and assembly of the proposed composite drive shaft. GRA

N86-19622# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
REDUNDANT SENSORS FOR MOBILE ROBOT NAVIGATION
Anita M. Flynn Sep. 1985 68 p
(Contract N00014-80-C-0505)
(AD-A161087; AI-TR-859) Avail: NTIS HC A04/MF A01 CSCL 17/7

Redundant sensors are needed on a mobile robot so that the accuracy with which it perceives its surroundings can be increased. Sonar and infrared sensors are used here in tandem, each compensating for deficiencies in the other. The robot combines the data from both sensors to build a representation which is more accurate than if either sensor were used alone. Another representation, the curvature primal sketch, is extracted from this perceived workspace and is used as the input to two path planning programs: one based on configuration space and one based on a generalized cone formulation of free space. (Author). GRA

N86-19623# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
PROCEEDINGS OF THE ISTVS (INTERNATIONAL SOCIETY FOR TERRAIN-VEHICLE SYSTEMS) WORKSHOP ON MEASUREMENT AND EVALUATION OF TIRE PERFORMANCE UNDER WINTER CONDITIONS, ALTA, UTAH, 11-14 APRIL 1983
George L. Blaisdell and Raymond N. Yong Sep. 1985 183 p
Workshop held at Alta, Utah, 11-14 Apr. 1983
(AD-A161129; CRREL-SR-85-15) Avail: NTIS HC A09/MF A01 CSCL 13/6

The problem of specification of required tire performance characteristics for operation in off-road situations can be a simple or complicated circumstance--depending on the sets of perspectives that are brought to bear in the evaluation of tire performance. The more detailed an individual is in specification or performance, the more complicated the issue becomes; primarily because the means for evaluation of performance cannot always be rigorously or exactly stated and because: (1) proper first evaluation of tires requires actual on-terrain running interaction; (2) test terrain variabilities cannot be readily described; and (3) test measurement systems and techniques, have yet to be fully delineated and rationalized, we are left with the situation of developing whole sets of procedures and standards that need to be continually upgraded or fine-tuned as more information becomes available. GRA

N86-19624# MMR Technologies, Inc., Mountain View, Calif.
DEVELOPMENT OF A LOW NOISE 10K REFRIGERATION SYSTEM Progress Report
Oct. 1985 21 p
(Contract N00014-85-C-0428)
(AD-A161199) Avail: NTIS HC A02/MF A01 CSCL 13/1

The purpose of this contract is the development of a Low Noise, Closed Cycle, Joule Thomson refrigeration system for 10K operation. This report summarizes work completed to date on the detailed thermodynamic analysis and physical design of the refrigerator. A complete enthalpy balance for the three stage device is presented. Fabrication of the first two refrigeration stages (argon and hydrogen) has begun. A prototype compressor for single gas operation has been designed and tested successfully. GRA

N86-19625*# Army Construction Engineering Research Lab., Champaign, Ill.
ADAPTIVE IDENTIFICATION AND CONTROL OF HVAC (HEATING, VENTILATING, AND AIR-CONDITIONING) SYSTEMS Final Report
Richard L. Bishop Sep. 1985 49 p
(Contract DE-AI02-83CE-30602; DA Proj. 4A1-61102-AT-23)
(AD-A161203; CERL-TR-E-85/08) Avail: NTIS HC A03/MF A01 CSCL 13/1

This report outlines the specialization of modern adaptive control theory to the control of heating, ventilation, and air-conditioning systems as a whole. Several technical aspects of this theory have been developed: preliminary filtration of data, time-optimal control, appropriate estimation of derivatives, novel test inputs, and a sequential UD algorithm. A form of time-optimal control has been found to be a good alternative to adaptive proportional-integral control, and a suggested implementation has been provided. GRA

N86-19626# Renault Vehicles Industriels (France). Direction Etudes et Recherches.
INDUSTRIAL SIMULATION AND MODELING. MODELING AND IDENTIFICATION OF TRANSIENT RESPONSES OF A TURBO-CHARGED DIESEL ENGINE FOR TRANSFER FUNCTION EVALUATION
Bernard Garaudee Feb. 1985 20 p
Avail: NTIS HC A02/MF A01

An identification, simulation, and control procedure which gives digital computers and modeling a major role in industrial applications of identification and control theory is described. Starting from an experimental design used to study an arbitrary unknown system, the procedure includes model structure determination, parameter estimation, model validation with feedback to model structure, and final model acceptance. The case of a diesel engine is detailed. The multiple input multiple output model includes the use of Kalman filter equations. Good agreement between predicted and experimental transient behavior is shown. Author (ESA)

N86-19627# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Avionics Panel.
ARTIFICIAL INTELLIGENCE AND ROBOTICS
Loughton, England Sep. 1985 141 p refs Lecture series held in Trondheim, Norway, 26-27 Sep. 1985, in The Hague, Netherlands, 30 Sep. - 1 Oct. 1985, and in Lisbon, Portugal, 3-4 Oct. 1985
(AGARD-LS-142; ISBN-92-835-1511-0) Avail: NTIS HC A07/MF A01

The renewed interest in the allied fields of Robotics and Artificial Intelligence is addressed. Both of these areas are studied with emphasis on robotics, beginning witth a review of the state-of-the-art and concluding with applications and a view of the future for each. Selected specialized subjects covered include vision and tactile sensors, robotics software, solid modelling, and expert systems. For individual titles, see N86-19628 through N86-19635.

N86-19628# National Bureau of Standards, Washington, D.C.
ROBOTICS: PAST, PRESENT, AND FUTURE
James S. Albus *In* AGARD Artificial Intelligence and Robotics Sep. 1985 16 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

Robotics is a systems science that attempts to integrate artificial intelligence with feedback control of mechanical devices. It draws on work in pattern recognition, scene analysis, geometrical reasoning, world modeling, language and speech understanding, planning, problem solving, goal seeking, task decomposition, manipulator control, mobility, and navigation. A brief history is given. A brief history of robotics is presented the following current research topics are examined: (1) kinematics, dynamics, and mobility; (2) vision, kinesthetic, tactile, and acoustic sensing and sensory processing; (3)sensory-interactive task decomposition, planning, and problem solving; (4) world modeling; (5) programming techniques and learning; and (6) system integration. Future applications are discussed. Author

N86-19629# Technische Hogeschool, Delft (Netherlands). Dept. of Applied Physics.
SENSORS: VISION AND TACTILE c35
Frans C. A. Groen and Piet W. Verbeek *In* AGARD Artificial Intelligence and Robotics Sep. 1985 17 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

Several techniques are presented to obtain 2D grey-value images and distance images. In these sensor systems different principles may be used to select the image points of which the grey-value is measured. The scanning may be presented in the light source, in the sensor, in the movement of the object or in a combination of these. Distance images may be obtained by triangulation of points in the scene between lightbeam and sensor. The sensors are based on scanning beams, planes of light or space encoding. Commonly used vision sensors such as video pick-up tubes, CCD arrays and Position Sensitive Detectors (PSD) are discussed. Tactile sensors are based on the measurement of surface deformation by optoelectronic, capacitive, magnetic, piezoelectric or piezoresistive transduction. Tactile arrays offer the possibility of obtaining pressure images which can be processed in the same way as if they are the result of a vision sensor. Author

N86-19630# Lehigh Univ., Bethlehem, Pa. Inst. for Robotics.
ROBOT SOFTWARE: CURRENT STATE-OF-THE-ART, AND FUTURE CHALLENGES c61
Roger N. Nagel and Scott R. Garrigan *In* AGARD Artificial Intelligence and Robotics Sep. 1985 9 p (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

Robot software system and their complexity currently are growing at an incredible rate. A complexity hierarchy covering the simplest methods of robot programming up through first and second generation robot programming languages is defined. Methods of graphical robot programming are described, and an assessment is made of the current state of the art of robotic software systems. The next generation of robot software systems which will be task level languages is described. That is, the elements of the programming language will be statements of tasks to be accomplished rather than statements with regard to robot motions. Technical challenges in achieving task level languages and current research approaches to overcoming these challenges are also described. Author

N86-19631# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Electrical, Computer, and Systems Engineering.
THE SENSING AND DISPLAY OF THREE-DIMENSIONAL INFORMATION WITH EMPHASIS ON SOLID MODELLING: STATUS AND APPLICATIONS c35
Lester A. Gerhardt *In* AGARD Artificial Intelligence and Robotics Sep. 1985 8 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

The sensing of three dimensional information is addressed, the display/representation of three dimensional information is considered. With respect to the sensing of three dimensional information, a variety of approaches are discussed including the use of structured light, the use of displaced sensors to develop stereo pairs, and coherence processing and time of flight measurement. Other techniques described are interpretation of object motion as a measurement of depth perception, and general methods for utilizing depth of field. The advantages and disadvantages of each are discussed and comparisons made. Three dimensional display techniques is also discussed. The approaches covered include graphics, stereo pairs, holograms, vibrating mirrors, and other optical systems. Applications are reviewed with examples of results such as the use of vibrating mirror technology for the three dimensional display of compterized tomography. Solid modelling as an approach to the display and representation of

three dimensional information is reviewed. Following a definition of solid modelling, the advantages of this generic approach are reviewed and analyzed. The relationship of solid modelling to robotics and artificial intelligence is made, and trends cited with respect to hardware costs, portability of software, computational efficiency, display resolution, and neutral data bases. The paper concludes by giving examples of some of the key applications of solid modelling in the automative industry, aircraft industry and CAM, among others. Author

N86-19632# IBM United Kingdom Labs. Ltd., Winchester, (England).
CRT INSTALL AND SECURE STATIONS FOR THE GENERIC MONITOR LINE
D. C. Teale *In* AGARD Artificial Intelligence and Robotics Sep. 1985 9 p (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

Illustrations of the product from an assembly point of view are presented. Briefly shown are the problems were expected and where these stations fit in the line. How the station was designed is discussed from a generic automation viewpoint, highlighting the areas which are common to most automation stations. The work in the CRT install is used to illustrate the various stages of automation design, with particular emphasis on the areas which are common to all automation stations. The problems which were experienced in working with a PMC group located remotely from the laboratory is covered along the various differences in national standards which must be solved in order to attain two identical lines. Author

N86-19633# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. fuer Dynamik der Flugsysteme.
SENSORY FEEDBACK STRUCTURES IN ROBOTICS
G. Hirzinger *In* AGARD Artificial Intelligence and Robotics Sep. 1985 15 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

The problems when trying to feed back on-line sensory signals in a robot control system are outlined. Special emphasis is laid on the question how to teach a robot a sensor-based task that must be repeated under changing environment. Feedback structures as they have proposed in literature especially for force-feedback are discussed. Generalizing definitions relating positions/orientations and (pseudo)-forces/torques are introduced. Sensor programming concept is outlined that refines any rudimentary robot command given by a human teacher or a CAD system via the sensory reaction with the environment. In this scheme motion commands and sensor data are stored together. The sensor data are then available as reference values for the repetition mode in a possibly changing environment. Techniques for teacher induced on-line improvements as well as self improvements of the robot are presented. The sensor-ball technique or programming robots is outlined as a special realization of these concepts. Author

N86-19634# Royal Signals and Radar Establishment, Malvern (England). Integrated Air Defence Systems Div.
APPLICATIONS OF EXPERT SYSTEMS c63
Philip R. Wetherall *In* AGARD Artificial Intelligence and Robotics Sep. 1985 17 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

An Expert System contains a knowledge base, an inference engine, an explanation system, a model of the real world and a man machine interface. The types of reasoning include interpretation, monitoring, prediction and design, together with specializations of these, such as diagnosis and planning, and aggregations, such as debugging, instruction and control. A range of possible applications are described to illustrate these general tasks. The nature of the knowledge available, and some implementation problems, are identified. The applications include examples in the area of tactical decision aids, specifically sensor data interpretation, data fusion, threat assessment and resource allocation. Other topics include cockpit environments and intelligent tutoring. Finally, some of the problems that limit the immediate widespread adoption of the technology are discussed. Author

N86-19635# George Mason Univ., Fairfax, Va.
APPLYING AI TO THE DIAGNOSIS OF COMPLEX SYSTEM FAILURES c63
Kenneth DeJong *In* AGARD Artificial Intelligence and Robotics Sep. 1985 4 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

The expert system technology from the artificial intelligence (AI) community is being applied to a wide variety of problems including fault isolation in complex man made systems. The use of expert systems was explored in the automatic test equipment (ATE) area (with particular interest in applications to Navy avionics gear). Several protype expert systems were built and discarded in the process of understanding how this technology can be usefully applied in the ATE world. The current views on these issues are summarized and an overview of the architecture of our latest prototype is required. Author

N86-20237# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF PLANETARY ROVER MOVEMENT
Abstract Only
Ye. I. Grigoryev and S. N. Yermakov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 130-131 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 92-99 Original language document was announced in IAA as A85-25334 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-19636*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NONDESTRUCTIVE TECHNIQUES FOR CHARACTERIZING MECHANICAL PROPERTIES OF STRUCTURAL MATERIALS: AN OVERVIEW
Alex Vary and Stanley J. Klima Dec. 1985 21 p refs Proposed for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by ASME (NASA-TM-87203; E-2858; NAS 1.15:87203) Avail: NTIS HC A02/MF A01 CSCL 14D

An overview of nondestructive evaluation (NDE) is presented to indicate the availability and application potentials of techniques for quantitative characterization of the mechanical properties of structural materials. The purpose is to review NDE techniques that go beyond the usual emphasis on flaw detection and characterization. Discussed are current and emerging NDE techniques that can verify and monitor entrinsic properties (e.g., tensile, shear, and yield strengths; fracture toughness, hardness, ductility; elastic moduli) and underlying microstructural and morphological factors. Most of the techniques described are, at present, neither widely applied nor widely accepted in commerce and industry because they are still emerging from the laboratory. The limitations of the techniques may be overcome by advances in applications research and instrumentation technology and perhaps by accommodations for their use in the design of structural parts. Author

N86-19637# Rockwell International Corp., Richland, Wash.
SIMULATION OF GLOVEBOX NONDESTRUCTIVE ASSAY TO AID IN ERROR ESTIMATION AND MEASUREMENT PROCEDURE DESIGN
R. F. Eggers, E. W. Giese, R. A. Jones, and R. E. Kerns 19 Jul. 1985 8 p Presented at the 26th Annual Meeting of the Institute

of Nuclear Material Management, Albuquerque, N. Mex., 21 Jul. 1985
(Contract DE-AC06-77RL-01030)
(DE85-017242; RHO-SS-SA-18P; CONF-850765-33) Avail: NTIS HC A02/MF A01

Gamma ray nondestructive assay (NDA) measurement procedures for large objects such as gloveboxes require that multiple measurements be made to cover the entire object. Net counts observed at each measurement location are converted to special nuclear material (SNM) equivalents using a data reduction equation. To facilitate rapid and reliable reduction of data, this equation is often a simple representation of the measurement situation. Using a single measurement procedure applied uniformly to many situations and a simple data reduction equation produce results that only approximate the quantity of SNM contained in the glovebox. This paper discusses a glovebox measurement simulation model and computer program that is being developed by Rockwell Hanford Operations. The model is being used to investigate some of the errors associated with current measurement and data reduction procedures. DOE

N86-19638# Technische Hogeschool, Delft (Netherlands). Dept. of Mechanical Engineering.
DEVELOPMENTS IN QUALITY CONTROL [DE ONTWIKKELING VAN DE KWALITEITSBEHEERSING]
M. A. A. Kooter 31 Oct. 1983 51 p refs In DUTCH
(Rept-186) Avail: NTIS HC A04/MF A01

Developments of quality control and in particular the role of workers and quality managers in it, were surveyed. An increase in demands for quality from the outside (market shift), preventive quality care efficiency, and employee requests for more responsibility are discerned. A motivation improvement by decentralization, consciousness awakening, participation, and self-(quality)control in the production sector is pursued. Quality section tasks are shifted to the control and support of this self-control. Results are cost reduction and product improvement. Certification as a result of acknowledged quality control consolidates competitivity. Author (ESA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-19639 Illinois Univ., Urbana-Champaign.
SYMMETRY, BIFURCATION AND COMPUTATIONAL METHODS IN NONLINEAR STRUCTURAL MECHANICS Ph.D. Thesis
Timothy James Healey 1985 321 p
Avail: Univ. Microfilms Order No. DA8511616

The computation of global (equilibrium) solution branches of one-parameter systems arising in nonlinear structural mechanics is considered in this work. Particular emphasis is given to systems possessing spatial symmetry and to the expoitation of that symmetry in computational schemes. Strategies for accurately locating and classifying singular points, and methods for continuation through limit points and bifurcation points are presented. The techniques allow for branch switching at simple and multiple bifurcation points. The equilibirum equations of general nonlinearly elastic structures and solids possessing symmetry are shown to be covariant with respect to a specific set of linear transformations. These transformations form a group and are derived from the symmetry of the physical system. It is shown that the identification of covariance leads to a reduction in the original problem. Moreover, the group transformations can be used to generate new solution branches from known ones. Dissert. Abstr.

N86-19640 Virginia Polytechnic Inst. and State Univ., Blacksburg.
GEOMETRICALLY NONLINEAR FINITE ELEMENT ANALYSIS OF SPACE FRAMES Ph.D. Thesis
Jih Jih Jau 1985 272 p
Avail: Univ. Microfilms Order No. DA8511942

The displacement method of the finite element is adopted. Both the updated Lagrangian formulation and total Lagrangian formulation of a three-dimensional beam element is employed for large displacement and large rotation, but small strain analysis. A beam-column element or finite element can be used to model geometrically nonlinear behavior of space frames. The two element models are compared on the basis of their efficiency, accuracy, economy and limitations. An iterative approach, either Newton-Raphson iteration or modified Riks/Wempner iteration, is employed to trace the nonlinear equilibrium path. The latter can be used to perform postbuckling analysis. Dissert. Abstr.

N86-19641 Ohio State Univ., Columbus.
VIBRATION AND BUCKLING OF LAMINATED COMPOSITE PLATES WITH ARBITRARY BOUNDARY CONDITIONS Ph.D. Thesis
Benham Baharlou 1985 151 p
Avail: Univ. Microfilms Order No. DA8518914

Laminated composite plates are widely used at the present because of their any significant advantages and the problem of vibration and buckling of these structural elements has attracted the attention of many researchers over the last two decades. In this study an accurate and economical analytical approach is developed to find natural frequencies and buckling loads for all the possible combinations of the geometric boundary conditions that exist for a rectangular laminated composite plate. The Ritz method is used with ordinary algebraic polynomials as displacement functions. These polynomials are modified such that they satisfy the geometric boundary conditions, as is required by the Ritz method. The formulation done within the limitations of the classical theory of thin laminated plates for a general case of unsymmetric laminate. The numerical results calculated are compared with the ones available in the literature and solutions are found for a number of previously unsolved problems. Dissert. Abstr.

N86-19642 Engineering Sciences Data Unit, London (England).
GROWTH OF CRACKS UNDER CONSTANT AMPLITUDE FATIGUE LOADING: EXAMPLE CALCULATIONS
Mar. 1985 19 p ref Submitted for publication Sponsored in part by the Royal Aeronautical Society, London, England
(ESDU-84001; ISBN-0-85679-464-3; ISSN-0141-3996) Avail: ESDU

ESDU 84001 shows how crack growth data, such as those in this Sub-series, are used in practical situations; it provides two fully-worked examples using representative structural components to estimate the number of cycles to a specified crack length. The example shows the effect of a series of equally pitched riveted stiffeners on the progress of a crack across a sheet. Author

N86-19643 Engineering Sciences Data Unit, London (England).
CYLINDER GROUPS: MEAN FORCES ON PAIRS OF LONG CIRCULAR CYLINDERS
Aug. 1984 36 p refs
(ESDU-84015; ISBN-0-85679-477-5; ISSN-0141-4003) Avail: ESDU

ESDU 84015 provides a graphical method for predicting the drag and lift (that is, crosswind force) on each of a pair of closely spaced equal diameter cylinders having their axes parallel and normal to the flow. The method was derived from a correlation of experimental results extracted from the literature and applies to spacings between the axes in the range from one (cylinders touching) to 50 diameters for a range of incidences of 0 to 90 degrees (that is for cylinders in tandem round to cylinders side-by-side). The cylinders can be smooth up to moderately rough, and the Reynolds number range is from 10,000 to 10,000,000. The data can be used for pairs of pipes, cables, masts, or cylindrical structural members directly, and, using correction factors for finite length and shear flow effects in ESDU 81017, can also be applied to stacks and towers. Also included are descriptions of the flow mechanisms, caused by inteference between the flows around

the cylinders, which lead to the forces on the cylinders differing from those on an isolated cylinders. ESDU

N86-19644 New South Wales Univ., Sydney (Australia). School of Civil Engineering.
NONLINEAR AND TIME-DEPENDENT BEHAVIOUR OF REINFORCED CONCRETE SKELETAL STRUCTURES Ph.D. Thesis Abstract Only
S. L. Bakoss Apr. 1985 3 p
Avail: Issuing Activity

Long-term static tests were carried out on simply supported beams, continuous beams and rectangular closed frames. The test specimens, which were prototype-size, were made out of normal weight production grade ready-mixed concrete and utilized standard structural grade deformed reinforcement. The specimen were either subjected of constant sustained loads, in the service load range or were left unloaded to act as companion shrinkage specimens. The instantaneous and time-dependent reflections were recorded, together with the time-varying strain distribution at selected cross sections. For the continuous beams the redistribution of bending moments due to creep and shrinkage were also recorded. Ancillary material tests were carried out to determine the material properties required for the prediction of structural behavior. Author

N86-19645 Central Electricity Generating Board, London (England).
CREEP STRENGTH TESTING OF WELDED PIPE JOINTS OF THE 13 CrMo 4 4 AND 10 CrMo 9 10 STEELS
E. Jahn 14 Nov. 1985 32 p Transl. into ENGLISH from Mitteilungen der VGB (West Germany), v. 52, no. 3, Jun. 1972 p 258-270
(BLL-CE-Trans-8129-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

According to the technical regulations for steam generators joint welds in pipes of the 13 CrMo 4 4 and 10 CrMo 9 10 steels had originally been subjected to heat treatment regardless of the pipe sizes. The objective of this research was to investigate if and under what circumstances annealing treatment could be omitted. Creep strength was considered to be an important criterion, and therefore relevant tests were carried out on boin steels. Gas fusion welded pipes were tested under uniaxial tensile stress in comparison with pipes under internal pressure, both in the unannealed and in the heat treated condition. For comparison, several unwelded specimens of the 10 CrMo 9 10 steel were tested which had, however, been annealed to simulate a comparable structure. It was necessary for the assessment of the importance of varying properties of these unannealed welds to carry out random tests on pipe welds of chromium-free 15 Mo 3 steel where annealing had never been required up to a wall thickness of 30 mm. Long-term annealing without stressing was carried out at the same time so that the change in hardness of these welds over a period of time could be determined. Author

N86-19646# Defence Research Information Centre, Orpington (England).
INFLUENCE OF INITIAL RESIDUAL STRESS ON FATIGUE CRACK PROPAGATION
S. Takezono (Kumamoto Univ., Japan), M. Sato (Mitsubishi Heavy Industries, Ltd., Japan), and K. Takita Oct. 1985 19 p refs Transl. into ENGLISH from Zairyo (Japan), v. 32, no. 361, 1983 p 1150-1156
(BLL-DRIC-Trans-7578-(3623.66)) Avail: British Library Lending Div., Boston Spa, Engl.

The fatigue crack propagation behavior of S35C steel plate affected by initial residual stress has been investigated. Fatigue crack propagation tests under constant stress intensity factor range delta K have been conducted and the infuence of initial residual stress on crack propagation examined. Initial residual stress has been applied to testpieces in the form of pure bending. A FEM elastic-plastic analysis of fatigue crack growth has been performed, relationships with mechanical quantities calculated from the analysis, and crack propagation rate discussed. Author

N86-19647 British Library Lending Div., Boston Spa (England).
NEW EVALUATION METHOD FOR THE FATIGUE STRENGTH OF WELDED JOINTS
O. Sunamato, S. Yamauchi, and M. Matoba Nov. 1985 35 p refs Transl. into ENGLISH from Mitsubishi Jugyo Giho (Japan), v. 16, no. 3, 1979 p 283-291
(BLL-Risley-Tr-5235-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

A method in which the stress generated in the welded joint is effectively broken down into a nominal stress sigma(n), a secondary stress sigma(s) and a peak stress sigma(p) has been proposed for the estimation of fatigue limits. The peak stress is the stress which is concentrated in the vary narrow range of the toe, corresponding to the state of the toe part of the weld bead, and it can be evaluated with the fatigue notch coefficient K sub f which is based on data for basic welded joints. The secondary stress is the additional stress which is generated by the overall form of the joint structure, being represented by the secondary stress coefficient K sub s obtained by taking its ratio with the nominal stress. It can be evaluated with a reverse analysis from existing joint data, actual material data or by using a detailed finite element method analysis. The method has been proved for two sets of experimental values and the usefulness of the method has been confirmed. Fracture dynamics studies show that it is possible to evaluate life expectancies by carrying out fatigue crack growth calculations on the assumption that initial equivalent cracks are present in the toe part of the bead. It should be possible to estimate fatigue S-N diagrams for subject joint structures on the desk top if the estimations for both the fatigue limits and life expectancies are combined. M.G.

N86-19648 Illinois Univ., Urbana.
NUMERICAL ANALYSIS OF A GENERALIZED THREE-DIMENSIONAL ELASTICA Ph.D. Thesis
Wen-Ben Chou 1985 110 p
Avail: Univ. Microfilms Order No. DA8521744

A straightforward approximate procedure based on large deflections and rotations but with small strains is developed for the static analysis of a spatial elastica (a three-dimensional elastic thin rod). The rod is divided into finite elements with rotations treated as matrix transformations on vectors. The equilibrium positions, internal loads, and external support forces and moments of the elastica are determined for prescribed arbitrary conservative external loads and temperature differences. Half of the end boundary values, namely, six of the generalized forces and displacements at each end are prescribed. Following initial guesses for the remaining boundary values at one end of the rod, a sequential (chain) calculation is performed on the deformation and equilibrium of each element. A Newton-type iteration is used for improved guesses to be used in the next chain calculation. The iteration is said to converge when boundary values obtained from the chain calculation agree within acceptable error with the prescribed boundary values. Dissert. Abstr.

N86-19649 Cornell Univ., Ithaca, N.Y.
ANALYSIS OF STEADY STATE CRACK PROPAGATION DUCTILE MATERIALS Ph.D. Thesis
Kuang-Chong Wu 1985 157 p
Avail: Univ. Microfilms Order No. DA8516923

An analysis is presented for the steady state crack propagation in ductile materials. The analysis is made on the basis of the theory of crack extension rates for ductile materials proposed by Hart. The work done by Hart for Mode 3 cracks is expanded. The treatment is extended to Model 1 and Mode 2 cracks. Integral representations of stress equilibrium for all three loading modes are delivered by the method of fictitious body force. The stress equations consist of three terms. The first term is the applied stress represented by the elastic singular stress under the small scale yielding assumption. The second term is the self-stress induced by the plastic flow in the creep zone and the third term is a residual stress due to the accumulated plastic strain in the wake. It is shown that the local stress intensity factor K can be distinguished from the applied stress intensity factor K sub A by a

quantity K' sup p that characterizes the stress relief effect of the plastic flow. The equations of energy balance of the crack systems are derived by employing the J-integral. Dissert. Abstr.

N86-19650 Wisconsin Univ., Madison.
TRANSIENT RESPONSE OF A TRANSVERSELY ISOTROPIC CYLINDRICAL SHELL WITH TEMPERATURE-DEPENDENT PROPERTIES Ph.D. Thesis
Yi-Syin Wang 1985 147 p
Avail: Univ. Microfilms Order No. DA8513490

The mechanical vibration of structural components can be caused when high energy is deposited in a very short interval of time. The vibration occurs because the temperature of the structural component can rise faster than the body can respond by thermal expansion under such conditions of rapid heating. In this paper, using the fundamental differential equations for the thermoelasticity of a thin cylindrical shell with finite length, the dynamic response of the shell subjected to volumetric and surface heat sources has been investigated. As the thermal shocks are expected to become significant the inertia terms have been taken into account in the study. The axisymmetric heat source is assumed to be instantly applied at an initial state and immediately afterwards cooled naturally. The physical reality of the influence of temperature upon the basic response characteristics of the material has been evaluated. The obtained results show differences in the thermally induced stresses for sensitive and insensitive materials. But the differences in displacements are not appreciable. Dissert. Abstr.

N86-19651 Texas Univ., Arlington.
COMPUTER ANALYSIS OF THREE-DIMENSIONAL FRAMED STRUCTURES USING AN EQUIVALENT PLANE FRAME METHOD Ph.D. Thesis
Ronald Douglas Matthys 1984 276 p
Avail: Univ. Microfilms Order No. DA8521176

A general computer program for the analysis of three-dimensional structures using an equivalent plane frame method is presented. This program is capable of analyzing both reinforced concrete and structural steel structures. The ability to determine the second order effect of lateral deflections on frame moments, shears, and axial forces is included. Analysis of concrete frames may include the effect of transverse torsional members, loss of stiffness due to cracking, and effective width of slab systems for both the gravity and lateral load cases. A model steel frame was analyzed to verify the technique developed for determining second order effects. A model concrete frame was analyzed to verify the procedures for modifying column or slab stiffnesses for the effects of torsional stiffnesses. The subroutine which calculates the stiffness coefficients for nonprismatic members and the subroutine which calculates the fixed end moments for nonprismatic members were tested independently of the main program. Dissert. Abstr.

N86-19652 Illinois Univ., Urbana-Champaign.
STRESS INTERFERENCE IN AXISYMMETRIC TORSION OF A TRANSVERSELY ISOTROPIC BODY Ph.D. Thesis
Stephen Michael Heinrich 1985 101 p
Avail: Univ. Microfilms Order No. DA8521786

An unbounded transversely isotropic body of revolution containing two spheroidal cavities is subjected to torsion about its axis of elastic symmetry, which coincides with its axis of revolution. At large distances from the cavities the elastic field approaches the Saint-Venant solution for the torsion of a circular cylinder. The elasticity solution is obtained in series form and numerical results presented for the case of two spherical cavities. Of primary interest is the degree of stress interference between the two perturbations, as a function of the spacing of the cavities and the values of the elastic constants. Dissert. Abstr.

N86-19653 Purdue Univ., West Lafayette, Ind.
SINGULARITY ELEMENTS FOR THE P-VERSION OF THE FINITE ELEMENT METHOD Ph.D. Thesis
Juh-Shiun Shieh 1985 143 p
Avail: Univ. Microfilms Order No. DA8520072

The purpose of this dissertation is to develop an appropriate element model with a general but simple formulation in FEM for improvement of the accuracy and the rate of convergence in computing the strain energy (or stress intensity) for linear elastic mechanics problems. Firstly, the FEM with the highly conforming formulations between elements for the p-version is studied. It is demonstrated that this strategy is only a valid and effective method for one-dimensional problems. Then the square root triangular singularity elements with C sup 0 formulations for the p-version are investigated. A general but simple rule for placing all the boundary and interiour nodal locations for these singularity elements is developed. Based on the numerical analysis of the experimental results obtained from simple practical problems, these singularity elements are not only used for the inverse square root stress singularity problems, but are also applicable to the other linear elastic problems, such as absence of singularity, nearly incompressible materials and variation of strength of singularity problems. Dissert. Abstr.

N86-19654# National Aerospace Lab., Tokyo (Japan).
TORSIONAL STRENGTH OF PRESSURELESS-SINTERED SILICON NITRIDE
Yoshiaki Fujisawa, Katsutoshi Matsueue, and Kitao Takahara 1985 9 p refs In JAPANESE; ENGLISH summary
(NAL-TR-877; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Torsional strength tests of pressureless-sintered silicon nitride were carried out at temperatures ranging from room temperature to 1400 C in air. The torsional strength rapidly decreased at temperatures above 800 C; at 1400 C it was 15% of that at room temperature where a value of 349 MPa was found. The fracture mode and of the crack propagation on the fracture surfaces are discussed. E.A.K.

N86-19655# National Aerospace Lab., Tokyo (Japan). First Airframe Div.
ON THE CONVERGENCE OF THE FINITE ELEMENT SOLUTION OF A NONLINEAR CRACK TYPE PROBLEM IN FINITE ELASTICITY
Kunihiko Ohtake Aug. 1985 14 p refs
(NAL-TR-872T; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The crack type problem in a hyperelastic body is investigated. The material is assumed to be isotropic, incompressible, and to have a special nonlinear constitutive equation under large deformation. This body is subjected to shear deformation under the action of body force. The problem leads to the nonlinear boundary value problem. The analytical solution of this problem exhibits the singularity at the crack tip. The convergence rate of the Galerkin approximation solution is studied by introducing the weighted Sobolev space in functional analysis technique. Author

N86-19656# National Aeronautical Lab., Bangalore (India). Materials Science Div.
FATIGUE CRACK PROPAGATION UNDER SPECTRUM LOADING
R. Sunder Mar. 1985 21 p refs
(NAL-TM-MT-8502) Avail: NTIS HC A02/MF A01

This project involved development of a method to predict the fatigue crack propagation process in thin-walled aircraft structural components under flight-by-flight loading. Extensive experimental test results provided the input for software development. They yielded evidence pointing to the complex nature of crack growth under spectrum loading and also provided the basis for procedures adopted for life prediction. A simple engineering method is proposed for estimating fatigue crack propagation life under random loading. Predictions are based on test data obtained under constant amplitude loading. Prediction accuracy favourably compares with that of available techniques. Computation time is extremely small, enabling the use of desktop computer for life predictions. Author

N86-19657# National Aeronautical Lab., Tokyo (Japan).
FUNDAMENTAL INVESTIGATION ON THE IMPACT STRENGTH OF HOLLOW FAN BLADES
Tameharu Ikeda, Toshio Miyachi, and Yasushi Sofue Sep. 1985

23 p refs In JAPANESE; ENGLISH summary
(NAL-TR-879; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Models of hollow fan blades were made and tested to prove that their strength is sufficient for use in real engines. The hollow blades were fabricated by diffusion bonding of two titanium alloy (6Al-4V-Ti) plates, one of which had three spanwise stiffeners and the other being flat plate. The model was a non-twisted tapered blade. Impact tests were carried out on the hollow fan blade models in which the ingestion of a 1.5 pound bird was simulated. Solid blades with the same external form were also tested by similar methods for comparison. The results of these tests show that properly designed hollow blades have sufficient stiffness and strength for use as fan blades in the turbo-fan engine. Author

N86-19658# National Aeronautical Lab., Bangalore (India). Structural Sciences Div.

A FIELD-CONSISTENT TWO-NODED AXISYMMETRIC SHELL ELEMENT

C. RameshBabu and G. Prathap Jan. 1985 38 p refs
(NAL-TM-ST-8501) Avail: NTIS HC A03/MF A01

The efficiency of a field-consistent two-noded linear curved axisymmetric shear-flexible shell element is shown to be due to the removal of both shear and membrane locking. Typical applications illustrate how the field-consistent representation dramatically improves performance, and allows greater flexibility in tailoring element design to satisfy specific problem needs. Author

N86-19659# National Aeronautical Lab., Bangalore (India). Structural Sciences Div.

A LINEAR THICK CURVED BEAM ELEMENT

C. RameshBabu and G. Prathap Apr. 1985 34 p refs
(NAL-TM-ST-8504) Avail: NTIS HC A03/MF A01

Early attempts to derive curved beam and shell elements in a curvilinear system were dramatically unsuccessful. This was wrongly attributed to the failure of these elements to recover strain-free rigid body displacement modes in a curvilinear coordinate description. Recent evidence points to a membrane locking phenomenon that arises when constrained strain-fields corresponding to inextensional bending are not consistently recovered. A simple linear two-noded C sup 0 continuous thick curved beam element based on a curvilinear deep shell theory is derived free from shear and membrane locking. Lack of consistency in the shear and membrane strain-field interpolations in their constrained physical limits (Kirchhoff and inextensional bending limits respectively) causes very poor convergence due to locking and severe spurious oscillations in stress predictions. Error estimates for these are made and verified. Author

N86-19660# National Aeronautical Lab., Bangalore (India). Structural Sciences Div.

A FIELD-CONSISTENT 4-NODED LAMINATED ANISOTROPIC PLATE/SHELL ELEMENT

B. B. Somashekar, G. Prathap, and C. RameshBabu Nov. 1985 37 p refs
(NAL-TM-ST-8515) Avail: NTIS HC A03/MF A01

The development of efficient and accurate finite element models of laminated anisotropic plate and shell behavior has been singularly difficult because of two problems relating to the use of shear deformable theory to describe the elasticity and a description in curvilinear geometry for the shell action. A fuller understanding of these problems has been possible recently, in terms of the field-consistency approach. The problems mentioned earlier in this context are examined and an accurate and reliable element with four nodes and five degrees of freedom at each node is developed, the inplane displacements u and v the transverse displacement w; and section rotations theta sub kappa and theta sub gamma. It is found that the element offered is very reliable and efficient and should be the simplest displacement type element of its class. Its convergence properties are insensitive to thickness ratio, degree of anisotropy and extent of inextensional bending action in a shell configuration. E.A.K.

N86-19661*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

APPLICATION OF MATHEMATICAL OPTIMIZATION PROCEDURES TO A STRUCTURAL MODEL OF A LARGE FINITE-ELEMENT WING

Joanne L. Walsh Jan. 1986 43 p refs
(NASA-TM-87597; L-15930; NAS 1.15:87597) Avail: NTIS HC A03/MF A01 CSCL 20K

An optimization system is described that consists of the finite-element analysis program known as Engineering Analysis Language (EAL), the CONMIN optimization program, and a piecewise linear analysis. The optimization analysis system (OPTEAL) is used to minimize the mass of a transport wing subject to stress constraints for two static load conditions. The optimization procedure and the optimization analysis system (OPTEAL) are described and the optiomized results with fully stressed design results compared. Author

N86-19662*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.

FATIGUE BEHAVIOR OF FLEXHOSES AND BELLOWS DUE TO FLOW-INDUCED VIBRATIONS Final Report, 11 Jan. 1985 - 10 Jan. 1986

Prateen V. Desai and Lindsey Thornhill Jan. 1986 84 p refs (Contract NAS10-17)
(NASA-CR-176481; NAS 1.26:176481) Avail: NTIS HC A05/MF A01 CSCL 20K

The analysis and results developed in a fresh approach to calculate flow induced vibration response of a flexible flow passage are summarized. The vibration results are further examined in the frequency domain to obtain dominant frequency information. A cumulative damage analysis due to cyclic strains is performed to obtain the number of cycles to failure for a metallic bellows of particular specifications under a variety of operational conditions. Sample plots of time and frequency domain responses are included. The complex listing of a computer program is provided. The program successively executes each of the analyses needed to calculate the vibration response, the frequency response, the cyclic strains and the number of cycles to failure. The program prompts the user for necessary input information. Sample data from the program is provided. The fatigue life results obtained by the computer model lie within an acceptable range of previously measured available data. Author

N86-19663*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPUTATIONAL ENGINE STRUCTURAL ANALYSIS

Christos C. Chamis and Robert H. Johns 1986 20 p refs Proposed for presentation at the 31st International Gas Turbine Conference and Exhibit, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by American Society of Mechanical Engineers
(NASA-TM-87231; E-2898; NAS 1.15:87231) Avail: NTIS HC A02/MF A01 CSCL 20K

A significant research activity at the NASA Lewis Research Center is the computational simulation of complex multidisciplinary engine structural problems. This simulation is performed using computational engine structural analysis (CESA) which consists of integrated multidisciplinary computer codes in conjunction with computer post-processing for problem-specific application. A variety of the computational simulations of specific cases are described in some detail in this paper. These case studies include: (1) aeroelastic behavior of bladed rotors, (2) high velocity impact of fan blades, (3) blade-loss transient response, (4) rotor/stator/squeeze-film/bearing interaction, (5) blade-fragment/rotor-burst containment, and (6) structural behavior of advanced swept turboprops. These representative case studies are selected to demonstrate the breath of the problems analyzed and the role of the computer including post-processing and graphical display of voluminous output data. Author

N86-19664# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.

ASYMPTOTIC FIELDS IN STEADY CRACK GROWTH WITH

LINEAR STRAIN-HARDENING
P. P. Castaneda Aug. 1985 62 p
(Contract N00014-84-K-0510)
(AD-A160921; MECH-69) Avail: NTIS HC A04/MF A01 CSCL 20/11

The asymptotic stress and velocity fields of a crack propagating steadily and quasi-statically into an elastic-plastic material are presented. The material is characterised by J sub 2 flow theory with linear strain-hardening. The possibility of reloading on the crack flanks is taken into account. The cases of anti-plane (mode III), plane strain (modes I and II), and plane stress (modes I and II) are considered. Numerical results are given for the strength of the singularity and for the distribution of the stress and velocity fields in the plastic loading, elastic unloading and plastic reloading regions, as functions of the strain-hardening parameter. An attempt is made to make a connection with the perfectly-plastic solutions in the limit of vanishing strain-hardening. Author (GRA)

N86-19665# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
ASYMPTOTIC FIELDS OF A PERFECTLY-PLASTIC, PLANE-STRESS MODE 2 GROWING CRACK
P. P. Castaneda Aug. 1985 11 p
(Contract N00014-84-K-0510)
(AD-A161006; DAS-MECH-70) Avail: NTIS HC A02/MF A01 CSCL 20/11

The asymptotic near-tip stress and velocity fields are presented for a plane-stress mode II crack propagating quasi-statically in an elastic-perfectly plastic Mises solid. The solution is found to have fully continuous stress and velocity fields, and a configuration similar to that of the anti-plane strain problem: a singular centered fan plastic sector ahead of the crack, followed by an elostic unloading sector and a constant stress plastic sector extending to the crack flank. The impossibility of a plane-stress mode I crack solution having these properties is also discussed. Author (GRA)

N86-19666# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
EFFECTS OF SHEAR STIRRUP DETAILS ON ULTIMATE CAPACITY AND TENSILE MEMBRANE BEHAVIOR OF REINFORCED CONCRETE SLABS Final Report
Stanley C. Woodson Aug. 1985 184 p
(AD-A161222; WES/MLP/SL-85-4) Avail: NTIS HC A09/MF A01 CSCL 20/11

At the time this study was initiated, civil defense planning in the United States called for the evacuation of nonessential personnel to safe host areas when a nuclear attack is probable, requiring the construction of blasts shelters to protect the keyworkers remaining in the risk areas. The placement of shear stirrups in the one-way reinforced concrete roof slabs of the shelters will contribute significantly to project costs. Ten one-way reinforced concrete slabs were statically and uniformly loaded with water pressure, primarily to investigate the effect of stirrups and stirrup details on the load-response behavior of the slabs. The slabs had clear spans of 24.0 inches, span to effective depth ratios of .4, tensile reinforcement of 0.75 percent, and concrete strengths of approximately 5,000 psi. The test series significantly increased the data bese for uniformly loaded one-way slabs. Support rotations between 13.1 and 20.6 degrees were observed. A more ductile behavior was observed in slabs with construction details, implying better concrete confinement due to more confining steel (i.e., closely spaced stirrups, double-leg stirrups, and closely spaced principal reinforcing bars). The parameters investigated did not appear to have a significant effect on ultimate load capacity. GRA

N86-19667# Sandia National Labs., Albuquerque, N. Mex.
NUMERICAL AND EXPERIMENTAL STUDY OF THE INDENTATION HARDNESS TEST
R. J. Bourcier, C. M. Stone, and F. G. Yost Sep. 1985 30 p
(Contract DE-AC04-76DP-00789)
(DE86-002095; SAND-85-0486) Avail: NTIS HC A03/MF A01

The process of indentation hardness testing has been analyzed both experimentally and numerically. A set of indentation experiments has been performed for several materials with conical/pyramidal and spherical indenters. The large strain elastoplastic finite element program JAC has been used, with tensile stress-strain data as input, to model these tests as well as tests reported in the literature. Load-depth curves generated with our finite element model deviate less than 15% from experimental data (both our own as well as literature values) for both large scale (up to 250 (MU)m depth) and small scale (less than 5 (MU)m depth) indentation tests for all indenter geometries examined. Also, agreement between the model and micro-micro (less than 1 (MU)m) pyramid indentation data from the literature is quite good. These results suggest that load-depth response of indentation hardness tests can be successfully predicted with a continuum based finite element model. In addition, examination of the finite element results has suggested several corrections based on geometry which must be included when computing the hardness of near surface material. DOE

N86-19668# Lawrence Livermore National Lab., Calif.
ABRASION AND IMPACT RESISTANT COATINGS Quarterly Report
T. Hirschfeld Aug. 1985 24 p
(Contract W-7405-eng-48)
(DE86-000739; UCID-20516-1) Avail: NTIS HC A02/MF A01

We have proven that a layer of reinforcing filaments emerging out of the surface of a composite provides it with substantial protection from abrasion and impact. We have determined the geometrical constraints on fiber diameter, length, root depths, orientation, and packing density required for this protection. Substantial performance has been demonstrated for even incompletely optimized systems. We are in the process of extending this technology to first aluminum and then steel structural metal protection. Pretreatment and assembly methods for such materials have been developed. DOE

N86-19669# Brookhaven National Lab., Upton, N. Y.
CHARACTERISTIC LENGTH SCALES IN GASEOUS HYDROGEN EMBRITTLEMENT
K. Sieradzki, J. K. McCoy, A. J. Markworth, and J. H. Holbrook 1985 13 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985 Prepared in cooperation with Battelle Columbus Labs., Ohio
(Contract DE-AC02-76CH-00016)
(DE86-000629; BNL-37027; CONF-851125-13) Avail: NTIS HC A02/MF A01

This paper presents an analysis which allows for an experimental determination of an upper bound to the characteristic length scale in a gaseous hydrogen embrittlement system. Our approach is based upon an ac analysis of the coupled adsorption diffusion equations for the hydrogen metal system. We show how the frequency of the driving pressure affects the depth below the surface at which surface and bulk processes effectively decouple from one another. This decoupling distance serves as a useful probe for the location of the so-called hydrogen embrittlement process zone. DOE

N86-19670# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
STRESS INTENSITY FACTORS OF HOLE EDGE CRACKS. COMPARISON BETWEEN ONE CRACK AND TWO SYMMETRIC CRACKS
J. Schijve Mar. 1983 7 p refs
(VTH-M-458) Avail: NTIS HC A02/MF A01

Numerical results for the stress intensity factor (K-factor) of a crack at the edge of a hole in an infinite sheet published by Bowie (1956), Newman (1971), and Tweed and Rooke (1973) are compared. Bowie solved the problem for a single crack and two symmetric cracks. Newman treated the results for two symmetric cracks, and Tweed and Rooke for a single crack. The K-factors calculated by Newman for a single crack at the edge of a hole, and by Tweed and Rooke for two symmetric cracks are considered to be significantly more accurate than the Bowie data. Equations

which closely represent the former data are presented.
Author (ESA)

N86-19671# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE INFLUENCE OF PRESTRAIN LEVEL ON THE CRACK PROPAGATION OF ARALL UNDER A MODE 1 CONDITION
M. L. C. E. Verbruggen Jul. 1983 30 p refs Sponsored by ENKA
(VTH-M-480) Avail: NTIS HC A03/MF A01

The influence of prestrain level of ARALL sheets on crack growth under a mode 1 loading condition was assessed using the wedge-edge test to study initial crack growth after insertion of the wedge, and crack growth due to environmental exposure. Results show that the higher the prestrain level, the larger the initial crack length. Crack growth due to environmental exposure is large in the first 24 hr for all prestrain levels and environmental temperatures. A temperature difference of 40C does not affect crack growth behavior. Crack growth drops rapidly after 24 hr for all prestrain levels and environmental temperatures. Crack stop is attained after a rather long exposure period. The linear relation between crack length and prestrain level is mostly destroyed because of stress intensity decreases at the crack tip of specimens with higher prestrain levels.
Author (ESA)

N86-19672# Netherlands Energy Research Foundation, Petten.
A STATE OF THE ART REPORT ON FATIGUE LIFE EVALUATION OF NOTCHED COMPONENTS AND WELDED JOINTS
M. Skorupa and J. Prij Jun. 1985 108 p refs
(ECN-166; B8566490) Avail: NTIS HC A06/MF A01

The evaluation of the stress intensity factor (KI) of a semielliptical surface crack initiated at a notch is discussed. The state-of-the-art of fatigue life estimates of notched components, and information on semielliptical surface cracks are reviewed. Crack shape development, KI solutions, and fatigue life prediction for smooth specimens using the conventional crack propagation data obtained from through cracks are considered. A KI solution for semielliptical surface cracks in a smooth plate obtained by three-dimensional finite elements analyses for selected crack shapes and depths is presented.
Author (ESA)

N86-19673# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
A SHORT COURSE ON FRACTURE AND FRACTURE MECHANICS OF METALLIC MATERIALS
R. J. H. Wanhill Mar. 1984 82 p
(NLR-MP-84045-U; B8572247) Avail: NTIS HC A05/MF A01

The visual presentation sheets of a course on fracture and fracture mechanics in metallic materials are reproduced. The course includes an introduction to fracture mechanics; fracture mechanisms in metallic materials; and the influence of material behavior on fracture mechanics properties. The course reviews the relations between fracture mechanics properties (especially those measured under nominally linear elastic conditions), fracture mechanisms, and microstructures of structural metallic materials. Author (ESA)

N86-19674# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
SIZE EFFECTS ON THE FATIGUE STRENGTH OF A WELDED SPECIMEN (A BRIEF NOTE)
J. Schijve Mar. 1984 10 p refs
(VTH-M-504) Avail: NTIS HC A02/MF A01

The relation between welded steel plate thickness and fatigue life and fatigue strength is discussed. Qualitative considerations on the stress concentration factor and the stress intensity factor of the welded specimens suggest that a higher plate thickness can lead to a lower fatigue resistance. There is a need for a quantitative investigation of these factors in order to understand the geometrical effects involved.
Author (ESA)

N86-19675# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE CRACK GROWTH RATE OF A CRACK IN A WIDTH TAPERED DOUBLE CANTILEVERED BEAM (WTDCB). SPECIMEN IN BOTH A CONSTANT AND LINEARLY VARYING EXTERNAL LOAD CONDITION
M. L. C. E. Verbruggen Jun. 1984 12 p
(VTH-M-513) Avail: NTIS HC A02/MF A01

Use of the width-tapered-double-cantilever-beam (WTDCB) test to obtain energy release rate data of adhesives and composites is considered. Equations for the crack growth rate for a constant and linearly varying applied load are derived. The theoretical results are compared with experimental data. Results show that growth rate of a crack in a WTDCB specimen can be well predicted in a constant and linearly varying load condition. In the latter case, a constant load approach does not result in accurate data.
Author (ESA)

N86-19676# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
STRUCTURAL RESPONSE TO LOW FREQUENCY ENVIRONMENTS [REPONSE DES STRUCTURES A UN ENVIRONNEMENT BASSE FREQUENCE]
Alain Girard Jun. 1985 56 p refs In FRENCH; ENGLISH summary
(CNES-NT-116) Avail: NTIS HC A04/MF A01

The computation of the response of a structure to a low frequency sine, transient, or random environment is discussed. The structure is characterized by the eigenmodes which are assimilated to single degree of freedom systems. The structural response is computed by superposition of the model responses of single degree of freedom systems. The analysis of the sine response introduces the concept of transfer functions between excitation and responses. The same transfer functions are used to compute random and transient response. The shock spectrum associated with the mode to single degree-of-freedom system equivalence gives quick information about structural response.
Author (ESA)

N86-19385# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
TEST FACILITIES
R. Prinz and K. Schmidt *In its* Mechanical Properties and Damage Mechanisms of Carbon Fiber-Reinforced Composites. Tension Loading Jun. 1985 p 17-32 (For primary document see N86-19384 10-24)
Avail: NTIS HC A18/MF A01; DFVLR, Cologne DM 125

42 GEOSCIENCES (GENERAL)

N86-19677# European Space Agency, Paris (France).
THE USE OF SATELLITE DATA IN CLIMATE MODELS
J. J. Hunt, comp. Sep. 1985 215 p refs Conference held in Alpbach, Austria, 10-12 Jun. 1985; sponsored by Austrian Solar and Space Agency, ESA, Bundesministerium fuer Forschung und Technologie, Commission of European Communities, European Science Foundation and World Climate Research Program
(ESA-SP-244; ISSN-0379-6566) Avail: NTIS HC A10/MF A01

The use of satellites for remote sensing of ocean waves, ocean circulation, sea level, sea ice, ice and snow and sea surface temperature, was discussed. The ESA ERS-1 program and its national data centers were described. For individual titles, see N86-19678 through N86-19707.

N86-19678# Massachusetts Inst. of Tech., Cambridge.
IMPACT OF SATELLITE MEASUREMENTS ON OCEANOGRAPHIC COMPONENT OF THE WCRP
C. Wunsch *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 3-6 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The use of satellite scatterometry, altimetry, gravity, and IR/microwave thermometry data in oceanography is discussed.

The satellite needs of the Tropical Ocean-Global Atmosphere program and the World Ocean Circulation Experiment are reviewed. Accuracy, precision, sampling, and coverage requirements on satellite systems are considered. Author (ESA)

N86-19679#. European Centre for Medium-Range Weather Forecasts, Reading (England).
FOUR-DIMENSIONAL DATA ASSIMILATION INTO ATMOSPHERIC GLOBAL MODELS c47
L. Bengtsson *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 7-17 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The status of four-dimensional atmospheric data assimilation is reviewed. Numerical models make efficient use of asynoptic observations of wind, temperature, and moisture from satellites. In data assimilation systems, observations are assimilated continously in time or are grouped in time-intervals of 3 to 6 hr where they are checked and analyzed before insertion into the model. The accuracy of the initial state depends on the data-assimilation technique as well as the correct interpolation of data in space and the merging between observations and model information. The accuracy of the ECMWF operational model, as expressed by 6 hr forecasts, is comparable to radiosonde observations of wind and temperature over Europe and North America. Research is concerned with improving the assimilation of single level data and a better usage of satellite observations, in particular in the Tropics. Author (ESA)

N86-19680# Royal Netherlands Meteorological Inst., De Bilt.
INTRODUCTION TO WAVE MODELS AND ASSIMILATION OF SATELLITE DATA IN WAVE MODELS c48
G. J. Komen *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 21-25 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Knowledge of the development of wind driven ocean waves, and wave models are discussed. The models integrate the energy transfer equations for the two dimensional wave spectrum numerically in time. The solution depends on external wind fields, specified in advance. Main applications are for ship routing, off-shore activities, and coastal defense. Validation of real-time model forecast results indicates the need for improvement of model results and wind input. Very little experience exists with the assimilation of wave observations into initial fields. A hindcast indicates that the effects of inaccuracies in the specified wind fields can be compensated by assimilation of observed wave parameters. Author (ESA)

N86-19681# Meteorological Office, Bracknell (England).
ALGORITHMS FOR WIND SCATTEROMETER PROCESSING c48
D. Offiler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 27-31 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The measurement of surface wind speed and direction over the ocean, using scatterometry is introduced. The theoretical and experimental background to the technique and how this translates into practical instruments is outlined. The algorithms used to retrieve the wind vectors are described. Algorithms for the ERS-1 mission are broadly similar to those previously used for the SEASAT SASS instrument. Author (ESA)

N86-19682# Bundeswehr Munich Univ., Neubiberg (West Germany).
ALGORITHM FOR WIND SCATTEROMETER DATA ANALYSIS-AMBIGUITY SUPPRESSION c48
K. J. Schwenzfeger *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 35-36 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

An algorithm for retrieving the wind vectors of the bias corrected backscatter coefficients derived from simulated ERS-1 wind scatterometer measurements is described. The main task is wind vector estimation by fitting the beam ordered sigma zeros onto the ESA C-band model using a Bayesian type estimator (BE). Extremizing BE gives up to four wind vectors for each cell of the swath. The goodness of fit gives a ranking of solutions. The results of case studies show that nearly 100% of the rank 1 solutions are the correct wind vectors, so no additional postprocessing is necessary. Author (ESA)

N86-19683# Bremen Univ., (West Germany). Fachbereich 1.
MICROWAVE MEASUREMENTS OF THE SEA SURFACE c48
W. Alpers *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 41-45 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Interpretation of ERS-1 Active Microwave Instrument (AMI) data in terms of oceanographic parameters is discussed. In order to extract quantitative information from the SAR image, the C-band modulation transfer function (MTF) was calculated, using data from a modulation experiment in the North Sea. Imaging of large scale oceanic features is considered. Author (ESA)

N86-19684# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
ASSIMILATION OF MICROWAVE DATA IN ATMOSPHERIC AND WAVE MODELS c48
K. Hasselmann *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 47-52 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Use of ERS-1, N-ROSS, TOPEX, and MOS-2 satellite data on global sea surface topography, surface winds, ocean waves, and sea ice for climate research and weather and wave forecasting is discussed. The need for an end-to-end data processing and assimilation system, including algorithms, dynamic data assimilation methods, and high resolution models, in order to produce the basic global data sets required for climate research is considered. It is shown that the data processing needs for climate studies are essentially the same as the processing needs for forecasting applications, so that the same system can satisfy both purposes. The relation of this end-to-end system, designed for the quasi-real time generation of level 3 gridded wind and wave fields, with other components of the ground segment, such as the generation of fast delivery products or the primary archiving facilities, is treated. Author (ESA)

N86-19685# Kiel Univ. (West Germany).
INTRODUCTION TO OCEAN CIRCULATION MODELS c48
J. Willebrand *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 63-64 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Prognostic and diagnostic ocean models are reviewed, and their equations of motion, including primitive equation and geostrophic models are discussed. Circulation models can reproduce the wind-driven subtropical gyres, and the equatorial circulation system including its variations on time scales up to a few years. The effect of quasi-geostrophic eddies is fairly well simulated. On longer time scales, the situation is less satisfactory with respect to thermohaline processes. It seems likely that this situation will improve by 1990 when several satellites are expected to be in operation. A considerable effort, however, is needed for the development of circulation models that can assimilate wind and altimeter data on a global basis. Author (ESA)

N86-19686# Meteorological Office, Bracknell (England). Dynamical Climatology Branch.
COMMENTS ON DATA REQUIREMENTS FOR OCEAN CLIMATE STUDIES c48
H. Cattle *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 67-69 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

The requirements for carrying out noninteractive integrations of ocean (and sea ice) models are discussed. Such integrations require forcing data to be specified from a knowledge of atmospheric parameters and the sea surface temperature and ice characteristics. In such integrations, the momentum flux is often specified directly via the vector surface stress fields (expressed in the main as monthly means. To determine the heat exchange across the interface, it is appropriate to specify the incoming radiative fluxes together with the air temperature, humidity, wind speed, and surface pressure from which the outgoing radiative fluxes and turbulent, sensible, and latent heat exchanges can be derived using the model predicted sea surface temperature and sea ice characteristics. The use of scatterometers and satellites, particularly for data-sparse areas of the Southern Hemisphere is discussed. Author (ESA)

N86-19687# Paris VI Univ. (France). Lab. de Physique et Chimie de l'Hydrosphere.

ANALYSIS AND INTERPRETATION OF ALTIMETRY DATA c48

J.-F. Minster *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 71-72 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

Ways to extract the variability signal on the mesoscale and large scale from satellite altimetry studies of ocean dynamics are reviewed. Methods include comparison of the variability of signals along a repetitive track with the dynamic topography of the area; analysis of the residuals of the altimetric measurement at crossovers of ascending and descending tracks, after adjustment of the latter to minimize orbit errors; and use of the distance of individual track measurements to a reference mean sea surface. By using a large set of short crossover-adjusted arcs, it is possible to map larger than mesoscale variability. Author (ESA)

N86-19688# Imperial Coll. of Science and Technology, London (England). Atmospheric Physics Group.

ALTIMETRIC OBSERVING SYSTEM SIMULATION STUDIES WITH AN EDDY RESOLVING OCEAN CIRCULATION MODEL c48

J. Marshall *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 73-76 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

Synoptic mapping of geostrophic eddies from altimetry by assimilation into a quasi-geostrophic ocean model is discussed. It is shown that for synoptic mapping the accuracy of the analysis is limited by the finite temporal and spatial resolution possible with one satellite, rather than the random error in the instrument. There is a clear advantage in flying several moderately accurate altimeters rather than one very precise instrument. The importance of ensuring that altimetric missions are synchronized so that more than one altimeter is flying simultaneously is stressed. Author (ESA)

N86-19689# Utrecht State Univ. (Netherlands). Inst. of Meteorology and Oceanography.

SEA LEVEL AND CLIMATE VARIATIONS c48

J. Oerlemans *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 81-85 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

Factors governing sea level and the relation between sea level and carbon dioxide are reviewed. The use of satellite data to study global variations in sea level is discussed. The greenhouse effect on the polar ice sheets, and consequences for sea level, are assessed. It is concluded that data are insufficient to make predictions other than that global temperature will increase. Author (ESA)

N86-19690# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).

SEA ICE MODELS AND REMOTE SENSING c48

W. D. Hibler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 87-94 refs Sponsored by Office of Naval Research and Max-Planck Institute fuer Meteorologie, Hamburg (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

Sea ice modeling and how satellite remote sensing can be used in model verification, improvement, and applications are discussed. Ice dynamics, including the relevance of ice drift and deformation to climate are considered. The role and justification for the use of nonlinear plastic rheologies is described. In order to show the necessity for ice-ice interaction in coupled dynamic-thermodynamic simulations, seasonal Arctic simulation results using only free drift are compared to those using a plastic rheology. Results without ice interaction yield a totally unacceptable ice build-up, even after only a 1 yr integration. Ice edge variation and coupled ice ocean models are mentioned. Author (ESA)

N86-19691# Institute of Oceanographic Sciences, Birkenhead (England).

ACCURACY OF EXISTING OCEAN TIDE MODELS c48

P. L. Woodworth *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 95-98 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

The Schwiderski (1983) and Parke-Hendershott (1980) ocean tide models are assessed. The Schwiderski model is claimed to be capable of computing the instantaneous M2 partial ocean tide with an accuracy of 5cm or better at any time and anywhere in the open ocean although with certain reservations for coastal and border seas. Pelagic data show this claim to be optimistic. Similar model claims are made for the other tidal constituents resulting in a predicted combined tide accuracy of 10cm. Until copious altimeter data become available there is no real way, other than by additional tide gage measurements, of checking them. The Parke-Hendershott model is of comparable accuracy and is subject to similar difficulties of validation on a global basis. Author (ESA)

N86-19692# Technical Univ. of Denmark, Lyngby.

APPLICATION OF SAR AND OTHER REMOTE SENSING DATA IN STUDIES OF THE ATMOSPHERE-OCEAN-ICE INTERACTION c48

P. Gudmandsen *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 107-111 refs (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

The physics of the atmosphere-ocean-ice interaction, the processes of the formation of sea ice and its characteristics from a remote sensing point of view, and the relevant remote sensing methods are reviewed. Use of the ERS-1 Active Microwave Instrument in the Arctic and Antarctic is discussed. The need for preparatory observation and modeling research to fully exploit satellite capabilities is stressed. Author (ESA)

N86-19693# National Museum of Natural History, Paris (France). Lab. d'Oceanographic Physique.

SCIENTIFIC APPLICATION OF SAR DATA TO SEA ICE STUDIES. SEA ICE MODELS c48

J. C. Gascard *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 113-114 (For primary document see N86-19677 10-42)

Avail: NTIS HC A10/MF A01

Sea ice observations from space are discussed and SAR contributions to sea ice numerical modeling are assessed. Satellite observations of sea ice concentrations in two dimensions help considerably in tuning models for a better prediction of ice thickness and for sea ice mass balance estimations. Author (ESA)

N86-19694# Atmospheric Environment Service, Ottawa (Ontario).

SCIENTIFIC APPLICATION OF PASSIVE MICROWAVE SATELLITE DATA FOR ICE MONITORING AND RESEARCH c48

I. G. Rubinstein (Ph.D. Associates, North York, Ontario) and R. O. Ramseier *In* ESA The Use of Satellite Data in Climate Models

Sep. 1985 p 117-123 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Algorithms for determination of total sea ice concentrations and ice type identification were tested during near real-time operational production of sea ice charts for the Arctic, Canadian East Coast, and the East Greenland Sea regions. Using computer contouring techniques, the sea ice parameters were determined with a spatial location accuracy within one half of a 37 GHz footprint (15 km). Model calculated total ice concentrations are in close agreement with values measured by the airborne sensors (< 10% deviation). In areas where gray and very young ice are present, the total ice concentrations are underestimated by 50%. The near real-time operational testing of the algorithm derived ice and wind charts provides very valuable information for improvement of the existing sea ice algorithms. The all weather capabilities of the spaceborne passive microwave sensors are positively established. Author (ESA)

N86-19695# Science Research Council, Chilton (England). Rutherford Appleton Lab.
FUTURE PASSIVE MICROWAVE SATELLITE DATA FOR SEA-ICE RESEARCH c48
D. L. Croom *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 125-127 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The potential of the passive microwave radiometers which form part of the Along Track Scanning Radiometer (ATSR) to be flown on ERS-1, and the Advanced Microwave Sounding Unit (AMSU) to be flown on the NOAA-TIROS series, for studies of sea-ice is surveyed. The ATSR will carry limited, but useful passive microwave channels for sea-ice studies, especially for assessing the value of altimetry over sea-ice. The AMSU-B will be a source of extensive sea-ice data and will provide it over a long (20yr plus) time scale. The AMSU-B should also be considered as a potential valuable source of data for land snow-cover. Author (ESA)

N86-19696# Helsinki Univ. of Technology, Espoo (Finland).
MAPPING OF SNOW BY PASSIVE AND ACTIVE MICROWAVE SENSORS c43
M. Hallikainen and R. Kuittinen (Technical Research Centre of Finland, Espoo) *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 131-132 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

A snow-related research program for ERS-1 is proposed. Discrimination of wet snow (melting season) from bare soil is possible using the SAR and the wind scatterometer. Special attention should be paid to observing the effects from various land-cover categories to the discrimination accuracy. With the SAR, the 25m resolution makes it possible to distinguish in a detailed manner backscattering contributions from land-cover categories. With the wind scatterometer, the situation is comparable to corresponding Nimbus-7 SMMR studies (resolution tens of kilometers). The data should be complemented with airborne gamma spectrometer measurements, NOAA data, Nimbus-7 SMMR (or DMSP/N-ROSS SSM/I) data, and in situ measurements. Finland is an excellent test site for snow studies. Author (ESA)

N86-19697# Innsbruck Univ. (Austria). Inst. of Meteorology and Geophysics.
MONITORING OF SNOW AND LAND ICE PARAMETERS: POSSIBILITIES AND CONSTRAINTS OF SAR AND MICROWAVE IMAGING SYSTEMS c43
H. Rott *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 133-135 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Global monitoring of cryospheric parameters using satellite-borne radar and microwave imaging systems, especially ERS-1, is considered. The different capabilities regarding dry and wet snow cover clearly indicate a combination of SAR and microwave radiometer as optimum snow sensor. However major differences in areal coverage and spatial resolution complicate the synergistic use of these sensors. An SMMR-like sensor provides global coverage in 3 days of operation. The spatial resolution (30 km in the 37 GHz-channel) is adequate for large scale climate studies. An improvement of resolution to a few kilometers appears feasible without major technical problems. The ERS-1 Active Microwave Instrument narrow swath and the restrictions in sensor operation time mean that the system can be used for detailed studied only over a few limited areas. The ERS-1 SAR system has only supplementary functions for land cryosphere monitoring and is of limited value for climatological studies on snow and land ice. A potential operational application is the surveillance of lake and river ice. Author (ESA)

N86-19698# Science Research Council, Chilton (England). Rutherford Appleton Lab.
PRECISE SST DATA FROM SATELLITES c48
D. T. Llewellyn-Jones *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 139-142 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The importance of ocean skin tempratures, in contrast to bulk temperatures, in climate models using sea surface temperatures measured by the ERS-1 Along Track Scanning Radiometer (ATSR) is pointed out. The ATSR accuracy is expected to reach 0.3 K, i.e., a factor of 2 better than AVHRR, and modellers who require bulk temperatures should say so, as this affects data products and their treatment. Author (ESA)

N86-19699# Istituto di Fisica dell Atmosfera, Rome (Italy).
REMOTE SENSING OF SEA SURFACE TEMPERATURE c48
G. Dalu and A. Viola *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 143-145 refs Sponsored by CNR (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The methodology that lies behind the algorithms used to retrieve the sea surface temperature from infrared radiometric data is examined with a radiative transfer model, that simulates the response of the atmosphere for different temperature and water vapor profiles. Generally linear algorithms are used to evaluate the sea surface temperature from the AVHRR data. Although the results obtained show that a nonlinear algorithm is more accurate, a linear algorithm can give better results if it is optimized for a particular region and season. Results show that the algorithms found in the literature are appropriate to particular data sets, and no single algorithm can be applied to other samples if they are from a completely different area or a different season. Author (ESA)

N86-19700# Mullard Space Science Lab., Dorking (England).
POST LAUNCH CALIBRATION AND VALIDATION OF THE ALONG TRACK SCANNING RADIOMETER (ATSR) c48
I. M. Mason *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 149-150 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

On-board calibration and validation of the ERS-1 Along Track Scanning Radiometer (ATSR), used for sea surface temperature (SST) measurement, are discussed. It is important that on-board calibration and validation are carried out to a precision compatible with the lowest expected atmospheric noise (0.1K RMS). The skin SST should ideally be the validated ATSR product, for reasons of accuracy and because of the role of skin SST in the ocean/atmosphere heat exchange. If possible, each algorithm should be validated separately, using a variety of instruments and sites. To retain the ATSR levels of precision, any correction of algorithms using validation data should be done by modeling the physical processes giving rise to the algorithm errors. An improved understanding and modeling of the skin/bulk SST differences will allow the validation of ATSR using bulk SST and aid the incorporation of ATSR data in climate models. Author (ESA)

N86-19701# Oxford Univ. (England). Dept. of Atmospheric Physics.
FOUR-DIMENSIONAL DATA ASSIMILATION IN TOGA MODELS c48
D. L. T. Anderson and A. M. Moore *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 151-153 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Use of ocean surface stress and heat fluxes in Tropical Ocean Global Atmosphere program models is discussed. Since the forcing fields are perfectly known and the ocean is not totally deterministic, redundancy must be built in. Measurements give mass field information, and numerical models indicate that this data may be very useful. The models do not reject height field data. Altimeter data could be very useful for interpolating between tide gage networks. Altimeter data can also be assimilated into models. The best method of projecting this data onto the vertical model structure uses XBT data. Sea surface temperatures (SST) used with XBT data may be very useful. Altimetry and SST can be used for model verification even if they are not used for assimilation. Author (ESA)

N86-19702# Science Research Council, Chilton (England). Rutherford Appleton Lab.
THE USE OF AIRBORNE MICROWAVE INSTRUMENTS TO GATHER DATA FOR THE VALIDATION OF ERS-1 WIND AND WAVE PRODUCTS c48
R. J. Powell *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 155-156 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

It is suggested that the main European effort to validate the wind and wave data products of ERS-1 should be concentrated in the Northeast Atlantic and Norwegian Sea. Conventional oceanographic data gathering techniques using ships and buoys should be augmented with permanently deployed and well-validated master stations and airborne instrumentation. The need to site such stations and altimeter transponders on the ground track argues strongly for the early selection of the location of 3 day repeat ground tracks and for ensuring that any higher repeat cycle used later is a multiple of 3. Author (ESA)

N86-19703# Institute of Oceanographic Sciences, Wormley (England).
WINDS FOR CLIMATE RESEARCH FROM THE ERS-1 AND N-ROSS SCATTEROMETERS c48
T. H. Guymer *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 157-159 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

Requirements for sea-surface wind in climate research are discussed in terms of accuracy and sampling considerations. Very stringent accuracies are needed and it is particularly important that biases in areal and temporal mean winds be minimized. These may arise from geographical biases in algorithms tuned to limited comparison data sets and from atmospheric attenuation effects. A single satellite scatterometer is incapable of providing adequate sampling and it is envisaged that the surface wind fields will be obtained from a combination of ERS-1, N-ROSS and in-situ data, including those of the Voluntary Observing Ships. Author (ESA)

N86-19704# European Space Agency, Paris (France).
REVIEW OF SCIENTIFIC AND TECHNICAL WORK REQUIRED BEFORE THE LAUNCH OF ERS-1: THE VIEW OF ESA c48
G. Duchossois, J. Louet (ESA/ESTEC, Noordwijk, Netherlands), C. R. Francis (ESA/ESTEC, Noordwijk, Netherlands), and E. Attema (ESA/ESTEC, Noordwijk, Netherlands) *In its* The Use of Satellite Data in Climate Models Sep. 1985 p 163-173 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The ESA views and plans for the utilization of ERS-1 data, sensor calibration and data validation, and activities for the coordination/cooperation with entities interested in ERS-1 and/or having similar programs under preparation are summarized. The ERS-1 will study coastal zones and global ocean processes which, together with the monitoring of polar regions, will provide a major contribution to the World Climate Research Program. It will establish, develop, and exploit coastal, ocean, and ice applications of remote sensing data. These applications are related mainly to a better knowledge of ocean and ice parameters and sea-state conditions. The Active Microwave Instrument and radar altimeter are presented. Author (ESA)

N86-19705# Meteorological Office, Bracknell (England).
WIND DIRECTION AMBIGUITY SUPPRESSION ALGORITHMS c48
D. Offiler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 175-176 refs (For primary document see N86-19677 10-42)
(Contract ESA-6154/85/NL-BI)
Avail: NTIS HC A10/MF A01

The problem of removing the ambiguity in the ERS-1 Active Microwave Instrument scatterometer wind directions is discussed. The scatterometer product was simulated using the C-band model with winds from the UK Meteorological Office forecast model. Objective and subjective means were used to suppress the ambiguity. The objective method was divided into two separate algorithms: one using no external data, the other using an independent wind field. The algorithms are described and results presented. Author (ESA)

N86-19706# Mullard Space Science Lab., Dorking (England).
THE UK ERS DATA CENTRE c14
C. G. Rapley *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 177-179 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The data facility to be built by the UK as part of its ERS-1 program and a measure taken within that facility to alleviate the problem of inadequate access to hardware and data sets are described. The main functions of the center are data receipt and archive; algorithm development; off-line product generation; product validation/quality monitoring; customer services; and dispatch. Author (ESA)

N86-19707# Centre National d'Etudes Spatiales, Paris (France). Earth Sciences and Applications Div.
THE CERSAT/AVISO/ALGOS: THE FRENCH PROGRAM FOR A COHERENT OCEANOGRAPHIC DATA BASE c14
B. Nutten *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 181-183 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

The French national plan for data handling of ERS-1 and future space oceanographic missions is presented. It is based on two data centers and one group. The CERSAT is the ERS-1 off-line low bit rate data center, part of the four-component preprocessing and archiving facilities managed by the Earthnet Program Office, aimed at production of geophysical data. The AVISO is a multisatellite data center for archiving geophysical oceanographic data, and processing of value-added products. The purpose of the ALGOS group, coordinated by scientists and engineers, is the development of models and algorithms required by the Data Centers. Author (ESA)

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-19708 New South Wales Univ., Kensington (Australia). School of Surveying.
THE COMBINATION OF VLBI AND GROUND DATA FOR

GEODESY AND GEOPHYSICS Ph.D. Thesis Abstract Only
Bruce R. Harvey Feb. 1985 2 p
Avail: Issuing Activity

An analytical procedure for the combination of VLBI and geodetic survey measurements and their evaluation and comparison was developed. Crustal deformation analysis, comparisons between space techniques, and the strengthening of geodetic networks are the main applications. The VLBI analysis is reviewed and the variance covariance matrix of the obserables is investigated. The effects of systematic errors, particularly biases in the tropospheric corrections, on VLBI results are investigated and classified. The results of the first geodetic VLBI experiment within Australia are presented and their accuracies estimated. A method which combines VLBI and ground data by estimating the transformation parameters relating the preadjusted coordinates of the points of each network is recommended. Methods for studying regional strain are discussed. Several models for 2D and 3D strain are examined. It is recommended that VLBI and ground data be combined at each epoch. Any strain detected is not due to crustal movements. If no significant strain is detected, then the geophysical strain between these epochs can be determined. E.A.K.

N86-19709 New South Wales Univ., Kensington (Australia).
A COMPARISON OF SPACE VECTORS DERIVED FROM SATELLITE DOPPLER OBSERVATIONS Abstract Only
Donald Frederick Wood 1984 2 p
Avail: Issuing Activity

A multi-station Doppler observation program was conducted across the Australian continent between February and June of 1982. Each phase of the program included up to thirteen Doppler Satellite receivers which had been manufactured by the Magnavox Company in U.S.A. The object of this project was to ascertain the accuracy of the Magnavox receivers in determining a position by the technique of semi-short arc translocation when compared to known terrestrial data. The Magnavox results have also been compared to the same satellite data which was processed in the computer programs PREDOP-GEODOP. Author

N86-19710 New South Wales Univ., Kensington (Australia).
INTEGRATION OF DOPPLER POSITIONING INTO THE GEODETIC NETWORK OF INDONESIA Abstract Only
Chaerul Hafidin 1984 3 p
Avail: Issuing Activity

The Doppler satellite terrestrial coordinate determination was used to establish large control networks and reinforcing existing networks of horizontal control surveys. The preliminary network of Sumatra, Jawa and Nusa Tenggara consists of 407 stations of basically first and second order triangulation. Seventeen Doppler positions are distributed over the network. The preliminary combined adjustments of the Sumatra, Jawa and Nusa Tenggara primary horizontal networks were tested. The adjustments were carried out using the program CHAOS and the method for adjusting networks in sections. This method is mathematically similar to the Helmert block adjustment. The transformation parameters, from the Doppler System (WGS-72) into the terrestrial system (GRS-67) were determined using the PARM program, which follows the Bursa model transformation. The adjusting and transformation results are analyzed and Systematic differences between Doppler and terrestrial networks are noted. E.A.K.

N86-19711* National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND APPARATUS FOR CONTOUR MAPPING USING SYNTHETIC APERTURE RADAR Patent
Richard M. Goldstein (JPL, Pasadena, Calif.), Edward R. Caro (JPL, Pasadena, Calif.), and Chialin Wu, inventors (to NASA) (JPL, Pasadena, Calif.) Issued 5 Jan. 1985 8 p Sponsored by NASA
(NASA-Case-NPO-15939-1; US-Patent-4,551,724;
US-Patent-Appl-SN-465365; US-Patent-Class-343-5-CM;
US-Patent-Class-343-5-CD; US-Patent-Class-343-5-VQ;
US-Patent-Class-367-88) Avail: US Patent and Trademark Office
CSCL 08B

By using two SAR antennas spaced a known distance, B, and oriented at substantially the same look angle to illuminate the same target area, pixel data from the two antennas may be compared in phase to determine a difference delta phi from which a slant angle theta is determined for each pixel point from an equation Delta phi = (2 pi B/lambda)sin(theta - alpha), where lambda is the radar wavelength and alpha is the roll angle of the aircraft. The height, h, of each pixel point from the aircraft is determined from the equation h = R cos theta, and from the known altitude, a, of the aircraft above sea level, the altitude (elevation), a', of each point is determined from the difference a - h. This elevation data may be displayed with the SAR image by, for example, quantizing the elevation at increments of 100 feet starting at sea level, and color coding pixels of the same quantized elevation. The distance, d, of each pixel from the ground track of the aircraft used for the display may be determined more accurately from the equation d = R sin theta.
Official Gazette of the U.S. Patent and Trademark Office

N86-19712 Purdue Univ., West Lafayette, Ind.
PRECISION FEATURE LOCATION IN DIGITIZED IMAGERY Ph.D. Thesis
Mark Leavitt Akey 1985 193 p
Avail: Univ. Microfilms Order No. DA8519972

Methods for the precision location of features in digitized imagery are developed. These features include one- and two-dimensional grey level step edges and two-dimensional objects. A new moment based edge locator is developed which is able to determine digitized step edges with subpixel accuracy. Under appropriate assumptions, these step edges can be located with an accuracy limited only by the signal-to-noise ratio and not by the pixel size. In addition, this operator can be used as an edge detector with excellent results when ompared with other edge detectors. Another method involves using threshold decomposition on a grey level object. The summation of many contour locations from a single object results in accurate subpixel location. Theoretical work shows that the location error arises from two-dimensional corners. Maximum location error bounds are determined for squares, rectangles, and crosses. Maximum location error ranges from 0.06 to 0.10 pixels. Average location error results show that accuracies are in the neighborhood of 0.02 pixels. Dissert. Abstr.

N86-19713*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EXCITATION OF THE EARTH'S CHANDLER WOBBLE BY SOUTHERN OSCILLATION/EL NINO, 1900-1979
B. Fong. Chao Sep. 1985 23 p refs
(NASA-TM-86231; Rept-85B0557; NAS 1.15:86231) Avail: NTIS
HC A02/MF A01 CSCL 08E

The southern oscillation/El Nino (ENSO) is the single most prominent interannual signal in global atmospheric/oceanic fluctuations. The following question is addressed: how important is the angular momentum carried by ENSO in exciting the Earth's Chandler wobble? The question is attacked through a statistical analysis of the coherence spectra (correlation as a function of frequency) between two data sets spanning 1900 to 1979-the southern oscillation index (SOI) time series and the excitation function psi (with x-component psi sub x and y-component psi sub y) of the Chandler wobble derived from the homogeneous ILS (International Latitude Service) polar motion data. The coherence power and phase in the Chandler frequency band (approx. 0.79 to 0.89 cpy) are studied. It is found that, during 1900 to 1979 the coherence between SOI and psi sub x is significant well over the 95% confidence threshold whereas that between SOI and psi sub y is practically nil. Quantitatively, the coherence study shows that ENSO provides some 20% of the observed Chandler wobble excitation power. Since earlier investigations have shown that the total atmospheric/oceanic variation can account for the Chandler wobble excitation at about 20% level, the implication is that ENSO maybe an important (interannual) part of the atmospheric/oceanic variation that is responsible for the Chandler wobble excitation during 1900 to 1979. Author

N86-19714 Purdue Univ., West Lafayette, Ind.
ARAMETER SPACE TECHNIQUES FOR TEMPORAL IMAGE EGISTRATION Ph.D. Thesis
aul Edward Anuta 1985 214 p
vail: Univ. Microfilms Order No. DA8519974

The purpose of this research is to investigate the use of arameter space techniques for achieving registration between nages which have undergone significant change due to temporal ffects of the environment. The parameter space method investiated in this thesis uses the Hough transform to create a new ype of image which is used to find intersections of lines to be sed as control points for registration. This method can identify near intersections regardless of rotation and other low order listortions. Two other methods for achieving image registration re studied. The first is conventional block correlation of image airs to determine translational shift. The second is block orrelation of edge images derived from the original images. The hree methods are evaluated analytically but comparison on a standard basis became difficult due to the nonlinearity of the nethods. A random image simulation algorithm was implemented which allowed evaluation of all three methods under the same conditions. Dissert. Abstr.

N86-19715# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
K SUB 0-BEHAVIOR OF NORMALLY CONSOLIDATED FINE-GRAINED SOILS DURING ONE-DIMENSIONAL SECONDARY COMPRESSION AGING AND THE QUANTITATIVE PREDICTION OF THE QUASI-PRECONSOLIDATION EFFECT Ph.D. Thesis - Florida Univ.
R. W. Brown Aug. 1985 158 p Sponsored in part by National Science Foundation
(AD-A160822; AFIT/CI/NR-85-137D) Avail: NTIS HC A08/MF A01 CSCL 08/13

No consensus and little experimental evidence exist in the geotechnical engineering community regarding k sub 0 behavior of normally consolidated fine-grained soils during one-dimensional secondary compression aging and the origin and magnitude of the quasi-preconsolidation effect. After reviewing several concepts, a control volume triaxial-type test cell with support systems was developed. This equipment allows the maintenance and measurement of the k sub 0 condition during consolidation. Design considerations, development history, and performance parameters for the system are provided. Six normally consolidated fine-grained specimens, three Edgar Plastic Kaolinite and three Agsco novaculite, were allowed to age a minimum of 14 days under a 2 tsf vertical stress while the k sub 0 condition was maintained and measured. The specimens were loaded in small increments following aging to determine if the quasi-preconsolidation effect had developed. Results show k sub 0 decreases during secondary aging in one-dimensional compression for normally consolidated fine-grained soils. Moreover, the quasi-preconsolidation effect develops in both cohesive and cohesionless fine-grained soils. This suggests the quasi-preconsolidation effect develops due to increased friction rather than bonding as previously proposed. Finally, results indicate the existing theory for predicting the magnitude of the quasi-preconsolidation effect needs further refinement. GRA

N86-19716# Advanced Information and Decision Systems, Mountain View, Calif.
LINEAR FEATURE EXTRACTION FROM RADAR IMAGERY Final Report, 11 Sep. 1984 - 30 Jun. 1985
Daryl T. Lawton, Jay Glicksman, Gary D. Conner, and Robert J. Drazovich Sep. 1985 149 p
(Contract DACW72-84-C-0014)
(AD-A161154; AI/DS-TR-3075-01; ETL-0405) Avail: NTIS HC A07/MF A01 CSCL 17/9

This report summarizes a feasibility study performed by AI&DS to determine the requirements for the extraction of linear features such as roads, rivers, and environmental region boundaries from SAR aerial imagery. The effort has involved determining effective processes for extracting such features by algorithm surveys, hand processing sample imagery, and algorithm implementation. This work has provided the necessary basis for the implementation of an intelligent, automated system in Phase 2 of this research. We have designed a general vision system for linear feature extraction which can be generalized to a wide range of SAR (and other sensor) objects, and begun developments of the components of such a system. Author (GRA)

N86-19717# Geological Survey, Reston, Va.
ANNOTATED BIBLIOGRAPHY OF COAL IN THE CARIBBEAN REGION
Randall C. Orndorff 1985 32 p ref
(TI86-900020; USGS-OFR-85-110) Avail: NTIS HC A03/MF A01

The purpose of preparing an annotated bibliography was to compile information on coal localities for the Caribbean region used for preparation of a coal map of the region. Also, it serves as a brief reference list of publications for future coal studies in the Caribbean region. It is in no way an exhaustive study or complete listing of coal literature for the Caribbean. All the material was gathered from published literature with the exception of information from Cuba which was supplied from a study by Gordon Wood of the U.S. Geological Survey, Branch of Coal Resources. The literature ranges from 1857 to 1981. The countries listed include Colombia, Mexico, Venezuela, Cuba, the Dominican Republic, Haiti, Jamaica, Puerto Rico, and the countries of Central America. DOE

N86-19718# Pacific Northwest Lab., Richland, Wash.
INVESTIGATIONS OF SENSITIVITY AND UNCERTAINTY IN SOME HYDROLOGIC MODELS OF YUCCA MOUNTAIN AND VICINITY
E. A. Jacobson, M. D. Freshley, and F. H. Dove Oct. 1985 126 p refs
(Contract DE-AC04-76DP-00789)
(DE86-002091; SAND-84-7212; PNL-5306) Avail: NTIS HC A07/MF A01

The uncertainty in travel time for water through unsaturated and saturated zones of Yucca Mountain and vicinity was determined by considering uncertainty associated with input parameters to the hydrologic models of these zones. A first-order analysis was used to investigate uncertainty in water travel time through the unsaturated zone at Yucca Mountain, based on an analytic solution for water flow. Results of the investigation of uncertainty for the unsaturated zone indicated that uncertainty in the percolation estimate contributed significantly more to uncertainty in travel time than uncertainty in estimates of hydraulic conductivity. Monte Carlo and first-order approaches were used to investigate uncertainty in ground-water travel time for different cases that varied in the treatment of the input parameters to the hydrologic model of the unsaturated zone. Comparison of the Monte Carlo and first-order estimates of mean ground-water travel and travel time uncertainty in the saturated zone demonstrates that the first-order approach underestimated both the mean and variance of travel time for all considered. This underestimation suggests that the Monte Carlo approach should be used to estimate mean travel and its variance as well as the probability density distribution of travel time. A sensitivity study of ground-water travel time in the standard zone indicated that the zones with smaller transmissivity produced the largest influence in travel time for most cases. DOE

N86-19719# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).
A NEW GEOPHYSICAL APPROACH USING REMOTE SENSING TECHNIQUES TO STUDY GROUND WATER TABLE DEPTHS AND REGIONAL EVAPORATION FROM AQUIFERS IN DESERTS
M. Menenti 1983 20 p refs Presented at International Symposium on Methods and Instrumentation of Ground Water Systems, Noordwijkerhout, Netherlands, May 1983
(B8469378) Avail: NTIS HC A02/MF A01; Inst. voor Cultuurtechniek en Waterhuishouding, Wageningen, Netherlands Hfl 5

Two methods to determine variables relevant to the appraisal of ground water resources are presented. It is shown that the properties and thickness of the different soil layers can be

inferred from the thermal behavior of the soil surface. An application of remotely sensed thermal infrared data to estimate shallow groundwater table depths is presented. A method dealing with the determination of actual evaporation in large regions by combining visible and thermal infrared data with ground measurements is discussed. Author (ESA)

N86-19720# Illinois State Geological Survey, Champaign.
GEOLOGY, HYDROLOGY AND WATER QUALITY OF THE CAMBRIAN AND ORDOVICIAN SYSTEMS IN NORTHERN ILLINOIS
A. P. Visocky, M. G. Sherrill, and K. Cartwright 1985 147 p refs Prepared in cooperation with Geological Survey, Urbana, Ill. and Illinois State Water Survey, Champaign, Ill.
(PB85-249795; IL/SGS/COOP-10) Avail: NTIS HC A07/MF A01 CSCL 08H

Cambrian and Ordovician strata provide much of the groundwater supply for approximately 250 municipalities and 150 industries in the northern half of Illinois. The cooperative effort of the Illinois State Water Survey, Illinois State Geological Survey, and U.S. Geological Survey provided a current hydrogeologic evaluation of the water resource. GRA

N86-19696# Helsinki Univ. of Technology, Espoo (Finland).
MAPPING OF SNOW BY PASSIVE AND ACTIVE MICROWAVE SENSORS
M. Hallikainen and R. Kuittinen (Technical Research Centre of Finland, Espoo) *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 131-132 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19697# Innsbruck Univ. (Austria). Inst. of Meteorology and Geophysics.
MONITORING OF SNOW AND LAND ICE PARAMETERS: POSSIBILITIES AND CONSTRAINTS OF SAR AND MICROWAVE IMAGING SYSTEMS
H. Rott *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 133-135 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-20192# Joint Publications Research Service, Arlington, Va.
SIMULTANEOUS OBSERVATIONS OF LONGITUDINAL CURRENTS, STREAMS OF CHARGED PARTICLES AND IONOSPHERIC GLOW DURING POLAR SUBSTORM OF 30 DECEMBER 1981 BY ARTIFICIAL EARTH SATELLITE INTERCOSMOS-BOLGARIYA-1300 Abstract Only
L. N. Zhuzgov, Z. N. Zaytsev, A. K. Kuzmin, V. I. Lazarev, V. O. Papitashvili, V. G. Petrov, M. V. Teltsov, L. O. Tyurmina, V. A. Sharova, and S. I. Shkolnikova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 88 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 25, no. 2, Mar. - Apr. 1985 p 328-331 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20193# Joint Publications Research Service, Arlington, Va.
COMPARISON OF THREE SATELLITE MODELS OF MAIN GEOMAGNETIC FIELD Abstract Only
N. P. Benkova and G. I. Kolomiytseva *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 89 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 25, no. 2, Mar. - Apr. 1985 p 343-345 Original language was announced in IAA as A85-32840 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20219# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 1: METHODS AND FIRST RESULTS Abstract Only
D. Oertel, V. I. Moroz, I. Nopirakovskiy, V. M. Linkin, H. Jahn, R. S. Kremnev, H. Becker-Ross, W. Stadthaus, V. V. Kerzhanovich, I. A. Matsygorin et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 115 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 191-205 Original language document was announced in IAA as A85-35235 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20220# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 2: PRELIMINARY RESULTS OF TEMPERATURE PROFILE RETRIEVAL Abstract Only
D. Spankuch, L. V. Zasova, K. Schafer, Ye. A. Ustinov, Yu. Gyuldner, V. I. Moroz, W. Dohler, V. M. Linkin, R. Dyubua, A. V. Dyachkov et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 116 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 206-220 Original language document was announced in IAA as A85-35236 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20221# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 3: SOME CONCLUSIONS ON CLOUD STRUCTURE BASED ON ANALYSIS OF SPECTRA Abstract Only
L. V. Zasova, D. Spankuch, V. I. Moroz, K. Schafer, Ye. A. Ustinov, W. Dohler, V. M. Linkin, D. Oertel, A. V. Dyachkov, H. Becker-Ross et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 117 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 221-235 Original language document was announced in IAA as A85-35237 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20222# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 4: PRELIMINARY RESULTS OF ANALYSIS OF SPECTRA IN REGION OF H2O AND SO2 ABSORPTION BANDS Abstract Only
V. I. Moroz, W. Dohler, Ye. A. Ustinov, K. Schafer, L. V. Zasova, D. Spankuch, A. V. Dyachkov, R. Dyubua, V. M. Linkin, D. Oertel et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 118 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 236-247 Original language document was announced in IAA as A85-35238 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20223# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 5: PRELIMINARY RESULTS OF ANALYSIS OF BRIGHTNESS TEMPERATURE AND HEAT FLOW FIELDS Abstract Only
V. M. Linkin, K. Schafer, I. A. Matsygorin, W. Dohler, V. I. Morozn, R. Dyubua, A. V. Dyachkov, D. Spankuch, V. V. Kerzhanovich, D. Oertel et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 118-119 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 248-258 Original language document was announced in IAA as A85-35239 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20238# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL-GEOMORPHOLOGICAL INTERPRETATION OF PHOTO IMAGE PATTERNS IN SPACE PHOTOGRAPHS FOR WESTERN PART OF FERGANA VALLEY AND ITS MOUNTAINOUS FRAMEWORK Abstract Only
D. Magzumova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 135 Transl. into ENGLISH from Uzbekskiy Geologicheskiy Zhurnal (Tashkent, USSR), no. 4, Jul. - Aug. 1985 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20239# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF COLOR COORDINATES OF SOME SOILS ACCORDING TO AIRCRAFT MEASUREMENT DATA Abstract Only
. Ya. Kondratyev, V. V. Kozoderov, P. P. Fedchenko, S. M. omova, and L. B. Karvovskaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 137-138 Transl. into NGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), o. 2, Mar. - Apr. 1985 p 29-40 (For primary document see 86-20178 10-88)
vail: NTIS HC A03

N86-20240# Joint Publications Research Service, Arlington, Va.
EXPERIENCE IN MAPPING EARTH ON BASIS OF SPACE PHOTOINFORMATION Abstract Only
. N. Kuleshov *In its* USSR Report: Space (JPRS-USP-86-001) 3 Jan. 1986 p 138 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 41-44 Original language document was announced in IAA as A85-37117 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20241# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL INFORMATION CONTENT OF MULTIZONAL PHOTOGRAPHS Abstract Only
N. A. Yakovlev and S. G. Slutskaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 139 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 45-51 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20242# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL INFORMATION CONTENT OF SPACE PHOTOGRAPHS OBTAINED IN DIFFERENT SPECTRAL RANGES IN COURSE OF GOBI-KHANGAI EXPERIMENT (MUSHUGAY-GURVANBOGD TEST RANGE) Abstract Only
V. I. Makarov and G. I. Volchkova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 140 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 52-58 Original language document was announced in IAA as A85-37118 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20243# Joint Publications Research Service, Arlington, Va.
TECTONIC INTERPRETATION OF RESULTS OF INTERPRETATION OF SPACE PHOTOGRAPHS OF THE CAUCASUS Abstract Only
G. A. Mikheyev and M. G. Makarova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 141 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 59-66 (For primary document see N86-20178 10-88)
Avail: NTIS HC A09

N86-20244# Joint Publications Research Service, Arlington, Va.
PRINCIPAL PATTERNS OF MORPHOTECTONIC STRUCTURE OF EASTERN CAUCASUS DETECTED BY REMOTE SENSING METHOD Abstract Only
B. A. Budagov, A. A. Mikailov, A. S. Aliyev, and E. K. Alizade *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 142 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 67-72 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20245# Joint Publications Research Service, Arlington, Va.
AUTOMATED SPECTRAL ANALYSIS OF DIMENSIONS AND DIRECTIONS OF STRUCTURAL ELEMENTS ON EARTH'S SURFACE Abstract Only
D. K. Tkhabisimov, D. A. Uiskov, and M. I. Kolsenik *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 143 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 3-80 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20246# Joint Publications Research Service, Arlington, Va.
USE OF MATERIALS FROM LARGE-SCALE AERIAL PHOTOSURVEY OF FOREST IN AUTOMATED INTERPRETATION OF SPACE PHOTOGRAPHS Abstract Only
L. A. Kuzenkov, N. A. Aparinova, and A. V. Starchenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 143-144 Transl. into ENGLISH from Isledovaniye Zemli iz Kosmosa(Moscow, USSR), no. 2, Mar. - Apr. 1985 p 90-96 Original language document was announced in IAA as A85-37119 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20247# Joint Publications Research Service, Arlington, Va.
CHOICE OF CONDITIONS FOR AEROSPACE SURVEY IN VISIBLE SPECTRAL RANGE FOR DETERMINING ALBEDO OF OBJECT AND BACKGROUND Abstract Only
A. B. Karasev and S. V. Pantyukhov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 144-145 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 97-107 Original language document was announced in IAA as A85-37120 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20248# Joint Publications Research Service, Arlington, Va.
SYSTEM OF CRITERIA FOR ANALYSIS AND RECOGNITION OF IMAGES OF RANDOM SPATIAL TEXTURES Abstract Only
O. V. Bazarskiy and Yu. V. Korzhik *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 145-146 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 108-110 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20249# Joint Publications Research Service, Arlington, Va.
RATIONALIZATION OF SYSTEM FOR ACQUISITION OF OZONE REMOTE MEASUREMENT DATA IN NORTHERN HEMISPHERE Abstract Only
O. M. Pokrovskiy and A. K. Malygina *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 146 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 10-16 Original language document was announced in IAA as A85-29901 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20252# Joint Publications Research Service, Arlington, Va.
POSSIBILITIES OF USE OF REMOTE METHODS FOR INCREASING EFFICIENCY OF PETROLEUM AND GAS EXPLORATION WORK Abstract Only
M. Kh. Ishanov, V. A. Yushin, A. K. Gayazova, and G. N. Malashenkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 148-149 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), n. 1, Jan. - Feb. 1985 p 39-46 Original language document was announced in IAA as A85-29905 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20253# Joint Publications Research Service, Arlington, Va.
DETERMINING WATER SURFACES IN NORTHWESTERN BOHEMIA FROM SATELLITE DATA Abstract Only
K. Kirchner, J. Kolar, and S. Plachy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 149 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 47-51 Original language document was announced in IAA as A85-29906 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20254# Joint Publications Research Service, Arlington, Va.
COMPREHENSIVE DESERTIFICATION MAPS AND METHODOLOGY FOR THEIR COMPILATION USING SPACE PHOTOGRAPHS Abstract Only
N. G. Kharin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 150 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 52-59 Original language document was announced in IAA as A85-29907 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20255# Joint Publications Research Service, Arlington, Va.
USE OF SPACE METHODS FOR STUDYING SALINE SOILS AND SOLONCHAKS Abstract Only
E. A. Mamedov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 151 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 60-65 Original language document was announced in IAA as A85-29908 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20256# Joint Publications Research Service, Arlington, Va.
DETERMINING SOIL MOISTURE CONTENT BY MICROWAVE RADIOMETRY METHOD USING A PRIORI INFORMATION Abstract Only
Ye. A. Reutov and A. M. Shutko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 152 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 73-87 Original language document was announced in IAA as A85-29910 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20257# Joint Publications Research Service, Arlington, Va.
RADAR MAPPING OF MOISTURE CONTENT OF OPEN SOILS Abstract Only
N. N. Krupenio *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 152-153 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 88-93 Original language document was announced in IAA as A85-29911 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20258# Joint Publications Research Service, Arlington, Va.
DISCRIMINATING HOMOGENEOUS REGIONS WITH INCOMPLETE BOUNDARIES ON IMAGE Abstract Only
A. A. Zlatopolskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 153-154 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 94-102 Original language document was announced in IAA as A5-29912 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20259# Joint Publications Research Service, Arlington, Va.
SEGMENTATION OF HALF-TONE AEROSPACE IMAGES BY LEVEL LINES METHOD Abstract Only
D. Ye. Minskiy and M. M. Feygin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 154 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 103-112 Original language document was announced in IAA as A85-29913 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20260# Joint Publications Research Service, Arlington, Va.
USE OF A PRIORI EVALUATION OF CONDITIONS FOR OBSERVING EARTH'S SURFACE FROM SPACE FOR EFFECTIVE CHOICE OF TIME FOR EXECUTING SURVEY Abstract Only
N. V. Kapitonova and Ye. L. Lukashevich *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 155 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 113-117 Original language document was announced in IAA as A85-29914 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20261# Joint Publications Research Service, Arlington, Va.
AEROSPACE OBSERVATIONS OF ADVECTIVE-EDDY FORMATIONS IN CENTRAL BALTIC SEA Abstract Only
I. A. Bychkova, S. V. Viktorov, V. V. Vinogradov, V. N. Losinskiy, and Kh. Yu. Brosin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 156 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 118-122 Original language document was announced in IAA as A85-29915 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20262# Joint Publications Research Service, Arlington, Va.
FEATURES IN ALLOWANCE FOR ATMOSPHERIC INFLUENCE IN VERY LONG BASELINE RADIOINTERFEROMETRY Abstract Only
N. S. Zabolotnyy and G. A. Shanurov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 157 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 3-8 Original language document was announced in IAA as A85-19994 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20263# Joint Publications Research Service, Arlington, Va.
DETERMINING GEOCENTRIC GRAVITATIONAL CONSTANT BY SPACE GEODESY METHODS Abstract Only
Yu. V. Plakhov and A. V. Paramzin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 157-158 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 46-53 Original language document was announced in IAA as A85-19995 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20264# Joint Publications Research Service, Arlington, Va.
DETERMINING ELEMENTS OF OUTER ORIENTATION OF AEROSPACE PHOTOGRAPHS IN REMOTE STUDY OF DYNAMIC PROCESSES AND PHENOMENA Abstract Only
V. B. Dubinovskiy and A. A. Morozov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 158-159 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 66-70 Original language document was announced in IAA as A85-19998 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20265# Joint Publications Research Service, Arlington, Va.
PREDICTING COORDINATE ERRORS OF PHOTOGRAPH POINTS Abstract Only
V. G. Yelyushkin and B. V. Pronin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 159 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Feodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 70-75 Original language document was announced in IAA as A85-19999 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20266# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CARRIER ORIENTATION ERRORS ON IMAGE MOTION IN PHOTOGRAPHY FROM MOVING OBJECT Abstract Only
B. M. Miller and G. I. Fedchenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 160 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 75-80 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20268# Joint Publications Research Service, Arlington, Va.
DYNAMIC AEROSPACE SENSING (CONTENT, PROBLEMS, FIELD OF APPLICABILITY) Abstract Only
Yu. F. Knizhnikov *In its* USSR Report: Space (JPRS-USP-86-001)

Jan. 1986 p 161-162 Transl. into ENGLISH form Vestnik skovskogo Universiteta, Seriya 5: Geografiya (Moscow, USSR), 4, Jul. - Aug. 1985 p 7-13 (For primary document see 6-20178 10-88)
ail: NTIS HC A03

86-20269# Joint Publications Research Service, Arlington, Va.
RINCIPAL PHOTOGRAMMETRIC DEPENDENCES IN PROESSING OF RADAR SURVEY MATERIALS Abstract Only
u. S. Tyuflin *In its* USSR Report: Space (JPRS-USP-86-001) 3 Jan. 1986 p 162 Transl. into ENGLISH from Geodeziya i artografiya (Moscow, USSR), no. 9, Sep. 1984 (For primary ocument see N86-20178 10-88)
vail: NTIS HC A03

86-20270# Joint Publications Research Service, Arlington, Va.
APPING OF VEGETATION RESOURCES OF ARID ZONES SING SPACE PHOTOINFORMATION Abstract Only
V. S. Khrutskiy Transl. into ENGLISH from Geodeziya i Kartografiya (Moscow, USSR), no. 9, Sep. 1984 p 51-56 Original language document was announced in IAA as A85-14322 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-19721* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEGATIVE ELECTRODE CATALYST FOR THE IRON CHROMIUM REDOX ENERGY STORAGE SYSTEM Patent
Randall F. Gahn and Norman H. Hagedorn, inventors (to NASA) Issued 24 Sep. 1985 7 p Filed 20 Aug. 1984
(NASA-Case-LEW-14028-1; US-Patent-4,543,302; US-Patent-Appl-SN-642310; US-Patent-Class-429-15; US-Patent-Class-429-19; US-Patent-Class-429-51; US-Patent-Class-429-109) Avail: US Patent and Trademark Office CSCL 10C

A redox cell which operates at elevated temperatures and which utilizes the same two metal couples in each of the two reactant fluids is disclosed. Each fluid includes a bismuth salt and may also include a lead salt. A low cost, cation permselective membrane separates the reactant fluids.
Official Gazette of the U.S. Patent and Trademark Office

N86-19722 Virginia Univ., Charlottesville.
CHLOROPHYLL SENSITIZED SOLAR CELLS Ph.D. Thesis
David Frankie Glenn 1984 109 p
Avail: Univ. Microfilms Order No. DA8515498

The photovoltaic properties of the green plant pigment chlorophyll-a (Chl-a) were investigated in photoelectrochemical and solid state solar cells. Both types of cells utilized a thin film of Chl-a electro-deposited on a SnO2 optically transparent electrode. Solid state cells were fabricated by vapor depositing a thin layer of metal on top of the Chl-A to produce a SnO2/Chl-a/metal sandwich cell. Photoelectrochemical cells were assembled by immersing the SnO2/Chl-a electrode in an aqueous electrolyte solution along with a counter electrode. Both types of Chl-a cells were generally characterized by a strong dependence of he photoactivity on the other cell components and a surprisingly large photovoltage. Photoelectrochemical cells of SnO2/l-a/aq.AlCl3 were seen to produce photovoltages as high as 1.1 V and photocurrents of 1.1 micro A/sq cm while a solid state cell of SnO2/Chl-a/Al could produce 1.4 V and an initial photocurrent of 200 micro A/sq cm. This photoactivity was strongly time dependent in both configurations. Despite this fact, these cells are the most powerful Chl-a sensitized solar cells yet reported. Dissert. Abstr.

N86-19723*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE FLAT-PLATE SOLAR ARRAY PROJECT WORKSHOP ON CRYSTAL GOWTH FOR HIGH-EFFICIENCY SILICON SOLAR CELLS
Katherine A. Dumas, ed. 15 Aug. 1985 296 p refs Workshop held in San Diego, Calif., 3-4 Dec. 1984
(Contract NAS7-918; JPL-5101-272; Contract DE-AI01-76ET-20356)
(NASA-CR-176540; DOE/JPL-1012-109; NAS 1.26:176540) Avail: NTIS HC A13/MF A01 CSCL 10B

A Workshop on Crystal Growth for High-Efficiency Silicon Solar Cells was held December 3 and 4, 1984, in San Diego, California. The Workshop offered a day and a half of technical presentations and discussions and an afternoon session that involved a panel discussion and general discussion of areas of research that are necessary to the development of materials for high-efficiency solar cells. Topics included the theoretical and experimental aspects of growing high-quality silicon crystals, the effects of growth-process-related defects on photovoltaic devices, and the suitability of various growth technologies as cost-effective processes. Fifteen invited papers were presented, with a discussion period following each presentation. The meeting was organized by the Flat-Plate Solar Array Project of the Jet Propulsion Laboratory. These Proceedings are a record of the presentations and discussions, edited for clarity and continuity. For individual titles, see N86-19724 through N86-19738. Author

N86-19724*# Pennsylvania Univ., Philadelphia.
MATERIALS REQUIREMENTS FOR HIGH-EFFICIENCY SILICON SOLAR CELLS
M. Wolf *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 3-15 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

To achieve higher Si solar cell efficiencies (greater than 20%), better single-crystal Si must be produced. It is believed possible to bring Cz (Czochralski) Si up to the same low recombination level as FZ (Float Zone) Si. It is also desirable that solar cell Si meet the following requirements: long minority carrier lifetime (0.2 ohm-cm p-type with tau less than 500 microsec); repeatedly uniform lifetime (not spread from 50 to 1000 microsec); a lifetime that does not decrease during normal device processing; a silicon wafer sheet that is flat and stays throughout normal device processing; uniform and reasonable mechanical strength; and, manufacture at low cost (less than $50/sq m). F.M.R.

N86-19725*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
THE STATUS OF SILICON RIBBON GROWTH TECHNOLOGY FOR HIGH-EFFICIENCY SILICON SOLAR CELLS
T. F. Ciszek *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 17-28 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

More than a dozen methods have been applied to the growth of silicon ribbons, beginning as early as 1963. The ribbon geometry has been particularly intriguing for photovoltaic applications, because it might provide large area, damage free, nearly continuous substrates without the material loss or cost of ingot wafering. In general, the efficiency of silicon ribbon solar cells has been lower than that of ingot cells. The status of some ribbon growth techniques that have achieved laboratory efficiencies greater than 13.5% are reviewed, i.e., edge-defined, film-fed growth (EFG), edge-supported pulling (ESP), ribbon against a drop (RAD), and dendritic web growth (web). Author

N86-19726*# Shin-Etsu handotai Co., Vancouver, Wash.
FUTURE APPLICATION OF CZOCHRALSKI CRYSTAL PULLING FOR SILICON
J. H. Matlock *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 29-54 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Czochralski (Cz) crystal pulling has been the predominant method used for preparing silicon single crystal for the past twenty years. The fundamental technology used has changed little. However, great strides have been made in learning how to make the crystals bigger and of better quality at ever increasing productivity rates. Currently charge sizes of 50 kg of polycrystal silicon are being used for production and crystals up to ten inches in diameter have been grown without major difficulty. The largest material actually being processed in silicon wafer form is 150 mm (6 inches) in diameter. Growing of crystals in a magnetic field has proved to be particularly useful for microscopic impurity control. Major developments in past years on equipment for Cz crystal pulling have included the automatic growth control of the diameter as well as the starting core of the crystal, the use of magnetic fields and around the crystal puller to supress convection, various recharging schemes for dopant control and the use of continuous liquid feed in the crystal puller. The latter, while far from being a reliable production process, is ideal in concept for major improvement in Cz crystal pulling. The Czochralski process will maintain its dominance of silicon crystal production for many years. F.M.R.

N86-19727*# Shin-Etsu handotai Co., Gumma (Japan).
POTENTIAL PRODUCTIVITY BENEFITS OF FLOAT-ZONE VERSUS CZOCHRALSKI CRYSTAL GROWTH c76
Takao Abe *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 55-80 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Efficient mass production of single-crystal silicon is necessary for the efficient silicon solar arrays needed in the coming decade. However, it is anticipated that there will be difficulty growing such volumes of crystals using conventional Czochralski (Cz) methods. While the productivity of single crystals might increase with a crystal diameter increase, there are two obstacles to the mass production of large diameter Czochralski crystals, the long production cycle due to slow growth rate and the high heat requirements of the furnaces. Also counterproductive would be the large resistivity gradient along the growth direction of the crystals due to impurity concentration. Comparison between Float zone (FZ) and Cz crystal growth on the basis of a crystal 150 mm in diameter is on an order of two to four times in favor of the FZ method. This advantage results from high growth rates and steady-state growth while maintaining a dislocation-free condition and impurity segregation. F.M.R.

N86-19728*# Massachusetts Inst. of Tech., Cambridge.
NEW OUTLOOK ON CONTROL OF CRYSTALLINE AND CHEMICAL PERFECTION DURING GROWTH OF SILICON c76
A. F. Witt *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 83-96 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Significant progress has been made in our understanding of the Czochralski crystal growth process with the realization that the incorporation of oxygen into silicon is directly related to the internal gettering capability of wafers during device fabrication. It was also recognized that the electronic properties exhibited by silicon during various stages of device fabrication were significantly affected by the thermal history of the silicon during the post-growth cool-down period. Turbulent melt convection, induced by unavoidable destabilizing thermal gradients, was found to interfere with homogeneous dopant (and oxygen) incorporation and to influence markedly the dynamics of nonequilibrium point defects in the solidified silicon matrix during the cool-down period. In view of the unavoidability of destabilizing thermal gradients in conventional crystal growth configurations, melt stabilization through the application of magnetic fields is generally considered a viable approach. Control of heat input to the melt through heat pipe systems, as used during growth of germanium, cannot be applied to industrial growth of silicon. Recent studies have shown that heat exchange systems located coaxially about a growing crystal can be used to stabilize and control not only heat transfer in the grown crystal, but also in the melt adjacent to the solidification interface. F.M.R.

N86-19729*# International Business Machines Corp., Hopewell Junction, N. Y.
MCZ: STRIATIONS IN CZ SILICON CRYSTALS GROWN UNDER VARIOUS AXIAL MAGNETIC FIELD STRENGTHS c76
George K. M. Kim *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 97-107 refs (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Suppression of fluid flow instabilities in the melt by the axial magnetic field in Czochralski silicon crystal growth (AMCZ) is investigated precisely by a high-sensitivity striation etching in conjunction with temperature measurements. The magnetic strength (B) was varied up to 4.0 kG, incremented in 0.5 kG/5 cm crystal length. The convection flow was substantially suppressed at $B > 1.0$ kG. A low oxygen level of 2-3 ppma and a high resistivity of 400 ohm-cm is achieved in the AMCZ silicon crystals at $B > 1.0$ kG. Details of the striation formation as a function of B are presented. Computer simulation of the magnetohydrodynamics of the AMCZ silicon crystal growth are discussed briefly with regard to the solute, especially oxygen segregation at $B=0$, 1.0, and 2.0 kG. Earlier studies in the inverted Bridgman growth of InSb and Ge, which have established the cause and effect relationship between the convection in the melt and the striation formation as well as the suppression of the convections in the melt by transverse magnetic field are reviewed. Author

N86-19730*# Hughes Research Labs., Malibu, Calif.
HIGH PURITH LOW DEFECT FZ SILICON c76
H. Kimura and G. Robertson *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 109-121 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The most common intrinsic defects in dislocation-free float zone (FZ) silicon crystals are the A- and B-type swirl defects. The mechanisms of their formation and annihilation have been extensively studied. Another type of defect in dislocation-free FZ crystals is referred to as a D-type defect. Concentrations of these defects can be minimized by optimizing the growth conditions, and the residual swirls can be reduced by the post-growth extrinsic gettering process. Czochralski (Cz) silicon wafers are known to exhibit higher resistance to slip and warpage due to thermal stress than do FZ wafers. The Cz crystals containing dislocations are more resistant to dislocation movement than dislocated FZ crystals because of the locking of dislocations by oxygen atoms present in the Cz crystals. Recently a transverse magnetic field was applied during the FZ growth of extrinsic silicon. Resultant flow patterns, as revealed by striation etching and spreading resistance in Ga-doped silicon crystals, indicate strong effects of the transverse magnetic field on the circulation within the melt. At fields of 5500 gauss, the fluid flow in the melt volume is so altered as to affect the morphology of the growing crystal. F.M.R.

N86-19731*# RCA Labs., Princeton, N. J.
DEFECTS IN SILICON EFFECT ON DEVICE PERFORMANCE AND RELATIONSHIP TO CRYSTAL GROWTH CONDITIONS c76
L. Jastrzebski *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 123-143 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

A relationship between material defects in silicon and the performance of electronic devices will be described. A role which oxygen and carbon in silicon play during the defects generation process will be discussed. The electronic properties of silicon are

a strong function of the oxygen state in the silicon. This state controls mechanical properties of silicon efficiency for internal gettering and formation of defects in the device's active area. In addition, to temperature, time, ambience, and the cooling/heating rates of high temperature treatments, the oxygen state is a function of the crystal growth process. The incorporation of carbon and oxygen into silicon crystal is controlled by geometry and rotation rates applied to crystal and crucible during crystal growths. Also, formation of nucleation centers for oxygen precipitation is influenced by the growth process, although there is still a controversy which parameters play a major role. All these factors will be reviewed with special emphasis on areas which are still ambiguous and controversial. Author

N86-19732*# Washington Univ., St. Louis, Mo.
SIMULATION OF THE TEMPERATURE DISTRIBUTION IN CRYSTALS GROWN BY CZOCHRALSKI METHOD c76
M. P. Dudokovic and P. A. Ramachandran *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 147-173 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Production of perfect crystals, free of residual strain and dislocations and with prescribed dopant concentration, by the Czochralski method is possible only if the complex, interacting phenomena that affect crystal growth in a Cz-puller are fully understood and quantified. Natural and forced convection in the melt, thermocapillary effect and heat transfer in and around the crystal affect its growth rate, the shape of the crystal-melt interface and the temperature gradients in the crystal. The heat transfer problem in the crystal and between the crystal and all other surfaces present in the crystal pulling apparatus are discussed at length. A simulation and computer algorithm are used, based on the following assumptions: (1) only conduction occurs in the crystal (experimentally determined conductivity as a function of temperature is used), (2) melt temperature and the melt-crystal heat transfer coefficient are available (either as constant values or functions of radial position), (3) pseudo-steady state is achieved with respect to temperature gradients, (4) crystal radius is fixed, and (5) both direct and reflected radiation exchange occurs among all surfaces at various temperatures in the crystal puller enclosure. Author

N86-19733*# Arizona State Univ., Tempe.
CONVECTIVE EFFECTS IN FLOAT-ZONE AND CZOCHRALSKI MELTS c76
G. P. Neitzel *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1986 p 175-192 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The hydrodynamics of crystal-growth melts is a relatively new research area. Numerical modeling of these processes is necessary. The work discussed herein is in two parts: numerical simulations of the flow in a Czochralski melt, and also of that in a float zone. In addition, for the float-zone case, energy stability theory will be used to determine stability bounds for the onset of oscillatory thermo-capillary flow. Convective effects in crystal-growth melts arise from a variety of mechanisms. Temperature gradients both in the direction of gravity and normal to it give rise to convection due to buoyancy effects. Rotation of the crucible and/or crystal causes a forced convection which may augment or oppose the buoyancy-driven flow. Finally, thermo-capillary forces (due to the variation of surface tension with temperature) drive surface motions which in turn generate convection in the bulk fluid. All of these mechanisms are present in either Czochralski or float-zone growth. The objective of the Czochralski modeling is to develop an accurate numerical simulation of the flow in a Czochralski silicon melt and to investigate the effects of various parameters on the flow properties. Like some earlier investigations, the intent is to simulate the effects of buoyancy, forced and thermo-capillary convection, including unsteady effects. Unlike earlier work, the aim is to include the effects of a variable free surface and freezing interface and, possibly incorporate nonaxisymmetric effects. Author

N86-19734*# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
THERMAL-CAPILLARY MODEL FOR CZOCHRALSKI GROWTH OF SEMICONDUCTOR MATERIALS c76
J. J. Derby and R. A. Brown *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 195-214 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The success of efficiently calculating the temperature field, crystal radius, melt meniscus, and melt/solid interface in the Czochralski crystal growth system by full finite-element solution of the government thermal-capillary model is demonstrated. The model predicts realistic response to changes in pull rate, melt volume, and the thermal field. The experimentally observed phenomena of interface flipping, bumping, and the difficulty maintaining steady-state growth as the melt depth decreases are explained by model results. These calculations will form the basis for the first quantitative picture of Cz crystal growth. The accurate depiction of the melt meniscus is important in calculating the crystal radius and solidification interface. The sensitivity of the results to the equilibrium growth angle place doubt on less sophisticated attempts to model the process without inclusion of the meniscus. Quantitative comparison with experiments should be possible once more representation of the radiation and view factors in the thermal system and the crucible are included. Extensions of the model in these directions are underway. Author

N86-19735*# Westinghouse Research and Development Center, Pittsburgh, Pa.
IMPURITIES IN SILICON SOLAR CELLS
R. H. Hopkins *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 215-233 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Metallic impurities, both singly and in combinations, affect the performance of silicon solar cells. Czochralski silicon web crystals were grown with controlled additions of secondary impurities. The primary electrical dopants were boron and phosphorus. The silicon test ingots were grown under controlled and carefully monitored conditions from high-purity charge and dopant material to minimize unintentional contamination. Following growth, each crystal was characterized by chemical, microstructural, electrical, and solar cell tests to provide a detailed and internally consistent description of the relationships between silicon impurity concentration and solar cell performance. Deep-level spectroscopy measurements were used to measure impurity concentrations at levels below the detectability of other techniques and to study thermally-induced changes in impurity activity. For the majority of contaminants, impurity-induced performance loss is due to a reduction of the base diffusion length. From these observations, a semi-empirical model which predicts cell performance as a function of metal impurity concentration was formulated. The model was then used successfully to predict the behavior of solar cells bearing as many as 11 different impurities. F.M.R.

N86-19736*# State Univ. of New York, Albany.
OXYGEN AND CARBON IN SILICON c76
J. W. Corbett *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 235-257 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The properties of the early transistors were determined by the minority-carrier lifetime, as is the silicon photovoltaic solar cell. Most of the devices on the modern integrated circuits are majority carrier devices, in part to avoid this lifetime dependence. The micro-electronics industry typically starts with wafers with a minority-carrier lifetime of 1000 micro-seconds, but during device fabrication this lifetime is reduced to beflow 1 micro-second, in spite of extraordinary cleanliness and precautions. Process-induced defects (PID) include point defects, defect complexes, line defects, and bulk precipitates. One of the aspects that needs to be better understood is the nature of minority carrier recombination at line defects and at precipitates. Some of the PIDs are

known to be related to the fast-diffusers of the iron-series transition elements. One of the common techniques of dealing with these elements is intrinsic gettering by the oxygen precipitates. But even in the gettered state, there may be a residual effect on the lifetime. Oxygen is an almost ubiquitous impurity in silicon and plays an important role in both integrated circuits and solar cells. The isolated oxygen interstitial is electrically inactive, but in its various aggregated forms it has a variety of electrical activities. The agglomeration and precipitation of oxygen, including impurity gettering and the complicating role of carbon, is discussed. F.M.R.

N86-19737*# Texas Instruments, Inc., Sherman.
SOLAR CELL AND I.C. ASPECTS OF INGOT-TO-SLICE MECHANICAL PROCESSING c76
Lawrence D. Dyer *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 259-277 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

Intensive efforts have been put into the growth of silicon crystals to suit today's solar cell and integrated circuit requirements. Each step of processing the crystal must also receive concentrated attention to preserve the grown-in perfection and to provide a suitable device-ready wafer at reasonable cost. A comparison is made between solar cell and I.C. requirements on the mechanical processing of silicon from ingot to wafer. Specific defects are described that can ruin the slice or can possibly lead to device degradation. These include grinding cracks, saw exit chips, crow's-foot fractures, edge cracks, and handling scratches. Author

N86-19738*# Storti (George), Washington, D.C.
DEFECTS AND DEVICE PERFORMANCE c76
George Storti, R. Armstrong, S. Johnson, H. C. Lin, W. Regnault, and K. C. Yoo *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 279-291 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

The necessity for a low-cost crystalline silicon sheet material for photovoltaics has generated a number of alternative crystal growth techniques that would replace Czochralski (Cz) and float-zone (FZ) technologies. Efficiencies of devices fabricated from low resistivity FZ silicon are approaching 20%, and it is highly likely that this value will be superseded in the near future. However, FZ silicon is expensive, and is unlikely ever to be used for photovoltaics. Cz silicon has many of the desirable qualities of FZ except that minority-carrier lifetimes at lower resistivities are significantly less than those of FZ silicon. Even with Cz silicon, it is unlikely that cost goals can be met because of the poor-material yield that results from sawing and other aspects of the crystal rowth. Although other silicon sheet technologies have been investigated, almost all have characteristics that limit efficiency to approx. 16%. In summary, 20% efficient solar cells can likely be fabricated from both FZ and Cz silicon, but costs are likely to be ultimately unacceptable. Alternate silicon technologies are not likely to achieve this goal, but cost per watt figures may be eventually better than either of the single crystal technologies and may rival any thin-film technology. F.M.R.

N86-19739*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH-EFFICIENCY SILICON SOLAR-CELL DESIGN AND PRACTICAL BARRIERS
A. Mokashi 15 Nov. 1985 31 p refs
(Contracts NAS7-918; DE-AI01-76ET-20356)
(NASA-CR-176529; JPL-Pub-85-75; NAS 1.26:176529; DOE/JPL-1012-112) Avail: NTIS HC A03/MF A01 CSCL 10B

A numerical evaluation technique is used to study the impact of practical barriers, such as heavy doping effects (Auger recombination, band gap narrowing), surface recombination, shadowing losses and minority-carrier lifetime (Tau), on a high efficiency silicon solar cell performance. Considering a high Tau of 1 ms, efficiency of a silicon solar cell of the hypothetical case is estimated to be around 29%. This is comparable with (detailed balance limit) maximum efficiency of a p-n junction solar cell of 30%. Value of Tau is varied from 1 second to 20 micro. Heavy doping effects, and realizable values of surface recombination velocities and shadowing, are then considered in succession and their influence on cell efficiency is evaluated and quantified. These practical barriers cause the cell efficiency to reduce from the maximum value of 29% to the experimentally achieved value of about 19%. Improvement in open circuit voltage V sub oc is required to achieve cell efficiency greater than 20%. Increased value of Tau reduces reverse saturation current and, hence, improves V sub oc. Control of surface recombination losses becomes critical at higher V sub oc. Substantial improvement in Tau and considerable reduction in surface recombination velocities is essential to achieve cell efficiencies greater than 20%. Author

N86-19740*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CHARACTERIZATION OF EMI GENERATED BY THE DISCHARGE OF A VOLT SOLAR ARRAY Final Report
Philip Leung 1 Nov. 1985 24 p refs
(Contract NAS7-918)
(NASA-CR-176537; JPL-Pub-85-82; NAS 1.26:176537) Avail: NTIS HC A03/MF A01 CSCL 10A

The interaction of a high-voltage solar array with the space plasma environment is investigated in a laboratory simulation experiment. Discharges are observed to occur when the solar array is at a sufficiently high negative bias with respect to the plasma. The frequency of occurrence of discharge is found to depend critically on the plasma density and on the geometry of the array. The electromagnetic interference (EMI) associated with a discharge is also measured. The amplitude of EMI increases with the magnitude of the high voltage. Since the discharge-generated EMI is of significant amplitude, its effect on the performance of systems in space must be evaluated. Author

N86-19741*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SENSITIVITY ANALYSIS OF CENTRAL FLAT-PLATE PHOTOVOLTAIC SYSTEMS AND IMPLICATIONS FOR NATIONAL PHOTOVOLTAICS PROGRAM PLANNING
M. R. Crosetti 30 Aug. 1985 65 p refs
(Contracts NAS7-918; DE-AI01-76ET-20356)
(NASA-CR-176526; JPL-Pub-85-92; NAS 1.26:176526; DOE/JPL-1012-114) Avail: NTIS HC A04/MF A01 CSCL 10B

The sensitivity of the National Photovoltaic Research Program goals to changes in individual photovoltaic system parameters is explored. Using the relationship between lifetime cost and system performance parameters, tests were made to see how overall photovoltaic system energy costs are affected by changes in the goals set for module cost and efficiency, system component costs and efficiencies, operation and maintenance costs, and indirect costs. The results are presented in tables and figures for easy reference. Author

N86-19742*# Georgia Inst. of Tech., Atlanta.
TECHNOLOGY FOR SATELLITE POWER CONVERSION Semiannual Technical Report, 27 May - 26 Oct. 1985
M. A. Gouker, D. P. Campbell, and J. J. Gallagher 29 Jan. 1986 35 p refs
(Grant NAG3-282; GTRI Proj. 3244)
(NASA-CR-176554; NAS 1.26:176554) Avail: NTIS HC A03/MF A01 CSCL 10A

The dipole pattern of the antenna was confirmed and work on the MOM diode began. The antenna - detector structure was modified and the measurement apparatus reconfigured to permit precise antenna pattern measurements. Fabrication of the MOM diode was initiated after antenna action from the new structures was observed. A refined antenna structure was developed. The previous antenna design allowed currents induced by the incident radiation in the bonding wires to flow through the bolometer. The detector was thus responding to both the antenna and bonding wire currents. A low pass filter was added to the antenna structure to improve the detection scheme. The new design uses an

interdigitated capacitor to prevent the induced current in the bonding wires from flowing through the detection element. Author

N86-19743# Naval Surface Weapons Center, Silver Spring, Md.
LOADING AND UTILIZATION OF ACTIVE MATERIAL IN NICKEL COMPOSITE ELECTRODES: OPTIMIZATION
W. W. Lee, W. A. Ferrando, and R. A. Sutula Dec. 1984 56 p
(AD-A160354; NSWC/TR-84-122) Avail: NTIS HC A04/MF A01
CSCL 09/1

As an attempt to reduce nickel battery weight, the nickel composite electrode (Ni. C. E.), has been under development. Investigations were undertaken to determine the optimum conditions for loading and utilizing nickel hydroxide active material in nickel composite electrodes. The main emphasis was placed on the improvement of both loading efficiency by electrochemical impregnation and utilization efficiency of the Ni(OH)2 active material. The efficiencies were examined as functions of such electrochemical conditions as current density, nickel concentration, pH, temperature of the impregnating bath, the continuity of current flow and manner of adding Co(OH)2 additive. Also studied was the loading efficiency of chemical impregnation (polarization method) and the suspension method which enables a direct loading of externally prepared active material into the composite body. The most important factor for a quick utilization of the active material was found to be the additive distribution. A model of the additive distribution in the active material is proposed to account for different patterns of utilization exhibited by the electrodes. GRA

N86-19744# Howard Univ., Washington, D. C.
GALLIUM ARSENIDE SOLAR CELLS
[1985] 17 p
(DE85-011085; DOE/ER-10096/T13) Avail: NTIS HC A02/MF A01

Ga(1-x)Al(x)As was applied in a thin epitaxial layer to increase the efficiency of the solar cells: resulting in negligible optical absorption, low series resistance, prevention of entrance of minority carriers, and low surface recombination velocity at interfaces. The performance of Ga(1-x)Al(x)As/GaAs p-n junction solar cells were improved by studying the effects of doping impurities; thickness and composition of the Ga(1-x)Al(x)As layer, grid pattern design, heat sink design, and antireflection coating. B.G.

N86-19745# Brookhaven National Lab., Upton, N. Y.
ADVANCED MATERIALS FOR GEOTHERMAL ENERGY PROCESSES
L. E. Kukacka Aug. 1985 15 p refs Presented at the Geothermal Program Review, Washington, D.C., 11 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001183; BNL-36933; CONF-8509142-7) Avail: NTIS HC A02/MF A01

The primary goal of the geothermal materials program is to ensure that the private sector development of geothermal energy resources is not constrained by the availability of technologically and economically viable materials of construction. This requires the performance of long-term high risk GHTD-sponsored materials R and D. Ongoing programs described include high temperature elastomers for dynamic sealing applications, advanced materials for lost circulation control, waste utilization and disposal, corrosion resistant elastomeric liners for well casing, and nonmetallic heat exchangers. DOE

N86-19746*# Springborn Labs., Inc., Enfield, Conn.
INVESTIGATION OF TEST METHODS, MATERIAL PROPERTIES AND PROCESSES FOR SOLAR CELL ENCAPSULANTS
Annual Report
P. B. Willis 1985 89 p
(Contracts NAS7-100; JPL-954527)
(NASA-CR-176567; NAS 1.26:176567; DE86-001309;
DOE/JPL-954527-27-85-AR-9) Avail: NTIS HC A05/MF A01

Progress in solar energy technology is reported in the following areas: aging and life prediction methodology and devices for solar cell encapsulation; the function of adhesion chemistry, primers, and a new diagnostic technique for estimations of bond durability; a study of fire retardant formulations for decreasing the potential flammability of solar modules; initial studies of the electrical insulating properties of encapsulation materials and measurement of the intrinsic dielectric strength; antisoiling compounds for the prevention of soil build-up on the outer surface of the module; and low temperature processing encapsulants that permit module fabrication at temperatures less than 100 C. Another area of study has been added to determine the degree to which formulation and processes affect the module quality and manufacturing yield. DOE

N86-19747# Netherlands Energy Research Foundation, Petten. Bureau Voorlichting.
ADDRESSES OF: 1. PRODUCERS AND DEALERS OF WIND TURBINES AND WIND TURBINE BLADES IN THE NETHERLANDS. 2. BUREAUS, INSTITUTIONS AND ASSOCIATIONS IN THE FIELD OF WIND ENERGY [ADRESSEN VAN: 1. PRODUCENTEN EN LEVERANCIERS VAN WINDTURBINES EN WINDTURBINEBLADEN IN NEDERLAND. 2. BUREAU'S INSTELLINGEN EN VERENIGINGEN OP HET GEBIED VAN WINDENERGIE]
A. Curvers and Fr. vanHulle Apr. 1985 24 p In DUTCH
Avail: NTIS HC A02/MF A01

The state of affairs in April 1985 concerning the supply in the Dutch wind energy market is presented. Author (ESA)

N86-19748# Netherlands Energy Research Foundation, Petten.
ECONOMIC AFFAIRS-REFERENCE SCENARIO 1984. SOME CALCULATIONS WITH THE ENERGY MODEL STATIC ESC LINEAR PROGRAMMING ENERGY (SELPE) MODEL [HET EZ-REFERENTIESCENARIO 1984. ENIGE BEREKENINGEN MET HET ENERGIEMODEL SELPE]
P. G. M. Boonekamp and J. J. C. Bruggink Dec. 1984 122 p refs In DUTCH; ENGLISH summary
(ESC-29) Avail: NTIS HC A06/MF A01

The Dutch national energy model SELPE and its application in a reference energy scenario are presented. Using final energy demand projections from the Central Planning Bureau and assumptions about the development of energy technologies and prices, calculations to construct optimal energy balances for the years 1990 and 2000, including several variations of the base case, were done. Special attention was given to developments in the electricity sector, in particular with respect to reliability and other technical aspects. Global results including financial and environmental implications are presented. Author (ESA)

N86-19749# Netherlands Energy Research Foundation, Petten.
NEW ENERGY SOURCES IN JAPAN. PLAN AND EXECUTION OF ENERGY PROGRAMS [NIEUWE ENERGIEBRONNEN IN JAPAN. OPZET EN UITVOERING VAN ENERGIEONDERZOEKPROGRAMMA'S]
T. Kram Mar. 1985 65 p refs Partly in DUTCH and ENGLISH
Sponsored by Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer
(ESC-31; B8564257) Avail: NTIS HC A04/MF A01

Japanese energy research programs are surveyed. Concerning the introduction of new energy sources and techniques, a consistent and integrated policy is pursued. Research and development management is set up in close cooperation with trade and industry, while the governement exerts a strong influence upon the market sector. Attention is paid to the Sunshine Project for the stimulation of solar, geothermal, hydrogen-based, coal gasification, and coal liquefaction energy. The new Energy Development Organization, a government institution concerned with undersea coal exploration and the development of geothermal resources, is discussed. Author (ESA)

N86-19750# Netherlands Energy Research Foundation, Petten.
ENERGY PRODUCTION ESTIMATION AND PARAMETER SENSITIVITY ANALYSIS FOR WIND ENERGY CONVERSION SYSTEMS (WECS)
T. D. Oei, A. Curvers, and H. vandeHee May 1985 36 p refs

(ECN-165; B8565552) Avail: NTIS HC A03/MF A01

The wind energy production computer program WEPP and its applications are described. Loss models for gearbox and generators used in the program are treated. Generator loss models for synchronous and asynchronous generators are given together with four options of turbine mode of control. Wind regime of the turbine site is calculated from a Weibull distribution function, with correction for turbine height and terrain roughness. Examples of production optimization methods, with spider diagrams presenting the sensitivity analysis of such calculations are shown. Author (ESA)

N86-19751# Technische Physische Dienst TNO-TH, Delft (Netherlands). Afdel. Geluid.

NOISE SOURCES IN WIND TURBINES. SOURCE IDENTIFICATION RESEARCH: NOISE SUPPRESSION DESIGN [GELUIDBRONNEN BIJ WINDTURBINES - BRONIDENTIFICATIEONDERZOEK GELUIDARM ONTWERPEN]

L. W. A. vanSchie, A. deBruijn, and F. H. vanTol 28 Jun. 1985 70 p refs In DUTCH Sponsored by Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer Prepared for Stichting Projectenbeheerbureau Energie Onderzoek, Utrecht and Bureau Energie Onderzoek Projecten, Petten, Netherlands
(TPD-308.440; TPD-308.452) Avail: NTIS HC A04/MF A01

Aerodynamic and mechanical noise measurements on medium-sized wind turbines were carried out; literature on aerodynamic noise sources at wings was reviewed. The total emission level as a function of the average wind velocity was determined. Aerodynamic wing noise was measured seperately from the nacelle noise using a microphone. A trigger unit consisting of an optical sensor and telelens was developed to measure synchronically the noise signal of the wing in horizontal position. In the nacelle, noise and vibration measurements were done at the entering axis, the gear casing, and the generator. Main sources are the gear casing, the generator, and obstacles on the wings. Noise reducing design recommendations are given. Author (ESA)

N86-19752# Volunteers in Technical Assistance, Inc., Arlington, Va.

UNDERSTANDING SOLAR ENERGY: A GENERAL OVERVIEW

K. Giarman 1985 21 p refs
(PB85-248623; VITA/TP-23:03/85) Avail: NTIS HC A02/MF A01 CSCL 10A

The overview focused on the simplest solar technologies, that is, those least likely to encounter economic and technical barriers during their introduction. Even these are likely to experience cultural impediments that must be understood, confronted, and resolved before total social acceptance is achieved in Third World villages. GRA

N86-19753# Volunteers in Technical Assistance, Inc., Arlington, Va.

UNDERSTANDING ENERGY STORAGE METHODS

C. S. Brooks 1985 23 p
(PB85-248136; VITA/TP-22:03/85) Avail: NTIS HC A02/MF A01 CSCL 10C

An introduction to specific state-of-the-art technologies of interest to people in developing countries is given. The research is intended to be used as a guideline to help people chose technologies that are suitable to their situations. GRA

N86-19754# Volunteers in Technical Assistance, Inc., Arlington, Va.

UNDERSTANDING BATTERIES

L. Merriman 1985 24 p
(PB85-248607; VITA/TP-25:03/85) Avail: NTIS HC A02/MF A01 CSCL 10C

A basic understanding of batteries is given, as well as their development from the early 1800s to the present day. Research and development continues in an effort to solve the inherent weakness of batteries, namely, how to pack more energy into a smaller package. An electric cell or battery is a device that transforms the chemical energy contained within its active materials directly into electrical energy by means of an electrochemical reaction. This type of reaction involves the transfer of electrons from one material to another through a conducting solution. Historically, batteries played an important role in the early days of electrical development both in the United States and in Europe. GRA

N86-19485# Joint Publications Research Service, Arlington, Va.

MOONLIGHT PROJECT PROMOTES ENERGY-SAVING TECHNOLOGY

Akira Ishihara *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 8-15 Transl. into ENGLISH from Denki To Gasu (Tokyo, Japan), Jun. 1985 p 17-21 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-19755# National Aeronautical Establishment, Ottawa (Ontario).

A FIELD STUDY OF GROUND DEPOSITION, WIND DRIFT AND BYSTANDER EXPOSURE FROM AGRICULTURAL AIRCRAFT SPRAY EMISSIONS

R. S. Crabbe and M. McCooeye Jul. 1985 42 p
(AD-A160891; NAE-AN-30; NRC-24745) Avail: NTIS HC A03/MF A01 CSCL 02/1

Wind drift, deposition and bystander exposure measurements from agricultural aircraft and ground-rig spray emissions over rural terrain using conventional spray booms and atomizers are presented. A single line was treated. The formulations were aqueous oil emulsions to simulate herbicide applications and aqueous wettable powder emulsions to represent fungicide sprays. Meteorological conditions varied from calm thermally unstable to near-neutral moderately windy (4.9 ms -1 at 4 m above ground). Time-integrated atmospheric droplet concentrations (dosage) were measured at breathing height to 500 m downwind and vertically to drift cloud top at 200 and 500 m downwind. Analysis of field data disclosed initial ground deposit accounting for nearly 100% of the nonvolatiles in the ground-rig emission, but only from 60 to 80% of the aircraft emission depending upon wind speed, in agreement with published data. When transformed into the equivalent operational multi-swath crosswind incremental spray scenario, the data indicated bystander dermal exposures to nonvolatiles at 75 m downwind increasing from 150 microgram for the first swath to 600 microgram after 10 swaths in light winds (2.8 ms -1 at 4 m agl). At 200 m the measured drift cloud mass from the aircraft sprays varied from 1 to 2% of the emission in light winds. In this connection, 90 deg nozzle orientation on the aircraft resulted in greater wind drift than trailing orientation. The wettable-powder drift data revealed that at and beyond 75 m where spray evaporation was essentially complete, the dermal exposure could be less than from herbicide sprays due to the possibility of particle rebound from collecting surfaces. GRA

N86-19756# California Univ., Berkeley. Lawrence Berkeley Lab.

CONTROL OF INDOOR RADON AND RADON PROGENY CONCENTRATIONS

R. G. Sextro May 1985 44 p Presented at the American Society of Heating, Refrigerating and Air-Conditioning Engineers Semiannual Meeting, Honolulu, Hawaii, 23 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000622; LBL-19726; CONF-850606-16) Avail: NTIS HC A03/MF A01

There are three general categories of techniques for the control of radon and radon progeny concentrations in indoor air - restriction of radon entry, reduction of indoor radon concentrations by ventilation or air cleaning, and removal of airborne radon progeny. The predominant radon entry process in most residences appears to be pressure driven flow of soil gas through cracks or other

openings in the basement, slab, or subfloor. Sealing these openings or ventilation of the subslab or subfloor space are methods of reducing radon entry rates. Indoor radon concentrations may be reduced by increased ventilation. The use of charcoal filters for removal of radon gas in the indoor air by adsorption has also been proposed. Concentrations of radon progeny, which are responsible for most of the health risks associated with radon exposures, can be controlled by use of electrostatic or mechanical filtration. Air circulation can also reduce radon progeny concentrations in certain cases. This paper reviews the application and limitations of each of these control measures and discusses recent experimental results. DOE

N86-19757# Netherlands Energy Research Foundation, Petten.
PLUME WASH-OUT: MODELING, CALCULATION AND VALIDATION
A. J. Janssen and H. M. TenBrink Jul. 1985 60 p refs In DUTCH; ENGLISH summary
(ECN-170; B8569806) Avail: NTIS HC A04/MF A01

For interpretation of experimental results and prediction of wet deposition patterns near power stations, a wash-out model was developed to estimate the wet deposition of several pollutants in plumes. Using a Gaussian dispersion model, plume depletion was determined numerically by following individual rain droplets through the plume and calculating the pollutant, absorption/desorption processes as well as chemical reactions in the droplets, while taking account of mass transport resistances at both sides of the gas/liquid interface. Following experimental evidence, the pollutants: SO2, HC1, HF, B-compounds, and particles (e.g., Al) were included in the model. Good agreement between calculations and measurements of HCl deposition at a coal-fired power plants is found. Plume wash-out of SO2 strongly depends on the concentrations of various species, e.g., H(+) and SO2 background concentrations. Using the results and meteorological data, the annual contribution of a 500 MW coal-fired power plant plume to wet deposition was estimated. Author (ESA)

N86-19758# Delft Hydraulics Lab. (Netherlands). Environmental Hydraulics Branch.
MODELING OF HYPOLYMNETIC WATER QUALITY IN DEEP PITS CREATED BY SAND DREDGING IN THE LAKE IJSSEL AREA
J. A. vanPagee, J. G. C. Smits, and J. A. W. deWit (Ministry of Public Works, Lelystad, Netherlands) Aug. 1984 14 p refs
(Publ-323) Avail: NTIS HC A02/MF A01

Water quality modeling techniques were developed and used to simulate the oxygen budget in the hypolymnetic region of pits with a depth up to 45m created in the Lake IJssel area (Netherlands) as a result of sand dredging. The settling of organic matter originating from phytoplankton growth and the related decomposition can create a high demand for oxygen in the hypolymnetic region of the pit. During the summer period when the pit is thermally stratified this can result in anaerobic conditions. Based on the models, a better understanding of the dominant processes and the influence of pit geometry and water quality of the lake is established. Such information is of special interest for the development of design criteria for new pits or the extension of existing pits in relation to water quality management in the area. Author (ESA)

N86-19759# Energy and Environmental Analysis, Inc., Arlington, Va.
DEVELOPMENT OF THE INDUSTRIAL COMBUSTION EMISSIONS MODEL FOR ACID RAIN ANALYSIS
K. F. Held and J. D. Mobley Jul. 1985 16 p
(Contract EPA-68-02-4202)
(PB85-243822; EPA-600/D-85-152) Avail: NTIS HC A02/MF A01 CSCL 08H

Forecasts of industrial combustion emissions being developed by the U.S. EPA as part of the National Acid Precipitation Assessment Program (NAPAP) are discussed. The Industrial Combustion Emissions (ICE) Model will estimate sulfur dioxide (SO2), nitrogen oxides (NOx), and primary sulfate emissions from industrial fossil-fuel-fired boilers. These forecasts will be generated on a state-level basis. Alternative pollution control scenarios will be evaluated for reducing emissions from both existing and new industrial boilers. The ICE Model also evaluates the selection of fossil fuels for industrial steam generation. Capital and operating/maintenance costs for boilers and pollution control equipment, plus the costs of alternative fuel types, are used in selecting the fuel type for individual industrial boilers. Since emission rates vary significantly between coals, residual fuel oils, and natural gas, the fuel choice decision is a critical factor in estimating aggregate levels of SO2, NOx, and primary sulfates. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-19760 New South Wales Univ., Kensington (Australia).
STRATIGRAPHIC INTERPRETATION IN A HIGH-CRANE METAMORPHIC TERRAIN: THE THACKARINGA AREA, BROKEN HILL, NEW SOUTH WALES Abstract Only
I. L. Willis Nov. 1984 2 p
Avail: Issuing Activity

Consistent field classification of metamorphic rocks, structural and lithostratigraphic markers were identified by lithographic mapping in the granulite facies, multiply-deformed rocks of the Thackaringa area. Thirteen stratigraphic units were recognized in the sequence, which forms an important part of the Early Proterozoic Willyama Supergroup of the Broken Hill Block. These units can be referred to as two main groups, the Thackaringa and Broken Hill Groups, in a sequence which appears to be conformable and about 1900 m thick. The basal sequence (Thackaringa Group, Thorndale Composite Gneiss) comprises comparatively immature metasedimentary rocks, with sodic plagioclase + quartz rocks, basic gneiss, leucogneiss and quartzo-feldspathic gneisses, and displays marked facies variations. The overlying Broken Hill Group contains mainly well-bedded metasediments, intercalated with basic gneiss, garnet-rich quartzo-feldspathic gneiss, and minor calc-silicate rock. The uppermost exposed unit, the Sundown Group, consists solely of well-bedded metasediments. Stratiform mineralization of the Broken Hill type occurs mainly in the Broken Hill Group, but a variant is also recognized in the Cues Formation in the underlying Thackaringa Group. Stratiform Fe-Facies mineralized rocks dominate in the Thackaringa Group. The succession in the area is interpreted as a transgressive volcano-sedimentary sequence, probably deposited in a widening and/or deepening intracratonic rift. E.A.K.

N86-19761 New South Wales Univ., Kensington (Australia).
THE EFFECTS OF GEOLOGICAL FACTORS ON FLOODS Abstract Only
Lesmana Polo Apr. 1985 3 p
Avail: Issuing Activity

A physical based basin runoff model, BRUNO, in the form of a computer program, was devised to relate geological factors to the flow properties in the basin, and to analyze the basin response to precipitation. The model takes into account: (1) the basin's major physical structures especially river parameters; (2) the principle of morphohydrology which enables the computation of the channel width and roughness of the upstream drainage network; (3) the equation of continuity and the Manning equation, in order to integrate the stream flowing system and to calculate flow velocity in the channel. E.A.K.

N86-19762 California Inst. of Tech., Pasadena.
STUDIES OF THE CRUST: MANTLE SYSTEM BENEATH SOUTHERN CALIFORNIA Ph.D. Thesis
Eugene Drake Humphreys 1985 196 p
Avail: Univ. Microfilms Order No. DA8519543

A back-projection method of tomographic reconstruction is adapted to invert seismic travel-time data. The problems encountered in inverting these data include ray set inhomogeneity and anisotropy and the three-dimensionality of the space interrogated. Jacobi iteration, deconvolution and variable ray weighting are shown to work well in augmenting the basic back-projection method to produce a well-focused image. Applications of the various focusing algorithms are shown to have a degree of success that depends on the ray geometry used. P-wave teleseismic travel time delays recorded by the southern California array inverted with the tomographic method to obtain variations in the P-wave velocity structure to a depth of 750 km. Two major anomalies are imaged. A curtain-like E-W trending high velocity features is found directly beneath the Transverse Ranges. This feature is about 50 km in thickness, extends in depth to a maximum of about 250 km on its eastern end, and attains a maximum velocity that is about 3% greater than average mantle at the same depth beneath southern California. Dissert. Abstr.

N86-19763 California Univ., Los Angeles.
PROBLEMS IN NONLINEAR CONVECTION IN PLANAR AND SPHERICAL GEOMETRIES Ph.D. Thesis
Edward Warren Bolton 1985 205 p
Avail: Univ. Microfilms Order No. DA8519080

Nonlinear convection was investigated in both planar and spherical geometries. A new family of oscillatory instabilities was found at intermediate Prandtl numbers for plane layer convection with rigid boundary conditions. These instabilities are characterized by various numbers of hot and cold blob pairs circulating in the convective rolls. Solutions for steady, finite amplitude two dimensional convection in a layer heated from below with stress free boundaries are obtained numerically by a Galerkin method. The stability of the steady convection rolls with respect to arbitrary three dimensional infinitesimal disturbances is investigated. The study of nonlinear convection in rotating self gravitating spheres is motivated by the geodynamo problem. A Galerkin method was used to solve the nonlinear governing equations for free slip, isothermal and electrically insulating bounary conditions. The amplitude of convection and the phase velocity of the drifting columns for convection in the nonlinear regime without magnetic field are characterized for Taylor numbers up to 106 for several choices of the dominant wavenumber. Dissert. Abstr.

N86-19764 Washington Univ., Seattle.
MODELING THE INFLUENCE OF HORIZONTAL VARIATIONS IN TERRAIN AND TEMPERATURE ON THE WELL-MIXED BOUNDARY LAYER Ph.D. Thesis
John Walter Glendening 1985 302 p
Avail: Univ. Microfilms Order No. DA8521592

Horizontal variations in boundary layer (BL) properties resulting from horizontal differences in suface elevation and surface heating are investigated with a mixed-layer dynamic model, which assumes BL variables to be constant with height. Two different parameterization of the upper level pressure gradient required by a one-layer model are derived: one assumes vertically coherent response in the upper layer, the other assumes vertically propagating gravity waves. Their coefficients depend upon the horizontal length scale of the forcing. Modeling horizontal BL variations resulting from flow over a ridge confirms that the vertically coherent parameterization is not appropriate for such flow; the wavelike parameterization produces a more realistic simulation. A two-layer model produces the most realistic simulation. Analysis of the upslope flow produced by daytime heating of an inclined surface yields its dependence upon surface heat flux, slope angle, BL depth, and upper layer lapse rate. Dissert. Abstr.

N86-19765 California Inst. of Tech., Pasadena.
METHODS OF MULTIPARAMETER INVERSION OF SEISMIC DATA USING THE ACOUSTIC AND ELASTIC BORN APPROXIMATIONS Ph.D. Thesis
Ronan LeBras 1985 152 p
Avail: Univ. Microfilms Order No. DA8519550

This thesis presents two different forms of the Born approximations for acoustic and elastic wavefields and discusses their application to the inversion of seismic data. The Born approximation is valid for small amplitude heterogeneities superimposed over a slowly varying background. The first method is related to frequency-wavenumber migration methods. It is shown to properly recover two independent acoustic parameters within the bandpass of the source time function of the experiment for contrasts of about 5 percent from data generated using an exact theory for flat interfaces. The independent determination of two parameters is shown to depend on the angle coverage of the medium. The second method explored is mathematically similar to iterative tomographic methods recently introduced in the geophysical literature. Its basis is an integral relation between the scattered wavefield and the medium parameters obtained after applying a far-field approximation to the first-order Born approximation. Dissert. Abstr.

N86-19766 Minnesota Univ., Minneapolis.
SEISMIC WAVE ATTENUATION IN UNCONSOLIDATED SEDIMENTS Ph.D. Thesis
Mohammed Badri 1985 537 p
Avail: Univ. Microfilms Order No. DA8519265

Several time and frequency domain processing methods were used to compute the in situ compressional wave velocity and specific dissipation function Q in water saturated unconsolidated sediments. The sediment is characterized by soft, water saturated, unconsolidated, silty sand clays with mean grain size diameter of 7.48 micrometers. Source explosive sizes ranging from 1 to 64 mg of silver azide were used to generate seismic waveforms. The computed compressional wave velocity value is observed to be in the range from 1507 to 1776 m/sec. An average Q value of 26 is obtained using the spectral amplitude ratio analysis over the frequency range 450 to 725 Hz for the five different explosive source sizes. Peak amplitude ratio measurements produced an average Q value of 123. The wide variation of the computed Q values indicates that the rise time and pulse broadening methods are probably source-dependent. This makes the spectral amplitude ratio method preferable over these two methods since it is a source independent method. The dominant attenuation mechanism is unconsolidated sediments appears to be internal friction over the frequency range 450 to 725 Hz. Dissert. Abstr.

N86-19767 Cornell Univ., Ithaca, N.Y.
RADAR INTERFEROMETER OBSERVATIONS AND THEORY OF PLASMA IRREGULARITIES IN THE AURORAL IONOSPHERE Ph.D. Thesis
Jason Fred Providakes 1985 374 p
Avail: Univ. Microfilms Order No. DA8517012

The radar interferometer technique first used at the equator in Peru is also a very powerful means for studying auroral plasma instabilities. The horizontal interferometer successfully measured the transverse vector electron drift velocities and the electric fields associated with radio aurora visual discrete auroral arcs. The interferometer observations generally show that separate echoeing regions within the scattering volume are responsible for composite spectra (e.g., type 1 and type 2 spectral features occurring simultaneously within the same spectrum). Kilometer scale (lambda approx. 50 km + or - 20 km) wave-like structures are often observed along the radar line-of-sight during intense magnetic storms (K sub p > 6). A new spectral type, referred to here as type 4 has been identified and is shown to be probably by a type 1 spectrum with an unusually larger Doppler shift from a region where the local ion acoustic speed is much larger than normal, due to enhanced electron temperature caused by anomalous plasma wave heating in the auroral electrojet. Dissert. Abstr.

N86-19768 Saint Louis Univ., Mo.
AN INVESTIGATION OF THE VERTICAL DISTRIBUTION OF TRACE CONSTITUENTS IN THE TROPOSPHERE WITH A ONE-DIMENSIONAL PHOTOCHEMICAL MODEL AND SIMPLE MODELS OF THE PLANETARY BOUNDARY LAYER Ph.D. Thesis
Thomas Albert Carney 1984 142 p

Avail: Univ. Microfilms Order No. DA8520099
This dissertation describes two separate experiments to improve the vertical transport parameterization of a one-dimensional photochemical model of the troposphere by incorporating models of boundary layer dynamics. The first experiment simulated the mid-latitude continental troposphere in summer and contrasted the conventional constant eddy-flux parameterization of tropospheric mixing to a new time- and height-dependent mixing scheme developed from proven models of boundary layer structure and dynamics. The resulting contrast in model-derived profiles suggest that proper parameterization of the diurnal cycle of mixing characteristic of continental areas is important to understanding global trace gas budgets. The second experiment simulates a remote marine tropical environment. The vertical transport parameterization considered the transport properties of shallow dispersed cumulus characteristic of the divergent trade-wind flow regions.
Dissert. Abstr.

N86-19769*# Lunar and Planetary Inst., Houston, Tex.
ARCHEAN FORELAND BASIN TECTONICS IN THE WITWATERSRAND, SOUTH AFRICA
Kevin Burke, William S. F. Kidd (State Univ. of New York, Albany), and T. M. Kusky (State Univ. of New York, Albany) 1986 62 p refs
(Grants NAG5-333; NAGw-489)
(NASA-CR-176561; NAS 1.26:176561) Avail: NTIS HC A04/MF A01 CSCL 08G
The Witwatersrand Basin of South Africa is the best-known of Archean sedimentary basins and contains some of the largest gold reserves in the world. Sediments in the basin include a lower flysch-type sequence and an upper molassic facies, both of which contain abundant silicic volcanic detritus. The strata are thicker and more proximal on the northwestern side of the basin which is, at least locally, bound by thrust faults. These features indicate that the Witwatersrand strata may have been deposited in a foreland basin and a regional geologic synthesis suggests that this basin developed initially on the cratonward side of an Andean-type arc. Remarkably similar Phanerozoic basins may be found in the southern Andes above zones of shallow subduction. It is suggested that the continental collision between the Kaapvaal and Zimbabwe Cratons at about 2.7 Ga caused further subsidence and deposition in the Witwatersrand Basin. Regional uplift during this later phase of development placed the basin on the cratonward edge of a collision-related plateau, now represented by the Limpopo Province. Similarities are seen between this phase of Witwatersrand Basin evolution and that of active basins north of the Tibetan Plateau. The geologic evidence does not agree with earlier suggestions that the Witwatersrand strata were deposited in a rift or half-graben.
E.A.K.

N86-19770# Institute of Oceanographic Sciences, Birkenhead (England).
HIGH PRECISION TIDAL GRAVITY Final Report, 1 Mar. 1984 - 28 Feb. 1985
T. F. Baker, R. J. Edge, and G. Jeffries 20 Jun. 1985 14 p
(Grant AF-AFOSR-0071-84)
(AD-A160676; AFGL-TR-85-0203) Avail: NTIS HC A02/MF A01 CSCL 08/5
This report discusses recent progress on the programme of high precision tidal gravity. The programme is now primarily concerned with the field measurement of tidal gravity and a description of present experiments and preliminary results is given. The preliminary results show that a measurement accuracy in amplitude for the principal tidal harmonics O sub 1 = and M2 of + or - 0.2 % is achievable and that phases may be determined to + or - 0.1 deg. This is approaching an order of magnitude improvement over existing measurements.
GRA

N86-19771# International Centre for Earth Tides, Brussels (Belgium).
TRANS WORLD TIDAL GRAVITY PROFILE Final Report, 1 Jan. - 31 Dec. 1984
P. Melchior 31 Dec. 1984 48 p
(Grant AF-AFOSR-0097-82)
(AD-A160723; AFGL-TR-85-0202) Avail: NTIS HC A03/MF A01 CSCL 08/5
The study analyzes 115 stations in the World Data Bank for Tidal Gravity. Under this study, 76 of these stations have been established in the equatorial and tropical regions as well as the Southern Hemisphere. This broad coverage has allowed, for the first time, for experimental determination of the Love numbers foreseen by Love (1911) and confirmed by Wahr (1981). This effect results from the flattening of the Earth and from the Coriolis force.
GRA

N86-19772# Texas Univ., Austin. Applied Research Lab.
MEASUREMENT OF COMPRESSIONAL WAVE PARAMETERS IN SATURATED SANDS Final Report, 1 Sep. 1983 - 31 Aug. 1984
R. D. Costley, Jr., A. M. Bedford, and Paul J. Vidmar 8 May 1985 51 p
(Contract N00014-83-K-0696)
(AD-A161067; ARL-TR-85-13) Avail: NTIS HC A04/MF A01 CSCL 08/13
The focus of this research was to improve the accuracy of velocity and attenuation measurements so that a definitive test of the Biot-Stoll theory could be made. The major accomplishments during this period were refining the design of transducers, improving the procedures for making accurate laboratory measurements of the velocity and attenuation of shear and compressional waves in saturated sands, and locating the sources of experimental error. Preliminary measurements of compressional wave parameters were also made as the first step in testing the Biot-Stoll theory.
GRA

N86-19773# Geological Survey, Denver, Colo.
BATHOLITHIC ROCKS OF SOUTHERN CALIFORNIA: A MODEL FOR THE PETROCHEMICAL NATURE OF THEIR SOURCE MATERIALS
A. K. Baird and A. T. Miesch 1984 44 p refs
(TI85-902207; USGS-PP-1284) Avail: NTIS HC A03/MF A01
Major-element analyses of 497 composite samples of batholithic rocks (quartz diorites, granodiorites, and quartz monzonites) from the northern Peninsular Ranges and Transverse Ranges Provinces, southern California, form basis for a mixing model that accounts for most of the compositional variation in the rocks. The compositional structure in the batholithic rocks as a group was found to be similar to that in the Sierra Nevada batholith, and indicates that four end members are sufficient to account for 85 to 97 percent of the variability in each of the eight major oxides. According to the model, the batholithic rocks formed from the mixing of basaltic and quartzofeldspathic end-member magmas, and the removal of variable proportions of plagioclase and mafic minerals, principally hornblende. Gabbroic rocks, common only in the western part of the region, could have formed from nearly uncontaminated magmas of the basaltic end member. Variations in the mixtures of basaltic and quartzofeldspathic magmas are presumed to reflect variations in their source materials at depth. According to the model, the compositions of the source materials do not vary smoothly over the region, but display a discontinuity along a line approximately coincident with the present San Jacinto fault zone. The discontinuity is roughly coincident with previously noted petrologic and isotopic discontinuites in the northern Peninsular Ranges and is interpreted as the western limit of significant contribution of continental materials to the batholithic rocks. The model gives no evidence of a discontinuity in the vicinity of the San Andreas fault zone.
Author

N86-19774# Geological Survey, Albany, N.Y.
STRUCTURAL AND TECTONIC STUDIES IN NEW YORK STATE Final Report, Jul. 1981 - Jun. 1982
Y. W. Isachsen Apr. 1985 84 p
(Contract NRC-04-74-328)
(TI85-901403; NUREG/CR-3178) Avail: NTIS HC A05/MF A01
Research was conducted during the period July 1976 to June 1982, as part of an earlier and continuing project to analyze the distribution patterns, geometry and geological history of brittle

deformation in New York State. A general background of previous work and a summary and analysis of new structural and tectonic studies undertaken towards providing a more comprehensive knowledge of regional brittle deformation in the northeast are given. Among other applications, the new data and insights obtained will provide a geological background for specialists in the fields of seismotectonic analysis and seismic risk analysis, and may contribute towards an eventual understanding of the factors that determine which geological surfaces are currently seismogenic, or likely to become seismogenic in the future. Subjects treated include the distribution, trends, exposure characteristics, aeromagnetic signatures, and detailed geometries of fracture systems, as well as tentative inferences concerning relative ages and causes of reactivation. Stress indicates are discussed, and a beginning is made at working out regional paleostress directions using the attitudes of dated mafic dikes. R.J.F.

N86-20197# Joint Publications Research Service, Arlington, Va.
DIRECTIVITY OF PROTON FLUX WITH E SUB p > 12 KeV IN LOW-LATITUDE TRANSITION REGION Abstract Only
K. Kudela, V. N. Lutsenko, N. F. Pisarenko, Y. Royko, and S. Fisher *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 92 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 317-319 Original language document was announced in IAA as A85-35248 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20203# Joint Publications Research Service, Arlington, Va.
STABILITY OF DIAMAGNETIC PLASMOID IN MAGNETOSPHERE Abstract Only
S. V. Leontyev, V. B. Lyatskiy, and A. A. Khrushchinskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 96-97 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 100-105 Original language document was announced in IAA as A85-28491 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20204# Joint Publications Research Service, Arlington, Va.
ENERGY DISTRIBUTIONS OF PROTONS WITH 0.05 < OR = E < OR = 50 MeV IN EARTH'S RADIATION Abstract Only
M. I. Panasyuk and E. N. Sosnovets *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 97-98 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 106-112 Original language document was announced in IAA as A85-28492 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20207# Joint Publications Research Service, Arlington, Va.
O+-He AND H+-He MEAN COLLISION FREQUENCIES FOR IONOSPHERIC RESEARCH Abstract Only
A. V. Pavlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 99-100 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 143-147 Original language document was announced in IAA as A85-28496 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20213# Joint Publications Research Service, Arlington, Va.
MODELING CHARGED PARTICLE FLUXES ALONG SPACE VEHICLE FLIGHT TRAJECTORIES IN EARTH'S RADIATION BELTS Abstract Only
O. I. Savun and B. Yu. Yushkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 104 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta, Seriya 3: Fizika, Astronomiya (Moscow, USSR), v. 26, no. 1, Jan. - Feb. 1985 p 3-8 Original language document was announced in IAA as A85-36596 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20251# Joint Publications Research Service, Arlington, Va.
METHODS FOR STUDYING RECENT TECTONICS USING MATERIALS FROM REMOTE AND SURFACE DATA Abstract Only
A. A. Freydlin, Ye. G. Farrakhov, and L. F. Volchegurskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 147-148 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 32-38 Original language document was announced in IAA as A85-29904 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-19775 Illinois Univ., Urbana-Champaign.
A CUMULUS PARAMETERIZATION STUDY WITH SPECIAL ATTENTION TO THE ARAKAWA-SCHUBERT SCHEME Ph.D. Thesis
Chih-Yue Jim Kao 1985 222 p
Avail: Univ. Microfilms Order No. DA8521797

Arakawa and Schubert (1974) developed a cumulus parameterization scheme in a framework that conceptually divides the mutual interaction of the cumulus convection and large-scale disturbance into the categories of large-scale budget requirements and the quasi-equilibrium assumption of cloud work function. The A-S scheme was applied through a semi-prognostic approach to two different data sets: one is for an intense tropical cloud band event; the other is for tropical composite easterly wave disturbances. It is found that the Arakawa-Schubert scheme underestimates both condensation and evaporation rates substantially when compared with the cumulus ensemble model results. In order to examine how the Arakawa-Schubert scheme works in a fully prognostic problem, a simulation of the evolution and structure of the tropical cloud band, mentioned above, under the influence of an imposed large-scale low-level forcing has been made, using a two-dimensional hydrostatic model with the inclusion of the Arakawa-Schubert scheme. Dissert. Abstr.

N86-19776 California Univ., Los Angeles.
NUMERICAL SIMULATION OF TROPICAL CUMULUS CLOUDS AND THEIR INTERACTION WITH THE SUBCLOUD LAYER Ph.D. Thesis
Steven Keith Krueger 1985 233 p
Avail: Univ. Microfilms Order No. DA8519119

A two-dimensional numerical model suitable for simulation in ensemble of cumulus clouds has been developed. The model is similar to one developed by Soong and Ogura (1980), but has greater emphasis on turbulent processes. In the model, cloud-scale dynamics are coupled with a third-moment turbulence closure model. A turbulence-scale condensation scheme is used to parameterize the cloud water mixing ratio. The computation domain is 30 km long and 15 km high. The horizontal grid size is 1 km, while the vertical grid size ranges from 100 m in the lowest layer to about 1 km in the uppermost. The cyclic boundary conditions was used at the lateral boundaries. Two simulations were performed: one with upward large-scale vertical velocity (the disturbed case), and one without any (the undisturbed case), but otherwise identical. Deep cumulus clouds formed in the disturbed case, but only shallow clouds formed in the undisturbed case. Dissert. Abstr.

N86-19777 California Univ., Los Angeles.
A CLOUD TUNNEL STUDY ON THE RIMING OF SNOWFLAKES AND A THEORETICAL INVESTIGATION ON THE CAPTURE EFFICIENCY OF ICE CRYSTALS BY LARGE CLOUD DROPS Ph.D. Thesis
Jeffrey Kevin Lew 1985 346 p
Avail: Univ. Microfilms Order No. DA8519122

A theoretical model has been formulated to study the trajectories and collision efficiencies of small columnar and plate-like ice crystals as they pass relatively large supercooled cloud drops.

The model is similar to the one used by Grover (1980) and uses hydrodynamic and gravity effects to determine the trajectories. Cloud drops of radii 416 to 591 micrometer corresponding to Reynolds numbers 200 to 400 at 900 mb and -6 C were used in the columnar crystal computations and drops of radii 530 to 760 micrometer corresponding to the same Reynolds numbers at 400 mb and -12 C were used in the plate-like crystal computations. In each case, the ice crystals were assumed to take three typical orientations as they passed the drop. It is found that for typical sizes and length-to-width ratios of column crystals in the atmosphere, and for plate-like crystals over 40 micrometer diameter, the collision efficiency ranges from 0.8 to 1.0. For these particular ice crystals, the orientation does not appear to be as important as the crystal mass in determining the collision efficiency.
Dissert. Abstr.

N86-19778 Purdue Univ., West Lafayette, Ind.
A SIMULATION OF THE CANOPY MICROENVIRONMENT USING HIGHER ORDER CLOSURE PRINCIPLES Ph.D. Thesis
Tilden Payne Meyers 1985 170 p
Avail: Univ. Microfilms Order No. DA8520049

The deficiencies of gradient diffusion theory to model turbulent transport in the plant canopy are becoming widely recognized although both modeling and experimental efforts still rely heavily upon these concepts. Recently, second order closure models have been used to successfully simulate the profiles of the mean wind speed, tangential stress and turbulent kinetic energy within a canopy. Problems with parameterizing the third order transport term for the tangential stress have been noted. In addition, second order closure models have only been applied to a few types of canopy structures and further testing is needed. A third order closure model has been developed to simulate airflow in a vegetative canopy for neutral conditions. The model contains simplified equations for the third order terms, bypassing the need to parameterize them as is done in second order closure. The model has been applied to a maize, soybean, wheat, orange, bean and sitka spruce canopy. The simulated mean wind profiles compared favorably with measurements. Dissert. Abstr.

N86-19779 Miami Univ., Coral Gables, Fla.
EFFECT OF FOSSIL FUELS AND INTRODUCTION OF HYDROGEN ON EARTH'S TEMPERATURE Ph.D. Thesis
Ilker Gurkan 1985 154 p
Avail: Univ. Microfilms Order No. DA8519211

The GREENHOUSE THEORY says that increase in CO_2 will warm the Earth. That means certain greenhouse gases (particularly CO_2) in the atmosphere allow the Sun's ultraviolet and visible radiation to penetrate and warm the Earth, but then absorb the infrared energy the Earth radiates back into the atmosphere. By blocking the escape of this radiation, these gases effectively form a thermal blanket around the Earth. To rebalance the incoming and outgoing radiation, the Earth's temperature must increase. A computer model has been developed to calculate the effect of atmospheric CO_2 concentration and introduction of hydrogen on the Earth's mean temperature. The results were checked with the historical data. After the validity of the model had been established, the computer program was run for the years 1985 through 2100 to estimate the atmospheric CO_2 concentrations and the Earth's mean temperature. Atmospheric CO_2 concentration increases with the increase of fossil fuel consumption. Dissert. Abstr.

N86-19780*# Cologne Univ. (West Germany). Inst. for Geophysics and Meteorology.
MAPPING THE DOWNWELLING ATMOSPHERIC RADIATION AT THE EARTH'S SURFACE: A RESEARCH STRATEGY
E. Raschke Feb. 1986 23 p refs
(NASA-CR-178054; L-85614B; NAS 1.26:178054) Avail: NTIS HC A02/MF A01 CSCL 04B

A strategy is presented along with background material for determining downward atmospheric radiation at the Earth's surface on a regional scale but over the entire globe, using available information on the temperature and humidity of the air near the ground and at cloud base altitudes. Most of these parameters can be inferred from satellite radiance measurements. Careful validation of the derived radiances will be required using ground-based direct measurements of radiances, to avoid systematic biases of these derived field quantities. Author

N86-19781*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DOCUMENTATION OF THE GODDARD LABORATORY FOR ATMOSPHERES FOURTH-ORDER TWO-LAYER SHALLOW WATER MODEL
Lawrence L. Takacs, comp. Feb. 1986 83 p refs
(NASA-TM-86227; Rept-85B0505; NAS 1.15:86227) Avail: NTIS HC A05/MF A01 CSCL 04B

The theory and numerical treatment used in the 2-level GLA fourth-order shallow water model are described. This model was designed to emulate the horizontal finite differences used by the GLA Fourth-Order General Circulation Model (Kalnay et al., 1983) in addition to its grid structure, form of high-latitude and global filtering, and time-integration schemes. A user's guide is also provided instructing the user on how to create initial conditions, execute the model, and post-process the data history. Author

N86-19782# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: RAMSTEIN AB (WEST GERMANY) Data Summary Report, Jan. 1974 - Dec. 1983
May 1985 413 p
(AD-A159634; USAFETAC/DS-85/015) Avail: NTIS HC A18/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Ramstein AB, West Germany, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19783# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A-F: VANDENBERG AFB, CALIFORNIA Data Summary Report, Jan. 1975 - Dec. 1984
Jun. 1985 258 p
(AD-A159635; USAFETAC/DS-85/020) Avail: NTIS HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Vandbenberg AFB, California, is discussed. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. SEE USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-19784# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: WRIGHT-PATTERSON AFB, OHIO Data Summary Report, Jun. - May 1985
Sep. 1985 307 p
(AD-A159636; USAFETAC/DS-85/050) Avail: NTIS HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations climatology for Wright-Patterson AFB, Ohio, consists of: PART

A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19785# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A-F: MCENTIRE ANGB, SOUTH CAROLINA-COLUMBIA Data Summary Report, Jun. 1974 - May 1984
Dec. 1984 366 p
(AD-A159637; USAFETAC/DS-84/041) Avail: NTIS
HC A16/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for McEntire ANGB, South Carolina, is discussed. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-19786# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: REESE AFB, TEXAS Data Summary Report, Mar. 1975 - Feb. 1985
Jul. 1985 483 p
(AD-A159638; USAFETAC/DS-85/028) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Reese AFB, Texas, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19787# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A-F: HAO ISLAND, SOUTH PACIFIC Data Summary Report, Jun. - May 1985
Sep. 1985 261 p
(AD-A159639; USAFETAC/DS-85/045) Avail: NTIS
HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Hao Island, South Pacific, is discussed. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. (Author). GRA

N86-19788# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: WATERTOWN, NEW YORK Data Summary Report, Jan. 1974 - Dec. 1983
Oct. 1984 471 p
(AD-A159640; USAFETAC/DS-84/035) Avail: NTIS
HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Watertown, New York, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19789# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A-F: FORT DEVENS AAF, MASSACHUSETTS Data Summary Report, Aug. 1974 - Jul. 1984
Jul. 1985 292 p
(AD-A159641; USAFETAC/DS-85/027) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Fort Devens Army Air Field, Massachusetts, is discussed. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-19790# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: POPE AFB, NORTH CAROLINA Data Summary Report, Dec. 1973 - Nov. 1983
Mar. 1985 469 p
(AD-A159642; USAFETAC/DS-85/008) Avail: NTIS
HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Pope AFB, North Carolina, consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19791# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
ATSUGI NAS, JAPAN. LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PART A, C-F Data Summary Report, Jan. 1974 - Dec. 1983
Feb. 1985 401 p
(AD-A159684; AD-E801193; USAFETAC/DS-85/006) Avail: NTIS
HC A18/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Atsugi NAS, Japan, is discussed. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week.

The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-19792# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
EDWARDS AFB, CALIFORNIA. LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F Data Summary Report, Sep. 1974 - Aug. 1984
Dec. 1984 340 p
(AD-A159688; USAFETAC/DS-84/039) Avail: NTIS
HC A15/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Edwards AFB, California, is discussed. This summary is similiar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; Part C, Surface Winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that Part B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N86-19793# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: SUWON AB, SOUTH KOREA Data Summary Report, Jan. 1974 - Dec. 1983
Nov. 1984 315 p
(AD-A159689; USAFETAC/DS-84/040) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Suwon AB, South Korea, consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19794# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: GRIFFISS AFB, NEW YORK Data Summary Report, Jul. 1974 - Jun. 1984
Jan. 1985 478 p
(AD-A159690; USAFETAC/DS-85/001) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Griffiss AFB, New York, consists of: PART A: Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; Part D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N86-19795# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: FORT SILL, OKLAHOMA Data Summary Report, Apr. 1975 - Mar. 1985
Aug. 1985 491 p
(AD-A159699; USAFETAC/DS-85/043) Avail: NTIS
HC A21/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Fort Sill, Oklahoma, consists of the following parts: (1) Weather Conditions and Atmospheric Phenomena; (2) Precipitation; (3) Surface Winds; (4) Ceiling and Visibility; (5) Psychrometric Summaries; and (6) Pressure Summaries. Data in this report are presented in tabular form, in most cases in percentage frequency of occurence or cumulative percentage frequency of occuring tables. Author (GRA)

N86-19796# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: FAIRCHILD AFB, WASHINGTON Data Summary Report, Jun. 1975 - May 1985
Sep. 1985 305 p
(AD-A159700; USAFETAC/DS-85/051) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Fairchild AFB, Washington, consists of the following parts: (1) Weather Conditions and Atmospheric Phenomena; (2) Precipitation; (3) Surface Winds; (4) Ceiling and Visibility; (5) Psychrometric Summaries; and (6) Pressure Summaries. Data in this report are presented in tabular form, in most cases in percentage frequency of occurence or cumulative percentage frequency of occuring tables. Author (GRA)

N86-19797# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: MACKALL AAF, NORTH CAROLINA Data Summary Report, Dec. 1973 - Nov. 1983
Mar. 1985 472 p
(AD-A159701; USAFETAC/DS-85/010) Avail: NTIS
HC A20/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Mackal AAF (Pope AFB), North Carolina, consists of the following parts: (1) Weather Conditions and Atmospheric Phenomena; (2) Precipitation; (3) Surface Winds; (4) Ceiling and Visibility; (5) Psychrometric Summaries; and (6) Pressure Summaries. Data in this report are presented in tabular form, in most cases in percentage frequency of occurence or cumulative percentage frequency of occuring tables. Author (GRA)

N86-19798# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: JOHNSTON ISLAND Data Summary Report, Jan. 1974 - Dec. 1983
Jan. 1985 413 p
(AD-A159702; USAFETAC/DS-85/002) Avail: NTIS
HC A18/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observation climatology for Johnston Island, consists of the following parts: (1) Weather Conditions and Atmospheric Phenomena; (2) Precipitation; (3) Surface Winds; (4) Ceiling and Visibility; (5) Psychrometric Summaries; and (6) Pressure Summaries. Data is presented in tabular form, in most cases in percentage frequency of occurence or cumulative percentage frequency of occurring tables. Author (GRA)

N86-19799# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
CLIMATOLOGICAL ATLAS FOR IRAQ Data Summary Report, 1923 - 1956
Apr. 1985 222 p
(AD-A159703; USAFETAC/DS-85/011) Avail: NTIS
HC A10/MF A01 CSCL 04/2

A climatological atlas for Iraq that provides, in graphic and chart form, a relatively fast and simple look at the weather and climate of the Republic of Iraq. Periods of record vary; although

some data begins with 1923, most record periods begin with the mid-1930's. All data ends with 1956. Elements chronicled are precipitation, temperature, humidity, pressure, cloudiness, dust, fog, thunderstorm, and wind. Author (GRA)

N86-19800# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A CASE STUDY OF A MID-ATLANTIC COASTAL FRONT M.S. Thesis
J. T. Kroll 1985 100 p
(AD-A160828; AFIT/CI/NR-85-135T) Avail: NTIS HC A05/MF A01 CSCL 04/1

A unique case of mid-Atlantic coastal frontogenesis on December 21 and 22, 1983 is examined to determine the evolution of the three dimensional structure of this mesoscale phenomena. Analysis of synoptic and mesoscale surface maps suggest a coastal front which moves steadily inland. However, review of temperature and wind profiles at individual stations reveals that frontogenesis actually occurs over the land in North Carolina and southern Virginia. Lagrangian and Eulerian frontogenesis process is found to be largely a result of the ageostropic flow within the cold wedge which results in weak cold air advection over the land. This northerly flow combines with a strong southerly flow over the Atlantic to increase the temperature gradient near the coastline. Analysis of kinematic variables indicates regions of relatively strong convergence and cyclonic vorticity in the region of the coastal front. Precipitation analyses identify the cold air side of the coastal front as favorable for enhanced precipitation. Relationships between precipitation bands and convective instability are also discussed. GRA

N86-19801# Naval Postgraduate School, Monterey, Calif.
A COMPARISON OF SIX VERTICAL DISCRETIZATION SCHEMES M.S. Thesis
Mary S. Jordan Sep. 1985 175 p
(AD-A161049) Avail: NTIS HC A08/MF A01 CSCL 12/1

Six vertical discretization schemes are compared for a linear, baroclinic, vorticity-divergence equation model in this thesis. Variables for the atmospheric prediction model are defined for two staggered and one unstaggered grids. A finite difference and a Galerkin finite element approximation are formulated for each of the three grids. The models are tested in three experiments. The largest difference between the grids occurs in the mid-atmosphere diabatic heat source experiment and the unstaggered grid provides the best results. For the staggered grids, the results of the finite element models are not more accurate than the corresponding finite difference results. Oscillations occur in the temperature profiles near the surface for both staggered finite element models. Results of Rossby wave, Mountain topography, and diabatic heating experiments are presented. GRA

N86-19802# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF THE ATMOSPHERIC BOUNDARY LAYER OVER THE ARCTIC OCEAN USING SODAR (SOUND DETECTION AND RANGING) M.S. Thesis
Etienne deRouge Sep. 1985 80 p
(AD-A161057) Avail: NTIS HC A05/MF A01 CSCL 04/1

An attempt to describe the atmospheric boundary layer during the (Marginal Ice Zone Experiment) MIZEX 84 from 11 July to 17 July was made using a sodar system. The computation of the temperature structure parameter CT2 in the surface layer using in situ measurements allowed the calibration of the system. A program was developed to obtain the inversion layer height Zi, where the signal reaches a maximum. The thickness of the inversion layer was also computed and was used with the calibration law to compute CT(2) at the inversion layer. Refractive trapping conditions were evident on 15 July although the generally small value of the heat flux did not indicate a strongly unstable boundary layer. Comparison with two radiosonde profiles shows good agreement in one case. It is the purpose of this thesis to calibrate the sodar system deployed by the research vessel POLAR QUEEN during MIZEX 84 to obtain the refractive-index structure parameter. The time-height structure of the boundary layer will also be investigated. Efforts will also be made to compute the height of the inversion layer and to estimate its thickness, the jump of potential temperature, and the refractive-index gradient. GRA

N86-19803# Naval Postgraduate School, Monterey, Calif.
NUMERICAL SIMULATION OF COLD SURGES M.S. Thesis
Nancy E. Harris Sep. 1985 81 p
(AD-A161133) Avail: NTIS HC A05/MF A01 CSCL 04/2

A global, six-level primitive equation model was numerically integrated to examine the interaction of a planetary wave with a growing mid-latitude baroclinic wave. The purpose of this study was to determine the contribution of the baroclinic wave to the initiation of a monsoon surge. Three experiments were run. Experiment 1 depicted the effect of the planetary wave on the southward migration of cold air. The cyclogenesis of a mid-latitude baroclinic wave was shown in Experiment 2. Experiment 3 combined the growing baroclinic wave with the stable planetary wave in an attempt to simulate a cold surge. Characteristics of a monsoon surge were present in the numerical simulation but not to the extent or detail of observed surges. The results indicated the important role of planetary wave advections in the formation of cold surges. GRA

N86-19804# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
EFFECTS OF MOUNTAIN RANGES ON MESOSCALE SYSTEMS DEVELOPMENT Final Report, 15 Apr. 1982 - 31 Jul. 1985
Elmar R. Reiter, John D. Sheaffer, Marjorie A. Klitch, and Ray L. McAnelly Sep. 1985 191 p
(Grant AF-AFOSR-0162-82)
(AD-A161136; AFOSR-85-0924TR) Avail: NTIS HC A09/MF A01 CSCL 04/2

Synoptic studies addressed themselves to a moisture bridge over Central America which often is tied to severe weather in the Rocky Mountain area. Heavy flooding events over eastern China have been tied to preferred positions of blocking highs and to vortices developing over the Plateau of Tibet. Mesoscale convective systems over, and to the east of, the U.S. Rocky Mountains have been investigated by individual case studies as well as by satellite composite imagery. There appears to be a well-defined sequence of events, whereby first the average precipitation rate maximizes, then the volumetric rain rate, and finally the rain area. Appendices: a satellite climatology of intense convective storms from manually digitized hourly cloud cover fields; meso-beta-scale characteristics of the meso-alpha-scale convective complex; evolution of precipitation and upper air characteristics during the life-cycle of a composite mesoscale convective complex; the precipitation life cycle of mesoscale convective complexes. GRA

N86-19805# Meteorological Office, Bracknell (England). Satellite Meteorology Branch.
ERS-1 SURFACE WIND AMBIGUITY REMOVAL BY MEANS OF OBJECTIVE PROCESSING AND SUBJECTIVE HUMAN INTERVENTION Final Report
D. Offiler Aug. 1985 55 p refs Original contains color illustrations
(Contract ESA-6154/85-NL-BI)
(ESA-CR(P)-2110) Avail: NTIS HC A04/MF A01

The directional ambiguity problem in ERS-1 satellite wind scatterometer measurements is studied. The two algorithms used for objective evaluation use no data other than that produced by the satellite in one case and incorporate external data in the form of meteorological forecast fields in the other. A subjective trackerball interactive removal (STIR) algorithm is also investigated. The three algorithms are all capable of being applied to the raw ambiguous scatterometer product. Each technique has its strengths and weaknesses, which are discussed. Only if near perfect suppression is required does the subjective STIR technique need to be involved. An optimum sequence of techniques can increase the baseline skill from around 70% to > 99%. Author (ESA)

N86-19806# Royal Netherlands Meteorological Inst., De Bilt. Afdel. Dynamische Meteorologie.

FORECAST UPDATING: THEORY AND APPLICATION TO A SIMPLE MODEL
P. Lynch 1985 52 p refs
(KNMI-WR-85-4; B8570100; ISSN-0169-1651) Avail: NTIS HC A04/MF A01

The use of updating to see where an early weather forecast is going wrong, and to amend later forecasts is explained. If a forecast is analyzed into its normal modes, the error dynamics of each component are relatively simple. By making reasonable assumptions about the behavior of nonlinearities, it is possible to estimate the errors, and to amend each component separately. The components are then resynthesized to give an updated forecast. It is shown that the errors in updated forecasts can grow more slowly than errors in normal forecasts starting from the same data time. Since updating is computationally undemanding, the technique can provide short-range forecasts which are more accurate and more economical. Tests show that updated forecasts using data valid 6 or 12 hr after the initial time are more accurate than corresponding forecasts out to 48 hr after initial time. Author (ESA)

N86-19807# Royal Netherlands Meteorological Inst., De Bilt. Afdel. Dynamische Meteorologie.
SOME DATA REDUCTION PROBLEMS IN METEOROLOGY SOLVED BY MEANS OF GRAPH THEORETICAL MODELS
H. M. deJong 1985 61 p refs
(KNMI-WR-85-5; B8573312; ISSN-0169-1651) Avail: NTIS HC A04/MF A01

A plotting problem, a superobservation problem, and a profile problem in meteorology are studied using graph theory. For the superobservation problem, an algorithm which generates solutions close to the best possible solution is proposed. Superobservations are studied using the clustering observations provided by AIDS/ASDAR during three proximate flights. Profile problem graph theory applications are described using rawinsonde and aircraft meteorological observations. The method proposed leads to a 30% reduction in the number of significant levels compared to the WMO method. Similar results for the plotting and superobservation problem are obtained. Author (ESA)

N86-19808# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
WIND SHEAR INVESTIGATION PROGRAM AT THE NLR
H. Haverdings 23 Mar. 1984 52 p refs In DUTCH; ENGLISH summary Presented at Aeronautical Symposium, Delft, Netherlands, 13 Apr. 1984
(NLR-MP-84027-U; B8571447) Avail: NTIS HC A04/MF A01

Wind shear statistics were collected from wide-body aircraft equipped with an airborne integrated data acquisition system during 9000 approaches and landings. In the resulting time dependent wind profiles, wind shear occurrences were analyzed, using a statistical discrete gust method. Flight simulation studies of F-28 aircraft landings for 8 wind profiles with different wind shear types were performed to evaluate 2 wind shear detectors. During the simulation, effort ratings of three pilots for air speed control and tracking the glide path were established. The indication of flight energy deviation is preferred above indication of this magnitude expressed in change of time. Ground and on-board indicators, including apparatus using predictive remote sensing techniques were surveyed. Author (ESA)

N86-19809# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
APPLICATION OF A LAGRANGIAN DISPERSION MODEL TO ENVIRONMENTAL PROBLEMS
D. J. Gaffen, C. Benocci, and D. Olivari Aug. 1985 38 p refs
(VKI-TM-38) Avail: NTIS HC A03/MF A01

A three dimensional Lagrangian pollutant dispersal model for passive contaminants was modified to allow simulation of dispersal of heavy gases, and moist and buoyant plumes. Outputs from a two dimensional Navier-Stokes atmospheric boundary layer solver are used. Model runs were made to simulate experimental tests of gas dispersion in atmospheric surface layers. Predicted concentration fields are in accord with measurement. Model simulation of water vapor plume dispersal in the planetary boundary layer were made using field data from cooling towers. Predicted plume rise and visible plume outline are in good agreement with observations for various meteorological and source conditions. Author (ESA)

N86-19679# European Centre for Medium-Range Weather Forecasts, Reading (England).
FOUR-DIMENSIONAL DATA ASSIMILATION INTO ATMOSPHERIC GLOBAL MODELS
L. Bengtsson *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 7-17 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-20250# Joint Publications Research Service, Arlington, Va.
ANNUAL VARIATION OF CLOUD QUANTITY AND ALBEDO Abstract Only
O. Yu. Kyarner *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 147 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 17-22 Original language document was announced in IAA as A85-29902 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-19810 California Univ., San Diego.
SHOALING SURFACE GRAVITY WAVES Ph.D. Thesis
Stephen Laurence Elgar 1985 138 p
Avail: Univ. Microfilms Order No. DA8517899

Aspects of the nonlinear evolution of nonbreaking ocean surface gravity waves shoaling between 9 m and 1 m water depths are investigated. Wave group statistics predicted by several approximate linear theories are compared to numerical simulations and it is found that these theories are not generally valid for ocean data due to assumptions beyond linearity and random phase. The simulations also provide information about the variability of linear wave group statistics. The simulation technique is used to show that in 9 m depth the observed wave group statistics are not inconsistent with an underlying wave field composed of linearly superposed random waves. A unidirectional nonlinear model based on Boussinesq type equations is shown to more accurately predict the evolution between 4 and 1 m depths of energy spectra, coherence and phase speed between sensors, and wave group length than linear finite depth theory which includes the effects of the directional distribution of energy. Bispectral analysis is employed to isolate and study nonlinear interactions within a shoaling wave field. Phase coupling between the power spectral peak and higher harmonics is clearly evident. Bispectral calculations provide evidence for the execution of Fourier modes via difference as well as sum interactions in a wave field with a double-peaked spectrum. Bicoherence values indicate that surf beat motions are coupled to higher frequency modes within the power spectral peak. Dissert. Abstr.

N86-19811# Naval Postgraduate School, Monterey, Calif.
MIZLANT 81 DATA REPORT RESULTS OF AN OCEANOGRAPHIC CRUISE TO THE GREENLAND SEA, OCTOBER AND NOVEMBER 1981 Interim Report, 1 Oct. 1980 - 31 Dec. 1981
R. H. Bourke and R. Paquette Aug. 1985 78 p
(AD-A159709; NPS68-85-020) Avail: NTIS HC A05/MF A01 CSCL 08/10

This report presents plots of property profiles for each of the 122 oceanographic stations occupied by the U.S. Coast Guard Icebreaker over the continental shelf and slope waters off the east coast of Greenland in October and November 1981. A Neil Brown Mark III CTD was used to obtain temperature and salinity

profiles to the sea floor in shallow water and at least to 600 m in deeper water. In addition to temperature and salinity profiles, plots of sound speed and density (sigma-t) are shown. GRA

N86-19812# Science Applications International Corp., La Jolla, Calif.
INTEGRATED REPORT ON MECHANISMS RESPONSIBLE FOR NARROW ANGLE v-WAKES IN THE GEORGIA STRAIT EXPERIMENT Final Report
E. D. Brown Jun. 1985 30 p
(Contract N00014-83-C-0438)
(AD-A159692) Avail: NTIS HC A03/MF A01 CSCL 20/4

The Georgia Strait Experiment was designed to identify the mechanisms responsible for SAR imaging of narrow angle v-wakes. SAR overflights were coordinated with surface measurements of environmental conditions and of wave height and slope within a ship wake. Narrow v-wakes were observed by and L-band aircraft SAR with incidence angles of 20 - 50 deg, under low ambient wind conditions for all relative orientations between the SAR and ship tracks. These V-lines are a few pixels wide (approx 10 m), several kilometers in length, and approx. 17 dB above the background radar backscatter at a distance of 1 km behind the ship. Surface measurements and modeling analysis from this experiment demonstrate that these v-wakes are unrelated to ship-generated internal wave wakes. The qualitative features of L-band v-wakes are consistent with first order Bragg scattering from intermittently generated ship surface waves. This report reviews the theoretical basis and the experimental evidence supporting this mechanism. GRA

N86-19813# Naval Polar Oceanography Center, Washington, D.C.
EASTERN-WESTERN ARCTIC SEA ICE ANALYSIS, 1984
Sep. 1985 109 p
(AD-A159906; RR-11) Avail: NTIS HC A06/MF A01 CSCL 08/12

These are approximately 7-days analysis of sea ice prepared by the Naval Polar Oceanography Center, Suitland, MD. Included are ice concentration and ice thickness (age). GRA

N86-19814# Naval Polar Oceanography Center, Washington, D.C.
ANTARCTIC ICE CHARTS, 1983-1984
Sep. 1985 215 p
(AD-A159907; RR-6) Avail: NTIS HC A10/MF A01 CSCL 08/12

This publication is the sixth in a continuing bi-yearly series of Antarctic sea ice atlases prepared in the Joint Ice Center at the Naval Polar Oceanography Center, Suitland. The Atlas contains weekly charts depicting Southern Hemisphere ice conditions and extents. The information presented was prepared under operational time constraints principally from satellite imagery supplemented by conventional observations. Table 1, located on the inside back cover, summarizes satellite data availability for 1983 and 1984. GRA

N86-19815# Naval Postgraduate School, Monterey, Calif.
ON THE DETECTION OF A 40 TO 50 DAY OSCILLATION IN SEA SURFACE TEMPERATURE ALONG THE CENTRAL CALIFORNIA COAST
L. C. Breaker and P. A. W. Lewis Sep. 1985 18 p
(RR0-1405)
(AD-A160391; NPS55-85-025) Avail: NTIS HC A02/MF A01 CSCL 08/10

Previous studies of the tropical troposphere indicate the presence of a 40 to 50 day oscillation in zonal winds. Spectral analysis of sea surface temperature reveals an increase in variance between 40 and 50 days along the California coast as far south as Santa Barbara (34.4N) and at least as far north as Pt. Arena (39N). Increases in the amplitude of this oscillation at 36N generally coincide with local El Nino warming episodes. It is suggested that the 40 to 50 day oscillation in sea surface temperature off central California may be related to the 40 to 50 day oscillation in the tropical troposphere through atmospheric teleconnections between the tropics and mid-latitudes. Author (GRA)

N86-19816# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF SOUND VELOCITY VARIATION IN AN ESTUARY FOR NOS (NATIONAL OCEAN SERVICE) STANDARDS M.S. Thesis
John D. Wilder Sep. 1985 84 p
(AD-A160929; AD-F630624) Avail: NTIS HC A05/MF A01 CSCL 20/1

Investigation of oceanographic data acquired in the Columbia River estuary, which lies the states of Washington and Oregon, revealed significant variation in sound velocity with respect to time and location. National Ocean Service (NOS) standards for echo-sounder acquired soundings require the knowledge of sound velocity to within plus or minus 4 meters per second. To meet this requirement in the Columbia River estuary, methods were devised to allow prediction of sound velocity based on location and the height of tide. Confidence intervals associated with sound velocity predictions provided by regression analyses showed a substantial improvement in accuracy when compared to using a single average velocity for each location. Nevertheless, there were still some cases where the NOS requirement could not be met. GRA

N86-19817# Lee (J. S.) Associates, Inc., Arlington, Va.
OCEAN SURVEILLANCE DETECTION STUDIES. PART 1. DETECTION IN GAUSSIAN MIXTURE NOISE. PART 2. AN INVESTIGATION OF CANONICAL CORRELATION AS AN AUTOMATIC DETECTION AND BEAMFORMING TECHNIQUE Final Report, 1 Jan. - 30 Sep. 1985
Jhong S. Lee, Leonard E. Miller, Robert H. French, and Young K. Kim Oct. 1985 271 p
(Contract N00014-85-C-0091)
(AD-A160931; AD-F630624; JC-2034-N) Avail: NTIS HC A12/MF A01 CSCL 17/1

In Part I, noncoherent detection of narrowband signals in Gaussian-Gaussian mixture noise is considered. The forms of the optimum detectors are found and evaluated for single and multiple observations. These detectors are sensitive to information on the signal and noise parameters. Also evaluated are several sub-optimum detectors which perform well under certain conditions without requiring knowledge of signal and noise parameters. In Part II, a new technique for detecting signals using arrays of sensors is investigated, based on the principles of canonical correlation. The theoretical results indicate that for a sufficient number of sensors, multiple, spatially separate signals, at the same frequency can be individually detected without knowledge of sensor position or using conventional beamforming. If sensor positions are known, the algorithm supplies the direction of the signal arrivals. The limited numerical results show that a few sensors can automatically steer on and detect a single signal, but are incapable of resolving multiple signals successfully. GRA

N86-19818# Naval Postgraduate School, Monterey, Calif.
COUPLED MIXED LAYER-ACOUSTIC MODEL M.S. Thesis
John J. McManus Sep. 1985 51 p
(AD-A160952) Avail: NTIS HC A04/MF A01 CSCL 08/10

A coupled ocean mixed layer-acoustic model is evaluated in two dimensions at a line of stations in the northeast Pacific Ocean. The Oceanic Boundary Layer Model (OBL) is initialized using bathythermograph data acquired during the 1980 Storm Transfer and Response Experiment (STREX). The OBL model was used to predict a new thermal profile after integrating in time for 20 days. This was then compared with actual bathythermograph data taken 20 days later. Three cases were examined: initial, model, and final data as input to the RAYMODE acoustic model. The acoustic performance for the three cases was measured median detection range (MDR) and convergence zone range (CRZ). In the absence of strong horizontal advection, over a 20 day period the OBL can predict surface temperature to within an average of 0.5 C. Therefore the coupled models can be used effectively to help predict MDR and CZR in a tactical situation. GRA

N86-19819# Naval Postgraduate School, Monterey, Calif.
TEST AND EVALUATION OF AN IMPROVED SEA, SWELL AND

SURF PROGRAM M.S. Thesis
Michael J. Gill Sep. 1985 129 p
(AD-A161023) Avail: NTIS HC A07/MF A01 CSCL 08/3

In this thesis a sea swell and surf program is improved, tested and evaluated on a micro-computer (HP-9845B). Sea swell is calculated by a two dimensional spectral model. The energy balance equation is tested for different cases of wind velocities and water depths. Satisfactory agreement is observed between the offshore model and expected wave heights for a 15 knot wind, but the model overbuilds wave energy for a 30 know wind. Wave transformation is described by a one dimensional random wave model in which the wave heights are described using the Rayleigh distribution. The obtained solution of the random wave field is used to predict the longshore currents. An empirical formula for determining the breaker parameters is developed, based on beach slope and incident wave steepness. The improved model is tested using an undulated bathymetry to validate the model physics. The model outputs of wave height and current are compared with data acquired from a wave tank and natural beaches. The model is found to accurately forecast wave heights, breaker location, breaker type and longshore currents for several sets of conditions. Model limitations are discussed and recommendations for further improvement are made. GRA

N86-19820# Colorado School of Mines, Golden. Center for Wave Phenomena.
SELECTED RESEARCH PROGRAM OF THE OFFICE OF NAVAL RESEARCH AT THE CENTER FOR WAVE PHENOMENA, COLORADO SCHOOL OF MINES Progress Report
Norman Bleistein, Jack K. Cohen, Frank G. Hagin, and John A. DeSanto 1 Oct. 1985 49 p
(Contract N00014-84-K-0049)
(AD-A161040; CWP-037) Avail: NTIS HC A03/MF A01 CSCL 08/11

This is a progress report on the current status of the research program of the Center for Wave Phenomena at the Colorado School of Mines. There have been two major research projects in inverse scattering under the Selected Research Opportunities Program. The first of these is reflector imaging for seabed mapping and seismic exploration. The second is ocean profile inversion. (1) Our research group is committed to the practical solution of inverse problems. Sullivan's modeling technique will be used to generate synthetic data for testing of inversion algorithms. Direct modeling of this sort is also used to test the output of migration and inversion algorithms on real data. (2) The second research project studies ocean soundspeed profile inversion, in the case of a soundspeed which is dependent on depth, only. This inversion problem is fundamentally different from the seismic problem. The source(s) and receiver(s) are separated laterally while the variation being sought is a function of the vertical variable, nearly orthogonal to the ray paths of propagation of the signals. An integral equation for the perturbation of the soundspeed from a reference speed is formulated. The inversion of the integral equation actually provides a solution for n'(z) rather than for n(z). The solutions obtained to date by this method, properly locate the perturbation. However, n'(z) exhibits an overshoot of the type usually associated with Gibbs phenomenon. Methods of integration of n'(z) which minimize this affect are presently being investigated. GRA

N86-19821# Wisconsin Univ., Madison. Mathematics Research Center.
THE ASYMPTOTIC BEHAVIOUR NEAR THE CREST OF WAVES OF EXTREME FORM Technical Summary Report
J. B. McLeod Aug. 1985 10 p
(Contract DAAG29-80-C-0041)
(AD-A161064; MRC-TSR-2856) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper concerns waves of permanent form on the free surface of an ideal liquid which is in two-dimensional, irrotational motion under the action of gravity. It considers only extreme waves, often called waves of greatest heights; each of these is the end-member of a one-parameter family of waves and is distinguished from other smaller members of the family by a sharp crest. Although this corner is physically unrealistic, oceanographers have given such idealised, extreme waves a great deal of attention since Stokes postulated their existence in 1880. This paper is a contribution to the strict mathematical theory of extreme waves, which has emerged only since 1978. An asymptotic series is known that describes the flow near the crest, but it has never been proved whether the leading term in this expansion has a nonzero coefficient or not (and so whether it is in fact the leading term or not). The author shows that the coefficient is nonzero and determines its sign. The result should play a useful part in numerical computation of extreme waves. GRA

N86-19822# Naval Postgraduate School, Monterey, Calif.
DETECTION OF SHOALS IN SEASAT SYNTHETIC APERTURE RADAR IMAGERY: SELECTED CASE STUDIES M.S. Thesis
Ronald L. Dickerman Sep. 1985 142 p
(AD-A161181) Avail: NTIS HC A07/MF A01 CSCL 08/10

Ocean-going vessels have increased in size and draft in recent years, making traditional waterways too shallow and dangerous for use, and new shipping methods and increased costs require shorter transit times. Therefore, as new shipping routes are being sought, limited hydrographic survey resources must be efficiently applied. This study sought to demonstrate the feasibility of synthetic aperture radar (SAR) imagery as a tool for hydrographic presurvey planning by analyzing SAR imagery of Shelikof Strait, Alaska. Anomalous brightness patterns visible in SAR imagery were related to interactions between ocean phenomena and bathymetric features, and an analysis of wave refraction was performed using optical Fourier transform (OFT)-measured wave spectra. The study results showed surface gravity wave refraction as measured by OFT's can be used to make quantitative estimates of water depths, generally within 40% error. Also, anomalous brightness patterns visible in SAR imagery indicate possible hazards to navigation. However, the absence of an anomalous pattern does not mean a hazard is not present. Author (GRA)

N86-19823# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF THE WATERS OF THE EAST GREENLAND CURRENT Final Report, 1 Aug. 1984 - 30 Sep. 1985
Mark D. Tunnicliffe, Robert H. Bourke, and Robert Paquette Sep. 1985 138 p
(AD-A161215; NPS68-85-025) Avail: NTIS HC A07/MF A01 CSCL 08/3

A dense network of conductivity-temperature-death (CTD) measurements made over the eastern Greenland continental shelf and slope between 81 N and 75 N provided new details on the water properties and circulation on the shelf and at the adjacent East Greenland Polar Front (EGPF). The EGPF approaches the shelf break rapidly between 80 N and 78 N remaining 20 to 30 km east of it thereafter at least until 75 N. A filament of Atlantic Water (AW) was found close to the eastern side of the front which became generally cooler with decreasing latitude, suggesting that the majority of the contribution of the West Spitzbergen Current to the southward flowing Return Atlantic Current occurs north of 78 N. The portion of the shelf investigated is cut by several troughs generally oriented east-west; two of which are joined by a north-south depression west of Belgica Bank. Dynamic topography, water properties and ice movement suggest an anticyclonic surface circulation over this system of troughs and banks with AIW advecting up the troughs from the east. GRA

N86-19824# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
CTD/O2 MEASUREMENTS DURING 1982 AND 1983 AS PART OF THE EQUATORIAL OCEAN CLIMATE STUDIES (EPOCS)
L. J. Mangum and S. P. Hayes Mar. 1985 428 p refs
(PB85-239648; NOAA-DR-ERL-PMEL-13) Avail: NTIS HC A19/MF A01 CSCL 08J

During 1982 and 1983, CTD data were collected in the eastern equatorial Pacific as part of the Equatorial Pacific Ocean Climate Studies (EPOCS) program, which began its field program in 1979. Summaries of CTD data from six cruises in 1982 and 1983 are presented. The time period spans the 1982 to 1983 El Nino-

Southern Oscillation event whose effects were seen in the eastern Pacific from August 1982 through June 1983. Station locations, meteorological conditions and profiles of temperature, salinity, sigma-T, and oxygen are shown for each cast. Additionally, T-S diagrams and section plots along 95 degs. W and the equator are presented. GRA

N86-19678# Massachusetts Inst. of Tech., Cambridge.
IMPACT OF SATELLITE MEASUREMENTS ON OCEANOGRAPHIC COMPONENT OF THE WCRP
C. Wunsch *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 3-6 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19680# Royal Netherlands Meteorological Inst., De Bilt.
INTRODUCTION TO WAVE MODELS AND ASSIMILATION OF SATELLITE DATA IN WAVE MODELS
G. J. Komen *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 21-25 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19681# Meteorological Office, Bracknell (England).
ALGORITHMS FOR WIND SCATTEROMETER PROCESSING
D. Offiler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 27-31 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19682# Bundeswehr Munich Univ., Neubiberg (West Germany).
ALGORITHM FOR WIND SCATTEROMETER DATA ANALYSIS-AMBIGUITY SUPPRESSION
K. J. Schwenzfeger *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 35-36 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19683# Bremen Univ., (West Germany). Fachbereich 1.
MICROWAVE MEASUREMENTS OF THE SEA SURFACE
W. Alpers *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 41-45 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19684# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
ASSIMILATION OF MICROWAVE DATA IN ATMOSPHERIC AND WAVE MODELS
K. Hasselmann *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 47-52 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19685# Kiel Univ. (West Germany).
INTRODUCTION TO OCEAN CIRCULATION MODELS
J. Willebrand *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 63-64 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19686# Meteorological Office, Bracknell (England). Dynamical Climatology Branch.
COMMENTS ON DATA REQUIREMENTS FOR OCEAN CLIMATE STUDIES
H. Cattle *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 67-69 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19687# Paris VI Univ. (France). Lab. de Physique et Chimie de l'Hydrosphere.
ANALYSIS AND INTERPRETATION OF ALTIMETRY DATA
J.-F. Minster *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 71-72 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19688# Imperial Coll. of Science and Technology, London (England). Atmospheric Physics Group.
ALTIMETRIC OBSERVING SYSTEM SIMULATION STUDIES WITH AN EDDY RESOLVING OCEAN CIRCULATION MODEL
J. Marshall *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 73-76 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19689# Utrecht State Univ. (Netherlands). Inst. of Meteorology and Oceanography.
SEA LEVEL AND CLIMATE VARIATIONS
J. Oerlemans *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 81-85 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19690# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
SEA ICE MODELS AND REMOTE SENSING
W. D. Hibler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 87-94 refs Sponsored by Office of Naval Research and Max-Planck Institute fuer Meteorologie, Hamburg (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19691# Institute of Oceanographic Sciences, Birkenhead (England).
ACCURACY OF EXISTING OCEAN TIDE MODELS
P. L. Woodworth *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 95-98 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19692# Technical Univ. of Denmark, Lyngby.
APPLICATION OF SAR AND OTHER REMOTE SENSING DATA IN STUDIES OF THE ATMOSPHERE-OCEAN-ICE INTERACTION
P. Gudmandsen *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 107-111 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19693# National Museum of Natural History, Paris (France). Lab. d'Oceanographic Physique.
SCIENTIFIC APPLICATION OF SAR DATA TO SEA ICE STUDIES. SEA ICE MODELS
J. C. Gascard *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 113-114 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19694# Atmospheric Environment Service, Ottawa (Ontario).
SCIENTIFIC APPLICATION OF PASSIVE MICROWAVE SATELLITE DATA FOR ICE MONITORING AND RESEARCH
I. G. Rubinstein (Ph.D. Associates, North York, Ontario) and R. O. Ramseier *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 117-123 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19695# Science Research Council, Chilton (England). Rutherford Appleton Lab.
FUTURE PASSIVE MICROWAVE SATELLITE DATA FOR SEA-ICE RESEARCH
D. L. Croom *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 125-127 refs (For primary document see N86-19677

10-42)
Avail: NTIS HC A10/MF A01

N86-19698# Science Research Council, Chilton (England). Rutherford Appleton Lab.
PRECISE SST DATA FROM SATELLITES
D. T. Llewellyn-Jones *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 139-142 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19699# Istituto di Fisica dell Atmosfera, Rome (Italy).
REMOTE SENSING OF SEA SURFACE TEMPERATURE
G. Dalu and A. Viola *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 143-145 refs Sponsored by CNR (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19700# Mullard Space Science Lab., Dorking (England).
POST LAUNCH CALIBRATION AND VALIDATION OF THE ALONG TRACK SCANNING RADIOMETER (ATSR)
I. M. Mason *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 149-150 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19701# Oxford Univ. (England). Dept. of Atmospheric Physics.
FOUR-DIMENSIONAL DATA ASSIMILATION IN TOGA MODELS
D. L. T. Anderson and A. M. Moore *in* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 151-153 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19702# Science Research Council, Chilton (England). Rutherford Appleton Lab.
THE USE OF AIRBORNE MICROWAVE INSTRUMENTS TO GATHER DATA FOR THE VALIDATION OF ERS-1 WIND AND WAVE PRODUCTS
R. J. Powell *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 155-156 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19703# Institute of Oceanographic Sciences, Wormley (England).
WINDS FOR CLIMATE RESEARCH FROM THE ERS-1 AND N-ROSS SCATTEROMETERS
T. H. Guymer *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 157-159 refs (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19704# European Space Agency, Paris (France).
REVIEW OF SCIENTIFIC AND TECHNICAL WORK REQUIRED BEFORE THE LAUNCH OF ERS-1: THE VIEW OF ESA
G. Duchossois, J. Louet (ESA/ESTEC, Noordwijk, Netherlands), C. R. Francis (ESA/ESTEC, Noordwijk, Netherlands), and E. Attema (ESA/ESTEC, Noordwijk, Netherlands) *In its* The Use of Satellite Data in Climate Models Sep. 1985 p 163-173 (For primary document see N86-19677 10-42)
Avail: NTIS HC A10/MF A01

N86-19705# Meteorological Office, Bracknell (England).
WIND DIRECTION AMBIGUITY SUPPRESSION ALGORITHMS
D. Offiler *In* ESA The Use of Satellite Data in Climate Models Sep. 1985 p 175-176 refs (For primary document see N86-19677 10-42)
(Contract ESA-6154/85/NL-BI)
Avail: NTIS HC A10/MF A01

N86-20267# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF USING SATELLITE IR-INFORMATION FOR OCEANOLOGICAL RESEARCH Abstract Only
I. V. Likhachev and A. N. Michurin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 160-161 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Geologiya, Geografiya (Leningrad, USSR), no. 14, issue 2, Jun. 1985 p 93-95 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-19825# New Mexico Univ., Albuquerque. School of Medicine.
ULTRASENSITIVE DETECTION OF CHEMICAL SUBSTANCES Quarterly Report, 1 Jun. - 31 Aug. 1985
R. G. Dean 31 Aug. 1985 4 p
(Contract N00014-82-K-0680; ARPA Order 4507)
(AD-A159996) Avail: NTIS HC A02/MF A01 CSCL 06/1

In this reporting period we have continued to characterize monoclonal antibodies against AChE-DFP. We have focused attention three monoclonals of interest. These are the V-16 antibody described in our previous report and two additional antibodies designated V-18 and D11B. The V-16 antibody demonstrates higher activity against AChE-DFP conjugate than against AChE alone. The V-18 and D11B antibodies showed higher activity against AChE than against the conjugate. In addition, the D11B antibody blocks AChE enzymatic activity in the Elman assay. Further study showed that these antibodies exhibit a different response to AChE-DFP conjugates on the basis that the AChE ages or loses and isopropoxy residue. The resulting phosphate diester has a charge, at normal pH, on oxygen. GRA

N86-19826# Massachusetts Univ., Worcester. Dept. of Medicine.
POTENTIAL FOR CROSS-REACTIVE PROTECTION USING PEPTIDES AND ADJUVANTS OR CARRIER MOLECULES Annual Report, 1 May 1984 - 30 Apr. 1985
F. A. Ennis 1 Oct. 1985 8 p
(Contract N00014-83-K-0357; RR0-401)
(AD-A160360) Avail: NTIS HC A02/MF A01 CSCL 06/5

We have demonstrated that a conserved portion of the HA2 subunit on the influenza virus hemagglutinin can induce a cytotoxic T lymphocyte response. This is a major development since it raises the possibility that this type of peptide could be used to provide protection that would be cross-reactive among influenza virus strains. The peptide we used was produced in E. coli using recombinant DNA techniques for the expression of segments of influenza viral genome. The molecule which stimulates this H-2 restricted cytotoxic T lymphocyte response is a fusion protein of the HA2 subunit of H1 virus (A/PR/8/34 H1N1), and the induced lymphocytes kill target cells infected with strains of influenza A virus possessing the H1 hemagglutinin irregardless of the years isolated (e.g. 1934, 1978), the results indicate that the HA2 subunit is a candidate for cross-reactive protection because there are substantial published data indicating that influenza virus induced cytotoxic T lymphocytes (Tc) are protective in challenged recipients. GRA

N86-19827# Texas Univ., Dallas. Center for Communication Disorders.
THE EFFECT OF IMPULSE INTENSITY AND THE NUMBER OF IMPULSES ON HEARING AND COCHLEAR PATHOLOGY IN THE CHINCHILLA
James H. Patterson, Jr., Ilia M. Lomba-Gautier, and Dennis L. Curd Jun. 1985 191 p
(Contract DAMD17-80-C-0109; DA Proj. 3F1-62777-A-878)
(AD-A161230; USAARL-85-3) Avail: NTIS HC A09/MF A01 CSCL 06/19

Forty-one chinchillas, divided into seven groups, were exposed to 1, 10, or 100 noise impulses having peak intensities of

131 dB, 135 dB, 139 dB or 147 dB. Hearing thresholds were measured in each animal prior to exposure using an avoidance conditioning procedure. Threshold shifts were monitored at regular intervals over a 30 day postexposure period. A surface preparation of the cochlear sensory epithelia was performed approximately 90 days after exposure. There was generally an orderly relaxation between the amount of permanent threshold shift and the severity of exposure, and a general agreement between averaged histological data and the audiometric data. Detailed relations between temporary and permanent threshold shift, cochlear pathology, and exposure variables are discussed, as are the implications of these data to the development of exposure criteria. All tabulated individual animal data, averaged group data, and individual cochleograms are presented in Appendixes A through D. GRA

N86-19828# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
2 Jan. 1986 108 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-001) Avail: NTIS HC A06

A literature survey of life sciences, biomedical sciences, and behavioral sciences in the U.S.S.R. is presented. Some areas covered are agrotechnology, biochemistry, biophysics, biotechnology, environmental protection, epidemiology, food technology, genetics, human factors and immunology. Other areas are laser effects, medicine, microbiology, pharmacology and toxicology, physiology, public health and radiation biology. For individual titles, see N86-19829 through N86-19849.

N86-19829# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF EFFECTS OF MICROBIOLOGICAL MEANS OF PLANT PROTECTION ON ORGANISM
I. A. Ivanova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 1-9 refs Transl. into ENGLISH from Izvestiya Akademii Nauk Latviyskoy SSR (Riga, USSR), no. 6, Jun. 1985 p 76-81 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The microbiological method of combatting pests is very promising, which is explained by the ever growing interest in it in many countries. Nevertheless, before permitting the use of microbiological agents, it is necessary to thoroughly study the characteristics of microorganisms artificially introduced into the environment. Therefore, studying the effects of biological means of protecting agricultural crops on man and warm blooded animals is of scientific and practical interest. This emphasizes the importance of the correct approach to normalizing microbe preparations, which is of great importance not only from the point of view of hygiene and occupational pathology, but also of environmental protection. These effects of microorganisms on man and the environment are studied. Author

N86-19830# Joint Publications Research Service, Arlington, Va.
COMPUTER GRAPHICS EMPLOYED IN MODELING PROTEIN MOLECULES c60
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 10 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 5 Sep. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

A computer aided method for modeling the structure of molecules will become a new tool for probing the secrets of matter. The method makes it possible to produce pictures of molecules of complex protein compounds on the screen of a terminal. The computer draws any of 250 molecules, whose diagrams, consisting sometimes of many thousands of coordinates, are stored in an electronic data bank. These drawings can be rotated in all planes and enlarged or reduced; different parts of them can be isolated, and cross-sections can be shown. For great clarity, atoms are colored in contrasting shades, and halftones create a three dimensional effect. Author

N86-19831# Joint Publications Research Service, Arlington, Va.
MICELLAR ENZYMOLOGY Abstract Only
K. Martinek, A. V. Levashov, N. L. Klyachko, Yu. L. Khmelnitskiy, and I. V. Berezin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 11 Transl. into ENGLISH from Biologicheskiye Membrany (Moscow, USSR), v. 2, no. 7, Jul. 1985 p 689-695 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

In nature, enzymes function primarily in complex ensembles involving lipids, proteins, polysaccharides and other molecular components in solutions in which water is not the only dominant component. Enzyme catalysis therefore occurs in a microheterogeneous medium in which water acts as a regulator, determining the supermolecular structure of the catalytic reactor. Possible experimental methods of modeling the enzyme functions under such conditions are discussed, with particular attention given to such systems as proteolipid complexes and enzymes in organic solvents solubilized with phospholipids or detergents. The tasks of micellar enzymology are formulated and its relationship to membranology is discussed. The tasks include the study of the catalytic properties of solubilized enzymes as a function of degree of hydration; use of natural lipids as micelle forming components, allowing study of the mechanisms of regulation of lipid dependent enzymes; study of the interaction of enzymes in substrates insoluble in water; investigation of the dynamics of enzyme processes under conditions such that the substrate is distributed between water and organic solvents; study of cryoenzymatic processes occurring below the freezing point of water; and modeling of elementary biomembrane structure fragments with hydrated associations of protein and amphiphilic compound molecules. Author

N86-19832# Joint Publications Research Service, Arlington, Va.
FLUORESCENT-POLARIZATION PROPERTIES OF CHROMOPHORES OF WATER-SOLUBLE PROTEINS OF NORMAL AND CATARACTAL HUMAN LENS c52
T. V. Birich, N. I. Poznyak, N. A. Prokoshina, and S. N. Cherenkevich *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 21-24 refs Transl. into ENGLISH from Doklady Akademii Nauk BSSR (Minsk, USSR), v. 29, no. 8, Aug. 1985 p 757-759 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The fluorescent properties, including the lifetime of the excited state of the molecules and the degree of polarization of fluorescence of the water soluble proteins of the normal and cataractal human lens cortex and nucleus are studied. The water soluble fraction of the proteins of the lens cortex and nucleus obtained after homogenization in physiological solution and subsequent centrifuging at 6000 g for 20 min. was also studied. All the studies were done at room temperature. The spectral fluorescent properties including the fluorescence lifetime and polarization of water soluble cortex and nucleus proteins are found to be different in normal and cataractal human lenses. The origin of chromophores which are emitted in the visible spectral range and the modification of protein structure are associated with the formation of intra- and intermolecular covalent bonds in proteins. Author

N86-19833# Joint Publications Research Service, Arlington, Va.
ELEMENT ANALYSIS OF SCLEROTIC FORMATIONS OF MAJOR BLOOD VESSELS BY LASER MASS SPECTROMETRY Abstract Only c52
G. G. Arabidze, S. M. Burkitbayev, Yu. A. Bykovskiy, A. I. Kutsenko, I. D. Laptev, E. A. Manykin, Ye. A. Petrenko, and V. T. Timoshin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 29 Transl. into ENGLISH from Biofizika (Moscow, USSR), v. 30, no. 4, Jul. - Aug. 1985 p 655-660 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The element and isotope composition as well as changes in natural propagation of isotopes of elements in sclerotic (plaque) formations developing on the walls of the blood vessels in atherosclerosis is studied by laser mass spectrometry. Sections

of sclerotic arteries in various stages of development of atherosclerosis were studied. Before placement in the ion source chamber, the specimens were dewatered with 10% formalin solution and by exposure to various concentration of tartaric acid, then dried at 37 C and atmospheric pressure. Experiments showed that atherosclerotic plaque consists of 12 to 16 elements. The total content of isotopes of the macrocomponents was determined mathematically. Significant changes in the content of trace elements were observed in various stages of vascular damage, anomalous disorders in the natural distribution of isotopes of oxygen, silicon, magnesium and calcium were observed in various stages on the development of atherosclerosis. Author

N86-19834# Joint Publications Research Service, Arlington, Va.
CLINICO-EPIDEMIOLOGICAL CHARACTERISTICS OF Q FEVER IN CARPATHIAN FOOTHILLS c52
A. A. Sukhopyatkina, O. S. Bat, A. V. Levitskaya, and V. G. Potapova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 34-36 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, April 1985 p 80-81 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The polymorphism and relative lack of severity of the clinical course of Q fever, as well as the multiplicity of ways of its transmission, lead to a situation in which this disease can go unrecognized. In connection with this, deeper study of the characteristics of its epidemiology are making it possible to establish the presence of natural and anthropurgic foci of this infection. The epidemiological investigation of Q fever was begun in 1975 and have continued to study the infection of the population. In 1975 blood serum from 216 individuals was studied in a complement fixation test with Coxiella burnetii, with negative results. In 1976, 2.1 percent of those examined were found to have a complement-binding antibody to C, burnetti in titers of 1:10 to 1:80. It was established that in one of the rayons of the oblast there existed an active anthropurgic focus of Q fever, manifested by group illness of the personnel working on dairy farms. The source of the infection for people was cattle, and the main method of transmission of the infection was aerogenic. A higher rate of infection by Q fever was observed among workers in livestock raising farms and meat combines. Author

N86-19835# Joint Publications Research Service, Arlington, Va.
EPIDEMIOLOGICAL SUPERVISION OF POLIOMYELITIS c52
Yu. I. Vaserin, L. V. Vaserin, R. G. Vlasova, R. G. Balakireva, S. F. Zakirova, N. V. Patsuk, and N. Ya. Venediktova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 37-42 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 81-85 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The events of the last decade have shown that under conditions of mass vaccination various regions of our country record isolated cases and outbreaks of poliomyelitis. A thorough description has been made of a period of epidemic increase in the rate of poliomyelitis in Sverdlovsk in 1969 to 1972, when epidemiological, virological, and serological methods were used to establish the polio virus etiology of most of the cases of paretic diseases. Some conclusions reached because of this monitoring are: (1) under conditions of mass vaccination, sporadic cases of poliomyelitis can be observed among inoculated children; (2) development of a program of epidemiological supervision of poliomyelitis for each administrative region has been proven necessary; and (3) epidemiological supervision of poliomyelitis should provide for early and complete discovery of all cases of the infection, regardless of the severity of the illness, analysis of the quality of vaccination, and determination of the immune status of the population of children and the characteristics of circulation of polio viruses. Author

N86-19836# Joint Publications Research Service, Arlington, Va.
IMPROVING COMMERCIAL AIRCRAFT TRAINING SIMULATORS c05
V. Goryachev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 48-49 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 10 Sep. 1985 p 3 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

Studies of the use of technical means of instruction was begun in 1976. Results of this research indicated that training with simulators could take the place of flight training of crews in preparation for spring and summer flight operations. Instructions from the Ministry of Civil Aviation to this effect were issued in 1977. This change has proved effective. Effective use of comprehensive training simulators has become an important way of saving fuel. Flight training in flight schools still takes up a large portion of their time, the benefit yielded by helicopter training simulators still is not large enough, and possibilities exist for reducing unproductive flight time in a whole series of training programs for flight crews. Author

N86-19837# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF REACTOGENIC AND ANTIGENIC ACTIVITY OF CHROMATOGRAPHICALLY PURIFIED, CONCENTRATED AND INACTIVATED DRY VACCINE AGAINST TICK BORNE ENCEPHALITIS Abstract Only c52
O. V. Popov, A. A. Sumarokov, R. Ya. Shkolnik, L. B. Elbert, M. S. Vorobyeva, G. L. Krutyanskaya, A. V. Razgulyayeva, and M. N. Rasshchepkina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 51-52 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 6, Jun. 1985 p 34-39 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

It is shown that the new concentrated chromatographically-pure (CCP) vaccine against tick borne encephalitis (TBE) had moderate reactivity in doses of 0.5 and 1 ml. A direct relationship was established between the frequency and intensity of postvaccination reactions of the vaccinated individuals and the dose. The highest indices of reactivity in individuals treated with CCP vaccine were noted after the first vaccination. CCP vaccine has high antigenic activity: virus-neutralizing antibodies are found in twice vaccinated individuals in 97 to 100% and antigen agglutinations in 75 and 91% respectively. This vaccine should be used for primary vaccination against TBE using two 0.5 ml injections 6 months apart. Author

N86-19838# Joint Publications Research Service, Arlington, Va.
LIGHT INDUCED DAMAGE TO ERYTHROCYTE MEMBRANE SENSITIZED BY TETRASULFOPHENYL PORPHIN
A. V. Vorobey, T. N. Vadetskaya, G. D. Yegorova, and Ye. A. Chernitskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 54-57 refs Transl. into ENGLISH from Vestsi Akademii Navuk BSSR: Seriya Biyalahichnykh Navuk (Minsk, USSR), no. 4, Jul. - Aug. 1985 p 103-105 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

In recent times researchers have displayed a great interest in the possibility of using porphyrins for the diagnosis and photoradiation therapy of malignant neoplasmas. At the same time, there is great optimism regarding the use of hydrophilic porphyrins also. In order to devise effective methods of photoradiation therapy, it is necessary to investigate the mechanism of the photosensitized forms of cell damage. One of the basic targets of such damage is the cell membrane. The structural-functional changes in the erythrocyte membrane were studied by irradiating a suspension of erythrocyte shadows with red laser light in the presence of the hydrophilic porphyrin methyl-tetra(n-sulfophenyl)porphin. The photodamage to the lipids was determined from the accumulation of the products of their peroxidation. The photodamage to the proteins from the formation of crosslinks of the polypeptide membranes. The photodamage to the functional properties of the membrane was evaluated on the basis of the reduction of their

permeability barrier, and by the inhibition of the transportation of glucose and pyruvate. Author

N86-19839# Joint Publications Research Service, Arlington, Va.
COVALENT CROSSLINKS BETWEEN FILAMENTS IN DNA INDUCED BY LASER Abstract Only
G. B. Zavilgelskiy, G. G. Gurzadyan, and D. N. Nikogosyan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 58 Transl. into ENGLISH from Biofizika (Moscow, USSR), v. 30, no. 4, Jul. - Aug. 1985 p 568-570 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

A study was made of the formation of covalent crosslinks and local denatured sectors in DNA under the influence of picosecond pulses of UV laser radiation. The kinetics of formation of these defects were studied by a fluorescent method using acridine orange dye, which forms complexes with DNA. Radiation at 266 nm was used with a pulse repetition frequency of 0.3 Hz, pulse length 30 ps, intensity 10 to the 11th power to 10 to the 14th power W/sq m. The molecular weight of the phage C DNA used in the studies was about 4 X 10 to the 7th power daltons, diluted in the phosphate buffer pH 7.2 to a concentration of 15 micrograms/ml. The quantum yield of crosslinks is about 1.0 X .000001 over the entire range of intensities of -.1 to 10 to the 11th power W/sq m. At intensities of over 10 to the 11th power sq m. the quantum yield of crosslinks increases by an order of magnitude, to 1.0 X .00001 at 4.10 to the 13th power W/sq m. Author

N86-19840# Joint Publications Research Service, Arlington, Va.
EXHIBITS CONCERNING SPARING MEDICINE AT ZDRAVOOKHRANENIYE-85 AT MOSCOW Abstract Only c52
Ye. Ponarina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 59-60 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 3 Aug. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

Exhibits concerning sparing therapy, displayed in Moscow, are listed and described briefly. The Delta-102 relieves pain without use of other analgesics by preventing pain impulses from entering the brain and by inciting release of endorphin. Akma magnets are helpful in alleviating migraine, toothache, sciatica, insomnia and can be used to assist efforts to stop smoking. The patients themselves fasten the magnets to acupuncture points. The Ritm EKG device takes readings from 64 points rather than the usual six and the data obtained are processed and displayed automatically. The comprehensive, automatic, republic system for mass physical examinations Kasmon employs electronic devices to allow one physician and 10 nurses to examine 13,000 patients. The Kardiolayn device can be used to monitor physical parameters of patients after release by their physician. Other exhibits demonstrated surgical procedures employed to perform unique eye surgery procedures, the use of plasma jet scalpels and a method of kidney stone treatment by shock waves in which the patient is subjected to shock waves after precise location of the stone and immersion in water. Author

N86-19841# Joint Publications Research Service, Arlington, Va.
MAGNETS AND SURGICAL PROCEDURES c52
V. Sarelyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 62-63 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 23 Aug. 1985 p 3 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The work of physicists, who are creating miniature magnets with great magnetic force, has permitted the widespread use of magnets in surgery. The development and introduction into clinical practice of new operations for diseases of the gastrointestinal tract and malformations of the thorax using original magnetic and mechanical systems is discussed. A multitude of different magnetic structures were specifically created for various operations. A new direction in surgery has been established. Some 5000 operations have been performed with very positive results. Author

N86-19842# Joint Publications Research Service, Arlington, Va.
MAGNETOCARDIOGRAPHY c35
A. Ruvinskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 64-67 Transl. into ENGLISH from Leninskoye Znamya (Moscow, USSR), 21 Jul. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

Electrocardiograms and magnetocardiograms of ill and apparently well patients were made and studied. The result of the studies fully confirmed the hypothesis of the scientists: the electro and magnetocardiograms differed significantly. Whereas the electrical portrait of the heart excited no suspicion the magnetic called attention to itself: the patient had latent pathologies. Magnetic fields are much less susceptible to distortions than are electrical signals. But magnetic diagnostics is distinguished not only by more complete and exact information. The new method is a noncontact technique--it is not necessary to apply a lot of sensors to the body of the patient and attach them there, as is the case with electrocardiography. There is a significant time savings for mass examination of patients. The method is absolutely harmless--it does not subject the person to any action and there are no adverse responses. Magnetocardiography can be used to investigate the function of the heart of a patient even if encased in plaster: the magnetic field knows no barriers. Author

N86-19843# Joint Publications Research Service, Arlington, Va.
THERMOVISUAL INDICATORS OF BRAIN RESPONSE TO VISUAL STIMULI Abstract Only c52
I. A. Shevelev, Ye. N. Tsykalov, A. M. Gorbach, K. P. Budko, and G. A. Sharayev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 75 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 538-543 Original language document was announced in IAA as A86-10695 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

A noninvasive thermovisual method was used to detect thermal reaction in the occitoparietal area of human brain cortex to stimulation of the eye with light from a photostimulator. The temporal, spatial, and temperature characteristics of the thermal effect were obtained by use of the AGA-780 thermovisor connected to a computer system. Possible mechanisms of the interrelationship between the visual stimuli and the thermal reaction of the human brain are discussed. I.S.

N86-19844# Joint Publications Research Service, Arlington, Va.
NEURONAL RESPONSE AND EVOKED POTENTIALS IN SUBCORTICAL FORMATIONS IN VISUAL PERCEPTION. PART 1: PROBLEM FORMULATION AND PRINCIPLES OF SOLUTION Abstract Only c52
Yu. D. Kropotov and V. A. Ponomarev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 75-76 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 563-575 Original language document was announced in IAA as A86-10696 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The problems of study the neurophysiological processes taking place during visual perception are discussed, including the methods used and the results obtained. The effects of visual stimuli on neuronal impulses and evoked potentials were registered in patients during functional diagnoses with the use of implanted electrodes. It was demonstrated that the processes of visual perception induce neuronal activity in the nuclei of the thalamus and striopallidal system. The nature of these reactions depends on the type of activity initiated by the visual stimuli. A system of psychological tests is proposed for the analysis of characteristic responses in the human brain to somatosensory features of visual stimuli. I.S.

N86-19845# Joint Publications Research Service, Arlington, Va.
RESPIRATORY FUNCTION IN INHABITANTS OF NORTH-EASTERN USSR Abstract Only
L. N. Matveyev, A. G. Marachev, A. N. Kozin, S. A. Kharkov, and I. Z. Sheres *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 77-78 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 634-640 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

Respiratory function analysis was conducted on 246 inhabitants of northeastern USSR with a mean stay of 9.40 + or - 0.43 years in the region, and 90 newcomers to the area from Moscow. The study groups consisted of both men and women with an average age for the cohort of 31.4 + or - 0.51 years. The long term residents of the Northeast presented with inferior pulmonary function status in comparison with the newcomers, the deterioration consisting predominantly of inferior gas-exchange parameters and reduction by a third in pulmonary reserve. Maximum gas exchange after 15 years in the northeast was reduced by 45.4% below that seen for the newcomers, and by 27.6% in comparison with immigrants with a 5 year stay. The corresponding reductions in the pulmonary reserve capacity were 45.4 and 20.3%, respectively. The morphological basis of respiratory deterioration in the long term residents of the Soviet northeast was ascribed to marked hypertrophy and hyperplasia of the seromucous glands and the increase in the percentage of goblet cells. Author

N86-19846# Joint Publications Research Service, Arlington, Va.
EFFECTS OF 24 h SLEEP DEPRIVATION ON BIOGENIC AMINE METABOLISM Abstract Only c52
T. D. Bolshskova, S. A. Meshcheryakova, V. F. Tyabenkova, N. I. Romanova, Ya. I. Levin, and I. G. Dallakyan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 78-79 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 652-656 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

An analysis was conducted on the effects of 24 h sleep deprivation on the metabolism of catecholamines, histamine and serotonin and the completion of recovery after a night's sleep. Measurements of the blood and urine levels of the metabolites in question were conducted on ten healthy males ranging in age from 22 to 27 years. Sleep deprivation of the specified duration resulted in enhanced production and secretion of the biogenic amines, as evidence by elevated urinary levels. In addition, psychological tests during that time showed a positive correlation between changes in the metabolism of the biogenic amines and behavioral performance. Comparison of blood and urine levels demonstrated that the latter status provided a more reliable indication of histamine status. It was also noteworthy that serotonin levels were most refractory to recovery after sleep deprivation, and the connection between depressed levels of serotonin and mental depression after repeated bouts of sleeplessness appears to establish a direct metabolic relationship. Author

N86-19847# Joint Publications Research Service, Arlington, Va.
VISUAL FORM PERCEPTION FROM HALFTONE IMAGES Abstract Only c52
A. M. Kuperman and A. B. Kravtsov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 79 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 687-689 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

Two subjects were employed in an experiment designed to test visual form perception from halftone images and evaluate the importance of orientation selective mechanisms in this function. Analysis of the resultant data indicated that the threshold time limit for perception of the volume parameter from halftone images is on the order of 70 to 180 msec, and depends on the mutual orientation of the test and masking meshwork stimuli to one another. The latency increases with orthogonal orientation. The data were interpreted to indicate that orientational and spatial frequency selective mechanisms are involved in surface form perception from halftone images. These mechanisms can be differentiated into local factors involving evaluation of intensity gradient of the test image, i.e., orientation of the normal to the surface, and nonlocal factors concerned with analysis of contour boundary characteristics. Author

N86-19848# Joint Publications Research Service, Arlington, Va.
PROBLEM OF BIOLOGICAL CLOCKS: NEW DATA ON CIRCADIAN CHANGES IN STATUS OF HUMAN ORGANISM Abstract Only c52
L. Ya. Glybin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 80 Transl. into ENGLISH from Biofizika (Moscow, USSR), v. 30, no. 4, Jul. - Aug. 1985 p 717-720 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

A possible biochemical mechanism has been suggested for endogenous intracellular clocks, suggesting that the biological clock is not a simple two phase day and night clock, but rather a more complex sequence of circadian changes. Results are summarized in a statistical analysis of the circadian rhythm of processes of morbidity, childbirth, domestic injury, traffic accidents and death due to certain diseases. The major result is that various physiological indices of the human body change during the course of the day in a quite complex manner with a regular sequence of phases of increased and decreased intensity of the processes studied. The picture was found to be the same in terms of local time regardless of season of year, latitude or location. Five periods of elevated physiological tone were observed (at 5-6, 11-12, 16-17, 20-21 and 24-1 o'clock) with an equal number of decreases (at 2-3, 9-10, 14-15, 18-19 and 22-23 o'clock). Author

N86-19849# Joint Publications Research Service, Arlington, Va.
ENHANCEMENT OF SOMNIFEROUS EFFECTS OF THERMAL PULSATION BY SIMULTANEOUS APPLICATION TO TWO REFLEXOGENIC ZONES Abstract Only c52
V. A. Likhtenshteyn and T. M. Mugutdinov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (PRS-UBB-86-001) 2 Jan. 1986 p 80 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 689-691 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

The somniferous effectiveness of simultaneous application of thermal pulses of two reflexogenic zones was tested on 33 healthy young adults, and compared with the results obtained when only the standard zone (nasolabial) or an adjunct zone (paraumbilical abdominal area) were stimulated. Depth of induced sleep was monitored by EEG. The results demonstrated that sleep induction was most effective when the two zones were simultaneously activated by thermal pulses, with 78.8% of the subjects reaching stage 2 sleep in 9.1 min on the average. In this mode only 6.1% of the subjects failed to respond. Stimulation of only the primary nasolabial zone resulted in 60.7% of the subjects entering stage 2 sleep in 12.7 min, while 15.1% failed to respond at all. Stimulation of the paraumbilical alone was least effective, with 36.3% of the subjects failing to respond and only 20.6% reaching stage 2 in 16.8 min. Author

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-19850* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING

BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 281)
Feb. 1986 60 p
(NASA-SP-7011(281); NAS 1.21:7011(281)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 153 reports, articles, and other documents introduced into the NASA scientific and technical information system in January 1986. Author

N86-19851 Marquette Univ., Milwaukee, Wis.
MUSCLE FATIGUE: PHYSIOLOGICAL AND BIOCHEMICAL STUDIES Ph.D. Thesis
John Patrick Troup 1985 139 p
Avail: Univ. Microfilms Order No. DA8516286

The purpose of this study was to examine the etiology of muscle fatigue in fast and slow skeletal muscles giving particular interest to the relationship of H + ion and muscle contractile properties. A further objective as to evaluate to what extent endurance and spring exercise training protects against the development of fatigue. Endurance exercise involved running 1.2 mph at a 15% grade 2 hours per day, 5 days per week for 10 weeks. The spring training program consisted of 6 sprints of 4.5 minute duration at 40 m.min-1 and 15% slope with 2.5 minute rest intervals performanced 5 days per week for six weeks. Muscle fatigue was produced in the predominantly type 1 Soleus, the type 2A and 2B extensor digitorum longus and the type 2B superficial region of the vastus lateralis by electrical stimulation in vitro at 22 C. Muscles were stimulated at 45 trains.min-1 for 1, 5 or 10 minutes. In both training modalities, train tension decreased faster in controls compared to the exercise trained group. This suggested that exercise training leads to a delay in the development of fatigue being most pronounced following a regimen of spring training. Dissert. Abstr.

N86-19852 Harvard Univ., Cambridge, Mass.
LUMINANCE AND CHROMATICITY SIGNAL PROCESSING IN THE HUMAN VISUAL SYSTEM Ph.D. Thesis
Graeme Raydon Cole 1985 154 p
Avail: Univ. Microfilms Order No. DA8520180

Luminance (Lum) and Chromatic (Chr) detection mechanisms were revealed with a 1 deg 200 ms test flash presented upon a uniform 6.2 deg yellow field of 3000 td. The test could have any direction in the (L,M) cone quantal catch space. All stimulus components were narrow-band, produced with a 8-channel Maxwellian view optical system. Using pedestals which were flashed coincident in space and time with the test, subthreshold masking and facilitation was obtained for Lum tests upon Lum pedestals and Chr tests upon Chr pedestals. Further increases in the pedestal strength beyond threshold, yielded facilitation independent of the sign of the test and pedestal, followed by a Weberian rise in threshold. Suprathreshold +/- Lum pedestals facilitated the detection of +/- Chr tests (+Chr = green; -Chr = red) by 2 to 3 fold. The facilitation was still apparent for tests and pedestals which were tilted away from the nominal Chr and Lum directions respectively. The results are discussed in terms of spatio-temporal uncertainty and edge effects. Dissert. Abstr.

N86-19853 Minnesota Univ., Minneapolis.
RESTING METABOLIC RATE IN MEN FOLLOWING PROLONGED TREADMILL EXERCISE Ph.D. Thesis
Gene Ronald Shaw 1985 162 p
Avail: Univ. Microfilms Order No. DA8519297

Previous studies have suggested that the resting metabolic rate (RMR) may be elevated for several hours following prolonged exercise and thus contribute significantly to 24-hour energy expenditure. The metabolic responses of 8 men (4 trained runners and 4 sedentary men) were studied during and after treadmill exercise. Each subject was studied on 8 different days: 3 control days (no exercise), 3 days following 45 min of exercise, and 2 days following 90 min of exercise. The trained subjects' exercise intensities averaged 78% and 61% of their maximal oxygen consumption during the 45 min and 90 min exercise bouts, respectively. Corresponding values for the sedentary men were 57% and 46%. Oxygen consumption (VO sub 2), minute ventilation (V sub e), and heart rate (HR) gradually increased during 45 and 90 min of constant-load exercise regardless of training status It is concluded that the total post-exercise increase in energy expenditure following 45 or 90 min of treadmill exercise was at most 4 to 8% of the cost of exercise itself. Dissert. Abstr.

N86-19854 Research Inst. of National Defence, Stockholm (Sweden).
THE ELEVENTH ANNUAL MEETING OF THE EUROPEAN UNDERSEA BIOMEDICAL SOCIETY (EUBS) ON DIVING AND HYPERBARIC MEDICINE
Hans Oernhagen, ed. and Anne-Lie Carlsson, ed. Aug. 1985 274 p refs Meeting held in Goetborg, Sweden, 21-23 Aug. 1985 (FOA-C-50021-H1; ISSN-0347-7665) Copyright. Avail: Issuing Activity

Thermocontrol and pressure effects on divers; pulmonary function during diving and hyperbaric conditions; effects of hydrostatic pressure and gases; and decompression sickness are discussed. For individual titles, see N86-19855 through N86-19884.

N86-19855 Texas Univ., Austin.
DIVER RESPONSE TO HOT WATER LOSS AT DEPTHS GREATER THAN 300 METERS: EXPERIMENTAL OBSERVATIONS AND THEORETICAL INTERPRETATION
E. H. Wissler and A. Pasche *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 7-14 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

A mathematical model for simulating human thermal response to exercise and environmental stress is used to analyze experimental data obtained from 2 series of 350 m dives conducted in hyperbaric chambers. When divers wearing standard hot water suits were subjected to brief intervals without flow, they became uncomfortable and began to shiver within a few minutes. The physiological basis for this response and its consequences are discussed. It is concluded that nonuniform distribution of water within the suit, leakage of hot water from the suit at the wrists and ankles, and flushing of cold water into the suit around the hands and feet during a hot water cut are the primary causes of diver discomfort and shivering. Author (ESA)

N86-19856 Chalmers Univ. of Technology, Goeteborg (Sweden). Div. of Underwater Technology.
THE EFFECTS OF THE INSULATION PROPERTIES OF DIFFERENT DRY SUIT SYSTEMS ON THE DIVER'S HEAT BALANCE AND COMFORT DURING DIVING TO 50 m
D. E. Warkander, P.-A. Traeff, and G. O. Dahlbaeck *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 17-32 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

A method for quantifying thermal comfort during diving was tested during diving at 5 and 40 m using suits with and without passive insulation. Calculations of the insulation of a suit system were based on measurements of changes in body temperature, mean skin temperature, respiratory heat loss, and metabolism. Metabolism was measured with a technique based on argon dilution and mass spectrometry. Insulation values in the range of 0.10 to 0.15 K/(W/sq m) are measured for the suits, and are considered by divers to yield adequate thermal comfort. Author (ESA)

N86-19857 Bergen Univ. (Norway). Dept. of Chemistry.
A STUDY OF HUMAN LYMPHOCYTE MORPHOLOGY FROM THE PERIPHERAL CIRCULATION AFTER HYPERBARIC EXPOSURE
Judy Ann Paciorek *In* Research Inst. of National Defence The 11th Annual Meeting of the Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 33-43 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Scanning electron microscopy preparation of peripheral blood lymphocytes obtained from divers at the end of a deep dive in whole blood or in separated mononuclear cell fractions, demonstrate membrane changes in those samples that were air dried. Critical point drying of preparations prevents lymphocyte surface morphology collapse. Membrane binding studies indicated that between 24.5% of peripheral mature B and T cells binding sites are compromised after in vitro hyperbaric treatment. In vitro comparison of pre and post pressure stressed cells shows that inappropriate decompression procedures cause damage to the cytoskeletal matrix, with topographical alteration of membrane and antigenic sites. Author (ESA)

N86-19858 Tromsoe Univ. (Norway). Inst. of Medical Biology.
ENHANCEMENT OF PSEUDOMONAS AERUGINOSA VIRULENCE BY HYPERBARIC ATMOSPHERE CONDITIONS
Bjoern P. Berdal and Alain R. Eegaard *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 45-54 refs Prepared in cooperation with Norwegian Defence Microbiological Lab., Oslo (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Factors associated with Pseudomonas aeruginosa virulence (bacterial adhesion to human cells in culture, production of exotoxin A, and the activity of extracellular and cell-wall bound proteolytic enzymes) were measured under diving conditions. Toxin production remains undisturbed, but bacterial adhesion and an extracellural proteolytic, elastase-like activity increase. The enhanced adhesion associated with pressure increase is statistically significant for the assayed P. aeruginosa strains. Adhesion is much higher at 37 C than at 22 C. The hyperbaric pressure effect is significant at the higher temperature only. Observations correlate well with reports of external ear canal infections in divers and whirl-pool bathers. Enhanced bacterial adhesion under favorable atmosphere/temperature conditions could be a general phenomenon for the P. aeruginosa bacterial group. Author (ESA)

N86-19859 Admiralty Research Establishment, Gosport (England). Physiological Lab.
SOME DOMINANT FREQUENCIES OF POSTURAL TREMOR ARE LOWER AT 31 BAR
David J. Harris and Zoltan Torok *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 55-65 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

To test the hypothesis that the center frequencies of tremor bands are slightly lower at pressure as a consequence of slowed muscle contraction, tremor was studied during a heliox dive to 31 bar. Spectral analysis reveals that the power summed for the 6 to 13 Hz and 13 to 40 Hz bands in the finger increases 2 to 6 and 1.6 to 3.5 fold respectively, while hand tremor power increases from 1 to 6.6 fold. Center frequencies of all hand tremor peaks, (neurological and mechanical in origin) are reduced at pressure by 0.67 to 1.28 Hz. The results support the proposition that reflex and muscle factors play a role in causing or modulating tremor in the high pressure nervous syndrome. Author (ESA)

N86-19860 Karolinska Inst., Stockholm (Sweden). Dept. of Aerospace and Environmental Medicine.
LUNG VOLUMES AND DYNAMIC COMPLIANCE DURING IMMERSION AND OXYGEN BREATHING
R. Baer, G. O. Dahlbaeck, and U. I. Balldin *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 67-69 refs Prepared in cooperation with Chalmers Univ. of Technology, Goeteborg, Sweden (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The pulmonary mechanics and the time course of lung vital capacity (VC) reductions during immersion and oxygen breathing were investigated using 8 healthy male scuba-divers (mean age 24 yr, range 18 to 30 yr) with body plethysmographic techniques and simultaneous esophageal pressure recordings. The reductions in VC and the symptoms of airway irritation after immersion and oxygen breathing confirm suggestions that this reduction is mainly due to pulmonary absorption atelectasis formation caused by an elevated diaphragm and blood pooling in the thorax, creating closed off basal lung regions. However, the small reductions in residual lung capacity and dynamic compliance during 30 min immersion conditions, while breathing oxygen as well as air, might be explained by an increased lung interstitial fluid interfering with the gas volumes in the lung. Author (ESA)

N86-19861 Norwegian Underwater Technology Center Ltd., Laksevaag.
EFFECTS OF DRY AND HUMIDIFIED BREATHING GAS (AIR) AT 37 C ON PULMONARY FUNCTION IN HYPERBARIC CONDITIONS
I. Roennestad *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 71-79 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The effects of breathing humidified air were studied using 7 subjects performing a standard workload task at 1.17, 3.75, and 5.98 bar simulated depths and at the surface. Exposure to humidified breathing gas causes no change in any of the pulmonary function parameters. There are significant decreases in the pulmonary function parameters after exposure to dry breathing gas at 5.98 bar compared to 1.17 bar. At 1.17 bar mean mid expiratory flow (MMEF) is reduced to 94.5 % of the pre-exposure value, while MMEF at 5.98 bar is reduced to 77 % of the pre-exposure value. Data for humidified breathing gas at 5.98 bar are similar to those at 1.17 bar. Changes are probably due to an obstruction in the distal airways. The origin of the obstruction is unknown. It is concluded that humidification of dry breathing gas has an increasingly positive effect with depth on the pulmonary function of the diver. Author (ESA)

N86-19862 Research Inst. of National Defence, Haarsfjaerden (Sweden).
LUNG RUPTURE AS A COMPLICATION IN FREE ESCAPE
Claes Lindemark (Submarine Medical Section, Karlskrona, Sweden) and John Adolfson *In its* The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 81-84 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

In 104,200 free escapes performed by 9,253 trainees in submarine warfare, 63 cases (frequency of 0.7%) of lung rupture were observed. Mediastinal emphysema is found in 36 of the cases and pneumothorax in 4 by X-ray examination. Symptoms to be recompressed are thoracic sensations, cerebral symptoms, unconsciousness, subcutanous emphysema, bloody frothy sputum, auscultory crepitations, submucous emphysema and shortness of breath. It is uncommon that people trained in free ascent suffer from lung rupture. It is suggested that training in free ascent in a tank with maximum possibilities of rescue is a way to avoid severe diving accidents in the open sea. Author (ESA)

N86-19863 Institut National de la Sante et de la Recherche Medicale, Paris (France). Div. d'Exploration Fonctionnelle des Sportifs.
COMPARISON OF BRADYCARDIA BREATH-HOLD ON DIVERS AND NONDIVERS: ITS IMPORTANCE FOR THE CAPACITY VISIT OF DIVERS
D. Lapierre, F. Friemel, M. P. Curraladas, C. Larger, and G. Cannet *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 87-92 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Bradycardia during apneas with face-immersion was tested

with 12 divers and 12 nondivers. No statistically significant difference between the two groups as to the average length of breath hold and the frequency of appearance of the electrocardiographic changes is found. Breathing with face immerged (FI) cardia during apnea is significant for nondivers, FI or not. For divers, bradycardia is significant only with FI. The differences in the amplitude of bradycardia between the two groups are not statistically significant. The apnea-training of divers may reduce the parasympathetic sensitivity of the heart. During the capacity visit for candidate divers, the parasympathetic response of the subject should be tested by making him carry out an apnea. Author (ESA)

N86-19864 Red Cross Hospital, Barcelona (Spain). Centre de Recuperations i d'Investigations Submarines.

EXPLAINING THE UNEXPLAINED DYSBARIC SPORT DIVING ACCIDENTS

X. Lopez-Altimiras, J. Palomer, J. Borras, and J. Desola-Ala *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 93-98 (For primary document see N86-19854 10-52)

Avail: Issuing Activity

A total of 181 dysbaric sports diving accident case files were analyzed, and cases where adequate decompression procedures were followed were studied. The patients' personal data (age, physical condition, and background) diving instruction (experience and previous dysbaric disorders), the data which preceeded the dive (continued or successive dives, sailing, previous traveling) and the technical characteristics of the dive itself (exercise at depth, cold water, fatigue) were investigated. Exercise, advanced age, and negligence in applying safety factors are the reasons of the majority of the unexplained accidents. Author (ESA)

N86-19865 Research Inst. of National Defence, Stockholm (Sweden).

AN ATTEMPT TO COUNTERACT NITROGEN NARCOSIS BY NALOXONE ADMINISTRATION

M. H. Liner, O. Eiken, M. Gennser, H. Roeckert, and Hans Oernhagen *In its* The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 99-104 refs Prepared in cooperation with Chalmers Univ. of Technology, Goeteborg, Sweden, and Karolinska Inst., Stockholm, Swedennst. Natl. Defence (For primary document see N86-19854 10-52)

Avail: Issuing Activity

In order to evaluate the effect of naloxone (a specific opiate antagonist) on nitrogen narcosis, 8 healthy subjects were exposed to 8.5 ATA air on 2 occasions in a dry chamber. The degree of nitrogen narcosis was assessed by measurement of body sway motion, four-choice visual response time, and paced auditory serial addition test. The subjects assessed perceived degree of narcosis using the Borg category scale. Tests were performed pre and post-dive, and at bottom depth before and after drug administration. Each subject received naloxone (0.02 mg/kg bw) or placebo on separate dives. Drugs were administered intravenously in a double-blind random fashion. At 8.5 ATA performance decreases in all tests indicating nitrogen narcosis. Neither naloxone nor placebo affect performance at pressure. Results suggest that naloxone does not reverse the effects of excessive nitrogen partial pressure on body sway, and psychomotor and cognitive functions. Author (ESA)

N86-19866 London Univ. (England). Dept. of Chemical Pathology.

ELEVATIONS OF PLASMA ENDOTOXIN LEVELS AND LYSOSOMAL ENZYME ACTIVITIES IN DIVERS DURING A SIMULATED CHAMBER DIVE TO 300 msw

D. R. Doran, Z. Torok (Admiralty Research Establishment, Gosport, England), M. P. Garrard (Admiralty Research Establishment, Gosport, England), and L. Chaudry *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 107-112 refs Sponsored by UK Ministry of Defence Procurement Executive (For primary document see N86-19854 10-52)

Avail: Issuing Activity

Bacterial endotoxin levels were measured in blood samples taken from 3 men during a simulated chamber dive to 300 msw. Plasma concentrations rise in all 3 men from insignificant pre-dive values to reach levels > 10 times the upper limit of normal by the end of compression. The elevations persist well on into the decompression phase. Significant elevations of activities of acid phosphatase and Beta glucuronidase are noted, paralleling the rise in endotoxins. Such lysosomal enzyme activity increases are known to accompany endotoxaemia. The effect of hyperbaric exposure upon the efficiency of destruction of endotoxin by the liver, and/or direct effect of compression upon leakage of endotoxin from the gut are discussed. Author (ESA)

N86-19867 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Dept. of Underwater Medicine.

HIGH PRESSURE OXYGEN (OHP) INDUCED INCREASE OF SERUM PROLACTIN IS NOT DUE TO A DOPAMINE (DA)-RECEPTOR BLOCKADE

Georges Athanassenas, Roland Kaiser, Harald Schlebusch (Bonn Univ., West Germany), and Roland Berger *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 113-120 refs (For primary document see N86-19854 10-52)

Avail: Issuing Activity

A significant increase of serum prolactin (PRL) levels was found after breathing 100% O2 in a simulated depth of 18m, compared to normoxic breathing under the same conditions. In order to distinguish between a decrease of dopamine (DA) and a blockade of the DA post-synaptic receptor, bromocriptine (BRC) a known DA agonist, was administered in a double blind experiment. Eleven male divers participated in 4 series of simulated dives to 18 m breathing 100% O2 in 2 dives (1 with and 1 without BRC administration), and breathing a normoxic mixture in the 2 others (1 with and 1 without BRC administration). It is found that the increase of serum PRL under high pressure oxygen is suspended after BRC administration, suggesting that PRL increase is due to a decrease of DA rather than to a blockade of the post-synaptic DA receptor. Author (ESA)

N86-19868 Royal Netherlands Navy, The Hague. Diving Medical Centre.

EFFECTS OF INTERMITTENT EXPOSURE TO HYPEROXIA IN OPERATIONAL DIVING

W. Sterk (Vriens Diving Co.) and L. M. Schrier *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 123-131 refs (For primary document see N86-19854 10-52)

Avail: Issuing Activity

Two groups of 6 divers were exposed to hyperoxic mixtures during 3 no-stop dives of 2 hr duration per day, interrupted by 1 hr surface intervals breathing air, 5 days per week. Group 1 was exposed to 600 cumulative pulmonary toxicity dose (CPTD) and group 2 to 800 CPTD per day. Results show a chronic oxygen toxicity syndrome consisting of symptoms as fatigue, headache, dizziness, and paraesthesia. Most characteristic is a feeling of numbness in fingers and toes. It is uncertain whether these symptoms are of central or peripheral origin. It is concluded that daily exposure to 600 CPTD or more is not safe on a working week basis and as a schedule as in the experiment. Author (ESA)

N86-19869 Bergen Univ. (Norway). Dept. of Physiology.

INCREASED INOTROPI OF THE HEART IN NORMOXIC HYPERBARIC ATMOSPHERE

Linda B. Stuhr, Arne Ask, and Ingvald Tyssebotn *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 133-138 refs (For primary document see

N86-19854 10-52)
Avail: Issuing Activity
Cardiac activity of rats in a hyperbaric chamber was studied. A micromanometer independent of saline filled catheters was introduced into the left ventricular heart chamber of anesthetized subjects. Intraventricular pressure and velocity of ventricular pressure increase and decrease were measured in control and during 15 min elevated ambient pressure to 5 bar by He and N2 and 15 min after decompression. The mean arterial pressure and pulse pressure were recorded by a saline filled catheter in aorta via a femoral artery. Elevated ambient pressure (5 Bar) by N2 and He in a normoxic atmosphere increases the inotropi but does not influence the chronotropi and mean arterial pressure. It is suggested that the rat heart has to use a greater force and velocity of contraction to pump the same amount of blood at 5 bar. Author (ESA)

N86-19870 Institut za Pomorsku Medicina, Split (Yugoslavia).
HYBERBARIC OXYGEN IN THE TREATMENT OF BELL'S PALSY
Racic Goran, Denoble Petar, Gosovic Stracimir, and Kovacevic Hasan *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 139-146 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity
Twenty patients with Bell's palsy detected 7.6 days previously on average (no longer than 15 days) were treated by hyperbaric oxygen (HBO) at 2.8 bars for 60 min twice a day. A few days after the beginning of the therapy (mean 5.5. days) all but 1 improved and all but 1 healed completely in 17 to 21 days (mean 14.6). In one case decompression rather than HBO was indicated but subject having refused surgery joined oxygen treated group. At admission all patients presented complete paralysis with NET differing < 3.5 mA. During therapy none of them developed signs of electrodegeneration. Comparing outcome of Bell's palsy under HBO to the one under medicamentous therapy or spontaneous evolution, HBO cases heal quicker and with no sequella. Author (ESA)

N86-19871 Istanbul Medical Faculty (Turkey). Underwater Medicine Section.
A SURVEY OF ASEPTIC BONE NEGROSIS IN TURKISH SPONGE DIVERS, INTERIM REPORT
M. Cimsit, C. Babuna, A. Karacallik, G. Varan, Z. Karaguelle, B. Acunas, and N. Yuezbasloglu *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 147-157 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity
Physical examinations, blood and urine analyses, and radiological examinations of divers were completed. They were all actively diving on air. Mean age was 26.1 yr with a range of 19 to 35. The mean years of diving experience was 4.3. The average depth of diving was 35.4 m. Six divers had decompression sickness (DCS). Although aseptic bone necrosis is not found necessarily related with DCS, all cases with DCS have lesions of aseptic bone necrosis; 3 of the 21 divers are free of lesions and 4 have cystic changes and translucent areas in their coracoid process and fibula. Findings indicate a very high incidence of dysbaric osteonecrosis. Eighteen divers have lesions. Humerus is the primary site of affection. All these findings indicate that the high incidence of aseptic bone necrosis among Turkish sponge divers is related to diving habits. Author (ESA)

N86-19872 Slotervaartziekenhuis, Amsterdam (Netherlands).
EARLY DETECTION AND TREATMENT OF AVASCULAR BONE NECROSIS IN DIVERS
R. M. Kuipers, G. H. C. Schardijn, D. M. A. Agenant, C. A. Hoefnagel, and K. J. Hamelynck *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 159-164 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity
Dysbaric osteonecrosis diagnosis in divers is discussed. Four weeks after a decompression accident the first signs can be found by a diphosphonate bone-scan. An X-ray investigation is usually positive at a later stage of the disease (1 yr) but the best moment of treatment is gone. If a bone lesion is suspected on clinical examination and bone scintigraphy, further confirmation by intramedullary pressure and phlebography should be performed. In case of a high pressure and a venous stases, a core biopsy with intraossal decompression is indicated. The results of a local treatment of the necrotic part of head in early cases of femoral head necrosis are good, and less disabling than a hip arthrodesis or total hip replacement in cases of bone necrosis with secondary arthrosis. Author (ESA)

N86-19873 Chalmers Univ. of Technology, Goeteborg (Sweden). Lab. of Oral Biology.
ORAL CHANGES IN DIVERS WORKING WITH ELECTRICAL EQUIPMENT UNDER WATER
Thomas Oertendahl *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 165-171 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity
An inquiry study among professional commercial divers revealed that 55% complained of a metallic taste, strictly related to their work with electrical equipment under water. A clinical study was performed to see if the metallic taste reflected any clinical alteration. Divers who worked with electrical equipment under water have a significantly more unfavorable clinical appearance of their dental amalgams, in relation to a control group. The metallic taste is probably due to potential alterations in the mouth provoked by increasing humidity in diving suits when operating electrical welding machines. Author (ESA)

N86-19874 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Dept. of Underwater Medicine.
HYGIENIC ASPECTS OF WATER SUPPLY FOR CHAMBER SANITARY FACILITIES, CHANGES OF DIVERS' BACTERIAL MOUTH FLORA AND EFFECTIVENESS OF EAR PROPHYLAXIS IN SATURATION DIVES
R. Kaiser, L. Krizek (Bonn Univ., West Germany), M. Exner (Bonn Univ., West Germany), and L. Vogt *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 173-178 (For primary document see N86-19854 10-52)
Avail: Issuing Activity
In the first of two 230 m saturation dives a continuous spreading and increase of Pseudomonas aeruginosa (mainly PMA 4) was observed inside the chamber although a strict daily disinfection routine was followed. Beginning between day 3 and 5, PMA 4 is observed in all divers. Technical modifications to the water sypply system and the use of a H2O2 based disinfectant markedly improve microbiological water quality and reduce bacterial colonization of the divers in the second dive. For ear prophylaxis (5 min twice daily) 70% ethanol or AL-acetate/acetic acid was used. No case of manifest otitis externa occurs. Author (ESA)

N86-19875 Bergen Univ. (Norway). Inst. of Physiological Psychology.
PSYCHOLOGICAL AND PHYSIOLOGICAL STRESS REACTIONS AMONG SPORTS DIVER-STUDENTS
Arvid Jensen, Ragnar Vaernes, and Kjell-Torgeir Stokke *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 179-189 refs Sponsored in cooperation with Norwegian Underwater Technology Center and National Hospital of Norway (For primary document see N86-19854 10-52)
Avail: Issuing Activity
The existence of a significant activation or stress to perform

emergency procedures in water, and coping throughout dive training were studied. Pre and post activation on dives 1 and 6 were measured (5 m depth). Correlations between endocrine reactions, subjective fear rating, frequency of symptoms postdive and personality were obtained. There is a significant activation to the sea dive. However, students either really cope with the environment, or show a very large change in endocrine status. There are broad individual variations regarding coping throughout training. As found among navy divers loss of coping is related to high defense strategies. Author (ESA)

N86-19876 Hamilton Research Ltd., Tarrytown, N.Y.
REPETITIVE DECOMPRESSION TABLES FOR NO-STOP EXCURSIONS FROM SATURATION
R. W. Hamilton and D. J. Kenyon *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 191-198 refs Sponsored by NOAA and the Dept. of Commerce (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The classical gas loading method for calculating repetitive tables was used to calculate many sequences of excursions separated by various surface or habitat intervals. These were done for different excursion storage depths, vertical excursion distances, and interdive intervals. The allowable bottom time may be shorter for the second dive and even shorter for subsequent excursions. For a given depth-time combination the required adjustment is determined almost entirely by its order in the sequence and the duration of its preceeding interdive interval; the tables use these factors rather than repetitive groups. A linear interpolation method is used to account for excursions that use less than the total allowable time. Author (ESA)

N86-19877 Copenhagen Univ. (Denmark).
EXCURSION LIMITS IN SHALLOW WATER HELIOX SATURATION DIVING
Joop Madsen *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 199-201 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Discrepancies between experimental results on which tables for unlimited duration excursions from shallow heliox saturation are calculated are noted. Reasons for the discrepancies, and their significance for diving safety are discussed. Discrepancies may be due to the differences between experiment designs, particularly populations tested. Author (ESA)

N86-19878 Duesseldorf Univ. (West Germany). Inst. fuer Biophysik und Elektronenmikroskopie.
WET CHAMBER DIVES TO TEST ALGORITHMS FOR ELECTRONIC DECOMPRESSIOMETERS
M. Hahn, P. Hampe (DFVLR, Cologne, West Germany), and S. John (Deutsche Lebensrettungsgesellschaft, Berlin, West Germany) *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 203-211 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Wet chamber dives, simulating nonrectangular profiles and repetitive diving common in sports-diving, were performed to test a decompression model and supersaturation tolerances used in an electronic decompressiometer. Ultrasonic Doppler bubble measurements were made during test-dives. Occurrence of type 1 decompression sickness and peculiarities in the bubble history suggest that denitrification is delayed by decompression stress. Author (ESA)

N86-19879 Saitama Univ., Urawa (Japan). Dept. of Hygiene.
AN APPRAISAL OF DIVE PROFILES IN SHELLFISH DIVERS WITH REFERENCE TO THE RISK OF DECOMPRESSION SICKNESS
Ichiro Nashimoto, Koh Kobayashi, and Yoshiyuki Gotoh *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 213-219 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The dive profiles of six helmet shellfish divers were recorded and venous gas emboli (VGE) of divers after surfacing were monitored. Theoretical tissue nitrogen pressure (TNP) and decompression thresholds (DTHs) were calculated. Dive depth was 16 to 36 m, bottom time 16 to 36 min, and total ascent time 16 to 29 min. The first decompression stop was usually taken at 20 m, the second at 10 to 5 m. Constant fluctuations in diving depth were seen at the bottom. At each decompression stop the diver moved up and down within a range of 2 to 6 m. Grade 2 VGE is detected among 3 divers after surfacing from the second dive. No DCS is observed. With few exceptions, their empirical decompression profiles do not exceed the DTHs. This may be related to the reduced risks of DCS. Author (ESA)

N86-19880 Royal Norwegian Navy, Haakonsvern. Bureau of Ships.
ALTERNATIVES TO STANDARD AIR TABLES
Arne-Johan Arntzen *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 221-228 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Diving companies used an empirically modified surface decompression table with nitrox. This combination gives very long bottom times compared to standard air tables. Experience from several thousand dives (salvage and construction) proves that bends frequency is satisfactory. Evaluation of 2662 dive reports shows that the procedures are safe enough to be recommended for official use, with minor modifications. Author (ESA)

N86-19881 Compagnie Maritime d'Expertises, Marseille (France).
THE INFLUENCE OF INDIVIDUAL FACTORS IN MAN ON BUBBLE FORMATION IN AIR DIVING DECOMPRESSION
M. Carlioz, M. Comet, and B. Gardette *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 229-239 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The influence of biometric factors on decompression was studied in 78 air dives of 78 male subjects at 24 m 90 min bottom time, 30 m 80 min, and 51 m 40 min. Results show that factors which influence individual susceptibility to eliminate gas as bubbles, and consequently to pathological risk, are age, weight, and fat tissue. The statistical results were extended to 133 unit air chamber dives. The correlation coefficients are: 0.45 for age, 0.32 for fat tissue, and 0.28 for weight. Thus, there is not a sole determining factor but it appears that the sum of these 3 factors (age + weight + fat tissue : $r = 0.52$) induces pathogenic bubble formation during decompression. Author (ESA)

N86-19882 Direction des Constructions et Armes Navales, Toulon (France). Centre d'Etudes et de Recherches Techniques Sous-Marines.
ULTRASONIC DETECTION OF CIRCULATING BUBBLES IN EWES EXPOSED TO SIMULATED DIVES DEEPER THAN 800 msw UNDER ISOBARIC CONDITIONS AND WITH UNCHANGED GAS MIXTURES
G. Masurel, J. Hee, L. Giacomoni, and R. Guillerm *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 241-246 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

As part of a study intended for the in vivo checking of blood gases in animals exposed to high pressures, ewes were exposed to simulated saturation dives with heliox under normoxic conditions at depths between 800 and 1000 msw. Circulating bubbles are

reported during the simulated dives and during stops at the bottom, although conditions were isobaric, and the gas mixture was not changed. Author (ESA)

N86-19883 Red Cross Hospital, Barcelona (Spain). Centre de Recuperacio i de Investigacions Submarines.
LESS BUBBLE FORMATION IN WOMEN DIVERS
Jordi Desola-Ala and Gerard Masurel *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 247-256 refs Prepared in cooperation with Direction des Constructions et Armes Navales, Toulon, France (For primary document see N86-19854 10-52)
Avail: Issuing Activity

Nine couples (1 man, 1 woman) performed identical dives at depths varying from 40 to 50 msw during enough time to produce a residual nitrogen coefficient L according to US Navy decompression tables. Circulating bubbles in the precardial region were determined immediately after the dive and every 30 min during 2.5 hr. Seven men produce detectable bubble degrees in at least one observation, while only three women do so. The men show a higher number of positive determinations and higher degrees of circulating bubbles. No correlation with individual or technical factors can be clearly signaled as responsible for these variations. It is suggested that women divers produce a less bubble degree than men, and their proneness to decompression sickness is related to other physiological factors. Author (ESA)

N86-19884 Japan Marine Science and Technology Center, Tokyo. Dept. of Undersea Science and Technology.
EFFECT OF LOW AND HIGH ENVIRONMENTAL TEMPERATURES ON DECOMPRESSION SICKNESS IN THE AGING RAT
Y. Taya, F. Shidara, Y. Mizyshima, M. Nakano, N. Naraki, K. Takao, and K. Seki *In* Research Inst. of National Defence The 11th Annual Meeting of the European Undersea Biomedical Society (EUBS) on Diving and Hyperbaric Medicine Aug. 1985 p 257-261 refs (For primary document see N86-19854 10-52)
Avail: Issuing Activity

The combined effects of aging and environmental temperature on decompression sickness incidence in male and female rats (10, 36, and 60 weeks old) in a compression chamber pressurized with air to 11 bar in 10 min were studied. Temperature was controlled at 20 and 30 C, and freely ventilated. Following a 40 min stop at 11 bar, the rats were decompressed in stages, and fatality ratio observed. The results demonstrate a significant relationship (at 0.01%) between aging and fatality ratio; fatality ratio increases under low environmental temperature compared to high environmental temperature. There is little gender effect on fatality. Author (ESA)

N86-19885*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CUTTING HEAD FOR ULTRASONIC LITHOTRIPSY Patent Application
Earl D. Anguluo and Roger Goodfriend, inventors (to NASA) 30 Oct. 1985 10 p
(NASA-Case-GSC-12944-1; NAS 1.71:GSC-12944-1; US-Patent-Appl-SN-793006) Avail: NTIS HC A02/MF A01 CSCL 06E

A cutting head for attachment to the end of the wire probe of an ultrasonic kidney stone disintegration instrument is described. The cutting head has a plurality of circumferentially arranged teeth formed at one end thereof to provide a cup shaped receptacle for kidney stones encountered during the disintegration procedure. An integral reduced diameter collar diminishes stress points in the wire and reduce breakage thereof. NASA

N86-19886*# California State Coll., Bakersfield.
GENERAL AUTOMATIC COMPONENTS OF MOTION SICKNESS
Steven Suter, William B. Toscano, Joe Kamiya, and Karen Naifeh [1985] 37 p refs Prepared in cooperation with California Univ., San Francisco
(Contract NCC2-115)
(NASA-CR-176516; NAS 1.26:176516) Avail: NTIS HC A03/MF A01 CSCL 06S

A body of investigations performed in support of experiments aboard the space shuttle, and designed to counteract the symptoms of Space Adapatation Syndrome, which resemble those of motion sickness on Earth is reviewed. For these supporting studies, the automatic manifestations of earth-based motion sickness was examined. Heart rate, respiration rate, finger pulse volume and basal skin resistance were measured on 127 men and women before, during and after exposure to nauseogenic rotating chair tests. Significant changes in all autonomic responses were observed across the tests. Significant differences in autonomic responses among groups divided according to motion sickness susceptibility were also observed. Results suggest that the examination of autonomic responses as an objective indicator of motion sickness malaise is warranted and may contribute to the overall understanding of the syndrome on Earth and in Space. Author

N86-19887# Massachusetts Univ., Amherst. Dept. of Psychology.
BIOLOGICAL INVESTIGATIONS OF ADAPTIVE NETWORKS. NEURONAL CONTROL OF CONDITIONED RESPONDING Annual Technical Repor, 30 Apr. 1984 - 20 May 1985
J. W. Moore 20 May 1985 26 p
(Grant AF-AFOSR-0215-83)
(AD-A160345; AFOSR-85-0746TR; ATR-2) Avail: NTIS HC A03/MF A01 CSCL 06/16

Neurobiological investigations of adaptive neural networks were conducted using the classically conditioned nictitating membrane response (NM CR) of rabbit, a widely used model system for studies of learning. One experimental approach involved recording from single brain neurons from awake, behaving animals for the purpose of determining the loci and characteristics of neurons with activity correlated with the NM CR or its inhibition. A second approach involved the use of discrete brain lesions that selectively eliminate the NM CR while at the same time sparing the basic reflex pathway. A third approach employed fiber-tracing anatomical techniques designed to clarify the inter-connectivity among brain regions essential for the NM CR. These regions include discrete portions of the cerebellum and brain stem. Information from physiological studies has been incorporated into mathematical models of learning used by adaptive network researchers, and anatomical findings have guided the development of related neuronal models. GRA

N86-19888# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STUDY OF PATIENT'S SELF-IMAGE DURING ORTHODONTIC TREATMENT M.S. Thesis
B. B. Jacobus, Jr. Jun. 1985 126 p
(AD-A160751; AFIT/CI/NR-85-117T) Avail: NTIS HC A07/MF A01 CSCL 05/10

There has been little research done that has attempted to study the patient's self-image and record what changes occur with a correction of the patient's malocclusion through orthodontic treatment. A study was done to determine what changes occur in the orthodontic patient's self-image during orthodontic treatment. A questionnaire requiring responses pertaining to self-image was distributed to three hundred sixty 11 to 19-year old patients in various phases of pre-treatment and retention. The data was collected and statistically analyzed. Variables of age, sex, and time in treatment were examined. Findings indicated a definite positive effect upon the orthodontic patient's self-image. Significant differences in response levels of different age groups, time in treatment groups and males and females were found. The effects on self-image were the largest during the first year of active treatment and remained at a higher level throughout treatment. The positive self-image levels continued through the retention phase of treatment. GRA

N86-19889# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
IN VITRO COMPARISON OF ZINC PHOSPHATE AND GLASS

IONOMERS ABILITY TO INHIBIT DECALCIFICATION UNDER AND ADJACENT TO ORTHODONTIC BANDS M.S. Thesis
D. J. Copenhaver Aug. 1985 60 p
(AD-A160881; AFIT/CI/NR-85-141T) Avail: NTIS HC A04/MF A01 CSCL 06/5

Forty sets of impacted third molar teeth were banded with custom fitted bands and cycled in a latic acid solution for four weeks. This solution simulates an environment that would be found only in patients with the worst oral hygiene. Each set was from the same patient. Visual, spectrophotometric and pH testing were done on the sample sets. All area not banded showed significant decalcification after four weeks in the 0.10 M latic acid solution. The teeth banded with glass ionomer cement showed significantly more calcium was present in solution in the zinc phosphate cemented sample solutions also confirmed were more Ca(++) ions in solution. The evidence suggest that glass ionomer cement protects the tooth surfaces from decalcification under and adjacent to orthodontic bands significantly better than zinc phosphate cements. Further study on solubility and setting time of this new glass ionomer cement is necessary before routine clinical use can be considered. Author (GRA)

N86-19890# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
PASSING SCORES FOR THE FAA ATCS COLOR VISION TEST
J. J. Convey Aug. 1985 19 p
(AD-A160889; DOT/FAA-AM-85-7) Avail: NTIS HC A02/MF A01 CSCL 06/16

In response to recommendations from the Office of Personnel Management for measures of normal color vision that reflects as closely as possible the functional color vision requirements for an air traffic controller (Christup, 1981), subtests which simulated ATC tasks were developed in three content areas: (1) aircraft colors for fuselage and lights, (2) color weather radar displays, and (3) navigational chart terrain elevations. Pickrel and Convey (1983) performed an item analysis on these subtests using data obtained from 41 persons with normal color vision as determined by their performance on the Pseudoisochromatic Plates Test (PIP) from the American Optical Corporation and 22 persons with defective color vision according to the PIP. The item parameters and the internal consistency reliability estimates obtained were satisfactory. GRA

N86-19891# Naval Health Research Center, San Diego, Calif.
ASSESSING THE HEALTH RISKS OF CARRIER LANDINGS IN US NAVY PILOTS Interim Report
Anne Hoiberg and Ralph G. Burr Jul. 1985 12 p
(AD-A160928; AD-F630624; NAVHLTHRSCHC-85-24) Avail: NTIS HC A02/MF A01 CSCL 01/2

Landing an airplane on an aircraft carrier is one of the most demanding and complex tasks required of Navy pilots. Heart rate values in pilots increase during flight, especially during landings and launch. Because of the hazards involved, carrier landings might have an impact on the health of Navy pilots. This study was designed to determine whether or not carrier landings adversely affected the health of Navy pilots. The objective was to compare the hospitalization and mortality rates of helicopter pilots and fixed-wing pilots who had considerable carrier landing experience with a control group of pilots who had little, if any, carrier landing experience. Results of comparisons across carrier landing exposure groups revealed no significantly higher total hospitalization rate of any one of the three groups. GRA

N86-19892# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
INVESTIGATION OF THE METHOD TO DETERMINE CARBOXYHAEMOGLOBIN IN BLOOD
D. M. Kane Aug. 1985 66 p
(AD-A161061; DCIEM-85-R-32) Avail: NTIS HC A04/MF A01 CSCL 06/1

The current method for determining blood carboxyhemoglobin concentration by gaschromatography has been critically evaluated and compared to spectrophotometric analysis methods. The major sources of bias in the method accuracy have been found to be in the measurement of blood volume and in the separate determination of total hemoglobin concentration in the blood. The method is estimated to have a coefficient of variation of 6.2% over the range of 0.5 to 20 vol % COHb. Standardization procedures which have been examined are the use of a 500 ppm carbon monoxide in nitrogen gas mixture and carbon monoxide-saturated blood solutions as external standards. Also, methods of saturating blood with carbon monoxide have been examined, with the use of an impinger or tonometer held at 37 C giving the most effective results. Studies of long-term storage of carbon monoxide blood have been carried out and have revealed that the concentration remains stable for up to nine days if the blood is stored anaerobically at refrigerator temperatures. Blood containing 10% or less carboxyhemoglobin has been found to be stable up to 60 days. GRA

N86-19893# Naval Submarine Medical Research Lab., Groton, Conn.
BODY WEIGHT CHANGES BEFORE AND AFTER SUBMARINE PATROLS Interim Report
Kenneth R. Bondi and Arthur N. Beare 25 Sep. 1985 9 p
(AD-A161144; NSMRL-1062) Avail: NTIS HC A02/MF A01 CSCL 06/16

Analysis of pre- and post-patrol body weight of 670 men from the crews of seven submarines showed that 32% of the men gained weight, 52% lost, and the 12% did not change. From the magnitude of individual weight losses, it was inferred that as many as a third of the men may have been actively dieting. These data do not support the widespread belief that men tend to gain weight during submarine patrols. Author (GRA)

N86-19894# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ABSORPTION OF BENZENE THROUGH HUMAN SKIN
J. Hanke, T. Dutkiewicz, and J. Piotrowski 28 Oct. 1985 22 p
Transl. into ENGLISH from Medycyna Pracy (Poland), v. 12, no. 5, 1981 p 413-426
(AD-A161157; FTD-ID(RS)T-0395-85) Avail: NTIS HC A02/MF A01 CSCL 06/20

As a result of the proliferation of benzene solutions in several production technologies and of leading to prolonged exposure poisonings, the question of absorption through the skin has re-emerged with respect to the direction of preventive measures and the necessity to clarify the observed clinical signs of absorption. The absorption of benzene through the skin in men in experimental conditions was examined. The liquid benzene was absorbed with the velocity about 0,4 mg/sq cm/hour; the absorption of the benzene vapors was insignificant and it did not exceed 1 per cent of that absorbed throughout the respiratory ways in the same conditions. The study was based on the determination of phenol contents in urine and on the new direct chemical method for the designation of skin absorption of benzene, this method was described in the paper. The authors concluded that the absorption of benzene through the skin must not be neglected. GRA

N86-19895# Naval Postgraduate School, Monterey, Calif.
EXAMINATION OF RETINAL PATTERN THRESHOLD LEVELS AND THEIR POSSIBLE EFFECT ON COMPUTER ACCESS CONTROL MECHANISMS M.S. Thesis
Debra K. Helle Sep. 1985 48 p
(AD-A161213) Avail: NTIS HC A03/MF A01 CSCL 06/2

The advent of multi-programming and the proliferation of shared computer systems has increased the need for greater computer security. Computer security can be segmented into six categories: physical, hardware, software, personnel, communications and procedures. Embedded into software security are those features which protect the system against both unauthorized access and denial of service of authorized users. Another term for this is access control. Access control mechanisms verify an individual's identity via three distinct methods: (1) something an individual knows, (2) something an individual possesses or (3) something about the individual. One device which keys on something about

the individual is a retinal scan system. This system utilizes the retinal blood vessel pattern as a unique identifier. This thesis studies one such retinal pattern recognition device. For the purposes of this study, an experiment was designed and conducted which determined the reliability of this system as a function of various tolerance levels, as well as its applicability as a computer systems access control mechanism. The Eye Dentify 7.5 system proved to be a fairly expensive, highly reliable access control device. Its probability for false recognitions is far better than most other known devices. It can be used as a physical access device at virtually any military installation where access devices are used. GRA

N86-19832# Joint Publications Research Service, Arlington, Va.
FLUORESCENT-POLARIZATION PROPERTIES OF CHROMOPHORES OF WATER-SOLUBLE PROTEINS OF NORMAL AND CATARACTAL HUMAN LENS
T. V. Birich, N. I. Poznyak, N. A. Prokoshina, and S. N. Cherenkevich *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 21-24 refs Transl. into ENGLISH from Doklady Akademii Nauk BSSR (Minsk, USSR), v. 29, no. 8, Aug. 1985 p 757-759 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19833# Joint Publications Research Service, Arlington, Va.
ELEMENT ANALYSIS OF SCLEROTIC FORMATIONS OF MAJOR BLOOD VESSELS BY LASER MASS SPECTROMETRY Abstract Only
G. G. Arabidze, S. M. Burkitbayev, Yu. A. Bykovskiy, A. I. Kutsenko, I. D. Laptev, E. A. Manykin, Ye. A. Petrenko, and V. T. Timoshin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 29 Transl. into ENGLISH from Biofizika (Moscow, USSR), v. 30, no. 4, Jul. - Aug. 1985 p 655-660 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19834# Joint Publications Research Service, Arlington, Va.
CLINICO-EPIDEMIOLOGICAL CHARACTERISTICS OF Q FEVER IN CARPATHIAN FOOTHILLS
A. A. Sukhopyatkina, O. S. Bat, A. V. Levitskaya, and V. G. Potapova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 34-36 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, April 1985 p 80-81 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19835# Joint Publications Research Service, Arlington, Va.
EPIDEMIOLOGICAL SUPERVISION OF POLIOMYELITIS
Yu. I. Vaserin, L. V. Vaserin, R. G. Vlasova, R. G. Balakireva, S. F. Zakirova, N. V. Patsuk, and N. Ya. Venediktova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 37-42 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 81-85 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19837# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF REACTOGENIC AND ANTIGENIC ACTIVITY OF CHROMATOGRAPHICALLY PURIFIED, CONCENTRATED AND INACTIVATED DRY VACCINE AGAINST TICK BORNE ENCEPHALITIS Abstract Only
O. V. Popov, A. A. Sumarokov, R. Ya. Shkolnik, L. B. Elbert, M. S. Vorobyeva, G. L. Krutyanskaya, A. V. Razgulyayeva, and M. N. Rasshchepkina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 51-52 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 6, Jun. 1985 p 34-39 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19840# Joint Publications Research Service, Arlington, Va.
EXHIBITS CONCERNING SPARING MEDICINE AT ZDRAVOOKHRANENIYE-85 AT MOSCOW Abstract Only
Ye. Ponarina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 59-60 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 3 Aug. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19841# Joint Publications Research Service, Arlington, Va.
MAGNETS AND SURGICAL PROCEDURES
V. Sarelyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 62-63 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 23 Aug. 1985 p 3 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19843# Joint Publications Research Service, Arlington, Va.
THERMOVISUAL INDICATORS OF BRAIN RESPONSE TO VISUAL STIMULI Abstract Only
I. A. Shevelev, Ye. N. Tsykalov, A. M. Gorbach, K. P. Budko, and G. A. Sharayev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 75 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 538-543 Original language document was announced in IAA as A86-10695 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19844# Joint Publications Research Service, Arlington, Va.
NEURONAL RESPONSE AND EVOKED POTENTIALS IN SUBCORTICAL FORMATIONS IN VISUAL PERCEPTION. PART 1: PROBLEM FORMULATION AND PRINCIPLES OF SOLUTION Abstract Only
Yu. D. Kropotov and V. A. Ponomarev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 75-76 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 563-575 Original language document was announced in IAA as A86-10696 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19845# Joint Publications Research Service, Arlington, Va.
RESPIRATORY FUNCTION IN INHABITANTS OF NORTH-EASTERN USSR Abstract Only
L. N. Matveyev, A. G. Marachev, A. N. Kozin, S. A. Kharkov, and I. Z. Sheres *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 77-78 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 634-640 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19846# Joint Publications Research Service, Arlington, Va.
EFFECTS OF 24 h SLEEP DEPRIVATION ON BIOGENIC AMINE METABOLISM Abstract Only
T. D. Bolshskova, S. A. Meshcheryakova, V. F. Tyabenkova, N. I. Romanova, Ya. I. Levin, and I. G. Dallakyan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 78-79 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 652-656 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19847# Joint Publications Research Service, Arlington, Va.
VISUAL FORM PERCEPTION FROM HALFTONE IMAGES Abstract Only
A. M. Kuperman and A. B. Kravtsov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 79 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 687-689 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19848# Joint Publications Research Service, Arlington, Va.
PROBLEM OF BIOLOGICAL CLOCKS: NEW DATA ON CIRCADIAN CHANGES IN STATUS OF HUMAN ORGANISM Abstract Only
L. Ya. Glybin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 80 Transl. into ENGLISH from Biofizika (Moscow, USSR), v. 30, no. 4, Jul. - Aug. 1985 p 717-720 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19849# Joint Publications Research Service, Arlington, Va.
ENHANCEMENT OF SOMNIFEROUS EFFECTS OF THERMAL PULSATION BY SIMULTANEOUS APPLICATION TO TWO REFLEXOGENIC ZONES Abstract Only
V. A. Likhtenshteyn and T. M. Mugutdinov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (PRS-UBB-86-001) 2 Jan. 1986 p 80 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 4, Jul. - Aug. 1985 p 689-691 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-19896# Naval Aerospace Medical Research Lab., Pensacola, Fla.
SIMPLE AND CHOICE REACTION TIME IN A SECONDARY TASK UNDER VARIED STIMULUS MODALITY PROBABILITIES Interim Report
D. K. McBride, L. S. Goodman, and J. M. Owens Feb. 1985 12 p
(AD-A159698; NAMRL-1313) Avail: NTIS HC A02/MF A01 CSCL 05/10

Most investigations of attention and attention allocation have been limited to assessments of attention shifting among stimuli simultaneously presented within a single sensory modality. The construct of attention, however, is generally conceptualized as the process which determines the selection of sensory information from all potential sources, among all potential modalities. Although limited in relevance to more real-world, high demand task situations, many of the findings and interpretations from single modality attention studies provide an important theoretical basis for performance assessment in complex task environments requiring multimodal processing. The objective of the present research was to directly assess attention allocation in tasks requiring both visual and auditory information processing. In the present study, modality uncertainty was reduced by experimentally manipulating the probability of stimulus occurrence within a given modality. Furthermore, responding in the present experiment required choice as well as simple reaction, and the responses were made jointly with the continuous execution of a three-axis, compensatory tracking task. As expected, simple and choice reaction times to auditory signals were faster than were those to visual signals. GRA

N86-19897# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EVALUATION OF A MULTI-METHOD GROUP TREATMENT APPROACH FOR THE MANAGEMENT OF STRESS Ph.D. Thesis
S. H. Tallant 1985 322 p
(AD-A160813; AFIT/CI/NR-85-118D) Avail: NTIS HC A14/MF A01 CSCL 05/10

The treatment effectiveness of a stress management package is evaluated. The role of social support as a significant external factor in reducing stress symptomatology is then discussed. It is hypothesized that subjects receiving treatment would obtain significantly greater decreases in stress than subjects in a waiting list condition. Also, it is hypothesized that wait-list subjects with high levels of social support would obtain significant greater decreases in stress than wait-list subjects with low levels of social support. A matched-pair randomized block design is used. Thirty-two subjects are rank ordered on a measure of social support, matched according to level of social support, and randomized into either treatment or wait-list condition. The statistical and clinical results demonstrate the contribution of the stress management package in reducing stress when compared to no treatment intervention. GRA

N86-19898# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION INTO PEER AND SUPERVISOR DIFFERENCES IN THE OBSERVATION OF PERFORMANCE-RELATED BEHAVIORS M.S. Thesis
M. W. Daley Dec. 1985 46 p
(AD-A160819; AFIT/CI/NR-85-132T) Avail: NTIS HC A03/MF A01 CSCL 05/9

Differences between peer and supervisors with respect to the observation of performance-related behaviors using the Instanteneous Report of Judgments (IRJ) technique are examined. Undergraduate students and graduate teaching assistants served as peer and supervisor subjects respectively. All subjects viewed a videotape of an undergraduate giving a major classroom oral presentation. It was hypothesized that peer and supervisor subjects would differentially observe imbedded incidents due to their different role relationships to the presenter. The results indicate partial support for the hypothesis, with supervisor subjects observing significantly more critical incidents. An alternative interpretation for the results, that of rater expertise, is forwarded and discussed. Directions for future research in the area of cognitive processes and performance appraisal are discussed. GRA

N86-19899# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE CLINICAL PREDICTION OF DANGEROUSNESS Ph.D. Thesis
E. R. Williams May 1985 119 p
(AD-A160820; AFIT/CI/NR-85-133D) Avail: NTIS HC A06/MF A01 CSCL 05/10

The failure to accurately predict violent potential in psychiatric patients is currently an area of popular and professional interest. Virtually all studies have shown psychological testing to be a poor predictor of violence. The present investigation utilized typed vignettes which described a brief, fictionalized interview as an analog to an actual contact with a patient. A recent history of violence (an actuarial factor), support by a caring person (an environmental factor), and psychological testing information were systematically manipulated among the vignettes. Vignettes were mailed to psychiatrists in California who are asked to rate dangerousness and to decide if emergency hospitalization was required for the fictionalized patient. Each psychiatrist received one of 16 possible vignettes. Statistical analyses were utilized to determine how the three manipulated variables actually influenced professional decision making, and these results were compared with what factors the psychiatrists said influenced them. Psychological testing exerts a powerful but unwarranted, and possible unconscious, influence on the judgmental process. GRA

N86-19900# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
MESOLIMBIC AND NIGROSTRIATAL DOPAMINERGIC SYSTEMS: BEHAVIORAL NEUROPHARMACOLOGY Ph.D. Thesis
S. L. Hartgraves Aug. 1985 150 p
(AD-A160821; AFIT/CI/NR-85-134D) Avail: NTIS HC A07/MF A01 CSCL 06/15

Drug-induced behaviors associated with the nucleus acumbens and striatum are examined. The use of 6-Hydroxydopamine to anatomically enhance a behavior emanating from one of the above structures (by allowing doses of drugs low enough to prevent major behavioral competition from the other) was only partially successful. Thus, locomotor hyperactivity and circling were enhanced by 6-OHDA-induced lesions of the nucleus accumbens and the medial forebrain bundle, respectively. Bilateral lesions of the striatum did not result in simple enhancement of stereotypic

behavior, but instead caused a unique, self-directed behavior termed stereotypic grooming. Competition between the nucleus accumbens and the striatum for behavioral expression was evident in most of these studies. GRA

N86-19901# Chicago Univ., Ill. Center for Decision Research.
A MODEL OF THE CONJUNCTION FALLACY
H. J. Einhorn Jun. 1985 26 p
(Contract N00014-84-C-0018)
(AD-A160876; TR-15) Avail: NTIS HC A03/MF A01 CSCL 05/10

Tversky & Kahneman show that both sophisticated and naive people, in many different substantive problems, often judge the conjunction of events to be larger than one of its components (hereafter called a single violation). Furthermore, for some problems, people judge the conjunction as larger than both of its components (a double violation). The purpose of this document is to propose a quantitative model of how people judge the probability of conjunctive events. The advantage of the model is that it makes specific predictions as to when conjunction fallacies of different types will or will not occur. Moreover, the model is naturally extended to deal with conjunctive explanations for events. The conjunction fallacy occurs when the judged probability of a conjunctive event is larger than the probability of one (or more) of its constituents. A model of this phenomenon is proposed in which the judged conjunctive probability is a weighted geometric average of the component probabilities, where the weights reflect the representativeness of the components. The model generalizes to the case where the events involve a casual or correlational link, and, to the use of conjunctive explanations of an event. In all three situations, the model specifies the conditions under which different degrees of the fallacy will or will not occur. GRA

N86-19902# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
ON THE ANALYSIS AND DESIGN OF HUMAN INFORMATION PROCESSING ORGANIZATIONS
Kevin L. Boettcher and Robert R. Tenney Oct. 1985 6 p
(Contracts N00014-77-C-0532; N00014-84-K-0519)
(AD-A161015; AD-F620003; LIDS-P-1503) Avail: NTIS HC A02/MF A01 CSCL 05/10

The design of human organizations where members perform routine tasks under the pressure of time is considered. A three-phase approach is outlined. In the first phase, normative decision rules that specify ideal human behavior are obtained. In the second phase, implementations of these decision rules are devised, and descriptions of actual human behavior and workload are developed. Finally a third phase integrates design elements by placing parameters of the implementations for best organization performance, subject to individual member workload limitations. To illustrate the approach, a specific design problem is considered. Author (GRA)

N86-19903# Essex Corp., Orlando, Fla.
AN ANALYSIS OF VISUAL TASKS IN HELICOPTER SHIPBOARD LANDING Final Technical Report, Sep. 1981 - Apr. 1985
K. S. Berbaum and R. S. Kennedy 1 Nov. 1985 62 p
(Contract N61339-81-C-0105)
(AD-A161101; EOTR-85-7) Avail: NTIS HC A04/MF A01 CSCL 05/8

The purpose of this research effort was to identify visual research issues concerning helicopter landings, particularly the hover phase, for future study in the Visual Technology Research Simulator (VTRS) program. Identification of salient visual issues is a step toward surfacing equipment features that can be modified and studied. As we discussed the task with pilots, reviewed NATOPS manuals, and simulations witnessed, it became apparent that the visual task may differ depending upon whether: experienced or inexperienced pilots are flying; a simulator or an aircraft is flown; the environment is day or night; the pilot sought to acquire or maintain a skill level. As a way of limiting this broad project, it was elected to review intensively a scenario involving a highly experienced operator flying dusk/night approaches in a simulator. The Naval aviator selected was prompted by another aviator more familiar with the objective who dictated verbal protocols of his visual and control activities during several landings. These protocols were sorted into 10 phases in order to correspond to increasing distances in the landing task and the visual information processing within each stage was described. Therefore, the stages are delimited in terms of range or altitude from the ship. We believe the most useful outcome of this analysis will be a list of visual cue augmentations that may be implemented and studied over the various stages of landing. GRA

N86-19904# Brown Univ., Providence, R. I. Center for Neural Science.
LOCAL AND GLOBAL FACTORS IN LEARNING
Leon N. Cooper 6 Nov. 1985 42 p
(AD-A161128; TR-28) Avail: NTIS HC A03/MF A01 CSCL 05/10

Recent progress in the interaction of theoretical ideas and experimental results that relate to learning and memory is discussed. Consideration is given, in particular, to the effects of the neurotransmitters GABA, Norepinephrine and Acetylcholine on the development of circuitry in visual cortex. That most intriguing aspect of human memory is that: its persistence in spite of continual loss of individual neurons over the lifetime of the individual has led many workers to the concept of distributed memory. For a distributed memory (more like a hologram than a photograph) possesses in a very natural way the property of relative invulnerability to the loss of storage units. Individual memory sites hold superimposed information concerning many events. We can make complex decisions in small parts of a second. This suggests very strongly that there is much parallel processing in the brain - an idea that is almost obvious on inspection of component such as the retina. It is now commonly thought that the synaptic junction may be a means to store information (memory, for example) as well as to transmit it from neuron to neuron. GRA

N86-19905# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
THE INFLUENCE OF QUALITY CIRCLES ON ATTITUDINAL OUTCOMES AMONG CIVIL ENGINEERING PERSONNEL M.S. Thesis
Alfred E. Thal, Jr. Sep. 1985 29 p
(AD-A161152; AFIT/GEM/LSB/85S-21) Avail: NTIS HC A03/MF A01 CSCL 13/2

This thesis investigated the influence of QCs on various satisfaction levels among Air Force civil engineering personnel with the objective being to determine whether a relationship exists between QC membership and an employee's level of satisfaction/morale. Surveys were mailed to a sample of QC members and nonmembers working in civil engineering squadrons at five different bases. Statistical analysis consisted of reliability estimation, Pearson correlation, and Student's t-tests. The results of this research indicated that there were significant differences between QC members and nonmembers on two variables: self-ratings of both job performance and job effort. In fact, it appeared that QC members scored lower, but not significantly lower, on many of the variables. The many weaknesses inherent in this study suggest that these results are tentative, at best. Four tenable explanations for the results are given. If QCs are to be increasingly used by the government, further research into the outcomes of the QC process are warranted. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-19906*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEMS:

CELSS 1985 WORKSHOP
Robert D. MacElroy, ed., Norman V. Martello, ed., and David T. Smernoff, ed. Jan. 1986 624 p refs Workshop held at Moffett Field, Calif., 16-19 Jul. 1985
(NASA-TM-88215; A-86132; NAS 1.15:88215) Avail: NTIS HC A99/MF A01 CSCL 06K

Various topics related to closed ecological systems are discussed. Space habitats, vegetative growth, photosynthesis, recycling, culture techniques, waste utilization bioreactors and controlled atmospheres on space stations are among the topics covered. For individual titles, see N86-19907 through N86-19943.

N86-19907*# Massachusetts Inst. of Tech., Cambridge. Dept. of Applied Biological Sciences.
POTENTIAL FOR UTILIZATION OF ALGAL BIOMASS FOR COMPONENTS OF THE DIET IN CELSS
A. R. Kamarei, Z. Nakhost, and M. Karel *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 13-22 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The major nutritional components of the green algae (Scenedesmus obliquus) grown in a Constant Cell Density Apparatus were determined. Suitable methodology to prepare proteins from which three major undesirable components of these cells (i.e., cell walls, nucleic acids, and pigments) were either removed or substantially reduced was developed. Results showed that processing of green algae to protein isolate enhances is potential nutritional and organoleptic acceptability as a diet component in controlled Ecological Life Support System. Author

N86-19908*# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
BLSS, A EUROPEAN APPROACH TO CELSS
A. Ingemar Skoog *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 23-33 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Several studies have revealed the benefits of a biological life support system (BLSS) in space stations. Problem areas requiring experimental and analytical investigations necessary for the development of BLSS have been identified. The nature of these problems allows for the classification into near-term (prepilot) and long-term (pilot) studies, and into terrestrial and space research programmes. The knowledge of planned European and U.S. space experiments allows for a coordination with existing Spacelab and Shuttle programmes to avoid duplication of research efforts. The Japanese also plan biological experiments on Spacelab in 1988. Coordinating efforts should provide answers to certain BLSS relevant questions. Major areas which need immediate attention are: micorgravity effects; cosmic radiation effects; use of PAR-radiation and high energy particle radiation protection; and monitoring and control (including sensor technology). R.J.F.

N86-19909*# National Aerospace Lab., Tokyo (Japan).
CELSS EXPERIMENT MODEL AND DESIGN CONCEPT OF GAS RECYCLE SYSTEM
Keiji Nitta, Mitsuo Oguchi, and Syuji Kanda (Kawasaki Heavy Industries Ltd., Kobe, Japan) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 35-46 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

In order to prolong the duration of manned missions around the Earth and to expand the human existing region from the Earth to other planets such as a Lunar Base or a manned Mars flight mission, the controlled ecological life support system (CELSS) becomes an essential factor of the future technology to be developed through utilization of space station. The preliminary system engineering and integration efforts regarding CELSS have been carried out by the Japanese CELSS concept study group for clarifying the feasibility of hardware development for Space station experiments and for getting the time phased mission sets after FY 1992. The results of these studies are briefly summarized and the design and utilization methods of a Gas Recycle System for CELSS experiments are discussed. Author

N86-19910*# Yokohama National Univ. (Japan). Dept. of Chemical Engineering.
UTILIZATION OF MEMBRANES FOR H2O RECYCLE SYSTEM
Haruhiko Ohya and Mitsuo Oguchi (National Aerospace Lab., Tokyo, Japan) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 47-53 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Conceptual studies of closed ecological life support systems (CELSS) carried out at NAL in Japan for a water recycle system using membranes are reviewed. The system will treat water from shower room, urine, impure condensation from gas recycle system, and so on. The H2O recycle system is composed of prefilter, ultrafiltration membrane, reverse osmosis membrane, and distillator. Some results are shown for a bullet train of toilet-flushing water recycle equipment with an ultraviltration membrane module. The constant value of the permeation rate with a 4.7 square meters of module is about 70 1/h after 500th of operation. Thermovaporization with porous polytetrafluorocarbon membrane is also proposed to repice the distillator. Author

N86-19911*# Commissariat a l'Energie Atomique, Cadarache (France). Service de Radioagronomie.
THE C23A SYSTEM, AN EXMAPLE OF QUANTITATIVE CONTROL OF PLANT GROWTH ASSOCIATED WITH A DATA BASE
Marcel Andre, Alain Daguenet, Daniel Massimino, and Alain Gerbaud *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 55-64 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The architecture of the C23A (Chambers de Culture Automatique en Atmosphere Artificielles) system for the controlled study of plant physiology is described. A modular plant growth chambers and associated instruments (I.R. CO2 analyser, Mass spectrometer and Chemical analyser); network of frontal processors controlling this apparatus; a central computer for the periodic control and the multiplex work of processors; and a network of terminal computers able to ask the data base for data processing and modeling are discussed. Examples of present results are given. A growth curve analysis study of CO2 and O2 gas exchanges of shoots and roots, and daily evolution of algal photosynthesis and of the pools of dissolved CO2 in sea water are discussed. R.J.F.

N86-19912*# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Raumfahrttechnik G.m.b.H.
DESCRIPTION OF CONCEPT AND FIRST FEASIBILITY TEST RESULTS OF A LIFE SUPPORT SUBSYSTEM OF THE BOTANY FACILITY BASED ON WATER RECLAMATION
Helmut R. Loeser *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 65-76 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The Botany Facility allows the growth of higher plants and fungi over a period of 6 months maximum. It is a payload planned for the second flight of the Eureca platform around 1990. Major tasks of the Life Support Subsystem (LSS) of the Botany Facility include the control of the pressure and composition of the atmosphere within the plant/fungi growth chambers, control of the temperature and humidity of the air and the regulation of the soil water content within specified limits. Previous studies have shown that various LSS concepts are feasible ranging from heavy, simple and cheap to light, complex and expensive solutions. A summary of those concepts is given. A new approach to accomplish control of the temperature and humidity of the air within the growth chambers based on water reclamation is discussed. This reclamation is achieved by condensation with a heat pump and capillary transport of the condensate back into the soil of the individual growth chamber. Some analytical estimates are given in order to

obtain guidelines for circulation flow rates and to determine the specific power consumption. R.J.F.

N86-19913*# Niigata Univ. (Japan). Dept. of Civil Engineering.
WET-OXIDATION WASTE MANAGEMENT SYSTEM FOR CELSS c25
Yukio Takahashi and Haruhiko Ohya (Yokohama National Univ., Japan) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 77-84 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 07B

A wet oxidation system will be useful in the Closed Ecological Life Support System (CELSS) as a facility to treat organic wastes and to redistribute inorganic compounds and elements. However at rather higher temperatures needed in this reaction, for instance, at 260 deg C, only 80% of organic in a raw material can be oxidized, and 20% of it will remain in the liquid mainly as acetic acid, which is virtually noncombustible. Furthermore, nitrogen is transformed to ammonium ions which normally cannot be absorbed by plants. To resolve these problems, it becomes necessary to use catalysts. Noble metals such as Ru, Rh and so on have proved to be partially effective as these catalysts. That is, oxidation does not occur completely, and the unexpected denitrification, instead of the expected nitrification, occurs. So, it is essential to develop the catalysts which are able to realize the complete oxidation and the nitrification. Author

N86-19914*# North Carolina State Univ., Raleigh. Dept. of Soil Science.
SIMULATION MODEL FOR PLANT GROWTH IN CONTROLLED ENVIRONMENT SYSTEMS
C. David Raper, Jr. and Mien Wann *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 85-101 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The role of the mathematical model is to relate the individual processes to environmental conditions and the behavior of the whole plant. Using the controlled-environment facilities of the phytotron at North Carolina State University for experimentation at the whole-plant level and methods for handling complex models, researchers developed a plant growth model to describe the relationships between hierarchial levels of the crop production system. The fundamental processes that are considered are: (1) interception of photosynthetically active radiation by leaves, (2) absorption of photosynthetically active radiation, (3) photosynthetic transformation of absorbed radiation into chemical energy of carbon bonding in solube carbohydrates in the leaves, (4) translocation between carbohydrate pools in leaves, stems, and roots, (5) flow of energy from carbohydrate pools for respiration, (6) flow from carbohydrate pools for growth, and (7) aging of tissues. These processes are described at the level of organ structure and of elementary function processes. The driving variables of incident photosynthetically active radiation and ambient temperature as inputs pertain to characterization at the whole-plant level. The output of the model is accumulated dry matter partitioned among leaves, stems, and roots; thus, the elementary processes clearly operate under the constraints of the plant structure which is itself the output of the model. R.J.F.

N86-19915*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PLAN FOR CELSS TEST BED PROJECT
William M. Knott *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 109-118 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The Closed Ecological Life Support Systems (CELSS) testbed project will achieve two major goals: It will develop the knowledge and technology needed to build and test biological or combined biological physiochemical regenerative life support systems. It will fabricate, test, and operate ground based facilities to accomplish proof-of-concent testing and evaluation leading to flight experimentation. The project will combine basic research and applied research/engineering to achieve a phased, integrated development of hardware, systems, and techniques for food and oxygen production, food processing, and waste processing in closed systems. The project will design, fabricate, and operate within three years a botanical production system scaled to a sufficient size to verify oxygen and nutrient load production (carbohydrates, fats, proteins) at a useable level. It will develop within five years a waste management system compatible with the botanical production system and a food processing system that converts available biomass into edible products. It will design, construct, and operate within ten years a ground based candidate CELSS that includes man as an active participant in the system. It will design a flight CELSS module within twelve years and construct and conduct initial flight tests within fifteen years. R.J.F.

N86-19916*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PLANT GROWTH CHAMBER M DESIGN
Ralph P. Prince and William M. Knott *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 119-128 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Crop production is just one of the many processes involved in establishing long term survival of man in space. The benefits of integrating higher plants into the overall plan was recognized early by NASA through the Closed Ecological Life Support System (CELSS) program. The first step is to design, construct, and operate a sealed (gas, liquid, and solid) plant growth chamber. A 3.6 m diameter by 6.7 m high closed cylinder (previously used as a hypobaric vessel during the Mercury program) is being modified for this purpose. The chamber is mounted on legs with the central axis vertical. Entrance to the chamber is through an airlock. This chamber will be devoted entirely to higher plant experimentation. Any waste treatment, food processing or product storage studies will be carried on outside of this chamber. Its primary purpose is to provide input and output data on solids, liquids, and gases for single crop species and multiple species production using different nutrient delivery systems. R.J.F.

N86-19917*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
OPERATIONAL DEVELOPMENT OF SMALL PLANT GROWTH SYSTEMS
H. W. Scheld (PhytoResource Research, Inc., College Station, Tex.), J. W. Magnuson (PhytoResource Research, Inc., College Station, Tex.), and R. L. Sauer *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 129-150 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The results of a study undertaken on the first phase of an empricial effort in the development of small plant growth chambers for production of salad type vegetables on space shuttle or space station are discussed. The overall effort is visualized as providing the underpinning of practical experience in handling of plant systems in space which will provide major support for future efforts in planning, design, and construction of plant-based (phytomechanical) systems for support of human habitation in space. The assumptions underlying the effort hold that large scale phytomechanical habitability support systems for future space stations must evolve from the simple to the complex. The highly complex final systems will be developed from the accumulated experience and data gathered from repetitive tests and trials of fragments or subsystems of the whole in an operational mode. These developing system components will, meanwhile, serve a useful operational function in providing psychological support and diversion for the crews. R.J.F.

N86-19918*# New Hampshire Univ., Durham. Complex Systems Research Center.
ELECTROCHEMICAL CONTROL OF pH IN A HYDROPONIC NUTRIENT SOLUTION
Steven H. Schwartzkopf *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 151-158

refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The electrochemical pH control system described was found to provide a feasible alternative method of controlling nutrient solution pH for CELSS applications. The plants grown in nutrient solution in which the pH was controlled electrochemically showed no adverse effects. Further research into the design of a larger capacity electrode bridge for better control is indicated by the results of this experiment, and is currently under way. Author

N86-19919*# Battelle Columbus Labs., Ohio.
AN ENGINEERING ANALYSIS OF A CLOSED CYCLE PLANT GROWTH MODULE
George H. Stickford, Jr., Frank E. Jakob, and D. Karl Landstrom *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 159-181 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The SOLGEM model is a numerical engineering model which solves the flow and energy balance equations for the air flowing through a growing environment, assuming quasi-steady state conditions within the system. SOLGEM provides a dynamic simulation of the controlled environment system in that the temperature and flow conditions of the growing environment are estimated on an hourly basis in response to the weather data and the plant growth parameters. The flow energy balance considers the incident solar flux; incoming air temperature, humidity, and flow rate; heat exchange with the roof and floor; and heat and moisture exchange with the plants. A plant transpiration subroutine was developed based plant growth research facility, intended for the study of bioregenerative life support theories. The results of a performance analysis of the plant growth module are given. The estimated energy requirements of the module components and the total energy are given. R.J.F.

N86-19920*# National Aerospace Lab., Tokyo (Japan).
GAS AND WATER RECYCLING SYSTEM FOR IOC VIVARIUM EXPERIMENTS
Keiji Nitta and Koji Otsubo *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 185-200 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Water and gas recycling units designed as one of the common experiment support system for the life science experiment facilities used in the Japanese Experiment Module are discussed. These units will save transportation and operation costs for the life science experiments in the space station. These units are also designed to have interfaces so simple that the connection to another life science experiment facilities such as the Research Animal Holding Facility developed by the Rockheed Missiles and Space Company can be easily done with small modification. R.J.F.

N86-19921*# National Aerospace Lab., Tokyo (Japan).
WATER RECYCLING SYSTEM USING THERMOPERVAPORATION METHOD
Keiji Nitta, Akira Ashida (Hitachi Ltd., Tokyo, Japan), Kenji Mitani (Hitachi Ltd., Tokyo, Japan), Katsuya Ebara (Hitachi Ltd., Tokyo, Japan), and Akira Yamada *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 201-225 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

A water recycling system concept for the crew of the space station is presented. A thermopervaporation method is a new key technology used for the distillation process, utilizing a hydrophobic membrane. An experimental study of thermopervaporation revealed that the permeation depends on the gap between the membrane and the cooling surface in the condensation room: the steam diffusion occurs with gaps less than 5 mm while natural convection becomes dominant with gaps more than 5 mm. A brief discussion of the system operation is also described. Author

N86-19922*# MODEC, Cambridge, Mass.
SUPERCRITICAL WASTE OXIDATION OF AQUEOUS WASTES
Michael Modell *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 227-251 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 07B

For aqueous wastes containing 1 to 20 wt% organics, supercritical water oxidation is less costly than controlled incineration or activated carbon treatment and far more efficient than wet oxidation. Above the critical temperature (374 C) and pressure (218 atm) of water, organic materials and gases are completely miscible with water. In supercritical water oxidation, organics, air and water are brought together in a mixture at 250 atm and temperatures above 400 C. Organic oxidation is initiated spontaneously at these conditions. The heat of combustion is released within the fluid and results in a rise in temperature 600 to 650 C. Under these conditions, organics are destroyed rapidly with efficiencies in excess of 99.999%. Heteroatoms are oxidized to acids, which can be precipitated out as salts by adding a base to the feed. Examples are given for process configurations to treat aqueous wastes with 10 and 2 wt% organics. Author

N86-19923*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIRBORNE TRACE CONTAMINANTS OF POSSIBLE INTEREST IN CELSS
John S. Garavelli *In its* Controlled Ecological Life Support Systems Jan. 1986 p 253-262 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

One design goal of Closed Ecological Life Support Systems (CELSS) for long duration space missions is to maintain an atmosphere which is healthy for all the desirable biological species and not deleterious to any of the mechanical components in that atmosphere. CELESS design must take into account the interactions of at least six major components; (1) humans and animals, (2) higher plants, (3) microalgae, (4) bacteria and fungi, (5) the waste processing system, and (6) other mechanical systems. Each of these major components can be both a source and a target of airborne trace contaminants in a CELSS. A range of possible airborne trace contaminants is discussed within a chemical classification scheme. These contaminants are analyzed with respect to their probable sources among the six major components and their potential effects on those components. Data on airborne chemical contaminants detected in shuttle missions is presented along with this analysis. The observed concentrations of several classes of compounds, including hydrocarbons, halocarbons, halosilanes, amines and nitrogen oxides, are considered with respect to the problems which they present to CELSS. Author

N86-19924*# New Hampshire Univ., Durham. Complex Systems Research Center.
OBSERVATIONS ON GAS EXCHANGE AND ELEMENT RECYCLE WITHIN A GAS-CLOSED ALGAL-MOUSE SYSTEM
David T. Smernoff, Robert A. Wharton, Jr., and Maurice M. Averner *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 263-280 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Life support systems based on bioregeneration rely on the control and manipulation of organisms. Algae are potentially useful for a variety of Closed Ecological Life Support System (CELSS) functions including the revitalization of atmospheres, production of food and for nitrogen fixation. The results of experiments conducted with a gas-closed algal-mouse system designed to investigate gas exchange phenomena under varying algal environmental conditions, and the ability of algae to utilize oxidized mouse solid waste are reported. Inherent instabilities exist between the uptake and release of carbon dioxide (CO_2) and oxygen (O_2) by the mouse and algae in a gas-closed system. Variations in light intensity and cell density alter the photosynthetic rate of the algae and enable short-term steady-state concentrations of atmospheric CO_2 and O_2. Different nitrogen sources (urea and nitrate) result in different algal assimilatory quotients (AQ). Combinations of photosynthetic rate and AQ ratio manipulations were examined

for their potential in stabilizing atmospheric gas concentrations in the gas-closed algal-mouse system. R.J.F.

N86-19925*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CELSS SCIENCE NEEDS
John D. Rummel *In its* Controlled Ecological Life Support Systems Jan. 1986 p 281-284 (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Questions and areas of study that need to be persued in order to develope a Controlled Ecological Life Support System are posed. Research topics needing attention are grouped under various leadings: ecology, genetics, plant pathology, cybernetics, chemistry, computer science, fluid dynamics, optics, and solid-state physics. R.J.F.

N86-19926*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGN CONCEPTS FOR BIOREACTORS IN SPACE
P. K. Seshan, G. R. Peterson, B. Beard (Washington Univ., St. Louis, Mo.), and E. H. Dunlop (Washington Univ., St. Louis, Mo.) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 287-313 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Microbial food sources are becoming viable and more efficient alternatives to conventional food sources especially in the context of Closed Ecological Life Support Systems (CELSS) in space habitats. Since bioreactor designs for terrestrial operation will not readily apply to conditions of microgravity, there is an urgent need to learn about the differences. These differences cannot be easily estimated due to the complex nature of the mass transport and mixing mechanisms in fermenters. Therefore, a systematic and expeditious experimental program must be undertaken to obtain the engineering data necessary to lay down the foundations of designing bioreactors for microgravity. Two bioreactor design concepts presented represent two dissimilar approaches to grappling with the absence of gravity in space habitats and deserve to be tested for adoption as important components of the life support function aboard spacecrafts, space stations and other extra-terrestrial habitats. R.J.F.

N86-19927*# Martin Marietta Corp., Baltimore, Md.
AN ANALYSIS OF THE PRODUCTIVITY OF A CELSS CONTINUOUS ALGAL CULTURE SYSTEM
R. Radmer, P. Behrens, E. Fernandez, and K. Arnett *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 315-328 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

One of the most attractive aspects of using algal cultures as plant components for a Closed Ecological Life Support Systems (CELSS) is the efficiency with which they can be grown. Although algae are not necessarily intrinsically more efficient than higher plants, the ease which they can be handled and manipulated (more like chemical reagents than plants), and the culturing techniques available, result in much higher growth rates than are usually attainable with higher plants. Furthermore, preliminary experiments have demonstrated that algal growth and physiology is not detectable altered in a microgravity environment, (1) whereas the response of higher plants to zero gravity is unknown. In order to rationally design and operate culture systems, it is necessary to understand how the macroparameters of a culture system, e.g., productivity, are related to the physiological aspects of the algal culture. A first principles analysis of culture system is discussed, and a mathematical model that describes the relationship of culture productivity to the cell concentration of light-limited culture is derived. The predicted productivity vs cell concentration curve agrees well with the experimental data obtained to test this model, indicating that this model permits an accurate prediction of culture productivity given the growth parameters of the system. R.J.F.

N86-19928*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DEVELOPMENT OF AN UNCONVENTIONAL FOOD REGENERATION PROCESS: QUANTIFYING THE NUTRITIONAL COMPONENTS OF A MODEL METHYLOTROPHIC YEAST
Gene R. Petersen and Barry O. Stokes (Biomass International, Ogden, Utah) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 329-338 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

A hybrid chemical/biological approach to unconventional food regeneration is discussed. Carbon dioxide and water, the major wastes of human metabolism would be converted to methanol by one of several physiochemical processes available (thermal, photocatalytic, etc.). Methanol is then used to supply carbon and energy for the culture of microorganisms which in turn produce biological useful basic food stuffs for human nutrition. Our work has focused on increasing the carbohydrate levels of a candidate methylotrophic yeast to more nearly coincide with human nutritional requirements. Yeasts were chosen due to their high carbohydrate levels compared to bacteria and their present familiarity in the human diet. The initial candidate yeast studied was a thermotolerant strain of Hansenula polymor pha, DL-1. The quantitative results that permit an evaluation of the overall efficiency in hybrid chemical/biological food production schemes are discussed. A preliminary evaluation of the overall efficiency of such schemes is also discussed. R.J.G.

N86-19929*# California Univ., Berkeley. Lawrence Berkeley Lab. Membrane Bioenergetics Group.
APPLICATION OF PHOTOSYNTHETIC N2-FIXING CYANOBACTERIA TO THE CELSS PROGRAM
Lester Packer, Ian Fry, and Shimshon Belkin *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 339-352 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Commercially available air lift fermentors were used to simultaneously monitor biomass production, N2-fixation, photosynthesis, respiration, and sensitivity to oxidative damage during growth under various nutritional and light regimes, to establish a data base for the integration of these organisms into a Closed Ecological Life Support System (CELSS) program. Certain cyanobacterial species have the unique ability to reduce atmospheric N2 to organic nitrogen. These organisms combine the ease of cultivation characteristics of prokaryotes with the fully developed photosynthetic apparatus of higher plants. This, along with their ability to adapt to changes in their environment by modulation of certain biochemical pathways, make them attractive candidates for incorporation into the CELSS program. R.J.F.

N86-19930*# Cornell Univ., Ithaca, N.Y. School of Chemical Engineering.
CARBON DIOXIDE EVOLUTION RATE AS A METHOD TO MONITOR AND CONTROL AN AEROBIC BIOLOGICAL WASTE TREATMENT SYSTEM
S. S. Lee and M. L. Shuler *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 354-391 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

An experimental system was developed to study the microbial growth kinetic of an undefined mixed culture in an erobic biological waste treatment process. The experimental results were used to develop a mathematical model that can predict the performance of a bioreactor. The bioreactor will be used to regeneratively treat waste material which is expected to be generated during a long term manned space mission. Since the presence of insoluble particles in the chemically undefined complex media made estimating biomass very difficult in the real system, a clean system was devised to study the microbial growth from the soluble substrate. R.J.F.

N86-19931*# Commissariat a l'Energie Atomique, Cadarache (France). Service de Radioagronomie.
CAN PLANTS GROW IN QUASI-VACUUM?
M. Andre and Ch. Richaud *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 395-404 refs (For primary document see N86-19906 10-54)
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It was found that the growth of plants is possible under absolute pressure 14 times lower than the atmospheric pressure. In first approximation, plants ignore the absence of nitrogen and only react to the partial pressure of O2. Hence the growth of plantlets was delayed under low pressures of O2 in both cases with and without nitrogen. The CO2 availability being limited by the carbon content of the seed, the final results after 20 days were very similar. R.J.F.

N86-19932*# Commissariat a l'Energie Atomique, Cadarache (France). Service de Radioagronomie.
WHEAT RESPONSE TO CO2 ENRICHMENT: CO2 EXCHANGES TRANSPIRATION AND MINERAL UPTAKES
M. Andre, H. DuCloux, and Ch. Richaud *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 405-428 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

When simulating canopies planted in varied densities, researchers were able to demonstrate that increase of dry matter production by enhancing CO2 quickly becomes independant of increase of leaf area, especially above leaf area index of 2; dry matter gain results mainly from photosynthesis stimulation per unit of surface (primary CO2 effect). When crop density is low (the plants remaining alone a longer time), the effects of increasing leaf surface (tillering, leaf elongation here, branching for other plants etc.) was noticeable and dry matter simulation factor reached 1.65. This area effect decreased when canopy was closed in, as the effect of different surfaces no longer worked. The stimulation of photosynthesis reached to the primary CO2 effect. The accumulation in dry matter which was fast during that phase made the original weight advantage more and more neglectible. Comparison with short term measurements showed that first order long term effect of CO2 in wheat is predictible with short term experiment, from the effect of CO2 on photosynthesis measured on reference sample. R.J.F.

N86-19933*# California Univ., Davis. Plant Growth Lab.
EFFECTS OF NO3(-) AND NH4(+) AND UREA ON EACH OTHER'S UPTAKE AND INCORPORATION
Ray C. Huffaker and Michael R. Ward *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 429-445 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The purpose was to determine the optimal use by wheat plants of the N sources expected from processing biological waste products, NO3(-),NO2(-)NH4(+), and urea. The approach was to determine the uptake and metabolic products of each N source (from single and multiple component solutions), inhibitory effects of each, feedback inhibition, and overall in vivo regulation of the rates of assimilation of each by wheat plants. Previously, researchers determined the interactions of NO3(-),NO2(-),NH4(+) on each other's uptake and incorporation. The assimilation and some of its effects on NO3(-) and NH4(+) assimilation which have been completed to data are discussed. R.J.F.

N86-19934*# Utah State Univ., Logan. Plant Science Dept.
STUDIES ON MAXIMUM YIELD OF WHEAT FOR THE CONTROLLED ENVIRONMENTS OF SPACE
Bruce G. Bugbee and Frank B. Salisbury *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 447-485 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The economic feasibility of using food-producing crop plants in a closed ecological Life-Support System (CELSS) will ultimately depend on the energy and area (or volume) required to provide the nutritional requirements for each person. Energy and area requirements are, to some extent, inversely related; that is, an increased energy input results in a decreased area requirement and vice versa. A major goal of the research effort was to determine the controlled-environment good-production efficiency of wheat per unit area, per unit time, and per unit energy input. R.J.F.

N86-19935*# Wisconsin Univ., Madison. Dept. of Horticulture.
UTILIZATION OF POTATOES IN CELSS: PRODUCTIVITY AND GROWING SYSTEMS
T. W. Tibbitts *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 487-498 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The potato plant (solanum tuberosum L.) is one of the basic food crops that should be studied for use in NASA's closed Ecological Life Support System (CELSS). It offers high yields per unit area and time, with most of this production in the form of highly digestible carbohydrate. Potatoes, like wheat and rice, are particularly useful in human diets because of their nutritional versatility and ease of processing and preparation. The growth of the potato was studied and it was found to be a useful species for life support systems. R.J.F.

N86-19936*# Purdue Univ., West Lafayette, Ind. Dept. of Horticulture.
OPTIMIZATION OF CONTROLLED ENVIRONMENTS FOR HYDROPONIC PRODUCTION OF LEAF LETTUCE FOR HUMAN LIFE SUPPORT IN CELSS
Cary A. Mitchell, Sharon L. Knight, and Tameria L. Ford *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 499-521 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

A research project in the food production group of the Closed Ecological Life Support System (CELSS) program sought to define optimum conditions for photosynthetic productivity of a higher plant food crop. The effects of radiation and various atmospheric compositions were studied. R.J.F.

N86-19937*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CLOSED CULTURE PLANT STUDIES: IMPLICATIONS FOR CELSS
Takashi Hoshizaki *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 523-540 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Arabidopsis plants were grown in closed cultures similar to those used in space experiments. A shift in metabolism from photosynthesis to respiration is indicated by the accumulation of CO2 in the culture atmosphere. Reproductive growth is suppressed. Plant growth and development is apparently related to the atmospheric volume available to each plant. The implications of these findings to closed ecological systems are given: (1) there is a need for an open culture having ample gas exchange, (2) CO2 levels must be maintained within prescribed limits, (3) the minimum atmospheric volume required for each plant is dependent on the precision of the gas monitors and of the subsystems used to maintain appropriate levels of various atmospheric components, and (4) volatiles such as ethylene and terpenes emanating from plants be monitored and reduced to benign concentrations. R.J.F.

N86-19938*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A METHOD FOR SCREENING OF PLANT SPECIES FOR SPACE USE
J. D. Goeschl (Phytokinetics, Inc., College Station, Tex.), R. L Sauer, and H. W. Scheld (PhytoResource Research, Inc., College Station, Tex.) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 541-554 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

A cost-effective methodology which monitors numerous dynamic aspects of carbon assimilation and allocation kinetics in

e, intact plants is discussed. Analogous methods can apply to rogen uptake and allocation. This methodology capitalizes on e special properties of the short-lived, positron-gamma emitting otope C-11 especially when applied as CO2-11 in a special tended square wave (ESW) pattern. The 20.4 minute half-life lows for repeated or continuous experiments on the same plant er periods of minutes, hours, days, or weeks. The steady-state otope equilibrium approached during the ESW experiments, and e parameters which can be analyzed by this technique are also rect results of that short half-life. Additionally, the paired .511 MeV amma rays penetrate any amount of tissue and their 180 dog pposite orientation provides good collimation and allows coincience counting which nearly eliminates background. R.J.F.

N86-19939*# Wisconsin Univ., Madison. Dept. of Horticulture.
OTATO LEAF EXPLANTS AS A SPACEFLIGHT PLANT TEST YSTEM
aymond M. Wheeler *In* NASA. Ames Research Center Controlled cological Life Support Systems Jan. 1986 p 555-564 refs (For rimary document see N86-19906 10-54)
vail: NTIS HC A99/MF A01 CSCL 06K

The use of explant tissues or organs may circumvent limitations acing whole-plant experimentation during spaceflight. In the case f potato, a crop currently being studied for application to ioregenerative life support systems, excised leaves and their ubtended axillary buds can be used to test a variety of stem rowth and development phases ranging from tubers through tolons (horizontal stems) to upright leafy shoots. The leaves can e fit well into small-volume test packages and sustained under elatively low irradiance levels using light-weight growing media. Tubers formed on potato leaf cuttings can yield up from 0.5 to .0 g fresh mass 10 days after excision and up to 2.0 g or more, 4 days from excision. Author

N86-19940*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECT OF ULTRADIAN AND ORBITAL CYCLES ON PLANT GROWTH
Wade Berry (California Univ., Los Angeles), Takashi Hoshizaki, and Albert Ulrich (California Univ., Berkeley) *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 565-575 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

In a series of experiments using sugar beets, researchers nvestigated the effects of varying cycles lengths on growth 0.37 hr to 48 hr). Each cycle was equally divided into a light and dark period so that each treatment regardless of cycle length eceived the same amount of light over the 17 weeks of the xperiment. Two growth parameters were used to evaluate the ffects of cycle length, total fresh weight and sucrose content of he storage root. Both parameters showed very similar responses n that under long cycles (12 hr or greater) growth was normal, whereas plants growing under shorter cycle periods were progressively inhibited. Minimum growth occurred at a cycle period of 0.75 hr. The yield at the 0.75 hr cycle, where was at a minimum, for total fresh weight was only 51 percent compared to the 24 hr cycle. The yield of sucrose was even more reduced at 41 percent of the 24 hr cycle. R.J.F.

N86-19941*# North Carolina State Univ., Raleigh. Dept. of Soil Science.
NITROGEN UPTAKE AND UTILIZATION BY INTACT PLANTS
C. David Raper, Jr. and Leslie C. Tolley-Henry *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 577-594 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The results of experiments support the proposed conceptual model that relates nitrogen uptake activity by plants as a balanced interdependence between the carbon-supplying function of the shoot and the nitrogen-supplying function of the roots. The data are being used to modify a dynamic simulation of plant growth, which presently describes carbon flows through the plant, to describe nitrogen uptake and assimilation within the plant system. Although several models have been proposed to predict nitrogen uptake and partitioning, they emphasize root characteristics affecting nutrient uptake and relay on empirical methods to describe the relationship between nitrogen and carbon flows within the plant. Researchers, on the other hand, propose to continue to attempt a mechanistic solution in which the effects of environment on nitrogen (as well as carbon) assimilation are incorporated through their direct effects on photosynthesis, respiration, and aging processes. R.J.F.

N86-19942*# North Dakota State Univ., Fargo. Dept. of Plant Pathology.
THE ROLE OF PLANT DISEASE IN THE DEVELOPMENT OF CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEMS
Berlin Nelson *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 595-610 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

Plant diseases could be important factors affecting growth of higher plants in Closed Ecological Life Support Systems (CELSS). Disease control, therefore, will be needed to maintain healthy plants. The most important controls should be aimed at preventing the introduction, reproduction and spread of pathogens and preventing plant infection. An integrared ease control program will maximize that approach. In the design and operation of CELSS, plant disease should be considered an important aspect of plant growth. The effects of plant diseases are reviewed and several disease control measures are discussed. R.J.F.

N86-19943*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF SPACE TECHNOLOGY FOR ECOLOGICAL HABITATS
Norman V. Martello *In* NASA. Ames Research Center Controlled Ecological Life Support Systems Jan. 1986 p 613-625 refs (For primary document see N86-19906 10-54)
Avail: NTIS HC A99/MF A01 CSCL 06K

The development of closed ecological systems for space stations is discussed. Growth chambers, control systems, microgravity, ecosystem stability, lighting equipment, and waste processing systems are among the topics discussed. R.J.F.

N86-19944# Navy Clothing and Textile Research Facility, Natick, Mass.
REFURBISHING SPRAY ON ALUMINUM ENAMEL ON PROXIMITY CLOTHING Final Technical Report, Oct. 1982 - Sep. 1983
H. Winer, J. Walker, P. Campbell, and J. Calfee Jul. 1985 25 p (Contract MIPR-N-82-29; DA Proj. 250-5)
(AD-A159707; AFESC/ESL-TR-84-17) Avail: NTIS HC A02/MF A01 CSCL 06/17

The Navy Clothing and Textile Research Facility studied the effectiveness of refurbishing the aluminum coating on worn aluminized proximity firefighters' clothing. It was thought that, if a spray-on aluminum enamel could restore the surface aluminum coating to an acceptable level of infrared radiant heat reflectance, then the clothing could be worn for an extended period of time, reducing replacement costs. Vacuum-deposited aluminum fabric specimens were cut from worn firefighters' clothing and tested for their thermal transmission at three levels of heat flux. Before heat-testing, each specimen was identified as to its percentage of infrared reflectance at 1100 nanometers and, subjectively, by visually observing the worn aluminized surface. This report describes the laboratory investigation of two spray-on aluminum enamel coatings over worn aluminized fabric to obtain data that would allow a judgment as to their effectiveness, as well as the effectiveness of all spray-on aluminum enamel, to extend the use-life of proximity firefighters' clothing. GRA

N86-19945# Army Aeromedical Research Lab., Fort Rucker, Ala.
DYNAMICS OF HEAD PROTECTION (IMPACT PROTECTIVE COMPARISON OF THE SPH-4 FLIGHT HELMET TO A COM-

MERCIAL MOTORCYCLE HELMET)
R. F. Roisten and J. L. Haley, Jr. Jul. 1985 37 p
(AD-A161164; USAARL-85-5) Avail: NTIS HC A03/MF A01 CSCL 06/17

The impact protection provided by a commercial motorcycle helmet is evaluated in this report. The motorcycle helmet utilizes an expanded plastic foam liner of 12 mm thickness, which is less than that used in most motorcycle helmets made in this country today. The thickness of the foam is identical to that used in the US Army Aviator's standard Sound Protective Helmet No. 4 (SPH-4). The impact protection provided by the commercial helmet is compared to the protection provided by the SPH-4 aviator helmet. GRA

N86-19946# Army Aeromedical Research Lab., Fort Rucker, Ala.
HELICOPTER-REFERENCED SINGLE CONTROL, CENTER-POSITION FORCE EXERTION CAPABILITIES OF MALES AND FEMALES Final Report
Aaron W. Schopper and George R. Mastroianni Aug. 1985 60 p
(DA Proj. 3E1-62777-A-879)
(AD-A161234; USAARL-85-4) Avail: NTIS HC A04/MF A01 CSCL 06/16

In response to the need for reevaluation of anthropometric criteria contained in the US Army medical standards for flying duty, an assessment was made of helicopter-control-referenced force exertion capabilities of a sample of Army males and females. Males (N=74) ranged from 159 cm through 196 cm in stature; females (N=66) ranged from 152 cm through 183 cm. The force-exertion data were compared to values cited in MIL-H-8501A as upper force limits for the design of helicopter controls. The focuses of the analyses were upon the force exertion capabilities of individuals 167 cm and below in stature since, by virtue of their relatively small size, they represent the portion of the population which are most apt to evidence inabilities to exert forces which equal or exceed control force design limits. The comparison revealed that, overall, the presently existing limits (published in 1961) for other-than-the normal operational flight envelope exceeded the force exertion capabilities of 10% of the 39 small males evaluated and 27% of the 56 females evaluated. Most failures to achieve existing or proposed control force design limits occurred because of inabilities to attain criterion-level exertion data from the small individuals of this study, various combinations of specific control force design limits were evaluated to develop estimations of overall set-wise failure rates likely to be encountered during possible future strength testing/screening. GRA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-19947*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A PARTITIONING STRATEGY FOR NONUNIFORM PROBLEMS ON MULTIPROCESSORS Final Report
Marsha J. Berger (New York Univ., N.Y.) and Shahid Bokhari Nov. 1985 30 p refs
(Contracts NAS1-17070; DE-AC02-76ER-03077-V)
(NASA-CR-178024; ICASE-85-55; NAS 1.26:178024) Avail: NTIS HC A03/MF A01 CSCL 12A

The partitioning of a problem on a domain with unequal work estimates in different subddomains is considered in a way that balances the work load across multiple processors. Such a problem arises for example in solving partial differential equations using an adaptive method that places extra grid points in certain subregions of the domain. A binary decomposition of the domain is used to partition it into rectangles requiring equal computational effort. The communication costs of mapping this partitioning onto different microprocessors: a mesh-connected array, a tree machine and a hypercube is then studied. The communication cost expressions can be used to determine the optimal depth of the above partitioning. Author

N86-19948*# Allied Bendix Aerospace, Teterboro, N.J. Flight Systems Div.
THE DEVELOPMENT OF AN INTERIM GENERALIZED GATE LOGIC SOFTWARE SIMULATOR
J. G. McGough and S. Nemeroff Dec. 1985 178 p refs
(Contract NAS1-15946)
(NASA-CR-177939; NAS 1.26:177939) Avail: NTIS HC A09/MF A01 CSCL 09B

A proof-of-concept computer program called IGGLOSS (Interim Generalized Gate Logic Software Simulator) was developed and is discussed. The simulator engine was designed to perform stochastic estimation of self test coverage (fault-detection latency times) of digital computers or systems. A major attribute of the IGGLOSS is its high-speed simulation: 9.5 x 1,000,000 gates/cpu sec for nonfaulted circuits and 4.4 x 1,000,000 gates/cpu sec for faulted circuits on a VAX 11/780 host computer. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-19949*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GRAPHICS MINI MANUAL: AN INTRODUCTION TO GRAPHICS AT LANGLEY RESEARCH CENTER
Nancy L. Taylor, Donald P. Randall, Christine G. Matthews, Raymond L. Gates, John T. Bowen, Kennie H. Jones, William H. vonOfenheim, Arthur L. Gooden, Mary M. Johnson, Eric L. Everton et al Sep. 1985 72 p
(NASA-TM-87622; NAS 1.15:87622) Avail: NTIS HC A04/MF A01 CSCL 09B

Users are introduced to the computer graphics capabilities available at the NASA Langley Research Center to assist them in their use. More specifically, the manual identifies and describes the various graphics software and hardware components, details the interfaces between these components, and provides information concerning the use of these components at LaRC. Author

N86-19950*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A PROCESS ACTIVITY MONITOR FOR AOS/VS
R. A. McKosky (Rockwell International), S. W. Lindley (Rockwell International), and J. S. Chapman Washington Jan. 1986 30 p
(NASA-TM-86535; NAS 1.15:86535) Avail: NTIS HC A03/MF A01 CSCL 09B

With the ever increasing concern for computer security, users of computer systems are becoming more sensitive to unauthorized access. One of the initial security concerns for the Shuttle Management Information System was the problem of users leaving their workstations unattended while still connected to the system. This common habit was a concern for two reasons: it ties up resources unnecessarily and it opens the way for unauthorized access to the system. The Data General MV/10000 does not come equipped with an automatic time-out option on interactive peripherals. The purpose of this memorandum is to describe a system which monitors process activity on the system and

disconnects those users who show no activity for some time quantum. Author

N86-19951# California Univ., San Diego. Inst. for Cognitive Science.
DIRECT MANIPULTION INTERFACES
E. I. Hutchins, J. D. Hollan, and D. A. Norman May 1985 41 p
(Contract N00014-85-C-0133)
(AD-A156761; ICS-8503) Avail: NTIS HC A03/MF A01 CSCL 09/2

A cognitive account of both the advantages and disadvantages of direct manipulation interfaces is given. Two underlying phenomena that give rise to the sensation of directness are identified. One has to do with the information processing distance between the user's intentions and the facilities provided by the machine. Reduction of this distance makes the interface feel direct by reducing the effort required of the user to accomplish goals. The second phenomenon concerns the relation between the input and output vocabularies of the interface language. In particular, direct manipulation requires that the system provide representations of the objects of interest that behave as if they are the objects themselves. This provides the sensation of directness of manipulation. GRA

N86-19952# Arkansas Univ., Fayetteville. Dept. of Electrical Engineering.
ADAPTIVE HYBRID PICTURE CODING. VOLUME 1 Final Report, 1 Oct. 1983 - 30 Sep. 1984
R. A. Jones, C. D. Bowling, and Y. J. Tejwani 1 Feb. 1985 179 p
(Grant AF-AFOSR-0351-82)
(AD-A160316; AFOSR-85-0740TR-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 09/2

With the introduction and proliferation of computers into all facets of the work place and the home environment, a new awareness of the capabilities and short-comings of the computer for various tasks has been found. The computer has proven very useful in performing repetitive, mundane tasks in offices and manufacturing process control environments, but lack of a good real-world/computer interface prohibits many uses. Presently a computers input connections to the real-world consist mainly of a keyboard and in some instances joysticks, graphics pads, light pens, and other sensors of the physical world. Recent research into this interface has provided the computer with ears, that is to say speech recognition. Not only can the computer hear, but it can also act upon human voice commands and speech. A voice and associated language generation has also recently become a reality. The computer can generate syntactically correct language and then change this into intelligible human sounding speech. Perhaps the most important, and by far the most complex, interface would be the one which gives the computer eyes or sight. Providing the computer with eyes and vision opens new realms for computer automation that in the past were either too difficult to perform blindly or completely impossible. GRA

N86-19953# Texas Univ., Austin. Dept. of Electrical and Computer Engineering.
SOME COMMENTS ON THE DESIGN OF QUANTIZERS Interim Report, 1 Oct. 1980 - 30 Sep. 1985
E. F. Abaya and G. L. Wise 30 May 1985 9 p Presented at the Anual Allerton Conference, Communication, Control, and Computing, 3-5 Oct. 1984, Monticello, Ill.
(Grant AF-AFOSR-0047-81)
(AD-A160321; AFOSR-85-0774TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

In many applications involving quantization the probability distribution of the input signal is unknown. However, most of the algorithms for optimal scalar or vector quantization require an explicit distribution function or probability density. This paper shows that under certain conditions reasonable quantizer designs can be expected when standard algorithms are applied to estimates of distribution functions. GRA

N86-19954# Computer Sciences Corp., Falls Church, Va. Systems Div.
SCCE REHOSTING FEASIBILITY ASSESSMENT
S. Dressler, B. Kerns, W. Nakisher, and P. C. Wood 31 Oct. 1985 169 p
(Contract DCA100-81-C-0044)
(AD-A161158) Avail: NTIS HC A08/MF A01 CSCL 17/2

The Office of the Secretary of Defense (OSD) has directed that a Survivable DSCS Control System (SDCS), including an SCCE, be developed. The SDCS is required to provide a survivable, autonomous minimal DSCS III network control capability. The SDCS will be a transportable configuration that meets stringent environmental requirements. The SCCE's MODCOMP Classic II/75 computer will not meet the environmental requirements of the SDCS. Consequently, it will be necessary to rehost the SCCE to a militarized computer. Within the DSCSOC, several DOCS subsystems use DEC VAX computers. These subsystems will be incorporated into the SDCS, and will require rehosting to a militarized computer. Applications on the DEC VAX computers will run on the Norden Systems Inc. line of MIL VAX computers with minimal software conversion. Thus, these subsystems will likely be rehosted to MIL VAX computers. Consequently, in order to improve the commonality of computer equipment and simplify the logistic support of the SDCS, the Norden Systems Incorporated line of militarized VAX computers is a prime candidate for the rehosting of the SCCE in the SDCS. GRA

N86-19955# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
COMPUTER TECHNIQUES FOR PRODUCING COLOR MAPS Final Report
Albert N. Williamson, Jr. Aug. 1985 43 p Original contains color illustrations
(DA Proj. 4A1-62719-AT-40)
(AD-A161159; WES/MP/GL-85-13) Avail: NTIS HC A03/MF A01 CSCL 08/2

This report discusses a technique for encoding maps in a manner that permits rapid production of window maps and color separations. The discussion includes a description of equipment, data processing procedures, and an example of their use for verifying quantitative terrain information for input to an analytical model. A derivation used to portray the output of the Army Mobility Model as a vehicle performance map is described in an appendix. Author (GRA)

N86-19956# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
LOW POWER, RADIATION HARD GaAs RAM Semiannual Report, 10 Dec. 1983 - 9 Jun. 1984
R. Vahrenkamp, K. Elliot, R. Zucca, and E. Walton Mar. 1985 28 p
(Contract MDA903-83-C-0067; ARPA Order 4100)
(AD-A161160; MRDC41131.9SA) Avail: NTIS HC A03/MF A01 CSCL 09/5

The scope of this program is to demonstrate a 1K GaAs static RAM having very low power dissipation and short access time to meet the requirements of the DARPA Advanced On-Board Signal Processer (AOSP). Device isolation and backgating studies were performed, subthreshold uniformity measurements made, and a new RAM design using transmission gates finalized. Proton damage has proven to be an effective technique for maximizing device isolation for ultra-low power RAM circuits. However, backgating still remains as a possible yield limiting factor. Backgating measurements have been performed on test structures to determine the influence of backgating in proton isolated material with differing acceptor content. The results have been used to refine models for backgating and to identify properties of the starting GaAs material which affect backgating and isolation. A technique to characterize FET devices within a RAM has been successfully developed. It applies to test arrays of 224 (16 x 14) RAM cells extracted from the 1K RAM, and which have each row word-line, and each column bit-sense line connected to a contact pad. With a proper biasing scheme, and using our parametric test system,

the subthreshold characteristic of the output FET in each of the 72 cells forming the central core of the array can be measured individually. The device characteristics appear uniform and well behaved, as expected from measurements on single devices. The design of a transmission gate RAM has been completed and will be implemented on the RM5 mask set. GRA

N86-19957# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
DESIGN AND IMPLEMENTATION OF A RELATIONAL DATA-BASE MANAGEMENT SYSTEM FOR THE AFIT THESIS PROCESS M.S. Thesis
Joseph D. Perkumas Sep. 1985 92 p
(AD-A161217; AFIT/GLM/LSH/85S-63) Avail: NTIS
HC A05/MF A01 CSCL 09/2

The purpose of this study was to evaluate the feasibility of implementing a computerized data base management system to support the AFIT thesis process. A data base was designed and implemented using a relational data base management system. Although the data base was limited to thesis topics and advisors, this system would be useful for other supervisory and administrative functions. GRA

N86-19958# Yale Univ., New Haven, Conn. Dept. of Computer Science.
TEMPORAL IMAGERY. AN APPROACH TO REASONING ABOUT TIME FOR PLANNING AND PROBLEM SOLVING
Thomas Dean Oct. 1985 271 p
(Contract N00014-83-K-0281)
(AD-A161242; YALEU/CSD/RR-433) Avail: NTIS
HC A12/MF A01 CSCL 09/2

Reasoning about time typically involves drawing conclusions on the basis of incomplete information. Uncertainty arises in the form of ignorance, indeterminacy, and indecision. Despite the lack of complete information a problem solver is continually forced to make predictions in order to pursue hypotheses and plan for the future. Such predictions are frequently contravened by subsequent evidence. This dissertation presents a computational approach to temporal reasoning that directly confronts these issues. The approach centers around techniques for managing a data base of assertions corresponding to the occurrence of events and the persistence of their effects over time. The resulting computational framework performs the temporal analog of (static) reason maintenance (Doyle 79) by keeping track of dependency information involving assumptions about the truth of facts spanning various intervals of time. The system developed in this dissertation extends classical predicate-calculus data bases, such as those used by Prolog (Bowen 81), to deal with time in an efficient and natural manner. Applications in robot problem solving are stressed, but examples drawn from other applications areas are used to demonstrate the generality of the techniques. GRA

N86-19959# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
SUPERCOMPUTERS, ARCHITECTURE AND VECTORIZATION [SUPERCOMPUTERS: ARCHITECTUUR EN VECTORISEREN]
R. A. A. M. Geilleit Jul. 1984 15 p refs In DUTCH
(IWIS-B-84-TW-57) Avail: NTIS HC A02/MF A01

The concept of supercomputers is explained by describing the architecture of a CDC CYBER 205 and a CRAY-1S as examples. Special requirements for an efficient use are discussed; the concept of vectorization is illustrated. Author (ESA)

N86-19960# Office of Technology Assessment, Washington, D.C.
INFORMATION TECHNOLOGY R AND D: CRITICAL TRENDS AND ISSUES
Feb. 1985 52 p
(PB85-245660; OTA-CIT-268; LC-84-601150) Avail: NTIS
HC A04/MF A01 CSCL 09B

Four specific areas of research as case studies are examined: (1) computer architecture; (2) artificial intelligence; (3) fiber optics; and (4) software engineering. The structure and orientation of some selected foreign programs are discussed. A set of issues that have been raised in the course of the study manpower, institutional change and the new research organizations that grew out of Bell Laboratories and implications of trends in overall science and technology policy are examined. GRA

N86-19961# Transportation Research Board, Washington, D.C.
PROCEEDINGS OF THE WORKSHOP ON MICROCOMPUTERS IN TRANSIT: ISSUES AND DIRECTIONS Final Report
Edythe Taylor Crump, ed. Jul. 1985 75 p refs Workshop held at Airlie Houst, Va., 4-6 Nov. 1984
(Grant OT-UMTA-CD-06-0441)
(PB85-246924; UMTA-DC-06-0441-85-1) Avail: NTIS
HC A04/MF A01 CSCL 09B

The Workshop on Microcomputers in Transit: Issues and Directions, held November 4 to 6 1984 at Airlie House, Virginia is reported. The workshop was organized to determine the role that Urban Mass Transportation Administration (UMTA) should play in this area and to provide information to states and local bodies for their programs. Information on the latest developments was exchanged good and bad practices were determined and courses of action for advancing the application of microcomputers in transit-related organizations were recommended. The state-of-the-art was defined application of microcomputer technology, identification of institutional problems and solutions, find ways to improve the dissemination of current knowledge, and specification of research needs and priorities are discussed. GRA

N86-19488# Joint Publications Research Service, Arlington, Va.
CAPITALIZING ON AVAILABLE INFORMATION
Jiro Hiraishi *In its* Japan Report: Science and Technology (JPRS-JST-86-002) 27 Jan. 1986 p 63-70 Transl. into ENGLISH from Kogyo Gijutsu (Tokyo, Japan), Jun. 1985 p 30-35 (For primary document see N86-19484 10-31)
Avail: NTIS HC A06/MF A01

N86-19830# Joint Publications Research Service, Arlington, Va.
COMPUTER GRAPHICS EMPLOYED IN MODELING PROTEIN MOLECULES
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-001) 2 Jan. 1986 p 10 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 5 Sep. 1985 p 4 (For primary document see N86-19828 10-51)
Avail: NTIS HC A06

N86-19975*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN EVALUATION OF PROGRAMMER/ANALYST WORKSTATIONS
K. Koerner (Computer Sciences Corp., Silver Spring, Md.), R. Mital (Computer Sciences Corp., Silver Spring, Md.), D. Card (Computer Sciences Corp., Silver Spring, Md.), and A. Maione *In its* Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 178-195 refs (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-19962* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOFTWARE ENGINEERING LABORATORY (SEL) DATA BASE RETRIEVAL SYSTEM (DARES) SYSTEM DESCRIPTION
Aug. 1984 371 p refs
(NASA-TM-88589; SEL-83-105; NAS 1.15:88589) Avail: NASA. Goddard Space Flight Center, Greenbelt, Md. 20771 CSCL 09B

The Software Engineering Laboratory Data Base Retrieval System (DARES) system description is presented. DARES provides data base users with two types of access to development project

data: (1) reports summarizing the data in the data base; and (2) options to extract and move selected data into a work area from which user defined or predefined reports and plots may be produced. An overview of DARES is presented; the processing performed is described; and subroutines, COMMON blocks, file layouts, and system generation procedures are given. Author

N86-19963* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FORTRAN STATIC SOURCE CODE ANALYZER PROGRAM (SAP) SYSTEM DESCRIPTION: REVISION 1
Apr. 1985 214 p refs
(NASA-TM-88592; SEL-82-102; NAS 1.15:88592) Avail: NASA. Goddard Space Flight Center, Greenbelt, Md. 20771 CSCL 09B

The FORTRAN Static Source Code Analyzer Program (SAP) system description is presented. SAP is a software tool designed to assist Software Engineering Laboratory (SEL) personnel in conducting studies of FORTRAN programs. SAP scans FORTRAN source code and produces reports that present statistics and measures of statements and structures that make up a module. The processing performed by SAP; the routines, COMMON blocks, and files used by SAP; and the SAP system generation procedure are all described. The SAP tool specifies on the VAX-11/780, Version 3 is followed. The IBM 4341 is the batch Version 3. Departures from the VAX-11/780 version are noted. The PDP-11/70 version is an older version and is presented elsewhere. Author

N86-19964* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FORTRAN STATIC SOURCE CODE ANALYZER PROGRAM (SAP) USER'S GUIDE: REVISION 2
Apr. 1985 131 p refs
(NASA-TM-88586; SEL-78-202; NAS 1.15:88586) Avail: NASA. Goddard Space Flight Center, Greenbelt, Md. 20771 CSCL 09B

The FORTRAN Static Source Code Analyzer Program (SAP) User's Guide (Revision 2) is presented. SAP is a software tool designed to assist Software Engineering Laboratory (SEL) personnel in conducting studies of FORTRAN programs. SAP scans FORTRAN source code and produces reports that present statistics and measures of statements and structures that make up a module. Instructions are provided for operating SAP and contains information useful in interpreting SAP output. It is the result of program modifications to update several reports, additional software quality analysis, and recognition of all statements described in the FORTRAN dialects of the host VAX-11/780 and IBM 4341 computers. Author

N86-19965*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A COMPARISON OF SOFTWARE VERIFICATION TECHNIQUES
Apr. 1985 116 p refs
(NASA-TM-88585; NAS 1.15:88585; SEL-85-001) Avail: NTIS HC A06/MF A01 CSCL 09B

A controlled experiment performed by the Software Engineering Laboratory (SEL) to compare the effectiveness of code reading, functional testing, and structural testing as software verification techniques is described. The experiment results indicate that code reading provides the greatest error detection capability at the lowest cost, whereas structural testing is the least effective technique. The experiment plan is explained, the experiment results are described, related results from other studies are discussed. The application of these results to the development of software in the flight dynamics environment is considered. Appendices summarize the experiment data and list the test programs. Author

N86-19966*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOFTWARE VERIFICATION AND TESTING
Dec. 1985 65 p refs
(NASA-TM-88587; NAS 1.15:88587; SEL-85-005) Avail: NTIS HC A04/MF A01 CSCL 09B

General procedures for software verification and validation are provided as a guide for managers, programmers, and analysts involved in software development. The verification and validation procedures described are based primarily on testing techniques. Testing refers to the execution of all or part of a software system for the purpose of detecting errors. Planning, execution, and analysis of tests are outlined in this document. Code reading and static analysis techniques for software verification are also described. Author

N86-19967*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCEEDINGS OF THE NINTH ANNUAL SOFTWARE ENGINEERING WORKSHOP
Nov. 1984 361 p refs Workshop held in Greenbelt, Md., 28 Nov. 1984
(NASA-TM-88594; SEL-84-004; NAS 1.15:88594) Avail: NTIS HC A16/MF A01 CSCL 09B

Experiences in measurement, utilization, and evaluation of software methodologies, models, and tools are discussed. NASA's involvement in ever larger and more complex systems, like the space station project, provides a motive for the support of software engineering research and the exchange of ideas in such forums. The topics of current SEL research are software error studies, experiments with software development, and software tools. For individual titles, see N86-19968 through N86-19980.

N86-19968*# Computer Sciences Corp., Silver Spring, Md.
AN APPROACH TO DEVELOPING SPECIFICATION MEASURES
William W. Agresti *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 14-41 refs (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

An approach to developing specification measures is described. A key feature of the approach is the introduction of a new requirements representation, the Composite Specification Model (CSM). Results are reported from an experiment in which the requirements for a real system are recast using the CSM. Specification measures are then extracted from the CSM representation of the system. Author

N86-19969*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EVALUATING SOFTWARE TESTING STRATEGIES
Richard W. Selby, Jr. (Maryland Univ., College Park), Victor R. Basili, Jerry Page (Maryland Univ., College Park), and Frank E. McGarry *In its* Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 42-64 refs (For primary document see N86-19967 10-61)
(Grant NsG-5123; Contract F49620-80-C-001)
Avail: NTIS HC A16/MF A01

The strategies of code reading, functional testing, and structural testing are compared in three aspects of software testing: fault detection effectiveness, fault detection cost, and classes of faults detected. The major results are the following: (1) Code readers detected more faults than did those using the other techniques, while functional tester detected more faults than did structural testers; (2) Code readers had a higher fault detection rate than did those using the other methods, while there was no difference between functional testers and structural testers; (3) Subjects testing the abstract data type detected the most faults and had the highest fault detection rate, while individuals testing the database maintainer found the fewest faults and spent the most effort testing; (4) Subjects of intermediate and junior expertise were not different in number or percentage of faults found, fault detection rate, or fault detection effort; (5) subjects of advanced expertise found a greater number of faults than did the others, found a greater percentage of faults than did just those of junior expertise, and were not different from the others in either fault detection rate or effort; and (6) Code readers and functional testers both detected more omission faults and more control faults than

did structural testers, while code readers detected more interface faults than did those using the other methods. Author

N86-19970*# Maryland Univ., College Park.
SOFTWARE DEVELOPMENT IN Ada
Victor R. Basili and Elizabeth E. Katz *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1985 p 65-85 refs (For primary document see N86-19967 10-61)
(Contract N00014-82-C-0225)
Avail: NTIS HC A16/MF A01

Ada will soon become a part of systems developed for the US Department of Defense. NASA must determine whether it will become part of its environment and particularly whether it will become a part fo the space station development. However, there are several issues about Ada which should be considered before this decision is made. One means of considering these issues is the examination of other developments in Ada. Unfortunately, few full scale developments have been completed or made publicly available for observation. Therefore, it will probably be necessary to study an Ada development in a NASA environment. Another means related to the first is the development of Ada metrics which can be used to characterize and evaluate Ada developments. These metrics need not be confined to full scale developments and could be used to evaluate on going projects as well. An early development in Ada, some observations from that development, metrics which were developed for use with Ada, and future directions for research into the use of Ada in software development in general and in the NASA Goddard environment in particular are described. Author

N86-19971*# Virginia Univ., Charlottesville. Dept. of Computer Science.
A LARGE SCALE EXPERIMENT IN N-VERSION PROGRAMMING
John C. Knight and Nancy Leveson *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 86-99 (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

N-version programming has been proposed as a method of providing fault tolerance in software. The approach requires the independent preparation of several (i.e., N) versions of a piece of software for some application from the same requirements specifications. These versions are executed in parallel in the application environment; each receives identifical inputs and each produces its version of the required outputs. The outputs are collected by a voter and, in principle, they should all be the same. In practice there may be some disagreement. If this occurs, the results of the majority are assumed to be the correct output and this is the one used by the system. The great benefit that N-version programming is intended to provide is a substantial improvement in reliability. It is concluded that the assumption of independence does not hold. It is assumed in the analysis of the technique that the N different versions will fail independently; that is faults in the different versions occur at random and are unrelated. Author

N86-19972*# Maryland Univ., College Park. Dept. of Computer Science.
DESIGN METRICS FOR MAINTENANCE +
H. Dieter Rombach *In* NASA. Goddard Space Flight Center Nov. 1984 p 100-135 Sponsored in part by the Ministry of Research and Technology, Kaiserlautern, West Germany (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

Results of a study to develop maintenance metrics based on structural software design characteristics are described. A characteristic metric set suited to explain and predict software maintenance behavior is defined. The maintenance aspects investigated are stability and modifiability. While stability addresses the average number of modules affected per change cause, modifiability characterizes the ease with which changes can be made within each of these modules. Additional interest is dedicated to the difference between characteristic design and implementation metric sets, and to the difference between change behavior during development and maintenance. The development of six software systems and controlled maintenance experiments using these system is examined. Author

N86-19973*# Illinois Univ., Urbana. Dept. of Computer Science.
AN APPROACH TO OPERATING SYSTEM TESTING
R. N. Sum, Jr., R. H. Campbell, and W. J. Kubitz *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 136-167 (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

To ensure the reliability and performance of a new system, it must be verified or validated in some manner. Currently, testing is the only resonable technique available for doing this. Part of this testing process is the high level system test. System testing is considered with respect to operating systems and in particular UNIX. This consideration results in the development and presentation of a good method for performing the system test. The method includes derivations from the system specifications and ideas for management of the system testing project. Results of applying the method to the IBM System/9000 XENIX operating system test and the development of a UNIX test suite are presented. Author

N86-19974*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE COGNITIVE CONNECTION: SOFTWARE MAINTENANCE AND DOCUMENTATION
Elliot Soloway (Yale Univ., New Haven, Conn.), Stan Letovsky, Beatrice Loerinc (Baruch College, New York, N.Y.), and Art Zygielbaum *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 168-177 refs (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

With the goal of trying to understand what software maintainers do, talking aloud, video taped protocols with four expert maintainers were conducted as they were actively engaged in the process of enhancing a relatively small, interactive database program. The subjects exhibited a number of different types of information gathering strategies. Underlying these patterns of behavior, however, was the use of expectations about what should be seen in the program under examination. These expectations were generated on the basis of knowledge previously acquired as to the goals and programming plans that are typically employed in realizing interactive database programs. Thus, while the experts seemed to posses adequate programming knowledge, their actual code patches violated a basic principle of program structure. This failure by the programmers was attributed to ineffective program documentation. Suggestions for changes in the content of program documentation that should better facilitate software maintenance are presented. Author

N86-19975*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN EVALUATION OF PROGRAMMER/ANALYST WORKSTATIONS c60
K. Koerner (Computer Sciences Corp., Silver Spring, Md.), R. Mital (Computer Sciences Corp., Silver Spring, Md.), D. Card (Computer Sciences Corp., Silver Spring, Md.), and A. Maione *In its* Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 178-195 refs (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

Very few automated tools were available to support software requirements analysis and design even though improvements in quality during these phases appear to offer the greatest leverage for improving the quality and productivity of the overall software development process. Recently, however, some such tools have appeared on the market. An industry survey, and an in-house evaluation of two commercial products by programmers and

analysts was undertaken to determine which tool is the best to support programmers and analysts through life cycle development. A tool was selected for full implementation on a project, where complete analysis of software statistics over the system life cycle will determine whether or not quality and productivity improvements have actually occurred. The results of the industry survey and in-house evaluation are summarized. Author

N86-19976*# IBM Federal Systems Center, Gaithersburg, Md. Advanced Technology Dept.

A MODEL FOR THE PREDICTION OF LATENT ERRORS USING DATA OBTAINED DURING THE DEVELOPMENT PROCESS

John E. Gaffney, Jr. and Steven J. Martello (IBM Corp., Kingston, N.Y.) *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 196-212 refs (For primary document see N86-19967 10-61)

Avail: NTIS HC A16/MF A01

A model implemented in a program that runs on the IBM PC for estimating the latent (or post ship) content of a body of software upon its initial release to the user is presented. The model employs the count of errors discovered at one or more of the error discovery processes during development, such as a design inspection, as the input data for a process which provides estimates of the total life-time (injected) error content and of the latent (or post ship) error content--the errors remaining a delivery. The model presented presumes that these activities cover all of the opportunities during the software development process for error discovery (and removal). Author

N86-19977*# Virginia Polytechnic Inst., Blacksburg. Dept. of Computer Science.

THE INDEPENDENCE OF SOFTWARE METRICS TAKEN AT DIFFERENT LIFE-CYCLE STAGES

Dennis Kafura, James Canning, and Gereddy Reddy *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 213-230 refs (For primary document see N86-19967 10-61)

Avail: NTIS HC A16/MF A01

Over the past few years a large number of software metrics have been proposed and, in varying degrees, a number of these metrics have been subjected to empirical validation which demonstrated the utility of the metrics in the software development process. Attempts to classify these metrics and to determine if the metrics in these different classes appear to be measuring distinct attributes of the software product are studied. Statistical analysis is used to determine the degree of relationship among the metrics. Author

N86-19978*# Naval Surface Weapons Center, Dahlgren, Va.

AN INTERACTIVE PROGRAM FOR SOFTWARE RELIABILITY MODELING c64

William H. Farr and Oliver D. Smith *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 231-263 refs (For primary document see N86-19967 10-61)

Avail: NTIS HC A16/MF A01

With the tremendous growth in computer software, the demand has arisen for producing cost effective reliable software. Over the last 10 years an area of research has developed which attempts to address this problem by estimating a program's current reliability by modeling either the times between error detections or the error counts in past testing periods. A new tool for interactive software reliability analysis using the computer is described. This computer program allows the user to perform a complete reliability analysis using any of eight well-known models appearing in the literature. Some of the capabilities of the program are illustrated by means of an analysis of a set of simulated error data. Author

N86-19979*# Quantitative Software Management, Inc., McLean, Va.

ASSESSING THE PROFICIENCY OF SOFTWARE DEVELOPERS

Lawrence H. Putnam, Douglas T. Putnam, and Lauren P. Thayer *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 264-298 (For primary document see N86-19967 10-61)

Avail: NTIS HC A16/MF A01

The trend lines presented can be useful in a number of ways. They provide a baseline of comparision from which software developers can compare their performance against a large database of similar projects. This will often identify a organizational style. It was possible to quantify the organizational style using the Manpower Buildup Gradient. That the developer was a better than average producer on RAM based systems was shown. The Ck associated with the ROM system suggests that it is a different class of work. When this system is compared against the Firmware database it is very creditable. It is important to recognize that there are non linearities present in the software process. The non linearities are tied to system size. For comparative purposes one must always make judgements based on similar sizes. In the past the tendency has been to calculate a few ratios on several projects and then compare them without any regard to amount of functionality that was created. This practice can be very misleading and dangerous. The method described, used in a thoughtful analytic manner, can be very helpful. Author

N86-19980*# Intermetrics, Inc., Cambridge, Mass.

TAILORING A SOFTWARE PRODUCTION ENVIRONMENT FOR A LARGE PROJECT

David R. Levine *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 313-327 (For primary document see N86-19967 10-61)

Avail: NTIS HC A16/MF A01

A software production environment was constructed to meet the specific goals of a particular large programming project. These goals, the specific solutions as implemented, and the experiences on a project of over 100,000 lines of source code are discussed. The base development environment for this project was an ordinary PWB Unix (tm) system. Several important aspects of the development process required support not available in the existing tool set. Author

N86-19981*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ANNOTATED BIBLIOGRAPHY OF SOFTWARE ENGINEERING LABORATORY LITERATURE

Nov. 1985 144 p

(NASA-TM-88588; NAS 1.15:88588; SEL-82-306) Avail: NTIS HC A07/MF A01 CSCL 09B

An annotated bibliography of technical papers, documents, and memorandums produced by or related to the Software Engineering Laboratory is presented. More than 100 publications are summarized. These publications are summarized. These publications cover many areas of software engineering and range from research reports to software documentation. This document has been updated and reorganized substantially since the original version (SEL-82-006, November 1982). All materials are grouped into five general subject areas for easy reference: (1) the software engineering laboratory; (2) software tools; (3) models and measures; (4) technology evaluations; and (5) data collection. An index further classifies these documents by specific topic. Author

N86-19982*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

Ada TRAINING EVALUATION AND RECOMMENDATIONS FROM THE GAMMA RAY OBSERVATORY Ada DEVELOPMENT TEAM

Oct. 1985 42 p refs

(NASA-TM-88593; NAS 1.15:88593; SEL-85-002) Avail: NTIS HC A03/MF A01 CSCL 09B

The Ada training experiences of the Gamma Ray Observatory Ada development team are related, and recommendations are made concerning future Ada training for software developers. Training methods are evaluated, deficiencies in the training program are noted, and a recommended approach, including course outline, time allocation, and reference materials, is offered. E.A.K.

N86-19983*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INVESTIGATION OF SPECIFICATION MEASURES FOR THE SOFTWARE ENGINEERING LABORATORY (SEL)
Dec. 1984 74 p refs
(NASA-TM-88591; NAS 1.15:88591; SEL-84-003) Avail: NTIS HC A04/MF A01 CSCL 09B

Requirements specification measures are investigated for potential application in the Software Engineering Laboratory. Eighty-seven candidate measures are defined; sixteen are recommended for use. Most measures are derived from a new representation, the Composite Specification Model, which is introduced. The results of extracting the specification measures from the requirements of a real system are described. Author

N86-19984# North Carolina State Univ., Raleigh. Dept. of Industrial Engineering.
A NOTE ON LINEAR PROGRAMMING AND THE SINGLE MACHINE LOTSIZE SCHEDULING PROBLEM. REVISION
T. J. Hodgson and H. L. W. Nuttle Jun. 1985 11 p
(Contract N00014-84-K-0046)
(AD-A159683; AD-E801193; NUSC-TR-85-1-REV) Avail: NTIS HC A02/MF A01 CSCL 12/1

Past research on the lotsize scheduling problem has relied heavily on the following assumptions: (1) each product is to be produced on a regular invariant cycle, and (2) the inventory level at the onset of each production run is zero. In this paper these two restrictions have been dropped. It is shown that the inventory cost function can be expressed as a linear function. This allows the use of linear programming methods to determine the optimal lengths for a given sequence of production runs. Author (GRA)

N86-19985# Arkansas Univ., Fayetteville. Dept. of Electrical Engineering.
ADAPTIVE HYBRID PICTURE CODING. VOLUME 2 Final Report, 1 Oct. 1983 - 30 Sep. 1984
R. A. Jones, C. D. Bowling, and Y. J. Tejwani 1 Feb. 1985 184 p
(Grant AF-AFOSR-0351-82)
(AD-A160317; AFOSR-85-0922TR-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 09/4

A system for the machine recognition of partial shapes is described. Shape analysis methods are reviewed in context to the problem of machine recognition of partial shapes, and their limitations. The problem of defining the critical points for shapes and partial shapes with various degrees of curvature is considered. It is shown that the critical points derived using criteria based on curvature alone are insufficient to describe shapes represented by smooth curves. A new method of shape analysis is described which exhibits superior performance over the critical point detection methods based on curvature alone. The critical points determined by this method are based on a set of coordinate axes that are dependent on the shape itself. This guarantees that the critical points detected are independent of size, rotation, and displacement of the shape. The results of applying this new procedure to actual shapes are demonstrated and discussed. GRA

N86-19986# Naval Ocean Systems Center, San Diego, Calif.
KAPSE (KERNEL Ada PROGRAMMING SUPPORT ENVIRONMENT) INTERFACE TEAM PUBLIC REPORT. VOLUME 5 Final Report, Jul. 1984 - Aug. 1985
P. A. Oberndorf Aug. 1985 338 p
(AD-A160355; NOSC/TD-552-Vol-5) Avail: NTIS HC A15/MF A01 CSCL 09/2

This report gives the minutes of the April 1984, the July 1984, and the October 1984 KAPSE Interface Team. The report also includes the details of the Second CAIS Review Meeting, August 1984. GRA

N86-19987# Rutgers - The State Univ., New Brunswick, N. J. Lab. for Computer Science Research.
THE USE OF CK-LOG FORMALISM FOR KNOWLEDGE REPRESENTATION AND PROBLEM SOLVING IN OPPLAN-CONSULTANT: AN EXPERT SYSTEM FOR NAVAL OPERATIONAL PLANNING Interim Report, 1982 - 1984
C. V. Srinivasan 30 Sep. 1985 112 p
(Contract N00014-82-C-2126)
(AD-A160999; NRL-8902) Avail: NTIS HC A06/MF A01 CSCL 09/2

The principal concepts in the organization and operation of the logic-based knowledge processing system, called CK-LOG (A Calculus for Knowledge in LOGic) are introduced. CK-LOG uses the frame-based system MDS (the Meta Description System) for knowledge representation and for modelling world states. It uses an inference engine based on natural Deduction for stating and solving problems. The operation of CK-LOG is discussed here in the context fo OPPLAN-CONSULTANT, an expert consultation system for Naval Operational Planning that is now being designed using the CK-LOG formalism. CK-LOG itself is currently under implementation. The descriptive adequacy of CK-LOG to state and represent military planning knowledge needed for operational planning is established, as well as its problem solving adequacy to use this knowledge automatically to help military commanders design operational plans to achieve given military objectives. The various features of CK-LOG are described in this report. Author

N86-19988# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A USER'S MANUAL FOR THE FIT PROGRAM: A MODEL FOR SMOOTHING RAW DATA Memorandum Report
Denice M. Petro Oct. 1985 31 p
(DA Proj. 1L1-62618-AH-80)
(AD-A161035; BRL-MR-3472) Avail: NTIS HC A03/MF A01 CSCL 12/1

FIT is a FORTRAN 77 program which fits a smooth curve to raw data. The program finds the trends inherent in the data (the peaks, valleys, slopes, etc.) and produces a set of modified data points, which can be plotted using any available graphics package. It is easily used without much knowledge of the underlying techniques and can be employed repeatedly to the subsequent smoothed data sets to achieve any smoothness desired. However, some care must be taken, since the input data must be equally spaced in the independent variable with only a few missing data points. This report covers input preparation, output expectation, technique explanation and provides a program listing in the appendix. GRA

N86-19989# Measurement Concept Corp., Rome, N. Y.
SOFTWARE CONVERSION OF STANDARD LINEAR FORMAT (SLF) TO STANDARD INTERCHANGE FORMAT (SIF) Final Technical Report, Sep. 1983 - Jul. 1985
Kathryn J. Sands and Kim D. Headlee Jul. 1985 152 p
(Contract DAAK70-83-C-0174)
(AD-A161086; ETL-0394) Avail: NTIS HC A08/MF A01 CSCL 08/2

Software accepts a digital cartographic data set in DMA Standard Linear Format as input and generates graphics and attribute data base information in Intergraph Corporation Standard Interchange Format. Cartographic feature information is examined to derive graphic symbolization characteristics. Validation of inputs ensures the quality of the output. Additional software provides the capability to convert from Intergraph Standard Interchange Format to DMA Standard Linear Format. This report describes the capabilities, logical flow and components of the Conversion Software. The final section presents conclusions regarding performance and limitations and recommends areas for further investigation. The Users Manual, Program Maintenance Manual and Message Definition Document are included as Appendices. GRA

N86-19990# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
CHECKPOINTING AND ROLLBACK-RECOVERY FOR DISTRIBUTED SYSTEMS
Richard Koo and Sam Toueg Oct. 1985 26 p
(Contract MDA903-85-C-0124; Grants NSF DCR-84-12582; NSF

MCS-83-03135; ARPA Order 5378)
(AD-A161126; CU-CSD-TR-85-706) Avail: NTIS
HC A03/MF A01 CSCL 09/2

We consider the problem of bringing a distributed system to a consistent state after transient failures. We address the two components of this problem by describing a distributed algorithm to create consistent checkpoints, as well as a rollback-recovery algorithm to recover the system to a consistent state. In contrast to previous algorithms, they tolerate failures that occur during their executions. Furthermore, when a process takes a checkpoint, a minimal number of additional processes are forced to take checkpoints. Similarly, when a process restarts after a failure, a minimal number of additional processes are forced to restart with it. Our algorithms require each process to store at most two checkpoints in stable storage. This storage requirement is shown to be minimal under general assumptions. GRA

N86-19991# Naval Postgraduate School, Monterey, Calif.
SOFTWARE COST ESTIMATION THROUGH BAYESIAN INFERENCE OF SOFTWARE SIZE M.S. Thesis
In K. Park Sep. 1985 71 p
(AD-A161184) Avail: NTIS HC A04/MF A01 CSCL 09/2

It s important for the program manager to understand the software life-cycle and development process. Multiple models of the life-cycle are examined and compared with the DOD software lifecycle. The Rayleigh equation and the resulting difficulty gradient equation of the SLIM software model are very powerful techniques for estimating development time, effort, and cost. To estimate the size f the new project a Bayesian inference technique, is proposed. This technique is then applied using the SLIM model and the QSM data base. GRA

N86-19992# Naval Postgraduate School, Monterey, Calif.
MINIMIZING FILL-IN FOR GAUSSIAN ELIMINATION OF SYMMETRIC SYSTEMS M.S. Thesis
Young H. Seo Sep. 1985 34 p
(AD-A161196) Avail: NTIS HC A03/MF A01 CSCL 12/1

The new projective linear programming algorithm by Karmarkar requires solution of symmetric, positive definite systems of equations. One key to solving these systems efficiently is minimizing the fill-in; i.e., the number of new nonzero elements in the reduced matrix, in the various forms of Gaussian elimination used to solve these systems. Fill-in is affected only by symmetric reordering of rows and columns of the system of equations. Various heuristic ordering algorithms are tested and compared with the heuristic minimum degree algorithm of George and Liu. Computational results are reported for 16 large-scale real-world and artificial problems. The minimum degree algorithm of George and Liu is the most effective of six tested methods. Author (GRA)

N86-19993# Naval Postgraduate School, Monterey, Calif.
COMPUTER AIDED INSTRUCTION DESIGN ISSUES: THE DEVELOPMENT OF A PORTABLE MICROCOMPUTER-BASED CAI (COMPUTER ASSISTED INSTRUCTION) FOR STATISTICS INSTRUCTION M.S. Thesis
Randall L. Henderson Sep. 1985 293 p
(AD-A161211) Avail: NTIS HC A13/MF A01 CSCL 12/1

The primary focus of this thesis is the development of a portable microcomputer-based software package to aid in the instruction of a graduate level introductory statistics course. In order to accomplish this objective, an exploration of various conventional Computer Assisted Instruction (CAI) techniques is necessary to determine which methods are readily adaptable for use with portable microcomputers. Many of the design issues normally associated with the development of CAI packages are exasperated by the current physical limitations of portable microcomputers. This thesis will discuss general CAI design issues and related compromises and trade-offs needed to successfully implement some of these designs in a portable microcomputer-based system. A systematic methodology for designing simple paired-associate learning (Drill and Practice) software is presented, which incorporates many of the lessons learned in the development of the included statistics software package. Author (GRA)

N86-19994# Netherlands Energy Research Foundation, Petten.
USER-FRIENDLY APPLICATION OF THE RT-11 OPERATING SYSTEM IN MINICOMPUTER INSTRUMENT CONTROL
R. B. Helmholdt Jan. 1985 32 p refs
(ECN-163; B8561164) Avail: NTIS HC A03/MF A01

A software system to control a powder neutron diffractometer at an experimental nuclear reactor was designed. The system is completely transparent to the experimenter and allows access at nearly any time. The system configuration (hardware and software) and the requirements which define a transparent system are described. The requirements involve communication between the different parts of the system to establish the current or previous status. This status is defined by flags or files on floppy disk. Implementation of the condition to interrupt a running system in a soft way at nearly any moment, which requires that the console is listening, is outlined. The system is applicable to any other instrument as long as the same operating system is used. Author (ESA)

N86-19995# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
MANUAL FOR THE USE OF THE COMMON COMMAND LANGUAGE WITH A DARIUS COMMAND [HANDLEIDING VOOR HET GEBRUIK VAN DE COMMON COMMAND LANGUAGE BIJ EEN DARIUS-DATABANK]
Hans Bakker May 1984 24 p In DUTCH
(IWIS-C-84-AU-32) Avail: NTIS HC A03/MF A01

The DARIUS command language based on the Common Command Language (CCL) was developed to command a DARIUS databank. The CCL vocabulary was partly adopted; TYPE and METHOD elements were added. Searching with standardized command languages is possible. Author (ESA)

N86-19996# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
INTERACTIVE GOAL PROGRAMMING: A MULTICRITERIA DECISION METHOD [INTERACTIEVE DOEL PROGRAMMERING: EEN MULTICRITERIA BESLISSINGSMETHODE]
R. A. A. M. Geilleit Jan. 1984 37 p refs In DUTCH
(IWIS-A-84-TW-01) Avail: NTIS HC A03/MF A01

A continuous decision-making method in which the decision-maker can state his preferences during the solving process is described. The method was implemented on a linear model with 7 goal variables, > 1000 instrument variables, and > 1000 hard restrictions. In an iterative proces with the decision maker, the set of desired alternatives is limited by minimizing the goal restrictions or optimizing the instrument (as a function of the goal) variables. A manual and example are presented. Author (ESA)

N86-19997# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
DATA BASE MANAGEMENT ADMINISTOR FACILITIES FOR ENGINEERING DATA MANAGEMENT
H. Steenbergen and F. J. Heerema 5 Feb. 1985 25 p refs
Presented at 4th International Conference on Engineering Software ENGSOFT 85, London, England, 18-20 Jun. 1985
(NLR-MP-85010-U; B8571445) Avail: NTIS HC A02/MF A01

Engineering data base administration and the requirements for the facilities to support this task are discussed using the facilities for database administration in the Engineering Data Interactive Presentation and Analaysis System (EDIPAS). This system provides a standard framework for the data management and the data evaluation and presentation tasks for a variety of engineering applications. It provides data base administrator facilities to create a database, to inspect and to maintain the contents of the database, including the chosen user's views on the data as stored in the base. Author (ESA)

N86-19630# Lehigh Univ., Bethlehem, Pa. Inst. for Robotics.
ROBOT SOFTWARE: CURRENT STATE-OF-THE-ART, AND FUTURE CHALLENGES
Roger N. Nagel and Scott R. Garrigan *In* AGARD Artificial Intelligence and Robotics Sep. 1985 9 p (For primary document

see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-19998*# Research Triangle Inst., Research Triangle Park, N.C.
ADAMS: AIRLAB DATA MANAGEMENT SYSTEM USER'S GUIDE
C. L. Conrad, W. F. Ingogly, and L. A. Lauterbach Feb. 1986 162 p
(Contract NAS1-16489)
(NASA-CR-177975; NAS 1.26:177975) Avail: NTIS HC A08/MF A01 CSCL 09B

The AIRLAB Data Management System (ADAMS) is an online environment that supports research at NASA's AIRLAB. ADAMS provides an easy to use interactive interface that eases the task of documenting and managing information about experiments and improves communication among project members. Data managed by ADAMS includes information about experiments, data sets produced, software and hardware available in AIRLAB as well as that used in a particular experiment, and an on-line engineer's notebook. The User's Guide provides an overview of the ADAMS system as well as details of the operations available within ADAMS. A tutorial section takes the user step-by-step through a typical ADAMS session. ADAMS runs under the VAX/VMS operating system and uses the ORACLE database management system and DEC/FMS (the Forms Management System). ADAMS can be run from any VAX connected via DECnet to the ORACLE host VAX. The ADAMS system is designed for simplicity, so interactions within the underlying data management system and communications network are hidden from the user. Author

N86-19999# Naval Postgraduate School, Monterey, Calif.
STRATEGIC PERFORMANCE MANAGEMENT EVALUATION FOR THE NAVY'S SPLICE LOCAL AREA NETWORKS M.S. Thesis
D. D. Blankenship Apr. 1985 139 p
(AD-A161198) Avail: NTIS HC A07/MF A01 CSCL 09/2

Computational fluid dynamics as a research area has attracted mathematicians not only because of its importance to the engineering community, but also because of the pitfalls that are encountered in solving various discretizations of the governing Navier-Stokes equations. Such pitfalls are highlighted in this paper along with methods to circumvent them. Discretizations of the Navier-Stokes equations often can be viewed as systems defining flows on an associated network. This observation provides a means of economizing on their numerical solution. Author (GRA)

N86-20000# Naval Postgraduate School, Monterey, Calif.
ISSUES IN MANAGING THE MICROCOMPUTER INFORMATION RESOURCES IN THE NAVAL AVIATION COMMUNITY M.S. Thesis
Richard P. Halter Sep. 1985 83 p
(AD-A161207) Avail: NTIS HC A05/MF A01 CSCL 09/2

The proliferation of microcomputer systems within Naval Aviation organizations in this decade has forced managers to rethink the role of information production. This thesis addresses the interaction of the organization process on information production, which Navy managers must be aware of in order to perform their job. The role of information management is examined to allow management to use existing microcomputer information systems capabilities more effectively. Discussion includes the impact of microcomputers systems on the flow of information, and microcomputer assistance to management in planning, program solving, and decision making. Research findings indicate that management of microcomputers has increased the actual time and cost of information flow within organization units. Security of classified materials processed on microcomputers and training of user skills are deficient. Organizations need to incorporate a specialized computer manager. GRA

N86-20001# Naval Postgraduate School, Monterey, Calif.
MICROCOMPUTER MANAGEMENT POLICY FOR US NAVAL FORCES M.S. Thesis
Donald S. Free Sep. 1985 64 p
(AD-A161208) Avail: NTIS HC A04/MF A01 CSCL 09/2

Microcomputers have become an integral part of business life in America and in the U.S. Navy. They can be used as stand-alone processors, components of a network, or terminals to more powerful mini or mainframe computers. Microcomputers are a valuable resource and should be treated accordingly. The proliferation of microcomputers can not go unchecked by management. There must be a plan that will channel the power of microcomputer towards the goals and objectives of the organization. The Navy is no exception. It too must deal with the proliferation of a new technology. The Navy must establish hardware and software standards for use throughout the fleet. These standards must be incorporated in fleetwide training plans so that fleet personnel can apply the standards in the accomplishment of their tasks. Through a comprehensive microcomputer management policy, the power of microcomputers can be used to accomplish the Navy's mission. GRA

N86-20002# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
COMPUTER-AIDED FABRICATION SYSTEM IMPLEMENTATION Semiannual Technical Report, 1 Apr. - 30 Sep. 1985
Paul Penfield, Jr., Stanley B. Gershwin, Dimitri A. Antoniadis, and Donald E. Troxel 30 Sep. 1985 20 p
(Contract N00014-85-K-0213)
(AD-A161244) Avail: NTIS HC A02/MF A01 CSCL 09/2

The implication of completed aided fabrication systems is outlined. The following topics are included: research overview; scheduling; modular process; CAF system structure; publication list; dynamic production scheduling in computer-aided fabrication; MASTIF - a workstation approach to fabrication process design. GRA

N86-20003# Mitre Corp., McLean, Va.
RADICAL COMPUTING 3
Saul Amarel, Curtis G. Callan, Jr., Roger F. Dashen, Alvin M. Despain, and Oscar S. Rothaus Sep. 1985 69 p
(Contract F19628-84-C-0001)
(AD-A161249; JSR-84-701) Avail: NTIS HC A04/MF A01 CSCL 09/2

We explore two topics suggested from the last study. The first is Molecular Computing which may offer a technology that could realize some the ideas of reversible computing. The second topic is the Theory of Transformation of Weak Methods into Strong Methods. This is a direct extension of our prior Source Program Transformation work. Since the goal of this and all our previous work is to identify potential new development, the ideas discussed herein are quite speculative and should be considered with some caution. We limit our investigation to improvements in computer performance in the execution of only difficult calculations. We will not seek higher performance in the execution of only difficult calculations. We will not seek higher performance for problems easily managed by today's machines. GRA

N86-20004# Naval Postgraduate School, Monterey, Calif.
AN EVALUATION AND IMPLEMENTATION STUDY OF THE ZENITH 120 MICROCOMPUTER IN WEST COAST FLEET COMMANDS M.S. Thesis
George A. Barnett Sep. 1985 102 p
(AD-A161254) Avail: NTIS HC A06/MF A01 CSCL 09/2

Austere funding and the increased administrative burdens being placed on Fleet units will ultimately take their toll on performance, morale, and combat readiness. Applying low cost microcomputer technology presents one method to alleviate many of thees burdens. However, the current implementation process being used is not sufficient to meet the needs of the Fleet. Empirical

evidence indicates that expenditures on computers are not accompanied by the expected rise in productivity. The use of microcomputers is feasible. They are being used successfully throughout both the civilian and military communities. This study discusses the environment necessary to meet user needs. The central theme is one of standardization and documentation. Necessary tools and general recommendations are discussed. GRA

N86-20005# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
FLEXIBLE AND DYNAMIC DATA MODELING ASPECTS OF THE ENGINEERING DATA MANAGEMENT SYSTEM ENGINEERING DATA INTERACTIVE PRESENTATION AND ANALYSIS SYSTEM (EDIPAS)
H. A. Kreijkamp, H. vanHedel, and F. J. Heerema 20 Mar. 1985 24 p refs Presented at International Congress Intelligence 85, Paris, France, 21-24 May 1985
(NLR-MP-85026-U; B8571446) Avail: NTIS HC A03/MF A01

The data model required for data management facilities used in engineering is discussed. As engineering activities are mulitdisciplinary by nature, the model must be flexible. The data model has to offer the possibilities to change the data organization in an existing data base dynamically in accordance with the view of the user. The Engineering Data Interactive Presentation and Analysis System meets the requirements of and supports the management and the evaluation of engineering data. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-20006# Air Force Armament Lab., Eglin AFB, Fla.
MELLIN-FOURIER CORRELATION Final Technical Report, Jun. 1982 - Jan. 1984
E. C. Friday Aug. 1985 53 p
(AF Proj. 230-5)
(AD-A159685; AD-E801193; AFATL-TR-85-53) Avail: NTIS HC A04/MF A01 CSCL 05/8

This program evaluates the success of a pattern recognition system which attempts to recognize an object even though the object differs in size and orientation from the object used as a reference. The criteria for recognition were the peak value and shape of the cross correlation function calculated in two dimensions. The cross correlation was performed using Fourier transform techniques to judge the utility of implementing the system using many standards optical components. Size, or scale, invariance was achieved using a logarithmic sampling technique (the Mellin transform), and variations on traditional sampling methods were shown to extend the scale invariance predicted by various researchers. The utility of the sampling techniques developed was proven using images acquired from infrared sensors carried aboard helicopters. Limits of practical scale invariance were explored and system design approaches were suggested from the results of numerical experiments carried out in computer simulations. GRA

N86-20007# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
OPTIMAL BAYESIAN ESTIMATORS FOR IMAGE SEGMENTATION AND SURFACE RECONSTRUCTION
J. L. Marroquin Apr. 1985 19 p
(Contracts N00014-80-C-0505; DAAG29-84-K-0005)
(AD-A159692; AI-M-839) Avail: NTIS HC A02/MF A01 CSCL 12/1

A very fruitful approach to the solution of image segmentation and surface reconstruction tasks is their formulation as estimation problems via the use of Markov random field models and Bayes theory. However, the Maximum a Posteriori estimate, which is the one most frequently used, is suboptimal in these cases. The author shows that for segmentation problems, the optimal Bayesian estimator is the maximizer of the posterior marginals, while for reconstruction tasks, the thresholded posterior mean has the best possible performance. He presents efficient distributed algorithms for approximating these estimates in the general case. Based on these results, developed is a maximum likelihood procedure that leads to a parameter-free distributed algorithm for restoring piecewise constant images. To illustrate these ideas, the reconstruction of binary patterns is discussed in detail. Author (GRA)

N86-20008# Honeywell Systems and Research Center, Minneapolis, Minn.
HIERARCHICAL MULTISENSOR IMAGE UNDERSTANDING Final Report, Oct. 1983 - Aug. 1985
R. K. Aggarwal, M. Bazakos, J. Budenske, Y. Kim, and S. Mader Aug. 1985 129 p
(Contract F49620-83-C-0134)
(AD-A160324; AFOSR-85-0801TR) Avail: NTIS HC A07/MF A01 CSCL 12/1

This report describes the research results on Honeywell's Hierarchical Multisensor Image Understanding program. Honeywell is developing a unified framework for the different hierarchical levels of image processing such as segmentation, detection, classification, and identification of outdoor scenes and across different sensor modalities such as millimeter wave, infrared, and visible. Current activities on the project are reviewed under the following headings: (1) A Survey of Multisource Information Fusion Systems; (2) The Role of Structure in Human and Machine Perception; (3) A Knowledge Based Image Segmentation System; (4) The Use of Optical Flow as a Depth Cue in Scene Analysis; and (5) Belief Maintenance for A Fuzzy Reasoning System. GRA

N86-20009# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
ANALYSIS OF PREPROCESSORS AND DECISION AIDS IN ORGANIZATIONS Technical Report
G. H. L. Chyen and A. H. Levis Feb. 1985 8 p
(Grant AF-AFOSR-0229-80)
(AD-A160325; LIDS-P-1438; AFOSR-85-0819TR) Avail: NTIS HC A02/MF A01 CSCL 05/1

The use of preprocessors and decision aids in command, control and communication (C3) systems is meant to reduce the workload of individual decisionmakers and improve the quality of an organization's decisionmaking. An information theoretic framework is used to model the decision aids. Thus, it becomes possible to evalaute quantitatively the effect a decision aid has on the workload of a decisionmaker and to derive necessary conditions that preprocessors (a generic form of decision aids) must satisfy in order that they reduce the human's workload. GRA

N86-20010# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Electrical and Computer Engineering.
MULTI-DISCIPLINARY TECHNIQUES FOR UNDERSTANDING TIME-VARYING SPACE-BASED-IMAGERY Annual Report, May 1984 - May 1985
D. Casasent, A. Sanderson, and T. Kanade 10 May 1985 136 p
(Contract F49620-83-C-0100)
(AD-A160334; AFOSR-85-0818TR) Avail: NTIS HC A07/MF A01 CSCL 20/6

This project is a multidisciplinary effort between 3 departments and principal investigators. It intends to combine: pattern recognition, image understanding and artificial intelligence techniques for space-based image processing as well as: optical and digital processing methods. Optical feature extraction and sub-pixel target detection and tracking results are summarized. Scene representation and modeling work using: probabilistic graph matching, multiple resolution rotation-invariant operators and texture analysis are detailed. Image understanding techniques for 3D scene interpretation discussed include 2D image-level methods (using features such as edges, lines and corners) and 3D scene-level methods. New dynamic programming, stereo image and model building results are included. Author (GRA)

N86-20011# Pennsylvania State Univ., University Park. Dept. of Statistics.
AFFINE INVARIANT RANK METHODS IN THE BIVARIATE LOCATION MODEL
B. M. Brown and T. P. Hettmansperger Sep. 1985 23 p
(Contract N00014-80-C-0741)
(AD-A160341; TR-58) Avail: NTIS HC A02/MF A01 CSCL 12/1

The generalized multivariate median of H. Oja is used to define a multivariate notion of quantile, or rank, and to define a measure of scatter of multivariate linear models. The latter, when applied to the one- and two-sample bivariate location models, yields affine invariant analogs of the Wilcoxon rank-sum and signed-rank tests, and of the corresponding estimates. Author (GRA)

N86-20012# Colorado State Univ., Fort Collins. Dept. of Statistics.
MULTIVARIABLE PROBLEMS OF STATISTICS AND PROBLEM THEORY Annual Report, Apr. 1984 - Apr. 1985
J. Srivastava 23 May 1985 4 p
(Grant AF-AFOSR-0080-83)
(AD-A160347; Rept-03-2516; AFOSR-85-0771TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

During 1984 to 1985 two papers were published, two were submitted and three are in process. Work in Reliability, Multivariate Analysis and Information Theory continued. Additional Author (GRA)

N86-20013# MacAulay-Brown, Inc., Fairborn, Ohio.
AUTOMATION AND THE ALLOCATION OF FUNCTIONS BETWEEN HUMAN AND AUTOMATIC CONTROL: GENERAL METHOD
Robert Pulliam and H. E. Price Jan. 1985 106 p Prepared in cooperation with Essex Corp., Alexandria, Va.
(Contract F33615-82-C-0513)
(AD-A161072; AFAMRL-TR-85-017) Avail: NTIS HC A06/MF A01 CSCL 05/8

This report was prepared as a Human Engineering Data Base Supplement to the Integrated Perceptual Information for Designers (IPID) Engineering Data Compendium. It describes a general method for allocation of functions during systems development, with particular focus on what functions should be automatic. The method was originally developed for use in the nuclear power industry, and has here been redeveloped for use in aerospace systems. The report is intended for use of project managers, systems engineers and system designers, as an applied guide during the development of aerospace systems. It provides a detailed procedure for allocation of functions (AOF), a procedure to be applied during the research, development, test and evaluation (RDT&E) process. The report uses a hierarchical structure in which each of five sections treats the AOF process at an increasing level of detail, as follows: section 1 concerns how to use the report; section 2 describes the RDT&E process in terms of the cyclic decision and test steps by which design proceeds, and identifies those steps which are critical to a successful AOF; section 3 focuses on one critical step in RDT&E, the formation of design hypotheses, and describes that step in greater detail; section 4 focuses even more narrowly on a step within design hypothesis, and identifies four sets of criteria which should be applied in sequence to assist AOF decisions; finally, section 5 identifies human-machine models by which aerospace systems can be analyzed during systems design. GRA

N86-20014# IIT Research Inst., Chicago, Ill. Manufacturing Technology Information Analysis Center.
ARTIFICIAL INTELLIGENCE APPLICATIONS IN MANUFACTURING
Raymond H. Cook Oct. 1985 59 p
(Contract DLA900-84-C-1508)
(AD-A161161; MTIAC-TA-85-01) Avail: NTIS HC A04/MF A01 CSCL 09/2

Developments in the field of artificial intelligence hold great promise for applications in the factory of the future. However, the technology and applications are still in an early stage of emergence. The literature of the last few years has been surveyed to develop a profile of the state of this emergence. This, coupled with interviews with workers heavily involved in the application of AI, shows that within the AI family of technologies expert systems dominate current applications. The next year promises to be very active as true production expert systems begin to appear. This won't be without problems, however. Several references are recommended for initial reading in AI, and lists of products, programs, and players in the field are included. Author (GRA)

N86-19634# Royal Signals and Radar Establishment, Malvern (England). Integrated Air Defence Systems Div.
APPLICATIONS OF EXPERT SYSTEMS
Philip R. Wetherall *In* AGARD Artificial Intelligence and Robotics Sep. 1985 17 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

N86-19635# George Mason Univ., Fairfax, Va.
APPLYING AI TO THE DIAGNOSIS OF COMPLEX SYSTEM FAILURES
Kenneth DeJong *In* AGARD Artificial Intelligence and Robotics Sep. 1985 4 p refs (For primary document see N86-19627 10-37)
Avail: NTIS HC A07/MF A01

N86-20084# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF THE TRAJECTORY SENSITIVITY OF ADAPTIVE STOCHASTIC CONTROL SYSTEMS Abstract Only
A. I. Petrov, A. G. Zubov, and V. V. Minin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 89 Transl. into ENGLISH from Avtomatika (Kiev, USSR), no. 2, Mar. - Apr. 1985 p 51-59 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-20015 Suomalainen Tiedeakatemia, Helsinki (Finland). Dept. of Mathematics.
UPPER DENSITY PROPERTIES OF HAUSDORFF MEASURES ON FRACTALS Thesis
Arto Salli and Olli Lehto, ed. 1985 53 p refs
(ISSN-0355-0087; ISBN-951-41-0478-1) Copyright. Avail: Issuing Activity

Let n be a positive integer, R sup n the Euclidean n-space, 0 < or = s < or = n and H sup s the non-normalized s-dimensional Hausdorff outer measure over R sup N. Fix a set (E is a subset of R sup n) such that H sup s (E) < infinity. If the topological dimension of E is smaller than its Hausdorff dimension dim (E), then E is called a fractal. This study is focused on the measure-theoretical density properties of fractals. M.G.

N86-20016# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mathematical Sciences.
ADAPTIVE REFINEMENT METHODS FOR NONLINEAR PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS Interim Report
M. Bietermman, J. E. Flaherty, and P. K. Moore Dec. 1984 35 p Prepared in cooperation with Boeing Computer Services, Tukwila, Wash.
(Grant AF-AFOSR-0192-80)
(AD-A160314; AFOSR-85-0827TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considers two adaptive finite element techniques for parabolic partial differential equations (PDEs) that are based on using error estimates to control mesh refinement. One technique is a method of lines approach that uses a Galerkin method to discretize the PDEs in space and implicit multi-step

integration in time. Spatial elements are added and deleted in regions of high and low error and are all advanced with the same sequence of varying time steps. The second technique is a local refinement method that uses Galerkin approximations in both space and time. Fine grids of space-time elements are added to coarser grids and the problem is recursively solved in regions of high error. Author (GRA)

N86-20017# Wisconsin Univ., Madison. Mathematics Research Center.
LIPSCHITZ CONTINUITY OF SOLUTIONS OF LINEAR INEQUALITIES, PROGRAMS AND COMPLEMENTARITY PROBLEMS Technical Summary Report
O. L. Mangasarian and T. H. Shiau Jul. 1985 30 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A160957; MRC-TSR-2838) Avail: NTIS HC A03/MF A01 CSCL 12/1

It is shown that solutions of linear inequalities, linear programs and certain linear complementarity problems (e.g., those with P-matrices or Z-matrices but not semidefinite matrices) are Lipschitz continuous with respect to changes in the right hand side data of the problem. Solutions of linear programs are not Lipschitz continuous with respect to the coefficients of the objective function. The Lipschitz constant given here is a generalization of the role played by the norm of the inverse of a nonsingular matrix in bounding the perturbation of the solution of a system of equations in terms of a right hand side perturbation. Author (GRA)

N86-20018# Wisconsin Univ., Madison. Mathematics Research Center.
ERROR BOUNDS FOR NEWTON'S ITERATES DERIVED FROM THE KANTOROVICH THEOREM Technical Summary Report
Tetsuro Yamamoto Jul. 1985 17 p
(Contract DAAG29-80-C-0041)
(AD-A160959; MRC-TSR-2843) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper, it is shown that the upper and lower bounds of the errors in the Newton iterates recently obtained by Potra-Ptak and Miel, with the use of nondiscrete induction and majorizing sequence, respectively, follow immediately from the Kantorovich theorem and the Kantorovich recurrence relations. It is also shown that the upper and lower bounds of Miel are sharper than those of Potra-Ptak. GRA

N86-20019# Wisconsin Univ., Madison. Mathematics Research Center.
A NOTE ON LEAST TWO NORM SOLUTIONS OF MONOTONE COMPLEMENTARITY PROBLEMS Technical Summary Report
P. K. Subramanian Jul. 1985 18 p
(Contract DAAG29-80-C-0041; Grants NSF DCR-84-20963; NSF MCS-81-02648)
(AD-A160961; MRC-TSR-2844) Avail: NTIS HC A02/MF A01 CSCL 12/1

For the monotone nonlinear complementarity problem, this document considers Tihonov regularizations which reduce the solution of the problem to the solution of a sequence of strongly monotone complementarity problems. The sequence of solutions obtained are called aproximate solutions and it is known that for a soluable monotone complementarity problem, the approximate solutions converge to the least two norm solution of the given problem. This paper provides new growth rates for these approximate solutions, sharpens some previously known results and gives a computational procedure for obtaining an approximate solution for any apriori prescribed tolerance. Author (GRA)

N86-20020# Wisconsin Univ., Madison. Mathematics Research Center.
A CLASS OF ONE-DIMENSIONAL DEGENERATE PARABOLIC EQUATIONS Technical Summary Report
John A. Nohel Jul. 1985 20 p
(Contract DAAG29-80-C-0041)
(AD-A160962; MRC-TSR-2837) Avail: NTIS HC A02/MF A01 CSCL 12/1

Degenerate parabolic equations arise in the description of melting processes, gas dynamics and certain biological models. The interfaces corresponding to degeneracies in the constitutive function usually separate different media in the physical problem. Problem (P) stated in the abstract is related to nonlinear diffusion equations with nonmonotone constitutive functions as has been discussed in previous documents. This report obtains explicit self-similar solutions for (P) corresponding to a class of model initial data and for determining the free boundary explicitly. The qualitative behavior of these solutions, in particular of their interfaces, is typical of the situation in more general problems. For general initial data, the author then uses these self-similar solutions as comparison functions to study the regularity and the behavior of the free boundary for small time. GRA

N86-20021# Wisconsin Univ., Madison. Mathematics Research Center.
ERROR BOUNDS FOR MONOTONE LINEAR COMPLEMENTARITY PROBLEMS Technical Summary Report
O. L. Mangasarian and T. H. Shiau Sep. 1985 14 p
(Contract DAAG29-80-C-0041; Grant NSF DCR-84-20963)
(AD-A160975; MRC-TSR-2862) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors give a bound on the distance between an arbitrary point and the solution set of a monotone linear complementarity problem in terms of a condition constant which depends on the problem data only and a residual function of the violations of the complementarity problem conditions by the point considered. When the point satisfies the linear inequalities of the complementarity problem, the residual consists of the complementarity condition $x(Mx + q)$ plus its square root: $(x(Mx + q))$ to the 1/2 power. This latter term is essential and without which the error bound cannot hold. It is also shown that another natural residual that has been employed to bound errors for strictly monotone linear complementarity problems, fails to bound errors for the monotone case considered here. Author (GRA)

N86-20022# Wisconsin Univ., Madison. Mathematics Research Center.
FIXED POINT METHODS FOR THE COMPLEMENTARITY PROBLEM Technical Summary Report
P. K. Subramanian Aug. 1985 24 p
(Contract DAAG29-80-C-0041; Grants NSF DCR-84-20963; NSF MCS-81-02684)
(AD-A160976, MRC-TSR-2857) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper is concerned with iterative procedures for the monotone complementarity problem. These iterative methods consist of findng fixed points of appropriate continuous maps. In the case of the linear complementarity problem, it is shown that the problem is solvable if and only if the sequence of iterates is bounded in which case summability methods are used to find a solution of the nonlinear complementarity problem satisfying certain regularity conditions for which the problem has a nonempty bounded solution set. Author (GRA)

N86-20023# Wisconsin Univ., Madison. mathematics Research Center.
ON THE DENSITY OF THE RANGE FOR SOME SUPERQUADRATIC OPERATORS Technical Summary Report
Yiming Long Aug. 1985 23 p
(Contract DAAG29-80-C-0041)
(AD-A160978; MRC-TSR-2859) Avail: NTIS HC A02/MF A01 CSCL 12/1

During the past few years there has been a considerable amount of research on the existence of multiple solution of superlinear differential equations. By superlinear is meant the equations possess a nonlinearity which grows more rapidly than linearly at infinity. This research has been done in the setting of boundary value problems for semilinear elliptic partial differential equations, and periodicity problems for Hamiltonian systems of ordinary differential equations and semilinear wave equations. GRA

N86-20024# Wisconsin Univ., Madison. Mathematics Research Center.
SUP-NORM ESTIMATES IN GLIMM'S METHOD Technical Summary Report
Blake Temple Aug. 1985 10 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A160981; MRC-TSR-2855) Avail: NTIS HC A02/MF A01 CSCL 12/1

A system of two conservation laws in one dimension is a set of first order nonlinear partial differential equations of a certain form (1) where (u,v) is a vector function of (x,t), x epsilon R, t > or = 0. The Cauchy problem asks for a solution of (1) given the initial values of u and v at time t = 0. Equations of type (1) arise, for example, in gas dynamics where they express the conservation of quantities like mass, momentum and energy, when diffusion is neglected. Typically, smooth solutions of (1) cannot be found. This is due to the formation of shock waves. Shock waves are the mechanism by which entropy is dissipated in solutions of (1). This paper gives a proof that solutions exist even after shock waves form, so long as the amplitude of the waves are not too great initially. GRA

N86-20025# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
LIMITING SPECTRAL DISTRIBUTION FOR A CLASS OF RANDOM MATRICES Interim Report
Y. Q. Yin Dec. 1984 27 p
(Contract F49620-85-C-0008)
(AD-A161059; TR-84-50; AFOSR-85-0816TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A new combinatorial technique was developed in a previous paper to prove the existence of a limiting spectral distribution. That work can be generalized in two directions. First, we can generalize to the case when X sub P has isotropic columns. This work was done in Yin and Krishnaiah and Bai, Yin, and Krishnaiah. In the second direction, we can prove the result by assuming that X sub p has i.i.d. entries with minimum moment requirements. This paper is devoted to this goal. In this paper, we have succeeded in proving the existence of limiting spectral distribution by assuming only that the second moment exists. The keys to reach this goal are (1) truncation technique and (2) sophisticated combinatorial techniques. The two-stage truncation method works in proving the main result. To prove the main result, we have to generalize the notion of Q-graph to a new kind of graphs M-graphs. Some properties of M-graphs are developed here. In this paper, we have succeeded to prove the existence of the limiting spectral distribution in the sense of a.s. convergence. GRA

N86-20026# California Univ., Santa Barbara. Algebra Inst.
STABILITY ANALYSIS OF FINITE DIFFERENCE SCHEMES FOR HYPERBOLIC SYSTEMS, AND PROBLEMS IN APPLIED AND COMPUTATIONAL LINEAR ALGEBRA Annual Report, 1 May 1984 - 30 Apr. 1985
Marvin Marcus and Moshe Goldberg 22 Aug. 1985 29 p
(Grant AF-AFOSR-0150-83)
(AD-A161092; AFOSR-85-0936TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This interim report describes the following two projects carried out under an Air Force grant during the period May 1, 1984 to April 30, 1985: (1) stability criteria for difference approximations to hyperbolic systems, and multiplicativity of matrix norms, by M. Goldberg; and (2) problems in applied and computational linear algebra, by M. Marcus. The aim of these projects was to achieve better understanding of useful computational techniques for hyperbolic initial-boundary value problems, and to improve basic mathematical tools often used in numerical analysis and applied mathematics. GRA

N86-20027# Wisconsin Univ., Madison. Dept. of Computer Sciences.
ON AN ESTIMATE FOR THE THREE-GRID MGR MULTIGRID METHOD
Seymour V. Parter Aug. 1985 40 p
(Grant AF-AFOSR-0275-82)
(AD-A161096; TR-610; AFOSR-85-0940TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The MGR(upsilon) multigrid algorithm of Ries, Trottenberg and Winter, Algorithm 2.1 of Braess and Algorithm 4.1 of Verfurth are all algorithms for the numerical solution of the discrete Poisson equation based on red-black Gauss-Seidel smoothing iterations. This work considers the extension of the MGR(O) method to a certain general diffusion equation. In particular, for the three grid scheme the author extends an interesting and important result of Ries, Trottenberg and Winter whose results are based on Fourier analysis and hence intrinsically limited to the case where omega is a rectangle. Let omega be a general polygonal domain whose sides have slope + or - 1,0 and infinity. GRA

N86-20028# Wisconsin Univ., Madison. Dept. of Computer Sciences.
ON THE DISTRIBUTION OF THE SINGULAR VALUES OF TOEPLITZ MATRICES
Seymour V. Parter Aug. 1985 21 p
(Grant AF-AFOSR-0275-82)
(AD-A161146; WIS-CS-TR-609; AFOSR-85-0939TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document proves an interlacing theorem for singular values which is applied to obtain extension of the Szego theorem to the singular values of T sub n (f) when f is not a real-valued function. The asympotic distribution of the singular values of Toeplitz matrices can be expressed in the terminology of the theory of equal distribution. GRA

N86-20029# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE APPLICATION OF SCHOENBERG POLYNOMIALS TO THE CALCULATION OF PROFILE COORDINATES [OVER DE TOEPASSING VAN SCHOENBERG POLYNOMEN BIJ DE BEREKENING VAN PROFIEL-COOERDINATEN]
J. J. H. Blom Jan. 1983 32 p refs In DUTCH
(VTH-M-449) Avail: NTIS HC A03/MF A01

Formulas for integrals with equidistant function values as integrands were derived using Schoenberg polynomials; an application, the calculation of profile coordinates of the Timman real functions (sigma and tau) was elucidated. For the Timman conformal transformation method, a more accurate numerical treatment of the Poisson integral was required. Two essential problems, the presence of a cotan with an argument approaching zero and the numerically limited knowledge of sigma and tau, were solved by replacing them by a series development applied to small values and interpolation polynomials. Front point, longest chord, and zero lift angle of a transformation airfoil were determined using Schoenberg interpolation polynomials. Author (ESA)

N86-19978*# Naval Surface Weapons Center, Dahlgren, Va.
AN INTERACTIVE PROGRAM FOR SOFTWARE RELIABILITY MODELING
William H. Farr and Oliver D. Smith *In* NASA. Goddard Space Flight Center Proceedings of the Ninth Annual Software Engineering Workshop Nov. 1984 p 231-263 refs (For primary document see N86-19967 10-61)
Avail: NTIS HC A16/MF A01

N86-20082# Joint Publications Research Service, Arlington, Va.
GENERAL NONASYMPTOTIC ESTIMATES OF THE RATE OF CONVERGENCE OF ITERATIVE STOCHASTIC ALGORITHMS Abstract Only
Ya. I. Alber and S. V. Shilman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 80 Transl. into ENGLISH from Zhurnal Vychislitelnoy Matematiki I Matematicheskoy Fiziki (Moscow, USSR), v. 25, no. 3, Mar. 1985 p 344-355 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-20030# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.
STATISTICAL EFFECTS OF IMPERFECT INSPECTION SAMPLING. PART 2: DOUBLE SAMPLING AND LINK SAMPLING, REVISION Technical Report, Jun. - Sep. 1985
N. L. Johnson, S. Kotz, and R. N. Rodriguez Oct. 1985 12 p
Prepared in cooperation with North Carolina Univ., Chapel Hill and SAS Inst., Cary, N.C.
(Contract N00014-84-K-0301)
(AD-A160142; UMD-DMSS-85/9-REV) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper, the second in a series of three, utilizes the basic distributions established in the first paper to assess the effect of inspection errors in three types of acceptance procedures: double sampling, link and partial link sampling. GRA

N86-20031# North Carolina Univ., Chapel Hill. Chapel Hill Center for Stochastic Processes.
REMARKS ON THE FOUNDATIONS OF MEASURES OF DEPENDENCE Technical Report, Sep. 1984 - Aug. 1985
R. C. Bradley, W. Bryc, and S. Janson Jun. 1985 55 p
(Contract F49620-82-C-0009)
(AD-A160322; TR-105; AFOSR-85-0877TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper is a study of several aspects of measures of dependence, the various comparisons between them, and their foundation as norms of the bilinear form covariance. Author (GRA)

N86-20032# Naval Postgraduate School, Monterey, Calif.
DISCREPANCY-TOLERANT HIERARCHICAL POISSON EVENT-RATE ANALYSES
D. P. Gaver Jul. 1985 52 p
(AD-A160344; NPS55-85-016) Avail: NTIS HC A04/MF A01 CSCL 12/1

There are units (machines) that generate events (failures) at possibly different, constant, Poisson rates. Having observed a record of such events, it is desired to (a) characterize the overall variability of true rates, and (b) use the result of (a) to create improved estimates of the individual rates by selective pooling. The results are evaluated by simulation, and applied to actual operational data. Author (GRA)

N86-20033# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
DOUBLE SAMPLING IN ESTIMATION OF A RATIO
M. Ahmad, C. Marcotte, and R. S. Singh Jun. 1985 24 p
(Contract F49620-85-C-0008)
(AD-A160346; TR-85-24; AFOSR-85-0750TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Problems connected with the estimation of the ratio of the means of a finite bivariate population have been considered in this report. The usual estimator of the ratio, based on the means of a bivariate simple random sample drawn without replacement (s.r.s. (w.o.r.)), has been compared with estimators based on alternative double sampling design. Under this design a very large s.r.s. (w.o.r.) is drawn for measuring only one of the variables and a subsample (s.r.r. (w.o.r.)) is drawn out of the first phase units for measuring the other variable. Efficiency and bias comparisons have been made by subjecting each of the competitors to the same budgetary constraint. It turns out that deviation from the usual set-up sometimes leads to better sampling strategies. Author (GRA)

N86-20034# North Carolina Univ., Chapel Hill. Chapel Hill Dept. of Statistics.
OPTIMALLY BOUNDED SCORE FUNCTIONS FOR GENERALIZED LINEAR MODELS WITH APPLICATIONS TO LOGISTIC REGRESSION Technical Report, Sep. 1984 - Aug. 1985
L. A. Stefanski, R. J. Carroll, and D. Ruppert Apr. 1985 21 p
Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract F49620-82-C-0009)
(AD-A160348; AFOSR-85-0866TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document studied optimally bounded score functions for estimating regression parameters in a generalized linear model. This work extends results obtained by Krasker & Welsch (1982) for the linear model and provides a simple proof of Krasker and Welsch's first order condition for strong optimality. The application of these results to logistic regression is studied in some detail with an example given comparing the bounded influence estimator with maximum likelihood. Author (GRA)

N86-20035# Wisconsin Univ., Madison. Mathematical Research Center.
SEMI-PARAMETRIC GENERALIZED LINEAR MODELS Technical Summary Report
Peter J. Green and Brian S. Yandell Aug. 1985 20 p
(Contract DAAG29-80-C-0041)
(AD-A160958; MRC-TSR-2847) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document considers generalized linear models in which the linear predictor is of additive semi-parametric form, linear in most of the explanatory variables but with an arbitrary functional dependence on the remainder. Estimation of the parameters and the non-parametric curve in the model is approached by maximizing a penalized likelihood. Two explicit iterative algorithms are presented. The first, which operates in O(n) time per iteration, applies where there is just one variable entering the model in a non-parametric fashion, and an integrated squared second derivative penalty is used. An example in logistic regression of tumour prevalence is given. The second algorithm is for the much more general case of a regression model specified as an arbitrary composite log-likelihood function, permitting nonlinear dependence and several splined variables. Author (GRA)

N86-20036# Wisconsin Univ., Madison. Mathematics Research Center.
DESIGN EFFECTS OF TWO-STAGE SAMPLING Technical Summary Report
C. J. Skinner Jul. 1985 24 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A160960; MRC-TSR-2841) Avail: NTIS HC A02/MF A01 CSCL 12/1

In sample surveys, the design effect of a statistic is usually defined as the ratio of its true variance under the given sample design to its variance had the sample been obtained by simple random sampling. Empirical work suggests certain patterns for design effects of different types of statistics under different designs, but theoretical work explaining these patterns is limited. This paper obtains general theoretical results on the structure of design effects for a broad class of statistical inference under a two-stage sampling design. In particular, it discusses the relation between design effects of multivariate and of univariate statistics. This relation is of practical interest because it is of relevance to the imputation of standard errors for multivariate statistics such as correlation coefficients or regression coefficients using design effects of univariate statistics. The latter quantities are often routinely derived on completion of the survey. The former may be difficult to compute by standard procedures, either because of the absence of the necessary design information or because of software or degrees of freedom limitations. GRA

N86-20037# Wisconsin Univ., Madison. Mathematics Research Center.
COMPARISONS OF LEAST SQUARES AND ERRORS-IN-VARIABLES REGRESSION, WITH SPECIAL REFERENCE TO RANDOMIZED ANALYSIS OF COVARIANCE Technical Summary Report
Raymond J. Carroll, P. Gallo, and L. J. Gleser Sep. 1985 22 p
(Contracts DAAG29-80-C-0041; F49620-82-C-0009)
(AD-A160967; MRC-TSR-2866) Avail: NTIS HC A02/MF A01

CSCL 12/1

In an errors-in-variables regression model, the least squares estimate is generally inconsistent for the complete regression parameter but can be consistent for certain linear combinations of this parameter. The authors conjecture that, when least squares is consistent for a linear combination of the regression parameter, it will be preferred to an errors-in-variables estimate, at least asymptotically. The conjecture is false, in general, but it is true for important classes of problems. One such problem is a randomized two-group analysis of covariance, upon which this document focuses. GRA

N86-20038# Pennsylvania State Univ., University Park. Dept. of Statistics.
WHY NOT TRY A ROBUST REGRESSION
Thomas P. Hettmansperger Oct. 1985 24 p
(Contract N00014-80-C-0741)
(AD-A160968; TR-60) Avail: NTIS HC A02/MF A01 CSCL 12/1

There is a multitude of regression diagnostic methods available for identification. This paper discusses three: the leverage values (the diagonal elements of the least squares projection or hat matrix), the Studentized residuals, and the difference in fitted values that results from the elimination of a case (denoted DFFITS). GRA

N86-20039# Wisconsin Univ., Madison. Mathematics Research Center.
ASYMPTOTIC INFERENCE FROM SEQUENTIAL DESIGN IN A NONLINEAR SITUATION Technical Summary Report
C. F. J. Wu Aug. 1985 16 p
(Contract DAAG29-80-C-0041)
(AD-A160970; MRC-TSR-2853) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document shows that confidence regions constructed by the repeated-sampling principle are asymptotically valid for sequential designs in general linear models and nonlinear parameters. For estimation of parameters in nonlinear models or nonlinear parameters in linear models, sequential design of experiment is often used to best utilize the information. It results in saving the number of runs. After the termination of the experiment with a fixed sample size, inference (such as hypothesis testing or confidence interval) about the parameter is made. The classical repeated-sampling principle of inference can not be applied because it relies on the repetition of the same design while in the sequential setting it is not repeatable. By using the martingale as a technical tool, it is shown that, at least for large samples, such inference is still justified. The companion questions of consistency of parameter estimators and convergence of sequential design to an optimal design are also answered. GRA

N86-20040# Wisconsin Univ., Madison. Mathematics Research Center.
ANALYSIS OF FACTORIAL EXPERIMENTS Technical Summary Report
R. D. Meyer Sep. 1985 181 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-84-20968)
(AD-A160972; MRC-TSR-2865) Avail: NTIS HC A09/MF A01 CSCL 12/1

Fractional factorial designs have long been a key tool for the industrial statistician. They have received renewed attention recently due to the movement toward quality improvement sparked by the success of the Japanese in penetrating markets formerly dominated by western countries. Fractional factorial designs are usually not replicated, so that it is not possible to estimate error variance in the usual way from repeat observations. Past methods of analysis have rested on an implicit hypothesis of effect sparsity, that most of the estimated effects measure only noise. Formalization of this hypothesis leads to a Bayesian analysis in which the posterior probability that an effect is active can be computed. A similar approach can be employed to obtain the posterior probability that a particular experimental factor is active. These probabilities are readily interpreted by graphical means, and provide a straightforward method for identifying active contrasts and active factors. In addition, the model is extended to the situation where there are possible outliers in the original observations. The posterior probability that an effect is active can be computed taking into account the possibility of bad values, and the posterior probability that an observation is bad can be computed taking into account that the identity of active effects is unknown. GRA

N86-20041# Wisconsin Univ., Madison.
DISCRETE-TIME CONVERSION FOR SIMULATING SEMI-MARKOV PROCESSES Technical Summary Report
B. L. Fox Aug. 1985 14 p
(Contract DAAG29-80-C-0041; Grant NSF ECS-84-04809)
(AD-A161007; MRC-TSR-2850) Avail: NTIS HC A02/MF A01 CSCL 12/1

To simulate long-run averages of time integrals of a recurrent semi-Markov process efficiently, convert to discrete-time by simulating only an imbedded chain and computing the conditional expectations of everything else needed given the sequence of states visited. This reduces asymptotic variance and eliminates generating holding-time variates. In this setting, uniformizing continuous-time Markov chains is not worthwhile. The authors generalize beyond semi-Markov process and cut ties to regenerative simulation methodology. Author (GRA)

N86-20042# Tennessee Univ., Knoxville. Dept. of Psychology.
RESULTS OF ITEM PARAMETER ESTIMATION USING LOGIST 5 ON SIMULATED DATA
Fumiko Samejima Dec. 1984 236 p
(Contract N00014-81-C-0569)
(AD-A161038; ONR-RR-84-3) Avail: NTIS HC A11/MF A01 CSCL 12/1

In order to evaluate our methods and approaches of estimating the operating characteristics of discrete item responses, it is necessary to try other comparable methods on similar sets of data. LOGIST 5 was taken up for this reason, and was tried upon the hypothetical test items, which follow the normal ogive model and were used frequently in testing our own methods and approaches. Two sets of simulated data we used based upon 500 and 2,000 hypothetical examines, respectively. It was found out that LOGIST 5 provides us with good parameter estimates under certain conditions, in preference to certain other conditions. Author (GRA)

N86-20043# California Univ., Berkeley. Lawrence Berkeley Lab.
QUANTUM MONTE CARLO FOR MOLECULES Annual Summary Report, 1 Jan. - 31 Dec. 1985
William A. Lester, Jr. and Peter J. Reynolds 1 Nov. 1985 32 p
(Contract N00014-83-F-0101)
(AD-A161091) Avail: NTIS HC A03/MF A01 CSCL 20/10

Of particular interest to molecular physics are the quantum mechanical Monte Carlo (or QMC) methods. What we mean by QMC is a Monte Carlo procedure for solving the Schrodinger equation statistically by the simulation of an appropriate random process. The formal similarity of the Schrodinger equation with a diffusion equation allows one to calculate quantum mechanical expectation values as Monte Carlo averages over an ensemble of random walks. The method is procedurally quite simple. As a result, QMC provides an attractive alternative to the conventional variational and perturbation-theoretic techniques used in physics and chemistry. Progress in the report year on the evaluation of: (1) molecular properties, (2) energy derivatives with respect to coordinates, and (3) excited states with the same symmetry as the ground state is described. GRA

N86-20044# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence lab.
PROBABILISTIC SOLUTION OF INVERSE PROBLEMS Ph.D. Thesis
Jose L. Marroquin Sep. 1985 203 p
(Contract N00014-80-C-0505)
(AD-A161130; AI-TR-860) Avail: NTIS HC A10/MF A01 CSCL 12/1

In this thesis we study the general problem of reconstructing

a function, defined on a finite lattice, from a set of incomplete, noisy and/or ambiguous observations. The goal of this work is to demonstrate the generality and practical value of a probabilistic (in particular, Bayesian) approach to this problem, particularly in the context of computer vision. In this approach, the prior knowledge about the solution is expressed in the form of a Gibbsian probability distribution on the space of all possible functions, so that the reconstruction task in formulated as an estimation problem. GRA

N86-20045# Stanford Univ., Calif. Dept. of Statistics.
ON IMPROVING SIMULTANEOUS CONFIDENCE REGIONS FOR TIME SERIES ANALYSIS
Alan J. Izenman and Sanat K. Sarkar 10 Oct. 1985 16 p
(Contract N00014-76-C-0475)
(AD-A161193; TR-365) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper obtains a simultaneous confidence region for the real-valued gains of a dependent stationary Gaussian time series over a collection of independent fixed series, which is substantially shorter than similar confidence regions currently available in the statistical literature. The tools used here for constructing this improved region include a differential identity for the complex multivariate Gaussian distribution and a multivariate probability inequality for the amplitudes of components of a complex-valued Gaussian random vector. Author (GRA)

N86-20046# Stanford Univ., Calif. Dept. of Statistics.
INFERENCE FOR AN EXPERIMENT BASED ON REPEATED MAJORITY VOTES
Jessica Utts 15 Oct. 1985 19 p
(Contract N00014-76-C-0475)
(AD-A161241; TR-366) Avail: NTIS HC A02/MF A01 CSCL 12/1

Consider an experiment which consists of n independent Bernoulli sequences, each of which is randomly terminated at either the kth success or the kth failure, whichever comes first. The goals are to make inferences about the per trial probability of success, as well as the probability that a sequence is terminated with a success. The latter is equivalent to the probability that if 2k-1 trials are accumulated, the majority will be successes. Various estimators are investigated, and the results of an ESP experiment fitting this scheme are examined. GRA

N86-20047# Stanford Univ., Calif. Lab. for Computational Statistics.
THE BOOTSTRAP METHOD FOR ASSESSING STATISTICAL ACCURACY
Bradley Efron and Robert Tibshirani Oct. 1985 57 p
(Contract N00014-83-K-0472)
(AD-A161257; LCS-TR-19) Avail: NTIS HC A04/MF A01 CSCL 12/1

This is an invited review of bootstrap methods. It begins with an exposition of the bootstrap estimate of standard error for one-sample situations. Several examples, some involving quite complicated statistical procedures, are given. The bootstrap is then extended to other measures of statistical accuracy, like bias and prediction error, and to complicated data structures such as time series, censored data, and regression models. Several more examples are presented illustrating these ideas. The last third of the paper deals mainly with bootstrap confidence intervals. The paper ends with a FORTRAN program for bootstrap standard errors. GRA

N86-20048# Netherlands Energy Research Foundation, Petten.
DETERMINATION OF CALIBRATION EQUATIONS BY MEANS OF THE GENERALIZED LEAST SQUARES METHOD
Willem L. Zijp Dec. 1984 30 p refs
(ECN-161; B8560104) Avail: NTIS HC A03/MF A01

A mathematical-statistical approach to determine the values of the model parameters and their covariance matrix, which fit best to the mathematical model for the calibration equation, is outlined. The formulas are based on the generalized least squares method, where the term generalized implies that nonlinear equations in the unknown parameters and covariance matrices of the measurement data of the calibration can be taken into account. In the general case an iteration procedure is required. No iteration is required when the model is linear in the parameters, and the covariance matrices for the measurements of coordinates of the calibration points are proportional to each other. Author (ESA)

N86-20049# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
SKIP-LOT SAMPLING PLANS M.S. Thesis - Kent Univ., England
G. B. Derksen Aug. 1984 180 p refs Revised
(IWIS-A-84-ST-53) Avail: NTIS HC A09/MF A01

Two level skip-lot sampling plans used in situations where the order of inspection is the same as that of the production process are discussed. The plans try to keep the fraction of defective items in each lot below a specified value and to minimize the number of inspected lots. This is obtained by skipping the inspection of lots when the quality is supposed to be good. The effect of skipping rules and sampling methods on the operating characteristic curve, the fraction inspected, average run length, and the loss of protection is assessed: Theoretical results are compared with simulation. They do not always agree very well with each other, and the average run length is perhaps not a useful characteristic. Two methods to design Skip-Lot Sampling Plans are compared with Military Standard 105-D. The skip-lot plans have advantages. Author (ESA)

N86-20050# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
THE FOURTEENTH CONFERENCE ON STOCHASTIC PROCESSES AND THEIR APPLICATIONS [DE 14-DE CONFERENTIE STOCHASTISCHE PROCESSEN EN HUN TOEPASSINGEN' IN GOTHENBURG, 12 T/M 16 JUNI 1984]
L. G. Barendregt Jul. 1984 15 p refs In DUTCH Conference held in Goeteborg, Sweden, 12-16 Jun. 1984
(IWIS-B-84-ST-54) Avail: NTIS HC A02/MF A01

A list of lectures on stochastic processes is presented. Topics include Markov processes, random walks, Brownian motion, probability theory, optimization, queueing theory, statistical variance, and population theory. Author (ESA)

N86-20051# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
THE LINEAR FUNCTIONAL RELATIONSHIP MODEL FOR TWO VARIABLES [HET FUNCTIONELE RELATIE MODEL VOOR TWEE VARIABELEN]
Bas Engel Nov. 1984 75 p refs In DUTCH
(Contract IWIS-02.6.17826)
(IWIS-A-84-ST-85) Avail: NTIS HC A04/MF A01

Theoretical backgrounds of parameter estimates, asymptotic characteristics of the estimators, and possible detection of (serious) model deviations in case of two only approximately known linearly related variables are described. The condition of estimating information concerning error variances, error covariances, and normality is shown. Based on this normality, maximum likelihood estimators are presented; least square estimators are derived. Regularity conditions of estimator consistency and asymptotic normal distribution are determined. On the normality condition, asymptotic variances and covariances are derived. A goodness of fit test is described. Approximation methods based on the asymptotic distribution of the residue estimators are described. Author (ESA)

N86-20083# Joint Publications Research Service, Arlington, Va.
BAYESIAN ESTIMATION OF PROBABILITY DISTRIBUTION FUNCTION Abstract Only
V. I. Tikhonov and A. I. Fyedorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 87 Transl. into ENGLISH from Izvestiya Vysskikh Uchebsnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 28, no. 2, Feb. 1985 p 249-251:

(For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-20052# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
A NOTE ON AN INTEGRATED CAUCHY FUNCTIONAL EQUATION
K. S. Lau and H. M. Gu Apr. 1985 14 p
(Contract F49620-85-C-0008)
(AD-A160339; TR-85-10; AFOSR-85-0863TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In characterizing the semistable law, Shimizu reduced the problem into solving an equation where mu and upsilon are given positive measures on infinity. This document obtains a simple proof and shows that some of his conditions can be weakened.
Author (GRA)

N86-20053# Duke Univ., Durham, N. C. Dept. of Computer Science.
A SINGLE SERVER QUEUE IN A HARD-REAL-TIME ENVIRONMENT Interim Report
K. S. Trivedi and F. Baccelli May 1985 17 p
(Grants NSF MCS-83-0200; AF-AFOSR-0132-84)
(AD-A160340; CS-1985-12; AFOSR-85-0747TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This document considers a single server first in first out queue in which arriving task has to be completed within a certain period of time (its deadline). More precisely, each arriving task has its own deadline - a nonnegative real number - and as soon as the response time of one task exceeds its deadline, the whole system is considered to have failed. (In that sense the deadline is hard). The main practical motivation for analyzing such queues comes from the need to evaluate mathematically the reliability of computer systems working with real time constraints (space or aircraft systems for instance). The authors therefore are mainly concerned with the analytical characterization of the transient behavior of such a queue in order to determine the probability of meeting all hard deadlines during a finite period of time (the mission time). The probabilistic methods for analyzing such systems are suggested by earlier work on impatience in telecommunication systems.
GRA

N86-20054# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
DEVELOPING SOURCE SELECTION EVALUATION CRITERIA AND STANDARDS FOR RELIABILITY AND MAINTAINABILITY M.S. Thesis
Daniel E. Harnen, Jr. Sep. 1985 132 p
(AD-A161030; AFIT/GLM/LSQ/85S) Avail: NTIS HC A07/MF A01 CSCL 15/5

This thesis studied the development of source selection evaluation criteria and standards for reliability and maintainability. The data base consisted of information obtained during personal interviews with personnel from Air Force Acquisition Logistics Center. Those interviewed were experienced in the development of source selection criteria and standards for reliability and maintainability. Reliability and Maintainability (R&M) issues have become the prime focus of attention within the Air Force in the development and acquisition of major weapon systems. R&M considerations must be continuously addressed to insure readiness of our Air Force. A weapon system must be able to perform with consistent reliability and be designed for efficient and effective maintainablity.
Author (GRA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-20055# Katholieke Universiteit, Nijmegen (Netherlands).
ASYMPTOTIC ANALYSIS OF NON-LINEAR ELLIPTIC AND PARABOLIC SINGULAR PERTURBATIONS Final Technical Report, Sep. 1982 - Sep. 1985
L. S. Frank Sep. 1985 58 p
(Contract DAJA37-82-C-0731; DA Proj. 1T1-61102-BH-57)
(AD-A159705; R/D-3078-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

Some classes of Non-linear Second Order Elliptic and Parabolic Partial Differential Operators affected by the presence of a small parameter epsilon are investigated. The reduced problem (epsilon = 0) is characterized by the appearence of a free boundary of the solutions. The Existence, Uniqueness and regularity results are established for both perturbed and reduced problems. Sharp two-sided estimates for the difference of the solutions of the perturbed and reduced problems are proved and some constructive procedures are found out for localizing and computing the free boundary of the reduced problem. The Kinetic Theory of membranes with enzymotic activity is one of the possible fields of applications of the results established, the small parameter being the so-called Michaelis' coefficient.
Author (GRA)

N86-20056# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
THE VACUUM STATES AND THEIR STABILITY IN N=1, D=10 ANOMALY-FREE YANG-MILLS SUPERGRAVITY
J. Kowalski-Glikman Sep. 1985 8 p refs
(NIKHEF-H/85-10; B8573354) Avail: NTIS HC A02/MF A01

The positive energy theorem for N=1, D=10 anomaly-free Yang-Mills supergravity theory is stated and proved. Conditions that the vacuum state of this theory must satisfy are obtained.
Author (ESA)

N86-20057# Joint Publications Research Service, Arlington, Va.
USSR REPORT: PHYSICS AND MATHEMATICS
11 Feb. 1986 105 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UPM-86-005) Avail: NTIS HC A06/MF A01

Research in physics and mathematics is presented in this U.S.S.R. report. Specific topics discussed include: acoustics, crystals, lasers glasses and semiconductors; gas dynamics; fluid dynamics; high temperture physics; lasers; magnetohydrodynamics; molecular physics; nuclear physics; optics and spectroscopy; plasma physics; logic and game theory; numerical analysis and algorthms, probability and statistics; thermodynamics and control theory. For individual titles, see N86-20058 through N86-20084.

N86-20058# Joint Publications Research Service, Arlington, Va.
EXCITATION OF SUPERSHORT DEFORMATION PULSES DURING ABSORPTION OF STRONG OPTICAL RADIATION Abstract Only c71
V. E. Gusev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 1 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2197-2209 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The possibility of implementing a laser picosecond acoustic pulse generator is analyzed theoretically. Processes occurring in

the system when a metal film is applied to the surface of the dielectric are investigated in detail. The generation and propagation of acoustic phonons and deformation waves are investigated using a model of an isotropic solid body disregarding acoustic mismatch at the film-crystal boundary and assuming that the system generates only longitudinal phonons. Formulas are derived for the energy density balance in the film. The model demonstrates effective excitation of deformation waves by the moving front of the heat pulse. It is found that the main contribution to the deformation pulse comes from synchronous excitation of acoustic waves in the region associated with the front of the nonequilibrium flux. Author

N86-20059# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC DOMAIN STRUCTURE IN RUBY CRYSTALS Abstract Only **c76**
S. A. Basun, A. A. Kaplyanskiy, and S. P. Feofilov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 3-4 Transl. into ENGLISH from Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 87, no. 12, Dec. 1984 p 2047-2061 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

It is shown experimentally that concentrated ruby crystals subjected to laser radiation enter a steady spatially inhomogeneous state with regions (domains) in which the internal electrical field directed along the C axis has the same absolute value but opposite sign. The characteristic restructuring of the domain structure that is accompanied by hysteresis is observed when the crystals are irradiated in an external electrical field. The phonomenon of photo-induced electrical domains in ruby is explained qualitatively by a phenomenological theory that associates the phenomenon with electrical instability of the crystal during irradiation. The instability is caused by the fact that the photovoltaic current arising in a centrally symmetrical ruby in the presence of a field is directed against the field. The photocurrent flowing in the crystal against the applied external electrical field is observed directly by measuring the voltage-current characteristics of optically excited ruby. Reversible phase transition are detected between homogeneous and inhomogeneous (domain) states of optic excited ruby that occur when external conditions change. Characteristic critical behavior of these transitions is established. Author

N86-20060# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC DOMAIN STRUCTURE: THEORY Abstract Only **c76**
M. I. Dyakonov and A. S. Furman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 4 Transl. into ENGLISH from Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 87, no. 12, Dec. 1984 p 2063-2074 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

A phenomenological theory of photoelectric instability is constructed that explains the occurrence of a stationary electrical domain structure in ruby crystals subjected to strong laser radiation. The theory is based on a mechanism proposed in another study to underlie the occurrence of photovoltaic current in an axisymmetrical crystal in the presence of an electrical field directed against the field. The resistance of the specimen in the zero-order field is negative, which results in the development of instability and the spontaneous occurrence of an electrical field in the crystal. Different types of steady field distributions resulting in the application of fields with different strengths are investigated. The occurrence of a reverse photovoltaic current in an electrical field during two-quantum excitation is analyzed. The theory of photoelectric domain instability is in complete accord with the experimental findings: the occurrence of current in ruby crystals directed against the electrical field is firmly established. Author

N86-20061# Joint Publications Research Service, Arlington, Va.
INTERACTION OF CHARGED PARTICLE BEAMS WITH ACTIVE PLASMA MEDIUM Abstract Only **c75**
M. B. Bondarenko, A. N. Kondratenko, and V. I. Tkachenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 6 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 27, no. 11, Nov. 1984 p 1382-1387 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

This study investigates the interaction of a low-density beam of charged particles with a weakly ionized plasma whose neutral component contains active molecules. The latter are modeled by a nonlinear 2-level system. The effects of the collective interaction between the oscillations excited by the beam and the active medium are taken into account. The amplitude of the oscillations excited in the plasma is assumed to be low, and the beam particles are assumed not to be trapped by the field of those oscillations, i.e., a linear approximation is satisfactory. Periodic pumping of the plasma oscillation energy to active medium energy is observed in a plasma containing active molecules in the absence of a beam. The introduction of a beam of charge particles with comparatively low density into the medium causes additional phase discrepancy between the field of the oscillations and the polarized of the medium. This distorts the regular nature of the energy pumping from the active component to the plasma oscillations and back. For high beam densities the influence of active molecules is significant only in the initial stage of the instability. The parameters of the medium for which the subject interaction can occur are estimated for the example of an ammonia molecule. Author

N86-20062# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF A MODEL OF FLOW OF STREAM OF STRATIFIED FLUID ABOUT A BODY Abstract Only **c34**
K. A. Bezhanov and A. M. Ter-Krikorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 10 Transl. into ENGLISH from Doklady Akademii Nauk SSR (Moscow, USSR), v. 279, no. 6, Dec. 1984 p 1345-1348 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The plane problemn of the flow of a steady-state stream of stratified fluid about a body is investigated. The number of layers is finite, the bottom is horizontal, and the upper bound is free. The density and tangential component of the velocity vector are discontinuous at the boundaries of the layers, while the pressure and normal component of the velocity vector are continuous. The ox axis runs along the horizontal bottom of the channel, and the oy axis is vertical. The velocity field at the boundary of the bodies is approximate by the velocity field corresponding to flow about the body by a stream of weightless homogeneous fluid. The boundary problem for the multiply-connected region G is transformed to a linear integrodifferential equation that is solved with the help of an auxilary Fredholm equation with symmetrized kernel. The latter equation is shown to have no more than a finite number of positve characteristic numbers. Author

N86-20063# Joint Publications Research Service, Arlington, Va.
THE MECHANISM UNDERLYING DESTRUCTION OF POLYMERS BY RADIATION FROM PULSE-PERIODIC CO2 LASER Abstract Only **c36**
G. G. Gladush, Ye. B. Levchenko, V. G. Nizev, and R. D. Seydgazov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 12 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2294-2300 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

This study investigates the principles underlying the formation of deep ($h/d > 1$) craters in polymethylmethacrylate specimens caused by focused radiation from a pulse periodic CO2 laser. An LGI-50 CO2 laser with pulse length of 100 micron, repetition frequency of 380 Hz and pulse energy of less than 0.05 J was employed. The parameters of the craters formed were analyzed photographically. Analysis of the cratering indicates that, in addition to waveguide processes, gas-phase processes (absorption in vapors and excitation of acoustic oscillations within the crater cavity) are significant. The acoustic currents increase the heat flux on the walls of the crater, causing local expansion; these

processes restrict the possibility of achieving large crater depth-to-diameter ratios. Author

N86-20064# Joint Publications Research Service, Arlington, Va.
FINDING AND DEVELOPING GALLIUM-GARNET ACTIVE LASER MEDIA Abstract Only c36
Ye. V. Zharikov, S. P. Kalitin, V. V. Laptev, A. A. Mayer, and V. V. Osiko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 14 Transl. into ENGLISH of Akademiya Nauk SSSR, Inst. Obshchey Fiziki, Fizika Tverdogo Tela, Laboratoriya Fiziki Tverdogo Tela (Moscow, USSR) p 1-28 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

Rare-earth gallium-garnet crystals containing a chromium ion as the activator or sensitizer are developed. An integrated approach is described or developing laser materials that is based on crystallochemical construction, including spectroscopic and technological aspects. The proposed class of laser materials meets all of the basic spectral and lasing requirements, and can be used to develop a number of solid state lasers operating at various wavelengths in the near-IR region of the spectrum. Certain of the physical properties and lasing characteristics of crystal obtained by Chokhralskiy's method are presented. Author

N86-20065# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF STIMULATED MANDELSHTAM-BRILLOUIN SCATTERING OF FOCUSED BEAMS IN THE REPETITIVE-PULSE MODE Abstract Only c36
R. R. Buzyalis, A. S. Dementyev, and E. K. Kosenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 May 1986 p 15 Transl. into ENGLISH from Litovskiy Fizicheskiy Sbornik (Vilnius, USSR), v. 25, no. 1, Jan. - Feb. 1985 p 68-79 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

A YAG:Nd sup (3+) laser operating in a repetitive-pulse mode with pulse repetition frequencies less than 30 Hz was used to study stimulated Mandelsham-Brillouin scattering (SMBS) of the YAG-laser radiation from CC1 sub 4, acetone, and other organic liquids. In CC1 sub 4, which absorbs the YAG radiation weakly, the coefficient of reflection R increased with the laser pulse energy, both for single pulses and in the repetitive-pulse mode, in which the reflection coefficient depended only on the pulse energy. Intense 1-nsec Stokes pulses and an angular divergence of less than 1 mrad were obtained. In acetone it was found that for pulse repetition frequencies less than 5 Hz there is an optimum pumping energy above which R decreases and SMBS is disrupted. As the pulse repetition frequency was increased, R approached zero within several pulses. Observations of transient effect sin SMBS showed that this difference in the behavior of SMBS is linked to the absorption of the pumping radiation in the medium. The subsequent heating of the medium caused strong thermal defocusing of the pumping beam which made it impossible to achieve the intensity threshold required for SMBS scattering. Elucidation of this phenomenon is important because SMBS is used in phase-front reversal as a means for decreasing beam divergence of ruby and neodymium glass lasers operating in the single-pulse mode. Author

N86-20066# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF AMPLIFICATION AND LASING SPECTRUM OF TEA-LASER EMPLOYING MIXTURE OF ISOTOPE-SUBSTITUTED CARBON DIOXIDE MOLECULES Abstract Only c36
V. O. Petukhov, N. N. Sazhina, V. S. Starovoytov, S. A. Trushin, N. V. Cheburkin, S. K. Chekin, and V. V. Churakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 2, Feb. 1985 p 416-419 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The amplification and lasing spectra in a nonselectve cavity of a TEA-laser employing (C-12)O2 and (C-13)O2 isotope mixtures are investigated experimentally as a function of the degree of excitation of molecular oscillations, the gas pressure, and the content of isotopically substituted molecules. The radiation spectrum of the laser is assumed to be determined uniquely by the amplification spectrum at the maximum of the lasing pulse. A system with nonselective cavity is shown to lase on one or several lines at wavelengths ranging from 11.11 to 11.22 micron for a wide range of active medium pressures (100 - 3500 mm Hg) and excitation levels when a gas mixture is used in which the ratio of (C-13)O2 (x sub 13) and (C-12)O2 (x sub 12) molecules is x sub 13/(x sub 13 + x sub 12) > 0.35 - 0.45. The experimental results confirm the analytical findings regarding the lasing spectrum, indicating that the effectiveness of exciting asymmetrical oscillations of the CO2 and N2 molecules in the electrical discharge is independent of the isotope content. Author

N86-20067# Joint Publications Research Service, Arlington, Va.
DYNAMIC CHARACTERISTICS OF ADAPTIVE OPTICS SYSTEMS c74
V. P. Lukin and V. L. Mironov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 28-32 refs Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 9(159), Sep. 1985 p 1959-1961 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The Strehl ratio for an optical system with correction for distortion is examined as a function of time lag. Two adaptive optics systems are compared for effectiveness: a system with continuous lag and a system using the function as well as its derivative for correction. The required bandwidth for an adaptive optics system is determined. Author

N86-20068# Joint Publications Research Service, Arlington, Va.
NONLINEAR ATTENUATION OF PULSED LASER RADIATION ALONG A NEAR-SURFACE ATMOSPHERIC PATH c36
N. A. Blinov, I. A. Leontyev, Ye. G. Ryzhkov, V. L. Semenov, V. P. Sinelnikov, S. S. Fillippov, and N. V. Cherburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 33-36 refs Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 10, Oct. 1985 p 2147-2149 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The propagation of intensive pulsed CO2 laser radiation along a near-surface atmospheric path is examined. A mechanism is suggested which explains the anomalous radiation attenuation during a pulse. Author

N86-20069# Joint Publications Research Service, Arlington, Va.
COLLECTIVE EFFECTS DURING INDUCED RADIATION OF ELECTRON BEAM IN WIGGLER WITH AXIAL MAGNETIC FIELD Abstract Only c75
A. Kolomenskiy and I. I. Pakhomov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 37 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 10, no. 6, Nov. - Dec. 1984 p 1275-1279 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

Hydrodynamic approximation is employed to investigate the dispersion properties of free-electron lasers resulting from the combined operation of collective effects and the magnetic field H corresponding to actual experiments. Two magnetic field configurations are investigated: combination of the spiral field and longitudinal field, and an azimuthally-symmetrical field modulated along the z axis. It is found that, all other conditions being equal, the increment in the instability for the spiral field is somewhat greater than that of the azimuthally-symmetrical field. The increment is found to fall in both cases as the kinetic electron energy and radiation frequency increase. The combination of the wiggler field and a strong focusing longitudinal field changes the nature of the transverse movement of the electrons, and also has a strong influence on their longitudinal movement. Author

N86-20070# Joint Publications Research Service, Arlington, Va.
LASING PROPERTIES OF TWO-COMPONENT DYE SOLUTION

EMPLOYING FLASHLAMP PUMPING IN DIFFERENT SOLVENTS Abstract Only c72

A. M. Saletskiy and V. I. Yuzhakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 38 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 2, Feb. 1985 p 294-305 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

This study investigates the influence of the solvent on lasing properties in a system of rhodamine 6G and oxazine 17, which exhibits a wide frequency tuning range when flashlamp pumping is employed. It is found that the energy and spectral characteristics of the two-component system are improved by the participation of both components, as well as by donor-to-acceptor transfer of the excitation energy. The increase in 017 lasing efficiency resulting from transfer of the excitation energy from R6G molecules is insignificant, and no change in the solvent to influence the transfer rate of the excitation energy causes any significant change in the lasing efficiency of the two-component system. The lasing characteristics of the multicomponent system is influenced by the solvent chiefly due to modification of the spectral-luminescent properties of the components; the lasing energy of the dye mixture is increased mainly by the gain associated with the direct involvement of donor as well as acceptor molecules. Author

N86-20071# Joint Publications Research Service, Arlington, Va.
BEAM EXTRACTION FROM HIGH ENERGY CYCLOTRONS BASED ON INTEGER RESONANCE Abstract Only c73

L. A. Sarkisyan *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 39 Transl. into ENGLISH from Vestnik Moskovskogo Univ.: Seriya 3 Fizika, Astronomiya (Moscow, USSR), v. 25, no. 6, Nov. - Dec. 1984 p 59-61 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

Beam extraction from strong-current kaon-neutron cyclotrons with proton energy of several GeV is analyzed. In contrast to earlier models, it is found that integer resonance Q sub r = 2 followed by acceleration does not occur but that the bem was extracted on the basis of integer resonance rather than fourth-order nonlinear resonance. It is found that proton extraction on the basis of integer resonance can also be employed in cyclotron pion factories with low energy accumulation per revolution (approximately 400 keV). Author

N86-20072# Joint Publications Research Service, Arlington, Va.
INITIAL EXPERIMENTS ON HIGH FREQUENCY PLASMA HEATING AT TUMAN-3 TOKAMAK Abstract Only

L. G. Askinazi, V. Ye. Golant, S. G. Goncharov, M. P. Gryaznevich, V. K. Lusev, V. V. Dyachenko, A. B. Izvozchikov, A. I. Kislyakov, S. V. Krikunov, and S. V. Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 40 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 5, 12 Mar. 1985 p 315-318 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

The conditions for injecting hf power at the ion cyclotron resonance frequency are investigated and optimized experimentally with the help of a high-power generator loaded to a metal antenna. The power input to the plasma was 50 to 150 kW. The absorption efficiency was investigated as a function of the longitudinal magnetic field size and the amount of hydrogen added to the deuterium plasma. The replacement of deuterium by hydrogen is found not to change the parameters of the ohmic heating mode significantly. Experiments on ion cyclotron heating are described in which a single antenna contained a 72 x 330 sq mm tube is employed. The hf power is found to be contained in the stationary stage of the discharge, 25 to 35 msec after initiation. Oscillograms are presented of the discharge parameters in which the main working gas is deuterium. The increase in deuteron and proton temperature measured spectrally is analyzed as a function of the concentration of added hydrogen. Significant electron heating in modes was noted with a strong longitudinal field. Author

N86-20073# Joint Publications Research Service, Arlington, Va.
ESTIMATION OF MINIMUM LIGHT FLUX DETERMINED BY PHOTON NOISE FOR ADAPTIVE IMAGE VIBRATION COMPENSATION SYSTEM Abstract Only c74

A. N. Bogaturov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 27, no. 11, Nov. 1984 p 1410-1418 Original language document was announced in IAA as A85-20630 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

An adaptive-optic system whose measuring element is a Hartmann sensor cell is examined in the case of the precise measurement of the center of gravity of the coordinates of registered photocounts. An expression is obtained for the optimal gain factor n the corrector chain. It is shown that a nonoptimal choice of this factor can lead to an increase in the jitter in the case of a small number of registered photons. An expression for the minimal light flux and numerical estimates for the case of astronomical observations are also presented. L.M. (IAA)

N86-20074# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF RELATIVE CURRENT DENSITY DISTRIBUTION IN POWERFUL PULSE ELECTRON BEAM BY PHOTOMETER REGISTRATION OF X-RAY BREMSSTRAHLUNG Abstract Only c74

A. A. Golubev, A. Kh. Kadymov, and O. I. Radkevich *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 45 Transl. into ENGLISH from Radioelekronika Uskoriteley I Fizicheskogo Eksperimenta (Moscow, USSR), 1982 p 11-21 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

A pulse electron beam with E = 400 keV, I = 25 A and rectangular pulse shape is investigated photographically with allowance for the influence of the finite dimensions of the aperture of the camera. The electron beam was received in a vacuum by a flat tantalum target set at 45 deg to the axis of the beam 2 meters from the accelerator. The resulting X-ray bremsstrahlung (gamma radiation) exits the camera chamber and is recorded on film. The picture of the density distribution of the gamma radiation sources at the target corresponds to the distribution density of the current across the cross section of the electron beam. The optical density curves were recorded photometrically as a function of the radius on an automatic MF-431 microphotometer. This method is found to provide acceptable accuracy even under the unfavorable sensitivity conditions of the experiment. The use of high sensitivity film in conjunction with amplifying luminescent screen film makes it possible to enhance the accuracy of the method by placing the films farther from the aperture. This reduces the error in the mathematical allowance for the influence of the aperture, improves the photometry accuracy and makes it possible to operate in the linear section of the film characteristic. Author

N86-20075# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF A GARNET MAGNETIC MIRROR WITH WAVELENGTH OF 1.15 MICRON Abstract Only c74

I. A. Andronova, Yu. A. Gusev, Yu. N. Konoplev, M. A. Mamayev, M. A. Novikov, and A. A. Turkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 47 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Mv I SSO SSSR: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 388-392 Original language document was announced in IAA as A85-34890 (For primary document see N86-20057 10-70)

Avail: NTIS HC A06/MF A01

Loss characteristics and phase and amplitude nonreciprocity of a garnet magnetic mirror (GMM) at a wavelength of 1.15 microns are computed, and some experimental results which describe the phase nonreciprocity of the GMM in terms of the incidence angle are discussed. It is pointed out that the use of a submicron garnet film of appropriate thickness will make it possible to reduce the losses to 0.1 to 0.2 percent without changing the phase nonreciprocity value. The study is pertinent to the design of laser gyros, in which GMMs are presently being used. L.T. (IAA)

N86-20076# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF HOLOGRAM RECORDING IN IMPURITY CRYSTALS OF LITHIUM NIOBATE AT 325 nm Abstract Only c74

V. Yu. Kozlova and R. K. Ovsepyan *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 58 Transl. into ENGLISH from Doklady Akademii Nauk Armyanskoy SSR (Yerevan, USSR), v. 79, no. 5, Sep. - Oct. 1:9984 p 214-217 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

Photo refraction is investigated in LiNbO3 crystals at 325 nm in order to determine the mechanism that underlies recording at that wavelength, and to determine recording sensitivity. The experiments employed pure and iron-doped Y-cut LiNbO3 crystals 300 micrometers thick. The induced change in birefringence was measured holographically and polarization-optically. The diffraction efficiency of the holograms is analyzed as a function of exposure during reading and writing. Reading causes the hologram to be erased, with a time constant far shorter than in the visible band. No macroscopic phase distortions of the recorded segment that would degrade hologram quality were observed during reading and writing, which allows repeated read-write cycles without significant degradation in hologram sensitivity or quality. The maximum diffraction efficiency and photo refractive sensitivity are tabulated. Photo refraction at 325 nm is found to occur primarily due to a diffuse mechanism of separation of nonequilibrium carriers. Lithium niobate crystals can be used to record dynamic holograms, and for real time interferometry. Author

N86-20077# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF TWO-DIMENSIONAL LANGMUIR TURBULENCE Abstract Only c75

L. M. Degtyarev, I. M. Ibragimov, R. Z. Sagdeyev, G. I. Solovev, V. D. Shapiro, and V. I. Shevchenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 60 Transl. into ENGLISH from Pisma V Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 40, no. 11, 10 Dec. 1984 p 455-459 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

This study presents the results of numerical modeling of two-dimensional (x,y) turbulence created by a pumping wave with electrical field oriented along the X axis and unidimensional amplitude. The pumping models either the electromagnetic wave in the vicinity of plasma resonance, or long-wave plasma oscillations excited by the beam in the plasma. The turbulence is modeled on the basis of Zakharov's equations, modified to allow for the presence of the pumping wave and for absorption of oscillations by resonant particles in the short wave part of the spectrum for both modes forming the turbulence - the high frequency plasma and slow modes of quasineutral density perturbations. It is found that the Langmuir oscillation energy is localized in continuously generated collapsing caverns that burn up due to Landau attention. The integral characteristics of the quasisteady state obtained numerically agree satisfactorily with the analytical model. Author

N86-20078# Joint Publications Research Service, Arlington, Va.
HIGH FREQUENCY PLASMA HEATING AT FINITE PRESURE IN REGION OF ION CYCLOTRON FREQUENCIES Abstract Only c75

D. L. Grekov and K. N. Stepanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 61 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 10, no. 6, Nov. - Dec. 1984 p 1211-1218 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The heating of an inhomogeneous plasma cylinder by electromagnetic waves at approximately the ion cyclotron frequency is investigated. Analytical expressions are derived for the amount of power absorbed by the plasma. It is found that ion cyclotron resonance of the primary gas is an effective heating mechanism in Drakon-type installations with reactor parameters, in contrast to systems with small beta. The cyclotron attenuation at harmonics of the ion cyclotron frequency of the primary gas is found to be very strong. The width of the cyclotron resonance zone for waves with small enough values of k parallel is smaller than the plasma dimensions because of the plasma diamagnetism. Cherenkov absorption by electrons is also strong. It is found possible to excite intrinsic oscillations only for small values of k parallel or in small installations; cyclotron resonance by the Alfven branch of the oscillations can be employed in small installations. Author

N86-20079# Joint Publications Research Service, Arlington, Va.
EMISSION OF ELECTROMAGNETIC WAVES BY A MODULATED ELECTRON BEAM IN A RECTANGULAR WAVE GUIDE FILLED WITH A LONGITUDINALLY INHOMOGENEOUS PLASMA Abstract Only c75

S. M. Levitskiy and I. A. Anisimov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 64 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy MV I SSO SSSR: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 298-302 Original language document was announced in IAA as A85-34880 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The Lorentz lemma is used to study the problem of stimulated electromagnetic emission during the excitation of a plasma resonance region in an inhomogeneous plasma in a rectangular waveguide by a modulated electron beam with a random current density distribution across the waveguide. It is shown that for small dimensions of spatial plasma inhomogeneities (L) the amplitude of the radiation field increases with increasing L due to the larger number of electrons involved in the emission process. At larger L the plasma resonance region is excited non-phase-synchronously by the modulated electron beam, thereby weakening the emission. L.T. (IAA)

N86-20080# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF THERMAL FIELD OCCURRING DURING LASER HEATING OF METALS Abstract Only c77

N. A. Kirichenko and Yu. Yu. Morozov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 76 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2331-2335 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

This study analyzes the stability of the thermal field occurring during laser heating of a massive metal specimen in an oxidizing medium (air), and investigates behavior of the stability boundary for different external conditions. A system of three equations is derived that defines the surface which divides the entire parameter space into regions with different numbers of steady-state solutions of the slot boundary problem. The stability boundary is calculated for several values of the heat loss parameter, and the behavior of the temperature along the stability boundary is examined. The boundary problem is characterized by the intensity of radius of the radiation beam, in addition to the heat loss factor. Author

N86-20081# Joint Publications Research Service, Arlington, Va.
KINETIC COOLING IN BINARY MIXTURES OF MOLECULAR GASES DURING TWO-QUANTUM EXCHANGE OF OSCILLATING ENERGY Abstract Only c72

U. S. Dzhurabekov and A. I. Osipov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 77 Transl. into ENGLISH from Vestnik Moskovskogo Univ.: Seriya 3 Fizika, Astronomiya (Moscow, USSR), v. 25, no. 6, Nov. - Dec. 1984 p 44-47 Original language document was announced in IAA as A85-24059 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The effect of kinetic cooling in binary mixtures of molecular gases under two-quantum vibrational energy transfer between the components is investigated analytically. It is shown that in the mixtures CH3F-N2 and CH4-02, the kinetic cooling effect due to two-quantum vibrational transfer can be observed experimentally. This makes it possible to determine the probability of the two-quantum transfer of vibrational energy. V.L. (IAA)

N86-20082# Joint Publications Research Service, Arlington, Va.
GENERAL NONASYMPTOTIC ESTIMATES OF THE RATE OF CONVERGENCE OF ITERATIVE STOCHASTIC ALGORITHMS Abstract Only **c64**
Ya. I. Alber and S. V. Shilman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 80 Transl. into ENGLISH from Zhurnal Vychislitelnoy Matematiki I Matematicheskoy Fiziki (Moscow, USSR), v. 25, no. 3, Mar. 1985 p 344-355 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

The convergence of iterative stochastic algorithms of the following form as studied: x sub n + 1 = Pi sub G [x sub n = alpha sub n s sub n (x sub n)], n = 1, 2, 3, ... , where x sub n is a vector in R sup m, s sub n (x sub n) is a vector of random observations at the n-th iteration at the point x sub n, alpha sub n > or = 0 is the stp parameter, and Pi sub G is a projection operator onto a closed convex set G element of R sup M. Such algorithms are widely used to solve diverse probabilistic problems, in particular, the minimization of functions in the presence of random errors. Previous work on obtaining analytic estimates of the indicators indicating the accuracy of the iterative process for alpha sub n of the form alpha sub n sup-1 and n > 0 was extended to arbitrary forms of alpha sub n. The rate of convergence of the quantity lambda sub n = M [V (x sub n)] to zero, where M is the mathematical expectation operator and V is the Lyapunov function of the form rho sup 2 (x, X*), i.e. the square of the distance of the point x from the set X* of all solutions, was studied and theorems on the upper limit of lambda sub n were proved.
Author

N86-20083# Joint Publications Research Service, Arlington, Va.
BAYESIAN ESTIMATION OF PROBABILITY DISTRIBUTION FUNCTION Abstract Only **c65**
V. I. Tikhonov and A. I. Fyedorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 87 Transl. into ENGLISH from Izvestiya Vysskikh Uchebsnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 28, no. 2, Feb. 1985 p 249-251: (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

This study describes the Bayesian approach to estimating the unknown probability distribution function of a random quantity using an independent sample of finite size. In contrast to the traditional method, the Bayesian approach makes allowance for a priori information about the nature of the random quantity in question, and makes it possible to determine the sample size needed to obtain an estimate with the required variance. The Bayesian approach is found to be inadvisable for small samples because of the large variance.
Author

N86-20084# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF THE TRAJECTORY SENSITIVITY OF ADAPTIVE STOCHASTIC CONTROL SYSTEMS Abstract Only **c63**
A. I. Petrov, A. G. Zubov, and V. V. Minin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 89 Transl. into ENGLISH from Avtomatika (Kiev, USSR), no. 2, Mar. - Apr. 1985 p 51-59 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

Methods for studying the sensitivity of the trajectories of adaptive stochastic control systems, described by symmetric linear stochastic differential matrix equations with additive Gaussian noise and coefficients which are analytic functions of the time and of the Gaussian noise vector, to parametric and coordinate perturbations were constructed and applied to the study of adaptive systems with a stochastic standard model and with identifiers and to model-following systems and traditional linear systems with feedback. It was shown that in both insensitivity-optimal adaptive systems and model-following systems the use of a stochastic standard model makes it possible to decrease the effect of uncontrollable perturbations, which result is linked to the inherently closed nature of the adaptation processes in these systems.
Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-20085 Washington Univ., Seattle.
SOUND RADIATION FROM ISOTROPIC PALTES STIFFENED BY RECTANGULAR GRID NETWORKS Ph.D. Thesis
Abdel-Salaam Mohamad 1985 105 p
Avail: Univ. Microfilms Order No. DA8521632

A comprehensive and mathematical model for predicting the vibrational displacement of and the sound generated by a vibrating plate that is stiffened by periodically spaced, orthogonal beams subjected to a sinusoidally time varying point load is developed. The plate is assumed to be infinite in extent, and the beams are considered to exert both line force and moment reactions on it. Structural damping is included in both late and beam materials. A space harmonic series representation of the spacial variables is used in conjunction with the Fourier transform to find the displacement and the sound pressure in terms of harmonic coefficients which depend on the details of the structure. Results are shown for the sound pressure level measured on axis in a semi-infinite fluid (water) bounded by the plate for various locations of application of an external time harmonic point force on the plate. The determination of sound pressure radiated from period plate structures like the one described is fundamental in the estimation of noise levels in aircraft fuselages or similar periodic structures.
Dissert. Abstr.

N86-20086*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTIC GUIDE FOR NOISE TRANSMISSION TESTING OF AIRCRAFT Patent Application
Rimas Vaicaitis, inventor (to NASA) (Columbia Univ., N.Y., N.Y.) Filed 3 Jul. 1985 13 p Sponsored by NASA
(NASA-Case-LAR-13111-1-CU; NAS 1.71:LAR-13111-1-CU; US-Patent-Appl-SN-751695) Avail: NTIS HC A02/MF A01 CSCL 20A

Selective testing of aircraft or other vehicular components without requiring disassembly of the vehicle or components was accomplished by using a portable guide apparatus. The device consists of a broadband noise source, a guide to direct the acoustic energy, soft sealing insulation to seal the guide to the noise source and to the vehicle component, and noise measurement microphones, both outside the vehicle at the acoustic guide output and inside the vehicle to receive attenuated sound. By directing acoustic energy only to selected components of a vehicle via the acoustic guide, it is possible to test a specific component, such as a door or window, without picking up extraneous noise which which may be transmitted to the vehicle interior through other components or structure. This effect is achieved because no acoustic energy strikes the vehicle exterior except at the selected component. Also, since the test component remains attached to the vehicle, component dynamics with vehicle frame are not altered.
NASA

N86-20087*# National Aeronautics and Space Administration. Pasadena Office, Calif.
SINGLE MODE LEVITATION AND TRANSLATION Patent Application
Martin B. Barmatz (JPL, Pasadena, Calif.) and James L. Allen, inventors (to NASA) Filed 18 Oct. 1985 17 p
(Contract NAS7-918)
(NASA-Case-NPO-16675-1-CU; NAS 1.71:NPO-16675-1-CU; US-Patent-Appl-SN-789266) Avail: NTIS HC A02/MF A01 CSCL 20A

A single frequency resonant mode is applied by a transducer to acoustically levitate an object within a chamber. This process allows smooth movement of the object and suppression of unwanted levitation modes that would urge the object to a different levitation position. A plunger forms one end of the chamber, and the frequency changes as the plunger moves. Acoustic energy is applied to opposite sides of the chamber, with the acoustic energy

on opposite sides being substantially 180 degrees out of phase. NASA

N86-20088*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATUS AND CAPABILITIES OF SONIC BOOM SIMULATORS
Kevin P. Shepherd and Clemans A. Powell Jan. 1986 8 p refs
(NASA-TM-87664; NAS 1.15:87664) Avail: NTIS HC A02/MF A01 CSCL 20A

The current status and capabilities of sonic boom simulators which might be used in future studies of the effects of sonic boom on people, animals, or structures is summarized. The list of candidate simulators is based on a literature search which was confined to the United States and Canada. Some of the simulators are fully operational, others could be made operational with a modest investment, and still others would require a major investment. For the sake of the completeness, some simulators which were the subject of a previous review, but which no longer exist, are also included herein. Author

N86-20089*# Bolt, Beranek, and Newman, Inc., Canoga Park, Calif.
IN-FLIGHT ACOUSTIC MEASUREMENTS ON A LIGHT TWIN-ENGINED TURBOPROP AIRPLANE Final Report
J. F. Wilby, C. D. McDaniel, and E. G. Wilby Nov. 1985 233 p refs
(Contract NAS1-16521)
(NASA-CR-178004; NAS 1.26:178004) Avail: NTIS HC A11/MF A01 CSCL 20A

Four series of flight tests were conducted to measure sound pressure levels inside and outside the cabin of a twin-engined turboprop airplane. Particular emphasis was placed on harmonics of the propeller blade passage frequency. The cabin was unfurnished for the first three flights, when the main objective was to investigate the repeatability of the data. For the fourth flight, the cabin was treated with fiberglass batts. Typically, the exterior sound pressure levels were found to vary 3 to 5 dB for a given harmonic, but variations as high as 8 dB were observed. The variability of harmonic levels within the cabin was slightly higher but depended on control of the relative phase between the propellers; when phase was not controlled the average variability was about 10 dB. Noise reductions provided by the fuselage structure were in the range of 20 to 40 dB, when an exterior microphone in the plane of rotation of the propeller was used as reference. Author

N86-20090# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
INTERNATIONAL CIVIL AVIATION ORGANIZATION HELICOPTER NOISE MEASUREMENT REPEATABILITY PROGRAM: US TEST REPORT, BELL 206L-1, NOISE MEASUREMENT FLIGHT TEST
J. S. Newman, E. J. Rickley, and M. Locke Sep. 1985 427 p
(AD-A159898; FAA/EE-85-6) Avail: NTIS HC A19/MF A01 CSCL 14/2

This document reports the findings of the U.S test team's participation in the Helicopter Noise Measurement Repeatability Program (HNMRP). The U.S./Canadian flight test was held in August of 1984 at Dulles International Airport near Washington, D.C. The principal objective of this international HNMRP is to refine noise certification testing requirements. Participating nations conducted the test programs on the same type helicopter, the Bell 206L-1 (or the acoustically equivalent 206L-3), using the same test procedures. Analyses in this document include the investigation of source noise adjustments based on increases in noise level with advancing blade tip Mach number, the examination of relative source contributions in the helicopter acoustical spectrum, and source directivity for both in-flight and static operations. This report contains helicopter noise definition information (useful in environmental impact analyses) for level flyovers at various airspeeds and altitudes, and ICAO takeoff and approach procedures. Data are also shown for a noise abatement operation involving dynamic changes in torque, rate of descent and airspeed. This report also provides information for the hover-in-ground effect, flight idle and ground idle static operations. GRA

N86-20091# California Univ., Los Angeles. Dept. of Materials Science and Engineering.
ANNUAL SUMMARY REPORT FOR ONR CONTRACT NUMBER N00014-81-K-0011, INVESTIGATION FROM NOVEMBER 1984 TO THE PRESENT
K. Ono Sep. 1985 8 p
(Contract N00014-81-K-0011; DA Proj. RR0-1108)
(AD-A159899) Avail: NTIS HC A02/MF A01 CSCL 20/11

This investigation is aimed at studying emission for applications to residual stress measurements and for the evaluation of structural integrity of engineering structures. Effects of microstructure, composition and prior cold working on magnetomechanical acoustic emission (MAE) have been studied. Magnetization behavior, magnetostriction and Barkhausen noise are affected by stress as well as other parameters. These responses will be measured simultaneously in order to identify the the stress level uniquely. Combinations of advanced signal analysis methods at present, and have been studied to identify the optimum parameters for applications. In the second part of this study, acoustic emmission from materials undergoing plastic deformation and fracture has been examined in and attempt to improve detection capability of the impending structural failure. Our previously established techniques are extended in studying the acoustic emission behavior of advanced aluminum alloys and composite materials. Digital signal analysis techniques are used to investigate further the different types of acoustic emission behavior of advanced aluminum alloys and composite materials. Digital signal analysis techniques are used to investigate further the different types of acoustic emission signals from various sources. A major emphasis has been placed on the fracture related AE in high strength aluminum-lithium alloys and fiber-reinforced advanced composites including metal matrix (Al-SiC) and resin matrix (graphite-epoxy) materials. GRA

N86-20092# Open Univ., Milton (England). Faculty of Technology.
COORDINATION OF RESEARCH ON MECHANICAL WAVES IN PARTICULATE MATERIALS Interim Report, Mar. - Sep. 1985
K. Attenborough Sep. 1985 9 p
(Contract DAJA45-84-C-0037)
(AD-A159993; R/D-4541-EN-01; IR-3) Avail: NTIS HC A02/MF A01 CSCL 20/1

The Biot theory is reconciled with classical rigid-porous theory for air filled soils. The biot frequency dependent viscosity function was introduced to account for viscous drag between entrained pore fluid and the solid matrix of a fluid saturated porous solid during passage of a sound wave. A layered poroelastic system was analyzed by maxima in seismic transfer spectra and by sperical wave incidence. A more refined computation of the acoustic-to-seismic transfer spectrum and analysis of acoustically induced seismic waves is studied. E.R.

N86-20093# Texas Univ., Austin. Austin Applied Research Lab.
NONLINEAR ACOUSTICS: LONG RANGE UNDERWATER PROPAGATION, AIR-FILLED POROUS MATERIALS, AND NON-COLLINEAR INTERACTION IN A WAVEGUIDE Annual Summary Report, 1 Aug. 1984 - 31 Oct. 1985
David T. Blackstock 28 Oct. 1985 17 p
(Contract N00014-84-K-0574; DA Proj. RR0-1108)
(AD-A161037; ARL-TR-85-36; ASR-1) Avail: NTIS HC A02/MF A01 CSCL 20/1

Research on three topics in nonlinear acoustics is described. (1) Nonlinear effects in long range underwater propagation. The equations of nonlinear geometrical acoustics have been derived from the general equations of fluid mechanics for an inhomogeneous fluid. And analytical solution for the waveform of an arbitrary pressure signal traveling along a ray path has been implemented by a computer program. Not included in the program are effects of reflection and focusing. (2) Nonlinear effects in air-filled bulk porous materials. Theory and experiments on the propagation of intense airborne sound in bulk porous materials

are described. The primary source of nonlinearity is the velocity dependent resistivity of the materials. (3) Nonlinear interaction in rectangular waveguide. Two problems are considered, (a) distortion of a wave launched as a single tone in the 1,0 mode of the waveguide, and (b) noncollinear interaction of two noncollinear tones, one a low frequency wave in the 0,0 mode, the other a high frequency wave in the 1,0 mode. GRA

N86-20094# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
B-52G CREW NOISE EXPOSURE STUDY
William H. Decker and Charles W. Nixon 30 Aug. 1985 49 p
(AF Proj. 7231)
(AD-A161112; AFAMRL-TR-85-056) Avail: NTIS HC A03/MF A01 CSCL 20/1

The B-52G aircraft produces acoustic environments that are potentially hazardous, interfere with voice communications and may degrade task performance. Numerous reports from aircrew of high noise levels at crew location have been documented for those B-52G aircraft that have been modified with the Offensive Avionics System. To alleviate and minimize the excessive noise exposures of aircrews, a study of the noise problem in the b-52G was deemed necessary. First, in-flight noise measurements were obtained at key personnel locations on a B-52G during a typical training mission. Then, extensive laboratory analyses were conducted on these in-flight noise data. The resulting noise exposure data were evaluated in terms of the various segments of and the total flight profile relative to allowable noise exposures. Finally, recommendations were developed for short term and long term approaches toward potential improvement in the B-52G noise exposure problem. Author (GRA)

N86-20095# Institut Franco-Allemand de Recherches, St. Louis (France).
EXPERIMENTAL STUDY OF THE ACOUSTIC FIELDS FAR AND NEAR A MICROTURBO TRS 18 TURBOREACTOR [ETUDE EXPERIMENTALE DES CHAMPS ACOUSTIQUES PROCHES ET LOINTAINS D'UN TURBOREACTEUR MICROTURBO TRS 18]
Ch. Johe and J. Haertig 26 Jun. 1984 42 p refs In FRENCH
(ISL-R-113/84) Avail: NTIS HC A03/MF A01

An experimental study was carried out to compare the acoustic field of a small turbojet with the field generated by a cold free jet excited or not. With subsonic jets the wide band noise shows a sinus variation associated to the turbine excitation. The azimuth field distribution is similar to that of the free jet. At maximum velocity the supercritical jet shows a far field similar to that of a nonexcited jet. The maximum emission is at a 30 deg angle, corresponding to the Oertel W Mach waves. Author (ESA)

N86-20096# Institut Franco-Allemand de Recherches, St. Louis (France).
COCHLEAR MECHANISMS INVOLVED IN THE AUDITORY THRESHOLD AND IN AUDITORY FATIGUE Final Report [MECANISMES COCHLEAIRES IMPLIQUES DANS LE SEUIL DE SENSIBILITE AUDITIVE ET LA FATIGUE AUDITIVE]
P. Campo (INRS, Nancy, France), A. Dancer, and R. Franke 25 Sep. 1984 100 p refs In FRENCH; ENGLISH summary
(Contract ETBS/CETAM-82.02.050)
(ISL-R-119/84) Avail: NTIS HC A05/MF A01

The study of the auditory fatigue induced in guinea pigs exposure to pure tones applied at a constant level at the input to the cochlea showed that the velocity of displacement of the cochlear partition plays a decisive role in the origin of the auditory fatigue. This parameter is also responsible for the starting of the auditory responses at threshold. For a constant level at the input to the cochelea, the fatiguing power of pure tones increases with the frequency (from 2 to 11,3 KHz). The validity of the A weighted curve for the evaluation of the fatiguing power of complex acoustic signals is examined. Author (ESA)

N86-20097# Institut Franco-Allemand de Recherches, St. Louis (France).
STUDY OF THE NOISE RADIATED BY THE WAKE OF A CYLINDER PLACED IN A JET FLOW [ETUDE DU BRUIT RAYONNE PAR LE SILLAGE D'UN BARREAU PLACE DANS UN ECOULEMENT]
M. Schaffar, J. Juret, and J. J. Brunner 6 Sep. 1984 34 p refs In FRENCH
(ISL-R-120/84) Avail: NTIS HC A03/MF A01

A cylindrical body of 5 mm diameter was placed in a 120 m/sec jet flow produced by a 25 mm diameter nozzle. The study was performed using a dalambertometer along the path of a laser beam. The correlations between the volume operator and the acoustic pressure are measured in far fields at 30 and 90 deg. The existence of acoustic sources in the wake is shown. The contribution of these sources is important at frequencies near the cylinder critical frequency. The sources are bipolar and the length of the bipole is two diameters. Author (ESA)

N86-20058# Joint Publications Research Service, Arlington, Va.
EXCITATION OF SUPERSHORT DEFORMATION PULSES DURING ABSORPTION OF STRONG OPTICAL RADIATION Abstract Only
V. E. Gusev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 1 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2197-2209 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-20098*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
DEFINITION PHASE FOR THERMAL ION DYNAMICS EXPERIMENT FOR OPEN Final Report
William E. Sharp [1985] 6 p
(Contract NAS8-34910)
(NASA-CR-178677; NAS 1.26:178677) Avail: NTIS HC A02/MF A01 CSCL 20H

The Thermal Ion Dynamics Experiment (TIDE) combines differential measurements of angle, energy, and mass to determine the detailed distribution function of low energy magnetospheric ions in the range of 0 to 100 eV. Goals included designing a 1 sq cm entrance aperture, minimizing trajectory divergence at exist aperture, and minimizing internal scattering. Design parameters were used to construct the test model. B.G.

N86-20099# Chicago Univ., Ill.
INVESTIGATION OF THE SPATIALLY ISOTROPIC COMPONENT OF THE LATERALLY AVERAGED MOLECULAR HYDROGEN/Ag(3) PHYSISORPTION POTENTIAL Interim Technical Report
C. F. Yu, K. B. Whaley, C. S. Hogg, and S. J. Sibener Aug. 1985 72 p
(Contract N00014-77-C-0240)
(AD-A159682; AD-E801193; TR-6) Avail: NTIS HC A04/MF A01 CSCL 20/10

A comprehensive study of the spatially isotropic component of the laterally averaged molecular hydrogen/Ag(111) physisorption potential is presented. Diffractive selective adsorption scattering resonances for rotationally state-selected H2 and D2 on Ag(111) have been mapped out as a function of incident polar angle for several crystal azimuths and beam energies. These resonances have been used to determine the bound eigenvalues, and subsequently the shape, of the potential well. Best fit Lennard-Jones, Morse, variable exponent, and exponential-3 potentials having well depths of approximately 32 MeV are derived from the data. These measurements are supported by rotationally inelastic scattering measurements for HD and exact close-coupled quantum scattering calculations. Debye-Waller attenuation measurements are also presented for H2, D2, and HD. The ability to detect these diffractively coupled resonances on a closest-packed metallic surface, i.e., a surface of extremely low corruga-

tion, suggests that such measurements can be carried out on a much wider class of surfaces than previously envisioned. GRA

N86-20100# Oak Ridge National Lab., Tenn.
BASIC STUDIES OF GASES FOR FAST SWITCHES Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
L. G. Christophorou and S. R. Hunter Nov. 1985 66 p
(Contract N00014-82-F-0123)
(AD-A161012; AD-F620003) Avail: NTIS HC A04/MF A01 CSCL 09/1

Desirable electron attachment and electron drift characteristics of gases for possible use in diffuse-discharge switches are indicated. Gas mixtures for possible use in externally sustained (e-beam) diffuse-discharge switches are suggested on the basis of electron attachment rate constants and electron drift velocities measured as a function of the density-normalized electric field E/N. Of particular promise are mixtures of Ar and C3F8. GRA

N86-20101# Minnesota Univ., Minneapolis. Dept of Chemistry.
THE CONFERENCE ON THE DYNAMICS OF MOLECULAR COLLISIONS HELD AT SNOWBIRD, UTAH ON 14-19 JULY 1985 Final Report
Donald G. Truhlar Jul. 1985 246 p Conf. held at Snowbird, Utah, 14-19 Jul. 1985
(Grant AF-AFOSR-0124-85)
(AD-A161078; AFOSR-85-0930TR) Avail: NTIS HC A11/MF A01 CSCL 07/4

The research discussed at the conference included: reactive scattering studies with state selection and aligned reactants; reactive and nonreactive resonances; reactions of transition metal ions; reactive close coupling calculations and the distorted wave and quantal transition state theories of reactive scattering; potential energy surfaces; experimental studies of vibrational and rotational energy transfer collisions in the vapor and condensed phases, in ions in flow tubes, and at surfaces; collision-free energy transfer; infrared and visible fluorescence, theory and experiment for collisions of open-shell and electronically excited molecules; collisional interactions of molecules with surfaces; desorption; helium beam diffraction; and photodissociation. The plenary discussions following the lectures were exceptionally vital and provided a strong indication of the current excitement in this field. The posters covered an even broader spectrum of work on the dynamics of molecular collisions. GRA

N86-20102# Iowa State Univ. of Science and Technology, Ames.
STRUCTURE DETERMINATION OF MOLECULES OF BIOCHEMICAL INTEREST Final Report
Richard B. Honzatko Oct. 1985 6 p
(Contract N00014-84-G-0094)
(AD-A161119; FR-1) Avail: NTIS HC A02/MF A01 CSCL 06/1

In the past year we have established a new laboratory for the determination of macromolecular structure. Currently, facilities are in place for data collection, data processing, molecular modeling and X-ray refinement of structures of up to 100,000 molecular weight in their crystallographic asymmetric unit. In parallel with establishing a new laboratory, we have pursued structure investigations of hemoglobin from the sea lamprey, aspartate carbamoyltransferase from Escherichia coli and p-nitrobenzylidine aminoguanidine, a small molecule which is an acceptor of the adenosine diphosphate ribosyl group in an enzyme mediated reaction. In addition to the structural studies above we have made a theoretical study by techniques of energy minimization of possible modes of aggregation of lamprey hemoglobin and the relationship between aggregate formation and cooperativity expressed in solutions by lamprey hemoglobin. GRA

N86-20103# Rochester Univ., N. Y. Dept. of Chemistry.
THEORETICAL STUDIES OF LASER-INDUCED MOLECULAR RATE PROCESSES: TOPICS IN LINE BROADENING AND SPECTROSCOPY Final Report, 15 Nov. 1981 - 30 Sep. 1985
Thomas F. George Oct. 1985 20 p
(Grant AF-AFOSR-0046-82)
(AD-A161132; AFOSR-85-0929TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Theoretical studies of molecular rate processes were carried out, with an emphasis on how such processes can be induced or affected by external laser radiation. The processes were classified into two types: gas-phase processes and surface processes. Within the first type a variety of laser-assisted collisional processes were investigated, including chemical reactions in a laser field, laser-induced resonance scattering with applications to transition-state spectroscopy and line broadening in general, laser-induced curve switching, isotope separation by selective radiative scattering and laser-induced associative ionization. Several related problems not necessarily involving a laser field were investigated, such as fine-structure transitions in alkali-noble-gas collisions and nonlocal potentials in bound-continuum problems. In regard to the second-type of processes, the following dynamical processes were considered: electron transfer in positive-ion-surface collisions, where one-electron transfer leads to ion neutralization and two-electron transfer leads to negative-ion formation (the latter necessitates the inclusion of the Anderson correlation energy); surface-state excitation and laser-enhanced ion-semiconductor electron transfer; laser-induced electron-phonon processes on metal surfaces; formation of electron-hole pairs in a semiconductor by vibrationally-excited molecules; vibrational (both energy and phase) relaxation of a laser-excited adspecies; and laser-induced migration. Spectroscopic processes included resonance fluorescence of atoms near a metal surface and Stark quantum beats from beam-foil excited hydrogen atoms. GRA

N86-20104# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
IR OBSERVATIONS OF THE ETA (EXPERIMENTAL TEST ACCELERATOR) BEAM CHANNEL
D. L. McKenzie, R. P. Ditteon, E. N. Frazier, R. P. Giguere, and C. J. Rice 30 Sep. 1985 97 p
(Contract F04701-83-C-0084)
(AD-A161194; TR-0084A(5940-03)-1; SD-TR-85-73) Avail: NTIS HC A05/MF A01 CSCL 20/7

Aerospace Corporation scientists observed infrared radiation from the ETA beam channel in the wavelength range 0.65 to 14.4 micrometer on September 12 to 16, 1983. The data consisted of time profiles of radiation pulses from the beam channel, measured with a limiting time resolution of 100 nanoseconds. Isolation of spectral bands was achieved through the use of broadband filters and circular variable filters (CVF). The latter had resolution lambda/delta lambda = 50 to 100, where lambda is wavelength. A total of 1076 radiation pulses were recorded. The beam propagation tube was filled with either ambient laboratory air or synthetic (dry) air at pressures ranging from 0.05 Torr to 500 Torr. GRA

N86-20105# Brookhaven National Lab., Upton, N. Y.
MONONUCLIDIC ELEMENTS AND THE 1983 ATOMIC MASS TABLE OF A. H. WAPSTRA
N. E. Holden 1985 7 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001168; BNL-NCS-36955; CONF-8508138-11) Avail: NTIS HC A02/MF A01

During the last Atomic Weight's meetings in Lyngby, Denmark, there was a recommendation from the Subcommittee for the Assessment of Isotopic Composition, (SAIC), for a change in the treatment of uncertainties on atomic weight values from the pair (1,3) to any digit (1,9). This new treatment was adopted and with it a concern about treating the mononuclidic elements in a different manner from the polynuclidic elements. The reason for the difference is due to the fact that one is really accessing uncertainties on the isotopic composition in one case and uncertainties on nuclidic masses in the case of the mononuclidic elements. In the SAIC report on the Element-by Element Review, the present and preferred treatment of data on the mononuclidic elements are examined. For the past dozen years, the following rule has been applied to the nuclidic mass data for these elements. The uncertainty quoted in the atomic mass table is multiplied by

a factor of six. If the resulting digit is greater than unity, it is rounded up to one in the preceding digit. The atomic weight is always uncertain to one in the last quoted figure as a result. In 1983, the Commission appointed a working party to review this rule. As a result of a meeting at NBS last year, a new proposal is now being recommended. The factor of six will continue to be used, to account for systematic error (which is not considered in the mass table). However, the rounding up rule will be discontinued and the recommended standard atomic weights will carry uncertainties of from one to nine in the last quoted digit. This paper reviews the new proposed rule and makes some comments on the assumptions made during the discussions at the Lyngby meeting and at the meeting of the working party. DOE

N86-20106# Brookhaven National Lab., Upton, N. Y.
STATUS OF THE LANTHANIDES AND ACTINIDES IN THE PERIODIC TABLE
N. E. Holden 1985 3 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001188; BNL-NCS-36964; CONF-8508133-18) Avail: NTIS HC A02/MF A01

In extended discussions and correspondence with Ekkehard Fluck, the author was made aware of a problem with the Periodic Table, i.e., which element should be shown in the main table as the representative of the lanthanide series and the actinide series. In earlier discussion, he came to the conclusion that lanthanum and actinium are not the elements which should appear, but rather lutetium and lawrencium are more appropriate for inclusion in their place. This paper will attempt to justify the reasons for the above conclusions. DOE

N86-20107# Brookhaven National Lab., Upton, N. Y.
CORRELATED ELECTRON CAPTURE AND INNER-SHELL EXCITATION MEASUREMENTS IN ION-ATOM COLLISIONS
J. A. Tanis, E. M. Bernstein, M. W. Clark, W. G. Graham, R. H. McFarland, T. J. Morgan, A. Muller, M. P. Stockli, K. H. Berkner, and P. Gohil 1985 7 p refs Presented at the 14th International Conference on the Physics of Electronic and Atomic Collisions, Palo Alto, Calif., 24 Jul. 1985 Prepared in cooperation with Western Michigan Univ., Kalamazoo, New Univ. of Ulster, Coleraine, Northern Ireland, Missouri Univ., Rolla, Wesleyan Univ., Middletown, Conn., and Giessen Univ., West Germany
(Contract DE-AC02-76CH-00016)
(DE86-000030; BNL-36976; CONF-850701-3) Avail: NTIS HC A02/MF A01

In an ion-atom collision projectile excitation and charge transfer (electron capture) may occur together in a single encounter. If the excitation and capture are correlated, then the process is called resonant transfer and excitation (RTE); if they are uncorrelated, then the process is termed nonresonant transfer and excitation (NTE). Experimental work to date has shown the existence of RTE and provided strong evidence for NTE. Results presented here provide information on the relative magnitudes of RTE and NTE, the charge state dependence of RTE, the effect of the target momentum distribution on RTE, the magnitude of L-shell RTE compared to K-shell RTE, and the target Z dependences of RTE and NTE. DOE

N86-20070# Joint Publications Research Service, Arlington, Va.
LASING PROPERTIES OF TWO-COMPONENT DYE SOLUTION EMPLOYING FLASHLAMP PUMPING IN DIFFERENT SOLVENTS Abstract Only
A. M. Saletskiy and V. I. Yuzhakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 38 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 2, Feb. 1985 p 294-305 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20081# Joint Publications Research Service, Arlington, Va.
KINETIC COOLING IN BINARY MIXTURES OF MOLECULAR GASES DURING TWO-QUANTUM EXCHANGE OF OSCILLATING ENERGY Abstract Only
U. S. Dzhurabekov and A. I. Osipov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 77 Transl. into ENGLISH from Vestnik Moskovskogo Univ.: Seriya 3 Fizika, Astronomiya (Moscow, USSR), v. 25, no. 6, Nov. - Dec. 1984 p 44-47 Original language document was announced in IAA as A85-24059 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-20108# Kema N.V., Arnhem (Netherlands). Dept. of Technological Development.
RESEARCH ON TREATMENT OF RADIOACTIVE WASTE
J. Kuypers, ed. and A. J. vanLoon, ed. 1985 34 p refs
(S/T-Rept-Vol-3-No-1; ISBN-90-353-0024-6; ISSN-0167-8590; B8566386) Avail: NTIS HC A03/MF A01

Techniques for volume reduction and immobilisation of radioactive wastes from nuclear power plants are described. A cyclone incinerator is presented, and its control system is outlined. For individual titles, see N86-20109 through N86-20112.

N86-20109# Kema N.V., Arnhem (Netherlands). Dept. of Technological Development.
OVERVIEW OF TECHNIQUES FOR VOLUME REDUCTION AND IMMOBILIZATION OF RADIOACTIVE WASTE, AS INVESTIGATED AT KEMA
J. Kuypers, J. L. Matteman, and A. J. vanLoon *In its* Research on Treatment of Radioactive Waste 1985 p 3-9 refs Presented at Symposium on Radioactive Waste in the Netherlands, 's-Gravenhage, The Netherlands, 24 Oct. 1984; organized by Royal Inst. of Engineers (KIVI), Netherlands Energy Research Foundation and Netherlands Nuclear Society (For primary document see N86-20108 10-73)
Avail: NTIS HC A03/MF A01

Measures to decrease the amount of radioactive waste generated by power plants, to decontaminate active material, and to reduce the final volume of the waste, e.g., by incineration or acid digestion are reviewed. Organic radioactive wastes from nuclear power plants are treated adequately: only inorganic end-products remain, and they have a relatively small volume and are immobilized. Chemical, biological, and alteration processes therefore do not significantly increase the risk of storage, even if water intrudes the storage facility. The considerable volumes of activated and/or contaminated metal that remain after repair or decommissioning of the plants could be treated. Decontamination and melting may significantly reduce the volume of the final waste. It seems probable that estimates of waste volumes are too pessimistic, and relatively small storage facilities will be sufficient. Waste in those facilities presents unacceptable risk for the biosphere during the period it is considered as radioactive.
Author (ESA)

N86-20110# Kema N.V., Arnhem (Netherlands).
TREATMENT OF PLANT-PROCESS WASTE AT THE DODEWAARD (NETHERLANDS) NUCLEAR POWER PLANT
J. Hoekstra and W. H. M. Nissen *In* Kema N.V. Research on Treatment of Radioactive Waste 1985 p 11-18 refs Presented at Symposium on Radioactive Waste in the Netherlands, 's-Gravenhage, The Netherlands, 24 Oct. 1984; organized by Royal Inst. of Engineers (KIVI), Netherlands Energy Research Foundation and Netherlands Nuclear Society (For primary document see N86-20108 10-73)
Avail: NTIS HC A03/MF A01

Methods to treat plant-process waste from a boiling-water reactor (liquid and solid materials) are described. Methods to

dispose of this waste include solidification of the liquid waste, and packaging and compression of the solid waste to reduce the final waste volume. A procedure to pack the waste in containers by remote control in a so-called concreting train was developed. The effective dose equivalent for the employees involved remains low. High-level activated waste is also dealt with in lead containers (200 liters) placed inside standard concrete containers. Measurements, combined with calculations, resulted in an optimization of the package procedure; the results are demonstrated by comparison of the data from two treatment courses. Author (ESA)

N86-20111# Kema N.V., Arnhem (Netherlands). Dept. of Technological Development.
EXPERIMENTS WITH THE KEMA CYCLONE INCINERATOR FOR RADIOACTIVE WASTE
J. L. Matteman and P. Tigchelaar *In its* Research on Treatment of Radioactive Waste 1985 p 19-24 refs Presented at Seminar on Incineration of Radioactive Wastes, Arnhem, The Netherlands, 24 Oct. 1984; organized by Commission of European Communities and Kema N.V. (For primary document see N86-20108 10-73)
Avail: NTIS HC A03/MF A01

A cyclone incinerator for the treatment of solid waste at a nuclear power station was developed to reduce volume and weight of the final waste; reductions by factors of 7 and 80 respectively are possible (after solidification). For burnable waste the throughput is 23 kg/hr for 6 hr runs. About 7000 kg of nonradioactive waste were treated in total. The behavior of potentially dangerous radionuclides (Co, Cs, Mn and Sr) was studied by tracers. It appears that Co, Mn and Sr are concentrated in the resulting ashes, where 55% of the Cs is also found; the remaining Cs is unaccounted for. The ashes were solidified by mixing them with concrete in a 1:1 ratio. Due to the flexibility of the facility, start-up and turn-down periods are short. Since the process can be controlled automatically, the operation can be run by one employee, to load the waste and handle the ashes. Author (ESA)

N86-20112# Kema N.V., Arnhem (Netherlands). Dept. of Technological Development.
AUTOMATION AS A TOOL FOR SAFE AND DISCONTINUOUS OPERATION OF THE KEMA INCINERATOR
R. H. J. Beuse, J. J. vanDoorn, A. H. Eenink, and B. M. G. Gersten *In its* Research on Treatment of Radioactive Waste 1985 p 25-31 refs Presented at Seminar on Incineration of Radioactive Waste, Arnhem, Netherlands, 25-26 Sep. 1984; organized by Commission of European Communities and Kema N.V. (For primary document see N86-20108 10-73)
Avail: NTIS HC A03/MF A01

An automatic control system was developed and implemented for a nuclear waste disposal cyclone-type incinerator. The process analysis and the development of a control program required to obtain carbon-free ashes and clean flue gases are described. Automatic control allows the incinerator to burn solid low-level waste of various compositions and to be easily handled by one operator. Author (ESA)

N86-20113# Maryland Univ., College Park. Div. of Mathematical and Physical Sciences and Engineering.
PROPAGATION OF INTENSE CHARGED PARTICLE BEAMS INTO VACUUM Annual Progress Report, 1 Apr. 1984 - 31 Mar. 1985
W. W. Destler, M. P. Reiser, M. J. Rhee, and C. D. Striffler 31 Mar. 1985 82 p
(Grant AF-AFOSR-0091-84)
(AD-A160343; AFOSR-85-0854TR) Avail: NTIS HC A05/MF A01 CSCL 20/7

During the past year the experimental facilities have been augmented by the construction of a large diameter (60cm) vacuum chamber with and array of radial current collectors to support detailed studies of beam propagation characteristics, and a new pulsed magnetic field coil (surplus) from the Autoresonant Acceleratoar project. This new coil provides much more uniform fields over a longer axial length than did the previous coils. In addition, a Department of Defense University Instrumentation award is currently being used to construct a completely digital fast data acquisition system. This system, currently under installation in a special shielded room in the laboratory, will allow much greater flexibility in the manner in which we acquire and process data and hopefully will eventually reduce the yearly expenditures for Polaroid oscilloscope camera film. Author (GRA)

N86-20114# KM Sciences, Arlington, Va.
RADIATION EFFECTS PROGRAM Final Report, 1 Jul. 1984 - 13 Sep. 1985
13 Sep. 1985 17 p
(Contract N00014-84-C-2230)
(AD-A161000) Avail: NTIS HC A02/MF A01 CSCL 20/7

No existing LINAC Based Beam Heating facility comes within a factor of ten of the needs of a high heating rate thermodynamic properties research facility. The facility could be built at the Naval Research Lab. for a cost in the neighborhood of 2 million dollars. The 10 MeV electron beam would not produce any serious radioactivity but would provide unprecedented beam power for such other applications as food processing, sewer treatment, materials curing, radiation hardness assurance, etc. One can always achieve lower current densities by scattering the beam and moving the device under test further away from the scatterer. In this case one must rely on the TLD readings to indicate the dose rate at the point of interest. For general utility with the beam covering about four TLD's fairly evenly one can claim that the NRL LINAC can produce a maximum dose rate of about 6 x 10 to the 10th power rads (Si) per second for a pulse length of 1.5 microseconds, and about 1.4 x 10 to the 11th power rads (Si) per second in a 50 nanosecond pulse. In both cases the beam area is about 0.4 square centimeters. GRA

N86-20115# Lawrence Livermore National Lab., Calif.
CBEAM.2-D: A TWO-DIMENSIONAL BEAM FIELD CODE
K. A. Dreyer May 1985 29 p
(Contract W-7405-eng-48)
(DE86-000834; UCID-20500) Avail: NTIS HC A03/MF A01

The CBEAM.2-D is a two-dimensional solution of Maxwell's equations for the case of an electron beam propagating through an air medium. Solutions are performed in the beam-retarded time frame. Conductivity is calculated self-consistently with field equations, allowing sophisticated dependence of plasma parameters to be handled. A unique feature of the code is that it is implemented on an IBM PC microcomputer in the BASIC language. Consequently, it should be available to a wide audience. DOE

N86-20116# Wisconsin Univ., Madison. Dept. of Medical Physics.
EXTENSION OF CARBON KERMA FACTOR MEASUREMENTS TO 18- AND 20-MeV NEUTRON ENERGY
P. M. DeLuca, Jr., H. H. Barschall, M. Burhoe, and R. C. Haight 1985 18 p refs Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contracts W-7405-eng-48; DE-FG02-84ER40183; DE-AC02-76EV-01105)
(DE86-000845; DOE/EV-01105/320) Avail: NTIS HC A02/MF A01

Carbon kerma factor measurements were extended to neutron energies of 18 to 20 MeV. Contributions to the data of low energy interactions are identified and subsequently factored out. DOE

N86-20117# Brookhaven National Lab., Upton, N. Y.
RADIATION EFFECTS
N. E. Holden 1985 3 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001166; BNL-NCS-36966; CONF-8508138-12) Avail: NTIS HC A02/MF A01

For the meeting of the Commission on Radiochemistry and Nuclear Techniques our chairman has submitted comments on potential problems that the Commission should consider in Lyon which had been posed by various members. In one of these

comments, Prof. Roth has mentioned the problem of radiation effects in solids and in water and water solutions. The radiolysis of water has been of concern for a large number of years, but as Prof. Roth notes, the radiation effects on the first wall of fusion reactors is a problem that has arisen only in recent years and for which no critical data compilation is presently available. This paper has been prepared in response to Prof. Roth's comments and indicates a possible area, which the Commission might conceivably address at this meeting and/or in the near future. DOE

N86-20118# Brookhaven National Lab., Upton, N. Y.
POLARIZED PROTONS FROM THE SOURCE TO 70 GeV
Y. Makdisi, I. 1985 7 p Presented at the Workshop on Polarized Beams at the SSC, Ann Arbor, Mich., 10 Jun. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001184; BNL-37079; CONF-8506173-3) Avail: NTIS HC A02/MF A01

This energy range covers the current project at the AGS and extends well beyond it. I shall report on our learning experience at BNL, discuss the potential for improvement, and the limitations of extending the AGS resonance jumping technique beyond 25 GeV. DOE

N86-20119# Brookhaven National Lab., Upton, N. Y.
LIMITS ON LIKESIGN DILEPTON PRODUCTION IN (NU)/SUB (MU)/ INTERACTIONS
N. J. Baker 22 Aug. 1985 7 p Presented at the International Symposium on Multiparticle Dynamics, Kiryat Anavim, Israel, 1 Jun. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001203; BNL-36996; CONF-8506194-5) Avail: NTIS HC A02/MF A01

We have searched for the production of likesign dilepton events (n sub micron + Ne yields micron sup minus + e sup minus +...) in a wideband neutrino beam at Fermilab using the 15-ft bubble chamber. We observe no signal above the background arising from conventional sources. We set 90% confidence level upper limits for the production rates of (Nu sub micro + Ne yields micron sup minus + e sup minus +...)/(Nu sub micron + Ne yields micron sup minus +...) < 0.76 x 1/1000 and (Nu sub micron + Ne yields micron sup minus + e sup minus +...)/(Nu sub micron + Ne yields micron sup minus + e sup plus +...) < 5.3 x 1/100. DOE

N86-20120# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
THE QCD RADIATIVE CORRECTIONS TO THE DECAY W YIELDS qq-bar GAMMA
J. A. M. Vermaseren Jun. 1985 18 p refs Sponsored by Bundesministerium fuer Forschung und Technologie
(Grant NSF PHY-81090110-A-03)
(NIKHEF-H/85-9; B8570058) Avail: NTIS HC A02/MF A01

The complete order alpha sub S QCD corrections to the rate and the Dalitz plot for W yields qq-bar gamma are presented. The way in which these corrections modify the factorization property of the lowest order decay rate is discussed. Author (ESA)

N86-20071# Joint Publications Research Service, Arlington, Va.
BEAM EXTRACTION FROM HIGH ENERGY CYCLOTRONS BASED ON INTEGER RESONANCE Abstract Only
L. A. Sarkisyan *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 39 Transl. into ENGLISH from Vestnik Moskovskogo Univ.: Seriya 3 Fizika, Astronomiya (Moscow, USSR), v. 25, no. 6, Nov. - Dec. 1984 p 59-61 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

74 OPTICS

Includes light phenomena.

N86-20121 Carnegie-Mellon Univ., Pittsburgh, Pa.
A NON-CONTACT OPTICAL PROXIMITY SENSOR OR MEASURING SURFACE SHAPE Ph.D. Thesis
Michael Gilbert Fuhrman 1985 115 p
Avail: Univ. Microfilms Order No. DA8517520

A noncontact multi-light source optical promixity sensor that can measure the distance, orientation, and curvature of a surface has been developed. Beams of light are sequentially focused from light emitting diodes onto a target surface. An analog light sensor--a planar PIN diode--localizes the position of the resultant light spot in the field of view of the sensor. The 3-D locations of the light spots are then computed by triangulation. The distance, orientation, and curvature of the target surface is computed by fitting a surface to a set of data points on the surface. In designing the proximity sensor, a geometrical model of the sensor was first developed. This model relates the uncertainty in the measurement of surface orientation with the spatial distribution of the data points on the target surface and with the uncertainty in the measurement of their position. This model was used as a guide to determine the number of light sources, and their positions and orientations. Dissert. Abstr.

N86-20122 Missouri Univ., Rolla.
MEASUREMENT OF THE FAR INFRARED OPTICAL PROPERTIES OF STEEL, ALUMINUM, EVAPORATED IRON, AND TEFLON FEP Ph.D. Thesis
Raymond Edward Paul 1985 169 p
Avail: Univ. Microfilms Order No. DA8516297

The optical properties of low carbon shim steel, aluminum foil, and Teflon FEP were measured in the 20/cm to 70/cm range. In particular, measurements of surface impedance for aluminum and low carbon steel were used to calculate the imaginary part of the dielectric constant (E sub m,2). The resulting values of E sub m,2 were of order 100,000 for aluminu, and 10000 for steel. The imaginary part of the dielectric constant for metals is several times greater in magnitude than the real part in the frequency range of this experiment. Calculations of E sub m,2 obtained by a different method (Drude model prediction yielded results that were within 50% of the measured values of E sub m,2. In addition to the observed magnitude of E sub m,2 the Drude model frequency dependence for E sub m,2 was observed. Measurements of intenity/absorption per unit length for Teflon FEP are shown. Dissert. Abstr.

N86-20123 Arizona Univ., Tucson.
DIGITAL HETERODYNE TOPOGRAPHY Ph.D. Thesis
Bernard White Bell, Jr. 1985 200 p
Avail: Univ. Microfilms Order No. DA8517489

Digital heterodyne methods are employed in conjunction with periodic fringe projection to produce a fast automated surface relief measurement technique. A method of sampling the image with a solid state detector array produces a moire fringe image free of the noise terms normally present with moire techniques is presented along with an extension to Whittaker-Shannon sampling theory to cover the moire aliasing phenomena. The limitations imposed on the surface slopes by the requirement that the properly moire sampled image spectra must be confined to a moire interval are given. Moire sampling allows an optical processing step (removal of the reference surface tilt), while classical nonaliased sampling produces the same information with respect to a tilted surface. General additive noise is analyzed as regards both integrating bucket and phase stepping algorithms. A phase averaging technique which eliminates oscillatory errors as well as those caused by reference phase shift errors in all the algorithms is demonstrated. Dissert. Abstr.

N86-20124* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPECTRAL SLICING X-RAY TELESCOPE WITH VARIABLE MAGNIFICATION Patent
Richard B. Hoover and Ernest Hildner, inventors (to NASA) Issued 31 Dec. 1985 9 p Filed 17 Jan. 1984

(NASA-Case-MFS-25942-1; US-Patent-4,562,583;
US-Patent-Appl-SN-571613; US-Patent-Class-378-43;
US-Patent-Class-378-85) Avail: US Patent and Trademark Office

A telescope for viewing high frequency radiation (soft X-ray, extreme ultraviolet) is described. This telescope has a long focal length with a selection of magnifications despite a short housing. Light enters the telescope and is reflected by the telescope's primary optical system to one of several secondary mirrors at different locations on a movable frame. The secondary mirrors have varying degrees of magnification and select narrow spectral slices of the incident radiation. Thus, both the magnification and effective focal length field of view and wavelength can be altered by repositioning the moving frame. Configurations for spaceborne applications are discussed.

Official Gazette of the U.S. Patent and Trademark Office

N86-20125* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPTICAL SYSTEM WITH REFLECTIVE BAFFLES Patent
William I. Linior, inventor (to NASA) Issued 24 Sep. 1985 8 p Filed 28 Mar. 1984
(NASA-Case-ARC-11502-1; US-Patent-4,542,963;
US-Patent-Appl-SN-594134; US-Patent-Class-350-537;
US-Patent-Class-350-276-R; US-Patent-Class-350-319;
US-Patent-Class-350-448; US-Patent-Class-350-580) Avail: US Patent and Trademark Office CSCL 20F

This invention relates to an optical system incorporating a plurality of reflective baffles which return incoming off-axis rays from the optical system. The baffles in an infrared telescope would extend circumferentially around the telescope tube. Each of the baffles has a concave, rearwardly facing curved surface and a frontwardly facing planar surface. Baffles extend from the interior wall of tube in an acute angle with the optical axis of the telescope, relative to front end of the tube. This acute angle becomes greater for the baffles toward rear end of the telescope. Incoming off axis rays are reflected by the planar surface of the baffles against the curved surface of a forward adjacent baffle and are reflected back and forth between adjacent surfaces a number of times before being reflected back as rays out of the front end of the telescope. Other off axis rays are directly reflected as rays by the planar surfaces of the baffles. M.G.

N86-20126* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
X-RAY DETERMINATION OF PARTS ALIGNMENT Patent
Charles W. Nelson (Beech Aircraft Corp., Boulder, Colo.) Issued 17 Sep. 1985 4 p Sponsored by NASA
(NASA-Case-MSC-20418-1; US-Patent-4,542,520;
US-Patent-Appl-SN-438446; US-Patent-Class-378-58;
US-Patent-Class-378-59) Avail: US Patent and Trademark Office

A method for determining the alignment of adjoining metal objects is provided. The method comprises producing an X-ray image of adjoining surfaces of the two metal objects. The X-ray beam is tangential to the point the surfaces are joined. The method is particularly applicable where the alignment of the two metal objects is not readily susceptible to visual inspection.

Official Gazette of the U.S. Patent and Trademark Office

N86-20127 Department of the Navy, Washington, D. C.
TRIAXIAL OPTICAL FIBER SYSTEM FOR MEASURING MAGNETIC FIELDS Patent
L. C. Bobb, inventor (to Navy) Issued 22 May 1984 7 p Supersedes AD-D010247
(AD-D011941; US-Patent-4,450,406; US-Patent-Appl-SN-308310;
US-Patent-Class-324-247) Avail: US Patent and Trademark Office

This patent discloses an optical system wherein light is transmitted through fiber optic members orthogonally configured in a triaxial arrangement for measuring the magnetic field vector preset in the environment. In one preferred embodiment, a set of three fiber optic coils positioned coaxially along respective orthogonal axes and having predetermined lengths and diameters are coupled to a source of polarized light for transmitting the light subject to Faraday rotation of its plane of polarization. In another preferred embodiment, light, not necessarily polarized, is transmitted along respective orthogonal axes through a set of three bifurcated fiber optic cables each formed having a reference branch on which a magnetostrictive material is intimately connected to produce optical path length changes related to the magnetic field component along the respective axes. Photodetectors are used in both embodiments to produce current signals indicative of characteristic changes in the transmitted light, and the current signals are digitally processed to provide magnitude and directional information regarding the magnetic field vector. GRA

N86-20128*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A METHOD AND APPARATUS FOR MAKING AN OPTICAL ELEMENT HAVING A DIELECTRIC FILM Patent Application
Gordon C. Augason, inventor (to NASA) Filed 15 Aug. 1985 16 p
(NASA-CASE-ARC-11611-1; NAS 1.71:ARC-11611-1;
US-Patent-Appl-SN-765961) Avail: NTIS HC A02/MF A01 CSCL 20F

A film-application device (FAD) comprising a pair of exterior, tapered, O ring bearing plate members and a central plate member for simplifying the process of thermally bonding a thin dielectric film to a substrate comprising an optical element are discussed. In use, the film is sandwiched between the O rings and stretched across the optical element by squeezing the exterior plates together before bonding to the element. The film may be used for protecting the optical element or to reduce surface reflection of radiation. The FAD may also be used without the center plate to stretch a dielectric film prior to its attachment to or insertion in a holder to make pellicles or beam-splitters. NASA

N86-20129*# National Aeronautics and Space Administration. Pasadena Office, Calif.
CLOSED LOOP FIBER OPTIC ROTATION SENSOR Patent Application
W. C. Goss (JPL, Pasadena, Calif.), B. R. Youmans (JPL, Pasadena, Calif.), N. M. Nerheim, inventors (to NASA) (JPL, Pasadena, Calif.), and R. K. Bartman Filed 10 Sep. 1985 22 p
(Contract NAS7-918)
(NASA-Case-NPO-16558-1-CU; NAS 1.71:NPO-16558-1-CU;
US-Patent-Appl-SN-779744) Avail: NTIS HC A02/MF A01 CSCL 20F

An improved optical gyroscope is provided, of the type that passes two light components in opposite directions through an optic fiber coil, and which adds a small variable frequency to one of the light components to cancel the phase shift due to rotation of the coil. The amount of coil rotation from an initial orientation, is accurately determined by combining the two light components, one of which has a slightly increased frequency, to develop beats that each represent a predetermined angle of rotation. The direction of rotation is obtained by combining the two light components on a photodetector, intermittently phase shifting a single light component by 90 deg, and comparing the direction of change of photodetector output (+ or -) caused by the 90 deg shift, with the slope (+ or -) of the photodetector output at about the same time, when there is a 90 deg shift. NASA

N86-20130*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WELDING TORCH ARC LIGHT REFLECTOR Patent Application
Stephen S. Gordon, inventor (to NASA) (Rockwell International Corp., Canoga Park, Calif.) Filed 3 Oct. 1985 8 p
(NASA-Case-MFS-29134-1; NAS 1.71:MFS-29134-1;
US-Patent-Appl-SN-783890) Avail: NTIS HC A02/MF A01 CSCL 20F

A welding torch arc light reflector is disclosed for welding torches having optical viewing systems. A schematic of a welding torch having an internal coaxial viewing system consisting of a lens which focuses the field of view of the weld scene of the workpiece onto the end of the fiberoptic bundle is provided. The

transmitted image of the fiberoptic bundle is provided to a camera lens which focuses it onto a TV sensor array for transmission. To improve the parity of the image of the monitoring system, an arc light reflector is shown fitted to the end of the torch housing or gas cup. The arc light reflector has an internal conical section portion which is polished to serve as a mirror which reflects the bright arc light back onto the darker areas of the weld area and thereby provide a more detailed image for the monitoring system. The novelty of the invention lies in the use of an arc light reflector on welding torches having optical viewing systems. NASA

N86-20131# Royal Signals and Radar Establishment, Malvern (England).
APPLICATION OF PHASE CONJUGATION TO IMAGE AND SIGNAL PROCESSING
C. L. West Jul. 1985 63 p refs
(AD-A160724; RSRE-MEMO-3856; BR96967) Avail: NTIS HC A04/MF A01 CSCL 20/6

Nonlinear optical phase conjugation is shown to possess a potential as the key element in adaptive optical systems with applications in optical computing, communications, lensless imaging, fusion, and real time image and temporal signal processing. These are optical interactions which occur in real time free from electromechanical components and electronic networks and can provide large spatial and temporal bandwidths. Major limitations to such a technique include the size of the phase conjugate element (limiting the size of phase point that can be compensated), the spread of response of the element, the need for coherence between interacting beams (not as critical for fast elements), the availability of the phase conjugating media in parts of the electromagnetic spectrum near visible wavelengths, and the nonideal performance of a phase conjugage mirror which does not exhibit unity gain. Author (ESA)

N86-20132# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
PARTIALLY-COHERENT IMAGING WITH A MULTIAPERTURE OPTICAL SYSTEM Final Report, Jun. - Sep. 1985
J. P. Mills Sep. 1985 24 p
(AD-A158353; AD-E700020; AU-AFIT-EN-TR-85-6) Avail: NTIS HC A02/MF A01 CSCL 20/6

A theoretical analysis has been performed on the use of a six-element multi-aperture optical system for imaging of an incoherent object by sampling the degree of partial coherence of the optical field arriving at the multi-aperture system from the incoherent object. GRA

N86-20133# State Univ. of New York at Buffalo, Amherst. Dept. of Chemistry.
CONVERGENT LIGHT SCHEME FOR LIGHT SCATTERING FROM AN ARBITRARY DEEP METALLIC GRATING Interim Technical Report
Dan Agassi and Thomas F. George Nov. 1985 35 p
(Contract N00014-80-C-0472)
(AD-A161005; UBuffalo/DC/85/TR-70) Avail: NTIS HC A03/MF A01 CSCL 20/6

The justification of continuing the Rayleigh expansion to the grating's surface surface (the Rayleigh hypothesis) and its convergence properties are considered. A class of gratings for which the Rayleigh hypothesis is exact is identified, a prime example of which is the sinusoidal grating (SG). Based on identification of the origin of the limited stability of the Rayleigh expansion, a modified expansion is introduced, dubbed as the dressed Rayleigh expansion. This new expansion presumably has excellent convergence properties as explicitly demonstrated for the sinusoidal grating. The dimensionality N of the matrix which must be inverted for a SG of arbitrary depth g and periodicity d is found to be N approx. 8 g/d. GRA

N86-20134# National Bureau of Standards, Gaithersburg, Md.
OM85. BASIC PROPERTIES OF OPTICAL MATERIALS SUMMARIES OF PAPERS Final Report, 7 May - 1 Sep. 1985
Albert Feldman May 1985 88 p
(Grant AF-AFOSR-ISSA-85-00052)
(AD-A161247; NBS-SP-697; AFOSR-85-0902TR) Avail: NTIS HC A05/MF A01 CSCL 20/6

The purpose of the conference is to bring together researchers from industry, academia, and government to discuss the physical and structural properties of optical materials as they affect optical performance. The scope of the conference includes the measurement and theory of basic properties in bulk and in thin film form and the dependence of these properties on atomic structure, morphological structure, impurity content, and inhomogeneity. GRA

N86-20135# Panametrics, Inc., Waltham, Mass.
THEORETICAL STUDY OF SINGLE AND MULTIPLE SCATTERING BY CYLINDERS Final Rpet. May 1983 - May 1984
Norman E. Pedersen, Jeanne C. Pedersen, and Peter C. Waterman Apr. 1985 92 p
(Contract DAAK11-83-C-0044)
(AD-A161251; CRDC-CR-85014) Avail: NTIS HC A05/MF A01 CSCL 20/8

Closed form analytic results are obtaned for the calculation of the electromagnetic differential and total scattering, absorption, and extinction cross sections of arbitrarily oriented conductive fibers. An extensive computer program has been developed for the computation of these quantities. The results agree with expectations for arbitrary conductivity, arbitrary length-to-wavelength ratio and radius-to-wavelength ratio less than 0.3. Two minor exceptions are noted and discussed. The albedo of the particle is computed as are the appropriately averaged differential scattering cross sections. These quantities serve as inputs to a Radiative Transfer computer program which was developed concurrently to calculate and plot the angular distributions of reflected and transmitted radiation from large aggregates of the particles. GRA

N86-20136# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION OF PARTICLE SIZE MEASUREMENT USING NON-INTRUSIVE OPTICAL TECHNIQUES IN A GAS TURBINE COMBUSTOR M.S. Thesis
John S. Bennett Sep. 1985 51 p
(AD-A161253) Avail: NTIS HC A04/MF A01 CSCL 21/4

This thesis investigated the use of three-wavelength light transmission and forward-angle scattered light intensity ratio techniques to determine the effects of fuel additives on particle sizes and mass concentrations in a T-63 combustor and evaluated several improvements to the T-63 diagnostic system. Data from both optical methods indicated an increase in particle size in a range of .06 to .10 microns occurred in the exhaust region when the fuel additive was used, with no change in mass concentration. The two techniques resulted in different measured particle sizes and require further investigation. Current improvements to the T-63 diagnostic apparatus are discussed along with required changes for further testing. GRA

N86-20137# National Bureau of Standards, Gaithersburg, Md.
OM85: BASIC PROPERTIES OF OPTICAL MATERIALS. SUMMARIES OF PAPERS Final Report
A. Feldman Apr. 1985 297 p Presented at the Topical Conference on Basic Properties of Optical Materials, Gaithersburg, Md., 7-9 May 1985; sponsored by AFOSR, Bolling, AFB, D.C. and American Physical Society, Ne.
(PB85-206324; NBS-SP-697; LC-85-600534) Avail: NTIS HC A13/MF A01 CSCL 20F

Papers on Basic Properties of Optical Materials are summarized. The physical and structural properties of optical materials as they affect optical performance are discussed. The scope of the conference includes the measurement and theory of basic properties of optical materials in bulk and in thin film form and the dependence of these properties on atomic structure, morphological structure, impurity content, and inhomogeneity. GRA

N86-20067# Joint Publications Research Service, Arlington, Va.
DYNAMIC CHARACTERISTICS OF ADAPTIVE OPTICS SYSTEMS

V. P. Lukin and V. L. Mironov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 28-32 refs Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 9(159), Sep. 1985 p 1959-1961 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20073# Joint Publications Research Service, Arlington, Va.
ESTIMATION OF MINIMUM LIGHT FLUX DETERMINED BY PHOTON NOISE FOR ADAPTIVE IMAGE VIBRATION COMPENSATION SYSTEM Abstract Only
A. N. Bogaturov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 43 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 27, no. 11, Nov. 1984 p 1410-1418 Original language document was announced in IAA as A85-20630 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20074# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF RELATIVE CURRENT DENSITY DISTRIBUTION IN POWERFUL PULSE ELECTRON BEAM BY PHOTOMETER REGISTRATION OF X-RAY BREMSSTRAHLUNG Abstract Only
A. A. Golubev, A. Kh. Kadymov, and O. I. Radkevich *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 45 Transl. into ENGLISH from Radioelekronika Uskoriteley I Fizicheskogo Eksperimenta (Moscow, USSR), 1982 p 11-21 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20075# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF A GARNET MAGNETIC MIRROR WITH WAVELENGTH OF 1.15 MICRON Abstract Only
I. A. Andronova, Yu. A. Gusev, Yu. N. Konoplev, M. A. Mamayev, M. A. Novikov, and A. A. Turkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 47 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Mv I SSO SSSR: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 388-392 Original language document was announced in IAA as A85-34890 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20076# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF HOLOGRAM RECORDING IN IMPURITY CRYSTALS OF LITHIUM NIOBATE AT 325 nm Abstract Only
V. Yu. Kozlova and R. K. Ovsepyan *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 58 Transl. into ENGLISH from Doklady Akademii Nauk Armyanskoy SSR (Yerevan, USSR), v. 79, no. 5, Sep. - Oct. 1:9984 p 214-217 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-20138 Princeton Univ., N. J.
OPERATION OF THE MPD THRUSTER WITH STEPPED CURRENT INPUT Ph.D. Thesis
John William Barnett 1985 214 p
Avail: Univ. Microfilms Order No. DA8514054

A magnetoplasmadynamic (MPD) thruster was operated with stepped current pulses in order to investigate the sensitivity of its operation to nonconstant current input. The thruster terminal voltage lags the current increment by increasing times as the highest level of the stepped current pulse nears the onset condition. Magnetic field transients corresponding to the terminal voltage transients appear in the thruster exhaust. The magnetic field and terminal voltage equilibrations can be interpreted in terms of magnetic diffusion and convention processes. The time constants of equilibration are largest in the exhaust portion of the discharge. The transient thrust following a current step up is estimated to be below the quasi-steady thrust, while the transient thrust following a current step down is estimated to be above the quasi-steady thrust. Implications of the experimental studies for MPD thruster system design are discussed, focusing on the issues of anode design, propellant injection and criteria for the selection of an appropriate current input. Dissert. Abstr.

N86-20139 Louisiana State Univ., Baton Rouge.
CYCLOTRON RADIATION FROM MAGNETIC CATACLYSMIC VARIABLES Ph.D. Thesis
Paul Everett Barrett 1985 188 p
Avail: Univ. Microfilms Order No. DA8517723

The absorption coefficient for the ordinary and extraordinary modes of wave propagation are calculated for cyclotron radiation from hot magnetized plasmas (kT less than 50 keV). Two relativistic methods are used to calculate the absorption coefficients: the dielectric formulation and the single particle formulation. A nonrelativistic approximation which includes the effects of inverse-bremsstrahlung and Thomson scattering (collisions) is also made. The situations of radiative transfer for a homogeneous plasma, with large Faraday rotation, are solved, and simple analytic expressions for the Stokes parameters Q and V are derived in terms of the optical depths in both modes. The results are applied to the accretion columns of AM Herculis binaries. The inclusion of collisional effects in the nonrelativistic approximation reduces the amount of fractionally polarized light to levels which agree better with the observations. For small viewing angles with the magnetic field, the circular polarization does not approach 100% as is observed in the relativistic calculations without the effects of collisions. Dissert. Abstr.

N86-20140 Alabama Univ., Huntsville.
MHD DESCRIPTION OF THE CONFINEMENT OF LIQUID METALS: A CONTAINERLESS PROCESS IN A MICROGRAVITY ENVIRONMENT Ph.D. Thesis
Charles Franklin Schafer 1985 133 p
Avail: Univ. Microfilms Order No. DA8519069

The term containerless processing is applied to the act of holding a material in position without contact with a substantial container while using the material for some scientific, engineering, or industrial purpose. These purposes are those which require isolation from contamination effects, nucleation sites, or other perturbing effects of a container. A means of positioning conducting samples for containerless processing is through application of an alternating magnetic field which has the proper geometry to produce a three dimensional potential well. This is a technique which has been successfully used to levitate small metal samples electromagnetically against gravity. Much larger specimens could be processed if the influence of gravity could be removed or diminished by the several orders of magnitude possible in a spacecraft in earth orbit. Small restraining forces will still be necessary. Containerless processing experiments involving electromagnetic levitation of conducting liquids are being planned which will be conducted in orbital spacecraft. Dissert. Abstr.

N86-20141*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
RF WAVE OBSERVATIONS IN BEAM-PLASMA DISCHARGE Final Report
William Bernstein 11 Feb. 1986 170 p refs
(Grant NAGw-69)
(NASA-CR-176574; NAS 1.26:176574) Avail: NTIS HC A08/MF A01 CSCL 20I

The Beam Plasma Discharge (BPD) was produced in the large vacuum chamber at Johnson Space Center (20 x 30 m) using an energetic electron beam of moderately high perveance. A more complete expression of the threshold current I sub c taking into account the pitch angle injection dependence is given. Ambient plasma density inferred from wave measurements under various beam conditions are reported. Maximum frequency of the excited

RF band behaves differently than the frequency of the peak amplitude. The latter shows signs of parabolic saturation consistent with the light data. Beam plasma state (pre-BPD or BPD) does not affect the pitch angle dependence. Unexpected strong modulation of the RF spectrum at half odd integer of the electron cyclotron frequency (n + 1/2)f sub ce is reported (5 < n < 10). Another new feature, the presence of wave emission around 3/2 f sub ce for I sub b is approximate I sub c is reported. Author

N86-20142# Science Applications International Corp., McLean, Va.
DYNAMICS OF HIGH TEMPERATURE PLASMAS Final Report
D. Dialetis, J. Finn, H. Freund, A. Mondelli, and E. Ott 1 Oct. 1985 256 p
(Contract N00014-83-C-2138)
(AD-A161202; SAIC-85/1846) Avail: NTIS HC A12/MF A01 CSCL 20/9

High temperature dynamics are described. The following topics are discussed: envelope model for beam transport and focusing in an induction linac; high-current accelerators; free-electron laser studies; laser beat wave particle acceleration; orbitron maser design; electron beam stability in the modified betatron; relativistic electron beam diode design; free electron laser application to XUV production and particle acceleration; high-current betatron with stellarator fields; A bumpy-torus betatron; design and operation of a collective millimeter-wave free-electron-laser; study of gain, bandwidth, and tunability of a millimeter-wave free-electron laser operating in the collective regime; nonlinear analysis of free-electron-laser amplifiers with axial guide fields: unstable electrostatic beam modes in free-electron-laser Systems; Three-Dimensional Theory of Free Electron Lasers with an axial guide field; three-dimensional theory of the free-electron laser in the collective regime; rapid electron beam accelerators; excitation of the plasma waves in the laser beat wave accelerator; dynamics of space-charge waves in the laser beat wave accelerator; finite larmor radius diocotron instability; one dimensional models for relativistic electron beam diode design; collective instabilities and high-gain regime in a free electron laser; and free electron lasers for the XUV spectral region. GRA

N86-20143# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
MIT 12 TESLA COIL TEST RESULTS
M. M. Steeves and M. O. Hoenig Jul. 1985 136 p
(Contract DE-AC02-78ET-51013)
(DE86-001110; DOE/ET-51013/155; PFC/RR-85-12) Avail: NTIS HC A07/MF A01

Test results from the MIT 12 Tesla Coil experiment are presented. The coil was tested in the High Field Test Facility (HFTF) of the Lawrence Livermore National Laboratory in October 1984 and January 1985. The experiment measured the performance of an Internally Cooled, Cabled Superconductor (ICCS) of practical size, intended for use in magnetic fusion experiments. The MIT coil carried 15 kA at 11 T for 5 min with no sign of instability. A half turn length in a 10 T field was able to absorb a heat load in 4 msec of more than 200 mJ sub cm of cable volume while carrying a current of 12 kA. The MIT coil successfully met the performance requirements of the Department of Energy's 12 Tesla Coil Program. DOE

N86-20144# Sandia National Labs., Albuquerque, N. Mex.
SIMULATOR BEAM CONTROL BY GRAD B DRIFT
J. R. Lee 1985 51 p Presented at the 6th JOWOG Meeting, Aldermaston, England, 7 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001265; SAND-85-2126C; CONF-8510165-2) Avail: NTIS HC A04/MF A01

This paper presents theoretical analyses of three subjects pertinent to electron beam experiments. First, a new technique for injecting a beam from a triaxial diode is described, and calculations of the phase space acceptance are shown. Second, the interaction of a relativistic electron beam with a low pressure nitrogen gas in a strong magnetic field is discussed in detail. Calculation of the important parameters of the plasma generated by the beam leads to estimates of energy lost by beam electrons during transport. Third, pulse shaping is discussed. To first order, the risetime of the electron beam current after transport is infinitesimally small. Practical limits on the current risetime come from several second order effects, which are considered. DOE

N86-20061# Joint Publications Research Service, Arlington, Va.
INTERACTION OF CHARGED PARTICLE BEAMS WITH ACTIVE PLASMA MEDIUM Abstract Only
M. B. Bondarenko, A. N. Kondratenko, and V. I. Tkachenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 6 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorky, USSR), v. 27, no. 11, Nov. 1984 p 1382-1387 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20069# Joint Publications Research Service, Arlington, Va.
COLLECTIVE EFFECTS DURING INDUCED RADIATION OF ELECTRON BEAM IN WIGGLER WITH AXIAL MAGNETIC FIELD Abstract Only
A. Kolomenskiy and I. I. Pakhomov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 37 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 10, no. 6, Nov. - Dec. 1984 p 1275-1279 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20072# Joint Publications Research Service, Arlington, Va.
INITIAL EXPERIMENT ON HIGH FREQUENCY PLASMA HEATING AT TUMAN-3 TOKAMAK Abstract Only
L. G. Askinazi, V. Ye. Golant, S. G. Goncharov, M. P. Gryaznevich, V. K. Lusev, V. V. Dyachenko, A. B. Izvozchikov, A. I. Kislyakov, S. V. Krikunov, and S. V. Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 40 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 5, 12 Mar. 1985 p 315-318 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20077# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF TWO-DIMENSIONAL LANGMUIR TURBULENCE Abstract Only
L. M. Degtyarev, I. M. Ibragimov, R. Z. Sagdeyev, G. I. Solovev, V. D. Shapiro, and V. I. Shevchenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 60 Transl. into ENGLISH from Pisma V Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 40, no. 11, 10 Dec. 1984 p 455-459 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20078# Joint Publications Research Service, Arlington, Va.
HIGH FREQUENCY PLASMA HEATING AT FINITE PRESURE IN REGION OF ION CYCLOTRON FREQUENCIES Abstract Only
D. L. Grekov and K. N. Stepanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 61 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 10, no. 6, Nov. - Dec. 1984 p 1211-1218 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20079# Joint Publications Research Service, Arlington, Va.
EMISSION OF ELECTROMAGNETIC WAVES BY A MODULATED ELECTRON BEAM IN A RECTANGULAR WAVE GUIDE FILLED WITH A LONGITUDINALLY INHOMOGENEOUS PLASMA Abstract Only
S. M. Levitskiy and I. A. Anisimov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 64 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy MV I SSO SSSR: Radiofizika (Gorkiy, USSR), v. 28, no. 3, Mar. 1985 p 298-302 Original language document was announced in IAA as

A85-34880 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-20145 Polytechnic Inst. of New York, Brooklyn.
PHOTOEMISSION AND X-RAY ABSORPTION STUDIES OF INTERMETALLIC COMPOUNDS BASED ON THE EARLY RARE EARTHS Ph.D. Thesis
Yi-Shung Chaug 1985 94 p
Avail: Univ. Microfilms Order No. DA8515854

The general motivation for this thesis was to better understand the 4f instability in Cerium-based systems and hybridization effects involving the 4f electrons in Pr- and Nd- as well as Ce-based systems, by applying X-ray photoelectron spectroscopy, resonant photoelectron spectroscopy and X-ray absorption spectroscopy. The result of an ancillary study, not directly relevant to the main theme of the thesis is reported which addresses the problem of chemisorption-induced surface disproportionation in ReNi5, Re-=La, Pr and Nd, a subject of current interest in catalysis and hydrogen storage problem. Deep-core XPS studies on ReRu2 and ReIr2 systems, Re = La, Ce, Pr and Nd, show that there can be appreciable but decreasing intensity of the shake-down satellite in the 3d-XPS spectrum in going from La to Nd. The hybridization between the 4f electrons and the conduction electrons in the presence of a deep core hole has been deduced from the relative intensity of the shakedown satellite. Dissert. Abstr.

N86-20146 Lehigh Univ., Bethlehem, Pa.
THE DONOR LEVELS OF THE VACANCY IN SILICON: A NEGATIVE-U SYSTEM Ph.D. Thesis
James Lyle Newton 1985 225 p
Avail: Univ. Microfilms Order No. DA8516260

In a system possessing a negative effective correlation energy, U, the electrical levels are inverted so that the energy required to remove the first electron from the system is greater than that required to remove the second. The lattice vacancy in silicon is unambiguously shown to have this property, with the double donor level (+/+ +) being located above the single donor level (0/+) in the band gap. Electron Paramagnetic Resonance (EPR) was used to directly monitor V+, one of the paramagnetic charge states of the vacancy, while probing the donor levels with low energy optical and thermal excitation. By simultaneously monitoring the EPR signal of the group 3 acceptor, it was possible to identify the charge states involved in the charge transfer processes and to deduce that the vacancy levels were inverted in negative U ordering. The concentration of vacancies being monitored was estimated to be about 70% of that predicted by the simple radiation damage model previously proposed for Si. Dissert. Abstr.

N86-20147 Cincinnati Univ., Ohio.
EFFECTS OF MACROSCOPIC INHOMOGENEITIES ON THE MAGNETORESISTIVITY OF SIMPLE METALS AND CRITICAL FIELD ANISOTROPY IN GRANULAR ALUMINUM Ph.D. Thesis
Kevin Michael Loeffler 1985 211 p
Avail: Univ. Microfilms Order No. DA8518105

The effects of macroscopic voids on the high field thermal magnetoresistivity of the simple metals, including the effects of the lattice conductivity were determined. The calculations were performed using a Green's function approach and a boundary value method. The presence of the lattice conductivity causes large deviations from the linear term evident in the electrical magnetoresistivity. The thermal magnetoresistivity, both transverse and longitudinal, saturates in sufficiently strong fields. The deviation from linearity occurs for 10 is equal to or less than omega sub c tau is equal to or less than 100 depending upon the magnitude of k sub g. The Righi-Leduc coefficient was determined and it was found that the voids caused light increase. The magnetoresistance anomalies of potassium cannot be explained by the presence of voids. Critical field and fluctuation conductivity for extreme type 2 granular aluminum films were measured and found to exhibit a strong temperature dependent anisotropy. Dissert. Abstr.

N86-20148 Ohio State Univ., Columbus.
PICOSECOND DYNAMICS OF CHARGED CARRIERS IN AMORPHOUS SEMICONDUCTORS Ph.D. Thesis
Arvind Inacio DSouza 1985 128 p
Avail: Univ. Microfilms Order No. DA8518930

Picosecond dynamics of charged carriers in a-Si and a-Si:H are investigated. Pulse of width 15 ps, obtained from a cavity dumped dye laser operated at a wavelength of 600 nm and a repetition rate of 400 KHz are utilized to measure changes in reflectance as a function of delay time. Decay curves vary from an exponential decay with positive curvature in a-Si to a curve with negative curvature in a-Si:H. Change in reflectances switches from positive to negative in a-Si:H with the highest hydrogen concentration. A phenomenological model is proposed that divides the density of states of a-Si and a-Si:H into four regions. Change in reflectance is related to the number of electrons in the first and second regions and the number of holes in the third and fourth regions. Photoluminescence plays no role in a-Si and only a minor role in a-Si:H at 300 K. Gap states dominate the recombination mechanism in a-Si and a-Si:H up to 900 ps. Dissert. Abstr.

N86-20149 Pennsylvania State Univ., University Park.
THE FORMATION AND CHARACTERIZATION OF SIO SUB x-N SUB y Ph.D. Thesis
Richard Kenyon Brow 1985 227 p
Avail: Univ. Microfilms Order No. DA8515999

Silicon oxynitride films were formed by reacting porous, solgel derived silicon dioxide, deposited on single crystal silicon substrates, with ammonia at temperatures between 500 C and 1100 C. Film thicknesses and refractive indices were determined by ellipsometry. Depth profiles of the films by Auger electron spectroscopy and by secondary ion mass spectroscopy showed that nitrogen was uniformly distributed throughout the films. The compositions determined by X-ray photoelectron spectroscopy were found to agree with those calculated from the film refractive indices. The nitrided films were found to resist the high temperature oxidation of the silicon substrates much more effectively than thermal growth silicon dioxide films of comparable thicknesses. Films with greater initial nitrogen contents resisted substrate oxidation for longer times. This behavior was explained using the Deal and Grove model for silicon oxidation. A mechanism for the incorporation of nitrogen, based in part on thermodynamic calculations done using the SOLGASMIX computer program, was developed. Dissert. Abstr.

N86-20150* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GaAs SCHOTTKY BARRIER PHOTO-RESPONSIVE DEVICE AND METHOD OF FABRICATION Patent
George E. Alcorn (Howard Univ., Washington, D.C.), Charles Z. Leinkram (Howard Univ., Washington, D.C.), and Olatunji Okunola, inventors (to NASA) (Howard Univ., Washington, D.C.) Issued 24 Sep. 1985 6 p Filed 24 Jun. 1983 Sponsored by NASA (NASA-Case-GSC-12816-1; US-Patent-4,543,442; US-Patent-Appl-SN-507625; US-Patent-Class-136-255; US-Patent-Class-29-572; US-Patent-Class-136-262; US-Patent-Class-357-15; US-Patent-Class-357-30) Avail: US Patent and Trademark Office CSCL 20L

A gallium arsenide photo-responsive device is provided with an intermediate, transparent layer of a refractory metal or alkaline earth metal forming a tenacious bond between a non-hydroscopic oxide layer and a noble metal Schottky barrier layer. The device has a gallium arsenide substrate with a predetermined type conductivity and a gallium arsenide epitaxial layer with the same type conductivity but a lower charge carrier concentration grown on the substrate. The oxide layer is formed to cover the epitaxial

layer, and the transparent metal layer followed by the noble metal layer are deposited upon the oxide layer. An interdigitated ohmic contact is then formed upon the noble metal layer.
Official Gazette of the U.S. Patent and Trademark Office

N86-20151 Cornell Univ., Ithaca, N.Y.
ON EVALUATING STRAIN FIELDS IN SILICON [001] TWIST GRAIN BOUNDARIES USING ELECTRON DIFFRACTION Ph.D. Thesis
Timothy Dooling Sullivan 1985 234 p
Avail: Univ. Microfilms Order No. DA8516903

Methods have been developed to extract quantitative information on the structure of grain boundaries from electron diffraction patterns recorded on electron-image film in a transmission electron microscope (TEM). The relative intensities of grain boundary reflections (streaks) and matrix reflections are examined, and a criterion for the visibility of grain boundary reflections (streaks) is derived, taking effects of beam divergence into account. It is shown that the intensity of a matrix reflection reciprocal space decreases with the cube of the distance from the origin. Quantitative expressions are derived to link the optical density of exposed electron-image film to reflection intensity. Using quantitative microdensitometry several diffraction patterns from 22 deg twist boundaries are then examined. The results obtained are in agreement with the intensity distribution of the matrix reflection which was derived earlier. Dissert. Abstr.

N86-20152 Cornell Univ., Ithaca, N.Y.
DISLOCATION REACTIONS AT GRAIN BOUNDARIES AND THEIR ROLE IN THE MECHANICAL BEHAVIOR OF CRYSTALLINE INTERFACES Ph.D. Thesis
Leong-Chew Lim 1985 171 p
Avail: Univ. Microfilms Order No. DA8516946

Interactions between crystal slip and grain boundaries were investigated with polycrystals and bicrystals of pure nickel. The specimens were deformed in push-pull low-cycle fatigue at a plastic strain amplitude of 1.35% as well as in uniaxial compression at 573K and strain rates higher than .0003/s <011> symmetrical tilt bicrystals deformed in uniaxial compression showed that slip traces for screw dislocations were continuous at the grain boundaries and that low sigma boundaries exhibit a high degree of slip continuity than high sigma boundaries. Polycrystals of nickel in low cycle fatigue in vacuum showed that interactions between crystal slip and grain boundaries can lead to cavity formation, boundary migration and dynamic recrystallization, and that high sigma boundaries suffered more severe cavitation and migration as compared with low sigma boundaries. Low cycle fatigue of bicrystals revealed that the edge component of the residual dislocations left in the boundary by reactions of lattice dislocations is important in the various slip induced effects. Dissert. Abstr.

N86-20153*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TOTAL-DOSE RADIATION EFFECTS DATA FOR SEMICONDUCTOR DEVICES: 1985 SUPPLEMENT, VOLUME 1
Keith E. Martin, Michael K. Gauthier, James R. Coss, Armando R. V. Dantas, and William E. Price 15 Oct. 1985 132 p
(Contract NAS7-918)
(NASA-CR-176557; JPL-Pub-85-43-Vol-1; NAS 1.26:176557) Avail: NTIS HC A07/MF A01 CSCL 20L

Steady-state, total-dose radiation test data are provided, in graphic format, for use by electronic designers and other personnel using semiconductor devices in a radiation environment. The data were generated by JPL for various NASA space programs. The document is in two volumes: Volume 1 provides data on diodes, bipolar transistors, field effect transistors, and miscellaneous semiconductor types, and Volume 2 provides total-dose radiation test data on integrated circuits. Volume 1 of this 1985 Supplement contains new total-dose radiation test data generated since the August 1, 1981 release date of the original Volume 1. Publication of Volume 2 of the 1985 Supplement will follow that of Volume 1 by approximately three months. Author

N86-20154# Chicago Univ., Ill.
SURFACE DYNAMICS OF RARE GAS CRYSTALS Interim Technical Report
K. D. Gibson and S. J. Sibener Aug. 1985 11 p
(Contract N00014-77-C-0240)
(AD-A159681; AD-E801193; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/10

The surface properties of rare gas crystals have been explored using a He molecular beam as the dynamical probe. Specifically, ordered monolayer, bilayer, trilayer, and bulk Ar, Kr, and Xe were grown on an Ag(111) substrate. This has allowed us to examine how the physical properties of these films evolve on a layer by layer basis. Elastic diffraction and selective adsorption experiments were used to investigate the He-surface interaction potential. Comparing the results of close-coupled calculations with the experimental data, both the laterally averaged potential and higher order terms in the energy expansion can be determined. To examine the dynamical properties of the adsorbed rare gases, angle and time resolved inelastic scattering was used. This technique made it possible to investigate the dynamics of the surface across the entire Brillouin zone. In this paper on the properties of Ar(111) multilayers are specifically examined. These data are compared to the theoretical calculations of several other groups, testing the validity of several model potentials, and the importance of various interaction terms when constructing these potentials. GRA

N86-20155# California Univ., Santa Barbara. Inst. for Polymers and Organic Solids.
X-RAY SCATTERING FROM POLY(THIOPHENE): CRYSTALLINITY AND CRYSTOLLOGRAPHY STRUCTURE
Z. Mo, K. B. Lee, Y. B. Moon, M. Kobayashi, and A. J. Heeger 1 Oct. 1985 30 p
(Contract N00014-83-K-0450)
(AD-A159895; IPOS-ONR-7) Avail: NTIS HC A03/MF A01 CSCL 20/2

X-ray scattering has been used to investigate the crystallinity and crystal structure of chemically coupled polythiophene. Heat treatment at elevated temperatures leads to significant increases in crystallinity (from approx. 35% as-synthesized up to approx. 56% after annealing at 380 C for 30 minutes) and coherence length indicative of chain growth and extension. Chemical analysis of the chain extended PT shows a major reduction in residual iodine content consistent with growth of the polymer chains to approximately 1200 thiophene rings. An initial model of the crystal structure of polythiophene is presented. Author (GRA)

N86-20156# Northwestern Univ., Evanston, Ill. Dept. of Engineering Science and Applied Mathematics.
FIRST PASSAGE TIMES IN STOCHASTIC DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS AND ENGINEERING Final Report, 1 Apr. 1983 - 30 Mar. 1985
B. J. Matkowsky Apr. 1985 6 p
(Grant AF-AFOSR-0086-83)
(AD-A160323; AFOSR-85-0767TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The goal of our study was to develop new asymptotic and singular perturbation methods for the analysis of random phenomena, and their application in various areas of science and engineering. We have studied the problems of: (1) atomic migration in crystals, (2) ionic and super-ionic conductivity, (3) chemical reaction rates, surface desorption rates, and more general activated rate processes, (4) noise effects on the hysteretic Josephson junction, D.C.-SQUID, and other tunnel junction devices, (5) stability and reliability of randomly loaded elastic structures, and (6) relative stability of various multi-stable systems, among others. Considerable success has been achieved, not only in developing new mathematical methods, but in solving a number of problems whose solution has long been outstanding. These include the Kolmogorov Exit Problem and the Kramers nonlinear diffusion problem, among others. GRA

N86-20157# Naval Academy, Annapolis, Md. Dept. of Physics.
DSC (DIFFERENTIAL SCANNING CALORIMETRY) AND HIGH PRESSURE CONDUCTIVITY AND ELECTRICAL RELAXATION MEASUREMENTS IN PPO POLY(PROPYLENE OXIDE) AND PPO COMPLEXED WITH LITHIUM SALTS Interim Technical Report
J. J. Fontanella and M. C. Wintersgill 1 Sep. 1985 14 p
(AD-A160342; TR-19) Avail: NTIS HC A02/MF A01 CSCL 11/10

Differential scanning calorimetry and high pressure electrical conductivity studies have been carried out on poly(propylene oxide) after the addition of various lithium salts. In addition, high pressure electrical relaxation measurements have been performed in the glass transition region on uncomplexed PPO. The vacuum conductivity measurements show that To is 30 to 40 C lower than the DSC Tg. Next, it is found that both To and Tg increase several K/kbar. In terms of the configurational entropy model, the isobaric data yield a reasonable value for the activation volume which is consistent with values previously reported for PEO complexed with alkali metal ions. The isothermal data yield a negative activation volume for PPO complexed with LiSCN. Finally, DSC and isothermal conductivity measurements show that neither Tg nor the apparent activation volume scale directly with ion size. GRA

N86-20158# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
SOLID STATE RESEARCH Quarterly Technical Report, 1 Nov. 1984 - 31 Jan. 1985
Alan L. McWhorter 15 Feb. 1985 104 p
(Contract F19628-85-C-0002)
(AD-A160922; Rept-1985-1; ESD-TR-84-327) Avail: NTIS HC A06/MF A01 CSCL 20/12

The following aspects of solid state research Solid State Device Research - Heterodyne Radiometry at 28 micrometers; Wideband Integrated-Optics Electrooptic Intensity Modulator for 3.39-micrometers Operation; Quantum Electronics - Transient Carrier Density and Light Output Measurements of Pulsed Diode Lasers; Materials Research Zone-Melting Recrystallization of Si- and Ge-on-Insulator Films, MOSFETs Fabricated Using Self-Aligned Silicide Technology, GaAs Optical MESFET Detectors Fabricated on a Monolithic GaAs/ISi Substrate; microelectronics - A 420 X 420 CCD Imager for Ground-Based Satellite Surveillance, SAW/FET Wideband Programmable Filter, Etched-Emitter Silicon PBT, Linewidth Control with Masked Ion-Beam Lithography Using Stencil Masks, Solid-State Submillimeter Heterodyne Radiometer; Persistent Photoconductivity in Quantum Well Resonators; and Analog Device Technology - In situ Amplitude and Phase Adjustment of SAW Devices by Laser-Photochemical Etching, and Superconductive Chirp-Transform Spectrum Analyzer. GRA

N86-20159# Washington Univ., St. Louis, Mo. Semiconductor Research Lab.
CLUSTERING AND ORDERING IN 3-5 ALLOYS Annual Scientific Report, 1 Jun. 1984 - 31 May 1985
C. M. Wolfe, M. W. Muller, S. J. Hsieh, Elizabeth A. Patten, and P. Roblin 31 Jul. 1985 137 p
(Grant AF-AFOSR-0231-82)
(AD-A161099; WU/SRL-59583A-9; AFOSR-85-0931TR) Avail: NTIS HC A07/MF A01 CSCL 11/6

Staggered lineup heterojunctions are expected to exhibit tunneling assisted optical transitions across the interfacial energy gap E sub I. In the staggered lineup, E sub I is smaller than either of the energy gaps of the constituent semiconductors. In this work, we examined two staggered lineup heterojunctions, ZnSnP2/GaAs and In1-xGaP/GaAs. Below bandgap emission and absorption were observed in these structures, allowing the experimental determination of E sub I. Good agreement was seen between this value of E sub i and that from the predicted band lineup. Advances in technology have made possible the fabrication of rapidly varying heterostructures which hold the promise of important applications. We develop a set of approximate treatments of electron states in a variety of layered heterostructures. Recent III-V alloy formation models indicate that negative charge transfer energy can overcome positive bond distortion energy to stabilize long-range order or compound formation. Although a report of a layered ordering in A1xGa1-xAs tends to confirm this result, we have as yet obtained no convincing evidence for such ordering in InxGa1-xP. GRA

N86-20160# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
MOLECULAR BEAM EPITAXIAL (MBE) GROWTH OF GALLIUM ARSENIDE AND GALLIUM ALUMINUM ARSENIDE
Helmut Kanter 30 Sep. 1985 27 p
(Contract F04701-83-C-0084)
(AD-A161147; TR-0084A(5925-01)-4; SD-TR-85-69) Avail: NTIS HC A03/MF A01 CSCL 20/2

The construction and operation of a molecular beam epitaxial (MBE) system for promoting the epitaxial growth of gallium arsenide (GaAs) and gallium aluminum arsenide (GaAlAs) materials is described. These materials are studied in support of development of GaAs-based microwave and millimeter-wave devices as well as fast integrated digital circuits. GRA

N86-20161# Lawrence Livermore National Lab., Calif.
SIMULATION OF LIQUID HELIUM
D. M. Ceperley Jul. 1985 26 p refs Presented at the International School of Physics on Molecular Dynamics Simulation of Statistical Mechanical Systems, Varenna, Italy, 23 Jul. 1985
(Contract W-7405-eng-48)
(DE85-015397; UCRL-92970; CONF-850764-2) Avail: NTIS HC A03/MF A01

The author discusses simulation methods for quantum mechanical systems at finite temperatures. Recently it has been shown that static properties of some quantum systems can be obtained by simulation in a straightforward manner using path integrals, albeit with an order of manitude more computing effort needed than for the corresponding classical systems. Some dynamical information can be gleaned from these simulations as will be discussed below. But this is very limited - there is no quantum version of the molecular dynamics method. The path integral method is illustrated by scussing the application to liquid helium. DOE

N86-20162# Salerno Univ. (Italy).
PAIR TUNNELING IN A TWO-DIMENSIONAL SUPERCONDUCTOR
R. Vaglio, A. Cucolo, and C. M. Falco [1985] 12 p
(Contract DE-AC02-83ER-45025)
(DE85-014445; DOE/ER-45025/8) Avail: NTIS HC A02/MF A01

Pair tunneling to a two-dimensional superconductor is reported for the first time. It is found that flux quantization disappears due to the nature of the two-dimensional superconductor, while the magnitude of the pair tunneling current is unaffected. Also due to the specific behavior of the system under consideration, a crossover to conventional three-dimensional behavior is observed at low temperatures. DOE

N86-20163# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
RESONANT, INELASTIC SINGLE PHONON PROCESSES IN THE SCATTERING OF He ATOMS ON LiF(001) SURFACES Thesis [RESONANTE, INELASTICHE EIZELPHONONPROZESSE BEI DER STREUUNG VON He-ATOMEN AN DER LiF(001)-OBERFLAECHE]
D. Eichenauer May 1985 160 p refs In GERMAN
(MPIS-9/1985; ISSN-0436-1199) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

Inelastic scattering processes in the thermal energy domain were studied in the He-LiF(001) model system in order to determine the role of solid state surfaces as catalysts. The inelastic scattering of low energy (20 meV) He-atoms on a pure LiF(001) single crystal surface and the concomitant resonance effects were theoretically treated. Realistic models were taken as starting points in order to enable a comparison with experimental data. Since the resonances occur under well defined, easily specifiable kinematic

conditions, the measured energy loss spectra and angular distributions, compared with the dynamic calculation, allow qualitative as well as quantitative statements concerning microscopic, exactly determined elementary steps in adsorption and desorption processes. Author (ESA)

N86-19727*# Shin-Etsu handotai Co., Gumma (Japan).
POTENTIAL PRODUCTIVITY BENEFITS OF FLOAT-ZONE VERSUS CZOCHRALSKI CRYSTAL GROWTH
Takao Abe *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 55-80 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19728*# Massachusetts Inst. of Tech., Cambridge.
NEW OUTLOOK ON CONTROL OF CRYSTALLINE AND CHEMICAL PERFECTION DURING GROWTH OF SILICON
A. F. Witt *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 83-96 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19729*# International Business Machines Corp., Hopewell Junction, N. Y.
MCZ: STRIATIONS IN CZ SILICON CRYSTALS GROWN UNDER VARIOUS AXIAL MAGNETIC FIELD STRENGTHS
George K. M. Kim *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 97-107 refs (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19730*# Hughes Research Labs., Malibu, Calif.
HIGH PURITH LOW DEFECT FZ SILICON
H. Kimura and G. Robertson *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 109-121 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19731*# RCA Labs., Princeton, N. J.
DEFECTS IN SILICON EFFECT ON DEVICE PERFORMANCE AND RELATIONSHIP TO CRYSTAL GROWTH CONDITIONS
L. Jastrzebski *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 123-143 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19732*# Washington Univ., St. Louis, Mo.
SIMULATION OF THE TEMPERATURE DISTRIBUTION IN CRYSTALS GROWN BY CZOCHRALSKI METHOD
M. P. Dudokovic and P. A. Ramachandran *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 147-173 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19733*# Arizona State Univ., Tempe.
CONVECTIVE EFFECTS IN FLOAT-ZONE AND CZOCHRALSKI MELTS
G. P. Neitzel *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1986 p 175-192 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19734*# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
THERMAL-CAPILLARY MODEL FOR CZOCHRALSKI GROWTH OF SEMICONDUCTOR MATERIALS
J. J. Derby and R. A. Brown *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 195-214 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19736*# State Univ. of New York, Albany.
OXYGEN AND CARBON IN SILICON
J. W. Corbett *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 235-257 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19737*# Texas Instruments, Inc., Sherman.
SOLAR CELL AND I.C. ASPECTS OF INGOT-TO-SLICE MECHANICAL PROCESSING
Lawrence D. Dyer *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 259-277 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-19738*# Storti (George), Washington, D.C.
DEFECTS AND DEVICE PERFORMANCE
George Storti, R. Armstrong, S. Johnson, H. C. Lin, W. Regnault, and K. C. Yoo *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop 15 Aug. 1985 p 279-291 (For primary document see N86-19723 10-44)
Avail: NTIS HC A13/MF A01 CSCL 10B

N86-20059# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC DOMAIN STRUCTURE IN RUBY CRYSTALS Abstract Only
S. A. Basun, A. A. Kaplyanskiy, and S. P. Feofilov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 3-4 Transl. into ENGLISH from Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 87, no. 12, Dec. 1984 p 2047-2061 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

N86-20060# Joint Publications Research Service, Arlington, Va.
PHOTOELECTRIC DOMAIN STRUCTURE: THEORY Abstract Only
M. I. Dyakonov and A. S. Furman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 4 Transl. into ENGLISH from Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 87, no. 12, Dec. 1984 p 2063-2074 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-20164 Nebraska Univ., Lincoln.
THE GRAVITATIONAL FIELD DUE TO MASSLESS SCALAR FIELDS Ph.D. Thesis
James Carl Conwell 1985 128 p
Avail: Univ. Microfilms Order No. DA8516867

New metric solutions of Einstein's field equations are found for the stress-energy tensor due to massless scalar fields having plane and cylindrical symmetry. The Riemann curvature tensor is computed and the tidal forces due to these new solutions are studied. The location of singularities in the manifold is also discussed for these new solutions. Dissert. Abstr.

N86-20080# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF THERMAL FIELD OCCURRING DURING LASER HEATING OF METALS Abstract Only
N. A. Kirichenko and Yu. Yu. Morozov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-005) 11 Feb. 1986 p 76 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 11, Nov. 1984 p 2331-2335 (For primary document see N86-20057 10-70)
Avail: NTIS HC A06/MF A01

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-20165# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
RESEARCH AND DEVELOPMENT PROJECT SELECTION METHODS AT THE AIR FORCE WRIGHT AERONAUTICAL LABORATORIES M.S. Thesis
Jeremy R. Prince Sep. 1985 77 p
(AD-A161153; AFIT/GSM/LSY/85S-29) Avail: NTIS HC A05/MF A01 CSCL 14/2

This thesis sought to determine how in-house research projects are selected at the U.S. Air Force Wright Aeronautical Laboratories (AFWAL). The problem was explored by studying ten aspects of the research project selection process. This analysis was accomplished by using a combination of personal and telephone interviews. Ten individuals from each of the four AFWAL Laboratories were interviewed. The results illustrated that few of the respondents used a formal decision method model when selecting research projects. Most of the in-house projects selected at AFWAL are chosen via a consensus of agreement between the various levels of management in each laboratory. GRA

N86-20271# Joint Publications Research Service, Arlington, Va.
NEW SPACE ADMINISTRATION GLAVKOSMOS USSR CREATED
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 164-165 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 13 Oct. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-20166 Drexel Univ., Philadelphia, Pa.
A COMPARISON OF DOCUMENT CLUSTERS DERIVED FROM CO-CITED REFERENCES AND CO-ASSIGNED INDEX TERMS Ph.D. Thesis
Barbara Ann Rapp 1985 229 p
Avail: Univ. Microfilms Order No. DA8513956

The database partitioning effects of co-cited references and co-assigned MeSH term indexing systems, both of which have the common information retrieval purpose of identifying documents related in subject were examined. A matched dataset of over 8500 documents, published during the years 1975 to 1977 in 20 cardiology journals were drawn from the MEDLINE database and from the Institute for Scientific Information's citation database. Single link clustering was used to partition the data set in three different ways. Co-citation clustering was used to partition on the basis of reference relationships. To partition on the basis of MeSH index terms, both term clustering and document clustering were used. Results of the three cluster analyses were compared pairwise to measure similarity of document placement. Overlap between cluster systems was measured. Extremely low overlap between the clusters derived from co-citation analysis and those derived from term clustering or document clustering based on MeSH term relationships was found. Dissert. Abstr.

N86-20167 Lehigh Univ., Bethlehem, Pa.
A GEOMETRICAL MODEL FOR DBMS: AN EXPERIMENTAL DBMS USING IBM SOLID MODELLING Ph.D. Thesis
Ali Dia El-Din Loutfy 1985 126 p
Avail: Univ. Microfilms Order No. DA8516245

Geometrical data base management system (DBMS) solid modeling technology in designing and implementing DBMS. The Geometrical DBMS is implemented using IBM solid modelling Geometric Design Processor (GDP). In Geometrical DBMS, the graphical aspect of the model is not an alien concept tailored to the model but is, as a matter of fact, the atom around which the model was designed. The main idea in Geometrical DBMS is to allow the user and the system to refer to and manipulate data items as objects and attributes. This is done by representing a data item as a solid object in 3D space, and representing a record as a group of logically related solid objects. In Geometrical DBMS, the hierarchical structure is used to present the data relations, the user sees the data as a group of arrays yet, for the user and the system together, the data structure is a multidimensional tree. Dissert. Abstr.

N86-20168* National Aeronautics and Space Administration, Washington, D.C.
NASA THESAURUS. VOLUME 1: HIERARCHICAL LISTING 1985 Edition
Sep. 1985 851 p
(NASA-SP-7053-Vol-1; NAS 1.21:7053-Vol-1) Avail: NTIS HC $35.00

There are 16,835 postable terms and 3,765 nonpostable terms approved for use in the NASA scientific and technical information system in the Hierarchical Listing of the NASA Thesaurus. The generic structure is presented for many terms. The broader term and narrower term relationships are shown in an indented fashion that illustrates the generic structure better than the more widely used BT and NT listings. Related terms are generously applied, thus enhancing the usefulness of the Hierarchical Listing. Greater access to the Hierarchical Listing may be achieved with the collateral use of Volume 2 - Access Vocabulary. Author

N86-20169* National Aeronautics and Space Administration, Washington, D.C.
NASA THESAURUS. VOLUME 2: ACCESS VOCABULARY 1985 Edition
Sep. 1985 402 p
(NASA-SP-7053-Vol-2; NAS 1.21:7053-Vol-2) Avail: NTIS HC $20.00

The Access Vocabulary, which is essentially a permuted index, provides access to any word or number in authorized postable and nonpostable terms. Additional entries include postable and nonpostable terms, other word entries, and pseudo-multiword terms that are permutations of words that contain words within words. The Access Vocabulary contains 40,738 entries that give increased access to the hierarchies in Volume 1 - Hierarchical Listing. Author

N86-20170* National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 28)
7 Mar. 1986 55 p
(NASA-SP-7039(28); NAS 1.21:7039(28)) Avail: NTIS HC A04 CSCL 05B

Abstracts are provided for 109 patents and patent applications entered into the NASA Scientific and Technical Information System during the period July 1985 through December 1985. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application. Author

N86-20171# Litton Mellonics Systems Development Div., Fort Benning, Ga.
AN ANNOTATED BIBLIOGRAPHY OF THE MANNED SYSTEMS MEASUREMENT LITERATURE Final Report
J. M. Edwards, R. F. Bloom, J. F. Oates, Jr., S. Sipitkowski, and P. A. Brainin Feb. 1985 505 p Prepared in cooperation with Dunlap and Associates, Inc., Darien, Conn.
(Contract MDA903-80-C-0345; DA Proj. 2Q2-63743-A-794)
(AD-A160333; Rept-293-6; ARI-RN-85-18) Avail: NTIS HC A22/MF A01 CSCL 05/8

A comprehensive computerized literature search was conducted on the subject of systems and measurement theory and practice. As a result of this search, 244 citations were identified as very likely relevant to the area of interest, and were abstracted for this document. GRA

N86-20172# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A LONGITUDINAL STUDY OF THE RELATIONSHIP BETWEEN USER ATTITUDES AND THE SUCCESS OF THE MAJCOM AND AFRCE WORK INFORMATION MANAGEMENT SYSTEM M.S. Thesis
Paul E. McMullin Sep. 1985 165 p
(AD-A161055; AFIT/GEM/LSM/85S-10) Avail: NTIS HC A08/MF A01 CSCL 05/1

This thesis determines whether or not the relationship between Work Information Management System (WIMS) user attitudes and success found in previous military research has changed over time, and determines if WIMS is perceived to be more successful in 1985 than it was in 1984. Finally, this research evaluates how WIMS has impacted Major Command and Air Force Regional Civil Engineer organizations based on the responses of the users. 400 surveys were distributed to 19 MAJCOM and AFRCEs. Statistical techniques were used to answer the five research questions. A response rate of 55.5 percent was achieved. Results indicate that the relationship between user attitudes and the perceived success of WIMS has not changed significantly, and that WIMS is perceived to be more successful in 1985 than it was in 1984. Statistical Analysis techniques used included factor analysis, multiple regression, and a two-sample T test. GRA

N86-20173# MacAulay-Brown, Inc., Fairborn, Ohio.
AUTOMATED INFORMATION MANAGEMENT TECHNOLOGY (AIM-TECH): CONSIDERATIONS FOR A TECHNOLOGY INVESTMENT STRATEGY Final Report
Walter Reitman, Ralph M. Weischedel, Kenneth R. Boff, Mark E. Jones, and Joseph P. Martino May 1985 216 p
(Contract F33615-82-C-0513)
(AD-A161139; AFAMRL-TR-85-042) Avail: NTIS HC A10/MF A01 CSCL 09/2

The Automated Information Management Technology Program (AIM-Tech) has focused on evaluating the key factors to an investment strategy for implementing artificial intelligence technology in three technical domains: systems design; pilot/aircrew automation; and command, control, and communications (C3). A state-of-the-art review of artificial intelligence (AI), functional specifications for future AI aided systems, and required AI capabilities are discussed. The state-of-art review assesses eight technology areas: expert systems and knowledge engineering, natural language, knowledge representation, computer vision, tutoring and training, planning and problem solving under real world conditions, AI tools and environments, and speech. Functional specifications are classified into three groups for each technical domain: communications, expert understanding, and decision aiding. Futuristic scenarios were constructed in which information and control management choke points are resolved by the hypothetical application of machine intelligence for each of the three domains. Author

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-20174# Committee on Science and Technology (U. S. House).
AUTHORIZING APPROPRIATIONS FOR LANDSAT COMMERCIALIZATION
Washington GPO 1985 6 p Rept. to accompany H.S. 2800 presented by the Committee on Science and Technology to the 99th Congr., 1st Sess., Jun. 1985
(H-Rept-99-177; GPO-61-006) Avail: US Capitol, House Document Room

Appropriations for 1985 through 1989 for transfer to the private sector of the LANDSAT system by the Federal Government are described. B.G.

N86-20175# Comptroller General of the United States, Washington, D.C.
FEDERAL AGENCIES' POLICIES AND PRACTICES ARE IN ACCORDANCE WITH PATENT AND TRADEMARK AMENDMENTS OF 1980
[1985] 45 p
(B-207939; Rept-3) Avail: NTIS HC A03/MF A01

Implementation of Patent and Trademark Amendments of 1980 by 10 federal agencies was examined. Federal research and development procurement policies, regulations, and practices were reviewed for each agency. The 1984 funding agreements with contractors and grantees and the research and development titling and licensing activities of the agencies since the passage of the law were reviewed. The role of the Dept. of Commerce in implementing the Act was determined. How small businesses and nonprofit organizations viewed the changes in research and development activities was discussed. B.G.

N86-20176# Committee of Conference (U. S. Congress).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1986
Washington GPO 19 Nov. 1985 18 p Rept. to accompany H.R. 1714 presented by the Committee of Conference to the 99th Congression, 1st Session, Nov. 1985
(H-Rept-99-379; GPO-54-684) Avail: US Capitol, House Document Room

Appropriations to NASA for research and development, space flight, control and data communications, construction of facilities, and research and program management are discussed. Shuttle pricing policies for commercial and foreign users are also described. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-20177# Committee on Science and Technology (U. S. House).
TECHNOLOGY TRANSFER

Washington GPO 1985 259 p Hearings before the Subcommittee on Science, Research and Technology, 99th Congr., 1st Sess., no. 22, 21-22 May 1985
(GPO-49-539) Avail: Subcommittee on Science, Research and Technology

Budget restraints; assessment; of changes in technology transfer since 1980; redefining of Federal role in technology transfer; cooperative agreements; invention policy; transfer of technology from Federal laboratories; and flow of American Commercial products developed from government research were discussed. B.G.

88 SPACE SCIENCES (GENERAL)

N86-20178# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE
13 Jan. 1986 186 p Transl. into ENGLISH from various Russian articles
(JPRS-USP-86-001) Avail: NTIS HC A09

Numerous aspects of the U.S.S.R. space program are discussed. Manned space flight, geometrical optics, airglow, planets, photointerpretation, space maintenance, comets, gamma ray bursts, soil analysis, and radar maps are among the topics covered. For individual titles, see N86-20179 through N86-20272.

N86-20179# Joint Publications Research Service, Arlington, Va.
FEOKISTOV REVEALS DETAILS OF SALYUT-7 REACTIVATION c18
K. Feokistov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 1-6 Transl. into ENGLISH from Pravda (Moscow, USSR), 5 Aug. 1985 p 3; 8 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

In a routine check a problem in one of the units of the Salyut-7 radio system, through which commands from the Earth pass, was discovered. As a result, radio contact from the station ceased and it became impossible to obtain telemetry information on the condition of the station's on-board navigation systems. It became clear that in order to restore normal operation it would be necessary to have a crew on board. But to do this a scheme had to be worked out for guiding a transport ship to the silent station at an undetermined point in the expanse of space, to prepare a ship and crew for the flight and for performing this unusual task, to outfit this ship with the new equipment needed for such an operation, to work out a new ballistic path for the approach and to train the specialists of the Flight Control Center. The technology developed in order to approach the station is discussed. On 6 June the spacecraft Soyuz T-13, manned by V. Dzhanibekov and V. Savinykh, was put into orbit. After corrections to its orbit were completed, on the morning of 8 June the spacecraft approached the station. When the ship and station exited from shadow they were at a distance of about ten kilometers from each other. V. Dzhanibekov aligned the ship's lateral axis with that of the station, observing it through the porthole of the ship's descent craft while V. Savinykh entered data into the computer according to Dzhanibekov's commands. At a distance of two and one half kilometers the automatic equipment executed the last correction maneuver and the crew took manual control. The calculations of the on-board computers were accurate enough that the corrections to the approach trajectory that had to be made manually were insignificant. R.J.F.

N86-20180# Joint Publications Research Service, Arlington, Va.
PREPARATION OF COSMONAUTS FOR SALYUT-7 REACTIVATION MISSION c18
Yu. Glazkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 10-13 Transl. into ENGLISH from Pravda (Moscow, USSR), Sep. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The preparations of the cosmonauts who flew to the crippled Salyut-7 Space Station in order to reactivate it are discussed. The development of a laser range finder and a night vision instrument that were used on the mission is discussed. R.J.F.

N86-20181# Joint Publications Research Service, Arlington, Va.
SOYUZ T-13 LANDS WITH COSMONAUTS DZHANIBEKOV AND GRECHKO c18
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 50 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 27 Sep. 1985 p 1 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

On 26 September 1985, at 1352 hours Moscow time, Vladimire Dzhanibekov and Georgiy Grechko returned to Earth in the Soyuz T-13 spaceship after completing the planned program of joint research and experiments. Vladimir Vasyutin, Viktor Savinykh and Aleksandr Volkov are continuing to work on board the manned complex Salyut-7 -- Soyuz T-14. Delivered to Earth were research materials and experiments performed by Vladimire Dzhanibekov and Viktor Savinykh and also by the crew of five cosmonauts. The fourth long-term expedition on Salyut-7 began 8 June 1985, following the successful docking of the Soyuz T-13 ship with the station. In the course of their flight, Vladimir Dzhanibekov and Viktor Savinykh restored the station to working order, demonstrating courage and high professional skill in doing this. The cosmonauts carried out an extensive program of scientific-technical research, and made an egrees into open space to install extra solar panels. For the first time, a crew has been partially replaced, which ensures the continuous operation of the manned space complex over an extended time, and substantially heightens the effectiveness of its use in the interests of science and the economy. R.J.F.

N86-20182# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON 237 DAY EXPEDITION TO SALYUT-7 c18
S. A. Bovin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 54-62 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 9-15 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The 237 day flight of Soviet cosmonauts aboard the Salyut-7 station, the longest in the history of the space age, has been completed (Zemlya i Vselennaya, 1983, No 1, p. 2; 1984, No. 1, p. 6; No 3, p. 2; No 6, p. 2 - Ed.). The crew in flight performed a large volume of medical, biological, technological, astrophysical, geophysical as well as preventive maintenance work. The flight to the Salyut-7 station began on 8 February 1984 aboard the Soyuz T-10 transporter. The goal of the flight was to discover how successfully a group of three persons could tackle scientific-technical problems in lengthy orbital flight. For successful management of this experiment and the corresponding medical examinations directly on board the station, cardiologist O. Yu. At'kov was included in the crew. Besides the standard medical apparatus, a special apparatus was also delivered to the station for better observation of the condition of the cosmonauts during the lengthy flight. The presence of a doctor on board the station provided an objective assessment of the state of the crew and, if necessary, the length flight could be curtailed. At'kov conducted two very important experiments involving fundamental aspects of biology. In the Membrana experiment on red blood cells and artificially-created analogs of biological membranes, interesting results were obtained revealing the features of the functions and vital cell components responsible for communication with the environment. In the experiment Genom, an attept was made to employ the advantages conferred by weightlessness to separate large fragments of the DNA molecule, enabling a faster deciphering of the human genetic code. R.J.F.

N86-20183# Joint Publications Research Service, Arlington, Va.
INTERVIEW WITH COSMONAUTS KIZIM AND SOLOVYEV c12
G. I. Vorobyev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 63-70 Transl. into ENGLISH from Zemlya i

Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 16-22 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An interview with Salyut-7 cosmonauts who completed a 237 day mission space is given. Spaceborne experiments in medicine, oceanography, astrophysics and mineral exploration are discussed. R.J.F.

N86-20184# Joint Publications Research Service, Arlington, Va.
BLAGOV ON DEVELOPMENT OF COSMONAUT EVA PROGRAMS c12
V. D. Blagov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 71-79 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 2-8 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The recollections of V.D. Blagov, the second-in-command during the first space walk in outer space, are given. Some details of space maintenance procedures and tools are given. R.J.F.

N86-20185# Joint Publications Research Service, Arlington, Va.
COMMENTS ON SOVIET-FRENCH PROJECT FOR GAMMA-1 ORBITAL TELESCOPE c12
G. Alimov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 80-82 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 10 Mar. 1985 p 2 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A general account is given of the Gamma 1 orbital telescope mission. The capabilities of the telescope, gamma radiation, and stars are discussed. R.J.F.

N86-20186# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF INVESTIGATING STAR SYSTEMS BY RADAR Abstract Only c32
O. N. Rzhiga *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 83 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 500-505 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

There is no fundamental reason why radar cannot be used in investigations of star systems. In order to detect star systems by radar it is necessary to construct an antenna with a diameter of several tens of kilometers and a transmitter whose power is commensurable with the power of all electric power stations on the Earth. Such an antenna should be in outer space in order to avoid the influence of radio ray refraction in the Earth's troposphere and to to give rise to radio noise. At present the construction of such a radar apparatus may seem incredible, but there are no fundamentally insoluble problems. The closest stars are 10,000 times more distant from the Sun than Pluto. In order to make successful radar observations of star systems there would have to be the same jump in energy potential as with the transition from radar observations of the Moon to radar observations of Pluto. If the rates of increase in energy potential persist, radar observations of star systems will become realistic by the middle of the 21st century. A system for interstellar communication having a receiving antenna with an effective area of 2 x 10 to the 9th power square meters operating at a wavelength of 3 cm with a receiver noise temperature of 10 K can ensure transmission of a television signal from a distance of 4.34 light years with use at the transmitting end of an antenna with a diameter of 10 m and a transmitter with a power of 1 million W. Radar observations of star systems will open the way to interstellar ships in the same way that radar observations of planets in the solar system opened the way for the interplanetary stations. Author

N86-20187# Joint Publications Research Service, Arlington, Va.
USE OF LIQUID MIRRORS IN ASTRONOMY Abstract Only c89
V. P. Vasilyev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 84 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 598-601 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The development of a liquid telescope with a mirror placed in a rotating system of intermediate damping fluids is discussed. Experimental data indicating the advantages of use of this method in astronomy are given. The examination of this problem indicates that the use of liquid mirrors is far more promising than is usually assumed and the designing and construction of large zenith telescopes with a liquid objective is feasible. As a highly reflecting liquid it is possible to use mercury with a protective layer of glycerin or a gallium melt. In addition to having a high-quality surface, a liquid mirror is incomparably cheaper and more easily produced than a traditional mirror, is not subject to thermal and static deformations and has a controllable surface configuration. A system of such telescopes at different latitudes can be irreplaceable for problems of the scanning-search type. The use of a liquid mirror in a vertical solar telescope would not even require changes in its basic optical system. The simplicity of this method makes its use possible in the construction of ultralarge objectives for future generations of telescopes operating in both optical and microwave ranges. There is no need for mechanical processing of the mirror surface and efforts necessary for producing adequate materials and means for their hardening during the rotation process are justified. Author

N86-20188# Joint Publications Research Service, Arlington, Va.
PROCEDURE FOR INTEGRATING EQUATIONS FOR ELEMENTS OF INTERMEDIATE SATELLITE ORBIT Abstract Only c13
N. V. Yemelyanov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 84-85 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 590-597 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

One of the most perfect models of intermediate motion of a satellite is the orbit of the generalized problem of two fixed centers which takes into account the second and third zonal harmonics in the expansion of planetary gravitational potential. However, until now the equations for the elements of such an intermediate orbit have been solved only in the first approximation and there has been no clearly defined scheme for their integration in subsequent approximations. Since for an intermediate orbit, taking the Earth's oblateness into account, the perturbing actor is 1,000 times less than for a Keplerian orbit, the solution is simpler. The coefficients of the equations for such an intermediate orbit and the perturbing function are represented in the form of expansions in powers of the Earth's oblateness and it is an unwieldy problem to write these expansions. Operations which must be performed are clarified. Expansion terms that must be taken into account in order to obtain perturbations of the elements of an intermediate orbit with accuracy are discussed. The problem is solved on the assumption that secular and short-period perturbations must be determined with an accuracy to the third power of the Earth's oblateness and long-period perturbations with an accuracy to the second power of oblateness. Author

N86-20189# Joint Publications Research Service, Arlington, Va.
OPTICAL RADIATION AND RADIO EMISSION ACCOMPANYING COSMIC GAMMA BURSTS Abstract Only c93
N. N. Vzorov, L. P. Gorbachev, A. Yu. Matronchik, and K. S. Mozgov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 85-86 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 6, Jun. 1985 p 444-447 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

In order to register cosmic gamma radiation with an energy > 10 GeV and fluxes 0.0000000001 quantum/square centimeters times s it is necessary to have greater areas of detectors than those now present on spacecraft. C. Castagnoli, et al., proposed that gamma quanta with energies 0.00001 GeV be registered on the basis of records of Cerenkov flares from relativistic electrons of extensive atmospheric showers caused in the Earth's upper atmosphere by primary gamma quanta using large solar antenna arrays at nighttime. With that proposal taken into account, the

authors have evaluated the intensity of the light flashes excited in the atmosphere by gamma bursts. Calculations are given showing that the maximum intensity of atmospheric glow in the band lambda = 3914 A will be I sub max = 0.000001 minus 0.001 erg/square centimeters times s. In the case of the powerful gamma burst of 5 March 1979 I sub max equals 2 times 0.000001 erg/square centimeters. It is concluded that light flashes of this intensity can be registered using the large solar antenna arrays which it is proposed to be used for measuring the Cerenkov radiation (with an intensity 0.0000001 erg/square centimeters times s) from high-energy gamma quanta. The intensity of the light gamma flashes excited in the atmosphere by gamma bursts (0.01 minus 10 MeV) in order of magnitude coincides with the intensity of the Cerenkov radiation excited by electron showers from gamma quanta (10 minus 0.001 GeV) so that these flares must be taken into account in the registry of high-energy gamma quanta. Since there is a common nature of the mechanism for generation of optical and radio signals, they can be used together in the registry of cosmic gamma bursts. Author

N86-20190# Joint Publications Research Service, Arlington, Va.
COMETARY ICE HALO AND TEMPERATURE OF INNER COMA Abstract Only c90
D. V. Bisikalo and V. S. Strelnitskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 86 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 6, Jun. 1985 p 475-480 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A study was made of the influence of an ice halo on the temperature of the inner coma of a comet for a comet of average brightness situated at a heliocentric distance 1 a.u. It is shown that the presence of a halo can greatly smooth the temperature minimum, increasing the minimum temperature by several times. A hydrodynamic model of the inner coma was computed with the following assumptions: There is a stationary spherically symmetric flow of gas and ice particles; the cometary nucleus, gas and ice particles consist only of H2O; the ice particles are accelerated by the gas, but the gas does not experience significant slowing in the process; at the nucleus surface the gas velocity is equal to the speed of sound so that the entire gas flow is supersonic; the gas is heated due to photodissociation of molecules by an unattenuated flux of solar radiation and as a result of the entry into it of thermal molecules evaporating from the surface of ice particles; the gas is cooled only due to expansion; the surface temperature of the nucleus and ice particles is determined by the balance between the processes of absorption of solar radiation, evaporation and thermal radiation and is stipulated as a constant parameter; the ice particles are spheres of an identical radius with an identical evaporation rate over the entire surface. It is demonstrated that cooling in the inner coma can be considered negligible at distances up to approximately 1,000 km from the nucleus. R.J.F.

N86-20191# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF SURFACE STRUCTURE OF CELESTIAL BODIES WITHOUT ATMOSPHERES ON POLARIZATION CHARACTERISTICS OF REFLECTED LIGHT Abstract Only c89
L. O. Kolokolova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 86 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 2, Apr. - Jun. 1985 p 165-173 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Observations of celestial bodies without atmospheres and laboratory experiments with terrestrial samples indicate that the plane polarization of the light scattered by them is sensitive to the composition and structure of the surface. The dependence of the degree of polarization P of scattered light on phase angle alpha is the most informative. With this taken into account, the author applied the geometrical optics approach in examining the scattering of light on spherical body covered by randomly scattered fissures. Single and double reflection and shadow effects are taken into account. It was found that the curve of the dependence of the degree of polarization on phase angle has a negative branch only when the angle between the surfaces is close to 90 deg. Surface structure was found to be the principal factor responsible for the depth and shape of the negative branch of polarization. Asteroids of different types differ substantially with respect to surface structure despite a quite similar nature of surface layer matter: the value of the complex refractive index of this matter is considerably greater than the corresponding value for surface layer matter of the Galilean satellites of Jupiter. Accordingly, any quantitative theory of light reflection by bodies without atmospheres must include parameters determining surface structure. R.J.F.

N86-20192# Joint Publications Research Service, Arlington, Va.
SIMULTANEOUS OBSERVATIONS OF LONGITUDINAL CURRENTS, STREAMS OF CHARGED PARTICLES AND IONOSPHERIC GLOW DURING POLAR SUBSTORM OF 30 DECEMBER 1981 BY ARTIFICIAL EARTH SATELLITE INTERCOSMOS-BOLGARIYA-1300 Abstract Only c43
L. N. Zhuzgov, Z. N. Zaytsev, A. K. Kuzmin, V. I. Lazarev, V. O. Papitashvili, V. G. Petrov, M. V. Teltsov, L. O. Tyurmina, V. A. Sharova, and S. I. Shkolnikova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 88 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 25, no. 2, Mar. - Apr. 1985 p 328-331 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A simultaneous study was made of longitudinal currents, streams of charged particles penetrating into the ionosphere and ionospheric glow at the time of the polar substorm of 30 December 1981 on the basis of the results of observations by the artificial Earth satellite Intercosmos-Bolgariya-1300 and their comparison with magnetic data from ground observatories situated in the auroral oval near the projection of the satellite orbit. The data were used in formulating a model of substorm development. It was found that there is a good consistency between the observed phenomena and existing models of development of a polar substorm. During the course of this substorm the auroral oval expanded in the evening sector MLT to approx 20 deg along the meridian and was displaced toward the equator to Phi' approx 55 degrees and the large-scale system of longitudinal currents became stratified, probably due to reciprocal penetration of the easterly and westerly electrojets. The electrical currents flowing from the ionosphere were caused by electrons with E = 1 to 3 keV leaking into the ionosphere. The observed inflowing electrical currents coincide with a decrease in the flux of electrons with E = 1 keV and cannot be generated by fluxes of leaking ions with E = 0.4 to 15 keV. In the region of auroral curvature, moving westward, satellite instruments registered discrete auroral arcs, an intensive longitudinal current with a density 0.00001 A/square meters, directed from the ionosphere, and intensive streams of leaking electrons with characteristic humped spectra and a maximum in the energy range 1 to 3 keV. Author

N86-20193# Joint Publications Research Service, Arlington, Va.
COMPARISON OF THREE SATELLITE MODELS OF MAIN GEOMAGNETIC FIELD Abstract Only c43
N. P. Benkova and G. I. Kolomiytseva *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 89 Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 25, no. 2, Mar. - Apr. 1985 p 343-345 Original language was announced in IAA as A85-32840 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The Cosmos-49 model is compared with the OGO and MAGSAT 6/80 models. The results indicate that, in order to obtain sufficiently reliable spherical harmonic coefficients, it is necessary that the data cover the entire (or almost the entire) globe. The fact that observations were made at different heights (Cosmos and MAGSAT at 300 to 500 km, OGO at 400 to 1500 km) did not have a significant influence on the three models. Thus, if the task of the model is an approximation of the main field along, it is fully admissible to use data from high-flying satellites. B.J. (IAA)

N86-20194# Joint Publications Research Service, Arlington, Va.
MEAN DENSITY OF METEOR STREAM INCIDENT ON EARTH Abstract Only c90
P. B. Babadzhanov, R. Sh. Bibarsov, V. S. Getman, and V. M. Kolmakov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 89-90 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 4, Oct. 1985 p 824-826 Original language document was announced in IAA as A86-14580 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The average density of the flux of meteoroid bodies falling onto the Earth is determined over a wide mass range (0.001 to 100 g) using comprehensive photographic and radar observational data covering a period from 1957 to date. The characteristics of the falling flux of meteoroids are determined using a simple method which eliminates the effect of most of the factors associated with the selectivity of instruments. The results obtained are in good agreement with those reported by Hughes (1972). V.L. (IAA)

N86-20195# Joint Publications Research Service, Arlington, Va.
ONE CASE OF DETERMINATION OF ELEMENTS OF INTERMEDIATE ORBIT Abstract Only c13
Ye. L. Lukashevich *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 90-91 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 308-310 Original language document was announced in IAA as A85-35245 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A procedure for determinining the elements of an intermediate orbit on the basis of rectangular geocentric equatorial coordinates and their derivatives is described. This procedure makes it possible to account for all perturbations due to the second zonal harmonic of the geopotential as well as for secular and partially periodic perturbations due to an arbitrary even zonal harmonic. B.J. (IAA)

N86-20196# Joint Publications Research Service, Arlington, Va.
ANALYTICAL EVALUATIONS OF ACCURACY IN DETERMINING AND PREDICTING PARAMETERS OF ARTIFICIAL EARTH SATELLITE MOTION USING ALTIMETER MEASUREMENT DATA Abstract Only c13
M. P. Nevolko and Ye. L. Mosin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 90-91 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 310-314 Original language document was announced in IAA as A85-35246 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The proposed analytical estimation procedure is based on the methods of Porfir'ev and Smirnov (1968) and Bychkov and Boginskii (1972). It is shown that the main contribution to the prediction error according to the radius vector as well as along the orbit is from variations of atmospheric density. B.J. (IAA)

N86-20197# Joint Publications Research Service, Arlington, Va.
DIRECTIVITY OF PROTON FLUX WITH E SUB p > 12 KeV IN LOW-LATITUDE TRANSITION REGION Abstract Only c46
K. Kudela, V. N. Lutsenko, N. F. Pisarenko, Y. Royko, and S. Fisher *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 92 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 317-319 Original language document was announced in IAA as A85-35248 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The Prognoz-8 satellite measured the directional and temporal characteristics of protons with energies exceeding 12 keV in the low-latitude transition region in the upper atmosphere. The distribution of the proton fluxes in this region was found to have the character of unidirectional and bidirectional beams along or antiparallel to magnetic field lines; the main direction of the flux is from the magnetopause to the transition region. Bidirectionality, observed at low absolute values of B over a large part of the spacecraft trajectory in passing through the transition region, is a characteristic feature of the proton fluxes. B.J. (IAA)

N86-20198# Joint Publications Research Service, Arlington, Va.
EVOLUTION OF ALMOST CIRCULAR ORBITS OF 12-HOUR ARTIFICIAL EARTH SATELLITES Abstract Only c13
M. A. Vashkovyak *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 93 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 3-15 Original language document was announced in IAA as A85-28483 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An analysis of the evolution of almost-circular orbits of satellites with a revolution period of about 12 hours and an inclination not exceeding 90 deg is presented. Approximate formulas are obtained for the secular and long-period perturbations of the orbital elements under the effect of lunar and solar attraction, optical radiation pressure, and the noncentrality of the terrestrial gravitational field. The quantitative and qualitative characteristics of orbital evolution which are obtained are confirmed by numerical-analytical calculations for a time period of about 1000 days. B.J. (IAA)

N86-20199# Joint Publications Research Service, Arlington, Va.
COMPARISON OF CONDITIONALLY PERIODIC SOLUTIONS WITH RESULTS OF NUMERICAL INTEGRATION IN PROBLEM OF TRANSLATIONAL-ROTATIONAL SATELLITE MOTION Abstract Only c13
A. A. Zlenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 93-94 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 16-25 Original language document was announced in IAA as A85-28484 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Consideration is given to the translational-rotational motion of an axisymmetric satellite in a circular equatorial orbit in the gravitational field of a homogeneous triaxial ellipsoid. Stationary and conditional-periodic (CP) motions of the satellite in the presence of double resonance are determined. The CP solutions are compared with results of the numerical integration of the exact equations of motion for a hypothetic synchronously rotating stationary satellite and a hypothetic nonsynchronously rotating 48-hour satellite. B.J. (IAA)

N86-20200# Joint Publications Research Service, Arlington, Va.
OBLIQUE REGULAR SATELLITE MOTIONS AND SOME FINE EFFECTS IN MOTION OF MOON AND PHOBOS Abstract Only c13
Yu. V. Barkin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 94-95 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 26-36 Original language document was announced in IAA as A85-28485 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The stationary motions of a satellite with an arbitrary dynamic structure in a central field are investigated. This problem is shown to admit solutions which corresponds to relative equilibrium points of the satellite which differ from (through they are close to) the Lagrangian equilibrium points. Specifically, oblique satellite positions in circular orbit are possible for which the principal central axes of inertia do not coincide with the axes of the orbital coordinate system, though they are close to these axes. The solutions obtained make it possible to explain the observed constant angular displacements of the inertia axes of the Moon and to predict analogus effects in the motion of Phobos as well as the constant dynamic displacements of the mass centers of these bodies. B.J. (IAA)

N86-20201# Joint Publications Research Service, Arlington, Va.
SYNTHESIS OF OPTIMUM TRAJECTORIES FOR ORBITAL INSERTION FROM ANY POINT OF WHICH DESCENT INTO ATMOSPHERE IS POSSIBLE WITH STIPULATED RESTRICTIONS Abstract Only c13
V. A. Ilin and A. S. Filatyev *In its* USSR Report: Space

(JPRS-USP-86-001) 13 Jan. 1986 p 95 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 37-48 Original language document was announced in IAA as A85-28486 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The paper examines the synthesis of optimal trajectories of orbital injection from any point of which the descent module can return to the atmosphere without violation of restrictions pertaining to dynamics and/or thermal loads. The problem is characterized by branching trajectories with an infinite number of branches in the inner points of which restrictions are imposed on the phase variables. The solution is obtained by the substitution of phase restrictions on the descent trajectory by equivalent restrictions on the thrust vector orientation in the current point of the injection trajectory. As an example, attention is given to the optimization of an injection trajectory from any point of which spacecraft descent is possible without a violation of the velocity-head restriction.
B.J. (IAA)

N86-20202# Joint Publications Research Service, Arlington, Va.
APPLICATION OF RELATIVISTIC THEORY TO PROBLEMS OF SPACE VEHICLE TRAJECTORY MEASUREMENTS Abstract Only **c13**
V. S. Chapiinskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 96 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 49-62 Original language document was announced in IAA as A85-28487 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Initial relationships for the coupling of electromagnetic-signal parameters in reference systems specified for spacecraft trajectory measurements are obtained. The main interpretive expressions for determining navigation functions are obtained which take into account relativistic transformations of signals in near-earth space with an accuracy sufficient for practical applications. It is shown that the use of the relationships obtained to determine navigation parameters on the basis of direct and sum-difference frequency-phase measurements makes it possible to preserve the instrumental accuracy of direct measurements. B.J. (IAA)

N86-20203# Joint Publications Research Service, Arlington, Va.
STABILITY OF DIAMAGNETIC PLASMOID IN MAGNETOSPHERE Abstract Only **c46**
S. V. Leontyev, V. B. Lyatskiy, and A. A. Khrushchinskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 96-97 Transl. into ENGLISH from Kowmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 100-105 Original language document was announced in IAA as A85-28491 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The test-particle method is used to investigate the stability of a diamagnetic cluster (DC) of hot particles in the magnetosphere, and the possibility of DC generation in regions connected with active processes during substorms is assessed. The boundaries of regions of particle capture by the cluster oscillating along magnetic field lines are calculated, and the capture region is found to expand with an increase in the magnetic disturbance produced by the cluster. In addition, it is shown that, in order to generate a stable DC in the magnetosphere, it is necessary to have an injection of sufficiently intense fluxes of accelerated particles causing a significant disturbance in the magnetic field. The energy density of accelerated ion fluxes reaches a value of 3 x 10 to the -8th erg/cu cm, which produces 1-nT disturbance in the magnetic field inside the cluster. B.J. (IAA)

N86-20204# Joint Publications Research Service, Arlington, Va.
ENERGY DISTRIBUTIONS OF PROTONS WITH 0.05 < OR = E < OR = 50 MeV IN EARTH'S RADIATION Abstract Only **c46**
M. I. Panasyuk and E. N. Sosnovets *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 97-98 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 106-112 Original language document was announced in IAA as A85-28492 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Molniya-2-satellite data on differential energy spectra of protons with an energy of 0.05-50 MeV in the radiation belts (RBs) are analyzed. The existence of two different mechanisms for the formation of a maximum in the spectra is indicated. In the outer RB, the formation of the maximum at energies of the order of 100 keV is due to loss mechanisms (charge transfer and Coulomb collisions) during proton transport toward the Earth. In the inner RB, the most probable mechanism of maximum formation at energies in the MeV range is a resonance mechanism connected with quasi-period fluctuations of the geomagnetic field. These fluctuations (along with the observed predominance of LF Pc3-Pc-4 waves in the magnetosphere) are the most likely cause of an increase in the diffusion coefficient of high-energy RB protons.
B.J. (IAA)

N86-20205# Joint Publications Research Service, Arlington, Va.
DYNAMICS AND PREDICTION OF RADIATION CHARACTERISTICS OF SOLAR COSMIC RAYS Abstract Only **c93**
V. V. Bengin, L. I. Miroshnichenko, and V. M. Petrov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 98 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 123-133 Original language document was announced in IAA as A85-28494 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A probabilistic method for the prediction of the radiation characteristics of solar cosmic rays (SRC) based on a priori information about the parameters of solar proton events (SPE) is proposed with reference to radiation-safety assurance for spacecraft flight crews and equipment. Particular consideration is given to: (1) the prediction algorithm; (2) choice and comparison of SPE models; (3) construction of distribution functions of various SPE parameters; (4) construction of a priori probability density function of SPE parameters; and (5) validation of the full scheme for the prediction of SPE dynamics. The effectiveness of the proposed method for the prediction of SCR flux dynamics is demonstrated, and attention is given to the possibility of improving the method by taking into account a priori information about the spectrum and physical limits of the parameters of SCR progation. B.J. (IAA)

N86-20206# Joint Publications Research Service, Arlington, Va.
INTERPLANETARY DISTURBANCE FROM FLARE TRIPLET IN MAY 1981 AS OBSERVED BY PROGNOZ-8 Abstract Only **c91**
G. N. Sastenker, N. L. Borodkova, K. G. Ivanov, and N. V. Mikerina *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 99 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 134-142 Original language document was announced in IAA as A85-28496 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Prognoz-8-satellite data are used to investigate an interplanetary disturbance from a series of three intense solar flares which arose in an active region near the helioprojection of the Earth in May 1981. Please and magnetic measurements showed that the disturbance was characterized by a complete absence of intense fast shock waves, a very high particle concentration, and an equality of temperatures of protons and alpha particles. These features confirm the hypothesis of the intense attenuation of shock waves from series flares due to their interaction with each other and with flare ejections long before arrival at the Earth.
B.J. (IAA)

N86-20207# Joint Publications Research Service, Arlington, Va.
O+-He AND H+-He MEAN COLLISION FREQUENCIES FOR IONOSPHERIC RESEARCH Abstract Only **c46**
A. V. Pavlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 99-100 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985

p 143-147 Original language document was announced in IAA as A85-28496 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The model of polarizational dipole interaction is commonly used in ionospheric physics to calculate mean collision frequencies with momentum transfer nu(in) for nonresonant interactions of ions with neutral particles. It is know that, for planetary ionospheres, nu(in) values for O(+)-He and (+)-He interactions should be calculated in the approximation of the more real potential (12, 6, 4). An approximation of reduced collision integrals included in nu(in) is proposed for typical atmospheric values of reduced temperatures. This makes it possible to obtain an analytical expression for nu(in). Compared with the more precise values of nu(in) in the approximation of the potential (12, 6, 4), the use of commonly accepted expressions for nu(in) leads to errors in upper-atmospheric conditions: 8-23 percent for H(+)-He and 20-50 percent for O(+)-He. The results are of significance for the modeling of the Venus ionosphere. B.J. (IAA)

N86-20208# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF INTERACTION BETWEEN SOLAR WIND AND COMETARY PLASMA Abstract Only c92
A. S. Lipatov *In its* USSR Report: Space (JPRS-USP-86-0010 13 Jan. 1986 p 100 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 158-166 Original language document was announced in IAA as A85-28498 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The collisionless particle-in-cell technique is used to study the interaction of the solar wind with heavy cometary ions and the related magnetic-field dynamics. An analysis is made of the parameters of the solar-wind stagnation zone. The structure of the external shock wave and transition region, and the configuration of the induced magnetosphere. It is concluded that the passage of a solar-wind stream through a near-cometary region produces an entrainment of the ionized component of the comet, leading to the formation of a stream of the ionized component of the comet, leading to the formation of a stream of cometary ions with a characteristic temperature that is significantly greater than the temperature transverse to the magnetic field as well as the proton stagnation temperature. The comet is specifically characterized by the presence of energetic ions at the shock front. Therefore the thickness of the shock front and the structure of the transition region have a characteristic scale that is determined by the Larmor radius of the heavy ion. B.J. (IAA)

N86-20209# Joint Publications Research Service, Arlington, Va.
USE OF DIFFERENTIAL VERY LONG BASELINE RADIOINTERFEROMETRY IN ASTRONAVIGATION Abstract Only c17
L. R. Kogan, L. I. Matveyenko, and V. I. Kostenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 101 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 167-174 Original language document was announced in IAA as A85-28499 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

It is shown that differential VLBI can determine the coordinates of spacecraft with high accuracy. The accuracy with which the relative coordinates of spacecraft can be determined can be reduced to fractions of a milli-arcsec. A quasar or a spacecraft can be used as the reference source. The accuracy of absolute measurements of spacecraft coordinates (with allowance for quasar-coordinate errors) can be of the order of 10 milli-arcsec. Absolute measurements of the coordinates of the Giotto spacecraft in the Comet Halley mission are considered as an example. B.J. (IAA)

N86-20210# Joint Publications Research Service, Arlington, Va.
NUMERICAL INVESTIGATIONS OF RESONANCE INEQUALITIES OF LOW ORBIT ARTIFICIAL EARTH SATELLITES Abstract Only c13
V. L. Travin and S. N. Yashkin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 102 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 53-57 Original language document was announced in IAA as A85-19996 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The sharp-resonance region of satellites with different inclinations, eccentricities, and commensurabilities is analyzed with reference to the solution of space-geodesy problems. As an example, the width of the libration zone is determined for the principal commensurabilities for an inclination of 60 deg and an eccentricity of 0.01. This width is shown to to significantly dependent on the inclination; this dependence increases substantially as the orbit comes closer to the Earth; for almost circular orbits, the width of the libration zone is only several meters. B.J. (IAA)

N86-20211# Joint Publications Research Service, Arlington, Va.
DETERMINING SATELLITE ORBIT FROM TWO VELOCITY VECTORS Abstract Only c13
I. V. Onkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 102-103 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 57-61 Original language document was announced in IAA as A85-19997 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method is proposed for determining the Keplerian orbit of an artificial satellite of the Earth or of a planet according to two velocity vectors given at known moments of time. The method relies on a Newtonian orbit-parameter iteration procedure. A numerical example is presented for an Earth satellite with the following orbital elements: a = 6700 km, e = 0.01, i = 1 rad, Omega = 0 deg, omega = 0 deg, and M(0) = 0 deg. It is concluded that the proposed algorithm is sufficiently simple and that the convergence speed of the iterative procedure is high. B.J. (IAA)

N86-20212# Joint Publications Research Service, Arlington, Va.
USE OF DOPPLER EFFECT IN DETERMINING ANGULAR COORDINATES OF ARTIFICIAL EARTH SATELLITE Abstract Only c13
R. Durdyyev and A. Ibrayimov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 103 Transl. into ENGLISH from Izvestiya Akademii nauk Turkmenskoy SSR: Seriya Fiziko-Tekhnicheskikh, Khimicheskikh i Geologicheskikh Nauk (Ashkhabad, USSR), no. 2, Mar. - Apr. 1985 p 31-35 Original language document was announced in IAA as A85-10644 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The paper describes a technique of using the Doppler effect to determine satellite angular coordinates in ionospheric sounding studies. The proposed approach can also be used to predict the time of entry of a satellite into the radio-visibility zone. B.J. (IAA)

N86-20213# Joint Publications Research Service, Arlington, Va.
MODELING CHARGED PARTICLE FLUXES ALONG SPACE VEHICLE FLIGHT TRAJECTORIES IN EARTH'S RADIATION BELTS Abstract Only c46
O. I. Savun and B. Yu. Yushkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 104 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta, Seriya 3: Fizika, Astronomiya (Moscow, USSR), v. 26, no. 1, Jan. - Feb. 1985 p 3-8 Original language document was announced in IAA as A85-36596 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method has been developed to calculate the energies of electrons and protons along the trajectories of spacecraft in the Van Allen radiation belts. Variations due to the phases of the solar cycle were taken into account. The obtained energies were in the ranges 0.1 to 400 MeV for protons; and 40 keV to 4 MeV for electrons. Numerical integrations of the particle energy spectra for a 24-hour period were used to estimate the amount of radiation absorbed by various shielding materials during one orbit.

Numerical results are also presented for electron energies at altitudes lower than the radiation belts. I.H. (IAA)

N86-20214# Joint Publications Research Service, Arlington, Va.
INTERPRETATION OF NONPOLAR LATITUDE VARIATIONS Abstract Only c89
A. A. Korsun *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 105 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 78-80 Original language document was announced in IAA as A85-48687 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The nonpolar variation in the latitude of the Earth (z-term variation) due to nontidal deformations of the geoid is calculated. It is shown that the z-term estimates are free of error due to stellar declination and proper motion. The contribution of individual harmonics to the mean z-term fluctuations is assessed. I.H. (IAA)

N86-20215# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF PARAMETRIC APPROACH TO STUDY ON PREFLARE PHENOMENA IN SOLAR PLASMA BY ANALYSIS OF SOLAR RADIO EMISSION FLUCTUATIONS Abstract Only c92
Ye. A. Averyanikhina, M. M. Kobrin, and I. Ya. Orlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 105-106 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 1, Jan. 1985 p 3-10 Original language document was announced in IAA as A85-26726 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Since one of the most important problems in studies of the physics of active regions on the Sun is an investigation of preflare processes in solar plasma, the authors examined some additional possibilities for obtaining information on processes in active regions by regarding them as plasma parametric systems. An analysis was made of fluctuations of preflare solar radio emission, including the nature of changes in amplitudes, energy spectra and probability distribution functions. Data were used on integral solar radio emission at a frequency of 755 MHz made at the Radioastrophysical Observatory, Latvian Academy of Sciences, using the RT-10 radio telescope from June through August 1979 to 1980, a period of the solar maximum. About 40 observations were selected, during which 12 powerful radiobursts associated with proton flares were observed. The pertinent parameters were analyzed before and after flares. A comparison of the results of observation of these fluctuations and the results of modeling indicated a modulation-multiplicative nature of the interaction between noise radiation and quasiperiodic processes on the Sun. It is concluded that the agreement of the dynamic effects of the probability density function obtained from the results of observations in the preflare period and the results of analog and mathematical modeling, as well as comparison of experimental studies of parametric systems, give a sound basis for regarding solar activity processes as processes in a parametric system. This finding will be useful in physical interpretation of preflare phenomena and in predicting solar activity. Author

N86-20216# Joint Publications Research Service, Arlington, Va.
EVALUATIONS OF EXTERNAL VALUES OF INTEGRAL PROTON FLUXES IN FLARES IN PLANNING OF SPACE FLIGHTS Abstract Only c92
A. Kolomenskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 106 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 315-316 Original language document was announced in IAA as A85-35247 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method for estimating extremum values of proton fluxes in solar flares is developed with preference to space-experiment planning and the protection of spacecraft radar equipment from flare particles. An analytical expression is derived for the dependence of the probability of occurrence of intense flares on the flight duration. Maximum integral proton fluxes for flight durations of one and two years are estimated. B.J. (IAA)

N86-20217# Joint Publications Research Service, Arlington, Va.
INTERVIEW WITH KOVTUNENKO, VEGA PROJECT HEAD c12
M. Rebrov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 107-113 Transl. into ENGLISH from Krasnaya Zvedzda (Moscow, USSR), 20 Jul. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An interview with V. Kovtunenko, head of the U.S.S.R. Vega project, is given. International cooperation, space probe meteoroid protection, weight reduction, and scientific objectives of the mission to Halley's comet are discussed. R.J.F.

N86-20218# Joint Publications Research Service, Arlington, Va.
RESULTS ON INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 Abstract Only c12
V. I. Moroz, V. M. Linkin, and D. Ertel *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 114-115 Transl. into ENGLISH from Uspekhi Fizicheskikh Nauk (Moscow, USSR), v. 146, no. 2, Jun. 1985 p 346-348 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

During the period October to December 1983 about 1,500 IR spectra of Venus were transmitted from the artificial satellites, Venera-15 and Venera-16. The spectra were registered in the range 250 to 1600 0.01 cm. The field of view (about 4 deg) made it possible to discriminate sectors with a dimension of about 60 km (near orbital pericenter) on the planet. These measurements of outgoing thermal radiation of Venus with a satellite-borne spectral instrument were made for the first time and took in latitudes from -66 to 87 deg. The most conspicuous detail in the spectra is the CO2 absorption band 667 0.01 cm (15 microns). The profile of the band 15 m was used in retrieving the dependence of temperature on altitude from approximately 60 to 90 km. The full profile of the 15 micron band was observed for the first time in the Venusian spectrum. The lines of the H2O rotational band were also registered for the first time in the thermal emission spectrum of Venus. Sulfuric acid bands can also be identified. Within the 15 micron band different parts of the spectrum are formed at different altitudes. By solving the inverse radiative transfer problem, the atmospheric temperature profile can be retrieved from each spectrum. R.J.F.

N86-20219# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 1: METHODS AND FIRST RESULTS Abstract Only c43
D. Oertel, V. I. Moroz, I. Nopirakovskiy, V. M. Linkin, H. Jahn, R. S. Kremnev, H. Becker-Ross, W. Stadthaus, V. V. Kerzhanovich, I. A. Matsygorin et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 115 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 191-205 Original language document was announced in IAA as A85-35235 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Infrared Fourier spectrometers on Venera 15 and 16 obtained spectra of Venus in the 250 to 1600/cm range (40 to 6 microns) with a resolution of approximately 5/cm. The measurements were made primarily along paths situated in the Northern Hemisphere at latitudes not below 20 deg. The design of the instrument is described along with its characteristics and the program of operations in orbit. Sample spectra and brightness-temperature profiles along the measurement path are presented, and some of their characteristics are noted, including the different character of the spectra in polar and medium latitudes, the presence of hot spots, and the absence of thermal asymmetry. B.J. (IAA)

N86-20220# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16

AUTOMATIC INTERPLANETARY STATIONS. 2: PRELIMINARY RESULTS OF TEMPERATURE PROFILE RETRIEVAL Abstract Only **c43**

D. Spankuch, L. V. Zasova, K. Schafer, Ye. A. Ustinov, Yu. Gyuldner, V. I. Moroz, W. Dohler, V. M. Linkin, R. Dyubua, A. V. Dyachkov et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 116 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 206-220 Original language document was announced in IAA as A85-35236 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Thermal-emission spectra of Venus obtained by Venera 15 and 16 were used to determine the temperature profile in the Venus atmosphere at heights of 60 to 95 km. The obtained profiles show that the temperature decreases monotonically with increasing height inside the latitude zone of +, -60 deg. At higher latitude the atmosphere is warmer, and inversion or isothermal conditions are observed at a level of 10 to 100 mbar. Diurnal variations of temperature were not observed B.J. (IAA)

N86-20221# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 3: SOME CONCLUSIONS ON CLOUD STRUCTURE BASED ON ANALYSIS OF SPECTRA Abstract Only **c43**

L. V. Zasova, D. Spankuch, V. I. Moroz, K. Schafer, Ye. A. Ustinov, W. Dohler, V. M. Linkin, D. Oertel, A. V. Dyachkov, H. Becker-Ross et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 117 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 221-235 Original language document was announced in IAA as A85-35237 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Venera 15 and 16 spectra of different latitude zones of Venus in the 250 to 1650/cm range are analyzed. It is shown that differences in the spectra of different zones can be partly explained by differences in the structure of the cloud layer. At low latitudes (phi less than 60 deg) the cloud layer is sparse, and diurnal variations are not observed. At latitudes of 65 to 78 deg, a longitudinally extended but open region of elevated particle concentration exists. The upper cloud boundary in the hot-spot region (phi = 78 to 82 deg) is located lower than in other parts of the planet. B.J. (IAA)

N86-20222# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 4: PRELIMINARY RESULTS OF ANALYSIS OF SPECTRA IN REGION OF H2O AND SO2 ABSORPTION BANDS Abstract Only **c43**

V. I. Moroz, W. Dohler, Ye. A. Ustinov, K. Schafer, L. V. Zasova, D. Spankuch, A. V. Dyachkov, R. Dyubua, V. M. Linkin, D. Oertel et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 118 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 236-247 Original language document was announced in IAA as A85-35238 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A large group of absorption features belonging to the rotational band is identified along with the fundamental rotational-vibrational band nu2 of H2O. Two SO2 absorption bands are identified: nu2 at 519/cm and nu3 at 1360/cm. Preliminary estimates show that the H2O mixture ratio is 30 ppm at a height of 85 km, and that the SO2 mixture ratio is 2 ppm at 66 km. Both quantities (obtained from spectra determined at medium latitudes on October 14, 1983) were determined with an accuracy up to a factor of approximately 3. B.J. (IAA)

N86-20223# Joint Publications Research Service, Arlington, Va.
INFRARED EXPERIMENT ON VENERA-15 AND VENERA-16 AUTOMATIC INTERPLANETARY STATIONS. 5: PRELIMINARY RESULTS OF ANALYSIS OF BRIGHTNESS TEMPERATURE AND HEAT FLOW FIELDS Abstract Only **c43**

V. M. Linkin, K. Schafer, I. A. Matsygorin, W. Dohler, V. I. Morozn, R. Dyubua, A. V. Dyachkov, D. Spankuch, V. V. Kerzhanovich, D. Oertel et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 118-119 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 248-258 Original language document was announced in IAA as A85-35239 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Venera-15 infrared data were represented in the following ways: latitude dependence of brightness temperature for selected wave numbers; dependence of brightness temperature on date and solar time for selected latitudes; and analogous dependences for the spectrum (flux) integral. A preliminary analysis shows the existence of three characteristic regions in the Northern Hemisphere of Venus: low latitudes (40 to 60 deg) where the brightness temperatures and fluxes are constant; a cold zone (60 to 75 deg), with large variations; and a warm polar cap (phi greater than 75 deg). It is shown that thermal asymmetry is absent at latitudes below 60 deg, that hot spots may occur in pairs, and that the cold zone does not rotate together with the atmosphere. B.J. (IAA)

N86-20224# Joint Publications Research Service, Arlington, Va.
VENUSIAN INFRARED RADIATION: APPROXIMATE METHODS FOR COMPUTING SPECTRUM IN ABSORPTION BANDS OF ATMOSPHERIC GASES Abstract Only **c91**

V. I. Moroz and L. V. Zasova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 119-120 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 259-267 Original language document was announced in IAA as A85-35240 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Approximate methods for calculating synthetic spectra in the H2O, CO2, and SO2 absorption bands are described which are used for a quantitative interpretation (chemical analysis and determination of cloud-layer parameters) of results of the Venera 15 and 16 infrared experiment. A simplified version of the line-by-line method is used for H2O; an equidistant-line method is used for CO2; and the overlapping-line method is used for CO2; and the overlapping-line method is used for SO2. B.J. (IAA)

N86-20225# Joint Publications Research Service, Arlington, Va.
VENUSIAN IMPACT CRATERS ON RADAR IMAGES OF VENERA-15 AND VENERA-16 SPACECRAFT Abstract Only **c91**

A. T. Bazilevskiy, B. A. Ivanov, V. P. Kryuchkov, R. O. Kuzmin, A. A. Pronin, and I. M. Chernaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 120-121 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 671-674 Original language document was announced in IAA as A85-39150 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Venera-15 and Venera-16 radar image data are presented and discussed. It is found that the morphology and formation mechanisms of Venusian impact craters do not differ greatly from those on planets whose surface conditions are drastically different from those of Venus. It is suggested that the higher temperature of target rocks on Venus leads to the formation of quantities of impact vapor and melt per unit of impactor energy that are greater than those for other terrestrial planets. B.J. (IAA)

N86-20226# Joint Publications Research Service, Arlington, Va.
VENUSIAN EXOGENOUS PROCESSES AND SURFACE ROUGHNESS DETERMINED FROM RADAR OBSERVATIONS Abstract Only **c91**

V. P. Kryuchkov and A. A. Pronin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 121 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 268-275 Original language document was announced in IAA as A85-35241 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Earth-based and Pioneer-Venus radar observations of the

Venus surface were used to analyze the two-scale (centimeter and meter-decameter) roughness distribution at different hypsometric levels. The distribution of roughness classes with change in height is compared with the character of the hypsometric curve, which made it possible to identify the height zonality of roughness. These zones are characterized from the viewpoint of exogenetic processes on the basis of a comparison of geological situations at the landing sites of the Venera 9, 10, 13, and 14 with the degree of roughness in these areas. B.J. (IAA)

N86-20227# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF ERRORS IN RESULTS OF RADIO PROBING OF DAYTIME VENUSIAN IONOSPHERE CAUSED BY ITS ASPHERICITY Abstract Only c91
A. L. Gavrik and L. N. Samoznayev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 122 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 148-157 Original language document was announced in IAA as A85-28497 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Errors in the determination of electron density due to the use of the spherically symmetric approximation are evaluated on the basis of a model of the daytime Venusian ionosphere based on data of two-frequency radio occultation by the Venera-9, 10 probes. It is shown that the error in the determination of electron density profiles N(h) due to asymmetry did not have a significant influence on the radio-occultation results. In addition, the error due to radial variations of the solar zenith angle in the ionosphere had practically no effect on the determination of electron density distribution in the regions of the principal and lower ionization maxima. It is shown, however, that variations of ionopause height with solar zenith angle can lead in a number of cases to significant errors in the determination of the vertical extent of the daytime ionosphere and the height scales of electron density distribution in the upper ionosphere in the framework of the spherically symmetric approximation. B.J. (IAA)

N86-20228# Joint Publications Research Service, Arlington, Va.
PRINCIPAL TYPES OF STRUCTURES IN VENUSIAN NORTHERN HEMISPHERE Abstract Only c91
V. L. Barsukov, A. T. Bazilevskiy, R. O. Kuzmin, M. S. Markov, V. P. Kryuchkov, O. V. Nikolayeva, A. A. Pronin, A. L. Sukhanov, I. M. Chernaya, G. A. Burba et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 122-123 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 3-14 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Mapping of the Venusian Northern Hemisphere has made it possible to draw a whole series of important conclusions concerning the planet. There is no evidence of activity of liquid water. If a hydrosphere ever existed, it disappeared much more than a billion years ago. At the survey scale it is impossible to detect evidence of eolian erosion or redeposition. If the planet ever rotated more rapidly and stronger winds prevailed, this much have been over a billion years ago. Due to the weakness of exogenous reworking, in the Venusian relief there is a clear expression of deep dislocations corresponding in age to the Proterozoic complex on the Earth (on the Earth only observed t considerable depths). Tectonic dislocations of three types predominate on Venus: concentric annular voids, zones of linear folded-faulted dislocations and parquette dislocations. The latter constitute a phenomenon caused by a high temperature at the planetary surface, as a result of which large plates of the thin crust move along a plastic substrate or are entrained by it and are rumpled, hummocked and dilatated. Venus is not a single-plate planet, like the Moon or Mercury; its crust is distinctly broken into individual blocks with independent movements. It appears that extensive basaltic volcanism is a universal factor in evolution of planets of the Earth type. The rarity of impact craters in the ancient relief indicates that they disappear rather rapidly due to a number of possible mechanisms. Author

N86-20229# Joint Publications Research Service, Arlington, Va.
RADIATIVE HEAT TRANSFER AND WATER CONTENT IN VENUSIAN ATMOSPHERE Abstract Only c91
M. Ya. Marov, A. P. Galtsev, and V. P. Shari *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 123-124 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 15-41 Original language document was announced in IAA as A86-11963 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Procedures for calculating the optical characteristics of the mean components and effective fluxes of the atmosphere of Venus are presented, and some theoretical results are compared with the available experimental data and other atmospheric optics models. Attention is given to the problem of correctly estimating the absorption spectra of the main gaseous components (CO_2, H_2O, and SO_2) at their respective temperatures, pressures, and abundances. It is shown that the conditions of thermal equilibrium in the undercloud atmosphere of Venus correspond to a water vapor abundance of about 0.0001. Some possible sources of error in the theoretical calculations are discussed. I.H. (IAA)

N86-20230# Joint Publications Research Service, Arlington, Va.
MODEL OF COMPOSITION OF MARTIAN IONOSPHERE IN PHOTOCHEMICAL EQUILIBRIUM REGION Abstract Only c91
A. V. Pavlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 124 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 276-282 Original language document was announced in IAA as A85-35242 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A model is developed for the composition of the daytime Martian ionosphere at heights of 110-220 km, comprising zones of $O_2(+)$, $CO_2(+)$, $O(+)$, $H(+)$, $He(+)$, $NO(+)$, $C(+)$, $N(+)$, $CO(+)$, $N_2(+)$, $CO_2H(+)$, $COH(+)$, $OH(+)$, and electrons. Calculation results agree well with Viking-1 measurements of ion concentration. A group of $O(+)$, $O_2(+)$, $CO_2(+)$, $CO(+)$, and $C(+)$ ions is identified whose concentrations does not depend (within an error or 20 percent) on the concentration of other kinds of ions. Analytical expressions are obtained for ion concentration and electron density. The relative error of calculations of the electron density (due to errors in measuring the model input data) mounts to 18 to 25 percent. B.J. (IAA)

N86-20231# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ANALYSIS OF VOLCANIC EFFECT ON CLIMATE OF EARTH AND MARS Abstract Only c91
K. Ya. Kondratyev, N. I. Moskalenko, S. N. Parzhin, and S. Ya. Skvortsova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 125 Transl. into ENGLISH from Izvestiya Akademii Nauk SSR: Fizika Atmosfery i Okeana (Moscow, USSR), v. 21, no. 5, May 1985 p 451-459 Original language document was announced in IAA as A85-40637 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A comparative analysis of recent planetological data was carried out to determine the specific effects of gaseous atmospheric components on planetary climates, with emphasis given to the effect of volcanic aerosol cloud formation on the greenhouse effect. In connection with sporadic variations in the intensity of volcanic activity on Earth and Mars, a temporal modulation with warm and cold periods was found. It is shown that SO_2 and volcanic aerosols have had significant influence on the formation of climate during the early stages of the evolution of Earth and Mars. I.H. (IAA)

N86-20232# Joint Publications Research Service, Arlington, Va.
GLOBAL RESONANCE OF JOVIAN RADIATION BELTS Abstract Only c91
P. A. Bespalov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 126 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 72-77 Original language document was announced in IAA as A85-48686 (For primary document see N86-20178 10-88)

Avail: NTIS HC A03

The oscillation regimes of cyclotron stability in the Jovian radiation belts are analyzed. It is shown that the eigenfrequencies of oscillations in the outer magnetosphere of Jupiter are independent of the magnetic shell L and coincide with the angular rotational velocity. The theoretical results are used to explain Pioneer observations of 10-hour modulation in the energetic electron flux of Jupiter. I.H. (IAA)

N86-20233# Joint Publications Research Service, Arlington, Va.
PRELIMINARY RESULTS OF DETERMINATIONS OF PHYSICAL PROPERTIES OF MICROFRAGMENTS OF LUNAR ROCKS FROM SOIL RETURNED BY LUNA-16 AND LUNA-20 STATIONS Abstract Only **c91**
G. I. Gorbunov, R. V. Medvedev, and V. V. Chashnikov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 126-127 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 3, Jul. 1985 p 601-604 Original language document was announced in IAA as A85-48686 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A number of Luna vehicles returned with samples of lunar soil (basalts, anorthosites, breccias, slags, glass). Special methods were required for working with microfragments measuring a fraction of a millimeter. The tested particles were selected in the Comparatice Planetology Laboratory, Geochemical and Analytical Chemistry Institute. They include: two samples of melanoratic basalts, two samples of anorthositic gray rock, breccia, four types of glass from mare and continental regions, one light-colored breccia, one dark gray porous slag particle, three grains of rock-forming minerals (pyroxene with numerous inclusions, light-yellow olivine of irregular configuration and a transparent grain of plagioclase. The following parameters were determined: density, longitudinal elastic modulus, heat capacity, compressive strength, Young modulus. All these determinations are tabulated. The results of these tests of microsamples of lunar rocks agree with determinations made in the United States with macrosamples and also with averaged indices of properties for similar terrestrial rocks. The collected data can be useful for interpreting lunar geophysical data. Author

N86-20234# Joint Publications Research Service, Arlington, Va.
POLARIMETRIC STUDIES OF MOON AND PLANETS AT ABASTUMANI ASTROPHYSICAL OBSERVATORY Abstract Only **c91**
V. P. Dzhapiashvili, O. R. Bolvadze, O. I. Kvaratskheliya, A. N. Korol, and L. A. Sigua *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 127-128 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 77-85 Original language document was announced in IAA as A86-11967 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Abastumani Observatory has long been noted for polarimetric investigations of celestial bodies. Such observations are made using the 40-cm F/17 Zeiss refractor which is free of instrumental polarization. A significant series of lunar brightness images was obtained and these were used in publishing an atlas containing 21 such lunar maps for different phase angles. A detailed study was made of more than a hundred different features on the Moon, with particular attention being devoted to the accuracy in measuring maximum and minimum polarization and the inversion angle in different parts of the spectrum. Exotic phenomena were discovered on the Moon, especially near Aristarchus Crater, where high degrees of polarization of several small surface sectors were repeatedly measured. Polarimetric observations at the observatory have been made since 1967. Observations were made on 170 nights and more than 10,000 individual measurements were made. This made possible a clear visualization of the quantitative picture of the distribution of polarization over the apparent disk and the nature of its change over a long time interval. R.J.F.

N86-20235# Joint Publications Research Service, Arlington, Va.
CHANGE IN ANGULAR POSITION OF SPACECRAFT BY SYSTEM OF FLYWHEEL MOTORS WITH NONZERO INITIAL KINETIC MOMENT Abstract Only **c18**
K. B. Alekseyev and O. V. Zlodyreva *In its* USSR Report: Space (JPRS-USP-86-0010 13 Jan. 1986 p 129 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 3, May - Jun. 1985 p 2-7 Original language document was announced in IAA as A85-44809 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An analytical solution is presented for the problem of controlling the spatial reorientation of a spacecraft by executing a single two-dimensional turn with the aid of a system of flywheels having nonzero initial kinetic moments. Algorithms are obtained which make it possible to determine a program of change in the control stresses at the flywheel drives that is optimum with respect to the time of response, with certain natural constraints taken into account. V.L. (IAA)

N86-20236# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF AERODYNAMIC MOMENT ON GRAVITATIONAL ORIENTATION REGIME FOR SALYUT-6, SOYUZ COMPLEX Abstract Only **c18**
V. A. Sarychev and V. V. Sazonov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 130 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 63-83 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Within the framework of a simple mechanical model a study was made of the motion of the Salyut-6 - Soyuz orbital complex relative to its center of mass in a uniaxial gravitational orientation regime. The satellite is assumed to be a solid body having the configuration of a cylinder to which are attached three plates, solar cells. The orbit of the satellite center of mass in absolute space is considered circular. The effect of gravitational and restoring aerodynamic moments on the satellite is taken into account. The satellite equations of motion allow the natural introduction of a small parameter: the ratio of the longitudinal moment of inertia to the transverse moment of inertia. The Krylov-Bogolyubov method is used in constructing formal two-parameter integral surfaces of these equations describing oscillations and rotations of the satellite about the longitudinal axis directed approximately along the local vertical. Such satellite motions can be regarded as nominal unperturbed motions in a gravitational orientation regime. A numerical investigation of these integral surfaces was carried out. The resonances between satellite motion about its longitudinal axis and oscillations of this axis relative to the local vertical considerably intensify the influence exerted on the satellite by the nonpotential component of the aerodynamic moment. Examples are given in which such intensification results in strong oscillation of the Satellite and disruption of the gravitational orientation regime. R.J.F.

N86-20237# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF PLANETARY ROVER MOVEMENT Abstract Only **c37**
Ye. I. Grigoryev and S. N. Yermakov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 130-131 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 92-99 Original language document was announced in IAA as A85-25334 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A planet roving vehicle rolls down a landing ramp from the descent vehicle onto a planet surface. The motion of the planet rover during rollout is described mathematically, with the following assumptions. The rover consists of a absolutely solid frame, motor and wheels which have inertial mass and are coupled by individual torsional suspensions with longitudinal rocking of the support arms. Each wheel is elastically deformable in three mutually perpendicular directions at the point of contact. The elements of the disembarka-

tion platform ramp are absolutely rigid and the planet's soil is elasto-plastic. The analysis specifies the conditions for the contact of the wheels and the planet surface. The purely theoretical analysis provides equations for the kinetics of vehicle motion during rollout. Author

N86-20238# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL-GEOMORPHOLOGICAL INTERPRETATION OF PHOTO IMAGE PATTERNS IN SPACE PHOTOGRAPHS FOR WESTERN PART OF FERGANA VALLEY AND ITS MOUNTAINOUS FRAMEWORK Abstract Only c43
D. Magzumova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 135 Transl. into ENGLISH from Uzbekskiy Geologicheskiy Zhurnal (Tashkent, USSR), no. 4, Jul. - Aug. 1985 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A detailed analysis of photo image patterns was carried out using multizonal photographs at 1:1,000,000 obtained from the LANDSAT satellite in four spectral ranges in the western part of the Fergana valley and the mountains surrounding it. With respect to geomorphological analysis of the patterns, the most informative photographs were obtained in the spectral zone 0.8-1.1 microns. The territory was represented by three major geomorphological types: mountainous uplifts, made up primarily of Plaeozoic deposits; adyr (desert plains without sands but with soft ground); and foothills consisting of Neogene and Lower- and Middle Quaternary deposits. On the basis of the photo image pattern it is possible to differentiate strongly, moderately and weakly dissected, undulating and flat surfaces. Flat and slightly undulating surfaces are interpreted on the basis of a geometrical or spotty pattern of cultivated landscapes; moderately dissected surfaces are discriminated on the basis of a jetlike pattern; well-dissected surfaces are discriminated from patterns form by adyr relief forms. Comparison of the interpreted photographs with Meteor photographs at 1:2,500,00 indicated that the latter reflect the nature of surface macrodissection. Their patterns are caused by relief megaforms associated with large geological structures. These photographs, at a larger scale, corresponded to the largest geomorphological regions. The photographs at 1,000,000, on the other hand, reflected lower-order structures. R.J.F.

N86-20239# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF COLOR COORDINATES OF SOME SOILS ACCORDING TO AIRCRAFT MEASUREMENT DATA Abstract Only c43
K. Ya. Kondratyev, V. V. Kozoderov, P. P. Fedchenko, S. M. Somova, and L. B. Karvovskaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 137-138 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 29-40 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method for measuring the humus content in agricultural soils is described. In this method an aircraft carries a spectrometer used in measuring the spectral brightness coefficients (SBC) in the visible wavelength region which are then used in computing color coordinates quantitatively characterizing the humus content. Then the quantity of humus in soils is computed using a preconstructed calibration curve. Three types of soils were involved in this study: soddy-podzolic, gray forest and chernozem, located in a number of oblasts. Observations were made along measurement lines situated approximately 50 km apart for which SBC measurements were made. The spectral reflection curves were used in computing the color coordinates and determining the humus content at the measurement points. Observations were made from an AN-2 aircraft from a mean altitude of 100 m; measurements were made at a solar altitude greater than 40 deg. Photometric measurements of all the investigatated soils were made twice (1973 and 1981). The analyzed data revealed that aircraft spectrophotometric measurements can be used successfully in studying the dynamics of soil humus content. However, the method is suitable only for chernozems and possibly gray forest soils. Author

N86-20240# Joint Publications Research Service, Arlington, Va.
EXPERIENCE IN MAPPING EARTH ON BASIS OF SPACE PHOTOINFORMATION Abstract Only c43
L. N. Kuleshov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 138 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 41-44 Original language document was announced in IAA as A85-37117 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The use of photographic images obtained in space to compile large scale (1:500,000) thematic maps of agricultural land in the Kalmyk territory of the USSR is evaluated. It is shown that the information content of space images may vary according to the type of map being compiled: for maps of the topographical features and uses of agricultural land, 70 percent of the data extracted from space images was useful; for maps of soil types, only 40 percent of the photographic information data was useful. I.H. (IAA)

N86-20241# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL INFORMATION CONTENT OF MULTIZONAL PHOTOGRAPHS Abstract Only c43
N. A. Yakovlev and S. G. Slutskaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 139 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 45-51 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An evaluation is given for the several methods now in use for evaluating the geological information content of space photographs. Multizonal photographs must be evaluated primarily on the basis of the effectiveness of reflection of spectral criteria. In this method in discriminating the feature and identifying it the problem will be solved more successfully the greater the contrast between the images of the discriminated feature and the background (adjacent features). Contrast can be used as the principal index of comparative information content of mutizonal images obtained in different survey channels. Definite procedures are given for determining contrast. It is concluded that there are no universally informative survey channels for discriminating the images of geological features on the basis of spectral criteria. The geological formation content of multizonal photographs as a whole and each survey channel separately can be evaluated only from the point of view of a specific problem. R.J.F.

N86-20242# Joint Publications Research Service, Arlington, Va.
GEOLOGICAL INFORMATION CONTENT OF SPACE PHOTOGRAPHS OBTAINED IN DIFFERENT SPECTRAL RANGES IN COURSE OF GOBI-KHANGAI EXPERIMENT (MUSHUGAY-GURVANBOGD TEST RANGE) Abstract Only c43
V. I. Makarov and G. I. Volchkova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 140 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 52-58 Original language document was announced in IAA as A85-37118 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The Gobi-Khangai experiment was carried out from aboard the Salyut-6 Soyuz-39 orbital complex by a Soviet-Mongolian crew in April 1981. A multizonal space photographic survey of the Mushugay-Khuduk region was made. This area is situated in the north-central part of the Gobi, directly to the east of Gurvan-Bogd Range in the Gobi Altai. Included are the results obtained in an earlier (June 1973) survey of this same territory from the ERTS-1 satellite under different illumination conditions. The availability of data from two surveys made it possible to analyze photographic conditions more fully than would have been possible on the basis of the results of only one survey. The strengths and weaknesses of the two surveys are compared. The space photographs served as an excellent base for compiling a map of Quaternary deposits far exceeding the accuracy of maps compiled by surface methods. These photographs made possible a considerable upgrading of earlier published geological and tectonic maps. The comparative

analysis of the geological content of space photographs obtained in different spectral ranges indicated that for visual interpretation under conditions similar to the Gobi Altai it is sufficient to have images in the spectral range 0.8 to 0.9 microns the range 0.6 to 0.7 microns can be recommended as an additional range. A need for other ranges would arise only for obtaining synthesized images. Author

N86-20243# Joint Publications Research Service, Arlington, Va.
TECTONIC INTERPRETATION OF RESULTS OF INTERPRETATION OF SPACE PHOTOGRAPHS OF THE CAUCASUS Abstract Only c43
G. A. Mikheyev and M. G. Makarova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 141 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 59-66 (For primary document see N86-20178 10-88)
Avail: NTIS HC A09

An extensive literature has already been devoted to the possibilities of space photographs of the Caucasus for the geological study of that region. These materials and published results of such work are reviewed and integrated. A full-page map shows the location of lineaments and structures of the central (annular) type in the Caucasus region; this map is used in describing the interpreted photographs. It is concluded that in the formation of the present-day tectonic plan a definite role is played by faults of sublatitudinal and northwesterly directions forming disjunctive systems, longitudinal tectonic sutures bounding the principal structural-formation zones of the region. Dislocations with breaks in continuity but belonging to a single system were formed at the same time and under the same geotectonic conditions. Their degree of expression on space photographs in the form of systems of lineaments is determined by the degree of their influence on the formation of present-day morphostructures, that is, by activity in the neotectonic and most recent stages in development of this region. Structures of the central type in most cases constitute a surface reflection of vertical movements of polygonal basement blocks. But there are some structures of the central type whose nature remains unclarified. Space photograph analysis has shown that these materials are of great practical and scientific value for seismic research. R.J.F.

N86-20244# Joint Publications Research Service, Arlington, Va.
PRINCIPAL PATTERNS OF MORPHOTECTONIC STRUCTURE OF EASTERN CAUCASUS DETECTED BY REMOTE SENSING METHOD Abstract Only c43
B. A. Budagov, A. A. Mikailov, A. S. Aliyev, and E. K. Alizade *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 142 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 67-72 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

On space photographs, the Eastern Caucasus region in general is characterized by a quite nonuniform photoimage pattern attributable to sharp differences in the structure and strike of structural elements and a patchy composition of sedimentary strata. Against this background, interpretation of space photographs has made it possible to define major morphostructural zones, each having its own specific photoimage, pattern and phototone. Particular attention is devoted to the pattern of linear, arcuate and annular lineaments (a map of interpreted lineaments, accompanies the text). The overwhelming majority of lines fit into two conjugate systems of lineaments: orthogonal and diagonal. Lineaments of the orthogonal system with general Caucasian and anti-Caucasus directions show up on the space photographs more clearly and are characterized by a great extent. Longitudinal lineaments, constituting more than 60% of all the interpreted lines, are predominant. Lineaments of an anti-Caucasus strike are more difficult to interpret because they are less clearly expressed in the relief. The diagonal system includes lineaments of northeasterly and northwesterly strikes. The large lineaments for the most part coincide with faults detected by geological-geophysical methods. Many lineaments are not shown on existing tectonic maps and require field confirmation. Lineaments of each definite strike correspond to definite types of faults. The morphototectonic structure of the Eastern Caucasus as revealed by space photographs is entirely consistent with the theory of plate tectonics. R.J.F.

N86-20245# Joint Publications Research Service, Arlington, Va.
AUTOMATED SPECTRAL ANALYSIS OF DIMENSIONS AND DIRECTIONS OF STRUCTURAL ELEMENTS ON EARTH'S SURFACE Abstract Only c43
D. K. Tkhabisimov, D. A. Uiskov, and M. I. Kolsenik *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 143 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 3-80 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method for a structural-zonal survey of the Earth's surface from space is proposed. In this method the surface is viewed through a moving window containing N X N resolution elements, which is called an operational unit. Some functionals, such as a matrix of integral relative energies in several zones of a Wiener spectrum (in a polar coordinate system), are computed for each operational unit. The Ziman method is used in determining the sizes of tree crowns and discriminating the predominant directions of lineaments on photographs of the Earth's surface. For each photograph fragment it is necessary to compute the functions C(m) and L(n) whose values correspond to the part of Wiener spectrum energy falling within annular and slit filters respectively. The analysis was made for models of a forest and lineament structures with a uniform distribution (with respect to positions and sizes), and also for real photographs. Maps of crown size were constructed by correlation analysis of Wiener spectra. The discriminated directions are determined by the local maxima of the L(n) function. A full algorithm is given for automated fragment-by-fragment spectral analysis of images. An analysis of models of images of structural elements is used in developing a method for retrieving the probability distribution function for tree crown sizes from the Fourier spectrum. Author

N86-20246# Joint Publications Research Service, Arlington, Va.
USE OF MATERIALS FROM LARGE-SCALE AERIAL PHOTOSURVEY OF FOREST IN AUTOMATED INTERPRETATION OF SPACE PHOTOGRAPHS Abstract Only c43
L. A. Kuzenkov, N. A. Aparinova, and A. V. Starchenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 143-144 Transl. into ENGLISH from Isledovaniye Zemli iz Kosmosa(Moscow, USSR), no. 2, Mar. - Apr. 1985 p 90-96 Original language document was announced in IAA as A85-37119 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A step-wise numerical technique to process large scale aerial survey data for forestry applications is described. The method is based on the SNIMOK-DANNYE computer system for processing photographic data obtained by satellite. A block diagram illustrating the step-wise processing procedure is given and the statistical correlation used to match forest features with suitable deciphering indicators is described. The technique has been used to process photographic data from 30 different aerial surveys of forest land in Iakutsk, USSR, and was found to be practical for widespread use. I.H. (IAA)

N86-20247# Joint Publications Research Service, Arlington, Va.
CHOICE OF CONDITIONS FOR AEROSPACE SURVEY IN VISIBLE SPECTRAL RANGE FOR DETERMINING ALBEDO OF OBJECT AND BACKGROUND Abstract Only c43
A. B. Karasev and S. V. Pantyukhov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 144-145 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 97-107 Original language document was announced in IAA as A85-37120 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The use of stereoscopic survey results to determine absolute

values for target and background reflectance in optical surveys is discussed. It is shown that precise values for the angle of the Sun, sighting angle, and the spectral interval may be selected when the arriving radiation is expressed as a function of background and target reflectance. The effect of the atmosphere on the signal magnitude is expressed by average values for atmospheric conditions. The statistical correlation of the intensity of incoming radiation with aerosol optical thickness is illustrated. I.H. (IAA)

N86-20248# Joint Publications Research Service, Arlington, Va.
SYSTEM OF CRITERIA FOR ANALYSIS AND RECOGNITION OF IMAGES OF RANDOM SPATIAL TEXTURES Abstract Only c43

O. V. Bazarskiy and Yu. V. Korzhik *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 145-146 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 108-110 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Data on surface texture obtained in the form of a set of information criteria, as a result of compression of videoinformation, can be used in the routine analysis of images aboard a flight vehicle and in reducing the flow of information to Earth which was registered during surveys with a high spatial resolution. The data transmitted to the Earth can be analyzed using known textural criteria computed from matrices of spatial distribution of the gray tone, ensuring an adequately high percentage of correct identification of images (up to 90%). However, this requires a great number of computation operations, proportional to the number of resolution elements in the image, and the need for technically complex computers. For this reason the authors have developed a system of criteria for the analysis and identification of the images of random spatial textures which can be used with a very simple computer. On the basis of a matrix of primary criteria P sub ij it is possible to form a system of L = 3(1+2M) criteria: A sub i, C sub i, D sub i. The choice of the number of threshold levels M is dependent on the statistical properties of the analyzed textural sectors on the surface. It is adequate that M = 2 for images for random textures having a normal law of distribution of optical densities. A total of L = 15 criteria are computed, which requires only 105 computation operations, which is several orders of magnitude less than in known systems of criteria. A block diagram of the method for the formation of criteria and an example of application of the method are given. R.J.F.

N86-20249# Joint Publications Research Service, Arlington, Va.
RATIONALIZATION OF SYSTEM FOR ACQUISITION OF OZONE REMOTE MEASUREMENT DATA IN NORTHERN HEMISPHERE Abstract Only c43

O. M. Pokrovskiy and A. K. Malygina *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 146 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 10-16 Original language document was announced in IAA as A85-29901 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Problems of resource economy are discussed for a remote-sensing observational system providing data on total ozone content in the Northern Hemisphere for further numerical analysis. Ozone field analysis is considered for polar, middle, and tropical latitudes, and for the whole hemisphere. It is shown that an optimization of the remote-sensing system makes it possible to achieve a resource economy of 30-70 percent depending on the situation. The presence of information links is observed in between UV measurements at high and middle latitudes. This makes it possible to avoid the duplication of information and to achieve a further resource economy. B.J. (IAA)

N86-20250# Joint Publications Research Service, Arlington, Va.
ANNUAL VARIATION OF CLOUD QUANTITY AND ALBEDO Abstract Only c47

O. Yu. Kyarner *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 147 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 17-22 Original language document was announced in IAA as A85-29902 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Data on annual variations of mean zonal cloud amount (CA) are compared with data on the albedo of the Earth-atmosphere system (EAS). An effort is made to evaluate the reliability of determining the cloud albedo effect on the basis of a comparison of cloud data with EAS albedo data obtained in satellite experiments. It is shown that available CA data yield qualitative agreement in annual variations only for the Northern Hemisphere. A comparison of the annual EAS albedo and CA in the tropical belt shows that the cloud albedo depends on the CA. It is concluded that, in order to determine the global cloud albedo effect, it is necessary to assess the joint distribution of the amount and thickness of clouds for large averaging scales. B.J. (IAA)

N86-20251# Joint Publications Research Service, Arlington, Va.
METHODS FOR STUDYING RECENT TECTONICS USING MATERIALS FROM REMOTE AND SURFACE DATA Abstract Only c48

A. A. Freydlin, Ye. G. Farrakhov, and L. F. Voichegurskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 147-148 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 32-38 Original language document was announced in IAA as A85-29904 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Methods for the complex study of tectonic formations to the east of the near-Caspian depression have been developed on the basis of the interpretation of space (Salyut-4) and aerial photographs in conjunction with other types of geological and geophysical data. This approach led to the determination of: (1) the location and structure of recent tectonic zones; (2) the correlation of interpreted elements relief and deep teconic characteristics of the region; (3) the connection between oil deposits and tectonic and neotectonic activity; and (4) the role of tectonic processes in the formation of dispersed-sand massifs in the eastern Caspian region. B.J. (IAA)

N86-20252# Joint Publications Research Service, Arlington, Va.
POSSIBILITIES OF USE OF REMOTE METHODS FOR INCREASING EFFICIENCY OF PETROLEUM AND GAS EXPLORATION WORK Abstract Only c43

M. Kh. Ishanov, V. A. Yushin, A. K. Gayazova, and G. N. Maleshenkov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 148-149 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), n. 1, Jan. - Feb. 1985 p 39-46 Original language document was announced in IAA as A85-29905 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Space photoanomalies corresponding to structures promising for petroleum and gas are usually situated within the limits of anticlinal zones of petroleum and gas accumulation. Many buried anticlines in which petroleum and gas deposits have been discovered stand out as tonal photoanomalies in the near-IR spectral zone where the petroleum deposits show through as ovals of a darker tone, and gas deposits stand out in a lighter tone. Within the limits of the South Tajik Depression, for example, there are a number of discordant lineaments whose strike is not consistent with the most recent folding. Some of the most important features are sublatitudinal lineaments which can be identified with deep ancient faults which exert a great influence on the conditions for the formation and preservation petroleum and gas deposits. The combining of the results of traditional research methods and materials obtained by remote methods made it possible to define a number of promising regions which are recommended for further petroleum and gas exploration work. (These are clearly designated on the tectonic map). These promising regions are described in detail and some space photoanomalies within their limits are analyzed. R.J.F.

N86-20253# Joint Publications Research Service, Arlington, Va.
DETERMINING WATER SURFACES IN NORTHWESTERN BOHEMIA FROM SATELLITE DATA Abstract Only c43
K. Kirchner, J. Kolar, and S. Plachy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 149 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 47-51 Original language document was announced in IAA as A85-29906 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Satellite data were used in determining surface water formations in the territory of Czechslovakia. An analysis is given of a photograph of northwestern Bohemia which is characterized by a well-expressed dynamics of surface changes attributable to economic activity. The photograph was taken from the LANDSAT satellite on 30 June 1978. One of the manifestations of these changes is the appearance or disappearance of some water bodies in a relatively short time interval which necessitates corrections to topographic and geographic maps. A test range with an area of about 600 square kilometers was defined in the studied area. This is a mining region where open pits and mine tailings become filled or flooded with water. The water surfaces have different extents and configurations determined by the nature of the depression, hydrogeological and climatic conditions. The initial form of the information used in the study was the spectral characteristic of the water surface. The information used in the classification of water surfaces as from a single spectral channel for the near-IR region. A total of about 135,000 brightness values were obtained for the test range. Some 96 water surfaces of different extent were detected. These image data were compared with water surfaces on topographic maps at 1:25,000 and 1:50,000 and water surfaces on black-and-white panchromatic aerial photographs at 1:20,000. It was possible to make reliable identification of water bodies with an area greater than 1 hectare. R.J.F.

N86-20254# Joint Publications Research Service, Arlington, Va.
COMPREHENSIVE DESERTIFICATION MAPS AND METHODOLOGY FOR THEIR COMPILATION USING SPACE PHOTOGRAPHS Abstract Only c43
N. G. Kharin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 150 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 52-59 Original language document was announced in IAA as A85-29907 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Quantitative criteria of desertification are proposed, and a method for the compilation of desertification maps on the basis of space remote sensing data is developed. The desertification aspects include the current status, the rate and inherent risk of desertification, and the effect of animals and humans on the environment. LANDSAT and Soyuz-22 data on southest Turmenistan considered. B.J.(IAA)

N86-20255# Joint Publications Research Service, Arlington, Va.
USE OF SPACE METHODS FOR STUDYING SALINE SOILS AND SOLONCHAKS Abstract Only c43
E. A. Mamedov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 151 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 60-65 Original language document was announced in IAA as A85-29908 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

There is a spatial-temporal variability of saline lands which requires a constant inventory of their area and state and a systematic revision and correction of soil maps. A high percentage of the lands in the Azerbaijan SSR falls in this category. Work in the Adzhinourskaya steppe is described. Key sectors have been covered by detailed geobotanical surveys on the ground, taking into account the seasonal variability of the vegetation cover. After preparation of a detailed map of the key area on the basis of aerial photographs and ground field work, it was possible to proceed to interpretation and mapping on the basis of space photographs. The 1972 space photographs used were from the LANDSAT satellite in four spectral zones. It was found that the most effective spectral zones for the mapping of saline soils are 0.6 to 0.7 and 0.8 to 1.1 micrometers. The use of maps prepared from space photographs greatly increased the detail of the maps in comparison with those prepared by traditional methods, clearly revealing the natural pattern of soil and vegetation groupings, increasing the number of varieties of saline and swampy soils and solonchaks by a factor 2 to 3. The outlines of individual soil areas discriminated on the basis of phototone and color fully corresponded to the results of field mapping and data from physiochemical analysis. It was concluded that in Azerbaijan such work is best accomplished using multizonal photographs taken in July-August at wavelengths 0.5 to 0.6 and 0.6 to 0.7 micrometers. R.J.F.

N86-20256# Joint Publications Research Service, Arlington, Va.
DETERMINING SOIL MOISTURE CONTENT BY MICROWAVE RADIOMETRY METHOD USING A PRIORI INFORMATION Abstract Only c43
Ye. A. Reutov and A. M. Shutko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 152 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 73-87 Original language document was announced in IAA as A85-29910 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Theoretical and experimental studies of the microwave emission characteristics of nonuniformly wet soils were conducted. The dependence of spectral radio-brightness contrast on the parameters of the permittivity (moisture) profile is obtained. The emission characteristics of soils with different moisture profiles were measured by a microwave radiometer at wavelengths of 2.5, 18, and 30 cm. A method for determining moisture-profile parameters and total moisture content in soil at a depth of one meter is proposed which is based on the joint utilization of remote microwave radiometry data and a priori information about the water-physical properties of the soil. B.J. (IAA)

N86-20257# Joint Publications Research Service, Arlington, Va.
RADAR MAPPING OF MOISTURE CONTENT OF OPEN SOILS Abstract Only c43
N. N. Krupenio *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 152-153 Transl. into ENGLISH from Issledovaniya Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 88-93 Original language document was announced in IAA as A85-29911 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Airborne sidelooking radar with a 60-100 m resolution was used for the moisture mapping of open soils (i.e., without vegetation cover) in the 0-10 cm layer in the Stavropol'sk region of the USSR. The difference between the moisture value obtained by the remote radar measurements and that obtained by direct thermoweight measurements did not exceed 2 wt percent in the 9-30 percent moisture variation range. B.J. (IAA)

N86-20258# Joint Publications Research Service, Arlington, Va.
DISCRIMINATING HOMOGENEOUS REGIONS WITH INCOMPLETE BOUNDARIES ON IMAGE Abstract Only c43
A. A. Zlatopolskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 153-154 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 94-102 Original language document was announced in IAA as A5-29912 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

An image segmentation method according to identified parts of region boundaries is proposed in the framework of the interpretation of remote-sensing images. Results of a theoretical analysis of a structure generated by a distance transformation are presented, and an algorithm based on the structure is formulated. An example of the application of the algorithm to geological image analysis is examined. B.J. (IAA)

N86-20259# Joint Publications Research Service, Arlington, Va.
SEGMENTATION OF HALF-TONE AEROSPACE IMAGES BY LEVEL LINES METHOD Abstract Only c43
D. Ye. Minskiy and M. M. Feygin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 154 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 103-112 Original language document was announced in IAA as A85-29913 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The advantages and disadvantages of segmentation methods for half-tone multicontour images are examined. A mathematical model of a continuous scalar field is used to develop an edge detection method based on the comparative analysis of the boundary and the characteristic grey-scale function. The corresponding algorithm is described along with its implementation in a system for the preliminary interpretation of remote-sensing data for purposes of land-reclamation mapping. A segmentation of a photograph taken from Soyuz-22 is considered as an example.
B.J. (IAA)

N86-20260# Joint Publications Research Service, Arlington, Va.
USE OF A PRIORI EVALUATION OF CONDITIONS FOR OBSERVING EARTH'S SURFACE FROM SPACE FOR EFFECTIVE CHOICE OF TIME FOR EXECUTING SURVEY Abstract Only c43
N. V. Kapitonova and Ye. L. Lukashevich *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 155 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 113-117 Original language document was announced in IAA as A85-29914 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Adequate study has been made of the motion of space vehicles for studying the Earth's natural resources, such as the nominal parameters of their working orbits, but a weak link which remains is the uncertainty in choice of the initial orientation of the orbital plane relative to the direction to the Sun. This orientation is determined by the angle tau = alpha-omega, where alpha is the right ascension of the Sun on the initial date of the survey, omega is the longitude of the ascending node of the space vehicle orbit, unambiguously related to the illumination conditions for the Earth's surface along the flight trajectory. A method has been developed for determining a rational omega value which would make possible the most complete satisfaction of requirements on solar altitude in surveys of different regions, taking their meteorological and climatic characteristics into account. For this purpose the Earth's surface, which is to be photographed from a circular orbit from a satellite with a specific inclination, is broken down into regions with characteristic climatic conditions.
R.J.F.

N86-20261# Joint Publications Research Service, Arlington, Va.
AEROSPACE OBSERVATIONS OF ADVECTIVE-EDDY FORMATIONS IN CENTRAL BALTIC SEA Abstract Only c43
I. A. Bychkova, S. V. Viktorov, V. V. Vinogradov, V. N. Losinskiy, and Kh. Yu. Brosin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 156 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 118-122 Original language document was announced in IAA as A85-29915 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Under definite conditions eddy movements occurring at different depths in the Baltic Sea can be manifested in the form of surface nonuniformities of the temperature field and brightness of the sea surface. These nonuniformities are registered by satellite instruments operating in the visible and IR ranges. Considering the role of the wind in dynamic processes in the Baltic, there is probably a high frequency of recurrence of formation of local advective-eddy fronts of synoptic scales in the surface layer. Study of such phenomena was the objective of the second USSR-GDR Complex Subsatellite Experiment. The research ship A. von Humboldt during the first half of June 1983 was in a hydrological test range in the central part of the sea, each day occupying 8 to 9 stations. Satellite information in the IR range was received simultaneously. The observations revealed that regardless of wind conditions a correlation between radiation temperatures obtained from both a satellite and aircraft and shipboard thermodynamic temperatures can be traced to a depth of 17 m. At a depth of 35 to 40 m the correlation coefficient becomes negative, corresponding to the formation of a countercurrent in the Ekman layer. Accordingly, sea surface temperature maps obtained in the Baltic Sea using satellite data can be used in tracking drift currents. The three-dimensional thermal structure in the test range for 7 June on the basis satellite and ship is discussed.
Author

N86-20262# Joint Publications Research Service, Arlington, Va.
FEATURES IN ALLOWANCE FOR ATMOSPHERIC INFLUENCE IN VERY LONG BASELINE RADIOINTERFEROMETRY Abstract Only c43
N. S. Zabolotnyy and G. A. Shanurov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 157 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 3-8 Original language document was announced in IAA as A85-19994 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Space methods are playing an ever-increasing role in the solution of geodetic problems; this includes the very long baseline radiointerferometry method. The instrumental errors are on the order of centimeters and this accuracy may soon be increased by an order of magnitude. The measurement accuracy will be limited by the influence of the atmosphere and conditions for the propagation of electromagnetic waves. This influence is manifested in a change in the velocity of propagation and phase shift. These two phenomena were examined because they exert an influence on the measurement results in the most promising space geodesy radio methods: very long base radiointerferometry and the Doppler method for observing artificial Earth satellites. In order to solve these problems the authors propose models for the effective determination of the refractive index. These models are proposed for evaluating the time delays and frequency shifts of signals in the troposphere and ionosphere for different radio wave propagation conditions; corresponding formulas are presented. It is shown that distortions from the influence of the atmosphere in the measured ranges, range differences and Doppler frequency are so great that they must be taken into account in any geodetic determinations. Varieties of a biexponential model of the atmosphere are proposed for determining the refractive index.
Author

N86-20263# Joint Publications Research Service, Arlington, Va.
DETERMINING GEOCENTRIC GRAVITATIONAL CONSTANT BY SPACE GEODESY METHODS Abstract Only c43
Yu. V. Plakhov and A. V. Paramzin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 157-158 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 46-53 Original language document was announced in IAA as A85-19995 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The paper examines the problem of determining the preliminary value of the correction to the accepted value of the geocentric gravitational constant on the basis of modified equations of the orbital method of space geodesy. It is shown that satellites in near-polar almost-circular orbits are most suitable for the solution of this problem.
B.J. (IAA)

N86-20264# Joint Publications Research Service, Arlington, Va.
DETERMINING ELEMENTS OF OUTER ORIENTATION OF AEROSPACE PHOTOGRAPHS IN REMOTE STUDY OF DYNAMIC PROCESSES AND PHENOMENA Abstract Only c43
V. B. Dubinovskiy and A. A. Morozov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 158-159 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 66-70 Original language document was announced in

IAA as A85-19998 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

A method is proposed for determining the elements of outer orientation of a new flight on the basis of photographs of an old survey for which the elements of outer orientation are known. In the proposed method, two photographs of an old survey whose elements of outer orientation are known are used together with a photograph from a new flight. By forming two stereopairs from a photography of the new flight and one of the photographs from the old flight it is possible to determine the angular elements of outer orientation of the new photograph, the direction angles and angles of inclination of the photographic bases, and then, by solution of direct intersection using data from a pair of old photographs and the angular elements of outer orientation of a photograph from the new flight. The use of the elements of outer orientation of photographs of the old survey as control data completely precludes the need for determining reference points. The use of this method for constructing photogrammetric networks when revising topographic maps, in comparison with existing photogrammetric procedures, ensures an increase in the accuracy in constructing such networks. This method increases accuracy in determining terrain point coordinates due to a more precise determination of the control data (the elements of outer orientation of photographs) using the results of highly precise measurements of the coordinates of a large number of photograph points in the stage of determination of the elements of outer orientation. R.J.F.

N86-20265# Joint Publications Research Service, Arlington, Va.
PREDICTING COORDINATE ERRORS OF PHOTOGRAPH POINTS Abstract Only **c43**
V. G. Yelyushkin and B. V. Pronin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 159 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Feodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 70-75 Original language document was announced in IAA as A85-19999 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The paper examines the problem of improving the processing accuracy of space remote-sensing radar photographs by coordinate-error prediction at arbitrary points according to error values at reference points. An analytical expression (instead of a preliminary determination) of the error correlation function is obtained, and the parameters of this expression are chosen in such a way as to minimize the prediction error by comparing predicted and known error values in a certain part of the reference points. The proposed method makes possible a 30 percent improvement in processing accuracy. B.J. (IAA)

N86-20266# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF CARRIER ORIENTATION ERRORS ON IMAGE MOTION IN PHOTOGRAPHY FROM MOVING OBJECT Abstract Only **c43**
B. M. Miller and G. I. Fedchenko *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 160 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Geodeziya i Aerofotosyemka (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 75-80 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Image motion frequently plays a decisive role in photography from moving objects because it results in image degradation. One of the causative factors is the influence of errors in the orientation system, a subject about which little has been published. D. A. Kawachi (Photogrammetric Engineering, Vol. 31, 1965) derived expressions for image motion rates caused by rotations of a vehicle with constant angular velocities with zero errors in orientation angles, but no expressions were derived for the additional rates caused by deviation of the vehicle coordinate system from a nominal position. Accordingly, the authors obtained evaluations of the influence of this type of error on image motion for any optical system. This basis for this work was the expressions for image motion obtained by B. M. Miller, et al. in Izv. VUZov: Geodeziya I Aerofotos'yemka, No. 4, 1984. The proposed method is based on numerical methods and use of an electronic computer, which makes it possible to evaluate the stochastic characteristics of image motion over the entire frame field. The algorithm proposed in the 1984 article can also be used in evaluating the influence of errors in the orientation and stabilization system. This problem has now been rectified and the algorithm is based on the assumption of smallness of the errors. The method is based on a determination of the partial derivatives for the image motion rate field. The algorithm for determining influence coefficients is used jointly with the algorithm for computing the residual rates of image motion, thereby reducing computer time in the stochastic modeling of system operation. Author

N86-20267# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF USING SATELLITE IR-INFORMATION FOR OCEANOLOGICAL RESEARCH Abstract Only **c48**
I. V. Likhachev and A. N. Michurin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 160-161 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Geologiya, Geografiya (Leningrad, USSR), no. 14, issue 2, Jun. 1985 p 93-95 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Although there are real possibilities for obtaining satellite information (SI) for considerable expanses of the ocean, there are still no possibilities for its routine processing. This dictates a need for storing SI for its subsequent processing at on-shore computation centers. In exploring this problem, a Kapsi receiving station was used in determining the possibility of reception and registry of SI on an intermediate magnetic carrier with subsequent input of the SI into a computer. It was found that an ordinary magnetic recorder tape can be used as a magnetic carrier. An effective method was developed for SI registry on magnetic tape. On one track of an ordinary stereophonic recorder having adequately high frequency characteristics and relatively low detonation, there is registry of a satellite signal of a subcarrier frequency from the receiver output; the second track is used in registering a pulsed signal from a highly stable quartz oscillator used in data processing as a synchronizable signal determining the discreteness of SI digital readings. The next stage in data preparation is the input of satellite data registered on magnetic tape into a computer memory, with discrimination of R-radiometer data from the total volume of data. R.J.F.

N86-20268# Joint Publications Research Service, Arlington, Va.
DYNAMIC AEROSPACE SENSING (CONTENT, PROBLEMS, FIELD OF APPLICABILITY) Abstract Only **c43**
Yu. F. Knizhnikov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 161-162 Transl. into ENGLISH form Vestnik Moskovskogo Universiteta, Seriya 5: Geografiya (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 7-13 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Dynamic aerospace sensing is defined as a modern methodology for studying temporal dynamics with the use of aerospace methods. Direct and indirect variants are distinguished, being based on use of a series of photographs taken at different times or on use of individual photographs. Direct methods for the most part supply quantitative information on dynamics, its intensity and rate. The spatial and temporal coverage of the phenomena which can be studied using photographs taken at different times is different. Whereas there are virtually no spatial limitations, the duration of the temporal coverage does not exceed the 11 year, or posssibly the bruckner cycle of natural changes. The indirect methods make it possible to study the temporal and spatial dynamics in a case when it is reflected in the external appearance of objects which are indicators of dynamics. The interval of temporal analysis is virtually unlimited. The range of features, phenomena and processes whose dynamics can be studied by aerospace methods is extremely broad and the range of scales is from detailed to global. Nevertheless, they are all based on common methodological principles ensuring a comparability of the results. In the different geographic branches, the level and breadth of development of such studies varies at present. They are particularly promising in meteorology, oceanology, glaciology and hydrology, which deal

with mobile objects and phenomena. However, the other geographical sciences, especially dealing with the socioeconomic aspects of geography, can profit greatly from application of the method. Another highly important merit of the method is that it can be applied in the prediction of spatial-temporal changes of features, phenomena and processes; it is useful in expert evaluations, extrapolation and modeling. Author

N86-20269# Joint Publications Research Service, Arlington, Va.
PRINCIPAL PHOTOGRAMMETRIC DEPENDENCES IN PROCESSING OF RADAR SURVEY MATERIALS Abstract Only c43
Yu. S. Tyuflin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 162 Transl. into ENGLISH from Geodeziya i Kartografiya (Moscow, USSR), no. 9, Sep. 1984 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

In the photogrammetric processing of the materials from radar mapping of the Venusian surface from the Venera-15 and Venera-16, which carried side-looking radars, it is necessary to have mathematical expressions for accomplishing a coordinate referencing of the radar survey materials, for constructing a control network on the planet, for compiling photomaps of its surface and other procedures. This is dictated by the fact that the geometrical principles involved differ from those applicable to photographic and TV images. In the case of radar images it is essential to determine the spatial position of each projecting ray; a radar image can be formed only after spatial determination of the position of the radar rays at the current moments in time. The full derivation of the required expressions is given. These are derived using a feature-centered orbital coordinate system with its origin at the center of mass of the station, which virtually coincides with the center of radiation of the on-board radar antenna. The use of one or another of these expressions is governed by the method for the formation of the radar images during their processing. In executing the correct photogrammetric processing of survey materials, the principal requirement in the formation of panoramas from each survey revolution is the possibility of obtaining primary radar information from it. For each terrain point appearing on the radar panorama, such information will be the range r from the station to the terrain point, the velocity component V sub r along this direction, and also the moments in time t of station position in a survey revolution orbit corresponding to these parameters. Author

N86-20270# Joint Publications Research Service, Arlington, Va.
MAPPING OF VEGETATION RESOURCES OF ARID ZONES USING SPACE PHOTOINFORMATION Abstract Only c43
V. S. Khrutskiy Transl. into ENGLISH from Geodeziya i Kartografiya (Moscow, USSR), no. 9, Sep. 1984 p 51-56 Original language document was announced in IAA as A85-14322 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The use of satellite remote-sensing techniques for the vegetation mapping of arid areas is examined, and the possibilities of the direct and indirect interpretation of vegetation cover using local landscape indicators are evaluated. Particular consideration is given to relief interpretation, the interpretation of rocks and friable deposits, and the interpretation and classification of vegetation. Finally, the characteristics of field and laboratory work pertaining to the generation of pasture maps are examined. L.M. (IAA)

N86-20271# Joint Publications Research Service, Arlington, Va.
NEW SPACE ADMINISTRATION GLAVKOSMOS USSR CREATED c81
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 164-165 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 13 Oct. 1985 p 3 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

The Main adiminstration for Creation and Use of Space Technology for the National Economy and Scientific Research (Glaukosmos USSR) is discussed. Glavkosmos USSR will cooperate closely with all interested ministries and departments of the country. It will examined their proposals for study and exploration of space, development and will organize the corresponding work. Preparations and launches of space apparatus will be provided for as well as reception and dissemination of space information for practical use. R.J.F.

N86-20272# Joint Publications Research Service, Arlington, Va.
LIST OF RECENT SOVIET SPACE LAUNCHES c12
In its USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 169-171 Repr. from TASS (Moscow, USSR) (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

Launch dates for Cosmos, Moliniy, and Raduga satellites are given in tabular form. Apogee, perigee, period, and inclination are listed. Instruments aboard each flight are noted. R.J.F.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-20273 New South Wales Univ., Sydney (Australia). School of Electrical Engineering and Computer Sciences.
SINGLE STRUCTURE, STEERABLE SYNTHESIS TELESCOPES UTILIZING OFFSET REFLECTORS Ph.D. Thesis Abstract Only
Nicholas Fourikis Sep. 1984 3 p
Avail: Issuing Activity

The limit resolution at millimeter wavelengths and atmospheric attenuation increase total mapping time of extended regions of the sky to an unacceptable level for single beam radio telescopes. Conversion of a single beam telescope operating near its limiting resolution to a multiple beam telescope capable of taking high resolution and high sensitivity maps would decrease total mapping time to a reasonable level. The annular synthesis telescope with a fully steerable structure can be used to minimize astigmatism and exhibits considerable immunity to noise induced by the troposphere. When dual offset reflectors are used, the geometric optics cross polarization is negligible in the absence of misalignment errors. A model annular synthesis telescope operating at 38 GHz was designed and built. Measurements taken agree with theoretical results. B.G.

N86-20274*# Pennsylvania State Univ., University Park. Dept. of Astronomy.
OPTICAL AND UV SPECTROSCOPY OF THE PECULIAR RS CVn SYSTEM, RT LACERTAE
David P. Huenemoerder and Samuel C. Barden (Kitt Peak National Observatory, Tucson, Ariz.) 9 Nov. 1985 28 p refs
(Grants NAG5-405; NSF AST-83-17867)
(NASA-CR-176525; NAS 1.26:176525) Avail: NTIS HC A03/MF A01 CSCL 03A

Spectra in the H-alpha and H-beta regions of the peculiar double-lined RS CVn binary, RT Lacertae, were obtained in the fall of 1984. Limited International Ultraviolet Explorer (IUE) long wavelength low and high resolution spectra were obtained concurrently. The ground based spectra have shown an asymmetry with orbital phase in the H-alpha profile. The H-beta profiles were consistent with the same effect. One hemisphere showed excess emission and the other excess absorption, with a broad Gaussian emission component superposed upon the excess H-alpha line. An improved radial velocity curve, giving a better determined mass ratio and geometry was derived. This combined with the radii implied by the rotational broadening of the spectra, showed one component to be 80 to 90% filling the equilibrium Roche surface. The two-faced nature is, therfore, very likely due to mass transfer from the contact component impacting upon its companion. Low resolution ultraviolet data showed that the supposed cooler component is bluer than its companion. High resolution ultraviolet data taken during secondary eclipse showed Mg II emission strength which decreased more slowly than the area visible. The phase behavior of the low

resolution data support the former situation, indicating traditional chromospheric activity. E.A.K.

N83-20275# Los Alamos National Lab., N. Mex.
HIGH SPEED PHOTOMETRY OF AN UMa
J. N. Imamura, T. Y. Steiman-Cameron, and R. H. Durisen 24 Jun. 1985 11 p Presented at the 9th North American Workshop On Cataclysmic Variable, Seattle, Wash., 24 Jun. 1985 Prepared in cooperation with Mount Wilson Observatory, Pasadena, Calif. and Indiana Univ., Bloomington
(Contract W-7405-eng-36)
(DE85-015715; LA-UR-85-2447; CONF-8506143-3) Avail: NTIS HC A02/MF A01

As a class, the AM Her objects exhibit temporal variability on time scales ranging from seconds to years. Most of the variations can be adequately described by shot noise models (Cordova and Mason 1982). Exceptions to this are the strictly periodic features modulated on the orbital periods of the systems (typically several hours) and the one to two second features which show up as excesses of power in the time averaged power spectra of AN UMa. It has been suggested that the short time scale features are due to an oscillatory instability of radiative accretion shocks discovered by Langer, Chanmugam, and Shaviv (1981, 1982). A direct physical relationship between the one to two second optical variations and shock oscillations has not yet been demonstrated. Because of the potential importance of such a result further study of these systems is clearly warranted. In this work, we examine the short time scale behavior of AN UMa in more detail and improve on the work of Middleditch (1982) by resolving the feature in time. DOE

N86-20187# Joint Publications Research Service, Arlington, Va.
USE OF LIQUID MIRRORS IN ASTRONOMY Abstract Only
V. P. Vasilyev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 84 Transl. into ENGLISH from Astronomicheskiy Zhurnal (Moscow, USSR), v. 62, no. 3, May - Jun. 1985 p 598-601 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20191# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF SURFACE STRUCTURE OF CELESTIAL BODIES WITHOUT ATMOSPHERES ON POLARIZATION CHARACTERISTICS OF REFLECTED LIGHT Abstract Only
L. O. Kolokolova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 86 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 2, Apr. - Jun. 1985 p 165-173 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20214# Joint Publications Research Service, Arlington, Va.
INTERPRETATION OF NONPOLAR LATITUDE VARIATIONS Abstract Only
A. A. Korsun *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 105 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 78-80 Original language document was announced in IAA as A85-48687 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20295*# Washington Univ., Seattle.
MULTIFREQUENCY OBSERVATIONS OF DWARF NOVAE OUTBURSTS
Paula Szkody *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 39-45 refs Sponsored by ESA (For primary document see N86-20287 10-93)
(Grants NSG5-395; NSF AST-84-05923)
Avail: NTIS HC A14/MF A01 CSCL 03B

N86-20296# Cambridge Univ. (England). Inst. of Astronomy.
ECLIPSE STUDIES OF DWARF NOVAE
Keith Horne *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 47-53 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20297# Tasmania Univ., Hobart (Australia). Dept. of Physics.
SPECTROPHOTOMETRY OF THE ECLIPSING DWARF NOVAE V2051 OPHIUCHI
D. J. Watts, J. Bailey (Anglo-Australian Observatory, Sydney, Australia), P. W. Hill (St. Andrews Univ., Scotland), and J. G. Greenhill *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 55-59 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20298# Oxford Univ. (England). Dept. of Astrophysics.
THE THEORY AND OBSERVATION OF SUPERHUMPS IN SU UMA SYSTEMS
P. A. Charles, C. J. Clarke, G. T. Bath, R. Whitehurst, and J. Bailey (Anglo-Australian Observatory, Sydney, Australia) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 61-65 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20305# Nicolaus Copernicus Univ., Torun (Poland). Inst. of Astronomy.
THE H-BETA AND H-GAMMA PROFILES IN CH CYGNI DURING THE RECENT DROP OF BRIGHTNESS
M. Mikolaejewski and R. Biernikowicz *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 105-108 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20309# European Space Agency. European Space Operations Center, Darmstadt (West Germany). EXOSAT Observatory.
THE SPECTRAL AND TEMPORAL VARIABILITY OF GX 13+1
L. Stella, N. E. White, and B. G. Taylor (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 125-128 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20320# Indian Inst. of Astrophysics, Bangalore.
SPECTROPHOTOMETRY OF NOVA VULPECULAE 1984-1
B. S. Shylaja *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 183-185 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20323# Observatoire de Paris-Meudon (France). Dept. d'Astrophysique Fondamentale.
BUGS IN THE METHODS FOR DETERMINING THE EFFECTIVE TEMPERATURES OF IONIZING STARS IN SYMBIOTICS AND NOVAE
R. Tylenda and G. Stasinska *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 197-199 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20331# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
CONTINUUM AND LINE PROFILE VARIATIONS OF THE NOVA-LIKE SYSTEM V3885 SGR
K. Haug and H. Drechsel *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 233-236 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20332# Osservatorio Astrofisico, Asiago (Italy).
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF THE INTERMEDIATE POLAR 3A 0729+103
R. Falomo, P. A. Charles (Oxford Univ., England), R. Corbet (Oxford Univ., England), L. Maraschi (Milan Univ., Italy), G. Tagliaferri (Milan Univ., Italy), E. G. Tanzi (CNR, Milan, Italy), and A. Treves (Milan Univ., Italy) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 239-243 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20333# Helsinki Univ. of Technology, Espoo (Finland). Observatory and Astrophysics Lab.
FIVE-COLOR POLARIMETRY OF AM HERCULIS
V. Piirola, O. Vilhu, J. Kyroelaeinen, N. Shakhovskoi (Crimean Astrophysical Lab., USSR), and Y. Fimov (Crimean Astrophysical Lab., USSR) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 245-249 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20336# Tuebingen Univ. (West Germany). Inst. fuer Astronomie.
SPECTRAL AND INFRARED DIFFERENCES BETWEEN NOVA-LINKS AND DWARF NOVAE
D. J. Watts *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 259-262 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20338# Ceskoslovenska Akademie Ved, Ondrejov. Inst. of Astronomy.
VERY LONG-TERM PHOTOMETRY OF HZ HER=HER X-1 AND V1727 CYG=4U2127+47: ACTIVE AND INACTIVE STATES
R. Hudec, W. Wenzel (Academy of Sciences, Sonneberg, East Germany), W. Goetz (Academy of Sciences, Sonneberg, East Germany), G. Richter (Academy of Sciences, Sonneberg, East Germany), H. Huth (Academy of Sciences, Sonneberg, East Germany), and J. Drbohlav (Rtyne Observatory, Poland) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 267-271 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-20276 Rochester Univ., N. Y.
POLARIZATION AND INFRARED IMAGING OF REGIONS OF STAR FORMATION Ph.D. Thesis
Andrea Moneti 1985 236 p
Avail: Univ. Microfilms Order No. DA8511908

Observational studies of two regions of star formation are presented for the Taurus cloud and the BN-KL region of Orion. The magnetic field structure in the Taurus cloud was studied in order to investigate its possible role in the evolution of the cloud. It was found that the magnetic field is generally perpendicular to the elongated structures that make up the cloud, and that observed structure could be due to the effects of the magnetic field during the early stages of collapse. In addition, the magnetic field may have presented the formation of massive stars by inhibiting the collapse of large cores, while not effecting the collapse of the small ones. Using a new near-infrared array camera, high resolution (1') images of several young stars embedded in the cloud were also obtained. Most of these sources have extended, spatially resolved circumstellar shells. The largest shell was found around L1551-IRS5; that shell is flattened along the direction of the magnetic field which is also the direction of the bipolar flow of molecular gas that is associated with with star. It is suggested that the observed shell is responsible for collimating the outflow.
Author

N86-20277*# California Univ., Santa Barbara. Dept. of Geological Sciences.
MAGNETISM OF NAKHLITES AND CHASSIGNITES Final Technical Report, 1 Mar. 1984 - 28 Feb. 1985
Stanley M. Cisowski 10 Feb. 1985 27 p refs
(Grant NAG9-72)
(NASA-CR-176518; NAS 1.26:176518) Avail: NTIS HC A03/MF A01 CSCL 03B

Hysteresis measurements on three shergottite and two nakhlite meteorites indicate single domain grain size behavior for the highly shocked Shergotty, Zagami, and EETA 79001 meteorites, with more multidomain-like behavior for the unshocked Nakhla and Governador Valadares meteorites. High viscosity and initial susceptibility for Antarctic shergottite ALHA 7705 indicate the presence of superparamagnetic grains in this specimen. Thermomagnetic analysis indicate Shergotty and Zagami as the least initially oxidized, while EETA 79001 appears to be the most oxidized. Cooling of the meteorite samples from high temperature in air results in a substantial increase in magnetization due to the production of magnetite through oxidation exsolution of titanomagnetite. However, vacuum heating substantially suppresses this process, and in the case of EETA 79001 and Nakhla, results in a rehomogenization of the titanomagnetite grains. Remanence measurements on several subsamples of Shergotty and Zagami meteorites reveal a large variation in intensity that does not seem related to the abundance of remanence carriers. The other meteorites carry only weak remanence, suggesting weak magnetizing fields as the source of their magnetic signal. The meteorites' weak field environment is consistent with Martian or asteroidal body origin but inconsistent with terrestrial origin. E.A.K.

N86-20278*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
COMETARY ATMOSPHERES: MODELING THE SPATIAL DISTRIBUTION OF OBSERVED NEUTRAL RADICALS Interim Report, Sep. - Nov. 1985
Michael R. Combi Jan. 1986 53 p refs
(Contract NASw-3950)
(NASA-CR-176548; NAS 1.26:176548) Avail: NTIS HC A04/MF A01 CSCL 03B

New data for the spatial distribution of cometary C2 are presented. A recompilation of the Haser scale lengths for C2 and CN resolves the previously held anomalous drop of the C2/CN ratio for heliocentric distances larger than 1 AU. Clues to the source of cometary C2 have been found through fitting the sunward-antisunward brightness profiles with the Monte Carlo particle-trajectory model. A source (parent) lifetime of 3.1 x 10,000 seconds is found, and an ejection speed for C2 radicals upon dissociation of the parent(s) of approx. 0.5 km 1/5 is calculated. E.A.K.

N86-20279# Los Alamos National Lab., N. Mex.
TIME DEPENDENT WHITE DWARF RADIATIVE SHOCKS
J. N. Imamura, M. T. Wolff, and R. H. Durisen 1985 9 p refs Presented at the 9th North American Workshop on Cataclysmic Variables, Seattle, Wash., 24 Jun. 1985 Prepared in cooperation with Naval Research Lab., Wash., D.C. and Indiana Univ., Bloomington
(Contract W-7405-eng-36)
(DE85-015698; LA-UR-85-2538; CONF-8506143-2) Avail: NTIS HC A02/MF A01

We study the oscillatory instability of white dwarf radiative accretion shocks discovered by Langer, Chanmugam, and Shaviv. We extend previous works by examining spherical shocks dominated by: (1) bremsstrahlung and Compton cooling; and (2) bremsstrahlung and Compton cooling with the effects of electron thermal conduction are not negligible. The results of our calculations allow us to delineate stability regimes as a function of the dwarf mass, M/sub d, and the accretion rate, M(0). We parameterize M(0) in terms of the optical depth to electron scattering through the preshock flow, tau sub es. In the Compton cooling and bremsstrahlung case, the shocks are unstable to low order oscillation modes if M/sub d less than or equal to (0.7 + or - 0.1) M/sub solar/ for tau/sub es/ = 14, and if M/sub d less than or equal to (0.9 + or - 0.1) M/sub solar for tau/sub es/ = 1. When electron thermal conduction is added, low order oscillation modes are unstable only if M/sub d less than or equal to (0.3 + or - 0.1) M/sub sun mass. The unstable modes have approximate oscillation periods of 1.1 tau/sub br and 0.63 tau/sub br, where tau/sub br is the bremsstrahlung cooling time scale of the postshock plasma. DOE

N86-20280# Tel-Aviv Univ. (Israel).
WORLD SPINORS IN RIEMANNIAN GRAVITY
Y. Neeman 1985 21 p refs Presented at the Fibre Bundle Workshop, Beersheba, Israel, 31 Dec. 1984
(Contract DE-FG05-85ER-40200)
(DE86-001660; DOE/ER-40200/014; CPT-85-016; CONF-841285-1) Avail: NTIS HC A02/MF A01
We introduce a pseudo-frame serving to transform an anholonomic infinite spinor representation of S-bar L-bar(4, vertical bar R) carrying the Lorentz group generators into a holonomic S-bar L-bar (4, vertical bar R) representation carrying a realization of the diffeomorphism group. DOE

N86-20190# Joint Publications Research Service, Arlington, Va.
COMETARY ICE HALO AND TEMPERATURE OF INNER COMA
Abstract Only
D. V. Bisikalo and V. S. Streinitskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 86 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 6, Jun. 1985 p 475-480 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20194# Joint Publications Research Service, Arlington, Va.
MEAN DENSITY OF METEOR STREAM INCIDENT ON EARTH
Abstract Only
P. B. Babadzhanov, R. Sh. Bibarsov, V. S. Getman, and V. M. Kolmakov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 89-90 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 4, Oct. 1985 p 824-826 Original language document was announced in IAA as A86-14580 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20288# Cape Town Univ. (South Africa). Dept. of Astronomy.
NOVA REMNANTS
Brian Warner *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 1-6 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20289# Academy of Sciences (USSR), Moscow. Astronomical Council.
EVOLUTION OF LOW MASS CLOSE BINARIES WITH ORBITAL MOMENTUM LOSSES
A. V. Tutukov and L. R. Yungelson *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 7-16 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20290# Ludwig-Maximilians-Universitaet, Munich (West Germany). Universitaets-Sternwarte.
THE MASS SPECTRUM OF THE WHITE DWARFS IN CATACLYSMIC BINARIES
H. Ritter and A. Burkert *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 17-20 refs (For primary document see N86-20287 10-93)
(Grant DFG-Ku-474/8-1)
Avail: NTIS HC A14/MF A01

N86-20291*# Arizona State Univ., Tempe. Dept. of Physics.
ON THE LONG TERM EVOLUTION OF WHITE DWARFS IN CATACLYSMIC VARIABLES AND THEIR RECURRENCE TIMES
E. M. Sion and S. G. Starrfield *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 21-23 refs (For primary document see N86-20287 10-93)
(Grants NAG5-343; NSF AST-81-171777; NSF AST-83-14788)
Avail: NTIS HC A14/MF A01 CSCL 03B

N86-20292# Technion - Israel Inst. of Engineering, Haifa. Dept. of Physics.
ON ACCRETION OF ANGULAR MOMENTUM FROM AN INHOMOGENEOUS MEDIUM
M. Livio, N. Soker, M. deKool (Amsterdam Univ., Netherlands), and G. J. Savonije (Amsterdam Univ., Netherlands) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 25-27 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20293# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.
THE COLLAPSE OF WHITE DWARFS: A POSSIBLE ORIGIN OF LOW-MASS X-RAY BINARIES
J. Labay, R. Canal (Inst. d'Estudis Catalans, Spain), E. GarciaBerro, M. Hernanz (Inst. d'Estudis Catalans, Spain), and J. Isern *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 29-32 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20294# Slovak Academy of Sciences, Tatranska Lomnica (Czechoslovakia). Inst. of Astronomy.
LONGTERM EVOLUTION OF OUTBURST ACTIVITY IN CATACLYSMIC VARIABLE STARS
Z. Urban *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 33-36 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20299# Ludwig-Maximilians-Universitaet, Munich (West Germany). Universitaets-Sternwarte.
THE SPECTRAL ENERGY DISTRIBUTION OF STATIONARY ACCRETION DISKS IN CATACLYSMIC VARIABLES
A. Burkert and G. Hensler *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 67-71 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20301# Osservatorio Astrofisico, Asiago (Italy).
PROBABLE ORBITAL PERIOD FOR THE OLD NOVA CP PUP (1942) BELOW THE CATACLYSMIC BINARY PERIOD GAP
A. Bianchini, M. Friedjung (Inst. d'Astrophysique, Paris, France), and F. Sabbadin *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 77-79 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20302# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Dept. fuer Astrophysik.
ACCRETION DISK INSTABILITIES
Friedrich Meyer *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 83-89 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20303# Crimean Astrophysical Observatory (USSR).
SYMBIOTIC STARS
A. A. Boyarchuk *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 97-100 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20304# Nicolaus Copernicus Univ., Torun (Poland). Inst. of Astronomy.
ON THE NATURE OF CI CYGNI
J. Mikolaejewska *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 101-104 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20306# Tel-Aviv Univ. (Israel). Wise Observatory.
THE AG DRA: A CASE OF A STELLAR WIND ACCRETOR
E. M. Leibowitz, L. Formiggini, and H. Netzer *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 109-112 refs Sponsored by Israel Academy of Sciences (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20307# Academy of Sciences (USSR), Moscow. Astronomical Council.
THE SYMBIOTIC NOVA PU VUL
B. M. Shustov and A. V. Tutukov *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 113-115 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

N86-20310# Leicester Univ. (England). Dept. of Astronomy.
ACCRETION PROCESSES IN THE MAGNETIC CATACLYSMIC VARIABLES
A. R. King *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 133-138 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-20281*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OBSERVATIONS OF URANUS' SATELLITES: BIBLIOGRAPHY AND LITERATURE SEARCH
Robert A. Jacobson 15 Oct. 1985 19 p
(Contract NAS7-918)
(NASA-CR-176538; JPL-Pub-85-79; NAS 1.26:176538) Avail: NTIS HC A02/MF A01 CSCL 03B

A literature search has yielded more than 10,000 observations of the satellites of Uranus made from 1787 to 1985. The type (photographic, micrometer) and the number of observations are tabulated in 5 year increments and a complete bibliography is provided. Author

N86-20206# Joint Publications Research Service, Arlington, Va.
INTERPLANETARY DISTURBANCE FROM FLARE TRIPLET IN MAY 1981 AS OBSERVED BY PROGNOZ-8 Abstract Only
G. N. Sastenker, N. L. Borodkova, K. G. Ivanov, and N. V. Mikerina *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 99 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 134-142 Original language document was announced in IAA as A85-28496 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20224# Joint Publications Research Service, Arlington, Va.
VENUSIAN INFRARED RADIATION: APPROXIMATE METHODS FOR COMPUTING SPECTRUM IN ABSORPTION BANDS OF ATMOSPHERIC GASES Abstract Only
V. I. Moroz and L. V. Zasova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 119-120 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 259-267 Original language document was announced in IAA as A85-35240 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20225# Joint Publications Research Service, Arlington, Va.
VENUSIAN IMPACT CRATERS ON RADAR IMAGES OF VENERA-15 AND VENERA-16 SPACECRAFT Abstract Only
A. T. Bazilevskiy, B. A. Ivanov, V. P. Kryuchkov, R. O. Kuzmin, A. A. Pronin, and I. M. Chernaya *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 120-121 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 671-674 Original language document was announced in IAA as A85-39150 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20226# Joint Publications Research Service, Arlington, Va.
VENUSIAN EXOGENOUS PROCESSES AND SURFACE ROUGHNESS DETERMINED FROM RADAR OBSERVATIONS Abstract Only
V. P. Kryuchkov and A. A. Pronin *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 121 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 269-275 Original language document was announced in IAA as A85-35241 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20227# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF ERRORS IN RESULTS OF RADIO PROBING OF DAYTIME VENUSIAN IONOSPHERE CAUSED BY ITS ASPHERICITY Abstract Only
A. L. Gavrik and L. N. Samoznayev *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 122 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 148-157 Original language document was announced in IAA as A85-28497 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20228# Joint Publications Research Service, Arlington, Va.
PRINCIPAL TYPES OF STRUCTURES IN VENUSIAN NORTHERN HEMISPHERE Abstract Only
V. L. Barsukov, A. T. Bazilevskiy, R. O. Kuzmin, M. S. Markov, V. P. Kryuchkov, O. V. Nikolayeva, A. A. Pronin, A. L. Sukhanov, I. M. Chernaya, G. A. Burba et al *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 122-123 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 3-14 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20229# Joint Publications Research Service, Arlington, Va.
RADIATIVE HEAT TRANSFER AND WATER CONTENT IN VENUSIAN ATMOSPHERE Abstract Only
M. Ya. Marov, A. P. Galtsev, and V. P. Shari *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 123-124 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 15-41 Original language document was announced in IAA as A86-11963 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20230# Joint Publications Research Service, Arlington, Va.
MODEL OF COMPOSITION OF MARTIAN IONOSPHERE IN PHOTOCHEMICAL EQUILIBRIUM REGION Abstract Only
A. V. Pavlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 124 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 276-282 Original language document was announced in IAA as A85-35242 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20231# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ANALYSIS OF VOLCANIC EFFECT ON CLIMATE OF EARTH AND MARS Abstract Only
K. Ya. Kondratyev, N. I. Moskalenko, S. N. Parzhin, and S. Ya. Skvortsova *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 125 Transl. into ENGLISH from Izvestiya Akademii Nauk SSR: Fizika Atmosfery i Okeana (Moscow, USSR), v. 21, no. 5, May 1985 p 451-459 Original language document was announced in IAA as A85-40637 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20232# Joint Publications Research Service, Arlington, Va.
GLOBAL RESONANCE OF JOVIAN RADIATION BELTS

Abstract Only
P. A. Bespalov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 126 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 72-77 Original language document was announced in IAA as A85-48686 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20233# Joint Publications Research Service, Arlington, Va.
PRELIMINARY RESULTS OF DETERMINATIONS OF PHYSICAL PROPERTIES OF MICROFRAGMENTS OF LUNAR ROCKS FROM SOIL RETURNED BY LUNA-16 AND LUNA-20 STATIONS Abstract Only
G. I. Gorbunov, R. V. Medvedev, and V. V. Chashnikov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 126-127 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 3, Jul. 1985 p 601-604 Original language document was announced in IAA as A85-48686 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20234# Joint Publications Research Service, Arlington, Va.
POLARIMETRIC STUDIES OF MOON AND PLANETS AT ABASTUMANI ASTROPHYSICAL OBSERVATORY Abstract Only
V. P. Dzhapiashvili, O. R. Bolvadze, O. I. Kvaratskheliya, A. N. Korol, and L. A. Sigua *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 127-128 Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 19, no. 1, Jan. - Mar. 1985 p 77-85 Original language document was announced in IAA as A86-11967 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-20282 Rochester Univ., N. Y.
UMBRAL OSCILLATIONS AS A PROBE OF SUNSPOT STRUCTURE Ph.D. Thesis
Toufik El-Hak Abdelatif 1985 229 p
Avail: Univ. Microfilms Order No. DA8516458

The interaction of the solar 5 minute oscillations with a sunspot was explored, both on observational and theoretical grounds. Simple theoretical models were developed to understand the observations of umbral oscillations. The 3 minute and 5 minute umbral oscillations at photospheric heights were detected. The 3 minute oscillations were found to have a kinetic energy density six times higher in the photosphere than in the chromosphere and to be concentrated in the central part of the umbra, supporting the photospheric resonance theory for the 3 minute umbral oscillations. The 5 minute oscillations are attenuated in the umbra, which appears to act as a filter in selecting some of the peaks in the power spectrum of 5-minute oscillations in the surrounding photosphere. The K-omega power spectrum of the umbral oscillations shows a shift of power to longer wavelengths. The variation of the transmission coefficient of trapped acoustic waves along the eigenmode curves is responsible for the selection of the peaks of the 5 minute oscillations. The wavelength shift, due to the different dispersion relations in the nonmagnetic region and the magnetic region, is responsible for the shift of power in the umbral k-omega power spectrum. Dissert. Abstr.

N86-20283*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GLOBAL AURORAL RESPONSES TO MAGNETOSPHERIC COMPRESSIONS BY SHOCKS IN THE SOLAR WIND: TWO CASE STUDIES
J. D. Craven (Iowa Univ., Iowa City, Iowa), L. A. Frank (Iowa Univ., Iowa City, Iowa), C. T. Russell (California Univ., Los Angeles, Calif.), E. J. Smith (JPL, Pasadena, Calif.), and R. P. Lepping Apr. 1985 31 p Original contains color illustrations
(Contract N00014-76-C-0016)
(NASA-TM-88636; NAS 1.15:88636; AD-A161135; U-of-Iowa-85-11) Avail: NTIS HC A03/MF A01 CSCL 04A

Two case studies are presented of the global auroral responses to shocks in the solar wind at Earth. The z-component of the interplanetary magnetic field, Bz, is negative ahead and behind the first shock and positive for the second case. A sudden-commencement geomagnetic storm develops in each case, with maximum D sub st somewhat $<$ 190 nT. An immediate auroral response is detected at all longitudes around the auroral oval, in which auroral luminosities increase by a factor of 2 to 3 with the first samples after each sudden commencement. The time delay in obtaining the first sample varies with local time from about 1 to 18 minutes. No other significant variations in the aurora are associated with the immediate response. Beginning about 30 minutes after each sudden commencement, the aurora becomes active and displays significant variations in its luminosity and spatial distribution. For Bz $<$ 0 an intense substorm develops. a sun-aligned transpolar arc forms when Bz $>$ 0, appearing first at local midnight as a polar arc and then lengthening sunward from the auroral oval across the polar cap to noon at an average speed of about 1 km/sec. GRA

N86-20284# Los Alamos National Lab., N. Mex.
UPPER LIMITS TO THE MASSES OF OBJECTS IN THE SOLAR COMET CLOUD
J. G. Hills 1985 5 p Presented at the 2nd Asteroids, Comets and Meteors Symposium, Uppsala, Sweden, 3 Jun. 1985
(Contract W-7405-eng-36)
(DE85-015713; LA-UR-85-2457; CONF-8506174-1) Avail: NTIS HC A02/MF A01

The lack of a large steady stream of long-period comes with semi-major axes less than 2 x 10 to the 4th power AU rules out the sun having a companion more massive than about 0.01 M/sub solar with a semi-major axis less than about 1 x 10 to the 4th power AU. Any companion with a semi-major axis between 1 x 10 to the 4th power AU and 5 x 10 to the 4th power AU has more than a 50% probability of having entered the planetary system during the lifetime of the Solar System. The lack of apparent damage to the planetary system rules out any companion more massive than about 0.02 M/sub solar with a semi-major axis less than about 5 x 10 to the 4th power AU. DOE

N86-20208# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF INTERACTION BETWEEN SOLAR WIND AND COMETARY PLASMA Abstract Only
A. S. Lipatov *In its* USSR Report: Space (JPRS-USP-86-0010 13 Jan. 1986 p 100 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 158-166 Original language document was announced in IAA as A85-28498 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20215# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF PARAMETRIC APPROACH TO STUDY ON PREFLARE PHENOMENA IN SOLAR PLASMA BY ANALYSIS OF SOLAR RADIO EMISSION FLUCTUATIONS Abstract Only
Ye. A. Averyanikhina, M. M. Kobrin, and I. Ya. Orlov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 105-106 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Radiofizika (Gorkiy, USSR), v. 28, no. 1, Jan. 1985 p 3-10 Original language document was announced in IAA as A85-26726 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20216# Joint Publications Research Service, Arlington, Va.
EVALUATIONS OF EXTERNAL VALUES OF INTEGRAL PROTON FLUXES IN FLARES IN PLANNING OF SPACE FLIGHTS Abstract Only
A. Kolomenskiy *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 106 Transl. into ENGLISH from Kosmicheskiye

Issledovaniya (Moscow, USSR), v. 23, no. 2, Mar. - Apr. 1985 p 315-316 Original language document was announced in IAA as A85-35247 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-20285 Cornell Univ., Ithaca, N.Y.
FAR-INFRARED LINE EMISSION FROM THE GALAXY Ph.D. Thesis
Gordon John Stacey 1985 228 p Previously announced as N85-13702
Avail: Univ. Microfilms Order No. DA8504504

The diffuse 157.74 micron (CII) emission from the Galaxy was sampled at several galactic longitudes near the galactic plane including complete scan across the plane at (II) = 2.16 deg and (II) = 7.28 deg. The observed (CII) emission profiles follow closely the nearby (12)CO (J=1 to 0) emission profiles. The (CII) emission probably arises in neutral photodissociation regions near the edges of giant molecular clouds (GMC's). These regions have densities of approximately 350 cm(-3) and temperatures of approximately 300 K, and amount to 4x10(8) solar mass of hydrogen in the inner Galaxy. The total 157.74 micron luminosity of the Galaxy is estimated to be 6x10(7) solar luminosity. Estimates were also made of the galactic emission in other far-infrared (FIR) cooling lines. The (CII) line was found to be the dominant FIR emission line from the galaxy and the primary coolant for the warm neutral gas near the galactic plane. Other cooling lines predicted to be prominent in the galactic spectrum are discussed. The 145. 53 micron (OI) emission line from the Orion nebula was also measured. M.G.

N86-20286 Princeton Univ., N. J.
A TWO-DIMENSIONAL MODEL FOR RELATIVISTIC GAS JETS Ph.D. Thesis
Kevin William Thompson 1985 233 p
Avail: Univ. Microfilms Order No. DA8520752

Many extragalactic radio sources contain jets of plasma moving away from a central source at relativistic velocities. A two dimensional, cylindrically symmetric, relativistic hydrodynamics model was created to address the issue of jet stability. A description of the model is presented. The derivation of the relativistic fluid dynamics equations, in both conservative and characteristic forms, with specialization to the two dimensional, cylindrical problem is described. The grid and metric specification, the finite differencing, the time integration method, and linear stability theory are discussed. The general problem of boundary condition specification for hyperbolic systems of differential equations, in a space-time with any number of spatial coordinates, is analyzed. Boundary conditions for the relativistic fluid dynamics equations are given for the cylindrical case. Comparison of numerical and analytical solutions to test problems reveals that the numerical scheme represents shocks and smooth solutions properly, but allows excess diffusion at contact discontinjets, indicate that the beam boundary is stable, but that the cocoon boundary is unstable for low Mach number flows. The stability of the beam boundary may be due to excess numerical diffusion. Analytic solutions to the text problems, and the source code for the numerical model, are given. Author

N86-20287# European Space Agency, Paris (France).
RECENT RESULTS ON CATACLYSMIC VARIABLES: THE IMPORTANCE OF IUE AND EXOSAT RESULTS ON CATACLYSMIC VARIABLES AND LOW-MASS X-RAY BINARIES
W. R. Burke, comp. Jun. 1985 311 p refs Workshop held in Bamberg, West Germany, 17-19 Apr. 1985
(ESA-SP-236; ISSN-0379-6566) Avail: NTIS HC A14/MF A01

Cataclysmic variable and low-mass X-ray binary star evolution; dwarf novae; accretion disks; symbiotic stars; AM Her stars; and IUE and EXOSAT results were discussed. For individual titles, see N86-20288 through N86-20340.

N86-20288# Cape Town Univ. (South Africa). Dept. of Astronomy.
NOVA REMNANTS c90
Brian Warner *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 1-6 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The brightest nova remnants and nova-like variables (which are possible candidates for membership of the class of nova remnants) are reviewed. Several nova remnants show multiple periodicities: V603 Aql, HR Del, CP Pup and possibly V1500 Cyg have differing photometric and spectroscopic periods. The cause of this is not known, but there is a similarity with the superhump phenomenon in SU UMa stars. The RR Pic shows changes in structure, 50 yr after the outburst. Author (ESA)

N86-20289# Academy of Sciences (USSR), Moscow. Astronomical Council.
EVOLUTION OF LOW MASS CLOSE BINARIES WITH ORBITAL MOMENTUM LOSSES c90
A. V. Tutukov and L. R. Yungelson *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 7-16 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The formation and evolution of low-mass (M2 < M1 < or = 1.5 solar mass) close binaries influenced by angular momentum loss by radiation of gravitational waves and magnetic stellar wind is reviewed. The frequency of formation of cataclysmic variables and low-mass X-ray sources is 0.005 and 0.00000003 per year, respectively. Results of evolutionary computations of secondaries are presented, which explain the existence of 2 to 3h orbital period gap, 80m minimal period, as well as the existence of unique ultrashort period systems with 15 sup m < or = P < or = 1 sup h. Author (ESA)

N86-20290# Ludwig-Maximilians-Universitaet, Munich (West Germany). Universitaets-Sternwarte.
THE MASS SPECTRUM OF THE WHITE DWARFS IN CATACLYSMIC BINARIES c90
H. Ritter and A. Burkert *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 17-20 refs (For primary document see N86-20287 10-93)
(Grant DFG-Ku-474/8-1)
Avail: NTIS HC A14/MF A01

Using a simple model for the secular evolution of cataclysmic binaries, the extent to which observations would select in favor of massive white dwarfs was investigated. Results show that the selection effect is strong enough to account for the high mean white dwarf mass observed, and that the intrinsic mass spectrum of the white dwarfs in cataclysmic binaries need not be significantly different from that of single white dwarfs. The main reason for the strong selection is found to be the strong dependence on mass of the white dwarf's gravitational potential. Only a very small fraction of the population of cataclysmic binaries is actually observed. Accordingly, the true space density of these objects must be much higher than inferred from observations. Author (ESA)

N86-20291*# Arizona State Univ., Tempe. Dept. of Physics.
ON THE LONG TERM EVOLUTION OF WHITE DWARFS IN CATACLYSMIC VARIABLES AND THEIR RECURRENCE TIMES c90
E. M. Sion and S. G. Starrfield *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 21-23 refs (For primary document see N86-20287 10-93)
(Grants NAG5-343; NSF AST-81-171777; NSF AST-83-14788)

Avail: NTIS HC A14/MF A01 CSCL 03B

The relevance of the long term quasi-static evolution of accreting white dwarfs to the outbursts of Z Andromeda-like symbiotics; the masses and accretion rates of classical nova white dwarfs; and the observed properties of white dwarfs detected optically and with IUE in low M dot cataclysmic variables is discussed. A surface luminosity versus time plot for a massive, hot white dwarf bears a remarkable similarity to the outburst behavior of the hot blue source in Z Andromeda. The long term quasi-static models of hot accreting white dwarfs provide convenient constraints on the theoretically permissible parameters to give a dynamical (nova-like) outburst of classic white dwarfs. Author (ESA)

N86-20292# Technion - Israel Inst. of Engineering, Haifa. Dept. of Physics.

ON ACCRETION OF ANGULAR MOMENTUM FROM AN INHOMOGENEOUS MEDIUM **c90**

M. Livio, N. Soker, M. deKool (Amsterdam Univ., Netherlands), and G. J. Savonije (Amsterdam Univ., Netherlands) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 25-27 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

Accretion onto a compact object from a medium containing a density gradient was studied. Using a three dimensional numerical calculation, it is shown that the mass accretion rate is very close to the Bondi-Hoyle value (when pressure effects are neglected). Only a few percent of the angular momentum deposited into the accretion cylinder are accreted by the compact object. This could have important consequences in the case of neutron stars and white dwarfs accreting from a stellar wind. Author (ESA)

N86-20293# Barcelona Univ. (Spain). Dept. de Fisica de la Tierra y del Cosmos.

THE COLLAPSE OF WHITE DWARFS: A POSSIBLE ORIGIN OF LOW-MASS X-RAY BINARIES **c90**

J. Labay, R. Canal (Inst. d'Estudis Catalans, Spain), E. GarciaBerro, M. Hernanz (Inst. d'Estudis Catalans, Spain), and J. Isern *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 29-32 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

It is shown that if an accreting carbon-oxygen white dwarf is partially solid at the moment of the central ignition, the total disruption of the star may be avoided and the formation of a neutronized remnant ensured. The mass accreting carbon-oxygen white dwarfs could thus account for Type 1 supernovae and the presence of neutron stars in low-mass binaries. The parameter that determines the evolutionary outcome is the degree of chemical differentiation due to solidification before the accretion phase. Maximum separation leads to collapse, possibly without explosion, while partial separation leads to off-center carbon ignition and explosive burning of different amounts of the carbon-oxygen mixture. Even in this last case the formation of a bounded remnant, either a neutron star or a white dwarf, is not ruled out since the solid core would likely survive the explosion. But now, as the ejected matter is much greater, the binary system would probably be disrupted. Author (ESA)

N86-20294# Slovak Academy of Sciences, Tatranska Lomnica (Czechoslovakia). Inst. of Astronomy.

LONGTERM EVOLUTION OF OUTBURST ACTIVITY IN CATACLYSMIC VARIABLE STARS **c90**

Z. Urban *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 33-36 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

It is suggested that the various forms of the outburst activity observed in cataclysmic variables can be interpreted as the more or less alternating phases of the more general outburst activity cycle which repeats many times during the secular evolution of these systems. A crucial role in determining the properties of a particular cycle is played by the energetics, speed class, recurrence time, and heating and cooling time of the classical nova outburst at the beginning and at the end of this cycle. Importance of the recurrent nova T Pyx and a possible significant role of magnetic fields in the evolution of the cataclysmic outburst activity are stressed. Computer codes devoted to the study of the long-term evolution of outburst activity in cataclysmics are described. Author (ESA)

N86-20295*# Washington Univ., Seattle.

MULTIFREQUENCY OBSERVATIONS OF DWARF NOVAE OUTBURSTS **c89**

Paula Szkody *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 39-45 refs Sponsored by ESA (For primary document see N86-20287 10-93)

(Grants NSG5-395; NSF AST-84-05923)

Avail: NTIS HC A14/MF A01 CSCL 03B

Studies using EXOSAT and IUE data combined with ground-based optical and IR photometry, spectroscopy and polarimetry of the transition timescales and physical properties of the high accretion rate states of the disks in cataclysmic variables are discussed. Implications for dwarf novae stem from comparison of the timing and amplitude of the optical and IR rise with that of the UV and X-ray; the development of the optical and UV line profile changes as the outburst develops; and the similarity of the outburst flux distributions in different systems and different types of outbursts (standstills and supermaxima). These features of dwarf novae outbursts present interesting comparisons with the outbursts of systems like TV Col and GK Per. Author (ESA)

N86-20296# Cambridge Univ. (England). Inst. of Astronomy.

ECLIPSE STUDIES OF DWARF NOVAE **c89**

Keith Horne *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 47-53 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

Eclipses used for imaging studies of accretion disks in cataclysmic binaries are described. The light curves of eclipsing dwarf novae reveal the changes that occur in their disks over the course of the outburst cycle. These eclipse studies provide data with which to test models of the dwarf nova outburst. The assumptions that underly the widely discrepant mass determinations for these systems are examined. It is suggested that the most reliable method for estimating the masses employs the eclipse contacts of white dwarf and bright spot and the velocity separation of the emission peaks. Author (ESA)

N86-20297# Tasmania Univ., Hobart (Australia). Dept. of Physics.

SPECTROPHOTOMETRY OF THE ECLIPSING DWARF NOVAE V2051 OPHIUCHI **c89**

D. J. Watts, J. Bailey (Anglo-Australian Observatory, Sydney, Australia), P. W. Hill (St. Andrews Univ., Scotland), and J. G. Greenhill *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 55-59 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

An optical and UV spectrophotometric study of the eclipsing dwarf nova V2051 Oph is presented. The optical and UV spectra are typical of a dwarf nova at quiescence. The observed semiamplitude K1=111 km/sec with a crossing at phase 0.13. This anomalous phase can be reproduced by an asymmetric disk with the trailing lune brighter by 60% than the leading lune. This yields a revised K1=91 km/sec and implies a white dwarf mass of 0.43 M and a companion of mass 0.11 M and radius 0.15 R. The UV to optical continuum can be well fitted by a steady-state optically thick disk model with a turnover at 2500A. If this is related to the maximum temperature of the accretion disk then the system parameters are: maximum disk temperature of 15,500K, M dot = 1.3 times 10 to the minus 10th power M/yr, and distance between 90 and 150 pc. Author (ESA)

N86-20298# Oxford Univ. (England). Dept. of Astrophysics.

THE THEORY AND OBSERVATION OF SUPERHUMPS IN SU UMA SYSTEMS **c89**

P. A. Charles, C. J. Clarke, G. T. Bath, R. Whitehurst, and J. Bailey (Anglo-Australian Observatory, Sydney, Australia) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 61-65

refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The superoutburst phenomenon of dwarf novae is discussed. The SU UMa subclass of dwarf novae exhibit normal outbursts and superoutbursts (duration 2 and 12 days respectively). The principal characteristic of superoutbursts is the presence of superhumps at a period 3% to 7% longer than P orb. Although generally agreed that superoutbursts are the result of an extended period of enhanced accretion, the location of the superhump light source and the mechanism of its formation is a matter of controversy. Photometric data for the eclipsing system Z Cha indicate that the superhump must either reside on the red component as a form of superspot or be an extended region of the accretion disk. Results from spectroscopy during the May 1984 Z Cha superoutburst allow both interpretations. It is shown the general appearance of the superhump can be explained by periodic mass transfer variations which would be expected in the eccentric binary model. Author (ESA)

N86-20299# Ludwig-Maximilians-Universitaet, Munich (West Germany). Universitaets-Sternwarte.
THE SPECTRAL ENERGY DISTRIBUTION OF STATIONARY ACCRETION DISKS IN CATACLYSMIC VARIABLES c90
A. Burkert and G. Hensler *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 67-71 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Rotational energy dissipation effects on cataclysmic variable models are discussed. In order to become accreted onto the primary in cataclysmic variables, the disk matter has to dissipate its excess rotational energy in a thin boundary layer (BL). Applying Pringle's BL model and assuming optically thick accretion, soft X-ray luminosities which are several orders brighter than those observed in many systems can be deduced. The influence of an ellipsoidal BL on the spectral energy distribution is investigated, including its dependence on the aspect angle. The BL thickness and reprocessing of the BL radiation over the disk surface are also taken into account. It is concluded that the BL geometry is between the vertically thin model of Pringle and the ellipsoidal BL. Author (ESA)

N86-20300*# Mount Stromlo and Siding Spring Observatory, Canberra (Australia).
OPTICAL OBSERVATIONS OF NEW X-RAY EMITTING CATACLYSMIC VARIABLES
I. R. Tuohy, D. A. H. Buckley, R. A. Remillard (MIT), H. V. Bradt (MIT), and D. A. Schwartz (Harvard Smithsonian Center for Astrophysics) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 73-76 refs Sponsored by US/Australia Bilateral Science and Technology Agreement and Smithsonian Institution Scholarly Studies Program (For primary document see N86-20287 10-93)
(Contracts NAS8-27972; NAS8-30453; Grants NAG8-493; NSF INT-82-11357)
Avail: NTIS HC A14/MF A01 CSCL 03B

Two X-ray emitting cataclysmic variables were discovered as a result of a program to identify faint X-ray sources located by the HEAO-A3 modulation collimator experiment. The objects, H0534-581 and 1H0542-407, have similar high excitation spectra with intense emission lines showing broad and narrow components. Photometry shows that H0534-581 and 1H0542-407 have average magnitudes of V=14.9 and 15.7 respectively, leading to Lx/Lopt ratios of 1.5 (typical of dwarf novae in quiescence). While pronounced variability of delta B > or = 1.5 mag is observed from both systems, there is no clear evidence for repeatable orbital periods between 1 and 4 hr. Author (ESA)

N86-20301# Osservatorio Astrofisico, Asiago (Italy).
PROBABLE ORBITAL PERIOD FOR THE OLD NOVA CP PUP (1942) BELOW THE CATACLYSMIC BINARY PERIOD GAP c90
A. Bianchini, M. Friedjung (Inst. d'Astrophysique, Paris, France), and F. Sabbadin *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 77-79 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Spectra of the old classical nova CP Pup(1942) were obtained with the IDS detector of the 1.5m ESO telescope. The observed rapid variations of radial velocity and equivalent width of emission lines indicate a very short orbital period of the order of 0.06 days. This is better defined from line peak than line baricenter. A secondary 0.04 day period might exist. Author (ESA)

N86-20302# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Dept. fuer Astrophysik.
ACCRETION DISK INSTABILITIES c90
Friedrich Meyer *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 83-89 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The accretion disk outburst theory based on unstable stationary mass accretion in regions of partial ionization and convection is discussed. Observations of dwarf novae yield support when compared to time dependent model calculations. Apparent contradictions are rather constraints on unknown free parameters in the theoretical models. Observed features of dwarf novae outbursts indicate that alpha should be lower in cold than in hot regions. For reliable theoretical results the structure of transition fronts should be resolved. Quantitative theoretical progress is limited by the unknown frictional process; the difficulty to reliably model the thermally nonrelaxed transition between cold and hot states in presence of a large radial gradient; by imperfect treatment of disk atmospheres and optically thin regions; and by imperfect knowledge of opacities for very cool gas. It is shown that self-irradiations in accretion disks around neutron stars suppress the thermal instability but can lead to nonlinear mass flow variations on the long diffusive timescale, relevant for low mass X-ray binaries. Author (ESA)

N86-20303# Crimean Astrophysical Observatory (USSR).
SYMBIOTIC STARS c90
A. A. Boyarchuk *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 97-100 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Hypotheses on the nature of symbiotic stars are discussed. Arguments for binary nature of symbiotic stars are presented. Hot components of symbiotic stars are located on the temperature-luminosity diagram as the central stars of planetary nebulae. Author (ESA)

N86-20304# Nicolaus Copernicus Univ., Torun (Poland). Inst. of Astronomy.
ON THE NATURE OF CI CYGNI c90
J. Mikolaejewska *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 101-104 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Secular and eclipse variations of CI Cyg optical emission lines during 1979-1984 are presented. Hydrogen and helium lines show pronounced but nontotal eclipse effects while forbidden lines do not show such effects. This suggests that these lines are produced in different parts of the nebula. The physical and geometrical parameters of the line formation regions are determined. The parameters characterizing the boundary layer (T = 100,000 to 150,000 K, L = 1000 to 2000) responsible for the excitation and ionization in the nebula and the accretion rate are estimated. Author (ESA)

N86-20305# Nicolaus Copernicus Univ., Torun (Poland). Inst. of Astronomy.
THE H-BETA AND H-GAMMA PROFILES IN CH CYGNI DURING THE RECENT DROP OF BRIGHTNESS c89
M. Mikolaejewski and R. Biernikowicz *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 105-108 refs (For primary document see N86-20287 10-93)

Avail: NTIS HC A14/MF A01

Observations of H-beta and H-gamma profiles in CH Cygni during 1982-84 are presented. The profiles consist of two emission peaks (V>R) cut by sharp absorption. Sudden changes in the radial velocities and intensities of H-beta and H-gamma profile components as well as a drop of continuum are observed since mid-1984. The binary model of CH Cygni and possibility of occurrence of eclipses in this system are considered. Observational data are insufficient to distinguish between single and binary star models. Author (ESA)

N86-20306# Tel-Aviv Univ. (Israel). Wise Observatory.
THE AG DRA: A CASE OF A STELLAR WIND ACCRETOR **c90**
E. M. Leibowitz, L. Formiggini, and H. Netzer *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 109-112 refs Sponsored by Israel Academy of Sciences (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Optical observations of the symbiotic star AG Dra indicate the presence of an accretion luminous disk in the system. The disk is fed by stellar wind from the cool component in the system. The binary revolution of the hot component within the nontransparent wind may account for the observed optical light curve of the system in the U, B and V photometric bands. Author (ESA)

N86-20307# Academy of Sciences (USSR), Moscow. Astronomical Council.
THE SYMBIOTIC NOVA PU VUL **c90**
B. M. Shustov and A. V. Tutukov *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 113-115 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

An evolutionary scenario for PU Vul (Kuwano-Honda object) behavior beginning from 1978 is discussed. The star is identified as a very slow nova. It passed through phases of outburst, almost constant brightness with small amplitude quasiperiodic oscillations, and expansion of the dusty envelope. Author (ESA)

N86-20308# European Space Agency. European Space Operations Center, Darmstadt (West Germany). EXOSAT Observatory.
THE EXO 0748-676: AN EXCITING NEW X-RAY TRANSIENT
A. N. Parmar, M. Gottwald, F. Haberl, P. Giommi, and N. E. White *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 119-122 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The results of EXOSAT observations of the X-ray transient EXO 0748-676 are presented. This source shows X-ray eclipses, irregular intensity dips, and X-ray bursts. The eclipses last for 8.3 min and recur with a period of 3.8 hr. The intensity dips occur between phases 0.5 and 0.1 (where center of eclipse is 0.0) and are associated with an increase in low energy absorption. As the intensity of EXO 0748-676 decayed by a factor 2 over an interval of 50 days the shape of the 2 to 10 keV light curve changed such that the dips were centered on phase 0.0. In addition to 18 single type 1 bursts, 3 double X-ray bursts are observed. The luminosity of the second burst in a pair is 0.3 of the first. The rise and decay times of the second bursts appear to be more rapid than the first bursts. Author (ESA)

N86-20309# European Space Agency. European Space Operations Center, Darmstadt (West Germany). EXOSAT Observatory.
THE SPECTRAL AND TEMPORAL VARIABILITY OF GX 13+1 **c89**
L. Stella, N. E. White, and B. G. Taylor (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 125-128 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The results of an EXOSAT observation of the bright galactic bulge X-ray source GX 13+1 are reported. Short term aperiodic variability with characteristic timescales of 1sec, similar to that observed from the black hole candidate Cyg X-1, is found. The spectrum consists of 2 components and displays 2 different types of intensity correlated spectral changes, the transition between the 2 modes occurring in 1hr. The source is compared with other galactic bulge X-ray sources and with the black hole candidates in their high state. Author (ESA)

N86-20310# Leicester Univ. (England). Dept. of Astronomy.
ACCRETION PROCESSES IN THE MAGNETIC CATACLYSMIC VARIABLES **c90**
A. R. King *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 133-138 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Accretion processes in magnetic cataclysmic variables are reviewed. The evolutionary status of the synchronous and nonsynchronous systems is discussed, as are the system geometries and their hard and soft X-ray emission. It is argued that accretion disks may not form in nonsynchronous (intermediate polar) systems with orbital periods < or = 5 hr. Author (ESA)

N86-20311# Anglo-Australian Observatory, Sydney.
MULTIWAVELENGTH OBSERVATIONS OF AM HERCULIS TYPE BINARIES
Jeremy Bailey *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 139-149 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Observational data on the 10 AM Her type binaries are compared with models. The origin of the components of the radiation observed from such objects is discussed. Multiwavelength photometry and polarimetry of AM Her systems in the optical and near IR in conjunction with models of the cyclotron emission can be used to constrain the temperature, size, and shape of the emission region. The data require temperatures of order 20keV indicating that cyclotron radiation is produced in the shock heated region and not in cooler preshock regions, and indicate small flat emitting regions with diameter 10 times the height. Such observations can also yield information on the temperature structure within the emitting region. Author (ESA)

N86-20312# Amsterdam Univ. (Netherlands). Inst. of Astronomy.
SPIN UP OF THE WHITE DWARF IN THE INTERMEDIATE POLAR AO PSC/H2252-035
J. vanParadijs, H. Kraakman, S. vanAmerongen, E. Damen, and H. Tjemkes *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 151-153 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

From photometric observations of AO Psc/H2252-035, made with the 90 cm telescope at ESO, times of maximum light for the orbital and the 2 pulsational light curve are derived. Combining these with previous values reveals that both pulse periods show a secular decrease. The spin-up rate of the white dwarf equals -6.6 +or- 1.1 10 to the minus 11th power 10-11, in good agreement with the prediction of Lamb and Patterson (1983) for an accreting magnetized white dwarf, rotating near its equilibrium period. However, the inferred low value of the white-dwarf magnetic field is in conflict with the conclusion of King, Frank and Ritter (1985), that there is no systematic difference between the white-dwarf magnetic fields in polars and intermediate polars. Author (ESA)

N86-20313# Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
ORBITAL AND FAST VARIABILITY OF THE AM-HER SYSTEM H1405-45 IN THE X-RAY AND OPTICAL RANGES
J. M. Bonnet-Bidaud, K. Beuermann (Technische Univ., Berlin, West Germany), P. A. Charles (Oxford Univ., England), L. Maraschi (Milan Univ., Italy), C. Motch (Observatoire de Besancon, France), M. Mouchet (Observatoire Paris-Meudon, France), J. P. Osborne (ESOC, Darmstadt, West Germany), E. Janzi (CNR, Milan, Italy), and A. Treves (Milan Univ., Italy) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 155-159 refs (For primary

document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Simultaneous X-ray and optical observations of the magnetic white dwarf binary H1405-45 are presented. The orbital modulation at the period of 101 min is clearly observed in soft and hard X-rays with EXOSAT as well as from 0.4 to 2.2 mu. The soft, optical, and infrared light curves show a pronounced minimum at the same phase, while the hard X-rays present a roughly correlated maximum. Fast optical photometry, obtained simultaneously with EXOSAT, reveals the presence of variable (0.3 to 0.7 Hz) fast oscillations. Searches for an X-ray counterpart of these oscillations are inconclusive. The temporal and spectral characteristics of the light modulation in H1405-45 favor a two-poles model similar to AM-Her. The shift of the accretion from one pole to the other could possibly explain the phase jitters observed in both sources.
Author (ESA)

N86-20314# European Space Agency. European Space Operations Center, Darmstadt (West Germany). EXOSAT Observatory.
X-RAY, OPTICAL AND UV OBSERVATIONS OF THE AM HER OBJECT E2003+225
J. P. Osborne, K. Mukai (Oxford Univ., England), J. M. Bonnet-Bidaud (CEA, Saclay, France), P. A. Charles (Oxford Univ., England), R. Corbet (Oxford Univ., England), P. Henry (Hawaii Univ.), G. Hill (Hawaii Univ.), S. Kahn (California Univ., Berkeley), M. vanDerklis (ESA/ESTEC, Noordwijk, Netherlands), L. Maraschi (Milan Univ., Italy) et al *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 161-165 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Quasi-simultaneous EXOSAT, low resolution spectrophotometric optical, and IUE observations of the AM Her object E2003 = 225 made in October 1983, and simultaneous high resolution optical and phase-resolved IUE observations made in July 1984 are presented. The soft X-ray light curve shows two maxima per orbital period and two eclipses. The EXOSAT 500 1/mm grating observation limits the blackbody temperature to 18 to 29 eV. The blackbody luminosity exceeds the bremsstrahlung luminosity by a least a factor of 2.3, in contradiction to standard accretion models. In July 1984 systemic velocity = -30 Km/sec for all line components (previous observations) show 300 to 500 Km/sec). Optical minimum and soft X-ray eclipse occur at dia = 0.3, previous observations showed optical minimum at 0.4.
Author (ESA)

N86-20315# Observatoire de Paris-Meudon (France). Dept. d'Astrophysique Fondamentale.
X-RAY ILLUMINATION IN CATACLYSMIC VARIABLES AND LOW MASS X-RAY BINARIES
J. M. Hameury, A. R. King, and J. P. Lasota *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 167-168 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Models for mass transfer variations in cataclysmic variables and soft X-ray transients which involve X-ray illumination of the companion star are examined. It is concluded that models are unable to give limit cycle behavior on the observed time scales.
Author (ESA)

N86-20316# Leicester Univ. (England). X-Ray Astronomy Group.
THE EF ERI: STRUCTURE OF THE X-RAY LIGHT CURVE
M. G. Watson, A. R. King, G. Williams, J. Heise (Space Research Lab., Utrecht, Netherlands), and K. Beuermann (Technische Univ., Berlin, West Germany) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 169-172 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The EXOSAT observations of the AM-Her System EF Eri which cover over 3 cycles of the 81 min binary period are presented. It is shown that the EXOSAT observations require a specific polecap geometry to explain the hard X-ray light curve. Geometrical constraints from polarization data are only consistent with interpretations of the origin of the hard X-ray light curve for polecap sizes f = 0.01, somewhat larger than usually assumed for polars. The soft X-ray light curve arises in a similar manner but its structure is dominated by phase dependent absorption which arises in the accretion flow close to the polecap. The prominent dip occurring at phase 0.45 in soft and hard X-ray light curves is probably due to obscuration by the accretion stream at large distances from the white dwarf. The occurrence of this dip before phase 0.5 indicates that the gas stream does not follow the field lines all the way from the L1 point to the white dwarf.
Author (ESA)

N86-20317# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
GEOMETRY AND MAGNETIC FIELD OF THE AM HER STAR H0139-68
A. Schwope and K. Beuermann *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 173-174 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Results of X-ray and optical observations of the AM Her star H0139-68 during its low state at V = 17 to 18 are reported. The data are consistent with accretion onto one active pole. The most probable geometry of the system is characterized by an inclination of i = 25 deg, and a magnetic colatitude of 98 deg. Spectrophometry reveals Zeeman absorption features near H alpha and H beta. For a dipole field, the implied polar field strength is 39 MG.
Author (ESA)

N86-20318# Max-Planck-Inst. fuer Extraterrestrische Physik, Garching (West Germany).
X-RAY OBSERVATIONS OF CLASSICAL NOVAE DURING THE OUTBURST STAGE BY EXOSAT
Hakki Oegelman, Klaus Beuermann, and Joachim Krautter (Landessternwarte Koenigstuhl, Heidelberg, West Germany) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 177-179 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Soft X-ray observations of Nova Mus 83 and Nova Vul 84(1) by EXOSAT are described. Nova Mus 83 continues to emit X-rays 18 and 23 months after the outburst at the same intensity as the original observation 15 months after outburst. Nova Vul 84(1) was observed at optical maximum and not detected; a second observation three months later yields a 2 sigma signal. The results are discussed in terms of the possible origin of the X-rays. A hot white dwarf model is suggested.
Author (ESA)

N86-20319# Institut d'Astrophysique, Paris (France).
THE ORIGIN OF THE PRINCIPAL SYSTEM AND THE PRESENCE OF VERY HOT REGIONS OF NOVAE
M. Friedjung *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 181-182 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Collisions between high velocity material nearer the center of a nova envelope during outburst, and slower moving material further out are discussed. Within the framework of continued ejection models, the theory is similar to that for the interaction of stellar winds with the interstellar medium. The principal velocity system, which eventually contains most of the envelope mass, could be due to a shell formed by the collision of a continuously ejected wind with material ejected before maximum light. Hot gas would be formed as a result of collision from about 10 days after maximum light onwards, and could sometimes contribute significantly to the production of coronal emission lines and X ray emission.
Author (ESA)

N86-20320# Indian Inst. of Astrophysics, Bangalore.
SPECTROPHOTOMETRY OF NOVA VULPECULAE 1984-1 c89
B. S. Shylaja *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 183-185 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The spectrophotometric observations of the nova Vulpeculae,

1984-1 obtained in September 84 are reported. Emissions were identified and compared with other novae. The nova appears to be in early decline phase and falls into the category of slow novae. Author (ESA)

N86-20321# Observatoire de Haute Provence, Forcalquier (France).
NOVA VULPECULAE 1984-2 NEAR THE MAXIMUM OF LIGHT
Y. Andrillat and L. Houziaux (Mons Univ., Belgium) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 187-191 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The spectra of Nova Vul 1984-2 are discussed. They are like the spectra of other novae near maximum of light, but Nova Vul 1984-2 is a typical slow nova. The most unusual spectroscopic feature of this nova seems to be the relative strength of Mg II and Mg I lines. As turbulent mixing between the white dwarf and the accreted material can lead to CNO enrichments, such a mixing of core matter can explain the overabundance of Mg if one assumes a massive O-Ne-Mg white dwarf. Author (ESA)

N86-20322*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for Astronomy and Solar Physics.
FUTURE ULTRAVIOLET OBSERVATIONS FROM SPACE
Yoji Kondo *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 193-194 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Astronomical facilities to observe from space in the ultraviolet are reviewed. For the immediate future, IUE and the extreme ultraviolet spectrometers of Voyager 1 and Voyager 2 are available for furthering knowledge of cataclysmic variables. The Hubble Space telescope is scheduled for launch in 1986 and will be available to guest observers. The Far Ultraviolet Spectroscopic Explorer, which is expected to provide the capability to observe in the far and extreme ultraviolet, is planned for launch in the 1990s. Author (ESA)

N86-20323# Observatoire de Paris-Meudon (France). Dept. d'Astrophysique Fondamentale.
BUGS IN THE METHODS FOR DETERMINING THE EFFECTIVE TEMPERATURES OF IONIZING STARS IN SYMBIOTICS AND NOVAE c89
R. Tylenda and G. Stasinska *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 197-199 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Using models of photoionized nebulae, methods for determining the effective temperatures of ionizing stars in symbiotics and novae in the nebular stage were tested. It is found that the methods seriously underestimate the stellar temperatures for Teff > 150,000 K. It is suggested that symbiotics and novae may possess stars much hotter than the value of 150,000 K quoted in the literature. This agrees with the theory of these objects which predicts that the white dwarfs after a nova-like outburst should go through a phase of very high effective temperatures. Author (ESA)

N86-20324# Nicolaus Copernicus Univ., Torun (Poland). Inst. of Astronomy.
BALMER LINE PROFILES DURING THE 1975 ECLIPSE OF CI CYGNI
J. Mikolajewska and M. Mikolajewski *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 201-203 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Balmer line profile variations of CI Cygni during the initial phase of 1975 eclipse were analyzed. The eclipse in Balmer series starts before the first contact of the V light curve. Variations of H-beta and H-delta profiles during the eclipse ingress suggest that a rotating and possibly expanding ring is eclipsed. Author (ESA)

N86-20325# Osservatorio Astronomico, Turin (Italy).
THE NEBULAR PHASE OF THE OUTBURST OF CH CYG
P. L. Selvelli and M. Heck *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 207-211 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The IUE observations of CH Cyg show that the UV continuum is very weak and completely flat, and that the line spectrum is dominated by numerous and strong emissions. A wide ionization range exists, indicating stratification in the ionization conditions. The width of the emissions increases with ionization, irrespective of the permitted or semiforbidden character of the transmission. A decrease in the density of the line emitting region is indicated by the appearance of the [CIII] lambda 1906.7 emission. The observations clearly indicate that the outburst started in 1977 is nearly ended. Author (ESA)

N86-20326# Remeis Sternwarte, Bamberg (West Germany).
THE STRUCTURE OF THE CATACLYSMIC VARIABLE GD 1401
I. Bues *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 215-216 ref (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Spectra of GD 1401, a faint (V = 14 m.4) apparently cataclysmic object are presented. The generally accepted model for novalike systems fails to explain the stong Balmer lines in absorption at all phases. A nonstandard model, where the accretion disk is optically thin in the visible region of the spectrum is proposed. The main contribution of the flux is provided by a white dwarf of spectral type DA; the emission components at certain phases are due to hot regions in the disk, or in the outermost layers of the white dwarf. Author (ESA)

N86-20327# Ludwig-Maximilians-Universitaet, Munich (West Germany). Universitaets-Sternwarte.
SYNTHETIC SPECTRA OF DWARF NOVA DISKS
C. laDous *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 217-220 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Applying codes for stellar atmosphere computation, the ultraviolet and optical spectra of accretion disks in cataclysmic variables are investigated with assumed parameter sets characteristic of dwarf novae. As few and as simple assumptions as possible are made. The influence of the input parameters (mass, angle of inclination, assumed size, geometrical height) on the wavelength dependence of the radiation in optical and ultraviolet wavelengths is discussed. Author (ESA)

N86-20328# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany).
THE 3000 SEC X-RAY VARIATIONS OF GK PER: EVIDENCE FOR TRANSITION FRONTS IN THE INNER ACCRETION DISK
W. J. Duschl, E. Meyer-Hofmeister, and F. Meyer *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 221-222 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The 3000 sec modulation of the X-ray light curve of GK Per in the 1983 outburst is discussed. It is suggested that the timescale of running accretion fronts in the limited region lies between the thermal timescale and the diffusion timescale through the disk. The small instable region contributes only very little to the optical light (of order 1/100). The observed modulation of the optical light by 5% to 8% over 3000 sec could be understood as an effect of disk irradiation which varies with the central mass flow. Author (ESA)

N86-20329# Universidad Complutense, Madrid (Spain). Dept. de Astrofisica.
THE ULTRAVIOLET BEHAVIOR OF Z ANDROMEDAE DURING QUIESCENCE AND OUTBURST
T. Fernandez-Castro, A. Gimenez, M. Friedjung (Inst. d'Astrophysique, Paris, France), A. Cassatella (ESA, Madrid, Spain), and R.

Viotti *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 225-227 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The UV variability of Z Andromedae symbiotic stars was monitored by IUE. Results show that the observed UV-near Ir energy distribution can be accounted for by three components: a latetype giant star, responsible for the observed flux in the near IR; a compact object providing the observed spectrum in the far-UV; and an extended nebular region giving rise to gas recombination continuum and emission lines. Author (ESA)

N86-20330# Institut d'Astrophysique, Paris (France).
NOVA EXPLOSION ON OXYGEN NEON MAGNESIUM WHITE DWARFS
P. Delbourgo-Salvador, R. Mochkovitch, and E. Vangioni-Flam *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 229-232 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Nova explosions in cataclysmic variables containing an oxygen neon magnesium white dwarf are considered. It is shown that these systems might contribute to a non negligible fraction of the observed classical nova outbursts. Using a simple model, the time evolution of bolometric luminosity, effective temperature, and temperature and density at the bottom of the accreted layer during one outburst are calculated. The consequences of shear mixing between the accreted layer and the white dwarf material are investigated in relation with observations of 2 neon enriched novae (Nova V 693 CrA 1981 and Nova Aql 1982). Nucleosynthesis in such objects is discussed. Author (ESA)

N86-20331# Erlangen-Nuremberg Univ. (West Germany). Inst. of Astronomy.
CONTINUUM AND LINE PROFILE VARIATIONS OF THE NOVA-LIKE SYSTEM V3885 SGR c89
K. Haug and H. Drechsel *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 233-236 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Optical spectroscopic measurements with high time resolution of the UX UMa-type system cataclysmic variable V3885 Sgr (= CD -42 deg 14462) were obtained in 1982 and 1983. The spectra are characterized by very broad (FWHM = 3000 km/sec) and shallow Balmer absorption lines with superimposed complex emission components. In 2 spectra of 1982, the H beta line exhibits a marked P Cygni profile shape and spectral features of TiO bands can be detected. The continuum fluxes and the complex Balmer emission features show phase-dependent intensity variations. The flux modulations can be interpreted by short term eclipses of the disk by the secondary component and by a variable line of sight aspect of an extended bright spot region on the following side of the accretion disk. Author (ESA)

N86-20332# Osservatorio Astrofisico, Asiago (Italy).
ULTRAVIOLET AND OPTICAL OBSERVATIONS OF THE INTERMEDIATE POLAR 3A 0729+103 c89
R. Falomo, P. A. Charles (Oxford Univ., England), R. Corbet (Oxford Univ., England), L. Maraschi (Milan Univ., Italy), G. Tagliaferri (Milan Univ., Italy), E. G. Tanzi (CNR, Milan, Italy), and A. Treves (Milan Univ., Italy) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 239-243 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The Ariel V X-ray source 3A 0729 + 103 was observed by IUE at 1200 to 3200A, and by quasi simultaneous optical spectrophotometry at 5300 to 7000 A. The overall energy distribution is similar to that of other intermediate polars, but reaches a maximum at 1200A. Temperature = 60,000 K, as opposed to reported values of 150,000 to 200,000 K for other polars. This is due to a smaller ratio of the outer to the inner radius of the disk (17, as opposed to 50 to 80 for other polars). Author (ESA)

N86-20333# Helsinki Univ. of Technology, Espoo (Finland). Observatory and Astrophysics Lab.
FIVE-COLOR POLARIMETRY OF AM HERCULIS c89
V. Piirola, O. Vilhu, J. Kyroelaeinen, N. Shakhovskoi (Crimean Astrophysical Lab., USSR), and Y. Fimov (Crimean Astrophysical Lab., USSR) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 245-249 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Simultaneous UBVRI polarimetric and photometric observations, carried out in June 1984, on the cataclysmic variable AM Her are reported. They show a broad linear polarization pulse (or 2 overlapping spikes) and the inclination 35 to 40 deg can be derived from the phase dependence of the position angle. The latitude of the magnetic pole (= 5 to 65 deg) depends on wavelength, if derived from the 2 subsequent crossovers of the circular polarization. The observations are compared with the warm (< 1keV) magnetoactive plasma computations above the hot (> or = 20 keV) shock-heated region. To explain better the wavelength dependence of the polarization curves, new physical processes and/or new ranges of the model parameters should be included in the plasma computations. However, the overall shape of the orbital phase dependent variations seems to be adequately explained by the changing viewing angle between the line of sight and the magnetic field lines. Author (ESA)

N86-20334# Tuebingen Univ. (West Germany). Inst. fuer Astronomie.
ON THE 4-DAY PHASE-DEPENDENCE OF THE 5.2 HOUR PHOTOMETRIC MAXIMA AND MINIMA IN THE INTERMEDIATE POLAR TV COLUMBA
D. J. Watts *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 251-253 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The light curve of cataclysmic variable TV Col (2A0526 328) is discussed. Its spectroscopic period (5.5 hr) is different from its short photometric period of 5.2 hr. The beat period between the 2 shorter periods is also present as a 4.024 day photometric variation. The phase shifts of the 5.2 hr photometric period over the 4 day photometric cycle are shown to be reproducable by the addition of the weaker photometric moculation at the orbital period of 5.5 hr. Author (ESA)

N86-20335# Tuebingen Univ. (West Germany). Inst. fuer Astronomie.
SOME COMMENTS ON THE ANOMALOUS RADIAL VELOCITY PHASE SHIFTS IN CATACLYSMIC VARIABLES
D. J. Watts *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 255-258 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Brightness asymmetry in the accretion disks of cataclysmic variables are discussed. In several cataclysmic variables, the phase of superior conjunction as determined by radial velocity measurements is later than conjunctions determined by eclipse timings and/or the phase of inferior conjunction from the absorption lines of secondaries. These shifts are explained as a result of the gas stream from secondary penetrating deeply in the disk and causing asymmetries in the distribution of emission. Author (ESA)

N86-20336# Tuebingen Univ. (West Germany). Inst. fuer Astronomie.
SPECTRAL AND INFRARED DIFFERENCES BETWEEN NOVA-LINKS AND DWARF NOVAE c89
D. J. Watts *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 259-262 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Differences between nova-like systems and dwarf nova are compared using the emission lines and infrared colors as a discriminant. The comparison using spectral lines clearly separates different classes of cataclysmic variables. Most nova-likes occupy

the region near the line that describes the polars and intermediate polars indicating very similar ionization conditions. Several nova-likes are located within the dwarf novae region. Infrared data show that nova-likes tend to be redder than dwarf novae. Author (ESA)

N86-20337# Consiglio Nazionale delle Ricerche, Frascati (Italy). Inst. di Astrofisica Spaziale.
THE EXOSAT OBSERVATIONS OF THE X-RAY SOURCE IN THE GLOBULAR CLUSTER TERZAN 2
B. M. Belli, F. DAntona, D. Molteni (Osservatorio Astronomico, Rome, Italy), and M. Morini (CNR, Palerma, Italy) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 263-265 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The Globular Cluster X-ray source 4U1722-30 was observed with EXOSAT on 1985 March 14. The observed spectrum and the luminosity, 3.8 times 10 to the 36th power erg/sec, are consistent with Einstein observations of this source. No long term or burst temporal variability are apparent during the 11 hr of observation, but shot noise with typical time scale of 3.5 sec is revealed by autocorrelation analysis. The result is relevant in the context of the models proposed for accretion disks around the compact component in interacting binary systems. Author (ESA)

N86-20338# Ceskoslovenska Akademie Ved, Ondrejov. Inst. of Astronomy.
VERY LONG-TERM PHOTOMETRY OF HZ HER=HER X-1 AND V1727 CYG=4U2127+47: ACTIVE AND INACTIVE STATES c89
R. Hudec, W. Wenzel (Academy of Sciences, Sonneberg, East Germany), W. Goetz (Academy of Sciences, Sonneberg, East Germany), G. Richter (Academy of Sciences, Sonneberg, East Germany), H. Huth (Academy of Sciences, Sonneberg, East Germany), and J. Drbohlav (Rtyne Observatory, Poland) *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 267-271 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Very long-term photographic monitoring of X-ray binary systems HZ Her=Her X-1 and V1727 Cyg=4U 2127+47 provided data on their long-term evolution and behavior. The long-term behavior of both objects is similar, showing drastic changes of luminosity between active and inactive states, suggesting that the physical properties of both systems are analogous. The significance of long-term optical monitoring in X-ray astronomy is discussed. Author (ESA)

N86-20339# European Space Agency. ESA Tracking Station, Madrid (Spain). IUE Observatory.
ULTRAVIOLET OBSERVATIONS OF THE RECURRENT NOVA RS OPH IN OUTBURST
A. Cassatella, B. J. M. Hassall, A. Harris (Science Research Council, Chilton, England), and M. A. J. Snijders (Royal Greenwich Observatory, Hailsham, England) *In its* Recent Results on Cataclysmic Variables Jun. 1985 p 281-284 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

Results of UV monitoring by IUE of the recurrent nova RS Oph during the first 3 months after its outburst (Jan 1985) are reported, and compared with UV spectra at quiescence. The object is rather heavily reddened. Its distance is estimated as 1.3 Kpc. The decline phase is characterized by an increase of the degree of ionization and by a decrease of the electron density in the ejecta. Forbidden emission lines from FeXI and FeXII are detected in the IUE spectra taken in the later stages of the decline. High resolution IUE spectra show complicated emission line profiles, potentially important to study the dynamics of the ejection and the geometry of the system. Author (ESA)

N86-20340# Astronomical Research Ltd. (New Zealand).
THE SU UMA TYPE DWARF NOVA TU MENSAE
Frank M. Bateson *In* ESA Recent Results on Cataclysmic Variables Jun. 1985 p 287-288 refs (For primary document see N86-20287 10-93)
Avail: NTIS HC A14/MF A01

The optical behavior of TU Mensae, a southern dwarf nova of the SU Uma subgroup, the past two decades is outlined. It is suggested that the nature of its variations changed with time, and that it warrants closer photoelectric observations. Author (ESA)

N86-20189# Joint Publications Research Service, Arlington, Va.
OPTICAL RADIATION AND RADIO EMISSION ACCOMPANYING COSMIC GAMMA BURSTS Abstract Only
N. N. Vzorov, L. P. Gorbachev, A. Yu. Matronchik, and K. S. Mozgov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 85-86 Transl. into ENGLISH from Pisma v Astronomicheskiy Zhurnal (Moscow, USSR), v. 11, no. 6, Jun. 1985 p 444-447 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

N86-20205# Joint Publications Research Service, Arlington, Va.
DYNAMICS AND PREDICTION OF RADIATION CHARACTERISTICS OF SOLAR COSMIC RAYS Abstract Only
V. V. Bengin, L. I. Miroshnichenko, and V. M. Petrov *In its* USSR Report: Space (JPRS-USP-86-001) 13 Jan. 1986 p 98 Transl. into ENGLISH from Kosmicheskiye Issledovaniya (Moscow, USSR), v. 23, no. 1, Jan. - Feb. 1985 p 123-133 Original language document was announced in IAA as A85-28494 (For primary document see N86-20178 10-88)
Avail: NTIS HC A03

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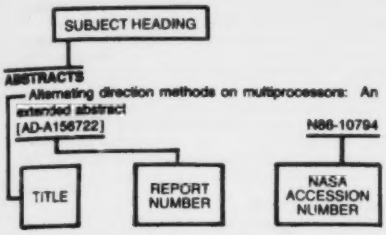

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[AD-A159996] N86-19825
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[JPRS-UBB-86-001] N86-19828
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[AD-A161119] N86-20102
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Aerospace medicine and biology: A continuing bibliography with indexes (supplement 281)
[NASA-SP-7011(281)] N86-19850
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BIOPHYSICS
USSR report: Life sciences. Biomedical and behavioral sciences
[JPRS-UBB-86-001] N86-19828
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[JPRS-UBB-86-001] N86-19828
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[NASA-CR-178025] N86-19554
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Comparison of bradycardia breath-hold on divers and nondivers: Its importance for the capacity visit of divers N86-19863
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[AD-A159692] N86-19812
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Thermovisual indicators of brain response to visual stimuli N86-19843
Biological investigations of adaptive networks. Neuronal control of conditioned responding
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[AD-A160821] N86-19900
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[DE85-016072] N86-19573
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[TI85-901403] N86-19774
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[BBC-RD-1985/12] N86-19491
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[AD-A161250] N86-19475
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[ISL-CO-201/85] N86-19476
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C

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Interface chemistry of ternary semiconductors: Local morphology of the Hg(1-x)CdxTe-Cr interface
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Solar cell calibration facility validation of balloon flight data: A comparison of shuttle and balloon flight results
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Results of the 1985 NASA/JPL balloon flight solar cell calibration program
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[AD-A161057] N86-19802
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[ECN-161] N86-20048
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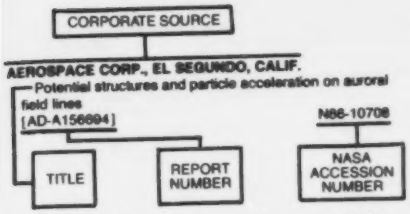

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SOURCE

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Microcomputer controlled current sharing experiments with parallel convertors
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Correlation of results of an OH-58A helicopter composite tail boom test with a finite element model
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Proceedings of the ISTVS (International Society for Terrain-Vehicle Systems) Workshop on Measurement and Evaluation of Tire Performance under Winter Conditions, Alta, Utah, 11-14 April 1983
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The influence of individual factors in man on bubble formation in air diving decompression N86-19681
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An approach to developing specification measures N86-19968
CONSIGLIO NAZIONALE DELLE RICERCHE, FRASCATI (ITALY).
The EXOSAT observations of the X-ray source in the globular cluster Terzan 2 N86-20337
COPENHAGEN UNIV. (DENMARK).
Excursion limits in shallow water heliox saturation diving N86-19877
CORNELL UNIV., ITHACA, N.Y.
Inelastic deformation and microstructural analysis of transition metal carbides N86-19381
Acoustic emission source characterization of fatigue cracks in 7075-T6 aluminum alloy thin plate N86-19434
Reliable communication in an unreliable environment, revision
[AD-A161125] N86-19501
Trajectory control and obstacle avoidance for robot manipulators with bounded inputs N86-19608
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Radar interferometer observations and theory of plasma irregularities in the auroral ionosphere N86-19767
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Optimally bounded score functions for generalized linear models with applications to logistic regression
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On evaluating strain fields in silicon 001 twist grain boundaries using electron diffraction N86-20151
Dislocation reactions at grain boundaries and their role in the mechanical behavior of crystalline interfaces N86-20152
Far-infrared line emission from the galaxy N86-20285
CRIMEAN ASTROPHYSICAL OBSERVATORY (USSR).
Symbiotic stars N86-20303

D

DEFENCE AND CIVIL INST. OF ENVIRONMENTAL MEDICINE, DOWNSVIEW (ONTARIO).
Investigation of the method to determine carboxyhaemoglobin in blood
[AD-A161061] N86-19892
DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON (ENGLAND).
Influence of initial residual stress on fatigue crack propagation
[BLL-DRIC-TRANS-7578-(3623.86)] N86-19648
DELFT HYDRAULICS LAB. (NETHERLANDS).
Modeling of hypolymnetic water quality in deep pits created by sand dredging in the Lake Ussel area
[PUBL-323] N86-19758
DELTA INFORMATION SYSTEMS, INC., HORSHAM, PA.
Development of a methodology to test video codecs used in teleconferencing
[AD-A160878] N86-19498
DENVER UNIV., COLO.
Damage progression in fiber composites during repeated loading
[DE85-017282] N86-19404
DEPARTMENT OF THE ARMY, WASHINGTON, D. C.
Millimeter wave-infrared Bloch oscillator/detector
[AD-D011950] N86-19533
Method of protecting a radiochromic optical waveguide dosimeter from adverse temperature effects
[AD-D011949] N86-19592
DEPARTMENT OF THE NAVY, WASHINGTON, D. C.
Triaxial optical fiber system for measuring magnetic fields
[AD-D011941] N86-20127
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).
Mechanical properties and damage mechanisms of carbon fiber-reinforced composites. Tension loading
[DFVLR-FB-85-45] N86-19384
Test facilities N86-19385
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
High pressure oxygen (OHP) induced increase of serum prolactin is not due to a dopamine (DA)-receptor blockade N86-19867
Hygienic aspects of water supply for chamber sanitary facilities, changes of divers' bacterial mouth flora and effectiveness of ear prophylaxis in saturation dives N86-19874
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, WESSELING (WEST GERMANY).
Sensory feedback structures in robotics N86-19633
DIRECTION DES CONSTRUCTIONS ET ARMES NAVALES, TOULON (FRANCE).
Ultrasonic detection of circulating bubbles in ewes exposed to simulated dives deeper than 800 msw under isobaric conditions and with unchanged gas mixtures N86-19882
Less bubble formation in women divers N86-19883
DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
Study of the use of lightweight shipborne terminals for maritime satellite telecommunications
[ESA-CR(P)-2115] N86-19341
BLSS, a European approach to CELSS N86-19908
DREXEL UNIV., PHILADELPHIA, PA.
A fundamental study of P/M processed elevated temperature aluminum alloys N86-19429
A comparison of document clusters derived from co-cited references and co-assigned index terms N86-20166
DUESSELDORF UNIV. (WEST GERMANY).
Wet chamber dives to test algorithms for electronic decompressiometers N86-19878
DUKE UNIV., DURHAM, N. C.
A single server queue in a hard-real-time environment
[AD-A160340] N86-20053

DUNLAP AND ASSOCIATES, INC., DARIEN, CONN.
An annotated bibliography of the manned systems measurement literature
[AD-A160333] N86-20171
DYNAMIC CONTROLS, INC., DAYTON, OHIO.
Linear actuator for large space structure
[AD-A161227] N86-19346

E

EIDGENOESSISCHES FLUGZEUGWERK, EMMEN (SWITZERLAND).
Flow visualization using minitufts for wind tunnels
[F+W-FO-1753] N86-19295
Performance computation of turbofan and turbojet engines in off-design conditions
[F+W-FO-1746] N86-19323
Flow quality in large wind tunnels: A simple method for quantification of mean flow inhomogeneities
[F+W-FO-1749] N86-19332
ENERGY AND ENVIRONMENTAL ANALYSIS, INC., ARLINGTON, VA.
Development of the industrial combustion emissions model for acid rain analysis
[PB85-243822] N86-19759
ENGINEERING SCIENCES DATA UNIT, LONDON (ENGLAND).
Growth of cracks under constant amplitude fatigue loading: Example calculations
[ESDU-84001] N86-19642
Cylinder groups: Mean forces on pairs of long circular cylinders
[ESDU-84015] N86-19643
ERLANGEN-NUREMBERG UNIV. (WEST GERMANY).
Continuum and line profile variations of the novalike system V3885 SGR N86-20331
ESSEX CORP., ALEXANDRIA, VA.
Automation and the allocation of functions between human and automatic control: General method
[AD-A161072] N86-20013
ESSEX CORP., ORLANDO, FLA.
An analysis of visual tasks in helicopter shipboard landing
[AD-A161101] N86-19903
EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS, READING (ENGLAND).
Four-dimensional data assimilation into atmospheric global models N86-19679
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
The use of satellite data in climate models
[ESA-SP-244] N86-19677
Review of scientific and technical work required before the launch of ERS-1: The view of ESA N86-19704
Recent Results on Cataclysmic Variables
[ESA-SP-236] N86-20287
EUROPEAN SPACE AGENCY. ESA TRACKING STATION, MADRID (SPAIN).
Ultraviolet observations of the recurrent nova RS OPH in outburst N86-20339
EUROPEAN SPACE AGENCY. EUROPEAN SPACE OPERATIONS CENTER, DARMSTADT (WEST GERMANY).
The EXO 0748-676: An exciting new X-ray transient N86-20306
The spectral and temporal variability of GX 13+1 N86-20309
X-ray, optical and UV observations of the AM Her object E2003+225 N86-20314

F

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Passing scores for the FAA ATCS color vision test
[AD-A160699] N86-19890
International Civil Aviation Organization Helicopter Noise Measurement Repeatability Program: US test report, Bell 206L-1, noise measurement flight test
[AD-A159698] N86-20090
FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D. C.
Spectrum management policy in the United States, an historical account
[PB85-204550] N86-19510
FILMTEC CORP., MINNEAPOLIS, MINN.
Nonfouling coatings for thin film composite membranes
[PB85-247971] N86-19471
FORSCHUNGSINSTITUT DER DEUTSCHEN BUNDESPOST, DARMSTADT (WEST GERMANY).
The power density spectra of some nB(n+1)B block coded signals
[FI-44-TBR-98] N86-19534
Simulation of the transmission behavior of a glass fiber section, exclusively with the help of a simulation program system for the analysis of electronic circuits
[FI-441-TBR-3] N86-19535

G

GENERAL RESEARCH CORP., SANTA BARBARA, CALIF.
Sequentially deployable maneuverable tetrahedral beam
[NASA-CASE-LAR-13098-1] N86-19479
GEOLOGICAL SURVEY, ALBANY, N.Y.
Structural and tectonic studies in New York State
[TI85-901403] N86-19774
GEOLOGICAL SURVEY, DENVER, COLO.
Batholithic rocks of southern California: A model for the petrochemical nature of their source materials
[TI85-902207] N86-19773
GEOLOGICAL SURVEY, RESTON, VA.
Annotated bibliography of [illegible] the Caribbean region
[TI86-900020] N86-19717
GEOLOGICAL SURVEY, URBANA, ILL.
Geology, hydrology and water quality of the Cambrian and Ordovician systems in northern Illinois
[PB85-249795] N86-19720
GEORGE MASON UNIV., FAIRFAX, VA.
Applying AI to the diagnosis of complex system failures N86-19635
GEORGIA INST. OF TECH., ATLANTA.
Fatigue behavior of flexhoses and bellows due to flow-induced vibrations
[NASA-CR-176481] N86-19662
Technology for satellite power conversion
[NASA-CR-176554] N86-19742
GIESSEN UNIV. (WEST GERMANY).
Correlated electron capture and inner-shell excitation measurements in ion-atom collisions
[DE86-000030] N86-20107

H

HAMILTON RESEARCH LTD., TARRYTOWN, N.Y.
Repetitive decompression tables for no-stop excursions from saturation N86-19876
HARVARD UNIV., CAMBRIDGE, MASS.
Embrittlement of metallic glasses N86-19459
A class of instabilities associated with streamwise vorticity N86-19546
Sequential processes in image generation: An objective measure
[AD-A161200] N86-19590
Asymptotic fields in steady crack growth with linear strain-hardening
[AD-A160921] N86-19664
Asymptotic fields of a perfectly-plastic, plane-stress mode 2 growing crack
[AD-A161006] N86-19665
Luminance and chromaticity signal processing in the human visual system N86-19852
HELSINKI UNIV. OF TECHNOLOGY, ESPOO (FINLAND).
Mapping of snow by passive and active microwave sensors N86-19696
Five-color polarimetry of AM Herculis N86-20333
HONEYWELL SYSTEMS AND RESEARCH CENTER, MINNEAPOLIS, MINN.
Hierarchical multisensor image understanding
[AD-A160324] N86-20008
HOWARD UNIV., WASHINGTON, D. C.
Photodissociation dynamics of small molecules
[NASA-CR-176512] N86-19418
Gallium arsenide solar cells
[DE85-011085] N86-19744
GaAs Schottky barrier photo-responsive device and method of fabrication
[NASA-CASE-GSC-12816-1] N86-20150
HUGHES RESEARCH LABS., MALIBU, CALIF.
Fabrication of low-loss halide glass fibers
[AD-A161111] N86-19469
High purith low defect FZ silicon N86-19730

I

IBM FEDERAL SYSTEMS CENTER, GAITHERSBURG, MD.
A model for the prediction of latent errors using data obtained during the development process N86-19976
IBM UNITED KINGDOM LABS. LTD., WINCHESTER, (ENGLAND).
CRT install and secure stations for the generic monitor line N86-19632
IIT RESEARCH INST., CHICAGO, ILL.
Artificial intelligence applications in manufacturing
[AD-A161161] N86-20014
ILLINOIS INST. OF TECH., CHICAGO.
Mechanical properties of ductile organic fiber polymeric matrix composites N86-19453
ILLINOIS STATE GEOLOGICAL SURVEY, CHAMPAIGN.
Geology, hydrology and water quality of the Cambrian and Ordovician systems in northern Illinois
[PB85-249795] N86-19720
ILLINOIS STATE WATER SURVEY, CHAMPAIGN.
Geology, hydrology and water quality of the Cambrian and Ordovician systems in northern Illinois
[PB85-249795] N86-19720
ILLINOIS UNIV., URBANA.
Influence of alumina on the structure and mechanical properties of yttria stabilized zirconia composites
[AD-A159994] N86-19400
Experimental and theoretical studies of nuclear generation of ozone and its photolysis into singlet delta oxygen N86-19414
A study of croastalk and distortion of high speed pulses in digital circuits
[AD-A161261] N86-19529
Numerical analysis of a generalized three-dimensional elastica N86-19648
An approach to operating system testing N86-19973
ILLINOIS UNIV., URBANA-CHAMPAIGN.
Fluctuating pressure and velocity fields in the near field of a round jet N86-19282
The effect of hydrogen on the microstructure of silicon carbide N86-19415
Radiation heat transfer in anisotropically scattering media N86-19542
Experimental and mathematical modeling of the interaction of a perturbed free shear layer with a flat plate N86-19544
Symmetry, bifurcation and computational methods in nonlinear structural mechanics N86-19639
Stress interference in axisymmetric torsion of a transversely isotropic body N86-19652
A cumulus parameterization study with special attention to the Arakawa-Schubert scheme N86-19775
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Harmonic generation of ion waves due to Brillouin backscattering
[DE85-016072] N86-19573
Altimetric observing system simulation studies with an eddy resolving ocean circulation model N86-19688
INDIAN INST. OF ASTROPHYSICS, BANGALORE.
Spectrophotometry of nova Vulpeculae 1984-1 N86-20320
INDIANA UNIV., BLOOMINGTON.
High speed photometry of AN UMa
[DE85-015715] N86-20275
Time dependent white dwarf radiative shocks
[DE85-015698] N86-20279
INNSBRUCK UNIV. (AUSTRIA).
Monitoring of snow and land ice parameters: Possibilities and constraints of SAR and microwave imaging systems N86-19697
INSTITUT D'ASTROPHYSIQUE, PARIS (FRANCE).
The origin of the principal system and the presence of very hot regions of novae N86-20319
Nova explosion on oxygen neon magnesium white dwarfs N86-20330
INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS (FRANCE).
Density measurements in a tube behind a projectile. Simulation in a shock tube
[ISL-CO-237/84] N86-19296
Experimental and theoretical study of incompressible flow around a wing profile with a spoiler. Contributions of laser velocimetry and the Dvorak method
[ISL-R-116/84] N86-19297
Studies of the combustion of solid propellants up to 1000 MPa
[ISL-CO-201/85] N86-19476
Gas thermometry using Fourier rotational coherent anti-Stokes Raman scattering
[ISL-CO-202/85] N86-19577
Numerical treatment of the Young interference fringes in the presence of speckle
[ISL-R-126/84] N86-19578
Measurement of the local concentration in a CO2 free jet using spontaneous Raman diffusion
[ISL-R-117/84] N86-19593
Utilization of microchannel plates in X-ray crystallography
[ISL-R-124/84] N86-19594
Experimental study of the acoustic fields far and near a Microturbo TRS 18 turboreactor
[ISL-R-113/84] N86-20095
Cochlear mechanisms involved in the auditory threshold and in auditory fatigue
[ISL-R-119/84] N86-20096

Study of the noise radiated by the wake of a cylinder placed in a jet flow
[ISL-R-120/84] N86-20097

INSTITUT NATIONAL DE LA SANTE ET DE LA RECHERCHE MEDICALE, PARIS (FRANCE).
Comparison of bradycardia breath-hold on divers and nondivers: Its importance for the capacity visit of divers N86-19863

INSTITUT ZA POMOREKU MEDICINA, SPLIT (YUGOSLAVIA).
Hyberbaric oxygen in the treatment of Bell's palsy N86-19870

INSTITUTE FOR TELECOMMUNICATION SCIENCES, BOULDER, COLO.
Effects of narrow-band filters on the output analytical extension of the Bedrosian-Rice formulation
[PB85-210067] N86-19536

INSTITUTE OF OCEANOGRAPHIC SCIENCES, BIRKENHEAD (ENGLAND).
Accuracy of existing ocean tide models N86-19691
High precision tidal gravity
[AD-A160676] N86-19770

INSTITUTE OF OCEANOGRAPHIC SCIENCES, WORMLEY (ENGLAND).
Winds for climate research from the ERS-1 and N-ROSS scatterometers N86-19703

INSTITUTO NACIONAL DE TECNICA AEROESPACIAL, MADRID (SPAIN).
Utilization of Liquified Petroleum Gas (LPG) in compression ignited motors N86-19477

INSTITUUT TNO VOOR WISKUNDE, INFORMATIEVERWERKING EN STATISTIEK, THE HAGUE (NETHERLANDS).
Supercomputers, architecture and vectorization
[IWIS-B-84-TW-57] N86-19959
Manual for the use of the common command language with a DARIUS command
[IWIS-C-84-AU-32] N86-19995
Interactive goal programming: A multicriteria decision method
[IWIS-A-84-TW-01] N86-19996
Skip-lot sampling plans
[IWIS-A-84-ST-53] N86-20049
The Fourteenth Conference on Stochastic Processes and Their Applications
[IWIS-B-84-ST-54] N86-20050
The linear functional relationship model for two variables
[IWIS-A-84-ST-85] N86-20051

INSTITUUT VOOR CULTURRTECHNIEK EN WATERHUISHOUDING, WAGENINGEN (NETHERLANDS).
A new geophysical approach using remote sensing techniques to study ground water table depths and regional evaporation from aquifers in deserts
[B8469378] N86-19719

INTERMETRICS, INC., CAMBRIDGE, MASS.
Tailoring a software production environment for a large project N86-19980

INTERNATIONAL BUSINESS MACHINES CORP., HOPEWELL JUNCTION, N. Y.
MCZ: Striations in CZ silicon crystals grown under various axial magnetic field strengths N86-19729

INTERNATIONAL CENTRE FOR EARTH TIDES, BRUSSELS (BELGIUM).
Trans world tidal gravity profile
[AD-A160723] N86-19771

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Structure determination of molecules of biochemical interest
[AD-A161119] N86-20102

ISTANBUL MEDICAL FACULTY (TURKEY).
A survey of aseptic bone negrosis in Turkish sponge divers, interim report N86-19871

ISTITUTO DI FISICA DELL ATMOSFERA, ROME (ITALY).
Remote sensing of sea surface temperature N86-19609

J

JAI ASSOCIATES, MOUNTAIN VIEW, CALIF.
Aerodynamics of two-dimensional blade-vortex interaction
[AD-A160662] N86-19315

JAPAN MARINE SCIENCE AND TECHNOLOGY CENTER, TOKYO.
Effect of low and high environmental temperatures on decompression sickness in the aging rat N86-19884

JAYCOR, SAN DIEGO, CALIF.
Concepts for near continuous reception of VHF (Very High Frequency) signals using meteor burst propagation
[AD-A159891] N86-19495

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
High dynamic GPS receiver validation demonstration
[NASA-CR-176530] N86-19306
Cathode for primary battery
[NASA-CASE-NPO-16397-1-CU] N86-19517
Radiation-hard analog-to-digital converters for space and strategic applications
[NASA-CR-176536] N86-19518
Solar cell calibration facility validation of balloon flight data: A comparison of shuttle and balloon flight results
[NASA-CR-176528] N86-19585
Results of the 1985 NASA/JPL balloon flight solar cell calibration program
[NASA-CR-176527] N86-19586
Memory metal actuator
[NASA-CASE-NPO-15960-1] N86-19604
Joint for deployable structures
[NASA-CASE-NPO-16036-1] N86-19605
Method for forming hermetic seals
[NASA-CASE-NPO-16423-1-CU] N86-19610
Method and apparatus for contour mapping using synthetic aperture radar
[NASA-CASE-NPO-15939-1] N86-19711
Proceedings of the Flat-Plate Solar Array Project Workshop on Crystal Gowth for High-Efficiency Silicon Solar Cells
[NASA-CR-176540] N86-19723
High-efficiency silicon solar-cell design and practical barriers
[NASA-CR-176529] N86-19739
Characterization of EMI generated by the discharge of a VOLT solar array
[NASA-CR-176537] N86-19740
A sensitivity analysis of central flat-plate photovoltaic systems and implications for national photovoltaics program planning
[NASA-CR-176526] N86-19741
Design concepts for bioreactors in space N86-19926
The development of an unconventional food regeneration process: Quantifying the nutritional components of a model methylotrophic yeast N86-19928
Closed culture plant studies: Implications for CELSS N86-19937
The effect of ultradian and orbital cycles on plant growth N86-19940
The cognitive connection: Software maintenance and documentation N86-19974
Single mode levitation and translation
[NASA-CASE-NPO-16675-1-CU] N86-20087
Closed loop fiber optic rotation sensor
[NASA-CASE-NPO-16558-1-CU] N86-20129
Total-dose radiation effects data for semiconductor devices: 1985 supplement, volume 1
[NASA-CR-176557] N86-20153
Observations of Uranus' satellites: Bibliography and literature search
[NASA-CR-176538] N86-20261

JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Japan report: Science and technology
[JPRS-JST-86-003] N86-19446
Powdered, sintered alloy materials described: Development of titanium alloys N86-19447
Powdered metallurgy process described N86-19448
Advantages of metal sintering N86-19449
Developing abrasion-resistant ceramics N86-19450
Titanium dioxide properties described N86-19451
Conductive oxides described N86-19452
Japan report: Science and technology
[JPRS-JST-86-002] N86-19464
Moonlight project promotes energy-saving technology N86-19485
Production, application of piezoelectric ceramics described N86-19486
Ceramics strategy of Asahi Glass reported N86-19487
Capitalizing on available information N86-19488
Assessment of fine ceramics N86-19489
USSR report: Life sciences. Biomedical and behavioral sciences
[JPRS-UBB-86-001] N86-19828
Characteristics of effects of microbiological means of plant protection on organism N86-19829
Computer graphics employed in modeling protein molecules N86-19830
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Fluorescent-polarization properties of chromophores of water-soluble proteins of normal and cataractal human lens N86-19832
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Neuronal response and evoked potentials in subcortical formations in visual perception. Part 1: Problem formulation and principles of solution N86-19844
Respiratory function in inhabitants of northeastern USSR N86-19845
Effects of 24 h sleep deprivation on biogenic amine metabolism N86-19846
Visual form perception from halftone images N86-19847
Problem of biological clocks: New data on circadian changes in status of human organism N86-19848
Enhancement of somniferous effects of thermal pulsation by simultaneous application to two reflexogenic zones N86-19849
USSR report: Physics and mathematics
[JPRS-UPM-86-005] N86-20057
Excitation of supershort deformation pulses during absorption of strong optical radiation N86-20058
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Kinetic cooling in binary mixtures of molecular gases during two-quantum exchange of oscillating energy N86-20081
General nonasymptotic estimates of the rate of convergence of iterative stochastic algorithms N86-20082
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Analysis of the trajectory sensitivity of adaptive stochastic control systems N86-20084
USSR report: Space
[JPRS-USP-86-001] N86-20178

KAROLINSKA INST., STOCKHOLM (SWEDEN).

Feoktistov reveals details of Salyut-7 reactivation N86-20179

Preparation of cosmonauts for Salyut-7 reactivation mission N86-20180

Soyuz T-13 lands with cosmonauts Dzhanibekov and Grechko N86-20181

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KATHOLIEKE UNIVERSITEIT, NIJMEGEN (NETHERLANDS).

Asymptotic analysis of non-linear elliptic and parabolic singular perturbations [AD-A159705] N86-20055

KEMA N.V., ARNHEM (NETHERLANDS).

Research on treatment of radioactive waste [S/T-REPT-VOL-3-NO-1] N86-20108

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KENTUCKY UNIV., LEXINGTON.

Modeling of equilibrium gas adsorption for multicomponent vapor mixtures [AD-A159632] N86-19377

KIEL UNIV. (WEST GERMANY).

Introduction to ocean circulation models N86-19585

KM SCIENCES, ARLINGTON, VA.

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LAWRENCE LIVERMORE NATIONAL LAB., CALIF.

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LEE (J. S.) ASSOCIATES, INC., ARLINGTON, VA.

Ocean surveillance detection studies. Part 1. Detection in Gaussian mixture noise. Part 2. An investigation of canonical correlation as an automatic detection and beamforming technique [AD-A160931] N86-19817

LEHIGH UNIV., BETHLEHEM, PA.

The viscous flow induced near a wall by counter-rotating vortex pairs and vortex loops N86-19551

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LEICESTER UNIV. (ENGLAND).
Accretion processes in the magnetic cataclysmic variables N86-20310
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LITTON MELLONICS SYSTEMS DEVELOPMENT DIV., FORT BENNING, GA.
An annotated bibliography of the manned systems measurement literature N86-20171
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LOCKHEED ENGINEERING AND MANAGEMENT SERVICES, INC., LAS CRUCES, N. MEX.
Device and method for frictionally testing materials for ignitability N86-19413
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LONDON UNIV. (ENGLAND).
Elevations of plasma endotoxin levels and lysosomal enzyme activities in divers during a simulated chamber dive to 300 msw N86-19866

LOS ALAMOS NATIONAL LAB., N. MEX.
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LOUISIANA STATE UNIV., BATON ROUGE.
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LUDWIG-MAXIMILIANS-UNIVERSITAET, MUNICH (WEST GERMANY).
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LUNAR AND PLANETARY INST., HOUSTON, TEX.
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M

MACAULAY-BROWN, INC., FAIRBORN, OHIO.
Automation and the allocation of functions between human and automatic control: General method N86-20013
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Automated Information Management Technology (AIM-TECH): Considerations for a technology investment strategy N86-20173
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MARQUETTE UNIV., MILWAUKEE, WIS.
Muscle fatigue: Physiological and biochemical studies N86-19851

MARTIN MARIETTA CORP., BALTIMORE, MD.
An analysis of the productivity of a CELSS continuous algal culture system N86-19927

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MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Direct passive navigation: Analytical solution for planes N86-19307
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MASSACHUSETTS INST. OF TECH., LEXINGTON.
Restructurable VLSI program N86-19522
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MASSACHUSETTS UNIV., AMHERST.
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MASSACHUSETTS UNIV., WORCESTER.
Potential for cross-reactive protection using peptides and adjuvants or carrier molecules N86-19626
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MAX-PLANCK-INST. FUER EXTRATERRESTRISCHE PHYSIK, GARCHING (WEST GERMANY).
X-ray observations of classical novae during the outburst stage by EXOSAT N86-20318

MAX-PLANCK-INST. FUER METEOROLOGIE, HAMBURG (WEST GERMANY).
Assimilation of microwave data in atmospheric and wave models N86-19684
Sea ice models and remote sensing N86-19690

MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
Accretion disk instabilities N86-20302
The 3000 sec X-ray variations of GK Per: Evidence for transition fronts in the inner accretion disk N86-20328

MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Resonant, inelastic single phonon processes in the scattering of He atoms on LiF(001) surfaces N86-20163
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MCDONNELL-DOUGLAS TECHNICAL SERVICES CO., INC., HOUSTON, TEX.
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MEASUREMENT CONCEPT CORP., ROME, N. Y.
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MEMBRANE TECHNOLOGY AND RESEARCH, INC., MENLO PARK, CALIF.
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., BREMEN (WEST GERMANY).
Description of concept and first feasibility test results of a life support subsystem of the Botany Facility based on water reclamation N86-19912

METEOROLOGICAL OFFICE, BRACKNELL (ENGLAND).
Algorithms for wind scatterometer processing N86-19681
Comments on data requirements for ocean climate studies N86-19686
Wind direction ambiguity suppression algorithms N86-19705
ERS-1 surface wind ambiguity removal by means of objective processing and subjective human intervention N86-19805
[ESA-CR(P)-2110]

MIAMI UNIV., CORAL GABLES, FLA.
Effect of fossil fuels and introduction of hydrogen on Earth's temperature N86-19779

MICHIGAN UNIV., ANN ARBOR.
Thermo-mechanical contact of two sliding half-planes and related problems N86-19609
Definition phase for thermal ion dynamics experiment for OPEN N86-20098
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MICRO COMMUNICATIONS, INC., MANCHESTER, N.H.
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MIDWEST RESEARCH INST., GOLDEN, COLO.
The status of silicon ribbon growth technology for high-efficiency silicon solar cells N86-19725

MINNESOTA UNIV., MINNEAPOLIS.
Interface chemistry of ternary semiconductors: Local morphology of the Hg(1-x)CdxTe-Cr interface N86-19524
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Seismic wave attenuation in unconsolidated sediments N86-19766
Resting metabolic rate in men following prolonged treadmill exercise N86-19853
The conference on the dynamics of molecular collisions held at Snowbird, Utah on 14-19 July 1985 N86-20101
[AD-A161078]

MISSOURI UNIV., ROLLA.
Correlated electron capture and inner-shell excitation measurements in ion-atom collisions N86-20107
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Measurement of the far infrared optical properties of steel, aluminum, evaporated iron, and Teflon FEP N86-20122

MITRE CORP., BEDFORD, MASS.
National Security Issues Symposium, 1984. Space, National Security, and C3I (Command, Control, Communications and Intelligence) held at Bedford, Massachusetts on 25-26 October 1984 N86-19335
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MITRE CORP., MCLEAN, VA.
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MMR TECHNOLOGIES, INC., MOUNTAIN VIEW, CALIF.
Development of a low noise 10K refrigeration system N86-19624
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MODEC, CAMBRIDGE, MASS.
Supercritical waste oxidation of aqueous wastes N86-19922

MOUNT STROMLO AND SIDING SPRING OBSERVATORY, CANBERRA (AUSTRALIA).
Optical observations of new X-ray emitting cataclysmic variables N86-20300

MOUNT WILSON OBSERVATORY, PASADENA, CALIF.
High speed photometry of AN UMa N86-20275
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MULLARD SPACE SCIENCE LAB., DORKING (ENGLAND).
Post launch calibration and validation of the Along Track Scanning Radiometer (ATSR) N86-19700
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NAGOYA UNIV. (JAPAN).
Modern uses of Langmuir probes N86-19582
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NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
The vacuum states and their stability in N=1, D=10 anomaly-free Yang-Mills supergravity N86-20056
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The QCD radiative corrections to the decay W yields qq-bar gamma N86-20120
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NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
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Metal phthalocyanine intermediates for the preparation of polymers N86-19455
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NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
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NATIONAL AERONAUTICAL LAB., BANGALORE (INDIA).
Diffusion studies on advanced fibre hybrid composites N86-19383
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NATIONAL AERONAUTICAL LAB., TOKYO (JAPAN).
Fundamental investigation on the impact strength of hollow fan blades
[NAL-TR-879] N86-19657

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical engineering: A continuing bibliography with indexes (supplement 195)
[NASA-SP-7037(195)] N86-19281
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 281)
[NASA-SP-7011(281)] N86-19850
NASA thesaurus. Volume 1: Hierarchical listing
[NASA-SP-7053-VOL-1] N86-20168
NASA thesaurus. Volume 2: Access vocabulary
[NASA-SP-7053-VOL-2] N86-20169
NASA patent abstracts bibliography: A continuing bibliography. Section 1: Abstracts (supplement 28)
[NASA-SP-7039(28)] N86-20170

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Ground vibration test results for Drones for Aerodynamic and Structural Testing (DAST)/Aeroelastic Research Wing (ARW-1R) aircraft
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Airborne trace contaminants of possible interest in CELSS N86-19923
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
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JFET reflection oscillator
[NASA-CASE-GSC-12555-1] N86-19515
Temperature averaging thermal probe
[NASA-CASE-GSC-12795-1] N86-19580
Excitation of the Earth's Chandler wobble by southern oscillation/El Nino, 1900-1979
[NASA-TM-86231] N86-19713
Documentation of the Goddard Laboratory for atmospheres fourth-order two-layer shallow water model
[NASA-TM-86227] N86-19781
Cutting head for ultrasonic lithotripsy
[NASA-CASE-GSC-12944-1] N86-19885
Software Engineering Laboratory (SEL) Data Base Retrieval System (DARES) system description
[NASA-TM-88589] N86-19962
FORTRAN static source code analyzer program (SAP) system description: Revision 1
[NASA-TM-88592] N86-19963
FORTRAN static source code analyzer program (SAP) user's guide: Revision 2
[NASA-TM-88586] N86-19964
A comparison of software verification techniques
[NASA-TM-88585] N86-19965
Software verification and testing
[NASA-TM-88587] N86-19966
Proceedings of the Ninth Annual Software Engineering Workshop
[NASA-TM-88594] N86-19967
Evaluating software testing strategies N86-19969
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Annotated bibliography of Software Engineering Laboratory literature
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The global auroral responses to magnetospheric compressions by shocks in the solar wind: Two case studies
[NASA-TM-88636] N86-20283
Future ultraviolet observations from space N86-20322

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Video processor for air traffic control beacon system
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
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[NASA-CR-178024] N86-19947
Graphics mini manual: An introduction to graphics at Langley Research Center
[NASA-TM-87622] N86-19949
A process activity monitor for AOS/VS
[NASA-TM-86535] N86-19950
Acoustic guide for noise transmission testing of aircraft
[NASA-CASE-LAR-13111-1-CU] N86-20086
Status and capabilities of sonic boom simulators
[NASA-TM-87664] N86-20088

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
A two-dimensional numerical study of the flow inside the combustion chambers of a motored rotary engine
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NATIONAL LAB. FOR HIGH ENERGY PHYSICS, OHO (JAPAN).
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WASH.
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NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, WASHINGTON, D.C.
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NEW UNIV. OF ULSTER, COLERAINE (NORTHERN IRELAND).
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OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
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RESEARCH INST. OF NATIONAL DEFENCE, HAARSFJAERDEN (SWEDEN).
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RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
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[FOA-C-50021-H1] N86-19854
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RHODE ISLAND UNIV., KINGSTON.
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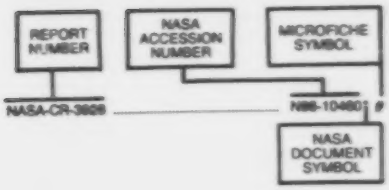

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 1711

02 AERODYNAMICS 1711
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.
For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 1716
Includes passenger and cargo air transport operations; and aircraft accidents.
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04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 1717
Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1718
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07 AIRCRAFT PROPULSION AND POWER 1719
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.
For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 1720
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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 1726
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20 SPACECRAFT PROPULSION AND POWER 1736
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For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **1737**
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24 COMPOSITE MATERIALS **1738**
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25 INORGANIC AND PHYSICAL CHEMISTRY **1739**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
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26 METALLIC MATERIALS **1743**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

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28 PROPELLANTS AND FUELS **1750**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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Includes vacuum technology; control engineering; display engineering; and cryogenics.

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Includes land and global communications; communications theory; and optical communications.
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Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
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35 INSTRUMENTATION AND PHOTOGRAPHY **1775**
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39 STRUCTURAL MECHANICS **1788**
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For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

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Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

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47 METEOROLOGY AND CLIMATOLOGY **1816**
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48 OCEANOGRAPHY **1829**
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LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **1830**
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54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **1842**
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55 PLANETARY BIOLOGY **1842**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **1842**

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Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

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Includes mathematical modeling, network analysis; and operations research.

67 THEORETICAL MATHEMATICS **N.A.**
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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

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73 NUCLEAR AND HIGH-ENERGY PHYSICS **1863**
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

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Includes quantum mechanics; and Bose and Fermi statistics.
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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
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81 ADMINISTRATION AND MANAGEMENT **1881**
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82 DOCUMENTATION AND INFORMATION SCIENCE **1882**
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83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **1885**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **1886**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

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89 ASTRONOMY **1887**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **1888**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **1890**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

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Note: N.A. means that no abstracts were assigned to this category for this issue.

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 11 / JUNE 8, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-20341* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING, A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 197)
Feb. 1986 139 p
(NASA-SP-7037(197); NAS 1.21:7037(197)) Avail: NTIS HC A07 CSCL 01A

This bibliography lists 488 reports, articles and other documents introduced into the NASA scientific and technical information system in January 1986. Author

N86-20342*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROELASTICITY AT THE NASA LANGLEY RESEARCH CENTER RECENT PROGRESS, NEW CHALLENGES
Perry W. Hanson Dec. 1985 76 p refs
(NASA-TM-87660; NAS 1.15:87660) Avail: NTIS HC A05/MF A01 CSCL 01B

Recent progress in aeroelasticity, particularly at the NASA Langley Research Center is reviewed to look at the questions answered and questions raised, and to attempt to define appropriate research emphasis needed in the near future and beyond. The paper is focused primarily on the NASA Langley Research Center (LaRC) Program because Langley is the lead NASA center for aerospace structures research, and essentially is the only one working in depth in the area of aeroelasticity. Historical trends in aeroelasticity are reviewed broadly in terms of technology and staffing particularly at the LaRC. Then, selected studies of the Loads and Aeroelasticity Division at LaRC and others over the past three years are presented with attention paid to unresolved questions. Finally, based on the results of these studies and on perceptions of design trends and aircraft operational requirements, future research needs in aeroelasticity are discussed. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-20343# Iowa State Univ. of Science and Technology, Ames. Coll. of Engineering.
MODULAR APPLICATION OF A SHOCK/BOUNDARY LAYER INTERACTION SOLUTION TO SUPERCRITICAL VISCOUS-INVISCID FLOW FIELD ANALYSIS
G. R. Inger and W. G. Habashi, ed. 1984 40 p refs Reprinted from Computational Methods in Viscous Flows. Volume 3: Recent Advances in Numerical Methods in Fluids (Swansea, England), 1984 p 1-38
Avail: NTIS HC A03/MF A01

Shock boundary layer interaction influence extends significantly downstream within the boundary layer and thereby alters the global aerodynamic properties of lift, drag and pitching moment. Shock boundary layer interactions and their Reynolds and Mach number scaling must be fundamentally understood and appropriate theoretical tools be developed for their prediction in engineering applications. Features of an approximate nonasymptotic triple deck theory of shock turbulent boundary layer interaction and its application as an element in the overall viscous flow analysis of the body are described. Two main aspects of the problem are examined: local interactive thickening and skin friction drop in the shock foot region, including the effects of the incoming boundary layer shape factor, wall curvature, an improved viscous ramp model of the interaction and an approximate prediction of incipient separation behavior; and influence of such interaction on the subsequent downstream turbulent boundary layer thickening, profile shape and skin friction behavior. Comparisons with experimental data are given and applications presented for both supercritical airfoils and transonic bodies of revolution. Author

N86-20344*# George Washington Univ., Washington, D.C.
EXPLORATORY LOW-SPEED WIND-TUNNEL STUDY OF CONCEPTS DESIGNED TO IMPROVE AIRCRAFT STABILITY AND CONTROL AT HIGH ANGLES OF ATTACK M.S. Thesis
David Edgar Hahne Dec. 1985 73 p refs Sponsored by NASA
(NASA-CR-176615; NAS 1.26:176615) Avail: NTIS HC A04/MF A01 CSCL 01A

A wind tunnel investigation of concepts to improve the high angle-of-attack stability and control characteristics of a high performance aircraft was conducted. The effect of vertical tail geometry on stability and the effectiveness of several conventional and unusual control concepts was determined. These results were obtained over a large angle-of-attack range. Vertical tail location, cant angle and leading edge sweep could influence both longitudinal and lateral-directional stability. The control concepts tested were found to be effective and to provide control into the post stall angle-of-attack region. Author

N86-20345*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF UNDERWING AFT-MOUNTED NACELLES ON THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A HIGH-WING TRANSPORT AIRPLANE
William K. Abeyounis and James C. Patterson, Jr. Dec. 1985 139 p refs
(NASA-TP-2447; L-15664; NAS 1.60:2447) Avail: NTIS HC A07/MF A01 CSCL 01A

As part of a propulsion/airframe integration program, tests were conducted in the Langley 16-Foot Transonic Tunnel to determine the longitudinal aerodynamic effects of installing flow through engine nacelles in the aft underwing position of a high wing transonic transfer airplane. Mixed flow nacelles with circular and D-shaped inlets were tested at free stream Mach numbers from

0.70 to 0.85 and angles of attack from -2.5 deg to 4.0 deg. The aerodynamic effects of installing antishock bodies on the wing and nacelle upper surfaces as a means of attaching and supporting nacelles in an extreme aft position were investigated. Author

N86-20346*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INSTALLATION EFFECTS OF LONG-DUCT PYLON-MOUNTED NACELLES ON A TWIN-JET TRANSPORT MODEL WITH SWEPT SUPERCRITICAL WING
Edwin E. Lee, Jr. and Otis C. Pendergraft, Jr. Dec. 1985 145 p refs
(NASA-TP-2457; L-15932; NAS 1.60:2457) Avail: NTIS HC A07/MF A01 CSCL 01A

The installation interference effects of an underwing-mounted, long duct, turbofan nacelle were evaluated in the Langley 16-Foot Transonic Tunnel with two different pylon shapes installed on a twin engine transport model having a supercritical wing swept 30 deg. Wing, pylon, and nacelle pressures and overall model force data were obtained at Mach numbers from 0.70 to 0.83 and nominal angles of attack from -2 deg to 4 deg at an average unit Reynolds number of 11.9 x 1,000,000 per meter. The results show that adding the long duct nacelles to the supercritical wing, in the near sonic flow field, changed the magnitude and direction of flow velocities over the entire span, significantly reduced cruise lift, and caused large interference drag on the nacelle afterbody. Author

N86-20347*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ORIFICE-INDUCED PRESSURE ERROR STUDIES IN LANGLEY 7- BY 10-FOOT HIGH-SPEED TUNNEL
E. B. Plentovich and Blair B. Gloss Feb. 1986 24 p refs
(NASA-TP-2545; L-16001; NAS 1.60:2545) Avail: NTIS HC A02/MF A01 CSCL 01A

For some time it has been known that the presence of a static pressure measuring hole will disturb the local flow field in such a way that the sensed static pressure will be in error. The results of previous studies aimed at studying the error induced by the pressure orifice were for relatively low Reynolds number flows. Because of the advent of high Reynolds number transonic wind tunnels, a study was undertaken to assess the magnitude of this error at high Reynolds numbers than previously published and to study a possible method of eliminating this pressure error. This study was conducted in the Langley 7- by 10-Foot High-Speed Tunnel on a flat plate. The model was tested at Mach numbers from 0.40 to 0.72 and at Reynolds numbers from 7.7 x 1,000,000 to 11 x 1,000,000 per meter (2.3 x 1,000,000 to 3.4 x 1,000,000 per foot), respectively. The results indicated that as orifice size increased, the pressure error also increased but that a porous metal (sintered metal) plug inserted in an orifice could greatly reduce the pressure error induced by the orifice. Author

N86-20348*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC INTERNAL PERFORMANCE OF A SINGLE-ENGINE ONAXISYMMETRIC-NOZZLE VANED-THRUST-REVERSER DESIGN WITH THRUST MODULATION CAPABILITIES
Laurence D. Leavitt and James R. Burley, II Dec. 1985 109 p refs
(NASA-TP-2519; L-15991; NAS 1.60:2519) Avail: NTIS HC A06/MF A01 CSCL 01A

An investigation has been conducted at wind-off conditions in the stati-test facility of the Langley 16-Foot Transonic Tunnel. The tests were conducted on a single-engine reverser configuration with partial and full reverse-thrust modulation capabilities. The reverser design had four ports with equal areas. These ports were angled outboard 30 deg from the vertical impart of a splay angle to the reverse exhaust flow. This splaying of reverser flow was intended to prevent impingement of exhaust flow on empennage surfaces and to help avoid inlet reingestion of exhaust gas when the reverser is integrated into an actual airplane configuration. External vane boxes were located directly over each of the four ports to provide variation of reverser efflux angle from 140 deg to 26 deg (measured forward from the horizontal reference axis). The reverser model was tested with both a butterfly-type inner door and an internal slider door to provide area control for each individual port. In addition, main nozzle throat area and vector angle were varied to examine various methods of modulating thrust levels. Other model variables included vane box configuration (four or six vanes per box), orientation of external vane boxes with respect to internal port walls (splay angle shims), and vane box sideplates. Nozzle pressure ratio was varied from 2.0 approximately 7.0. Author

N86-20349*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF SEVERAL CURRENT HELICOPTER TAIL BOOM CROSS SECTIONS INCLUDING THE EFFECT OF SPOILERS
John C. Wilson and Henry L. Kelley Jan. 1986 74 p refs
(DA Proj. 1L1-61102-AH-45)
(NASA-TP-2506; L-15978; NAS 1.60:2506; AVSCOM-TR-85-B-3) Avail: NTIS HC A04/MF A01 CSCL 01A

Aerodynamic characteristics were determined of three cylindrical shapes representative of tail boom cross sections of the U.S. Army AH-64, UH-60, and UH-1H helicopters. Forces and pressures were measured in a wind-tunnel investigation at the Langley Research Center. Data were obtained for a flow incidence range from -45 to 90 deg and a dynamic pressure range from 1.5 to 50 psf. These ranges provided data representative of full-scale Reynolds numbers and the full range of flow incidence to which these helicopter tail boom shapes would be subjected at low flight speeds. The effects of protuberances such as tail rotor drive-shaft covers and spoilers were evaluated. The data indicate that significant side loads on tail booms of helicopters can be generated and that the addition of spoilers can beneficially alter the side loads. Although an increase in vertical drag occurs, the net effect through reduction of tail rotor thrust required can be an improvement in helicopter performance. Author

N86-20350*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHT MEASUREMENTS OF SURFACE PRESSURES ON A FLEXIBLE SUPERCRITICAL RESEARCH WING
Clinton V. Eckstrom Dec. 1985 120 p refs
(NASA-TP-2501; L-15877; NAS 1.60:2501) Avail: NTIS HC A06/MF A01 CSCL 01A

A flexible supercritical research wing, designated as ARW-1, was flight-tested as part of the NASA Drones for Aerodynamic and Structural Testing Program. Aerodynamic loads, in the form of wing surface pressure measurements, were obtained during flights at altitudes of 15,000, 20,000, and 25,000 feet at Mach numbers from 0.70 to 0.91. Surface pressure coefficients determined from pressure measurements at 80 orifice locations are presented individually as nearly continuous functions of angle of attack for constant values of Mach number. The surface pressure coefficients are also presented individually as a function of Mach number for an angle of attack of 2.0 deg. The nearly continuous values of the pressure coefficient clearly show details of the pressure gradient, which occurred in a rather narrow Mach number range. The effects of changes in angle of attack, Mach number, and dynamic pressure are also shown by chordwise pressure distributions for the range of test conditions experienced. Reynolds numbers for the tests ranged from 5.7 to 8.4 x 1,000,000. Author

N86-20351*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE APPLICATION TO AIRFOILS OF A TECHNIQUE FOR REDUCING ORIFICE-INDUCED PRESSURE ERROR AT HIGH REYNOLDS NUMBERS
E. B. Plentovich Jan. 1986 44 p refs
(NASA-TP-2537; L-16002; NAS 1.60:2537) Avail: NTIS HC A03/MF A01 CSCL 01A

A wind tunnel investigation was conducted in the Langley 0.3-Meter Transonic Cryogenic Tunnel to study the effects of

porous (sintered metal) plug orifices on orifice-induced static-pressure measurement error at high Reynolds numbers. A NACA airfoil was tested at Mach numbers from 0.60 to 0.80 and at Reynolds numbers from 6 x 1,000,000 to 40 x 1,000,000. Data are included which compare pressure measurements obtained from porous plug orifices and from conventional orifices with diameters of 0.025 cm (0.010 in.) and 0.102 cm (0.040 in.). The two dimensional airfoil code GRUMFOIL was used to calculate boundary layer displacement thickness. The response time and the downstream effect of the porous plug orifice were considered in this investigation. The results showed that the porous plug orifice could be a viable method of reducing pressure error. The data also showed that the pressure measurements obtained with a 0.102-cm-diameter orifice were very close to the measurements obtained with 0.025-cm-diameter orifice over such of the airfoil and that downstream of a shock the orifice size was not critical.
Author

N86-20352*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BREAKDOWN OF THE CONSERVATIVE POTENTIAL EQUATION
M. D. Salas and Clyde R. Gumbert Feb. 1986 38 p refs Previously announced in IAA as A85-19700
(NASA-TP-2539; L-15769; NAS 1.60:2539) Avail: NTIS HC A03/MF A01

The conservative full-potential equation is used to study transonic flow over five airfoil sections. The results of the study indicate that once shock are present in the flow, the qualitative approximation is different from that observed with the Euler equations. The difference in behavior of the potential eventually leads to multiple solutions.
Author

N86-20353# National Aeronautical Lab., Tokyo (Japan).
RESEARCH ON THE AERODYNAMIC CHARACTERISTICS OF VEHICLES BY FREE FLIGHT TESTING AT SUPERSONIC SPEEDS
Iwao Kawamoto Sep. 1985 74 p refs In JAPANESE; ENGLISH summary
(NAL-TR-876; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

A new free flight testing technique was developed in the 1mx1m blow-down supersonic wind tunnel. The following results were obtained: (1) a new launching method in which a model is installed inside the launcher was developed, and various models were successfully launched at various angles of attack; (2) a data processing program for moving models was developed by use of a parameter identification method under the assumption of three degrees of longitudinal freedom of motion; (3) cone models, Mercury capsule models, blunt cone capsule models, sounding rocket models and supersonic aircraft models were launched, results were obtained from the flight tests. There sometimes existed a short duration of the freedom motion, the data reduction to this partial duration of motion are in agreement with the conventional wind tunnel force test results in the aerodynamic coefficients, the divergence of the pitching motion of the Mercury Capsule model was shown in pictures; (4) the relations between the amount of data gathered during a run and the aerodynamic characteristics derived thererom are discussed; and (5) the excessive nonlinear terms of alpha for the aerodynamic expressions sometimes result in unacceptable aerodynamic characteristics.
E.A.K.

N86-20354# National Aeronautical Lab., Bangalore (India). Fluid Mechanics Div.
JET PLUME TEMPERATURE EFFECTS ON AFTERBODY PRESSURE DISTRIBUTION AND DRAG
N. B. Mathur and K. S. Yajnik Mar. 1985 10 p refs
(NAL-TM-FM-8502) Avail: NTIS HC A02/MF A01

A typical axisymmetric configuration with a circular arc boat-tailed afterbody was investigated to study the jet plume temperature effects on afterbody pressure distribution and drag. The experiments which were carred out at a free stream Mach number of 0.62 and jet pressure ratio of about 3.0 show that as the jet temperature ratio is increased the afterbody pressures tend to increase and the afterbody pressure drag tends to decrease. It is a reduction in afterbody pressure drag by about 30 to 40% is shown when the jet plume temperature is increased from 307 deg K (cold jet) to 945 deg K. Both jet plume temperature and the afterbody surface temperature effects generally contribute to the observed changes in the pressure distribution and drag. E.A.K.

N86-20355# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
INVESTIGATION OF PASSIVE DEVICES FOR AXISYMMETRIC BASE DRAG REDUCTION AT TRANSONIC SPEEDS
P. R. Viswanath Sep. 1985 20 p refs
(NAL-TM-AE-8506) Avail: NTIS HC A02/MF A01

The effectiveness of several base modifications for reducing base drag and total afterbody drag at transonic speeds was assessed. The modifications include base cavities, ventilated cavities and two vortex suppression devices. It is shown that while appreciable base drag reductions are possible with many of the devices examined, the net total drag reuctions are lower, presumably because of the additional losses associated with the devices.
E.A.K.

N86-20356# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
SIDE FORCE CHARACTERISTICS OF A 20 DEG CONE AT HIGH ANGLES OF ATTACK
P. R. Viswanath and K. Y. narayan May 1985 24 p refs
(NAL-TM-AE-8503) Avail: NTIS HC A02/MF A01

Force measurements were made on a 20 deg. cone to study the features of side force generation at high angles of attack. The experiments covered a Mach number range of 0.17 to 0.25 and a Reynolds number range of 0.5 to 2.8x1,000,000. The model incidence was varied up to 47 deg. The magnitude of side forces and the onset angle of attack for side force generation are in fairly good agreement with other published data on cones. E.A.K.

N86-20357*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF FULLY STALLED COMPRESSOR
Wojciech Rostafinski 1986 14 p refs Proposed for presentation at the 4th Joint Fluid Mechanics, Plasma Dynamics and Laser Conference, Atlanta, Ga., 12-14 May 1986; sponsored by AIAA and the American Society of Mechanical Engineers
(NASA-TM-87254; E-2944; NAS 1.15:87254) Avail: NTIS HC A02/MF A01 CSCL 21E

An analysis yields a model for energy transfer in compressor stages operating in the closed-throttle condition. The derivation indicates that three geometry parameters (hub/tip ration, aspect ration, and rotor blade setting angle) influence the values of pressure coefficient when the compressor flow is close to zero.
Author

N86-20358*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF PLANFORM GEOMETRY ON HOVER PERFORMANCE OF A 2-METER-DIAMETER MODEL OF A FOUR-BLADED ROTOR
Arthur E. Phelps, III and Susan L. Althoff Mar. 1986 33 p refs (DA Proj. 1L1-61102-AH-45)
(NASA-TM-87607; L-16020; NAS 1.15:87607;
AVSCOM-TR-85-B-6) Avail: NTIS HC A03/MF A01 CSCL 01A

Hover tests were conducted on three small scale rotors to evaluate the effects of blade planform taper on rotor hover performance. Tests were conducted on a rectangular swept-tip configuration, on a configuration with a 3 to 1 taper over the outboard 20 percent of the span, and on a configuration with a 5 to 1 taper over the outboard 20 percent of the blade span. The investigation covered a range of thrust coefficients from 0 to 0.0075 and a range of tip speeds from 300 to 600 ft/sec. The tests showed that both tapered configurations had better hover performance than the swept-tip rectangular configuration and that the 3 to 1 taper configuration was better than the 5 to 1 taper configuration. The test results were compared with predictions

made with a prescribed wake analysis, a momentum analysis, and a simplified free wake analysis. Author

N86-20359# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
HYPERSONIC FLOW PROBLEMS ASSOCIATED WITH FUTURE SPACE SHUTTLE VEHICLES
J. L. Stollery Sep. 1985 39 p refs
(CAR-8512) Avail: NTIS HC A03/MF A01

There is growing interest in reusable or partly reusable systems for putting vehicles into a Low Earth Orbit. Such a vehicle can act as a launch pad for satellites to be placed in geosynchronous or other high orbits; a staging post for orbital transfer vehicles and an observation platform and scientific laboratory. Because of the market for communication satellites which is estimated at around $150 billion over the next 10 years and the military uses of space, the interest in hypersonics is increasing rapidly. Out knowledge of transition, separation, viscous interaction including shock interaction and base flows, and heat transfer needs to be enlarged. B.G.

N86-20360*# Vigyan Research Associates, Inc., Hampton, Va.
METHOD FOR THE PREDICTION OF THE INSTALLATION AERODYNAMICS OF A PROPFAN AT SUBSONIC SPEEDS: USER MANUAL
B. Chandrasekaran Jan. 1986 100 p refs
(Contract NAS1-17826)
(NASA-CR-178057; NAS 1.26:178057) Avail: NTIS HC A05/MF A01 CSCL 01A

This document is the user's guide for the method developed earlier for predicting the slipstream wing interaction at subsonic speeds. The analysis involves a subsonic panel code (HESS code) modified to handle the propeller onset flow. The propfan slipstream effects are superimposed on the normal flow boundary condition and are applied over the surface washed by the slipstream. The effects of the propeller slipstream are to increase the axial induced velocity, tangential velocity, and a total pressure rise in the wake of the propeller. Principles based on blade performance theory, momentum theory, and vortex theory were used to evaluate the slipstream effects. The code can be applied to any arbitrary three dimensional geometry, expressed in the form of HESS input format. The code can handle a propeller alone configuration or a propeller/nacelle/airframe configuration, operating up to high subcritical Mach numbers over a range of angles of attack. Inclusion of a viscous modelling is briefly outlined. Wind tunnel results/theory comparisons are included as examples for the application of the code to a generic supercritical wing/overwing Nacelle with a powered propfan. A sample input/output listing is provided. Author

N86-20361*# Vigyan Research Associates, Inc., Hampton, Va.
SUBSONIC FLOW INVESTIGATIONS ON A CRANKED WING DESIGNED FOR HIGH MANEUVERABILITY Final Report
Dhanvada M. Rao Feb. 1986 45 p refs
(Contract NAS1-17420)
(NASA-CR-178046; NAS 1.26:178046) Avail: NTIS HC A03/MF A01 CSCL 01A

The characteristic pitching moment nonlinearity of cranked wings limits their usable lift coefficient well below C sub L max. The potential of several aerodynamic devices, viz., fences, pylon vortex generators (PVG), mid-span strakes and cavity flaps, in delaying the pitch up onset on a 70/50 deg cranked wing was explored in low speed tunnel tests. Upper surface pressure measurements and low visualizations were conducted on a semi-span wing model to observe the vortex flow development with increasing angle of attack, and then to assess the effectiveness of the devices in controlling the collapse of vortex lift over the wing panel outboard of the crank. Force tests on a full span wing and body model were also conducted to assess the fence and PVG in improving the usable C sub L. Author

N86-20362# Aeronautical Research Labs., Melbourne (Australia).
A VISUALISATION STUDY OF THE VORTEX FLOW AROUND DOUBLE-DELTA WINGS
D. H. Thompson 1985 70 p refs
(ARL-Aero-R-165; AR-004-047) Avail: NTIS HC A04/MF A01

A family of double delta wings with leading edge sweep combinations of 80/80, 80/70, 80/60, 80/50, and 80/40 degrees was tested in a small towing tank. The hydrogen bubble technique was used to visualize the vortex patterns above the wings over a range of Reynolds numbers (based on centerline chord) from 7,000 to 100,000. The effects of variations in incidence and leading edge kink angle were examined. Reynolds number and leading edge cross section shape were found to have significant effects on the vortex structure. Attempts to visualize details of the upper surface secondary vortex flows met with only partial success. Author

N86-20363# Aeronautical Research Labs., Melbourne (Australia).
INTERNAL PERFORMANCE OF A VARIABLE RAMP MIXED COMPRESSION INTAKE AT MACH 3.05
S. A. Fisher 1985 59 p refs
(ARL-Aero-Prop-R-167; AR-004-041) Avail: NTIS HC A04/MF A01

Results of an experimental investigation into the performance of a two dimensional mixed compression intake are presented. The intake featured focused cowl compression matched to a discrete slot boundary layer bleed system. The tests were conducted at the intake design Mach number of 3.05. The design worked well in a two dimensional sense, but the losses were exacerbated by three dimensional viscous effects involving the sidewall boundary layers. Author

N86-20364# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF INVISICID FLOWS ABOUT WING-FUSELAGE COMBINATIONS. 2: DEVELOPMENT OF FULL POTENTIAL FLOW CODE YOKUDO-P
Tomiko Ishiguro 1985 87 p refs In JAPANESE; ENGLISH summary
(NAL-TR-881; ISSN-0389-4010) Avail: NTIS HC A05/MF A01

The main purpose of this paper is to numerically analyze inviscid flows about wing-fuselage combinations. In the second series a numerical procedure is developed for calculating full potential flows about wing-fuselage combinations by the successive-line-over-relaxation method of the rotated finite difference scheme, using the grids which have already been generated by the code YOKUDO-G in the first series. A user's manual for the FORTRAN code of the procedure is also described. Furthermore, many numerical examples are presented in order to show the utility of this code for flows about several wing-fuselage combinations under several free stream boundary conditions. The numerical results obtained by this code are compared with the experimental results and with numerical results of other methods. Author

N86-20365# National Aerospace Lab., Tokyo (Japan).
RESEARCH ON THE AERODYNAMIC CHARACTERISTICS OF VEHICLES BY FREE FLIGHT TESTING AT SUPERSONIC SPEEDS
Iwao Kawamoto 1985 74 p refs In JAPANESE; ENGLISH summary
(NAL-TR-876; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Results from free flight testing, developed in the 1mx1m blow-down supersonic wind tunnel of the National Aerospace Laboratory are presented. Models installed inside the launcher were successfully launched at various angles of attack. Using a parameter identification method (3 degrees longitudinal freedom of motion), a data processing program for moving models was developed. Aerodynamic coefficients were successfully derived. Cone models, Mercury Capsule models, blunt cone capsule models, sounding rocket models, and supersonic aircraft models were successfully launched. Though hard for vehicles with lifting surfaces to achieve 3 degrees of longitudinal freedom, a short duration of this motion was accomplished. Data reduction showed good agreement with wind tunnel results. Divergence of pitching motion of the mercury Capsule was clearly demonstrated. Excessive

nonlinear terms of alpha for aerodynamic expressions sometimes resulted in unacceptable aerodynamic characteristics. B.G.

N86-20366# National Aerospace Lab., Tokyo (Japan).
AERODYNAMIC TRANSFER FUNCTIONS FOR A FINITE WING IN INCOMPRESSIBLE FLOW
Hiroshi Matsushita Jul. 1985 59 p refs In JAPANESE; ENGLISH summary
(NAL-TR-867) Avail: NTIS HC A04/MF A01

Aerodynamic transfer functions for a wing with a control surface in an incompressible flow are presented analytically using Laplace transform technique. The aerodynamic transfer function for an airfoil can be analytically represented with the generalized Theodorsen function as circulatory parts and the rational function as noncirculatory parts. The aerodynamic transfer function for a finite wing is obtained in a closed form which includes the nonrational function called a modified circulation. A modified circulation function shows a finite wing effect and is governed by an integrodifferential equation, which can be solved efficiently by numerical computation. These results extend the simple harmonic theory to a general transient motion. With the expression thus obtained, the characteristics of the aerodynamic transfer function for a finite wing clearly show that it should have a branch point at the origin and have no singularities along the negative real axis. Transient aerodynamic forces in time domain such as an indicial lifts are obtained by inverse Laplace transforming the present results. Comparison of these results with the other methods and the experimental values shows a good agreement. Author

N86-20367# National Aerospace Lab., Tokyo (Japan).
A WIND TUNNEL TEST OF 22% SCALE MODEL OF A WINDMILL WITH A TWO-BLADED ROTOR OF 14m DIAMETER FOR FIELD TEST
Yoji Ishida, Mayayoshi Noguchi, and Shoichi Murota 1985 21 p refs In JAPANESE; ENGLISH summary
(NAL-TR-887; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Aerodynamic characteristics of a horizontal axis windmill, rated at 20 KW at 8 m/s, with a two bladed rotor of 14m diameter is described. The blade of the windmill was basically designed so as to vary its geometry in such a way that the aerodynamic efficiency becomes maximum and then was fabricated with minor modifications needed to satisfy structural requirements. To confirm the aerodynamic characteristics of the windmill rotor, a wind tunnel test of a 22% scale model was performed in the National Aerospace Laboratory (NAL) low speed wind tunnel. Measurements were made of the efficiency, torque, axial drag force and initial torque for various combinations of the pitch angle and the tip speed ratio for a zero yaw angle. The data were corrected for the wake blockage effect. The yaw characteristics of the windmill were also measured. Author

N86-20368# Naval Ship Research and Development Center, Bethesda, Md.
LIFT DISTRIBUTION ON A HIGH ASPECT RATIO CIRCULATION CONTROL WING WITH ROOT LIFT CUTOUT Final Report, 1 Oct. 1982 - 1 Oct. 1983
Roger Joseph Furey Jun. 1985 56 p refs
(AD-A157024; DTNSRDC-85/030; AR-1294) Avail: NTIS HC A04/MF A01 CSCL 20/4

A computational procedure is developed, based on lifting line theory, which successfully predicts the spanwise lift distribution at moderate blowing momentum coefficient on a high aspect ratio (AR - 18) circulation control wing-body model with several variations in the spanwise extent of blowing. Experimental data are presented on the spanwise lift distribution which validates this procedure. Author

N86-20369# Sandia National Labs., Albuquerque, N. Mex.
AEROELASTIC EFFECTS IN THE STRUCTURAL DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES
D. W. Lobitz and T. D. Ashwill 1985 7 p Presented at WINDPOWER 85, San Francisco, Calif., 27 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017317; SAND-85-0957C; CONF-850834-2) Avail: NTIS HC A02/MF A01

Aeroelastic effects impact the structural dynamic behavior of vertical axis wind turbines (VAWTs) in two major ways. First the stability phenomena of flutter and divergence are direct results of the aeroelasticity of the structure. Secondly, aerodynamic damping can be important for predicting response levels particularly near resonance but also for off resonance conditions. The inclusion of the aeroelasticity is carried out by modifying the damping and stiffness matrices in the NASTRAN finite element code. Through the use of a specially designed preprocessor which reads the usual NASTRAN input deck and adds appropriate cards to it the incorporation of the aeroelastic effects has been made relatively transparent to the user. NASTRAN flutter predictions are validated using field measurements and the effect of aerodynamic damping is demonstrated through an application to the Test Bed VAWT being designed at Sandia. DOE

N86-20370# Sandia National Labs., Albuquerque, N. Mex.
AIRFOIL TREATMENTS FOR VERTICAL AXIS WIND TURBINES
P. C. Klimas 1985 7 p Presented at WINDPOWER 85, San Francisco, Calif., 27 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017369; SAND-85-1910C; CONF-850834-3) Avail: NTIS HC A02/MF A01

Sandia National Laboratories (SNL) has taken three airfoil related approaches to decreasing the cost of energy of vertical axis wind turbine (VAWT) systems; airfoil sections designed specifically for VAWTs, vortex generators (VGs), and pumped spoiling. SNL's blade element airfoil section design effort has led to three promising natural laminar flow (NLF) sections. One section is presently being run on the SNL 17-m turbine. Increases in peak efficiency and more desirable dynamic stall regulation characteristics have been observed. Vane-type VGs were fitted on one DOE/Alcoa 100 kW VAWT. With approximately 12% of span having VGs, annual energy production increased by 5%. Pumped spoiling utilizes the centrifugal pumping capabilities of hollow blades. With the addition of small perforations in the surface of the blades and valves controlled by windspeed at the ends of each blade, lift spoiling jets may be generated inducing premature stall and permitting lower capacity, lower cost drivetrain components. SNL has demonstrated this concept on its 5-m turbine and has wind tunnel tested perforation geometries on one NLF section. DOE

N86-20371# Sandia National Labs., Albuquerque, N. Mex.
DEVELOPMENT DROP TEST RESULTS OF THE 15-FT-DIA RIBBON PARACHUTE AND 73-FT-DIA CROSS PARACHUTE FOR THE US ARMY NATICK LABORATORY UHLCADS SYSTEM
W. B. Pepper Sep. 1985 27 p
(Contract DE-AC04-76DP-00789)
(DE85-017614; SAND-84-2183) Avail: NTIS HC A03/MF A01

During 1984 a series of 12 drop tests was conducted at the US Army Yuma Proving Ground near Yuma, Arizona to develop a new system to recover a 2200-lb resupply container from high altitude. The parachute system consists of a 15-ft-dia ribbon parachute reefed for 10 s and a 73-ft-dia cross parachute with no reefing. The system has been successfully demonstrated by flight tests. The impact velocity is 30 fps. DOE

N86-20372# British Aerospace Aircraft Group, Preston (England). Wind Tunnel Dept.
THE USE OF THE PANEL PROGRAM FOR INVESTIGATING WIND TUNNEL WALL CONSTRAINT
A. R. Whitaker Aug. 1984 49 p refs Presented at British Aerospace Wind Tunnel Sub Committee Specialists' Meeting, Preston, England, 21 Sep. 1983
(BAe-ARG-184) Copyright. Avail: Issuing Activity

The panel program was used to study the effects of lifting wake relocation and solid body blockage on a typical 2.7 x 2.1m low speed wind tunnel (LSWT) model at CL = 1.0. Wake

blockage effects (which are very significant at CL max) could not be studied using this method. Correction standards are validated by the panel program. However, lack of agreement of longitudinal stability between experimental results for 5.5m and 2.7 x 2.1m LSWTs is not fully explained. The panel program gives comprehensive views of interference over the model planform and reveals useful facts about the interference flowfield. The program was used for investigating nonlifting local flow problems, but the absence of a wake displacement model results in underestimates of the interferences. Author (ESA)

N86-20373# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
EDUCATION AND RESEARCH IN COMPRESSIBLE AERODYNAMICS. A SURVEY OF 15 YEARS ACTIVITIES AT THE LABORATORY FOR HIGH SPEED AERODYNAMICS
P. G. Bakker, W. J. Bannink, ed., J. Boeker, C. Nebbeling, ed., E. W. deKeizer, G. A. F. Beking, N. J. Lam, M. vanLent, J. A. G. vanGils, and J. A. Moeller Nov. 1983 63 p refs
(VTH-M-483) Avail: NTIS HC A04/MF A01

Educational and test facilities for high speed aerodynamics; sonic boom research; conical flow structures; and transonic flow and shock wave-boundary layer interaction are discussed. Author (ESA)

N86-20374# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Transportfysica.
A REVISION OF THE ACTUATOR DISK CONCEPT AND MOMENTUM THEORY
G. A. M. vanKuik Aug. 1985 62 p refs
(Rept-R-732-D) Avail: NTIS HC A04/MF A01

The analytical solution of the singularity problem in the limit case of edge flow on a disk with constant surface load is analyzed, leading to an extension of the actuator disk concept with edge forces. If these forces are taken into account in the momentum theory, the results are more convincing, and nuclear experimental phenomena can be explained. The shift of the momentum theory results is only indicated qualitatively. Author (ESA)

N86-20375# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
PITCH-FLAP STABILITY OF A CENTRALLY HINGED RIGID ROTOR BLADE
W. P. Koppens Dec. 1984 31 p refs
(VTH-M-511) Avail: NTIS HC A03/MF A01

The pitch-flap stability of a centrally hinged rigid rotor blade rotating in still air is investigated. Quasi-steady strip theory is used to obtain the aerodynamic loads. The aerodynamic loads are compared with aerodynamic loads from the literature. The influence on the stability boundary of effective camber terms and angle of attack terms is investigated. It is concluded that the aerodynamic loads must be modeled carefully; it is inadequate to neglect terms of common chord-rotor radius ratio order. Author (ESA)

N86-20376# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
IMPROVEMENT OF AERODYNAMIC PERFORMANCE THROUGH BOUNDARY LAYER CONTROL AND HIGH LIFT SYSTEMS
B. Oskam (National Aerospace Lab., Amsterdam) and B. vandenBerg (National Aerospace Lab., Amsterdam) May 1985 11 p
(AGARD-AR-210; ISBN-92-835-1498-X) Avail: NTIS HC A02/MF A01

This report presents an overall survey and evaluation of the AGARD Symposium on Improvement of Aerodynamic Performance through Boundary Layer Control and High Lift Systems held in Brussel, Belgium, 21 to 23 May 1984. Emphasis of the presentations and discussion on lift augmentation was on mechanical highlift systems, while laminar flow control and boundary layer manipulation shared the session on drag reduction. Significant interest was also shown in control of shock wave boundary layer interactions to mitigate their adverse effects. Author

N86-20422# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
FUNDAMENTAL REFLECTIONS ON CRYOGENIC TESTING
Andre Mignosi *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 25 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

N86-20424# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. dAerothermodynamique.
THE T2 CRYOGENIC INDUCTION TUNNEL IN TOULOUSE
Jean-Bernard Dor *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 22 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

N86-20425# Aerodynamische Versuchsanstalt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungamechanik.
THE CRYOGENIC LUDWIEG TUBE TUNNEL AT GOETTINGER
G. Hefer *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 6 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

N86-20426# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE KRYO-KANAL-KOELN (KKK) PROJECT: DESCRIPTION OF TUNNEL CONVERSION, INSULATION, CONTROLS, INSTRUMENTATION, OPERATIONAL EXPERIENCE AND FIRST PRELIMINARY TEST RESULTS
G. Viehweger *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 20 p refs Previously announced in IAA as A85-40314 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-20377# National Transportation Safety Board, Washington, D. C.
SAFETY STUDY: ULTRAVIOLET VEHICLE ACCIDENTS Safety Study Report, Mar. 1983 - Sep. 1984
2 Jul. 1985 406 p refs
(PB85-917001; NTSB/SS-85/01) Avail: NTIS HC A18/MF A01

Since 1982, the Federal Aviation Administration (FAA) has regulated the operation of ultralight vehicles under 14 CFR Part 103. Increasing numbers of reports of ultralights being operated in regulated airspace and for nonrecreational purposes made it apparent to the Safety Board that an evaluation of the effectiveness of the FAA's regulatory approach to ultralights was needed. In the absence of a systematic accident data collection process on which to base the analysis, the Safety Board in March 1983 decided to investigate all fatal accidents involving a powered ultralight and other selected powered ultralight accidents involving obvious safety issues. Between March 1983 and September 1984, the Safety Board investigated 177 ultralight accidents, of which 88 involved a total of 93 fatalities. The Safety Board has prepared a report which describes the safety problems identified through analyses of these accidents, explores safety concerns raised by organizations and associations interested in ultralights, and recommends improvements in existing ultralight safety measures, where appropriate. Author

N86-20378# RMS Technologies, Inc., Trevose, Pa.
GALLEY AND OVERHEAD COMPARTMENT EXPERIMENT RESULTS: FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION Final Report, Jun. 1981 - Dec. 1985
Roger M. Lloyd and Dick Johnson Dec. 1985 57 p refs

(Contract DTFA03-81-C-00040)
(DOT/FAA/CT-85/33) Avail: NTIS HC A04/MF A01

An air-to-ground impact test demonstration was conducted with a remotely piloted transport category airplane. The Full-Scale Transport Controlled Impact Demonstration Program (CID) is discussed. The program includes activities involved in the development and subsequent demonstration of an antimisting fuel experiment and experiments relating to improvements in cabin fire safety and structural impact protection. The results of structural experiments associated with two onboard galleys and overhead stowage compartments are reported. During the impact demonstration, both compartments remained in place without spillage of their internal contents, while the post crash fire resulted in minor galley damage and total destruction to the overhead compartments. E.A.K.

N86-20379*# Wichita State Univ., Kans.
PARTICLE TRAJECTORY COMPUTATION ON A 3-DIMENSIONAL ENGINE INLET Final Report Ph.D. Thesis
John J. Kim Jan. 1986 115 p refs
(Grant NAG3-566)
(NASA-CR-175023; NAS 1.26:175023; DOT-FAA-CT-86-1) Avail: NTIS HC A06/MF A01 CSCL 01C

A 3-dimensional particle trajectory computer code was developed to compute the distribution of water droplet impingement efficiency on a 3-dimensional engine inlet. The computed results provide the essential droplet impingement data required for the engine inlet anti-icing system design and analysis. The droplet trajectories are obtained by solving the trajectory equation using the fourth order Runge-Kutta and Adams predictor-corrector schemes. A compressible 3-D full potential flow code is employed to obtain a cylindrical grid definition of the flowfield on and about the engine inlet. The inlet surface is defined mathematically through a system of bi-cubic parametric patches in order to compute the droplet impingement points accurately. Analysis results of the 3-D trajectory code obtained for an axisymmetric droplet impingement problem are in good agreement with NACA experimental data. Experimental data are not yet available for the engine inlet impingement problem analyzed. Applicability of the method to solid particle impingement problems, such as engine sand ingestion, is also demonstrated. Author

N86-20380*# Toledo Univ., Ohio. Coll. of Engineering.
A NUMERICAL AND EXPERIMENTAL INVESTIGATION OF ELECTROCHEMICAL AIRCRAFT DEICING M.S. Thesis Final Report
Kevin L. Leffel Jan. 1986 268 p refs
(Grant NAG3-72)
(NASA-CR-175024; NAS 1.26:175024) Avail: NTIS HC A12/MF A01 CSCL 01C

This study was composed of three parts. The first part involved the extension of an existing transient two dimensional numerical code for an electrothermal deicer so that it would simulate the situation where a variable thickness ice layer existed at the outer surface. The Enthalpy Method was used to simulate the phase change, and Gauss-Seidel iteration was used to solve the resulting system of finite difference equations. A set of criteria were developed for determining when a variable thickness ice layer had an effect on deicer performance. The second part was the acquisition and analysis of experimental data. The test model was a section of a Bell UH-1H helicopter blade equipped with an electrothermal deicer. A total of fifty-two thermocouples were utilized to document the thermal response of the blade and decier assembly. In the deicing runs, the experimental temperature response data clearly showed when melting, shedding or refreezing occurred. The tests illustrated that the criterion for shedding in the three cases where it did occur was that the abrasion shield interface temperature was 32 to 34 F. The third part concerned the validation of a one dimensional transient thermal model of an electrothermal deicer by comparison of the predictions with the experimental data. The Enthalpy Method was found to effectively model the phase change which occurred, and the ice shedding algorithm employed in the simulation was also evaluated. Author

N86-20381# Boeing Commercial Airplane Co., Seattle, Wash. Flight Deck Research.
FLIGHT PHASE STATUS MONITOR STUDY. PHASE 2: OPERATIONAL SIMULATION Final Report, Jul. 1984 - Sep. 1985
G. P. Boucek, Jr., B. L. Berson (Lockheed Aircraft Co.), L. C. Summers (Douglas Aircraft Co.), and D. C. Hanson 1 Dec. 1985 170 p refs
(Contract DTFA01-83-20033)
(FAA-PM-85-34) Avail: NTIS HC A08/MF A01

Flight status monitor (FSM) concepts were studied for the Federal Aviation Association. Previous studies of crew alerting systems suggested the concept of a system which could monitor a flight, alert the crew to non-normal operation and system conditions, guide the crew through the appropriate response procedures and provide feedback to the crew concerning their actions. The major Phase 2 activities reported include: reviewing the results of Phase 1 and developing a test plan to evaluate the FSM system; using the results of Phase 1 to refine the FSM system specifications; finalizing the implementations of the FS simulator hardware and software; conducting evaluations of the system with experienced transport pilots; drawing conclusions and working recommendations concerning an FSM system by using the data developed in the evaluation; and identifying issues which used further investigation. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-20382 British Aerospace Dynamics Group, Bristol (England). Guidance and Control Dept.
INTERPOLATION OF HEIGHTS AND SLOPES FROM A DIGITAL TERRAIN ELEVATION MODEL
R. F. Scott May 1982 12 p
(BAe-BT-13198) Copyright. Avail: Issuing Activity

An interpolation scheme for the TERPROM navigation system, that combines third order polynomials in the x and y directions to obtain a continuous surface which fits the terrain model exactly, conforming to whatever degree of intricacy the model can provide, is outlined. It is recommended that flights where deterioration occurred over rugged country are re-run with this interpolation to determine improvements in accuracy. Author (ESA)

N86-20383# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
EVALUATION OF THE FAA DESIGN PROCEDURES FOR HIGH TRAFFIC VOLUME PAVEMENTS Report, Jan. 1983 - May 1984
Starr D. Kohn Oct. 1985 144 p refs
(Contract DTFA01-81-Y-10555)
(DOT/FAA/PM-84/14) Avail: NTIS HC A07/MF A01

The results of a field study of the performance of high traffic volume airfield pavements is presented. Both rigid (portland cement concrete) and flexible (asphalt concrete) pavements were included in the study. Condition surveys and nondestructive testing were performed on the pavement sections in order to measure present performance and estimate load-carrying capacity. Traffic and material properties data were also collected for each pavement section. These parameters were used to compared thicknesses obtained using the current FAA design procedure and the thicknesses of the existing sections in order to evaluate the adequacy of the current design procedures. In general it was found that the design procedures are adequate; however, further field study has been recommended in order to verify collected data. Author

N86-20384*# Boeing Commercial Airplane Co., Seattle, Wash.
PERFORMANCE OF A COMMERCIAL TRANSPORT UNDER TYPICAL MLS NOISE ENVIRONMENT Final Report
John K. Ho Feb. 1986 55 p refs
(Contract NAS1-17635)
(NASA-CR-178032; NAS 1.26:178032; D6-57212) Avail: NTIS HC A04/MF A01 CSCL 17G

The performance of a 747-200 automatic flight control system (AFCS) subjected to typical Microwave Landing System (MLS) noise is discussed. The performance is then compared with the results from a previous study which had a B747 AFCS subjected to the MLS standards and recommended practices (SARPS) maximum allowable noise. A glide slope control run with Instrument Landing System (ILS) noise is also conducted. Finally, a linear covariance analysis is presented. Author

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-20385# National Aeronautical Lab., Bangalore (India). Structural Sciences Div.
MODAL ANALYSIS OF A TYPICAL FIGHTER AIRCRAFT USING TRANSIENT TESTING TECHNIQUE
R. Balasubramaniam, D. S. Ramakrishna, and P. S. VijayaKumar Dec. 1985 30 p refs
(NAL-TM-ST-8517) Avail: NTIS HC A03/MF A01

The dynamic performance of individual structural components and the whole aircraft was evaluated. The dynamic properties of the aircraft and its components were analyzed. One hundred and thirty-nine locations for transient imputs are chosen using an instrumented hammar and on-line data reduction for modal properties. Results from up to six modes of the natural frequency modal mass ans stiffness and damping tests are presented. The test set-up, choice of locations for excitations, and actual test procedures are outlined. The advantages of sweep-sine, step relation random and transient test methods on aircraft structures are discussed. E.A.K.

N86-20386*# Florida Univ., Gainesville. Dept. of Engineering Sciences.
OPTIMAL AIRFRAME SYNTHESIS FOR GUST LOADS Final Report
Prabhat Hajela Feb. 1986 45 p refs
(Grant NAG1-579)
(NASA-CR-178047; NAS 1.26:178047) Avail: NTIS HC A03/MF A01 CSCL 01C

An optimization capability for sizing airframe structures that are subjected to a combination of deterministic and random flight loads was established. The random vibration environment introduces the need for selecting a statistical process that best describes the random loads and permits computation of the dynamic response parameters of interest. Furthermore, it requires a formulation of design constraints that would minimize the conservativeness in the design and retain computational viability. The random loads are treated as a stationary, homogeneous process with a Gaussian probability distribution. The formulation of the analysis problem, the structure of the optimization programming system and a representative numerical example are discussed. Author

N86-20420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND CONSTRUCTION OF MODELS FOR THE NATIONAL TRANSONIC FACILITY, PART 2
Clarence P. Young, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 16 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 17G

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-20387 Department of the Air Force, Washington, D.C.
ASYMMETRIC THRUST WARNING SYSTEM FOR DUAL ENGINE AIRCRAFT Patent
William W. Stockton, inventor (to Air Force) Issued 8 Oct. 1985 4 p Supersedes AD-D010978
(AD-D011960; US-Patent-4,546,353; US-Patent-Appl-SN-577412; US-Patent-Class-340-966) Avail: US Patent and Trademark Office CSCL 01/4

An asymmetric thrust warning system for an aircraft having two gas turbine engines. The compressor discharge pressures of the two engines are compared to determine the engine providing the lower thrust and to provide a signal indicative of the actual difference in thrust. If the difference in thrust exceeds a prescribed value related to aircraft altitude, a low thrust warning lamp is illuminated. In addition, the positions of the two augmenter metering valves are compared. If their positions significantly differ, the warning light associated with the valve having the minimum opening will be illuminated. A stall warning circuit may also be included as a part of the system. GRA

N86-20388# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AVIONICS STANDARDIZATION: PERCEPTIONS AND RECOMMENDATIONS M.S. Thesis
Jennifer A. Furru Sep. 1985 139 p
(AD-A161709; AFIT/GSM/LSY/85S-11) Avail: NTIS HC A07/MF A01 CSCL 15/5

This research effort reflects the perceptions and attitudes about avionics standardization by some members of the acquisition community. All of the interviewees were knowledgeable on the subject of and many had extensive experience with, avionics standardization. They either were currently working or had previously worked with avionics standardization. The analysis reflects some of the attitudes about the policies and procedures of avionics standardization and the role of the Deputy for Avionics Control in the process of standardization. The analysis also includes recommended changes to the current process of standardizing avionics equipment. The result of the research effort shows that the acquisition community has not accepted avionics standardization for a number of reasons. GRA

N86-20401# Marconi Avionics Ltd., Rochester (England). Flight Controls Div.
DIGITAL FLY-BY-WIRE EXPERIENCE
A. D. Hills *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 8 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

N86-20402# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
REDUNDANCY MANAGEMENT OF SYCHRONOUS AND ASYNCHRONOUS SYSTEMS
Gregory M. Papadopoulos *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 15 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

N86-20405# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France).
DEPENDABLE AVIONIC DATA TRANSMISSION
D. R. Powell and J. C. Valadier *In* AGARD Fault Tolerant

Hardware/Software Architecture Sep. 1985 19 p refs Sponsored in part by Direction des Recherches, Etudes et Techniques. Prepared in cooperation with Crouzet Aerospace and Systems, Valence, France, and Electronique Serge Dassault, St. Cloud, France (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

N86-20407# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DESIGN ISSUES IN DATA SYNCHRONOUS SYSTEMS
Gregory M. Papadopoulos *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 12 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

N86-20408# Northrop Corp., Hawthorne, Calif. Aircraft Div.
DIGITAL FAULT-TOLERANT FLIGHT ACTUATION SYSTEMS
Howard H. Belmont *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 19 p (For primary document see N86-20399 11-08)
(Contract F33615-80-C-3623)
(AFWAL-83-3041) Avail: NTIS HC A07/MF A01

N86-20409# Honeywell Systems and Research Center, Minneapolis, Minn.
DESIGN VALIDATION OF FLY-BY-WIRE FLIGHT CONTROL SYSTEMS
Gary L. Hartmann, Joseph E. Wall, Jr., and Edward R. Rang *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 17 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-20389* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD FOR IMPROVING THE FUEL EFFICIENCY OF A GAS TURBINE ENGINE Patent
George A. Coffinberry, inventor (to NASA) (General Electric Co., Cincinnati, Ohio) Issued 5 Nov. 1985 8 p 30 Aug. 1982
(NASA-Case-LEW-13142-2; US-Patent-4,550,561;
US-Patent-Appl-SN-413101; US-Patent-Class-60-39.02;
US-Class-60-39.07; US-Patent-Class-60-736) Avail: US Patent and Trademark Office CSCL 21E

An energy recovery system is provided for an aircraft gas turbine engine of the type in which some of the pneumatic energy developed by the engine is made available to support systems such as an environmental control system. In one such energy recovery system, some of the pneumatic energy made available to but not utilized by the support system is utilized to heat the engine fuel immediately prior to the consumption of the fuel by the engine. Some of the recovered energy may also be utilized to heat the fuel in the fuel tanks. Provision is made for multiengine applications wherein energy recovered from one engine may be utilized by another one of the engines or systems associated therewith.

Official Gazette of the U.S. Patent and Trademark Office

N86-20390*# Scientific Research Associates, Inc., Glastonbury, Conn.
INFLUENCE OF LARGE-SCALE MOTION ON TURBULENT TRANSPORT FOR CONFINED COAXIAL JETS. VOLUME 2: NAVIER-STOKES CALCULATIONS OF SWIRLING AND NON-SWIRLING CONFINED COAXIAL JETS Final Report
Bernard C. Weinberg and Henry McDonald Jan. 1986 57 p refs
(Grant NAG3-350)
(NASA-CR-175036; NAS 1.26:175036) Avail: NTIS HC A04/MF A01 CSCL 21E

The existence of large scale coherent structures in turbulent shear flows has been well documented. Discrepancies between experimental and computational data suggest a necessity to understand the roles they play in mass and momentum transport. Using conditional sampling and averaging on coincident two-component velocity and concentration velocity experimental data for swirling and nonswirling coaxial jets, triggers for identifying the structures were examined. Concentration fluctuation was found to be an adequate trigger or indicator for the concentration-velocity data, but no suitable detector was located for the two-component velocity data. The large scale structures are found in the region where the largest discrepancies exist between model and experiment. The traditional gradient transport model does not fit in this region as a result of these structures. The large scale motion was found to be responsible for a large percentage of the axial mass transport. The large scale structures were found to convect downstream at approximately the mean velocity of the overall flow in the axial direction. The radial mean velocity of the structures was found to be substantially greater than that of the overall flow.

Author

N86-20391*# Clemson Univ., S.C. Dept. of Mechanical Engineering.
VISCOUS COMPRESSIBLE FLOW DIRECT AND INVERSE COMPUTATION AND ILLUSTRATIONS Final Report
Tah-Teh Yang and Francois Ntone Jan. 1986 102 p refs
(Grant NAG3-538)
(NASA-CR-175037; NAS 1.26:175037) Avail: NTIS HC A06/MF A01 CSCL 21E

An algorithm for laminar and turbulent viscous compressible two dimensional flows is presented. For the application of precise boundary conditions over an arbitrary body surface, a body-fitted coordinate system is used in the physical plane. A thin-layer approximation of the Navier-Stokes equations is introduced to keep the viscous terms relatively simple. The flow field computation is performed in the transformed plane. A factorized, implicit scheme is used to facilitate the computation. Sample calculations, for Couette flow, developing pipe flow, an isolated airflow, two dimensional compressor cascade flow, and segmental compressor blade design are presented. To a certain extent, the effective use of the direct solver depends on the user's skill in setting up the gridwork, the time step size and the choice of the artificial viscosity. The design feature of the algorithm, an iterative scheme to correct geometry for a specified surface pressure distribution, works well for subsonic flows. A more elaborate correction scheme is required in treating transonic flows where local shock waves may be involved.

Author

N86-20392*# Oklahoma State Univ., Stillwater.
MEASUREMENTS OF A SINGLE LATERAL JET INJECTED INTO SWIRLING CROSSFLOW M.S. Thesis Final Report
L. H. Ong and D. G. Lilley Jan. 1986 92 p refs
(Grant NAG3-549)
(NASA-CR-175040; NAS 1.26:175040) Avail: NTIS HC A05/MF A01 CSCL 21E

Experiments have been conducted to document the time-mean and turbulent flowfield of a deflected turbulent jet in a confined swirling crossflow. The jet-to-crossflow velocity ratio of 4 was investigated with swirler vane angles of 45 and 70 degrees. A six-orientation single hot-wire technique was used to measure the velocities and turbulence properties of the flow. In addition, a five-hole pitot probe technique was used to measure the time-mean velocities or verification purposes. The results are presented in the form of r-x plots to aid visualization of the fully three-dimensional flowfield. The swirl in the crossflow intensified the local velocity at the location of the injected jet, which effectively reduced the jet-to-crossflow velocity ratio. This caused the trajectory of the injected jet to follow the path of the local flow direction of the

crossflow, and reduce its penetration into the crossflow. The time-mean velocity measurements using the hot-wire corresponded to pitot-probe data obtained in identical flow conditions. Turbulence stress data show the same trends as previous swirl flow data without lateral injection. The lateral jet was found to deflect the axis of the precessing vortex core. Author

N86-20393*# California Univ., Berkeley.
AERODYNAMIC PROPERTIES OF TURBULENT COMBUSTION FIELDS Final Report
Chia-Chun Hsiao and A. K. Oppenheim Nov. 1985 136 p
(Grant NAG3-131)
(NASA-CR-175005; NAS 1.26:175005) Avail: NTIS HC A07/MF A01 CSCL 21E

Flow fields involving turbulent flames in premixed gases under a variety of conditions are modeled by the use of a numerical technique based on the random vortex method to solve the Navier-Stokes equations and a flame propagation algorithm to trace the motion of the front and implement the Huygens principle, both due to Chorin. A successive over-relaxation hybrid method is applied to solve the Euler equation for flows in an arbitrarily shaped domain. The method of images, conformal transformation, and the integral-equation technique are also used to treat flows in special cases, according to their particular requirements. Salient features of turbulent flame propagation in premixed gases are interpreted by relating them to the aerodynamic properties of the flow field. Included among them is the well-known cellular structure of flames stabilized by bluff bodies, as well as the formation of the characteristic tulip shape of flames propagating in ducts. In its rudimentary form, the mechanism of propagation of a turbulent flame is shown to consist of: (1) rotary motion of eddies at the flame front, (2) self-advancement of the front at an appropriate normal burning speed, and (3) dynamic effects of expansion due to exothermicity of the combustion reaction. An idealized model is used to illustrate these fundamental mechanisms and to investigate basic aerodynamic features of flames in premixed gases. The case of a confined flame stabilized behind a rearward-facing step is given particular care and attention. Solutions are shown to be in satisfactory agreement with experimental results, especially with respect to global properties such as the average velocity profiles and reattachment length. Author

N86-20394*# Oklahoma Univ., Norman. School of Mechanical and Aerospace Engineering.
EXPERIMENTS ON OPPOSED LATERAL JETS INJECTED INTO SWIRLING CROSSFLOW M.S. Thesis Final Report
C. B. McMurry and D. G. Lilley Jan. 1986 116 p refs
(Grant NAG3-549)
(NASA-CR-175041; NAS 1.26:175041) Avail: NTIS HC A06/MF A01 CSCL 21E

Experiments have been conducted to obtain the time-mean and turbulent quantities of opposed lateral jets in a low speed, nonreacting flowfield. A jet-to-crossflow velocity ratio of R = v sub J/u sub 0 = 4 was used throughout the experiments, with swirl vane angles of d = 0 (swirler removed), 45 and 70 deg used with the crossflow. Flow visualization techniques used were neutrally-buoyant helium-filled soap bubbles and multispark photography in order to obtain the gross flowfield characteristics. Measurements of time-mean and turbulent quantities were obtained utilizing a six-orientation single hot-wire technique. For the nonswirling case, the jets were found not to penetrate past the test-section centerline, in contrast to the single lateral jet with the same jet-to-crossflow velocity ratio. In the swirling cases, the crossflow remains in a narrow region near the wall of the test section. The opposed jets are swept from their vertical courses into spiral trajectories close to the confining walls. Extensive results are presented in r-x plane plots. Author

N86-20395*# Connecticut Univ., Storrs.
INFLUENCE OF LARGE-SCALE MOTION ON TURBULENT TRANSPORT FOR CONFINED COAXIAL JETS. VOLUME 1: ANALYTICAL ANALYSIS OF THE EXPERIMENTAL DATA USING CONDITIONAL SAMPLING Final Report
David C. Brondum and John C. Bennett Jan. 1986 136 p refs
(Grant NAG3-350)
(NASA-CR-175035; NAS 1.26:175035) Avail: NTIS CSCL 21E

The existence of large scale coherent structures in turbulent shear flows has been well documented. Discrepancies between experimental and computational data suggest a necessity to understand the roles they play in mass and momentum transport. Using conditional sampling and averaging on coincident two component velocity and concentration velocity experimental data for swirling and nonswirling coaxial jets, triggers for identifying the structures were examined. Concentration fluctuation was found to be an adequate trigger or indicator for the concentration-velocity data, but no suitable detector was located for the two component velocity data. The large scale structures are found in the region where the largest discrepancies exist between model and experiment. The traditional gradient transport model does not fit in this region as a result of these structures. The large scale motion was found to be responsible for a large percentage downstream at approximately the mean velocity of the overall flow in the axial direction. The radial mean velocity of the structures was found to be substantially greater than that of the overall flow. Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-20396*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THREE AXIS ATTITUDE CONTROL SYSTEM Patent Application
Philip A. Studer, inventor (to NASA) Filed 7 Nov. 1985 22 p
(NASA-Case-GSC-12970-1; NAS 1.71:GSC-12970-1;
US-Patent-Appl-SN-795805) Avail: NTIS HC A02/MF A01 CSCL 01C

A three axis attitude control system for an orbiting body comprised of a motor driven flywheel supported by a torque producing active magnetic bearing is described. Free rotation of the flywheel is provided about its central axis and together with limited angular torsional deflections of the flywheel about two orthogonal axes which are perpendicular to the central axis. The motor comprises an electronically commutated dc motor, while the magnetic bearing comprises a radially servoed permanent magnet biases magnetic bearing capable of producing cross-axis torques on the flywheel. Three body attitude sensors for pitch, yaw and roll generate respective command signals along three mutually orthogonal axes (x, y, z) which are coupled to circuit means for energizing a set of control coils for producing torques about two of the axes (x and y) and speed control of the flywheel about the third (z) axis. An energy recovery system, which is operative during motor deceleration, is also included which permits the use of a high speed motor to perform effectively as a reaction wheel suspended in the magnetic bearing. NASA

N86-20397*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRPLANE AUTOMATIC CONTROL FORCE TRIMMING DEVICE FOR ASYMMETRIC ENGINE FAILURES Patent application
Eric C. Stewart, inventor (to NASA) 23 Oct. 1985 14 p
(NASA-Case-LAR-13280-1; NAS 1.71:LAR-13280-1;
US-Patent-Appl-SN-790556) Avail: NTIS HC A02/MF A01 CSCL 01C

The difference in dynamic pressure in the propeller slipstreams as measured by sensors is divided by the freestream dynamic pressure generating a quantity proportional to the differential thrust coefficient. This quantity is used to command an electric trim motor to change the position of trim tab thereby retrimming the airplane to the new asymmetric power condition. The change in position of the trim tab produced by the electric trim motor is summed with the pilot's input to produce the actual trim tab position. NASA

N86-20398# Aeronautical Research Labs., Melbourne (Australia).
INTERACTIVE FLUTTER SOLVER AT ARL
S. Gales Jun. 1985 34 p
(AD-A161541; ARL/STRUC-TM-414) Avail: NTIS
HC A03/MF A01 CSCL 20/4

An interactive direct flutter solving routine has been installed on ARL's ELXSI computer. Interactive graphics routines, using DI-3000 graphics, software, have been incorporated to give the user a progressive picture of the solution. Estimates of subcritical response data may also be determined using this method. A description of the method and the associated software is presented here. Also included is a two-dimensional flutter problem, using quasi-steady aerodynamics, which is solved by this direct flutter solver. GRA

N86-20399# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Guidance and Control Panel.
FAULT TOLERANT HARDWARE/SOFTWARE ARCHITECTURE FOR FLIGHT CRITICAL FUNCTION
Loughton, England Sep. 1985 146 p refs Lecture series held at Edwards AFB, Calif., 1-2 Oct. 1985, in Copenhagen, Denmark, 17-18 Oct. 1985, and in Athens, Greece, 21-22 Oct. 1985
(AGARD-LS-143; ISBN-92-835-1510-2) Copyright. Avail: NTIS
HC A07/MF A01

This Lecture Series is intended to provide basic concepts and theories in the design of fault-tolerant architectures for flight critical systems. It is intended to cover experience with flight tested fly-by-wire systems as well as issues in redundancy management of synchronous and asynchronous approaches. It will specifically address the individual aspects of software fault tolerance, actuation fault tolerance, reliable data communication, and multi-computer operation using the Ada language. For individual titles, see N86-20400 through N86-20409.

N86-20400# Honeywell Systems and Research Center, Minneapolis, Minn.
INTRODUCTION TO LECTURE SERIES NO. 143: FAULT TOLERANT HARDWARE/SOFTWARE ARCHITECTURES FOR FLIGHT CRITICAL FUNCTIONS
Gary L. Hartmann *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 3 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

Modern weapon systems, driven by escalating performance demands, are becoming complex and sophisticated. Demands for higher accuracy, improved reliability/survivability, all-weather operation, and more automation are placing increased emphasis on the control function. Nowhere is this increased emphasis more evident than in the control functions required in advanced aircraft systems. Due to the expanded role of automation many functions are becoming flight-critical (i.e., loss of this function is catastrophic). Flight critical architectures are more complex than fault-tolerant computers. In addition to airborne computers, overall reliability depends on proper design and management of: (1) Sensors and their interfaces; (2) Actuation elements; and (3) Data communication along the distributed elements. Previous NATO-AGARD publications have dealt with related aspects of this subject. This lecture series covers experience with flight tested fly-by-wire systems as well as issues in redundancy management of synchronous and asynchronous systems. It specifically addresses software fault tolerance, actuation fault tolerance, reliable data communications, and multi-computer operation using the Ada language. Author

N86-20401# Marconi Avionics Ltd., Rochester (England). Flight Controls Div.
DIGITAL FLY-BY-WIRE EXPERIENCE **c06**
A. D. Hills *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 8 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

A description of two recent GEC Avionics (GAv) systems is included: (1) A310 Slats and Flaps Control System; and (2) Jaguar FBW Demonstrator Flight Control System. Particular reference is made to the architecture of the computers and embedded software. Data is included on the two different system design requirements, especially those relating to integrity and availability. Emphasis is placed on the reasons for selecting dissimilarity, as an implementation philosophy, for the A310 system, as against the multiple similar Jaguar demonstrator architecture. The paper then provides a brief description of the design and development program for the two computer units with emphasis on lessons learned, specially in the software areas. The aspects of the system and computer design involved with maintainability and reliability are detailed and current in-service experience discussed where applicable. Conclusions are drawn particularly on dissimilarity, highlighting lessons learned from these successful FBW programs. A potential method of providing software fault tolerance within a dissimilar implementation is discussed and preliminary results of a GEC research program in this area provided. Author

N86-20402# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
REDUNDANCY MANAGEMENT OF SYCHRONOUS AND ASYNCHRONOUS SYSTEMS **c06**
Gregory M. Papadopoulos *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 15 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

While asynchronous systems may initially appear attractive due to the uncoupling the channels, the cross-channel interactions are much greater than what might be expected. Both synchronous and asynchronous systems share the burden of cross-channel consistency maintenance, the requirement that inputs and internal states are not allowed to diverge too far from each other. In fact, consistency maintenance often dominates the engineering process in a correctly designed system. In asynchronous systems, consistency maintenance takes the form of cross-channel equalization along with techniques for handling discrete changes in operating mode. In synchronous systems, consistency maintenance is implemented with source congruence algorithms. Synchronous and asynchronous systems must both support reliable resolution of redundant channel outputs, the process of isolating correct effectuator commands from faulty ones. A correctly designed synchronous system may rely on exact bit-for-bit voting to isolate faulty channels, while an asynchronous system must employ more heuristic means such as threshold and reasonableness tests. This research concludes that data synchronous principle is the approach of choice. the systems provide general purpose vehicles on which increasingly complex and diverse flight critical applications may execute. Author

N86-20403# Newcastle-upon-Tyne Univ. (England). Computing Lab.
SOFTWARE FAULT TOLERANCE EXPERIMENTS **c61**
T. Anderson and P. A. Barrett *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 5 p refs Sponsored in part by UK Science and Engineering Research Council and by the Ministry of Defence (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

A major experimental program has been undertaken in order to evaluate the effectiveness of software fault tolerance techniques in practical systems. This paper presents the results of phases two and three of these experiments, which indicate that the techniques can significantly enhance software reliability. The particular application used for these experiments was a naval command and control system, thus confirming that software fault tolerance can be successfully utilized in critical real-time systems. Author

N86-20404# Newcastle-upon-Tyne Univ. (England). Computing Lab.
CAN DESIGN FAULTS BE TOLERATED? **c61**
T. Anderson *In* AGARD Fault Tolerant Hardware/Software

Architecture Sep. 1985 5 p refs (For primary document see N86-20399 11-08)
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The fault tolerant approach to building a reliable system acknowledges that perfection is impossible (or at best, very expensive) and therefore tries to cope with the consequences of residual defects within the system. Fault tolerance has an established role in detecting and masking component faults in hardware systems, but has also been advocated as a defense against deficiencies of design. This paper argues, in question and answer format, the case for adopting design fault tolerance techniques in practical systems. Author

N86-20405# Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse (France).
DEPENDABLE AVIONIC DATA TRANSMISSION c06
D. R. Powell and J. C. Valadier *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 19 p refs Sponsored in part by Direction des Recherches, Etudes et Techniques. Prepared in cooperation with Crouzet Aerospace and Systems, Valence, France, and Electronique Serge Dassault, St. Cloud, France (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

This paper outlines the major constraints imposed on the design of dependable local area networks for avionic systems and underlines the essential differences in requirements that exist with respect to those of ground-based (civil) LANs. The different choices available to the system designer are then discussed: technology (electrical or optical), architecture (bus or loop), general philosophy (centralized or decentralized), medium access control (competition or consultation). The paper then goes on to summarize two different and independent avionic LAN research projects; one which focusses on fault and damage-tolerance and the other on high-speed. Author

N86-20406# Honeywell Systems and Research Center, Minneapolis, Minn.
MULTI-COMPUTER FAULT TOLERANT SYSTEMS USING ADA c61
Walter L. Heimerdinger *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 8 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

Ada will be the language of choice for a number of flight critical applications in the future. Ada incorporates a number of constructs to aid in constructing reliable software, including packages and private data types to manage the visibility of data and strong typing to control the values and operations that can be applied to a data object. Ada also provides constructs to assist in the construction of fault tolerant software. These include tasks and the Ada mechanisms for synchronizing and communicating between tasks, for exception handling and for timing. These mechanisms rely to a large degree on an Ada run time kernel, a set of routines to provide Ada features that can only be implemented while the application program is running. Since multiple computer architectures are often used for fault tolerant systems, the implementation of Ada software for multiple computers is an important consideration. Two ongoing projects illustrate the range of options for distributing Ada software on multiple computers. The first approach, which creates a separate Ada program for each computer, makes the least demands on the Ada compiler and run time software. The second approach, which treats all software for a multiple computer system as a single Ada program, requires a specialized Ada compiler and special distributed run time support routines, but separates software partitioning from the application programming. Author

N86-20407# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DESIGN ISSUES IN DATA SYNCHRONOUS SYSTEMS c06
Gregory M. Papadopoulos *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 12 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

Fault tolerant data synchronous systems are ones where the outputs of all correctly operating redundant channels are guaranteed to bit-for-bit agree, independent of whether the channels are clock, instruction or frame synchronous. Data synchronous systems offer a form of fault tolerant processing capable of correctly supporting a very general class of programs. In fact, the redundancy becomes relatively transparent to the programmer of applications for data synchronous systems, making them ideally suited for complex, algorithmically intensive programs that would be otherwise impossible to support. The various aspects of the design of correct data synchronous systems are examined in detail. These include: Source consistency, the requirement that all correctly operating channels receive precisely the same inputs, Event synchronization, the problem of keeping the time skew between channels within predetermined bounds, as well system initialization. The unsolved problem of latent faults is also presented along with the need for self-test heuristics. Sequential fault tolerant and parallel fault tolerant approaches are contrasted for systems requiring protection from multiple faults. Both hardware and software solutions to these problems are given, emphasizing system performance and economy. The paper concludes with the application of these techniques to the design of triplex fail-operational and quadruplex and dual-dual fail-operational-fail-operational systems. Author

N86-20408# Northrop Corp., Hawthorne, Calif. Aircraft Div.
DIGITAL FAULT-TOLERANT FLIGHT ACTUATION SYSTEMS c06
Howard H. Belmont *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 19 p (For primary document see N86-20399 11-08)
(Contract F33615-80-C-3623)
(AFWAL-83-3041) Avail: NTIS HC A07/MF A01

A study was made of the equipments making up a typical flight control actuation system (servo electronics, servo valves, actuators and transducers) to determine where digital technology could replace analog technology for the purpose of providing a more fault-tolerant flight control actuation system. The investigation involved an analysis of where digital-to-analog conversion should take place between the light control computer and the analog control surface, and led to an evaluation of several architectural design issues. Among these were how to functionally partition the system, where to locate the servo electronics, the adequacy of military standard serial bus systems for control (versus data) applications, and the feasibility of providing electronics which could survive severe environments. Several actuation system configurations were evaluated. This led to recommending, as the best development prospect, a locally integrated actuation system consisting of servo electronics, servo valves, actuators, and transducers, interfacing with a digital flight control computer over a serial bus. Author

N86-20409# Honeywell Systems and Research Center, Minneapolis, Minn.
DESIGN VALIDATION OF FLY-BY-WIRE FLIGHT CONTROL SYSTEMS c06
Gary L. Hartmann, Joseph E. Wall, Jr., and Edward R. Rang *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 17 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

This paper addresses the problem of design validation of fault tolerant architectures. Finite-state machines are used to formally specify flight control functions. Their application is not new to engineering practice in flight control. However, it is believed that their systematic and formal use to form the structure of the system specification will be an aid in the design phase and in the validation phase. Examples are used to illustrate their application to flight control specifications. The second portion of this paper is concerned with the problem of testing highly reliable systems. Models based on fault-trees in the early definition phase of estimating reliability are used to design tests to be performed at the iron bird state (hardware in-the-loop). Confidence in the overall

system reliability is derived from a combination of component life-tests and a careful evaluation of the faults that the system is designed to accommodate without loss of control. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-20410# Federal Aviation Administration, Washington, D.C.
OBSTRUCTION MARKING AND LIGHTING
Oct. 1985 66 p
(AC-70/7460-1G) Avail: NTIS HC A04/MF A01

The Federal Aviation Administration's (FAA) standards for marking and lighting of obstructions as identified by FAA regulations part 77, are desribed. Provision's for marking and lighting wind turbines, towers, and moored balloons are given. R.J.F.

N86-20411# Royal Aircraft Establishment, Farnborough (England).
HIGH-PERFORMANCE GUN PROJECTORS OF 20-50mm CALIBRE FOR LABORATORY EXPERIMENTS
G. Simon and G. Kukofka Jul. 1985 49 p refs Transl. into ENGLISH of "Systeme de Lancement de Laboratoire a Hautes Performances de Calibre 20 A 50 mm. Conception et Performances. VsubO=2000 m/s" rept. N-601-83 Franco-German Research Lab., Saint-Louis, France
(RAE-Trans-2135; BR98506; N-601-83) Avail: NTIS HC A03/MF A01

The design of a family of high-performance gun projectors of great flexibility and well-suited to laboratory experiments is described. For any given experiment a choice of barrels and chambers is available within the range of calibers between 20 and 50 mm and given muzzle velocities (V sub 0) of up to 2000 m/s for maximum chamber pressures of 600 MN/sq m. Propelling charges can be cased, combustible or caseless, initiation are effected electrically. The results of 10 year experience with the projector are given and compared with ballistics theory. Curves are presented to assist in the selection of the optimum gun projector for any particular application. E.A.K.

N86-20412*# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
FURTHER INVESTIGATION INTO CALIBRATION TECHNIQUES FOR A MAGNETIC SUSPENSION AND BALANCE SYSTEM Contractor Report, Jan. - Sep. 1985
J. Eskins Feb. 1986 44 p refs
(Grant NsG-7523)
(NASA-CR-178056; NAS 1.26:178056) Avail: NTIS HC A03/MF A01 CSCL 14B

Calibrations performed on three different magnetic cores for wind tunnel models suspended in the Southampton University Magnetic Suspension and Balance System (SUMSBS) are detailed. The first core investigated was the Southampton University pilot Superconducting Solenoid model, first flown in July 1983. Static calibrations of lift force, drag force and pitching moment, together with lift force and pitching moment calibrations determined by the dynamic method are detailed in this report. Other types of core investigated in a similar manner were conventional permanent magnets, Alnico and samarium-cobalt. All static calibrations gave a linear dependence of force on electromagnet current as expected. Dynamic calibrations are faster to perform but are proving to be not as easily analyzed as static calibrations. There are still some effects to be explained but dynamic lift calibration results were obtained agreeing to within 2 percent of the static calibration value. Author

N86-20413# Air Force Human Resources Lab., Brooks AFB, Tex.
FLIGHT SIMULATOR: EVALUATION OF SODERN VISUALIZATION SYSTEM SVS-14 Technical Paper, Jun. - Dec. 1984
Jost P. Gerlicher Sep. 1985 75 p
(AF Proj. 2363)
(AD-A161794; AFHRL-TP-85-11) Avail: NTIS HC A04/MF A01 CSCL 09/3

A solid crystal color light valve display system (to be used on flight simulators) has been developed by SODERN of France for the General Electric Company (GE) under an Air Force Human Resources Laboratory (AFHRL) contract. At the completion of the development phase, a prototype projector, designated as SODERN Visualization System SVS-14, was manufactured. The equipment underwent a series of acceptance tests at the SODERN facility in France and final acceptance testing at AFHRL, Williams AFB. The analysis of the test results showed that the SVS-14 met all important specifications and in some areas even exceeded them. Further experiments with the SVS-14 at AFHRL covered additional engineering evaluations and a human factors study. These tests consisted of a comparison demonstration between the SODERN SVS-14 and the GE PJ5155 projector. Ratings of the visual appearance of the imagery produced by the projectors on a side-by-side arrangement of rear projection screen were in favor of the GE system. However, it was soon found that the performance of the SODERN projector had degraded due to malfunctions of system components. This was caused by a power supply failure that had not been detected prior to the comparison tests. After extensive onsite repair efforts by SODERN personnel, the performance of the SVS-14 was again evaluated in a side-by-side comparison test with the PJ5155. The results indicated improvements in the quality of video imagery. The image persistence for fast moving objects was about equal for both projectors. Author (GRA)

N86-20414# Sandia National Labs., Albuquerque, N. Mex.
STATUS OF THE DOE/SANDIA 500 KW VAWT TEST BED
H. M. Dodd 27 Aug. 1985 7 p Presented at WINDPOWER 85, San Francisco, Calif., 27 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE85-017225; SAND-85-1900C; CONF-850834-1) Avail: NTIS HC A02/MF A01

The DOE/Sandia Vertical Axis Wind Turbine (VAWT) Test Bed represents an evolutionary step in the development of larger and more efficient VAWT's. It is an advanced research machine whose purposes include prototype scale evaluations of improved aerodynamic designs, aerodynamic/structural loads determination for fatigue life improvements, and investigation of new operational modes to increase energy capture while maintaining or improving turbine life. The significant physical features of the machine include a rated power of 500 kW at 37.5 rpm in a 13.4 m/s (30 mph) wind, a diameter of 33.5 m (110 ft), and a height to diameter ratio of 1.25. Significant technological features include blades with multiple laminar airfoil shapes and multiple chord lengths, tailored aerodynamic performance and loads, and variable speed operating capability. The Test Bed will be assembled and operated at the USDA's Agricultural Research Service facility in Bushland, Texas, by Sandia and USDA personnel. Initial operation is scheduled for the fall of 1986. DOE

N86-20415# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
SPECIAL COURSE ON CRYOGENIC TECHNOLOGY FOR WIND TUNNEL TESTING
Loughton, England Jul. 1985 408 p refs Course held in Rhode-Saint-Genese, Belgium, 22-26 Apr. 1985; sponsored by the Von Karmen Inst. and AGARD
(AGARD-R-722; ISBN-92-835-1506-4) Avail: NTIS HC A18/MF A01

Following a brief review of the development and early application of cryogenic wind tunnels, the 16 lectures examine the following aspects of cryogenic wind tunnel technology related to the design and operation of cryogenic tunnels: cryogenic engineering and safety, properties of materials at cryogenic temperatures, model

design requirements and fabrication techniques, instrumentation for control and data acquisition, data accuracy, productivity, and costs of models and operation. A review of the status of cryogenic wind tunnel projects is also presented. For individual titles, see N86-20416 through N86-20431.

N86-20416# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
INTRODUCTION TO CRYOGENIC WIND TUNNELS **c31**
M. J. Goodyer *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 11 p refs Previously announced in IAA as N86-12238 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

The background to the evolution of the cryogenic wind tunnel is outlined, with particular reference to the late 60's/early 70's when efforts were begun to re-equip with larger wind tunnels. The problems of providing full scale Reynolds numbers in transonic testing were proving particularly intractible, when the motion of satisfying the needs with the cryogenic tunnel was proposed, and then adopted. The principles and advantages of the cryogenic tunnel are outlined, along with guidance on the coolant needs when this is liquid nitrogen, and with a note on energy recovery. Operational features of the tunnels are introduced with reference to a small low speed tunnel. Finally the outstanding contributions are highlighted on the 0.3-Meter Transonic Cryogenic Tunnel (TCT) at NASA Langley Research Center, and its personnel, to the furtherance of knowlege and confidence in the concept. Author

N86-20417*# Applied Cryogenics and Materials Consultants, New Castle, Del.
BASIC CRYOGENICS AND MATERIALS **c31**
D. A. Wigley *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 18 p refs Previously announced in IAA as N85-32215 Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 13B

The effects of cryogenic temperatures on the mechanical and physical properties of materials are summarized. Heat capacity and thermal conductivity are considered in the context of conservation of liquid nitrogen, thermal stability of the gas stream, and the response time for changes in operating temperature. Particular attention is given to the effects of differential expansion and failure due to thermal fatigue. Factors affecting safety are discussed, including hazards created due to the inadvertent production of liquid oxygen and the physiological effects of exposure to liquid and gaseous nitrogen, such as cold burns and asphyxiation. The preference for using f.c.c. metals at low temperatures is explained in terms of their superior toughness. The limitations on the use of ferritic steels is also considered. Nonmetallic materials are discussed, mainly in the context of their LOX compatibility and their use in the form of foams and fibers as insulatants, seals, and fiber reinforced composites. Author

N86-20418*# Applied Cryogenics and Materials Consultants, New Castle, Del.
MATERIALS AND TECHNIQUES FOR MODEL CONSTRUCTION **c26**
D. A. Wigley *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 19 p refs Previously announced in IAA as N85-31066 Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

The problems confronting the designer of models for cryogenic wind tunnel models are discussed with particular reference to the difficulties in obtaining appropriate data on the mechanical and physical properties of candidate materials and their fabrication technologies. The relationship between strength and toughness of alloys is discussed in the context of maximizing both and avoiding the problem of dimensional and microstructural instability. All major classes of materials used in model construction are considered in some detail and in the Appendix selected numerical data is given for the most relevant materials. The stepped-specimen program to investigate stress-induced dimensional changes in alloys is discussed in detail together with interpretation of the initial results. The methods used to bond model components are considered with particular reference to the selection of filler alloys and temperature cycles to avoid microstructural degradation and loss of mechanical properties. Author

N86-20419*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND CONSTRUCTION OF MODELS FOR THE NATIONAL TRANSONIC FACILITY, PART 1 **c26**
Clarence P. Young, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 17 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 11F

The design and construction of models for the National Transonic Facility (NTF) has resulted in significant technology developments in many areas. This lecture covers the development of design criteria and major research and development work that has contributed to the successful design and fabrication models for testing at full scale Reynolds number the NTF. Emphasis is placed on the materials aspect of the design and fabrication proces, including metallic materials, mechanical properties characterization, new steel alloy development, fracture toughness enhancement, and identification of fillers and solders suitable for use in cryogenic models. Quantitative data are provided which will be of value to the potential user of NTF or for application to the design and fabrication of model systems for other cryogenic wind tunnels. Author

N86-20420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND CONSTRUCTION OF MODELS FOR THE NATIONAL TRANSONIC FACILITY, PART 2 **c05**
Clarence P. Young, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 16 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 17G

This lecture presents the results of fastener load and retention systems tests which were carried out as a part of the cryogenic models technology development program a the NASA Langley Research Center (LaRC). Various design concepts for the National Transonic Facility (NTF) developmental and production models are discussed. A number of NTF models are described with emphasis on materials used, uniqueness of design and design drivers. Design and fabrication experience is presented in terms of the primary thermal and mechanical considerations required for design as well as fabrication. Cost considerations are addressed in terms of factors influencing costs for NTF models and cost data comparisons which are taken from both NASA Langley and industry experience. Author

N86-20421# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CRYOGENIC WIND TUNNEL INSTRUMENTATION **c35**
M. Bazin *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 28 p refs Previously announced in IAA as A85-47284 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

Research conducted under the European Wind Tunnel project with the objective of adapting wind tunnel instrumentation to cryogenic conditions is reviewed. In particular, attention is given to the development of cryogenic balances, pressure transducers, accelerometers, temperature transducers, skin friction gages, and instruments for attitude and deformation measurements. Model instrumentation and model motorization are also discussed. V.L. (IAA)

N86-20422# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France).
FUNDAMENTAL REFLECTIONS ON CRYOGENIC TESTING **c02**

Andre Mignosi *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 25 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

This paper concerns a number of aerodynamic problems related to cryogenic testing but which can also be encountered during testing at room temperature. The first part describes the various factors involved to achieve the best similarity possible between an aircraft in flight and the model in the wind tunnel. The second part covers the analysis of these factors: effects of a non adiabatic wall, boundary layer transition, two-dimensional testing, effects of the Reynolds number. In the paper, an attempt is made to alternate theoretical considerations with practical examples in order to illustrate the importance of experimental/theoretical correlations. Finally, the paper endeavors to highlight a few areas to which effort must be devoted in the future so that the new technique of cryogenic wind tunnels now available to scientists and manufacturers provides reliable and accurate results leading to a better analysis of aerodynamic phenomena and improved prediction and optimization of aircraft performance. Author

N86-20423# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PRODUCTIVITY: THE ECONOMIC ASPECTS OF CRYOGENIC WIND TUNNEL DESIGN AND USE c83
J. Christophe *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 21 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

The idea of productivity, as it is applied to large non-cryogenic wind tunnels is investigated. These considerations can be extended to the new cryogenic wind tunnels; but these have some special features we attempt to define precisely. Important focal points in designing a cryogenic wind tunnel or good productivity in operation are examined. Author

N86-20424# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. dAerothermodynamique.
THE T2 CRYOGENIC INDUCTION TUNNEL IN TOULOUSE c02
Jean-Bernard Dor *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 22 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

This paper summarizes the main results obtained by the experimental activity at the ONERA/CERT T2 induction tunnel in Toulouse since it was converted for cryogenic operation in 1981. It describes the main characteristics of this facility, operating by short pressurized transonic runs driven by induction, with a test section equipped with two self-adapting walls and its adaptation to cold flows: internal thermal insulation, cooling by injection of liquid nitrogen, system for precooling profile models and introducing them in the test section. The following subjects concerning cryogenic operation are then discussed: pressure and temperature fluctuations, thermal behavior of the walls, transverse temperature distributions in the flow, thermal equilibrium of a profile with the fluid, condensation phenomena in the cold flow and problems of particles. Finally, the test results at high Reynolds number conducted on a CAST 7 profile with a 150 mm chord are given. Author

N86-20425# Aerodynamische Versuchsanstalt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungamechanik.
THE CRYOGENIC LUDWIEG TUBE TUNNEL AT GOETTINGER c02
G. Hefer *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 6 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

At the Research Center Gottingen of the DFVLR a cryogenic Ludwieg tube wind tunnel for transonic operation is under construction. The tunnel, having an effective run time of 1 second, a test section of 0.4 x 0.35 sq m, and a stagnation pressure of 10 bars, is to be operated with nitrogen at temperatures between ambient and 120 K, achieving a Reynolds number of 70 x 10 to the 6th power based on a model chord of 0.15 m. In addition to reviewing the Ludwieg tube concept, this paper presents the main features of design and operation of the tunnel. Author

N86-20426# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE KRYO-KANAL-KOELN (KKK) PROJECT: DESCRIPTION OF TUNNEL CONVERSION, INSULATION, CONTROLS, INSTRUMENTATION, OPERATIONAL EXPERIENCE AND FIRST PRELIMINARY TEST RESULTS c02
G. Viehweger *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 20 p refs Previously announced in IAA as A85-40314 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

The fundamental principles, costs, and operational phases (cooldown, preparation, starting, measurement, rundown, and warming) of cryogenic wind tunnels are discussed, and the problems encountered in modifying the conventional low-speed wind tunnel at Cologne for cryogenic operation are discussed. Particular attention is given to the test section, the blowers and power plant, the liquid-N2 system, the exhaust and safety system, and the interior insulation; and photographs, drawings, and diagrams are provided. The first trial operation of the KKK took place in September 1984, with calibration under cryogenic conditions scheduled for the second half of 1985. T.K. (IAA)

N86-20427# National Aerospace Lab., Amsterdam (Netherlands). Technical Group ETW.
THE EUROPEAN TRANSONIC WINDTUNNEL (ETW) PROJECT
J. A. Tizard and J. P. Hartzuiker *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 23 p refs Previously announced in IAA as N84-23566 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

The status of the preliminary design phase of the European Transonic Wind Tunnel project is described. The latest version of the proposed tunnel is given together with some details of its estimated performance. Some features of the tunnel which were revised following the first preliminary design proposals are discussed and the results of an investigation into the expected future use of the tunnel are summarized. An aerodynamic circuit test-rig is described along with some of the results obtained. Information on the pilot tunnel is included as well as reference to the supporting program on cryogenic technology. Author

N86-20428*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE NASA LANGLEY 0.3-M TRANSONIC CRYOGENIC TUNNEL
Robert A. Kilgore *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 15 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

The Langley 0.3-m Transonic Cryogenic Tunnel (0.3-m TCT) can operate from ambient to cryogenic temperatures at absolute pressures from 1 to 6 bars. Since the 0.3-m TCT began operation in 1973, it has been used to develop instrumentation and operating techniques for cryogenic tunnels as well as for aerodynamic tests where advantage can be taken of the extremely wide range of Reynolds number available. This paper describes the present capabilities of the 0.3-m TCT and gives an overview of recent research activities which include both steady and unsteady testing. Emphasis is given to safety and the development of testing techniques for cryogenic tunnels. Results of studies aimed at establishing the lower limits of operating temperature are presented and the impact of these studies on tunnel operation is discussed. Finally, the design features and operating characteristics of a new self-streamlining wall test section recently installed in the tunnel circuit are described. Author

N86-20429*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE US NATIONAL TRANSONIC FACILITY, PART 1
Walter E. Bruce, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 10 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

The construction of the National Transonic Facility was completed in September 1982, and checkout operations started the following month, with the maximum Reynolds number being obtained in May 1983. Following, most of the effort was devoted to installing the model access housings, and adjusting or altering various tunnel hardware systems. In May 1984, preliminary aerodynamic calibration of the tunnel was initiated in parallel with checkout of the tunnel operating systems, and in August 1984, the tunnel was declared operational and turned over to the user organization for a complete aerodynamic calibration and research and development testing. The facility has been operated in both the air and nitrogen modes covering a Mach number range of 0.2 to 1.22 at pressures up to 8.5 atm and at temperatures down to 100K. This paper presents a status of the tunnel operating systems and an overview of the major milestones during checkout. Author

N86-20430*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE US NATIONAL TRANSONIC FACILITY, PART 2
Walter E. Bruce, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 10 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

The construction of the National Transonic Facility was completed in September 1982, and checkout operations started the following month with the maximum Reynolds number being obtained in May 1983. Afterwards, effort was primarily devoted to installing the model access housings and adjusting or altering various tunnel hardware systems. In May 1984, the aerodynamic calibration started and was performed in parallel with checkout of the tunnel systems. In August 1984, the final operation readiness review was conducted and the facility declared operational for research testing. The facility has been operated in both air and nitrogen modes covering a Mach number range of 0.2 to 1.22 at pressures up to 8.5 atm and at temperatures doen to 100K. A limited amount of tunnel circuit performance information has been obtained and is presented in this paper. An aerodynamic calibration plan has been outlined, and the first part of the steady-state calibration has been completed, of which some results are presented in this paper. The first aerodynamic vehicle, Pathfinder I, was installed in December 1984 for checkout of instrumentation systems, and a status report and some results are presented. Author

N86-20431*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OTHER CRYOGENIC WIND-TUNNEL PROJECTS
Robert A. Kilgore *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 15 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

Following the development of the cryogenic wind tunnel at the NASA Langley Research Center in 1972, a large number of cryogenic wind-tunnel projects have been undertaken at various research establishments around the world. Described in this lecture are cryogenic wind-tunnel projects in China (Chinese Aeronautical Research and Development Center), England (College of Aeronautics at Cranfield, Royal Aircraft Establishment - Bedford, and University of Southampton), Japan (National Aerospace Laboratory, University of Tsukuba, and National Defense Academy), Sweden (Rollab), and the United States (Douglas Aircraft Co., University of Illinois at Urbana-Champaign, and NASA Langley). Author

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-20432# Committee on Science and Technology (U. S. House).
ASSURED ACCESS TO SPACE DURING THE 1990'S
Washington GPO 1985 187 p Joint hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology and the Subcommittee on Research and Development of the Committee on Armed Services, 99th Congress, 1st Session, no. 51, HASC no. 99-9, 23-25 Jul. 1985 Prepared in cooperation with Committee on Armed Services, US House
(GPO-53-617) Avail: Subcommittee on Space Science and Applications

Hearings on the subject of assured access to space during the 1990's is presented. During the past 27 years, activities in outer space have become increasingly important to the national security, to the economic well being, to the quality of life, and to the rate of technological growth of the United States. In the past year, NASA and the Defense Department have reached agreements on how to best meet the space launch needs for the rest of this decade. Additionally, work has begun on studies of the next generation of space transportion. However, these next generation systems may not be available until about the year 2000 or beyond. Accordingly, decisions must soon be reached on how existing systems and technologies will be procured and operated to meet all of the space transportation needs of the 1990's. This subject is the focus of these hearings. Author

N86-20433*# Texas Univ., Dallas. Center for Space Sciences.
DE-1 PHASE 3 EXTENDED MISSION DATA ANALYSIS OF DYNAMICS EXPLORER RETARDING ION MASS SPECTROMETER FLIGHT DATA Final Report, 25 Ja. - 24 Nov. 1985
5 Dec. 1985 7 p
(NASA Order H-78173B)
(NASA-CR-178704; NAS 1.26:178704) Avail: NTIS HC A02/MF A01 CSCL 22A

Field-aligned motion of ionospheric ions at a low altitudes and different pitch angle distributions of ionospheric ions at high altitudes were studied. The objective is twofold: (1) to discover the degree to which observations made by Dynamics Explorer 1 (DE-1) and DE-2 agree when taken in the same ionospheric volume; (2) to understand the processes operating along a magnetic field tube connecting DE-1 and DE-2 that allow a reconciliation of the two data sets. A second investigation has two facets; to reconcile the observed occurrence of ionospheric ions at high altitudes with a point source injection in the ionosphere and subsequent E x B drift, and to reconcile the observed fluxes of ionospheric ions at high altitudes with the measured upward flux at low altitudes. An understanding of the effects of E x B drift molten on the dispersion of ionospheric ions is attained. E.A.K.

N86-20434*# Universities Space Research Association, Columbia, Md.
REVIEW AND EVALUATION OF SPACE PROCESSING APPLICATIONS Final Report
7 Jan. 1986 21 p refs
(Contract NAS8-35768)
(NASA-CR-178703; NAS 1.26:178703) Avail: NTIS HC A02/MF A01 CSCL 22A

Materials research in space which offers advantages in studying phenomena and preparing materials under conditions which cannot be realized in the gravity field of the Earth is discussed. Many techniques were developed to improve processing systems and reduce the effect of gravitationally induced restrictions. The space-based devices take advantage of a wide range of low-gravity facilities including drop towers and tubes, aircraft and sounding rocket parabolic trajectories, simple materials experiment accommodations in the Space Shuttle, and more complex capabilities in Spacelab. All these systems are used to produce novel

materials and to study material processing under unique conditions. E.A.K.

N86-20435*# Stanford Univ., Calif. Space, Telecommunications and Radioscience Lab.
DYNAMICS-A EXPLORER RIMS DATA ANALYSIS Interim Final Report, 17 Sep. 1981 - 30 Sep. 1985
P. M. Banks and C. R. Clauer Sep. 1985 6 p
(Contract NAS8-34430)
(NASA-CR-178689; NAS 1.26:178689) Avail: NTIS HC A02/MF A01 CSCL 22A

Activities of the RIMS instrument during the extended mission are planned. The modes of operation for RIMS to achieve the science requirements utilizing the new and exciting information on the composition and dynamics of the low energy (0-50eV) ions in the Earth's ionosphere and magnetosphere are determined. The specific science problems and the required RIMS operational modes needed to acquire the desired data are identified. The analysis was performed on the RIMS data to achieve the science results and this new information was used in determining RIMS operations during the latter part of the mission. Necessary sensitivity tests of RIMS operating modes and instrument performance was suggested. The inflight results was compared with theoretical models. E.R.

N86-20436# Committee on Science and Technology (U. S. House).
SPACE SCIENCE: PAST, PRESENT AND FUTURE
Washington GPO 1985 210 p Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, no. 60, 8-10 Oct. 1985
(GPO-55-239) Avail: Subcommittee on Space Science and Applications CSCL 22A

The Congressional Subcommittee on Space Science and applications held hearings on Space Science: past, present and future. Topics discussed include: space sciences and exploration, space physics, Earth observations from space, Earth sciences, planetary and solar system formation, weather observations from space, biology studies from space, solar system space physics, and solar-terrestrial sciences. E.A.K.

N86-20437# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE
10 Feb. 1986 97 p refs Transl. into ENGLISH from various Russian articles
(JPRS-USP-86-002) Avail: NTIS HC A05

Aerospace sciences and its applications in the U.S.S.R. is reported. Manned missions, interplanetary exploration, extraterrestrial intelligence, space processing are some of the topic areas explored. For individual titles, see N86-20438 through N86-20456.

N86-20438# Joint Publications Research Service, Arlington, Va.
WORLD'S LARGEST CAMERA FOR SATELLITE OBSERVATION INSTALLED AT ZVENIGOROD **c35**
M. Rogozhnikov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 18-19 Transl. into ENGLISH from Leninskoye Znamya (Moscow, USSR), 17 Oct. 1985 p 4 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

The world's largest camera for observing artificial Earth satellites was installed at the Zvenigorod station of the USSR Academy of Sciences' Astronomical Council. Small deviations of geostationary satellites from their prescribed orbits sometimes occur. At regular intervals, it is necessary to give them a push—to correct their orbits. The photographing of satellites from Earth is still the most precise and accurate method for determining their coordinates. The camera was installed near Zvenigorod for this purpose. Author

N86-20439# Joint Publications Research Service, Arlington, Va.
SOME POSSIBILITIES OF REPRESENTATION OF GRAVITATIONAL POTENTIAL BY SERIES ALWAYS CONVERGENT OUTSIDE ITS SURFACE **c64**
N. A. Chuykova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 28 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta: Fizika, Astronomiya (Moscow, USSR), v. 26, no. 5, Sep. - Oct. 1985 p 77-81 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

In processing surface and satellite gravimetric data the problem usually arises as to the possibility of using a single Laplace series for the representation of geopotential and its derivatives because the convergence of this series everywhere outside the planetary surface has been demonstrated only for a certain class of surfaces. For a surface of arbitrary form this problem can be solved by applying the Runge-Krarup theorem. An analysis of this problem indicates that planetary potential can be uniformly represented everywhere in the region of its analyticity in the form of the limit of sums of spherical functions a form given. The coefficients on the spherical functions are quite dependent on the number of the approximation and on the region of observations. Since in the satellite region the Laplace series gives the best quadratic approximation for potential, in processing satellite data alone it is impossible to obtain the proposed universal models. A satellite model cannot be used for a surface not conforming to the conditions of convergence of a Laplace series on it. The proposed universal model can be obtained using either joint satellite and surface observations or surface data alone. Author

N86-20440# Joint Publications Research Service, Arlington, Va.
PROBOS MISSION DISCUSSED AT INTERNATIONAL COMMITTEE MEETING **c18**
V. Ovcharov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 29 Transl. into ENGLISH from Sovetskaya Moldaviya (Kishinev, USSR), 15 Nov. 1985 p 3 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

The carrying out of a new international project, Phobos, will become an important step in the study of planets of the solar system. This project calls for launching two Soviet automatic stations in 1988, for the purpose of studying the planet Mars and its satellites Phobos and Deimos. Preparations for this unique space experiment are being discussed at a meeting of the international scientific and technical committee for the Vega project. The two Phobos automatic interplanetary stations are to be launched from the Baykonur Cosmodrome in July of 1988. The launches will be separated by an interval of several days. Each spacecraft will carry 30 instruments on board. It will take the stations about 7 months to make the trip to Mars. They will be approaching the planet early in 1989. Plans call for photographing the surfaces of Mars and its satellites and for studying the Martian atmosphere and the planet's magnetic field in the course of the experiment. The landing of small probes with instruments on Phobos is also proposed. Author

N86-20441# Joint Publications Research Service, Arlington, Va.
SAGDEYEV ON INTERNATIONAL TRACKING, PROCESSING OF VEGA BALLOON PROBE **c91**
In its USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 30-32 Transl. into ENGLISH from Pravda (Moscow, USSR), 27 Aug. 1985 p 3 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Within the framework of the international project Vega, which is opening an era of fundamentally new research on the atmosphere of Venus and also a program of studying the small bodies of the solar system--the comets and steroids, the Soviet spacecraft Vega-1 and Vega-2 inserted two balloon probes into the atmosphre of Venus, in addition to their landers. The main task of the balloon experiment was to obtain new information about the dynamics of the atmosphere of Venus. A sonde, unlike a lander, makes it possible to conduct measurements over various sectors of the planet. Each balloon probe was operating for 46 hours and in this time flew with the wind over 12,000 kilometers, measuring along its flightpath the temperature, pressure, vertical gusts of wind, the range of visibility in the clouds, the average amount of illumination and following the presence of light flashes. The balloon

flights started from the middle of the planet's night region and finished their work on the daylight side. Author

N86-20442# Joint Publications Research Service, Arlington, Va.
RESULTS FROM VENUS CLOUD STUDIES ON VEGA CRAFT **c91**
V. Moroz and L. Mukhin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 33-34 Transl. into ENGLISH from Pravda (Moscow, USSR), 18 Nov. 1985 p 8 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Results of studies that were made of the clouds of Venus with the aid of the probes that were released by the automatic interplanetary stations Vega-1 and Vega-2 are reported. Each of the capsules that descended through Venus' atmosphere carried several instruments for measuring the chemical composition of cloud particles, the size particles and their distribution by altitude. Direct measurements of the content of sulfuric acid in cloud particles were made with Sigma-3 instrument on both capsules. Another experiment established that clouds of Venus also contain sulfur, chlorine, and apparently phosphorus, which was detected for the first time. Author

N86-20443# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON 15TH LUNAR-PLANETARY CONFERENCE **c91**
V. V. Shevchenko *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 35-38 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 6, Nov. - Dec. 1984 p 43-45 Conf. held at Houston, Tex., Mar. 1984 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Every year in Houston there is a lunar-planetary conference, at which the current results of the work of scientists studying the solar system's bodies are summed up. The conference is organized by the U.S. Lunar-Planetary Institute of the University Association for Space Research and by NASA's Johnson Space Center. Originally the conferences were concerned only with lunar research. Later, as of March, 1978, the meetings' scientific program was expanded and began to include many other questions connected with the study of the solar system. Nearly 500 planetologists and scientists with allied specialities participated in the work of the 15th Lunar-Planetary Conference, which took place in March, 1984. In all, at 28 sectional meetings, almost 300 oral reports were heard and they touched on such themes as: the study of regoliths; the origin of the crust; lunar petrology; lunar geology; planetary physics; the study of isotopes; the study of meteorites; the study of shock crater formation; the satellites of the giant planets; Mars; Venus; the evolution of the solar system; asteroids and comets; and cosmic dust. Author

N86-20444# Joint Publications Research Service, Arlington, Va.
SHKLOVSKIY DISCUSSES POSSIBILITY OF EXTRATERRESTRIAL INTELLIGENCE **c51**
I. S. Shklovskiy *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 39-44 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 3, May - Jun. 1985 p 76-80 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

The silence of the universe can be completely and naturally attributed to the fact that extraterrestrial civilizations have either perished, not being able to contend with the problems that arose in the course of their own development, or there have never been such civilizations. In an examination of the history of terrestrial civilization it is seen that there are global problems in the present era and an inability to solve them can lead mankind to destruction. The proposed hypothesis makes possible a more profound discussion of the board range of problems related to the future of mankind and the extent to which life occurs in the universe. Author

N86-20445# Joint Publications Research Service, Arlington, Va.
SALYUT-7 ELECTROPHORESIS EXPERIMENTS AID MEDICAL RESEARCH **c51**
T. Chesanova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 45 Transl. into ENGLISH from Leningradskaya Pravda (Leningrad, USSR), 13 Oct. 1985 p 2 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Experiments performed by crews of Salyut orbiting stations have been aimed at obtaining extrapure hemagglutinin and other surface proteins of the influenza virus, using the method of electrophoresis. The series of space experiments called Tavriya demonstrated that such products can be obtained comparatively quickly and easily in conditions of zero gravity. A new generation electrophoretic unit called EFU-Robot is now in use on the Salyut-7 station. The EFU-Robot can be programmed by a cosmonaut to select samples of substances purified in the course of experiments and automatically transfer the samples from the unit's working chamber to ampoules, using syringes. Preparations obtained during the current manned orbital mission were delivered to Earth recently by cosmonauts. Author

N86-20446# Joint Publications Research Service, Arlington, Va.
RADAR OBSERVATIONS OF RIVER OVERFLOWS FROM OUTER SPACE Abstract Only **c43**
A. P. Pichugin, A. S. Gavrilenko, A. G. Gribunin, L. V. Yelenskiy, A. I. Kalmykov, and V. P. Shestopalov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 63 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 2, Sep. 1985 p 323-326 Original language translation was announced in IAA as A86-13984 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Cosmos-1500 sidelooking radar observations of the flooding of the Amur River in August 1984 are examined. It is concluded that remote-sensing radar images can be effectively used to monitor river flooding and to identify the basic features of flooded regions. The proposed radar-image processing method makes it possible to compute the areas of regions with different degrees of flooding as well as the percentage of land under water. B.J.

N86-20447# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF ATMOSPHERIC TRANSFER FUNCTION COMPONENTS Abstract Only **c47**
O. M. Pokrovskiy, V. M. Prokhorov, and T. F. Pchelova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 64 refs Transl. into ENGLISH from Issledovaniye Zemli IZ Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 9-20 Original language document was announced in IAA as A86-13277 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Atmospheric transfer functions have been computed for the spectral band 0.4-0.9 microns, assuming the optical thickness of the atmospheric boundary layer is variable. The sensitivity of the transfer functions to variations in the optical characteristics of the aerosol was analyzed, and the results are used to predict optimal times for satellite observations of the Earth surface when the influence of the atmosphere on spectrometric data is minimal. Estimates of the optical thickness of the aerosol in the troposphere are given in a table. I.H.

N86-20448# Joint Publications Research Service, Arlington, Va.
OPTICAL THICKNESS OF ATMOSPHERIC AEROSOL OVER SEA Abstract Only **c74**
K. S. Shifrin, V. M. Volgin, B. N. Volkov, O. A. Yershov, and A. V. Smirnov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 65 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 21-30 Original language document was announced in IAA as A86-13278 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Measurements of the optical depth of the atmospheric aerosol over marine and coastal regions are presented. The measurements were carried out using a photoelectric amplifier and a photodiode detector having a combined sensitivity in the range 300-1016 nm.

The measured data were cross correlated using the Burder method and the results are discussed. It is shown that the two sets of measurements have good correlation in the visible band (300-500 nm), and in the infrared (500-1016 nm). The estimated optical depths are given in a table. I.H.

N86-20449# Joint Publications Research Service, Arlington, Va.
NEW METHOD FOR GEOLOGICAL INTERPRETATION OF ANNULAR STRUCTURES WITHIN COVERED AND PARTIALLY COVERED AREAS Abstract Only **c46**
B. S. Zeylik, L. G. Perfilyev, A. N. Vasilenko, and E. Yu. Seytmuratova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 66 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 31-40 Original language document was announced in IAA as A86-13279 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Digital modelling of topographic features in low angle sunlight is proposed to identify ring structures in remote sensing images. The technique was used to construct a relief image of the Shunak crater based on satellite measurements of solar irradiance in four directions. A map of the Shunak crater, showing the isolines of the total solar irradiance is provided. I.H.

N86-20450# Joint Publications Research Service, Arlington, Va.
STUDY OF SPATIAL STRUCTURE OF SOIL COVER IN BAYKAL REGION USING AEROSPACE PHOTOGRAPHS Abstract Only **c43**
V. A. Kuzmin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 67 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 53-57 Original language document was announced in IAA as A86-13282 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Soil cover and its changes can be studied best by using aerospace materials. It is best that soil regions be defined on photographs at 1:2,500,000. An example of a soils geography regionalization map, compiled from photographs at this scale, is illustrated. Regions are defined within the limits of plateaus, plains, high, intermediate and low mountains and basins. Photographs at 1:1,000,000 yield considerably more information; in addition to provinces and regions it is possible to define landscape units. Among the different photographic scales used the most detailed were intermediate scale photographs on which it is possible to discriminate districts soil micro- and mesostructures and elementary soil areas. In contrast to space photographs on aerial photographs it is possible to discriminate vegetation, micro- and mesorelief, and in cultivated areas such soil characteristics as humus content, moisture content, calcareousness, etc. In the study of soils geography the soil cover is reflected through the structure of different levels of organization. Author

N86-20451# Joint Publications Research Service, Arlington, Va.
RADIATION CORRECTION FOR AEROSPACE IMAGES OF AGRICULTURAL CROPS Abstract Only **c43**
A. S. Barykin, V. V. Kozoderov, and V. P. Popov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 68-69 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosma (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 78-85 Original language document was announced in IAA as A86-13285 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

The methods used to calculate radiative corrections in thematic processing of remotely-sensed agricultural images are reviewed. The effect of atmospheric turbidity on the accuracy of thematic classifications is estimated by comparing corrected and uncorrected images. A radiative correction algorithm is derived based on model estimates of radiative transfer in the atmosphere and an orthogonal polynomial approximation of outgoing radiation. It is found that the accuracy of image classifications increased when the effect of atmospheric turbidity was removed. Some examples of the processed imagery are provided. I.H.

N86-20452# Joint Publications Research Service, Arlington, Va.
IDENTIFICATION OF NATURAL FORMATIONS FROM RESULTS OF SPECTRAL-ENERGY MEASUREMENTS FROM SPACE Abstract Only **c46**
L. I. Kiselevskiy, A. A. Kovalev, and V. Ye. Plyuta *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 69-70 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 98-104 Original language document was announced in IAA as A86-13287 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Photographs obtained on board the orbital station Salyut-4 were used to study the spectral and energy characteristics of the upper boundary layer over selected regions of the USSR. The influence of the sample volume on the statistical classifications for spectral features in the range 0.4-0.8 microns is examined in detail. The most informative spectral features were chosen according to Shannon's criterion of information content. A list of the spectral classifications is given. I.H.

N86-20453# Joint Publications Research Service, Arlington, Va.
CLASSIFICATION OF NATURAL FORMATIONS BASED ON THEIR OPTICAL CHARACTERISTICS USING SMALL VOLUMES OF SAMPLES Abstract Only **c46**
N. S. Abramovich, A. A. Kovalev, and V. Ye. Plyuta *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 70 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 105-111 Original language document was announced in IAA as A86-13288 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

A computer algorithm has been developed to classify the spectral bands of natural scenes on Earth according to their optical characteristics. The algorithm is written in FORTRAN-IV and can be used in spectral data processing programs requiring small data loads. The spectral classifications of some different types of green vegetable canopies are given in order to illustrate the effectiveness of the algorithm. I.H.

N86-20454# Joint Publications Research Service, Arlington, Va.
ALLOWANCE FOR PROPERTIES OF BOUND MOISTURE IN REMOTE SENSING OF SOIL MOISTURE CONTENT Abstract Only **c43**
T. A. Sologubova and V. S. Etkin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 71 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 112-115 Original language document was announced in IAA as A86-13289 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

It is shown that a distinction should be made between the dielectric properties of fixed and free water in interpretations of radiometer measurements of soil moisture content. Some elementary calculations of the free water content in different types of soil are carried out based on the published data and the results are discussed. It is suggested that taking into account the distinction between differences in the dielectric properties of free and fixed water deposits can increase the accuracy of soil moisture estimates in remote sensing surveys. I.H.

N86-20455# Joint Publications Research Service, Arlington, Va.
THE EXPLORATION OF OUTER SPACE AND THE DEVELOPING COUNTRIES **c43**
S. M. Monin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 72-78 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 76-81 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

In many countries of Asia, Africa and Latin America ground communications systems still do not adequately cover large areas, and space technology is frequently the simplest and fastest means of setting up communications between regions within countries as well as with the outer world. Space television can play an important

part in overcoming illiteracy and raising the general educational and cultural standards of the people of such countries. Data received from outer space on meteorology, the state of farmlands and forests, and mineral deposits can facilitate the development of agriculture and the extracting industries, which constitute the developing countries' economic basis. Of considerable importance are navigation support, oceanic studies, and monitoring the environment. The development and operation of space hardware is extremely expensive. In most cases the level of industry, science and technology is not high enough. There are few experts capable of contributing to space projects. It is not surprising, therefore, that these countries account for only 5 percent of space-related world research and development. These and other space policy considerations are considered. Author

N86-20456# Joint Publications Research Service, Arlington, Va.
HISTORICAL OVERVIEW OF INTERCOSMOS PROGRAM c17
M. A. Rimsha *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 79-86 refs Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 6, Nov. - Dec. 1984 p 26-32 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

Fifteen years ago, on October 14, 1969, the artificial Earth satellite Intercosmos-1 was launched initiating joint satellite research conducted by scientists and specialists from friendly countries. A little more than 2 years were spent on the preparations for this launch. The first envoys of the Intercosmos program were comparatively small space vehicles. They consisted of three basic sections: a cylindrical middle section and two hemispheres. The first craft of the Intercosmos series achieved orientation on the Sun with an accuracy of a few angular degrees. The launch of the Intercosmos-1 satellite initiated one of the basic directions of research conducted in accordance with the program of space cooperation by the socialist countries--research on the solar-terrestrial ties using satellites. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-20457# Royal Aircraft Establishment, Farnborough (England).
ORBIT DETERMINATION AND ANALYSIS FOR 1970-97B AT 14TH-ORDER RESONANCE
A. N. Winterbottom and D. G. King-Hele Jun. 1985 24 p
(AD-A160686; RAE-TR-85054; DRIC-BR-96950) Avail: NTIS HC A02/MF A01 CSCL 03/3

The orbit of the satellite 1970-97B, the rocket of Cosmos 378, at inclination 74 deg, has been determined at 18 epochs between April and August 1971, when the effects of 14th-order resonance with the Earth's gravitational field were appreciable. The orbits were determined with the PROP 6 program from Hewitt camera, kinetheodolite, US Navy and visual observations, and an average accuracy of 90 m in perigee distance was achieved, despite the low perigee height (near 230 km) and the consequent high drag. The orbits, together with 13 previously evaluated, have been analysed to reveal the effects of the 14th-order resonance and to evaluate six lumped geopotential harmonics of order 14. Because the orbit passed through resonance rapidly, the values are not as accurate as those from slow resonances; but they are more accurate than any others available for an inclination near 74 deg, and have proved their worth in a recent determination of individual 14th-order coefficients. Author (GRA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-20458# National Oceanic and Atmospheric Administration, Boulder, Colo.
[ACTIVITIES OF THE SPACE ENVIRONMENT LABORATORY, FY 1984] Annual Report, 1 Oct. 1983 - 30 Sep. 1984
H. Leinbach 1984 50 p refs
(PB85-226256) Avail: NTIS HC A04/MF A01 CSCL 04A

Topics including space environment services: current progress--(space environment services, forecast operations, real-time data and sources, communications for data collection, data display systems, distribution of service products, mechnical improvements in services, international data exchange); future plans--(services, technical improvements in services); research and development: current progress--(operational satellite instrumentation, SELSIS - Space Environment Laboratory Solar Imaging System, solar physics, interplanetary physics, magnetospheric physics, atmosphere-ionosphere-magnetosphere interactions; SELDADS II; SEL staff; Publications; SEL talks are presented. GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-20459 British Aerospace Dynamics Group, Bristol (England). Human Factors and Vision Research Dept.
MODELS FOR A TARGET RECOGNITION SYSTEM IN MISSILES USING A COMPUTER AND SENSOR DEVICE
N. J. Puzey Nov. 1980 19 p refs
(BAe-BT-11140) Copyright. Avail: Issuing Activity

Shape recognition models are discussed and recommendations for the design of a computer guidance system for missiles are made. A model to account for shape discrimination by the Octopus visual system is the most heuristic in forming the basis of an automatic target acquisition system. A system based on a recognition template of hexagonal cell sensors is proposed; this can identify the same aspect of an object along the three axes of symmetry of the hexagon so the system is largely independent of object/sensor orientation. Author (ESA)

N86-20460*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STAR 48 SOLID ROCKET MOTOR NOZZLE ANALYSES AND INSTRUMENTED FIRINGS
Robert L. Porter Mar. 1986 58 p refs
(NASA-TP-2572; NAS 1.60:2572) Avail: NTIS HC A04/MF A01 CSCL 21H

The analyses and testing performed by NASA in support of an expanded and improved nozzle design data base for use by the U.S. solid rocket motor industry is presented. A production nozzle with a history of one ground failure and two flight failures was selected for analyses and testing. The stress analysis was performed with the Champion computer code developed by the U.S. Navy. Several improvements were made to the code. Strain predictions were made and compared to test data. Two short duration motor firings were conducted with highly instrumented nozzles. The first nozzle had 58 thermocouples, 66 strain gages, and 8 bondline pressure measurements. The second nozzle had 59 thermocouples, 68 strain measurements, and 8 bondline pressure measurements. Most of this instrumentation was on the nonmetallic parts, and provided significantly more thermal and strain

data on the nonmetallic components of a nozzle than has been accumulated in a solid rocket motor test to date. Author

N86-20461# Committee on Science and Technology (U. S. House).
CENTAUR COST, SCHEDULE AND PERFORMANCE REVIEW
Washington GPO 1985 86 p Hearings before the Comm. on Sci. and Technol., 99th Congr., 1st Sess., No. 34, 21 and 23 May 1985
(GPO-51-382) Avail: Subcommittee on Space Science and Applications

The Subcommittee on Space Science and Applications of the Committee on Science and Technology of the U.S. House of Representatives (99th Congress) met on 21-23 May 1985 to perform a cost, schedule and performance review of the Space Shuttle/Centaur Program. Excessive costs, amounting to more than 100 million dollars were attributed by the Subcommittee to government indecision, contracting delays, launch schedule pressures, and breakdowns in engineering and management systems at NASA and the contractor. The Centaur G-Prime vehicles were to be available for the Galileo Mission to Jupiter and the International Solar Polar Mission, but scheduled for launch in May - June 1986. However, this schedule cannot be met, and the next Jupiter launch window is not until July 1987. F.M.R.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-20462# Committee on Science and Technology (U. S. House).
RESULTS OF SPACE SHUTTLE FLIGHT 51-D
Washington GPO 1985 29 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, no 19, 3 May 1985
(GPO-48-813) Avail: Subcommittee on Space Science and Applications

Col. Karol Bobko, mission commander of Space Shuttle Discovery Flight 51-D, reported on that mission before the Subcommittee on Space Science and Applications of the Committee on Space and Technology of the House of Representative (99th Congress) on 3 May 1985. The flight program consisted of the launch of two satellites, operation of the continuous-flow electrophoresis experiment, investigations using an echocardiograph, student experiments, as well as planned observations of the Earth. One of the satellites, a Syncom, failed to activate. Otherwise the flight was nominal. F.M.R.

N86-20463# Committee on Science and Technology (U. S. House).
RESULTS OF SPACE SHUTTLE FLIGHT 51-D
Washington GPO 1985 29 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, no. 19, 3 May 1985
(GPO-58-813) Avail: Subcommittee on Space Science and Applications

The Congressional Subcommittee on Space Science and applications held hearings on the results of the Space Shuttle flight 51-d activities onboard the Space Shuttle Discovery included: deployment of two (Anik and Syncom) satellites, continued operation of the continuous flow electrophoresis experiment, echocardiograph investigations, student experiments, gas canisters. Earth observations and an unexpected space rendezvous with an artificial satellite and the use of the mechanical arm. E.A.K.

N86-20464# Congressional Budget Office, Washington, D. C.
BUDGET EFFECTS OF THE CHALLENGER ACCIDENT
David H. Moore and Patricia H. Johnston, ed. Mar. 1986 23 p
Avail: NTIS HC A02/MF A01

The preliminary estimates of the effects of the Challenger accident on the NASA budget for FY 1986 and 1987 are presented. E.A.K.

N86-20465# Air Force Academy, Colo.
STS (SPACE TRANSPORTATION SYSTEM) TASK SIMULATOR
Final Report, Aug. 1984 - Aug. 1985
Salvatore Alfano 15 Aug. 1985 136 p
(AD-A162461; USAFA-TR-85-12) Avail: NTIS HC A07/MF A01 CSCL 09/2

This paper describes simplified mathematical models of the Space Transportation System (STS), Reaction Control Systems (RCS), and Digital Autopilot (DAP), used in the USAFA Proximity Operations Simulator for the VAX 11/780 and the Evans and Sutherland PS 300 computers. Included in the modeling are propellant expenditures for translational maneuvers, rotational maneuvers, and attitude maintenance and on-orbit trajectory deviations induced by RCS cross coupling. This simulator serves as a learning aid for cadets studying orbital dynamics and STS mission planning and as a research platform for the Department of Astronautics. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-20466*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD AND APPARATUS FOR TELEMETRY ADAPTIVE BANDWIDTH COMPRESSION Patent Application
Olin L. Graham, inventor (to NASA) Filed 13 Sep. 1985 25 p
(NASA-Case-MSC-20821-1; NAS 1.71:MSC-20821-1;
US-Patent-Appl-SN-775990) Avail: NTIS HC A02/MF A01 CSCL 09F

Methods and apparatus are provided for automatic and/or manual adaptive bandwidth compression of telemetry. An adaptive sampler samples a video signal from a scanning sensor and generates a sequence of sampled fields. Each field and range rate information from the sensor are hence sequentially transmitted to and stored in a multiple adaptive field storage means. The field storage means then, in response to an automatic or manual control signal, transfers the stored sampled field signals to a video monitor in a form for sequential or simultaneous display of a desired number of stored field signals. The sampling ratio of the adaptive sampler, the relative proportion of available communication bandwidth allocated respectively to transmitted data and video information, and the number of fields are manually or automatically selectively adjustable in functional relation to each other and detected range rate. In one embodiment, when relatively little or no scene motion is detected, the control signal maximizes sampling ratio and cause simultaneous display of all stored fields, thus maximizing display resolution and bandwidth available or data transmission. When increased scene motion is detected, the control signal is adjusted accordingly to cause display of fewer fields. If greater resolution is desired, the control signal is adjusted to increase sampling ratio. NASA

N86-20467# Technische Hogeschool, Delft (Netherlands). Dept. of Maritime Engineering.
NAVIGATION BY SATELLITE TIMING AND RANGING: GLOBAL POSITIONING SYSTEM (GPS) NAVSTAR
J. A. Spaans Mar. 1984 59 p refs
Avail: NTIS HC A04/MF A01

The NAVSTAR satellite positioning system is described. The control, user, and space vehicle segments are outlined. Signal processing; signal decoding; the data blocks of the navigation message; the positioning equations; position accuracy; velocity measurement; the navigation filter; and high accuracy applications of the system are discussed. Author (ESA)

N86-20468# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
NAVSAT SYSTEM SIMULATOR Final Report
G. J. Dekker, L. J. M. Jconsten, P. J. dePagter, and W. J. Pol Paris ESA 23 Jan. 1985 68 p refs
(Contract ESA-5649/83-D-JS(SC))
(NLR-TR-85022-L; ESA-CR(P)-2152) Avail: NTIS HC A04/MF A01

The initial set of models to be used to demonstrate the correct working of the NAVSAT-system simulator is described. The set comprises the course of the navigation signal from the Regional Center to the user. It contains sufficient elements to demonstrate the hierarchical structure of the modeling process. Most models use empirical error functions. The most complex one calculates the errors to be added to the miminal satellite positions. The user-models have a complete algorithm to estimate position. The output of the simulation is the error in the estimated position and velocity of the user. Author (ESA)

N86-20456# Joint Publications Research Service, Arlington, Va.
HISTORICAL OVERVIEW OF INTERCOSMOS PROGRAM
M. A. Rimsha *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 79-86 refs Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 6, Nov. - Dec. 1984 p 26-32
(For primary document see N86-20437 11-12)
Avail: NTIS HC A05

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-20469* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE PROBE/SATELLITE EJECTION APPARATUS FOR SPACECRAFT Patent
Harold M. Smyly, Charles D. Miller, Richard A. Cloyd, and Clarence Heller, inventors(to NASA) Issued 26 Nov. 1985 13 p Filed 5 Apr. 1984
(NASA-Case-MFS-25429-1; US-Patent-4,554,905;
US-Patent-Appl-SN-596959; US-Patent-Class-124-56;
US-Patent-Class-244-158-R; US-Patent-Class-403-326) Avail: US Patent and Trademark Office CSCL 22B

An ejection apparatus for spinning and propelling objects for ejection from a spacecraft at a desired velocity and rotational speed is discussed. The apparatus includes a launch cradle on which the space object to be ejected rests. The cradle is rotatably supported by a central hub secured to the upper end of the pneumatic cylinder piston shaft. Release mechanisms consisting of a retractable pin and locking lug is utilized to hold the cradle and object to be ejected. The release mechanism has a fixed barrier member which holds the retractable pin in engagement with the locking lug until release by upward movement of the launch cradle beyond the barrier height.

Official Gazette of the U.S. Patent and Trademark Office

N86-20470*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TELESCOPING SPACE STATION MODULES Patent Application
Robert D. Witcofski, inventor (to NASA) Filed 31 Jul. 1985 15 p
(NASA-Case-LAR-13330-1; NAS 1.71:LAR-13330-1;
US-Patent-Appl-SN-761233) Avail: NTIS HC A02/MF A01 CSCL 22B

A space station module consisting of a cylindrical can within a can is presented. The outer can, which has one open end, encloses the inner can. The inner can has one tapered end with a hatch and one untapered end with a hatch. The outer can has one tapered end with a hatch. The overall length of the outer can is 25 ft, and its outer diameter is 14 ft. Two such assemblies easily fit end to end in the Shuttle Orbiter payload bay. With a shuttle payload capability of 65,000 pounds and an approximate weight of each twin can assembly of 16,000 pounds, 33,000 pounds of payload are available for instrumenting the cans. Only the inner can can be instrumented prior to launch. Once in orbit, the module is expanded to provide twice the usable space, approximately 48 ft total length. NASA

N86-20471*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AEROBRAKING ORBITAL TRANSFER VEHICLE Patent Application
Carl D. Scott, Kornel Nagy, Barney B. Roberts, Robert C. Ried, Kenneth R. Kroll, and Joe D. Gamble, inventors (to NASA) Filed 18 Jun. 1985 15 p
(NASA-Case-MSC-20921-1; NAS 1.71:MSC-20921-1;
US-Patent-Appl-SN-746162) Avail: NTIS HC A02/MF A01 CSCL 22B

An aerobraking orbital transfer vehicle is described. The vehicle includes an aerobraking device which also serves as a heat shield in the shape of a raked-off elliptic or circular cone with a circular or elliptical base, and with an ellipsoid or other blunt shape nose. The aerobraking device is fitted with a toroid-like skirt and is integral with the support structure of the propulsion system and other systems of the space vehicle. The vehicle is intended to be transported in components to a space station in low Earth orbit where it is assembled for use as a transportation system from low Earth orbit to geosynchronous Earth orbit and return. Conventional guidance means are included for autonomous flight. NASA

N86-20472*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 2: OPTIONS DEVELOPMENT DR-5. VOLUME 1: TECHNOLOGY OPTIONS
May 1985 379 p refs Prepared in cooperation with Ford Aerospace Communications Corp., Sunnyvale, Calif., IBM Federal Systems Div., Cape Canaveral, Fla. and Radio Corporation of America, Hollywood, Calif.
(Contract NAS5-28082)
(NASA-CR-177839; NAS 1.26:177839; MDC-H1343A) Avail: NTIS HC A17/MF A01 CSCL 22B

The second task in the Space Station Data System (SSDS) Analysis/Architecture Study is the development of an information base that will support the conduct of trade studies and provide sufficient data to make key design/programmatic decisions. This volume identifies the preferred options in the technology category and characterizes these options with respect to performance attributes, constraints, cost, and risk. The technology category includes advanced materials, processes, and techniques that can be used to enhance the implementation of SSDS design structures. The specific areas discussed are mass storage, including space and round on-line storage and off-line storage; man/machine interface; data processing hardware, including flight computers and advanced/fault tolerant computer architectures; and software, including data compression algorithms, on-board high level languages, and software tools. Also discussed are artificial intelligence applications and hard-wire communications. M.G.

N86-20473*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 1: FUNCTIONAL REQUIREMENTS DEFINITION, DR-5
Dec. 1985 308 p refs
(Contract NAS5-28082)
(NASA-CR-177838; NAS 1.26:177838; MDC-H1343A-Rev) Avail: NTIS HC A14/MF A01 CSCL 22B

The initial task in the Space Station Data System (SSDS)

Analysis/Architecture Study is the definition of the functional and key performance requirements for the SSDS. The SSDS is the set of hardware and software, both on the ground and in space, that provides the basic data management services for Space Station customers and systems. The primary purpose of the requirements development activity was to provide a coordinated, documented requirements set as a basis for the system definition of the SSDS and for other subsequent study activities. These requirements should also prove useful to other Space Station activities in that they provide an indication of the scope of the information services and systems that will be needed in the Space Station program. The major results of the requirements development task are as follows: (1) identification of a conceptual topology and architecture for the end-to-end Space Station Information Systems (SSIS); (2) development of a complete set of functional requirements and design drivers for the SSIS; (3) development of functional requirements and key performance requirements for the Space Station Data System (SSDS); and (4) definition of an operating concept for the SSIS. The operating concept was developed both from a Space Station payload customer and operator perspective in order to allow a requirements practicality assessment. M.G.

N86-20474*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 3: TRADE STUDIES, DR-5, VOLUME 1
Dec. 1985 383 p refs 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177842; NAS 1.26:177842; MDC-H1343A-Vol-1) Avail: NTIS HC A17/MF A01 CSCL 22B

The primary objective of Task 3 is to provide additional analysis and insight necessary to support key design/programmatic decision for options quantification and selection for system definition. This includes: (1) the identification of key trade study topics; (2) the definition of a trade study procedure for each topic (issues to be resolved, key inputs, criteria/weighting, methodology); (3) conduct tradeoff and sensitivity analysis; and (4) the review/verification of results within the context of evolving system design and definition. The trade study topics addressed in this volume include space autonomy and function automation, software transportability, system network topology, communications standardization, onboard local area networking, distributed operating system, software configuration management, and the software development environment facility. M.G.

N86-20475*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 2: OPTIONS DEVELOPMENT, DR-5. VOLUME 2: DESIGN OPTIONS
Dec. 1985 435 p 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177840; NAS 1.26:177840; MDC-H1341A-Vol-2) Avail: NTIS HC A19/MF A01 CSCL 22B

The primary objective of Task 2 is the development of an information base that will support the conduct of trade studies and provide sufficient data to make key design/programmatic decisions. This includes: (1) the establishment of option categories that are most likely to influence Space Station Data System (SSDS) definition; (2) the identification of preferred options in each category; and (3) the characterization of these options with respect to performance attributes, constraints, cost and risk. This volume contains the options development for the design category. This category comprises alternative structures, configurations and techniques that can be used to develop designs that are responsive to the SSDS requirements. The specific areas discussed are software, including data base management and distributed operating systems; system architecture, including fault tolerance and system growth/automation/autonomy and system interfaces; time management; and system security/privacy. Also discussed are space communications and local area networking. M.G.

N86-20476*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 3: TRADE STUDIES, DR-5, VOLUME 2
Dec. 1985 298 p refs 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177843; NAS 1.26:177843; MDC-H1343A-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 22B

Results of a Space Station Data System Analysis/Architecture Study for the Goddard Space Flight Center are presented. This study, which emphasized a system engineering design for a complete, end-to-end data system, was divided into six tasks: (1); Functional requirements definition; (2) Options development; (3) Trade studies; (4) System definitions; (5) Program plan; and (6) Study maintenance. The Task inter-relationship and documentation flow are described. Information in volume 2 is devoted to Task 3: trade Studies. Trade Studies have been carried out in the following areas: (1) software development test and integration capability; (2) fault tolerant computing; (3) space qualified computers; (4) distributed data base management system; (5) system integration test and verification; (6) crew workstations; (7) mass storage; (8) command and resource management; and (9) space communications. Results are presented for each task. B.W.

N86-20477*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 2: OPTIONS DEVELOPMENT, DR-5. VOLUME 3: PROGRAMMATIC OPTIONS
Dec. 1985 240 p refs 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177841; NAS 1.26:177841; MDC-H1343A-Vol-3) Avail: NTIS HC A11/MF A01 CSCL 22B

Task 2 in the Space Station Data System (SSDS) Analysis/Architecture Study is the development of an information base that will support the conduct of trade studies and provide sufficient data to make design/programmatic decisions. This volume identifies the preferred options in the programmatic category and characterizes these options with respect to performance attributes, constraints, costs, and risks. The programmatic category includes methods used to administrate/manage the development, operation and maintenance of the SSDS. The specific areas discussed include standardization/commonality; systems management; and systems development, including hardware procurement, software development and system integration, test and verification. M.G.

N86-20478*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 1: FUNCTIONAL REQUIREMENTS DEFINITION, DR-5. APPENDIX: REQUIREMENTS DATA BASE
Dec. 1985 559 p 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177847; NAS 1.26:177847; MDC-H1343A) Avail: NTIS HC A25/MF A01 CSCL 22B

Appendix A contains data that characterize the system functions in sufficient depth as to determine the requirements for the Space Station Data System (SSDS). This data is in the form of: (1) top down traceability report; (2) bottom up traceability report; (3) requirements data sheets; and (4) cross index of requirements paragraphs of the source documents and the requirements numbers. A data base users guide is included that interested parties can use to access the requirements data base and get up to date information about the functions. M.G.

N86-20479*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 4: SYSTEM DEFINITION REPORT
Dec. 1985 574 p refs 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177844; NAS 1.26:177844; MDC-H1343A) Avail: NTIS HC A25/MF A01 CSCL 22B

Functional/performance requirements for the Space Station Data System (SSDS) are analyzed and architectural design concepts are derived and evaluated in terms of their performance and growth potential, technical feasibility and risk, and cost effectiveness. The design concepts discussed are grouped under five major areas: SSDS top-level architecture overview, end-to-end SSDS design and operations perspective, communications assumptions and traffic analysis, onboard SSDS definition, and ground SSDS definition. M.G.

N86-20480*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 4: SYSTEM DEFINITION REPORT. APPENDIX
Dec. 1985 610 p 7 Vol.
(Contract NAS5-28082)
(NASA-CR-177845; NAS 1.26:177845; MDC-H1343A) Avail: NTIS HC A99/MF A01 CSCL 22B

Appendices to the systems definition study for the space station Data System are compiled. Supplemental information on external interface specification, simulation and modeling, and function design characteristics is presented along with data flow diagrams, a data dictionary, and function allocation matrices. M.G.

N86-20481*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
SPACE STATION DATA SYSTEM ANALYSIS/ARCHITECTURE STUDY. TASK 5: PROGRAM PLAN
Dec. 1985 135 p
(Contract NAS5-28082)
(NASA-CR-177846; NAS 1.26:177846; MDC-H1343A) Avail: NTIS HC A07/MF A01 CSCL 22B

Cost estimates for both the on-board and ground segments of the Space Station Data System (SSDS) are presented along with summary program schedules. Advanced technology development recommendations are provided in the areas of distributed data base management, end-to-end protocols, command/resource management, and flight qualified artificial intelligence machines. M.G.

N86-20482*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONSTRUCTION AND CONTROL OF LARGE SPACE STRUCTURES
Michael F. Card, Walter L. Heard, Jr., and David L. Akin (MIT, Cambridge) Feb. 1986 21 p refs
(NASA-TM-87689; NAS 1.15:87689) Avail: NTIS HC A02/MF A01 CSCL 22B

Recent NASA research efforts on space construction are reviewed. Preliminary results of the EASE/ACCESS Shuttle experiments are discussed. A 45-foot beam was constructed on orbit in 30 minutes using a manual assembly technique at a work station. A large tetrahedron was constructed several times using a free floating technique. The capability of repair, utilities installation, and handling the structures using a mobile foot restraint on the RMS was also demonstrated. Implications of the experiments for space station are presented. Models of 5-meter space station structure together with neutral buoyancy simulations suggest manual assembly techniques are feasible. Selected research on control of flexible structures is discussed. Author

N86-20483# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ELECTROSTATIC POTENTIAL AND DENSITY ESTIMATION AROUND A IONOSPHERIC SATELLITE
Isabel Maria deMoraes, Nellore Srinivasan Venkataraman, and Hans-Ulrich Pilchowski Jan. 1986 25 p refs Submitted for publication
(INPE-3742-PRE/873) Avail: NTIS HC A02/MF A01

This work presents the electrostatic potential distribution around a spherical ionospheric satellite by solving Poisson's equation through a finite difference method. The approximate numerical densities for ions and electrons are obtained as one solves the Boltzmann's equation by means of the characteristics method. It is shown that the use of a local planar approximation for the numerical electron density gives reasonably accurate results compared with the radial approximation, which has been used in former works. Author

N86-20484# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A REVIEW OF THE PERTURBATION TECHNIQUES FOR THE SOLUTION OF THE MOTION OF ARTIFICIAL SATELLITES
Kondapalli Rama Rao Jan. 1986 6 p refs Presented at TELECON 85, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3751-PRE/875) Avail: NTIS HC A02/MF A01

To generate satellite ephemerides, an orbit determination system uses, in general, one of the three fundamental perturbation methods, namely: the analytical methods, the numerical methods and the semianalytical methods. The aim of this work is to review the orbital theory, involving these methods, developed during the last 25 years and analyze the limits of application of these techniques in the case of the artificial low-orbit Earth satellites. Author

N86-20485*# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
VIBRATIONS AND STRUCTUREBORNE NOISE IN SPACE STATION Progress Report, 1 Jul. - 31 Dec. 1985
Rimas Vaicaitis 31 Dec. 1985 119 p refs
(Grant NAG1-541)
(NASA-CR-176520; NAS 1.26:176520) Avail: NTIS HC A06/MF A01 CSCL 22B

Theoretical models were developed capable of predicting structural response and noise transmission to random point mechanical loads. Fiber reinforced composite and aluminum materials were considered. Cylindrical shells and circular plates were taken as typical representatives of structural components for space station habitability modules. Analytical formulations include double wall and single wall constructions. Pressurized and unpressurized models were considered. Parametric studies were conducted to determine the effect on structural response and noise transmission due to fiber orientation, point load location, damping in the core and the main load carrying structure, pressurization, interior acoustic absorption, etc. These analytical models could serve as preliminary tools for assessing noise related problems, for space station applications. Author

N86-20486# Harris Corp., Melbourne, Fla. Government Aerospace Systems Div.
EXPLORATION OF THE MAXIMUM ENTROPY/OPTIMAL PROJECTION APPROACH TO CONTROL DESIGN SYNTHESIS FOR LARGE SPACE STRUCTURES Annual Report, 2 Jan. 1984 - 28 Feb. 1985
David C. Hyland and Dennis S. Bernstein Feb. 1985 243 p
(Contract F49620-84-C-0015)
(AD-A161355; AFOSR-85-0966TR; AR-1) Avail: NTIS HC A11/MF A01 CSCL 13/13

Increased interest in deploying large flexible spacecraft has focused attention on active structural control techniques to achieve crucial advances in vibration suppression, pointing accuracy and shape control. The extreme complexity of such systems, and the lack of accurate finite-element structural models present severe control-design challenges which were extensively documented by previous Government research Programs. Optimal Projection/Maximum Entropy Stochastic Modelling and Reduced-Order Design Synthesis is a rigorous new approach to this class of problems. Inspired by Statistical Energy Analysis, a branch of dynamic modal analysis developed for analyzing acoustic vibration problems, its present stage of development embodies a fundamental generalization of classical steady-state Kalman filter and linear-quadratic-Gaussian optimal control theory. GRA

N86-20487# ALPHATECH, Inc., Burlington, Mass.
ROBUST DECENTRALIZED CONTROL Final Report, 20 Jul. 1984 - 20 May 1985

Douglas P. Looze, George C. Goodman, John S. Eterno, and Michael Athans Aug. 1985 155 p
(Contract F33615-84-C-3618)
(AD-A161626; AFWAL-TR-85-3042) Avail: NTIS HC A08/MF A01 CSCL 22/2

This report considers the problem of designing decentralized control systems for Large Space Structures to satisfy robustness and performance requirements for multiple system configurations. The problem is motivated by the fact that such structures will have to be assembled in space. A partially assembled structure will need some real-time control so that it maintains its station, performs partial functions, and damps oscillations during assembly. Completely reprogramming the control computers each time a subassembly is incorporated in the structure is likely to be impractical. A more sound engineering approach would be to require the same control system design to satisfy performance requirements for the partial assemblies and to maintain stability for the completely assembled structure. Performance can then be restored for the full assembly by applying an outer loop (hierarchical) control or adjusting the decentralized design parameters. GRA

N86-20488# WEA, Cambridge, Mass.
WAVE MEASUREMENTS ON TRUSS MODEL Technical Report, 1 Jan. 1984 - 1 Sep. 1985
James H. Williams, Jr., Howard L. Ou, and Samson S. Lee 1 Sep. 1985 72 p
(Contract F49620-83-C-0092)
(AD-A162433; AFOSR-85-1077TR) Avail: NTIS HC A04/MF A01 CSCL 22/2

Large space structures (LSS) are large periodic lattice structures being considered for space applications in Earth orbit. The vibration and wave propagation characteristics of these structures can affect their performance, integrity and the ability to nondestructively assess that integrity. In this preliminary study, the wave propagation characteristics of a tetrahedral truss model consisting of fiberglass reinforced composite rods and aluminum joints are observed experimentally. Longitudinal ultrasonic transducers are coupled to the joints of the truss model. The input signal consists of a gated sinusoid having a center frequency of 280 kHz. Because a tetrahedral truss, a commonly proposed LSS configuration can be constructed from basic repeating units of tetrahedrons and pyramids, only tetrahedrons and pyramids are considered. Tetrahedrons and pyramids are constructed by inserting fiberglass reinforced polyester rods 0.193 cm (0.076 in) in diameter and 18.72 cm (7.37 in) in length into machined 2024-T4 aluminum joints. Because a tetrahedral truss requires only two types of joints, the tetrahedrons and pyramids are constructed using the two types of joints. The cutting of the fiberglass rods, the machining of the aluminum joints and the final assembly of tetrahedrons and pyramids are done with great care to minimize structure variability. GRA

N86-20489# National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Div.
TESTING OF SPACECRAFT ATTITUDE AND ORBIT CONTROL SYSTEMS Final Report
J. J. M. Prins Paris ESA 18 May 1984 267 p refs
(Contract ESA-5262/82)
(NLR-TR-84133-L; ESA-CR(P)-2100) Avail: NTIS HC A12/MF A01

The testing of spacecraft Attitude and Orbit Control Subsystems (AOCS) from the early design up to in-flight is described. Three generic AOCS test classes, model philosophy, standardization, subsystem static test methods, subsystem dynamic test methods, generic test equipment, and test facilities are covered. It is suggested that test scheduling should aim to find problems and errors as early as possible. System level tests should be delayed in favor of detailed testing of the AOCS (unit level) and in particular subsystem level testing. Onboard AOCS software poses testing problems, especially when RAM located. There is a shift from airbearing-type dynamic tests to servotable-type dynamic tests, mainly due to increasing spacecraft size, structural flexibility, and multibody dynamics concepts. Author (ESA)

N86-20490# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
IMPROVEMENT OF HYDRAZINE GAS GENERATOR SYSTEM FOR ATTITUDE CONTROL OF SPACECRAFT Final Report
Paris ESA Feb. 1985 84 p
(Contract ESTEC-4826/81-NL-AK)
(ESA-CR(P)-2146) Avail: NTIS HC A05/MF A01

Solid deposit formation in an electrothermal and a catalytic hydrazine decomposition gas generator was studied. A 12 month endurance life test shows that problems due to formation of solid deposits in the cold gas valve do not occur. The decomposition of hydrazine by the catalytic gas generator is complete so that no fluid condensates are found in the plenum tank. The use of purified low aniline hydrazine is the reason for trouble-free endurance life firing. A manufacturing problem observed with the gas generator middle screen is noted. The problem does not influence gas generator performance much. Modifications to increase the life of the gas generator are suggested. It is stated that a hydrazine gas generator pressure system is a good alternative to argon, nitrogen, or other cold gas systems and is able to fulfill the mission requirements for satellites, probes, and space station elements, because by application of manual override a system with flexible preselectable thrust levels is available. Author (ESA)

N86-20491# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
EVALUATION OF TECHNIQUES FOR DETERMINATION OF LOADS DUE TO FLUID-STRUCTURE INTERACTION Final Report
C. Stavrindis 15 Jun. 1985 227 p refs
(Contract ESTEC-5094/82-NL-PB)
(ESA-CR(P)-2151) Avail: NTIS HC A11/MF A01

Finite element and classical methods for determining fluid-structure interactions in spacecraft are reviewed. For evaluation of fluid sloshing eigenfrequencies and fluid-structure coupled eigenfrequencies, three finite element computer programs were used. The ANSYS program includes nearly all features which are necessary for fluid-structure interaction calculations and only a few restrictions have to be considered, whereas NASTRAN (virtual mass method, fluid ring element method) is designed only for special cases. Author (ESA)

N86-20440# Joint Publications Research Service, Arlington, Va.
PROBOS MISSION DISCUSSED AT INTERNATIONAL COMMITTEE MEETING
V. Ovcharov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 29 Transl. into ENGLISH from Sovetskaya Moldaviya (Kishinev, USSR), 15 Nov. 1985 p 3 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-21134# Joint Publications Research Service, Arlington, Va.
METHODOLOGICAL PROBLEMS RELATED TO GROUND-BASED TESTING OF TEMPERATURE-CONTROL SYSTEM FOR MANNED SPACECRAFT
L. B. Strogonova *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 124-125 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 82-83 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-20492*# Essex Corp., Huntsville, Ala.
DEVELOPMENT OF SPACE TELESCOPE NON-ORU HARDWARE Final Report
Kem B. Robertson and David E. Henderson 31 Dec. 1985 37 p

(Contract NAS8-36364)
(NASA-CR-178713; NAS 1.26:178713; H-85-10) Avail: NTIS HC A03/MF A01 CSCL 03A

Since 1979 work has progressed in the development of the Hubble Space Telescope (HST) mockup. Underwater simulations to evaluate proposed on-orbit servicing tasks have also been done. These tasks involve the planned changeout of scientific instruments and the unscheduled changeout of other orbital replacement units (ORUs) such as batteries and computers. The HST components and subsystems that originally were designated ORUs were the items that were mission critical and were designed for easy changeout. Mockups of 14 non-ORU items were designed and fabricated for the purpose of evaluating the EVA changetasks in the MSFC Neutral Buoyancy Simulator (NBS). The objectives of this design/fabrication/test activity were to design and fabricate the potential ORUs so they contained realistic interfaces and were compatible with the NBS environments. The attachment of the mockup hardware to the spacecraft mockup was similar to the flight version. Also, the hardware connectors were flight-like. B.W.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-20493*# General Dynamics/Convair, San Diego, Calif. Advanced Space Programs.
ORBITAL TRANSFER VEHICLE ENGINE INTEGRATION STUDY Final Report
W. J. Ketchum 30 Nov. 1984 51 p refs
(Contract NAS3-23772; NASA Order L-814740)
(NASA-CR-174842; NAS 1.26:174842; GDC-SP-84-050) Avail: NTIS HC A04/MF A01 CSCL 21H

NASA-LeRC is sponsoring industry studies to establish the technology base for an advanced engine for orbital transfer vehicles for mid-1990s IOC. Engine contractors are being assisted by vehicle contractors to define the requirements, interface conditions, and operational design criteria for new LO2-LH2 propulsion systems applicable to future orbit transfer vehicles and to assess the impacts on space basing, man rating, and low-G transfer missions on propulsion system design requirements. The results of a study is presented. The primary study emphasis was to determine what the OTV engine thrust level should be, how many engines are required on the OTV, and how the OTV engine should be designed. This was accomplished by evaluating planned OTV missions and concepts to determine the requirements for the OTV propulsion system, conducting tradeoffs and comparisons to optimize OTV capability, and evaluating reliability and maintenance to determine the recommended OTV engine design for future development. Author

N86-20494*# Lockheed Missiles and Space Co., Huntsville, Ala. Systems Analysis and Simulation Section.
SHUTTLE SRB PREFLIGHT/POST-FLIGHT THERMAL ASSESSMENT Final Report
5 Dec. 1985 9 p
(Contract NAS8-34335)
(NASA-CR-178706; NAS 1.26:178706; LMSC-HREC-TR-F042735) Avail: NTIS HC A02/MF A01 CSCL 21H

The development of the thermal protection system for the Solid Rocket Booster is reported. Tests and analytical efforts were conducted and new problems are continually attacked and solved. During the first six Shuttle flights it was necessary to make a final thermal assessment of the TPS and structural systems temperatures. The thermal assessments were made and are compared with post flight data. E.A.K.

N86-20495*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
ADVANCED TURBINE STUDY Final Report, 1 Aug. 1982 - 15 Aug. 1985
J. H. Castro 10 Dec. 1985 188 p
(Contract NAS8-33821)
(NASA-CR-178707; NAS 1.26:178707; FR-19009-1) Avail: NTIS HC A09/MF A01 CSCL 21H

The feasibility of an advanced convective cooling concept applied to rocket turbine airfoils which operate in a high pressure hydrogen and methane environment was investigated. The concept consists of a central structural member in which grooves are machined. The grooves are temporarily filled with a removable filler and the entire airfoil is covered with a layer of electroformed nickel, or nickel base alloy. After removal of the filler, the low thermal resistance of the nickel closure causes the wall temperature to be reduced by heat transfer to the coolant. The program is divided in the following tasks: (1) turbine performance appraisal; (2) coolant geometry evaluation; (3) test hardware design and analysis; and (4) test airfoil fabrication. E.A.K.

N86-20496*# Lockheed Missiles and Space Co., Huntsville, Ala.
SSME STRUCTURAL DYNAMIC MODEL DEVELOPMENT, PHASE 2 Final Report
M. J. Foley and V. L. Wilson 1 Nov. 1985 234 p refs
(Contract NAS8-34973)
(NASA-CR-178708; NAS 1.26:178708; LMSC-HEC-TR-F042668) Avail: NTIS HC A11/MF A01 CSCL 21H

A set of test correlated mathematical models of the SSME High Pressure Oxygen Turbopump (HPOTP) housing and rotor assembly was produced. New analysis methods within the EISI/EAL and SPAR systems were investigated and runstreams for future use were developed. The LOX pump models have undergone extensive modification since the first phase of this effort was completed. The rotor assembly from the original model was abandoned and a new, more detailed model constructed. A description of the new rotor math model is presented. Also, the pump housing model was continually modified as additional test data have become available. This model is documented along with measured test results. Many of the more advanced features of the EAL/SPAR finite element analysis system were exercised. These included the cyclic symmetry option, the macro-element procedures, and the fluid analysis capability. In addition, a new tool was developed that allows an automated analysis of a disjoint structure in terms of its component modes. A complete description of the implementation of the Craig-Bampton method is given along with two worked examples. Author

N86-20497*# Solar Turbines International, San Diego, Calif.
ROCKET THRUST CHAMBER THERMAL BARRIER COATINGS Final Report, Dec. 1981 - Oct. 1984
A. P. Batakis and J. W. Vogan Jul. 1985 169 p refs
(Contract NAS3-23262)
(NASA-CR-175022; NAS 1.26:175022; SR85-R-5052-16) Avail: NTIS HC A08/MF A01 CSCL 21H

A research program was conducted to generate data and develop analytical techniques to predict the performance and reliability of ceramic thermal barrier coatings in high heat flux environments. A finite element model was used to analyze the thermomechanical behavior of coating systems in rocket thrust chambers. Candidate coating systems (using a copper substrate, NiCrAlY bond coat and ZrO2.8Y2O3 ceramic overcoat) were selected for detailed study based on photomicrographic evaluations of experimental test specimens. The effects of plasma spray application parameters on the material properties of these coatings were measured and the effects on coating performance evaluated using the finite element model. Coating design curves which define acceptable operating envelopes for seleted coating systems were constructed based on temperature and strain limitations. Spray gun power levels was found to have the most significant effect on coating structure. Three coating systems were selected for study using different power levels. Thermal conductivity, strain tolerance, density, and residual stress were measured for these

coatings. Analyses indicated that extremely thin coatings (< 0.02 mm) are required to accommodate the high heat flux of a rocket thrust chamber and ensure structural integrity. Author

N86-20498# Naval Plant Representative, Magma, Utah.
DESIGN OF COMPOSITE MATERIAL CHAMBERS FOR SOLID PROPELLANT MISSILE MOTORS
J. L. Szatkowski Aug. 1985 25 p refs
(AD-A158890) Avail: NTIS HC A02/MF A01 CSCL 11/4

A review of the technical research on composite materials used in the manufacture of solid propellant missiles was conducted. Current design methods were compared to the methods given in the literature. Most of the designers of composite structures use empirical relationships based on data compiled from previous designs, to predict the structure's characteristics. No universal approach to characterization of material properties of composites has been found, because no one has been able to adequately characterize the material properties of the constituent materials and their interrelationships. Recent analyses have shown that only finite element analysis (FEA) can adequately represent the material loading within the composite matrix. Accurate material properties, obtained only by detailed analysis of experimental work, are required to be used in the calculations. The properties are deduced from the experimental results by computer analysis by finite elements. Accurate analysis of the total structure of a composite material chamber will also require the use of 3-dimensional FEA. The use of 3-D FE has been limited because of computer time and costs. However, new computers will now handle reasonable 3-dimensional problems within acceptable limits of time and cost. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-20499*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE 1-[(DIORGANOOXPHOSPHONYL)METHYL]-2, 4- AND -2, 6-DINITRO AND DIAMINO BENZENES AND THEIR DERIVATIVES Patent Application
John A. Mikroyannidis and Demetrius A. Kourtides, inventors (to NASA) Filed 16 Aug. 1984 19 p
(NASA-Case-ARC-11425-2; NAS 1.71:ARC-11425-2; US-Patent-Appl-SN-641152) Avail: NTIS HC A02/MF A01 CSCL 07C

The 1-[Diorganooxyphosphonyl])methyl] -2,4- and -2,6-dinitro- and diamino benzenes are prepared by nitrating an (organophosphonyl)methyl benezene to produce the dinitro compounds which are then reduced to the diamino compounds. The organo groups (alkyl, haloalkyl, aryl) on the phosphorus may be removed to give the free acids (HO)2P(=O)-. The diamino compounds may be polymerized with dianhydrides or diacyl halides to produce fire and flame resistant polymers which are useful in the manufacture of aircraft structures. NASA

N86-20500# Duke Univ., Durham, N. C.
GENERATION OF PHOSPHORUS ESTER, PHOSPHORUS AMIDE AND PHOSPINE DERIVATIVES OF LOW COORDINATION NUMBER Final Report, 19 Jul. 1982 - 18 Jul. 1985
Louis D. Quin 10 Oct. 1985 22 p
(Contract DAAG29-82-K-0159)
(AD-A161628; ARO-19288.10-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

The 5,6-oxaphosphabicyclo(2.2.2)octene ring system was created by O-insertion into a strained C-P bond of 7-phosphanorbornene derivatives, and then used for the generation of metaphosphoric and metaphosphonic acid derivatives by retrocyclo-addition. Synthetic methods were developed for creating 2-phosphabicyclo(2.2.2)-octene derivatives as potential generators of phosphaalkenes. The new fragments Me2N-P double bond S and Cl3CH2OP double bond S were generated from retrocycloaddition of 7-phosphanorbornene derivatives. GRA

N86-20501# California Univ., Santa Barbara. Dept. of Chemistry.
ENERGY TRANSFORMATIONS IN ORGANOMETALLIC COMPLEXES Progress Report, 1 Jul. 1984 - 31 Sep. 1985
R. J. Watts 1985 16 p
(Contract DE-AT03-78ER-70277)
(DE86-000333; DOE/ER-70277/T2) Avail: NTIS HC A02/MF A01

The primary purpose of research projects performed during this report period was to characterize the fundamental photoproperties of a variety of ortho-metalated species. The proposal which was submitted and approved in 1984 describes the initial work on dichloro-bridged dimeric complexes of Ir(III) and Rh(III) with 2-phenylpyridine (ppy) and benzoquinoline (bzq). During 1985 efforts have been expanded to incorporate the additional metal centers, Re(1) and Pd(II), as well as different ortho-metalating ligands including 3-methyl-2-phenylpyridine (mppy), 2-(p-tolylpyridine) (tpy), azobenzene (azb) and 2-phenylpyrimidine (ppyr). In addition, several new, mononuclear complexes of Ir(III) and Rh(III) with various combinations of metallated ppy or bzq and coordinated 2,2'-bipyridine (bpy) or 1,10-phenanthroline (phen) ligands have been prepared and studied. The goals of studies of these complexes are to provide a basis for evaluating their potential application as photocatalysts and to generally provide initial characterizations of the effects of metal-carbon sigma bonds on the identity, photophysics, and photochemistry of their low energy excited states. DOE

N86-20502# Los Alamos National Lab., N. Mex.
SYNTHESIS OF (13)C-ENRICHED CARBOHYDRATES AS CHIRAL SYNTHONS FOR LABELED COMPOUNDS
T. E. Walker, C. J. Unkefer, and D. S. Ehler 1985 3 p refs
Presented at the 2nd International Symposium on the Synthesis and Application of Isotopically Labeled Compounds, Kansas City, Mo., 3 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000780; LA-UR-85-3180; CONF-8509173-2) Avail: NTIS HC A02/MF A01

Methods have been developed to synthesize labeled chiral compounds from labeled carbohydrates. During the course of these investigations, both chemical and enzymatic methods for the large-scale interconversion of labeled aldoses and ketoses have been adapted. DOE

N86-20503# Brookhaven National Lab., Upton, N. Y.
SOME PROBLEMS WITH THE 1983 REPORTS ON ATOMIC WEIGHTS AND ISOTOPIC COMPOSITION
N. E. Holden 1985 5 p Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001167; BNL-NCS-36954; CONF-8508138-10) Avail: NTIS HC A02/MF A01

Three reports from the Commission published subsequent to the 1983 meeting in Lyngby, Denmark is discussed. Some of these comments are in the form of errata to the various reports, while others deal with inconsistencies or perhaps better methods for handling recurring items for future reports. It concludes with some thoughts for consideration by the Commission. It is hoped that discussion of these points will strengthen the Commission's efforts, while easing the burden of the Commission officers when preparing future reports for publication. DOE

N86-20504# Department of Energy, Washington, D. C. Chemical Sciences Div.
SUMMARIES OF FY 1985 RESEARCH IN THE CHEMICAL SCIENCES
Sep. 1985 116 p
(DE85-008925; DOE/ER-0144/3) Avail: NTIS HC A06/MF A01

Four hundred eleven projects supported by both the Chemical Sciences budget and that portion of the Nuclear Sciences budget

which is administered by the Division of Chemical Sciences are listed. These computer generated summaries provide the scientific and technical public and interested persons in the legislative and executive branches of the Government a means for becoming acquainted with the Chemical Sciences program. Areas of research supported by the Division are: photochemical and radiation sciences; chemical physics; atomic physics; chemical energy conversions; separations and analysis; chemical engineering basics including thermodynamics and physical and chemical rate processes; isotope preparations; heavy element chemistry of the actinides, and support for operation of the Stanford Synchrotron Radiation Laboratory. Special facilities are described whose support allows the general scientific community access to unique and/or expensive equipment for research activities where no commercial laboratory exists. Individual contacts are provided. Indexes cover researchers and facilities. DOE

N86-20505# Pittsburgh Univ., Pa. Dept. of Chemical and Petroleum Engineering.
PROMOTION EFFECTS ON THE SYNTHESIS OF HIGHER ALCOHOLS Final Report
J. G. Goodwin, Jr. and S. C. Chuang 30 Aug. 1985 243 p refs (Contract DE-FG22-82PC-50810)
(DE85-018269; DOE/PC-50810/T11) Avail: NTIS HC A11/MF A01

The importance of direct syntheses of higher (C2-C6) alcohols from synthesis gas as a promising route for providing clean fuels and petrochemical feedstocks is generally recognized. Addition of alkali salts to methanol synthesis catalysts increases production of higher alcohols. However, few investigations were made into the effect of various alkali species on the synthesis of oxygenates from CO and hydrogen. Research studies were carried out which greatly expand current knowledge Objectives were to investigate reaction pathways for and the effect of alkali promotion (Li(+), K(+), Rb(+), Cs(+)) on formation of oxygenated compounds from synthesis gas. A series of Group VIII metals (Ni, Ru, Rh, and Pd) and alkali-promoted Rh and Pd catalysts were studied using CO hydrogenation and a chemical probing method with ethylene, ethanol, and acetaldehyde as probe molecules. The chemical probing method developed for was demonstrated to be an effective way to: identify possible reaction network occurring on these catalysts; study interrelationships between oxygenate and hydrocarbon synthesis; determine catalytic properties of the catalyst surfaces; and investigate support and alkali promotion effects on reaction pathways to oxygenates and hydrocarbons. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-20506 Department of the Air Force, Washington, D.C.
FIBER REINFORCED CARBON/CARBON COMPOSITE STRUCTURE WITH TAILORED DIRECTIONAL SHEAR STRENGTH PROPERTIES Patent
Thomas Vasilos, inventor (to Air Force) Issued 8 Oct. 1985 5 p (AD-D011953; US-Patent-4,546,032; US-Patent-Appl-SN-562369; US-Patent-Class-428-223) Avail: US Patent and Trademark Office CSCL 11/4

Fiber reinforced composite with five directions of fiber orientation comprising multiple planar fabric layers adjacent to each other with warp and fill fibers of one or more of such groups offset relative to the fibers of the others, a lateral array (extending perpendicular to the planes) of piercing fibers utilizing carbon/carbon, as reinforcement and matrix materials, providing a composite with tailored shear strength and stiffness in a selected anisotropy to meet the needs of specific thermostructural applications. GRA

N86-20507# Massachusetts Inst. of Tech., Cambridge. School of Engineering.
IMPACT RESISTANCE OF RUBBER MODIFIED CARBON FIBER COMPOSITE
J. Kawamoto, F. J. McGarry, and J. F. Mandell Feb. 1985 75 p Sponsored by Dow Chemical Co.
(PPST-85-5) Avail: NTIS HC A04/MF A01

The effect on impact resistance of inserting tailored rubbery coatings between the fibers and matrix of carbon fiber reinforced plastics was measured. A machine was designed to apply a dilute solution of varied imposition onto the carbon fibers in the form of a thin rubbery coating. For good adhesion between fibers and coatings, dilute epoxy solution was applied as a sizing in some composites. To compare bonding levels, interlaminar shear strength was measured using short beam testing. The composites were impacted by a projectile at various energy levels using a Gardner Impact Tester. Damage zones were examined under an optical microscope. The energy level to start delamination and the size and number of delaminations were studied. The morphology of the intralaminar cracks was also carefully examined. The treated materials showed a marked increase in impact resistance: two to three times as much energy was required to produce initial delamination. At high energies, cracking was more ductile with fewer cracks appearing. Author

N86-20508*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRENGTH OF GRAPHITE/EPOXY BOLTED WING-SKIN SPLICE SPECIMENS SUBJECTED TO OUTDOOR EXPOSURE UNDER CONSTANT LOAD AND YEARLY FATIGUE LOADING
Gregory R. Wichorek and John H. Crews, Jr. 1986 35 p refs (NASA-TP-2542; L-16065; NAS 1.60:2542) Avail: NTIS HC A03/MF A01 CSCL 11D

The results of an experimental study to provide long-term durability data on detailed full-scale graphite/epoxy wing-skin joint designs under environmental exposure and cyclic loading associated with commercial transport aircraft are reported. The specimens consisted of a single-row bolt configuration fabricated from T300/5208 and a double-row bolt configuration fabricated from T300/5209. The unpainted specimens were exposed to the outdoor environment under a sustained tensile load, and at yearly intervals, they were subjected to fatigue loading. Experimental results showed a slight reduction in residual tensile strength for both graphite/epoxy joints under the exposure times and fatigue loadings reported. A 7.5-percent decrease in residual strength was observed for the T300/5208 single-row joint after 5 years exposure and two lifetimes of fatigue loading. A 5.3-percent decrease in residual strength was observed for the T300/5209 double-row joint after 7 years exposure and 2.8 lifetimes of fatigue loading. The 5208 epoxy material was more susceptible to degradation by ultraviolet radiation than the 5209 epoxy material. Author

N86-20509# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE BOND STRENGTH OF COMPOSITE RESIN TO DENTAL CASTING ALLOYS USING AN ELECTRO-CHEMICAL TIN PLATING SYSTEM M.S. Thesis
K. S. Smith, II Jun. 1985 77 p
(AD-A160682; AFIT/CI/NR-85-119T) Avail: NTIS HC A05/MF A01 CSCL 11/6

An alternative to the metal ceramic restoration has been the resin veneer crown. The resin veneer offers the advantages of low cost, ability to make clinical repairs, lack of wear to opposing teeth, and ease of fabrication. Clinical use of the resin veneer has been limited due to problems associated with the resin including low resistance to abrasion, high water sorption, a high coefficient of thermal expansion, low proportional limit, and a low modulus of elasticity. Improvements realized in composite resin technology have prompted the introduction of a number of composite resin veneering materials for prosthodontic applications. An electrochemical tin plating technique has been suggested for bonding composite veneering resins in lieu of conventional mechanical retention. The adhesive bonding of veneering resins to castings would prove beneficial by improving esthetics and eliminating the percolation of fluids at the resin-metal interface. The purpose of this investigation was to examine the shear bond strength of a composite resin processed to gold and base metal specimens that were

treated with an electro-chemical tin plating technique. Uniform specimens were cast in a gold alloy and a base metal. Conventional retentive beads on the gold alloy and electroetching of the base metal served as controls in this investigation. GRA

N86-20510# Maryland Univ., College Park. Engineering Materials Group.
COMPOSITE STRENGTHENING Annual Report
R. J. Arsenault 1985 5 p
(Contract N00014-85-K-0007)
(AD-A162423) Avail: NTIS HC A02/MF A01 CSCL 11/4

It has been demonstrated that a strong interfacial bond is required to produce the observed strengthening in discontinuous SiC/Al composites. Dislocation generation (which is the strengthening mechanism) is dependent upon a good bond existing between the SiC and the Al matrix. Although it has been shown that the stresses developed in the matrix as a result of the differences in the coefficients of thermal expansion between SiC and Al are greatly reduced by the motion and generation of dislocations, an elastic residual stress can still remain. An investigation was undertaken and it was determined that in the discontinuous SiC/Al composites a tensile-elastic-residual stress remains in the matrix. It has been observed that as the strength of the matrix increases, e.g., due to alloying or age hardening, the percentage increase in yield or ultimate tensile strength decreases for a given volume per cent SiC/al composite. GRA

N86-20511# Aeronautical Research Inst. of Sweden, Stockholm.
USE OF RADIOGRAPHY FOR NONDESTRUCTIVE TESTING AND EVALUATION OF FIBER REINFORCED COMPOSITES
Anders F. Blom and Per A. Gradin (A.S. Veritas Research) Sep. 1985 31 p refs Submitted for publication Sponsored by Aeronautical Research Inst. of Sweden and A.S. Veritas Research
(FFA-TN-1985-53) Avail: NTIS HC A03/MF A01

Radiographic nondestructive testing is reviewed. Applications to composite materials are discussed, including measurements of volume fractions fiber-resin, measurements of fiber alignment and fiber flows, the use of opaque penetrants for studies of fiber fractures, matrix cracks and delaminations, use of stereoradiographic techniques for studies of through the thickness distribution of damage, neutron inspection of bonded structures, moisture determination using positron annihilation, and the determination of composite stresses with X-ray diffraction. Author (ESA)

N86-20512# Construcciones Aeronauticas S.A., Madrid (Spain). Investigacion Desarrollo de Tecnologia y Materiales.
DETERMINATION OF GEL TIME AND TEMPERATURE IN PREIMPREGNATED GROUP 4 CARBON FIBER MATERIALS [DETERMINACION DE TEMPERATURAS Y TIEMPOS DE GELIFICACION EN MATERIALES DE FIBRA DE CARBONO PREIMPREGNADOS GRUPO 4]
28 Oct. 1984 15 p In SPANISH
(I-94/84) Avail: NTIS HC A02/MF A01

Thermometric and thermomechanical tests were carried out in order to characterize the thermal behavior of Group 4 carbon fiber materials in autoclave hardening process conditions. The reaction energy and the gel time and temperature were determined. The polymerization proceeds in a similar way for the various tested specimens. Complete hardening is reached in 69 min in autoclave conditions. The average gel temperature is 159 to 163 C while the gel time is 55 to 57 min. Author (ESA)

N86-20513# Polytechnical Univ. of Madrid (Spain). Escuela Technica Superior de Ingenieros Telecomunicacion.
EPOXY MATRICES AND THEIR BEHAVIOR IN AGGRESSIVE ENVIRONMENTS [MATRICES EPOXIDICAS Y SU COMPORTAMIENTO EN AMBIENTES HOSTILES]
Senen Paz Abuin Gairesa May 1985 17 p refs In SPANISH
Avail: NTIS HC A02/MF A01

The combined effects of time stress and water absorption on epoxy matrix composites are studied. Bifunctional and tetrafunctional epoxy resins hardened with animated hardeners were exposed to moisture and stress at different temperatures. It is shown that water absorption is independent of the test temperature, that equilibrium is reduced more rapidly under stress, and that tetrafunctional resins have higher equilibrium values as well as higher glass transitions. Author (ESA)

N86-20608# Morton Thiokol, Marshall, Tex.
ELECTROSTATIC SENSITIVITY OF MAGNESIUM-TEFLON COMPOSITIONS
H. C. Havron *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 495-500 (For primary document see N86-20589 11-31)
(AD-P004840) Avail: NTIS HC A99/MF E03 CSCL 19/4

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-20514 Portland State Univ., Oreg.
STUDIES OF NUCLEATION AND HEAT TRANSFER IN LIQUID HELIUM ISOTOPES 3 AND 4 Ph.D. Thesis
David James Lezak 1985 102 p
Avail: Univ. Microfilms Order No. DA8520329

Light induced nucleation of vapor bubbles in superheated liquid helium 4, transient heat transfer in liquid helium isotopes 3 and 4, and homogeneous nucleation of vapor bubbles in superheated liquid helium 3 were studied. The transient heat transfer resulted in extremely high temperature measurements of the Kapitza thermal boundary conductance limits in helium 3 and 4, in measurements of the delay time to the onset of film boiling over a wide range of bath temperatures in helium 4, and in a determination of bubble growth rates in helium 4. The so called light effect were characterized and it was established photographically that small amounts of visible light will cause the formation of vapor bubbles at the interface of a solid and superheated liquid helium 4 and that this vapor can influence the quasi steady state heat flux vs temperature hysteresis curve. The homogeneous nucleation temperature of liquid helium 3 were measured and good agreement was found with the predicitons of the Becker-Doring-Volmer-Zel'dovich Frenkel nucleation theory. The study has applications to practical cryogenic engineering, to further understanding of basic heat transfer and nucleation theory, and to practical and theoretical environmental and resource considerations. Dissert. Abstr.

N86-20515# Los Alamos National Lab., N. Mex.
A CHEMICAL CHARACTERIZATION OF CHALLENGE AEROSOLS FOR HEPA FILTER PENETRATION TESTING Thesis - Colorado State Univ.
Steven W. Strandberg Apr. 1985 101 p refs
(Contract W-7405-eng-36)
(LA-10393-T) Avail: NTIS HC A06/MF A01

Quality assurance penetration testing of high efficiency particulate air (HEPA) filters use oil mists as challenge aerosols. Concern over the carcinogenic risk associated with the use of di-(2-ethylhexyl)phthalate (DEHP) led to the investigation of alternative materials and generation methods for these aerosols. Since several commonly used generation methods for quality assurance testing of HEPA filters utilize heating of the starting material, it was determined essential to evaluate the starting material and the resultant aerosol which might contain thermal degradation by-products. A penetrometer utilizing flash vaporization was developed as a possible alternative generation method to the Q-127 thermally generated DEHP penetrometer. Tetraethylene glycol, oleic acid, and DEPH aerosols were generated and particulate and vapor samples were collected and identified using gas chromatography/mass spectrometry techniques. Thermally

generated DEHP by-products were also sampled and identified using a Q-107 penetrometer used in the testing of large HEPA filters were found in the flash vaporization penetrometer, although a number of thermally generated by-products were found in the Q-107 penetrometer. Author

N86-20516# National Bureau of Standards, Washington, D.C. Center for Fire Research.
A LITERATURE REVIEW OF THE CHEMICAL NATURE AND TOXICITY OF THE DECOMPOSITION PRODUCTS OF POLYETHYLENES
Maya Paabo and Barbara C. Levin Jan. 1986 65 p refs Sponsored in part by the Consumer Products Safety Commission (NBSIR-85-3268) Avail: NTIS HC A04/MF A01

The literature on polyethylenes was reviewed with an emphasis on the identification of gaseous products generated under various thermal decomposition conditions and the toxicity of those products. The chemical studies of the thermal decomposition products generated under vacuum, inert and oxidative experimental conditions are described. In oxidative atmospheres, which most closely simulate real fire conditions, carbon monoxide (CO) and acrolein were found to be the predominant toxicants. The acute inhalation toxicity of combustion products from various polyethylene formulation was assessed. The combustion products generated from the polyethylenes studied in the nonflaming mode appeared to be slightly more toxic than those produced in the flaming mode. It is found that toxicity of the degradation products of polyethylenes is similar to that found for other common materials designed for the same end uses. E.A.K.

N86-20517*# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.
COMBUSTION CHARACTERISTICS IN THE TRANSITION REGION OF LIQUID FUEL SPRAYS Final Report, Jan. 1983 - Sep. 1985
Nicholas P. Cernansky, Izak Namer, and R. J. Tidona Jan. 1986 56 p refs
(Grant NAG3-382; Drexel Proj. 1098)
(NASA-CR-176656; NAS 1.26:176656) Avail: NTIS HC A04/MF A01 CSCL 21B

A number of important effects have been observed in the droplet size transition region in spray combustion systems. In this region, where the mechanism of flame propagation is transformed from diffusive to premixed dominated combustion, the following effects have been observed: (1) maxima in burning velocity; (2) extension of flammability limits; (3) minima in ignition energy; and (4) minima in NOx formation. A monodisperse aerosol generator has been used to form and deliver a well controlled liquid fuel spray to the combustion test section where measurements of ignition energy have been made. The ignition studies were performed on monodisperse n-heptane sprays at atmospheric pressure over a range of equivalence ratios and droplet diameters. A capacitive discharge spark ignition system was used as the ignition source, providing independent control of spark energy and duration. Preliminary measurements were made to optimize spark duration and spark gap, optimum conditions being those at which the maximum frequency or probability of ignition was observed. Using the optimum electrode spacing and spark duration, the frequency of ignition was determined as a function of spark energy for three overall equivalence ratios (0.6, 0.8, and 1.0) and for initial droplet diameters of 25, 40, 50, 60, and 70 micro m. B.W.

N86-20518*# Nebraska Univ., Lincoln. Lab. of Physics.
THE RELATIVE FLUORESCENT EFFICIENCY OF SODIUM SALICYLATE BETWEEN 90 AND 800 eV
G. C. Angel, James A. R. Samson, and G. Williams (Brookhaven National Lab., Upton, N.Y.) [1986] 16 p refs
(Grants NGR-28-002-01; NSF PHY-82-14172; NSF ATM-84-12820)
(NASA-CR-176605; NAS 1.26:176605) Avail: NTIS HC A02/MF A01 CSCL 07D

The relative fluorescent quantum efficiency of sodium salicylate was measured between 90 and 800 eV (138 -15 A) by the use of synchrotron radiation. A general increase in efficiency was observed in this spectral range except for abrupt decreases in efficiency at the carbon and oxygen K-edges. Beyond the oxygen K-edge (532 eV) the efficiency increased linearly with the incident photon energy to the limit of the present observations. Author

N86-20519# Air Force Academy, Colo.
THE WETTING BEHAVIOR OF DIALKYLIMIDAZOLIUM CHLOROALUMINATE, A ROOM TEMPERATURE MOLTEN SALT Interim Report, May - Sep. 1984
J. G. Eberhart Aug. 1985 4 p
(AD-A160254; FJSRL-JR-85-0008) Avail: NTIS HC A02/MF A01 CSCL 07/4

The wetting behavior of a battery electrolyte can have a dramatic effect on the internal resistance of the battery as well as its cycle life. Good wetting of battery separators by electrolyte is essential for easy passage of ions through the separator pores during charge and discharge. Porous, gas diffusion electrodes require, on the other hand, a lesser degree of electrolyte wetting, so that the line of contact of three phases (reactive gas/liquid electrolyte/porous electrode or current collector) can be maintained within the porous electrode through a balance of capillary and hydrostatic pressures. Advancing and receding contact angles were determined for diakylimidazolium chloroaluminate, room-temperature molten salts on various candidate battery separator and porous electrode materials. The wetting angles were determined for the binary 1-methyl-3-ethylimidazolium chloride/aluminum chloride melt as a function of such variables as composition, chlorination of the imidazolium ion, replacement of AlCl3 by LiCl, solid porosity, and solid surface cleaning procedure. In nearly all cases involving AlCl3 as a second component, the melt easily wets the substrate. GRA

N86-20520# California Univ., Berkeley. Lawrence Berkeley Lab.
THE OBSERVATION OF CH3O IN THE COLLISION FREE MULTIPHOTON DISSOCIATION OF CH3NO2
ALec M. Wodtko, Eric J. Hintsa, and Yuan T. Lee 24 Oct. 1985 11 p
(Contract N00014-83-K-0069)
(AD-A161420) Avail: NTIS HC A02/MF A01 CSCL 07/4

The method of infra-red, laser, crossed, molecular-beam, photofragmentation, translational spectroscopy has been used to study the thermal chemistry of nitromethane under collision free conditions. We have observed for the first time experimental evidence that shows that the isomerization of nitromethane to methylnitrite is an important thermochemical process in the unimolecular decomposition of the title compound. Based on theoretical predictions of Dewar et.al. that the Arrhenius pre-exponential factor is 10 to the 13.3 power, we have been able to estimate the potential energy barrier height for the isomerization reaction to be 55.5 + or - 1.5 kcal/mol, compared to the C-N bond energy of 59.2 kcal/mol. It is clear that in mechanistic modeling of the thermal decomposition of nitromethane, this important dissociation channel must be taken into consideration. We have also been able to conclusively show that previous suggestions of a dynamical barrier in the exit channel of the simple C-N bond fission reaction are in error. Author (GRA)

N86-20521# Stanford Univ., Calif. Dept. of Chemistry.
THEORY AND EXPERIMENTS ON CHEMICAL INSTABILITIES Final Technical Report, 1 Jan. 1984 - 30 Mar. 1985
John Ross 30 Jun. 1985 10 p
(Contract F49620-84-C-0030)
(AD-A162430; AFOSR-85-1001TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Progress is reported on experiments and theoretical studies of chemical instabilities including chemical waves, photo-illuminated thermal, chemical reactions; critical slowing down, periodic precipitation processes, resonance phenomena in oscillatory reactions, rate of entropy production in systems far from equilibrium. Author (GRA)

N86-20522# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FUEL PROPERTY EFFECTS ON COMBUSTION Final Report, Sep. 1984 - Apr. 1985
Cynthia A. Obringer Oct. 1985 20 p
(AF Proj. 304-8)
(AD-A162451; AFWAL-TR-85-2051) Avail: NTIS HC A02/MF A01 CSCL 21/4

This report deals with fuel property effects on gas turbine engine combustors. In order to increase jet fuel availability and decrease cost, the Air Force is investigating alternate feedstocks such as tar sands, shale oils, heavy oils, and coal derived fuels. As these lower quality feedstocks begin to play a major role as sources of military jet fuels, it becomes increasingly important to be able to evaluate the effects of these fuels on engine life and performance. These effects have usually been measured using expensive and time-consuming engine tests. Of major concern in each of these programs was the effects of fuel properties and composition on soot formation, and the effects of soot on engine performance and durability. Being able to predict the change in soot formation due to changing fuel properties would be an invaluable tool in future research and development efforts to eliminate soot formation and its deleterious effects on engines. The reduction in exhaust plume, through reduced soot formation, reduces a vehicle's visibility for tracking and targeting purposes, thus increasing its survivability. It was concluded that smoke and combustion linear radiative heating correlate well with hydrogen content. That hydrogen content is as effective as any parameter at predicting soot formation; and the questioning of the validity of the data, and the need for more and better data. GRA

N86-20523# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
PHOTOCHEMICAL REACTIONS OF (n(5) PENTA-METHYLCYCLPENTADIENYL) DICARBONYLIRON-ALKYL AND -SILYL COMPLEXES: REVERSIBLE ETHYLENE INSERTION INTO AN IRON-SILICON BOND AND IMPLICATIONS FOR THE MECHANISM OF TRANSITION METAL-CATALYZED HYDRO-SILATION OF ALKENES
Claudia L. Randolph and Mark S. Wrighton 11 Dec. 1985 47 p
(Contract N00014-84-K-0553)
(AD-A162462; TR-8) Avail: NTIS HC A03/MF A01 CSCL 07/5

We wish to report three aspects of the photochemistry of (n5-C5Me5)Fe(CO)2R complexes, R = Me, Et, CH2CH2SiMe3 and SiMe3, which relate to a proposed mechanism for hydorsilation catalysis. These are (1) photochemically induced insertion of C2H4 into the Fe-Si bond of (n5-C5Me5)Fe(CO)2SiMe3, (2) transfer of either the -SiMe3 group or a beta-H group upon photolysis of n5-C5Me5)Fe(CO)2CH2CH2SiMe3, and (3) reductive elimination of alkane, RH, upon photoinduced oxidative addition of HSiR'3 (R' = Me, Et) to n5-C5Me5)Fe(CO)2R, R = Me, Et. GRA

N86-20524# Arizona Univ., Tucson. Dept. of Chemistry.
MIXED LIGAND CHELATE EXTRACTION OF LANTHANIDES WITH AMINE SYSTEMS
S. Inoue, C. F. Ordonez, and H. Freiser 1985 21 p refs
(Contract DE-AC02-76ER-04073)
(DE85-014275; DOE/ER-04073/16) Avail: NTIS HC A02/MF A10

A study of the equilibrium extraction behavior of a series of representative tervalent lanthanide ions, Pr, Eu and Yb, was carried out with chloroform solutions containing N-benzoylphenylhydroxylamine, N-m-trifluromethylbenzoylhenylhydroxylamine (HL) either alone or combined with 1,10-phenanthroline (phen). The results demonstrated that the lanthanides are extracted as LnL3 x 2 HL or in the presence of phen as LnL3 x HL phen for Pr and Eu, and LnL3 x 2phen for Eu and Yb. The extraction constants, separation factors, and composition of adduct complexes for the two extractants were compared. DOE

N86-20525# Oak Ridge Gaseous Diffusion Plant, Tenn.
VAPOR-AEROSOL PHYSICOCHEMICAL LABORATORY
J. D. Lore and L. M. Skeen 1 Oct. 1985 12 p refs Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract DE-AC05-84OT-21400)
(DE86-000522; K/PS-5061; CONF-8510151-4) Avail: NTIS HC A02/MF A01

A laboratory capable of generating and characterizing vapors and aerosols at typical ambient concentration levels observed in chemical processing operations has been established at the ORGD Plant, operated by Martin Marietta Energy Systems, Inc. for the USDOE. A three-stage generation system (TSGS), originally developed by SRI, International, for the analytical methods validation studies sponsored by NIOSH, has been installed. Several aerosol/particulate monitors, controlled by microcomputers, provide the means for semi-real-time particle size and mass concentration measurements over the size range 0.1 to 10 microns. A full complement of chemical analysis instrumentation including laser Raman spectroscopy and gas chromatography-mass spectrometry is available for in-situ or sequential measurements of TSGS diluents. DOE

N86-20526# Los Alamos National Lab., N. Mex.
TESTING SITE SIZE REQUIREMENTS IN CHEMISORPTION: EXPERIMENT AND THEORY
C. T. Campbell, M. T. Paffett, and A. F. Voter 1985 20 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-7405-eng-36)
(DE86-000766; LA-UR-85-3252; CONF-851174-9) Avail: NTIS HC A02/MF A01

Ensemble requirements in surface chemistry refer to the number and shape of contiguous empty sites necessary for chemisorption of a particular molecule. Ensemble effects can play a major role in directing the course of surface reactions, leading, for example, to dramatic changes in catalytic selectivity when the active metal component is diluted upon alloying with an inert metal. We will review here fundamental surface science studies that have attempted to probe this site size requirement by diluting active sites on a single crystal surface with an inert metal overlayer. We will emphasize recent results in our lab on the interaction of simple molecules (CO, H2, O2) with Cu-, Ag-, and Bi-dosed Pt(111). Theoretical models based upon Monte-Carlo simulations will be summarized which, when compared to such data, allow more accurate determination of ensemble sizes. These models predict uptake curves that deviate strongly from the commonly used (1-theta) (sup A) law (A = number of sites in ensemble), which is valid only for an array of isolated ensembles. DOE

N86-20527# Lawrence Livermore National Lab., Calif.
SUCCESSIVE REIGNITION OF FUEL-AIR MIXTURES AND PULSE COMBUSTION
C. K. Westbrook Sep. 1985 27 p refs Presented at the Two Phase Combustion, Numerical Modelling of Combustion Processes: General Combustion Topics, Davis, Calif., 21 Oct. 1985
(Contract W-7405-eng-48)
(DE86-001560; UCRL-93362; CONF-8510158-2) Avail: NTIS HC A03/MF A01

Chemical kinetic modeling of the successive reignition of fuel-air mixtures is described, under conditions of pressure and temperature very similar to those encountered in conventional pulse combustion systems. The overall system model is described and the kinetic model is discussed in some detail. Computed results for ignition delay times are then related to time scales of interest in pulse combustion. From these comparisons, some of the physical and chemical factors which control the operation of the pulse combustor can be identified and quantified. In addition, the dependence of pulse combustor performance on various system parameters can be addressed, including the mass flow rate, fuel composition, presence of selected diluents and inhibitors, and combustion chamber geometry. DOE

N86-20528# Massachusetts Inst. of Tech., Cambridge.
TEMPERATURE EFFECTS ON LITHIUM-NITROGEN REACTION

RATES

W. J. Ijams and M. S. Kazimi Aug. 1985 91 p
(Contract DE-AP07-79ID-00019)
(DE86-001848; PFC/RR-85-6) Avail: NTIS HC A05/MF A01

A series of experiments have been run with the aim of measuring the reaction rate of lithium and nitrogen over a wide spectrum of lithium pool temperatures. In these experiments, pure nitrogen was blown at a controlled flow rate over a preheated lithium pool. The pool had a surface area of approximately 4 sq cm and a total volume of approximately 6 cu cm. The system pressure varied from 0 to 4 psig. The reaction rate was very small - approximately 0.002 to 0.003 g Li min sq cm for lithium temperatures below 500C. Above 500C the reaction rate began to increase sharply, and reached a maximum of approximately 0.80 g Li min sq cm. above 700C. It dropped off beyond 1000C and seemed to approach zero at 1150C. The maximum reaction rate observed in these forced convection experiments was higher by 60% than those previously observed in experiments where the nitrogen flowed to the reaction site by means of natural convection. During a reaction, a hard nitride layer built up on the surface of the lithium pool - its effect on the reaction rate was observed. The effect of the nitrogen flow rate on the reaction rate was also observed. DOE

N86-20529# California Univ., Berkeley. Lawrence Berkeley Lab.
INTERACTION OF A LAMINAR FLAME WITH ITS SELF-GENERATED FLOW DURING CONSTANT VOLUME COMBUSTION

D. Dunn-Rankin and R. F. Sawyer Feb. 1985 23 p Presented at the 10th International Colloquium on Dynamics of Explosions and Reactive Systems, Berkeley, Calif., 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE85-016640; LBL-19164; CONF-850830-7) Avail: NTIS HC A02/MF A01

The formation of cusp shaped or tulip flames during closed tube flame propagation has been recorded by combustion researchers for nearly sixty years. Flame instability, pressure wave/flame interaction, and large scale circulation in the unburned gas have been suggested as explanations for the tulip flame phenomenon, but the cause of the tulip flame has not been conclusively determined. This work uses laser Doppler anemometer measurements of the flow field during flame propagation in a closed tube to describe the combustion generated flow and to support a fluid mechanical explanation for the tulip flame formation. The flame behaves as a fluid mechanical discontinuity which deflects the velocity of the gas passing through it. As the flame quenches at the side walls of the combustion vessel, the flow deflection generates a vortex in the burned gas. The vortex remains in the proximity of the flame and modifies the unburned gas field such that the flame propagates more quickly near the wall than at the center. The discrepancy in propagation rates leads to the tulip flame. DOE

N86-20530# Argonne National Lab., Ill.
SELECTIVE DETECTION OF PRIMARY AROMATIC AMINES IN COMPLEX MIXTURES BY LIQUID CHROMATOGRAPHY WITH ELECTROCHEMICAL DETECTION USING A SHORT REVERSED-PHASE COLUMN

T. Otagawa, S. Zaromb, and J. R. Stetter 1985 32 p refs Presented at the Health and Environmental Research on Complex Organic Mixtures, Richland, Wash., 21 Oct. 1985
(Contract W-31-109-eng-38)
(DE85-018351; CONF-851027-1) Avail: NTIS HC A03/MF A01

Selective detection of primary aromatic amines (PAAs) in the presence of phenols by liquid chromatography with electrochemical detection was investigated. PAAs were resolved from other aromatic compounds, using three mobile phases, at various electrode potentials and flow rates. The phases used a combination of pH and organic modifiers (tetrahydrofuran, acetonitrile, or n-propanol) to optimize the degree of separation. As the pH of the mobile phase was increased, the signals for two- and three-ring PAAs decreased and became independent of pH at values between 4 and 8, while the signals from aniline and phenols increased. Selective detection of PAAs is feasible at pH 2.2 at potentials of 0.7 to 0.85 V vs Ag/AgCl. The best result was obtained with a 35 vol % tetrahydrofuran/water mobile phase, which yielded the highest signal for aniline and the lowest signal for phenol at pH 2.2 with satisfactory retention times. Electrochemical detectors are about one thousand times more sensitive to PAAs and phenols than ultraviolet detectors. The results obtained will permit design and construction of a portable PAA monitor with an appropriate sample concentrator, pump, and injection system. DOE

N86-20531# Argonne National Lab., Ill.
FEASIBILITY STUDY: A PORTABLE HIGH-PERFORMANCE LIQUID CHROMATOGRAPH FOR ANALYSIS OF PRIMARY AROMATIC AMINES

C. L. Vila Aug. 1985 19 p refs
(Contract W-31-109-eng-38)
(DE86-001455; ANL/EES-TM-287) Avail: NTIS HC A02/MF A01

The results of this work demonstrate the feasibility of constructing and operating a portable instrument for analysis of primary aromatic amines (PAAs) in air samples containing other organic chemicals. The proposed instrumentation would use amperometric (electrochemical) detection, which is both selective for and highly sensitive to PAAs, and high-performance liquid chromatography. Three mobile-phase systems amenable to electrochemical detection and capable of resolving PAAs were tested: methanol, acetonitrile, and propanol. The system used will depend on the nature of the sample to be analyzed. Because air samples cannot be introduced directly into such an instrument, a gas sample collector and concentrator was designed. A preliminary set of experiments with a prototype concentrator system without a thermoelectric device using an air sample containing aniline resulted in 5 to 15% recovery. Additional work will be needed to improve the efficiency of the sample concentrator. DOE

N86-20532# Oak Ridge National Lab., Tenn.
ALUMINUM ELECTROCHEMISTRY IN LIQUID AMMONIA

L. Maya Sep. 1985 15 p refs
(Contract DE-AC05-84OR-21400)
(DE86-001462; ORNL/TM-9762) Avail: NTIS HC A02/MF A01

The electrochemistry of aluminum in liquid ammonia was investigated using potassium amide as supporting electrolyte. Anodic dissolution of the metal in this medium is feasible using a glassy carbon cathode and becomes significant at approximately +2.2 V from solvated electron couple. The dissolution efficiency is limited by the interference of solvated electrons which discharge at the anode. The generation of solvated electrons is one of the cathodic processes and their migration could not be completely prevented in a divided cell. In addition to this, electrodeposition of potassium at the glassy carbon cathode also takes place leading to its eventual catastrophic disintegration. This apparently takes place through the disruption of the glassy carbon structure. The presence of electroactive aluminum species produced in situ by anodic dissolution or added as $LiAl(NH_2)_4$ was detected by means of cyclic voltammetry which revealed the appearance of a cathodic response at about +100 mV from the solvent decomposition limit. DOE

N86-20533# Lawrence Livermore National Lab., Calif.
LASER SPECTROSCOPY OF GLASSES

M. J. Weber Oct. 1985 27 p refs Presented at the Symposium on Emerging Directions of Glass Research, Troy, N.Y., 10 Apr. 1985
(Contract W-7405-eng-48)
(DE86-001653; UCRL-93486; CONF-8504185-1) Avail: NTIS HC A03/MF A01

Laser spectroscopy unlike most other spectroscopies used to study amorphous solids involves selective excitation of subsets of ions and molecules having electronic transitions resonant with the laser frequency. Thus by using a tunable laser, site-to-site variations in the distribution of environments and interactions present in a glass can be probed. High resolution, highly sensitive techniques such as laser-induced fluorescence line narrowing, spectral hole burning, and coherent optical transients are providing new insights

into the spectroscopy and microscopic structure of glasses. Basic principles and recent results achieved with these unique techniques are reviewed. DOE

N86-20534# Pacific Northwest Lab., Richland, Wash.
ZIRCALOY OXIDATION STUDIES
J. T. Prater, R. H. Beauchamp, and N. T. Saenz Jun. 1985 23 p Presented at the ASM Metals Congress International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001766; PNL-SA-13372; CONF-8510160-3) Avail: NTIS HC A02/MF A01

The oxidation kinetics of Zircaloy-4 in steam have been determined at 1300 to 2400(0)C. Growth of the ZrO2 and (ALPHA)-Zr layers display parabolic behavior over the entire temperature range studied. A discontinuity in the oxidation kinetics at 1510(0)C causes rates to increase above those previously established by the Baker-Just relationship. This increase coincides with the tetragonal-to-cubic phase transformation in ZrO/sub 2-x/. No discontinuity in the oxide growth rate is observed upon melting of Zr(0). The effects of temperature gradients have been taken into account and corrected values representative of near-isothermal conditions have been computed. DOE

N86-20535# Department of Energy, Morgantown, W. Va. Energy Technology Center.
PROPAGATION PROPERTIES OF THE NONLINEAR ONE-DIMENSIONAL TRIMOLECULAR REACTION
V. Komkov Jul. 1985 13 p
(DE85-013610; DOE/METC-85/4030) Avail: NTIS HC A02/MF A01

A random walk algorithm is presented for computation of nonlinear one- (or more) dimensional trimolecular reaction partial C/partial t = D(x)Del(2)C (+) (1 - C)(2 - C)(3 - C). DOE

N86-20536# Argonne National Lab., Ill.
DIGITAL FILTERS AND THEIR LIMITATIONS IN DATA ANALYSIS FOR ELECTRON ENERGY LOSS SPECTROSCOPY
N. J. Zaluzec and J. F. Mansfield Sep. 1985 5 p Presented at the Electron Microscopy and Analysis Group Conference, Newcastle-Upon-Tyne, England, 2 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018464; CONF-8509168-2) Avail: NTIS HC A02/MF A01

It has been shown (Zaluzec, 1985) that the application of digital filters to EELS data can in many cases remove ambiguities in the interpretation of EELS data by removing the judgemental nature of the background modeling step, particularly in situations of poor edge/background ratios. Using this technique to identify the presence or absence of an edge, independent of a background model, allows the analyst to employ without serious reservation more elaborate, yet operator-defined, background modeling routines to recover the relevant characteristic edge profiles. The advantages and limitations of using these types of filters to spectral analysis of electron loss data in practical data analysis situations are briefly discussed. DOE

N86-20625# Savanna Army Depot Activity, Ill.
COMPLEXITIES OF LEAD AZIDE
W. Shaneyfelt *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosive Safety Seminar, Volume 2 Aug. 1984 p 1143-1148 (For primary document see N86-20623 11-31)
(AD-P004872) Avail: NTIS HC A99/MF E01 CSCL 13/12

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-20537 British Library Lending Div., Boston Spa (England).
STATISTICAL INDICES USED FOR EVALUATING THE QUALITY OF METAL
V. A. Litvinenko, I. M. Rozhkov, and G. N. Mulko 1985 11 p refs Transl. into ENGLISH from Izv. VUZ, Cheneya Metall. (USSR), no. 5, 1985 p 72-77
(BLLD-Trans-M-36510-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A procedure to determine the quality indices for metals from the results of mechanical tests on metals by different heat gradients is presented. The indices are calculated by first finding the correlational matrix of the mutual relationship between the service properties of metal and mean values of the properties for individual heats and sets of heats. Metal product quality can be improved, and the indices can be used by improving the chemical compositions of steels and the production technology. E.A.K.

N86-20538 British Library Lending Div., Boston Spa (England).
INFLUENCE OF ANNEALING SCHEDULE ON SOFTENING OF PREHARDENED AND TEMPERED HIGH-SPEED STEEL
V. I. Alimov, V. G. Onoprienko, and S. I. Marchuk [1985] 4 p refs BLLD-M-36549-Trans-(5828.4) Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 6, 1985 p 95-96
Avail: British Library Lending Div., Boston Spa, Engl.

The softening of high speed steels in the initial hardened and tempered state during annealing by different schedules was studied. Softening was assessed from the results of measuring Brinell hardness and from the physical broadening of the (110) and (220) lines of the alpha phase. Author

N86-20539# Central Electricity Generating Board, London (England). Translations Section.
STRESS RELIEF CRACKING OF Cr-Mo-V STEEL
M. Nakanishi and J. Furushawa 1980 23 p refs Transl. into ENGLISH from Sumitoma Kinzoku (Japan), v. 32, no. 4, Oct. 1980 p 439-452
(BLL-CE-Trans-8171-(9022.09)) Avail: NTIS HC A02/MF A01

Stress relief (SR) annealing is commonly applied during or after the building of heavy gauge steel plate to improve welded joint performance by removing residual stress from the weld, or by softening the weld hardened zone. The SR treatment is prescribed by standard specifications for certain steels and plate thicknesses. It is found that: (1) the circular notched, constant load, rising temperature rupture test synthetic welding HAZ is an effective method for reproducing SR cracking and evaluating SR crack susceptibility; (2) the critical stress for constant load SR crack initiation (alpha sub SR) obtained from constant load rising temperature rupture tests gives on index of SR crack susceptibility to SR cracking, lower in steels of larger alpha sub SR; (3) under given welding conditions, the critical value of alpha sub SR for crack initiation may be specified irrespective of the composition; (4) the SR crack susceptibility of Cr-Mo-V is compared by alpha sub SR; (5) intragranular hardening due to precipitation hardening in SR has large effect on SR crack initiation; (6) when V is added to raise the strength of a Cr-Mo steel composition of large Cr content is recommended a steel to control SR cracking. E.A.K.

N86-20540# British Library Lending Div., Boston Spa (England).
PRESSURE OF SATURATED STEAM OF REFRACTORY METALS
R. A. Yu. Aleev, V. Balkovoi, and A. A. Manokhin [1985] 4 p refs Transl. into ENGLISH from Iz. VUZ, Chernaya Metall. (USSR), v. 5, 1985 3 p
(BLL-M-Trans-36527(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The pressure of saturated steam of niobium, molybdenum, chromium, zirconium and titanium was determined by evaporation from an uncovered surface in a vacuum. The values of the saturated steams at a given temperature were calculated from the loss of mass in the specimen by the Langmuir equation. The regulations for the temperature dependence referring to the solid state of elements are presented. E.A.K.

N86-20541*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ALLOY CHEMISTRY AND MICROSTRUCTURAL CONTROL TO

MEET THE DEMANDS OF THE AUTOMOTIVE STIRLING ENGINE Final Report
Joseph R. Stephens 1986 38 p refs Proposed for presentation at MiCon 1986, Philadelphia, Pa., 15-16 May 1986; sponsored by the American Society for Testing Materials
(Contract DE-AI01-85CE-50112)
(NASA-TM-87250; E-2892; DOE/NASA/50112-63; NAS 1.15:87250) Avail: NTIS HC A03/MF A01 CSCL 11F

The automotive Stirling engine now under development by DOE/NASA as an alternative to the internal combustion engine, imposes severe materials requirements for the hot portion of the engine. Materials selected must be low cost and contain a minimum of strategic elements so that availability is not a problem. Heater head tubes contain high pressure hydrogen on the inside and are exposed to hot combustion gases on the outside surface. The cylinders and regenerator housings must be readily castable into complex shapes having varying wall thicknesses and be amenable to brazing and welding operations. Also, high strength, oxidation resistance, resistance to hydrogen permeation, cyclic operation, and long-life are required. A research program conducted by NASA Lewis focused on alloy chemistry and microstructural control to achieve the desired properties over the life of the engine. Results of alloy selection, characterization, evaluation, and actual engine testing of selected materials are presented. Author

N86-20542*# Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
GRAIN BOUNDARY OXIDATION AND OXIDATION ACCELERATED FATIGUE CRACK NUCLEATION AND PROPAGATION
H. W. Liu and Yoshiki Oshida Jan. 1986 19 p refs Presented at the Minnowbrook Conference on Life Prediction for High Temperature Gas Turbine Materials, Blue Mountain Lake, N.Y., 27-30 Aug. 1985 Sponsored in part by the HOST Program
(Grant NAG3-348)
(NASA-CR-175050; NAS 1.26:175050) Avail: NTIS HC A02/MF A01 CSCL 11F

Fatigue life at elevated temperatures is often shortened by oxidation. Grain boundary oxidation penetrates deeper than the surface oxidation. Therefore, grain boundary oxide penetration could be the primary cause of accelerated fatigue crack nucleation and propagation, and the shortened fatigue life at elevated temperatures. Grain boundary oxidation kinetics was studied and its statistical scatter was analyzed by the Weibull's distribution function. The effects of grain boundary oxidation on shortened fatigue life was analyzed and discussed. A model of intermittent microruptures of the grain boundary oxide was proposed for the fatigue crack growth in the low frequency region. The proposed model is consistent with the observations that fatigue crack growth rate in the low frequency region with hold time at K sub max is inversely proportional to cyclic frequency and that crack growth is intergranular. Author

N86-20543*# Clarkson Univ., Potsdam, N.Y. Dept. of Chemical Engineering.
MODELLING DIRECTION SOLIDIFICATION Semiannual Progress Report, 1 Sep. 1985 - 28 Feb. 1986
William R. Wilcox 1986 74 p refs
(Grant NAG8-541)
(NASA-CR-176606; NAS 1.26:176606; SAPR-1) Avail: NTIS HC A04/MF A01 CSCL 11F

The overall objective of this program is to develop an improved understanding of some phenomena of importance to directional solidification. The aim of this research is also to help predict differences in behavior between solidification on Earth and solidification in space. In this report, the validity of the Burton-Primslichter equation is explored. The influence of operating variables on grain and twin generation and propagation in single crystals of In sub (x) Ga sub (1-x) Sb is also investigated. B.W.

N86-20544*# National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF VOLUME FRACTION AND SIZE OF FINE-GAMMA PRIME PARTICLES ON RAISING THE CREEP STRENGTH OF A DS NICKEL-BASE SUPERALLOY
D. L. Lin, D. L. Yao, X. J. Lin, and C. Q. Sun Feb. 1986 23 p refs Transl. into ENGLISH from Acta Metallurgica Sinica (Beijing, China), v. 18, no. 1, Feb. 1982 p 104-114 Previously announced in IAA as A82-33045 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Shanghai Jianotong Univ., China
(NASA-TM-77983; NAS 1.15:77983) Avail: NTIS HC A02/MF A01 CSCL 11F

The creep behavior of a directionally solidifified nickel-base superalloy, DKS3, has been investigated as a function of the volume fraction and size of the gamma-prime phase at 760 and 950 C. The dislocation structure and morphology of gamma-prime was examined by transmission electron microscopy at the primary, secondary and tertiary creep stages at 73.8 kgf/sq mm. Experimental results are described in terms of a high temperature creep model in the range of temperatures and applied stresses where shearing of the gamma-prime phase does not control the straining process. Author

N86-20545# Pittsburgh Univ., Pa. Surface Science Center.
ORGANIC FUNCTIONAL GROUP REACTIVITIES AT METAL SURFACES Final Report, 1 Jul. 1982 - 30 Aug. 1985
John T. Yates, Jr. Oct. 1985 26 p
(Contract DAAG29-82-K-0141)
(AD-A161281; ARO-19250.7-CH) Avail: NTIS HC A03/MF A01 CSCL 07/4

This research has been directed toward understanding the mode of surface decomposition of organic functional groups on atomically-clean single crystal metal surfaces. In addition, the development of rapid and efficient kinetic methods to gain this information has been a goal which has been achieved. The stepwise decomposition of methanol and ethanol has been characterized on a Ni(111) single crystal surface. In addition, a Cu(111) surface has been studied for methanol decomposition behavior, and then its surface behavior has been modified systematically by oxygen adsorption. GRA

N86-20546# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Chemistry.
SPECTROSCOPIC AND ELECTROCHEMICAL STUDIES OF THE TRANSITION METAL TETRASULFONATED PHTHALOCYANINES. PART 5: VOLTAMMETRIC STUDIES OF ADSORBED TETRASULFONATED PHTHALOCYANINES (MTSPC) IN AQUEOUS SOLUTIONS Technical Report
S. Zecevic, B. Simic-Glavaski, E. Yeager, A. B. F. Lever, and P. C. Minor 1 Oct. 1985 23 p
(Contract N00014-83-K-0343)
(AD-A161357; TR-56-Pt-5) Avail: NTIS HC A02/MF A01 CSCL 07/4

Cyclic voltammetric measurements of adsorbed Fe- and Co-tetrasulfonated phthalocyanine (TsPc) and Co-phthalocyanine (Pc) have been carried out on ordinary pyrolytic graphite and silver electrodes at different solution pH ranging from 1 to 13. Many voltammetry peaks were found to be pH dependent with a slope of -59 mV/unit pH. In some instances this dependence was observed in alkaline or acid solutions only. Explanations for the various voltammetry peaks and their pH dependence are discussed. The influence of dioxygen and its reduction have also been examined. GRA

N86-20547# Columbia Univ., New York.
PRODUCTION OF FINE POWDERS FOR PERMANENT MAGNETS USING A D.C. ARC PLASMA
Huk Y. Cheh and Thomas J. Dougherty Oct. 1985 24 p
(Contract N00014-81-K-0749)
(AD-A162460) Avail: NTIS HC A02/MF A01 CSCL 11/6

Powdered feeds of iron(-100 mesh and -325 mesh) Crumac (Mn3A1C, various sieved fractions) entrained in argon were fed into a D.C. arc through a Forced Convection Cathode. The arc effluent was quenched with argon and the products collected in a cyclone and Pulsaire baghouse. The baghouse products from the iron runs are frequently pyrophoric, igniting in air. The object was

to prepare rapidly quenched, submicron powders of high coercive force for use in permanent magnets. The electrical conductivity of the feed and products proved to be the major source of difficulty in this work. The products and unvaporized feed would collect on the arc chamber walls and never reach the cyclone and baghouse. This problem was partially solved by applying a negative potential (-100 v) to the chamber. Useful product was obtainable in only five runs (three with iron, two with Crumac), near the end of this project. The products from the three iron runs were combined into two samples, one cyclone product and one baghouse product. These two samples, along with the baghouse products from the two Crumac runs were shipped to Crucible Research Division of Colt Industries. The highest surface areas of the baghouse products were 27 sq m/g for Iron and 42 sq. m/g for Crumac. The surface area was measured on samples that had been exposed to air and undoubtedly oxidized. All samples appeared to be heterogeneous, at least after exposure to air. GRA

N86-20548# Los Alamos National Lab., N. Mex.
CONSTITUTIVE RELATION FOR 6061T6 ALUMINUM UNDER SHOCK LOADING CONDITIONS
D. L. Tonks 1985 6 p Presented at the American Physics Society Topical Conference on Shock Waves in Condensed Matter, Spokane, 22 Jul. 1985
(Contract W-7405-eng-36)
(DE85-015684; LA-UR-85-2327; CONF-850736-50) Avail: NTIS HC A02/MF A01

For the first time a based on plastic flow data extracted from 6061T6 Al shocks is published. The data involves strain rates up to 10 to the 7th power and shear stresses up to 5kbar. The relation is interpreted in terms of a dislocation-kinetics model. DOE

N86-20549# Hanford Engineering Development Lab., Richland, Wash.
US-JAPAN SEMINAR ON IRRADIATION TESTING AND DEVELOPMENT OF ALLOYS FOR FUSION REACTORS
D. S. Gelles and D. G. Doran Aug. 1985 559 p Presented at the US/Japan Seminar on Radiation Testing and Development of Alloys for Fusion Reactors, Richland, Wash., 18 Mar. 1985
(Contract DE-AC06-76FF-02170)
(DE85-018214; HEDL-7555; CONF-8503149-Summ) Avail: NTIS HC A24/MF A01

Among the topics discussed at the US/Japan Seminar on irradiation testing and development of fusion reactor allys were magnetic confinement systems, properties of burning plasmas, fusion materials, and nuclear fusion technology. DOE

N86-20550# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
EFFECTS OF TRITIUM ON MATERIAL PROPERTIES
G. R. Caskey, Jr. 1985 34 p refs Presented at the Workshop on Effects of Hydrogen on Deformation and Fracture in Metals, Los Alamos, N. Mex., 19 Aug. 1985
(Contract DE-AC09-76SR-00001)
(DE85-018532; DP-MS-85-89; CONF-8508130-1) Avail: NTIS HC A03/MF A01

The effecs of tritium on deformation and fracture of metals are reviewed with emphasis on similarities and differences between tritium and the other hydrogen isotopes. Helium generated by radioactive decay of tritium introduces time dependent property changes not observed with protium or deuterium. On-going studies and topics for further investigations are identified. DOE

N86-20551# Pacific Northwest Lab., Richland, Wash.
LIGHT-ION INDUCED HARDENING KINETICS IN IRRADIATED FERRITIC STEELS
C. H. Henager, Jr. and E. P. Simonen Oct. 1985 9 p refs Presented at the 2nd International Symposium on Environmental Degradation of Materials in Nuclear Power Systems Water Reactors, Monterey, Calif., 9 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001673; PNL-SA-13101; CONF-850902-5) Avail: NTIS HC A02/MF A01

Radiation hardening was observed during creep of ferritic alloys with and without copper additions. Irradiation creep testing was combined with microhardness testing to study changes in creep strength and yield stress of two ferritic alloys. Post-irradiation creep rates and post-irradiation microhardness data confirm that significant radiation hardening occurred in both ferritic alloys due to the 673 K deuteron bombardment of 0.05 dpa. The observed hardening is attributed to growth of interstitial loops and not to growth of copper precipitates. The lack of cascade damage from light-ions may account for the lack of precipitation effects. DOE

N86-20552# Los Alamos National Lab., N. Mex.
COMBINED ELECTROCHEMICAL/SURFACE SCIENCE INVESTIGATIONS OF Pt/Cr ALLOY ELECTRODES
K. A. Daube, M. T. Paffett, S. Gottesfeld, and C. T. Campbell 1985 21 p refs Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-7405-eng-36)
(DE86-000765; LA-UR-85-3253; CONF-851174-10) Avail: NTIS HC A02/MF A01

Chromium addition improves the performance of carbon-supported Pt electrodes for oxygen reduction in phosphoric acid fuel cells. To clarify the role of chromium and its chemical nature at the electrode surface, a combined electrochemical/surface science investigation of a series of bulk Pt(sub x)Cr(sub (1-x)) alloys (0 less than or equal to x less than or equal to 1) was performed. The surface characterization of the starting electrodes by XPS, electrochemical results from cyclic voltammetry in 85% phosphoric acid, and post-electrochemical surface characterization are described. For Cr contents less than 40%, the electrodes were quite stable up to +1.6 V vs DHE. The surface Cr was largely oxidized to Cr(+3) for surfaces at open circuit and those exposed at potentials < +1.4 V. For intermediate Cr levels, Cr was leached from the surface region by +1.5 V, leaving a porous Pt electrode with increased electrochemical hydrogen adsorption capacity. For Pt(sub 0.2)/Cr(sub 0.8), treatments at +1.4 V and above led to the appearance of Pt(4+) and Cr(6+) species, apparently stabilized in a porous phosphate overlayer up to 50 A thick. The Pt electrochemical hydrogen adsorption capacity was simultaneously increased by a factor of 15. DOE

N86-20553# Pacific Northwest Lab., Richland, Wash.
UPS OF SPUTTER-FORMED Re-1%Pd ALLOY
R. L. Gordon Sep. 1985 8 p Presented at the 13th DOE Surface Studies Conference, Dayton, OH., 8 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001672; PNL-SA-13426; CONF-8510181-1) Avail: NTIS HC A02/MF A01

Ultraviolet Photoelectron Spectroscopy (UPS) has been used to obtain electron energy distribution curves (EDC's) from samples of a Re-1%Pd alloy formed by high-rate sputter deposition. The shape of He-I-induced EDC's was found to depend on surface concentration of Pd. For surfaces with Pd/Re < 0.014 the EDC is nearly identical to that of a pure Re reference sample and shows structure attributable to the rhenium density of states. With Pd/Re = 0.33 the EDC shows reduced width and exhibits a peak at 2.4 eV below the Fermi level, in keeping with behavior expected on the basis of the palladium density of states. The increase in occupation of the 2.4 eV level at the expense of higher-lying levels in both pure Re and in the low-Pd-coverage alloy is thought to be responsible for the increase in work function of the alloy which accompanies segregation of Pd to the surface. DOE

N86-20554# Pacific Northwest Lab., Richland, Wash.
LOW TEMPERATURE DEPOSITION OF TRIBOLOGICAL COATINGS
J. R. Prater Sep. 1985 16 p Presented at the ASM Metals Congress International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001767; PNL-SA-12942; CONF-8510160-2) Avail: NTIS

HC A02/MF A01

The results of microstructural and tribological studies performed on sputter-deposited coatings of ZrO2.20Y2O3, TiB2 and B-18 Si (8 at. %) are reported. In each case, deposition parameters were identified that offered good tribological properties while maintaining low deposition temperatures (<400(0)C) to avoid distortion and softening of prior heat-treated substrates. Zirconia deposits were prepared with a pronounced columnar microstructure that provided excellent thermal fatigue and wear resistance making them candidates for heat engine applications. The TiB2 coatings were the hardest coatings prepared. These provided good wear resistance on steel substrates. The B-Si coating displayed excellent wear resistance and good adherence to Cu and Al alloys. DOE

N86-20555# Washington Univ., Seattle. Dept. of Physics.
X-RAY ABSORPTION SPECTRUM OF COMPRESSED COPPER
R. Ingalls, E. D. Crozier, and A. S. Seary 1985 9 p refs Presented at the 10th High Pressure Conference on Research in High Pressure Science and Technology, Amsterdam, Netherlands, 8 Jul. 1985 Prepared in cooperation with Simon Fraser Univ., Burnaby, British Columbia
(Contract DE-FG06-84ER-45163)
(DE86-000545; DOE/ER-45163/2; CONF-850759-15) Avail: NTIS HC A02/MF A01

Recently a theoretical calculation of the X-ray absorption spectrum, XANES and EXAFS, versus pressure, has appeared for metallic copper. The theory agrees well with experiment at atmospheric pressure, and goes on to predict the response of the absorption spectrum to pressures corresponding to compressions as high as ten-fold. The authors also suggest copper to be a suitable pressure calibrant (marker) for high pressure X-ray studies by using the pressure dependence of the EXAFS features, which are calculated to vary roughly as V (sup -2/3), where V is the volume. Coincidentally, we have been using copper as pressure calibrant for X-ray absorption studies. However, we have determined the pressure by extracting the nearest neighbor bond compressibility from an analysis of the EXAFS. It should be recalled that because of the general difficulty with the ruby calibration method we have customarily used EXAFS determined bond lengths for pressure calibration. Other materials used for this purpose have been NaBr and RbCl [4,5]. DOE

N86-20556# Technische Hogeschool, Delft (Netherlands). Lab. voor Metaalkunde.
MATERIALS SCIENCE, NATURE AND POSITION OF THE SUBJECT [MATERIAALKUNDE, AARD EN PLAATS VAN HET VAK]
P. Jongenburger 1984 19 p In DUTCH
Avail: NTIS HC A02/MF A01

Materials science origin, history, future developments, and its present significance in particular with regard to energy and environment are discussed. By means of the examples of cadmium and tungsten, attention is paid to exhaustion and recovery of materials. Author (ESA)

N86-20557# Kema N.V., Arnhem (Netherlands). Dept. of Chemical Research.
DEPOSITION AND EROSION-CORROSION RIPPLING IN BOILER TUBES
W. M. M. Huijbregts and A. J. vanLoon, ed. 1985 14 p refs
(S/T-Rept-Vol-3-No-2; ISBN-90-353-0025-4; ISSN-0167-8590)
Avail: NTIS HC A02/MF A01

Experiments at an experimental installation studied effects of heat load, tube wall thickness, presence of a casing, and chemical composition of the steel on rippling. Experiments were carried out under supercritical conditions and under subcritical two-phase (water-steam) flow conditions. Two types of rippling appear: deposition rippling where ripples are formed since magnetite crystals are arranged in a ripple pattern; and erosion-corrosion rippling where the steel surface itself is erosion-corroded into a ripple pattern. Author (ESA)

N86-20558# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
THE STRENGTH OF OXYGEN-CUT SURFACES IN AE 355 D STEELS [RESISTANCE DES TRANCHES OXYCOUPEES DES ACIERS DE QUALITE AE 355 D]
W. Chapeau (Liege Univ., Belgium), M. Hubert (Administration des Ponts et Chaussees, Belgium), and E. Piraprez Nov. 1985 122 p refs In FRENCH Sponsored by Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture, Brussels, Belgium
(CRIF-MT-162) Avail: NTIS HC A06/MF A01

Metallographic, residual stress, surface aspect, and mechanical test studies were carried out on the surface layer of oxygen cut AE 355 D steel plates in order to verify the requirement to grind-off 1 mm deep after oxygen cutting. The results show that the surface layer keeps approximately the same static strength, but the fatigue resistance is diminished by 20%. It is concluded that except for particular cases, no grind-off operation is necessary. Author (ESA)

N86-20559# Bureau of Mines, Reno, Nev.
SORPTION OF LITHIUM FROM A GEOTHERMAL BRINE BY PELLETIZED MIXED ALUMINUM-LITHIUM HYDROUS OXIDES
L. E. Schultze and D. J. Bauer 1985 20 p
(PB85-245686; BM-OFR-94-85) Avail: NTIS HC A02/MF A01 CSCL 11F

An inorganic ion exchanger was evaluated by the Bureau of Mines for recovering lithium from geothermal brines. The ion exchanger or sorbent was mixed hydrous oxide of aluminum and lithium that was dried at 100 C. The dried precipitate was pelletized with a sodium silicate binder to improve flow rates in sorption tests. The sorbent was loaded to 2 mg Li/g of pellets and sorption from the solution was independent of the concentrations of Ca, Fe, Mn, and Zn. Manganese and zinc were sorbed by the pellets but did not suppress lithium sorption. Lithium was desorbed with water, but none of the washing solutions investigated removed entrained brine without stripping lithium. The complex nature of the sorption mechanisms is discussed. GRA

N86-20418*# Applied Cryogenics and Materials Consultants, New Castle, Del.
MATERIALS AND TECHNIQUES FOR MODEL CONSTRUCTION
D. A. Wigley *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 19 p refs Previously announced in IAA as N85-31066 Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 14B

N86-20419*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND CONSTRUCTION OF MODELS FOR THE NATIONAL TRANSONIC FACILITY, PART 1
Clarence P. Young, Jr. *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 17 p refs Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 11F

N86-20899# Joint Publications Research Service, Arlington, Va.
MECHANISM OF FIXATION OF Mn AND Fe ON SURFACE OF FERROMANGANESE NODULES Abstract Only
A. A. Morozov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 21 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 688-692 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20911# Joint Publications Research Service, Arlington, Va.
GEOCHEMISTRY DISCOVERY OPENS WAY TO NEW MINING OF RARE METALS
Sh. Muladzhanov *In its* USSR Report: Earth Sciences

(JPRS-UES-86-001) 10 Jan. 1986 p 32-33 Transl. into ENGLISH from Moskovskaya (Moscow, USSR), 20 Sep. 1985 p 1 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-20560* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COPOLYMERS OF VINYL STYRYLPYRIDINES OR VINYL STILBAZOLES WITH BISMALEIMIDE Patent
John A. Parker, Alvin H. Heimbuch, Ming-Ta S. Hsu, and Timothy S. Chen, inventors (to NASA) Issued 2 Jul. 1985 11 p Filed 18 Nov. 1983
(NASA-Case-ARC-11429-1-CU; US-Patent-4,526,925; US-Patent-Appl-SN-553339; US-Patent-Class-524-548; US-Patent-Class-525-186; US-Patent-Class-526-262; US-Patent-526-265) Avail: US Patent and Trademark Office CSCL 11B

Vinyl pyridines including vinyl stilbazole materials and vinyl styrylpyridine oligomer materials are disclosed. These vinylpyridines form copolymers with bismaleimides which copolymers have good fire retardancy and decreased brittleness. The cure temperatures of the copolymers are substantially below the cure temperatures of the bismaleimides alone. Reinforced composites made from the cured copolymers are disclosed as well.
Official Gazette of the U.S. Patent and Trademark Office

N86-20561* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HIGH TEMPERATURE POLYIMIDE FILM LAMINATES AND PROCESS FOR PREPARATION THEREOF Patent
Anne K. StClair and Terry L. StClair, inventors (to NASA) Issued 24 Sep. 1985 15 p Filed 24 Oct. 1984 Continuation-in-part of abandoned US-Patent-Appl-SN-189234, filed 22 Sep. 1980
(NASA-Case-LAR-13384-1; US-Patent-4,543,295; US-Patent-Appl-SN-663840; US-Patent-Class-428-458; US-Patent-Class-156-307; US-Patent-Class-256-308.2; US-Patent-Class-156-309.9; US-Patent-Class-156-331.5; US-Patent-Class-427-385.5; US-Patent-Class-427-388.1; US-Patent-Class-428-473.5) Avail: US Patent and Trademark Office CSCL 11D

High temperature polyimide film laminates and a process for fabricating large-area, void-free polyimide laminate structures wherein multiple-ply polyimide film laminates may be constructed without decreasing the individual film strength and wherein layers of metal foil may be laminated between polyimide film layers to yield a flexible high temperature resistant structure having capabilities for use as flexible electric circuits, in aerospace applications, and the like.
Official Gazette of the U.S. Patent and Trademark Office

N86-20562# Massachusetts Inst. of Tech., Cambridge. School of Engineering.
FRACTURE MECHANICS IN PVC AND OTHER THERMOPLASTICS
L. H. Lee, F. J. McGarry, and J. F. Mandell Jun. 1985 155 p refs Sponsored by the Dow Chemical Co.
(PPST-85-8) Avail: NTIS HC A08/MF A01

Multiple crazing was the principle nonelastic deformation mechanism occurring at crack tips of polyvinyl chloride (PVC) pipe materials under plane strain conditions. Direct correlation between multiple crazing and macroscopic fracture toughness value was established based on fracture properties of several thermoplastic polymers. Formation of multiple crazes at the crack tip serves as an energy absorption mechanism which enhances fracture toughness value of a polymer. Failure mechanisms of polymers which form multiple crazes were shown to be broadly similar. Transition from multiple to single crazing occurs prior to catastrophic failure, and the mode of crack propagation changes correspondingly from stable to unstable. Factors governing transition in PVC were investigated by studying craze initiation and growth and velocities of crack propagation before and after instability. Fracture toughness value of PVC can be estimated from the number of crazes formed and from craze properties as determined by use of interference microscopy and electron microscopy. The effect on craze properties of PVC microstructure, specifically crystallinity and molecular entanglement, was investigated. Author

N86-20563# Massachusetts Inst. of Tech., Cambridge. School of Engineering.
ELASTOMER COATED FILLER AS TOUGHNESS MODIFIER IN GLASSY POLYMERS
F. J. McGarry and Kwan Tse Ming (Dow Chemical Co.) Mar. 1985 203 p refs Sponsored by Dow Chemical Co.
(PPST-85-10) Avail: NTIS HC A10/MF A01

An elastomer coated A-glass, microsphere-filler epoxy was investigated. A gamma-mercaptopropyltrimethoxy silane coupling agent was used to treat two micron A-glass microspheres, followed by a coating of carboxyl terminated butadiene acrylonitrile (CTBN) elastomer in methyl ethyl ketone solvent. After the stepwise solution coating, gravimetric analysis, scanning electron microscopy and energy dispersive X-ray analysis were employed to determine the presence, completeness, uniformity, adhesion and thickness of the coating, which were found to be adequate. The coated microsperes were dispersed in Epon 828 epoxy prepolymer which was cured with Curing Agent D. The mechanical properties of the elastomer-filler-epoxy were compared to those of elastomer-epoxy, the filler-epoxy and the unmodified epoxy control. The fracture surface work of the elastomer-filler-epoxy was higher than that of other samples, based on the amount of elastomer used. The toughening action was accompanied by an increase in modulus, with minimal sacrifice of elongation to break and tensile strength. The test results were considered in the context of fractographic studies and existing theoretical models. A basis for a new and cost effective approach to polymer toughening was established.
Author

N86-20564*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THERMOPLASTICS/THERMOSETTING ADHESIVE SPECIMEN BONDING Patent Application
Bland A. Stein, Robert L. Fox, John D. Buckley, Linwood G. Burcher, James R. Tyeryar, S. Elmo Sterling, Jr., inventors (to NASA), Spencer V. Inge, Jr., and Robert E. Wright, Jr. Filed 29 May 1985 37 p
(NASA-Case-LAR-13066-1; NAS 1.71:LAR:13066-1; US-Patent-Appl-SN-738816) Avail: NTIS HC A03/MF A01 CSCL 11A

An induction heating, pressure bonding apparatus for bonding specimens of similar or dissimilar material compositions is disclosed. Specimens are sandwiched about an adhesive impregnated susceptor, and then placed within a specimen fixture. The fixture is inserted into a press, and power is supplied to a toroid induction heater. The induction heater emits electromagnetic energy which passes through a susceptor, thereby heating the susceptor and melting the impregnating adhesive. Pressure is simultaneously applied via a hydraulic jack, and the melted adhesive thoroughly wets the inner bonding surfaces of the specimens. Either thermosetting or thermoplastic adhesives may be used, and short bonding times are obtained due to the utilization of induction heater. NASA

N86-20565*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYIMIDES CONTAINING ATBN ELASTOMETERS AND THE PROCESS FOR PREPARING SAME Patent Application
Anne K. St.Clair, Stephen A. Ezzell, Terry L. StClair, and Jeffrey A. Hinkley, inventors (to NASA) Filed 23 Aug. 1985 22 p
(NASA-Case-LAR-13178-1; NAS 1.71:13178-1; US-Patent-Appl-SN-768771) Avail: NTIS HC A02/MF A01

CSCL 11B

High temperature linear aromatic polyimides and the process for preparing same through a solvent solution or by molten reaction are disclosed. By incorporation of relatively small amounts (1 to 25% by weight) of amine terminated butadiene/acrylonitrite (ATBN) elastomer into the linear polyimide backbone, an otherwise hard to process polymer is rendered readily processable. Cast films of the polyamic acid solution exhibit improved tear resistance with 1 to 15% by weight of the ATBN elastomer. NASA

N86-20566*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COPOLYIMIDES WITH A COMBINATION OF FLEXIBILIZING GROUPS Patent Application
Terry L. St.Clair, Harold D. Burks, and Donald J. Progar, inventors (to NASA) Filed 20 Jun. 1985 23 p
(NASA-Case-LAR-13354-1; NAS 1.71:LAR-13354-1; US-Patent-Appl-SN-746901) Avail: NTIS HC A02/MF A01 CSCL 11B

Novel copolyimides are prepared by reacting one or more aromatic dianhydrides with a metasubstiuted phenylene diamine and an aromatic bridged diamine. The incorporation of metasubstituted phenylene diamine derived units and bridged aromatic diamine derived units into the linear aromatic polymer backbone results in a copolyimide of improved flexibility, processability, and melt-flow characteristics. The novel copolyimides are especially useful as thermoplastic hot-melt adhesives. NASA

N86-20567*# Boeing Aerospace Co., Seattle, Wash.
EVALUATION OF HIGH TEMPERATURE STRUCTURAL ADHESIVES FOR EXTENDED SERVICE, PHASE 4 Final Report, 15 Oct. 1983 - 15 Oct. 1985
C. L. Hendricks, S. G. Hill, and J. N. Hale Oct. 1985 56 p refs (Contract NAS1-15605)
(NASA-CR-177936; NAS 1.26:177936) Avail: NTIS HC A04/MF A01 CSCL 11A

The evaluation of three phenylquinoxaline polymers as high temperature structural adhesives is presented. These included an experimental crisskubjabke oiktner (X-PQ) and two experimental materials (PPQ-2501) and (PPQ-HC). Lap shear, crack extension, and climing drum peel specimens were fabricated from all three polymers, and tested after thermal, combined thermal/humidity, and stressed Skydrol exposure. All three polymers generally performed well as adhesives at initial test temperatures from 219K (-67 F) to 505K (450 F) and after humidity exposure. The 644K (700 F) cured test specimens exhibited superior Skydrol resistance and thermal stability at 505K (450 F) when compared to the 602K (625 F) cured test specimens. Author

N86-20568*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPOSITION OPTIMIZATION OF SELF-LUBRICATING CHROMIUM CARBIDE-BASED COMPOSITE COATINGS FOR USE TO 760 DEG C Final Report
Chris DellaCorte and Harold E. Sliney 1986 27 p refs Proposed for presentation at the American Society of Lubrication Engineers Annual Meeting, Toronto, Ontario, 12-15 May 1986
(Contract DE-AI01-85CE-50112)
(NASA-TM-87261; E-2953; DOE/NASA/50112-64; NAS 1.15:87261) Avail: NTIS HC A03/MF A01 CSCL 11H

This paper describes new compositions of self-lubricating coatings that contain chromium carbide. A bonded chromium carbide was used as the base stock because of the known excellent wear resistance and the chemical stability of chromium carbide. Additives were silver and barium fluoride/calcium fluoride eutectic. The coating constituents were treated as a ternary system consisting of: (1) the bonded carbide base material, (2) silver, and (3) the eutectic. A study to determine the optimum amounts of each constituent was performed. The various compositions were prepared by powder blending. The blended powders were then plasma sprayed onto superalloy substrates and diamond ground to the desired coating thickness. Friction and wear studies were performed at temperatures from 25 to 760 C in helium and hydrogen. A variety of counterface materials were evaluated with the objective of discovering a satisfactory metal/coating sliding combination for potential applications such as piston ring/cylinder liner couples for Stirling engines. Author

N86-20569# Department of the Navy, Washington, D. C.
CONDUCTIVE HETEROCYCLIC LADDER POLYMERS Patent Application
Oh-Kil Kim, inventor (to Navy) Filed 30 May 1985 10 p
(AD-D011915; US-Patent-Appl-SN-739354) Avail: NTIS HC A02/MF A01 CSCL 07/3

The present invention pertains generally to electroactive materials and in particular to electroactive organic ladder polymers. The electrical properties of organic polymers have attracted a great deal of attention from the scientific and industrial communities. Conductive polymers would be useful for the production of light weight batteries for electric vehicles and for use in place of metallic conductors aboard aircraft, where weight is and important consideration. They may also prove useful where corrossion resistance is required. It is one object of this invention to obtain and organic ladder polymer with high electrical conductivity. It is a further object of this invention to obtain a conductive ladder polymer that is stable against both thermal and chemical degradation. Phenothiazine Ladder Polymer, PTL (or di-chloro-PTL) was prepared by polycondensation of 2,5-diamino-1, 4-benzenedithiol with 2,5 dichloro (or 2,3,5,5-tetrachloro)-p-benzoquinone in polyphosphoric acid at 250 C. Phenoxazine Ladder Polymer, POL, was prepared from 2,5-dichloro-p-phylendiamine and 2,5-dihydroxy-p-benezoquinone under the same conditions as used for PTL synthesis. Di-chloro-POL and other derivatives can be made under a similar condition. These polymers conduct electricity. GRA

N86-20570*# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
DEVELOPMENT OF TWO CANDIDATE CONCRETE MIXTURES (SALT, NONSALT) FOR REPOSITORY SEALING APPLICATIONS Final Report
A. D. Buck Aug. 1985 59 p
(Contract DE-AI97-81ET-46633)
(AD-A160692; WES/MP/SL-85-8) Avail: NTIS HC A04/MF A01 CSCL 11/2

Two concrete mixtures were developed in 1983 for possible use in nuclear waste repository sealing application. The salt concrete was basically an adaptation of BCT 1-F salt grout made by adding aggregate. The nonsalt mixture was a similar adaptation of nonsalt BCT 1-FF grout. The basic requirement was continued workability after 2 hr of intermittent mixing. Tests of hardened specimens included strength, modulus of elasticity (E), permeability, coefficient of linear thermal expansion, thermal conductivity, expansion, creep, and examinations by X-ray diffraction for phase composition and by scanning electron microscopy for microstructure. Some of the physical tests were done on specimens that had been kept at 23 + or - 1.7 deg C and on other specimens kept at 61 + or - 2 deg C. Tests for expansion and examinations for phase composition and microstructure are being continued at 6-month or yearly intervals. It was concluded that each concrete mixture was a viable candidate for use in repository sealing applications. Author (GRA)

N86-20571# Pennsylvania State Univ., University Park.
RESIDUAL STRESSES AND ELASTIC PROPERTIES IN POLYCRYSTALLINE MATERIALS Final Report, 10 Aug. 1981 - 9 Aug. 1984
E. K. Graham and R. C. Bradt 16 Aug. 1985 21 p
(Contract DAAG29-81-K-0159)
(AD-A161446; ARO-17708.1-MS) Avail: NTIS HC A02/MF A01 CSCL 20/11

The primary objective of this research program was to assess and develop the use of high-precision ultrasonic interferometery as a means of evaluating the internal residual stresses in polycrystalline materials. The method which was pursued involved the comparison of the elastic properties of the polycrystalline solid with those inferred for the stress-free aggregate from single-crystal

data used in conjunction with and appropriate theoretical averaging scheme. Another approach, based on residual stress-induced transverse isotropy, also was evaluated. A primary problem with all acoustic approaches is associated with effects arising from microstructural characteristics. In the present study, accurate microstructure characterization and theoretical models were utilized to account for these effects. Residual stress evaluation by the photoelastic method was employed also as an independent means of comparison. Work in this study was limited to MgAl2O4 spinel, which was available in high-quality single-crystal specimens and polycrystalline blanks. Extensive sets of elastic property data were obtained as functions of both temperature and pressure for numerous specimens of single-crystal and polycrystalline spinel. Ourt single-crystal second-order elastic constant results for stoichiometric spinel compared favorably with those from previous studies. The higher-order property results, particularly with respect to temperature, are new and provide useful insight relevant to the high P,T equation of state. GRA

N86-20572# La Jolla Inst., Calif. Center for the Study of Nonlinear Dynamics.
STRETCHING OF MACROMOLECULES IN TURBULENT FLOWS
Yitzhak Rabin and Frank S. Henyey 15 Nov. 1985 17 p
(Contract MDA903-84-C-0373)
(AD-A161800; LJI-R-85-358) Avail: NTIS HC A02/MF A01 CSCL 20/4

We have investigated the behavior of dilute polymer solutions in flows which are strong in sense that they can induce a significant deformation of the macromolecules. The rationale for this approach is that since turbulent flows are laminar on sufficiently small scales (such as the size of a polymer). The stretching of polymers by elongational flow bursts within the turbulent fluid can be studied by examining the behavior of polymers in simple (laminar) elongational flows. The stretching, in turn, is a necessary condition for the flow to be significantly affected by the addition of minute quantities of polymer; this is true regardless of the details of the mechanism leading to drag reduction (DR) and is a consequence of the observation that flow modification appears when the volume fraction of the polymers exceeds unity, i.e., when the polymers are strongly overlapping (in a dilute solution this condition is satisfied only for stretched polymers). We investigated the stretching of polymers (the so-called coil stretching transition) in elongational flows using a combination of physical (scaling type) and chemical (molecular level description in terms of local conformational states) techniques. This report summarizes the ones that are the most important in the context of DR, and flow modification in general. GRA

N86-20573# Department of the Army, Washington, D. C.
OXYNITRIDE GLASS FIBERS Patent Application
Donald R. Messier and Eileen J. Deguire, inventors (to Army) Filed 12 Sep. 1985 17 p
(AD-D011956; US-Patent-Appl-SN-775076) Avail: NTIS HC A02/MF A01 CSCL 11/2

This invention relates to the production of high elastic modulus, high strength, corrosion-resistant oxynitride glass fibers for improved fiber-reinforced composites. The incorporation of nitrogen into silicon-yttrium-aluminum oxide glasses enhances the properties of bulk glass. This invention is the first demonstration that such glasses can be made into fibers. The addition of nitrogen to practically any oxide glass fiber composition will produce improvements in properties similar to those shown for the silicon-yttrium-aluminum system. GRA

N86-20574# Princeton Univ., N. J. Dept. of Chemical Engineering.
TIME-TEMPERATURE-TRANSFORMATION (TTT) CURE DIAGRAMS: RELATIONSHIP BETWEEN T SUB g AND THE TEMPERATURE AND TIME OF CURE FOR EPOXY SYSTEMS Technical Report, Nov. 1984 - Dec. 1985
Xinsheng Peng and J. K. Gillham Dec. 1985 28 p
(Contract N00014-84-K-0021)
(AD-A162428; TR-5) Avail: NTIS HC A03/MF A01 CSCL 11/9

A procedure is provided for estimating the time to full cure versus isothermal cure temperature for vitrified epoxy systems. An equation relating the glass transition temperature of vitrified epoxy systems to the time and temperature of cure is developed. Author (GRA)

N86-20575# Sandia National Labs., Albuquerque, N. Mex.
THE EFFECT OF ALTERNATIVE AGING AND ACCIDENT SIMULATIONS ON POLYMER PROPERTIES
L. D. Bustard, J. Chenion (CEA-ORIS-LABRA at Saclay, Gif-sur-Yvette, France), F. Carlin (CEA-ORIS-LABRA at Saclay, Gif-sur-Yvette, France), C. Alba (CEA-ORIS-LABRA at Saclay, Gif-sur-Yvette, France), G. Gaussens (CEA-ORIS-LABRA at Saclay, Gif-sur-Yvette, France), and M. LeMeur (CEA-DAS-SAF, Fontenay-aux-Roses, France) May 1985 174 p refs
(Contract WRC-FIN-A-1051)
(TI85-014726; NUREG/CR-4091; SAND-84-2291) Avail: NTIS HC A08/MF A01

The influence of accident irradiation, steam, and chemical spray exposures on the behavior of twenty-three age-preconditioned polymer sample sets (twenty-one different materials) has been investigated. The test program varied the following conditions: (1) accident simulations of irradiation and thermodynamic (steam and chemical spray) conditions were performed both frequentially and simultaneously; (2) accident thermodynamic (steam and chemical spray) exposures were performed both with and without air present during the exposures; (3) sequential accident irradiations were performed both at 28 C and 70 C; (4) age preconditioning was performed both sequentially and simultaneously; (5) sequential aging irradiations were performed both at 27 C and 70 C; and (6) sequential aging exposires were performed using two sequences: (1) thermal followed by irradiation and (2) irradiation followed by thermal. Both general trends applicable to a majority of the tested materials as well as specific results for each polymer are reported. Author

N86-20576# Sandia National Labs., Albuquerque, N. Mex.
QUANTITATIVE ANALYSIS OF HYDROXYL AND BORON IN S GLASS-CERAMIC BY FOURIER TRANSFORM INFRARED SPECTROSCOPY
M. C. Oborny Jul. 1985 27 p refs
(Contract DE-AC04-76DP-00789)
(DE86-001148; SAND-85-0738) Avail: NTIS HC A03/MF A01

Fourier transform infrared (FT-ir) spectroscopy has been used to analyze hydroxyl and boron content in samples of S glass-ceramic, which is used in making glass-to-metal seals in the MC3753 actuator. Hydroxyl and boron concentrations in S glass-ceramic have a large effect on the final properties of the glass-ceramic. Therefore, a rapid and accurate method of analysis for these components is desirable for process monitoring. Our studies have found a direct correlation between OH content and bubble formation in S glass-ceramic which has been used to identify critical manufacturing parameters necessary for eliminating bubble formation in the S glass-ceramic during formation of glass-to-metal seals. A lower energy absorption band in S glass-ceramic near 2685 cm(-1) due to the first overtone of the B-O stretching vibration was used to determine boron concentration. Although the accuracy is slightly lower using FT-ir, it is a much more rapid technique than ion chromatography exclusion for the analysis of boron in S glass-ceramic and thus is more appropriate for measurements on large numbers of samples. DOE

N86-20577# Technische Hogeschool Twente, Enschede (Netherlands). Tribology Lab.
TRACTION IN ELASTOHYDRODYNAMIC LUBRICATION. HIGH CONTACT PRESSURE EXPERIMENTS AND A THERMAL ROE-LANDS-EYRING-MAXWELL MODEL
P. Klein Meuleman, A. A. Lubrecht, and W. E. tenNapel Mar. 1985 33 p refs Sponsored by SKF-ERC, Nieuwegein, The Netherlands
(RR-WB-85-15) Avail: NTIS HC A03/MF A01

Traction experiments for an intermediate and a low viscosity lubricant were carried out on a disk-machine. It is shown that the

results can be explained by a thermal Roelands-Eyring-Maxwell model for the lubricant. The order of magnitude of the Eyring shear stress is 1 MPa, and the elastic shear modulus is 10 MPa. The elastic shear modulus of the lubricants increases with pressure and decreases with temperature. The Eyring shear stress increases with temperature and exhibits a small tendency to decrease with increasing pressure. The very thin lubricant shows a much stronger decreasing tendency, but more results are needed. Author (ESA)

N86-20578# National Bureau of Standards, Gaithersburg, Md. Office of Standard Reference Materials.
GLASS FIBERBOARD SRM (STANDARD REFERENCE MATERIALS) FOR THERMAL RESISTANCE Final Report
J. G. Hust Aug. 1985 35 p refs
(PB86-107430; NBS/SP-260-98; LC-85-600566) Avail: NTIS HC A03/MF A01; also Avail: SOD HC as 003-003-02674-3 CSCL 11B

The apparent thermal conductivity data that provided the basis for the certification of glass fiberboard as an SRM of thermal resistance are reported and analyzed. New data for the extension of the temperature range of this SRM to 100 K are included. Detailed analysis and intercomparisons of previously described NBS and other published data are given. These data are represented by an equation describing the dependencies of the data on temperature and density. Certified values of thermal resistance are given for temperature from 100 to 300 K and densities from 113 to 145 kg/cu m. Author (GRA)

N86-20948# Joint Publications Research Service, Arlington, Va.
RESEARCH ON FIRE RESISTANT PLASTIC MOLDING COMPOUNDS
Wieslaw Nowaczek and Waclaw Krolikowski *In its* East Europe Report (JPRS-EER-86-007) 17 Jan. 1986 p 155-156 Transl. into ENGLISH from Chemik (Gliwice, Poland), no. 8, Aug. 1985 p 199-203 (For primary document see N86-20946 11-43)
Avail: NTIS HC A09/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-20579# Mueller Associates, Inc., Baltimore, Md.
GASOLINE OCTANE ENHANCEMENT: TECHNOLOGY, ECONOMICS, AND ENVIRONMENTAL, HEALTH AND SAFETY CONSIDERATIONS
Peter McCallum, Joseph A. Mulloney, Jr., Daniel L. Raley, and Linda L. Green Jul. 1985 106 p refs
(Contract DE-AC01-84PE-72013)
(DOE/PE-72013/1) Avail: NTIS HC A06/MF A01

Basic data on gasoline octane enhancement technology and other information on the environmental, health, and safety considerations in the use of octane-improving components are provided. Recent events, including some regulatory actions by the U.S. Environmental Protection Agency (EPA) in accelerating the phasedown of organic lead compounds as octane boosters and the avilability of new compounds and classes of compounds suitable for use as octane boosters, have incided renewed interest in this whole area. Furthermore, on the commercial side, considerable financial gains and losses are at stake for companies manufacturing or purchasing properietary octane boosters. Thus, the economics of octane components is integrally tied to their use and must be taken into consideration in any review of these compounds. In addition to the technical and economic considerations that have relevance to decisions about how to supply the octane needed to achieve gasoline grade standards, there a number of regulatory and competitive forces that must be taken into account. Author

N86-20580# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)
PRODUCIBILITY AND COST STUDIES OF AVIATION KEROSENE
Cecil C. Rosen, III, ed. Jul. 1985 51 p refs
(AGARD-AR-227; ISBN-92-835-1504-8) Avail: NTIS HC A04/MF A01

A computer analysis conducted by Exxon Research and Engineering Company and NASA used standard refinery planning methods to determine the optimum processing path within model refineries to achieve minimum cost for various product outputs. Crude feedstock types were combined and refinery configurations selected to create regional calculation models. Principal objectives were: to determine the effect of jet fuel quality variations on the maximum yield of jet fuel; to determine the effect of jet fuel quality variations on refining costs for regional models based on future supply and demand; and to determine, for the United States Air Force, the effect of changing from wide cut (naptha) to kerosene jet fuels on refining cost and production yield in the United States and Europe. B.G.

N86-20581# Southwest Research Inst., San Antonio, Tex.
REAL-TIME QUALITY CONTROL OF ANTIMISTING KEROSENE (AMK) Final Report, Feb. 1983 - Jan. 1985
R. J. Mannheimer Dec. 1985 58 p refs
(DOT/FAA/CT-85/5) Avail: NTIS HC A04/MF A01

This report discusses the results of a program to develop real-time quality-control tests for antimisting fuels. Die-swell and torsional balance experiments were performed to compare the shear and normal stress developed by antimisting kerosene (0.3 percent FM-9 + glycol/amine in Jet A) and 0.1 percent ARCO in Jet A. Capillary tube experiments show that AMK shear thickness at a critical shear rate, reaches a maximum viscosity, and then shear thins at higher shear rates. Furthermore, it is established that AMK made with an improved FM-9 polymer has a lower critical shear rate, a higher maximum viscosity, a larger viscoelastic end corrections than AMK made with the original FM-9 polymer. Based on die-swell experiments, the outstanding rheological property of both antimisting fuels at high shear rates is the development of normal stresses that are 20 to 40 times larger than shear stresses. Experiments were conducted to determine the effect of polymer concentration and methods of blending on the rheological properties of AMK. This approach has shown that the critical velocity for in-line blended AMK (age- 30 minutes) is only slightly lower than for batch-blended AMK at the same specific degrader power. Author

N86-20582# National Aerospace Lab., Tokyo (Japan). HMX Propellant Research Group.
THE FUNDAMENTAL STUDY OF HMX COMPOSITE PROPELLANT AND ITS PRACTICAL APPLICATION
1985 58 p refs In JAPANESE; ENGLISH summary
(NAL-TR-875; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Synthetic research on HMX composite propellants is described, from the fundamental investigation of propellent burning mechanisms to the demonstration firing test of a full-scale apogee motor. First, the safety and physical properties were examined. By using a new bonding-agent between HMX and HTPB binder for HMX composite propellants, detonability was held in the same manner s the standard propellant without HMX, and some mechanical properties were improved. Second, burning experiments of various HMX/binder strands were made and from these results the mechanisms of lowering the burning rate of HMX composite propellants was discussed. Third, firing tests of small-scale rocket motors were conducted under the atmospheric condition for obtaining fundamental combustion characteristics. An example of these characteristics is the absence of combustion instability. Finally, a full-scale (760 mm dia.) spherical motor was tested by means of the high altitude test facility. The specific impulse under the vacuum condition was 2.90 KN.s/kg(296kgf.s/kg) at a nozzle expansion ratio of 70. Author

N86-20583# Monsanto Research Corp., Miamisburg, Ohio. Mound.
THERMOGRAPHIC OBSERVATION OF HYDROCARBON OXYGEN EXPLOSIONS
L. D. Abney, M. D. Kelly, and J. H. Mohler 1985 4 p Presented at the 8th Thermosense Conference, Cambridge, Mass., 16 Sep. 1985
(Contract DE-AC04-76DP-00053)
(DE86-001757; MLM-3296(OP); CONF-8509181-1) Avail: NTIS HC A02/MF A01

Balloons containing methane-oxygen mixtures were detonated to simulate ordinance firebalis. To establish fireball characteristics, analyses were required of reacting temperatures, thermal profiles, and mixing patterns of the methane-oxygen products with the atmosphere. Infrared videothermography measured and recorded the detonation and gas cloud mixing. Image digitization and in-band energy calculations were done to compare reaction parameters for different balloon tests. DOE

N86-20584# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Lab. de Propulsantes y Explosivos.
SINGLE AXIS MECHANICAL CHARACTERIZATION OF A NEW FORMULATION OF PLASTIC PROPELLANTS [CARACTERIZACION MECANICA UNIAXIAL DE UNA NUEVA FORMULACION DE PROPULSANTE PLASTICO]
Carlos Schuller Gil and Eugenia Martin-SanzMartinez 1985 14 p refs In SPANISH
Avail: NTIS HC A02/MF A01

The extension of the lower temperature limit was subjected to experimentation formulating a double base solid propellant based on CIS 1,4 polyisoprene. The mechanical test temperature range was -70 C to 70 C and the test deformation velocities were from 0.1 to 10 mm/sec. The results show a performance superior to that of polyisobutylene. Low temperature extensibility and high temperature tensile strength are acceptable over a much wider temperature range. Author (ESA)

N86-20596# Messerschmitt-Boelkow G.m.b.H., Munich (West Germany).
SENSITIVITY OF HIGH EXPLOSIVES AGAINST HOT FRAGMENTS
M. Held and T. K. Rosendorfer *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 225-248 (For primary document see N86-20589 11-31)
(AD-P004827) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20597# Aerojet Tactical Systems, Sacramento, Calif.
ATEX: A CASTABLE INSENSITIVE HIGH EXPLOSIVE
J. W. Barry and G. A. Zimmerman *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 249-258 (For primary document see N86-20589 11-31)
(AD-P004828) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20598# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France).
METHOD OF PREDICTION OF THE EXPLOSIVE BEHAVIOR OF HIGHLY CONFINED PBXS SUBMITTED TO BULLET IMPACT
P. Monteagudo *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 259-283 (For primary document see N86-20589 11-31)
(AD-P004829) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20599# Health and Safety Executive, London (England).
THE UNITED NATIONS MANUAL OF TESTS FOR CLASSIFICATION OF EXPLOSIVES
R. R. Watson *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 285-291 (For primary document see N86-20589 11-31)
(AD-P004830) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20600# Health and Safety Executive, London (England).
CLASSIFICATION REQUIREMENTS FOR THE IMPORTATION OF EXPLOSIVES INTO THE UNITED KINGDOM
A. R. Duckworth *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 293-302 (For primary document see N86-20589 11-31)
(AD-P004831) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20602# Ministry of Defence, London (England).
CLASSIFICATION OF EXPLOSIVES IN ACCORDANCE WITH INTERNATIONAL SYSTEM
W. S. N. Tinkler *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 313-323 (For primary document see N86-20589 11-31)
(AD-P004833) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20609# Lawrence Livermore National Lab., Calif.
DOE HAZARD CLASSIFICATION FOR INSENSITIVE HIGH EXPLOSIVES (IHE)
R. R. McGuire and R. P. Guarienti *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 501-507 (For primary document see N86-20589 11-31)
(Contract W-7405-eng-48)
(AD-P004841) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20611# Department of Defence, Canberra (Australia).
PROPELLANT CATEGORIZATION TRIALS
N. H. Tozer *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 523-538 (For primary document see N86-20589 11-31)
(AD-P004843) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20624# Tooele Army Depot, Utah.
DENSITIZATION AND CONVERSION OF AMMONIUM PICRATE (EXPLOSIVE d) TO FUEL
S. S. W. Kwak *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 873-999 (For primary document see N86-20623 11-31)
(AD-P004683) Avail: NTIS HC A99/MF E03 CSCL 13/12

N86-20630# Naval Surface Weapons Center, Silver Spring, Md.
MAXIMUM TNT EQUIVALENCE OF NAVAL PROPELLANTS
M. M. Swisdak, Jr. *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1383-1393 (For primary document see N86-20623 11-31)
(AD-P004886) Avail: NTIS HC A99/MF E03 CSCL 13/12

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-20585# National Bureau of Standards, Washington, D.C.
FIRE BEHAVIOR OF UPHOLSTERED FURNITURE Final Report
Vytenis Babrauskas and John F. Krasny Nov. 1985 104 p refs (NBS/MONO-173; LC-85-600620) Avail: SOD HC as 003-003-02710-3

A systematic review is made of engineering data on the major aspects of upholstered furniture flammability: cigarette ignition, small open flame ignition, radiant ignition, transition from smoldering to flaming, flame spread rates, and heat release and mass loss rates during fully involved burning. Other areas discussed, but for which less data are available, include smoke production and radiant heat fluxes. Mattresses and transportation vehicle seating are included, along with upholstered chairs, loveseats, and sofas. Appropriate test methods most suitable for measuring each of these properties are discussed. Where available, relationships are presented which permit the quantitative prediction of full scale furniture behavior from bench scale tests. Where such relationships

are not available, generalizations of qualitative results of empirical tests are given. Areas where substantive work is not available are outlined.
Author

N86-20586*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROWTH OF HIGH-QUALITY THIN-FILM Ge SINGLE CRYSTALS BY PLASMA-ENHANCED CHEMICAL VAPOR DEPOSITION
R. A. Outlaw and P. Hopson, Jr. Feb. 1986 15 p refs
(NASA-TP-2532; L-16011; NAS 1.60:2532) Avail: NTIS HC A02/MF A01 CSCL 20B

Thin-film Ge single crystals (approx. 10 microns) have been epitaxially grown on polished NaCl(100) substrates at 450C by using plasma-enhanced chemical vapor deposition. Films on approximately 1 sq cm and larger were separated from the NaCl by either melting the salt or by differential shear stress upon cooling to room temperature. The ordered growth of the Ge was found to be most sensitive to the initial plasma power and to the continuum flow dynamics within the carbon susceptor. The films were visually specular and exhibited a high degree of crysalline order when examined by X-ray diffraction. The films were found to be p-type with a carrier concentration of approximately 3 x 10 to the 16th power/cu cm, a resistivity of 0.11 ohm-cm, and a Hall hole mobility of 1820 sq cm/v/s at room temperature. Vacuum firing minimized the primary contaminant, Na, and corresponding lowered the carrier concentration to 4 x 10 to the 14th power/cu cm.
Author

N86-20587*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION BEAM SPUTTER ETCHING Patent Application
Bruce A. Banks and Sharon K. Rutledge, inventors (to NASA) Filed 13 Sep. 1985 12 p
(NASA-Case-LEW-13899-1; NAS 1.71:LEW-13899-1; US-Patent-Appl-SN-775968) Avail: NTIS HC A02/MF A01 CSCL 13H

An ion beam etching process which forms extremely high aspect ratio surfce microstructures using thin sputter masks is utilized in the fabrication of integrated circuits. A carbon rich sputter mask together with unmasked portions of a substrate is bombarded with inert gas ions while simultaneous carbon deposition occurs. The arrival of the carbon deposit is adjusted to enable the sputter mask to have a near zero or even slightly positive increase in thickness with time while the unmasked portions have a high net sputter etch rate.
NASA

N86-20588*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE SAFETY ADVISORY PANEL, COVERING CALENDAR YEAR 1985 Annual Report
Jan. 1986 99 p
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The level of activity of the Aerospace Safety Advisory Panel was increased somewhat during 1985 in concert with the increased mission rate of the National Space Transportation System, the evolutionary changes in management and operation of that program, and the preparation of the Vandenberg Launch Site; the implementation of the Program Definition Phase of the Space Station Program; and actual flight testing of the X-29 research aircraft. Payload STS missions and NASA's overall aircraft operations were reviewed. The safety aspects of the Leasat salvage mission were assessed. The panel's 1985 work is summarized and its findings enumerated and recommendations for the attention of NASA management presented. NASA's response to the Panel's 1984 report findings and recommendations is appended.
Author

N86-20589# Department of Defense Explosives Safety Board, Alexandria, Va.
MINUTES OF THE 21ST EXPLOSIVES SAFETY SEMINAR, VOLUME 1
Aug. 1984 843 p refs Seminar held in Houston, Tex., 28-30 Aug. 1984 2 Vol.
(AD-A152062) Avail: NTIS HC A99/MF E03 CSCL 19/4

Numerous topics related to explosives safety are discussed. Fire fighting and prevention, propellants, shielding, safety systems, transportation electric circuits, and concrete structures are among the subjects discussed. For individual titles, see N86-20590 through N86-20622.

N86-20590# Corps of Engineers, Huntsville, Ala.
DEPARTMENT OF THE ARMY FACILITY SYSTEM SAFETY (FASS) PROGRAM
R. D. Dempsey *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosive Safety Seminar, Volume 1 Aug. 1985 p 33-68 (For primary document see N86-20589 11-31)
(AD-P004821) Avail: NTIS HC A99/MF E03 CSCL 19/4

The Facility System (FASS) program, is designed to apply system safety engineering and management principles to identify hazards and reduce risks associated with new facilities to a level consistent with mission requirements.
GRA

N86-20591# Chemical Research and Development Center, Aberdeen Proving Ground, Md.
THE DEVELOPMENT AND IMPLEMENTATION OF FACILITY SYSTEM PROGRAM AT THE CHEMICAL RESEARCH AND DEVELOPMENT CENTER
T. E. Bower, G. E. Collins, and T. S. Kartachak *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 69-84 (For primary document see N86-20589 11-31)
(AD-P004822) Avail: NTIS HC A99/MF E03 CSCL 19/4

A systems approach to hazard identification, elimination and control has historically been applied primarily to the development of equipment. The Safety Office of the Chemical Research and Development Center (CRDC) has reviewed and evaluated the current facility safety posture to determine regulatory complicance and good engineering practices. To augment the effectiveness of facility design construction review, a new systematic approach for early hazard identification, assessment, elimination and control for facilities was developed and implemented to alleviate these shortcomings in the future.
GRA

N86-20592# Chemical Research and Development Center, Aberdeen Proving Ground, Md.
SAFETY AND HEALTH CRITERIA FOR THE DESIGN OF A RESEARCH AND DEVELOPMENT FACILITY
G. E. Collins and T. S. Kartachak *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 85-134 (For primary document see N86-20589 11-31)
(AD-P004823) Avail: NTIS HC A99/MF E03 CSCL 19/4

Safety engineering support is provided to a chemical research and development center research and development facility. The criteria was developed during the early stages of the project and represents the minimum requirements tailored specifically for this facility.
GRA

N86-20593# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
WINDOW PANES LOADED BY EXPLOSIONS
A. Harmanny, W. Karthaus, and G. Opschoor *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 135-149 (For primary document see N86-20589 11-31)
(AD-P004824) Avail: NTIS HC A99/MF E03 CSCL 19/4

It is possible to calculate the maximum stresses in blast-loaded, rectangular window-panes, with the help of the stresses in the corner of a simply supported plate under pure bending. A value for the strength of glass has been established that may be adjusted for changes in pane area and thickness.
GRA

N86-20594# Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN CRITERIA AND PRELIMINARY ACCEPTANCE TEST SPECIFICATIONS FOR BLAST RESISTANT WINDOWS c39

G. E. Meyers *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 153-214 (For primary document see N86-20589 11-31)
(AD-P004825) Avail: NTIS HC A99/MF E03 CSCL 19/4

Preliminary design criteria for blast resistant windows exposed to blast overpressures up to 25 psi are recommended. Design procedures and design curves for fully tempered glass are presented and parametized according to glass thickness, glass dimensions, glass aspect ratio, peak blast overpressures, and effective blast duration. Curves for annealed glass are also presented for the purpose of analyzing the safety of existing structures. Design criteria for frames and a test certification procedure are also discussed. Additionally, design examples are presented. GRA

N86-20595# IIT Research Inst., Annapolis, Md.
VEHICLE OVERTURNING VULNERABILITY FROM AIR BLAST LOADS
R. R. Robinson, H. Napadensky, and A. Longinow *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 215-224 (For primary document see N86-20589 11-31)
(AD-P004826) Avail: NTIS HC A99/MF E03 CSCL 19/4

The overturning response of an armored personnel carrier to air blast loads derived from a nuclear blast environment is presented. The orientation of the vehicle is side-on to the air blast shock front. It is assumed there is no translation at the downwind wheels, i.e., the roll over point. In addition, the vehicle is assumed to behave as a rigid body. That is, the suspension system are taken as rigid, so that the wheels and axles rotate in unison with the body. It can be shown that this assumption slightly overestimates the overturning resistance of vehicles with suspension systems. For a stiff suspension system, such as that of the APC, the rigid body behavior assumption is justified. The only motion possible for this analysis is rotation about the rollover point. The effect of overturning restraint systems has been included in the analysis by incorporating a perfectly plastic vehicle to ground connection on the upwind side of the vehicle. The results give the threshold nuclear environment that just causes overturning. The threshold environment is given in terms of a peak overpressure corresponding to a weapon yield. Results are presented for a range of weapon yields from 1KT to 1MT. GRA

N86-20596# Messerschmitt-Boelkow G.m.b.H., Munich (West Germany).
SENSITIVITY OF HIGH EXPLOSIVES AGAINST HOT FRAGMENTS **c28**
M. Held and T. K. Rosendorfer *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 225-248 (For primary document see N86-20589 11-31)
(AD-P004827) Avail: NTIS HC A99/MF E03 CSCL 19/4

A procedure has been developed for testing the reaction of high explosive to the heat of hot fragments. Fragments are heated up to 1000 C and injected into HE and the reaction noted. The most surprising result was that, at all tests performed on this device with steel spheres of 10 and 20 mm diameter even up to temperatures of 1000 C, neither a fast reaction nor deflagration, nor even a detonation occurred. GRA

N86-20597# Aerojet Tactical Systems, Sacramento, Calif.
ATEX: A CASTABLE INSENSITIVE HIGH EXPLOSIVE **c28**
J. W. Barry and G. A. Zimmerman *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 249-258 (For primary document see N86-20589 11-31)
(AD-P004828) Avail: NTIS HC A99/MF E03 CSCL 19/4

A new castable IHE explosive, ATEX, developed by the Aeroject Tactical Systems Co. is described. The interim qualification testing conducted successfully according to NAVord OD44811 is reviewed and the processing characteristics and physical properties of the explosives are discussed. ATEX was the first composition to be tested to the new IHE standards established by the DOD Ammunition and Explosives Safety Standards, DOD 5154.45, Interim Change 4. GRA

N86-20598# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France).
METHOD OF PREDICTION OF THE EXPLOSIVE BEHAVIOR OF HIGHLY CONFINED PBXS SUBMITTED TO BULLET IMPACT **c28**
P. Monteagudo *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 259-283 (For primary document see N86-20589 11-31)
(AD-P004829) Avail: NTIS HC A99/MF E03 CSCL 19/4

The mechanisms which govern the bullet impact reactivity of strongly confined castable plastic bonded high explosives are described. The parameters which drive the reaction are pointed out. This is a deflagration to detonation transition, in the studied cases. A first practical model, able to forecast the explosive behavior of castable plastic bonded high explosives (based on the fragmentability of the explosive material) and strongly confined was elaborated. GRA

N86-20599# Health and Safety Executive, London (England).
THE UNITED NATIONS MANUAL OF TESTS FOR CLASSIFICATION OF EXPLOSIVES **c28**
R. R. Watson *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 285-291 (For primary document see N86-20589 11-31)
(AD-P004830) Avail: NTIS HC A99/MF E03 CSCL 19/4

The United Nations Committee of Experts on the Transport of Dangerous Goods has prescribed a regime of test methods in chapter 4 of its recommendations on the transport of dangerous goods, commonly known as The Orange Book. The UN Group of Experts on Explosives has just completed a manual of tests which will enable national competent authorities to harmonize their techniques and criteria for acceptance of explosives into Class 1 and the assignment of explosives to appropriate hazard divisions, thereby promoting the international recognition of one another's classifications. The test manual is in broad terms. The difficulties in harmonizing test methods and the future program of work by the UN in this field are discussed. GRA

N86-20600# Health and Safety Executive, London (England).
CLASSIFICATION REQUIREMENTS FOR THE IMPORTATION OF EXPLOSIVES INTO THE UNITED KINGDOM **c28**
A. R. Duckworth *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 293-302 (For primary document see N86-20589 11-31)
(AD-P004831) Avail: NTIS HC A99/MF E03 CSCL 19/4

The UK position on the classification of commercial explosives is presented. some of the problems encountered are described. An approach is proposed for the international acceptance of explosives classified in other countries which the UK has recently adopted. The term commercial explosives refers to all types other than military explosives under the control of the Ministry of Defence. GRA

N86-20601# Royal Armament Research and Development Establishment, Fort Halstead (England).
CLASSIFICATION OF ENERGETIC MATERIALS FOR TRANSPORT
J. F. Bassett and J. Connor *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 303-311 (For primary document see N86-20589 11-31)
(AD-P004832) Avail: NTIS HC A99/MF E03 CSCL 19/4

The United Nations recommendations on the Transport of Dangerous Goods give guidelines for the procedures to be followed in order to determine whether materials should be classified as explosives and, if they should, to which hazard division they should be assigned. Studies of two materials, a demolition explosive and an energetic plasticiser, designed to determine their hazard classifications are detailed. Comments are made on the UN scheme

and on its interpretation. K10 liquid should be removed from the UN explosives class since test results demonstrate such a classification to be unrealistically severe. Under the present UN scheme, PE4 is correctly assigned to HD1.1D. However, PE4 is a low sensitiveness, low explosiveness material and this assignment is believed to be unnecessarily severe. The choice of ignition or initiation stimulus in the package and stack stages of UN Series 6 should be based on a test of the product employing a severe mechanical shock such as bullet impact rather than on the proposed end use of the product. GRA

N86-20602# Ministry of Defence, London (England).
CLASSIFICATION OF EXPLOSIVES IN ACCORDANCE WITH INTERNATIONAL SYSTEM **c28**
W. S. N. Tinkler *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 313-323 (For primary document see N86-20589 11-31)
(AD-P004833) Avail: NTIS HC A99/MF E03 CSCL 19/4

Principles for deciding the hazard division classification; the compatibility group classification; Classification codes; and the interaction of hazard division, compatibility group, and quantity of explosives are discussed. GRA

N86-20603# Army Materiel Command, Aberdeen Proving Ground, Md.
REFLECTED OVERPRESSURE IMPULSE ON A FINITE STRUCTURE **c39**
G. A. Coulter and C. N. Kingery *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 325-364 (For primary document see N86-20589 11-31)
(AD-P004834) Avail: NTIS HC A99/MF E03 CSCL 19/4

The effect of angle of incidence of the shock front on reflected impulse loading on a finite structure is discussed. Impulse reflection factors have been developed for angles of incidence from zero to ninety degrees. Reflected impulse on a finite structure is much less than reflected impulse on an infinite plane because of the unloading due to rarefaction waves propagating from the sides of the structure which lowers the reflected overpressure. GRA

N86-20604# Naval Civil Engineering Lab., Port Hueneme, Calif.
EFFECT OF FRANGIBLE PANELS ON INTERNAL GAS PRESSURES **c34**
J. E. Tancreto and E. S. Helseth *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 365-394 (For primary document see N86-20589 11-31)
(AD-P004835) Avail: NTIS HC A99/MF E03 CSCL 19/4

A frangible panel in a structure is an exterior surface designed to break lose and blow away quickly enough to limit effects from an explosion inside the structure. Typical frangible panels are lightweight, compared to the surfaces of the structure. Panel connections are designed to offer little resistance in any surfae of the structure. Frangible panels are primarily to limit the internal blast environment, reduce the debris hazard to personnel and property outside the structure, and vent effects of explosions inside hardened structures in prescribed directions away from the structure. An ideal frangible panel is one that does not increase the internal blast environment. This requires a massless panel that is a nonreflecting surface for shock waves. Since any panel will have mass, frangible panels must be designed on a case-by-case basis and their effects on the internal blast environment accounted for in the design of the structure. Topics discussed include gas pressure loading, design loading, and equivalent weight of TNT. GRA

N86-20605# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF COMBUSTIBLES ON INTERNAL QUASI-STATIC LOADS **c39**
N. R. Sandoval, J. C. Hokanson, E. D. Esparza, and W. E. Baker *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 395-415 (For primary document see N86-20589 11-31)
(AD-P004836) Avail: NTIS HC A99/MF E03 CSCL 19/4

The phenomenon of quasi-static pressure enhancement produced when combustible materials are placed near high explosive (HE) source has been recently discovered. The effects of placing solid and liquid combustible materials near detonating explosives on internal blast loading was measured during tests conducted in a one-eighth scale model of a containment structure. In many cases, dramatic increases in gas pressures resulted. Principal conclusions of this study are: combustible materials near explosives can markedly increase gas pressures in enclosed structures; there is a lack of data on HE-combustible combinations; quasi-static loading calculations should include estimates of contributions from the burning of combustible materials whenever such materials are expected to be in intimate contact with HE sources; and effects of combustibles should be investigated further to determine methods for prediction. Variations in charge to combustible mass, charge type, structure volume, degree of venting and degree of contact between HE and combustible should be studied. GRA

N86-20606# Army Materiel Command, Aberdeen Proving Ground, Md.
BLAST LOADING ON ABOVE GROUND BARRICADED MUNITION STORAGE MAGAZINES **c39**
G. Bulmash and C. N. Kingery *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 417-464 (For primary document see N86-20589 11-31)
(AD-P004837) Avail: NTIS HC A99/MF E03 CSCL 19/4

A NATO munitions storage facility at Machrihanish, Scotland has armaments stored in aboveground magazines. The magazines are surrouned of 3 sides by earth berms. A mass explosion is simulated in a 1/23.5 scale model of this facility using a 1 kg bare hemispherical Pentolite charge to model the full scale mixed explosive load. The charge is detonated with a responding concrete donor structure, and measurements are obtained from pressure sensitive transducers mounted in a neighboring nonresponding steel model. Visual evidence of the blast loading is obtained from a responding concrete acceptor structure. All models are surrounded on 3 sides by coarse sand berms or hardpacked soil berms. It was determined that sand berms attenuate the blast pressure more than hardpacked berms. The confining effects of the donor structure significantly reduced the blast pressure. Positive phase impulse was not significantly reduced by altering the berm material or confining the charge. GRA

N86-20607# Tooele Army Depot, Utah.
SHIELD/BARRICADE TESTING AT AED (AMMUNITION EQUIPMENT DIRECTORATE) **c39**
J. R. Miller *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 465-469 (For primary document see N86-20589 11-31)
(AD-P004838) Avail: NTIS HC A99/MF E03 CSCL 19/4

The shield/barricade testing performed at the Ammunition Equipment Direcorate, Tooele Army Depot, Tooele, Utah, has been invaluable in assessing the protective capability of shields/barricades. Weaknesses, trouble spots, venting problems, and personnel hazards of all kinds have been brought to light during the testing process. Design changes, product and protection improvements have been incorporated in the shields/barricades so that the final tested products can meet MIL-STD 398 requirements. GRA

N86-20608# Morton Thiokol, Marshall, Tex.
ELECTROSTATIC SENSITIVITY OF MAGNESIUM-TEFLON COMPOSITIONS **c24**
H. C. Havron *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 495-500 (For primary document see N86-20589 11-31)
(AD-P004840) Avail: NTIS HC A99/MF E03 CSCL 19/4

Infrared decoy flares are made with a magnesium-Teflon formulation. Under most circumstances, the composition is reported

to have little or no tendency towards ignition from electrostatic discharge. Recent events at the Longhorn Army Ammunition Plant have changed this perception. Three fires have occurred at the press during removal of the RR-119 pellet from the consolidation die. As a result of analysis consultants, investigations, and test data the most probable cause is due to ignition by electrostatic discharge. This particular situation was best solved by placing several Simco Co., ionizing air nozzles fore and aft of the pellet as it sits in the raised position. The system was essentially a positive air pressure being maintained at all times. This assures sufficient air velocity to prevent the ingress of gaseous or particular matter around the ionizing electrodes. Since the ionizing air blowers were installed, there has not been a pellet ignition at the press. GRA

N86-20609# Lawrence Livermore National Lab., Calif.
DOE HAZARD CLASSIFICATION FOR INSENSITIVE HIGH EXPLOSIVES (IHE) **c28**
R. R. McGuire and R. P. Guarienti *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 501-507 (For primary document see N86-20589 11-31)
(Contract W-7405-eng-48)
(AD-P004841) Avail: NTIS HC A99/MF E03 CSCL 19/4
The DOE has adopted a hazard classification of IHE and IHE Subassembly based on the premise of no probability of initiation and proposed a test protocol for that classification based on an in depth understanding of the hazards involved and the response of the energetic material to relevant stimuli. GRA

N86-20610# Centre d'Etudes et Recherches des Charbonnages de France, Verneuil-en-Halatte. Lab. des Substances Explosives.
HAZARD ASSESSMENT OF EXPLOSIVE SUBSTANCES
M. Demissy and C. Michot *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 509-521 (For primary document see N86-20589 11-31)
(AD-P004842) Avail: NTIS HC A99/MF E03 CSCL 19/4
Three French test methods for explosive hazards classification are summarized. A reliable shock sensitivity test, a mechanical stimulus sensitivity test, and a test to determine the tendency of a substance to undergo the transition from deflagration to detonation are discussed. GRA

N86-20611# Department of Defence, Canberra (Australia).
PROPELLANT CATEGORIZATION TRIALS **c28**
N. H. Tozer *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 523-538 (For primary document see N86-20589 11-31)
(AD-P004843) Avail: NTIS HC A99/MF E03 CSCL 19/4
The tests conducted showed that medium calibre propellant AR5401, and by analogy small arms propellant AR2201, can be classified as HD 1.3 when transported in M2 cans palletized in an ISO freight container. The tests do not cover the effects of an external detonation as may be experienced in times of hostilies but cover a typical severe practical disaster that may confront the civilian transportation of propellant. Both AR2201 (critical height 13 inches) and AR5401 (critical height 7 inches) exhibited UN HD 1.3 behavior in M2 cans with greater powder column heights. M2 cans have considerably higher venting pressures than the copper lined wooden boxes traditionally used for transport of small web powders. The time which elapsed between fire outbreak and propellant ignition sugests strong possibility for fire control or event minimization by the use of drenches, etc. GRA

N86-20612# Southwest Research Inst., San Antonio, Tex.
BLAST PRESSURE MEASUREMENTS FOR THE FULL-SCALE GRAVEL GERTIE TEST **c35**
E. D. Esparza and W. E. Baker *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 549-580 (For primary document see N86-20589 11-31)
(AD-P004845) Avail: NTIS HC A99/MF E03 CSCL 19/4
The blast and gas pressure data obtained in the full-scale Gravel Gertie test conducted in 1982 have been used by architecture-engineer firms, in conjunction with other data from model experiments, to define the design loads for the new generation of Gravel Gertie and other blast containment facilities. GRA

N86-20613# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE FAILURE MODE OF LAYERED CONCRETE CONSTRUCTION DUE TO CONTACT CHARGES **c39**
J. Weerheijm, W. Karthaus, and G. Opschoor *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 581-596 (For primary document see N86-20589 11-31)
(AD-P004846) Avail: NTIS HC A99/MF E03 CSCL 19/4
Conclusions from an experimental and theoretical research program involving a slab with an intermediate layer are given. When the thickness of directly loaded outer slab is smaller than the critical thickness, this slab fails in a critical way. This means that a concentrated loading is created by the stream of particles which are ejected through the hole punched in the directly loaded slab. This concentrated load has a high energy content and dominates the failure process in the other parts of the structure. No geometrical damping occurs in the stream of particles. When the concentrated loading is formed, this loading cannot be distributed economically by increasing the stiffness and strength of the second layer, and the lower slab fails as a result of shearing. GRA

N86-20614# IIT Research Inst., Chicago, Ill.
FAILURE ANALYSIS OF STRUCTURES SUBJECTED TO MULTIPLE BLAST LOADS **c39**
A. Longinow, J. Mohammadi, and H. S. Mapadensky *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 597-604 (For primary document see N86-20589 11-31)
(AD-P004847) Avail: NTIS HC A99/MF E03 CSCL 19/4
The problem of structural response in a multiple load blast environment is examined. Due to the non-deterministic nature of the problem, the method considers the failure probability of the structure after each blast. The structure is modeled as a single degree of freedom system with strength. The method considers uncertainties in both structural and blast load parameters. Load and resistance are assumed to be lognormally distributed. A failure probability is computed after each blast. GRA

N86-20615# Tooele Army Depot, Utah.
RAPID RESPONSE DELUGE SYSTEM
J. R. Mille *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 605-612 (For primary document see N86-20589 11-31)
(AD-P004848) Avail: NTIS HC A99/MF E03 CSCL 19/4
The development of a rapid response deluge system by the Ammunition Equipment Directorate (AED) for use in suppressing propellant fires during demilitarization shows great promise. Prototype systems have been tested and data acquired on their efficiencies. Present system vs previous generations and lessons learned are discussed. GRA

N86-20616# Radford Army Ammunition Plant, Va.
FAST-ACTING SPRINKLER SYSTEM DESIGN CONSIDERATIONS FOR PROPELLANT MANUFACTURE
A. L. Matthews, J. M. Crable, and P. T. Kristoff *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 613-626 (For primary document see N86-20589 11-31)
(AD-P004849) Avail: NTIS HC A99/MF E03 CSCL 19/4
Fast-acting sprinkler systems for detection and suppression of fires in propellant operations, which require activation in the millisecond range in order to be effective, can be easily defeated unless particular attention is paid to design and maintenance details. Of primary consideration are detector selection and placement in processes to minimize the effect of environmental

influences. Also important are nozzle placement, water flow density, water supply pressure, and pattern and sloping of piping. When all of these design criteria are properly implemented, water application can occur within 100 ms of fire detection. GRA

N86-20617# Detector Electronics Corp., Minneapolis, Minn.
RECENT ADVANCES IN HIGH SPEED DETECTION SYSTEMS FOR AMMUNITION PLANTS
K. M. Klapmeier *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 627-644 (For primary document see N86-20589 11-31)
(AD-P004850) Avail: NTIS HC A99/MF E03 CSCL 19/4

The application of UV detection systems in radioactive environments and the application considerations of infrared, and combinations of ultraviolet and infrared are discussed. Recent developments in high speed single frequency infrared detection systems and their applications to munitions processes are also reviewed. GRA

N86-20618# Army Defense Ammunition Center and School, Savanna, Ill.
INTRINSICALLY SAFE ELECTRICAL CIRCUITS: THEIR APPLICATION IN EXPLOSIVE ENVIRONMENTS **c33**
K. W. Proper *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 645-664 (For primary document see N86-20589 11-31)
(AD-P004851) Avail: NTIS HC A99/MF E03 CSCL 19/4

The successful application of intrinsically safe electrical circuits depends upon a complete understanding of the concept of intrinsically safe and the concept's utilization during design and evaluation. The history of the concept of intrinsically safe and an exploration of what it is are presented. Its application in an explosive environment and employment of the concept during design and evaluation are discussed. GRA

N86-20619# Naval Surface Weapons Center, Dahlgren, Va.
DoD LIGHTNING PROTECTION REQUIREMENTS FOR STRUCTURES HOUSING EXPLOSIVES
M. Guthrie *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 665-673 (For primary document see N86-20589 11-31)
(AD-P004852) Avail: NTIS HC A99/MF E03 CSCL 19/4

The results of the Department of Defense Lightning Protection Working Group's project on DOD lightning protection requirements for structures housing explosives are given. The text of this paper is limited to that of DOD 6055.9-STD, Chapter 7. The requirements of this Standard are often supplemented by additional requirements from each of the services. GRA

N86-20620# Naval Surface Weapons Center, Silver Spring, Md.
REACTION PROPAGATION ALONG AN ENCLOSED CONVEYOR **c34**
P. J. Peckham and M. M. Swisdak, Jr. *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 789-806 (For primary document see N86-20589 11-31)
(AD-P004858) Avail: NTIS HC A99/MF E03 CSCL 19/4

Tests were conducted to study the likelihood of explosive reaction propagation along an enclosed explosive handling conveyor. An initiation scheme was selected and tests conducted which insured a high order detonation over the entire length of an explosive increment. A full scale mockup of a 125-foot enclosed section of conveyor was constructed. A 50-foot increment of explosive was detonated. A 25-foot air gap and a 50-foot acceptor increment were also present. The acceptor did not detonate, nor even react violently. A small amoung of self-extinguishing burning was also observed. GRA

N86-20621# Air Force Armament Lab., Eglin AFB, Fla.
SUPPRESSION OF SYMPATHETIC DETONATION
J. C. Foster, Jr., M. E. Gunger, B. G. Craig, and G. H. Parsons *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 813-837 (For primary document see N86-20589 11-31)
(AD-P004860) Avail: NTIS HC A99/MF E03 CSCL 19/4

There are two basic approaches to suppression of sympathetic detonation. Minimizing the shock sensitivity of the explosive to long duration pressure will obviously reduce interround separation distances. However, given that the explosive sensitivity is fixed, then much can be gained through the use of simple barriers placed between the rounds. Researchers devised calculational methods for predicting shock transmission; experimental methods have been developed to characterize explosive shock sensitivity and observe the response of acceptors to barriers. It was shown that both EAK and tritonal can be initiated to detonation with relatively low pressure shocks of long durations. It was also shown that to be an effective barrier between the donor and acceptor, the material must attenuate shock and defect fragments. Future actions will concentrate on refining the design of barriers to minimize weight, volume, and cost. GRA

N86-20622# Aerojet Techsystems Co., Sacramento, Calif.
A SYSTEM FOR EXTINGUISHING POL (PETROLEUM, OILS AND LUBRICANTS) AND ORDNANCE TYPE FIRES
W. C. Ostrander *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 839-851 (For primary document see N86-20589 11-31)
(AD-P004861) Avail: NTIS HC A99/MF E03 CSCL 19/4

The capability to control catastrophic fire is now available and application analysis can identify optimum hardware installation. Protection can be by mobile equipment or a fixed installation; the system provides reduced damage, permits earlier facility start-up and return to production/operation and readiness is preserved by minimizing personnel, material, and facility losses. GRA

N86-20623# Department of Defense Explosives Safety Board, Alexandria, Va.
MINUTES OF THE 21ST EXPLOSIVES SAFETY SEMINAR, VOLUME 2
Aug. 1984 839 p refs Seminar held in Houston, Tex., 28-30 Aug. 1984 2 Vol.
(AD-A152150) Avail: NTIS HC A99/MF E03 CSCL 13/12

Several topics related to the safe manufacturing and handling of explosive materials are discussed. Concrete reinforced structures, carbon monoxide poisoning, protective clothing, production engineering, and risk assessment techniques are among the topics covered. For individual titles, see N86-20624 through N86-20638.

N86-20624# Tooele Army Depot, Utah.
DENSITIZATION AND CONVERSION OF AMMONIUM PICRATE (EXPLOSIVE d) TO FUEL **c28**
S. S. W. Kwak *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 873-999 (For primary document see N86-20623 11-31)
(AD-P004683) Avail: NTIS HC A99/MF E03 CSCL 13/12

Recovery of Explosive D incidental to demilitarization of munitions by a water washout technique planned for use at the western Area Demilitarization Facility (WADF), results in plating of process piping and equipment with explosive crystals as the Explosive D slurry cools. The solidification and plating of process equipment by Explosive D crystals would create serious operational problems and present a hazardous condition during disassembly and repair of equipment. The Ammunition Equipment Directorate (AED) of Tooele Army Depot, was tasked by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) to develop a process to prevent Explosive D from solidifying and plating onto the surface of process equipment and piping. In addition, the WADF processes would possibly involve the mixing of explosive D with traces of other explosives from previous operations, resulting in a number of associated hazards. GRA

N86-20625# Savanna Army Depot Activity, Ill.
COMPLEXITIES OF LEAD AZIDE **c25**
W. Shaneyfelt *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosive Safety Seminar, Volume 2 Aug.

1984 p 1143-1148 (For primary document see N86-20623 11-31) (AD-P004872) Avail: NTIS HC A99/MF E01 CSCL 13/12

Lead azide, Pb(N3)2, is an explosive salt of hydrazole acid, HN3, having a molecular weight of 291.258. It is very sensitive to impact, friction, heat, and electrical discharge. Its soluability is less than 1% in cold water and nearly zero in ammonium hydroxide solution, ether, acetone, or ethanol, but it is quite soluable in heated, strongly acid or strongly alkaline solutions. When dry, it does not corrode most metals, however, in the presence of moisture, gold, silver, copper, mercury, tin, and zinc, all form extremely sensitive and dangerous azides. Pure lead azide occurs as colorless needle-like crystals. Breaking these crystals is believed to initiate detonation. Military-use lead azide is white to tan with crystals less than 0.1 mm long to minimize sensitivity. It is approximately 92% pure, having about 4% lead hydroxide (a manufacturing by-product), 3% dextrin (a binder), and 1% trace impurities. Vietnam-era jungle warfare fostered the development of munitions using relatively enormous quantities of load azide. Their sensitivity to detonation caused a reluctance among many users to deploy them, resulting in a stockpile of both munitions and bulk lead azide. The winding down of hostilities left a vast supply and an extremely small demand. Mounting environmental regulations limited most open-air detonations to emergency destruction of immediately hazardous munitions. All munitions were eventually destroyed, leaving the stockpile of bulk lead azide in deteriorating 55-gallon drums. GRA

N86-20626# Naval Civil Engineering Lab., Port Hueneme, Calif.
YIELD-LINE ANALYSIS OF RECTANGULAR LABS WITH DOORS **c39**
P. Wager and S. Berkenbile IN Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1149-1164 (For primary document see N86-20623 11-31)
(AD-P004783) Avail: NTIS HC A99/MF E01 CSCL 13/12

Several possible yield-line failure mechanisms and the corresponding equations for the ultimate flexural resistance of a slab with a door when subjected to a uniform pressure are presented. The equations are limited to rectangular slabs with openings and are the beginning of an effort of the Naval Civil Engineering Laboratory to develop a comprehensive design procedure for rectangular slabs subjected to blast loads. GRA

N86-20627# Army Armament Research and Development Command, Dover, N. J.
REVISION OF THE DESIGN MANUAL STRUCTURES TO RESIST THE EFFECTS OF ACCIDENTAL EXPLOSIONS (TM 5-1300, NAVFAC P-397, AFM 88-22)
J. Caltagirone, A. Castellano, M. Dede, and N. Dobbs *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1191-1208 (For primary document see N86-20623 11-31)
(AD-P004875) Avail: NTIS HC A99/MF E01 CSCL 13/12

Procedures for structures designed to resist the effects of a high energy (HE) type explosions are presently available in the Tri-Service Design Manual Structures to Resist the Effects of Accidental Explosions. However, these procedures are limited to reinforced concrete structures. Since its original publication, a considerable amount of data has been generated which brought about the requirement to revise existing procedures in the manual and incorporate new data. The format of the revised manual is described and a discussion on the contents of each of the six volumes, including the improvements made to the existing manual is given. GRA

N86-20628# Army Missile Command, Redstone Arsenal, Ala.
EFFECTS OF CARBON MONOXIDE ON PERSONNEL **c52**
M. Mossa *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1309-1341 (For primary document see N86-20623 11-31)
(AD-P004882) Avail: NTIS HC A99/MF E03 CSCL 13/12

New weapons and the vehicles on which they mount have and will continue to become increasingly complex. These weapons are potentially more demanding, and challenges need to be addressed. One important challenge is the need to accurately monitor and control the amount of toxic substances, generated by weapon systems, that may endanger the soliders who will operate the systems. Toxic fumes generated from various sources can have debilitating effects on the efficiency of occupants and operators of vehicles and ground equipment. The insidious nature of these effects underscores the necessity for detecting, measuring, and eliminating these hazards to the extent possible. The overall problem that must be addressed is the potential exposure of soldiers to carbon monoxide, ammonia, oxides of sulfur, oxides of nitrogen, lead fumes, and other harmful substances. The exposures are likely to be relatively intense (above present Federal standards for occupational exposure), brief (1 hour or less), and rapidly repeated (as often as six times daily for periods as long as 14 days). Such exposures may occur when soldiers are trained to use various weapon systems or while in combat. GRA

N86-20629# Army Materiel Command, Aberdeen Proving Ground, Md.
AN EXAMINATION OF INJURY CRITERIA FOR POTENTIAL APPLICATION TO EXPLOSIVE SAFETY STUDIES **c52**
D. N. Neades and R. R. Rudolph *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1343-1354 (For primary document see N86-20623 11-31)
(AD-P004883) Avail: NTIS HC A99/MF E03 CSCL 13/12

A state-of-the-art assessment of research into and the modeling of wounding mechanisms and phenomena is described. The results of an extensive survey of the literature are presented along with recommendations for replacement of the presently used 58 ft-lb rule. The data and models located have been evaluated with respect to applicability to explosive safety studies which typically require quantification of the fragment impact hazards to personnel. Major topics for discussion include penetrating and non-penetrating injury mechanisms and models, wounding thresholds, military incapacitation criteria, and existing safety criteria, as well as recommendations for formulation of new criteria. Author (GRA)

N86-20630# Naval Surface Weapons Center, Silver Spring, Md.
MAXIMUM TNT EQUIVALENCE OF NAVAL PROPELLANTS **c28**
M. M. Swisdak, Jr. *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1383-1393 (For primary document see N86-20623 11-31)
(AD-P004886) Avail: NTIS HC A99/MF E03 CSCL 13/12

As part of the Naval Explosives Safety Improvement Program (NESIP), two series of tests have been conducted to determine the maximum TNT equivalence of Naval propellants. Airblast and detonation velocity measurements were made on M26 and NACO 5-inch propelling charges, MK 10 (3.25 in.), MK 16 (5 in.), MK 40 (2.75 in.), MK 58 (Sparrow), MK 37 (Asroc), MK 27 (Tartar), MK 30 (Standard) rocket motors, and TNT cylinders. The MK 40 and MK 37 motors detonated high order and had a TNT equivalence of 70 to 75%. The other applications had TNT equivalencies ranging from 5 to 50%. Recommendations are also made about possible revisions to OP-5. Instead of the 25 percent equivalency now used for guided missile propellants, 100 percent is recommended for double base and composite/double base materials, 50 percent for composite materials, and 125 percent for high energy propellants. Author (GRA)

N86-20631# Mound Lab., Miamisburg, Ohio.
EXPLOSIVE SAFETY CRITERIA AT A DEPARTMENT OF ENERGY CONTRACTOR FACILITY
F. Krach *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1421-1443 (For primary document see N86-20623 11-31) (Contract DE-AC04-76DP-00053)
(AD-P004889) Avail: NTIS HC A99/MF E03 CSCL 13/12

Monsanto Research Corporation (MRC) operates the Mound facility in Miamisburg, Ohio, for the Department of Energy. Small

explosive components are manufactured at MRC, and stringent explosive safety criteria have been developed for their manufacturing. The goals of these standards are to reduce employee injuries and eliminate fenceline impacts resulting from accidental detonations. The manner in which these criteria were developed and what DOD standards were incorporated into MRC's own design criteria are described. These design requirements are applicable to all new construction at MRC. An example of the development of the design of a Component Test Facility is presented to illustrate the application of the criteria. Author (GRA)

N86-20632# Naval Civil Engineering Lab., Port Hueneme, Calif.
PREDICTION OF DEBRIS HAZARDS FROM EXPLOSIONS IN BUILDINGS
L. C. P. Huang *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1445-1459 (For primary document see N86-20623 11-31)
(AD-P004890) Avail: NTIS HC A99/MF E03 CSCL 13/12

The Multiple Debris Missile Impact Simulation (MUDEMIMP) is a computer program that determines debris hazard by calculating the accumulated number of critical debris missiles at various impact ranges. Critical debris missiles are defined by DDESB as those with terminal kinetic energies greater than or equal to 58 ft-lb. The MUDEMIMP employs a probabilistic approach in solving the multiple debris hazard problem by utilizing Monte Carlo sampling techniques to assess the effects of variations and uncertainties on the debris launch characteristics. The debris missile impact simulation starts by selecting one debris missile from the total debris with Monte-Carlo selected debris launch and flight parameters. Then, the computer calculates the trajectory, impact range and terminal kinetic energy of this particular sample debris missile. This Monte Carlo random sampling process is repeated on the remaining debris missiles until all the debris have been sampled. GRA

N86-20633# Ministry of Defence, London (England).
JOINT AUSTRALIAN/UK STACK FRAGMENTATION TRIALS
F. Bowman, J. Henderson, N. J. M. Rees, and J. Walker *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1461-1484 (For primary document see N86-20623 11-31)
(AD-P004891) Avail: NTIS HC A99/MF E03 CSCL 13/12

In 1980 ESTC decided to conduct a series of trials to assess the fragment throw from explosives. Because of the restrictive nature of minimum fragment throw criteria and the expense of building traverse, for which little credit was given, approaches were made to Australia resulting in Phase I of the trails which were fired in early 1982. The Phase I trials consisted of open stacks of bombs surrounded on two sides by traverses and a similar situation with the stack inside a building, representative of a typical UK array unit storehouse. After the explosion, fragments and debris were collected, on a sample basis, and these were then computer sorted into a basic weight distribution with distance from the site of the explosion. These results were further refined and are presented in tabular form. A detailed consideration of the fragment distribution with distance has resulted in a proposal to reduce minimum fragment throw criteria in the UK Quality-Distance Tables provided the results are confirmed for smaller quantities of explosives. Further trials have been proposed to consider this and the additional complications of different building structures. Author (GRA)

N86-20634# Basler (Ernst) and Partners, Zurich (Switzerland).
METHODS OF QUANTITATIVE RISK ASSESSMENT: THE CASE OF THE PROPELLANT SUPPLY SYSTEM
H. A. Merz and A. Bienz *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1485-1505 (For primary document see N86-20623 11-31)
(AD-P004892) Avail: NTIS HC A99/MF E03 CSCL 13/12

As a consequence of the disastrous accident in Lapua (Finland) in 1976, where an explosion in a cartridge loading facility killed 40 and injured more than 70 persons, efforts were undertaken to examine and improve the safety of such installations. An ammunition factory in Switzerland considered the replacement of the manual supply of propellant hoppers by a new pneumatic supply system. This would reduce the maximum quantity of propellant in the hoppers to a level, where an accidental ignition would no longer lead to a detonation, and this would drastically limit the effects on persons. A quantitative risk assessment of the present and the planned supply system demonstrated that, in this particular case, the pneumatic supply system would not reduce the risk enough to justify the related costs. In addition, it could be shown that the safety of the existing system can be improved more effectively by other safety measures at considerably lower costs. Based on this practical example, the advantages of a strictly quantitative risk assessment for the safety planning in explosives factories are demonstrated. The methodological background of a risk assessment and the steps involved in the analysis are summarized. In addition, problems of quantification are discussed. Author (GRA)

N86-20635# IIT Research Inst., Chicago, Ill.
TOTAL SYSTEM HAZARDS ANALYSIS FOR THE WESTERN AREA DEMILITARIZATION FACILITY
R. Pape, K. Mniszewski, and E. Swider *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1529-1551 (For primary document see N86-20623 11-31)
(AD-P004894) Avail: NTIS HC A99/MF E03 CSCL 13/12

The results of a hazards analysis of the Western Area Demilitarization facility (WADF) at Hawthorne, Nevada are summarized. An overview of the WADF systems, the hazards analysis methodology that was applied, a general discussion of the fault tree analysis results, and a compilation of the conclusions and recommendations for each area of the facility are given. Author (GRA)

N86-20636# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
VELOCITY OF DEBRIS FROM BURSTING EXPLOSIVES STORAGE BUNKERS WITH SOIL OVERBURDEN
E. H. Jager *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1651-1660 (For primary document see N86-20623 11-31)
(AD-P004899) Avail: NTIS HC A99/MF E03 CSCL 13/12

The velocity and range of roof fragments of an earth covered vented bunker on detonation of a mass of explosive contained therein has been calculated by means of a simple analytical techniques, devised originally for calculating the velocity of fragments from bursting pressurized-gas vessels. A 1/10 scale model experiment gave a result very close to the predicted values. Also, a recent incident with a 200-kg HE charge in a 250 cu m bunker gave evidence that agreed all with the results calculated by both the debris range and the appurtenance range (venting-area-hazard) approaches presented here. Author (GRA)

N86-20637# Department of Defence, Canberra (Australia).
DESTRUCTION OF PROPELLANT MAGAZINE, NOVEMBER 1982
N. H. Tozer *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1661-1669 (For primary document see N86-20623 11-31)
(AD-P004900) Copyright. Avail: NTIS HC A99/MF E03 CSCL 13/12

Details on the destruction of a propellant magazine are given. The properties of single base propellants are discussed. Although single base propellants have been around for one hundred years, production of this type of propellant in Australia only commenced during World War 2 when appropriate plant and know how were provided under the Lend Lease Scheme. Most of the single base propellants made at Mulwala Explosives Factory have been of the IMR type i.e., single perforated tubular granules with their surface coated with DNT for use in small to medium calibre ammunition. Since production started at Mulwala Explosives

Factory in 1944 some fourteen different versions of style of propellant have been manufactured. Four versions only were made up until 1957 and these were identified with an IMR type number matching the US propellants from which they were copied. New varieties introduced since 1957 have been identified with an AR aeries number commencing with AR2001 - the original Australian 7.62 mm rifle propellant. GRA

N86-20638# Lone Star Army Ammunition Plant, Texarkana, Tex.
EVALUATION OF MATERIALS FOR THERMAL PROTECTION c54
J. I. Martin *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1671-1687 (For primary document see N86-20623 11-31)
(AD-P004901) Avail: NTIS HC A99/MF E03 CSCL 13/12

An on-going program to provide improved thermal protection for pyrotechnic operators is described. The critical first step in providing improved personal protection is to insure that the best available materials is used to provide the outer shield. Researchers and manufacturers are continually introducing new materials, but they have not been tested against the special kind of thermal threat presented by pyrotechnics. A method of comparative testing of fabrics and other materials is described, and the results obtained with some of the latest available varieties of fabrics are discussed. Author (GRA)

N86-20639# Army Armament Munitions and Chemical Command, Rock Island, Ill.
MINUTES OF THE RAPID ACTION FIRE PROTECTION SYSTEM SEMINAR
Oct. 1984 172 p Seminar held at Rock Island, Ill., 23-24 Oct. 1984
(AD-A158936; AD-E700019) Avail: NTIS HC A08/MF A01 CSCL 13/12

Individual papers in the minutes deal with the following topics: ultraviolet and infrared fire detectors, reduction of false alarms in industrial flame detection systems, deluge systems, rapid action fire protection at ammunition plants, and hazardous waste generation in fire protection. GRA

N86-20640# Department of the Army, Washington, D. C.
RELATIVE SIZING OF LAYOUT DATA TO COMPENSATE FOR EXPOSURE ERRORS ON OPTICAL LITHOGRAPHY SYSTEMS Patent Application
Pallab K. Chatterjee, inventor (to Army) Filed 28 Nov. 1985 7 p
(AD-D011955; US-Patent-Appl-SN-791970) Avail: NTIS HC A02/MF A01 CSCL 13/8

The processing of advance integrated circuits oftentimes employs the patterning of fine geometries of differing levels. This leads to a non-uniform thickness of photo-resist about the topologies and a built-in defocus for the optical projection lithography used to fabricate the integrated circuit itself. In the processing of these advanced integrated circuits according to the invention, the data is to be laid out with a predetermined reticule sizing based on the topological characteristics then of concern, so as to compensate for the defocussing previously associated with a single layer photo-resist process. Author (GRA)

N86-20641# Factory Mutual Research Corp., Norwood, Mass.
FIRE PROTECTION REVIEW REVISIT NO. 2, SANDIA NATIONAL LABORATORIES, ALBUQUERQUE, NEW MEXICO
P. H. Dobson, J. M. Simmons, and H. H. Wallace Oct. 1985 59 p
(Contract DE-AC01-84PE-17056)
(DE86-001138; DOE/PE-17056/T5) Avail: NTIS HC A04/MF A01

Findings of a fire protection review conducted during July 21 to 25, July 28-August 2, 1985, and August 19-23, 1985, at Sandia National Laboratories, Albuquerque, New Mexico are summarized. The visit included: (1) a tour of the facility, (2) water tests, (3) review of records of testing and inspection of fire protection equipment, and (4) tests of selected fire protection equipment to verify equipment had been properly tested and inspected. DOE

N86-20642# Lawrence Livermore National Lab., Calif.
[THE ENGINEERING RESEARCH PROGRAM'S SEARCH AND SUPPORT OF NEW MECHANICAL-ENGINEERING TECHNOLOGY] Engineering Research Progress Report, Oct. 1984 - Mar. 1985
H. H. Woo, ed., R. M. Denney, ed., R. S. Frost, ed., and M. B. Kamelgarn, ed. Mar. 1985 94 p
(Contract W-7405-eng-48)
(DE86-001558; UCID-19323-85-1) Avail: NTIS HC A05/MF A01

This report summarizes the progress made in the first 6 months of the FY-85 Engineering Research Program in the Mechanical Engineering Department. The program's mission is to seek new knowledge and concepts for mechanical-engineering applications of immediate or potential interest to the Laboratory. During this reporting period the program supported 13 projects. Eleven of the projects enhanced the mechanical engineering technology base in four thrust areas. The thrust areas and their associated projects are: (A) Computer-Aided Engineering (2 projects), (1) - Reacting Gasdynamic Flow Interaction, (2) - Solid Geometric Modeling; (B) Dynamic Systems and Controls (2 projects), (1) - Complex Mode-Shape Criteria, (2) Multivariable Systems Analysis and Design; (C) Fabrication Technology (5 projects), (1) - Chip Science, (2) High-Speed Contour Grinding, (3) Fine Grinding of Glass, (4) Precision Contouring of Brittle Materials, (5) - Topometric Interferometry; and (D) Nondestructive Evaluation (2 projects), (1) - Quantitative Ultrasonic Nondestructive Evaluation, (2) - Radiographic Variables in the Ultra-Low Energy Range. The two remaining projects are devoted to studying an isothermal compressor-heat exchanger, and to developing a methodology for determining the mechanical properties of polymers. DOE

N86-20643# Oak Ridge National Lab., Tenn.
QUENCH ENERGIES OF POTTED MAGNETS, III
L. Dresner 1985 7 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016962; CONF-850814-19) Avail: NTIS HC A02/MF A01

Several different formulas have been proposed for estimating quench energies of potted magnets. These formulas, although based on plausible approximations, disagree with one another by factors of 2 to 6. By the use of maximum and minimum principles for the heat balance equation, it has been possible to determine whether each estimate is an upper or lower bound and to show that some estimates majorize others. DOE

N86-20644# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
INVESTIGATION OF TURBULENT FIRES ON VERTICAL WALLS: WALL PLUME STRUCTURE
M. C. Lai, S. M. Jeng, and G. M. Faeth Feb. 1985 74 p refs
(Grant NB81-NADA-2044)
(PB86-102233; NBS/GCR-85-486) Avail: NTIS HC A04/MF A01 CSCL 21B

A theoretical and experimental study designed to improve understanding of buoyant fires is described. The main objective is to study turbulent fires long surfaces, however, several noncombusting and combusting flow configurations, which offer opportunities to highlight aspects of this problems under impler circumstances, were considered during the work, e.g., buoyant noncombusting wall plumes, for studies of flow properties; and turbulent round flames, for studies of flame radiation properties. Various phases of the study are reported separately; this report considers results for noncombusting wall plumes. Author (GRA)

N86-20416# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
INTRODUCTION TO CRYOGENIC WIND TUNNELS
M. J. Goodyer *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 11 p refs Previously announced in IAA as N86-12238 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

N86-20417*# Applied Cryogenics and Materials Consultants, New Castle, Del.
BASIC CRYOGENICS AND MATERIALS
D. A. Wigley *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 18 p refs Previously announced in IAA as N85-32215 Sponsored in part by NASA (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01 CSCL 13B

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-20645 Polytechnic Inst. of New York, Brooklyn.
EQUALIZATION IN DIGITAL SATELLITE COMMUNICATION SYSTEMS USING ROBUST KALMAN FILTERING Ph.D. Thesis
Deepak Malhotra 1985 84 p
Avail: Univ. Microfilms Order No. DA8515858

The problem of digital data transmission over handlimited, nonlinear channels in the presence of intersymbol interference and white Gaussian and/or non-Gaussian noise in the uplink and downlink paths is considered. The satellite transponder is assumed to be of soft-limiting type. A recursive, adaptive, real time equalizer structure employing the standard Kalman filter is developed for bindary-phase-shift-keyed (BPSK) satellite systems. The simulation results obtained using a digital computer point to a superior performance of the Kalman filter type equalizer when compared to the Wiener filter equalizer used in the past. The scheme is then extended to the case of an M = 6 PAM system and a four-phase PSK system for which optimum sampling times are derived. It is observed that in contrast to the BPSK system, in which the probability of error decreases exponentially with increasing signal-to-noise ratio, in the the M = 6 PAM system and the four-phase PSK system the probability of error decreases linearly with increasing SNR. Dissert. Abstr.

N86-20646# Louisiana State Univ., Baton Rouge.
PHASE-SENSITIVE DETECTION AND THE BACK-ACTION EVASION OF AMPLIFIER FORCE NOISE Ph.D. Thesis
Gary W. Spetz 1985 191 p
Avail: Univ. Microfilms Order No. DA8517758

Limitations on the sensitivity for detecting a weak classical force acting on a harmonic oscillator are imposed by the quantum mechanical properties associated with a standard amplitude-and-phase measurement and, classically, by the back reaction noise associated with the finite noise temperature of the amplifier used to process the measurement. These are known as the standard quantum limit and the standard amplifier limit, respectively. The theoretical motivation behind the quest to circumvent these limits is presented, and a single-transducer back-action evading measurement scheme designed to perform a phase-sensitive coupling to the oscillator is examined, with the concomitant circumvention of the standard amplifier limit via the squeezing of amplifier back reaction noise. The applicability of squeezing in the detection of gravitational radiation is explored via the dependence of detection sensitivity on the physical temperature and quality factor of the resonant-bar gravitational radiation antenna, on the noise temperature of the amplifier, and on the squeezing factor of the back-action evading measurement; the success of back-action evasion in improving upon the optimum amplitude-and-phase detection sensitivities depends critically upon these parameters. Author

N86-20647* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WIND DYNAMIC RANGE VIDEO CAMERA Patent
Glenn D. Craig, Inventor (to NASA) Issued 8 Oct. 1985 7 p Filed 8 Sep. 1983
(NASA-Case-MFS-25750-1; US-Patent-4,546,248; US-Patent-Appl-SN-530-185; US-Patent-Class-250-225; US-Patent-Class-350-354; US-Patent-Class-358-168) Avail: US Patent and Trademark Office

A television camera apparatus is disclosed in which bright objects are attenuated to fit within the dynamic range of the system, while dim objects are not. The apparatus receives linearly polarized light from an object scene, the light being passed by a beam splitter and focused on the output plane of a liquid crystal light valve. The light valve is oriented such that, with no excitation from the cathode ray tube, all light is rotated 90 deg and focused on the input plane of the video sensor. The light is then converted to an electrical signal, which is amplified and used to excite the CRT. The resulting image is collected and focused by a lens onto the light valve which rotates the polarization vector of the light to an extent proportional to the light intensity from the CRT. The overall effect is to selectively attenuate the image pattern focused on the sensor.
Official Gazette of the U.S. Patent and Trademark Office

N86-20648 British Broadcasting Corp., London (England). Engineering Div.
APLITUDE MODULATION RADIO BROADCASTING: APPLICATION OF COMPANDING TECHNIQUES TO THE RADIATED SIGNAL
W. I. Manson Nov. 1985 23 p refs
(BBC-RD-1985/13) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

A power-saving technique which may be applied to double-sideband amplitude modulation transmitters is described. The technique operates by imposing dynamic compression on the raidated signal, and relies on the action of receiver automatic-gain-control circuits to compensate for this compression at the receiver. It is suggested that use of the proposed technique could result in considerable power saving with minimal effect on the quality of reproduced programs. An extended field trial should be conducted using a representative high-power transmitter, to prove the system fully before an extensive introduction in service is put into effect.
E.A.K.

N86-20649 British Broadcasting Corp., London (England). Engineering Div.
THE PERFORMANCE OF A SATELLITE LINK USING THE BBC TRANSPORTABLE EARTH STATION WITH EBU-LEASED CAPACITY IN THE EUROPEAN COMMUNICATION SATELLITE SYSTEM
C. Gandy Nov. 1985 14 p refs
(BBC-RD-1985/14) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

A series of tests on a satellite link established between the British Broadcasting Corporation (BBC) Transportable Satellite Earth Station and a BTI fixed earth station using an EBU-leased transponder on the European Communication Satellite (ECS) 2 satellite are described. The transmitted power was limited to comply with new regulations imposed by the satellite operator, but the results indicate that a high quality television link can still be established over a potential coverage area which includes most of Europe. Also, under these conditions an adequate fading margin is obtained for all but 1.75 hours per year. Author

N86-20650 Illinois Univ., Urbana-Champaign.
AN INFORMATION-THEORETIC STUDY OF RATIO-THRESHOLD ANTIJAM TECHNIQUES Ph.D. Thesis
LiFung Chang 1985 114 p
Avail: Univ. Microfilms Order No. DA8521736

The performances of ratio/threshold (R/T) antijam communication systems in the presence of different jamming strategies are studied. Frequency hopping spread spectrum (FH/SS) binary frequency shift keying (FSK) modulation is used for the transmitted signal. Comparisons with a hard decision receiver are made. Channel capacity, cutoff rate and coded bit error probability are used as measures of the performance. A game theoretic problem with two players, transmitter and jammer is formed. The transmitter

can choose either fixed threshold or random threshold as its strategy. The jammer with fixed finite power has either one dimensional jamming or partial band jamming as its strategy. The payoff function of the game is channel capacity or cutoff rate. Using R/T technique, performance considerably superior to that possible with a hard decision receiver vs one dimensional jamming channel or partial band jamming channel can be obtained.
Dissert. Abstr.

N86-20651 Department of the Air Force, Washington, D.C.
SIMULTANEOUS SIGNAL DETECTION FOR IFM (INSTANTANEOUS FREQUENCY MEASUREMENT) RECEIVERS BY TRANSIENT DETECTION Patent
James B. Y. Tsui and Ruby L. Shaw, inventors (to Air Force) Issued 15 Oct. 1985 12 p Supersedes AD-D010496
(AD-D011958; US-Patent-4,547,727; US-Patent-Appl-SN-512064; US-Patent-Class-324-79D) Avail: US Patent and Trademark Office CSCL 17/4

The instantaneous frequency measurement (IFM) receiver is highly susceptible to erroneously reporting frequency if two or more signals are overlapped in time. This problem is extremely important when the receiver is presented to detect simultaneous signals which overlap in the critical frequency encode strobe. In essence, during the pulse overlap condition, a transient will occur on the video output lines of the receiver. These lines are monitored during the transient period and compared with predetermined values which are obtained from a single signal condition. If a transient is detected, a simultaneous signal detect flag is raised and this flag is sent to an associated processor. In this special design, the receiver will measure the frequency again at approximately 200 ms from the first measurement. The transient detection is also performed on the second measurement. GRA

N86-20652*# Notre Dame Univ., Ind. Dept. of Electrical and Computer Engineering.
ERROR CONTROL TECHNIQUES FOR SATELLITE AND SPACE COMMUNICATIONS Final Report, 1 Jul. 1984 - 31 Dec. 1985
Daniel J. Costello, Jr. Mar. 1986 103 p refs
(Grant NAG5-234)
Avail: NTIS HC A06/MF A01 CSCL 17B

The performance of NASA Telecommand System was analyzed. A random coding approach was taken to determine the optimum code rate to use in forward error correcting (FEC) system with a fixed signal energy to noise power density ration, but no bandwidth constraint. Capacity and cutoff rates of concatened coding systems were determined. A lower bound on the minium distance growth rate between unmerged codewords was obtained for time invarient convolutional codes. B.G.

N86-20653# National Aerospace Lab., Tokyo (Japan).
CALIBRATION OF AN ON-GROUND AIRCRAFT TRACKING RADAR BY AERIAL PHOTOGRAMMETRY
Kenji Yazawa, Toshiharu Inagaki, Takatsugu Ono, and Toichi Oka 1985 43 p refs In JAPANESE; ENGLISH summary
(NAL-TR-861; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

An on-ground tracking radar was calibrated for obtaining the accurate position of an aircraft during flight testing. The calibration was performed by aerial photogrammetry for estimating the position and the attitude of an aircraft compared with synchronized data from tracking radar. The accuracy of aerial photogrammetry using a non-metric camera, was less than 0.2% of the flight altitude from ground. The accuracy corresponds to an angle of 0.01 degree at 1000 m height and 10 km distance from the radar. It is comparable to the resolution of the radar. Author

N86-20654# Rome Air Development Center, Griffiss AFB, N.Y.
SIDELOBE SECTOR NULLING WITH MINIMIZED WEIGHT PERTURBATIONS Report, Sep. 1984 - Jan. 1985
R. A. Shore Mar. 1985 23 p Sponsored by AF
(AD-A157057; RADC-TR-85-40) Avail: NTIS HC A02/MF A01 CSCL 20/14

A new method is presented to lower the sidelobes of a given array pattern in a specified sidelobe sector while maintaining the integrity of the original pattern. The method consists of minimizing a performance measure defined to be equal to the weighted sum of the power in the sidelobe sector and the squared eight perturbations. By varying the weights in the performance measure, it is possible to shift the relative emphasis placed on the objectives of lowered sidelobes and small pattern distortion. An analytic solution is obtained and for the perturbed weights that minimize the performance measure, and for the perturbed weights when a constant look direction gain constraint is imposed. Curves are plotted showing pattern parameters and examples of perturbed patterns. Author (GRA)

N86-20655# Electronics Research Lab., Adelaide (Australia).
THE RADAR CROSS SECTION OF PERFECTLY-CONDUCTING RECTANGULAR FLAT PLATES AND RECTANGULAR CYLINDERS: A COMPARISON OF PHYSICAL OPTICS, GTD AND UTD (GEOMETRICAL THEORY OF DIFFRACTION AND THE UNIFORM GEOMETRICAL THEORY OF DIFFRACTION) SOLUTIONS
W. C. Anderson Aug. 1985 95 p
(AD-A161540; ERL-0344-TR) Avail: NTIS HC A05/MF A01 CSCL 17/9

The method of Physical Optics, the Geometrical Theory of Diffraction and the Uniform Geometrical Theory of Diffraction are applied here to electromagnetic scattering from flat plates and rectangular cylinders. The results are compared with experimental measurements to establish the domains of validity of the theoretical techniques. GRA

N86-20656# Royal Australian Navy Research Lab., Edgecliff.
MODELLING THE RADAR EVAPORATIVE DUCT
M. R. Battaglia Apr. 1985 44 p
(AD-A161542; RANRL-TN-3/85) Avail: NTIS HC A03/MF A01 CSCL 20/14

A model of the radar evaporative duct is described, based on Monin-Oburkov similarity theory. The similarity functions, Monin-Oburkov stability length and scaling parameters are derived from experimental data. Graphs are presented for duct heights and the number of trapped modes at 10 GHz for a wide range of environmental conditions. The input to any such theoretical model is information about the vertical rate of change of refractive index in the atmosphere and (in the case of surface-based ducts), and the reflectivity of the rough sea surface. The outputs include refractivity profiles and duct height, and the frequency-dependence of trapping expressed as either the number of trapped modes at a given frequency, or the cut-off frequency. GRA

N86-20657# Defense Communications Engineering Center, Reston, Va.
TWO METHODS OF CONTROLLING POINT-TO-POINT LOSS PROBABILITIES IN A CIRCUIT SWITCHED NETWORK Technical Note Report, 1984 - 1985
Murti Gajjala Sep. 1985 26 p
(AD-A161547; DCEC-TN-1-85) Avail: NTIS HC A03/MF A01 CSCL 17/2

The existing program for the design of OS/AUTOVON networks determines the link sizes for the given network connectivity, traffic loads, routing plan and link blocking probabilities. If the resulting point-to-point loss probabilities are unacceptably high or too low (resulting in large link sizes), the link blocking probabilities need manual adjustment. The desired adjustment is not known and can only be assessed by experimenting with a large number of sets of link blocking probabilities and examining the resultant link sizes and point-to-point loss probabilities. Our search for methods to automatically resize the links using the feedback principle and thereby improve the design of a network led to identification of two methods: (1) Link GOS Adjustment method and (2) Link Size Adjustment method. Test results showed that the first method can effectively bring the point-to-point loss probability of traffic to within the specified GOS with fewer interswitch trunks. The second method maximized the number of source-destination pairs whose point-to-point loss probabilities are

between the specified lower and upper bounds, although it involved more hops for completed calls and more interswitch trunks. GRA

N86-20658# Analytic Sciences Corp., Reading, Mass.
INTEGRATED COMMUNICATION, NAVIGATION, AND IDENTIFICATION AVIONICS: IMPACT ANALYSIS. EXECUTIVE SUMMARY Final Report, Mar. 1982 - Mar. 1984
Michael H. Veatch and James C. McManus Oct. 1985 16 p
(Contract F33615-82-C-0002)
(AD-A161799; AFHRL-TP-85-20) Avail: NTIS HC A02/MF A01 CSCL 17/2

This paper summarizes the approach and findings of research into reliability, supportability, and survivability prediction techniques for fault-tolerant avionics systems. Since no technique existed to analyze the fault tolerance of reconfigurable systems, a new method was developed and implemented in the Mission Reliability Model (MIREM). The supportability analysis was completed by using the Simulation of Operational Availability/Readiness (SOAR) model. Both the Computation of Vulnerable Area and Repair Time (COVART) model and FASTGEN, a survivability model, proved valuable for the survivability research. Sample results are presented and several recommendations are also given for each of the three areas investigated under this study: reliability, supportability and survivability. GRA

N86-20659# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
FORCE-PULSE TESTS OF TACTICAL COMMUNICATION EQUIPMENT Final Report
Roger D. Crowson and Frederick Safford Sep. 1985 232 p
(AD-A162421; WES/TR/SL-85-6) Avail: NTIS HC A11/MF A01 CSCL 14/2

A unique test device as been developed and has been shown to be an effective means of subjecting electronic equipment to biaxial acceleration levels that might be encountered in a battlefield condition. The pulse generator can develop simultaneously a 10,000-lb force vertically and horizontally. Test articles of up to 100 lb have been tested in a rack-mounted system to acceleration levels of 2000 g's. Several mechanical limitations have been identified (i.e., tool chatter) and research has been suggested to broaden the field of application of the pulser. GRA

N86-20660# Fondazione Ugo Bordoni, Rome (Italy).
EXPERIMENTAL EVALUATION OF TWO METHODS TO DETERMINE FORMANT FREQUENCIES USING LINEAR PREDICTION CORRELATION ANALYSIS [VALUTAZIONE SPERIMENTALE DI DUE METODI PER IL TRACCIAMENTO DELLE FREQUENZE FORMANTI BASATI SU ANALISI LPC]
Alessandro Falaschi and Germana Banci Dec. 1984 36 p refs In ITALIAN; ENGLISH summary
(FUB-20-1984) Avail: NTIS HC A03/MF A01

Frequency analysis methods for speech recognition are discussed. One method identifies the physical parameters (poles) of the autoregressive model, while the other uses the spectral estimate obtained by linear prediction analysis. Application examples and graphic representation of the obtained results are presented. Both methods are found equivalent to identify the resonances, but the poles method is easier to handle. The choice of the optimum prediction order remains a problem in both cases. Author (ESA)

N86-20661# Fondazione Ugo Bordoni, Rome (Italy).
OPTIMIZATION CRITERIA FOR MOBILE RADIO SYSTEMS [CRITERI DI OTTIMIZZAZIONE NEI SISTEMI RADIOMOBILI]
Gabriele Falciasecca (Bologna Univ., Italy) Dec. 1984 34 p refs In ITALIAN
(FUB-21-1984) Avail: NTIS HC A03/MF A01

A procedure to optimize mobile radio systems which takes in account user requirements and technical limitations is presented. The factors examined include cost, quality, spectrum utilization, and error probability. The optimization regarding frequency utilization should be considered independent of the cost optimization. The role of research centers in providing up to date information to planning centers is pointed out. Author (ESA)

N86-20662# Fondazione Ugo Bordoni, Rome (Italy).
PROBLEMS RELATED TO ECHO CANCELLATION IN DIGITAL TELEPHONE TRANSMISSIONS [PROBLEMI ATTINENTI ALLA CANCELLAZIONE D'ECO NELLA TRASMISSIONE NUMERICA SU DOPPINO D'UTENTE]
Odoardo Brugia, Salvatore Improta (FATME Spa.), and Romolo Pietroiusti (SIP) Dec. 1984 20 p refs In ITALIAN
(FUB-26-1984) Avail: NTIS HC A02/MF A01

Echo cancellation techniques application to two-wire digital telephone communication is discussed. The model described includes an adaptive transverse filter, a correlation algorithm, and a stochastic iterative algorithm. The criteria for parameter choice are examined. It is shown that this choice influences the convergence rate of the algorithm. Author (ESA)

N86-20663# Fondazione Ugo Bordoni, Rome (Italy).
ANALYSIS OF SYNTHETIC AND VOICE SIGNALS USING EVOLUTIONARY PARAMETRIC METHODS [ANALISI DI SEGNALI SINTETICI E VOCALI MEDIANTE METODI PARAMETRICI EVOLUTIVI]
Giuseppe Martinelli (Rome Univ., Italy), Gianni Orlandi (Rome Univ., Italy), and Lucio PrinaRicotti Dec. 1984 21 p refs In ITALIAN
(FUB-28-1984) Avail: NTIS HC A02/MF A01

Unsteady autoregressive models are discussed. The coefficients of the model may evolve with time following a law described by a linear combination of an orthogonal function set. Using the least squares method, the coefficients of the linear combination of the temporal functions can be obtained by solving a linear equation system. Parameter estimation is similar to the steady autoregressive case, but for the same regression order the number of parameters is multiplied by the number of temporal functions. An implementation of the evolutionary parametric method is applied to voice signals and synthetic signals. The examples show the advantages of the method. Author (ESA)

N86-20664# Institute for Telecommunication Sciences, Boulder, Colo.
LOCAL NETWORK ASSESSMENT
D. V. Glen Apr. 1985 135 p Sponsored by Army
(PB85-217883; NTIA-85/174) Avail: NTIS HC A07/MF A01 CSCL 17B

Local networks, related standards activities of the Institute of Electrical and Electronics Engineers the American National Standards Institute and other elements are presented. These elements include: (1) technology choices such as topology, transmission media, and access protocols; (2) descriptions of standards for the 802 local area networks (LAN's); high speed local networks (HSLN's) and military specification local networks; and (3) intra- and internetworking using bridges and gateways with protocols Interconnection (OSI) reference model. The convergence of LAN/PBX technology is also described. GRA

N86-20665# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT
24 Jan. 1986 146 p refs Transl. into ENGLISH from various East European articles
(JPRS-EER-86-010) Avail: NTIS HC A07/MF A01

Progress in the strategical, local and international relations, and international dissemination by East European countries is reported. Topics discussed include: agriculture, economy, military technology, policies, and developments in science and technology. For individual titles, see N86-20666 through N86-20666.

N86-20666# Joint Publications Research Service, Arlington, Va.
DIGITAL PROCESSING OF RADAR SIGNALS DETAILED
J. Schuster and R. Roemer *In its* East Europe Report (JPRS-EER-860010) 24 Jan. 1986 p 129-141 refs Transl. into ENGLISH from Militaertechnik (East Berlin, East Germany), no. 4, 1985 p 190-193 (For primary document see N86-20665 11-32)
Avail: NTIS HC A07/MF A01

The development of the digital signal processing technology is discussed. Radar signal processing in particular has taken advantage of the procedure and achieved greater dynamic ranges, possibilities of more accurate adjustement of processing parameters to the transmission characteristics of the radar instruments and a higher degree of stability in the parameters than would have been possible with analog technology. The advantages of digital processing are enumerated, they include great accuracy and reproducibility, high reliability, small size and weight, and decreased energy requirements. E.A.K.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-20667 Vermont Univ., Burlington.
BASE AND COLLECTOR CURRENT MECHANISMS IN BIPOLAR NPN GALLIUM ALUMINUM ARSENIDE/GALLIUM ARSENIDE HETEROJUNCTION TRANSISTORS Ph.D. Thesis
Robert Joseph Ferro 1985 91 p
Avail: Univ. Microfilms Order No. DA8517451

Described is an experimental study of the components that are found in the base and collector currents of bipolar Ga sub 1-y Al sub y As(N)-GaAs(PN) heterojunction transistors that are made with liquid phase epitaxy (LPE). The subscript y in Ga sub 1-y Al sub y As denotes the aluminum mole fraction in the emitter material. Reviews of the theories of current flow by diffusion and drift, recombination through band-gap states in the depletion regions and at the interface, tunneling, and tunneling-recombination involving band gap states are first presented. The experimental dependence of base and collector current on base-emitter voltage V sub BE and temperature are used to identify the nature of the current flow in five LPE heterotransistors built with different doping levels, emitter aluminum concentrations, and degrees of graduality in the heterojunction. A relationship is found between the natures of the base and collector currents and both are discovered to be strongly dependent on the graduality of the heterojunction. Author

N86-20668* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AUTOMATIC OSCILLATOR FREQUENCY CONTROL SYSTEM Patent
Stephen F. Smith, inventor (to NASA) (Smith (Stephen F.), Knoxville, Tenn.) Issued 29 Oct. 1985 15 p Filed 6 Sep. 1983 Sponsored by NASA
(NASA-Case-GSC-12804-1; US-Patent-4,550,292;
US-Patent-Appl-SN-529803; US-Patent-Class-331-2;
US-Patent-Class-331-1-A) Avail: US Patent and Trademark Office CSCL 09C

A frequency control system makes an initial correction of the frequency of its own timing circuit after comparison against a frequency of known accuracy and then sequentially checks and corrects the frequencies of several voltage controlled local oscillator circuits. The timing circuit initiates the machine cycles of a central processing unit which applies a frequency index to an input register in a modulo-sum frequency divider stage and enables a multiplexer to clock an accumulator register in the divider stage with a cyclical signal derived from the oscillator circuit being checked. Upon expiration of the interval, the processing unit compares the remainder held as the contents of the accumulator against a stored zero error constant and applies an appropriate correction word to a correction stage to shift the frequency of the oscillator being checked. A signal from the accumulator register may be used to drive a phase plane ROM and, with periodic shifts in the applied frequency index, to provide frequency shift keying of the resultant output signal. Interposition of a phase adder between the accumulator register and phase plane ROM permits phase shift keying of the output signal by periodic variation in the value of a phase index applied to one input of the phase adder.
Official Gazette of the U.S. Patent and Trademark Office

N86-20669* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ROTATABLE ELECTRIC CABLE CONNECTING SYSTEM Patent
David R. Manges, inventor (to NASA) 24 Sep. 1985 9 p Filed 23 May 1984
(NASA-Case-GSC-12899-1; US-Patent-4,542,858;
US-Patent-Appl-SN-613140; US-Patent-Class-242-54-R;
US-Patent-Class-242-107; US-Patent-Class-191-12.2-R) Avail: US Patent and Trademark Office CSCL 09A

A cable reel assembly is described which is particularly adapted for, but not limited to, a system for providing electrical connection of power and data signals between an orbiter vehicle, such as a space shuttle, and a recovered satellite. The assembly is comprised of two mutually opposing ring type structures having 180 deg relative rotation with one of the structures being held in fixed position while the other structure is rotatable. Motor controlled berthing latches and umbilical cable connectors for the satellite are located on the rim of the rotatable ring structure. The electrical cable assembly is fed in two sections from the orbiter vehicle into the outer rim portion of the fixed ring structure where they are directed inwardly and attached to two concentrically coiled metal bands whose respective ends are secured to inner and outer post members of circular sets of guide pins located on opposing circular plate members, one rotatable and one fixed. The cable sections are fed out as three output cable sections through openings in the central portion of the circular plate of the rotatable ring structure where they are directed to the latches and connectors located on its rim.
Official Gazette of the U.S. Patent and Trademark Office

N86-20670* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AMPLIFIER FOR MEASURING LOW-LEVEL SIGNALS IN THE PRESENCE OF HIGH COMMON MODE VOLTAGE Patent
Fred E. Lukens, inventor (to NASA) (Martin Marietta Corp., Denver, Colo.) Issued 5 Nov. 1985 7 p Filed 7 Aug. 1984 Sponsored by NASA
(NASA-Case-MFS-25868-1; US-Patent-4,551,687;
US-Patent-Appl-SN-638584; US-Patent-Class-330-258;
US-Patent-Class-330-311; US-Patent-Class-330-261) Avail: US Patent and Trademark Office

A high common mode rejection differential amplifier wherein two serially arranged Darlington amplifier stages are employed and any common mode voltage is divided between them by a resistance network. The input to the first Darlington amplifier stage is coupled to a signal input resistor via an amplifier which isolates the input and presents a high impedance across this resistor. The output of the second Darlington stage is transposed in scale via an amplifier stage which has its input a biasing circuit which effects a finite biasing of the two Darlington amplifier stages.
Official Gazette of the U.S. Patent and Trademark Office

N86-20671* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PIEZOELECTRIC DEICING DEVICE Patent
Robert C. Finke and Bruce A. Banks, inventors (to NASA) Issued 8 Oct. 1985 5 p Filed 7 Aug. 1984 Continuation of abandoned US-Patent-Appl-SN-469867, filed 25 Feb. 1983
(NASA-Case-LEW-13773-2; US-Patent-4,545,553;
US-Patent-Appl-SN-638541; US-Patent-Class-244-134-D;
US-Patent-Class-39-25.35; US-Patent-Class-310-324) Avail: US Patent and Trademark Office CSCL 09A

A fast voltage pulse is applied to a transducer which comprises a composite of multiple layers of alternately polarized piezoelectric material. These layers are bonded together and positioned over the curved leading edge of an aircraft wing structure. Each layer

is relatively thin and metallized on both sides. The strain produced in the transducer causes the composite to push forward resulting in detachment and breakup of ice on the leading edge of the aircraft wing.

Official Gazette of the U.S. Patent and Trademark Office

N86-20672* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HYBRID POWER SEMICONDUCTOR Patent
Dan Y. Chen Issued 15 Oct. 1985 5 p Filed 30 Sep. 1983
(NASA-Case-LEW-13922-1; US-Patent-4,547,686;
US-Patent-Appl-SN-537614; US-Patent-Class-307-570;
US-Patent-Class-307-264; US-Patent-Class-307-270;
US-Patent-Class-307-566; US-Patent-Class-307-572) Avail: US Patent and Trademark Office CSCL 09A

The voltage rating of a bipolar transistor may be greatly extended while at the same time reducing its switching time by operating it in conjunction with FETs in a hybrid circuit. One FET is used to drive the bipolar transistor while the other FET is connected in series with the transistor and an inductive load. Both FETs are turned on or off by a single drive signal of load power, the second FET upon ceasing conductions, rendering one power electrode of the bipolar transistor open. Means are provided to dissipate currents which flow after the bipolar transistor is rendered nonconducting.

Official Gazette of the U.S. Patent and Trademark Office

N86-20673*# National Aeronautics and Space Administration. Pasadena Office, Calif.
FERRORESONANT REGULATED POWER SUPPLY Patent Application
W. T. McLyman, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 24 Dec. 1984 12 p
(Contract NAS7-918)
(NASA-Case-NPO-15977-1-CU; NAS 1.71:NPO-15977-1-CU;
US-Patent-Appl-SN-692740) Avail: NTIS HC A02/MF A01 CSCL 10B

A voltage controlled oscillator which drives a switching circuit for dc-to-ac conversion of dc power is presented. The dc-to-ac converter operates into a ferroresonant voltage stabilizer which limits the amplitude of ac voltage that is then rectified and filtered. A sample of the dc voltage output is compared with a reference and fed back as an error signal to alter the frequency of the oscillator, and thus alter the voltage limiting level of the ferroresonant voltage stabilizer as a linear function of frequency for tight control of the output voltage. NASA

N86-20674 Rensselaer Polytechnic Inst., Troy, N.Y.
THEORETICAL STUDY OF SMALL-SIGNAL TRANSPORT AND NOISE IN SEMICONDUCTORS AT HIGH ELECTRIC FIELDS Ph.D. Thesis
Amitava Chatterjee 1985 195 p
Avail: Univ. Microfilms Order No. DA8519485

The advancement of semiconductor technology has progressively reduced the space and time scales for electron motion in modern devices to a point where a basic understanding of the related physical effects is mandatory for a realistic analysis or simulation of the electrical behavior of these devices. Here, the effect of a high electric field on the small signal transport and electrical noise in silicon and gallium arsenide is examined, theoretically, based on the displaced Maxwellian solution to the Boltzmann transport equation. A small signal circuit model is developed for silicon. Nyquist's formula for thermal noise is used to study the effect of electric field on noise power and power pectral density, and to relate the small signal transient and frequency response to the velocity autocovariance function. Thermal and intervalley noise power spectral density and microwave mobility in gallium arsenide are calculated for various field strengths. The observed high frequency limit to negative differential resistance and the maximum in the current noise power spectral density versus electric field curve are explained.

Dissert. Abstr.

N86-20675 Department of the Air Force, Washington, D.C.
PLL SWEPT FREQUENCY GENERATOR WITH PROGRAMMABLE SWEEP RATE Patent
Edwin B. Smith and John R. Fogleboch, Sr., inventors (to Air Force) Issued 8 Oct. 1985 5 p Supersedes AD-D010302
(AD-D011957; US-Patent-4,546,328; US-Patent-Appl-SN-497447;
US-Patent-Class-331-4) Avail: US Patent and Trademark Office CSCL 09/5

This document discusses a phase-locked voltage controlled oscillator for generating frequency modulated waveforms having a programmable digital RF phase shifter to determine the phase difference between the output signal and a phase corrected reference signal to thereby generate the desired output waveform. Author (GRA)

N86-20676 Department of the Air Force, Washington, D.C.
METHOD FOR ASSEMBLING A MULTICONDUCTOR FLAT CABLE Patent
Edward A. Escallier, Stanley R. Dawson, and Joseph M. Shaheen, inventors (to Air Force) Issued 22 Oct. 1985 7 p Supersedes AD-D009632
(AD-D011962; US-Patent-4,548,661; US-Patent-Appl-SN-375640;
US-Patent-Class-156-52) Avail: US Patent and Trademark Office CSCL 09/1

A multiconductor flat cable incorporates an approximately right angle turn in its conductor runs. The right angle turn is provided by first securing the conductor runs in a desired spacing through a first lamination of insulation cover and base sheets while leaving portions of the conductor runs exposed through a window in the first lamination. The first lamination is then severed at the lateral edges of the window so that an end portion of the first lamination may be moved 90% relative to a remaining body portion thereto. The right angle turn is then secured by forming a second lamination with cover and base layers so as to overlap the first lamination and the turn in the conductor runs. GRA

N86-20677# National Aerospace Lab., Tokyo (Japan).
COVARIANCE SPECIFICATION FOR THE LINEAR TIME-INVARIANT OUTPUT-FEEDBACK CONTROL SYSTEMS USING A KALMAN FILTER
Masahiko Nagayasu 1985 16 p refs In JAPANESE; ENGLISH summary
(NAL-TR-882; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The covariance specification problem using a Kalman filter for the linear time-invariant output-feedback control system contaminated by observation and system noise is described. The optimal output-feedback control using a Kalman filter with which the stationary state covariance matrix coincides with the prescribed matrix is discussed. The system is disturbed by additive white/color system noise and the output signal is contaminated by white observation noise. Using a Kalman filter, the dynamic output feedback control system was obtained. The covariance specification problem, i.e., to obtain the optimal feedback gains under the requirements of the state covariance coinciding with the prescribed covariance for minimizing the control effort, is solved. The control problem of an aircraft in the atmospheric turbulence is discussed as a numerical example. Author

N86-20678*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF UHF RADIOMETER
Bruce M. Kendall, Hans-Juergen C. Blume, and Aubrey E. Cross Dec. 1985 58 p refs
(NASA-TP-2504; L-16006; NAS 1.60:2504) Avail: NTIS HC A04/MF A01 CSCL 09A

A wideband multifrequency UHF radiometer was initially developed to operate in the 500 to 710 MHz frequency range for the remote measurement of ocean water salinity. However, radio-frequency interference required a reconfiguration to operate in the single-frequency radio astronomy band of 608 to 614 MHz. Details of the radiometer development and testing are described. Flight testing over variable terrain provided a performance comparison of the UHF radiometer with an L-band radiometer for

remote sensing of geophysical parameters. Although theoretically more sensitive, the UHF radiometer was found to be less desirable in practice than the L-band radiometer. Author

N86-20679*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROGRAMMABLE ELECTRONIC SYNTHESIZED CAPACITANCE Patent Application
Leonard L. Kleinberg, inventor (to NASA) Filed 15 Jul. 1985 15 p
(NASA-Case-GSC-12961-1; NAS 1.71:GSC-12961-1;
US-Patent-Appl-SN-754707) Avail: NTIS HC A02/MF A01 CSCL 09A

A predetermined and veriable synthesized capacitance which may be incorporated into the resonant portion of an electronic oscillator for the purpose of tuning the oscillator comprises a programmable operational amplifier circuit. The operational amplifier circuit has its output connected to its inverting input, in a follower configuration, by a network which is low impedance at the operational frequency of the circuit. The output of the operational amplifier is also connected to the noninverting input by a capacitor. The noninverting input appears as a synthesized capacitance which may be varied with a variation in gain-bandwidth product of the operational amplifier circuit. The gain-bandwidth product may, in turn, be varied with a variation in input set current with a digital to analog converter whose output is varied with a command word. The output impedance of the circuit may also be varied by the output set current. This circuit may provide very small ranges in oscillator frequency with relatively large control votages unaffected by noise. NASA

N86-20680*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHOD AND APPARATUS FOR REBALANCING A REDOX FLOW CELL SYSTEM Patent Application
Randall F. Gahn, inventor (to NASA) Filed 25 Jun. 1985 11 p
(NASA-Case-LEW-14127-1; NAS 1.71:LEW-14127-1;
US-Patent-Appl-SN-748536) Avail: NTIS HC A02/MF A01 CSCL 09A

A rebalance cell is provided for a REDOX electrochemical system of the type with anode and cathode fluids which are aqueous HC1 solutions with two metal species in each. The rebalance cell has a cathode compartment and a chlorine compartment separated by an ion permeable membrane. By applying an electrical potential to the rebalance cell while circulating cathode fluid through the cathode compartment and while circulating an identical fluid through the chlorine compartment, any significant imbalance of the REDOX system is prevented. NASA

N86-20681*# National Aeronautics and Space Administration. Pasadena Office, Calif.
BRUSHLESS DC MOTOR CONTROL SYSTEM RESPONSIVE TO CONTROL SIGNALS GENERATED BY A COMPUTER OR THE LIKE Patent Application
Douglas T. Packard, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 26 Apr. 1985 39 p
(Contract NAS7-100)
(NASA-Case-NPO-16420-1; NAS 1.71:NPO-16420-1;
US-Patent-Appl-SN-727838) Avail: NTIS HC A03/MF A01 CSCL 09A

A control system for a brushless DC motor responsive to digital control signals is disclosed. The motor includes a multiphase wound stator and a permanent magnet rotor. The motor is arranged so that each phase winding, when energized from a DC source, will drive the rotor through a predetermined angular position or step. A commutation signal generator responsive to the shaft position provides a commutation signal for each winding. A programmable control signal generator such as a computer or microprocessor produces individual digital control signals for each phase winding. The control signals and commutation signals associated with each winding are applied to an AND gate for that phase winding. Each gate controls a switch connected in series with the associated phase winding and the DC source so that each phase winding is energized only when the commutation signal and the control signal associated with that phase winding are present. The motor shaft may be advanced one step at a time to a desired position by applying a predetermined number of control signals in the proper sequence to the AND gates and the torque generated by the motor be regulated by applying a separate control signal and each AND gate which is pulse width modulated to control the total time that each switch connects its associated winding to the DC source during each commutation period. NASA

N86-20682*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FOUR QUADRANT CONTROL CIRCUIT FOR A BRUSHLESS THREE PHASE dc MOTOR Patent Application
Frank Nola, inventor (to NASA) Filed 13 Sep. 1985 30 p
(NASA-Case-MFS-28080-1; NAS 1.71:MFS-28080-1;
US-Patent-Appl-SN-775548) Avail: NTIS HC A03/MF A01 CSCL 09A

A control circuit is provided for a brushless three-phase dc motor which afforts four quadrant control a single command. The control circuit probes acceleration of the motor in both clockwise and counterclockwise directions and braking and generation in both clockwise and counterclockwise directions. In addition to turning on individual transistors of the transistor pairs connected to the phase windings of the motor for 120 deg periods while the other transistor of that pair is off, the control circuit also provides, in a further mode of operation, turning the two transistors of each pair on and off alternately at a phase modulation frequency during such a 120 deg period. A feedback signal is derived which is proportional to the motor current and which has a polarity consistent with the command signal, such that negative feedback results. NASA

N86-20683# Maryland Univ., College Park. Dept. of Physics and Astronomy.
ELECTRONIC FEEDBACK CONTROL OF MASS-SPRING SYSTEMS
Q. Kong Sep. 1985 114 p
(Contract DACA72-84-C-0004)
(AD-A160691; ETL-0398) Avail: NTIS HC A06/MF A01 CSCL 20/11

This thesis develops an electronic system for the control of motion of different types of active springs, thus improving the performance of mass-spring systems. A mathematical analysis is carried out for various types of active springs. Also, this thesis discusses future design for improving the performance of these electronic circuits to achieve even better performance of mass-spring systems. Josephson junction, mass-spring system, SQUID amplifier, and Wide-band accelerometers are discussed. GRA

N86-20684# Utah Univ., Salt Lake City. Dept. of Bioengineering.
SUSPENDED GATE FIELD EFFECT TRANSISTOR MODIFIED WITH POLYPYRROLE AS ALCOHOL SENSOR Interim Technical Report
Mira Josowicz and Jiri Janata 31 Oct. 1985 37 p
(Contract N00014-81-K-0664)
(AD-A160988; TR-7) Avail: NTIS HC A03/MF A01 CSCL 09/1

A generic type of new type of solid state gas sensor is described which uses change of electron work function of a chemically sensitive layer in response to interaction with a gas or vapor. It is shown that if this layer is electrochemically deposited polypyrrole the device responds to lower aliphatic alcohols. The new sensor operates at room temperature and has time response in seconds. GRA

N86-20685# Carnegie-Mellon Univ., Pittsburgh, Pa.
A PROGRAM OF RESEARCH ON MICROFABRICATION TECHNIQUES FOR VLSI MAGNETIC DEVICES Final Report, 1 Oct. 1983 - 30 Sep. 1984
Mark H. Kryder, M. Alex, J. Artman, L. Bauer, and R. Campbell Nov. 1984 296 p
(Grant AF-AFOSR-0284-80)

(AD-A161271; AFOSR-85-0900TR) Avail: NTIS HC A13/MF A01 CSCL 09/5

New materials, new fabrication techniques and new device structures for high density magnetic bubble devices were developed. The main focus of the work has been to develop ion implanted contiguous disk devices offering sixteen times the bit density of presently manufactured bubble devices and chip capacities of 64 Mbit. Under this contract the authors developed a computer program for modeling magnetic bubble garnet materials and have applied it to the design of bubble materials having isotropic magnetostriction. They have previously shown that such materials would provide better device operating characteristics. During the past year they also modeled the anisotropic stresses around ion implanted propagation patterns and showed how they produce non-uniform anisotropies due to magnetostrictive effects. GRA

N86-20686# Illinois Univ., Urbana. Coordinated Science Lab.
ANALYSIS OF PULSE PROPAGATION IN COUPLED MICROSTRIP TRANSMISSION LINES
J. E. Schutt-aine and R. Mittra Mar. 1985 74 p
(Contract N00014-84-C-0149)
(AD-A161431; R-1036; UILU-ENG-85-2211) Avail: NTIS HC A04/MF A01 CSCL 09/5

In this report the problem of propagation of high speed pulses is considered. The purpose of this analysis is to investigate effects such as RC delays, reflection cross-coupling or cross talk, etc., in coupled microstrip lines. Two-, three-, and coupled N-line configurations are considered under various conditions of terminations. GRA

N86-20687# Illinois Univ., Urbana. Electromagnetic Communication Lab.
MILLIMETER-WAVE INTEGRATED CIRCUITS Final Report, 15 Mar. 1982 - 20 Aug. 1985
Raj Mittra Oct. 1985 104 p
(Contract DAAG29-82-K-0084)
(AD-A161444; UIEC-85-8; UILU-ENG-85-2568; ARO-18054.16-EL) Avail: NTIS HC A06/MF A01 CSCL 09/5

In this report, a number of topics are considered that concern printed circuits and printed circuit discontinuities. First, propagating and evanescent modes of a shielded microstrip are calculated using the spectral Galerkin technique. The characteristic impedance and field configurations of these modes are also calculated. These modes are then used in a mode matching technique, in order to calculate the scattering from abrupt discominuities in the microstrip. Results are given for various configurations of single and cascaded discontinuities. Next, the singular interval equation technique is used as an alternative to the spectral Galerkin technique, to calculate modes in a shielded microstrip. These results are compared to those generated by the spectral Galerkin technique. Finally, the coupling between multiple transmission lines is considered by using the coupled-mode theory. Results for the propagation constants of the various modes of propagation, as well as for the transfer of current from one line to the next, are presented. GRA

N86-20688# Technical Univ. of Denmark, Lyngby. Lab. of Applied Mathematical Physics.
NON-LINEAR WAVE PHENOMENA IN JOSEPHSON ELEMENTS FOR SUPERCONDUCTING ELECTRONICS Final Report, Apr. - Jun. 1985
P. L. Christiansen, R. D. Parmentier, and O. Skovgaard Jul. 1985 80 p
(Contract DAJA37-82-C-0057; DA Proj. 1T1-61102-BH-57)
(AD-A161544) Avail: NTIS HC A05/MF A01 CSCL 09/3

The long and intermediate length Josephson tunnel junction oscillator with overlap geometry of linear and circular configuration, is investigated by computational solution of the perturbed sine-Gordon equation model and by experimental measurements. The model predicts the experimental results very well. Line oscillators as well as ring oscillators are treated. For long junctions soliton perturbation methods are developed and turn out to be efficient prediction tools, also providing physical understanding of the dynamics of the oscillator. For intermediate length junctions expansions in terms of linear cavity modes reduce computational costs. The narrow linewidth of the electromagnetic radiation (typically 1 kHz of a line at 10 GHz) is demonstrated experimentally. Corresponding computer simulations requiring a relative accuracy of less than 10 to the -7th power are performed on supercomputer CRAY-1-S. The broadening of linewidth due to external microradiation and internal thermal noise is determined. GRA

N86-20689# Oak Ridge National Lab., Tenn.
MECHANICAL PRETHINNING AND THINNING OF UNIQUE MATERIALS FOR TEM
C. P. Haltom 1985 3 p Presented at the Joint Meeting of the Electron Microscopy Society of America and the Microbeam Analysis Society, Louisville, Ky., 5 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-016598; CONF-850840-15) Avail: NTIS HC A02/MF A01

A mechanical dimpling device and ion milling have been used to prepare transmission electron microscopy (TEM) specimens of Al2O3 spheres overcoated with pyrocarbon and SiC. Tensile specimens of partially stabilized zirconia were also prepared for fracturing in an electron microscopy. DOE

N86-20690# Sandia National Labs., Albuquerque, N. Mex. Power Flow Research Div.
IMPEDANCE EFFECTS ON ANODE FORMATION OF MICROPARTICLES IN AN ELECTRON-BEAM DIODE
Eoin W. Gray and Larry F. Rinehart 1985 5 p refs Conference held at undisclosed location
(Contract DE-AC04-76DP-00789)
(DE85-012862; SAND-84-2513C; CONF-850616-9) Avail: NTIS HC A02/MF A01

Anode interactions in electron-beam diodes cannot be ignored. A second impedance level in a microsecond pulse, electron-beam diode with a carbon cathode was identified. Production of spherical microparticles was also observed. These particles range in size from 0.2 to 60 micron diameter and their dimensions obey the Rossin-Rammler distribution. These particles do not appear to be able to penetrate far enough into the vacuum space to participate in the bipolar flow on a micron time scale. However, they can damage the electron support structures and cause spurious discharges on subsequent operation. Possible formation mechanisms of the spherical particles are presented. E.A.K.

N86-20691# Brookhaven National Lab., Upton, N. Y.
DEVELOPMENT OF SUPERCONDUCTING POWER TRANSMISSION TECHNOLOGY
E. B. Forsyth 1985 42 p
(Contract DE-AC02-76CH-00016)
(DE85-016054; BNL-36743) Avail: NTIS HC A03/MF A01

Superconducting power transmission cables are the latest innovation in a technology which is as old as electric power engineering. Distribution of power by means of wires suspended from poles was tried briefly but the densely populated areas chosen as sites for the early generators soon forced the distribution system underground. Edison's low voltage dc system was a technological dead-end but by 1890 Ferranti had built a 7 mile-long underground cable system which operated at the then unprecedented level of 10,000 V, alternating current. Ferranti was remarkably prescient in his choice of wrapped brown paper for the cable insulation, a material which has continued to be used in this application until the present day. Paper was chosen for the insulation because it gave good operating performance at low cost compared to other insulating materials then available, such as rubber and gutta percha. Economic considerations must be weighed carefully in the design of underground power transmission systems and they have been a compelling factor in the pattern of development from the turn of the century to the advanced superconducting systems under test in the 1980's. DOE

N86-20692# Wisconsin Univ., Madison. Dept. of Nuclear Engineering.
MODELING AMBIPOLAR POTENTIAL FORMATION DUE TO ICRF HEATING EFFECTS ON ELECTRONS
J. W. Johnson, J. D. Callen, and N. Hershkowitz Aug. 1985 24 p
(Contract DE-AC02-80ER-53104)
(DE85-018047; DOE/ER-53104/T4; UWPR-85-4) Avail: NTIS HC A02/MF A01

A mechanism for the potential bump observed near the region of ICRF heating in the endplugs of the Phaedrus tandem mirror experiment is investigated by numerical simulation of electron orbits in a simple mirror geometry. Given initial magnetic and ambipolar potential wells that trap the electrons, the near field parallel electric field E-tilde(sub z)e(sup -i(LC OMEGA)t), which is localized near and due to the ICRF heating, tends to eject electrons from the region where E-tilde (sub z) is nonzero. This depletion of the local electron population causes a local increase in the ambipolar potential. The rate at which the electrons are ejected, (dn/dt), is calculated from the electron orbit computation for a given potential well depth. The rate at which passing particles fill in the potential well can also be calculated. For Phaedrus parameters (n0 approx. = 4.0 x 10 to the 12th power cu cm, T sub e) = 20 eV, E-tilde (sub z) approx. = 1.0 V/cm) the electron pumping rate balances the filling rate at a potential well depth of approximately 40 V, consistent with experimental results. DOE

N86-20693# Utah Univ., Salt Lake City. Earth Sciences Lab.
VERY LOW FREQUENCY MAGNETOTELLURIC AND DIPOLE-DIPOLE RESPONSES OF THREE-DIMENSIONAL THIN-LAYER RESISTIVITY STRUCTURE MODELED USING FINITE ELEMENTS
P. E. Wannamaker Sep. 1985 36 p refs
(Contract DE-AC03-84SF-12196)
(DE86-002011; DOE/SAN-12196/14; ESL-159) Avail: NTIS HC A03/MF A01

An algorithm to simulate the very low frequency magnetotelluric and dipole-dipole responses of three-dimensional thin-layer inhomogeneity has been developed from an existing finite element program used to simulate resistivity/IP signatures of 2-D earth sections. The 3-D body is confined to and extends uniformly across a thin layer overlain by air and underlain by infinite resistivity. Electric fields are obtained through differentiation of piecewise parabolas fit to nodal voltages while magnetic fields arise from integration of the free-space Green's tensor over secondary current perturbations throughout the thin layer. Dipole-dipole apparent resistivities arise through application to nodal voltages of the logarithmic geometric factors appropriate to continuously grounded line sources of current. Checks on accuracy of the simulation utilize analytic solutions, 2-D AC plane-wave results using finite elements, and a surface integral equations technique. DOE

N86-20694# Sandia National Labs., Albuquerque, N. Mex.
STABILITY AND GROWTH OF LENNARD-JONES STRAINED LAYER SUPERLATTICE INTERFACES
B. W. Dodson 1985 5 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE85-012348; SAND-84-1188C; CONF-851217-1) Avail: NTIS HC A02/MF A01

In the context of a model system whose atoms interact via Lennard-Jones (LJ) interatomic potentials, we have studied the stability of an initially perfect strained layer superlattice interface (SLS) and the process of growth of a mismatched layer on a substrate using Monte Carlo techniques. An initially perfect SLS interface is found to be metastable up to 12% mismatch, a much higher value than is found in real SLS systems. In contrast, we find that, within the limitations of the calculations, a perfect SLS interface cannot be grown in an LJ system. The implications of these results for understanding SLS growth processes is discussed. DOE

N86-20695# Los Alamos National Lab., N. Mex.
OBSERVATION OF HIGH-POWER MILLIMETER WAVE EMISSION FROM A VIRTUAL CATHODE
H. A. Davis, R. R. Bartsch, E. G. Sherwood, R. M. Stringfield, and L. E. Thode 1985 10 p Presented at the International Conference on Infrared and Millimeter Waves, Lake Buena Vista, Fla., 8 Dec. 1985
(Contract W-7405-eng-36)
(DE86-000799; LA-UR-85-3452; CONF-851238-1) Avail: NTIS HC A02/MF A01

Intense bursts of mm wave power have been observed in microwave generation experiments with a relativistic electron beam (REB) virtual cathode oscillator. In this device an electron beam is injected into a drift space at a current above the space-charge-limit, and a potential develops downstream which is large enough to reflect electrons back to the source region. Two mechanisms can give rise to microwave oscillations in a virtual cathode device: electrons reflexing between the real and virtual cathodes, and oscillations in the amplitude and position of the virtual cathode. Typically both mechanisms are present, but in the present experiments reflexing has been shown to be dominant. DOE

N86-20696# Oak Ridge National Lab., Tenn.
THEORY OF THE AC RESPONSE OF ROUGH INTERFACES
S. H. Liu, T. Kaplan, and L. J. Gray Sep. 1985 8 p Presented at the 6th International Symposium on fractals in Physics, Trieste, Italy, 9 Jul. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001359; CONF-850797-1) Avail: NTIS HC A02/MF A01

It has been known for six decades that the small signal ac impedance of the interface between a blocking electrode and an aqueous or solid electrolyte frequently contains a constant-phase-angle (CPA) element whose impedance has the frequency dependance according to Z proportional to (j(LC OMEGA))/sup -eta/, where 0 < eta < 1. In recent years it has been shown experimentally that the exponent eta is related to the roughness of the interface, with eta approaching 1 when the interface is made increasingly smooth. We propose that the CPA originates from the fractal geometry of the rough interface, and derive on the basis of a number of models that eta = 3 - d (sub s), where d (sub s) is the fractal dimension of the interface. DOE

N86-20697# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Technology Div.
STUDY TO ASSESS THE EFFECTS OF ELECTROMAGNETIC PULSE ON ELECTRIC POWER SYSTEMS. PHASE 1: EXECUTIVE SUMMARY
J. R. Legro, N. C. Abi-Samra, J. C. Crouse, A. R. Hileman, V. J. Kruse, E. R. Taylor, Jr., and F. M. Tesche Sep. 1985 50 p
(Contract DE-AC05-84OR-21400)
(DE86-001430; ORNL/Sub-83-43374/1/Vol-1) Avail: NTIS HC A03/MF A01

The high-altitude detonation of a nuclear device over the continental United States can expose electric utility power systems to intense, transient electromagnetic pulses (EMP). In addition to the initial transient fields designated as early-time, high-altitude EMP and intermediate-time, high-altitude EMP, electromagnetic signals are also produced at times from seconds to hundreds of seconds after the burst. Nuclear detonations at or near the Earth's surface can also produce transient EMP. This volume presents an executive summary of the preliminary research effort to investigate the nature and coupling of EMP environments to electric power systems, define the construction of approximate system response models, and document the development of a methodology to assess equipment and system vulnerability. The research to date does not include an attempt to quantify power system performance in EMP environments. This effort has been to define the analytical methods and techniques necessary to conduct such assessments at a later time. DOE

N86-20698# Sandia National Labs., Albuquerque, N. Mex.
PHOTONIC MEASUREMENTS OF MICROWAVE PULSES
W. F. Filter, J. Chang, C. O. Landron, and D. J. Muron 1985

6 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001714; SAND-85-0694C; CONF-850887-40) Avail: NTIS HC A02/MF A01

A photonic free space microwave frequency has been successfully demonstrated at the Sandia High Power Microwave facility. This sensor, which uses the Pockels effect, is a miniature dielectric device that was constructed from electro-optic and fiber-optic components. In this sensor, an incident pulsed microwave electric field modulates a carrier laser beam at the microwave frequency. The depth of modulation is proportional to the field strength. Since the bandwidth of the detected signal exceeds that of conventional transient signal digitizers, a prototype High Speed Multichannel Data Recorder that was developed is used. This instrument employs a high bandwidth streak camera to record the sensor signal in real time, without the need for downmixing. Because it is small and dielectric, the sensor is non-perturbing. Its input and output leads are fiber-optic and therefore immune to electromagnetic interference. Because the sensor is broadband, the pulse can be Fourier transformed to a power spectrum. DOE

N86-20699# Lawrence Livermore National Lab., Calif.
INDUCTIVE VOLTAGE DIVIDER
P. C. Wheeler 23 Aug. 1985 20 p
(Contract W-7405-eng-48)
(DE86-001776; UCID-20521) Avail: NTIS HC A02/MF A01

A new diagnostic for measuring pulsed high voltage is proposed, and its characteristics are discussed. The device consists of a small helical coil having a measurable, relatively constant inductance, L. A nearby probe measured I-dot, the time rate of change of current carried by the coil. The voltage to be measured is then the product L times I-dot. This paper discusses the constraints imposed by time resolution and by the necessity to prevent turn-to-turn flashover. DOE

N86-20700# Massachusetts Inst. of Tech., Cambridge. Lab. for Electromagnetic and Electronic Systems.
VARIABLE-RELUCTANCE MOTOR DRIVES FOR ELECTRIC VEHICLE PROPULSION Ph.D. Thesis Final Report
J. H. Lang and F. J. Vallese 1 May 1985 217 p Sponsored in part by DOE/JPL, Pasadena, Calif.
(Grant NAG3-257; Contract DE-AI01-78CS-54209)
(NASA-CR-176566; JPL-9950-1037; NAS 1.26:176566; DE85-017585; DOE/CS-54209) Avail: NTIS HC A10/MF A01 CSCL 09A

A methodology is presented for the design of a variable reluctance motor drive having high specific torque, power output and efficiency. Models are developed that describe the magnetic terminal relations of the VRM. These models are based on a flux-tube analysis that is motivated by numerically obtained finite-difference magnetic simulations. The result is a model for the flux-linkage/phase-current characteristic of the VRM. Intrinsic to this model is the estimation of maximum and minimum inductance as well the incremental inductance during bulk saturation. Also fundamental is the behavior of the flux linkage during local pole-tip saturation and due to bulk core saturation. The drive-oriented treatment of modelling and design uncovered important design interactions between the VRM, its inverter, and its excitation. The experimental 3.8-kW drive operated as expected, verifying the models and the design optimizations developed for VRM drives. These experimental results were projected to the 60-kW level, indicating that a 60-kW drive could be constructed with a VRM having a mass of approximately 65 kg, and an efficiency in excess of 95% at and below peak power output. DOE

N86-20701# Brookhaven National Lab., Upton, N. Y.
TUNING THE RF CAVITY BY USING A DETUNING LOOP
Y. M. Wang, J. Keane, and K. Batchelor Sep. 1985 8 p
(Contract DE-AC02-76CH-00016)
(DE86-001179; BNL-37082) Avail: NTIS HC A02/MF A01

The tuning of the RF cavity with a coupling loop connected to a variable capacitor or an open or shorted coaxial line is described. Two kinds of equivalent circuits are described and some of the calculations of delta f and Q vs capacitance curves are given. At 52 MHz the maximum practical tuning range is about 100 KHz, if the parameters of tuning circuit are chosen properly so that the Q of the accelerating cavity does not decrease too much. DOE

N86-20702# Kema N.V., Arnhem (Netherlands). Dept. of Physical Research.
EXPERIMENTS ON DIELECTRIC RECOVERY OF SWITCHING ARCS
W. R. Rutgers, A. H. vanderWey, and A. J. vanLoon, ed. 1985 14 p refs
(S/T-Rept-Vol-3-No-3; ISBN-90-353-0027-0; ISSN-0167-8590) Avail: NTIS HC A02/MF A01

An experimental facility to investigate the extinction of switching arcs in various gases was built. The temporal evolution of the arc diameter, density, temperature, and withstand voltage were studied during extinction of high-current arc discharges in argon, nitrogen, air and carbon-dioxide gases. The gas column in the early afterglow during the recovery phase can be described as a variable resistance and later as a dielectric gas. The value of the resistance depends on recombination processes and is mainly determined by gas pressure and gas composition. The breakdown strength in the late afterglow depends on gas-temperature (or neutral density) decay and on the remaining degree of ionization. Author (ESA)

N86-20703# Research Inst. of National Defence, Linkoeping (Sweden).
MICROWAVE TUBES. LITERATURE SURVEY NO. 6 COMPRISING YEAR 1984
Lennart Lundgren Oct. 1985 131 p refs
(FOA-C-30406-E; ISSN-0347-3708) Avail: NTIS HC A07/MF A01; Research Inst. of National Defence KR 50

Literature on conventional microwave tubes including gyrotrons, orotrons and reflex triodes was surveyed. References on free electron masers and other concepts of generating or amplifying microwave power indicate the state of the art and the trends of future development. Technological issues like electron guns, cathodes, and electron beams up to 6W level are also included. Author (ESA)

N86-20704# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
29 Dec. 1985 55 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-039) Avail: NTIS HC A04/MF A01

Progress in East European science and technology is reported. Topics discussed include: international cooperation in standardization, technology utilization, computer applacations, industrial development, microelectronics, electrical engineering training, computer aided design and computer assisted education, integrated circuits, and vibration proof devices in the mining industry. For individual titles, see N86-20705 through N86-20705.

N86-20705# Joint Publications Research Service, Arlington, Va.
TRENDS IN MICROELECTRONICS DEVELOPMENT, APPLICATIONS
R. Koestner *In its* East Europe Report: Science and Technology (JPRS-ESA-85-039) 29 Dec. 1985 p 12-30 refs Transl. into ENGLISH from Nachrichtentechnik-Elektronik (East Berlin, East Germany), v. 35, no. 9, Sep. 1985 p 322-327 (For primary document see N86-20704 11-33)
Avail: NTIS HC A04/MF A01

Scientific-technical development is characterized by elaboration and application of new technologies based on the principles of chemistry and physics. The microelectronic technology focuses on the highly efficient production of electronic circuits. Microelectronics makes possible the production of electronic circuits of heretofore unattainable complexity and reliability and at quite favorable costs. The reliability of the microelectronic application with the qualitative changes in the cost/performance ratio stimulates its applications to data processing and industry.

Microelectronic products are characterized by a distant increase in functional value with a simultaneous decline in expense. Integrated circuit (IC) adaptation are manufactured and users are interested in the microelectronics. Author

N86-20618# Army Defense Ammunition Center and School, Savanna, Ill.
INTRINSICALLY SAFE ELECTRICAL CIRCUITS: THEIR APPLICATION IN EXPLOSIVE ENVIRONMENTS
K. W. Proper *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 645-664 (For primary document see N86-20589 11-31) (AD-P004851) Avail: NTIS HC A99/MF E03 CSCL 19/4

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-20706 Princeton Univ., N. J.
POINT VORTEX INTERACTIONS Ph.D. Thesis
Ambady Suresh 1985 145 p
Avail: Univ. Microfilms Order No. DA8515880

The dynamics of point vortices with a view towards the onset of chaos in these systems were studied. It was conjectured that for a given geometry and external flow, a chaotic threshold N* exists such that N<N* Quasiperiodic Motion N>N* Chaotic Motion where N is the number of vortices. The conjecture (and the determination of N*) for a few special cases is proven. The existence of Horseshoes in the Poincare map of the perturbed system via Melnikov function technique are shown. Such a chaotic threshold suggests the nonintegrability of the two dimensional Euler Equations, in which the vortex equations are imbedded. It is shown that a vortex moving in a bounded, simply connected region of the plane has precisely one equilibrium point that is elliptic and Liapunov stable. The problem of two vortices inside a circle is solved exactly and the role of Morse theory in estimating special solutions is illustrated. Dissert. Abstr.

N86-20707 Michigan Univ., Ann Arbor.
THERMAL INSTABILITIES IN POROUS MEDIA Ph.D. Thesis
Douglas Wayne Stamps 1985 163 p
Avail: Univ. Microfilms Order No. DA8520991

The permanently unsteady fluctuating natural convective state is described or a fluid which saturates a cube of porous medium with constant temperature top and bottom and insulated vertical sides having an initially linear temperature distribution. Four regimes exist as the Rayleigh number increases. The first regime is the conduction state. The second regime is the steady natural convective state which begins at the Rayleigh number 4 pi(2). The third regime is the permanently unsteady regularly fluctuating convective state which begins at a Rayleigh number between 550 and 600. It is characterized by periodic variations in the Nusselt number with time in which the frequency of the variations increases with increasing Rayleigh numbers. The fourth regime is the permanently unsteady irregularly fluctuating convective state which begins at a Rayleigh number between 625 and 650. It is characterized by random variations in the Nusselt number with time and the range of frequencies increases with increasing Rayleigh numbers. Dissert. Abstr.

N86-20708 Illinois Univ., Urbana-Champaign.
AN EXPERIMENTAL INVESTIGATION OF THE SHOCK WAVE TURBULENT BOUNDARY LAYER INTERACTION Ph.D. Thesis
David William Kuntz 1985 287 p
Avail: Univ. Microfilms Order No. DA8521811

Interaction between a shock wave and a turbulent boundary layer was studied. The boundary layer was formed on the floor of a wind tunnel and compression corner models were used to generate the oblique shock wave. Full range of possible flowfields, including flow with no separation, flow with incipient separation, and flow with a significant amount of separation were generated. Measurement techniques used included Schlieren photography, surface static pressure measurement, surface streak pattern measurement, and laser Doppler velocimetry. The results of the LDV measurements indicated that the boundary layer was significantly altered by the interaction. Several features of the redeveloping flow, including high rates of boundary layer growth, large Reynolds stress values, and large turbulent triple product values, indicated the presence of large scale turbulent structures within the turbulent boundary layers downstream of the shock wave boundary layer interactions. Dissert. Abstr.

N86-20709 Cornell Univ., Ithaca, N.Y.
SECOND-ORDER MODELING OF TURBULENT REACTING FLOWS WITH INTERMITTENCY AND CONDITIONAL AVERAGING Ph.D. Thesis
Jyh-Yuan Chen 1985 201 p
Avail: Univ. Microfilms Order No. DA8516980

A rational approach to incorporate the effects of intermittency into a second-order closure scheme for turbulent thin-shear reacting flows is developed in this study. Equations for the intermittency and conditioned statistics are derived using a conventional averaging with the effects of variable density appearing in a first order expansion form. A second-order closure scheme is presented with an emphasis on the terms resulting from the interactions between conditioned zones. A modified Patankar-Spalding numerical method is developed to give better numerical stability. Both equilibrium and nonequilibrium thermodynamic models are considered with a special interest in the prediction of nitric oxide formation. The approach of using combined variables and a second scalar to describe the effects of nonequilibrium is presented in full detail. Calculations of turbulent thin-shear flows with and without combustion agree fairly well with the data available in the literature. Dissert. Abstr.

N86-20710 Rice Univ., Houston, Tex.
SEQUENTIAL GRADIENT-RESTORATION ALGORTHIM FOR OPTIMAL CONTROL PROBLEMS WITH CONTROL INEQUALITY CONSTRAINTS AND GENERAL BOUNDARY CONDITIONS Ph.D. Thesis
Estelle Mathilda Coker 1985 100 p
Avail: Univ. Microfilms Order No. DA8517188

The problem of minimizing a functional 1 subject to differential constraints, control inequality constraints, and terminal constraints is considered in this thesis. It consists of finding the state x(t), the control u(t), and the parameter pi so that the functional is minimized, while the constraints are satisfied to a predetermined accuracy. A sequential gradient-restoration algorithm is developed. It involves a sequence of two-phase cycles, the gradient phase and the restoration phase. In the gradient phase, the value of the functional is decreased, while avoiding excessive constraint violation; in the restoration phase, the constraint error is decreased, while avoiding excessive change in the value of the functional. The variations delta x(t), delta u(t), delta pi are generated by requiring the first variation of the augmented functional J to be negative during the gradient phase; and by requiring the first variation of the constraint error P to be negative, while imposing a least-square criterion on the variations of the control, the parameter, and the initial state during the restoration phase. Dissert. Abstr.

N86-20711 Michigan Univ., Ann Arbor.
NUMERICAL SIMULATION OF VISCOELASTIC FLOWS OF POLYMER FLUIDS Ph.D. Thesis
Mark Victor Bower 1985 193 p
Avail: Univ. Microfilms Order No. DA8520874

Numerical techniques for the simulation of two typical viscoelastic flows of polymer fluids are presented. Flow in an orthogonal rheometer, which is a shear dominated, and the flow of a tubular membrane under simultaneous inflation and extension, which is

extension dominated. The BKZ model is used in the simulations. The effect of inertia on the flow in an orthogonal rheometer was determined. The governing equations reduce to a two point boundary value problem in spatial variables. Time effects drop out due to the steady flow. The governing equations are solved using a Runge-Kutta technique with the associated shooting procedure done by Broyden's method. Since the flow in a tubular membrane is unsteady the problem reduces to a system of partial differential-integral equations with two point boundary conditions in the spatial variable. The equations are solved in the spatial variable at each time using an Adams method with the associated shooting problem done by Broyden's method. Dissert. Abstr.

N86-20712 California Inst. of Tech., Pasadena.
LASER DOPPLER VELOCITY AND VORTICITY MEASUREMENTS IN TURBULENT SHEAR LAYERS Ph.D. Thesis
Daniel Bernard Lang 1985 209 p
Avail: Univ. Microfilms Order No. DA8519549

A Laser Doppler velocimeter (LDV) system was developed to measure the instantaneous spanwise vorticity, -omega (sub z), in a turbulent shear layer. It was necessary to design and fabricate the LDV optics and processing electronics, as no commercially available LDV systems met the specifications of measuring the velocity of four closely spaced points to the requisite accuracy. Measurements were also made of the instantaneous u, v, u prime, v prime, and - u prime v prime. The instantaneous vorticity was processed to obtain an estimate of its probability density function, from which the mean and rms values were estimated. It was also possible to separate the irrotational fraction of the flow from the rotational (intermittent) fraction of the flow. The development of the intermittency profiles, based on vorticity, as a function of the downstream distance from the splitter plate was studied. A notable feature is that the vorticity is found to have values opposite the mean sense of rotation, a significant fraction of the time.
Dissert. Abstr.

N86-20713 Minnesota Univ., Minneapolis.
DEVELOPMENT AND EVALUATION OF ITERATIVE AND DIRECT METHODS FOR THE SOLUTION OF THE EQUATIONS GOVERNING RECIRCULATING FLOWS Ph.D. Thesis
Mark Edward Eraaten 1985 294 p
Avail: Univ. Microfilms Order No. DA8519309

Existing numerical methods were evaluated for the solution of the equations governing recirculating flows, and to develop new methods that are more reliable, rapidly convergent, and computationally efficient than the existing methods. A number of widely used finite difference methods, including SIMPLE, SIMPLEC, SIMPLEST, and SIMPLER, were carefully examined. These methods solve the flow equations in a decoupled sequential manner using standard iterative solvers. A number of new methods that employ direct sparse matrix techniques to solve the flow equations were developed. Three new direct methods, denoted as UVP, PENALTY, and NR-PENALTY, solve the momentum and continuity equations simultaneously over the full domain. The performance of the various methods was tested on some steady two dimensional recirculating flows, over a range of grid sizes and Reynolds numbers. The direct spares matrix methods were found to be much more rapidly convergent and more computationally efficient than the existing iterative procedures. Dissert. Abstr.

N86-20714 Brown Univ., Providence, R. I.
DIRECT AND INVERSE PROBLEMS IN GAS DYNAMICS Ph.D. Thesis
Prabir Kumar Daripa 1985 105 p
Avail: Univ. Microfilms Order No. DA8519825

Three problems in computational fluid dynamics are considered. Steady, inviscid, irrotational flow of a perfect gas in two dimensions is considered in the tangent gas approximation. A fast and accurate method of solution is proposed and solved numerically. Comparison of tangent gas and exact flows are presented. Tangent gas solutions, when used as the first step in the iterative solution of the exact flowfield, are shown to give substantial reduction in computational time. The inverse problem in the tangent gas approximation is considered. An exact method in this approximation for designing airfoils is presented. A simple numerical algorithm which is fast and accurate is presented. Comparison of designed airfoils using the tangent gas method with exact Euler results is found to be excellent for subcritical and slightly supercritical flows. An exact inverse method for designing airfoils is presented. The inverse problem is formulated in terms of a boundary value problem in speed only and the body angle is computed from the boundary estimate of the normal derivative of speed. Closure constraints are not imposed thus allowing the designed airfoil to be an open body. Dissert. Abstr.

N86-20715 British Library Lending Div., Boston Spa (England).
THE CRITICAL DIMENSIONS OF BODIES IN UNSTEADY THERMAL CONDUCTIVITY PROBLEMS
S. Z. Sapozhnikov and S. L. Krupetskii [1985] 8 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 6, 1985 p 123-127
(BLLD-M-36552-Trans-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The heating of plate, cylindrical and spherical shaped bodies in heat bearing media was considered, arriving at equations for the effectiveness of heating (amounts of heat absorbed). The use of the equations is illustrated by an example of heating quasi-spherical particles of iron powder in a layer of pseudo-liquefied corundum; the particle size with which the heat absorbed is minimum is found. As particle size increases, heating becomes rapidly less effective. The concept of the critical size of a body should be used in selecting the optimum heating conditions. Assimilation of heat is lowest with low values of the Fourier criterion. Author

N86-20716 British Library Lending Div., Boston Spa (England).
RADIATIVE HEAT EXCHANGE IN CYLINDRICAL CAVITY WITH ALLOWANCE FOR HEAT LOSSES THROUGH SIDE WALL
Yu. A. Popov and F. R. Shklyar [1985] 9 p refs
(BLLD-M-36553-Trans-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The problem of heat exchange in a cylindrical chamber with adiabatic walls and an arbitrary number of screens is examined. A simple algorithm is developed for solving the problem of heat losses from the black isothermal base of a round cylinder to the cold base and to the side walls. Author

N86-20717 Illinois Univ., Chicago.
MIXED CONVECTION AROUND A HORIZONTAL CYLINDER Ph.D. Thesis
Rashid A. Ahmad 1985 155 p
Avail: Univ. Microfilms Order No. DA8511263

An analysis and experimental investigation of combined forced and natural convection (mixed convection) heat transfer from a horizontal cylinder dissipating a uniform heat flux is carried out. The ambient medium is taken to be air with Pr = 0.7. The analysis considered the full Navier-Stokes equations describing a two-dimensional mixed flow. The numerical analysis covered the ranges of Reynolds numbers 1 < or = Re sub D < or = 60 and Grashof numbers 0 < or = Gr sub d < or = 1.6 x 10 to the 4th power. The forced convection results for 1 < or = Re sub d < or = 60 were correlated and compared with theoretical results and with other experimental correlations. The correlation is given by Nu bar sub D sub f = 0.8160 Re sub D sup 0.3939. To conduct experimnets, an open return wind tunnel was designed and fabricated. Although the tunnel is capable of producing a forced flow at any arbitrary direction, only cross-flow geometry was considered. The forced flow was varied from 1.4 m/sec to 8 m/sec. At each flow velocity the surface heat flux was varied to cover a range of Gr sub D*. Author

N86-20718 Department of the Air Force, Washington, D.C.
SONIC FLOW PLATE Patent
Nelson E. Jones, inventor (to Air Force) Issued 15 Oct. 1985 8 p Supersedes AD-D009423
(AD-D011954; US-Patent-4,547,884; US-Patent-Appl-SN-366743;

US-Patent-Class-372-58) Avail: US Patent and Trademark Office CSCL 20/4

This patent discloses a sonic flow plate assembly for controlling the mass flow rate of gases by use of the sonic choking phenomenon. Identical gas flow control plate portions, each containing a plurality of nozzles formed by the smooth internal surface of vertical passageways is in the shape of a hollow inverted truncated cone with bases in communication with hollow cylinders. Each plate portion, including the passageways therein, are molded from a fiberglass composite. The connected plate portions are secured in place by transversely positioned tension rods. GRA

N86-20719 British Aerospace Aircraft Group, Preston (England). Wind-Tunnel Dept.

INVESTIGATION INTO TEST RIG INTERFERENCE ON THE Q66 5-HOLE PROBE CALIBRATIONS USING THE BAe WARTON Mk II PANEL PROGRAM

A. P. Winstanley 1 Jun. 1983 31 p

(BAe-ARG-178) Copyright. Avail: Issuing Activity

A panel program was used to confirm that residual flow angles measured with a set of five hole probes are essentially due to the support assembly. The program detects support induced flow angularity at tips of up to 1 deg at high angles of support attitude. The program predicted upwash and sidewash trends agree with experimental observations, although the panel program underestimates the magnitude of the flow angularities.

Author (ESA)

N86-20720*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STUDIES OF CONDENSATION EFFECTS ON AIRFOIL TESTING IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL

Robert M. Hall Jan. 1986 34 p refs Previously announced in IAA as A85-19603

(NASA-TP-2509; L-16021; NAS 1.60:2509) Avail: NTIS HC A03/MF A01 CSCL 20D

In the context of an overall development of transonic, cryogenic wnd tunnel technology, NASA has been investigating the onset of condensation effects in nitrogen gas. The temperature at which condensation occurs determines the minimum operating temperature (MOT) of cryogenic tunnels. The apparatus and airfoils are discussed, taking into account a description of the 0.3-m Transonic Cryogenic Tunnel (TCT), the drag rake, the airfoils, and the technique used for determining the onset of condensation effects. Attention is also given to the types of nucleation processes, the relative sensitivity of drag rake and surface pressure measurements, correlations between data and theory, the prediction of minimum operating temperatures for the 0.3-m TCT, and MOT's for different tunnels. G.R. (IAA)

N86-20721*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

PUMPED TWO-PHASE HEAT TRANSFER LOOP Patent Application

Fred Edelstein, inventor (to NASA) (Grumman Aerospace Corp., Bethpage, N.Y.) Filed 15 Jul. 1985 16 p Sponsored by NASA

(NASA-Case-MSC-20841-1; NAS 1.71:MSC-20841-1; US-Patent-Appl-SN-755288) Avail: NTIS HC A02/MF A01 CSCL 20D

A pumped loop two-phase heat transfer system is presented. The system operates at a nearly constant temperature throughout, and includes a pluarity of independently operating grooved capillary heat exchanger plates supplied with working fluid through independent flow modulation valves connected to a liquid supply line, a vapor line for collecting vapor from the heat exchangers, a condenser between the vapor and the liquid lines, and a fluid circulating pump between the condenser and the heat exchanges. NASA

N86-20722*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abteilung Turbulenzforschung.

SHEAR LAYER EXCITATION, EXPERIMENT VERSUS THEORY

Dietrich W. Bechert and Bernhard Stahl 1984 86 p refs

(Grant NAG3-198)

(NASA-CR-176604; NAS 1.26:176604; DFVLR-FB-84-26) Avail: NTIS HC A05/MF A01

The acoustical excitation of shear layers is investigated. Acoustical excitation causes the so-called orderly structures in shear layers and jets. Also, the deviations in the spreading rate between different shear layer experiments are due to the same excitation mechanism. Measurements in the linear interaction region close to the edge from which the shear layer is shed are examined. Two sets of experiments (Houston 1981 and Berlin 1983/84) are discussed. The measurements were carried out with shear layers in air using hot wire anemometers and microphones. The agreement between these measurements and the theory is good. Even details of the fluctuating flow field correspond to theoretical predictions, such as the local occurrence of negative phase speeds. Author

N86-20723# National Aeronautical Lab., Bangalore (India). Fluid Mechanics Div.

A NOTE ON A CLASS OF EXACT SOLUTIONS IN INVISCID ROTATIONAL FLOWS

P. N. Shankar May 1984 3 p

(AEL-FM-TM-84-4) Avail: NTIS HC A02/MF A01

The inviscid rotational flow field about an infinite cylinder of arbitrary cross-section is determined when the free stream velocity has a component perpendicular to the generators of the cylinder and arbitrary nonuniform component parallel to the generators.

Author

N86-20724*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

APPLICATION OF A RUNGE-KUTTA SCHEME FOR HIGH-SPEED INVISCID INTERNAL FLOWS Final Report

Anutosh Moitra (SASC Technologies, Inc., Hampton, Va.), Eli Turkel, and Ajay Kumar Jan. 1986 26 p refs Previously announced as A86-19968

(Contracts NAS1-17070; NAS1-18107)

(NASA-CR-178053; ICASE-86-5; NAS 1.26:178053) Avail: NTIS HC A03/MF A01 CSCL 20D

A multi-stage Runge-Kutta method is analyzed for solving the two-dimensional Euler equations for external and internal flow problems. Subsonic, supersonic and, highly supersonic flows are studied. Various techniques for accelerating the convergence to a steady state are described and analyzed. Effects of the grid aspect ratio on the rate of convergence are evaluated. An enthalpy damping technique applicable to supersonic flows is described in detail. Numerical results for supersonic flows containing both oblique and normal shocks are presented confirming the efficiency of the method. Author

N86-20725# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aeromechanics Div.

VISCOUS AND INTERACTING FLOW FIELD EFFECTS: PROCEEDINGS OF THE 9TH US AIR FORCE AND THE FEDERAL REPUBLIC OF GERMANY DATA EXCHANGE AGREEMENT MEETING Technical Report, May 1982 - May 1984

Anthony W. Fiore Aug. 1984 306 p refs Meeting held in Silver Spring, Md., 9-10 May 1984

(AD-A153020; AFWAL-84-3099) Avail: NTIS HC A14/MF A01 CSCL 20/4

In 1975 the U.S. Air Force and the Federal Republic of Germany signed a Data Exchange Agreement numbered AF-75-G-7440 titled Viscous and Interacting Flow Field Effects. The purpose was to exchange data in the area of boundary layer research. It included both experimental and theoretical boundary layer research at speeds from subsonic to hypersonic Mach numbers in the presence of laminar, transitional, and turbulent boundary layers. The main effort, in recent years, has been on turbulent boundary layers; both attached and separated. The research presented here report covers the period May 1982 to May 1984 with the results presented on 9 to 10 May 1984 at the Naval Surface Weapons Center in Silver Springs, Maryland. In the United States the research was

conducted in the Department of Defense, NASA and various Aircraft Corporations and Universities. In the Federal Republic of Germany, it was done in the DFVLR - AVA and various Companies and Universities. For individual titles, see N86-20726 through N86-20739.

N86-20726# Mississippi State Univ., Mississippi State.
A DISCRETE ELEMENT PREDICTION APPROACH FOR TURBULENT FLOW OVER ROUGH SURFACES
R. P. Taylor, H. W. Coleman, and B. K. Hodge *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 1-11 (For primary document see N86-20725 11-34)
(AD-P004787) Avail: NTIS HC A14/MF A01 CSCL 20/4

A discrete element model for turbulent flow over rough surfaces has been rigorously derived from basic principles. This model includes surface roughness effects as a constitutent part of the partial differential equations which describe momentum and energy transport in turbulent flows. The model includes the necessary empirical information on the interaction between the roughness elements and the flow around and between the elements in a general way which does not require experimental data on each specific surface. This empirical information is input via algebraic models for the local element drag coefficient and Nusselt number. These models were calibrated by comparison with base data sets from surfaces with three-dimensional (distributed) roughness elements. Calculations using the present model have been compared with experimental data from 118 separate experimental runs. The results of these comparisons ranged from good to excellent. The calculations compared equally well with both transitionally rough and fully rough turbulent flow results without modification of the roughness model. GRA

N86-20727# Boeing Commercial Airplane Co., Seattle, Wash.
SHOCK/BOUNDARY-LAYER INTERACTION MODEL FOR THREE-DIMENSIONAL TRANSONIC FLOW CALCULATIONS
J. D. McLean and T. K. Matoi *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 45-77 (For primary document see N86-20725 11-34)
(AD-P004788) Avail: NTIS HC A14/MF A01 CSCL 20/4

A new computational model for three-dimensional shock-boundary layer interaction has been developed for use in viscous transonic flow calculations. In general, the new model has been found to be an improvement over the old method in which the boundary-layer equations are simply integrated through the shock. The basic empirical content of the method was tested against detailed boundary-layer measurements in two-dimensional transonic airfoil flows, and the new model was found, in general, to give better agreement with experiment. The new model has also been tested in coupled viscous-inviscid interaction calculations for wings and for nacelles. GRA

N86-20728# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
BOUNDARY SEPARATION DUE TO WEAK AND STRONG VISCOUS-INVISCID INTERACTION ON AN INCLINED BODY OF REVOLUTION
H. U. Meier and H. P. Kreplin *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 79-76 (For primary document see N86-20725 11-34)
(AD-P004789) Avail: NTIS HC A14/MF A01 CSCL 20/4

Detailed measurements in three-dimensional boundary layers and separated flow fields, developing on a prolate spheroid and flow visualizations are presented. The discussion is concentrated on the possible topological structure of separation patterns resulting from laminar on turbulent boundary layer flows at different Reynolds numbers. Author (GRA)

N86-20729# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
EXPERIMENTAL STUDY OF VORTICAL FEATURES IN THREE-DIMENSIONAL SEPARATED FLOWS
H. Bippes *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 97-117 (For primary document see N86-20725 11-34)
(AD-P004790) Avail: NTIS HC A14/MF A01 CSCL 20/4

Possible topological structures of three-dimensional separated flows are studied on a hemisphere-cylinder at incidence. By means of a systematic variation of flow parameters a manifold of skin-friction patterns is produced. It is established that they develop from three basic structures simply by successive splitting of saddles in saddle-node-saddle combinations. The adjoining spatial flow field is visualized in low Reynolds number water tunnel flow, where similar kind of skin friction pattern develops as in fully turbulent flow. Velocity field measurements in the separated region on a rectangular wing indicate that on both models a similar topological structure, including unsteady effects, is possible. Author (GRA)

N86-20730*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AXISYMMETRIC BLUFF-BODY DRAG REDUCTION THROUGH GEOMETRICAL MODIFICATIONS
F. G. Howard and W. L. Goodman *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 119-129 (For primary document see N86-20725 11-34)
(AD-P004791) Avail: NTIS HC A14/MF A01 CSCL 20D

The effect of shoulder radiusing and grooving (longitudinally or circumferentially) the afterbodies of bluff bodies of reduce the base drag at low speeds is discussed. Shoulder radii as large as 2.75 body diameters are examined. Reynolds number based on body diameter varied from 20,000 to 200,000. Results indicate that increasing the shoulder radius to 2.75 body diameters can reduce the drag levels to those of a streamline body having 67 percent greater fineness ratio. For the relatively sharp shoulder case, body drag reductions as large as 50% are obtained using circumferential or longitudinal grooves. Author (GRA)

N86-20731# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
EXPERIMENTAL INVESTIGATIONS ON BODIES WITH NONCIRCULAR CROSS SECTIONS IN COMPRESSIBLE FLOW (PRESSURE DISTRIBUTIONS)
W. Schneider *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 131-153 (For primary document see N86-20725 11-34)
(AD-P004792) Avail: NTIS HC A14/MF A01 CSCL 20/4

The present results were obtained in a continuation of extensive investigations on bodies with noncircular cross sections. Such bodies became important for various payload transport missions of missiles rather than for their smaller radar signature. The objective of these studies is to get a better insight into the complex flow phenomena and to provide a useful data base for theoretical efforts in this area. Author (GRA)

N86-20732# Naval Surface Weapons Center, Silver Spring, Md.
MACH 3 THREE-DIMENSIONAL BOUNDARY LAYER TURBULENCE TRANSPORT PROPERTIES ON A SPHERICALLY BLUNT CONE
D. W. Ausherman and W. J. Yanta *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 155-178 (For primary document see N86-20725 11-34)
(AD-P004793) Avail: NTIS HC A14/MF A01 CSCL 20/4

Three-dimensional boundary layer measurements were carried out on a 7-degree semi-vertex angle conical body configuration for angles-of-attack of 0 deg, 2 deg, and 4 deg in the NSWC Supersonic Tunnel Number Two. Tests were conducted at a freestream Mach number of 3 for a nominal freestream Reynold number of 2.3 x 1000000/ft (7.5 x 1000000/m) on a cone with a nominal 22% spherically blunt nose. Measurements of the three mean velocity component, turbulence, intensities, and Reynolds stresses were obtained at various circumferential locations around the body for one axial station using a 3-D Laser Doppler Velocimeter system. In addition, surface Preston probe and static pressure measurements were obtained at five axial stations along the body. The effects of angle-of-attack and model roll position on the three-dimensional mean velocities, boundary layer turbulence properties, and surface parameters are discussed herein. Author (GRA)

N86-20733# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

AN EXPERIMENTAL INVESTIGATION OF THE STABILITY OF THE LAMINAR BOUNDARY LAYER ON A CONE AT m=8

K. F. Stetson, E. R. Thompson, J. C. Donaldson, and J. G. Siler *In its* Viscous and Interacting Flow Field Effects Aug. 1984 p 179-186 (For primary document see N86-20725 11-34)

(AD-P004794) Avail: NTIS HC A14/MF A01 CSCL 20/4

The stability of the laminar boundary layer on a 7-degree half angle cone at M infinity = 8 was experimentally investigated using hot-wire anemometry techniques. The principle instability of the hypersonic boundary layer was associated with second mode disturbances. The frequency of the most amplified disturbances was directly related to the boundary layer thickness. Small nosetip bluntness was found to make significant changes, compared to a sharp cone, in the stability characteristics of the boundary layer. GRA

N86-20734# Naval Surface Weapons Center, Silver Spring, Md.

BOUNDARY-LAYER TRANSITION ON BLUNT SLENDER CONES AT MACH 10

R. L. Bell *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 187-205 (For primary document see N86-20725 11-34)

(AD-P004795) Avail: NTIS HC A14/MF A01 CSCL 20/4

Investigations of the effects of nose blunting on the location of boundary-layer transition on slender cones at supersonic or hypersonic speeds so back 25 years. For some time it was thought that the movement of the transition point was simply due to the reduction in local Reynolds number associated with the loss in total pressure through the bow shock. More recently, it has been shown that variations in the local transition Reynolds number also occur on a blunt cone and that both these effects must be taken into account in explaining the observed movement in transition along the cone frustum. The present investigation was carried out as a demonstration test for the development of a new capability in Hypervelocity Tunnel 9 at the Naval Surface Weapon Center. The objective of this development effort was to raise the Reynolds number at mach 10 from about 5 x 1000000 per foot to 20 x 1000000 per foot. This was done so that naturally turbulent boundary layers (i.e., without tripping) could be obtained on R/V models. Thus an investigation of boundary layer transition was an appropriate choice for the demonstration test. GRA

N86-20735# Naval Surface Weapons Center, Silver Spring, Md.

LOW REYNOLDS NUMBER HYPERSONIC TESTING IN THE NSWC HYPERVELOCITY WIND TUNNEL 9

E. R. Hedlund, W. C. Ragsdale, and R. L. P. Voisinet *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 207-241 (For primary document see N86-20725 11-34)

(AD-P004796) Avail: NTIS HC A14/MF A01 CSCL 20D

The capabilities of the NSWC Hypervelocity Wind Tunnel 9 have been extended to simulate higher altitudes. A second ejector has been installed to allow operation at a supply pressure of 60 psia. Compression heating has been used to increase the supply temperature. High quality flow is obtained in a large core diameter. Static forces and moments on a subscale model have been successfully measured in a series of verification tests. GRA

N86-20736# Ballistic Research Labs., Aberdeen Proving Ground, Md.

NAVIER-STOKES COMPUTATIONS OF TRANSONIC FLOW OVER A PROJECTILE WITH A TWO-EQUATION MODEL OF TURBULENCE

J. Sahu and J. E. Darberg *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 243-256 (For primary document see N86-20725 11-34)

(AD-P004797) Avail: NTIS HC A14/MF A01 CSCL 20/4

A thin-layer Navier-Stokes code has been used to compute the axisymmetric turbulent flow over a projectile at transonic speeds. The thin layer form of the compressible Navier-Stokes equations is solved using a time dependent, implicit numerical algorithm. Numerical computations have been made using aero-equation (algebraic) and two-equation (kinetic energy and length scale) turbulence eddy viscosity models. The algorithm, and how the turbulence models are incorporated into it, are described. Computed results have been obtained for a secant-ogive-cylinder-boattail shape at M infinity = .94 and .97 using both models and are compared with experiment. Author (GRA)

N86-20737# Naval Surface Weapons Center, Silver Spring, Md.

PNS (PARABOLIZED NAVIER-STOKES) COMPUTATIONS FOR NONCIRCULAR AND FINNED BODY CONFIGURATIONS AT SUPERSONIC VELOCITIES

R. U. Jettmar and W. Kordulla *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 257-270 (For primary document see N86-20725 11-34)

(AD-P004798) Avail: NTIS HC A14/MF A01 CSCL 20/4

The Parabolized Navier-Stokes (PNS) equations are used to predict the viscous supersonic flow field over tangent-ogive-cylinder bodies with noncircular cross-section and finned body configurations. Current design interests make it desirable to gain some advanced knowledge of the aerodynamic characteristics of such bodies. Since the solution of the full, unsteady, Reynolds-averaged Navier-Stokes equations has its limitation due to computational resources, considerable interest exist in applying the PNS model to obtain a viscous supersonic flow field over realistic, complex configurations. GRA

N86-20738# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).

EFFECTS OF PROPULSIVE JET ON THE FLOW FIELD IN THE TAIL REGION OF A MISSILE IN A SUPERSONIC STREAM

G. Koppenwallner, D. Rammenzweig, and W. Stahl *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 271-292 (For primary document see N86-20725 11-34)

(AD-P004799) Avail: NTIS HC A14/MF A01 CSCL 02/4

Work concentrated on the effects of an under-expanded supersonic jet on the external supersonic flow past a typical missile configuration. Jet simulation in the wind tunnel was achieved by means of a small Ludwieg tube, which allowed jet operation times of about 0.1 s. The circular cylinder missile model with ogival nose had three different afterbody configurations: cylindrical, and conical boat tailing of 5 deg and 10 deg respectively. The experiments were carried out in the DFVLR High-Speed Wind tunnel at free-stream Mach numbers of Ma infinity = 1.5 and Ma infinity = 1.98; angles of attack were varied between alpha = -4 deg and alpha = 8 deg. Base pressures and pressure distributions on the afterbodies were measured without jet and with jets of various exit-pressure ratios. Schlieren pictures were taken in order to get some insight into the flow field in the tail region of the missile, especially with respect to flow separation. GRA

N86-20739# Ballistic Research Labs., Aberdeen Proving Ground, Md.

NAVIER-STOKES CALCULATIONS OF BASE REGION FLOW FIELDS FOR BODIES OF REVOLUTION

J. Sahu, C. J. Nietubicz, and J. L. Steger *In* AFWAL Viscous and Interacting Flow Field Effects Aug. 1984 p 293-304 (For primary document see N86-20725 11-34)

(AD-P004800) Avail: NTIS HC A14/MF A01 CSCL 20/4

A computational capability has been developed for predicting the entire flow field about bodies of revolution including the base region. The additional complexity of base bleed and base jet effects have also been incorporated into is new capability. The thin-layer form of the compressible Navier-Stokes equations is solved using a time dependent, implicit algorithm. Numerical solutions have been obtained for a secant-ogive-cylinder projectile for $.9 < M < 1.2$ both with and without base bleed. Base drag has been computed and compared with experimental and semi-empirical data. The reduction in base drag with base bleed has been clearly shown for various mass injection rates. Additionally, the effect of a centered propulsive jet on base flow has been computed where the free stream Mach number is 1.343 and the jet exit Mach number is 2.7. Computed results show both qualitative and quantitative features of the base region flow fields. GRA

N86-20740# Wisconsin Univ., Madison.
OPTIMAL CONTROL TECHNIQUES FOR COMPUTING STATIONARY FLOWS OF VISCOELASTIC FLUIDS Technical Summary Report
Patrick LeTallec Aug. 1985 22 p
(Contract DAAG29-80-C-0041)
(AD-A160993; MRC-TSR-2852) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document considers the problem of computing the stationary flows of a viscoelastic fluid flowing through a given domain. The proposed numerical method is based on optimal control techniques, which replace the original equations of the problem by a minimization problem to be solved by a descent method. Such techniques are very powerful and can handle equations which change type, provided that, as done here, one uses an adequate preconditioning strategy and that one computes efficiently the gradient of the function to be minimized.
Author (GRA)

N86-20741# Manchester Coll. of Science and Technology (England). Dept. of Mechanical Engineering.
COMPUTATION OF FLOW AND HEAT TRANSFER IN FLOW AROUND A 180 DEG BEND
B. E. Launder Oct. 1985 132 p
(Contract N00014-83-G-0021)
(AD-A161789) Avail: NTIS HC A07/MF A01 CSCL 20/4

This research year saw the completion of the research on turbulent convective heat transfer in 180 deg bends. The main research effort during the year was directed at bends of circular cross section. Two sections deal with experimental and computational aspects of this work. These are preceded by a brief account of further computational work in the squared-sectional duct. GRA

N86-20742# Argonne National Lab., Ill.
NATURAL CONVECTIVE BEHAVIOR OF EBR-2 FOLLOWING A LOSS OF FLOW FROM DECAY HEAT LEVELS
L. K. Chang, D. Mohr, E. E. Feldman, P. R. Betten, and H. P. Planchon 1985 4 p Presented at the International Symposium on Fundamental Aspects of Gas-liquid Flows, Miami, FL., 17 Nov. 1985
(Contract W-31-109-eng-38)
(DE85-006885; CONF-851103-1) Avail: NTIS HC A02/MF A01

Eight loss-of-flow transients were conducted at initial decay heat levels of 0.75 to 1.6% of the rated EBR-II power. The data indicate that the natural convective flow was adequate to remove the decay heat without overheating the reactor core. Good agreement with NATDEMO and HOTCHAN predictions was obtained.
DOE

N86-20743# Sandia National Labs., Albuquerque, N. Mex.
PROJECTILE AND IMPACTOR DESIGNS FOR PLATE-IMPACT EXPERIMENTS
J. R. Asay, L. C. Chhabildas, and L. M. Barker Oct. 1985 46 p
(Contract DE-AC04-76DP-00789)
(DE86-001680; SAND-85-2009) Avail: NTIS HC A03/MF A01

The use of plate-impact techniques for producing a variety of loading histories in plane wave experiments is discussed. Specific techniques concern direct shock compression, shock compression followed by unloading, shock compression followed by further loading, shock compression followed by unloading and then reloading (cyclic loading), shockless compression (quasi-isentropic loading), and pressure-shear loading. Emphasis is placed on the considerations of projectile and impactor design and the constraints of structural loading during projectile acceleration, which are associated with these loading conditions.
DOE

N86-20744# Los Alamos National Lab., N. Mex.
ELASTIC WAVE SCATTERING METHODS: ASSESSMENTS AND SUGGESTIONS
J. E. Gubernatis 1985 14 p Presented at the Review of Progress in Quantitative NDE, Williamsburg, Virg., 23 Jun. 1985
(Contract W-7405-eng-36)
(DE86-000757; LA-UR-85-3309; CONF-8506110-4) Avail: NTIS HC A02/MF A01

Elastic wave scattering methods were reviewed and assessed for the past ten years to suggest areas of future research opportunities. Developments are highlighted, focusing on distinct steps forward in the theoretical understanding of how elastic waves interact with flaws. For references and illustrative figures, it was decided to use as a principal source the proceedings of the various annual Reviews of Progress in Quantitative Nondestructive Evaluation (NDE). These meetings have been the main forum not only for presenting results of theoretical research but also for demonstrating the relevance of the theoretical research for the design and interpretation of experiment. A quantitative NDE is possible only if this relevance exists, and the major objective is to discuss and illustrate the degree to which relevance has developed.
DOE

N86-20745# Sandia National Labs., Albuquerque, N. Mex.
CALCULATED TRANSIENT TWO-DIMENSIONAL MARANGONI FLOW IN A PULSED-LASER WELD POOL
A. J. Russo 18 Apr. 1985 23 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE85-010671; SAND-85-0225C; CONF-851125-1) Avail: NTIS HC A02/MF A01

Pulsed-laser welding produces short-lived weld pools which have strong radial temperature gradients at the pool surface. These gradients produce surface tension variations which usually reinforce the weak natural convective flows caused by radial temperature gradients. The flow in the molten pool is of interest because it can change the temperature distribution in and around the molten zone which can alter the weld shape, and because it controls the transport of surface contaminants (or alloying or doping materials in case of surface processing) into the substrate. A two-dimensional finite difference code is being developed to model the transient flow in a prescribed axisymmetric weld pool geometry. A flux corrected transport algorithm is used with a vorticity-steamfunction formulation of the problem to calculate the flow field. Flow velocities during a typical laser pulse are presented for nickel and steel.
DOE

N86-20746# Oklahoma Univ., Norman. School of Chemical Engineering and Materials Science.
THERMOPHYSICAL PROPERTIES CORRELATIONS AND PSEUDOCOMPONENT CHARACTERIZATION PARAMETER ESTIMATION FOR FOSSIL FLUIDS Annual Report, 1 Sep. 1984 - 31 Aug. 1985
K. E. Starling, L. L. Lee, R. T. Ellington, S. Watanasiri, M. A. Khan, M. A. Langenberg, M. Mannan, and K. Sheth 1985 51 p
(Contract DE-FG22-83PC-60804)
(DE86-000197; DOE/PC-60804/T8; AR-2) Avail: NTIS HC A04/MF A01

This report summarizes work performed during the period September 1, 1984 through August 31, 1985. During this period, the companion correlations for dilute-gas viscosity and thermal conductivity have been developed. Both correlations are applicable to nonpolar, polar and associating fluids. The correlations require four characterization parameters as input, namely, critical temperature, critical volume, acentric factor, and dipole moment. One important feature of these correlations is that none of the characterization parameters has to be regressed from experimental viscosity or thermal conductivity data. This feature allows for apriori prediction of dilute gas viscosity and thermal conductivity. The correlation for dilute gas viscosity eta0 uses the Chapman-Enskog expression. The main departure from other earlier work on eta0 includes the use of the Stockmayer potential for polar and associating compounds. The dipole moment, along with molecular weight, critical temperature, critical volume and accentric factor, was found to be adequate in characterizing both polar and associating fluids studied in this work. A total of 757 data points were used covering 14 nonpolar, 11 polar, and 7 associative fluids. The overall deviation is 1.37%.
DOE

N86-20747# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
VORTEX GENERATION AT SHARP EDGES: TWO AND THREE-DIMENSIONAL EFFECTS Thesis
D. Auerbach May 1985 88 p refs
(MPIS-12/1985; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlrsuhe, West Germany DM 33

Vortices were generated at straight edges by an impulsively-started flow of water to determine steady and unsteady global aspects of the flow as the edge-angle was varied from 0 to 180 deg; trajectories of the vortex centers in the mid-plane during vortex generation for edge-angles 0 to 145 deg; and vorticity distributions and circulations at the nozzle in the mid-plane for edge-angles 0, 90 and 180 deg. The temporal development of the flow shows 3 phases; an initial phase, in which no vortex generates, the flow remaining attached despite the sharpness of the edge; a vortex-generating phase; and a final phase, which remains steady for a Reynolds number < 3000 for nozzle-type flows and Re $<$ 10,000 for diffusor-type flows. Author (ESA)

N86-20748# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
IMPLEMENTATION OF A PREPROCESSOR FOR A SHOCK WAVE LOADING
J. vanBeest 3 Dec. 1985 18 p refs
(B8575342) Avail: NTIS HC A02/MF A01

Determination of explosion shock wave loading on a structure in the ICES-STRUDL program is outlined. Assuming that the peak overpressure, the duration of the positive phase, and the direction of the shock wave are known, the overpressure at any point of the structure may be determined using the shock wave loading. Author (ESA)

N86-20749# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
UTILIZATION OF THE SYMBOLIC MANIPULATION SYSTEM REDUCE 2 FOR DERIVING EQUATIONS OF MOTION
W. P. Koppens Jul. 1983 24 p refs Sponsored by Stichting voor de Technische Wetenschappen
(VTH-M-477) Avail: NTIS HC A02/MF A01

In order to reduce computing times in direct application of Lagrange's equations for deriving equations of motion with the symbolic manipulation system REDUCE 2, the kinetic energy part in Lagrange's equations was rewritten in terms of global displacements. Formulations for nonlinear equations of motion, linearized equations of motion, and linearized perturbation equations are presented. Derivations based on these formulations lead to acceptable computing times. Two examples of the input data and output data are given. Author (ESA)

N86-20604# Naval Civil Engineering Lab., Port Hueneme, Calif.
EFFECT OF FRANGIBLE PANELS ON INTERNAL GAS PRESSURES
J. E. Tancreto and E. S. Helseth *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 365-394 (For primary document see N86-20589 11-31)
(AD-P004835) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20620# Naval Surface Weapons Center, Silver Spring, Md.
REACTION PROPAGATION ALONG AN ENCLOSED CONVEYOR
P. J. Peckham and M. M. Swisdak, Jr. *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 789-806 (For primary document see N86-20589 11-31)
(AD-P004858) Avail: NTIS HC A99/MF E03 CSCL 19/4

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-20750* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HIGH GRADIENT DIRECTIONAL SOLIDIFICATION FURNACE Patent
Billy R. Aldrich and William D. Whitt, inventor (to NASA) Issued 1 Oct. 1985 9 p Filed 17 Jan. 1984
(NASA-Case-MFS-25963-1; US-Patent-4,544,025; US-Patent-Appl-SN-571614; US-Patent-Class-165-65; US-Patent-Class-165-61; US-Patent-Class-165-30; US-Patent-Class-219-390; US-Patent-Class-219-395; US-Patent-Class-219-396; US-Patent-Class-432-18) Avail: US Patent and Trademark Office CSCL 14B

A high gradient directional solidification furnace is disclosed which includes eight thermal zones throughout the length of the furnace. In the hot end of the furnace, furnace elements provide desired temperatures. These elements include Nichrome wire received in a grooved tube which is encapsulated y an outer alumina core. A booster heater is provided in the hot end of the furnace which includes toroidal tungsten/rhenium wire which has a capacity to put heat quickly into the furnace. An adiabatic zone is provided by an insulation barrier to separate the hot end of the furnace from the cold end. The old end of the furnace is defined by additional heating elements. A heat transfer plate provides a means by which heat may be extracted from the furnace and conducted away through liquid cooled jackets. By varying the input of heat via the booster heater and output of heat via the heat transfer plate, a desired thermal gradient profile may be provided. Official Gazette of the U.S. Patent and Trademark Office

N86-20751* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LABORATORY GLASSWARE RACK FOR SEISMIC SAFETY Patent
Marc M. Cohen, inventor (to NASA) Issued 1 Oct. 1985 10 p Filed 16 Aug. 1983
(NASA-Case-ARC-11422-1; US-Patent-4,544,068; US-Patent-Appl-SN-523991; US-Patent-Class-211-74; US-Patent-Class-211-126) Avail: US Patent and Trademark Office CSCL 14B

A rack for laboratory bottles and jars for chemicals and medicines has been designed to provide the maximum strength and security to the glassware in the event of a significant earthquake. The rack preferably is rectangular and may be made of a variety of chemically resistant materials including polypropylene, polycarbonate, and stainless steel. It comprises a first plurality of parallel vertical walls, and a second plurality of parallel vertical walls, perpendicular to the first. These intersecting vertical walls comprise a self-supporting structure without a bottom which sits on four legs. The top surface of the rack is formed by the top edges of all the vertical walls, which are not parallel but are skewed in three dimensions. These top edges form a grid matrix having a number of intersections of the vertical walls which define a number of rectangular compartments having varying widths and lengths and varying heights.

Official Gazette of the U.S. Patent and Trademark Office

N86-20752* National Aeronautics and Space Administration. Pasadena Office, Calif.
VIBRATING-CHAMBER LEVITATION SYSTEMS Patent
Martin B. Barmatz, Dan Granett, and Mark C. Lee, inventors (to NASA) Issued 29 Oct. 1985 6 p Filed 14 Dec. 1983
(NASA-Case-NPO-16142-1-CU; US-Patent-4,549,435;

US-Patent-Appl-SN-561433; US-Patent-Class-73-505) Avail: US Patent and Trademark Office CSCL 14B

Systems are described for the acoustic levitation of objects, which enable the use of a sealed rigid chamber to avoid contamination of the levitated object. The apparatus includes a housing forming a substantially closed chamber, and means for vibrating the entire housing at a frequency that produces an acoustic standing wave pattern within the chamber.

Official Gazette of the U.S. Patent and Trademark Office

N86-20753*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

NEW METHOD FOR DETERMINING HEATS OF COMBUSTION OF GASEOUS HYDROCARBONS

Jag J. Singh, Danny R. Sprinkle, and Richard L. Puster Dec. 1985 13 p refs

(NASA-TP-2531; L-16054; NAS 1.60:2531) Avail: NTIS HC A02/MF A01 CSCL 14B

As a spin off of a system developed for monitoring and controlling the oxygen concentration in the Langley 8-foot High Temperature Tunnel, a highly accurate on-line technique was developed for determining heats of combustion of natural gas samples. It is based on measuring the ratio m/n, where m is the (volumetric) flowrate of oxygen required to enrich the carrier air in which the test gas flowing at the rate n is burned, such that the mole fraction of oxygen in the combustion product gases equals that in the carrier air. The m/n ratio is directly related to the heats of combustion of the saturated hydrocarbons present in the natural gas. A measurement of the m/n ratio for the test gas can provide a direct means of determination of its heat of combustion by using the calibration graph relating the m/n values for pure saturated hydrocarbons with their heats of combustion. The accuracy of the technique is determine solely by the accuracy with which the flowrates m and n can be measured and is of the order of 2 percent in the present study. The theoretical principles and experimental results are discussed.

Author

N86-20754*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

METHOD OF FABRICATING AN IMAGING X-RAY SPECTROMETER Patent Application

George E. Alcorn and Andre S. Burgess, inventors (to NASA) Filed 18 Jun. 1985 11 p

(NASA-Case-GSC-12956-1; NAS 1.71:GSC-12956-1; US-Patent-Appl-SN-745977) Avail: NTIS HC A02/MF A01 CSCL 14B

A process for fabricating an X-ray spectrometer having imaging and energy resolution of X-ray sources is discussed. The spectrometer has an array of adjoining rectangularly shaped detector cells formed in a silicon body. The walls of the cells are created by laser drilling holes completely through the silicon body and diffusing n(+) phosphorous doping material therethrough. A thermally migrated aluminum electrode is formed centrally through each of the cells.

NASA

N86-20755*# National Aeronautics and Space Administration. Pasadena Office, Calif.

A WATER-ABSORBING CAPACITOR SYSTEM FOR MEASURING RELATIVE HUMIDITY Patent Application

Eric G. Laue, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 20 Jun. 1985 12 p

(NASA-Case-NPO-16544-1-CU; NAS 1.71:NPO-16544-1-CU; US-Patent-Appl-SN-746809) Avail: NTIS HC A02/MF A01 CSCL 14B

A method and apparatus using a known water-absorbent polymer as a capacitor which is operated at a DC voltage for measuring relative humidity is presented. When formed as a layer between porous electrically-conductive electrodes and operated in an RC oscillator circuit, the oscillator frequency varies inversely with the partial pressure of the moisture to be measured. In a preferred embodiment, the capacitor is formed from Nafion and is operated at a low DC voltage wih a resistor as an RC circuit in an RC oscillator. At the low voltage, the leakage current is proper for oscillation over a satisfactory range. The frequency of oscillation varies in an essentially linear fashion with relative humidity which is represented by the moisture being absorbed into the Nafion. The oscillation frequency is detected by a frequency detector.

NASA

N86-20756*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

FLUID LEAK INDICATOR Patent Application

George E. Anderson (Rockwell International Corp., Pittsburg, Pa.) and Shu Loo, inventors (to NASA) (Rockwell International Corp., Pittsburg, Pa.) Filed 29 May 1985 14 p

(NASA-Case-MSC-20783-1; NAS 1.71:MSC-20783-1; US-Patent-Appl-SN-738931) Avail: NTIS HC A02/MF A01 CSCL 14B

A fluid leak indicator for detecting and indicating leaks in visually inaccessible fluid tubing joints, such as those obstructed by insulation includes a bag system and a wicking system surrounding or wrapping the joints under the visual obstructing material. Leaking fluid is collected in the bag or on the wicking material where it is conducted along the wicking material to a visily accessible capturing transparent indicator bulb for providing a visual indication of the leak without requiring a chemical change in the capturing indicator bulb.

NASA

N86-20757*# Stanford Univ., Calif. Center for Space Science and Astrophysics.

THE DEVELOPMENT AND TEST OF MULTI-ANODE MICROCHANNEL ARRAY DETECTOR SYSTEMS. PART 2: SOFT X-RAY DETECTORS Progress Report, 1 Aug. 1985 - 31 Jan. 1986

J. G. Timothy [Mar. 1986] 17 p refs

(Grant NAG5-622)

(NASA-CR-176593; NAS 1.26:176593) Avail: NTIS HC A02/MF A01 CSCL 14B

Detector systems based on the high gain microchannel plate (MCP) electron multiplier were used extensively for imaging at soft X-ray wavelengths both on the ground and in space. The latest pulse counting electronic readout systems provide zero readout noise, spatial resolutions (FWHM) of 25 microns or better and can determine the arrival times of detected photons to an accuracy of the order of 100 ns. These systems can be developed to produce detectors with active areas of 100 nm in diameter or greater. The use of CsI photocathodes produces very high detective quantum effjciencies at wavelengths between about 100 and 1A (approximately 0.1 to 10 keV) with moderate energy resolution. The operating characteristics of the different types of soft X-ray MCP detector systems are described and the prospects for future developments are discussed.

Author

N86-20758*# California Inst. of Tech., Pasadena. Big Bear Solar Observatory.

THE CALIBRATRION OF DOPPLERGRAMS AND MAGNETOGRAMS AT BBSO

Zhongxian Shi (Academia Sinica, Beijing, China), Jingxiu Wang (Academia Sinica, Beijing, China), and Alan Patterson [1986] 10 p refs

(Grants NGL-05-002-034; NSF ATM-82-11002)

(NASA-CR-176598; NAS 1.26:176598; BBSO-0257) Avail: NTIS HC A02/MF A01 CSCL 14B

The calibration procedure for the Big Bear Solar Observatory (BBSO) videomagnetograph in which the radial velocity of the sidereal rotation of the Sun is used as a calibrator is described. One of the key points of the procedure is to eliminate the effects of the Earth's motion relative to the Sun and the temperature instability of the birefringent filter by tuning the bandpass of the birefringent filter. The other is to make the light level of the direct image of the videomagnetograph the same both in Doppler and in Zeeman modes in order to reduce the errors introduced by imperfect linearity of the transfer curve of the camera tube. Some practical problems of calibration are discussed for further improvement.

Author

N86-20759# National Aerospace Lab., Tokyo (Japan).
STUDY ON THE DIGITAL POSITION TRANSDUCER WITH OPTICAL TIME-DELAY PULSE
Mitsuyoshi Mayanagi 1985 40 p refs In JAPANESE; ENGLISH summary
(NAL-TR-878; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A rotary optical position transducer employing a pulse technique time delay multiplexor was studied during the development of a Fly-By-Light (FBL) for the aircraft control system, the aim of which is to offer inherent resistance to environments of electromagnetic interference (EMI), electromagnetic pulse (EMP) and lightning. The conventional absolute type optical digital transducer causes difficulty in the interface technique between the transducer and other devices such as a computer. The transducer system described consisting of a rotary position transducer unit, fiber optic cable, light source unit, and electronics interface unit, can improve this interface technique. The rotary transducer unit is an electrically passive device connected through optical fibers to the light source unit and electronics interface unit, and has many advantages of fiber optic techniques. Basic problems in the development of the rotary transducer system were studied. In particular, a basis for optimizing illumination irradiance and photodetector characteristics is given, and the intrinsic performance of the transducer is quantitatively examined. Author

N86-20760# National Aerospace Lab., Tokyo (Japan).
A PRESSURE MEASURING SYSTEM USING ELECTRONICALLY SCANNED PRESSURE SENSORS (ESP) INSTALLED IN A TRANSONIC BLOWDOWN WIND TUNNEL
Toshimi Fujita, Katsuichi Murota, and Koichi Suzuki 1985 52 p refs In JAPANESE; ENGLISH summary
(NAL-TR-883; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

A pressure measuring system using electrically scanned pressure sensors (ESP) was built and installed in a transonic blowdown wind tunnel, and thoroughly tested to see how effective an ESP system is in enhancing data productivity when compared with the scanivalve system hitherto used. After a brief description of what an ESP is and how to use it, detailed results are given of studies in which linearity, stability and repeatability characteristics of our ESP system was examined. It is shown that the deviation of the system output from linearity is less than 0.25% of the full-scale value (FS), that the thermal zero shift is of negligible magnitude and that the repeatability is also quite satisfactory. The pressure sensors were placed in the plenum chamber surrounding the test section, where the temperature change during the tunnel operation remains rather small (generally about 1 C). This environmental stability contributed to the excellent performance of our pressure measuring system. Author

N86-20761# Tri-Con Associates, Inc., Cambridge, Mass.
REFURBISHMENT OF AN ULTRAVIOLET AND ELECTRONIC SPECTROMETER AND PHOTOMETER Final Report, 26 Apr. 1983 - 31 Mar. 1985
R. S. Hills 29 Apr. 1985 41 p
(Contract F19628-82-C-0080)
(AD-A160363; C-208; AFGL-TR-85-0105) Avail: NTIS HC A03/MF A01 CSCL 14/2

Modification and field services for instruments launched on rocket from WSMR, New Mexico, 19 April 1983. Modification of shuttle Electron Spectrometer. Design, fabrication and launch services for Electron Spectrometer. on PIIE project launched on rocket from Sondrestrom Air Base, Greenland 14 March 1985. GRA

N86-20762# Pacific Northwest Lab., Richland, Wash.
ACOUSTICAL HOLOGRAPHIC SIAMESE IMAGE TECHNIQUE FOR IMAGING RADIAL CRACKS IN REACTOR PIPING
H. D. Collins and R. P. Gribble Apr. 1985 9 p Presented at the 15th Symposium on Nondestructive Evaluation, San Antonio, Tex., 23 Apr. 1985
(Contract DE-AC06-76RL-01380)
(TI85-010976; PNL-SA-13149; CONF-8504119-1) Avail: NTIS HC A02/MF A01

Siamese imaging for quasi-vertical defects in reactor pipe weldments is described. The Siamese image is a bisymmetrical view of the inner surface defect. Image construction geometry consists of two probes operating either from opposite sides or the same side of the defect to be imaged. As the probes scan across a lower surface defect, they encounter two images--first the normal upright image and then the inverted image. The final integrated image consists of two images connected along their baseline. The experimental imaging results on simulated and natural cracks in reactor piping weldments graphically illustrate this unique technique. Excellent image of mechanical fatigue and thermal cracks were obtained on ferritic and austentic piping. Author

N86-20763# Fermi National Accelerator Lab., Batavia, Ill.
MEASURING HEAT LEAK WITH A HEATMETER
M. Kuchnir, J. D. Gonczy, and L. Tague Aug. 1985 8 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-000240; FNAL-TM-1344; CONF-850814-21) Avail: NTIS HC A02/MF A01

The heatmeter or more precisely the heatflowmeter is a device based on thermal conductivity measuring techniques. It consists of a thermal conducting body between two thermometers, with provisions for thermal connections and calibration. The paper describes the design, construction details, calibration and performance of one such heatmeter for use with heat reservoirs at either 4.2 K or 78 K. Near 4.2 K it has a sensitivity of 10 micro W and requires less than a minute to reach steady state. Near 78 K its sensitivity is 10 MW and requires 25 minutes to reach steady state. DOE

N86-20764# Sandia National Labs., Albuquerque, N. Mex.
MOS-TRANSISTOR RADIATION DETECTORS AND X-RAY DOSE-ENHANCEMENT EFFECTS
L. D. Posey, T. F. Wrobel, D. C. Evans, W. Beezhold, J. G. Kelly, C. J. MacCallum, F. N. Coppage, T. F. Luera, and A. J. Smith 1985 7 p refs Presented at the 6th JOWOG Meeting, Aldermaston, England, 7 Oct. 1985 Prepared in cooperation with Ktech Corp., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-001320; SAND-85-1936C; CONF-8510165-1) Avail: NTIS HC A02/MF A01

Sandia National Laboratory (SNL) CMOS IC dose detectors and 3N161 MOS Transistors were evaluated as pulsed X-radiation dosimeters and used as monitors to measure dose-enhancement effects. Measurements were made in the photon environments from the HydraMITE II, SPR III, MBS and PITHON radiation sources. The dosimetric evaluation data suggest that the 3N161 MOS transistors are useful dosimeters for measuring flash X-ray-induced doses in the oxide layers of modern metal-oxide-semiconductor (MOS) integrated circuits. However, dose-enhancement calculations indicate that Monte Carlo codes, using 1-D geometries and calculated source spectra, consistently overpredict measured dose-enhancement ratios by factors as large as two. DOE

N86-20765# Lawrence Livermore National Lab., Calif.
PERFORMANCE CHARACTERIZATION OF AN IMAGE CONVERTER BASED STREAK CAMERA
C. C. Lai and L. B. Olk 20 Aug. 1985 9 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract W-7405-eng-48)
(DE86-001567; UCRL-92214; CONF-850887-39) Avail: NTIS HC A02/MF A01

The performance response of an electronic subnanosecond streak camera to a spatially distributed optical signal varies significantly with the image location on output screen. The variations are due mainly to the combined effects of (1) electron-optics aberrations, (2) camera sweep ramps and gating waveform imperfections, (3) photocathode and phosphor quantum efficiency

nonuniformities, and (4) excessive incident intensity or power. Consequently, a dynamic full-scale characterization of the streak camera is necessary for achieving a better measurement accuracy, relative or absolute. To meet this need, we are developing a simple yet versatile technique for characterizing the large-format image-converter-tube based streak cameras that are routinely used as the prime diagnostic instruments at the nuclear test site in Nevada. A mode-locked pulsed dye laser routing through beam splitters and mirrors provides the repetitive light source of multiple pulses with known intensities and inter-pulse timing for illumination along the streak sweep axis. Meanwhile, a bar-chart test pattern at the input slit intercepting an expanded form of the light source, or a bundle of equal-length fibers fanning out into a linear line array replacing the slit, distributes the illumination along the axis perpendicular to the sweep. In one single shot, this technique enables an accurate and detailed mapping of the key performance parametes of a large-format streak camera. The obtainable parameters include quantitative temporal and spatial resolutions, descriptive dynamic range, two-dimensional sweep nonlinearity, and intensity or power dependent distortions. Experimental setup is described. Sample test data, digitization plots, and computer analysis results are presented. DOE

N86-20766# Lawrence Livermore National Lab., Calif.
PHOTOPHORESIS AND THE SCATTERING OF ELECTROMAGNETIC RADIATION
J. R. Ipser Sep. 1985 12 p
(Contract W-7405-eng-48)
(DE86-001687; UCID-20541) Avail: NTIS HC A02/MF A01

Electron-microscope photographs of soot lend support to the picture in which a soot particle is modeled as a collection of chains of small carbon spheres. The soot particle itself is typically considerably larger than the small carbon spheres making up the chains. Thus the soot particles might have a size approx. 0.1 - 1 microns while the small carbon spheres might have a size approx. 0.03 microns in typical situations. Further, measurements of the density of soot yield values much less than that of normal carbon, indicating that an individual soot particle has a rather small filling factor, i.e., the fraction of the volume of the particle that is occupied by chains. If a soot particle is taken to be a sphere partially filled with carbon chains, what are its scattering and absorption properties. Several workers have adopted the view that the net scattering and absorption properties can be determined simply by summing the cross-sections for the individual small carbon spheres. It appears that in a first rough approximation the scattering and absorption properties of soot can be determined by estimating the effective dielectric constant of a soot sphere. DOE

N86-20767# Pacific Northwest Lab., Richland, Wash.
PORTABLE INSTRUMENTS FOR EMERGENCY RESPONSE
K. L. Swinth May 1985 16 p refs Presented at the Health Physics Summer School Conference, Evanston, Ill., 3 Jun. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017928; PNL-SA-13225; CONF-8506136-3) Avail: NTIS HC A02/MF A01

The selection and use of instruments for emergency response is complicated by lack of specific guidance, the diversity of potential conditions, and the variable performance of available instruments. The user must examine the projected radiological conditions during an accident and the environmental extremes that could exist. This should assist in determining requirements that the instruments must meet during an emergency. Due to the variable performance of available instrumentation, critical parameters (temperature dependence) should be tested prior to use to assure adequate measurements. Although it is tempting to stock emergency kits with inexpensive monitoring equipment, one should carefully consider the possible conditions (environmental, radiological) and equipment performance since inaccurate measurements could be very costly in terms of decisions regarding lifesaving and evacuation during an emergency. DOE

N86-20768# Sandia National Labs., Albuquerque, N. Mex.
RADIOLOGICAL EQUIPMENT FOR EMERGENCIES
A. Stanley 1985 10 p Presented at the Advanced Management of Radiation Accidents, Albuquerque, N. Mex., 3 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000432; SAND-85-2165C; CONF-8510164-1) Avail: NTIS HC A02/MF A01

A brief guide to training and equipment needed to effectively manage victims of radiation accidents is given. DOE

N86-20769# Wisconsin Univ., Madison. Dept. of Medical Physics.
RESPONSE OF A GAMMA-RAY TELESCOPE DOSIMETER TO THE (n + (GAMMA)) RADIATION FROM A (239)Pu-Be SOURCE
F. H. Attix, D. W. Pearson, and P. M. DeLuca, Jr. 1985 18 p
(Contract DE-AC02-76EV-01105)
(DE86-000850; DOE/EV-01105/316) Avail: NTIS HC A02/MF A01

The design, construction, and investigation of a gamma-ray telescope that can tell the direction of incident photons is reported. The dosimeter is based on LiF thermoluminescence. The gamma-ray telescope dosimeter was tested with a (239)Pu-Be source and found to perform satisfactorily. For a high-energy neutron field the gamma-ray telescope dosimeter contributes very little to the total dose equivalent. DOE

N86-20770# Rockwell International Corp., Golden, Colo.
EVALUATION OF THE ANALYSIS OF PLUTONIUM MATERIALS FOR LOW-LEVEL URANIUM USING A MODIFIED SCINTREX URANIUM ANALYZER (LASER FLUOROMETER)
C. E. Michel and J. R. Weiss 25 Sep. 1985 8 p refs
(Contract DE-AC04-76DP-03533)
(DE86-000880; RFP-3827) Avail: NTIS HC A02/MF A01

Evaluation and analysis of low-level uranium in plutonium materials using a modified Scintrex UA-3 Uranium Analyzer are described. Two liquid/liquid procedures for the separation of uranium from plutonium are compared. They are 0.1M tri-n-octylphosphine oxide (TOPO) in cyclohexane and 20% (v/v) tributyl phosphate (TBP) in 2,2,4-trimethylpentane (iso-octane). DOE

N86-20771# Groningen Rijksuniversiteit (Netherlands). Lab. for Space Research.
THE IRAS-DAX PHOTOMETRIC CHANNEL EXPLANATORY SUPPLEMENT
P. R. Wesselius, D. A. Beintema, A. R. W. deJonge, T. A. Jurriens, D. J. M. Kester, J. E. vanWeerden, J. deVries (ESA/ESTEC, Noordwijk, Netherlands), and M. Perault (Observatoire de Paris-Meudon, France) 6 Nov. 1985 68 p refs
Avail: NTIS HC A04/MF A01

Technical information required to interpret IRAS chopped photometric channel maps is presented. Observations; end products; the photometer; data reduction; and photometric calibration are covered. Author (ESA)

N86-20772# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.
CALIBRATION AND TEST MEASUREMENTS OF A HIGH PURETY GERMANIUM BETA SPECTROMETER [CALIBRATIE-EN TESTMETINGEN AAN EEN HIGH-PURE GERMANIUM BETASPECTROMETER]
P. Coops Nov. 1983 93 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A05/MF A01

Calibration measurements of an on-line beta spectrometer are described. Distortions of the measured spectra, caused by the detection step, are discussed. A correction of the beta spectrum for coincidental gamma rays was introduced and put into the fitting program BCONT. Using a Co56 source, a performance test of the correction was carried out. The fitted Q-value (4566.54 (1.92) keV) agrees with the literature value. On-line measurements of the spectra of Au186 were carried out. Data analysis gives a Q-value of 4830 keV, over 1200 keV lower than the calculated Q-value in the literature. Author (ESA)

N86-20773# Environmental Research and Technology, Inc., Concord, Mass.
DEVELOPMENT OF A LOW COST NDIR (NON-DISPERSIVE INFRARED DETECTION) CO MONITOR Final Report, May 1983 - Aug. 1984
P. L. Kebabian and J. R. Kruse Aug. 1984 60 p refs
(Contract GRI-5082-251-0726)
(PB86-105053; Rept-840178; GRI-84/0178) Avail: NTIS HC A04/MF A01 CSCL 14B

A feasibility program was undertaken to develop a low cost CO detector for residential and commercial use utilizing non-dispersive infrared detection techniques. Experimental results are described along with details of a proposed design of an instrument incorporating techniques developed during this program. The design includes a fluorescent source of CO emission, a sample cell and a dual detector gas correlation sensor. Similar to size to a home smoke detector, the bench model has demonstrated a threshold sensitivity to CO of less than 20 ppm and no detectable interference from CO2, methane or water vapor. It has no moving parts or consumables and is inherently fail-safe. GRA

N86-20774# National Bureau of Standards, Gaithersburg, Md. Office of Standard Reference Materials.
FEASIBILITY STUDY FOR THE DEVELOPMENT OF STANDARDS USING DIFFERENTIAL SCANNING CALORIMETRY Final Report
J. E. Callanan, S. A. Sullivan, and D. F. Vecchia Aug. 1985 59 p refs
(PB86-106747; NBS/SP-260-99; LC-85-600567) Avail: NTIS HC A04/MF A01; also Avail. from SOD as N003-003-02675-1 CSCL 14B

The tremendous increase in the use of differential scanning calorimetry, coupled with the decrease in the capability for conventional precision calorimetry, has created a need for more and better thermal standards for use with scanning calorimeters and other thermal instruments currently available, such as thermomechanical analyzers. The development of these standards by methods such as adiabatic or drop calorimetry is impractical because of the number and variety of standards required, the associated expense, and the lack of facilities and personnel to do the certification. A two-part study was designed to evaluate the capability of a differential scanning calorimeter for developing temperature and enthalpy of fusion standards. Author (GRA)

N86-20421# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CRYOGENIC WIND TUNNEL INSTRUMENTATION
M. Bazin *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 28 p refs Previously announced in IAA as A85-47284 (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

N86-20438# Joint Publications Research Service, Arlington, Va.
WORLD'S LARGEST CAMERA FOR SATELLITE OBSERVATION INSTALLED AT ZVENIGOROD
M. Rogozhnikov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 18-19 Transl. into ENGLISH from Leninskoye Znamya (Moscow, USSR), 17 Oct. 1985 p 4 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20612# Southwest Research Inst., San Antonio, Tex.
BLAST PRESSURE MEASUREMENTS FOR THE FULL-SCALE GRAVEL GERTIE TEST
E. D. Esparza and W. E. Baker *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 549-580 (For primary document see N86-20589 11-31)
(AD-P004845) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20912# Joint Publications Research Service, Arlington, Va.
RADIOMETRIC AIRBORNE MOISTURE METER
M. Gusev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 34 Transl. into ENGLISH from Trud (Moscow, USSR), 19 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20913# Joint Publications Research Service, Arlington, Va.
THEORY OF FIELD PROPAGATION ADVANCES MHD PROBING OF EARTH'S CRUST
M. Savin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 36-37 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 11 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20917# Joint Publications Research Service, Arlington, Va.
EXPERIENCE WITH SURFACE IR SURVEY FOR ESTIMATING TEMPERATURE AND HEAT RADIATION OF THERMAL FIELDS OF MUTNOVSKIY VOLCANO (KAMCHATKA) Abstract Only
B. G. Polyak, B. A. Bezukh, V. I. Kaftan, A. I. Kuzmin, Yu. D. Kuzmin, V. Ye. Stelmashok, and V. P. Turkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 41-42 Transl. into ENGLISH from Vulkanologiya I Seysmologiya (Moscow, USSR), no. 3, May - Jun. 1985 p 54-63 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20929# Joint Publications Research Service, Arlington, Va.
ERROR IN METHOD FOR FLIGHT TESTS OF RADAR INSTRUMENTS FOR MEASURING ICE THICKNESS Abstract Only
V. V. Bogorodskiy and A. G. Oganesyan *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 53-54 Transl. into ENGLISH from Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 55, no. 6, Jun. 1985 p 1159-1162 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-20775 Brown Univ., Providence, R. I.
SOME MODEL PROBLEMS IN THE LASER ENHANCED MCVD PROCESS Ph.D. Thesis
Chen-Yuan Wang 1985 125 p
Avail: Univ. Microfilms Order No. DA8519929

Combined free and forced laminar convection in horizontal and vertical tubes with external and volumetric heating were investigated. A continuum model of a two phase flow of submicron aerosol particles and a background gas is considered. An attempt is made to increase the deposition efficiency of the aerosol particles produced by the Modified Chemical Vapor Deposition (MCVD) process in the manufacture of optical fiber preforms. It is indicated that laser heating can significantly modify temperature gradients and the thermophoretic deposition of aerosol particles in the temperature field. In the vertical tube cases, buoyant heating plays a significant role in its effect on particle trajectories. Results using the Boussinesq approximation deviate significantly from those using the perfect gas law, even when laser heating is small. Such analysis may have an important bearing on methods employed in the fabrication of optical fiber preforms. Dissert. Abstr.

N86-20776# Los Alamos National Lab., N. Mex.
SCREENING AND SHIELDING EFFECTIVENESS OF AEROSOLS AGAINST LASER BEAMS: AN OPTIMIZATION STUDY
A. Zardecki and S. A. W. Gerstl May 1985 51 p refs
(Contract W-7405-eng-36)
(LA-10359-MS) Avail: NTIS HC A04/MF A01

The power of a laser beam delivered to a target through an aerosol screen is optimized in a three dimensional parameter space having as axes the real part of the refractive index, its imaginary part, and the mean particle size. On the basis of the small angle approximation, which applies to particles whose size is comparable

to or larger than the wavelength of the radiation, equations were set up describing the reduced and diffuse power of a beam propagating through a slab filled with scattering and absorbing aerosol particles. The scattering characteristics of a single particle are derived from Mie theory, and their dependence on the parameters in equation is investigated. The power transmittance is evaluated for real and imaginary parts of the refractive index ranging from 1 to 3 and from 0 to 2, respectively; the mean particle size for log-normally distributed particles is varied between 0.5 and 10.0 microns. A series of iso-valued surface plots of the delivered power allows design of an aerosol with desired screening or shielding effectiveness. Author

N86-20777*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND APPARATUS FOR ENHANCING LASER ABSORPTION SENSITIVITY Patent Application
Christopher R. Webster, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 31 Jul. 1985 33 p
(Contract NAS7-918)
(NASA-Case-NPO-16567-1-CU; NAS 1.71:NPO-16567-1-CU; US-Patent-Appl-SN-760790) Avail: NTIS HC A03/MF A01 CSCL 20E

A simple optomechanical method and apparatus is described for substantially reducing the amplitude of unwanted multiple interference fringes which often limit the sensitivities of tunable laser absorption spectrometers. An exterior cavity is defined by partially transmissible surfaces such as a laser exit plate, a detector input, etc. That cavity is spoiled by placing an oscillating plate in the laser beam. For tunable diode laser spectroscopy in the mid-infrared region, a Brewster plate spoiler allows the harmonic detection of absorptances of < .0001 in a single laser scan. Improved operation is achieved without subtraction techniques, without complex laser frequency modulation and without distortion of the molecular lineshape signal. The technique is applicable to tunable lasers operating from UV to IR wavelengths and in spectrometers which employ either short or long pathlengths, including the use of retroreflectors or multipass cells. NASA

N86-20778*# National Aeronautics and Space Administration. Pasadena Office, Calif.
MULTIPLEX ELECTRIC DISCHARGE GAS LASER SYSTEM Patent Application
Thomas J. Pacala and James B. Laudenslager, inventors (to NASA) Filed 23 Oct. 1985 22 p
(Contract NAS7-100)
(NASA-Case-NPO-16433-1; NAS 1.71:NPO-16433-1; US-Patent-Appl-SN-790594) Avail: NTIS HC A02/MF A01 CSCL 20E

A multiple pulse electric discharge gas laser system is described in which a plurality of pulsed electric discharge gas lasers are supported in a common housing. Each laser is supplied with excitation pulses from a separate power supply. A controller, which may be a microprocessor, is connected to each power supply for controlling the application of excitation pulses to each laser so that the lasers can be fired simultaneously or in any desired sequence. The output light beams from the individual lasers may be combined or utilized independently, depending upon the desired application. The individual lasers may include multiple pairs of discharge electrodes with a separate power supply connected across each electrode pair so that multiple light output beams can be generated from a single laser tube and combined or utilized separately. NASA

N86-20779*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND MEANS FOR GENERATION OF TUNABLE LASER SIDEBANDS IN THE FAR-INFRARED REGION Patent Application
H. M. Pickett (JPL, Pasadena, Calif.) and J. Farhoomand, inventors (to NASA) (JPL, Pasdena, Calif.) Filed 3 Oct. 1985 13 p
(Contract NAS7-918)
(NASA-Case-NPO-16497-1-CU; NAS 1.71:NPO-16497-1-CU; US-Patent-Appl-SN-783887) Avail: NTIS HC A02/MF A01 CSCL 20E

A method for generating tunable far-infrared radiation is described. The apparatus includes a Schottky-barrier diode which has one side coupled through a conductor to a waveguide that carries a tunable microwave frequency, the diode has an opposite side which is coupled through a radiating whisker to a bias source. Infrared light is directed at the diode, and infrared light with tunable sidebands is radiated by the whisker through an open space to a reflector. The original infrared is separated from a tunable infrared sideband by a polarizing Michelson interferometer. NASA

N86-20780*# National Aeronautics and Space Administration. Pasadena Office, Calif.
MEANS FOR PHASE LOCKING THE OUTPUTS OF A SURFACE EMITTING LASER DIODE ARRAY Patent Application
James R. Lesh, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 30 Sep. 1985 14 p
(Contract NAS7-918)
(NASA-Case-NPO-16542-1-CU; NAS 1.71:NPO-16542-1-CU; US-Patent-Appl-SN-781612) Avail: NTIS HC A02/MF A01 CSCL 20E

An array of diode lasers, either a two-dimensional array of surface emitting lasers, or a linear array of stripe lasers, is phase locked by a diode laser through a hologram which focuses the output of the diode laser into a set of distinct, spatially separated beams, each one foced onto the back facet of a separated diode laser of the array. The outputs of the diode lasers thus form an emitted coherent beam out of the front of the array. NASA

N86-20781*# Raytheon Co., Sudbury, Mass. Electro-Optics Systems Lab.
PULSED DOPPLER LIDAR AIRBORNE SCANNER Progress Report, Jan. - Sep. 1985
C. A. DiMarzio, D. B. McVicker, C. E. Morrow, and C. C. Negus 10 Oct. 1985 33 p
(Contract NAS8-33120)
(NASA-CR-178728; NAS 1.26:178728; ER85-4352; PR-35) Avail: NTIS HC A03/MF A01 CSCL 20E

This report covers the work accomplished during the reporting period on Pulsed Doppler Lidar Airborne Scanner and describes plans for the next reporting period. The objectives during the current phase of the contract are divided into four phases. Phase 1 includes ground testing of the system and analysis of data from the 1981 Severe Storms Test Flights. Phase 2 consists of preflight preparation and planning for the 1983 flight series. The flight test itself will be performed during Phase 3, and Phase 4 consists of post-flight analysis and operation of the system after that flight test. The range profile from five samples taken during Flight 10, around 1700 Z is given. The lowest curve is taken from data collected upwind of Mt. Shasta at about 10,000 feet of altitude, in a clear atmosphere, where no signals were observed. It thus is a good representation of the noise level as a function of range. The next curve was taken downwind of the mountain, and shows evidence of atmospheric returns. There is some question as to whether the data are valid at all ranges, or some ranges are contaminated by the others. Author

N86-20782*# Spectra Technology, Inc., Bellevue, Wash.
WINDVAN LASER STUDY Final Report
13 Sep. 1985 105 p refs
(Contract NAS8-36644)
(NASA-CR-178687; NAS 1.26:178687) Avail: NTIS HC A06/MF A01 CSCL 02E

The goal of defining a CO2 laser transmitter approach suited to Shuttle Coherent Atmospheric Lidar Experiment (SCALE) requirements is discussed. The adaptation of the existing WINDVAN system to the shuttle environment is addressed. The size, weight, reliability, and efficiency of the existing WINDVAN system are largely compatible with SCALE requirements. Repacking is needed for compatibility with vacuum and thermal environments. Changes are required to ensure survival through launch and landing, mechanical, vibration, and acoustic loads. Existing WINDVAN

thermal management approaches depending on convection need to be upgraded zero gravity operations. B.G.

N86-20783# Department of the Army, Washington, D. C.
MULTIPLE PARALLEL RF EXCITED CO2 LASERS Patent Application
P. P. Chenauski, L. N. Laughman, and E. H. Drinkwater, inventors (to Army) Filed 12 Aug. 1985 18 p
(AD-D011859; US-Patent-Appl-SN-761256) Avail: NTIS HC A02/MF A01 CSCL 20/5

Dual waveguide lasers which are transversely excited in parallel from a common source of radio frequency are provided with one or more channels or bores connecting the laser cavities. The dimensions and configuration of the connecting channels are chosen so that the electric field from the applied RF excitation source will be higher in the connecting channels than in either of the paralleled waveguide gas discharge cavities, or that the electron collision loss to the nearby ceramic and metallic walls will be lower in the connecting channels than in the aforementioned waveguide cavities. The initial gas breakdown is thus made to preferentially occur in the connecting channels and thus force initiation of both laser cavities simultaneously. GRA

N86-20784# Materials Research Labs., Ascot Vale (Australia).
INVESTIGATION OF COLLISION-INDUCED FLUORESCENCE IN D2:Ar AND D2:HD:Ar MIXTURES AT 200 k
R. C. McLeary and D. P. Juchnevicius Jul. 1985 15 p
(AD-A161545; MRL-R-967) Avail: NTIS HC A02/MF A01 CSCL 07/4

The collision-induced fundamental-band fluorescence from vibrationally-excited D2 in high-pressure mixtures of D2 and Ar and D2, HD and Ar has been investigated. Fluorescence intensity and vibrational lifetime have been measured at 200 K as a function of pressure and mixture ratio. The results indicate that a D2:HD:Ar mixture at reduced temperature is an attractive candidate medium for an optically-pumped collision-induced-dipole laser. GRA

N86-20785# Pacific Northwest Lab., Richland, Wash.
HIGH-RESOLUTION CW RESONANCE IONIZATION MASS SPECTROMETRY
T. J. Whitaker, B. D. Cannon, and B. A. Bushaw Sep. 1985 7 p refs Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001674; PNL-SA-13253; CONF-8510151-10) Avail: NTIS HC A02/MF A01

We have used continuous-wave (CW) lasers to produce efficient, isotopically selective ionization of barium in the source region of a quadrupole mass spectrometer. The technique involves two low-power, high-resolution dye lasers for the resonance steps and a 100 watt CW Nd:YAG laser for photoionization. The use of CW lasers offers both better duty cycle and much better resolution than is possible with pulsed lasers. We have observed an isotopic selectivity of 800 between (137)Ba and (138)Ba in the CW resonance process. Ionization efficiency is estimated to be about 10(-4) and simple improvements should improve this value to near unity. DOE

N86-20786# Sandia National Labs., Albuquerque, N. Mex.
Nd:YAG LASER WELDING EXPERIMENTS
R. L. Akau, D. M. Keicher, P. W. Fuerschbach, and T. J. Lienert 1 Oct. 1985 18 p Presented at the Laser Welding and Laser Surface Treatment Clinic, Detroit, Mich., 29 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000863; SAND-85-1523C; CONF-8510170-1) Avail: NTIS HC A02/MF A01

Laser-beam/plume interaction experiments were conducted with a pulsed Nd:YAG laser. Tests were done on four different metals: Aluminum 1100, Molybdenum, Nickel 200, and Stainless Steel 304. Previous laser welding experiments have indicated that the vapor plume ejected from the irradiated base material significantly attenuates the laser beam energy for Nickel 200 and Stainless Steel 304. To substantiate this observation, the plume was subjected to a cross flow of argon gas. Metallurgical studies showed a significant increase in weld penetration for all materials except for Aluminum. These experiments also indicated that the plume ejects normal to the base material. Thus, the specimen was tilted at different angles in an attempt to reduce laser beam attenuation. Results showed no significant increase in weld depth when the tilt angle was increased. Mass loss measurements were also performed and the experimental data were an order-of-magnitude less than those predicted by a numerical laser welding code. DOE

N86-20787# European Space Agency, Paris (France).
DEVELOPMENT OF A THEORETICAL MODEL TO DESCRIBE THE INTERACTION PHENOMENA BETWEEN ELECTRIC DISCHARGE AND SUPERSONIC FLOW OF A PULSED CO LASER
Holger Jacoby Aug. 1985 116 p refs Transl. into ENGLISH of "Entwicklung eines theoretischen Modells zur Beschreibung der Wechselwirkung zwischen elektrischer Entladung u. Ueberschal-Istroemung eines gepulsten CO-Lasers' Rept. DFVLR-FB-84-45 Stuttgart, West Germany, Dec. 1984 Original report in GERMAN previously announced as ESA-94453
(ESA-TT-913; DFVLR-FB-84-45) Avail: NTIS HC A06/MF A01; original German version available from DFVLR, Cologne DM 34

A theoretical model to describe the interaction phenomena of heat release in a supersonic flow was developed. It based on a finite difference method, reliability is proved by analytical and numerical tests. For the case of a pulsed electric discharge in a Mach 3 flow the formation and propagation of density perturbations are investigated and results are presented for different energy distributions within the discharge volume. The repetition frequency of pulsed lasers can be exactly determined by calculating the clear-time of the flow. The applicability of the model to the description of other laser types is shown. Author (ESA)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-20788* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DAMPING SEAL FOR TURBOMACHINERY Patent
George L. vonPragenau, inventor (to NASA) Issued 8 Oct. 1985 5 p Filed 18 Jan. 1985
(NASA-Case-MFS-25842-2; US-Patent-4,545,586; US-Patent-Appl-SN-692875; US-Patent-Class-277-53; US-Patent-Class-415-174) Avail: US Patent and Trademark Office CSCL 11A

A damping seal between a high speed rotor member and stator member that separates pressurized fluid compartments is described. It is characterized by the rotor member having a smooth outer surface and the stator member having its bore surface roughened by a plurality of pockets or depressions.
Official Gazette of the U.S. Patent and Trademark Office

N86-20789* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SELF-LOCKING TELESCOPING MANIPULATOR ARM Patent
Malcolm F. Nesmith, inventor (to NASA) Issued 15 Oct. 1985 8 p Filed 30 Sep. 1983
(NASA-Case-MFS-25906-1; US-Patent-4,547,121; US-Patent-Appl-SN-537757; US-Patent-Class-414-753; US-Patent-Class-901-31; US-Patent-Class-901-25; US-Patent-Class-414-718; US-Patent-Class-414-4; US-Patent-Class-212-230) Avail: US Patent and Trademark Office CSCL 13I

A telescoping manipulator arm and pivotable finger assembly are disclosed. The telescoping arm assembly includes a generally T-shaped arm having three outwardly extending fingers guided on grooved roller guides to compensate for environmental variations. The pivotable finger assembly includes four pivoting fingers. Arcuate

teeth are formed on the ends of the fingers. A rack having teeth on four sides meshes with each one of the fingers. One surface of the rack includes teeth along its entire surface which mesh with teeth of one of the fingers. The teeth at the remote end of the rack engage teeth of a gear wheel. The wheel includes a worm which meshes with a worn drive shaft of the drive motor providing a ninety degree self-locking drive for locking the fingers in a desired position. A similar drive provides a self-locking drive for positioning the telescoping arm.

Official Gazette of the U.S. Patent and Trakemark Office

N86-20790 United Kingdom Atomic Energy Authority, Risley (England).
PROPERTIES OF TYPE 1811 CrNi ss AND PARENT-LIKE WELD JOINTS WITH REGARD TO APPLICATION IN THE HIGH TEMPERATURE FIELD
E. D. Grosser, E. teHeesen, and H. Lorenz 16 Dec. 1985 18 p refs Transl. into ENGLISH of conference paper "Eigenschaften des Stahles X6 CrNi 1811 und Artgleicher Schweissverbindungen unter Beruecksichtigung des Einsatzes im Hochtemperaturgebiet" presented at the 2nd International Colloquium on Welding in Nuclear Engineering, West Germany, 1974 p 187-194 Colloquium held in Dusseldorf, West Germany, 23-24 Oct. 1974
(BLL-Risley-Tr-5230-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Since 1969 the unstabilized austenitic steel X 6 CrNi 1811 was used in Germany for applications in the high temperature range. In cases where it was used, this steel has confirmed the positive experienced gained aboard with the comparable type AISI 304 ss with regard to processing, welding behavior, and mechanical parameters. The differences in mechanical behavior of the basic material and the welded joints, caused by the low content of delta ferrite, should be taken into account in special applications. The adoption of American design specifications applicable in Germany for the high temperature fields makes extended investigations essential, both for the basic material and especially for welded joints with regard to fatigue behavior. B.G.

N86-20791 British Library Lending Div., Boston Spa (England).
EXTENDING THE FIELD OF USE FOR ROPES WITH THREE STRAND METAL CORES
Yu. M. Shapranov, V. P. Rudakov, and I. N. Razborshchikov [1986] 7 p refs Transl. into ENGLISH from Stzd. (USSR), no. 5, 1955 6 p
(BLLD-Trans-M-36506-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The use of a 3 x 7 (1+6) + 3 metal core for hoisting wire LK-3 rope, instead of organic material, is discussed. The new design metal core is 15 to 20% more efficient than wire ropes with the standard 7x7 (1+6) metal core design. B.G.

N86-20792 British Library Lending Div., Boston Spa (England).
PROCEDURE FOR SELECTING OPTIMAL TEMPERATURE AND SPEED CONDITIONS FOR PRESSURE WELDING
G. Ya. Gun, N. V. Biba, and O. P. Buzina 1985 4 p refs Transl. into ENGLISH from Iz. VUZ Chernaya Metall. (USSR), no. 5, 1985 3 p
(BLLD-Trans-M-36528-(5828.4)) Avail: British Library Lending Div., Bston Spa, England

The procedure for selecting optimal temperature and speed conditions for pressure welding is described. Author

N86-20793 Cornell Univ., Ithaca, N.Y.
NONLINEAR ANALYSIS OF SQUEEZE FILM DAMPER SYSTEMS Ph.D. Thesis
Xuehai Li 1985 117 p
Avail: Univ. Microfilms Order No. DA8516935

A squeeze film damper system with centering spring is investigated for both rigid rotor and flexible rotor models. Under the existence of small gravitational residual which comes from the imperfect balance of preloading springs and gravitational force, a perturbation method is applied to the problem, and analytical solutions are obtained. A thorough study of the steady state behavior of the system with synchronous motion is performed. Two perturbation solutions are developed: one for large speed and one for small speed. The perturbation solutions are in good agreement with the previous experimental results and present numerical simulation. Besides the synchronous motion there exist nonsynchronous motions for the system. The existence conditions for the phenomenon are revealed, the degree of nonlinearity fluid film force associated with phenomenon is explored, and some other related factors are studied, as well. Effort is made on the global analysis of the topological structures of the system. Though the squeeze film damper system is an inherently stable system, undesirable responses could occur for wide range of parameters and initial conditions. Dissert. Abstr.

N86-20794 Wisconsin Univ., Madison.
INVESTIGATION OF THE INFLUENCE OF GEAR SYSTEM PARAMETERS ON NOISE GENERATION Ph.D. Thesis
Indera Nurhadi 1985 224 p
Avail: Univ. Microfilms Order No. DA8512321

A procedure, based on a displacement based finite element method, or investigating noise generation, transmission and radiation from idealized gear systems was developed. The systems under investigation are modeled as acoustic-structure interaction problems. The procedure incorporates an efficient time integration method suitable for calculating the dynamic time response. Examples of simulation of the interaction of a pair of gear teeth and investigation of the acoustic field inside and outside a gear box are presented. Dissert. Abstr.

N86-20795 Alabama Univ., Huntsville.
A VISCOELASTIC/DAMAGE SIMULATION MODEL FOR FILAMENT-WOUND CYLINDRICAL PRESSURE VESSELS Ph.D. Thesis
Johnny Lawrence Prater 1985 84 p
Avail: Univ. Microfilms Order No. DA8519066

A model to predict the viscoelastic/damage response of a filament wound composite cylindrical pressure vessel to a proof test loading is developed. The matrix material of the composite system is assumed to be isotropic and linearly viscoelastic. A damage model is proposed which produces a quadratic relationship between the transverse modulus and the circumferential strains. A nonlinear model results and is solved by iterative solution based on the damaged response. The elastic/viscoelastic correspondence principle is used to produce, in the Laplace domain, an associated elastic solution for the circumferential strains. The associated elastic solution is inverted by using the method of collocation to yield the time dependent circumferential strain. A numerical example to demonstrate the simulation model is included. A proof test loading of 5.5 MPa is applied for one minute. Results indicate that the damage is modeled reduces the instantaneous failure load from 9.977 MPa to 7.771 MPa, or 22%. Dissert. Abstr.

N86-20796 Department of the Air Force, Washington, D.C.
INERT ATMOSPHERE TRANSFER VESSEL Patent
Joseph T. Maloy, John F. Leonard, and David H. Fritts, inventors (to Air Force) Issued 15 Oct. 1985 5 p Supersedes AD-D011433
(AD-D011952; US-Patent-4,546,897; US-Patent-Appl-SN-657100; US-Patent-Class-220-227) Avail: US Patent and Trademark Office CSCL 13/4

This patent describes a novel hermetically sealed, protective atmosphere transfer vessel which comprises a container defining an interior cavity and opening thereof for receiving a sample to be protected during transfer, an annular lip surrounding the opening for receiving a flexible puncturable membrane sealing the container, and a wire puncture bridge attached at one to the container and having at the other end a point positioned near the membrane whereby pressure internal of the container expands the membrane against the point to puncture and tear away the membrane for exposure of the sample. An alternative embodiment includes a lid for the container including an axial exhaust hole therethrough and a ball valve for sealing the exhaust hole under the influence of external pressure on the lid. GRA

N86-20797*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SEGMENTED TUBULAR CUSHION SPRINGS AND SPRING ASSEMBLY Patent Application
Leonard A. Haslim, inventor (to NASA) Filed 18 Jun. 1985 39 p
(NASA-Case-ARC-11349-1; NAS 1.71:ARC-11349-1;
US-Patent-Appl-SN-746160) Avail: NTIS HC A03/MF A01 CSCL 13E

A spring which includes a tube with an elliptical cross section, with the greater axial dimension extending laterally and the lesser axial dimension extending vertically is disclosed. A plurality of cuts in the form of slots passing through most of a wall of the tube extend perpendiculary to a longitudinal axis extending along the tube. An uncut portion of the tube wall extends along the tube for bonding or fastening the tube to a suitable base, such as a bottom of a seat cushion. NASA

N86-20798*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CURE-IN-PLACE COMPOSITE FASTENER
Gary L. Farley (Department of the Army, Washington, D.C.) and William T. Freeman, Jr., inventors (to NASA) 25 Jun. 1985 11 p
(NASA-Case-LAR-12939-1; NAS 1.71:LAR-12939-1;
US-Patent-Appl-SN-748532) Avail: NTIS HC A02/MF A01 CSCL 13E

The cure-in-place composite fastener embodies a method and apparatus to fasten composite components in laminate structures. At least one single or multipiece metal or fibrous cure-in-place fastener is inserted into and through at least two layers of partially cured composite material possing diverse curing properties. In the simplest case, a laminate structure is comprised of a layer which cures to a skin layer. The fastener is inserted into a flush with the surface of layer and held in place in laminate structure as the tapered ends are bent against a mold after fastener is inserted through laminate structure. When the laminate structure is completely cured with the fastener in place, the epoxy matrix of the layer flows around and over the fastener thereby making the surface of the layer a smooth surface free from cut fibers or abrubt discontinuities. NASA

N86-20799*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEPLOYABLE M-BRACED TRUSS STRUCTURE Patent Application
Martin M. Mikulas, Jr. and Marvin D. Rhodes, inventors (to NASA) Filed 30 Jul. 1985 12 p
(NASA-Case-LAR-13081-1; NAS 1.71:LAR-13081-1;
US-Patent-Appl-SN-760378) Avail: NTIS HC A02/MF A01 CSCL 13I

A deployable M-braced truss structure, efficiently packaged into a compact stowed position and expandable to an operative position at the use site is described. The M-braced configuration effectively separates tension compression and shear in the structure and permits efficient structural design. Both diagonals and longerons telescope from an M-braced base unit and deployed either pneumatically, mechanically by springs or cables, or by powered reciprocating mechanisms. Upon full deployment, the diagonals and longerons lock into place with a simple latch mechanism. NASA

N86-20800*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADVANCED VAPOR SUPPLY MANIFOLD Patent Application
Ivan O. Clark, William J. Debnam, Jr., Archibald L. Fripp, Jr., and Roger K. Crouch, inventors (to NASA) Filed 15 Jul. 1985 14 p
(NASA-Case-LAR-13259-1; NAS 1.71:LAR-13259-1;
US-Patent-Appl-SN-754706) Avail: NTIS HC A02/MF A01 CSCL 13I

A four-port vapor supply valve to control a vapor or fluid supply to a vapor growth manifold that eliminates supply source contamination from back diffusion into the supply vapor container is disclosed. This valve greatly improves the ability to sharply add or terminate supply flow to the main manifold line. The valve is comprised of a housing with four ports. Two of the ports disposed on opposite sides of the housing are for ingress and egress of the main manifold line. The other two opposing ports are for supply input and purge outlet. The supply/purge line and main manifold line form an X when the supply valve is open and two separate lines when the valve is closed. A single valve stem plunger and seal seat against the main manifold valve inlet seat in the closed position while supply vapor flow is full intensity behind the closed valve seal flowing into the purge line. When the plunger is raised opening access to the main manifold line simultaneously with closing the purge line valve supply flow is routed directly into the manifold line arriving quickly and full strength. Closing the valve by lowering the valve stem plunger seals the main manifold line and terminates supply flow without bleed down time, thus, a staccato supply on/off is provided. NASA

N86-20801*# National Aeronautics and Space Administration. Pasadena Office, Calif.
SELF-LOCKING DOUBLE RETENTION REDUNDANT FULL PIN RELEASE Patent Application
Thomas O. Killgrove, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 18 Mar. 1985 12 p
(Contract NAS7-100)
(NASA-Case-NPO-16233-1; NAS 1.71:NPO-16233-1;
US-Patent-Appl-SN-737018) Avail: NTIS HC A02/MF A01 CSCL 13E

A double retention redundant pull pin release system is disclosed. The system responds to a single pull during an intentional release operation. A spiral threaded main pin is seated in a mating bore in a housing, which main pin has a flange fastened thereon at the part of the main pin which is exterior to the housing. Accidental release tends to rotate the main pin. A secondary pin passes through a slightly oversized opening in the flange and is seated in a second bore in the housing. The pins counteract against one another to prevent accidential release. A frictional lock is shared between the main and secondary pins to enhance further locking of the system. The secondary pin, in response to a first pull, is fully retracted from its bore and flange hole. Thereafter the pull causes the main pin to rotate free of the housing to release, for example, a parachute mechanism. NASA

N86-20802*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD OF REPAIRING HIDDEN LEAKS IN TUBES Patent Application
Joseph D. Duesburg (Rockwell International Corp., Pittsburgh, Pa.) and Robert C. Mills, inventors (to NASA) (Rockwell International Corp., Pittsburgh, Pa.) Filed 30 Aug. 1985 11 p Sponsored by NASA
(NASA-CASE-MFS-19796-1; NAS 1.71:MFS-19796-1;
US-Patent-Appl-SN-770920) Avail: NTIS HC A02/MF A01 CSCL 13I

A method of repairing a tubular assembly in which access to a defect in the tube is limited includes the steps of cutting an opening in the tube on the side opposite the defect so as to expose the defect from the inside of the tube. A tubular insert is inserted into the tube to cover the defect and is secured in place by means of brazing or welding. The remaining space between the opening and insert is closed by means of close-out patches which are welded or brazed to both the insert and the tube. The result is a permanent repair having great structural integrity. NASA

N86-20803*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUN SHIELD Patent Application
Arthur Frank, Silvio F. DeRespinis, and John Mockovciak, Jr., inventors (to NASA) Filed 12 Aug. 1985 12 p Prepared in cooperation with Grumann Aerospace Corp., Bethpage, N.Y.
(NASA-Case-MSC-20162-1; NAS 1.71:MSC-20162-1;
US-Patent-Appl-SN-764805) Avail: NTIS HC A02/MF A01 CSCL 13I

A shading device which is capable of compactly storing a flexible shade on a biased, window-shade type spring roller and

controlled to deliver the shade selectively to either its operative shading or compact storage orientation. NASA

N86-20804*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RADIAL AND TORSIONALLY CONTROLLED MAGNETIC BEARING Patent Application
Phillip A. Studer, inventor (to NASA) Filed 21 Nov. 1985 23 p
(NASA-Case-GSC-12957-1; NAS 1.71:GSC-12957-1;
US-Patent-Appl-SN-800193) Avail: NTIS HC A02/MF A01 CSCL 13I

A magnetic bearing including a circular stator member with a plurality of circumferential pole faces and a suspended annular ring member with corresponding number of inward facing circumferential pole faces separated by respective air gaps is presented. A source of DC magnetic flux circulates flux between the circumferential pole faces of the stator and the ring to provide axial stability along a central longitudinal axis. Flux coil means are included on the stator member to provide variable flux density along predetermined radial paths to provide active radial stabilization. Flux coil means are included on the stator to actively modulate the magnitude of the magnetic forces as well as their direction by differential flux control involving the DC magnetic flux to produce torquing moments about a pair of mutually orthogonal axes which are perpendicular to the central axis. NASA

N86-20805*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THERMAL-STRESS-FREE FASTENERS Patent Application
Max L. Blosser, Robert McWithey, and Thomas F. Kearns, inventors (to NASA) (Inst. for Defense Analysis, Alexandria, Va.) Filed 18 Dec. 1984 11 p
(NASA-Case-LAR-13325-1-SB; NAS 1.71:LAR-13325-1-SB;
US-Patent-Appl-SN-683110) Avail: NTIS HC A02/MF A01 CSCL 13E

A fastener used for connecting two or more structural elements together where the fastener and structural elements have substantially different coefficients of thermal expansion is described. The fastener head or load bearing surface is shaped according to a thermal expansion equation to form a rounded conical shape. This shape allows the fastener to maintain snug contact with the structural elements and at the same time, prevents the buildup of stresses due to thermal expansion. As a result the fastener and structural elements can be exposed to severe temperature cycles while maintaining a stress free snug fit. Particular shaping of the conical portion of the invention permits the use of specially orthotropic structural materials. NASA

N86-20806*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLEXIBLE DIAPHRAGM: EXTREME TEMPERATURE USAGE Patent Application
Guillermo Lerma, inventor (to NASA) Filed 7 Nov. 1985 15 p
(NASA-Case-MSC-20797-1; NAS 1.71:MSC-20797-1;
US-Patent-Appl-SN-771537) Avail: NTIS HC A02/MF A01 CSCL 13I

A diaphragm suitable for extreme temperature usage, such as encountered in critical aerospace applications, is fabricated by a unique method, and of a unique combination of materials, which include multilayered lay-ups of diaphragm materials sandwiched between layers of bleeder fabric which, after being formed in the desired shape on a mold, are vacuum sealed and then cured under pressure, in a heated autoclave, to produce a bond capable of withstanding extreme temperatures. NASA

N86-20807*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SELF-CONTAINED, SINGLE-USE HOSE AND TUBING CLEANING MODULE Patent Application
Fred Patrick Rollins (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) and James Steven Glass, inventors to NASA (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) Filed 3 Oct. 1985 16 p
(NASA-Case-MSC-20857-1; NAS 1.71:MSC-20857;
US-Patent-Appl-SN-783886) Avail: NTIS HC A02/MF A01 CSCL 13I

A self-contained, single-use hose and tubing cleaning module which utilizes available water supplies without requiring access to precision cleaning facilities is presented. The module is attached to the water source at the inlet side and to the hose or tubing to be cleaned at the outlet side. The water flows through a water purification zone, a detergent dispensing zone a filtration zone before the detergent-laden water flows into the tubing to clean the tubing walls. The module contains an embedded pad which is impregnated with a pH indicator to indicate to the user when the detergent has dissolved and rinsing of the tubing begins. NASA

N86-20808*# General Motors Corp., Indianapolis, Ind. Allison Gas Turbine Div.
ADVANCED GAS TURBINE (AGT) TECHNOLOGY REPORT Annual Report, Jan. - Dec. 1984
Jun. 1985 139 p
(Contracts DEN3-168; DE-AI01-77CS-51C
(NASA-CR-175018; DOE/NASA/0168-9; NAS 1.26:175018;
EDR-12070) Avail: NTIS HC A07/MF A01 CSCL 21A

Engine testing, ceramic component fabrication and evaluation, component performance rig testing, and producibility experiments at Pontiac comprised AGT 100 activities of this period, January to December 1984. Two experimental engines were available and allowed the evaluation of eight experimental assemblies. Operating time accumulated was 115 hr of burning and 156 hr total. Total cumulative engine operating time is now 225 hr. Build number 11 and 12 of engine S/N 1 totaled 28 burning hours and constituted a single assembly of the engine core--the compressor, both turbines, and the gearbox. Build number 11 of engine S/N 1 included a 1:07 hr continuous test at 100% gasifier speed (86,000 rpm). Build number 8 of engine S/N 2 was the first engine test with a ceramic turbine rotor. A mechanical loss test of an engine assembly revealed the actual losses to be near the original design allowance. Component development activity included rig testing of the compressor, combustor, and regenerator. Compressor testing was initiated on a rig modified to control the transfer of heat between flow path, lubricating oil, and structure. Results show successful thermal decoupling of the rig and lubricating/cooling oil. Rig evaluation of a reduced-friction compressor was initiated. Combustor testing covered qualification of ceramic parts for engine use, mapping of operating range limits, and evaluation of a relocated igniter plug. Several seal refinements were tested on the hot regenerator rig. An alternate regenerator disk, extruded MAS, was examined and found to be currently inadequate for the AGT 100 application. Also, a new technique for measuring leakage was explored on the regenerator rig. Ceramic component activity has focused on the development of state-of-the-art material strength characteristics in full-scale hardware. Injection-molded sintered alpha-SiC rotors were produced at Carborundum in an extensive process and tool optimization study. Author

N86-20809*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADHESION AND WEAR RESISTANCE OF MATERIALS
Donald H. Buckley 1986 30 p refs Proposed for presentation at the Hartstoffschichten zur Verschleissminderung, Bad Honnef, West Germany, 5-7 May 1986; sponsored by max-Planck-Inst. fuer Metallforschung
(NASA-TM-87239; E-2914; NAS 1.15:87239) Avail: NTIS HC A03/MF A01 CSCL 11H

Recent studies into the nature of bonding at the interface between two solids in contact or a solid and deposited film have provided a better understanding of those properties important to the adhesive wear resistance of materials. Analytical and experimental progress are reviewed. For simple metal systems the adhesive bond forces are related to electronic wave function overlap. With metals in contact with nonmetals, molecular-orbital energy, and density of states, respectively can provide insight into adhesion and wear. Experimental results are presented which correlate adhesive forces measured between solids and the

electronic surface structures. Orientation, surface reconstruction, surface segregation, adsorption are all shown to influence adhesive interfacial strength. The interrelationship between adhesion and the wear of the various materials as well as the life of coatings applied to substrates are discussed. Metallic systems addressed include simple metals and alloys and these materials in contact with themselves, both oxide and nonoxide ceramics, diamond, polymers, and inorganic coating compounds, h as diamondlike carbon. Author

N86-20810# National Aerospace Lab., Tokyo (Japan).
THE PERFORMANCE OF A CRYOGENIC PUMP FOR THE TWO-PHASE FLOW CONDITION
Hitoshi Yamada, Mitsuo Watanabe, Satoshi Hasegawa, and Kenjiro Kamijio 1985 12 p refs In JAPANESE; ENGLISH summary
(NAL-TR-870; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

An experimental investigation was carried out in order to obtain the performance characteristics of a cryogenic pump under a two-phase flow condition. The experiment used an oxygen pump with an inducer and liquid nitrogen as the test fluid. The vapor volumetric fraction at the pump inlet was calculated with an assumption of a constant enthalpy process across an orifice which was used to generate the two-phase flow at the pump inlet. The results showed at the pump head rise did hardly decrease even when the vapor fraction became about 40 percent at the pump inlet. The two-phase flow at the pump inlet was confirmed by a visual observation through a transparent plastic section. It was also found that the adiabatic efficiency for the two-phase flow provided a good agreement with the pump efficiency, which was determined by using torques, outlet flow rates and the pressure difference between the pump inlet and outlet. Author

N86-20811# Army Military Personnel Center, Alexandria, Va.
ANALYSIS OF THE DYNAMICS AND CONTROL OF A TWO DEGREE OF FREEDOM ROBOTIC MANIPULATOR MOUNTED ON A MOVING BASE Final Report
R. Lynch 18 Oct. 1985 121 p
(AD-A160672) Avail: NTIS HC A06/MF A01 CSCL 05/8

Mounting robotic manipulators on moving bases offers the potential of greatly extending the manipulator applications. However, the motion of the base creates a number of problems in terms of the control of the manipulator. The base motion subjects the manipulator to large scale disturbances that can seriously degrade system performance. This thesis illustrates the problems associated with a moving base as it applies to a two degree of freedom manipulator. It is shown that conventional control techniques, such as PID control, cannot effectively compensate for the base accelerations in a typical application. It is also shown that more advanced control algorithms, including decoupling control, LQR control, and pole placement prove to be ineffective to varying degrees. The linear controller that placement technique, is then applied to the complete nonlinear system in an attempt to investigate the influence of the base motion over the entire range of motion of the manipulator. Recommendations for possible solutions to the moving base problem, along with recommendations for extensions of this work, are then made GRA

N86-20812# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Mechanical, Industrial and Aerospace Engineering.
A THERMODYNAMIC SYSTEM ANALYSIS MODEL OF A DIESEL ENGINE Final Report, 1 Aug. 1984 - 31 Jul. 1985
K. T. Rhee, X. L. Yang, and S. L. Chang 16 Oct. 1985 121 p
(Contract DAAG29-84-K-0158)
(AD-A161433; ARO-21770.4-EG) Avail: NTIS HC A06/MF A01 CSCL 21/7

A thermodynamic system model of a direct injection-type diesel engine has been developed. The objective of the modeling was to enable predictions of the instantaneous temperature distribution along and into the combustion chamber of a diesel engine. The present model has a main emphasis on the heat transfer computation with inclusion of new submodels of conduction, radiation heat transfer of the engine, plus engine energy conversion processes. The development of submodels of space-resolved heat release and species distribution in the global model was not possible during the period of the present contract (1 August, 1984 - 31 July, 1985). Consequently, some assumptions were employed for replacing the said submodels in the selected sample computations based on some of the reported results on heat release and heat transfer rates made available in literature. Some results obtained from the present computational study are included in the report and the usefulness of the new computer program for the actual engine design is suggested herein. In addition, recommendation for improvement of the present computational model is included. Author (GRA)

N86-20813*# Naval Postgraduate School, Monterey, Calif.
PROCEEDINGS OF THE 1985 ONR/NAVAIR WAVE ROTOR RESEARCH AND TECHNOLOGY WORKSHOP Final Report, 1 Jan. - 31 Mar. 1985
R. P. Shreeve and A. Mathur May 1985 425 p Workshop held in Monterey, Calif., 26-27 Mar. 1985
(RR0-2403)
(AD-A161539; NPS67-85-008) Avail: NTIS HC A18/MF A01 CSCL 21/5

The purpose of this workshop was to bring together an international group who are, or who have been, involved in research studies or applications of gas-gas, or gas-shaft, energy exchange through wave propagation in rotor passages. It is intended that the workshop serve to define the current levels of understanding, capability and interest in the field, and to provide the input necessary for an assessment of the prospects for the useful exploitation of wave rotors in gas turbine engines. GRA

N86-20814# Mechanical Technology, Inc., Latham, N. Y.
FREE-PISTON STIRLING ENGINE DIAPHRAGM-COUPLED HEAT-ACTUATED HEAT PUMP COMPONENT TECHNOLOGY PROGRAM Final Report
Jun. 1985 179 p
(Contract DE-AC05-84OR-21400)
(DE86-001463; ORNL/SUB-80-61618/1) Avail: NTIS HC A09/MF A01

The results of an effort to develop and demonstrate the technical feasibility of a residential size Stirling engine driven, diaphragm coupled compressor for a heat pump application are presented. The module was to consist of a free piston resonant engine capable of producing 3 kW of useable power, a low loss hydraulic transmission and a nominal 3 ton refrigerant-22 reciprocating compressor. Presented are details of analysis predicted performance goals, design, development of hardware, component testing, and engine/compressor breadboard testing. The test results demonstrated the mechanical feasibility and operational stability of the design concept. The assembly did not stroke out to achieve the full capacity levels predicted, however, anJ a follow on phase IA was initiated in which the reasons for the short fall will be determined. Details of phase IA are included in the appendix. In general, it was concluded that losses in the hydraulic transmission were excessive to the point where insufficient power was available to the compressor to satisfy its driving requirements at the design point conditions. Future work is recommended to reduce the transmission losses so that full capacity can be achieved. DOE

N86-20815# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC AND SHIELDED METAL ARC WELDING OF CHROMIUM-NICKEL STEEL. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 25 p
(Contract DE-AC05-84OR-21400)
(DE86-001500; ORNL/M-14) Avail: NTIS HC A02/MF A01

Procedure WPS-303-ASME-3 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc and shielded metal arc welding of 300 Series Cr-Ni steels (P-8-1), in thickness range 0.25 to 2 in. The filler metals are ER3XX (F-6, A-8) (GTAW) and E3XX-15 (F-5, A-8). The shielding gas for GTAW is argon. DOE

N86-20816# Oak Ridge National Lab., Tenn.
SEMIAUTOMATIC GAS METAL ARC WELDING OF 6XXX ALUMINUM. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 7 p
(Contract DE-AC05-84OR-21400)
(DE86-001513; ORNL/M-27) Avail: NTIS HC A02/MF A01

Precedure WPS-1015 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for semiautomatic gas metal arc welding of aluminum alloys 6061 and 6063 (P-23), in thickness 0.187 to 2.0 in. The filler metal is ER4043 (F-23). The shielding gas is argon. DOE

N86-20817# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF NICKEL. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 13 p
(Contract DE-AC05-84OR-21400)
(DE86-001515; ORNL/M-29) Avail: NTIS HC A02/MF A01

Procedure WPS-1301-ASME-4 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of nickel N02200 and N02201 (P-41), in thickness range 0.035 to 0.432 in.; filler metal is ERNi-1 (F-41); shielding gas is argon. DOE

N86-20818# Connecticut Univ., Storrs.
INVESTIGATION OF ROLE OF SUBSURFACE ZONES IN WEAR OF MATERIALS Final Report
R. Solecki, H. Nowotny, and S. L. Rice Aug. 1985 9 p
(Contract DE-AC02-81ER-10910)
(DE86-001862; DOE/ER-10910/03-FR) Avail: NTIS HC A02/MF A01

Experimental work was conducted with wear tests in both the undirectional sliding and reciprocating impact modes. Experimental results included weight loss and/or volume change measurements, and specimens were analyzed for subsurface zone characteristics by optical and scanning electron microscopy, energy-dispersive X-ray analysis, and by powder X-ray techniques. Theoretical work was based, in part, upon finite-element analysis of subsurface zone development, including thermo-elastoplastic work hardening with temperature-dependent physical properties. The effect of the geometry on the magnitude of the stress intensity factor of a rigid sliding specimen was also investigated. DOE

N86-20819# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Plant.
ALLCORR WELDING AND WELDMENT CORROSION RESISTANCE
C. F. Jenkins and T. A. Jones 1985 31 p Presented at the ASM Metals Congress - International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001973; DP-MS-85-4; CONF-8510160-6) Avail: NTIS HC A03/MF A01

The corrosion and mechanical properties of Allcorr are affected by precipitation of coarse secondary phases at grain boundaries occurring during welding or heat treatment at 700 to 1100(0)C. Welding parameters were varied in an attempt to minimize property degradation and develop an acceptable joining technique for the alloy. The flow characteristics of Allcorr allow welding with low heat input, though special care is required to insure full penetration. Low heat input welding preserves the good corrosion resistance of the alloy. A solution heat treatment at 1200(0)C restores maximum corrosion resistance in Allcorr. DOE

N86-20820# Department of Energy, Morgantown, W. Va.
CIVIL AND MECHANICAL ENGINEERING APPLICATIONS OF SENSITIVITY ANALYSIS
V. Komkov Jul. 1985 21 p
(DE85-013611; DOE/METC-85/4031) Avail: NTIS HC A02/MF A01

In this largely tutorial presentation, the historical development of optimization theories has been outlined as they applied to mechanical and civil engineering designs and the development of modern sensitivity techniques during the last 20 years has been traced. Some of the difficulties and the progress made in overcoming them have been outlined. Some of the recently developed theoretical methods have been stressed to indicate their importance to computer-aided design technology. DOE

N86-20821# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF CHROMIUM-NICKEL STEEL LIMITED TO SPECIAL APPLICATIONS (AUTOGENOUS WELDING). WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 12 p
(Contract DE-AC05-84OR-21400)
(DE86-001502; ORNL/M-16) Avail: NTIS HC A02/MF A01

Procedure WPS-307 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of 300 series austenitic Cr-Ni stainless steels (P-8-1), in thickness range 0.020 to 0.125 in.; filler metal is not used; shielding gas is argon. DOE

N86-20822# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC DC WELDING OF ALUMINUM ALLOYS 6XXX. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 9 p
(Contract DE-AC05-84OR-21400)
(DE86-001511; ORNL/M-25) Avail: NTIS HC A02/MF A01

Procedure WPS-1007 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of aluminum alloys 6061 and 6063 (P-23), in thickness range 0.125 to 2.0 in.; filler metal is ER4043 (F-23); current is direct; shielding gas is helium. DOE

N86-20823# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC (DC) WELDING OF ALUMINUM ALLOYS 3004, 5052, AND 5X54 TO 6XXX. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 8 p
(Contract DE-AC05-84OR-21400)
(DE86-001526; ORNL/M-40) Avail: NTIS HC A02/MF A01

Procedure WPS-2206 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of aluminum alloys 3004, 5052, 5154, and 5454 (P-22) to 6061 and 6063 (P-23), in thickness range 0.187 to 2.0 in.; filler metal is ER4043 (F-23); current is direct; shielding gas is helium. DOE

N86-20824# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF CHROMIUM-NICKEL STEEL TO NICKEL. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 13 p
(Contract DE-AC05-84OR-21400)
(DE86-001533; ORNL/M-47) Avail: NTIS HC A02/MF A01

Procedure WPS-2601-ASME-3 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding 300 series Cr-Ni steels (P-8-1) to nickel N02200 or N02201 (P-41), in thickness range 0.035 to 0.432; filler metal is ERNi-Cr-3 (F-43); shielding gas is argon. DOE

N86-20825# Lawrence Livermore National Lab., Calif.
EXPLOSIVE CONSOLIDATION OF ALUMINUM NITRIDE POWDER
M. L. Wilkins, A. S. Kusubov, and C. F. Cline Jun. 1985 30 p Presented at the EXPLOMET 85 International Conference on Metallurgical Applications of Shock Wave and High Strain-rate Phenomena, Portland, Ore., 28 Jul. 1985
(Contract W-7405-eng-48)
(DE86-001574; UCRL-92861; CONF-850770-12) Avail: NTIS HC A03/MF A01

Aluminum nitride is used as a model material for studying methods for the consolidation of high strength ceramics and metal alloys by dynamic compaction. Experiments coupled with computer simulations are used to explore fabrication techniques. The objective is to develop a methodology for manufacturing high strength material systems by dynamic compaction. DOE

N86-20826# SKF Industries, Inc., King of Prussia, Pa.
MECHANICAL INTERACTIONS OF ROUGH SURFACES Quarterly Progress Report, 30 Jun. - 30 Sep. 1985
J. I. McCool Oct. 1985 16 p
(Contract DE-AC02-84ER-13163)
(DE86-001602; DOE/ER-13163/8) Avail: NTIS HC A02/MF A01

Traction data from 115 tests were compiled into a database using commercial database management software. This enables quick and convenient examination of trends and effects. An example plot and tabulation produced using the database software is given. A reformulation of the traction computation under an elastic/plastic rheological model and in the presence of spin is discussed. Employed within computer program TRIBOS, this formation is shown to reproduce computed values found in the literature. Using TRIBOS, thus revised, it is then shown that the asymmetry of a plot of traction curve slope against spindle skew angle may be explained by an elastic/plastic model when the inherent spin of the rig is considered. The project is an experimental/analytical investigation to: (1) explore the behavior of lubricated concentrated contacts involving microscopically rough surfaces under conditions of combined rolling, sliding and spinning with and without the presence of contaminating particles, and (2) develop processing principles and techniques for the analysis of digitized rough surface profiles to yield surface descriptors that are predictive of functional performance and which have acceptable systematic and random error. DOE

N86-20827# TRW Space Technology Labs., Redondo Beach, Calif. Engineering Sciences Lab.
COMBUSTION PHENOMENA IN CI ENGINES Final Report, 30 Nov. 1984 - 20 Aug. 1985
F. Fendell 1985 49 p
(Contract DE-AC04-84AL-25994)
(DE85-016574; TRW-SN-44134-000) Avail: NTIS HC A03/MF A01

TRW has initiated theoretical modeling and experimental measurement of soot formation and oxidation in a laminar counterflow apparatus, as a step toward the goal of evolving novel strategies for in-cylinder reduction of particle levels in diesel engines. A sequence of experiments is envisioned, whereby a gaseous fuel species is flowed against a hot inert stream, against a hot inert stream with oxides that can be reduced, and against air. A range of intrusive (sampling with gas chromatography, thermocouples, streak photography, etc.) and nonintrusive (laser-beam absorption and scattering) diagnostics are being evaluated for obtaining the soot number density, particle typical dimension, temperature, major-species concentrations, etc. Until laboratory data are available, solution procedures for the theoretical model, which couples a conventional diffusion-flame analysis for the basic thermodynamic and dynamic fields with a kinetic-theory-type phase-plane analysis for the soot-related fields, are to be evolved and evaluated by processing of conceptual data. DOE

N86-20828# Wisconsin Univ., Madison.
INVESTIGATION OF THE EFFECTS OF ALTERNATIVE FUEL PROPERTIES ON COMBUSTION AND EMISSION MECHANISMS IN DIRECT INJECTION ENGINES
H. Ng and G. Borman Apr. 1985 106 p
(Contract DE-AI01-81CS-50006)
(DE85-017008; DOE/CS-50006/2) Avail: NTIS HC A06/MF A01

Six different fuels were tested using a TACOM-LABECO modified single cylinder direct injection diesel engine with a four hole nozzle and a 24:1 compression. The six fuels tested were a blend of commercial diesel fuels Numbers 1 and 2 giving a cetane number of 43.3, JP-7 with only 2% aromatic content and a cetane number of 57.2, two bends of one-ring (benzene-ring) aromatic solvent and JP-7 giving cetanes of 31.3 and 41.7, and two bends of two-ring (naphthalene-ring) aromatics giving cetane numbers of 30.3 and 41.2 respectively. The two-ring aromatic blends gave 20 to 30% more particulates than the corresponding one-ring aromatic blends. The two-ring aromatic blends had a lower flame temperature at the beginning diffusion-burning period than the corresponding cetane number one-ring aromatic blends. Radiance data indicated that there were more in-cylinder particulates during that period in the two-ring than the one-ring blends. It was found that the lower cetane and one-ring blends had a larger fraction of homogeneous (premixed) burning than the higher cetane and two-ring blends respectively. DOE

N86-20829# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Mechanical Engineering.
METHODICAL USE OF PRINCIPLES OF KINEMATICS WITH RESPECT TO ROTARY PUMPS AND ENGINES
J. H. B. Stulen Oct. 1984 18 p refs
(RR-WB-84-14) Avail: NTIS HC A02/MF A01

The use of principles of kinematics in designing rotary engines is discussed. The methodical way of treatment delivers a coherent and surveyable collection of forms. The constant transmission ratio gives a great variety of trochoidal forms useful for point-flank contacts in rotary engines or pumps. Truncation or hollowing the trochoids and a multiple use enlarge their utility. Envelopes due to cycloidal motion of a generating curve may be used for flank-flank contacts. Here too truncation or hollowing and a multiple form widens the possibilities of application. Author (ESA)

N86-20830# Technische Hogeschool, Delft (Netherlands). Metalworking Technology Section.
THE RESISTANCE WELDING OF A MICRO THERMOCOUPLE TO A WORKPIECE. VOLUME 2: FIGURES [HET WEERSTANDSLASSEN VAN EEN MIKRO-THERMOKOPPEL VAAN EEN WERKSTUK (FIGUREN)]
R. Nooder 17 Jan. 1983 29 p In DUTCH 2 Vol.
(Rept-14A18-Vol-2) Avail: NTIS HC A03/MF A01

Layouts, tables, and figures of the article on welding a thermocouple to a workpiece are presented. Author (ESA)

N86-20831# Technische Hogeschool, Delft (Netherlands). Metalworking Technology Section.
THE RESISTANCE WELDING OF A MICRO THERMOCOUPLE TO A WORKPIECE. VOLUME 1: TEXT
R. Nooder 17 Jan. 1983 43 p refs In DUTCH; ENGLISH summary 2 Vol.
(Rept-14A18-Vol-1) Avail: NTIS HC A03/MF A01

Based on a model for the arc welding of a single 50 micrometer diameter 100 Cr6 wire at right angles to the surface, the welding of a micro thermocouple to a workpiece with electric pulses was investigated. The micro thermocouple was developed for countersinking temperature measurements, but its attachment to the workpiece caused problems. Connected to the positive pole of a small condensor, the couple was approached to the piece with constant velocity to create an arc for a first attachment. Next the contact surface was increased with a small pulse (transitional resistance minimal). The connection strength was maximized using a strong pulse. Determining magnitudes are the heat developed in the weld and the force exerted by the couple on the weld. They depend on the input energy. The power of the pulses depends upon the object to be welded and must be found through experience. Author (ESA)

N86-20832# European Space Agency, Paris (France).
MASS AND HEAT TRANSFER IN REFLUX CONDENSERS FOR ABSORPTION HEAT PUMPS
Robert Mack Aug. 1985 43 p refs Transl. into ENGLISH of "Stoff- u. Waermeuebertragung bei Ruecklaufkuehlern fuer Absorptionswaermepumpen' Rept. DFVLR-FB-84-43 Hardthausen am Kocker, West Germany, Jul. 1984 Original language document was announced as N85-24266
(ESA-TT-912; DFVLR-FB-84-43) Avail: NTIS HC A03/MF A01; original German version available from DFVLR, Cologne DM 15.50

An equation to calculate horizontal reflux condensers was deduced. It makes mass and heat transfer computable depending on known numerical values of the process variables. The equation is demonstrated by experiments with two absorption heat pumps working with ammonia water solution. Parameter studies are made with a computer program to show the different dependences and

to guarantee an efficient construction. The program is extended to allow the computation of other than nominal conditions. Computation and test results show good agreement. Author (ESA)

N86-20833# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
LARGE PROBLEM FACILITIES FOR DYNAMICS
J. vanBeest 1983 124 p
(ICES-STRUDL-83-3; B8575346) Avail: NTIS HC A06/MF A01
Modifications to the STRUDL VM28 version to incorporate the large problem option such that dynamic analysis can be interrupted at critical points are presented. Load modules used during the dynamic analysis were reorganized. Author (ESA)

N86-20834# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
ICES-STRUDL V2M8. UPDATE TO THE ENGINEERING USER MANUAL
J. vanBeest, E. A. Guse, A. W. M. Kok, C. F. Vrijman, and A. deBoer 1983 43 p refs
(ICES-STRUDL-83-4; B8575347) Avail: NTIS HC A03/MF A01
Estimation of start vectors for the inverse power method in the STRUDL structural analysis program; an addition to members properties command in plastic frame analysis; selective backsubstitution and output commands for a steady state analysis and a transient analysis; implementation of heat analysis in STRUDL V2M8; implementation of the linear buckling in STRUDL V2M8; and large problem and subspace option for dynamics are outlined. Author (ESA)

N86-20835# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ON THE EFFICIENCY OF STIFFENED PANNELS WITH APPLICATION TO SHEAR WEB DESIGN
A. Rothwell Jul. 1984 31 p refs
(VTH-M-518) Avail: NTIS HC A03/MF A01
Criteria for the design of stiffened panels, based on the concept of efficiency, are reviewed. The shear web example is chosen, and results for conventional stiffened webs, truss webs, post-buckled designs, and webs of corrugated cross-section are presented. Author (ESA)

N86-20836# AiResearch Mfg. Co., Torrance, Calif.
HIGH-TEMPERATURE CERAMIC RECUPERATOR AND COMBUSTION AIR BURNER PROGRAMS Program Summary, Apr. 1981 - Mar. 1984
H. J. Strumpf, D. M. Kotchick, and M. G. Coombs Aug. 1985 59 p
(Contracts GRI-5083-231-0961; GRI-5080-342-0440; GRI-5080-342-0439)
(PB86-102712; Rept-84-21508; GRI-85/0067) Avail: NTIS HC A04/MF A01 CSCL 13A
A study has been performed for the development of a ceramic recuperator and its companion high-temperature preheated combustion air burner. The system is designed to operate in a variety of industrial flue gas streams with exhaust temperatures up to 15000 F. Current ceramic recuperator and high-temperature burner systems were reviewed. Industrial processes with flue gas temperatures in excess of 1900 F were identified and quantified to ascertain market potential. Conceptual designs of ceramic recuperators and burners were developed and evaluated for four promising industrial applications. A preliminary reference design of a high-temperature combustion air system was developed for a typical steel soaking pit application. The design and fabrication of a 5-MMBtu/hr prototype recuperator was completed. An industrial burner capable of operating with 2000 F combustion air was procured. GRA

N86-20837# AiResearch Mfg. Co., Torrance, Calif.
HIGH-TEMPEATURE CERAMIC RECUPERATOR AND COMBUSTION AIR BURNER PROGRAMS: MARKET POTENTIAL AND ECONOMIC ANALYSIS Topical Report, Apr. 1981 - Oct. 1983
H. J. Strumpf, D. M. Kotchick, and M. G. Coombs Aug. 1985 122 p refs
(Contracts GRI-5083-231-0961; GRI-5080-342-0439; GRI-5080-342-0440)
(PB86-102753; Rept-84-21511; GRI-85/0068) Avail: NTIS HC A06/MF A01 CSCL 13A
The summary covers a portion of a comprehensive study performed for the development of a ceramic recuperator and its companion high-temperature preheated combustion air burner. The system is designed to operate in a variety of industrial flue gas streams with exhaust temperatures up to 2500 F. The ceramic recuperator provides up to 2000 F preheated combustion air to the high-temperature burner. Current ceramic recuperator and high-temperature burner systems were reviewed industrial processes with flue gas temperatures in excess of 1900 F were identified and quantified to ascertain market potential. Conceptual designs of ceramic recuperators and burners were developed and evaluated for four promising industrial applications. GRA

N86-20838# AiResearch Mfg. Co., Torrance, Calif.
HIGH-TEMPERATURE CERAMIC RECUPERATOR AND COMBUSTION AIR BURNER PROGRAMS: TESTING OF A HIGH-TEMPERATURE BURNER Topical Report, Apr. 1981 - Oct. 1983
H. J. Strumpf, D. M. Kotchick, M. G. Coombs, and G. Hossepian Aug. 1985 122 p
(Contracts GRI-5083-231-0961; GRI-5080-342-0440)
(PB86-103819; Rept-84-21510; GRI-85/0066) Avail: NTIS HC A06/MF A01 CSCL 13A
The resport describes part of a comprehensive effort performed to support the development of a high-temperature waste heat recovery system. The system includes a ceramic recuperator and a high-temperature combustion air burner. This topical report covers the testing of a high-temperture, preheat, 15-MMBtu/hr industrial burner. The burner was successfully operated at preheated air temperatures up to 2000 F. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

No abstracts in this category.

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-20839 Michigan Univ., Ann Arbor.
AN IMPROVED 2-DIMENSIONAL GRILLAGE METHOD FOR ANALYZING ORTHOGONALLY STIFFENED PLATED GRILLAGE STRUCTURES Ph.D. Thesis
Kyu Nam Cho 1985 94 p
Avail: Univ. Microfilms Order No. DA8512384
An improved simplified modeling method for the analysis of orthogonally stiffened plated grillage structures is presented. The simplified method improved is two-dimensional grillage modeling, whereby the plating cover is lumped with the beam elements representing the orthogonal stiffener system. More accurate determination of the grillage beam section properties is based on rational reduction of accurate three-dimensional model characteristics through a modified static condensation procedure. A general three-dimensional procedure which overcomes the well known

problems with nonconforming beam and planestress plate elements, and thus gives more accurate and reliable solutions, is also developed. This procedure provides the basis for evaluating the two-dimensional grillage modeling procedure, and provides the global matrices for the systematic grillage beam section property reductions. The theory and numerical model are applied to a typical orthogonally stiffened plated grillage structure. Comparison with accurate three-dimensional calculations supports the reliability of the simplified method developed. Author

N86-20840 Texas Univ., Austin.
ULTIMATE STRENGTH OF TUBULAR JOINTS SUBJECTED TO COMBINED LOADS Ph.D. Thesis
Peter Windell Hoadley 1984 296 p
Avail: Univ. Microfilms order No. DA8513230

Nine tests were conducted on double-tee (DT) tubular joints subjects to various combinations of axial load, in-plane bending and out-of-plane bending in the branch. These tests along with three reference tests (axial load alone, in-plane bending alone, and out-of-plans bending) were used to study joint interaction and to develop equations for joint design. It was found that the branch load interaction was best represented by the following equation: P/P sub u + (M/M sub n) sub OPB sup 1.2 + (M/M sub u) sub 1PB sup 2.1 = 1.0. The equation of the type used in Supplement 1 to the 13th Edition of the American Petroleum Insititute (API) Specification, namely P/P sub u + 2/pi arcsine square root (M/M sub u) sub 1PB sup 2 + (M/M sub u) sub OPB sup 2 = 1.0 was found to be slightly unconservative when P sub u and M sub u are based on experimental results. When API predictions of P sub u and M sub u are used, the arcsine equation was very conservative in many instances because M sub u is underestimated. Strain gage measurements were used to determine the SCF at the toe of the weld for axial load, in-plane bending and out-of-plane bending. Author

N86-20841* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CRYOGENIC INSULATION STRENGTH AND BOND TESTER Patent
Paul H. Schuerer, James H. Ehl, and Willibald P. Prasthofer, inventors (to NASA) Issued 22 Oct. 1985 11 p Filed 3 Nov. 1983
(NASA-Case-MFS-25910-1; US-Patent-4,548,083;
US-Patent-Appl-SN-548582; US-Patent-Class-73-827;
US-Patent-Class-73-150-A) Avail: US Patent and Trademark Office CSCL 20K

A method and apparatus for testing the tensile strength and bonding strength of sprayed-on foam insulation attached to metal cryogenic fuel tanks is described. A circular cutter is used to cut the insulation down to the surface of the metal tank to form plugs of the insulation for testing in situ on the tank. The apparatus comprises an electromechanical pulling device powered by a belt battery pack. The pulling device comprises a motor driving a mechanical pulling structure comprising a horizontal shaft connected to two bell cracks which are connected to a central member. When the lower end of member is attached to a fitting, which in turn is bonded to a plug, a pulling force is exerted on the plug sufficient to rupture it. The force necessary to rupture the plug or pull it loose is displayed as a digital read-out.
Official Gazette of the U.S. Patent and Trademark Office

N86-20842 British Library Lending Div., Boston Spa (England).
ALLOWANCE FOR FORCES OF INERTIA IN MECHANICAL TESTING OF METAL
V. A. Osadchii, V. T. Zhadan, and A. V. Rumyantsev 1985 5 p Transl. into ENGLISH from Izv. VUZ, Chernaya Metall. (Moscow, USSR), no. 5, 1955 p 107-109
(BLLD-Trans-M-36512-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The effects of the forces of inertia of both the specimen itself and those of the auxiliary mechanisms are examined in the modeling of processes entailing loading at high speeds with varying rate of deformation. B.G.

N86-20843 Rensselaer Polytechnic Inst., Troy, N.Y.
AN EXPERIMENTAL STUDY OF BIAXIAL INELASTIC DEFORMATION BEHAVIOR OF ENGINEERING ALLOYS IN SUPPORT OF VISCOPLASTICITY THEORY AND LIFE PREDICTION Ph.D. Thesis
1985 239 p
Avail: Univ. Microfilms Order No. DA8519501

The measured stress strain responses under various biaxial monotonic and cyclic proportional and nonproportional histories are compared with the predictions of the classical flow law of plasticity and the viscoplasticity theory based on overstress. The role of accumulated inelastic strain in materials modeling was studied using proportional, to step, and two-step loadings. Hardening and rate-dependence were investigated using fully reversed strain controlled axial (a), torsional (T), in-phase (I), and out-of-phase (O) loadings. During cycling the normalized stress amplitude was observed to increase nearly threefold. After the A, T and I segments, a cross effect was oserved which was not seen following the O-segment. The applicability of the viscoplasticity theory in fatigue-creep life predictions was studied. It is shown that the predictions reflect both qualitativity and quantitatively the strain rate and hold time effects. Dissert. Abstr.

N86-20844 Brown Univ., Providence, R. I.
AN EXAMINATION OF CRACK TIP FIELDS IN BRITTLE MATERIALS SUBJECTED TO DYNAMIC LOADING Ph.D. Thesis
Chien-Ching Ma 1985 154 p
Avail: Univ. Microfilms Order No. DA8519870

Several phenomena which were observed in experiments involving brittle materials subjected to dynamic loading do not seem to follow the usual concepts of linear elastic fracture mechanics. Some of these phenomena are examined on the basis of theoretical models. Fracture initiation and crack growth in a plate due to dynamic pressure loading on the faces of a pre-existing crack are considered. The problem is formulated within the framework of two dimensional elastodynamics, and the system is viewed as a semi-infinite crack in an otherwise unbounded body. The overall features of the model were selected to simulate recent experiments on dynamic fracture of Homalite-100 in which the optical shadow spot method was used to measure the time history of the stress intensity factor. Dissert. Abstr.

N86-20845 Akron Univ., Ohio.
FINITE ELEMENT ANALYSIS OF TRANSIENT CONTACT Ph.D. Thesis
Yukio Nakajima 1986 396 p
Avail: Univ. Microfilms Order No. DA8520438

The contact analysis of deformable bodies is one of the major research areas in finite element analysis. A development solution to the problem of transient contact, is discussed. In relation to the tire industry, the satisfactory analysis of transient contact is of growing importance as the demand for increased ride comfort, but lower tire rolling resistance is imposed. A finite element procedure that solves transient contact problems subject to time dependent boundary conditions was developed. Two contact procedures were implemented in ADINA, the Lagrange multiplier method and the penalty function method. Several numerical experiments which illustrate the capabilities of the schemes to analyze sliding/rolling contact over a bump or hole are presented. Dissert. Abstr.

N86-20846 Purdue Univ., West Lafayette, Ind.
DETERMINISTIC AND NON-DETERMINISTIC RESPONSE ANALYSIS OF COMPLEX SHELLS Ph.D. Thesis
Rakesh Kumar Kapania 1985 187 p
Avail: Univ. Microfilms Order No. DA8520023

Finite element analysis capabilities are developed for performing deterministic and nondeterministic responses of complex thin shells. A set of shell elements is adopted, modified or extended to study the seismic and wind responses of column supported cooling towers. For the deterministic responses, both the modal superposition and the time integration methods are used and for the nondeterministic responses both frequency domain analysis

and the time analysis methods are used. For the frequency domain analysis, a finite element formulation and Gaussian quadrature procedure, using both the direct complex matrix inversion and the modal superposition methods, are presented. Results are obtained for a simply supported cylindrical panel under purely random loads and for a cooling tower subjected to random wind loads are at three different wind velocities, based on the quasi-steady aerodynamic theory and Davenport's spectrum for wind fluctuations. Random wind response analysis of a cooling tower is also performed using Monte Carlo simulation approach. Dissert. Abstr.

N86-20847 California Inst. of Tech., Pasadena.
ON THE EXISTENCE AND UNIQUENESS OF THE SOLUTION TO THE SMALL-SCALE NONLINEAR ANTI-PLANE SHEAR CRACK PROBLEM IN FINITE ELASTOSTATICS Ph.D. Thesis
Jason Masao Wakugawa 1985 84 p
Avail: Univ. Microfilms Order No. DA8519568

Existence and uniqueness of the solution to the small scale nonlinear antiplane shear crack problem in finite elastostatics are addressed. The hodograph transformation, commonly used in the theory of compressible fluid flows, plays an essential role. Existence is established by exhibiting an exact closed form solution, constructed via the hodograph transformation. Uniqueness is established by first proving the uniqueness of the solution to a related boundary value problem, which is linear by virtue of the hodograph transformation, and then examining the implications of this result on the original problem. The possibility of making some of the conditions imposed on the solution to the small scale nonlinear crack problem less restrictive is then investigated. This leads to several further results, including estimates of the nonvanishing shear stress component of the stress tensor along the crack faces. Dissert. Abstr.

N86-20848 California Inst. of Tech., Pasadena.
DYNAMIC RESPONSE OF A PARTIALLY EMBEDDED BAR UNDER TRANSVERSE EXCITATIONS Ph.D. Thesis
Ronald Y. S. Pak 1985 120 p
Avail: Univ. Microfilms Order No. DA8519558

The dynamic response of a finite flexible bar partially embedded in a half space, under transverse loadings is examined. The loadings are applied at the unembedded end of the bar and may, in general, be a combination of time/harmonic shear and moment. The problem is intended to serve as a fundamental idealization for the dynamic analysis of piles or other embedded foundations whose flexibilities are not negligible. By treating the bar as a one dimensional structure and the half space as a three dimensional elastic continuum, the interaction problem is formulated as a Fredholm integral equation of the second kind. The essential tool required in the formulation is a group of Green's function which describe the response of an elastic half space to a finite, distributed, buried source which acts in the lateral direction. Dissert. Abstr.

N86-20849 British Aerospace Aircraft Group, Warton (England). Aircraft Group.
A DEVELOPMENT OF THE CRACK GROWTH RESISTANCE CURVE (R-CURVE) TECHNIQUE AT BAe, WARTON
A. Schofield Nov. 1984 16 p refs
(BAe-MDR-0748) Copyright. Avail: Issuing Activity

The crack growth resistance curve (R-Curve) is the parameter normally used to predict failure in thin sheet materials where plane stress conditions are developed at the crack tip. The R-Curve is of particular use where long cracks are produced in wide panels, for example in combat damaged skin panels. Hence, the R-Curve is an essential part of any damage tolerant design or analysis approach to airframe structure. Author (ESA)

N86-20850# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
EFFECT OF DIFFERENT FACTORS ON THE SENSITIVITY OF ENGINEERING MATERIALS TO STRESS CONCENTRATION IN THE CASE OF FATIGUE LOADING
A. Buch Aug. 1984 55 p refs
(TAE-551) Avail: NTIS HC A04/MF A01

More accurate fatigue test results were used for verification of different calculation methods and for establishing a more reliable relationship between the notch factor and the notch radius. Scatter bands for the dependence of the notch sensitivity K (sub F)/K (sub T) on the notch radius were obtained for steel specimens with stress concentration factors K (sub T) is equal to or less than 3.6, with particular consideration of test results for large component similar specimens with large notch radii. The scatter bands of test points were plotted separately for tempered and normalized steels, but the rotating/bending and tension/compression test results were considered together. Their upper and lower boundaries were expressed analytically with a two parameter formula. This formula takes better into account the notch size effect than the formulas of Neuber, Peterson or Stieler. Author

N86-20851# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
REPEATED BUCKLING OF GRAPHITE EPOXY SHEAR PANELS WITH BONDED METAL STIFFENERS
T. Weller, G. Messer, and A. Libai Aug. 1984 54 p refs Sponsored in part by European Office of Aerospace Research and Development
(Contract AF-AFOSR-0103-82)
(TAE-546; SR-5) Avail: NTIS HC A04/MF A01

The durability of hybrid Wagner type beams (Gr/Ep shear web stiffened by a bonded aluminum frame) subjected to repeated deep bucklings in shear was investigated. Test results demonstrated that: composite shear webs can withstand loads which correspond to many times of their buckling, and be utilized safely in the deep postbuckling region; utmost fibers in the stacking sequence should be placed in tension field direction to increase both fatigue life and ultimate strength of the web; composite shear webs are less sensitive to fatigue than metal ones; and fatigue damage in a composite web does not necessarily lead to comprehensive failure. Author

N86-20852# Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
STIFFENED SHEAR PANELS SUBJECTED TO REPEATED BUCKLINGS: DURABILITY STUDIES
A. Libai, T. Weller, M. Kollet, and J. Singer Jul. 1984 65 p refs Prepared in part for European Office of Aerospace Research and Development, London, England
(Grant AF-AFOSR-0103-82)
(TAE-545; SR-4) Avail: NTIS HC A04/MF A01

The durability of Wagner-Type metal shear panels subjected to repeated bucklings was investigated. The numbers of buckling cycles to crack initiation, extension and failure were measured for beams with various combination of web thickness, stiffener properties and panel aspect ratios. Tests were supported by analysis. Design prediction formulas were constructed, and important parameters were identified. Qualitative results showed that the load at which local yielding initiates along the panel boundary near the tension diagonal is the best single predictor of the life of the panels. The effects of the (ultimate/cyclic) load ratio on panel durability are much more pronounced than those of the corresponding (cyclic/buckling) load ratio. Strengthening of boundary stiffeners is not fully utilizable for increasing the working loads due to adverse effects on structural life. Author

N86-20853# Queensland Univ., St. Lucia (Australia). Dept. of Civil Engineering.
INELASTIC EXPERIMENTS ON ANGLE AND TEE STRUTS
S. Kitipornchai and H. W. Lee Aug. 1984 35 p refs
(CE54) Avail: NTIS HC A03/MF A01

An experimental investigation was made of the inelastic buckling of axially loaded, pinned end single angle, tee, and double angle struts. A total of 54 struts with modified slenderness ranging from 0.33 to 1.08 was tested. Specially designed pinned end supports allowed the end cross sections to rotate about the major and minor axes, but restrained them against twisting about the longitudinal axis. All struts failed in the inelastic range by excessive

bending and twisting. The experimental results compared with the theoretical predictions and with other test results. It was found the related design rules in the current Australian AS 1250-1981 and American AISC Specification are satisfactory for single and double angle struts, but are slightly unsafe for tee struts. Experimental results are compared with the SSRC multiple column curves. Author

N86-20854# Queensland Univ., St. Lucia (Australia). Dept. of Civil Engineering.
INELASTIC BUCKLING OF SINGLE ANGLE, TEE AND DOUBLE ANGLE STRUTS
S. Kitipornchai and H. W. Lee Sep. 1984 35 p refs
(CE55) Avail: NTIS HC A03/MF A01

The inelastic flexural and flexural-torsional buckling of axially loaded, pinned end single angle, tee and double angle struts are investigated theoretically. The calculated inelastic buckling loads are based on the tangent modulus concept, assuming idealized residual stress distributions in the strut sections. In the inelastic range, although the elastic flexural-torsional buckling loads for some struts are less than the elastic flexural buckling loads, results show that the inelastic buckling loads of the struts are not at all influenced by nor related to the elastic flexural-torsional buckling loads. Flexural buckling mode is the dominant failure mode for most of the strut shapes, except for single unequal angles and for tees and double angles whose radii of gyration ratios, r(subx)/r (suby) are greater than 1.0. Experimental results compare well with the ultimate strength curves, except for tee struts in which experimental buckling loads are consistently lower than the theoretical predictions. Author

N86-20855°# Failure Analysis Associates, Palo Alto, Calif.
A REVIEW OF FRACTURE MECHANICS LIFE TECHNOLOGY Final Report
Philip M. Besuner, David O. Harris, and Jerrell M. Thomas Washington NASA Feb. 1986 431 p refs
(Contract NAS8-34746)
(NASA-CR-3957; NAS 1.26:3957) Avail: NTIS HC A19/MF A01 CSCL 20K

Lifetime prediction technology for structural components subjected to cyclic loads is examined. The central objectives of the project are: (1) to report the current state of the art, and (2) recommend future development of fracture mechanics-based analytical tools for modeling subcritical fatigue crack growth in structures. Of special interest is the ability to apply these tools to practical engineering problems and the developmental steps necessary to bring vital technologies to this stage. The authors conducted a survey of published literature and numerous discussions with experts in the field of fracture mechanics life technology. One of the key points made is that fracture mechanics analyses of crack growth often involve consideration of fatigue and fracture under extreme conditions. Therefore, inaccuracies in predicting component lifetime will be dominated by inaccuracies in environment and fatigue crack growth relations, stress intensity factor solutions, and methods used to model given loads and stresses. Suggestions made for reducing these inaccuracies include development of improved models of subcritical crack growth, research efforts aimed at better characterizing residual and assembly stresses that can be introduced during fabrication, and more widespread and uniform use of the best existing methods. Author

N86-20856°# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN APPROXIMATE BUCKLING ANALYSIS FOR RECTANGULAR ORTHOTROPIC PLATES WITH CENTRALLY LOCATED CUTOUTS
Michael P. Nemeth, Manuel Stein, and Eric R. Johnson (Virginia Polytechnic Inst. and State Univ., Blacksburg, Va.) Feb. 1986 21 p refs
(NASA-TP-2528; L-16032; NAS 1.60:2528) Avail: NTIS HC A02/MF A01 CSCL 20K

An approximate analysis for predicting buckling of rectangular orthotropic composite plates with centrally located cutouts is presented. In this analysis, prebuckling and buckling problems are converted from a two-dimensional to a one-dimensional system of linear differential equations with variable coefficients. The conversion is accomplished by expressing the displacements as series with each element containing a trigonometric function of one coordinate and a coefficient that is an arbitrary function of the other coordinate. Ordinary differential equations are then obtained from a variational principle. Analytical results obtained from the approximate analysis are compared with finite element analyses for isotropic plates and for specially orthotropic plates with central circular cutouts of various sizes. Experimental results for the specially orthotropic plates are also presented. In nearly all cases, the approximate analysis predicts the buckling mode shapes correctly and predicts the buckling loads to within a few percent of the finite element and experimental results. Author

N86-20857°# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOLUTION OF THE SYMMETRIC EIGENPROBLEM AX=LAMBDA BX BY DELAYED DIVISION
Gaylen A. Thurston and Nancy J. C. Bains Mar. 1986 40 p refs
(NASA-TP-2514; L-15984; NAS 1.60:2514) Avail: NTIS HC A03/MF A01 CSCL 20K

Delayed division is an iterative method for solving the linear eigenvalue problem AX = lambda BX for a limited number of small eigenvalues and their corresponding eigenvectors. The distinctive feature of the method is the reduction of the problem to an approximate triangular form by systematically dropping quadratic terms in the eigenvalue lambda. The report describes the pivoting strategy in the reduction and the method for preserving symmetry in submatrices at each reduction step. Along with the approximate triangular reduction, the report extends some techniques used in the method of inverse subspace iteration. Examples are included for problems of varying complexity. Author

N86-20858# National Aeronautical Lab., Bangalore (India).
SYSTEM FOR AUTOMATED CRACK GROWTH TESTING UNDER RANDOM LOADING
R. Sunder Aug. 1984 24 p refs Sponsored in part by the Aeronautics Research and Development Board
(NAL-TM-MT-8-84) Avail: NTIS HC A02/MF A01

Procedures were developed for computer controlled crack propagation testing under random load sequences, they include features which are not available in conventional systems, but which appear essential for random load testing. These include the capability to simulate any desired K-function on standard laboratory specimens and continuous on-line Rainflow analysis of the test load sequence to exclude cycles falling below given values of threshold stress intensity, stress level or range. The system includes a procedure for automated COD-based crack opening/closing load level measurement. Experimental studies on Al-Cu alloy sheet material point to a requirement for development of standards for spectrum loading crack growth testing. E.A.K.

N86-20859# National Aeronautical Lab., Bangalore (India). Structures Div.
FIELD-CONSISTENT STRAIN INTERPOLATIONS FOR THE QUADRATIC SHEAR FLEXIBLE BEAM ELEMENT
G. Prathap and C. Ramesh Babu Feb. 1985 32 p refs Sponsored by Council for Scientific and Industrial Research
(NAL-TM-ST-8503) Avail: NTIS HC A03/MF A01

A shear flexible quadratic isoparametric beam element with three degrees of freedom per node is critically examined from the point of view of the consistency of the constrained strain fields that arise in the thin beam limits. The errors, in terms of convergence of displacement fields and violent oscillations of stress fields that emerge when exactly integrated elements are used, are predicted a priori and confirmed with numerical experiments. The rationale behind the use of optimal stress sampling at Gaussian points is also derived directly from these arguments. Author

N86-20860# National Aeronautical Lab., Bangalore (India). Structures Div.

A FIELD-CONSISTENT THREE-NODED QUADRATIC CURVED AXISYMMETRIC SHELL ELEMENT
G. Prathap and C. Ramesh Babu Feb. 1985 31 p refs Sponsored by Council for Scientific and Industrial Research
(NAL-TM-ST-8502) Avail: NTIS HC A03/MF A01

A curved three noded quadratic isoparametric axisymmetric thick shell element is developed. Field consistency interpretations allow various configurations of the element to be designed so as to satisfy specific problem needs. Typical applications demonstrate the versatility and accuracy of this element in its different problem specific forms. Author

N86-20861# National Aeronautical Lab., Bangalore (India). Structural Sciences Div.
ASKA AND CONSTRAINED MULTI-STRAIN-FIELD PROBLEMS
B. R. Somashekar, G. Prathap, and C. RameshBabu Sep. 1985 23 p refs
(NAL-TM-ST-8513) Avail: NTIS HC A02/MF A01

A computer program, ASKA, to computate multistrain fields is presented. The element libraries of most general purpose program packages are derived from the finite element method used in the sixties and seventies. These procedures met with large success in many applications, however, large grey areas of uncertainty remained. In these, elements which were in many respects excellent could fail dramatically in many practical situations. These problems were described as parasitic shear, shear locking, and the very poor performance of curved beams and shells was often attributed to lack of strain free rigid body motion, locking at incompressible or nearly incompressible limits. Some elements of ASKA program package are tested and reported. The field consistency options are introduced. The field consistency method can be applied with little modification to existing codes. E.A.K.

N86-20862# National Aeronautical Lab., Bangalore (India). Structures Div.
AN ISOPARAMETRIC QUADRATIC THICK CURVED BEAM ELEMENT
G. Prathap and C. Ramesh Babu May 1985 43 p refs Sponsored by the Council for Scientific and Industrial Research
(NAL-TM-ST-8505) Avail: NTIS HC A03/MF A01

A three-noded curved beam element with transverse shear deformation, based on independent isoparametric quadratic interpolations is designed from field-consistency principles. It is shown that a quadratic element that is field-inconsistent in membrane strain effects from membrane locking - i.e., an error of the second kind propagates indefinitely as element length to thickness ratio and/or element length to radius of curvature ratio increase, in nearly inextensional bending. However, field inconsistency in shear strain does not lead to shear locking but degrades its performance to exactly that of a field consistent linear element. It is also seen that field inconsistency leads to severe axial force and shear force oscillations. Error estimates for locking, wherever possible are derived and confirmed by numerical experiments. E.A.K.

N86-20863# National Aeronautical Lab., Bangalore (India).
CRACK GROWTH UNDER RANDOM LOADING: FATIGUE CYCLE ANALYSIS FOR TESTING AND LIFE PREDICTIONS
R. Sunder Aug. 1984 18 p refs Presented at the International Symposium on Strength at Sonic and Ultrasonic Frequencies, Kiev (USSR), 25-28 Sep. 1984
(NAL-TM-MT-9-84) Avail: NTIS HC A02/MF A01

The Rainflow cycle counting technique which is valid for fatigue crack growth analysis. This technique was incorporated into a procedure for engineering predictions of crack propagation life under random loading on the basis of experimental data for constant amplitude loading. Predictions require less computer time and offer an accuracy which favorably compares to that of existing techniques. A realtime computer procedure was developed for Rainflow based on on-line modification of random load sequencies during crack growth testing. On-line load sequence modification opens new possibilities in computer controlled testing. E.A.K.

N86-20864# National Aerospace Lab., Tokyo (Japan).
FUNDAMENTAL INVESTIGATION ON THE IMPACT STRENGTH OF HOLLOW FAN BLADES
Tameharu Ikeda, Toshio Miyachi, and Yasushi Sofue 1985 23 p refs In JAPANESE; ENGLISH summary
(NAL-TR-879; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Models of hollow fan blades were made and tested to prove that their strength is sufficient for use in real engines. The hollow blades were fabricated by diffusion bonding of two titanium alloy (6Al-4V-Ti) plates, one of which had three spanwise stiffners and the other being flat plate. The model as a nontwisted tapered blade. Impact tests were carried out on the hollow fan blade models in which the ingestion of a 1.5 pounds bird was simulated. Solid blades with the same external form were also tested by similar methods for comparison. The results of these tests show that properly designed hollow blades have sufficient stiffness and strength for use as fan blades in the turbo-fan engine. Author

N86-20865# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
ON THE ROLE OF DIMENSIONLESS ELASTIC FRACTURE MECHANICS Final Report, 15 Jan. 1984 - 14 Jan. 1985
G. B. Sinclair 3 Jul. 1985 117 p
(Grant AF-AFOSR-0047-84)
(AD-A161285; SM-85-14; AFOSR-85-0942TR) Avail: NTIS HC A06/MF A01 CSCL 20/11

Dimensionless elastic fracture mechanics - the nondimensionalized counterpart to linear elastic fracture mechanics (LEFM) - predicts size-independent strengths for geometrically similar specimens. This is in contrast to LEFM which has that the stress at fracture reduces as the inverse square root of the in-plane scale factor. It is shown that neither agrees with the data, irrespective of how brittle material response is. Used predictions is possible. However, both are essentially inadequate, since they lack valid underlying physical reasoning and, even as merely empirically based approaches, are short of sufficient accuracy to be reliable in practice. There is a need, therefore, to critically examine the very foundations of elastic fracture mechanics. Author (GRA)

N86-20866# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
PREDICTING CATASTROPHIC OUTSIDE DIAMETER INITIATED FATIGUE FAILURE OF THICK-WALLED CYLINDERS USING LOW CYCLE FATIGUE DATA Final Technical Report
Joseph A. Kapp Sep. 1985 20 p Presented at the 9th Airapt High Pressure Conference 25-28 Jul. 1983
(AD-A161805; AD-E440305; ARLCB-TR-85035) Avail: NTIS HC A02/MF A01 CSCL 20/11

A procedure is presented to predict fatigue failure of thick-walled cylinders containing discontinuities at the outside diameter (OD). Both crack initiation life and crack growth are considered. The elastic-plastic strains at an OD discontinuity are estimated using elastic analysis and stress concentration factors. The strain estimates are then used in conjunction with low cycle fatigue data to determine the initiation life. Crack growth is estimated by integration of a power law relationship. The results obtained by using this analysis method compared to measured fatigue life data for several OD initiated failures in thick-walled cylinders agrees to within about ten percent. GRA

N86-20867# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
ASSESSMENT OF J-R CURVES OBTAINED FROM PRE-CRACKED CHARPY SAMPLES Final Technical Report
J. A. Kapp and M. I. Jolles Sep. 1985 27 p Presented at 17th National Fracture Mechanics Symposium Albany, N.Y., 7-9 Aug. 1984
(AD-A161806; AD-E440306; ARLCB-TR-85037) Avail: NTIS HC A03/MF A01 CSCL 20/11

J-R curves were determined for five materials (7075-T651; 2024-T351; HY130; HY80; and A723, Class 1, Grade 4) using precracked Charpy samples and standard size C(T) and SE(B)

samples. Crack growth in the Charpy samples was estimated using the load drop method of analysis of the load displacement trace, and crack extension in the C(T) and SE(B) specimens was determined using the electric potential method. The results show that physical crack extension in the larger sample was not well estimated by the Charpy sample results. However, if the crack extension is presented as relative crack growth (as a percentage of the uncracked ligament), the agreement between the two widely different specimen sizes is much better, although not exact. With the exception of the relatively brittle 7075-T651, the J corresponding to zero, 1% and 2% crack growth was higher in the Charpy samples than in the larger samples. This was attributed to the inability of the load drop method to determine the exact location of the crack initiation. Although nonconservative, we believe the load drop method analysis of precracked Charpy data is adequate for quality control toughness testing provided that it is realized that Jic and J-R curves may be overestimated slightly. GRA

N86-20868# Sandia National Labs., Albuquerque, N. Mex.
RELATIVE CONSERVATISM AND DROP TABLE AND SHAKER SHOCK TESTS
T. J. Baca and T. D. Blacker 1985 22 p
(Contract DE-AC04-76DP-00789)
(DE86-001263; SAND-85-1394C) Avail: NTIS HC A02/MF A01

Judging the conservation of a mechanical shock test is a crucial concern of the engineer responsible for interpreting the outcome of the test. Either overtest or undertest can have devastating implications if the former results in a costly redesign of the structure being tested, or if the latter fails to properly qualify the structure for use in its design environment. A quantitative comparison of the relative conservatism of haversine and decaying sinusoid shock test input pulses which are generated on drop tables and electro-dynamic shakers is made. A complete evaluation of test conservatism between the laboratory and field shock environment requires characterization of shock severity and consideration of this characterization's statistical variation. A shock intensity spectrum (SIS) is introduced as a new shock characterization which provides information on the severity of the shock as a function of frequency. Test conservatism is quantified in terms of an Index of Conservatism (IOC) and a novel criterion called an Overtest Factor (OTF). DOE

N86-20869# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Dept.
FATIGUE AND FRACTURE RESISTANCE OF WROUGHT PM 7091 AND IM 7050
R. J. H. Wanhill 28 May 1984 22 p refs Presented at International Conference and Exhibition on Powder Metallurgy Aerospace Materials, Bern, Switzerland, Nov. 1984 Sponsored by Netherlands Agency for Aerospace Programs
(NLR-MP-84055-U; B8569029) Avail: NTIS HC A02/MF A01

Investigation of the fatigue and fracture properties of PM 7091-T7E69 and IM 7050-T736 aluminum alloy die forgings reveals that under spectrum loading the fatigue crack propagation resistance of 7091-T7E69 is greatly inferior. This is due to tensile crack jumping which could be explained using Thomason's (1971) theory of tensile fracture. Fractographic and microstructural analysis supports this explanation. It is concluded that the oxides from air atomization of the powder cause early tensile crack jumping in 7091, and that potentially inferior fatigue crack propagation resistance is a generic problem for PM alloys containing a relatively high volume fraction of small oxide particles. Author (ESA)

N86-20870# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
IMPLEMENTATION OF THE LINEAR BUCKLING IN STRUDL V2M8
E. A. Guse 1982 27 p refs
(ICES-STRUDL-82-8; B8575344) Avail: NTIS HC A03/MF A01

Modifications of the STRUDL program to handle linear buckling of elastic beams in frame analysis are presented. The derivation of the initial stress matrix and solution algorithm are presented. Author (ESA)

N86-20871# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
SELECTIVE PRINT AND PLOT COMMANDS FOR A FINITE ELEMENT ANALYSIS
A. W. M. Kok 1983 46 p ref
(ICES-STRUDL-83-7; B8575349) Avail: NTIS HC A03/MF A01

Commands by which a graphical representation of stress results can be prepared and output in STRUDL program finite element analyses are presented. Author (ESA)

N86-20872# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
IMPLEMENTATION OF SUBSTRUCTURE COMMAND IN STRUDL V2M9
E. A. Guse 1983 36 p
(ICES-STRUDL-83-17; B8575352) Avail: NTIS HC A03/MF A01

Commands to enable the STRUDL program to obtain the stiffness matrices of similar substructures by exploiting the matrix of the basic substructure are presented. The example of the windows in a building is given. Author (ESA)

N86-20873# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
INITIAL STRAINS, STRESSES AND ELEMENT TEMPERATURE COMMAND IN STRUDL V2M9
E. A. Guse 1983 31 p
(ICES-STRUDL-83-18; B8575353) Avail: NTIS HC A03/MF A01

User commands for initial strains, stresses and element temperature in the STRUDL structural design program are given. Author (ESA)

N86-20874# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
ICES STRUDL USER MANUAL. PART 1: THE CALCULATION OF FRAMEWORKS
A. W. M. Kok, C. F. Vrijman, and A. deBoer Oct. 1984 135 p refs 6 Vol.
(B8575336-Pt-1) Avail: NTIS HC A07/MF A01

The linear static analysis of frame structures using STRUDL is covered. Language conventions, coordinate systems, general commands, topology, loading data, input controls, analysis, output commands, modifications of topology and loadings, and samples are presented. Author (ESA)

N86-20875# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
ICES STRUDL USER MANUAL. PART 2: ANALYSIS OF CONTINUOUS STRUCTURES WITH THE FINITE ELEMENT METHOD
A. W. M. Kok and C. F. Vrijman Oct. 1984 97 p refs 6 Vol.
(B8575337-Pt-2) Avail: NTIS HC A05/MF A01

The linear static analysis of continuous structures using the STRUDL program is covered. Coordinate systems, additional topological data, element properties, rigid bodies, joint ties and springs, mesh generations, element loads, output commands, and samples are presented. Author (ESA)

N86-20876# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
ICES STRUDL USER MANUAL. PART 3: DYNAMIC ANALYSIS
A. W. M. Kok Oct. 1984 76 p refs 3 Vol.
(B8575338-Pt-3) Avail: NTIS HC A05/MF A01

Modal analysis, Newmark BETA method, steady state, and response spectrum in the STRUDL program are covered. Mass properties, damping properties, loading specifications, dynamic analysis commands, output specifications, restart options, and samples are presented. Author (ESA)

N86-20877# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
ICES STRUDL USER MANUAL. PART 4: ANALYSIS OF NONLINEAR STRUCTURES
A. W. M. Kok and C. F. Vrijman Oct. 1984 38 p refs 6 Vol.

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(B8575339-Pt-4) Avail: NTIS HC A03/MF A01

Linear buckling, geometrical nonlinear analysis of 2D and 3D frame structures, and a geometrical nonlinear plastic analysis of 2D frameworks with the STRUDL program are covered. The command language includes loading specifications, additional member properties, analysis commands, and restart options.

Author (ESA)

N86-20878# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.

ICES STRUDL USER MANUAL. PART 5: SPECIAL OPTIONS

C. F. Vrijman and J. vanBeest Oct. 1984 65 p refs 6 Vol.

(B8575340-Pt-5) Avail: NTIS HC A04/MF A01

Shell elements, properties, and surface definitions with the STRUDL program are covered. Direct input of element stiffness matrix, extensions of element loads and joint loads, bandwidth reduction, restart options for large problems, routing of STRUDL data to user defined data sets, and samples are presented.

Author (ESA)

N86-20879# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.

ICES STRUDL USER MANUAL. PART 6: COMMANDS AND ERRORS

A. deBoer and J. H. Voorrips Oct. 1984 87 p 6 Vol.

(B8575341-6-Pt-6) Avail: NTIS HC A05/MF A01

The command syntax of all STRUDL commands, arranged in alphabetical order, with a series of references to the Users Manuals part 1 to 5 is covered. A series of STRUDL error messages and warnings together with conditions and recommended actions is presented.

Author (ESA)

N86-20880# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

DATA ACQUISITION OF IMPERFECTION MEASUREMENTS OF SHELLS TESTED AT THE DET NORSKE VERITAS RESEARCH LABORATORY

T. J. vanBaten Jul. 1983 17 p refs

(VTH-M-447) Avail: NTIS HC A02/MF A01

Data acquisition from a tape containing the results of imperfect shape and buckling mode measurements of shells is described. The data were recorded on magnetic tape using an A/D converter. A FORTRAN program was written and made operational on an Amdahl 470 V/7B digital computer to read and interpret the data and to convert them to the format of the Imperfection Data Bank.

Author (ESA)

N86-20881# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

THE STABILITY AND VIBRATION CHARACTERISTICS OF A UNIVERSAL JOINT-SUSPENDED RIGID BODY

W. P. Koppens Mar. 1983 28 p refs

(VTH-M-461) Avail: NTIS HC A03/MF A01

The stability and vibration characteristics of a steady rotating rigid body suspended by a universal joint are investigated. A rigid body suspended by a steady rotating universal joint (rotations of the internal gimbal and the rigid body are elastically restrained) and a steady rotating rigid body, suspended by a universal joint (rotations of the internal and external gimbal are elastically restrained) are compared. It is concluded that the regions of stability of both cases coincide when the spring stiffnesses are equal. Depending on the mass distribution of the body, the elastic connections can be stabilizing or destabilizing. The frequency paths are identical for both cases.

Author (ESA)

N86-20882# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

STABILITY OF SHELL WITH STOCHASTIC INITIAL IMPERFECTIONS PROJECT Progress Report

P. G. Vermeulen Jun. 1983 17 p refs Sponsored by Stichting Technische Wetenschappen

(VTH-M-471; PR-2) Avail: NTIS HC A02/MF A01

The simulation of initial shell imperfections via the Monte Carlo method was studied. The method for tracing possible errors or inaccuracies in the different steps made to generate the reliability functions is presented. The influence of the sample size on the sample mean vector and sample covariance matrix and their confidence intervals is examined. The statistical model used for the initial imperfections is explained.

Author (ESA)

N86-20883# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

OVERALL BUCKLING OF Z-STIFFENED PANELS IN COMPRESSION, PART 2

A. vanderNeut Sep. 1983 8 p refs

(VTH-M-485-Pt-2) Avail: NTIS HC A02/MF A01

A correction to van der Neut (1980) Overall buckling of Z-stiffened panels in compression is presented. The error is an inconsistency when accounting for the lateral load of the flange (in the direction of z). Section 3.3 gives this load per unit of length of x correctly as - p d A (W - Phi 2 y)''. However the shear force on the total cross section of stringer and plate is given by equation (3.6) as D = PW'', thus neglecting the Phi 2 contribution to the shear force. The correct expression for D is D = P (W - S/A Phi 2)'. Also, it is better to use the complete plate equation rather than replacing it by the strip equation (2.2).

Author (ESA)

N86-20884# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

INITIAL IMPLEMENTATION OF THE LEVEL 2 APPROACH TO THE STOCHASTIC BUCKLING OF SHELLS

P. G. Vermeulen Jan. 1984 10 p refs Sponsored by Stichting voor de Technische Wetenschappen

(VTH-M-503) Avail: NTIS HC A02/MF A01

It is shown that the Level 2 method can be used for determining the reliability function of axially compressed shells. The number of buckling load calculations is significantly less then with the Monte Carlo method. The mean buckling load of both methods are in good agreement, but still considerably higher than the experimental value. This is mainly caused by the buckling load analysis. Since the Level 2 method does not need so many calculations, using a more advanced and expensive method can be considered. The reliability functions of both methods are in good agreement, but the Level 2 method is more critical in the higher reliability region.

Author (ESA)

N86-20885# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.

FIRST ORDER SECOND MOMENT ANALYSIS OF THE BUCKLING OF SHELLS WITH RANDOM IMPERFECTIONS

I. Elishakoff (Technion Univ., Haifa, Israel), S. vanManen (TNO-Inst. for Building Materials and Structures, Rijswijk, Netherlands), P. G. Vermeulen (Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost, Netherlands), and J. Arbocz 13 Nov. 1985 20 p refs Sponsored by Stichting voor de Technische Wetenschappen

(VTH-M-526) Avail: NTIS HC A02/MF A01

First order second moment analysis for nominally circular cylindrical shells possessing axisymmetric and general nonsymmetric random imperfections is given. Results of measurements of initial imperfection Fourier coefficients are used to construct their second order statistical properties. The MIUTAM computer code is applied for determination of buckling loads. Results of reliability calculations are found to be in good agreement with those of the Monte Carlo method.

Author (ESA)

N86-20886# California Inst. of Tech., Pasadena. Earthquake Engineering Research Lab.

CUMULATIVE DAMAGE OF STRUCTURES SUBJECTED TO RESPONSE SPECTRUM CONSISTENT RANDOM PROCESSES Ph.D. Thesis

G. D. Jeong 1985 121 p

(Grant NSF CEE-81-19962)

(PB86-100807; EERL-85-03) Avail: NTIS HC A06/MF A01 CSCL 13M

A theoretical analysis of the effect of duration on the damage of structures subjected to earthquakes is presented. Earthquake

excitation is modeled as a nonstationary random process. Estimates of the first-passage probability of a simple oscillator are employed to choose modulated Gaussian random processes consistent with a prescribed response spectrum. Expressions for the mean damage of a structure are derived using an approach similar to the Miner-Palmgren rule for failure caused by cyclic loads. The expected damage expressions are then evaluated for structure subjected to modulated Gaussian random processes of varying duration. Two types of structures are examined: a steel structure and a reinforced concrete structure. Author (GRA)

N86-20594# Naval Civil Engineering Lab., Port Hueneme, Calif.
DESIGN CRITERIA AND PRELIMINARY ACCEPTANCE TEST SPECIFICATIONS FOR BLAST RESISTANT WINDOWS
G. E. Meyers *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 153-214 (For primary document see N86-20589 11-31)
(AD-P004825) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20603# Army Materiel Command, Aberdeen Proving Ground, Md.
REFLECTED OVERPRESSURE IMPULSE ON A FINITE STRUCTURE
G. A. Coulter and C. N. Kingery *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 325-364 (For primary document see N86-20589 11-31)
(AD-P004834) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20605# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF COMBUSTIBLES ON INTERNAL QUASI-STATIC LOADS
N. R. Sandoval, J. C. Hokanson, E. D. Esparza, and W. E. Baker *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 395-415 (For primary document see N86-20589 11-31)
(AD-P004836) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20606# Army Materiel Command, Aberdeen Proving Ground, Md.
BLAST LOADING ON ABOVE GROUND BARRICADED MUNITION STORAGE MAGAZINES
G. Bulmash and C. N. Kingery *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 417-464 (For primary document see N86-20589 11-31)
(AD-P004837) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20607# Tooele Army Depot, Utah.
SHIELD/BARRICADE TESTING AT AED (AMMUNITION EQUIPMENT DIRECTORATE)
J. R. Miller *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 465-469 (For primary document see N86-20589 11-31)
(AD-P004838) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20613# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
THE FAILURE MODE OF LAYERED CONCRETE CONSTRUCTION DUE TO CONTACT CHARGES
J. Weerheijm, W. Karthaus, and G. Opschoor *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 581-596 (For primary document see N86-20589 11-31)
(AD-P004846) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20614# IIT Research Inst., Chicago, Ill.
FAILURE ANALYSIS OF STRUCTURES SUBJECTED TO MULTIPLE BLAST LOADS
A. Longinow, J. Mohammadi, and H. S. Mapadensky *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 1 Aug. 1984 p 597-604 (For primary document see N86-20589 11-31)
(AD-P004847) Avail: NTIS HC A99/MF E03 CSCL 19/4

N86-20626# Naval Civil Engineering Lab., Port Hueneme, Calif.
YIELD-LINE ANALYSIS OF RECTANGULAR LABS WITH DOORS
P. Wager and S. Berkenbile IN Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1149-1164 (For primary document see N86-20623 11-31)
(AD-P004783) Avail: NTIS HC A99/MF E01 CSCL 13/12

42 GEOSCIENCES (GENERAL)

N86-20887# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES
10 Jan. 1986 61 p Transl. into ENGLISH from various Russian articles
(JPRS-UES-86-001) Avail: NTIS HC A04

Program developments research and management and research and development in Earth sciences in the USSR are reported. Categories discussed include: meteorology, oceanography, terrestrial geophysics, upper atmosphere physics, and research in the arctic and antarctic regions. For individual titles, see N86-20888 through N86-20929.

N86-20888# Joint Publications Research Service, Arlington, Va.
AN-30 PHOTOGRAPHY AIRPLANE OUTFITTED FOR CLOUD-SEEDING MISSIONS c47
T. Kuznetsova and A. Pimenov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 1-2 Transl. into ENGLISH from Pravda Ukrainy (Kiev, USSR), 15 Aug. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The development of the AN-30M airplane mode, which can modify the weather is discussed. It has excellent flight qualities, high reliability, and modern pilotage-and-navigation equipment that permits flight routes and course changes in the semiautomatic mode and takeoffs during daytime and nighttime, in difficult weather conditions. Ammunition against precipitation (crystalline and other reagents) is loaded into containers placed inside and outside the aircraft on external mounts with a streamlined shape. The instruments evaluate weather conditions outside the airplane and decide at what altitude the cloud cover should be seeded and on the methods to be used. The AN-30M seeds clouds with frozen carbon dioxide granules. The plane can induce additional rainfall on farmlands, increase snow cover, and extinguish forest fires. E.A.K.

N86-20889# Joint Publications Research Service, Arlington, Va.
FACILITY FOR MODELING ORIGINS OF TYPHOONS c47
A. Melnikov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 3-4 Transl. into ENGLISH from Pravda (Moscow, USSR), 8 Jul. 1985 p 7 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A facility for prediction of typhoons, and their origins is discussed. The mechanism which puts massive air flows in motion is examined. The hydrodynamic properties of typhoons are analyzed and a facility for modeling whirlwind formations is presented. The facility is a large cylindrical tank where ocean-atmosphere interaction is simulated by heating its water content. Above it, a motion picture camera is mounted which record processes taking place inside the tank. A laser attachment which creates a bright blue screen above the water detects these processes. The screen is the effect of a flattened-out laser beam, which provides a cross-section of the whirlwind flows that arise. The data together with aerospace photographs determine with greater accuracy the parameters and the pressure in the center of a tropical cyclone, and the maximum wind zones. E.A.K.

N86-20890# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL ADAPTATION RESEARCH AT BIOLOGY

INSTITUTE Abstract Only c51
Ye. Krushelnitskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 5-6 Transl. into ENGLISH from Trud (Moscow, USSR), 26 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Natural mechanisms of anticipation of weather changes in animals and human beings, and effects of weather conditions on human behavior and working fitness were studied. Meteorological sounds on the noise of free atmosphere caused by turbulent motion of the air. It is perceived by living organisms as sounds, analyzed by them and their behavior is modified accordingly. The biological forecasting mechanism may lead to the development of improved weather-forecasting methods and equipment. An acoustic weather-forecasting method was ued. Cloudiness and precipitation reportedly were forecast with accuracies of 98% and 85 percent using this method. A medical forecasting method using primary data, which is based on the meteorological-adaptation hypothesis was developed. Ecological factors are considered in the forecasting and prevention of illness. E.A.K.

N86-20891# Joint Publications Research Service, Arlington, Va.
WORK ON MATHEMATICAL MODELING OF TROPICAL STORMS WAKES Abstract Only c47
A. Yakovlev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 7 Transl. into ENGLISH from Gudok (Moscow, USSR), 29 Sep. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Effects of the formatijon of tropical storms on the surface waters of the ocean were studied. It was discovered that a tropical storm leaves a wake a strip of cooled water which remains in surface waters for as long as several weeks after a storm has passed. The structure of storms' wakes is studied to evaluate energy-conversion processes which occur during tropical storms, in order to forecast their behavior. A physical-mathematical model of the wake of a storm is developed which predicts the intensity and direction of a spawning storm by calculating a model of its wake on a computer from point of origin, initial velocity, and certain energy factors. E.A.K.

N86-20892# Joint Publications Research Service, Arlington, Va.
RESEARCH SHIP ZUBOV TO LAUNCH WEATHER ROCKETS IN ATLANTIC c46
T. Volgina *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 10 Transl. into ENGLISH from Leningradskaya (Leningrad, USSR), 14 Aug. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Hydrometeorology and monitoring of the natural environment, are reported. Probing of the upper layers of the atmosphere with rockets over the Atlantic is discussed. Series of meteorological rockets equipped with scientific apparatus are launched over the ocean at several points. The rockets will soar to altitudes as high as 80 kilometers in the planet's atmosphere. Important data on the structure and dynamics of the upper layers of the atmosphere and of the ionosphere are obtained in this manner. Physical processes occurring in near-earth space in conditions of minimal solar activity are studied. E.A.K.

N86-20893# Joint Publications Research Service, Arlington, Va.
HYDROPHYSICAL STUDIES FROM SHIP VEYMER IN NORTH ATLANTIC c47
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 11 Transl. into ENGLISH from Sovetskaya Belorussiya (Minsk, USSR), 13 Aug. 1985 p 4 (For primary document see N86-20837 11-42)
Avail: NTIS HC A04

Velocities of water masses at various depths in the Gulf Stream and near the island of Newfoundland off the coast of Canada were measured from ship. Cyclones systematically give rise to active transfer of heat from the surface of the water to the atmosphere in these areas. These cyclones carry warm masses of air to the European continent, shaping its climate. Understanding regularities involved in the variability of hydrophysical fields in the Atlantic provides guaranteed forecasts for the season and even for a year in advance. E.A.K.

N86-20894# Joint Publications Research Service, Arlington, Va.
PORT APPARATUS FOR REMOTE DETECTION OF SEA ROUGHNESS c48
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 12 Transl. into ENGLISH from Sovetskaya Litva (Vilnius, USSR), 24 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Port waters and mooring places, and the direction of the wind and of underwater currents that most often form cyclones, were configurated. An apparatus for remote detection of waves that roll in from time to time was developed. At any time of the day, roughness of the sea is detected several days in advance and its duration, direction, intensity and other parameters are forecasted with the aid of this unit. Special programs were developed whose data will be processed by a computer. E.A.K.

N86-20895# Joint Publications Research Service, Arlington, Va.
DEVICE FOR ANALYZING UNDERWATER TV PICTURES WITH IR CAPABILITY c48
A. Isayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 14 Transl. into ENGLISH from Trud (Moscow, USSR), p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

An automatic device for analyzing underwater pictures was developed. The automatic device has a memory with which it can be programmed to discern ferromanganese nodules from other objects on the sea bottom. One of its big advantages is the adaptation to its environment. The device sees infrared rays which is valuable for the determination of the temperature at deep sea levels. The device recommended for underwater navigation, plotting courses for adaptive submersible robots operating at various levels or on the sea bottom. E.A.K.

N86-20896# Joint Publications Research Service, Arlington, Va.
LONG-TERM PROGRAM TO STUDY OCEAN'S ENERGY-ACTIVE ZONES DESCRIBED Abstract Only c48
S. Lappo *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 18 Transl. into ENGLISH from Kommunist (Yerevan, USSR), 11 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Ocean-atmosphere interaction was studied to gain a better understanding of short-term fluctuations in climate. Identified energy-active zones of the world's oceans where the exchange of heat between ocean and atmosphere is most intensive were analyzed. The following items are studied: (1) climatic processes of the large-scale interactior of the atmosphere, ocean and continents in regions of energy-active zones; (2) temporary variability of basic characteristics of the ocean and atmosphere in energy-active zones; and (3) the connection between thermal and dynamic anomalies in these zones and the formation of air-circulation anomalies above the ocean and continents. The following energy-active zones are identified: the Norwegian-Greenland zone, the Newfoundland zone, the Gulfstream Current zone, the Atlantic tropical zone, and the Japan Current zone. E.A.K.

N86-20897# Joint Publications Research Service, Arlington, Va.
HYDROPHYSICAL EXPERIMENT MEZOPOLIGON-85 IN TROPICAL ATLANTIC c48
V. Titov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 19 Transl. into ENGLISH from Vodnyy Transport (Moscow, USSR), 1 Oct. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A hydrophysical experiment called 'mezopoligon-85', was conducted. Problems of the interaction of large synoptic eddy

currents and the water surrounding them were studied. The author relates that a survey area 220 kilometers square in the tropical Atlantic was selected for the experiment. Physical and chemical properties of the water were measured from the surface of the ocean down to 1,500 meters. Two large eddy currents were found in the survey area. Each of them is approximately 80 miles in diameter, and they rotate in opposite directions and touch each other. In the layer of ocean between the 900 and 1,300-meter levels, the expedition discovered a lens of a water mass about 30 miles in diameter, whose properties were completely different from those of the surrounding water. E.A.K.

N86-20898# Joint Publications Research Service, Arlington, Va.
SEASONAL SOURCES OF THERMOHALINE CIRCULATION IN NORTH ATLANTIC Abstract Only c48
L. I. Galerkin, A. S. Monin, and S. V. Sergunin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 20 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 705-708 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The diurnal and seasonal variations of temperature and currents over most of the ocean caused by thermal and mechanical inertia of the ocean small however some characteristics experience considerable seasonal variations, especially the effect of the atmosphere on the ocean: vertical flows of heat and salt at its surface and especially their combination. The map of M values was based on the mean annual components of the heat and water budgets of the ocean surface. The results are given of computations of the annual variation of M values in 11 5 grid squares in the main currents, in dynamic zones and on the periphery of the subtropical anticyclonic circulation in the North Atlantic on the basis of mean monthly long term P (rate of falling of precipitation), R (radiative heat flow), relative humidity f, wind speed u, water and air temperature (sub, T sub) values. The results of the computations are tabulated. It is noted that earlier computations based on mean annual meteorological data considerably exaggerated the mean annual M values and sometimes even distorted their signs, indicating that the role of seasonal variations is extremely great. E.A.K.

N86-20899# Joint Publications Research Service, Arlington, Va.
MECHANISM OF FIXATION OF Mn AND Fe ON SURFACE OF FERROMANGANESE NODULES Abstract Only c26
A. A. Morozov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 21 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 688-692 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The formation of torromanganese nodules attributed to the specifics of the chemical properties of Mn forms existing in the ocean: Mn(II) and M2O2. The structure of colloidal-disperse particles of hydrated M2On and their fixation on the nodule surface were studied. Factors involved in nodule formation are reviewed and a number of possible variants are considered. A model of the mechanism of formation of the nodule or body is proposed. A chemical interaction can arise due to the appearance of reduced forms of Mn and Fe, whose hydroxides, in contrast to hydroxides of oxidized forms, have a well-expressed basic character. A positive charge appears on the surface. This gives rise to the possibility of electrostatic attraction, contact and chemical redox interactions between different Mn and Fe forms. E.A.K.

N86-20900# Joint Publications Research Service, Arlington, Va.
NUCLEAR PHYSICAL METHODS FOR DETERMINING CARBON IN OCEANIC SUSPENSIONS Abstract Only c73
I. Ya. Barit, L. Ye. Kuzmin, and B. A. Shnykin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 22 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 587-590 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Nuclear physical methods to determine the total carbon content in oceanic suspensions using the reactions C-12 (d, p) sup C-13 and C-12 (d, n) sup N-13 are described. The methods are based on new techniques for preparing samples for analysis involving a transfer of suspended matter from the filter onto a metallic backing with a low C content by pressing and subsequent removal of the filter. Most of the suspended matter is transferred equivalent fractions, biogenous and terrigenous, whose particles have a different capacity for adhesion to the filter material. It is found that the transfer is complete. The results of determination of C content in suspension samples are given. The tabulated data contain a correction for pollution by the backing (contamination factor). E.A.K.

N86-20901# Joint Publications Research Service, Arlington, Va.
FLUCTUATIONS IN PROPAGATION TIME AND DIRECTION OF ARRIVAL OF SIGNAL REFLECTED FROM WAVE-COVERED SEA SURFACE Abstract Only c71
V. M. Frolov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 22-23 Transl. into ENGLISH from Izvestiya Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 768-774 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The two dimensional problem of finding fluctuations in propagation time, angle of arrival and intensity of sound experiencing multiple reflection from the surface of a stratified ocean was solved by the author in an earlier study (AKUST. ZHURN., Vol 31, No 1, pp 103-110, 1185). A three-dimensional case of single reflection in a geometroacoustical approximation with ray refraction neglected. The development of a method to determine the parameters is studied of the wavecovered sea surface was studied. Formulas are derived for determining the averaged characteristics of a signal arriving at a directional antenna from such a spot: fluctuations of signal propagation time and the direction of its arrival and the spatial-temporal correlation of these characteristics. A number of simplifying assumptions are made. Incidence of spherical and plane waves on the scattering surface, and a narrow collimated beam, are examined. A narrow collimated beam are examined. Recommendations are given on how to determinate the characteristics of sea waves from measurements of these fluctuations. E.A.K.

N86-20902# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF TAYLOR-HOGG CONE ON DENSITY FIELD STRUCTURE IN STRATIFIED OCEAN WITH PYCNOCLINE Abstract Only c48
M. B. Timonov and N. K. Shelkovnikov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 23 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 752-758 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The influence of stratification of the lower layer, density drop in the pycnocline and ratio of thicknesses of the upper and lower layers on pycnocline position was studied. It was found that the isolines of the functions for disturbances of the pycnocline and density field in the lower layer do not coincide with the isolines of the stream function. Pycnocline deformations are also observed when the flow contains no closed stream lines (Taylor-Hogg cone). It is shown that rising of the pycnocline over an underwater obstacle is caused by the existence of a region of anticyclonic vorticity above it; pycnocline deformation is very significant and easily detected. This effect can be used in study of Taylor eddies in the ocean and in determining promising fishing areas. E.A.K.

N86-20903# Joint Publications Research Service, Arlington, Va.
MASLOV OPERATOR METHOD IN PROBLEM OF WAVES IN WATER GENERATED BY SOURCE MOVING OVER UNEVEN BOTTOM Abstract Only c48
S. Yu. Dobrokhotov and P. N. Khevandrov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 24 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985

p 744-751 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A wedge of waves behind a source moving over a fluid surface is a result of the Cerenkov radiation of waves in a dispersive medium. Linear differential equations in which the moving soruce is represented in the form of a Dirac delta function described this phenomenon. In a homogeneous medium, the coefficients in the corresponding equations are constant and after application of the Fourier of Laplace transforms they are reduced to ordinary differential or algebraic equations. The problem of Cerenkov radiation of waves in water involves a system whose precise or approximate solution is impossible. If the depth changes slowly the waves generated by the source are short in comparison with the characteristic scale of depth change. In such a case asymptotic formulas can be used for describing Cerenkov radiation. These formulas are derived by nonstandard characteristics the Maslov operator method. A method was developed reducing construction of the asymptotic form of solution of the initial problem to an analytical or numerical solution or systems of ordinary differential equations in partial derivatives. The Maslov approach is applied to compute the wave patterns during motion of a source over some specific bottom profiles along different trajectories. E.A.K.

N86-20904# Joint Publications Research Service, Arlington, Va.
EVALUATION OF COEFFICIENTS OF HEAT AND MOISTURE EXCHANGE BETWEEN OCEAN AND ATMOSPHERE Abstract Only **c48**
V. V. Yefimov, N. A. Timofeyev, Ye. N. Sychev, and I. V. Kurzheyevskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 24-25 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 735-743 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The heat budget of the Black Sea was determined by generalization of about 60,000 series of standard shipboard hydrometeorological observations carried out between 1891 and 1966, supplemented by additional archival data for 1967 to 1975 and all hydrological information collected between 1880 and 1973. The mean monthly and annual values of components of the external heat budget were computed for 60 elementary squares and then averaged for the entire area of the Black Sea. The tabulated and integrated data for flows of momentum, heat and moisture between the ocean and atmosphere are compared with corresponding values obtained using standard formulas. It is found that there is an understatement of the fluxes of heat and moisture computed using these formulas in comparison with the experimental data. Values are proposed for the constant components and computation formulas and for the variable exchange coefficients which are most consistent with in situ data. E.A.K.

N86-20905# Joint Publications Research Service, Arlington, Va.
ESTIMATING DENSITY INHOMOGENEITY OF UPPER MANTLE UNDER ATLANTIC OCEAN USING DATA FROM COMPREHENSIVE REGIONAL GEOPHYSICAL RESEARCH Abstract Only **c48**
A. V. Ladynin, E. M. Litvinov, and S. P. Mashchenkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 25 Transl. into ENGLISH from Geologiya I Geofizika (Novosibirsk, USSR), no. 5, May 1985 p 93-103 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Ways to estimate lateral density inhomogeneities in the upper mantle were reviewed and a method for determining density in the lithospheric layer between the crust and asthenosphere, was presented. Density inhomogeneity of the Atlantic Ocean upper mantle based on the mentioned method, was studied. Isostasy prevails virtually everywhere, crustal structural inhomogeneities detected by deep seismic sounding; seismology and gravimetry, together with upper mantle inhomogeneities, are mutually compensated. It is shown with a density model of the crust that it is possible to evaluate lateral variations of upper mantle density. The main role in upper mantle density structure is played by inhomogeneities of its lithospheric part, but asthenospheric inhomogeneities are also considered. Data on bottom bathymetry, seismic data on crustal structure, gravimetric: (1) crustal thickness under Atlantic Ocean coefficients for compensating Atlantic Ocean bottom relief masses; (2) corrected depths of Moho in isostatic model; (3) density distribution in upper mantle lithospheric layer; and (4) lateral changes in asthenospheric density. E.A.K.

N86-20906# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF SEDIMENTARY COVER OF RED SEA DETERMINED FROM SEISMIC DATA Abstract Only **c46**
I. N. Yelnikov and L. P. Zonenshayn *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 26 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 110-122 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The continuous seismic profiling method was used in a region of study of the Red Sea rift and on regional runs along the edges of the Red Sea rift and across it to the south and north of the region. Clearly defined southern and northern parts of the sea were found. The southern part has a well-expressed zonality in structure of the sedimentary cover. Evaporites developed along the edges of the Red Sea depression and are absent in a central zone with a width of about 50 km and an extent not less than 750 km. Only the upper, Pliocene-Quarternary sedimentary stratum with a thickness up to 300 m has developed in this central zone. Within it is a narrower axial rift zone without significant thicknesses of sediments. Three zones in the cross section of the southern part of the Red Sea rift coincide well with tectonic zonality in the rift. The marginal parts, underlain by evaporites correspond to more ancient parts of the rift formed during the first phase of spreading; its central part, without evaporites, corresponds to the younger bed of the rift formed during the second phase of spreading; the narrow axial zone, without sediments, coincides with the zone of the most recent volcanism and most recent dilatation. The difference between the southern and northern parts of the Red Sea is that in the south the thick evaporite layer, was broken, whereas in the north it was not. E.A.K.

N86-20907# Joint Publications Research Service, Arlington, Va.
PATTERNS OF RELATIVE POSITIONING OF OCEANIC RIFTS AND TRANSFORM FAULTS Abstract Only **c46**
N. Yu. Bocharova, Ye. G. Mirlin, and K. V. Popov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 26-27 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 100-109 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The general patterns of relative arrangement of rift zones and transform faults in the ocean were studied. The geological-geophysical materials for the crests of mid-oceanic ridges fall into three categories: (1) data on structure of oceanic rift zones and transform faults; (2) bathymetric and geophysical maps for regions explored in detail; (3) bathymetric maps at 1:2,000,000 and 1:5,000,000. These materials were used in determining the parameters of 360 active transform faults. The quantitative characteristics of each of these faults were catalogued. Distance between transform faults was determined, lengths of active parts of these faults were ascertained, the angular relationships between rift zones and transform faults were calculated. It is concluded that the distribution of the quantitative characteristics of the geometry of the axis of spreading of plates in the ocean is clearly dependent on the spreading rate. The thermal regime of the lithosphere exerts a decisive influence on the geometry of the axis of spreading of plates. E.A.K.

N86-20908# Joint Publications Research Service, Arlington, Va.
ACOUSTIC FIELD IN UNDERWATER WAVEGUIDE WITH RANDOM INHOMOGENEITIES Abstract Only **c71**
A. G. Nechayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 27-28 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 358-364 (For primary document see N86-20887

11-42)
Avail: NTIS HC A04

The representation of the acoustic field in the horizontal plane in the form of a wave beam and the approximation of a Markov random process, are applied to an analysis of signal propagation in an underwater waveguide with random volmetric irregularities. It is shown that with a large number of pairs of modes satisfying the synchronism condition the interference structure is determined by the mean field, and by partial coherent of the random components of normal waves and because of this attenuates to a considerably lesser degree than the coherent field. Under certain conditions, however, the interference structure is determined only by the coherent field. E.A.K.

N86-20909# Joint Publications Research Service, Arlington, Va.
DETERMINING UNIVERSAL HIGH-FREQUENCY ASYMPTOTIC SPECTRAL FORMS ASSOCIATED WITH PROPAGATION OF INTENSIVE ACOUSTIC NOISE Abstract Only c71
L. Bjorno and S. N. Gurbatov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 28 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 303-308 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The process of appearance of high-frequency asymptotic forms of the energy spectrum of noise in media with weak dispersion and attenuation was studied. Data on the propagation of intensive acoustic noise in air-filled pipes where the appearance of dispersion is associated with the influence of near-wall viscosity are compared. It is shown that there is a power-law dropoff of the spectrum which is associated with field characteristics. Transformation of the noise spectra in different sections indicates in the direction of the lower frequencies as the wave propagates. The appearance of some universal spectral form and a loss of information on fine structure of the spectrum in an ever-broader frequency range are observed. It is postulated that the experimentally observed transformation of the spectrum is the initial stage in appearance of a self similar structure of the spectrum of intensive acoustic noise. E.A.K.

N86-20910# Joint Publications Research Service, Arlington, Va.
DIFFERENTLY DIRECTED MOVEMENTS OF GAS BUBBLES IN VIBRATING FLUIDS IN PRESENCE OF PHYSICAL INHOMOGENEITIES Abstract Only c71
N. A. Pelykh *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 28 - 29 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 6, Jun. 1985 p 100-107 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A multiphase medium constituting a mixture of gas inclusions of different sizes in a carrier fluid of a given density filling a rigid vessel which experiences oscillations in a longitudinal direction was studied. The dynamic behavior of bubbles of two sizes relative to a noninertial coordinate system was examined. A transparent cylindrical vessel with a homogeneous fluid or two unmixing fluids of different density to study the movement of gas bubbles. It is shown that a repulsion level exists in one of the layers of fluid. Bubbles of identical size situated close to this level on either side either float up or sink to the bottom. In the case of motion of bubbles greatly differing in size, the initial position of bubbles of different size is the same but their behavior is different. Small bubbles sink whereas large bubbles float up. E.A.K.

N86-20911# Joint Publications Research Service, Arlington, Va.
GEOCHEMISTRY DISCOVERY OPENS WAY TO NEW MINING OF RARE METALS c26
Sh. Muladzhanov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 32-33 Transl. into ENGLISH from Moskovskaya (Moscow, USSR), 20 Sep. 1985 p 1 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The nature of separation of analog-elements that make up the hard-to-separate pairs (niobium-tantalum, aluminum-silicon, was analyzed. It was shown by geochemical procedures that large agglomerations of many rare and even ultrarare elements exist. Specific geological investigations showed objects with maximum separation of many rare analog-elements, with agglomerations of tantalum, yttrium and other rare-metal elements that were previously unknown to science. The new techniques caused new commercial types of ores to appear in the arsenal of the extraction industry. Major commercial-scale deposits of tantalum, zirconium and other rare metals are now mapped of the USSR, Mongolia and other countries. Author

N86-20912# Joint Publications Research Service, Arlington, Va.
RADIOMETRIC AIRBORNE MOISTURE METER c35
M. Gusev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 34 Transl. into ENGLISH from Trud (Moscow, USSR), 19 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The moisture meter is an instrument which gives accurate recording of the presence of moisture in the ground from an airplane. With the aid of the meter, the reasons for the flooding of three settlements with ground water were established and the place where the ground water was accumulating was discovered. As the temperature of the ground changes, changes also occur in the boundaries of this spectrum and the ground's radiation-brightness temperature which vary according to the amount of moisture. The instrument measures the ground's radiation brightness temperature. E.A.K.

N86-20913# Joint Publications Research Service, Arlington, Va.
THEORY OF FIELD PROPAGATION ADVANCES MHD PHOBING OF EARTH'S CRUST c35
M. Savin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 36-37 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 11 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Magnetohydrodynamic (MHD) generators can develop unprecedented power surges in seconds. With a MHD generator it is possible to probe the Earth's crust to a depth of 50 kilometers. The generator's penetrating field is reflected from deep-level geophysical boundaries and carries information to the Earth's surface. A mathematical theory of the propagation of pulsed electromagnetic fields in the material of the Earth's crust was constructed. The results from geophysical MHD generators provide reliable information on physical properties of the lower levels of the Earth's crust. It is possible to look into even greater depths of the planet the mantle by studying variations of the Earth's natural electromagnetic field. E.A.K.

N86-20914# Joint Publications Research Service, Arlington, Va.
EXPERIMENTS TO RECORD GRAVITATIONS c93
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 38-39 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 4 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The development of a gravitational laser (graser) is reported. Harmonious seismic oscillations of unexplained origin were examined. Their frequency [may be] a multiple of the frequencies of oscillations of pulsars near the planet. The periodicity of the recorded signals indicated that the source of seismic oscillations was of extraterrestrial origin. The effects were the result of gravitational waves generated by pulsars. E.A.K.

N86-20915# Joint Publications Research Service, Arlington, Va.
EARTH PHYSICIST DESCRIBES US NUCLEAR TEST MONITORING SYSTEM Abstract Only c73
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 40 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 23 Aug. 1985 p 5 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The U. S. capabilities to monitor underground nuclear weapons

tests in the USSR was examined. American methods used in monitoring the underground nuclear tests are enumerated. The U. S. technical means of monitoring Solviet nuclear weapons testing, and whether it is possible to conduct tests that could not be detected by these means are examined. The worldwide seismic station network in 55 countries available to the U. S. for seismic detection and measurement of underground nuclear explosions, and also the systems of seismic research observatories in 15 countries and seismic grouping stations in 12 countries are outlined including the advanced computerized data processing capabilities of these facilities. The level of capability of the U. S. seismic system for monitoring nuclear tests, other, nonseismic means of monitoring, such as hydroacoustic and recording of effects in the atmosphere, ionosphere, and the Earth's magnetic field, are discussed. E.A.K.

N86-20916# Joint Publications Research Service, Arlington, Va.
RADON AS INDICATOR OF PERMEABILITY ZONES FOR STEAM HYDROTHERMS Abstract Only c46
A. M. Rozhkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 41 Transl. into ENGLISH from Vulkanologiya I Seysmologiya (Moscow, USSR), no. 3, May - Jun. 1985 p 78-82 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The importance of increasing the efficiency in reconnaissance exploration work for high-temperature waters, searching for hidden centers of discharge of steam hydrotherms and the choice of optimum sites for test holes is discussed. Radon is an indicator of modern hydrothermal processes and its distribution can be used in outlining the areal distribution of hydrotherms and also heat-conducting fissured zones. The individual profiles and small sectors of the areal survey of hydrothermal deposits do not give a full picture of the patterns and distribution of radon anomalies over the entire area of the deposit. It was found that the radon concentrations were greater than the background radon concentrations in soil air. Radon anomalies occupy more than half the tested area and coincide with a series of northwesterly faults. A distinguishing feature of these sectors is their concentric arrangement relative to the caldera. E.A.K.

N86-20917# Joint Publications Research Service, Arlington, Va.
EXPERIENCE WITH SURFACE IR SURVEY FOR ESTIMATING TEMPERATURE AND HEAT RADIATION OF THERMAL FIELDS OF MUTNOVSKIY VOLCANO (KAMCHATKA) Abstract Only c35
B. G. Polyak, B. A. Bezukh, V. I. Kaftan, A. I. Kuzmin, Yu. D. Kuzmin, V. Ye. Stelmashok, and V. P. Turkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 41-42 Transl. into ENGLISH from Vulkanologiya I Seysmologiya (Moscow, USSR), no. 3, May - Jun. 1985 p 54-63 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A surface IR survey method was developed for obtaining quantitative data on the heat regime of thermal fields associated with volcanic and hydrothermal activity. The method provides data on the spatial characteristics of geothermal activity within volcanic structures and hydrothermal systems, including places where contact measurements cannot be made. The IR survey was made on Mutnovskiy volcano, where the intensity of fumarole activity was evaluated by contact measurements. At its peak there is an extensive depression formed by two merging craters with diameters of about 1.5 to 2 km and with fumaroles. The heat fields on the inner walls of the funnel are inaccessible for contact measurements; wall steepness dictates use of a surface survey. Observations were made from a distance of 7 m, which provided the first quantitative data for estimating total heat intensity of fumarole activity for Mutnovskiy volcano. It is found that the total intensity is appreciably lower than was assumed earlier. E.A.K.

N86-20918# Joint Publications Research Service, Arlington, Va.
NEOTECTONICS AND VOLCANISM IN EASTERN VOLCANIC ZONE OF KAMCHATKA Abstract Only c46
I. V. Florenskiy and V. G. Trifonov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 42 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 78-87 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The relationship between Quaternary volcanoes and different elements of the present-day structure of Kamchatka was studied. On Kamachatka there are three main zones of concentration of Quaternary volcanism: middle range, central Kamchatkan depression, eastern volcanic zone. The volcanic Quaternary zones are associated with regions of downwarping with a predominant synchronous regime of transverse dilatation. The dilatation zone ensures a general rising of magma from the deep horizons where the main magma hearths are situated and the volcanotectonics reflects the life of peripheral magma hearths situated in the higher crustal horizons. The rejuvenation of the faults forming the zone and the caldera depressions from south to north is evidence of propagation of the zone in this direction. There is a geodynamic disharmony between mantle and crustal structural stages. The position of deep and peripheral magma hearths within a single volcanic zone may be related to the structural-dynamic stratification of the lithosphere. The structural-dynamic conditions beneath the volcanic zone are considerably more complex than would be surmised from simple subduction of an oceanic plate beneath an island arc. E.A.K.

N86-20919# Joint Publications Research Service, Arlington, Va.
REGULARITY OF STRUCTURE OF INHOMOGENEITIES OF SCATTERING OF OPTICAL RADIATION AND THEIR RELATIONSHIP TO METEOROLOGICAL PARAMETERS Abstract Only c74
Yu. A. Polkanov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 44 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow. USSR), v. 21, no. 7, Jul. 1985 p 720-725 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Stable atmospheric stratification favors the suppression of turbulence in a flow, but it is maintained in a zone of collapse of internal waves, where a quite stable and regular turbulent structure is formed. Radiation scattered on such aerosol carries information on the spatial-temporal characteristics of turbulent structures. The regularity of structure of a scattered signal amplified proportionally to the square of current time squared is analyzed. At nightime a quite stable and regular structure of optical inhomogeneities in the horizontal plane was established. Its registry in lidar measurements was caused by the presence of urban polluting aerosol. There was a high degree of correlation between the parameters of the detected structure and stability of the thermodynamic state of the atmospheric surface layer test. A signifcant correlation between a set of parameters describing these atmospheric formations and a set of meteorological parameters characterizing atmospheric humidity and inversion situations. The investigation shows that laser sounding can be used in predicting stability of stratification in the atmospheric surface layer. E.A.K.

N86-20920# Joint Publications Research Service, Arlington, Va.
SOUND RADIATION IN ATMOSPHERE DURING UNDERWATER EARTHQUAKE Abstract Only c46
S. P. Vdovichenko and Yu. M. Zaslavskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 45 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 714-719 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Acoustic fields in the atmosphere generated by hydroacoustic disturbances which are caused by seismic movements of bottom rocks during an underwater earthquake are used to predict tsunami waves. Different models of deepened seismic sources equivalent to an earthquake focus with respect to the total quantity of released energy are outlined. The characteristics of radiation introduced by the ocean water layer are examined. The dependence of the level and directional diagram of radiation of focal depth is examined. The level of acoustic oscillations is examined at the maximum of

the diagram at altitudes were the appearance of ionized regions detectable during sounding by Doppler radars is possible. Author

N86-20921# Joint Publications Research Service, Arlington, Va.
CALCULATION OF SOUND FIELDS IN ATMOSPHERIC REFRACTION WAVEGUIDE Abstract Only c71
A. V. Razin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 45-46 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 707-713 Previously announced in IAA as A85-46238 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The sound intensity of a point harmonic source in a near-ground atmospheric refraction waveguide has been estimated using a geometrical acoustics approximation. The waveguide was created by the interaction of air temperature inhomogeneities with the wind. Questions concerning the definition of waveguide parameters are discussed, and criteria are developed to estimate the number of rays approaching the point source. The effect of temperature gradients and wind on the sound intensity of an acoustic radar in the near-ground atmospheric layer was calculated numerically, and results are presented. I.H. (IAA)

N86-20922# Joint Publications Research Service, Arlington, Va.
ACOUSTIC WAVE PROPAGATION IN POLYMERIC FLUID WITH VAPOR-GAS BUBBLES Abstract Only c71
S. P. Levitskiy and Z. P. Shulman *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 46 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 353-357 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Acoustic properties of polymeric fluids with bubbles were studied. The multiple scattering method was used to investigate sound propagation in a relaxing fluid with vapor-gas inclusions. The approach makes successive allowance for all the principal factors determining the process: compressibility and heat conductivity of the fluid during interaction of inclusions with the carrier phase and with one another, polydisperse character of the mixture, presence of vapor in the bubbles and distribution of fluid relaxation time. The propagation of a monochromatic wave of weak nonisothermal disturbances in a relaxing polymeric medium with rheological equations of the hereditary type is determined. The characteristic parameters were equilibrium radius of one of the bubbles, fluid density, pressure and temperature. A dispersion equation for a two-phase hereditary medium is derived and analyzed. Application of the equation is illustrated in a specific example. E.A.K.

N86-20923# Joint Publications Research Service, Arlington, Va.
INTERNAL GRAVITY WAVES, FLUCTUATIONS OF SOLAR ULTRAVIOLET RADIATION AND IONOSPHERIC PARAMETERS Abstract Only c46
R. S. Steblova, I. A. Freyzon, V. V. Koltsov, Ye. I. Chertok, Yu. V. Gorokhov, V. A. Vazherkin, I. N. Panova, and M. G. Kogan *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 47 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 353-357 Previously announced in IAA as A85-46032 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Experimental data are presented which indicate similar and synchronous fluctuations in the ionospheric electron concentration maximum and in the intensity of the near-field UV radiation recorded at ground stations located far from one another. This phenomenon cannot be explained in the context of the internal gravity wave theory. The working hypothesis proposed here is that solar radiation fluctuations are capable of producing wave perturbations in the ionosphere. The causes and mechanisms of the observed synchronicity, however, remain unclear. V.L. (IAA)

N86-20924# Joint Publications Research Service, Arlington, Va.
DIALOG SYSTEM FOR NUMERICAL MODELING OF ENERGY LOSSES OF ATMOSPHERIC OPTICAL WAVES Abstract Only c74
V. Ye. Zuyev, Yu. S. Makushkin, A. A. Mitsel, L. I. Nesmelova, O. B. Rodimova, V. P. Rudenko, S. D. Tvorogov, K. M. Firsov, and N. Ye. Yakovlev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 47-48 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 345-348 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

A dialog system ensuring automated numerical modeling of absorption of the energy of optical waves by atmospheric gas components for any spectral resolution is described. The system consists of a set of programs which in a dialog regime with BESM-6 computer makes it possible to carry out computations of the characteristics of absorption by atmospheric gases and the attenuation caused by atmospheric aerosols and molecular scattering and therefore computations of total atmospheric attenuation. The development of this dialog regime required the following: (1) preparation of a working data bank; (2) writing of algorithms for retrieval and sampling of absorption lines informative for stipulated conditions; (3) writing of algorithms for speedy calculation of absorption characteristics. The working data bank includes the parameters of absorption lines of atmospheric gases, meteorological models, continuum absorption constants, aerosol models. The system provides for three operating regimes. The system has a number of advantages in comparison with known sets of programs for solving such problems. Author

N86-20925# Joint Publications Research Service, Arlington, Va.
ONE METHOD FOR COMPENSATING DISTORTIONS CAUSED BY ATMOSPHERIC TURBULENCE Abstract Only c74
V. N. Filinov and G. P. Chernyy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 48 Transl. into ENGLISH from Optika I Spektroskopiya (Leningrad, USSR), v. 58, no. 3, Mar. 1985 p 634-639 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The resolution of an aberration-free optical system which is dependent on diffraction phenomena in the aperture and atmospheric turbulence is discussed. A holographic method which uses compensation of the distortions caused by turbulence of an equality of the mean value of the phase fluctuations caused by the atmosphere to zero was developed. The difficulty in applying this method is the problem of determining distribution of the field phase at the input aperture of the system. This distribution can be obtained from interference experiments due to the high frequency of the light wave. The influence of the finite dimensions of the investigated object on the attainable angular resolution in the retrieved image was examined. The extent of the isoplanatism zone is determined. The results of computer modeling of the method and the results of experiments for evaluating the extent of the isoplanatism zone are presented. The materials demonstrate the feasibility of compensating the phase distortions introduced by atmospheric turbulence by averaging the field phase in the aperture plane of the optical system after determining the phase distribution from interference measurements. E.A.K.

N86-20926# Joint Publications Research Service, Arlington, Va.
TESTING OF WIND POWER UNITS AT ANTARCTIC STATION c44
G. Sergeyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 50 Transl. into ENGLISH from Vodnyy Transport (Moscow, USSR), 15 Oct. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Multipurpose wind-driven power generating units were tested. Each one generates 4 to 6 kilowatts. The windmills heat buildings by converting the energy of wind into electric power. A unit is located on an ice dome near the outlying airfield. It sometimes replaces a diesel generator and provides enough electric power for heat, light, cooking, and charging storage batteries. The use of wind motors on the Antarctic continent will make it possible to

save diesel fuel and to support various operations. Year round aerometeorological, geophysical, glaciological, and biological effects are studied. Author

N86-20927# Joint Publications Research Service, Arlington, Va.
POLLUTION OF ARCTIC SEAS BY RADIOACTIVE WASTES OF WEST EUROPEAN ATOMIC INDUSTRY PLANTS Abstract Only c45
S. M. Vakulovskiy, A. I. Nikitin, and V. B. Chumichev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 52 Transl. into ENGLISH from Atomnaya Energiya (Moscow, USSR), v. 58, no. 6, Jun. 1985 p 445-449 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

The waters of the Barnets, Kara and Greenland Seas were studied to determine the parameters of transport and determination of the limits of propagation of radioactive pollutants caused by the atomic industry. It was shown that radiation conditions in the western Arctic seas are influenced by the receipt of waters of the Norwegian coastal current, which is polluted by radioactive wastes. The presence of a radioactive indicator in a measurable quantity can be used in solving problems related to the dynamics of waters and identification of water masses in the Arctic Basin. The tabulated data for the Greenland, Barnets and Kara Seas suggest that the radioactive pollution observed there is also propagated to other parts of the Arctic Ocean. E.A.K.

N86-20928# Joint Publications Research Service, Arlington, Va.
POSTULATED METEORITIC STRUCTURES IN ROSS SEA (ANTARCTICA) Abstract Only c90
L. P. Khryanina *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 53 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Geologicheskaya (Moscow, USSR), no. 8, Aug. 1985 p 128-132 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Morphological and mineralogical information indicates that there are two structures on the Ross Sea shelf which may be of a meteoritic origin. The crater has a diameter of about 100 km and the wall rises as much as 800 m above the bottom. The Bauers annular structure corresponds to a concentric system of gravity anomalies with positive delta g values for horsts and netative values for grabens, as is typical for meteoritic structures. The clear expression of the crater in the relief, the fact that it is superposed on the present-day continental slope and is filling with thick strata of recent sediments are indicative of its youth. A meteorite explosion logically explains a number of contradictory facts concerning the geological history of the Ross Sea, especially the 300 km northward jump of the boundary of iceberg drift and cold-loving fauna in the ocean and the simultaneous interglacial and lush development of fauna in the Ross Sea 5 to 3 million years ago. After formation of the crater the waters of the Ross Sea for some time became warmer and the surrounding ocean became colder due to the thawing of ice transported from the Ross Sea ice shelf. Author

N86-20929# Joint Publications Research Service, Arlington, Va.
ERROR IN METHOD FOR FLIGHT TESTS OF RADAR INSTRUMENTS FOR MEASURING ICE THICKNESS Abstract Only c35
V. V. Bogorodskiy and A. G. Oganesyan *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 53-54 Transl. into ENGLISH from Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 55, no. 6, Jun. 1985 p 1159-1162 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

Various radar instruments for measuring ice thickness (ITR) were introduced, but it is essential to have reliable means for precise determination of their meteorological parameters. The error in measurement instruments are determined in field tests by a comparison of the results of measurements made with the tested and reference (standard) instruments. A method making it possible to use asynchronous series (2) with i =/= j was developed, using as a point of departure an ideal ITR which forms a series d sub i fully coinciding with the reference series d sub i0. This serves as a basis for a method which can be used aboard an aircraft or a hovering helicopter. Another method is based on the strong correlation of closely spaced ice thickness readings. This quasisynchronous method makes it possible to obtain the ITR rms error without a sample d sub i0 series although this applies only to the standard deviation. In order to find the systematic error it is still necessary to measure ice thickness along the line, but asynchronous measurements are adequate for this purpose. The quasisynchronous method is particularly effective when two or more identical ITR are carried aboard an aircraft and only one transmitter is used in shaping the sounding signal. This method is the most suitable for ITR flight tests. E.A.K.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-20930 New South Wales Univ., Kensington (Australia).
THE IMPLEMENTATION OF A LAND USE SUITABILITY STUDY ON A COMPUTER-ASSISTED MAPPING SYSTEM Abstract Only
Pau Wai Kwong Yeung Mar. 1985 2 p
Avail: Issuing Activity

The implementation of an experimental Land Use Suitability Study System using the Intergraph (CAD/CAM) System is described. The traditional techniques for a Land Use Suitability Study (LUSS) are reviewed. The objectives and applications are considered as part of the system analysis of a computer-assisted LUSS System. The Landplan System, a computer-assisted system for LUSS utilizing grid cell structure, and the methodology adopted by the METLAND Project are discussed. The capability of the Intergraph System in relation to the implementation of the project using vector structure is discussed. Intergraph System is described in terms of its basic system features and development philosophy. The graphical system and the attribute database are the basic structures of the System. The problems and solutions in relation to the implementation are listed and discussed with reference to the adoptation of the Intergraph System as a LUSS System. E.A.K.

N86-20931* National Aeronautics and Space Administration, Washington, D.C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Jan. 1986 100 p
(NASA-SP-7041(48); NAS 1.21:7041(48)) Avail: NTIS HC A05 CSCL 05B

This bibliography lists 326 reports, articles and other documents introduced into the NASA Scientific and Technical Information System between October 1 and December 31, 1985. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

N86-20932*# California Univ., Santa Barbara. Dept. of Geography.
CANOPY REFLECTANCE MODELING IN A TROPICAL WOODED GRASSLAND Semiannual Report
David Simonett 31 Jan. 1986 5 p
(Grant NAGw-788)
(NASA-CR-176514; NAS 1.26:176514) Avail: NTIS

HC A02/MF A01 CSCL 02F

A study area was selected in West Africa in order to establish a relationship between rainfall and grassland productivity, and also to provide ground measurements and support for the GIMMS investigation of the use of AVHRR vegetation index data for monitoring grassland biomass and productivity. Field data collection, image and collateral data acquisition, model development, and data analysis and processing are briefly discussed. E.R.

N86-20933*# California Univ., Santa Barbara. Dept. of Geography.

ADVANCED DATA STRUCTURES FOR THE INTERPRETATION OF IMAGE AND CARTOGRAPHIC DATA IN GEO-BASED INFORMATION SYSTEMS Final Report

Donna J. Peuquet 4 Mar. 1986 84 p refs

(Grant NAG5-369)

(NASA-CR-176559; NAS 1.26:176559) Avail: NTIS HC A05/MF A01 CSCL 08B

A growing need to usse geographic information systems (GIS) to improve the flexibility and overall performance of very large, heterogeneous data bases was examined. The Vaster structure and the Topological Grid structure were compared to test whether such hybrid structures represent an improvement in performance. The use of artificial intelligence in a geographic/earth sciences data base context is being explored. The architecture of the Knowledge Based GIS (KBGIS) has a dual object/spatial data base and a three tier hierarchial search subsystem. Quadtree Spatial Spectra (QTSS) are derived, based on the quadtree data structure, to generate and represent spatial distribution information for large volumes of spatial data. B.G.

N86-20934*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SIMULATION OF LANDSAT MULTISPECTRAL SCANNER SPATIAL RESOLUTION WITH AIRBORNE SCANNER DATA

Christine A. Hlavka Jan. 1986 10 p refs

(NASA-TM-86832; A-85400; NAS 1.15:86832) Avail: NTIS HC A02/MF A01 CSCL 08B

A technique for simulation of low spatial resolution satellite imagery by using high resolution scanner data is described. The scanner data is convolved with the approximate point spread function of the low resolution data and then resampled to emulate low resolution imagery. The technique was successfully applied to Daedalus airborne scanner data to simulate a portion of a LANDSAT multispectra scanner scene. Author

N86-20935*# Southern Methodist Univ., Dallas, Tex. Dept. of Geological Sciences.

ANALYSIS AND INTERPRETATION OF MAGSAT ANOMALIES OVER NORTH AFRICA Final Technical Report, 1 Mar. 1983 - 31 May 1985

Roger J. Phillips 1985 104 p refs

(Grant NAG5-298)

(NASA-CR-176607; NAS 1.26:176607) Avail: NTIS HC A06/MF A01 CSCL 08G

Crustal anomaly detection with MAGSAT data is frustrated by inherent resolving power of the data and by contamination from external and core fields. Quality of the data might be tested by modeling specific tectonic features which produce anomalies that fall within proposed resolution and crustal amplitude capabilities of MAGSAT fields. To test this hypothesis, north African hotspots associated with Ahaggar, Tibesti and Darfur were modeled as magnetic induction anomalies. MAGSAT data were reduced by subtracting external and core fields to isolate scalar and vertical component crustal signals. Of the three volcanic areas, only the Ahaggar region had an associated anomaly of magnitude above error limits of the data. Hotspot hypothesis was tested for Ahaggar by seeing if predicted magnetic signal matched MAGSAT anomaly. Predicted model magnetic signal arising from surface topography of the uplift and the Curie isothermal surface was calculated at MAGSAT altitudes by Fourier transform technique modified to allow for variable magnetization. Curie isotherm surface was calculated using a method for temperature distribution in a moving plate above a fixed hotspot. Magnetic signal was calculated for a fixed plate as well as a number of plate velocities and directions. Author

N86-20936# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THE BRAZILIAN REPORT TO THE 7TH LANDSAT TECHNICAL WORKING GROUP (LTWG) MEETING

Jose Luiz deBarros Aquirre, Leopoldo Edgardo Messenger Parada, and Sergio dePaula Pereira Oct. 1985 10 p Presented at the 7th LTWG Meeting, Williamsburg, Va., 26 Feb. - 1 Mar. 1985 Sponsored by NASA

(NASA-CR-176592; NAS 1.26:176592; INPE-3672-PRE/826) Avail: NTIS HC A02/MF A01 CSCL 05B

Described is the current status of the INPE LANDSAT receiving and processing facilities, as well as the experience in the related activities during the period from June 1984 to February 1985. Author

N86-20937*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

BRAZIL'S REMOTE SENSING ACTIVITIES IN THE EIGHTIES

Marco Antonio Raupp, Roberto PereiradaCunha, and Rene Antonio Novaes Oct. 1985 7 p Presented at the 5th Selper Meeting, Ottawa, Ontario, 15-19 Jul. 1985

(NASA-CR-176591; NAS 1.26:176591; INPE-3671-PRE/825) Avail: NTIS HC A02/MF A01 CSCL 05B

Most of the remote sensing activities in Brazil have been conducted by the Institute for Space Research (INPE). This report describes briefly INPE's activities in remote sensing in the last years. INPE has been engaged in research (e.g., radiance studies) development (e.g., CCD-scanners, image processing devices) and applications (e.g., crop survey, land use, mineral resources, etc.) of remote sensing. INPE is also responsible for the operation (data reception and processing) of the LANDSATs and meteorological satellites. Data acquisition activities include the development of CCD-Camera to be deployed on board the space shuttle and the construction of a remote sensing satellite. Author

N86-20938# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

EFFICIENCY/EQUITY ANALYSIS OF WATER RESOURCES PROBLEMS: A GAME THEORETIC APPROACH Ph.D. Thesis

E. K. Ng 1985 175 p

(AD-A160685; AFIT/CI/NR-85-113D) Avail: NTIS HC A08/MF A01 CSCL 05/1

Successful regional water resources planning involves an efficiency analysis to find the optimal system that maximizes benefits minus costs, and an equity analysis to apportion project costs. Traditionally, these two problems have been treated separately. A reliable total numerization procedure is used to find the optimal system for regional water network problems. This procedure is easy to understand and can be implemented using readily available computer software. Furthermore, the more engineer can use realistic cost functions or perform detailed cost analysis and, also, examine good suboptimal systems. In addition, this procedure finds the optimal system for each individual and each subgroup of individuals; hence, an equity analysis can be accomplished using the theory of the core from cooperative n-person game theory on the optimal system as well as good suboptimal systems. A rigorous procedure using core conditions and linear programming is described to unambiguously measure an individual's minimum cost and maximum cost as a basis for the equitable cost allocation. Traditional approaches for quantifying minimum cost and maximum cost assume that either a regional system involving the grand coalition is built or all the individuals will go-it-alone. GRA

N86-20939# Colorado State Univ., Fort Collins. Dept. of Earth Resources.

MICROWAVE DETERMINATION OF SNOWPACK LIQUID WATER CONTENT Final Report, 19 Sep. 1983 - 18 May 1985

H. S. Boyne 15 Sep. 1985 43 p

(Contract DAAG29-83-K-0161)

(AD-A161798; ARO-20107.1-GS) Avail: NTIS HC A03/MF A01 CSCL 08/12

The measurement of liquid water in snowpack based on the electrical path length difference in snowpack depth in the region of high dielectric dispersion of water is described. The measurement system consists of a previously described LFM/CW microwave system (Ellerbruck and Boyne, 1980) operating at two frequency bands 2 to 5 GHz and 5 to 8 GHz. The system is tested, evaluated and intercompared with a dilution measurement technique (Davis, et al., 1985) in both a laboratory and field environment. It is found that the two methods of intercomparison are equivalent provided the snowpack is homogeneous and free of stratigraphy. The accuracy of the intercomparison is + or - 2.5% at the 95% level of confidence. The intercomparison of the methods is not equivalent when compared in an inhomogeneous stratified snowpack. The microwave system consistently registers a higher volumetric liquid water content than the dilution method. This discrepancy is believed due to differences in the snowpack volumes sampled. In particular, it is believed that ponded water above impermeable layers regions in the snowpack is responsible for the discrepancy. These regions could not be cored successfully for measurement by the dilution method. Author (GRA)

N86-20940# Geological Survey, Lincoln, Nebr.
HYDROGEOLOGY OF PARTS OF THE CENTRAL PLATTE AND LOWER LOUP NATURAL RESOURCES DISTRICTS, NEBRASKA
J. M. Peckenpaugh and J. T. Dugan 1985 142 p refs
(TI85-901799; USGS/WRI-83-4219) Avail: NTIS HC A07/MF A01

Water-level declines of at least 15 feet have occurred in this heavily irrigated area of central Nebraska since the early 1930's, and potential for additional declines is high. To test the effects of additional irrigation development on water levels and streamflow in the area, computer programs were veloped that represent the surface-water system, soil zone, and saturated zone of the hydrogeologic system. A two-dimensional, finite-difference ground-water flow model of the 3,374 square-mile study area was developed and calibrated using steady-state and transient conditions, and three management alternatives were examined. Results indicate that significant additional water-level declines will occur even if there is no additional ground-water development. The first management alternative examined is diversion of an additional 125,000 acre-feet of water per year from the Platte River. This alternative would have a substantial effect on flows in the Platte River. The second alternative examined is to allow no new ground-water development after 1980, but to apply irrigation water at five different rates ranging from a low of 80 percent of consumptive irrigation requirements (CIR) to a high of 16.0 inches per year (about 125 to 150 percent of CIR) for the western part of the study area. The third alternative is to allow potentially irrigable but unirrigated land to be developed at an annual rate of 2, 5, and 8 percent and to apply irrigation water at 80, 100, and 120 percent of CIR. R.J.F.

N86-20941# Rogers, Golden and Halpern, Inc., Reston, Va.
GULF OF MEXICO: OUTER CONTINENTAL SHELF OIL AND GAS ACTIVITIES IN THE GULF OF MEXICO AND THEIR ONSHORE IMPACTS
Christopher W. Lynch and Robert W. Rudolph Sep. 1984 141 p
(Contract DI-14-12-0001-30042)
(TI85-901421; OCS/MMS-84-0073) Avail: NTIS HC A07/MF A01

Issues and developments occuring in the Gulf of Mexico Outer Continental Shelf region are discussed. The geology and geologic history of deepwater zones are detailed. The results of areawide leasing in the Gulf is described. The transportation of hydrocarbon and changes that will come as development moves to frontier areas are also discussed. The effects of the two year recession, increased exploratory rig activity, and the use of advanced technology in refining operations are examined. E.R.

N86-20942# Geological Survey, Reston, Va.
GROUND-WATER REGIONS OF THE UNITED STATES
Ralph C. Heath 1984 85 p
(TI85-902209; USGS-WSP-2242; LC-83-600247) Avail: NTIS HC A05/MF A01

Ground water occurs in the rocks that form the Earth's crust and thus is in the domain of geology. Because the geology of the country is complex, the occurrence of ground water, in details, is extremely complex. This complexity makes it difficult for many people to develop an understanding of ground-water occurrence and availability and has resulted in problems of ground water depletion and ground-water pollution whose correction will be both difficult and expensive. Fortunately, such problems are not yet widespread and can, with intelligent applications of existing ground-water knowledge, be avoided in most other areas. However, to realize the goal, those engaged in water resources development and management and the general public need to become better informed on the Nation's ground-water resources. Those water resources are described. A discussion of the general aspects of geology and rocks as is a description of the ground water systems in the 15 ground-water regions into which the United States, Puerto Rico, and the Virgin Islands are divided is given. DOE

N86-20943# Los Alamos National Lab., N. Mex.
COLLECTION AND ANALYSIS OF GEOTHERMAL GASES
L. Shevenell, F. Goff, L. Gritzo, and P. E. Trujillo, Jr. Jul. 1985 26 p refs
(Contract W-7405-eng-36)
(DE86-001234; LA-10482-OBES) Avail: NTIS HC A03/MF A01

Rapid, reliable procedures are described for the collection and analysis of geothermal gases at Los Alamos National Laboratory. Gases covered are H2, He, Ar, O2, N2, CH4, C2H6, CO2, and H2S. The methods outlined are suitable for geothermal exploration. DOE

N86-20944# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
URANIUM IN CLAYS OF CRYSTALLINE ROCKS
G. Simmons and L. Caruso 10 Mar. 1985 28 p refs
(Contract DE-AC02-78ER-04972)
(DE86-000878; DOE/ER-04972/T2) Avail: NTIS HC A03/MF A01

Uraniferous clay aggregates in several granites have been examined in detail with a scanning electron microscope (SEM) equipped with a high resolution backscattered electron detector (BSE) and an energy dispersive X-ray system (EDS). The same polished sections used for the microscope observations were irradiated with thermal neutrons and the etched lexan detectors were then used to determine the location of uranium with a spatial resolution of a few microns. A set of 100 samples of granites were used for this study. These samples contain clay rich regions as large as a few millimeters that appear to consist entirely of clay when examined with the petrographic microscope. The fission track detectors show uranium to be present within the regions. Close examination with the BSE and EDS, however, shows in every instance that the host for the uranium is not clay but clay-sized grains of several minerals. This finding may have severe implications for the long-term retention of uranium and transuranic elements adsorbed on clay. Perhaps the presence of clay is not significant for the long-term retention of radioisotopes. DOE

N86-20345# North Carolina State Univ., Raleigh. Sea Grant Coll. Program.
LAND USE AND LAND COVER CLASSIFICATION OF THE NORTH CAROLINA BARRIER ISLANDS: LEVEL 3
S. Baker May 1985 107 p refs Prepared in cooperation with East Carolina Univ., Greenville, N.C.
(Grant NA83AA-D-00012)
(PB86-102498; UNC/SG-85-03) Avail: NTIS HC A06/MF A01 CSCL 13B

North Carolina's ocean shoreline consists entirely of a chain of sandy barrier islands. To understand and manage this fragile natural resource, it necessary to evaluate the impact of people

on the islands. This can be done by classifying, mapping and measuring the different ways the land is being used. A detailed survey of land use and land cover can give us an appreciation of the existing situation. This type of information is needed to plan future growth. It will help preserve the beauty of the islands and their ecologically valuable areas. GRA

N86-20946# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT
17 Jan. 1986 179 p refs Transl. into ENGLISH from various East European articles
(JPRS-EER-86-007) Avail: NTIS HC A09/MF A01

Research in agriculture, economics, microelectronic and remote sensing is discussed. Astronomy, quality control, refining, air pollution, and construction material are also discussed. For individual titles, see N86-20947 through N86-20948.

N86-20947# Joint Publications Research Service, Arlington, Va.
RESEARCH CONTRIBUTIONS IN ASTRONOMY, SATELLITE REMOTE SENSING
In its East Europe Report (JPRS-EER-86-007) 17 Jan. 1986 p 152-154 Transl. into ENGLISH from Astronautyka (Warsaw, Poland), No. 4, Apr. 1985 p 2 (For primary document see N86-20946 11-43)
Avail: NTIS HC A09/MF A01

Various research programs in astronomy and remote sensing are briefly discussed. A space probe to study Halley's Comet, interstellar gas investigations, magnetic star studies, a spaceborne telescope and spaceborne infrared photography are among the topics covered. R.J.F.

N86-20948# Joint Publications Research Service, Arlington, Va.
RESEARCH ON FIRE RESISTANT PLASTIC MOLDING COMPOUNDS **c27**
Wieslaw Nowaczek and Waclaw Krolikowski *In its* East Europe Report (JPRS-EER-86-007) 17 Jan. 1986 p 155-156 Transl. into ENGLISH from Chemik (Gliwice, Poland), no. 8, Aug. 1985 p 199-203 (For primary document see N86-20946 11-43)
Avail: NTIS HC A09/MF A01

Research for fire-resistant plastic molding compounds is discussed. Emphasis is on the development of noncombustible polyester molding plastic compounds of the DMC type using domestically produced aluminum hydroxide subjected to additional laboratory processes of drying and grinding to obtain the required grain size. R.J.F.

N86-20446# Joint Publications Research Service, Arlington, Va.
RADAR OBSERVATIONS OF RIVER OVERFLOWS FROM OUTER SPACE Abstract Only
A. P. Pichugin, A. S. Gavrilenko, A. G. Gribunin, L. V. Yelenskiy, A. I. Kalmykov, and V. P. Shestopalov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 63 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 2, Sep. 1985 p 323-326 Original language translation was announced in IAA as A86-13984 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20450# Joint Publications Research Service, Arlington, Va.
STUDY OF SPATIAL STRUCTURE OF SOIL COVER IN BAYKAL REGION USING AEROSPACE PHOTOGRAPHS Abstract Only
V. A. Kuzmin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 67 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 53-57 Original language document was announced in IAA as A86-13282 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20451# Joint Publications Research Service, Arlington, Va.
RADIATION CORRECTION FOR AEROSPACE IMAGES OF AGRICULTURAL CROPS Abstract Only
A. S. Barykin, V. V. Kozoderov, and V. P. Popov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 68-69 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosma (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 78-85 Original language document was announced in IAA as A86-13285 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20454# Joint Publications Research Service, Arlington, Va.
ALLOWANCE FOR PROPERTIES OF BOUND MOISTURE IN REMOTE SENSING OF SOIL MOISTURE CONTENT Abstract Only
T. A. Sologubova and V. S. Etkin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 71 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 112-115 Original language document was announced in IAA as A86-13289 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20455# Joint Publications Research Service, Arlington, Va.
THE EXPLORATION OF OUTER SPACE AND THE DEVELOPING COUNTRIES
S. M. Monin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 72-78 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 76-81 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-20949 Brown Univ., Providence, R. I.
FABRICATION AND CHARACTERIZATION OF QUENCH CAST SILICON FOR SOLAR CELL APPLICATION Ph.D. Thesis
Thomas Cutler Russell 1985 140 p
Avail: Univ. Microfilms Order No. DA8519900

A new silicon ribbon casting process was developed for use in the fabrication of low cost photovoltaic cells. This process is known as double roller quench casting and produces ribbon directly from silicon melt. Solar cells fabricated on quench cast material have efficiencies as high as 8.7% under simulated AM1 spectrum. The minority carrier diffusion length as measured by spectral response was found to be on the order of 10 microns. An open circuit voltage of 484 mV was measured and is consistent with the diffusion length. Solar cells were passivated with hydrogen plasma. The solar cell conversion efficiency was increased by as much as 40%. Electron beam induced current scans revealed that the intragrain response was significantly improved while the grain boundaries showed little improvement. The double roller quench casting process produces good quality ribbon for solar cell application. The conductivity and lifetime of the material appears to be limited by the intragrain defects. Optimization of the casting process may help to reduce the number of defects and further improve the ribbon quality. Dissert. Abstr.

N86-20950# Office of Technology Assessment, Washington, D.C. Congressional Board of the 99th Congress
MARINE APPLICATIONS FOR FUEL CELL TECHNOLOGY: A TECHNICAL MEMORANDUM
Feb. 1986 42 p refs
(OTA-TM-O-37; LC-85-600642) Avail: NTIS HC A03/MF A01

To date, almost no attention was given to the potential marine applications for fuel cell technologies. Some of the benefits that fuel cells may offer to the utility industry may also apply to marine

use. At a 1 day workshop the Office of Technology Assessment found fuel cells to offer advantages in applications requiring quiet operations, applications where throttle setings are constantly changed, and for small submarines. Fuel cells are not expected to penetrate marine markets until they become firmly established in the commercial utility section. B.G.

N86-20951# Maryland Univ., College Park. Dept. of Mechanical Engineering.
LABORATORY EXPERIMENTS ON ABSORPTION HEAT PUMPS
Reinhard Radermacher 1984 6 p refs
(DE85-004050; CONF-841231-19) Avail: NTIS HC A02/MF A01

A series of laboratory performance tests were conducted on an absorption cycle water chiller and heat pump. The part-load performance was compared to the full-load capacity and coefficient of performance. The causes of performance degradation wih shorter operating times are speculated upon with partial substantiation resulting from tests on the chiller after it had been modified to prevent off cycle fluid migration. Author

N86-20952# Hawaii Univ., Manoa. Natural Energy Inst.
TENTH ANNIVERSARY SPECIAL EDITION Annual Report, 1984
1984 184 p
(NP-5901429; TI85-901429) Avail: NTIS HC A09/MF A01

The development and progress in alternative natural energy sources in Hawaii for the past ten years is detailed. A brief history and research and development project summaries are given. The types of energy described are biomass energy, geothermal energy, ocean energy, solar energy, wind energy and hydrogen or methanol production. Other related educational programs and activities are described. E.R.

N86-20953# Chronar Corp., Princeton, N.J.
PHOTOVOLTAIC DEVICES USING HYDROGENATED AMORPHOUS SILICON PRODUCED BY THE CHEMICAL VAPOR DEPOSITION OF HIGHER ORDER SILANES Final Report, 1 Aug. 1982 - 31 Aug. 1983
A. Delahoy Apr. 1985 39 p
(Contract DE-AC02-83CH-10093)
(DE85-008810; SERI/STR-211-2607) Avail: NTIS HC A03/MF A01

Hydrogenated amorphous silicon (a-Si:H) films were prepared by the static chemical vapor deposition (CVD) of mainly disilane. The photoconductivity of the CVD material increased with decreasing activation energy. The temperature dependence of the photoconductivity only exhibits a single high temperature peak. The spectral response of the photoconductivity shifts to longer wavelengths as the temperature increases. An exponential subband gap absorption edge is observed. The ratio of the change in band gap to the change in inverse slope of the absorption edge was found to be the same regardless of whether the deposition temperature or measurement temperature was varied, strongly suggesting that the energy band gap is determined by the disorder. A-Si:H film produced by the mercury sensitized photo CVD of dilane, is expected to be a very promising technique since low deposition temperatures are possible and since atomic hydrogen is produced. B.G.

N86-20954# Alaska Univ., Fairbanks. Geophysical Inst.
GEOTHERMAL ENERGY RESOURCE INVESTIGATIONS IN THE EASTERN COPPER RIVER BASIN, ALASKA
E. M. Wescott and D. L. Turner Jun. 1985 225 p
(Contract DE-FG07-84ID-12471)
(DE86-001803; DOE/ID-12471/T1; UAG-R-302) Avail: NTIS HC A10/MF A01

This report consists of a review of the geological, geochemical and geophysical data available for the Eastern Copper River basin with emphasis on the mud volcanoes, and the results of geophysical and geochemical studies carried out in the summers of 1982 and 1984. The purpose was to determine if there are geothermal energy resources in the Copper River Basin. The Eastern Copper River basin is situated on the flanks of a major volcano, Mt. Drum, which was active as late as 200,000 years ago and which is thought to have retained significant amounts of residual heat at high levels. Mt. Wrangell, farther to the east, has been volcanically active up to the present time. The 1982 geophysical and geochemical surveys located three principal areas of possible geothermal interest, one near Tazlina and two near the Klawasi mud volcanoes. The intensive survey work of 1984 was concentrated on those areas. We have integrated the results of soil helium, soil mercury, gravity, aeromagnetic, electrical, self-potential, and controlled-source audio magnetotelluric (CSAMT) surveys to evaluate the geothermal potential of the areas studied. DOE

N86-20955# Electric Power Research Inst., Palo Alto, Calif.
DOE/EPRI BETA (SODIUM-SULFUR) BATTERY WORKSHOP V: PROCEEDINGS
J. L. Sudsworth, ed. Dec. 1984 750 p Presented at the DOE/EPRI Beta Battery Workshop, Washington, D.C., 18 Oct. 1983 Prepared in cooperation with Beta R and D Ltd., Sinfin, Derby, England; DOE, Washington, D.C.
(DE85-006947; EPRI-EM-3631-SR; CONF-8310241) Avail: NTIS HC A99/MF A01

Separate abstracts were prepared for 48 papers in this conference proceedings. Two other papers had been previously indexed for EDB. DOE

N86-20956# Department of Energy, Morgantown, W. Va.
FUEL CELLS Technology Status Report
Dec. 1984 55 p
(DE85-008591; DOE/METC-85-0223) Avail: NTIS HC A04/MF A01

The US Department of Energy (DOE), Office of Fossil Energy, has supported and managed a fuel cell research and development (R and D) program since 1976. Responsibility for implementing DOE's fuel cell program, which includes activities related to both fuel cells and fuel cell systems, has been assigned to the Morgantown Energy Technology Center (METC) in Morgantown, West Virginia. The total United States effort of the private and public sectors in developing fuel cell technology is referred to as the National Fuel Cell Program (NFCP). The goal of the NFCP is to develop fuel cell power plants for base-load and dispersed electric utility systems, industrial cogeneration, and on-site applications. To achieve this goal, the fuel cell developers, electric and gas utilities, research institutes, and Government agencies are working together. Four organized groups are coordinating the diversified activities of the NFCP. The status of the overall program is reviewed in detail. DOE

N86-20957# Midwest Research Inst., Golden, Colo.
PHOTOVOLTAIC STAND-ALONE APPLICATIONS READING LIST
Aug. 1985 6 p
(Contract DE-AC02-83CH-10093)
(DE85-008811; SERI/SP-271-2728) Avail: NTIS HC A02/MF A01

This list of general publications on photovoltaic stand-alone applications was prepared by the Technical Information Branch at the Solar Energy Research Institute (SERI) for the US Department of Energy (DOE) as part of the Solar Technical Information Program. The list provides an introduction to this literature and is not intended to be comprehensive. Although some of the citations refer to grid-connected photovoltaic systems, they contain basic information applicable to stand-alone applications. Many of the technical reports in this reading list result from government contracts with the Jet Propulsion Laboratory, Sandia National Laboratories-Albuquerque, and the Solar Energy Research Institute, or subcontracts from these laboratories to universities and researchers in private industry. DOE

N86-20958# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
RESEARCH ON BASIC UNDERSTANDING OF HIGH EFFICIENCY IN SILICON SOLAR CELLS Final Report

M. Wolf Aug. 1985 138 p
(Contract DE-AC02-83CH-10093)
(DE85-016858; SERI/STR-211-2756) Avail: NTIS HC A07/MF A01

Through modeling of silicon solar cell performance, a solar cell design has evolved that could reach efficiencies above 20% (AM1) under standard conditions. Modeling has been based on current understanding of the effects involved in charge carrier generation, transport, and recombination, and on technology-influenced parameters already reported as achieved. It is also important to experimentally determine the values for all parameters used in modeling the device. However, experimental methods for determining physical parameters, particularly minority carrier lifetimes and surface recombination velocities, are still inadequate. A goal of solar cell research has therefore been to develop adequate analytical methods to determine all parameters of a device that affect its performance. This project has contributed to that goal by investigating a closed loop design capability. Based on previous modeling, which resulted in a device design, a developmental fabrication process sequence was also designed. Next, devices were fabricated using the process design. DOE

N86-20959# Sandia National Labs., Albuquerque, N. Mex.
MAGMA ENERGY AND GEOTHERMAL PERMEABILITY ENHANCEMENT PROGRAMS
J. C. Dunn 1985 7 p Presented at the Geothermal Program Review, Washington, D.C., 11 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018271; SAND-85-2030C; CONF-8509142-6) Avail: NTIS HC A02/MF A01

Accomplishments during FY85 and project plans for FY86 are described for the Magma Energy Extraction and Permeability Enhancement programs. DOE

N86-20960# Midwest Research Inst., Kansas City, Mo.
SOLERAS: SOLAR ENERGY WATER DESALINATION PROJECT. EXXON RESEARCH AND ENGINEERING. VOLUME 3: APPENDICES PILOT PLAN AND DESIGN DETAILS AND SUBSYSTEM DIRECT COST SUPPORT Final Report
1985 409 p
(Contract DE-AC02-83CH-10093)
(DE86-000428; MRI/SOL-0401-03) Avail: NTIS HC A18/MF A01

Details of the design of a water desalination solar pilot plant in Yanbu, Saudi Arabia are presented. The major subsystems of the plant are defined, including solar energy collection and simulation, energy storage, energy delivery, reverse osmosis/multiple effect distillation, water storage, waste disposal, backup power generators, controls and instrumentation data acquisition, facilities and enclosures, and computers. A list of the plant equipment and a set of process flow diagrams are provided. A cost analysis of the pilot plant is included. DOE

N86-20961# Taylor (Robert M.), Boston, Mass.
INTEGRATED AGRICULTURAL ENERGY SYSTEM
R. M. Taylor 1985 3 p
(Contract DE-FG41-81R1-23281)
(DE86-000508; DOE/R1-23281/T1; MA-81-002) Avail: NTIS HC A02/MF A01

The purpose of this program is to show New England farmers and other New England energy users how they can use alternative energy sources to reduce their energy cost and dependency on conventional sources. The project demonstrates alternative energy technologies in solar, alcohol and methane. Dissemination is planned through tours to be conducted by the Worcester County Extension Service. Most of these goals were completed as planned. A few things have yet to be completed. The solar panels and solar hot water tanks have to be installed. The fermenter's agitating and cooling system have to be secured inside the fermenter. Once these items are complete tours will begin early in the spring. DOE

N86-20962# Communications Satellite Corp., Clarksburg, Md.
DESIGN AND DEVELOPMENT OF A SEALED 100-Ah HYDROGEN/NICKEL OXIDE BATTERY Final Report
J. Dunlop, M. Earl, M. Brown, H. Vaidyanathan, W. Gentry, R. Beauchamp, and J. Sindorf Sep. 1985 94 p Prepared in cooperation with Johnson Controls, Inc., Milwaukee, Wis.
(Contract DE-AC04-76DP-00789)
(DE86-001114; SAND-85-7219) Avail: NTIS HC A05/MF A01

Cost studies have shown that the low-cost manufacturing processes developed for mass-produced lead/acid batteries are applicable to the economical production of a limited volume, high-technology/nickel oxide system. Considering that this is a new development in battery technology, performance data are very encouraging, particularly the performance of Battery 2. The technical objectives of the program (20-year life with daily cycling) appear feasible with this new hydrogen/nickel oxide battery system. DOE

N86-20963# Southern Methodist Univ., Dallas, Tex. Dept. of Geological Sciences.
HEAT FLOW AND GEOTHERMAL STUDIES IN THE STATE OF WASHINGTON
D. D. Blackwell, J. L. Steele, and S. A. Kelley Aug. 1985 84 p refs
(Contract DE-AI07-81ID-12307)
(DE86-001550; DOE/ID-12307/1) Avail: NTIS HC A05/MF A01

Existing geothermal gradient and heat flow data for the state of Washington are summarized. In addition, information on mean-annual ground surface temperatures is included. The data consist of accurate, detailed temperature-depth measurements in selected available holes throughout the state of Washington made between 1979 and 1982. Measurements of thermal conductivity on selected rock samples from these drill holes and ancillary information required to assess the significance of the data and calculate heat flow values were obtained as well. Information is presented on the mean-annual ground-surface temperatures throughout the state of Washington. DOE

N86-20964# Pacific Northwest Lab., Richland, Wash.
COMPUTER CODE FOR ANALYZING THE PERFORMANCE OF AQUIFER THERMAL ENERGY STORAGE SYSTEMS
L. W. Vail, C. T. Kincaid, and L. D. Kannberg May 1985 6 p Presented at the ENERSTOCK '85 International Conference on Energy Storage for Building Heating and Cooling, Toronto, Ontario, 22 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001667; PNL-SA-12870; CONF-850905-6) Avail: NTIS HC A02/MF A01

A code called Aquifer Thermal Energy Storage System Simulator (ATESSS) has been developed to analyze the operational performance of ATES systems. The ATESSS code provides an ability to examine the interrelationships among design specifications, general operational strategies, and unpredictable variations in the demand for energy. The uses of the code can vary the well field layout, heat exchanger size, and pumping/injection schedule. Unpredictable aspects of supply and demand may also be examined through the use of a stochastic model of selected system parameters. While employing a relatively simple model of the aquifer, the ATESSS code plays an important role in the design and operation of ATES facilities by augmenting experience provided by the relatively few field experiments and demonstration projects. ATESSS has been used to characterize the effect of different pumping/injection schedules on a hypothetical ATES system and to estimate the recovery at the St. Paul, Minnesota, field experiment. DOE

N86-20965# Pacific Northwest Lab., Richland, Wash.
AQUIFER THERMAL ENERGY STORAGE IN THE US
L. D. Kannberg Jun. 1985 7 p Presented at the ENERSTOCK '85 International Conference on Energy Storage for Building Heating and Cooling, Toronto, Ontario, 22 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001668; PNL-SA-13289; CONF-850905-7) Avail: NTIS HC A02/MF A01

DOE has funded investigation of Aquifer Thermal Energy

Storage (ATES) since 1975. The scope of the ATES investigation has encompassed numerical modeling, field testing, economic analyses, and evaluation of institutional issues. ATES has received the bulk of the attention because of its widespread potential in the US. US efforts are now concentrated on a high temperature (up to 150C) ATES field test on the St. Paul campus of the University of Minnesota. Four short-term test cycles and the first of two long-term test cycles have been completed at this site. Utilization of chill ATES to meet summer air conditioning demands has been monitored at two operating sites in Tuscaloosa, Alabama. The systems utilize a cooling tower to directly chill groundwater pumped from a water table aquifer for storage in the same aquifer. The first of the two systems has exhibited relatively poor performance. More comprehensive monitoring has recently been undertaken at another site. DOE

N86-20966# Sandia National Labs., Albuquerque, N. Mex.
AUTONOMOUS PHOTOVOLTAIC-DIESEL POWER SYSTEM DESIGN
T. M. Calloway 1985 13 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001750; SAND-85-1193C; CONF-851043-5) Avail: NTIS
HC A02/MF A01

A methodology for designing an autonomous photovoltaic power system in conjunction with a diesel-fueled electric generator and a battery has been developed. Any photovoltaic array energy not utilized immediately by the load is stored in the battery bank. The diesel generator set is operated periodically at 14-day intervals to ensure its availability and occasionally as needed during winter to supplement combined output from the array and battery. It is hypothesized that logistical support is infrequent, so the hybrid photovoltaic-diesel power system is designed to consume only 10% as much fuel as would a diesel-only system. This constraint is used to generate a set of possible combinations of array area and battery energy storage capacity. For each combination, a battery-life model predicts the time interval between battery replacements by deducting the fraction of total life consumed each day. An economic model then produces life-cycle system cost. Repeating this process for different combinations of array area and battery capacity identifies the minimum-cost system design. DOE

N86-20967# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SILVER-SILICON BONDING ON SILICA SURFACES
J. R. Pitts Apr. 1985 253 p
(Contract DE-AC02-83CH-10093)
(DE85-012138; SERI/TR-255-2410) Avail: NTIS
HC A12/MF A01

The properties of Ag films deposited on silica or silica-based glass substrates have been investigated using X-ray photoelectron spectroscopy (XPS), Auger electron spectroscopy (AES), ion scattering spectrometry (ISS), and secondary ion mass spectrometry (SIMS). Interfacial studies are reported for films prepared by decomposing organometallic Ag on glass, depositing Ag by the wet chemical electroless method onto glass and SiO2, and vacuum evaporating Ag onto SiO2. For organometallic Ag films on glass, depth profiles indicate that the interfacial regions are enriched in Si or depleted in O. For electroless films, Sn-Si bonds are formed after sensitization with tin chloride and Ag-Si bonds are formed after silvering without reducers. Silver is strongly bonded to Si via a set of Sn insertion reactions, but impurities were found at the interfaces and these probably contribute to the rapid degradation of mirrors in terrestrial environments. Particle bombardment of silica with He, Ne, Ar or electrons in the range of 0.25 to 8 keV results in reduction of the surface to form SiO(sub x) (x 2). DOE

N86-20968# Research Triangle Inst., Research Triangle Park, N.C.
AlGaAs-GaAs PATTERNED Ge TUNNEL JUNCTION CASCADE CONCENTRATOR SOLAR CELL Annual Technical Progress Report, 15 Oct. 1983 - 14 Dec. 1984
Aug. 1985 92 p
(Contract DE-AC02-83CH-10093)
(DE85-016856; SERI/STR-211-2755) Avail: NTIS
HC A05/MF A01

A two-junction cascade solar cell, 0.5 cm(2) in area, in the AlGaAs-GaAs material system that has a power conversion efficiency of more than 30% at a cell temperature of 50 C is demonstrated. Objectives for the first year of the program included growth of Al sub x Ga sub 1-x As on Al sub y Ga sub 1-y As exposed to air for at least one hour; growth of Ge by vapor phase epitaxy on a GaAs substrate; fabrication of a p/n patterned Ge tunnel junction grown on n-GaAs and demonstration of a current density larger than 80 A/cm(2); growth and characterization of a top cell on a patterned Ge tunnel junction; and fabrication and demonstration of an AlGaAs-GaAs cascade solar cell using the patterned Ge tunnel junction. A patterned Ge-tunnel junction connecting the n-type base region of a GaAs cell to a p(+)-GaAs substrate was demonstrated for the first time. DOE

N86-20969# Oregon State Univ., Corvallis. Wind Resources Assessment Lab.
NORTHEAST NEVADA WIND RESOURCE ASSESSMENT STUDY
R. W. Baker and R. Wittrup Aug. 1985 62 p
(Contract DE-AC79-81BP-29182)
(DE85-018285; DOE/BP-29182/16) Avail: NTIS
HC A04/MF A01

Wind power potential at satellite sites around Pequop Summit was poor. Mean annual wind speeds were 8 to 12 mph and mean power density values well below 200 W/m(2). Only the Pequop Summit site had good wind power potential, especially during winter and spring months. In northeast Nevada good winds are only found at well exposed north/south oriented ridges that are at least at 7000 ft (MSL) and above valley temperature inversions. Wind shear in the lowest 200 ft over higher elevation ridgecrest areas is small due to low level acceleration in the winds. At lower elevation sites much higher wind shear was measured. Detailed estimates of wind power potential in Pequop Summit site area revealed windfarms using horizontal axis machines could produce significant levels of energy on a seasonal and annual basis. Annual Capacity Factors varied from 0.28 to 0.30. However, vertical axis turbine used only had an annual Capacity Factor of 0.14 since rated speed was very high. From estimated Pequop Summit land area availability it appears a windfarm could consist of 30 Type A 2500 kW machines, 70 Type B 300 kW units, or 120 Type D 65 kW turbines. Estimated annual energy outputs for windfarms vary from 20,400,000 kWh for Type D units to 184,300,000 kWh for Type A array. DOE

N86-20970# Bohemia Solar and Scientific, Inc., Eugene, Oreg.
THEORY OF THE GEYSER-PUMP SOLAR COLLECTOR Final Report
E. Haines 1985 53 p
(Contract DE-FG06-81R0-01318)
(DE86-000487; DOE/R0-01318/T1; OR-81-004) Avail: NTIS
HC A04/MF A01

The geyser-pump solar collector is a self-controlling, self-pumping active collector having no moving or electronic parts, drawing its mechanical pump energy from boiling in the collector's risers. The only use of the geyser-pump principle reported in patents and the open literature is only for circulating the fluid in the collector plate. Computer simulations show that most design and algorithm parameters have only negligible impact on solar fraction, F. The only parameter which affects F is the length of the storage heat exchanger. Episodic cloud cover does not hamper the geyser-pump collector's ability to restart. Daylong simulations show that the energy cost of geyser-pumping is only about 3% of the absorbed insolation. The geyser-pump collector is found to be as efficient as an electrically pumped collector. Initial costs are estimated to be about the same for the geyser-pump and conventional collectors, but lifetime costs of the geyser-pump are substantially lower, perhaps only half, because of low maintenance. DOE

N86-20971# Fondazione Ugo Bordoni, Rome (Italy).
STATE OF THE ART AND PROSPECTIVES OF PHOTOVOLTAIC SEMICONDUCTOR SOLAR CELLS [STATO DELLARTE E PROSPETTIVE DELLE CELLE SOLARI FOTOVOLTAICHE A SEMICONDUTTORE]
Francesco Barbaliscia and Pier Giorgio Masullo Dec. 1984 48 p refs In ITALIAN
(FUB-30-1984) Avail: NTIS HC A03/MF A01

Solar cell production technology is reviewed. Single crystal solar cells; manufacturing techniques; thin film technology; polycrystalline cells; amorphous silicon cells; condensed light cells; GaAs and CdS cells; laser annealing; and electron beam annealing are discussed. Author (ESA)

N86-20972# AEG-Telefunken, Wedel (West Germany). Anlagentechnik A.G.
THE COMPLETE ELECTRICAL PART OF THE ADVANCED RIGID ARRAY (ARA)-SOLAR ARRAY Final Report
D. Poeck and W. Snaikker Paris ESA 1985 52 p
(Contract ESTEC-5523/83-NL-PB(SC))
(ESA-CR(P)-2147) Avail: NTIS HC A04/MF A01

Solar cell type impact on the power to mass ratio of the Advanced Rigid Array (ARA) solar array was investigated. A 50 micron BSFR solar cell with a 50 micron CMX coverglass leads to the highest power to mass ratio at end of life (EOL) in geostationary orbit (10 yr). A 180 micron BSFR solar cell leads to a higher EOL-power to mass ratio than BSR cells assuming an ARA structure of 70 mg/sq cm or thicker. The hold down point sensitivity analysis shows that cell loss near hold down points can be minimized by using different cell dimensions. The harness routing tradeoff and torque measurements show that a separate panel, interpanel, and transfer harness concept is best due to its low mass and good reproducibility of the mechanical torque in the hinge area. Two ARA verification samples were successfully tested for 2000 deep thermal cycles between +80 and -130 C. A third sample of an open lay-up facesheet (minimum weight substrate) was designed and manufactured to meet possible modified mass requirements. Author (ESA)

N86-20926# Joint Publications Research Service, Arlington, Va.
TESTING OF WIND POWER UNITS AT ANTARCTIC STATION
G. Sergeyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 50 Transl. into ENGLISH from Vodnyy Transport (Moscow, USSR), 15 Oct. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-20973# Illinois Commerce Commission, Springfield.
ACID RAIN: ENVIRONMENTAL CONSTRAINTS AND COSTS
Feb. 1985 17 p refs
(TI85-902100; NP-5902100; Sunset-12) Avail: NTIS HC A02/MF A01

The negative financial and economic impact of proposed acid rain legislation could be significant to Illinois utilities and their ratepayers. Emission credit trading/leasing offers hope of being a feasible least cost compliance strategy, but this method of compliance would only be applicable under the bubble approach. The commission and DENR studies on Acid Rain compliance impacts and strategies will assist Illinois in ascertaining the specific approach, or mix of approaches, to compliance best suited to the state. These studies will provide quantitative data on how the various compliance strategies analyzed will affect utility rates. Thus, they will also provide the Commision with useful guidance in adjusting utility rates so as to minimize acid rain compliance costs on Illinois ratepayers. DOE

N86-20974# Washington Univ. Hospital, Seattle. School of Oceanography.
CHEMICAL AND GEOCHEMICAL STUDIES OFF THE COAST OF WASHINGTON Final Progress Report, Jul. 1983 - Jul. 1985
R. Carpenter, comp. Jul. 1985 14 p
(Contract DE-AT06-71EV-70024)
(DE86-000549; DOE/EV-70024/T1) Avail: NTIS HC A02/MF A01

Progress from July 1983 through conclusion in July 1985 of a series of marine chemical and geochemical investigations involving both laboratory studies and field studies off the coast of Washington is summarized. Most of the field work the past few years has been on the Washington continental shelf, slope, and the submarine canyons indenting the shelf north of the Columbia River. The aim has been to provide basic data required to characterize underlying chemical and physical processes and their rates which control the distribution, concentrations, and ultimate fate of some of the potentially hazardous agents associated with fossil fuel and/or nuclear power production or transportation. Laboratory and field experiments and theories derived from them were used iteratively to investigate: (1) vertical transfer of trace chemicals from surface seawaters to underlying waters and sediments; (2) processes which may transfer certain chemicals from sediments back into the overlying water column; (3) redox processes which besides changing valence states of certain chemicals may alter their precipitation/dissolution tendencies, their biological availability and/or toxicity; and (4) accumulation histories of potentially hazardous chemicals in sediments during the past 100 years. DOE

N86-20975# Argonne National Lab., Ill.
ESTIMATION OF SOURCE-RECEPTOR MATRICES FOR DEPOSITION OF NITRATE
J. D. Shannon and B. M. Lesht 1985 16 p Presented at the Muskoka Conference: International Symposium on Acidic Precipitation, Toronto, Ontario, 15 Sep. 1985
(Contract W-31-109-eng-38)
(DE86-001796; CONF-850944-3) Avail: NTIS HC A02/MF A01

Using the Advanced Statistical Trajectory Regional Air Pollution (ASTRAP) model, regional-scale transport and deposition reactions involving NO and NO2 were approximated with a linear, irreversible rate of transformation of combined NO/NO2 to an imprecisely defined NO3(-) species, which combines both nitric acid and particulate nitrate. DOE

N86-20976# Oak Ridge National Lab., Tenn.
INVESTIGATION OF LANDSCAPE AND LAKE ACIDIFICATION RELATIONSHIPS Interim Report
R. M. Rush, R. B. Honea, E. C. Krug, R. W. Peplies, J. E. Dobson, and F. P. Baxter Oct. 1985 39 p
(Contract DE-AC05-84OR-21400)
(DE86-001450; ORNL/TM-9754) Avail: NTIS HC A03/MF A01

This interim report presents the rationale and initial results for a program designed to gather and analyze information essential to a better understanding of lake acidification in the northeastern United States. The literature pertinent to a study of landscape and lake acidification relationships is reviewed and presented as the rationale for a landscape/lake acidification study. The results of a study of Emmons Pond in northwestern Connecticut are described and lead to the conclusion that a landscape change was a contributor to the acidification of this pond. A regional study of sixteen lakes in southern New England using LANDSAT imagery is described, and preliminary observations from a similar study in the Adirondack Mountains are given. These results indicate that satellite imagery can be useful in identifying types of ground cover important to landscape/lake acidification relationships. DOE

N86-20977# Pacific Northwest Lab., Richland, Wash.
IMPACT OF WATER QUALITY ON AQUIFER THERMAL ENERGY STORAGE
R. D. Allen Mar. 1985 6 p Presented at the ENERSTOCK '85 International Conference on Energy Storage for Building Heating and Cooling, Toronto, Ontario, 22 Sep. 1985

(Contract DE-AC06-76RL-01830)
(DE86-001669; PNL-SA-12866; CONF-850905-8) Avail: NTIS HC A02/MF A01

Ground-water quality may affect the regional potential for aquifer thermal energy storage (ATES). Six mechanisms can impair reservoir permeability: (1) particulate plugging, (2) chemical precipitation, (3) liquid-solid reactions, (4) formation disaggregation, (5) oxidation reactions, and (6) biological activity. Countermeasures to reduce these effects are identified. The chemistry of ground-water depends upon solution, precipitation, and fluid mixing. Modeling of water analyses indicated three problem reactions: (1) precipitation of calcium carbonate at elevated temperature; (2) solution of silica at elevated temperature, followed by its precipitation at lowered temperature; and (3) oxidation and precipitation of iron compounds. Aquifers composed of quartz sands and sandstones are promising for low temperature and chilled water storage. Quartz-bearing rocks are promising for high temperature storage, if silica dissolution and precipitation is insignificant. Of the 19 US hydrologic regions reviewed, 10 were identified as having characteristics necessary for ATES development. DOE

N86-20978# Oak Ridge Gaseous Diffusion Plant, Tenn.
COOLING TOWER DRIFT STUDIES AT ORGDP Final Report
S. H. Park and F. G. Taylor, Jr. 31 Jul. 1985 27 p
(Contract DE-AC05-84OT-21400)
(DE85-018438; K/PS-1123) Avail: NTIS HC A03/MF A01

During the 1970s, a major consideration in environmental impact studies of electric power plant operations was the effects of cooling tower drift. In 1973 the distribution and magnitude of drift from mechanical draft cooling towers at the Oak Ridge Gaseous Diffusion Plant (ORGDP), Oak Ridge, Tennessee, was investigated (Taylor et al., 1975). That study provided evidence of the transport and deposition of drift to the terrestrial environment, but only depicted a single season from over three decades of continuous operation. Results of that study suggested that increased quantities of trace elements (chromium) in vegetation attained an equilibrium concentration with environmental losses (weathering, leaching) compensated by chronic deposition. The cooling towers investigated in the 1973 study were built in the early 1950s, but were constantly remodeled and upgraded over this time period. However, 0.03% to 0.1% drift percentage obtained in the 1973 study (Jallouk et al., 1974) was considerably higher than some of similar towers constructed later. The ORGDP diffusion process production rate is varied by changing the operating power level of the plant which, in turn, is related to the recirculating cooling water (RCW) flow rate. Drift fraction is a function of the RCW flow, such that variations (seasonal) in plant operation influence drift emissions. DOE

N86-20979# California Univ., Berkeley. Lawrence Berkeley Lab.
INDOOR CONCENTRATIONS OF RADON 222 AND ITS DAUGHTERS: SOURCES, RANGE, AND ENVIRONMENTAL INFLUENCES
A. V. Nero, Jr. Apr. 1985 27 p Presented at the 7th ORNL Life Sciences Symposium on Indoor-air and Human Health: Major Indoor Air Pollutant and Their Health Implications, Knoxville, Tenn., 29 Oct. 1984
(Contract DE-AC03-76SF-00098)
(DE86-000615; LBL-19346; CONF-8410136-1) Avail: NTIS HC A03/MF A01

The author here reviews what is presently known about factors affecting indoor concentrations of radon 222 and its daughters is reviewed. In US single-family homes, radon concentrations are found to average about 1.5 pCi/1, but substantially higher concentrations occur frequently: perhaps a million US homes have concentrations exceeding 8 pCi/1 (from which occupants receive radiation doses comparable to those now experienced by uranium miners). The major contributor to indoor radon is ordinary soil underlying homes, with this radon being transported indoors primarily by the slight depressurization that occurs toward the bottom of a house interior (due to indoor-outdoor temperature differences and winds). Water from underground sources contributes significantly in a minority of cases, primarily residences with private wells, with public water supplies contributing only a few percent of indoor radon, even when drawn from wells. The strong variability in indoor concentrations is associated primarily with variability in the amount of radon entering homes from these various sources, and secondarily with differences in ventilation rates. However, for a given entry rate, the ventilation rate is the key determinant of indoor concentrations. DOE

N86-20980# European Space Agency, Paris (France).
DFVLR MEASURING SYSTEM FOR THE DETERMINATION OF THE SPATIAL DISTRIBUTION OF ENVIRONMENTAL PARAMETERS OF THE ATMOSPHERE BY MEANS OF MOBILE INSTRUMENTED PLATFORMS
Dieter Paffrath Aug. 1985 73 p refs Transl. into ENGLISH of "DFVLR-Messsystem zur Erfassung der raeumlichen Verteilung von Umweltparametern in der Atmosphaere mit mobilen Messtraegern' Rept. DFVLR-FB-85-09 Oberpfaffenhofen, West Germany, Dec. 1984 Original report in GERMAN previously announced as N85-28472
(ESA-TT-924; DFVLR-FB-85-09) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 21

Mobile measuring platforms and measurement methods for the quantitative determination of the spatial distribution of air pollution concentration and of meteorological parameters are described. The measuring instruments are installed in a twin-engined airplane for environmental research, in three vector gliders for acquisition of meteorological parameters, in a van for measuring aerosol and air pollution, and in a lidar system container for determination of the horizontal and vertical aerosol distribution. Author (ESA)

N86-20981# Battelle Columbus Labs., Ohio.
EVALUATION OF POLYURETHANE FOAM CARTRIDGES FOR MEASUREMENT OF POLYNUCLEAR AROMATIC HYDROCARBONS IN AIR Final Report, 1 Aug. - 31 Dec. 1984
C. C. Chuang, W. E. Bresler, and S. W. Hannan Aug. 1985 37 p
(Contract EPA-68-02-3487)
(PB85-245645; EPA-600/4-85-055) Avail: NTIS HC A03/MF A01 CSCL 14B

Polyurethane foam (PUF) cartridges was evaluated as collection media for quantification of vapor phase polynuclear aromatic hydrocarbons (PAHs) in air. Two cleanup methods for PUF cartridges were evaluated. Both methds successfully remove interfering material and background PAHs from the PUF. The compression rinsing method is recommended because it is easier, faster, and cheaper. Two procedures for extraction of PAHs from the PUF matrix, Soxhlet extraction and compression rinsing, were compared. These sample extracts were analyzed by on-column injection, electron impact gas chromatography/mass spectrometry (EI GC/MS) to determine PAHs. The results indicated that the levels of the spiked perdeuterated benzo(a)pyrene decreased significantly during storage. The rate of decrease was much faster when the PUF cartridges were stored in light. Other PAH levels were not adversely influenced by the storage time. GRA

N86-20982# National Oceanic and Atmospheric Administration, Rockville, Md. National Marine Pollution Program Office.
NATIONAL MARINE POLLUTION PROGRAM: AGENCY PROGRAM SUMMARIES FY 1984 UPDATE, APPENDIX NO. 1
Jul. 1985 290 p
(PB86-101953) Avail: NTIS HC A13/MF A01 CSCL 06T

The National Ocean Pollution Planning Act, P.L. 95-273 (as amended), calls or the establishment of a comprehensive, coordinated, and effective Federal program for ocean pollution research, development, and monitoring. Summaries of the major programs conducted by the Federal agencies are given. GRA

N86-20983# National Oceanographic Data Center, Washington, D. C.
NATIONAL MARINE POLLUTION PROGRAM: CATALOG OF FEDERAL PROJECTS FY 1984 UPDATE, APPENDIX NO. 2
Jun. 1985 311 p

(PB86-101961) Avail: NTIS HC A14/MF A01 CSCL 06T
The National Ocean Pollution Planning Act, P.L. 95-273 (as amended), calls for the establishment of a comprehensive, coordinated, and effective Federal program for ocean pollution research, development, and monitoring. The Catalog of Federal Projects is one of a series of documents published by NMPPO to meet the mandates of the National Ocean Pollution Planning Act. Federal programs related to ocean pollution research, development, and monitoring are listed. GRA

N86-20984# National Oceanic and Atmospheric Administration, Boulder, Colo. Air Resources Labs.
ASSESSMENT OF PRECIPITATION CHEMISTRY MEASUREMENTS FROM THE GLOBAL TRENDS NETWORK AND ITS PREDECESSORS, 1972-1982
U. Dayan, A. M. Yoshinaga, D. W. Nelson, and J. M. Miller Apr. 1985 132 p
(PB85-212058; NOAA-TM-ERL-ARL-136) Avail: NTIS HC A07/MF A01 CSCL 04A
The Global Trends Network (GTN) consists of two parts: (1) the routine stations operated directly by NOAA, which are considered a part of the WMO baseline network; and (2) the research network, which is part of the Global Precipitation Chemistry Project directed by the University of Virginia. The precipitation chemistry measurements from the GTN and its predecessors are presented and analyzed. Among the important conclusions from this study are the following: A great improvement has been made in the baseline data with the introduction of weekly sampling in 1980, no obvious trends can be detected in the 10-year record, the average hydrogen ion concentration is about pH 5.0 in remote areas. For certain individual events this can be much lower, and the sulfate values in remote locations are about 10 times less than those found in polluted areas. GRA

N86-20927# Joint Publications Research Service, Arlington, Va.
POLLUTION OF ARCTIC SEAS BY RADIOACTIVE WASTES OF WEST EUROPEAN ATOMIC INDUSTRY PLANTS Abstract Only
S. M. Vakulovskiy, A. I. Nikitin, and V. B. Chumichev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 52 Transl. into ENGLISH from Atomnaya Energiya (Moscow, USSR), v. 58, no. 6, Jun. 1985 p 445-449 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-21037 Rheinisch Westfaelische Technischer Ueberwachungs-Verein e.V., Essen (West Germany).
MEASUREMENTS OF CARBON MONOXIDE IMMISSIONS FOR DETERMINATION OF THE CONCENTRATION DIFFERENCES BETWEEN OPEN AIR AND INDOOR AIR VALUES [MESSUNGEN VON KOHLENWASSERSTOFFIMMISSIONEN ZUR ERMITTLUNG VON KONZENTRATIONSUNTERSCHIEDEN ZWISCHEN FREI-LAND- UND RAUMLUFTWERTEN]
Juergen Frank *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium Human Biometeorology 13 Aug. 1985 p 65-66 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21048 Basel Univ. (Switzerland).
A SIMPLE PROCEDURE FOR SEMI-QUANTITATIVE DETERMINATION OF DUST IN AIR [EINE EINFACHE, WENIG AUFWENDIGE METHODE ZUR HALBQUANTITATIVEN BESTIMMUNG VON STAUB IN DER LUFT]
Gundo Boehm *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 92-94 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21052 Kaiserslautern Univ. (West Germany). Fachbereich ARUBI.
MISSIONS AND INSTRUMENTS OF REGIONAL AND LAND PLANNING [AUFGABEN UND INSTRUMENTE DER REGIONAL- UND LANDESPLANUNG]
Dieter Eberle *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 104-105 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-20985 Pennsylvania State Univ., University Park.
THE ORIGIN AND EVOLUTION OF A CONTINENTAL VOLCANO: INDEPENDENCE, MONTANA Ph.D. Thesis
James Kenneth Meen 1985 953 p
Avail: Univ. Microfilms Order No. DA8516068
A volcano, Independence, in the Absaroka Mountains, Montana was studied. Its igneous record to elucidate the genesis of the volcanic rocks and the composition of the lithosphere in the Bearthooth region was studied. The magma parental to most of the extrusive rocks was a high magnesium andesite; the parent of the Independent stock was a basaltic andesite. Both these magmas evolved by precipitation of plagioclass-rich, olivine-free, magnetite-bearing assemblages of potassic compositions. Crustal contamination-fractional crystallization produced liquid lines of descent with only moderate potash enrichment. Minor crustal rock types can be important contaminants and can produce unexpectedly large deviations n the isotopic compositions of contaminated rocks. The mantle-derived rocks have low (Nd-143, Nd-144), and moderate (Sr-87/SR-86), which reflect the composition of the sub-Bearthooth mantle. The Pb-isotopic compositions of the high-magnesium andesites suggest that enrichment occurred 3.8 By ago. The Pb-isotopic compositions of the anatectites define a 3.3 By isochron, interpreted as the age of regional homogenization of the deep crust. Dissert. Abstr.

N86-20986 Washington Univ., Seattle.
GRAVITATIONAL RADIATION IN A NONSYMMETRIC GRAVITATIONAL THEORY Ph.D. Thesis
Timothy Philip Krisher 1985 112 p
Avail: Univ. Microfilms Order No. DA8520804
The properties of gravitational radiation in a nonsymmetric gravitational theory (NGT) proposed by Moffat that is based on a nonsymmetric metric and affine connection were analyzed. A generalized formalism is developed for determining the physically observable polarization modes of weak, plane gravitational waves in nonsymmetric theories of gravitation. For the case of NGT, it is found that a Lorentz-invariant description of gravitational waves is possible if a transposition-invariant definition of measurable geodesic deviation is adopted for the theory. The generation of gravitational radiation is examined and it is shown that NGT predicts the emission of dipole gravitational radiation from a binary system. The source of the dipole radiation is a vector density S postulated to be proportional to the number density of fermion particles in the components of the system. This radiation results in a secular decrease in the orbital period of a binary system in addition to that predicted by general relativity. Constriction of the theory might be constrained by observations of the binary pulsar PSR 1913 + 16 and the cataclysmic binary AM CVn. Dissert. Abstr.

N86-20987 Washington Univ., Seattle.
ON THE ELECTRICAL HETEROGENEITY OF THE EARTH'S INTERIOR: A GLOBAL STUDY OF MID-MANTLE CONDUCTIVITY Ph.D. Thesis
Adam Schultz 1985 256 p
Avail: Univ. Microfilms Order No. DA8521654
Deep global electrical conductivity structure was studied by

inversion of a large collection of independent electromagnetic response functions calculated for a variety of tectonic provinces on the earth's surface. A response function (Z/H) is estimated by assuming the geomagnetic field is principally P sub 1 deg. The response is scaled into an equivalent scalar magnetotelluric impedance and inverted using both Backus-Gilbert linarizations and extremal nonlinear solutions. Simultaneous D sup + inversion of joint response functions from pairs of observatories was carried out. Electrical heterogeneity within the mantle is shown to be required to fit the data. The range of acceptable H sup + models was systematically evaluated. A much large permissible model range is seen for observatories within the Pacific Margin and Baikal Rift Zone then for observatories distant from these regions. Enhanced upper model conductivity is the preferred explanation for this effect. Dissert. Abstr.

N86-20988 Cornell Univ., Ithaca, N.Y.
THE CONTINENTAL LOWER CRUST AND MOHO: STUDIES USING COCORP DEEP SEISMIC REFLECTION PROFILING Ph.D. Thesis
Simon Louis Klemperer 1985 159 p
Avail: Univ. Microfilms Order No. DA8516895

Seismic reflection profiling was used to map the lower crust and Moho in diverse areas of the U.S.A. The best reflections yet detected from the Moho were recorded and used to constrain interpretations of the age and formation of the Moho. The seismic character of the Moho in Nevada is unchanged across a province which experienced complex, pre-Cenozoic, accretion-related phenomena. This suggest that the Moho in the Basin and range may be a Cenozoic feature, presumably related to the volcanism and/or the extension that characterize the Cenozoic history of the Basin and Range province. In the Adirondack mountains of New York, a Proterozoic compressional orogen, an unusualy layered structure in the lower crust was identified. It is found that the in situ lower crust has a very different seismic character from that of the present-day upper crust, even though the upper crust has been uplifted from depths greater than 20 km. Simulations of various noise rejection procedures are compared, to select appropriate methods for mitigating the adverse effects of noise bursts. A computer noise rejection method is presented which provides effective removal of noise bursts while preserving the true amplitude characteristics of the recorded data. Dissert. Abstr.

N86-20989 California Univ., San Diego.
EXACT NONLINEAR INVERSION OF ELECTROMAGNETIC INDUCTION SOUNDINGS Ph.D. Thesis
Giovanni B. Marchiso 1985 187 p
Avail: Univ. Microfilms Order No. DA8517909

Exact solutions to the inverse problem of recovering the one-dimensional conductivity structure of the Earth from incomplete and imprecise measurements its impedance at the surface are presented. The new approach relies on the mapping between a spectral expansion representation for the complex responses and the corresponding conductivity distributions, when the exponential attenuation of the electromagnetic fields with depth is incorporated in a fully nonlinear mathematical model. Two different construction techniques are developed: (1) an adaptation of the Gel'fand and Levitan method for scattering from Bargmann-type potentials; (2) the original time-domain formulation for the equivalent scattering problem. The introduction of boundary conditions at h gives rise to an eigenvalue problem. Implementation of linear constraints in lambda gives control on the values of the conductivity and conductivity gradient at the surface, effective penetration depth, nature of the boundary condition at the bottom, presence or absence of an insulating layer at the surface. All these constraints are enforced simultaneously by a direct, noniterative algorithm which provides solutions with misfit arbitrarily close to the smallest one possible for sets of real data. The potential of the new interpretation technique is demonstrated with results from the inversion of long period MT oceanic and land data. Dissert. Abstr.

N86-20990 State Univ. of New York, Buffalo.
ON APPLICATION OF NON-ISOTHERMAL VISCOELASTICAL THEORY TO THE GEOPHYSICAL PLATE SUBDUCTION PROBLEM Ph.D. Thesis
Pongdet Wipasuramonton 1985 139 p
Avail: Univ. Microfilms Order No. DA8518787

The basic equilibrium, constitutive and deformation equations are developed for a nonisothermal, nonlinear viscoelastic beam, which is undergoing large rotation. A nonlinear Maxwell constitutive law with temperature dependent viscosity and with thermal expansion is employed. The formulation is specialized for the case of a steadily moving load, whereupon the time and longitudinal space variables may be combined into a single variable. The formulation is focused on the geophysical plate subduction problem. This problem consists of a slowly moving nonlinear viscoelastic slab with large geothermal gradients, which is subjected to large rotations during a subduction that is primarly indicated by the weight of the slab. Since displacements are known at several points via seismic evidence wherein some of the loads are unknown, the problem falls into the class of an inverse multipoint boundary value problem. The formulation and method of solution is applied to solve an inverse four-point boundary problem for the North Tonga Trench subduction zone. Interplate normal and friction forces, static and dynamic pressures, and internal forces and stresses are determined and discussed. Dissert. Abstr.

N86-20991# Oak Ridge Associated Universities, Inc., Tenn.
REVIEW OF CARBON DIOXIDE RESEARCH STAFFING AND ACADEMIC SUPPORT
Sheldon B. Clark, Lee Howard, Wayne Stevenson, and Jan Trice
Apr. 1985 120 p refs Prepared for DOE, Washington, D.C.
(Contract DE-AC05-76OR-00033)
(DCE/NBB-0068) Avail: NTIS HC A06/MF A01

More than 60 percent of the staff on Carbon Dioxide Research Division (CDRD) projects were university affiliated, and over one third of project scientists and engineers also had university teaching responsibilities. Almost 20 percent of project staff were students. CO2 research is unlikely to affect the general labor market for scientists and engineers because it uses such a small portion of the total pool. On the other hand, anticipated tight labor markets in some disciplines important to CO2 research may make it advantageous for CDRD to expand its support of university faculty, students, and staff to ensure that competent, knowledgeable researchers and managers are available for eventual policy decisions on CO2 issues. Options for academic support that lend themselves readily to the diffuse nature of CO2 research, while providing flexibility in the identification and accomplishment of specific programmatic objectives, include modifying procurement procedures for research contracts to enhance academic involvement, sponsoring summer institutes tailored to specific participants and focused on issues of interest to CDRD, and supporting traveling lecture programs designed to bring information of concern to CDRD to technical and nontechnical audiences. Author

N86-20992*# National Academy of Sciences - National Research Council, Washington, D. C. Committee for an International Geosphere-Biosphere Program.
GLOBAL CHANGE IN THE GEOSPHERE-BIOSPHERE: INITIAL PRIORITIES FOR AN IGBP
1986 104 p
(Contracts NAS2-3985; NASw-4056; DE-FG05-84ER-602777; Grant N00014-84-G-0196)
(NASA-CR-176519; NAS 1.26:176519) Avail: NTIS HC A06/MF A01 CSCL 04A

Some of the factors are outlined that leads one to endorse the concept of focused, international geosphere-biosphere program, whose goal is to understand the interactive physical, chemical, and biological processes that regulate the Earth's unique environment for life, the changes that are occurring in this system, and the manner in which they are influenced by human actions. There is a pressing need to assess the consequence of human activities in the context of natural global change and to provide the body of knowledge necessary to chart a wise course to the future. A number of specific objectives were developed which leads to the conclusion that the need for new programs of observation

of the Earth as a planet, a better understanding of the interactive processes that governs its changes, the development of a new generation of coupled modes, and the design of suitable tests to guide the development of these models and the understanding of the processes involved. Some general recommendations are summarized. Author

N86-20993# Danish Space Research Inst., Lyngby.
POLAR IONOSPHERIC E-REGION PLASMA WAVE STABILIZATION AND ELECTRON HEATING BY WAVE-INDUCED ENHANCEMENT OF THE ELECTRON COLLISION FREQUENCY
F. Primdahl 1985 23 p refs Presented at the Nordic Symposium on Nonlinear Waves in Plasmas, Roskilde, Denmark, 13-16 Aug. 1985
(DRI-5-85; ISSN-0109-6605) Avail: NTIS HC A02/MF A01

Comparative measurements indicate that the phase velocity of low frequency waves in the ionospheric E region is often lower than the drift speed of the electrons that drive the waves unstable. In order to understand these results, the linear instability theory is modified to conform with zero growth rate even above threshold. The result is that the waves travel at the ion acoustic velocity with an amplitude stabilized at the observed level, and also that the electron gas is substantially heated by the wave. Author

N86-20994*# Massachusetts Inst. of Tech., Cambridge.
CHARACTERIZATION OF POTENTIAL SOURCES OF MAGNETIC ANOMALIES WITHIN THE CRUST IN A TECTONICALLY ACTIVE REGION: AMPHIBOLITES AND MIGMATITES FROM POTRILLO MAAR, NEW MEXICO Final Report
Frank S. Spear and Elaine Padovanni 2 Dec. 1985 11 p refs
(Grant NAG5-147)
(NASA-CR-176385; NAS 1.26:176385) Avail: NTIS HC A02/MF A01 CSCL 08G

The purpose was to characterize the oxide mineralogy and petrology of samples collected from Potrillo Maar, New Mexico with the goal of explaining the magnetic anamoly that is observed over this region from remote sensing. Potrillo Maar is a diatreme that has brought rocks from all depths in the crust to the surface almost instantaneously. The samples are therefore thought to be representative of the crust as it exists today below this portion of the Rio Grande Rift. It is generally believed that oxide minerals (magnetite, hematite, etc.) are responsible for the magnetic signature of the crust. The samples from Portillo Maar therefore offer a unique opportunity to examine the magnetic mineralogy of the entire crust. The results indicate that the magnetic anamoly observed over Rio Grande Rift may be consequence of the tectonic activity that caused mylonitization of the rocks and allowed the infiltration of oxidizing fluids. R.J.F.

N86-20995*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THE CALCULATION OF THEORETICAL CHROMOSPHERIC MODELS AND THE INTERPRETATION OF SOLAR SPECTRA FROM ROCKETS AND SPACECRAFT Semiannual Report, 1 Jan. - 31 Dec. 1985
Eugene H. Avrett Feb. 1986 68 p refs
(Grant NsG-7054)
(NASA-CR-176573; NAS 1.26:176573; SAR-20; SAR-21) Avail: NTIS HC A04/MF A01 CSCL 04A

Calculated results based on two chromospheric flare models F1 and F2 of Machado, et al., (1980) are presented. Two additional models are included: F1*, which has enhanced temperatures relative to the weak-flare model F1 in the upper photosphere and low chromosphere, and F3 which has enhanced temperatures relative to the strong flare model F2 in the upper chromosphere. Each model is specified by means of a given variation of the temperature as a function of column mass. The corresponding variation of particle density and the geometrical height scale are determined by assuming hydrostatic equilibrium. The coupled equations of statistical equilibrium is solved as is radiative transfer for H, H-, He I-II, C I-IV, Si I-II, Mg I-II, Fe, Al, O I-II, Na, and Ca II. The overall absorption and emission of radiation by lines throughout the spectrum is determined by means of a reduced set of opacities sampled from a compilation of over 10 to the 7th power individual lines. That the white flight flare continuum may arise by extreme chromospheric overheating as well as by an enhancement of the minimum temperature region is also shown. The radiative cooling rate calculations for our brightest flare model suggest that chromospheric overheating provides enhanced radiation that could cause significant heating deep in the flare atmosphere. Author

N86-20996*# California Univ., Santa Barbara.
NEOTECTONICS OF THE SAN ANDREAS FAULT SYSTEM: BASIN AND RANGE PROVINCE JUNCTURE Final Report, 1 May 1981 - 15 Mar. 1986
John E. Estes and John C. Crowell 1986 14 p
(Grant NAG5-177)
(NASA-CR-176562; NAS 1.26:176562) Avail: NTIS HC A02/MF A01 CSCL 08G

Several new details regarding the surficial patterns of neotectonic activity of the Eastern Transverse Ranges and vicinity were discovered. Additionally a number of data display and analysis techniques were developed. These findings will be useful both in the continued development of neotectonic models for southern California and for the future application of remote sensing methodologies elsewhere. Author

N86-20997*# Business and Technological Systems, Inc., Seabrook, Md.
GEOMAGNETIC MAIN FIELD MODELING USING MAGNETOHYDRODYNAMIC CONSTRAINTS
Ronald H. Estes Nov. 1985 33 p refs
(Contract NAS5-28671)
(NASA-CR-177849; NAS 1.26:177849; BTS03-85-51/k1; Rept-1080) Avail: NTIS HC A03/MF A01 CSCL 08G

The influence of physical constraints are investigated which may be approximately satisfied by the Earth's liquid core on models of the geomagnetic main field and its secular variation. A previous report describes the methodology used to incorporate nonlinear equations of constraint into the main field model. The application of that methodology to the GSFC 12/83 field model to test the frozen-flux hypothesis and the usefulness of incorporating magnetohydrodynamic constraints for obtaining improved geomagnetic field models is described. Author

N86-20998# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MIDDLE ATMOSPHERIC-ELECTRODYNAMIC MODIFICATION BY SOLAR ACTIVITY AT THE SOUTH ATLANTIC MAGNETIC ANOMALY
W. D. Gonzalez, S. L. G. Dutra, and O. Pinto, Jr. Oct. 1985 20 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3692-PRE/837) Avail: NTIS HC A02/MF A01

Evidences for a localized middle atmospheric electrodynamic modification at low latitudes of the South Atlantic Magnetic Anomaly (SAMA), in association with enhanced geomagnetic activity, are presented in a unified way combining recent observational efforts and related numerical studies. X-ray and electric field measurements suggest the occurrence of a distortion effect in the fair weather electric field at balloon altitudes. This effect is attributed to a local intensification of energetic electron precipitation through a related middle atmospheric ionization enhancement and is elucidated by numeric simulation. From electric field measurements and numeric simulation, intensification of precipitation is argued to occur on fairly narrow regions at the observed low L values of the SAMA, with horizontal extensions of the order of few hundred km. A physical mechanism that could be responsible for this sort of intensification is suggested. A comparison of the phenomenum of middle atmospheric electrodynamic modification at the SAMA with a similar one at auroral latitudes is also given. Author

N86-20999# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DOWNWARD MAPPING OF EQUATORIAL IONOSPHERIC ELEC-

TRIC FIELDS

W. D. Gonzalez, S. L. G. Dutra, A. L. C. Gonzalez, and A. E. C. Pereira (Univ. Federal de Uberlandia, Brazil) Oct. 1985 15 p refs Submitted for publication Sponsored in part by Fundo Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3665-PRE/822) Avail: NTIS HC A02/MF A01

The problem of downward mapping of equatorial ionospheric electric fields is studied in two dimensions. Numerical solutions are shown and are compared with the corresponding ones for high latitudes. It is found that ionospheric electric fields can map down in the equatorial atmosphere with negligible attenuation when the scale lengths of those fields are of the order or larger than 100 km. On the other hand, when the scale lengths are of the order of some tens of kilometers the electric fields are severely attenuated, with the attenuation factors being even larger than the corresponding ones at high latitudes. Author

N86-21000# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PERIODICITIES IN THE INTERPLANETARY MAGNETIC FIELD POLARITY

A. L. C. Gonzalez and W. D. Gonzalez Oct. 1985 50 p Submitted for publication Sponsored by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3677-PRE/828) Avail: NTIS HC A03/MF A01

The daily data of the polarity of the interplanetary magnetic field for the years 1926 to 1982 were studied by means of a power spectrum analysis in order to determine prevailing structures of this polarity as well as to search for recurrence in those structures. On a global scale, it was observed that presence of significant peaks at about 25.5, 13.5, 9.1 and 6.8 years, with amplitudes decreasing in that same order. These results are interpreted, through a simulation with rectangular waves, as cases that correspond either to a two sector or to a four sector structure, when the dominant peak is that of about 27.5 or 13.5 days, respectively. Thus, by performing an annual survey of the data, it was found that there is a continuous change in the type of dominant structure, with intervals having a well defined two sector structure and being alternated by others with a less defined structure or even with a well defined four sector structure. These periodicities become important when compared to similar ones reported in studies of solar and geomagnetic activity. Other less significant periodicities in this alternated variability are also reported and discussed. Author

N86-21001# Air Force Geophysics Lab., Hanscom AFB, Mass.

DETERMINATION OF IONOSPHERIC ELECTRON DENSITY PROFILES FROM SATELLITE UV (ULTRAVIOLET) EMISSION MEASUREMENTS, FISCAL YEAR 1984 Environmental Research Papers, Feb. 1984 - Feb. 1985

R. E. Daniell, D. J. Strickland, D. T. Decker, J. R. Jasperse, and H. C. Carlson, Jr. 26 Apr. 1985 66 p
(AF Proj. 4643)
(AD-A160368; AFGL-TR-85-0099; AFGL-ERP-913) Avail: NTIS HC A04/MF A01 CSCL 04/1

The possible use of satellite ultraviolet measurements to deduce the ionospheric electron density profile (EDP) on a global basis is discussed. During 1984 comparisons were continued between the hybrid daytime ionospheric model and the experimental observations. These comparison studies indicate that: (1) the essential features of the EDP and certain UV emissions can be modelled; (2) the models are sufficiently sensitive to input parameters to yield poor agreement with observations when typical input values are used; (3) reasonable adjustments of the parameters can produce excellent agreement between theory and data for either EDP or airglow but not both; and (4) the qualitative understanding of the relationship between two input parameters (solar flux and neutral densities) and the model EDP and airglow features has been verified. The development of a hybrid dynamic model for the nighttime midlatitude ionosphere has been initiated. This model is similar to the daytime hybrid model, but uses the sunset EDP as an initial value and calculates the EDP as a function of time through the night. In addition, a semiempirical model has been developed, based on the assumption that the nighttime EDP is always well described by a modified Chapman function. This model has great simplicity and allows the EDP to be inferred in a straightforward manner from optical observations. Comparisons with data are difficult, however, because of the low intensity of the nightglow. GRA

N86-21002# Naval Research Lab., Washington, D. C.

DYNAMICS OF THE LARGE SCALE RETURN CURRENTS ON AURORAL FIELD LINES

Supriya B. Ganguli, H. G. Mitchell, Jr., and P. J. Palmadesso 11 Nov. 1985 42 p
(RR0-3302)
(AD-A161697; NRL-MR-5673) Avail: NTIS HC A03/MF A01 CSCL 04/1

Multimoment fluid plasma simulations have been performed to study the dynamics of auroral field lines in the presence of large scale field-aligned return currents. The flux tube plasma has a rapid initial response to the onset of current. Electron velocity increases with the application of return current to the system. Electron temperature exhibits adiabatic cooling and temperature anisotropy but the electrons cool much more compared to their polar wind value. We have only considered cold ionospheric electrons in this simulation. The hydrogen iron drift velocity decreases and hydrogen ion temperature increases. The hydrogen ion temperature still exhibits the polar wind characteristics, i.e., the increase in temperature at the lower end of the tube, temperature anisotropy and adiabatic cooling. GRA

N86-21003# Rogers, Golden and Halpern, Inc., Reston, Va.

ARCTIC SUMMARY REPORT: OUTER CONTINENTAL SHELF OIL AND GAS ACTIVITIES IN THE ARCTIC AND THEIR ONSHORE IMPACTS

Christopher Lynch, Douglas L. Slitor, and Robert W. Rudolph Jan. 1985 111 p
(Contract DI-14-12-0001-30042)
(TI85-901863; M85901863; OCS/MMS-85-0022) Avail: NTIS HC A06/MF A01

Issues and developments occuring in the Arctic Outer Continental Shelf subregion are discussed. The geology and hydrocarbon potential of the Diapir Field petroleum provinces are detailed. Recent lease sales, exploration activities, and the first development proposals for offshore areas of the North slope are considered. Issues relating to transporting resources from production islands to shore and various proposals for moving Arctic hydrocarbons to market are presented. Production projects onshore and possible support bases for offshore activity are also examined. E.R.

N86-21004# Geological Survey, Denver, Colo.

INVESTIGATION OF AN AEROMAGNETIC ANOMALY ON WEST SIDE OF YUCCA MOUNTAIN, NEY COUNTY, NEVADA

G. D. Bath and C. E. Jahren 1985 29 p refs
(Contract DE-AI08-78ET-44802)
(DE85-018329; USGS-OFR-85-459) Avail: NTIS HC A03/MF A01

Investigations of the source of a prominent aeromagnetic anomaly of 290 nT were undertaken at a potential repository site located in the Yucca Mountain area, Nevada Test Site. The anomaly was detected on a recent flight line of a survey flown north-south at 400 m (1300 ft) spacing and 122 m (400 ft) above the surface. The anomaly, which is on the high-standing side of a major fault, was interpreted previously as arising from either an increase of magnetization within a volcanic tuff or a small intrusive feature. Both air and ground anomalies were analyzed using geologic data from surface mapping and drill holes, and magnetic property data from drill holes. The anomaly is caused by contributions from at least three sources. The elevated topography gives a terrain effect since the altitude is decreased between the airplane and exposed Topopah Spring Member of the Paintbrush Tuff. Ground anomalies 300 m (1000 ft) south of the air maximum indicate either an increase in magnetization or the presence of a small intrusive body. Finally, there is an increase in magnetic influence from the nearby Solitario Canyon fault. DOE

N86-21005# Lawrence Livermore National Lab., Calif.
DEPTH DISTRIBUTIONS OF SEISMICITY IN THE EAST SAN FRANCISCO BAY REGION
J. Scheimer Aug. 1985 25 p refs
(Contract W-7405-eng-48)
(DE86-001612; UCID-20522) Avail: NTIS HC A02/MF A01
Depth distributions of seismicity are given for nine seismic source zones in the Livermore Valley Region. The dataset used covers the time period from 1969 through 1982. Most seismicity, in all zones, occurs between the depths of 3.5 km and 15 km. DOE

N86-21006# Lawrence Livermore National Lab., Calif.
HEMP INTERNAL COUPLING PHENOMENOLOGY STUDY
K. S. Kunz, H. G. Hudson, J. K. Breakall, R. J. King, R. Ziolkowski, N. Madsen, J. Peterson, and S. T. Pennock Sep. 1985 122 p
(Contract W-7405-eng-48)
(DE86-001439; UCID-20542) Avail: NTIS HC A06/MF A01
The electromagnetic coupling problem associated with the interaction of the high altitude electromagnetic pulse HEMP) with typical aerospace systems is studied. A bottom up approach to this task has been selected. Tools are developed for measuring and predicting the responses of simple test systems; from these measurements and predictions phenomenological understanding of the coupling mechanisms may be obtained and the tools may be verified. The construction and the experimental characterization of a test system embodying the fundamental features of an interior coupling problem, is discussed. Experimental, computational and analytical tools has been applied to this test system. Experimental measurements have revealed a pronounced modal interior response which has been closely replicated with the time domain three dimensional finite difference code G3DXL3. The persistence of these modes has been established analytically with an N-series analysis. Focusing and reflection effects as well as hot spot formation have been examined with the N-series analysis and with a time domain two-dimensional finite element code GEM2D. DOE

N86-21007# Construcciones Aeronauticas S.A., Madrid (Spain). Investigacion y Desarrollo de Tecnologia y Materiales.
INFRARED SPECTROSCOPY [ESPECTROSCOPIA INFRARROJA]
Belen Alvarez Lopez 28 Nov. 1984 53 p In SPANISH
(I-102/84) Avail: NTIS HC A04/MF A01
Infrared spectroscopic analysis is reviewed. Applications to chemical analysis of preimpregnated carbon fiber materials, including polystyrene spectra, epoxy resin analysis, mineral loads analysis, determination of epoxy groups and identification of spurious organic materials are discussed. The advantages of the method for quality control are pointed out. Author (ESA)

N86-21008# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solid Earth Geophysics.
CATALOG OF STRONG-MOTION ACCELEROGRAPH RECORDS
J. L. Coffman and S. Godeaux Jun. 1985 90 p
(PB85-233120; SE-38) Avail: NTIS HC A05/MF A01 CSCL 08K
The National Geophysical Data Center (NGDC) and its collocated World Data Center-A for Solid Earth Geophysics (WDC-A) are responsible for acquiring, archiving, and disseminating strong-motion accelerograph data to meet requirements of the scientific and technical community. The U.S. Geological Survey (USGS) has provided most of the digital data now in the strong-motion archive froms its National Strong-Motion Instrumentation Network. The present catalog contains information on all digital accelerograph records in the archives of NGDC and WDC-A. The date, time, epicenter, magnitude, depth, and intensity of each triggering earthquakes is reported. The recording station, geographic location, date of record, type of accelerograph, component, acceleration, velocity, and displacement is given. GRA

N86-21009# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solar-Terrestrial Physics.
COMBINED INTERNATIONAL CATALOG OF GEOMAGNETIC DATA
C. C. Abston, N. E. Papitashvili, and V. O. Papitasnvili Jul. 1985 303 p
(PB85-235570; UAG-92) Avail: NTIS HC A14/MF A01 CSCL 08N
The Combined International Catalog of Geomagnetic Data attempts to: (1) consolidate all the geomagnetic data from standard, rapid-run, and digital measurements known to exist at all of the World Data Centers having responsibility for geomagnetic data; (2) indicate years of geomagnetic observatory operation from 1810; (3) provide the observed or simulated absolute 1980 values for all listed observatories; (4) provide first and most recent annual values for all listed observatories; (5) provide a list of alternate observatory names, and (6) provide a digital section including catalog inventory formats, data base design and all associated software coding necessary to manage, update, and produce the tables published here. The World Data Centers with geomagnetic data holdings are located in Bombay, Boulder, Copenhagen, Edinburg, Kyoto, and Moscow. Their holdings include data recorded before the IGY (when the WDC system was established). GRA

N86-21010# Systems Applications, Inc., San Rafael, Calif.
SAI (SYSTEMS APPLICATIONS, INCORPORATED) AIRSHED MODEL OPERATIONS MANUALS. VOLUME 2: SYSTEMS MANUAL Report, Aug. 1976 - Sep. 1979
J. Ames, S. R. Hayes, T. C. Myers, and D. C. Whitney Apr. 1985 248 p refs
(Contract EPA-68-02-2429)
(PB85-191575; EM78-79R2-Vol-2; EPA-600/8-85-0078) Avail: NTIS HC A11/MF A01 CSCL 04A
The SAI Airshed Model System is described fro a programmer's point of view. Included are discussions of all subroutines and how they fit together, run-time core allocation techniques, internal methods of segment handling using secondary storage, and detailed definitions of the structure of each file in the ystem. This manual also includes suggestions for implementing the programs on different computers. The SAI Airshed Model System consists of 17 programs that communicate with each other through 17; data files; both the programs and files are described in detail in this manual. An overview briefly describing the programs used to perform each of the five system functions is presented. Guidelines for implementing the programs, detailed descriptions of the programs by function, including hierarchical subroutine tables and short module descriptions, and detailed file structure definitions for each file in the system are given. GRA

N86-20449# Joint Publications Research Service, Arlington, Va.
NEW METHOD FOR GEOLOGICAL INTERPRETATION OF ANNULAR STRUCTURES WITHIN COVERED AND PARTIALLY COVERED AREAS Abstract Only
B. S. Zeylik, L. G. Perfilyev, A. N. Vasilenko, and E. Yu. Seytmuratova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 66 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 31-40 Original language document was announced in IAA as A86-13279 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20452# Joint Publications Research Service, Arlington, Va.
IDENTIFICATION OF NATURAL FORMATIONS FROM RESULTS OF SPECTRAL-ENERGY MEASUREMENTS FROM SPACE Abstract Only
L. I. Kiselevskiy, A. A. Kovalev, and V. Ye. Plyuta *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 69-70 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 98-104 Original language document was announced in IAA as A86-13287 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20453# Joint Publications Research Service, Arlington, Va.
CLASSIFICATION OF NATURAL FORMATIONS BASED ON

THEIR OPTICAL CHARACTERISTICS USING SMALL VOLUMES OF SAMPLES Abstract Only
N. S. Abramovich, A. A. Kovalev, and V. Ye. Plyuta *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 70 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 105-111 Original language document was announced in IAA as A86-13286 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20892# Joint Publications Research Service, Arlington, Va.
RESEARCH SHIP ZUBOV TO LAUNCH WEATHER ROCKETS IN ATLANTIC
T. Volgina *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 10 Transl. into ENGLISH from Leningradskaya (Leningrad, USSR), 14 Aug. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20906# Joint Publications Research Service, Arlington, Va.
STRUCTURE OF SEDIMENTARY COVER OF RED SEA DETERMINED FROM SEISMIC DATA Abstract Only
I. N. Yelnikov and L. P. Zonenshayn *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 26 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 110-122 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20907# Joint Publications Research Service, Arlington, Va.
PATTERNS OF RELATIVE POSITIONING OF OCEANIC RIFTS AND TRANSFORM FAULTS Abstract Only
N. Yu. Bocharova, Ye. G. Mirlin, and K. V. Popov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 26-27 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 100-109 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20916# Joint Publications Research Service, Arlington, Va.
RADON AS INDICATOR OF PERMEABILITY ZONES FOR STEAM HYDROTHERMS Abstract Only
A. M. Rozhkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 41 Transl. into ENGLISH from Vulkanologiya I Seysmologiya (Moscow, USSR), no. 3, May - Jun. 1985 p 78-82 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20918# Joint Publications Research Service, Arlington, Va.
NEOTECTONICS AND VOLCANISM IN EASTERN VOLCANIC ZONE OF KAMCHATKA Abstract Only
I. V. Florenskiy and V. G. Trifonov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 42 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 78-87 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20920# Joint Publications Research Service, Arlington, Va.
SOUND RADIATION IN ATMOSPHERE DURING UNDERWATER EARTHQUAKE Abstract Only
S. P. Vdovichenko and Yu. M. Zaslavskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 45 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 714-719 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20923# Joint Publications Research Service, Arlington, Va.
INTERNAL GRAVITY WAVES, FLUCTUATIONS OF SOLAR ULTRAVIOLET RADIATION AND IONOSPHERIC PARAMETERS Abstract Only
R. S. Steblova, I. A. Freyzon, V. V. Koltsov, Ye. I. Chertok, Yu. V. Gorokhov, V. A. Vazherkin, I. N. Panova, and M. G. Kogan *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 47 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 353-357 Previously announced in IAA as A85-46032 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-21011 Saint Louis Univ., Mo.
THE EFFECT OF HIGHER RESOLUTION AND IMPROVED FORMULATION OF SURFACE FLUXES, CLOUDINESS, AND OTHER PHYSICAL PARAMETERS ON A SIMULATED MONSOON SYSTEM Ph.D. Thesis
Lie-Shieu Fang 1985 292 p
Avail: Univ. Microfilms Order No. DA8520106

Many general circulation modelers have identified the key factors influencing the Indian southwest monsoon. The Webster and Chou model was employed to diagnose important monsoon events or disturbances such as the shock, onset vortex, organized precipitation cells, etc., and to resolve the near equatorial disturbances that develop on the Southern Equatorial Trough (SET). A two degree resolution instead of the original four degree solution was adopted. A noteworthy result of the High Resolution (HR) experiment is the generation of a shock signalling the onset of monsoon. The results of surface winds (CS) case show a weakening of the shock but a stronger development of westerlies at 750 mb. The precipitation in association with the onset in CS is less compared to HR but is prolonged. Climatologically derived albedos (CA) experiment experiment affected the timing of the monsoon onset, reduced the intensity of the shock and developed less rainfall than HR. A combination of the CS and CA experiments eliminated the shock, advanced the monsoon onset and increased the rainfall over the land area. It is demonstrated that SET can influence the monsoon activity by decreasing rainfall particularly north of 25 deg N. This means that SET can initiate break conditions over northern India. The land-sea boundary experiments show that the timing of the monsoon onset is dependent on the land-sea distribution while the vigor is dependent on the air-sea exchange.
Dissert. Abstr.

N86-21012 Deutscher Wetterdienst, Offenbach am Main (West Germany).
ANNALS OF METEOROLOGY, NO. 22. INTERNATIONAL SYMPOSIUM ON HUMAN BIOMETEOROLOGY [ANNALEN DER METEOROLOGIE (NEUE FOLGE). NR. 22: INTERNATIONALE TAGUNG FUER HUMAN-BIOMETEOROLOGIE]
13 Aug. 1985 150 p refs In ENGLISH and GERMAN Symposium held in Freiburg, West Germany, 2-4 Oct. 1985
(ISBN-3-88148-229-9; ISSN-0072-4122) Copyright. Avail: Issuing Activity

Neurophysiology, receptor physiology, thermophysiology using epidemiological methodology; air hygiene; applications to city and regional planning; and boundary layer meteorology are discussed. For individual titles, see N86-21013 through N86-21067.

N86-21013 Dortmund Univ. (West Germany). Inst. fuer Arbeitsphysiologie.
NEUROPHYSIOLOGICAL ACTIVITY AND PSYCHOPHYSICAL EFFECTIVENESS OF ENVIRONMENTAL FACTORS [NEUROPHYSIOLOGISCHE VERARBEITUNG UND PSYCHOPHYSISCHE WIRKSAMKEIT VON UMWELTEINFLUESSEN] c52
Walter H. Ehrenstein *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 1-5 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The sensorial transmission of the body/environment relationship is presented as well as the correlation between subjective and objective data through sensorial organs. The

correlation investigation method is successfully applied to vision investigation to study the neurophysiological activity and psychophysical effectiveness of environmental factors. Further application of the psychophysiological concepts and methods presented is recommended for medical meteorological research. The investigation of qualitative relationships using impression scales is recommended to determine the central processes in the psychological assessment of the environmental factors. Author (ESA)

N86-21014 Max-Planck-Inst. fuer Physiologische und Klinische Forschung, Bad Nauheim (West Germany).
THE INTERFACE BETWEEN ATMOSPHERE AND ORGANISM c52
Friedrich-Karl Pierau *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 6-8 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The effects of temperature, air currents, and humidity on the human body and the stimulation of skin receptors are studied. The somatosensory processes underlying the communication between man and his environment and the relay of sensory information into the central nervous system are discussed. The transformation of temperature and mechanical signals into bioelectric signals (generation of a depolarizing nonpropagated receptor potential), the encoding of the stimulus features and the principles of processing in the central nervous system are reviewed. Mechanisms to detect air humidity by nasal and/or hypothalamic temperature receptors (slowly adapting and rapidly adapting mechanoreceptors) are discussed. The high sensitivity (transient and proportional) of temperature receptors is used to sense changes in air humidity. Sudden increase of nasal temperature may contribute to sensation of humidity. Author (ESA)

N86-21015 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
DETERMINATION OF THE THERMAL ENVIRONMENTAL CONDITION FLUCTUATIONS IN MAN USING MEASURING TECHNIQUES [MESSTECHNISCHE ERFASSUNG VON FLUKTUATIONEN DER THERMISCHEN UMGEBUNGSBEDINGUNGEN DES MENSCHEN]
Olaf Kolle and Karl Hoeschele *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 9-11 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Fluctuations of the thermal action magnitude are studied to determine the differences in stimuli of the thermal environmental conditions on microturbulent variation spectra under different weather conditions and location data. Investigations in high and low pressure weather conditions, in cold and warm fronts, under various stratification stabilities were peformed. Measurement under comparable weather conditions were performed using a mobile device in city center, in an urban area with scattered housing, in a woods, and indoors. The radiation temperature was measured with a radiation measuring instrument to determine the radiation field strength and distribution. Measurements show good agreement with theoretical results. Author (ESA)

N86-21016 Dortmund Univ. (West Germany). Inst. fuer Arbeitsphysiologie.
MAN'S THERMAL BUDGET UNDER VARIOUS CLIMATES [WAERMBEBILANZ DES MENSCHEN IN VERSCHIEDENEN KLIMATEN] c52
Hans Gerd Wenzel *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 12-16 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Facts on man's thermoregulation system, conditioning, clothing and food requirements, on heat transfer through blood and skin, and metabolism are presented. Physiological processes of autonomous thermoregulation are described. Boundary conditions based on rectal temperature variations under heavy climates are studied to determine man's tolerance to heat stroke and heat stress (sensations of uneasiness, drop in corporal and psychological efficiency, specific health troubles). Author (ESA)

N86-21017 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
APPLICATION OF A NONSTATIONARY ENERGY BUDGET MODEL TO DETERMINE THERMAL COMFORT [ANWENDUNGSMOEGLICHKEITEN EINES INSTATIONAEREN ENERGIEBILANZMODELLS ZUR BEWERTUNG DER THERMISCHEN BEHAGLICHKEIT] c52
Peter Hoeppe *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 17-18 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A nonstationary energy budget model based on the fundamental energy flux equations is applied to determine heat stress and heat storage under variable environmental conditions. Temperature variations in the body core and shell are calculated. A man walking on a 200 m long sunlit street section at a speed of 0.4 m/sec dressed in light summer clothing is exposed to 3 min direct sun radiation and street surface radiation. No sultriness is noted with the nonstationary model. Nonstationary energy budget models can be applied for cold and warm therapy since they can give information on the optimal exposure times to reach a given thermal body condition. Author (ESA)

N86-21018 Fraunhofer-Inst. fuer Bauphysik, Stuttgart (West Germany). Institutsbereich Waerme/Klima.
PHYSICAL CAUSES OF AIR DRAFT PHENOMENA, NEW FACTS [PHYSIKALISCHE URSACHEN FUER ZUGERSCHEINUNGEN - NEUE ERKENNTNISSE] c52
Erhard Mayer *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 19-20 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The physical causes of air draught phenomena causing health troubles are analyzed (especially man's local convective cooling resulting in a surface temperature decrease) as well as the relationship between convective heat transfer factor and thermal comfort. Measurements of convection on a heated artificial head show a parabolic correlation between self-convection and the product of air velocity mean value with turbulence degree and convective heat transfer factor. The area under the hyperboles corresponds to thermal comfort. Measurements were performed in buildings with and without air conditioning. Experimental results show good agreement with inquiry results. More cases of air draft troubles are recorded in buildings with air conditioning than in buildings without air conditioning. Convective heat transfer factor is better adapted to thermal comfort evaluation than air velocity mean value. Author (ESA)

N86-21019 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie und Klimatologie.
CLIMATIC CURE ON A PRACTICAL LEVEL [KLIMATUR IN DER PRAXIS] c52
Angela Schuh *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 21-22 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

About 150 patients were submitted to cardiovascular training and thermoregulatory training during their cure period to improve their response to climatic stimuli by applying ambulatory therapy. Pulse and blood pressure were measured to determine the physiological reaction and eye stress under climatic conditions. Patients were taught the thermoregulation system so as to react economically to climatic conditions. They were interrogated on their thermal comfort during the walk. Lactate formation and rewarming time were measured. Improved response to cold stimuli

can be achieved with the application of this form of climatic cure combining cardiopulmonar training and thermoregulatory training.
Author (ESA)

N86-21020 Meteorologischer Dienst der DDR, Berlin (East Germany). Forschungsinst. fuer Bioklimatologie.
ON THE IMPORTANCE OF COOLING IN CLIMATIC THERAPY [ZUR BEDEUTUNG DER ABKUEHLUNG IM RAHMEN DER KLIMATHERAPIE] c52
L. Klinker and E. Turowski *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 23-24 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The effects of meteorological cold stimuli under constant social environment before, during, and after a cold air resting cure with whole body stress are analyzed. Resistance and vegetative transposition are reflected by an increase in the resting time for a cooling value of 188 kJ/sq m and by an increased excretion of creatinine and of a subsitute product of adrenalin and noradrenalin. Increased blood pressure in cold pressure test, blood pressure fall to 5 to 15 mm, pulse frequency drop to 1.5 per min. and a drop in flicker fusion frequency and in the pupillary aperture are recorded during the acclimatization period. A better use of oxygen is observed during cooling therapy. Dosage recommendations for the different groups of patients according to their sensitivity to cold conditions are given. Author (ESA)

N86-21021 National Inst. for Rheumatics and Physiotherapy, Budapest (Hungary).
THE INFLUENCE OF HELIOMETEOROLOGIC FACTORS ON CIRCULATION AND SOME VEGETATIVE FUNCTIONS c52
Imre Oermenyi *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 25-26 (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Solar effects on circulation and vegetative functions were studied based on daily measurements of the systolic and diastolic blood pressure (SBP and DBP), and the arterial pulse number (APN) of 112 patients and 11 control individuals leading to a vegetative Index (VI). If VI is positive, sympathetic reactions increase; if VI is negative, parasympathetic reactions increase. Weather data and chromospheric flares are taken into account. The SBP and DBP increase during cold front passage, upper or lower, and during anticyclonic weather formation. The APN increases in presence of higher troposphere subtropical air. Tropospheric coding and continental cold air cause increased parasympathetic reactions. The latter increase in accordance with the direction of weather and geoactive solar activity. Sympathetic-like reactions appear with increased solar radio noise level around 200 MHz and 19 Ghz. The results of the study are used in forecasting physiological effects for public health. Author (ESA)

N86-21022 Institute of Meteorology and Water Management, Podlesna (Poland). Dept. of Climatology.
METEOROTROPIC DETERMINANTS OF ROAD COLLISIONS AND ACCIDENTS c52
Maria Baranowska and Barbara Gabryl-Wojtach *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 27-28 ref (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The effects of traffic intensity fluctuations and rainfall and fog on human psychophysical performance are studied based on statistics of daily number of road collisions and accidents (Lkw) over a period of 8 yr. Correlation is found between Lkw and rainfall but not between Lkw and duration of fog. The relationship between Lkw and basic systems and atmospheric fronts as well as the influence of extreme environmental changes are investigated. A significant increase of accidents is noted during strong front passages. A correlation is noted between Lkw statistics and cyclonal processes and extreme environmental changes, whatever the seasonal rhythm.
Author (ESA)

N86-21023 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria). Neurochirurgische Ambulanz am Ambulatorium. Sued.
OBJECTIVE INVESTIGATIONS AND SUBJECTIVE OBSERVATIONS OF SENSITIVITY TO WEATHER [OBJEKTIVE UNTERSUCHUNGEN UND SUBJEKTIVE BEOBACHTUNGEN UEBER WETTERFUEHLIGKEIT] c52
Fritz J. Jenkner *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 29-30 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The following criteria were investigated in 4,000 patients (women: 68%, men: 32%); sex, sensitivity to weather, light or painful troubles, shorter or longer period, with normal or increased blood, sedimentation rate, vertigo, headaches, lymphocyte count, pherogram, lymphocytosis. Women are more sensitive to weather changes than men with a higher frequency and increased blood sedimentation rate. Sensitive patients with a frequency of 75% for women and 25% for men have more painful troubles, a longer anamnesis period, more migraine and vertigo and a delay of the ovalbumin fraction. In insensitive patients the frequency is 62% for women and 38% for men. Further investigations are recommended to elicit the reasons of the statistically based differences.
Author (ESA)

N86-21024 Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
COLLOIDAL AND METEOROLOGICAL IN VITRO REACTIONS c52
Nada Plesko *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 31-32 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A reaction measuring system was developed to determine the effects of differential mean mole weight colloids, and to investigate the state variations of colloidal systems in correlation with solar-terrestrial phenomena. The relationships between solar terrestrial phenomena and the measurement variations, and between the measurement variations and weather sensitivity in healthy and ill people are investigated. The measured data corrected by the two relationships can then be applied for prevention in medicine, transport, and industry. The closed measuring system is insensitive to vibrations, gravity, and temperature stable when stored, and automatically performs the measurement of large molecular polyvinylpyrrolidon (PVP) in solutions with few electrolytes. The pseudopolarization effects depend on the adsorption layer thickness due to the degree of association of dissolved PUP molecules and to solar terrestrial factors.
Author (ESA)

N86-21025 Universitaetsspital, Zurich (Switzerland). Biologisches Zentrallaboratorium.
WEATHER SENSITIVITY AS DISCOMFORT [DIE WETTERFUEHLIGKEIT ALS DISKOMFORT] c52
Wolf H. Weihe *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 35-37 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Weather sensitivity due to a thermal imbalance between environment and organism leads to uneasiness or discomfort. Subjective and cognitive processes trigger the behavorial temperature regulation in order to sustain the autonomous physiological regulation. The behavorial temperature regulation can influence healing or aggravate the discomfort condition. Ill behavorial attitudes (unadapted dressing, inactivity, unbalanced eating and drinking, environment changes, etc.) are modified with training, decisiveness, will power, self-confidence and education. Weather

sensitivity appears when individuals cannot perceive the relationship between thermal load error and temperature preferred conditions. Pharmacotherapy is recommended for special cases only. Further investigation of weather sensitivity is recommended to check the identity between sensitivity and thermal discomfort under natural weather changes. Individuals should be taught temperature balance. Author (ESA)

N86-21026 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizin-Meteorologische Forschungsstelle.
WEATHER AS A PHYSICAL PROCESS AND PARAMETERIZATION OF THE EFFECTS AS A METEOROLOGICAL CONTRIBUTION FOR INVESTIGATING THE CORRELATION BETWEEN WEATHER AND MAN [DAS WETTER ALS PHYSIKALISCHE PROZESS UND SEINE WIRKUNGSRELEVANTE PARAMETRISIERUNG ALS METEOROLOGISCHER BEITRAG ZUR UNTERSUCHUNG DER BEZIEHUNG WETTER - MENSCH] c52
Klaus Bucher *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 38-41 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Use of meteorological parameters as causal parameters for medical research on thermoregulatory troubles due to atmospheric processes is discussed. They can be used for characterization of specific atmospheric processes. An objective classification of meteorological parameters is based on biotropy influenced by weather change intensity and pressure areas and on the characterization of the transition areas between systems with differential air pressure. Air temperature and humidity changes are investigated for quantification of the description of meteorological processes. The change of the atmospheric dynamic relations determined by statistical investigations based on factor analysis influences the meteorological parameters measured near the ground.
Author (ESA)

N86-21027 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria). Ambulatorium Sued.
WEATHER AND MIGRAINE [WETTER UND MIGRAENE] c52
Fritz L. Jenkner and Alois Machalek *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 43-44 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The relationship between headache intensity and weather situations is investigated statistically based on forms filled in by 80 ambulent patients suffering from migraine from April to September 1982. The correlations are determined using univariant methods (correlation and regression analysis) and parameter-free methods (Chi-squared test and U-test) with respect to high pressure and low pressure weather situations, even pressure distribution, variable weather, and southern circulation form. Almost 60% of the patients are sensitive to weather. Less cases of high intensity headaches occur under low pressure weather conditions than under anticyclonal and zonal circulation weather situations. More serious headaches occur under atmospheric subsidence. No reliable statistical results can be obtained due to the medical data inhomogeneity. Improved terminology of bioweather situations should give more accurate data on the relationship between headache intensity and frequency and weather. Author (ESA)

N86-21028 Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
TEMPERATURE WIND SPEED HUMIDITY (TWH): A BIOMETEOROLOGICAL INDEX TESTING c52
Ksenija Zaninovic *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 45-46 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The temperature, wind velocity, humidity index (TWH) based on measured values of temperature, wind speed and air humidity, on Hill's equations for cooling power, and on Brazol's sensation scale is tested for extreme temperature conditions to assess thermal sensation and its applicability in bioclimate evaluation. The TWH was compared with air enthalpy average values of a 10-day period during 10 yr. The TWH index including wind cooling effects gives better results than air enthalpy. It reinforces the sensation of cold in winter and smoothes the sensation of warmth in summer mornings and evenings. Author (ESA)

N86-21029 Jugenddorf Christophorusschule, Berchtesgaden (West Germany). Asthmatherapiezentrum.
WEATHER AND ASTHMA SYMPTOMS [WETTER UND ASTHMASYMPTOMATIK] c52
J. Lecheler and M. Voelker *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 47-48 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The influence of weather-dependent environmental factors outside the laboratory on asthma was investigated based on the observation of 46 heavily asthmatic children and teenagers undergoing a long therapy at 1200 m. Peak-flow forms are filled in indicating their lung function every morning and evening. The values are compared with those of the weather station with respect to temperature, air humidity, sunshine, rainfall amount in mm, and atmospheric pressure. Correlation is noted between peak flow measured lung function values and monthly average temperatures and average insolation time. A relationship between temperature collapses and lung function worsening is noted. During the first months of summer the influence of the weather-dependent factors is added to the allergy stress. A 2 yr. observation time is recommended to obtain more accurate results. Author (ESA)

N86-21030 Central Meteorological Service, Peking (China).
STUDY OF A METEOROLOGICAL PREDICTION OF ACUTE MYOCARDIAL INFARCTION INCIDENCE c52
Yianwen Wang and Xuecui Zhang (Lianyungang Ocean Station, China) *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 49-50 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The relationship between acute myocardial infarction incidence and weather in Beijing area is investigated. Excitation weather event and mitigating weather situation effects are analyzed to draw prediction model charts for infarction incidence. The whole-year synoptic situation is split into 65.5% for mitigating weather situation and 34.5% for excitation weather events. The disease occurrence is associated with cold front passage, low temperature, and high wind situations. Severe cold air before the front edge of cold high situation without any cold front passage is sufficient to affect a patient. Association of excitation weather event and precipitation eliminates the harmful effect. Further study of the disease inducement effects of excitation weather events is recommended. Author (ESA)

N86-21031 Forschunginstitut fuer Balneologie, Marianske Lazne (Czechoslovakia).
METEOROTROPIC CHANGES OF CARDIAC PATIENTS' BLOOD PRESSURE AND PULSE FREQUENCY DURING A COMPLEX BATH CURE [METEOROTROPE VERAENDERUNGEN DES BLUTZUCKERS UND DER PULSFREQUENZ DER HERZKRANKEN IM VERLAUF DER KOMPLEXEN BAEDERKUR] c52
Vit Kveton, Jiri Matousek, and Zdenek Sebesta *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 51-52 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Air temperature, air humidity, and barometric pressure effects on cardiac patients' blood pressure (systolic and diastolic) and pulse frequency were investigated during a complex bath cure using multidimensional linear regression analysis. The cure includes climatotherapy, diet, balneological and physical therapy, kinesetherapy, group training, and cycling. The barometric pressure influences the systolic and diastolic blood pressure. Daily

temperature magnitude and passage from anticyclonal to zonal weather influence the pulse frequency. The synoptic coupling of biotropic efficient meteorological factors is assessed to deduce synoptic weather situations influencing the patients' blood pressure and pulse frequency. Author (ESA)

N86-21032 Forschunginstitut fuer Balneologie, Marianske Lazne (Czechoslovakia).
WEATHER AND SUBJECTIVE HEALTH COMPLICATIONS IN CARDIAC PATIENTS [DAS WETTER UND DIE SUBJEKTIVEN GESUNDHEITSSCHWIERIGKEITEN DER HERZKRANKEN] c52
Vit Kveton *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 53-54 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The relationship between daily occurrence of complications in cardiac patients and the atmospheric environment (air pressure, air humidity, wind velocity, temperature) is analyzed based on data of 2 yr observation of patients suffering from myocardial infarction. Stress of the thermoregulatory system as well as ground meteorological elements increase the biological reaction. The deviation of the relative daily occurrence is determined for chest troubles and respiratory distress at rest and during walking, for heart beat, and exhaustion and fear situations with respect to sunshine, jog, rain, and bad weather conditions. Author (ESA)

N86-21033 Deutscher Wetterdienst, Offenbach am Main (West Germany).
INVESTIGATIONS OF THE POSSIBLE INFLUENCE OF AIR ELECTRICAL PHENOMENA ON DULLING AND GHOST ACHING IN AMPUTATED PATIENTS [UNTERSUCHUNGEN UEBER EINEN MOEGLICHEN EINFLUSS VON LUFTELEKTRISCHEN ERSCHEINUNGEN AUF STUMPF- UND PHANTOMSCHMERZEN BEI AMPUTIERTEN] c52
J. Pelz (Freie Univ., Berlin, West Germany) and H. J. Swantes *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 55-56 ref In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The effects of air electricity on dulling and ghost aching in amputated patients are investigated based on written patients' complaints, weather observations in weather stations, and on automatic measurement of the atmospheric impulse radiation. Ghost aching geographical distribution is shown statistically. Ghost aching occurrence increases parallel to increased impulse radiation. Dulling troubles have a similar distribution as the occurrence distribution. The occurrence geographical distribution of aching complaints per month and per patient from 1976 to 1979 is investigated, leading to a mapping of the complaint locations. The correlation between bad weather occurrence and aching occurrence cannot be made. The same mapping can be made for dulling troubles. Author (ESA)

N86-21034 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
THE AUSTRIAN BIOMETEOROLOGICAL SERVICE [DER OESTERREICHISCHE BIOWETTERDIENST] c52
Alois Machalek and Peter Sabo *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 57-58 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The bioweather research project to analyze the effects of weather on healthy and sick persons is described. The investigation is based on high pressure weather; even pressure distribution; low pressure situation; western and north-western weather situation; southern and South-Western weather situation as well as on cold air incursions in ground and medium layers of the atmosphere and on atmospheric depression. Application of Bioweather requires the partition of Austria in bioweather areas according to bioclimatic conditions. Author (ESA)

N86-21035 Kommunalverband Ruhrgebiet, Essen (West Germany).
VERTICAL EXCHANGE AND POLLUTION CONCENTRATIONS IN CONURBATIONS, FOR EXAMPLE, DORTMUND (WEST GERMANY) [VERTIKALAUSTAUSCH UND SCHADSTOFFKONZENTRATIONEN UEBER BALLUNGSRAEUMEN AM BEISPIEL DER STADT DORTMUND]
Wolfgang Beckroege *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 60-62 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A city climate analysis was performed to investigate exchange conditions and pollution concentrations in a city. A 24 hr measurement was performed under light wind high pressure conditions. Atmospheric stability at stations in city surroundings, transition area between city/city surroundings, and city center was measured. The energy required for labeling can be calculated using a simple numerical simulation model based on mixing layer height over the city area and on the temperature gradients of the inversion layer. The highest vertical wind velocity is measured in the city center at night fall and at higher levels than the city neigborhood using radar. Leading tracks corresponding to wind steady direction over areas with reduced roughness over long distances can increase or reduce the mixing condition according to the situation and to the wind direction. Author (ESA)

N86-21036 Jugenddorf Christophorusschule, Berchtesgaden (West Germany). Asthmatherapiezentrum.
HEIGHT-DEPENDENT REDUCTION OF AIRBORNE POLLEN AND EFFECTS ON CHILDREN AND TEENAGERS AFFECTED BY BRONCHIAL ASTHMA [HOEHENABHAENGIGIGE REDUZIERUNG DES POLLENFLUGS UND DIE AUSWIRKUNG AUF KINDER UND JUGENDLICHE MIT ASTHMA BRONCHIALE] c52
J. Lecheler, M. Voelker, and R. Winkler *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 63-64 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Forty asthmatic children and adolescents with seasonal sensitization and rhinoconjunctivitis were monitored and their symptomatology compared during the pollinosis season. The comparison shows a significant reduction of the bronchial symptomatology as well as of the allergic rhinoconjunctivitis due to a reduced allergen influx resulting from reduced airborne pollen in high mountains. Disappearance of the perennial allergens, better monitoring, and therapy optimization account for bronchial improvement. The seasonal allergen effects are reduced by height-dependent reduced airborne pollen. Author (ESA)

N86-21037 Rheinisch Westfaelische Technischer Ueberwachungs-Verein e.V., Essen (West Germany).
MESUREMENTS OF CARBON MONOXIDE EMISSIONS FOR DETERMINATION OF THE CONCENTRATION DIFFERENCES BETWEEN OPEN AIR AND INDOOR AIR VALUES [MESSUNGEN VON KOHLENWASSERSTOFFIMMISSIONEN ZUR ERMITTLUNG VON KONZENTRATIONSUNTERSCHIEDEN ZWISCHEN FREI- LAND- UND RAUMLUFTWERTEN] c45
Juergen Frank *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium Human Biometeorology 13 Aug. 1985 p 65-66 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Measurements of benzol, toluol, xylol, ethylbenzol and dicyclopentadiene in a urban area next to a big city were performed from summer 1984 to fall 1984 and completed in April 1985 by measurements in a reference area to determine carbon monoxide emissions. Measurements were performed in the open air (85%) and indoors (15%). Air and ground temperature, and wind direction and velocity were measured. The measured pollution concentrations are assessed with respect to load and hazard effects. The limit values for each material (maximum immission concentrations and maximum activity concentrations) are far

exceeded. The concentration level in houses is higher than in the open air. Thus, emission of the selected materials comes from houses. The differences between the test and the reference area cannot be explained. Author (ESA)

N86-21038 Duesseldorf Univ. (West Germany). Medizinisches Inst. fuer Umwelthygiene.
EFFECTS OF AIR POLLUTION ON MAN [WIRKUNG VON LUFTVERUNREINIGUNGEN AUF DEN MENSCHEN] c52
H.-W. Schlipkoeter and K. Beyen *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 67-69 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Air pollution and airway diseases; effects of carbon monoxide on healthy and cardiac people; effects of smog on old people affected by serious airway and blood circulation diseases and effects of heavy dust; heavy metal effects of babies, and young children (neurophysiological troubles); effects of cadmium on old people's renal function; and air pollution and lung cancer due to polycyclic aromatic carbon monoxides are discussed.Author (ESA)

N86-21039 Giessen Univ. (West Germany). Hygiene-Inst.
GROUP DIAGNOSIS AS RISK ASSESSMENT IN ENVIRONMENT HYGIENE [GRUPPENDIAGNOSTIK ALS RISIKOABSCHAETZUNG IN DER UMWELTHYGIENE] c52
Pavel Schmidt and Ernst Gerhard Beck *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 70-71 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Group diagnosis based on clinical epidemiology, laboratory investigation, and anthropological and statistical methods is performed for risk assessment and to determine the correlation between health, development maturity, living habits and environment pollution. An epidemiological investigation on a group of clinically healthy 10 yr old children over 5 yr shows that children in an urban air-polluted area have more enlarged lymphatic nodes, fewer red blood cells and hemoglobin, fewer antibodies, and are more sensitive to stress than children in relatively pure air areas. Author (ESA)

N86-21040 Freie Univ., Berlin (West Germany). Rittberg-Kinderklinik.
IMMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY ILLNESSES IN BERLIN (1979-1982): METHODOLOGY AND RESULT SUMMARY [IMMISSIONS- UND WETTEREINFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982). METHODIK UND ERGEBNISUEBERBLICK] c52
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 72-74 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The possible acute effects of inhalative air pollution and of meteorological environmental factors on the morbidity rate of children's upper and lower airway illnesses listed in four diagnosis groups (pseudo Croup, bronchitis-pneumonia, asthma, and influenza) are reviewed with respect to immission parameters. Independent variables (SO_2 concentration, equivalent temperature, interdiurnal air pressure, and relative indoor humidity) are linearly correlated with morbidity rate in monthly, weekly, and daily mean values. Air pollution immission and meteorological parameters influence the course of the infection rate of upper and lower airway illnesses. They have hazardous effects on the respiratory tissue separately or combined. Assumptions on the influence on infection rates of air chemical and thermal complex are given for Croup syndrome and asthma. Author (ESA)

N86-21041 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
ENVIRONMENTAL FACTORS AND INFANT MORTALITY [UMWELTFAKTOREN UND SAEUGLINGSSTERBLICHKEIT] c52
Alois Machalek, Helene Kapaun, and Ermar Junker *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 75-76 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The Sudden Infant Death Syndrome (SIDS) was studied with respect to air chemistry. Hexachlorobenzol, nitrates in water, and acid rain cause SIDS. The effects of air substances are reviewed. The relationship between airway illnesses and air substances is statistically established for Croup syndrome. No seasonal influence is noted for SIDS. Two correlations are shown (but not statistically): appearance of SIDS culminations during the hot period after biospheric high pollution load and on days with temperature extremes in summer or in winter. Author (ESA)

N86-21042 Gesamthochschule, Kassel (West Germany).
AIRWAY INFECTIONS RELATED TO CITY CLIMATE AND LOCAL IMMISSION LOAD [ATEMWEGSERKRANKUNGEN IN ABHAENGIGKEIT VON STADTKLIMA UND LOKALER IMMISSIONSBELASTUNG] c52
Lutz Katzschner *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 77-79 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The effects of immission load on infants up to 6 yr old are investigated in relation to climate, airway infections, and SO_2 concentration. Air temperature significantly influences the onset of illnesses. Immission data are not sufficient to explain stress situations. Air polluting substances influence the immune system leading to body weakening and to an increased sensitization to viral agents. Author (ESA)

N86-21043 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie und Klimatologie.
WHAT IN HUMAN BIOMETEOROLOGY CAN CONTRIBUTE TO ASSESSMENT OF THE EFFECTS OF HAZARDOUS SUBSTANCES ON HEALTH? [WAS KANN DIE HUMANBIOMETEOROLOGIE ZUR BEWERTUNG GESUNDHEITLICHER WIRKUNGEN VON SCHADSTOFFEN BEITRAGEN] c52
Karl Dirnagl *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 80-81 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Anthropogenic atmospheric influence factors; relativism in the assessment of the quantification of the hazardous effects on health and limit values; a political assessment of quantitative data; and disproportion between measurement and monitoring programs and investigations of the hazardous effects are discussed. Quantitative assessment should be avoided. The popularity gained by scientific results on weather effects on man's health should be used to avoid an erroneous vision of assessment of environmental effects. Author (ESA)

N86-21044 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
IMMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY TROUBLES IN BERLIN (1979-1982). TIME SERIES INVESTIGATIONS: CROUP SYNDROME AND ASTHMATIC AIRWAY TROUBLES [IMMISSIONS- UND WETTEREINFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982) ZEITREIHENUNTERSUCHUNGEN: CROUPSYNDROM UND ASTHMATISCHE ATEMWEGSERKRANKUNGEN] c52
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorolog 13 Aug. 1985 p 82-85 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Croup syndrome and asthma airway troubles in children aged

0 to 6 yr divided into 3 age groups were clinically investigated to determine the effects of immission and weather conditions on the infection percentage according to annual, interannual, and weekly variations, and SO2 concentration periods and days. Croup affection percentage increases from summer to fall, during the cold period due to an increased immission. Linear correlations are made between SO2 concentration, indoor humidity, and infection percentage. Maximum occurrence of asthma affections is in winter and from May to July due to pollen allergens. A positive correlation is made between asthma and SO2 concentration, a negative one between asthma and indoor humidity. The injection epidemiological effect (mycoplasma pneumoniae) is excluded for Croup syndrom. It is taken into account for asthma Author (ESA)

N86-21045 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
EMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY TROUBLES IN BERLIN (1979-1982). COMPARISON OF TWO DIFFERENT EMISSIONS: LOADED RESIDENTIAL AREAS IN WEST BERLIN POLLUTED AREAS [IMMISSIONS- UND WETTERFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982). VERGLEICH ZWEIER UNTERSCHIEDLICH IMMISSIONSBELASTETER WOHNBEREICHE IM BELASTUNGSGEBIET BERLIN (WEST)] c52
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 86-87 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Two SO2 emission-loaded residential areas are compared based on affection ratios of children suffering from Croup syndrome and asthma in the two investigation hospitals. More children suffer from asthmatic troubles in a polluted area with SO2 emission over the average than the one with SO2 emission below the average. More children suffer from Croup syndrome in a polluted area with SO2 emission below the average than in the one with SO2 emission over the average. Author (ESA)

N86-21046 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie.
AIR QUALITY DETERMINATION IN HEALTH RESORTS [LUFTQUALITAETSBESTIMMUNG IN KURORTEN] c52
Angela Schuh *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 88-89 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The medium pollution and short-time peak concentration of SO2, CO and other gaseous air constituents were measured to assess air quality in health resorts. The spatial distribution and air constituent content were assessed in weekly analyses of Petri dish sulfur and nitrogen oxide content. The filter was exposed to heavy air pollution to test the measuring procedure. Comparison with the previous concentration measurements shows good agreement with the filter measurements. Author (ESA)

N86-21047 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizinmeteorologische Forschungsstelle.
THE BIOLOGICAL EFFICIENCY OF DUST EMISSION: DETERMINATION BASED ON THE WITHERING DEGREE OF EXPLOSED LICHENS [DIE BIOLOGISCHE WIRKSAMKEIT VON STAUBIMMISSIONEN: ERMITTELT ANHAND DES ABSTERBEGRADES EXPONIERTER FLECHTEN] c52
R. Rabe and E. Schultz *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 90-91 In GERMAN Prepared in cooperation with Rheinische Westfaelische Technischer Ueberwachungs-Verein e.V., Essen, West Germany (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Air hygiene and air quality in cities and health resorts were determined using the method of lichen exposition to dust emission based on the relationship between lichen withering degree and emission constituent efficiency and their effects on health. Results show good agreement between lichen withering degree and mortality or morbidity. The results are confirmed by epidemiological investigations based on dust foil measurement. A correlation between soot deposition and lichen withering degree is noted. The quantity deposition ratio for particle combustion products allows assessment of air quality in health resorts using the adherence foil method. Author (ESA)

N86-21048 Basel Univ. (Switzerland).
A SIMPLE PROCEDURE FOR SEMI-QUANTITATIVE DETERMINATION OF DUST IN AIR [EINE EINFACHE, WENIG AUFWENDIGE METHODE ZUR HALBQUANTITATIVEN BESTIMMUNG VON STAUB IN DER LUFT] c45
Gundo Boehm *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 92-94 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Dust in the air was determined using the Burkard pollen and spore trap fixture. The particles are retained on an adhesive foil and immersed in a polyvinylalcohol. The preparations are analyzed quantitatively and qualitatively based on microscopic study of dust, soot, and dust particle strips. Densitometers and a pherogram are used to study the strips semi-quantitatively. Author (ESA)

N86-21049 Deutscher Wetterdienst, Offenbach am Main (West Germany).
PROBLEMS OF CITY PLANNING [PROBLEME DER STADTPLANUNG] c52
Bob Frommes *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 95-98 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The limits of meteorology for city planning; purpose of city and building climatology; architects' and planners' expectations regarding meteorology; and relevance of the meteorological information in planners decision making are discussed. Interactions between climate, buildings and city; and inhabitants' protection against bad weather and health troubles are considered. Author (ESA)

N86-21050 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
PROBLEMS IN CITY CLIMATE EVALUATION IN HUMAN BIOMETEOROLOGICAL TERMS [PROBLEMATIK BEI DER HUMANBIOMETEOROLOGISCHE BEWERTUNG DES STADTKLIMAS] c52
Helmut Mayer *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 99-100 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The city climate is split into air hygiene (city air quality) and thermal components (city air energy) for relevant assessment of the city climate in human biometeorological terms for decision making in city planning. The relations between hazardous substances in the city causing health troubles in man should be further investigated with respect to inner city differentiations (city elements, constructions, entire city districts). Relevant meteorological data include the height of man's center of gravity and spatial radiation field. Author (ESA)

N86-21051 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizinmeteorologische Forschungsstelle.
NUMERICAL SIMULATION OF THE METEOROLOGICAL CONDITIONS OF MAN'S HEAT LOSS IN NARROW ALLEYS [NUMERISCHE SIMULATION DER METEOROLOGISCHEN BEDINGUNGEN DER WAERMEABGABE DES MENSCHEN IN STRASSENSCHLUCHTEN]
U. Sievers (Mainz Univ., West Germany) and G. Jendritzky *In its*

Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 101-103 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Climate models were used to investigate the effects of city construction variables on city planning. The models allow the evaluation of the planned city construction activity effects on the microscale meteorological conditions. The calculations show the technical but not economic feasibility of the microscale numerical simulation. The reproducibility of the results on two-dimensional models should be verified with a three dimensional problem. Measures in narrow alleys and inner yards should be done to check and improve the simulation model. Author (ESA)

N86-21052 Kaiserslautern Univ. (West Germany). Fachbereich ARUBi.
MISSIONS AND INSTRUMENTS OF REGIONAL AND LAND PLANNING [AUFGABEN UND INSTRUMENTE DER REGIONAL- UND LANDESPLANUNG] c45
Dieter Eberle *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 104-105 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The regional and land planning instruments resulting from studies of surface utilization reduction; resource conservation; and coordination of the open air functions are described. Self development and conurbation areas are used in construction land potential models with little integration of climatic ecological aspects. Author (ESA)

N86-21053 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPRESENTATION OF LOCAL CLIMATIC PHENOMENA AND RESULTING BIOCLIMATIC REPORTS IN REGIONAL PLANNING [DIE DARSTELLUNG LOKALKLIMATISCHER PHAENOMENE UND DARAUS RESULTIERENDE BIOKLIMATISCHE AUSSAGEN IN DER REGIONALPLANUNG]
V. Vent-Schmidt *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 106-108 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Bioclimatic relevant phenomena (radiation ratio, formation of cold air, appearance of local wind systems, ground inversion, and ground fog) are investigated to assess the local climatic variations for city planning. Maps, charts, and tables are drawn based on climatic elements for planning proposals and a visualization of the results (wind build-up, fog structure, and frost damage). A simulation of the future situations or planning proposals can be done using model results. Author (ESA)

N86-21054 Lodz Univ. (Poland). Dept. of Meteorology, Climatology and Hydrology.
RELATIONSHIPS BETWEEN AIR TEMPERATURE AND WIND FIELD IN ATMOSPHERIC BOUNDARY LAYER. EXAMPLE OF WESTERN PART OF THE POLISH BALTIC SEA
Ireneusz H. Dubaniewicz *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 109-111 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The relationship between air temperature and air circulation is analyzed based on measurements in coastal areas (sea dune and urban built-up areas). The influence of the town area and built-up areas on thermal and humidity conditions can be noticed in the daily changes of air temperature. Urban areas influence the topoclimatic conditions of medical treatment and recreation in coastal areas. Author (ESA)

N86-21055 Ceskoslovenska Akademie Ved, Bratislava. Inst. fuer Bauwesen und Architektur.
DETERMINATION OF THE BASIC RADIATION CLIMATIC PARAMETERS OF A GIVEN LOCATION [BESTIMMUNG DER GRUNDPARAMETER DES STRAHLUNGSKLIMAS EINER BELIEBIGEN LOKALITAET]
Janka Pulpitlova *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 112-113 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Calculation procedures for simulation of quantitative and qualitative radiation climate parameters were assessed. The Angstrom equation can be applied to determine the average monthly total radiation quantity of the surface energy thickness of global and diffusion radiation on a horizontal surface measured in a given location (villages and cities). Regression factors of the relative sunshine correlative dependence should be applied for construction and city planning. Measures in villages and cities show good agreement with theoretical results. Author (ESA)

N86-21056 Innsbruck Univ. (Austria). Inst. fuer Medizinische Physik.
RECENT MEASUREMENTS OF THE ALBEDO OF VARIOUS SURFACES FOR ERYTHERMAL EFFICIENT RADIATION [NEUERE MESSUNGEN DER ALBEDO VERSCHIEDENER OBERFLAECHEN FUER ERYTHEMWIRKSAME STRAHLUNG]
Mario Blumthaler and Walter Ambach *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 114-115 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Albedo dependent on the diffuse sky radiation for erythermal efficient solar radiation on highly reflecting snow-covered and bare surfaces was investigated. The erythermal efficient radiation intensity was measured to determine the relationship with albedo. Various oriented areas were used as a model for the exposed body parts of a fictitious person. A significant difference is noted between erythermal efficient solar radiation and global radiation. With weakly reflecting snow-covered surfaces and with bare areas albedo is smaller for erythermal efficient solar radiation than for global radiation. Snow-covered surfaces with high albedo present less differences in radiation intensities for variously oriented areas. For bare areas the radiation intensities depend on the orientations of the areas. The results can be applied for skin radiation intensity assessment in snow-covered high mountains. Author (ESA)

N86-21057 Deutscher Wetterdienst, Offenbach am Main (West Germany).
CARTOGRAPHIC EXTRAPOLATION OF BIOCLIMATICALLY RELEVANT PARAMETERS FOR REGIONAL PLANNING [KARTOGRAPHISCHE UMSETZUNG BIOKLIMATISCH RELEVANTER PARAMETER FUER DIE REGIONALPLANUNG]
W.-P. Gerth *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 116-118 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Climatologically relevant parameters for characterization of area utilization for residence and habitation and their threshold values are investigated using mappings based on inversion occurence in the investigated area, the mean yearly wind velocity, the number of heat stress days, and local climatic particularities. The results show good agreement with investigations using climate models. Areas with bioclimatic stress are not suitable for further house construction due to the construction density. Areas without air circulation outlets are not suitable for residence due to insufficient nocturnal cooling during heat stress days. The same criteria can be applied for areas with medium or reduced bioclimatic stresses. Author (ESA)

N86-21058 Austrian Automobile Touring Club, Vienna. Medizinmeteorologischer Beratungsdienst.
HUMAN BIOCLIMATIC CLASSIFICATION METHODS ILLUSTRATED WITH EXAMPLES OF SELECTED COUNTRIES [HUMANBIOKLIMATISCHE KLASSIFIZIERUNGSMETHODEN AM BEISPIEL AUSGEWAEHLTER LAENDER] c52
Othmar Harlfinger *In* Deutscher Wetterdienst Annals of Meteorol-

ogy, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 119-121 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The analysis of meteorological parameters for tourism, recreation, and outdoor activities with respect to climatic comfort and discomfort is illustrated. Consideration of the thermal hygrometric area using model calculations or bioclimatologically complex factors to determine the boundary between comfort and discomfort; methods for determination of tourist season based on climatic parameters; and a combination of the first two methods with differential weighting of climatic and bioclimatic factors are used in bioclimatic holiday counseling. Author (ESA)

N86-21059 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
COMPARISON BETWEEN METEOROLOGICAL COMPLEX VALUES AND A MODEL OF MAN'S ENERGY BUDGET [VERGLEICH ZWISCHEN METEOROLOGISCHEN KOMPLEXGROESSEN UND EINEM ENERGIEBILANZMODELL DES MENSCHEN] c52
Norbert Hammer, Elisabeth Koch, and Ernst Rudel *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 122-123 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Heat and cooling parameters are compared to comfort criteria resulting from a model of man's energy budget with respect to sitting, slow and rapid walking, and dressing according to seasons. Assessment using equivalent temperature limits shows good agreement with energy budget methods during a 300 W activity and the cooling factor during a light sport activity. The results show a need for further investigation using the energy budget model to give physicians information on therapeutic applications of climate. Author (ESA)

N86-21060 Rheinisch Westfaelische Technischer Ueberwachungs-Verein e.V., Essen (West Germany).
A PROPOSAL FOR CONSIDERATION OF LOCAL OROGRAPHIC DATA IN LOCAL PLANNING [EIN VORSCHLAG ZUR BERUECKSICHTIGUNG LOKALER OROGRAPHISCHER GEGEBENHEITEN BEI DER STANDORTPLANUNG]
C.-J. Richter *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 124-125 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The Gaussian propagation model is applied to forecast immission in orographic areas using wind direction, velocity, and propagation class measurements. Wind direction distribution was measured for 10 yr to obtain statistical data on the propagation class in orographic locations. Comparison of the measurements leads to a four dimensional occurrence distribution. A channelling effect is noticed for temporary measurement location. The duration of the temporary measurement should be oriented towards orographic data on the facility location besides weathering. The stronger the channelling effect, the shorter the comparison measurement period. Temporary measurements can be used for forecasting only through comparison with long duration statistical data. Author (ESA)

N86-21061 Rheinisch Westfaelische Technischer Ueberwachungs-Verein e.V., Essen (West Germany).
EMPIRICAL PROCEDURES FOR DETERMINATION OF ODOR EMISSION AND EXTRAPOLATION TO REPRESENTATIVE PERCEPTION OCCURRENCE [EMPIRISCHE VERFAHREN ZUR EMITTLUNG VON GERUCHIMMISSIONEN UND DIE UEBERTRAGBARKEIT AUF REPRAESENTATIVE WAHRNEMUNGSHAEUFIGKEITEN]
Wolfgang Medrow *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 126-127 ref In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The grid method and flag method were applied to determine environmental odor emission from diffusive sources without specified emission conditions such as purification station and dumping areas, to check odor perception. In the grid method the occurrence of odor perception for each grid intersection is deduced from the ratio of the number of inspections with odor perception to the total member of inspections. The odor perception occurrence must be weighted with a comparison of the whole-year and short-time wind direction distribution for representativeness. The flag method takes into account the whole-year wind direction, wind velocity and propagation class distribution to calculate the statistical odor perception occurrence; statistical conclusion on odor emission could be made using a propagation mathematical model and medium odor flow and representative propagation class statistics. Author (ESA)

N86-21062 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
APPLICATION OF FISHEYE PHOTOGRAPHS FOR HUMAN BIOMETEOROLOGICAL ISSUES [VERWENDUNG VON FISHEYE-AUFNAHMEN FUER HUMANBIOMETEOROLOGISCHE FRAGESTELLUNGEN]
Annie Rall *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 128-129 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Horizontograms processed from shots of the sky using a camera fitted with a fisheye lens were used to obtain location information such as sunshine duration. By visual assessment absorption or emission coefficients can be determined as well as the surrounding surface. A computer program based on digitized data of the horizon can calculate the maximum insolation duration for a specific day in the year. Using a coordinate transformation the image is divided into pixels of identical space angle ratio. The horizontogram procedure is accurate and reproducible. It allows rational assessment and gives important data for application of energy budget models. Horizontograms can be used for assessment of land utilization (construction planning and environment decontamination) and for forest damage investigations. Author (ESA)

N86-21063 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
MEASUREMENTS OF SURFACE TEMPERATURE IN DIFFERENTIALLY EXPOSED GREENHOUSES WITH OR WITHOUT VEGETATION [MESSUNGEN VON OBERFLAECHENTEMPERATUREN IN GARTENHOEFEN VERSCHIEDENER EXPOSITION MIT UND OHNE VEGETATION]
Fritz Wilmers *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 130-131 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

The surface temperatures in differentially exposed experimental gardens were measured in the course of the day (mornings, midday, evenings) using an infrared scanner. Differential temperatures are recorded for vegetation on walls, on the ground; flower beds, trees, and ornamental ponds. A smoothing of extreme temperatures is noticed. Walls and flower beds are relatively temperate except in shadowy areas. Groves and trees provide temperature balance in microclimate and air humidification. Watery surfaces have cooling effects on warm days and store heat at night. Application of these data can improve man's environment and thermal comfort. Author (ESA)

N86-21064 Deutscher Wetterdienst, Offenbach am Main (West Germany).
LOCAL CLIMATIC PARTICULARITIES AND THEIR IMPORTANCE FOR RECREATION AREA (EXAMPLE, SAARLAND-LOWER BLIESTAL) [LOKALKLIMATISCHE BESONDERHEITEN IN IHRER BEDEUTUNG FUER ERHOLUNGSGEBIETE (AM BEISPIEL SAARLAND-ERHOLUNGSRAUM UNTERES BLIES-

TAL)] c52
Hans Juergen Swantes *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 132-133 ref In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A medico-meteorological-bioclimatic assessment of Saarland (West Germany) was made for construction of a recreation network. It is based on investigations of local wind circulation and cloud cover and air pollution in valleys. Air temperature and air humidity are measured. Inquiry forms are distributed to farmers, walkers, and highway engineers to obtain further information on local climatic particularities. Results of the measurement and written inquiry campaign are mapped to give information on the investigated area planning and utilization for adequate recreation forms according to bioclimatic criteria. Author (ESA)

N86-21065 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizin-Meteorologische Forschungsstelle.
SPATIAL DISTRIBUTION OF HEAT AND COLD STRESS IN THE FEDERAL REPUBLIC OF GERMANY [DIE RAEUMLICHE VERTEILUNG VON WAERMEBELASTUNG UND KAELTESTRESS IN DER BUNDESREPUBLIK DEUTSCHLAND] c52
G. Jendritzky *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 134-136 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A stochastic climate model based on data of cooling effects on the thermoregulatory system was developed to design monthly differential climate maps for description of the thermal environment in city and environmental planning. The model is standardized with respect to individual thermoregulation differences, to Sun-shadow difference and to heat loss conditions. The small-scale effects on orography or vegetation as well as UV radiation, oxygen partial pressure, and air hygiene are not taken into account. The maps constitute a standardized basis for space comparison with respect to efficiency, thermal comfort, and human health. Author (ESA)

N86-21066 Technische Univ., Berlin (West Germany). Fachgebiet Bioklimatologie.
RESULTS OF CITY CLIMATOLOGICAL INVESTIGATIONS IN WEST BERLIN [ERGEBNISSE STADTKLIMATISCHER UNTERSUCHUNGEN IN BERLIN (WEST)]
Manfred Horbert, Annette Kirchgeorg, and Albrecht vonStuelpnagel *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 137-139 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

Climatic maps based on measurement of air temperature, relative air humidity, vapor pressure and equivalent temperature were designed for qualitative and quantitative assessement of city-climate effects. Distributions of the parameters are analyzed for land utilization and city planning. The temperature distribution shows a difference between city center and outer districts. The influence of construction density and vegetation on the wind direction is analyzed. Average annual temperatures and average minimum temperatures are used to map the areas with city-climatic changes. Tendency to overheating, night cooling, and frost hazards; humidity changes; modification of the ground-layer wind behavior; and interaction between various climatic areas and emission hazards are described for each city area. Author (ESA)

N86-21067 Institute of Balneoiogy and Climatology, Poznani (Poland).
APPLICATION OF METEOROLOGICAL AND SOLAR DATA IN HEALTH RESORT CLIMATHERAPY c52
Sabina Tyczka and Irena Ponikowska *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 140-141 (For primary document see N86-21012 11-47)
Avail: Issuing Activity

A quantitative analysis of the thermal and photochemical effects of solar radiation on 150 healthy patients aged 18 to 60 is made to determine the effectiveness of heliotherapy using long-term actinometric data and the intensity of ultraviolet solar radiation corresponding to the Sun exposure time necessary to obtain a skin photoerythema. Global solar radiation is analyzed in relation to the mean photoerythema dose, to the Sun's altitude and to cloudiness. The skin photoerythema dose is the product of solar radiation intensity and Sun exposure time. The results are valid for insolation conditions similar to those on the Baltic coast with solar altitude of 50 to 60 deg. Author (ESA)

N86-21068 World Meteorological Organization, Geneva (Switzerland).
COMPOSITION OF THE WMO
Oct. 1985 136 p
(WMO-5) Copyright. Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The membership of the World Meteorological Organization is given. Nations are listed, as well as the names, titles and addresses by individuals. R.J.F.

N86-21069*# FWG Associates, Inc., Tullahoma, Tenn.
ANALYSIS OF AERODYNAMIC COEFFICIENTS USING GRADIENT DATA: SPANWISE TURBULENCE EFFECTS ON AIRPLANE RESPONSE Report, 3 Jun. 1983 - 2 Jun. 1985
Erik A. Ringnes and Walter Frost Washington NASA Feb. 1986 70 p refs
(Contract NAS8-35186)
(NASA-CR-3961; NAS 1.26:3961) Avail: NTIS HC A04/MF A01 CSCL 04B

The influence of spanwise turbulence on airplane dynamic behavior is determined. Calculations are based on data collected from test flights with the NASA B-57 research aircraft. The approach is to first compute aerodynamic forces and moments due to a spanwise distribution of angle of attack and airspeed. Secondly, these quantities are incorporated into the equations of motion. Simulation of flights done with the effects of spanwise turbulence included are compared to simulations without any spanwise turbulence. The findings of the study are that the moments developed by turbulence along the span are significant and that more realistic flight simulation can be achieved by including the spanwise turbulence terms. Author

N86-21070# Hawaii Univ., Honolulu. Dept. of Meteorology.
THE APPLICATION OF A WIND FLOW MODEL FOR COMPLEX TERRAIN AREAS ON OAHU: A COMPARISON WITH OBSERVATIONS AND OTHER MODELS
D. Andre Erasmus Nov. 1985 70 p refs
(UHMET-85-01) Avail: NTIS HC A04/MF A01

Erasmus has formulated a boundary layer wind flow model for complex terrain areas where the basic flow is onshore and at least of moderate strength. The model was applied to the Kahuka area on the island of Oahu, Hawaii. The model was evaluated by comparing observed and simulated winds during two periods of persistent trade winds and two periods of intermittent trades. The results of this evaluation are summarized. Under trade wind conditions, the observed and simulated winds at test stations agree very well. Author

N86-21071*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
SURFACE ENERGY FLUXES IN COMPLEX TERRAIN Progress Report, 1 Feb. 1985 - 28 Feb. 1986
Elmar R. Reiter, John D. Sheaffer, and James E. Bossert Mar. 1986 42 p refs
(Grant NAGw-601)
(NASA-CR-176594; NAS 1.26:176594) Avail: NTIS HC A03/MF A01 CSCL 04B

The emphasis of the 1985 NASA project activity was on field measurements of wind data and heat balance data. Initiatives included a 19 station mountaintop monitoring program, testing and refining the surface flux monitoring systems and packing and

shipping equipment to the People's Republic of China in preparation for the 1986 Tibet Experiment. Other work included more extensive analyses of the 1984 Gobi Desert and Rocky Mountain observations plus some preliminary analyses of the 1985 mountain-top network data. Details of our field efforts are summarized and results of our data analyses are presented. Author

N86-21072*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TRANSIENT CONVECTION OVER THE AMAZON-BOLIVIA REGION AND THE DYNAMICS OF DROUGHT OVER NORTHEAST BRAZIL
Julio Buchmann (Univ. Federal do Rio de Janeiro, Brazil), Pedro LeitedaSilvaDias (Inst. Astronomico e Geofisico da USP), and Antonio Divino Moura Nov. 1985 34 p refs Sponsored in part by FINEP and by CNPq
(Grant NAG5-127)
(NASA-CR-176617; NAS 1.26:176617; INPE-3723-RPE/497) Avail: NTIS HC A03/MF A01 CSCL 04B

A two layer, nonlinear, equatorial beta-plane model in p-coordinates is used to study the atmospheric response to a large scale prescribed heat source varying in time. The heat source is meant to represent a convective burst with total duration of approximately 48 hours over the Amazon/Bolivia region. The boundary conditions used are meridional velocity zero at 60 deg S, omega w = 0 at the top and zero geometric velocity at the lower boundary. Sensitivity study was done which includes initial state at rest, compared with realistic initial flow. The scale of the heat source is 1500 km in latitude and longitude and it is centered at 10 deg S. Special attention is paid to the distribution and intensity of the induced vertical motion. The model is integrated for two days and the preliminary results show agreement with the observed 200 mb flow. Of interest is the establishment of a trough and descending motion to the northeast of the heat source. A conjucture is thus made that the Amazon heat source and its fluctuations bear some relationship with the drought problem over Northeast Brazil. Author

N86-21073# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TELECONNECTIONS BETWEEN THE RAINFALL OVER NORTHEAST BRAZIL AND THE WINTER CIRCULATION OF NORTHERN HEMISPHERE
V. Brahmananda Rao and Jose I. B. deBrito Oct. 1985 21 p refs Submitted for publication
(INPE-3696-PRE/840) Avail: NTIS HC A02/MF A01

Linear correlation coefficients are calculated between the geopotential heights for the winter months at 700mb (December, January and February) over Northern Hemisphere and the March rainfall over Northeast Brazil. Isolines of correlation coefficient showed interesting patterns and regions of significantly high correlation. The occurrence of PNA pattern is interpreted as a connection between the Northern Hemisphere winter circulation and NE Brazil rainfall through El Nino - Southern oscillation phenomena. The negative center over North-West United States in the PNA pattern has also a direct relationship to the NE Brazil rainfall. Author

N86-21074# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STABILITY OF AN OCEANIC FRONT
Alejandro Livio Camerlengo Nov. 1985 25 p refs Presented at the I Encontro Regional de Geofisica, Sao Jose dos Campos, Brazil, 27-29 Nov., 1985
(INPE-3727-PRE/859) Avail: NTIS HC A02/MF A01

It is analytically shown that in the case of oceanic fronts in the upper layer, instability due to horizontal shear may only be possible on very small horizontal scales. Therefore, in the specific case of the Pacific Ocean Subarctic Front, barotropic instability should not occur. Author

N86-21075# Air Force Systems Command, Patrick AFB, Fla.
STATUS REPORT ON UPGRADE OF WEATHER FORECAST SUPPORT TO SHUTTLE OPERATIONS Progress Report, 1984 - 1985
T. M. Myers and B. F. Boyd 28 Feb. 1985 14 p
(AD-A159137; ESMC-TR-85-03) Avail: NTIS HC A02/MF A01 CSCL 04/2

The report details the background of a joint USAF and NASA project to upgrade the forecast inputs at the Cape Canaveral Forecast Facility (CCFF) in support of space shuttle and missile launch operations at the Eastern Test Range (ETR). The short range and microscale forecast requirements for shuttle could not be met with the inplace technology. To deal with this support capability shortfall, NASA and the USAF (Det 11, 2WS and the Eastern Space and Missile Center) initiated a Meteorological Systems Modernization Program (MSMP). The intent of this weather support upgrade is to minimize the impacts of the environment on the shuttle by providing the most accurate possible forecast advice to support managers during processing, launch, and recovery operations. Shuttle weather sensitivities are presented along with the architecture of the forecast support system being assembled to meet these challenges. Author (GRA)

N86-21076# Massachusetts Inst. of Tech., Cambridge. Center for Meteorology and Physical Oceanography.
EXPERIMENTAL RUNS WITH A LOW-ORDER MODEL OF A MOIST GENERAL CIRCULATION Final Report, 24 Nov. 1982 - 31 Mar. 1985
E. N. Lorenz 31 May 1985 24 p
(Contract F19628-83-K-0012)
(AD-A160359; AFGL-TR-85-0118) Avail: NTIS HC A02/MF A01 CSCL 04/2

We have made some experimental runs with a very-low-order general-circulation model, which includes the thermodynamic and radiative effects of water vapor and liquid water in the atmosphere. We first made several runs lasting 20 years or longer, to determine suitable combinations of values of model parameters for use in subsequent experiments. Using one suitable combination, we made one 450 year run, and found that the globally averaged atmospheric temperature underwent long-period fluctuations with a range of about two degrees, resembling real atmospheric climatic changes. In some final runs we suppressed the influence of cloudiness on the global albedo, and found that this modification eliminated the high sensitivity of the temperature to the plantary temperature and the very slow approach of the temperature to equilibrium, which characterized the ordinary runs. Thermodynamic and radiative effects of water. GRA

N86-21077# Air Force Geophysics Lab., Hanscom AFB, Mass.
THE AFGL GLOBAL SPECTRAL MODEL: EXPANDED RESOLUTION BASELINE VERSION Final Report, 1 Oct. 1982 - 30 Sep. 1984
S. Brenner, C. H. Yang, and K. Mitchell 16 Nov. 1984 80 p
(AF Proj. 2310)
(AD-A160370; AFGL-TR-84-0308; AFGL-ERP-895) Avail: NTIS HC A05/MF A01 CSCL 04/2

The flexible resolution/truncation baseline version of the AFGL global spectral model as adapted to the CRAY-1 is described. A series of low-resolution and high-resolution forecasts were run and compared to test the performance of the model. In general, higher resolution resulted in improved forecast skill in the 24-to-96-hour range. The only exception to this is the humidity forecast, which shows minimal skill. This characteristic is rather insensitive to the resolution partly because of the poor quality of analyzed humidity fields used for initial data and verification. The original gridded (2.5 X 2.5 deg) topography has been replaced by a smoothed terrain field that has been passed through a nine-point smoother, interpolated to the model's Gaussian grid, and then spectrally truncated. Finally, the effects of initialization have been studied by comparing a series of forecasts subjected to several initialization methods. For forecasts beyond 24 hours, the model is able to supress spurious gravity waves through the combined effects of the semiimplicit time scheme and the subgrid scale diffusion. The impact of normal mode initialization is seen mainly in the very short-range forecasts (less than 24 hours) and is thus important

for providing smooth first-guess fields for the analysis/data assimilation cycle. GRA

N86-21078# Transportation Systems Center, Cambridge, Mass.
THE STAPLETON MICROBURST ADVISORY SERVICE PROJECT: AN OPERATIONAL VIEWPOINT Final Report, Jun. 1984 - Sep. 1985
Lloyd Stevenson Sep. 1985 80 p
(AD-A161543; DOT-TSC-FAA-85-8; DOT/FAA/PM-85/21) Avail: NTIS HC A05/MF A01 CSCL 04/2

A microburst advisory service project was conducted at Stapleton International Airport for a six week period during the summer of 1984. This report describes what took place during the project and what was learned from an operational, air traffic control viewpoint. Specifically, the report describes: (1) The operational, Doppler weather radar-based, microburst advisory service provided to pilots; (2) An unplanned and informal, Doppler radar-based, gust front advisory service initiated partway through the project and used by the FAA for runway management purposes; (3) The operational impact on runway operations of an unexpected, low-altitude, wind shear feature in which individual microbursts form a relatively long-lived line structure; and (4) The low-altitude wind shear environment faced by Stapleton controllers and pilots during the six week project, which took place at the peak of the Denver thunderstorm season. A microburst is a small, short-lived, low-altitude, thunderstorm-related, wind shear feature that can exhibit an intense, complex wind shear pattern that can be particularly hazardous to landing and departing aircraft. GRA

N86-21079# Lawrence Livermore National Lab., Calif.
SIMPLE TRAJECTORY MODEL USING METEOROLOGICAL DATA ON AN IRREGULAR GRID
J. J. Walton Aug. 1985 9 p
(Contract W-7405-eng-48)
(DE86-001688; UCID-20557) Avail: NTIS HC A02/MF A01

A simple trajectory model has been developed that uses wind and temperature observations on an irregular grid. No diffusion calculation is performed but a number of parcels, injected at different locations and heights can be followed. The present version of the code has been driven using data from the NAMER-WINDTEMP tapes. DOE

N86-21080# Los Alamos National Lab., N. Mex.
OVERVIEW OF CLIMATIC EFFECTS OF NUCLEAR WINTER
E. M. Jones and R. C. Malone 1985 24 p refs Presented at the American Anthropological Society, Washington, D.C., 4 Dec. 1985
(Contract W-7405-eng-36)
(DE85-015738; LA-UR-85-2686; CONF-851225-1) Avail: NTIS HC A02/MF A01

A general description of the climatic effects of a nuclear war are presented. This paper offers a short history of the subject, a discussion of relevant parameters and physical processes, and a description of plausible nuclear winter scenario. DOE

N86-21081# Columbia Univ., Palisades, N.Y. Geological Observatory.
ARCTIC CLOUD COVER DURING THE SUMMERS OF 1977-1979
D. A. Robinson, G. J. Kukla, and M. C. Serreze 1985 182 p refs
(Contract DE-AC02-81EV-10665)
(DE86-000729; DOE/EV-10665/6; LDGO-85-5) Avail: NTIS HC A09/MF A01

Cloud cover in the Artic Basin has been charted from satellite images at approximately 3 day intervals for the months of May to August from 1977 to 1979. Three classes of cloud thickness at three altitudes were mapped and digitized together with sea level pressure. Cloudiness was found to be heterogeneous in space and time. Optically thick clouds had high tops and were associated with low pressure systems and airmasses advected from the south. Clouds of moderate thickness were the most prevalent. Cloud-free skies were most often colocated with high pressure. The central Arctic was cloudest, whereas the Canadian Archipelago was least cloudy. Overall, thick clouds were considerably less common than in earlier analyses drawn from ground and drifting station data. Cloud-free episodes throughout the basin persisted long enough to significantly affect the surface radiation budget and the dissipation of snow and ice. Our results indicate that climate models which attempt to assess the impact of CO2 on the radiation budget in the high latitudes should take into account the heterogeneity of cloud extent, thickness and height in the Arctic Basin. DOE

N86-21082# Oregon State Univ., Corvallis. Wind Resources Assessment Lab.
WAKE VELOCITY DEFICIT MEASUREMENTS AT THE GOODNOE HILLS MOD-2 SITE: A SUMMARY OF THE 1982 AND 1984 FINDINGS
R. W. Baker and S. N. Walker Aug. 1985 102 p
(Contract DE-AC79-81BP-29182)
(DE85-018284; DOE/BP-29182/15) Avail: NTIS HC A06/MF A01

The wake velocity deficits and turbulence levels measured behind the Goodnoe Hills MOD-2 2500 kW wind turbine generators using portable kite anemometers are described. The measured deficits are compared to those calculated from two different wake models as well as to those measured by other research scientists at the Goodnoe Hills test facility. DOE

N86-21083# Pacific Northwest Lab., Richland, Wash.
IMPROVING THE PERFORMANCE OF MASS-CONSISTENT NUMERICAL MODELS USING OPTIMIZATION TECHNIQUES
J. C. Barnard, H. L. Wegley, and T. R. Hiester Sep. 1985 33 p
(Contract DE-AC06-76RL-01830)
(DE86-001224; PNL-5566) Avail: NTIS HC A03/MF A01

This report describes a technique of using a mass-consistent model to derive wind speeds over a microscale region of complex terrain. A serious limitation in the use of these numerical models is that the calculated wind field is highly sensitive to some input parameters. Because accurate values for these parameters are not usually known, confidence in the calculated winds is low. However, values for these parameters can be found by tuning the model to existing wind observations within a microscale area. This tuning is accomplished by using a single-variable, unconstrained optimization procedure that adjusts the unknown parameters so that the error between the observed winds and model calculations of these winds is minimized. Model verification is accomplished by using eight sets of hourly averaged wind data. When the model is tuned to a small subset of 30 sites, an accurate determination of the wind speeds was made for the remaining sites in six of the eight cases. Therefore, when this technique is used, numerical modeling shows great promise as a tool for microscale siting of wind turbines in complex terrain. DOE

N86-21084# Technische Hochschule, Aachen (West Germany). Dept. of Aerospace Engineering.
WIND SHEAR MEASUREMENT ON BOARD A MORANE 893
H. Nelles 1985 21 p refs
Avail: NTIS HC A02/MF A01

To investigate wind shear during flight, a pneumatic sensing device was developed and installed on board a single engine light aircraft. The device measures the difference in total pressure between two positions vertically displaced from the airplane. The mass flow rate created by the difference in pressure is measured by a hot-wire probe. The signal of this probe is a function of the wind shear. Results compare favorably with those of a ground based sensing system and a D028 research aircraft. Author (ESA)

N86-21085# Hamburg Univ. (West Germany). Fachbereich Geowissenschaften.
THE INFLUENCE OF ANTHROPOGENIC AEROSOL PARTICLES ON THE RADIATION BUDGET OF THE ATMOSPHERE Ph.D. Thesis [EINFLUSS ANTHROPOGENER AEROSOLTEILCHEN AUF DEN STRAHLUNGSHAUSHALT DER ATHMOSPHAERE]
Madeleine Newiger 1985 109 p refs In GERMAN Sponsored

by Commission of European Communities Original contains color illustrations
(Wiss-Abhandl-73) Avail: NTIS HC A06/MF A01

The influence of anthropogenic aerosol particles on the atmospheric radiation budget was estimated via the changes of the climate parameters albedo and net radiant flux. Besides the directly emitted particles, the significance in the atmosphere of particles resulting from sulfur dioxide emission was studied. The particle concentrations were calculated with a two-dimensional transport model; the particle size distribution was described by a modified exponential function. Anthropogenic aerosol particles cause an increase of the average albedo of the Northern Hemisphere; soot reduces the albedo increase. In winter the albedo increases by 0.3 to 0.54% depending on particle absorption capacity, in summer it increases by 0.53% to 0.79%. It is shown that the emissions of aerosol particles and CO2 particles have on opposite effect on the radiation budget. On the Earth surface the net flux reduction due to particle emission is compensated by CO2 doubling. On the outer border of the atmosphere the CO2 effect dominates. Author (ESA)

N86-21086# Battelle Pacific Northwest Labs., Richland, Wash.
INTRODUCTION TO MICROMETEOROLOGICAL AND TRACER DATA ARCHIVE PROCEDURES Final Report
J. G. Droppo and C. R. Watson Aug. 1985 59 p
(Contract EPA-68-02-4063)
(PB85-235216; EPA-600/3-85-053) Avail: NTIS
HC A04/MF A01 CSCL 04B

A user oriented introduction to the archive structure and contents is provided. The archive includes both documentation and data. A data set documentation report is prepared for each archived data set. The archived data are contained within a well-defined structure called data map. Standard words are used for mapping variables and their units within the various data sets. This feature allows global scanning of data sets for specific variables. The data structure is designed so that selected portions may be loaded into the user's data base system or it may be accessing using a custom computer program. An example of a computer code for accessing the data is given. GRA

N86-21087# Battelle Pacific Northwest Labs., Richland, Wash.
MINNESOTA 1973 ATMOSPHERE BOUNDARY LAYER EXPERIMENT: MICROMETEOROLOGICAL AND TRACER DATA ARCHIVE, SET 001 DOCUMENTATION REPORT Final Report
R. K. Woodruff, J. S. Droppo, and C. S. Glantz Aug. 1985 22 p
(Contract EPA-68-02-4063)
(PB85-243152; EPA-600/E-85-054) Avail: NTIS
HC A02/MF A01 CSCL 04B

An archive for micrometeorological and tracer dispersion data was developed by Battelle, Pacific Northwest Laboratories for the U.S. Environment Protection Agency. The archive is designed to make the results of extensive field tests readily accessible to EPA for model testing, development, and verification efforts. Documentation is provided for one of the archived data sets, the Minnesota 1973 Boundary Layer Experiment. The aim of the effort is to achive invaluable data sets in a timely fashion before the necessary supporting information about the data becomes lost forever. The entries in the documentation report are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary table. GRA

N86-21088# National Climatic Center, Asheville, N. C.
TROPICAL CYCLONES OF THE NORTH ATLANTIC OCEAN, 1871-1980 (WITH STORM TRACK MAPS UPDATED THROUGH 1984)
C. J. Neumann, G. W. Cry, E. L. Caso, and B. R. Jarvinen Jul. 1985 181 p Prepared in cooperation with National Hurricane Center, Coral Gables, Fla. and National Hurricane Research Lab., Coral Gables, Fla.
(PB85-246163) Avail: NTIS HC A09/MF A01 CSCL 04B

North Atlatnic tropical cyclone tracks and certain basis statistical summaries are presented. The availability of storm tracks for the complete 110-year period 1871 to 1980 provide information on the climatology of tropical cyclones. GRA

N86-21089# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
DIURNAL AND SPATIAL VARIABILITY OF LIGHTNING ACTIVITY IN NORTHEASTERN COLORADO DURING THE SUMMER
R. E. Lopez and R. L. Holle Mar. 1985 44 p
(PB85-212173; NOAA-TM-ERL-ESG-14) Avail: NTIS
HC A03/MF A01 CSCL 04B

Lightning data obtained in 1983 from a network of three direction finders were studied to ascertain the diurnal development of space distributions of flash frequencies. The influence of the underlying topography and the resulting diurnal circulations on the time and place of lighting strokes was very apparent. In addition, the data showed that lightning is relatively rate, and exhibits a very large day-to-day variability. This study also emphasizes the utility of the type of data employed, to study the characteristics not only of lightning as such but also of topographically induced convection in general. GRA

N86-21090# National Hurricane Center, Coral Gables, Fla.
ANNUAL DATA AND VERIFICATION TABULATION ATLANTIC TROPICAL CYCLONES, 1984
G. B. Clark and R. A. Case Feb. 1985 280 p
(PB85-211332; NOAA-TM-NWS-NHC-26) Avail: NTIS
HC A13/MF A01 CSCL 04B

This is the eleventh report of an annual series prepared by the National Hurricane Center (NHC) to provide a source of summaried data on Atlantic tropical cyclones. It will not duplicate the narrative overview of the hurricane season or the description of individual storms, which will continue to be published in the Monthly Weather Review. In addition to data supplied by the National Weather Service, materials have been furnished by the NOAA Tropical Satellite and Analysis Center of NHC, and the CARACH (Chief Aerial Reconnaissance Coordination, All Hurricanes). This report also includes Probability Forecasts issued with advisories on landfalling United States tropical storms and hurricanes (Appendix B). GRA

N86-21091# National Severe Storms Lab., Norman, Okla.
NATIONAL SEVERE STORMS LABORATORY, FISCAL YEAR 1984 Annual Report, 1 Oct. 1983 - 30 Sep. 1984
Mar. 1985 53 p
(PB85-211092) Avail: NTIS HC A04/MF A01 CSCL 04B

Topics including: organization chart; personnel statisics; budget and funding; program areas (meteorological research, Doppler radar and storm electricity research, computer and engineering support and development, Cooperative Institute for Mesoscale Meteorological Studies); administrative group; grants and contracts; publications and reports of the laboratory, FY 1984; and Personnel of the National Severe Storms Laboratory are presented. GRA

N86-20447# Joint Publications Research Service, Arlington, Va.
VARIABILITY OF ATMOSPHERIC TRANSFER FUNCTION COMPONENTS Abstract Only
O. M. Pokrovskiy, V. M. Prokhorov, and T. F. Pchelova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 64 refs Transl. into ENGLISH from Issledovaniye Zemli IZ Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 9-20 Original language document was announced in IAA as A86-13277 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20888# Joint Publications Research Service, Arlington, Va.
AN-30 PHOTOGRAPHY AIRPLANE OUTFITTED FOR CLOUD-SEEDING MISSIONS
T. Kuznetsova and A. Pimenov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 1-2 Transl. into ENGLISH from Pravda Ukrainy (Kiev, USSR), 15 Aug. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20889# Joint Publications Research Service, Arlington, Va.
FACILITY FOR MODELING ORIGINS OF TYPHOONS
A. Melnikov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 3-4 Transl. into ENGLISH from Pravda (Moscow, USSR), 8 Jul. 1985 p 7 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20891# Joint Publications Research Service, Arlington, Va.
WORK ON MATHEMATICAL MODELING OF TROPICAL STORMS WAKES Abstract Only
A. Yakovlev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 7 Transl. into ENGLISH from Gudok (Moscow, USSR), 29 Sep. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20893# Joint Publications Research Service, Arlington, Va.
HYDROPHYSICAL STUDIES FROM SHIP VEYMER IN NORTH ATLANTIC
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 11 Transl. into ENGLISH from Sovetskaya Belorussiya (Minsk, USSR), 13 Aug. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-21092*# State Univ. of New York, Albany. Dept. of Geological Sciences.
WILSON STUDY CYCLES: RESEARCH RELATIVE TO OCEAN GEODYNAMIC CYCLES Final Report, 1 Jul. 1983 - 5 May 1985
William S. F. Kidd 5 May 1985 23 p refs
(Grant NAG3-333)
(NASA-CR-176560; NAS 1.26:176560) Avail: NTIS HC A02/MF A01 CSCL 08C

The effects of conversion of Atlantic (rifted) margins to convergent plate boundaries; oceanic plateaus at subduction zones; continental collision and tectonic escape; southern Africa rifts; and global hot spot distribution on long term development of the continental lithosphere were studied. B.G.

N86-21093# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
DEVELOPMENT OF A DEEP-TOWED ARRAY GEOPHYSICAL SYSTEM: A NEW CAPABILITY FOR DEEP-OCEAN ACOUSTIC MEASUREMENTS Final Report
Martin G. Fagot and Stephen E. Spychalski Jul. 1985 13 p
(AD-A162417; NORDA-74) Avail: NTIS HC A02/MF A01 CSCL 08/10

Development of a deep-towed seismic profiling system has been completed after four years of design, fabrication, and testing. This system provides the capability to determine the detailed acoustic character of the sea floor and upper 500 to 1000 m of subbottom structure. The system is designed for tow depths of 6000 m while operating at an altitude of 100 m above the sea floor. The major components of the system include: a sound source located in the deep-towed vehicle, which operates over a frequency range from 260 Hz to 650 Hz at a peak source level of 201 dB re 1 micropascal at 1 m; a 24 channel, 1000 m long array attached as a tail to the deep-towed vehicle; a duplex digital telemetry link to communicate with the deep-towed system over a coaxial tow cable; a digital data record system; a real time engineering data display system; a short baseline navigation system; handling hardware to deploy and retrieve the system; and two instrumentation vans to support system operations. This paper discusses the unique hardware developed for the deep-towed seismic system and focuses on the acoustic subsystems. Also reviewed is a performance prediction analysis initially performed to define geoacoustic parameter measurement improvements achievable with a deep-towed configuration. Field measurement engineering results acquired during the system's final performance evaluation are presented. Data was acquired at two depths of 4500 m. GRA

N86-21094# Rogers, Golden and Halpern, Inc., Reston, Va.
GULF OF MEXICO INDEX, AUGUST 1983 - OCTOBER 1984
Denise D. Molajo, Stephen P. Risotto, and Virginia A. Farris 1985 86 p
(Contract DI-14-12-0001-30042)
(TI85-90220X; OCS/MMS-85-0043) Avail: NTIS HC A05/MF A01

The Gulf of Mexico Index listing relevant, actual or proposed programs, plans, reports, environmental impact statements, and other lease information was prepared by the Outer Continental Shelf Oil and Gas Information Program. The index is provided on a regular basis to coastal states, and, upon request, to local governments and the public. B.G.

N86-21095# Brookhaven National Lab., Upton, N. Y.
OCEANOGRAPHIC DATA FROM MOORED INSTRUMENTATION Data Report, Apr. 1979
T. S. Hopkins, W. J. Behrens, A. L. Swoboda, and E. G. Divis Apr. 1985 114 p refs
(Contract DE-AC02-76CH-00016)
(DE86-001194; BNL-36785) Avail: NTIS MF A01

Five instrumented moorings were deployed in the nearshore region off Shinnecock, Long Island, during April 1979. Four of the moorings each had four sensor packages at distributed depths recording velocity, conductivity, temperature and pressure over hourly intervals. The fifth mooring had two fluorometers at two depths. The average period of operation was 21 days. The data are shown here through statistics, real time plots, progressive vector diagrams, and stick figures of 4 hourly averaged currents. This mooring deployment was the observational focus of an oceanographic experiment called Meso-Scale Experiment (MESEX). An objective of MESEX was to observe meso-scale (order 10 km) advective fluxes of temperature, salinity and particulate chlorophyll over the inner shelf off Long Island. The supporting observations included the ADVANCE II cruise, the OCEANUS cruise, an air-sea interaction buoy and a drogue experiment. DOE

N86-21096# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
STUDY OF THE APPLICATIONS OF ALTIMETRY DATA AND EXTRACTION METHODS Final Report [ETUDE SUR LES APPLICATIONS DES DONNEES D'ALTIMETRIE ET METHODES D'EXTRACTION]
A. deLeffe, M. Avignon, P. Raizonville, G. Cuvelier, and Y. Menard (Groupe de Recherches de Geodesie Spaciale, GRGS, Toulouse, France) 29 Jan. 1985 426 p refs In FRENCH
(Contract ESA-5812/84/NL-PB(SC))
(ESA-CR(P)-2113) Avail: NTIS HC A19/MF A01

The characteristics and utility of possible oceanographic and geophysics products are examined, refering to SEASAT results and to ERS-1 satellite possibilities. A global analysis of altimetric measurement errors is presented, estimating the amplitude and associated wavelength of the errors before and after correction. The main sources of error include instrument errors, for which a simulation computer program was developed in order to obtain quantitative estimations, errors due to ocean surface-electromagnetic interaction, propagation errors, and errors due to geophysical factors such as tides and atmospheric pressure. The algorithms used for SEASAT were studied, leading to data processing propositions for ERS-1. An external calibration strategy, using the laser site at Dakar, is also presented. Author (ESA)

N86-20894# Joint Publications Research Service, Arlington, Va.
PORT APPARATUS FOR REMOTE DETECTION OF SEA ROUGHNESS
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 12 Transl. into ENGLISH from Sovetskaya Litva (Vilnius,

USSR), 24 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20895# Joint Publications Research Service, Arlington, Va.
DEVICE FOR ANALYZING UNDERWATER TV PICTURES WITH IR CAPABILITY
A. Isayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 14 Transl. into ENGLISH from Trud (Moscow, USSR), p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20896# Joint Publications Research Service, Arlington, Va.
LONG-TERM PROGRAM TO STUDY OCEAN'S ENERGY-ACTIVE ZONES DESCRIBED Abstract Only
S. Lappo *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 18 Transl. into ENGLISH from Kommunist (Yerevan, USSR), 11 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20897# Joint Publications Research Service, Arlington, Va.
HYDROPHYSICAL EXPERIMENT MEZOPOLIGON-85 IN TROPICAL ATLANTIC
V. Titov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 19 Transl. into ENGLISH from Vodnyy Transport (Moscow, USSR), 1 Oct. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20898# Joint Publications Research Service, Arlington, Va.
SEASONAL SOURCES OF THERMOHALINE CIRCULATION IN NORTH ATLANTIC Abstract Only
L. I. Galerkin, A. S. Monin, and S. V. Sergunin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 20 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 705-708 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20902# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF TAYLOR-HOGG CONE ON DENSITY FIELD STRUCTURE IN STRATIFIED OCEAN WITH PYCNOCLINE Abstract Only
M. B. Timonov and N. K. Shelkovnikov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 23 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 752-758 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20903# Joint Publications Research Service, Arlington, Va.
MASLOV OPERATOR METHOD IN PROBLEM OF WAVES IN WATER GENERATED BY SOURCE MOVING OVER UNEVEN BOTTOM Abstract Only
S. Yu. Dobrokhotov and P. N. Khevandrov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 24 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 744-751 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20904# Joint Publications Research Service, Arlington, Va.
EVALUATION OF COEFFICIENTS OF HEAT AND MOISTURE EXCHANGE BETWEEN OCEAN AND ATMOSPHERE Abstract Only
V. V. Yefimov, N. A. Timofeyev, Ye. N. Sychev, and I. V. Kurzheyevskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 24-25 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 735-743 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20905# Joint Publications Research Service, Arlington, Va.
ESTIMATING DENSITY INHOMOGENEITY OF UPPER MANTLE UNDER ATLANTIC OCEAN USING DATA FROM COMPREHENSIVE REGIONAL GEOPHYSICAL RESEARCH Abstract Only
A. V. Ladynin, E. M. Litvinov, and S. P. Mashchenkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 25 Transl. into ENGLISH from Geologiya I Geofizika (Novosibirsk, USSR), no. 5, May 1985 p 93-103 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-21097*# National Aeronautics and Space Administration, Washington, D.C.
THE HUMAN FACTOR: BIOMEDICINE IN THE MANNED SPACE PROGRAM TO 1980
John A. Pitts 1985 402 p refs *In its* History Series
(Contract NASw-3213)
(NASA-SP-4213; NAS 1.21:4213; LC-85-21526) Avail: SOD HC $23.00 as 033-000-00977-1; NTIS MF A01 CSCL 05E

The purpose of this publication is to provide NASA personnel, NASA managers, and the biomedical and historical research communities a well-documented, historical summary of the content and organization of NASA's biomedical programs from Project Mercury up to the Shuttle program. The publication includes not only a major narrative portion, but appendixes and reference notes. Author

N86-21098# Michigan Univ., Ann Arbor. Dept. of Physiology.
CIRCADIAN VARIATION IN HOST DEFENSE Annual Report, Nov. 1984 - Oct. 1985
Matthew J. Kluger 18 Nov. 1985 10 p
(Contract N00014-85-K-0027; RR0-4108)
(AD-A161702) Avail: NTIS HC A02/MF A01 CSCL 06/15

We have been monitoring the body temperature and relative activity of up to 24 rats at a time using a recently developed biotelemetry system (The Dataquest III; Mini-Mitter Company). Each cage is maintained in a constant temperature chamber at 27 C and is on a 12:12 hour light-dark cycle. In the process of testing the versatility of this system and obtaining pilot data we have generated data for two manuscripts: (1) Hyperthermia induced by open-field stress is blocked by salicylate, Physiology and Behavior, and (2) Selection of cage size by Sprague-Dawley rats. Data directly relevant to the ultimate goal of the research include the following: a. We have established a dose of sodium salicylate which will block the circadian rise in body temperature, and b. We have established the normal circadian variation in activity for rats maintained on a 12:12 light-dark cycle. The administration of an antipyretic dose of sodium salicylate to rats in the late afternoon resulted in significant attenuation of the rise in body temperature normally observed at night; the drug had no effect on activity. Administration of this same dose of sodium salicylate to rats during the morning hours had no effect on body temperature or on activity. Since antipyretic drugs are thought to act by returning an elevated thermoregulatory set-point to normal, these data suggest to us that the rise in temperature observed at night in rats is a true fever, perhaps induced by interleukin-1 (IL-1). GRA

N86-21099# Georgia Univ., Athens.
ROLE OF Ca(2+)/CALMODULIN IN PHOSPHORYLATION OF PROTEINS IN PLANTS Final Report, 1 Aug. 1983 - 31 Jul. 1985
M. J. Cormier 1985 11 p refs
(Contract DE-AS09-83ER-13107)
(DE86-001804; DOE/ER-13107/3) Avail: NTIS HC A02/MF A01

In order to elucidate the role of Ca(2+)-dependent protein phosphorylation in plant cell function, a Ca(2+)-dependent protein kinase from suspension-cultured soybean cells has been partially

purified and characterized. It was previously shown that crude extracts of the soybean cells contain soluble protein kinase(s) that preferentially phosphorylates at least eight endogenous proteins in vitro in the presence of 0.5 mM CaCl2. An assay based on phosphorylation of the artificial substrate histone H1 has been devised. DOE

N86-21100# Los Alamos National Lab., N. Mex.
NEW ROLES FOR COMPUTATION IN THE LIFE SCIENCES
G. I. Bell 1985 13 p refs Presented at the Computer Analysis for Life Science, Okayama, Japan, 9 Jul. 1985
(Contract W-7405-eng-36)
(DE85-017542; LA-UR-85-2985; CONF-850784-2) Avail: NTIS HC A02/MF A01

Important new roles for computation in the life sciences are being found in the study of the linear polymers DNA, RNA, and proteins, and in the correlation of the sequence with the structure and function of each. Because of the ease with which DNA sequences can be determined and the definitive and often surprising information contained in the sequences, an explosion of biological information is taking place that will increasingly rely on computers for its analysis and understanding. DOE

N86-21101# Brookhaven National Lab., Upton, N. Y.
EXPERIMENTAL, STRUCTURAL AND THEORETICAL MODELS OF BACTERIOCHLOROPHYLLS a, d AND g
J. Fajer, K. M. Barkigia, E. Fujita, D. A. Goff, L. K. Hanson, J. D. Head, T. Horning, K. M. Smith, and M. C. Zerner 1985 17 p refs Prepared in cooperation with California Univ., Davis, and Florida Univ., Gainesville
(Contract DE-AC02-76CH-00016)
(DE86-001727; BNL-36992) Avail: NTIS HC A02/MF A01

The model studies presented here probe possible effects that the protein environment may induce or impose on the conformation and electronic configuration of photosynthetic chromophores. Results are presented for the effect of axial ligation and hydrogen bonding on the electron spin resonance properties of bacteriopheophytin and bacteriochlorophyll a cation radicals. X-ray diffraction results on single crystals illustrate the significant conformational changes that different crystal habits enforce on the same skeleton of bacteriopheophytins d and the structural consequences of oxidation on a magnesium porphyrin. Theoretical calculations are also described that predict spectral and redox properties of bacteriochlorophyll g, the recently discovered chromophore of the anoxygenic bacterium, heliobacterium chlorum. DOE

N86-21102# Pacific Northwest Lab., Richland, Wash.
COMPARATIVE ANALYSIS OF BIOMASS PYROLYSIS CONDENSATES
D. C. Elliott Sep. 1985 38 p refs Presented at the Health and Environmental Research on Complex Organic Mixtures, Richland, Wash., 21 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001773; PNL-SA-13158; CONF-851027-2) Avail: NTIS HC A03/MF A01

The purpose of this research is to determine the chemical composition, physical properties, and biological activity of biomass gasification/pyrolysis tars and condensates. The analytical results show conclusively that all biomass derived tars and condensates are not the same. There is no typical tar composition that can be adequately used. It is dependent on the operating conditions, principally a time/temperature thermal severity-type function. Results show high biological activity (Ames assay) only in high-temperature processed tars. Mutagenic activity in gasification condensates is correlated with the concentration of polycyclic aromatic hydrocarbons in the same. Based on the above information, a potential processing dilemma has now been identified. Higher temperatures are generally perceived to improve the efficiency and rate of gasification. In addition, our data also suggests that less contamination will remain in the aqueous byproduct stream when the gasification is performed at higher temperature. On the other hand, the tar components that do remain following higher temperature processing contain more highly condensed PAH which result in a higher level of mutagenic activity. The transformation from phenolic to PAH is strongly a function of temperature in the range of 700(0) to 950(0)C. Therefore consideration of the processing requirements for the aqueous condensate stream versus the organic condensate stream may become critical with operating temperature being the major independent variable. DOE

N86-20444# Joint Publications Research Service, Arlington, Va.
SHKLOVSKIY DISCUSSES POSSIBILITY OF EXTRATERRESTRIAL INTELLIGENCE
I. S. Shklovskiy *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 39-44 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 3, May - Jun. 1985 p 76-80 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20445# Joint Publications Research Service, Arlington, Va.
SALYUT-7 ELECTROPHORESIS EXPERIMENTS AID MEDICAL RESEARCH
T. Chesanova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 45 Transl. into ENGLISH from Leningradskaya Pravda (Leningrad, USSR), 13 Oct. 1985 p 2 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20890# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL ADAPTATION RESEARCH AT BIOLOGY INSTITUTE Abstract Only
Ye. Krusheinitskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 5-6 Transl. into ENGLISH from Trud (Moscow, USSR), 26 Sep. 1985 p 3 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-21132# Joint Publications Research Service, Arlington, Va.
GREENHOUSES WITH CURVILINEAR PLANTING SURFACE
Yu. A. Berkovich, V. A. Korbut, and V. I. Pavlovskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 115-119 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 77-80 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-21103 New South Wales Univ., Kensington (Australia). Centre for Biomedical Engineering.
ANALYSIS TECHNIQUES FOR CONTINUOUS TWENTY FOUR HOUR AMBULATORY BLOOD PRESSURE PATTERNS Abstract Only
David John Roffe 1985 3 p
Avail: Issuing Activity

The Oxfor ambulatory blood pressure recording system records each arterial blood pressure complex during a 24 hour period onto a miniature cassette tape. A hierarchy of analysis techniques was developed on a DEC LSI-11/03 minicomputer. Subsequent statistical analysis and graphical representation describe the patient's arterial blood pressure variation throughout the recording period. Inspection of 24 hour continuous ambulatory blood pressure record shows many marked, apparently spontaneous blood pressure fluctuations. Detection of these blood pressure transients as they occur may help sort out their causal mechanisms. A microprocessor device was constructed to monitor direct blood pressure in real time and compile a history of the blood pressure and heart rate. E.A.K.

N86-21104 Central Electricity Generating Board, London (England).
THE EFFECT OF EQUALLY EFFECTIVE NEUTRON AND X-RAY RADIATION DOSES ON THE EPITHELIAL CELLS OF THE HAIR BULB
S. M. Vaiter, E. L. Ginsburg, A. V. Bogatyrev, G. I. Kalonykova, and A. G. Sverdlov 6 Nov. 1985 13 p refs Transl. into ENGLISH from Radiobiologia (USSR), v. 22, issue 5, 1982 p 637-642
(BLL-CE-Trans-8221-(9022.090)) Avail: British Library Lending Div., Boston Spa, Engl.

Two stages in the response of rat hair follicle cells to X-ray and neutron irradiation with equally effective doses were examined. Enlargement of endoplasmic reticulum canals, swelling of some of the mitochondria, and appearance of autophagous vacuoles in cells were detected during the first day following irradiation. After 5 to 7 days, the changes which occurred were characteristic of the process of hair follicle transfer from the active to resting stage. No qualitative distinctions are detected in the radiation response of the cells studied. E.A.K.

N86-21105*# Baylor Coll. of Medicine, Houston, Tex. Dept. of Medicine.
IN VIVO NUCLEAR MAGNETIC RESONANCE IMAGING Final Report, Oct. 1984
Adrian LeBlanc, Harlan Evans, R. Nick Bryan, Phillip Johnson, Ernie Schonfeld, and Satish G. Jhingran Oct. 1984 25 p refs (Contract NAS9-16442)
(NASA-CR-171928; NAS 1.26:171928) Avail: NTIS HC A02/MF A01 CSCL 06P

A number of physiological changes have been demonstrated in bone, muscle and blood after exposure of humans and animals to microgravity. Determining mechanisms and the development of effective countermeasures for long duration space missions is an important NASA goal. The advent of tomographic nuclear magnetic resonance imaging (NMR or MRI) gives NASA a way to greatly extend early studies of this phenomena in ways not previously possible; NMR is also noninvasive and safe. NMR provides both superb anatomical images for volume assessments of individual organs and quantification of chemical/physical changes induced in the examined tissues. The feasibility of NMR as a tool for human physiological research as it is affected by microgravity is demonstrated. The animal studies employed the rear limb suspended rat as a model of mucle atrophy that results from microgravity. And bedrest of normal male subjects was used to simulate the effects of microgravity on bone and muscle. Author

N86-21106*# Nevada Univ., Reno. Fast Motion Perception Lab.
CONTRIBUTIONS TO WORKLOAD OF ROTATIONAL OPTICAL TRANSFORMATIONS Final Technical Report
Rick Paul Atkinson and Thomas L. Harrington [1985] 123 p refs
(Contract NCC2-272)
(NASA-CR-176542; NAS 1.26:176542) Avail: NTIS HC A06/MF A01 CSCL 06S

An investigation of visuomotor adaptation to optical rotation and optical inversion was conducted. Experiment 1 examined the visuomotor adaptability of subjects to an optically rotating visual world with a univariate repeated measures design. Experiment 1A tested one major prediction of a model of adaptation put forth by Welch who predicted that the aversive drive state that triggers adaptation would be habituated to fairly rapidly. Experiment 2 was conducted to investigate the role of motor activity in adaptation to optical rotation. Specifically, this experiment contrasted the reafference hypothesis and the proprioceptive change hypothesis. Experiment 3 examined the role of cognition, error-corrective feedback, and proprioceptive and/or reafferent feedback in visuomotor adaptation to optical inversion. Implications for research and implications for practice were suggested for all experiments. Author

N86-21107*# San Francisco State Univ., Calif.
STIMULUS SPECIFICITY AND INDIVIDUAL STEREOTYPY OF AUTONOMIC RESPONSES TO MOTION STRESSORS M.S. Thesis
Maxwell Guy Morgan Aug. 1985 54 p refs
(Contract NCC2-115)
(NASA-CR-176543; NAS 1.26:176543) Avail: NTIS HC A04/MF A01 CSCL 06S

Motion sickness research shows a lack of agreement regarding the contribution of the autonomic nervous system (ANS). The resolution of this question is exigent for Space Adaptation Syndrome, zero gravity sickness. A case is drawn for the necessity to apply a methodological approach that incorporates: (1) standardization of parameters in relation to the individual differences in variability and prestimulus levels; (2) a concern for patterning of responses; and (3) the physiological association with subjective reports. Vasomotor, heart rate, respiration rate, skin conductance and subjective reports of malaise were collected from 22 subjects while participating in three motion stressors; vertical acceleration, Coriolis stimulation, and combined optokinetic and Coriolis stimulation. The results demonstrate that ANS response patterns can be separated into three mutually exclusive components: (1) a generalized response to motion sickness; (2) a stimulus specific response to the type of stressor being presented; and (3) individualized stereotypical response patterns that are associated with subjective reports of malaise. Author

N86-21108*# California Univ., San Francisco. Contract NCC2-115
EXPLORATORY STUDIES OF PHYSIOLOGICAL COMPONENTS OF MOTION SICKNESS: CARDIOPULMONARY DIFFERENCES BETWEEN HIGH AND LOW SUSCEPTIBLES Progress Report
Karen Naifeh [1985] 18 p refs
(NASA-CR-176541; NAS 1.26:176541) Avail: NTIS HC A02/MF A01 CSCL 06S

A comprehensive examination of cardiovascular autonomic response to motion sickness was studied and whether differences in cardiopulmonary function exist in high and low susceptibility groups were determined. Measurement techniques were developed as was test equipment for its ability to provide accurately new measures of interest and to test the adequately of these new measures in differentiating between susceptibility groups. It was concluded that these groups can be differentiated using simple, brief stressors and measurements of cardiodynamic function. Author

N86-21109*# California Univ., San Francisco.
SHUTTLE FLIGHT EXPERIMENT 30-DAY SUMMARY REPORT
1985 25 p
(Contract NCC2-115)
(NASA-CR-176539; NAS 1.26:176539) Avail: NTIS HC A02/MF A01 CSCL 06S

A total of 12 AFT training sessions were administered to SL 3 Payload Specialists over a 7 month period. Nine of these sessions were 2 hours in duration and three were 3 hours in duration. A total of three rotating chair tests were conducted in this time frame with four subjects. The performance of these crewmen across tests is shown. Test 1, a baseline motion sickness test, was conducted approximately 10 months prior to the mission, before any AFT was administered. Test 2 was administered after 2 hours of AFT, test 3 after 4 hours and test 4 after 6 hours (total) of training in symptom control. Improvement in performance is reflected by a subject's ability to tolerate a greater number of rotations across tests. Additional training for crewman was not possible within the constraints of the mission. Results of the mission indicate that, as predicted preflight, subject #32 was relatively symptom free inflight while subject #33 was not. Other preflight and postflight tests and analyses are reported. Author

N86-21110# Office of Naval Research, London (England).
THE 10TH MEETING OF THE INTERNATIONAL SOCIETY FOR NEUROCHEMISTRY HELD AT RIVA DEL GARDA, ITALY ON 19-24 MAY 1985
C. E. Zomzely-Neurath 8 Oct. 1985 12 p Meeting held at Riva del Garda, Italy, 19-24 May 1985
(AD-A160668; ONRL-C-10-85) Avail: NTIS HC A02/MF A01

CSCL 06/1

The Tenth Meeting of the International Society for Neurochemistry was held in Riva del Garda, Italy, from 19 through 24 May 1985. This report discusses presentations on molecular neurobiology, post-translational modification, neurotransmitter receptors, neuropeptide processing, and specific macromolecules in cell-cell interactions in the nervous system. Author (GRA)

N86-21111# Army Research Inst. of Environmental Medicine, Natick, Mass.

COMPARISON OF MALE AND FEMALE MAXIMUM LIFTING CAPACITY

M. A. Teves, J. A. Vogel, and J. E. Wright Sep. 1985 15 p
(AD-A160687; USARIEM-M40/85) Avail: NTIS HC A02/MF A01
CSCL 06/19

A large influx of women into traditionally male fields of employment has drawn much attention to the strength differences between men and women. Two tests of isometric strength (handgrip and upright pull) and two tests of maximum lift capacity (a weight lift machine-IDL 152 and a weighted box lift MLC 132) were administered to 90 male and 107 female soldiers at the end of their Basic Training in order to examine differences in female/male (F/M) strength ratio. Skinfold measurements were made to obtain an estimate of lean body mass (LBM). Females exhibited 63% of the isometric strength and 55-59% of the lifting capacity of males. When the scores were normalized for body weight (BW) females were 75% as strong as males on isometric measures, and were able to lift 66% as much on IDL 152 and 72% as much on MLC 132. Comparison of the two lifting tasks revealed that on the average, males were able to lift 18% more weight and 24% more weight on the free lift than on the machine lift. This would suggest that if a machine lift is used for pre-employment screening purposes, the absolute weight an applicant is required to lift on the machine need not equal the maximum weight to be lifted on the job. As the difference between a machine lift and a free lift task was greater in females, a machine lift test may pose a greater disadvantage to female candidates than would isometric or free weight lift testing. GRA

N86-21112# Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.

HEAD-SPINE STRUCTURE MODELING: ENHANCEMENTS TO SECONDARY LOADING PATH MODEL AND VALIDATION OF HEAD-CERVICAL SPINE MODEL Final Technical Report, May 1980 - May 1984

T. Belytschko, M. Rencis, and J. Williams Jul. 1985 132 p
(Contract F33615-80-C-0523)
(AD-A161425; AAMRL-TR-85-019) Avail: NTIS HC A07/MF A01
CSCL 06/19

SAM (for Structural Analysis of Man) is a three-dimensional discrete element mathematical model developed for the prediction of the dynamic response of the head-spine-torso structure to severe impact environments. The model mathematically describes the equations of motion for a system of rigid bodies representing, for example, the head, torso segments and the pelvis, interconnected by deformable elements representing, for example, the intervertebral discs, ligaments and other connective tissues. SAM consists of two distinct components; a general purpose, large displacement, dynamic structural analysis program and a data base containing a number of data sets each which contains material, geometric and inertial property, connectivity and loading environment data. This report describes. the development of a model of the diaphragm which, when incorporated into the HSM, will significantly enhance its ability to replicate the effects of the secondary +Gz loading path through the viscera-abdominal wall/diaphragm/rib-cage system; a discussion of spinal injuries associated with pilot ejection and proposed injury criteria for the cervical spine; an axisymmetric finite element analysis of a lumbar vertebral body with comparisons to other models and specific attention to the question of material distribution effects on stresses; and frontal (-Gx) and lateral (+Gy) impact simulations using the recently developed Head-Cervical Spine Model and comparisons of simulation results with experimental data. GRA

N86-21113# Monsanto Research Corp., Miamisburg, Ohio. Mound.

LIGHT-WEIGHT RADIOISOTOPE HEATER UNIT SAFETY ANALYSIS REPORT (LWRHU-SAR). VOLUME 1. A. INTRODUCTION AND EXECUTIVE SUMMARY. B. REFERENCE DESIGN DOCUMENT (RDD)

E. W. Johnson Oct. 1985 96 p
(Contract DE-AC04-76DP-00053)
(DE86-001457; MLM-3293-Vol-1) Avail: NTIS HC A05/MF A01

The orbiter and probe portions of the NASA Galileo spacecraft contain components which require auxiliary heat during the mission. To meet these needs, the Department of Energy's (DOE's) Office of Special Nuclear Projects (OSNP) has sponsored the design, fabrication, and testing of a one-watt encapsulated plutonium dioxide-fueled thermal heater named the Light-Weight Radioisotope Heater Unit (LWRHU). This report addresses the radiological risks which might be encountered by people both at the launch area and worldwide should postulate mission failures or malfunctions occur, which would result in the release of the LWRHUs to the environment. Included are data from the design, mission descriptions, postulated accidents with their consequences, test data, and the derived source terms and personnel exposures for the various events. DOE

N86-21114# Joint Publications Research Service, Arlington, Va.

USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 19, NO. 6, NOVEMBER - DECEMBER 1985

O. G. Gazenko, ed. 19 Feb. 1986 154 p refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 95 p
(JPRS-USB-86-001) Avail: NTIS HC A08/MF A01

Reports of U.S.S.R. researach in space biology and aerospace medicine are presented. Orthostatic tolerance under various conditions in humans and animals was an important topic of interest. Weightless effects on muscular function in animals and humans were also investigated. Studies were also carried out on the physiological effect of high altitude on the cardiovascular system and the brain. For individual titles, see N86-21115 through N86-21137.

N86-21115# Joint Publications Research Service, Arlington, Va.

SPATIAL ILLUSIONS OF VESTIBULAR GENESIS DURING FLIGHTS IN AIRCRAFT

E. V. Lapayev and O. A. Vorobyev *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 11-16 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 11-15 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Vestibular illusions (incidence, pattern, manifestation, negative effect on pilot's activity) that occur in the atmospheric flight were studied. A special questionnaire was used to interview anonymously 484 flying crewmembers. Spatial illusions were detected in 71.1% of the crewmembers; they developed in 50.6% when turns were performed and they were perceived in 76.2% as a false bank. Over 50% (54.3%) of the crewmembers interviewed reported that spatial illusions adversely affected pilot's performance and 3.6% of them indicated that they adversely influenced the flight program as a whole. Spatial illusions can be generated by various factors which should be taken into account in order to improve countermeasures against spatial illusions in the flying personnel. Author

N86-21116# Joint Publications Research Service, Arlington, Va.

VESTIBULAR FUNCTION IN OLDER INDIVIDUALS SUBMITTED TO ANTIORTHOSTATIC HYPOKINESIA FOR 30 DAYS

V. K. Gavrilin and L. N. Zakharova *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 17-25 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6,

Nov. - Dec. 1985 p 15-20 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Vestibular responses of 15 men (aged 42 to 50) to 30-day head-down tilt (-8 deg) were investigated. The test subjects showed atherosclerotic symptoms and neurocirculatory dystonia of the hypertensive type. They were exposed to the Fitzgerald-Hallpike caloric test, indirect otolithometry (eye counter-rolling reflex according to the method of successively presented images), and motion sickness according to Bryanov. In the pretest period vestibular changes were seen at the level of labyrinths and central formations (change in the nystagmic pattern, dissociation of the components of the caloric reaction, vestibular asymmetry, negative counter-rolling). During head-down tilt cupular reflexes remained essentially unaltered, except for the asymmetry and enhancement of the sensory and autonomic components of the caloric reaction. The otolith function was modified in all the test subjects. After exposure tolerance to motion sickness was not deteriorated.

Author

N86-21117# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF ACCELERATIONS IN AEROBATIC FLIGHT AS A SPORT
V. G. Voloshin, Yu. I. Bykova, A. V. Opryshko, and N. A. Lapshina *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 26-28 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 20-22 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Thirty well-qualified flying sportsmen, aged 22 to 42, who performed 210 aerobatic flights, onboard a sporting airplane Yak-50, were examined, using an automatic monitoring system. The flyers were exposed to +9 Gz and -6 Gz as a maximum the duration of which was 10 s and 5 s, respectively. The onset rate varied from 0.5 to 2.5 G/s (with the mean rate 1 G/s), reaching 4.2 G/s as a maximum. On the average, the training flight lasts 25 min, 45 to 50% of which the pilot experiences acceleration of various values and different sign. The most common acceleration values are: +6 and +7 Gz or -4 and -5 Gz.

Author

N86-21118# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS IN REACTIONS TO ACTIVE ORTHOSTATIC AND WATER-LOADING TESTS OF SUBJECTS DIFFERING IN TOLERANCE TO POSITIVE Gz ACCELERATIONS
I. G. Dlusskaya and M. N. Khomenko *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 29-35 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 22-27 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Thirty-seven healthy male test subjects, aged 19 to 21, with different +Gz acceleration tolerance were examined. Their blood pressure (BP) and heart rate (HR) during 5-min tilt tests and 2% water loading tests were measured 2 to 3 weeks prior to centrifugation. Quantitative evaluation of orthostatic tolerance using an orthostatic index and BP and HR responses to tilt tests before and after water loading revealed specific features of cardiovascular regulation in the subjects with high and low +G acceleration tolerance. The negative predictive indicators include: decreased BP, HR and cardiac index in the supine position in combination with high orthostatic tolerance, as well as decreased orthostatic tolerance in combination with a lower function of vasoconstrictor mechanisms in the upright position and a lower sensitivity of carotid sinus reflexes to blood volume changes during tilt and water loading tests.

Author

N86-21119# Joint Publications Research Service, Arlington, Va.
EFFECT OF IMMERSION HYPOKINESIA ON CHARACTERISTICS OF PROGRAMMED VOLUNTARY MOVEMENTS
A. V. Kirenskaya, I. B. Kozlovskaya, and M. G. Sirota *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 36-43 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 27-32 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The effect of immersion hypokinesia on the precision of program-type voluntary movements was investigated using standard test movements and quantitative analytical methods. The exposure did not cause disorders in the programme mechanisms but reduced significantly the precision range of the motor control system. The loss of precision was at its maximum (by 100% and over) on immersion day 3. The universality and consistency of the above changes indicated their close association with the specific exposure while the fast rate of their development suggested their reflex nature.

Author

N86-21120# Joint Publications Research Service, Arlington, Va.
CEREBRAL CIRCULATION AND OXYGENATION IN HEALTHY MAN DURING GRADED EXERCISE IN ANTIORTHOSTATIC POSITION
V. Ye. Katkov and N. V. Pravetskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 44-47 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 32-34 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Eleven healthy male test subjects performed exercises of 600 kgm/min (98 W) for 20 min in the head-down position (-15 deg). A day before exercises they were catheterized, with catheters implanted into the internal jugular vein and brachial artery. It was shown that exercises in the head-down position an increase in cerebral circulation, a decrease in oxygen utilization and a decrease in jugular pressure. CO2 tension in arterial blood and blood outflowing from the brain remained comparatively stable, while base deficiency and buffer capacity decreased by a similar value.

Author

N86-21121# Joint Publications Research Service, Arlington, Va.
FORCED EXPIRATION PARAMETERS IN HEALTHY MAN SUBMITTED TO SIMULATED WEIGHTLESSNESS
N. M. Asyamolova, V. G. Shabelnikov, V. M. Baranov, A. N. Kotov, and M. Yu. Volkov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 48-52 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 34-37 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Lung volumes and forced expiratory volumes during 3-hour water immersion as well as in the upright and supine positions were measured. Water immersion up to the neck decreased the functional residual capacity, peak and maximum velocities of air flows during inspiration and expiration with various lung volumes and increased the forced expiratory time and pulmonary time constant. These changes seem to be produced by a higher inelastic resistance as well as additional hydrostatic pressure upon the chest and abdomen. During the transfer from the upright to the supine position these changes were identical but of smaller magnitude.

Author

N86-21122# Joint Publications Research Service, Arlington, Va.
EFFECT OF RESTRICTED MOTOR ACTIVITY ON ALANINE LEVEL IN HUMAN PLASMA
T. F. Vlasova, Ye. B. Miroshnikova, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 53-57 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 37-40 (For primary document

see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The plasma alanine concentration was measured in 28 healthy male test subjects exposed to head-down tilt of various duration (2-hour exposure at -12 deg, 7-day exposure at -6 deg, 49-day exposure at -4 deg, and 120-day exposure at -4 deg). Head-down tilt led to alanine changes that correlated with exposure time. These results suggest that alanine concentrations in blood reflect to a certain extent the rate of hepatic gluconeogenesis and depend significantly on the hypokinetic time. The findings can be clinically used as a measure of hepatic gluconeogenesis in bed-ridden patients that may require preventive or therapeutic treatment.
Author

N86-21123# Joint Publications Research Service, Arlington, Va.
EFFECT OF WEIGHTLESSNESS AND SOME OF ITS MODELS ON MECHANICAL PROPERTIES OF ANIMAL BONES SUBMITTED TO TORSION
M. A. Dobelis, Yu. Zh. Saulgozis, V. Ye. Novikov, Ye. A. Ilin, and V. S. Oganov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 58-65 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no 6, Nov. - Dec. 1985 p 40-45 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Mechanical properties (stress and strain) of bones from rats of different ages exposed to weightlessness, hypodynamia or hypokinesia were examined upon torsion. As compared to the controls, the femur of Cosmos-1129 rats showed high deformability. Also, skeletal bones of young rats proved more sensitive to hypodynamia than those of adult animals.
Author

N86-21124# Joint Publications Research Service, Arlington, Va.
ROLE OF VITAMIN D3 ACTIVE METABOLITES IN REGULATION OF CALCIUM METABOLISM IN HYPOKINETIC RATS
I. N. Sergeyev, B. V. Afonin, N. V. Blazheyevich, B. V. Morukov, and M. S. Belakovskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 66-71 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 46-50 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The rats exposed to prolonged hypokinesia showed hypocalcemia, lower PTH and higher calcitonin concentrations in the serum, decreased calcium absorption in the small intestine, and a trend toward nephro- and arteriocalcinosia. Prophylactic administration of 24,25-hydroxy D sub 3, 1,25-hydroxy D sub 3 and their combinations enhanced calcium absorption and alleviated hypocalcemia. The changes in the hormonal regulation of calcium homeostasis can be viewed as a factor responsible for calcium metabolic disorders associated with hypokinesia.
Author

N86-21125# Joint Publications Research Service, Arlington, Va.
COMPARISON OF BONE REACTIONS OF RATS SUBMITTED TO CLINOSTATIC AND ANTIORTHOSTATIC HYPOKINESIA
V. N. Shvets, A. S. Pankova, O. Ye. Kabitskaya, and Z. Ye. Vnukova *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 72-78 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 50-54 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Examination of spongy bones of rats exposed to clino- and antiorthostatic hypokinesia showed that changes in bone mass, bone cells and their precursors were similar in both cases. The bone resorption-bone formation process remained balanced. However, bone responses to clino- and antiorthostatic hypokinesia exhibited certain differences. Clinostatic hypokinesia produced greater osteo-porosis in the femoral bone, whereas bone losses in the humerus, sternum and pelvis were identical. Antiorthostatic hypokinesia led to osteoporosis that was identical in every bone examined. In addition, clino- and antiorthostatic hypokinesia caused different reactions of stromal precursor cells, the latter model producing a greater effect on them. It is concluded that immobilization-induced skeletal disorders are associated with a decreased rate of bone histogenesis which proceeds at a lower level rather than with the stress-reaction.
Author

N86-21126# Joint Publications Research Service, Arlington, Va.
CONDITION OF THYROID GLAND AND C CELLS DURING LONG-TERM ROTATION (MORPHOLOGICAL AND BIOCHEMICAL INVESTIGATION)
G. I. Plakhuta-Plakutina, Ye. A. Savina, and B. V. Afonin *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 79-83 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 54-57 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The thyroid and parathyroid glands of 65 Wistar rats centrifuged for 30 days at 1.1 and 2.0 G were examined histologically and biochemically. The centrifugation led to a higher activity to C cells, an increased rate of thyro-calcitonin (TCT) synthesis and excretion, i.e., C-cell degranulation, and a significant (twofold) increase of TCT in plasma. The stimulation effect of the TCT-producing system persisted during 7-postrotation days and was very distinct in the animals exposed to 2.0 G. There were no morphological changes in the parathyroid glands or in the PTH concentration in the plasma.
Author

N86-21127# Joint Publications Research Service, Arlington, Va.
CONDITION OF CARDIOVASCULAR SYSTEM IN PRESENCE OF ACUTE MOUNTAIN SICKNESS
M. M. Mirrakhimov, R. O. Khamzamulin, and V. A. Larkov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 84-90 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 57-62 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Fifteen subjects with uneventful adaptation and 28 subjects with acute high mountain sickness were kept at an altitude of 3600 m. Prior to the exposure all the test subjects, aged 18 to 20, were essentially healthy. As compared to the controls, the subjects with acute high mountain sickness showed a greater increment in heart rate, blood pressure in the brachial artery, pulmonary hypertension and vasoconstriction. It was found that the subjects susceptible to acute high mountain sickness exhibited (at sea level) higher values of heart rate and R wave in the ECG II lead and lower systolic pressure in the brachial artery. These findings can serve as predictors of acute high mountain sickness.
Author

N86-21128# Joint Publications Research Service, Arlington, Va.
RAT BRAIN IMPEDANCE IN STATIONARY MAGNETIC FIELD
L. D. Klimovskaya, N. P. Smirnova, and A. S. Dyakonov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 91-94 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 62-64 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The cortical impedance of the large hemispheres of nembutal-anesthetized rats exposed to a constant magnetic field of 0.1, 0.4 and 1.6 T was investigated. During 20 min. exposure the impedance decreased (at the expense of a decrease in both of its components--capacity and active resistance). The impedance decrease was more pronounced (up to 93%) and statistically significant in a field of 1.6 T. After exposure the impedance decrease persisted for 10 min.
Author

N86-21129# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL ARRHYTHMIA AND ITS PREVENTION
L. L. Stazhadze, T. A. Ventslavskaya, and V. V. Korzhova *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 95-101 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 64-68 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The preventive antiarrhythmic effect of a new derivative of selene-containing aralkyl amines, i.e., selenophene-24, was compared with the routinely used drugs--novocain amide, isoptin and inderal. With respect to the preventive effect and spectrum of action selenophene-24 was shown to be advantageous on various experimental models of arrhythmias: aconitium, strophantinum, pituitrinum or calcium chloride. Author

N86-21130# Joint Publications Research Service, Arlington, Va.
EVALUATION OF CONDITION OF HUMAN SKIN IN A CLOSED ENVIRONMENT BY MEANS OF CHROMATOGRAPHY
D. M. Dubinin, V. P. Naydina, and S. N. Zaloguyev *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 102-108 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 69-73 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Gas-liquid chromatography was used to study the skin and sebum cutaneum of 6 male test subjects (aged 45 to 55) before and after 30-day enclosure. The greatest changes were seen in the composition of free fatty acids of lipids of the facial skin (increase of palmito-oleic acid). The lipid composition of the sebum cutaneum of the healthy subjects differed from that of the acne-bearing subjects. It is recommended to use the ratio of palmitic acid to palmito-oleic acid as a measure of changes of fatty acids in the sebum cutaneum of healthy people in an unusual environment. Author

N86-21131# Joint Publications Research Service, Arlington, Va.
TOXICOLOGICAL EVALUATION OF GAS EMISSION FROM HEAT-STABLE TETRAFLUOROETHYLENE-BASED POLYMERS WHEN HEATED
V. F. Ushakov, G. I. Solomin, G. P. Tikhonova, A. I. Gorshunova, I. I. Lyubarskaya, L. V. Marchenko, E. I. Chukhno, N. Ye. Ostasheva, Ye. A. Demchenko, and S. S. Pashin *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 109-114 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 73-77 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The purpose of this study was to investigate the composition and toxicity of fluoroplastic F-40 thermodestruction products at 300 to 500 C and to identify the maximally allowable temperature for their safe use. When heated over 400 C, the products of fluoroplastic F-40 evolution included such compounds as hydrogen fluoride, fluoroorganic compounds, carbon monoxide, formaldehyde. When heated at 500 C, the thermodestruction products caused the highest mortality rate of mice. The pathogenesis and clinical development of fluoroplastic F-40 poisoning are primarily associated with fluoro-compounds. It is concluded that the temperature 300 C is the maximum temperature at which tetrafluoroethylene based polymers can be used. Author

N86-21132# Joint Publications Research Service, Arlington, Va.
GREENHOUSES WITH CURVILINEAR PLANTING SURFACE c51
Yu. A. Berkovich, V. A. Korbut, and V. I. Pavlovskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 115-119 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 77-80 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The laws of light distribution in plants shown on the flat plane, spherical or cylindrical surfaces were investigated. In microgravity where the plants are arranged radially the level of illumination of lower leaf strata is higher on curvilinear than on flat surfaces. This is due to the following: as the plants grow they get separated; also, the concentration of the light flux increases with depth of plants on the curvilinear surfaces. In view of this, a space greenhouse is suggested, the design of which provides high productivity per unit volume and per unit energy of the incident flux of photosynthetically active radiation. Author

N86-21133# Joint Publications Research Service, Arlington, Va.
DEVICE FOR COMBINED STUDY OF VISUAL TRACKING AND VERBAL ACTIVITY
B. A. Karpov and A. I. Pudov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 120-123 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 80-82 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The diverse forms of industrial and research work often require that man combine intensive visual tracking with verbal activity. A pilot or cosmonaut may be compelled to keep attentive watch over relatively mobile reference points, targets and other objects and, at the same time, hold responsible conversations, receive or give orders, receive important information orally, etc. It is necessary to make synchronous records of the subject's eye movements, his speech as well as speech addressed to him for a quantitative evaluation of tracking distinctions associated with a verbal load. An experimental device designed to solve this problem should meet the following conditions: (1) eye movements must be recorded by a rather sensitive method, so that all elements of functional significance to tracking of eye movements in the macro- and microrange (with the exception of tremor) are distinctly recorded, (2) the test signals delivered for tracking must be few in number and standard, typical, and (3) the tracing obtained as a result of the examination must provide a clear idea about the oculomotor and verbal activity of the subject, as well as the speech of individuals with whom he converses. A device for simultaneous and combined recording of two processes in graphic form--eye movements when tracking visual stimuli and concomitant conversation is described. B.W.

N86-21134# Joint Publications Research Service, Arlington, Va.
METHODOLOGICAL PROBLEMS RELATED TO GROUND-BASED TESTING OF TEMPERATURE-CONTROL SYSTEM FOR MANNED SPACECRAFT c18
L. B. Strogonova *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 124-125 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 82-83 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The temperature-control system (TCS) of manned spacecraft is one of the chief elements of the life-support system that affect the structural features of the craft as a whole. Not only reliable and proper operation of craft instruments, equipment, scientific apparatus, but work capacity of crew members depend on operation of this system. Analysis of data in the literature shows that mathematical modeling with consideration of possible identification or parameters of the mathematical model should fine broad application in the field of experimental development of TSC. Author

N86-21135# Joint Publications Research Service, Arlington, Va.
EFFECT OF ACTIVE ANTIORTHOSTATIC CONDITIONING ON

TOLERANCE TO CRANIAL REDISTRIBUTION OF BLOOD
A. F. Zavadovskiy, M. M. Korotayev, S. V. Kopanev, I. A. Plyasova-Bakunina, and Yu. N. Vavakin *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 126-129 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 83-85 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

At the present time, antiorthostatic position of the body is used extensively in aerospace medicine as a model for investigation of reactions of the cardiovascular system to gravity-caused redistribution of blood. In particular, one can predict, to some extent, tolerance of the circulatory system to weightlessness, particularly in the acute period of adaptation, by means of the antiorthostatic test an angles of -15 and -30 deg. A distinction is made between active and passive orthostatic tests. In the active form, the subject assumes an antiorthostatic position by himself and voluntary muscular tension is mandatory; in the passive form, the position is usually obtained by means of a turntable. Under these conditions one observes muscular relaxation. The objective here was to investigate the flexibility of regulatory mechanisms of the cardiovascular system and the possibility of enhancing the body's tolerance to gravity-related redistribution of blood by using active antiorthostatic tests. Author

N86-21136# Joint Publications Research Service, Arlington, Va.
SOME ASPECTS OF HUMAN AMINO ACID METABOLISM AT HIGH ALTITUDE
Yu. A. Sinyavskiy, T. F. Vlasova, M. S. Belakovskiy, Yu. A. Senkevich, and B. I. Kim *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 130-133 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 85-87 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

The problem of adaptation to altitude hypoxia has become particularly timely recently in view of the active economic development of mountainous regions and the need to perform difficult forms of physical and intellectual work at high altitudes. In addition, high-altitude climate is used extensively for prevention and treatment of cardiovascular and pulmonary pathology, as well as for holding training meets for representatives of different sports. But stays at high altitudes and concomitant hypoxial lead to functional changes in different systems of the body, eliciting changes in energy, protein and amino acid metabolism, yet the latter has not been sufficiently investigated. This study was undertaken in order to assess amino acid metabolism as related to hypoxic conditions and physical exercise in top-ranking sport mountain climbers, who were candidates for an expedition to Mount Everest, at the time of their adaptation to high-altitude conditions and after an ascent to more than 4000 m above sea level. Author

N86-21137# Joint Publications Research Service, Arlington, Va.
ELECTROCARDIOGRAM IN NEHB TYPE LEADS OF MACACA MULATTA MONKEYS
V. P. Melnichenko, M. D. Goldovskaya, I. O. Giryayeva, Yu. V. Shevchenko, G. G. Chamurliyev, and V. S. Magedov *In its* USSR Report: Space Biology and Aerospace Medicine, Volume 19, no. 6, November - December 1985 (JPRS-USB-86-001) 19 Feb. 1986 p 134-138 refs Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 19, no. 6, Nov. - Dec. 1985 p 87-89 (For primary document see N86-21114 11-52)
Avail: NTIS HC A08/MF A01

Macaca mulatta (rhesus) monkeys are used extensively in model experiments, which reproduce various physiological and pathological states, including cardiovascular diseases [6]. There are a considerable number of publications dealing with the normal electrocardiogram (ECG) of lower primates, including Macaca mulatta, which were recorded in standard and amplified monopolar leads from the extremities. At the same time, when monitoring the heart's bioelectric activity in chronic experiments there are some advantages to using the system of bipolar precardiac leads of Nehb, since it permits recording the ECG when there is a high signal level in several projection planes of the resultant vector of the heart's electromotive force with a minimum of implanted exploring electrodes. However, there is no information in the literature concerning the standard features of the ECG in the Nehb leads for monkeys. The objective here was to examine the ECG distinctions of monkeys as recorded in the leads of Nehb using chronically implanted electrodes. Author

N86-20628# Army Missile Command, Redstone Arsenal, Ala.
EFFECTS OF CARBON MONOXIDE ON PERSONNEL
M. Mossa *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1309-1341 (For primary document see N86-20623 11-31)
(AD-P004882) Avail: NTIS HC A99/MF E03 CSCL 13/12

N86-20629# Army Materiel Command, Aberdeen Proving Ground, Md.
AN EXAMINATION OF INJURY CRITERIA FOR POTENTIAL APPLICATION TO EXPLOSIVE SAFETY STUDIES
D. N. Neades and R. R. Rudolph *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1343-1354 (For primary document see N86-20623 11-31)
(AD-P004883) Avail: NTIS HC A99/MF E03 CSCL 13/12

N86-21013 Dortmund Univ. (West Germany). Inst. fuer Arbeitsphysiologie.
NEUROPHYSIOLOGICAL ACTIVITY AND PSYCHOPHYSICAL EFFECTIVENESS OF ENVIRONMENTAL FACTORS [NEUROPHYSIOLOGISCHE VERARBEITUNG UND PSYCHOPHYSISCHE WIRKSAMKEIT VON UMWELTEINFLUESSEN]
Walter H. Ehrenstein *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 1-5 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21014 Max-Planck-Inst. fuer Physiologische und Klinische Forschung, Bad Nauheim (West Germany).
THE INTERFACE BETWEEN ATMOSPHERE AND ORGANISM
Friedrich-Karl Pierau *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 6-8 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21016 Dortmund Univ. (West Germany). Inst. fuer Arbeitsphysiologie.
MAN'S THERMAL BUDGET UNDER VARIOUS CLIMATES [WAERMBEBILANZ DES MENSCHEN IN VERSCHIEDENEN KLIMATEN]
Hans Gerd Wenzel *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 12-16 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21017 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
APPLICATION OF A NONSTATIONARY ENERGY BUDGET MODEL TO DETERMINE THERMAL COMFORT [ANWENDUNGSMOEGLICHKEITEN EINES INSTATIONAEREN ENERGIEBILANZMODELLS ZUR BEWERTUNG DER THERMISCHEN BEHAGLICHKEIT]
Peter Hoeppe *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 17-18 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21018 Fraunhofer-Inst. fuer Bauphysik, Stuttgart (West Germany). Institutsbereich Waerme/Klima.
PHYSICAL CAUSES OF AIR DRAFT PHENOMENA, NEW FACTS [PHYSIKALISCHE URSACHEN FUER ZUGERSCHEINUNGEN - NEUE ERKENNTNISSE]
Erhard Mayer *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 19-20 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21019 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie und Klimatologie.
CLIMATIC CURE ON A PRACTICAL LEVEL [KLIMATUR IN DER PRAXIS]
Angela Schuh *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 21-22 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21020 Meteorologischer Dienst der DDR, Berlin (East Germany). Forschungsinst. fuer Bioklimatologie.
ON THE IMPORTANCE OF COOLING IN CLIMATIC THERAPY [ZUR BEDEUTUNG DER ABKUEHLUNG IM RAHMEN DER KLIMATHERAPIE]
L. Klinker and E. Turowski *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 23-24 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21021 National Inst. for Rheumatics and Physiotherapy, Budapest (Hungary).
THE INFLUENCE OF HELIOMETEOROLOGIC FACTORS ON CIRCULATION AND SOME VEGETATIVE FUNCTIONS
Imre Oermenyi *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 25-26 (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21022 Institute of Meteorology and Water Management, Podlesna (Poland). Dept. of Climatology.
METEOROTROPIC DETERMINANTS OF ROAD COLLISIONS AND ACCIDENTS
Maria Baranowska and Barbara Gabryl-Wojtach *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 27-28 ref (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21023 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria). Neurochirurgische Ambulanz am Ambulatorium. Sued.
OBJECTIVE INVESTIGATIONS AND SUBJECTIVE OBSERVATIONS OF SENSITIVITY TO WEATHER [OBJEKTIVE UNTERSUCHUNGEN UND SUBJEKTIVE BEOBACHTUNGEN UEBER WETTERFUEHLIGKEIT]
Fritz J. Jenkner *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 29-30 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21024 Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
COLLOIDAL AND METEOROLOGICAL IN VITRO REACTIONS
Nada Plesko *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 31-32 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21025 Universitaetsspital, Zurich (Switzerland). Biologisches Zentrallaboratorium.
WEATHER SENSITIVITY AS DISCOMFORT [DIE WETTERFUEHLIGKEIT ALS DISKOMFORT]
Wolf H. Weihe *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 35-37 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21026 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizin-Meteorologische Forschungsstelle.
WEATHER AS A PHYSICAL PROCESS AND PARAMETERIZATION OF THE EFFECTS AS A METEOROLOGICAL CONTRIBUTION FOR INVESTIGATING THE CORRELATION BETWEEN WEATHER AND MAN [DAS WETTER ALS PHYSIKALISCHE PROZESS UND SEINE WIRKUNGSRELEVANTE PARAMETRISIERUNG ALS METEOROLOGISCHER BEITRAG ZUR UNTERSUCHUNG DER BEZIEHUNG WETTER - MENSCH]
Klaus Bucher *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 38-41 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21027 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria). Ambulatorium Sued.
WEATHER AND MIGRAINE [WETTER UND MIGRAENE]
Fritz L. Jenkner and Alois Machalek *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 43-44 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21028 Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
TEMPERATURE WIND SPEED HUMIDITY (TWH): A BIOMETEOROLOGICAL INDEX TESTING
Ksenija Zaninovic *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 45-46 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21029 Jugenddorf Christophorusschule, Berchtesgaden (West Germany). Asthmatherapiezentrum.
WEATHER AND ASTHMA SYMPTOMS [WETTER UND ASTHMASYMPTOMATIK]
J. Lecheler and M. Voelker *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 47-48 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21030 Central Meteorological Service, Peking (China).
STUDY OF A METEOROLOGICAL PREDICTION OF ACUTE MYOCARDIAL INFARCTION INCIDENCE
Yianwen Wang and Xuecui Zhang (Lianyungang Ocean Station, China) *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 49-50 refs (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21031 Forschunginstitut fuer Balneologie, Marianske Lazne (Czechoslovakia).
METEOROTROPIC CHANGES OF CARDIAC PATIENTS' BLOOD PRESSURE AND PULSE FREQUENCY DURING A COMPLEX BATH CURE [METEOROTROPE VERAENDERUNGEN DES BLUTZUCKERS UND DER PULSFREQUENZ DER HERZKRANKEN IM VERLAUF DER KOMPLEXEN BAEDERKUR]
Vit Kveton, Jiri Matousek, and Zdenek Sebesta *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 51-52

In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21032 Forschunginstitut fuer Balneologie, Marianske Lazne (Czechoslovakia).
WEATHER AND SUBJECTIVE HEALTH COMPLICATIONS IN CARDIAC PATIENTS [DAS WETTER UND DIE SUBJEKTIVEN GESUNDHEITSSCHWIERIGKEITEN DER HERZKRANKEN]
Vit Kveton *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 53-54 In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21033 Deutscher Wetterdienst, Offenbach am Main (West Germany).
INVESTIGATIONS OF THE POSSIBLE INFLUENCE OF AIR ELECTRICAL PHENOMENA ON DULLING AND GHOST ACHING IN AMPUTATED PATIENTS [UNTERSUCHUNGEN UEBER EINEN MOEGLICHEN EINFLUSS VON LUFTELEKTRISCHEN ERSCHEINUNGEN AUF STUMPF- UND PHANTOMSCHMERZEN BEI AMPUTIERTEN]
J. Pelz (Freie Univ., Berlin, West Germany) and H. J. Swantes *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 55-56 ref In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21034 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
THE AUSTRIAN BIOMETEOROLOGICAL SERVICE [DER OESTERREICHISCHE BIOWETTERDIENST]
Alois Machalek and Peter Sabo *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 57-58 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21036 Jugenddorf Christophorusschule, Berchtesgaden (West Germany). Asthmatherapiezentrum.
HEIGHT-DEPENDENT REDUCTION OF AIRBORNE POLLEN AND EFFECTS ON CHILDREN AND TEENAGERS AFFECTED BY BRONCHIAL ASTHMA [HOEHENABHAENGIGIGE REDUZIERUNG DES POLLENFLUGS UND DIE AUSWIRKUNG AUF KINDER UND JUGENDLICHE MIT ASTHMA BRONCHIALE]
J. Lecheler, M. Voelker, and R. Winkler *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 63-64 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21038 Duesseldorf Univ. (West Germany). Medizinisches Inst. fuer Umwelthygiene.
EFFECTS OF AIR POLLUTION ON MAN [WIRKUNG VON LUFTVERUNREINIGUNGEN AUF DEN MENSCHEN]
H.-W. Schlipkoeter and K. Beyen *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 67-69 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21039 Giessen Univ. (West Germany). Hygiene-Inst.
GROUP DIAGNOSIS AS RISK ASSESSMENT IN ENVIRONMENT HYGIENE [GRUPPENDIAGNOSTIK ALS RISIKOABSCHAETZUNG IN DER UMWELTHYGIENE]
Pavel Schmidt and Ernst Gerhard Beck *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 70-71 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21040 Freie Univ., Berlin (West Germany). Rittberg-Kinderklinik.
IMMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY ILLNESSES IN BERLIN (1979-1982): METHODOLOGY AND RESULT SUMMARY [IMMISSIONS- UND WETTEREINFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982). METHODIK UND ERGEBNISUEBERBLICK]
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 72-74 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21041 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
ENVIRONMENTAL FACTORS AND INFANT MORTALITY [UMWELTFAKTOREN UND SAEUGLINGSSTERBLICHKEIT]
Alois Machalek, Helene Kapaun, and Ermar Junker *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 75-76 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21042 Gesamthochschule, Kassel (West Germany).
AIRWAY INFECTIONS RELATED TO CITY CLIMATE AND LOCAL IMMISSION LOAD [ATEMWEGSERKRANKUNGEN IN ABHAENGIGKEIT VON STADTKLIMA UND LOKALER IMMISSIONSBELASTUNG]
Lutz Katzschner *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 77-79 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21043 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie und Klimatologie.
WHAT IN HUMAN BIOMETEOROLOGY CAN CONTRIBUTE TO ASSESSMENT OF THE EFFECTS OF HAZARDOUS SUBSTANCES ON HEALTH? [WAS KANN DIE HUMANBIOMETEOROLOGIE ZUR BEWERTUNG GESUNDHEITLICHER WIRKUNGEN VON SCHADSTOFFEN BEITRAGEN]
Karl Dirnagl *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 80-81 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21044 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
IMMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY TROUBLES IN BERLIN (1979-1982). TIME SERIES INVESTIGATIONS: CROUP SYNDROME AND ASTHMATIC AIRWAY TROUBLES [IMMISSIONS- UND WETTEREINFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982) ZEITREIHENUNTERSUCHUNGEN: CROUPSYNDROM UND ASTHMATISCHE ATEMWEGSERKRANKUNGEN]
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 82-85 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21045 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
IMMISSION AND WEATHER EFFECTS ON CHILDREN'S AIRWAY TROUBLES IN BERLIN (1979-1982). COMPARISON OF TWO DIFFERENT IMMISSIONS: LOADED RESIDENTIAL AREAS IN WEST BERLIN POLLUTED AREAS [IMMISSIONS- UND WETTERFLUESSE AUF ATEMWEGSERKRANKUNGEN VON KINDERN IN BERLIN (1979-1982). VERGLEICH ZWEIER UNTERSCHIEDLICH IMMISSIONSBELASTETER WOHNBEREICHE IM BELASTUNGSGEBIET BERLIN (WEST)]
Ulrich Fegeler, Roman Moyzes, Erich Wedler, and Kurt Eberhard

In Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 86-87 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21046 Technische Univ., Munich (West Germany). Inst. fuer Medizinische Balneologie.
AIR QUALITY DETERMINATION IN HEALTH RESORTS [LUFT-QUALITAETSBESTIMMUNG IN KURORTEN]
Angela Schuh *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 88-89 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21047 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizinmeteorologische Forschungsstelle.
THE BIOLOGICAL EFFICIENCY OF DUST IMMISSION: DETERMINATION BASED ON THE WITHERING DEGREE OF EXPOSED LICHENS [DIE BIOLOGISCHE WIRKSAMKEIT VON STAUBIMMISSIONEN: ERMITTELT ANHAND DES ABSTERBEGRADES EXPONIERTER FLECHTEN]
R. Rabe and E. Schultz *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 90-91 In GERMAN Prepared in cooperation with Rheinische Westfaelische Technischer Ueberwachungs-Verein e.V., Essen, West Germany (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21049 Deutscher Wetterdienst, Offenbach am Main (West Germany).
PROBLEMS OF CITY PLANNING [PROBLEME DER STADTPLANUNG]
Bob Frommes *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 95-98 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21050 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Meteorologie.
PROBLEMS IN CITY CLIMATE EVALUATION IN HUMAN BIOMETEOROLOGICAL TERMS [PROBLEMATIK BEI DER HUMANBIOMETEOROLOGISCHE BEWERTUNG DES STADTKLIMAS]
Helmut Mayer *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 99-100 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21058 Austrian Automobile Touring Club, Vienna. Medizinmeteorologischer Beratungsdienst.
HUMAN BIOCLIMATIC CLASSIFICATION METHODS ILLUSTRATED WITH EXAMPLES OF SELECTED COUNTRIES HUMANBIOKLIMATISCHE KLASSIFIZIERUNGSMETHODEN AM BEISPIEL AUSGEWAEHLTER LAENDER]
Othmar Hartfinger *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 119-121 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21059 Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
COMPARISON BETWEEN METEOROLOGICAL COMPLEX VALUES AND A MODEL OF MAN'S ENERGY BUDGET [VERGLEICH ZWISCHEN METEOROLOGISCHEN KOMPLEXGROESSEN UND EINEM ENERGIEBILANZMODELL DES MENSCHEN]
Norbert Hammer, Elisabeth Koch, and Ernst Rudel *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 122-123 refs In GERMAN (For primary document see N86-21012 11-47)
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N86-21064 Deutscher Wetterdienst, Offenbach am Main (West Germany).
LOCAL CLIMATIC PARTICULARITIES AND THEIR IMPORTANCE FOR RECREATION AREA (EXAMPLE, SAARLAND-LOWER BLIESTAL) [LOKALKLIMATISCHE BESONDERHEITEN IN IHRER BEDEUTUNG FUER ERHOLUNGSGEBIETE (AM BEISPIEL SAARLAND-ERHOLUNGSRAUM UNTERES BLIESTAL)]
Hans Juergen Swantes *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 132-133 ref In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21065 Deutscher Wetterdienst, Freiburg (West Germany). Zentrale Medizin-Meteorologische Forschungsstelle.
SPATIAL DISTRIBUTION OF HEAT AND COLD STRESS IN THE FEDERAL REPUBLIC OF GERMANY [DIE RAEUMLICHE VERTEILUNG VON WAERMEBELASTUNG UND KAELTESTRESS IN DER BUNDESREPUBLIK DEUTSCHLAND]
G. Jendritzky *In its* Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 134-136 refs In GERMAN (For primary document see N86-21012 11-47)
Avail: Issuing Activity

N86-21067 Institute of Balneology and Climatology, Poznani (Poland).
APPLICATION OF METEOROLOGICAL AND SOLAR DATA IN HEALTH RESORT CLIMATHERAPY
Sabina Tyczka and Irena Ponikowska *In* Deutscher Wetterdienst Annals of Meteorology, No. 22. International Symposium on Human Biometeorology 13 Aug. 1985 p 140-141 (For primary document see N86-21012 11-47)
Avail: Issuing Activity

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-21138*# Federation of American Societies for Experimental Biology, Bethesda, Md. Life Sciences Research Office.
RESEARCH OPPORTUNITIES ON IMMUNOCOMPETENCE IN SPACE
William R. Beisel, ed. and John M. Talbot, ed. Dec. 1985 54 p refs
(Contract NASw-3924)
(NASA-CR-176482; NAS 1.26:176482) Avail: NTIS HC A04/MF A01 CSCL 05I

The most significant of the available data on the effects of space flight on immunocompetences and the potential operational and clinical significance of reported changes are as follows: (1) reduced postflight blastogenic response of peripheral lymphocytes from space crew members; (2) postflight neutrophilia persisting up to 7 days; (3) gingival inflammation of the Skylab astronauts; (4) postflight lymphocytopenia, eosinopenia, and monocytopenia; (5) modifications and shifts in the microflora of space crews and spacecraft; and (6) microbial contamination of cabin air and drinking water. These responses and data disclose numerous gaps in the knowledge that is essential for an adequate understanding of space-related changes in immunocompetence.
Author

N86-21139*# Illinois Univ., Urbana-Champaign. Engineering Psychology Research Lab.
THE DISSOCIATION OF SUBJECTIVE MEASURES OF MENTAL WORKLOAD AND PERFORMANCE Final Report
Yei-Hu Yeh and Christopher D. Wickens Oct. 1984 98 p

(Grant NAG2-169)
(NASA-CR-176609; NAS 1.26:176609; EPL-84-2/NASA-84-2)
Avail: NTIS HC A05/MF A01 CSCL 05I

Dissociation between performance and subjective workload measures was investigated in the theoretical framework of the multiple resources model. Subjective measures do not preserve the vector characteristics in the multidimensional space described by the model. A theory of dissociation was proposed to locate the sources that may produce dissociation between the two workload measures. According to the theory, performance is affected by every aspect of processing whereas subjective workload is sensitive to the amount of aggregate resource investment and is dominated by the demands on the perceptual/central resources. The proposed theory was tested in three experiments. Results showed that performance improved but subjective workload was elevated with an increasing amount of resource investment. Furthermore, subjective workload was not as sensitive as was performance to differences in the amount of resource competition between two tasks. The demand on perceptual/central resources was found to be the most salient component of subjective workload. Dissociation occurred when the demand on this component was increased by the number of concurrent tasks or by the number of display elements. However, demands on response resources were weighted in subjective introspection as much as demands on perceptual/central resources. The implications of these results for workload practitioners are described. Author

N86-21140# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE EFFECT OF ACCELERATION STRESS ON HUMAN WORKLOAD
W. B. Albery, S. L. Ward, and R. T. Gill May 1985 26 p
(AF Proj. 7231)
(AD-A156770; AMRL-TR-85-039) Avail: NTIS HC A03/MF A01 CSCL 06/19

The effects of +Gz stress on operator task performance and workload are assessed. Subjects were presented a two-dimensional maze on a CRT, and were required to solve it as rapidly as possible while under G-stress at levels from +Gz to +6Gz. The G-stress was provided by a human centrifuge. The effects of this stress were assessed by two techniques: objective performance measures on the primary maze - solving task, and subjective workload measures obtained using the Subjective Workload Assessment Technique (SWAT). It was found that while neither moderate (+3Gz) nor high (+5Gz and +6Gz) levels of G stress affected maze solving performance, the high G levels did significantly increase the subjective workload of the maze task. Author

N86-21141# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ATTENTION ALLOCATION, DISTRACTION, AND THE TYPE A/TYPE B BEHAVIOR PATTERN M.S. Thesis
A. J. Guardino Aug. 1985 100 p
(AD-A160671; AFIT/CI/NR-85-109T) Avail: NTIS HC A05/MF A01 CSCL 05/10

This thesis sought to determine whether individuals identified as having a Type A or Type B behavior pattern allocate attention differently in the presence of a distractor. Thirty-seven university students, grouped by type through use of the Jenkins Activity survey, and further divided into distractor and control groups, performed two discrete tasks for eight blocks under single- then dual-task conditions. The distractor was presented during the dual-task condition on Blocks 6 and 7. While the results did not support the hypothesized relation, this study did support previous findings of a differential effect of noise on multiple-task performance: Both quiet groups' performance improved on both tasks, whereas both noise groups' performance improved on the primary task but leveled off on the secondary task during and after the distractor. Further research is required. GRA

N86-21142# Colorado Univ., Boulder.
PRINCIPLES OF INSTRUCTION FOR SUCCESSFUL ASSEMBLY AND REPAIR Final Report, 1 Nov. 1983 - 31 Nov. 1984
Patricia Baggett 31 Nov. 1984 14 p
(Contract N00014-84-C-0112)
(AD-A161280) Avail: NTIS HC A02/MF A01 CSCL 05/9

In this one-year project the aim was to continue the previous three years' research on designing multimedia instructions for procedures so that people could use and learn from them more easily. There were both theoretical and practical aspects to the work. We viewed the conceptual structure of a task as a (hierarchical) tree (later a directed acyclic graph) with nodes representing information from different modalities (motoric, visual, and linguistic). The overview will be preceded by a short summary, stating the five main studies, the total number of subject hours run, stimulus materials used, and computer programming done. At the end are listed technical reports, conference papers, and publications. Main Studies: (1) Transforming a task's tree structure to lessen short term memory load in instructions, (2) Developing generic and functional terminology, (3) Theoretical hypotheses about what narration in dual media presentations should consists of, (4) Transfer of learning in assembly tasks, and (5) Empirical investigation of adequacy of knowledge representation for repair in a computerized tutor. GRA

N86-21143# California Univ., San Diego. Jolla.
INTERACTIVE ACTIVATION MODELS OF PERCEPTION AND COMPREHENSION Status Report, 1 Dec. 1984 - 1 Oct. 1985
Jeffrey L. Elman and James L. McClelland 1 Oct. 1985 15 p
(Contract N00014-85-K-0076)
(AD-A161362) Avail: NTIS HC A02/MF A01 CSCL 05/10

The objective of this research is to construct a computationally sufficient, biologically plausible, and behaviorally adequate account of human information processing skills in visual and auditory language processing. We have the following specific research goals for our contract: (1) To implement a model of reading printed text through a series of fixations. The model is intended to account for the integration of visual information over successive fixations, and the interaction of visual and contextual information in reading. (2) To implement a new version of our model of speech perception (TRACE), using programmable connections to allow the model to tune itself, in the course of processing, to changes in global parameters such as rate. This new model (which we will call the Programmable TRACE) is intended to account for human sensitivity to global as well as local contextual influences on the speech signal while retaining all the virtures of the present version of TRACE. (3) To begin work on the development of simulation models designed to capture aspects of interactions between lexical, syntactic, and semantic constraints on the construction of syntactic and functional representations of sentences. GRA

N86-21144# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A PROCEDURE-BASED APPROACH TO HUMAN INFORMATION PROCESSING MODELS
Kevin L. Boettcher and Robert R. Tenney Nov. 1985 37 p
(Contracts N00014-77-C-0532; N00014-84-K-0519)
(AD-A162454; LIDS-P-1499) Avail: NTIS HC A03/MF A01 CSCL 05/10

An approach is suggested for modeling human processing time in routine tasks. The existence of mental processing methods, or procedures, is presumed and the approach uses information theoretic concepts to develop a functional relationship between task variables and processing time for a given procedure. The resulting model contains parameters that must be estimated using processing time data. In addition to considering the single-procedure model, the modeling framework is extended to include situations where multiple procedures are used in an alternate fashion. The information theoretic framework provides a specific model form for the extra time required for switching to, or activating, a procedure. The modeling approach is tested experimentally in two ways. First, a single procedure task is devised for which a model is developed. Second, a multiple procedure task is devised to test the model for switching. Experimental results in both cases give evidence in support of the approach as a method for describing task processing time in terms of task variables. Author (GRA)

N86-21145# Leiden Univ. (Netherlands). Inst. of Mathematics.
ON INTERACTING POPULATIONS THAT DISPERSE TO AVOID CROWDING: THE EFFECT OF A SEDENTARY COLONY
M. Bertsch, M. E. Gurtin (Carnegie-Mellon Univ., Pittsburgh, Pa.), D. Hilhorst, and L. A. Peletier Mar. 1983 30 p refs
(Rept-4) Avail: NTIS HC A03/MF A01

A population model in which a finite number of interacting groups attempt to avoid crowding is considered. A habitat containing a mobile and a sedantary species is studied. It is shown that when the mobile population is sufficiently large relative to the sedentary population, the mobile species eventually populates the entire habitat. However, when mobile species density is less than that of the sedentary species, the mobile individuals do not reach the portion of the habitat that lies to the other side of the sedentary colony. Author (ESA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-21146 Central Electricity Generating Board, London (England).
RADIOPROTECTION UPDATE
Jacques Leclercq 14 Nov. 1985 19 p Transl. into ENGLISH from Epure (France), no. 7, Jul. 1985 p 49-57
(BLL-CE-Trans-8223-(9022-09)) Avail: British Library Lending Div., Boston Spa, Engl.

The problems involved in the radiation protection of nuclear power plant workers are illustrated. It is shown how and the safety of these workers, which is already ensured by the strict observance of public health requirements relating to occupational irradiation, can be improved by means of rational management. Radiation dosage, radiation distribution in the plants, reactor coolant chemistry, shutdown procedures, and nuclear fuels are among the topics discussed. R.J.F.

N86-21147*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MOBILE REMOTE MANIPULATOR VEHICLE SYSTEM Patent Application
Harold G. Bush, Martin M. Mikulas, Jr., Richard E. Wallsom, and J. Kermit Jensen, inventors (to NASA) Filed 31 Jul. 1985 27 p
(NASA-Case-LAR-13393-1; NAS 1.71:LAR-13393-1;
US-Patent-Appl-SN-760799) Avail: NTIS HC A03/MF A01 CSCL 05H

A mobile remote manipulator system is disclosed for assembly, repair and logistics transport on, around and about a space station square bay truss structure. The vehicle is supported by a square track arrangement supported by guide pins integral with the space station truss structure and located at each truss node. Propulsion is provided by a central push-pull drive mechanism that extends out from the vehicle one full structural bay over the truss and locks drive rods into the guide pins. The track switches allow the vehicle to travel in two (2) orthogonal directions over the truss structure which coupled with the bi-directional drive, allow movement in four (4) directions on one plane. The top layer of this tri-layered vehicle is a logistics platform. This platform is capable of 360 degrees of rotation and will have two (2) astronaut foot restraint platforms 18 and a space crane integral. NASA

N86-21148# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
INSTRUMENT LIGHTING LEVELS AND AN/AVS-6 USAGE Final Report
William M. Slusher Aug. 1985 48 p
(AF Proj. 718-4)
(AD-A161538; AAMRL-TR-85-055) Avail: NTIS HC A03/MF A01 CSCL 14/2

Two experimental investigations were performed to determine the effects of the AN/AVS-6 Aviators Night Vision Imaging System (ANVIS) display luminance on the setting of instrument lighting levels. In a laboratory study using a simulated A-10 night lighting mockup, eight subjects adjusted instrument lighting levels to what they judged to be the minimum required for safe readability of instruments. Prior to the adjustment of instrument lighting, the subjects were preadapted to various ambient lighting conditions, including a simulated ground luminance of a full moonlit night and two simulated ANVIS display luminances. Results show primary instrument lighting levels were set higher, by a factor of 1.6 following adaptation to the 1.0 foot lambert (ft-L) ANVIS luminance test condition when compared to lighting levels set following adaptation to a 0.00065 ft-L ambient luminance condition. GRA

N86-21149# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
HUMAN ENGINEERING GUIDELINES FOR THE EVALUATION AND ASSESSMENT OF VIDEO DISPLAY UNITS
W. E. Gilmore Jul. 1985 537 p
(TI85-016435; NUREG/CR-4227) Avail: NTIS HC A23/MF A01

The Nuclear Regulatory Commission is provided with a single source that documents known guidelines for conducting formal Human Factors evaluation of Video Display Units (VDUs). The handbook is a cookbook of acceptance guidelines for the reviewer faced with the task of evaluating VDUs already designed or planned for service in the control room. The areas addressed are video displays, controls, control/display integration, and workplace layout. Guidelines relevant to each of those areas are presented. The existance of supporting research is also indicated for each guideline. A Comment section and Method for Assessment section are provided for each set of guidelines. Author

N86-20638# Lone Star Army Ammunition Plant, Texarkana, Tex.
EVALUATION OF MATERIALS FOR THERMAL PROTECTION
J. I. Martin *In* Department of Defense Explosives Safety Board Minutes of the 21st Explosives Safety Seminar, Volume 2 Aug. 1984 p 1671-1687 (For primary document see N86-20623 11-31)
(AD-P004901) Avail: NTIS HC A99/MF E03 CSCL 13/12

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-21150*# National Aeronautics and Space Administration, Washington, D.C.
PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1984: A SPECIAL BIBLIOGRAPHY
Janice S. Wallace, comp. and Donald L. DeVincenzi, comp. Feb. 1986 45 p Prepared in cooperation with George Washington Univ., Washington, D.C.
(Contract NASw-3165)
(NASA-TM-88382; NAS 1.15:88382) Avail: NTIS HC A03/MF A01 CSCL 03B

A bibliography of NASA exobiology programs is given. Planetary environments; chemical evolution; organic geochemistry; extraterrestrial intelligence; and the effect of planetary solar and astrophysical phenomena on the evolution of complex life in the universe are among the topics listed. R.J.F.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-21151*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
[ACTIVITIES OF THE INSTITUTE FOR COMPUTER APPLICATIONS IN SCIENCE AND ENGINEERING] Semiannual Report, 1 Apr. - 2 Oct. 1985

Nov. 1985 64 p refs
(Contracts NAS1-17070; NAS1-17130)
(NASA-CR-178020; NAS 1.26:178020) Avail: NTIS
HC A04/MF A01 CSCL 12A

Research conducted at the Institute for Computer Applications in Science and Engineering in applied mathematics, numerical analysis, and computer science during the period April 1, 1985 through October 2, 1985 is summarized. Author

N86-21152*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A RIEMANN SOLVER BASED ON A GLOBAL EXISTENCE PROOF FOR THE RIEMANN PROBLEM Final Report
Pravir Dutt Jan. 1986 13 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178042; ICASE-86-3; NAS 1.26:178042) Avail: NTIS
HC A02/MF A01 CSCL 12A

Godunov's method and several other methods for computing solutions to the equations of gas dynamics use Riemann solvers to resolve discontinuities at the interface between cells. A new method is proposed here for solving the Riemann problem based on a global existence proof for the solution to the Riemann problem. The method is found to be very reliable and computationally efficient. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-21153 New South Wales Univ., Kensington (Australia).
DIGITAL DIFFERENTIAL ANALYSERS Abstract Only
Max B. Webster Dec. 1984 2 p
Avail: Issuing Activity

Hitherto, Digital Differential Analyzers (DDAs) have been restricted to the use of a predetermined, constant integration step size. Second Order Difference transmission, developed by Bywater, allows the potential problem of variable intermodule data path width associated with variable step-size (VSS) integration to be avoided, and VSS overcomes the starting problem of Second Order Differences. Here, the modifications necessary for Second Order Difference, Extended Resolution DDA modules to be able to cope with VSS are detailed. The resulting VSSDDA structure is eminently suitable for special purpose, dedicated applications where foreknowledge of solution characteristics permits external control of step-size. The application of truncation error analysis to nonlinear differential equations (DEs) is investigated, and a new class of nonlinear DEs, developed for the testing of VSS algorithms, is presented. With these equations, VSS integration can yield speed improvement factors in excess of 100 to 1 over constant step-size integration. Finally, a new method for solving stiff DEs, based on existing explicit integration methods and suitable for DDA hardware implementation, is proposed. Solution speed improvement factors of up to 10 to 1 over standard explicit methods were achieved. R.J.F.

N86-21154* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AUTO COVARIANCE COMPUTER Patent
Timothy E. Hepner and James F. Meyers, inventors (to NASA)
Issued 1 Oct. 1985 6 p Filed 16 Aug. 1983
(NASA-Case-LAR-12968-1; US-Patent-4,545,025;
US-Patent-Appl-SN-523560; US-Patent-Class-364-728) Avail: US Patent and Trademark Office CSCL 09B

A laser velocimeter covariance processor which calculates the auto covariance and cross covariance functions for a turbulent flow field based on Poisson sampled measurements in time from a laser velocimeter is described. The device will process a block of data that is up to 4096 data points in length and return a 512 point covariance function with 48-bit resolution along with a 512 point histogram of the interarrival times which is used to normalize the covariance function. The device is designed to interface and be controlled by a minicomputer from which the data is received and the results returned. A typical 4096 point computation takes approximately 1.5 seconds to receive the data, compute the covariance function, and return the results to the computer.

Official Gazette of the U.S. Patent and Trademark Office

N86-21155 British Aerospace Dynamics Group, Bristol (England). Dept. 260.
PRELIMINARY INVESTIGATION INTO THE FEASIBILITY OF AN M700/40 BASED REPLACEMENT FOR THE LORAL CPU FOR THE RAPPORT SYSTEM ANALYSIS PROCESSOR
P. J. Ireland Feb. 1982 21 p
(BAe-BT-12862) Copyright. Avail: Issuing Activity

The Loral processor and the M700/40 are described. Features necessary in M700/40 to provide a Loral compatable replacement are explained. Processor speeds are compared. It is shown that the suitability depends on information concerning the operational program tasks and compiler. Author (ESA)

N86-21156# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 4, SEPTEMBER 1984
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jan Heering, ed.
Sep. 1984 54 p refs
(ISSN-0168-821x) Avail: NTIS HC A04/MF A01

Stochastic geometry and image analysis; computer aided typesetting; and order statistics, quantile processes, and extreme value theory are discussed. For individual titles, see N86-21157 through N86-21159.

N86-21157# Bath Univ. (England). School of Mathematics.
STOCHASTIC GEOMETRY AND IMAGE ANALYSIS
A. J. Baddeley *In* Center for Mathematics and Computer Science CWI Newsletter Sep. 1984 p 2-20 refs (For primary document see N86-21156 11-60)
Avail: NTIS HC A04/MF A01

Ideas in stochastic geometry which are closely related to image analysis are listed. These include the synthesis of stochastic models of images; techniques for evaluating models and algorithms; general concepts of geometrical information and the theory of random sets; problems of image irregularity and errors in observation; techniques of geometric integration theory; and fractional dimensional irregularity. Author (ESA)

N86-21158# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
TYPESETTING AT THE CENTER FOR MATHEMATICS AND COMPUTER SCIENCE (CWI), PART 2
Jaap Akkerhuis *In its* CWI Newsletter Sep. 1984 p 21-32 refs (For primary document see N86-21156 11-60)
Avail: NTIS HC A04/MF A01

Computer aided printing of tables, graphs, and mathematical material is illustrated. Author (ESA)

N86-21159# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
ORDER STATISTICS, QUANTILE PROCESSES AND EXTREME VALUE THEORY c65
R. Helmers *In its* CWI Newsletter Sep. 1984 p 33-38 refs
Presented at Meetingheld in Oberwolfach, West Germany, 25-31 Mar. 1984 (For primary document see N86-21156 11-60)
Avail: NTIS HC A04/MF A01

Spacings theory, empirical and quantile processes, estimation of the tail of a distribution, and extreme value theory are discussed. Author (ESA)

N86-21160# Harvard Univ., Cambridge, Mass. Computation Lab.
DERIVATION OF RANDOMIZED ALGORITHMS
Sanguthevar Rajasekaran and John H. Reif Oct. 1985 26 p

(Contract N00014-80-C-0647)
(AD-A161358; TR-16-85) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper surveys a number of efficient randomized algorithms for selection and sorting which we derive from inefficient deterministic specifications. Along with these derivations, we simultaneously derive bounds on the probability distribution of the sequential and parallel time cost of these algorithms. There are several potential benefits of this work. We develop, for the first time, general techniques for deriving randomized algorithms from deterministic specifications. Previous derivations only considered deterministic algorithms. Furthermore, our derivations encompass many known sequential and parallel randomized algorithms for selection and sorting which required separate proofs and probabilistic analysis. Also, we present a new randomized comparison sorting algorithm that takes 0(loglogn) time and uses n1+ epsilon processors to sort n keys. GRA

N86-21161# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
COMPUTING MINIMUM SPANNING TREES ON A FAT-TREE ARCHITECTURE M.S. Thesis
Bruce M. Maggs Oct. 1985 40 p
(Contract N00014-80-C-0622)
(AD-A161434) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper presents two parallel algorithms for computing the minimum spanning forest of an input graph on a fat-tree architecture. One algorithms if deterministic, and the other probabilistic. The deterministic algorithm generates O(cv log/V/) message sets, each of which can be delivered in O(beta (G) delivery cycles. The probabilistic algorithm generates O(sq log/V/) message sets, each of which can be delivered in O(beta(G)) delivery cycles. Author (GRA)

N86-21162# Naval Postgraduate School, Monterey, Calif.
AN ADAPTIVE MODEL BASED DISK FILE HEAD POSITIONING SERVO SYSTEM M.S. Thesis
Kenneth R. Wikstrom Sep. 1985 147 p
(AD-A161704) Avail: NTIS HC A07/MF A01 CSCL 09/2

The feasibility of controlling a disk file head positioning servo with an adaptive computer simulation model is investigated. During the seek mode, model updating of position, velocity, and motor gain parameter are accomplished from samples of head position only, thereby eliminating the requirement for a tachometer in the positioning servo system. In the track follow mode, three methods of linear compensation are presented to settle the transients of the servo and allow for the positioning of the read/write head on track center in minimum time. Implementation of the simulation model into a microprocessor is also investigated. Author (GRA)

N86-21163# Harvard Univ., Cambridge, Mass. Computation Lab.
OPTIMAL PARALLEL ALGORITHMS FOR INTEGER SORTING AND GRAPH CONNECTIVITY
John H. Reif 1985 30 p
(Contract N00014-80-C-0647)
(AD-A161791; TR-08-85) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document gives new parallel algorithms for integer sorting and undirected graph connectivity problems such as connected components and spanning forest. These algorithms cost only logarithmic time and are the first known that are optimal: the product of their time and processor bounds are bounded by a linear function of the input size. All previous known parallel algorithms for these problems required at least a linear number of processors to achieve logarithmic time bounds, and hence were nonoptimal by at least a logarithmic factor. The author assumes a parallel random access machine (RAM) model which allows both concurrent writes and concurrent reads of global memory. The algorithms are randomized; each processor is allowed an independent random number generator; however, our stated resource bounds hold for worst case input with overwhelming likelihood as the input size grows. Author (GRA)

N86-21164# Arizona Univ., Tucson. Dept. of Chemistry.
CONVERS 3.3: A THREADED CODE INTERPRETIVE COMPILER FOR THE PDP-11 MICROCOMPUTER
G. R. Sims and M. B. Denton 25 Nov. 1985 36 p
(Contract N00014-83-K-0268)
(AD-A162420; TR-41) Avail: NTIS HC A03/MF A01 CSCL 09/2

A threaded code interpretive compiler called CONVERS 3.3 is presented. This language is intended for use in laboratory instrument control and data acquisition applications. Discussed are the philosophy behind the development of this language, the internal operation of the interpreter and the compiler, and the advantages this language offers over other programming languages in its intended applications. CONVERS is compared and contrasted to BASIC interpreters, FORTRAN compilers, and particularly to typical FORTH interpretive compilers. Programming examples and execution time benchmarks for code written in BASIC, FORTH, FORTRAN, and CONVERS are presented. Author (GRA)

N86-21165# Sandia National Labs., Albuquerque, N. Mex.
LINKED DATA BASES CONTAIN PARTS EXPLOSION
J. Carkeet and D. Jones Sep. 1985 15 p Presented at the Association of SYSTEM 2000 Users for Technical Exchange (ASTUTE), Phoenix, Ariz., 5 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000433; SAND-85-2040C; CONF-8511105-1) Avail: NTIS HC A02/MF A01

A data base has been developed to provide an automated audit of all components, modules, and subsystems for a Global Positioning System that consists of a constellation of 18 satellites. The data base includes detailed fabrication, test, and operational performance data. The objective is to mitigate the effects of an avalanche of paper audits from a production program involving a proliferation of subcomponents and to facilitate quality control of an extremely complex system. Four separate SYSTEM 2000 data bases that use redundant pointers are linked to provide many-to-many relationships and to minimize mainframe resource requirements. Updates of the four data bases are facilitated by a color-form entry capability on the IBM PC. Retrievals are simplified by a menu-driven query capability. DOE

N86-21175# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
TYPESETTING AT THE CENTER FOR MATHEMATICS AND COMPUTER SCIENCE (CWI), PART 1
Jaap Akkerhuis *In its* CWI Newsletter Jun. 1984 p 15-24 refs
(For primary document see N86-21173 11-61)
Avail: NTIS HC A03/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-21166 Illinois Univ., Urbana-Champaign.
A COMPUTERIZED IMPLEMENTATION OF THE MATERIAL FAILURE LOGIC MODEL TECHNIQUE Ph.D. Thesis
Wei-Rong Lue 1985 192 p
Avail: Univ. Microfilms Order No. DA8521323

The development of a computer-aided design software system intended to help designers avert mechanical failures is discussed. If competitive and reliable products are to be designed, the designer has to study the behavior of materials carefully, to assess the nature of actual service conditions, and to understand the many modes of mechanical failure. Unfortunately, there are thousands of failure case studies in the literature. The task of storing human experience painfully acquired through previous failure cases and effectively helping the designer in the prevention of the repetition of these failures is examined. Dissert. Abstr.

N86-21167# Los Alamos National Lab., N. Mex.
A STATE SPACE METHOD OF FAULT TREE ANALYSIS WITH APPLICATIONS Ph.D. Thesis
Robert J. Bartholomew Dec. 1984 198 p refs
(Contract W-7405-eng-36)
(LA-10298-T) Avail: NTIS HC A09/MF A01

Generic fault trees comprising two, three, and four statistically independent initiators in addition to common cause and common mode initiators were developed with their Markov and Adjoint models. Failure Mode State Variable (FMSV) models that represent the probabilities of failure occurrence in [0, t] of events depicted by generic fault trees were developed using modern control theory concepts. The FMSV models are contained within the Adjoint Modes. Several practical fault trees of nuclear reactor components and subsystems were modeled by the FMSV method. FMSV method is a symbiosis of fault tree analysis and Markov modeling, therefore is complete and exhaustible as a probability model. B.G.

N86-21168# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
PARAMETRIC BI-CUBIC SURFACE PATCH FOR COMPUTER AIDED GEOMETRIC DESIGN OF AIRCRAFT AND/OR OTHER THREE-DIMENSIONAL GEOMETRIES
H. N. V. Dutt Sep. 1985 58 p refs
(NAL-TM-AE-8505) Avail: NTIS HC A04/MF A01

A FORTRAN program was developed to fit smooth surfaces to the component parts of an arbitrary aircraft configuration or any three dimensional geometry. The basic surface element used for this fit is a bicubic surface patch. Once the geometry was replaced by a set of patch equations, various kinds of calculations which require a three dimensional mathematical description of the surface can be performed easily. The second part of the code generates orthographic views of the given geometry on a calcomp drum plotter or on a Tektronix screen. The last part of the program generates cross sectional plots at any desired orientation through the given configuration. Also this module can be used to generate cross sectional areas, intermediate sections and other geometric details of the given configuration. The input data is oriented mainly towards aircraft geometry. But the code can be efficiently used for representing any arbitrary surface or a combination of both. Author

N86-21169# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
FLIGHT SIMULATION MOTION-BASE DRIVE ALGORITHMS. PART 1: DEVELOPING AND TESTING THE EQUATIONS
L. D. Reid and M. A. Nahon Dec. 1985 373 p refs
(UTIAS-296-Pt-1; ISSN-0082-5255) Avail: NTIS HC A16/MF A01

The development and testing of flight simulator motion-base algorithms suited to commercial jet transports is reported. Full six degrees-of-freedom motion of a synergistic motion base is studied. Three forms for these algorithms are considered: (1) classical linear washout; (2) optimal control; and (3) coordinated adaptive washout. It is felt that the latter two techniques may provide some advantages over the classical, which is currently employed in most commercial flight simulators. The aims of this project are to, develop the necessary equations, implement the necessary software in real-time, and evaluate the performance of the software with the help of test pilots in a complete flight simulation. The development of the equations and the software used for testing them is described. The evaluation of the performance of the algorithms is based on predicted pilot motion sensations and motion-based travel. The motion sensations are formulated from linear models of the human vestibular system. The test runs of the algorithms demonstrate their operation and effectiveness. Several modifications to existing formulations are suggested. E.A.K.

N86-21170# National Aeronautical Lab., Bangalore (India).
COMPUTER PROGRAM FOR PREDICTION OF DAMPED CRITICAL SPEEDS OF ROTOR SYSTEMS Propulsion Div.
V. Arun Kumar and P. Rajagopal Apr. 1985 25 p refs
(NAL-TM-PR-8502) Avail: NTIS HC A02/MF A01

The development of a computer program to calculate the flexural critical speeds of complex rotor systems is described. The program takes into account bearing stiffness, external damping provided from bearing support structures and/or squeeze film dampers and coupling effects in the rotor assembly. The program can evaluate the critical speeds of the shaft systems provided with discs producing gyroscopic effects, whirling in either forward precision or backward precision. The output prints the converged values of critical speeds, and the details of the coordinates required for plot of first three normalized mode shapes and for excess moment diagram. Calcomp plotter is used to produce the first three mode shape drawings. E.A.K.

N86-21171*# National Bureau of Standards, Boulder, Colo. Chemical Engineering Science Div.
CRYOGENIC PROPELLANT SCAVENGING Final Report, Aug. 1982 - Mar. 1985
B. Louie, N. J. Kemp, and D. E. Daney Apr. 1985 123 p refs
(NASA Order T-6077-J)
(NASA-CR-176600; NAS 1.26:176600; PB86-100682; NBSIR-85/3023) Avail: NTIS HC A06/MF A01 CSCL 22B

A detailed description of a computer model that has been developed for assessing the feasibility of low g cryogen propellant scavenging from the space shuttle External Tank (ET) is given. Either pump-assisted or pressure-induced propellant transfer may be selected. The program will accept a wide range of input variables, including the fuel to be transferred (LOX or LH2), heat leaks, tank temperatures, and piping and equipment specifications. The model has been parametrically analyzed to determine initial design specification for the system. GRA

N86-21172*# Informatics, Inc., Palo Alto, Calif.
PROFILE USER'S GUIDE
Leslie Collins and David Saunders Feb. 1986 138 p refs
(Contract NAS2-11555)
(NASA-CR-177332; NAS 1.26:177332; Rept-7104-307-11) Avail: NTIS HC A07/MF A01 CSCL 09B

User information for program PROFILE, an aerodynamics design utility for refining, plotting, and tabulating airfoil profiles is provided. The theory and implementation details for two of the more complex options are also presented. These are the REFINE option, for smoothing curvature in selected regions while retaining or seeking some specified thickness ratio, and the OPTIMIZE option, which seeks a specified curvature distribution. REFINE uses linear techniques to manipulate ordinates via the central difference approximation to second derivatives, while OPTIMIZE works directly with curvature using nonlinear least squares techniques. Use of programs QPLOT and BPLOT is also described, since all of the plots provided by PROFILE (airfoil coordinates, curvature distributions) are achieved via the general purpose QPLOT utility. BPLOT illustrates (again, via QPLOT) the shape functions used by two of PROFILE's options. The programs were designed and implemented for the Applied Aerodynamics Branch at NASA Ames Research Center, Moffett Field, California, and written in FORTRAN and run on a VAX-11/780 under VMS. Author

N86-21173# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 3, JUNE 1984
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jan Heering, ed. Jun. 1984 49 p refs
(ISSN-0168-826x) Avail: NTIS HC A03/MF A01

The B programming language; computer aided typesetting; and multigrid algorithms for solving elliptic differential equations on supercomputers are discussed. For individual titles, see N86-21174 through N86-21176.

N86-21174# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
THE B PROGRAMMING LANGUAGE AND ENVIRONMENT
Steven Pemberton *In its* CWI Newsletter Jun. 1984 p 2-14 refs (For primary document see N86-21173 11-61)
Avail: NTIS HC A03/MF A01

The B programming language, designed to replace BASIC, is described. It is a high level language, avoiding the need to build up long sets of commands as in BASIC. It is intended for use on personal computers by nonprofessional programmers. Since user-written programs are called in exactly the same way as built-in B commands, much of the need for a separate command language disappears. Variables serve as files, and since programs are the equivalent of subroutines in other languages, parameters can be passed to programs using the normal parameter passing mechanism of subroutines. Author (ESA)

N86-21175# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
TYPESETTING AT THE CENTER FOR MATHEMATICS AND COMPUTER SCIENCE (CWI), PART 1 **c60**
Jaap Akkerhuis *In its* CWI Newsletter Jun. 1984 p 15-24 refs
(For primary document see N86-21173 11-61)
Avail: NTIS HC A03/MF A01

The computer assisted typesetting of scientific reports is illustrated. Author (ESA)

N86-21176# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
MULTIGRID ALGORITHMS RUN ON SUPERCOMPUTERS
P. W. Hemker *In its* CWI Newsletter Jun. 1984 p 25-30 refs
(For primary document see N86-21173 11-61)
Avail: NTIS HC A03/MF A01

Multigrid methods to solve elliptic partial differential equations are introduced. Implementation of the algorithms on supercomputers is described. Author (ESA)

N86-21177# University of Southern California, Marina del Rey. Information Sciences Inst.
A BASIC GUIDE TO UNIX
L. Moses Oct. 1985 72 p
(Contract MDA903-81-C-0335)
(AD-A160364; ISI/TM-85-157) Avail: NTIS HC A04/MF A01 CSCL 09/2

This is an introductory document of UNIX on the ISI VAX machines. It is intended for people who would like to use UNIX for electronic mail, text editing, and document preparation, but who may not have experience with UNIX or with programming. It does not include an in-depth explanation of the programs covered; instead, it is a guide to the basic commands. This basic instructional manual introduces the use of several programs that are used on the DARPA sponsored UNIX 4.2 bsd computer systems at USC/Information Sciences Institute. The programs covered include the CCA Emacs text editor, the MH/HM nad MM message programs, the Scribe formatting program, and some csh and Tcsh commands. This manual is intended for people who may not have experience with UNIX or with programming. GRA

N86-21178# Mississippi State Univ., Mississippi State. Dept. of Astrophysics and Aerospace Engineering.
WESSEL: CODE FOR NUMERICAL SIMULATION OF TWO-DIMENSIONAL TIME-DEPENDENT WIDTH-AVERAGED FLOWS WITH ARBITRARY BOUNDARIES Final Technical Report, Jun. 1979 - Sep. 1983
Joe F. Thompson and Robert S. Bernard Aug. 1985 59 p
(Contract DACW39-78-C-0054)
(AD-A160990; WES/TR/E-85-8) Avail: NTIS HC A04/MF A01 CSCL 20/4

The code WESSEL solves the two momentum equations, the energy equation, and the continuity equation on a two-dimensional field with boundaries of arbitrary shape, including multiple inlets, outlets, and obstacles. The basis of this numerical solution is a boundary-fitted curvilinear coordinate system that allows all computation to be done on a rectangular field with a square grid in the transformed plane, regardless of the boundary shape and configuration in the physical plane. The finite difference solution is done in finite volume formulation. The solution is implicit in time, with the difference equations being solved simultaneously by SOR iteration at each time step. The code reads the boundary-fitted coordinate system from the output of the coordinate code WESCOR. The input allows any portions of the boundary (external or obstacles) to be designated as inlets, outlets, no-slip surfaces, or slip surfaces. Arbitrary specification of the variables on inlets and outlets is allowed. The output is in the form of field arrays and plots of the velocity components, pressure, and temperature. All computation is done in metric units, but the input and output units may be specified otherwise. The WESSEL code permits analysis of hydrodynamics for a variety of applications to Civil Works projects. GRA

N86-21179# Air Force Logistics Command, Wright-Patterson AFB, Ohio.
DATA PREPARATION USING LOTUS AND OTHER SPREADSHEETS
Ronnie E. Cooper Sep. 1985 12 p Presented at 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Virg, 17-20 Sep. 1985
(AD-A160995) Avail: NTIS HC A02/MF A01 CSCL 09/2

A data preparation which uses LOTUS and other spread sheets is presented. The following items are discussed: introduction to spreadsheet use; distributed processing - someone preprocesses the needed data; comparisons - why use a spreadsheet or a program; spreadsheet preparation - general principles; documentation - organizing all that information; data types, potential errors; data entry - what does it look like; how to compute a weighted average; why and how to structure data; using learning curves; using comparison data; using cost estimating relationships (CER); what is a macro; macro examples and their use in menus; the future of the concept; conclusion. GRA

N86-21180# Illinois Univ., Urbana. Computer Systems Group.
THE EFFECT OF SYSTEM WORKLOAD ON ERROR LATENCY: AN EXPERIMENTAL STUDY
Ram Chillarege and Ravishankar K. Iyer Jan. 1985 27 p
(Contract N00014-84-C-0149)
(AD-A161290; CSG-40; UILU-ENG-85-2202) Avail: NTIS HC A03/MF A01 CSCL 05/8

In this paper we have established a methodology for determining and characterizing error latency. The method is based on real workload data gathered by an experiment instrumented on a VAX 11/780 during the normal workload cycle of the installation. This is the first attempt at jointly studying error latency and workload variations in a full production system. Distributions of error latency were generated by seeding errors under varying workload conditions. A family of error latency distributions so generated illustrate that error latency varies by a 1 to 10 (hours) ratio between high and low workloads. The methods is general and can be applied to any system. GRA

N86-21181# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
AISIM (AUTOMATED INTERACTIVE SIMULATION MODELING SYSTEM) VAX VERSION TRAINING MANUAL Final Report
S. Kneeburg, V. Allerton, and T. Woodcock Feb. 1985 155 p
(Contract F33615-81-C-5098)
(AD-A161436; ESD-TR-85-129) Avail: NTIS HC A08/MF A01 CSCL 09/2

This training manual presupposes virtually no programming experience and is intended to provide step by step information necessary to begin using AISIM as hosted on a VAX 11/780. It is not intended as a complete account of the system, and many topics covered in the companion AISIM User's Manual are covered here in less detail, or not at all. For further details on the operation of AISIM or on the kind of simulation AISIM is adapted to, the reader is referred to the more detailed AISIM User's Manual. This manual consists of seven sections. This first section provides a brief overview of AISIM and its main concepts. Sections 2, 3, and 4 concern the Design User Interface (DUI), i.e., that part of AISIM in which models are created. Section 5 describes the complete construction of a simple model. Section 6 turns to the use of the Analysis User Interface--the part of AISIM where simulation and analysis occur--using the model developed in Section 5 as an

example. Finally, Chapter 7 will document the creation, simulation and analysis of a more complex system. GRA

N86-21182# Utah Univ., Salt Lake City. Dept. of Computer Science.
DISCRETE B-SPLINES AS AN APPROACH TO COMPUTER AIDED GEOMETRIC DESIGN Final Report, 1 Jul. 1981 - 31 Dec. 1984
Richard F. Riesenfeld and Elaine Cohen Sep. 1985 8 p
(Contract DAAG29-81-K-0111)
(AD-A161445; ARO-18092.8-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Investigations have been made of many interesting problems deriving from the applications of discrete splines to the problems of computer aided geometric design. New theory and algorithms have been developed and support mechanisms based on the Oslo algorithm have been incorporated in order to help use the geometry model directly to calculate many geometric attributes needed for the design process including surface rendering and intersections. Author (GRA)

N86-21183# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
CONCURRENT PROGRAMMING USING ACTORS: EXPLOITING LARGE-SCALE PARALLELISM
Gul Agha and Carl Hewitt 7 Oct. 1985 22 p
(Contract N00014-80-C-0505)
(AD-A162422; AI-M-865) Avail: NTIS HC A02/MF A01 CSCL 09/2

We argue that the ability to model shared objects with changing local states, dynamic reconfigurability, and inherent parallelism are desirable properties of any model of concurrency. The actor model addresses these issues in a uniform framework. This paper briefly describes the concurrent programming language Act3 and the principles that have guided its development. Act3 advances the state of the art in programming languages by combining the advantages of object-oriented programming with those of functional programming. We also discuss considerations relevant to large-scale parallelism in the context of open systems, and define an abstract model which establishes the equivalence of systems defined by actor programs. Author (GRA)

N86-21184# Boeing Aerospace Co., Seattle, Wash.
SPECIFICATION TECHNOLOGY GUIDEBOOK Final Report, Mar. 1984 - Mar. 1985
David R. Addleman, Margaret J. Davis, and P. E. Presson Aug. 1985 238 p
(Contract F30602-84-C-0073)
(AD-A162457; RADC-TR-85-135) Avail: NTIS HC A11/MF A01 CSCL 09/2

The Specification Technology Guidebook provides guidelines for the selection of requirements and design specification methodologies appropriate to various software development environments and various types of software. The guidelines cover the requirements analysis architectural and detailed design phases. These guidelines are incorporated in a table-driven format that define increasingly thorough and formal levels of specification based on a software project's significance level. Significance level measures the relative importance of an individual project based on considerations of quality, software, and project. The guidebook provides summary descriptions of specification methodologies. It includes a method for selecting automated tools to support the selected methodologies. It includes typical paragraphs that can be included in Air Force software development statements-of-work to specify the use of specification methodologies by the contractor during the requirements analysis and design phases of a contracted development. Three example problems for C3I software development projects are included. A primary consideration imposed on each example is compatibility with the Ada programming language. The other considerations used for system requirements and design of the C3I problems were derived from actual requirements set forth in C3I RFP's, and working knowledge of the requirements for C3I software and system projects gained by Boeing Aerospace engineers during the last decade. GRA

N86-21185# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
GEONAMES PROCESSING SYSTEM FUNCTIONAL DESIGN SPECIFICATION. VOLUME 1: AUTOMATED ALPHANUMERIC DATA ENTRY SYSTEM Final Report
Gail Langran, Anne Downs, Barry Glick, and Warren Schmidt Mar. 1985 29 p
(AD-A162458; NORDA-98-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes the Geonames Processing System attributes and serves as a basis for understanding between the user and the developer. The subsystems referred to are: Advanced Symbol Processing, Advanced Type Placement, Geographic Names Data Base, and Automated Alphanumeric Data Entry System (AADES). The Automated Alphanumeric Data Entry System described in this volume will provide DMA with a means of high-volume geonames data entry from map sources. Source maps will include DMA map series and non-DMA maps (foreign and domestic). Captured information will be stored in a sequential file to be merged with the Geographic Names Data Base (GNDB). This file will include information on the geoname (specific and generic components, if applicable), the position of the feature to which the name refers, the feature's designator or class, the source document, the country (or countries) the named feature is in, the feature's attributes, and the non-Romanized name (if applicable). GRA

N86-21186# Argonne National Lab., Ill.
THREE COMPUTER CODES FOR SAFETY AND STABILITY OF LARGE SUPERCONDUCTING MAGNETS
L. R. Turner 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contracts DE-AC07-76ID01570; W-31-109-eng-38)
(DE85-018444; CONF-850814-10) Avail: NTIS HC A02/MF A01

For analyzing the safety and stability of large superconducting magnets, three computer codes TASS, SHORTURN, and SSICC have been developed, applicable to bath-cooled magnets, bath-cooled magnets with shorted turns, and magnets with internally cooled conductors, respectively. The TASS code is described, and the use of the three codes is reviewed. DOE

N86-21187# Argonne National Lab., Ill.
COMPONENT CONFIGURATION CONTROL SYSTEM: AN APPLICATION OF LOGIC PROGRAMMING
R. C. Stratton and G. G. Town 1985 9 p Presented at the Artificial Intelligence in Engineering Conference, Washington, D.C., 21 Oct. 1985 Prepared in cooperation with Central Washington Univ., Ellensburg
(Contract W-31-109-eng-38)
(DE85-018455; CONF-8510161-1) Avail: NTIS HC A02/MF A01

A computer application system is described which provides nuclear reactor power plant operators with an improved decision support system. This system combines traditional computer applications such as graphics display with artificial intelligence methodologies such as reasoning and diagnosis so as to improve plant operability. This paper discusses the issues, and a solution, involved with the system integration of applications developed using traditional and artificial intelligence languages. DOE

N86-21188# Allied Bendix Aerospace, Kansas City, Mo.
SOLID MODELING AND IGES
N. C. Christensen Sep. 1985 4 p Presented at the Solid Modeling 1985: Making CAD/CAM Pay Back, San Francisco, Calif., 6 Oct. 1985
(Contract DE-AC04-76DP-00613)
(DE86-000528; BDX-613-3366; CONF-8510171-1) Avail: NTIS HC A02/MF A01

The current status of IGES as concerns solid modeling is described. Covered are the activities of the IGES Solids Committee,

planned solids capability for IGES and IGES-PDES by December 1986. One of the key requirements of CIM is data integration. Data are entered once and then made available to all applications. IGES was developed to allow communication of CAD data between different vendor's systems. Originally the requirement was to communicate drawings. IGES Version 3.0 due in October 1985 contains no capability to communicate solids. But as industry moves toward the use of solids, the IGES Committee has been preparing to meet the foreseen need for solids. DOE

N86-21189# California Univ., Los Angeles. School of Engineering and Applied Science.
USE OF LOGIC FLOWGRAPH MODELS IN A COMPUTER AIDED PROCESS ANALYSIS AND MANAGEMENT SYSTEM
S. B. Guarro and D. Okrent Jul. 1985 12 p refs Presented at the International Topical Meeting on Computer Applications for Nuclear Power Plant Operation and Control, Pasco, Wash., 8 Sep. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif. Calif.
(Contract W-7405-eng-48)
(DE86-000740; UCRL-93293; CONF-850903-22) Avail: NTIS HC A02/MF A01

The development of a multi-function computer-aided process analysis and management (CAPAM) system, to be implemented in nuclear power plant control rooms, is proposed and discussed. The design goals identified for such a system are early disturbance detection and diagnosis, accompanied by identification of the best possible recovery actions or alternative success paths. The CAPAM structure is articulated in three functional levels with dedicated CRT displays. Increasing amount of diagnostic or recovery information is made available to the operators at the lower display levels. Probabilistic safety margins to the loss of important safety functions may be also calculated. The proposed implementation of the CAPAM concept is based on the use of logic flowgraph networks for the more detailed system modeling. Examples of such an implementation are given. DOE

N86-21190# Los Alamos National Lab., N. Mex.
TRAC-PF1 CODE VERIFICATION WITH DATA FROM THE OTIS TEST FACILITY
M. T. Childerson and R. K. Fujita 1985 18 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-7405-eng-36)
(DE85-010709; LA-UR-85-1265; CONF-851125-1) Avail: NTIS HC A02/MF A01

A computer code (TRAC-PF1/MOD1) developed for predicting transient thermal and hydraulic integral nuclear steam supply system (NSSS) response was benchmarked. Post-small break loss-of-coolant accident (LOCA) data from a scaled, experimental facility, designated the One-Through Integral System (OTIS), were obtained for the Babcock and Wilcox NSSS and compared to TRAC predictions. The OTIS tests provided a challenging small break LOCA data set for TRAC verification. The major phases of a small break LOCA observed in the OTIS tests included pressurizer draining and loop saturation, intermittent reactor coolant system circulation, boiler-condenser mode, and the initial stages of refill. The TRAC code was successful in predicting OTIS loop conditions (system pressures and temperatures) after modification of the steam generator model. In particular, the code predicted both pool and auxiliary-feedwater initiated boiler-condenser mode heat transfer. DOE

N86-21191# Oak Ridge National Lab., Tenn.
APPLICATIONS GUIDE TO THE RSIC-DISTRIBUTED VERSION OF THE MCNP CODE (COUPLED MONTE CARLO NEUTRON-PHOTON CODE)
S. N. Cramer Sep. 1985 25 p
(Contract DE-AC05-84OR-21400)
(DE86-001370; ORNL/TM-9641) Avail: NTIS HC A02/MF A01

An overview of the RSIC-distributed version of the MCNP code (a coupled Monte Carlo neutron-photon code) is presented. All general features of the code, from machine hardware requirements to theoretical details, are discussed. The current nuclide cross-section and other libraries available in the standard code package are specified, and a realistic example of the flexible geometry input is given. Standard and nonstandard source, estimator, and variance-reduction procedures are outlined. Examples of correct usage and possible misuse of certain code features are presented graphically and in standard output listings. Finally, itemized summaries of sample problems, various MCNP code documentation, and future work are given. DOE

N86-21192# Oak Ridge National Lab., Tenn.
APPLICATIONS GUIDE TO THE RSIC-DISTRIBUTED VERSION OF THE KENO-V CODE
S. N. Cramer Sep. 1985 24 p
(Contract DE-AC05-84OR-21400)
(DE86-001373; ORNL/TM-9642) Avail: NTIS HC A02/MF A01

A review of the KENO-V multigroup Monte Carlo criticality code available from the Radiation Shielding Information Center (RSIC) at Oak Ridge National Laboratory (ORNL) is presented. All aspects of the code are discussed, including the stand-alone and SCALE system modules and the applicable computer hardware systems. The cross-section requirements are outlined, and the available code package libraries and other necessary data are defined. The supergroup feature for use of the code on small computer systems is explained. The capabilities and limitations of the KENO array geometry description are illustrated. Various aspects of the random-walk and estimation procedures are itemized. Examples of the various calculated values of k/sub eff/ and its statistical uncertainty are shown in standard output listings. Finally, a summary of sample problems and future work is given. DOE

N86-21193# Geological Survey, Menlo Park, Calif.
AUTOMATIC PROGRAM FOR THE INTERPRETATION OF TWO-DIMENSIONAL GRAVITY AND MAGNETIC ANOMALIES
A. Wagini 1985 70 p refs
(Contract DE-AI08-78ET-44802)
(DE86-001418; USGS-OFR-85-377) Avail: NTIS HC A04/MF A01

This automatic inversion program for the interpretation of two-dimensional gravity and magnetic anomalies has been developed mainly in support of the US Geological Survey's effort to characterize potential radioactive-waste storage sites at the Nevada Test Site, Nevada. The method presented minimizes the sum of the squares of the residuals by varying only one variable (coordinate) at a time. This allows one to use all available information in the model calculation, which can reduce the computation time. The objective of this program is to find the shape of geologic bodies when the physical parameters are known. Except for the outermost corners, only the z-coordinate of each corner-point is varied. The variation of only one variable at a time has the advantage that a large number of bodies and corner-points (in this program up to 50 bodies, each with up to 50 corner-points) can be used for the model calculation without solving a large matrix. DOE

N86-21194# Technische Hogeschool, Delft (Netherlands). Lab. voor Geotechniek.
RESOLVING LINEAR EQUATIONS ON A MICROCOMPUTER [OPLOSSING VAN LINEAIRE VERGELIJKINGEN OP EEN MICROCOMPUTER]
A. Verruijt 1985 24 p In DUTCH
(Stumico-Rept-1) Avail: NTIS HC A02/MF A01

Algorithms to resolve systems of N linear equations with N unknowns numerically on microcomputers with limited memory capacity are presented. As a condition, the describing matrices are supposed to be sparse; i.e., many zeros and mostly symmetric. Iterative methods (Gauss-Seidel, or a variation) as well as direct methods (Gauss elimination with a wave front technique) are discussed. The methods are illustrated with the standard problem of a network of electrical resistances. The programs were written in BASIC for microcomputers with an OPTION BASE 1 possibility. Author (ESA)

N86-21195# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
COPWAL, AN ALGOL PROCEDURE FOR CONSTRAINED OPTIMIZATION BY MEANS OF AUGMENTED LAGRANGE FUNCTIONS
C. deWit Oct. 1983 22 p
(RC-TWA-83001) Avail: NTIS HC A02/MF A01
An Algol procedure which is more efficient than penalty function methods in constrained optimization using augmented Lagrange functions is presented. Author (ESA)

N86-21196# Technische Hogeschool, Delft (Netherlands). Lab. for Technical Physics.
COMPUTER SIMULATION OF THE CHARGE DISTRIBUTION AS A RESULT OF ION IMPACT IN THE MULTIWIRE PROPORTIONAL WIRE CHAMBERS BY MEANS OF A MULTIPARTICLE MODEL ON A SUPERCOMPUTER [CUMPUTERSIMULATIE VAN DE LADINGSVERDELING T.G.V. INFLUENTIE IN DE DRADENKAMER MET EEN VEEL DEELTJES MODEL OP EEN SUPERCOMPUTER]
J. P. Wagenaar Apr. 1983 55 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A04/MF A01
The calculation of the induced electric charge on the conductors of a multiwire proportional wire chamber was evaluated. Analytical solution of the Poisson equation; numerical solution of the Poisson equation using the variation principle of Hamilton; and the multiparticle approach using Coulombs' law were evaluated. Optimization of the program for a CDC CYBER 205 computer is discussed. Author (ESA)

N86-21197# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering
EVALUATION OF THE CYBER 205 VECTOR PROGRAMMING COURSE
J. H. vanDijk and J. W. deHeer Dec. 1984 18 p refs Course held in Amsterdam, 23-26 Oct. 1984; sponsored by Amsterdam Universities Computing Center and Utrecht Academic Computing Center
(Contracts STW-DRL-14.0120; PBE-90753.140)
(VTH-M-529) Avail: NTIS HC A02/MF A01
Participants' impressions of a CYBER 205 vector programming course are outlined. Author (ESA)

N86-21198# Technische Hogeschool, Eindhoven (Netherlands). Working Group on Software.
AN INVENTORY OF BASIC SOFTWARE FOR COMPUTER AIDED CONTROL SYSTEM DESIGN (CACSD), PRELIMINARY VERSION
12 Jul. 1985 57 p refs
(WGS-85-1) Avail: NTIS HC A04/MF A01
Over 1200 subroutines that may be considered as basic routines for solving problems in control and system theory are listed. Author (ESA)

N86-21199# Groningen Rijksuniversiteit (Netherlands). Rekencentrum.
THE CREATION OF A VIRTUAL NAG-ALGOL68 PROGRAM LIBRARY
R. deBruin and C. G. vanderLaan 1983 25 p refs
Avail: NTIS HC A02/MF A01
A method for the creation of a virtual ALGOL68 program library over the NAG-FORTRAN Subset Library is discussed. The virtual ALGOL68 library and the intermediate FORTRAN library are listed. Author (ESA)

N86-21200# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Computer Science Dept.
THE B NEWSLETTER, ISSUE 3, JAN. 1985
Jan. 1985 14 p refs
Avail: NTIS HC A02/MF A01
Implementation of the B programming language on the IBM PC; a file maintenance program; a proposal for matrix/vector functions in B; and efforts to speed up B implementation are covered. Author (ESA)

N86-21201# National Bureau of Standards, Gaithersburg, Md. Center for Applied Mathematics.
GLOBAL SOLUTIONS TO FACTORABLE NONLINEAR OPTIMIZATION PROBLEMS USING SEPARABLE PROGRAMMING TECHNIQUES
G. P. McCormick Jul. 1985 46 p
(PB86-105988; NBSIR-85/3206) Avail: NTIS HC A03/MF A01 CSCL 12B
Many algorithms for obtaining global solutions to nonconvex optimization problems have been proposed in recent years. The methods farthest along computationally are those for separable problems. These use linear programming codes to solve sequences of LP problems formed from piece-wise linear approximations to the nonlinear functional forms. For a large class of optimization problems, called factorable programming problems, it is possible to create equivalent separable problems. This is done at a cost: additional variables and constrains. In this paper the procedure for creating the equivalent separable problems is outlined and a brief description is given of a global solution algorithm due to Falk. A small example is given illustrating the above techniques. The example is also solved using a more direct method. Application to the solution of nonlinear least squares is illustrated with another example. Areas of research or improving the efficiency of this approach are also discussed. GRA

N86-20403# Newcastle-upon-Tyne Univ. (England). Computing Lab.
SOFTWARE FAULT TOLERANCE EXPERIMENTS
T. Anderson and P. A. Barrett *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 5 p refs Sponsored in part by UK Science and Engineering Research Council and by the Ministry of Defence (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

N86-20404# Newcastle-upon-Tyne Univ. (England). Computing Lab.
CAN DESIGN FAULTS BE TOLERATED?
T. Anderson *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 5 p refs (For primary document see N86-20399 11-08)
Copyright. Avail: NTIS HC A07/MF A01

N86-20406# Honeywell Systems and Research Center, Minneapolis, Minn.
MULTI-COMPUTER FAULT TOLERANT SYSTEMS USING ADA
Walter L. Heimerdinger *In* AGARD Fault Tolerant Hardware/Software Architecture Sep. 1985 8 p refs (For primary document see N86-20399 11-08)
Avail: NTIS HC A07/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-21202# Koninklijke Inst. van Ingenieurs, The Hague (Netherlands). Afdeling/Sectie Informatietechniek.
NATIONAL LAN-DAY. IN SEARCH OF THE PROMISED LAN [NATIONALE LAN-DAG. OP ZOEK NAAR HET BELOOFDE LAN]
5 Mar. 1985 188 p refs Partly in DUTCH and ENGLISH Conf. held in Utrecht, Netherlands, 5 Mar. 1985
Avail: NTIS HC A09/MF A01
Local Area Network (LAN) selection criteria for setup and acquisition were outlined. Problems around cables and topology were discussed. Standardization possibilities of LAN (interfaces) were indicated. The LAN'S were compared with telecommunication in general. Security possibilities were examined. Four examples of LAN in operation were given. A flexible LAN, implemented with

fourth generation software tools, was presented. For individual titles, see N86-21203 through N86-21214.

N86-21203# Tele-Consulting G.m.b.H., Gaeufelden (West Germany).
HOW TO SELECT AND IMPLEMENT A LOCAL AREA NETWORK
Dieter Steinle *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 42 p (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Based on the market situation and its driving forces, the question of how a Local Area Network (LAN) user can specify, select, and implement a suitable solution for an (office) environment is treated. Main LAN functions in relation to the user needs were summarized. Network design criteria and main requirements of a LAN, were specified. Elements for a request for price quotation were given. A selection process was outlined and prerequisites for a successful LAN project were outlined. Author (ESA)

N86-21204# Shell Internationale Petroleum Maatschappij B.B. (Netherlands).
THE PLACE OF LOCAL AREA NETWORKS (LAN) IN LARGE ORGANIZATIONS
J. A. Robinson *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 6 p (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

The Shell UK telecommunication network developed for voice and data transmission is described. Services and protocols to be carried, i.e., TV channels, voice channels, and digital data, were surveyed and brought as an argument for a broadband network. Basic network properties, i.e., intersite links, logical numbering, duplicated equipment and alternate routing, and the network control centers (NCC) are described. Difficulties related to the dimensions of the network, i.e., over-strained NCC's and autonomy ambitions of different groups of people in the net are discussed. Author (ESA)

N86-21205# Europe Container Terminus B.V., Rotterdam (Netherlands).
DATA COMMUNICATION SYSTEMS OF EUROPE CONTAINER TERMINUS BV IN ROTTERDAM (THE NETHERLANDS) [DATACOMMUNICATIESYSTEMEN VAN EUROPE CONTAINER TERMINUS B.V. IN ROTTERDAM]
R. J. M. vanEyndhoven *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 6 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

The data communication network of a container transhipment company is described. Operational processes at the terminal are controled by a network including a double Burroughs mainframe in which decentralized processing on micro and minicomputers is applied. Techniques implemented are: high-speed multiplexing, Ethernet, and wireless communication via radio and infrared. By means of 128 infrared transmitter receivers placed in the terrain, the exchange of information between the straddlecarriers and the terminal is provided. The load planning of the ships is carried out by a computer aided ship planning system. Via double statistical multiplexers the data transmission between the docks terminal and the two other terminals is provided. Author (ESA)

N86-21206# Philips International B.V., Eindhoven (Netherlands). Product Div. Telecommunications Systems.
STANDARDIZATION OF LOCAL AREA NETWORKS (LANS): LAN SERVICE AND LAN INTERFACE [STANDAARDISATIE VAN LAN'S, LAN SERVICE EN LAN INTERFACE]
J. vanEgmond *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 12 p refs In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Definition and standardization possibilities of a LAN technology independent interface within the Open Systems Interconnection Basic Reference Model were investigated. This standard interface would enable a simple connection between terminals and LAN's of different manufacturers. The importance with regard to future communication-integrated LAN's, providing for the communication in one building or complex, was emphasized. More kinds of communication on one LAN means the aptness of the LAN for the transport of data blocks and continuous data streams. Author (ESA)

N86-21207# Electrical Engineering Nederland (Netherlands).
(COMMUNICATION) CABLE ASPECTS [BEKABELINGSASPECTEN]
H. Walgemoed *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 13 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Cable aspects of Local Area Networks are discussed. A clearly structured unity is lacking, because there are hardly any norms in computer cabling. A comparison with telephone cabling shows the practibility of a star topology network with distributors. The advantages of ring nets and bus nets and their sensitivity to disturbances are discussed. The advantages of the use of fiber optic cables are summarized. Author (ESA)

N86-21208# Posterijen, Telegrafie en Telefonie, The Hague (Netherlands).
A POST, TELEGRAPH AND TELEPHONE (PTT) VIEW ON LOCAL COMMUNICATION [EEN PTT VISIE OP LOKALE COMMUNICATIE]
P. C. J. Hamelberg *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 10 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Local Area Networks (LAN) are considered within wider telecommunications. Possible kinds of telecommunication and demands are discussed. Developments in public telecommunication infrastructure are illustrated as there are marked parallels between local communication and the public infrastructure. Author (ESA)

N86-21209# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Ground Data Handling Section.
ADVANCED LOCAL AREA NETWORK (LAN) APPLICATION AT ESTEC: LAN APPLICATION WITHIN A TEST SYSTEM FOR SPACECRAFT [GEAVANCEERDE LAN TOEPASSINGEN BIJ ESTEC. LOCAL AERA NETWORK TOEPASSING BINNEN EEN TEST SYSTEM VOOR RUIMTEVAARTUIGEN]
W. F. M. vanLeeuwen *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 5 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

The application of a LAN as part of the Overall Check-Out Equipments (OCOE) used during the integration and afterwards during the test programs of the Giotto spacecraft is described. Specific functions of the OCOE and the place and necessity of the LAN within it are discussed. Based on the network requirements, the SYTEC Localnet 20/CATV combination was chosen. Areas in which implantation problems occurred, e.g., effective data transmission, components (splitters and taps), network start and control, intercom, and color image quality are discussed. Author (ESA)

N86-21210# Philips Data Systems B. V., Apeldoorn (Netherlands).
SELECTION CRITERIA FOR LOCAL AREA NETWORKS (LANS) [SELECTIECRITERIA VOOR LAN'S]
A. Hazeleger *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 27 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Selection criteria for the acquisition fo a LAN are presented. Application relevant alternatives were related to the organization desires (the environment). Material, i.e., PABX, base and broad-

band, and optical fiber LAN's are described. Time and frequency multiplexing are considered. Arbitration methods i.e., TDMA, CSMA/CD, and Token passing are discussed. Limitations, e.g., connector prices, distances bridged, portability, and extension possibilities are depicted. Standardization is reviewed.
Author (ESA)

N86-21211# IHBO de Maere, Enschede (Netherlands). HIO Afdel.
MANUS, A FOURTH GENERATION LOCAL COMPUTER NETWORK [MANUS, EEN VIERDE GENERATIE LOKAAL COMPUTERNETWERK]
Theo deRidder *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 6 p refs In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

The MAere Net of Unix Systems was developed and implemented with fourth generation software tools, as available in UNIX environments. Complete transparency on users level as well as facilities for an automated and fault-tolerant network are offered. Every control task, such as back-ups, or the management of configuration changes, is distributed and is as such not dependent upon a specific network joint. Author (ESA)

N86-21212# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
EXPERIENCE WITH A LOCAL AREA NETWORK (LAN) AT THE CENTER FOR MATHEMATICS AND COMPUTER SCIENCE (CWI)
Jim McKie *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 5 p (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

A computing environment and reasons for the choice of Ethernet and the Transmission Control Protocol/Internet Protocol are given. Experience with the hardware and software and how the LAN changed user practices are outlined. Author (ESA)

N86-21213# Klynveld Kraayenhof and Co., Amsterdam (Netherlands).
SECURITY IN LOCAL AREA NETWORKS (LANS) [BEVEILIGING IN LOKALE NETWERKEN]
H. A. J. M. Spape *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 8 p refs In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Computer information security problems of Local Area Networks (LAN's) are discussed in relation to the IEEE-802 standard where the condition of open systems with high connectivity is defined. The transmission line used, i.e., twisted pair, fiber optic, and coaxial cable (base and broadband); topology, i.e., star, ring, or bus; and the IEEE-Logical Link Control, i.e., unacknowledged connectionless, connection oriented, and acknowledged connectionless service are considered. The LAN's as defined by the IEEE-802 standard, hardly provide any security. Author (ESA)

N86-21214# Gemeentelijk Centrum voor Electronische Informatieverwerking, Amsterdam (Netherlands).
DOES A LOCAL AREA NETWORK (LAN) SOLVE YOUR CABLE PROBLEMS [LOST EEN LAN UW BEKABELINGSPROBLEEM OP]
P. Wester *In* Koninklijk Inst. van Ingenieurs Nationale LAN-Day. In Search of the Promised LAN 5 Mar. 1985 12 p In DUTCH (For primary document see N86-21202 11-62)
Avail: NTIS HC A09/MF A01

Possibilities of installing a Local Area Network (LAN) cable system in a building to be constructed were investigated. The building has 5 floors, 1200 working places, and considerable processing equipment. The usefulness of a LAN versus conventional ad hoc and IBM standard cable was examined. The multifunctional IBM cable system, and five LAN's, i.e., Digital Ethernet, Localnet of Syntec, Net/one of Ungerman-Bas, Planet of Racal-Milgo, and Sopholon of Philips, were asked to make an offer based on a definition study. It is suggested that present LAN's do not solve the problem (which is better solved by the IBM system); and conventional cable is much cheaper.
Author (ESA)

N86-21215# Wisconsin Univ., Madison. Mathematics Research Center.
WHAT KIND OF WORKSTATION SHOULD I BUY? SEVEN-FOLD CRITERIA FOR HARDWARE AND SOFTWARE Technical Summary Report
L. R. Scott Jul. 1985 13 p
(Contract DAAG29-80-C-0041)
(AD-A160985; MRC-TSR-2840) Avail: NTIS HC A02/MF A01
CSCL 05/5

The problem of designing a workstation suitable for an individual scientist or group of scientists are addressed from an abstract point of view. A set of seven criteria concerning hardware are presented that should be considered when assessing one's needs and comparing various available products. Seven categories of software are also discussed that are critical for someone doing code development, testing and production runs on a remote computer (mainframe or supercomputer). The criteria discussed are intended to be a model checklist relevant especially for people doing code development and production work in scientific computation. After discussing criteria for evaluating workstations, two examples are given of inexpensive yet powerful systems that should be possible to assemble today. Author (GRA)

N86-21216# Lawrence Livermore National Lab., Calif.
SUPERCOMPUTER: A FRIENDLY TOOL ON THE SCIENTIST'S DESK
D. Fuss 1985 12 p Presented at the SHARE European Association Meeting, Zurich, Switzerland, 23 Sep. 1985
(Contract W-7405-eng-48)
(DE86-001581; UCRL-93357; CONF-8509182-1) Avail: NTIS HC A02/MF A01

Supercomputers are being used in a variety of relatively new applications - airplane design, weather forecasting, oil reclamation, energy research, and structural analysis, to name a few. Thus, the supercomputer is rapidly moving from an exotic tool used by a few experts to the indispensable tool of many researchers. This raises questions about how to make supercomputers easier to use, how to provide access to supercomputers for remote users, and how to maximize the efficiency of both users and supercomputers. This paper discusses some of the trade-offs and provide some points of view, gained through experience, on these issues.
DOE

N86-21217# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
POSSIBILITIES OF THE HP1000 - A900 FOR THE REPLACEMENT OF THE HYBRID COMPUTER OF THE DEPARTMENT OF STABILITY AND CONTROL [DE MOGELIJKHEDEN VAN DE HP1000 - A900 TER VERVANGING VAN DE HYBRIDE REKENMACHINE VAN DE VAKGROEP STABILITEIT EN BESTURING]
E. W. deKeizer and F. L. M. Kok 24 Oct. 1983 6 p refs In DUTCH
(VTH-M-488) Avail: NTIS HC A02/MF A01

As an acquisition alternative for a SEL 32/87, the HP1000 - A900 was tested for its computing (time) capacity. High capacity is required for flight simulation. A benchmark test program was developed. Results of the SEL and the HP, which was equipped with a standard HP FORTRAN 77 compiler, were compared with those of an Amdahl computer. The test was executed using the standard HP Vector Instruction Set (VIS). The HP computer appears to be 2 to 10 times, and 1.5 to 4 times (with VIS) slower than the SEL. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-21218 Wisconsin Univ., Madison.
OFF-LINE ROBOT PROGRAMMING AND SIMULATION
Ph.D. Thesis
Mark Lawrence Hornick 1985 193 p
Avail: Univ. Microfilms Order No. DA8512304

The fundamental aspects of offline robot programming and simulation through computer modelling of the robot and its workspace environment are discussed. The advantages of the system are described and an overview of the computer program developed for this purpose is outlined. The generalized matrix symbolism used to mathematically describe mechanical linkages is applied to robot manipulators, and the kinematic equation of a robot arm are developed. The dynamic equations of motion are formulated for a manipulator by applying the Lagrange equations in conjunction with the same matrix notation. An efficient recursive formulation for calculation of dynamic joint torques resulting from this development is presented. Methods used for robot motion programming are discussed. A high level programming language is presented which was incorporated into the simulation program. Procedures for generating the actual motion trajectories are discussed, and a method for path generation based upon use of truncated trigonometric series is presented. In the final chapters, the dynamic aspects of robot motions are analyzed, and a method based upon time scaling for optimal determination of motion trajectories for minimum cycle times is presented. The capabilities of the program and the effects of the time scaling process are demonstrated. Dissert. Abstr.

N86-21219# National Aerospace Lab., Tokyo (Japan).
COVARIANCE SPECIFICATION FOR THE LINEAR TIME-INVARIANT OUTPUT-FEEDBACK CONTROL SYSTEMS USING A KALMAN FILTER
Masahiko Nagayasu Oct. 1985 16 p refs In JAPANESE; ENGLISH summary
(NAL-TR-882; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The covariance specification problem using a Kalman filter for the linear time-invariant output-feedback control system contaminated by observation and system noise is described. Linear stochastic control problems based on the quadratic performance criteria were studied. However, the relationships between the criteria and the behavior of the resultant closed loop system are still in question today. The optimal output-feedback control using a Kalman filter with which the stationary state covariance matrix coincides with the prescribed matrix is described. The system is disturbed by additive white/color system noise and the output signal is contaminated by white observation noise. The dynamic output feedback control system is obtained by using a Kalman filter. The covariance specification problem, i.e., to obtain the optimal feedback gains under the requirement of the state covariance coinciding with the prescribed covariance for minimizing the control effort, is solved. The control problem of an aircraft in atmospheric turbulence is numerically discussed. E.A.K.

N86-21220*# VAIR, Inc., Williamsburg, Va.
IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE RULES IN A DATA BASE MANAGEMENT SYSTEM
Stefan Feyock Feb. 1986 64 p refs
(Contract NAS1-18002)
(NASA-CR-178048; NAS 1.26:178048) Avail: NTIS HC A04/MF A01 CSCL 09B

The intelligent front end prototype was transformed into a RIM-integrated system. A RIM-based expert system was written which demonstrated the developed capability. The use of rules to produce extensibility of the intelligent front end, including the concept of demons and rule manipulation rules were investigated. Innovative approaches such as syntax programming were to be considered. B.G.

N86-21221# Illinois Univ., Urbana. Decision and Control Lab.
ISSUES IN FREQUENCY DOMAIN FEEDBACK CONTROL
Ph.D. Thesis
James S. Freudenberg May 1985 416 p
(Contract N00014-84-C-0149)
(AD-A161452; DC-81; UILU-ENG-85-2218) Avail: NTIS HC A18/MF A01 CSCL 09/3

The purpose of this thesis is to examine several issues in the frequency domain theory of feedback control systems. Properties of both single loop and multiple loop systems are considered. For single loop systems the limitations on feedback properties imposed by right half plane poles and zeros of the plant are considered. The relation between open and closed loop properties of multiple loop systems is studied. A great deal of attention is given to how complex analyticity of matrix transfer functions limits feedback properties of multiple loop systems. An integral constraint generalizing Bode's gain-phase relation is presented. Author (GRA)

N86-21222# Lawrence Livermore National Lab., Calif.
ROBUSTNESS OF REDUCED ORDER DECENTRALIZED CONTROL DESIGNS
K. D. Young and D. D. Siljak 28 Aug. 1985 6 p Presented at the 24th IEEE Conference on Decision and Control, Fort Lauderdale, Fla., 11 Dec. 1985 Prepared in cooperation with Santa Clara Univ., Calif.
(Contract W-7405-eng-48)
(DE85-018185; UCRL-93309; CONF-851209-3) Avail: NTIS HC A02/MF A01

Although there have been a great deal of studies in reduced order control designs, the issues relating to the robustness of the resulting controller with respect to distortions in the feedback channels, as well as gain and phase margin, have not been addressed. The robustness of reduced order Linear Quadratic (LQ) design is considered. DOE

N86-21223# Lawrence Livermore National Lab., Calif.
ADAPTIVE CONTROL OF DECENTRALIZED SYSTEMS: KNOWN SUBSYSTEMS, UNKNOWN INTERCONNECTIONS
D. T. Gavel and D. D. Siljak 28 Aug. 1985 9 p Presented at the 24th IEEE Conference on Decision and Control, Fort Lauderdale, Fla., 11 Dec. 1985 Prepared in cooperation with Santa Clara Univ., Calif.
(Contract W-7405-eng-48)
(DE85-018189; UCRL-92417; CONF-851209-4) Avail: NTIS HC A02/MF A01

One of the common assumptions in control of large interconnected systems is that models of subsystems are to a large extent known to a designer, and an essential modeling uncertainty resides in the interconnections. Current decentralized adaptive control schemes take no advantage of this fact. In this paper, an algorithm is presented in which adaptation of local feedback gains is in the direction which compensates for the unknown interconnections, while exploiting the knowledge about the subsystems. As a result, we broaden considerably the class of interconnected systems for which decentralized adaptation is feasible. DOE

N86-21224# Tilburg Univ. (Netherlands). Dept. of Econometrics.
FROM STRUCTURAL FORM TO STATE-SPACE FORM
Max D. Merbis and Aart J. deZeeuy 1985 20 p refs
(FEW-145) Avail: NTIS HC A02/MF A01

Ways to transform an econometric model into state-space form are considered. Consequences of these transformations are that a particular transformation determines the dimension of the resulting state vector, and determines the applicability of systems and control techniques, like optimal feedback control. It appears that both the numbers p and q and the (parsimonious) structure of the ARMA (p,q) model influence the resulting dimension of the state. A considerable reduction can be achieved by elimination of static relationships and reduced stacking. A macroeconometric model consisting of 65 endogenous variables serves as an illustration. Application of a control algorithm might otherwise indicate which transformation is desirable. A choice must be made

between a linear system and a state-space format. For the standard, deterministic, linear quadratic control problem, the optimal trajectories are the same in both cases. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-21225 Washington Univ., Seattle.
QUALITATIVE STABILITY PROPERTIES OF MATRICES Ph.D. Thesis
Terrence M. Bone 1985 69 p
Avail: Univ. Microfilms Order No. DA8521560

A matrix A is sign stable if some matrix with the same sign pattern of positive, negative, and zero entries has all eigenvalues with negative real parts. It is potentially stable if it is not sign unstable. The system $A x + b = 0$ is positively sign solvable if the sign pattern of the solution vector x contains all positive entries and is determined by the sign patterns of A and b. The characterization of potentially stable matrices remains unresolved. Counterexamples are presented refuting some previous results of Quirk and Campbell. New classes of potentially stable matrices are defined by means of recursive constructions, and a new necessary condition for potential stability is given. A characterization is presented of systems $A x + b = 0$ for which A is sign stable and the system is positively sign solvable. This leads to a recognition algorithm of time complexity which is linear in the order of A and the number of nonzero entries of A. The relation between this characterization and previous results of Manber is explored. Dissert. Abstr.

N86-21226 Brown Univ., Providence, R. I.
IS ELASTICITY THE PROPER ASYMPTOTIC THEORY FOR MATERIALS WITH VISCOSITY AND CAPILLARITY Ph.D. Thesis
Jose Luiz Boldrini 1985 99 p
Avail: Univ. Microfilms Order No. DA8519810

The equations for the isothermal motion of a one dimensional unbounded body composed of a material with viscosity (of rate type) and capillarity were considered. Using a technique derived from the Theory of Compensated Compactness, the conditions that guarantee that, as viscosity and capillarity approach zero, the solutions of these equations converge to a solution of the corresponding equations in elasticity was found. Then the structure that viscosity and capillarity impose on shock layers was studied through the asymptotic behavior of traveling wave solutions of the equations of motion. The results that indicate that the conditions that guarantee convergence are indeed necessary. Similar conclusions were reached for material with memory (viscosity of Boltzmann type). Dissert. Abstr.

N86-21227 British Aerospace Aircraft Group, Preston (England). Aircraft Group.
TIME HISTORY RESPONSE OF LINEAR TRANSFER FUNCTION
J. H. McDonnell Aug. 1983 15 p refs
(BAe-MSN-272-Iss-2) Copyright. Avail: Issuing Activity

An algorithm for calculating the time history response y(t) of a linear system to a forcing function f(t), where f(t) and solution y(t) are defined at equally spaced time intervals, is derived. O'Brien's method for reducing to a set of first order differential equations followed by exact solution, assuming that f(t) is represented by straight line segments, is used. A better approximation to f(t) could be made, but not without looking ahead. The method here assumes that yk is calculated as soon as fk is known, that is, without waiting for fk plus 1. The proposed solution method is recommended for any set of linear equations with constant coefficients. The alternative method, while not having the same accuracy, could be more appropriate if the coefficients were variable. Author (ESA)

N86-21228# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
STUDIES IN D-OPTIMAL EXPERIMENTAL DESIGN
Demetre Betsis 1985 18 p refs
(TRITA-NA-8501) Avail: NTIS HC A02/MF A01

The problem of selecting the initial design in iterative computation of the D-optimal design has not been treated previously. A method is suggested here of constructing the initial design. The method yields very good approximations and often the D-optimal design itself. An algorithm for optimal allocation of the masses, is presented and tested. Author

N86-21229# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
REVIEW OF ADAPTIVE-GRID TECHNIQUES FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS
D. F. Hawken Dec. 1985 36 p refs
(UTIAS-Review-46; ISSN-0082-5247) Avail: NTIS HC A03/MF A01

The results of a literature search for adaptive numerical methods of solving partial differential equations are summarized. The methods discussed involve the adaptive movement of nodes, so as to obtain a low level of solution truncation error while minimizing the number of nodes used in the calculation. Such methods are applicable to the solution of blast wave or other nonstationary flow problems that contain moving regions of rapid change in the flow variables, surrounded by regions of relatively smooth variation. Shock waves, contact surfaces, phase change interfaces, boundary layers, and other structures, can be modelled in detail by these methods. It will be shown that significant economies of execution can be attained if nodes are moved so that they remain concentrated in regions of rapid variation of the flow variables. Author

N86-21230# Montpellier Univ. (France). Lab. de Physique Mathematique.
NONFORMAL RECURSION OPERATORS AND NONLINEAR INTEGRABLE EVOLUTION EQUATIONS
M. Boiti and B. G. Konopelchenko (Inst. of Nuclear Physics, Novosibirsk, USSR) Sep. 1985 6 p refs
(PM:85-16; PACS-03.80) Avail: NTIS HC A02/MF A01

A wide class of nonlinear evolution equations is integrable by inverse scattering transform method. The use of nonformal recursion operators to solve the equation is demonstrated. B.G.

N86-21231# Montpellier Univ. (France). Lab. de Physique Mathematique.
ON A NEW HIERARCHY OF NONLINEAR EVOLUTION EQUATIONS CONTAINING THE POHLMEYER-LUND-REGGE EQUATION
F. Pempinelli and S. Potenza (Lecce Univ., Italy) Sep. 1985 26 p refs
(PM:85-17) Avail: NTIS HC A03/MF A01

A hierarchy of local nonlinear evolution equations associated with a new spectral problem is derived. Each equation is Hamiltonian and their fluxes commute. A local infinite set of conserved densities is given. An interesting reduction is considered, which a hierarchy of local nonlinear evolution equations is generated by a recursion operator and its explicit inverse. This hierarchy also satisfies a canonical geometrical scheme, containing as a special case the Pohlmeyer-Lund-Regge equation. Author

N86-21232# National Aeronautical Lab., Bangalore (India). Systems Engineering Div.
COMPUTATION OF TRANSFER FUNCTION MATRICES
J. K. Sridhar and B. Satyabhagavan Aug. 1985 30 p refs
(NAL-TM-SE-8509) Avail: NTIS HC A03/MF A01

Control systems design in frequency domain involves the computation of transfer function matrices. Details of the software developed on UNIVAC-1100/60 to compute transfer function matrices and hence zeros and poles of numerator and denominator polynomials respectively are given. The software developed here is intended to form an integral part of a package available in the

division to study longitudinal and lateral dynamics of an aircraft. Numerical algorithm and schematic flow chart is presented along with an example on a fighter aircraft model. The software is documented and validated. A user manual is provided. Author

N86-21233# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
A PRELIMINARY NOTE ON THE DEVELOPMENT OF A THREE DIMENSIONAL POTENTIAL CODE IN CARTESIAN COORDINATES
S. S. Desai, R. Rangarajan, and K. S. Ravichandran Jul. 1985 53 p refs
(NAL-TM-AE-8504) Avail: NTIS HC A04/MF A01

An existing two dimensional transonic code TRADE1 was extended in Cartesian coordinates to three dimensions. A code was developed using Cartesian coordinates, instead of the more involved body fitting coordinates, so that the incorporation of a fuselage in the code developed for wing alone case becomes straight forward. The preliminary studies show encouraging results, but also bring into focus areas in a flow field where more needs to be done for a good resolution of the flow details, particularly for swept, tapered wings. Author

N86-21234# National Aeronautical Lab., Bangalore (India). Structures Div.
FIELD-CONSISTENCY AND VIOLENT STRESS OSCILLATIONS IN FINITE ELEMENT METHOD
G. Prathap and C. Ramesh Babu Jun. 1985 43 p refs Sponsored by the Council for Scientific and Industrial Research
(NAL-TM-ST-8506) Avail: NTIS HC A03/MF A01

The fact that finite element models can give rise to violent stress oscillations has been known for some time. However, it is less well known that these oscillations arise in a specific class of problems where there are multiple strain-fields arising from one or more field-variables and where one or more of these strain-fields must be constrained in particular physical limits. In this paper, it is shown that unless the interpolations for these constrained strain-fields are field-consistent violent oscillations would set in. The field-consistency interpretation offers a conceptual scheme to delineate these problems and an operational procedure called the functional re-constitution technique allows the errors resulting from field-inconsistency to be anticipated a priori. The power of this approach is demonstrated through an interesting example of a multi-strain field, multi-field variable problem - the inextensional deformation of a shear flexible curved beam. Author

N86-21235# National Aeronautical Lab., Bangalore (India). Structures Div.
DEVELOPMENT OF A LIBRARY OF FIELD-CONSISTENT FINITE ELEMENTS
C. Ramesh Babu, B. R. Somashekar, and G. Prathap Aug. 1985 34 p refs Sponsored by the Council for Scientific and Industrial Research
(NAL-TM-ST-8511) Avail: NTIS HC A03/MF A01

Although the finite element method has progressed rapidly from simple engineering principles to thorough and rigorous mathematical formalizations, here still exist large areas of uncertainty. Reviewed here, is some of the recent progress made in the laboratory to identify and classify a particular problem area in the finite element method, to define its new vocabulary and devise new operational procedures of error analysis based on this conceptual scheme, and to use this to design and develop and test an entire library of field-consistent elements. Author

N86-21236*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY ANALYSIS OF SPECTRAL METHODS FOR HYPERBOLIC INITIAL-BOUNDARY VALUE SYSTEMS Final Report
David Gottlieb (Tel-Aviv Univ., Israel), Liviu Lustman, and Eitan Tadmor (Tel-Aviv Univ., Israel) Jan. 1986 39 p refs
(Contracts NAS1-17070; NAS1-18107; Grants AF-AFOSR-0089-83; NSF DMS-85-03194; DAAG29-85-K-0190)
(NASA-CR-178041; ICASE-86-2; NAS 1.26:178041) Avail: NTIS HC A03/MF A01 CSCL 12A

A constant coefficient hyperbolic system in one space variable, with zero initial data is discussed. Dissipative boundary conditions are imposed at the two points x = + or - 1. This problem is discretized by a spectral approximation in space. Sufficient conditions under which the spectral numerical solution is stable are demonstrated - moreover, these conditions have to be checked only for scalar equations. The stability theorems take the form of explicit bounds for the norm of the solution in terms of the boundary data. The dependence of these bounds on N, the number of points in the domain (or equivalently the degree of the polynomials involved), is investigated for a class of standard spectral methods, including Chebyshev and Legendre collocations. Author

N86-21237# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
STABILITY THEOREMS CONCERNING HIGH ORDER EXPLICIT ALGORITHMS FOR THE LINEAR ADVECTION EQUATION
M. Lobo Oct. 1985 47 p refs
CAR-8517; ISBN-0-947767-142 Avail: NTIS HC A03/MF A01

Analysis of the stability of an N-point explicit algorithm for the linear advection equation involves the calculation of the roots of a polynominal of degree N-1. A theorem is proved to show that if the algorithm is of the nth order (n < N), then the associated stability polynomial must have a multiple root of order [n+2/2] so that, in effect, the analysis need only be carried out for a polynomial of degree N - [n + 2/2]. This technique for reducing the complexities involved in stability analysis is illustrated for families of 4- and 5- point algorithms. Moreover in the special case of ideal algorithms (for which n = N - 1), a complete stability analysis is carried through, a theorem being proved that such algorithms are always stable in their central range but never outside. Author

N86-21238# Wisconsin Univ., Madison. Mathematics Research Center.
SINGULAR SOLUTIONS FOR SOME SEMILINEAR ELLIPTIC EQUATIONS Technical Summary Report
Haim Brezis and Luc Oswald Aug. 1985 20 p
(Contract DAAG29-80-C-0041)
(AD-A160982; MRC-TSR-2858) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document gives a new proof of Veron's result concerning the classification of isolated singularities for the equation-delta u + u sub p = 0. The author also establish that the singular behavior at a point can be prescribed and determines uniquely the solution (under fixed boundary conditions). Author (GRA)

N86-21239# Wisconsin Univ., Madison.
GAUSS-NEWTON METHODS FOR THE NONLINEAR COMPLEMENTARITY PROBLEM Technical Summary Report
P. K. Subramanian Aug. 1985 26 p
(Contract DAAG29-80-C-0041; Grants NSF DCR-84-20963; NSF MCS-81-02684)
(AD-A160983; MRC-TSR-2845) Avail: NTIS HC A03/MF A01 CSCL 12/1

It is a result of Mangasarian that the nonlinear complementarity problem is equivalent to the solution of a system of nonlinear equations. This paper considers the solution of this system by the damped Gauss-Newton method using the principle of least squares minimization. Algorithms are developed which under fairly simple conditions converge locally to a solution and under stronger hypotheses converge locally quadratically. The algorithms have been used successfully to solve both linear and nonlinear complementarity problems including a standard difficult test problem due to Colville. Author (GRA)

N86-21240# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE ANTI-CYLINDER Technical Summary Report
I. J. Schoenberg Jul. 1985 16 p

(Contract DAAG29-80-C-0041)
(AD-A160984; MRC-TSR-2842) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document defines a geometric figure which is called an anticylinder, like the cylinder, it has a bottom circle gamma function and a topcircle gamma function' and all common normals of gamma function and gamma function' have the same length c. Figure two exhibits a model made by the author of 1.5 feet height. Unlike the two circles of a cylinder the circles gamma function and gamma function' are linked, like two consecutive elements in a chain. If made of anodized aluminum tubing and of reasonable height (15 to 20 feet) it would make and attractive outdoor sculpture, of interest also to nonmathematicians, and also perhaps for children's playgrounds, the children climbing around the figure. GRA

N86-21241# Mississippi State Univ., Mississippi State. Dept. of Aerophysics and Aerospace Engineering.
NUMERICAL MODELING OF TWO-DIMENSIONAL WIDTH-AVERAGED FLOWS USING BOUNDARY-FITTED COORDINATE SYSTEMS Final Technical Report, Jun. 1979 - Sep. 1983
Joe F. Thompson and Robert S. Bernard Aug. 1985 125 p
(Contract DACW39-78-C-0054)
(AD-A160991; WES/TR/E-85-9) Avail: NTIS HC A06/MF A01 CSCL 20/4

Finite-difference solution of two-dimensional, time-dependent width-averaged Navier-Stokes equations, including an algebraic turbulence model, based on a numerically generated boundary-fitted coordinate system, is discussed. This solution, implemented by the WESSEL computer code, is applicable to 2D regions of arbitrary shape, with multiple inlets and outlets, and with obstacles in the interior. A choice of central, upwind, or ZIP differencing of the convective terms is provided. One-sided differencing is used for the continuity equation. The density is taken to be a function of the temperature, and the system of equations forming the model consists of the continuity equation, the two momentum equations, and the energy equation. Arbitrary distribution of velocity and temperature (or density) can be specified on the inlets and outlets. The solution is implicit in time, with the difference equations being solved simultaneously by SOR (successive over-relaxation) iteration at each time step. Pressure is calculated via Chorin's method. GRA

N86-21242# Wisconsin Univ., Madison. Mathematics Research Center.
ERROR BOUNDS FOR NEWTON-LIKE METHODS UNDER KANTOROVICH TYPE ASSUMPTIONS Technical Summary Report
Tetsuro Yamamoto Jul. 1985 43 p
(Contract DAAG29-80-C-0041)
(AD-A160994; MRC-TSR-2846) Avail: NTIS HC A03/MF A01 CSCL 12/1

To find sharper error bounds for iterative solutions of nonlinear equations is one of the important subjects in numerical analysis. This paper gives a method to derive new a posteriori error bounds for Newton-like methods in a Banach space under Kantorovich type assumptions. The bounds found are sharper than those of Miel and include those recently obtained by Moret. The applicability of the author's method is studied for other types of iterations. Various error bounds for the Newton method under the Kantorovich assumptions are surveyed in the Appendix. GRA

N86-21243# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
REAL INVERSION FORMULAS FOR LAPLACE AND STIELTJES TRANSFORMS Technical Report, Sep. 1984 - Aug. 1985
Jozef L. Teugels Jul. 1985 18 p
(Contract F49620-82-C-0009)
(AD-A161270; TR-111; AFOSR-85-0949TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

We provide probabilistic proofs for a number of real inversion formulas for the Laplace and for the Stieltjes transform. The main drawback of the method used in this paper is that the revelant integral transform has to be recovered from a potential inversion formula. The main virtue of the paper lies in singling out the relevance of the asymptotic behavior of the sequence d sub n for n to infinity; probabilistic arguments often provide this behavior immediately. GRA

N86-21244# Florida State Univ., Tallahassee. Dept. of Statistics.
MOMENT AND GEOMETRIC PROBABILITY INEQUALITIES ARISING FROM ARRANGEMENT INCREASING FUNCTIONS
Philip J. Boland, Frank Proschan, and Y. L. Tong Aug. 1985 13 p
(Contract F49620-85-C-0007; Grant AF-AFOSR-0113-84)
(AD-A161273; FSU-STATISTICS-M708; TR-85-182-AFOSR; AFOSR-85-0952TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A real valued function g of two vector arguments x and y epsilon R sub n is said to be arrangement increasing if it increases in value as the arrangement of components in x becomes increasingly similar ot the arrangement of components in y. Hollander, Proschan and Sethuramen (1977) show that the composition of arrangement increasing functions is arrangement increasing. This result is used to generate some interesting probability inequalities of a geometric nature for exchangeable random vectors. Other geometric inequalities for families of arrangement increasing multivariate densities are also given and some moment inequalities are also given, and some moment inequalities are obtained. Author (GRA)

N86-21245# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
SOME GENERAL PROBABILISTIC ESTIMATIONS FOR THE RATE OF CONVERGENCE IN OPERATOR SEMIGROUP REPRESENTATIONS
Dietmar Pfeifer Sep. 1985 10 p
(Contract F49620-82-C-0009)
(AD-A161359; TR-114; AFOSR-85-0967TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Starting from well-known estimations for the rate of convergence in Hille's, Philips' and Widder's representation formulas for operator semigroups this document shows that by a suitable probabilistic approach, these results are easily reobtained, and can immediately be generalized to arbitrary (probabilistic) representation formulas. Some examples are also considered. Author (GRA)

N86-21246# North Carolina Univ., Chapel Hill. Dept. of Statistics.
INNOVATIONS AND WOLD DECOMPOSITIONS OF STABLE SEQUENCES
Stamatis Cambanis, Clyde D. Hardin, Jr., and Aleksander Weron Jul. 1985 41 p
(Contract F49620-82-C-0009)
(AD-A161437; TR-106; AFOSR-85-0946TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

For symmetric stable sequences, notions of innovation and Wold decomposition (WD) are introduced, characterized, and their ramifications in prediction theory are discussed. As the usual covariance orthogonality is inapplicable, the non-symmetric James orthogonality is used, thus leading to right and left innovations and Wold decompositions, which are related to regression prediction and least p sub th moment prediction, respectively. Independent innovations and WD are also characterized; and several examples illustrating the various decompositions are presented. Author (GRA)

N86-21247# Massachusetts Inst. of Tech., Cambridge. Dept. of Ocean Engineering.
TOPICS ON BOUNDARY-ELEMENT SOLUTIONS OF WAVE RADIATION-DIFFRACTION PROBLEMS
Paul D. Sclavounos and Chang-Ho Lee 1985 10 p
(Contracts N00167-84-R-0144; N00014-82-K-0198)
(AD-A161699) Avail: NTIS HC A02/MF A01 CSCL 12/1

Two topics on the numerical solution of boundary-integral equations arising in linear wave-body interactions are discussed.

The properties of a spectral technique for the solution of the integral equation are analyzed and compared to the conventional collocation method. It is shown that, using this technique, hydrodynamic forces predicted by the source-distribution method are identical to those obtained from the direct solution for the velocity potential. The second part of the paper investigates the numerical properties of a method which removes the effects of the irregular frequencies for bodies of general shape at a small computational and algorithmic overhead. Its performance is illustrated in the evaluation of the heave and sway hydrodynamic coefficients of a circle and a rectangle. Author (GRA)

N86-21248# Texas Univ., Austin. Dept. of Physics.
PERTURBATION AND CHARACTERIZATION OF NONLINEAR PROCESSES Progress Report, 15 Nov. 1984 - 14 Nov. 1985
H. L. Swinney and J. Swift 1985 7 p
(Contract DE-AS05-84ER-13147)
(DE86-001952; DOE/ER-13147/2) Avail: NTIS HC A02/MF A01

Methods of characterizing nonperiodic processes in nonlinear systems are being developed and tested on low dimensional mathematical models and applied to laboratory data for nonequilibrium systems, particularly the Belousov--Zhabotinskii (BZ) reaction. Methods developed for characterizing dynamical behavior are described first, followed by a discussion of the experimental work. DOE

N86-21249# Lawrence Livermore National Lab., Calif.
APPROXIMATE FINITE ELEMENT MODELS FOR STRUCTURAL CONTROL
K. D. Young 27 Aug. 1985 21 p Presented at the 24th IEEE Conference on Decision and Control, Fort Lauderdale, Fla., 11 Dec. 1985
(Contract W-7405-eng-48)
(DE86-001582; UCRL-93310; CONF-851209-5) Avail: NTIS HC A02/MF A01

Approximate finite element models are developed for the purpose of preserving the tridiagonality of the mass and stiffness matrices in the state space model matrices. These approximate models are utilized in the design of active structural control laws for large flexible structures. DOE

N86-21250# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain). Dept. de Informatica y Normalizacion.
CONTRIBUTIONS TO THE ANALYSIS OF NUMERICAL SERIES [ALGUNAS CONTRIBUCIONES AL ANALISIS DE SUCESIONES NUMERICAS]
Jose Manuel Garcia Conca 1985 8 p refs In SPANISH
Avail: NTIS HC A02/MF A01

The algorithms to solve by successive approximations real or complex, scalar or vectorial equations are discussed. The analysis reduces all cases to the real case and refers to the error and convergence analysis of number series. The Cauchy and D'Alambert criteria are combined to provide necessary and sufficient convergence conditions. It is shown that the error can be estimated and that integration difficulties can be detected but not always solved. Examples are presented to illustrate the method. Author (ESA)

N86-21251# Fondazione Ugo Bordoni, Rome (Italy).
THE GENERATION OF BINARY SEQUENCES [CONSIDERAZIONI IN MERITO ALLA GENERAZIONE DI SEQUENZE BINARIE]
Giuseppe M. Poscetti Dec. 1984 35 p In ITALIAN
(FUB-27-1984) Avail: NTIS HC A03/MF A01

Definitions and properties of the generation of binary sequences including the polynomial representation of binary sequences, the generation by the division of one polynomial by another, linear feedback shift registers, and properties and examples of nonlinear feedback shift registers are discussed. Binary sequences with a fixed rate of zeros to ones are examined. Examples of the procedure to calculate the total number of different separate sequences for a given length and zeros rate are presented. Author (ESA)

N86-21252# Fondazione Ugo Bordoni, Rome (Italy).
GENERATION OF PRIMITIVE POLYNOMIALS BY DECIMATION OF MAXIMUM LENGTH SEQUENCES [GENERAZIONE DI POLINOMI PRIMITIVI MEDIANTE DECIMAZIONE DI SEQUENZE DI MASSIMA LUNGHEZZA]
Emilio Montolivo Dec. 1984 17 p refs In ITALIAN
(FUB-29-1984) Avail: NTIS HC A02/MF A01

Decimation is defined as a procedure by which a sequence is generated from another of length l by selecting the sequence values which are at a distance k from each other. The properties of decimated sequences obtained from maximum length sequences are described. It is shown that if l and k have no common dividers the decimated sequence is also a maximum length sequence and that the primitive polynomials of r order can be sought by a decimation procedure including a Massey algorithm. Cryptography applications are pointed out. Author (ESA)

N86-20439# Joint Publications Research Service, Arlington, Va.
SOME POSSIBILITIES OF REPRESENTATION OF GRAVITATIONAL POTENTIAL BY SERIES ALWAYS CONVERGENT OUTSIDE ITS SURFACE
N. A. Chuykova *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 28 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta: Fizika, Astronomiya (Moscow, USSR), v. 26, no. 5, Sep. - Oct. 1985 p 77-81 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-21253# Massachusetts Inst. of Tech., Cambridge.
A MODEL FOR SERIAL DEPENDENCE IN LOGISTIC REGRESSION Technical Report
Thomas Paul Lane Sep. 1985 127 p
(Contract N00014-75-C-0555)
(AD-A161274; TR-38-ONR) Avail: NTIS HC A07/MF A01 CSCL 12/1

A model is proposed for binary time series with marginal probabilities given by logistic regression on explanatory variables, by analogy with the first order autoregressive error model for least squares regression. Measurements at adjacent time points are assumed to have an odds ration that is no equal to one and that is constant as a function of time. Measurements separated in time are assumed to be conditionally independent given an intervening observation. Consequences of using and ordinary logistic model in the presence of serial dependence are explored. The closest logistic model, defined as the one with the same marginal probabilities. Consistency of the maximum likelihood estimator of the serial dependence model is proved under certain conditions, and a procedure for finding these estimates is given. Properties of the model are found, including expressions for the joint probabilities and the odds ratio between observations separated in time. The model is shown to generate a mixing processes. A score test is derived in order to test for independence after performing an ordinary logistic regression, and properties of the test are explored. The effects of missing data on the score test and on estimation of the odds ratio (with known coefficients) are presented. The model is applied to the problem of automatic classification of EKG data based on feature extraction. A positive serial dependence is found in the examples presented. Author (GRA)

N86-21254# Florida State Univ., Tallahassee. Dept. of Statistics.
A CHARACTERIZATION OF THE GAMMA DISTRIBUTION FROM A RANDOM DIFFERENCE EQUATION
Eric S. Tollar Jul. 1985 15 p
(Contract DAAG29-82-K-0168)

(AD-A161282; FSU-STATISTICS-M705; TR-D-82-ARO; ARO-19367.29-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

A characterization of the gamma distribution is considered which arises from a random difference equation. A proof without characteristic functions is given that if V and Y are independent random variables, then the independence of V.Y and (1-V).Y results in a characterization of the gamma distribution (after excluding the trivial cases). GRA

N86-21255# Stanford Univ., Calif. Systems Optimization Lab.
ESTIMATION OF STEADY-STATE CENTRAL MOMENTS BY THE REGENERATIVE METHOD OF SIMULATION
Peter W. Glynn and Donald L. Iglehart Aug. 1985 19 p
(Contract DAAG29-84-K-0030; Grant NSF MCS-82-03483)
(AD-A161435; ARO-20927.11-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let X be a postive recurrent regenerative process on state space S with steady state distribution pi. Given a function f : S yields R, the problem of estimating the steady state central moments muk (supra f) = summation s (f(x)-r)(Supra k) pi(dx) is considered where r is the steady state mean of f (x(.)). Strong laws, central limit theorems, and confidence intervals for estimators, and present numerical results are obtained. Author

N86-21256# Stanford Univ., Calif. Lab. for Computational Statistics.
BAYESIAN NONPARAMETRIC BOOTSTRAP CONFIDENCE INTERVALS Technical Report
Nils L. Hjort Nov. 1985 39 p
(Contract N00014-83-K-0472)
(AD-A161786; LCS-TR-20; TR-240) Avail: NTIS HC A03/MF A01 CSCL 12/1

It is assumed that X sub 1,...,X sub n be a random sample from an unknown probability distribution P on the sample space X, and that theta = theta(P) is parameter of interest. This paper gives a Bayesian botstrap method of obtaining Bayes estimates and Bayesian confidence limits for theta, using a (nondegenerate) Dirichlet process prior for P. This extends methods and results of Rubin (1981) and Efron (1982), in that they assume the sample space to be finite and use only a particular degenerate Dirichlet prior. An asymptotic justification of the Bayesian bootstrap is given, parallelling results of Bickel and Freedman(1981). Author (GRA)

N86-21257# Department of Energy, Morgantown, W. Va. Energy Technology Center.
MECHANICAL INTERPRETATION OF STOCHASTIC PROCESSES
V. Komkov Jul. 1985 9 p
(DE85-013601; DOE/METC-85-4028) Avail: NTIS HC A02/MF A01

In this report some well-known and some not-so-well known analogies between stochastic processes and mechanisms of rigid bodies are pointed out. The discussion of these analogies is kept at an elementary level. DOE

N86-21258# Department of Energy, Morgantown, W. Va.
MONTE CARLO APPROACH TO MODELING OF CHEMICAL PROCESSES
V. Komkov Jul. 1985 78 p refs
(DE85-013609; DOE/METC-85-4029) Avail: NTIS HC A05/MF A01

While the most attractive feature of the Monte Carlo method is the ability to directly simulate diverse physical phenomena (chemical phenomena are regarded as physics), it is also a powerful technique for studying differential and integral equations. While considerable activity exists in solving integral equations arising in transport theory, not much recent literature is available on direct applications to solutions of partial differential equations, particularly to systems of nonlinear equations. For a while activity in developing the Monte Carlo method was diminished, but recently there seems to be a revival of stochastic simulation of physical phenomena, particularly in chemistry and material science. DOE

N86-21259# Brookhaven National Lab., Upton, N. Y.
COMMENTS ON THE ASSIGNMENT OF UNCERTAINTIES
N. E. Holden 1985 3 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001187; BNL-NCS-36958; CONF-8508138-4) Avail: NTIS HC A02/MF A01

Most experimentalists separate their errors into two distinct categories, random errors and systematic errors. Various statistical methods are available to provide the random error but the experimentalist is usually left with estimating bounds to systematic errors through judgement or experience. A judgement-type estimate of limits to systematic error leads one to wonder if it is merely a guess. There are those who argue that one should never estimate an upper limit to the systematic error but it should be treated as a type of statistical uncertainty. This paper discusses how one should treat this problem as far as atomic weights and isotopic composition are concerned. DOE

N86-21260# Lawrence Livermore National Lab., Calif.
APPLICATION OF PRA TO HEMP VULNERABILITY ANALYSIS
R. W. Mensing Sep. 1985 57 p
(Contract W-7405-eng-48)
(DE86-001781; UCID-20553) Avail: NTIS HC A04/MF A01

Vulnerability analyses of large systems, e.g., control and communication centers, aircraft, ships, are subject to many uncertainties. A basic source of uncertainty is the random variation inherent in the physical world. Thus, vulnerability is appropriately described by an estimate of the probability of survival (or failure). The estimate of the probability of survival is not a single value but a range of values. Probabilistic risk analysis (PRA) is a methodology which deals with these uncertainty issues. This report discusses the application of PRA to HEMP vulnerability analyses. Vulnerability analysis and PRA are briefly outlined and the need to distinguish between random variation and modeling uncertainty is discussed. Then a sequence of steps appropriate for applying PRA to vulnerability problems is outlined. Finally, methods for handling modeling uncertainty are identified and discussed. DOE

N86-21261# Los Alamos National Lab., N. Mex.
MONTE CARLO SIMULATION OF TWO-PARTICLE RELATIVE DIFFUSION USING EULERIAN STATISTICS
J. T. Lee, G. L. Stone, R. E. Lawson, Jr., and M. Shipman 1985 16 p Presented at the 7th Symposium on Turbulence and Diffusion of the AMS, Boulder, Colo., 12 Nov. 1985 Prepared in cooperation with Environmental Protection Agency, Research Triangle Park, N.C. and N.C. Northrop Services, Inc., Research Triangle Park, N.C.
(Contract W-7405-eng-36)
(DE85-015727; LA-UR-85-2745; CONF-851177-1) Avail: NTIS HC A02/MF A01

One-particle Monte Carlo simulations of relative diffusion in LSa are modified to account for interparticle velocity correlations both at the source and along the particle trajectories. The interparticle correlations are calculated directly from the Eulerian space-time velocity autocorrelation function. Since the particle trajectories are coupled, this is referred to as a two-particle model. Results from these two-particle simulations are compared to our previous one-particle results to determine the importance of the interparticle correlations downwind of the source. The models are evaluated by comparison with new wind tunnel data on the absolute diffusion and meandering of a plume in a field of grid-generated turbulence. DOE

N86-21262# Sandia National Labs., Albuquerque, N. Mex.
RANDOM VARIATION OF MODAL FREQUENCIES: EXPERIMENTS AND ANALYSIS
T. L. Paez, L. J. Branstetter, and D. L. Gregory 1985 28 p
(Contract DE-AC04-76DP-00789)
(DE86-000[illegible]34; SAND-85-1379C) Avail: NTIS HC A03/MF A01

The purpose of this investigation is to establish an analytic technique for the estimation of the second order statistical moments

(mean, variance, covariance) of modal frequencies, when one or more underlying structural parameters are random variables is established. The analytical investigation summarized here shows that the moments of modal frequencies can be defined in terms of some simpler measure of structural characteristics. The second order moments of a structural system can be evaluated approximately. Some examples are presented. The first example shows the results of a sequence of experiments in which the fundamental frequency of a cantilever beam is evaluated repeatedly. The fundamental frequency varies randomly, and its mean and variance are estimated from measured data. In the same example, the mean and variance of an underlying random variable (base stiffness of the cantilever beam) are estimated from data, and it is shown that these moments can be used in the analytic framework developed here to estimate the mean and variance of the fundamental frequency. Good agreement exists between the experimental and analytical results. DOE

N86-21263# Oak Ridge National Lab., Tenn.
NLO ERROR PROPAGATION EXERCISE: STATISTICAL RESULTS
D. J. Pack and D. J. Downing Sep. 1985 111 p
(Contract DE-AC05-84OR-21400)
(DE86-001228; ORNL/CSD-128) Avail: NTIS HC A01

The NLO error propagation exercise was planned as a field demonstration of the utilization of statistical error propagation methodology at the Feed Materials Production Center in Fernald, Ohio from April 1 to July 1, 1983 in a single material balance area formed specially for the exercise. Major elements of the error propagation methodology were: variance approximation by Taylor Series expansion; variance cumulation by uncorrelated primary error sources as suggested by Jaech; random effects ANOVA model estimation of variance effects (systematic error); provision for inclusion of process variance in addition to measurement variance; and exclusion of static material. The error propagation Limits of Error on Inventory Differences (LEIDs) did encompass the actual uranium and (235)U inventory differences. Further, one can see that error propagation actually provides guidance for reducing inventory differences and LEIDs in future time periods. DOE

N86-21264# Tilburg Univ. (Netherlands). Dept. of Economics.
TESTING THE MEAN OF AN ASYMMETRIC POPULATION: JOHNSON'S MODIFIED t TEST REVISED
J. P. C. Kleijnen, G. L. J. Kloppenburg, and F. L. Meeuwsen Aug. 1985 25 p refs
(FEW-183) Avail: NTIS HC A02/MF A01

Johnson's (1978) modification of Student's t test was assessed. Confidence intervals based on the quadratic approximation were investigated geometrically. Monte Carlo experiments yield estimates of the coverage and power of several variations of Johnson's test. The experiments show that the quadratic approximation is superior. Author (ESA)

N86-21265# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Automatic Control.
COMPUTER-AIDED GRAY-BOX IDENTIFICATION
Torsten Bohlin 1985 21 p refs Presented at 7th International Symposium on Mathematical Theory of Networks and Systems, Stockholm, Sweden, Jun. 1985
(TRITA-REG-8502) Avail: NTIS HC A02/MF A01

Contaminated data and partial knowledge of an object structure is studied, applying statistical inference and validation methods to generate a number of algorithms and procedures. A way to develop interactive programs for computer aided modeling of such cases is presented. The steps of a typical identification session are listed as a sequence of fitting and validation steps, designed to arrive at the simplest model that does not contradict data. It is shown that identification algorithms for two rather general classes of case elements for which exact predictors are known are feasible. In addition, use of approximate predictors allows solution of still wider classes of identification problems. Author (ESA)

N86-21266# Fondazione Ugo Bordoni, Rome (Italy).
CORRELATION AND COVARIANCE METHODS FOR VECTOR SIGNALS APPLIED TO AUTOREGRESSIVE NONSTEADY ANALYSES [I METODI DI CORRELAZIONE E DI COVARIANZA PER SEGNALI VETTORIALI APPLICATI NELLANALISI AUTOREGRESSIVA NON-STAZIONARIA]
Lucio Prina Ricotti Dec. 1984 76 p refs In ITALIAN
(FUB-23-1984) Avail: NTIS HC A05/MF A01

Coefficient estimation methods to extend linear regression to the nonsteady case are discussed. A typical application is the analysis of voice signals. The main characteristic of the procedure is that the linear prediction filter is adaptive. The model includes parameters which vary in a continuous way. Even if the number of coefficients to estimate is larger, the unsteady model requires a smaller number of segment samples, resulting in a smaller number of system parameters. Details of the computer program are presented. Author (ESA)

N86-21267# Tilburg Univ. (Netherlands). Dept. of Economics.
ESTIMATION IN A LINEAR MODEL WITH SERIALLY CORRELATED ERRORS WHEN OBSERVATIONS ARE MISSING
Tom Wansbeek and Arie Kapteyn 16 Jan. 1984 37 p refs
(FEW-139; BPA-13640-82-M1) Avail: NTIS HC A03/MF A01

The estimation of the linear regression model with AR(1) errors on the basis of time series data obtained at irregular intervals or with missing observations is discussed. The structure of the error covariance matrix is analyzed, and a simplying transformation of the model which allows for least squares estimation is derived. The maximum likelihood estimate (MLE) of the parameters is given and its asymptotic covariance matrix is established. The performance of ML vis-a-vis two-stage estimation methods is assessed using real and simulated data. Although MLE is the most complicated, it is the most efficient. A simpler (two step) estimator with almost identical performance is presented. Author (ESA)

N86-21268# Tilburg Univ. (Netherlands). Dept. of Economics.
IDENTIFICATION OF LINEAR STOCHASTIC MODELS WITH COVARIANCE RESTRICTIONS
Paul A. Bekker and D. S. G. Pollock 1985 38 p refs Sponsored by Netherlands Organization for the Advancement of Pure Research
(FEW-144) Avail: NTIS HC A03/MF A01

Identification in systems of linear structural equations where disturbances are uncorrelated is treated. The class of decomposable covariance restrictions that give rise to relationships of exogeneity is defined. The wider class of recursively decomposable restrictions is introduced. If all the covariance restrictions are recursively decomposable, then any set of structural parameters that are identifiable are also globally or uniquely identifiable. Undecomposable covariance restrictions are considered. Such restrictions no longer afford an assurance of global identification. Nevertheless, for one model a simple criterion for discriminating amongst the isolated solutions of the identifying equations is shown. Author (ESA)

N86-21269# Tilburg Univ. (Netherlands). Dept. of Economics.
STATISTICALLY AND COMPUTATIONALLY EFFICIENT ESTIMATION OF THE GRAVITY MODEL
Tom Wansbeek (Groningen Rijksuniv., Netherlands) and Arie Kapteyn 1985 18 p refs
(FEW-154) Avail: NTIS HC A02/MF A01

Least squares estimation of the gravity model in log-linear form is discussed. Computational efficiency (essential when the number of nodes distinguished is large) obtained by the covariance transformation can only be applied when flows are observed between all nodes. It therefore breaks down in the generic case where there are no flows observed from node i to itself. A transformation that allows for efficient computation of the estimates in the generic case is presented. Author (ESA)

N86-21270# Tilburg Univ. (Netherlands). Dept. of Economics.
AN IMPLEMENTATION OF AN INVENTORY MODEL WITH STOCHASTIC LEAD TIME

R. Heuts and J. vanLieshout 1985 20 p refs
(FEW-158) Avail: NTIS HC A02/MF A01

An inventory model having as lead time demand distribution a Schmeiser-Deutsch distribution is analyzed. It is shown that this type of distribution is very suitable as it can have many different shapes. A method for estimating the parameters of this distribution is developed and the explicit cost function of the model as function of the order quantity and the reorder level is derived. Properties of this function are given together with a global algorithm to find the optimal order quantity and reorder point. Author (ESA)

N86-21159# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
ORDER STATISTICS, QUANTILE PROCESSES AND EXTREME VALUE THEORY
R. Helmers *In its* CWI Newsletter Sep. 1984 p 33-38 refs
Presented at Meetingheld in Oberwolfach, West Germany, 25-31 Mar. 1984 (For primary document see N86-21156 11-60)
Avail: NTIS HC A04/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-21271# National Aeronautical Lab., Bangalore (India). Systems Engineering Div.
ROBUST EIGENSYSTEM ASSIGNMENT IN MULTI-INPUT SYSTEMS
S. Srinathkumar and R. V. Jategaonkar May 1985 14 p refs
(NAL-TM-SE-8506) Avail: NTIS HC A02/MF A01

Using simple geometric concepts it is shown that system sensitivity to parameter perturbation stems from the numerical illconditioning of the normalized modal matrix (matrix of eigenvectors) to inversion, which is quantified by the absolute value of its determinant. By noting the freedom in partial election of eigenvectors, beyond eigenvalue assignment in multi-input state feedback systems, an optimization procedure is formulated to maximize the modal matrix determinant and thus minimize eigensystem sensitivity. Author

N86-21272# Illinois Univ., Urbana. Urbana Decision and Control Lab.
CONTROLLER DESIGN FOR LINEAR STOCHASTIC SYSTEMS WITH UNCERTAIN PARAMETERS M.S. Thesis
Paul Howard McDowell Mar. 1985 170 p
(AD-A161428; DC-77; IU-UILU-ENG-85-2213; R-1038) Avail: NTIS HC A08/MF A01 CSCL 12/1

The design of optimal controllers for linear stochastic systems requires an accurate description of the system. However, the construction of an accurate model of real systems is often not possible. These inaccuracies can stem from the fact that the adopted linear model may be only a first-order approximation of a nonlinear system. Also, there may be actual uncertainty in the parameters of the real system. This type of uncertainty can arise, for instance, if one wishes to design a single type of controller for a large number of similar systems, when, for example, the system is mass produced and it is impractical to tune each controller to each system. Another situation where this type of uncertainty can arise is when the parameters of a single system varies slowly over long periods of time, perhaps due to wear or changes in the environment. These uncertainties, in this thesis, are grouped into a vector of parameter. Several ways of handling these uncertainties in the design process are considered. GRA

N86-21273# Northwestern Univ., Evanston, Ill.
MARKOV PROCESSES APPLIED TO CONTROL, REPLACEMENT AND SIGNAL ANALYSIS Annual Report, 1 Jun. 1984 - 31 May 1985
Erhan Cinlar Oct. 1985 7 p
(Grant AF-AFOSR-0189-82)
(AD-A162431; AFOSR-85-1085TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The concept of intrinsic age was introduced to relate the deterioration of a component under field conditions to the deterioration it would have experienced under laboratory conditions. Work has begun on research into random shapes. Additional research was performed on the stability of a harmonic oscillator in the presence of small noise. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-21274# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Space Mechanics and Control Dept.
EXACTLY SOLVING THE WEIGHTED TIME-FUEL OPTIMAL CONTROL OF AN UNDAMPED HARMONIC OSCILLATOR
Marcelo LopesdeOliveiraeSouza Jan. 1986 31 p refs Submitted for publication
(INPE-3750-PRE/874) Avail: NTIS HC A03/MF A01

The exact solution to weighted time/fuel optimal control of an undamped harmonic oscillator is presented. Its motivation is the possibility of improvements on the final behavior of trajectories produced by Vander Velde's design for on/off controls of large space structures, by replacing the approximate solution by the exact one. First order necessary conditions. The existence, normality, unicity, and determination of its externals and its solution were investigated. Numerical comparisons between those solutions were made according to three criteria. Author

N86-21275# Argonne National Lab., Ill.
MAGNETIC RELAXATION IN HIGHLY ANISOTROPIC SYSTEMS
A. J. Fedro and B. D. Dunlap 1985 10 p refs Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Univ. of Northern Illinois, Dekalb
(Contract W-31-109-eng-38)
(DE85-014992; CONF-850890-8) Avail: NTIS HC A02/MF A01

Using the Mori formalism, a general theory is developed for the calculation of paramagnetic relaxation effects in a general crystal field doublet. For systems with extreme magnetic anisotropy, the relaxation rates show a strong angular dependence, being severely peaked in a direction perpendicular to the magnetic easy axis. Application to the RRh4B4 (R = rare-earth) compounds is discussed. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-21276* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ULTRASONIC ANGLE BEAM STANDARD REFLECTOR Patent
Robert F. Berry, Jr., inventor (to NASA) Issued 17 Dec. 1985 5 p Filed 19 Mar. 1984
(NASA-Case-LAR-13153-1; US-Patent-4,558,585;
US-Patent-Appl-SN-590921; US-Patent-Class-73-1-DV;
US-Patent-Class-72-341; US-Patent-Class-72-324) Avail: US

Patent and Trademark Office CSCL 20A

A method that provides an impression profile in a reference standard material utilized in inspecting critically stressed components with pulsed ultrasound is described. A die stamp having an I letter is used to impress the surface of a reference material. The die stamp is placed against the surface and struck with an inertia imparting member to impress the I in the reference standard material. Upset may appear on the surface as a result of the impression and is removed to form a smooth surface. The stamping and upset removal is repeated until the entire surface area of a depth control platform on the die stamp uniformly contacts the material surface. The I impression profile in the reference standard material is utilized for reflecting pulsed ultrasonic beams for inspection purposes.

Official Gazette of the U.S. Patent and Trademark Office

N86-21277 California Inst. of Tech., Pasadena.
EDGETONES AND ACOUSTIC RESONANCES IN A DUCT Ph.D. Thesis
Kim Maynard Aaron 1985 131 p
Avail: Univ. Microfilms Order No. DA8519532

Undesirable sound generation in the combustion chamber of segmented solid propellant rocket motors has been attributed to vortex shedding from obstructions that are uncovered as the propellant burns back. This phenomenon was investigated experimentally and the mechanism are explained. Flow visualization using smoke and a strobe light triggered by the pressure oscillations indicate that vortex shedding occurs at the first baffle in phase with the acoustic velocity oscillations there. The interaction of these vortices with the downstream baffle drives the acoustic resonance which, in turn, triggers the formation of new vortices at the upstream separation point. The phase relations for the feedback to operate require that there be close to an integral number of wavelengths, or vortices, from the separation point to the impingement point. A model was developed which predicts the experimentally observed behavior. Pressure amplitudes are predicted within an order of magnitude. Mean flow rates and baffle spacings yielding maximum response are determined correctly by the model.

Dissert. Abstr.

N86-21278 Washington Univ., St. Louis, Mo.
ULTRASONIC BACKSCATTER: A QUANTITATIVE INDEX OF THE ELASTIC PROPERTIES OF INHERENTLY INHOMOGENEOUS MEDIA Ph.D. Thesis
Lewis J. Thomas, III 1985 169 p
Avail: Univ. Microfilms Order No. DA85120815

The use of backscattered ultrasound to determine physical parameters of inhomogeneous materials was investigated. Experimental methods were described for determining backscatter efficiency (integrated backscatter), a quantity which is closely related to the backscatter coefficient. These methods were used to study fatigue and impact damage in graphite-epoxy composite laminates and living hearts. A technique was described for determining the slope of attenuation with frequency from backscattered ultrasound. This technique is based on the Wigner distribution of the backscattered signal. The application of these techniques permitted determination of the physical parameters of a specimen, thereby allowing a quantitative assessment of the condition of the specimen. By using the polar backscatter technique we were able to investigate the effects of both impact and fatigue on specific lamina of graphite-epoxy composite laminates.

Dissert. Abstr.

N86-21279# Federal Aviation Administration, Washington, D.C.
NOISE LEVELS FOR US CERTIFICATED AND FOREIGN AIRCRAFT
4 Nov. 1985 101 p
(FAA-AC-36-1D) Avail: NTIS HC A06/MF A01

U.S. Department of Transportation Advisory Circular No. 36-1D (11/4/85) provides noise level data for airplanes certificated under FAR Part 36. Noise level data for foreign airplanes certificated to ICAO Annex 16 standards are also provided in a separate appendix for informational purposes. New appendices have been added to represent selected configurations of U.S. certificated aircraft and to provide listings of noise levels ranked in descending order.

Author

N86-21280*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NEW TECHNIQUES FOR EXPERIMENTAL GENERATION OF TWO-DIMENSIONAL BLADE-VORTEX INTERACTION AT LOW REYNOLDS NUMBERS
Earl Booth, Jr. and James C. Yu Mar. 1986 27 p refs
(NASA-TP-2551; L-15981; NAS 1.60:2551) Avail: NTIS HC A03/MF A01 CSCL 20A

An experimental investigation of two dimensional blade vortex interaction was held at NASA Langley Research Center. The first phase was a flow visualization study to document the approach process of a two dimensional vortex as it encountered a loaded blade model. To accomplish the flow visualization study, a method for generating two dimensional vortex filaments was required. The numerical study used to define a new vortex generation process and the use of this process in the flow visualization study were documented. Additionally, photographic techniques and data analysis methods used in the flow visualization study are examined.

Author

N86-21281*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INFRASONIC EMISSIONS FROM LOCAL METEOROLOGICAL EVENTS: A SUMMARY OF DATA TAKEN THROUGHOUT 1984
Allan J. Zuckerwar, J. W. Stroughton, and C. W. Khalaf Feb. 1986 50 p refs Prepared in cooperation with Old Dominion Univ., Norfolk, Va.
(Contract NAS1-17099)
(NASA-TM-87686; NAS 1.15:87686) Avail: NTIS HC A03/MF A01 CSCL 20A

Records of infrasonic signals, propagating through the Earth's atmosphere in the frequency band 2 to 16 Hz, were gathered on a three microphone array at Langley Research Center throughout the year 1984. Digital processing of these records fulfilled three functions: time delay estimation, based on an adaptive filter; source location, determined from the time delay estimates; and source identification, based on spectral analysis. Meteorological support was provided by significant meteorological advisories, lightning locator plots, and daily reports from the Air Weather Service. The infrasonic data are organized into four characteristic signatures, one of which is believed to contain emissions from local meteorological sources. This class of signature prevailed only on those days when major global meteorological events appeared in or near to eastern United States. Eleven case histories are examined. Practical application of the infrasonic array in a low level wing shear alert system is discussed.

Author

N86-21282# Tennessee Univ., Knoxville. Dept. of Physics.
NONLINEAR ACOUSTICS Annual Summary Report, 1 Dec. 1984 - 30 Nov. 1985
M. A. Breazeale 3 Oct. 1985 6 p
(Contract N00014-81-K-0229; DA Proj. RR0-1108)
(AD-A160366) Avail: NTIS HC A02/MF A01 CSCL 20/1

Nonlinear properties of solids and liquids are studied. Both pulsed and CW ultrasonic waves are used in the ultrasonic measurements which are made by electronic as well as optical techniques. Nonlinear properties of solids of cubic, hexagonal, and trigonal symmetries are described in terms third-order elastic constants which can be measured between room temperature and 4K; those of liquids are described in terms of ratio B/A of coefficients in the equation of state. Nonlinear diffraction theory is considered.

GRA

N86-21283# Computer Sciences Corp., San Diego, Calif.
BEAMFORMING TECHNIQUES TO SEPARATE THE SOUND PATHS BY VERTICAL ARRIVAL ANGLE IN SHALLOW WATER Final Report
P. W. Schey Sep. 1985 57 p
(Contract N66001-83-D-0043)
(AD-A161546; NOSC-CR-304) Avail: NTIS HC A04/MF A01

CSCL 17/1

The purposes of this project were: (1) to test the ability of various beamforming techniques to separate the sound paths by vertical arrival angle in a shallow water environment; (2) to determine if a source can be localized in range and depth by back raytracing; and (3) to test matched field detection as a method of determining source range and depth. GRA

N86-21284# Yale Univ., New Haven, Conn. Dept. of Mechanical Engineering.
PROPERTIES OF MATERIALS USING ACOUSTIC WAVES Annual Report, 1 Nov. 1984 - 31 Oct. 1985
R. E. Apfel Oct. 1985 29 p
(Contract N00014-85-K-0215; RR0-1108)
(AD-A161629) Avail: NTIS HC A03/MF A01 CSCL 20/1

Our goal of characterizing materials using acoustic waves was forwarded through a number of projects: (1) We have derived a theory, and tested it on tissues, for predicting the composition of composite materials using mixture rules, such as the one we derived for the nonlinear parameter two years ago; (2) We have published one article and another is in review on our use of modulated acoustic radiation pressure on levitated drops to characterize interfaces with and without surfactants. We have begun to study in a systematic way the nonlinear dynamics of drops, including drop fission: (3) we have improved apparatus for 30 MHz ultrasonic scattering from microparticles (approx. micron size), which should allow us to discriminate between different microparticles in a liquid; (4) We have begun to study the nonlinear mechanics of hydrodynamic solitons in cylindrical (2-d) geometry; and (5) We have been studying the use of acoustic levitation for transducer calibration. GRA

N86-21285# Lawrence Livermore National Lab., Calif.
ACOUSTIC MICROSCOPY OF ROUGH SURFACES
B. P. Bonner, S. E. Benson, and J. G. Berryman 26 Jul. 1985 17 p Presented at the Multiple Scattering of Waves in Random Media and Random Rough Surfaces, University Park, Pa., 29 Jul. 1985
(Contract W-7405-eng-48)
(DE86-001723; UCRL-92422; CONF-850787-2) Avail: NTIS HC A02/MF A01

Water-saturated lightly sintered packs of nearly spherical glass particles with radii (a) ranging from approx. 30 to approx. 110 microns were examined over a wide frequency range (21 to 90 MHz) with the focused reflecting acoustic microscope (FRAM). Back scattered images can be compared for a wide range of 2(PI)a/lambda, from approx. 5 to 30, where lambda is the wavelength of the incident wave. The images are digital, and are analyzed with image processing techniques. Assuming that the imaged surface is representative of the bulk porosity, two- and three-point spatial correlation functions can be computed from the FRAM data. These measurements are then compared qualitatively to exact calculation results for arrays of impenetrable spheres. DOE

N86-21286# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.
PITCH DISCRIMINATION FOR VARIOUS MODEL STIMULI [HET TOONHOOGTEONDERSCHEIDINGSVERMOGEN VOOR DIVERSE STIMULI GEMODELLEERD]
F. W. Wittkaemper Aug. 1983 166 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A08/MF A01

An extension of the model for the critical band scale (Zwicker, 1967), based on the steepness of the slopes in the excitation pattern of a stimulus on the frequency scale, was developed. This Just Noticible Discrimination (JND) model for the frequency scale is more general than the model for the critical band scale, as the choice of the filters is not determined. Based on a series of auditory filters, the model was tested comparing measured and calculated JND values for the stimuli: sinusoid, periodic impulse, cosine noise, and comb filter noise. It appears that the model reproduces the JND in pitch reasonably to well. Author (ESA)

N86-21287# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
RECENT EXPERIENCES IN THE ANALYSIS OF AIRCRAFT CABIN NOISE
Rudolf F. C. Kriens 1985 5 p refs Presented at Inter-Noise 85, Munich, West Germany, 18-20 Sep. 1985
Avail: NTIS HC A02/MF A01

Reduction of cabin noise in propeller driven aircraft is discussed. Separation of cabin noise into left and right hand components is described. Acoustic finite element analysis and airborne acoustic intensity measurements are reviewed. Author (ESA)

N86-20901# Joint Publications Research Service, Arlington, Va.
FLUCTUATIONS IN PROPAGATION TIME AND DIRECTION OF ARRIVAL OF SIGNAL REFLECTED FROM WAVE-COVERED SEA SURFACE Abstract Only
V. M. Frolov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 22-23 Transl. into ENGLISH from Izvestiya Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 768-774 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20908# Joint Publications Research Service, Arlington, Va.
ACOUSTIC FIELD IN UNDERWATER WAVEGUIDE WITH RANDOM INHOMOGENEITIES Abstract Only
A. G. Nechayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 27-28 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 358-364 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20909# Joint Publications Research Service, Arlington, Va.
DETERMINING UNIVERSAL HIGH-FREQUENCY ASYMPTOTIC SPECTRAL FORMS ASSOCIATED WITH PROPAGATION OF INTENSIVE ACOUSTIC NOISE Abstract Only
L. Bjorno and S. N. Gurbatov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 28 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 303-308 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20910# Joint Publications Research Service, Arlington, Va.
DIFFERENTLY DIRECTED MOVEMENTS OF GAS BUBBLES IN VIBRATING FLUIDS IN PRESENCE OF PHYSICAL INHOMOGENEITIES Abstract Only
N. A. Pelykh *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 28 - 29 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 6, Jun. 1985 p 100-107 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20921# Joint Publications Research Service, Arlington, Va.
CALCULATION OF SOUND FIELDS IN ATMOSPHERIC REFRACTION WAVEGUIDE Abstract Only
A. V. Razin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 45-46 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 707-713 Previously announced in IAA as A85-46238 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20922# Joint Publications Research Service, Arlington, Va.
ACOUSTIC WAVE PROPAGATION IN POLYMERIC FLUID WITH VAPOR-GAS BUBBLES Abstract Only
S. P. Levitskiy and Z. P. Shulman *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 46 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 31, no. 3, May - Jun. 1985 p 353-357 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-21288# Montpellier Univ. (France). Lab. de Physique Mathematique.
INTRODUCTION TO ILL-POSED ASPECTS OF NUCLEAR SCATTERING
Pierre C. Sabatier Jun. 1985 20 p refs
(PM/85-12; CNRS-040768; RCP-264) Avail: NTIS HC A02/MF A01

This survey is presented as an educational tool. It tries to present in a simple way the main ill-posed aspects of inverse problems arising in nuclear scattering. Some examples are given which explains how they are dealt with or how they are circumvented. Author

N86-21289# Naval Research Lab., Washington, D. C.
MOLECULAR ORBITAL STUDY OF ACYCLICAL NITRAMINE COMPOUNDS Interim Report
G. H. Herling 25 Sep. 1985 34 p
(RR0-1201)
(AD-A159351; AD-E700020; NRL-MR-5641) Avail: NTIS HC A03/MF A01 CSCL 20/8

The results of MNDO and MINDO/3 semiempirical self-consistent field calculations for the ground state structures, heats of formation, and dipole moments of several acyclical nitramine compounds are compared with each other and experiment. Because the reactions of such molecules are complicated, it may happen that the first steps of their decompositions are not amenable to experimental study, and, in order to attempt to obtain an understanding of the complete dynamics, it is necessary to perform theoretical calculations. The small value of the ratio of electron to proton masses, 1/1823, leads to a decoupling of the electronic motion from that of the heavy particles, the Born-Oppenheimer approximation. The quantum mechanical treatment of the electronic motion for fixed positions of the nuclei forms the basis of quantum chemistry which generates a potential energy surface that determines the heavy particle motion classically, semiclassically, or quantum mechanically. In Sec 2, the Hartree-Fock (HF) self-consistent field (SCF) method is briefly described. The reduction of the HF equations by means of atomic orbitals (AO's) is described as is the problem of multifold proliferation of matrix elements. In Sec 3, the reduction of the full SCF Hamiltonian to the MINDO/3 and MNDO forms is discussed, and the empirical parameterization of matrix elements is described. In Sec. 4, the results obtained for the ground state properties of several acyclical nitramine compounds using MINDO/3 and MNDO Hamiltonians are compared with each other and with experiment. GRA

N86-21290# Rome Air Development Center, Griffiss AFB, N.Y.
MULTIPLE SCATTER CROSS SECTIONS FOR ANISOTROPIC KOLMOGOROFF TURBULENCE Report, Sep. 1982 - Dec. 1983
S. P. Yukon Feb. 1985 40 p
(AD-A160357; RADC-TR-85-22) Avail: NTIS HC A03/MF A01 CSCL 20/14

The cross section for multiple scattering from anisotropic random media are calculated for scattering into forward and backward directions from slabs containing electron density or refractive index irregularities whose symmetry axes are aligned at an arbitrary angle to the slab face. The cross sections are calculated in the CFSB (Simulative Forward-scatter Single-backscatter) approximation using techniques used in RADC-TR-82-287 (AD-A127873) and extended here to include arbitrary turbulence spectra and, in particular, three-dimensional Kolmogoroff turbulence. GRA

N86-21291# North Carolina State Univ., Raleigh. Dept. of Physics.
DEVELOPMENT OF AN X-RAY BEAM LINE AT THE NSLS FOR STUDIES IN MATERIALS SCIENCE USING X-RAY ABSORPTION SPECTROSCOPY Progress Report
D. E. Sayers 1 Oct. 1985 24 p
(Contract DE-AS05-80ER-10742)
(DE86-001954; DOE/ER-10742/4) Avail: NTIS HC A02/MF A01

This has been an exciting year, highlighted by the running of the NSLS X-ray ring in an operational mode beginning in May of this year. Line X-11A was the first to obtain an experimental spectrum and the first to publish a paper with results from the X-ray ring. These early successes have allowed running in an operational mode during the entire time that the X-raying ring itself was operational. In addition to a number of exciting initial scientific results described, the initial results, particularly in the four crystal mode, have verified the original optical design and demonstrated an improved resolution using the four crystals. This will have a significant impact on near edge (XANES) studies. DOE

N86-21292# Lawrence Livermore National Lab., Calif.
CROSS SECTIONS FOR X-RAY PHOTOELECTRON-INDUCED DESORPTION OF HYDROGEN IONS FROM METAL SURFACES
J. H. Kinney, W. J. Siekhaus, and R. A. Anderson 20 Sep. 1985 17 p refs
(Contract W-7405-eng-48)
(DE86-001777; UCID-20520) Avail: NTIS HC A02/MF A01

We have measured the cross sections for X-ray photoelectron-induced desorption of hydrogen ions from beryllium, carbon, aluminum, tantalum and gold surfaces. This report describes the results of the cross-section measurements, and discusses a time-of-flight technique that allows the determination of ionic-desorption cross sections as small as 10(-25) sq cm per photoelectron. DOE

N86-21293# Argonne National Lab., Ill.
CROSS SECTIONS FOR INELASTIC COLLISIONS OF FAST CHARGED PARTICLES WITH ATOMS AND MOLECULES
Mitio Inokuti 1985 9 p refs Presented at the IAEA Advisory Group Meeting on Nuclear and Atomic Data for Radiotherapy and Radiobiology, Rijswijk, Netherlands, 16 Sep. 1985
(Contract W-31-109-eng-38)
(DE86-001802; CONF-8509178-2) Avail: NTIS HC A02/MF A01

A large volume of data of these cross sections are required for solving problems of radiological physics and dosimetry, as well as for detailed analysis of the earliest stage of radiation actions on matter (including the biological cell and substances constituting it). One practical approach to the cross section determination is to test experimental data with general criteria. More recent studies concern the determination of the analytic expression most suitable for fitting the data on the oscillator-strength distribution or the energy distribution of secondary electrons from ionizing collisions of charged particles. There are three areas to which major efforts should be directed. First, methods of absolute cross-section measurements both for electron and ionic collisions must be thoroughly reviewed so that sources of systematic errors may be identified and corrected. Second, efforts should be devoted to the understanding of the data systematics, viz., the trends of cross sections for a series of molecules. Finally, electron and ionic collisions with molecules in condensed phases will be an important topic of study for years to come. DOE

N86-21294# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.
INVESTIGATION OF A DRIFT CHAMBER [ONERZOEK AAN EEN DRIFTKAMER]
D. Langerveld and R. W. Hollander Jun. 1983 31 p refs In DUTCH
(Stratech-83-3) Avail: NTIS HC A03/MF A01

Two double drift chambers, built to locate ionizing radiation in one coordinate direction at an accuracy of 1 mm were investigated. For low pressure purposes the investigation was extended with the determination of the spatial resolution at 200 Torr.

Disturbances in the time signal, and effects which determine the width of the time spectrum peak were examined. Attention was paid to the energy spectrum of primary electrons at 1 atm and the information yielded. The linear relation between time and position appears to fit accurately. An expression for the electron transport efficiency as a function of the distance to the side-walls is presented. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-21295 Japan Atomic Energy Research Inst., Tokai. Dept. of Physics.
EVALUATION OF NEUTRON NUCLEAR DATA OF LI(7) FOR JENDL-3
Keiichi Shibata Nov. 1984 50 p refs
(JAERI-M-84-204; NEANDC(J)-109/U; INDC(JPN)-95/L) Copyright. Avail: Issuing Activity

Neutron nuclear data of Li-7 were evaluated for Japanese Evaluated Nuclear Data Library (JENDL-3) in the energy range from 10 to the -minus 5th power eV to 20 MeV. Evaluated quantities are the total, elastic and inelastic scattering, radiative capture, photon production, (n,Zn), (n,d) and (n,n') alpha tau reaction cross sections and the angular and energy distributions of secondary neutrons. For the inelastic scattering two discrete levels were taken into consideration. The energy angle distributions of neutrons from the inelastic scattering to continum and the (n,Zn) reaction were calculated with the three body phase space model. Author

N86-21296# Los Alamos National Lab., N. Mex.
DOCUMENTATION FOR TRACE: AN INTERACTIVE BEAM-TRANSPORT CODE
K. R. Crandall and D. P. Rusthoi Jan. 1985 68 p refs
(LA-10235-MS) Avail: NTIS HC A04/MF A01

TRACE is an interactive, first order, beam dynamics computer program. TRACE includes space charge forces and mathematical models for a number of beamline elements not commonly found in beam transport codes, such as permanent magnet quadrupoles, RF quadrupoles, RF gaps, accelerator columns, and accelerator tanks. TRACE provides an immediate graphic display of calculative results, has a powerful and easy-to-use command procedure, includes eight different types of beam matching or fitting capabilities, and contains its own internal HELP package. The models and equations used for each of the transport elements, the fitting procedures, and the space charge/emittance calculations are described, and detailed instruction for using the code is provided. Author

N86-21297*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SECOND QUANTIZATION TECHNIQUES IN THE SCATTERING OF NONIDENTICAL COMPOSITE BODIES
John W. Norbury (Old Dominion Univ., Norfolk, Va.), Lawrence W. Townsend, and Philip A. Deutchman (Idaho Univ., Moscow) Jan. 1986 18 p refs
(NASA-TP-2522; L-16016; NAS 1.60:2522) Avail: NTIS HC A02/MF A01 CSCL 30H

Second quantization techniques for describing elastic and inelastic interactions between nonidentical composite bodies are presented and are applied to nucleus-nucleus collisions involving ground-state and one-particle-one-hole excitations. Evaluations of the resultant collision matrix elements are made through use of Wick's theorem. Author

N86-21298# Committee on Science and Technology (U. S. House).
SPACE NUCLEAR POWER GENERATION, CONVERSION AND STORAGE FOR THE NINETIES AND BEYOND
Washington GPO 1986 19 p Presented by the Subcommittee on Energy Research and Production to the Committee on Science and Technology, 99th Congress, 1st Session, Dec. 1985
(GPO-55-987) Avail: US Capitol, House Document Room

Concerns and interests in the development of space nuclear power systems for civilian and defense applications were reaffirmed. Government policy issues affecting the potential implementation of such systems were addressed. The status of the technology was reviewed. Innovative approaches to development of advanced nuclear power systems for space were explored. B.G.

N86-21299# Naval Research Lab., Washington, D. C.
BEAM TRAPPING IN A MODIFIED BETATRON WITH TORSATRON WINDINGS
C. A. Kapetanakos, D. Dialetis, and S. J. Marsh 5 Nov. 1985 48 p
(RR0-1109)
(AD-A161696; NRL-MR-5619) Avail: NTIS HC A03/MF A01 CSCL 20/7

The guiding center equations for the reference electron that is located at the centroid of an intense electron ring confined in a torsatron assisted modified betatron field are derived by time averaging out its fast motion. These slow equations are integrated analytically to obtain the nonlinear orbits for the guiding center. In addition, from the guiding center equations we have obtained a nonlinear expression that predicts very accurately the ring equilibrium position even for large displacement from the minor axis of the torus. These results have provided an invaluable insight in the development of a trapping scheme. The proposed scheme is compatible with the slow acceleration of the modified betatron and is based on a low amplitude, rapidly varying magnetic field that shifts the ring equilibrium position from near the wall to the minor axis of the torus in time shorter than a beam bounce period. GRA

N86-21300# Naval Research Lab., Washington, D. C.
STOCHASTICITY OF PARTICLE ORBITS IN A COLLECTIVE PARTICLE ACCELERATOR Memorandum Report, Sep. 1984 - Sep. 1985
G. Ganguli, H. G. Mitchell, Jr., and P. J. Palmadesso 6 Dec. 1985 24 p
(RR0-1107; RR0-1109)
(AD-A162418; NRL-MR-5664) Avail: NTIS HC A02/MF A01 CSCL 20/7

A detailed investigation of the behavior of particle orbits in the simultaneous presence of three large amplitude waves such as those encountered in the Collective Particle Accelerator (CPA) experiment is undertaken. Stochasticity arising out of the resonance overlap of the waves can influence the particle dynamics significantly and thereby affect the outcome of the experimental results. Choice of initial phase and energy for successful operation is identified and discussed. GRA

N86-21301# Fermi National Accelerator Lab., Batavia, Ill.
IMPEDANCES OF THE SHIELDED BELLOWS IN THE SSC AND THE EFFECTS ON BEAM STABILITY
King Yuen Ng Jul. 1985 18 p
(DE85-017364; FNAL-TM-1339) Avail: NTIS HC A02/MF A01

The 1.08 km of bellows in Design A of the SSC (Superconducting Super Collider) will contribute to single-bunch instabilities: i.e., in transverse mode-coupling, bellow contribution Z bar (perpendicular) = 68 mega ohm/m, and allowance for stability Z bar (perpendicular) < 120 mega ohm/m; in transverse microwave (for borad band at 13 GHz), bellow contribution Z (perpendicular) = 174 mega ohm/m, and allowance for stability Z (perpendicular) < 1287 mega ohm/m; in longitudinal microwave, bellow contribution Z (parallel)/n = 2.3 ohms and allowance for stability Z (parallel)/n < 4.7 ohms. In the above, it is assumed that an average single-bunch current I = 7.7 microA, RMS energy spread sigma sub E = 1.5x10 to the -4 power at injection energy of 1 TeV, RMS bunch length sigma sub iota = 7 cm, average betaron function beta bar = 150 m, and frequency slip actor eta = 1.3 x 10 to the -4th power. In order to support a stable bunch beam of

the designed intensity, the bellow corrugations must be shielded. The shielding itself also must have low impedances. Author

N86-21302# Brookhaven National Lab., Upton, N. Y.
NUCLEAR DATA AND RELATED SERVICES
J. K. Tuli 1985 6 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE85-017843; BNL-NCS-36975; CONF-850942-32) Avail: NTIS HC A02/MF A01

National Nuclear Data Center (NNDC) maintains a number of data bases containing bibliographic information and evaluated as well as experimental nuclear properties. An evaluated computer file maintained by the NNDC, called the Evaluated Nuclear Structure Data File (ENSDF), contains nuclear structure information for all known nuclides. The ENSDF is the source for the journal Nuclear Data Sheets which is produced and edited by NNDC. The Evaluated Nuclear Data File (ENDF), on the other hand is designed for storage and retrieval of such evaluated nuclear data as are used in neutronic, photonic, and decay heat calculations in a large variety of applications. Some of the publications from these data bases are the Nuclear Wallet Cards, Radioactivity Handbook, and books on neutron cross sections and resonance parameters. In addition, the NNDC maintains three bibliographic files: NSR - for nuclear structure and decay data related references, CINDA - a bibliographic file for neutron induced reactions, and CPBIB for charged particle reactions. Selected retrievals from evaluated data and bibliographic files are possible on-line or on request from NNDC. DOE

N86-21303# Pacific Northwest Lab., Richland, Wash.
NEUTRON SOURCE MULTIPLICATION METHOD
E. D. Clayton Aug. 1985 38 p Presented at the DOE Subcritical Reactivity Measurements Workshop, Albuquerque, N. Mex., 26 Aug. 1985
(Contract DE-AC06-76RL-01830)
(DE85-017930; PNL-SA-13357; CONF-8508105-3) Avail: NTIS HC A03/MF A01

The relationship between neutron multiplication and reactivity is discussed and data presented to illustrate problems associated with the absolute measurement of neutron multiplication and reactivity in subcritical systems. A number of curves of inverse multiplication have been selected from a variety of experiments showing variations observed in multiplication during the course of critical and subcritical experiments where different methods of reactivity addition were used, with different neutron source detector position locations. The inverse multiplication curves show that as the system approaches criticality, source, counter, and geometry effects become relatively small near delayed criticality and good estimates of criticality are possible by extrapolation of the curves. Concern is raised regarding the meaning and interpretation of k(sub eff) as might be measured in a far subcritical system because of the modal effects and spectrum differences that exist between the subcritical and critical systems. Because of this, the calculation of k(sub eff) identical to unity for a critical assembly, although necessary, may not be sufficient to assure safety margins in calculations pertaining to far subcritical systems. DOE

N86-21304# Los Alamos National Lab., N. Mex.
NEUTRON DIFFRACTION STUDIES OF BACTERIORHODOPSIN
J. Trewhella, J. L. Popot, D. M. Engelman, and G. Zaccai 1985 7 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Yale Univ., New Haven, Conn. and Institut von Laue/Paul Langevin, Grenoble, France
(Contract W-7405-eng-36)
(DE86-000763; LA-UR-85-3268; CONF-850871-18) Avail: NTIS HC A02/MF A01

Neutron diffraction studies of bacteriorhodopsin have utilized the entire range of deuterium labeling techniques that are commonly used in biological neutron scattering experiments. We will review the work published in this area and report on current projects. DOE

N86-21305# Los Alamos National Lab., N. Mex.
PERFORMANCE PROGRAMMING WITH THE LOS ALAMOS MACRO ACCELERATOR
G. Cort 1985 23 p Presented at the 4th Semi-annual Meeting of the Softool User's Group, Santa Barbara, Calif., 30 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000788; LA-UR-85-3129; CONF-8509179-1) Avail: NTIS HC A02/MF A01

The CCC macro facility, as extended by Version 2.0 of Softool's Change and Configuration Control Environment, offers many new and powerful features. Among these are a vastly extended suite of commands, error trapping, and structured constructs. In concert with previously existing Version 1.x features (notably the very powerful symbol substitution and parameter passage facilities), these features combine to transform the macro facility from a simple command language into an extremely flexible programming language which is suitable for developing very large and complex applications. This paper presents the results of a performance analysis of the CCC macro facility conducted at the Los Alamos National Laboratory Weapons Neutron Research Facility. The goal of this work was to identify and evaluate major factors that can contribute to the degradation of performance of the CCC macro facility, and to develop strategies for countering their effects. In particular, we report on the Los Alamos Macro Accelerator, which can produce dramatic increases in execution speed for many applications. DOE

N86-21306# Oak Ridge National Lab., Tenn.
RESIN BEADS AS A SAMPLE ACQUISITION AND LOADING MEDIUM FOR MASS SPECTROMETRIC ANALYSIS
R. L. Walker, D. H. Smith, H. S. McKown, H. C. Smith, and J. A. Carter Sep. 1985 55 p refs Revised
(Contract DE-AC05-84OR-21400)
(DE86-001451; ORNL/TM-5505/R1-Rev) Avail: NTIS HC A04/MF A01

This volume is a revised version of a previous edition of this work, Practical Aspects of the Resin Bead Technique for Mass Spectrometric Sample Loading. It has been updated to include current practice and expanded to cover more topics. Appendices are included to provide step-by-step instructions for many of the required operations. Among the developments reported herein are procedures for acquisition of samples in a hot cell, for loading one thousand beads with uranium and plutonium to reduce the chance of significant contamination, and for loading virtually any amount of sample from 1 ng to 1 (MU)g on each bead. DOE

N86-21307# Lawrence Livermore National Lab., Calif.
INITIAL MEASUREMENTS OF BEAM BREAKUP INSTABILITY IN THE ADVANCED TEST ACCELERATOR
Y. P. Chong, G. J. Caporaso, and K. W. Struve 13 May 1985 14 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract W-7405-eng-48)
(DE86-001583; UCRL-91938; CONF-850504-290) Avail: NTIS HC A02/MF A01

The measurements of beam breakup (BBU) instability performed on the Advanced Test Accelerator (ATA) up to the end of February, 1984 are discussed. The main objective was to produce a high current usable electron beam at the ATA output. A well-known instability is BBU which arises from the accelerator cavity modes interacting with the electron beam. The dominant mode is TM130 at a frequency of approximately 785 MHz. It couples most strongly to the beam motion and has been observed to grow in the Experimental Test Accelerator (ETA) which has only eight accelerator cavities. ATA has one hundred and seventy cavities and, therefore, the growth of BBU is expected to be more severe. BBU measurements are reported for ATA with beam currents of 4 to 7 kA. The injector BBU noise level for a field emission brush cathode was found to be an order of magnitude lower than for a cold plasma discharge cathode. These injector RF amplitudes agree very well with values obtained using the method of differenced B sub solar loops. DOE

N86-21308# Sandia National Labs., Albuquerque, N. Mex.
HERMES 3
D. E. Hasti, J. J. Ramirez, K. R. Prestwich, T. W. L. Sanford, and R. A. Hamil 1985 13 p Presented at the 6th JOWOG Meeting, Aldermaston, England, 7 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001622; SAND-85-2154C; CONF-8510165-3) Avail: NTIS HC A02/MF A01

Hermes 3 is a major new gamma-ray simulator that is part of the Simulation Technology Laboratory Project. This accelerator will significantly improve the capability to evaluate the effects of gamma-ray radiation from nuclear weapons on weapons subsystems. This accelerator will be designed to produce 10(5)R, 5 x 10 to the 12th power R/S and 2 x 10 to the 20th power R/S(2) over a 500 sq cm area. The radiation dose will vary less than a factor of two over this area and less than a factor of four throughout a volume found by extending this surface 15 cm further from the gamma-rzy converter. The minimum dose in this volume will be greater than or equal to 5 x 10 to the 4th power R. The accelerator will be designed with sufficient reliability and short enough turn-around time to produce more than 600 radiation pulses per year. In Hermes 3 the peak power in the beam is to be increased from 1.2 TW of Hermes 2 to 16 TW. Two techniques for achieving these high powers have been successfully developed. The first technique is a high current linear induction accelerator with several parallel beams. Experiments to evaluate this concept were done on the MABE accelerator. The second concept uses induction cavities and a magnetically insulated transmission line (MITL) to form a multi-terawatt voltage adder. DOE

N86-21309# Los Alamos National Lab., N. Mex.
FEYNMANN VARIANCE-TO-MEAN METHOD
E. J. Dowdy, G. E. Hansen, and A. A. Robba 1985 13 p Presented at the DOE Subcritical Reactivity Measurements Workshop, Albuquerque, N. Mex., 26 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017529; LA-UR-85-3073; CONF-8508105-2) Avail: NTIS HC A02/MF A01

The Feynmann and other fluctuation techniques have been shown to be useful for determining the multiplication of subcritical systems. The moments of the counting distribution from neutron detectors is analyzed to yield the multiplication value. We present the methodology and some selected applications and results and comparisons with Monte Carlo calculations. DOE

N86-21310# Brookhaven National Lab., Upton, N. Y.
NEUTRON SCATTERING STUDIES OF HEAVY FERMIONS
S. M. Shapiro 1985 22 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000628; BNL-36943; CONF-850871-17) Avail: NTIS HC A02/MF A01

Heavy Fermions are f electron materials characterized by a large linear term in the low temperature specific heat and a large magnetic susceptibility at low temperatures. This implies that there is a narrow peak in the f electron density of states at the Fermi energy. Typical examples are CeAl3, UBe13, CeCu2Si2, CeCu6, U2Zn17 and UPt3. Neutron scattering measurements can play an important role in understanding the magnetic interactions in these systems. Measurements of the form reveal details about the nature of the wave functions. Inelastic scattering studies gives information about the energy scale of the spin fluctuations and the narrow f-resonance. Such measurements on the above systems are reviewed with the goal of establishing systematics between the information obtained in neutron studies and that from bulk measurements. DOE

N86-21311# Nebraska Univ., Lincoln. Dept. of Chemistry.
ENERGETICS OF THE FORMATION AND REACTIONS OF GASEOUS IONS Annual Progress Report, 16 Sep. 1984 - 1 Sep. 1985
G. G. Meisels 1985 8 p
(Contract DE-AC02-76ER-02567)
(DE86-000639; DOE/ER-02567/T2) Avail: NTIS HC A02

High energy radiation leads to chemically measurable products by first producing electronically excited states or ions, and in the gas phase well over half of product formation can normally be ascribed to reactions of ionic precursors. Mechanisms responsible for product formation include both first order dissociation and second order or ion-molecule reactions. These mechanisms are examined via ionization by vacuum ultraviolet radiation. The four molecules examined are fluorobenzene, furan, formic acid and methyl formate. DOE

N86-21312# Brookhaven National Lab., Upton, N. Y.
TABLE OF RADIOACTIVE ELEMENTS
N. E. Holden 1985 2 p Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000649; BNL-NCS-36956; CONF-8508138-13) Avail: NTIS HC A02/MF A01

As has been the custom in the past, the Commission publishes a table of relative atomic masses and half-lives of selected radionuclides. The information contained in this table will enable the user to calculate the atomic weight for radioactive materials with a variety of isotopic compositions. The atomic masses have been taken from the 1984 Atomic Mass Table. Some of the half-lives have already been documented. DOE

N86-21313# Colorado Univ., Boulder. Nuclear Physics Lab.
PROPOSAL FOR INTERMEDIATE ENERGY NUCLEAR PHYSICS RESEARCH Progress Report
1 Oct. 1985 109 p
(Contract DE-AC02-81ER-40016)
(DE86-000733; DOE/ER-40016/4; NPL-1002) Avail: NTIS HC A06/MF A01

This report summarizes work carried out between October 1, 1984 and October 1, 1985 in the Nuclear Physics Laboratory of the Department of Physics at the University of Colorado, Boulder. This work is divided into two separate tasks, C and W. Task C covers intermediate energy physics in general and Task W supports study of the nucleon charge exchange reactions (p,n) and (n,p) at intermediate energies. Other efforts in the laboratory, such as LAMPF II accelerator development and several projects in low-energy nuclear physics, are described in this report. DOE

N86-21314# Los Alamos National Lab., N. Mex.
PION PRODUCTION CROSS SECTIONS AND ASSOCIATED PARAMETERS
J. N. Bradbury 1985 18 p refs Presented at the IAEA Advisory Group Meeting on Nuclear and Atomic Data for Radiotherapy and Radiobiology, Rijswijk, Netherlands, 16 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000808; LA-UR-85-3366; CONF-8509178-1) Avail: NTIS HC A02/MF A01

Negative pions have been used for radiotherapy at the meson factories LAMPF (USA), SIN (Switzerland), and TRIUMF (Canada) and have been planned for use at new meson facilities under construction (USSR) and at proposed dedicated medical facilities. Providing therapeutically useful dose rates of pions requires a knowledge of the pion production cross sections as a function of primary proton energy (500 to 1000 MeV), pion energy (less than or equal to100 MeV), production angle, and target material. The current status of the data base in this area is presented including theoretical guidelines for extrapolation purposes. The target material and geometry, as well as the proton and pion beam parameters, will affect the electron (and muon) contamination in the beam which may have an important effect on both the LET characteristics of the dose and the dose distribution. In addition to cross-section data, channel characteristics such as length of pion trajectory, solid-angle acceptance, and momentum analysis will affect dose rate, distribution, and quality. Such considerations are briefly addressed in terms of existing facilities and proposed systems. DOE

N86-21315# Los Alamos National Lab., N. Mex.
PHYSICAL CONSTRAINTS ON MODELS OF GAMMA-RAY BURSTERS
R. I. Epstein 1985 20 p refs Presented at the International Astronomical Union (IAU) Colloquium, Copenhagen, Denmark, 11 Jun. 1985
(Contract W-7405-eng-36)
(DE86-000818; LA-UR-85-3331; CONF-8506205-1) Avail: NTIS HC A02/MF A01

The constraints that can be placed on models of gamma-ray burst sources based on only the well-established observational facts and physical principles are discussed. The premise is developed that the very hard X-ray and gamma-ray continua spectra are well-established aspects of gamma-ray bursts. Recent theoretical work on gamma-ray bursts are summarized with emphasis on the geometrical properties of the models. Constraints on the source models which are implied by the X-ray and gamma-ray spectra are described. The allowed ranges for the luminosity and characteristic dimension for gamma-ray burst sources are shown. Some of the deductions and inferences about the nature of the gamma-ray burst sources are summarized. DOE

N86-21316# Washington Univ., St. Louis, Mo.
HIGH-SPIN STRUCTURE OF Lu-163
K. Honkanen, H. C. Griffin, D. G. Sarantites, V. Abenante, L. A. Adler, C. Baktash, Y. S. Chen, O. Dietzsch, M. L. Halbert, and D. C. Hensley 1985 7 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985 Prepared in cooperation with Michigan Univ., Ann Arbor; Oak Ridge National Lab., TN.; Pittsburgh Univ., PA.; Tennessee Univ., Knoxville
(Contract DE-AC05-84OR-21400)
(DE86-001349; CONF-850942-30) Avail: NTIS HC A02/MF A01

The (PI)1/2(+)[411] ground band structure of Lu-163 shows a large signature splitting with inversion above the backbend suggesting a shape change associated with the triaxiality degree of freedom. The (PI)1/2(-)[541] band shows no backbending up to h bar (LC OMEGA) = 0.4 MeV indicating a more deformed structure. DOE

N86-21317# Lawrence Livermore National Lab., Calif.
CALCULATIONAL TOOLS FOR THE EVALUATION OF NUCLEAR CROSS-SECTION AND SPECTRA DATA
M. A. Gardner May 1985 13 p refs Presented at the International Conference on Nuclear Data for Basic and Applied Science, Santa Fe, N. Mex., 13 May 1985
(Contract W-7405-eng-48)
(DE86-001559; UCRL-91947; CONF-850507-55) Avail: NTIS HC A02/MF A01

A technique based on discrete energy levels rather than energy level densities is presented for nuclear reaction calculations. The validity of the technique is demonstrated via theoretical and experimental agreement for cross sections, isomer-ratios and gamma-ray strength functions. DOE

N86-21318# Fermi National Accelerator Lab., Batavia, Ill.
WILL THE NEXT FIFTEEN YEARS OF HIGH ENERGY PHYSICS MATCH THE LAST FIFTEEN
J. D. Bjorken Sep. 1985 26 p Presented at the 10th Hawaii Topical Conference in Particle Physics, Honolulu, Hawaii, 26 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-001566; FNAL/C-85/133; CONF-8508139-1) Avail: NTIS HC A03/MF A01

A brief retrospective of advances in high energy physics made during the last 15 years, both theoretical and experimental, is given, followed by predictions for future work, which is said to include testing the standard model and exploring the Higgs sector. The theoretical methods available for understanding the Higgs sector are briefly discussed, as well as available experimental tools. DOE

N86-21319# Brookhaven National Lab., Upton, N. Y.
RESONANCES IN THE phi phi SYSTEM AND GLUEBALLS
S. J. Lindenbaum 1985 5 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contracts DE-AC02-83ER40107; DE-AC02-76CH-00016)
(DE86-001728; BNL-37067; CONF-850721-8) Avail: NTIS HC A02/MF A01

The mass spectrum and the final partial wave analysis of the OZI forbidden reaction (PI)(-)p (YIELDS) phi phi n are shown. A unique good fit solution was found which selected only three I (sup G) J (sub PC) = 0(+)2(2+) waves with J (sub z) sup e+a/ = 0(-) in the Gottfried Jackson frame. The partial wave amplitude and phase behavior clearly indicated resonant behavior. A three-pole matrix fit corresponded to a good fit whereas a two-pole fit was rejected. It is found that the disconnected Zweig diagram is due to a (PI)(+) annihilating the incident (PI)(-). A partial wave analysis of the background in the region slightly above the phi mass for the K(+)K(-) pair is given. The selective breakdown of the OZI suppression and the different nature of the OZI-allowed background are explained in the context of QCD by attributing the production of these states to 1-3 primary glueballs. DOE

N86-21320# Brookhaven National Lab., Upton, N. Y.
HEAVY ION INDUCED TRANSFER REACTIONS: A SPECTROSCOPIC TOOL FOR HIGH SPIN STATES
P. D. Bond 1985 6 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001739; BNL-37078; CONF-850942-31) Avail: NTIS HC A02/MF A01

By selectively choosing the appropriate heavy ion transfer reaction high spin states can be accessed. As a demonstration of the technique two proton and two neutron states of high spin (both yrast and non-yrast) in Nd nuclei were identified. These spectroscopic results have yielded the first direct information about the configuration of some of these states. DOE

N86-21321# Brookhaven National Lab., Upton, N. Y.
NUCLEAR MASSES FAR FROM STABILITY: THE INTERPLAY OF THEORY AND EXPERIMENT
P. E. Haustein 1985 6 p Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001741; BNL-37119; CONF-850942-29) Avail: NTIS HC A02/MF A01

Mass models seek, by a variety of theoretical approaches, to reproduce the measured mass surface and to predict unmeasured masses beyond it. Subsequent measurements of these predicted nuclear masses permit an assessment of the quality of the mass predictions from the various models. Since the last comprehensive revision of the mass predictions (in the mid-to-late 1970's) over 300 new masses have been reported. Global analyses of these data have been performed by several numerical and graphical methods. These have identified both the strengths and weaknesses of the models. In some cases failures in individual models are distinctly apparent when the new mass data are plotted as functions of one or more selected physical parameters. Several examples will be given. Future theoretical efforts will also be discussed. DOE

N86-21322# Brookhaven National Lab., Upton, N. Y.
LONG-LIVED HEAVY MASS ELEMENTS HALF-LIVES (A<125)
N. E. Holden 1985 19 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001742; BNL-NCS-36960; CONF-8508138-15) Avail: NTIS HC A02/MF A01

Reported values of half-lives of intermediate mass and heavy elements are evaluated. The evaluation analysis estimates the systematic error the resulting standard deviation. Recommended values are then presented for Te-128, Te-130, I-129, La-138,

Nd-144, Nd-145, Sm-146, Sm-147, Sm-148, Gd-152, Dy-154, Lu-176, Hf-174, Ta-180, Re-187, Os-186, Pt-190, Pb-204, Pb-205, and Th-230, Th-232. DOE

N86-21323# Brookhaven National Lab., Upton, N. Y.
LONG-LIVED LIGHT MASS ELEMENT HALF-LIVES (A>125)
N. E. Holden 1985 18 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001743; BNL-NCS-36959; CONF-8508138-16) Avail: NTIS HC A02/MF A01

Reported values of half-lives of light and intermediate mass elements are evaluated. The evaluation analysis estimates the systematic error and the resulting standard deviation. Recommended values are then presented for tritium, Be-10, C-14, Al-26, Ar-39, K-90, V-50, Mn-53, Ge-76, Rb-87, Nb-92, Pd-107, Cd-113, In-115, and Te-123. DOE

N86-21324# Brookhaven National Lab., Upton, N. Y.
TOTAL AND SPONTANEOUS FISSION HALF-LIVES FOR URANIUM AND PLUTONIUM NUCLIDES
N. E. Holden 1985 11 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001744; BNL-NCS-36961; CONF-8508138-17) Avail: NTIS HC A02/MF A01

Several reported experiments have been reanalyzed and recommended values are presented for /sup 232,233,234,235,236,238/U and for /sup 236,238,239,240,241,242,244/Pu. These values improve upon previous preliminary estimates of both the half-lives and the standard deviations. DOE

N86-21325# Brookhaven National Lab., Upton, N. Y
TOTAL AND SPONTANEOUS FISSION HALF-LIVES FOR AMERICIUM AND CURIUM NUCLIDES
N. E. Holden 1985 7 p refs Presented at the 33rd IUPAC General Assembly, Lyon, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001745; BNL-NCS-36962; CONF-8508138-14) Avail: NTIS HC A02/MF A01

The long-lived nuclides of the americium curium elements are of interest for their use in certain safeguard applications and for nuclear reactor burnup studies in waste management. Recommended values are presented for /sup 241,242m,243/Am, and for /sup 242,243,244,245,246,247,248,250/Cm. These values result from a consistent evaluation of all these half-lives. These preliminary estimates were presented earlier. The uncertainties are provided at the 95% confidence limit for each of the recommended values. It will be noted that many of the recommended errors considerably exceed errors quoted by individual authors in their publication, by up to an order of magnitude, e.g., the total half-life of /sup 242,246,248/Cm and the spontaneous fission half-life of (244)Cm. DOE

N86-21326# Stanford Linear Accelerator Center, Calif.
QCD MECHANISMS FOR HEAVY PARTICLE PRODUCTION
S. J. Brodsky Sep. 1985 18 p refs
(Contract DE-AC03-76SF-00515)
(DE86-001778; SU-SLAC-PUB-3770) Avail: NTIS HC A02/MF A01

For very large pair mass, the production of heavy quarks and supersymmetric particles is expected to be governed by ACD fusion subprocesses. At lower mass scales other QCD mechanisms such as prebinding distortion and intrinsic heavy particle Fock states can become important, possibly accounting for the anomalies observed for charm hadroproduction. We emphasize the importance of final-state Coulomb interactions at low relative velocity in QCD and predict the existence of heavy narrow four quark resonances (c c-bar u u-bar) and (cc c-bar c-bar) in (GAMMA)(GAMMA) reactions. Coherent QCD contributions are discussed as a contribution to the non-additivity of nuclear structure functions and heavy particle production cross sections. We also predict a new type of amplitude zero for exclusive heavy meson pair production which follows from the tree-graph structure of QCD. DOE

N86-21327# Bristol Univ. (England). Physics Lab.
STRUCTURE OF EQUIMOLAR LiCl-AlCl3 MELT BY NEUTRON SCATTERING
S. Biggin, S. Cummings, J. E. Enderby, and M. Blander 1985 9 p refs Presented at the 5th International Symposium on Molten Salts, Las Vegas, Nev., 14 Oct. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-001788; CONF-8510177-1) Avail: NTIS HC A02/MF A01

The structure of LiAlCl4 has been investigated by neutron diffraction of isotopically enriched samples. The lithium contribution to the scattering has been removed by using a null scattering sample, of Li-6 and Li-7. We have derived three partial structure factors S/sub AlAl/(k), S/sub ClCl/(k) and S/sub AlCl/(k) and their Fourier transforms, the partial radial distribution functions (rdf's), g/sub ij/(r). The first peaks in g/sub AlAl/(r), g/sub ClCl/(r) and g/sub AlCl/(r) are at 5.6, 3.51, and 2.13 A, respectively. The coordination numbers obtained by integrating to the first minima are about 6, 6, and 4, respectively. As anticipated, the existence of extremely well defined AlCl4(-) tetrahedra has been established, with little if any Al-Cl-Al bridging between tetrahedra in this melt. The results are similar to those predicted from molecular dynamical calculations on model systems. DOE

N86-21328# Argonne National Lab., Ill.
SURFACE SEGREGATION DURING IRRADIATION
L. E. Rehn and N. Q. Lam Oct. 1985 37 p refs Presented at the ASM Metals Congress International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-001789; CONF-8510160-5) Avail: NTIS HC A03/MF A01

Gibbsian adsorption is known to alter the surface composition of many alloys. During irradiation, four additional processes that affect the near-surface alloy composition become operative: preferential sputtering, displacement mixing, radiation-enhanced diffusion and radiation-induced segregation. Because of the mutual competition of these five processes, near-surface compositional changes in an irradiation environment can be extremely complex. Although ion-beam induced surface compositional changes were noted as long as fifty years ago, it is only during the past several years that individual mechanisms have been clearly identified. In this paper, a simple physical description of each of the processes is given, and selected examples of recent important progress are discussed. With the notable exception of preferential sputtering, it is shown that a reasonable qualitative understanding of the relative contributions from the individual processes under various irradiation conditions has been attained. However, considerably more effort will be required before a quantitative, predictive capability can be achieved. DOE

N86-21329# Argonne National Lab., Ill.
RELATIVISTIC NUCLEAR DYNAMICS
F. Coester 1985 15 p refs Presented at the Bates Users Theory Group Workshop, Cambridge, Mass., 9 Aug. 1985
(Contract W-31-109-eng-38)
(DE86-001818; CONF-8508140-1) Avail: NTIS HC A02/MF A01

A review is presented of three distinct approaches to the construction of relativistic dynamical models: (1) Relativistic canonical quantum mechanics. (The Hilbert space of states is independent of the interactions, which are introduced by modifying the energy operator.) (2) Hilbert spaces of manifestly covariant wave functions. (The interactions modify the metric of the Hilbert space.) (3) Covariant Green functions. In each of the three approaches the focus is on the formulation of the two-body dynamics, and problems in the construction of the corresponding many-body dynamics are discussed briefly. DOE

N86-21330# Northeastern Univ., Boston, Mass.
GAUGE THEORIES AND UNIFICATION OF ELEMENTARY PARTICLE INTERACTIONS Final Report, 1 May 1982 - 30 Jun.

1985
M. T. Vaughn Sep. 1985 7 p refs
(Contract DE-AC02-82ER-40059)
(DE86-001841; DOE/ER-40059/3) Avail: NTIS HC A02/MF A01

The calculation was completed of the two-loop (BETA)-functions (using dimensional regularization and the MS renormalization scheme) for the gauge, Yukawa and scalar quartic couplings in a general renormalizable quantum theory with scalar, spinor, and (vector) gauge fields. Radiative corrections to sin(2)theta/sub w/, the (MU) decay rate, and the electroweak rho parameter in grand unified theories with hidden sector supergravity were calculated. Limits were computed on the scalar neutrino mass from single photon production in e(+)e(-) annihilation. Vector boson decay modes of the nucleon were calculated in N = 1 supergravity models, including possible enhancements due to a heavy (m/sub t/ greater than or equal to 40 GeV) top quark. DOE

N86-21331# Lawrence Livermore National Lab., Calif.
REAL TIME ANALYSIS UNDER EDS
D. Schneberk Jul. 1985 20 p Presented at the Information Crossroads of the 80's, Washington, D.C., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE85-016944; UCRL-92975; CONF-8509152-1) Avail: NTIS HC A02/MF A01

The analysis component of the Enrichment Diagnostic System (EDS) developed for the Atomic Vapor Laser Isotope Separation Program (AVLIS) at Lawrence Livermore National Laboratory (LLNL) is described. Four different types of analysis are performed on data acquired through EDS: (1) absorption spectroscopy on laser-generated spectral lines, (2) mass spectrometer analysis, (3) general purpose waveform analysis, and (4) separation performance calculations. The information produced from this data includes: measures of particle density and velocity, partial pressures of residual gases, and overall measures of isotope enrichment. The analysis component supports a variety of real-time modeling tasks, a means for broadcasting data to other nodes, and a great degree of flexibility for tailoring computations to the exact needs of the process. A particular data base structure and program flow is common to all types of analysis. Key elements of the analysis component are: (1) a fast access data base which can configure all types of analysis, (2) a selected set of analysis routines, (3) a general purpose data manipulation and graphics package for the results of real time analysis. DOE

N86-21332# Department of Energy, Washington, D. C. Div. of Nuclear Power Development.
COPROCESSING OF THERMAL REACTOR FUELS
W. W. Ballard, Jr. 1985 16 p
(DE85-017991; DOE/NBM-5017991; DOE-010) Avail: NTIS HC A02/MF A01

The Nuclear Power Development Division (NPD) under the Assistant Secretary for Energy Technology in the Department of Energy (DOE) is responsible for examining alternative nuclear reactor fuel recycle systems which have potential for reducing the risk of proliferation of nuclear weapons. NPD is administering a base technology program of research and development and design studies which will provide a sound technical foundation for evaluating the nonproliferation potential and commercial feasibility of these alternatives. The Savannah River Laboratory (SRL) has been assigned as the technical lead for those activities associated with the processing of thermal reactor fuel. In order to systematically identify technical requirements and design solutions, SRL periodically updates a Design Integration Study (DIS). The reference process being incorporated into the current DIS is coprocessing uranium and plutonium in a manner whereby pure plutonium is never available in a separate stream. As with other processes, coprocessing doesn't offer a technical fix for preventing proliferators. A flowsheet for this reference process is described with particular emphasis on technical issues and proliferation resistance advantages of coprocessing over conventional Purex processing. DOE

N86-21333# Oak Ridge National Lab., Tenn.
ORNL NPB TASKS
O. H. Crawford 1985 7 p Presented at the NPB Program Technical Interchange Meeting, Huntsville, Ala., 20 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018066; CONF-8506133-1) Avail: NTIS HC A02/MF A01

ORNL's work on optical target return radiation is funded by AFWL, in connection with discrimination. Observation of the optical emission (visible, ultraviolet or low-energy X-ray) due to NPB bombardment may be a way to determine readily how much (if any) beam is on the target. One needs to know the beam is on target in order to discriminate. Since optical photons originate from very near the surface, they can be emitted from light targets (penaids) as well as from heavy ones. Also, the ability to focus is an important advantage in connection with maximizing signal and minimizing noise. Accomplishments include theoretical predictions of intensity and spectral distribution of optical photons from neutral H atom bombardment. Many physical mechanisms have been considered in these predictions, which cover the spectral range from visible and ultraviolet light to low-energy X-rays. Luminescence (i.e., from electron-hole recombination) is predicted to be potentially the strongest source of optical emission. Research was also performed on laser photodetachment in a magnetic field, electrical breakdown phenomena, and calculations of dose distributions in targets exposed to high-energy radiation. DOE

N86-21334# Department of Energy, Washington, D. C. Office of Safeguards and Security.
STRATEGIC SPECIAL NUCLEAR MATERIAL INVENTORY DIFFERENCES Semiannual Report, Apr. 1 - 30 Sep. 1984
Jul. 1985 26 p
(DE86-000051; DOE/DP-0001/16; SAR-16) Avail: NTIS HC A03/MF A01

This sixteenth periodic semiannual report of Inventory Differences (ID) covers the last six months of fiscal year 1984 (April 1, 1984, through September 30, 1984), for the Department of Energy (DOE) and DOE contractor facilities possessing significant quantities of strategic special nuclear material (SSNM). Inventory Differences are simply the differences between the amount of material shown in the accounting records and the amount of material reported in the physical inventory. These differences are generally due to errors in estimating material in unmeasurable form at the time of an inventory, unmeasurable holdup in equipment, measurement imprecisions, inaccuracies in initial determinations of SSNM produced or used in nuclear reactors, and inventory or bookkeeping errors. Both DOE and contractors operating DOE facilities carefully maintain, analyze, and investigate ID data. Inventory Differences are expected in nuclear material processing and are not, in and of themselves, evidence of lost or stolen material. On the other hand, ID analysis provides valuable information on the effectiveness of the safeguards system's physical protection and material control measures as well as a check on the process controls and material management procedures. If necessary, an operation may be shut down until an ID is resolved. DOE

N86-21335# California Univ., Berkeley. Lawrence Berkeley Lab.
TWO PHOTON PHYSICS WITH THE MARK II AT PEP
G. Gidal Jun. 1985 11 p Presented at the International Symposium on Multiparticle Dynamics, Kiryat Anavim, Israel, 1 Jun. 1985 Prepared in cooperation with Stanford Linear Accelerator Center, Menlo Park, CA.; Harvard Univ., Cambridge, Mass.
(Contract DE-AC03-76SF-00098)
(DE86-000616; LBL-19992; CONF-8506194-4) Avail: NTIS HC A02/MF A01

Measurements of the mass spectrum and angular distribution of high mass meson pairs produced in (GAMMA)(GAMMA) interactions are compared with QCD predictions. The radiative width (GAMMA(eta') (YIELDS) (GAMMA)(GAMMA)) is measured using three different eta' decay modes. Upper limits for the iota radiative width are given. DOE

N86-21336# California Univ., Berkeley. Lawrence Berkeley Lab.
RECENT PROGRESS IN APPLICATIONS OF HIGH ENERGY HEAVY ION BEAMS TO NUCLEAR STRUCTURES AND ATOMIC PHYSICS
T. J. M. Symons Aug. 1985 8 p Presented at the 2nd International Conference on Nucleus-Nucleus Collisions, Visby, Sweden, 10 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000617; LBL-20136; CONF-850672-4) Avail: NTIS HC A02/MF A01

Some recent experiments at the Bevalac are discussed which demonstrate the usefulness of relativistic heavy ion beams for study of the nuclear structure of radioactive isotopes. DOE

N86-21337# California Univ., Berkeley. Lawrence Berkeley Lab.
TWO PHASE COOLING FOR SUPERCONDUCTING MAGNETS
P. H. Eberhard, G. A. Gibson, M. A. Green, R. R. Ross, R. G. Smits, J. D. Taylor, and R. D. Watt Aug. 1985 8 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Stanford Linear Accelerator Center, Menlo Park, Calif.
(Contract DE-AC03-76SF-00098)
(DE86-000619; LBL-19246; CONF-850814-24) Avail: NTIS HC A02/MF A01

A closed circuit tubular cooling system for superconducting magnets offers advantages of limiting boiloff and containing high pressures during quenches. Proper location of automatic valves to lower pressures and protect the refrigerator in the event of quenches is described. Theoretical arguments and experimental evidence are given against a previously suggested method to determine He two phase flow regimes. If loss of flow occurs due to some types of refrigeration failure and transfer lines have enough heat leak to warm up, quenches are induced when the flow is restored. Examples are taken from experience with the TPC magnet. DOE

N86-21338# California Univ., Berkeley. Lawrence Berkeley Lab.
ALADDIN UPGRADE DESIGN STUDY: SHIELDING
W. P. Swanson, P. M. DeLuca, Jr., R. A. Otte, and S. W. Schilthelm 23 Apr. 1985 100 p Prepared in cooperation with Wisconsin Univ., Madison and Wisconsin Univ., Stoughton
(Contract DE-AC02-76EV-01105)
(DE86-000847; DOE/EV-01105/318) Avail: NTIS HC A05/MF A01

The object of this shielding is to examine all aspects of Aladdin operation to ensure that adequate shielding is provided to meet the design objectives. To do this, we will look at shielding necessary for radiation produced during the injection process, during normal loss of the stored beam and during accidental loss of the stored beam. It will therefore be necessary to specify shielding not only at the ring, but also along the injection line and the optical beam lines. We will also give special attention to the occupation of the accelerator Vault during injection as this may be a desirable design option. In effect, two shielding plans will be presented, permitting estimates of cost and space requirements for both. DOE

N86-21339# Rockefeller Univ., New York.
HIGHLIGHTS OF ISR RESULTS
P. T. Cox 1985 15 p refs Presented at the International Symposium on Multiparticle Dynamics, Kiryat Anavim, Israel, 1 Jun. 1985
(Contract DE-AC02-81ER-40033)
(DE86-000874; DOE/ER-40033/89; CONF-8506194-2) Avail: NTIS HC A02/MF A01

A selection of recent results from experiments at the CERN Intersecting Storage Rings is presented, covering both pp and p anti p interactions. DOE

N86-21340# European Organization for Nuclear Research, Geneva (Switzerland).
HIGH TRANSVERSE ENERGY AND HIGH TRANSVERSE MOMENTUM EVENTS IN ANTI p p AND pp INTERACTIONS AT THE CERN INTERSECTING STORAGE RINGS
A. L. S. Angelis, G. Basini, H. J. Besch, R. E. Breedon, L. Camilleri, T. J. Chapin, R. L. Cool, P. T. Cox, C. vonGagern, and C. Grosso-Pilcher 1985 28 p Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract DE-AC02-81ER-40033)
(DE86-000876; DOE/ER-40033/86; CONF-850721-6) Avail: NTIS HC A03/MF A01

A comparison between anti p p and pp interactions at radical s = 52.7 GeV is presented for a total neutral transverse energy (E sub T 0) trigger and for a high transverse momentum (p sub T) neutral cluster trigger. The rate of production of events in the range 6 LT E sub T 0 LT 20 GeV is observed to be 10% higher in anti p p collisions than in pp collisions. A study of the structure of the events shows this excess to be due to more isotropic events being produced in anti p p collisions. The ratio of the production cross section for single neutral clusters in anti p p and pp interactions in the range 1.25 LT p sub T LT 10 GeV/c does not significantly differ from unity. DOE

N86-21341# European Organization for Nuclear Research, Geneva (Switzerland).
PRELIMINARY RESULTS FROM EXPERIMENT UA-6 ON THE INCLUSIVE pi 0 SPECTRUM FROM ANTI p p COLLISIONS AT RADICAL s = 24.3 GeV
J. Antille, S. Baumann, A. Bernasconi, J. C. Berney, R. E. Breedon, L. Camilleri, R. L. Cool, P. T. Cox, L. Dick, and E. C. Dukes 1985 17 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract DE-AC02-81ER-40033)
(DE86-000877; DOE/ER-40033/85; CONF-850721-7) Avail: NTIS HC A02/MF A01

We present a preliminary invariant cross section for inclusive pi 0 production in anti p p collisions at radical s = 24.3 GeV in the range 2.5 LT p sub T LT 4.5 GeV/c. DOE

N86-21342# Brookhaven National Lab., Upton, N. Y.
REEXAMINATION OF 2200 METER/SECOND CROSS SECTION EXPERIMENTS FOR NEUTRON CAPTURE AND FISSION STANDARDS
N. E. Holden and K. A. Holden 1985 6 p refs Presented at the 33rd IUPAC General Assembly, Lyons, France, 30 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001191; BNL-NCS-36965; CONF-8508138-3) Avail: NTIS HC A02/MF A01

Neutron capture and fission reaction cross sections are usually measured relative to a standard basis. The most common absolute cross sections which are used in the thermal neutron energy region are (197)Au and (59)Co for capture reactions and (235)U and (239)Pu for fission reactions. Values for these four cross sections have been compiled and evaluated for the purpose of recommending standard values. DOE

N86-21343# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
SADDLE POINT INSTABILITY IN MODELS OF CHIRAL SYMMETRY BREAKING
R. W. Haymaker and T. Matsuki Aug. 1985 31 p
(Contract DE-AS05-77ER-05490)
(DE86-001326; DOE/ER-05490/69) Avail: NTIS HC A03/MF A01

The stability of models of chiral symmetry breaking based on truncated Schwinger-Dyson equations is examined, incorporating renormalization group improvement through a running coupling constant. A specific model confirms that all chiral symmetry breaking solutions correspond to saddle points of the effective potential functional. The instability can be traced to momentum scales in the range from intermediate to infrared. The region from intermediate to ultraviolet is a completely consistent picture of the energetics of candidate vacuum states. Further systematic patterns of solutions are presented. DOE

N86-21344# Oak Ridge National Lab., Tenn.
DETECTING ISOTOPIC RATIO OUTLIERS
C. K. Bayne and D. H. Smith 1985 10 p refs Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001335; CONF-8510151-6) Avail: NTIS HC A02/MF A01

An alternative method is proposed for improving isotopic ratio estimates. This method mathematically models pulse-count data and uses iterative reweighted Poisson regression to estimate model parameters to calculate the isotopic ratios. This computer-oriented approach provides theoretically better methods than conventional techniques to establish error limits and to identify outliers. DOE

N86-21345# California Univ., Berkeley. Lawrence Berkeley Lab.
UNRESOLVED GAMMA RAYS FROM HIGH-SPIN STATES
F. S. Stephens Aug. 1985 17 p refs Presented at the 2nd International Conference on Nucleus-Nucleus Collisions, Visby, Sweden, 10 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001401; LBL-20163; CONF-850672-6) Avail: NTIS HC A02/MF A01

The gamma-rays which are emitted from the highest spin states in nuclei cannot be resolved using present techniques. Nevertheless, methods are being developed to study nuclear structures in this spin range. For example, coincidence data has been used in the study of superdeformations and moments of inertia. While the general properties of these correlation plots are in accord with present expectations, there are several puzzling features of the data which require more study. One unresolved aspect concerns gamma-ray energy spreads in a given decay pathway. In addition, higher-order correlation methods are in various stages of inception. DOE

N86-21346# Centro Informazioni Studi Esperienze, Milan (Italy).
BEHAVIOR OF RADIONUCLEI IN WATER SUSPENSIONS [COMPORTAMENTO DEI RADIONUCLIDI NEI CONFRONTI DEL MATERIALE IN SOSPENSIONE]
G. Ciceri 1985 58 p refs In ITALIAN Presented at Corso di Radioecol. degli Ambienti Acquatici Conference, Como, Italy, 10-14 Jun. 1985 Sponsored by Ente Nazionale per l'Energia Electricca
(CISE-2693) Avail: NTIS HC A04/MF A01

The interactions of radioactive nuclei disolved in a water mass with the suspended matter are discussed. One possible measure is the distribution ratio (Kd) between the two matrices. The thermodynamic and kinetic aspects of the interactions are examined, as well as chemical and physical chemical parameters of water and particulate matter which have an influence on Kd. It is shown that the reproduction of real conditions in laboratory is extremely difficult. Criteria to follow when attempting an experimental approach are given. Author (ESA)

N86-21347# Centro Informazioni Studi Esperienze, Milan (Italy).
THE USE OF LOOP-SEALS FOR THE CONTROL OF THE OVERPRESSURES IN HYDRAULIC TRANSIENTS EVOLVING IN A SEA SERVICE WATER SYSTEM
D. Canetta, A Capozza, and G. Iovino (Ente Nazionale per l'Energia Electricca, Rome, Italy) 1985 33 p ref Presented at 7th International Round Table on Hydraulic Transients in Power Stations, Alvkarleby, Sweden, 9-11 Sep. 1985 Sponsored by Ente Nazionale per l'Energia Electicca
(CISE-2706) Avail: NTIS HC A03/MF A01

The transient response following pump trip-offs and start-ups was investigated in the sea water system of a nuclear power plant. Specific care was devoted to water column separation and cavity collapse phenomena. A computer program designed for analysis of complex hydraulic networks was used. It is found that dangerous overpressures can be avoided by the use of loop seals. The design of the vacuum breaker valves of the loop seals and the optimization of overall transient behavior is discussed. Author (ESA)

N86-20900# Joint Publications Research Service, Arlington, Va.
NUCLEAR PHYSICAL METHODS FOR DETERMINING CARBON IN OCEANIC SUSPENSIONS Abstract Only
I. Ya. Barit, L. Ye. Kuzmin, and B. A. Shnykin *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 22 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 3, May 1985 p 587-590 (For primary document see N86-20987 11-42)
Avail: NTIS HC A04

N86-20915# Joint Publications Research Service, Arlington, Va.
EARTH PHYSICIST DESCRIBES US NUCLEAR TEST MONITORING SYSTEM Abstract Only
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 40 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 23 Aug. 1985 p 5 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

74 OPTICS

Includes light phenomena.

N86-21348* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL STEREO VIDEO SIGNAL PROCESSOR Patent
Glenn D. Craig, inventor (to NASA) Issued 3 Dec. 1985 9 p Filed 9 Mar. 1983
(NASA-Case-MFS-25752-1; US-Patent-4,556,986; US-Patent-Appl-SN-473499; US-Patent-Class-382-42; US-Patent-Class-350-335; US-Patent-Class-356-4.5; US-Patent-Class-356-345; US-Patent-Class-358-88; US-Patent-Class-358-105; US-Patent-Class-358-125; US-Patent-Class-364-822) Avail: US Patent and Trademark Office CSCL 20F

An otpical video signal processor is described which produces a two-dimensional cross-correlation in real time of images received by a stereo camera system. The optical image of each camera is projected on respective liquid crystal light valves. The images on the liquid crystal valves modulate light produced by an extended light source. This modulated light output becomes the two-dimensional cross-correlation when focused onto a video detector and is a function of the range of a target with respect to the stereo camera. Alternate embodiments utilize the two-dimensional cross-correlation to determine target movement and target identification.

Official Gazette of the U.S. Patent and Trademark Office

N86-21349 Department of the Air Force, Washington, D.C.
WIDE ANGLE LENS FOR THE INFRARED DEDICATORY CLAUSE Patent
David E. Stoltzmann, inventor (to Air Force) Issued 24 Sep. 1985 4 p
(AD-D011984; US-Patent-4,542,954; US-Patent-Appl-SN-550698; US-Patent-Class-350-1.3) Avail: US Patent and Trademark Office CSCL 20/6

This rotationally symmetric optical sensor consists of six lens elements made selectively of the alkali halide materials KBr, C l, and KI. It has a wide field-of-view coverage of 60 degrees and operates in the middle infrared through the far infrared bands and extends well into the extreme infrared band. The combination of optical materials selected to be used effectively corrects the chromatic and monochromatic aberrations of the sensor. GRA

N86-21350 British Aerospace Dynamics Group, Bristol (England). Optics Research Dept.
ON THE DEVELOPMENT OF OPTICAL SLIP-RINGS, 2 Progress Report
A. G. Levenston and A. R. Tooth Oct. 1980 19 p refs
(BAe-BT-10955) Copyright. Avail: Issuing Activity

The feasibility of an optical slip-ring for use in an optical communication link is demonstrated. The light signals are conveyed to and from the optical slip-ring via fiber optics, offering the

advantages of large bandwidths and immunity to electromagnetic interference. A working optical slip-ring model was produced insertion loss is 12 dB. The peak signal to noise ratio is 7:1 at which + or - 10% signal variation with rotation is measured. Methods of reducing insertion loss, increasing the signal to noise ratio and reducing the angular signal variation are suggested.
Author (ESA)

N86-21351*# Korsch Optics, Inc., Huntsville, Ala.
AN OPTICAL TECHNOLOGY STUDY ON LARGE APERTURE TELESCOPES Final Report
Dietrich Korsch Dec. 1985 26 p ref
(Contract NAS8-36610)
(NASA-CR-178725; NAS 1.26:178725) Avail: NTIS HC A03/MF A01 CSCL 20F

The difficult and crucial problem of selecting a suitable telescope concept for an advanced space observatory was examined. To this end two and four mirror telescopes were analyzed and compared. Both configurations are very practical and structurally similar. Parabolic primary and spherical primary four mirror telescope were compared with respect to their performance and the alignment sensitivities of the three correction mirrors. A 1 meter class afocal telescope system with lag angle compensation, to be used in a LIDAR experiment, was examined. B.G.

N86-21352*# Computer Technology Associates, Inc., Columbia, Md.
STATE OF THE ART SURVEY OF NETWORK OPERATING SYSTEMS DEVELOPMENT
7 Jun. 1985 224 p
(Contract NAS5-28583)
(NASA-CR-177853; NAS 1.26:177853) Avail: NTIS HC A10/MF A01 CSCL 20F

The results of the State-of-the-Art Survey of Network Operating Systems (NOS) performed for Goddard Space Flight Center are presented. NOS functional characteristics are presented in terms of user communication data migration, job migration, network control, and common functional categories. Products (current or future) as well as research and prototyping efforts are summarized. The NOS products which are revelant to the space station and its activities are evaluated. B.G.

N86-21353# State Univ. of New York, Buffalo. Dept. of Chemistry.
SURFACE PLASMON DISPERSION RELATION AND LOCAL FIELD ENHANCEMENT DISTRIBUTION FOR A DEEP SINUSOIDAL GRATING Interim Technical Report
Dan Agassi and Thomas F. George Dec. 1985 51 p
(Contract N00014-86-K-0043)
(AD-A162453; UBUFFALO/DC/85/TR-1) Avail: NTIS HC A04/MF A01 CSCL 20/6

Two features of light scattering from a deep lossless metallic sinusoidal grating are considered in the limit g/d approaches infinity, where g and d are the height and periodicity of the grating, respectively. It is found that the surface plasmon dispersion relation is comprised of two flat bands with a frequency gap Delta omega/omega sub p = sq rt. 2 - 1)/2, where omega sub p is the volume plasmon frequency. For the local field enhancement distribution at the grating's surface, the results show the existence of two qualitatively distinct domains, i.e., lamda >> d and lambda << denotes the radiation wavelength. In both domains, however, the local field enhancement is larger at the bottom of the troughs than at the top of the peaks. The dressed Rayleigh expansion is used throughout for the analysis. GRA

N86-21354# Massachusetts Inst. of Tech., Cambridge. Lab. of Electronics.
SWITCHABLE ZERO ORDER DIFFRACTION GRATINGS AS LIGHT VALVES Semiannual Report, 1 Apr. - 30 Sep. 1985
John Melngailis 11 Oct. 1985 4 p
(Contract N00014-84-K-0073)
(AD-A162464) Avail: NTIS HC A02/MF A01 CSCL 20/6

The goal of this project is to produce a light valve based on the cancellation of the zero order of diffraction. The light valve works by displacement of two facing gratings with respect to one another by half an operating period. The light valve is made of polyvinylidine fluoride (PVF2) a piezoelectric plastic. It is simple cheap and, in principle, mass producible into arrays to serve as a flat display or as a light modulator in optical signal processing.
GRA

N86-21355# California Univ., Berkeley. Lawrence Berkeley Lab.
SPECULAR AND DIFFUSE REFLECTION OF SOFT X-RAYS FROM MIRRORS
H. Hogrefe, R. P. Haelbich, and C. Kunz Aug. 1985 17 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985 Prepared in cooperation with Hamburg Univ., West Germany
(Contract DE-AC03-76SF-00098)
(DE86-000620; LBL-20116; CONF-850734-14) Avail: NTIS HC A02/MF A01

Measurements of surface scattering from plane mirrors with different degrees of roughness using soft X-rays are reported. Angle resolved distributions of s-polarized light, scattered in the plane of incidence, were obtained with a precise reflectometer for various angles of incidence and different wavelengths. The influence of the sample preparation and the optical constants on the scattering properties is shown. DOE

N86-21356# Sandia National Labs., Albuquerque, N. Mex.
HIGH BANDWIDTH APPLICATIONS OF PHOTONICS
J. Chang 1985 6 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE86-000862; SAND-85-1237C; CONF-850887-37) Avail: NTIS HC A02/MF A01

High-bandwidth analog applications are a new and very promising area of photonics. Photonics is fast becoming the lead technology in the study of single-shot, rapid-transient phenomena because the photonic equivalent of a conventional diagnostic system offers unsurpassed performance and value. DOE

N86-21357# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
ON-LINE URANIUM DETERMINATION USING REMOTE FIBER FLUORIMETRY
R. A. Malstrom 1985 28 p Presented at the Du Pont Process Analytical Symposium, Wilmington, Del., 16 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001831; DP-MS-85-39; CONF-8510178-1) Avail: NTIS HC A03/MF A01

Remote Fiber Fluorimetry (RFF) is being developed at Savannah River Laboratory for the on-line determination of uranium in plant process streams. A prototype system suitable for plant use has been designed and is being built. RFF has four major components: a laser, an optical fiber, an optrode, and a detector. Essentially, an optical fiber carries laser radiation from a laser to a process sampling point. An optrode (the optical analog of an electrode) couples the laser light into a sample solution. Fluorescence from the sample is collected by the optrode and goes back through the same fiber to a detector. DOE

N86-21358# Brookhaven National Lab., Upton, N. Y.
METROLOGY OF REFLECTION OPTICS FOR SYNCHROTRON RADIATION
P. Z. Takacs Sep. 1985 51 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001205; BNL-37050; CONF-850734-12) Avail: NTIS HC A04/MF A01

This paper reviews some of the experiences of the National Synchrotron Light Source in procuring grazing incidence optical components over the past several years. The specification process - how it is related to the function of the optic, and how it relates

to the metrology available during the manufacturing process and after delivery to the user's laboratory - is reviewed. Practical aspects of experiences with new technologies, such as single point diamond turning of metal mirrors and the use of SiC as a mirror material, are discussed. Recent advances in metrology instrumentation have the potential to move the measurement of surface figure and finish from the research laboratory into the optical shop, which should stimulate growth and interest in the manufacturing of optics to meet the needs of the synchrotron radiation user community. DOE

N86-21359# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.
PHOTON ABSORPTION GRAPHS: 1 keV TO 10 MeV
V. R. Bom and R. W. Hollander Jan. 1983 28 p
(Stratech-83-1) Avail: NTIS HC A03/MF A01

Photon absorption graphs for H2 (liquid), He (liquid), Be, C, Al, Ar (gas), Fe, Cn, Ge, Kr (gas), Mo, Sn, Xe (gas), Dy, An, Pb, U, NaI, NE102A, Kapton, Mylar, Hostaphan, polyethylene, and BaF2 are presented. Author (ESA)

N86-21360# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
30 Dec. 1985 43 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-85-038) Avail: NTIS HC A03/MF A01

Progress in science and technology in East European countries is reported. Topics discussed include: international cooperation, computer systems, and science, electronics, electrical engineering, and solar energy conversion. For individual titles, see N86-21361 through N86-21361.

N86-21361# Joint Publications Research Service, Arlington, Va.
FORMATION OF SURFACE FIGURE DURING OPTICAL SURFACE POLISHING
A. Leitel *In its* East Europe Report: Science and Technology (JPRS-ESA-85-038) 30 Dec. 1985 p 4-13 refs Transl. into ENGLISH from Feingeraetetechnik (East Berlin, East Germany), v. 34, no. 7, 1985 p 313-316 (For primary document see N86-21360 11-74)
Avail: NTIS HC A03/MF A01

In the manufacturing of optical precision components special importance is given to the polishing operation because it is manufacturing. It has an important effect on the precision of optical surfaces. The essential parameters which characterize precision are the surface form and the fine surface figure which emerge from a continuous smoothing process. The formation of the fine surface figure during polishing which relates to the optical medium, glass, is discussed. Analogies to other materials may be discovered when the elementary structure of such materials is considered. The formation of the fine optical figure in polishing optical functional surface is a consequence of material separation processes and the mechanism of lapping and polishing theoretical conceptions which were developed to explain the polishing process and contain a proposed complex view of the elementary processes which are compared. Elementary friction-wear mechanisms and tribological parameters show that the formation of the optical fine figure in polishing optical glass can be described as a triboseparation. Author

N86-20448# Joint Publications Research Service, Arlington, Va.
OPTICAL THICKNESS OF ATMOSPHERIC AEROSOL OVER SEA Abstract Only
K. S. Shifrin, V. M. Volgin, B. N. Volkov, O. A. Yershov, and A. V. Smirnov *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 65 Transl. into ENGLISH from Issledovaniye Zemli Iz Kosmosa (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 21-30 Original language document was announced in IAA as A86-13278 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20919# Joint Publications Research Service, Arlington, Va.
REGULARITY OF STRUCTURE OF INHOMOGENEITIES OF SCATTERING OF OPTICAL RADIATION AND THEIR RELATIONSHIP TO METEOROLOGICAL PARAMETERS Abstract Only
Yu. A. Polkanov *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 44 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery I Okeana (Moscow, USSR), v. 21, no. 7, Jul. 1985 p 720-725 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20924# Joint Publications Research Service, Arlington, Va.
DIALOG SYSTEM FOR NUMERICAL MODELING OF ENERGY LOSSES OF ATMOSPHERIC OPTICAL WAVES Abstract Only
V. Ye. Zuyev, Yu. S. Makushkin, A. A. Mitsel, L. I. Nesmelova, O. B. Rodimova, V. P. Rudenko, S. D. Tvorogov, K. M. Firsov, and N. Ye. Yakovlev *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 47-48 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 345-348 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

N86-20925# Joint Publications Research Service, Arlington, Va.
ONE METHOD FOR COMPENSATING DISTORTIONS CAUSED BY ATMOSPHERIC TURBULENCE Abstract Only
V. N. Filinov and G. P. Chernyy *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 48 Transl. into ENGLISH from Optika I Spektroskopiya (Leningrad, USSR), v. 58, no. 3, Mar. 1985 p 634-639 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-21362# Electricity Council, London (England). Overseas Relations Branch.
MASS SPECTROMETRY OF THE NEGATIVE GLOW OF A CYLINDRICAL HOLLOW CATHODE DISCHARGE
M. Pahl, W. Lindinger, and F. Howorka 13 Dec. 1985 35 p refs Transl. into ENGLISH from Zeitschrift fuer Naturforschung (West Germany), v. 27a, no. 4, 1972 p 678-692
(BLL-OA-Trans-3237-(C196.3)) Avail: NTIS HC A03/MF A01

Positive ions were extracted from the negative glow (NG) of a cylindrical hollow cathode discharge through a plane sampling probe and analyzed. The discharge was operated in pure Argon with about 0.1% of H2O. Principal ions were Ar+, Ar++, Ar2+, ArH+, H2O+, and H3O+. Individual ion currents were measured as functions of the probe potential U (sub b), at different discharge currents (2 to 7 mA) and gas pressures (0.05 to 0.5 torr). At probe potentials above +15 V no ions from the NG reached the probe, but electrons were accelerated so that ionization of the neutral gas could arise in and behind the orifice. The Ar++ current as a function of U (sub b) together with other results suggested the presence of very vast electrons. B.G.

N86-21363# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LARGE PLASMASPHERIC ELECTRIC FIELDS AT L-2 BY THE S3-3 SATELLITE DURING STRONG GEOMAGNETIC ACTIVITY
W. D. Gonzalez, O. Pinto, Jr., O. Mendes, Jr., and F. S. Mozer (California Univ., Berkeley) Nov. 1985 14 p refs Submitted for publication Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3705-PRE/845) Avail: NTIS HC A02/MF A01

Large plasmaspheric electric fields at L is approximately 2 measured by the S3-3 satellite during strong geomagnetic activity are reported. Since these measurements have amplitudes comparable to those of the local corotation electric field, during such events the plasmasphere is expected to get strongly altered event at such low L-values. Furthermore, those measurements could

contribute to the understanding of the physics of the convection/electric field penetration to the low latitude plasmasphere as well as the disturbed dynamo, during strong geomagnetic activity. For this purpose, critical parameters related to geomagnetic activity are also presented for the reported electric field events. Author

N86-21364# Nagoya Univ. (Japan). Inst. of Plasma Physics.
CRESCENT SHAPED TOKAMAK FOR COMPACT IGNITION
K. Yamazaki and W. T. Reiersen (Princeton Univ., N.J.) Dec. 1985 18 p refs
(IPPJ-754) Avail: NTIS HC A02/MF A01

A compact high beta tokamak configuration with crescent shaped (or boomerang shaped) cross section is proposed as a next generation ignition machine. This configuration with a small indentation but a large triangularity is more compact than the normal dee shaped design because of its high beta characteristics in the first-second transition regime of stability. This may also be a more reliable next generation compact device than the bean shaped design with large indentation and small triangularity, because this design does not rely on the second stability and is easily extendable from the present dee shaped design. Author

N86-21365# Nagoya Univ. (Japan). Inst. of Plasma Physics.
AXIAL ELECTRIC FIELD DRIVEN BY TEMPERATURE ANISOTROPY IN A BUMPY TORUS EQUILIBRIUM
C. S. Chang, T. Shoji, and Y. Ohara Nov. 1985 25 p refs
(IPPJ-753) Avail: NTIS HC A02/MF A01

Cyclotron heating effect on the axial equilibrium is studied in a bumpy torus geometry. It is found that the temperature anisotropy of warm heated species can generate axial potential variation along the magnetic field lines. The temperature anisotropy is analyzed with a bi-Maxwellian fluid model. Author

N86-21366# Arizona Univ., Tucson. Dept. of Chemistry.
COMPARISON OF A VERY HIGH FREQUENCY 148 MHz INDUCTIVELY COUPLED PLASMA TO A 27 MHz ICP Interim Report
B. D. Webb and M. B. Denton 26 Nov. 1985 51 p
(Contract N00014-83-K-0268)
(AD-A162452; TR-43) Avail: NTIS HC A04/MF A01 CSCL 20/9

Physical parameters and analytical performance are determined for an analytical (ICP) operated at 148 MHz, a frequency nearly three times higher than any previously reported. The iron (I) excitation temperatures are approximately 1.5 times lower and the electron densities are five times lower than 27 MHz. The consequences of these changes are lower analyte and background continuum emission intensities, such that the signal to background ratios are decreased at the higher frequency. Freedom from interferences and working curve linearity are unaffected while ease of sample introduction is improved. A shift towards atomic emission indicates a deviation farther from LTE at 148 MHz. These effects are attributed to the decrease in skin depth with increasing frequency. GRA

N86-21367# Oak Ridge National Lab., Tenn.
FEATURES OF SPHERICAL TORUS PLASMAS OF ULTRA-LOW ASPECT RATIO AND LARGE ELONGATION
Y. K.M. Peng 1985 4 p Presented at the 12th European Conference on Controlled Fusion and Plasma Physics, Budapest, Hungary, 2 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE85-017310; CONF-850927-6) Avail: NTIS HC A02/MF A01

High beta, good confinement and steady-state operation in compact configuration and at modest field have long been major goals of magnetic fusion energy research. Accomplishing these in a single device will permit cost-effective and attractive embodiments of future fusion reactors. The introduction of the spherical torus concept was so motivated to a large degree. An equally important motivation is its prospect of reducing cost and time of fusion research and development. In comparison with alternate confinement concepts of RFP and spheromak, a spherical torus experiment is expected to be similar in compactness, low field, and high beta; but with better, tokamak-like confinement times by more than an order of magnitude. DOE

N86-21368# GA Technologies, Inc., San Diego, Calif.
CHARGE EXCHANGE MEASUREMENTS ON THE DOUBLET III TOKAMAK
J. Lohr and C. J. Armentrout Aug. 1985 9 p Presented at the Course and Workshop on Basic Physical Processes in Fusion Plasmas, Varenna, Italy, 26 Aug. 1985
(Contract DE-AC03-84ER-51044)
(DE86-000311; GA-A-18113; CONF-850806-1) Avail: NTIS HC A02/MF A01

Two passive charge exchange analyzers were installed on the Doublet III tokamak. Both were of the E parallel B type, permitting H-D discrimination by mass. Deuterons with energies up to about 90 keV could be observed at the highest spectrometer magnetic fields available. Beam injection energy on Doublet III was typically 75 keV. One of the analyzers could scan across the beam injection angle of approximately 27 deg at the magnetic axis, while the other analyzer observed parallel neutral flux across nearly the entire cross section from about 10 cm inside the limiter to tangency radii of about 85 cm, intersecting the centerpost. Beam injection was angled toward the direction of positive plasma current and co-going particles were generally observed by both analyzers. When neutral beam power was increased in steps, generally the observed fast neutral flux did not increase proportionally at higher power levels. Flux bursts were observed in synchronism with limiter H (sub (ALPHA)) spikes at the low energy range of the parallel analyzer. The perpendicular analyzer, observing fast particles near their injected pitch angle, detected bursts at all energies, with especially pronounced correlation with H (sub (ALPHA)) activity at high energies. DOE

N86-21369# California Univ., Berkeley. Lawrence Berkeley Lab.
CONCEPTS FOR INSERTION DEVICES THAT WILL PRODUCE HIGH-QUALITY SYNCHROTRON RADIATION
K. Halbach Jul. 1985 22 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE86-000621; LBL-20174; CONF-850734-9) Avail: NTIS HC A02/MF A01

A simple analysis is presented that shows what effect the two major construction tolerances have on the field distribution in undulators, and it is shown that the consequential effects on the synchrotron radiation spectrum depend strongly on the type of undulator. A number of new conceptual undulator designs are described that allow electromagnetic correction of the field distribution in these undulators. DOE

N86-21370# Fermi National Accelerator Lab., Batavia, Ill.
THERMAL SHIELD BOWING IN LONG SUPERCONDUCTING MAGNETS
T. H. Nicol, M. Roman, and S. Fulton Sep. 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(DE86-000643; FNAL-TM-1351; CONF-850814-14) Avail: NTIS HC A02/MF A01

One of the interesting problems associated with building long magnets for the SSC (Superconducting Super Collider) is predicting and controlling the dynamic response of the cryostat tubes during cooldown. Thermal bowing occurs in any of these tubes that are asymmetric in shape or which are not cooled uniformly. Understanding the bowing behavior is important for two reasons. First, one needs to know the magnitude of the induced displacements so that potential interferences in the entire magnet assembly can be located. Second, the bowing phenomenon introduces structural loads on the supports which need to be folded into the design of those supports. It is desirable, due to cost and time constraints, to develop an analytical model which accurately predicts loads and displacements rather than relying on a physical model of each candidate cryostat tube design. This report describes a

procedure and an analytical model to predict this dynamic behavior on the thermal radiation shield for Fermilab's proposed SSC magnet design. The results are compared with test data obtained on a physical model fabricated and tested in an effort to verify the analytical approach. DOE

N86-21371# Lawrence Livermore National Lab., Calif. Space Systems Div.
DESIGN AND FABRICATION OF THE MFTF-B MAGNET SYSTEM
R. E. Tatro and T. A. Kozman Sep. 1985 6 p Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-000742; UCRL-15718) Avail: NTIS HC A02/MF A01

The MFTF-B superconducting magnet system consists of 40 NbTi magnets and two Nb3Sn magnets. General Dynamics (GD) designed all magnets except for the small trim coils. GD then fabricated 20 NbTi magnets, while LLNL fabricated 20 NbTi magnets and two Nb3Sn magnets. The design phase was completed in February 1984 and included the competitive procurement of magnet structural fabrication, superconductor, G-10CR insulation, support struts and bearings, vapor-cooled leads, and thermal shields for all magnets. Fabrication of all magnets was completed in March 1985. At GD, dual assembly lines were necessary during fabrication in order to meet the aggressive LLNL schedule. The entire magnet system has been installed and aligned at LLNL, and Tech Demo tests will be performed during September and November 1985. DOE

N86-21372# Los Alamos National Lab., N. Mex.
SUMMARY FROM WORKING GROUP ON NONINTERCEPTIVE DIAGNOSTICS
D. D. Chamberlin 1985 4 p Presented at the Workshop on High Brightness, High Current, High Duty Factor Ion Injectors, San Diego, Calif., 21 May 1985
(Contract W-7405-eng-36)
(DE86-000790; LA-UR-85-2942; CONF-8505164-9) Avail: NTIS HC A02/MF A01

The working group for noninterceptive diagnostics spent much of its time comparing diagnostic techniques from different fields and their possible application to high-power injectors. The group included backgrounds from electron beam diagnostics, fusion power diagnostics, CW ion source and transport design, and ion beam of diagnostics. The probability of success for adapting techniques from these different areas is quite difficult to judge, short of a detailed examination of each application. Unexpected flaws or unforeseen noise sources can eliminate an idea that would otherwise appear promising. The report presents several ideas that were discussed, with an indication of those ideas most likely to succeed if implemented. DOE

N86-21373# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
TRAPPED ELECTRON STOCHASTICITY BY FREQUENCY-MODULATED WAVES
A. K. Ram, K. Hizanidis, and A. Bers Aug. 1985 13 p
(Contract DE-AC02-78ET-51013)
(DE86-001315; PFC/JA-85-27) Avail: NTIS HC A02/MF A01

It is shown that for electrons trapped in a static potential a finite amplitude frequency-modulated wave induces stochastic motions (and diffusion) in electron orbits over a significantly larger area of phase-space than a single frequency wave of the same amplitude. The wavelength of the FM fields is unimportant if it is greater than twice the width of the static potential. It is proposed that this be used for pumping of mirror trapped electrons to enhance the confining potential in a tandem mirror cell. DOE

N86-21374# Oak Ridge National Lab., Tenn.
MHD STABILITY OF TORSATRONS USING THE AVERAGE METHOD
J. A. Holmes, B. A. Carreras, L. A. Charlton, L. Garcia, T. C. Hender, H. R. Hicks, and V. E. Lynch 1985 19 p Presented at the Course and Workshop on Basic Physical Processes in Fusion Plasmas, Varenna, Italy, 26 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001348; CONF-850806-2) Avail: NTIS HC A02/MF A01

The stability of torsatrons is studied using the average method, or stellarator expansion. Attention is focused upon the Advanced Toroidal Fusion Device (ATF), an l = 2, 12 field period, moderate aspect ratio configuration which, through a combination of shear and toroidally induced magnetic well, is stable to ideal modes. Using the vertical field (VF) coil system of ATF it is possible to enhance this stability by shaping the plasma to control the rotational transform. The VF coils are also useful tools for exploring the stability boundaries of ATF. By shifting the plasma inward along the major radius, the magnetic well can be removed, leading to three types of long wavelength instabilities: (1) A free boundary edge mode occurs when the rotational transform at the plasma edge is just less than unity. This mode is stabilized by the placement of a conducting wall at 1.5 times the plasma radius. (2) A free boundary global kink mode is observed at high (BETA). When either (BETA) is lowered or a conducting wall is placed at the plasma boundary, the global mode is suppressed, and (3) an interchange mode is observed instead. For this interchange mode, calculations of the second, third, etc., most unstable modes are used to understand the nature of the degeneracy breaking induced by toroidal effects. Thus, the ATF configuration is well chosen for the study of torsatron stability limits. DOE

N86-21375# Oak Ridge National Lab., Tenn.
JET-ISX-B BERYLLIUM LIMITER EXPERIMENT SAFETY ANALYSIS REPORT AND OPERATIONAL SAFETY REQUIREMENTS
P. H. Edmonds Sep. 1985 68 p
(Contract DE-AC05-84OR-21400)
(DE86-001465; ORNL/TM-9512) Avail: NTIS HC A04/MF A01

An experiment to evaluate the suitability of beryllium as a limiter material has been completed on the ISX-B tokamak. The experiment consisted of two phases: (1) the initial operation and characterization in the ISX experiment, and a period of continued operation to the specified surface fluence (10 to the 22d power atoms/sq cm of hydrogen ions; and (2) the disassembly, decontamination, or disposal of the ISX facility. During these two phases of the project, the possibility existed for beryllium and/or beryllium oxide powder to be produced inside the vacuum vessel. Beryllium dust is a highly toxic material, and extensive precautions are required to prevent the release of the beryllium into the experimental work area and to prevent the contamination of personnel working on the device. Details of the health hazards associated with beryllium and the appropriate precautions are presented. Also described in appendixes to this report are the various operational safety requirements for the project. DOE

N86-21376# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
OPTIMIZATION OF GYROKLYSTRON EFFICIENCY
T. M. Tran, B. G. Danly, K. E. Kreischer, J. B. Schutkeker, and R. J. Temkin Feb. 1985 33 p
(Contract DE-AC02-78ET-51013)
(DE86-001609; PFC/JA-85-8) Avail: NTIS HC A03/MF A01

The optimization of gyroklystron efficiency is investigated by employing a two-step procedure. As a first step, the prebuncher is analyzed using a small signal approximation, since the cavity(ies) here serve mainly to modulate slightly the velocities of the electrons, which will be bunched in the field-free drift section(s). It is found that the electrons entering the energy extraction cavity can be characterized entirely by only two dimensionless parameters: a bunching parameter q and a relative phase psi. The numerical simulation of the extraction cavity, based on the nonlinear pendulum equations describing the interaction between the electrons and the RF field, supplemented by the initial conditions specified by q and psi, constitutes the second step. The final result of this two-step analysis is the efficiency, eta/sub perpendicular, opt optimized with respect to q, psi and the magnetic detuning parameter (DELTA). This efficiency depends only on the

normalized cavity length (MU) and the normalized RF field F of the energy extraction section. DOE

N86-21377# Texas Univ., Austin. Fusion Research Center.
DESTABILIZATION OF GLOBAL ALFVEN EIGENMODES AND KINETIC ALFVEN WAVES BY ALPHA PARTICLES IN A TOKAMAK PLASMA
Y. M. Li, S. M. Mahajan, and D. W. Ross Sep. 1985 62 p
(Contracts DE-AS05-85ER-53193; DE-AC05-76ET-53036)
(DE86-001678; DOE/ET-53193/2-276; FRCR-276) Avail: NTIS HC A04/MF A01

Alfven wave instabilities in a reacting tokamak plasma are calculated both analytically and numerically. Two distinct classes of eigenmodes are considered, global Alfven eigenmodes and kinetic Alfven waves, each driven unstable by the free energy associated with the alpha particle density gradient. The growth rates of the global Alfven eigenmodes are given for the first time. These are basically MHD modes, whose resonances with electrons and alpha particles are calculated using kinetic theory. depend on electron inertia and finite ion gyroradius for their existence and have no counterpart in MHD theory. Global modes with small parallel phase velocity are identified as the most dangerous, both because of their substantial growth rates and the expected ineffectiveness of quasilinear stabilization. The kinetic waves, on the other hand, are likely to be stabilized easily by quasilinear flattening of the alpha particle profile. DOE

N86-21378# Texas Univ., Austin. Inst. for Fusion Studies.
STUDY OF THE MAGNETIC COMPRESSIONAL MODE IN A HOT PARTICLE PLASMA
D. P. Stotler, H. L. Berk, and M. G. Engquist Sep. 1985 25 p
(Contract DE-FG05-80ET-53088)
(DE86-001784; DOE/ET-53088/208; IFSR-208) Avail: NTIS HC A02/MF A01

The integral equation for the magnetic compressional mode, accounting for geometrical effects along the field line and using the eikonal approximation across the field line, is solved numerically for the eigenvalues and eigenfunctions. These results reproduce the analytic estimates when there is strong drift reversal. For typical EBT-S parameters, instability is observed for all pressure scale lengths just below those needed for drift reversal, i.e., vertical bar Rpar. delta (P (sub c) + P/sub perpendicular h)) /2B(2)par. deltar vertical bar > 1 (where P is the particle pressure, c and h refer to cold and hot components, B is the midplane magnetic field, and R is the midplane radius of curvature). If larger core densities are present, a wave-particle resonance arises when the particle drifts are not reversed, causing instability up to much larger pressure scale lengths. Stability for all values of the ratio of hot electron density to core density is obtained with vertical bar Rpar. deltaP/sub c) /B(2)par. deltar vertical bar > 1 + P (sub parallel h) /P (sub perpendicular h). DOE

N86-21379# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
AXISYMMETRIC PUMPING SCHEME FOR THE THERMAL BARRIER IN A TANDEM MIRROR
X. Z. Li Sep. 1985 38 p
(Contract DE-AC02-78ET-51013)
(DE86-002001; DOE/ET-51013/159; PFC/RR-85-19) Avail: NTIS HC A03/MF A01

An axisymmetric pumping scheme is proposed to pump the particles that trap in a thermal barrier without invoking the neutral beam or geodesic curvature. In this scheme a magnetic scraper is moved uni-directionally on the barrier peak to push the barely trapped particles into the central cell. We utilize a potential jump that forms at the peak field for sufficiently strong pumping. The non-collisional catching effect has to be limited by setting an upper limit on the scraping frequency of the magnetic bump. On the other hand, the dynamic stability of the pumping scheme sets a lower limit on the scraping frequency. Using the variational method, we are able to estimate the window between these two limits, which seems feasible for the Tara reactor parameter set. A primary calculation shows that the magnetic bump, (DELTA)B/B is about 10(-4) and the scraping frequency, nu/sub sc/, is about 10(+5)sec(-1), which are similar to the parameters required for those for drift pumping. DOE

N86-21380# Lawrence Livermore National Lab., Calif.
TRANSIENT PLASMA ESTIMATION: A NOISE CANCELLING-IDENTIFICATION APPROACH
J. V. Candy, T. Casper, and R. Kane Mar. 1985 21 p Presented at the 24th IEEE Conference on Decision and Control, Fort Lauderdale, Fla., 11 Dec. 1985
(Contract W-7405-eng-48)
(DE85-008962; UCRL-92334; CONF-851209-1) Avail: NTIS HC A02/MF A01

The application of a noise cancelling technique to extract energy storage information from sensors occurring during fusion reactor experiments on the Tandem Mirror Experiment-Upgrade (TMX-U) at the Lawrence Livermore National Laboratory (LLNL) is examined. We show how this technique can be used to decrease the uncertainty in the corresponding sensor measurements used for diagnostics in both real-time and post-experimental environments. We analyze the performance of algorithm on the sensor data and discuss the various tradeoffs. The algorithm suggested is designed using SIG, an interactive signal processing package developed at LLNL. DOE

N86-21381# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
LOWER HYBRID CURRENT DRIVE EXPERIMENTS ON THE MIT ALCATOR C AND VERSATOR II TOKAMAKS
S. Knowlton, S. McDermott, M. Porkolab, Y. Takase, S. Texter, P. Bonoli, C. Fiore, S. McCool, M. Mayberry, and K. I. Chen Aug. 1985 6 p Presented at the 12th European Conference on Controlled Fusion and Plasma Physics, Budapest, Hungary, 2 Sep. 1985
(Contract DE-AC02-78ET-51013)
(DE86-001109; DOE/ET-51013/T157; PFC/CP-85-6; CONF-850927-7) Avail: NTIS HC A02/MF A01

Energy confinement studies in lower hybrid RF driven discharges at 4.6 GHz have been carried out on the Alcator C tokamak. The electron temperature profile is measured by a five point Thomson scattering system and the ion temperature by charge-exchange analysis. The energy content of the bulk plasma is found to be similar for RF-driven and ohmic discharges of identical current and density. In the parameter range anti n(sub e) = 3 - 7 x 10 to the 13th power/cu cm, B = 7 - 11 T, I(sub p) = 100 - 200 kA, q (a) > 8, the RF power needed to sustain the discharge is significantly greater than the ohmic power required to maintain a similar plasma. The gross energy confinement time is lower in the RF-driven discharges than in the ohmic ones by a factor of 1.5 to 4, depending on plasma conditions. The frequency scaling of the density limit for current drive is reported from the Versator II tokamak. The steady-state current drive density limit of anti n(sub e) = 6 x 10 to the 12th power/cu cm at 800 MHz. has been raised to a density of at least anti n(sub e) = 1.0 x 10 to the 13th power/cu cm at the same toroidal field by operations at a frequency of 2.45 GHz. Superthermal electron effects during RF injection are observed up to a density of anti n(sub e) = 2.5 x 10 to the 13th power/cu cm. DOE

N86-21382# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
ANALYTICAL MODEL FOR THE PERPENDICULAR TEMPERATURE ENHANCEMENT IN LOWER-HYBRID CURRENT DRIVE
K. Hizanidis, A. Bers, V. Fuchs, and R. A. Cairns Aug. 1985 12 p
(Contract DE-AC02-78ET-51013)
(DE86-001113; PFC/JA-85-28) Avail: NTIS HC A02/MF A01

The enhancement of the perpendicular temperature inside the resonant region, observed in numerical studies of the two-dimensional Fokker-Planck equation, combined with unidirectional RF quasilinear diffusion, is modeled on the basis of the collisional relaxation equations. Strong RF diffusion is assumed and relativistic effects are taken into account. The resulting enhanced per-

pendicular temperature is a function of the position and the width of the applied RF spectrum. Good agreement with two-dimensional Fokker-Planck numerical results has been found. DOE

N86-21383# Oak Ridge National Lab., Tenn.
ICRF WAVE PROPAGATION AND ABSORPTION IN TOKAMAK AND MIRROR MAGNETIC FIELDS: A FULL-WAVE CALCULATION
E. F. Jaeger, D. B. Batchelor, H. Weitzner, and J. H. Whealton 1985 71 p Presented at the 3rd European Workshop on Problems in the Numerical Modeling of Plasmas, Varenna, Italy, 10 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001350; CONF-8509162-6) Avail: NTIS HC A04/MF A01

Global solutions for the ion cyclotron resonant frequency (ICRF) wave fields in a straight tokamak with rotational transform and a poloidally symmetric mirror are calculated in the cold plasma limit. The component of the wave electric field parallel to vector Bis assumed zero. Symmetry in each problem allows Fourier decomposition in one ignorable coordinate, and the remaining set of two coupled, two-dimensional partial differential equations is solved by finite differencing. Energy absorption and antenna impedance are calculated using a simple collisional absorption model. When large gradients in vertical barBvertical bar along vectorB are present in either geometry, ICRF heating at the fundamental ion cyclotron resonance is observed. For the mirror, such gradients are always present. But for the tokamak, the rotational transform must be large enough that vectorB . delB greater than or equal to 0(1). For smaller transforms more typical of real tokamaks, only heating at the two-ion hybird resonance is observed. This suggests that direct resonant absorption at the fundamental ion cyclotron resonance may be possible in stellarators where vectorB . delB approx. 0(1) + 11. DOE

N86-21384# Oak Ridge National Lab., Tenn.
CHARGE EXCHANGE PROCESSES INVOLVING IRON IONS
R. A. Phaneuf 1985 25 p Presented at the International Atomic Energy Agency (IAEA) Advisory Group Meeting on Atomic Data for Fusion Plasma Modelling, Vienna, Austria, 18 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001353; CONF-8509180-1) Avail: NTIS HC A02/MF A01

A review and evaluation is given of the experimental data which are available for charge exchange processes involving iron ions and neutral H, H2 and He. Appropriate scaling laws are presented, and their accuracy estimated for these systems. A bibliography is given of available data sources, as well as of useful data compilations and review articles. A procedure is recommended for providing single approximate formulae to the fusion community to describe total cross sections for electron capture by partially-stripped Fe (sup q+) ions in collisions with H, H2 and He, based on the scaling relationships suggested by Janev and Hvelplund. DOE

N86-21385# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY, PLASMA FUSION CENTER, 1984-1985. REPORT TO THE PRESIDENT
Jul. 1985 27 p
(Contract DE-AC02-78ET-51013)
(DE86-001476; DOE/ET-51013/T5) Avail: NTIS HC A03/MF A01

During the past year, technical progress has been made in all Plasma Fusion Center (PFC) research programs. The Plasma Fusion Center is recognized as one of the leading university research laboratories in the physics and engineering aspects of magnetic confinement fusion. Its research programs have produced significant results on four fronts: (1) the basic physics of high-temperature plasmas (plasma theory, rf heating, free electron lasers, development of advanced diagnostics and small-scale experiments on the Versator tokamak and Constance mirror devices); (2) major confinement results on the Alcator C tokamak, including pioneering investigations of the stability, heating, and confinement properties of plasmas at high densities, temperatures and magnetic fields; (3) development of an innovative design for axisymmetric tandem mirrors with inboard thermal barriers, with initial operation of the TARA tandem mirror experiment beginning in 1984; and (4) a broad program of fusion technology and engineering development that addresses problems in several critical subsystem areas (e.g., magnet systems, superconducting materials development, environmental and safety studies, advanced millimeter wave source development, and system studies of fusion reactor design, operation, and technology requirements). A review of these programs is given. DOE

N86-21386# Supercon, Inc., Shrewsbury, Mass.
DEVELOPMENT OF HIGH FIELD SUPERCONDUCTORS FOR FUSION ENERGY APPLICATIONS Final Report
26 Sep. 1985 21 p
(Contract DE-AC01-80ER-52068)
(DE86-001509; DOE/ER-52068/T1) Avail: NTIS HC A02/MF A01

The purpose of this project was to develop a conductor design and a manufacturing procedure for a composite multifilamentary Nb3Sn conductor suitable for winding a magnet for use in a fusion energy power plant. Effort was concentrated on the design of a conductor with tubular niobium filaments in a copper matrix. Bronze in the bores of the filaments would react with the niobium to form Nb3Sn on the inside diameter of the niobium tubular filaments during a heat treatment at final size. Four filament geometries were evaluated. The addition of titanium to the bronze was found to increase the current density. The use of a hydrogen atmosphere did not appear to cause any increase in current density. Primary billets were assembled and extruded with five tubular filament designs and for comparison, five rod type filament designs. Billet designs are described. DOE

N86-21387# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
ELECTRIC PROBES IN PLASMAS
B. Lipschultz, I. Hutchinson, B. LaBombard, and A. Wan Aug. 1985 27 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC02-78ET-51013)
(DE86-001544; PFC/JA-85-29; CONF-851174-11) Avail: NTIS HC A03/MF A01

This paper provides a background for the use of Langmuir and gridded energy analyzer probes in diagnosing plasmas with varied characteristics. Theory is illustrated which governs the analysis of data from, and the design of these probes. Several probe analysis techniques and some of their typical problems are presented. DOE

N86-21388# Texas Univ., Austin. Inst. for Fusion Studies.
THREE DIMENSIONAL PARTICLE SIMULATION OF DRIFT WAVE FLUCTUATIONS IN A SHEARED MAGNETIC FIELD
R. D. Sydora, J. N. Leboeuf, D. R. Thayer, P. H. Diamond, and T. Tajima Aug. 1985 15 p
(Contract DE-FG05-80ET-53088)
(DE86-000236; DOE/ET-53088/201; IFSR-201) Avail: NTIS HC A02/MF A01

Three dimensional particle simulations of collisionless drift waves in sheared magnetic fields were performed in order to determine the nonlinear behavior of inverse electron resonance dynamics in the presence of thermal fluctuations. It is found that stochastic electron diffusion in the electron resonance overlap region can destabilize the drift wave eigenmodes. Numerical evaluations based on a nonlinear electron resonance broadening theory give predictions in accord with the frequency and growth rates found in the simulation of short wavelength modes (k sub y rho sub s greater than or equal to 1). DOE

N86-21389# Texas Univ., Austin. Inst. for Fusion Studies.
DIFFUSION INDUCED BY CYCLOTRON RESONANCE HEATING
S. Riyopoulos, T. Tajima, T. Hatori, and D. Pfirsch Sep. 1985 13 p

(Contract DE-FG05-80ET-53088)
(DE86-000858; DOE/ET-53088/184; IFSR-184-R) Avail: NTIS HC A02/MF A01

The wave induced particle transport during the ion cyclotron resonance heating is studied in collisionless toroidal plasmas. It is shown that the previously neglected non-conservation of the toroidal angular momentum IP sub phi caused by the toroidal wave component E sub phi is necessary to allow particle diffusion and yields the leading diffusive contribution. While the induced ion transport for the RF power in contemporary experiments is of the order of the neoclassical value, that of fast alpha particles is quite large if resonance is present. DOE

N86-21390# Brookhaven National Lab., Upton, N. Y.
COLD IRON COS THETA MAGNET OPTION FOR THE SSC
P. Reardon 1985 5 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-00016)
(DE86-001175; BNL-36935; CONF-850504-287) Avail: NTIS HC A02/MF A01

The evolution over the past several years of a cold iron, high field cos theta magnet design option for the Superconducting Supercollider (SSC) is reviewed. The collaborative approach pursued by Brookhaven National Laboratory (BNL) and Lawrence Berkeley Laboratory (LBL) on the 2-in-1 option and the culmination of this effort in the tests of the BNL 4.5 m model magnets are noted. Finally, the subsequent 1-in-1 option being pursued jointly by BNL, Fermilab and LBL is discussed. DOE

N86-21391# Columbia Univ., New York. Plasma Physics Lab.
TOMOGRAPHIC ANALYSIS OF THE EVOLUTION OF PLASMA CROSS-SECTIONS
A. Holland and G. A. Navratil Sep. 1985 54 p
(Contract DE-AC02-76ET-53016)
(DE86-001227; DOE/ET-53016/88) Avail: NTIS HC A04/MF A01

A diagnostic has been developed for measurements of the evolution of plasma density distributions in 2D using the principles of computed emission tomography. The system measures the near infrared emission along several chords through the plasma cross-section and the emission profile is then reconstructed using a maximum entropy based algorithm. This paper will present details of the reconstruction algorithm; the data collection system; the verification of the diagnostic using both physical and numerical phantom sources; evidence for the correlation between n(2) and the infrared emission intensity; initial measurements on a tokamak plasma. DOE

N86-21392# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.
STRONG AND ELECTROMAGNETIC INTERACTION IN PIONIC AND MUONIC ATOMS [STERKE EN ELECTROMAGNETISCHE WISSELWERKING IN PIONISCHE EN MUONISCHE ATOMEN]
C. T. A. M. deLaat Jan. 1983 39 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC A03/MF A01

Preliminary runs at a synchrocyclotron and a medium energy accelerator to test detectors, electronics, and software for measurements on muonic and pionic atoms are described. The purpose of the measurements is to describe the nuclear matter density dependence of that part of the optical pion-nuclear potential that describes pion absorption. Measurements of quadrupole moments of nuclei in a model independent way were carried out. The pion/muon telescope and germanium detector with NaI anti-Compton background were tested and analyzed with the developed sotfware. Time of flight spectra were collected to determine the beam composition in the muon extraction channel. Results show good functioning of the instruments. In the time of flight spectra the presence of pions, muons, and positons is clearly demonstrated. Author (ESA)

N86-21393# FOM-Inst. voor Plasmafysica, Rijnhuizen, Jutphaas (Netherlands).
HEATING OF PLASMAS IN TOKAMAKS BY CURRENT-DRIVEN TURBULENCE
H. deKluiver Oct. 1985 18 p refs Sponsored by Euratom and Nederlands Organisatie voor Zuiver-Wetenschappelijk Onderzoek (ZWO)
(Rept-85-159) Avail: NTIS HC A02/MF A01

Anomalous resistivity and turbulent heating of plasmas are reviewed. Current-driven turbulence is classified. Pulsed turbulent heating results and energy confinement in tokamak experiments are discussed. Investigations of current-driven turbulence show the potential to heat plasmas to elevated temperatures in relatively small cross-section devices. Although it is shown to be possible to relax the technical requirements on the necessary electric field and the pulse length to acceptable values, the effect of energy generation near the plasma edge, the energy transport, the impurity influx, and the variation of the current profile are unknown for large-radius tokamaks. Heating of plasmas by quasi-stationary weakly turbulent states caused by moderate increases of the resistivity due to higher loop voltages could be envisaged. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-21394 British Library Lending Div., Boston Spa (England).
PROPERTIES OF ION-PLATED TIN FILMS FROM WATCH CASE EXTERIORS
M. Kishi, A. Watanabe, and R. Shimoyama 7 Nov. 1985 13 p Transl. into ENGLISH from Kinzoku Hyomen Gijutsu, v. 35, no. 1, (Japan) 1984 p 50-55
(BLL-Risley-Tr-5110-(9091.9F)) Avail: British Library Lending Division, Boston Spa, Engl.

Ion plating was first proposed in 1963 in the USA and the good cohesion and coverage of the coating attracted much interest. More recently, widespread use has begun to be made of reactive ion-plating, in which the coating is formed while the evaporated material is reacted with an atmospheric gas. Of the various coatings that may be formed by reactive ion-plating, titanium nitride films are now beginning to be widely used for decorative components, chiefly watch case exteriors, on account of their fine gold color coupled with great hardness (Hv greater than 1500). Although, as an alternative to ion plating, titanium nitride coatings can be formed by chemical vapor deposition utilizing titanium halide, this method requires high temperatures (approx. 1000 C) and is unsuitable for decorative applications owing to the coarse grain of the film formed. On the other hand, a variety of ion-plating methods have been devised, examples being active reaction evaporation, the hollow cathode process, and the hot cathode process, and the formation of dense titanium nitride ion-plated films for decorative purposes is described. Author

N86-21395 Cornell Univ., Ithaca, N.Y.
GRAIN BOUNDARY STRUCTURAL TRANSFORMATIONS INDUCED BY SOLUTE SEGREGATION Ph.D. Thesis
Kurt Edward Sickafus 1985 245 p
Avail: Univ. Microfilms Order No. DA8516925

Observations are presented that demonstrate that solute segregation can have a dramatic effect on the structure of a grain boundary. It was determined that the segregation of Au solute to a low-angle, twist boundary in an Fe bicrystal produces a change in the dislocation structure of the boundary. A background to solute segregation effects and an introduction to the theoretical models of grain boundary structure and interfacial segregation are presented. The procedures for the preparation and analysis of the bicrystal specimens are outlined. The experimental results that demonstrate the consequence of solute segregation on boundary are given and the experimental results are discussed. Directions

for future research on interfacial segregation are suggested.
Dissert. Abstr.

N86-21396 Cornell Univ., Ithaca, N.Y.
GRAIN BOUNDARY SLIDING AND RELATED PHENOMENA Ph.D. Thesis
Roupen Leon Keusseyan 1985 250 p
Avail: Univ. Microfilms Order No. DA8516906

At elevated temperatures grain boundary sliding is an important deformation mechanism, leading to grain boundary anelasticity, plastic deformation and stress concentration at inhomogeneities such as grain boundary corners, steps and second phase particles. For grain boundary anelasticity and plastic deformation involving grain boundary sliding a unified state variable model has been proposed. A combination of constant displacement rate tests and load relaxation tests are used to determine the material parameters and flow equations required. A parameter Y, related to the stress concentration at inhomogeneities during grain boundary sliding, was found to be insensitive to the stress level applied and grain size. A non-linear flow equation for the grain boundary was found. The applicability of the model is shown by computer simulation of the experimental results.
Dissert. Abstr.

N86-21397 British Library Lending Div., Boston Spa (England).
ENERGY OF PARTICLE INTERACTIONS IN LIQUID MELTS CONTAINING DIFFERENT LATTICE-FORMING IONS
B. M. Lepinskikh, S. P. Kurlov, and O. I. Bukhtoyarov [1985] 8 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 6, 1985 p 5-8
(BLLD-M-36540-Trans-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

To analyze the influence of bonding energy, repulsion energy, and ionization potentials on the energy of atomization, an examination is made of features of the structure of the atoms that are the basis of formation of elementary structural anion groups in polymerized oxide systems. An analysis is made of variation in the energy situation in a system containing different lattice forming oxides during the formation of chains and rings containing a large number of elementary groups.
Author

N86-21398* Cryomagnetics, Inc., Oak Ridge, Tenn.
SUPERCONDUCTING MAGNET Final Report
[1985] 11 p
(Contract NAS5-28627)
(NASA-CR-177848; NAS 1.26:177848) Avail: NTIS HC A02 CSCL 20L

Extensive computer based engineering design effort resulted in optimization of a superconducting magnet design with an average bulk current density of approximately 12KA/cm(2). Twisted, stranded 0.0045 inch diameter NbTi superconductor in a copper matrix was selected. Winding the coil from this bundle facilitated uniform winding of the small diameter wire. Test coils were wound using a first lot of the wire. The actual packing density was measured from these. Interwinding voltage break down tests on the test coils indicated the need for adjustment of the wire insulation on the lot of wire subsequently ordered for construction of the delivered superconducting magnet. Using the actual packing densities from the test coils, a final magnet design, with the required enhancement and field profile, was generated. All mechanical and thermal design parameters were then also fixed. The superconducting magnet was then fabricated and tested. The first test was made with the magnet immersed in liquid helium at 4.2K. The second test was conducted at 2K in vacuum. In the latter test, the magnet was conduction cooled from the mounting flange end.
Author

N86-21399 Department of the Air Force, Washington, D.C.
CONDUCTOR STRUCTURE FOR THICK FILM ELECTRICAL DEVICE Patent
Michael D. Adamo, Cederick U. Darter, and Frederick Y. Cho, inventors (to Air Force) Issued 8 Oct. 1985 7 p Supersedes AD-D011240
(AD-D011961; US-Patent-4,546,283; US-Patent-Appl-SN-607094; US-Patent-Class-310-313R) Avail: US Patent and Trademark Office CSCL 20/12

A thick film device conductor arrangement suitable for making connections between a resiliently mounted element such as a surface acoustic delay line and adjacent thick film conductors and then with the device connecting pins. The thick film conductors include a double layer structure of differing noble metals each selected for desirable properties in designated areas of the device.
GRA

N86-21400 Department of the Air Force, Washington, D.C.
LPE (LIQUID PHASE EPITAXY) SEMICONDUCTOR MATERIAL TRANSFER METHOD Patent
Frank Z. Hawrylo, inventor (to Air Force) Issued 15 Oct. 1985 5 p Supersedes AD-D011250
(AD-D011963; US-Patent-4,547,230; US-Patent-Appl-SN-635393; US-Patent-Class-148-171) Avail: US Patent and Trademark Office CSCL 20/12

This is a patent for a method for liquid phase epitaxy maskless deposition of a III-V compound on a substrate in a predetermined pattern which includes the steps of contacting a growth wafer having a patterned mask there on to a growth solution in equilibrium and then increasing the temperature of the growth solution and wafer thereby locally melting the exposed portions of the wafer surface and locally changing the equilibrium properties of the growth solution. The substrate upon which the material is to be deposited is then contacted with the growth solution and the temperature lowered. Because of the locally varying equilibrium conditions the constituents of the growth solution will be preferentially deposited on those portions of the portions of the substrate corresponding to the unmasked portions of the growth wafer.
GRA

N86-21401*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD OF PRODUCING HIGH T SUPERCONDUCTING NbN FILMS Patent Application
Sarita Thakoor (JPL, Pasadena, Calif.), James L. Lamb (JPL, Pasadena, Calif.), Anilkumar P. Thakoor (JPL, Pasadena, Calif.), and Satish K. Khanna, inventors (to NASA) (JPL, Pasadena, Calif.) Filed 12 Aug. 1985 26 p
(Contract NAS7-918)
(NASA-Case-NPO-16681-1-CU; NAS 1.71:NPO-16681-1-CU; US-Patent-Appl-SN-764812) Avail: NTIS HC A03/MF A01 CSCL 20L

Thin films of niobium nitride with high superconducting temperature (T sub c) of 15.7 K are deposited on substrates held at room temperature (approx. 90 C) by heat sink throughout the sputtering process. Films deposited at P sub Ar > 12.9 + or - 0.2 mTorr exhibit higher T sub c with increasing P sub N2, I' with the highest T sub c achieved at P sub n2, I = 3.7 + or - 0.2 mTorr and total sputtering pressure P sub tot = 16.6 + or - 0.4. Further increase of N2 injection starts decreasing T sub c.
NASA

N86-21402*# Stanford Univ., Calif. Dept. of Applied Physics.
GROWTH AND EVALUATION OF AgGaS2 AND AgGaSe2 FOR INFRARED NONLINEAR APPLICATIONS Final Technical Report, 1 Feb. 1982 - 31 Dec. 1985
Robert L. Byer and Robert S. Feigelson Feb. 1986 30 p refs Sponsored in cooperation with NSF, ARO, SRI International, and Quanta-Ray, Inc.
(Grant NAG5-220)
(NASA-CR-176597; NAS 1.26:176597; SU-GL-3994) Avail: NTIS HC A03/MF A01 CSCL 20L

Significant advances were made in the growth technology of silver thiogallate (AgGaS2) and silver selenogallate (AgGaSe2). High efficiency harmonic generation of carbon dioxide laser radiation and tunable infrared parametric oscillation were demonstrated using these materials. Nonlinear frequency conversion in the infrared was limited by the optical properties and the size of the available nonlinear materials. The development of these materials has reduced some of the limitations and generated wide interest. The continued development and application of AgGaS2 and AgGaSe2 now appears assured.
Author

N86-21403# Cornell Univ., Ithaca, N.Y.
THE STRUCTURE OF DEFECTS IN GaAs AND RELATED MATERIALS Final Report, 1 Jul. 1982 - 30 Jun. 1985
C. B. Carter 24 Aug. 1985 14 p
(Contract DAAG29-82-K-0148)
(AD-A161272; ARO-18729.6-MS) Avail: NTIS HC A02/MF A01 CSCL 20/12

A new approach for characterizing super-lattice structures has been developed which uses REM to examine the layer quality rather then conventional TEM. The technique developed by Alexander to deform Si at low temperatures has been applied for the first time to GaAs. The results are complimentary to those of Maeda and Takeuchi, but are of a much higher spatial resolution. This technique has been extended to the technologically important case of the superlattice by actually deforming a series of superlattice structures at these same low (150 C) temperatures. Finally a new approach has been developed for growing bicrystals of GaAs using a Ge bicrystal as a substrate. GRA

N86-21404# Westinghouse Research and Development Center, Pittsburgh, Pa.
PLASMA DEPOSITION OF SILICON CARBIDE THIN FILMS Annual Technical Report, 1 Jul. 1984 - 30 Jun. 1985
W. D. Partlow, W. J. Choyke, John T. Yates, Jr., L. E. Kline, and M. J. Bozack 30 Jul. 1985 20 p
(Contract F49620-84-C-0063)
(AD-A161275; AFOSR-85-0969TR; ATR-1) Avail: NTIS HC A02/MF A01 CSCL 20/12

During this reporting period we completed the adaptation of experimental equipment required for three related areas of the research program: understanding plasma deposition chemistry and physics, characterization of plasma deposited thin films, and surface chemistry of elemental deposition processes. In the plasma studies area, extensive experiments were conducted on methane plasmas, and experiments were begun on methane-silane plasmas. We achieved significant anisotropy in the deposition chemistry by controlling electrode bias and the data are being compared to a theoretical model produced in a collaborative effort by L.E. Kline at Westinghouse R&D Center. We have selected characterization techniques for the thin films produced with these plasmas, and measurements have begun. The UHV apparatus for surface chemistry was acquired, assembled, and tested, and initial measurements of the desorption of organic gases were completed. GRA

N86-21405# Lawrence Livermore National Lab., Calif.
TIBER WINDING PACK DESIGN
J. R. Miller 19 Aug. 1985 26 p
(Contract W-7405-eng-48)
(DE85-017879; UCID-20510) Avail: NTIS HC A03/MF A01

A preliminary winding pack design was performed with the goal of showing feasibility of producing 10-T maximum field with a pack current density of 40 sq mm while accepting 2.7 kW per coil nuclear heating. A cable-in-conduit conductor design (CIC), reported at the 6th Topical Meeting on the Technology of Fusion Energy, was based on several key issues. DOE

N86-21406# Oregon Univ., Eugene. Dept. of Physics.
INVESTIGATIONS OF THE ORIGINS OF METASTABLE LIGHT-INDUCED CHANGES IN HYDROGENATED AMORPHOUS SILICON
J. D. Cohen Aug. 1985 43 p
(Contract DE-AC02-83CH-10093)
(DE85-016855; SERI/STR-212-2754) Avail: NTIS HC A03/MF A01

The effects of light saturation on the properties of undoped a-Si:H films were studied by a new capacitance profiling technique that can be used to determine changes directly in the dangling bond density of states near mid-gap. The advantages of this technique are that it is insensitive to changes in near interface and surface states in the a-Si:H samples, that it gives the spatial variation of sample properties, and that it is much more easily interpreted than other profiling techniques. Electron spin resonance spectroscopy was used to seek increases in the number of dangling bond spins, but with negative results. This was determined to be caused by the low defect densities in these samples. The studies revealed two important aspects of the Staebler-Wronski effect in these samples: (1) Results for some films indicated that changes in the dangling bond density could not account for the Fermi level shifts observed: in at least one film, this was the dominant mechanism. (2) Two of the a-Si:H films appeared to be much more stable against light-induced effects than the others. DOE

N86-21407# Los Alamos National Lab., N. Mex.
APPLICATION OF IMPEDANCE SPECTROSCOPY TO PROBLEMS IN SOLID STATE IONICS
I. D. Raistrick 1985 11 p Presented at the 5th International Conference on Solid-State Ionics, Lake Tahoe, Calif., 18 Aug. 1985
(Contract W-7405-eng-36)
(DE85-017544; LA-UR-85-2960; CONF-850870-2) Avail: NTIS HC A02/MF A01

Some applications of impedance spectroscopy to solid state ionics are reviewed. Particular emphasis is given to the effect of statistical distributions of bulk properties on the observed impedance, and to sources of anomalous frequency dispersion in bulk and interfacial response. DOE

N86-21408# Lawrence Livermore National Lab., Calif.
TERNARY FLUORIDES OF GALLIUM AND STRONTIUM
P. Julien and J. Chassaing 30 Jul. 1985 5 p refs Translation of C.R. Acad. Sc. Paris, Volume 271 (15 July 1970)
(Contract W-7405-eng-48)
(DE85-017109; UCRL-Trans-12071) Avail: NTIS HC A02/MF A01

The liquid-solid equilibrium diagram for the GaF3-SrF2 system indicates two tetragonal, iso-type compounds: SrGaF5: a = 14.32 A, c = 7.28 A, with 16 molecules per unit cell, with congruent melting, F 812(0)C, and Sr5Ga3F19: a = 14.22 A, c = 7.27 A with 4 molecules per unit cell. SrCaF5 forms a continuous solid solution with PbGaF5, the same as Sr5Ga3G19 with Pb3(GaF6)2. DOE

N86-21409# Argonne National Lab., Ill.
EXOTIC ORGANIC SUPERCONDUCTORS BASED ON BEDT-TTF AND THE PROSPECTS OF RAISING T/SUB C/'S
J. M. Williams, M. A. Beno, H. H. Wang, U. W. Geiser, T. J. Emge, P. C.W. Leung, G. W. Crabtree, K. D. Carlson, L. J. Azevedo, and E. L. Venturini 1985 17 p refs Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex. and North Carolina State Univ., Raleigh
(Contract W-31-109-eng-38)
(DE85-018407; CONF-850871-13) Avail: NTIS HC A02/MF A01

Ambient-pressure superconductivity has now been discovered in five systems based on BEDT-TTF:X, X(-) = polyatomic monovalent-anion. The highest T/sub c/ reported is 5 K, in (BEDT-TTF) 2AuI2, and it appears that much higher T/sub c/'s are possible if disorder (molecular and anionic), and structural modulation, can be avoided in new derivatives containing monovalent triatomic anions. DOE

N86-21410# Argonne National Lab., Ill.
MEDIUM VOLTAGE ANALYTICAL ELECTRON MICROSCOPY MICROANALYSIS VERSUS RADIATION DAMAGE
N. J. Zaluzec, J. F. Mansfield, P. R. Okamoto, and N. Q. Lam Sep. 1985 5 p Presented at the Electron Microscopy and Analysis Group Conference, Newcastle-Upon-Tyne, England, 2 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018463; CONF-8509168-1) Avail: NTIS HC A02/MF A01

The kinetic energy transferred to some elements by an electron of kinetic energy 100 to 400 kV is discussed. The displacement rates are compared to the signal generation. DOE

N86-21411# Brookhaven National Lab., Upton, N. Y.
CRITICAL CURRENT STUDIES ON FINE FILAMENTARY NbTi

ACCELERATOR WIRES

M. Garber, M. Suenaga, W. B. Sampson, and R. L. Sabatini 1985 8 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985

(Contract DE-AC02-76CH-00016)

(DE86-000032; BNL-37019; CONF-850814-22) Avail: NTIS HC A02/MF A01

The magnets for the Superconductig Super Collider, a high energy proton colliding beam accelerator, require a superconductor with very high current density (> 2400 A/mm(2) at 5 T) and very small filaments (approx. 2(MU)m in diameter). Previous work has shown that by controlling the formation of Cu4Ti compound particles on the filament surfaces, it is possible to make fine filamentary NbTi wire with high critical current density. The performance of multi-filamentary wire is characterized by the current density and the quantity n which describes the superconducting-normal transition. Micrographs of wires having high J sub c and high n show smooth, uniform filaments. Recently wires of very high critical current and high n have been produced in experimental quantities by commercial manufactures. DOE

N86-21412# California Univ., Berkeley. Lawrence Berkeley Lab.

CAPACITOR ENERGY NEEDED TO INDUCE TRANSITIONS FROM THE SUPERCONDUCTING TO THE NORMAL STATE

P. H. Eberhard and R. R. Ross Aug. 1985 28 p Presented at the 9th International Conference on Magnet Technology, Zurich, Switzerland, 9 Sep. 1985

(Contract DE-AC03-76SF-00098)

(DE86-000604; LBL-20054; CONF-850920-3) Avail: NTIS HC A03/MF A01

A technique is described to turn a long length of superconducting wire normal by dumping a charged capacitor into it and justify some formulae needed in the design. The physical phenomenon is described. A formula for the energy to be stored in the capacitor is given. There are circumstances where the dc in an electrical circuit containing superconducting elements has to be turned off quickly and where the most convenient way to switch the current off is to turn a large portion or all of the superconducting wire normal. Such was the case of the Time Projection Chamber (TPC) superconducting magnet as soon as a quench was detected. The technique used was the discharge of a capacitor into the coil center tap. It turned the magnet winding normal in ten milliseconds or so and provided an adequate quench protection. The technique of discharging a capacitor into a superconducting wire should have many other applications whenever a substantial resistance in a superconducting circuit has to be generated in that kind of time scale. DOE

N86-21413# Brookhaven National Lab., Upton, N. Y.

MAGNETIZATION AND CRITICAL CURRENTS OF NbTi WIRES WITH FINE FILAMENTS

A. K. Ghosh and W. B. Sampson 1985 8 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985

(Contract DE-AC02-76CH-00016)

(DE86-001195; BNL-37044; CONF-850814-28) Avail: NTIS HC A02/MF A01

In high energy accelerators such as the Superconducting Supercollider (SSC), the magnetization of the superconductor is an important component in determining the harmonic fields at injection (approx.0.3T). In an effort to reduce these residual fields, interest has focused on NbTi conductors with fine filaments which are expected to have a reduced magnetization as dictated by the critical state model. With this in view, the magnetization and critical currents were measured at 4.3K for a set of NbTi wires with filament diameters, d, ranging from 1.0 to 5.0 microns. The data show that, although the magnetization scales linearly with d, it does not do so with the product J sub c d for d less than 3 mu m. However, at these d values, the critical transport current density, J sub c of NbTi was observed to decrease rapidly as a function of d. The origin of this J sub c degradation and its effect on the scaling of magnetization within the framework of the critical state model is explored. We also examine the question of the observed asymmetry of the hysteretic magnetization. DOE

N86-21414# Brookhaven National Lab., Upton, N. Y.

SYMMETRY, STABILITY, AND DIFFRACTION PROPERTIES OF ICOSAHEDRAL CRYSTALS

P. Bak 1985 12 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985

(Contract DE-AC02-76CH-00016)

(DE86-001196; BNL-37043; CONF-850871-19) Avail: NTIS HC A02/MF A01

In a remarkable experiment on an Mn-Al alloy, Shechtman, et al., observed a diffraction spectrum with icosahedral symmetry. This is inconsistent with discrete translational invariance since the symmetry includes a five-fold axis. In this paper, it is shown that the crystallography and diffraction pattern can be described by a six-dimensional space group. The crystal structure in 3d is obtained as a cut along a 3d hyperplane in a regular 6d crystal. Displacements of the 6d crystal along 6 orthogonal directions define 6 continuous symmetries for the icosahedral crystal, three of which are phase symmetries describing internal rearrangements of the atoms. DOE

N86-21415# Technische Hogeschool, Delft (Netherlands). Lab. voor Technische Natuurkunde.

TEST OF A BaF2 SCINTILLATION CRYSTAL [TEST VAN EEN BAF2 SCINTILLATIEKRISTAL]

J. M. Schippers and J. deVries Apr. 1983 15 p ref In DUTCH (Stratech-83-2) Avail: NTIS HC A02/MF A01

Gamma energy response and temporal resolution of a BaF2 crystal were compared with those of a Pilot-U plastic. Using a photomultiplier, the possibility to use the fast ultraviolet component of the gamma ray excited emission spectrum for positron lifetime measurements was investigated. For the gamma energy response, the BaF2 crystal (height 2.5 cm, diameter 2.5 cm) was coupled to the multiplier with and without an optical coupling compound. In an existing spectrometer, temporal resolution of Pilot-U detectors with 0.5 and 2.5 cm thickness and the BaF2 crystal was measured. As positron emitters, NA22, Co60, Cs137, Am241, Co57, and Bi2O7 were used. To obtain a temporal resolution comparable to the 0.5 Pilot-U plastic, a 1 mm thick crystal should be used. An improvement is obtained by omitting the (ultraviolet absorbing) coupling compound. For tomographic time of flight purposes, the use of positron emitters with a maximum gamma energy of 300 keV is recommended. Author (ESA)

N86-21416# Groningen Rijksuniversiteit (Netherlands). Solid State Physics Lab.

ELECTRICAL RESISTIVITY AND THERMOPOWER OF LIQUID ALKALI-ALKALI AND Li-Mg ALLOYS

J. Hennephof, P. D. Feitsma, C. vanderMarel, W. vanderLugt, A. B. vanOosten, comp., and W. vanderLugt, comp. 3 Dec. 1985 15 p

Avail: NTIS HC A02/MF A01

Resistivity (r) and thermopower (S) measurements on liquid alkali-based alloys are given as a function of concentration and temperature. Tables of r are given for the systems Li-Na, Li-Mg, Na-K, Na-Rb, Na-Cs, K-Rb, K-Cs, Rb-Cs. A table of S is given for Na-Cs. The experimental error in r does not exceed 1% except for the case of pure liquid Cs, where the values differ by 3,5%. The error in the S-values does not exceed 0.2 mV/deg K. Author (ESA)

N86-21417# Groningen Rijksuniversiteit (Netherlands). Solid States Lab.

ELECTRICAL RESISTIVITY OF SOME COMPOUND FORMING LIQUID METAL ALLOYS (Li-Pb, Na-Pb, K-Pb, Rb-Pb, Cs-Pb, Li-Sn, Na-Sn, Na-In, K-In)

C. vanderMarel, A. B. vanOosten, J. A. Meijer, G. J. B. Vinke, and W. vanderLugt 3 Dec. 1985 25 p refs

Avail: NTIS HC A02/MF A01

Electrical resistivity data for the alloy systems Li-Pb, Na-Pb, K-Pb, Rb-Pb, Cs-Pb, Li-Sn, Na-Sn, Na-In and K-In are shown in

graphs and tables. The relative error in the resistivity (r) is roughly proportional to r. For resistivities up to 1000 micro-ohm cm it does not exceed 1%. In the Rb-Pb and Cs-Pb systems, an error of 2.5% must be reckoned with in the region around the resistivity maximum. Author (ESA)

N86-21418# Netherlands Energy Research Foundation, Petten.
PHASE TRANSITIONS IN THE MIXED QUADRATIC-LAYER ANTIFERROMAGNETS WITH COMPETING ANISOTROPIES K2Co(x)Fe(1-x)F4 Thesis - Utrecht Univ.
W. A. H. M. Vlak Sep. 1985 114 p refs
(ECN-169; B8573795) Avail: NTIS HC A06/MF A01

The magnetic phases of the randomly mixed two-dimensional antiferromagnet K2 Co(x)Fe(1-x)F4 were explored. Ordered phases similar to those in K2FeF4 and K2CoF4 are detected for low and high x, respectively. By virtue of the competition between the orthogonal anisotropies of the Fe(2+) and Co(2+) ions, a third ordered oblique phase is found for 0.20 < or = x < or = 0.32, in which all moments are oriented in between the preferential axes of Fe(2+) and Co2+. The critical behavior, sublattice magnetization and magnetization of individual ions, and magnetic excitations, for compositions and temperatures covering all relevant parts of the phase diagram were studied. The magnetic structure of a system which enters the oblique phase was investigated in an external magnetic field. Strong nonequilibrium behavior related to random-field effects is observed. Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

No abstracts in this category.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-21419*# American Productivity Center, Houston, Tex.
WHITE COLLAR PRODUCTIVITY IMPROVEMENT: SPONSORED ACTION RESEARCH 1983 - 1985
1985 41 p Presented at the National Conference on White Collar Productivity Improvement, Dallas, 30-31 Oct. 1985; sponsored by Dun and Bradstreet Corp., General Dynamics Corp., McDonnell Douglas Corp., Northern Telecom Ltd., Westinghouse Furniture Systems, and the US Dept. of Labor Sponsored in part by Armco., Inc., Atlantic Richfield Co., Johnson and JohnsonMotorola, Inc., Ortho Pharmaceutical Corp., Rockwell International Corp., TRW, Inc., and Warner-Lambert Co.
(Contract NASw-3834)
(NASA-CR-176366; NAS 1.26:176366) Avail: NTIS HC A03/MF A01 CSCL 05A

A program developed by the American Productivity Center to boost white collar worker effectiveness is described. This program is the culmination of a two-year sponsored action research project, White Collar Productivity Improvement. Traditional attempts aimed at cutting costs or staffing levels, often alienating workers at the outset. They typically focused on increased efficiencies in individual activities or specific procedures, such as paperwork processing. In contrast, the Center's approach to white collar productivity focuses on the effectiveness of actual outputs, typically professional services. These typically consist of both tangible products, such as a financial report or research study, and intangibles, such as the expertise, advice or guidance that accompanies the product. Eight general observations about white collar productivity improvement are summarized. B.W.

N86-21420*# National Aeronautics and Space Administration, Washington, D.C.
NASA: 1986 LONG-RANGE PROGRAM PLAN
Aug. 1985 269 p
(NASA-TM-87560; NAS 1.15:87560) Avail: NTIS HC A12/MF A01 CSCL 05A

For the years beyond FY 1986, the plan consists of activities that are technologically possible and considered to be in the national interest. Its implementation will ensure logical and continued progress in reaching the Nation's goals in aeronautics and space, consistent with the responsibilities assigned NASA by the National Aeronautics and Space Act of 1958, as amended. The major features of the programs are described in detail and the nature of the aeronautics and space programs beyond the year 2000 are projected. The abbreviations and acronyms that appear in this report are listed. The status of NASA's plans are summarized at the time of its preparation. Author

N86-21421# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
PARTICIPATIVE DECISION MAKING AND QUALITY CIRCLES: A LOOK AT THEIR RELATIONSHIP IN THREE US GOVERNMENT ORGANIZATIONS M.S. Thesis
James B. Minchello Sep. 1985 85 p
(AD-A161360; AFIT/GLM/LSB/85S-52) Avail: NTIS HC A05/MF A01 CSCL 05/1

The use of Quality Circles (QCs) as an organizational development intervention, has gained increasing popularity over the past few years in the federal sector. Much of the recent attention concerning QCs has been centered around understanding the organizational and attitudinal variables inherent in the QC process. It is theorized that by understanding these variables, researchers are better able to evaluate the effectiveness of QC interventions. This thesis effort sets out to determine the relationship between one particular attitudinal variable, Paticipative Decision Making (PDM) and the intervention of QCs. QC programs in organizations within the federal sector were studied utilizing a nonequivalent control group design. Statistical tests used to facilitate evaluation of the data included the independent mean and paired difference t-tests and Cronbach's Alpha Reliability Coefficient technique. The evaluation of the data produced mixed results dealing with the relationship between PDM and QCs. A better understanding of the QC process and its effects on organizational and attitudinal variables is needed and evidenced by the shortage of research in these areas. By understanding the QC intervention, researchers will be better able to assess its effectiveness. GRA

N86-21422# Assistant Secretary of Defense (Installations and Logistics), Washington, D.C.
TRANSITION FROM DEVELOPMENT TO PRODUCTION
Sep. 1985 169 p
(AD-A161804; AD-E440305) Avail: NTIS HC A08/MF A01 CSCL 15/5

This manual provides assistance in structuring technically sound programs, assessing their risk, and identifying areas needing corrective action. It applies to the Office of the Secretary of Defense (OSD), the Military Departments, the Organization of the Joint Chiefs of Staff, and the Defense Agencies. The major thrust of the DSB report is directed toward the identification and establishment of critical engineering processes and their control methods.

This will lead to a more organized accomplishment of these activities and will place more significance and accountability on them. Selected areas of this document stress the electrical and electronics field is playing in improving system effectiveness and productivity. GRA

N86-21423# Puerto Rico Univ., San Juan.
DEVELOPMENT PLAN: CENTER FOR ENERGY AND ENVIRONMENT RESEARCH, UNIVERSITY OF PUERTO RICO
May 1985 48 p
(DE86-000061; CEER-X-208) Avail: NTIS HC A03/MF A01

This document delineates the development plan for the Center for Energy and Environment Research (CEER) within the framework of the 1983 UPR Master Plan. The development plan, using the CEER mission as its point of departure, provides for the allocation of available human, technical and financial resources needed to achieve its mission and sets programmatic goals and priorities on short, intermediate and long terms. It also considers the overall and general budgetary requirements and identifies major funding sources. Since UPR funding support and the potential for competitive fund raising is limited, the plan stresses a program of high quality research within the context of service to Puerto Rico for problem oriented energy and environment research and development activities and leadership for education and technology transfer in the Caribbean Basin. DOE

N86-21424# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
NETHERLANDS AND SPACE FLIGHT. ELUCIDATION PRESENTED AT THE SPACE FLIGHT AND INNOVATION INFORMATION DAY [NEDERLAND EN DE RUIMTEVAART. TOELICHTING GEGEVEN OP DE INFORMATIEDAG RUIMTEVAART EN INNOVATIE IN HET MICROCENTRUM TE EINDHOVEN OP 30 NOVEMBER 1983]
H. Wittenberg Dec. 1983 7 p In DUTCH Conference held at Eindhoven, Netherlands, 30 Nov. 1983
(VTH-M-494) Avail: NTIS HC A02/MF A01

The relatively small participation of the Netherlands in space flight developments is criticized. With regard to industrial innovation, the importance of increased participation in bi or trilateral international cooperation projects is emphasized. It is concluded that space flight activities stimulate technology transfer and the interelated industrial development. Author (ESA)

N86-21425# Netherlands Energy Research Foundation, Petten.
PHASED MISSION ANALYSIS OF MAINTAINED SYSTEMS. A STUDY IN RELIABILITY AND RISK ANALYSIS
K. Terpstra Sep. 1984 351 p refs
(ECN-158; B8478686) Avail: NTIS HC A16/MF A01

A methodology that analyzes phased missions and all branches of an event tree and can take into account repair of the system during its mission and the effects of component models with general distributed lifetimes and repair times was developed. The introduction of the concept of period of a component makes it possible to separate the analysis of the system behavior from that of the component behavior. As a result the calculation of the probability of mission success is very simple. However, calculation of component unavailability becomes intricate, particularly if no negative exponentially distributed lifetimes and repair times are applied. Author (ESA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-21426 Library of Congress, Washington, D. C.
THE INTERNATIONAL OF SCIENTIFIC AND TECHNICAL INFORMATION. A SUMMARY OF THE 2ND ANNUAL FORUM ON FEDERAL INFORMATION POLICIES
Barbara J. Meredith 1985 28 p Forum held at Washington, D.C., 27 Feb. 1985
Avail: NTIS HC A03/MF A01

Information is part of a generic list of materials whose internal flow the military urges the US to control. The Department of defense's policy is described. The trends causing tightening of scientific communications are examined. The effects of copyright laws on international flow of information are discussed. B.G.

N86-21427*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESEARCH AND TECHNOLOGY, LEWIS RESEARCH CENTER Annual Report, 1985
1985 57 p
(NASA-TM-87179; NAS 1.15:87179) Avail: NTIS HC A04/MF A01 CSCL 05B

The NASA Lewis Research Center's research and technology accomplishments for fiscal year 1985 are summarized. The report is organized into five major sections covering aeronautics, aerospace technology, spaceflight systems, space station systems, and computational technology support. This organization of the report roughly parallels the organization of the Center into directorates. Where appropriate, subheadings are used to identify special topics under the major headings. Results of all research and technology work performed during the fiscal year are contained in Lewis-published technical reports and presentations prepared either by Lewis scientists and engineers or by contractor personnel. In addition, significant results are presented by university faculty or graduate students in technical sessions and in journals of the technical societies. For the reader who desires more information about a particular subject, the Lewis contact will provide that information or references. In 1985, five Lewis products were selected by Research and Development Magazine for IR-100 awards. All are described and identified. In addition, the Lewis Distinguished Paper for 1984 to 1985, which was selected by the Chief Scientist and a research advisory board, is included and so identified. Author

N86-21428*# Research and Data Systems, Inc., Lanham, Md.
USER'S GUIDE AND TAPE SPECIFICATION FOR ERB 7 DELMAT
Philip Ardanuy and Lanning Penn Mar. 1985 46 p refs
(Contract NAS5-27728)
(NASA-CR-175299; NAS 1.26:175299) Avail: NTIS HC A03/MF A01 CSCL 05B

Guidance is provided to the DELMAT user in the areas of purpose, use and limitations of DELMAT tapes and software. The DELMAT tape specifications is also provided. The ERB-7, ERB MAT and tape characteristics applicable to the DELMAT tapes are also summarized. Author

N86-21429# Defense Technical Information Center, Alexandria, Va.
AN ANALYSIS OF PROPOSED ALTERNATIVES TO THE DEFENSE TECHNICAL INFORMATION CENTER'S ANNOUNCEMENT PRODUCTS AND SERVICES Final Report
B. Lesser, M. Hanna, and R. Evans Oct. 1985 69 p
(AD-A160365; DTIC/TR-85/13) Avail: NTIS HC A04/MF A01 CSCL 05/2

Currently, the Defense Technical Information Center (DTIC) offers it users information about new reports entered into the DTIC database through: the Defense RDT&E Online System (DROLS), the Current Awareness Bibliography (CAB) service and the Technical Abstract Bulletin (TAB). However, the decrease in the number of TAB subscribers, the decreasing usefulness of TAB and its unavailability to many DTIC users are matters of grave concern and force DTIC to look at possible replacements for TAB. In the future, when the vast majority of DTIC users have their own terminals, the need for paper-based announcement products may be eliminated. However, until that time, DTIC must continue to produce print products. Therefore, the authors recommend that

the following actions be taken: (1) DTIC should discontinue the publication of TAB; and (2) DTIC should publish and unclassified, limited, monthly, comprehensive acquisitions list with indexes. The citations in the list would not contain abstracts or subject terms. A subject list would not be offered. Author (GRA)

N86-21430# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AGARD BULLETIN TECHNICAL PROGRAMME 1986
Aug. 1985 41 p
(AD-A161553; AGARD-BUL-85/2) Avail: NTIS HC A03/MF A01 CSCL 05/1

This Bulletin presents the 1986 program approved by the AGARD National Delegates Board. Section 1 includes a chronological listing of the meetings tentatively scheduled to take place during 1986 and Section 2 gives a detailed description of the individual Panel Program, the Consultant and Exchange Program, and the Military Committee Studies Program. The total budget required to support the Proposed 1986 AGARD Technical Program is presented in Section 3. The Publication Summary in Section 4 identifies by activity the AGARD publications scheduled for publication in 1986. GRA

N86-21431# Defense Technical Information Center, Alexandria, Va.
THE INTEGRATED BIBLIOGRAPHIC INFORMATION SYSTEM: RESOURCE SHARING TAILORED FOR LOCAL NEEDS Final Report
Gladys A. Cotter and Richard W. Hartt Nov. 1985 11 p Presented at the International Online Meeting, London, England
(AD-A161700; DTIC/TR-85/17) Avail: NTIS HC A02/MF A01 CSCL 05/2

The Defense Technical Information Center (DTIC) is charged with providing information services to the scientific and technical community of the Department of Defense (DOD). These service range from collecting and disseminating bibliographic information to sponsoring and directing research into innovative information handling technologies. Through this research, DTIC actively seeks ways to promote resource sharing as a means for speeding access to information while reducing the costs of information processing throughout the Defense technical library community. As part of this research, DTIC is sponsoring the development of an Integrated Bibliographic Information System (IBIS). The prototype of this system has been under development since April 1983. It will be used to demonstrate and evaluate the advantages of combining an integrated library system with an intelligent gateway capable of querying and updatng -- simultaneously -- heterogeneous bibliographic databases. Queries and updates of databases will be performed using a common command language, relieving the system user of the need to master separate languages and procedures for each database accessed. Users will be able to download and post-process data from external sources. This capability will allow libraries to tailor search results, derived from external sources and a local catalog, to their patron's needs and deliver a single product in an economical and efficient manner. GRA

N86-21432# Defense Technical Information Center, Alexandria, Va.
THE DOD GATEWAY INFORMATION SYSTEM Final Report
Gladys A. Cotter Oct. 1985 10 p Presented at the IEEE Conference, Williamsburg, Va.
(AD-A161701; DTIC/TR-85/16) Avail: NTIS HC A02/MF A01 CSCL 05/2

The Defense Technical Information Center (DTIC) is sponsoring development of a DOD Gateway Information System (DGIS) to provide online, streamlined methods for identifying, accessing, searching and analyzing data from heterogenous databases of interest to the DOD community. Present-day access to information resources (data-bases) is limited since each database has its own complex access procedure and command language. In addition, results from multiple databases cannot be combined or analyzed easily by the user. The Gateway will provide DOD researchers and managers access to many different databases using a single, simple access procedure. Queries of databases will be performed using a common command language, relieving the system user of the need to learn and master separate languages and procedures for each database accessed. A prototype system is under development at the Lawrence Livermore National Laboratory. The characteristics required in the DGIS and the development approach for designing a prototype system are described. GRA

N86-21433# Instituut TNO voor Wiskunde, Informatieverwerking en Statistiek, The Hague (Netherlands).
NONGRAMMATICAL LANGUAGE PROCESSING
J. Chudacek Apr. 1984 17 p refs Submitted for publication
(IWIS-A-84-AU-26) Avail: NTIS HC A02/MF A01

An approach to natural language processing based on nongrammatical entities is discussed. The Principle of Least Effort and properties of n-grams (overlapping character-strings of length n) are considered. Systems for retrieval in free natural languages are described. The systems behave tolerantly towards the inexactness of natural languages and the people using them. They are suitable for integrating with other systems. Author (ESA)

N86-21434# National Technical Information Service, Springfield, Va.
INFORMATION FOR THE DEVELOPING WORLD: NTIS'S (NATIONAL TECHNICAL INFORMATION SERVICES'S) ROLE IN INFORMATION TRANSFER TO DEVELOPING COUNTRIES
J. F. Caponio 1985 17 p Presented at the International Federation of Library Association Conference, Chicago, Ill., 1985
(PB85-243269) Avail: NTIS HC A02/MF A01 CSCL 05B

There is a great need for technical information in developing countries. Technical information is broadly defined to include all knowledge relating to how any specific economic activity is carried out. The techniques used by the National Technical Information Service (NTIS) of the U.S. Department of Commerce in helping both individuals and institutions (ranging from small shopkeepers to technical institutes) in developing countries to solve their technical information needs by providing access to NTIS's vast collection of reports and documents are described. The need for technical information in developing countries are outlined, then the techniques and mechanisms being used in the transfer of technical information described and finally, the findings of a recent study illustrating how data from NTIS documents is being applied to address a wide range of technical problems in developing countries are described. The competent local implementing institutions, are vital links the chain of international information dissemination. GRA

N86-21435# National Bureau of Standards, Washington, D.C. Information Resources and Services Div.
PUBLICATIONS OF THE NATIONAL BUREAU OF STANDARDS, 1984 CATALOG Report, Jan. - Dec. 1984
R. J. Morehouse Jun. 1985 441 p
(PB85-245678; NBS/SP-305-SUPPL-16) Avail: NTIS HC A19/MF A01; SOD HC $16.00 as 003-003-02667-1 CSCL 05B

The 16th Supplement to Special Publication 305 lists the 1984 papers which reflect the results of National Bureau of Standards (NBS) programs. Also included are those NBS papers published prior top 1984 but not reported in previous supplements of SP305. In addition to bibliographic data, key words, and abstracts for each publication and/or paper, the catalog provides author, key word, title, and NTIS order/report number indexes. GRA

N86-21436# National Library of Medicine, Bethesda, Md.
MEDICAL SUBJECT HEADINGS, TREE STRUCTURES, 1986
Jul. 1985 466 p
(PB85-232635; NLM/MED-85/03) Avail: NTIS HC A20/MF A01 CSCL 05B

All Medical Subject Headings currently in use by the National Library of Medicine's indexers, catalogers, and searchers are arranged in a hierarchical manner showing relationships between

broader and narrower terms. Included are minor and geographic descriptors. GRA

N86-21437# National Library of Medicine, Bethesda, Md.
PERMUTED MEDICAL SUBJECT HEADINGS, 1986
Jul. 1985 596 p
(PB85-232643; NLM/MED-85/04) Avail: NTIS HC A25/MF A01 CSCL 05B

Permuted Medical Subject Headings, 1986, is a computer generated display of all terms, i.e., descriptors and cross references, in the alphabetic list of the National Library of Medicine's Medical Subject Headings (MeSH) for 1986, as well as all citation type, check tag, and geographic descriptors in the Annotated Alphabetic MeSH, 1986. The Permuted MeSH takes each significant word that appears in each MeSH term and then lists all the MeSH terms in which that word appears. GRA

N86-21438# Online Computer Systems, Inc., Germantown, Md.
INTEGRATED LIBRARY SYSTEM USER MANUAL FOR FINES AND BILLING SUBSYSTEMS
Dec. 1984 54 p
(PB85-243293; LHNCBC-CR-85-01; NLM/SW/MT-85/001A) Avail: NTIS HC A04/MF A01 CSCL 05B

Enhancements to standard (ILS) which support a fines and billing system in addition to a copy record function for location information, a calendar of closed days for circulation control, and improved functions for detailing circulation policies are presented. GRA

N86-21439# National Environmental Satellite Service, Washington, D. C.
PUBLICATIONS AND FINAL REPORTS ON CONTRACTS AND GRANTS, 1985
N. A. Everson Apr. 1985 19 p
(PB85-208460; NOAA-TM-NESDIS-11) Avail: NTIS HC A02/MF A01 CSCL 05B

The technical memorandum is one of a series containing lists of articles and reports published by or for the National Environmentals Satellite, Data and Information Service (NESDIS). The issue lists items published or received during 1984 and includes items omitted from the previous issue. GRA

N86-21440# Sheffield Univ. (England). Dept. of Information Studies.
EVALUATION OF CLUSTERING METHODS FOR AUTOMATIC DOCUMENT CLASSIFICATION Final Report, Oct. 1982 - Sep. 1984
A. Griffiths and P. Willett Oct. 1984 79 p
(BLRDR-5837) Avail: Issuing Activity

Use of hierarchic agglomerative clustering methods for automatic document classification is discussed. Extensive comparative studies are made of the classifications produced by application of the single linkage, complete linkage, group average and Ward clustering methods to the Keen, Cranfield and Evans document test collections. A range of experiments is described. After validating the use of clustering methods for structuring document collections, studies are presented of the degrees of distortion imposed on the input similarity matrices when the four clustering methods are applied to them, and of the structures of the four types of cluster hierarchy. An extent series of retrieval tests is reported using the cluster based retrieval search strategy, together with a comparison of the membership of the clusters formed by use of the methods. Results suggest that the single linkage method, which was used extensively in document clustering, may not be the most effective procedure, although it should be emphasized that the experiments used only small document test collections. Author

N86-21441# Leicester Univ. (England). Office for Humanities Communication.
BIBLIOGRAPHIC DATABASES ON MICROCOMPUTERS: A SERIES OF DEMONSTRATIONS FOR STAFF AND RESEARCH STUDENTS IN THE HUMANITIES Final Report
J. S. Macdonald Nov. 1984 47 p
(BLRDR-5844) Avail: Issuing Activity

The applications of private data bases on microcomputers were demonstrated. To this end, it was decided to use the Schools Information Retrieval (SIR) software package, not least because of its availability as British Library Research and Development Department (BLRDD) material, but also because of its suitability as a simple bibliographic data base package. The aims and objectives were: (1) to increase awareness of the convenience and utility of distant commercial data bases within the context of research in the humanities; (2) to show the extent to which a private data base on a microcomputer can be used as a more effective research tool than the conventional, manual card indexing and cataloging system; and to assess the reaction to the assumptions of the first two objectives. B.G.

N86-21442# Newcastle-upon-Tyne Univ. (England). School of Librarianship and Information Studies.
CALLISTO: A DIRECTORY OF NEW TECHNOLOGY IN USE IN UK SCHOOLS OF LIBRARY AND INFORMATION STUDIES
Joan M. Day, D. Alasdair Kemp, and Lucy A. Tedd 1985 93 p
(BLRDR-5801) Copyright. Avail: Issuing Activity

The CALLISTO (Computer Assisted Learning in Library and Information Studies Teaching Organizations) Directory is the result of a British Library funded survey of Schools of Librarianship and Information Studies in the United Kingdom, to investigate the extent to which new technology is being used in Courses - SECTION A. In particular, the development of software packages for computer Assisted Learning throughout the curriculum is recorded in SECTION 2 CALLISTO: software bibliography to enable wider use to be made of the programs by the information community in general as well as to support the already high level of co-operation and exchange between Schools. Author

N86-21443# Science Research Council, London (England).
OPTICAL CHARACTER RECOGNITION: THE TECHNOLOGY AND ITS APPLICATION IN INFORMATION UNITS AND LIBRARIES
John W. T. Smith and Zinat Merali (Centre for Information Media and Technology of Great Britain) 1985 136 p refs
(LIRR-33; ISBN-07123-3047-X; ISSN0263-1709) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

This report is intended to be of interest to anyone who is considering optical character recognition (OCR) in an information or library context. Chapter 1 shows where OCR fits in the range of electro-optic for optoelectric devices including facsimile optical mark recognition and OCR. It includes a brief history of OCR and indicates the possible applications of OCR within information work. Survey results of special libraries and information units concerning the use of OCR and the views of OCR by users and nonusers are reported. Four case studies of OCR applications are presented. A survey of available machines considered of possible value in information or library application is presented. It includes full specifications of each machine and explanatory text of those specifications. A simple guide to choosing and OCR machine for a specific purpose is given. Author

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-20423# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PRODUCTIVITY: THE ECONOMIC ASPECTS OF CRYOGENIC WIND TUNNEL DESIGN AND USE
J. Christophe *In* AGARD Special Course on Cryogenic Technology for Wind Tunnel Testing Jul. 1985 21 p refs (For primary document see N86-20415 11-09)
Avail: NTIS HC A18/MF A01

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-21444# Congress of the United States, Washington, D.C.
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT OF 1986
Washington GPO 5 Dec. 1985 8 p H.R. 1714, enacted into law by the 99th Congress, 5 Dec. 1985
(PUB-LAW-99-170) Avail: US Capitol, House Document Room

The National Aeronautics and Space Administration Authorization Act of 1986 (Public Law 99-170) was enacted on 5 December 1985. The 7.7 billion dollar authorization is broken down as follows: Research and Development - 2.8 billion; Space Flight Control, and Data Communications - 3.4 billion; Construction of Facilities - 140 million; and Research and Program Management -1.4 billion. Section 106 of the Law prohibits the use of a civil space station to carry a nuclear weapon or other weapon of mass destruction. Title II sets pricing policy for the use of the Shuttle's services by commercial and foreign entities. F.M.R.

N86-21445# Committee on Commerce, Science, and Transportation (U. S. Senate).
AUTHORIZATION FOR THE ATMOSPHERIC AND SATELLITE PROGRAMS OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
John C. Danforth Washington GPO 1985 9 p Rept. to accompany S. 1103 presented by the Comm. on Commerce, Science, and Transportation, 99th Congr., 1st Sess., 30 May 1985
(S-Rept-99-75; GPO-51-010) Avail: US Capitol, Senate Document Room

The Federal budget allocations for the National Oceanic and Atmospheric Administration (NOAA) are presented. The importance of collection, analysis, and dissemination of weather data by the National Weather Service (NWS) is examined. Procurement, operation, and maintenance of the NOAA Satellite system is described. B.G.

N86-21446# Committee on Science and Technology (U. S. House).
SUBJECTS AND POLICY AREAS FOR THE CONSIDERATION OF THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, 99TH CONGRESS
Washington GPO 1985 146 p Presented to the Committee on Science and Technology, 99th Congress, 1st Session, Apr. 1985 Prepared by the Library of Congress, Congressional Research Service
(GPO-45-170) Avail: US Capitol, House Document Room

The Committee on Science and Technology of the U.S. House of Representatives (99th Congress) accepted in April 1985 the annual report of the Congressional Research Service of the Library of Congress (dated 4 March 1985) on the subjects and policy areas which CRS feels the Committee might wish to analyze in depth during the current session of Congress, which report was submitted in accordance with the Legislative Reorganization Act of 1970. Among the subjects tendered for the Committee's consideration were food and nutrition, energy policy, the environment, computer science, telecommunications, science and technology abroad, life sciences and biotechnology, strategic and critical materials, space R&D, technology transfer, and weather, climatology and Earth sciences. Basic to the foregoing, Congress is asked to examine recent trends reflecting increased Federal funding for defense as opposed to civilian R&D and the implications for the U.S. economy and its international competitive position. F.M.R.

N86-21447# Committee on Science and Technology (U. S. House).
OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1986 RESEARCH, ENGINEERING AND DEVELOPMENT BUDGET REQUEST
Washington GPO 1985 191 p Hearings before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 8, 19-20 Mar. 1985
(GPO-46-725) Avail: Subcommittee on Transportation, Aviation and Materials

Hearings held by the House Committee on Science and Technology on the Federal Aviation Administration fiscal year 1986 research, engineering, and development budget requests are presented. Statements in support of the implementation of R & D programs in the National Airspace System Plan are presented. B.W.

N86-21448# Committee on Science and Technology (U. S. House).
EARTHQUAKE HAZARDS REDUCTION ACT
Washington GPO 1985 194 p refs Hearing before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 9, 19 Mar. 1985
(GPO-46-071) Avail: Subcommittee on Science, Research and Technology

The Subcommittee on Science, Research and Technology of the Committee on Science and Technology, House of Representatives (99th Congress) met on 19 March 1985 to discuss the Earthquake Hazards Reduction Act of 1977. The Act was formulated in view of the widespread recognition that earthquake hazard reduction was important to the nation as a whole. Although earthquake hazards are associated with relatively finite areas of the country, e.g., California, historically other areas of the country have experienced earthquake phenomena. Thirty-nine states are considered at risk, in which dwell some 70 million Americans. A panel of outside experts discussed the leadership role of FEMA Federal Emergency Management Agency) in the program, and what is being done on the Federal, State, and local level to implement the act. F.M.R.

N86-21449# Committee on Science and Technology (U. S. House).
ASSESS POTENTIAL GAINS AND DRAWBACKS OF CIVILIAN SPACE COOPERATION WITH THE SOVIETS
Washington GPO 1985 145 p refs Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congr., 1st Sess., no. 23, 30-31 Jul. 1985
(GPO-52-457) Avail: Subcommittee on Space Science and Applications

Topics discussed included: International Space Year; Mars resolution; cooperation between the U.S.S.R. and the U.S. in a joint space venture; technology tranfer and assessment; and scientific benefits. Areas of cooperation include: discussion and exchange of results, discussion of mission plans, sharing of experiments, and joint mission. B.G.

N86-21450# Committee of Conference (U. S. Congress).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1986
Washington GPO 1985 18 p Report to accompany H.R. 1714 presented by the Committee of Conference to the 99th Congress, 1st Session, 19 Nov. 1985
(H-Rept-99-379; GPO-54-684) Avail: US Capitol, House Document Room

Appropriations to NASA for research and development, space flights, control and data communications, construction of facilities, and research and program management were discussed by the committee of conference. B.G.

N86-21451# National Bureau of Standards, Gaithersburg, Md.
US ACCESS TO JAPANESE TECHNICAL LITERATURE: ELECTRONICS AND ELECTRICAL ENGINEERING Final Report
Edward L. Brady, ed. Jan. 1986 168 p Presented at a Seminar held at Gaithersburg, Md., 24-25 Jun. 1986 Sponsored in part by Institute of Electrical and Electronics Engineers, Inc., New York, N.Y.
(NBS-SP-710; LC-85-600637) Avail: NTIS HC A08/MF A01

The problems existing in the transfer and exchange of Japanese science and technology information were discussed. The technical subject matter as restricted to electrical and electronics

engineering. The difficulties which arise from American business lack of knowledge of the Japanese language were explored. The nature of the problems of accessibility to Japanese technical literature and translators is assessed. The program was designed to provide an opportunity for individuals representing Congress, the practicing engineering community, industry, and educational committee to voice their concerns and their needs.

N86-21452# Committee on Science and Technology (U. S. House).
REPORTS SUBMITTED TO CONGRESS BY NASA PURSUANT TO HOUSE REPORT 98-65, TO ACCOMPANY H.R. 2065, THE NASA AUTHORIZATION ACT FOR FISCAL YEAR 1984
Washington GPO 1985 268 p refs Report to accompany H.R. 2065 presented by the Committee on Science and Applications to the Committee on Science and Technology, 98th Congress, 2d Session, Dec. 1984
(GPO-42-943) Avail: US Capitol, House Document Room

Topics discussed include: maintenance of expendable launch vehicles; space transportation marketing; 40x80 wind tunnel accident; civil applications of nuclear power; and research and technology for future space exploration. B.G.

N86-21453# Committee on Science and Technology (U. S. House).
ASSURED ACCESS TO SPACE DURING THE 1990'S
Washington GPO 1986 187 p Joint Hearings on HASC-99-9 before the Subcommittee on Space Science and Applications of the Committee on Science and Technology and the Subcommittee on Research and Development of the Committee on Armed Services, 99th Congress, 1st Session, no. 51, 23-25 Jul. 1985
(GPO-53-617) Avail: Subcommittee on Space Science and Applications

The Subcommittees on Space Science and applications, and the subcommittee on research and development held joint hearings on assured access to space during the 1990's. Topics discussed include: space transportation systems, launch vehicle requirements of the Space Station Program during the 1990's, commercial payloads and satellite launches, strategic defense initiative, DOD launch plans through the 1990's, space launch vehicle capacity, complementary expendable launch vehicles (CELV), and adequacy of the orbiter fleet to meet the launch requirements through the 1990's. E.A.K.

N86-21454# National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
FEDERAL R AND D FUNDING BY BUDGET FUNCTION: FISCAL YEARS 1984-86 Final Report, 1984 - 1986
Mar. 1985 98 p
(PB85-232528; NSF-84-319) Avail: NTIS HC A05/MF A01 CSCL 05A

The report provides a distribution of Federal Research and Development programs based on the functions of the Federal budget. Analysis focuses on relative changes from 1984 to 1986 of chief R&D program areas within each function. Some 600 programs are identified with their budget authority levels for fiscal years 1984, 1985, and 1986. Included in the report is an agency/function crosswalk, correlating agencies contributing support to particular functional areas as well as historical tables in which Federal R&D funds by function are presented for 1955 to 1986. Author (GRA)

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-21455# Committee on Science and Technology (U. S. House).
THE 1985 SCIENCE AND TECHNOLOGY POSTURE HEARING WITH THE DIRECTOR OF THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY
Washington GPO 1985 77 p Hearing before the Committee on Science and Technology, 99th Congr., 1st Sess., no. 1, 5 Feb. 1985
(GPO-44-080) Avail: Committee on Science and Technology

Presidential Science Adviser Dr. George Keyworth, Director of the Office of Science and Technology Policy, gave his annual (1985) report on U.S. Science and Technology posture at a hearing of the Committee on Science and Technology of the U.S. House of Representatives (99th Congress) on 5 Feb. 1985. He spoke of critical choices in three areas, i.e., how to reduce nuclear weapons, thereby to enhance the national security, how to ensure U.S. technological superiority in the face of rapidly growing international competition, and how to accomplish the foregoing while reducing government deficits. U.S. government support for Research and Development will total $60 billion this year, $20 of which are for non-defense programs, and $8 billion for basic research. He emphasized the importance of the latter to the nation's economic wellbeing, and the need to make every research dollar count in the face of rising costs and soaring deficits. Dr. Keyworth urges aggressive U.S. efforts to maintain its world leadership in science and technology. F.M.R.

N86-21456*# Westinghouse Research and Development Center, Pittsburgh, Pa.
DESIGN AND EVALUATION OF FLUIDIZED BED HEAT RECOVERY FOR DIESEL ENGINE SYSTEMS
J. R. Hamm, R. A. Newby, E. J. Vidt, and T. E. Lippert Jul. 1985 228 p refs
(Contracts DEN3-345; DE-AI01-80CS-50194)
(NASA-CR-174898; DOE/NASA-0345-1; NAS 1.26:174898) Avail: NTIS HC A11/MF A01 CSCL 13F

The potential of utilizing fluidized bed heat exchangers in place of conventional counter-flow heat exchangers for heat recovery from adiabatic diesel engine exhaust gas streams was studied. Fluidized bed heat recovery systems were evaluated in three different heavy duty transport applications: (1) heavy duty diesel truck; (2) diesel locomotives; and (3) diesel marine pushboat. The three applications are characterized by differences in overall power output and annual utilization. For each application, the exhaust gas source is a turbocharged-adiabatic diesel core. Representative subposed exhaust gas heat utilization power cycles were selected for conceptual design efforts including design layouts and performance estimates for the fluidized bed heat recovery heat exchangers. The selected power cycles were: organic rankine with RC-1 working fluid, turbocompound power turbine with steam injection, and stirling engine. Fuel economy improvement predictions are used in conjunction with capital cost estimates and fuel price data to determine payback times for the various cases. E.A.K.

N86-21457*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AUTOMOTIVE STIRLING SUMMARY AND OVERVIEW Final Report
William K. Tabata and Richard K. Shaltens [Oct. 1985] 12 p Presented at the 23rd Automotive Technology Development Contractors Coordination Meeting, Dearborn, Mich., 21-24 Oct., 1985; sponsored by DOE
(Contract DE-AI01-85CE-50112)
(NASA-TM-87177; E-2825; DOE/NASA-50112-61; NAS 1.15:87177) Avail: NTIS HC A02/MF A01 CSCL 13F

Government funded studies for adapting the Stirling engine to an automotive application started in 1971. The initial studies were to reduce exhaust emissions and were later broadened to include fuel economy and alternate fuels. With the passage of the Automotive Propulsion Research and Development Act of 1978, the studies matured into the current Automotive Stirling Engine (ASE) Program. After eight years of development effort, the accomplishments of the ASE Program are reviewed to assess the

outlook for program success at its scheduled completion in September 1987. One important goal of the ASE Program is the transfer of Stirling engine technology to the USA. The technology transfer to the ASE Program team members was accomplished. To expand the transfer in the USA, various activities were initiated to make available the developed automotive Stirling engine technology to other U.S. industries, including nonautomotive.
Author

N86-21458# Committee on Science and Technology (U. S. House).
TECHNOLOGY TRANSFER
Washington GPO 1985 258 p Hearings before the Subcommittee on Science, Research and Technology of the Committee on Science and Technology, 99th Congress, 1st Session, no. 22, 21-22 May 1985
(GPO-49-539) Avail: Subcommittee on Science, Research and Technology

The Congressional Subcommittee on science, research and technology held hearings on primarily technology transfer. The legislation was proposed on: utilization of federal technology basic research, commercializing intellectual property, technology utilization, stimulation of global competition, improvement of city services, stimulation of local economics, Federal commercial cooperation, and technology transfer from Government to private sector. E.A.K.

N86-21459# Appropriate Technology International, Washington, D.C.
SYSTEM FOR THE MONITORING AND EVALUATION OF APPROPRIATE TECHNOLOGY PROJECTS
E. L. Hyman and T. C. Corl Feb. 1985 82 p
(Contract AID/DSAN-G-0047)
(PB85-224798) Avail: NTIS HC A05/MF A01 CSCL 05A

A.T. International's monitoring and evaluation system for field projects is described. It is designed primarily to assist ATI's field staff and the organizations in LDCs that collaborate with ATI in evaluating selected projects. Part 1 of the paper contains a general discussion of monitoring and evaluation -- their definitions, objectives, and relationship to the project planning and implementation process. It aslo states the case for preparation of an information framework for systematic and efficient monitoring and evaluation. Part 2 discusses the information framework adopted by ATI--the Project monitoring and Evaluation System (PMES). Appendix A includes a list of French-Spanish translations of key terms. Appendix B contains an example of a completed PMES form for a hypothetical appropriate technology project. Appendix C contains a blank PMES form for reproduction purposes. GRA

N86-21460# National Bureau of Standards, Gaithersburg, Md. Public Information Div.
NBS (NATIONAL BUREAU OF STANDARDS) RESEARCH REPORTS
Jul. 1985 38 p
(PB85-236354; NBS/SP-680/3; LC-85-600549) Avail: NTIS HC A03/MF A01 CSCL 14B

Reports are presented of research conducted by the NBS (National Bureau of Standards). Topics discussed include: polymer composites; amperes; lightning measurement; fire research for building safety; advanced heat pumps; ozone measurement; ultraviolet wavelength standards; space telescope calibrations; and quality of clinical measurements. B.W.

N86-21461# National Science Foundation, Washington, D.C.
NATIONAL SCIENCE FOUNDATION, VOLUME 1 Annual Report, 1984
1985 123 p
(PB85-232551) Avail: NTIS HC A06/MF A01 CSCL 05A

The annual report to the U.S. Congress is required by law. The results of scientific and engineering research supported by the Foundation during the past fiscal year are summarized. Also included are a statement by the NSF Director and five appendixes (financial report, patents list, staff and advisory committee members, etc.) GRA

88 SPACE SCIENCES (GENERAL)

N86-21462# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
[ACTIVITIES REPORT OF THE INSTITUTE FOR EXTRATERRESTRIAL PHYSICS] Status Report, 1983 - 1985
Aug. 1985 77 p refs
(MPE-Rept-188; ISSN-0178-7101) Avail: NTIS HC A05/MF A01

Research in solar and space plasma physics; the solar system; the life cycle of stars; the interstellar medium; active galactic nuclei and quasars; and laboratory astrophysics is summarized. Solar flares; plasmas in interplanetary space; solar wind magnetosphere interactions; electrodynamic coupling of magnetosphere and ionosphere; equatorial ionosphere; and active plasma experiments are discussed. Infrared observations of planetary atmospheres; planet formation; star formation; X-ray emission from main sequence stars; cataclysmic variables; X-ray binaries; neutron stars; supernova remnants; local interstellar medium; molecular clouds; the galactic center and halo; high-resolution molecular spectroscopy in the vacuum UV; transition probabilities of faint lines; and determination of accurate potential energy curves are treated. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-21463 California Univ., San Diego.
A STUDY OF THE OPTICAL AND X-RAY PROPERTIES OF QUASARS Ph.D. Thesis
Steven Ever Bradley 1985 143 p
Avail: Univ. Microfilms Order No. DA8517893

Photoionization by the central nucleus is primarily responsible for the emission lines observed in quasars. If this view is correct, X-ray wavelength photons from the nucleus could play a role in determining the emission line strengths of the various chemical species present in quasars. All of the quasars in this sample have been previously observed with the Einstein Observatory. Strengths of the broad permitted emission lines as well as narrow forbidden lines are analyzed for correlations with the X-ray strength and the optical strength. Weak correlations with most of the strengths of the permitted emission lines with the X-ray strength are detected. This is apparent in the case of hydrogen Balmer emission. However, in the majority of cases, these correlations appear stronger with the optical luminosity. The forbidden lines do not show as strong an evidence for correlations as do the permitted lines. It has also been known for some time that the X-ray and optical continuum strengths are correlated. It is difficult to draw strong conclusions concerning any proposed physical basis for these correlations. Dissert. Abstr.

N86-21464 New Mexico State Univ., Las Cruces.
OCCULTATION AND LIGHTCURVE ANALYSIS: THE FIGURE OF 2 PALLAS Ph.D. Thesis
John Vincent Lambert 1985 142 p
Avail: Univ. Microfilms Order No. DA8519956

Techniques to analyze occultation and lightcurve observations of asteroids were developed and applied to the determination of the figure of 2 Pallas. The procedure consisted of first solving for the pole using modified implementations of photometric astrometry and amplitude-aspect. The derived pole and the results from two stellar occultations were then used to identify the triaxial ellipsoid best approximating the figure of Pallas. A computer model, developed for the simulation of the lightcurves of irregularly shaped bodies with complex surface scattering functions, was used to compare theoretical lightcurves for the derived ellipsoid with observations. The method of computing the subearth point was changed to use the phase angle bisector rather than line of sight

and a more direct method of calculating the change in the subpoint between epochs was incorporated to remove restrictions on pole latitudes. An amplitude-aspect analysis was performed to select between the two resulting solutions, again, modified to utilize the phase angle bisector. When the pole of an asteroid is known, and observed elliptical occultation profile could be produced only by a restricted set of triaxial ellipsoids. If, as for 2 Pallas, multiple occultation profiles are available, the triaxial ellipsoid best approximating the figure of the asteroid can be identified. The ellipsoid obtained from the analysis of the two Pallas occultations has equatorial dimensions of 580 to 8 and 522 + or - 2 Km, and a polar dimension of 478 + or - 18 Km. Dissert. Abstr.

N86-21465 Pittsburgh Univ., Pa.
AN ANALYSIS OF THE ROTATION EFFECT IN THE RADIAL VELOCITY CURVE OF THE ECLIPSING BINARY DELTA LIBRAE Ph.D. Thesis
Thaddeus Francis Worek 1985 251 p
Avail: Univ. Microfilms Order No. DA8519464

Using 339 spectra obtained at the Kitt Peak National Observatory in 1981, 1983 and 1984, the pulse like disturbance that appears in the radial velocity curve of the eclipsing binary Delta Librae was isolated. This pulse is symmetric in 1983 but asymmetric in 1984. To account for the latter pulses, it is proposed that apparent expansion velocity and fractional luminosity of the envelope were derived. Other models that might explain the asymmetric rotation pulsed were considered and observations are equally satisfied if the spin axis of the primary star is tilted and precession. However, both the magnitude of the obliquity angle and the rapidity of its decay as indicated in the numerical fitting are judged unrealistic and appear to discredit this alternative explanation. Dissert. Abstr.

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-21466 California Univ., San Diego.
A MAGNETOSPHERIC CRITICAL IONIZATION VELOCITY EXPERIMENT Ph.D. Thesis
Patrick K. Newell 1985 159 p
Avail: Univ. Microfilms Order No. DA8515599

A barium injection sounding rocket experiment (The Star of Lima) was conducted to investigate Alven's critical ionization velocity (CIV) hypothesis in space. A particle detection experiment consisting of five retarding potential analyzers was undertaken. Several possible explanations for this low ionization efficiency are explored. It is shown that based both on the data set and on theoretical calculations that the superthermal electrons required for the CIV to operate were contained; and that the ionization rate was not limited by momentum considerations. It is shown that loss of electron energy to background oxygen places a strict lower limit on the barium cloud density for which CIV effects are possible; and loss of energy through barium line radiation increases by square root of 2 the necessary velocity for the onset of this effect. The most likely explanation for the negative result in the Star of Lima experiment is that the length of the cloud parallel to the magnetic field was smaller than the fastest growing modes of the lower hybrid instability believed to energize the electrons. Dissert. Abstr.

N86-21467 California Inst. of Tech., Pasadena.
DYNAMICAL ELECTROMAGNETIC FIELDS NEAR BLACK HOLES AND MULTIPOLE MOMENTS OF STATIONARY, GENERAL RELATIVISTIC SYSTEMS Ph.D. Thesis
Wai Mo Suen 1985 177 p
Avail: Univ. Microfilms Order No. DA8519566

Electromagnetic fields were studied in terms of the membrane formalism for black holes with the aim of developing formalism into a complete, self consistent description of electromagnetic and gravitational fields in a black hole background. Various model problems are presented as aids in understanding the interactions of electromagnetic fields with a black hole, and special attention is paid to the concept of the stretched horizon. A multipole moment formalism was developed for a general stationary system in general relativity. The multipole moments are defined in terms of a general formal series solution of the stationary Einstein equation, in analogy to multipole moments in the Newtonian theory of gravity. These relativistic moments exhibit many desirable properties and are useful in studying the interactions between a gravitating body and an external gravitational field. A model calculation applying the formalism to a black hole interacting with an external multipole field shows that the interaction can be understood in terms of elastic moduli of the black hole horizon. Dissert. Abstr.

N86-21468 New Mexico State Univ., Las Cruces.
THE NEUTRAL SODIUM D SUB 2 LINE IN LATE-TYPE STARS Ph.D. Thesis
Daniel Craig Boice 1985 229 p
Avail: Univ. Microfilms Order No. DA8519967

The effects of a stellar chromosphere on the Na 1 D2 profile are investigated. The analysis of line profile parameters yields the following results: (1) a relationship between the line width and the luminosity for the giants and supergiants does not exist for Na 1 D2 as has been observed for CA 11 K core emission and H 1 alpha; (2) the correlation between Na 1 D2 line width and luminosity for the through K dwarfs is explained in terms of differences in effective temperature and surface gravity along with the main sequence, the dME stars exhibit central reverals in the Na 1 D lines; (3) the method of Steintz was used to measure Doppler widths for H 1 alpha and Na 1 D2 lines under the assumption of a constant properties atmosphere. The H 1 alpha measurements imply supersonic nonthermal velocities for the giants and supergiants. Nonthermal velocities less than 10 km/sec are needed to explain the Na 1 D2 Doppler widths for three dwarfs. For the two stars, EQ Vir (dK5e) and Gl616.2 (dM1.5E), a detailed study of the formation of Na I D2 is presented applying the non-LTE radiative transfer method and using model chromospheres. The calculations provide a consistency check on the chromospheric models inferred from the CA II K diagnostics. Dissert. Abstr.

N86-21469 Harvard Univ., Cambridge, Mass.
TOPICS IN INFLATIONARY COSMOLOGY Ph.D. Thesis
Ronald Nathan Kahn 1985 351 p
Avail: Univ. Microfilms Order No. DA8520223

The theory of inflationary cosmology was examined. The existence of Hawking Radiation during the slow-rolling period of a new inflationary universe is proven, and derives and somewhat extends Bardeen's gauge invariant formalism for calculating the growth of linear gravitational perturbations in a Friedmann-Robertson-Walker cosmological background. This formalism is applied, first to several new inflationary universe models which all show a Zel'dovich spectrum on fluctuations, but with amplitude delta (100) above observational limits. The general formalism is next applied to models which exhibit primordial inflation. Fluctuations in these models also exhibit a Zel'dovich spectrum, with an acceptable amplitude. The results of new, numerical calculations are presented. A classical, (2 + 1) dimensional computer model is developed which includes a Higgs field along with enough auxiliary fields to generate dynamically not only a thermal bath, but also the fluctuations which naturally accompany that bath. Dissert. Abstr.

N86-21470 New Mexico State Univ., Las Cruces.
THE MORPHOLOGY OF THE PLANETARY NEBULA NGC 3242 Ph.D. Thesis
Randy Warren Olson 1985 109 p
Avail: Univ. Microfilms Order No. DA8519961

Observations of the Balmer decrement were used to obtain information about the internal structure on the doubleshell planetary nebula NGC 3242. Variations in the Balmer decrement are associated with reddening, self absorption, and changes in excitation mechanisms. Variations in the intensity line ratios allow

the definition and position of a shock wave to be determined. By using high resolution plots of the Balmer-line ratios, a simple straightforward method for finding and locating weak shocks in H II regions is proposed. It is demonstrated that a shock front exists at the boundary between the inner and outer shells of NGC 3242. The discontinuity is moving into the outer shell at a speed of 1.3 times the speed of sound in that material. Temperature, density, and velocity variations in this nebula support the model developed for the existence of a shock front in NGC 3242. Dissert. Abstr.

N86-21471 Harvard Univ., Cambridge, Mass.
SOME ASTROPHYSICAL APPLICATIONS OF MHD INSTABILITIES OF DIFFERENTIALLY ROTATING FLUIDS Ph.D. Thesis
Bruce Donald Popp 1985 115 p
Avail: Univ. Microfilms Order No. DA8520271

The combined effect of differential rotation and a magnetic field on the stability of certain astrophysical fluids were considered. The properties of multiply diffusive instabilities driven by both magnetic buoyancy and differential rotation were investigated. The governing equations for these instabilities are obtained by modifying the magnetic Boussinesq equations; the linear dispersion relation for axisymmetric and nonaxisymmetric perturbations is derived. This dispersion relation is investigated numerically for parameters relevant to the solar radiative interior and a thin magnetized accretion disk about a one solar mass central object. The effect of these instabilities on the magnetization of the solar interior was investigated. Dissert. Abstr.

N86-21472 Montana State Univ., Bozeman.
LIMITS TO THE EXTRAGALACTIC DISTANCE SCALE FROM INTEGRATED PROPERTIES OF LOCAL GROUP GALAXIES Ph.D. Thesis
David John Westpfahl, Jr. 1985 173 p
Avail: Univ. Microfilms Order No. DA8519362

Integrated properties, magnitudes and isophotal diameters of the Local Group galaxies M31 and M33 are used to set upper and lower limits to the extragalactic distance scale in the direction of the Virgo cluster and the Ursa Major cluster. The assumption is made that M31 should not be larger or brighter than the largest, brightest cluster members, so a lower limit to the distance modulus of the cluster can be calculated. It is also assumed that M33 should not be smaller or fainter than the smallest, faintest cluster members, so an upper limit to the distance modulus can be calculated. Data are collected in three systems with several correction schemes, and cluster membership lists are compared to determine the largest, brightest, smallest, and faintest members. The results depend upon the radial velocities of the clusters, which are in dispute. The method is applied to groups of galaxies seen in projection behind the Virgo and Ursa Major clusters, and to groups in the direction opposite to the clusters. It is concluded many small groups have a component of motion toward the clusters, relative to a uniform Hubble flow. Dissert. Abstr.

N86-21473 Melbourne Univ., Carlton (Australia).
THE ALLENDE METEORITE: INFORMATION FROM Ca-Al-RICH INCLUSIONS ON THE FORMATION AND EARLY EVOLUTION OF THE SOLAR SYSTEM Ph.D. Thesis
David Andrew Wark 1984 411 p
Avail: Univ. Microfilms Order No. DA8518695

Chemical and petrological investigations of the Allende CV carbonaceous chondrite meteorite show that the different types of Ca-Al-rich inclusions (CAI's) in Allende formed variously as molten or semimolten evaporative residues, as solid condensates, as liquid condensates, as fine grained condensates, and from melted fine grain aggregates. Once formed, many of these materials grew further by capture, aggregation and overgrowth. The mass dependent isotopic fractionation in the isotopically anomalous FUN CAI's was probably produced by the slow volatilization of excessive amounts of silicate dust in the primordial solar nebula; the volatization could simultaneously also have created the oxidizing conditions that gave rise to the characteristic chemical signatures of FUN CAI's. FUN CAI's appear to be either oxidized evaporative residues enriched in refractory elements and heavy isotopes, or the complementary refractory depleted, heavy isotope depleted condensates. Various lines of evidence indicate that all the components of Allende formed within a relatively circumscribed region of the solar nebula. Dissert. Abstr.

N86-21474 Michigan Univ., Ann Arbor.
PRIMITIVE TERRESTRIAL ATMOSPHERES Ph.D. Thesis
Kevin John Zahnle 1985 274 p
Avail: Univ. Microfilms Order No. DA8521019

A 23.3 year periodicity preserved in a 2500 million year old banded iron formation is interpreted as reflecting the climatic influence of the lunar nodal tide. The lunar distance is deducted as 52 Earth radii. The implied history of Precambrian tidal friction is in excellent agreement with both more recent paleontological evidence and the long term stability of the lunar orbit. The solar semidiurnal thermal tide was resonant with the natural period of the atmosphere when the day was approximately 21.3 hours at the end of the Precambrian. The resonant atmospheric tide was large enough (.01 bar at the surface) to have influenced the weather. In contrast to lunar oceanic tides, the gravitational torque on the thermal tide accelerates the Earth's rotation rate; near resonance the opposing torques were comparable, so that the day was stabilized near 21.3 hours for much of the Precambrian. Methane photochemistry in the primitive terrestrial atmosphere is studied using a detailed numerical model. Dissert. Abstr.

N86-21475*# Michigan Univ., Ann Arbor. Dept. of Astronomy.
HYDROGEN LINE RATIOS IN SEYFERT GALAXIES AND LOW REDSHIFT QUASARS Final Technical Report, 1 Jun. 1983 - 31 Jul. 1984
Gerard R. Kriss 1984 14 p refs
(Grant NAG5-324)
(NASA-CR-176547; NAS 1.26:176547) Avail: NTIS HC A02/MF A01 CSCL 03B

New observations of the Lyman alpha radiation/hydrogen alpha radiation ratio in a set of X-ray selected active galactic nuclei and an archival study of International Ultraviolet Explorer (IUE) observations of Lyman alpha low redshift quasars and Seyfert galaxies have been used to form a large sample for studying the influence of soft X-rays on the enhancement of Balmer emission in the broad line region. In common models of broad line clouds, the Balmer lines are formed deep in the interior, largely by collisional excitation. Heating within the clouds is provided by soft X-ray radiation, while Lyman alpha is formed mainly by recombination after photoionization. The ratio Lyman alpha/Halpha is expected to depend weakly on the ratio of ionizing ultraviolet luminosity to X-ray luminosity (L sub UV/I sub x). If the Lyman alpha luminosity is used as a measure of L sub UV' a weak dependence of Lyman/H alpha on the X-ray luminosity is found similar to previous results. Author

N86-21476*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THEORETICAL STUDIES OF CHROMOSPHERES AND WINDS IN COOL STARS Semiannual Progress Report, 1 Apr. - 30 Sep. 1985
Lee Hartmann Jan. 1986 18 p refs
(Grant NAGw-511)
(NASA-CR-176524; NAS 1.26:176524; SAPR-4) Avail: NTIS HC A02/MF A01 CSCL 03B

Propagation of pulsational waves through the atmosphere of the M supergiant alpha Ori was explored using a time dependent hydrodynamic code. Wind properties for three FU Orionis objects were determined using radiative transfer models based on optical line profiles. The effects of varying wind temperature while keeping the velocity steady were considered. Using the premise that FU Orionis eruptions result from massive accretions from a disk into a T Tauri star explains a variety of observational peculiarities of FU Orionis objects. B.G.

N86-21477*# Alabama Univ., Huntsville.
STUDY OF TRAVELLING INTERPLANETARY PHENOMENA (STIP) WORKSHOP TRAVEL Final Report

S. T. Wu Jan. 1986 46 p ref
(Grant NAGw-743)
(NASA-CR-176544; NAS 1.26:176544) Avail: NTIS HC A03/MF A01 CSCL 03B

Thirty six abstracts are provided from the SCOSTEP/STIP Symposium on Retrospective Analyses and Future Coordinated Intervals held in Switzerland on June 10 to 12, 1985. Six American scientists participated in the symposium and their abstracts are also included. The titles of their papers are: (1) An analysis of near surface and coronal activity during STIP interval 12, by T. E. Gergely; (2) Helios images of STIP intervals 6, B. V. Jackson; (3) Results from the analysis of solar and interplanetary observations during STIP interval 7, S. R. Kane; (4) STIP interval 19, E. Cliver; (5) Hydrodynamic buoyancy force in the solar atmosphere, T. Yeh; and (6) A combined MHD modes for the energy and momentum transport from solar surface to interplanetary space, S. T. Wu. E.R.

N86-21478*# California Inst. of Tech., Pasadena. Seismological Lab.
SHOCK-INDUCED VOLATILE LOSS FROM A CARBONACEOUS CHONDRITE: IMPLICATIONS FOR PLANETARY ACCRETION
James A. Tyburczy, Benjamin Frisch, and Thomas J. Ahrens 31 Jan. 1986 15 p refs
(Grant NGL-05-002-105)
(NASA-CR-176575; NAS 1.26:176575) Avail: NTIS HC A02/MF A01 CSCL 03B

Solid recovery impact-induced volatile loss experiments on the Murchison C2M meteorite indicate that for an impact of a given velocity, H2O and total volatiles are driven from the sample in the same proportion as present initially. The primitive surface volatile budget of a planet growing by accretion would have the same bulk elemental composition as the volatiles in the incident planetesimals. Incipient devolatilization of Murchison occurs at an initial shock pressure of about 11 GPa and complete devolatilization occurs at a pressure of about 30 GPa. For the Earth, incipient and complete devolatilization of accreting planetesimals would occur when the planet reached approximately 12% and 27%, respectively, of its present-day radius. Impact-induced devolatilization would profoundly affect the volatile distribution within the accreting planet. Prior to metallic core formation and internal differentiation the growing planet would have a very small core with the same volatile content as the incident material, a volatile depleted mantle, and an extremely volatile rich surface. In the case of the Earth, 99.4 wt% of the total incident volatile material would end up on or near the planetary surface. E.A.K.

N86-21479*# California Inst. of Tech., Pasadena. Seismological Lab.
OBLIQUE IMPACT: A PROCESS FOR PROVIDING METEORITE SAMPLES OF OTHER PLANETS
John D. OKeefe and Thomas J. Ahrens 10 Mar. 1986 16 p refs
(Grant NsG-7129)
(NASA-CR-176616; NAS 1.26:176616) Avail: NTIS HC A02/MF A01 CSCL 03B

Cratering flow calculations for a series of oblique to normal impacts of silicate projectiles onto a silicate halfspace were carried out to determine whether the gas produced upon shock vaporizing both projectile and planetary material could entrain and accelerate surface rocks and thus provide a mechanism for propelling SNC meteorites from the Martian surface. The difficult constraints that the impact origin hypothesis for SNC meteorites has to satisfy are that these meteorites are lightly to moderately shocked and yet were accelerated to speeds in excess of the Martian escape velocity. Two dimensional finite difference calculations demonstrate that at highly probable impact velocities, vapor plume jets are produced at oblique impact angles of 25 deg to 60 deg and have speeds as great as 20 km/sec. These plumes flow nearly parallel to the planetary surface. It is shown that upon impact of projectiles having radii of 0.1 to 1 km, the resulting vapor jets have densities of 0.1 to 1 g/cu.cm. These jets can entrain Martian surface rocks and accelerate them to velocities >5 km/sec. It is suggested that this mechanism launches SNC meteorites to Earth. Author

N86-21480# Los Alamos National Lab., N. Mex.
HALOS AROUND ELLIPTICALS AND THE ENVIRONMENT DEPENDENCE OF HUBBLE TYPE
W. H. Zurek, P. J. Quinn, and J. K. Salmon 1985 3 p Presented at the International Astronomical Union Meeting, Princeton, N.J., 24 Jun. 1985 Prepared in cooperation with California Inst. of Tech., Pasadena
(Contract W-7405-eng-36)
(DE86-000755; LA-UR-85-3314; CONF-8506199-1) Avail: NTIS HC A02/MF A01

It is not surprising that the baryonic material inside the more compact halos will tend to form a more compact, luminous elliptical. What needs to be explained is the difference in the value of the spin parameter (lambda). It might be tempting to speculate that more compact, dense halos have systematically smaller values of lambda. Such an effect is predicted by linear calculations. Our simulations show that it may exist but it appears to be too small compared to the random scatter of the values of lambda and rho to be decisive. It is more likely that the baryonic material has initially similar lamoda both in the future spirals and elliptical but compact halos damp out the lambda of the dissipative, baryonic material more readily. DOE

N86-21481# Brookhaven National Lab., Upton, N. Y.
NUCLEAR EQUATION OF STATE, GENERAL RELATIVITY AND SUPERNOVAE EXPLOSIONS
S. Kahana 1985 5 p refs Presented at the International School for Intermediate Energy Nuclear Physics, Veronna, Italy, 20 Jun. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001193; BNL-37038; CONF-850634-2) Avail: NTIS HC A02/MF A01

Prompt explosions are obtained in hydrodynamic simulations for the 12 Msub solar and 15 Msub solar type 2 supernova initial models of Weaver and Woosley, when the nuclear equation of state is sufficiently soft and when general relativity is included. DOE

N86-20928# Joint Publications Research Service, Arlington, Va.
POSTULATED METEORITIC STRUCTURES IN ROSS SEA (ANTARCTICA) Abstract Only
L. P. Khryanina *In its* USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 53 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Geologicheskaya (Moscow, USSR), no. 8, Aug. 1985 p 128-132 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N86-21482 California Inst. of Tech., Pasadena.
THE ANNUAL HEAT BALANCE OF THE MARTIAN POLAR CAPS FROM VIKING OBSERVATIONS Ph.D. Thesis
David Abbey Paige, Jr. 1985 222 p
Avail: Univ. Microfilms Order No. DA8519557

The first measurements of the annual heat budgets of the polar caps of Mars from spacecraft observations are presented. The primary motivation is to understand why seasonal CO2 frost deposits at the north pole of Mars disappear in the summer, whereas seasonal CO2 deposits near the south pole do not. Annual radiation budgets for the core regions of the north and south polar caps are determined from solar reflectance and infrared

emission observations obtained by the Infrared Thermal Mappers aboard the two Viking orbiters. Results show that the absence of CO2 frost at the north pole during summer is primarily due to an asymmetry in the rates of CO2 frost sublimation at surface in the north and south during spring. It is suggested that the unexpected properties of Martian seasonal frost deposits are caused by the tendency for dust particles within the frost to absorb solar radiation, sublimate the soil CO2 that supports them and sink into the frost. Dissert. Abstr.

N86-21483*# Arizona State Univ., Tempe. Dept. of Geology.
MARTIAN SURFACE PROPERTIES Final Technical Report
Ronald Greeley 1 Jan. 1986 8 p
(Grant NAGw-263)
(NASA-CR-176556; NAS 1.26:176556) Avail: NTIS HC A02/MF A01 CSCL 03B

The objectives were: to characterize surficial geologic units through integration of Infrared Thermal Mapper (IRTM)-derived regolith properties with other existing remote sensing data; to determine the physical and spectral properties of volcanic units in the mid-latitudes of Mars through the synthesis of the highest resolution IRTM, radar, and imaging data available; and to identify and characterize aeolian terrains on Mars using physical surface characteristics determined from remote sensing data. Author

N86-20441# Joint Publications Research Service, Arlington, Va.
SAGDEYEV ON INTERNATIONAL TRACKING, PROCESSING OF VEGA BALLOON PROBE
In its USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 30-32 Transl. into ENGLISH from Pravda (Moscow, USSR), 27 Aug. 1985 p 3 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20442# Joint Publications Research Service, Arlington, Va.
RESULTS FROM VENUS CLOUD STUDIES ON VEGA CRAFT
V. Moroz and L. Mukhin *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 33-34 Transl. into ENGLISH from Pravda (Moscow, USSR), 18 Nov. 1985 p 8 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

N86-20443# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON 15TH LUNAR-PLANETARY CONFERENCE
V. V. Shevchenko *In its* USSR Report: Space (JPRS-USP-86-002) 10 Feb. 1986 p 35-38 Transl. into ENGLISH from Zemlya I Vselennaya (Moscow, USSR), no. 6, Nov. - Dec. 1984 p 43-45 Conf. held at Houston, Tex., Mar. 1984 (For primary document see N86-20437 11-12)
Avail: NTIS HC A05

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-21484 National Research Council of Canada, Ottawa (Ontario).
OBSERVATIONS OF SOLAR FLUX AT THE ALGONQUIN RADIO OBSERVATORY ON 2800 MHz AND THE DOMINION RADIO ASTROPHYSICAL OBSERVATORY ON 2700 MHz Monthly Reports, Jan. 1984 - Dec. 1984
M. B. Bell, H. P. Gagnon, and J. D. Moore Feb. 1985 101 p
(NRCC-24190; ARO-14) Copyright. Avail: Issuing Activity

Daily tabulations of the radio flux at 2800 MHz from the Algonquin Radio Observatory (ARO) and at 2700 MHz from the Dominion Radio astrophysical Observatory (DRAO) are presented for the year 1984. This period marks the ninth year into sunspot cycle 21. Author

N86-21485# Ceskoslovenska Akademie Ved, Prague. Astronomical Inst.
PROGNOZ DATA. PART 4: SOLAR X-RAY FLUX IN THE 4-8 keV BAND DURING THE PERIOD 1 JULY 1983 - 13 JANUARY 1984
B. Valnicek, F. Farnik, J. Sudova, B. Komarek, O. Likin, and N. Pisarenko 1985 189 p
(Publ-62) Avail: NTIS HC A09/MF A01

The Prognoz-9 satellite was launched with the fifth Czechoslovak solar X-ray photometer of the Prognoz type (RF-2P) onboard. The Prognoz-9 satellite was launched on July 1, 1983 into the orbit of apogee of 720,000 km and perigee of 380 km, inclination of 65 deg and orbital period of about 641 hours. The photometer was in operation till January 15, 1984. The instrument and survey plots obtained are included. Author

N86-21486*# California Inst. of Tech., Pasadena. Solar Observatory.
THE TWO TYPES OF FLARE ASSOCIATED FILAMENT ERUPTIONS
Frances Tang Jan. 1986 23 p refs Submitted for publication
(Grants NGL-05-002-034; NSF ATM-85-13577)
(NASA-CR-176571; NAS 1.26:176571; BBSO-0255) Avail: NTIS HC A02/MF A012 CSCL 03B

Using years of high resolution solar footage obtained at Big Bear Solar Observatory flare associated filament eruptions were studied. In addition to the classical type eruption consisting of expansion and breakup, evidence was found of another type where a layer is shed from the filament and erupts while the inversion line filament below (or, what is left of it) remains in place. Both types of eruptions are presented. It is hoped that the new evidence will shed new light on the understanding of the role of filaments in flares. Author

N86-21487*# Delaware Univ., Newark.
IONIC CHARGE DISTRIBUTIONS OF ENERGETIC PARTICLES FROM SOLAR FLARES Semiannual Report, 1 Jul. - 31 Dec. 1985
D. J. Mullan and W. L. Waldron (Applied Research Corp., Landover, Md.) 25 Mar. 1986 10 p
(Grant NAG5-567)
(NASA-CR-176610; NAS 1.26:176610) Avail: NTIS HC A02/MF A01 CSCL 03B

The effects which solar flare X-rays have on the charge states of solar cosmic rays is determined quantitatively. Rather than to characterize the charge distribution by temperature alone, it is proposed that the X-ray flux at the acceleration site also is used. The effects of flare X-rays are modeled mathematically. E.R.

N86-21488# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A SYNCHROTRON/INVERSE COMPTON INTERPRETATION OF A SOLAR BURST PRODUCING FAST FLUXES AT LAMBDA > 3mm AND HARD X-RAYS
P. Kaufmann, E. Correia, J. E. R. Costa, and A. M. Zodi Vaz Oct. 1985 35 p refs Submitted for publication
(INPE-3667-PRE/824) Avail: NTIS HC A03/MF A01

The recently discovered new class of solar burst emission component exhibiting very fast pulses (duration approximately 60 ms) at mm-waves only (delta < 3 mm) and at hard X-rays, poses serious constraints for interpretations. Ultrarelativistic electrons are likely to be required in order to explain the high spectral turnover frequency. The time scales, however, are too small to be explained by synchrotron losses alone, or by bremsstrahlung losses, unless extremely large ambient plasma densities are assumed. The mm-wave emission is associated with a synchrotron component and hard X-rays with the inverse Compton process. The observed mm-wave emission is in the optically thick part of a spectrum peaking somewhere in the infrared range of frequencies, and the electron energies are reduced primarily by inverse Compton quenching on the synchrotron source photons. The model explains self-consistently the X-rays/sub-mm flux ratio and the short time scales. It also accounts for typical fluxes reported for white light flares. Author

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N86-21489# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 487, MARCH 1985. PART 1: (PROMPT REPORTS). DATA FOR FEBRUARY 1985, JANUARY 1985 AND LATE DATA
H. E. Coffey Mar. 1985 109 p
(PB85-201440; SGD-487-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03B

Solar-Geophysical Data Number 487, March 1985, Part 1 (Prompt Reports) contains data on the following: Detailed index for 1984 to 1985; Data for February 1985 – (IUWDS alert periods, Advance and worldwide), Solar activity indices, Solar flares, Solar radio emission, GOES solar proton events 1976 - January 1985, Inferred interplanetary magnetic field polarity, Mean solar magnetic field); Data for January 1985 – (Solar active regions, Sudden ionospheric disturbances, Solar radio spectral observations, Cosmic ray measurements by neutron monitor, Geomagnetic indices, Radio propagation indices); Late data – (Pioneer XII solar indices, Geomagnetic indices December 1984, Solar radio emission July 1982, cosmic rays August-September 1978 Climax May 1983 Huancayo, calcium plage regions, Errata–Cosmic rays Kiel and Toyo August 1983). GRA

N86-21490# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 487, MARCH 1985. PART 2 (COMPREHENSIVE REPORTS). DATA FOR SEPTEMBER 1984, JULY-NOVEMBER 1982
H. E. Coffey Mar. 1985 188 p
(PB85-201457; SGD-487-PT-2) Avail: NTIS HC A09/MF A01 CSCL 03B

Detailed index for 1984-1985; Data for September 1984–(Meudon carte synoptique, Solar radio bursts at fixed frequencies, Solar X-ray radiation from GOES satellite, Mass ejections from the Sun, Active prominences and filaments); Data for July-November 1982 – (Solar flares July 1982, Solar flares August 1982, Solar flares September 1982, Solar flares October 1982, Solar flares November 1982, Intervals of no flare patrol observation July - November 1982, Number of flares August 1966 - November 1982). GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-21491 Harvard Univ., Cambridge, Mass.
SYNCHROTRON EMISSION MODELS FOR GAMMA-RAY BURST SOURCES, THE DETERMINATION OF THE ORIENTATIONS OF AM HERCULIS BINARIES, AND NON-ADIABATIC SHOCKS ON MAGNETIC WHITE DWARFS Ph.D. Thesis
Jerome James Brainerd 1985 261 p
Avail: Univ. Microfilms Order No. DA8520165

The validity of using classical electrodynamics to calculate emission from a relativistic plasma in a strong magnetic field is examined. The radiative transfer equations are derived for a plasma that has an idex of refraction close to one. Solutions are derived for the special case of a thermal plasma in a uniform magnetic field and temperature, with the effect of pairs included. Special attention is paid to behavior of the polarization. Synchrotron emission is explored as an emission mechanism for gamma ray bursts. The synchrotron emissivity is calculated for steady state thermal and power law particle distributions. Linearly polarized cyclotron emission from 10 AM Herculis binaries is used to derive their orientations. The present models for AM Herculis binaries are unable to explain these results, suggesting a modification. Dissert. Abstr.

N86-21492*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ELECTROMAGNETIC DISSOCIATION EFFECTS IN GALACTIC HEAVY-ION FRAGMENTATION
John W. Norbury and Lawrence W. Townsend Feb. 1986 48 p refs
(NASA-TP-2527; L-16033; NAS 1.60:2527) Avail: NTIS HC A03/MF A01 CSCL 03B

Methods for calculating cross sections for the breakup of galactic heavy ions by the Coulomb fields of the interacting nuclei are presented. By using the Weizsacker-Williams method of virtual quanta, estimates of electromagnetic dissociation cross sections for a variety of reactions applicable to galactic cosmic ray shielding studies are presented and compared with other predictions and with available experimental data. Author

N86-21493# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE TIME BEHAVIOUR OF THE 8 KM/S WATER MASER SOURCE IN ORION
Z. Abraham, J. W. S. Vilas Boas, and L. F. delCiampo Dec. 1985 17 p refs Submitted for publication
(INPE-3731-PRE/861) Avail: NTIS HC A02/MF A01

The time behavior of the 8 km/s water maser source in Orion during the period August 1979 to November 1985 is reported. Four flares were detected, with rise times of the order of a month and decay times of the order of several months to a year. The source presented a high degree of linear polarization (30% to 60%), independent of the value of the intensity. The polarization angle varied between -3 deg and -36 deg, imposing constraints on possible models of the emitting region. Author

N86-21494# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SEARCH FOR FAST 22 GHz PULSES FROM GBS 0526-66
E. Correia, P. Kaufmann, J. W. S. Vilas Boas, and A. M. Zodi Vaz Nov. 1985 3 p ref Submitted for publication
(INPE-3702-PRE/843) Avail: NTIS HC A02/MF A01

The results of a survey of the gamma burst source GBS 0526-66 made at 22 GHz, with the 13.7-m Itapetinga antenna, during 5 days in 1984 to 1985 are reported. A distinct transient was observed on 3 January 1985, 05 15 17 UT, exhibiting 21 Jy intensity and 3.5 s duration. Author

N86-21495# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATIONS OF 3C273 WITH HIGH NORTH-SOUTH RESOLUTION
J. A. Biretta (California Inst. of Technology, Pasadena), M. H. Cohen (California Inst. of Technology, Pasadena), H. E. Hardebeck (California Inst. of Technology, Pasadena), P. Kaufmann, Z. Abraham, A. A. Perfetto, E. Scalise, Jr., R. E. Schaal, and P. M. Silva (Observatorio Nacional, Rio de Janeiro, Brazil) Nov. 1985 18 p refs Previously announced in IAA as A85-35438 Submitted for publication Sponsored in part by NSF/CNPq
(Grant NSF AST-82-10259)
(INPE-3713-PRE/849) Avail: NTIS HC A02/MF A01

VLBI maps of 3C 273 with high north-south resolution are presented. A strong, nonmonotonic curvature is found in the jet at projected radii of less than or equal to 5 pc. Measurements of the core size show that bulk relativistic motion in the core is not required for consistency with the observed X-ray flux. Author

N86-21496# Fermi National Accelerator Lab., Batavia, Ill.
HIGH ENERGY NEUTRINOS FROM CYG X-3
T. P. Walker, E. W. Kolb, and M. S. Turner Jul. 1985 11 p refs
(Contract DE-AC02-76CH-03000)
(DE85-013219; FNAL/C-85/99-A) Avail: NTIS HC A02/MF A01

Assuming that the UHE air showers from Cyg X-3 are produced by photons, the expected neutrino emission is calculated from a model which produces the (GAMMA)-rays in the atmosphere of the Cyg X-3 companion. The possibility of detecting such neutrinos in underground detectors is discussed. The constraints that such a signal places on the use of this model in other particle production scenarios is also discussed. DOE

N86-21497# Los Alamos National Lab., N. Mex.
COSMIC RAYS, SUPERNOVA AND THE ORIGIN OF ULTRAHIGH ENERGY PARTICLES
S. A. Colgate 1985 29 p Presented at the Symposium on Cosmogonical Processes, Boulder, Colo., 25 Mar. 1985
(Contract W-7405-eng-36)
(DE85-012712; LA-UR-85-1642; CONF-8503145-1) Avail: NTIS HC A03/MF A01

The acceleration of ultrahigh energy cosmic rays, greater than or equal to 10(15 to 20) eV, is still an unsolved problem in high-energy astrophysics. The now classical mechanism of stochastic acceleration of cosmic rays in a strong shock in the interstellar or intergalactic medium is limited in time and dimension for all likely acceleration sites, particularly for the highest energies. Acceleration of cosmic rays across a plasma shock of velocity, (BETA)/sub s/ ((BETA)/sub s/ = v/sub shock//c), requires 1/(BETA)/sub s/ number of crossings and therefore (1/(BETA)/sub s/) (2) number of scatterings for doubling the energy of a particle. This requires space of the order of 1/9BETA)/sub s/ x the scattering length, or a multiple of the Larmor radius and hence, the space requirements to cosmic ray acceleration are very many Larmor orbits in dimension, as well as times that are larger by (1/(BETA)/sub s/) (2) x t/sub Larmor/. The acceleration of cosmic rays by the shock in the envelope of a Type 1 supernova is reviewed, and the interaction of the accelerated matter with the nearby ISM is considered. DOE

N86-20914# Joint Publications Research Service, Arlington, Va.
EXPERIMENTS TO RECORD GRAVITATIONS
In its USSR Report: Earth Sciences (JPRS-UES-86-001) 10 Jan. 1986 p 38-39 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 4 Jul. 1985 p 4 (For primary document see N86-20887 11-42)
Avail: NTIS HC A04

99 GENERAL

N86-21498*# National Aeronautics and Space Administration, Washington, D.C.
PROFILES OF EXCELLENCE
[1985] 88 p
(EP-186; NAS 1.19:186) Avail: NTIS HC A05/MF A01 CSCL 05D

Contributions by minorities to the NASA programs are highlighted by profiles of 80 personnel. Educational and professional histories are summarized. B.G.

N86-21499# Committee on Science and Technology (U. S. House).
ASTRONAUTS AND COSMONAUTS BIOGRAPHICAL AND STATISTICAL DATA, REVISED JUNE 28, 1985
Washington GPO Dec. 1985 407 p Presented to the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, 26 Aug. 1985 Prepared by the Library of Congress, Congressional Research Service
(GPO-52-498) Avail: Subcommittee on Space Science and Applications

Astronauts' and cosmonauts' biographical and statistical data are reported. The following issues are described. Astronaut selection criteria, education and experience, medical and psychological condition; US payload specialists and passengers; the X-15, X-20 Dynasolar, and manned orbiting laboratory program, Soviet cosmonauts; non-US, non-Soviet spacenauts, and comparative data on American and Soviet spaceflights. E.A.K.

Typical Subject Index Listing

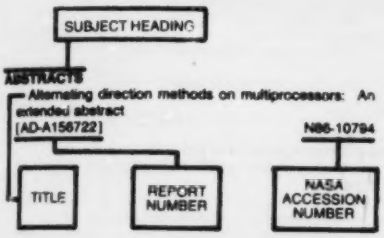

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A

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Aeronautical engineering, a continuing bibliography with indexes (supplement 197)
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Earth resources: A continuing bibliography with indexes
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[PB86-101953] N86-20982
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[PB86-101961] N86-20983
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[NASA-SP-4213] N86-21097
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[NASA-TM-88382] N86-21150
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The integrated bibliographic information system: Resource sharing tailored for local needs
[AD-A161700] N86-21431
Publications of the National Bureau of Standards, 1984 catalog
[PB85-245878] N86-21435
Publications and final reports on contracts and grants, 1985
[PB85-208460] N86-21439
Bibliographic databases on microcomputers: A series of demonstrations for staff and research students in the humanities
[BLRDR-5844] N86-21441
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The structure of defects in GaAs and related materials
[AD-A161272] N86-21403
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Shuttle flight experiment 30-day summary report
[NASA-CR-176539] N86-21109
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Astronauts and cosmonauts biographical and statistical data, revised June 28, 1985
[GPO-52-498] N86-21499
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Annals of meteorology, no. 22. International Symposium on Human Biometeorology
[ISBN-3-88148-229-9] N86-21012
Determination of the thermal environmental condition fluctuations in man using measuring techniques N86-21015
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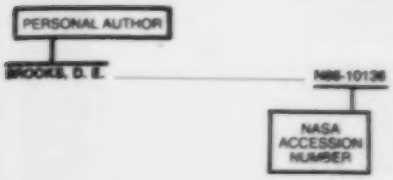

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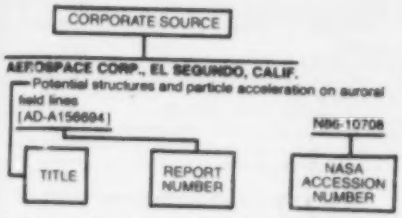

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HAWAII UNIV., MANOA.
Tenth anniversary special edition
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Classification requirements for the importation of explosives into the United Kingdom
[AD-P004831] N86-20600

HONEYWELL SYSTEMS AND RESEARCH CENTER, MINNEAPOLIS, MINN.
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Space station data system analysis/architecture study. Task 2: Options development DR-5. Volume 1: Technology options
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PROFILE user's guide
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INSTITUTE FOR DEFENSE ANALYSES, ALEXANDRIA, VA.
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LEICESTER UNIV. (ENGLAND).
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LEIDEN UNIV. (NETHERLANDS).
On interacting populations that disperse to avoid crowding: The effect of a sedentary colony
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LIBRARY OF CONGRESS, WASHINGTON, D. C.
The International of Scientific and Technical Information. A summary of the 2nd annual Forum on Federal Information Policies N86-21426
Subjects and policy areas for the consideration of the House Committee on Science and Technology, 99th Congress
[GPO-45-170] N86-21446
Astronauts and cosmonauts biographical and statistical data, revised June 28, 1985
[GPO-52-496] N86-21499

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[DE86-001113] N86-21382
Massachusetts Institute of Technology, Plasma Fusion Center, 1984-1985. Report to the President
[DE86-001476] N86-21385
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[DE86-001544] N86-21387
MATERIALS RESEARCH LABS., ASCOT VALE (AUSTRALIA).
Investigation of collision-induced fluorescence in D2:Ar and D2:HD:Ar mixtures at 200 k
[AD-A161545] N86-20784
MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
Activities report of the Institute for Extraterrestrial Physics
[MPE-REPT-168] N86-21462
MAX-PLANCK-INST. FUER PHYSIOLOGISCHE UND KLINISCHE FORSCHUNG, BAD NAUHEIM (WEST GERMANY).
The interface between atmosphere and organism N86-21014
MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Vortex generation at sharp edges: Two and three-dimensional effects
[MPIS-12/1985] N86-20747
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Space station data system analysis/architecture study. Task 2: Options development DR-5. Volume 1: Technology options
[NASA-CR-177839] N86-20472
Space Station data system analysis/architecture study. Task 1: Functional requirements definition, DR-5
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[NASA-CR-177842] N86-20474
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The Allende meteorite: Information from Ca-Al-rich inclusions on the formation and early evolution of the solar system N86-21473
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[DE85-012138] N86-20967

MIDWEST RESEARCH INST., KANSAS CITY, MO.
SOLERAS: Solar Energy Water Desalination Project. Exxon Research and Engineering. Volume 3: Appendices pilot plan and design details and subsystem direct cost support
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MINISTRY OF DEFENCE, LONDON (ENGLAND).
Classification of explosives in accordance with international system
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N

NAGOYA UNIV. (JAPAN).
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NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
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NATIONAL AERONAUTICAL LAB., TOKYO (JAPAN).
Research on the aerodynamic characteristics of vehicles by free flight testing at supersonic speeds
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical engineering, a continuing bibliography with indexes (supplement 197)
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Earth resources: A continuing bibliography with indexes
[NASA-SP-7041(48)] N86-20931
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[NASA-SP-4213] N86-21097
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
The 1-(diorganooxphosphonyl)methyl-2, 4- and -2, 6-dinitro and diamino benzenes and their derivatives
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
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NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
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NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
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[NBS-SP-710] N86-21451
NBS (National Bureau of Standards) research reports
[PB85-236354] N86-21460

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
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Fire behavior of upholstered furniture
[NBS/MONO-173] N86-20585
Publications of the National Bureau of Standards, 1984 catalog
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NATIONAL CLIMATIC CENTER, ASHEVILLE, N. C.
Tropical cyclones of the North Atlantic Ocean, 1871-1980 (with storm track maps updated through 1984)
[PB85-246183] N86-21088

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.
Publications and final reports on contracts and grants, 1985
[PB85-208460] N86-21439

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
Solar-geophysical data number 487, March 1985. Part 1: (Prompt reports). Data for February 1985, January 1985 and late data
[PB85-201440] N86-21489
Solar-geophysical data number 487, March 1985. Part 2 (Comprehensive reports). Data for September 1984, July-November 1982
[PB85-201457] N86-21490

NATIONAL HURRICANE CENTER, CORAL GABLES, FLA.
Tropical cyclones of the North Atlantic Ocean, 1871-1980 (with storm track maps updated through 1984)
[PB85-246183] N86-21088
Annual data and verification tabulation Atlantic tropical cyclones, 1984
[PB85-211332] N86-21090

NATIONAL HURRICANE RESEARCH LAB., CORAL GABLES, FLA.
Tropical cyclones of the North Atlantic Ocean, 1871-1980 (with storm track maps updated through 1984)
[PB85-246183] N86-21088

NATIONAL INST. FOR RHEUMATICS AND PHYSIOTHERAPY, BUDAPEST (HUNGARY).
The influence of heliometeorologic factors on circulation and some vegetative functions N86-21021

NATIONAL LIBRARY OF MEDICINE, BETHESDA, MD.
Medical subject headings, tree structures, 1986
[PB85-232635] N86-21436
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
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Assessment of precipitation chemistry measurements from the Global Trends Network and its predecessors, 1972-1982
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Catalog of strong-motion accelerograph records
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Combined international catalog of geomagnetic data
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Diurnal and spatial variability of lightning activity in northeastern Colorado during the summer
[PB85-212173] N86-21089

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.
National marine pollution program: Agency program summaries FY 1984 update, appendix No. 1
[PB86-101953] N86-20982

NATIONAL OCEANOGRAPHIC DATA CENTER, WASHINGTON, D. C.
National marine pollution program: Catalog of federal projects FY 1984 update, appendix No. 2
[PB86-101901] N86-20983
NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO).
Observations of solar flux at the Algonquin Radio Observatory on 2800 MHz and the Dominion Radio Astrophysical Observatory on 2700 MHz
[NRCC-24190] N86-21484
NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Federal R and D funding by budget function: Fiscal years 1984-86
[PB85-232528] N86-21454
National Science Foundation, volume 1
[PB85-232551] N86-21461
NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.
National Severe Storms Laboratory, fiscal year 1984
[PB85-211092] N86-21091
NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Information for the developing world: NTIS's (National Technical Information Services's) role in information transfer to developing countries
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Safety study: Ultraviolet vehicle accidents
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NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
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Effect of frangible panels on internal gas pressures
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Yield-line analysis of rectangular labs with doors
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Prediction of debris hazards from explosions in buildings
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Development of a deep-towed array geophysical system: A new capability for deep-ocean acoustic measurements
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Geonames processing system functional design specification. Volume 1: Automated alphanumeric data entry system
[AD-A162458] N86-21185
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Design of composite material chambers for solid propellant missile motors
[AD-A158890] N86-20496
NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Proceedings of the 1985 ONR/NAVAIR Wave Rotor Research and Technology Workshop
[AD-A161539] N86-20813
An adaptive model based disk file head positioning servo system
[AD-A161704] N86-21162
NAVAL RESEARCH LAB., WASHINGTON, D. C.
Dynamics of the large scale return currents on auroral field lines
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DoD lightning protection requirements for structures housing explosives
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The relative fluorescent efficiency of sodium salicylate between 90 and 800 eV
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Energetics of the formation and reactions of gaseous ions
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NETHERLANDS ENERGY RESEARCH FOUNDATION, PETTEN.
Phase transitions in the mixed quadratic-layer antiferromagnets with competing anisotropies K2Co(x)Fe(1-x)F4
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Contributions to workload of rotational optical transformations
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The morphology of the planetary nebula NGC 3242 N86-21470
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Land use and land cover classification of the North Carolina Barrier Islands: Level 3
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Real inversion formulas for Laplace and Stieltjes transforms
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Innovations and wold decompositions of stable sequences
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Gauge theories and unification of elementary particle interactions
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Digital fault-tolerant flight actuation systems
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NORTHROP SERVICES, INC., RESEARCH TRIANGLE PARK, N. C.
Monte Carlo simulation of two-particle relative diffusion using Eulerian statistics
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Head-spine structure modeling: Enhancements to secondary loading path model and validation of head-cervical spine model
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ICRF wave propagation and absorption in tokamak and mirror magnetic fields: A full-wave calculation
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Charge exchange processes involving iron ions
[DE86-001353] N86-21384
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Cryogenic wind tunnel instrumentation N86-20421
Productivity: The economic aspects of cryogenic wind tunnel design and use N86-20423
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE (FRANCE).
Fundamental reflections on cryogenic testing N86-20422
The T2 cryogenic induction tunnel in Toulouse N86-20424
OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
The 10th Meeting of the International Society for Neurochemistry held at Riva del Garda, Italy on 19-24 May 1985
[AD-A160668] N86-21110

OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
Marine applications for fuel cell technology: A technical memorandum
[OTA-TM-O-37] N86-20950
OKLAHOMA STATE UNIV., STILLWATER.
Measurements of a single lateral jet injected into swirling crossflow
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Experiments on opposed lateral jets injected into swirling crossflow
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Thermophysical properties correlations and pseudocomponent characterization parameter estimation for fossil fluids
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OLD DOMINION UNIV., NORFOLK, VA.
Infrasonic emissions from local meteorological events: A summary of data taken throughout 1984
[NASA-TM-87686] N86-21281
ONLINE COMPUTER SYSTEMS, INC., GERMANTOWN, MD.
Integrated library system user manual for fines and billing subsystems
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OREGON STATE UNIV., CORVALLIS.
Northeast Nevada wind resource assessment study
[DE85-018285] N86-20969
Wake velocity deficit measurements at the Goodnoe Hills MOD-2 site: A summary of the 1982 and 1984 findings
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Investigations of the origins of metastable light-induced changes in hydrogenated amorphous silicon
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PENNSYLVANIA UNIV., PHILADELPHIA.
Research on basic understanding of high efficiency in silicon solar cells
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PHILIPS DATA SYSTEMS B. V., APELDOORN (NETHERLANDS).
Selection criteria for local area networks (LANS) N86-21210
PHILIPS INTERNATIONAL B.V., EINDHOVEN (NETHERLANDS).
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PITTSBURGH UNIV., PA.
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Organic functional group reactivities at metal surfaces
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POLYTECHNIC INST. OF NEW YORK, BROOKLYN.
Equalization in digital satellite communication systems using robust Kalman filtering N86-20645
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Epoxy matrices and their behavior in aggressive environments N86-20513
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Studies of nucleation and heat transfer in liquid helium isotopes 3 and 4 N86-20514
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[NASA-CR-178707] N86-20495
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PURDUE UNIV., WEST LAFAYETTE, IND.
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Fast-acting sprinkler system design considerations for propellant manufacture
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RADIO CORP. OF AMERICA, HOLLYWOOD, CALIF.
Space station data system analysis/architecture study. Task 2: Options development DR-5. Volume 1: Technology options
[NASA-CR-177839] N86-20472
RAYTHEON CO., SUDBURY, MASS.
Pulsed Doppler lidar airborne scanner
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An experimental study of biaxial inelastic deformation behavior of engineering alloys in support of viscoplasticity theory and life prediction N86-20843
RESEARCH AND DATA SYSTEMS, INC., LANHAM, MD.
User's guide and tape specification for ERB 7 DELMAT
[NASA-CR-175299] N86-21428
RESEARCH INST. OF NATIONAL DEFENCE, LINKOEPING (SWEDEN).
Microwave tubes. Literature survey no. 6 comprising year 1984
[FOA-C-30406-E] N86-20703
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N.C.
AlGaAs-GaAs patterned Ge tunnel junction cascade concentrator solar cell
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Galley and overhead compartment experiment results: Full-scale transport controlled impact demonstration
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Highlights of ISR results
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Evaluation of the analysis of plutonium materials for low-level uranium using a modified Scintrex uranium analyzer (laser fluorometer)
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Gulf of Mexico: Outer Continental Shelf oil and gas activities in the Gulf of Mexico and their onshore impacts
[TI85-901421] N86-20941
Arctic summary report: Outer Continental Shelf oil and gas activities in the Arctic and their onshore impacts
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Gulf of Mexico Index, August 1983 - October 1984
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Multiple scatter cross sections for anisotropic Kolmogoroff turbulence
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SCIENCE RESEARCH COUNCIL, LONDON (ENGLAND).
Optical character recognition: The technology and its application in information units and libraries
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SCIENTIFIC RESEARCH ASSOCIATES, INC., GLASTONBURY, CONN.
Influence of large-scale motion on turbulent transport for confined coaxial jets. Volume 2: Navier-Stokes calculations of swirling and nonswirling confined coaxial jets
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SHEFFIELD UNIV. (ENGLAND).
Evaluation of clustering methods for automatic document classification
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SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
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SOCIETE NATIONALE DES POUDRES ET EXPLOSIFS, VERT-LE-PETIT (FRANCE).
Method of prediction of the explosive behavior of highly confined PBXs submitted to bullet impact
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SOLAR TURBINES INTERNATIONAL, SAN DIEGO, CALIF.
Rocket thrust chamber thermal barrier coatings
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SOUTHAMPTON UNIV. (ENGLAND).
Further investigation into calibration techniques for a magnetic suspension and balance system
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Analysis and interpretation of MAGSAT anomalies over north Africa
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Heat flow and geothermal studies in the State of Washington
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Real-time quality control of antimisting kerosene (AMK)
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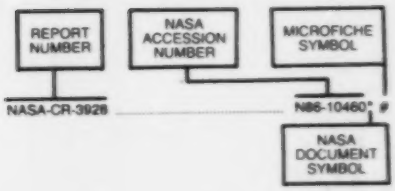

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BLL-CE-TRANS-8223-(9022-09) N86-21146

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BLL-RISLEY-TR-5290-(9091.9F) N86-20790

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BLLD-M-36552-TRANS-(5828.4) N86-20715
BLLD-M-36553-TRANS-(5828.4) N86-20716

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BLLD-TRANS-M-36510-(5828.4) N86-20537
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BLLD-TRANS-M-36528-(5828.4) N86-20792

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DOE/ER-52068/T1 ..... N86-21386 #
DOE/ER-53104/T4 ..... N86-20692 #
DOE/ER-7[illegible]7/T2 ..... N86-20501 #

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HOW TO USE *STAR* SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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VOLUME 24 NUMBER 12 / JUNE 23, 1986

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 1895

02 AERODYNAMICS 1895

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY 1899

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 1900

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1900

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 1902

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 1902

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 1903

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 1904

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 1905

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS N.A.

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 1906

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION N.A.

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING 1906

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 1907

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 1908

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 1909

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **1909**
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **1911**
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY **1917**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics.*

26 METALLIC MATERIALS **1921**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **1925**
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **1930**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

31 ENGINEERING (GENERAL) **1932**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **1933**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING **1936**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

34 FLUID MECHANICS AND HEAT TRANSFER **1943**
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

35 INSTRUMENTATION AND PHOTOGRAPHY **1947**
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS **1952**
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING **1954**
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY **1958**
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **1958**
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) **N.A.**

43 EARTH RESOURCES **1972**
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **1974**
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

45 ENVIRONMENT POLLUTION **1978**
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS **1980**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY **1986**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **1988**
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **1990**
Includes genetics.

52 AEROSPACE MEDICINE **1992**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **1994**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **1995**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **1996**

60 COMPUTER OPERATIONS AND HARDWARE **1997**
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE **2000**
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS **2007**
Includes computer networks.

63 CYBERNETICS **2007**
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS **2009**
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **2013**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **2016**
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **2016**
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) **2017**
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS **2024**
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS **2026**
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS **2028**
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS **2039**
Includes light phenomena.

75 PLASMA PHYSICS **2042**
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS **2045**
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS **2048**
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **2048**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **2050**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS **2050**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **2050**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **2051**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **2051**

89 ASTRONOMY **2052**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2058**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **2059**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS **2062**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2062**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

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(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

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COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 12 / JUNE 23, 1986

Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N86-21500# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
DEVELOPMENT OF A COMPUTERISED METHOD OF DETERMINING AIRCRAFT MAINTENANCE INTERVALS M.S. Thesis
David B. OHearn Sep. 1985 102 p
(AD-A161339; AFIT/GLM/LSM/85S-59) Avail: NTIS HC A06/MF A01 CSCL 05/1

Scheduled maintenance is considered one of the largest costs of aircraft ownership. For some components that exhibit an increasing failure rate, this cost can be minimized by changing the components at their optimal age replacement intervals which can be determined using the Total-Time-on-Test statistic. However, the age replacement model treats all components as separate entities and does not recognize economies that can be achieved by changing groups of components at the same time. This study develops a heuristic model for determination of near optimal groupings of components and the replacement intervals for these components. This heuristic model is illustrated using actual field data for a number of components fitted to the C130H aircraft engines operated by the Royal Australian Air Force. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-21501 Virginia Polytechnic Inst. and State Univ., Blacksburg.
A NEW PARABOLIZED NAVIER-STOKES SCHEME FOR HYPERSONIC REENTRY FLOWS Ph.D. Thesis
Bilal A. Bhutta 1985 173 p
Avail: Univ. Microfilms Order No. DA8521297

High Mach number, low-Reynolds number (high-altitude) reentry flowfield predictions are an important problem area in computational aerothermodynamics. Available numerical tools for handling such flows are very few and significantly limited in their applicability. A new implicit fully-iterative Parabolized Navier-Stokes (PNS) scheme is developed to accurately predict such low-Reynolds number flows. In the new approach the differential equations governing the conservation of mass, momentum and energy, and the algebraic equation of state for a perfect gas are solved simultaneously in a coupled manner. The idea is presented that by treating the governing equations in this manner (rather than eliminating the pressure terms in the governing equations by using appropriate differentiated forms of the equation of state) it may be possible to have an unconditionally time-like numerical scheme. The stability of a simplified version of this new PNS scheme is also studied, and it is demonstrated that these simplified equations are unconditionally time-like in the subsonic as well as the supersonic flow regions. Dissert. Abstr.

N86-21502 Colorado Univ., Boulder.
VORTICAL FLOWS ABOUT OSCILLATING AIRFOIL WITH SURFACE SUCTION Ph.D. Thesis
Chyn-Shan Chiu 1985 94 p
Avail: Univ. Microfilms Order No. DA8522651

The motion of discrete vortices in the vicinity of an oscillating Joukowski airfoil with surface suction and the influence of these vortices on the aerodynamic performance of the airfoil are studied using the method of conformal mapping in combination with a numerical technique. The following four cases are examined: (1) discrete vortices are released intermittently from the upper surface of the airfoil causing the mean lift to increase and approach an symptotic value as time increases while the mean drag decreases monotonically. The oscillating moment always lags behind the airfoil motion and the behavior of its mean value is similar to that of the lift; (2) a trapped vortex is perturbed by a finite distance away from its equilibrium position and is found to be generally unstable to the finite disturbances; (3) a free vortex is released at a location upstream of the airfoil and moves towards the trailing edge with its trajectory being affected by the geometry of the airfoil; and (4) a free vortex can be made to linger above the oscillating airfoil for a long period of time provided a proper suction is applied to the upper surface. Dissert. Abstr.

N86-21503 California Inst. of Tech., Pasadena.
EXPERIMENTS ON ENTRAINMENT, MIXING AND CHEMICAL REACTIONS IN TURBULENT JETS AT LARGE SCHMIDT NUMBER Ph.D. Thesis
Werner Johann Anton Dahm 1985 182 p
Avail: Univ. Microfilms Order No. DA8522608

Entrainment, mixing and chemical reactions are investigated in the far field of a steady, axisymmetric, momentum-driven, turbulent jet issuing into an unconfined, quiescent medium in the large Schmidt number (liquid-phase) regime. Visualization experiments using both passive and chemically-sensitive laser induced fluorescence (LIF) techniques show the important role of large scale transport in the jet far field, and show that entrainment, mixing and chemical reactions in the far field are dominated by a large scale organization of the flow. Consecutive instantaneous profiles of the jet fluid concentration along the axial and radial directions in the far field are measured by combining these LIF techniques with direct high-resolution linear photodiode array imaging and high speed digital data acquisition. These axial imaging measurements have revealed a similarity concentration variable in the jet far field for which probability density functions (PDFs) display self-similarity along rays in the jet. Dissert. Abstr.

N86-21504 Maryland Univ., College Park.
COMPUTATION OF THREE DIMENSIONAL POTENTIAL FLOW AROUND A FINITE WING WITH A LEADING-EDGE DISCONTINUITY AT HIGH ANGLE OF ATTACK Ph.D. Thesis

Taehwan Cho 1985 219 p
Avail: Univ. Microfilms Order No. DA8523059

The aerodynamics of a finite wing above the stall angle of attack is investigated computationally. Vortex panel computer programs have been developed which can be used to calculate two dimensional separated flows over airfoils and three dimensional separated flow over a wing with leading edge droop modification. On each wind surface panel, a bound vortex is assumed to be distributed linearly in the spanwise direction and also in the chordwise direction. For the three dimensional flow around a finite thickness wing, the upper and lower surfaces are assumed to be independent infinitely thin wings located on top of each other. For three dimensional separated flow calculations, two different computational models are developed. One is a semi-empirical engineering model which is applied to an infinitely thin wing. The location of the separation and the pressure inside the separation region are provided from experiment. Inside the separation region, constant strength vortex panels are distributed corresponding to the constant pressure, Cp = -0.6, which is confirmed by various experiments. Dissert. Abstr.

N86-21505*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF A LINEARIZED UNSTEADY AERODYNAMIC ANALYSIS TO STANDARD CASCADE CONFIGURATIONS Final Report
Joseph M. Verdon and William J. Usab, Jr. Washington NASA Jan. 1986 56 p refs
(Contract NAS3-22257)
(NASA-CR-3940; R85-956896-4; E-2686; NAS 1.26:3940) Avail: NTIS HC A04/MF A01 CSCL 01A

A linearized potential flow analysis, which accounts for the effects of nonuniform steady flow phenomena on the linearized unsteady aerodynamic response to prescribed blade motions, has been applied to five cascade configurations. These include the first, fifth, eighth and ninth standard configurations proposed as a result of the Second International Symposium on Aeroelasticity in Turbomachines and a NASA Lewis flutter cascade. Selected results from this study, including comparisons between analytical predictions and the experimental measurements submitted for three of the foregoing configurations, are described. The correlation between theory and experiment for the first standard configuration (a compressor cascade operating at low Mach number and frequency) is quite good. Moreover, the predictions and measurements for the NASA Lewis cascade of symmetric biconvex airfoils show good qualitative agreement. However, wide discrepancies exist between the theoretical predictions and the experimental measurements for the fifth standard configuration (a subsonic transonic fan tip cascade). These can be partially attributed to conditions being imposed in the experiment which differ from those commonly used in unsteady aerodynamic analyses. Author

N86-21506*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYSIS OF JIMSPHERE PAIRS FOR USE IN ASSESSING SPACE VEHICLE ASCENT CAPABILITY
Charles K. Hill Mar. 1986 113 p refs
(NASA-TP-2573; NAS 1.60:2573) Avail: NTIS HC A06/MF A01 CSCL 01A

A data base of paired detailed wind profiles was developed for use in evaluating Shuttle Transportation System (STS) ascent capability. Since launch decision is based on a wind measured about 3.5 hr before launch, a data base of paired detailed profiles is needed. Method and technique on the reduction process and analysis is also presented. Guidelines used in selecting the pairs of profiles were established to insure a valid and representative data base. Sigma-U values for 3.5 hr at 12 km altitude show 8 percent increase from the transition case to the winter case and 18 percent decrease from the transition case to the summer case. Sigma-Values for 3.5 hr at 12 km altitude shows 12 percent increase from the transition case to the winter case and 17 percent decrease from the transition case to the summer case. A special feature of the 7- and 10.5-hr cases is that sigma-V increases by as much as 30 percent from the transition to the winter profiles. This large increase does not appear in the sigma-U data. Comparisons of the calculated values of 3.5 hr standard deviations of U and V with actual component deviations measured during space shuttle launch conditions confirm that the statistical values are representative. Author

N86-21507*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INVESTIGATION OF SOLID PLUME SIMULATION CRITERIA TO PRODUCE FLIGHT PLUME EFFECTS ON MULTIBODY CONFIGURATION IN WIND TUNNEL TESTS
Alonao L. Frost and Charlie C. Dill Mar. 1986 182 p
(NASA-TP-2569; NAS 1.60:2569) Avail: NTIS HC A09/MF A01 CSCL 01A

An investigation to determine the sensitivity of the space shuttle base and forebody aerodynamics to the size and shape of various solid plume simulators was conducted. Families of cones of varying angle and base diameter, at various axial positions behind a Space Shuttle launch vehicle model, were wind tunnel tested. This parametric evaluation yielded base pressure and force coefficient data which indicated that solid plume simulators are an inexpensive, quick method of approximating the effect of engine exhaust plumes on the base and forebody aerodynamics of future, complex multibody launch vehicles. Author

N86-21508# National Aerospace Lab., Tokyo (Japan).
A VISCOUS-INVISCID INTERACTION METHOD TO PREDICT THE AERODYNAMIC PERFORMANCE OF AIRFOILS AT TRANSONIC SPEED
Kenichi Masuno 1985 34 p refs In JAPANESE; ENGLISH summary
(NAL-TR-873) Avail: NTIS HC A03/MF A01

The present paper describes a calculation method for predicting the aerodynamic performance of single airfoils in the transonic flows of high Reynolds numbers. For the inviscid part of the method, a transonic full potential equation represented on an algebraically generated C-topology coordinate system is solved by a fully conservative AF2 iteration scheme. A finite difference method (PC-CN Scheme) is used for the boundary layer and wake solutions. In the viscous method, an algebraic turbulence model for the asymmetric near wake is also developed. The model used to achieve viscous-inviscid coupling is the equivalent source model. The wake thickness and curvature are taken into account. The calculations for turbulent wake flows indicated good agreement with the experimental data, and show that the velocity profiles across the wake and minimum velocities can be computed satisfactorily with the present method. Comparisons of the predictions with high Reynolds number wind tunnel experiments show good agreement for pressure distributions, lift and drag. Author

N86-21509*# National Aeronautics and Space Administration, Washington, D.C.
COMPARISON OF COMPUTATIONAL RESULTS OF A FEW REPRESENTATIVE THREE-DIMENSIONAL TRANSONIC POTENTIAL FLOW ANALYSIS PROGRAMS
K. Tanaka and H. Hirose Jan. 1986 19 p refs Transl. into ENGLISH of "Sanjigen Sen-Onsokunagare Kaisetsu Kakashu Puroguramu Niyoru Keisankekka no Hikaku" presented at the NAL Symposium on Aircraft Computational Aerodynamics, 1983 p 157-167 Symposium held in Tokyo, Japan, 30 Jun. - 1 Jul. 1983 Original language document was announced as N85-26628 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77963; NAS 1.15:77963) Avail: NTIS HC A02/MF A01 CSCL 01A

The development of transonic aerodynamic computation methods and specific examples, as well as examples of three-dimensional transonic computation in design, are discussed. The case of the transonic transport and the case of the small transport are analyzed. Requirements for programs of the future are itemized. Author

N86-21510*# National Aeronautics and Space Administration, Washington, D.C.
VORTEX CONCEPTION OF ROTOR AND MUTUAL EFFECT OF SCREW/PROPELLERS
A. M. Lepilkin Jan. 1986 48 p refs Transl. into ENGLISH from Bulletin of the Academy of Sciences USSR, Mechanics and Machine Building (USSR), no. 5, 1963 p 77-107 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77979; NAS 1.15:77979) Avail: NTIS HC A03/MF A01 CSCL 01A

A vortex theory of screw/propellers with variable circulation according to the blade and its azimuth is proposed, the problem is formulated and circulation is expanded in a Fourier series. Equations are given for inductive velocities in space for crews, including those with an infinitely large number of blades and expansion of the inductive velocity by blade azimuth of a second screw. Multiparameter improper integrals are given as a combination of elliptical integrals and elementary functions, and it is shown how to reduce elliptical integrals of the third kind with a complex parameter to integrals with a real parameter. Author

N86-21511*# National Aeronautics and Space Administration, Washington, D.C.
PROPULSION AND CONTROL PROPELLERS WITH THRUSTER NOZZLES PRIMARILY FOR AIRCRAFT APPLICATIONS
W. Pabst Mar. 1986 8 p Transl. into ENGLISH of West German Patent no. P3440369.8 (5 Nov. 1984) p 1-6 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77715; NAS 1.15:77715) Avail: NTIS HC A02/MF A01 CSCL 01A

A propulsion and control propeller with thruster nozzles, primarily for aircraft application is described. Adjustability of rotor blades at the hub and pressurized gas expulsion combined with an air propeller increase power. Both characteristics are combined in one simple device, and, furthermore, incorporate overall aircraft control so that mechanisms which govern lateral and horizontal movement become superfluous. Author

N86-21512*# National Aeronautics and Space Administration, Washington, D.C.
MUTUAL EFFECT OF THERMOCHEMICAL SURFACE DECOMPOSITION AND VISCOUS INTERACTION DURING HYPERSONIC FLOW PAST A SHARP CONE
A. V. Limanskiy and V. I. Timoshenko Feb. 1986 11 p refs Transl. into ENGLISH from Kosmicheskiye Issledovaniya na Ukraine (USSR), no. 11, 1977 p 23-26 Original language document was announced in IAA as A78-53508 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-78015; NAS 1.15:78015) Avail: NTIS HC A02/MF A01 CSCL 01A

Numerical results on the hypersonic gas flow in viscous interaction regime past sharp circular cones with thermally destructible Teflon surface are presented. Characteristics of the mutual influence between the thermochemical decomposition of the surface and the viscous interaction are revealed. Author

N86-21513*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE PREDICTED EFFECT OF AERODYNAMIC DETUNING ON COUPLED BENDING-TORSION UNSTALLED SUPERSONIC FLUTTER
Daniel Hoyniak and Sanford Fleeter [1986] 30 p refs Prepared for presentation at the 31st International Gas Turbine Conference, Dusseldorf, West Germany, 8-12 Jun. 1986; sponsored by ASME Prepared in cooperation with Purdue Univ., West Lafayette, Ind.
(NASA-TM-87240; E-2915; NAS 1.15:87240) Avail: NTIS HC A03/MF A01 CSCL 01A

A mathematical model is developed to predict the enhanced coupled bending-torsion unstalled supersonic flutter stability due to alternate circumferential spacing aerodynamic detuning of a turbomachine rotor. The translational and torsional unsteady aerodynamic coefficients are developed in terms of influence coefficients, with the coupled bending-torsion stability analysis developed by considering the coupled equations of motion together with the unsteady aerodynamic loading. The effect of this aerodynamic detuning on coupled bending-torsion unstalled supersonic flutter as well as the verification of the modeling are then demonstrated by considering an unstable 12 bladed rotor, with Verdon's uniformly spaced Cascade B flow geometry as a baseline. However, with the elastic axis and center of gravity at 60 percent of the chord, this type of aerodynamic detuning has a minimal effect on stability. For both uniform and nonuniform circumferentially space rotors, a single degree of freedom torsion mode analysis was shown to be appropriate for values of the bending-torsion natural frequency ratio lower than 0.6 and higher 1.2. When the elastic axis and center of gravity are not coincident, the effect of detuning on cascade stability was found to be very sensitive to the location of the center of gravity with respect to the elastic axis. In addition, it was determined that when the center of gravity was forward of an elastic axis located at midchord, a single degree of freedom torsion model did not accurately predict cascade stability. Author

N86-21514*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTEGRATION EFFECTS OF UNDERWING FORWARD- AND REARWARD-MOUNTED SEPARATE-FLOW, FLOW-THROUGH NACELLES ON A HIGH-WING TRANSPORT
Milton Lamb and William K. Abeyounis Apr. 1986 31 p refs
(NASA-TM-87627; L-16026; NAS 1.15:87627) Avail: NTIS HC A03/MF A01 CSCL 01A

An experimental investigation was conducted in the Langley 16-Foot Transonic Tunnel at free-stream Mach numbers from 0.70 to 0.82 and angles of attack from -2.5 to 4.0 degrees to determine the integration effects of pylon-mounted underwing forward and rearward separate-flow, flow-through nacelles on a high-wing transonic transport configuration. The results showed that the installed drag of the nacelle/pylon in the rearward location was slightly less than that of the nacelle/pylon in the forward location. This reduction was due to the reduction in calculated skin friction of the nacelle/pylon configuration. In all cases the combined value of form, wave, and interference drag was excessively high. However, the configuration with the nacelle/pylon in a rearward location produced an increase in lift over that of the basic wing-body configuration. Author

N86-21515*# National Aeronautics and Space Administration, Washington, D.C.
LOSSES IN CHANNELS WITH INCREASED INTERNAL TURBULENCE
A. Ye. Zaryankin and G. S. Soloveva Jan. 1986 11 p refs Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR, Energetika i Transport (USSR), no. 5, 1976 p 164-168 Original language document was announced in IAA as A77-14955 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77995; NAS 1.15:77995) Avail: NTIS HC A02/MF A01 CSCL 01A

An approximate method for determining the effect of the level of turbulence on the aerodynamic characteristics of convergent and diffuser channels is examined. A momentum equation for the boundary layer is in the method, introducing external flow turbulence on the basis of experimental values of the coefficient of friction and the form factor. It is found that at significant levels of external turbulence, losses must be considered not only in the boundary layer but also in the central region of the channel. Author

N86-21516*# National Aeronautics and Space Administration, Washington, D.C.
THREE-DIMENSIONAL BOUNDARY LAYER ANALYSIS PROGRAM BLAY AND ITS APPLICATION
Ken-ichi Matsuno and Tomiko Ishiguro Jan. 1986 24 p refs Transl. into ENGLISH from proceedings of the NAL Symposium

on Aircraft Computational Aerodynamics, 1983 p 207-218 Symposium held in Tokyo, Japan, 30 Jun. - 1 Jul. 1983 Original language document was announced as N85-26632 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77962; NAS 1.15:77962) Avail: NTIS HC A02/MF A01 CSCL 01A

The boundary layer calculation program (BLAY) is a program code which accurately analyzes the three-dimensional boundary layer of a wing with an undefined plane. In comparison with other preexisting programs, the BLAY is characterized by the following: (1) the time required for computation is shorter than any other; (2) the program is adaptable to a parallel processing computer; and (3) the program is associated with a secondary accuracy in the z-direction. As a boundary layer modification to transonic nonviscous flow analysis programs, it is used to adjust viscous and nonviscous interference problems repeatedly. Its efficiency is an important factor in cost reduction in aircraft designing.
Transl. by B.G.

N86-21517*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ANALYSIS FOR THE SOUND FIELD PRODUCED BY RIGID WIDE CORD DUAL ROTATION PROPELLERS OF HIGH SOLIDARITY IN COMPRESSIBLE FLOW
Sridhar M. Ramachandra and Lawrence J. Bober [1986] 42 p refs Presented at the 24th Aerospace Sciences Meeting, Reno, Nev., 6-8 Jan. 1986; sponsored by AIAA
(NASA-TM-87178; E-2826; NAS 1.15:87178) Avail: NTIS HC A03/MF A01 CSCL 01A

An unsteady lifting service theory for the counter-rotating propeller is presented using the linearized governing equations for the acceleration potential and representing the blades by a surface distribution of pulsating acoustic dipoles distributed according to a modified Birnbaum series. The Birnbaum series coefficients are determined by satisfying the surface tangency boundary conditions on the front and rear propeller blades. Expressions for the combined acoustic resonance modes of the front prop, the rear prop and the combination are also given. Author

N86-21518*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NEW METHOD FOR LAMINAR BOUNDARY LAYER TRANSITION VISUALIZATION IN FLIGHT: COLOR CHANGES IN LIQUID CRYSTAL COATINGS
Bruce J. Holmes, Peter D. Gall, Cynthia C. Croom, Gregory S. Manuel, and Warren C. Kelliher Jan. 1986 9 p refs Original contains color illustrations
(NASA-TM-87666; NAS 1.15:87666) Avail: NTIS HC A02/MF A01 CSCL 01A

The visualization of laminar to turbulent boundary layer transition plays an important role in flight and wind-tunnel aerodynamic testing of aircraft wing and body surfaces. Visualization can help provide a more complete understanding of both transition location as well as transition modes; without visualization, the transition process can be very difficult to understand. In the past, the most valuable transition visualization methods for flight applications included sublimating chemicals and oil flows. Each method has advantages and limitations. In particular, sublimating chemicals are impractical to use in subsonic applications much above 20,000 feet because of the greatly reduced rates of sublimation at lower temperatures (less than -4 degrees Farenheit). Both oil flow and sublimating chemicals have the disadvantage of providing only one good data point per flight. Thus, for many important flight conditions, transition visualization has not been readily available. This paper discusses a new method for visualizing transition in flight by the use of liquid crystals. The new method overcomes the limitations of past techniques, and provides transition visualization capability throughout almost the entire altitude and speed ranges of virtually all subsonic aircraft flight envelopes. The method also has wide applicability for supersonic transition visualization in flight and for general use in wind tunnel research over wide subsonic and supersonic speed ranges. Author

N86-21519*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EFFECT OF FLOW OSCILLATIONS ON CAVITY DRAG AND A TECHNIQUE FOR THEIR CONTROL
M. Gharib, A. Roshko, and V. Sarohia 30 Sep. 1985 70 p refs Prepared for Army Research Office, Research Triangle Park, N.C.
(Contract NAS7-100)
(NASA-CR-176652; JPL-PUB-85-72; NAS 1.26:176652) Avail: NTIS HC A04/MF A01 CSCL 01A

Experiments to relate the state of the shear layer to cavity drag have been performed in a water channel using a 4' axisymmetric cavity model. Detailed flow measurements in various cavity flow oscillation phases, amplitude amplification along the flow direction, distribution of shear stress, and other momentum flux obtained by laser Doppler velocimeter are presented. Measurements show exponential dependence of cavity drag on the length of the cavity. A jump in the cavity drag coefficient is observed as the cavity flow shows a bluff body wake type behavior. Natural and forced oscillations are introduced by a sinusoidally heated thin-film strip which excites the Tollmein-Schlichting waves in the boundary layer upstream of the gap. For a large gap, self-sustained periodic oscillations are observed, while for smaller gaps, which do not oscillate naturally, periodical oscillations can be obtained by external forcing through the strip heater. The drag of the cavity can be increased by one order of magnitude in the non-oscillating case through external forcing. Also, it is possible to completely eliminate mode switching by external forcing. For the first time, it is demonstrated that amplitude of cavity flow Kelvin-Helmholtz wave is dampened or cancelled by introduction of external perturbation of natural flow frequency but different phase. Author

N86-21520*# Kansas Univ., Lawrence.
THEORY OF WING ROCK
Chung-Hao Hsu and C. Edward Lan Feb. 1984 112 p refs
(Grant NAG1-134)
(NASA-CR-176640; NAS 1.26:176640; CRINC-FRL-516-1) Avail: NTIS HC A06/MF A01 CSCL 01A

A theory is developed for predicting wing rock characteristics. From available data, it can be concluded that wing rock is triggered by flow asymmetries, developed by negative or weakly positive roll damping, and sustained by nonlinear aerodynamic roll damping. A new nonlinear aerodynamic model that includes all essential aerodynamic nonlinearities is developed. The Beecham-Titchener method is applied to obtain approximate analytic solutions for the amplitude and frequency of the limit cycle based on the three degree-of-freedom equations of motion. An iterative scheme is developed to calculate the average aerodynamic derivatives and dynamic characteristics at limit cycle conditions. Good agreement between theoretical and experimental results is obtained. Author

N86-21521# Boston Univ., Mass. Center for Computational and Applied Dynamics.
TWO METHODS FOR VISCOUS AND INVISCID FREE-WAKE ANALYSIS OF HELICOPTER ROTORS Final Report, 15 Feb. 1983 - 14 Apr. 1985
L. Morino and B. Bharadvaj Aug. 1985 147 p
(Contract DAAG29-83-K-0050)
(AD-A161513; CCAD-TR-85-2; ARO-19797.3-EG) Avail: NTIS HC A07/MF A01 CSCL 20/4

Two integral equation methods for the free wake analysis of helicopter rotors (for potential and rotational flows, respectively) have been presented. The rotational flow formulation is based upon Helmholtz scalar/vector-potential decomposition. The advantages of the rotational flow formulation over the potential flow formulation have been discussed. The numerical equivalence of the two methods have been demonstrated. It should be noted that (whereas in the potential flow problem viscosity may be introduced only as artificial viscosity) in the rotational-flow formulation the presence of viscosity is consistent with the formulation. Therefore, this formulation is applicable to the solution of time-averaged Navier-Stokes equations: in particular, a simplified thin-wake analysis with an elementary eddy-viscosity model for turbulence is used in the numerical applications. Analysis of the

computer times indicates that the new formulation presented here (for rotational flows) has much broader applicability than the formulation for potential flows, while requiring approximately the same amount of computer time. GRA

N86-21522# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA MECHANICA SINICA (SELECTED ARTICLES)
Xieyuan Yin, Nan Xia, Guohua Deng, Dayou Liu, and Jilin Yu 5 Dec. 1985 125 p Transl. into ENGLISH from Lixue Xuebao (China), no. 5, 485-520 1984 p 454-475
(AD-A162726; FTD-ID(RS)T-0494-85) Avail: NTIS HC A06/MF A01 CSCL 20/4

The following articles appeared in Acta Mechanica Sinica, No. 5, 1984: Investigation of Rolling-up and Interaction of Leading-edge and Trailing-edge Vortex Sheets on a Slender Delta Wing; Calculation of Circular Jet with Particles Impacting Upon a Plate; A Non-local Elastic Plastic Continum Model and the Distress Distribution Near a Cracked Tip; Study of Plane Stress with Elastic Plastic Mixed Node Fracture; An Analytical Solution of Dynamic Response for Ideal Rigid Plastic; and General Variational Theorem for Structural Plastic Buckling Analysis Using Deformation Theory. GRA

N86-21523# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
MEASUREMENTS OF THE SYMMETRIC AERODYNAMIC COEFFICIENTS FOR FLAT FACED CYLINDERS WITH STRAKES IN THE ANGLE OF ATTACK REGIME 70 TO 90 DEG FOR TRANSONIC SPEED M.S. Thesis - Royal Inst. of Technol., Stockholm
Aake Roth Jul. 1985 179 p refs
(FFA-TN-1985-39) Avail: NTIS HC A09/MF A01

Flat faced cylinder bodies with strakes were examined in a wind tunnel for 6 Mach numbers in the range 0.6 to 1.0. The length to diameter ratios were 2, 4, 6, and 8. Each cylinder had 3 different pairs of strakes along the whole body forming the halfspan to radius ratios 1.20, 1.55, and 2.00. Angle of attack range was 70 to 90 deg. The coefficients normal force, pitching moment, tangential force (CN, CM, CT) increase as the halfspan to radius ratio increases. The same happens to CN and CM when the length to diameter ratio increases; CN is slightly affected by the angle of attack. Author (ESA)

N86-21524# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Hauptabteilung Windkanaele.
INVESTIGATION OF FERRI INSTABILITY IN SUPERSONIC INLETS
Ernst-Otto Krohn and Klaus Triesch Jun. 1985 34 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-978)
(DFVLR-FB-85-53; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 13

Ferri instability, caused by the inflow of a discontinuity surface (slipline) in the inlet was studied. A criterion for the appearance of the Ferri instability was derived. Flat inlets are the most, and semirotationsymmetric inlet the least, sensitive to Ferri instability. Means to avoid the instability are discussed. Strength and penetration depth of the slipline play a role in triggering the instability, although this role is not classified. Author (ESA)

N86-22258# Joint Publications Research Service, Arlington, Va.
NUMERICAL ANALYSIS OF NONEQUILIBRIUM FLOW ABOUT AIRFOIL IN THIN SHOCK LAYER APPROXIMATION Abstract Only
V. N. Golubkin and V. V. Negoda *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 5 Transl. into ENGLISH from Zhurnal Vychislitelnoy Matematiki i Matematicheskoy Fiziki (Moscow, USSR), v. 25, no. 4, Apr. 1985 p 599-608 Original language document was announced in IAA as A85-33593 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-21525# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: AIR CANADA FLIGHT 797, MCDONNELL DOUGLAS DC-9-32, C-FTLU GREATER CINCINNATI INTERNATIONAL AIRPORT, COVINGTON, KENTUCKY, JUNE 2, 1983 Accident Report, 2 Jun. 1983
31 Jan. 1986 118 p refs
(PB86-910402; NTSB/AAR-86-02) Avail: NTIS HC A06/MF A01 CSCL 01C

A fire aboard a McDonnell Douglas DC-9-32, at the Greater Cincinnati International Airport, Covington, Kentucky, and the death of 23 passengers is reported. A fire in the aft lavatory was discovered while in flight and an emergency descent was made. Airport support, escape measures, and fire fighting are described. It was determined that the probable causes of the accident were: (1) a fire of undetermined origin; (2) an underestimate of fire severity; and (3) misleading fire progress information provided to the captain. It is concluded that the time taken to evaluate the nature of the fire and to decide to initiate an emergency descent contributed to the severity of the accident. E.A.K.

N86-21526# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: GALAXY AIRLINES, INC., LOCKHEED ELECTRA-L-188C, N5532, RENO, NEVADA, JANUARY 21, 1985
4 Feb. 1986 89 p
(PB86-910401; NTSB/AAR-86-01) Avail: NTIS HC A05/MF A01 CSCL 01C

About 0102:30 Pacific standard time on January 21, 1985, Galaxy Airlines Flight 203, a Lockheed Electra charter flight en route to Minneapolis, Minnesota, departed runway 16R of the Reno-Cannon International Airport. Approximately one minute later, the crew requested a turn to a left downwind to return to the airport because of a vibration in the airplane. In accordance with the request, the tower controller cleared the flight to make a left turn to a downwind traffic pattern. The airplane crashed at 0104 into an area 1 1/2 miles from the departure end of runway 16R, and 3/4 mile to the right of the extended runway centerline. The impact and subsequent fire killed the crew of six and 64 of the 65 passengers onboard. The airplane was destroyed. The sky was clear and the visibility was 12 miles at the time of the accident. The National Transportation Safety Board determines that the probable cause of this accident was the captain's failure to control and the copilot's failure to monitor the flight path and airspeed of the aircraft. This breakdown in crew coordination followed the onset of unexpected vibration shortly after takeoff. Contributing to the accident was the failure of ground handlers to properly close an air start access door, which led to the vibration. Author

N86-21527# Flight Safety Foundation, Inc., Arlington, Va.
PROCEEDINGS OF CABIN SAFETY CONFERENCE AND WORKSHOP HELD ON 11-14 DECEMBER 1984 Final Report
Aug. 1985 221 p Conference and Workshop held 11-14 Dec. 1984
(AD-A160950; DOT/FAA/ASF-100-85/01; DOT-TSC-FAA-85-6) Avail: NTIS HC A10/MF A01 CSCL 01/2

These proceedings contain formal conference presentations as well as summaries of informal workshop discussions on how to further improve aircraft cabin occupant safety. The overall objective of the conference is increased communication between various segments of the aviation community in the area of aircraft safety. Also included are the FSF's analysis and future recommendations for occupant safety. Topics covered include: overview of aircraft occupant safety problems; cabin safety initiatives; inflight

occupant protection; crash and fire protection; evacuation and survival; economics and regulatory considerations. GRA

N86-21528# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
AIRCRAFT MISHAP FIRE PATTERN INVESTIGATIONS Final Report, 1 Jun. 1984 - 31 Jul. 1985
Joseph M. Kuchta (Green International, Inc., Sewickley, Pa.) and Robert G. Clodfelter Aug. 1985 190 p
(Contract F33615-83-C-2359)
(AD-A161094; AFWAL-TR-85-2057) Avail: NTIS HC A09/MF A01 CSCL 01/2

This manual was prepared to provide the aircraft mishap investigator with state-of-the-art data and guidelines for investigating aircraft fires and explosions. Sections are included on investigating procedures, properties of air atmospheres, properties of aircraft combustibles (liquids, gases, or solids), properties of ordnance explosives, and damage analyses relating to fires and explosions. Procedures for accumulating, developing, and analyzing the evidence are outlined, and various combustion data are summarized for use in determining the ignition source, combustible source, and mishap scenario. To help establish the mishap scenario, damage criteria are given in terms of material or biological response to fire temperatures, explosion pressures, toxic gases, and other potentially hazardous exposures. Methods for calculating combustion quantities and damage potentials, including material failures, are included in this manual. Author (GRA)

N86-21529# Federal Aviation Administration, Atlantic City, N.J.
AIRCRAFT INTERIOR PANEL TEST CRITERIA DERIVED FROM FULL-SCALE FIRE TESTS Final Report
R. G. Hill, T. I. Eklund, and C. P. Sarkos Sep. 1985 65 p
Original contains color illustrations
(AD-A161637; FAA/CT-85/23) Avail: NTIS HC A04/MF A01 CSCL 01/2

Full-scale cabin fire tests were conducted to determine potential increases in passenger survivability associated with different interior honeycomb panel constructions. The test fuselage was a C-133 with a simulated wide-body door opening exposed to an 8-foot by 10-foot fuel fire. In the first series, the interior near the door was lined with the honeycomb panels to determine whether earlier studies performed with small-scale enclosures were consistent with the full-scale counterpart. These earlier studies resulted in the selection of the Ohio State University (OSU) Rate of Heat Release Apparatus as the most appropriate type test to evaluate aircraft panels. The first series was followed by tests that included fire-blocked seats and carpeting as well as the panels to determine the type survivability increases that could be attained from low heat release materials. The scenario employed generally resulted with flashover within 2 minutes for panels considered typical in performance. A low heat release phenolic/fiberglass panel demonstrated a flashover delay until about 4 minutes into the test. An incombustible panel prevented flashover altogether. The performance of the various panels was evaluated to develop recommended flammability criteria for a modified OSU Rate of Heat Release Apparatus. GRA

N86-21530# Transportation Systems Center, Cambridge, Mass.
GENERAL AVIATION PILOT AND AIRCRAFT ACTIVITY SURVEY Final Report, 1984
Carolyn Frank and Jon Ohman Sep. 1985 83 p Prepared in cooperation with Automated Sciences Group, Inc., Silver Spring, Md.
(Contract DTRS-57-84-C-00100)
(AD-A161665; TSC-FAA-85-7; FAA-MS-85-1) Avail: NTIS HC A05/MF A01 CSCL 14/2

A summary and analysis of the data collected in the 1984 General Aviation Pilot and Aircraft Activity Survey is provided. The survey was conducted at a random sample of general aviation airports across the nation throughout the months of July, August, September, and October, 1984 by the Federal Aviation Administration with the assistance of the Civil Air Patrol. The survey data provide information regarding the magnitude and characteristics of general aviation including: type and source of weather information services, trip length in time and distance, and pilot age and certification. Estimates are made of total 1984 general aviation operations, fuel consumption and aircraft miles flown. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-21531# European Space Agency, Paris (France).
ALGORITHMS FOR THE AUTOMATIC FOUR-DIMENSIONAL GUIDANCE OF AIRCRAFT, TAKING INTO ACCOUNT THE CURRENT WIND SITUATION
Werner Lechner Oct. 1985 108 p refs Transl. into ENGLISH of "Algorithmen zur automatischen 4 dimensionalen Flugbahnfuehrung unter Beruecksichtigung der momentanen Windsituation" Rept. DFVLR-FB-84-40 Brunswick, West Germany, Sep. 1984
(ESA-TT-908; DFVLR-FB-84-40) Avail: NTIS HC A06/MF A01

An automatic time-of-arrival control flight mode covering the terminal maneuvering area was developed for the digital flight-control system of the HFB 320 test aircraft and flight tested. The algorithms used for computing four dimensional flight paths taking into account the current wind situation are described. Methods for measuring, filtering, and predicting the wind vector are developed and discussed with reference to the results of the flight tests. Evaluation shows that time error limits of + or - 5 sec can be achieved under varied wind situations. The aircraft-oriented method of wind prediction by extrapolation, based on the Kalman filter method, proves to be particularly efficient. Author (ESA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-21532 Royal Aircraft Establishment, Farnborough (England).
STRUCTURAL MATERIALS IN AERONAUTICS: PROSPECTS AND PERSPECTIVES
G. G. Pope 28 Aug. 1985 45 p refs Presented at European Pioneers Day Meeting, Paris, 25 Apr. 1985
(RAE-TR-85077; BR97329) Copyright. Avail: NTIS HC A03/MF A01

Developments in materials and their prospects of application in airframes and engines are reviewed. Technical and cost considerations that govern material selection; and the merits of fiber composites, titanium alloys, steels and aluminum alloys for airframe applications are examined. The benefits offered by fiber composites must be assessed for specific applications in relation to developments in aluminum alloys, notably lithium-containing alloys and alloys produced by rapid solidification or condensation. Titanium alloys and steels are expected to fulfil an important but limited role in airframes. In the engine, titanium and nickel-base alloys respectively will satisfy most compressor and turbine requirements, although use of ceramics is expected. It is concluded that new materials are acceptable only if a clear understanding is achieved of the relationship between composition, microstructure and material behavior, the manufacturing route, and quality control of the product. Author (ESA)

N86-21533# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.

A PROGRAMME OF RESEARCH INTO THE AERODYNAMICS, STABILITY AND CONTROL CHARACTERISTICS OF A COMBAT AIRCRAFT HAVING A FORWARD SWEPT WING Interim Report, Nov. 1984 - Oct. 1985
M. V. Cook and F. Heydari Oct. 1985 16 p refs
(CAR-8516; ISBN-0-947767-27-4)
Avail: NTIS HC A02/MF A01

The aerodynamic stability and control characteristics of the forward swept wing aircraft, and likely stability augmentation requirements were studied. It is found that: (1) the theoretical aerodynamic models match the observed aerodynamic performance; (2) the estimated stability derivatives when incorporated in a computer simulation provide response characteristics which agree with experimentally derived responses; (3) the parametric identification technique is effective; (4) theoretical predictions of longitudinal static stability margins indicate that the aircraft is more stable than observed in experiments; (5) feedback control is relatively straightforward; and (6) the experimental system permits dynamic testing on the aircraft model with a longitudinal static stability margin as small as -4%. E.A.K.

N86-21534*# National Aeronautics and Space Administration, Washington, D.C.
PROCEDURE FOR UTILIZING THE LIFT AND THRUST FORCES OF ORNITHOPTERS
C. Bezard Nov. 1985 15 p Transl. into ENGLISH of French Patent no. 8404354 (21 Mar. 1984) p 1-15 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77682; NAS 1.15:77682) Avail: NTIS HC A02/MF A01 CSCL 01C

This procedure is distinguished by two beating wings which together describe, in space, a succession of interlaced triangles. On these wings, whose incidence varies automatically, identical forces are exerted: simultaneous lift and thrust when they make their descent, which is inclined toward the front of the craft, and lift alone when they make their ascent, which is inclined toward the rear of the craft and follows a slide horizontal movement. A mechanical device makes these movements possible. It includes: two wings with hollow profiles, connected by a framework located above a rigid frame and attached to it by bars with joints. These bars are moved with control rods which gear down the drive force. A mechanism with elastic bands or springs automatically varies the incidence of the wings. Author

N86-21535*# National Aeronautics and Space Administration, Washington, D.C.
VERTICALLY OPERATING FLIGHT VEHICLE FOR DRILLING AND AGRICULTURAL USE
W. Pabst Mar. 1986 13 p Transl. into ENGLISH of West German Patent no. P3521624.7 (10 Jun. 1985) p 1-12 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77713; NAS 1.15:77713) Avail: NTIS HC A02/MF A01 CSCL 01C

The invention deals with an aircraft which ascends and descends vertically and which is used for recreational aircraft, as well as for drilling and in agriculture. The invention combines the floating effect of a parachute with the helicopter to develop a flight vehicle with multiple uses which go beyond those of contemporary flight vehicles. Both hub mechanisms and thrust power are implemented to achieve this goal. Four designs are described in detail. Author

N86-21536# Boeing Co., Seattle, Wash.
OPERATION REDWING, PROJECT 5.2, IN-FLIGHT PARTICIPATION OF A B-52
F. L. Williams 1 Apr. 1985 69 p refs Prepared in cooperation with Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio Prepared for DNA, Washington, D.C.
(AD-A995286; WT-1328-Ex) Avail: NTIS HC A04/MF A01 CSCL 18/3

Measured energy input and aircraft response data on an instrumented B-52 aircraft when subjected to the thermal, blast, and gust effects of a nuclear explosion were examned. The spatial location for the B-52, relative to a detonation, that would result in the desired aircraft inputs and responses was analyzed. The B-52 participated in nine shots. The reliability of the instrumentation system was between 95% and 100% throughout the test program. It is recommended that the B-52 not participate in future nuclear tests as a weapons-capability aircraft. E.A.K.

N86-21537# Aeronautical Research Labs., Melbourne (Australia).
COMPARISON OF AIRBORNE DATA ACQUISITION SYSTEMS AT ARL (AERONAUTICAL RESEARCH LABORATORIES)
G. F. Forsyth Sep. 1985 13 p
(AD-A161664; ARL/AERO-PROP-TM-430) Avail: NTIS HC A02/MF A01 CSCL 09/2

During formulation of plans to raise contracts to implement a new data acquisition arrangement to suit aircraft engines and other propulsion components, it became necessary to evaluate other systems which might be available for the same or similar tasks. Accordingly details have been collected on all the various airborne data acquisition systems which may be considered for use at ARL. Later sections of this paper compare the major capabilities of the various airborne data acquisition systems currently available at ARL and of some systems which have recently become available from industry. GRA

N86-21538# Air Univ., Maxwell AFB, Ala.
THE EVOLUTION OF THE CRUISE MISSILE
Kenneth P. Werrell Sep. 1985 300 p
(AD-A162646) Avail: NTIS HC A13/MF A01; also available SOD $7.00 CSCL 16/4

While weapons come and go in the military, history provides examples of classes of weapons having both a dramatic and a lasting impact upon the conduct of warfare. These examples involve weapons which were, at their inception, revolutionary since they were not merely new but clearly superior to equipment already in use on the battlefield. Because they dominated warfare they were crucial to battlefield success; and nations possessing and using such weapons effectively were, more often than not, victorious. A class of missile of particular interest, now entering the US inventory, is the cruise missile. The purpose of this study is to evaluate the cruise missile against the criteria suggested above, seeking answers to two basic questions: is the current cruise missile simply another weapon in the now familiar class of aerial munitions? or does it represent a potentially revolutionary class of weapons in its own right? These questions, and the answers to them, may well have far-reaching implications, for if the current version of the cruise missile represents not an evolutionary development but a quantum leap forward in weaponry, then US development and employment strategies require significant adjustment. GRA

N86-21539# Naval Postgraduate School, Monterey, Calif.
HELICOPTER PERFORMANCE COMPUTER PROGRAMS FOR HP-41 HAND-HELD COMPUTER
Donald M. Layton Dec. 1985 73 p
(AD-A162794) Avail: NTIS HC A04/MF A01 CSCL 01/3

This document has reference tables and programs used to evaluate helicopter performance in the areas of: Autorotation; Service and Combat Ceilings; Basic Power Required Parameters; Fuel Consumption; High Speed Effects; Basic Power Considerations; Maximum Endurance Power/Velocity; Maximum Rage Power/Velocity; and Weight Estimation Relationships. These programs present the user of the HP-41 hand-held, programmable calculator with a series of self-prompting, alphanumeric programs that can be used with acceptable results to compute and evaluate helicopter performance. Most of the programs are structured so as to be more expedient when doing preliminary helicopter design where intermediate values are of less a concern than would be the case when studying detailed performance. GRA

N86-21540# Department of the Air Force, Washington, D.C.
ROBOTIC REFUELING SYSTEM FOR TACTICAL AND STRATEGIC AIRCRAFT Patent Application

Edwin R. Schultz, inventor (to Air Force) Filed 12 Aug. 1985 17 p
(AD-D011980; US-Patent-Appl-SN-764820) Avail: NTIS HC A02/MF A01 CSCL 01/2

A ground based aircraft refueling system uses existing air-to-air refueling technology. A fixed facility design attaches a moveable air-to-air type refueling boom and probe to an overhead track mounted on the ceiling of a TAB VEE aircraft shelter. Movement of the boom and probe is controlled from a remote control room protected from hazardous chemical and biological environments. In a second embodiment a moveable facility design mounts on the top of a tank truck a first boom attached at a right angle to an air-to-air type refueling second boom and probe The booms and probe are remotely controlled from the truck cab which is protected from hostile chemical and biological environments. A third embodiment adds to the moveable facility design a second tank and nozzle outlet for spraying decontaminate. Author (GRA)

N86-21541# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Forschungsbereich Nachrichtentechnik und Erkundung.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF FLOW VECTOR MEASUREMENTS WITH ANGLE-OF-ATTACK AND SIDESLIP SENSORS ON DFVLR METEOROLOGICAL RESEARCH AIRCRAFT Ph.D. Thesis - Technische Univ., Munich, West Germany
Peter Muehlbauer Jun. 1985 132 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-976)
(DFVLR-FB-85-50; ISSN-0171-1342) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 42.50

Calibration of the equipment of three powered sail planes and a jet plane with angle-of-attack and sideslip sensors for measuring the local flow vector is described. The impact of angle-of-attack and sideslip and of other interfering parameters on the measured value was studied. A mathematical simulation of compressible flow at the tip of the probe is followed by experimental wind tunnel investigations, analysis, and application on in-flight measurement. Criteria for flight-test use of the sensors are outlined.Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-21542# Radio Technical Commission for Aeronautics, Washington, D. C.
MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRBORNE DISTANCE MEASURING EQUIPMENT (DME) OPERATION WITHIN THE RADIO FREQUENCY RANGE OF 960-1215 MEGAHERTZ
20 Sep. 1985 195 p refs
(RTCA/DO-189; SC-149) Avail: NTIS HC A09/MF A01

Minimal operational performance standards for airborne distance measuring equipment (DME) operating within the radio frequency range of 960 to 1215 MHz are contained. Information needed to understand the rationale for equipment characteristics and requirements is stated along with the minimum performance standards for the equipment. These standards define required performance under standard operating conditions and stressed physical environmental conditions. The operational performance characteristics are described for equipment installations and conditions and tests that will assure the user that the equipment will perform safely and reliably in the expected operational environment are defined. A configuration of airborne equipment encompassing an antenna system, transmission lines, DME interrogator, interrogator control unit and interfaces with aircraft displays/systems are considered. B.G.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-21543*# National Aeronautics and Space Administration, Washington, D.C.
HIGH FREQUENCY-HEATED AIR TURBOJET
Juan Heliodoro Diaz Miron Feb. 1986 12 p Transl. into ENGLISH of Spanish Patent no. 293,727 (21 Nov. 1983) p 1-10 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77710; NAS 1.15:77710) Avail: NTIS HC A02/MF A01 CSCL 21E

A description is given of a method to heat air coming from a turbojet compressor to a temperature necessary to produce required expansion without requiring fuel. This is done by high frequency heating, which heats the walls corresponding to the combustion chamber in existing jets, by mounting high frequency coils in them. The current transformer and high frequency generator to be used are discussed. Author

N86-21544*# National Aeronautics and Space Administration, Washington, D.C.
CORROSION AND CORROSION PREVENTION IN GAS TURBINES
A. J. A. Mom and H. J. Kolkman Nov. 1985 43 p refs Transl. into ENGLISH of "Corrosie en Corrosiebestrijding in Gasturbines" rept. NLR-MP-82048-U National Aerospace Lab., Amsterdam, Netherlands, 30 Sep. 1981 p 1-42 Original language document was announced as N84-19355 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77924; NAS 1.15:77924; NLR-MP-82048-U) Avail: NTIS HC A03/MF A01 CSCL 21E

The conditions governing the corrosion behavior in gas turbines are surveyed. Factors such as temperature, relative humidity, the presence of sulfur and nitrogen dioxide, and fuel quality are discussed. Electromechanical corrosion at relatively low temperature in compressors; oxidation; and hot corrosion (sulfidation) at high temperature in turbines are considered. Corrosion prevention by washing and rinsing, fueld additives, and corrosion resistant materials and coatings are reviewed. Author (ESA)

N86-21545*# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.
SPONTANEOUS IGNITION DELAY CHARACTERISTICS OF HYDROCARBON FUEL-AIR MIXTURES Final Report
Arthur H. Lefebvre, William G. Freeman, and Luke H. Cowell Feb. 1986 102 p refs
(Grant NAG3-226)
(NASA-CR-175064; NAS 1.26:175064) Avail: NTIS HC A06/MF A01 CSCL 21E

The influence of pressure on the autoignition characteristics of homogeneous mixtures of hydrocarbon fuels in air is examined. Autoignition delay times are measured for propane, ethylene, methane, and acetylene in a continuous flow apparatus featuring a multi-point fuel injector. Results are presented for mixture temperatures from 670K to 1020K, pressures from 1 to 10 atmospheres, equivalence ratios from 0.2 to 0.7, and velocities from 5 to 30 m/s. Delay time is related to pressure, temperature, and fuel concentration by global reaction theory. The results show variations in global activation energy from 25 to 38 kcal/kg-mol, pressure exponents from 0.66 to 1.21, and fuel concentration exponents from 0.19 to 0.75 for the fuels studied. These results are generally in good agreement with previous studies carried out under similar conditions. Author

N86-21546*# General Motors Corp., Indianapolis, Ind. Gas Turbines Div.
TURBINE VANE EXTERNAL HEAT TRANSFER. VOLUME 1: ANALYTICAL AND EXPERIMENTAL EVALUATION OF SURFACE HEAT TRANSFER DISTRIBUTIONS WITH LEADING EDGE SHOWERHEAD FILM COOLING
E. R. Turner, M. D. Wilson, L. D. Hylton, and R. M. Kaufman Jul. 1985 246 p refs
(Contract NAS3-23695)
(NASA-CR-174827; NAS 1.26:174827; EDR-11984-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 21E

Progress in predictive design capabilities for external heat transfer to turbine vanes was summarized. A two dimensional linear cascade (previously used to obtain vane surface heat transfer distributions on nonfilm cooled airfoils) was used to examine the effect of leading edge shower head film cooling on downstream heat transfer. The data were used to develop and evaluate analytical models. Modifications to the two dimensional boundary layer model are described. The results were used to formulate and test an effective viscosity model capable of predicting heat transfer phenomena downstream of the leading edge film cooling array on both the suction and pressure surfaces, with and without mass injection. B.G.

N86-21547# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
JET ENGINE OPERATING AND SUPPORT COST ESTIMATING RELATIONSHIP DEVELOPMENT M.S. Thesis
Brenda H. Cox Sep. 1985 106 p
(AD-A161683; AFIT/GSM/LSY/85S-8) Avail: NTIS HC A06/MF A01 CSCL 14/1

This investigation derived a jet engine Cost Estimating Relationship (CER) model from multivariate linear regression techniques. Prior to the model's development, all known jet engine cost data bases were examined for applicability to the thesis effort. After identifying constraints and limitations in the data, stepwise regression equations for analysis. The best equation was identified base on pre-established logic and statistical criteria. The equation selected had the following performance, physical, and usage variables: Turbine Inlet Temperature, Specific Fuel Consumption, Weight, and Annual Engine Flying Hours. Results of the model development can be used in comparative cost analyses of present and proposed weapon systems; in cost trade-off studies to determine impact of design alternatives for new engineers; in reports to Congress on the costs of operating engines; and in estimating budget requirements. GRA

N86-21548# Department of the Air Force, Washington, D.C.
DUAL MATERIAL EXHAUST NOZZLE FLAP Patent Application
Dudley O. Nash, inventor (to Air Force) Filed 1 Oct. 1985 19 p
(AD-D011998; US-Patent-Appl-SN-782332) Avail: NTIS HC A02/MF A01 CSCL 21/5

This patent application discloses an exhaust nozzle flap capable of resisting high exhaust temperatures of turbojet engines. The flap is composed of a two-part structure of high strength metal, in a support member, combined with a heat resistant base member made from a ceramic or carbon-carbon material. The different materials in the base and support members, having substantially different rates of thermal expansion, are not bolted or riveted together, but attached in a unique manner to allow relative movement therebetween. GRA

N86-21888# General Motors Corp., Indianapolis, Ind. Gas Turbine Operations.
DAMPING APPLICATIONS IN TURBINE ENGINES
R. L. Jay and D. W. Burns *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 23 p ref (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21890# Stress Technology, Inc., Rochester, N.Y.
DAMPING PROPERTIES OF STEAM TURBINE BLADES
Neville F. Rieger *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 31 p refs Sponsored in part by the Electric Power Research Inst. (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21892# Carnegie-Mellon Univ., Pittsburgh, Pa.
RESEARCH ON FRICTION DAMPING IN JET ENGINES AT CARNEGIE-MELLON UNIVERSITY
J. H. Griffin and J. Bielak *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 12 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC 99/MF A01 CSCL 20/11

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-21549*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STEP AND STEPSPL: COMPUTER PROGRAMS FOR AERODYNAMIC MODEL STRUCTURE DETERMINATION AND PARAMETER ESTIMATION
James G. Batterson Jan. 1986 142 p refs
(NASA-TM-86410; NAS 1.15:86410) Avail: NTIS HC A07/MF A01 CSCL 01C

The successful parametric modeling of the aerodynamics for an airplane operating at high angles of attack or sideslip is performed in two phases. First the aerodynamic model structure must be determined and second the associated aerodynamic parameters (stability and control derivatives) must be estimated for that model. The purpose of this paper is to document two versions of a stepwise regression computer program which were developed for the determination of airplane aerodynamic model structure and to provide two examples of their use on computer generated data. References are provided for the application of the programs to real flight data. The two computer programs that are the subject of this report, STEP and STEPSPL, are written in FORTRAN IV (ANSI 1966) compatible with a CDC FTN4 compiler. Both programs are adaptations of a standard forward stepwise regression algorithm. The purpose of the adaptation is to facilitate the selection of a adequate mathematical model of the aerodynamic force and moment coefficients of an airplane from flight test data. The major difference between STEP and STEPSPL is in the basis for the model. The basis for the model in STEP is the standard polynomial Taylor's series expansion of the aerodynamic function about some steady-state trim condition. Program STEPSPL utilizes a set of spline basis functions. Author

N86-21550*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF WING MODIFICATION ON AN AIRCRAFT'S AERODYNAMIC PARAMETERS AS DETERMINED FROM FLIGHT DATA
Robert Alan Hess Jan. 1986 72 p refs
(NASA-TM-87591; NAS 1.15:87591) Avail: NTIS HC A04/MF A01 CSCL 01C

A study of the effects of four wing-leading-edge modifications on a general aviation aircraft's stability and control parameters is presented. Flight data from the basic aircraft configuration and configurations with wing modifications are analyzed to determine each wing geometry's stability and control parameters. The parameter estimates and aerodynamic model forms are obtained using the stepwise regression and maximum likelihood techniques. The resulting parameter estimates and aerodynamic models are verified using vortex-lattice theory and by analysis of each model's ability to predict aircraft behavior. Comparisons of the stability and control derivative estimates from the basic wing and the four leading-edge modifications are accomplished so that the effects

of each modification on aircraft stability and control derivatives can be determined. Author

N86-21551# Virginia Univ., Charlottesville. Dept. of Mechanical and Aerospace Engineering.
LIMITING PERFORMANCE OF NONLINEAR SYSTEMS WITH APPLICATIONS TO HELICOPTER VIBRATION CONTROL Final Report, 1 Aug. 1982 - 31 Oct. 1984
W. D. Pilkey Aug. 1985 9 p
(Contract DAAG29-82-K-0164)
(AD-A161457; ARO-18643.10-EG) Avail: NTIS HC A02/MF A01 CSCL 20/11

Several problems concerning the vibration control of helicopters were studied. A method for introducing structural modifications leading to vibration reduction has been developed. In particular, a formulation for attaching appendages to continuous structural members was completed and applied to a two-beam helicopter model. Author (GRA)

N86-21552# Texas Technological Univ., Lubbock. Dept. of Mechanical Engineering.
STOCHASTIC NON-LINEAR FLUTTER OF AEROELASTIC STRUCTURES Annual Report, 1 Nov. 1984 - 31 Oct. 1985
Raouf A. Ibrahim 21 Oct. 1985 104 p
(Grant AF-AFOSR-0008-85)
(AD-A162748; AFOSR-85-1076TR; AR-1) Avail: NTIS HC A06/MF A01 CSCL 01/1

The linear and non-linear random modal interactions of a two degree-of-freedom aeroelastic structure are examined by using the Fokker-Planck equation approach. A general differential equation describing the evolution of the response moments is derived for any moment order. For the case of linear modal interaction this differential equation is found to constitute a closed set of moment equations. The stationary response is determined for various system parameters. It is found that the linear interaction results in a suppression of one mode when the uncoupled frequencies of the structure are close to each other. For the case of nonlinear modal (known as autoparametric) interaction the differential equation of the response moments forms an infinite coupled set of equations which are closed via two closure schemes. These are the Gaussian and non-Gaussian closure leads to 69 differential equations in the first four orders of response moments. The two sets are solved by numerical integration. GRA

N86-21553# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Forschungsbereich Flugmechanik/Flugfuehrung.
A CONTRIBUTION TO THE DIGITAL COMPENSATION OF PERIODIC DISTURBANCES WITH FREQUENCIES IN BOUNDED INTERVALS Ph.D. Thesis - Technische Univ., Berlin, West Germany
Rainer Froriep Sep. 1985 141 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-979)
(DFVLR-FB-85-55; ISSN-0171-1342) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 45.50

A general design method for the simplest possible compensator was developed in order to satisfy the requirement of stationary disturbance compensation within given tolerance limits for all helicopter rotor speeds within a given bounded interval. The approach to the suppression of rotor induced vibrations is to suspend the fuselage from the rotor by electrohydraulic actuators. Using a digital computer the most dominant harmonics of the disturbance can be actively compensated. For compensation at sampling instants, a structure of a digital controller is introduced and motivated, in which a minimal number of parameters is adapted to a varying rotor speed. The remaining parameters are to be held constant during operation independent of rotor speed. In the design, these parameters are systematically improved with a multidisturbance model approach and a design methodology with vector performance index. For disturbance suppression between sampling instants a design method for impulse forming filters is proposed. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-21554*# Essex Corp., Huntsville, Ala. Space Systems Group.
EMERGENCY MANAGEMENT COMPUTER-AIDED TRAINER (EMCAT) Final Report
Ricardo C. Rodriguez and Randall P. Johnson 31 Jan. 1986 26 p
(Contract NAS8-35815)
(NASA-CR-178738; NAS 1.26:178738; H-85-11) Avail: NTIS HC A03/MF A01 CSCL 14B

The Emergency Management Computer-Aided Trainer (EMCAT) developed by Essex Corporation or NASA and the Federal Emergency Management Administration's (FEMA) National Fire Academy (NFA) is described. It is a computer based training system for fire fighting personnel. A prototype EMCAT system was developed by NASA first using video tape images and then video disk images when the technology became available. The EMCAT system is meant to fill the training needs of the fire fighting community with affordable state-of-the-art technologies. An automated real time simulation of the fire situation was needed to replace the outdated manual training methods currently being used. In order to be successful, this simulator had to provide realism, be user friendly, be affordable, and support multiple scenarios. The EMCAT system meets these requirements and therefore represents an innovative training tool, not only for the fire fighting community, but also for the needs of other disciplines. Author

N86-21555# New Mexico Univ., Albuquerque.
RUBBER REMOVAL SPECIFICATION DEVELOPMENT Final Report, May 1983 - Sep. 1985
Richard A. Graul, Lary R. Lenke, and Daniel L. Standiford Oct. 1985 56 p refs Prepared in cooperation with Air Force Engineering Services Center, Tyndall AFB, Fla.
(Contract F29601-84-C-0080)
(FAA/PM-85/33; ESL-TR-85-67) Avail: NTIS HC A04/MF A01

The phenomenon of runway touchdown-zone rubber buildup is a potentially hazardous problem. Rubber buildup covers the runway surface and occludes the surface texture. This results in a reduced wet friction coefficient between the runway pavement and aircraft tires. Methods and equipment are available for evaluating the wet friction coefficient; however, these methods are expensive and require highly trained personnel. Currently, no guidelines have been established for determining the need and effectiveness of rubber removal. Therefore, most airport and airbase managers rely exclusively on visual impressions of rubber buildup in lieu of quantitative measurements. Quantitative evaluation techniques are desirable for evaluating rubber buildup. An extensive literature review suggested that pavement surface texture measurement techniques are indicative of rubber buildup and resultant reduction in wet friction coefficients. A statistically designed field experiment determined that surface texture measurements were indicative of pavement friction levels; however, these relationships lacked the precision necessary for inclusion in performance specifications. Author

N86-21556# New Mexico Univ., Albuquerque. Engineering Research Inst.
RUNWAY RUBBER REMOVAL SPECIFICATION DEVELOPMENT Final Report, May 1983 - Sep. 1985
Richard A. Graul, Lary R. Lenke, and Daniel L. Standiford Oct. 1985 56 p refs Prepared in cooperation with Air Force Engineering and Services Center, Tyndall AFB, Fla.
(Contract F29601-84-C-0080)
(DOT/FAA/PN-85/33; ESL-TR-85-67) Avail: NTIS

HC A04/MF A01

The phenomena of runway touchdown-zone rubber buildup is a potentially hazardous problem. Rubber buildup covers the runway surface and occludes the surface texture. This results in a reduced wet friction coefficient between the runway pavement and aircraft tires. Methods and equipment are available for evaluating the wet friction coefficient; however, these methods are expensive and require highly trained personnel. Currently, no guidelines have been established for determining the need and effectiveness of rubber removal. Therefore, most airport and airbase managers rely exclusively on visual impressions of rubber buildup in lieu of quantitative measurements. Quantitative evaluation techniques are desirable for evaluating rubber buildup. An extensive literature review suggested that pavement surface texture measurement techniques are indicative of rubber buildup and resultant reduction in wet friction coefficients. A statistically designed field experiment determined that surface texture measurements were indicative of pavement friction levels; however, these relationships lacked the precision necessary for inclusion in performance specifications. A summary of previous work in developing a rubber removal specification, supporting evidence for the frictional performance criteria proposed in developing a coherent specification for rubber removal contracts, and proposed contract specification criteria for runway rubber removal are given. Author

N86-21557*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.

THERMAL SENSING OF CRYOGENIC WIND TUNNEL MODEL SURFACES Final Report, 15 May 1984 - 28 Feb. 1985

Kamran Daryabeigi and Robert L. Ash Oct. 1985 55 p refs (Contract NAS1-17099)

(NASA-CR-176641; NAS 1.26:176641) Avail: NTIS HC A04/MF A01 CSCL 14B

Different sensors and installation techniques for surface temperature measurement of cryogenic wind tunnel models were investigated. Silicon diodes were selected for further consideration because of their good inherent accuracy (their average absolute temperature deviation in comparison tests with standard platinum resistance thermometers was found to be 0.2 K in the range from 125 to 273 K). Subsurface temperature measurement was selected as the installation technique in order to minimize aerodynamic interference. Temperature distortion caused by an embedded silicon diode was studied numerically. Author

N86-21558# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Hauptabteilung Windkanaele.

FLOW FIELD MEASUREMENTS IN THE 3mx3m LOW SPEED WIND TUNNEL OF THE DFVLR IN GOETTINGEN (WEST GERMANY)

Arnulf Kuehn Jul. 1985 66 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-981)

(DFVLR-Mitt-85-14; ISSN-0176-7739) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 25

A ten-hole probe was developed for flow field measurements in a low speed wind tunnel. The probe allows the determination of the total and static pressures as well as the local direction in a flow field. Mechanical design, calibration procedure, and control system are described. The probe is moved in the wind tunnel by a three-dimensional displacement mechanism. The data acquisition and reduction system, and the presentation of results are described. The accuracy of the flow direction measurements is discussed. Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-21559*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

GRAPHICAL TECHNIQUES TO ASSIST IN POINTING AND CONTROL STUDIES OF ORBITING SPACECRAFT

Leonard W. Howell and Joseph H. Ruf Mar. 1986 20 p (NASA-TP-2575; NAS 1.60:2575) Avail: NTIS HC A02/MF A01 CSCL 22A

Computer generated graphics are developed to assist in the modeling and assessment of pointing and control systems of orbiting spacecraft. Three-dimensional diagrams are constructed of the Earth and of geometrical models which resemble the spacecraft of interest. Orbital positioning of the spacecraft model relative to the Earth and the orbital ground track are then displayed. A star data base is also available which may be used for telescope pointing and star tracker field-of-views to visually assist in spacecraft pointing and control studies. A geometrical model of the Hubble Space Telescope (HST) is constructed and placed in Earth orbit to demonstrate the use of these programs. Simulated star patterns are then displayed corresponding to the primary mirror's FOV and the telescope's star trackers for various telescope orientations with respect to the celestial sphere. Author

N86-21560*# National Aeronautics and Space Administration, Washington, D.C.

DISTRIBUTED AUTOMATIC CONTROL OF TECHNOLOGICAL PROCESSES IN CONDITIONS OF WEIGHTLESSNESS

A. I. Kukhtenko, V. I. Merkulov, Yu. I. Samoylenko, and Yu. P. Ladikov-Royev Feb. 1986 18 p refs Transl. into ENGLISH from Kosmicheskie Issledovaniia na Ukraine (USSR), no. 6, 1975 p 7-15 Original language document was announced in IAA as A76-33508 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-4004)

(NASA-TM-77953; NAS 1.15:77953) Avail: NTIS HC A02/MF A01 CSCL 22A

Some problems associated with the automatic control of liquid metal and plasma systems under conditions of weightlessness are examined, with particular reference to the problem of stability of liquid equilibrium configurations. The theoretical fundamentals of automatic control of processes in electrically conducting continuous media are outlined, and means of using electromagnetic fields for simulating technological processes in a space environment are discussed. Author

N86-21561*# National Aeronautics and Space Administration, Washington, D.C.

MANNED SPACEFLIGHT IN THE NINETIES: THE EUROPEAN PERSPECTIVE

W. Finke Jan. 1985 11 p Transl. into ENGLISH of "Die Bemannte Raumfahrt in den Neunziger Jahren: Eine Europaeische Perspektive" presented at the International Symposium Towards Columbus and Space Station, 1985 p 1-9 Symposium held in Bad Godesberg, West Germany, 2 Oct. 1985 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-77697; NAS 1.15:77697) Avail: NTIS HC A02/MF A01 CSCL 22A

The inaugural speech for the international space travel symposium which took place in Bad Godesberg, West Germany on 2 Oct. 1985 explains why Europe must take an active part in all aspects of manned space travel for the nineties, including the development of the space station itself and the development of its own reusable space transport and supporting ground equipment to proceed on an equal share basis with the US and Japan while maintaining close international cooperation. Author

N86-21562*# National Aeronautics and Space Administration, Washington, D.C.

NORWEGIAN AEROSPACE ACTIVITIES: AN OVERVIEW

T. Arnesen, ed. and G. Rosenberg, ed. Feb. 1986 95 p ref Transl. into ENGLISH from Norsk Romvirksomhet IN: Norges Offentlige Utredninger (Oslo, Norway), no. 1, Jan. 1986 p 1-6,

30-31, 33-61, 66-71 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Government Committee of July 26, 1985
(Contract NASw-4005)
(NASA-TM-77711; NAS 1.15:77711; ISSN-0333-2306) Avail: NTIS HC A05/MF A01 CSCL 22A

Excerpts from a Governmental Investigation concerning Norwegian participation in the European Space Organization (ESA) is presented. The implications and advantages of such a move and a suggestion for the reorganization of Norwegian Aerospace activity is given. Author

N86-21563*# National Aeronautics and Space Administration, Washington, D.C.
CONTEMPORARY ACHIEVEMENTS IN ASTRONAUTICS: SALYUT-7, THE VEGA PROJECT AND SPACELAB
V. N. Kubasov, V. M. Balebanov, and D. Yu. Goldovskiy Mar. 1986 55 p Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhnike, Seriya: Kosmonavtika, Astronomiya (Moscow, USSR), no. 12, 1985 p 1-64 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77712; NAS 1.15:77712) Avail: NTIS HC A04/MF A01 CSCL 22A

The latest achievements in Soviet aeronautics are described; the new stage in the space program to study Venus using Soviet automated space probes, and the next space mission by cosmonauts to the Salyut-7 station. Information is also presented on the flight of the Spacelab orbiting laboratory created by Western European specialists. Author

N86-21564*# Alabama Univ., Huntsville. Environmental and Energy Center.
DROP TUBE TECHNICAL TASKS Final Report
Gary L. Workman Jan. 1986 44 p refs
(Contract NAS8-35665)
(NASA-CR-178741; NAS 1.26:178741; UAH-RR-475) Avail: NTIS HC A03/MF A01 CSCL 14B

Criteria, using fundamental thermochemical dynamics, were developed to assist a scientist using the Drop Tube Facility in designing a good experiment. The types of parameters involved in designing the experiments include the type of furnace, the type of atmosphere, and in general which materials are better behaved than others as determined by pest experience in the facility. One of the major advantages of the facility lies in its ability to provide large undercoolings in the cooling curve during the drops. A beginning was to consider the effect of oxygen and other gases upon the amount of undercooling observed. The starting point of the thermochemistry was given by Ellingham and later transformed into what is known as the Richardson Chart. The effect of surface oxidations upon the nucleation phenomena can be observed in each specimen. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-21565# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
CONTROL OF MISSILE DISPERSION VIA ROLL RATE MODULATION
Daniel H. Platus and Jennifer Shandling 15 Nov. 1985 53 p Previously announced in IAA as A85-43839
(Contract F04701-85-C-0086)
(AD-A162542; TR-0086(6550)-1; SD-TR-85-77) Avail: NTIS HC A04/MF A01 CSCL 20/4

Feedback control via roll rate modulation to limit cross-range dispersion of spinning missiles is investigated. The dispersion to be controlled is assumed to result from lift variations that do not average out over a roll cycle when the missile roll rate remains constant. By modulating the roll rate in a prescribed manner through feedback control, lift nonaveraging and the resulting cross-range dispersion are minimized. Two different approaches to the feedback control are investigated. In one approach, the roll rate is modulated by feedback of the state variables to prevent the occurrence of lateral velocity increments that produce dispersion. In the other approach, the roll rate is modulated harmonically about a steady roll rate, and the amplitude of the harmonic variation is controlled to limit dispersion. Author (GRA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information, see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-21566# Ball Aerospace Systems Div., Boulder, Colo.
RADIATION-HARD BREADBOARD STAR TRACKER Final Report
M. W. Hubbard and D. L. Murata Sep. 1985 140 p
(Contract N00014-82-C-2488)

(AD-A162777; BASD/F85-03) Avail: NTIS HC A07/MF A01 CSCL 17/3

Operation in a radiation environment affects the performance of many types of electro-optical sensors. Specifically, noise generated from radiation in the detector and front-end electronics in star trackers can degrade the performance of the sensors. Upsets in the related processing electronics can cause loss of track, data interruptions, and in some cases, failure to recover. Degradation of performance can occur in a natural charged-particle environment and becomes worse in a weapon-enhanced radiation environment. High total dose results in component and, in turn, system failure to operate. The objectives of this program, which was conducted by Ball Aerospace Systems Division (BASD) for the Naval Research Laboratory (NRL), were to develop a tracker that could survive a high total dose and to gain a better understanding of the transient effects of radiation on the star tracker performance. Survivability of the star tracker in a radiation environment, both at the component level and at the system level, is of primary importance. GRA

N86-21567# Ball Aerospace Systems Div., Boulder, Colo.
RADIATION-HARD BREADBOARD STAR TRACKER. ATTACHMENT 1 Final Report
M. W. Hubbard and D. L. Murata Sep. 1985 140 p
(Contract N00014-82-6(C)-2488)
(AD-A162778; BASD/F85-03-1) Avail: NTIS HC A07/MF A01 CSCL 09/2

The Final Report on a radiation-hard breadboard star tracker discusses the following topics: Star Tracker Control Program listing; flowchart of the Star Tracker Control Program; Data Input Program listing, Command Output Program listing; PIOTXY Program Listing; and error messages. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-21568 Stanford Univ., Calif.
SIMULATION OF MOTIONS OF SATELLITES CARRYING A DEPLOYABLE FLEXIBLE LINKAGE Ph.D. Thesis
Shlomo Djerassi 1985 143 p
Avail: Univ. Microfilms Order No. DA8522130

Numerical simulations based upon equations governing the motion of a rigid body supporting a deployable flexible linkage that carries a rigid load are used to study spacecraft control. However, since existing methods for the formulation of equations of motion do not lend themselves well for this purpose, one must extend these methods in order to come into position to undertake numerical simulations. The central idea underlying the extension is that equations of motion of a system of bodies subject to constraints can be obtained by temporarily disregarding the constraints, writing expressions for generalized inertia forces and for generalized active forces associated with the unconstrained system, and then using these together with coefficients appearing in the constraint equations to generate a set of equations of motion of the original system. Certain arrays, called Z arrays, are introduced in connection with the derivation of constraint equations associated with elastic bodies arranged in closed kinematical loops. Use of these arrays makes it possible to let the linkage have any number of links. The legitimacy of modal representation of the elastic deformation of a typical link is discussed in view of the fact that the link is subjected to an unknown time-varying shear load. Several studies are performed to illustrate the behavior of the system with a variety of initial conditions, parameters, and number of modes used to describe elastic deflections. These studies indicate that in-orbit deployment can be obtained passively, and that, in certain applications, weight reduction of the links can be sustained without affecting the dynamic behavior of the system, as far as inplane motions are concerned. Dissert. Abstr.

N86-21569*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC CHARACTERISTICS OF TWO 300 kW CLASS DUAL KEEL SPACE STATION CONCEPTS
John T. Dorsey, Thomas R. Sutter, Mark S. Lake, and Paul A. Cooper Feb. 1986 50 p refs
(NASA-TM-87680; NAS 1.15:87680) Avail: NTIS HC A03/MF A01 CSCL 22B

Results from an investigation of the dynamic behavior of a 300 kW class solar dynamic powered, dual keel space station are presented. The purpose of the investigation was to determine and assess the influence of space station truss bay size on station controllability during rigid body attitude adjustment and orbit reboost maneuvers. The dual keel space station concept is defined and two finite element models (one which has a truss bay size of 5m and another with a truss bay size of 9 feet) are described. Rigid and flexible body characteristics of the two space station models are also presented. Finally, results from a transient response analysis, where the stations are subjected to an orbit reboost maneuver, are summarized. Author

N86-21570# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TV-SAT FINAL ORBIT ACQUISITION OPTIMIZATION STRATEGY
Valder MatosdeMedeiros and A. F. Leibold Oct. 1985 14 p refs Presented at the International Conference Space Dynamics for Geostationary Satellites, Toulouse, France, 28-30 Oct., 1985
(INPE-3679-PRE/829) Avail: NTIS HC A02/MF A01

This work describes the strategy for the final station acquisition for three-axis stabilized geostationary satellite with solar constraints, which affect the allowed position maneuvers. The least cost for this purpose is got when apsidal line lies on the outside of the boundary layer of the constraints and the three-impulse Hohmann transfer is possible to perform, but, when this does not happen, maneuvers can not be performed at the apsidal and a four-impulse strategy is necessary. For this purpose, one software program was developed. The basic formulation for applying Linear Programming Methods to the computation of optimal guidance correction during the station acquisition process of a geostationary satellite has been proposed by Hechler (1). However, the problem to pick the proper set of right ascensions for possible orbit corrections has not been satisfactory solved, particulary for the case of prescribed maneuver-free orbit determination periods between the correction impulses. A second work (3) was done based on the results of this last work and uses set of four-split impulse strategy from the three-maneuver Hohmann transfer. The present work suggests a more general strategy, getting four impulse optimized solution for this problem. Results obtained for TV-SAT case simulation with a mission and conclusions are included. Author

N86-21571# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ANALYSIS OF THE CAPTURE OF THE NOMINAL EQUILIBRIUM POSITION FOR THE FIRST BRAZILIAN SATELLITE
Paulo TadeudeMeloLourencao and Donizete Leonel Ferreira Oct. 1985 13 p refs Presented at the 4th Japan-Brazil Symposium on Science and Technology, held at Sao Jose dos Campos, Brazil, Aug. 1984
(INPE-3694-PRE/839) Avail: NTIS HC A02/MF A01

This work presents the study of the capture of the equilibrium position for the first Brazilian satellite after obtaining the kinetic, gravitational potential and elastic potential energies for the Lagrangean equations of motion. This system of equations is hybrid, nonautonomous, coupled and nonlinear, thus making an analytical approach not feasible. Performing simplifications on the modelling of the appendages and using the assumed modes method for the elastic displacements, the distributed parameters and the hybrid

character of the set of equations are eliminated. Then, by numerical integration the attitude motion during and after the transient phase of the appendages deployment are established. The initial conditions in which the capture is possible are studied, by considering a large variation of parameters like deployment velocity, position of center of mass, moments and products of inertia, bending rigidity, etc. Author

N86-21572# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PARAMETER OPTIMIZATION AND ATTITUDE STABILIZATION OF A FLEXIBLE SPACECRAFT
Decio Castilho Ceballos Oct. 1985 10 p refs Presented at the International Conference Space Dynamics for Geostationary Satellites, Toulouse, France, 28-30 Oct. 1985
(INPE-3680-PRE/83C) Avail: NTIS HC A02/MF A01

This paper describes the synthesis and analysis of a control law for a flexible spacecraft. The control law is considered a simple proportional, integral, and derivative law together with a second order structural filter. Parameter optimization is applied for finding the controller parameters, so as to have an optimized behavior when applied to the high order model. Frequency and Laplace domain analysis are shown, which indicate the satisfactory behavior of the proposed controller. Author

N86-21573# General Electric Co., Schenectady, N. Y.
DEVELOPMENT OF SPACECRAFT MATERIALS AND STRUCTURES FUNDAMENTALS Final Scientific Report, 1 Jun. 1984 - 31 May 1985
S. Prochazka and S. L. Dole Aug. 1985 87 p
(Contract F49620-83-C-0101)
(AD-A161338; SRD-85-021; AFOSR-85-0974TR) Avail: NTIS HC A05/MF A01 CSCL 11/2

Compacts of boron carbide powders with specific surface area = or > 8 sq m/g were sintered in argon at temperatures near 2200C. Several of these powders were prepared by attrition milling of abrasive grade boron carbide. Densification to 95+% of theoretical density could be obtained only with compositions that had appropriate amounts of excess carbon. The microstructures were fine grained and uniform but underwent abnormal grain growth above 2235C accompanied by transgranular microcracking. This grain growth could be inhibited by increasing the carbon content. Mechanical damping capacity was measured by the free beam and cantilevered beam techniques on boron carbide and other materials. Methods to enhance the damping capacity in a beam structure were analyzed. The flexural strength of sintered boron carbide was evaluated and related to powder processing and sintering parameters. Author (GRA)

N86-21574# Sandia National Labs., Albuquerque, N. Mex.
PROTOTYPE RECOVER SYSTEM HARDWARE AND SOFTWARE REVIEW AND FUTURE REMOTE MONITORING SYSTEM PHILOSOPHY. POTAS TASK E.59 REMOTE MONITORING DESIGN REVIEW
W. C. Fienning and F. A. Bailey Sep. 1985 12 p
(Contract DE-AC04-76DP-00789)
(DE86-001681; SAND-83-2618; ISPO-207) Avail: NTIS HC A02/MF A01

This report describes the first phase of Task E.59 of the Program for Technical Assistance to IAEA Safeguards (POTAS). It contains a design review of the existing prototype RECOVER equipment and preliminary recommendations for an operational, remote monitoring system. The principal conclusions of the design review are related to the limitations of the prototype system regarding communications efficiency and operator interactions. To a large extent, the limitations are a result of the initial RECOVER system conceptual design, and perhaps more importantly, to the technology available when the system was developed. The preliminary recommendations are aimed at eliminating, to the maximum extent possible, the aforementioned limitations through the use of the suggested concepts and current state-of-the-art technology. These recommendations are intended to provide the basis for follow-on Task E.59 activities leading to a detailed conceptual design, including specifications, of an operational, remote monitoring system. Efforts leading to such a design would commence after the overall utility and cost effectiveness of remote monitoring are defined in terms of ultimate routine use of such a system by the IAEA. DOE

N86-21887*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
EXPERIMENTAL MEASUREMENT OF MATERIAL DAMPING FOR SPACE STRUCTURES
Edward F. Crawley and Raymond L. Sheen *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 18 p refs Sponsored in part by US Air Force (For primary document see N86-21883 12-39)
(Contract NAGw-21)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21904# Rockwell International Corp., Downey, Calif.
STRUCTURAL DAMPING OF SHUTTLE ORBITER AND ASCENT VEHICLES
D. L. Jensen *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 13 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21905# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
MEASURED DAMPING OF SHUTTLE ACOUSTIC TEST STRUCTURES
C. E. Wallace, Mark Mielke, and Jack Joanides (Rockwell International, Downey, Calif.) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 13 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-21575*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF A SPACECRAFT INSTRUMENT BALL BEARING ASSEMBLY LUBRICATED BY A PERFLUOROALKYLETHER
Wilfredo Morales, William R. Jones, Jr., and Donald H. Buckley Mar. 1986 9 p refs
(NASA-TM-87260; E-2885; NAS 1.15:87260) Avail: NTIS HC A02/MF A01 CSCL 22B

An analysis of a spacecraft instrument ball bearing assembly, subjected to a scanning life test, was performed to determine the possible case of rotational problems involving these units aboard several satellites. The analysis indicated an ineffective transfer of a fluorinated liquid lubricant from a phenolic retainer to the bearing balls. Part of the analysis led to a novel HPLC separation method employing a fluorinated mobile phase in conjunction with silica based size exclusion columns. Author

N86-22471# Danish Space Research Inst., Lyngby.
INSTRUMENTATION FOR X-RAY SPECTROSCOPY
Herbert W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 77-86 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-21576 Marconi Space Systems Ltd., Portsmouth (England).
SPACECRAFT PROPULSION SYSTEMS MASS MODELLING STUDY: ASSUMPTIONS AND DEFINITIONS
Sep. 1984 40 p
Copyright. Avail: Issuing Activity

A computer model and program structure for the generation of a versatile and quick method of determining the spacecraft, launch vehicle, and in particular, the propulsion system requirements of any low Earth orbit or geostationary orbit mission are described. The program is designed for an HP-9826 computer. Author (ESA)

N86-21577*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TECHNOLOGY FOR BAYTON-CYCLE POWERPLANTS USING SOLAR AND NUCLEAR ENERGY
Robert E. English Feb. 1986 15 p refs
(NASA-TP-2558; E-2761; NAS 1.60:2558) Avail: NTIS HC A02/MF A01 CSCL 10B

Brayton cycle gas turbines have the potential to use either solar heat or nuclear reactors for generating from tens of kilowatts to tens of megawatts of power in space, all this from a single technology for the power generating system. Their development for solar energy dynamic power generation for the space station could be the first step in an evolution of such powerplants for a very wide range of applications. At the low power level of only 10 kWe, a power generating system has already demonstrated overall efficiency of 0.29 and operated 38 000 hr. Tests of improved components show that these components would raise that efficiency to 0.32, a value twice that demonstrated by any alternate concept. Because of this high efficiency, solar Brayton cycle power generators offer the potential to increase power per unit of solar collector area to levels exceeding four times that from photovoltaic powerplants using present technology for silicon solar cells. The technologies for solar mirrors and heat receivers are reviewed and assessed. This Brayton technology for solar powerplants is equally suitable for use with the nuclear reactors. The available long time creep data on the tantalum alloy ASTAR-811C show that such Brayton cycles can evolve to cycle peak temperatures of 1500 K (2240 F). And this same technology can be extended to generate 10 to 100 MW in space by exploiting existing technology for terrestrial gas turbines in the fields of both aircraft propulsion and stationary power generation. Author

N86-21578*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A BIBLIOGRAPHY OF ELECTROTHERMAL THRUSTER TECHNOLOGY, 1984
James S. Sovey, Terry L. Hardy, and Matthew Englehart (Paper Basics, Brookpark, Ohio) Mar. 1986 49 p
(NASA-TM-86998; E-2536; NAS 1.15:86998) Avail: NTIS HC A03/MF A01 CSCL 21C

Electrothermal propulsion concepts are briefly discussed as an introduction to a bibliography and author index. Nearly 700 citations are given for resistojets, thermal arcjets, pulsed electrothermal thrusters, microwave heated devices, solar thermal thrusters, and laser thermal thrusters. Author

N86-21579*# Software and Engineering Associates, Inc., Carson City, Nev.
PERFORMANCE PREDICTIONS FOR AN SSME CONFIGURATION WITH AN ENLARGED THROAT
G. R. Nickerson and L. D. Dang Nov. 1985 44 p
(Contract NAS8-35931)
(NASA-CR-178740; NAS 1.26:178740; SN-63) Avail: NTIS HC A03/MF A01 CSCL 21H

The Two Dimensional Kinetics (TDK) computer program that was recently developed for NASA was used to predict the performance of a Large Throat Configuration of the Space Shuttle Main Engine (SSME). Calculations indicate that the current design SSME contains a shock wave that is induced by the nozzle wall shape. In the Large Throat design an even stronger shock wave is predicted. Because of the presence of this shock wave, earlier performance predictions that have neglected shock wave effects have been questioned. The JANNAF thrust chamber performance prediction procedures given in a reference were applied. The analysis includes the effects of two dimensional reacting flow with a shock wave. The effects of the boundary layer with a regenatively cooled wall are also included. A Purdue computer program was used to compute axially symmetric supersonic nozzle flows with an induced shock, but is restricted to flows with a constant ratio of specific heats. Thus, the TDK program was also run with ths assumption and the results of the two programs were compared. Author

N86-21580# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF SWIRLING AIR FLOWS ON THE COMBUSTION PROPERTIES OF A SOLID FUEL RAMJET MOTOR M.S. Thesis
William H. Campbell, Jr. Sep. 1985 71 p
(AD-A161382) Avail: NTIS HC A04/MF A01 CSCL 21/2

A series of reacting flow tests of a solid fuel ramjet were conducted with different air inlet swirl. Cold flow measurements of the air flow at the exit plane of the tube-in-hole injector were used to determine the Swirl Number for each configuration. Regression rates of the HTPB fuel at low air mass flux were found to increase with swirl vane angle (and Swirl Number) up to 30 degrees. GRA

N86-21581# Calspan Field Services, Inc., Arnold AFS, Tenn.
TEST FIXTURE EFFECTS IN VIBRATION TESTS OF ROCKET MOTORS Final Report, 1 Nov. 1982 - 1 May 1983
C. J. Welsh Nov. 1985 27 p Sponsored by Air Force
(AD-A161403; AEDC-TR-85-42) Avail: NTIS HC A03/MF A01 CSCL 21/8

An analysis was made of acceleration response measurements of solid-propellant rocket motors in vibration testing at the Arnold Engineering Development Center. In this type of testing, an electrodynamic shaker is utilized to provide the desired oscillatory driving force, and a test fixture is required to adapt the motor to the shaker. Although a test fixture can contribute adverse effects on the rocket motor motions for some conditions in vibration testing, the results of the analysis indicate that large undesirable rocket motor acceleration responses may be measured and invalidly attributed to the test fixture used. Author (GRA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-21582* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERFLUORO (IMIDOYLAMIDINE) DIAMIDINES Patent
Robert W. Rosser, Timothy S. Chen (San Jose State Univ., Calif.), and Chung-Heng Cheng, inventors (to NASA) (San Jose State Univ., Calif.) Issued 28 Jan. 1986 6 p Filed 5 Jun. 1985 Continuation of US-Patent-Appl-SN-528777, filed 2 Sep. 1983, abandoned, which is a division of US-Patent-Appl-SN-366025, filed 6 Apr. 1982, US-Patent-4,434,106
(NASA-Case-ARC-11402-3; US-Patent-4,567,301; US-Patent-Appl-SN-741405; US-Patent-Class-564-243) Avail: US Patent and Trademark Office CSCL 07C

Perfluoroether triazine elastomers having improved properties

are prepared from oligomeric imidoylamidines that were in turn, prepared by the process of: (1) reacting a perfluorodinitrile with liquid ammonia to yield a perfluorodiamidine, (2) isolating the perfluorodiamidine, (3) reacting the isolated diamidine with a perfluorodinitrile to yield a perfluoro(imidoylamidine) dinitrile, and then repeating the steps to sequentially grow an oligomer of desired molecular size. The isolated amidine and nitrile intermediates are also disclosed. The elastomers can be fashioned into seals, gaskets, and sealing components and the like.
Official Gazette of the U.S. Patent and Trademark Office

N86-21583*# National Aeronautics and Space Administration, Washington, D.C.
SYNTHESIS OF PYROMELLITIC ACID ESTERS
V. A. Fedorova, V. A. Donchak, and A. N. Martynyuk-Lototskaya Dec. 1985 6 p refs Transl. into ENGLISH from Journal of the Lvov Polytechnic Inst. (USSR), v. 139, 1980 p 31-33 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77977; NAS 1.15:77977; ISSN-0460-0436) Avail: NTIS HC A02/MF A01 CSCL 07C

The ester acids necessary for studyng the thermochemical properties of pyromellitic acid (PMK)-based peroxides were investigated. Obtaining a tetramethyl ester of a PMK was described. The mechanism of an esterification reaction is discussed, as is the complete esterification of PMK with primary alcohol. Author

N86-21584*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CHEMICAL BONDING TECHNOLOGY: DIRECT INVESTIGATION OF INTERFACIAL BONDS
J. L. Koenig, F. J. Boerio, E. P. Plueddemann, J. Miller, P. B. Willis, and E. F. Cuddihy Jan. 1986 54 p refs
(JPL Proj. 5101-284; Contract DE-AI01-85CE-89008)
(NASA-CR-176657; JPL-PUB-86-6; DOE/JPL-1012-120; NAS 1.26:176657) Avail: NTIS HC A04/MF A01 CSCL 07C

This is the third Flat-Plate Solar Array (FSA) Project document reporting on chemical bonding technology for terrestrial photovoltaic (PV) modules. The impetus for this work originated in the late 1970s when PV modules employing silicone encapsulation materials were undergoing delamination during outdoor exposure. At that time, manufacturers were not employing adhesion promoters and, hence, module interfaces in common with the silicone materials were only in physical contact and therefore easily prone to separation if, for example, water were to penetrate to the interfaces. Delamination with silicone materials virtually vanished when adhesion promoters, recommended by silicone manufacturers, were used. The activities related to the direct investigation of chemically bonded interfaces are described. Author

N86-21585# International Union of Pure and Applied Chemistry, Vienna (Austria).
THE 12TH INTERNATIONAL CONFERENCE ON ORGANOMETALLIC CHEMISTRY HELD AT CONGRESS CENTER HOFBURG, VIENNA ON 8-13 SEPTEMBER 1985. ABSTRACTS
1985 582 p Conference held at Vienna, Austria, 8-13 Sep. 1985
(AD-A161039) Avail: NTIS HC A25/MF A01 CSCL 07/3

This document contains abstracts of papers presented at the 12th International Conference on Organometallic Chemistry. GRA

N86-21586# Naval Ship Research and Development Center, Annapolis, Md.
AN EXPERIMENTAL EVALUATION OF THE EFFECTS OF SELECTED ORGANIC COMPOUNDS ON THE FORMATION OF INSOLUBLES IN DIESEL FUELS Final Report
John G. Zimmerman Nov. 1985 101 p
(Contract N61533-82-M-2379; Z08-38)
(AD-A161323; Z1-83; DTNSRDC/SME-CR-12-83) Avail: NTIS HC A06/MF A01 CSCL 21/4

The study documents and interrelates five experimental programs conducted by the David Taylor Naval Ship Research and Development Center in-house and under contract. The programs were designed to increase understanding of the effects of eleven selected heterocompounds on the stability of diesel-range fuels. The programs employed any or all of four different stability tests ranging from an oven test conducted at 150 F (65.6) for periods up to eight weeks to a test which exposed the fuel to a temperature of 500 F (260 C) for a few seconds. Ranking of the fuels and fuel mixes by all of the tests was reasonably consistent. The nature of the base fuel was important in determining the amount of sediment formed in the presence of a given heterocompound. Of the nine compounds individually tested, 2,5-dimethylpyrrole (DMP) and 1,2,5-trimethylpyrrole produced the greatest amounts of sediment, and 2- methylpiperazine (MPPZ), 1-dodecanethiol (DDSH), and 2,6-di-tert-butylphenol the least. Also, DDSH over a range of concentrations showed a synergistic effect in the presence of a constant level of DMP. In a synergistic effect in the presence of a constant level of DMP. In contrast, MPPZ inhibited the formation of sediment in the presence of an equivalent concentration of DMP. A number of sediment mass versus time curves gave evidence of an inducation period. Curves of sediment mass versus compound concentration was roughly linear. GRA

N86-21587# North Carolina Univ., Chapel Hill.
NEIGHBORING GROUP PARTICIPATION IN SOLVOLYSIS OF ORGANOSULFUR AND RELATED COMPOUNDS Final Report, 1 Sep. 1982 - 31 Aug. 1984
Ernest L. Eliel 31 Aug. 1985 7 p
(Contract DAAG29-82-K-0184)
(AD-A161458; ARO-19625.5-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

This investigation involved exploring in detail participation of sulfur (and, in less detail, that of oxygen) in solvolysis reactions via four-membered cyclic intermediates. This has been achieved. In the process some potentially interesting observations concerning solvent and salt effects in these reactions have been recorded.
Author (GRA)

N86-21588# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
A STUDY OF THE MECHANISM OF POPULATION OF HIGH LYING ROTATIONAL STATES IN HYDROGEN HALIDES Final Report, May 1982 - May 1985
Eric Weitz 30 Aug. 1985 16 p
(Contract DAAG29-82-K-0125)
(AD-A161460; ARO-18596.4-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

The production of vibrationally excited HCl was carried out either by photodissociation of HCl with an ArF laser with the dissociation initial step followed by recombination or by photoelimination of HCl from a variety of chloroethylenes. Relaxation rates of vibrationally excited HCl in liquid Xe or Kr were determined. Highly rotationally excited HF produced via photoelimination of HF from C2H5F was investigated. GRA

N86-21589# Defence Research Establishment Valcartier (Quebec).
COMPLEXES OF NITROCELLULOSE WITH CUPRIC CHLORIDE
E. Ahad Nov. 1985 27 p
(AD-A162519; DREV-R-4384/85) Avail: NTIS HC A03/MF A01 CSCL 07/3

The cupric chloride (CC) effect on the viscosity of nitrocellulose (NC) in an acetone solution was studied for various military and commercial type NC samples obtained from different suppliers. The NC samples were produced from wood cotton cellulose with a nitrogen content between 11.0 and 13.5% and a molecular weight ranging from 20,000 to 800,000. The study was carried out using different NC and CC concentrations and at different shear rates. The addition of CC to the NC solution causes an increase of the viscosity as a function of time due to the complex formation between NC and CC which is accomplished in two stages, each with a specific rate constant. The variation of the viscosity with the shear rate followed a pseudoplastic non-Newtonian behaviour. An empirical factor, the Cupric Chloride Parameter

(CCP), is computer from the intrinsic viscosity of the polymer as weight fraction of CC relative to NC, X, determined at the saturation point. The CCP is characgteristic of the NC sample and cna be related to the cellulose source (wood or cotton) and nitrogen content. The value of the square root of X* can be used as a parameter ot elucidate structural differences among NC samples. Author (GRA)

24 COMPOSITE MATERIALS

Includes laminates.

N86-21590* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HIGH PERFORMANCE MIXED BISIMIDE RESINS AND COMPOSITES BASED THEREON Patent
John A. Parker, Alvin H. Heimbuch, Ming-ta S. Hsu (HC Chem Research and Service Corp., San Jose, Calif.), and Timothy S. Chen, inventors (to NASA) (HC Chem Research and Service Corp., San Jose, Calif.) Issued 4 Feb. 1986 8 p
(NASA-Case-ARC-11538-1SB; US-Patent-4,568,733; US-Patent-Appl-SN-719796; US-Patent-Class-526-262) Avail: US Patent and Trademark Office CSCL 11D

Mixtures of bismaleimide/biscitraconirnide resins produces materials which have better handling, processing or mechanical and thermal properties, particularly in graphite composites, than materials made with the individual resins. The mechanical strength of cured graphite composites prepared from a 1:1 copolymer of such bisimide resins is excellent at both ambient and elevated temperatures. The copolymer mixture provides improved composites which are lighter than metals and replace metals in many aerospace applications.
Official Gazette of the U.S. Patent and Trademark Office

N86-21591 Pennsylvania State Univ., University Park.
FATIGUE RESPONSE OF SILICON CARBIDE WHISKER/ ALUMINUM MATRIX COMPOSITES Ph.D. Thesis
Balakrishna Korukonda 1985 169 p
Avail: Univ. Microfilms Order No. DA8516047

The present study addresses the fatigue response of silicon carbide whisker reinforced aluminum alloy (SiC sub w/6061-F) at room temperature (25 C) as well as at elevated temperatures up to 250 C. Material variables studied were limited to volume fraction of reinforcement. Field variables examined were temperature and applied stress range. Experimental results were compared to those expected for the unreinforced alloy in the as-fabricated, or -F, condition, as well as to those for the alloy in its optimal fatigue resistance state,-T6. At 25 C, 6061-F reinforced with 10 V%, 20 V%, and 30 V%SiC exhibited improved endurance over the 6061-F material in the unreinforced condition. However, improvements in endurance over the strengthened alloy from 6061-T6 were displayed only by composites with 20 V% and 30 V% reinforcement. Improvements in fatigue endurance were analytically found to be attributable to load sharing by the reinforcement fibers. Elevated temperature fatigue endurance up to 123 C indicated that the reinforced alloy was superior to the same alloy without ceramic content. Dissert. Abstr.

N86-21592# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Composite Materials and Structures.
PROCEEDINGS OF THE SECOND ANNUAL REVIEW OF THE CENTER FOR COMPOSITE MATERIALS AND STRUCTURES
Apr. 1985 346 p refs Review held in Blacksburg, Va., 23-24 Apr. 1985
Avail: NTIS HC A15/MF A01

Topics covered include: finite element models; geometric analysis; failure analysis of graphite-epoxy laminates; fracture mechanics; modeling cured laminates; edge reinforcement concepts; nondestructive testing; impact damage to thick composite laminates; and prediction analysis techniques. For individual titles, see N86-21593 through N86-21613.

N86-21593# Virginia Polytechnic Inst. and State Univ., Blacksburg.
DEVELOPMENT OF HIGH ORDER FINITE ELEMENTS TO MODEL FILAMENT WOUND COMPOSITES
C. A. Rogers, C. E. Knight, Jr., and W. G. Dodge *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 10 p refs (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

Analysis of filament wound composite structures is typically very complex, and in order to accomplish a reasonable analysis, considerable detail of the fabrication pattern of the winding process usually must be incorporated. The application of the finite element method to the analysis and design of filament wound composite structures makes what would normally be an untractable problem into one that can be solved. Because a large number of equations exist, the data input and computer computation time are consequently large also. In order to develop a design oriented analysis capability which could produce accurate results quickly with reduced input-data requirements, the total number of system equations must be reduced. A single high displacement order finite element was used to model the through thickness of a composite laminate. The displacement order for the in-plane direction remains linear, while the through thickness order is user selectable. Numerical integration for stiffness is evaluated with respect to the various material properties and laminar thicknesses in each individual element. Author

N86-21594*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
DESIGN OF NOTCHED PLATES UNDER COMPRESSION
Zafer Guerdal and Raphael T. Haftka *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 21 p refs Sponsored in part by NASA (For primary document see N86-21592 12-24)
(Grant NAG1-168)
Avail: NTIS HC A15/MF A01 CSCL 11D

A failure criterion for notched plates in compression was developed. The criterion is based on experimentally observed kinking failure of fibers around a notch combined compressive and shear stresses. Experimental results for plates with a crack or a hole are used to verify the failure model, and design studies are performed to demonstrate the use of the model. Author

N86-21595# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
ANALYSIS OF ALUMINUM/ARAMID-EPOXY HYBRID LAMINATES
D. A. Hirschfeld and C. T. Herakovich *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 16 p refs Sponsored in part by Aluminum Co. of America, Alcoa Center, Pa. (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

Composite laminates made of Armaid fiber reinforced epoxy sandwiched between Aluminum sheets (Al) have the potential for being ideal structural materials in many engineering applications. This is because they combine the strength and elastoplastic isotropic behavior of Al with the high strenght-to-weight ratio and fatigue resistance of the Aramid-epoxy composite plies (AR). The inplane engineering properties and interlaminar stresses that can cause delamination are studied. Included is a discussion of the relationship between the interlaminar stresses and the mismatch of engineering properties between layers. This relationship can be a good indicator of the conditions yielding maximum interlaminar stresses. Prediction of inplane elastic and thermal properties were made assuming that the properties of 7075-T6 Al (0.012 in thick) and AR (0.008 in thick) are known and that classical lamination theory is valid. The properties were predicted as a function of fiber orientation. Typical elastic laminate properties and thermal laminate properties were plotted. Author

N86-21596# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics

GEOMETRIC AND MATERIAL NONLINEAR BENDING ANALYSIS OF LAMINATED COMPOSITE PLATES AND SHELLS
K. Chandrashekhara and J. N. Reddy *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 22 p refs Sponsored in part by Army (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

A finite element displacement model is developed for geometric and material nonlinear analysis of laminated plates and shells. The material model is based on the incremental theory of plasticity with modified Hill's anisotropic yield condition and the associated flow rule. The strain hardening is assumed to be isotropic since the applied load is restricted to monotonic application. The method accounts for the fact that the parameters of anisotropy vary as the material strain hardens. Layered element approach is adopted for the treatment of plastic behavior through the thickness. The finite element is based on an extension of Sander's shell theory and accounts for the von Karman strains and transverse shear strains. A number of sample problems showing the effects of geometric and/or material nonlinearities on deflections and stresses in plates and shells are presented. Author

N86-21597# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
RESPONSE AND FAILURE ANALYSIS OF A GRAPHITE-EPOXY LAMINATE CONTAINING TERMINATING INTERNAL PLIES
Brian L. Kemp (Johns Hopkins Univ., Laurel, Md.) and Eric R. Johnson *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 42 p refs Previously announced in IAA as A85-30226 (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

A change in laminate thickness due to terminating internal plies acts as a stress riser for both intralamina and interlamina stresses. This laminate configuration is referred to as a ply drop. The linear elastic, three-dimensional stress distributions in the vicinity of a ply drop are determined for a graphite-epoxy laminate subject to axial tension and compression by a finite element analysis. It is shown that the interlaminar stresses have a maximum magnitude at the ply drop-off, and decrease proceedings away from the drop. The interlaminar stresses vanish in regions sufficiently removed from the ply drop-off. Two modes of failure initiation are analyzed. In the pure resin regions surrounding the dropped plies, the maximum stress criterion is assumed to govern failure. The Tsai-Wu criterion is used for intralamina failure prediction. The influence of two laminate lay-ups and a variety of ply drop geometries on the response and failure are presented. Author

N86-21598*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THERMALLY INDUCED STRESSES AND DEFORMATIONS IN LAYERED COMPOSITE TUBES
D. E. Cooper (Virginia Polytechnic Inst. and State Univ., Blacksburg), D. Cohen (Virginia Polytechnic Inst. and State Univ., Blacksburg), C. Q. Rousseau (Virginia Polytechnic Inst. and State Univ., Blacksburg), M. W. Hyer (Virginia Polytechnic Inst. and State Univ., Blacksburg), and S. S. Tompkins *In* Virginia Polytechnic Inst. and State Univ. Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 198[illegible] 37 p Sponsored in part by NASA (For primary document see N86-21592 12-24) (Grant NAG1-343)
Avail: NTIS HC A15/MF A01 CSCL 11D

The thermally induced stresses and deformations in layered, orthotropic tubes are studied. The motivation for studying tubes is their likely application for use in space structures. Tubes are a strong candidate for this application because of their high structural efficiency, as measured by stiffness per unit weight, and their relative ease of fabrication. Also, tubes have no free edges to deteriorate or delaminate. An anticipated thermal condition for tubes in space is a circumferential temperature gradient. This type of gradient will introduce dimensional changes into the structure and may cause stresses large enough to cause damage to the material. There are potentially large differences in temperatures at different circumferential locations on the tube. Because of this, the effects of temperature dependent material properties on the stresses and deformations may be important. The study is composed of three parts: experiments to determine the functional form of the circumferential gradient and to measure tube deflections; an elasticity solution to compute the stresses and deformations; and an approximate approach to determine the effects of temperature dependent material properties. Author

N86-21599*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
FRACTURE MORPHOLOGY OF 2-D CARBON-CARBON COMPOSITION
William B. Avery and Carl T. Herakovich *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 4 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Out-of-plane tensile tests of a woven fabric carbon-carbon composite were performed in a scanning electron microscope equipped with a tensile stage and a videotape recording system. The composite was prepared from T-300 8-harness satin graphite fabric and a phenolic resin. The (0/90/0/90/0 sub 1/2) sub 2 laminate, with a Theta describing the orientation of the warp fibers of the fabric, was cured at 160 C and pyrolized at 871 C. This was followed by four cycles of resin impregnation, curing, and pyrolysis. A micrograph of the cross section of the composite is presented. Inspection of the specimen fracture surface revealed that the filaments had no residual matrix bonded to them. Further inspection revealed that the fracture was interlaminar in nature. Failure occurred where filaments of adjacent plies had the same orientation. Thus it is postulated that improvement in transverse tensile strength of 2-D carbon-carbon depends on the improvement of the filament-matrix bond strength. Author

N86-21600*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
MODELING THE CURING PROCESS OF THICK-SECTION AUTOCLAVE CURED COMPOSITES
Alfred C. Loos and Philip H. Dara *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 23 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Temperature gradients are significant during cure of large area, thick-section composites. Such temperature gradients result in nonuniformly cured parts with high void contents, poor ply compaction, and variations in the fiber/resin distribution. A model was developed to determine the temperature distribution in thick-section autoclave cured composites. Using the model, long with temperature measurements obtained from the thick-section composites, the effects of various processing parameters on the thermal response of the composites were examined. A one-dimensional heat transfer model was constructed for the composite-tool assembly. The governing differential equations and associated boundary conditions describing one-dimensional unsteady heat-conduction in the composite, tool plate, and pressure plate are given. Solution of the thermal model was obtained using an implicit finite difference technique. B.G.

N86-21601*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
COMPOSITE LAMINATE FREE EDGE REINFORCEMENT CONCEPTS
W. E. Howard, Terry Gossard, Jr., and Robert M. Jones *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 27 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
(Grant NAG1-389)
Avail: NTIS HC A15/MF A01 CSCL 11D

The presence of a free edge in a laminated composite structure can result in delamination of the composite under certain loading

conditions. Linear finite element analysis predicts large or even singular interlaminar stresses near the free edge. Edge reinforcements which will reduce these interlaminar stresses, prevent or delay the onset of delaminations, and thereby increase the strength and life of the structure were studied. Finite element models are used to analyze reinforced laminates which were subsequently fabricated and loaded to failure in order to verify the analysis results. Author

N86-21602*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
VISCOELASTIC BEHAVIOR AND LIFE-TIME PREDICTIONS
D. A. Dillard and H. F. Brinson *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 10 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Fiber reinforced plastics were considered for many structural applications in automotive, aerospace and other industries. A major concern was and remains the failure modes associated with the polymer matrix which serves to bind the fibers together and transfer the load through connections, from fiber to fiber and ply to ply. An accelerated characterization procedure for prediction of delayed failures was developed. This method utilizes time-temperature-stress-moisture superposition principles in conjunction with laminated plate theory. Becaus failures are inherently nonlinear, the testing and analytic modeling for both moduli and strength is based upon nonlinear viscoelastic concepts. B.G.

N86-21603*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE DYNAMIC RESPONSE OF COMPOSITE BEAMS TO AXIAL IMPACT
E. J. Derian (Virginia Polytechnic Inst. and State Univ., Blacksburg), M. W. Hyer (Virginia Polytechnic Inst. and State Univ., Blacksburg), and H. D. Carden *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 11 p ref Sponsored in part by NASA (For primary document see N86-21592 12-24)
(Grant NAG1-343)
Avail: NTIS HC A15/MF A01 CSCL 11D

Large deformation response of simple composite structural elements to intense dynamic loadings is studied by focusing on the response of beams. Overall goals are to: design a simple test fixture to introduce crash related bending loads in beams; determine any difference between large deformation static and large deformation dynamic response; determine the influence of laminate stacking arrangements on the dynamic response, failure mode, and energy absorbed; and predict the dynamic response. Twelve different laminate orientations were investigated. Modeling of the response was done with an existing finite element program. The program computed nonlinear transient response analysis of a structure objected to a time varying load. B.G.

N86-21604*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
NONDESTRUCTIVE EVALUATION OF COMPOSITES BY OPTICAL TIME DOMAIN REFLECTOMETRY
R. O. Claus, D. D. Bennette, and B. S. Jackson *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 15 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Results in the measurement of slowly varying mechanical loading functions on composites using optical time domain reflectometry (OTDR) in imbedded optical fiber during both simulated manufacture and use are reviewed. First, the basic theoretical and experimental principles of the OTDR system are described. Next, the mechanical system of the composite and the imbedded fiber is analyzed. Results of measurement obtained for various loading functions applied to material specimens are then described and system limitations on spatial resolution, strain amplitude sensitivity, and frequency response are explained in terms of the range and resolution limits of the OTDR system. Author

N86-21605# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
BOUNDARY LAYER EFFECTS IN NEARLY INCOMPRESSIBLE CRACKED BODIES
C. W. Smith and O. Olaosebikan *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 7 p refs (For primary document see N86-21592 12-24)
(Grant NSF SMP-83-20252)
Avail: NTIS HC A15/MF A01

After briefly reviewing an experimental method which integrates the methods of frozen stress photoelasticity and high density moire interferometry together with appropriate algorithms for estimating three dimensional distributions of fracture parameters was focused upon. Results obtained by the method pertaining to boundary effects and their possible interpretation within the context of linear elastic fracture mechanics are stressed. Author

N86-21606# National Bureau of Standards, Boulder, Colo. Fracture and Deformation Div.
INFLUENCE OF DAMAGE ON MECHANICAL PERFORMANCE OF WOVEN LAMINATES AT LOW TEMPERATURE Abstract Only
Ronald D. Kriz and Walter J. Muster (Swiss Federal Laboratories for Materials Testing and Research, Debendorf, Switzerland) *In* Virginia Polytechnic Inst. and State Univ. Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 1 p (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

Large quantities of nonmetallic woven composites will be used in magnetic fusion energy structures at low temperatures. The influence of crack formation on the mechanical performance of standard glass/epoxy laminates (G-10CR, G-11CR) at low temperatures were predicted and measured. Mechanics of the load deformation response of a unit cell of weave was predicted by a finite element model that assumes generalized plane strain. Damage was modeled as macrocracks confined to individual fiber bundles that were oriented transverse to the tensile load direction. From experiments with tension loads, the formation of damage as a collection of fiber breaks, fiber bundle cracks, and delaminations between adjacent fiber bundles was studied. Author

N86-21607*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A FRACTURE MECHANICS ANALYSIS OF IMPACT DAMAGE IN A THICK COMPOSITE LAMINATE Abstract Only
C. C. Poe, Jr. *In* Virginia Polytechnical Inst. and State Univ. Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 1 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Graphite/epoxy filament-wound cases (FWC) for the solid rocket motors of the space shuttle are being made by NASA. The FWC cases are wound with AS4W graphite fiber impregnated with an epoxy resin and are about 1.4 inches or more thick. Graphite-epoxy composite laminates, unlike metals, can be damaged easily by low velocity impacts of objects like dropped tools. The residual tension strength of the FWC laminate, after impact, is being studied at Langley Research Center. The conditions that give minimum visual evidence of damage are being emphasized. A fracture mechanics analysis was developed to predict the residual strength, after impact, using radiographs to measure the size of the damage and an equivalent surface crack to represent the damage. Author

N86-21608# Virginia Polytechnic Inst. and State Univ., Blacksburg. Materials Response Group.
LIFE PREDICTION FOR COMPOSITE LAMINATES USING CRITICAL ELEMENT CONCEPTS
W. W. Stinchcomb and K. L. Reifsnider *In its* Proceedings of the

2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 14 p refs Sponsored in part by AF and General Dynamics, Fort Worth, Tex. (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

The critical element model was used to predict residual strength and life of a variety of graphite-epoxy laminates subjected to tension-tension, compression-compression, tension-compression, and block loading conditions. The model predictions were compared with experimental results from an extensive test program using thick, graphite-epoxy laminates. Author

N86-21609# Virginia Polytechnic Inst. and State Univ., Blacksburg. Materials Response Group.
NDE OF COMPOSITE MATERIALS USING ULTRASOUND: QUANTITATIVE OPTICAL DETECTION
A. Sarrafzadeh and C. J. Duke, Jr. *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 19 p refs (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

Two optical set-ups for detection and measurement of acoustic surface displacements produced by stress waves are presented. An optical displacement sensor based on speckle interferometry is designed so that both in-plane and out-of-plane components of disturbance caused by stress waves propagating in the material substrate can be detected and measured. A two beam interferometric system based on the diffraction grating application and single-mode-fiber optic utilization in measuring displacement amplitude of ultrasonic waves was designed. Schematic diagrams of such optical sensors presently under investigation are included. Author

N86-21610*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Materials Response Group.
RESPONSE OF THICK, NOTCHED LAMINATES SUBJECTED TO TENSION-COMPRESSION CYCLIC LOADS
C. E. Bakis and W. W. Stinchcomb *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 12 p Presented at the ASTM Symposium on Composite Materials: Fatigue and Fracture, Dallas, Tex., 24-25 Oct. Sponsored in part by NASA (For primary document see N86-21592 12-24)
(Grant NAG1-343)
Avail: NTIS HC A15/MF A01 CSCL 11D

The fatigue response of a [(0/24/90/-45)s]4 T300-5208 graphite-epoxy laminate with a drilled centerhole subjected to fully reversed tension-compression (R=-1, T-C) constant amplitude loading was investigated. Damage evaluation techniques such as stiffness monitoring, penetrant-enchanced X-ray radiography, C-scan, laminate deeply and residual strength were used to establish the mechanisms of damage development as well as the relations between this damage and the stiffness, strength and life of the laminate. Damage initiated at the hole as matrix cracking parallel to the fibers in all plies. Matrix cracks had a significant effect on delamination initiation and growth. Delaminations initiated near the surface in the densely cracked region at the hole and grew along major matrix cracks. Compressive properties degraded more rapidly than tensile properties. At the stress levels used, residual tensile strength increased early in the fatigue life and remained approximately constant to near the end of life, when failure was precipitated by excessive laminate instability during the compressive portion of the loading. Author

N86-21611*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
FRACTURE OF THICK GRAPHITE/EPOXY LAMINATES WITH PART-THROUGH SURFACE FLAWS
D. H. Morris and C. E. Harris *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 11 p refs Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01 CSCL 11D

Fracture behavior of tensile specimens containing through-the-thickness flaws and part-through semi-elliptic surface flaws was investigated. The material was T300/5208 graphite/epoxy, with a stacking sequence [0/+ or - 45/90] sub ns. Laminate thicknesses ranged from 8 to 120 plies. Fracture toughness for specimens with through-the-thickness flaws was a function of laminate thickness. Fracture toughness was also independent of crack size. Fracture toughness for the thick laminates was also independent of specimen geometry (center-cracked tension specimen, compact tension specimen, and three-point bend specimen). Using the asymptotic value of facture toughness and linear elastic isotropic fracture mechanics, the notched strength of tensile specimens with semi-elliptic surface flaws was predicted. The strength ratio is a function of the flaw depth (a/t) and flaw aspect (a/c) ratios. Comparisons between predicted and experimental strengths are good for large values of a/t. The notched strength of filament wound graphite/epoxy tensile specimens with part-through surface flaws was also predicted. Author

N86-21612*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
CHARACTERIZATION OF CARBON FIBERS AND FIBER-MATRIX ADHESION IN COMPOSITES
James P. Wightman and T. A. DeVilbiss *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 17 p Sponsored in part by NASA (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

The effect of fiber/matrix interactions on the mechanical properties of thermoplastic carbon fiber composites was determined. The experimental approach was a multi-faceted one involving the following areas: characterization of the surface of carbon fibers using X-ray photoelectron spectroscopy (XPS), secondary ion mass spectroscopy (SIMS) and scanning transmission electron microcopy (STEM); determination of the functional groups on carbon fiber surfaces using an elemental tagging scheme - derivatization; determination of the polar and dispersion contribution to the surface energy of carbon fibers by measuring wetting forces in a series of liquids having known polar and dispersion components; and study of the interaction of thermoplastic polymers with carbon surfaces by solution adsorption, STEM and fiber critical length. Author

N86-21613# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry and Chemical Engineering.
CHEMICAL MODIFICATION OF MATRIX RESIN NETWORKS WITH ENGINEERING THERMOPLASTICS: MORPHOLOGY AND PROPERTIES OF POLY(ARYL ETHER SULFONE) MODIFIED EPOXY NETWORKS
J. L. Hedrick, I. Yilgor, J. C. Hedrick, G. L. Wilkes, and J. E. McGrath *In its* Proceedings of the 2nd Annual Review of the Center for Composite Materials and Structures Apr. 1985 13 p refs Previously announced in IAA as A86-13133 Sponsored in part by Navy (For primary document see N86-21592 12-24)
Avail: NTIS HC A15/MF A01

Epoxy resins were modified with functionally terminated poly(aryl ether sulfone) oligomers to improve fracture toughness, while still essentially maintaining the bulk flexural modulus. Phenolic hydroxyl terminated polysulfone oligomers were first capped with a large molar excess of Epon Resin 828 to chemically link the ductile, glassy modifier. The resulting system was cured with a stoichiometric amount of diaminodiphenyl sulfone to form a network structure in a two step process. The molecular weights and the amount of polysulfone chemically incorporated into the network were varied and their effect on several important physical properties were investigated. The dynamic mechanical analysis and microscopy (SEM) studies show that it is possible to form a two phase morphology wherein the polysulfone composite particles are dispersed in the epoxy network matrix. Despite the two phase structure, the modified crosslinked systems are nearly transparent, apparently due to a similarity in refractive index values. The fracture toughness of these modified networks under plane strain condi-

tions improved significantly with minimal sacrifice of the flexural modulus and modulus-temperature profile. Author

N86-21614*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTEGRATED COMPOSITE ANALYZER (ICAN): USERS AND PROGRAMMERS MANUAL
Pappu L. N. Murthy and Christos C. Chamis Mar. 1986 77 p refs
(NASA-TP-2515; E-2035; NAS 1.60:2515) Avail: NTIS HC A05/MF A01 CSCL 11D

The use of and relevant equations programmed in a computer code designed to carry out a comprehensive linear analysis of multilayered fiber composites is described. The analysis contains the essential features required to effectively design structural components made from fiber composites. The inputs to the code are constituent material properties, factors reflecting the fabrication process, and composite geometry. The code performs micromechanics, macromechanics, and laminate analysis, including the hygrothermal response of fiber composites. The code outputs are the various ply and composite properties, composite structural response, and composite stress analysis results with details on failure. The code is in FORTRAN IV and can be used efficiently as a package in complex structural analysis programs. The input-output format is described extensively through the use of a sample problem. The program listing is also included. The code manual consists of two parts. Author

N86-21615# B and M Technological Services, Inc., Cambridge, Mass.
STATE-OF-THE-ART REVIEW ON COMPOSITE MATERIAL FATIGUE/DAMAGE TOLERANCE Final Report, Jul. - Nov. 1984
Reginald L. Amory and David S. Wang Dec. 1985 81 p refs
(Contract DTFA03-84-C-00052)
(FAA/CT-85/7; FAA-84-03-F) Avail: NTIS HC A05/MF A01

A state of the art review on composite material fatigue/damage tolerance was conducted to investigate the literature for fatigue life prediction methodologies including stress based methodologies, strength degradation models, and damage growth models. A critical review was made of each methodology and its commensurate basic equations of importance. Experimental data were reviewed and the behavior of specimens was correlated with that of civil aircraft components. Six recognized methods for the nondestructive testing of fibrous composite materials were examined and the most effective methods identified. Author

N86-21616*# National Aeronautics and Space Administration, Washington, D.C.
THE EFFECTS OF SURFACE FINISH AND GRAIN SIZE ON THE STRENGTH OF SINTERED SILICON CARBIDE
Young Hyuk You, Young Wook Kim, June Gunn Lee, and Chong Hee Kim Oct. 1985 12 p refs Transl. into ENGLISH from Journal of the Korean Ceramic Society (Seoul, South Korea), v. 21, no. 1, 1984 p 27-32 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77871; NAS 1.15:77871) Avail: NTIS HC A02/MF A01 CSCL 11D

The effects of surface treatment and microstructure, especially abnormal grain growth, on the strength of sintered SiC were studied. The surfaces of sintered SiC were treated with 400, 800 and 1200 grit diamond wheels. Grain growth was induced by increasing the sintering times at 2050 C. The beta to alpha transformation occurred during the sintering of beta-phase starting materials and was often accompanied by abnormal grain growth. The overall strength distributions were established using Weibull statistics. The strength of the sintered SiC is limited by extrinsic surface flaws in normal-sintered specimens. The finer the surface finish and grain size, the higher the strength. But the strength of abnormal sintering specimens is limited by the abnormally grown large tabular grains. The Weibull modulus increases with decreasing grain size and decreasing grit size for grinding. Author

N86-21617*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF THICKNESS AND PLY ORIENTATION ON BUCKLING OF LAMINATED PLATES
Dawn C. Jegley Feb. 1986 16 p ref
(NASA-TM-87691; NAS 1.15:87691) Avail: NTIS HC A02/MF A01 CSCL 11D

The buckling loads of laminated plates are predicted using a new theory which takes into account transverse shearing effects. This new theory assumes trigonometric terms through-the-thickness in the displacements to take into account transverse shearing effects in thick plates. Buckling loads predicted by the new theory and by traditional theories are compared for isotropic and laminated plates. The effect of ply orientation on the buckling loads predicted by each theory is demonstrated. Author

N86-21618*# Delaware Univ., Newark. Coll. of Engineering.
DELAMINATION GROWTH IN COMPOSITE MATERIALS
John W. Gillespie, Jr., Leif A. Carlsson, R. Byron Pipes, Robert Rothschilds, Bruce Trethewey, and Anthony Smiley Feb. 1986 212 p refs
(Grant NAG1-475)
(NASA-CR-178066; NAS 1.26:178066) Avail: NTIS HC A10/MF A01 CSCL 11D

The Double Cantilever Beam (DCB) and the End Notched Flexure (ENF) specimens are employed to characterize MODE I and MODE II interlaminar fracture resistance of graphite/epoxy (CYCOM 982) and graphite/PEEK (APC2) composites. Sizing of test specimen geometries to achieve crack growth in the linear elastic regime is presented. Data reduction schemes based upon beam theory are derived for the ENF specimen and include the effects of shear deformation and friction between crack surfaces on compliance, C, and strain energy release rate, G sub II. Finite element (FE) analyses of the ENF geometry including the contact problem with friction are presented to assess the accuracy of beam theory expressions for C and G sub II. Virtual crack closure techniques verify that the ENF specimen is a pure Mode II test. Beam theory expressions are shown to be conservative by 20 to 40 percent for typical unidirectional test specimen geometries. A FE parametric study investigating the influence of delamination length and depth, span, thickness and material properties on G sub II is presented. Mode I and II interlaminar fracture test results are presented. Important experimental parameters are isolated, such as precracking techniques, rate effects, and nonlinear load-deflection response. It is found that subcritical crack growth and inelastic materials behavior, responsible for the observed nonlinearities, are highly rate-dependent phenomena with high rates generally leading to linear elastic response. Author

N86-21619*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
THERMOPLASTIC MATRIX COMPOSITE PROCESSING MODEL
Philip H. Dara and Alfred C. Loos Sep. 1985 151 p refs
(Grant NAG1-343)
(NASA-CR-176639; NAS 1.26:176639; VPI-E-85-21; IR-57) Avail: NTIS HC A08/MF A01 CSCL 11D

The effects the processing parameters pressure, temperature, and time have on the quality of continuous graphite fiber reinforced thermoplastic matrix composites were quantitatively accessed by defining the extent to which intimate contact and bond formation has occurred at successive ply interfaces. Two models are presented predicting the extents to which the ply interfaces have achieved intimate contact and cohesive strength. The models are based on experimental observation of compression molded laminates and neat resin conditions, respectively. Identified as the mechanism explaining the phenomenon by which the plies bond to themselves is the theory of autohesion (or self diffusion). Theoretical predictions from the Reptation Theory between autohesive strength and contact time are used to explain the effects of the processing parameters on the observed experimental strengths. The application of a time-temperature relationship for autohesive strength predictions is evaluated. A viscoelastic compression molding model of a tow was developed to explain

the phenomenon by which the prepreg ply interfaces develop intimate contact. Author

N86-21620# California Univ., Los Angeles. School of Engineering and Applied Science.
STRESS-STRAIN BEHAVIOR AND FAILURE OF UNIAXIAL COMPOSITES IN COMBINED COMPRESSION AND SHEAR - 1 Interim Technical Report
S. B. Batdorf and Robert W. C. Ko 1 Jul. 1985 19 p
(Contract N00014-77-C-0505)
(AD-A161772; UCLA-ENG-85-25) Avail: NTIS HC A02/MF A01 CSCL 11/4

The effects of increasing fiber tilt with increasing load in uniaxial composites, culminating in kink band formation is considered. The fibers themselves are assumed to remain elastic. Nonlinearities result from changing fiber tilt and yielding of the matrix. Compressive stress-strain relations and failure are treated from a unified viewpoint. Comparisons are made between theory and experiment. GRA

N86-21621# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
FATIGUE PROPERTIES OF MULTIDIRECTIONAL BRAIDED COMPOSITES Final Report
L. W. Gause, J. M. Alper, and R. H. Dalrymple Feb. 1985 42 p
(WRO-2303)
(AD-A162572; AD-E900528; NADC-85022-60) Avail: NTIS HC A03/MF A01 CSCL 11/4

The fatigue performance of graphite/epoxy composites manufactured using a general braiding process was evaluated. Two styles of braided composites were fabricated and tested. Style I was the basic (1 x 1) braid pattern. Style II was constructed by holding half of the yarns as straight columns and braiding the rest of the yarns about the fixed yarns. Performance was compared to a 24 ply conventional laminate. Tension-tension, compression-compression and fully reversed constant amplitude fatigue tests were performed. Both style braids exhibited similar behavior, except style II had longer compression-compression fatigue life. As expected, in all fatigue conditions the braids had shorter lives than the baseline laminate. Nonetheless, the fatigue threshold stress levels observed for the braids as a percent of ultimate strength were similar to current laminated construction design stress values. GRA

N86-21622# Georgia Inst. of Tech., Atlanta.
ANALYSIS AND EXPERIMENTS ON INTERLAMINAR FRACTURE TOUGHNESS IN RESIN MATRIX COMPOSITES Final Scientific Report, 1 Jan. 1983 - 14 Apr. 1985
Lawrence W. Rehfield, Erian A. Armanios, and Ambur D. Reddy Jul. 1985 56 p
(Grant AF-AFOSR-0056-83)
(AD-A162689; AFOSR-85-1075TR) Avail: NTIS HC A04/MF A01 CSCL 11/4

This final report summarizes the objectives, accomplishments and proposed new direction of research on mode II interlaminar fracture in resin matrix composites. A mode II interlaminar fracture specimen, test and analysis method for interpreting results have been successfully developed and demonstrated for the AS4/3502 material system. Experimental data have been obtained under both net tensile and compressive loading. Of considerable importance are the findings that: (1) the AS4/3502 material system show increasing resistance to crack growth in tension; (2) interlaminar fracture under compression is a totally unstable process; and (3) tension and compression behaviors are considerably different. The findings and the conclusions that are drawn from them point to new, promising directions. Complementary experiments on low cycle fatigue in tension and compression and on mode I suppression in tension have been performed. The former basically confirm the static findings. The latter illustrate the potential effectiveness of mode I suppression technology and help to clarify mixed mode fracture. GRA

N86-21623# Ohio State Univ., Columbus.
BUCKLING OF LAMINATED COMPOSITE PLATES AND SHELL PANELS Final Report, 20 Nov. 1980 - 20 Jan. 1985
Arthur W. Leissa Jun. 1985 456 p
(Contract F33615-81-K-3203)
(AD-A162723; OSURF-762513/713464; AFWAL-TR-85-3069)
Avail: NTIS HC A20/MF A01 CSCL 11/4

The technical literature dealing with buckling and post-buckling behavior of laminated composite plates and shell panels is summarized. Emphasis is given to modern materials used in the aerospace industry having fiber-matrix constituents (e.g., glass-epoxy, boron-epoxy, graphite-epoxy, boron-aluminum), but other applications are also considered (e.g., plywood, paperboard). Geometric configurations taken up are either flat (plates) or cylindrically curved (shells), and have rectangular planform. All possible types of loading conditions and edge constraint conditions are considered. Both symmetrically and unsymmetrically laminated configurations are included, with symmetrical laminates represented by orthotropic or anisotropic plate or shell theory. Complicating effects dealt with include: internal holes, shear deformation, sandwich plates with soft cores, local instability, inelastic materials, hygrothermal effects and stiffeners. Extension numerical results are presented in graphical and tabular form. Both theoretical and experimental results are summarized. Author (GRA)

N86-21624# University Coll. of North Wales, Bangor. Dept. of Physics.
AN EVALUATION AND PREPARATION OF FERROMAGNETIC LIQUID COMPOSITES FOR USE AT MILLIMETER WAVELENGTHS Annual Report, 21 Dec. 1982 - 30 Oct. 1985
J. Popplewell, J. P. Llewellyn, and P. Davies Oct. 1985 78 p
(Contract DAJA45-83-C-0026; DA Proj. 1L1-61102-BH-57)
(AD-A162753; R/D-4130-MS-01; AR-2) Avail: NTIS HC A05/MF A01 CSCL 20/3

Ferrofluid composites containing polystyrene, tin, copper, aluminum, carbon and silver particles 1 to 50 micron in diameter have been prepared by dispersing the articles in ferrofluids with M s = 400 to 800 G. Thin film samples 1 micron to 1 mm thick have been studied using a 3 mm microwave source and Fourier Transform Spectrometry. Large microwave absorptions (60%) which are induced by small fields of less than 100 Oe have been observed in thin film composites containing metal particles. Magnetic absorptions arise from chain formation in composition and this has been modelled using Monte-Carlo simulations. Good agreement between the observations and theoretical predictions is obtained. GRA

N86-21625# Department of the Air Force, Washington, D.C.
A NEW NDE METHOD FOR COATED CARBON-CARBON COMPOSITES Patent Application
Robert L. Crane, inventor (to Air Force) Filed 5 Sep. 1985 12 p
(AD-D011978; US-Patent-Appl-SN-772815) Avail: NTIS HC A02/MF A01 CSCL 11/3

This document describes a non-destructive technique for detecting and repairing surface flaws in the silicon carbide oxidation resistant coating of a carbon-carbon composite. The surface of the composite is treated with a test liquid consisting essentially of a carrier fluid, a particulate pigment and a finely divided borosilicate glass, or a mixture of silicon dioxide and boron oxide, containing 0.25 to 8 weight percent boron oxide. The treated surface is inspected for surface flaws. Any discovered flaws are repaired by heating the surface to cause the borosilicate glass to flow and heal the flaw. The composite is thereafter heated to a further elevated temperature to deplete the boron from the flaw sealing glass. Author (GRA)

N86-21626# Oxford Univ. (England). Dept. of Engineering Science.
BEHAVIOUR OF FIBRE-REINFORCED COMPOSITES UNDER DYNAMIC TENSION
K. Saka and J. Harding 1985 73 p refs
(Grant AFOSR-84-0092)
(OUEL-1602/85) Avail: NTIS HC A04/MF A01

Epoxy specimens reinforced with plain-weave fabrics of carbon or glass or with several hybrid combinations of the two in various lay-ups, giving 5 different weight fractions of reinforcement from all-carbon to all-glass, were tested in tension at an impact strain rate of 1000/sec. Dynamic stress-strain curves are derived and the effect of hybrid weight fraction on the modulus, the tensile strength, the strain to fracture, and the energy absorbed during the fracturing process is determined. The fracture surfaces were examined by optical and scanning electron microscopy and the failure process in the hybrid composites is related to that found in the all-carbon and the all-glass specimens. Results for tests on similar specimens at an intermediate tensile strain rate of 10/sec are presented. Analytical expressions which relate the strength and stiffness of the hybrid specimens to the properties of the constituent plies and the lamination parameters are derived.
Author (ESA)

N86-21725# Joint Publications Research Service, Arlington, Va.
FIBER REINFORCED PLASTICS DESCRIBED
In its Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 19-42 Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Jan. 1985 p 85-96 (For primary document see N86-21723 12-31)
Avail: NTIS HC A04/MF A01

N86-21897# Manhattan Coll., New York. Dept. of Mechanical Engineering.
MATERIAL DAMPING OF CARBON/EPOXY COMPOSITES BY MEANS OF FREE-FREE BEAM RESONANCE TESTS
Daniel W. Haines *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 16 p refs Sponsored in part by the Celanese Corp. (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21898# Idaho Univ., Moscow.
IMPROVEMENT OF DAMPING IN FIBER REINFORCED POLYMER COMPOSITES
R. F. Gibson, S. A. Suarez, and L. R. Deobald *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 20 p refs (For primary document see N86-21883 12-39)
(Grant AF-AFOSR-0156-83)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21899# Naval Surface Weapons Center, Silver Spring, Md.
DYNAMIC MECHANICAL PROPERTIES OF GRAPHITE/ALUMINUM WIRES AT AUDIOFREQUENCIES
Gilbert F. Lee and Clifford W. Anderson *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 15 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21900# Martin Marietta Aerospace, Denver, Colo.
DAMPING BEHAVIOR OF METAL MATRIX COMPOSITES
M. S. Misra and P. D. LaGreca *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 12 p refs Sponsored in part by Martin Marietta Aerospace (For primary document see N86-21883 12-39)
(Contract F33615-82-R-3222A)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21901# National Bureau of Standards, Boulder, Colo. Fracture and Deformation Div.
DAMPING IN METAL-MATRIX COMPOSITES: MEASUREMENT AND MODELING
H. M. Ledbetter and S. K. Datta (Colorado Univ., Boulder) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 17 p refs Sponsored in part by DARPA (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-22490# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
CARBON-FIBER REINFORCED EPOXY TECHNIQUES FOR THE X-RAY MULTIMIRROR MISSION (XMM) LOW-ENERGY (LE) TELESCOPES
P. A. J. deKorte (Space Research Lab., Leiden), J. Klug, G. Moreau (Instruments SA, France), and G. P. Whitcomb (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 189-193 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-21627*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRICAL PHOTOSEMICONDUCTING AND PARAMAGNETIC PROPERTIES OF POLYPYROMELLITIMIDES
V. S. Voishchev, O. V. Kolninov, T. A. Gordina, B. V. Komov, B. I. Sazhin, B. I. Mikhantev, and A. N. Pravednikov Dec. 1985 7 p refs Transl. into ENGLISH from Vysokomolekuliarnye Soedineniia, Series B (USSR), v. 16, no. 4, 1974 p 295-298 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77975; NAS 1.15:77975) Avail: NTIS HC A02/MF A01 CSCL 07D

Semiconducting properties with dark and photoconductivity, type r, were observed in polypyromellitimides (PPMI) and explained by a donor-acceptor interreaction in the PPMI between electron acceptor promellitimide fragments and electron donor diamide in adjacent macromolecules.
Author

N86-21628*# National Aeronautics and Space Administration, Washington, D.C.
STUDIES ON THE OXIDATION OF HEXAMETHYLBENZENE 1: OXIDATION OF HEXAMETHYLBENZENE WITH NITRIC ACID
Koji Chiba, Shinya Tomura, and Toshiyuki Mizuno Feb. 1986 10 p Transl. into ENGLISH from Nippon Kagaku Kaishi (Japan), no. 10, 1973 p 1959-1962 Presented at the Tohoku Regional Session of the Japan Chemical Association, Part One, Japan, Oct. 1972 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77945; NAS 1.15:77945) Avail: NTIS HC A02/MF A01 CSCL 07D

The oxidative reaction of hexamethylbenzene (HMB) with nitric acid was studied, and the hitherto unknown polymethylbenzene-polycarboxylic acids were isolated: tetramethylphthalic anhydride, tetramethylisophthalic acid, 1,3,5-, 1,2,4- and 1,2,3-trimethylbenzenetricarboxylic acids. When HMB was warmed with 50% nitric acid at about 80 C, tetramethylphthalic anhydride and tetramethylisophthalic acid were initially produced. The continued reaction led to the production of trimethylbenzenetricarboxylic acids, but only slight amounts of dimethylbenzenetetracarboxylic acids were detected in the reaction mixture. Whereas tetramethylphthalic anydride and tetramethylisophthalic acid were obtained, pentamethylbenzoic acid, a possible precursor of them, was scarcely produced. On the other hand, a yellow material extracted with ether from the initial reaction mixture contained bis-(nitromethyl)prehnitene (CH3)4C6(CH2NO2)2, which was easily converted into the phthalic anhydride.
Author

N86-21629*# National Aeronautics and Space Administration, Washington, D.C.
STUDIES ON THE OXIDATION OF HEXAMETHYLBENZENE 2: PREPARATION OF DIMETHYLPYROMELLITIC ACID
Koji Chiba and Shinya Tomura Feb. 1986 10 p Transl. into ENGLISH from Nippon Kagaku Kaishi (Japan), no. 11, 1973 p 2188-2190 Presented at the Tohoku Regional Session of the Japan Chemical Association, Part One, Japan, Oct. 1972 Transl.

by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77946; NAS 1.15:77946) Avail: NTIS
HC A02/MF A01 CSCL 07D

Hexamethylbenzene (HMB) was difficult to be oxidized with an alkaline potassium permanganate solution, since HMB was insoluble in an aqueous alkaline solution. But, when HMB was warmed with 50% nitric acid for a short time, and then treated with aqueous potassium permanganate, the reaction occurred readily and dimethylpyromellitic acid was obtained. When HMB was warmed with 50% nitric acid for 1 to 2 minutes, a yellow material was produced, which was soluble in hot aqueous potassium hydroxide, though free from carboxylic acids. It contained a little amount of bis-(nitromethyl)prehnitene and several unknown compounds. Further, the heat stability of polyimide prepared by the reaction of tetramethyldimethylpyromellitate with 4,4 prime-diaminodiphenylmethane turned out to be nearly equal to that of polyimide prepared from tetramethylpyromellitate. Author

N86-21630*# National Aeronautics and Space Administration, Washington, D.C.
EXPERIMENTAL STUDIES ON THE REACTION KINETICS OF 1,1-DIMETHYLHYDRAZINE AND OXYGEN
Th. Just Nov. 1985 24 p refs Transl. into ENGLISH of "Experimentlle Untersuchungen zur Kinetik der Reaktion von 1.1-Dimethylhydrazin mit Sauerstoff" rept. DLF-FB-70-34 DFVLR, Cologne-Porz, West Germany, Aug. 1970 p 1-26 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA-TM-77947; NAS 1.15:77947) Avail: NTIS
HC A02/MF A01 CSCL 07D

Measurements behind shock waves in highly diluted 1,1 dimethylhydrazine-O2-Ar mixtures clearly showed a two-stage reaction. In the first stage, UDMH decomposes via a unimolecular step; in the second stage, clear', separated from the first one, the decay products react further with O2. Values for the rate constant of unimolecular decomposition were obtained. Author

N86-21631*# National Aeronautics and Space Administration, Washington, D.C.
CHARGE TRANSFER COMPLEXES OF CERTAIN AROMATIC POLYIMIDES
T. A. Gordina, B. V. Kotov, O. V. Kolninov, and A. N. Pravednikov Dec. 1985 9 p refs Transl. into ENGLISH from Vysokomolekulyarnyye Soyedineniya (USSR), V. 15, Series B, 1973 p 378-381 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77974; NAS 1.15:77974) Avail: NTIS
HC A02/MF A01 CSCL 07D

By electron spectroscopy it was shown that aromatic polyimides containing electron-donor residues of diamines -C6H4-X-C6H- (X=NH, NCH3, NC6H5, O, S, and CH2) form charge transfer complexes with low-molecular-weight electron acceptors. Based on the data obtained, the hypothesis was advanced that the coloration of the polyimides per se is due to the formation of charge transfer complexes between the electron-acceptor imide fragments and the electron-donor residues of the diamines. Author

N86-21632*# National Aeronautics and Space Administration, Washington, D.C.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE DESTRUCTION OF GRAPHITES IN A FLOW OF DISSOCIATED AIR
T. A. Bovina, Yu. V. Zviagin, N. V. Markelov, and Yu. V. Chudetskiy Feb. 1986 10 p refs Transl. into ENGLISH of "Teoreticheskoye i Eksperimentalnoye Issledovaniye Razrucheniya Grafitov v Potoke Dissotsiirovannogo Vozdukha" presented at Heat and Mass Transfer 5: 5th All-Union Conference on Heat and Mass Transfer, 1976 p 85-90 Conference held in Minsk, USSR, 17-20 May 1976 Original language document was announced in IAA as A77-43935 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
Avail: NTIS HC A02/MF A01 CSCL 07D

A method is presented for calculating the heating and erosion of blunt bodies made of graphite in a high-enthalpy flow of dissociated air, assuming chemical equilibrium on the surface and taking account of the thermal effects of combustion and sublimation of graphite. The analysis involves the use of a finite difference scheme to solve an equation of unsteady heat conduction. Attention is given to the equilibrium vaporization of C, C2 and C3 molecules. The calculations agree well with experimental data for a wide range of temperatures and stagnation pressures. B.J.

N86-21633*# National Aeronautics and Space Administration, Washington, D.C.
EXPERIMENTAL STUDY OF THE THERMAL STABILITY OF MATERIALS IN HIGH TEMPERATURE OXYGEN-CONTAINING MEDIA
Y. Ye. Abaltusov, A. R. Bagramyan, A. M. Grishin, and V. I. Yukhvid Mar. 1986 5 p refs Transl. into ENGLISH from Fizika Goreniya i Vzryva (USSR), v. 17, Jan. - Feb. 1981 p 147-148 Original language document was announced in IAA as A81-28022 Transl. by Scientific Translation Service, Santa Barbara, Calif.
Avail: NTIS HC A02/MF A01 CSCL 07D

An experimental study is made of the interaction of several materials with a high temperature medium containing oxygen. The temperature of the surface was measured as a function of time. It is found that the higher the velocity of mass removal from the surface, the more effective is the material from the viewpoint of heat resistance. Author

N86-21634*# National Aeronautics and Space Administration, Washington, D.C.
DETERMINATION OF NITROGEN MONOXIDE IN HIGH PURITY NITROGEN GAS WITH AN ATMOSPHERIC PRESSURE IONIZATION MASS SPECTROMETER
Kenji Kato et al Nov. 1985 16 p refs Trasnl. into ENGLISH from Bunseki Kagaku (Janan), v. 31, no. 1, 1982 p 22-27 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77959; NAS 1.15:77959) Avail: NTIS
HC A02/MF A01 CSCL 07D

An atmospheric pressure ionization mass spectrometric (API-MS) method was studied for the determination of residual NO in high purity N2 gas. The API-MS is very sensitive to NO, but the presence of O2 interferes with the NO measurement. Nitrogen gas in cylinders as sample gas was mixed with NO standard gas and/or O2 standard gas, and then introduced into the API-MS. The calibration curves of NO and O2 has linearity in the region of 0 - 2 ppm, but the slopes changed with every cylinder. The effect of O2 on NO+ peak was additive and proportional to O2 concentration in the range of 0 - 0.5 ppm. The increase in NO+ intensity due to O2 was (0.07 - 0.13)%/O2, 1 ppm. Determination of NO and O2 was carried out by the standard addition method to eliminate the influence of variation of slopes. The interference due to O2 was estimated from the product of the O2 concentration and the ratio of slope A to Slope B. Slope A is the change in the NO+ intensity with the O2 concentration. Slope B is the intensity with O2 concentration. Author

N86-21635*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
METHANE OXIDATION BEHIND REFLECTED SHOCK WAVES: IGNITION DELAY TIMES MEASURED BY PRESSURE AND FLAME BAND EMISSION
Theodore A. Brabbs and Thomas F. Robertson (Case Western Reserve Univ., Cleveland, Ohio) [1986] 23 p refs Presented at the Central States Meeting of the Combustion Inst., Cleveland, Ohio, 5-6 May 1986
(NASA-TM-87268; E-2956; NAS 1.15:87268) Avail: NTIS
HC A02/MF A01 CSCL 21B

Ignition delay data were recorded for three methane-oxygen-argon mixtures (phi = 0.5, 1.0, 2.0) for the temperature range 1500 to 1920 K. Quiet pressure trances enabled us to obtain delay times for the start of the experimental pressure rise. These times were in good agreement with those obtained from the flame band emission at 3700 A. The data correlated well with the oxygen and methane dependence of Lifshitz, but showed a much stronger

temperature dependence (phi = 0.5 delta E = 51.9, phi = 1.0 delta = 58.8, phi = 2.0 delta E = 58.7 Kcal). The effect of probe location on the delay time measurement was studied. It appears that the probe located 83 mm from the reflecting surface measured delay times which may not be related to the initial temperature and pressure. It was estimated that for a probe located 7 mm from the reflecting surface, the measured delay time would be about 10 microseconds too short, and it was suggested that delay times less than 100 microsecond should not be used. The ignition period was defined as the time interval between start of the experimental pressure rise and 50 percent of the ignition pressure. This time interval was measured for three gas mixtures and found to be similar (40 to 60 micro sec) for phi = 1.0 and 0.5 but much longer (100 to 120) microsecond for phi = 2.0. It was suggested that the ignition period would be very useful to the kinetic modeler in judging the agreement between experimental and calculated delay times. Author

N86-21636*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CHEMISTRY OF MOS-LSI RADIATION HARDENING Final Report
P. Grunthaner 15 Aug. 1985 88 p refs Prepared for Defense Nuclear Agency, Washington, D.C.
(Contract NAS7-918)
(NASA-CR-176651; JPL-PUB-85-77; NAS 1.26:176651) Avail: NTIS HC A05/MF A01 CSCL 07D

The objective of this task was to obtain chemical information on MOS test samples. Toward this end, high resolution X-ray photoemission spectroscopy (XPS) has been the primary techniques used to characterize the chemistry and structure of the SiO2/Si interface for a variety of MOS structures with differing degrees of susceptibility to damage by ionizing radiation. The major accomplishments of this program are: (1) the identification of a structurally distinct region of SiO2 in the near-interfacial region of thermal SiO2 on Si; (2) the identification in the near-interfacial region of SiO2 structural differences between radiation hard and soft gate oxides; (3) the direct observation of radiation-induced damage sites in thermal SiO2 with XPS using in situ electron stress; (4) the correlation of suboxide state distributions at the SiO2/Si interface with processing parameters and radiation susceptibility; (5) the development of a chemical mechanism for radiation-induced interface state generation in SiO2/Si structures; and (6) the development benign chemical profiling techniques which permit the investigation of oxide/semiconductor structures using surface sensitive electron spectroscopic techniques. Author

N86-21637# Environmental Devices Corp., Sacramento, Calif.
COINCIDENTAL CHEMICAL SIGNATURE IDENTIFIER Final Report
1985 20 p
(Contract F04704-84-C-0072)
(AD-A161269) Avail: NTIS HC A02/MF A01 CSCL 07/4

In our proposal, we hypothesized that an individual possesses distinguishable characteristics, inherent in his chemical makeup, that differentiates him from all other people. The Phase 1 research was concerned with how existing analytical chemical instrumentation could assist in deciphering vapors emitted by humans which could result in a positive chemical identification signature. In the Phase 1 feasibility research study, we evaluated and tested methods for collecting, cataloguing and identifying human effluent vapors that were characteristic and unique to the individual. A variety of temperatures, enclosures, flow rates, filters and sample traps were used in the collection of vapors from three female and two male subjects in an attempt to distinguish one spectrum from another. Analysis of specimen was via the Olfax I mass spectrometer. It was found that all our subjects' spectra were comprised of essentially the same chemical compounds, with varying abundances. The two subjects, (1 male, 1 female), most frequently and thoroughly tested, revealed nominal mass intensity ratios for 53% of the mass numbers usually monitored in our studies differing by more than 20% from the paired spectrum. These differences suggest that distinguishing characteristics do exist from person to person and that given the proper tools and sufficient time, an instrument can be developed to meet military and commercial security requirements. GRA

N86-21638# Pennsylvania State Univ., University Park.
STUDIES OF GAS-PHASE CLUSTERS: APPLICATION TO NUCLEATION AND AEROSOL FORMATION Final Report, Aug. 1982 - Jul. 1985
A. W. Castleman, Jr. 25 Sep. 1985 35 p
(Contract DAAG29-82-K-0160)
(AD-A161401; ARO-19757.33-CH) Avail: NTIS HC A03/MF A01 CSCL 07/4

Currently, there is extensive interest in factors governing the size distribution and morphology of small particles produced in smokes and missile exhausts, the formation and properties of atmospheric clusters which lead to a number of phenomena such as fogs and hazes, and the generation of species that may influence the propagation of electromagnetic radiation. This research program constituted an investigation of the properties and formation of small molecule clusters which serve as prenucleation embryos to aerosol formation. Results are reported on studies of: (1) mechanisms of growth and nucleation of clusters, (2) spectroscopic properties of clusters, and (3) energetics of ion-molecule complex formation. Author (GRA)

N86-21639# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
CHARACTERIZATION OF VESICLE AND MICROEMULSION MICROSTRUCTURES Final Report, 1 Aug. 1984 - 31 Jul. 1985
D. F. Evans 31 Jul. 1985 13 p
(Contract DAAG29-84-K-0152)
(AD-A161459; ARO-21635.2-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

This research is concerned with developing strategies for controlling the structure and stability of surfactant microstructures. These structures include micelles, vesicles, microtubules, bilayers and with added oil a range of bicontinuous materials and they play key roles in many biological and industrial processes. During the past year we have characterized an unusual micelle-vesicle equilibrium, demonstrating how the structures of bicontinuous microemulsions can be controlled by mixture of oil or surfactant and by the addition of cosurfactants. In addition we have assembled a video enhanced contrast differential interference microscope which permits direct visualization of surfactant microstructures. GRA

N86-21640# Wien Univ. (Austria). Inst. fuer Physikalische Chemie.
BORONNITRIDE AND SILICONNITRIDE SYSTEMS Annual Report, Sep. 1984 - Sep. 1985
Peter Rogl and Julius Schuster Sep. 1985 152 p
(Contract DAJA45-84-C-0038)
(AD-A161563; AR-1) Avail: NTIS HC A08/MF A01 CSCL 07/4

Transition Metal-Boron-Nitrogen Systems: The existing literature data regarding the systems Fe-B-N, Co-B-N and Ni-B-N were critically assessed including the binary boundary systems. The thermodynamic phase equilibria at 900 C were reinvestigated for the binary systems Fe-B, Co-B and Ni-B using different methods of preparation and analysis. A complete constitutional diagram Fe-B was established in the temperature range 600 < T < 1700 C using X-ray phase analysis, metallography, Differential Thermal Analysis, (DTA) and melting point analysis. Transition Metal-Silicon-Nitrogen Systems: The compilation and critical assessment of existing literature data as well as the experimental investigation in the ternary systems Ti-Si-N, Zr-Si-N, V-Si-N, Nb-Si-N and Ta-Si-N and the respective TM-N as well as TM-Si binary systems were completed. Silicon nitride reacts with each of these transition metals to form either binary silicides and nitrides or ternary phases of D8 sub 8-type structure with the general formula TM5Si3N1-x. These phases are commonly known as Nowotny phases and were described in the literature. No new ternary phase was observed. GRA

N86-21641# Case Western Reserve Univ., Cleveland, Ohio.
SPECTROSCOPIC AND ELECTROCHEMICAL STUDIES OF TRANSITION-METAL TETRASULFONATED PHTHALOCYANINES. PART 6: THE ADSORPTION OF IRON TETRASULFONATED PHTHALOCYANINE ON SINGLE CRYSTAL SILVER ELECTRODES
R. Adzic, B. Simic-Glavaski, and E. B. Yeager 1 Nov. 1985 20 p
(Contract N00014-83-K-0343)
(AD-A161640; TR-58) Avail: NTIS HC A02/MF A01 CSCL 07/4

Adsorbed layers of iron tetrasulfonated phthalocyanine have been examined using cyclic voltammetry on the silver single crystal low index surface: (100), (110), and (111). The peak potentials and charge under the voltammetry peaks show some dependence on the crystal planes. The effects of the underpotential deposition of lead on the adsorbed macrocycle have also been examined on the silver single crystal electrode. The lead can be underpotential deposited on the silver directly through a pre-adsorbed macrocycle layer without desorbing the macrocycle. The data are explained in terms of a model for the adsorbed macrocycle which has the plane of the ligand perpendicular to the electrode surface. GRA

N86-21642# Indiana Univ., Bloomington. Dept. of Chemistry.
MICROVOLTAMMETRIC ELECTRODES Final Report, 1 Jul. 1982 - 30 Jun. 1985
E. M. Wrightman 25 Sep. 1985 8 p
(Contract MIPR-105-84)
(AD-A161653; ARO-18983.15-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

Microvoltammetric electrodes, electrodes of micrometer dimensions, have opened many new domains for electrical investigations. These include increased temporal resolution, increased current density, and decreased sensitivity to the effects of solution resistance. Dramatic improvements in electrochemical data can be obtained with these electrodes. A number of different areas have been investigated with the emphasis on obtaining data that is inaccessible with electrodes of conventional size. Successfully completed projects include measurement of transient electrogenerated intermediates on a microsecond time scale, the use of electrochemistry in highly resistive media such as solutions of benzene, and a characterization of the mass transport processes operant at these electrodes. In addition, the analytical opportunities of microvoltammetric electrodes have been explored, especially as liquid chromatographic detectors. GRA

N86-21643# York Univ., Downsview (Ontario). Dept. of Chemistry.
BINUCLEAR PHTHALOCYANINES AS MODEL ELECTROCATALYSTS FOR THE REDUCTION OF OXYGEN
M. Hempstead, M. Melnik, A. Nevin, W. Liu, and A. B. P. Lever May 1985 11 p
(Contract N00014-84-G-0201)
(AD-A161758; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

Binuclear cobalt phthalocyanines linked by bridges containing 1, 2, 4, or 5 atoms are shown to reduce oxygen catalytically, more efficiently than mononuclear cobalt phthalocyanines. The kinetic efficiency for oxygen reduction is related to the degree of electronic coupling between the two halves of the molecule. The Co(II) species disproportionate in non-coordinating solvents, in the presence of hydroxide ion, forming the potentially two-electron redox reagents Co(I) and Co(III)Pc. Author (GRA)

N86-21644# International Society of Electrochemistry, Lausanne (Switzerland).
EXTENDED ABSTRACTS, 36TH INTERNATIONAL SOCIETY OF ELECTROCHEMISTRY HELD AT SALAMANCA, SPAIN ON 23-28 SEPTEMBER 1985
28 Sep. 1985 98 p Meeting held in Salamanca, Spain, 23-28 Sep. 1985
(AD-A162434) Avail: NTIS HC A05/MF A03 CSCL 07/4

This document contains abstracts of articles presented at a meeting of the International Society of Electrochemistry. The articles are written on such areas as: Corrosion; Organic Electrochemistry; Electrochemical Kinetics; Bioelectrochemistry; Electroanalysis; and Electrochemical Thermodynamics. GRA

N86-21645# Pittsburgh Univ., Pa. Dept. of Physics and Astronomy.
RATE COEFFICIENTS FOR THE OXIDATION REACTIONS OF ZIRCONIUM IONS WITH OXYGEN, NITRIC OXIDE, AND CARBON DIOXIDE
S. Dheandhanoo, B. K. Chatterjee, and R. Johnsen 1 Oct. 1985 4 p Document previously announced in IAAA as A86-10061
(Contract F19628-83-K-0037)
(AD-A162694; AFGL-TR-85-0308) Avail: NTIS HC A02/MF A01 CSCL 07/4

Rate coefficients for the oxidation reactions of zirconium ions with oxygen, nitric oxide, and carbon dioxide have been determined in the near-thermal energy range (0.04 to about 0.4 eV) using a selected-ion drift apparatus. The reactions are found to proceed with large rate coefficient (approximately 5 to the 10th power cu cm/s at 300K). At elevated ion energies the reactions with NO and CO2 exhibit smaller rates. The secondary oxidation reactions of ZrO+ ions with the same reactants have rate coefficients about two orders of magnitude smaller than those for the first oxidation steps. The discharge ion source used to produce the zirconium ions in these experiments is described in some detail. GRA

N86-21646# San Diego State Univ., Calif. Dept. of Electrical and Computer Engineering.
ELECTRON PRODUCTION, ELECTRON ATTACHMENT, AND CHARGE RECOMBINATION PROCESS IN HIGH PRESSURE GAS DISCHARGES Annual Scientific Report, 1 Aug. 1984 - 31 Jul. 1985
Long C. Lee 10 Sep. 1985 32 p
(Grant AF-AFOSR-0314-82)
(AD-A162747; AFOSR-85-1132TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

The electron productions from two-photon-ionization of CS2, SO2 and (CH3)3N at 193 nm were investigated and their coefficients were measured. The effect of space charge on the electron conduction pulse was observed as a function of charge density and the applied electric field. The electron attachment rate constants of H2O and C3F8 in buffer gases of Ar, N2, and CH4 were measured. The electron attachment rate constants for the gas mixtures of H2O-Ar, C3F8-N2 and X3F8-CH4 increase with increasing E/N. These characteristics are useful for the application of opening switches. The electron drift velocities of various gas mixtures were measured. GRA

N86-21647# Department of the Army, Washington, D. C.
ELECTROLYTE FOR LITHIUM-INORGANIC NON-AQUEOUS RECHARGEABLE CELL SYSTEM AND RECHARGEABLE CELL SYSTEM INCLUDING SAID ELECTROLYTE Patent Application
Robert J. Mammone and Michael Binder, inventors (to Army) Filed 12 Nov. 1985 13 p
(AD-D011976; US-Patent-Appl-SN-796332) Avail: NTIS HC A02/MF A01 CSCL 07/4

The general object of this invention is to provide an improved high energy lithium inorganic non-aqueous rechargeable cell system. A more particular object of the invention is to provide such an improved system wherein the lithium dithionite discharge product can be chemically oxidized so that the carbon cathode capacity is increased. The aforementioned objects can be attained by using a liquid electrolyte comprising sulfur dioxide complexed at room temperature with a salt that dissolves in sulfur dioxide without the assistance of organic co-solvents and with soluble molecular chlorine added to the complex to saturate the electrolyte. The present invention provides an improved lithium-inorganic non-aqueous rechargeable cell system having an electrolyte based on sulfur dioxide and containing dissolved molecular chlorine. The cell includes an alkali metal anode, an inorganic conductive electrolyte composed of either a metal, a metal chloride, an electroactive polymer, a carbonaceous material, a blend of carbonaceous materials, or a blend of carbonaceous materials

and various metals, metallic compounds or electroactive polymers. One of the preferred salts that can dissolve in sulfur dioxide without the assistance of organic co-solvents is LiAlCl4. GRA

N86-21648*# National Bureau of Standards, Gaithersburg, Md.
NBS (NATIONAL BUREAU OF STANDARDS): MATERIALS MEASUREMENTS Annual Report, 1 Apr. 1984 - 31 Mar. 1985
J. R. Manning Jul. 1985 98 p refs
(NASA Order H-27954-B)
(NASA-CR-176646; NAS 1.26:176646; PB86-103470; NBSIR-85-3217) Avail: NTIS HC A05/MF A01 CSCL 07D

NBS work for NASA in support of NASA's Microgravity Science and Applications Program under NASA Government Order H-2-7954B (Properties of Electronic Materials) covering the period April 1, 1984 to March 31, 1985 is described. The work has been carried out in three independent tasks: Task 1--Surface Tensions and Their Variations with Temperature and Impurities; Task 2--Convention during Unidirectional Solidification; Task 3--Measurement of High Temperature Thermodynamic Properties. The results for each task are given separately in the body of the report. GRA

N86-21649# National Bureau of Standards, Gaithersburg, Md. Center for Analytical Chemistry.
HANDBOOK FOR SRM (STANDARD REFERENCE MATERIALS) USERS Final Report
J. K. Taylor Sep. 1985 101 p refs
(PB86-110897; NBS-SP-160-100; LC-85-600576) Avail: NTIS HC A06/MF A01; Also avail: SOD as SN003-003-02689-1 CSCL 07D

The handbook was prepared to provide guidance for the use of Standard Reference Materials (SRM's) to provide an accuracy base for chemical measurements. The general concepts of precision and accuracy are discussed and their realization by quality assurance of the measurement process. General characteristics of SRM's are described and guidance is given for their selection for specific applications. Ways to effectively use SRM's are recommended, utilizing control charts to evaluate and monitor measurement accuracy. Appendices provide statistical guidance on the evaluation of measurement uncertainty. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-21650 Northwestern Univ., Evanston, Ill.
DEVELOPMENT OF AN ELEVATED TEMPERATURE ALUMINUM ALLOY CONTAINING Al3X-TYPE DISPERSED PHASES Ph.D. Thesis
Michael S. Zedalis 1985 267 p
Avail: Univ. Microfilms Order No. DA8523611

The use of high strength Al alloys for numerous aerospace applications has been severely restricted by poor elevated temperature performance. Suitable dispersed phases in high temperature Al alloys should be thermodynamically stable and exhibit partial coherency with the matrix at temperatures of interest. Minimum lattice disregistry across the precipitate/matrix boundary yields a low interfacial energy and thus, a low driving force for Ostwald ripening. The extents of solid solubility in the equilibrium, tetragonal Al3X-type dispersed phases (X represents binary and ternary combinations of Hf, Ti, V and Zr) were examined using powder X-ray diffraction methods. Minimum lattice disregistry (delta) with the Al(ss) matrix was achieved by maximizing the amount of Ti or V added to the Al3Hf and/or Al3Zr phases without forming a co-intermetallic compound exhibiting a DO sub 22 crystall structure. In comparison to Al3Zr, with a (delta) equal to 2.88%, the addition of V to Al3Zr in the ratio 7:1, results in a decrease in (delta) by approximately 17%. Dissert. Abstr.

N86-21651 Stanford Univ., Calif.
CRACK INITIATION AND MICROSTRUCTURE IN TUNGSTEN CARBIDE-COBALT COMPOSITES Ph.D. Thesis
Vikram Jayaram 1985 149 p
Avail: Univ. Microfilms Order No. DA9522164

The present work examines the consequences of a combination of slip systems for polycrystalline deformation in sintered tungsten carbide-cobalt. Also studied are microstructural features associated with thin intergranular cobalt films and a chemical reaction that follows the annealing of deformed material. Commercially sintered compositions were deformed by Vickers indentation and by compression with a superimposed constrained pressure. Slices from these samples were thinned and examined in the transmission electron microscope. Plastic incompatibility between randomly oriented grains leads to the development of stresses that promote fracture on the basal plane. Two cases of strain discontinuity are considered: those in the plane of, and those normal to the boundary between two grains. It is shown that the former can lead to intergranular cracking from a triple point and transgranular failure. Experimental observations of cracks and uncracked boundaries confirm the validity of a crystallographic analysis of incompatible deformation. The implications for fracture initiation in other brittle materials are considered. Dissert. Abstr.

N86-21652 Virginia Univ., Charlottesville.
RAPIDLY SOLIDIFIED ALLOYS OF IRON-RARE EARTH BORON FOR PERMANENT MAGNETS Ph.D. Thesis
Ruel Anthony Overfelt 1984 158 p
Avail: Univ. Microfilms Order No. DA8522485

The effects of composition and processing variables on the magnetic properties of rapidly solidified iron-rare earth-boron alloys have been explored using a vibrating sample magnetometer. Additionally, supporting microstructural analyses are given to help explain the observed variations. This work has concentrated on producing large intrinsic coercivities, i.e., greater than about 10 kOe, directly at controlled solidification rates in melt spinning. Intrinsic coercivities of only 100 to 1000 Oe are obtained at the lowest (0 to 4 m/s) and highest (40 to 80 m/s) wheel surface speeds in all alloys investigated. Intrinsic coercivities over 20 kOe have been obtained at intermediate wheel surface speeds (20 to 30 m/s) in alloys of Fe sub 76 R sub 76 B sub 76 where substituting samarium and cerium for praseodymium and neodymium does not lead to large intrinsic coercivities at all wheel surface speeds. Replacements of boron with the metalloids carbon or silicon are also ineffective in producing large intrinsic coercivities. Dissert. Abstr.

N86-21653 Notre Dame Univ., Ind.
A STUDY OF SUBSURFACE MICROSTRUCTURAL CHANGES DUE TO ABRASION OF ALUMINUM, COPPER AND NICKEL Ph.D. Thesis
C. Mukund Rao 1986 190 p
Avail: Univ. Microfilms Order No. DA8523612

The subsurface dislocation structures and the extent of dynamic recovery and recrystallization in pure metals subjected to low-stress abrasion have been examined. Pure aluminum, copper and nickel were chosen to provide a range of recrystallization temperature and thermal conductivities. Large grain specimens were abraded on a dry sand rubber wheel abrasion tested (RWAT) using three different abrasives: -50 + 70 mesh-rounded quartz, -50 + 70 crushed quartz and 80 grit Al2O3. X-ray diffraction-back-reflection pinhole patterns of the original specimens gave single-crystal Laue patterns, whereas the abraded specimens produced Debye rings. In the case of aluminum the Debye rings showed distinct individual spots, whereas the copper and nickel produced smooth, continuous rings. Patterns from aluminum samples abraded with semi-rounded quartz showed fewer spots on the Debye rings than with the other two abrasives. There was no effect of the differences between abrasives for copper and nickel. Dissert. Abstr.

N86-21654*# Syracuse Univ., N. Y.
GRAIN BOUNDARY OXIDATION AND AN ANALYSIS OF THE EFFECTS OF PRE-OXIDATION ON SUBSEQUENT FATIGUE LIFE

Yoshiki Oshida and H. W. Liu Feb. 1986 38 p refs
(NASA-CR-175051; NAS 1.26:175051) Avail: NTIS
HC A03/MF A01 CSCL 11F

The effects of preoxidation on subsequent fatigue life were studied, Surface oxidation and grain boundary oxidation of a nickel-base superalloy (TAZ-8A) were studied at 600 to 1000 C for 10 to 1000 hours in air. Surface oxides were identified and the kinetics of surface oxidation was discussed. Grain boundary oxide penetration and morphology were studied. Pancake type grain boundary oxide penetrates deeper and its size is larger, therefore, it is more detrimental to fatigue life than cone-type grain boundary oxide. Oxide penetration depth, a (sub m), is related to oxidation temperature, T, and exposure time, t, by an empirical relation of the Arrhenius type. Effects of T and t on statistical variation of a (sub m) were analyzed according to the Weibull distribution function. Once the oxide is cracked, it serves as a fatigue crack nucleus. Statistical variation of the remaining fatigue life, after the formation of an oxide crack of a critical length, is related directly to the statistical variation of grain boundary oxide penetration depth. Author

N86-21655*# National Aeronautics and Space Administration, Washington, D.C.

DIFFUSION AND SOLUBILITY OF OXYGEN IN SILVER

W. Eichenauer and G. Miller Nov. 1985 12 p refs Transl. into ENGLISH from Diffusion and Loeslichkeit von Sauerstoff in Silber (Stuttgart, West Germany), v. 53, 1962 p 321-324 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. was prep. by Technical Univ., Darmstadt, West Germany
(Contract NASw-4005)
(NASA-TM-77938; NAS 1.15:77938) Avail: NTIS
HC A02/MF A01 CSCL 11F

The diffusion and solubility of oxygen in Ag in the temperature range between 412 and 862 C was determined. The following interpolation formula was found for the solubility: L = 8.19.1/100. exp(-11 860/RT)Mol O2/g.At.Ag.at 1/.5. The process obeys the Sieverts square root law within the limits of error. The dissolution of oxygen in Ag may be accompanied by the dissociation of the oxygen molecules into atoms. The tests on Ag-foils reveal that below a temperature of about 500 C a higher solubility is simulated by the adsorption of oxygen. The diffusion coefficient of oxygen in silver obeys the following equation: D = 2.72.1/100.exp(-11 000/RT)sq cm/s. The relatively low activation energy of 11 kcal/g.At suggests that the diffusion of oxygen takes places over interstitial sites. E.A.K.

N86-21656*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.

EFFECT OF BORON ON TENSILE PROPERTIES OF B2 BeAl Final Report

M. Crimp and K. Vedula Feb. 1986 17 p refs
(Grant NAG3-563; Contract DE-AI-01-77CS-51040)
(NASA-CR-175074; DOE/NASA/0563-1; NAS 1.26:175074) Avail: NTIS HC A02/MF A01 CSCL 11F

Small additions of boron were shown to improve the room temperature ductility of the intermetallic compound Ni3Al. Boron is believed to segregate to the gain boundaries and strengthen them, allowing the inheret ductility of the grains to be achieved. The present study was undertaken to see if boron has a similar effect on the low temperature tensile properties of the equiatomic intermetallic compound FeAl. A binary alloy without boron is compared with an alloy containing 0.78 at % B (0.2 wt %) B, by tensile testing over the temperature range of 300 K to 640 K. Both alloys were processed by powder metallurgy. Results showed that 0.78 at % B addition to FeAl does indeed change the room temperature fracture mode from intergranular to transgranular, suggesting a strengthening of grain boundaries. The alloy containing boron is, however, still brittle at room temperature. A slight decrease in the ductile to brittle transition temperature is, nevertheless, observed. In addition a significant increase in strength of the alloy is observed with boron addition. Author

N86-21657*# National Aeronautics and Space Administration, Washington, D.C.

EFFECT OF ADDITIONAL HEAT TREATMENT OF 2024-T3 ON THE GROWTH OF FATIGUE CRACK IN AIR AND IN VACUUM

E. P. Louwaard Feb. 1986 19 p refs Transl. into ENGLISH of "Invloed van het Naveredelen van 2024-T3 op het Groeien van Vermoeilingsscheueren in Lucht en in Vacuum" rept. LR-237 Delft Technical Univ., Delft, Netherlands, 1976 p 1-16 Original language document was announced as N78-15255 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77984; NAS 1.15:77984) Avail: NTIS
HC A02/MF A01 CSCL 11F

In order to determine the influence of ductility on the fatigue crack growth rate of aluminum alloys, fatigue tests were carried out on central notched specimens of 2024-T3 and 2024-T8 sheet material. The 2024-T8 material was obtained by an additional heat treatment applied on 2024-T3 (18 hours at 192 C), which increased the static yield strength from 43.6 to 48.9 kgf/sq mm. A change in the ultimate strength was not observed. Fatigue tests were carried out on both materials in humid air and in high vacuum. According to a new crack propagation model, crack extension is supported to be caused by a slip-related process and debonding triggered by the environment. This model predicts an effect of the ductility on the crack growth rate which should be smaller in vacuum than in humid air; however, this was not confirmed. In humid air the crack-growth rate in 2024-T8 was about 2 times faster than in 2024-T3, while in vacuum the ratio was about 2.5. Crack closure measurements gave no indications that crack closure played a significant role in both materials. Some speculative explanations are briefly discussed. Author (ESA)

N86-21658*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ROLE OF MOLYBDENUM IN THE Na SUB 2SO SUB 4 INDUCED CORROSION OF SUPERALLOYS AT HIGH TEMPERATURES

A. K. Misra (Case Western Research Univ., Cleveland, Ohio) [1986] 29 p refs Presented at the TMS-AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986
(NASA-TM-87235; E-2905; NAS 1.15:87235) Avail: NTIS
HC A03/MF A01 CSCL 11F

Sodium sulfate induced corrosion of a molybdenum containing nickel-base superalloy, Udimet 700, was studied in laboratory furnace tests and in a high velocity (Mach 0.3) burner rig. The effect of SO2 content in the atmosphere on the corrosion behavior in the laboratory furnace tests was determined. Catastrophic corrosion occurs only when the melt contains MoO3 in addition to Na2SO4 and Na2MoO4. The conditions under which catastrophic corrosion occurs are identified and a mechanism is described to explain the catastrophic corrosion. Author

N86-21659*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

UNDERCOOLED AND RAPIDLY QUENCHED Ni-Mo ALLOYS

S. N. Tewari and T. K. Glasgow (Defence Metallurgical Research Lab., Hyderabad, India) [1986] 19 p refs Presented at the Hume Rothery Memorial Sympcsium on Undercooled Alloy Phases at the AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986 Sponsored in part by National Research Council
(NASA-TM-87257; E-2947; NAS 1.15:87257) Avail: NTIS
HC A02/MF A01 CSCL 11F

Hypoeutectic, eutectic, and hypereutectic nickel-molybdenum alloys were rapidly solidified by both bulk undercooling and melt spinning techniques. Alloys were undercooled in both electromagnetic levitation and differential thermal analysis equipment. The rate of recalescence depended upon the degree of initial undercooling and the nature (faceted or nonfaceted) of the primary nucleating phase. Alloy melts were observed to undercool more in the presence of primary Beta (NiMo intermetallic) phase than in gamma (fcc solid solution) phase. Melt spinning resulted in an extension of molybdenum solid solubility in gamma nickel, from 28 to 37.5 at % Mo. Although the microstructures observed by undercooling and melt spinning were similar the microsegregation pattern across

the gamma dendries was different. The range of microstructures evolved was analyzed in terms of the nature of the primary phase to nucleate, its subsequent dendritic growth, coarsening and fragmentation, and final solidification of interfenderitic liquid.
Author

N86-21660*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF A STANDARD TEST METHOD FOR TOTAL HEMISPHERICAL EMITTANCE OF SURFACES FROM 293K TO 1673K
E. Conrad Compton Jan. 1986 22 p refs
(NASA-TM-87681; NAS 1.15:87681) Avail: NTIS HC A02/MF A01 CSCL 11F

Emittance tests were made on samples of Rene' 41, Haynes 188, and Inconel 625 superalloy metals in an evaluation of a standard test method for determining total hemispherical emittances of surfaces from 293 K to 1673 K. The intent of this evaluation was to address any problems encountered, check repeatability of measured emittances, and gain experience in use of the test procedure. Five test specimens were fabricated to prescribe test dimensions and surfaces cleaned of oil and residue. Three of these specimens were without oxidized surfaces and two with oxidized surfaces. The oxidized specimens were Rene' 41 and Haynes 188. The tests were conducted in a vacuum where the samples were resistance-heated to various temperature levels ranging from 503 K to 1293 K. The calculated results for emittance, in the worst case, were repeatable to a maximum spread to + or - 4% from the mean of five sets of plotted data for each specimen.
Author

N86-21661*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VARIABLES CONTROLLING FATIGUE CRACK GROWTH OF SHORT CRACKS
Jack Telesman, Douglas M. Fisher, and Donna Holka (Michigan Technological Univ., Houghton) Dec. 1985 20 p refs Presented at the International Conference on Fatigue, Corrosion Cracking, Fracture Mechanics, and Failure Analysis, Salt Lake City, Utah, 2-6 Dec. 1985; sponsored by American Society for Metals
(NASA-TM-87208; E-2865; NAS 1.15:87208) Avail: NTIS HC A02/MF A01 CSCL 11F

A study was conducted to evaluate the roles of crack closure and microstructure in the fatigue growth of short cracks. Testing was performed at R ratios of 0.1, 0.5, and 0.7. At all R ratios short cracks exhibited accelerated growth rates in comparison to long cracks. It was concluded that crack closure could not entirely account for the accelerated growth rates of short cracks. The accelerated growth rates occurred over crack lengths on the order of grain size, suggesting a strong influence of microstructure. A significant effect of grain boundaries and inclusions on short crack FCG behavior was observed. For very short crack lengths, fatigue growth rates do not appear to be a function of either delta K or R ratio.
Author

N86-21662# Fairchild Republic Co., Farmingdale, N.Y.
STRUCTURAL EVALUATION OF SUPERPLASTIC ALUMINUM. PART 1. MECHANICAL, CORROSION, METALLURGICAL DATA
Final Report, Jun. 1983 - Mar. 1985
Hadassah C. Lipsius, Julius Stock, and Alvin Shames Aug. 1985 120 p
(Contract F33615-83-C-3208)
(AD-A161366; AFWAL-TR-85-3050-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 11/6

The mechanical, corrosion, metallurgical and secondary fabricability properties of the superplasticity formable Supral alloy were evaluated to assess the amenability of these alloys to standard aircraft practices. Fracture and fatigue properties were evaluated through extensive testing of superplasticity formed parts and discs. The mechanical property test results meet Alcan/Superform claims provided that the microaviation is restricted to less than three percent of the volume. Research findings show that Supral 100, 150, and 220 are alloys suitable for aircraft use. Testing of shop manufacturing practices and welding techniques indicate that the Supral alloys are comparable to standard U.S. aluminum alloys.
GRA

N86-21663# Michigan Univ., Ann Arbor. Dept. of Materials and Metallurgical Engineering.
AGE HARDENING OF BINARY IRON-NICKEL MARTENSITES
Final Report, 6 Feb. 1981 - 31 May 1985
J. T. Carter, Zhang Guosheng, and W. C. Leslie Jul. 1985 109 p
(Contract DAAG29-81-K-0052)
(AD-A161407; ARO-17752.3-MS) Avail: NTIS HC A06/MF A01 CSCL 11/6

Age hardening of binary Fe-Ni martensites was investigated to determine the nature and kinetics of the hardening reaction. Six Fe-Ni alloys containing 24 to 34 wt% Ni were austenitized, quenched, then cooled to either 16 degrees C to retain austenite or to -196 degrees C to promote the transformation to martensite. Specimens were aged at six temperatures between 270 and 450 degrees C for up to 14,000 hr. Four other ferritic/martensitic alloys containing 5 to 30 wt% Ni, previously cold rolled and aged 8000 hr, were also aged. Specimens were studied by hardness and tensile testing, X-ray diffraction, electron microscopy, and Fe-57 Mossbauer spectroscopy. Age hardening occurred in all of the 24 to 34 wt% Ni martensites and at all of the aging temperatures. The maximum hardening of 270 HV (up to 480 HV) occurred in an Fe-32Ni martensite upon aging 8000 hr at 300 C. Hardening was attributed to Ni-rich, disc-shaped, austenite particles formed on (110) matrix planes during aging. The 30 to 34 wt% Ni alloys cooled to 16 C were largely austenite, very soft (100 HV), and not age harden.
GRA

N86-21664# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
A STUDY OF PRECIPITATION AND SEGREGATION ON AN ATOMIC SCALE OF 11AT.PERCENTCr-LAT.PERCENTMo HEAT RESISTING STEEL BY ATOM-PROBE AND TEM (TRANSMISSION ELECTRON MICROSCOPE)
N. Igata, S. Sato, T. Ando, T. Hashizume, and T. Sakurai Nov. 1985 11 p
(Contract N00014-84-K-0201)
(AD-A161590) Avail: NTIS HC A02/MF A01 CSCL 11/6

An 11at.%Cr-lat%Mo commercial steel which contains C, Si, Mn, Nb and V as minor elements was investigated by atom-probe (AP) and transmission electron microscopy (TEM). This steel has an excellent heat resisting property at 600 - 650 C but undergoes the ductile - brittle transition in this temperature range. The following results were obtained: (1) After solution treatment the FIM image was homogenous on an atomic scale. (2) After tempering at 650 C for 1 hr a precipitate was detected. AP analysis showed that the precipitate was M(C+N) where M is Nb, Cr, V, Mo and Fe. (3) After tempering at 700 C for 1 hr, a precipitate with a Fe/Cr ratio of 60/40 (sigma phase) was also observed at the lath boundary, and adjacent to this region the chromium concentration decreased to 1%.
GRA

N86-21665# California Univ., Berkeley. Dept. of Mechanical Engineering.
TWO-DIMENSIONAL STRAIN CYCLING IN PLASTICITY
P. M. Naghdi and D. J. Nikkel, Jr. Nov. 1985 65 p
(Contract N00014-84-K-0264)
(AD-A161666; UCB/AM-85-1) Avail: NTIS HC A04/MF A01 CSCL 11/6

Detailed calculations are presented for strain cycling in a homogenous deformation that can be sustained by a biaxial state of stress in thin-walled specimens of OFHC copper. These calculations are made with a set of relatively simple constitutive equations within the framework of the strain-space formulation of plasticity. The predicted theoretical calculations, carried out in the context of small deformation, are in good agreement with corresponding available experimental results for saturation hardening and erasure of memory in two-dimensional strain cycling. Also, with the use of the calculated results, a scalar quantity that

characterized strain-hardening is plotted as a function of plastic strains. Such plots are likely to be useful for computational purposes. Author (GRA)

N86-21666# National Bureau of Standards, Gaithersburg, Md. Metallurgy Div.
MECHANISMS AND KINETICS OF SURFACE ALLOYING BY DIFFUSION-INDUCED GRAIN BOUNDARY MIGRATION Final Report, 1 Apr. 1982 - 30 Apr. 1985
J. R. Manning, J. W. Cahn, D. B. Butrymowicz, and C. A. Handwerker Sep. 1985 43 p
(Contracts MIPR-ARO-42-82; MIPR-ARO-163-83)
(AD-A161671; ARO-19262.5-MS) Avail: NTIS HC A03/MF A01 CSCL 11/6

The phenomenon of diffusion-induced grain boundary migration has been investigated to determine conditions under which this effect occurs and to establish the mechanism and driving forces that control the process. This migration and the surface alloying that accompanies it were observed in a number of different alloy systems, including Cu-Zn, Cu-As, Au-Pd, Fe-Zn, Fe-Cr, and Fe-As. Detailed tests in the Ag-Au alloy system using thin layers of diffusant deposited on a metal substrate and analyses of liquid phase sintering experiments in Mo-Ni base alloys indicated that the driving force for diffusion-induced grain boundary migration depends on lattice parameter variations in the alloy. Connections were made between diffusion-induced grain boundary migration in solid alloy systems and liquid film migrations that occur during liquid phase sintering. The theory then was used to select ceramic systems in which migrations might occur and as a result diffusion-induced liquid film migration was observed for the first time in a ceramic system. Author (GRA)

N86-21667# Virginia Univ., Charlottesville. Dept. of Materials Science.
MODIFICATIONS IN MICROSTRUCTURE, DEFORMATION AND FATIGUE BEHAVIOR BY ION IMPLANTATION Final Report, 1 Mar. 1983 - 31 May 1985
K. V. Jata and E. A. Starke, Jr. Oct. 1985 21 p
(Contract N00014-83-K-0263)
(AD-A161688; UVA/525386/MS86/101) Avail: NTIS HC A02/MF A01 CSCL 11/6

A number of materials, copper, aluminum, titanium and steel, have been examined for microstructural evolution, deformation and fatigue behavior in the ion implanted, as - implanted and implanted + annealed conditions. A wide variety of implant species that produce residual compressive stresses, residual tensile stresses or cause precipitation have been chosen to examine the above effects. The main goal has, however, been to choose implant species that would enhance deformation and fatigue resistance through a modification in the surface microstructure and/or by providing residual compressive stresses. In instances where no major changes in the surface microstructure are observed it appears that surface dislocation sources either become inoperative or become operative on a larger number of slip planes, limiting the size of the slip steps that would nucleate fracture. In materials where major changes in the microstructure are observed, slip is dispersed, also resulting in fine slip that enhances resistance. Ion implantation is being used to modify surface-related mechanical properties such as friction and wear, fatigue, corrosion and recently, near surface deformation at high temperatures. GRA

N86-21668# Virginia Univ., Charlottesville. School of Engineering and Applied Science.
VOID INITIATION PRECEDING DUCTILE FRACTURE IN POLY-CRYSTALLINE TITANIUM
Heinz G. F. Wilsdorf and Marjorie A. Erickson Sep. 1985 31 p
(Contract N00014-82-K-0309)
(AD-A161821; AD-E900526; UVA/525375/MS86/101) Avail: NTIS HC A03/MF A01 CSCL 11/6

The objective of this research was determination of primary void initiation sites preceding void growth in the process of deformation leading to ductile fracture in polycrystalline C.P. titanium. Stereo-photogrammetry was employed to evaluate SEM fracture surfaces. Two distinct regimes of void initiation were found to operate in: (1) specimens with grain sizes up to 50 micron void initiation occurring predominately at grain boundary triple points; and (2) larger grain sized material. Here, additional void sites were due to twinning and glide band intersections and grain boundaries and grain boundary ledges themselves. Quantitative topographical information was the basis for constructing fracture surface profiles which permitted the determination of time sequence of void initiation. GRA

N86-21669# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE 3RD NATIONAL CONFERENCE ON METALLIC POWDER STUDY WAS HELD IN AN-SHAN
Gau Ping 21 Nov. 1985 5 p Transl. into ENGLISH from Gangtie (China), no. 2, 1983 p 76-77 Conference held in An-Shan, China, 13-17 Oct. 1982
(AD-A162408; FTD-ID(RS)T-0928-85) Avail: NTIS HC A02/MF A01 CSCL 11/6

The Chinese Society of Metallic Science held its Third National Conference on Metallic Powder in An-Shan, Liaoning, between October 13 and 17, 1982. Participants of this meeting came from 25 provinces, cities, autonomous areas, all related ministries and scientific institutes. A total of 139 experts, scholars and engineering-technical personnel from 81 different units in research and development, manufacturing and design areas took part in the conference. The results of this Conference is discussed. GRA

N86-21670# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.
CORROSION FATIGUE OF Al-Zn-Mg AND Al-Mg-Li ALLOYS Final Technical Report
R. E. Ricker and D. J. Duquette Jan. 1986 276 p Prepared in cooperation with Notre Dame Univ., Ind.
(Contract N00014-67-A-0117-0012)
(AD-A162627) Avail: NTIS HC A13/MF A01 CSCL 11/6

Corrosion fatigue and related electrochemical experiments have been conducted on a high purity Al-Zn-Mg ternary alloy and a high purity Al-Mg-Li ternary alloy. The electrochemical experiments were performed in solutions of various concentrations of sodium chloride and sodium sulfate as functions of pH, temperature and degree of aeration. Thin sheets of the alloys were examined in strain controlled fatigue with controlled environmental conditions. Samples were heat treated to obtain the maximum tensile strength, electropolished, and stored in vacuum to remove absorbed hydrogen. Fatigue tests were performed in dry nitrogen gas as a reference environment, and compared with tests in humid nitrogen, distilled water, 0.5 molar sodium sulfate and 0.5 molar sodium chloride. The corrosion test results indicate that the corrosion potentials of the Al-Mg-Li alloy are considerably more active than those of the Al-Zn-Mg alloy and that the pitting potentials are slightly more active. Therefore, while the lithium alloy pits more readily at the same potential in a given environment, the overpotential or energy required to induce pitting in the lithium containing alloy is greater than that required for Al-Zn-Mg alloys. These results are consistent with the hypothesis that corrosion fatigue of these alloys in environments containing water to water vapor results from hydrogen assisted fracture. The differences in the behavior of the alloys is attributed to either reduced hydrogen absorption or to reduced susceptibility to hydrogen assisted fracture. GRA

N86-21671# Army Armament Research and Development Command, Watervliet, N. Y. Close Combat Armaments Center.
THE ELECTROPLATING OF LAMINATED CHROMIUM Final Report
E. S. Chen, G. P. Capsimalis, and G. R. Weigle Nov. 1985 24 p Presented at 12th International Conference, Metallurgical Coatings, Los Angeles, Calif., 15-19 Apr. 1985
(AD-A162751; ARCCB-TR-85002) Avail: NTIS HC A02/MF A01 CSCL 13/8

A microprocessor-controlled flow plating process was developed to deposit laminated chromium consisting of alternating

layers of low contraction (LC) and high contraction (HC) chromium. The automated plating system contains a large number of variable parameters designed to allow the use of multiple plating modes. The available modes include a combination of direct current, interrupted, periodic reverse, pulse, and laminated chromium plating. The laminated plating experiments were conducted at LC/HC solution temperatures of 85 and 55 C, current densities of 120 and 45 A/dm sq, and at LC/HC duty cycles to produce spacings between 0l01 and 2.7 micrometers. Under these plating conditions, deposits with hardness values between 655 and 1089 KHN and tensile strengths between 6.8 and 57.2 were obtained. GRA

N86-21672# Los Alamos National Lab., N. Mex.
CONTROLLED POWDER MORPHOLOGY EXPERIMENTS IN MEGABAR 304 STAINLESS STEEL COMPACTION
K. P. Staudhammer and K. A. Johnson 1985 25 p Presented at the EXPLOMET 85 International Conference on Metallurgical Applications of Shock Wave and High Strain-Rate Phenomena, Portland, Ore., 28 Jul. 1985
(Contract W-7405-eng-36)
(DE86-002416; LA-UR-85-3625; CONF-850770-13) Avail: NTIS HC A02/MF A01

Experiments with controlled morphology including shape, size, and size distribution were made on 304L stainless steel powders. These experiments involved not only the powder variables but pressure variables of 0.08 to 1.0 Mbar. Also included are measured container strain on the material ranging from 1.5% to 26%. Using a new strain controllable design it was possible to seperate and control, independently, strain and pressure. Results indicate that powder morphology, size distribution, packing density are among the pertinent parameters in predicting compaction of these powders. DOE

N86-21673# Oak Ridge National Lab., Tenn.
FINAL REPORT ON 3 Cr-1.5 Mo STEELS FOR GASIFIER PRESSURE VESSEL CONSTRUCTION Final Report
R. W. Swindeman, J. F. King, and R. K. Nanstad Sep. 1985 136 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002905; ORNL/TM-9731) Avail: NTIS HC A07/MF A01

Results from an experimental program to evaluate the potential of 3 Cr-1.5 Mo steels for construction of large gasifier vessels for service at metal temperatures of 316C and pressures to 8 MPa are provided. Information starts with processing data for three commercial heats with different elements added for hardenability and strength. This is followed by a description of welding practices, which included submerged arc and shielded metal arc methods. Hardenability data are provided along with information on tempering and postweld heat treating. The mechanical properties compiled included tensile and impact strength, fracture toughness, fatigue, and embrittlement. The steels were found to be very promising and competitive with the best of the new steels being developed for petrochemical and petroleum applications. DOE

N86-21674# Oak Ridge National Lab., Tenn.
EROSION-RESISTANT TiB2 COATINGS FORMED BY CHEMICAL VAPOR DEPOSITION
A. J. Caputo, D. P. Stinton, and J. C. McLaughlin Oct. 1985 31 p refs
(Contract DE-AC05-84OR-21400)
(DE86-003003; ORNL/TM-9813) Avail: NTIS HC A03/MF A01

Erosion- and wear-resistant coatings are needed for numerous applications for coal liquefaction and gasification plants. Titanium diboride is unusually hard and stable and, in earlier work, had shown promise for use in highly erosive and corrosive environments. Our objective was to continue to study the deposition of TiB2 with emphasis on obtaining erosion-resistant coatings on various substrate materials. Coatings of TiB2 were deposited at temperatures from 800 to 1000(0)C by using TiCl4 and BCl3. Substrates used included commercial and experimental cemented carbides, nickel-bonded and hot-pressed TiB2, and abrasion-resistant grades of cast iron. The erosion resistance of the deposited coatings was determined by a hot coal-oil or silica-oil slurry impingement test. Some coatings deposited at 900 and 1000(0)C were found to be erosion resistant, although coatings could not be reproducibly deposited. Erosion-resistant coatings were deposited on the various substrates tested. Coatings deposited at 800(0)C were not erosion resistant, and their microhardness was lower than that of coatings deposited at 900 or 1000(0)C. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-21675* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ETHYNYL AND SUBSTITUTED ETHYNYL-TERMINATED POLYSULFONES Patent
Paul M. Hergenrother, inventor (to NASA) Issued 21 Jan. 1986 5 p Division of US-Patent-4,431,761; US-Patent-Appl-SN-433598, filed 8 Oct. 1982
(NASA-Case-LAR-12931-2; US-Patent-4,565,886;
US-Patent-Appl-SN-527914; US-Patent-Class-556-436;
US-Patent-Class-585-24; US-Patent-Class-260-544-D) Avail: US Patent and Trademark Office CSCL 06C

Ethynyl and substituted ethynyl-terminated polysulfones and their synthesis are disclosed. These polysulfones are thermally cured to induce cross-linking and chain extension, producing a polymer system with improved solvent resistance and use temperatures. Also disclosed are substituted 4-ethynylbenzoyl chlorides as precursors to the substituted ethynyl-terminated polysulfones and a process for preparing the same.
Official Gazette of the U.S. Patent and Trademark Office

N86-21676 Department of the Air Force, Washington, D.C.
THERMOSETTING ARYLETHER COMPOUNDS AND THEIR SYNTHESIS Patent
Bruce A. Reinhardt, Fred E. Arnold, and Marilyn R. Unroe, inventors (to Air Force) Issued 15 Oct. 1985 4 p Supersedes AD-D011269
(AD-D012025; US-Patent-4,547,592; US-Patent-Appl-SN-634346;
US-Patent-Class-568-33) Avail: US Patent and Trademark Office CSCL 07/3

In this patent arylether compounds containing terminal phenyletnynyl groups are provided. Also provided is a process for producing these compounds. The following compounds are claimed; 4,4'-bis(3-phenylethynyl-phenoxy) diphenylsulfone; 2,2-bis(((3-phenoxy)-3-phenoxy)-3-phenylethynyl)-3-phenoxy)-4phenyl)-propane and 2,2-bis((((3-phenoxy-4-phenoxy)-3-phenyl ethynyl)-3-phenoxy-4-phenyl)-hexafluoropropane. GRA

N86-21677*# National Aeronautics and Space Administration, Washington, D.C.
CONTRIBUTION TO THE PHOTOMETRIC DETERMINATION OF SMALL AMOUNTS OF BORON TRIOXIDE IN GLASSES
D. Markova Dec. 1985 9 p refs Transl. into ENGLISH from Sklar a Keramik (Czechoslovakia), v. 31, no. 7, 1981 p 193-195 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77955; NAS 1.15:77955) Avail: NTIS HC A02/MF A01 CSCL 11B

The photometric determination for boron trioxide is described in amounts of 0-75 micrograms B2O3 with an azomethin H reagent. The yellow colored complex which occurs in a medium held at a pH of 4.5 was measured in light of a wavelength of 415 nm.
Author

N86-21678*# National Aeronautics and Space Administration, Washington, D.C.
MANUFACTURE OF HIGH-DENSITY CERAMIC SINTERS
Y. Hibata Oct. 1986 10 p Transl. into ENGLISH of Japanese

Patent no. 59-116178 (4 Jul. 1984) p 1-6 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77925; NAS 1.15:77925) Avail: NTIS HC A02/MF A01 CSCL 11B

High density ceramic sinters are manufactured by coating premolded or presintered porous ceramics with a sealing material of high SiO2 porous glass or nitride glass and then sintering by hot isostatic pressing. The ceramics have excellent abrasion and corrosion resistances. Thus LC-10 (Si3N2 powder) and Y2O3-Al2O3 type sintering were mixed and molded to give a premolded porous ceramic (porosity 37%, relative bulk density 63%). The ceramic was dipped in a slurry containing high SiO2 porous glass and an alcohol solution of cellulose acetate and dried. The coated ceramic was treated in a nitrogen atmosphere and then sintered by hot isostatic pressing to give a dense ceramic sinter. Author

N86-21679*# National Aeronautics and Space Administration, Washington, D.C.
SILICON CARBIDE SINTERED PRODUCTS AND A METHOD FOR THEIR MANUFACTURING
Keiichiro Suzuki Oct. 1986 35 p Transl. into ENGLISH of German Patent no. DE3,344,263 (28 Jun. 1984) p 1-35 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77932; NAS 1.15:77932) Avail: NTIS HC A03/MF A01 CSCL 11B

SiC based sinters are produced by pressureless sintering from a SiC-AlN solid solution containing Al2 to 20, N 0.2 to 10, O 0.2 to 5, a Group IIIB element 0 to 15 percent, the remainder being Si and C. Thus, a 90:10 mixture of SiC and AlN powders were cold pressed at 2000 kg/sq cm and sintered for 5 hours at 2100 C in a nitrogen atmosphere. The resulting product had density of 3.11 g/cu cm and bending strength at ambient and 1400 C at 68.5 and 66.3 kg/sq mm. Author

N86-21680*# National Aeronautics and Space Administration, Washington, D.C.
CAPSULATION OF MOLDINGS MADE FROM SILICON CERAMIC MATERIAL
Axel Rossmann, Klaus Schweitzer, and Werner Huether Oct. 1985 8 p Transl. into ENGLISH of West Germany Patent Application No. 2737208 (18 Aug. 1977) p 1-3 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77933; NAS 1.15:77933) Avail: NTIS HC A02/MF A01 CSCL 11B

Ceramic articles are potted for hot isostatic pressing by porous glass and/or ceramic coating which is sintered to a pressure-tight coating in vacuo. Thus, a powdered SiO2 glass mixture with saturated alcohol sterin is sprayed on a Si3N4 ceramic, dried, introduced into the press which is evacuated to less than 0.013 mbar and heated to approximately 1200 C to drive off the organic binder and leave a powdered glass coating on the ceramic. The coating is sintered by heating to approximately 1200 C for 0.5 to 2 hours and forms a tight gass-impermeable layer. The press is heated to approximately 1700 C at 1000-300 bar and isostatic pressing is performed in the conventional manner. Author

N86-21681*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRON MICROSCOPIC DETERMINATION OF THE METASTABLE DISSOCIATION REGION IN THE SYSTEM LI SUB 2SIO3-SIO SUB 2
M. Marinov and M. Radenkov-Yaneva Feb. 1986 7 p refs Transl. into ENGLISH from Elektronenmikroskopische Bestimmung des Metastabilen Entmischungsgebietes im System Li2 SiO3-SiO2, Doklady Bolgarskoy Akademi Nauk, Comptes Rendue de IAcademi Bulgare des Sciences, v. 19, no. 10, 1966 p 917-920 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77980; NAS 1.15:77980) Avail: NTIS HC A02/MF A01 CSCL 11B

Seven glasses with an alkali oxide content in the range 9.57 to 29.53 mole percent were investigated. The temperature at which the transition of microheterogeneous mixing to the condition of mutual solubility occurs on heating is found. It is found that the altered constituent composition results in the alteration in the percentage amount of the coexisting phases. Author

N86-21682*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A NEW CHROMIUM CARBIDE-BASED TRIBOLOGICAL COATING FOR USE TO 900 DEG C WITH PARTICULAR REFERENCE TO THE STIRLING ENGINE Final Report
Harold E. Sliney 1986 17 p refs Presented at the International Conference on Metallurgical Coatings, San Diego, Calif., 7-11 Apr. 1986; sponsored by the American Vacuum Society and the American Society for Metals
(Contract DE-AI01-85CE-50112)
(NASA-TM-87274; E-2977; DOE/NASA/50112-65; NAS 1.15:87274) Avail: NTIS HC A02/MF A01 CSCL 11G

A new chromium carbide-based coating (PS 200) is described. This coating is shown to have good friction and wear properties over a wide temperature range. A nickel alloy-bonded chromium carbide coating was used as a baseline material for comparison with experimental formulated coatings. Coatings were plasma sprayed onto metal disks, then diamond ground to a thickness of 0.025 cm. Friction and wear were determined using a pin on disk tribometer at temperatures from 25 to 900 C in hydrogen, helium, and air. Pin materials included several metallic alloys and silicon carbide. It was found that appropriate additions of metallic silver and of barium fluoride/calcium fluoride eutectic to the baseline carbide composition significantly reduced friction coefficients while preserving, and in some cases, even enhancing wear resistance. The results of this study demonstrate that PS 200 is a promising coating composition to consider for high temperature aerospace and advanced heat engine applications. The excellent results in hydrogen make this coating of particular interest for use in the Stirling engine. Author

N86-21683*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A COMPARISON OF THE BROMINATION DYNAMICS OF PITCH-BASED AND VAPOR-GROWN GRAPHITE FIBERS
James R. Gaier [1986] 16 p refs Presented at the March Meeting of the American Physical Society, Las Vegas, Nev., 31 Mar. - 4 Apr. 1986
(NASA-TM-87275; E-2978; NAS 1.15:87275) Avail: NTIS HC A02/MF A01 CSCL 11G

The electrical resistance of pitch based P-100 fibers and experimental organic vapor grown fibers was recorded in-situ during bromination and subsequent exposure to ambient laboratory air. The results indicate that the bromination and debromination reactions proceed much slower for vapor grown fibers than for pitch based. While this may be due in part to the larger diameter of the vapor grown fibers, the majority of the effect can probably be attributed to the differences in graphene plane orientation between the fiber types. Although the reactions are slower in the vapor grown than in the pitch based fibers, the extent of reaction as measured by the change in electrical resistance is essentially the same, with comparable (or larger) decreases in resistivity. The bromination reaction proceeds with one or more plateaus in the resistance versus time curves, which suggests staging and strengthens the argument that these fibers produce true intercalation compounds. Author

N86-21684*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
QUASI-CONTAINERLESS GLASS FORMATION METHOD AND APPARATUS Patent Application
Robert J. Naumann and Edwin C. Ethridge, inventors (to NASA) Filed 5 Dec. 1985 18 p
(NASA-Case-MFS-28090-1; NAS 1.71:MFS-28090-1; US-Patent-Appl-SN-805012) Avail: NTIS HC A02/MF A01 CSCL 11B

In the method of the invention glass rods or fibers are prepared from a polycrystalline rod by heating a short section of the rod in a first furnace to form a molten zone of the rod, heating a second short section of the rod in a second furnace to form a second molten zone and gradually moving the furnaces apart from one another to form an elongated molten float zone, which is cooled in its midsection to produce a glass rod between the molten zones. In another embodiment a single moving furnace assembly and a precursor rod with compositional gradient sections, are used, and the moving furnace traverses the rod so that the molten portion moves through various sections of the rod enabling preparation of glass from reluctant glass-forming compositions. A method and apparatus for producing glass fiber by pulling from molten sections are also disclosed. Novelty of the invention is believd to reside in formation of a molten zone that remains out of contact with container walls during glass formation. This enables preparation of high purity glasses and glasses of novel compositions that are not amenable to preparation by previous methods. NASA

N86-21685*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACETYLENE (ETHYNYL) TERMINATED POLYIMIDE SILOXANE AND PROCESS FOR PREPARATION THEREOF Patent Application
Terry L. St.Clair and Shubha Maudgal, inventors (to NASA) (National Research Foundation) Filed 30 Sep. 1985 14 p
(NASA-Case-LAR-13318-1; NAS 1.71:LAR-13318-1; US-Patent-Appl-SN-781813) Avail: NTIS HC A02/MF A01 CSCL 11B

Siloxane containing addition polyimides having improved physical property characteristics of flexibility, drape, tack and toughness and the process for preparing and utilizing same are disclosed. The novelty of this invention appears to reside in the composition and process of preparing addition type polyimides useful as structural adhesives as well as composite matrix materials and the process of preparing same. NASA

N86-21686*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AMINOPHENOXYCYCLOTRIPHOSPHAZENE CURED EPOXY RESINS AND THE COMPOSITES, LAMINATES AND STRUCTURES THEREOF Patent Application
Devendra Kumar (NRC-NAS), George M. Fohlen, and John A. Parker, inventors (to NASA) Filed 21 Nov. 1985 22 p
(NASA-Case-ARC-11548-1; NAS 1.71:ARC-11548-1; US-Patent-Appl-SN-806572) Avail: NTIS HC A02/MF A01 CSCL 11B

Aminophenoxycyclotriphosphazenes such as hexakis(4-aminophenoxy)cyclotriphosphazene and tris(4-aminophenoxy)-tris phenoxycyclotriphosphazene are used as curing agents for epoxy resins. These 1,2-epoxy resins are selected from di- or polyepoxide containing organic moieties of the formula (CH2-CHO-CH2)m-W-R-W-(CH2CH-CH2O)m where R is diphenyldimethylmethane, diphenylmethane, bis(dibromophenyl)dimethylmethane. W is a nitrogen or oxygen atom; and m is 1 when W is oxygen and 2 when W is nitrogen. The resins are cured thermally in stages at between about 110 to 135 C for between about 1 and 10 min, then at between about 175 to 185 C for between about 0.5 to 10 hr and post-cured at between about 215 and 235 C for between about 0.1 and 2 hr. These resins are useful for making fire resistant elevated temperature stable composites, laminates (e.g., graphite fiber or fiberglass), molded parts, and adhesives and structures, usually for aircraft secondary structures and for spacecraft construction. NASA

N86-21687# University Coll., Cork (Ireland).
RE-EVALUATION OF SURFACE PROPERTIES OF OXIDE-CATHODE MATERIALS Final Report, 1 Jul. 1984 - 28 Feb. 1985
Joseph Cunningham 15 Jul. 1985 79 p
(Grant AF-AFOSR-0129-84)
(AD-A161131; AFOSR-85-0933TR) Avail: NTIS HC A05/MF A01 CSCL 07/4

Surface properties of high-surface-area samples of alkaline earth oxides BaO, MgO, SrO, and CaO - prepared singly as pure materials or as binary systems having BaO dispersed onto the surface of another of the oxides - have been examined using as probes the luminescence and the catalytic activity of the materials. Comparisons of results from the pure systems with those from the binary systems are consistent with extensive reconstruction (rumpling) of the surface layers of the surface-doped binary systems. Such rumpling can produce up to one half of a mono-layer of surface ions jutting out from the surface with a high degree of coordinative unsaturation and resultant high lability and catalytic activity. GRA

N86-21688# Battelle Columbus Labs., Ohio.
PROTOTYPE SALVAGE FOAMING SYSTEM Final Report
J. R. Myers, K. E. Alexander, D. J. Hackman, and D. W. Caudy 4 Nov. 1985 62 p
(Contract N00014-84-C-0145)
(AD-A161499) Avail: NTIS HC A04/MF A01 CSCL 11/9

Polyurethane foam is made by mixing MDI (Polymeric Diphenylmethane Diisocyanate) and polyol together with a blowing agent such as freon, carbon dioxide, or nitrogen. This mixture expands, then hardens. Battelle investigated developments in polyurethane foam formulations and emplacement equipment, to determine what technology could be adapted for underwater foaming. These studies concluded that the combination of high pressure impingement mixing technology (HPIM) and a fast reacting foam formulation would produce an improved foam under water. Based on the information and data gathered during the development of the laboratory model and full-scale prototype foaming machines, including the in-house and at-sea tests, the following conclusions are made: (1) Making high quality foam underwater is feasible to depths of at least 100 feet. Foam densities of less than (10 pounds/cubic feet) can be obtained. (2) The full-scale prototype foaming machine performs well and provides the high degree of control necessary for good foam making. The machine, with its automatic features, is safer to operate, requires less labor to operate and has less down time than previous models. (3) In order to increase the efficient use of chemicals and prevent nozzle clogging, more development work is warranted in the gun and nozzle design. Future machines should use flow meters that are not affected by changes in chemical viscosity (temperature changes+). The heater control system will require further investigation and possibly a re-design, to produce a more stable time/temperature profile. GRA

N86-21689# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
ASYMPTOTIC ANALYSIS OF A MODE 1 CRACK PROPAGATING STEADILY IN A DEFORMATION THEORY MATERIAL
P. P. Casteneda Sep. 1985 30 p
(AD-A161770; MECH-71) Avail: NTIS HC A03/MF A01 CSCL 20/11

The asymptotic stress and deformation fields of a crack propagating steadily and quasi-statically into and elastic-plastic material are present. The material is characterized by J2 deformation theory suitably modified to account for unloading and reloading together with linear strain-hardening. The cases of plane-strain and mode 1 are considered. The associated governing equations are integrated analytically, and the boundary conditions lead to algebraic nonlinear equations which are solved numerically. Results are given for the strength of the singularity, and for the distribution of stress in the plastic loading, elastic unloading and plastic reloading regions, as functions of the strain-hardening parameter. GRA

N86-21690# Aerospace Corp., El Segundo, Calif. Materials Sciences Lab.
RADIANT-ENERGY PENETRATION EFFECT IN THE THERMAL-DIFFUSIVITY FLASH TECHNIQUE FOR LAYERED AND POROUS POLYMERS
Robert S. Bretzlaff 2 Dec. 1985 37 p Previously announced in IAA as A86-11382

(Contract F04701-85-C-0086)
(AD-A162508; TR-0086(6935-03)-2; SD-TR-85-80) Avail: NTIS HC A03/MF A01 CSCL 11/9

Thermal insulation characterization of polymers and other materials is an important requirement for present and future aerospace missions, as well as for the home construction industry. Some dispersed composites and layered samples have been successfully characterized by the thermal-diffusivity flash technique, while the interpretation of these and other experiments for systems remains problematical. One refinement for layered-sample data reduction is investigated here. An exponentially decaying spatial penetration of radiant energy into the sample is accounted for. Under the conditions chosen for numerical evaluation and 18% reduction in the backface rise time, t1/2, is predicted for a case in which on 5% as much radiant energy is deposited on the midplane as on the front surface. It is experimental methods of estimating the penetration depth of the radiant energy for particular samples. Author (GRA)

N86-21691# Princeton Univ., N. J. Dept. of Chemical Engineering.
THE TIME-TEMPERATURE-TRANSFORMATION (TTT) CURE DIAGRAM OF THERMOSETTING SYSTEMS Technical Report, Nov. 1984 - Dec. 1985
Marc T. Aronhime and John K. Gillham Dec. 1985 68 p
(Contract N00014-84-K-0021)
(AD-A162626; TR-6) Avail: NTIS HC A04/MF A01 CSCL 11/10

An isothermal time-temperature-transformation (TTT) cure diagram for thermosetting systems has been developed to aid in the understanding of the cure process and the properties after cure. The diagram summarizes in a convenient manner the temperature of cure (T sub cure) vs. the times to gelation, vitrification, phase separation (in the case of rubber-modified systems), full cure, and thermal degradation. A more complete diagram could also include contours of constant conversion, viscosity, and modulus. The principal experimental technique which has been used to obtain a TTT diagram, torsional braid analysis (TBA), is described. Two recent models describing the cure process are reviewed; from these the time to vitrification vs. T sub cure is computed from the chemical kinetics and the conversion at vitrification. One model uses a relationship between T sub g and the extent of conversion at vitrification in conjunction with experimental data for the extent of conversion at vitrification, whereas the other predicts the extent of conversion of T sub g from relationships in the literature. Both models predict an S-shaped time to vitrification curve, as has been obtained experimentally. The second model has been applied also to linearly polymerizing systems. GRA

N86-21692# Kingston Polytechnic, Kingston-Upon-Thames (England).
SYNTHESIS OF HYDROPHOBIC, CROSSLINKABLE RESINS Annual Report
G. Pritchard, W. E. Douglas, J. S. Ghotra, and A. E. Matthews Dec. 1985 36 p
(Contract DAJA45-84-C-0016)
(AD-A162702; AD-E301866; AR-2) Avail: NTIS HC A03/MF A01 CSCL 11/9

This is the second annual report of progress in the synthesis of organic, crosslinkable polymers of low water absorption, for use as matrix materials in fiber composites and/or as coatings or adhesives. The approach has been to synthesize low molecular weight, chloromethyl terminated polyethers by the reaction of any of a number of bisphenols with the para or meta isomers of dichloroxylene. Various reaction conditions are described, and the polymers thus produced are discussed briefly. The chloromethyl ends have in one case been converted to vinyl groups by the Wittig reaction, and the resultant unsaturated polymer crosslinked by heat alone without peroxide. Some properties of the crosslinked polymer have been briefly explored, and the low equilibrium water uptake of the product confirmed. Further improvements are necessary in the control of molecular weight distribution and crosslink density before attention turns to fabrication and mechanical property determination. GRA

N86-21693# Florida Univ., Gainesville. Dept. of Materials Science and Engineering.
INVESTIGATION OF CHEMICAL DURABILITY MECHANISM IN FLUORIDE GLASSES Annual Report, No. 2, 1 Jul. 1984 - 30 Jun. 1985
Catherine J. Simmons and Joseph H. Simmons 1 Dec. 1985 61 p
(Contract N00014-82-K-0497)
(AD-A162740) Avail: NTIS HC A04/MF A01 CSCL 11/2

Leaching data on two families of fluoride glasses were collected in aqueous media and in solutions buffered at various pH values. The corrosion process was analyzed, leading to the development of a model for dissolution. The dissolution model is broken down into component mechanisms and each component analyzed separately. While many processes take part in the aqueous corrosion of fluoride glasses, the results of these processes have been identified and a quantitative description of each part and of what role it plays in the dissolution of zirconium-fluoride based glasses has been developed. This analysis method is currently being applied to thorium-fluoride glasses and a publication on those results is in preparation. The comparison between the leach rates of different classes of fluoride glasses (ZrLF4, ThF4 and UF4) has been of great value in understanding the effect of composition variations on the leaching processes. Monitoring the pH variations and conducting tests in pH buffered solutions have led to an understanding of the effects which enhance the corrosion rate of these glasses, and which makes them far less durable than silicates. GRA

N86-21694# Virginia Univ., Charlottesville. Dept. of Materials Science.
STUDY OF TRANSPORT PROPERTIES AND STRUCTURE OF EXTENDED-CHAIN POLYMERS Final Report, 1 Oct. 1979 - 31 Mar. 1983
R. Edward Barker, Jr., Kenneth R. Lawless, and Daniel Y. Chen Sep. 1985 283 p
(Grant AF-AFOSR-0014-80)
(AD-A162765; UVA/525631/MS86/103; AFOSR-85-1111TR) Avail: NTIS HC A13/MF A01 CSCL 11/9

Charge, heat, and mass transport in the Air Force's extended chain polymers (especially poly-para-phenylene benzobisthiazole PBT) are related to other electrical, thermal, mechanical nad microstructural properties of the polymers and also compared to these very unusual, highly anisotropic Air Force materials with other materials when it is scientifically relevant or when potential applications may be involved. Special techniques were developed for making transport-property determinations on samples in the form of thin fibers and small area films. Two types of miniature cells were developed in the study of PBT transport properties. A very promising area of the research relates to an anisotropic version of the Barker-Sharbaugh weak electrolyte model for ionic conduction in polymers. A new technique which has been termed the diffusion controlled-differential current (DCDC) method evolved from experiments related to the weak electrolyte model. This DCDC-technique looks promising as a new analytical tool. GRA

N86-21695# Virginia Univ., Charlottesville. Dept. of Materials Science.
STUDY OF TRANSPORT PROPERTIES AND STRUCTURE OF EXTENDED-CHAIN POLYMERS: DIFFUSION AND SOLUBILITY OF GASES Interim Report, 1 Oct. 1981 - 30 Sep. 1982
R. Edward Barker, Jr. and W. S. Huang Sep. 1985 170 p
(Grant AF-AFOSR-0014-80)
(AD-A162766; UVA/525631/MS86/101; AFOSR-85-1110TR) Avail: NTIS HC A08/MF A01 CSCL 11/9

The study of the transport properties in extended chain polymers has added to the understanding of relations between their macroscopic and microscopic properties. There was a need to determine the extent to which a new class of high strength extended chain polymers absorb various vapors and how the vapor

moves within the materials, which have a highly anisotropic fibrous morphology. The main polymer studied as a representative of the class is poly p-phenylene benzobisthiazole (PPBT). An abnormally large heat of sorption (solution) and paradoxical data from two experimental systems with somewhat different conditions are attributed to a large volume fraction of microcavities in PPBT. This hypothesis was shown to be consistent by using the theory of dual sorption. A statistical mechanical model due to diBenedetto was modified to correlate the activation energy with rotation energy and to make possible the prediction of the parallel diffusion coefficient. GRA

N86-21696# Akron Univ., Ohio. Inst. of Polymer Science.
CONTRIBUTION OF BENDING ENERGY LOSSES TO THE APPARENT TEAR ENERGY
A. N. Gent and Jongkoo Jeong Dec. 1985 40 p
(Contract N00014-85-K-0222)
(AD-A162775; TR-2) Avail: NTIS HC A03/MF A01 CSCL 20/11

When a strip is torn, energy is expended both in tearing it and in propagating a bend along each torn section. Estimates are given of the contribution of bending energy losses to the apparent tear energy. Experiments with highly-dissipative semi-crystalline polymers, torn with controlled amounts of bending, are then described. The bending energy losses ranged from 5 to 70 percent of the total tear energy, depending upon the degree of bending imposed, the thickness of the strip, and the extent to which it had been partly cut through before tearing. These results were in satisfactory agreement with approximate theoretical estimates. When the torn strips were allowed to take up naturally bent configurations under the action of the tearing force, then the contribution of bending energy losses to the apparent tear energy became rather independent of the strip dimensions and depended principally upon the dissipative nature of the material, represented by the fraction H of deformation energy that is not recovered. GRA

N86-21697# Dayton Univ., Ohio. Research Inst.
EFFECT OF TEMPERATURE, HUMIDITY, AND LOADING RATE ON THE SHEAR PROPERTIES OF TACTICAL SHELTER CORE MATERIALS Interim Technical Report, Jan. 1981 - May 1983
Ronald J. Kuhbander and Steven J. Caldwell Feb. 1985 64 p
(Contracts F33615-80-C-5011; F33615-82-C-5039)
(AD-A162793; UDR-TR-84-93; AFWAL-TR-84-4178) Avail: NTIS HC A04/MF A01 CSCL 11/4

Honeycomb core shear specimens were prepared and tested using five types of core material, two test methods, and four test conditions. The objective was to determine the effect of loading rate, temperature, and environmental exposure on the shear strength of the various core materials. The results indicated that the core shear strengths were relatively unaffected by loading rate. For all core materials tested, the shear strength decreased with increasing temperature; and humidity aging further decreased the strength. Core shear strength was also found to decrease with increasing core thickness; and the beam shear test method was found to produce higher apparent shear strengths than the plate shear test method. Lastly, glass/phenolic cores (HRP & HTP) were less affected by temperature and humidity than were the paper (WRII), Nomex (HRH-10), or balsa cores. GRA

N86-21698# Sandia National Labs., Albuquerque, N. Mex.
SHOCK-COMPRESSION PROCESSES IN INORGANIC POWDERS
R. A. Graham, B. Morosin, E. L. Venturini, M. J. Carr, and E. K. Beauchamp 1985 10 p
(Contract DE-AC04-76DP-00789)
(DE86-002920; SAND-85-0404C) Avail: NTIS HC A02/MF A01

A large number of inorganic powders have been studied over a range of shock conditions with a number of different material probes. It has been found that the shock compression process caused large plastic deformation and the introduction of dense concentrations of deformation microstructures. The ability to introduce plastic deformation in normal brittle refractory materials is one of the unique aspects of the shock process. DOE

N86-21699# Los Alamos National Lab., N. Mex.
MICROCELLULAR FOAMS VIA PHASE SEPARATION
A. T. Young 1985 23 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-7405-eng-36)
(DE86-000784; LA-UR-85-3163; CONF-851174-7) Avail: NTIS HC A02/MF A01

A study of wide variety of processes for making plastic foams shows that phase separation processes for polymers from solutions offers the most viable methods for obtaining rigid plastic foams which met the physical requirements for fusion target designs. Four general phase separation methods have been shown to give polymer foams with densities less than 0.1 g/cm(3) and cell sizes of 30(MU)m or less. These methods involve the utilization of non-solvent, chemical or thermal cooling processes to achieve a controlled phase separation wherein either two distinct phases are obtained where the polymer phase is a continuous phase or two bicontinuous phases are obtained where both the polymer and solvent are interpenetrating, continuous, labyrinthine phases. Subsequent removal of the solvent gives the final foam structure. DOE

N86-21700# Oak Ridge National Lab., Tenn.
AMPHIBOLE CERAMICS: CONCEPTUAL DEVELOPMENT AND PRELIMINARY EXPERIMENTS
R. J. Lauf Aug. 1985 44 p
(Contract DE-AC05-84OR-21400)
(DE86-001445; ORNL/TM-9539) Avail: NTIS HC A03/MF A01

Certain natural silicate minerals, commonly called jade, are well known for their resistance to brittle fracture. One type of jade, nephrite, is a compacted form of the amphibole mineral series tremolite-actinolite. Nephrite is tough because the naturally acicular crystal habit of these amphibole minerals produces an interwoven fibrous microstructure that impedes crack propagation. Object of this work was to duplicate the fibrous microstructure of nephrite by pulverizing natural tremolite or actinolite and then compacting it by hot pressing to form a dense body. Two other materials were also investigated, namely, clinochrysotile (serpentine asbestos) and synthetic fluor-tremolite. For each material, the milling characteristics and densification were studied. The resulting microstructures were characterized, and fracture toughness was measured for a limited number of samples. The most fibrous microstructure was obtained by hot pressing clinochrysotile 15 min a 1000(0)C. Actinolite, hot pressed 15 min at 1100(0)C, had a critical fracture toughness K sub IC = 4.5 MPa m sup 1/2, which compares favorably with the toughness of nephrite jade (K sub IC = 3.6). Decomposition of tremolite and actinolite to more stable phases occurred to some degree during hot pressing. Results suggest that hot isostatic pressing at high water vapor pressure should yield a dense product without causing amphibole decomposition. DOE

N86-21701# California Univ., Berkeley. Lawrence Berkeley Lab.
MORPHOLOGICAL STABILITY OF CONTINUOUS INTERGRANULAR PHASES
W. C. Carter and A. M. Glaeser Jul. 1985 25 p Presented at the 21st University Conference on Ceramic Science, University Park, Pa., 17 Jul. 1985 Prepared in cooperation with California Univ., Berkeley
(Contract DE-AC03-76SF-00098)
(DE86-001483; LBL-19160; CONF-850705-1) Avail: NTIS HC A02/MF A01

A thermodynamic analysis of the morphological stability of continuous intergranular phases, incorporating the number of bounding grains n, and dihedral angle psi as variables is presented. For each n, the minimum thermodynamically unstable wavelength of an infinitesimal amplitude perturbation coincides with the Rayleigh result for psi = 180(0), increases with decreasing psi and tends to infinity as psi approaches (PI) - (2(PI)/n), or

equivalently as the interface curvature vanishes. For fixed psi, the stability increases with n. Several applications and implications of the analysis are discussed. DOE

N86-21702# General Electric Co., Largo, Fla. Neutron Devices Dept.
QUANTITATIVE METHODS FOR THE CHEMICAL ANALYSIS OF SEALING GLASSES
R. J. Äntepenko, J. M. Carter, J. C. Foster, and D. C. Palmer 1985 21 p Presented at the 7th General Electric Company-Wide Materials Characterization Symposium, Schenectady, N.Y., 22 Apr. 1985
(Contract DE-AC04-76DP-00656)
(DE86-001662; GEPP-OP-895; CONF-8504183-2) Avail: NTIS HC A02/MF A01

Sandia developed a high corrosion-resistant glass called TA-23 for application as the header sealing glass in lithium-sulfur dioxide (LAMB) cells. This glass contained a lower silica content and higher alumina content and was far more resistant to lithium electrolyte corrosion at the glass-to-metal seal. The glass functions as the electrical insulator and hermetic seal in the header. Chemical analysis methods were developed for quantitatively measuring the elemental composition of TA-23 glass, which has a nominal composition (wt %) of 45% SiO_2, 20% Al_2O_3, 8% B_2O_3, 12% CaO, 7% MgO, 6% SrO, 2% La_2O_3 and 0.05% CoO. Classical wet-chemical methods based on either gravimetric or volumetric procedures were used to measure silica and boric oxide. Instrumental techniques using atomic absorption spectrometry (AAS) and inductively coupled plasma (ICP) - atomic emission spectrometry were used to measure the remaining elements. The sample preparation and analysis procedures will be described for these methods. These methods have also been used to analyze other sealing glasses. DOE

N86-22257# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF EFFECT OF REPEATED LASER IRRADIATION ON ACTIVE LASER GLASSES Abstract Only
R. I. Andreeva, A. P. Kalagin, V. N. Nikolaev, and G. N. Toropkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 3 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 14-17 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-21703*# National Aeronautics and Space Administration, Washington, D.C.
SENSITIVITY OF SOLID EXPLOSIVES: MINIMUM ENERGY OF A DANGEROUS IMPACT
G. T. Afanasyev Mar. 1986 10 p refs Transl. into ENGLISH from Fizika Goreniya i Vzryva (USSR), 1980 p 35-39 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88405; NAS 1.15:88405) Avail: NTIS HC A02/MF A01 CSCL 19A

A method which uses initiating explosives for determining the sensitivity of solid explosives is described. The energy index of sensitivity is determined by the mechanical properties of the explosives. The results of the calculations are discussed. Author

N86-21704*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
DEVELOPMENT OF LC-13C NMR Final Annual Report, 10 Jan. 1984 - 9 Jan. 1985
H. C. Dorn, J. S. Wang, and T. E. Glass 17 Mar. 1986 20 p refs
(Grant NAG3-517)
(NASA-CR-176656; NAS 1.26:176656) Avail: NTIS HC A02/MF A01 CSCL 21D

This study involves the development of C-13 nuclear resonance as an on-line detector for liquid chromatography (LC-C-13 NMR) for the chemical characterization of aviation fuels. The initial focus of this study was the development of a high sensitivity flow C-13 NMR probe. Since C-13 NMR sensitivity is of paramount concern, considerable effort during the first year was directed at new NMR probe designs. In particular, various toroid coil designs were examined. In addition, corresponding shim coils for correcting the main magnetic field (B sub 0) homogeneity were examined. Based on these initial probe design studies, an LC-C-13 NMR probe was built and flow C-13 NMR data was obtained for a limited number of samples. Author

N86-21705# Air Force Armament Lab., Eglin AFB, Fla.
AN EIGHT-INCH DIAMETER, HEAVILY CONFINED CARD GAP TEST
Joseph C. Foster, Jr., Keith R. Forbes, Michael E. Gunger, and B. G. Craig 1985 10 p
(AD-A161557; AFATL-TR-85-98) Avail: NTIS HC A02/MF A01 CSCL 19/4

An instrumented card gap test which is useful for investigating the response of explosives to low pressure, long duration shock stimuli has been developed. The test was designed to screen for an explosive's propensity to detonate or react violently as result of shock induced sympathetic detonation of large ordnance such as general purpose bombs. Both donor and acceptor are encased in an 8-in. outside diameter by 0.35-in. wall steel pipe. Plexiglass of varying thickness and steel end plates are used to control the shock amplitude transmitted to the acceptor. The acceptor is instrumented with piezoelectric time of arrival pins and an armor witness plate. Hydrocode calculations show that the end plates result in significantly longer pressure durations and lower peak pressures than other gap test and is a more realistic mock of the shock loading experienced in large ordnance sympathetic detonation experiments. The results presented includes data for tritonal, composition B, TNT/wax and TNT/NQ/wax. The range of pressure resulting in transition to detonation for different explosives is narrower for this test than that measured in experiments such as the NOL LSGT. Author (GRA)

N86-21706*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE ARMY RESEARCH INSTITUTE UNIT PERFORMANCE RESEARCH AND DEVELOPMENT CENTER Final Report, Aug. 1982 - Jun. 1985
J. L. Fobes Sep. 1985 176 p
(Contract NAS7-918; DA Proj. 2Q2-63743-A-794)
(NASA-CR-176618; NAS 1.26:176618; AD-A161616; ARI-RN-85-97) Avail: NTIS HC A09/MF A01 CSCL 05I

This Research Note describes the activities undertaken by the Jet Propulsion Laboratory (JPL) in support of the development of the Army Research Institute Unit Performance Research and Development Center. The description includes the desirability of conducting research with data from the National Training Center (NTC), the requirement for analysis capabilities away from Fort Irwin itself, and the detailed nature of JPL assistance. GRA

N86-21707# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
F100 FUEL SAMPLING ANALYSIS Final Technical Report, May 1983 - Apr. 1984
L. Q. Maurice Sep. 1985 136 p
(AF Proj. 3048)
(AD-A161667; AFWAL-TR-85-2045) Avail: NTIS HC A07/MF A01 CSCL 21/4

Fuel pump cavitation problems experienced with the F100 engine used in the F-15/F-16 aircraft have led to an extensive fuel analysis program to identify fuel properties that might be contributing to fuel pump failures. This report analyzes the chemical

and physical properties of twenty-one JP-4 fuel samples obtained from United States Air Force Bases. The fuels analyzed met specifications in all but a few isolated cases, and had no unusual properties. If the fuel used is causing fuel pump failure, it must be the result of a fuel property not being measured. The fuels are as good or better than the specification prescribes. It is concluded that the F100 fuel pump cavitation problems are most likely associated with the mechanical complexity built into the design, rather than the result of the fuel used. GRA

N86-21708# Southwest Research Inst., San Antonio, Tex. Belvoir Fuels and Lubricants Research Facility.
FUEL PROPERTY EFFECTS ON THE UNAIDED COLD STARTING OF A TWO-CYCLE DIESEL ENGINE Interim Report, Jan. 1981 - Dec. 1985
Alan F. Montemayor and Edwin C. Owens Dec. 1985 30 p
(Contracts DAAK70-80-C-0001; DAAK70-85-C-0007; DAAK70-82-C-0001)
(AD-A162658; BFLRF-186) Avail: NTIS HC A03/MF A01 CSCL 21/4

In this program, a Detroit Diesel 4-53T was heavily insulated and cooled using a chilled coolant circulation system and cooled combustion air was provided. An external cranking motor was used to turn the engine at a constant rpm. Twenty-one test fuels were blended, and a minimum unaided starting temperature was obtained for each fuel. Multiple linear regression analysis was then performed in order to relate fuel properties to minimum starting temperature. Fuel properties examined were: viscosity; ASTM D 86 and D 2887 boiling point temperatures, cetane number, autoignition temperature, and flash point. Cetane number, viscosity, 50% boiling temperature, and autoignition temperature had statistically significant impact on minimum starting temperature. GRA

N86-21709# Dayton Univ., Ohio.
MULTIDIMENSIONAL HIGH-RESOLUTION GAS CHROMATOGRAPHIC INVESTIGATIONS OF HYDROCARBON FUELS AND VARIOUS TURBINE ENGINE FUEL PRECURSORS Final Report, Apr. - Sep. 1984
Wayne A. Rubey Aug. 1985 89 p
(Contract F33615-83-C-2359)
(AD-A162660; UDR-TR-84-132; AFWAL-TR-85-2033) Avail: NTIS HC A05/MF A01 CSCL 21/4

The instrumental chemical analysis of complex organic mixtures requires efficient chromatographic techniques for the separation and analysis of the mixture constituents. Highly complicated mixtures, such as petroleum crudes, turbine engine fuels, shale oil, composited industrial organic liquid wastes, etc., require the use of high-resolution gas chromatographic (HRGC) techniques. The recent introduction of multidimensional gas chromatographic (MDGC) procedures shows promise of advancing HRGC techniques even further. The literature pertaining to multicolumn and multidimensional procedures was surveyed, and an MDGC system was assembled which used a previously optimized open tubular column gas chromatographic system. Special features were incorporated into this MDGC system which contained a two-column arrangement within a single temperature programmable chamber. The performance of the assembled MDGC system was evaluated and it was determined that for maximum performance of the assembled MDGC system was evaluated and it was determined that for maximum performance to be obtained from such coupled-column assemblies, considerable attention must be given to the design and behavior of each of the many different components within the entire chromatrographic flow path. It was concluded that MDGC represents a valuable additional approach for obtaining high-quality analyses of complex organic mixtures. GRA

N86-21710# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DEFECT INSPECTION OF SOLID FUEL PROPELLANT CYLINDERS BY MEANS OF LASER HOLOGRAPHIC TECHNIQUES
Jiang Linzhen, Lue Chichung, and Tsue Chenkuo 13 Dec. 1985 13 p Transl. into ENGLISH from Harbin Gongye Daxue Xuebao (China), no. 1, Mar. 1984 p 56-61
(AD-A162746; FTD-ID(RS)T-0903-85) Avail: NTIS HC A02/MF A01 CSCL 21/9

The theory and practices of applying laser holographic interference techniques in the inspection of solid fuel propellant cylinders for defects such as shield debonds, internal cracks and voids are described. Experimental results obtained from the inspection and testing of solid fuel propellants with the application of heat stress and vacuum stress are reported. GRA

N86-21711# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
PREDICTION OF DETONATION TRANSITION IN POROUS EXPLOSIVES FROM RAPID COMPRESSION LOADINGS Final Report, 30 Aug. 1983 - 10 Sep. 1985
Herman Krier and James R. Stewart 15 Sep. 1985 69 p
(Grant AF-AFOSR-0145-81)
(AD-A162767; IU-UILU-ENG-85-4007; AFOSR-85-1134TR) Avail: NTIS HC A04/MF A01 CSCL 19/4

Increasing the nitramine content of solid rocket propellants increases the overall performance of the system as well as the sensitivity to Shock to Detonation Transition (SDT) and Deflagration to Detonation Transition (DDT). This report deals primarily with the analysis and numerical modeling of a combined SDT/DDT event. The results show that in some instances a zone of burning granulated propellant, confined and adjacent to a zone of cast propellant, can provide a rapid enough pressure-rise rate to shock initiate the cast material. This type of detonation hazard scenario is a real possibility in any high-energy rocket motor environment. The modeling study also indicates areas where important assumptions need to be further researched. These include: (1) relations for dynamic (transient) collapse of the voids or pores; (2) relations for setting the volume percent of hot spots based on initial porosity; (3) the evaluation and expression for the chemical rate of decomposition of the reactive, shocked material; and (4) the assessment of two-phase mixture equilibrium. Author (GRA)

N86-21712# Lawrence Livermore National Lab., Calif.
NEW APPROACH FOR STUDYING THE EXPANSION OF DETONATION PRODUCTS
D. Steinberg and H. Chau Aug. 1985 5 p refs Presented at the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE86-000746; UCRL-93224; CONF-850706-32) Avail: NTIS HC A02/MF A01

Single crystal 100 LiF has well known mechanical and optical properties. Consequently, it has been used for many years as a window when studying inert materials via the velocimeter technique. Because of its close impedance match to detonating HE, this technique was used to probe the expansion of detonation products. Data on LX14 clearly show the Von Neumann spike as well as many other structures not yet identified. The best estimate for the CJ pressure is 35.3 GPa. DOE

N86-21713# Sandia National Labs., Albuquerque, N. Mex.
APPLICATION OF HYDROGEN ANALYSIS TO THE COMPATIBILITY TESTING AND LONG-TERM AGING OF EXPLOSIVES
S. E. Klassen and J. E. Womelsduff Sep. 1985 16 p refs
(Contract DE-AC04-76DP-00789)
(DE86-001689; SAND-85-1686) Avail: NTIS HC A02/MF A01

The addition of a hydrogen transfer system (Carle Instruments) to a Hewlett-Packard 5880A gas chromatograph has enabled us to quantitate hydrogen in addition to other gases produced during compatibility testing of explosives. This report describes our particular modification and gives results which describe its capabilities. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-21714* Philips Labs., Briarcliff Manor, New York.
DESIGN AND FABRICATION OF A LONG-LIFE STIRLING CYCLE COOLER FOR SPACE APPLICATION. PHASES 1 AND 2: ENGINEERING MODEL Final Report, 29 Sep. 1978 - 31 Dec. 1982
F. Stolfi, M. Goldowsky, C. Keung, L. Knox, E. Lindale, R. Maresca, J. Ricciardelli, and P. Shapiro Mar. 1983 221 p refs
(Contract NAS5-25172)
(NASA-CR-175288; NAS 1.26:175288; PL-11-CR83-0307)
Copyright. Avail: Issuing Activity CSCL 13I

A model of a Stirling cycle cryogenic refrigerator capable of producing 5 Watts of cooling at 65 deg Kelvin was tested. The cooler demonstrated the concept feasiblity of providing refrigeration for long-life, reliable operation in spaceborne missions. Linear, moving-magnet, electric motors provide a direct-drive mechanism. The moving mechanical elements, the piston and displacer, are supported with linear magnetic bearings which provide nonlubricated, contact-free operation. The pressure seals are formed by long, narrow, annular gaps, thereby eliminating the possibility of performance degradation by mechanical wear. Electronic control of the axial position of the piston and displacer permits independent adjustment of their amplitudes and phase relationship during operation. All internal parts are fabricated of only metal and ceramic components, thereby removing all forms of organic contamination. This synergistic approach omits all the life limiting aspects of conventional Stirling cycle machines. The steps taken to combine the thermodynamic, mechanical, magnetic, and electronic features of this work into a successfully operating refrigerator are described. For individual titles, see N86-21715 through N86-21717.

N86-21715* Philips Labs., Briarcliff Manor, New York.
INTRODUCTION TO DESIGN AND FABRICATION OF A LONG-LIFE STIRLING CYCLE COOLER FOR SPACE APPLICATION. PHASES 1 AND 2: ENGINEERING MODEL Final Report
In its Design and Fabrication of a Long-Life Stirling Cycle Cooler for Space Application. Phases 1 and 2: Engineering Model Mar. 1983 184 p (For primary document see N86-21714 12-31)
Avail: Issuing Activity CSCL 13I

A concept for a cryogenic refrigerator capable of long-life, reliable operation in space was proposed. The proposed concept was translated into a design phase in which the critical components were tested in dedicated fixtures and by the fabrication and test of a laboratory prototype with which to demonstrate the feasibility of the proposed concept. The engineering model program concept feasibility and addressed, the problems of efficiency, long life, and reliability. The cooler uses the Stirling cycle, a thermodynamically reversible process, as its refrigeration method. To attain the desired life and reliability, its design incorporates features which eliminate wear and reduce working-gas contamination. Efforts associated with, design, manufacturing, and testing of the engineering model are reported. E.A.K.

N86-21716* Philips International B.V., Eindhoven (Netherlands).
A SMALL FREE-PISTON STIRLING REFRIGERATOR Final Report
A. K. deJonge *In its* Design and Fabrication of a Long-Life Stirling Cycle Cooler for Space Application. Phases 1 and 2: Engineering Model Mar. 1983 7 p refs (For primary document see N86-21714 12-31)
Avail: Issuing Activity CSCL 13I

The performance characteristics of Stirling machines with free moving pistons were studied. The design of the small free piston Stirling refrigerator, is described and a new way to describe the pressure fluctuations in the Stirling system is given. The equations of movement of the piston and the displacer are derived. A small cryogenic cooler, based on the free displacer Stirling principle, was designed and developed with a capacity of 1 W at 77 K. The main application is for infrared radiation detection. The concept leads to a machine with a very long life requiring no maintenance and having negligible degradation. The machine, has shown a long lifetime and a very stable lowest temperature. The pressure fluctuation in the machine which leads to an explanation of the behavior of a free displacer refrigerator is descrbed and the linear drive system of the machine is discussed. E.A.K.

N86-21717* Philips Labs., Briarcliff Manor, New York.
[BASIC PRINCIPLES OF THE STIRLING CYCLE] Final Report
In its Design and Fabrication of a Long-Life Stirling Cycle Cooler for Space Application. Phases 1 and 2: Engineering Model Mar. 1983 16 p refs (For primary document see N86-21714 12-31)
Avail: Issuing Activity CSCL 13I

The basic principles of the Stirling cycle are outlined. From an elementary theory the general properties of the cycle are derived with a discussion of the most important losses. The performance of the fundamental and ideal (isothermal) cycle are described. The actual cycle, which differs from the ideal one by the occurrence of losses is also described. In the ideal Stirling cycle, the cold is produced by the reversible expansion of a gas. The gas performs a closed cycle, during which it is alternately compressed at ambient temperature in a compression space and expanded at the desired low temperature in an expansion space, thereby reciprocating between these spaces through one connecting duct, wherein a regenerator provides for the heat exchange between the outgoing and the returning gas flow. The problem of how to minimize the total sum of the losses is examined. E.A.K.

N86-21718* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CONTAINERLESS HIGH PURITY PULLING PROCESS AND APPARATUS FOR GLASS FIBER Patent
Robert J. Naumann and Edwin C. Ethridge, inventors (to NASA) issued 21 Jan. 1986 6 p Filed 19 Apr. 1984 Continuation-in-part of US-Patent-Appl-SN-526754, filed 26 Aug. 1983, abandonded
(NASA-Case-MFS-25905-2; US-Patent-4,565,557;
US-Patent-Appl-SN-601130; US-Patent-Class-65-1;
US-Patent-Class-65-2; US-Patent-Class-65-11.1;
US-Patent-Class-65-12) Avail: US Patent and Trademark Office CSCL 13H

Apparatus and method for pulling optical glass fibers in a containerless environment is disclosed which includes a single axis acoustical levitation furnace in which a specimen is levitated and melted. A reflector unit is carried in the interior of the furnace and includes a reflector disposed centrally about the acoustical axis of the levitator. The reflector unit includes a circular shroud of insulation and a copper sleeve inserted in the unit which is hollow at for receiving a cooling medium. A fiber pulling bore is formed centrally in the reflector unit surrounded by cooling jacket to enhance solidification and formation of a fiber. A starting fiber strand is introduced into the melt and pulled outwardly through bore whereby the specimen fiber is started and formed as pulled therethrough. In order to replenish the melt and thus enable a continous process, a movable secondary reflector is provided which captures a supplemental specimen pellet and by movement of the reflector transfers it to the melt.

Official Gazette of the U.S. Patent and Trademark Office

N86-21719*# National Aeronautics and Space Administration, Washington, D.C.
REMOVAL OF GLASS ADHERED TO SINTERED CERAMICS IN HOT ISOSTATIC PRESSING
Nov. 1985 11 p Transl. into ENGLISH of Japanese Patent no. 58-88177 (26 May 1983) p 1-5 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(NASA-TM-77930; NAS 1.15:77930) Avail: NTIS HC A02/MF A01 CSCL 13H

In the hot isostatic pressing of ceramic materials in molten glass using an inert gas as a pressing medium, glass adhered to the sintered ceramics is heated to convert it to a porous glass and removed. Thus, Si3N4 powder was compacted at 5000 kg/sq cm, coated with a 0.5 mm thick BN, embedded in Pyrex glass in a graphite crucible, put inside a hot isostatic press containing

Argon, hot pressed at 1750 C and 100 kg/sq cm; cooled, taken out from the crucible, heated at 1100 C for 30 minutes, cooled, and then glass adhered to the sintered body was removed. Author

N86-21720*# National Aeronautics and Space Administration, Washington, D.C.
APPARATUS FOR EDGE ETCHING OF SEMICONDUCTOR WAFERS
A. Casajus Feb. 1986 13 p Transl. into ENGLISH of East German Patent no. 143,333 (13 Aug. 1980) p 1-11 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77998; NAS 1.15:77998) Avail: NTIS HC A02/MF A01 CSCL 13H

A device for use in the production of semiconductors, characterized by etching in a rapidly rotating etching bath is described. The fast rotation causes the surface of the etching bath to assume the form of a paraboloid of revolution, so that the semiconductor wafer adjusted at a given height above the resting bath surface is only attacked by etchant at the edges. Author

N86-21721# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES. VOLUME 39, NUMBER 12
Larry E. Shaffer Dec. 1985 55 p
(AD-A161069; ESN-39-12) Avail: NTIS HC A04/MF A01 CSCL 05/2

Progress in European science and technology is reported. Topics discussed in this issue include: bioelectromagnetic featured at ONRL Minisymposium on the influence of electric and electromagnetic fields on organized biological structures; neurobiology research at the universities of Stockholm, Lund, and Goeteborg (Sweden); conference on parallel computing; General Electric Co. (UK) research at Hirst and Marconi; research centres--information technology, image processing and analysis, radars communications, and semiconductors; and fatigue research at the Univ. of Vienna on short crack (less than 0.5 mm). GRA

N86-21722# Department of the Army, Washington, D. C.
METHOD OF CHEMICALLY POLISHING QUARTZ CRYSTAL BLANKS Patent Application
Ronald J. Brandmayr, inventor (to Army) Filed 30 Sep. 1985 14 p
(AD-D011975; US-Patent-Appl-SN-781166) Avail: NTIS HC A02/MF A01 CSCL 07/1

The general object of this invention is to provide a method of chemically polishing quartz crystal blanks. A more specific object is to provide such a method wherein the resulting chemically polished blanks will be suitable for use in resonators and oscillators. Quartz crystal blanks are chemically polished by thoroughly cleaning the blanks, treating the quartz crystal blanks with an etching solution at high pressures in a high pressure vessel while agitating to circulate the etchant and maintaining a uniform temperature throughout the etching solution, cooling the vessel, removing the quartz crystal blanks, rinsing thoroughly with water and spinning dry. GRA

N86-21723# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
10 Jan. 1986 59 p refs Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-001) Avail: NTIS HC A04/MF A01

Progress in Japanese science and technology is reported. Topics discussed include: aerospace sciences, chemical engineering, energy, nuclear development, and science and technology policies. For individual titles, see N86-21724 through N86-21726.

N86-21724# Joint Publications Research Service, Arlington, Va.
EARTH SENSOR FOR ARTIFICIAL SATELLITE CONTROL DISCUSSED c35
Kunio Nakamura and Matsushita Giken *In its* Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 1-12 refs Transl. into ENGLISH from Sensa Gijutsu (Tokyo, Japan), May 1985 p 69-74 (For primary document see N86-21723 12-31)
Avail: NTIS HC A04/MF A01

Confirmation of the state of satellite operation and the appropriate control of satellite attitude was examined. A certain attitude is necessary to put a satellite in its planned orbit after launched by a ground rocket while, weight is an important design item in the launching of satellites and the amount of fuel used for attitude control must be minimized, but this hinges on how precisely the attitude can be detected. Attitude control is important to any satellite, whether a meteorological satellite, communications satellite, or broadcasting satellite. Satellites are designed so that their attitude can be detected by sensors. The Earth sensor is important to application satellites operated around the Earth. This sensor has the function of deciding the attitude of a satellite to the Earth and can decide two of the three attitude axes. An attitude detecting system is designed by combining it with the solar sensor to decide all three axes. E.A.K.

N86-21725# Joint Publications Research Service, Arlington, Va.
FIBER REINFORCED PLASTICS DESCRIBED c24
In its Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 19-42 Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Jan. 1985 p 85-96 (For primary document see N86-21723 12-31)
Avail: NTIS HC A04/MF A01

The development of fiber reinforced plastics (FRP) in Japan is described. During the years of development of new FRP products, was made in molding FRP materials to produce FRP products. The molding method progressed from the band lay-up molding to the spray-up molding to the hot press molding to the preform MMD molding to the SMC molding. The development of these molding methods has contributed to the resultant progress of the FRP industry in Japan. E.A.K.

N86-21726# Joint Publications Research Service, Arlington, Va.
TDK AFFILIATE DEVELOPS NEW SOLAR POWER CELL c44
In its Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 52 Repr. from Kyodo (Tokyo, Japan), 0727 GMT, 21 Nov. 1985 (For primary document see N86-21723 12-31)
Avail: NTIS HC A04/MF A01

A solar power generating cell capable of changing sunlight into electricity more efficiently, paving the way to produce commercially viable solar power generators was developed. The amorphous noncrystal photovoltaic cell will lead to wide use of solar power stations by electric power companies. Photovoltaic cells generate voltage when radiant energy fall on the boundary between dissimilar semiconductors. Amorphous cells will be used for large-scale power generating systems because they are more economical and efficient than costly crystal semiconductor cells. A square prototype-1 cm by 10 cm-consisting of 15 amorphous cells was produced its laser technology. The prototype converts 9.9% of solar heat into electric energy, more efficient than conventional amorphous cells, which convert about 8%. E.A.K.

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-21727*# National Aeronautics and Space Administration, Washington, D.C.
IONOSPHERIC EFFECTS TO ANTENNA IMPEDANCE
Karl-Heinz Bethke Jan. 1986 25 p refs Transl. into ENGLISH of Ionpsphaereninfluss auf die Antennenimpedanz (Bochum, West Germany), Dec. 1980 p 1-25 Original language doc. was announced as N85-28217 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. prep. by Ruhr Univ., Bochum, West Germany

(Contract NASw-4004)
(NASA-TM-77956; NAS 1.15:77956; BMFT-FB-W-84-052) Avail: NTIS HC A02/MF A01 CSCL 20N

The reciprocity between high power satellite antennas and the surrounding plasma are examined. The relevant plasma states for antenna impedance calculations are presented and plasma models, and hydrodynamic and kinetic theory, are discussed. A theory from which a variation in antenna impedance with regard to the radiated power can be calculated for a frequency range well above the plasma resonance frequency is give. The theory can include photo and secondary emission effects in antenna impedance calculations. Author

N86-21728# Illinois Univ., Urbana. Coordinated Science Lab.
AN EXPERIMENTAL STUDY OF DIELECTRIC ROD ANTENNAS FOR MILLIMETER-WAVE IMAGING APPLICATIONS
S. H. Doran and R. Mittra Apr. 1985 23 p
(Contract N00014-84-C-0149)
(AD-A161350; R-1037; UILU-ENG-85-2212) Avail: NTIS HC A02/MF A01 CSCL 17/9

In this report, the results of an experimental investigation of dielectric antennas for application in an imaging radar at millimeter wavelengths are presented. Several designs for the antenna were tested for use at 81 or 220 GHz and critical design features for these antennas were studied. A simple design for an imaging radar using dielectric antennas was also implemented and field maps were obtained for a series of simple test objects. GRA

N86-21729# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF WAVEGUIDE MODES ON THE SCATTERING OF A FINITE TUBULAR CYLINDER M.S. Thesis
Gyoo Phil Chung Sep. 1985 101 p
(AD-A161500) Avail: NTIS HC A06/MF A01 CSCL 20/14

This thesis is a study of the back scattering of finite tubular cylinders with circular cross-sections and very thin conducting walls. Measurements of several scaled tubular cylinders were taken and the experimental results were compared to theoretical data and to previous results, respectively. This research is part of an ongoing project to investigate the resonant scattering characteristics of targets. The results are expected to find applications in target identification. GRA

N86-21730# Illinois Univ., Urbana. Computer Systems Group.
THE METHOD OF CONJUGATE GRADIENTS FOR THE NUMERICAL SOLUTION OF LARGE-BODY ELECTROMAGNETIC SCATTERING PROBLEMS
A. F. Peterson and R. Mittra Mar. 1985 30 p
(Contract N00014-84-C-0149)
(AD-A161550; R-1035; UILU-ENG-85-2210) Avail: NTIS HC A03/MF A01 CSCL 20/14

Over the past few decades, many techniques have been developed for the numerical solution of integral equations representing electromagnetic scattering problems. However, a majority of these techniques are limited to electrically small scatterers, i.e., below the resonance range. This is primarily because the amount of CPU computer time and storage requirements become prohibitive for large body scatterers. Recent work indicates that a procedure based on the iterative conjugate gradient method can be incorporated into conventional numerical methods in order to extend the range of application of the techniques to larger geometries. In this paper we discuss the conjugate gradient method and illustrate several ways in which it can be applied to electromagnetic scattering problems. The discussion includes mention of the method as compared to conventional approaches as well as some of its limitations. In many practical scattering problems of interest at optical wavelengths, the method can provide a convenient means of treating problems which are electrically more than an order of magnitude larger than can be handled by other techniques. Author (GRA)

N86-21731# Computer Systems Management, Inc., Arlington, Va.
DESIGN, DEVELOPMENT, AND INSTALLATION OF A TWO-NODE, COLOR VIDEO-TELECONFERENCING SYSTEM FOR THE US NAVY Final Technical Report, 27 Jul. 1984 - 28 Sep. 1985
Kevin F. Vest, Patrick Jones, Douglas French, Harvey Sachs, and Frances Clements 1 Nov. 1985 48 p
(Contract MDA903-84-C-0008; ARPA Order 3829)
(AD-A161614; CSMI/TR-85/02) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report discusses the design of a two-node, color Video-Teleconferencing System for the System for the U.S. Navy and its installation at sites in Suitland, Maryland, and Pearl Harbor. It details the development of the audio, video, and fast-facsimile parts of the system; integration of the system into the communications network; design of a teleconference room; and installation of the system. GRA

N86-21732# Naval Research Lab., Washington, D. C.
USING SPECTRAL ESTIMATION TECHNIQUES IN ADAPTIVE PROCESSING ANTENNA SYSTEMS Interim Report
W. F. Gabriel 9 Oct. 1985 42 p
(DA Proj. WR0-2101)
(AD-A161670; NRL-8920) Avail: NTIS HC A03/MF A01 CSCL 09/5

Improved spectral estimation techniques are applied to adaptive processing array antenna systems. They are invaluable because the amount of additional useful information they can provide about the interference environment, utilizing only a relatively small number of degrees-of-freedom (DOF). Two conceptual application area examples that use such techniques are discussed; partially-adaptive low-sidelobe arrays, and fully-adaptive tracking arrays. For the partially-adaptive area, the information is used for the efficient assignment of a limited number of DOF in a beamspace constrained adaptive system to obtain a stable mainbeam, retention of low sidelobes, considerably faster response, and reduction in overall cost. These benefits are demonstrated via simulation examples computed for a 16-element linear array. For the fully adaptive tracking array area, the information is used in an all-digital processing system concept to permit stable nulling of coherent interference sources in the mainbeam region, efficient assignment/control of the available DOF, and greater flexibility in time-domain adaptive filtering strategy. GRA

N86-21733# National Oceanic and Atmospheric Administration, Boulder, Colo.
DATA ANALYSIS OF THE NOAA-GIT (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION-GEORGIA INSTITUTE OF TECHNOLOGY) MILLIMETER-WAVE PROPAGATION EXPERIMENT NEAR FALTVILLE, ILLINOIS Technical Report
R. J. Hill, W. P. Schoenfeld, J. P. Riley, J. T. Priestley, and S. F. Clifford Aug. 1985 61 p
(Contract MIPR-ARO-122-85 29)
(AD-A161722; NOAA-TR-ERL-429-WPL-60; ARO-18029.7-GS) Avail: NTIS HC A04/MF A01 CSCL 20/14

The authors discuss the quantities calculated from the millimeter-wave and micrometeorological data base. The data base was obtained from the millimeter-wave propagation experiment conducted near Flatville, Illinois, by the National Oceanic and Atmospheric Administration (NOAA) and Georgia Institute of Technology (GIT). The repair of data-base errors by digital computation is also discussed, and the overall structure of the data-processing programming is described. GRA

N86-21734# City Coll. of the City Univ. of New York. Communications Systems Lab.
SPREAD SPECTRUM ACQUISITION AND TRACKING Final Report, 30 Jun. 1984 - 30 Jun. 1985
Donald L. Schilling and H. Kayser 8 Nov. 1985 51 p
(Grant AF-AFOSR-0102-83)
(AD-A162442; AFOSR-85-1066TR) Avail: NTIS HC A04/MF A01 CSCL 17/4

This report discusses the following subjects: An acquisition scheme for a frequency-hopped SS signal received over a Rayleigh multipath channel with random delay time. We consider relatively fast FH with a hopping rate of 1 KHZ and 127 different hopping

frequencies. The received signal is embedded in white Gaussian noise. While the above problem appears to be specific the approach given below is general and can be generalized further. In this case, ignoring the spreading effect, there will be a possible overlapping between only three adjacent frequencies. For such a case we propose an optimum receiver and acquisition scheme whose characteristics are analyzed mathematically and by computer simulation. We characterize the performance of the acquisition scheme by the probability of detection for given probability of false acquisition when the input signal is white Gaussian noise only. The probability of detection is the probability that, at the end of the observation period, the desired signal code sequence is detected. GRA

N86-21735# Illinois Univ., Urbana. Coordinated Science Lab.
DIVERSITY COMBINING FOR FREQUENCY-HOP SPREAD-SPECTRUM COMMUNICATIONS WITH PARTIAL-BAND INTERFERENCE AND FADING Ph.D. Thesis
Catherine M. Keller Oct. 1985 115 p
(Contract N00014-84-C-0149)
(AD-A162495; UILU-ENG-85-2228) Avail: NTIS HC A06/MF A01 CSCL 17/2

This report presents results on the evaluation of several diversity combining techniques that are suggested for frequency-hop (FH) communications with partial-band interference and fading. The analysis covers systems with M-ary orthogonal signaling and noncoherent demodulation. The partial-band interference is modeled as a Gaussian process, although some of the results also apply to general (non-Gaussian) partial-band interference. The performance measures we use to evaluate the diversity combining techniques are the narrowband interference rejection capability and the signal to noise ratio requirement over the entire range of interference duty factors. We evaluate the exact probability of error for each of the diversity combining techniques studied. The performance of the optimum combining technique for receivers with perfect side information is established. It is shown that for receivers with perfect side information, the system performance does not change significantly with the choice of the diversity combining technique. However, the same schemes that work well in receivers with perfect side information perform poorly in receivers without side information. GRA

N86-21736# ALPHATECH, Inc., Burlington, Mass.
SPECIFICATION AND PRELIMINARY VALIDATION OF IAT (INTEGRATED ANALYSIS TECHNIQUES) METHODS: EXECUTIVE SUMMARY
Judith R. Kornfeld Mar. 1985 34 p
(Contract F33615-82-C-0509)
(AD-A162509; TR-223; AFAMRL-TR-85-003) Avail: NTIS HC A03/MF A01 CSCL 17/2

Since FY83 work has been conducted to develop a methodology for the description and analysis of complex Command, Control, and Communications (C3) systems. The methodology will explicitly consider the human role in such systems, as well as organizational and equipment constraints. The methodology developed under this effort will be a set of interrelated techniques, thus the title Integrated Analysis Techniques (IAT) has been chosen. This report outlines work to date, including the identification of requirements for IAT, development of an IAT conceptual framework, and preliminary validation of IAT concepts. Planned work for FY85, including more extensive validation, is also described. IAT is being developed to provide quantitative information about C3 human/system performance. This information can then be used to guide the analysis and design of new systems as well as the improvement or reconfiguration of existing ones. GRA

N86-21737# Ohio State Univ., Columbus. Electroscience Lab.
SPACE-FREQUENCY SAMPLING CRITERIA FOR ELECTROMAGNETIC SCATTERING OF A FINITE OBJECT
Frederic Y. S. Fok Aug. 1985 202 p
(Contract N00014-82-K-0037)
(AD-A162553; ESL-714190-11) Avail: NTIS HC A10/MF A01 CSCL 20/14

This investigation concerns the sampling criteria in the wave number space for generating the spatial impulse response of a finite target. The impulse response of a finite target is important for target identification and imaging. The other purpose of this report is in the management of large amounts of data for potential application in the presentation of scattered field data and construction of such images. For clarity, monostatic impulse responses of up to two dimensions are considered. A proper choice of canonical confinement for the target in space can greatly reduce the number of samples required to sufficiently characterize the target's spatial impulse response. One dimensional impulse responses generated using two basic types of confinement: 1) isotropic and 2) parallelepiped, are compared. The two approaches show competitive reconstructed results. Though a sampling lattice may be more efficient in the sense of a reduced number of measurement points, it may be less effective when digital processing is involved. Specifically, the time consuming interpolation step is required to put data presented in other types of sampling lattice into the cubic type. Two dimensional impulse responses reconstructed from cubic sampled data are compared with those using Mensa et al., method. Two dimensional impulse responses obtained also indicate good potentials for image reconstruction via the spatial impulse response. GRA

N86-21738# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
SEQUENTIAL DECODING FOR MULTIPLE ACCESS CHANNELS Ph.D. Thesis
Erdal Arikan Dec. 1985 115 p
(Contract N00014-84-K-0357; DARPA Order 3045)
(AD-A162630; LIDS-TH-1517) Avail: NTIS HC A06/MF A01 CSCL 17/2

Sequential decoding is a decoding algorithm for tree codes originally developed for single-user channels (i.e., channels with one transmitter and one receiver). Sequential decoding relies on what is called a metric to direct its search and find the path in the tree that corresponds to the encoded message. The decoding complexity in sequential decoding, that is, the number of computations to decode a source digit, is a random variable. A rate is said to be achievable by sequential decoding if it is possible to select a code with that rate and a metric such that the expected value of the decoding complexity is finite. In the single-user case, the largest achievable rate is called the cut-off rate of sequential decoding. Multiple access channels are models of communication systems where there are a number of users all sharing the same transmission medium to communicate their messages to a common receiver. This thesis explores the possibility of using sequential decoding on multiple access channels. GRA

N86-21739# Maxim Technologies, Inc., Santa Clara, Calif.
ADAPTIVE ANTENNA NULLING PERFORMANCE IN A DISPERSIVE PROPAGATION MEDIUM Technical Report, 15 Sep. 1983 - 15 Jan. 1985
Ronald Y. Ibaraki and Ernest T. Tsui 15 Feb. 1985 58 p
(Contract DNA001-83-C-0321)
(AD-A162708; AD-E301864; MT-TR-8502S; DNA-TR-85-75) Avail: NTIS HC A04/MF A01 CSCL 17/4

The Signal-to-Interference pulse Noise Ratio (SINR) performance of a generic Multi-Beam Antenna (MBA) and a Thinned Phased Array Antenna (TPAA) is evaluated for multiple jammer scenarios including the effect of angle-of-arrival distortion of the jamming signals caused by a striated propagation media. The analysis is based on computer modeling of the antenna configurations using the optimal Wiener solution for the adaptive weight calculations. Statistically distributed SINR values in fading are obtained by applying the equivalent effect of independent two-dimensional sample functions of spatially varying flat fading at the antenna aperture. GRA

N86-21740# Department of the Army, Washington, D. C.
SAW (SURFACE ACOUSTIC WAVE) TRANSITION DETECTOR FOR PSK (PHASE SHIFT KEYING) SIGNALS Patent Application

William J. Skudera, Jr. and Charles E. Konig, inventors (to Army) Filed 1 Nov. 1985 20 p
(AD-D011974; US-Patent-Appl-SN-793931) Avail: NTIS HC A02/MF A01 CSCL 17/2

This disclosure related to a phase transition detector for PSK signals which utilizes a dual channel SAW differential delay line to achieve a required delay. Each channel or path of the SAW device comprises an input and an output transducer. The two channels provide a predetermined differential delay (T) inasmuch as they are of different lengths. A PSK input signal is delivered to a power splitter, with the output therefrom coupled to the pair of input transducers of the SAW device. The output transducers are coupled to a multiplier which serves to detect phase transitions in the input PSK signal. The multiplier output is coupled to an output terminal via a low pass filter which provides harmonic repression. In another embodiment a SAW device comprises a bank if dual channel differential delay lines with each channel set to a different predetermined delay (T) so that a plurality of PSK signals of different chip rates can be separated out and detected. The PSK input signals are delivered to a power splitter, with the output thereform coupled to a pair of input transducers of the SAW device. Output transducers are spaced predetermined distances from one or the other of said input transducers. Parallel sets of multipliers and low pass filters are coupled to predetermined SAW output transducers. Each multiplier serves to detect the phase transitions in one, and only one, PSK input signal. GRA

N86-21741# Department of the Air Force, Washington, D.C.
RADAR-CLUTTER SIMULATOR Patent Application
Gregory Schaaf, inventor (to Air Force) Filed 4 Sep. 1985 12 p
(AD-D011992; US-Patent-Appl-SN-772581) Avail: NTIS HC A02/MF A01 CSCL 17/9

The simulation of clutter echo return signals for a radar system is accomplished using two sets of diode noise sources, a frequency synthesizer for bandwidth control, multiplexing control, two D/A converters and mixers, a 90-degree splitter, and a summer; the output of the summer being the simulated clutter. The two sets of noise sources each produce a digital encoded controlled bandwidth Gaussian noise signal which is strobed by the multiplexing control unit firstly to the pulse repetition interval of the radar system and secondly to the data rate of the radar system. The two strobed D/A converters convert the two digital noise signals into their analog equivalents. The two separate video channels are required to obtain the Rayleigh noise distribution characteristic of clutter. This distribution results when the analog signals from the D/A converters are multiplied with in-phase and quadrature RF reference frequencies in the two mixers, then summed in the summer. GRA

N86-21907# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STRUCTURAL DAMPING POTENTIAL OF WAVEGUIDE ABSORBERS
Eric E. Ungar and Leonard G. Kurzwell *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 14 p refs
(For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-21742* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LINEARIZED TRAVELING WAVE AMPLIFIER WITH HARD LIMITER CHARACTERISTICS Patent
Henry G. Kosmahl, inventor (to NASA) Issued 14 Jan. 1986 7 p Filed 20 Mar. 1985 Continuation-in-part of US-Patent-Appl-SN-492522, filed 9 May 1983, abandonded (NASA-Case-LEW-13981-2; US-Patent-4,564,787; US-Patent-Appl-SN-714051; US-Patent-Class-315-3.6; US-Patent-Class-315-3.5; US-Patent-Class-315-39.3; US-Patent-Class-330-43) Avail: US Patent and Trademark Office CSCL 09A

A dynamic velocity taper is provided for a traveling wave tube with increased linearity to avoid intermodulation of signals being amplified. In a traveling wave tube, the slow wave structure is a helix including a sever. A dynamic velocity taper is provided by gradually reducing the spacing between the repeating elements of the slow wave structure which are the windings of the helix. The reduction which takes place coincides with the ouput point of helix. The spacing between the repeating elements of the slow wave structure is ideally at an exponential rate because the curve increases the point of maximum efficiency and power, at an exponential rate. A coupled cavity traveling wave tube having cavities is shown. The space between apertured discs is gradually reduced from 0.1% to 5% at an exponential rate. Output power (or efficiency) versus input power for a commercial tube is shown.
Official Gazette of the U.S. Patent and Trademark Office

N86-21743 Stanford Univ., Calif.
POINT DEFECTS AND DOPANT DIFFUSION IN SILICON Ph.D. Thesis
Paul Martin Fahey 1985 246 p
Avail: Univ. Microfilms Order No. DA8522139

Since dopant atoms are substitutional in nature, they become mobile only by interacting with the native point defects of the silicon lattice. Dopant diffusion by the vacancy, interstitial, and interstitialcy mechanisms are examined from an energetics viewpoint. Both the charge states of the defects and the chemical identity of the dopant atoms are variables in the analysis. Relationships between dopant and point defect concentrations are examined under equilibrium and non-equilibrium conditions, and the appropriate equations governing diffusion presented. It is demonstrated that exposure of the silicon surface to NH3 ambient at elevated temperatures caused vacancy defects to be injected into the silicon bulk, while exposure of SiO2 layers of SiO2 layers to NH3 results in injected of interstitial type defects. These thermal nitridation processes are used to study the diffusion of the common dopants, P, As, Sb, and B. By selectively injecting vacancies or interstitials into the bulk and monitoring the changes in diffusion rates through spreading resistance or SIMS profile analysis, the types of mechanisms by which the dopants diffuse can be ascertained. Dissert. Abstr.

N86-21744 Stanford Univ., Calif.
COMPLEXITY RESULTS IN VLSI AND DISTRIBUTED COMPUTING Ph.D. Thesis
King Fai Pang 1985 164 p
Avail: Univ. Microfilms Order No. DA8522210

Two classes of complexity problems are investigated in this thesis. For the first class, namely, VLSI Complexity, the main results are bounds on combinations of the area A, computation time T and pipelined period P expended by a VLSI circuit in solving a problem. Based on the Grid Model for VLSI circuits, a unified framework for formalizing circuit partitions is developed. Multiple circuit partitions in two- and three-dimensions are introduced. Employing these proof methods, matching (or the strongest known) lower and upper bounds are derived for a class of functions with localized information flow. These include: generalized discrete Fourier transform, generalized barrel shift and rectangular matrix multiplication. Formal definitions are given to derive general complexity bounds for four communication models. They are the deterministic, epsilon-error, epsilon-randomized and delta-distortion models. Dissert. Abstr.

N86-21745 California Univ., Los Angeles.
A NEW IMPLEMENTATION OF THE PIPELINE ANALOG-TO-DIGITAL CONVERSION TECHNIQUE Ph.D. Thesis
Mostafa Reza Yazdy 1985 207 p
Avail: Univ. Microfilms Order No. DA8522359

With the present trend towards digital LSI technology, the echniques of analog-to-digital conversion play a major role in the apidly growing field of signal processing. For over two decades nany approaches for A/D conversion have been explored. Among hem two popular schemes; successive approximation and flash conversion techniques, are widely used at the present time. An lternative to the methods above, that has the advantages of hose techniques without their drawbacks, is the pipelining approach o be described in this dissertation. A new implementation of this echnique, which allows for realization of high speed A/D conversion without complex circuitry, is introduced. A discrete prototype of an 8-bit pipeline converter, using commercially available IC's, was built and the experimental results are presented. The circuit ealization of the pipeline converter, along with the NMOS and CMOS circuit designs and SPICE simulations of all key components of the A/D (op amps, comparators,...) are provided. These key elements are laid out and fabricated, using 4 microns standard NMOS and 5 microns double-poly p-well bulk CMOS technologies, and the test results are presented. Dissert. Abstr.

N86-21746 Boston Coll., Chestnut Hill, Mass.
THE EFFECT OF CONTACTS ON THE COUNTING CHARACTERISTICS OF HEAVILY DOPED n-TYPE CADMIUM TELLURIDE Ph.D. Thesis
Hai-Yuin Cheng 1985 237 p
Avail: Univ. Microfilms Order No. DA8522305

Cadmium telluride single crystals were grown heavily doped with chloride. The resulting crystals were n-type with free carrier concentrations of the order of 10 to the 12th power cu cm/v-sec and resistivities between .002 and .0002 ohm-cm. Studies were made of the gamma and alpha counting characteristics of these crystals with metal, metal-semiconductor, and metal-insulator electrodes. It was found that the MIS and MSS structures resulted in significant improvement over the MS structures in counting, signal-to-noise and energy resolution. Dissert. Abstr.

N86-21747 Carnegie-Mellon Univ., Pittsburgh, Pa.
GALLIUM ARSENIDE STRUCTURES AND INTERFACES FORMED BY MOLECULAR BEAM EPITAXY Ph.D. Thesis
Hwa Cheng 1985 148 p
Avail: Univ. Microfilms Order No. DA8517515

Sb-GaAs Schottky barrier diodes on n and p clean substrates were prepared by in situ metal deposition in a molecular beam epitaxy (MBE) system. Reduction of effective barrier heights on substrates with higher doping concentrations is in agreement with theoretical predictions. Thermal annealing up to 250 C shows changes in barrier heights that depend on whether the original surface was As or Ga rich. The barrier heights of thick Ga layers on n- and p-type (100) GaAs surfaces are 1.0 eV and 0.44 eV, respectively. The lective epitaxy of GaAs through windows in SiO2 deposited on semi-insulating GaAs substrates was also studied. The epitaxial growth of GaAs sub y Sb sub 1-y (y is equal to or greater than 7) on GaAs for study of the interface region was examined. This facilitates the compositional control in the MBE growth of GaAs (sub y) Sb (sub 1-y) film by adjusting the atomic flux ratio of Sb to Ga with extra arsenic flux supplied for maintaining stoichiometry. Dissert. Abstr.

N86-21748 Stanford Univ., Calif.
PERFORMANCE LIMITS OF SCALED CMOS ANALOG ICs Ph.D. Thesis
Jamebond Kuo 1985 138 p
Avail: Univ. Microfilms Order No. DA8522181

A new concept of merging semi-custom CMOS analog circuits with the basic digital gate array approach is introduced with a 2 micron analog/digital gate array chip. Tradeoffs in the analog circuit performance using scaled digital CMOS technology were evaluated. Speed and precision performance limits in scaled CMOS analog integrated circuits based on pass transistor induced errors are investigated. Conventional single lump SPICE models used to analyze transients of MOS transistors assume quasi-static operation, which can easily be violated for high speed analog applications. New distributed and two lump models were created to analyze pass transistor turn-off transients for very short clock fall times. These models can be used to explain performance of transistors in the diffusion mode of operation. A pass transistor test chip including four kinds of new selectively doped pass transistors was designed, fabricated, and tested to verify the transient analysis. Measured transients are consistent with the model results. Dissert. Abstr.

N86-21749 Stanford Univ., Calif.
INTERFACE STRUCTURE AND ELECTRONIC PROPERTIES OF THE TITANIUM-SILICON SYSTEM Ph.D. Thesis
Marc Alan Taubenblatt 1985 237 p
Avail: Univ. Microfilms Order No. DA8522235

Although Schottky barrier diodes and ohmic contacts are used extensively in integrated circuits, no theory currently exists that accurately predicts the electronic properties of the barrier from basic materials parameters. The importance of the metal-silicon interface in determining these properties and the complexity of the reactions observed have made the formulation of such a theory quite difficult. Silicon Schottky barriers were examined by a carefully controlled study of both interface structure and electrical properties for titanium-silicon diodes, which are of interest for use in advanced integrated circuits. An ultra-high vacuum system capable of in situ analysis of interface structure using surface spectroscopies was designed and constructed, and measurement of barrier height was performed using the photoresponse technique. This system provides a well controlled environment, which reduces the confounding effects of uncharacterized contamination, and allows detailed interface studies not otherwise possible. The results impact on both Schottky barrier technology, by elucidating interfacial reactions and correlating them to electrical behavior for relevant systems, and Schottky barrier theory, by determining barrier characteristics that Schottky models must be able to explain. Dissert. Abstr.

N86-21750 Stanford Univ., Calif.
NUMERICAL MODEL AND ANALYSIS OF TRANSISTORS WITH POLYSILICON EMITTERS Ph.D. Thesis
Zhiping Yu 1985 130 p
Avail: Univ. Microfilms Order No. DA8522254

With the advent of Very Large Scale Integration (VLS) technology, innovative bipolar devices with shallow junctions and high performances are being developed both for silicon and compound semiconductor materials. In the composite structure, such as HBJT (Heterojunction Bipolar Junction Transistor), the device characteristics are controlled not only by the doping profile but also by the composition of the structure. A complete physical and numerical model was developed to handle the carrier transport in such composite structure. An analytical approach (the introduction of an effective recombination velocity) to analyze carrier transport in the emitter of the bipolar transistor is discussed. Both analytical and numerical methods are then applied to the analysis of the device characteristics of transistors with polysilicon emitters. Good agreement between simulations and experimental results is achieved, and a regime of carrier distribution in the base space charge region is revealed. The numerical implementation of the model--a general purpose, one dimensional device simulation program (SEDAN) is briefly discussed. Dissert. Abstr.

N86-21751 Oregon Graduate Center for Study and Research, Beaverton.
STRUCTURE AND ELECTRICAL PROPERTIES OF STRONTIUM ZIPCONATE Ph.D. Thesis
Nongluck Pankurddee Suriyayothin 1984 197 p
Avail: Univ. Microfilms Order No. DA8517174

The different defect disorders in ternary ionic crystals of the type ABO3 were considered and defect concentrations as functions of several independent thermodynamic variables were evaluated. This analysis was then applied to interpret the specific case of the electrical behavior of SrZrO3. The analysis was next extended to explain the effects of partially and completely ionized foreign atoms, both acceptors and donors, added intentionally or present as impurities, to achieve controlled properties. Equilibrium conduc-

tivity experiments were performed over a wide range of temperature P sub O2 and dopant concentration and the applicability of point defect chemistry in solving these results was demonstrated. Thermogravimetric studies, under both oxidizing and reducing conditions, were conducted to under the self-compensation phenomenon in SrZrO3 with dopant additions and a model was proposed to explain the compensation process. The underlying mechanisms involved in the conduction process were also directly studied through diffusion experiments, by following the kinetics of interdiffusion through transient electrical conductivity measurements, again over a wide range of temperature and P sub O2 steps. Finally, a comprehensive study was made of laser-excited Raman spectra characteristics of undoped and doped zirconates at various temperatures. Dissert. Abstr.

N86-21752# Defence Research Information Centre, Orpington (England).
LOW LOSS DIELECTRICS WITH CONTROLLABLE VALUES OF SPECIFIC PERMITTIVITY
J. Zehentner Oct. 1985 13 p refs Transl. into ENGLISH from Elektrotechnicky Casopis, vol. 22, no. 1, 1971 p 66-72
(DRIC-T-7632; BR97524) HC A02/MF A01

The preparation of solid phase dielectric materials for filling functional volumes in microwave circuits is discussed. The objective is to produce filling material of known low loss and with a high operating temperature and known temperature coefficient of permittivity. Waxes, polymers, and ceramics are considered. It is concluded that a mixture of one of the polymers with a suitable ceramic is the most likely material. Mixtures of polystyrene and rutile are examined. It is concluded that this combination is the most suitable. Author (ESA)

N86-21753 Plessey Co. Ltd., Havant (England).
THE RTJ1200 VIDEO AMPLIFIER. INVESTIGATION OF LOW NOISE, LOW DISTORTION AMPLIFIERS FOR LOW SOURCE IMPEDANCE
N. Downie Jul. 1983 41 p refs
(Rept-52/83/54) Copyright. Avail: Issuing Activity

Amplifier circuits for a video recorder were studied. Integrated circuit or hybrid modules capable of meeting the noise and harmonic specification are not available. Designs employing discrete transitors and integrated circuits were investigated using specially prepared test equipment. By suitable choice of input transistor and careful circuit design, the required 3dB noise figure can be met. A standard test circuit was employed to prepare a preference list of transistors to aid this choice. The second and third harmonic specifications of < -90dB could not be measured with the test rig. However, figures of < -80dB are observed for these parameters on different amplifiers. The most promising design employs a complementary pair common emitter stage. Author (ESA)

N86-21754 Marconi Space Systems Ltd., Portsmouth (England).
METEOSAT OPERATIONAL PROGRAMME: RADIOMETER IMAGING ELECTRONICS RADIATION ANALYSIS
K. Morgan May 1985 24 p
(MTO-51F00-031) Copyright. Avail: Issuing Activity

The radiation dosage received by any component within the METEOSAT imaging electronics units are calculated. The effect of the radiation dosage is interpreted. Results show that radiation dosage within the radiometer is extremly low. If it is assumed that the background bremstrahlung level is 15 k rad, the visible and IR preamplifier units receive well below the background radiation level dosage. The total dosage is 43 k rad (si). The effect on components is detailed. Author (ESA)

N86-21755*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROGRAMMABLE, AUTOMATED TRANSISTOR TEST SYSTEM
Long V. Truong and Gale R. Sundburg 1986 25 p refs Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13-16 Jan. 1986
(NASA-TP-2554; E-2768; NAS 1.60:2554) Avail: NTIS HC A02/MF A01 CSCL 09A

A programmable, automated transistor test system was built to supply experimental data on new and advanced power semiconductors. The data will be used for analytical models and by engineers in designing space and aircraft electric power systems. A pulsed power technique was used at low duty cycles in a nondestructive test to examine the dynamic switching characteristic curves of power transistors in the 500 to 1000 V, 10 to 100 A range. Data collection, manipulation, storage, and output are operator interactive but are guided and controlled by the system software. Author

N86-21756*# National Aeronautics and Space Administration, Washington, D.C.
SURFACE DISCHARGE THROUGH AN INSULATOR IN A VACUUM
B. Boersch, H. Hamisch, and W. Ehrlich Oct. 1985 26 p refs Transl. into ENGLISH from Zeitschrift fuer Angewandte Physik (West Germany), v. 15, 1963 p 518-524 Presented at the 5th International Electromicroscopy Conference, Philadelphia, Pa., 1962 Transl. by The Corporate Word, Inc., Pittsburgh, Pa. Original doc. prep. by Technische Univ., Berlin, West Germany
(Contract NASw-4006)
(NASA-TM-77936; NAS 1.15:77936) Avail: NTIS HC A03/MF A01 CSCL 09C

A model for the mechanism of stationary discharges over insulators in a vacuum was developed. Upon introduction of this discharge, the insulator charges as a result of secondary emissions, in such a way that electrons coming from the cathode strike with an average secondary electron yield of 1, and so that the secondary electrons return again to the insulator through the electric field near the insulator. When the secondary electrons strike, electrons with an average yield of 1 are released again. The electrons move in short faults toward the anode, which they strike with lesser energy. Author

N86-21757*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPTICALLY CONTROLLED PHASED ARRAY ANTENNA CONCEPTS USING GaAs MONOLITHIC MICROWAVE INTEGRATED CIRCUITS
Richard R. Kunath and Kul B. Bhasin [1986] 9 p refs To be presented at the Optical Control Techniques Applied to Antennas and Propagation Session of the International IEEE AP-S/URSI Symposium, Philadelphia, Pa., 9-13 Jun. 1986
(NASA-TM-87229; E-2887; NAS 1.15:87229) Avail: NTIS HC A02/MF A01 CSCL 09A

The desire for rapid beam reconfigurability and steering has led to the exploration of new techniques. Optical techniques have been suggested as potential candidates for implementing these needs. Candidates generally fall into one of two areas: those using fiber optic Beam Forming Networks (BFNs) and those using optically processed BFNs. Both techniques utilize GaAs Monolithic Microwave Integrated Circuits (MMICs) in the BFN, but the role of the MMIC for providing phase and amplitude variations is largely eliminated by some new optical processing techniques. This paper discusses these two types of optical BFN designs and provides conceptual designs of both systems. Author

N86-21758# Illinois Univ., Urbana. Applied Computation Theory Group.
AREA-TIME LOWER-BOUND TECHNIQUES WITH APPLICATION TO SORTING
Gianfranco Bilardi and Franco P. Preparata 25 Apr. 1985 42 p
(Contract N00014-84-C-0149)
(AD-A161327; ACT-59; UILU-ENG-85-2217) Avail: NTIS HC A03/MF A01 CSCL 09/5

The area-time complexity of VLSI (Very Large Scale Integration) computations is constrained by the flow and the storage of information in the two-dimensional chip. The information exchanged across the boundary of the cells of a square-tessellation of the layout is considered. When the information exchange is due to the functional dependence between variables respectively input and output on opposite sides of a cell boundary, lower bounds

are obtained on the AT squared measure (which subsume bisection bounds as a special case). When information exchange is due to the storage saturation of the tessellation cells, a new type of lower bound is obtained on the AT measure. In the above arguments, information is essentially viewed as a fluid whose flow is uniquely constrained by the available bandwidth. However, in some computations, the flow is kept below capacity by the necessity to transform information before an output is produced. This mechanism is called computational friction and it is shown that it implies lower bounds on the AT/log A measure. Regimes corresponding to each of the three mechanisms described above can appear by varying the problem parameters. GRA

N86-21759# Illinois Univ., Urbana. Applied Computation Theory Group.
A NETWORK FLOW APPROACH TO THE WAFER SCALE INTEGRATION OF VLSI ARRAYS
Bruno Codenotti and Roberto Tamassia Jun. 1985 16 p
(Contract N00014-84-C-0149)
(AD-A161345; ACT-61; UILU-ENG-85-2222) Avail: NTIS HC A02/MF A01 CSCL 09/5

An algorithm is described for reconfiguring a 2-dimensional VLSI array on a silicon wafer that has some faulty cells. The functional cells of the array are interconnected in order to simulate a fault-free array of smaller size, where the interconnection wires are routed inside horizontal and vertical channels, according to the Manhattan model. The concept of simulation distance is introduced, and it is shown to be related to the length of the longest interconnection wire. The algorithm makes use of network flow techniques in order to find wiring with minimum simulation distance. This results in a practical heuristic for minimum simulation distance. This results in a practical heuristic for minimizing the maximum wire length. The complexity and performance of this algorithm are also discussed in the paper. GRA

N86-21760# Illinois Univ., Urbana. Computer Systems Group.
REDUCING MEMORY REFERENCES VIA EFFECTIVE REGISTER USAGE M.S. Thesis
Hoichi Cheong May 1985 99 p
(Contract N00014-79-C-0424)
(AD-A161352; CSG-41; UILU-ENG-85-2216) Avail: NTIS HC A05/MF A01 CSCL 09/2

In order to better utilize the greater possible number of on-chip registers in VLSI-technology processor chips, the memory access behavior of several programs was traced and analyzed. More registers, properly used, lead to a substantial reduction in the off-chip memory accesses required by a program, thereby resulting in a significant performance speedup. This work concentrates on identifying an effective register allocation policy and exploring the relationship between the number of registers used and the consequent reduction in the number of memory accesses. Several different register allocation strategies have been applied to the trace data. It is shown from this analysis that a great number of the memory accesses produced when executing a program can be eliminated by a small increase over the typical number of registers. A simple, but effective, allocation strategy, which achieves this reduction is to allocate registers to data with short average interaccess distance. GRA

N86-21761# Illinois Univ., Urbana. Coordinated Science Lab.
SWITCH-LEVEL TIMING SIMULATION OF MOS VLSI (METAL-OXIDE-SEMICONDUCTOR VERY LARGE-SCALE INTEGRATED) CIRCUITS Final Technical Report, Aug. 1980 - Dec. 1984
Vasant B. Rao Jan. 1985 246 p
(Contract N00014-84-C-0149)
(AD-A161371; R-1032; IU-UILU-ENG-85-2207) Avail: NTIS HC A11/MF A01 CSCL 09/5

The development of a fast and accurate simulation tool for very-large-scale integrated (VLSI) circuits consisting of metal-oxide-semiconductor (MOS) transistors is described. Such tools are called switch-level timing simulators and they provide adequate information on the performance of the circuits with a reasonable expenditure of computation time even for very large circuits. The algorithms presented in this thesis can handle only n-channel MOS (NMOS) circuits, but are easily extendible to handle complementary MOS(CMOS) circuits as well. The algorithms presented report have been implemented in a computer program called MOSTIM. In all the circuits simulated thus far, MOSTIM provides timing information with an accuracy of within 10% of that provided by SPICE2, at approximately two orders of magnitude faster in simulation speed. Author (GRA)

N86-21762# Naval Postgraduate School, Monterey, Calif. Coordinated Science Lab.
A SIMULATION PROGRAM WITH LATENCY EXPLOITATION AND NODE TEARING M.S. Thesis
Tat Kwan E. Yu Feb. 1985 91 p
(Contract N00014-84-C-0149)
(AD-A161379; R-1029; UILU-ENG-85-2204) Avail: NTIS HC A05/MF A01 CSCL 09/5

Circuit simulation has become an indispensable tool in the design of integrated circuits. Standard circuit simulators, such as SPICE (1), can predict accurately the circuit performance. However, the use of these simulators is limited to circuits of several hundred transistors. As the size and complexity of the integrated circuit increase, the memory and cpu time requirements for such an analysis become prohibitive. GRA

N86-21763# Illinois Univ., Urbana. Coordinated Science Lab.
INVESTIGATION OF PLANAR WAVEGUIDES AND COMPONENTS FOR MILLIMETER-WAVE INTEGRATED CIRCUITS
K. J. Webb and R. Mittra Mar. 1985 87 p
(Contract N00014-84-C-0149)
(AD-A161400; R-1034; IU-UILU-ENG-85-2209) Avail: NTIS HC A05/MF A01 CSCL 09/5

Several important elements in millimeter-wave integrated circuit systems are studied. Filter-type structures which are composed of a series of discontinuities are employed frequently in such systems. The study of the general discontinuity problem is thus very important. GRA

N86-21764# University of Southern California, Los Angeles.
ELECTRICALLY EXCITED PHENOMENA IN GAS-PHASE DEVICES Final Report, 5 Jul. 1982 - 4 Jul. 1985
Martin A. Gundersen 18 Oct. 1985 17 p
(Contract DAAG29-82-K-0137)
(AD-A161527; ARO-19238.16-PH) Avail: NTIS HC A02/MF A01 CSCL 09/1

The research program sought to analyze in a very quantitative way the high current glow discharge for hydrogen, and other gases that are of interest for optogalvanic opening switches, thyratons, and for other areas of high power switching, The work developed quantitative models, and this analysis, based on theory and experiment, provides a body of basic knowledge to be used for switch development and other applications. the program addressed properties of the bulk plasma including transport, the electron distribution function, the populations of specific excited states, and device development. This is needed for the development of a new and different generation of gas phase devices, and thus will be especially useful as device concepts are developed that are based on energy transfer processes involving specific quantum states, such as light assisted opening switches and other optogalvanic devices. Further, the development of optical diagnostic methods will provide an important additional benefit to DOD laboratory research. GRA

N86-21765# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
WAFER-SCALE INTEGRATION OF SYSTOLIC ARRAYS
Frank Thomson Leighton and Charles E. Leiserson Oct. 1985 31 p
(Contract N00014-80-C-0622; Grant AF-AFOSR-0326-82)
(AD-A161528) Avail: NTIS HC A03/MF A01 CSCL 09/5

VLSI technologists are fast developing wafer-scale integration. Rather than partitioning a silicon wafer into chips as is usually done, the idea behind wafer-scale integration is to assemble an

entire system (or network of chips) on a single wafer, thus avoiding the costs and performance loss associated with individual packaging of chips. A major problem with assembling a large system of microprocessors on a single wafer, however, is that some of the processors, or cells, on the wafer are likely to be defective. In the paper, we describe practical procedures for integrating wafer-scale systems around such faults. The procedures are designed to minimize the length of the longest wire in the system, thus minimizing the communication time between cells. Although the underlying network problems are NP-complete, we prove that the procedures are reliable by assuming a probabilistic model of cell failure. We also discuss applications of this work to problems in VSLI layout theory, graph theory, fault-tolerant systems and planar geometry. GRA

N86-21766# Army Combat Systems Test Activity (Provisional), Aberdeen Proving Ground, Md.
DEVELOPMENT OF IMPROVED BROADBAND CABLE SYSTEM COMMUNICATIONS Research Study, May 1983 - Aug. 1985
C. L. Francis Aug. 1985 42 p
(AD-A161559; USACSTA-6272) Avail: NTIS HC A03/MF A01 CSCL 17/2

A broadband cable system was installed at U.S. Army Combat Systems Test Activity (USACSTA) in 1980 to allow data communication between test site data acquisition systems. The high-speed modems selected for this function were found to be unreliable and unmaintainable. This project was to investigate alternative equipment which would be suitable for providing high-speed data communications on the USACSTA broadband cable system. The investigation was conducted at USACSTA from May 1983 to August 1985. It is concluded that: (1) The Fairchild Data Corporation M505 provides the flexibility, reliability, and maintainability required for the USACSTA broadband network; (2) The best network topology consists of using a computer at Building 436 to perform network routing and not using a translator; (3) Routine preventive maintenance must be performed on the broadband cable system to maintain its effectiveness; (4) The CATEL DM-2100 provides adequate low-speed performance; (5) Additional cable drops must be provided to meet user needs; (6) An improved software data transfer utility must be created to support the broadband cable system requirements; (7) The addition of an audio-communications capability to the broadband cable system would increase its utility and improve range communications. Author (GRA)

N86-21767# Illinois Univ., Urbana. Applied Computation Theory Group.
THE AREA-TIME COMPLEXITY OF SORTING M.S. Thesis
Gianfranco Bilardi Dec. 1984 192 p
(Contract N00014-84-C-0149)
(AD-A161562; ACT-52; UILU-ENG-84-2218) Avail: NTIS HC A09/MF A01 CSCL 12/1

This thesis studies the minimum area A = alpha sub n,k (T) required by a layout of a VLSI circuit that sorts n k-bit keys in time T. The square tessellation technique is introduced as a powerful tool to establish area-time lower bounds, based on the information exchanges across the boundary of a suitable set of square cells that tessellate the layout region. When the information exchange is due to the fact that variables output on one side of the cell boundary are functions of variables input on the other side, the square tessellation yields bounds on the AT squared measure. When, on the other hand, the information exchange is due to the fact that the cell saturates its storage resources and sends some information outside for temporary storage, the square tessellation yields bounds on the AT measure. Both AT squared and AT lower bounds are obtained for sorting. The former dominate in fast computations, while the latter dominate in slow computations. The analysis indicates that the nature of the problem varies considerably with the relative size of n and k, and suggest a classification of keys into short (k > or = logn), long (k > or = 2logn), and of medium length . Optimal or near-optimal designs of VLSI sorters are proposed for the entire range of n, k, and T, confirming the inherent validity of the lower-bound analysis. GRA

N86-21768# Michigan Univ., Ann Arbor. Solid-State Electronics Lab.
HARMONIC POWER GENERATION OF IMPATT DIODES Final Report, 15 Mar. 1982 - 30 Sep. 1985
C. K. Pao Sep. 1985 316 p
(Contract DAAG29-82-K-0083)
(AD-A161611; TR-174; ARO-18619.2-EL) Avail: NTIS HC A14/MF A01 CSCL 10/2

The harmonic power generation capability of IMPATT diodes is investigated theoretically and experimentally. The existing computer simulation program for IMPATT diodes, employing the drift-diffusion model, is used to investigate four different conventional double-drift IMPATT diodes operated in the active mode and three pin diodes with different lengths operated in the passive mode and three pin diodes with different lengths operated in the passive mode at a fundamental frequency of 23 GHz. For conventional IMPATT diodes, the depletion-layer modulation effect, which strongly depends on the diode doping structure, is essential for harmonic power generation. Because of the moderate dependence of the harmonic current on the terminal RF voltage, the GaAs and Si uniform diodes seem to be promising devices for harmonic power generation. The GaAs uniform diode can achieve the highest third-harmonic efficiency, of the order of 4.1 percent, while the Si uniform diode can achieve the highest third-harmonic power of the order of 1. GRA

N86-21769# Office of Naval Research, London (England).
QUANTUM ELECTRONICS IN THE UK, A NATIONAL-SURVEY CONFERENCE
Paul Roman 30 Oct. 1985 12 p Conference held in Malvern, England, 16-20 Sep. 1985
(AD-A161623; ONRL-C-11-85) Avail: NTIS HC A02/MF A01 CSCL 09/3

This report on the status of quantum electronics in U.K. highlights presentations on lasers, nonlinear optics, and quantum optics. GRA

N86-21770# Illinois Univ., Urbana. Applied Computation Theory Group.
PLANE REPRESENTATIONS OF GRAPHS AND VISIBILITY BETWEEN PARALLEL SEGMENTS
Roberto Tamassia and Ioannis G. Tollis Apr. 1985 29 p
(Contract N00014-84-C-0149)
(AD-A161689; ACT-57; UILU-ENG-85-2215) Avail: NTIS HC A03/MF A01 CSCL 09/5

Several layout compaction strategies for VLSI are based on the concept of visibility between parallel segments, where we say that two parallel segments of a given set are visible if they can be joined by a segment orthogonal to them, which does not intersect any other segment. This paper studies visibility representations of graphs, which are constructed by mapping vertices to horizontal segments, and edges to vertical segments drawn between visible vertex-segments. Clearly, every graph that admits such a representation must be a planar. The authors consider three types of visibility representations, and give complete characterizations of the classes of graphs that admit them. Furthermore, they present linear time algorithms for testing the existence of and constructing visibility representations of planar graphs. GRA

N86-21771# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
A COHERENT VLSI DESIGN ENVIRONMENT Semiannual Technical Report, 1 Apr. - 30 Sep. 1985
Paul Penfield, Jr., Lance A. Glasser, Thomas F. Knight, Jr., Charles E. Leiserson, and Ronald L. Rivest 30 Sep. 1985 59 p
(Contract N00014-80-C-0622)
(AD-A161743) Avail: NTIS HC A04/MF A01 CSCL 09/5

The research discussed here is described in more detail in several published and unpublished reports cited. The CAD frame

Schema has progressed to the point where it is useful for ample chip designs. The interface to CIF is complete, and work has begun on importing layout libraries. An interface to EDIF is being installed. Simulators can now be connected, and thought is going into organization of VLSI libraries. A plan for the distribution of Schema is now being worked out. Previous results on waveform bounding have been generalized to large classes of problems described in canonical control-theory form. Work has begun on models for interconnect taking account of line inductance. This domain is less general than RLC networks, and there is hope that some of the previously derived bounds still apply. During this period a novel device, the UV write-enabled PROM, was reported at a conference. Work continues on developing useful circuits employing this device. GRA

N86-21772# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
INVESTIGATION OF SHEATH PHENOMENA IN ELECTRONEGATIVE GLOW DISCHARGES Final Report, Jul. 1980 - Sep. 1984
Gary L. Duke Apr. 1985 230 p
(AF Proj. 230-1)
(AD-A162416; AFWAL-TR-84-2099) Avail: NTIS HC A11/MF A01 CSCL 20/3

Two different methods of analyzing the cathode fall region of low pressure glow discharges were developed and applied to three different electronegative gas mixtures. One method was based on a self-consistent numerical solution to Poisson's equation, the current continuity equations for electrons and negative ions, and the current conservation equation. This method assumes the electrons are always in equilibrium with the electric field. The other method was based on a self-consistent numerical solution of the Boltzmann transport equation for electrons, Poisson's equation, and the current conservation equation. This method allows the electrons not to be in equilibrium with the field. Comparing these two methods revealed that nonequilibrium prevails throughout the cathode fall region. The electronegative gas mixtures investigated were small concentrations (less that 10%) of hydrogen chloride in helium, argon, or xenon. The electric field, Townsend ionization and attachment coefficients, electron and negative ion current densities, and electron, positive ion, and negative ion number densities are plotted as functions of distance through the cathode fall region. GRA

N86-21773# Georgia Univ., Athens. Dept. of Physics and Astronomy.
TIME AND FREQUENCY DEPENDENT BEHAVIOR OF A TWO DIMENSIONAL ELECTRON GAS AT LONG WAVELENGTHS
M. H. Lee and J. Hong 5 Nov. 1985 35 p
(Contract N00014-84-K-0365)
(AD-A162546; TR-10) Avail: NTIS HC A03/MF A01 CSCL 09/3

Using the recently developed method of recurrence relations, we have studied the time and frequency dependent behavior of the two dimensional electronic system at long wavelengths. Several families of autocorrelation functions including the relaxation and memory functions are obtained exactly. In addition, other linear response quantities e.g., the density-density response function and dynamic structure factor are obtained. This work contains a detailed application of the method of recurrence relations. GRA

N86-21774# Illinois Univ., Urbana. Coordinated Science Lab.
SILICON COMPILATION: A SOLUTION TO THE COMPLEXITY OF VLSI (VERY LARGE-SCALE INTEGRATED) CIRCUIT DESIGN M.S. Thesis. Final Technical Report, Sep. 1984 - Sep. 1985
Perry Gee Sep. 1985 72 p
(Contract N00014-84-C-0149)
(AD-A162564; UILU-ENG-85-2230) Avail: NTIS HC A04/MF A01 CSCL 09/5

Designing very large-scale integrated circuits requires several months or more and increases as the complexity of the design increases. This thesis proposes to reduce the complexity of the design problem and to reduce the design time by using a high-level language to specify only the behavioral aspects of a circuit. The circuit is then synthesized from this specification. GRA

N86-21775# Washington Univ., Seattle. Dept. of Computer Science.
AUTOMATED GENERATION OF MICROCONTROLLERS Interim Technical Report
Barry W. Jinks, David L. Pulfrey, and Warren S. Snyder Dec. 1985 5 p
(Contract MDA903-85-K-0072; ARPA Order 4563)
(AD-A162668; TR-85-12-02) Avail: NTIS HC A02/MF A01 CSCL 17/2

The concept of an algorithmic microcontroller has been investigated. Software has been created which, when supplied with design parametrics, will generate several representation of the desire instance. This paper discusses the methodology followed during generator creation and the architecture and instruction set of the resulting family of controllers. A design environment for the automatic generation of microcontrollers in single chip telecommunications applications has been developed. When the input parameters are supplied, the generator synthesizes the mask geometries for the required microcontroller. By analyzing the instructions used in a particular program, layouts of major components such as the ALU and the barrel shifter are defined. In this manner, a compact layout is produced for each different microcontroller instance. Several microcontrollers with data-paths ranging from 2 to 16 bits have been simulated. The corresponding machine cycle times are predicted to be 180 to 600 nanoseconds. GRA

N86-21776# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
A SOLVABLE MODEL FOR LOCALIZED ADSORPTION IN A COULOMB SYSTEM Interim Technical Report
M. L. Rosinberg, J. L. Lebowitz, and L. Blum 15 Oct. 1985 29 p
(Contract N00014-81-C-0776)
(AD-A162697; TR-18) Avail: NTIS HC A03/MF A01 CSCL 11/1

A model for an interface with localized adsorption is presented, in which the surface has a distribution of sticky adhesive sites in contact with a Coulomb fluid. Contrary to the current literature on the electrical double layer the surface charge is in dynamic equilibrium with the bulk fluid. The sum-rules obeyed by the one-and two-body correlation functions are investigated. Explicit results are obtained for a solvable model, the two dimensional one-component plasma at reduced temperature 2. The effect of the granularity of the adsorbed charge on the adsorption isotherm is discussed. GRA

N86-21777# Harry Diamond Labs., Adelphi, Md.
EMPIRICAL EQUATIONS FOR DRIFT VELOCITIES IN SILICON
Alford L. Ward Oct. 1985 18 p
(DA Proj. 1L2-63749-D-462)
(AD-A162743; HDL-TM-85-9) Avail: NTIS HC A02/MF A01 CSCL 20/12

Hardening against the electromagnetic pulse and high power microwave radiation is discussed. Vital to semiconductor modeling of burnout are the transport properties of semiconductors at high fields and high temperatures. At present, there is no single expression valid for this hot electron regime. The results of this study will be used in the thermal modification of the DIODE2D program, now underway. A recent report of the National Reseach Council, Evaluation of Methodologies for Estimating Vulnerability to Electromagnetic Pulse Effects, recommended that there should be a better understanding of the mechanisms of component failure. The theoretical work included in this report provides physical insight into the damage mechanisms and should lead to nondestructive means of characterizing specific devices. Empirical equations for the drift velocities of electron and holes in silicon are given as a function of electric field, temperature, and doping density. A single equation, which is valid above room temperature, results from the inverse dependence of the saturation velocity upon the square root of the temperature. GRA

N86-21778# Graz Univ. (Austria).
PROJECT: SUBMICRON PHONONICS 1. 1. THE PROBLEMATICS OF PHONON DISTURBANCES IN d.c. SEMICONDUCTOR TRANSPORT Final Report
P. Kocevar Oct. 1985 6 p
(Contract DAJA45-84-M-0394)
(AD-A162785) Avail: NTIS HC A02/MF A01 CSCL 20/12

The main objectives of the present project were: to develop a FORTRAN-code for distribution functions of nonequilibrium phonons to be used on heated displaced maxwellian (HDM) models of nonlinear transport in GaAs-devices, with the purpose to provide semi-quantitative calculations of nonequilibrium phonon effects on the electronic properties of small devices; to determine the magnitude of such effects on the electronic properties of small devices; to determine the magnitude of such effects; and to determine feasibility and value of a major effort to integrate highly accurate phonon-electron effects into a more precise electron-transport code. GRA

N86-21779# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
EFFECTS OF ESTIMATED NOISE COVARIANCE MATRIX IN OPTIMAL SIGNAL DETECTION
C. G. Khatri and C. R. Rao Oct. 1985 26 p
(Contract F49620-85-C-0008)
(AD-A162796; TR-85-38; AFOSR-85-1130TR) Avail: NTIS HC A03/MF A01 CSCL 09/4

There is loss of efficiency when an estimated noise covariance matrix is used in the place of the unknown true noise covariance matrix in the construction of the optimum filter for signal detection. In the case of detecting a single signal specified by a real or a complex vector, we investigate the extent of this loss by obtaining an exact confidence bound for the realized signal to noise ratio. We also give an estimate of this ratio which is useful in optimum selection of features. Some of these results are extended to the case of discrimination between a number of given signals. Author (GRA)

N86-21780# Department of the Army, Washington, D. C.
OPTICALLY TRIGGERED BULK DEVICE GUNN OSCILLATOR Patent Application
Lawrence J. Bovino and Maurice Weiner, inventors (to Army) Filed 28 Oct. 1985 94 p
(AD-D011977; US-Patent-Appl-SN-791672) Avail: NTIS HC A05/MF A01 CSCL 09/5

A high power solid state source of microwave and millimeter wave signals is provided by an optically triggered body of bulk semiconductor material selected from the Group 3 to 5 compounds including GaAs, Cr:GaAs, and Fe:InP and having a relatively long gap length which is in the order of 0.5 to 10.0 mm as well as having a resistivity which is greater than 10 to the 7th power ohm-cm. The device is further dc biased to a field of between 15 kV/cm and 35 kV/cm. Under such conditions, a very low dc current flows without any oscillatory behavior; however, illumination of the semiconductor body with a fast rising optical pulse having a wavelength suitable for carrier generation causes electrons to be lifted to the conduction band which is accompanied by a rapid reduction of the resistivity. At the same time, the electric field across the gap length decreases to a value just above the oscillation threshold whereupon high power RF oscillations are generated whose frequency is a function of the recombination time of the excited carriers. Author (GRA)

N86-21781# Department of the Air Force, Washington, D.C.
ELECTRICAL CONE CONNECTOR Patent Application
Edward A. Strate, inventor (to Air Force) Filed 9 Oct. 1985 20 p
(AD-D011982; US-Patent-Appl-SN-785690) Avail: NTIS HC A02/MF A01 CSCL 09/1

The electrical interface of two sets of wires is accomplished with the use of a conically shaped male plug, a female socket, an indexing key and a self locking center bolt. The male plug terminates a first set of wires in a plurality of contacts on its conically shaped mating surface. The female socket terminates a second set of wires in a concave conical surface which is complementary to the mating surface of male plug. The self locking center bolt is inserted through the female socket into an insert within the male plug, and provides a means for early engagement and locking between the male plug and female socket that prevents contacts from prematurely making and contact. The indexing key is a longitudinal protrusion on the female socket which fits into a complementary slot on the male plug to align the contacts of the first and second set of wires to ensure a proper connection between the two set of wires. GRA

N86-21782# Department of the Air Force, Washington, D.C.
CLAW GRIP CONTACT PROBE FOR FLAT PACKS Patent Application
Joseph W. Shearer, Jr., inventor (to Air Force) Filed 24 Sep. 1985 19 p
(AD-D011997; US-Patent-Appl-SN-779402) Avail: NTIS HC A02/MF A01 CSCL 09/1

A probe device including a unitary body 2 and a sliding plate means 44 for testing and diagnosing multi-lead electrical flat packs. The sliding plate means contains two sets of holes 52 into which are inserted spring-loaded electrical contact probes for making contact with the leads of the electrical flat pack. The unitary body 2 includes comb teeth for orienting the unitary body over the leads of the electrical flat pack, as well as gripping means having hook ends for securely fastening the probe device to the electrical flat pack being tested or diagnosed. The gripping means include an outwardly flared portion against which the sliding plate means exerts inward lateral pressure causing the hook ends to grip underneath the electrical flat pack at each corner thereof to securely clamp it in place. Included in unitary body 2 is at least one threaded hole which is sufficiently large to allow a size 4 to 40 machine screw to pass therethrough. Author (GRA)

N86-21783# Lawrence Livermore National Lab., Calif.
ELECTRICAL CONDUCTIVITY MEASUREMENTS IN SHOCK COMPRESSED LIQUID NITROGEN
D. C. Hamilton, A. C. Mitchell, and W. J. Nellis Jun. 1985 6 p refs Presented at the American Physical Society Topical Conference on Shock Waves in Condensed Matter, Spokane, Wash., 22 Jul. 1985
(Contract W-7405-eng-48)
(DE86-001575; UCRL-93396; CONF-850736-64) Avail: NTIS HC A02/MF A01

The electrical conductivity of shock compressed liquid nitrogen was measured in the pressure range 20 to 50 GPa using a two-stage light-gas gun. The conductivities covered a range 4 x 10(-2) to 1 x 10(2) ohm(-1) cm(-1). The data are discussed in terms of a liquid semiconductor model below the onset of the dissociative phase transition at 30 GPa. DOE

N86-21784# Sandia National Labs., Albuquerque, N. Mex.
CHEMICAL PREPARATION OF HIGH-FIELD ZINC OXIDE VARISTORS
R. G. Dosch and K. M. Kimball Sep. 1985 97 p
(Contract DE-AC04-76DP-00789)
(DE86-001611; SAND-85-0195) Avail: NTIS HC A05/MF A01

Chemical preparation methods were developed for high-field ZnO varistors in which precipitation techniques were used to prepare precursor powders. Varistors were made by sintering uniaxially pressed pellets in the range of 675 to 740 C in air. Varistor properties included electric fields(E) in the 10 to 100 kV/cm range at current densities(J) of 5A/cm(2), nonlinearity coefficients ((ALPHA)) greater than 30 at 2.5 less than or equal to J less than or equal to 5.0 A/cm(2), and densities in the range of 65 to 99% of theoretical depending both on sintering temperature and composition. DOE

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-21785 California Inst. of Tech., Pasadena.
EXPERIMENTAL STUDY OF SHEAR FLOWS AND CONVECTIVE HEAT TRANSFER CHARACTERISTICS OF GRANULAR MATERIALS Ph.D. Thesis
James Scott Patton 1985 180 p
Avail: Univ. Microfilms Order No. DA8522630

Granular material shear flows and convective heat transfer characteristics are presented. The experiments were conducted with two sizes of glass beads. The experiments were conducted with two sizes of glass beads. Information was obtained on the shear stress of polyethylene pellets. Bulk flow properties are used to evaluate wall shear. Development of a method for determining bulk density allowed for more accurate calculation of flow quantities. A derivation of a compressible open channel equation is given for determining the wall shear. Results show that the friction coefficient is not a constant but increases with the Froude Number. The presentation of the wall shear as a function of a wide range of solid fractions is the first experimental work that can be directly compared to analytical and computational investigations. The convective heat transfer properties of flowing granular materials were investigated by examining the flow over a flat heating plate. A derivation for convective heat transfer to flowing granular material is given to predict the heat transfer properties over a wide range of flow conditions. Dissert. Abstr.

N86-21786 California Inst. of Tech., Pasadena.
AN EXPERIMENTAL STUDY OF CONVECTIVE HEAT TRANSFER, FRICTION, AND RHEOLOGY FOR NON-NEWTONIAN FLUIDS: POLYMER SOLUTIONS, SUSPENSIONS OF FIBERS, AND SUSPENSIONS OF PARTICULATES Ph.D. Thesis
Eric Francois Matthys 1985 426 p
Avail: Univ. Microfilms Order No. DA8522628

The convective heat transfer, friction, and rheological properties of various types of nonNewtonian fluid in circular tube flows were investigated. If an apparent Reynolds number is used and if the temperature and degradation effects are properly taken into account, the reduced turbulent friction and heat transfer results, respectively, are then shown to be well correlated by the same expressions for different fluids, regardless of the nature of the fluids and whether they are shear-thinning or shear-thickening. This representation can also separate the reductions in turbulent heat transfer and friction that are induced by viscoelasticity from those induced by pseudoplasticity. Polyacrylamide solutions inducing asymptotic and intermediate drag reduction regimes were investigated over a broad range of Reynolds numbers. A kerosene-based antimisting polymer solution was also studied. Suspensions of bentonite of various concentrations were investigated in laminar and turbulent regimes, and the results for fully developed and entrance flows were well correlated by Newtonian relationships when an adequate wall viscosity concept was used. Dissert. Abstr.

N86-21787 Northwestern Univ., Evanston, Ill.
DYNAMICS AND STABILITY OF FLOWS WITH MOVING CONTACT LINES Ph.D. Thesis
Gerald Wayne Young 1985 317 p
Avail: Univ. Microfilms Order No. DA8523610

The intersection of the interfacial region between two immiscible fluid phases with a solid surface forms a three phase region. Under the continuum hypothesis this three phase region is replaced by a contact line. This property of a contact line along with its other properties is formulated into boundary conditions necessary for the development of well-posed mathematical models governing systems possessing contact lines. Two fluid/fluid/solid systems possessing contact lines are considered. A three-dimensional rivulet flowing down a vertical plane is examined. There exists a basic state with fully developed flow and straight contact lines. In the absence of contact-angle hysteresis the slope of the contact angle versus contact-line speed relationship measures the mobility of these contact lines. The stability characteristics of flat rivulets subject to long wave disturbances are examined using lubrication theory. This research also considers the effects of contact-angle hysteresis on the motion if the contact line formed as a plate is immersed/emerged into and out of a bath of liquid. Wilhelmy plate experiments leading to the measurement of dynamic contact-angle characteristics are based upon such an apparatus. Dissert. Abstr.

N86-21788 California Inst. of Tech., Pasadena.
HEAT RELEASE EFFECTS IN A TURBULENT, REACTING SHEAR LAYER Ph.D. Thesis
James Carl Hermanson 1985 208 p
Avail: Univ. Microfilms Order No. DA8522619

The effects of heat release were studied in a planar, gaseous reacting mixing layer formed between free streams containing hydrogen and fluorine in inert diluents. Sufficiently high concentrations of reactants were employed to produce adiabatic flame temperature rises up to 940 K (1240 K absolute). The Reynolds number at the measuring station, based on velocity difference, 1% temperature thickness and cold kinematic viscosity was approximately 6 x 10 to the 4th power. The temperature field was measured with cold wire resistance thermometers and thermocouples. Flow visualization was accomplished by schlieren spark and motion picture photography. Mean velocity information was extracted from mean pitot probe dynamic pressure measurements. Though the displacement thickness of the layer, for zero streamwise pressure gradient, increased with increasing heat release, the actual growth rate of the layer did not increase, but instead decreased slightly. The mean temperature rise profiles, normalized by the adiabatic flame temperature rise, were not greatly changed in shape by heat release. The change in layer growth rate can be related to change in free stream velocity ratio induced by pressure gradient. Dissert. Abstr.

N86-21789*# National Aeronautics and Space Administration, Washington, D.C.
NUMERICAL SIMULATION OF VORTEX BREAKDOWN
Xungang Shi Nov. 1985 17 p refs Transl. into ENGLISH from Acta Aerodynamica Sinica (Beijing, China), no. 1, 1985 p 22-29 Previously announced in IAA as A85-35785 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. was prep. by Beijing Univ., China
(Contract NASw-4004)
(NASA-TM-77951; NAS 1.15:77951) Avail: NTIS HC A02/MF A01 CSCL 20D

The breakdown of an isolated axisymmetric vortex embedded in an unbounded uniform flow is examined by numerical integration of the complete Navier-Stokes equations for unsteady axisymmetric flow. Results show that if the vortex strength is small, the solution approaches a steady flow and the vortex is stable. If the strength is large enough, the solution remains unsteady and a recirculating zone will appear near the axis, its form and internal structure resembling those of the axisymmetric breakdown bubbles with multi-cells observed by Faler and Leibovich (1978). For appropriate combinations of flow parameters, the flow reveals quasi-periodicity. Parallel calculations with the quasi-cylindrical approximation indicate that so far as predicting of breakdown is concerned, its results coincide quite well with the results mentioned above. Both show that the vortex breakdown has little concern with the Reynolds number or with the critical classification of the upstream flow, at least for the lower range of Reynolds numbers. Author

N86-21790*# National Aeronautics and Space Administration, Washington, D.C.
MEASUREMENT OF HEAT-TRANSFER COEFFICIENTS IN SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTION REGIONS WITH A MULTI-LAYERED THIN FILM HEAT TRANSFER GAUGE

Masanori Hayashi, Akira Sakurai, and Shigeru Aso Jan. 1986 16 p refs Transl. into ENGLISH from Memoirs of the Faculty of Engineering of Kyushu Univ. Technology Reports (Japan), v. 57, Aug. 1984 p 455-462 Original language document was announced in IAA as A85-20997 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3542)
(NASA-TM-77958; NAS 1.15:77958) Avail: NTIS
HC A02/MF A01 CSCL 20D

A thin film heat transfer gauge is applied to the measurement of heat transfer coefficients in the interaction regions of incident shock waves and fully developed turbulent boundary layers. It was developed to measure heat flux with high spatial resolution and fast response for wind tunnels with long flow duration. To measure the heat transfer coefficients in the interaction region in detail, experiments were performed under the conditions of Mach number = 4, total pressure = 1.2 MPa, 0.59 to approximately 0.65. Reynolds number = 1.3 to approximately 1.5 x 10 to the 7th power and incident shock angles from 17.8 to 22.8 degrees. The results show that the heat transfer coefficient changes complicatedly in the interaction region. At the beginning the interaction region, the heat transfer coefficient decreases at first, reaches its minimum value at the point where the pressure begins to increase, and then increases sharply. When the boundary layer begins to separate, even a small separation bubble causes significant changes in the heat transfer coefficient, while the pressure does not show any changes which suggests that the boundary layer begins to separate. Author

N86-21791*# National Aeronautics and Space Administration, Washington, D.C.
HEAT AND MASS TRANSFER IN A DISSOCIATED LAMINAR BOUNDARY LAYER OF AIR WITH CONSIDERATION OF THE FINITE RATE OF CHEMICAL REACTION
A. O. Oyegbesan and J. Algermissen Feb. 1986 14 p refs Transl. into ENGLISH from Teplomassoobmen v Dissotsiirovannom Laminarnom Pogranichnom Sloye Vozdukha s Uchetom Konechnoy Skorosti Khimicheskikh Reaktsiy (USSR), v. 2 p 126-137 Presented at the Heat and Mass Transfer 5th, All-Union Conference, Minsk, Belorussian SSSR (USSR), 17-20 May 1976 Original language document was announced in IAA as A77-43939 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-78001; NAS 1.15:78001) Avail: NTIS
HC A02/MF A01 CSCL 20D

A numerical investigation of heat and mass transfer in a dissociated laminar boundary layer of air on an isothermal flat plate is carried out for different degrees of cooling of the wall. A finite-difference chemical model is used to study elementary reactions involving NO2 and N2O. The analysis is based on equations of continuity, momentum, energy, conservation and state for the two-dimensional viscous flow of a reacting multicomponent mixtures. Attention is given to the effects of both catalyticity and noncatalyticity of the wall. Author

N86-21792*# National Aeronautics and Space Administration, Washington, D.C.
STUDIES OF ACOUSTIC EFFECTS ON A FLOW BOUNDARY LAYER IN AIR
F. Mechel and W. Schilz Feb. 1986 17 p refs Transl. into ENGLISH from Untersuscungen zur Akustischen Beeinflussung der Stroemungsgrenzschicht in Luft (West Germany), Acustica, v. 14, 1964 p 325-331 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Goettingen Univ.
(Contracts NASw-4005; AF61(052)-666)
(NASA-TM-77981; ; NAS 1.15:77981) Avail: NTIS
HC A02/MF A01 CSCL 20D

Effects of sound fields on the flow boundary layer on a flat plate subjected to a parallel flow are studied. The boundary layer is influenced by controlling the stagnation point flow at the front edge of the plate. Depending on the Reynolds number and sound frequency, excitation or suppression of turbulent is observed. Measurements were taken at wind velocities between 10 and 30 m/sec and sound frequencies between 0.2 and 3.0 kHz. Author

N86-21793*# National Aeronautics and Space Administration, Washington, D.C.
DEVELOPMENT OF PERTURBATIONS IN THE BOUNDARY LAYER
A. V. Dovgal, Yu. S. Kachanov, V. V. Kozlov, V. Ya. Levchenko, and V. P. Maksimov Feb. 1986 22 p refs Transl. into ENGLISH from the book "Razvitiye Vozmushcheniy v Pogranchnom Sloye" Novosibirsk, USSR, 1979 p 4-22 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77986; NAS 1.15:77986) Avail: NTIS
HC A02/MF A01 CSCL 20D

The transition of laminar flows into turbulent flows in a boundary layer is discussed. The individual aspects of the transition process, observed under controllable model conditions are examined. The aspect of this problem, namely the development or excitation of the natural oscillations in the boundary layer, the so-called Tollmin-Schlichting waves is covered. Three types of excitation of these waves are considered: (1) distributed generation throughout the boundary layer; (2) generation in the vicinity of the forward edge of a model, having either a sharp edge or an edge with a large radius or curvature, and (3) generation in a developed boundary layer by means of a focused effect. Author

N86-21794*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
EFFECT OF A ROTOR WAKE ON THE LOCAL HEAT TRANSFER ON THE FORWARD HALF OF A CIRCULAR CYLINDER
Kim A. Morehouse and Robert J. Simoneu Mar. 1986 22 p refs Presented at the 8th International Heat Transfer Conference, San Francisco, Calif., 17-22 Aug. 1986
(NASA-TM-87234; E-2751; NAS 1.15:87234) Avail: NTIS
HC A02/MF A01 CSCL 20D

Turbine rotor-stator wake dynamics was simulated by a spoked wheel rotating in annular flow, generating rotor wakes. Spanwise averaged circumferentially local heat transfer in the circular cylindrical leading edge region of a turbine airfoil was obtained. Reynolds numbers ranged from 35,000 to 175,000. Strouhal numbers ranged from 0.63 to 2.50. Wakes were generated by 2 sets of circular cylindrical bars, 1.59 and 3.18 mm in diameter. The rotor could be rotated either clockwise or counterclockwise. Grid turbulence was introduced upstream yielding freestream turbulence of 1.0 to 2.5% at the stator. Data represented an extensive body of local heat transfer coefficients, which can be used to model the leading edge region of a turbine airfoil. In the presence of rotor wakes, an asymmetry from the leeward to windward side was noted. Windward side levels were 30 to 40% higher than the corresponding leeward side. Author

N86-21795*# National Aeronautics and Space Administration, Washington, D.C.
SEMIEMPIRICAL METHODS FOR COMPUTING TURBULENT FLOWS
I. A. Belov and I. P. Ginzburg Jan. 1986 22 p refs Transl. into ENGLISH from Leningradskii Universitet, Vestnik, Matematika, Mekhanika, Astronomiia (USSR), no. 1, Jan. 1975 p 159-170 Original language document was announced in IAA as A75-30714 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77996; NAS 1.15:77996) Avail: NTIS
HC A02/MF A01 CSCL 20D

Two semiempirical theories which provide a basis for determining the turbulent friction and heat exchange near a wall are presented: (1) the Prandtl-Karman theory, and (2) the theory utilizing an equation for the energy of turbulent pulsations. A comparison is made between exact numerical methods and approximate integral methods for computing the turbulent boundary layers in the presence of pressure, blowing, or suction gradients. Using the turbulent flow around a plate as an example, it is shown that, when computing turbulent flows with external turbulence, it is

preferable to construct a turbulence model based on the equation for energy of turbulent pulsations. Author

N86-21796*# National Aeronautics and Space Administration, Washington, D.C.
LAMINAR BOUNDARY LAYER IN CONDITIONS OF NATURAL TRANSITION TO TURBULENT FLOW
N. F. Polyakov Feb. 1986 43 p refs Transl. into ENGLISH of "Laminarnyy Pogranichnyy Sloy v Usloviyakh Yestestvennogo Perekhoda k Turbulentnomu Techeniyu" rept. Institute of Theoretical and Applied Mechanics, Siberian Section, Academy of Sciences (USSR), Novosibirsk, USSR, 1979 p 23-67 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77985; NAS 1.15:77985) Avail: NTIS HC A03/MF A01 CSCL 20D

Results of experimental study of regularities of a natural transition of a laminar boundary layer to a turbulent layer at low subsonic air flow velocities are presented, analyzed and compared with theory and model experiments. Author

N86-21797*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PIEZOVISCOUS EFFECTS IN NONCONFORMAL CONTACTS LUBRICATED HYDRODYNAMICALLY
Yeau-Ren Jeng, Bernard J. Hamrock, and David E. Brewe (Army Aviation Research and Technology Activity-AVSCOM, Lewis Research Center, Cleveland, Ohio) May 1985 36 p refs Presented at the Annual Meeting of the American Society of Lubrication Engineers, Las Vegas, Nev., 5-9 May 1985
(NASA-TM-87141; E-2767; NAS 1.15:87141; USAAVSCOM-TR-86-C-1) Avail: NTIS HC A03/MF A01 CSCL 20D

The analysis is concerned with the piezoviscous-rigid regime of lubrication for the general case of elliptical contacts. In this regime several formulas of the lubricant film thickness have been proposed by Hamrock and Dowson, by Dowson et al., and more recently by Houpert. However, either they do not include the load parameter W, which has a strong effect on film thickness, or they overestimate the film thickness by using the Barus formula for pressure-viscosity characteristics. The Roelands formula was used for the pressure-viscosity relationship. The effects of the dimensionless load, speed, and materials parameters, the radius ratio, and the lubricant entrainment direction were investigated. The dimensionless load parameter was varied over a range of one order of magnitude. The dimensionless speed parameter was varied by 5.6 times the lowest value. Conditions corresponding to the use of solid materials of steel, bronze, and silicon nitride and lubricants of paraffinic and naphthenic mineral oil were considered in obtaining the exponent in the dimensionless materials parameter. The radius ratio was varied from 0.2 to 64 (a configuration approaching a line contact). Forty-one cases were used in obtaining a minimum film thickness formula. Contour plots indicate in detail the pressure developed between the contacting solids. Author

N86-21798*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
RADIATIVE INTERACTIONS IN TRANSIENT ENERGY TRANSFER IN GASEOUS SYSTEMS Progress Report
Surendra N. Tiwari Dec. 1985 103 p refs
(Grant NAG1-423)
(NASA-CR-176644; NAS 1.26:176644) Avail: NTIS HC A06/MF A01 CSCL 20D

Analyses and numerical procedures are presented to investigate the radiative interactions in transient energy transfer processes in gaseous systems. The nongray radiative formulations are based on the wide-band model correlations for molecular absorption. Various relations for the radiative flux are developed; these are useful for different flow conditions and physical problems. Specific plans for obtaining extensive results for different cases are presented. The methods presented in this study can be extended easily to investigate the radiative interactions in realistic flows of hydrogen-air species in the scramjet engine. GRA

N86-21799# Illinois Inst. of Tech., Chicago.
BIFURCATION AND STABILITY OF COMPLEX FLOWS Final Report, 15 Feb. 1982 - 14 Aug. 1985
S. Rosenblat 10 Oct. 1985 8 p
(Contract DAAG29-82-K-0061)
(AD-A161405; ARO-18844.6-MA) Avail: NTIS HC A02/MF A01 CSCL 20/4

The work performed under this Contract was principally concerned with the theoretical investigation of bifurcation and stability phenomena in complex fluid flows. A major part of the effort was devoted to the study of viscoelastic fluids, with special emphasis on the problems concerned with convective instabilities. Both model systems and fluid governing equations were investigated. The dependence of predicted behavior on constitutive relations became very clear. Other convection-type problems considered included coupled thermal loops and convection pattern in the presence of a melting-freezing interface. GRA

N86-21800# Materials Research Labs., Ascot Vale (Australia).
BURGER'S EQUATION AND SHOCK WAVES PROPAGATING WITHIN LIQUID-GAS MIXTURES
E. H. van Leeuwen Aug. 1985 20 p
(AD-A161554; MRL-R-970) Avail: NTIS HC A02/MF A01 CSCL 20/4

In this paper the time evolution of weak shock waves propagating within a fluid-gas mixture is considered. The model uses continuum classical theory to describe the shock waves and allows for the relative motion of the gas bubbles and liquid. It is shown that for a dissipative system the waves are governed by Burger's Equation. This corresponds to the far-field solution for waves of small amplitude and long wavelength. The model also provides a nonlinear description of how the compression wave forms and approaches a steady state. GRA

N86-21801# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LAGRANGIAN BOUNDARY EQUATION AND UNSTEADY SEPARATION OF ELLIPTICAL CYLINDER AT ANGLE OF ATTACK
Yunming Chen 15 Nov. 1985 22 p Transl. into ENGLISH from Shuxue Xuebao (China), v. 6, no. 11, 1983 p 571-578
(AD-A162407; FTD-ID(RS)T-0634-85) Avail: NTIS HC A02/MF A01 CSCL 20/4

In this document the Lagrangian boundary equation is introduced to steady the separation of an abruptly moved elliptical cylinder at the angle of attack. Not only the occurrence of separation singular points but also their forward movement with time were calculated. The computation also revealed that the separation pattern would change from trailing edge separation to leading edge separation. In regard to the methodology of computation, a transformation was introduced to map the non-uniform mesh on the physical plane) to the uniform mesh on an auxiliary plane. Thus, it is only required to tighten the mesh (locally on the physical plane to improve the accuracy without increasing too much computing time. In addition, the advantages of the equal space finite difference, such as simplicity and high accuracy, will remain. Furthermore, a complicated variable boundary problem (separation point moving forward) was treated as a fixed boundary problem which significantly simplifies the process. Author (GRA)

N86-21802# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
A DIFFUSER HEAT TRANSFER AND EROSION CODE Final Report, Oct. 1983 - Jul. 1985
Gale H. Buzzard Oct. 1985 54 p
(AD-A162436; AFRPL-TR-076) Avail: NTIS HC A04/MF A01 CSCL 20/13

A computer code for diffuser heat transfer and erosion analysis (DHTE) has been developed which improves upon the earlier Rocket Engine Diffuser Thermal Analysis Program (REDTAP). Improvements contained within DHTE include provision for a radial temperature gradient within the diffuser wall, an improved model for the particle impingement accommodation coefficient, a model

for particle debris shielding, and a model for wall erosion by particle impact. DHTE differs from an earlier diffuser heat transfer code (DHT) to the extent that it incorporates a simple erosion model and utilizes a more recent diffuser version of the JANNAF Standardized Plume Flow Field Model (SCP2ND). The 77-inch diffuser was instrumented to record the water side wall temperature and water jacket temperature at selected sites along the initial seven feet of the diffuser during routine test firings. Data is presented that supports the predictions of DHTE but is inadequate to validate the code. GRA

N86-21803# Defence Research Establishment Suffield, Ralston (Alberta).
THE INFLUENCE OF INITIAL AND BOUNDARY CONDITIONS ON GASEOUS DETONATION WAVES Ph.D. Thesis
Stephen B. Murray Sep. 1985 315 p
(AD-A162631; DRES-SR-411) Avail: NTIS HC A14/MF A01 CSCL 19/4

Results of five experimental investigations on the initiation, propagation and transmission of detonation have shown that the wave behavior depends on the relative rates of gasdynamic expansion and chemical energy release occurring within the cellular detonation front. The former rate is controlled by the boundary conditions defined by the physical system, while the latter rate depends on the chemical and physical properties of the combustible mixture. The fractional increase zeta in the area of th post-shock stream tube, evaluated over a chemical kinetic distance equal to the cell length, has been identified as a parameter which satisfactorily characterizes the competition between these two rate processes. For zeta less than about 20%, the chemical processes survive the gasdynamic expansion and self-sustained propagation is possible. However, under these supercritical conditions, the wave propagates with a velocity deficit which appears to be a universal and theoretically predictable function of zeta. For zeta greater than 20%, the shock/reaction zone coupling breaks down, resulting in failure of the wave. The critical conditions for the propagation of detonation waves subjected to a wide range of expansion inducing mechanisms, including viscous boundary layers, compressible boundary gases and yielding walls, are all found to be consistent with the 20% criterion. However, the criterion becomes inapplicable as the cell size approaches the characteristic transverse dimension of the geometry. GRA

N86-21804# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering.
VISCOUS FLUID MOTION IN A SPINNING AND NUTATING CYLINDER Contractor Report, Aug. 1983 - Apr. 1985
Thorwald Herbert Nov. 1985 124 p Document previously announced as N86-14954
(Contract DAAK11-83-K-0011)
(AD-A162686; CRDC-CR-86004) Avail: NTIS HC A06/MF A01 CSCL 20/11

Spin-stabilized projectiles with liquid payloads can experience a severe flight instability characterized by a rapid yaw-angle growth and a simultaneous loss in spin rate. Laboratory experiments and field tests have shown that this instability originates from the internal fluid motion in the range of high viscosity. After evaluation of the experimental data and analysis of the equations for the fluid motion in a spinning and nutating cylinder, we have developed a simple model of this flow. Disregarding the finite length of the cylinder, this model provides the flow field and the viscous contribution to the liquid moments in analytical form. At low Reynolds number, the flow field agrees well with computational results for the center section of a cylinder of aspect ratio 4.3. The roll moment caused by this flow largely agrees with experimental data for a wide range of reynolds numbers. Estimates of the temperature variation indicate that discrepancies at very low Reynolds numbers may originate from associated changes of the viscosity during the experiments. The flow in an infinitely long cylinder has been utilized as a basic flow subject to axially periodic cellular disturbances. Both, the inviscid and the viscous situations have been studied. Parametric excitation of the cellular motions has been found at low Reynolds numbers. A small experiment has been designed to visualize this cellular motion in a finite-length cylinder. Author (GRA)

N86-21805# Department of the Air Force, Washington, D.C.
COMPUTER CONTROLLER OPTICAL SURFACING (CCOS) LAP PRESSURE CONTROL SYSTEM Patent Application
Greenleaf, inventor (to Air Force) Filed 18 Sep. 1985 15 p
(AD-D011985; US-Patent-Appl-SN-777141) Avail: NTIS HC A02/MF A01 CSCL 20/4

A rotary lapping system and process is disclosed for producing a controlled pressure gradient, including positive and negative lift, when lapping a workpiece coated with an abrasive slurry liquid with a plurality of grinding pads mounted beneath a rotating lap substrate. To obtain positive and negative lift, the grinding pads are tilted with respectively a positive and negative angle of attack, which hydrodynamically reacts with the abrasive slurry liquid to produce the desired lift. The controlled pressure gradient is further varied by decentering the rotation of lap substrate. GRA

N86-21806# Los Alamos National Lab., N. Mex.
TRANSIENT HEAT PIPE INVESTIGATIONS FOR SPACE POWER SYSTEMS
M. A. Merrigan, E. S. Keddy, and J. T. Sena 1985 19 p ref Presented at the 2nd SP-100 Program Integration Meeting, Denver, Colo., 17 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000813; LA-UR-85-3341; CONF-8509153-4) Avail: NTIS HC A02/MF A01

A 4-meter long, high temperature, high power, molybdenum-lithium heat pipe has been fabricated and tested in transient and steady state operation at temperatures to 1500 K. Maximum power throughput during the tests was approximately 37 kW/cm(2) for the 1.4 cm diameter vapor space of the annular wick heat pipe. The evaporator flux density for the tests was 150.0 W/cm(2) over a length of 40 cm. Condenser length was approximately 3.0 m with radiant heat rejection from the condenser to a coaxial, water cooled radiation calorimeter. A variable radiation shield, controllable from the outside of the vacuum enclosure, was used to vary the load on the heat pipe during the tests. DOE

N86-21807# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
FLUID SLOSH STUDIES FOR SPINNING SPACECRAFT Final Report
J. P. Guibert, F. Jouhaud, and J. C. Garnier Paris ESA 26 Mar. 1985 114 p refs Original contains color illustrations
(Contract ESTEC-5327/83-NL-BI(SC))
(ONERA-RT-8/3269-SY; ESA-CR(P)-2101) Avail: NTIS HC A06/MF A01

An approximate method for calculation of sloshing modes in a spinning container is outlined. An eigenvalue problem for the essential modes is obtained by assuming that liquid velocity can be represented as a combination of known admissible flows, either irrotational or rotational with uniform vorticity. A test facility for fluid slosh investigation is presented. Model tanks are subjected to a forced precession motion by two driven tables, and slosh moment exerted by liquid is measured by quartz load washers. This moment allows spacecraft divergence rate to be estimated. Test results for cylindrical tanks with hemispherical ends clearly show liquid resonances and prove very encouraging. Author (ESA)

N86-21808# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.
THE DYNAMICS OF HEAT TRANSFER IN A TURBULENT PIPE FLOW, PART 2
Heinz Schmidl Jul. 1985 55 p refs In GERMAN; ENGLISH summary
(OEFZS-4325-Pt-2; RS-254/85-Pt-2) Avail: NTIS HC A04/MF A01

The general differential equation resulting from the energy equation for temperature distribution in a turbulent pipe flow is solved. The solution is split into several systems, leading to a general solution of heat transfer. The power series coefficient (Cv)

functions are determined. The general differential equation is solved for n = 1 and 2. Calculations are made for Ln and Mn (power series coefficients) for n > 2. The multiplication of two and three polynomials is discussed as well as the complete determination of the first and second system of the solution. Author (ESA)

N86-21809# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
THE EVOLUTION OF A WAVE TRAIN IN A THREE-DIMENSIONAL BOUNDARY LAYER
Jan Nordstroem 1 Oct. 1985 45 p refs
(Contract STU-84-4563)
(FFA-TN-1985-54) Avail: NTIS HC A03/MF A01

A computer code (VAX-11 FORTRAN) to determine the stability characteristics of a three-dimensional incompressible boundary layer was developed. A single wave component is followed downstream and all its important stability characteristics, such as frequency, wave number, and group velocity are calculated. In the code the laminar boundary layer is calculated for an infinite swept wing, and the velocity profiles for that flow case are used as input to the stability calculation. In the stability calculation the conventional shooting method is used with a nearly globally convergent search procedure. The source code is listed.
Author (ESA)

N86-21810# Oxford Univ. (England). Dept. of Engineering Science.
THE DEVELOPMENT OF A HEAT TRANSFER MEASUREMENT TECHNIQUE FOR APPLICATION TO ROTATING TURBINE BLADES
J. E. Doorly Mar. 1985 181 p refs
(OUEL-1584/85) Avail: NTIS HC A09/MF A01

A technique which allows heat transfer rate measurements on fully rotating test facilities using multilayered model turbine blades comprising an electrical insulator on a metal base is described. An accurate and computationally efficient method for determining the surface heat flux to a multilayered model turbine blade is developed theoretically, together with a method for calibrating the thermal properties of the multilayered system. This method allows the heat flux measurement technique, which utilizes electronic analog circuitry with thin film surface thermometers on a model made from a thermal insulator, to be extended for application to multilayered models. The production of test models by applying a vitreous enamel (as an electrical insulator) to a mild steel, is identified as the most suitable coating technique for experimental application. Radiant and wind tunnel testing for multilayered cylindrical models confirm that the method is practical and accurate. Author (ESA)

N86-21811# Oxford Univ. (England). Dept. of Engineering Science.
EXPERIMENTAL STUDIES ON CAVITATION INCEPTION IN A SUBMERGED JET
R. E. Franklin and J. Rozewicz 1985 42 p refs
(Contract MOD-ER/1/9/4/2057/093-ARE-T)
(OUEL-1586/85) Avail: NTIS HC A03/MF A01

The characteristics, intensity, and spectral distribution of the noise generated at cavitation inception and their variations with the diameter of the jet orifice were studied. In the noncavitating range the rms pressure changes proportionally to root sigma. The inception range is characterized by a sharp increase of rms pressure with reduction in cavitation number. Comparison of statistically counted crossings of the pressure fluctuation signal through zero level, to those expected for a random signal with normal distribution, indicates that in the inception range the pressure fluctuation impulses do not obey the characteristics of random impulses with normal distribution. Investigation of the power spectral density (PSD) functions shows that when PSD curves are presented in log-log scale, they are enclosed by two envelopes. The lower one is a theoretical noncavitating, no-air spectra line. For the noncavitating range the spectrum is the same at lower frequencies as the theoretically predicted one, but increases slightly at higher frequencies. Author (ESA)

N86-21812# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Trans-Ueberschall-Entwurfsverfahren.
A DIRECT METHOD TO CALCULATE DISTURBANCE FIELDS OF MOVING BODIES AT SUBSONIC SPEEDS IN COMPRESSIBLE MEDIA Ph.D. Thesis - Technische Univ., Brunswick, West Germany
Hans-Heinrich Kohlmeier Apr. 1985 100 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-977)
(DFVLR-FB-85-52; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 30

A panel method for the analysis of three-dimensional steady compressible subsonic flow was developed. It is based on a first order panel method, into which Mach-number dependent aerodynamic influence coefficients are incorporated. The procedure using linearized theory takes into account the real magnitudes of potentials and velocities that are induced by disturbance sources at a point in space and which in compressible flow differ from that in incompressible flow. In this way it is possible to apply the exact boundary condition directly at the original body surface. Comparisons of solutions obtained by this method with measurements and with the results from methods solving full potential equation show good agreement for subcritical Mach numbers.
Author (ESA)

N86-22259# Joint Publications Research Service, Arlington, Va.
NUMERICAL SOLUTION OF PROBLEM ON DECAY OF HIGH-TEMPERATURE REGION OF RADIATING GAS WITH VARIOUS INITIAL INTERNAL ENERGY DISTRIBUTIONS Abstract Only
V. P. Korobeynikov, B. V. Putyatin, and A. K. Sharipov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 6 Transl. into ENGLISH from Doklady Akademii Nauk Tadzhikskoy SSR (Dushanbe, USSR), v. 27, no. 11, Nov. 1984 p 633-636 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22260# Joint Publications Research Service, Arlington, Va.
SHOCKWAVE PROPAGATION IN LOW-TEMPERATURE CARBON PLASMA Abstract Only
A. M. Galkin, N. N. Sysoev, and F. V. Shugaev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 7 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta Seriya 3: Fizika Astronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1985 p 77-80 Original language document was announced in IAA as A85-37374 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-21813 National Physical Lab., Teddington (England). Div. of Materials Applications.
RELATIVE INTENSITY-ENERGY CALIBRATION OF X-RAY PHOTOELECTRON SPECTROMETERS: INSTRUCTIONS FOR THE USE OF REFERENCE MATERIALS SCAA83
M. P. Seah and M. T. Anthony Jan. 1985 20 p refs
(NPL-DMA(A)-97; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Two methods involving the use of the reference samples SCAA83 to relate the intensity-energy response functions from one X-ray photoelectron spectrometer used for quantitative surface analysis to another with an accuracy better than 5% were

established. The instructions given were used for the original interlaboratory comparison to test the reference procedure and to determine the transmission functions of a limited set of instruments. Details for the handling of the reference samples, the operation of the spectrometer, and the reporting of results are enclosed. Author (ESA)

N86-21814 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
THE MEASURING ASSEMBLY FOR A PRIMARY STANDARD ABSORBED DOSE CALORIMETER
Alan R. DuSautoy Oct. 1985 38 p refs
(NPL-RS(EXT)-74; ISSN-0143-7135) Copyright. Avail: Issuing Activity

A measuring assembly with which a calorimeter forms a stable and accurate means to measure local absorbed dose in high energy photon or electron beams is described. The assembly contains ac bridges with phase sensitive detectors which provide good noise rejection and high sensitivity for the measurement of very small temperature changes sensed by thermistors in the calorimeter. The system functions automatically under microcomputer control providing data collection and processing as well as the means for calibration by electrical heating. The circuits and operation of the calorimeter in various modes are described. Author (ESA)

N86-21815*# National Aeronautics and Space Administration, Washington, D.C.
INFRARED DIAGNOSIS USING LIQUID CRYSTAL DETECTORS
M. Hugenschmidt and K. Vollrath Feb. 1986 19 p refs Transl. into ENGLISH of "Infrarotdiagnostik mit Hilfe von Fluessigkristalldetektorn" rept. no. BMVG-FBWT-73-16 West German Ministry of Defense and the Institute Franco-Allemand de Recherches, St. Louis, France and Weil, West Germany, 1972 p 1-21 Original language document was announced as N73-32564 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77999; NAS 1.15:77999; BMVG-FBWT-73-16) Avail: NTIS HC A02/MF A01 CSCL 14B

The possible uses of pulsed carbon dioxide lasers for analysis of plasmas and flows need appropriate infrared image converters. Emphasis was placed on liquid crystal detectors and their operational modes. Performance characterstics and selection criteria, such as high sensitivity, short reaction time, and high spatial resolution are discussed. Author

N86-21816*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
RESPONSE TIME FOR MULTILAYERED PLATINUM RESISTANCE THERMOMETERS Final Report, 4 Dec. 1984 - 30 Mar. 1985
D. K. Pandey and R. L. Ash Jul. 1985 34 p refs
(Contract NAS1-17099)
(NASA-CR-176655; NAS 1.26:176655) Avail: NTIS HC A03/MF A01 CSCL 14B

Response time constants for several multilayered temperature transducers were determined numerically by using Martin Marietta's MITAS software package which is available at NASA Langley Research Center. Present results were found in close agreement with the solutions reported in the literature, thus, the capability of MITAS was justified. On the basis of experiences gained, the MITAS is recommended for use in predicting the response time constants of sensors by an in-situ technique. Author

N86-21817*# United Technologies Research Center, East Hartford, Conn.
DEMONSTRATION TEST OF BURNER LINER STRAIN MEASURING SYSTEM Final Report
Karl A. Stetson Jun. 1984 96 p refs
(Contract NAS3-23690)
(NASA-CR-174743; NAS 1.26:174743; R84-926376-15) Avail: NTIS HC A05/MF A01 CSCL 14B

A demonstration test was conducted for two systems of static strain measurement that had been shown to have potential for application jet engine combustors. A modified JT12D combustor was operated in a jet burner test stand while subjected simultaneously to both systems of instrumentation, i.e., Kanthal A-1 wire strain gages and laser speckle photography. A section of the burner was removed for installation and calibration of the wire gages, and welded back into the burner. The burner test rig was modified to provide a viewing port for the laser speckle photography such that the instrumented section could be observed during operation. Six out of ten wire gages survived testing and showed excellent repeatability. The extensive precalibration procedures were shown to be effective in compensating for the large apparent strains associated with these gages. Although all portions of the speckle photography system operated satisfactorily, a problem was encountered in the form of optical inhomogeneities in the hot, high-pressure gas flowing by the combustor case which generate large and random apparent strain distributions. Author

N86-21818# SRI International Corp., Menlo Park, Calif. Computer Science and Technology Div.
INSTALLING A COPY OF THE ARPA/DMA IMAGE UNDERSTANDING TESTBED AT THE US ARMY ENGINEER TOPOGRAPHIC LABORATORIES Final Technical Report, 30 Jul. 1982 - 30 Jun. 1985
Andrew J. Hanson 10 Jun. 1985 10 p Prepared for DARPA, Arlington, Va.
(Contract MDA903-82-C-0385; ARPA Order 7; ARPA Order 3862)
(AD-A158394) Avail: NTIS HC A02/MF A01 CSCL 14/5

The Image Understanding Testbed system of hardware and software was established at the U.S. Army Engineer Topographic Laboratories (ETL) Research Institute. Tasks included preparation of the site for testbed system installation, purchase of required hardware, and arranging for availability of software systems. The ETL site was established as a node on the DDN ARPANET/MILNET network. Final tasks included installation of LISP machine software and associated consultation, as well as other general assistance and trouble shooting. Main beneficial results were the establishment of ETL of a state of the art research facility and the transfer of a large body of research technology. B.G.

N86-21819# California Univ., Santa Barbara. Dept. of Physics.
A TUNNELING MICROSCOPE FOR OPERATION IN AIR OR FLUIDS
B. Drake, R. Sonnenfeld, J. Schneir, P. K. Hansma, and G. Slough Oct. 1985 21 p Prepared in cooperation with Virginia Univ., Charlottesville
(Contract N00014-78-C-0011)
(AD-A161325; TR-19) Avail: NTIS HC A02/MF A01 CSCL 14/2

A tunneling microscope that is a hybrid between IBM Zurich designs and squeezable tunnel junctions has been oriented in air, oil, and liquid nitrogen. Key design goals were: (1) maximum rigidity, and (2) minimum thermal drift. Images of individual atoms in a close packed layer have been obtained under liquid nitrogen. GRA

N86-21820# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A SYNTHESIS OF RESEARCH ON COLOR, TYPOGRAPHY AND GRAPHICS AS THEY RELATE TO READABILITY M.S. Thesis
Melvin E. Lamoreaux Sep. 1985 161 p
(AD-A161340; AFIT/GLM/LSH/85S-40) Avail: NTIS HC A08/MF A01 CSCL 05/10

A foundation for future research on the use of color, typography, and graphics to improve readability is provided. Articles from the broad fields of education and psychology, as well as from the fields of journalism and printing, have been reviewed for research relating color, typography, and graphics to reading ease, speed, or comprehension. The most relevant articles reviewed are presented in an annoated bibliography; the remaining articles are also presented in bibliographic format. This literature review indicates that recognition and recall of printed material may be improved through the use of headings, underlining, color, and, especially, illustrations. Current research suggests that individuals can remember pictures far longer than past research indicates.

However, researchers are divided on the usefulness of illustrations to improve reading comprehension. On the other hand, reading comprehension can be improved through the use of statistical graphs and tables if the reader is properly trained in the use of these devices. GRA

N86-21821# Naval Postgraduate School, Monterey, Calif.
LOW-NOISE PHASE/FREQUENCY DETECTOR M.S. Thesis
John W. McCorkle Sep. 1985 62 p
(AD-A161394) Avail: NTIS HC A04/MF A01 CSCL 09/5

The purpose of the research reported on in this thesis, is to demonstrate the effectiveness of a new circuit technique proposed by the author to eliminate the dead-zone anomaly in a digital phase/frequency detector. In addition to demonstrating the elimination of the dead zone, a new loop filter is described. The filter takes advantage of the new phase detector circuit technique so as to simultaneously provide both low-level reference sidebands and a lock-up time of one cycle of the reference. Phase detectors are used in control systems to measure the phase of one signal relative to the phase of another signal. Control systems of this type are usually referred to as Phase-Locked-Loops (PLL). Development of phase detectors has occurred because of the PLL application. A new phase detector is described in this paper. GRA

N86-21822# Electronics Research Lab., Adelaide (Australia).
DETERMINATION OF THE MODULATION TRANSFER FUNCTION OF LINE SCANNED INFRARED IMAGING SYSTEMS
G. V. Poropat May 1985 37 p
(AD-A161521; ERL-0338-TR) Avail: NTIS HC A03/MF A01 CSCL 14/5

A computer model to determine the Modulation Transfer Function of a line scanned imaging system is discussed. The model can incorporate the effects of the atmospheric path, the system optics and the display as well as the detector's resolution limits. It can be used with single element or SPRITE detectors and its application to a design task is discussed. GRA

N86-21823# Aeronautical Research Labs., Melbourne (Australia).
A CONDITIONAL SAMPLING MODULE FOR THE TSI LASER DOPPLER ANEMOMETER COUNTER PROCESSOR
Warren H. Harch Jul. 1985 20 p
(AD-A161555; ARL/AERO-PROP-TM-428) Avail: NTIS HC A02/MF A01 CSCL 14/2

A module is described that is fully compatible with TSI Laser Doppler Counter Processors and Interfaces and which, when installed, permits conditional sampling of the TSI Laser Doppler Anemometer Output at some predetermined cyclic or externally imposed rate. GRA

N86-21824# Lockheed Missiles and Space Co., Palo Alto, Calif.
SPECTRAL IMAGING WITH A CID CAMERA Final Report, 4 Feb. 1982 - 14 Sep. 1984
Theodore D. Tarbell 22 Mar. 1985 84 p
(Contract F19628-82-C-0030)
(AD-A161608; LMSC/F059543; AFGL-TR-85-0075) Avail: NTIS HC A05/MF A01 CSCL 03/2

The electron velocity distribution is calculated for an idealized model of the high electron mobility transistor using a many-particle Monte Carlo model and a self-consistent two-dimensional Poisson solver. Hot electron effects, nonstationary effects, and real space transfers are analyzed. The results show that significant velocity overshoot 2.8 X 10 to the power 7th cm/s at 300 K and 3.7 X 10 to the 7th power cm/s at 77 K exits under the gate and that the velocity overshoot; is limited by both k-space transfer and real-space transfer. The value of the overshoot is limited by both k-space transfer and real-space transfer. The values of the overshoot velocities are much smaller that those obtained from the more conventional drift-diffusion model. GRA

N86-21825# Panametrics, Inc., Waltham, Mass.
FABRICATE, CALIBRATE AND TEST A DOSIMETER FOR INTEGRATION INTO THE CRRES (COMBINED RELEASE AND RADIATION EFFECTS SATELLITE) Scientific Report, 1 Sep. 1983 - 31 Aug. 1984
Paul R. Morel Mar. 1985 32 p
(Contract F19628-82-C-0090)
(AD-A161695; AFGL-TR-85-0150; SR-2) Avail: NTIS HC A03/MF A01 CSCL 22/2

A space-radiation dosimeter is being fabricated, calibrated, tested, and integrated into the CRRES satellite. This Dosimeter is essentially identical to that previously designed, fabricated, calibrated, tested and integrated into the DMSP F7 satellite. These dosimeters are primarily designed to measure the dose from electrons of greater than 1 MeV to greater than 10 MeV in four channels. Each channel has a different thickness aluminum dome. The solid state detector outputs are processed to provide the dose from electrons (low energy loss), the dose from protons (high energy loss), the flux of electrons, the flux of protons, and the rate of high energy loss nuclear star events. The dosimeter also has a calibration mode in which the alpha particles from a weak source behind each detector are used to check for total detector depletion and proper operation of the electronics. GRA

N86-21826# University Coll. of North Wales, Bangor.
DEVELOPMENT OF SHEAROGRAPHIC IMAGING SYSTEM Periodic Report
D. K. Das-Gupta, K. Doughty, and S. M. Farrington 24 Sep. 1985 12 p
(Contract DAJA45-84-C-0042)
(AD-A161819; R/D-4679-EE-01; Periodic-2) Avail: NTIS HC A02/MF A01 CSCL 14/5

Since the submission of the First Periodic Report no significant progress in these laboratories was made until the delivery of a 50 mW. helium-neon laser from Spectra Physics together with a spatial filtering unit. The present report gives details of the adopted experimental arrangements and also includes photographs of the shearographic fringes obtained for a number of displacements of a stainless steel sample. The basic arrangement for image shearing is shown in schematic form. In our arrangement the 1 degree optical wedge covering half the field was mounted in the filter-holder of a Toyo-View Model 45E Plate camera fitted with a 150 mm. f5.6 compound lens. The test samples employed in the present work were stainless steel discs of 0.15mm. thickness and 80 mm. diameter. One surface of the disc was sprayed matt white using a cellulose-based can of automobile touch-up paint in order to increase the reflectivity of the sample surface. Also drawn on this white surface were two fine intersecting lines, one in the horizontal plane and the other in the vertical plane. The sample was mounted on a block of aluminum which had a central cut-out through a point force could be applied. GRA

N86-21827# Los Alamos National Lab., N. Mex.
CONCEPTUAL DESIGN AND ANALYSIS OF HIGH SPEED ELECTRONIC IMAGING Final Technical Report, Nov. 1982 - Sep. 1984 on Phase 1
Randy Brown and J. R. Parker Oct. 1985 54 p
(Contract MIPR-FY7621-83-90003; AF Proj. 2567)
(AD-A161825; AD-E801223; LA-10072-MS; AFATL-TR-85-65) Avail: NTIS HC A04/MF A01 CSCL 14/2

This study addresses the feasibility of using electronic imaging technology for aeroballistics research. Electronic imaging devices are analyzed with respect to range system characteristics. Optical imaging and illumination parameters in the existing system are defined and quantified. System imaging capability is measured and described by modern imaging systems analysis in terms of the system response to a step function input. Two independent measurements that determine system illumination are described and supporting analysis is included. Concepts critical to data analysis are discussed, along with a survey of available hardware that will image and process projectile flight path data. Recommendations pertinent to the selection of hardware and the overall system organization and maintenance are made. GRA

N86-21828# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN OPTICOACOUSTIC CORRELATION SPECTRAL ANALYZER
S. V. Kulakov, B. P. Razzhivin, S. I. Sokolov, and D. V. Tigin 15 Nov. 1985 6 p Transl. into ENGLISH of Russian Patent no. 337750 (5 May 1972) p 1-2
(AD-A162406; FTD-ID(RS)T-1568-84) Avail: NTIS HC A02/MF A01 CSCL 20/14

The Patent concerns the field of radioengineering and is designed for the analysis of radio signal spectra. An opticoacoustic correlation spectral analyzer is known, containing a mixer, a band filter, a radio pulse generator and an indicator. The aim of the invention is to increase the product of the analysis band to speed up the analysis process. This is achieved by the fact that an opticoacoustic correlator with two ultrasonic light modulators is introduced into the analyzer, in which ultrasonic waves propagate in opposite directions. One of the modulators is connected to the output of the band filter, the other to the output of the radio pulse generator. GRA

N86-21829# Arizona Univ., Tucson. Dept. of Chemistry.
CHARACTERIZATION OF A CHARGE INJECTION DEVICE CAMERA SYSTEM FOR SPECTROCHEMICAL MEASUREMENTS Interim Report
G. R. Sims and M. B. Denton 25 Nov. 1985 46 p
(Contract N00014-83-K-0268)
(AD-A162472; TR-40) Avail: NTIS HC A03/MF A01 CSCL 14/5

An electronic camera system employing a CID-11B Charge Injection Device (CID) detector is described. Unique capabilities of this camera system, including destructive and nondestructive readout modes, signal-to-noise enhancement through multiple nondestructive readouts, and pseudo random pixel addressing are discussed. The performance characteristics related to spectrometric applications are presented. Parameters discussed include sensitivity, linearity, noise, dynamic range, blooming, pixel crosstalk, and spectral response. The CID appears to be uniquely qualified among imaging detectors to fulfill those requirements for an imaging spectroscopic detector presented at the beginning of this manuscript. The sensitivity of the CID-11B has been shown to be very good over a wide spectral range. The effective readout noise can be made to be very low, and the device is not susceptible to readout lag or blooming. In addition, this device has a highly linear response function and, when operated at cryogenic temperatures, exhibits virtually no thermal charge generation. While the CID-11B does suffer from a form of spatial pixel crosstalk, this effect is both understood and easily compensated for. GRA

N86-21830# Department of the Air Force, Washington, D.C.
UNIVERSAL WAVEFRONT SENSOR APPARATUS Patent Application
John T. Watson, inventor (to Air Force) Filed 8 Aug. 1985 19 p
(AD-D011983; US-Patent-Appl-SN-763576) Avail: NTIS HC A02/MF A01 CSCL 20/6

A wavefront sensor apparatus for a large optical system, such as a telescope, having a reticle with at least one slit therein to provide image signatures for various portions of the aperture to an array of infrared sensor cells. The time differences between the image signatures represents relative image displacement caused by the wavefront slope variation in the actual wavefront. GRA

N86-21831# Department of the Air Force, Washington, D.C.
APPARATUS FOR TRANSMITTING DATA FROM HIGH SPEED ROTORS Patent Application
Wayne K. Movick, inventor (to Air Force) Filed 4 Jan. 1985 8 p
(AD-D011991; US-Patent-Appl-SN-688943) Avail: NTIS HC A02/MF A01 CSCL 09/6

This patent application discloses an apparatus for transmitting electric and pneumatic signals from a high speed rotating test item. All of the sensor wires having electric signals from strain and/or temperature sensors are converted to stationary wires by a slip ring assembly. A pneumatic tube is selected for output by a multichannel pressure select valve. This selected pneumatic tube is passed through the slip ring assembly to a stationary transducer that converts the pneumatic signal to an electric signal on a stationary wire. GRA

N86-21832# NLO, Inc., Cincinnati, Ohio.
DETERMINATION OF TRI-n-BUTYL PHOSPHATE (TBP) IN THE TBP-MVARSOL-HNO3 SYSTEM USING PRECISION DENSIMETRY
H. T. Matsuda, B. F. deAraujo, and J. A. deAraujo 1985 12 p Translation of IPEN Publication No. 23, May 1981 Presented at the 21st Brazilian Congress of Chemistry, Porto Alegre, Brazil, 21 Oct. 1980 Prepared in cooperation with Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo, Brazil
(Contract DE-AC05-76OR-01156)
(DE86-001607; NLCO-tr-20; CONF-8010269-8) Avail: NTIS HC A02/MF A01

A simple and rapid method for the direct determination of TBP using precision densimetry is presented, which is designed to determine the solvent concentration in the TBP-Varsol system during the irradiated-uranium treatment process, now being introduced at the Chemical Engineering Center of the Institute for Energy and Nuclear Research. DOE

N86-21833# Sandia National Labs., Albuquerque, N. Mex.
AUTOMATED INSTRUMENT FOR QUALITATIVE ANALYSIS OF PHOTOGRAPHICALLY RECORDED SPECTRA
W. A. Hareland and D. M. Meisaard 1985 12 p Presented at the 28th Conference on Analytical Chemistry, Knoxville, Tenn., 30 Sep. 1985 Prepared in cooperation with J and M Systems, Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-001621; SAND-85-1361C; CONF-850937-1) Avail: NTIS HC A02/MF A01

An advanced technique has been developed for the identification of element spectral lines in photographically recorded emission spectra. It is based on measurement of the relative position of a line on the photoplate and calculation of the wavelength using an equation derived from measured positions of known spectral lines. With this technique, the wavelength of any line can be determined to within 0.04 Angstrom over a 1000 Angstrom region. The elements are identified by comparing the calculated wavelengths with known values in the MIT Wavelength Tables and verified based on the wavelengths of the most intense spectral lines. The automated instrument can be applied to the analysis of photographically recorded spark source mass spectra. Isotopes can be identified based on their mass-to-charge ratios which are calculated from the measured positions of the lines on the photoplate. DOE

N86-21834# Los Alamos National Lab., N. Mex.
CALIBRATION OF A MONOCHROMATOR/SPECTROMETER SYSTEM FOR THE MEASUREMENT OF PHOTOELECTRON ANGULAR DISTRIBUTIONS AND BRANCHING RATIOS
S. H. Southworth, A. C. Parr, J E. Hardis, J. L. Dehmer, and D. M. P. Holland 1985 19 p refs Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985 Prepared in cooperation with National Bureau of Standards, Washington, D.C., Argonne National Lab., Ill., and Daresbury Nuclear Physics Lab., England
(Contract W-7405-eng-36)
(DE86-000789; LA-UR-85-3113; CONF-850734-13) Avail: NTIS HC A02/MF A01

We describe the techniques used in calibrating a monochromator/spectrometer system for gas-phase photoelectron angular distribution and branching ratio measurements. We report a self-consistent set of values for the Ne 2p, Ar 3p, Kr 4p sub 3/2 and 4p sub 1/2, and Xe 5p sub 3/2 and 5p sub 1/2 photoelectron asymmetry parameters and for the Kr 4p sub 3/2:4p sub 1/2 and Xe 5p sub 3/2:5p sub 1/2 branching ratios for the energy regions from threshold to approximately 15 iV. DOE

N86-21835# Brookhaven National Lab., Upton, N. Y.
SAFEGUARDS INSTRUMENTATION: A COMPUTER-BASED CATALOG, SECOND EDITION
C. Auerbach Apr. 1985 189 p

(Contract DE-AC02-76CH-00016)
(DE86-000840; BNL-51450-2nd-Ed) Avail: NTIS HC A09/MF A01

This catalog contains entries on new developments and on items listed in BNL 51450, which have either been carried over unchanged or been updated. More than 70 entries were deleted because of either obsolescence, insufficient interest in terms of safeguards, or lack of documentable development activities in recent years. Some old listings as well as new material was consolidated into more generic entries. As in the earlier document, the emphasis is on devices and instruments that are either in field use at this time or under active development. A few items such as NDA reference materials, instrument vans and certain shipping containers are included because they are important adjuncts to optimum utilization of safeguards instrumentation. This catalog does not include devices for physical protection. As was the case with its predecessor, most of the material in this catalog originated in the US and Canada; a few contributions came from member states of the European Community. DOE

N86-21836# Oak Ridge Gaseous Diffusion Plant, Tenn.
IMPROVED AMPHOTERIC ION EXCHANGER AND ITS MANUFACTURING METHOD
Tadao Kodaka and Hiroshi Onuma 1985 18 p Translation of Japanese Patent 59-105,848 (June 19, 1984)
(Contract DE-AC05-84OT-21400)
(DE86-001608; K-Trans-301) Avail: NTIS HC A02/MF A01

This invention relates to an amphoteric ion exchanger comprising a block copolymer composed of a polymer chain poly A(-) having a cation exchange group, poly B(+) polymer chain having an anion exchange group, and poly C polymer chain not having an ion exchange group, among which the constituent poly chain C is produced by adding hydrogen to a diene-group polymer. A multiphased structure material having both regions of cation and anion exchange groups is expected to provide an unusual characteristic because of its effect of fixed level of amphoteric electric charge. An amphoteric ion exchange is to be manufactured with the use of a three-dimensional block copolymer having a diene-group polymer chain as a constituent block capable of being easily bridgeable without introducing an ion exchange group in addition to the use of polymer chains to which a cation or anion exchange can be introduced. This method requires, at the same time, very careful selections of reaction conditions for sulfonizing the added diene-group polymer, which does not have sufficient chemical strength. The present inventors have found that an amphoteric ion exchange with excellent chemical strength can be manufactured by hydrogenating the polydiene group region of a block copolymer, consisting of three constituents having such a diene-group polymer chain. DOE

N86-21837# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
IMPROVEMENTS AND APPLICATION OF A NEW TYPE OF THREE COMPONENT LASER DOPPLER VELOCIMETER
M. Carbonaro, Enrico DAmato (Aquila Univ., Italy), and Enrico P. Tomasini (Aquila Univ., Italy) Oct. 1984 32 p refs
(VKI-TM-37) Avail: NTIS HC A03/MF A01

A velocimeter to measure the velocity components in a three dimensional flow field was designed and built. The system uses a set of six monochromatic laser beams converging in the same probe volume, and a single photomultiplier receiving optic. A procedure based on a combination of light frequency shifting, filtering, light chopping, and time sampling, was used to separate the Doppler signals corresponding to the various components of velocity. The 45 deg offset forward scattering scheme performs satisfactorily in flow fields with small acceleration such as a jet flow, where in large particles can be used. In larger acceleration flows such as vortex wakes of aircraft and missiles, smaller particles have to be used, and this imposes the adoption of a combined forward scattering scheme. Author (ESA)

N86-21838# Stockholm Univ. (Sweden). Dept. of Meteorology.
A PULSE AMPLIFIER/DISCRIMINATOR (PAD) FOR SINGLE PHOTON COUNTING
Alexander Lennart Sep. 1985 16 p refs Sponsored by Swedish Board for Space Activities
(AP-24; ISSN-0280-4441) Avail: NTIS HC A02/MF A01

The LeCroy MVL 100 pulse amplifier/discriminator (PAD) was evaluated for use in single photon counting. Count rate as a function of photon flux when used with an EMI 9924B photomultiplier; pulse pair resolution time; power requirements; and necessary additional components were assessed. The pulse amplifier is found to be reliable, fast, and small. The circuit diagram and the printed circuit board layout are included. Author (ESA)

N86-21839# National Bureau of Standards, Gaithersburg, Md. Center for Manufacturing Engineering.
SIZING OF POLYSTYRENE SPHERES PRODUCED IN MICROGRAVITY
G. Mulholland, G. Hembree, and A. Hartman Jul. 1985 26 p refs
(PB86-102241; NBSIR-84/2914) Avail: NTIS HC A03/MF A01 CSCL 14B

The standard deviation of the size distribution was determined for a polystyrene latex produced in a space shuttle experiment and in an Earth-bound control experiment. Values determined from direct measurement of transmission electron micrographs, corrected for magnification distortion, were 0.035 micrometer for the space grown material and 0.15 micrometer for the control. The standard deviations obtained from an aerodynamic particle sizer were only slightly greater than those obtained by TEM; 0.042 micrometer and 0.20 micrometer for the shuttle and ground material respectively. However these values were produced in a few hours versus the several weeks it took for the electron microscopy. Both of the techniques used here resulted in measured standard deviations significantly smaller than those previously reported for this material. GRA

N86-21724# Joint Publications Research Service, Arlington, Va.
EARTH SENSOR FOR ARTIFICIAL SATELLITE CONTROL DISCUSSED
Kunio Nakamura and Matsushita Giken *In its* Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 1-12 refs Transl. into ENGLISH from Sensa Gijutsu (Tokyo, Japan), May 1985 p 69-74 (For primary document see N86-21723 12-31)
Avail: NTIS HC A04/MF A01

N86-21936*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NASA EXPERIMENTS ON THE B-720 STRUCTURE AND SEATS
Emilio Alfaro-Bou *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 29-47 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

N86-21948*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPACT DYNAMICS INSTRUMENTATION
Royce F. McCormck *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 289-301 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

N86-22496# Centre National de la Recherche Scientifique, Vernieres-Le Buisson (France).
BOLOMETERS AS SPECTROMETERS FOR X-RAY ASTRONOMY
N. Coron, G. Artzner, G. Dambier, G. Jegoudez, J. Leblanc, J. Y. Deschamps (CEA, Saclay, France), R. Rocchia (CEA, Saclay, France), A. Tarrius (CEA, Saclay, France), O. Testard (CEA, Saclay, France), H. R. Ravn (CERN, Geneva, Switzerland) et al *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 229-231 refs (For primary document see

N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22497# Consiglio Nazionale delle Ricerche, Bologna (Italy). Ist. di Technologie e Studio delle Radiazioni Extraterrestri.
ROOM TEMPERATURE SOLID STATE SPECTROMETER FOR X-RAY ASTRONOMY
G. DiCocco, W. Dusi, C. Labanti, G. F. Spada, G. Ventura, and P. Siffert *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 233-236 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22499# Danish Space Research Inst., Lyngby.
A MULTIWIRE PROPORTIONAL COUNTER FOR LOW ENERGY X-RAY IMAGING
M. M. Madsen, P. Jonasson, P. L. Jensen, H. E. Rasmussen, P. Orup, and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 245-254 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22502# Danish Space Research Inst., Lyngby.
OBJECTIVE CRYSTAL SPECTROMETER (OXS) FOR IMAGING EXTENDED COSMIC X-RAY SOURCES
H. W. Schnopper and B. Byrnak *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 283-286 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22503# Mullard Space Science Lab., Dorking (England).
THE PENNING GAS IMAGER IN A SPACE APPLICATION
Hugo E. Schwarz *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 287-290 refs Sponsored by UK Science and Engineering Research Council (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-21840 Stanford Univ., Calif.
RESEARCH AND DEVELOPMENT OF A HIGH AVERAGE POWER PHOTOPROCESSING LASER SYSTEM Ph.D. Thesis
Kelin Jo Kuhn 1985 236 p
Avail: Univ. Microfilms Order No. Da8522180

In recent years, significant research effort has gone into applying laser physics to electronic device fabrication. Such applications range from generating laser plasmas for lithography X-ray sources to using laser light for rapid doping of device substrates. Unfortunately, no existing laser provides sufficient total peak power to photoprocess a large area at a reasonable (2 to 10 hertz) repetition rate. Development of a 40 joule, 5 hertz, zig-zag slab laser system capable of large area photoprocessing is reported. A new cooling technique which isolates the laser slab in a static gas chamber was used in the laser design. This technique permits precise control of thermal boundary conditions in large slab lasers. Application of this cooling technique to the large laser slabs necessary for photoprocessing resulted in the formulation of new scaling laws for large slab lasers. Large area photoprocessing operation of the laser was demonstrated by rapid (800 angstroms/second) deposition of silicon dioxide on a silicon substrate using a mixture of infrared (1.05 microns) and green (527.5 nanometers) laser light. Dissert. Abstr.

N86-21841*# National Aeronautics and Space Administration, Washington, D.C.
STIMULATED RAMAN SCATTERING OF LIGHT ABSORBING MEDIA EXCITED BY ULTRASHORT LASER PULSES
F. N. Marchevskiy, V. L. Strizhevskiy, and V. P. Feshchenko Oct. 1985 12 p refs Transl. into ENGLISH from Ukrainskiy Fizicheskiy Zhurnal (USSR), v. 24, no. 11, 1979 p 1746-1751 Original language document was announced in IAA as A80-25008 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77903; NAS 1.15:77903) Avail: NTIS HC A02/MF A01 CSCL 20E

The fluctuation-dissipation theory of spontaneous and stimulated vibration Raman scattering is worked out taking into account the dissipation losses at frequencies of laser pump and scattering radiation. General expressions are found, which describe the absolute intensities and shape, energy and duration of scattered pulses in terms of the parameters of the medium and the the input laser pulses. The general regularities are analyzed in detail. Conditions are found for the realization of spontaneous or stimulated Raman scattering and its dependence on absorption, pulse duration and other parameters of the problem. Author

N86-21842# Naval Postgraduate School, Monterey, Calif.
LASER PROPAGATION CODE STUDY
Edward B. Rockower Sep. 1985 26 p
(Contract MIPR-TRASANA-5029)
(AD-A161370; NPS55-85-019) Avail: NTIS HC A03/MF A01 CSCL 20/5

A number of laser propagation codes have been assessed as to their suitability for modeling Army High Energy Laser (HEL) weapons used in an anti-sensor mode. A number of areas in which systems analysis HEL codes are deficient are identified. Most notably, available HEL scaling law codes model the laser aperture as circular, possibly with a fixed (e.g., 10%) obscuration. However, most HELs have rectangular apertures with up to 30% obscuration. A beam-quality/aperture shape scaling relation which can be useful when applying these codes to realistic designs for HELs is presented. GRA

N86-21843# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
BEHAVIOR OF SINGLET OXYGEN IN THE OXYGEN-IODINE TRANSFER LASER
Raymond F. Heidner, III 28 Sep. 1985 38 p
(Contract F04701-83-c-0084)
(AD-A161390; TR-0084(4610)-3; SD-TR-85-65) Avail: NTIS HC A03/MF A01 CSCL 07/5

The kinetic processes that affect the decay of O2Delta 1 in the oxygen-iodine transfer laser (COIL) are discussed. The kinetics of O2 removal in the absence of iodine are now quite well established. A brief review of this topic is presented. When I2 is added to O2, a distinction can be made between the behavior of O2 when I2 and iodine atoms are present and when I2 is fully dissociated into atoms. In the latter case, energy pooling between O2Delta 1 and I is the dominant process unless a strong I quencher (e.g., H2O) is present. In the former case, the O2Delta 1-driven chain reaction mechanism for I2 dissociation is the dominant feature of the kinetics. A detailed description of each of these regimes is critical in understanding the oxygen-iodine laser. GRA

N86-21844# Naval Research Lab., Washington, D. C.
PROCEEDINGS OF THE 38TH ANNUAL GASEOUS ELECTRONICS CONFERENCE: PROGRAM AND ABSTRACTS
18 Oct. 1985 125 p Proc. held at Monterey, Calif., 15-18 Oct. 1985
(AD-A161658) Avail: NTIS HC A06/MF A01 CSCL 09/3

A report on the 38th Annual Gaseous Electronics Conference, held at Monterey, California, 15-18 October 1985, includes articles on the following topics: electron-molecule collisions; excitation, XUV lasers, collision, discharges, photonics, electron-molecule collisions; attachment, high pressure arc lamps, ion-molecule reactions, DC-glows, electron-molecule collisions; total scattering and excitation, plasma chemistry, symposium on ion-molecule reactions, breakdown, Loeb commemorative session, heavy particle collisions, ionization and electron heating; gas lasers, sheaths and distribution functions, R-F discharges, arcs and switching, and invited lectures. GRA

N86-21845# Naval Research Lab., Washington, D. C.
HIGH VOLTAGE K SUB a -BAND GYROTRON EXPERIMENT Memorandum Report, Jan. 1984 - Mar. 1985
S. H. Gold, A. W. Fliflet, W. M. Manheimer, W. M. Black, and V. L. Granatstein 20 Nov. 1985 47 p
(RR0-1109; DNA Proj. X99-QMXV)
(AD-A161686; NRL-MR-5682) Avail: NTIS HC A03/MF A01 CSCL 20/7

A new high voltage, intense beam Ka band gyrotron experiment is underway, using a 350-400 keV, 0.5-1 kA beam from a short-pulse Febetron pulser. High power operation at 35 GHz has been observed, with 20 MW (+ or - 3 dB) produced at about 8.5% efficiency in a whispering-gallery TE62 mode. Operation in other modes, and at other frequencies has also been studied. GRA

N86-21846# Harry Diamond Labs., Adelphi, Md.
HOST MATERIALS FOR TRANSITION-METAL IONS WITH THE ndN ELECTRONIC CONFIGURATION Data Summary
Clyde A. Morrison, Richard P. Leavitt, and Amanda F. Hansen Oct. 1985 19 p
(AD-A161782; HDL-DS-85-1) Avail: NTIS HC A02/MF A01 CSCL 20/5

Data are given on 12 host materials for lasers that use the transition metal ions. Included in each section are the crystallographic data, X-ray data, lattice sum parameters A sub nm, crystal field parameters B sub nm(Dq), and spin-orbit constants (xi). One section contains the phenomenological free ion parameters F (superscript k), (xi) and alpha, which have been obtained by fitting the reported free ion data. There is a bibliography for each host which, dependent on that particular host, is more or less complete. The data contained on each host material as well as on new host materials will be added periodically. GRA

N86-21847# Department of the Air Force, Washington, D.C.
NOVEL METHODS FOR TUNING FREE ELECTRON LASERS TO MULTIPLE WAVELENGTHS Patent Application
William B. Colson, inventor (to Air Force) Filed 14 Aug. 1985 15 p
(AD-D011986; US-Patent-Appl-SN-765483) Avail: NTIS HC A02/MF A01 CSCL 20/5

The tuning of the output of a free electron laser to different wavelengths is accomplished using a tilting resonator. In a free electron laser, relativistic electrons travel through a periodic magnetic field and oscillate to amplify coherent optical radiation within a resonator with the same polarization as the magnet. Usually, the electron beam is parallel with the resonator axis and the fundamental harmonic is ordinarily used in the transverse magnetic field. By tilting the resonator axis with respect to the electron beam and transverse magnetic field, the free electron laser's output is tuned to different wavelengths. By using higher harmonics (f = 3,5,7,...) the free electron laser produces lasing in several wavelengths simultaneously. These several wavelengths are also tuned by the tilting resonator. GRA

N86-21848# Department of the Air Force, Washington, D.C.
REPETITIVELY PULSED Q-SWITCHED CHEMICAL OXYGEN-IODINE LASER Patent Application
Hager, inventor (to Air Force) Filed 7 Oct. 1985 19 p
(AD-D011989; US-Patent-Appl-SN-785186) Avail: NTIS HC A02/MF A01 CSCL 20/5

The present invention overcomes the problems of severe flux induced density gradients in a continuous wave subsonic cavity of a chemical oxygen-iodine laser by operating the laser in a repetitively pulsed mode through the incorporation therein of a scaleable intracavity gas phase Q-switch. This abstract discloses a repetitively cavity containing a lasing medium in the form of a flowing mixture of excited oxygen and iodine atoms and an iodine absorption region within the resonant cavity. The iodine absorption region includes a source of iodine atoms and a magnetic field associated therewith. Selectively altering the magnetic field results in changing the absorption characteristics of the iodine atoms and therefore effectively pulses the output of the laser. GRA

N86-21849# Oregon Graduate Center for Study and Research, Beaverton.
SEMICONDUCTOR LASER SOURCE FOR NATURAL GAS LEAK DETECTION Final Report, 1 Sep. 1984 - 31 Mar. 1985
R. A. Elliott Jun. 1985 39 p refs
(Contract GRI-5084-260-0998)
(PB86-102811; GRI-85/0140) Avail: NTIS HC A03/MF A01 CSCL 14B

The feasibility of using semiconductor lasers as infrared sources for handheld natural gas leak detectors was assessed. The detection system was assumed to be based on the differential absorption (DIAL) technique and to operate at ambient temperatures. The absorption spectra of the major components of natural gas, methane and ethane, were measured in the spectral range from 1.2 to 2.0 micrometers where cryogenic cooling of detectors is not required. Both spectra exhibited absorption features due to overtones of the fundamental C-H stretching modes strong enough to be suitable for DIAL measurements. It is found that lasers made from InGaAs emitting near 1.65 micrometers are suitable for methane detection however, considerable materials development would be needed to develop a laser for ethane detection. GRA

N86-22261# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF EFFICIENCY OF UTILIZING ALPHA-RADIATION TO PRE-IONIZE THE WORKING MIXTURE IN GAS DISCHARGE LASERS AND AMPLIFIERS Abstract Only
N. G. Basov, V. A. Danilychev, V. N. Koterov, S. G. Perlov, T. M. Plyshevskaya, and A. M. Soroka *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 8 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 5, Apr. 1985 p 1106-1110 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22262# Joint Publications Research Service, Arlington, Va.
FUTURE POSSIBILITIES OF FREE-ELECTRON LASER Abstract Only
A. N. Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 9 Transl. into ENGLISH from Priroda (Moscow, USSR), no. 9, Sep. 1984 p 28-36 Original language document was announced in IAA as A85-14873 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22263# Joint Publications Research Service, Arlington, Va.
NEW FINDINGS ON CREATION OF POWERFUL TUNABLE SUBPICOSECOND SOLID-STATE LASERS Abstract Only
V. Vasilyauskas, A. Piskarskas, V. Sirutkaitis, A. Stabinis, and A. Yankauskas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 10 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 3, Mar. 1985 p 493-499 Original language document was announced in IAA as A85-31861 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22264# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ELECTROMAGNETIC WAVE AND WIGGLER FIELDS INHOMOGENEITY ON A FREE-ELECTRON LASER Abstract Only
A. V. Serov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 11 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 516-521 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22265# Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSE DEPENDENT DISCHARGE ON RELAXING GAS FLOW Abstract Only
V. A. Levin, V. V. Netesov, and Yu. V. Tunik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 12

Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 540-545 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22266# Joint Publications Research Service, Arlington, Va.
IGLAN-3 MULTIBEAM CW GAS-DISCHARGE CO2 LASER Abstract Only
G. I. Kozlov and V. A. Kuznetsov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 13 Transl. into ENGLISH from Kvantovaya lektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 553-562 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04/MF A01

N86-22267# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF ELECTROIONIZATION PULSED CARBON DIOXIDE ISOTOPE OUTPUT CHARACTERISTICS Abstract Only
S. V. Bardakovskiy, N. M. Bladimirova, P. V. Sarubin, V. G. Lyakishev, A. A. Kholodilov, V. M. Tsarev, and N. V. Cheburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 14 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 622-624 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22268# Joint Publications Research Service, Arlington, Va.
HYSTERESIS EFFECTS IN Ar+ LASER WITH NONLINEAR ABSORBER IN THE CAVITY Abstract Only
Kh. G. Gafurov and D. P. Krindach *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 15 Transl. into ENGLISH from Kvantovaya Elektronika Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 625-627 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22269# Joint Publications Research Service, Arlington, Va.
LASING OF XeCl, Xe and KrF EXCIMER MOLECULES IN TWO-COMPONENT MIXTURES Abstract Only
N. G. Zubrilin, A. I. Milanich, M. P. Chernomorets, and S. V. Yurchuk *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 16 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 643-644 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22270# Joint Publications Research Service, Arlington, Va.
HIGH-POWER CO2 ELECTRIC DISCHARGE LASER WITH EASILY IONIZED SUBSTANCES ADDED Abstract Only
V. V. Apollonov, Yu. M. Vaskovskiy, M. I. Zhavoronkov, A. M. Prokhorov, R. Ye. Rovinskiy, V. Ye. Rogalin, N. D. Ustinov, K. N. Firsov, I. S. Tsenina, and V. A. Yamshchikov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 5-9 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22271# Joint Publications Research Service, Arlington, Va.
GENERATION OF PICOSECOND PULSES IN MONOPULSE-PUMPED DYE LASERS Abstract Only
K. D. Yeçorov, V. M. Petnikova, S. A. Pleshanov, and V. V. Shuvalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 18 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 41-47 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22272# Joint Publications Research Service, Arlington, Va.
SPATIAL, TEMPORAL AND ENERGY CHARACTERISTICS OF COPPER-VAPOR LASER RADIATION Abstract Only
V. P. Belyayev, V. V. Zubov, A. A. Isayev, N. A. Lyabin, Yu. F. Sobolyev, and A. D. Chursin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 19 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 74-79 Original language document was announced in IAA as A85-26231 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22273# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ANALYSIS OF OPTICALLY AND ELECTRONICALLY PUMPED BROADBAND EXCIMER LASERS Abstract Only
G. Marovski, A. V. Kanayev, L. D. Mikheyev, and D. B. Stavroskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 20 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 180-183 Original language document was announced in IAA as A85-26240 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22274# Joint Publications Research Service, Arlington, Va.
SINGLE-FREQUENCY CW LASING IN INJECTION LASER BASED ON TERRACED HETEROSTRUCTURE WITH EXTERNAL DISPERSION CAVITY Abstract Only
A. P. Bogatov, I. C. Goldobin, P. G. Yeliseyev, O. G. Okhotnikov, G. T. Pak, M. P. Rakhvalskiy, Ye. G. Faynboym, and K. A. Khayretdinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM86-003) 5 Feb. 1986 p 21 Transl. into ENGLISH from KVantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 162-164 Original language document was announced in IAA as A85-26237 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22275# Joint Publications Research Service, Arlington, Va.
WAVELENGTH SWITCHING IN COPPER-VAPOR LASERS Abstract Only
S. A. Zenchenko, V. I. Ivanov, I. A. Malevich, and S. F. Shulekin N its USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 22 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 196-197 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22276# Joint Publications Research Service, Arlington, Va.
H2/F2 CHEMICAL LASER INITIATED BY EXCIMER FLASHLAMP Abstract Only
Ye. V. Gordon, V. I. Matyushenko, V. S. Pavlenko, and V. D. Sizov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 23 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 220-223 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22277# Joint Publications Research Service, Arlington, Va.
YAG:Er3+ CROSS-RELAXATION LASER Thesis - USSR Academy of Sciences, 1984 Abstract Only
Vladimir Andreyevich Lobachev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 24 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-21850* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AUTOMATED WELD TORCH GUIDANCE CONTROL SYSTEM Patent
Hubert E. Smith, William A. Wall, and Morrison R. Burns, Jr., inventors (to NASA) Issued 28 Jan. 1986 9 p Filed 27 Dec.

1984 Continuation-in-part of US-Patent-Appl-SN-460733, filed 25 Jan. 1983, abandonded
(NASA-Case-MFS-25807-2; US-Patent-4,567,348; US-Patent-Appl-SN-685607; US-Patent-Class-219-124.34; US-Patent-Class-318-577; US-Patent-Class-358-101; US-Patent-Class-901-42; US-Patent-Class-901-47) Avail: US Patent and Trademark Office CSCL 13I

A device for automatically controlling the movement of a welding torch while welding an elongated joint is described. A charge injection television camera is carried on a movable support. The camera includes a matrix of individual light sensing video elements which generate voltages responsive to light reflected off of the joint and surrounding areas of the work piece. The voltages produced by the pixels are converted to digital words which are fed to a microprocessor for generating an error signal. This error signal is fed to a digital motor which is used to drive a movable support upon which the television camera is carried.
Official Gazette of the U.S. Patent and Trademark Office

N86-21851 Stanford Univ., Calif.
INFLUENCE OF GROWTH CONDITIONS ON THE STRUCTURE AND PROPERTIES OF COBALT AND COBALT CHROMIUM THIN FILMS Ph.D. Thesis
Joyce Anne Thompson 1985 293 p
Avail: Univ. Microfilms Order No. DA852236

The influences of the sputter deposition and growth conditions on the structure and properties of cobalt and cobalt alloy thin films were investigated with particular emphasis on the magnetic properties of interest for magnetic recording storage media. They were deposited by RF sputtering, and the relationships between growth conditions, film structure, and magnetic properties were investigated. The sputtering parameters having the greatest influence on film properties are the target voltage, substrate bias, and sputter cleaning of the substrates prior to deposition. Thermal effects were shown to be very important in determining film properties. The key influences of various substrates are their effective thermal mass and substrate surface finish. Oxygen stabilizes the hexagonal structure in preference to the cubic structure in pure cobalt, and coercivities increase as oxygen content increases, for cobalt, cobalt-chromium, and also cobalt-titanium. Both cobalt and cobalt-chromium are modeled with a grain structure consisting of a core of more magnetic material surrounded by a periphery of less magnetic material. Dissert. Abstr.

N86-21852 Stanford Univ., Calif.
EXPERIMENTS ON THE END-POINT POSITION CONTROL OF A VERY FLEXIBLE ONE-LINK MANIPULATOR Ph.D. Thesis
Eric Schmitz 1985 239 p
Avail: Univ. Microfilms Order No. DA8522225

An experiment was constructed to demonstrate control strategies for the next generation of fast-moving and lightweight industrial robots as well as for future manipulators for space applications; it consists of a one link, one meter long, very flexible manipulator in which the position of one end (tip) is to be sensed and precisely positioned by torquing a the other end. The arm is moving and bends freely in the horizontal plane but is stiff in torsion and vertical bending. For such a situation, where the sensor used for feedback and the actuator are separated by a flexible structure (non-colocation), the problem of achieving stability is severe. After a description of the dynamic modelling of the arm and of the experimental apparatus, the application of classical and modern control design techniques to the design of a tip position controller is discussed. Dissert. Abstr.

N86-21853 Virginia Polytechnic Inst. and State Univ., Blacksburg.
EXPERIMENTAL-THEORETICAL STUDY OF VELOCITY FEEDBACK DAMPING OF STRUCTURAL VIBRATIONS Ph.D. Thesis
Gary Robert Skidmore 1985 109 p
Avail: Univ. Microfilms Order No. DA8521353

The active damping of structural vibrations through the application of various forms of velocity feedback control is studied. Active damping will be required for large space structures which are performance-sensitive to motion or inaccurate pointing. Several control forms, including modal-space active damping and direct rate feedback are analyzed theoretically, and three laboratory models are described. A previous, unsuccessful attempt at control is reviewed and explained. The remaining control forms developed in the theoretical section were implemented successfully and the results compare favorably with theoretical predictions. Each control form is analyzed relative to its own merits and in comparison with other methods. An important point is the stability assured by a dual (colocated) configuration of velocity sensors and control force actuators. Modal-space active damping is shown to be an effective control method with predictable performance in controlled modes and beneficial spillover into residual (noncontrolled) modes. Dissert. Abstr.

N86-21854 State Univ. of New York, Stony Brook.
CHARACTERIZATION OF PLASMA-SPRAYED FERRITE COATINGS Ph.D. Thesis
Bijay S. Saha 1985 282 p
Avail: Univ. Microfilms Order No. DA8518361

Ferrite coatings based on the system Fe2O3-BaO-CoO were investigated. The microstructural and crystallographic studies of the coatings were carried out, employing scanning electron microscope, transmission electron microscope, and X-ray diffraction. The magnetic properties were examined by ferrimagnetic resonance and d.c. magnetic measurements. The effects of oxygen, both during plasma spraying and upon subsequent heat treatment in oxygen, were investigated. The magnetic domain structure of the coatings and thin films formed by the evaporation of coating and powder materials was examined. Dissert. Abstr.

N86-21855*# National Aeronautics and Space Administration, Washington, D.C.
COMBUSTION ENGINE FOR SOLID AND LIQUID FUELS
W. Pabst Mar. 1986 10 p Transl. into ENGLISH of West German Patent no. P34-40-370.1 (5 Nov. 1984) p 1-8 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77714; NAS 1.15:77714) Avail: NTIS HC A02/MF A01 CSCL 13I

A combustion engine having no piston, a single cylinder, and a dual-action, that is applicable for solid and liquid fuels and propellants, and that functions according to the principle of annealing point ignition is presented. The invention uses environmentally benign amounts of fuel and propellants to produce gas and steam pressure, and to use a simple assembly with the lowest possible consumption and constant readiness for mixing and burning. The advantage over conventional combustion engines lies in lower consumption of high quality igniting fluid in the most cost effective manner. Author

N86-21856*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QUASI-MODAL VIBRATION CONTROL BY MEANS OF ACTIVE CONTROL BEARINGS
Kenzou Nonami and David P. Fleming [1986] 12 p refs To be presented at the International Conference on Rotordynamics, Tokyo, Japan, 14-17 Sep. 1986; sponsored in part by IFTOMM, and the Japan Society of Mechanical Engineers
(NASA-TM-87232; E-2899; NAS 1.15:87232) Avail: NTIS HC A02/MF A01 CSCL 13I

This paper investigates a design method of an active control bearing system with only velocity feedback. The study provides a new quasi-modal control method for a control system design of an active control bearing system in which feedback coefficients are determined on the basis of a modal analysis. Although the number of sensors and actuators is small, this quasi-modal control method produces a control effect close to an ideal modal control. Author

N86-21857*# Shaker Research Corp., Latham, N.Y.
TURBOMACHINERY INCIPIENT FAILURE DYNAMIC DETECTION INDICATORS AND ANALYSIS Final Report, May 1982 -

Nov. 1983
D. R. Faby, R. L. Smith, and J. L. Frarey Aug. 1985 54 p
(Contract NAS8-34683)
(NASA-CR-178739; NAS 1.26:178739; MTI-85TR17) Avail: NTIS HC A04/MF A01 CSCL 13I

Tape recorded signals from case-mounted accelerometers are examined to determine the feasibility of detecting spalls on bearing balls in the liquid oxygen (LOX) pump in the Space Shuttle Main Engine (SSME). The nonperiodic nature of the spall impact on inner and outer bearing races caused traditional techniques to be unsuccessful. A technique involving statistical techniques and spectra ratios was used to review available pump test tapes.
Author

N86-21858*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TOOL AND PROCESS FOR EXPLOSIVE JOINING OF TUBES Patent Application
Laurence J. Bement and James W. Bailey, inventors (to NASA) Filed 23 Oct. 1985 14 p
(NASA-Case-LAR-13309-1; NAS 1.71:LAR-13309-1;
US-Patent-Appl-SN-790597) Avail: NTIS HC A02/MF A01 CSCL 13I

The invention is a tool and process to be used in explosive joining of tubes. The tool consists of an inititator, a tool form and a ribbon explosive. The assembled tool is a compact, storable and safe device suitable for explosive joining of small, lightweight tubes down to 0.20 inch in diameter. The invention is inserted into a tube to be welded which tube has itself been inserted into either another tube or a tube plate. A shim or standoff between the two surfaces to be welded is necessary. Initiation of the explosive inside the tube results in a high velocity, angular collision between the mating surfaces. This collision creates surface melts and collision bonding wherein electron-sharing linkups are formed.
NASA

N86-21859*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SELF-COMPENSATING SOLENOID VALVE Patent Application
Fritz H. Woeller and Yutaka Matsumoto, inventors (to NASA) Filed 7 Nov. 1985 8 p
(NASA-Case-ARC-11620-1; NAS 1.71:ARC-11620-1;
US-Patent-Appl-SN-795945) Avail: NTIS HC A02/MF A01 CSCL 13K

The subject invention relates to a solenoid valve in which both an inlet and an outlet of the valve are sealed when the valve is closed. This double seal compensates for leakage at either the inlet or the outlet by making the other seal more effective in response to the leakage and allows the reversal of the flow direction int he valve by simply switching the inlet and outlet connections. Solenoid valve has a valve chamber within valve body. Inlet and outlet tubes extend through plate into the chamber. Movable core in a chamber extends into solenoid coil. The distal end of the core has a silicone rubber plug. Other than when the solenoid is energized, compressed spring biases the core downward so that the surface of the plug is in sealing engagement with ends of the tubes. Any leak at the ends increases pressure in the chamber, resulting in increased sealing force of the plug against the other end. Flow direction through the valves is easily reversed by changing connections to the tubes.
NASA

N86-21860# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
MACHINABILITY DATA BASES FOR METAL CUTTING Final Technical Report
Walter W. Olson Sep. 1985 31 p
(AD-A161646; AD-E440303; ARLCB-TR-85030) Avail: NTIS HC A03/MF A01 CSCL 13/8

Machinability date bases are discussed with respect to content, form and methods. Machinability data is needed to implement the factory of the future. Therefore, data sources and current formulas are featured in addition to formation of structures.
GRA

N86-21861# North Carolina State Univ., Raleigh.
PERFORMANCE COMBUSTION CHARACTERISTICS AND EXHAUST EMISSION OF A DIRECT INJECTION DIESEL ENGINE USING WATER/OIL EMULSIONS AS FUEL Final Report, 15 Jan. 1983 - 30 Jun. 1985
E. M. Afify 30 Sep. 1985 106 p
(Contract DAAG29-83-K-0015)
(AD-A161652; ARO-19435.3-EG) Avail: NTIS HC A06/MF A01 CSCL 21/7

A CLR single cylinder diesel engine is used to determine the effect of air content in the emulsified fuel on the performance, exhaust emissions and ignition delay of diesel engines. The effects associated with use of the emulsions on performance, ignition delay and exhaust emissions were determined. The results showed that slight improvement in Brake Specific Fuel Consumption (BSFC) was observed when emulsions with low water content were used at high speeds. For high water content emulsions, the BSFC increased. Heating the intake air increased the BSFC at high engine loads and slightly improved it at low engine loads. While the ignition delay was found to increase with the increase of the water percentage in the emulsion, preheating the air charge was effective in reducing it. Although, NO sub x and soot formation were reduced effectively with the increase of water content in the emulsion, preheating the air charge adversely affected NO sub x and soot emissions. While CO and VHC emissions increased with the increase of the water content in the emulsion, increasing the intake air temperature slightly reduced carbon monoxide and unburned hydrocarbons at low loads.
GRA

N86-21862# Purdue Univ., West Lafayette, Ind. School of Industrial Engineering.
THE SCIENCE OF AND ADVANCED TECHNOLOGY FOR COST-EFFECTIVE MANUFACTURE OF HIGH PRECISION ENGINEERING PRODUCTS. VOLUME 1: AUTOMATED DETECTION AND ERROR COMPENSATION OF NC WORKPIECE POSITION Final Report, 1 Jan. - 31 Dec. 1983
David Noller, Moshe M. Barash, and A. L. Sweet Mar. 1985 215 p
(Contract N00014-83-K-0385)
(AD-A161656) Avail: NTIS HC A10/MF A01 CSCL 13/8

The purpose of the research was to develop methods which will: 1) Locate, by means of a touch-trigger probe, planes and cylinders on a workpiece, 2) Using the location, determine the error between the desired and actual location of the workpiece, and 3) Compensate for the errors so that further machining can take place. In the reported work equations which can fit a plane to the probe measurement by minimizing the sum of the squared errors are used to locate the plane. These equations are well known from linear regression theory. The same principle is used to fit a skewed cylinder to a set of measurements. Using a matrix formulation, expressions for the errors between the fitted surfaces and the desired surfaces are given. These errors are used as the input to two compensation methods: one forces the desired tool/workpiece alignment by using the machine to realign the workpiece, while the other alters the NC program so that subsequent machining operations will be correctly specified. Computer programs to fit surfaces, compute the errors, and accomplish the compensations were developed. Computer runs were made using simulated probe data.
GRA

N86-21863# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
CALIBRATION AND USE OF A LIGHT STRIPE RANGE SENSOR MOUNTED ON THE HAND OF A ROBOT Interim Report
Gerald J. Agin Nov. 1985 20 p
(Contract F33615-83-C-1023; DARPA Order 3597)
(AD-A162441; CMU-RI-TR-85-20) Avail: NTIS HC A02/MF A01 CSCL 17/2

A three-dimensional sensing capability can be very useful in automating the robotic handling of industrial parts. This report describes a sensor that uses a Puma robot to carry a cage in which are mounted a light-stripe projector and a lightweight television camera in fixed relationship to each other. Calculation

of the Cartesian coordinates of all points illuminated by the stripe is a straight-forward matter, provided the positions of the manipulator end point, the camera, and the projector are accurately known. Calibration is necessary to determine these positions. Since the robot itself introduces significant systematic errors, we present a procedure for reducing these errors by recalibration of the zero reference points for each joint. The relative positions of the camera and projector with respect to the robot end-point can be inferred by moving the robot to a selected set of positions and analyzing the images obtained. The ultimate accuracy of the system is a function of the conditions under which it is evaluated. Presently we estimate the worst-case accuracy to be + or - 5 mm.
Author (GRA)

N86-21864# Yale Univ., New Haven, Conn. Dept. of Computer Science.
PLANNING BY SEARCH THROUGH SIMULATIONS
David Miller Oct. 1985 141 p
(Contract N00014-85-K-0301)
(AD-A162470; YALEU/CSD/RR-423) Avail: NTIS HC A07/MF A01 CSCL 12/1

This research is directed towards the creation of automatic planning systems capable of directing the actions of robots in solving realistic tasks. Realistic domains often involve constraints on quantitative issues such as time and cost. In order to produce successful plans, interactions and conflicts between plan steps that involve these quantities must be detected and resolved. The central assumption of this work is that the ordering of tasks, and the sequencing of the plan steps created for their solution, are major and necessary parts of the planning process. The order in which a plan's actions are to be carried out can greatly affect the efficiency and outcome of executing the plan. The actual design of the plan can and should be affected by the ordering of its steps. GRA

N86-21865# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
ACCURATE TRAJECTORY CONTROL OF ROBOTIC MANIPULATORS Interim Report
J. C. VanWinssen and C. W. DESilva Apr. 1985 56 p Sponsored in part by Atlantic Richfield Foundation
(AD-A162561; CMU-RI-TR-85-15) Avail: NTIS HC A04/MF A01 CSCL 20/11

This report presents a control scheme for accurate trajectory following with robotic manipulators. The method uses feedforward control using model-based torques for fast operation and gross compensation, and adaptive feedback control for correcting deviations from the desired trajectory under feedforward control. The adaptive controller eliminates trajectory-following errors in the least squares sense. The control scheme takes into account dynamic nonlinearities (e.g., coriolis and centrifugal accelerations and payload changes), geometric nonlinearities (e.g., nonlinear coordinate-transformation matrices) and physical nonlinearities (e.g., nonlinear damping) as well as dynamic coupling in manipulators. Computer simulations are presented to indicate the effectiveness and robustness of the control scheme. When the desired trajectory is completely known before the control scheme is implemented, then off-line computations can be used to generate the adaptive feedback gains and the computational efficiency will not be a major limiting factor with this control scheme. If real-time changes in the desired trajectory have to be accommodated, the computational efficiency has to be improved using recursive relations to compute the adaptive gains. The necessary recursive relations are derived and presented in this report. Author (GRA)

N86-21866# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE SYNTHESIS OF FORCE CLOSURE GRASPS IN THE PLANE
Van-Duc Nguyen Sep. 1985 48 p
(Contracts N00014-80-C-0505; N00014-82-K-0334)
(AD-A162635; AI-M-861) Avail: NTIS HC A03/MF A01 CSCL 13/5

This paper addresses the problem of synthesizing planar grasps that have force closure. A grasp on an object is a force closure grasp if and only if we can exert, through the set of contacts, arbitrary force and moment on this object. Equivalently, any motion of the object is resisted by a contact force, that is the object cannot break contact with the finger tips without some nonzero external work. The force closure constraint is addressed from three different points of view: mathematics, physics, and computational geometry. The last formulation results in fast and simple polynomial time algorithms for directly constructing force closure grasps. We can also find grasps where each finger has an independent region of contact on the set of edges.
Author (GRA)

N86-21867# Lawrence Livermore National Lab., Calif.
IMPROVEMENTS IN THE WELDABILITY OF A SUPERCONDUCTOR SHEATH MATERIAL
L. T. Summers and J. W. Morris, Jr. Aug. 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with California Univ., Lawrence Berkeley Lab.
(Contract W-7405-eng-48)
(DE86-000748; UCRL-92346; CONF-850814-27) Avail: NTIS HC A02/MF A01

The effects of chemistry and heat treatment variation on the 4-K tensile properties of A-286, a candidate sheath material for force-cooled superconductors, are investigated. Currently, full use of A-286 and similar superalloys is limited by the observed low yield and ultimate tensile strengths in the welded and aged condition. The low strength is shown to be associated with the formation of precipitate-free zones as a result of alloying-element segregation during weld pool solidification. It has been determined that minor modifications of the weld-metal chemistry by the addition of Ti reduce precipitate-free-zone formation, resulting in matching weld-metal and base-plate strengths at 4 K. Furthermore, nucleation of the (GAMMA)' hardening phase has been found to be a strong function of temperature and composition. Modified heat-treatment schedules have been determined that are amenable to superconductor fabrication and that result in increased weld hardening and improved 4-K tensile properties. DOE

N86-21868# Los Alamos National Lab., N. Mex.
ROBOTIC SAMPLE PREPARATION FOR RADIOCHEMICAL PLUTONIUM AND AMERICIUM ANALYSES
N. Stalnaker, T. Beugelsdijk, A. Thurston, and J. Quintana 1985 5 p ref Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract W-7405-eng-36)
(DE86-000801; LA-UR-85-3444; CONF-8510151-7) Avail: NTIS HC A02/MF A01

A Zymate robotic system has been assembled and programmed to prepare samples for plutonium and americium analyses by radioactivity counting. The system performs two procedures: a simple dilution procedure and a TTA (xylene) extraction of plutonium. To perform the procedures, the robotic system executes 11 unit operations such as weighing, pipetting, mixing, etc. Approximately 150 programs, which require 64 kilobytes of memory, control the system. The system is now being tested with high-purity plutonium metal and plutonium oxide samples. Our studies indicate that the system can give results that agree within 5% at the 95% confidence level with determinations performed manually. DOE

N86-21869# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
FINITE-ELEMENT ANALYSIS OF ADHESIVELY BONDED JOINTS Interim Report
J. N. Reddy and S. Roy Aug. 1985 55 p refs
(Contract N00014-82-K-0185)
(PB86-100708; VPI-E-85-18) Avail: NTIS HC A04/MF A01 CSCL 13E

The report summarizes the technical work performed on the finite-element analysis of adhesively bonded joints. A review of

the literature (30 ref.) is presented, validation of the program VISTA is described, and the theoretical basis of the program NAP2D (developed during the current project) is outlined, and the effect of boundary conditions and finite element meshes on the stress distribution in adhesively bonded joints is investigated. GRA

N86-21870# AiResearch Mfg. Co., Torrance, Calif.
HIGH-TEMPERATURE CERAMIC RECUPERATOR AND COMBUSTION AIR BURNER PROGRAMS: SEAL DEVELOPMENT Report, Apr. 1981 - Oct. 1983
H. Strumpf, D. M. Kotchick, and M. G. Coombs Aug. 1985 83 p
(Contracts GRI-5083-231-0961; GRI-5080-342-0440; GRI-5080-342-0439)
(PB86-105079; Rept-84-21509; GRI-85/0069) Avail: NTIS HC A05/MF A01 CSCL 13H

This report describes part of a comprehensive research effort performed to support the development of a ceramic recuperator and its companion high-temperature preheated combustion air burner. The system is designed to operate in a variety of industrial flue gas streams with exhaust temperatures up to 2500F. The recuperator design required the development of high temperature compliant tube seals and the development of high-temperature compliant shell seals. Seals utilizing ceramic fiber and/or refractory mortar were successfully developed, resulting in air leak rates were below the design limit of 25 cu in/min for each joint. GRA

N86-21871# Trochoid Power Corp., Eden Prairie, Minn.
VOLUMETRIC TROCHOIDAL GAS COMPRESSOR FOR USE AS A HEAT PUMP Final Report, Jan. 1981 - Mar. 1985
R. M. Hoffmann Mar. 1985 127 p
(Contract GRI-5080-342-0389)
(PB86-102720; GRI-85/0026) Avail: NTIS HC A07/MF A01 CSCL 13A

Topics include: design, development, and manufacture of 300 cfm volumetric compressor based on trochoidal geometry. GRA

N86-21872# Mechanical Technology, Inc., Latham, N. Y.
FREE-PISTON STIRLING ENGINE DEVELOPMENT Annual Report, 1 Dec. 1983 - 31 Dec. 1984
T. J. Marusak and R. A. Ackerman Jul. 1985 113 p
(Contract GRI-5082-242-0721)
(PB86-102746; MIT-85FPSE29; GRI-85/0117) Avail: NTIS HC A06/MF A01 CSCL 13A

The Free Piston Stirling Engine/Heat Pump (FPSE/HP) is a heat-actuated heat pump that is being developed for residential applications. The system features an advanced free piston Stirling engine coupled to a Rankine refrigerant compressor through a unique and highly efficient diaphragm-actuated hydraulic transmission. During the past year the program has concentrated on developing the performance of the individual components, and this report presents the progress made. The engine development is being funded by the Gas Research Institute, with the main technical goal of integrating the most advanced, reliable system components into a prototype FPSE heat pump module for laboratory testing and evaluation. GRA

N86-21873# Battelle Columbus Labs., Ohio.
BURNER TECHNOLOGY BULLETIN: CONTROL OF NOx EMISSIONS FROM RESIDENTIAL GAS APPLIANCES
M. J. Murphy and A. A. Putnam Apr. 1985 55 p
(Contract GRI-5082-241-0772)
(PB86-103892; N-4250-1452; GRI-85/0132) Avail: NTIS HC A04/MF A01 CSCL 13A

The status of technology on NOx control for reference by appliance manufacturers is summarized and is intended as a primer for engineering personnel. Information contained the origin of NO and NO2 emissions, typical NO and NO2 emissions from arious types of gas appliances, effects of combustion variables on NOx emissions, methods of NOx reduction, test methods and instrumentation, and conversion factors for various units of measure for NOx emissions. methods discussed include: burner adjustment, flame inserts, staged combustion secondary air baffling, flue gas recirculation and use of radiant catalytic burners. GRA

N86-21874# IIT Research Inst., Chicago, Ill.
CHARACTERIZATION OF EMISSION RATES FROM INDOOR COMBUSTION SOURCES Final Report, Mar. 1982 - Mar. 1985
D. J. Moschandreas, S. M. Relwani, H. J. ONeill, J. T. Cole, and R. H. Elkins Mar. 1985 224 p Prepared in cooperation with Institute of Gas Technology, Chicago, Ill.
(Contract GRI-5081-251-0575)
(PB86-103900; IITRI-C08675-F; GRI-85/0075) Avail: NTIS HC A10/MF A01 CSCL 13A

Indoor air pollution in residences, offices, public access buildings, and the like may be as important a factor to public health as pollution in the outdoors and in indoor-industrial environments. In addition to others, unvented gas appliances are perceived to be sources of indoor nitric oxide (NO) and nitrogen dioxide (NO2). Chamber experiments were performed to measure emission rates of NO, NO2, and CO for range-top burners, range ovens, pilot lights, gas dryers, gas space heaters, and cigarettes. The values evaluated establish the range of emission rates for these constituents under well-conrolled conditions. Emissions of particulate matter, formaldehyde, polynuclear aromatic hydrocarbons, and volatile organic compounds were also measured and found to be low compared to NOx and CO. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-21875# Industrial Quality, Inc., Gaithersburg, Md.
HIGH SENSITIVITY, ONE-SIDED X-RAY INSPECTION SYSTEM Final Report, 20 Nov. 1984 - 20 May 1985
Harold Berger, Y. T. Cheng, and E. L. Criscuolo Jul. 1985 33 p
(Contract N60921-85-C-0056)
(AD-A162567; IQI-R-85-0710; NSWC-TR-85-292) Avail: NTIS HC A03/MF A01 CSCL 14/2

A backscatter X-ray imaging method for nondestructive testing has been developed. The one-sided inspection technique, a slot camera, is much faster in response than previous backscatter methods. Delaminations in graphite-epoxy composites and other low atomic number materials have been detected. Wall thicknesses up to 7 cm thick have been interrogated. The results show the location (depth) and magnitude (separation width) of simulated delaminations throughout the entire wall. A disbond between two flat surfaces in contact has been detected. Feasibility of the system has been shown with film detectors. A fast response electronic detector is proposed. The objective of this program was to demonstrate the feasibility of an X-ray inspection equipment capable of probing an inspection sample from only one side to detect delaminations, voids, cracks or foreign material through the thickness interrogated. The feasibility of a unique, patented X-ray slot camera that works by scattered radiation was demonstrated using film techniques. The unique capability of this slot camera is that it can obtain images of the internal structure of an object at depths of many centimeters (depending on the object density and the X-ray energy) with a sensitivity that is several orders of magnitude greater than past-developed scattered radiation cameras. GRA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-21876 British Library Lending Div., Boston Spa (England).
ESTIMATION OF THE HIGH TEMPERATURE LOW CYCLE

FATIGUE STRENGTH OF WELDED JOINTS. 1: PROPOSAL OF FUNDAMENTAL ESTIMATION METHODS
I. Nonaka, M. Kitagawa, and A. Otomo 2 Dec. 1985 19 p refs Transl. into ENGLISH from Ishikawa-Harima Engineering Review (Japan), v. 22, pt. 2, 1982 p 103-107 (BLL-Risley-Tr-5236-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Two basic estimation methods for the high temperature, low cycle fatigue strength of welded joints are described. In both of these methods the base metal and the weld metal constituting the joint are treated as two independent factors and the fatigue life of the welded joint is predicted by means of previously obtained basic data for these, i.e., fatigue curves and cyclic stress/strain curves. The first estimation method predicts fatigue life on the basis of the value of the stress imposed; the second, on the basis of the mean strain. Prediction values for these methods were compared with experimental results from low cycle fatigue tests performed on welded joints in heating tubes of SUS 316 steel and 2 1/4 Cr - 1 Mo steel. The effect of post-weld heat treatment on the accuracy of the prediction is also considered.
M.G.

N86-21877 British Library Lending Div., Boston Spa (England).
EVALUTION OF LOW CYCLE FATIGUE STRENGTH OF WELDED JOINTS AT ELEVATED TEMPERATURE: APPLICABILITY OF METHODS OF EVALUATION AND PLASTIC RESTRAINT
Isamu Nonaka, Masaki Kitagawa, and Akira Otomo Nov. 1985 19 p refs Transl. into ENGLISH from Ishikawajima Harima Technology Report (Japan), v. 23, no. 6, Nov. 1983 p 515-520 (BLL-Risley-Tr-5237-(9091.9F); Rept-2) Avail: British Library Lending Div., Boston Spa, Engl.

The applicability of a method to predict fundamental fatigue strengths proposed in an earlier report is discussed. The effect of plastic restraint due to the difference in the cyclic deformation resistances of the parent material and the weld metal on the accuracy of predicted fatigue life expectancies is determined. An FEM analysis was carried out in order to evaluate the plastic restraint quantitatively; fatigue life expectancy predictions were also made on the basis of the FEM analysis. In this case 304 stainless steel welded joints and 2 1/4Cr-1Mo steel welded joints which had different plastic restraints were used for the test materials and the proportion of weld metal in the gauge length was varied.
M.G.

N86-21878 Wyoming Univ., Laramie.
MODIFIED FINITE STRIP METHOD WITH SPLINE FUNCTIONS Ph.D. Thesis
Jui-Lin Chen 1985 126 p
Avail: Univ. Microfilms Order No. DA8517853

An alternative method of finite strip is developed for the analysis of irregular elastic thin plates. The conventional method of finite strip is a powerful method for problems defined in rectangular regions. This modified finite strip method is developed for deflection, bending, vibration and stability analysis of irregular plates using spline functions in the y-direction instead of trigonometric series. Using the finite strip method with spline functions, nonrectangular, irregularly-shaped two dimensional problems can be investigated. An algorithm for large eigenvalue problems is also written to solve the natural frequencies and buckling factors by computer programming. Numerical examples showed that the new method is superior to the finite element method in computational labor. Confirmatory runs were made against the classical method for square plates. Displacement, moment, vibration and buckling of nonrectangular plates, including trapezoidal and polygonal plates, were investigated using this alternative method of finite strip.
Dissert. Abstr.

N86-21879 Dayton Univ., Ohio.
SHOCK FRACTURE AND RECOMPACTION OF CERAMICS Ph.D. Thesis
Dan Yaziv 1985 174 p
Avail: Univ. Microfilms Order No. DA8523960

A comprehensive model for shock fracture of ceramics was developed. Plate impact experiments were conducted. The dynamic target response was measured. Three commercial ceramics were employed, alumina Al-300, alumina AD-85 and to a lesser extent, beryllia Ceralloy 418. A double impact technique for studying the properties of shock-damaged materials was developed. The first impact causes pall in the target while the second impact recompacts the target. Analysis of the transmitted waves gives the properties of the damaged region. A self trap recovery technique was developed to examine spalled targets. Examination of the recovered targets, as well as the timing of spall signals has led to a spall zone model, in which spall occurs not at a plane but in a finite region. The Hugoniot Elastic Limit (HEL) of 6.5 mm thick Al-300 is 8 GPa. The HEL of AD-85 decays from 5.9 GPa in 6.4 mm thick samples to 4.1 GPa in 20.4 mm. This decay partially explains the discrepancy between static and dynamic strength measurements. Above the HEL all three materials fractured in compression. Spall toughness in brittle materials was defined and evaluated.
Dissert. Abstr.

N86-21880 Brown Univ., Providence, R. I.
SHEAR STRESS CONCENTRATION NEAR THE EDGE OF A THIN FILM DEPOSITED ON A SUBSTRATE Ph.D. Thesis
Wei Yang 1985 135 p
Avail: Univ. Microfilms Order No. DA8519932

The shear stress concentration near the edge of a thin film attached to a deformable substrate is studied. Chapter 1 outlines the basic mechanical analysis for film deposition. An integral differential equation is derived to govern the film stretching force. The general structure suggests that the bonding shear stress exhibits a square root singularity at the film edge. In chapter 2, a general discussion of the thermal differential strain which results from film deposition from a melt is presented. Chapter 3, 4 and 5 are devoted to the solution techniques of the Prandtl equation. The simplest case of deposition of a slender, non-interactive and uniform film is attacked by means of Mellin transforms and the significant influence of the deposition process on nondimensional stress intensity factor k is revealed. Chapters 6 and 7 are devoted to discussion of research on more sophisticated film models, including effects of viscosity, creep and plasticity. For polymeric films, the stress intensity factor histories are traced for several different visco-elastic film models. The fictitious singular bonding stress near film edge is removed in the last chapter by admitting relative slip between the film and substrate. Dissert. Abstr.

N86-21881 Northwestern Univ., Evanston, Ill.
PLASTIC DEFORMATION ON THE CRACK LINE IN AN ELASTIC PERFECTLY-PLASTIC MATERIAL Ph.D. Thesis
Zailiang Li 1985 114 p
Avail: Univ. Microfilms Order No. DA8523555

For rapid crack propagation in an elastic perfectly-plastic material, explicit expressions have been obtained for quasi-static and steady-state dynamic strains on the crack line, from the moving crack tip to the moving elastic-plastic boundary. The method of solution uses power series in the distance to the crack line, with coefficients which depend on the distance to the crack tip. Substitution of the expansions in the equations of motion, the yield condition (Huber-Mises) and the stress-strain relations yields a system of nonlinear ordinary differential equations for the coefficients. These equations have been solved rigorously for Mode 3, and in an approximate manner for Mode-I plane stress. The crack-line fields have been matched to appropriate elastic fields at the elastic-plastic boundary. In conjunction with the crack growth criterion the expressions for the strain on the crack line to an integral equation for the size of the plastic zone as a function of the crack length, for both the Mode-3 and the Mode-I plane stress quasi-static crack propagation problems. A relation between the plastic zone size and the remote elastic yield yields resistance curves.
Dissert. Abstr.

N86-21882 Northwestern Univ., Evanston, Ill.
ELASTODYNAMIC SCATTERING BY PERIODIC SURFACE INDENTATIONS Ph.D. Thesis
Ronald Allen Roberts 1985 230 p
Avail: Univ. Microfilms Order No. DA8523578

Scattering of an incident elastodynamic field by an array of periodically spaced indentations contained in the otherwise plane surface of an elastic half space is investigated both theoretically and experimentally. This work is intended for application in Quantitative Nondestructive Evaluation (QNDE), and employs ultrasonic QNDE experimental techniques. The theoretical modelling includes often overlooked features of the experimental reality, such as the beam profile and temporal response of the ultrasonic transducer. An emphasis is placed on signal processing. Both the direct and inverse scattering problems are addressed. The problem for a finite number of adjacent scattering indentations is theoretically formulated as a boundary integral employing the two dimensional Green's function for an elastic half space. The resulting coupled singular integral equations for the displacements on the indented surface are regularized by isolating all singular and near singular terms from the kernels. A rigorous numerical solution is then employed. The boundary integral formulation for scattering by an infinite number of adjacent surface indentations for plane wave incident, is extended to model a finite width incident ultrasonic beam. Dissert. Abstr.

N86-21883# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
VIBRATION DAMPING 1984 WORKSHOP PROCEEDINGS Summary Report, Feb. 1978 - Feb. 1984
Lynn Rogers, ed. Nov. 1984 872 p refs Workshop held in Long Beach, Calif., 27-29 Feb. 1984
(AF Proj. 486U)
(AD-A152547; AFWAL-TR-84-3064) Avail: NTIS HC A99/MF E03 CSCL 20/11

Vibration damping workshop proceedings are presented. Subjects presented include: mechanical properties of polymers, experimental methods, damping in metal matrix composites, friction damping, design of damping structure, modal damping values, and applications of damping. For individual titles, see N86-21884 through N86-21931.

N86-21884# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
SOME MUSINGS ON HOW TO MAKE DAMPING A CREATIVE FORCE IN DESIGN
James W. Mar *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 21 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Ways are suggested to make damping a complete technology, to become a creative force in structural design. The following examples are cited: (1) invention of mechanisms to enhance and control damping; (2) testing of structural joints in simulated zero-g; (3) measurement of material damping without aerodynamic forces; and (4) testing of structures in the zero-g and high vacuum of space. E.A.K.

N86-21885# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FRACTIONAL CALCULUS TO REPRESENT COMPLEX MODULUS c64
Lynn Rogers *In its* Vibration Damping 1984 Workshop Proceedings Nov. 1984 4 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Equations were extracted which summarize developments in use of operators and fractional derivatives. The equations unify and extend capability in viscoelasticity. Adaptation of the integer order Maxwell model to the fractional case gives a related representation. Properties other than complex modulus are expressed through interconversion based on the integer order factored polynomial approximation to equation. E.A.K.

N86-21886# Universal Energy Systems, Inc., Dayton, Ohio.
COMPLEX MODULUS BEHAVIOR OF A VISCOELASTIC ADHESIVE MEASURED AT HARMONIC STRAIN AMPLITUDES OF 10-10
T. J. Lagnese and D. I. G. Jones (AFWL, Wright-Patterson AFB, Ohio) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 16 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The complex modulus behavior of a viscoelastic material, measured by a dynamic stiffness method, was determined at several low excitation levels and temperatures. The effect of strain amplitude is demonstrated. It is found that the complex modulus of the viscoelastic adhesive does not depend on strain amplitude at cyclic levels as low as 10E-10m/m. E.A.K.

N86-21887*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
EXPERIMENTAL MEASUREMENT OF MATERIAL DAMPING FOR SPACE STRUCTURES c18
Edward F. Crawley and Raymond L. Sheen *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 18 p refs Sponsored in part by US Air Force (For primary document see N86-21883 12-39)
(Contract NAGw-21)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A procedure for the measurement of material damping is described. The free decay of free-free beams, when lofted into free fall in vacuum, was recorded. Tests were performed on aluminum, graphite/epoxy, and graphite/magnesium metal matrix materials. Specimens with a fundamental free-free frequency below the elaxation frequency showed a higher level of damping and of stress dependence than predicted. For [0] sub 8 laminates, a material damping ratio of 0.00055 was found for fequencies varying from 45 Hz to 237 Hz. The damping was neither stress nor frequency dependent. For [90] sub 8 laminates, the damping ratio ranged from 0.0055 to 0.0066 as frequency ranged from 42 Hz to 143 Hz. Damping ratios for [90] sub 8 specimens were independent of stress. Experimentally measured damping ratios for metal matrix specimens with unidirectional graphite fibers, magnesium matrix, and either titanium or magnesium foil, ranged from .00039 to .00099, depending upon the matrix material, frequency, and possibly the stress range involved. E.A.K.

N86-21888# General Motors Corp., Indianapolis, Ind. Gas Turbine Operations.
DAMPING APPLICATIONS IN TURBINE ENGINES c07
R. L. Jay and D. W. Burns *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 23 p ref (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The application of damping treatments to turbomachinery rotating and static components based on measured response characteristics of compressor and turbine stages was evaluated. Data from a shrouded fan stage, an integral turbine stage, and two stator vane assemblies were used. The contributions due to material damping, interface damping and aerodynamic damping comprising the total system damping were identified. A basis for the application of damping treatments which can be effective in controlling resonant response amplitudes is established. E.A.K.

N86-21889# United Technologies Research Center, East Hartford, Conn. Applied Mechanics Research.
CHARACTERISTICS OF DRY FRICTION DAMPING
A. V. Srinivasan, B. N. Casenti, and D. G. Cutts *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 30 p refs (For primary document see N86-21883 12-39)
(Contract F49620-83-C-0076)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The problem of estimating damping due to dry friction forces induced at interfaces of vibrating components is summarized. The complex processes involved during rubbing of one component relative to another bringing into play a host of parameters are

indicated. Limited data are available in regard to dry friction in a vibratory environment. E.A.K.

N86-21890# Stress Technology, Inc., Rochester, N.Y.
DAMPING PROPERTIES OF STEAM TURBINE BLADES c07
Neville F. Rieger *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 31 p refs Sponsored in part by the Electric Power Research Inst. (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Material hysteresis, attachment friction and gasdynamic effects are recognized sources of damping in turbomachinery blading. The damping properties of several types of steam turbine blades were examined. One objective was to determine the relative contributions from the damping sources in these blade types. A nonrotating damping test rig which used real blades mounted in corresponding real disk root attachments was used. The rig and the test program are described. The blade damping properties conform to effects associated with material hysteresis damping. For the blades the influence of friction in the attachment region was negligible for test loads and vibratory amplitudes encountered in practice. Gasdynamic damping from the surrounding medium was studied in an environmental chamber and was found to be negligible. A small level of gasdynamic damping from fluid working appears to be possible for blades under operating loads. E.A.K.

N86-21891*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONCEPTS AND EFFECTS OF DAMPING IN ISOLATORS
James Kerley *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 14 p (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20K

A series of innovative designs and inventions which led to the solution of many aerospace vibration and shock problems through damping techniques is presented. The design of damped airborne structures has presented a need for such creative innovation. The primary concern was to discover what concepts were necessary for good structural damping. Once these concepts are determined and converted into basic principles, the design of hardware follows. The following hardware and techniques were developed in support of aerospace program requirements: shipping containers, alignment cables for precision mechanisms, isolation of small components such as relays and flight instruments, isolation for heavy flight equipment, coupling devices, universal joints, use of wire mesh to replace cable, isolation of 16-dB, 5000 lb horn, and compound damping devices to get better isolation from shock and vibration in a high steady environment. E.A.K.

N86-21892# Carnegie-Mellon Univ., Pittsburgh, Pa.
RESEARCH ON FRICTION DAMPING IN JET ENGINES AT CARNEGIE-MELLON UNIVERSITY c07
J. H. Griffin and J. Bielak *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 12 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC 99/MF A01 CSCL 20/11

Research on friction damping in jet engines is discussed. Topics include: (1) mistuning/friction interaction, (2) flutter stabilization, (3) the use of the finite element method to calculate the forced response of structures containing friction interfaces, and (4) improved methods for modeling friction. E.A.K.

N86-21893# Imperial Coll. of Science and Technology, London (England).
FRICTION DAMPING STUDIES AT IMPERIAL COLLEGE
C. F. Beards *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 6 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Force transfer by friction between joint elements, energy dissipation mechanisms, friction damping in joints and the effects of increased joint damping on the vibration response of structures are discussed. The source of damping-inherent structural damping which originates in the joints is investigated. E.A.K.

N86-21894# Martin Marietta Aerospace, Denver, Colo. Aerospace Div.
A DERIVATION OF EQUIVALENT LINEAR VISCOUS AND ELASTIC CONSTANT FOR VISCOELASTIC MATERIALS
S. R. Dahl and R. B. Rice *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 8 p (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A testing method to directly measure the hysteresis characteristics of a viscoelastic material for shear displacement was devised. Three commonly available materials were tested over a frequency range of 0.1 to 100 Hz. Though the materials are essentially nonlinear, linear elastic and viscous damping parameters were approximated using an equivalent energy approach valid for specific frequencies and amplitudes. The linearized parameters can be used in linear structural and control systems analysis programs for the analysis of structures with distributed discrete passive damping mechanisms. E.A.K.

N86-21895# Florida Univ., Gainesville. Dept. of Engineering Sciences.
COMPOSITE MATERIAL DAMPING USING IMPULSE TECHNIQUE
C. T. Sun, B. T. Lee, and S. K. Chaturvedi (Missouri Univ., Rolla) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 23 p refs (For primary document see N86-21883 12-39) (Grant AF-AFOSR-0154-83)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The impulse technique for measuring the internal damping of composite materials is presented. Some improvements were made to gain confidence on the experimental data measured from this technique. The improvements involve the following: (1) replace a contact probe by a noncontact probe; (2) use an amplifier to reduce the noise level; (3) use a spring to control the magnitude, location and dwelling time of the applied force; and (4) use zooming technique to obtain more accurate data. E.A.K.

N86-21896# Naval Surface Weapons Center, Silver Spring, Md.
IMPROVED EXTENSIONAL MODULUS MEASUREMENTS FOR POLYMERS AND METAL MATRIX COMPOSITES
Walter Madigosky *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 11 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

An improved resonance apparatus for rapid and reliable materials characterization is described. The apparatus determines the propagation constants of an extensional acoustic wave by exciting a bar of material at one end by a noise source while the other is allowed to move freely. Miniature accelerometers measure the accelerations at the two locations. A dual channel Fast Fourier Transform (FFT) spectrum analyzer is used to obtain the amplitude and phase response as a function of frequency from which the complex Young's modulus can be obtained. Young's modulus and loss factor measurements were measured in materials ranging from soft polymers to rigid metal matrix composites. For viscoelastic materials the method of fractional derivative is found to successfully model the complex modulus throughout the transition region. It is suggested that the four independent constants used are related to the measurable physical properties and chemical composition of the material. E.A.K.

N86-21897# Manhattan Coll., New York. Dept. of Mechanical Engineering.
MATERIAL DAMPING OF CARBON/EPOXY COMPOSITES BY MEANS OF FREE-FREE BEAM RESONANCE TESTS c24
Daniel W. Haines *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 16 p refs Sponsored in part by the Celanese Corp. (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A testing program which characterizes the principal (0 deg

and 90 deg) damping properties of unidirectional composites incorporating Celion carbon is presented. Data for 0/ + or - 45/90s specimens are also presented. The free-free beam resonance tests eliminate errors introduced by support conditions. This test method enables the determination of Young's moduli and the shear modulus in the plane of bending. E.A.K.

N86-21898# Idaho Univ., Moscow.
IMPROVEMENT OF DAMPING IN FIBER REINFORCED POLYMER COMPOSITES c24
R. F. Gibson, S. A. Suarez, and L. R. Deobald *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 20 p refs (For primary document see N86-21883 12-39)
(Grant AF-AFOSR-0156-83)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Damping in aligned discontinuous fiber reinforced polymer composites was studied to verify a previously developed theoretical model, which predicted that discontinuous fiber reinforcement should enhance the shear-induce linear viscoelastic damping effect in the polymer matrix material. Data for graphite/epoxy and aramid/epoxy composites show that very low fiber aspect ratios are required to produce significant improvements in damping, and that damping also increases markedly with increasing vibration frequency at these low aspect ratios. E.A.K.

N86-21899# Naval Surface Weapons Center, Silver Spring, Md.
DYNAMIC MECHANICAL PROPERTIES OF GRAPHITE/ALUMINUM WIRES AT AUDIOFREQUENCIES c24
Gilbert F. Lee and Clifford W. Anderson *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 15 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Twenty graphite/aluminum wires showed voids due to poor impregnation of aluminum in the graphite fibers. The dynamic mechanical properties of these wires were determined. It was found that the dynamic mechanical properties correlated with the X-ray results. The following properties were determined at room temperature: torsional properties, logarithmic decrement and shear modulus at approximately 0.5 Hz and flexural properties, logarithmic decrement and bending stiffness over a frequency range of 10 to 500 Hz. Torsional results, showed that good impregnated wires have logarithmic decrements less than 0.6 dB and shear moduli greater than 1.3 x 10 to the 10th power Pa while poorly impregnated wires have logarithmic decrements greater than 2.0 dB and shear moduli less than 0.9 x 10 to the 10th power Pa. The flexural results showed that good impregnated wires have logarithmic decrements less than 1.1 dB and bending stiffnesses greater than 1.3 x 1/1000 Pa m sub 4, while poorly impregnated wires have logarithmic decrements greater than 1.1 dB and bending stiffnesses less than 1 x 1/1000 pa-m sub 4. The two nondestructive methods are viable means of investigating the effects of poor aluminum impregnation on the dynamic mechanical response of graphite reinforced aluminum precursor wires. E.A.K.

N86-21900# Martin Marietta Aerospace, Denver, Colo.
DAMPING BEHAVIOR OF METAL MATRIX COMPOSITES c24
M. S. Misra and P. D. LaGreca *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 12 p refs Sponsored in part by Martin Marietta Aerospace (For primary document see N86-21883 12-39)
(Contract F33615-82-R-3222A)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Discontinuous and continuous fiber reinforced composites were evaluated for their damping capacities and elastic moduli. In the case of Gr/Al and Gr/Mg, the damping factor increases significantly in the transverse direction and slightly in the longitudinal direction whereas the longitudinal elastic modulus of the composite has increased by a factor of 3 or more. The damping behavior of the SiC particulate reinforced aluminum composite was similar to that of the matrix aluminum alloy. The observed behavior to the fiber matrix and the diffusion bonded interface present in these compositely are explained. If the interface strength is higher than that of the matrix alloy, the damping capacity remains the same. However, if the interfaces are the weaker areas the damping capacity increases. E.A.K.

N86-21901# National Bureau of Standards, Boulder, Colo. Fracture and Deformation Div.
DAMPING IN METAL-MATRIX COMPOSITES: MEASUREMENT AND MODELING c24
H. M. Ledbetter and S. K. Datta (Colorado Univ., Boulder) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 17 p refs Sponsored in part by DARPA (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Attenuation, alpha of elastic waves in a composite consisting of elastic reinforcing particles dispersed in an elastic matrix was considered. Only geometrical attenuation caused by scattering from particles is discussed. The model contains the effects of particle volume fraction, particle shape, particle size, particle elastic constants, matrix elastic constants, measurement frequency, and elastic-wave polarization. Several assumptions are made concerning the particles: arbitrary-shape ellipsoids (spheres, discs, rods), uniform distribution, random orientation. The model composite is macroscopically both homogeneous and isotropic. Calculations relate only to long wavelengths. A composite consisting of 6061-aluminum-alloy matrix reinforced with 5-micrometer silicon-carbide particles is considered. E.A.K.

N86-21902# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
DAMPING MEASUREMENT BY DYNAMIC STIFFNESS METHODS
David I. G. Jones and Agnes Muszynska (Bently Rotor Dynamics Research Corp., Minden, Nev.) *In its* Vibration Damping 1984 Workshop Proceedings Nov. 1984 25 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The problem of determining the mass, stiffness and damping parameters of a structure from measured modal response data is addressed. The modal mass shape and damping parameters are determined from both receptance and dynamic stiffness approaches. Complex normal modes are used in the representation of nonproportional damping, localized in specific parts of a structure, whereas real normal modes are sufficient to represent the behavior of a system with damping proportional to stiffness. The inversion of the receptance matrix to obtain the dynamic stiffness matrix, and some unique properties of the elements of the dynamic stiffness matrix, are discussed. Two examples, one from dynamics of a discrete structure and the other for a rotor-bearing system, are presented. E.A.K.

N86-21903*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COMPARISON OF MEASURED SPACECRAFT MODAL DAMPING VALUES Abstract Only
B. K. Wada and J. C. Chen *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 6 p (For primary document see N86-21883 12-39)
(Contract NAS7-100)
Avail: NTIS HC A99/MF A01 CSCL 20K

The prediction and the measurement of modal damping values of spacecrafts for use in the determination of design loads were summarized. Realistic transient forcing functions were used. The solution of complex eigenvalue response solutions resulting from modal synthesis of subsystems in which each subsystem is assigned modal damping values is discussed. Damping data on both the Voyager and the Galileo spacecrafts using up to eight different types of techniques to analyze modal data are presented. It is concluded that it is difficult to estimate the true damping of a structure and the measured damping values which are dependent on the analysis method of the data. E.A.K.

N86-21904# Rockwell International Corp., Downey, Calif.
STRUCTURAL DAMPING OF SHUTTLE ORBITER AND ASCENT VEHICLES c18

D. L. Jensen *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 13 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Experimental structural mode damping factor data are presented for an actual full size vehicle structure. Vibration test programs were conducted during development of the shuttle orbiter vehicle. Average values of structural damping factor range from 0.017 to 0.32 are shown. It is indicated that a primary source of energy dissipation due to air mass displacement is directly dependent on amplitude of motion. A frictional energy loss analysis develops a relation between viscous damping factor and coulomb friction. E.A.K.

N86-21905# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
MEASURED DAMPING OF SHUTTLE ACOUSTIC TEST STRUCTURES **c18**
C. E. Wallace, Mark Mielke, and Jack Joanides (Rockwell International, Downey, Calif.) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 13 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Damping was measured on 10 shuttle structural test specimens which were constructed for acoustic testing. The specimens include the cargo bay doors, the OMS/RCS pod, the wing leading edge section, the wing elevon section, the body flap, the tail section, three fuselage panels and one wing panel. The damping of each natural mode of vibration for each specimen is plotted versus the natural frequency. Statistical analysis, including the mean, standard deviation and probability density for the damping data is presented. It is demonstrated that the damping ratio decreases with increasing frequency and that the logarithm of the damping ratio has a normal distribution. E.A.K.

N86-21906# Southampton Univ. (England). Institute of Sound and Vibration Research.
AVERAGE LOSS FACTORS FOR USE IN STATISTICAL ENERGY ANALYSIS
K. T. Brown and B. L. Clarkson (University Coll. of Swansea, England) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 12 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A new technique for the measurement of frequency band and space averaged loss factors of uniform structural components is described. Values are obtained by an energy measurement technique which gives good results over a wide range of loss factor values. The results can be used in statistical energy analysis prediction programs, or to study the frequency dependence of loss factors in components or materials. E.A.K.

N86-21907# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
STRUCTURAL DAMPING POTENTIAL OF WAVEGUIDE ABSORBERS **c32**
Eric E. Ungar and Leonard G. Kurzwell *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 14 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Waveguide absorbers, structural elements that extract energy from vibrating structures in the form of traveling waves, may serve as effective means of vibration reduction. Expressions that indicate how the damping effectiveness of waveguide absorbers attached to structures depend on absorber and structural parameters are presented. Realizations of waveguide absorbers in terms of damped tapered rods and beams are described. Data are presented which illustrate that suitable waveguide absorber installations can provide considerable damping, even of massive structures, with relatively little weight penalty. The damping of a thin plate by a waveguide absorber is compared to that of viscoelastic layer treatments of the same weight. E.A.K.

N86-21908# Hochschule der Bundeswehr, Munich (West Germany). Inst. of Space Technology.
NEW PROPOSED DYNAMIC VIBRATION ABSORBERS FOR EXCITED STRUCTURES
Helmut F. Bauer *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 26 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Space structural systems are very susceptible to oscillations. A liquid damper which consists of a completely filled liquid container filled with two immiscible liquids, in which the motion of the interface is able to effectively dampen the structure is presented. The effectiveness is exhibited for the coupled structure-liquid system. An active motion prevention system is proposed which consists of a control system with a control accelerometer and a cold-gas jet system as a control force. Both systems show good results in preventing structural motion. E.A.K.

N86-21909*# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.
EXTENSIONS OF THE RITZ-GALERKIN METHOD FOR THE FORCED, DAMPED VIBRATIONS OF STRUCTURAL ELEMENTS
A. W. Leissa and T. H. Young *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 21 p (For primary document see N86-21833 12-39)
(Grant NAG3-424)
Avail: NTIS HC A99/MF A01 CSCL 20K

The Ritz-Galerkin methods were used to obtain approximate solutions for free undamped, vibration problems. It is demonstrated that these same methods may be used straightforwardly to analyze forced vibrations with damping without requiring the free vibration eigenfunctions. It was shown that the Galerkin method is an effective technique for these types of problems. The Ritz method has the advantage that it does not need to satisfy the force-type boundary conditions, which is particularly important for plates and shells. Proper functionals representing the forcing and damping terms were developed. Two types of damping--viscous and material (hysteretic) are discussed. Distributed and concentrated exciting forces are treated. Numerical results are obtained for cantilevered beams and rectangular plates. The rates of convergence of the solutions are shown. Approximate solutions from the present methods are compared with the exact solutions for the cantilever beam. E.A.K.

N86-21910# CSA Engineering, Inc., Palo Alto, Calif.
FINITE ELEMENT DESIGN OF VISCOELASTICALLY DAMPED STRUCTURES
Conor D. Johnson, David A. Kienholz, Eric M. Austin, and Michael E. Schneider *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 27 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Four methods for the finite element analysis of structures containing a viscoelastic material are described. These methods fall into the categories of methods for damping treatment selection or methods for response prediction. The Modal Strain Energy (MSE) method is emphasized. The MSE method uses normal mode techniques and is an efficient method for the design of viscoelastically damped structures. The MSE method, implemented by finite element techniques, aids in: (1) selecting the location of the damping treatment; (2) selecting the damping treatment; (3) predicting the modal damping factors; and (4) predicting the responses of the structure. Finite element modeling methods for structures containing viscoelastic materials are discussed. Predicted and measured modal damping and frequencies are compared. E.A.K.

N86-21911# Dayton Univ., Ohio. Research Inst.
ON VIBRATION DAMPING ANALYSIS USING THE FINITE ELEMENT METHOD
R. A. Brockman *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 9 p refs (For primary document see

N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Solution methodology for finite element analysis of problems in vibration damping is described, and several common questions regarding the differences between methods and computer programs are addressed. The discussion focuses on basic questions and principles in the use of finite elements for damping design and analysis. E.A.K.

N86-21912# Dayton Univ., Ohio. Research Inst.
RESULTS OF FINITE ELEMENT ANALYSIS OF DAMPED STRUCTURES
Matthew F. Kluesener *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 11 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A Finite Element Analysis (FEA) was used to model passive damping configurations on integrally damped structures. The modeling of passive damping designs on complex structures poses two problems: (1) the thin damping layers generally result in high aspect ratios of the 3D solid elements representing the damping systems; (2) if a multilayered damping system is modeled, there are a large number of degrees-of-freedom (DOF). Ways to reduce the number of elements representing the damping system and the accuracy of the damping prediction using high aspect ratios are discussed. Tests and corresponding FEA of a double constrained layer damped cantilever plate show that aspect ratios up to 1000:1 yield very accurate results. The experimental FEA comparison also shows that FEA modeling techniques such as using membrane elements for the constraining layers or an equivalent element to represent several layers of the damping system yield good results. E.A.K.

N86-21913# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SEGMENTING AND MECHANICAL ATTACHMENT OF CONSTRAINED VISCOELASTIC LAYER DAMPING TREATMENTS FOR FLEXURAL AND EXTENSIONAL WAVES
Edward M. Kerwin, Jr. and P. W. Smith, Jr. *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 23 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The application of segmented constrained layers to the damping of extensional waves is discussed. There are significant parallels with the flexural wave case; the optimum segment length for a given damping treatment is essentially the same. As with flexural waves, the results apply below an upper frequency limit. Achievable loss factors for extensional waves are lower than for flexural waves for a given system cross section. Mechanical attachment of the constrained-layer damping treatment is sometimes required. Damping performance is compromised to the extent that the constraining layer lateral deflection is inhibited. Quantitative results on the effect of a point fastener are reported. The treatment effective area lost due to a rigid fastener, and a fastener of finite lateral stiffness are examined. The results guide the design of fasteners to minimize their effect on performance. E.A.K.

N86-21914# North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Mechanical Engineering.
VIBRATION ISOLATION OF AN ELEVATOR SYSTEM
H.-S. Tzou and A. J. Schiff *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 5 p refs Sponsored in part by the Natioonal Science Foundation (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The vulnerability of an elevator system was demonstrated from recent earthquake reports. An elevator counterweight/frame/guide rails system is modeled by beam finite elements. Because of large structural vibration, parts of the system may come in contact if their relative displacement exceeds the gap. Large dynamic forces which results from contact often cause the damage of the elevator system, the study of viscoelastic damper used as a vibration isolator is introduced. A system with viscoelastic dampers which are modeled by standard linear model is evaluated. E.A.K.

N86-21915# Dayton Univ., Ohio. Research Inst.
DESIGN EVALUATION AND FIELD QUALIFICATION OF A DAMPING SYSTEM FOR AN AUXILIARY POWER UNIT
Michael L. Drake *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 17 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A turbine engine incurred resonant vibration induced fatigue failures in the inlet guide vanes (IGV). High stress levels at frequencies corresponding to the second bending and second torsional resonances were revealed. The operational environment required a damping system to be functional over the temperature range of -50 F to 150 F. The damping system had to survive the high airflow and erosion environment associated with the inlet of the engine and also had to be field installable. A computer aided design procedure was used to develop the required damping design. The final design demonstrated an 86% stress reduction. Engine test stress reductions agreed well with the laboratory results. E.A.K.

N86-21916# LTV Aerospace Corp., Dallas, Tex.
LAMINATED DAMPED FUSELAGE STRUCTURES
Richard A. Ely *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 32 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The application of constrained layer damping, in the form of laminated skins, frames, and equipment racks, to control acoustic fatigue of structures and vibration of equipment in the aft fuselage sections of large aircraft is discussed. It is shown that the influence of constrained layer damping on the response of a honeycomb panel at its critical frequency is very different from the influences on its resonant responses. The discussed baseline data and background methodology include: laboratory characterization of materials, acoustical fatigue tests of baseline and laminated structures, peculiarities of structures with high damping, influences of various boundary conditions on damped panels, dynamic versus static stiffness of damped panels, and comparisons of predicted and measured stresses in damped and undamped panels that are representative of aircraft structures. Advanced metallic technology and constrained layer damping are utilized to redesign the A-7 center section leading edge flap and the F-111 outboard spoiler to achieve large increases in their acoustical fatigue lives. E.A.K.

N86-21917# Boeing Co., Seattle, Wash.
BEAM DAMPERS FOR SKIN VIBRATION AND NOISE REDUCTION IN THE 747
R. N. Miles *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 17 p ref (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A special constrained layer damper was incorporated into the Boeing 747 upper deck fuselage structure. The damper replaces a rivetted stiffener which was installed to reduce noise levels inside the cabin. It was found that the damper installation produced a noise reduction equal to that achieved by the stiffener and resulted in an $8000 per airplane cost savings and a 130 pound per airplane weight savings. The analysis and test that led to this design are reviewed. E.A.K.

N86-21918# Boeing Military Airplane Development, Seattle, Wash.
INTEGRATED DAMPED FUSELAGE STRUCTURE
L. M. Butzel *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 29 p (For primary document see N86-21883 12-39)
(Contract F33615-79-C-3206)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A program aimed at developing design guidelines for viscoelastic damping applied to skin-stringer-frame type aerospace structure is described. Periodic structure type response models were

developed. Two procedures for assigning values of the damping parameters required in these models are presented. Results of test to develop and verify the damping parameter assignment procedure and response prediction models are discussed. The current status of these efforts is: (1) response models are yielding predictions in agreement with test results; (2) the damping parameter assignment procedures are working, however, more work is needed to bring them up to the confidence level of the response models. E.A.K.

N86-21919# Cabot Corp., Indianapolis, Ind. E-A-R Div.
USE OF SKIN DAMPING TREATMENTS TO CONTROL AIRFRAME DYNAMIC RESPONSE FOR INTERIOR NOISE CONTROL
C. I. Holmer *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 19 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A conceptual model for airframe and interior trim dynamic response. The model suggests that skin response in the frequency range may be affected by skin damping treatments. It is suggested that this motion is of significance in producing interior noise. Laboratory data of system loss factors for a new constrained layer, skin damping treatment show improved damping performance at lighter weight than other commercially available skin damping materials. Experimental data on an effective skin damping treatment which produces system loss factors which contribute significantly to total losses in the airframe in the presence of other loss mechanisms associated with the outfitted airframe are presented. The effective skin damping treatment reduces airframe motion at representative trim panel attachment points, suggesting role in the reduction of aircraft interior noise. E.A.K.

N86-21920# Rockwell International Corp., Seal Beach, Calif.
DAMPING APPLICATION TO SPACECRAFT
T. S. Nishimoto *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 7 p (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Various cases of design application of damping technology to spacecraft development are presented. Various vibration problems for which damping was used as a design tool are illustrated. The examples of damping applications are a succession of spacecraft hardware design problems from the component level to the spacecraft system. Typical confining constraints which work to the detriment of the engineering effort are illustrated. Late fixes to equal vibration failure necessarily loads to less than desirable design solutions. The example of integrating damping into the preliminary design process for system solutions points to the technology requirements necessary. E.A.K.

N86-21921# Boeing Aerospace Co., Seattle, Wash.
APPLICATION OF DAMPING TO IMPROVE RELIABILITY OF IUS-TYPE SATELLITE EQUIPMENT: RELSAT PROGRAM
Roy Ikegami, Clark J. Beck, and William J. Walker *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 14 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The status of the RELiability of SATellite equipment in environmental vibration (RELSAT) Program is presented. The program objectives, approach, goals and schedule are discussed. The work performed is described the selection of the inertial upper stage (IUS) as the baseline system for development in the RELSAT program. Work performed is which contains typical passive damping design concepts under consideration, and component developmental testing and finite element modeling results. E.A.K.

N86-21922# General Electric Co., Philadelphia, Pa. Space Systems Div.
DAMPING IN SUPPORT STRUCTURES FOR SATELLITE EQUIPMENT RELIABILITY: RELSAT
J. A. Staley and C. V. Stahle *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 25 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The reliability for satellite equipment in environmental vibration (RELSAT) program is discussed. The need for and benefits from applying damping treatments to satellite equipment panels to reduce component vibration during launch and ground vibration tests are discussed. Application of the same technology would directly benefit efforts to provide very stable platforms to meet high pointing accuracy requirements of satellites. The technology used to develop damped panel designs is discussed and a cost reliability model used to assess the cost benefit of reduced vibration is described. The RELSAT program which demonstrates the technology for vibration reduction of damped satellite equipment panels is described. E.A.K.

N86-21923# Lockheed-California Co., Burbank.
A DESIGN GUIDE FOR DAMPING OF AEROSPACE STRUCTURES
J. Soovere, M. L. Drake (Dayton Univ., Ohio), and V. R. Miller (Air Force Wright Aeronautical Lab., Wright-Patterson AFB, Ohio) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 9 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The effectiveness of polymeric damping materials in controlling resonant vibration problems has been established through many successful applications. The area of these applications range from aircraft structures to jet engine structures. The development of a viscoelastic damping design guide for use by designers is outlined. A brief outline of this effort is presented. E.A.K.

N86-21924# Massachusetts Inst. of Tech., Cambridge.
DISTRIBUTED PIEZOELECTRIC-POLYMER ACTIVE VIBRATION CONTROL OF A CANTILEVER BEAM
Thomas Bailey and James E. Hubbard, Jr. *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 22 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

An active vibration damper for a cantilever beam was designed using a distributed-parameter actuator and distributed-parameter control theory. The distributed-parameter actuator was a piezoelectric polymer, poly(vinylidene fluoride). Lyapunov's second method for distributed-parameter systems was used to design a control algorithm for the damper. Preliminary testing of the damper was performed on the first mode of the cantilever beam. A linear, constant-gain controller and a nonlinear constant-amplitude controller were compared. The constant-gain controller provided more than a factor of 2 increase in the modal damping with a feedback voltage limit of 200 VRMS. With the same voltage limit, the constant-amplitue controller achieved the same damping as the constant-gain controller for large vibrations, but increased the damping by a factor of 40 to at least eat=0.040 for small vibration levels. E.A.K.

N86-21925# TRW, Inc., Redondo Beach, Calif. Engineering Mechanics Lab.
AN EXPERIMENTAL STUDY OF PASSIVE DAMPING AND ACTIVE CONTROL OF LARGE SPACE STRUCTURES
S. S. Simonian, C. S. Major, and R. Gluck *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 40 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A methodology for incorporating passive dampers in large space systems (LSS) design is presented. The methodology focuses on modular, discrete viscoelastic dampers which are integrally designed into the structure. The application of the methodology to the LSS experiment, a laboratory demonstration of a structure supporting a simulated optical mirror and subject to active and passive vibration control is described. Performance evaluation of the damped structure design was obtained by the modal strain energy technique, based on finite element models in Program NASTRAN. A parameter variation study of the damper's performance was conducted, yielding, for the first three modes of a nominal damper configuration, an augmented modal damping

ratio of 9% of critical damping. This amount of passive damping, which is an order of magnitude larger than the residual damping present in the original structure, is obtained with a mere 8% penalty in structural weight. E.A.K.

N86-21926# Martin Marietta Aerospace, Denver, Colo. Guidance and Control Section.
SIZING OF DISCRETE VISCOUS DAMPERS ON A FLEXIBLE BODY IN THE PRESENCE OF A FIXED CONTROLLER
George R. Rapacki and Robert B. Rice *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 27 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The effects of discrete viscous dampers on a spacecraft's rigid body control loop were investigated. The damper's affect on the open loop gain and phase margins, the shape of the open loop gain-phase plot and the flexible body dynamics were determined as a function of the viscous damper's strength and the mass connected to the damper. The damper is sized for those configurations where the added damper improves the system robustness. E.A.K.

N86-21927# State Univ. of New York, Buffalo. Dept. of Mechanical and Aerospace Engineering.
CRITICAL DAMPING IN COMPLEX STRUCTURES AND CONTROL SYSTEMS
D. J. Inman *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 11 p refs (For primary document see N86-21883 12-39)
(Grant AF-AFOSR-0242-82)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The concept of critical damping normally defined for single degree of freedom systems as applied to more complex models of structures and their control systems was examined. Complex models refers to lumped mass models, such as finite element models (FEM), full distributed parameter (DPS) models (described by sets of partial differential equations), hybrid systems (systems with lumped and distributed parameter elements, such as passive control systems) and active control systems consisting of the models subject to position and velocity feedback. Critical damping of FEM and DPS models is reviewed and applied to more general linear models. E.A.K.

N86-21928# Martin Marietta Aerospace, Denver, Colo.
AN APPROACH TO THE SIZING OF DISCRETE VISCOUS STRUCTURAL DAMPERS USING AN EXTENSION OF THE FINITE ELEMENT APPROACH AND MODAL STRAIN ENERGY
Robert B. Rice and Eric C. Dalton (Teledyne Brown Engineering, Huntsville, Ala.) *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 20 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

A method to determine viscous damper values and damper locations for a structure which has particular damping requirements is presented. The method is intended as a starting point in a design process. The finite element approach and concept of modal strain energy are relied upon. The method was applied to a large space-based telescope in which damping of optical support structures is critical for tracking and pointing accuracy. It is indicated that the method will yield the desired amount of damping a structure provided that the complex mode shapes do not significantly deviate from the classical shapes. The characterization of nonviscous dampers is considerably more complicated than viscous dampers, it is suggested that the method be used in the early phases of design. If viscous damping values are known, the range of other candidate dampers may be narrowed. E.A.K.

N86-21929# General Electric Co., Philadelphia, Pa. Control Systems Design.
FLEXIBLE STRUCTURE CONTROL IN THE FREQUENCY DOMAIN
R. Harding and A. Das *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 20 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

Techniques to analyze structure and controller interaction in the frequency domain are defined and used to determine the modal damping requirements of the spacecraft structure to assure control system stability and performance. Gain and phase versus frequency techniques are described which predict system stability in the presence of uncontrolled structural modes and errors in a priori natural frequencies and quantify control system margin for these modes. The techniques are applied to an optimally controlled single axis satellite with very large solar arrays. Control system actuator and sensor configurations are based upon system controllability and observability of four dominant structural modes. E.A.K.

N86-21930# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
PASSIVELY DAMPED JOINTS FOR ADVANCED SPACE STRUCTURES
Richard W. Trudell, Lawrence W. Rehfield (Georgia Inst. of Tech., Atlanta), Ambur D. Reddy (Georgia Inst. of Tech., Atlanta), Jacky Prucz (Georgia Inst. of Tech., Atlanta), and James Peebles *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 28 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

The benefits to be gained by designing damping into the joints of large space structure are described. A typical joint is developed and two new nonresonant test techniques are outlined. The joints are double-lap shear joints that dissipate energy when worked in an axial direction. To better understand the relationship between structural stiffness and structural damping as a function of important physical parameters, a one-dimensional analysis of a typical joint was dveloped. Two new nonresonant forced vibration test methods (steady state and transient) were developed that are particularly well suited for obtaining the damping characteristics of joints in large space structures. The steady state method does not require measurement of relative displacements. The transient sine-pulse approach frees the specimen from fixture/joint interaction effects. E.A.K.

N86-21931# Martin Marietta Aerospace, Denver, Colo.
PASSIVE AND ACTIVE CONTROL OF SPACE STRUCTURES (PACOSS) Abstract Only
Charles White *In* AFWAL Vibration Damping 1984 Workshop Proceedings Nov. 1984 1 p (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

An early objective of the PACOSS program was to experimentally verify that substantial passive damping was practical in test articles generally representative of large space structure in arrangement, dimensional size, and frequency range. Two 60-foot, truss-type test articles were designed, fabricated, and tested. For one large generic test article (LGTA) in one plane, The diagonal members are Lexan;l in the other plane, the five lower bays have included discrete link dampers in the diagonals. The other LGTA has only Plexiglas diagonals in one plane, and also includes the five bays of link dampers in the other plane. E.A.K.

N86-21932*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
BURNER LINER THERMAL-STRUCTURAL LOAD MODELING
R. Maifeo [1986] 205 p
(Contract NAS3-23272)
(NASA-CR-174892; NAS 1.26:174892) Avail: NTIS HC A10/MF A01 CSCL 20K

The software package Transfer Analysis Code to Interface Thermal/Structural Problems (TRANCITS) was developed. The TRANCITS code is used to interface temperature data between thermal and structural analytical models. The use of this transfer module allows the heat transfer analyst to select the thermal mesh density and thermal analysis code best suited to solve the thermal problem and gives the same freedoms to the stress analyst, without the efficiency penalties associated with common meshes

and the accuracy penalties associated with the manual transfer of thermal data. E.A.K.

N86-21933*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION
Robert J. Hayduk, comp. Jan. 1986 356 p refs Workshop held in Hampton, Va., 10 Apr. 1985; sponsored by NASA. Langley Research Center and FAA
(NASA-CP-2395; L-16048; NAS 1.55:2395) Avail: NTIS HC A16/MF A01 CSCL 20K

The controlled impact demonstration (CID) test of a transport aircraft took place on December 1, 1984, crashing at a prepared site on Rogers Dry Lakebed, Edwards Air Force Base, California. The demonstration was a setback for the antimisting kerosene (AMK) researchers. The impact conditions, considerably different from the planned scenario, exposed large quantities of degraded AMK and hydraulic fluid and caused unexpectedly hot ignition sources, bulk loss of fuel from the right wing, airflow patterns over the wings and fuselage that were untested on AMK, and fuel intrusion into the lower fuselage. The test was much more severe than planned and is generally considered to be unrepresentative of the type of survivable crash that would benefit from AMK. Ninety-seven percent of the sensors on the fuselage and wing structure, seats, dummies, restraint systems, galley, and bins were active at impact. A wealth of sensor data was collected from this once-in-a-lifetime research test. The flight data recorder experiments on board were also generally successful. For individual titles, see N86-21934 through N86-21949.

N86-21934*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CID OVERVIEW
Robert J. Hayduk *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 1-16 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

On December 1, 1984, NASA and the Federal Aviation Administration (FAA) conducted the first remotely piloted air-to-ground crash test of a transport category aircraft. The Full-Scale Transport Controlled Impact Demonstration (CID) was the culmination of 4 years of effort by the two agencies. NASA and the FAA had many objectives during the joint planning and execution of the Controlled Impact Demonstration. The structural loads experiment was very successful. Ninety-seven percent of the channels were active at impact. The data is still being assessed. Only a portion of the data is presented here; approximately 80 channels of data are available. Analysis of the remaining data is in progress. Interior photography was also very successful. One hundred percent of the cameras functioned. The film contains unique information on the development of fire and smoke in the interior of the aircraft. From a human tolerance point of view, the CID was simulation of a survivable crash. R.J.F.

N86-21935*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
CID FLIGHT/IMPACT
Russ Barber *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 17-28 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

The planned versus the actual results of the controlled impact demonstration of a transport aircraft are discussed. Remote control systems, site selection, manned flight tests, and wreckage distribution are discussed. R.J.F.

N86-21936*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NASA EXPERIMENTS ON THE B-720 STRUCTURE AND SEATS c35
Emilio Alfaro-Bou *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 29-47 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

Two experiments onboard a remotely piloted transport aircraft that was crashed on landing are discussed. The structural experiment deals with the location and distribution of the instrumentation throughout the airplane structure. In the seat experiment, the development and testing of an energy absorbing seat are discussed. The objective of the structural experiment was to obtain a data base of structural crash loads for use in the advancement of crashworthy technology of materials (such as composites) in structural design and for use in the comparison between computer and experimental results. The objective of the seat experiment was to compare the performance of an energy absorbing transport seat and a standard seat when subjected to similar crash pulses. Details are given on the location of instrumentation, on the dynamic seat test pulse and headward acceleration limits. R.J.F.

N86-21937*# Federal Aviation Agency, Atlantic City, N.J. Technical Center.
CONTROLLED IMPACT DEMONSTRATION SEAT/CABIN RESTRAINT SYSTEMS: FAA
Richard A. Johnson *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 49-60 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

The FAA restraint system experiments consisted of 24 standard and modified seats, 2 standard galleys and 2 standard overhead compartments. Under the controlled impact demonstration (CID) program, the experimental objective was to demonstrate the effectiveness of individual restraint system designs when exposed to a survivable air-to-ground impact condition. What researchers were looking for was the performance exhibited by standard and modified designs, performance differences resulting from their installed cabin location, and interrelating performance demonstrated by test article and attaching floor and/or fuselage structure. The other restraint system experiment consisted of 2 standard overhead stowage compartments and 2 galley modules. Again, researchers were concerned with the retention of stowed equipment and carry-on articles. The overhead compartments were loaded with test weights up to their maximum capacity, and each of the galleys was filled with test articles: aft with normal galley equipment, forward with hazardous material test packages. A breakdown of instrumentation and distribution is given beginning with 11 instrumented type anthropomorphic dummies and 185 sensors which provided for acceleration and load measurements at the various experiment and associated structure locations. The onboard cameras provided additional coverage of these experiments, including the areas of cabin which were not instrumented. Test results showing the window-side leg forces versus pulse duration are given. R.J.F.

N86-21938*# Space Development Corp., Hampton, Va.
DATA REDUCTION, MANAGEMENT, AND ANALYSIS SOFTWARE FOR CID c60
Charles W. Davis *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 61-77 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

In an overview of the Data Reduction System, three major steps are examined. First, the raw data tapes were selected from the onboard recorders. These tapes should provide the best quality data for the data reduction software system. These tapes contained 352 channels of data, plus the monitor channels recorded in 8 bit Pulsed Coded Modulation (PCM) words. The next step consists of transcribing the PCM tapes from 8 bit serial digital data to 8 bit parallel digital data. This puts the data in the correct format for processing. The transcription process was accomplished here at LaRC in the Central Data Transportation Facility (CDTF). The last step in this 3 step process is to process the data through the reduction system developed for the Impact Dynamic Research Facility in the early part of 1980. Processing system criteria, system interface routines, and engineering units program that reads

digitized data from tapes, and file management programs are discussed. R.J.F.

N86-21939*# PRC Kentron, Inc., Hampton, Va.
NASA SEAT EXPERIMENT AND OCCUPANT RESPONSES
E. L. Fasanella *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 79-89 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

Results of the crash test of a remotely piloted transport aircraft instrumented to measure a NASA energy-absorbing transport seat are given. Human tolerance limits to acceleration and a dynamic response index model are discussed. It was found that the acceleration levels at the rear of the airplane were quite low and were below the stroking threshold of the NASA EA-seat. Therefore, dummies in the standard and EA-seat responded approximately the same. All longitudinal accelerations were quite low for the primary impact with very low forces measured in the lap belts. The vertical (spineward) acceleration levels measured in the dummies were also relatively low and very survivable from an impact tolerance standpoint. The pilot with an 18 G peak acceleration received by far the highest vertical acceleration and could have possibly received slight spinal injury. R.J.F.

N86-21940*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL LOADS PRELIMINARY RESULTS
Emilio Alfaro-Bou *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 91-102 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

From a total of 351 instrumentation channels, 341 channels (97%) were in operation during the initial impact of the airplane. Both NASA seats, the energy absorbing seat and the standard seat, maintained their integrity during the impact. The floor accelerations at the seat locations were lower than the accelerations required for the energy absorbers to stroke; consequently, the energy absorbing seat did not stroke. The two seats remained firm in place during the crash and no seat attachment failures were observed. Due to the low accelerations experienced during the crash, both seats performed as standard seats. In the airplane structure, the accelerations were higher at both the point of impact in the left wing and at the forward end of the fuselage. The accelerations on the floor were higher toward the front than toward the rear and the floor accelerations on the left side were higher than on the right side at the front of the fuselage, but toward the rear they evened out. Author

N86-21941*# PRC Kentron, Inc., Hampton, Va.
DIGITAL FILTERING AND ACCELERATION PULSE INTERPRETATION **c64**
E. L. Pasanella *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 103-123 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 12A

It was concluded that the post processing digital filter is quite effective for removing unwanted high frequency and noise without distorting the signal. In addition, digital filtering is effective for smoothing low-level low resolution digital data where the digital stairstep phenomena are pronounced. Integrating the acceleration data to obtain velocity traces is quite useful. The velocity change provides a check on the validity of the acceleration trace. (Zero offsets in acceleration must be removed before integrating.) Average accelerations can be obtained from the velocity trace by dividing the change in velocity for an acceleration pulse by the pulse duration. One can obtain the peak of an equivalent triangular pulse by doubling the average acceleration. Author

N86-21942*# Simula, Inc., Phoenix, Ariz.
PRELIMINARY FLOOR, SEAT, AND DUMMY DATA
Mark R. Cannon and Richard E. Zimmerman *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 125-155 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

According to preliminary examination of the data, out of 179 data channels that were onboard the aircraft in support of the seat experiments, there is data from 168. There was somewhat more severe environment imposed in the structure of the obstacles than by the ground impact. Therefore, both ground impact and obstacle impact are of interest for crashworthiness experiments. Most of the data channels that were studied are fairly consistent with the physical evidence: they show acceleration levels that are reasonable, and in many cases these integrate out to a reasonable velocity change. Finally, from observation thus far, the ground impact did not fail or significantly damage any seat. Nor did any of the energy absorbers in the modified seats extend. The accelerations do not appear high enough and/or energetic enough to cause this to happen. At this time, the onboard films have not been studied; only some videotape have been viewed. Some of the seats were so badly damaged by the fire that any failures which might have occurred were obscured. A close examination of the onboard films using a stop-action projector will allow a more thorough evaluation. Author

N86-21943*# Federal Aviation Administration, Long Beach, Calif.
CONTROLLED IMPACT DEMONSTRATION AIRFRAME BENDING BRIDGES
Stephen J. Soltis *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 157-179 (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

The calibration of the KRASH and DYCAST models for transport aircraft is discussed. The FAA uses computer analysis techniques to predict the response of controlled impact demonstration (CID) during impact. The moment bridges can provide a direct correlation between the predictive loads or moments that the models will predict and what was experienced during the actual impact. Another goal is to examine structural failure mechanisms and correlate with analytical predictions. The bending bridges did achieve their goals and objectives. The data traces do provide some insight with respect to airframe loads and structural response. They demonstrate quite clearly what's happening to the airframe. A direct quantification of metal airframe loads was measured by the moment bridges. The measured moments can be correlated with the KRASH and DYCAST computer models. The bending bridge data support airframe failure mechanisms analysis and provide residual airframe strength estimation. It did not appear as if any of the bending bridges on the airframe exceeded limit loads. (The observed airframe fracture was due to the fuselage encounter with the tomahawk which tore out the keel beam.) The airframe bridges can be used to estimate the impact conditions and those estimates are correlating with some of the other data measurements. Structural response, frequency and structural damping are readily measured by the moment bridges. R.J.F.

N86-21944*# Federal Aviation Agency, Atlantic City, N.J. Technical Center.
CONTROLLED IMPACT DEMONSTRATION FLIGHT DATA RECORDERS/COCKPIT VOICE RECORDERS
Leo J. Garodz *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 181-193 ref (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

It was found that the sampling rates from flight recorders on a remotely piloted transport aircraft that crashed into the ground were too low, although they were higher than those required now by regulations. For example, the sampling rate for roll angle was one per second. The sampling rate for normal acceleration was also fairly low. Existing regulations require only 4 samples per second; researchers had 16 samples per second. Some data was lost during the initial impact. The frequency response data was adequate. R.J.F.

N86-21945*# Naval Air Test Center, Patuxent River, Md.
UNITED STATES NAVY - CANADIAN FORCES SOLID STATE

FLIGHT DATA RECORDER/CRASH POSITION LOCATOR EXPERIMENT ON THE B-720 CONTROLLED IMPACT DEMONSTRATION

D. M. Watters *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 195-208 (For primary document see N86-21933 12-39)

Avail: NTIS HC A16/MF A01 CSCL 20K

The operation of a radio beacon position locator during and after the remotely controlled transport aircraft is discussed. The radio beacon transmission was actuated and was picked up by the Navy P-3A chase aircraft for a short time, after which reception was lost. The pilot reported that he received a signal on both 121.5 MHz and 243 MHz for a period of approximately 5 seconds. Five minutes after the crash a portable direction finding unit located on the roof of the NASA Dryden Flight Research Facility, 4 miles distant from the crash, was unable to pick up the beacon transmission. The fire crews started fighting the fires approximately 90 seconds after the time of impact. Navy personnel access to the crash site was allowed on the morning of December 2, 1984. Radio beacon locator was found resting top side up, 15 feet forward and 13 feet perpendicular from the tray location the starboard side of the aircraft. An immediate inspection indicated the airfoil suffered moderate fire damage with paint peeling but not intumescing. The visual marker strobe lamp housings were intact but extensively burned such that it was impossible to see if the lamps had survived. The airfoil suffered minor structural damage, with assorted dents, etc. The extended plunger on the ARU-21 release unit indicated that the pyrotechnic deployment system operated. The radio beacon base (tray) suffered some heat and fire damage, and was charred and blackened by smoke. The frangible switch in the nose survived and the switch in the belly was recovered and found to have actuated. It is assumed that this switch fired the ARU-21 squib. There were no other release switches installed in the normally open system in the aircraft. R.J.F.

N86-21946*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CONTROLLED IMPACT DEMONSTRATION ON-BOARD (INTERIOR) PHOTOGRAPHIC SYSTEM

Clyde J. May *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 209-239 ref (For primary document see N86-21933 12-39)

Avail: NTIS HC A03/MF A01 CSCL 20K

Langley Research Center (LaRC) was responsible for the design, manufacture, and integration of all hardware required for the photographic system used to film the interior of the controlled impact demonstration (CID) B-720 aircraft during actual crash conditions. Four independent power supplies were constructed to operate the ten high-speed 16 mm cameras and twenty-four floodlights. An up-link command system, furnished by Ames Dryden Flight Research Facility (ADFRF), was necessary to activate the power supplies and start the cameras. These events were accomplished by initiation of relays located on each of the photo power pallets. The photographic system performed beyond expectations. All four power distribution pallets with their 20 year old Minuteman batteries performed flawlessly. All 24 lamps worked. All ten on-board high speed (400 fps) 16 mm cameras containing good resolution film data were recovered. R.J.F.

N86-21947*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CID-720 AIRCRAFT HIGH-ENVIRONMENT FLIGHT INSTRUMENTATION SYSTEM

R. S. Calloway *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 241-287 (For primary document see N86-21933 12-39)

Avail: NTIS HC A16/MF A01 CSCL 20K

The high-environment flight instrumentation system was designed to acquire Langley's structural response data during the full scale transport-controlled impact demonstration test. There was only one opportunity for data acquisition. Thus, a high reliability and crashworthy design approach was implemented. The approach featured multi-level redundancy and a vigorous quality assurance testing program. Complying with an accelerated schedule, the instrumentation system was developed, tested and shipped within 18 months to Dryden Flight Research Facility. The flight instrumentation system consists of two autonomous data systems, DAS #1 and #2, and an excellent checkout subsystem. Each data system is partitioned into four pallets. The system was designed to operate on manned and unmanned flights. There are 176 data channels per data system. These channels are sequentially sampled and encoded into 1 megabit/sec pulse code modulation (PCM) data signal. To increase the probability of success, a special PCM distribution subsystem was developed. This subsystem distributes the PCM signal to two transmitters, one delay memory, and eight recorder tracks. The data on four of these trackes was digitally delayed approximately 300 msec to maximize data acquisition during impact. Therefore each data system's data is redundantly recorded onboard and on the ground. There are two time code generators. Parallel time from each is encoded into both data systems. Serial time from each is redundantly recorded on both onboard recorders. Instrumentation power is independent of aircraft power and self-contained. R.J.F.

N86-21948*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

IMPACT DYNAMICS INSTRUMENTATION c35

Royce F. McCormck *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 289-301 (For primary document see N86-21933 12-39)

Avail: NTIS HC A16/MF A01 CSCL 20K

One of the tasks specified in the NASA Langley controlled impact demonstration (CID) work package was to furnish dynamic instrumentation sensors. The types of instrumentation sensors required were accelerometers for aircraft structural loads measurements, seat belt load cells to measure anthropomorphic dummy responses to the aircraft impact, and strain gage bending bridges to measure the aircraft fuselage and wing bending during impact. The objective in the selection of dynamic instrumentation for the CID was to provide 352 of the highest quality transducers and remain within budget allocation. The transducers that were selected for the CID evaluation process were each subjected to rigorous laboratory acceptance tests and to aircraft fuselage section drop tests at the LaRC Impact Dynamics Research Facility. Data compiled from this series of tests showed the selected transducers to be best suited for the CID mission requirement. The transducers installation technique on the airframe proved successful. The transducer quality assurance was guaranteed through rigorous acceptance testing. Data acquired was 97.0%. R.J.F.

N86-21949*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CID-720 AIRCRAFT LANGLEY RESEARCH CENTER PRE-FLIGHT HARDWARE TESTS: DEVELOPMENT, FLIGHT ACCEPTANCE AND QUALIFICATION

J. D. Pride *In its* Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 303-328 ref (For primary document see N86-21933 12-39)

Avail: NTIS HC A16/MF A01 CSCL 20K

The testing conducted on LaRC-developed hardware for the controlled impact demonstration transport aircraft is discussed. To properly develop flight qualified crash systems, two environments were considered: the aircraft flight environment with the focus on vibration and temperature effects, and the crash environment with the long pulse shock effects. Also with the large quantity of fuel in the wing tanks the possibility of fire was considered to be a threat to data retrieval and thus fire tests were included in the development test process. The aircraft test successfully demonstrated the performance of the LaRC developed heat shields. Good telemetered data (S-band) was received during the impact and slide-out phase, and even after the aircraft came to rest. The two onboard DAS tape recorders were protected from the intense fire and high quality tape data was recovered. The complete photographic system performed as planned throughout the 40.0 sec of film supply. The four photo power distribution pallets remained in

good condition and all ten onboard 16 mm high speed (400 frames/sec) cameras produced good film data. R.J.F.

N86-21950*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A TORQUE, TENSION AND STRESS CORROSION EVALUATION OF HIGH STRENGTH A286 BOLTS
J. W. Montano Feb. 1986 27 p
(NASA-TM-86539; NAS 1.15:86539) Avail: NTIS
HC A03/MF A01 CSCL 20K

The problems associated with overtorque applied to the Booster Separation Motor (BSM) Igniter Adapter high strength [200 KSI (1379 Mpa)] A286 CRES bolts and the threaded holes of the 7075-T73 aluminum alloy BSM cases are addressed. The evaluation included torque, tensile, and stress corrosion tests incorporating the A286 CRES bolts and the 7075-T73 aluminum alloy BSM cases. The tensile test data includes ultimate tensile load (UTL), Johnson's 2/3 yield load (J2/3YL), proportional limit load (PLL), and total bolt stretch. Torque tension data includes torque, torque induced load, and positive and negative break-away torque. Stress corrosion test data reflect the overtorque and the resulting torque induced loads sustained by the A286 CRES bolts torqued into a 7075-T73 aluminum alloy forged dome with threaded holes. After 60 days of salt fog exposure, the positive and the negative break-away torques, the subsequent mechanical property tensile test results, and the BSM dome threaded hole axial tensile pullout loads are reported. Author

N86-21951*# Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
FATIGUE CRACK GROWTH UNDER GENERAL-YIELDING CYCLIC-LOADING
Zheng Minzhong and H. W. Liu Feb. 1986 28 p refs
(Grant NAG3-348)
(NASA-CR-175049; NAS 1.26:175049) Avail: NTIS
HC A03/MF A01 CSCL 20K

In low cycle fatigue, cracks are initiated and propagated under general yielding cyclic loading. For general yielding cyclic loading, Dowling and Begley have shown that fatigue crack growth rate correlates well with the measured delta J. The correlation of da/dN with delta J was also studied by a number of other investigators. However, none of thse studies have correlated da/dN with delta J calculated specifically for the test specimens. Solomon measured fatigue crack growth in specimens in general yielding cyclic loading. The crack tips fields for Solomon's specimens are calculated using the finite element method and the J values of Solomon's tests are evaluated. The measured crack growth rate in Solomon's specimens correlates very well with the calculated delta J. Author

N86-21952*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Engineering Mechanics.
ANISOTROPIC CONSTITUTIVE MODEL FOR NICKEL BASE SINGLE CRYSTAL ALLOYS: DEVELOPMENT AND FINITE ELEMENT IMPLEMENTATION Final Report
L. T. Dame and D. C. Stouffer Mar. 1986 130 p refs
(Grant NAG3-511)
(NASA-CR-175015; NAS 1.26:175015) Avail: NTIS
HC A07/MF A01 CSCL 20K

A tool for the mechanical analysis of nickel base single crystal superalloys, specifically Rene N4, used in gas turbine engine components is developed. This is achieved by a rate dependent anisotropic constitutive model implemented in a nonlinear three dimensional finite element code. The constitutive model is developed from metallurgical concepts utilizing a crystallographic approach. A non Schmid's law formulation is used to model the tension/compression asymmetry and orientation dependence in octahedral slip. Schmid's law is a good approximation to the inelastic response of the material in cube slip. The constitutive equations model the tensile behavior, creep response, and strain rate sensitivity of these alloys. Methods for deriving the material constants from standard tests are presented. The finite element implementation utilizes an initial strain method and twenty noded isoparametric solid elements. The ability to model piecewise linear load histories is included in the finite element code. The constitutive equations are accurately and economically integrated using a second order Adams-Moulton predictor-corrector method with a dynamic time incrementing procedure. Computed results from the finite element code are compared with experimental data for tensile, creep and cyclic tests at 760 deg C. The strain rate sensitivity and stress relaxation capabilities of the model are evaluated. Author

N86-21953*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE LATDYN USER'S MANUAL
Jerrold M. Housner, Paul E. McGowan, A. Louis Abrahamson, and Michael G. Powell Jan. 1986 212 p refs
(NASA-TM-87635; NAS 1.15:87635) Avail: NTIS
HC A10/MF A01 CSCL 20K

The LATDYN User's Manual presents the capabilities and instructions for the LATDYN (Large Angle Transient DYNamics) computer program. The LATDYN program is a tool for analyzing the controlled or uncontrolled dynamic transient behavior of interconnected deformable multi-body systems which can undergo large angular motions of each body relative other bodies. The program accommodates large structural deformation as well as large rigid body rotations and is applicable, but not limited to, the following areas: (1) development of large flexible space structures; (2) slewing of large space structure components; (3) mechanisms with rigid or elastic components; and (4) robotic manipulations of beam members. Presently the program is limited to two dimensional problems, but in many cases, three dimensional problems can be exactly or approximately reduced to two dimensions. The program uses convected finite elements to affect the large angular motions involved in the analysis. General geometry is permitted. Detailed user input and output specifications are provided and discussed with example runstreams. To date, LATDYN has been configured for CDC/NOS and DEC VAX/VMS machines. All coding is in ANSII-77 FORTRAN. Detailed instructions regarding interfaces with particular computer operating systems and file structures are provided. Author

N86-21954*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EQUIVALENT PLATE ANALYSIS OF AIRCRAFT WING BOX STRUCTURES WITH GENERAL PLANFORM GEOMETRY
Gary L. Giles Mar. 1986 12 p refs Proposed for presentation at the 27th AIAA/ASME/ASCE/ANS Structures, Structural Dynamics and Materials Conference, San Antonio, Tex., 19-21 May 1986
(NASA-TM-87697; NAS 1.15:87697; AIAA-86-0940-CP) Avail: NTIS HC A02/MF A01 CSCL 20K

A new equivalent plate analysis formulation is described which is capable of modeling aircraft wing structures with a general planform such as cranked wing boxes. Multiple trapezoidal segments are used to represent such planforms. A Ritz solution technique is used in conjunction with global displacement functions which encompass all the segments. This Ritz solution procedure is implemented efficiently into a computer program so that it can be used by rigorous optimization algorithms for application in early preliminary design. A direct method to interface this structural analysis procedure with aerodynamic programs for use in aeroelastic calculations is described. This equivalent plate analysis procedure is used to calculate the static deflections and stresses and vibration frequencies and modes of an example wing configuration. The numerical results are compared with results from a finite element model of the same configuration to illustrate typical levels of accuracy and computation times resulting from use of this procedure. Author

N86-21955# North Carolina State Univ., Raleigh. Raleigh School of Engineering.
KINETICS AND MECHANISMS OF CREEP IN SINTERED ALPHA SILICON CARBIDE AND NIOBIUM CARBIDE Final Report, 1 May 1982 - 15 Jun. 1985

Robert F. Davis 18 Sep. 1985 60 p
(Grants NSF DMR-81-20804; ARO-MIPR-43-48)
(AD-A161455; ARO-18434.8-MS) Avail: NTIS HC A04/MF A01 CSCL 20/11

Constant stress compressive creep studies and complementary TEM research have been conducted on sintered alpha-SiC and on dense polycrystalline NbCO737 to determine the kinetics and the mechanisms of deformation as a function of temperature and stress. In the former material, the values of the stress exponents of 1.44 to 1.71 indicate that either viscous flow or grain boundary sliding is controlling creep. However, the values of the activation energies (approx. 400 kJ/mol below 1920 K and approx. 850 kJ/mol above 1920K) coupled with the TEM studies which show the presence of considerable dislocation glide activity and the formation of corrugated grain boundaries and the formation of porosity on the boundaries and voids at the triple points. GRA

N86-21956# Naval Postgraduate School, Monterey, Calif.
DETERMINATION OF THE DUCTILE TO BRITTLE TRANSITION TEMPERATURE OF PLATINUM-ALUMINIDE GAS TURBINE BLADE COATINGS M.S. Thesis
David J. Vogel Sep. 1985 63 p
(AD-A161516) Avail: NTIS HC A04/MF A01 CSCL 11/6

A strain-to-failure method was employed with Naval Postgraduate School tensile testing equipment to determine the ductile to brittle transition temperature (DBTT) of five basic platinum-aluminide gas turbine blade coatings on a nickel-base superalloy (IN738). THe results of these tests were compared to similarly formed nickel-aluminide coatings without platinum and aluminum content and structure on coating ductility. GRA

N86-21957# Texas Inst. for Computational Mechanics, Austin.
A FINITE ELEMENT ANALYSIS OF A CLASS OF PROBLEMS IN ELASTO-PLASTICITY WITH HIDDEN VARIABLES Final Report, 1 Feb. 1983 - 1 Oct. 1985
J. T. Oden Sep. 1985 161 p
(Contract DAAG29-83-K-0036)
(AD-A161642; TICOM-85-11; ARO-19499.4-MA) Avail: NTIS HC A08/MF A01 CSCL 12/1

A general theory of finite elastoplasticity deformations is developed which makes use of the generalized Clarke-Rockafellar subdifferentials from non-convex optimization theory and the notion of internal state variables. The theory involves two fundamental potential functionals, the free energy and a general flow potential. An exact kinematical description of large elastic-plastic deformations is given, together with a complete thermodynamics. New finite element methods are derived and several example problems are solved to illustrate the generality and utility of the theory and the numerical schemes. GRA

N86-21958# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
ELASTIC-PLASTIC LOADING AND UNLOADING IN A THICK TUBE WITH KINEMATIC HARDENING THEORY Final Technical Report
Peter C. T. Chen Sep. 1985 23 p Presented at the 3rd Army Conference, Applied Mathematics and Computing, Atlanta, Ga., 13-16 May 1985
(AD-A161733; AD-E440302; ARLCB-TR-85032) Avail: NTIS HC A02/MF A01 CSCL 20/11

Using Tresca's yield criterion, its associated flow rule, and the linear hardening law, analytical solutions have been obtained for elastic-plastic loading and unloading problems in a thick tube subjected to uniform internal pressure. Explicit expressions for the displacement strains, and stresses are presented herein, along with numerical results for a closed-end tube. GRA

N86-21959# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.
THERMO-MECHANICAL AND THERMAL BEHAVIOR OF HIGH-TEMPERATURE STRUCTURAL MATERIALS Final Summary Report, 1 Apr. 1978 - 31 Dec. 1984
D. P. H. Hasselman, M. M. Abraham, G. R. Angell, S. Baskaran, and E. K. Beauchamp 31 Dec. 1984 13 p
(Contract N00014-78-C-0431)
(AD-A161741) Avail: NTIS HC A02/MF A01 CSCL 20/13

A seven-year study was conducted of the thermo-mechanical and thermal behavior of high-temperature structural materials, described in detail in earlier technical interim and end-of-the-fiscal-year letter reports, listed in this bibliography. This reseach project resulted in a total of 85 technical publications in the engineering and scientific literature involving a total of fifty-three different co-authors. Author (GRA)

N86-21960# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
ON THE ROLES OF CORROSION PRODUCTS IN LOCAL CELL PROCESSES Annual Technical Report
H. W. Pickering Jan. 1986 70 p
(Contract N00014-84-K-0201)
(AD-A162448) Avail: NTIS HC A04/MF A01 CSCL 20/11

This paper reviews work performed on the roles that corrosion products play in corrosion and materials degradation processes. Subject areas include: (1) wedging action in which the tensile stresses required for crack propagation are generated by the formation of solid corrosion products within the crack cavity; (2) gas bubble formation and coalescence that eventually fills a major volume segment of a pit, crevice or crack; (3) an experimental determination and mathematical modeling of the local electrode potential and solution composition existing within active pits and crevices; (4) an analysis that shows the existence of a limiting electrode potential, E sub LIM, in a cavity and defines its value; (5) an analysis based on the E sub LIM concept and on known trends in concentrations of ionic species that provides a means for distinguishing between stress corrosion and hydrogen cracking in noble metal alloys. GRA

N86-21961# Failure Analysis Associates, Palo Alto, Calif.
FRACTURE CONTROL FOR FIXED OFFSHORE STRUCTURES Final Report, Apr. 1982 - Jul. 1983
P. M. Besuner, K. Ortiz, J. M. Thomas, and S. D. Adams Dec. 1984 213 p
(AD-A162507; FAA-83-6-2; SSC-328) Avail: NTIS HC A10/MF A01 CSCL 13/13

Literature and telephone surveys were conducted to determine the current status of fracture control as practiced by U.S. designers, builders, and operators. From this, recommendations are made for strengthening industry practices: promising areas for research are identified and prioritized, as are areas where cost-effective improvements could be made within existing technology. A fracture control checklist is also provided as an example of an unstructured, yet responsive, fracture control plan. It appears that there are two basic types of fracture problems. One type occurs because of poor workmanship or direct human error. Examples of this are significant crack initiations due to poor welding technique, construction overloads, and falling objects. Fracture control is achieved in these cases by preventing the errors from occurring. GRA

N86-21962# Pratt and Whitney Aircraft, West Palm Beach, Fla. Engineering Div.
THERMAL MECHANICAL FATIGUE CRACK GROWTH. AN APPLICATION FOR FRACTURE MECHANICS ANALYSES OF GAS TURBINE ENGINE DISKS Interim Report, Mar. 1981 - Jun. 1983
Dale A. Wilson and John R. Warren Mar. 1985 32 p
(Contract F33615-80-C-5160)
(AD-A162634; PW/ED/FR-18538; AFWAL-TR-84-4185) Avail: NTIS HC A03/MF A01 CSCL 20/11

The capability of the existing Hyperbolic Sine Model to accurately or conservatively predict the crack growth in engine components subject to thermal mechanical fatigue (TMF) was investigated. It was determined that existing empirical crack growth models adequately predict TMF crack growth under conditions tested, which reflect the current gas turbine engine retirement for cause requirements/applications. GRA

N86-21963# Rockwell International Science Center, Thousand Oaks, Calif.
INVESTIGATION INTO THE FATIGUE CRACK INITIATION PROCESS IN METALS Final Technical Report, 3 Sep. 1983 - 2 Sep. 1985
Fred W. L. Morris, Brian N. Cox, and Mike R. James Dec. 1985 85 p
(Contract N62269-83-C-0267)
(AD-A162663; SC5379.9FTD) Avail: NTIS HC A05/MF A01 CSCL 20/11

The foundation for a physically derived model of fatigue crack initiation in metals under spectrum loading is described. the work focuses on the microplastic deformation properties of a surface subject to stresses under the bulk elastic limit. A theoretical description of the highly localized plastic strains in individual surface grains, known to be pertinent to aluminum alloys, is developed with the support of high spacial resolution, high sensitivity strain measurements. These are made within individual grains of a Al 2219-T851 model material by a scanning electron microscopy technique. An important finding is that fatigue causes the local flow stresses in individual large surface grains to fall dramatically to less than 50% of their prefatigue values. the local stress-strain behavior is then controlled by the external load spectra, but is greatly influenced by the reaction stresses within a microplastic grain generated when its plasticity is constrained by the essentially elastic surface. Because of the constraint, the local stresses in a grain differ markedly from the applied. The theoretical models developed allow these stresses to be calculated and local mechanical properties of the surface including flow stress and plastic moduli to be estimated from experimental data. An especially interesting anti-clockwise motion of the external stress-local strain hysteresis loop near grain boundaries is observed, and is explained by a simple dual-domain deformation model. It results from an inhomogeneity in mechanical properties with a higher flow stress within the grain near the boundary. Opportunities for the use of such deformation theories to predict crack initiation lifetime are discussed. GRA

N86-21964# Naval Postgraduate School, Monterey, Calif.
GEOMETRICALLY NONLINEAR ANALYSIS OF SHELL STRUCTURES USING FLAT DKT SHELL ELEMENTS Progress Report, 1 Oct. 1984 - 30 Sep. 1985
Jean-Louis Batoz and Gilles Cantin 22 Nov. 1985 68 p
(AD-A162729; NPS69-85-007PR) Avail: NTIS HC A04/MF A01 CSCL 20/11

This report describes nonlinear analysis of arbitrary thin shell structures subjected to static loads. The nonlinear analysis includes pre and post-buckling behavior for any degree of nonlinearity due to large displacements and large rotations but small strains. The formulation includes some recent developments of plate and shell theories, automatic solution strategies for the nonlinear equations; all adapted for implementation in mini and micro-computers with virtual memory. GRA

N86-21965# Dayton Univ., Ohio. Research Inst.
OVERLOAD EFFECTS IN SUSTAINED LOAD CRACK GROWTH IN INCONEL 718 Interim Report, Jan. - Oct. 1985
T. Weerasooriya and T. Nicholas Nov. 1985 32 p
(Contract F33615-84-C-5051)
(AD-A162739; AFWAL-TR-85-4121) Avail: NTIS HC A03/MF A01 CSCL 20/11

Crack-growth-rate experiments were conducterd on CT specimens of Inconel 718 at 649 C. The loading spectrum consisted of a single 1 Hz cycle at R = 0.1 and a hold time. The ratio of the amplitude of the hold time to the maximum amplitude of the fatigue cycle, R sub in, was 1.0, 0.9, 0.8 and 0.5 with hold times from 0 to 200 s. Tests were performed under computer controlled constant K conditions using values of the maximum of the fatigue cycle of 40 and 50 MPa. the square root of m. Data show that for R sub in = 1.0, a linear summation model works well, while at R sub in = 0.9 there is a measurable retardation effect on the crack growth during the hold time. For values of R sub in less than 0.8, the sustained load crack growth is almost completely retarded. A simple retardation model is proposed which can fit the experimental data and is based on the concept of an overload plastic zone being produced by the fatigue cycles. It is concluded that hold times do not contribute to crack growth in this material unless their amplitude is at or near the maximum amplitude of the adjacent fatigue cycles. Author (GRA)

N86-21966# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
AIRBLAST LOADING OF WALL PANELS
Rickard Forsen Oct. 1985 24 p refs
(FOA-C-20586-D6; ISSN-0347-3694) Avail: NTIS HC A02/MF A01

Wall panels used in houses, including walls of reinforced concrete, brick mansonry, light weight concrete, and sandwich constructions, were laterally loaded with static and dynamic pressure. One way action elements in a full storey high test bench were used. Pressure load, deflection, and mode of deflection were recorded. Comparison of the test results for deflection with results from a single degree of freedom analysis indicates an increase of resistance at high velocities of deflection. Dynamic increase factors for the static resistance function were evaluated and used in calculations of isodamage curves for the walls tested. Author (ESA)

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-21967 Stanford Univ., Calif.
SPATIAL CLASSIFICATION OF URBAN LANDSCAPES FROM LANDCOVCER PROBAABILITIES DERIVED THROUGH REMOTE SENSING Ph.D. Thesis
Edward C. Driscoll, Jr. 1985 172 p
Avail: Univ. Microfilms Order No. DA8522134

A technique for classification of urban landuses from remotely sensed data such as aerial photographs is presented. Simulating the behavior of a human airphoto interpreter, it uses a two-stage approach, recognizing first landcover and then landuse. In the first stage a straightforward multispectral classification technique is used to generate probability maps for a set of urban landcovers, e.g., grass, trees, asphalt, concrete, and shadow. Then the spatial nature of these landcover probabilities is examined and landuses are predicted based on neighborhood landcover mix and structure. Varying neighborhood sizes are explored. The algorithm is tested on a large urban dataset of Palo Alto, California, obtained by scanning a high altitude, infrared, aerial photograph to an effective resolution of 1.5 meters. Dissert. Abstr.

N86-21968*# Southern Methodist Univ., Dallas, Tex. Dept. of Geological Sciences.
CONSTRAINTS ON LITHOSPHERIC STRUCTURE FROM SATELLITE POTENTIAL FIELD DATA: AFRICA AND ASIA. ANALYSIS AND INTERPRETATION OF MAGSAT ANOMALIES OVER NORTH AFRICA Final Technical Report, 1 Mar. 1983 - 31 May 1985
Roger J. Phillips [1986] 104 p refs
(Grant NAG5-298)
(NASA-CR-176611; NAS 1.26:176611) Avail: NTIS

HC A06/MF A01 CSCL 08G

Crustal anomaly detection with MAGSAT data is frustrated by the inherent resolving power of the data and by contamination from the external and core fields. The quality of the data might be tested by modeling specific tectonic features which produce anomalies that fall within the proposed resolution and crustal amplitude capabilities of the MAGSAT fields. To test this hypothesis, the north African hotspots associated with Ahaggar, Tibestia and Darfur have been modeled as magnetic induction anomalies due solely to shallower depth to the Curie isotherm surface beneath these features. The MAGSAT data were reduced by subtracting the external and core fields to isolate the scalar and vertical component crustal signals. The predicted model magnetic signal arising from the surface topography of the uplift and the Curie isotherm surface was calculated at MAGSAT altitudes by the Fourier transform technique modified to allow for variable magnetization. In summary it is suggested that the region beneath Ahaggar is associated with a strong thermal anomaly and the predicted anomaly best fits the associated MAGSAT anomaly if the African plate is moving in a northeasterly direction. Author

N86-21969*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

COMPARISON OF MANUALLY PRODUCED AND AUTOMATED CROSS COUNTRY MOVEMENT MAPS USING DIGITAL IMAGE PROCESSING TECHNIQUES

Lisa K. Wynn 15 Dec. 1985 111 p refs

(Contract NAS7-100)

(NASA-CR-176653; JPL-PUB-85-90; NAS 1.26:176653) Avail: NTIS HC A06/MF A01 CSCL 05B

The Image-Based Information System (IBIS) was used to automate the cross country movement (CCM) mapping model developed by the Defense Mapping Agency (DMA). Existing terrain factor overlays and a CCM map, produced by DMA for the Fort Lewis, Washington area, were digitized and reformatted into geometrically registered images. Terrain factor data from Slope, Soils, and Vegetation overlays were entered into IBIS, and were then combined utilizing IBIS-programmed equations to implement the DMA CCM model. The resulting IBIS-generated CCM map was then compared with the digitized manually produced map to test similarity. The numbers of pixels comprising each CCM region were compared between the two map images, and percent agreement between each two regional counts was computed. The mean percent agreement equalled 86.21%, with an areally weighted standard deviation of 11.11%. Calculation of Pearson's correlation coefficient yielded +9.997. In some cases, the IBIS-calculated map code differed from the DMA codes: analysis revealed that IBIS had calculated the codes correctly. These highly positive results demonstrate the power and accuracy of IBIS in automating models which synthesize a variety of thematic geographic data. Author

N86-21970*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PERFORMANCE EVALUATION AND GEOLOGIC UTILITY OF LANDSAT-4 THEMATIC MAPPER DATA

Earnest D. Paylor, Michael J. Abrams, James E. Conel, Anne B. Kahle, and Harold R. Lang 15 Oct. 1985 77 p refs

(Contract NAS7-918)

(NASA-CR-176660; JPL-PUB-85-66; NAS 1.26:176660) Avail: NTIS HC A05/MF A01 CSCL 08B

The overall objective of the project was to evaluate LANDSAT-4 Thematic Mapper (TM) data in the context of geologic applications. This involved a quantitative assessment of the data quality including the spatial and spectral characteristics realized by the instrument. Three test sites were selected for the study: (1) Silver Bell, Arizona; (2) Death Valley, California; and (3) Wind River/Bighorn Basin area, Wyoming. Conclusions include: (1) Artificial and natural targets can be used to atmospherically calibrate TM data and investigate scanner radiometry, atmospheric parameters, and construction of atmospheric Modulation Transfer Functions (MTF's), (2) No significant radiometric degradation occurs in TM data as a result of SCROUNGE processing; however, the data exhibit narrow digital number (DN) distributiosn suggesting that the configuration of the instrument is not optimal for each science applications, (30 Increased spatial resolution, 1:24,000 enlargement capability, and good geometric fidelity of TM data allow accurate photogeologic/geomorphic mapping, including relative age dating of alluvial fans, measurement of structural and bedding attitudes, and construction of such things as structural cross sections and stratigraphic columns. (4) TM bands 5 and 7 are particularly useful for geologic applications because they span a region of the spectrum not previously sampled by multispectral scanner data and are important for characterizing clay and carbonate materials. Author

N86-21971# Geological Survey, Flagstaff, Ariz.

DESERT STUDIES: A GLOBAL VIEW Final Report, 5 Apr. 1982 - 30 Jun. 1985

John F. McCauley, Carol S. Breed, and Maurice J. Grolier 23 Aug. 1985 24 p

(Contract MIPR-155-84)

(AD-A161453; ARO-18405.12-GS) Avail: NTIS HC A02/MF A01 CSCL 08/6

Results of work on summary reports of the surficial geology and geomorphology of Coastal Peru, Western Desert of Egypt/Sudan, and deserts of China (including the Taklimakan, Badan Jarain, and Hohsi Corridor) are outlined. Sections of summary reports on these hyperarid regions have been published as journal articles, interim technical reports, and abstracts. Significant new findings have been described in interim published reports on the Western Desert. These include the discovery of a buried paleofluvial terrain, over printed by aeolian erosion and deposition, which controls the topography and trafficability of much of southwest Egypt and northwest Sudan. A new model for the Western Desert relates a series of superposed river networks, concealed beneath a centimeters-to-meters thick veneer of wind blown sand sheets and dunes to the composition and distribution of surficial and subjacent geologic units, including soil parent materials. A key finding has been the role of groundwater carbonate deposition in recording the sequence of Quarternary fluvial episodes and climatic fluctuations in this region, as well as the present-day influence of the caliche deposits on radar responses of interfluve, valley fill, and inset channel units. Preliminary results of field reconnaissance, LANDSAT, and Shuttle Imaging Radar (SIR-A and SIR-B) studies of deserts in Northwest China show evidence there, too, of radar signal penetration through dry sand to underlying bedrock and alluvium. GRA

N86-21972# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Fernerkundung.

INVESTIGATION OF THE INFORMATION CONTENT OF LANDSAT THEMATIC MAPPER (TM) AND SPOT MULTIBAND IMAGE DATA USING SIMULATED IMAGE DATA OF THE FREIBURG REGION

Werner Kirchhof, Wolfram Mauser (Freiburg Univ., West Germany), and Hans-Juergen Stiebig (Freiburg Univ., West Germany) Jun. 1985 146 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-975) Original contains color illustrations

(DFVLR-FB-85-49; ISSN-0171-1342) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 52

A comparative analysis of information content was performed using data sets with pixel sizes of 10, 20, 30, 50, and 80 m from LANDSAT TM simulation. The discrimination of objects, structures, and texture, depending on pixel size and combination of spectral bands, was investigated by visual interpretation and supervised classification for applications in agriculture and forestry. The new TM bands produce significant improvements in the separation of vegetated and built-up areas as well as in the delineation of the status of growth and humidity in comparison with LANDSAT MSS. The thematic mapper is eminently suited for the extraction of thematic information of surface areas of 1 hectare or more. Three to four spectral bands are normally sufficient. The information content of 20 m SPOT multiband data does not differ essentially

from that of comparable TM bands (TM2, TM3, TM4). A substantial complement to the TM information are structure and texture elements of the panchromatic 10 m SPOT band. Author (ESA)

N86-21973# Auburn Univ., Ala. Water Resources Research Inst.
[RESEARCH PROJECTS OF THE WATER RESOURCES RESEARCH INSTITUTE DURING FY 1983] Final Report
J. C. Warman and D. H. Block 1 May 1985 15 p
(Contract DI-14-08-0001-G-880)
(PB86-101235; USGS/G-880-01) Avail: NTIS HC A02/MF A01 CSCL 08H

Alabama's Water Resources Research Institute began expenditure of FY 1983 funds under Grant No. 14-08-0001-G880 about June 1, 1983, supporting six research projects. One project performed a sensitivity analysis of a biological toxicity model of an activated sludge process. The analysis indicated that the single most important factor in determining model output (based on the effluent organics concentration) is the retention time in the reactor and the second most important factor is the floc radius. Other projects addressed biodegradation of potential ground water pollutants by microorganisms in subsurface soil horizons; optimization of irrigation techniques to reduce water needs for fields with irregular boundaries. GRA

N86-21974# Colorado State Univ., Fort Collins.
COLORADO WATER RESOURCES RESEARCH INSTITUTE ACTIVITIES REPORT, FY 1981-1984 Final Report
Jun. 1985 26 p
(Contract DI-14-08-0001-G-895)
(PB86-101367; USGS/G-895-01) Avail: NTIS HC A03/MF A01 CSCL 08H

An overview is provided of activities of the Colorado Water Resources Research Institute during FY1981 - 1984. The report provides a summary of Institute programs for FY 1981 to 1984. Selected examples of completed research integrated basinwide water management; surface and groundwater management; groundwater recharge; urban drainage; computer-assisted water resources planning; urban water conservation; development of drought-tolerant crops; and water quality management for metal mining operations. GRA

N86-21975# Environmental Protection Agency, Atlanta, Ga.
FRESHWATER WETLANDS FOR WASTEWATER MANAGEMENT ENVIRONMENTAL ASSESSMENT HANDBOOK
Sep. 1985 516 p refs
(PB86-106564; EPA-904/9-85-135) Avail: NTIS HC A22/MF A01 CSCL 08H

The Freshwater Wetlands Handbook provides institutional, scientific and engineering guidance for the use of natural, freshwater wetlands for wastewater management. Wetlands have long been recognized for their pollutant removal capabilities and many have been used for wastewater management for some time. Little technical or institutional guidance currently exists for regulating these stems or for planning new systems. This Handbook provides guidance for state and federal regulatory agencies and potential dischargers evaluating wetlands for wastewater disposal or pollutant removal. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-21976 Northwestern Univ., Evanston, Ill.
STUDY OF MECHANISMS OF IONIC TRANSPORT IN CRYSTALLINE AND GLASSY SOLID ELECTROLYTES Ph.D. Thesis
Alexander Pechenik 1985 240 p
Avail: Univ. Microfilms Order No. DA8523571

Ionic conductivity in crystalline (beta'-alumina) and amorphous (beta-eucryptite glass) solid electrolytes has been investigated both theoretically (using Monte-Carlo computer simulation techniques) and experimentally. A powerful Monte Carlo technique has been developed and applied to study order-disorder transitions and transport properties (diffusion and frequency dependent conductivity) in beta'-alumina. The curvature of the Arrhenius plots of ionic conductivity observed experimentally has been explained on the basis of the order-disorder transition taking place in this system. Both long-range order (S) and short range order parameters have been calculated as functions of temperature. Also, the effects of mixing of mono- and divalent ions on the beta'-alumina typle lattice have been investigated. For the amorphous electrolyte (beta-eucryptite glass), the ionic conductivity has been measured using the complex impedance method and the structure of the glass has been elucidated using Raman and IR spectroscopy and X-ray diffraction. Dissert. Abstr.

N86-21977*# National Aeronautics and Space Administration, Washington, D.C.
THERMAL DEFORMATION OF CONCENTRATORS IN AN AXISYMMETRIC TEMPERATURE FIELD
R. Bairamov, Yu. I. Machuev, A. Nazarov, Ye. V. Sokolov, L. A. Solodovnikova, and V. G. Fokin Dec. 1985 12 p refs Transl. into ENGLISH from Akademiya Nauk Turkmenskoy SSR, Izvestiya, Seriya Fiziko-Tekhnicheskikh, Khimicheskikh i Geologicheskikh Nauk (USSR), no. 2, 1981 p 26-31 Original language document was announced in IAA as A81-32157 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77935; NAS 1.15:77935) Avail: NTIS HC A02/MF A01 CSCL 10A

Axisymmetric thermal deformations of paraboloid mirrors, due to heating, are examined for a mirror with a optical axis oriented toward the Sun. A governing differential equation is derived using Mushtari-Donnel-Vlasov simplifications, and a solution is presented which makes it possible to determine the principal deformation characteristics. Author

N86-21978*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIGHTWEIGHT NICKEL ELECTRODE FOR NICKEL HYDROGEN CELLS AND BATTERIES
Doris L. Britton [1986] 10 p refs Presented at the 32nd International Power Sources Symposium, Cherry Hill, N.J., 9-12 Jun. 1986; sponsored by Army
(NASA-TM-87253; E-2942; NAS 1.15:87253) Avail: NTIS HC A02/MF A01 CSCL 10C

The nickel electrode was identified as the heaviest component of the nickel hydrogen (NiH2) battery. The NASA Lewis Research Center is developing nickel electrodes for NiH2 battery devices which will be lighter in weight and have higher energy densities when cycled under a low Earth orbit regime at deep depths of discharge. Lightweight plaques are first exposed to 31 percent potassium hydroxide for 3 months to determine their suitability for use as electrode substrates from a chemical corrosion standpoint. Pore size distribution and porosity of the plaques are then measured. The lightweight plaques exemined are nickel foam, nickel felt, nickel plastic and nickel plated graphite. Plaques are then electrochemically impregnated in an aqueous solution. Initial characterization tests of the impregnated plaques are performed at five discharge levels, C/2, 1.0 C, 1.37 C, 2.0C, and 2.74 C rates. Electrodes that passed the initial characterization screening test will be life cycle tested. Lightweight electrodes are approximately 30 to 50 percent lighter in weight than the sintered nickel electrode. Author

N86-21979*# TriSolar Corp., Bedford, Mass.
DEVELOPMENT OF A MICROPROCESSOR CONTROLLER FOR STAND-ALONE PHOTOVOLTAIC POWER SYSTEMS Final Report
Alan R. Milliner and David L. Kaufman Jun. 1984 192 p
(Contracts DEN3-310; DE-AI01-79ET-20485)
(NASA-CR-174723; DOE/NASA/0310-1; NAS 1.26:174723) Avail: NTIS HC A09/MF A01 CSCL 10B

A controller for stand-alone photovoltaic systems has been developed using a low power CMOS microprocessor. It performs battery state of charge estimation, array control, load management, instrumentation, automatic testing, and communications functions. Array control options are sequential subarray switching and maximum power control. A calculator keypad and LCD display provides manual control, fault diagnosis and digital multimeter functions. An RS-232 port provides data logging or remote control capability. A prototype 5 kW unit has been built and tested successfully. The controller is expected to be useful in village photovoltaic power systems, large solar water pumping installations, and other battery management applications. Author

N86-21980*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE AGING CORRELATION (RH + t): RELATIVE HUMIDITY (%) + TEMPERATURE (DEG C)
E. F. Cuddihy 15 Jan. 1986 22 p refs
(JPL Proj. 5101-283; Contract DE-AI01-85CE-89008)
(NASA-CR-176661; JPL-PUB-86-7; DOE/JPL-1012-121; NAS 1.26:176661) Avail: NTIS HC A02/MF A01 CSCL 10A

An aging correlation between corrosion lifetime, and relative humidity RH (%) and temperature t (C) has been reported in the literature. This aging correlation is a semi-log plot of corrosion lifetime on the log scale versus the interesting summation term [RH(%) + t(C)] on the linear scale. This empirical correlation was derived from observation of experimental data trends and has been referred to as an experimental law. Using electrical resistivity data of polyvinyl butyral (PVB) measured as a function of relative humidity and temperature, it was found that the electrical resistivity could be expressed as a function of the term [RH(%) t(C)]. Thus, if corrosion is related to leakage current through an organic insulator, which, in turn, is a function of RH and t, then some partial theoretical validity for the correlation is indicated. This article describes the derivation of the term [RH(%) t(C)] from PVB electrical resistivity data. Author

N86-21981*# National Aeronautics and Space Administration. Pasadena Office, Calif.
HIGH BAND GaP 3-5 TUNNELING JUNCTION FOR SILICON MULTIJUNCTION SOLAR CELLS Patent Application
Taher Daud (JPL, Pasadena, Calif.) and Akaram H. Kachare, inventors (to NASA) (JPL, Pasadena, Calif.) Filed 17 Dec. 1985 11 p
(Contract NAS7-918)
(NASA-Case-NPO-16526-1CU; NAS 1.71:NPO-16526-1CU; US-Patent-Appl-SN-809975) Avail: NTIS HC A02/MF A01 CSCL 10A

A multijunction silicon solar cell of high efficiency is provided by providing a tunnel junction between the solar cell junctions to connect them in series. The tunnel junction is comprised of p(+) and n(+) layers of high band gap 3 to 5 or 2 to 6 semiconductor materials that match the lattice structure of silicon, such as GaP (band gap 2.24 eV) or ZnS (band gap 3.6 eV), each of which has a perfect lattice match with silicon to avoid defects normally associated with lattice mismatch. NASA

N86-21982*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AIRBORNE TRACKING SUN PHOTOMETER APPARATUS AND SYSTEM Patent Application
Tak Matsumoto, Cesar Mina, Philip Russell, and William VanArk, inventors (to NASA) Filed 29 Jan. 1986 17 p
(NASA-Case-ARC-11622-1; NAS 1.71:ARC-11622-1; US-Patent-Appl-SN-823712) Avail: NTIS HC A02/MF A01 CSCL 10A

An airborne tracking Sun photometer apparatus has a rotatable dome. An aximuth drive motor is connected to rotate the dome. The dome has an equatorial slot. A cylinderical housing is pivotally mounted inside the dome at the equatorial slot. A photometer is mounted in the housing to move in the equatorial slot as the housing pivots. The photometer has an end facing outward from the slot with an optical flat transparent window. An elevation drive motor is connected to pivot the cylindrical housing. The rotatable dome is mounted in bulkhead of an aircraft to extend from the interior of the aircraft. A Sun sensor causes the photometer to track the Sun automatically. Alternatively, the photometer may be oriented manually (by voltages or by computer). NASA

N86-21983# European Space Agency, Paris (France).
SOLAR ENERGY 85: RESOURCES, TECHNOLOGIES, ECONOMICS
W. R. Burke, comp. Nov. 1985 229 p refs Proceedings of Summer School Papers, Igls, Austria; organized by Austrian Solar and Space Agency, and DFVLR; sponsored by ESA, Swiss Federal Office of Energy and Swedish Council for Building Research
(ESA-SP-240; ISSN-0379-6566) Avail: NTIS HC A11/MF A01

The physics and potential of solar energy; solar energy and insulation; collection and storage of solar energy; process heat and chemicals; photochemistry and hydrogen; solar power plants and photovoltaics; technology assessment and space applications; and the place of solar energy in energy policies were discussed. For individual titles, see N86-21984 through N86-21997.

N86-21984# Ludwig-Maximilians-Universitaet, Munich (West Germany).
SOLAR RADIATIVE ENERGY
Rudolf Sizmann *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 5-16 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Solar radiation conversion into heat, and electrical and chemical energy is discussed. The theoretical limits of energy conservation along these conversion paths are considered. Thermal conversion is improved by use of optically selective absorbers. There are fundamental analogies between photovoltaics, photochemical and (optically selective) photothermal processes. Natural photosynthesis is taken as an example for a balance of energy yield from solar irradiance. Author (ESA)

N86-21985# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany).
THE OTHER ASPECT OF SOLAR ENERGY UTILIZATION. SOLAR TECHNOLOGIES EXPORT ENHANCEMENT: A CENTRAL EUROPEAN POINT OF VIEW
C.-J. Winter, J. Nitsch, H. Klaiss, and C. Voigt *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 17-31 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

It is shown that solar energy utilization can, on a moderate scale, supplement the indigenous energy supply of the Federal Republic of Germany. It can contribute to the prevention of fatal ecological damage, open an attractive export market and, in the long run, prepare ground for North-South compensation, where energy-poor but technology rich countries cooperate with countries of the Third World, which are often rich in raw materials and are situated in the solar belt of the world, for the benefit of the implementation of a solar industry or the production of a marketable synthetic solar energy carrier. Author (ESA)

N86-21986# European Space Agency, Paris (France).
PASSIVE AND HYBRID SOLAR SYSTEMS
S. Robert Hastings (EMPA, Dubendorf, Switzerland) *In its* Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 35-43 refs Sponsored by Swiss Federal Energy Office, Bern, and Swiss National Energy Research Foundation, Basel (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Passive solar systems are introduced. The four most common types of system are direct gain windows, air collectors, mass walls, and sunspaces. For each system type the concept, an example, design considerations, calculation methods, performance data, and suggested reading are presented. Conclusions are valid for central and to an extent for northern Europe. Author (ESA)

N86-21987# Wuerzburg Univ. (West Germany). Inst. fuer Physik.
TRANSPARENT SUPERINSULATING MATERIALS: NEW ASPECTS IN SOLAR TECHNOLOGY
J. Fricke *In* ESA Solar Energy 85: Resources, Technol., Econ. Nov. 1985 p 45-52 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Silica aerogel utilization in architecture is discussed. Silica aerogel is a solid inorganic material of high porosity with an open microstructure smaller than the wavelength of visible light. It is made from tetramethoxysilane, which is catalytically converted into an alcogel. Supercritical drying in an autoclave produces transparent aerogel tiles or translucent aerogel granulate. Aerogel has a small Young's modulus (1 to 10 million N/sq m) and can be mechanically loaded with 200,000 N/sq m. Evacuated aerogel provides excellent thermal insulation at 300 K (thermal conductivity 0.008 W/(m.K)) and this is suitable as a spacer in windows or in covers for passive solar systems. Author (ESA)

N86-21988# Philips G.m.b.H., Aachen (West Germany). Forschungslab.
SOLAR SYSTEMS WITH HIGHLY EFFICIENT COLLECTORS
B. Vitt *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 55-61 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Seasonal performance data of solar thermal systems are reported. For southern and middle European climatic conditions, systems with constant operating temperature, two types of a domestic hot water system, as well as a space heating system were evaluated. The results are related to the thermo-optical properties of the collectors. A heat pipe evacuated tubular collector was examined. The impact of the optimization of the selective absorber coating on performance was studied. It is concluded that optimized evacuated tube collectors can be used to generate heat at temperatures > 200 C. Author (ESA)

N86-21989# Studsvik Energiteknik A.B., Nykoping (Sweden).
DISTRICT HEATING BY SOLAR ENERGY WITH HEAT STORAGE
Heimo Zinko *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 63-82 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Solar district heating in middle and northern European climates is discussed. Well performing collectors can easily be directly applied for producing 10% to 15% of the yearly energy needs in district heating systems. It can be shown that the introduction of small daily storage is beneficial for the load management of the total system. This holds even more if long term storage is introduced for systems with solar fractions > 30%. Solar energy systems with different types of storage and an economic outlook based on Swedish experience are outlined. Author (ESA)

N86-21990# Ludwig-Maximilians-Universitaet, Munich (West Germany).
PROCESS HEAT APPLICATIONS
Rudolf Sizmann *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 85-91 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Conversion of solar energy into industrial process heat is discussed. The demand for industrial process heat energy exhibits distinct regimes of maximum usage: at medium temperatures, i.e., < 300 C, and 1150 C. Solar radiation converted to process heat energy can be used as fuel saver but also for solar unique applications: direct absorption, uncommonly high temperatures, and photocatalytic promotion of thermochemical reactions. The fluctuating input causes logistics and materials problems. Thermochemical reactions under consideration for pilot tests are mentioned. Author (ESA)

N86-21991# Bern Univ. (Switzerland). Dept. of Inorganic and Physical Chemistry.
PHOTOCHEMICAL, ELECTROCHEMICAL AND THERMOCHEMICAL TRANSFORMATION AND STORAGE OF SOLAR ENERGY: THERMODYNAMIC ASPECTS
Gion Calzaferri *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 93-100 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Arguments of the reversible and irreversible chemical thermodynamics are explained and applied to the transfer and storage of solar energy chemical and radiation potential. The key processes are identified as water splitting, carbon dioxide reduction and nitrogen reduction. Results on photochemical storage processes are reported. Author (ESA)

N86-21992# Technische Univ., Vienna (Austria). Inst. for Theoretical Chemistry and Radiation Chemistry.
CRITICAL VIEW OF PHOTOCHEMICAL AND PHOTOELECTROCHEMICAL METHODS FOR HYDROGEN PRODUCTION
Nikola Getoff *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 103-114 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Methods for hydrogen production by water splitting using solar energy are reviewed. Water photolysis and solar radiation; homogeneous and heterogeneous photoredox sysems; photogalvanic cells; liquid-junction transducers; and hybrid water splitting systems are discussed. Results concerning the reaction mechanisms of decomposition reactions are presented. The most promising systems for hydrogen production by solar energy seem to be liquid-junction transducers and hybrid systems. Author (ESA)

N86-21993# Joint Research Centre of the European Communities, Ispra (Italy).
ROLE OF HYDROGEN IN SOLAR ENERGY UTILIZATION: PROBLEMS AND ASPECTS OF THE HYDROGEN ISSUE
J. Gretz *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 115-127 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

The thermodynamics of water splitting is reviewed. A hydrogen-based, clean energy supply concept comprising the production of hydrogen by hydropower, its transportation to Europe, and its storage and use in different forms is described. The economic aspects are treated. Author (ESA)

N86-21994# Eidgenoessisches Inst. fuer Reaktorforschung, Wuerenlingen (Switzerland).
EXPERIENCES WITH SOLAR POWER
P. Kesselring *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 131-144 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Experience with solar thermal plants is reviewed. The component and subsystems development of the last decade and particularly the receiver, collector and heliostat field development is a technical success. Solar specific problems on the system and component level arose, when off the shelf solutions of fossile fired plants were transferred uncritically. It is shown that concentrated solar radiation is a relatively cheap high quality fuel. Other uses than electricity generation are high temperature processes and the production of solar fuels and chemicals. A

technical and economic comparison of solar thermal and photovoltaic electricity generation is made. Author (ESA)

N86-21995# Fraunhofer-Inst. fuer Systemtechnik und Innovationsforschung, Karlsruhe (West Germany).
TECHNOLOGY ASSESSMENT OF SOLAR ENERGY UTILIZATION
F. Jaeger *In* ESA Solar Energy 85: Resources, Technologies, Economies Nov. 1985 p 147-151 refs Sponsored by Deutsche Forschungsgemeinschaft (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

The general objectives and methods of Technology Assessment (TA) are outlined. Typical analysis steps of a TA for solar energy are reviewed: description of the technology and its further development; identification of impact areas; analysis of boundary conditions and definition of scenarios; market penetration of solar technologies; projection of consequences in areas of impact; and assessment of impacts and identification of options for action. Author (ESA)

N86-21996# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SPACE APPLICATIONS OF SOLAR ENERGY SYSTEMS
K. Bogus and D. Kassing *In its* Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 153-167 refs (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

Space solar energy systems are reviewed. The European technology development program is discussed. Interactions with non-European space programs, and interactions with the development of terrestrial photovoltaics are considered. Author (ESA)

N86-21997# Austrian Solar and Space Agency, Vienna.
SOLAR ENERGY: ONE DECADE OF RESEARCH AND APPLICATION, REVIEW AND OUTLOOK
G. Faninger *In* ESA Solar Energy 85: Resources, Technologies, Economics Nov. 1985 p 205-211 (For primary document see N86-21983 12-44)
Avail: NTIS HC A11/MF A01

The state of the art of solar technologies, and the problems opposing their large-scale market introduction are described. Hydrogen production, heat generation, and electricity production are considered. Author (ESA)

N86-21998# Naval Weapons Center, China Lake, Calif.
GEOTHERMAL POTENTIAL OF ADAK ISLAND, ALASKA Interim Report, 1976 - 1982
Allan M. Katzenstein and James A. Whelan Oct. 1985 93 p
(AD-A161824; AD-E900526; NWC-TP-6676) Avail: NTIS HC A05/MF A01 CSCL 08/7

The U.S. Naval Station, Adak, Alaska, is dependent on JP-5 jet fuel for all power and space heating requirements. In the Navy's continuing program to explore alternative energy sources, investigations have been undertaken into the geothermal potential of Adak Island. Extensive geological, geophysical, and geochemical investigations and the results obtained from drilling observation holes indicated that a geothermal potential exists. Further drilling should be accomplished to verify whether an economic geothermal resource can be developed. GRA

N86-21999# Naval Weapons Center, China Lake, Calif.
COSO: EXAMPLE OF A COMPLEX GEOTHERMAL RESERVOIR Final Report, 1984 - 1985
Carl F. Austin and William F. Durbin Sep. 1985 101 p
(Z08-29)
(AD-A162575; AD-E900521; NWC-TP-6658) Avail: NTIS HC A06/MF A01 CSCL 08/7

The Coso geothermal system has been widely studied and reported by scientists through the past several years, but there is still a considerable divergence of opinion regarding the structural setting, origin, and internal structure of this energy resource. Because of accelerating exploration and development drilling that is taking place, there is a need for a reservoir model that is consistent with the limited geologic facts available regarding the area. GRA

N86-22000# Sandia National Labs., Albuquerque, N. Mex.
OPTICAL EFFECTS OF THIN FILM ADHESIVES IN MECHANICALLY STACKED MULTIJUNCTION SOLAR CELLS
R. B. Siegel 1985 8 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001620; SAND-85-1160C; CONF-851043-4) Avail: NTIS HC A02/MF A01

The use of multijunction solar cells allows an increased utilization of the solar spectrum and thereby increases cell efficiency. The optical coupling of cells with different bandgaps used in a mechanically stacked configuration, however, causes some concern since the gains from the bottom cell can be effectively negated by reflectance losses between the cells. A short outline of the theory of thin film optics as applied to this situation is presented. Theoretical reflectances of single and multiple layer adhesives between AlGaAs and Si cells are developed. An option currently being investigated for a series connected multijunction cell is illustrated. The multijunction cell with multilayer adhesives could have less than 2% reflectance loss between the cells. This compares most favorably to the 25% reflectance loss of thick adhesive layers. DOE

N86-22001# Sandia National Labs., Albuquerque, N. Mex.
TEST DATA ANALYSIS FOR CONCENTRATING PHOTOVOLTAIC ARRAYS
A. B. Maish and J. E. Cannon 1985 7 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001623; SAND-85-1150C; CONF-851043-3) Avail: NTIS HC A02/MF A01

A test data analysis approach for use with steady state efficiency measurements taken on concentrating photovoltaic arrays is presented. The analysis procedures can be used to identify based and erroneous data. The steps involved in analyzing the test data are screening the data, developing coefficients for the performance equation, analyzing statistics to ensure adequacy of the regression fit to the data, and plotting the data. In addition, this paper analyzes the sources and magnitudes of precision and bias errors that affect measurement accuracy are analyzed. DOE

N86-22002# Public Service Electric and Gas Co., Newark, N. J.
UTILITY CYCLE TESTING OF A 500-kWh ZINC CHLORIDE BATTERY AT THE BATTERY ENERGY STORAGE TEST (BEST) FACILITY Final Report
E. A. Hyman Oct. 1985 88 p
(Contract DE-AC02-76ET-29368)
(DE86-001598; EPRI-EM-4295) Avail: NTIS HC A05/MF A01

A 500-kWh zinc chloride battery test system completed an entire schedule of 80 simulated utility and customer application cycles - the most diverse and severe known to be successfully performed by any advanced battery system. Encouraged by these results, researchers plan to have a 2-MW demonstration battery system ready for testing in 1986. DOE

N86-22003# Pacific Northwest Lab., Richland, Wash.
OPPORTUNITIES IN PULSE COMBUSTION
D. L. Brenchley and H. J. Bomelburg Oct. 1985 24 p
(Contract DE-AC06-76RL-01830)
(DE86-001436; PNL-5563) Avail: NTIS HC A02/MF A01

In most pulse combustors, the combustion occurs near the closed end of a tube where inlet valves operate in phase with the pressure amplitude variations. Thus, within the combustion zone, both the temperature and the pressure oscillate around a mean value. However, the development of practical applications of pulse combustion has been hampered because effective design requires the right combination of the combustor's dimensions, valve characteristics, fuel/oxidizer combination, and flow pattern. Pulse

combustion has several additional advantages for energy conversion efficiency, including high combustion and thermal efficiency, high combustion intensity, and high convective heat transfer rates. Also, pulse combustion can be self-aspirating, generating a pressure boost without using a blower. This allows the use of a compact heat exchanger that may include a condensing section and may obviate the need for a chimney. In the last decade, these features have revived interest in pulse combustion research and development, which has resulted in the development of a pulse combustion air heater by Lennox, and a pulse combustion hydronic unit by Hydrotherm, Inc. To appraise this potential for energy savings, a systematic study was conducted of the many past and present attempts to use pulse combustion for practical purposes. The authors recommended areas where pulse combustion technology could possibly be applied in the future and identified areas in which additional R and D would be necessary. Many of the results of the study project derived from a special workshop on pulse combustion. This document highlights the main points of the study report, with particular emphasis on pulse combustion application in chemical engineering. DOE

N86-21726# Joint Publications Research Service, Arlington, Va.
TDK AFFILIATE DEVELOPS NEW SOLAR POWER CELL
In its Japan Report: Science and Technology (JPRS-JST-86-001) 10 Jan. 1986 p 52 Repr. from Kyodo (Tokyo, Japan), 0727 GMT, 21 Nov. 1985 (For primary document see N86-21723 12-31) Avail: NTIS HC A04/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-22004# Institute for Defense Analyses, Alexandria, Va.
NUCLEAR WINTER: SMOKE GENERATION, DEPOSITION, AND REMOVAL Final Report
Ernest Bauer Dec. 1984 118 p
(Contract MDA903-84-C-0031)
(AD-A161807; AD-E500730; IDA-M-24; IDA/HQ-84-29173) Avail: NTIS HC A06/MF A01 CSCL 18/3

The Nuclear Winter scenario predicts a major worldwide cooling arising from the large quantities of soot deposited in the atmosphere from fires ignited by the explosions in a large nuclear exchange. This document reviews the source function for smoke associated with urban and forest fires, addressing the smoke composition and predicted smoke cloud rise height. The interaction of the smoke cloud with the atmosphere is complex and depends on weather conditions. Results from past forest fires demonstrate what can actually happen to smoke clouds. GRA

N86-22005# Weston (Roy F.), Inc., West Chester, Pa.
INSTALLATION RESTORATION GENERAL ENVIRONMENTAL TECHNOLOGY DEVELOPMENT. TASK 6: MATERIALS HANDLING OF EXPLOSIVE CONTAMINATED SOIL AND SEDIMENT Final Report, Jan. 1984 - Jan. 1985
Lawrence J. Bove, M. Ramanathan, John W. Noland, and Peter J. Marks Jun. 1985 113 p
(Contract DAAK11-82-C-0017)
(AD-A162516; AMXTH-TE-TR-85010) Avail: NTIS HC A06/MF A01 CSCL 13/2

Past practices at explosives manufacturing and handling facilities have resulted in contaminated soils and lagoon sediments. Treatment and handling procedures will result in numerous safety concerns due to the potentially reactive nature of these materials. This report discusses development of typical materials handling processes from removal of soils/sediments from a particular site to feed into a treatment of disposal process. Sensitivity testing was reviewed to enable recommendations for complete analysis of contaminated soils. Materials handling techniques, including state-of-the-art explosives handling and other adaptable solids handling techniques, were compiled into four application categories: excavation/removal, transport, conditioning/storage, and feed. This includes a process description, potential sources of ignition inherent to equipment operation, applicability of differing site characteristics, and possible design and operating modifications to reduce the potential for ignition. A protocol for handling contaminated soils and sediments was developed. Initially each site will undergo a detailed site categorization which will include site assessment, field sampling with chemical analysis, and a sensitivity testing program. GRA

N86-22006# Weston (Roy F.), Inc., West Chester, Pa.
INSTALLATION RESTORATION GENERAL ENVIRONMENTAL TECHNOLOGY DEVELOPMENT. TASK 8: BENCH-SCALE INVESTIGATION OF LOW TEMPERATURE THERMAL REMOVAL OF TCE (TRICHLOROETHYLENE) FROM SOIL Final Report, Jun. 1984 - Feb. 1985
W. P. Lambert, L. J. Bove, D. Burkitt, S. Birk, and D. Russell Mar. 1985 111 p
(Contract DAAK11-82-C-0017)
(AD-A162528; AMXTH-TE-TR-85004) Avail: NTIS HC A06/MF A01 CSCL 13/2

Bench-scale studies were performed to demonstrate the viability of the concept of low temperature thermal volatilization of TCE from soils. A factorial experimental design using multi-way Analysis of Variance (ANOVA) for data analysis was employed. Factors were type of soil (3 levels), TCE concentration (2 levels), operating temperature (3 levels), and moisture content (2 levels). Duplicates were run. TCE can be stripped from contaminated soils under the conditions of this study. Varying amount of TCE were not stripped from the tested soil at all experimental conditions at temperatures less than 120 degrees C. The content of these residuals was verified by independent analysis to be TCE. Only TCE was displayed as output traces by the experimental apparatus. All of the experimental factors and each of their binary combination were statistically significant to the magnitude of TCE residual concentrations. Operating temperature was the dominant factor. Engineering data implications based on experimental results are: Operating temperatures for pilot-scale equipment should be greater than or equal to 120 degrees C for complete removal of TCE in less than 20 minutes. Pilot-scale equipment should be of sufficient flexibility to permit verification of the results of this study and experimentation to optimize operating parameters. GRA

N86-22007# Oak Ridge National Lab., Tenn.
OPERATING RESEARCH PLAN. VOLUME 2: INVENTORY OF RESEARCH UNDER THE NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM
G. M. Caton, J. M. Riordan, and C. Oen 1984 561 p
(Contract DE-AC05-84OR-21400)
(DE86-001593; DOE/OR-21400/T199) Avail: NTIS HC A24/MF A01

This document contains an appendix section for each research area and includes a detailed description of all ongoing and planned projects of the National Program with the performer(s), duration, funding, study area, research objectives, methodologies, and expected outputs. This information is also recorded in the National Program's on-line computer inventory of research activities, which is frequently updated by the National Program managers. DOE

N86-22008# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Strahlenschutz.
RESULTS OF LARGE-SCALE ENVIRONMENT MONITORING OF THE SEIBERSDORF AUSTRIAN RESEARCH CENTER [ERGEBNISSE DER GROSSRAEUMIGEN UMGEBUNGSUEBERWACHUNG DES OESTERREICHISCHEN FORSCHUNGSZENTRUMS SEIBERSDORF]
Herbert Sorantin, Karl Irlweck, and Ferdinand Steger Jun. 1985 27 p refs In GERMAN; ENGLISH summary Presented at OEVS/OESRAD Fruehjahrstagung 1985, 22 May 1985
(OEFZS-4324; ST-132/85) Avail: NTIS HC A03/MF A01

Environment contamination and radiation around an 8mw research reactor, incineration plant, and radionuclide laboratories

were investigated, using air, water, ground and biological material radioactivity analysis, and external radiation determination. Natural background radiation in the region is higher than in the research center surroundings. Neither environment contamination nor increased external environment radiation is shown. Author (ESA)

N86-22009# Stockholm Univ. (Sweden). Dept. of Meteorology.
INVENTORY OF RESEARCH GRADE AIR MONITORING STATIONS OPERATED BY EUROPEAN RESEARCH GROUPS
J. Heintzenberg and B. Moberg Oct. 1985 41 p refs
(AP-25; ISSN-0280-4441) Avail: NTIS HC A03/MF A01

Logistic information and measuring programs at 21 air monitoring stations in (or operated by) 9 countries are reported. Eight of the stations are located off the European subcontinent, four in the European Arctic sector, one off the African coast and three in the Southern Hemisphere. Author (ESA)

N86-22010# GCA Corp., Bedford, Mass.
NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM EMISSION INVENTORY ALLOCATION FACTORS Final Report
F. M. Sellars, T. E. Fitzgerald, L. M. Lennon, L. J. Maiocco, and N. M. Monzione Sep. 1985 181 p refs Sponsored in part by Energy Engineering Research Lab.
(Contract EPA-68-02-3698)
(PB86-104247; GCA-TR-84-171-G; EPA-600/7-85-035) Avail: NTIS HC A09/MF A01 CSCL 13B

This report describes the processes, assumptions, and data sources used in developing the National Acid Precipitation Assessment Program (NAPAP) temporal, spatial, and species allocation factors. The processing of the NAPAP emissions inventory through the Regional Model Data Handling System (RMDHS) and the specifications for a new NAPAP data handling system are also detailed. The Eulerian acid deposition model being developed for use in the NAPAP required more resolved emissions data than are available in the NAPAP emissions inventory. The NAPAP inventory, which separately covers annual emissions from point and county-wide area sources, had to be apportioned to reflect hourly emissions with area source emissions assigned to grid squares. Hourly emissions of volatile organic compounds (VOCs) then had to be allocated into photochemical reactivity classes and nitrogen oxides (NOx) emissions had to be separated into NO and NO2. GRA

N86-22011# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
QUALITY ASSURANCE FOR THE ACID PRECIPITATION MEASUREMENT PROGRAM IN THE US
P. L. Finkelstein Sep. 1985 8 p ref
(PB86-107034; EPA-600/D-85-197) Avail: NTIS HC A02/MF A01 CSCL 14B

The U.S. National Atmospheric Deposition Program (NADP) is a confederation of scientists, universities, and government agencies formed with the common interest of measuring acid rain in the United States. In order to insure that the data developed under this program are reliable, a quality assurance program was developed. This report reviews the major aspects of the NADP Quality Assurance Plan, including field operations, laboratory activities, and data handling. Author (GRA)

N86-22012# National Oceanic and Atmospheric Administration, Rockville, Md. National Marine Pollution Program Office.
INVENTORY OF NON-FEDERALLY FUNDED MARINE POLLUTION RESEARCH, DEVELOPMENT AND MONITORING ACTIVITIES: GREAT LAKES REGION
M. E. Monaco May 1985 124 p
(PB86-102308) Avail: NTIS HC A06/MF A01 CSCL 06T

Information concerning marine pollution research and monitoring programs currently being undertaken is an important factor in helping plan and guide national efforts to control such pollution. Projects listed in the report concern only marine pollution research, development, and monitoring activities. Research projects include studies, investigations, and surveys of the behavior, fate, and effects of pollutants or potential pollutants. They may also concern natural oceanic processes related to pollutants and potential pollutants. GRA

N86-22013# Battelle Pacific Northwest Labs., Richland, Wash.
GREEN RIVER AIR QUALITY MODEL DEVELOPMENT. VALMET: A VALLEY AIR POLLUTION MODEL Final Report
C. D. Whiteman and K. J. Allwine Aug. 1985 185 p Sponsored in part by Environmental Protection Agency, Research Triangle Park, N. C.
(PB86-104106; PNL-4728; EPA-600/E-85-064) Avail: NTIS HC A09/MF A01 CSCL 07D

Following a thorough analysis of meteorological data obtained from deep valleys of western Colorado, a modular air pollution model was developed to simulate the transport and diffusion of pollutants released from an elevated point source in a well-defined mountain valley during the nighttime and morning transition periods. This initial version of the model, named VALMET, operates on a valley cross section at an arbitrary distance down-valley from a continuous point source. The model was constructed to include parameterizations of the major physical processes that act to disperse pollution during these time periods. The model was not fully evaluated. Further testing, evaluations, and development of the model are needed. Priorties for further development and testing are provided. GRA

N86-22014# PEI Associates, Inc., Durham, N.C.
USER'S GUIDE FOR THE MULTIPLE AIRSHED (MASH) MODEL
R. A. Paul Jul. 1985 34 p
(Contract EPA-68-02-3512)
(PB86-100146; EPA-450/4-85-009) Avail: NTIS HC A03/MF A01 CSCL 13B

Multiple airshed (MASH) model calculates design values for each of a series of ozone monitoring sites in the U.S. Each monitor is assigned to various airsheds, depending on time of day and the resultant wind direction for each day. Using a list of high values for each airshed, one design value is selected for each airshed and monitor combination. The design value associated with a particular SMSA can be selected from the resulting list of site specific design values which the program generates for each airshed. Input data for MASH are hourly ozone values from monitors, daily resultant wind directions at selected meteorological stations, and a coded set of instructions telling how to allocate hourly ozone values to various airsheds based on wind direction. GRA

N86-22015# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
INVESTIGATION OF TRANSIENT ASPECTS OF ATMOSPHERIC DISPERSION PROCESSES IN THE WAKE OF A BUILDING THROUGH VIDEO IMAGE ANALYSIS
A. H. Huber and S. P. S. Arya Sep. 1985 8 p Prepared in cooperation with North Carolina State Univ., Raleigh
(PB86-100989; EPA-600/D-85-217) Avail: NTIS HC A02/MF A01 CSCL 04A

The processing of continuous video images is now very feasible and applicable to the study of the transient nature of atmospheric transport and the highly variable pollutant concentrations near buildings. Research is now ongoing to best develop and refine appropriate methods of analysis. The present capabilities for video image analysis are summarized. GRA

N86-22016# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
EPA (ENVIRONMENTAL PROTECTION AGENCY) OXIDANT MODEL: DESCRIPTION AND EVALUATION PLAN
K. L. Schere and A. J. Fabrick Sep. 1985 92 p Prepared in cooperation with MEF Environmental, Inc., Austin, Tex.
(PB86-103090; EPA-600/3-85-067) Avail: NTIS HC A05/MF A01 CSCL 04A

The U.S. EPA Regional Oxidant Model (ROM) and NEROS data base are described. The mode incorporates a comprehensive description of the physical and chemical processes thought to be important to tropospheric O3 production on 1000 km scales. The

data base employed for the first application of the ROM was collected during the summers of 1979 and 1980 in the northeast U.S. It contains meteorological and air quality data from regular monitoring networks and from enhanced networks or special field project measurements during that period. The evaluation procedure that will be used to determine the ROM performance on this data base is outlined. A number of episodes will be simulated from the period July 23 through August16, 1980, for which performance statistics will be developed. The evaluation of any given day within an episode will proceed in two distinct stages. The first stage will focus on model performance for an individual model realization, irrespective of all other realizations. GRA

N86-22017# California Inst. of Tech., Pasadena. Lab. of Environmental Engineering Science.
CHARACTERIZATION OF REACTANTS, REACTION MECHANISMS AND REACTION PRODUCTS IN ATMOSPHERIC WATER DROPLETS: FOG, CLOUD, DEW AND RAIN WATER CHEMISTRY Final Report
M. R. Hoffmann, D. J. Jacob, J. M. Waldman, J. W. Munger, and R. C. Flagan Apr. 1985 278 p Sponsored in part by California State Air Resources Board, Sacramento
(Contract ARB-A2-048-32)
(PB86-107976; ARB-R-85/259) Avail: NTIS HC A13/MF A01 CSCL 04A

Analyses of ground based fogwater collected by inertial impaction in the Los Angeles basin, the San Gabriel Mountains, and the San Joaquin Valley revealed very high concentrations of NO3(-1), SO4(-2), NH4(+1), and other ions, often coupled with very high acidities. Fogs and stratus in the Los Angeles basin typically had pH values ranging from 2 to 4. Acidities were not as high in the San Joaquin Valley, mostly because of scavenging by the fogs of ammonia from agricultural sources. Deposition of fogwater was observed to be important pollutant sink during stagnation episodes in the San Joaquin Valley, and may also be an important source of acid input to surfaces in some areas. Kinetic experiments showed that H2O2 is important in the oxidation of S(IV) to S(VI) at low pH. Metal-catalyzed auto-oxidation could also be an important source of sulfate. However, the extreme acidities observed in fogs (below pH3) require condensation on preexistent acidic nuclei and scavenging of gaseous nitric acid. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-22018 Colorado Univ., Boulder.
ANALYSIS OF NITRIC OXIDE FLUORESCENCE BANDS FROM HIGH LATITUDE ROCKET OBSERVATIONS OF THE THERMOSPHERIC DAYGLOW
David Dempster Cleary 1985 165 p
Avail: Univ. Microfilms Order No. DA8522653

Ultraviolet spectra of the Earth's thermospheric dayglow are analyzed. Observations were made on August 10, 1982, from Poker Flats, Alaska, using a rocket-borne spectrometer that measured the wavelength range 1950 to 2170 A. This part of the spectrum is dominated by emissions from the gamma, delta, and epsilon bands of nitric oxide. Column densities of nitric oxide are determined by fitting these fluorescence bands with synthetic spectra. Below 125 km, the (1,0) and (2,0) gamma bands are self-absorbed due to the large NO column densities associated with the auroral zone, particularly when the measurements are made using a horizontally viewing instrument. Three bands of the weak NO epsilon system, (0,1), (0,2), and (0,3), were detected in this region of the spectrum. This is the first time these features were clearly resolved from spectra of the Earth's dayglow and positively identified with the epsilon system. The NO column density profile obtained from this analysis is compared with the results of a one dimensional photochemical model. A sensitivity analysis of the model shows that the data can be reproduced equally well over a range of these parameters. Dissert. Abstr.

N86-22019 Institut d'Aeronomie Spatiale de Belgique, Brussels.
PLASMOID MOTION ACROSS A TANGENTIAL DISCONTINUITY (WITH APPLICATION TO THE MAGNETOPAUSE)
J. Lemaire 1985 30 p refs Presented at Chapman Conference on Solar-Wind Magnetosphere Coupling, Pasadena, Calif., 12-15 Feb. 1984 Submitted for publication Sponsored by Belgian Ministry of National Education and Belgian Fonds National de la Recherche Scientifique
(Aeronomica-Acta-A-297-1985) Avail: Issuing Activity

The motion of a plasmoid across an inhomogeneous magnetic field distribution of which the direction and strength change along the penetration trajectory was studied. The bulk velocity decreases when the plasma element penetrates into a region of increasing magnetic field. The critical magnetic field intensity where a plasmoid is stopped or deflected is found to be the same critical field as observed in laboratory experiments for a nonrotating B-field distribution. The polarization electric field induced inside a moving plasma element for low and high beta plasmoids was determined. Impulsive penetration of solar wind plasma irregularities impinging on the Earth's geomagnetic field with an excess momentum density was analyzed. A plasma boundary layer is formed where the intruding plasmoids are deflected eastward. Magnetospheric plasma is dragged in the direction parallel to the flanks of the average magnetopause surface. Author (ESA)

N86-22020 Institut d'Aeronomie Spatiale de Belgique, Brussels.
DYNAMICAL PLASMAPAUSE POSITIONS DURING THE JULY 29-31/1977 STORM PERIOD: A COMPARISON OF OBSERVATIONS AND TIME DEPENDENT MODEL CALCULATIONS
Y. Corcuff (Poitiers Univ., France), P. Corcuff (Poitiers Univ., France), and J. Lemaire 1985 44 p refs Presented at 18th IAGA Meeting on the Role of Ionospheric Plasma in the Plasmasphere and Magnetosphere, Hamburg, West Germany, 17 Aug. 1983 Document previously announced in IAA as A86-18678 Submitted for publication Sponsored by CNRS and Belgian Fonds National de la Recherche Scientifique
(Aeronomica-Acta-A-299-1985) Avail: Issuing Activity

The temporal evolution of the plasmapause boundary was studied over a period of 3.5 days with substorms. The equatorial plasmapause position in different local time sectors was calculated as a function of universal time using electric field distributions derived from the models of Volland-Stern and McIlwain, with similar variation of the electric field intensity as a function of the Kp index. Model predictions were compared with data from a large number of whistlers, GEOS-1 in situ electron density measurements, and estimates of low-altitude plasmapause boundaries deduced from S3-3 satellite data. It is concluded that when the mechanism of plasma interchange motion is taken into account the calculated positions of the plasmapause fit the observations better than in the case of the classical MHD approximation. The time dependent E3H and Volland-Stern's electric field models satisfactorily describe a number of features. Author (ESA)

N86-22021 Institut d'Aeronomie Spatiale de Belgique, Brussels.
VERTICAL DISTRIBUTION OF ACETONITRILE IN THE ATMOSPHERE
J. Ingels, D. Nevejans, and E. Arijs 1985 13 p refs Presented at International Middle Atmosphere Program (MAP) Symposium 1984, Kyoto, Japan, 26-30 Nov. 1984 Submitted for publication
(Aeronomica-Acta-A-300-1985) Avail: Issuing Activity

The presence of acetonitrile in the atmosphere was confirmed by results of surface and stratospheric investigations. Stratospheric measurements give mixing ratios typically decreasing with height from 3 ppt at 25 km to 0.5ppt at 40 km. Measurements at the Earth's surface are less unanimous, although a ground level background mixing ratio of a few times 10ppt seems realistic. Measurements are compatible with a small global surface source of acetonitrile and a small tropospheric loss. The vertical distribu

tion of acetonitrile presented is consistent with general knowledge of composition and chemistry of the atmosphere. Author (ESA)

N86-22022*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPARATIVE ACCURACY OF THE ALBEDO, TRANSMISSION AND ABSORPTION FOR SELECTED RADIATIVE TRANSFER APPROXIMATIONS
Michael D. King and Harshvardhan Jan. 1986 47 p refs
(Grant NAG5-309)
(NASA-RP-1160; Rept-86B0034; NAS 1.61:1160) Avail: NTIS HC A03/MF A01 CSCL 04A

Illustrations of both the relative and absolute accuracy of eight different radiative transfer approximations as a function of optical thickness, solar zenith angle and single scattering albedo are given. Computational results for the plane albedo, total transmission and fractional absorption were obtained for plane-parallel atmospheres composed of cloud particles. These computations, which were obtained using the doubling method, are compared with comparable results obtained using selected radiative transfer approximations. Comparisons were made between asymptotic theory for thick layers and the following widely used two stream approximations: Coakley-Chylek's models 1 and 2, Meador-Weaver, Eddington, delta-Eddington, PIFM and delta-discrete ordinates. Author

N86-22023*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE MSFC/J70 ORBITAL ATMOSPHERE MODEL AND THE DATA BASES FOR THE MSFC SOLAR ACTIVITY PREDICTION TECHNIQUE
Dale L. Johnson and Robert E. Smith Nov. 1985 42 p refs
(NASA-TM-86522; NAS 1.15:86522) Avail: NTIS HC A03/MF A01 CSCL 04A

The MSFC/J70 Orbital Atmospheric Density Model, a modified version of the Smithsonian Astrophysical Observatory Jacchia 1970 model is explained. The algorithms describing the MSFC/J70 model are included as well as listing of the computer program. The 13-month smoothed values of solar flux (F sub 10.7) and geomagnetic index (S sub p), which are required as inputs for the MSFC/J70 model, are also included and discussed. Author

N86-22024*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASSESSING THE CAPABILITY OF EOS SENSORS IN MEASURING OCEAN-ATMOSPHERE MOISTURE EXCHANGE
W. Timothy Liu 15 Dec. 1985 26 p refs
(Contract NAS7-918)
(NASA-CR-176658; JPL-PUB-85-93; NAS 1.26:176658) Avail: NTIS HC A03/MF A01 CSCL 04A

As part of the Science Synergism Studies to identify interdisciplinary Scientific studies, which could be addressed by the Environmental Observing System (EOS), the techniques being developed to measure ocean-atmosphere moisture exchanges using satellite sensors were evaluated. Studies required to use sensors proposed for EOS were examined. A method has been developed to compute the moisture flux using the wind speed, sea surface temperature, and preciptable water measured by satellite sensors. It relies on a statistical model which predicts surface-level humidity from precipitable water. The Scanning Multichannel Microwave Radiometer (SMMR) measures all 3 parameters and was found to be sensitive to the annual cycle and large interannual variations such as the 1982 to 1983 El Nino. There are systematic differences between geophysical parameters measured by Nimbus/SMMR and in situ measurements. After quadratic trends and crosstalks were removed from the parameters through multivariate regressions, the latent heat fluxes computed from SMMR agree with those computed from ship reports to within 30 W/sq m. The poor quality of ship reports may be the cause of a portion of this scatter. Similar results are found using SEASAT/SMMR data. When the scatterometer winds were used instead of the SMMR winds, the difference between the satellite fluxes and the ship fluxes was reduced. Author

N86-22025# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ATMOSPHERIC ELECTRIC FIELDS: A NUMERICAL APPROACH
S. L. G. Dutra, A. E. C. Pereira (Univ. Federal de Uberlanica-UFU, Uberlandia, Brazil), A. L. C. Gonzalez, and W. D. Gonzalez Nov. 1985 33 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3704-PRE/844) Avail: NTIS HC A03/MF A01

In this work some numerical methods for the resolution of the atmospheric electric potential equation are presented and discussed. Some applications related to different sources of the atmospheric electric potential for equatorial latitudes are also given. Author

N86-22026*# Illinois Univ., Urbana. Aeronomy Lab.
ROCKET EXPERIMENTS FOR SPECTRAL ESTIMATION OF ELECTRON DENSITY FINE STRUCTURE IN THE AURORAL AND EQUATORIAL IONOSPHERE AND PRELIMINARY RESULTS
B. A. Tomei and L. G. Smith 1 Jan. 1986 164 p refs
(Grant NGR-14-005-181)
(NASA-CR-176648; NAS 1.26:176648; Aeronomy-119; ISSN-0568-0581) Avail: NTIS HC A08/MF A01 CSCL 04A

Sounding rockets equipped to monitor electron density and its fine structure were launched into the auroral and equatorial ionosphere in 1980 and 1983, respectively. The measurement electronics are based on the Langmuir probe and are described in detail. An approach to the spectral analysis of the density irregularities is addressed and a software algorithm implementing the approach is given. Preliminary results of the analysis are presented. Author

N86-22027# Stockholm Univ. (Sweden). Dept. of Meteorology.
PROCEEDINGS OF THE 12TH ANNUAL MEETING ON ATMOSPHERIC STUDIES BY OPTICAL METHODS
Georg Witt, ed. 15 Aug. 1985 271 p refs Proceedings held in Stockholm, 3-7 Sep. 1984
(Contract SWED-NSRC-O-TA-2628-118)
(AP-23; ISSN-0280-4441) Avail: NTIS HC A12/MF A01

Auroral spectroscopy and aeronomy; atmospheric interferometry; infrared studies of the atmosphere; laser and remote sensing techniques for atmospheric sounding; light scattering; and imaging systems and instrumentation were discussed. For individual titles, see N86-22028 through N86-22041.

N86-22028# Tromsoe Univ. (Norway). Auroral Observatory.
SPECTROSCOPIC OBSERVATIONS OF THE AURORA AND NIGHTGLOW AT SVALBARD
K. Henriksen, K. Stamnes, and G. Witt (Stockholm Univ.) *In* Stockholm Univ. Proceedings of the 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 4-14 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

It is shown that the NII 5001/5 multiplet is a dominating spectral feature in the nightside aurora on the latitude of the polar cleft, whereas the NI 5199/5201 doublet is strongest on the dayside. The NII 5001/5 emissions are primarily caused by harder electron precipitation than the NI 5199/5201 doublet. In the infrared, the NI 8446 line is a good indication of auroral activity. At 8521A an emission correlated with auroral activity appears, it is most likely due to the Q23 band head of the N2 1P(3,2) vibrational band. Even if argon has an intense emission at 8521A, the possibility of a significant contribution from argon is low. Author (ESA)

N86-22029*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Dept. of Physics and Astronomy.
OBSERVATIONS OF BARIUM ION JETS IN THE MAGNETOSPHERE USING DOPPLER IMAGING SYSTEMS AND VERY SENSITIVE IMAGING SYSTEMS USING IMAGING PHOTON DETECTORS
D. Rees, J. Conboy, W. Heinz, and J. P. Heppner *In* Stockholm

Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 15-38 refs Prepared in cooperation with University College, London, England (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

Observations of four shaped charge releases from rockets launched from Alaska are described. Results demonstrate that imaging and Doppler imaging instruments, based on exploiting the imaging photon detector, provide additional insight into the motion and development of low intensity targets such as the fast ion jets produced by shaped charge releases. It is possible to trace the motion of fast ion jets to very great distances, of the order of 50,000 km, outward along the Earth's magnetic field, when the conditions are suitable for the outward (upward) motion and/or acceleration of such ion jets. It is shown that ion jets, which fade below the lower sensitivity threshold of previous instruments, do not always disappear. There is no evidence of an abrupt field-aligned shear-type acceleration. Author (ESA)

N86-22030# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATIONS OF AIRGLOW O2 (1 SIGMA) ATMOSPHERIC BAND AT 8645A AND THE ROTATIONAL TEMPERATURE AT 23 S
H. Takahashi, Y. Sahai, and P. P. Batista *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 39-50 refs (For primary document see N86-22027 12-46)
(Contract FINEP-537/CT)
Avail: NTIS HC A12/MF A01

Observations of the O2 (1 Sigma, 0-1) atmospheric band at 8645A (O2A) and the rotational temperature, with the OH(9,4) band and OI 5577A airglow emissions, using multichannel tilting filter type photometers, were carried out at Cachoeira Paulista (22.7 S, 45.0 W) Brazil. The O2A band intensities occasionally vary from 200 to 1000 Rayleighs during a night. Covariations in nocturnal and seasonal variation with the OI 5577A emissions are observed. The rotational temperatures determined from the P branch of the O2 (1 Sigma) vary between 180 and 230 K. The amplitude of the nocturnal temperature variation is frequently larger than that determined from the OH emission, and the phase of the variation can lead that of the OH. Author (ESA)

N86-22031# Queens Univ., Belfast (Northern Ireland). Dept. of Pure and Applied Physics.
THE NIGHTGLOW HYDROXL (8-3) BAND EMISSION: A COMPARISON OF EXPERIMENT AND THEORY
D. P. Murtagh and R. G. H. Greer *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 51-69 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

The results of a rocket measurement of the hydroxyl (8-3) band volume emission profile are presented. Near simultaneous determinations of atomic oxygen concentrations allow the computation of mesospheric ozone densities in a chemistry based model. Using the hydrogen-ozone mechanism, it is found that the observed intensity is consistent with a model in which vibrational relaxation plays an important role. The theoretical profile is in reasonable agreement with the observations, but the problems associated with hydroxyl emission models are considered. Author (ESA)

N86-22032# Physical Sciences, Inc., Andover, Mass.
KINETICS AND SPECTROSCOPY OF HIGH ALTITUDE INFRARED EMISSIONS
Wilson T. Rawlins *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 70-92 refs Sponsored in part by DNA and AF (For primary document see N86-22027 12-46)
(PSI-G050-SR-207) Avail: NTIS HC A12/MF A01

The study of infrared phenomenology at high altitudes (70 to 150 km) is introduced. Relationships between observed molecular infrared signatures and the chemical dynamics of the quiescent and auroral upper atmosphere are emphasized. Laboratory and in situ measurement programs are described. The coupling of laboratory and field data with kinetic modeling to characterize specific excitation mechanisms for vibrationally excited NO, O3, and CO2 is illustrated. Author (ESA)

N86-22033# Wuppertal Univ. (West Germany).
MIDDLE INFRARED EMISSION STUDIES IN THE UPPER ATMOSPHERE BY ROCKET TECHNIQUES
K. U. Grossmann *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 93-113 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

A liquid helium cooled infrared twin grating spectrometer for use on sounding rockets was built. It was successfully flown three times on Skylark rockets from Esrange, Sweden. The experiments covered the midinfrared spectral range of 2.5 to 17 microns with a resolving power of 150 during the first two flights and 85 during the last flight. The far infrared regime between 50 and 100 microns was scanned with a resolution of 15. The instruments yielded zenith spectra and zenith intensity profiles of the vibration-rotation band emissions of CO2 at 15 microns and of O3 at 9.6 microns. In the far infrared the pure rotational spectrum of water vapor was measured. Author (ESA)

N86-22034# Nice Univ. (France). Dept. d'Astrophysique.
SCINTILLATION DETECTING AND RANGING (SCIDAR/LIDAR) DESCRIPTION OF A GRAVITY WAVE AND ASSOCIATED TURBULENCE
Jean Vernin *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 114-121 (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

The SCIntillation Detection And Ranging (scidar) optical device was used for remote sensing of atmospheric turbulence from an altitude of 1 km up to 20 to 30 km. The basic principle of this turbulence profiler is the statistical analysis of the speckle pattern produced by the light coming from a double star. It detected a thin sheet structure inside a thick turbulent layer at the tropopause. The periodic occurrence of turbulence in respect to time and altitude was associated with a gravity wave degenerating in turbulence. Its vertical wavelength is found to be 2700 m, and its apparent temporal periodicity 38 min. Two infinity sets of solutions describe the two components of the horizontal wavenumber, and temporal frequency of the gravity wave. Lidar ozone measurements show the same temporal periodicity, with wavelength 21.3 km. Author (ESA)

N86-22035# Tromsoe Univ. (Norway). Auroral Observatory.
MULTIPLE SCATTERING AND RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES
Knut Stamnes *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 122-163 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

Multiple scattering theory associated with radiative transfer problems in planetary atmospheres is reviewed. The radiative transfer equation pertaining to a scattering, absorbing, and emitting medium is considered. Analytic solutions and computational aspects for plane parallel atmospheres are discussed. These computationally efficient and reliable solutions can be used to attack a multitude of radiative transfer problems in realistic atmospheres. Applications to auroras are considered. Author (ESA)

N86-22036# Oxford Univ. (England). Physical Chemical Lab
ATOM RECOMBINATION AS A SOURCE OF AIRGLOW
R. P. Wayne *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 164-179 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

The basic principles of atom recombination are considered, and simple arguments that yield rough estimates of the rate coefficients for different recombination mechanisms are presented. More sophisticated methods for the calculation of recombination rate parameters are outlined to provide a context for the interpretation of theories. Factors that might determine the distribution of recombination events into the available electronic states are discussed. Author (ESA)

N86-22037# Research Inst. for Physics, Stockholm (Sweden).
EXPERIMENTAL AND THEORETICAL INFORMATION ON RADIATIVE LIFETIMES AND OSCILLATOR STRENGTHS
Mats Larsson *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 180-187 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

Diagnostic studies of the upper atmosphere by using the methods of quantitative spectroscopy on auroral and airglow emissions are reviewed. Data on oscillator strengths, transition probabilities and radiative lifetimes for atoms and molecules are discussed. Formulas for converting between the different types of dynamical parameters, such as oscillator strength, and transition probability for atoms are outlined. The situation for molecules is considered. Author (ESA)

N86-22038# Maryland Univ., College Park. Inst. of Molecular Physics.
EVOLUTION OF N2 EXCITED STATE VIBRATIONAL LEVEL POPULATIONS FOLLOWING DIRECT ELECTRON EXCITATION
William Benesch *In* Stockholm Univ. Proceedings of 12th Ann. Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 188-199 (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

Experiments to elucidate the processes governing the population distribution among the molecular nitrogen triplet state vibrational levels, under circumstances where molecular collisions are important, were conducted in conditions analogous to those in low altitude auroras. Nitrogen gas, at 0.03 to 3.0 Torr was excited by a pulsed electric discharge. The radiation was detected with a photomultiplier tube. The electrical signal was amplified and fed into a boxcar integrator to select a specific time interval after the exciting pulse for spectrometric display on a stripchart recorder. It is possible to follow the history of the excited molecules well into the afterglow. Using time resolutions down to the microsecond level and pressures < 0.1 Torr, characteristics of the spectrum on a collision-by-collision basis can be recorded. The time-development of well known auroral species is discussed. Author (ESA)

N86-22039# University Coll., London (England). Dept. of Physics and Astronomy.
INITIAL SIMULATIONS OF THE HIGH LATITUDE THERMOSPHERE AND IONOSPHERE WITH A COUPLED THREE DIMENSIONAL MODEL
David Rees, S. Quegan (Marconi Space Systems, Chelmsford, England), R. Moffett (Sheffield Univ., England), I. Perla, R. Gordon, and T. J. Fuller-Rowell *In* Stockholm Univ. Proceedings of 12th Ann. Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 200-225 refs Sponsored in part by UK Science and Engineering Research Council (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

A joint three dimensional time-dependent global model of the Earth's thermosphere and ionosphere which includes self-consistent coupling between the thermosphere and the ionosphere in the polar regions was developed. Features in the polar ionosphere which the simulations indicate are due to the strong coupling of ions and neutrals in the presence of strong electric fields and energetic electron precipitation are reviewed. The model also simulates UT variations in the polar thermosphere and ionospheric regions due to the diurnally variable solar photoionization in specific geomagnetic regions such as the cusp and polar cap. Author (ESA)

N86-22040# Kiruna Geophysical Inst. (Sweden).
AN INTENSIFIED PHOTODIODE ARRAY APPLIED TO ONE-DIMENSIONAL AURORAL IMAGING
Aake Steen *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 226-245 refs (For primary document see N86-22027 12-46)
(Grant AF-AFOSR-0084-84)
Avail: NTIS HC A12/MF A01

An imaging instrument than can replace mechanically scanning photometers in ground based auroral photometry was developed. The instrument utilizes a Reticon photodiode array, 1*1024 pixels, coupled with fiber optics to an image intensifier. The optics is a telecentric design allowing for 170 deg FoV with narrow band interference filters. Peltier element cooling is found to be sufficient to neglect dark current noise for 1 sec integration time. The whole system is controlled by a computer via the IEEE-488 bus. Test results and instrument performance are encouraging. Author (ESA)

N86-22041# University Coll., London (England). Dept. of Physics.
OBSERVATIONS OF AURORAL AND AIRGLOW SPECTRA USING A GRATING SPECTROMETER WITH AN IMAGING PHOTON DETECTOR
D. Rees, J. Conboy, W. Heinz, G. Witt (Stockholm Univ.), and J. Stegman (Stockholm Univ.) *In* Stockholm Univ. Proceedings of 12th Annual Meeting on Atmospheric Studies by Optical Methods 15 Aug. 1985 p 246-264 refs (For primary document see N86-22027 12-46)
Avail: NTIS HC A12/MF A01

A grating spectrometer of 60 cm focal length and 15 cm grating width was equipped with an imaging photon detector to observe the night sky spectra. Data include a sequence of complete spectra of the night sky from 350 to 700 nm. Most of the line and band spectra associated with airglow and auroral emissions within this spectral region are positively identified. With an integration period of 120 sec, it is possible to observe the scattered Fraunhofer spectrum of sunlight in the visible-light spectral region, even during periods near midnight in winter. An attempt to detect the O2 Hertzberg or Chamberlain bands was unsuccessful, with the competition from the strong Fraunhofer absorption lines in this region being partly responsible. Author (ESA)

N86-22042# McMillian Science Associates, Inc., Los Angeles, Calif.
EARTHQUAKE LIGHT Final Report, 1 Mar. 1983 - 15 Aug. 1986
W. G. McMillan 15 Aug. 1985 65 p
(Contract F0462-83-C-0079; ARPA Order 4700)
(AD-A161385; MSA-FCR-36; AFOSR-85-0923TR) Avail: NTIS HC A04/MF A01 CSCL 04/1

This paper focuses on manifestations of earthquake light that appear to be of electromagnetic origin: general atmospheric luminosity; light flashes; and auroral effects. Explanations of near-ground phenomena are offered in terms of acceleration of free electrons in air by a geoelectric field, both electron number density and field possibly being enhanced by the earthquake. High-altitude phenomena resemble natural aurorae, but apparently utilize electrons stored in the natural reservoirs of the ionosphere (F layer) and Van Allen belt. Various mechanisms for accelerating ionospheric electrons and for lowering the mirror-point altitudes of Van Allen electrons are examined. Author (GRA)

N86-22043# Birmingham Univ. (England). Dept. of Space Research.
ION AND ELECTRON INTERACTIONS OF ATMOSPHERIC IMPORTANCE
David Smith and Nigel G. Adams 31 Aug. 1985 100 p
(Grant AF-AFOSR-0095-82)

(AD-A161619; AFGL-TR-85-0247; SR-3) Avail: NTIS HC A05/MF A01 CSCL 04/1

Exploited are variable-temperature selected ion flow tube (VT-SIFT), variable-temperature selected ion flow drift tube (VT-SIFDT) and variable-temperature flowing afterglow/Langmuir probe (VT-FALP) apparatuses to study: (1) Ion/neutral reactions at thermal energies (VT/SIFT), (2) ion-neutral reactions as a function of the center-of-mass energy of the reactants (VT-SIFDT), (3) electron attachment at thermal energies (VT-FALP), and (4) electron/ion dissociative recombination (VT-FALP). Under 1 and 2, new kinetic and thermochemical data have been obtained and under 3 new data include attachment coefficients for strong acids. GRA

N86-22044# American Chemical Society, Springfield, Va. Div. of Industrial and Engineering Chemistry.

ULTRASONIC MODEL INVESTIGATION OF THE EFFECTS OF LATERAL HETEROGENEITIES ON SEISMIC SURFACE WAVE PROPAGATION AND SCATTERING Final Report, 1 Aug. 1981 - 31 May 1984

M. N. Toksoez 10 Sep. 1985 71 p Original contains color illustrations

(Contract DAAG29-81-K-0145)

(AD-A161720; ARO-18022.3-GS) Avail: NTIS HC A04/MF A01 CSCL 08/11

The effects of topographic features on Rayleigh wave propagation and scattering are investigated using two and three-dimensional ultrasonic models. Starting from simple steps, different topographic features are modeled. The effects of these features on Rayleigh wave transmission and scattering are examined as a function of wavelength. In general, backscattered or reflected of the Rayleigh wave energy is scattered into body waves. To complement the laboratory studies, two-dimensional finite difference calculations are carried out. These show the details of the scattering of incident Rayleigh waves at a step discontinuity into P, S and Rayleigh waves. More energy scatters into S waves than into P waves. Using three-dimensional laboratory models of steps, the dependence of wave scattering on angle of incidence is studied. Transmission and reflection coefficients (transmitted or reflected energy/incident energy) computed from spectral ratios vary strongly with incident energy) computed from spectral ratios vary strongly with incidence angle. At wavelengths equal to twice the step height, the fraction of incident energy scattered into body waves ranges from more than 90% at normal incidence to about zero at near-grazing incidence. At each angle, transmission coefficients vary strongly with frequency. Because of frequency-dependent phase shifts, the transmitted and reflected waves are distorted. GRA

N86-22045# Naval Research Lab., Washington, D. C.

CHAOS AND NONLINEAR DYNAMICS OF SINGLE-PARTICLE ORBITS IN A MAGNETOTAIL-LIKE MAGNETIC FIELD

J. Chen and P. J. Palmadesso 22 Nov. 1985 29 p

(AD-A161750; NRL-MR-5665) Avail: NTIS HC A03/MF A01 CSCL 04/1

The properties of charged-particle motion in Hamiltonian dynamics are studied in a magnetotail-like magnetic field configuration. It is shown by numerical integration of the equation of motion that the system is generally nonintegrable and that the particle motion can be classified into three distinct types of orbits; the bounded integrable orbits, unbounded stochastic orbits and unbounded transient orbits. It is also shown that different regions of the phase space exhibit qualitatively different response to external influences. The concept of differential memory in single-particle distributions is proposed. Physical implications to the dynamical properties of the magnetotail plasmas, and the possible generation of non-Maxwellian features in the distribution function are discussed. GRA

N86-22046# Calspan Corp., Buffalo, N. Y.

A CHAMBER INVESTIGATION OF THE IR AND VISIBLE WAVELENGTH OBSCURATION PROPERTIES OF PYROTECHNICALLY GENERATED SMOKES

J. T. Hanley and E. J. Mack May 1985 49 p

(Contract N00014-84-C-2174)

(AD-A161753; CALSPAN-7278-1) Avail: NTIS HC A03/MF A01 CSCL 19/1

The overall objective of the program is the development of an effective screening agent to both visible and IR wavelengths utilizing pyrotechnically-generated hygroscopic aerosol. In pursuit of an effective IR wavelength screen and an increased understanding of the particle formation mechanisms and resultant size distribution, the primary objective of this year's effort was to evaluate the influence of an energetic binder (GAP) on the performance of two pyrotechnics, one which produced a KCL aerosol, the other a mixed aerosol, the other a mixed aerosol of MgCl2 and carbon. Comparison tests were run, in Calspan's 600 cu m test chamber, in which the performance of the energetic vs. non-energetic pyrotechnics was compared in terms of mass yield, payload mass extinction coefficient, aerosol decay rate and size distribution. A secondary objective of limited scope was to investigate the potential of using IR absorbing surface active agents to coat the smoke aerosol so as to enhance the smoke's IR wavelength absorption as well as inhibit subsequent aerosol evaporation upon exposure to decreasing humidity. GRA

N86-22047# Columbia Univ., New York.

GROUND RESPONSE IN ALLUVIAL BASINS DUE TO SEISMIC DISTURBANCES Final Report, Mar. 1981 - Sep. 1984

John T. Kuo and Yu-Chiung Teng Mar. 1985 171 p

(Contract F19628-81-K-0012)

(AD-A162467; AFGL-TR-85-0062) Avail: NTIS HC A08/MF A01 CSCL 08/11

This report summarizes the scientific accomplishments of this contract. These include: (1) five preliminary basin models for SH-waves and three for elastic (P and SV) waves were studied using the finite element method, the results of these problems are presented either by synthetic seismograms or by snapshots; (2) modification and improvement of the two dimensional finite element computer codes with particular attention being paid to save computer in-core storage and computing time; (3) development of a new finite element technique to simulate different types of seismic sources, an example of demonstrating the difference in waveforms due to different types of source is appended; and (4) a detailed description and user's guide for the two-dimensional elastodynamic finite element computer program developed at Aldridge and adapted to the VAX 11 computer at AFGL is provided. GRA

N86-22048# Air Force Geophysics Lab., Hanscom AFB, Mass.

A GLOBAL REFERENCE ATMOSPHERE FROM 18 TO 80 km, AIR FORCE SURVEYS IN GEOPHYSICS

Gerald V. Groves 31 May 1985 126 p

(AD-A162499; AFGL-TR-85-0129; AFGL-AFSG-448) Avail: NTIS HC A07/MF A01 CSCL 04/2

Monthly means of zonal mean temperature, pressure, density, number density, pressure scale height, and geostrophic W-E wind are tabulated at heights from 18 to 80 km and latitudes from 80 S to 80 N with a 10 deg latitude interval. Formulae by which these quantities may be computed are present. Monthly mean longitudinal variations of temperature, pressure and density are tabulated at 30 deg longitude intervals for September to April in the N Hemisphere and April to November in the S Hemisphere at latitudes 20, 30, ..., 80 N (or S) over the same range of heights. Formulae by which the temperature, pressure and density variations may be computed are presented. The zonal means are derived from tabulations of temperature and geopotential height based on Nimbus 5 SCR and Nimbus 6 PMR and a S Hemisphere reference atmosphere based on rocketsonde data that were both prepared for the COSPAR Meeting, Graz 1984 and on two earlier N hemisphere rocket-based reference atmospheres. CIRA 1972 and Air Force Reference Atmospheres (1978). The longitudinal variations are derived solely from the satellite-based tabulations. Comparisons are made between the rocket-based reference atmospheres, the satellite-based tabulations and the reference values presented here. Author (GRA)

N86-22049# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
X-RAY MICROBURSTS AND VLF CHORUS
J. L. Roeder, J. R. Benbrook, E. A. Bering, W. R. Sheldon, and E. G. Stansberry 30 Sep. 1985 29 p Prepared in cooperation with Houston Univ., Tex.
(Contract F04701-83-C-0084)
(AD-A162531; TR-0084A(5940-06)-4; SD-TR-85-71) Avail: NTIS HC A03/MF A01 CSCL 03/2

On January 4, 1978, at 1140 UT, a Super Arcas sounding rocket was launched from Siple Station, Antarctica (L = 4.2, 76 S, 84 W) during a geomagnetically disturbed period (K sub p = 6-) with intense X-ray and VLF chorus activity. The parachuted payload observed an intense microburst precipitation event of 10 minute duration. These data have been correlated with measurements of Very Low Frequency chorus by receivers on the ground at both Siple and its magnetic conjugate point, Roberval, Quebec. Detailed one-to-one correspondence between the microbursts and the chorus was not a consistent feature of the data. Time series analysis of the data did indicate a significant correlation between the Siple X-ray precipitation and the Roberval VLF waves with an arrival time delay of 0.1 + or - 0. GRA

N86-22050# Air Force Geophysics Lab., Hanscom AFB, Mass.
SPECTROSCOPIC, KINETIC, AND DYNAMIC EXPERIMENTS ON ATMOSPHERIC SPECIES Final Report, 1 Oct. 1982 - 30 Sep. 1984
S. M. Miller, J. B. Lurie, R. A. Armstrong, I. Winkler, and J. I. Steinfeld 21 Mar. 1985 252 p
(AD-A162691; AFGL-TR-85-0077; AFGL-PSRP-668) Avail: NTIS HC A12/MF A01 CSCL 04/1

This final report on atmospheric species experiments contains: the results of COCHISE (Cold Chemical Infrared Simulation Experiment) experiments involving the interaction of N2 with CO, O3(v) with N2 and the fluorescences of NO and N2; a theoretical discussion of O2/Ar and N2/Ar microwave discharges; trajectory calculations involving the collisional relaxation of high vibrational-rotational states of O3 by Ar; the experimental determination of the intramolecular branching ratio of the (021) and (101) combination bands of CO2; a determination of the distribution of vibration sites of NO(v) from the reaction N(4S) + O2 yield NO(v) via multiphoton ionization; (flowing atmospheric kinetic infrared experiment (FAKIR) measurements of atomic oxygen production in the reaction between N(2D) and CO2 and the quenching of N(2D) by atomic oxygen; both the visible and infrared fluorescence results from the Laser Infrared Nuclear Simulation (LINUS) project. GRA

N86-22051# Johns Hopkins Univ., Laurel, Md. Dept. of Space.
HIGH FREQUENCY RADAR STUDIES OF THE VERY HIGH LATITUDE IONOSPHERE Final Report, 15 Feb. 1983 - 30 Sep. 1985
Raymond A. Greenwald 30 Sep. 1985 57 p
(Grants AF-AFOSR-ISSA-85-00084; AF-AFOSR-ISSA-84-00042)
(AD-A162754; AFOSR-85-1200TR) Avail: NTIS HC A04/MF A01 CSCL 04/1

Operation of the Goose Bay radar began on October 11, 1983. Since that time collaborative measurements have been made with both the Sondre Stromfjord and Millstone Hill incoherent scatter radars, with the HILAT satellite, and with the Air Force Geophysics Laboratory Airborne Geophysical Observatory. In addition, an extensive set of noncollaborative measurements have been obtained. From this base of observation several papers have been written and submitted for publication and several studies have been initiated but not, as yet, reached the publication stage. These efforts include an examination of high latitude F-region irregularties in the afternoon and late evening local time sectors, an attempt to use the HF radar data to study the two-dimensional structure of irregularity drifts, a detailed study of plasma conditions and irregularity characteristics in the vicinity of the dayside cleft, attempts to compare E- and F-region irregularity drifts with plasma drift measurements obtained with the Sondre Stromfjord and Millstone Hill incoherent scatter radars, and some preliminary observations of seasonal depencences in the diurnal formation of high latitude F-region irregularities. GRA

N86-22052# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
MEASUREMENT OF HORIZONTAL STRUCTURES AND WAVE-LENGTHS (5-500 km) IN MESOSPHERIC GRAVITY WAVES, TIDES AND WINDS. WORKSHOP AND DESIGN STUDY Final Report, 15 May - 14 Nov. 1984
Gene W. Adams 30 Aug. 1985 14 p
(Grant AF-AFOSR-0121-84)
(AD-A162768; AFOSR-85-0996TR) Avail: NTIS HC A02/MF A01 CSCL 17/9

It is well known that monostatic radars are poor meteor-wind radars. It has been suggested, however, that an outboard receiving site, configured as an interferometer, could receive pulses scattered by meteor trails from the ST's beams, resolve the geometry, and thus measure winds in the 80 to 110 km region. This approach, dubbed MENTOR (Meteor Echoes; No Transmitter, Only Receivers), would be an inexpensive way to add mesospheric capabilities to ST radars. The cost of a MENTOR receiver system is expected to be a small fraction of the cost of either a meteor-wind system or an ST radar. In addition, locations such as Colorado and Pennsylvania that have networks of ST radars could use a single MENTOR receiving site to determine winds above all ST radars within a several hundred kilometer radius. This could make possible the measurement of gravity-wave phenomena over much larger horizontal distances than can be accomplished from a single site. The MENTOR approach in Colorado (or anyplace else with a network of MST radars) should yield important new information about winds in the mesosphere and about mesospheric gravity waves with horizontal scales of 50 to 500 km. Author (GRA)

N86-22053# Lawrence Livermore National Lab., Calif.
REAL-TIME MONITORING OF PRE-COLLAPSE PHENOMENA USING LOCATIONS OF SEISMIC SOURCES
S. P. Jarpe and N. R. Burkhard Sep. 1985 13 p refs Presented at the 3rd Symposium on Containment of Underground Nuclear Explosions, Idaho Falls, Ida., 10 Sep. 1985
(Contract W-7405-eng-48)
(DE86-001649; UCRL-93326; CONF-850953-11) Avail: NTIS HC A02/MF A01

We attempted to develop a method for real-time monitoring of pre-collapse activity in the cavity region using seismic trace data recorded following EGMONT. Signals from an array of eight three-component, short-period seismometer stations were recorded using a new high dynamic range, portable digital telemetry and recording system. Three stations were located at 1 DOB, three at 2 DOB, and two at 4 DOB. Seismic data were recorded continuously before, during, and after collapse. As has been reported by previous studies, the pre-collapse period was characterized by a continuous high level of activity, but unlike previous studies, the recording system was not saturated, which allowed us to attempt to process the information. We discovered that all of the signals at a given location are very similar, but that the character is very different at the separate locations. A variety of computer processing techniques were attempted with the aim of obtaining source locations accurately enough to monitor chimney growth, i.e., +-50m both horizontally and vertically. These included the traditional methods of picking arrival times of phases at the different stations and using the time differences to locate the source, as well as more unusual approaches. We concluded that an array of sensors such as that used for EGMONT will not produce satisfactory results with real-time processing. We did, however, come up with an approach using several small, closely-spaced groups of sensors called arrays that should be more successful for this type of situation. The arrays, if designed properly, will take advantage of the similarity of the signals at a given location to estimate source direction. The directions from several arrays to one source can be combined to determine the source location. DOE

N86-22054# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.

NOAA (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION) METEOROLOGY DIVISION SUPPORT TO THE ENVIRONMENTAL PROTECTION AGENCY Summary Report, Fiscal Year 1984

J. H. Viebrock Jul. 1985 70 p Sponsored in part by Environmental Protection Agency, Washington, D.C.

(PB86-101664; NOAA-TM-ERL-ARL-139) Avail: NTIS HC A04/MF A01 CSCL 04A

The Meteorology Division provided research and meteorological support to the Environmental Protection Agency. The primary research effort was the development and evaluation of air quality simulation models using numerical and physical techniques supported by field studies. Activity highlights included the initial implementation of the first generation Regional Oxidant Model; development of a Photochemical Box Model for use in screening high level O3 episodes during stagnant conditions in urban areas; description of a model for the diurnal behavior of the layer of surface-based turbulent mixing and the wind and temperatures averaged over this layer; conduct of a major complex terrain field study at the Tracy Power Plant near Reno, Nevada; and preparation of a scientific assessment document on the status of complex terrain dispersion models. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-22055 State Univ. of New York, Albany.

INTERACTIONS BETWEEN UNSTABLE BAROCLINIC AND RESONANT, TOPOGRAPHIC WAVES IN A TWO-LAYER MODEL OF THE ATMOSPHERE Ph.D. Thesis

Terrence Ronald Nathan 1985 149 p

Avail: Univ. Microfilms Order No. DA8523308

Interactions between unstable baroclinic and resonant, topographic waves are investigated in a quasi-geostrophic two-layer model on the Beta-plane with sinusoidal topography and dissipation. The dissipative processes are of two types: Asymmetric Ekman dissipation, and internal dissipation due to interfacial friction and equivalent thermal damping. The weakly nonlinear analysis requires two long time scales to describe the evolution of the baroclinic wave while the topographic wave evolves only on the longest time scale. This is due to the fact that the linear growth rate of the baroclinic wave, which is modified by the topography, is larger than the linear growth rate of the topographic wave. To facilitate the analysis, the method of reconstitution is used to form evolution equations on a combined time scale. If both Ekman dissipation and internal dissipation are considered, the interaction dynamics of the baroclinic and topographic waves are characterized by either periodic vacillations or damped vacillatory approaches to equilibration. Dissert. Abstr.

N86-22056*# Universities Space Research Association, Columbia, Md.

SOLITON TURBULENCE Quarterly Contractor Report, 30 May - 20 Nov. 1985

C. M. Tchen Washington NASA Mar. 1986 75 p refs

(Contract NAS8-36153)

(NASA-CR-3969; NAS 1.26:3969) Avail: NTIS HC A04/MF A01 CSCL 04B

Theoretical and numerical works in atmospheric turbulence have used the Navier-Stokes fluid equations exclusively for describing large-scale motions. Controversy over the existence of an average temperature gradient for the very large eddies in the atmosphere suggested that a new theoretical basis for describing large-scale turbulence was necessary. A new soliton formalism as a fluid analogue that generalizes the Schrodinger equation and the Zakharov equations has been developed. This formalism, processing all the nonlinearities including those from modulation provided by the density fluctuations and from convection due to the emission of finite sound waves by velocity fluctuations, treats large-scale turbulence as coalescing and colliding solitons. The new soliton system describes large-scale instabilities more explicitly than the Navier-Stokes system because it has a nonlinearity of the gradient type, while the Navier-Stokes has a nonlinearity of the non-gradient type. The forced Schrodinger equation for strong fluctuations describes the micro-hydrodynamical state of soliton turbulence and is valid for large-scale turbulence in fluids and plasmas where internal waves can interact with velocity fluctuations. Author

N86-22057# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PERIODICITIES IN THE ALL INDIA RAINFALL SERIES AND IN THE DROUGHT AND FLOOD AREA INDICES

R. P. Kane Nov. 1985 39 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication

(INPE-3717-PRE/853) Avail: NTIS HC A03/MF A01

Using the method of Maximum Entropy Spectral Analysis (MESA) for locating periodicities and a Multiple Regression Analysis for amplitude estimations, the All-India annual, summer and nonsummer rainfall and the Drought and Flood Area Indices were analyzed. Significant periodicities were observed in a wide band; but, in each case, substantial Quasi-Biennial Oscillations (QBO) were noticed, which made predictions impossible. Author

N86-22058# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

A MERIDIONAL CIRCULATION MODEL TO STUDY UPPER ATMOSPHERE SEASONAL PHENOMENA

Carlos Jose Zamlutti Nov. 1985 53 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication

(INPE-2716-PRE/852) Avail: NTIS HC A04/MF A01

This paper presents a meridional circulation model for the study of the upper atmosphere dynamics at middle latitudes. In the study of the energy balance, it considers two geomagnetic conjugated locations, connected to each other through plasma flow, along the magnetic field lines, and linked, at mesopause altitudes, by meridionally propagating gravity waves. It is shown that the closed loop is necessary to account for the energy transferred from the ions to the neutrals. Author

N86-22059# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

LARGE SCALE PRECIPITATION VARIATIONS OVER SOUTH AMERICA DURING THE 1982-83 ENSO EVENT

Antonio Divino Moura and Mary Toshie Kagano Oct. 1985 10 p refs Presented at the 1st WMO Workshop on the Diagnosis and Prediction of Monthly and Seasonal Atmospheric Variations over the Globe, College Park, Md., 29-Jul. - 2 Aug.

(INPE-3676-PRE/827) Avail: NTIS HC A02/MF A01

The effects of 1982-83 ENSO EVENT over South America are reanalyzed mainly with respect to large-scale precipitation anomalies. Long lasting and very intense floods have occurred in the southern part of Brazil, northern Argentina, Paraguay, Uruguay, Southern Bolivia, mainly during the period May to July 1983. Also, severe droughts have striken Northeast Brazil, including the Amazon region which was very dry during 1983. Ecuador and northwestern Peru suffered strong flood conditions from the end of 1982 until mid-1983. Some GCM simulations reproduced the general aspects of the atmospheric circulation observed during last strong warming over Eastern Pacific. Theoretical results suggest that the precipitation anomalies observed over South America could be explained as the atmospheric response to the anomalous heating over the Eastern Pacific associated with the El Nino. Author

N86-22060# Hydrologic Engineering Center, Davis, Calif.

STOCHASTIC ANALYSIS OF DROUGHT PHENOMENA Final Report

David Goldman Jul. 1985 141 p

(AD-A160947; HEC-TD-25) Avail: NTIS HC A07/MF A01 CSCL 12/1

Droughts are caused by both hydrologic and socioeconomic components. This document concentrates on stochastic models of streamflow as the hydrologic component of drought. Stochastic models of drought are presented to the water resource engineer as an extension of the more commonly understood flood frequency analysis. The extension can be made because flood frequency analysis utilizes stochastic models of independent random variables whereas drought analysis utilizes stochastic models of independent random variables. There are many different stochastic models that have been implemented to describe dependent random variables. A comparison of these models indicate that simple ones, such as the autoregressive model, are adequate for the water resource engineer's needs. Author (GRA)

N86-22061# Massachusetts Inst. of Tech., Lexington.
WEATHER RADAR STUDIES Quarterly Technical Summary Report, 1 Jan. - 31 Mar. 1985
James E. Evans 31 Mar. 1985 42 p
(Contract DT-FA01-80-Y-10546)
(AD-A161622; DOT/FAA/PM-85-16) Avail: NTIS
HC A03/MF A01 CSCL 04/2

FAA-funded Doppler weather radar activities during the period 1 January to 31 March 1985 are reported. The test-bed Doppler weather radar system measurements in Olive Branch, Mississippi, commenced following the installation of an improved lightning protection system. Clutter suppression testing showed that the objective of 50-dB suppression was obtained in the field against appropriate fixed targets. Weather measurements were conducted on a number of cold front passages with attendant prefrontal lines of showers and thunderstorms. The Lincoln mesonet was recalibrated at Lincoln in January and February and then installed at the site in late February. The mesonet was fully operational in March. The 1984 peak wind speed data from the mesonet and the Memphis International Airport LLWAS data were analyzed preliminarily to determine wind shear characteristics in the Memphis area. Doppler weather radar data from the National Center for Atmospheric Research JAWS program and the National Severe Storms Laboratory are being analyzed to develop low-altitude wind shear detection algorithms. GRA

N86-22062# Lamont-Doherty Geological Observatory, Palisades, N. Y.
AIR MASS MODIFICATION IN THE MARGINAL ICE ZONE Final Technical Report
Theodore J. Bennett, Jr. and Kenneth Hunkins Nov. 1985 38 p
(Contract N00014-84-K-0735)
(AD-A161745; LDGO-85-6) Avail: NTIS HC A03/MF A01 CSCL 04/1

A case study of the Andreas, et al., (1984) data on atmospheric boundary layer modification in the marginal ice zone is made. Our model is a two-dimensional, multi-level, linear model with turbulence, lateral and vertical advection, and radiation. Good agreement between observed and modeled temperature cross-sections is obtained. In contrast to the hypothesis of Andreas, et al., we find the air flow is stable to secondary circulations. Cloud top longwave cooling, not an air-to-surface heat flux, dominates the cooling of the boundary layer. The accumulation with fetch over the ice of changes in the surface wind field are shown to have a large effect on estimates of the surface wind stress. We speculate that the Andreas, et al., estimates of the drag coefficient over the compact sea ice are too high. GRA

N86-22063# Naval Postgraduate School, Monterey, Calif.
AIR PARCEL MOTION AT THE VANDENBERG HYDROGEN FLARE STACKS Report, Dec. 1984 - Oct. 1985
Gordon E. Schacher and Charles E. Skupniewicz Oct. 1985 118 p
(Contract MIPR-FY6168500914)
(AD-A162520; NPS61-86-005) Avail: NTIS HC A06/MF A01 CSCL 19/1

Three months of flow and turbulence data obtained at the Vandenberg AFB hydrogen flare stack site has been used to simulate the behavior of the plume. Time series analyses have been used to determine air parcel trajectories. Turbulence in the area is sufficient to carry air parcels to ground level. The spatial persistence of the trajectory end and function of time spent near the average position have been determined as functions of conditions. The results have been prepared and methodologies outlined to enable heat deposition calculation to be performed. GRA

N86-22064# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Wolkenphysik.
THE ICING RESEARCH AIRCRAFT DO28, D-IFMP OF DFVLR, AND ITS MEASURING EQUIPMENT
Hans-Eberhard Hoffmann and Johann Demmel Aug. 1985 72 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-972)
(DFVLR-Mitt-85-12; ISSN-0176-7739) Avail: NTIS
HC A04/MF A01; DFVLR, Cologne DM 25.50

A Dornier Do28 D-IFMP, equipped as an icing research aircraft, is described. Ice accretion is measured on three metal cylinders and at the tip of one wing. The icing-relevant, cloud-physical parameters measured include air temperature, liquid water content, particle size (0.5 to 600 micron), particle concentration, particle phase (qualitative), visibility in and outside clouds, relative humidity, and absolute humidity. The measured data are recorded on two analog and one digital recorder. Author (ESA)

N86-22065# National Weather Service, Silver Spring, Md. Engineering Div.
MAINTENANCE PLANNING FOR THE 1990'S (INITIAL PLANNING)
W. J. VanFeldt, R. R. Knibb, D. M. Entrikin, A. Kerner, and R. I. Racer Jul. 1985 51 p refs
(PB86-106010; NOAA-TM-NWS-ENG-11) Avail: NTIS
HC A04/MF A01 CSCL 04B

New equipment programs, changing technologies, staffing constraints, and restrictive budgets are but a few of the reasons why the National Weather Service (NWS) must strive for greater efficiency and productivity in its maintenance and logistics programs. Comprehensive maintenance and logistics planning is necessary to allow smooth transition and integration of new systems into the NWS meteorological and hydrological operations. To initiate this planning, a Maintenance and Logistics Steering Group (MLSG) was formed to study and recommend action necessary to ensure appropriate NWS maintenance and logistics programs in the 1990's. NOAA technical memorandum NWS ENG-11 describes the MLSG analyses and contains the resulting recommendations. GRA

N86-22066# National Oceanographic Data Center, Washington, D. C.
MARINERS WEATHER LOG, VOLUME 29, NUMBER 3: SUMMER, 1985
1985 68 p
(PB86-108313) Avail: NTIS HC A04/MF A01 CSCL 04B

Weather observations for marine areas are described. Articles included are: Great Lakes Navigation Season, 1983; Marine Observation Program; tips to the radio officer; and Marine Weather Review. Author

N86-22067# National Center for Atmospheric Research, Boulder, Colo.
RELATIVE ACCURACY OF ALPEX AIRCRAFT DATA: AN EVALUATION OF THE ALPEX INTERCOMPARISON FLIGHT WITH THE NCAR (NATIONAL CENTER FOR ATMOSPHERIC RESEARCH) ELECTRA, THE NOAA (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION P3 AND THE DFVLR (DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTAIT FUER LUFT-UND RAUMFAHRT) FALCON
Hans Richner Jul. 1985 90 p
(PB86-100823; NCAR/TN-238+STR) Avail: NTIS
HC A05/MF A01 CSCL 04B

During the ALPEX program, three participating large research

aircraft--the NCAR Electra, the NOAA P3, and the DFVLR Falcon--joined for an intercomparison flight. Using the data from this flight, this report lists the relative accuracies for position, pressure, temperature, humidity, horizontal and vertical winds, radio altitude, and radiation (some of these quantities were measured by two aircraft only). The results are presented in form of basic statistical data such as mean differences, standard deviations, and correlation coefficients, as well as in form of power, coherence and--for some quantities--phase spectra. GRA

N86-22068# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
STUDIES OF COMPLEX-TERRAIN FLOWS USING ACOUSTIC REMOTE SENSORS
W. D. Neff and C. W. King Apr. 1985 138 p refs
(PB86-100138; ASCOT-85-1) Avail: NTIS HC A07/MF A01 CSCL 04B

Sodars have now been deployed extensively n the ASCOT complex-terrain studies. How these instruments were used, what was learned from them, and how they may be applied to future studies is detailed. Sodar instrumentation and the theory that underlies its use is described. Bistatic and monostatic Doppler methods, data processing using the complex-covariance technique, and limitations in mean-wind and turbulence measurements are compared. A guide to the interpretation of sodar facsimile records including the origin and maintenance of echo layers in complex terrain is provided. Using a second order 1-D numerical model, it is found that only slight accelerations are required to create and maintain the many echo layers found in the transition layer above the nocturnal drainage. The model was used to calculate the rate of turbulent errosion into the cool air that often pools over the Collayomi Valley finding values up to 4 m/h. A detailed analysis of data from four ASCOT experiments is provided. The section begins with a climatology of the wind in the Anderson/Putah Creek Valley using almost 100,000 20-min wind averages obtained from a Doppler sodar that operated from July through December 1979. Author

N86-22069# National Weather Service, Garden City, N.Y.
WXR: WEATHER WIRE REFORMATTING PACKAGE (VERSION 3.00) REVISED
H. Opitz Aug. 1985 67 p refs
(PB85-100815; NOAA-NWS-ERCP-24-Rev) Avail: NTIS HC A04/MF A01 CSCL 04B

WXR is a hydrologic weather wire and PLT product software package which manipulates decoded SHEF hydrologic data according to runtime command line options. WXR coordinates execution with various master format parameter files. The master format parameter files contain the actual output format for specific weather wire products and are assembled during an initial setup phase. Multiple master files may be assembled for various output formats. The operator decides, via command line input, which file(s) WXR will use. WXR will also create, at the operator's option, an intermediate PLT product. The PMOD package can then be used to transform this into a graphic product displayable on an AFOS GDM. WXR uses two other programs. Each program has a complex command line with several processing options. Probably the best approach for routine use is to construct a macro. GRA

N86-22070# National Weather Service, Kansas City, Mo.
RELIABILITY OF THE BOW ECHO AS AN IMPORTANT SEVERE WEATHER SIGNATURE. OBSERVATION OF BOW ECHOES WITH THE MARSEILLES RADAR SYSTEM
R. W. Przbylinski, W. J. Gery, and J. E. Wright Sep. 1985 25 p refs
(PB86-102340; NOAA-NWS-CR-76; NOAA-TM-NWS-CR-77) Avail: NTIS HC A02/MF A01 CSCL 04B

From the 1960's into the mid 1970's, numerous authors have considered the hook echo and the line echo wave pattern (LEWP) to be widely accepted radar signatures associated with severe weather. In recent years, a tremendous amount of research has been conducted on the radar characteristics of severe thunderstorms. Lemon (1980) introduced a method for detecting severe weather echoes according to their structure, intensity, and evolution. In recent years a more extensive effort in detecting severe local storms by utilizing the latest radar techniques has been conducted by National Weather Service (NWS) personnel at the Indianapolis Weather Service Forecast Office. This paper presents preliminary statistical results of a continuing study which evaluates the effectiveness of the bow echo as a severe weather indicator. GRA

N86-22071# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-SEPTEMBER TO MID-OCTOBER 1985, VOLUME 39, NUMBER 18: SEPTEMBER 14, 1985
14 Sep. 1985 10 p
(PB86-104684) Avail: NTIS HC A02/MF A01 CSCL 04B

The precipitation and temperature weather outlook for periodic and seasonal variations for North America are given for September and October. Distribution and probabilities are mapped. E.R.

N86-22072# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR SEPTEMBER 1985, VOLUME 39, NUMBER 17: AUGUST 30, 1985
30 Aug 1985 10 p
(PB86-101672) Avail: NTIS HC A02/MF A01 CSCL 04B

The precipitation and temperature weather outlook for periodic and seasonal variations for North America are given for September. Distributions and probabilities are mapped. E.R.

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-22073# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
SPECTRAL ANALYSIS OF COLUMBIA RIVER ESTUARY CURRENTS Final Report
Barbara P. Donnell and William H. McAnally, Jr. Sep. 1985 123 p
(AD-A161609; WES/TR/HL-85-5) Avail: NTIS HC A06/MF A01 CSCL 08/8

A spectral analysis study was conducted to determine if wind-induced currents within the Columbia River estuary were sufficiently large to justify their inclusion in a numerical model of sediment transport within the estuary. Completion of the analysis showed that wind-induced current velocities were considerably less than 0.5 fps and consequently have little effect on instantaneous sediment transport. GRA

N86-22074# JAYCOR, Alexandria, Va.
WIND DRIVEN OCEAN MODELING AND OCEAN MODEL DEVELOPMENT Final Report
Alan Wallcraft, Tamara Townsend, and Darren Grant Oct. 1985 89 p
(Contract N00014-83-C-0464)
(AD-A161742; J665-85-006/6251) Avail: NTIS HC A05/MF A01 CSCL 08/3

Numerical simulations were performed with a 0.2 deg, two layer, free surface, primitive equation, ocean circulation model of the Gulf of Mexico with a realistic bottom topography and coastline. As in previous simulations, with idealized bottom topography and coastline, realistic Loop Current behavior could be obtained without wind forcing and with constant inflow through the Yucatan Straits. However, simulations with both wind and port forcing showed significantly more variation than those with port forcing alone. A similiar two layer model was set up for a North Atlantic region, from 20N, 82W to 48N, 30W, on a 0.25 by 0.2 deg grid. A Black Box multigrid package was prepared for solving finite difference Helmholtz's equations with staggered grid Neumann boundary

conditions in nonrectangular regions. In semi-implicit free surface primitive equation ocean models, it is competitive with other powerful iterative methods but slower than the direct Capacitance Matrix Technique. Several wind stress data sets were prepared for use in ocean models, based on global analysis products from FNOC and NMC, regional analysis products from FNOC, and ship observations. These data sets have been used to drive ocean circulation model of the World Ocean, the Indian Ocean, the North Atlantic, and the Western Mediterranean Sea. GRA

N86-22075# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
CZCS (COASTAL ZONE COLOR SCANNER) ATLAS OF WATER OPTICAL PROPERTIES IN THE ALBORAN SEA Final Report
Robert Arnone and Ramon Oriol Aug. 1985 28 p
(AD-A162503; NORDA-117) Avail: NTIS HC A03/MF A01 CSCL 08/10

Optical water properties of the world oceans can be rapidly obtained from data from the Coastal Zone Color Scanner (CZCS) aboard the Nimbus -7 satellite. Satellite processing techniques have been developed to eliminate the atmospheric contamination that contributes 90% of the total visible channel signal. The remaining signal, which constituted the ocean color, is directly related to the diffuse attenuation coefficient (k) at 490 nanometers for the upper surface waters. Calculation and geographic registration of k can be done for each of the 800-square-meter pixel resolution of CZCS, and results show that the accuracy is within 25% of ship measurements. This report indicates the processing procedures used to calculate k from radiance data from the CZCS. GRA

N86-22076# Rhode Island Univ., Kingston. Graduate School of Oceanography.
PROCEEDINGS OF THE GULF STREAM WORKSHOP HELD AT WEST GREENWICH, RHODE ISLAND ON 23-26 APRIL 1985
D. R. Watts Apr. 1985 581 p Workshop held in Greenwich, Rhode Island, 23-26 Apr. 1985
(Contract N00014-85-G-0322)
(AD-A162506) Avail: NTIS HC A25/MF A01 CSCL 08/3

Topics included: Modeling of the Gulf Stream System - Local dynamics and non-local effects; Recent Gulf Stream Theoretical Work and Pertinent Observations; Data Assimilation, Mesoscale Dynamics and Dynamical Forecasting; Two Recent Views of the Gulf Stream East of Cape Hatteras; Modification of an Intense Oceanic Current system Flowing into a Region of Cooling; Bimodality in the Gulf Stream; Isopycnal RAFOS Floats and the Dynamics of Gulf Stream Meanders; Sea-surface Height by GEOSAT-A Altimetry; Structure of the Gulf Stream as Derived from an EOF Analysis; Gulf Stream Envelope and Mean Path between 75 deg. and 58 deg; Maximum Gradient Inverse for the Gulf Stream System; Frontal Geostrophic Dynamics; Analysis of Gulf Stream Mean Flow Energetics off Charleston, S.C.; Nonlinear Waves and Coherent Vortex Structures in Barotropic Beta-Plane Jets; Spatial Structure of Gulf Stream Current Variability Downstream of the New England Seamount Chain; Recirculation and the Deep Gulf Stream; Eddy-resolved Ocean Circulation Related to the Gulf Stream Region; Partial Solutions for Inertial Western Boundary Current with Continuous Stratification; Time Scales and Structure of Topographic Rossby Waves and Meanders in the Deep Gulf Stream. GRA

N86-22077# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
COMPREHENSIVE FINAL REPORT FOR THE MARINE SEISMIC SYSTEM PROGRAM Final Report
J. D. Ward and J. A. Ballard Aug. 1985 231 p
(ARPA Order 4152)
(AD-A162539; NORDA-111) Avail: NTIS HC A11/MF A01 CSCL 08/11

The Marine Seismic System program demonstrated that the technology exists to place large instrument packages, carried external to the drill string, in deep-ocean boreholes using a single deployment vessel. Operating depths of 20,000 ft are feasible, with borehole depths to 2000 ft below the ocean floor. Large, heavy, long-term data recording packages may be deployed on the sea floor and recovered by vessels with adequate winch and navigation systems. Seismic data collected by the Marine Seismic System are generally superior to ocean-bottom seismometer data. Signal/noise ratios of borehole instruments exceed those of ocean bottom seismometers by more than 15 dB in the 1 to 15 Hz frequency band. Subsequent to the 1983 expedition, the Marine Seismic System program was terminated. The borehole instrument package and a dummy bottom processing package remain at the 1983 experiment site. No existing programs are presently designed for continued development of a permanent marine seismic station. GRA

N86-22078# National Oceanic and Atmospheric Administration, Seattle, Wash. Marine Environmental Lab.
PACIFIC MARINE ENVIRONMENTAL LABORATORY Report, Fiscal Year 1984
Jan. 1986 68 p
(PB86-105525) Avail: NTIS HC A04/MF A01 CSCL 08C

Pacific Marine Environmental Laboratory (PMEL) is one of nine research laboratories within the Environmental Research Laboratories (ERL), Office of Oceanic and Atmospheric Research (OAR) of the National Oceanic and Atmospheric Administration (NOAA). PMEL, which is located in Seattle, Washington, carries out scientific investigations in physical, chemical and geolocial oceanography, marine meteorology, and related disciplines in support of NOAA's missions to protect human health and safety from marine hazards and to ensure wise development of ocean resources. Summaries are provided which given an overview of each program area. GRA

N86-22079# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
CURRENT VELOCITY AND HYDROGRAPHIC OBSERVATIONS OF THE STRAITS OF FLORIDA: SUBTROPICAL ATLANTIC CLIMATE STUDY (STACS) 1983 AND 1984
M. J. Ratnaswamy, D. Wilson, and R. L. Molinari Jun. 1985 248 p
(PB86-108602; NOAA-ERL-AOML-5) Avail: NTIS HC A11/MF A01 CSCL 08C

The primary objective of the Sub-Tropical Climate Study (STACS) is to define which oceanographical processes are important in medidional heat flux. As the Florida Current has been shown to play an important role in this flux, the initial emphasis of STACS was to develop the capability to monitor the variability of oceanic heat and mass transport in the Strait of Florida. As described, STACS consisted of several separate projects designed to verify the ability of different remote sensing techniques to measure continuously Florida Current velocity, transport and/or temperature. GRA

N86-22080# Northwestern Univ., Evanston, Ill. Center for Urban Affairs and Policy Research.
FIVE YEAR PROGRAM STRATEGY FOR GREAT LAKES NATIONAL PROGRAM OFFICE, 1986-1990
P. L. Wise, K. Fuller, and L. Botts Aug. 1985 54 p
(Grant EPA-R-005804)
(PB86-107984; EPA-905/9-85-002) Avail: NTIS HC A04/MF A01 CSCL 08G

A five year progra strategy for the Great Lakes National Program Office of the Environmental Protection Agency (EPA) is presented. This office coordinates with other EPA programs and with other agencies to support activities that benefit the Great Lakes and assist implementation of the Great Lakes Water Quality Agreement with Canada. The program strategy is to inform other EPA programs, federal agencies and the states how the Great Lakes Office will address its longterm goals from 1986 to 1990. GRA

N86-22081# Colorado Univ., Boulder. Cooperative Inst. for Research in Environmental Science.
COMPREHENSIVE OCEAN-ATMOSPHERE DATA SET (COADS), RELEASE 1

R. J. Slutz, S. L. Lubker, S. D. Woodruff, R. L. Jenne, and P. M. Steurer Apr. 1985 263 p refs Sponsored in part by NOAA, NSF, Natl. Environmental Satellite, Data and Information Service, and by Equatorial Pacific Ocean Climate Studies Prepared in cooperation with NOAA, Boulder, Colo., National Climatic Center, Asheville, N.C., and by National Center for Atmospheric Research, Boulder, Colo.
(PB85-105723) Avail: NTIS HC A12/MF A01 CSCL 04B

Global marine data observed during 1854 to 1979, primarily by ships-of-opportunity, have been collected, edited, and summarized statistically for each month of each year of the period, using 2 deg latitude x 2 deg longitude boxes. Products now available in a first release from this Comprehensive Ocean-Atmosphere Data Set (COADS) include fully quality-controlled (trimmed) reports and summaries. Each of the 70 million unique reports contains 28 elements of weather, position, etc., as well as flags indicating which observations were statistically trimmed. The summaries give 14 statistics, such as the median and mean, for each of eight observed variables of air and sea surface temperatures, wind, pressure, humidity, and cloudiness, plus 11 derived variables. Author (GRA)

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-22082# Gordon Research Conferences, Inc., Kingston, R.I.
PROCEEDINGS: PROTONS AND MEMBRANE REACTIONS HELD AT SANTA BARBARA, CALIFORNIA ON 28 JANUARY - 1 FEBRUARY 1985
Lester Packer and David Deamer 9 Oct. 1985 28 p
(Contract N00014-85-G-0055; DA Proj. RR0-4108)
(AD-A161331) Avail: NTIS HC A03/MF A01 CSCL 06/1

The Proceedings of the Confeence on Protons and Membrane Reactions which took place at Santa Barbara, California, on 28 January to 1 February, 1985, included the following topics: Intracellular Water Structure/Translocation; Concepts and Principles of Membrane Proton Conduction Pathways; Translocation of Protons/Water through Lipsomes and Model Systems; Non Bulk Phase vs Bulk Proton Translocation; Translocation of Protons Through Membranes: Bacteriorhodopsin; Transmembrane Proton Translocation by the F sub 0 Moiety of H(+)-ATP (Adenosine Triphosphate) Synthase; Proton Translocation and the Catalytic Process in the H+-ATP Synthase; The Flagellar Motor System; Proton Translocation Through Redox Complexes. GRA

N86-22083# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THEORETICAL PREREQUISITES FOR THE POSSIBLE USE OF BACTERIA WHICH SPLIT ORGANOPHOSPHATES IN ORDER TO INCREASE THE YIELD OF NUTRIENT YEAST AND ITS NITROGEN AND PHOSPHORUS CONTENT
D. L. Shamis 28 Oct. 1985 25 p Transl. into ENGLISH from Trudy Instituta Mikrobiologii i Virusologii, Adademiya Nauk Kazakhskoy SSSR (USSR), v. 11, 1968 p 3-17
(AD-A161811; FTD-ID(RS)T-1393-84) Avail: NTIS HC A02/MF A01 CSCL 06/13

This article reflects the theme of one of the areas of investigation of the Laboratory of Microbial Protein Synthesis, where we are studying the factors which accelerate the conversion (mobility) of macroergic and other phosphorus compounds. The purpose of these studies is to increase the energy supply of the metabolic synthesis reactions connected with the yield and quality of food yeast. Professor Malkov, the author of the idea of the partial inhibition of respiration in order to save carbon, mentions a factor which may be the cause of intensification of the biosynthetic processes of the yeasts he investigated. We are speaking here about the doubled amount of labile phosphorus p7 obtained in yeast as a result of placing it in concentrated orthophosphate. In our investigations the increased labile phosphorous content is connected with the biosynthetic activity of the yeast. The article correlates many studies which show the very important role of ATP and polyphosphates as energy accumulators and transporters, and presents data from the literature and preliminary results of our own investigations which indicate the exceptional effectiveness of making practical use of the phenomena of microbial synergism and metabiosis. Bacteria which split orthophosphates were studied on the basis of these results. There is also significant interest in the phosphates activity of food yeast using organophosphates as a phosphorus source. GRA

N86-22084# Minnesota Univ., Duluth. Dept. of Medical Microbiology and Immunology.
SUPPRESSION OF ANTIBODY FORMING CELLS BY MURAMYL DI-PEPTIDES Final Report, Aug. 1982 - Nov. 1985
Mariko Wakai and Arthur G. Johnson 1 Dec. 1985 25 p
(Contract N00014-82-K-0635; RR0-4108)
(AD-A162400) Avail: NTIS HC A02/MF A01 CSCL 06/5

Non-toxic synthetic adjuvants are under prime consideration for use in increasing the immune response of human beings. Three of microbial origin are the muramyl di-peptides (N-acetyl-muramyl-L-alany-D-isoglutamine and analogs, termed MDP), polyadenylic acid polyuridylic acid-polyuridylic acid complexes termed poly A-poly U) and the recently isolated monophosphoryl lipid A. While each of these has been demonstrated in animals to be active in increasing the immune response when given with the antigen, each also has been found to suppress this response when given one to several days before antigen. The enhancing actions of MDP and poly A-poly U have been well characterized. However, characterization of the suppressive phenomenon has been minimal, but it is important to gain a responsible understanding of how these adjuvants regulate the immune response non-specifically. Accordingly, the experiments proposed during the tenure of this contract were undertaken to further knowledge of how each of these adjuvants activate the suppressive arm of the immune response. GRA

N86-22085# Minnesota Univ., Duluth. Dept. of Medical Microbiology and Immunology.
STUDIES ON THE MECHANISM OF SUPPRESSION OF THE IMMUNE RESPONSE BY SYNTHETIC, NON-TOXIC ADJUVANTS Final Report, Aug. 1982 - Nov. 1985
Arthur G. Johnson, Marilyn J. Odean, Mariko Wakai, and Mark Tomai 1 Dec. 1985 26 p
(Contract N00014-82-K-0635; RR0-4108)
(AD-A162444) Avail: NTIS HC A03/MF A01 CSCL 06/5

The immunomodulatory action of a non-toxic monophosphoryl lipid A (MPL) and a toxic diphosphoryl lipid A (DPL) fraction derived from endotoxins of the heptoseless mutants of bacteria were compared. Both derivatives retained the ability characteristic of lipopolysaccharides, to enhance antibody formation in young adult mice when injected along with antigen and suppress antibody production when given a day before antigen. In aging mice, a model of immunodeficiency, a marked restoration of antibody formation was observed when antigen was injected together with either MPL or DPL. Levels of antibody in these aging mice were comparable to those observed in young adult mice. Moreover, both MPL and DPL enhanced antibody production significantly in the endotoxin low-responder mouse strains, C3H/HeJ and C57Bl/10 ScN, whereas, phenol-water extracted endotoxin from an R-7 mutant was ineffective. MPL and DPL also acted as suppressive agents when administered prior to antigen in the C3H/HeJ strain. Thus, the results from these studies show that (a) the toxic properties of lipid A can be removed without eliminating immunomodulating activity, and (b) such lipidic compounds can overcome the immunologic lesions of immunodeficient and hyporesponsive animals. GRA

N86-22086# California Univ., Berkeley. Dept. of Microbiology and Immunology.
MOLECULAR AND BIOLOGICAL PROPERTIES OF AN IMMUNOPOTENTIATING COMPLEX POLYSACCHARIDE ADJUVANT PRODUCED BY A GLIDING BACTERIUM Annual Report, 1 Jul. 1984 - 30 Jun. 1985

Robert I. Mishell and William R. Usinger 13 Dec. 1985 15 p
(Contract N00014-84-K-0626)
(AD-A162664) Avail: NTIS HC A02/MF A01 CSCL 06/15

Gliding bacteria adjuvant (GBA) is composed of macromolecular substances secreted or shed into the growth media of a newly described Cytophaga species. We had established prior to the onset of this contract that GBA strongly augments the in vitro generation of humoral immunity by mouse spleen cells and that it is mitogenic for murine spleen cells. Since GBA is very water soluble, its absorbance at 280 nm is low, and its biological activities are stable to boiling, we hypothesized that GBA was a polysaccharide or a complex of polysaccharides. Our principle objectives during the first year of this contract were to develop methods for large scale production and purification of GBA, to initiate studies of its physical and chemical properties, to prepare a panel of monoclonal antibodies against GBA for future studies defining its biologically significant epitopes and to extend studies of its biological activities. Large scale production and purification have been essentially achieved using protocols described in this report. Knowledge of the biological activities of GBA for mammalian cells was extended this year. Titration curves with the most highly purified preparations of GBA were performed with assays measuring in vitro adjuvanticity, mitogenicity, B cell polyclonal activation and induction of the murine macrophage cell line, WEHI 265, to secrete IL-1. Studies on the mechanism of action of GBA were initiated. GRA

N86-22087# Northeastern Univ., Boston, Mass. Dept. of Biology.
LYMPHOCYTE ACTIVATION - REGULATORY SUBSTANCES Final Report, Jun. 1982 - Sep. 1985
Phyllis R. Strauss 10 Dec. 1985 8 p
(Contract N00014-82-C-0283)
(AD-A162683) Avail: NTIS HC A02/MF A01 CSCL 06/16

Initially, the objectives of this work were to characterize substances which regulated DNA synthesis in lymphocytes. In particular we wished to determine the role of detergent soluble (DS)DNA in replication of activated splenocytes. We now feel that DS DNA is a hitherto overlooked class of replication intermediates not yet stabilized by nucleosome maturation. One possibility is that the detergent lability arises because of the presence of topoisomerase II in the replicating region which results in the release of these fragile fragments. These observations hold not only in activated lymphocytes but also in any actively dividing cell. GRA

N86-22088# Tel-Aviv Univ. (Israel). Dept. of Chemistry.
BIMANE DERIVATIVES AS FLUORESCENT PROBES FOR BIOLOGICAL MACROMOLECULES Periodic Report, No. 4, Jul. - Dec. 1985
Edward M. Kosower Dec. 1985 16 p
(Contract DAJA45-83-C-0057)
(AD-A162725) Avail: NTIS HC A02/MF A01 CSCL 07/3

Nine years ago, a convenient syntheses for a new class of heterocyclic molecules, the bimanes or 1,5-diazabicyclo(3.3.0) octadienediones was discovered and developed. In the course of preparing the bromo derivatives, fortuitously that proteins were fluorescently labeled by bromobimanes. It was established that bromobimanes reacted preferentially with thiols, and usefulness of such labeling for both small and large molecules in biological systems was demonstrated. Many applications of the agents have been reported. The primary aims of our research on the bimanes are divided into the following areas: (1) synthesis, (2) reactivity, (3) photophysics, and (4) application to macromolecules. Although we have a number of new results, it seems pertinent to base this report on a new summary of the application of bimane labeling to thiols. GRA

N86-22089# Ohio State Univ., Columbus. Dept. of Microbiology.
DEVELOPMENT AND USE OF ANUCLEATED BACTERIAL CELLS TO ASSAY THE IN VIVO ACTIVITY OF POLLUTANTS Final Report, Apr. 1981 - Jul. 1985
John N. Reeve and Jacqueline B. Rice 31 Jul. 1985 93 p
(Grant AF-AFOSR-0087 81)
(AD-A162727; AFOSR-85-1136TR) Avail: NTIS HC A05/MF A01 CSCL 06/13

There were 2 objectives in this research project: development of an in vivo assay for mistranslation-inducing activity of pollutants and characterization of amino acid substitutions. The first objective proved to be the more difficult. The T7 0.3 gene product (0.3 protein) was purified by a modification of the published procedure, and used to raise rabbit antibody to this protein. A radioimmune precipitation assay was developed which could be used to estimate increased misincorporation of cysteine into 0.3 protein. A sample assay involving only counting of the radioimmune precipitate was not achieved because we were not able to obtain the 0.3 protein free of contaminating proteins in the RIP. The 2nd objective proved more fruitful. The cysteine substitution sites in the N-terminal 42 positions of 0.3 protein have been successfully identified. Cleavage of 0.3 protein with trypsion to identify cysteine for arginine substitutions showed that the major sites of cysteine misincorporation were at residues other than arginine. Sequencing of (35S) cysteine-labeled 0.3 protein showed that the most frequent substitution was at residue 15 (tyrosine) and other substitutions were at a positions 9 (asparagine), 12 (aspartate), 41 (alanine) and 42 (aspartqate). GRA

N86-22090# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
PARTICULATE MODELS OF PHOTOSYNTHESIS Progress Report
G. R. Seely Oct. 1985 27 p refs
(Contract DE-FG02-84ER-13187)
(DE86-001625; DOE/ER-13187/2) Avail: NTIS HC A03/MF A01

Studies are reported on the photochemical and physical properties of chlorophyll while associated with various surfactants onto polyethylene particles. Results to date have shown that the forms of chlorophyll association are specific to the surfactant; furthermore, when chlorophyll is ligated by the surfactant, even dense associations are fluorescent, but when the ligating surfactant contains a reducible group like quinone, the fluorescence is strongly suppressed. DOE

N86-22091# Oak Ridge National Lab., Tenn.
BIOMEDICAL AND ENVIRONMENTAL SCIENCES AT OAK RIDGE NATIONAL LABORATORY
1985 47 p
(Contract DE-AC05-84OR-21400)
(DE86-001639; ORNL/M-88) Avail: NTIS HC A03/MF A01

The themes, activities, and facilities of the Biomedical and Environmental Sciences Program at Oak Ridge National Laboratory are described. Programs discussed include those in the Biology Division, Environmental Sciences Division, Health and Safety Research, and the Biotechnology Program. DOE

N86-22092# Science Applications International Corp., La Jolla, Calif.
JAPANESE TECHNOLOGY EVALUATION PROGRAM (JTECH): BIOTECHNOLOGY PANEL Final Report
D. Oxender, C. Cooney, D. Jackson, G. Sato, and R. Wickner Jun. 1985 171 p Sponsored in part by Department of Commerce, Washington, D.C.
(Contract TA-83-SAC-02254; Grant NSF PRA-85-13755)
(PB86-109386; JTECH-TAR-8404; NSF/PRA-85016) Avail: NTIS HC A08/MF A01 CSCL 06E

Japanese research and development in several of the main areas of biotechnology, including biochemical process technology, biosensors, cell culture technology, protein engineering, and recombinant DNA technology are assessed. Japan's strategic planning in biotechnology is based on a 10 to 15 year time scale, whereas most similar planning and resource commitment in the United States is based on a 3 to 5 year time scale. This difference in time scale is thought to be partially responsible for Japan's apparently more technology-driven than market-driven resource commitment. It is noted that much of the commercialization of

biotechnology in Japan is being carried out by large established companies and that Japan has a well-established coordination of the development of biotechnology by industry, universities, and government groups. GRA

52 AEROSPACE MEDICINE

. Includes physiological factors; biological effects of radiation; and weightlessness.

N86-22093* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 282)
Mar. 1986 67 p
(NASA-SP-7011(282); NAS 1.21:7011(282)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 154 reports, articles, and other documents introduced into the NASA scientific and technical information system in February 1986. Author

N86-22094*# National Aeronautics and Space Administration, Washington, D.C.
THE HISTORY OF AERONAUTICAL MEDICINE IN VENEZUELA
David R. Iriarte Feb. 1986 20 p Transl. into ENGLISH of "Historia de la Medicina Aeronautica en Venezuela" presented at the 6th Seminar of Aeronautical Medicine, 1985 p 1-15 Seminar held in Caracas, Venezuela, 27-28 Sep. 1985 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77709; NAS 1.15:77709) Avail: NTIS HC A02/MF A01 CSCL 06E

The Aerial Medical Service of the Ministry of Transportation and Communications of Venezuela was created on June 1949, and later became the Department of Aeronautical Medicine. Its functions include the medical examinations of future pilots, navigators and flight engineers. The importance of good mental and physical health in all flight and ground personnel to ensure the safety of air travel is discussed. Author

N86-22095*# Hershey (Milton S.) Medical Center, Hershey, Pa. Div. of Gastroenterology.
VECTION-INDUCED GASTRIC DYSRHYTHMIAS AND MOTION SICKNESS Annual Report, 1 May 1985 - 30 Apr. 1986
Kenneth L. Koch and Robert M. Stern 1 Apr. 1986 64 p refs
(Grant NAG9-118)
(NASA-CR-176620; NAS 1.26:176620; AR-1) Avail: NTIS HC A04/MF A01 CSCL 06S

Gastric electrical and mechanical activity during vection-induced motion sickness was investigated. The contractile events of the antrum and gastric myoelectric activity in healthy subjects exposed to vection were measured simultaneously. Symptomatic and myoelectric responses of subjects with vagotomy and gastric resections during vection stimuli were determined. And laboratory based computer systems for analysis of the myoelectric signal were developed. Gastric myoelectric activity was recorded from cutaneous electrodes, i.e., electrogastrograms (EGGs), and antral contractions were measured with intraluminal pressure transducers. Vection was induced by a rotating drum. gastric electromechanical activity was recorded during three periods: 15 min baseline, 15 min drum rotation (vection), and 15 to 30 min recovery. Preliminary results showed that catecholamine responses in nauseated versus symptom-free subjects were divergent and pretreatment with metoclopramide HC1 (Reglan) prevented vection-induced nausea and reduced tachygastrias in two previously symptomatic subjects. Author

N86-22096# National Aerospace Lab., Tokyo (Japan).
ELECTRODERMAL CHANGES CORRESPONDING TO THE DEGREE OF DISCOMFORT INDUCED BY MOTION SICKNESS
1985 19 p refs In JAPANESE; ENGLISH summary
(NAL-TR-880; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The qualitative correspondence between the degree of discomfort induced by motion sickness and the following electrodermal changes was examined; skin potential level (SPL), skin resistance level (SRL), and skin potential reflex (SPR). A depolarizing change in SPL and a lowering of SRL were observed which corresponded to lasting discomfort. These changes were detected in the thermal sweat areas. It was suggested that the change in SPL also occured in the arousal sweat area. Arousal response appears in the arousal sweet area rather than in the sweat areas. SPL showed better correspondence than SRL, especially in the time required for recovery after the discomfort stimulation. On the other hand, SPR was observed in the arousal sweat area accompanied by transient discomfort induced by Corioils stimulus. It was indicated that the amplitude of the positive wave (P wave) in SPR might correlate quantitatively to the degree of discomfort. SPR was not remarkably detected in the thermal sweat areas. Author

N86-22097# California Univ., Irvine, Dayton, Ohio.
TOXIC HAZARDS RESEARCH UNIT ANNUAL TECHNICAL REPORT: 1985 Report, Jun. 1984 - May 1985
J. D. MacEwen and E. H. Vernot Sep. 1985 202 p
(Contract F33615-80-C-0512)
(AD-A161558; AAMRL-TR-85-058; Rept-22) Avail: NTIS HC A10/MF A01 CSCL 06/20

The research program of the Toxic Hazards Research Unit (THRU) for the period of June 1984 through May 1985 is reviewed in this report. Chronic toxicity and oncogenic studies were carried out with hydrazine, JP-4, and JP-8. Results of histopathologic examination became available for a number of studies including chronic inhalation exposures to monomethylhydrazine, methylcyclohexane, and Otto Fuel II; and subchronic to petroleum and oil shale diesel fuel marine. These studies are now complete. Other investigations are complete except for histopathologic results. These include chronic exposures to petroleum JP-4, RJ-5, JP-7, JP-TS, and JP-10; subchronic exposures to petroleum JP-4 and JP-8; and weekly exposures to hydrazine. Three studies have concluded the exposure phases and are now being held postexposure - 90 day continuous exposures to shale JP-4 and dimethyl methylphosphonate and rat strain susceptibility to shale JP-4. A series of short-term toxicity studies was conducted on a variety of chemicals and chemical agents used by the Army, Air Force, and Navy. GRA

N86-22098# Naval Health Research Center, San Diego, Calif.
MECHANISMS OF BIOENERGETIC HOMEOSTASIS DURING EXERCISE: A GENERAL MODEL Interim Report
Charles G. Gray May 1985 27 p
(MR0-00001)
(AD-A161678; NAVHLTHRSCHC-85-19) Avail: NTIS HC A03/MF A01 CSCL 06/16

Studies over the past several years have identified limitations of substrate utilization as a primary determinant of physical endurance capacity. These studies have shown that muscles have a preference and a great capacity to utilize fats as a source of energy. However, the prepoderance of these studies have been directed at extending endurance by increasing glucose availability through increasing muscle glycogen stores or supplementing endogenous glucose supplies during exercise with various forms of sugar containing solutions. Some studies have shown that oral administration of glucose solutions during exercise can improve performance, while prefeeding with glucose decreases endurance performance. However, physical training and adaption to low carbohydrate diets drive the system toward greater fatty acid oxidation during exercise. The main problem appears to be integration of the observed effects of training and dietary manipulation into a comprehensive solution for maximizing physical endurance under a variety of circumstances. This report presents a brief review of information of the mechanisms which regulate cellular substrate metabolism in the central nervous system, liver, muscles, and adipose tissue. The concepts are organized into a systematic metabolic model which interlaces the mechanisms at work within each subsystem. Examples of regulation of substrate

flows is presented for exercise under three conditions: fasted, post-prandial, and after adaptation to a low carbohydrate diet. By using the proposed scheme of integrative metabolism, complex dietary and physical training programs for extending endurance performance are suggested. GRA

N86-22099# Thermedics, Inc., Woburn, Mass.
DEVELOPMENT OF AN ULTRAFAST-CURING WOUND DRESSING Annual Report, 30 Sep. 1983 - 30 Sep. 1984
Michael Szycher and Jonathan L. Rolfe 15 Mar. 1985 31 p
(Contract DAMD17-83-C-3240; DA Proj. 3S1-62775-A-825)
(AD-A162471; TE4337-53-85) Avail: NTIS HC A03/MF A01 CSCL 06/12

This document describes a second-generation, drug-dispensing wound dressing. The wound dressing, which can be applied by the wounded soldier himself, incorporates thrombin as a coagulant to stop bleeding, and gentamycin sulfate as a wide-spectrum antibiotic to prevent bacterial infection. The new would dressing is a trilaminate composite. The air side of the trilaminate is a fabric impregnated with an aliphatic, medical grade polyurethane elastomer; the middle laminate is a controlled release layer, containing the microencapsulated pharmacoactive agents, and the third laminate is a 1.0-mil-thick layer of acrylic-based, pressure-sensitive adhesive. The middle layer is fabricated from a mixture of urethane and silicone oligomers, which are pre-compounded with pharmacoactive agents, and is subsequently solidified (cured) upon mere exposure to low-intensity UV radiation at room temperature. Solidification at room temperature is a vital consideration, because most drugs are rapidly inactivated upon mild heating. Once cured, the oligomer layer containing pharmacoactive agents becomes a controlled-release monolith, capable of dispensing drugs at a continuous and predictable rate. GRA

N86-22100# Iowa Univ., Iowa City. Coll. of Medicine.
THE ROLE OF ENDORPHINS IN THE PATHOPHYSIOLOGY OF HEMORRHAGIC AND ENDOTOXIC SHOCK IN THE SUBHUMAN PRIMATE Annual Report, 1 Jun. 1980 - 31 May 1981 and Final Report, 15 Sep. 1981 - 15 Mar. 1985
Nelson J. Gurll, David G. Reynolds, Thomas Vargish, and Carl V. Gisolfi 15 Mar. 1985 65 p
(Contracts DAMD17-80-C-0094; DAMD17-81-C-1177; DA Proj. 3S1-62772-A-874)
(AD-A162483) Avail: NTIS HC A04/MF A01 CSCL 06/15

In order to investigate the pathophysiological role of endogenous morphine-like substances (endorphins) in shock, we studied cynomolgus monkeys and dogs subjected to hemorrhagic or endotoxic shock. Blockade of opiate receptors with naloxone improved cardiovascular function and survival in both species and both models but requires correction of acidosis and hypothermia. Shock is associated with elevations in plasma levels of endorphins. Using different sites of injection and various anatomical and pharmacological ablations, we have shown that naloxone's beneficial effects in hemorrhagic shock are due to potentiation of the effect of released catecholamines on cardiac opiate receptors. The myocardial depression found in shock is due to an endorphin-mediated attenuation of catecholamine activity on the heart. We believe this is mediated by interaction with cardiac receptors and is expressed via G-protein activation of adenylate cyclase and cyclic-AMP. This hypothesis needs to be tested by biochemical determination of these substances, and our observations need to be extended to endotoxic shock. Nevertheless, naloxone and other antiendorphin substances may be important in the treatment of shock by reversing one of the important pathophysiological mechanisms of cardiovascular depression. GRA

N86-22101# Pennsylvania State Univ., University Park. Dept. of Industrial and Management Systems Engineering.
INCORPORATION OF ACTIVE ELEMENTS INTO THE ARTICULATED TOTAL BODY MODEL Final Report, 26 Sep. 1983 - 30 Jun. 1985
Andris Freivalds 30 Jun. 1985 113 p
(Contract F33615-83-C-0506)
(AD-A162518; AAMRL-TR-85-061) Avail: NTIS HC A06/MF A01 CSCL 06/16

The Articulated Total Body (ATB) Model, based on rigid-body dynamics with Euler equations of motion and Lagrange type constraints, is used by the Harry G. Armstrong Aerospace Medical Research Laboratory to predict the forces and motions experienced by air crew personnel in typical flight operations. To provide a more realistic representation of human dynamics, active neuromusculature was added to the ATB Model using elements of the newly developed advanced harness system. A lumped three-parameter muscle model with a contractile element, a damping element and a parallel elastic element was developed. The contractile element included a length-tension relationship, a force-velocity relationship and an active state function. The basic fiber mechanisms were integrated into muscle systems utilizing motor unit organization, orderly recruitment of motor units and adjustments in force due to fatigue and reflex action. The complete muscle systems were then used to replicate the human neuromusculature of the trunk and neck and for the elbow, shoulder, hip and knee joints. GRA

N86-22102# Army Research Inst. of Environmental Medicine, Natick, Mass.
HEAT ACCLIMATIZATION DEVELOPED DURING SUMMER RUNNING IN NORTHEASTERN UNITED STATES
Lawrence E. Armstrong, Roger W. Hubbard, Jane P. DeLuca, and Elaine L. Christensen Dec. 1985 27 p
(DA Proj. 3E1-62777-A-879)
(AD-A162728) Avail: NTIS HC A03/MF A01 CSCL 06/16

Five highly trained distance runners (DR) were observed during controlled 90-min thermoregulation trials in spring and late summer to document the extent of heat acclimatization developed during summer running in Northeastern United States. These trials simulated environmental and exercise stresses encountered by DR during daily training. Between spring and late summer, DR trained outdoors for weeks but consequently showed few physiological adaptations classically associated with HA. Statistical comparison indicated no significant differences in mean heart rate, rectal temperature, sweat, plasma, or change in plasma, volume during exercise; mean weighted skin temperature was unchanged (except at 50 min of exercise) and sweat rate was also unchanged (except during the initial 30 min segments). Significant decreases in submaximal oxygen uptake were observed, at treadmill speeds of 80, 120, and 200 m min respectively. It is conclude that distance runners did not require summer heat exposure to adequately thermoregulate during the spring trial, which simulated the hottest summer days recorded during this study. GRA

N86-22103# California Univ., San Diego, La Jolla.
ADVANCED CLINICAL RESEARCH IN SHOCK AND TRAUMA Final Report, 1976 - Feb 1985
Richard M. Peters Feb. 1985 6 p
(Contract N00014-76-C-0282)
(AD-A162730) Avail: NTIS HC A02/MF A01 CSCL 06/5

This final report covers the years from 1976 through February, 1985. The overall subject of this research has been the best methods of resuscitation and maintaining patients who have hypovolemic shock of major surgery, particularly the support of the cardiac and the respiratory function. The number of subjects covered is described with the years in which those projects were completed and their conclusion. Table I lists the publications that have resulted from these investigations. GRA

N86-22104# Army Research Inst. of Environmental Medicine, Natick, Mass.
AN AUTOMATED SYSTEM FOR COMPREHENSIVE ASSESSMENT OF VISUAL FIELD SENSITIVITY
John L. Kobrick, Adrien R. Lussier, Stephen Mullen, and Calvin Witt Apr. 1985 19 p
(AD-A162755; USARIEM-T10/85) Avail: NTIS HC A02/MF A01 CSCL 06/16

A device for comprehensive assessment of the capability of operators for detection and location of visual signals throughout the functional visual field is described. The system is completely

automated and computerized, and provides documentation files and graphic descriptions of each operator performance immediately upon completion of testing. Sensitivity can be measured for three stimulus colors (red, yellow, green), in a testing situation which mimics commonplace viewing. An abbreviated listing of the main operating program software is provided. GRA

N86-22105# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MODELING ELECTROCARDIOGRAMS USING INTERACTING MARKOV CHAINS
Peter C. Doerschuk, Robert R. Tenney, and Alan S. Willsky Jul. 1985 64 p
(Grant AF-AFOSR-0258-82)
(AD-A162758; LIDS-P-1491; AFOSR-85-1118TR) Avail: NTIS HC A04/MF A01 CSCL 06/5

A methodology for the statistical modeling of cardiac behavior and electrocardiograms (ECG's) is developed that emphasizes a) the physiological event/detailed waveform hierarchy; and b) the importance of control and timing in describing the interactions among the several anatomical subunits of the heat. This methodology has been motivated by a desire to develop improved algorithms for statistical rhythm analysis that capture cardiac behavior in a more fundamental way but that stops short of complete accuracy in order to highlight decompositions that can be exploited to simplify statistical inference based on these models. The models consist of interacting finite-state processes, where a very few of the transition probabilities for each process can take on a small number of different values depending upon the states of neighboring processes. Each finite-state process is constructed from a very small set of elementary structural elements. The methodology is illustrated by describing models for three cardiac rhythms and include simulation results for one of these, namely the rhythm known as Wenckebach. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-22106 Arizona Univ., Tucson.
VISUAL PERCEPTION IN CORRELATED NOISE Ph.D. Thesis
Kyle Jean Myers 1985 149 p
Avail: Univ. Microfilms Order No. DA8522817

The ability of human observers to perform detection tasks in medical images that contain structured noise was investigated. Physical measures of image quality, such as signal-to-noise ratio (SNR), resolution, modulation transfer function (MTF), and contrast, do not accurately predict how well an observer can detect lesions in an image. For images with equal pixel SNR, humans can detect a low contrast object more readily in images that have a low-pass noise structure, as opposed to a high-pass noise structure. This finding is important in the comparison of images generated by a classical pinhole-imaging system with images generated by a computed tomography imager. A figure of merit was wanted for imaging systems that is more than an evaluation of the physician's performance, measured using human observers and an accepted method such as receiver operating characteristic techniques. The hypothesis is that the human observe acts approximately as an ideal observer who does not have the ability to prewhiten the noise in an image. Without this ability, the ideal observer's detection performance for even a simple task is degraded substantially in correlated noise. This is just the effect found for human observers. Dissert. Abstr.

N86-22107# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
PERSONALITY TYPE ANALYSIS OF AIR FORCE INSTITUTE OF TECHNOLOGY SCHOOL OF SYSTEMS AND LOGISTICS GRADUATE DEGREE 85S CLASS USING MYERS-BRIGGS TYPE-INDICATOR M.S. Thesis
Richard A. Carter Sep. 1985 146 p
(AD-A161053; AFIT/GLM/LSM/85S-11) Avail: NTIS HC A07/MF A01 CSCL 05/10

The objective of this research was to identify significant learning differences in the AFIT School of Systems and Logistics (AFIT/LS) using the personality type theory developed by psychologist Jung and identified by the Myers-Briggs Type Indicator (MBTI). The data were collected from graduate students of AFIT/LS through the MBTI and a Preferred Academic Environment Questionnaire. Results of the MBTI categorized each of the subjects into personality types. The Preferred Academic Environment Questionnaire determined student habits test taking preferences: AFIT situations which the student felt improved academic performance; and AFIT learning situations which were important to the student. The data were analyzed according to the distribution of MBTI type, the effect of MBTI type upon grade point average, and student preference for instructional technique and learning styles as they related to MBTI type. GRA

N86-22108# Naval Submarine Medical Research Lab., Groton, Conn.
THE EFFECTS OF COLOR-CODING IN GEOSIT DISPLAYS. 1: COLOR AS A REDUNDANT CODE Interim Report
Alan R. Jacobsen, David F. Neri, and William H. Rogers 13 Sep. 1985 20 p
(AD-A161107; NSMRL-1061) Avail: NTIS HC A02/MF A01 CSCL 05/8

The effect of color-coding symbols in geographical situation (GEOSIT) displays on response time was studied using 12 observers. Three levels of the threat dimension (friendly, unknown, and hostile) were redundantly coded by both color and shape, while the three levels of the platform dimension (submerged, surface, and airborne) were coded only by shape. Compared to the standard monochrome coding scheme, response time on the color-coded threat dimension was enhanced by over 100%. Performance on the noncolor-coded platform dimension was unaffected by color-coding of the threat dimension. Several other significant effects were also found. This study demonstrates that the use of color in GEOSIT displays can dramatically improve performance without any decrement in performance on noncolor-coded information. GRA

N86-22109# Naval Health Research Center, San Diego, Calif.
HEALTH AND PERFORMANCE OF ANTARCTIC WINTER-OVER PERSONNEL: A FOLLOW-UP STUDY Final Report
Lawrence A. Palinkas Jun. 1985 15 p
(AD-A161773; NAVHLTHRSCHC-85-18) Avail: NTIS HC A02/MF A01 CSCL 06/10

Despite extensive previous research on the health and performance of Antarctic winter-over personnel while they are on the ice, little is known about the long-term effects of the winter-over experience. Using the records of enlisted personnel who applied to the Operation Deep Freeze program between 1963 and 1973, the health and service history data available on these individuals at the Naval health Research Center were examined to determine if incidence rates and performance criteria were significantly different between a group of winter-over personnel and a control group of enlisted personnel who were rated as acceptable by a screening team but who did not winter over. Results indicated that the overall incidence rate for the winter-over group was significantly lower than the rate for the control group. The winter-over group also had significantly fewer first hospitalizations for neoplasms, endocrine, nutritional, and metabolic disorders, and diseases of the musculoskeletal system. Results suggest that wintering over does not adversely affect subsequent health and performance of enlisted personnel, and that the screening program has been successful in selecting the best candidates in terms of these criteria. GRA

N86-22110# Army Construction Engineering Research Lab., Champaign, Ill.
THE ROLE OF VIBRATION AND RATTLE IN HUMAN RESPONSE

TO HELICOPTER NOISE Final Report
Paul D. Schomer and Robert D. Neathammer Sep. 1985 161 p
(AD-A162466; CERL-TR-N-85/14) Avail: NTIS HC A08/MF A01 CSCL 05/10

Our understanding of community reaction to helicopter noise remains incomplete. A technique called A-weighting appears to produce realistic data outdoors and at modest noise levels, and the community response in terms of percentage of population highly annoyed can be correlated with respect to the Day/Night Average Sound Level (DNL) descriptor. However, questions remain as to the effect of perceived building vibrations and rattle in human response to helicopter noise. To answer these questions, this study examined the role of vibration and rattle in human response to helicopter noise. Many volunteer subjects were tested under real noise conditions. The helicopter noise was generated by an Army UH-1H (Huey) helicopter. Subjects were located either in the living room of a new mobile home, outdoors, or in the living room or dining room of an old frame farmhouse near Champaign, IL. The control or comparison sound was generated electronically through loudspeakers at each location using a 500-Hz octave band of white noise. By performing paired comparison tests between the helicopter and control noises, it was possible to establish equivalency between these two stimuli. Author (GRA)

N86-22111# Yale Univ., New Haven, Conn. Dept. of Psychology.
ATTENTION WITHIN AUDITORY WORD PERCEPTION Final Report, 1 Jan. 1982 - 31 Dec. 1983
Arthur G. Samuel and William H. Ressler Nov. 1985 58 p
(Contract N00014-82-C-0160)
(AD-A162550; Rept-85-1-ONR) Avail: NTIS HC A04/MF A01 CSCL 06/16

Phonemic restoration is a powerful auditory illusion that arises when a phoneme is removed from a word and replaced with noise, resulting in a percept which sounds like the intact word with a spurious bit of noise. It is hypothesized that the configurational properties of the word impair attention to the individual phonemes and thereby induce perceptual restoration of the missing phoneme. If so, this impairment might be unlearned if listeners can process individual phonemes within a word selectively. Subjects received training with the potentially restorable stimuli (972 trials with feedback); in addition, the presence or absence of an attentional cue, contained in a visual prime preceding each trial, was varied between groups of subjects. Cueing the identity and location of the critical phoneme of each test word allowed subjects to attend to the critical phoneme, thereby inhibiting the illusion, but only when the prime also identified the test word itself. When the prime only provided the identity or location of the critical phoneme, or only the identity of the word, subjects performed identically to those subjects for whom the prime contained no information at all about the test word. Furthermore, training did not produce any generalized learning about the types of stimuli used. A limited interactive model of auditory word perception is discussed, in which attention operates through the lexical level. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-22112* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DROP FOOT CORRECTIVE DEVICE Patent
Bert C. Bois, inventor (to NASA) Issued 28 Jan. 1986 5 p
Continuation of US-Patent-Appl-SN-876298, filed 9 Feb. 1978, abandoned
(NASA-Case-LAR-12259-2; US-Patent-4,566,447;
US-Patent-Appl-SN-280152; US-Patent-Class-128-80-E) Avail: US Patent and Trademark Office CSCL 05H

A light weight, economical device to alleviate a plurality of difficulties encountered in walking by a victim suffering from a drop foot condition is discussed. A legband girdles the leg below the knee and above the calf providing an anchor point for the upper end of a ligament having its lower end attached to a toe of a shoe or a toe on the foot. The ligament is of such length that the foot is supported thereby and retained in a normal position during walking. NASA

N86-22113*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DIRECT MODEL REFERENCE ADAPTIVE CONTROL OF A FLEXIBLE ROBOTIC MANIPULATOR
Deirdre R. Meldrum 15 Dec. 1985 90 p refs
(Contract NAS7-918)
(NASA-CR-176659; JPL-PUB-85-100; NAS 1.26:176659) Avail: NTIS HC A05/MF A01 CSCL 05H

Quick, precise control of a flexible manipulator in a space environment is essential for future Space Station repair and satellite servicing. Numerous control algorithms have proven successful in controlling rigid manipulators wih colocated sensors and actuators; however, few have been tested on a flexible manipulator with noncolocated sensors and actuators. In this thesis, a model reference adaptive control (MRAC) scheme based on command generator tracker theory is designed for a flexible manipulator. Quicker, more precise tracking results are expected over nonadaptive control laws for this MRAC approach. Equations of motion in modal coordinates are derived for a single-link, flexible manipulator with an actuator at the pinned-end and a sensor at the free end. An MRAC is designed with the objective of controlling the torquing actuator so that the tip position follows a trajectory that is prescribed by the reference model. An appealing feature of this direct MRAC law is that it allows the reference model to have fewer states than the plant itself. Direct adaptive control also adjusts the controller parameters directly with knowledge of only the plant output and input signals. Author

N86-22114*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RECONFIGURABLE WORK STATION FOR A VIDEO DISPLAY UNIT AND KEYBOARD Patent Application
Nicholas L. Shields (Essex Corp.), Mary F. Fagg (Essex Corp.), David E. Henderson (Essex Corp.), and Fred D. Roe, inventors (to NASA) Filed 5 Dec. 1985 17 p
(NASA-Case-MFS-26009-1SB; NAS 1.71:MFS-26009-1SB;
US-Patent-Appl-SN-805011) Avail: NTIS HC A02/MF A01 CSCL 05H

A reconfigurable workstation is illustrated having video, keyboard, and hand operated motion controller capabilities. The workstation includes main side panels between which a primary work panel is pivotally carried in a manner in which primary work panel may be adjusted and set in a negatively declined or positively inclined position for proper forearm support while operating hand controllers. A keyboard table supports a keyboard in such a manner that the keyboard is set in a positively inclined position with respect to the negatively declined work panel. Various adjustable devices are provided for adjusting the relative declinations and inclinations of the work panels, tables, and visual display panels. NASA

N86-22115# New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
A MULTIPLE-REGRESSION MODEL OF PILOT PERFORMANCE IN VERTICAL AND TRANSLATIONAL FLIGHT
John Wiedemann and Stanley N. Roscoe May 1985 102 p
(Contract N00014-81-K-0439)
(AD-A161364; BEL-85-2/ONR-85-2) Avail: NTIS HC A06/MF A01 CSCL 01/4

An experiment was conducted to advance the development of a multiple regression model of VTOL pilot performance as a function of various control/display system and flight mission variables. Second-order response surfaces as a function of two control system design variables (translational control order and

vertical control gain reduction factor) and three downward-looking display design variables (horizontal position error magnification, translational prediction time, and translational tracking mode) were derived from Pilot performances on each of three mission scenarios. The optimum values for each of the five system design variables were determined for each scenario independently using the same central composite experimental design with three groups of four subjects each. Comprehensive analyses of variance and canonical analyses were used to refine the fitted surfaces to determine the true nature of the pilot performance effects for each flight scenario and to select a single set of system design parameters that would yield near-optimum performances on all three scenarios. GRA

N86-22116# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
EVALUATION OF A PASSENGER MASK MODIFIED WITH A REBREATHER BAG FOR PROTECTION FROM SMOKE AND FUMES
E. A. Higgins, J. T. Saldivar, P. J. Lyne, and G. E. Funkhouser Oct. 1985 25 p
(AD-A162473; DOT/FAA/AM-85-10) Avail: NTIS HC A02/MF A01 CSCL 06/11

A series of experiments were conducted in an altitude chamber at ground level, 8,000 ft, 14,000 ft, and 21,500 ft, both with and without exercise, to evaluate the potential for providing protection from smoke and fumes for airline passengers while wearing a standard continuous-flow passenger mask modified by the addition of a rebreather bag. It was determined that it would provide increased protection for those individuals who had tidal volumes of 1.5 L or less. However, it would not function properly for those individuals who had tidal volumes greater than 1.5 L. Either the carbon dioxide levels were too great (above 15 mm Hg partial pressure) or the rebreather bag collapsed. These results indicate that the addition of the rebreather bag to the passenger mask has the potential for providing protection from smoke and fumes, but the system must have appropriately balanced valve resistances and appropriately sized valve openings. This critical balance has not yet been achieved for those individuals with large tidal volumes. GRA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-22117# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 2, MARCH 1984
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jan Heering, ed. Mar. 1984 51 p refs
(CWI-Newsletter-2; ISSN-0168-826X) Avail: NTIS HC A04/MF A01

The proof of two properties of the subjects of positive integers (Van den Waerden's Theorem and Hindeman's Theorem) by use of dynamical topology is reported. A mathematical approach to software problems is discussed. Numerical research on the Riemann hypothesis is presented. For individual titles, see N86-22118 through N86-22120.

N86-22118# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
TWO APPLICATIONS OF TOPOLOGICAL DYNAMICS IN COMBINATORIAL NUMBER THEORY c64
Jan deVries *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 2-17 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

Methods of dynamical topology are reported. A theorem of Van der Waerden and a theorem of Hindeman are proved using dynamical topology methods. Results concern combinatorial number theory. Author (ESA)

N86-22119# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
SOFTWARE DEVELOPMENT: SCIENCE OR PATCHWORK c61
Robert L. Baber *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 18-34 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

A series of case examples illustrates the problematic state of affairs in the field of software development theory. Detailed specifications and design and development of computer software in various technical and scientific domains are discussed. Author (ESA)

N86-22120# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
RECENT PROGRESS ON THE NUMERICAL VERIFICATION OF THE RIEMANN HYPOTHESIS c67
J. vandeLune and H. J. J. teRiele *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 35-37 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

The fact that the first 400 million nontrivial zeros of Riemann's zeta function are all simple and are on the critical line is reported. Author (ESA)

N86-22121# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 7, JUNE 1985
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jo C. Ebergen, ed. Jun. 1985 46 p refs
(CWI-Newsletter-7; ISSN-0168-826X) Avail: NTIS HC A03/MF A01

Second order approximation concerning the deficiency theory is discussed. Three classic problems are discussed by use of set theory and topology. A problem of optimization methods (Vehicle Routing Problem) for distribution management is studied. A bibliography of UNIX and C Language is given. For individual titles, see N86-22122 through N86-22124.

N86-22122# Limburg State Univ., Maastricht (Netherlands).
SECOND ORDER APPROXIMATIONS c64
Willem Albers *In* CWI CWI Newsletter, No. 7, June 1985 Jun. 1985 p 2-7 (For primary document see N86-22121 12-59)
Avail: NTIS HC A03/MF A01

Aspects of the second order approximation are discussed. Hodger-Lehmam's deficiency theory is presented with practical examples. Author (ESA)

N86-22123# Amsterdam Univ. (Netherlands).
SET THEORY AND TOPOLOGY c67
Jan vanMill *In* CWI CWI Newsletter, No. 7, June 1985 Jun. 1985 p 10-14 refs (For primary document see N86-22121 12-59)
Avail: NTIS HC A03/MF A01

The methods of set theory and topology are discussed using three classical problems. The fact that Alexandroff's problem is undecidable is reported. The fact that the Whitehead's problem is not undecidable by consideration of the Martin's axiom but, not the continuum hypotheses, is conjectured. The fact that the Choquet problem can be studied as a topological problem is shown. Author (ESA)

N86-22124# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
VEHICLE ROUTING AND COMPUTER GRAPHICS c61
M. W. P. Savelsbergh *In its* CWI Newsletter, No. 7, June 1985

Jun. 1985 p 15-24 refs (For primary document see N86-22121 12-59)
(Grant STW-CWI-22-0348)
Avail: NTIS HC A03/MF A01

The vehicle routing problem as a optimization method for distribution management is studied. Arguments for interactive approaches to computerized vehicle routing are proposed.

Author (ESA)

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-22125 Pennsylvania State Univ., University Park.
COLOR IMAGE PROCESSING WITH COMPUTER-GENERATED SPATIAL FILTERS IN A DISPERSED WHITE-LIGHT OPTICAL SYSTEM Ph.D. Thesis
Michael Stanley Dymek 1985 173 p
Avail: Univ. Microfilms Order No. DA8518018

Computer generated (CG) spatial filters are applied to color image processing in a dispersed white light optical system. The range of input wavelengths produces continuously dispersed Fourier spectra in the filter plane, each having scale factor proportional to wavelength. Analysis of the requirements for multi-, discrete-band filters to achieve real bipolar and complex filtering operations on the dispersed color spectra is presented. Computer simulations, for the linear image deblurring example, show that significant processing performance can be achieved by filters realized with typical CG filter making devices. Processing performance is more sensitive to filter geometry and alignment for the color processor than for a monochromatic processor, primarily because of color smear effects, similar to those produced with holograms under white light illumination. Experimental results with binary and continuous tone smeared color images agree well with computer simulation results. Wavelength discrimination in the color image display material largely determines the effectiveness of wavelength as an additional degree of freedom in an optical processing system. Finally, a parallel processing technique is proposed which can increase the number of CG filter processing channels for moderate resolution color input images.

Dissert. Abstr.

N86-22126 Stanford Univ., Calif.
PARALLEL ARCHITECTURES FOR COMPUTER GRAPHICS DISPLAYS Ph.D. Thesis
Marc Regis Hannah 1985 121 p
Avail: Univ. Microfilms Order No. DA8522154

The use of Very Large Scale Integration (VLSI) based parallel architectures in two aspects of computer graphics display hardware was investigated. First, a flexible multiprocessor pipeline architecture for geometric computation is described. Second, the architecture and algorithms of a distributed processing array for smooth-shaded scan-conversion of three dimensional geometric image descriptions is presented. Frame buffers driving raster-scanned displays have recently become the technology of choice for computer graphics because of their flexibility and relatively low cost. Two graphics methodologies have evolved for programming these displays (bit-map and geometric). Geometric graphics, although more convenient from the user's standpoint, has previously required expensive hardware support to avoid slow system response. The Geometry Engine is a low cost, VLSI based architecture for providing the hardware support necessary for interactive geometric graphics. This work extends the Geometry Engine architecture to support smooth-shaded rendering, and higher performance systems.

Dissert. Abstr.

N86-22127 Stanford Univ., Calif.
ARCHITECTURAL ELEMENTS FOR BITMAP GRAPHICS Ph.D. Thesis
Cary Dikel Kornfeld 1985 135 p
Avail: Univ. Microfilms Order No. DA8522176

Two closely related aspects of bitmap graphics methods for manipulating bitmap images and techniques for displaying these images are examined. The implementation of three primitive operations useful when manipulating images are presented in Mirror, Rotate and Translate (BitBlt). When implemented on conventional bitmap systems these fundamental operations require extensive memory and processor activity. Alternative architectures for bitmap graphic systems are explored. Two architectural elements that significantly improve system performance are defined. The first, a Raster Op unit, combines four bitmap images under arbitrary merging operations at video data rates. The second element, called an Image Prism, generates orthogonal image transformations on bitmap images without requiring processor interaction. As a result, these fundamental operations can be performed several hundred times faster than before. VLSI implementations of each are described and their performance is reviewed. The design and development of a research display device is presented. Three major architectural components of traditional CRT-based bitmap display systems (frame buffer, display controller and display device are interated into a single, exceptionally thin, flat display device of which several working prototypes were built.

Dissert. Abstr.

N86-22128 Virginia Polytechnic Inst. and State Univ., Blacksburg.
A PROTECTION MODEL FOR DISTRIBUTED DATA BASE MANAGEMENT SYSTEMS Ph.D. Thesis
Atika Laribi 1985 267 p
Avail: Univ. Microfilms Order No. DA8521333

Security is important for Centralized Data Base Management Systems (CDBMS) and becomes crucial for Distributed Data Base Management Systems (DDBMS) when different organizations share information. Secure cooperation can be achieved only if each participating organization is assured that the data it makes available will not be abused by other users. Differences between CDBMS and DDBMS that characterize the nature of the protection problem in DDBMS are identified. These differences are translated into basic protection requirements. Policies that a distributed data base management protection system should allow are described. The hybrid system is incorporated in a general model of DDBMS protection. Three levels of abstraction describing different apects of DDBMS protection problems are defined. The conceptual level describes the protection control of the DDBMS transactions and information flows. The logical level is concerned with the interaction between the different organizations participating in the DDBMS. The physical level is involved with the architectural implementation of the logical level.

Dissert. Abstr.

N86-22129*# Allied Bendix Aerospace, Mishawaka, Ind. Guidance Systems Div.
HARDWARE TEST PROGRAM FOR EVALUATION OF BASELINE RANGE/RANGE RATE SENSOR CONCEPT
E. Pernic Dec. 1985 127 p
(Contract NAS8-36144)
(NASA-CR-178710; NAS 1.26:178710; BGSD-MO-7078) Avail: NTIS HC A07/MF A01 CSCL 09B

The test program Phase II effort provides additional design information in terms of range and range rate (R/R) sensor performance when observing and tracking a typical spacecraft target. The target used in the test program was a one-third scale model of the Hubble Space Telescope (HST) available at the MSFC test site where the tests were performed. A modified Bendix millimeter wave radar served as the R/R sensor test bed for evaluation of range and range rate tracking performance, and generation of radar signature characteristics of the spacecraft target. A summary of program test results and conclusions are presented along with detailed description of the Bendix test bed radar with accompaning instrumentation. The MSFC test site and facilities are described. The test procedures used to establish background levels, and the calibration procedures used in the range accuracy tests and RCS (radar cross section) signature

measurements, are presented and a condensed version of the daily log kept during the 5 September through 17 September test period is also presented. The test program results are given starting with the RCS signature measurements, then continuing with range measurement accuracy test results and finally the range and range rate tracking accuracy test results. Author

N86-22130*# California Inst. of Tech., Pasadena.
ADVANCED TECHNOLOGY UNIT TRAINING AND MANAGEMENT SYSTEM (ATUTMS). USER'S GUIDE Final Report, Jan. 1984 - Jun. 1985
T. Antczak, A. Benson, and T. Ibbott 14 Jul. 1985 319 p
(Contract NAS7-918)
(NASA-CR-176643; NAS 1.26:17643; AD-A161002; ARI-RN-85-71) Avail: NTIS HC A14/MF A01 CSCL 05/9

A computer-based management information system was designed to assist unit training at the battalion level. A prototype system was successfully implemented and made operational within a host battalion of the U.S. Army personnel in the use of this system. ATUTMS uses the relational database management system, INGRES, to record information and to produce reports needed for battalion management. INGRES is utilized to store, add, change, and delete data, and to generate reports. The relational database includes the three functional areas of the battalion: Personnel, Training and Logistics. Word processing is accomplished on ATUTMS by using a software program called MUSE. MUSE consists of a powerful text editor, a spelling checker, and the capability to print documents on either a dot-matrix printer or the system letter-quality printer. Useful tools available on the ATUTMS computer system, in addition to the database management system and word processing, are MAIL and PHONE. Using these tools, the user can communicate with other users on-line or send messages to be read later. The ATUTMS hardware is based on a central computer located in the battalion headquarters building. Terminals are distributed throughout the battalion facilities to make them easily available to users. The central computer is a VAX 11/750. GRA

N86-22131# Naval Ocean Systems Center, San Diego, Calif.
ADVANCED MAIL SYSTEMS TECHNOLOGY. EXECUTIVE SUMMARY AND APPENDICES A-G Annual Report, 1 Sep. 1983 - 31 Aug. 1984
Nov. 1984 139 p
(AD-A161003; NOSC/TR-1038; AR-9) Avail: NTIS HC A07/MF A01 CSCL 09/2

The principal objectives of this work are to provide for the US Postal Service improvements in image acquisition, compression, storage and presentation technology. Contents includes: graphics conversion subsystem hardware and software; datacopy camera as the graphics conversion system input; graphics conversion acquisition alternatives; illumination computation program; an autoedit program; thinning algorithm; examples of facsimile data compression. GRA

N86-22132# Illinois Univ., Urbana. Applied Computation Theory Group.
A UNIFIED APPROACH TO THE ANALYSIS AND SYNTHESIS OF SYSTOLIC ARRAYS M.S. Thesis
Scot W. Hornick Apr. 1985 50 p
(Contract N00014-84-C-0149)
(AD-A161326; ACT-56; UILU-ENG-85-2214) Avail: NTIS HC A03/MF A01 CSCL 09/2

The first steps toward the development of a theoretical framework to unify the analysis and synthesis of systolic networks are taken. A class of transformations on systolic networks is described that alter the topology of a network while preserving the timing of its computations. These transformations may be used to demonstrate the equivalence of two existing systolic designs or to obtain a new design from an existing one, according to particular design specifications. A model of systolic network is presented and then the parameters that are used to characterize one are identified. Next, the correctness of two types of transformations on these parameters is proved. These transformations are shown to account for different processor types and multiple processor states. Finally, these transformations characterize those that avoid the phenomenon of crossing. Author (GRA)

N86-22133# Illinois Univ., Urbana. Coordinated Science Lab.
SPECIAL PURPOSE COMPUTER ARCHITECTURE FOR LU FACTORIZATION OF PARTITIONED SYSTEMS Final Technical Report, Aug. 1983 - Aug. 1984
Kin-Man I. Lui Aug. 1985 98 p
(Contract N00014-84-C-0149)
(AD-A161351; R-1015; UILU-ENG-84-2209) Avail: NTIS HC A05/MF A01 CSCL 09/2

The simulation of large-scale integrated circuits requires a considerable amount of computation time using the currently available circuit simulation programs like SPICE. One of the bottlenecks of these simulation programs is in solving these systems of linear equations using LU factorization. The idea of a nested clustering algorithm to partition the matrices into bordered block diagonal form to facilitate parallel processing is explored. In addition, an architecture combining both the systolic array and the wavefront array processors is proposed to perform the LU factorization of the partitioned system using highly concurrent parallel processor arrays. Author (GRA)

N86-22134# Naval Postgraduate School, Monterey, Calif.
A DECISION SUPPORT SYSTEM FOR COST-EFFECTIVENESS ANALYSIS FOR CONTROL AND SECURITY OF COMPUTER SYSTEMS M.S. Thesis
Emmanuel A. Prevenas Sep. 1985 152 p
(AD-A161388) Avail: NTIS HC A08/MF A01 CSCL 09/2

The increasing number of computer failures and crimes has forced managers to tighten the control procedures of their EDP systems. However, the cost of an exhaustive control strategy is often very expensive, and its effectiveness is not guaranteed. This thesis designs and implements a Decision Support System that helps determine optimal control procedures for EDP systems (CEA-DSS). The model base of the proposed DSS consists of various techniques for estimating computer exposures. The latter can be interactively analyzed via a Dialogue interface that supports tabular and graphic outputs. CEA-DSS also provides extensive database management capabilities to keep track of the diverse control problems. It is implemented in PASCAL for the IBM-PC. GRA

N86-22135# Florida State Univ., Tallahassee. Dept. of Statistics.
OPTIMUM ALLOCATION IN MULTISTATE SYSTEMS, WITH APPLICATIONS IN RELIABILITY
E. El-Neweihi, F. Proschan, and J. Sethuraman May 1985 9 p
(Contracts DAAG29-82-K-0168; F49620-85-C-0007)
(AD-A161392; FSU-STATISTICS-M699; TR-85-175-AFOSR; ARO-19367.28-MA; TR-D-80-ARO) Avail: NTIS HC A02/MF A01 CSCL 14/4

This paper presents some results in the optimal allocation of multistate components in a parallel-series system. In addition, these results may be used to obtain fruitful applications in reliability theory. Our basic mathematical tools are majorization and Schur functions; the theorems obtained and methods used are related to those of Optimal Allocation of Components in Parallel-Series and Series-Parallel systems. The present paper and the reference just above are the only papers exploiting the elegance and power of majorization and Schur functions to solve optimal allocation problems in reliability. GRA

N86-22136# Illinois Univ., Urbana. Applied Computation Theory Group.
DICTIONARY MACHINES FOR CUBE-CLASS NETWORKS
Alan M. Schwartz 5 Apr. 1985 75 p
(Contract N00014-84-C-0149)
(AD-A161393; ACT-53; IU-UILU-ENG-85-2206; R-1031) Avail: NTIS HC A04/MF A01 CSCL 05/2

A dictionary is a data structure that supports insertion, deletion, and retrieval operations. To maintain a database, a dictionary

machine accepts an arbitrary sequence of instructions at a constant rate. This idea presents two new VLSI dictionary machines on networks that emulate the binary cube. One machine runs on a shuffle-exchange network. The other machine runs on a cube-connected cycles network. These two designs demonstrate that general purpose networks can perform dictionary operations. Chapter 1 includes a definition of the dictionary machine problem and an overview of previous work. Chapters 2 and 3 present the bulk of this idea: two dictionary algorithms that run on cube-class architectures. The design in Chapter 2 uses bitonic merge to perform dictionary operations on the SEN. It also presents a novel architecture to implement pipelining. This architecture is an important contribution. The dictionary algorithm of Chapter 3 runs on the CCC and borrows heavily from previous work on three machines. Chapter 4 places these new designs in perspective with previous work and offers concluding remarks. GRA

N86-22137# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
DECISION SUPPORT SYSTEM FOR ASD (AERONAUTICAL SYSTEMS DIVISION) PROGRAM MANAGERS M.S. Thesis
Terrence W. Brotherton Sep. 1985 180 p
(AD-A161690; AFIT/GSM/LSY/85S-5) Avail: NTIS
HC A09/MF A01 CSCL 09/2

This thesis effort identifies the program management tasks most amenable to computerization, researches existing implementation of the identified tasks, and incorporated selected implementations with a user friendly interface on a Zenith Z-100 computer. The thesis is a combination of reviewed literature and the demonstration of the prototype concept. The literature review concentrated on the program management environment, the application of a Decision Support System (DSS) to that environment, Information System design factors related to development of a DSS and the evaluation of Information systems. A prototyping effort ensued to insure that the system would meet the requirements of the prototype user. The DSS prototype was demonstrated to two sub-groups of generic program managers at ASD and AFIT. Using a developed evaluation instrument, they evaluated eleven qualities of the DSS. The evaluation was composed of the three subcategories of system worth, system quality, and user propensity to use the system. The DSS was favorably received by both groups of prospective users. GRA

N86-22138# Columbia Univ., New York. Library.
ALGORITHMS FOR NONLINEAR PROGRAMMING Final Report, 15 Aug. 1983 - 31 May 1985
Donald Goldfarb 30 Jul. 1985 7 p
(Contract DAAG29-82-K-0106)
(AD-A161746; Rept-85-1; ARO-21013.5-MA) Avail: NTIS
HC A02/MF A01 CSCL 12/1

Several algorithms for solving problems in linear, quadratic, and nonlinear programming, network flows, and facilities location were developed and analyzed. Results include: (1) The analysis of the computational complexity of the problem of determining an optimally sparse representation of the null space of a matrix, and the development of worst-case bounds for the shadow-vertex simplex algorithm and several heuristics for distance constrained discrete facility location problems and conditional covering problems; (2) The development of efficient algorithms for dense and sparse assignment problems, strictly convex quadratic programming problems, and a nonlinear programming problem that arises when maximizing a correlation coefficient subject to linear constraints; and (3) The application of iterative methods to large sparse equality-constraind quadratic programs and the development of multiple constraint deletion strategies for active-set algorithms for linearly constrained nonlinear programming problems. Author (GRA)

N86-22139# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
DP FORMAT OF THE DRAWING FILES Interim Report
Dario Giuse Sep. 1985 27 p
(AD-A162440; CMU-RI-TR-85-16) Avail: NTIS HC A03/MF A01 CSCL 09/2

DP is a highly interactive graphics editor that runs on a personal workstation and can produce general-purpose illustrations as well as circuit drawings. The main purpose of this document, which is a complete specification of the format and semantics of DP drawing files, is to encourage the development of application programs that can read and generate drawings in the DP format and thus exchange information in graphic form. GRA

N86-22140# Illinois Univ., Urbana. Coordinated Science Lab.
A PARALLEL STACK PROCESSOR TO REDUCE PROCEDURE-CALL OVERHEAD M.S. Thesis
Richard J. Eickemeyer Nov. 1985 83 p
(Contracts N00039-80-C-0556; N00014-84-C-0149)
(AD-A162494; UILU-ENG-85-2232; CSG-48) Avail: NTIS
HC A05/MF A01 CSCL 09/2

A processor organization is presented to reduce the large overhead of procedure calls in high-level languages. In the Parallel Stack Processor, processor registers are each at the top of a hardware stack of registers. Saving processor registers on procedure call takes place in one cycle by pushing all registers simultaneously. A detailed performance model, driven by dynamic high-level language statistics, is presented. Results from the model indicate the effect on performance of the parallel stack computer architecture when compared to a processor without parallel stacks. The processor architecture is specified in the report along with a discussion of implementation details for the VLSI single-chip processor. Author (GRA)

N86-22141# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
GEONAMES PROCESSING SYSTEM FUNCTIONAL DESIGN SPECIFICATION. VOLUME 5: PERFORMANCE SPECIFICATIONS Final Report
Gail Langran Mar. 1985 32 p
(AD-A162571; AD-E900528; NORDA-102-Vol-5) Avail: NTIS
HC A03/MF A01 CSCL 05/2

This work, referred to as the Geonames Processing System, will be conducted during FY82-FY89. A Comprehensive Coordination Plan (Norda Technical Note 189) was written in FY82 to provide a general system description. The Geonames Processing System Functional Design Specification, of which this is Volme 5, describes in more detail a proposed system based on requirements presented to NORDA by DMA Headquarters and DMA's two production centers. A comprehensive system with simple and adaptable standard interfaces is described. This volume outlines the performance specifications of the Geonames Processing System as a whole. Stated requirements are either shared by all four subsystems, or are developmental functions. GRA

N86-22142# Illinois Univ., Urbana. Coordinated Science Lab.
SIMULATIONS AMONG MULTIDIMENSIONAL ITERATIVE ARRAYS, ITERATIVE TREE AUTOMATA, AND ALTERNATING TURNING MACHINES M.S. Thesis
Jerry L. Trahan Jan. 1986 42 p
(AD-A162661; IU-UILU-ENG-86-2202; ACT-66) Avail: NTIS
HC A03/MF A01 CSCL 12/1

We present three simulations: a simulation of an alternating Turning machine (ATM) operating in time T(n) by an iterative tree automation (IITA), a simulation of a d-dimensional iterative array (dIA) operating in time T(n) by an ATM and a simulation of an ITA operating in time T(n) by an ATM. The first two improve previously known results. The first implies the simulation of a nondeterministic Turing machine by an ITA in time O(T(n)) of Culik and Yu(1984)sub d + 1. The second is stronger than the simulation of a dIA by an ATM in time O((T(n)) /logT(n)) of Seiferas (1977) and Dymond and Tompa (1985). GRA

N86-22143# Oak Ridge National Lab., Tenn.
EFFICIENT PARALLEL LU FACTORIZATION WITH PIVOTING ON A HYPERCUBE MULTIPROCESSOR
G. A. Geist Oct. 1985 28 p
(Contract DE-AC05-84OR-21400)

(DE86-001461; ORNL-6211) Avail: NTIS HC A03/MF A01

A message-passing parallel algorithm is developed for forming the LU factors of general non-singular matrices on a hypercube multiprocessor. Partial pivoting is performed to ensure numerical stability, but the scheduling of tasks is such that the pivot search in the parallel algorithm is completely masked. Empirical tests show that the load imbalance produced by random pivoting causes a 5% to 14% increase in execution time. A complementary parallel triangular solution algorithm is also given. Comparisons with the non-pivoting case are used to demonstrate the efficiency of this new algorithm. DOE

N86-21938*# Space Development Corp., Hampton, Va.
DATA REDUCTION, MANAGEMENT, AND ANALYSIS SOFTWARE FOR CID
Charles W. Davis *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 61-77 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 20K

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-22144 Oregon State Univ., Corvallis.
VIEW BASED, GLOBAL DESIGN OF ACCESS STRUCTURES FOR RELATIONAL DATABASES Ph.D. Thesis
Taflan Imre Gundem 1985 184 p
Avail: Univ. Microfilms Order No. DA8523617

The problem of automating the design of access structures for relational database systems is considered. The main considerations are effective and rigorous utilization of the users' usage patterns, global treatment of the whole design and utilizing most of the commonly known access structures. The usage patterns are represented on the access structures as relational algebra views. A view into one or more simple access structures is transformed. Using the simple access structures compound access structures were generated. For this set of access structures an approximately optimal set of access structures was chosen that process the input views as efficiently as possible and obey the storage space constraint. In developing the transformation methods, concepts of aggregation and generalization for access structure were developed and use in obtaining compound access structures from simple data items and in integrating several access structures into one access structure. A general method was introduced that shows how any complex access structure is formed from the simple data items using aggregation. Dissert. Abstr.

N86-22145 California Inst. of Tech., Pasadena.
COMBINING COMPUTATION WITH GEOMETRY Ph.D. Thesis
Sheue-Ling Chang Lien 1985 185 p
Avail: Univ. Microfilms Order No. DA8522623

Mathematical principles are sought to provide efficient solutions to various time consuming operations in computer aided geometric design. Three major topics are discussed: design validation by means of object interference detection, object reconstruction through the union, intersection, and subtraction of two polyhedra, and calculation of basic engineering properties such as volume, center of mass, or moments of inertia. Two criteria are presented for solving the problems of point polygon enclosure and point polyhedron enclosure in object interference detection. An algorithm for efficient point polyhedron enclosure detection is presented. Singularities encountered in point polyhedron enclosure detection are categorized and simple methods for resolving them are also included. A new scheme for representing solid objects, called skeletal polyhedron representation, is proposed. Also included are algorithms for performing set operations on polyhedra (or polygons) represented in skeletal polyhedron representation, algorithms for performing edge-edge intersection and face-face intersection in a set operation, and a perturbation method which can be used to resolve singularities for an easy execution of edge-edge intersection and face-face intersection. Dissert. Abstr.

N86-22146 State Univ. of New York, Binghamton.
FUNCTIONAL TEST GENERATION OF DIGITAL LSI/VLSI SYSTEMS USING MACHINE SYMBOLIC EXECUTION TECHNIQUE Ph.D. Thesis
tonysheng Lin 1985 322 p
Avail: Univ. Microfilms Order No. DA8521037

In this dissertation, a functional test pattern generation algorithm is developed. This algorithm is explicit, systematic and practical. The whole research work consists of five related topics including theoretical development and computer experiment. First, a register transfer language specially designed for the functional description of a general digital system is defined. Second, a register-transfer (RT) level fault model quite different from the conventional gate-level stuck-at fault model is established and the fault collapsing analysis is performed for better test generation efficiency. Third, the technique of register-transfer-level symbolic execution is explored. The major problems are defined, analyzed, and solved. A register-transfer-level symbolic execution system is designed and implemented. Fourth, an overall RT-level test pattern generation algorithm is developed based on the RT-level fault model and the RT-level symbolic execution technique. The symbolic executions are performed on both fault-free and fault-injected machines for symbolic results. Dissert. Abstr.

N86-22147 George Washington Univ., Washington, D.C.
A GRAPHICAL DEBUGGER FOR CONCURRENT Ada PROGRAMS Ph.D. Thesis
Melinda Lee Moran 1985 398 p
Avail: Univ. Microfilms Order No. DA8522366

The nature of this research was the design and evaluation of a debugging tool for concurrent Ada programs which employs a graphical abstraction of the task and the rendezvous construct. This graphical debugger was experimentally evaluated against a debugger producing textual output. Sixteen subjects participated in debugging four concurrent Ada programs, two utilizing the graphical debugger and two utilizing the textual debugger. The programs were run on a DEC GIGI terminal tied to a VAX 11/780 under Telesoft's partial Ada compiler. Results of the evaluation indicate that the debugger format effects no statistically significant difference in the mean debugging time required by subjects for programs where (1) the number of tasks in the program is small (four to five) and the relationships between them is simple, (2) the bug in the program is relatively simple, and (3) the bug in the program occurs early in the sequence of events occurring within the program. The evaluation also shows, however, that in terms of subject preference there is a 3:1 difference in favor of the graphical debugger. Dissert. Abstr.

N86-22148 California Inst. of Tech., Pasadena.
HIERARCHICAL COMPOSITION OF VLSI CIRCUITS Ph.D. Thesis
Telle Elizabeth Whitney 1985 146 p
Avail: Univ. Microfilms Order No. DA8522636

A transistor level representation for VLSI circuits is presented. A transistor level cell is represented as the interconnection of devices along with their types, sizes and placement, and the cell's typed ports. Connection is represented explicity by shared connection points. The ports describe the interface between this cell and other cells. This representation, together with a set of synthesis and analysis rules, enforces the description of strictly legal designs. The synthesis rules ensure that each structure is correct by construction. The analysis rules check for geometrical design rule violations which cannot, by their nature be enforced by construction. A file of technology dependent information indicates how to implement each transistor type, interconnect type and connection point type, as well as how structure types may interact. Cells described in this representation may be composed hierarchically to form larger cells. Given and valid composition, the topology, geometry and connectivity of the composite structure

is guaranteed to be legal. A working system supporting this hierarchical representation is also described. Dissert. Abstr.

N86-22149 California Inst. of Tech., Pasadena.
ANIMAC: A MULTIPROCESSOR ARCHITECTURE FOR REAL TIME COMPUTER ANIMATION Ph.D. Thesis
Daniel S. Whelan 1985 299 p
Avail: Univ. Microfilms Order No. DA8522635

This thesis proposes a new architecture for real-time animation engines. The ANIMAC architecture achieves high performance by utilizing a two-dimensional array of processors that determine visible surfaces in parallel. An array of sixteen processors with only nearest neighbor interprocessor communications can produce real-time shadowed images of scenes containing 100,000 triangles. The ANIMAC architecture is based upon analysis and simulations of various parallelization techniques. These simulations suggest that the viewing space be spatially subdivided and that each processor produce a visible surface image for several viewing space subvolumes. Simple assignments of viewing space subvolumes to processors are shown to offer high parallel efficiencies. Simulations of parallel algorithms were driven with data derived from real scenes since analysis of scene composition suggested that using simplistic models of scene composition might lead to incorrect results. Dissert. Abstr.

N86-22150*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A COMPUTER PROGRAM TO CALCULATE THE RESISTIVITY OF A THIN FILM DEPOSITED ON A CONDUCTIVE SUBSTRATE FROM FOUR-POINT PROBE MEASUREMENTS
Lawrence G. Oberle and Gustave C. Fralick Mar. 1986 28 p refs
(NASA-TM-87262; E-2954-NAS 1.15:87262) Avail: NTIS HC A03/MF A01 CSCL 09B

A series of FORTRAN-77 programs is described which correct for the effect of a conducting substrate when a linear four-point probe is used to measure the resistivity of a thin film. The resistivity of the film is given in terms of the thicknesses of the film and substrate, the known resistivity of the substrate, and the measured delta V/I. A full development is given as well as a complete description of the operation of the programs. The programs themselves can be obtained through COSMIC, and are identified as LEW No. 14381. Author

N86-22151*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIMRAND 1 COMPUTER PROGRAM: SIMULATION OF RESEARCH AND DEVELOPMENT PROJECTS
R. F. Miles, Jr. 15 Feb. 1986 79 p refs
(JPL Proj. 5101-274; Contract DE-AI01-85CE-89008)
(NASA-CR-176665; JPL-PUB-85-96; DOE/JPL-1012-115; NAS 1.26:176665) Avail: NTIS HC A05/MF A01 CSCL 09B

The SIMRAND I Computer Program (Version 5.0 x 0.3) written in Microsoft FORTRAN for the IBM PC microcomputer and its compatibles is described. The SIMRAND I Computer Program comprises eleven modules-a main routine and ten subroutines. Two additional files are used at compile time; one inserts the system or task equations into the source code, while the other inserts the dimension statements and common blocks. The SIMRAND I Computer Program can be run on most microcomputers or mainframe computers with only minor modifications to the computer code. Author

N86-22152*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE RANDOM COMPUTER PROGRAM: A LINEAR CONGRUENTIAL RANDOM NUMBER GENERATOR
R. F. Miles, Jr. 15 Feb. 1986 56 p refs
(JPL Proj. 5101-275; Contract DE-AI01-85CE-89008)
(NASA-CR-176664; JPL-PUB-85-97; DOE/JPL-1012-116; NAS 1.26:176664) Avail: NTIS HC A04/MF A01 CSCL 09B

The RANDOM Computer Program is a FORTRAN program for generating random number sequences and testing linear congruential random number generators (LCGs). The linear congruential form of random number generator is discussed, and the selection of parameters of an LCG for a microcomputer described. This document describes the following: (1) The RANDOM Computer Program; (2) RANDOM.MOD, the computer code needed to implement an LCG in a FORTRAN program; and (3) The RANCYCLE and the ARITH Computer Programs that provide computational assistance in the selection of parameters for an LCG. The RANDOM, RANCYCLE, and ARITH Computer Programs are written in Microsoft FORTRAN for the IBM PC microcomputer and its compatibles. With only minor modifications, the RANDOM Computer Program and its LCG can be run on most microcomputers or mainframe computers. Author

N86-22153*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIMRAND METHODOLOGY: THEORY AND APPLICATION FOR THE SIMULATION OF RESEARCH AND DEVELOPMENT PROJECTS
R. F. Miles, Jr. 15 Feb. 1986 37 p refs
(JPL Proj. 5101-277; Contract DE-AI01-85CE-89008)
(NASA-CR-176663; JPL-PUB-85-98; DOE/JPL-1012-117; NAS 1.26:176663) Avail: NTIS HC A03/MF A01 CSCL 09B

A research and development (R&D) project often involves a number of decisions that must be made concerning which subset of systems or tasks are to be undertaken to achieve the goal of the R&D project. To help in this decision making, SIMRAND (SIMulation of Research ANd Development Projects) is a methodology for the selection of the optimal subset of systems or tasks to be undertaken on an R&D project. Using alternative networks, the SIMRAND methodology models the alternative subsets of systems or tasks under consideration. Each path through an alternative network represents one way of satisfying the project goals. Equations are developed that relate the system or task variables to the measure of reference. Uncertainty is incorporated by treating the variables of the equations probabilistically as random variables, with cumulative distribution functions assessed by technical experts. Analytical techniques of probability theory are used to reduce the complexity of the alternative networks. Cardinal utility functions over the measure of preference are assessed for the decision makers. A run of the SIMRAND Computer I Program combines, in a Monte Carlo simulation model, the network structure, the equations, the cumulative distribution functions, and the utility functions. Author

N86-22154# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 6, MARCH 1985
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jo C. Ebergen, ed. Mar. 1985 52 p refs
(CWI-Newsletter-6; ISSN-0168-826X) Avail: NTIS HC A04/MF A01

The Pythagoras tree as a Julia set is described. Activities related to programming in Ada language are presented. For individual titles, see N86-22155 through N86-22156.

N86-22155# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
THE PYTHAGORAS TREE AS A JULIA SET
H. A. Lauwerier *In its* CWI Newsletter, No. 6, March 1985 Mar. 1985 p 2-18 refs Previously announced as N86-15028 (For primary document see N86-22154 12-61)
Avail: NTIS HC A04/MF A01

The Pythagoras tree as a Julia set is studied. The determination of the set of infinitesimally small (the blossom) squares formed in the limit when the construction of the Pythagoras tree is continued indefinitely is considered. The examples given are related to the algebraic functions theory. Author (ESA)

N86-22156# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
MATHEMATICAL LIBRARIES IN Ada
Jan Kok *In its* CWI Newsletter, No. 6, March 1985 Mar. 1985

p 19-25 refs (For primary document see N86-22154 12-61)
Avail: NTIS HC A04/MF A01

A short history of the recent progress of Ada language is reported. The contributions of CWI's activities to the research on Ada are summarized. Author (ESA)

N86-22157# Softech, Inc., Waltham, Mass.
Ada REUSABILITY GUIDELINES Final Report
Christine Ausnit, Christine Braun, Sterling Eanes, John Goodenough, and Richard Simpson Apr. 1985 85 p
(AF Proj. 5720)
(AD-A161259; Rept-3285-2-208/2; ESD-TR-85-142) Avail: NTIS HC A05/MF A01 CSCL 09/2

Reusable software is software that can, with little of no modification, be used in a variety of application systems other than that for which it was originally developed. The Ada language provides many features that support reusability, but reusability can be greatly enhanced if the features are used in certain controlled ways. This report addresses the design, development, documentation, and management issues relating to reusability. GRA

N86-22158# System Development Corp., San Diego, Calif.
INTERACTIVE GRAPHICS UTILITY FOR ARMY NEC (NUMERICAL ELECTROMAGNETICS CODE) AUTOMATION (IGUANA). INSTALLATION GUIDE Final Report, Period Ending May 1985
J. Strauch and S. Thompson Sep. 1985 10 p
(Contract N66001-83-D-0094; CM4-1)
(AD-A161324; NOSC-CR-306) Avail: NTIS HC A02/MF A01 CSCL 09/2

The Interactive Graphics Utility for Army NEC Automation (IGUANA) is a system designed to reduce the time required for antenna model evaluation by providing partial automation to both the data entry and the data display processes. Previously antenna evaluation required a lengthy, tedious, and error-prone process involving manual measurement of three dimensional coordinates of each significant point of the desired input structure from scale drawings (generally only top and side views are available), and manual entry via keyboard. IGUANA automates much of the above described process using a personal computer, a digitizer for input of the model wire end points from the top and side scale drawings, a graphics monitor for the display (including rotation and zooming capabilities) of the input data and resulting structures, a mouse for the editing of the structures, a plotter for the production of a hardcopy of the structure in various stages of completion, a printer for generating a hardcopy of data files to be sent eventually to the selected NEC host computer, and a modem to transfer data to and from the NEC host computer. GRA

N86-22159# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
SELECTION OF A MAN-MODELLING CAD (COMPUTER-AIDED DESIGN)
P. L. Rothwell Sep. 1985 22 p
(AD-A161342; DCIEM-85-C-36) Avail: NTIS HC A02/MF A01 CSCL 09/2

DCEIM has been tasked to review Canadian Forces (CF) aircrew/cockpit compatibility and to make recommendations regarding future aircrew selection standards. Computer man-modelling has been proposed as the method to address the evaluation. In this report, three potential computer-aided design, man-modelling programs (CAR, COMBIMAN and SAMMIE) are evaluated. The ELECTRE multi-criteria decision making process was used to select the most appropriate program. The criteria were based on man-modelling and workspace-modelling features, and the capabilities to address the problems of reach, clearance and vision in aircraft crew stations. The results of the analysis support the recommendation to procure SAMMIE. SAMMIE was also found to be suitable to other work station design applications. GRA

N86-22160# Illinois Univ., Urbana. Coordinated Science Lab.
CLUSTERING ALGORITHMS FOR HIERARCHICAL ROUTING IN NETWORKS
James Rossi Dec. 1984 40 p
(Contract N00014-84-C-0149)
(AD-A161372; R-1025; UILU-ENG-84-2219) Avail: NTIS HC A03/MF A01 CSCL 12/1

A distributed asynchronous algorithm to form overlapping clusters on a network with a dynamic topology is presented. Properties of the algorithm are also presented. It is shown that the algorithm is essentially a distributed implementation of a centralized algorithm. Also, bounds on the number or clusters formed on a network with N nodes is derived. The algorithm (DACA) is then compared with another algorithm (DHCA) for forming overlapping clusters in a dynamic environment. It is shown that in some ways, DACA is better than DHCA. The major disadvantage of DACA is that it passes more bits through the network than DHCA. Which algorithm is better depends on the particular implementation. GRA

N86-22161# Harvard Univ., Cambridge, Mass. Computation Lab.
FAST AND EFFICIENT ALGORITHMS FOR LINEAR PROGRAMMING AND FOR THE LINEAR LEAST SQUARES PROBLEM
Victor Pan and John H. Reif 1985 17 p Presented at the 12th International Symposium, Mathematical Programming, 5-9 Aug. 1985, Boston, Mass.
(Contract N00014-80-C-0647; Grant NSF MCS-82-03232; NSF DCR-85-07573)
(AD-A161391; TR-11-85) Avail: NTIS HC A02/MF A01 CSCL 12/1

We present a new parallel algorithm for computing a least-squares solution to a sparse overdetermined system of linear equations Ax=b such that mXn matrix A is sparse and the graph, G = (V,E), of the matrix H. Our algorithm uses Olog(m+n) log squared s(m+n) steps and < or = s cubed (m+n) processors; it relies on our recent parallel algorithm for solving sparse linear systems. The objective of this paper is to reexamine the time-complexity of the l.l.s.p. and to indicate the possibility of speeding up its solution using the parallel algorithms of PR in brackets. As a major consequence, (which may become decisive for determining the best algorithm for the linear programming problem (l.p.p) at least over some important classes of instances of that problem), we will substantially speed up Karmarkar's algorithm, K, for the l.p.p. because solving the l.l.s.p. constitutes the most costly part of every iteration of that algorithm. A very wide range of applications leads to in particular the acceleration of the simplex algorithms, see C,M, for sparse l.p. problems. Further applications may include several combinatorial computations. In the next section we recall two known representations of the l.l.s.p. using normal equations. In section 3 we reexamine the computational cost of sequential algorithms for l.l.s.p. In section 4 we estimate the cost of performing our parallel algorithm for the same problem. In section 5 we consider one of the major applications of our results, that is, to the acceleration of Karmarkar's algorithm. In Appendix we will briefly comment on the current estimates for the computational cost of solving the l.p.p. GRA

N86-22162# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
ASIM (AUTOMATED INTERACTIVE SIMULATION MODELING SYSTEM) VAX VERSION USER'S MANUAL Final Report
S. Kneeburg Feb. 1985 279 p
(Contract F33615-81-C-5098)
(AD-A161556; ESD-TR-85-127) Avail: NTIS HC A13/MF A01 CSCL 09/2

The Automated Interactive Simulation Modeling System (AISIM) provides the user with the ability to do high level simulation of complex operational and distributed data processing systems. The purpose of this manual is to provide the AISIM user with a comprehensive guide for the use of the AISIM system on a VAX 11/780 computer. This manual is a straightforward reference document for the AISIM user. Chap 1 introduces this document, detailing the organization of this document, the document conventions and applicable documents. Chap 2 is an overview of the concepts used in modeling and simulation of systems using AISIM.

Chap 3 contains a detailed description of the AISIM modeling constructs. Chap 4 describes the interface between the AISIM software and the host computer's time sharing system. Chap 5 through 10 present information of the various system user interface levels, including detailed descriptions of prompts and commands. Chap 11 discusses AISIM simulation results and how to interpret them. Appendix A presents operational procedures and other information which is useful for the user to know but not mandatory for using the system. Appendix B lists simulation error messages with a description of their meaning. Appendix C is a glossary of AISIM terms. Appendix D contains a detailed description of the message routing submodel. The tool is designed for the operations analyst or engineer as a workbench for investigating the impact of system alternatives. GRA

N86-22163# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

A MICROCOMPUTER PROGRAM FOR THE SOLUTION OF LEARNING CURVE COMPUTATIONS M.S. Thesis

Larry D. Hutchison Sep. 1985 119 p

(AD-A161648; AFIT/GSM/LSQ/85S-18) Avail: NTIS HC A06/MF A01 CSCL 09/2

A microcomputer program that solves a variety of learning curve computations is written. Based on a review of historical literature and on interviews conducted with cost and price analysts at Wright-Patterson Air Force Base, Ohio, the program integrates a comprehensive file editor with three learning curve applications. The file editor contains features that allow the user to create, edit and review data files containing up to 50 unit/lots. A curve fitting routine has options for the determination of first unit cost and slope coefficient based on the unit curve or cumulative average formulation using either weighted or ordinary least squares techniques. Another feature of the program allows the user to perform sensitivity analysis by varying the first unit cost and learning curve slope to determine the affect on the cost of future units of production. A new routine, not previously seen in earlier learning curve programs, uses a statistical F test to determine the most appropriate formulation, unit or cumulative average, for a given data file. This BASIC computer program is completely menu driven for ease of use. GRA

N86-22164# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

A GUIDE TO PROMOTE THE USE OF ELECTRONIC SPREADSHEETS AMONG AIR FORCE PERSONNEL M.S. Thesis

John C. Grupe Sep. 1985 145 p

(AD-A161682; AFIT/GSM/LS/85S-16) Avail: NTIS HC A07/MF A01 CSCL 05/3

The object of this thesis was to design an instructional text to enable students at the Air Force Institute of Technology in the School of Systems and Logistics to learn to use the electronic spreadsheet available on the Burroughs microcomputer system. The literature review and findings portion of this thesis are meant to familiarize the many aspects of and functions for electronic spreadsheets. While the tutorial text is for use on the Burroughs microcomputer system, concepts written in the text may be transferrable to other electronic spreadsheets. It is with this additional statement that this thesis may also be helpful to Air Force personnel who operate the Air Force Zenith microcomputer systems. GRA

N86-22165# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

AN ASSESSMENT OF Ada'S SUITABILITY IN GENERAL PURPOSE PROGRAMMING APPLICATIONS M.S. Thesis

Larry D. Cavitt and Anthony A. Panek Sep. 1985 235 p

(AD-A161715; AFIT/GLM/LSM/85S-62) Avail: NTIS HC A11/MF A01 CSCL 09/2

The Ada programming language is the result of a multiyear effort under the sponsorship of the Department of Defense (DOD) to obtain the benefits of a single DOD-wide language for use in embedded computer systems. The language was developed to reduce or eliminate many of the serious and costly problems associated with the development and maintenance of software for embedded systems. This thesis assesses Ada's suitability in simple, non-embedded applications, specifically, numerical computation, simulation, and file processing. FORTRAN and PASCAL programs in these applications were translated into Ada. Comparisons were made between the originals and the translations with regard to lines of source code, transportability, maintainability, readability, execution time, and other finding relevant to the study. The study revealed that while further research is needed, Ada is a powerful programming language suitable for use in these non-embedded applications. GRA

N86-22166# Naval Air Development Center, Warminster, Pa. Systems Directorate.

MINIMIZATION OF A SIX VARIABLE BOOLEAN FUNCTION Final Report

Lorraine M. Koch May 1985 114 p

(AD-A161718; NADC-85135-20) Avail: NTIS HC A06/MF A01 CSCL 09/2

The MINIZE computer program is a minimization model which can be used to aid in the design and optimization of a digital system. An interactive input section allows the user to enter any six variable boolean function. MINIZE will then determine the minimum number of four-input medium-scale integration (MSI) circuits needed to realize that function and output their inputs. The purpose of this paper is to describe the MINIZE program and to provide a user's manual. MINIZE is written in HP Basic for use on a Hewlett-Packard 9845B desktop computer with Advanced Programming capability. Section 2 describes the minimization process, along with the techniques used in the model. An example is presented to illustrate the method. Section 3 is the user's manual for the MINIZE program. This section outlines the inputs, outputs and operating instructions for the model. Section 4 describes the program and each of its subroutines. Appendix A contains flowcharts of these routines. GRA

N86-22167# Essex Corp., Orlando, Fla.

COMPUTER-BASED INSTRUCTION (CBI): CONSIDERATIONS FOR A USER-ORIENTED TECHNOLOGY DATA BASE Final Report, Sep. 1984 - Oct. 1985

Norman E. Lane and Grace P. Waldrop 14 Oct. 1985 112 p

(Contract N62269-83-D-0115)

(AD-A161776; AD-E500731; EOTR-85-5) Avail: NTIS HC A06/MF A01 CSCL 05/9

This report documents 1) an analysis of feasibility and 2) the development of a preliminary structure for a computerized data base on capability and availability of computer-based instruction (CBI) technologies within the Department of Defense (DOD). It concludes that the proposed data base, although logistically complex, can be developed and would be of considerable value in providing ready access to technology information for a variety of DoD users. Rationale for recommendations is based on review and synthesis of the CBI research and development (R&D) literature, structured interviews with a cross-section of potential data base users, and an analysis of existing R&D data bases. This report provides a first step in the data base development process, that of examining the user requirements, issues of importance, and potential development considerations. It also describes the subsequent requirements leading to creation of a user-oriented R&D data base for CBI technology. Author (GRA)

N86-22168# Defense Systems Management School, Fort Belvoir, Va.

ARTIFICIAL INTELLIGENCE AND ITS USE IN COST TYPE ANALYSES WITH AND EXAMPLE IN COST PERFORMANCE MEASUREMENT

Barry Berkowitz 1985 40 p Presented at the Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985

(AD-A161817) Avail: NTIS HC A03/MF A01 CSCL 14/1

With the advent of ARTIFICIAL INTELLIGENCE (AI), we are entering into a new age of man/machine/software combined effectiveness. AIL offers us, not only, user friendly apolication

packages and interfaces, but a major boost in our effectiveness planes. The user friendliness is one aspect of AI, but there are other elements that make this technology a major extension of the human mind. This paper will explore just two applications and their use in the analysis world. The first aspect examined is: user friendliness. The other aspect discussed is expert systems. GRA

N86-22169# McLean Research Center, Inc., Va.
ENHANCEMENT OF PROJECT PRIORITIZATION GOAL PROGRAMMING FORMULATION AND CODE Final Technical Report, May - Sep. 1985
H. R. Blacksten and Judith H. Podell 27 Sep. 1985 141 p
(Contract DAAK70-84-D-0052)
(AD-A162412) Avail: NTIS HC A07/MF A01 CSCL 09/2

A linear goal programming model (LGPM) used by the Belvoir R&D Center for project prioritization decision support was reviewed and improved in this effort. Improvements included addition of efficient sensitivity analysis capabilities, and elimination of certain programming inefficiencies. As a result, the LGPM runs many times faster than before. General application of the LGPM was reviewed and critiqued. Suggestions for novel approaches to project prioritization decision support were offered. Author (GRA)

N86-22170# Yale Univ., New Haven, Conn. Dept. of Computer Science.
TEMPORAL REASONING AND DEFAULT LOGICS
Steve Hanks and Drew McDermott Oct. 1985 131 p
(Contract N00014-85-K-0301)
(AD-A162447; YALEU/CSD/RR-430) Avail: NTIS HC A07/MF A01 CSCL 05/10

This document presents axioms to represent some simple concepts in temporal reasoning: events occuring at points in time, facts holding true over time, events causing facts to begin, facts causing contradictory facts to cease, and facts tending to remain true unless explicitly forced to cease. To express this last notion the authors couch the axioms in a default logic: they alternatively consider the logics of McDermott and Doyle, of Reiter, and of McCarthy. This document defines precisely (through a computer program and its formal description) the conclusions its authors intend be drawn from these axioms, given a particular temporal state of affairs. They prove, however, that these conclusions are not deductions licensed by any of the above default logics. Further analysis leads to the conclusion that these logics are inherently incapable of representing this particular kind of default reasoning. Author (GRA)

N86-22171# Naval Postgraduate School, Monterey, Calif.
TWO NEW APPROXIMATE SOLUTION TECHNIQUES FOR A MOVING TARGET PROBLEM WHEN SEARCHER MOTION IS CONSTRAINED M.S. Thesis
Metin Sagal Sep. 1985 43 p
(AD-A162491) Avail: NTIS HC A03/MF A01 CSCL 12/1

The objective of this thesis is to develop and test two new approximate solution techniques for a moving target problem in discrete time and space where both the searcher and the target have constraints on their paths. The first technique is an application of the heuristic Local Search Method and the second technique is an application of the Frank-Wolfe Method. The motivation for looking at approximate methods is that the problem is NP-complete and optimal solution techniques become impractical for large size problems. Experiments showed that the Local Search Method approach is an efficient technique for obtaining approximate computation solutions. However, the Frank-Wolfe Method approach does not perform well for the problem. Author (GRA)

N86-22172# Illinois Univ., Urbana. Coordinated Science Lab.
FLOW OPTIMIZATION IN DYNAMIC AND CONTINUOUS NETWORKS Ph.D. Thesis
Richard G. Ogier Nov. 1985 111 p
(Contract N00014-82-K-0359)
(AD-A162493; UILU-ENG-85-2229) Avail: NTIS HC A06/MF A01 CSCL 12/2

The problem studied in this thesis is computing a minimum-delay time-varying routing assignment in a dynamic network where the node demands and link capacities are deterministic functions of time, and where the commodity being routed is represented by continuous variables. A single node is designated to be the destination, and a tau-maximum flow is defined to be a routing assignment which maximizes the amount of commodity reaching the destination before time tau. The key discovery used to solve the problem is that a routing assignment has minimum delay if and only if it is a tau-maximum flow for all tau. When the capacities are constant or piecewise-constant, this discovery and the well-known max-flow min-cut theorem are used to divide the problem into two smaller problems. The result is a polynomial algorithm which finds a minimum-delay routing assignment by solving a series of static maximum-flow problems. In order to apply the above ideas to dynamic networks with continuously varying capacities, a continuous network is defined whose flows and capacities are additive set functions, and a generalization of the max-flow min-cut theorem is proved. An even more general version of this theorem is proved for continuous network models whose capacities are submodular set functions. Various applications are considered, including the finite polymatroid networks of Lawler. GRA

N86-22173# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
GEONAMES PROCESSING SYSTEM FUNCTIONAL DESIGN SPECIFICATION. VOLUME 2: GEOGRAPHIC NAMES DATA BASE Final Report
Gail Langran, Allen Barnes, and Steven Miller Mar. 1985 40 p
(AD-A162504; NORDA-99-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes the Geonames Processing System attributes and serves as a basis for understanding between the user and the developer. The subsystems referred to are: Advanced Symbol Processing, Advanced Type Placement, Geographic Names Data Base, and Automated Alphanumeric Data Entry System. A subsystem of the Geonames Processing System, the GNDB will handle the data banking, storage, and retrieval of geonames and their associated attributes in an all-digital environment. This will provide a single, controlled repository for geonames data within DMA and, as part of a computer-assisted cartographic system, will increase production throughput. The file will consist of about 60 million geographic names and their attributes, thus serving both toponymic and cartographic products. The GNDB will receive batch inputs from AADES, and will allow authorized operators to modify the data base from interactive ASP workstations. Data sets will be compiled from the GNDB in support of gazetteer and map production. The GNDB will reside at DMAHTC and all updates will be made by DMAHTC personnel. The GNDB will output Names Data Files to DMAHTC users via terminals and to DMAAC users via batch transmission (e.g., magnetic tape or data line). GRA

N86-22174# Army Construction Engineering Research Lab., Champaign, Ill.
DEVELOPMENT AND USE OF THE LIFE CYCLE COST IN DESIGN COMPUTER PROGRAM (LCCID) Final Report
Linda Lawrie Nov. 1985 104 p
(DA Proj. 4A1-62781-AT-45)
(AD-A162522; CERL-TR-E-85/07) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report documents the development of and provides basic user instructions for a program to perform life cycle cost analysis of new military facilities. The program is easy for personnel who have not had much experience with computers to use. It allows the user to select parameters that best describe his/her design project from a menu of choices. Responses to computer queries can often be answered in one word. The program output can either be displayed on the terminal or printed out as hard copy. The output contains much of the information needed for an economic review of a design. The program is written in FORTRAN 77 and will be made available on the Corps of Engineers' timesharing vendor, on District/Division Harris computers, and on

Intel 8086 compatible microcomputers. The source code will be made available for conversions to other hardware, as well. GRA

N86-22175# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
GEONAMES PROCESSING SYSTEM FUNCTIONAL DESIGN SPECIFICATION. VOLUME 3: ADVANCED TYPE PLACEMENT Final Report
Gail Langran Mar. 1985 64 p
(AD-A162552; NORDA-100-Vol-3) Avail: NTIS HC A04/MF A01 CSCL 05/2

Ths work, referred to as the Geonames Processing System, will be conducted during FY82-FY89. A Comprehensive Coordination Plan (NORDA Technical Note 189) was written in FY82 to provide a general system description. The Geonames Processing System Functional Design Specification, of which this is Volume 3, describes in more detail a proposed system based on requirements presented to NORDA by DMA headquarters and DMA's two production centers. A comprehensive system with simple and adaptable standard interfaces is described. This report states the functional, requirements and specifications of a digital type placement system for map names layout, to include names compilation, type composition, and label placement. Section 1 is a subsystem overview. Sections 2-9 discuss major functions. Section 10 shows processing flow. Data set usage is in Section 11; interfaces between the four geonames processing subsystems are in Section 12. Assumptions and constraints on which the design is based are in Section 13. Hardware and performance requirements are in Sections 14 and 15, respectively. Digital type placement will provide DMA with a softcopy method of type placement that exploits a digital Geonames Data Base and will integrate map/chart names overlay production into overall digital chart production. GRA

N86-22176# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE USE OF QUANTITATIVE DATABASES IN ALADIN, AN ALLOY DESIGN SYSTEM Interim Report
Ingemar Hulthage, Michael D. Rychener, Mark S. Fox, and Martha L. Farinacci Sep. 1985 18 p Sponsored in part by Alcoa Labs., Alcoa Center, Pa.
(AD-A162555; CMU-RI-TR-85-19) Avail: NTIS HC A02/MF A01 CSCL 09/2

The Aluminum Alloy Design Inventor (Aladin) is an expert system that aids in the design of new alloys. The system uses traditional, rule based, qualitative methods as well as quantitative calculations. Our approach is to model the design process as a collaboration among several different bodies of expertise: composition in terms of elements to be added; properties of known alloys; internal sturcture, ranging from solid phases and microstructure down to the crystal lattice structure; and thermomechanical processing of the metal. The inference mechanism is a variant of hypothesize-and-test. The present implementation combines the Carnegie Representation Language (CRL) and OPS5 along with Lisp. A database of metallurgical knowledge and data on known alloys is built in the form of CRL schemata. The execution of the system is controlled by OPS productions and most of the data produced in a specific run is represented by OPS working memory elements. This paper gives a preliminary overview of the architecture of Aladin with emphasis on the couplng of symbolic and numeric computations. We briefly describe the knowledge representation of Alloys, Phase diagrams and Microstructure information. We explain how qualitative reasoning is used to define the variables to be dealt with quantitatively and how regression among known alloys is used. We describe multidimensional constraints and how they are used to deal with interaction between variables, to implement a least commitment strategy and how they at the same time provide criteria for search termination and backtracking. GRA

N86-22177# Adaptive Sensors, Inc., Santa Monica, Calif.
AN ALGEBRAIC SYNDROME DECODING TECHNIQUE FOR CERTAIN CONVOLUTIONAL CODES Final Progress Report
I. S. Reed 25 Oct. 1985 21 p
(Contract N00014-84-C-0720)
(AD-A162636; FPR-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this final report, some of the same machinery developed in an earlier report for syndrome decoding is shown to provide a basis for what is called algebraic syndrome decoding of convolutional codes. Actually, algebraic syndrome decoders were developed quite early in a heuristic manner for certain simple convolutional codes. In particular, syndrome decoders in the form of feedback decoders were developed for the one error-correcting Wyner-Ash convolutional code. However, the generalization to algebraically constructed syndrome decoders other than feedback and majority-logic decoders seems to have been largely ignored. In order to demonstrate the general nature of algebraic syndrome decoding, some definitions and terminology are now in order. GRA

N86-22178# Boeing Aerospace Co., Kent, Wash.
SPECIFICATION TECHNOLOGY GUIDELINES Final Report, 2 Mar. 1984 - 1 Mar. 1985
David R. Addleman, Margaret J. Davis, and Edward P. Presson Aug. 1985 81 p
(Contract F30602-84-C-0073)
(AD-A162655; RADC-TR-85-128) Avail: NTIS HC A05/MF A01 CSCL 09/2

The purpose of this research was to provide the Air Force system and software development manager with an uncomplicated set of guidelines for matching existing methods and tools to the needs of specific development projects. The Specification Technology Guidelines effort was divided into five major tasks. The first task studied software requirements in six Air Force mission areas. In the performance of this task information was gathered regarding programming characteristics, software development requirements, and the support environments of typical application software. Within each mission area, differences in application and development of software most affecting methodology selection were given more attention. All Air Force software efforts were deemed to fall into 18 generic software categories. GRA

N86-22179# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia).
GETWRD PACKAGE UPDATE: NEW FEATURES AND MODIFICATIONS TO THE GETWRD PACKAGE Technical Communication Report
David Hally Aug. 1985 44 p
(AD-A162698; DREA-TC-85/312) Avail: NTIS HC A03/MF A01 CSCL 09/2

The GETWRD Package is a library of procedures designed to ease the implementation of command languages using FORTRAN 77. It allows the user to interpret a word of user input by matching it with one of the entries in a user-supplied dictionary. Features designed to increase the friendliness of the program/user interface include a type ahead facility, recognition of abbreviations, word completion and understandable error messages. This memorandum describes enhancements to the GETWRD Package. While most of the enhancements are of most benefit to the programmer, a major improvement to the program/user interface is the inclusion of a spelling corrector which will catch most typographical errors committed by the user. Other improvements include the ability to interpret the work of input as a simple string with no dictionary matching, a logical variable, the answer to a Yes-No question, or a number in a specified range; greater flexibility for the programmer in formatting prompt and help messages; and a sorting routine which can be used to ensure that the dictionary is in alphabetic order. All changes have been implemented to be upwardly compatible with the original version of the GETWRD Package so that no changes need be made to existing code which calls GETWRD Package procedures. GRA

N86-22180# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
BUILD: A TOOL FOR MAINTAINING CONSISTENCY IN MODULAR SYSTEMS
Richard E. Robbins Nov. 1985 60 p Revised

(Contract N00014-80-C-0505; Grant NSF MCS-81-17633)
(AD-A162744; AI-TR-874) Avail: NTIS HC A04/MF A01 CSCL 09/2

BUILD is a tool for keeping modular system in a consistent state by managing the construction tasks (e.g., compilation, linking etc.) associated with such systems. It employs a user supplied system model and a procedural description of a task to be performed in order to perform the task. This differs from existing tools which do not explicitly separate knowledge about systems from knowledge about how systems are manipulated. Build provides a static framework for modeling systems and handling construction requests that makes use of programming environment specific definitions. By altering the set of definitions, BUILD can be extended to work with new programming environments and to perform new tasks. Author (GRA)

N86-22181# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
MASTIF (MIT ANALYSIS AND SIMULATION TOOLS FOR IC FABRICATION): A WORKSTATION APPROACH TO FABRICATION PROCESS DESIGN
Duane S. Boning and Dimitri A. Antoniadis Sep. 1985 9 p
(Contract N00014-85-K-0213)
(AD-A162752) Avail: NTIS HC A02/MF A01 CSCL 13/8

The design of a fabrication process increasingly necessitates the availability and use of a variety of tools, including process and device simulation, analysis, and synthesis aids. The MASTIF workstation (MIT Analysis and Simulation Tools for IC Fabrication) is a menu and window oriented program written in C and FORTRAN which provides a methodology and uniform software structure for the connection of process and device design tools. MASTIF currently includes a facility for incremental development and version management of a process description, management mechanisms for definition of physical cross sections deriving from the overall process description, and an interactive graphics interface and data interchange for process and device simulators (SUPREM-III and MINIMOS). With MASTIF, the user can effectively develop and evaluate a fabrication process via a single integrated workstation. Author (GRA)

N86-22182# Florida State Univ., Tallahassee. Dept. of Statistics.
FAULT DIVERSITY IN SOFTWARE RELIABILITY
Philip J. Boland, Frank Proschan, and Y. L. Tong Sep. 1985 24 p Prepared in cooperation with University Coll., Dublin, Ireland and Georgia Inst. of Tech., Atlanta, Ga.
(Contract F49620-85-C-0007; Grant NSF DMS-85-02346)
(AD-A162757; FSU-STATISTICS-M714; TR-85-185;
AFOSR-85-1112TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

Diversity of bugs or faults in a software system is a factor contributing to software unreliability which has not yet been emphasized. This paper is written with the intention of demonstrating the impact of fault diversity on the time to detection of software bugs. A new discrete software reliability model based on the multinomial distribution is introduced. It is shown that for models of this type, the more diverse the fault probabilities are, the longer (stochastically) it takes to detect or eliminate any n faults, while the smaller (stochastically) will be the number of faults detected or eliminated during a given amount of time (or during a given number of inputs to the system). The impact of fault diversity is also demonstrated for the Jelinski-Moranda model. Author (GRA)

N86-22183# Department of the Air Force, Washington, D.C.
COMPUTER CONTROLLED LEAD FORMING Patent Application
Stephen P. Jones, inventor (to Air Force) Filed 23 Aug. 1985 19 p
(AD-D011984; US-Patent-Appl-SN-768664) Avail: NTIS HC A02/MF A01 CSCL 13/8

The present invention relates generally to the manufacturing of electrical components and specifically to an automated lead forming system for axial electrical components. The fabrication of printed circuit boards often includes the forming of wire-like leads of axial components. This forming step includes the cutting of the leads to a specific length, and the bending of the leads into a tailored configuration, using axial forming equipment. An axial lead forming machine is presented which is capable of trimming, shaping, and electrically verifying the characteristics of axial components under computer control. Two die cutting and bending assemblies are incrementally moved horizontally over the wire leads of an axial component, which is suspended between them. A set of counters, lead screws, and two electric motors initially hold the two die assemblies in a known position defined as a home location. By correlating the number of leads per inch on the lead screws and counting the number of rotations of the electric motor, the lead forming mechanism is capable of communicating to a computer the exact location of the hammer, anvil and cutting edge of the die assemblies so that a programmable setting of the trimming and shaping of the axial leads may be accomplished automatically under computer direction. GRA

N86-22184# Lawrence Livermore National Lab., Calif.
FINITE ELEMENT ANALYSIS OF THE ROQUEFORT DIAGNOSTIC CANISTER
S. M. Pratuch Aug. 1985 39 p
(Contract W-7405-eng-48)
(DE86-000837; UCID-20503) Avail: NTIS HC A03/MF A01

This document reports on the development of a simple finite element model of the Roquefort diagnostic canister. It describes the means in which the model was used to predict the canister deflection when simply supported as well as the corresponding forces, moments, and stresses in the cable trays and lifting fixtures. Also included in the report are the results of the line of sight (LOS) hardware modeling which was used to size the LOS hardware to bulkhead connections. Three canister load configurations - bare frame, bare frame plus lead shielding, and bare frame, lead, plus LOS hardware - were studied during the analysis and are presented in this report. In addition, the results of a fourth canister configuration (using the same loads as that of the third load case), initiated because of the presence of near-yield stresses in the third load configuration and the subsequent addition of cable tray stiffeners, are also included. Throughout the analysis, three computer codes were used: SLIC, to generate the canister mesh, GEMINI, to conduct the finite element data, and TAURUS, to create the finite element data. DOE

N86-22185# Geological Survey, Menlo Park, Calif.
POLYGON: AN INTERACTIVE PROGRAM FOR CONSTRUCTING AND EDITING THE GEOMETRIES OF POLYGONS USING A COLOR GRAPHICS TERMINAL
B. A. Chuchel 1985 130 p
(Contract DE-AI08-78ET-44802)
(DE86-001419; USGS-OFR-85-233) Avail: NTIS HC A07/MF A01

This report is a user manual for the FORTRAN program POLYGON. POLYGON is designed to facilitate the construction and editing of the geometries of polygonal shapes using an Envision color-graphics terminal. The Open-File Report number 85-233-B [Chuchel, 1985] contains a listing of the FORTRAN source code for the POLYGON program. POLYGON features color-graphics, an interactive user dialogue, brief help messages, and zooming to selected portions of the terminal screen in order to edit and manipulate polygons using a graphics cursor or the Envision mouse. A quadruply linked tree is used within POLYGON to represent and store the information about the geometries of the polygons. These polygonal shapes may subsequently be used by independent modeling programs to represent three-dimensional shapes of gravitational or magnetic sources; for example, output from POLYGON is directly compatible with programs MAGPOLY or GRAVPOLY and PFGRAV3D or PFMAG3D. POLYGON is written in DEC (Digital Equipment Corporation) extended FORTRAN 77 and is presently operational on the USGS, Branch of Geophysics VAX/VMS computer. The program is written to operate on the Envision 200 series of color graphics terminals by Envision

Technology Incorporated. Suggestions are provided on converting the program to other types of color terminals. DOE

N86-22119# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
SOFTWARE DEVELOPMENT: SCIENCE OR PATCHWORK
Robert L. Baber *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 18-34 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

N86-22124# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
VEHICLE ROUTING AND COMPUTER GRAPHICS
M. W. P. Savelsbergh *In its* CWI Newsletter, No. 7, June 1985 Jun. 1985 p 15-24 refs (For primary document see N86-22121 12-59)
(Grant STW-CWI-22-0348)
Avail: NTIS HC A03/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-22186# Yale Univ., New Haven, Conn. Dept. of Computer Science.
PARALLEL IMPLEMENTATION OF PRECONDITIONED CONJUGATE GRADIENT METHODS
Youcef Saad and Martin H. Schultz Oct. 1985 22 p refs Sponsored in part by IBM/Kingston
(Contract N00014-82-K-0184)
(AD-A161988; YALEU/DCS-RR-425) Avail: NTIS HC A02/MF A01 CSCL 09/2

A few different implementations of classical iterative methods on parallel processors were considered for the purpose of studying how multiprocessor architecture affects performance. The framework is that of general nonsymmetric linear systems that arise from the discretization of partial differential equations. The solution methods based Generalized Minimal Residual Algorithm (GMRES), a conjugate gradient like method, combined with well known preconditionings were examined. The architectures considered were shared memory machines and loosely coupled linear or mesh connected arrays. Author

N86-22187# Aerodyne Research, Inc., Billerica, Mass.
BIMODAL OPTICAL COMPUTER Final Technical Report, 1 Oct. 1984 - 30 Sep. 1985
H. J. Caulfield, J. H. Gruninger, K. Steiglitz, H. Rabitz, and J. Gelfand 6 Sep. 1985 21 p
(Contract DAAG29-84-C-0026)
(AD-A161399; ARI-RR-461; ARO-22455.1-PH-S) Avail: NTIS HC A02/MF A01 CSCL 09/2

Much of the current attention being given to optical computing stems from its new found ability to perform digital operations and hence to achieve high accuracy. In optics as in electronics, digital operations are slower and clumsier than analog operations. On the other hand, digital operations are more flexible and more accurate. These considerations lead us to consider whether some sorts of hybrid optical-electronic, analog-digital systems might be useful for some tasks. In this paper, we consider two closely-related hybrids: analog optics with digital electronics and analog optics with hybrid analog-digital electronics. Both systems will use analog optics for rapid and moderately accurate solution of complex problems and use the electronics to bootstrap the accuracy. That is each new optical computation should increase the accuracy of the solution. We will call such a system a Bimodal Optical Computer. While many of these concepts appear to be new to optics, they are not new to computing in general. We will attempt to document the most useful of the prior publications, to make isomorphisms with other fields explicit, and to label those contributions which appear to be new. With all of these caveats, our primary purpose is to present a general approach for using optical computers. We will illustrate that approach with one specific problem (linear algebraic equations), but this should not obscure the generality of the concept. Author (GRA)

N86-22188# Naval Postgraduate School, Monterey, Calif.
THE QUEUEING MODEL OF A PACKET SWITCH SUBJECT TO ROUTING IN COMPUTER NETWORKS Technical Report
Jin-Fu Chang Sep. 1985 46 p
(AD-A161638; NPS62-85-027) Avail: NTIS HC A03/MF A01 CSCL 09/2

In a previous paper, the steady-state behavior of a finite queue which accepts batch poisson inputs and received service from servers operating in synchronous mode was studied. An analysis was successfully completed via the application of the Residue theorem in complex variables. The study is extended to include the effect of routing and buffer sharing. Upon the arrival of a batch each customer determines its route independently according to certain probability distribution. Buffer sharing with minimum allocation is also considered. Results obtained include state probability, blocking probability, delay, and throughput. Validity of analysis has been verified by computer simulations. The system considered is a good approximate model of a packet switch in a computer network. GRA

N86-22189# North Carolina State Univ., Raleigh. Raleigh.
STUDY ON ROUTING AND FLOW CONTROL IN COMPUTER NETWORKS Final Report, 21 Sep. 1981 - 1 Jun. 1985
Wushow Chou and Arne A. Nilsson 11 Oct. 1985 10 p
(Contract DAAG29-81-K-0176)
(AD-A161768; ARO-18160.6-EL) Avail: NTIS HC A02/MF A01 CSCL 09/2

The objectives of this research were the investigation of certain issues on routing, flow control, and the relationship between the two. More specifically, the following research tasks were carried out: (1) It was shown that while deterministic routing may seem to perform better under stable traffic conditions, the adaptive strategy out-performs the deterministic one for networks spanning several time zones; (2) Approximation models were determined for determining response time on a virtual circuit under the real network condition that arriving packets encountering a full window wait in buffers instead of being discarded, as in the case of earlier models; (3) A detailed simulation model was developed to verify the approximate analytic model and to perform certain experiments; (4) A strategy for determining optimal window size was developed based on the minimum-cut of a multi-commodity problem. GRA

N86-22190# Michigan Univ., Ann Arbor. Dept. of Electrical Engineering and Computer Science.
AN ANALYSIS AND SIMULATION OF THE CRAY X-MP MEMORY SYSTEM
D. A. Calahan 1 Sep. 1985 8 p Presented at the 1st International Conference, Supercomputing, Tampa, Fla., 16-19 Dec. 1985
(Grant AF-AFOSR-0096-84)
(AD-A162769; AFOSR-85-1117TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The CRAY X-MP 2- and 4-processor memory systems are analyzed and simulated using an instruction-level timing simulation of up to 16 processors. This study indicates a disturbing counter-intuitive trend to longer delays in vector accesses as both the number of processors and memory banks increase proportionately. This delay appears to be related to access start-up delays, which are determined for various memory organizations. GRA

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-22191# California Univ., Irvine. Dept. of Information and Computer Science.
METHODS OF CONCEPTUAL CLUSTERING AND THEIR RELATION TO NUMERICAL TAXONOMY

Douglas Fisher and Pat Langley [1986] 39 p refs
(Contract N00014-84-K-0345)
(AD-A160221; UCI-ICS-85-26) Avail: NTIS HC A03/MF A01 CSCL 12/1

Artificial intelligence methods for machine learning can be reviewed as forms of exploratory data analysis, even though they differ markedly from the statistical methods generally connoted by the term. The distinction between methods of machine learning and statistical data analysis is primarily due to differences in the way techniques of each type represent data and structures within data. Methods of machine learning are strongly biased toward symbolic data representations. This difference is explored within a limited context, the explication of conceptual clustering, an extension to the statistically based methods of numerical taxonomy. The form of concepts used by existing conceptual clustering systems is described. Several conceptual clustering techniques are described along with sample outputs. The use of alternative concept representations to enhance the effectiveness of future conceptual clustering systems is examined. Author

N86-22192# Integrated Systems, Inc., Palo Alto, Calif.
ROBUST ADAPTIVE CONTROL Final Report, 15 Sep. 1984 - 15 Feb. 1985
Robert L. Kosut 19 Sep. 1985 59 p
(Contract F49620-84-C-0085)
(AD-A161349; ISI-61; AFOSR-85-0968TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

This project addresses the problems involved in developing an interactive software system that integrates adaptive and nonlinear control design procedures with a real-time processor for implementation. The proposed system implements complex control laws in the laboratory for rapid testing evaluation and tuning. Recent hardware development and software methodologies form the basis of computer-aided control system design (CACSD) products. The two basic elements defined in the study are: (1) A user friendly CACSD software package for product development and validation of control laws using simulation models, (2) A real-time hardware system which can automatically implement control laws designed by the CACSD software package, without real-time programming. The products proposed under this project will significantly reduce engineering development time. Many new applications will occur as more and more improved CAE tools are available and the designed control laws can be rapidly verified in the laboratory. The hardware will be capable of implementing optimal trajectories allowing more economical operation of process plants and automated manufacturing lines. Author (GRA)

N86-22193# Illinois Univ., Urbana. Decision and Control Lab.
MULTI-INPUT/MULTI-OUTPUT SENSITIVITY POINTS TUNING M.S. Thesis
Stephen T. Hung May 1985 53 p
(Contract N00014-84-C-0149)
(AD-A161641; DC-82; UILU-ENG-85-2219; R-1044) Avail: NTIS HC A04/MF A01 CSCL 12/1

Periodic tuning is a virtually essential aspect in the maintenance of almost any physical plant. One method of such tuning is that known as sensitivity points turning method. The theory of this method and application to single-input/single-output (SISO) systems has been fairly well developed. The application of sensitivity points turning concepts to the tuning of multi-input/multi-output (MIMO) systems is investigated. The concept of sensitivities in feedback systems was originally introduced in the 1940's. Methodologies for using sensitivity information for optimal tuning of system parameters date back to the late 1950's and early 1960's. These works all involve the use of system sensitivities in order to provide a searchless means of computing the gradient of a given cost function which possesses some extremal value that is related in some way to some desired characteristic performance of the system under tuning. Included in this class of optimization techniques are the iterative parameter optimization techniques. GRA

N86-22194# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
ON A THEORY OF CONTROL FOR LINEAR SYSTEMS OVER RINGS AND NONLINEAR/TIME-VARYING SYSTEMS Final Report, 1 Jul. 1984 - 30 Jun. 1985
Erol Emre Sep. 1985 6 p
(Grant AF-AFOSR-0282-82)
(AD-A162680; AFOSR-85-0991TR) Avail: NTIS HC A02/MF A01 CSCL 09/3

During the grant period the principal investigator wrote 18 research papers. Titles include Regulation of Linear Systems Over Rings by Dynamic Output Feedback, Control of Linear Systems with Fixed Noncommensurate Point Delays, On regulation of Linear Systems by Dynamic Output Feedback, On Globally Stable Adaptive Control, and Continuous Stabilization of Time-Varying Systems Over Parameters Approach. Author (GRA)

N86-22195# Yale Univ., New Haven, Conn. Center for Systems Science.
ADAPTIVE CONTROL OF MULTIVARIABLE SYSTEMS Interim Report, 15 Jul. 1984 - 14 Jul. 1985
A. S. Morse 1 Oct. 1985 5 p
(Grant AF-AFOSR-0242-84)
(AD-A162795; AFOSR-85-1113TR) Avail: NTIS HC A02/MF A01 CSCL 09/3

During this period the Principal Investigator wrote six technical papers. Titles are: New directions in parameter adaptive control, Adaptive stabilization of linear systems with unknown high frequency, A smooth algorithm for adaptive stabilization of a discrete linear system with an unknown high frequency gain, A $4(n+1)$-dimensional model reference adaptive control for the stabilization of any strictly proper minimum phase linear system with relative degree not exceeding tow an dimension not exceeding phase linear system with relative degree not exceeding two and dimension not exceeding n, Adaptive stabilization of a discrete linear system with an unknown high frequency gain, and A three dimensional universal controller for the adaptive stabilization of any strictly proper minimum-phase system with relative degree not exceeding two. Author (GRA)

N86-22196# Oxford Univ. (England). Dept. of Engineering Science.
TUTORIALS ON SELF-TUNING CONTROL. VOLUME 1: INTRODUCTION TO SELF-TUNING AND ADAPTIVE CONTROL
D. W. Clarke 1985 20 p refs 2 Vol.
(OUEL-1592/85-Vol-1) Avail: NTIS HC A02/MF A01

The background to self-tuning control systems design is introduced. Reasons why self-tuning should be used are given. An elementary self-tuner for tuning a PI regulator based on an estimated model is presented. Adaptive control is introduced for the case of a plant with an unknown gain where the control objective is to regulate the output to a given set-point despite load disturbances. Author (ESA)

N86-22197# Oxford Univ. (England). Dept. of Engineering Science.
TUTORIALS ON SELF-TUNING CONTROL. VOLUME 2: AUTOMATIC TUNING OF PID REGULATORS
D. W. Clarke 1985 22 p refs 2 Vol.
(OUEL-1593/85-Vol-2) Avail: NTIS HC A02/MF A01

Pattern recognition and model based approaches to tuning of PID parameters are reviewed. It is seen that both approaches can lead to satisfactory tuning of PID parameters but they have respective strengths and weaknesses. The pattern recognition approach is quite slow and can be seriously affected by disturbances of unassumed structure. However, it appears not to depend on a model of the plant, though it has an implicit assumption that the plant response is smooth and monotonic. The model-based designs are fast to adapt but depend crucially on the assumption of model structure. In particular if the plant dead-time is different from that assumed, the closed-loop might become unstable. To avoid this problem it is important that the model parameter set is extended to encompass all possible variations; this might involve

quite a large parameter vector and a consequential computational load. Author (ESA)

N86-22198# Oxford Univ. (England). Dept. of Engineering Science.
PRINCIPAL DIRECTION ALIGNMENT, A GEOMETRIC FRAMEWORK FOR THE COMPUTER SOLUTION TO THE mu-PROBLEM
R. Daniel, B. Kouvaritakis, and H. Latchman 1985 57 p refs
(OUEL-1595/85) Avail: NTIS HC A04/MF A01

Nonsimilarity scaling results for element by element bounded perturbations, particularly the Major Principal Direction Alignment (MPDA) property, are reviewed. The block diagonal bounded perturbation problem formulation of Doyle (1982) for the case of 1x1 blocks is summarized. It is proved that a computable solution for mu is always guaranteed under MPDA, for this class of perturbation. A simple extension which allows the treatment of 1x1 blocks with different upper bounds is presented. General block structured perturbations are examined, and using the MPDA principle, a solution to the mu problem is presented. The case of repeated singular values is considered. The generality of the principal direction alignment property is established. Author (ESA)

N86-22199# Oxford Univ. (England). Dept. of Engineering Science.
NECESSARY AND SUFFICIENT STABILITY CONDITIONS FOR THE CASE OF DEPENDENT ADDITIVE PERTURBATIONS
B. Kouvaritakis and H. Latchman 1985 40 p refs
(OUEL-1596/85) Avail: NTIS HC A03/MF A01

It is shown that nondiagonal transformations afford the extra degrees of freedom required for the attainment of Principal Direction Alignment (PDA). The associated results give a necessary and sufficient stability condition, for the case of dependent perturbations. Nonsimilarity operations where the stability results have a direct geometric interpretation in terms of the plant and perturbations matrices are considered. Necessary and sufficient stability conditions for the general case in the context of similarity operations are derived. The optimal choice of these similarity transformations requires the solution of a minimization problem, which by major PDA arguments, is shown to be convex. Thus any standard optimization technique produces reliable results. Author (ESA)

N86-22200# Oxford Univ. (England). Dept. of Engineering Science.
PREDICTION OF STOCHASTIC PROCESSES USING SELF-TUNING PRINCIPLES
P. P. Kanjilal 1985 37 p refs
(OUEL-1597/85) Avail: NTIS HC A03/MF A01

Constrained minimum variance prediction using self-tuning ideas is presented. Generalized cost-functions which penalize the prediction error, and several choices of increments of prediction are considered. It is claimed that constraining the prediction increments leads to more realistic prediction strategies. An adaptive predictor based on pole-placement principles is presented. The proposed formulations are developed on an ARIMAX process model, as it is believed that such a representation is more appropriate in practice. Features are incorporated into the prediction algorithms which make them particularly suitable for real-time applications. Author (ESA)

N86-22201# Oxford Univ. (England). Dept. of Engineering Science.
ROBUSTNESS OF MULTIVARIABLE FEEDBACK SYSTEMS: ANALYSIS AND OPTIMAL DESIGN Ph.D. Thesis
Y. K. Foo 1985 295 p refs Sponsored by UK Overseas Research Student Award and Institution of Electrical Engineers
(OUEL-1601/85) Avail: NTIS HC A13/MF A01

The robustness of the stability property of multivariable feedback control systems with respect to model uncertainty is studied. By introducing a topological notion of arcwise connectivity, robust stability tests are unified. The switching-type robust stability test is easy to apply, and does not require the nominal and perturbed plants to share the same number of closed right half-plane poles, or zeros, or both. It is shown that at frequencies where there is a possibility of an uncertain pole crossing the jw-axis, robust stability is maximized by minimizing the maximum singular value of the sensitivity matrix. At frequencies where there is a likelihood of uncertain zeros crossing the imaginary axis, it is desirable to minimize the maximum singular value of the complementary sensitivity matrix. A robustness optimization problem is posed as a non-square H sup inf optimization problem. All solutions to the optimization problem are derived, and parameterized by the solutions to an equivalent two-parameter interpolation problem. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-22202 Columbia Univ., New York.
FINITE ELEMENT METHOD ANALYSIS OF NONLINEAR CONTINUA USING STOCHASTIC EQUIVALENT LINEARIZATION TECHNIQUE Ph.D. Thesis
Ion Simulescu 1985 102 p
Avail: Univ. Microfilms Order No. DA8523240

A finite element formulation for a class of nonlinear viscoelastic continua subjected to stochastic excitation has been developed by means of a stochastic equivalent linearization technique. The nonlinear viscoelastic properties of the continua are modeled in terms of the constitutive equation which linearly involves the hysteretic tensor and of the auxiliary equation which describes a nonlinear relationship among the strain and hysteretic tensors and their time derivatives. This auxiliary equation is linearized with the aid of a stochastic linearization technique which minimizes the expected value of the square of the difference between the nonlinear and linearized auxiliary equations. The linearized boundary value problem then involves a set of two linearization coefficients which are functions of space and time. With the aid of the weighted residuals method, the boundary value problem developed for the continuum is transformed into that in the finite element formulation. Dissert. Abstr.

N86-22203 Northwestern Univ., Evanston, Ill.
MULTIPLE TIME STEP PARTITIONED INTEGRATORS FOR FINITE ELEMENT EQUATIONS Ph.D. Thesis
Patrick John Smolinski 1985 109 p
Avail: Univ Microfilms Order No. DA8523595

Time integration procedures which allow different time steps within different parts of the mesh are presented for the first order semidiscretized diffusion equation and the second order semidiscretized equations of motion. Different integrators (explicit and implicit) and mesh partitions (element and node) are investigated for the first order equations. The stability of these procedures is examined numerically and analytically for the case of the element partition. Also stability guidelines for the explicit nodal partition are presented. An explicit subcycling method is analyzed for second order equations, however, the exact stability criterion has yet to be determined. Numerical examples are presented. Dissert. Abstr.

N86-22204*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE BOUNDARY TREATMENT IN SPECTRAL METHODS FOR HYPERBOLIC SYSTEMS
Claudio Canuto (Inst. di Analisi Numerica del C. N. R., Pavia, Italy) and Alfio Quarteroni (Inst. di Analisi Numerica del C. N. R., Pavia, Italy) Jan. 1986 20 p refs
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178055; ICASE-86-1; NAS 1.26:178055) Avail: NTIS HC A02/MF A01 CSCL 12A

Spectral methods were successfully applied to the simulation of slow transients in gas transportation networks. Implicit time advancing techniques are naturally suggested by the nature of

the problem. The correct treatment of the boundary conditions are clarified in order to avoid any stability restriction originated by the boundaries. The Beam and Warming and the Lerat schemes are unconditionally linearly stable when used with a Chebyshev pseudospectral method. Engineering accuracy for a gas transportation problem is achieved at Courant numbers up to 100. Author

N86-22205# Wisconsin Univ., Madison. Mathematics Research Center.
IMPLICIT B-DIFFERENTIABILITY IN GENERALIZED EQUATIONS Technical Summary Report
Stephen M. Robinson Aug. 1985 13 p
(Contract DAAG29-80-C-0041; Grant NSF DCR-85-02202)
(AD-A160980; MRC-TSR-2854) Avail: NTIS HC A02/MF A01 CSCL 12/1

Generalized equations are mathematical models for nonlinear equilibrium problems in areas such as economics, transportation, etc. In such models, it is desirable to know how the solution of the model will change when the problem data change. When such a change is too hard to compute, a convenient approximation method may yield and answer that is good enough, particularly for small changes. This paper develops such an approximation. The author has previously proved an implicit-function theorem for regular solutions of generalized equations. Here he shows that when the underlying set for the generalized equation is polyhedral, as it is in many applications, then the implicit function has a Bouligand derivative defined by a formula generalizing that of the usual implicit-function theorem. This extends recent results on directional differentiability obtained by Kyparisis and others. GRA

N86-22206# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ON THE DISTANCE BETWEEN MIXED POISSON AND POISSON DISTRIBUTIONS Technical Report, Sep. 1985 - Aug. 1986
Dietmar Pfeifer Sep. 1985 20 p
(Contracts F49620-82-C-0009; F49620-85-C-0144)
(AD-A161337; TR-115; AFOSR-85-0956TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Estimations and asymptotic expansions for several distances between mixed Poisson and Poisson distributions are given, such as the total variation distance, the Kolmogorov distance and a specific Wasserstein distance (Fortet-Mourier distance). As an example, the author generalizes and improves results of Vervaat (1969) on the total variation distance between negative binomial and Poisson distributions. The main tool is an appropriate application of operator semigroups and their probabilistic representation theory. Author (GRA)

N86-22207# Duke Univ., Durham, N. C. Dept. of Computer Science.
FINDING CRITICAL SETS
Donald W. Loveland 13 Sep. 1985 16 p Revised
(Grants AF-AFOSR-0205-83; AF-AFOSR-0221-81)
(AD-A161368; CS-1985-22; AFOSR-85-0951TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Several algorithms are given for finding a critical subset S determined by a binary monotonic set function over a given set U. A set S is critical if f(T) = 1 for all T such that S is a subset of T and f (R) = O for all R such that R is a perfect subset of S. Upper bounds on the worst case times for the algorithms, determined by the number of calls to the binary set function, vary downwards from 2r(log(base 2) n) function calls. Here n is the size of U and r is the size of the critical set found. We find that the conceptually easiest algorithm is not the easiest to program and also that the algorithms with better upper bounds fare more poorly in practice, based on a small sample of random trails. Although finding one critical set is easy we also show that it can quickly get very difficult to find additional critical sets, simply because it can be hard to separate known critical sets from further possible critical sets. Author (GRA)

N86-22208# Harvard Univ., Cambridge, Mass. Center for Research in Computer Technology.
MOTION PLANNING IN THE PRESENCE OF MOVING OBSTACLES
John H. Reif and Micha Sharir 1985 30 p
(Contract N00014-80-C-0647)
(AD-A161374; TR-06-85) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper investigates the computational complexity of planning the motion of a body B in 2-D or 3-D space, so as to avoid collision with moving obstacles of known, easily computed, trajectories. Dynamic movement problems are of fundamental importance to robotics, but their computational complexity has not previously been investigated. We provide evidence that the 3-D dynamic movement problem is intractable even if B has only a constant number of degrees of freedom of movement. In particular, we prove the problem is PSPACE-hard if B is given a velocity modulus bound on its movements and is NP hard even if B has no velocity modulus bound, where in both cases B has 6 degrees of freedom. To prove these results we use a unique method of simulation of a Turing machine which uses time to encode configurations (whereas previous lower bound proofs in robotics used the system position to encode configurations and so required unbounded number of degrees of freedom). We also investigate a natural class of dynamic problems which we call asteroid avoidance problems: B, the object we wish to move, is a convex polyhedron which is free to move by translation with bounded velocity modulus and the polyhedral obstacles have known translational trajectories but cannot rotate. This problem has many applications to robot, automobile, and aircraft collision avoidance. GRA

N86-22209# Harvard Univ., Cambridge, Mass. Computation Lab.
COMPLEXITY OF THE GENERALIZED MOVER'S PROBLEM
John H. Reif 1985 38 p
(Contract N00014-80-C-0647)
(AD-A161378; TR-04-85) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper concerns the problem of planning a sequence of movements of linked polyhedra through 3 dimensional Euclidean space, avoiding contact with a fixed set of polyhedra obstacles. That this generalized mover's problem is polynomial space hard is proved. The proof provides strong evidence that robot movement planning is computationally intractable, i.e., any algorithm requires time growing exponentially with the number of degrees of freedom. GRA

N86-22210# North Carolina Univ., Chapel Hill. Center for Stochastic Processes
ON PREDICTION OF HARMONIZABLE STABLE PROCESSES Technical Report, Sep. 1984 - Aug. 1985
S. Cambanis and A. G. Miamee Jul. 1985 46 p
(Contract F49620-82-C-0009)
(AD-A161412; TR-110; AFOSR-85-0950TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Spectral and time domain criteria for a harmonizable stable process to be regular are given, which provide an orthogonal moving average representation. Also criteria for such processes to have linear predictor filters are obtained; these include the positivity of the distance and of the angle between past and future. In the process, the notion of angle between isotropic complex stable random variables is introduced and studied. GRA

N86-22211# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ON STOCHASTICAL INTEGRATION BY SERIES OF WIENER INTEGRALS Technical Report, Sep. 1984 - Aug. 1985
Jan Rosinski Aug. 1985 33 p
(Contract F49620-82-C-0009)
(AD-A161514; TR-112; AFOSR-85-0947TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Stochastic integrals of random functions with respect to a white noise random measure are defined in terms of random series of usual Wiener integrals. Conditions for the existence of such integrals are obtained in terms of the nuclearity of certain operators

in L2-spaces. The relation with the Fisk-Stratonovich symmetric integral is also discussed. Author (GRA)

N86-22212# Harvard Univ., Cambridge, Mass. Computation Lab.
SHORTEST PATHS IN EUCLIDEAN SPACE WITH POLYHEDRAL OBSTACLES
John H. Reif and James A. Storer Apr. 1985 57 p
(Contract N00014-80-C-0647)
(AD-A161599; TR-05-85) Avail: NTIS HC A04/MF A01 CSCL 12/1

The problem of finding a minimum length path between two points in Euclidean space which avoids a set (not necessarily convex) of polyhedral obstacles; we let n denote the number of the obstacle edges and k denote the number of islands in the obstacle space. For two dimensions, an island is defined to be a maximal convex obstacle surface such that for any two points contained in the interior of the island, a minimal length path between these two points is strictly contained in the interior of the island; for example, a set of i disconnected convex polyhedra forms a set of i islands, however, a single non-convex polyhedron will constitute more than one island. GRA

N86-22213# Florida State Univ., Tallahassee.
ON THE LIMIT BEHAVIOR OF A MULTI-COMPARTMENT STORAGE MODEL WITH AN UNDERLYING MARKOV CHAIN. PART II: WITH NORMALIZATION
Eric S. Tollar Feb. 1985 27 p
(Contract DAAG29-82-K-0168)
(AD-A161661; FSU-STATISTICS-M694; TR-D-77-ARO; ARO-19367.31-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

A multi-compartment storage model with one way flow is considered. The inputs and outputs for each compartment are controlled by a denumerable state Markov chain. Assuming finite first and second moment conditions, the limit behavior of the compartments is examined. It is shown that the diverging compartments under suitable normalization converge to functionals of multivariate Brownian motion, independent of those compartments which converge without normalization. Author (GRA)

N86-22214# Mississippi State Univ., Mississippi State. Dept. of Mathematics.
A STUDY OF SINGULARITIES IN BOUNDARY-FITTED COORDINATE SYSTEMS Final Report, 16 Aug. 1983 - 15 Aug. 1985
Helen V. McConnaughey 9 Oct. 1985 45 p
(Contract DAAG29-83-K-0101)
(AD-A161756; ARO-19979.3-EG) Avail: NTIS HC A03/MF A01 CSCL 12/1

Many problems in science and engineering require the solution of a system of partial differential equations on a complex two- or three-dimensional domain. In order to solve such a problem numerically, a boundary-fitted coordinate system is usually constructed. For geometries of practical importance, it is often necessary to partition the domain and to fit a separate coordinate system to each subregion. Patching these subsystems together to form a composite system can produce irregular grid structures where the numerical scheme of solution must be modified. Methods for treating nonstandard (special) grid points in two-dimensional configurations were developed and reported earlier in the course of this project. Verification of these methods through computer experimentation and extension of the methods to special points in three-dimensional grids were the primary objectives of the project reported here. GRA

N86-22215# Army Military Personnel Center, Alexandria, Va.
AN ADAPTIVE MESH ALGORITHM FOR SOLVING SYSTEMS OF TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS Ph.D. Thesis
David C. Arney Aug. 1985 263 p
(AD-A161822; AD-E900526) Avail: NTIS HC A12/MF A01 CSCL 12/1

This thesis discusses and adaptive mesh algorithm that can be used with a finite difference or finite element scheme to solve initial-boundary value problems for vector systems of time dependent partial differential equations in two space dimensions. This algorithm combines the adaptive technique of mesh moving, static rezoning, and local mesh refinement. The nodes of a coarse mesh of quadrilateral cells are moved by a simple algebraic node movement function. The local mesh refinement method recursively divides cells of the moving coarse mesh within clustered regions that contain nodes with large error until a user prescribed error tolerance is satisfied. GRA

N86-22216# Georgia Univ., Athens. Dept. of Chemistry.
SYSTEMATICS OF STRONGLY SELF-DOMINANT HIGHER ORDER DIFFERENTIAL EQUATIONS BASED ON THE PAINLEVE ANALYSIS OF THEIR SINGULARITIES
R. B. King 16 Dec. 1985 20 p
(Contract N00014-84-K-0365)
(AD-A162545; TR-14) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper presents a simple way of classifying higher order differential equations based on the requirements of the Painleve' property, i.e., the presence of no movable critical points. The fundamental building blocks for such equations may be generated by strongly self-dominant differential equations. Such differential equations having both a constant degree d and a constant value of the difference n-m form a Painleve' chain; however, only three of the many possible Painleve' chains can have the Painleve' property. Among the three Painleve' chains which can have the Painleve' property, one contains the Burgers' equation; another contains the dominant terms of the first Painleve' transcendent, the isospectral Korteweg-de Vries equation, and the isospectral Boussinesq equation; and the third contains the dominant terms of the second Painleve' transecendent and the isospectral modified (cubic) Korteweg-de Vries equation. Differential equations of the same order and having the same value of the quotient (n-m)/(d-1) can be mixed to generate a new hybrid differential equation. In such cases a hybrid can have the Painleve' property even if only one of its components has the Painleve' property. Such hybridization processes can be used to generate the various fifth-order evolution equations of interest, namely the Caudrey-Dodd-Gibbon, Kuperschmidt, and Morris equations. GRA

N86-22217# Georgia Univ., Athens. Dept. of Physics and Astronomy.
EXACT DYNAMICALLY CONVERGENT CALCULATIONS OF THE FREQUENCY-DEPENDENT DENSITY RESPONSE FUNCTION
J. Hong and M. H. Lee 5 Nov. 1985 14 p
(Contract N00014-85-K-0365)
(AD-A162570; AD-E900528; TR-9) Avail: NTIS HC A02/MF A01 CSCL 12/1

A general expression for the response function is derived by the method of recurrence relations. Memory effects appear as corrections to the dynamic RPA form. The dynamic structure for the 3d electron gas is calculated to third order and compared with Al data as a large wave vector. Also shown is the dynamic local-field term. Author (GRA)

N86-22218# State Univ. of New York, Stony Brook. Dept. of Applied Mathematics and Statistics.
NUMERICAL METHODS FOR DIFFERENTIAL EQUATIONS Annual Report, 30 Sep. 1984 - 29 Sep. 1985
Reginald P. Tewarson Sep. 1985 10 p
(Grant AF-AFOSR-0383-84)
(AD-A162722; AFOSR-85-1120TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Investigators have been able to develop a computer code which has turned out to be quite competitive with a well established code. The new approach implements a variable order finite difference scheme which does not require derivatives of the given function and which uses no information outside a subinterval to approximate the given system in that subinterval. Three papers have been published as a result of this effort, with the following titles: (1) An adaptive boundary value Runge-Kutta solver for first

order boundary value problems, on the solution of sparse nonlinear evaluations and some applicattions; and (2) A quasi-Newton method with sparse triple factorization. GRA

N86-22219# Massachusetts Inst. of Tech., Cambridge. lab. for Information and Decision Systems.
THE REDUCTION OF PERTURBED MARKOV GENERATORS: AN ALGORITHM EXPOSING THE ROLE OF TRANSIENT STATES
Jan R. Rohlicek and Alan S. Willsky Sep. 1985 54 p
(Grant AF-AFOSR-0258-82)
(AD-A162773; LIDS-P-1493; AFOSR-85-1119TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

A new algorithm for the hierarchical aggregation of singularly perturbed finite-state Markov processes is derived. The approach taken bridges the gap between conceptually simple results for a relatively restricted class of processes and the significantly more complex results for the general case. The critical role played by (almost) transient states is exposed resulting in a straightforward algorithm for the construction of a sequence of aggregate generators associated with various time scales. These generators together provide a uniform asymptotic approximation of the original probability transition function. Author (GRA)

N86-22220# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A MARKOV CHAIN APPROACH TO ELECTROCARDIOGRAM MODELING AND ANALYSIS
Peter C. Doerschuk Apr. 1985 404 p
(Grant AF-AFOSR-0258-82)
(AD-A162776; LIDS-TH-1452; AFOSR-85-1127TR) Avail: NTIS HC A18/MF A01 CSCL 12/1

A novel class of models of the electrocardiogram using interacting Markov chains is developed and used as a basis for signal processing. The modeling methodology emphasizes a balance between the inclusion of physiological detail and practicality for signal processing. In order for signal processing algorithms based on the model to achieve accurate, detailed classification of the electrocardiogram, it is necessary to include physiological detail in the model. On the other hand, in order to make the signal processing practical, the models are restricted by imposing spatial, temporal, and hierarchical decompositions. A signal processing algorithm for a wave tracking problem relevant to rhythm classification is proposed. The algorithm is decomposed to mirror the spatial decomposition of the model. On the other hand, in order to make the signal processing practical, the models are restricted by imposing spatial, temporal, and hierarchical decompositions. A signal processing algorithm for a wave tracking problem relevant to rhythm classification is proposed. The algorithm is decomposed to mirror the spatial decomposition of the model. Limited simulations indicate that reasonable performance may be attainable. GRA

N86-22221# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON CONSERVATIVE DIFFERENCE SCHEMAS
A. A. Samarskiy 5 Dec. 1985 21 p Transl. into ENGLISH from the booko. "Problemy Prikladnoy Matematiki i Mekhaniki Sbornik Statey" Moscow, 1971 p 129-136
(AD-A162798; FTD-ID(RS)T-0889-85) Avail: NTIS HC A02/MF A01 CSCL 12/1

The broadening of the scope of difference methods and the associated increase of demands on them stimulate interest in formulating general principles of obtaining difference schemas of a definite quality for problems of mathematical physics. The possibility of assigning to the same differential equation an infinite set of difference schemas defined on the same template and having the same order of approximation makes the problem of choosing the desired schema a very complex one. It is required of any numerical method that it supply and approximate solution of the problem with preset accuracy epsilon > 0 in a finite number of operations. Moreover, it is required that the schema be universal (suitable for a rather broad class of problems), homogeneous, stable, and economical (more precisely, that the numerical algorithm used to solve the difference equations be economical). GRA

N86-22222# Aerospace Corp., El Segundo, Calif.
ANALYSIS OF A LINEAR ANTENNA TWO WAVELENGTHS LONG: CONSIDERATION OF OPTIONS
Gwendolyn M. Shaw and Randolph H. Ott 1 Nov. 1985 45 p
(AD-A162799; TR-0086(6925-05)-2; SD-TR-85-87) Avail: NTIS HC A03/MF A01 CSCL 09/5

The far-zone electric field of a wire dipole antenna is numerically determined by the method of moments. Additional numerical methods that are used and compared are finite differences for computing a first derivative and L-V decomposition and the conjugate gradient method for solving linear equations. These additional methods are compared in terms of their agreement with previously accepted results and their computer execution time and memory requirements. GRA

N86-22223# North Carolina Univ., Chapel Hill. Chapel Hill Center for Stochastic Processes.
INVARIANCE PRINCIPLES UNDER A TWO-PART MIXING ASSUMPTION
Richard C. Bradley and Magda Peligrad Oct. 1985 45 p
(Contract F49620-85-C-0144; Grants NSF DMS-84-01021; NSF DMS-85-03016)
(AD-A162800; TR-122; AFOSR-85-1106TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this document weak and strong invariance principles are established for strictly stationary sequences satisfying a mixing assumption which has two parts, one based on the strong mixing condition with a polynomial mixing rate and the other based on the o-mixing condition. Author (GRA)

N86-22224# Atlanta Univ., Ga. Dept. of Physics.
INVESTIGATION OF PERTURBATION TECHNIQUES FOR NON-LINEAR DIFFERENCE EQUATIONS AND OTHER RELATED PROBLEMS Progress Report, Jul. 1984 - Mar. 1985
R. E. Mickens Mar. 1985 7 p
(Contract DE-AS05-83ER-13123)
(DE86-001162; DOE/ER-13123/1) Avail: NTIS HC A02/MF A01

A summary of the highlights of research on perturbation techniques for nonlinear difference equations performed since August 1, 1984 is given. The Appendix cites additional items which are directly related to the research proposed in the grant: (1) conferences attended, (2) abstracts, (3) lectures presented by the Principal Investigator, (4) theses' directed, and (5) publications. DOE

N86-22225# Tilburg Univ. (Netherlands). Dept. of Economics.
COMMENT ON: IDENTIFICATION IN THE LINEAR ERRORS IN VARIABLE MODELS
Paul A. Bekker 1985 11 p refs Sponsored by Netherlands Organization for the Advancement of Pure Research
(FEW-159) Avail: NTIS HC A02/MF A01

A model for multiple regression with errors is considered. The fact that one sentence proved in Kapteyn-Wansbeek's paper Identification in the linear errors in variables model (1983) is not exact is noted. A necessary and sufficient condition for identification in the linear error for variable model of a parameter normally distributed is proved. Author (ESA)

N86-22226# Oxford Univ. (England). Dept. of Engineering Science.
RECURSIVE ESTIMATION FOR NONLINEAR WIENER SYSTEMS BY ONLINE IMPLEMENTATION OF BAYE'S RULE
O. L. R. Jacobs Aug. 1985 23 p refs
(OUEL-1471/83) Avail: NTIS HC A02/MF A01

A linearization which permits on-line estimation of multiple random variables when their weighted sum is observed through severe nonlinearity is presented. Analysis to guarantee nice properties of the procedure is not available. For modest numbers of random variables the on-line computing requirements are readily met by microcomputers. The power of the Gaussian approximation

in estimating a constant random variable is shown. The observed convergence of computed conditional distributions towards the normal shape is a surprise: it might be a manifestation of the central limit theorem. Author (ESA)

N86-22227# Oxford Univ. (England). Dept. of Engineering Science.
FINITE ELEMENT ANALYSIS OF TWO CYLINDRICAL EXPANSION PROBLEMS INVOLVING NEAR INCOMPRESSIBLE MATERIAL BEHAVIOUR
H. J. Burd and G. T. Houlsby 1985 46 p refs
(OUEL-1580/85; SM056/85) Avail: NTIS HC A03/MF A01

Numerical problems which arise in the analysis of incompressible or near-incompressible material elastoplasticity using the displacement formulation of the finite element method are discussed. These effects are caused by the additional kinematic constraints imposed on the nodal velocities by the incompressibility condition. The detrimental effect of these additional constraints depends on mesh topology and element formulation, and are investigated with reference to a small strain thick-cylinder problem, and a large strain cavity expansion problem, both of which have closed form solutions. The study confirms that as Poisson's ratio is increased from a low number towards 0.5, the accuracy of the calculated stresses deteriorates. These errors are associated mainly with the mean stress, the deviatoric terms remaining relatively unaffected. Author (ESA)

N86-22228# Oxford Univ. (England). Dept. of Engineering Science.
A LARGE STRAIN FINITE ELEMENT FORMULATION FOR ONE DIMENSIONAL MEMBRANE ELEMENTS
H. J. Burd and G. T. Houlsby 1985 22 p refs Sponsored by UK Science and Engineering Research Council
(OUEL-1603/85; SM061/85) Avail: NTIS HC A02/MF A01

A finite element formulation suitable for large strain analysis of one dimensional membranes applicable to the analysis of problems in soil mechanics involving reinforced earth is described. The finite element equations, derived for a plane strain isoparametric element of arbitrary order, are cast in the small displacement form, but with a modified material stiffness matrix. In this formulation, full account is taken of element rotations during each load step, an affect which is important when stresses cease to be insignificant when compared with the material modulus. The method is illustrated with a large displacement test problem which has a known closed form solution. The application of the formulation to the analysis of a reinforced unpaved road is demonstrated. Author (ESA)

N86-21885# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FRACTIONAL CALCULUS TO REPRESENT COMPLEX MODULUS
Lynn Rogers *In its* Vibration Damping 1984 Workshop Proceedings Nov. 1984 4 p refs (For primary document see N86-21883 12-39)
Avail: NTIS HC A99/MF A01 CSCL 20/11

N86-21941*# PRC Kentron, Inc., Hampton, Va.
DIGITAL FILTERING AND ACCELERATION PULSE INTERPRETATION
E. L. Pasanella *In* NASA. Langley Research Center Full-Scale Transport Controlled Impact Demonstration Jan. 1986 p 103-123 refs (For primary document see N86-21933 12-39)
Avail: NTIS HC A16/MF A01 CSCL 12A

N86-22118# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
TWO APPLICATIONS OF TOPOLOGICAL DYNAMICS IN COMBINATORIAL NUMBER THEORY
Jan deVries *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 2-17 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

N86-22122# Limburg State Univ., Maastricht (Netherlands).
SECOND ORDER APPROXIMATIONS
Willem Albers *In* CWI CWI Newsletter, No. 7, June 1985 Jun. 1985 p 2-7 (For primary document see N86-22121 12-59)
Avail: NTIS HC A03/MF A01

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-22229 Houston Univ., Tex.
POWERS OF TESTS FOR CONSTANT REGRESSION COEFFICIENTS UNDER SEVERAL ALTERNATIVE MODELS Ph.D. Thesis
Chi-Si Hwu 1984 104 p
Avail: Univ. Microfilms Order No. DA8523283

It is common in time series regression work, in such fields as economics and finance, that the statistical relationship under consideration may not remain constant over time, but appears to be subject to some kinds of changes. When linear regression models with random coefficients are used in applications, a question of fundamental importance is whether the regression coefficients are constant over time. If they are then ordinary least-squares techniques can be applied. If not, then more efficient procedures are available. Several tests for constancy of regression coefficients have been developed for the random walk coefficient model. However, other random models are also possible. To some extent, tests designed to detect random walk coefficients may still reject the null hypothesis of constant regression coefficients even if the coefficients actually follow some other random model. At present, not much is known about the sensitivity of these tests to alternative models. The purpose of this dissertation research is: (1) to examine powers of tests designed to detect random walk coefficients when the coefficients in fact follow other regimes, and (2) to adapt existing test procedures to alternative models and to compare powers of these new tests. Dissert. Abstr.

N86-22230# Florida State Univ., Tallahassee. Dept. of Statistics.
PIECEWISE GEOMETRIC ESTIMATION OF A SURVIVAL FUNCTION
Gillian M. Mimmack and Frank Proschan Apr. 1985 50 p
(Contract F49620-82-K-0007)
(AD-A161322; FSU-STATISTICS-M700; TR-176;
AFOSR-85-0953TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A statistical procedure that uses incomplete data to estimate failure rate and survival functions is described. Although the procedure is designed for discrete distributions, it applied in the continuous case also. The procedure is based on the assumption of a piecewise constant failure rate. The resultant survival function estimator is a piecewise geometric function, denoted the Piecewise Geometric Estimator (PEGE). The PEGE is the discrete version of the piecewise exponential estimators proposed independently by Kitchin, Langberg and Proschan (1983) and Whittemore and Keller (1983), and it is a generalization of an estimator of Umholtz (1984) who considers complete data taken from an exponential distribution. The PEGE is consistent and asymptotically normal under conditions more general than those of the model of random censorship. Although the PEGE and the widely used Kaplan-Meier estimator (KME) are asymptotically equivalent and generally interlace, the PEGE is expected to perform better than the KME in terms of small sample properties. GRA

N86-22231# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
[FUNDAMENTAL ASPECTS OF FILTERING THEORY, STATISTICAL SIGNAL PROCESSING AND STOCHASTIC VARIATIONAL PROBLEMS RELATED TO ESTIMATION OF MARKOV RANDOM FIELDS] Final Technical Report, 15 Mar. 1984 - 15 Mar. 1985
Sanjoy K. Mitter and Bernard Levy Jun. 1985 22 p

(Grant AF-AFOSR-0135-82)
(AD-A161334; AFOSR-85-0948TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The following fundamental aspects of Stochastic Systems Theory are discussed: filtering, statistical signal processing and related problems in scattering and inverse scattering theory; theory of Markov random fields and related questions in image processing and image understanding; stochastic variational calculus and stochastic adaptive control; and parallel and distributed algorithms for statistical signal processing. GRA

N86-22232# Florida State Univ., Tallahassee. Dept. of Statistics.
EFFICIENCY LOSS WITH THE KAPLAN-MEIER ESTIMATOR
Myles Hollander, Frank Proschan, and James Sconing Aug. 1985 22 p
(Contract F49620-85-C-0007; Grant AF-AFOSR-85-C-0007)
(AD-A161341; FSU-STATISTICS-M707; TR-85-181; AFOSR-85-0975TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The proportional hazards model is considered where the distribution G of the censoring random variable is related to the distribution F of the lifetime random variable via (1 G)=(1 - F) to the beta power. Nonparametric estimators of F are developed for the case where beta is unknown and the case where beta is known. Of interest in their own right, these estimators also enable us to study the robustness of the Kaplan-Meier estimator (KME) in a nonparametric model for which it is not the preferred estimator. Comparisons are based on asymptotic efficiencies and exact mean square errors. We also compare the KME to the empirical survival function, thereby providing, in a nonparametric setting, a measure of the loss in efficiency due to the presence of censoring. GRA

N86-22233# North Carolina Univ., Chapel Hill. Dept. of Statistics.
EXISTENCE OF RANDOM VARIABLES WITH VALUES IN THE DUAL OF A NUCLEAR SPACE Technical Report, Sep. 1985 - Aug. 1986
S. Ramaswamy Sep. 1985 10 p
(Contract F49620-82-C-0009)
(AD-A161343; TR-116; AFOSR-85-0957TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Some results of L. Schwartz's theory of randomifying maps to prove existence theorems for infinite dimensional valued random variables are discussed. As a consequence, we deduce some known results in this direction due to K. Ito, M. Perez-Abreu C., and T. Bojdecki and L.G. Gorostiza are deduced. GRA

N86-22234# Stanford Univ., Calif. Dept. of Statistics.
TIME SERIES ANALYSIS AND MULTIVARIATE STATISTICAL ANALYSIS Final Report, 1 Jul. 1982 - 31 Jul. 1985
Theodore W. Anderson Sep. 1985 7 p
(Contract DAAG29-82-K-0156)
(AD-A161375; ARO-19065.15-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The probability of an estimated moving average model being noninvertible was characterized. Generalizations of autocorrelation and partial autocorrelation coefficients are suggested for determining the orders of autoregressive moving average processes. Maximum likelihood estimators and likelihood ratio criteria were derived for a class of elliptically contoured distributions. Zonal polynomials were developed as characteristic vectors of a matrix of polynomials. Author (GRA)

N86-22235# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
RANDOM INTEGRAL REPRESENTATIONS FOR CLASSES OF LIMIT DISTRIBUTIONS SIMILAR TO LEVY CLASS L(O)
Zbigniew J. Jurek Sep. 1985 32 p Prepared in cooperation with Auburn Univ., Ala.
(Contract F49620-82-C-0009)
(AD-A161413; TR-117; AFOSR-85-0958TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

For a linear operator Q, on a Banach space E, and a real number beta, there are introduced classes, mu sub beta (O), of some limit distributions such that mu sub O(I) coincides with the Levy class LO. Elements from mu sub beta (Q) are characterized in terms of convolution equations and as probability distributions of some random integral functionals. The continuity and fix points of this random mapping is studied. It is shown that fix points coincide with the class of Q-stable measures. GRA

N86-22236# Illinois Univ., Urbana. Coordinated Science Lab.
CORRELATION IN COUPLED QUEUES AND SIMULATION OF A STOCHASTIC APPROXIMATION PROCEDURE FOR MULTIACCESS COMMUNICATIONS
Walter E. Brady Mar. 1985 64 p
(Contract N00014-84-C-0149)
(AD-A161515; R-1030; UILU-ENG-85-2205) Avail: NTIS HC A04/MF A01 CSCL 17/2

In this report, two separate topics in queing theory are discussed. In the first half of the thesis, methods are presented that are used to show that quantitative evidence of correlation exists in intuitively correlated coupled systems. The second half of this thesis concerns the use of simulations to verify that predictions are valid for specific random access control strategies. These control strategies include cases where the number of stations is allowed to slowly vary. Author (GRA)

N86-22237# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision.
MARKOV CHAINS WITH RARE TRANSITIONS AND SIMULATED ANNEALING
John N. Tsitsiklis Sep. 1985 26 p
(Contract DAAG29-84-K-0005)
(AD-A161598; LIDS-P-1497; ARO-20980.32-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

Markov chains in which the entries of the one-step transition probability matrix are known to be of different orders of magnitude and whose structure (that is, the orders of magnitude of the transition probabilities) does not change with time are considered. For such Markov chains a method is presented for generating order of magnitude estimates for the t-step transition probabilities, for any t. The algorithms of the simulated annealing type may be represented by a Markov chain which is approximately stationary over fairly long time intervals. Using the results a characterization of the convergent cooling schedules for the general class of algorithms of the simulated annealing type is obtained. GRA

N86-22238# Texas A&M Univ., College Station. Dept. of Statistics.
STATIONARY TIME SERIES, QUANTILE FUNCTIONS, NONPARAMETRIC INFERENCE AND RANK TRANSFORM SPECTRUM M.S. Thesis
Avrahan Harpaz Sep. 1985 74 p
(Contracts N00014-84-K-0350; DAAG29-83-K-0051)
(AD-A161749; TR-A-31; ARO-20140.7-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

In this dissertation, weak convergence results for dependent sequences are used to derive the asymptotic distribution of linear rank statistics for the two sample problem. It is shown that the asymptotic variance of linear rank statistics when computed from two independent time series depends on the spectrum of the rank transform time series. The behavior of the rank transform spectrum in terms of its relations to the original spectrum is also empirically examined. Author (GRA)

N86-22239# Stanford Univ., Calif. Dept. of Operations Research.
LARGE-SAMPLE THEORY FOR STANDARDIZED TIME SERIES: AN OVERVIEW
Peter W. Glynn and Donald L. Iglehart Aug. 1985 22 p
(Contract DAAG29-84-K-0030; Grant NSF MCS-82-3438)
(AD-A161767; TR-10; ARO-20927.10-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

There are two basic approaches to constructing confidence intervals for steady-state parameters from a single simulation run.

The first is to consistently estimate the variance constant in the relevant central limit theorem. This is the approach used in the regenerative, spectral, and autoregressive methods. The second approach (standardized time series, STS) due to SCHRUBEN is to cancel-out the variance constant. This second approach contains the batch means method as a special case. The large-sample properties of the confidence intervals generated by the STS method are discussed. In particular, the asymptotic (as run size becomes large) expected value and variance of the length of these confidence intervals is studied and shown to be inferior to the behavior manifested by intervals constructed using the first approach. Author (GRA)

N86-22240# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
EXTREMA AND LEVEL CROSSINGS OF x(2) PROCESSES Technical Report, Sep. 1984 - Aug. 1985
Michael Aronowich and Robert J. Adler Aug. 1985 35 p
(Contract F49620-82-C-0009)
(AD-A162398; TR-113; AFOSR-85-0982TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The sample path behavior of sq X processes in the neighborhood of their level crossings and extreme is studied via the development of Slepian model processes. The results, aside from being of particular interest in the study of sq X processes, have a general interest insofar as they indicate which properties of Gaussian processes (which has been heavily researched in this regard) are mirrored or lost when the assumption of normality is not made. Particular emphasis is placed on the behavior of sq X processes at both high and low levels, these being of considerable practical importance. Also extended are previous results on the asymptotic Poisson form of the point process of high maxima to include also low minima (which are in a different domain of attraction) thus closing a gap in the theory of 59 sq X processes. GRA

N86-22241# Stanford Univ., Calif. Lab. for Computational Statistics.
BOOTSTRAPPING COX'S REGRESSION MODEL Technical Report
Nils L. Hjort Nov. 1985 61 p
(Contract N00014-83-K-0472; Grant NSF MCS-80-24649)
(AD-A162443; LCS-TR-21) Avail: NTIS HC A04/MF A01 CSCL 12/1

Statistical inference in Cox's regression model is usually carried out using traditional (first order) large sample theory. In the spirit of earlier success stories one might try to bootstrap data in order to better assess the sampling variability of the Cox estimator. Such a bootstrap scheme is proposed in this paper. An asymptotic justification is given, showing that inference based on the bootstrap procedure is first order equivalent to the standard one. The problem of constructing more accurate moderate-sample confidence intervals is also addressed, employing second order fine-tuning of the bootstrap. Author (GRA)

N86-22242# Iowa Univ., Iowa City.
ON MINI CONFERENCE ON ORDER RESTRICTED INFERENCE HELD AT IOWA UNIVERSITY CAMPUS ON 11-13 SEPTEMBER 1985 Final Report
Richard Dykstra and Tim Robertson Nov. 1985 26 p Conference held in Iowa City, Iowa, 11-13 Sep. 1985
(Contract N00014-85-G-0161)
(AD-A162478) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report contains a list of participants and abstracts of some of the 20 papers which were presented. The majority of papers presented at the conference are currently being organized to appear in a Conference Proceedings Volume to be published by Springer-Verlag during the summer of 1986. GRA

N86-22243# Northeastern Univ., Boston, Mass.
INVESTIGATIONS ON STATISTICS OF TERRAIN HEIGHT Final Report, Jan. - Oct. 1984
H. R. Raemer and C. K. Chow Sep. 1985 317 p
(Contract F19628-84-K-0007)
(AD-A162517; RADC-TR-85-178) Avail: NTIS HC A14/MF A01 CSCL 12/1

Three related but independent analytical investigations are reported in this document. The first is investigation of a binary hypothesis test to determine whether a given population of terrain height samples is more likely to have originated from a Gaussian or an expotential probability distribution. The input data for the test are assumed to be finitely sampled and quantized. Two tests are considered, one based on the assumption of continuously varying input data and the other based on finitely sampled and quantized data. Bivariate distributions with multiple observations are assumed. The second investigation concerns two classes of interpolation problems. The first is the inference of terrain height values at points for which no direct measurements are available using measured height values at other points, and using maximum likelihood estimator theory as a basis for the interpolation. The second is that of inferring the joint PDF of terrain height values of points at which height measurements have not been made. In both of these investigations, the effect of external constraints on heights and height differences are also considered. The third investigation concerns a continuation of a study initiated on a previous contract, sampling, and quantization errors in estimator of mean, variance and covariance of terrain heights. Author (GRA)

N86-22244# Wisconsin Univ., Madison. Dept. of Statistics.
THE 25TH CONFERENCE ON STATISTICAL THEORY AND PRACTICE HELD AT THE UNIVERSITY OF WISCONSIN, MADISON ON 29-31 MAY 1985 Final Report
George E. P. Box and Richard A. Johnson 1985 23 p Conference held at Madison, Wis., 29-31 May 1985
(Contract N00014-85-G-0073)
(AD-A162645) Avail: NTIS HC A02/MF A01 CSCL 12/1

The formal program consisted of seven invited paper sessions: Bayesian inference, inference, biostatistics, time series, quality and reliability, experimental design, and modelling and data analysis. There were three contributed paper sessions, a panel discussion on the future of statistics in industry and government and a banquet speech. The 23 distinguished speakers at the invited paper sessions all gave first rate presentations incorporating their latest findings within the framework of recent major advances in the area. Author (GRA)

N86-22245# Michigan State Univ., East Lansing. Dept. of Statistics and Probability.
[STATISTICAL METHODOLOGIES APPROPRIATE IN CENSORED SURVIVAL ANALYSES AND COMPETING RISK MODELS] Final Report
Joseph C. Gardiner Dec. 1985 22 p
(Contract N00014-79-C-0522)
(AD-A162703; AD-E301866) Avail: NTIS HC A02/MF A01 CSCL 12/1

The research performed on this contract addressed statistical methodologies that would be appropriate in censored survival analyses and competing risks models. Both general parametric and nonparametric models were considered. The problems of efficient estimation of parameters of the underlying failure time distribution were addressed when the data may only be partly observable due to the presence of censorship. The methodology developed permits costs associated with monitoring of experimentation and of recruitment of units to be incorporated into the basic infrastructure leading to the description and properties of optimal procedures that minimize overall expected cost. These optimal designs are inherently sequential in nature, in that the optimal stopping time or sample size is solely determined by the observed information gathered by experimeter. GRA

N86-22246# North Carolina Univ., Chapel Hill. Chapel Hill Dept. of Statistics.
M-ESTIMATION FOR DISCRETE DATA. ASYMPTOTIC DISTRIBUTION THEORY AND IMPLICATIONS
Douglas G. Simpson, Raymond J. Carroll, and David Ruppert Oct.

1985 22 p Prepared in cooperation with Illinois Univ., Urbana. Dept. of Statistics
(Contract F49620-85-C-0144; Grant NSF DMS-84-00602)
(AD-A162779; AFOSR-85-1115TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The asymptotic distribution of an M-estimator is studied when the underlying distribution is discrete. Asymptotic normality is shown to hold quite generally within the assumed parametric family. When the specification of the model is inexact, however, it is demonstrated that an M-estimator with a non-smooth score function, e.g., a Huber estimator, has a non-normal limiting distribution at certain distributions, resulting in unstable inference in the neighborhood of such distributions. Consequently, smooth score functions are proposed for discrete data. Author (GRA)

N86-22247# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
ISOTONIC RULES FOR SELECTING GOOD TRUNCATED EXPONENTIAL POPULATIONS
TaChen Liang Nov. 1985 30 p
(Contract N00014-84-C-0167)
(AD-A162790; TR-85-32) Avail: NTIS HC A03/MF A01 CSCL 12/1

The problem of selecting truncated exponential populations better than a control under an ordering prior is studied. Based on some prior information, it is reasonable to set lower bounds for the concerned parameters. Through this consideration, and isotonic selection rule is proposed. This selection rule always satisfies the requirement that the probability of a correct selection is at least equal to some prespecified value p_0. A criterion is proposed to evaluate the performance of the selection rules. Simulation results indicate that this rule always performs better than some other earlier existing isotonic selection rules. Author (GRA)

N86-22248# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Hauptabteilung Mathematik and Information.
THE STATISTICAL ANALYSIS PROGRAM PACKAGE (SAPP): A SPECIAL DATA ANALYSIS PROGRAM Final Report [SAPP: EIN SPEZIELLES DATENANALYSESYSTEM (KURZFASSUNG)]
Franz Helmreich Jul. 1985 18 p refs In GERMAN; ENGLISH summary
(OEFZS-4326; MI-83/85) Avail: NTIS HC A02/MF A01

The Statistical Analysis Program Package is a methodical preparation of statistical test procedures (descriptive statistics, correlation, regression, variance, covariance, factor and cluster analysis) in relation with an efficient data management. It is a flexible, menu-based system composed of data entry error-monitoring and explanation modules for solution of statistical biomedical data. The system allows synthetic collection of result formulas for direct utilization. Author (ESA)

N86-22249# Oxford Univ. (England). Dept. of Engineering Science.
NORMALITY SCALING AND EIGENVALUE INCLUSION REGIONS
R. F. Harrison and B. Kouvaritakis 1985 34 p refs
(OUEL-1594/85) Avail: NTIS HC A03/MF A01

The normal approximations approach to robust stability analysis is extended to utilize the eigenvalue preserving operation of similarity scaling. In the case of 2x2 systems, the scaling which minimizes the spread of the numerical range of the nominal system is obtained. It is identical to that obtained by minimizing the condition number of the system. It is also identical to the Perron scaling. In the general, mxm, case it is not possible to optimize the normal approximation but the results when $m=2$ suggest that any of the above criteria offer a (suboptimal) improvement. The Perron scaling is particularly useful due to its explicit nature. The other scaling matrices must be obtained by numerical means. Because no explicit account of the structure of the perturbation on the system is taken when calculating the scaling matrix, scaling may have unpredictable effects on the eigenvalue inclusion regions, even though the normal approximations are always improved. However, the improved condition of the approximated system should offset detrimental effects. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-22250*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
AN OPTIMAL REPARTITIONING DECISION POLICY Final Report
David M. Nicol and Paul F. Reynolds, Jr. (Virginia Univ.) Feb. 1986 19 p refs Submitted for publication
(Contract NAS1-17070; NAS1-18107)
(NASA-CR-178035; ICASE-86-7; NAS 1.26:178035) Avail: NTIS HC A02/MF A01 CSCL 12B

A central problem to parallel processing is the determination of an effective partitioning of workload to processors. The effectiveness of any given partition is dependent on the stochastic nature of the workload. The problem of determining when and if the stochastic behavior of the workload has changed enough to warrant the calculation of a new partition is treated. The problem is modeled as a Markov decision process, and an optimal decision policy is derived. Quantification of this policy is usually intractable. A heuristic policy which performs nearly optimally is investigated empirically. The results suggest that the detection of change is the predominant issue in this problem. Author

N86-22251*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
A HIERARCHICAL APPROACH TO RELIABILITY MODELING OF FAULT-TOLERANT SYSTEMS M.S. Thesis
William Elting Gossman Jan. 1986 81 p refs
(Contract NAS9-16023)
(NASA-CR-176654; NAS 1.26:176654; CSDL-T-897) Avail: NTIS HC A05/MF A01 CSCL 12B

A methodology for performing fault tolerant system reliability analysis is presented. The method decomposes a system into its subsystems, evaluates vent rates derived from the subsystem's conditional state probability vector and incorporates those results into a hierarchical Markov model of the system. This is done in a manner that addresses failure sequence dependence associated with the system's redundancy management strategy. The method is derived for application to a specific system definition. Results are presented that compare the hierarchical model's unreliability prediction to that of a more complicated tandard Markov model of the system. The results for the example given indicate that the hierarchical method predicts system unreliability to a desirable level of accuracy while achieving significant computational savings relative to component level Markov model of the system. Author

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-22252# Georgia Univ., Athens. Dept. of Chemistry.
THE ROLE OF THE TOPOLOGICAL DISTANCE MATRIX IN CHEMISTRY
D. H. Rouvray 16 Dec. 1985 14 p
(Contract N00014-85-K-0365)
(AD-A162523; TR-11) Avail: NTIS HC A02/MF A01 CSCL 12/1

The mathematical properties of the topological distance matrix are briefly surveyed and the numerous applications of this matrix to various branches of chemistry are then described. A detailed discussion is devoted to the Wiener index, defined as one half the sum of the entries in the distance matrix. This index has proved to be one of the most valuable topological indices in several different chemical contexts. GRA

N86-22253# Tilburg Univ. (Netherlands). Dept. of Economics.
ON MEASURES OF NONNORMALITY OF MATRICES
L. Elsner (Bielefeld Univ., West Germany) and M. H. C. Paardekooper Dec. 1984 29 p refs
(FEW-167) Avail: NTIS HC A03/MF A01

Nine measures of nonnormality of matrices and their interactions are discussed. The fact that a matrix is normal if and only if the matrix has a measure zero for each nonnegative measure is proved. This method is related to the behavior of the eigenvalue algorithms for normal and nonnormal matrices. Measures for numerical analysis of eigenvalue algorithms are introduced.
Author (ESA)

N86-22120# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
RECENT PROGRESS ON THE NUMERICAL VERIFICATION OF THE RIEMANN HYPOTHESIS
J. vandeLune and H. J. J. teRiele *In its* CWI Newsletter, No. 2, March 1984 Mar. 1984 p 35-37 refs (For primary document see N86-22117 12-59)
Avail: NTIS HC A04/MF A01

N86-22123# Amsterdam Univ. (Netherlands).
SET THEORY AND TOPOLOGY
Jan vanMill *In* CWI CWI Newsletter, No. 7, June 1985 Jun. 1985 p 10-14 refs (For primary document see N86-22121 12-59)
Avail: NTIS HC A03/MF A01

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-22254# Joint Publications Research Service, Arlington, Va.
USSR REPORT: PHYSICS AND MATHEMATICS Abstracts Only
5 Feb. 1986 69 p Transl. into ENGLISH from various Russian articles
(JPRS-UPM-86-003) Avail: NTIS HC A04

Numerous topics in physics and mathematics are discussed. Laser modulation, numerical analysis on nonequilibrium flow about an airfoil in thin shock layer approximation, the kinetics of molecular nitrogen, and the nonlinear properties of superconducting point contacts are among the topics discussed. For individual titles, see N86-22255 through N86-22299.

N86-22255# Joint Publications Research Service, Arlington, Va.
BRANCHES OF ACOUSTIC OSCILLATIONS OF A GAS INTERACTING IN RESONANCE WITH LIGHT Abstract Only c71
F. Kh. Gelmukhanov and L. V. Ilichev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 1 Transl. into ENGLISH from Zhurnal Eksperimentalnoy i Theoreticheskoy Fiziki (Moscow, USSR), v. 88, no. 3, Mar. 1985 p 733-740 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The influence of light pressure, light-induced drift, and related effects on branches of acoustic oscillations of a gas in a radiation field is investigated. The role of light pressure in forming the acoustic oscillation spectrum is investigated in pure form by disregarding light induced drift and related effects. The effect of light induced drift on oscillations is then investigated by disregarding the recoil effect. The propagation frequencies and velocities of acoustic oscillations are estimated. It is found that the frequency of acoustic oscillations caused by the recoil effect is 1,000 sec(-1). The radiation-induced pressure tensor and heat flux result in two additional oscillation branches.
Author

N86-22256# Joint Publications Research Service, Arlington, Va.
MODULATION OF IR LASERS BY SEMICONDUCTING PLASMA Abstract Only c76
L. I. Berezhinskiy and A. I. Liptuga *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 2 Transl. into ENGLISH from Kvantovaya Elektronika (Kiev, USSR), v. 27, Oct. 1984 p 50-54 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The properties are investigated of a semiconductor modulator employing a nonequilibrium plasma stimulated by hybrid electrical and magnetic fields. An InSb crystal is investigated in hybrid fields at 195 and 300 K, and exhibits the voltage-current characteristics of a rectifier diode, indicating an unsteady total number of carriers in the crystal. It is found that significant surface enrichment can be achieved by using hybrid fields. It is found possible to modulate the radiation with a modulation coefficient the order of 80% and speed of 0.00000001 seconds by controlling the concentration of the electron-hole plasma on an InSb surface. The region of wavelengths that can be modulated is determined by the limits of variation of the carrier concentration on the reflecting facet of the crystal. The method provides better speed, lower electrical field control voltages, and a wider spectral range of wavelengths that can be modulated than do other approaches.
Author

N86-22257# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF EFFECT OF REPEATED LASER IRRADIATION ON ACTIVE LASER GLASSES Abstract Only c27
R. I. Andreeva, A. P. Kalagin, V. N. Nikolaev, and G. N. Toropkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 3 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 14-17 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The occurrence and principles of defect accumulation in glasses with different bases are investigated. Experimental data on the time elapsed prior to breakdown for different laser radiation densities is analyzed. A single-mode single-frequency Q-modulated laser was employed to irradiate silicate and phosphate Nd3+ activated glasses. The accumulation and breakdown processes were found to occur on defects with different laser defect thresholds. The characteristics of the phosphate and silicate-based glasses examined are indistinguishable. The time elapsed prior to breakdown in glass subjected to repeated laser radiation is described by a log-normal distribution.
Author

N86-22258# Joint Publications Research Service, Arlington, Va.
NUMERICAL ANALYSIS OF NONEQUILIBRIUM FLOW ABOUT AIRFOIL IN THIN SHOCK LAYER APPROXIMATION Abstract Only c02
V. N. Golubkin and V. V. Negoda *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 5 Transl. into ENGLISH from Zhurnal Vychislitelnoy Matematiki i Matematicheskoy Fiziki (Moscow, USSR), v. 25, no. 4, Apr. 1985 p 599-608 Original language document was announced in IAA as A85-33593 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

An efficient method is presented for solving nonlinear equations for a thin nonequilibrium shock layer on a low-aspect-ratio wing in hypersonic gas flow. The effect of the nonequilibrium of three-dimensional flow on the shape of the shock wave attached to the leading edge, pressure distribution, and the force and moment characteristics of the wing is discussed. Results of numerical calculations are presented.
V.L.

N86-22259# Joint Publications Research Service, Arlington, Va.
NUMERICAL SOLUTION OF PROBLEM ON DECAY OF HIGH-TEMPERATURE REGION OF RADIATING GAS WITH VARIOUS INITIAL INTERNAL ENERGY DISTRIBUTIONS Abstract Only c34
V. P. Korobeynikov, B. V. Putyatin, and A. K. Sharipov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 6 Transl. into ENGLISH from Doklady Akademii Nauk Tadzhikskoy SSR (Dushanbe, USSR), v. 27, no. 11, Nov. 1984 p 633-636 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The decay of the high temperature region of a radiating gas is investigated as a problem which models the process independently of the nature of the energy release source. Radiation

gas dynamic equations are integrated numerically. Model step functions of the thermodynamic parameters are used for the coefficient of absorption and the radiation source function. Examples of the space-time distribution of the gas characteristics are presented. It is found analytically that the solutions to the problem for different types of initial internal energy distributions are practically the same when the dimensions of the heat release region are small enough. The role of the initial perturbation forms on the nature of the solution is examined. Author

N86-22260# Joint Publications Research Service, Arlington, Va.
SHOCKWAVE PROPAGATION IN LOW-TEMPERATURE CARBON PLASMA Abstract Only c34
A. M. Galkin, N. N. Sysoev, and F. V. Shugaev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 7 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta Seriya 3: Fizika Astronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1985 p 77-80 Original language document was announced in IAA as A85-37374 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The propagation of plane and spherical shock waves through the low-temperature plasma of a laser jet was investigated experimentally using a shock tube of a square (28.5 x 28.5 mm) cross-section. The Mach number of the nonturbulent shock wave varied from 1.2 to 6; the initial pressure in the test section of the shock tube was 5 to 50 kPa. It is found that in a plasma, the shock wave front breaks down into layers and then disappears. V.L. (IAA)

N86-22261# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF EFFICIENCY OF UTILIZING ALPHA-RADIATION TO PRE-IONIZE THE WORKING MIXTURE IN GAS DISCHARGE LASERS AND AMPLIFIERS Abstract Only c36
N. G. Basov, V. A. Danilychev, V. N. Koterov, S. G. Perlov, T. M. Plyshevskaya, and A. M. Soroka *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 8 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 5, Apr. 1985 p 1106-1110 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The spatial distribution of the laser mixture ionization rate by alpha-particles from a radioactive isotope layer is investigated. Conditions are identified under which the homogeneity of ionization by alpha-particles is as good as for electron ionization. The possibility of using electroionization excitation, in which the conductivity of the discharge plasma is maintained only by the external ionization source, is discussed. A discharge interval formed by two flat electrodes is analyzed as an example, assuming that the alpha-radioactive preparate is applied directly to both electrodes. The volumetric frequency of the gas ionization achieved near the electrodes, and the degree of inhomogeneity of the ionization frequency, are investigated as a function of the width of the discharge interval. The volumetric ionization frequency must be ncreased by approximately two orders of magnitude in order to employ electrode ionization excitation, which can be done by using alpha-radioactive isotopes with lifetimes of approximately one year. Author

N86-22262# Joint Publications Research Service, Arlington, Va.
FUTURE POSSIBILITIES OF FREE-ELECTRON LASER Abstract Only c36
A. N. Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 9 Transl. into ENGLISH from Priroda (Moscow, USSR), no. 9, Sep. 1984 p 28-36 Original language document was announced in IAA as A85-14873 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The principle of operation of free-electron lasers, their limitations, and the physical and engineering problems involved in the implementation of such lasers are reviewed. The discussion covers the principle of synchronism, induced emission of a system of electrons, undulators, and the feedback problem. Attention is also given to the efficiency of free-electron lasers and acceleration problems. V.L. (IAA)

N86-22263# Joint Publications Research Service, Arlington, Va.
NEW FINDINGS ON CREATION OF POWERFUL TUNABLE SUBPICOSECOND SOLID-STATE LASERS Abstract Only c36
V. Vasilyauskas, A. Piskarskas, V. Sirutkaitis, A. Stabinis, and A. Yankauskas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 10 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 3, Mar. 1985 p 493-499 Original language document was announced in IAA as A85-31861 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Pulse compression during the parametric interaction of light pulses in media with a quadratic nonlinearity under conditions of strong energy exchange and dispersive spread is investigated numerically. Experimental results are then presented on the phase modulation of the emission of superluminescent picosecond parametric light generators, in particular, a parametric light generator based on a LiNBO3 crystal. V.L. (IAA)

N86-22264# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF ELECTROMAGNETIC WAVE AND WIGGLER FIELDS INHOMOGENEITY ON A FREE-ELECTRON LASER Abstract Only c36
A. V. Serov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 11 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 516-521 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The influence of cross-sectional wave and undulator fields inhomogeneity on the particle dynamics and gain of free-electron lasers is investigated. A new operating mode is examined in which either the transverse velocities of the beam particles, or their transverse coordinates, are modulated to the frequency of the amplified wave prior to injection into the undulator. The efficiency of electron energy conversion to radiation is investigated when the initial conditions for electron injection into the laser undulator are modulated. Modulation of the initial injection conditions makes it possible to exploit the value difference between the fields interacting with the accelerated and retarded particles, in order to increase average beam energy losses. Author

N86-22265# Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSE DEPENDENT DISCHARGE ON RELAXING GAS FLOW Abstract Only c36
V. A. Levin, V. V. Netesov, and Yu. V. Tunik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 12 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 540-545 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

A dependent-discharge CO2 electroionization laser is examined. A system of gas dynamic equations is augmented with vibrational kinetic equations (equations that allow for the interaction of the discharge with a gas stream) and an equation for the radiation intensity. The influence of gas dynamic processes on the characteristics of an electric discharge CO2 laser is examined on the basis of a one-dimensional model. The influence of gas dynamic perturbations occurring in the discharge chamber, and of heating of the medium, on the output power in the pulsed and pulse-periodic modes is investigated analytically. The optimum pulse repetition frequency is found for different energy contributions to the discharge. Author

N86-22266# Joint Publications Research Service, Arlington, Va.
IGLAN-3 MULTIBEAM CW GAS-DISCHARGE CO2 LASER Abstract Only c36
G. I. Kozlov and V. A. Kuznetsov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 13 Transl. into ENGLISH from Kvantovaya lektronika (Moscow, USSR), v. 12,

no. 3(153), Mar. 1985 p 553-562 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04/MF A01

The IGLAN-3 multibeam laser, a high-power multibeam gas discharge diffusion-cooled system, is examined in detail. The optimum operating conditions are determined by changing sequentially the governing parameters - the composition of the laser mixture, the gas pressure, and the discharge characteristics. The optical properties of the active medium are investigated. The divergence of the output radiation and the intensity distribution in the focused beam are measured. Although the intensity is somewhat irregular over the cross-section of the beam since the different channels operate slightly differently, the intensity distribution is found to be sufficient for technological heat-treatment, surface doping, melting, and other processes. Author

N86-22267# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF ELECTROIONIZATION PULSED CARBON DIOXIDE ISOTOPE OUTPUT CHARACTERISTICS Abstract Only c36
S. V. Bardakovskiy, N. M. Bladimirova, P. V. Sarubin, V. G. Lyakishev, A. A. Kholodilov, V. M. Tsarev, and N. V. Cheburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 14 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 622-624 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The efficiency and spectral composition of radiation from a pulsed electroionization laser operating at atmospheric pressure in which the working mixture contains the carbon dioxide isotopes 12C16O2, 13C16O2, and 12C18O2 are investigated experimentally. Lasing with 13C16O2 occurs simultaneously on five vibrational-rotational transistions, while with 12C18O2 it occurs on one transition. The operating efficiency is close to that of an ordinary 12C16O2 laser, with the energy contribution determined by the presence of impurities in the working mixture. Author

N86-22268# Joint Publications Research Service, Arlington, Va.
HYSTERESIS EFFECTS IN Ar+ LASER WITH NONLINEAR ABSORBER IN THE CAVITY Abstract Only c36
Kh. G. Gafurov and D. P. Krindach *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 15 Transl. into ENGLISH from Kvantovaya Elektronika Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 625-627 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The nature of hysteresis phenomena in the lasing power near the threshold is discussed for a passive mode-locked Ar+ laser. The system in question employs a GL-301 gas discharge tube as the amplifying element, and a tube with a 15-cm discharge length as the absorbing element. Hysteresis is to be found to be associated essentially with those active medium saturated processes that govern passive mode-locked laser with the same characteristic time relationship as the Ar+ laser. Author

N86-22269# Joint Publications Research Service, Arlington, Va.
LASING OF XeCl, Xe AND KrF EXCIMER MOLECULES IN TWO-COMPONENT MIXTURES Abstract Only c36
N. G. Zubrilin, A. I. Milanich, M. P. Chernomorets, and S. V. Yurchuk *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 16 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 643-644 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Fast-discharge lasing in dual-component mixtures is achieved in a system with a 30-cm chamber and external cavity. Lasing is obtained on XeCl, XeF, and KrF molecules in mixtures with no buffer gas. The investigation of lasing and dual-component mixtures excited by a fast discharge makes it possible to establish the parameters of the processes which lead to the formation of excimer molecules and to understand better the role of the buffer gas in the active medium of excimer lasers. Author

N86-22270# Joint Publications Research Service, Arlington, Va.
HIGH-POWER CO2 ELECTRIC DISCHARGE LASER WITH EASILY IONIZED SUBSTANCES ADDED Abstract Only c36
V. V. Apollonov, Yu. M. Vaskovskiy, M. I. Zhavoronkov, A. M. Prokhorov, R. Ye. Rovinskiy, V. Ye. Rogalin, N. D. Ustinov, K. N. Firsov, I. S. Tsenina, and V. A. Yamshchikov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 5-9 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Optimization of the parameters of a transverse-discharge CO2 laser as described in a previous study by the authors is investigated. The output characteristics of the laser are optimized by investigating the radiated energy as a function of the length of the active medium as well as the coefficient of reflection of the exit mirror. It is found that by selecting the easily ionized substances and pumping mode properly, and optimizing the cavity, it is possible to obtain efficiencies and unit energy yields from an externally-driven O2 laser that are as good as those of corresponding electroionization systems. The laser used in the study employs an extremely compact electrode design, and requires no low-inductance capacitors in the pumping circuit. Specific output energy of 51 J/1 and electric energy-to-light conversion efficiency of 22% are achieved. Author

N86-22271# Joint Publications Research Service, Arlington, Va.
GENERATION OF PICOSECOND PULSES IN MONOPULSE-PUMPED DYE LASERS Abstract Only c36
K. D. Yegorov, V. M. Petnikova, S. A. Pleshanov, and V. V. Shuvalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 18 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 41-47 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Stimulated emission of radiation by thin cavity cuvettes and laser systems consisting of such a cuvette and an external dispersion cavity is investigated. Four different stages are identified in the development of stimulated emission: the formation of inverse population, linear amplification of spontaneous noise, nonlinear amplification with the formation of a time pulse envelope, and decay of the residual inverse population. An experimental setup employing a YAG passive Q-locked laser with a repetition frequency less than 3 Hz is described. The dynamics of stimulated emission was shown to agree exactly with the results of the numerical experiment. Spectrally limited pulses 3.5 picoseconds long are produced. Author

N86-22272# Joint Publications Research Service, Arlington, Va.
SPATIAL, TEMPORAL AND ENERGY CHARACTERISTICS OF COPPER-VAPOR LASER RADIATION Abstract Only c36
V. P. Belyayev, V. V. Zubov, A. A. Isayev, N. A. Lyabin, Yu. F. Sobolyev, and A. D. Chursin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 19 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 74-79 Original language document was announced in IAA as A85-26231 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

An analysis is made of the radiation characteristics of a copper-vapor laser in the superradiance regime with stable (planar-spherical) and unstable (telescopic) resonators. The total mean radiation power with a planar-spherical resonator was 26 W(52 percent at the green line), including the 3-W background radiation. With a telescopic resonator with a gain of = 200, the total mean radiation power was 18 W, including 10 W for the beam with diffraction divergence. An increase of the radiation power in the diffraction beam to 30-35 W was achieved through the use of a similar active element as an amplifier. L.T. (IAA)

N86-22273# Joint Publications Research Service, Arlington, Va.
COMPARATIVE ANALYSIS OF OPTICALLY AND ELECTRONICALLY PUMPED BROADBAND EXCIMER LASERS Abstract

Only c36
G. Marovski, A. V. Kanayev, L. D. Mikheyev, and D. B. Stavroskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 20 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 180-183 Original language document was announced in IAA as A85-26240 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

A comparison is made of optically pumped and electro-beam-pumped lasers based on three-atom excimers and C-A transition of the XeF excimer. The parameters under consideration are the small-signal gain, absorption losses, and energy characteristics. The electron-beam-pumped laser exhibited gain factors larger by an order of magnitude than those observed in the optically pumped laser, making it theoretically possible to maintain a periodic-pulse regime with a much higher pulse repetition rate. The optically pumped laser, however, exhibited lower absorption.
L.T. (IAA)

N86-22274# Joint Publications Research Service, Arlington, Va.
SINGLE-FREQUENCY CW LASING IN INJECTION LASER BASED ON TERRACED HETEROSTRUCTURE WITH EXTERNAL DISPERSION CAVITY Abstract Only c36
A. P. Bogatov, I. C. Goldobin, P. G. Yeliseyev, O. G. Okhotnikov, G. T. Pak, M. P. Rakhvalskiy, Ye. G. Faynboym, and K. A. Khayretdinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM86-003) 5 Feb. 1986 p 21 Transl. into ENGLISH from KVantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 162-164 Original language document was announced in IAA as A85-26237 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

A laser diode with a terrace-type active region is used as an active medium in a laser with external dispersion resonator to obtain CW single-frequency radiation of 35 mW at room temperature. It is noted that no multimode oscillation mechanism associated with deformation of the electronic spectrum in the semiconductor was observed up to intensities of 1.7 x 10 to the 7th W/sq cm. due to the relatively high output power (tens of mW), narrow oscillation line, and spectral tunability, this class of lasers is suggested to be suitable for application in nonlinear spectroscopy of superhigh resolution and coherent optical communications.
L.T. (IAA)

N86-22275# Joint Publications Research Service, Arlington, Va.
WAVELENGTH SWITCHING IN COPPER-VAPOR LASERS Abstract Only c36
S. A. Zenchenko, V. I. Ivanov, I. A. Malevich, and S. F. Shulekin N its USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 22 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 196-197 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The preliminary results of an investigation of the emission modes of copper vapor lasers employing an intra-cavity anisotropic filter consisting of polarization filters with parallel transmission axes that are separated by crystalline quartz plates set at the Brewste. angle are presented. The use of this birefringent filter for switching the lasing wavelength is described. It is found that the use of a simple birefringent filter makes it possible to switch wavelengths, which expands the area of application of copper vapor lasers. Eliminating the exit polarization filter can also make it possible to control the polarization characteristics of the radiation. Author

N86-22276# Joint Publications Research Service, Arlington, Va.
H2/F2 CHEMICAL LASER INITIATED BY EXCIMER FLASHLAMP Abstract Only c36
Ye. V. Gordon, V. I. Matyushenko, V. S. Pavlenko, and V. D. Sizov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 23 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 220-223 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The results of an investigation of a H2/F2 chemical laser built by the authors that is initiated by an excimer flashlamp are discussed. The lasing energy of the HF laser and the UV luminescence of the excimer flashlamp are investigated as a function of the composition and pressure of the mixture in the lamp chamber and the charge voltage of the power supply. Suppression of the superluminscence of the flashlamp, which is necessary for the chemical laser to work, is discussed. The technical efficiency of the flashlamp is estimated at approximately 5%, which is 10 times greater than that of the excimer laser on which it is based. The possibility of increasing the efficiency of chemical lasers initiated by achieving a mode in which the formation of the excimer molecules and vibrational excited HF molecules coincides in space is discussed. Author

N86-22277# Joint Publications Research Service, Arlington, Va.
YAG:Er3+ CROSS-RELAXATION LASER Thesis - USSR Academy of Sciences, 1984 Abstract Only c36
Vladimir Andreyevich Lobachev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 24 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The ion-ion tranfer of excitation energy (cross-relaxation) in (Y, Er)3Al5O12 crystals is investigated experimentally. The influence of cross-relaxation on inversion formation and the lasing of a YAG:Er(3+) laser is investigated. The excitation conditions and modes for a YAG:Er(3+) laser are selected, and the lasing characteristics are studied. The mechanisms underlying the formation of inverse population of the 4 I 11/2 - 4 I ion of ER(3+) in yttrium-aluminum garnet crystals is explained. Relaxation of the excitation nergy from the S sub 3/2 level is found to be governed by a cross-relaxation mechanism. Kinetic equations comosed to allow for cross-relaxation processes are used to analyze laser operation. A YAG:Er(3+) cross-relaxation laser with good energy characteristics with free lasing efficiency of about 1.5% and differential efficiency of about 3%, producing output energy of up to 6 J, is described. Author

N86-22278# Joint Publications Research Service, Arlington, Va.
NONEQUILIBRIUM EFFECTS AND STRUCTURE OF X-RAY LINES IN TOKAMAK PLASMA Abstract Only c75
V. G. Gontis and V. S. Lisitsa *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 25-26 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 438-492 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The sensitivity of X-ray spectra to a number of typical non-equilibrium effects occurring in modern tokamaks is examined. Experimental data from the T-10 and ST tokamaks are cited to illustrate the degree of deviation from coronal equilibrium. The analysis exploits recent atomic data for radiation and autoionization line widths; standard semiempirical formulas are used to calculate the rates of collision processes. Ion diffusion and impurity distribution by degrees of ionization are investigated. The sensitivity of K radiation to electron nonequilibrium and ion charge exchange is examined. Author

N86-22279# Joint Publications Research Service, Arlington, Va.
STUDY OF THE KINETICS OF MOLECULAR NITROGEN BY THE METHOD OF WIDE-BAND COHERENT ANTISTOKES SCATTERING OF LIGHT Abstract Only c74
A. A. Devyatov, S. A. Dolenko, and N. N. Roy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 27 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 6, Apr. 1985 p 1355-1359 Original language document was announced in IAA as A85-35876 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The broadband version of coherent anti-Stokes Raman spectroscopy (CARS) has been used for probing nitrogen atoms vibrationally excited by a self-maintained pulsed discharge. New data on the form of the vibrational population distribution function in post-discharge nitrogen are presented, and the kinetics of the

function is investigated. The sensitivity limit of the CARS spectrometer used in the study is 10 to the 17th nitrogen molecules in the ground state per cu cm. V.L. (IAA)

N86-22280# Joint Publications Research Service, Arlington, Va.
NONLINEAR OPTICAL SPECTROSCOPY OF PHONON POLARITONS Thesis - USSR Academy of Sciences Abstract Only c74

Yuriy Nikolayevich Polivanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 28 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The physical mechanisms, singularities, and general principles of Raman scattering, coherent anti-Stokes scattering, and two-photon combination scattering of light on polaritons are established and investigated experimentally. New spectroscopic methods are developed based on these processes or solving problems in quantum electronics and solid state physics. It is found that two-photon scattering can be used to investigate polaritons of the upper dispersion branches in optically isotropic media. The characteristics and regularities of the scattering spectra of uniaxial and bi-axial polyatomic crystals are interpreted. The singularities occuring in the spectra of Raman scattered light on polaritons are studied experimentally. The interference of direct four-photon and cascaded three-photon processes in the anti-Stokes spectra of crystals without centers of symmetry is detected. Author

N86-22281# Joint Publications Research Service, Arlington, Va.
DIAGNOSIS OF POPULATIONS AND RELAXATION PROCESSES OF VIBRATIONAL AND ROTATIONAL STATES OF MOLEUCLES IN GASES BY COHERENT ANTI-STOKES SCATTERING SPECTROSCOPY Thesis - USSR Academiy of Sciences Abstract Only c74

Viktor Immanuilovich Fabelinskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 29 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Coherent anti-Stokes scattering spectroscopy is employed to investigate spectral line contours and to measures the rotational relaxation times in molecular gases by measuring line widths as a function of pressure. The molecule distribution functions are investigated at vibrational and rotational states in non-equilibrium and equilibrium excited gas systems; the influence of the gas temperature and pressure on the form of the coherent anti-Stokes spectra is studied. The velocity constants of the intra-mode resonant exchange of vibrational energy in gases are measured by the dynamics of the line intensities in the Stokes spectra. The gases in question, acetylene and nitrogen, are investigated by means of a pulse spectrometer with resolution of 0.2 cm(-1) and sensitivity of approximately 10 14 molecules per cubic centimeter. Author

N86-22282# Joint Publications Research Service, Arlington, Va.
INTENSE BEAMS OF COLD ATOMS FOR LASER SPECTROSCOPY Abstract Only c74

V. I. Balykin, V. C. Letokhov, V. G. Minogin, and A. I. Sidorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 30 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), vol. 49, no. 3, Mar.1985 p 479-486 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Longitudinal cooling of beams of atoms by extended interaction with strong laser radiation is examined. An experimental set-up is described in which a narrow beam of atoms is irradiated by a counter-propagating light beam in resonance with the 3(2)S sub 1/2 -3(2)P sub 3/2 transition of the sodium atom. The longitudinal velocity distribution is recorded by a second laser probe beam which intersects the atom beam at a slight angle at the end of the zone of interaction with the strong beam. Optimum conditions are defined for the configuration of the laser beam, and for the time and length of interaction, to ensure a low effective atom beam temperature with high intensity. Transverse cooling of atom beams by radiation collimation is described. It is estimated that the atom density can be increased significantly, and atom beams with the smallest possible transverse temperature can be obtained, by using a large collimator or a retarded atom beam. The ability to obtain intense atom beams at low temperature makes it possible to use cold atoms in precision spectroscopy. Author

N86-22283# Joint Publications Research Service, Arlington, Va.
DIFFRACTION EFFICIENCY OF HOLOGRAPHIC GRATINGS WITH SYMMETRICAL PROFILES Abstract Only c74

L. A. Dmitrieva, I. V. Golubenko, and G. M. Savitskin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 31 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 4-6 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The diffraction properties of holographic reflecting diffraction gratings are examined. An approximation for infinite conductivity is used based on a sufficiently accurate and simple numerical method which uses integral equations to solve problems of electromagnetic waveguide splitting by a reflecting grating of arbitrary profile. The optimum channel depth for different profiles is analyzed. The preferable profile for different fixed channel depth and the preferable symmetrical profile for obtaining the best efficiency are studied. The diffraction efficiency is examined as a function of the light wavelength, with one of the diffraction harmonics propagating in the opposite direction of the incident light. The best diffraction efficiency is obtained by using a grating profile with elongated peaks, smooth bottoms, and channel depth not exceeding 0.4. Profiles with smooth peaks are found to be superior to pointed peaks for h/d=0.2. Author

N86-22284# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF OPTICAL INHOMOGENEITY OF CYLINDRICAL BODIES BY LIGHT BEAM DEFLECTION Abstract Only c74

Kh. K. Aben, S. I. Idnurm, Yu. I. Iozepson, M. S. Kaplan, and S. A. Malinovskaya *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 32 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 7-9 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

A simple method is examined for studying the optical inhomogeneity of cylindrical bodies based on measuring the deflection of a laser beam. The radial distribution and axial gradient of the index of refraction are found. A method is proposed for interpreting experimental data when a caustic appears. The concepts of isotropic (scalar) and anisotropic (tensor) optical inhomogeneities are introduced in order to distinguish between optical inhomogeneity with and without birefringence. The optical inhomogeneity of a polymethylmethacrylate cylinder is investgated. Author

N86-22285# Joint Publications Research Service, Arlington, Va.
ENHANCING EFFICIENCY OF ATOM IONIZATION BY PULSED PERIODIC LASERS Abstract Only c74

S. V. Andreev, V. I. Minshin, and S. K. Sekatskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 33 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 611-614 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The possibility is investigated of improving particle trapping efficiency by laser resonant atom photionization using pulsed laser radiation with a high relative pulse duration. Photoionization of atoms in a closed cavity by laser radiation input to the cavity through a small opening in the wall is examined. Each atom within the cavity either falls within the zone of the laser beam when radiation occurs and is ionized, or it exits through the opening in the cavity wall and is lost. The cavity geometry can be selected to provide capture efficiency exceeding 50% for real radiation parameters (pulse duration up to 15 nsec, and 10 kHz repetition

frequency). This method may provide highly effective for ionizing atoms through Rydberg states, in which case the extracting voltage can also serve to ionize atoms already excited to higher Rydberg states. Author

N86-22286# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF COMPENSATING SMALL-SCALE INHOMOGENEITIES BY A ZERNIKE CELL Abstract Only c74
V. Ye. Sherstebitov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 34 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 91-95 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

A wavefront conjugating mirror based on a Zernicke cell containing no nonlinear elements is examined theoretically. The scheme incorporates a flat mirror and two identical co-focal objectives that implement the Zernike phase contrast method except that the radiation passes twice: once in each direction. The wavefront conjugation distortions are found to be small for the B variation range of interest if the ratio of the characteristics beam dimensions at the input to that of the period of spatial phase fluctuations of the wavefront is greater than 3 to 3.5. This scheme for correcting small scale distortions is advantageous in that the coefficient of reflection of the wavefront conjugation mirror is near unity, and is independent of the operating mode laser (continuously repulsed) and of the radiation spectral composition to some extent. Author

N86-22287# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF UNIVERSAL INTRAMOLECULAR INTERACTIONS ON LASER RADIATION FROM OXAZINE 17 Abstract Only c74
N. V. Korolkova, N. V. Kurokhtin, and B. M. Uzhinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 35 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 96-98 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

This study investigates the influence of intramolecular actions of a universal nature on the luminescence and laser emission of oxazine 17 (a highly efficient working substances that lases in the 600 to 700 nm region) to identify the conditions under which maximum lasing efficiency can be achieved. Oxazine 17 solutions in polar aprotic solvents are found to provide the test lasing efficiency. The lasing and fluorescence spectral maxima in polar solvents are practically identical; the wavelengths of the former are longer in nonpolar solvents. Author

N86-22288# Joint Publications Research Service, Arlington, Va.
RADIATION FOCUSING BY PRISM RASTER Abstract Only c74
A. S. Dementyev and D. P. Domarkene *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 36 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 197-201 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

This study describes the focusing properties of a prism raster, which consists of two crossed sets of prisms having the profile of a polyhedron scribed in a circle. The focusing properties are investigated with the help of the Rayleigh approximation. The transmission function of the raster is derived by approximating the arc of the circle by the corresponding polyhedron. Hot spots, or intensity spikes, are detected in the radiation focused by the prism raster that result from interference of the coherent radiation that is diffracted on different prisms. This means that the use of prism rasters alone for highly coherent radiation is insufficient for obtaining near-uniform intensity distribution in the focal plane. Author

N86-22289# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF FLUORESCENCE KINETICS OF DYES BY PARAMETRIC FREQUENCY CONVERSION Abstract Only c74
S. A. Pleshanov and V. V. Shuvalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 37 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta Seriya 3: Fizika Astronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1985 p 63-66 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The fluorescence dynamics of solutions of organic dyes is investgated using a set-up based on a passive mode-locked YAG laser. The arrangement and calibration of the experimental system are described in detail. The logarithm of the energy of the converted radiation is measured as a function of he delay between the excitation pulses and the pumping pulses. The electron excitation decay time for RB dye was 1.8 plus or minus .2 nsec, and the dipole moment rotation time is 320 plus or minus 3 psec. The method is accurate, and can be used in any spectral band, making it useful in picosecond spectroscopy of condensed media. Author

N86-22290# Joint Publications Research Service, Arlington, Va.
SLOW COMBUSTION OF LASER PLASMA AND OPTICAL CHARGES Thesis - USSR Academy of Sciences, 1984 Abstract Only c75
Vadim Borisovich Fedorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 39-40 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Laser plasma is investigated in the region of moderate lasing intensities, where the electron heating rate in the radiation field is usually slower than the rate At which electrons lose energy, and the electron-ion relaxation rate. Slow laser plasma combustion is detected, in which an optical discharge plasma is maintained at minimum threshold intensity levels for the optical band, with subsonic propagation of the plasma and thermal ionization of the matter a the front of the dicharge in the maintaining radiation field. the process of subsonic propagation of a slow combustion wave of laser plasma is interpreted theoretically. Steady-state unidimensional propagation of a plane wavefront in a collimated laser beam is achieved, and new methods are developed for diagnosing gas motion in the region of subsonic optical discharge. A new method is developed for diagnosing a hot gas (plasma) on a target by measuring the parameters of the plasma near the front of the shockwave. A neodymium glass laser is developed which employs reflecting plasma as a nonlinear mirror in the optical cavity, and also as an optical shutter. Author

N86-22291# Joint Publications Research Service, Arlington, Va.
SPECTROSCOPY OF LABORATORY AND SPACE PLASMA WITH OSCILLATING ELECTRICAL FIELDS Thesis - USSR Academy of Sciences, 1984 Abstract Only c75
Evgeniy Aleksandrovich Oks *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 40 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The spontaneous emission spectra of atoms and ions interacting with oscillating electrical fields in a plasma medium are investigated theoretically. The use of these phenomena for plasma diagnosis under specific laboratory and space conditions is examined. The I (delta omega) contours of the emitted lines are investigated as a function of the electrical field parameters (the amplitude, the position of the maximum and widths of the frequency spectrum, the degree of elipticity or degree of spatial anisotropy), and of the plasma medium parameters (the electron concentration and temperature, the ion temperature, and the atom temperature). A theory is developed to explain broadening of atom and ion spectral lines in a plasma caused by two types of intra-plasma electrical fields simultaneously: quasimonochromatic and wideband. The simultaneous effect of the latter two types of fields on a coulomb radiator is investigated. A new nonlinear optical effect called dynamic resonance is detected. A nonlinear theory for plasma and laser satellites of spectral lins in homogeneous and inhomogeneous plasma is developed. The plasma diagnostic

methods developed are applied under laboratory conditions. A search program for oscillating electrical fields in space plasma is developed theoretically and carried out. Author

N86-22292# Joint Publications Research Service, Arlington, Va.
EQUILIBRIUM STATES OF CHARGED ELECTRON BEAMS AND SPACE CHARGE COMPENSATION PROCESSES Thesis - USSR Academy of Sciences, 1984 Abstract Only c75
Vladimir Alekseyevich Malafayev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The equilibrium states and stability of a nonrelativistic electron beam in an external longitudinal magnetic field are investigated theoretically and experimentally. Possible equilibrium states of the electron beam with arbitrary cathode shielding is analyzed theoretically, and the theory is tested experimentally for the case of strong magnetic fields. The formation of a virtual cathode in the region in which the beam engers drift space is studied experimentally, as are the processes of compensation and stability of the quasi-steady-state of the beam. Three characteristic equilibrium regions with different geometric dimensions and beam energy characteristics are found. Extremal currents occur for a fixed magnetic field and fixed beam radiants, that increase in values as the magnetic field becomes weaker and the cathode shielding becomes greater. The branch of the state diagram orresponding to high kinetic energy is found to be stable. Instability occurs within the ionization time at low pressures, resulting in azimuthally inhomogeneous beam structure. Author

N86-22293# Joint Publications Research Service, Arlington, Va.
ESTIMATES OF PARAMETERS OF HOT ELECTRONS DURING BEAM HEATING OF PLASMA IN A MAGNETIC FIELD Abstract Only c75
B. N. Breyzman and V. I. Yerofeev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 42 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 387-393 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The dynamics of high-energy electrons formed in Langmuir turbulence and excited in a plasma by a relativistic electron beam is examined. The density perturbations that cause waves to move from one region of the phase space to another, and to maintain balance between pumping and attenuation, are assumed to be generated by the high frequency pressure of the Langmuir waves themselves. A kinetic equation is derived for the excitation, attenuation, and elastic scattering of Langmuir waves. The concentration and characteristic energy of the hot electrons is found within the framework of the proposed model. The estimates are compared with the results of experiments conducted on the INAR and GOL-1 installations. Author

N86-22294# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL KINETIC MODEL OF HYDROGEN MACRO-PARTICLE EVAPORATION IN A TOKAMAK Abstract Only c75
B. V. Kuteyev, A. P. Umov, and L. D. Tsendin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 43 Transl. into ENGLISH from Fiziki Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 409-416 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The evaporation of a fuel tablet in a plasma with Maxwell electron distribution by energy and angles is investigated. A formula is derived that approximates to within 10% the relationship between the evaporation rate and temperature, plasma density, and macroparticle radius. Most of the heat reaching the tablet is found to come from electrons at the tail of the distribution function with energies of (6 to 8) T sub e. This accounts for the small influence of electrical fields near the surface on the evaporation rate. Experiments on injecting hydrogen macroparticles into a plasma at the T-10 tokamak are described. Author

N86-22295# Joint Publications Research Service, Arlington, Va.
RELATIVISTIC EFFECTS DURING COMPTON INTERACTION OF STRONG ELECTROMAGNETIC RADIATION AND OPTICALLY THIN LAYER OF COLD PLASMA Abstract Only c75
Yu. I. Lysikov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 497-499 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The development of plasma oscillations when a strong electromagnetic radiation flux interacts with an optically thin layer of cold plasmas is analyzed. A hydrodynamic description of the dynamics of a cold two-component (singly-charged ions and electrons) plasma in a strong electromagnetic radiation field with induced Compton quantum scattering by electrons predominating is used in the analysis. Examples of such systems include objects in space, such as the plasma near pulsars and quasars. A one-dimensional case is examined, assuming an initial uniform electron and ion distribution throughout the entire space. A process of exponential growth of plasma oscillations is found analytically. Author

N86-22296# Joint Publications Research Service, Arlington, Va.
PLASMA FLOWS IN DIVERTOR REGIONS OF VINT-20 SINGLE-PASS TORSATRON Abstract Only c75
V. K. Bocharov, Ye. D. Volkov, G. G. Lesnyakov, and V. B. Yuferov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 500-504 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Plasma flows are investigated along and across the helical divertor magnetic slot in a single-pass Torsatron with a spatial magnetic axis and highly inhomogeneous magnetic field along the line of force. Well-formed plasma jets are shown to occur in the regioin behind the separatrix, indicating the fundamental possibility of achieving a divertor configuration. The width of the divertor flows is no more than one twentieth that of the last closed magnetic surface. The plasma flows along the divertor slot increase in magnitude in the direction of the outer part of the torus. Author

N86-22297# Joint Publications Research Service, Arlington, Va.
COLLISION AND RADIATION PROCESSES IN LOW-TEMPERATURE PLASMA INVOLVING HIGHLY EXCITED ATOMIC AND MOLECULAR STATES Thesis - USSR Academy of Sciences, 1984 Abstract Only c75
Vladimir Sergeyeviy Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 46 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

Elementary collision and radiation processes occurring in gas and plasma involving strongly-excited states of atoms, molecules and molecular ions are investigated theoretically. Simple analytical expressions are derived for the possibilities, cross-sections and velocity constants of these processes. A quasi-classical model is proposed that makes possible analytical calculations of the nuclear matrix elements for the dipole moment of diatomic molecules and ions during transitions between states of continuous and discrete spectra close to the dissociation boundary. Inelastic transitions, as well as direct and associative ionization of highly excited atoms caused by collision between a neutral particle and its atomic trunk are analyzed theoretically. The proposed mechanism underlying inelastic transitions is shown to explain experiments on the extinction of NS atomic levels for alkali metals and inert gases. Author

N86-22298# Joint Publications Research Service, Arlington, Va.
PLASMA MECHANISM UNDERLYING HIGH PRESSURE GAS BREAKDOWN Thesis - USSR Academy of Sciences, 1984 Abstract Only c75
Aleksandr Petrovich Broytman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 47 Transl.

into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The breakdown of gases at high pressure (atmospheric or higher) in strong electrical fields - spark or streamer breakdown - is investigated in order to establish the mechanism underlying the formation of streamer breakdown and o create an adequate theoretical model. Streamer breakdown is divided into three stages: in the first, thermal fluctuations of the homogeneous electron background build up over time and cause distortion of the external magnetic field. In the second stage, the electrical field drops due to longitudinal Debye shielding, resulting in abrupt cooling of the electrons and strong recombination. In the third stage, secondary avalanches, which distort the electrical field as they develop, cause a rapid increase in the plasma region near the electrodes, i.e., streamer propagation. The experimentally observed similarity law alpha d approximately 20 is confirmed by the proposed theory. The quantity alpha d is a logarithmic function of the intensity of the external electrical field and the number of initial electrons causing ionization avalanche. Author

N86-22299# Joint Publications Research Service, Arlington, Va.
NONLINEAR PROPERTIES OF SUPERCONDUCTING POINT CONTACTS AND PROSPECTS FOR USE IN QUANTUM ELECTRONICS Abstract Only **c76**
M. V. Danilenko, V. E. Derkach, E. M. Belenov, V. I. Romanenko, and A. V. Uskov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 48 Transl. into ENGLISH from Kvantovaya Elektronika (Kiev, USSR), v. 27, Oct. 1983 p 3-37 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

The nonlinear properties of superconducting point contacts employed in electrodynamic systems, such as resonators or waveguides, are examined. Two cases are investigated: one in which the currents of the superconducting contact interact only with the fields excited by the contact itself in the resonator or waveguide, and one in which microwave and optical radiation are applied simultaneously or alternately to the contact from without. The study is based on Maxwell's equations for an electromagnetic field in a system incorporating a contact, as well as the material equations describing the contact properties. The multiplicative and mixing properties of superconducting point contacts are investigated. The possibility of developing induced radiation sources and frequency synthesizers operating between the microwave and optical bands based on Josephson junctions is investigated. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-22300 Stevens Inst. of Tech., Hoboken, N. J.
STUDIES OF ACOUSTICAL FIELDS GENERATED BY VIBRATING STRUCTURES WITH APPLICATIONS TO NOISE CONTROL BY DESIGN Ph.D. Thesis
Jiann-Kuo Jiang 1985 151 p
Avail: Univ. Microfilms Order No. DA8522788

Machinery noise control problem can generally be classified as noise control at the source, noise control along the path and noise control at the receiver. It is known that noise control at the source usually is the most desirable but difficult approach. The success of the efforts to control noise at the source certainly depends on the knowledge of the influence of various design parameters on the acoustical near and far fields. Vibrating structural components form one of the major sources of noise in machinery. In this thesis theoretical and experimental studies on the acoustical fields due to various types of vibrating structures are conducted. The theoretical work is based on the boundary element method which can effectively deal with the boundary value problems especially associated with an infinite domain. The experimental work was conducted (in an anechoic chamber) to measure the sound pressure levels in the acoustical field generated by various vibrating structures. The types of vibrating structures considered are piston-type and beam-type. Dissert. Abstr.

N86-22301 Stanford Univ., Calif.
HIGH RESOLUTION ACOUSTIC MICROSCOPY Ph.D. Thesis
Babur Baki Hadimioglu 1985 119 p
Avail: Univ. Microfilms Order No. DA8522153

Advancements in the fields of high resolution water and superfluid helium acoustic microscopy are described. The reflection acoustic microscope using water as the coupling fluid was operated at frequencies as high as 5 gigahertz by using ultrashort radio frequency-pulses and acoustic lenses as small as 12 microns in radius. The smallest sound wavelength used for imaging was 3000 Angstroms and the microscope presents a resolution of better than 2000 Angstroms when a nonlinear resolution improvement technique is used. The design and fabrication of the high frequency acoustic transducers are presented. The operating frequency of the acoustic microscope using liquid helium at temperatures less than 0.2 K was increased to 8 gigahertz. The design and fabrication of acoustic transducers to operate at low temperatures are described. The use of the liquid helium microscope at much higher frequencies is also considered. Work is now underway to build a helium microscope at 96 gigahertz with sub-30 Angstroms resolution. Dissert. Abstr.

N86-22302 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
AN EXPERIMENTAL APPRAISAL OF THE USE OF GROUND-PLANE MICROPHONES FOR AIRCRAFT NOISE MEASUREMENT
R. C. Payne Aug. 1985 50 p refs
(NPL-AC-104; ISSN-0143-7143) Copyright. Avail: Issuing Activity

Sound pressure levels measured using ground-plane microphone configurations are compared with pressure-doubled spectra derived from measurements using a conventional 1.2 m microphone location. Experimental data were obtained under laboratory conditions and in the field using a stationary sound source producing pure tone signals or shaped white noise. An arrangement involving a half-inch condenser microphone inverted over a circular baffle gives a close approximation to a pressure-doubled spectrum. Field trials using over-flights of light propeller-driven aircraft confirm the validity of the arrangement. Author (ESA)

N86-22303*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COHERENT LARGE-SCALE STRUCTURES IN HIGH REYNOLDS NUMBER SUPERSONIC JETS Final Report
J. Lepicovsky, K. K. Ahuja, W. H. Brown, and R. H. Burrin Washington NASA Dec. 1985 105 p refs
(Contract NAS1-17442)
(NASA-CR-3952; NAS 1.26:3952; LG85ER0111) Avail: NTIS HC A06/MF A01 CSCL 20A

The flow structure of a 50.8 mm (2 in) diameter jet operated at a full expanded Mach number of 1.37, with Reynolds numbers in the range 1.7 to 2.35 million, was examined for the first 20 jet diameters. To facilitate the study of the large scale structure, and determine any coherence, a discrete tone acoustic excitation method was used. Phase locked flow visualization as well as laser velocimeter quantitative measurements were made. The main conclusions derived from this study are: (1) large scale coherent like turbulence structures do exist in large Reynolds number supersonic jets, and they prevail even beyond the potential core; (2) the most preferential Strouhal number for these structures is in the vicinity of 0.4; and (3) quantitatively, the peak amplitudes of these structures are rather low, and are about 1% of the jet exit velocity. Finally, since a number of unique problems related to LV measurements in supersonic jets were encountered, a summary of these problems and lessons learned therefrom are also reported. Author

N86-22304*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRPORT-NOISE LEVELS AND ANNOYANCE MODEL (ALAMO) USER'S GUIDE
Richard DeLoach, James L. Donaldson, and Margaret J. Johnson Jan. 1986 129 p Prepared in cooperation with Computer Sciences Corp., Hampton, Va.
(NASA-TM-87695; NAS 1.15:87695) Avail: NTIS HC A07/MF A01 CSCL 20A

A guide for the use of the Airport-Noise Level and Annoyance MOdel (ALAMO) at the Langley Research Center computer complex is provided. This document is divided into 5 primary sections, the introduction, the purpose of the model, and an in-depth description of the following subsystems: baseline, noise reduction simulation and track analysis. For each subsystem, the user is provided with a description of architecture, an explanation of subsystem use, sample results, and a case runner's check list. It is assumed that the user is familiar with the operations at the Langley Research Center (LaRC) computer complex, the Network Operating System (NOS 1.4) and CYBER Control Language. Incorporated within the ALAMO model is a census database system called SITE II. Author

N86-22305*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRPORT-NOISE LEVELS AND ANNOYANCE MODEL (ALAMO) SYSTEM'S REFERENCE MANUAL
Richard DeLoach, James L. Donaldson, and Margaret J. Johnson Jan. 1986 129 p refs Prepared in cooperation with Computer Sciences Corp., Hampton, Va.
(NASA-TM-87694; NAS 1.15:87694) Avail: NTIS HC A06/MF A01 CSCL 20A

The airport-noise levels and annoyance model (ALAMO) is described in terms of the constituent modules, the execution of ALAMO procedure files, necessary for system execution, and the source code documentation associated with code development at Langley Research Center. The modules constituting ALAMO are presented both in flow graph form, and through a description of the subroutines and functions that comprise them. Author

N86-22306*# Bionetics Corp., Hampton, Va.
AN EVALUATION OF STUDY DESIGN FOR ESTIMATING A TIME-OF-DAY NOISE WEIGHTING
James M. Fields Mar. 1986 30 p refs
(Contract NAS1-16978)
(NASA-CR-178062; NAS 1.26:178062) Avail: NTIS HC A03/MF A01 CSCL 20A

The relative importance of daytime and nighttime noise of the same noise level is represented by a time-of-day weight in noise annoyance models. The high correlations between daytime and nighttime noise were regarded as a major reason that previous social surveys of noise annoyance could not accurately estimate the value of the time-of-day weight. Study designs which would reduce the correlation between daytime and nighttime noise are described. It is concluded that designs based on short term variations in nighttime noise levels would not be able to provide valid measures of response to nighttime noise. The accuracy of the estimate of the time-of-day weight is predicted for designs which are based on long term variations in nighttime noise levels. For these designs it is predicted that it is not possible to form satisfactorily precise estimates of the time-of-day weighting. Author

N86-22307*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTIC RADIATION STRESS MEASUREMENT Patent Application
William T. Yost and John H. Cantrell, Jr., inventors (to NASA) Filed 13 Sep. 1985 10 p
(NASA-Case-LAR-13440-1; NAS 1.71:LAR-13440-1; US-Patent-Appl-SN-775989) Avail: NTIS HC A02/MF A01 CSCL 20A

Ultrasonic radio frequency tone-bursts are launched into a sample of material tested. The amplitude of the tone-bursts and the slope of the resulting static displacement pulses are measured. These measurements are used to calculate the nonlinearities of the materials. NASA

N86-22308*# Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
AEROACOUSTICS OF CONTOURED AND SOLID/POROUS CONICAL PLUG-NOZZLE SUPERSONIC JET FLOWS Final Report
Darshan S. Dosanjh and Indu S. Das Dec. 1985 204 p refs
(Grant NAG1-29)
(NASA-CR-176645; NAS 1.26:176645) Avail: NTIS HC A10/MF A01 CSCL 20A

The acoustic far field, the shock-associated noise and characteristics of the repetitive shock structure of supersonic jet flows issuing from a contoured plug-nozzle and uncontoured plug-nozzle having a short conical plug of either a solid or a combination of solid/porous surface with pointed termination operated at a range of supercritical pressure are reported. The contoured and the uncontoured plug-nozzles had the same throat area and the same annular-radius ratio. Author

N86-22309*# Tennessee Univ. Space Inst., Tullahoma. Space Inst.
NONLINEAR ACOUSTIC WAVE PROPAGATION IN ATMOSPHERE Final Report, 1 Oct. 1984 - 31 Oct. 1985
S. I. Hariharan Oct. 1985 28 p refs
(Grant NAG1-527)
(NASA-CR-176642; NAS 1.26:176642) Avail: NTIS HC A03/MF A01 CSCL 20A

A model problem that simulates an atmospheric acoustic wave propagation situation that is nonlinear is considered. The model is derived from the basic Euler equations for the atmospheric flow and from the regular perturbations for the acoustic part. The nonlinear effects are studied by obtaining two successive linear problems in which the second one involves the solution of the first problem. Well posedness of these problems is discussed and approximations of the radiation boundary conditions that can be used in numerical simulations are presented. Author

N86-22310# Washington State Univ., Pullman. Dept. of Physics.
RESEARCH ON ACOUSTICAL SCATTERING, OPTICS OF BUBBLES, DIFFRACTION CATASTROPHES, AND LASER GENERATION OF SOUND BY BUBBLES Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
Philip L. Marston Sep. 1985 72 p
(Contract N00014-85-C-0141)
(AD-A161333; ASR-5) Avail: NTIS HC A04/MF A01 CSCL 20/1

The research summarized concerns four topics of the propagation and scattering of acoustical and optical waves: (1) acoustical scattering theory and experiments (focused backscattering from elastic spheres due to Rayleigh waves and resonances, Sommerfeld-Watson transformation or predicting echo amplitudes and resonance phenomena, scattering from complicated elastic objects); (2) novel manifestations of diffraction catastrophes and their application to inverse problems (optical hyperbolic-umbilic and cusp diffraction catastrophes in the scattering from a penetrable spheroid, angular location of the cusp as a method of inverse scattering, calculation of the shape of the wavefront which produces a directional cusp diffraction catastrophe); (3) production of sound by a bubble in water illuminated by modulated light (bubbles as a novel photoacoustic source, photoacoustics as a method of investigating adsorbed films or bubbles in water); (4) light scattering from real bubbles in water (optical backscattering from freely rising bubbles in water, the unfolded glory of an oblate bubble, optical effects of adsorbed films.) GRA

N86-22311# Naval Submarine Medical Research Lab., Groton, Conn.
TEMPORARY AUDITORY-THRESHOLD SHIFTS INDUCED BY TWENTY-FIVE-MINUTE CONTINUOUS EXPOSURES TO IN-

TENSE TONES IN WATER Interim Report
Paul F. Smith and John J. Wojtowicz 25 Sep. 1985 19 p
(M00-96-PN)
(AD-A162404; NSMRL-1063) Avail: NTIS HC A02/MF A01 CSCL 20/1

Four bare-headed divers were exposed for twenty-five minutes to continuous tones in water at frequencies of 700, 1400, and 5600 hertz at estimated sound pressure levels between 153 and 165 decibels (dB) above 20 micropascal. Subsequent analyses revealed that the eight ears involved were actually exposed to average sound pressure levels between 143.1 and 165.1 dB. These exposure levels are comparable to those to which divers may be exposed while using some underwater hand-held tools. Temporary auditory-threshold shifts (TTS) were measured from two minutes to five minutes after the exposure terminated. TTS at two minutes post-exposure was between 23 and 55 dB and recovery times varied from twenty-four hours to more than fifty hours depending on exposure conditions. Nonauditory effects including middle-ear sensations and a reddened ear-drum were also observed. The results indicate that several hand-held tools now in use by military and civilian divers are extremely hazardous to hearing. The results also support the theory that the dynamic range of the water-immersed ear is smaller than the dynamic range of the ear in air. GRA

N86-22312# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
MEASUREMENT OF NOISE FROM AIRPLANES TRAVELING AT HEIGHTS 3500 TO 6000m
Magnus Linde and Staffan Meijer Sep. 1985 19 p ref
(Contract STU-AU-2168)
(FFA-TI-AU-2168) Avail: NTIS HC A02/MF A01

The noise on the ground produced by overflights of jet and propeller airplanes, at different flight levels, was studied to provide a basis for the estimation of the noise from future propeller airplanes. The noise on the ground from airplanes at heights 3500 to 6000m was measured. Author (ESA)

N86-22255# Joint Publications Research Service, Arlington, Va.
BRANCHES OF ACOUSTIC OSCILLATIONS OF A GAS INTERACTING IN RESONANCE WITH LIGHT Abstract Only
F. Kh. Gelmukhanov and L. V. Ilichev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 1 Transl. into ENGLISH from Zhurnal Eksperimentalnoy i Theoreticheskoy Fiziki (Moscow, USSR), v. 88, no. 3, Mar. 1985 p 733-740 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-22313 Stanford Univ., Calif.
EXTREME ULTRAVIOLET EMISSION SPECTROSCOPY OF ATOMS AND LASER APPLICATIONS Ph.D. Thesis
Andrew James Mendelsohn 1985 137 p
Avail: Univ. Microfilms Order No. DA8522199

Many extreme ultraviolet (XUV) laser schemes are limited by the short autoionizing lifetimes of atomic states which lie above the ionization threshold. Two approaches to dealing with this problem are presented. The properties of a class of levels known as quasi-metastable levels are investigated. These levels are relatively metastable against autoionization due to a number of selection rules and possess substantial branching ratios for radiation in the XUV. Autoionizing and radiative rates are calculated for quasi-metastable levels in alkali atoms with a Hartree-Fock code. The results of emission spectra confirming the high radiative yield of these states is presented. Implications for several proposed XUV laser schemes are discussed. The use of MMM super Coster-Kronig transitions in Zn to produce inversion and gain on several transitions in Zn3 between 56.8 nm and 133.8 nm are examined. The super Coster-Kronig transition converts 90% of Zn2 ions created by photoionization in a laser-produced plasma into Zn3 3d84s2 ions at an energy of approximately 65 eV. Several laser schemes utilizing this selective autoionization process are discussed. Experimental verification of the high super Coster-Kronig branching ratio in a microwave discharge cell is presented. Dissert. Abstr.

N86-22314# National Aerospace Lab., Tokyo (Japan). First Aerodynamics Div.
SENSITIVITY OF ELECTRON THERMALIZATION IN RARE GASES TO MOMENTUM-TRANSFER CROSS SECTION AND IMPURITIES
Katsuhisa Koura Jul. 1985 11 p refs
(NAL-TR-866T; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The sensitivity of the electron thermalization in rare gases to the momentum-transfer cross section sigma sub m (epsilon) and gas impurities is investigated using both the Monte Carlo simulation and the empirical equation for the electron energy-loss rate in relation to the remarkable discrepancy betweem the theoretical and experimental results revealed in rare gases with the Ramsauer minimum. The electron thermalization is very sensitive to sigma sub m (epsilon), because the more accurate data of sigma sub m (epsilon) with the smaller Ramsauer minimum enlarge the discrepancy. The electron thermalization is shown to be so sensitive to gas impurities that it is considered probable that molecular impurities cause the discrepancy even for an experiment with a purity grade better than 99.9%. Author

N86-22315 Duke Univ., Durham, N. C.
A STUDY OF ORIENTATIONAL ORDERING IN SOLID DEUTERIUM Ph.D. Thesis
Myron Eugene Calkins, Jr. 1985 363 p
Avail: Univ. Microfilms Order No. DA8523033

Nuclear magnetic resonance (NMR) studies were performed on samples of solid deuterium with para concentrations X in the range $0.05 < X < 0.07$ at temperatures between 0.032 and 3.0 K and at a Larmor frequency of 5.88 MHz. This range of temperatures and concentrations includes the first order transition to the long range orientational ordered state. The spin-lattice relaxation times for both ortho (1 = 2) and para (1 = 1)D2 species were measured by the intensity of solid echoes generated by the pulse sequence. In addition, the solid echoes themselves were digitized which, through the use of the fast Fourier transform, provided both the lineshapes of the two species, and the second-moments M sub 2 of their absorption lines. At all concentrations below which the transition to a long range ordered phase does not occur, the temperature dependence of the lineshape, secondmoment, and spin-lattice relaxation times is quite smooth. Dissert. Abstr.

N86-22316 Boston Coll., Chestnut Hill, Mass.
ELECTRONIC ENERGY TRANSFER AMONG COMPLEX MOLECULES Ph.D. Thesis
Oktay Demir 1985 242 p
Avail: Univ. Microfilms Order No. DA8522279

Electronic energy transfer among complex molecules in gas phase and in polar solvents was studied by employing naphthalene and biacetyl as sensitizer and activator, respectively. Triplet-triplet energy transfer from naphthalene to biacetyl was observed. In the gas phase at 310 nm, in polar solvents 230 nm, 295 nm and 325 nm excitation bands were found as the starting points in the mechanism of energy transfer for the 560 nm sensitized phosphorescence emission from biacetyl. An experimental method to determine the interaction mechanism between sensitizer-activator pairs of complex molecules was developed; the molecular interaction mechanism taking place in the energy transfer was found to be of exchange type. A transient physical molecule model (PMOL) was introduced to explain the proposed energy gap law. Based on the experimental observations and conclusions a triplet-triplet energy transfer model including the FEET phenomenon was constructed. Dissert. Abstr.

N86-22317# York Univ., Toronto (Ontario). Dept. of Chemistry.
CORRELATIONS BETWEEN ELECTROCHEMICAL POTENTIALS AND OPTICAL CHARGE TRANSFER ENERGIES IN RUTHENIUM BIPYRIDINE DERIVATIVES
Elaine S. Dodsworth and A. B. P. Lever Apr. 1985 22 p
(Contract N00014-84-G-0201)
(AD-A161668; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/4

Linear relationships are discussed linking the Ru yields Pi*(byp) charge transfer transition energy in the species (Ru(bipyridine)2XY)(n+)(X,Y various non-diimine ligands, n=0,1,2) and the observed potentials E (Ru(III)/Ru(II)), E((bpy)/(bpy(-)) and their difference. The conditions under which such relationships might be valid are investigated. Correlation of E(Ru(III)/Ru(II)) is also explored. The results permit the use of optical energies to calculate CT energies and vice versa GRA

N86-22318# Physical Sciences, Inc., Andover, Mass.
FLUORESCENCE FROM ELECTRON IRRADIATED GASES IN REFURBISHED LABCEDE Final Report, 25 Sep. 1980 - 29 Feb. 1984
B. D. Green, L. G. Piper, G. E. Caledonia, P. F. Lewis, and H. C. Murphy Sep. 1985 366 p
(Contract F49628-80-C-0168)
(AD-A161674; PSI-TR-433; AFGL-TR-84-0218) Avail: NTIS HC A16/MF A01 CSCL 04/1

This report describes our efforts directed toward the study of electron-irradiated gases of atmospheric interest as part of the LABCEDE project. Emission spectra of nitrogen and air between 185 and 900 nm were surveyed and compared to observations of auroral radiances. Infrared spectral surveys using a CVF and interferometer provided many intriguing observations which suggest numerous future measurements programs. A series of measurements undertaken on the higher-pressure apparatus identified N(2D) as responsible for NH formation in N2/H2 mixtures by altering the neutral and ionic kinetics with trace species. The absolute production rates of vibrationally excited NO in irradiated N2/O2 mixtures are determined, with N(2D) felt to be the reaction precursor. About two precent of the total energy deposited in the gas by the electron beam appears as NO vibrational energy, A discussion of self-trapping of CO2(nu5) emission is given to illustrate the modification of the observed fluorescence spectrum due to hot band and istopic emissions. The excitation and quenching of Meinel bands by air and nitrogen are also reported. Large intensity enhancements have been observed in the presence of applied magnetic fields. Preliminary observations and explanations of this beam plasma discharge phenomenon are given. GRA

N86-22319# Washington Univ., Seattle. Dept. of Chemistry.
AVERAGE COLLISIONAL VIBRATIONAL ENERGY TRANSFER QUANTITIES. THE EXPONENTIAL MODEL
B. S. Rabinovitch 15 Nov. 1985 33 p
(Contract N00014-75-C-0690)
(AD-A161814; NR092-549-TR32) Avail: NTIS HC A03/MF A01 CSCL 20/8

The important collisional energy transfer ratio, gamma = <delta E>sub all/<delta E> sub d was examined by using a fitted classical approximation for the density of internal energy eigenstates. The exponential form of the collisional energy transfer probability function was applied to four model unimolecular reaction systems. Two parameters, the inversion temperature Ti and the effective temperature Te (defined previously in I), were employed to develop a form for the parametric dependence of gamma on <delta E> sub d, energy level E and temperature T; these quantities are related to a reduced average energy transfer quantity E' sub e. Comparison was made with previous literature expressions for the inter-relationship between <delta E>sub all and <delta E>sub d for both exponential and stepladder models of the collisional transition probabilities. GRA

N86-22320# Arizona Univ., Tucson. Dept. of Chemistry.
COMPLEX MIXTURE ANALYSIS BY PHOTOIONIZATION MASS SPECTROMETRY WITH A VUV HYDROGEN LASER SOURCE Interim Technical Report
Thomas C. Huth and M. B. Denton 6 Dec. 1985 22 p
(Contract N00014-83-K-0268)
(AD-A162401; TR-44) Avail: NTIS HC A02/MF A01 CSCL 07/5

Trace organic analysis in complex matrix presents one of the most challenging problems in analytical mass spectrometry. When ionization is accomplished non-selectively using electron impact, extensive sample clean-up is often necessary in order to isolate the analyte from the matrix. Sample preparation can be greatly reduced when the VUV H2 laser is used to selectively photoionize only a small fraction of compounds introduced into the ion source. This device produces parent ions only for all compounds whose ionization potentials lie below a threshold value determined by the photon energy of 7.8 eV. The only observed interference arises from electron impact ionization, when scattered laser radiation interacts with metal surfaces, producing electrons which are then accelerated by potential fields inside the source. These can be suppressed to levels acceptable for practical analysis through proper instrumental design. Results are presented which indicate the ability of this ion source to discriminate against interfering matrix components, in simple extracts from a variety of complex real world matrices, such as brewed coffee, beer, and urine. GRA

N86-22321# Purdue Univ., West Lafayette, Ind. Dept. of Physics.
INELASTIC SCATTERING IN CONDENSED MATTER WITH HIGH INTENSITY MOESSBAUER RADIATION Progress Report, 1 Mar. - 31 Oct. 1985
J. G. Mullen Oct. 1985 9 p
(Contract DE-FG02-85ER-45199)
(DE86-002461; DOE/ER-45199/1) Avail: NTIS HC A02/MF A01

The past year has seen the completion of most of the design and construction phases of instrument development and the beginning of scientific investigations. Many technical difficulties relating to mechanical strains in the source cryostat and in the Microfoil Internal Conversion Electron (MICE) detector assembly caused by cycling them between 300 and 100 K have been overcome. The scientific work has been highlighted by the performance of the MICE detector and how it has allowed measurement of the asymmetry parameters in w-183 and w-182 much more reliably than in the past, and by the high momentum resolution made possible with intense sources as demonstrated by studies on Si. DOE

N86-22322# California Univ., Berkeley. Lawrence Berkeley Lab.
THEORETICAL STUDY OF INTERMOLECULAR ENERGY TRANSFER OF AN ELECTRONICALLY EXCITED DIATOMIC MOLECULE BY ATOM IMPACT: He((1)S) + H2(B (1)(SIGMA)(+) /SUB u/)
R. M. Grimes, W. A. Lester, Jr., and M. Dupuis May 1985 18 p refs Presented at the 12th Annual Meeting of the National Organization of Black Chemists and Chemical Engineers, Minneapolis, Minn., 22 May 1985
(Contract DE-AC03-76SF-00098)
(DE86-001480; LBL-19331; CONF-8505193-2) Avail: NTIS HC A02/MF A01

An ab initio potential energy surface (pes) for He + H2(B (1)(SIGMA)+ sub u) has been determined using self-consistent field plus configuration interaction methods. The long-term interactions are described by a multipole expansion. The He-H2(B (1)(SIGMA)(+) sub u) interaction energy is much more anisotropic than those of ground state systems studied to date. As a first step in the dynamics studies, cross sections for rotational excitation at c.m. energies 0.015 to 0.105 eV have been computed in the rigid-rotator model using the space-fixed coupled-channel formalism and an analytical fit to the ab initio pes. Partial inelastic cross sections display a high degree of structure, which appears to be mainly due to the anisotropy of the interaction energy. The magnitudes of total cross sections for (DELTA)j = + - 2 transitions are comparable to those for ion-molecule systems. DOE

N86-22323# George Washington Univ., Washington, D.C. Office of Sponsored Research.

INVESTIGATIONS OF THE STRUCTURE AND ELECTROMAGNETIC INTERACTION OF FEW-BODY SYSTEMS
D. R. Lehman 1985 35 p
(Contract DE-AS05-79ER-10332)
(DE86-001659; DOE/ER-10332/15) Avail: NTIS HC A02/MF A01

Progress is reported in these areas: (GAMMA)(3)He (YIELDS) pd in the 200 < E sub gamma < 400 MeV region; application of the Austern model to the reactions (GAMMA)He-3 (YIELDS) pd, (PI) sup 0 He-3 (YIELDS) pd; analyzing power in pd (YIELDS) (GAMMA)He-3 at intermediate energies; elastic and inelastic electron scattering from Li-6; quasielastic electron and proton scattering from Li-3; higher shell orbitals in Li-6 in jj and LS coupling and the magnetic moment of Li-6 from three-body models. Other areas of study include: explanation of the binding energy difference between the ground and first excited state of the A = 4 (LAMBDA)-hypernuclei; the asymptotic normalization constants for He-4 (YIELDS)n+He-3 and He-4(YIELDS)d + d; low-energy two body photodisintegration of He-3 and H-3; photodisintegration of the deuteron; and photodisintegration of the trinculeon at intermediate energies. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-22324 Northwestern Univ., Evanston, Ill.
MEASUREMENTS OF PROTON-PROTON AND PROTON-ANTIPROTON ELASTIC SCATTERING AT THE EUROPEAN CENTER FOR NUCLEAR RESEARCH INTERSECTING STORAGE RINGS Ph.D. Thesis
Norman Alexander Amos 1985 204 p
Avail: Univ. Microfilms Order No. DA8523495

Proton-proton and proton-anitproton elastic scattering were measured at the CERN Intersecting Storage rings. Using the optical theorem, the total nuclear cross sections was extracted for these collisions. By measuring the interference between the Coulomb amplitude and the nuclear amplitude rho, the ratio of the real part to the imaginary part of the forward nuclear elastic scattering amplitude was found. Further, the nuclear slope parameter was extracted in the forward direction. The elastic scattering measurements were made at small scattering angles (approx. 1 milliradian), demanding that the detectors be placed close to the beams. Normalization of the data was performed by two methods: Van der Meer calibrations were performed on sets of luminosity monitor counters, the known Coulomb differential scattering cross section fixed the normalization scale. Dissert. Abstr.

N86-22325 Duke Univ., Durham, N. C.
RADIATIVE NEUTRON CAPTURE BY DEUTERUM Ph.D. Thesis
George Mitev 1984 178 p
Avail: Univ. Microfilms Order No. DA8520829

A study of the H-2(n,g)H-3 reaction was performed employing polarized and unpolarized beams of neutrons. Angular distributions of cross sections were measured at E sub n = 9.0, 10.8 and 14.0 MeV. An expansion in Legendre polynomials was fit to the data and the resulting coefficients are reported. Polarized neutrons were employed to measure an angular distribution of analyzing powers E sub n = 9.0 MeV. Coefficients resulting from fitting an expansion in associated Legendre polynomials to the angular distribution are reported. The combined analyzing power and cross section data at this energy were analyzed under simplifying assumptions to determine significant transition matrix elements of the H-2(n, gamma)H-3 reaction. Total cross sections have been determined at E sub n =9.0, 10.8 and 14.0 MeV from fits to the angular distributions. A three-body direct capture calculation was performed in an effort to reconcile theory with experiment, but the results are essentially the same as those of the two-body calculations. Dissert. Abstr.

N86-22326# Brookhaven National Lab., Upton, N. Y.
[ACTIVITY OF THE NATIONAL SYNCHROTRON LIGHT SOURCE (NSLS)] Annual Report
R. Klaffky, ed. and W. Thomlinson, ed. 1984 204 p refs
(Contract DE-AC02-76CH-00016)
(BNL-51840) Avail: NTIS HC A10/MF A01

The National Synchrotron Light Source (NSLS), located at Brookhaven National Laboratory, is a national user facility supported by the U.S. Department of Energy. The NSLS has two electron storage rings dedicated to the production of UV and X-ray radiation. The 750 MeV VUV facility has been in operation since 1982. The frst NSLS comprehensive Annual Report contains reports on work carried out on its VUV storage ring during Fiscal 1984. For individual titles, see N86-22327 through N86-22373.

N86-22327# Bell Telephone Labs., Inc., Murray Hill, N. J.
METAL-INSULATOR TRANSITION ON THE Ge(001) SURFACE
S. Kevan and N. G. Stoffel *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 73-75 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The (001) surfaces of germanium and silicon are prototypical examples of systems possessing a strong, short range reconstruction accompanied by a longer ranger weaker ordering. The short range interaction is generally accepted to involve asymmetric dimerization of nearest neighboring surface atoms. The energetics involved are hence those of chemical bond formation. If this were the only ordering present, a (2x1) surface unit cell would result. Various reports of larger unit cells (p(2x2), c(2x2), c(4x2)) have usually been explained in terms of longer range, energetically weaker ordering of neighboring dimers. Recently, total-energy surface slab calculations have been combined with renormalization group techniques to predict a phase transition at approx 200K on both surfaces from a low temperature phase in which the dimers are ordered to a high temperature phase in which the dimer bond is preserved but the dimers are randomly oriented. Such a transition was subsequently observed by LEED. High resolution angle-resolved photoemission (ARP) experiments are reported which indicate that this transition is accompanied by a metal insulator transition. F.M.R.

N86-22328# Bell Telephone Labs., Inc., Murray Hill, N. J.
SURFACE STATES ON SIMPLE METAL SURFACES
S. D. Kevan, N. G. Stoffel, and N. V. Smith *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 76-78 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The existence of electronic states localized at nominally clean metal surfaces has long been a subject of interest. The accurate characterization of such states continues to be an active area of experimental and theoretical work. In the past year, using high-resolution synchrotron radiation based angle-resolved photoemission (ARP), the number of known surface states on a fw simple metal surfaces has been nearly doubled. In addition, very accurate 2-dimensional energy dispersion relations have been measured and compared to the latest self-consistent calculations. A summary of these results is given. Author

N86-22329# Bell Telephone Labs., Inc., Murray Hill, N. J.
ANGLE RESOLVED PHOTOEMISSION STUDIES OF ELECTRONIC STRUCTURE
N. G. Stoffel, S. D. Kevan, and N. V. Smith *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 79-81 (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Angle resolved photoelectron spectroscopy (ARPES) is an effective technique for determining the valence electronic structure of ordered two- and three-dimensional systems. Summaries of two ARPES studies performed at the U4 beamline of the NSLS UUV ring are presented. This beamline is comprised of a 6-meter toroidal

grating monochromator and a high-resolution hemispherical photoelectron-energy analyzer in an ultrahigh vacuum chamber.
Author

N86-22330# Brookhaven National Lab., Upton, N. Y.
BEAM LINE U5: (FEL AND DIAGNOSTIC LINE)
Alfredo Luccio *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 82-84 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Beam line #5 in the VUV storage ring includes two beam lines: the Free Electron Laser (FEL) line and a beam diagnostic line. The FEL line extends from one of the straight sections of the VUV ring, where the permanent magnet undulator is installed. At the present time, there are three stations on this line: (1) upstream and (2) downstream of the ring straight for the FEL experiment, and (3) midway downstream to use the undulator as a source of monochromatic radiation in the far ultraviolet. The FEL beam line was designed to carry on an experiment of production of coherent radiation in the visible-to-ultraviolet region of the spectrum. An amplifier and a laser oscillator are being studied. For the amplifier, a CW Argon-Ion laser is being used together with a variable gap, 38 period permanent magnetic undulator. The laser is located in the FEL downstream station hutch; its beam propagates counter the direction of motion of the electrons in the VUV straight, along a line two meters above the electron orbit plane. In the upstream station hutch the laser beam is deflected downwards and then steered into the storage ring. There, the laser beam is propagated collinear with the electron beam. The undulator installed on the ring early in 1983 and systematic tests were performed during the summer of 1984.
Author

N86-22331# Brookhaven National Lab., Upton, N. Y.
UNDULATOR BASED BEAMLINE STUDIES ON U5
L. McDonnell, P.D. Johnson, R. W. Klaffky, and N. V. Smith (Bell Labs., Murray Hill, N.J.) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 85-87 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

An undulator installed on beamline U5 at NSLS is expected to produce an intense flux of photons into a highly collimated beam. At normal operating energies (750 MeV) the FEL undulator is expected to have a fundamental harmonic at wavelength lambda = 300A for magnetic strength parameter K = 1. A simple beamline has been constructed to allow measurements of the absolute photon flux available from this device at wavelengths in the long wavelength tail of the fundamental. The central element of this beamline is a small monochromator based on the chromatic aberration properties of a LiF lens. This lens focuses different wavelengths at different points along the optical axis and monochromatization is achieved by moving the lens to focus different wavelengths onto a fixed 200 microns wide exit slit. Photoelectron spectroscopy was carried out with a CMA; photoelectrons being ejected from a freshly evaporated gold surface. Examination of a typical series of EDC's recorded on this system allows measurements of the bandwidth of the monochromator to be made. By measuring the total yield of electrons from the surface and comparing with previously published electron yield measurements from the same surface it is possible to obtain the total flux of photons from the undultor source.
F.M.R.

N86-22332# IBM Watson Research Center, Yorktown Heights, N.Y.
X-RAY LITHOGRAPHY: BEAMLINE U6
Jerome P. Silverman, Rolf P. Haelbich, and John M. Warlaumont *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 88-90 refs (For primary document see N86-22326 12-73)
(Contract N00014-82-C-2094)
Avail: NTIS HC A10/MF A01

Over the last decade there have been remarkable advances in the manufacture of integrated circuits. In 1974, the smallest features being replicated in production were about 4.0 microns wide; by now (1984) they have shrunk to 1.0 microns wide. At this size, however, it has become increasingly difficult to progress to smaller features because of the blurring caused by diffraction of the UV light used to expose the photoresist on the silicon wafers. Although there are techniques being developed to extend conventional optical lithograpiy to smaller dimensions, they are difficult and costly. An alternative approach is to use X-rays, which, because of their much shorter wavelength, promise better resolution than can be obtained by todays's methods. The primary goal of this effort is to develop a system to use synchrotron radiation for X-ray lithography. Synchrotron radiation has two major advantages over conventional X-ray sources: the radiation is collimated, and it is orders of magnitude more intense. It is believed that a storage ring source will allow the best possible resolution with reasonable throughput.
Author

N86-22333# Exxon Research and Engineering Co., Annandale, N.J. Corporate Research Science Labs.
FRAGMENTATION OF SMALL MOLECULES FOLLOWING SOFT X-RAY ABSORPTION NEAR THE CARBON K-EDGE
W. Eberhardt, T. K. Sham (Brookhaven National Lab., Upton, N.Y.), R. G. Carr (Brookhaven National Lab., Upton, N.Y.), S. Krummacher (State Univ. of New York, Stony Brook), M. Strongin (Brookhaven National Lab., Upton, N.Y.), S. L. Weng (Brookhaven National Lab., Upton, N.Y.), and D. Wesner (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 91-93 refs (For primary document see N86-22326 12-73)
(Contracts DE-AC02-76CH-00016; DE-AC02-80ER-10750)
Avail: NTIS HC A10/MF A01

The absorption of soft X-ray photons by Cls electrons in CO, as well as in a number of aliphatic and aromatic hydrocarbons and their derivatives, has been studied by carbon K-edge absorption spectroscopy at the NSLS U7 beamline in the ion yield mode. It is found that the absorption process results in ionic fragmentation of the original molecules. The fragmentation pattern changes whether the Cls electron gets ionized or excited into a Rydberg-like orbital, or into an unfilled molecular orbital, or into a quasibound resonance state. Moreover, the fragmentation occurs specifically around the site of the carbon atom where the bound (atomic) to bound (molecular orbital) transition takes place. Based on these observations one might consider the use of tunable X-ray to produce the heretofore uninvestigated excited states and to induce photochemistry or to selectively break large organic molecules. The latter has very interesting implications in photo-stimulated desorption from surfaces, biology, and lithography.
Author

N86-22334# Exxon Research and Engineering Co., Annandale, N.J.
CORE LEVEL SHIFTS AND ELECTRONIC STRUCTURE OF Cu3Au
W. Eberhardt, Sicheng Wu (State Univ. of New York, Stony Brook), R. F. Garrett (State Univ. of New York, Stony Brook), D. Sondericker (State Univ. of New York, Stony Brook), and F. P. Jona (State Univ. of New York, Stony Brook) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 94-96 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-80ER-10750)
Avail: NTIS HC A10/MF A01

The effects of geometry and charge transfer between the constituents of an alloy on its electronic structure are studied. Alloys, together with small metal particles, are known to be very good catalysts for a number of chemical reactions, but very little is known about the atomic and electronic structures of their surfaces. This photoemission study of the /100/ and /111/ surfaces of Cu3Au was undertaken in conjunction with LEED (low energy electron diffraction) and AES (Auger electron spectroscopy) structural studies of Cu3Au and Ni3Al which are being performed at Stony Brook. This work has established that the /100/ surfaces of these A3B-type ordered alloys consists of 50% A and 50% B,

with the second layer being 100% A, while the /111/ surfaces always have 75% A and 25% B. Author

N86-22335# Exxon Research and Engineering Co., Annandale, N.J.
ANGLE RESOLVED PHOTOEMISSION AND BAND STRUCTURE OF Cu3Au
W. Eberhardt, Sicheng Wu (State Univ. of New York, Stony Brook), J. Sokolov (State Univ. of New York, Stony Brook), D. Sondericker (State Univ. of New York, Stony Brook), R. F. Garrett (State Univ. of New York, Stony Brook), and F. P. Jona (State Univ. of New York, Stony Brook) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 97-98 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-80ER-10750)
Avail: NTIS HC A10/MF A01

For the purpose of determining the band structure, its difference from the band structure of the constituents, and the extent of the agreement with band-structure calculations, a study of normal photoelectric emission from Cu3Au/001/ and Cu3Au/111/ as a function of photon energy was undertaken. The following reports the preliminary results of this investigation. Author

N86-22336# Brookhaven National Lab., Upton, N. Y.
PHOTON ENERGY DEPENDENT BRANCHING RATIOS OF THE INNER VALENCE SATELLITES IN THE PHOTOEMISSION OF SOLID ETHYLENE
V. Murgai, S. L. Hulbert, P. D. Johnson, Myron Strongin, and W. Eberhardt (Exxon Research and Engineering Co., Annandale, N.J.) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 99-100 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

Measurements of the photoelectron branching ratios of the outer and inner valance emission of solid ethylene (C2H4) as a function of photon energy between 40 eV and 200 eV have resulted in the identification of the various photoemission lines. Whereas the single particle picture is valid for photoemission from the outer valance orbitals, the excitation of the innermost valance orbital of ethylene (C 2s derived, 2ag symmetry) is accompanied by a shake-up satellite. Ethylene, along with acetylene, is the simplest hydrocarbon that exhibits significant shake-up structure. The experiments were performed on NSLS bealine U7A using a plane grating monochromator. Author

N86-22337# Brookhaven National Lab., Upton, N. Y.
STUDIES OF Gd CLUSTERS ON CARBON: THE QUESTION OF INITIAL STATE OR FINAL STATE EFFECTS
V. Murgai, S. Raaen, Myron Strongin, and Paul Citrin (Bell Labs., Murray Hill, N.J.) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 101-103 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

The question of whether the core levels of metal clusters are shifted due to initial state effects, or whether instead the final state configuration of the cluster is the major source of the core level shift, still remains unsettled. Part of this problem involves the intrinsic difficulty of devising an experiment which unambiguously distinguishes between final state effects and initial state effects. As an example of an initial state effect the levels of very small clusters of Pd in tunneling contact with a metal, Nb, substrated, but not actually touching is considered. The cluster states are referenced to the substrate vacuum level, and since the affinity level in the small cluster can be above the Fermi level of the metal substrate, charge cannot flow from the substrate to the particle to equilibriate Fermi levels. In this case the system is not in equilibrium and the vacuum level serves as the reference level. It is only when the particle size increases enough so that charge can be transferred that thermodynamic equilibrium is attained and the Fermi level becomes the reference level. Experiments on this system are consistent with this interpretation. Author

N86-22338# Brookhaven National Lab., Upton, N. Y.
CORE LEVEL SHIFT OF Pt CLUSTERS IN SI02: THE TRANSITION FROM METALLIC TO INSULATING BEHAVIOR
V. Murgai, S. Raaen, Myron Strongin, R. Garrett (State Univ. of New York, Stony Brook), and P. Citrin (Bell Labs., Murray Hill, N.J.) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 104-106 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

The core level shifts and valance band features of Pt in an SiO2 matrix were determined as a function of Pt concentration. At a Pt fraction of about 0.6 the Pt resistance changes by two orders of magnitude. This is presumably a percolation transition where continuous Pt paths do not exist below this concentration. The experiments described investigate changes in the valance band and core levels as one goes from metallic to insulating behavior. Author

N86-22339# Brookhaven National Lab., Upton, N. Y. Physics Dept.
PHOTON DESORPTION STUDIES OF SYNCHROTRON MATERIALS
Xiaohe Pan, R. Corderman, F. E. Loeb, and Myron Strongin *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 107-109 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Preliminary photodesorption studies have been made on an aluminum alloy used as the chamber material at NSLS. The studies were made for different cleaning procedures and after different sputtering procedures. One of the cleaning processes employed common solvents such as acetone and then alcohol, and the other treatment employed a more complex recipe which included a NaOH etch. Before this second treatment the samples were also polished. The desorption experiments were done by inserting the samples into the U7 beamline before the plane grating monochromator. Hence the samples were in the direct white beam. Auger spectra are shown for a solvent cleaned Al sample which is Ar sputtered for various times. Other spectra for hydrogen sputtering and oxygen sputtering show similar removal of carbon. Author

N86-22340# Brookhaven National Lab., Upton, N. Y.
THE ADSORPTION OF CARBON MONOXIDE ON PALLADIUM FILMS
M. W. Ruckman, P. D. Johnson, and Myron Strongin *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 110-111 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

Studies of the growth of palladium overlayers on a Ta(110) substrate show that in the region of one monolayer coverage there is a reduction in the density of states at the Fermi level, a characteristic of the noble metals. Representative photoemission spectra from these different coverages are shown. Carbon monoxide is found to adsorb molecularly on the thicker palladium films which grow parallel to the (111) direction, in agreement with earlier studies of adsorption on Pd(111) crystals. However at room temperature no adsorption is found to occur on a palladium monolayer. Studies of carbon monoxide adsorption of these palladium monolayers cooled to liquid nitrogen temperatures have been done. It is found that at the lower temperatures, carbon monoxide is adsorbed and that the photoemission spectra have a similar structure to those recorded from carbon monoxide adsorption on the noble metals. The photoemission spectra observed for carbon monoxide adsorbed at liquid nitrogen temperatures on the palladium monolayers and on the thicker palladium films are compared. Both spectra show features that may be interpreted in terms of electron excitation from molecular orbitals associated with the CO. F.M.R.

N86-22341# Brookhaven National Lab., Upton, N. Y.
Ni, Pd AND Pt OVERLAYERS ON Ta(110)

M. W. Ruckman, V. Murgai, and Myron Strongin *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 112-114 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

Initial work on Pd overlayers grown on Nb showed that the single monolayer had chemical properties that are different from either the bulk overlayer metal itself, or the substrate. These changed properties included reduced hydrogen dissociation and reduced CO adsorption. The dynamic changes were correlated with drastic changes in the density of states near E sub F. The work presented here extends this work to layers of Ni and Pt, and besides the photon energy dependence of the valance band structure, fairly extensive studies were made of core level spectra. There were two significant features of the core level results. In the case of Pd on Ta it was demonstrated that Pd layers prepared by deposition, and by heating a thicker layer to leave a stable monolayer structure, were actually somewhat different. This is with comparable LEED spectra and valance band spectra. In the case of Pt where there are sharp 4f levels it was possible to analyze both the substrate (Ta 4f) core level shifts in addition to the overlayer shifts and from this and the valance band spectra some estimate could be made of the bonding energy of the surface layer. Author

N86-22342# Brookhaven National Lab., Upton, N. Y.
STUDIES OF THE Ta(110) SURFACE AND HYDROGEN ON Ta(110)
M. W. Ruckman, V. Murgai, and Myron Strongin *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 115-117 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

The properties of hydrogen on metal surface besides being of intrinsic scientific interest, are also important to any understanding of hydrogen uptake in metals. Before the hydrogen features themselves can be studied, there must be some understanding of the features of the clean Ta(110) surface, and various measurements have been made of Ta(110) in normal photoemission. Author

N86-22343# Brookhaven National Lab., Upton, N. Y.
CARBON K-EDGE X-RAY ABSORPTION SPECTROSCOPIC STUDIES OF STRUCTURE AND ELECTRONIC PROPERTIES OF HYDROCARBONS ADSORBED ON Ni CRYSTAL SURFACES
T. K. Sham, R. G. Carr (Stanford Synchrotron Radiation Lab., Calif.), W. Eberhardt (Exxon Research and Engineering Co., Annandale, N.J.), R. Garrett (State Univ. of New York, Stony Brook), E. Baldwin (Harvard Univ., Cambridge, Mass.), and C. M. Friend (Harvard Univ., Cambridge, Mass.) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 118-120 refs (For primary document see N86-22326 12-73)
(Contracts DE-AC02-76CH-00016; DE-AC02-80ER-10750; Grant PRF ACS-1477GS)
Avail: NTIS HC A10/MF A01

Using the Plane Grating Monochromator of the U7A beamline at the National Synchrotron Light Source (NSLS), the carbon K-edge X-ray absorption spectra of a large number hydrocarbon molecules and their derivatives adsorbed on Ni single-crystal surfaces (Ni(111), Ni(110) and Ni(100)) have been examined. The molecules studied include saturated hydrocarbons C2H6 and C6H12, and unsaturated ones C2H4, C2H2, C6H6, C6H10, C5H5N and C5H5S. Under the experimental conditions (room temperature, saturated surface), it is found that all the C K-edge Near Edge X-ray Absorption Fine Structures (NEXAFS) of the surface species exhibit the 1s yields pi* and 1s yields sigma shape resonance characteristic of unsaturated molecules although an intense 1s yields pi* transition is not seen in the gas phase spectra for the saturated alkanes. some of the adsorbates also exhibit polarization dependent behavior in their C K-edge adsorption coefficient. Author

N86-22344# General Electric Co., Schenectady, N. Y. Corporate Research and Development.
PHOTOEMISSION STUDY OF METAL-DOPED BETA-BORON THERMOELECTRIC MATERIALS Abstract Only
Joe Wong, G. A. Stack, and T. K. Sham (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 121 (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

In the period August 13 to 17, ten shifts on beam Line U-7 were assigned to perform photoemission measurements of V-doped boron materials. All the beam time, however, was consumed in detecting leaks in the experimental chamber. After all possible leaks were mended, the background pressure was still high and the beam time had expired. A major leak in the monochromator section was later detected. Author

N86-22345# IBM Watson Research Center, Yorktown Heights, N.Y.
OXIDATION OF GaSe(110) CLEAVED SURFACE
G. Hughes, R. Ludeke, G. Landgren, J. F. Morar, and J. Jordan *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 122-124 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The oxidation of the GaAs(110) surface has been the subject of considerable attention in both experimental and theoretical investigations. Despite the large number of studies there has not been any direct or conclusive evidence in support of a particular oxidation mechanism. A variety of models have been proposed in attempts to explain the experimental results; however, in the case of photoemission studies, these explanations have to some degree been limited by the spectral resolution of the original data. The first results of a high resolution photoelectron spectroscopy study of cleaved GaAs(110) surfaces exposed to oxygen carried out on the IBM beam line at the Light Source are presented. The good overall resolution of less than 0.2 ev for the gallium and arsenic 3d core levels and 0.7 ev for the oxygen 1s made possible the identification of a number of chemically shifted components not previously resolved. The tunability of the synchrotron radiation was utilized to obtain spectra with predominantly surface or bulk features. These results necessitate a major revision of current ideas about the oxidation mechanism for this surface. Author

N86-22346# IBM Watson Research Center, Yorktown Heights, N.Y.
POLYIMIDE AND THE POLYMER-METAL INTERACTION
J. L. Jordan, J. F. Morar, G. Hughes, R. A. Pollak, and F. J. Himpsel *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 125-127 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Understanding how metal films adhere to polymer surfaces is a task of great interest and importance to the semiconductor packaging industry. The types of chemical and physical interactions which occur at the interface determine the strength and stability of the metal-polymer bond. Earlier work has included several ESCA and UPS studies of clean and metal coated polyimide. The individual components in photoemission spectra for carbon, oxygen and nitrogen 1s core levels have been tentatively assigned and changes with metal coverage indicate that while Cu does not form chemical bonds with the polymer surface, Cr does. The use of synchrotron radiation for photoemission spectroscopy at the U8 Beamline at NSLS has several significant advantages over laboratory ESCA for studying this system. First, a resolution of 0.5-1.0 eV allows for a more accurate assignment and monitoring of peak positions and intensities as a function of metal coverage. Second, photon energy tunability makes a certain amount of depth profiling possible. Author

N86-22347# IBM Watson Research Center, Yorktown Heights, N.Y.
INVESTIGATIONS OF THE ETCHING CHEMISTRY OF ELEC-

TRONIC MATERIALS

F. R. McFeely, J. F. Morar, and F. J. Himpsel *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 128-130 ref (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

The production of VLSI devices involves the fabrication of silicon substrates with micron-scale anisotropic features incorporating a number of distinct materials, such as silicon regions of various electrical properties, grown or deposited insulating layers, and metallizations. Currently, a variety of plasma-based processes are used to achieve the requisite level of profile control. A common feature of these methods is that the reaction is effected by radical and ionic species in a fluorocarbon plasma. In order to begin to investigate some of the mechanisms involved in etching reactions, a series of experiments has been conducted probing the interaction between fluorine atoms (supplied by the dissociative chemisorption of XeF2) and the surfaces of silicon. The experiments were performed by exposing the clean substrates, either (111) wafers or ingots for cleaving, to XeF2 in a special dosing chamber. The samples were then transferred into the spectrometer chamber through a double vacuum lock after pumping away the residual XeF2. High resolution core level spectra were obtained by means of a two-dimensional display type photoemission spectrometer operating in conjunction with a three-meter toroidal grating monochromator situated at beam line UV-8 at NSLS.

F.M.R.

N86-22348# IBM Watson Research Center, Yorktown Heights, N.Y.

HIGH RESOLUTION PHOTOEMISSION INVESTIGATION: THE OXIDATION OF W

J. F. Morar, F. J. Himpsel, G. J. Hughes, J. L. Jordan, F. R. McFeely, and Guy Hollinge (Universite Claude Bernard, Lyon, France) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 131-133 (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

High resolution photoemission measurements of surface oxide layers on tungsten has revealed a set of well resolved core level shifts characteristic of individual metal oxidation states. Measurement and analysis of this type of data can provide specific and quantitative chemical information about surface oxides. The formation of bonds between transition metals and strongly electronegative elements such as oxygen and fluorine results in charge transfer with the effect of shifting the metal core electron binding energies. The magnitude of such shifts depends primarily on two factors; the amount of charge transfer and the screening ability of the metals electrons. The size of core-level shifts tend to increase with additional charge transfer and be decreased by screening. In the case of tungsten the amount of screening should be a function of oxygen content since the oxygen ties up free electrons which are effective at screening. A continuous change in the tungsten core level shifts is observed with increasing oxygen content, i.e., as the screening changes from that characteristic of a metal screened to that characteristic of an insulator unscreened.

Author

N86-22349# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.

PHOTOIONIZATION OF LASER-EXCITED SODIUM ATOMS USING SYNCHROTRON RADIATION

J. M. Preses, C. E. Burkhardt (Missouri Univ., St. Louis), R. Corey (Missouri Univ., St. Louis), T. Daulton (Missouri Univ., St. Louis), D. Earsom (Missouri Univ., St. Louis), W. P. Garver (Missouri Univ., St. Louis), and J. J. Leventhal (Missouri Univ., St. Louis) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 134-135 refs (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

The absorption of electromagnetic energy by an atom produces either an energically excited atom or a positive ion and a free electron (or electrons). Experiments designed to study these bound-bound and bound-free transitions have been conducted for many years; the early results, especially those associated with bound-bound transitions, provided the impetus for the development of quantum physics. A great deal has been learned about bound-bound transitions, in both emission and absorption. In fact the energies of the most important of the discrete states of almost all atoms and many of their ions are accurately known. However, thorough studies of photoionization of only a relatively few atoms have been carried out. This is due largely to the lack of stable continuous sources of radiation covering the wavelengths corresponding to the range of atomic ionization potentials, approx. 500-3000 A (24.6-4.3 eV). The relatively recent availability of synchrotron radiation and laser light has made it possible to perform a great many new experiments of fundamental interest. The work being performed in this project is directed toward providing new information on atomic photoionization.

Author

N86-22350# Los Alamos National Lab., N. Mex.

APPLICATIONS OF TUNABLE VUV RADIATION

C. R. Quick, Jr., J. J. Tiee, J. Preses (Brookhaven National Lab., Upton, N.Y.), and R. E. Weston, Jr. (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synghrotron Light Source (NSLS) 1984 p 136-137 ref (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

Synchrotron radiation in the 110-140 nm wavelength region has been used to produce electronically excited gas-phase radicals via photofragmentation of suitable radical precursors. To date, most of the effort has been directed towards the investigation of the photophysical properties of two different species: (1) C2H (C2CD) radicals, which are an important hydrocarbon combustion intermediate and yet their spectroscopy is poorly understood, and (2) CF3 radicals, which are of interest in a variety of chemical systems such as atmospheric chemistry, where they have been implicated in the stratospheric ozone depletion problem, and semiconductor device fabrication, where they are used as chemical etching ingredients. A brief summary of the experimental results obtained for each of these two radicals is given.

Author

N86-22351# Yale Univ., New Haven, Conn. Dept. of Physics.

REFLECTANCE MEASUREMENTS OF ALUMINUM COATINGS AT 200 - 500 nm Abstract Only

Stephen F. Schaffner, Linas I. Simonaitis, Elizabeth B. Martin, Henry Kasha, and Richard C. Larsen (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 138 (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

The U9A beam line of NSLS equipped with a monochromator was used to measure the reflectance of mirror samples in the 200 - 500 nm wavelength range. This was done in conjunction with the construction of a Cherenkov detector for BNL - Yale AGS Experiment 780 (Search for rare decay modes of the neutral kaon) which is approved for a run in 1985, as a complement to tests done in the AGS test beam and optical tests at 337 nm using a nitrogen laser. The utmost efficiency of the Cherenkov counter is crucial for the success of the experiment, and it was therefore mandatory to assure that its light gathering power at the short-wavelength end of the range tested be as close to the design value as possible. The tests were very successful in that they helped select a thin aluminized mylar with close to 90% reflectance, and pointed out a problem which exists with a certain type of katadioptric mirror on which the reflective layer had been (poorly) deposited.

Author

N86-22352# Brookhaven National Lab., Upton, N. Y.

UV-VUV CIRCULAR DICHROISM SPECTROMETER

D. J. Spandau, J. S. Gaffney, G. I. Senum, E. T. Premuzic, and P. A. Snyder (Florida Atlantic Univ., Boca Raton) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 139-140 refs Sponsored in part by DOE and National Science Foundation (For primary document see N86-22326 12-73)

Avail: NTIS HC A10/MF A01

An attachment to the National Synchrotron Light Source (NSLS)

beamline U9A was designed and constructed for the spectroscopic study of optically active compounds using circular dichroism (CD) in the vacuum ultra violet (VUV) region. Synchrotron radiation, which is highly linearly polarized upon extraction from the ring, enters a mirror box and passes through a LiF window which separates the ultra high vacuum VUV synchrotron ring from the experimental system vacuum. After exiting the LiF window the beam enters the monochrometer and is then focused into the experimental chamber. The linearly polarized, monochromatic light passes through a CaF2 quarter-wave photoelastic modulator (PEM) which alternately produces right- and left-handed circularly polarized light at a 50 kHz frequency. The modulated circularly polarized light enters the sample cell and the differential absorption of the left- and right-handed components by the optically active compound under study gives rise to a 50 kHz ac signal. This signal is superimposed on a much larger dc signal due to the total light striking the PMT. To extract the small CD ac signal, the dc voltage supplying the photomultiplier tube (PMT) is controlled and maintained by an automatic gain control feedback circuit, which automatically extracts and amplifies the 50 kHz ac signal. This is accomplished by feedback loop to the photomultiplier high voltage supply which compensates source dc variations due to sample absorption and light source variability. This system automatically normalizes the CD signal with respect to the total absorption of the sample. Author

N86-22353# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
THE LIFETIME OF THE FLUORESCENT EXCITED STATE OF SOLID, LIQUID AND VAPOR PHASE CYCLOHEXANE
M. A. Wickramaaratchi, J. M. Preses, R. A. Holroyd, and R. E. Weston *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 141-142 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
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In early work, the fluorescence lifetimes of saturated hydrocarbons were estimated by fluorescence quenching and energy transfer measurements. These values are very inaccurate. In some studies, it was found that the lifetimes of some saturated hydrocarbon liquids are temperature dependent, and the lifetimes of others in the vapor phase are wavelength dependent. One of these is cyclohexane. One of the reasons for the discrepancies among these values could be due to variations in experimental conditions such as temperature and excitation energy, and another reason could be the difficulty of evaluating the short lifetime of a very weak emitter. In the present studies, therefore, the lifetime of cyclohexane in the liquid and solid phases was determined using synchrotron radiation and by systematically varying the temperature and the excitation energy and in the gas phase by varying the excitation energy. F.M.R.

N86-22354# Columbia Univ., New York. Dept. of Chemistry.
VUV OPTICAL PROPERTIES OF CADMIUM DIMETHYL Abstract Only
Q. Y. Yang, R. Bersohn, and J. Preses (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 143 (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

When photodissociating a molecular beam of Cd(CH3)2 with 193 nm light from an excimer laser intense Cd(3P1 yields 1S0) emission was seen at 326.1 nm. However the 6.42 eV energy of the photon was somewhat less than the 6.93 eV required for the reaction: Cd(CH3)2 yields 2CH3 + Cd(3p1). This paradox could be resolved by assuming either that the published thermochemical data was in error or that the excimer laser had effected a two photon transition. Radiation from the synchrotron, a weak source compared to the excimer, was shown to produce no measurable emission from Cd(CH3)2 over the range 250-150 nm. At the higher energies in this range, some of the excited states reached must correlate with Cd(3P1). The fact that this state is not observed implies highly efficient potential curve hopping, i.e., internal quenching. A rough VUV absorption spectrum was measured. Author

N86-22355# Columbia Univ., New York. Dept. of Chemistry.
PHOTODISSOCIATION OF VINYL CYANIDE Abstract Only
C. F. Yu, G. Ondrey, R. Bersohn, and J. Preses (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 144 (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The bond energies of cyanides can be determined by measuring the threshold energy for the process: R - CN + h mu yields R + CN(B sup 2 sigma) i.w., the upper limit determined in this process is close to the true value. This scheme is applied to molecules in which R = I, Cl, Br, H and CH3. Also of interest is the process: CH2 = CH - C + N + h mu yields CH2 = CH + CN(B sup 2 sigma). If the minimum energy for this reaction could be measured, the heat of formation of the vinyl radical could be determined using the known heats of formation of the CN radical and the parent vinyl cyanide. Unfortunately, in the wavelength region 200-105 nm, no emission was seen from vinyl cyanide. (An exceedingly weak emission excited by 121.6 nm light was previously observed). Similar negative results were obtained for phenyl cyanide, C6H5CN but for CH3CN complete agreement was obtained. The conclusion is that just as with Cd(CH3)2 there is very efficient internal quenching of the excited state. An alternative explanation is that photodissociation of vinyl cyanide in the VUV process HCN molecules but not CN radicals. Author

N86-22356# Columbia Univ., New York.
PRELIMINARY STUDIES ON THE ACETYLCHOLINE RECEPTOR BY VACUUM ULTRA-VIOLET CIRCULAR DICHROISM SPECTROSCOPY Abstract Only
Donna L. Mielke, B. A. Wallace, and John C. Sutherland (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 145 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Circular dichroism (CD) spectroscopic studies have been performed on the acetylcholine receptor (AChR) using conventional instrumentation. This instrumentation has had to reached a wavelength minimum of about 200 nanometers (nm). Vacuum ultra-violet (VUV) CD studies of the AChR will be useful because the low wavelength data provided is more sensitive than the higher (greater than 200 nm) wavelength data available from conventional CD instrumentation. VUV-CD spectroscopy was performed on reconstituted vesicle samples of purified AChR. The purpose of these preliminary trials was to ascertain whether the sample was amenable to VUV-CD and whether low (170-180 nm) wavelengths could be reached. Spectra were obtained for this sample, but the absorbing components of the sample buffer prevented the desired low wavelengths from being attained. After optimization of the buffer system, and with the use of Gray cells of various pathlengths, it is expected that low wavelength data collection will be possible. Author

N86-22357# Brookhaven National Lab., Upton, N. Y.
U9B: ULTRAVIOLET BIOPHYSICS
John Clark Sutherland *In its* Activity of the National Synchrotron Light Sourcs (NSLS) 1984 p 146-147 (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Station U9B at NSL has two spectrometers that exploit different features of synchrotron radiation. A vacuum spectrometer is devoted to circular dichroism and magnetic circular dichroism; it operates in the spectral range from 160 to 1600 nm. The second spectrometer uses the time structure of the synchrotron beam to measure fluorescence lifetimes and anisotropy. A rotatable mirror directs the photon beam to one or the other spectrometers. The vacuum spectrometer was used to measure the circular dichrosim of DNA's and proteins. The solution structure of repeating sequence nucleic acid copolymers (synthetic DNA's) was studied. A CD band near 200 nm was found to be diagnostic for the handedness of

the DNA double helix. Vacuum ultraviolet CD has proven a better indication of helical type than the longer wavelength conventional CD. The addition of a thermo-regulated sample holder permitted improved short wavelength penetration, reduced problems of bubble formation in short pathlength samples and sharpened spectral bands. The circular dichroism of the 1300 nm band of photooxidized photosynthetic reaction centers from Rhodopseudomonas viridis was measured. The fluorescence lifetime spectrometer became fully functional in 1984. A gating circuit was built to eliminate artifacts in the fast timing electronics. A systematic survey of the lifetimes of the amino acid tyrosine and a large number of chemically related compounds was begun. The results will provide information on the solution conformation of peptide hormones such as insulin. F.M.R.

N86-22358# Yale Univ., New Haven, Conn. Dept. of Physics.
THE EFFECTS OF AUTOIONIZATION ON THE ALIGNMENT OF Cd+(4d95s2,2D5/2)
Z. M. Goodman, C. D. Caldwell, and M. G. White (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 148-150 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The benchmark process for photoionization-induced alignment in atoms is the fluorescence decay of the excited d-hole states of Cd(+). Fluorescence polarization measurements, from which alignment is derived, have been made at the He I (2,3)- and Ne II (3) resonance lines, and recently, Kronast, et al., covered the region from threshold for 2D5/2 production at 705.1 A to 400 A. Although these authors see evidence for the presence of doubly excited autoionizing resonances, a detailed study of the variation of alignment through an autoionizing resonance has not been made. It is just such a measurement which is reported here. Author

N86-22359# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
APPLICATION OF VACUUM ULTRAVIOLET PHOTON BEAMS TO TRANSIENTS PRODUCED BY DISCHARGE-FLOW TUBE SOURCES: PHOTOIONIZATION EFFICIENCY SPECTRUM OF O2(1 DELTA g)
J. R. Grover, R. B. Klemm, and F. L. Nesbitt *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 151-153 refs (For primary document see N86-22326 12-73)
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The photoionization spectrum of a (1 delta g) oxygen was measured previously only over the limited range from its threshold at 11.09 eV up to the threshold for the ionization of the O2(x3sig-mag-) ground state at 12.071 eV. However, the availability of monochromatic photon beams of high intensity at the National Synchrotron Light Source and the development of efficient spectrum-stripping techniques now make it feasible to observe the photoionization of (1 delta g) oxygen in the presence of ground state oxygen. Therefore a wider span of photon energies can be covered than was heretofore possible. Also, the investigation of a transient species such as O2(a1 delta g) serves as a demonstration of the application of discharge flow tube techniques at synchrotron light beam lines to measure thermochemical properties and spectra of the radicals and highly reactive molecular fragments that are significant intermediates in flow tube studies of fast chemical reactions in the gas phase. Author

N86-22360# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
MEASUREMENT OF THE DISSOCIATION ENERGIES OF GAS PHASE NEUTRAL DIMERS BY A PHOTOIONIZATION TECHNIQUE
J. R. Grover, M. G. White, E. A. Walters (New Mexico Univ., Albuquerque), J. K. Newman (New Mexico Univ., Albuquerque), E. T. Hui (New Mexico Univ., Albuquerque), and P. F. Fernandez (New Mexico Univ., Albuquerque) *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 154-156 refs (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
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A knowledge of the dissociation energies of weak polyatomic heterodimers in the gas phase provides extremely important information for the study of long range intermolecular forces, which study is crucial if chemical reactivity is to be understood in detail. Unfortunately, very few such dissociation energies are known because the measurements have been very difficult. To help alleviate this problem a photoionization technique has been developed for making these measurements that is proving to be fast, unambiguous, sensitive, accurate, and reasonably general. Author

N86-22361# New Mexico Univ., Albuquerque.
ENERGY FLOW IN VAN DER WAALS MOLECULES
E. A. Walters, J. K. Newman, E. T. Hui, P. F. Fernancez, J. R. Grover (Brookhaven National Lab., Upton, N.Y.), and M. G. White (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 157-159 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Energy disposal in isolated molecules and during collisions between molecules is fundamental to chemical processes. The high brightness of the synchrotron radiation from the stored electron beam of NSLS is used to probe energy flow in van der Waals molecules. These species are generally dimeric clusters of molecules bound together only by long range attractive forces collectively known as van der Waals forces. In many respects they resemble chemical reagents frozen at the stage of formation of collision complexes. This is a particularly significant stage at which to interrupt a chemical reaction and to probe the energy flow. The results of chemical reactions on energy migration in loosely bound systems are described. Author

N86-22362# Brookhaven National Lab., Upton, N. Y. Dept. of Chemistry.
PHOTOELECTRON SPECTROSCOPY OF AUTOIONIZING RYDBURG STATES IN SMALL MOLECULES
M. G. White and J. R. Grover *In its* Activity on the National Synchrotron Light Source (NSLS) 1984 p 160-162 (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

Unlike Rydberg series involving promotion of the outermost valence electron, Rydberg states resulting from excitations of deeper lying valence orbitals usually lie above the ionization potential. Although the latter belong to the neutral excited state manifold, such super-excited Rydberg levels are likely to interact with the degenerate ionization continuum, leading to the well-known phenomenon of autoionization. Autoionizing Rydberg and non-Rydberg resonances have been identified and characterized for a large number of molecules by photoabsorption and photoionization (integrated) measurements. Their effect on the internal energy distribution of the resulting ions, however, has been difficult to study due to the lack of suitably intense laboratory light sources (below 1000 A) required for such detailed measurements. It is the aim of the present work to systematically measure the decay of selectively excited autoionizing Rydberg states in small molecules through use of photoelectron spectroscopy and the intense, tunable, narrow-band radiation from the U-1 beam line of NSLS. Such data provide the basis for understanding the complex interaction between the molecular ion core and photoexcited electron, which is responsible for the autoionization process. Author

N86-22363# Pennsylvania Univ., Philadelphia.
DEEXCITATION ELECTRON SPECTROSCOPY OF FREE AND COORDINATED CO c74
C. T. Chen, W. K. Ford, R. A. DiDio, E. W. Plummer, and W. Eberhardt (Exxon Research and Engineering Co., Annandale, N.J.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 163-165 refs (For primary document

e N86-22326 12-73)
vail: NTIS HC A10/MF A01

The resonant absorption behavior of free and coordinated olecules can be readily measured with tunable soft X-ray sources. o study the electronic details of the molecule-substrate interaction, e de-excitation of molecules that have been resonantly excited n also be monitored. Deexcitation electron spectroscopy (DES) the analysis of electrons emitted following the decay from a asonantly excited neutral state, and is complementary to hotoemission (PES) and Auger (AES) spectroscopies. This new chnique is well-suited to the study of valence-charge redistribution nd excited-state lifetimes in molecules. DES has been used to ompare the decay channels of resonantly excited CO in two onfigurations: strongly bound in the carbonyl complex Cr(CO)6, nd weakly adsorbed on Cu(110). The DES spectra of these two ystems show large intensity variations characteristic of the bonding onfiugrations. The 1Pi-3Pi splitting of CO following the C sub Is ields 2 pi transition can also be measured by a comparison of ES with PES. Author

86-22364*# Jet Propulsion Lab., California Inst. of Tech., asadena.
URFACE SENSITIVE PHOTOEMISSION EXAFS: A NEW TRUCTURAL TOOL
K. M. Choudhary (Stevens Inst. of Tech., Hoboken, N.J.), G. M. Rothberg (Stevens Inst. of Tech., Hoboken, N.J.), M. L. denBoer, G. P. Williams (Polytechnic Inst. of New York, Brooklyn), M. H. Hecht, and I. Lindau (Stanford Electronics Labs., Calif.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 166-168 refs Sponsored in part by DOE and National Science Foundation (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

A new technique for surface EXAFS has been developed. In this technique the absorption fine structure is observed by monitoring the photoelectrons emitted from core levels as a function of photon energy. The surface sensitivity is achieved by detecting elastic photoelectrons that escape to the vacuum from a few atomic layers near the surface. EXAFS from Mn 3p and F2s outer core levels in MnF2 were measured, the results were compared with transmission EXAFS from Mn Is core level and good agreement was found. This development is significant because: (1) almost all elements have suitable core levels of low binding energy; (2) since photopeaks from adjacent core levels do not cross as the photon energy is varied, the limitations imposed on other surface EXAFS techniques by this interference is removed. Auger electrons, which have fixed kinetic energies and so can cross photopeaks, will generally have low energies if they originate from outer core levels and be unlikely to appear in the EXAFS region of kinetic energies, i.e., in excess of about 50 eV; (3) VUV light is used, which greatly extends the usable range of photon energies; (4) more than one element in a solid may be studied with the same monochromator. The experiments were carried out on the VUV beam line U14A at NSLS. Author

N86-22365# Utah Univ., Salt Lake City. Dept. of Materials Science and Engineering.
STUDIES OF THE ELECTRONIC STRUCTURE AND EXCITATION PROPERTIES OF VANADIUM-OXYGEN COMPOUNDS WITH TETRAHEDRAL AND OCTAHEDRAL V-O COORDINATION. PART 1: VANADIUM PENTOXIDE
I. M. Curelaru, K. S. Din, J. Barth (IBM Watson Research Center, Yorktown Heightrs, N.Y.), G. P. Williams (Brookhaven National Lab., Upton, N.Y.), and N. Lucas (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 169-170 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Vanadium-oxygen compounds are the subject of active current interest. The investigation of vanadium pentoxide is the first part of a larger project devoted to studies of five series of oxides, vanadates, and bronzes. Characteristic for all these materials is the enclosure of vanadium atoms within rigid oxygen cages with tetrahedral or octahedral V-O coordination. The previous XPS, EELS, and APS studies have revealed large final state many body effects in the highly localized excited configurations of the VO sub n ionic clusters. The present synchrotron radiation photoemission experiment is particularly interesting. Tuning through edges and detecting the decay products of various final state configurations should provide important information on the structure of orbitals and the excitation dynamics. The main objectives are: (1) to gain insight into the detailed electronic structure, bonding characteristics, and excitation properties of the studied materials; (2) to evaluate the photoionization cross sections of valence and shallow levels in the energy range from 20 to 200 eV; and (3) to study the phase instability of non-stoichiometric or open-structure compounds caused by particle (electron and/or ion) bombardment. Author

N86-22366# Utah Univ., Salt Lake City. Dept. of Materials Science and Engineering.
PHOTOEMISSION STUDIES OF I-II, I-III INTERMETALLIC COMPOUNDS WITH B32 (ZINTL) STRUCTURE. PART 1: LiAl
I. M. Curelaru, K. S. Din, G. P. Williams (Brookhaven National Lab., Upton, N.Y.), and N. Lucas (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 171-172 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The I-II, I-III intermetallic compounds with B32 (Zintl) structure have recently attracted considerable interest because one of the members of this family (LiAl) is a promising candidate for an electrode material in high energy density (lithium-sulfur) batteries. In addition, these materials are useful as solid blankets for nuclear reactors. The experimental and theoretical data obtained so far for these materials raise a number of problems that warrant a thorough consideration, among which: (1) the conductivity behavior (metallic in I-II compounds and p-type in I-III compounds); (2) the finite vacancy concentration in I-III compounds even at low temperatures; and (3) the discrepancies between the results of different band structure calculations, and their poor agreement with the reported experimental data. A systematic experimental study of the electronic structure of the occupied and empty states of representative compounds in the I-II and I-III series was recently begun by using the complementary information provided by a number of electron and X-ray spectroscopies, including XPS, EELS, AES, APS, and synchrotron radiation photoelectron and yield spectroscopies. Results follow. Author

N86-22367# State Univ. of New York, Stony Brook. Dept. of Chemistry.
PHOTON STIMULTED DESOPRTION OF IONS FROM POLYMER SURFACES
D. M. Hanson, S. L. Anderson, M. C. Nelson, G. P. Williams (Brookhaven National Lab., Upton, N.Y.), and N. Lucas (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 173-174 refs (For primary document see N86-22326 12-73)
(Grant NSF CHE-82-15061)
Avail: NTIS HC A10/MF A01

The desorption of ions from solid molecular films following deep valence or core level excitation using synchrotron radiation has been reported for a few relatively small molecules. Using the instrumentation on beamline U14A of NSLS, the first results for the case of polymers have been obtained. Detailed studies were made of thin films of polystyrene and polyethylene, which were characterized by ion and electron yield spectra in the region of the carbon K edge. Author

N86-22368# Notre Dame Univ., Ind. Dept. of Chemistry and Radiation Lab.
RESONANCE VALENCE-BAND PHOTOEMISSION AND h Nu DEPENDENT 3p PHOTOEMISSION OF MnF2
R. G. Hayes and T. K. Sham (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 175-177 refs (For

primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

This experiment was a preliminary part of a project which is concerned primarily with the h sub mu dependence of 3p photoemission in transition-element compounds. The primary objective of the work is to seek evidence for the presence of satellite structures in 3p photoemission. Examination of the resonance valence-band photoemission was undertaken because of the considerable recent interest in this phenomenon in compounds and because of the idea that the resonant part of the balance photoemission amplitude should be concentrated more in the ligand field states (that is, more in the states which are described in first approximation as d states) the more ionic the system. Author

N86-22369# Polytechnic Inst. of New York, Brooklyn.
RESONANT PHOTOEMISSION STUDIES OF f-ELECTRON SYSTEMS PERFORMED ON STATION U14
R. D. Parks, S. Raaen, M. L. denBoer, Y.-S. Chaug, and G. P. Williams (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 178-180 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

The study of the behavior of f-electrons in the early rare earths and early actinides has become an area of strong current interest. This results from (1) the anomalous nature of the 4f instability in mixed valent Ce-based systems, which appears to fall outside the usual promotional model description of mixed valence, and (2) the recent discovery of superconductivity in several Ce- and U-based (so-called heavy fermion) systems, where the effective mass of the electrons responsible for the superconductivity is of an order 200 times the free electron mass. F-Derived photoemission experiments allow one to observe the response of the electronic system to the presence of a 4f hole, this being of particular interest in the rare earths because of the Coulomb disturbance created by the deep core 4f hole. Moreover, these experiments reveal the juxtaposition of f-states and valence band states and allow the probing of hybridization effects between the f-electrons and conduction or ligand electrons. The use of a synchrotron light source allows one to employ Fano resonances which enhance the f-derived features, thereby allowing isolation of f-derived features from other features in the valence band. Author

N86-22370# IBM Watson Research Center, Yorktown Heights, N.Y.
CONTACT X-RAY MICROSCOPY OF BIOLOGICAL MATERIALS
Lorena Beese and Ralph Feder *In* Brookhaven National Lab. [Activity of the National Synchrotron Light Source (NSLS) 1986 p 181-182 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

In contact X-ray microscopy, X-rays pass through the biological sample and expose an underlying X-ray sensitive material (photoresist), producing an image that reflects the photon absorbance within the specimen. Because this absorbance is a function of the energy of the incident X-rays, tuneable synchrotron radiation can be used to vary the contrast in X-ray images, accentuating regions of different chemical composition. The technique is capable of resolution of the order of 100 A. Progress has been made toward automating the data collection process. A sample holder was developed that enables up to 28 different samples to be exposed sequentially. The X-ray wavelength and exposure for each sample can be pre-programmed and the experiment run under control of a microcomputer. Preliminary experiments have been made to assess the feasibility of using contact X-ray microscopy to determine the distribution of elements (differential absorption microanalysis) within biological samples. In principle, differences between images of samples exposed to wavelengths slightly above and slightly below the absorption edge of an element could be used to indicate the distribution and concentration of the element. Differences in contrast have been observed which may be correlated not only with elemental distribution, but also with the location of protein and lipid within the biological sample. Author

N86-22371# Brookhaven National Lab., Upton, N. Y.
X-RAY HOLOGRAPHY EXPERIMENTS ON THE U15 BEAM LINE
M. R. Howells and M. Larocci *In its* Activity of the National Synchrotron Light Source (NSLS) 1984 p 183-185 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

For many years scientists have tried to make a new and unique microscope by recording a hologram in the X-ray region and reconstructing it with visible light. This would be expected to give the superb, instant three dimensional picture typical of the holographic method plus the special information gathering properties of the X-ray probe. Under suitable conditions the magnification of the device should naturally be the ratio of the X-ray to visible light wavelength. This type of microscopy has not been realized due mainly to the poor coherence properties of microfocus X-ray tubes and other available sources. With the present rapid improvement of synchrotron radiation sources, the introduction of dedicated storage rings, and the demonstration of undulators in the soft X-ray region, sources of vastly greater coherent power and correspondingly improved possibilities for holographic microscopy are now available. Using the U15 beam line of NSLS, initial aim is to equal or surpass the performance (especially resolution) achieved in earlier experiments and to try to demonstrate that the understanding of X-ray holography is correct. To this end holograms have been made of various objects, mostly rather simple, so that there would be some possibility of comparison with theory. Author

N86-22372# State Univ. of New York, Stony Brook. Dept. of Physics.
SCANNING SOFT X-RAY MICROSCOPY ON THE U15 BEAM LINE
C. Jacobsen, J. M. Kenney, J. Kirz, R. Rosser, F. Cinotti (Brookhaven National Lab., Upton, N.Y.), and H. Rarback (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1985 p 186-188 Sponsored in part by National Science Foundation (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

Soft X-rays are well suited to the imaging of biological materials. The instrumentation for scanning microscopy has been developed and applied the apparatus to the study of a variety of specimens. The basic optical element in the microscope is a Fresnel zoneplate, fabricated for us at IBM using electron beam lithography techniques. This zoneplate is used to focus the X-ray beam to a 0.2 micrometer spot. The specimen is mechanically scanned past this spot, while the X-rays transmitted through it are detected by a flow proportional counter. The output from the counter is used to form the image, a map of the specimen absorptivity. Author

N86-22373# State Univ. of New York, Stony Brook. Dept. of Physics.
GAS PHASE SPECTROSCOPY IN THE SOFT X-RAY REGION OF THE U15 BEAMLINE
Bing Xin Yang, Janos Kirz, and Tsun K. Sham (Brookhaven National Lab., Upton, N.Y.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1985 p 189-190 refs Sponsored in part by National Science Foundation (For primary document see N86-22326 12-73)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A10/MF A01

The U15 beamline operates with a toroidal grating monochromator. It delivers a beam in the 300eV - 1200eV range with a typical bandwidth of 1/300. The experimental station is isolated from the storage ring by a 1500 A thick aluminum contamination barrier. These characteristics make it attractive to use the beamline for spectroscopy near the nitrogen and oxygen absorption edges, especially for specimens which are either gaseous or are incompatible with ultrahigh vacuum systems for other reasons. The hardware and the software to collect near edge and X-ray

Absorption Fine Structure (EXAFS) spectra of gases has been developed in three ways: (1) transmission; (2) ion yield; and (3) scintillation. During the development of the system data has been collected on a variety of materials, such as oxygen, carbon dioxide, water vapor, and ethyl alcohol. The thickness effect has been studied, and the relationship between the three types of spectra obtained. The spectra obtained on carbon dioxide are shown. The structure near the oxygen edge is in qualitative agreement with results obtained. Structure at higher energies is suggestive of EXAFS. Author

N86-22374 Pennsylvania Univ., Philadelphia.
SOME ASPECTS OF THE PHENOMENOLOGICAL AND MICROSCOPIC THEORY OF NUCLEAR COLLECTIVE MOTION Ph.D. Thesis
Dennis Bonatsos 1985 244 p
Avail: Univ. Microfilms Order No. jDA8523396

Low lying collective states in nuclei are described from the phenomenological and the microscopic point of view. First, the Variable Moment of inertia model was generalized so as to be applicable to transitional and vibrational nuclei. Two three-parameter models, the Variable Anharmonic Vibrator Model and the Generalized VMI model were introduced and applied to all known ground state bands of medium and heavy even nuclei away from closed shells. Except for strongly deformed nuclei, these models substantially improve the agreement with the data. Backbending in even nuclei is fitted next, by mixing a ground state, beta or gamma band with a superband characterized by a constant moment of inertia and applying either the standard band coupling formalism or the constant interband interaction formalism. An approximate method for carrying out the boson mapping in the seniority scheme is described, in which the boson expansion of the pair and multipole operators are determined by satisfying the commutation relations for the associated Lie algebra. A special closed set of communication relations satisfied by the fermion pair and multipole operators for a major shell in LST coupling is found. Dissert. Abstr.

N86-22375# Mission Research Corp., Santa Barbara, Calif.
MONTE CARLO CALCULATIONS ON THE DIRECT CABLE DRIVE DUE TO GAMMA RADIATION Technical Report, 30 Jun. - 1 Aug. 1984
Ed Kalasky 1 Dec. 1984 72 p
(Contract DNA001-81-C-0151; DA Proj. X99-QMXV)
(AD-A161734; AD-E301842; MRC-R-835; DNA-TR-85-8) Avail: NTIS HC A04/MF A01 CSCL 20/14

Two Monte Carlo codes, labeled MCABLE and MCIMP, were developed to determine the direct drive currents in cables due to gamma radiation. MCABLE was written in cylindrical coordinates for circular shaped cables and MCIMP in Cartesian coordinates for any arbitrary shape. A background into single and multiple scattering theory with an emphasis on the Moliere and Scott-Snyder distribution functions is presented. Range and emission current calculations are provided to substantiate the validity and accuracy of the technique used in the Monte Carlo codes. An experimental comparison was also made to verify the accuracy of the codes. A parametric study was conducted on the response of a coaxial cable due to variations in the dimensions and material types. Based on this study, a simple model for estimating the shield and center conductor currents is presented. Finally, a comparison is made between the response of eight cables measured in the laboratory and the Monte Carlo code MCABLE. GRA

N86-22376# Berkeley Research Associates, Inc., Calif.
DEVELOPMENT OF RESEARCH TOOLS TO STUDY STRUCTURE AND EVOLUTION IN THE INTERMEDIATE ALTITUDE REGIME Final Technical Report, 1 Nov. 1983 - 31 Oct. 1984
Stephen H. Brecht 22 Jan. 1985 29 p
(Contract DNA001-84-C-0018)
(AD-A162707; AD-E301861; BRA-85-496R; DNA-TR-85-63) Avail: NTIS HC A03/MF A01 CSCL 18/3

This report covers the initial research on alternative methods to study aspects of the nonlinear dynamics of low and intermediate altitude fireballs. The research consisted of developing a 2-D vertex-in-cell code, VINCE, and examining the flow field interaction of some simple multiple burst scenarios during the rise and torusing phase of the dynamics. This code will allow the study of a variety of potential structure mechanisms. It was determined that a 3-D version of this code was possible. A final aspect of the research reported here was a cursory study of the problem of small scale structure convention in large codes. Some speculative ideas are presented. GRA

N86-22377# California Univ., Los Angeles. School of Engineering and Applied Science.
HIGH REPETITION RATE ELECTRON BEAM RF-ACCELERATION AND SUB-MILLIMETER WAVE GENERATION VIA A FREE ELECTRON LASER Annual Progress Report, 15 Aug. 1984 - 14 Aug. 1985
N. C. Luhmann, Jr. and D. B. McDermott 14 Aug. 1985 22 p
(Contract N00014-84-K-0569)
(AD-A162791) Avail: NTIS HC A02/MF A01 CSCL 20/5

A Radiofrequency linac has been constructed which is specifically designed for Free electron laser applications. The shunt resistance is moderate, thereby allowing the acceleration of relatively high beam currents (somewhat 1 A) which will result in moderate FEL gains (somewhat 10 dB). Numerical simulation of the single-cavity TM sub 010 linear accelerator has been performed to determine the optimum cavity length. For this value, optimally phased electrons cross the cavity in one half of the RF cycle. This length is dependent on both the input and desired output energies. For the calculations 10 kV was chosen as the input electron energy and 725 kV as the output energy in order to amplify 94 GHz radiation with a 3.0 cm period wiggler. GRA

N86-22378# Oak Ridge National Lab., Tenn.
(252)Cf-SOURCE-DRIVEN NEUTRON NOISE ANALYSIS METHOD
J. T. Mihalczo, W. T. King, and E. D. Blakeman 1985 32 p
Presented at the DOE Subcritical Reactivity Measurements Workshop, Albuquerque, N. Mex., 26 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018094; CONF-8508105-4) Avail: NTIS HC A03/MF A01

The Cf-252-source-driven neutron noise analysis method has been tested in a wide variety of experiments that have indicated the broad range of applicability of the method. The neutron multiplication factor k(sub eff) has been satisfactorily determined for a variety of materials including uranium metal, light water reactor fuel pins, fissile solutions, fuel plates in water, and interacting cylinders. For a uranyl nitrate solution tank which is typical of a fuel processing or reprocessing plant, the k(sub eff) values were satisfactorily determined for values between 0.92 and 0.5 using a simple point kinetics interpretation of the experimental data. The short measurement times, in several cases as low as 1 min, have shown that the development of this method can lead to a practical subcriticality monitor for many in-plant applications. The further development of the method will require experiments oriented toward particular applications including dynamic experiments and the development of theoretical methods to predict the experimental observables. DOE

N86-22379# Hanford Engineering Development Lab., Richland, Wash.
PERFORMANCE TESTING OF REFRACTORY ALLOY-CLAD FUEL ELEMENTS FOR SPACE REACTORS
D. S. Dutt, C. M. Cox, R. A. Karnesky, and M. K. Millhollen 1985 9 p Presented at the 20th Intersociety Energy Conversion Engineering Conference, Miami Beach, Fla., 18 Aug. 1985
(Contract DE-AC06-76FF-02170)
(DE85-018209; HEDL-SA-3347-FP; CONF-850808-25) Avail: NTIS HC A02/MF A01

Two fast reactor irradiation tests, SP-1 and SP-2, provide a unique and self-consistent data set with which to evaluate the technical feasibility of potential fuel systems for the SP-100 space reactor. Fuel pins fabricated with leading cladding candidates (Nb-1Zr, PWC-11, and Mo-13Re) and fuel forms (UN and UO2)

are operated at temperatures typical of those expected in the SP-100 design. The first US fast reactor irradiated, refractory alloy clad fuel pins, from the SP-1 test, reached 1 at. % burnup in EBR-II in March 1985. At that time selected pins were discharged for interim examination. These examinations confirmed the excellent performance of the Nb-1Zr clad uranium oxide and uranium nitride fuel elements, which are the baseline fuel systems for two SP-100 reactor concepts. DOE

N86-22380# California Univ., Santa Barbara. Dept. of Electrical and Computer Engineering.
ELECTRON ACCELERATION BY LASER FIELDS IN A GAS Technical Progress Report
J. R. Fontana 1 Oct. 1985 50 p
(Contract DE-AS03-84ER-40136)
(DE86-000983; DOE/ER-40136/T3) Avail: NTIS HC A03/MF A01

The interaction of an electron with laser radiation within an optical waveguide is discussed. The use of cylindrical waveguides allows extension of the interaction region beyond the distance imposed by the geometrical constraints of Cherenkov angle and beam width. The guide loss depends on the mode and the nature of the wall. Numerical examples are given. Results of computer simulations of electron trajectories under simultaneous acceleration and gas deflection collisions are given. A conference paper describes the use of interactions between laser fields and charged relativistic particles inside a passive gas medium for high-energy acceleration. Suitable geometrical configurations are discussed quantitatively, and consideration is given to gas breakdown and collision effects. It is shown how currently available laser powers can yield large electron acceleration gradients and total energy gain while controlling beam spreading by the inherent focusing properties of the fields. Another paper proposes a scheme using the inverse Cherenkov effect to focus particle beams with the potential of high focusing gradients and rapid, accurate control of the focusing elements. DOE

N86-22381# Tennessee Univ., Knoxville. Dept. of Physics.
BUBBLE CHAMBER STUDIES OF HADRON AND PHOTON INTERACTIONS Progress Report, 1 Oct. 1984 - 30 Sep. 1985
W. M. Bugg, J. E. Brau, G. T. Condo, T. Handler, and E. L. Hart Oct. 1985 44 p
(Contract DE-AS05-76ER-03956)
(DESS-002513; DOE/ER-03956/4) Avail: NTIS HC A03/MF A01

The past year has been a hectic one with extended runs at Fermilab and SLAC, equipment design and construction, and installation of holographic scanning devices at Tennessee. Highlights include data analysis on charm and non-charm parts of BC72-73-75 by Brau, Condo and Handler, and solid proof of feasibility of holographic bubble chamber techniques for large bubble chambers by E745. However, the most important contribution of the Tennessee Group was to calorimetry for the SLD detector. Almost two years after his bold and independent initiative within the SLD collaboration, the calorimetry studies of Jim Brau supported consistently by tests of four different calorimeters by the SLD collaboration, has resulted in a decision to build the SLD calorimeter out of lead rather than uranium. This will result in a net savings of nearly 1.5 million dollars with negligible degradation in performance characteristics. DOE

N86-22382# Illinois Univ., Urbana. Fusion Studies Lab.
ALPHA-PARTICLE-DRIVEN INSTABILITY OF ALFVEN WAVES IN A TANDEM MIRROR Final Summary Report, 21 Feb. - 20 May 1985
S. K. Ho 20 Aug. 1985 21 p
(Contract W-7405-eng-48)
(DE86-000741; UCRL-15719) Avail: NTIS HC A02/MF A01

Alpha particles born at D-T fusion are mirror confined in the tandem mirror due to their relatively high energy. Therefore, they have a loss-cone type distribution in the velocity space. This anisotropy is susceptible to microinstability. The objective of this work is to study the possible instability that can be driven by the alpha loss-cone. The low frequency (at the order of the ion cyclotron frequency) wave spectrum is studied to seek the waves that can be destabilized by the alphas. The radial mode structure is found for the growth rate calculation. The alpha particle distribution with a loss-cone is obtained from a Legendre function expansion and a diffusion front method. The growth rate of the instability is formulated from linear stability theory and computed numerically. A marginal stability boundary in the ion density and temperature parameters is calculated. DOE

N86-22383# Los Alamos National Lab., N. Mex.
LAMPF: ITS ORIGINS, HISTORY, AND ACCOMPLISHMENTS
L. Rosen 1985 26 p refs Presented at the Kyoto International Symposium: The Jubilee of the Meson Theory, Kyoto, Japan, 15 Aug. 1985
(Contract W-7405-eng-36)
(DE86-000814; LA-UR-85-3340; CONF-8508120-2) Avail: NTIS HC A03/MF A01

The main vehicle for bringing the pion to bear on a vast array of problems has been the meson factories. Today there exist such facilities in Switzerland (SIN), in Canada (TRIUMF), and in the USA (LAMPF). A fourth is just now being completed in the Soviet Union. They are enormous enterprises - the current replacement value of LMPF is $350 million, not including the part devoted to national security problems. But they accommodate hundreds of scientists from around the world and by so doing generate political as well as intellectual and economic capital. Proton facilities, together with heavy-ion accelerators and electron facilities, form a triad on which stands the present edifice of experimental nuclear science. Each leg of this triad is dependent, to a greater or lesser extent, on the other two. However, in terms of versatility, the size of the community it serves, and the relatively short-term application of the knowledge base and people base for which nuclear science is responsible, the meson factory part of the above triad is by no means the least important component. I discuss this component from the standpoint of the facility I know best, namely LAMPF. DOE

N86-22384# California Univ., Berkeley. Lawrence Berkeley Lab.
FLOW OF NUCLEAR MATTER
H. G. Ritter, K. G. R. Doss, H. A. Gustafsson, H. H. Gutbrod, K. H. Kampert, B. Kolb, H. Loehner, B. Ludewigt, A. M. Poskanzer, and A. Warwick Aug. 1985 9 p refs Presented at the 2nd International Conference on Nucleus-nucleus Collisions, Visby, Sweden, 10 Jun. 1985 Prepared in cooperation with Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)
(Contract DE-AC03-76SF-00098)
(DE86-001484; LBL-20086; CONF-850672-5) Avail: NTIS HC A02/MF A01

The systems Nb + Nb and Au + Au have been measured at different energies at the Bevalac with the Plastic Ball spectrometer. Distributions of the flow angles as a function of charged particle multiplicity are presented. Also shown is a transverse momentum analysis for 400 MeV per nucleon Nb + Nb. DOE

N86-22385# Lawrence Livermore National Lab., Calif.
NUMERICAL SIMULATION OF AN ACCELERATOR INJECTOR
J. K. Boyd, G. J. Caporaso, and A. G. Cole May 1985 13 p Presented at the Particle Accelerator Conference, Vancouver, Canada, 13 May 1985
(Contract W-7405-eng-48)
(DE86-001572; UCRL-91878; CONF-850504-291) Avail: NTIS HC A02/MF A01

Accelerator injector designs have been evaluated using two computer codes. The first code self consistently follows relativistic particles in two dimensions. Fields are obtained in the Darwin model which includes inductive effects. This code is used to study cathode emission and acceleration to full injector voltage. The second code transports a fixed segment of a beam along the remainder of the beam line. Using these two codes the effects of electrode configuration on emittance, beam quality and beam transport have been studied. DOE

N86-22386# Lawrence Livermore National Lab., Calif.
RECENT PROGRESS OF THE ADVANCED TEST ACCELERATOR
D. S. Prono 13 May 1985 21 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract W-7405-eng-48)
(DE86-001578; UCRL-91940; CONF-850504-288) Avail: NTIS HC A02/MF A01

Attempts to further improve the beam brightness from field emission cathodes are currently centered on the issue of how beam optics and phase mixing within the injector transport tend to average down the beam brightness. Particle simulation work indicates that beam brightness can be significantly improved by simply reducing the injector transport magnetic field and losing peak transport current, i.e., only transporting that high brightness portion of the total current. The simulation results shown in Figure 8 suggest that beam brightness can be increased perhaps a factor of 5 or more simply by tuning for brightness rather than tuning for peak transported current. If this can indeed be experimentally realized and the resulting beam matched onto accelerator transport (magnetic and/or laser guided) without emittance degradation, then simple field emission cathodes would, at least in the immediately near term, saisfy the needs for 10 micron FEL experiments. DOE

N86-22387# Lawrence Livermore National Lab., Calif.
ANALYTICAL METHODS OF ELECTRODE DESIGN FOR A RELATIVISTIC ELECTRON GUN
G. J. Caporaso, A. G. Cole, and J. K. Boyd May 1985 9 p refs Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985 Previously announced in IAA as A86-10784
(Contract W-7405-eng-48)
(DE86-001584; UCRL-91912; CONF-850504-292) Avail: NTIS HC A02/MF A01

The paraxial approximation is used to derive a differential equation for the applied potential in a relativistic electron gun. The equation incorporates the effects of the beam's own azimuthal magnetic field. The equation is applied to the cases of a parallel beam and an exponentially converging beam. When the paraxial approximation is valid, the solutions provide reasonably accurate results in terms of expected current and axial placement of electrodes. C.D.

N86-22388# Virginia Polytechnic Inst. and State Univ., Blacksburg.
STUDIES OF e(+)e(-) INTERACTIONS Progress Report, Jan. - Dec. 1984
A. Abashian Aug. 1985 12 p
(Contract DE-AS05-80ER-10713)
(DE86-001656; DOE/ER-10713/4B) Avail: NTIS HC A02/MF A01

Virginia Polytechnic Institute and State University has assumed primary responsibility for the design, construction, and testing of an electromagnetic calorimeter which is the primary device for the detection of electrons and photons in the planned AMY detector at TRISTAN. The design of the calorimeter began together with a program of prototyping of components. Several questions regarding the configuration of the detector are discussed. The development of fabrication techniques for the calorimeter and the design and construction of fabrication fixtures are reported. DOE

74 OPTICS

Includes light phenomena.

N86-22389 Stanford Univ., Calif.
ALL-FIBER-OPTIC GYROSCOPE WITH EXTENDED LINEAR DYNAMIC RANGE Ph.D. Thesis
Byoung Yoon Kim 1985 161 p
Avail: Univ. Microfilms Order No. DA8522172

The single mode fiber optic gyroscope is a potential alternative to mechanical and ring laser gyroscopes in many application areas. The fiber optic gyroscope becomes practical only when the periodic response of the interferometer to the rotation rate is linearized over a wide dynamic range. A number of methods that provide a wide linear dynamic range without complicating the optical circuit of an all fiber optic gyroscope are described. One approach to getting a linear dynamic range is to operate the gyroscope in a closed loop mode where a nonreciprocal phase shifter provides a cancellation of the rotation induced phase shift. Three different ways of getting a linear scale factor using a fiber optic phase modulator in place of a nonreciprocal phase shifter are described. Another approach is to translate the optical phase difference in the interferometer into a phase shift in a low frequency electronic signal using an optical phase modulation in conjunction with simple electronic signal processing. Dissert. Abstr.

N86-22390*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPTICAL ELEMENTS FORMED BY COMPRESSED GASES: ANALYSIS AND POTENTIAL APPLICATIONS
Walton L. Howes 1986 24 p refs
(NASA-TP-2555; E-2561; NAS 1.60:2555) Avail: NTIS HC A02/MF A01 CSCL 20F

Spherical, cylindrical, and conical shock waves are optically analogous to gas lenses. The geometrical optics of these shock configurations are analyzed as they pertain to flow visualization instruments, particularly the rainbow schlieren apparatus and single-pass interferometers. It is proposed that a lens or mirror formed by gas compressed between plastic sheets has potential as a fluid visualization test object; as the objective mirror in a very large space-based telescope, communication antenna, or energy collector; as the objective mirror in inexpensive commercial telescopes; and as a component in fluid visualization apparatuses. Author

N86-22391 Stanford Univ., Calif.
RAMAN HETERODYNE INTERFERENCE PHENOMENA Ph.D. Thesis
Emily S. Kintzer 1985 107 p
Avail: Univ. Microfilms Order No. DA8522174

A laser spectroscopic technique was recently introduced that permits highly sensitive optical detection of nuclear magnetic resonance. This optical heterodyne technique is based on the coherent Raman effect and was demonstrated successfully in hyperfine structure of praseodymium in different crystal hosts, lanthanum trifluoride and yttrium aluminum perovskite. The interference that occurs in the Raman heterodyne technique is a consequence of the linear dependence of the signal on the three participating matrix elements, enabling the detection of relative phases as well as amplitudes. The nature of the interference was fully explored both in experiment and theory. Presented here are the experimental results showing interference between inequivalent nuclear sites and also between Zeeman components of a single site. The results show important differences in the interference behavior of praseodymium in the two crystals. Dissert. Abstr.

N86-22392# Technion - Israel Inst. of Tech., Haifa.
MEASUREMENT OF ATMOSPHERIC TRANSMISSION OVER LONG PATHS IN THE INFRARED SPECTRAL REGION Final Scientific Report, 1 Jan. 1984 - 31 Mar. 1985
U. P. Oppenheim and S. G. Lipson 15 Apr. 1985 21 p
(Grant AF-AFOSR-0023-83)
(AD-A161258; AFOSR-85-0890TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

A field experiment on atmospheric transmission over long paths in the infrared spectral region was carried out in the coastal plain of Israel, near the settlement of Palmachim, about 20 km south of Tel Aviv. The Palmachim experiment was carried out over a north-south optical path of 8.6 km length, along the shore of the mediterranian. The black-body source was kept at 2100 C and the dual-channel spectroradiometer was used to measure the spectrum, using circular variable filters with 4% resolution. GRA

N86-22393# City Coll. of the City Univ. of New York. Dept. of Electrical Engineering.
OPTICAL ACQUISITION, IMAGE AND DATA COMPRESSION Final Technical Report, 1 Mar. 1983 - 31 May 1985
George Eichmann Jul. 1985 99 p
(Grant AF-AFOSR-0081-83)
(AD-A161650; AFOSR-85-0971TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

The Hough transform (HT) is an efficient shape detector that maps straight lines into a two-parameter feature shape. Recently it has been pointed out that the forward Radon transform (FRT), well known from the theory of computed tomography, and the HT are equivalent for binary images. In this paper, analog coherent optical implementation of the FRT is discussed. The FRT will not only be of use in implementing the HT shape descriptors but also act as a coherent optical preprocessor for the implementation of multidimensional convolution, correlation, and spectral analysis using 1-D acoustooptical signal processing devices. Several different coherent optical FRT architectures are presented. Experimental results using conventional coherent Fournier transform configuration are given. The relationship between the coherent optical implementation of the FRT and the inverse Radon transform, an important tool in computed tomography, is also detailed. GRA

N86-22394# Naval Weapons Center, China Lake, Calif.
THE ASYMPTOTIC BEHAVIOR OF AN EXPONENTIAL-TYPE SERIES Final Report, Jan. - Jun. 1985
William O. Alltop and Charles S. Kenney Oct. 1985 9 p
(ZR0-0001)
(AD-A162574; AD-E900528; NWC-TP-6662) Avail: NTIS HC A02/MF A01 CSCL 20/6

The limit of a certain function of three variables is shown to be exponential in one variable and independent of the other two. The function is a generalization of an infinite series arising in the calculation of backscattering of sharp laser pulses in an infinite cloud of isotropic scatterers. Convexity of the function in a particular region enables the evaluation of the asymptotic behavior without extensive algebraic manipulations. GRA

N86-22395# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
EDGE DETECTION
Ellen C. Hildreth Sep. 1985 22 p
(Contract N00014-80-C-0505)
(AD-A162662; AI-M-858) Avail: NTIS HC A02/MF A01 CSCL 20/6

For both biological systems and machines, vision begins with a large and unwieldly array of measurements of the amount of light reflected from surfaces in the environment. The goal of vision is to recover physical properties of objects in the scene such as the location of object boundaries and the structure, color and texture of object surfaces, from the two-dimensional image that is projected onto the eye or camera. This goal is not achieved in a single step: vision proceeds in stages, with each stage producing increasingly more useful descriptions of the image and then the scene. The first clues about the physical properties of the scene are provided by the changes of intensity in the image. The importance of intensity changes and edges in early visual processing has led to extensive research on their detection, description and use, both in computer and biological vision systems. This article reviews some of the theory that underlies the detection of edges, and the methods used to carry out this analysis. GRA

N86-22396# Department of the Air Force, Washington, D.C.
HYBRID SINGLE CRYSTAL OPTIC FIBERS BY GROWTH SOLUTION Patent Application
Stephen C. Rand, inventor (to Air Force) Filed 1 Oct. 1985 9 p
(AD-D011979; US-Patent-Appl-SN-782335) Avail: NTIS HC A02/MF A01 CSCL 20/6

This invention relates generally to glass fiber optics, and particularly, relates to a process of fabricating fibers useful in nonlinear optics applications. This abstract discloses a process of fabricating a hybrid single crystal fiber having nonlinear optical properties such as frequency doubling. Said process includes placing a fiber core upon a bulk nonlinear crystal such as $LiIO_3$ in a saturated growth solution of $LiIO_3$ in water. After the core is encased a sufficient distance crystal growth is stopped. Because of evanescent wave coupling between modes guided by the fiber, whose index of refraction exceeds that of the bulk nonlinear crystal, nonlinear optical polarizations can be generated in the nonlinear optical crystal which radiates new frequencies back into the guided modes. The fiber thereby acquires controllable nonlinear optical properties which glass fibers do not possess. GRA

N86-22397# Department of the Air Force, Washington, D.C.
A REAL-TIME PROGRAMMABLE OPTICAL CORRELATOR Patent Application
Francis T. S. Yu, inventor (to Air Force) Filed 22 Oct. 1985 19 p
(AD-D011990; US-Patent-Appl-SN-790292) Avail: NTIS HC A02/MF A01 CSCL 20/6

A real-time programmable joint transform optical correlator incorporating a magneto-optic spatial light modulator and a liquid crystal light valve therein. Object functions to be correlated are input into the magneto-optic spatial light modulator by a programmable microcomputer as input signals. Real time correlation takes place at the liquid crystal light valve with a coherent read out beam. Cross correlation between the input functions (signals) are obtained through the inverse Fourier transform of the read out coherent illumination and are subsequently output from the correlator. GRA

N86-22398# Department of the Air Force, Washington, D.C.
INFRARED SENSOR TARGET Patent Application
Charles N. Scully, inventor (to Air Force) Filed 26 Aug. 1985 20 p
(AD-D011996; US-Patent-Appl-SN-769114) Avail: NTIS HC A02/MF A01 CSCL 17/5

A target simulator device for simulating infrared radiation from infrared emitting targets. Such devices are often referred to as black body radiation sources and are employed as instruments for testing and calibrating infrared devices. In the present invention, the target simulator device or black body simulates given types of infrared radiation emitting targets and comprises, in general, a plate of beryllium oxide (BeO) mounted in a supportive case. It is provided with external power for heating the plate. The power consumed by heating the BeO plate of this invention amounts to only 44 percent of that required by a conventional commercial black body with the same effective target area. Author (GRA)

N86-22399# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Kreiseltechnik und Traegheitsnavigation.
CONSTRUCTION OF FIBER OPTICS TWO-BEAM INTERFEROMETERS AND INVESTIGATIONS OF THE STRAIN AND TEMPERATURE SENSITIVITY
Norbert Fuerstenau Aug. 1985 47 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-980)
(DFVLR-FB-85-56; ISSN-0171-1342) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 18

Investigations on fiber optic Mach-Zehnder and Fabry-Perot interferometers are described as a first step in the development of a digital fiber optics control and sensor system. Measurements on laboratory setups yield a digital strain resolution of 0.56 micron count in agreement with the theoretically derived result. The measured temperature resolution is 0.04 Km/count per 1 m fiber, a value 20% lower as compared to the theoretical one. For automatic fringe counting the Mach-Zehnder setup was modified into a two-polarization type interferometer and its operation was tested by measuring strain and temperature characteristics. Author (ESA)

N86-22279# Joint Publications Research Service, Arlington, Va.
STUDY OF THE KINETICS OF MOLECULAR NITROGEN BY

THE METHOD OF WIDE-BAND COHERENT ANTISTOKES SCATTERING OF LIGHT Abstract Only
A. A. Devyatov, S. A. Dolenko, and N. N. Roy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 27 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 6, Apr. 1985 p 1355-1359 Original language document was announced in IAA as A85-35878 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22280# Joint Publications Research Service, Arlington, Va.
NONLINEAR OPTICAL SPECTROSCOPY OF PHONON POLARITONS Thesis - USSR Academy of Sciences Abstract Only
Yuriy Nikolayevich Polivanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 28 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22281# Joint Publications Research Service, Arlington, Va.
DIAGNOSIS OF POPULATIONS AND RELAXATION PROCESSES OF VIBRATIONAL AND ROTATIONAL STATES OF MOLEUCLES IN GASES BY COHERENT ANTI-STOKES SCATTERING SPECTROSCOPY Thesis - USSR Academy of Sciences Abstract Only
Viktor Immanuilovich Fabelinskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 29 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22282# Joint Publications Research Service, Arlington, Va.
INTENSE BEAMS OF COLD ATOMS FOR LASER SPECTROSCOPY Abstract Only
V. I. Balykin, V. C. Letokhov, V. G. Minogin, and A. I. Sidorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 30 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), vol. 49, no. 3, Mar.1985 p 479-486 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22283# Joint Publications Research Service, Arlington, Va.
DIFFRACTION EFFICIENCY OF HOLOGRAPHIC GRATINGS WITH SYMMETRICAL PROFILES Abstract Only
L. A. Dmitrieva, I. V. Golubenko, and G. M. Savitskin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 31 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 4-6 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22284# Joint Publications Research Service, Arlington, Va.
DETERMINATION OF OPTICAL INHOMOGENEITY OF CYLINDRICAL BODIES BY LIGHT BEAM DEFLECTION Abstract Only
Kh. K. Aben, S. I. Idnurm, Yu. I. Iozepson, M. S. Kaplan, and S. A. Malinovskaya *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 32 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 1, Jan. 1985 p 7-9 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22285# Joint Publications Research Service, Arlington, Va.
ENHANCING EFFICIENCY OF ATOM IONIZATION BY PULSED PERIODIC LASERS Abstract Only
S. V. Andreev, V. I. Minshin, and S. K. Sekatskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 33 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 3(153), Mar. 1985 p 611-614 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22286# Joint Publications Research Service, Arlington, Va.
POSSIBILITY OF COMPENSATING SMALL-SCALE INHOMOGENEITIES BY A ZERNIKE CELL Abstract Only
V. Ye. Sherstebitov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 34 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 91-95 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22287# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF UNIVERSAL INTRAMOLECULAR INTERACTIONS ON LASER RADIATION FROM OXAZINE 17 Abstract Only
N. V. Korolkova, N. V. Kurokhtin, and B. M. Uzhinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 35 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 96-98 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22288# Joint Publications Research Service, Arlington, Va.
RADIATION FOCUSING BY PRISM RASTER Abstract Only
A. S. Dementyev and D. P. Domarkene *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 36 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 12, no. 1, Jan. 1985 p 197-201 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22289# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF FLUORESCENCE KINETICS OF DYES BY PARAMETRIC FREQUENCY CONVERSION Abstract Only
S. A. Pleshanov and V. V. Shuvalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 37 Transl. into ENGLISH from Vestnik Moskovskogo Universiteta Seriya 3: Fizika Astronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1985 p 63-66 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22363# Pennsylvania Univ., Philadelphia.
DEEXCITATION ELECTRON SPECTROSCOPY OF FREE AND COORDINATED CO
C. T. Chen, W. K. Ford, R. A. DiDio, E. W. Plummer, and W. Eberhardt (Exxon Research and Engineering Co., Annandale, N.J.) *In* Brookhaven National Lab. Activity of the National Synchrotron Light Source (NSLS) 1984 p 163-165 refs (For primary document see N86-22326 12-73)
Avail: NTIS HC A10/MF A01

N86-22491*# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
ELECTROFORM REPLICATION OF GRAZING INCIDENCE X-RAY OPTICS
M. P. Ulmer, W. R. Purcell, D. Bedford (Birmingham Univ., England), and G. R. Simnett (Birmingham Univ., England) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 195-198 ref Sponsored by UK Science and Engineering Research Council (For primary document see N86-22461 12-89)
(Grant NAG5-181)
Avail: NTIS HC A14/MF A01

N86-22493# Danish Space Research Inst., Lyngby.
THE XMM IMAGING BRAGG SPECTROMETER WITH A DOUBLY CURVED CRYSTAL
B. Byrnak, F. E. Christensen, N. J. Westergaard and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 209-212 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22498# California Univ., Berkeley. Dept. of Physics.
THE APPLICATION OF REFLECTION GRATINGS TO A LARGE AREA X-RAY SPECTROSCOPY MISSION: A DISCUSSION OF SCIENTIFIC REQUIREMENTS AND VARIOUS DESIGN OPTIONS

Steven M. Kahn and Michael C. Hettrick *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 237-244 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22500# Columbia Univ., New York. Astrophysics Lab.
X-RAY POLARIMETRY ON XMM
R. Novick, G. Chanan, and D. J. Helfand *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 265-275 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-22400 Stanford Univ., Calif.
MEASUREMENTS OF MAGNETOACOUSTIC WAVES IN MHD PLASMAS Ph.D. Thesis
Archibald Currie Munce, Jr. 1985 267 p
Avail: Univ. Microfilms Order No. DA8522202

The results of the interaction between the electromagnetic fields and the acoustic and entropy waves in a partially ionized gas are presented. The effects of this interaction were measured and analyzed for combustion driven magnetohydrodynamic (MHD) generators. The solutions of an MHD dispersion relationship were examined to analyze the effects that the various different MHD operating parameters have upon the three types of waves, with emphasis on both the magnetoacoustic phase velocities, and wave amplitudes. The analysis was facilitated by the introduction of a nondimensional frequency which incorporates the effects of frequency and the magnetic interaction parameter in one variable. The limitations of a dispersion relationship analysis were discussed in detail, including some limitations which were not previously investigated. The experimental results demonstrate that there is an MHD interaction effect on the acoustic waves and that the magnitude of the effect is in good agreement with the predicted results based on the solutions of the MHD dispersion relationship and the acoustic model of the MHD flowtrain. Dissert. Abstr.

N86-22401 Stanford Univ., Calif.
FAR INFRARED DIAGNOSTICS OF ELECTRON CONCENTRATION IN COMBUSTION MHD PLASMAS USING INTERFEROMETRY AND FARADAY ROTATION Ph.D. Thesis
Paul John Kuzmenko 1985 309 p
Avail: Univ. Microfilms Order No. DA8522182

The plasma electrical conductivity is a key parameter in determining the efficiency of an magnetohydrodynamic (MHD) generator. Electromagnetic waves offer an accurate, non-intrusive probe. The electron concentration and mobility may be deduced from the refractive index and absorption coefficient measured with an interferometer. The first experiment used an HCOOH laser at 393.6 microns feeding a Michelson interferometer mounted around a combustor duct with open ports. Simultaneous measurements of positive ion density and plasma temperature made with a Langmuir probe and line reversal apparatus verified the operation of the interferometer. With a magnetic field present, measurement of the polarization rotation and induced ellipticity in a wave traveling along the field provides information on the plasma conductivity. Compared to interferometry, diagnostic apparatus based on Faraday rotation offers simpler optics and requires far less stringent mechanical stability at a cost of lower sensitivity. An advanced detection scheme, using a polarizing beam splitter improved the sensitivity to be comparable to that of interferometry. Interferometry is the preferred technique for small scale, high accuracy measurements, with Faraday rotation reserved for large systems or measurements within a working generator. Dissert. Abstr.

N86-22402# Nagoya Univ. (Japan). Inst. of Plasma Physics.
THEORY FOR RESONANT ION ACCELERATION BY NONLINEAR MAGNETOSONIC FAST AND SLOW WAVES IN FINITE BETA PLASMAS
Yukiharu Oshawa Nov. 1985 40 p refs
(IPPJ-751) Avail: NTIS HC A03/MF A01

A Korteweg de-Vries equation that is applicable to both the nonlinear magnetosonic fast and slow waves is derived from a two-fluid model with finite ion and electron pressures. As in the cold plasma theory, the fast wave has a critical angle theta(c). For propagation angles greater than theta(c) (quasi-perpendicular propagation), the fast wave has a positive soliton, whereas for angles smaller than theta(c), it has a negative soliton. Finite Beta effects decrease the value of theta(c). The slow wave has a positive soliton for all angles of propagation. The magnitude of resonant ion acceleration (the upsilon (p) x B acceleration) by the nonlinear fast and slow waves is evaluated. In the fast wave, the electron pressure makes the acceleration stronger for all propagation angles. The decrease in theta(c) due to finite Beta effects results in broadening of the region of extremely strong acceleration. It is also found that strong ion acceleration can occur in the nonlinear slow wave in high Beta plasmas. Possibility of unlimited acceleration of ions by quasi-perpendicular magnetosonic fast waves is discussed. Author

N86-22403# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PLASMA PRODUCTION WITH ROTATING ION CYCLOTRON WAVE EXCITED BY NAGOYA TYPE-3 ANTENNAS IN RFC-XX
S. Okamura, K. Adati, T. Aoki, D. R. Baker, H. Fujita, H. R. Garner, K. Hattori, S. Hidekuma, T. Kawamoto, and R. Kumazawa Nov. 1985 37 p refs
(IPPJ-752) Avail: NTIS HC A03/MF A01

A method of plasma production with ion cyclotron wave heating was developed in RFC-XX. Nagoya Type-3 antennas were used for the wave excitation and the gas supply was through a gas box. The effect of the rotation field excitation in plasma production and heating was investigated. In m = -1 rotation mode (rotation in the direction of ion cyclotron motion), the plasma density profile is flat within the gas box bore with the line-integrated density n1 = 3 x 10 to the 13th power/sq cm and the ion temperature T sub i approx. 150 eV. For m = +1 mode, a high density plasma was obtained with a different profile which has a peak at the center. In this mode the line-integrated density is nl = 3 x 10 to the 14th power/sq cm with the peak density n(o) = 7 x 10 to the 13th power/cu cm. M.G.

N86-22404 State Univ. of New York, Stony Brook.
FUSION AND FISSION STUDIES FOR THE SYSTEM S-32 + U-238 Ph.D. Thesis
Richard H. Freifelder 1985 76 p
Avail: Univ. Microfilms Order No. DA8522088

The total fusion cross section was measured at energies from .93 to 1.08 times the s-wave interaction barrier for the system S32 + U238. Measurements were made by detecting coincident fission fragments following full momentum transfer in two position sensitive parallel plate avalanche counters. Fission fragment angular distributions were measured from 90 to 166 degrees in the center of mass for all energies except the lowest where the angular range was 127 to 170 degrees. The experimental total fusion cross section was first compared to a one dimensional barrier penetration model which severely underpredicted the data. Then the data were compared to the predictions of coupled channels calculations where the first 2+ and then higher lying states in U238 were included. The calculations with only the 2+ state were able to predict the trend in the data quite well. The measured angular distribution of fission fragments were compared to the predictions of transition state theory. A model using the scission point as the transition state was discussed and predictions based on this model were presented. Dissert. Abst

N86-22405# Air Force Systems Command, Wright-Patterson AFB Ohio. Foreign Technology Div.
A PULSED MAGNETOHYDRODYNAMIC GENERATOR WITH

SUPERCONDUCTING MAGNETIC SYSTEM
V. A. Kirillin, A. Ye. Sheyndlin, E. I. Asinovskiy, V. V. Sychev, and V. B. Zenkevich 8 Nov. 1985 9 p
(AD-A161812; FTD-ID(RS)T-0754-85) Avail: NTIS HC A02/MF A01 CSCL 10/2

An urgent need for creating independent sources of electric power capable of generating a power of tens or hundreds of megawatts in a few milliseconds has now emerged. A pulsed MHD generator, in which the conversion of mechanical energy of explosion products into electrical energy is accomplished, can serve as such a power source. There are published reports on testing of such MHD generators with ordinary magnetic systems. It seemed advisable to study the operation of a pulsed generator with a superconductive magnetic system in the overall plan of research on the creation of magnetohydrodynamic generators. The creation of a pulsed MHD generator with a superconductive magnetic system would make it possible to improve substantially the operational indicators of the installation and to ensure its continuous operation, regardless of the presence of additional power sources for feeding the magnet. The problem of creating an optimum generator and a magnetic system with the maximum acceptable field intensity was not raised in the first stage. The purpose of the work was to investigate the set of questions which arise in the joint use of a pulsed MHD generator and a superconductive magnetic system. GRA

N86-22406# Arizona Univ., Tucson. Dept. of Chemistry.
CHARACTERIZATION OF THE GENERAL ELECTRIC CID-17 AS A DETECTOR FOR PLASMA EMISSION SPECTROMETRY
Interim Report
Robert B. Bilhorn and M. B. Denton 25 Nov. 1985 61 p
(Contract N00014-83-K-0268)
(AD-A162415; TR-42) Avail: NTIS HC A04/MF A01 CSCL 20/9

Rapid qualitative and quantitative elemental analysis of complex mixtures by optical emission spectrometry requires sensitive simultaneous multiwavelength detection. Until the present, this has been possible only by employing a number of discrete detectors. Detectors for plasma emission spectroscopy must meet demanding requirements, i.e., high quantum yield over a wide wavelength range, low noise, and a very wide dynamic range. Studies have indicated that the Charge Injection Device CID-11B possesses characteristics which make it an ideal detector for atomic spectroscopy. The newer CID-17, having more detector elements and a device geometry which would suggest an enhanced ultraviolet response, was a logical choice. An array camera system based on this device has been designed, constructed and evaluated. It has been found to meet all the requirements for use as a detector for plasma emission spectrometry and over some wavelength ranges to be far superior to photomultiplier tubes. With almost 100,000 channels, true multiwavelength detection is obtained making a new wealth of information available to the analytical chemist. GRA

N86-22407# Lawrence Livermore National Lab., Calif.
MAGNETIC SYSTEMS FOR FUSION DEVICES
C. D. Henning Feb. 1985 15 p Presented at the 8th International Conference on Structural Mechanics in Reactor Technology, Brussels, Belgium, 19 Aug. 1985
(Contract W-7405-eng-48)
(DE86-000743; UCRL-91577; CONF-850809-82) Avail: NTIS HC A02/MF A01

Mirror experiments have led the way in applying superconductivity to fusion research because of unique requirements for high and steady magnetic fields. The first significant applications were Baseball II at LLNL and IMP at ORNL. More recently, the MFTF-B yin-yang coil was successfully tested and the entire tandem configuration is nearing completion. Tokamak magnets have also enjoyed recent success with the large coil project tests at ORNL, preceded by single coil tests in Japan and Germany. In the USSR, the T-7 tokamak has been operational for many years and the T-15 tokamak is under construction, with the TF coils nearing completion. Also the Tore Supra is being built in France. DOE

N86-22408# Los Alamos National Lab., N. Mex.
COMPUTATION OF ANGLE AVERAGED CROSS SECTIONS IN A DEGENERATE COMPTON SCATTERING MEDIUM
G. H. Nickel, M. Pochkowski, and W. F. Bailey 1985 9 p refs Presented at the 3rd International Conference and Workshop on Radiative Properties of Hot Dense Matter, Williamsburg, Va., 14 Oct. 1985 Prepared in cooperation with Air Force Inst. of Tech., Wright-Patterson AFB, Ohio
(Contract W-7405-eng-36)
(DE86-000806; LA-UR-85-3382; CONF-8510172-1) Avail: NTIS HC A02/MF A01

An accurate yet simple analytic method is developed for calculating Compton scattering cross sections for monoenergetic photons interacting with an isotropic and degenerate distribution of relativistic electrons. DOE

N86-22409# Los Alamos National Lab., N. Mex.
ANALYTICAL APPLICATIONS OF ICP-FTS
L. M. Faires, B. A. Palmer, and P. T. Cunningham 1985 7 p refs Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract W-7405-eng-36)
(DE86-000819; LA-UR-85-3326; CONF-8510151-8) Avail: NTIS HC A02/MF A01

The Analytical Chemistry Group of the Chemistry Division at Los Alamos National Laboratory has been investigating the analytical utility of the inductively coupled plasma (ICP) Fourier transform spectrometer (FTS) combination. While a new state-of-the-art FTS facility is under construction at Los Alamos, preliminary data have been obtained on the one-meter FTS at the National Solar Observatory at Kitt Peak, Arizona. This paper presents an update of the Los Alamos FTS facility, which is expected to be completed in 1986, and presents data showing the analytical potential of an ICP-FTS system. Some of the potential problems of the multiplex disadvantage are discussed, and the advantages of the high resolution obtainable with the FTS are illustrated. DOE

N86-22410# Oak Ridge National Lab., Tenn.
MIGRATION OF A RADIOACTIVE BERYLLIUM IN THE ISX-B TOKAMAK
A. C. England, D. L. Hillis, and P. H. Edmonds Oct. 1985 20 p
(Contract DE-AC05-84OR-21400)
(DE86-001448; ORNL/TM-9550) Avail: NTIS HC A02/MF A01

One of 12 beryllium tiles on a top rail limiter in the Impurity Study Experiment (ISX-B) tokamak was intentionally made radioactive. The migration of the radioactivity due to melting, ablation, and general excoriation of the radioactive tile was studied. Several hundred milligrams of material from the radioactive tile were spread to the other tiles over the course of the experiment, which consisted of more than 3000 tokamak shots. A small amount of activity was found on the bottom of the tokamak vacuum vessel. The distribution of activity on the other limiter tiles showed a marked radially inward directivity, although all of the tiles received some activity. The possibility that some of the activity was the result of photo- and electro-excitation by runaway electrons cannot be ruled out but probably cannot account for the bulk of the effect. DOE

N86-22411# Oak Ridge National Lab., Tenn.
PLASMA ENGINEERING ANALYSIS OF A SMALL TORSATRON REACTOR
J. T. Lacatski, W. A. Houlberg, and N. A. Uckan Oct. 1985 95 p
(Contract DE-AC05-84OR-21400)
(DE86-001469; ORNL/TM-9533) Avail: NTIS HC A05/MF A01

This study examines the plasma physics and reactor engineering feasibility of a small, medium aspect ratio, high-beta, $l = 2$, D-T torsatron power reactor, based on the magnetic configuration of the Advanced Toroidal Facility, Oak Ridge National Laboratory. Plasma analyses are performed to assess whether confinement in a small, average radius plasma is sufficient to yield an ignited or high-Q driven device. Much of the physics assessment focuses on an evaluation of the radial electric field created by the nonambipolar particle flux. Detailed transport simulations are done with both fixed and self-consistent evolution of the radial electric

field. Basic reactor engineering considerations taken into account are neutron wall loading, maximum magnetic field at the helical coils, coil shield thickness, and tritium breeding blanket-shield thickness. DOE

N86-22412# Texas Univ., Austin. Inst. for Fusion Studies.
ANALYTIC THEORY OF THE NONLINEAR M = 1 TEARING MODE
R. D. Hazeltine, J. D. Meiss, and P. J. Morrison Sep. 1985 24 p (Contract DE-FG05-80ET-53088)
(DE86-001783; DOE/ET-53088/205; IFSR-205) Avail: NTIS HC A02/MF A01

Numerical studies show that the m = 1 tearing mode continues to grow exponentially well into the nonlinear regime, in contrast with the slow, Rutherford, growth of m > 1 modes. We present a single helicity calculation which generalizes that of Rutherford to the case when the constant-psi approximation is invalid. As in that theory, the parallel current becomes an approximate flux function when the island size, W, exceeds the linear tearing layer width. However for the m = 1 mode, W becomes proportional to deltaB, rather than (deltaB)/sup 1/2/ above this critical amplitude. This implies that the convective nonlinearity in Ohm's law, which couples the m = 0 component to the m = 1 component, dominates the resistive diffusion term. The balance between the inductive electric field and this convective nonlinearity results in exponential growth. Assuming the form of the perturbed fields to be like that of the linear mode, we find that the growth occurs at 71% of the linear rate. DOE

N86-22413# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
PLASMA PROCESSES IN THE EXCITATION OF HERBIG-HARO OBJECTS
I. Axnaes, N. Brenning, and G. Gahm (Stockholm Observatory, Sweden) Dec. 1984 27 p refs
(TRITA-EPP-84-09; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

The UV excess from highly ionized elements in the high-excitation Herbig-Haro objects is discussed. It is proposed that it can be explained if a sheath is formed in the object, with heating in excess of ordinary shock wave calculations. Such a sheath could be the result of dynamo interaction between a Herbig-Haro cloudlet and a magnetized stellar wind, with a transverse magnetic field of the order of 0.1 m Gauss. Author (ESA)

N86-22414# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Forschungsbereich Energetik.
POPULATION INVERSIONS OF QUANTUM LEVELS IN SPACE AND TIME-DEPENDENT FAST RECOMBINING PLASMAS. THEORY OF THE RECOMBINATION LASER Ph.D. Thesis - Stuttgart Univ.
Willi L. Bohn Jul. 1985 236 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-974)
(DFVLR-FB-85-47; ISSN-0171-1342) Avail: NTIS HC A11/MF A01; DFVLR, Cologne DM 40.50

A theory of ionization and recombination for optically thin and thick plasmas was derived in order to calculate the population densities of excited quantum levels in hydrogen and hydrogen-like ions. Criteria for the generation of population inversions were established within a quasi-static approximation leading to a theory of the recombination laser. A hydrodynamic computer code for one-dimensional plasma flows which describes the transient properties of population inversions was developed. Laser transitions in a plasma nozzle flow, in the plasma expansion into vacuum, and in the plasma expansion in the presence of a background gas are described in good agreement with available experimental data. Inversions leading to XUV-laser transitions are emphasized. Author (ESA)

N86-22278# Joint Publications Research Service, Arlington, Va.
NONEQUILIBRIUM EFFECTS AND STRUCTURE OF X-RAY LINES IN TOKAMAK PLASMA Abstract Only
V. G. Gontis and V. S. Lisitsa *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 25-26 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 438-492 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22290# Joint Publications Research Service, Arlington, Va.
SLOW COMBUSTION OF LASER PLASMA AND OPTICAL CHARGES Thesis - USSR Academy of Sciences, 1984 Abstract Only
Vadim Borisovich Fedorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 39-40 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22291# Joint Publications Research Service, Arlington, Va.
SPECTROSCOPY OF LABORATORY AND SPACE PLASMA WITH OSCILLATING ELECTRICAL FIELDS Thesis - USSR Academy of Sciences, 1984 Abstract Only
Evgeniy Aleksandrovich Oks *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 40 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22292# Joint Publications Research Service, Arlington, Va.
EQUILIBRIUM STATES OF CHARGED ELECTRON BEAMS AND SPACE CHARGE COMPENSATION PROCESSES Thesis - USSR Academy of Sciences, 1984 Abstract Only
Vladimir Alekseyevich Malafayev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22293# Joint Publications Research Service, Arlington, Va.
ESTIMATES OF PARAMETERS OF HOT ELECTRONS DURING BEAM HEATING OF PLASMA IN A MAGNETIC FIELD Abstract Only
B. N. Breyzman and V. I. Yerofeev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 42 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 387-393 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22294# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL KINETIC MODEL OF HYDROGEN MACRO-PARTICLE EVAPORATION IN A TOKAMAK Abstract Only
B. V. Kuteyev, A. P. Umov, and L. D. Tsendin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 43 Transl. into ENGLISH from Fiziki Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 409-416 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22295# Joint Publications Research Service, Arlington, Va.
RELATIVISTIC EFFECTS DURING COMPTON INTERACTION OF STRONG ELECTROMAGNETIC RADIATION AND OPTICALLY THIN LAYER OF COLD PLASMA Abstract Only
Yu. I. Lysikov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 497-499 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22296# Joint Publications Research Service, Arlington, Va.
PLASMA FLOWS IN DIVERTOR REGIONS OF VINT-20 SINGLE-PASS TORSATRON Abstract Only
V. K. Bocharov, Ye. D. Volkov, G. G. Lesnyakov, and V. B. Yuferov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 44 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 4, Apr. 1985 p 500-504 (For primary

document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22297# Joint Publications Research Service, Arlington, Va.
COLLISION AND RADIATION PROCESSES IN LOW-TEMPERATURE PLASMA INVOLVING HIGHLY EXCITED ATOMIC AND MOLECULAR STATES Thesis - USSR Academy of Sciences, 1984 Abstract Only
Vladimir Sergeyeviy Lebedev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 46 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22298# Joint Publications Research Service, Arlington, Va.
PLASMA MECHANISM UNDERLYING HIGH PRESSURE GAS BREAKDOWN Thesis - USSR Academy of Sciences, 1984 Abstract Only
Aleksandr Petrovich Broytman *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 47 Transl. into ENGLISH from Russian Thesis (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-22415 Central Electricity Generating Board, London (England). Translation Section.
USING THE NUCLEAR GAMMA RESONANCE METHOD TO STUDY RADIATION DEFECTS IN FERRITES
Yu. F. Babikov, V. M. Maikin, I. I. Marchik, S. V. Sinitsyn, A. N. Spirin, I. V. Starostenko, and M. N. Uspenskii 6 Nov. 1985 16 p refs Transl. from Izvestia Academy of Sciences Kaz SSR Physico-Mathematical Series (USSR), no. 8, 1982 p 65-72
(BLL-CE-Trans-8220-(9022.090)) Avail: British Library Lending Div., Boston Spa, Engl.

The nuclear gamma resonance method was used to investigate the effect of electron irradiation on the properties of yttrium-gallium garnets. The possibility of using this method to study radiation defects not only in ferrimagnetic materials, but also in other compounds, metals and alloys is illustrated. Author

N86-22416*# National Aeronautics and Space Administration, Washington, D.C.
KNbO3 SINGLE CRYSTAL GROWTH BY THE RADIO FREQUENCY HEATING CZOCHRALSKI METHOD
Wenshan Wang, Qun Zou, and Zhaohua Geng Nov. 1985 14 p refs Transl. into ENGLISH frpm Guisuanyan Xuebao (China), v. 10, no. 1, 1982 p 79-85 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Nanjing Univ., China
(NASA-TM-77944; NAS 1.15:77944) Avail: NTIS HC A02/MF A01 CSCL 20L

A radio frequency heating Czochralski technique to obtain single crystal KNbO3 is first presented. The technological parameters of KNbO3 crystal growth by the Czochralski technique and its pulling conditions were studied in detail. The experiments on second harmonic generation using 1.06 micrometer Nd:YAG laser in KNbO3 have been conducted. The second harmonic efficiency for upconversion of KNbO3 is found to be as high as that of NaBa2Nb5O15. An automatic scanning measurement for the optical homogeneity of KNbO crystal is also described. KNbO3 is revealed to be a potentially useful nonlinear material for optical device applications. Author

N86-22417*# National Aeronautics and Space Administration, Washington, D.C.
A STUDY ON INCLUSION FORMATION MECHANISM IN ALPHA-LIIO SUB 3 CRYSTALS
Wan-Chun Chen, Shou-Li Yan, Shou-Quan Jia, and Shu-Yong Du Dec. 1985 16 p refs Transl. into ENGLISH from Guisuanyan Xuebao (Beijing, China), v. 10, no. 1, Mar. 1982 p 79-85 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. was prep. by Inst. of Physics, Academia Sinica
(NASA-TM-77943; NAS 1.15:77943) Avail: NTIS HC A02/MF A01 CSCL 20L

The spatial distribution of inclusions in alpha-LiIO3 crystals by means of an argon laser beam scanning technique is studied. The effects of crystal dimensions and solution fluid flow on the inclusion formation in the alpha-LiIO3 crystals were observed. It was further shown that the fluid flow plays an important role in the formation of inclusions. The results obtained were further applied and verified by growing a perfect alpha-LiIO3 single crystal. An experimental foundation for further theoretical studies on the causes of inclusions may be provided. Author

N86-22418*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THIN-FILM CHEMICAL SENSORS BASED ON ELECTRON TUNNELING Final Report
S. K. Khanna, J. Lambe, H. G. LeDuc, and A. P. Thakoor 15 Nov. 1985 36 p refs
(Contract DE-AI01-82ER-13007)
(NASA-CR-176662; JPL-PUB-85-85; DOE/ER-13001/1; NAS 1.26:176662) Avail: NTIS HC A03/MF A01 CSCL 20L

The physical mechanisms underlying a novel chemical sensor based on electron tunneling in metal-insulator-metal (MIM) tunnel junctions were studied. Chemical sensors based on electron tunneling were shown to be sensitive to a variety of substances that include iodine, mercury, bismuth, ethylenedibromide, and ethylenedichloride. A sensitivity of 13 parts per billion of iodine dissolved in hexane was demonstrated. The physical mechanisms involved in the chemical sensitivity of these devices were determined to be the chemical alteration of the surface electronic structure of the top metal electrode in the MIM structure. In addition, electroreflectance spectroscopy (ERS) was studied as a complementary surface-sensitive technique. ERS was shown to be sensitive to both iodine and mercury. Electrolyte electroreflectance and solid-state MIM electroreflectance revealed qualitatively the same chemical response. A modified thin-film structure was also studied in which a chemically active layer was introduced at the top Metal-Insulator interface of the MIM devices. Cobalt phthalocyanine was used for the chemically active layer in this study. Devices modified in this way were shown to be sensitive to iodine and nitrogen dioxide. The chemical sensitivity of the modified structure was due to conductance changes in the active layer. Author

N86-22419# California Univ., Santa Barbara. Dept. of Physics.
SQUEEZABLE TUNNEL JUNCTIONS
P. K. Hansma Oct. 1985 17 p
(Contract N00014-78-C-0011)
(AD-A161537; TR-20) Avail: NTIS HC A02/MF A01 CSCL 20/12

Squeezable tunnel junctions set the current state of the art for resistance stability of mechanically adjustable tunneling structures at Delta R/R approx 0.1%. This is sufficient for spectroscopies as subtle as phonon spectroscopy, but it is marginal and cannot be maintained to high enough bias voltage to permit molecular vibrational spectroscopy at present. Squeezable junctions have been used for characterizing bulk samples and for C-V analysis on semiconductors. GRA

N86-22420# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
A MEASUREMENT OF INTRINSIC SIO2 FILM STRESS RESULTING FROM LOW TEMPERATURE THERMAL OXIDATION OF Si Interim Technical Report
E. Kobeda and E. A. Irene 1 Oct. 1985 15 p
(Contract N00014-83-K-0571)
(AD-A161620; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

Over the past several years there have been a number of

studies that have reported an intrinsic SiO2 film stress resulting from the thermal oxidation of Si at low oxidation temperatures. The intrinsic stress has been considered to be influential in Si oxidation kinetics both at the Si-SiO2 interface and by altering the diffusion of oxidant. Various stress measurements have been reported using light in single beam and double beam reflection experiments, and using the automatic Bragg angle camera (ABAC) technique. Laser techniques are not well described in the literature, often without calibration standards, diagrams and detailed procedures. A double beam technique, with calibration standards and the experimental results of one study using the technique to measure SiO2 stress on Si at room temperature is reported. This parallel beam reflection technique has been developed in the laboratory for measuring intrinsic residual stress for Si wafers thermally oxidized at temperatures of 600 to 1150 C. Low temperature thermal oxidations resulted in compressive intrinsic SiO2 stresses greater than 4,000,000,000 dyn/sq cm. GRA

N86-22421# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
SILICON OXIDATION STUDIES. SILICON ORIENTATION EFFECTS ON THERMAL OXIDATION Interim Technical Report
Eugene A. Irene, H. Z. Massoud, and E. Tierney 1 Oct. 1985 19 p Prepared in cooperation with Duke Univ., Durham, N.C., and IBM Watson Research Center, Yorktown Heights, N.Y.
(Contract N00014-83-K-0571)
(AD-A161633; TR-3) Avail: NTIS HC A02/MF A01 CSCL 20/12

The initial stage of the thermal oxidation of various crystallographic orientations of silicon reveals a complex rate behavior. This behavior is not understood within the conventional linear - parabolic model. A recently revised model which explicitly contains the areal density of Si atoms and mechanical stress effects is shown to provide both a qualitative and somewhat quantitative explanation of the complex substrate orientation effects. The purpose of this study is to analyze the crossover effect in terms of a recently proposed viscous flow model for Si oxidation. This model utilizes the notion of mechanical stress and viscous relaxation in SiO2 which occur as a result of the oxidation process on a Si substrate in addition to the other assumptions in the L-P model such as a steady state between the interface reaction and the transport of oxidant through the oxide. It is reported herein that the new viscous flow model provides a reasonable qualitative explanation for the crossover effect and in some instances a quantitative correlation of the effect. GRA

N86-22422# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
A MEASUREMENT OF THE EFFECT OF INTRINSIC FILM STRESS ON THE OVERALL RATE OF THERMAL OXIDATION OF SILICON Interim Technical Report
J. K. Srivastava and E. A. Irene 1 Oct. 1985 9 p
(Contract N00014-83-K-0571)
(AD-A161634; TR-2) Avail: NTIS HC A02/MF A01 CSCL 20/12

Recently, in our laboratory more extensive intrinsic stress measurements have been made and these measurements will be reported separately. So while the existence of a compressive intrinsic SiO2 film stress has been experimentally verified, the experimental verification of the effects of the stress on oxidation kinetics remains a matter of speculation within the various models. Along with the development of an intrinsic film stress due to the molar volume change during the oxidation of Si, a SiO2 film density increase occurs and has been measured. We consider the intrinsic stress and density increases to have a common origin in the nature of the Si oxidation process on a single crystal Si surface. The present communication provides a rather direct experimental measurement of the effect of the compressive intrinsic film stress and/or oxide density on the Si oxidation kinetics. All the Si wafers used were lightly P doped n-type (100) oriented commercially available high quality single crystal Si slices. GRA

N86-22423# California Univ., San Diego. Inst. for Pure and Applied Physical Sciences.
A STUDY OF SURFACE PROPERTIES OF SUPERCONDUCTING MATERIALS FOR HIGH POWER MICROWAVE APPLICATIONS Final Technical Report, 1 Aug. 1982 - 31 Aug. 1985
Harry Suhl and Wayne Vernon 31 Oct. 1985 10 p
(Contract N00014-82-K-0578)
(AD-A161740) Avail: NTIS HC A02/MF A01 CSCL 20/3

We have investigated electric and magnetic critical field levels for Nb and Nb sub 3 Sn superconductors. Since the maximum power levels for RF-Superconducting cavities seem to be limited by maximum magnetic field capability, most of the work involved studies of the time dependence of flux penetration into Nb sub 3 Sn samples where maximum field limits are unknown. We find that the lower critical field (Hc sub 1) of Nb sub 3 Sn is about 600 gauss at low temperature and 2MHz frequency of applied field, but flux penetration occurs at very low level so that considerably higher field values will not lead to large power loss. Additional interesting effects are associated with Nb sub 3 Sn on Nb substrates which may also lead to increased peak power capability. GRA

N86-22424# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
MODELS FOR THE OXIDATION OF SILICON Interim Technical Report
E. A. Lewis and E. A. Irene 1 Oct. 1985 29 p
(Contract N00014-83-K-0571)
(AD-A161751; TR-1) Avail: NTIS HC A03/MF A01 CSCL 20/12

Many adaptations to the linear parabolic model for silicon oxidation have been proposed. For the purpose of process engineering, curve fitting procedures which are sometimes devoid of physical content but numerically precise are employed. However, a truely unified physical model which is in quantitative accord with all known facts is still lacking. In this review, we will discuss the facts and newer models. GRA

N86-22425# Harvard Univ., Cambridge, Mass. Dept. of Chemistry.
FLUORESCENCE PROPERTIES OF DANSYL GROUPS COVALENTLY BONDED TO THE SURFACE OF OXIDATIVELY FUNCTIONALIZED LOW-DENSITY POLYETHYLENE FILM
Stephen R. Holmes-Farley and George M. Whitesides Dec. 1985 57 p
(Contract N00014-83-K-0142)
(AD-A162435; TR-85-2) Avail: NTIS HC A04/MF A01 CSCL 07/4

Brief oxidation of low-density polyethylene film with chromic acid in aqueous sulfuric acid introduced carboxylic acid and ketone and/or aldehyde groups onto the surface of the film. The carboxylic acid moieties can be used to attach more complex functionality to the polymer surface. We are developing this surface-functionalized polyethylene (named polyethylene carboxylic acid, PE-CO2H, to emphasize the functional group that dominates its surface properties) as a substrate with which to study problems in organic surface chemistry--especially wetting, polymer surface reconstruction, and adhesion--using physical-organic techniques. This document describes the preparation, characterization, and fluorescence properties of derivatives of PE-CO2H in which the Dansyl (5-dimethylaminonaphthalene-1-sulfonyl) group has been covalently attached by amide links to the surface carbonyl moieties. GRA

N86-22426# Oklahoma State Univ., Stillwater. Dept. of Chemistry.
THEORETICAL INVESTIGATIONS OF THE CVD (CHEMICAL VAPOR DEPOSITION) OF SILICON FROM SILANE Final Report, 1 Sep. 1982 - 31 Aug. 1985
Lionel M. Raff and Donald L. Thompson 31 Aug. 1985 20 p
(Grant AF-AFOSR-0311-82)
(AD-A162548; AFOSR-85-1032TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The results of a program of theoreucal research to determine the relative importance and dynamics of various elementary processes occurring in the chemical vapor deposition (CVD) of silicon from silane are reported. The processes studied include the gas-phase unimolecular dissociation of SiH4, Ch4, and SiH2, the homogeneous three-body recombination of Si atoms, surface adsorption and diffusion of Si atoms on Si(100) and Si(111) surfaces, and the recombination and desorption of H2 on silicon surfaces. In addition, several studies involving the reaction dynamics of van der Waals molecules are described. We also report the development of a quantum mechanical method for computing the results of elastic and inelastic atomic scattering from surfaces. Author (GRA)

N86-22427# Washington Univ., St. Louis, Mo. Dept. of Electrical Engineering.
SEMICONDUCTOR MILLIMETER WAVELENGTH ELECTRONICS Final Report, Sep. 1979 - Dec. 1983
F. J. Rosenbaum Dec. 1985 14 p
(Contract N00014-79-C-0840; RR0-2102)
(AD-A162566; Rept-85-1-ONR) Avail: NTIS HC A02/MF A01 CSCL 20/12

This final report summarizes the results of research carried out on topics in millimeter wavelength semiconductor electronics under an ONR Selected Research Opportunity program. Study areas included III-V compound semiconductor growth and characterization, microwave and millimeter wave device modeling, fabrication and testing, and the development of new device concepts. A new millimeter wave mixer and detector, the Gap diode was invented. Topics reported on include ballistic transport, Zener oscillations, impurities in GaAs, electron velocity-electric field calculation and measurements, etc., calculations. GRA

N86-22428# Chicago Univ., Ill.
TEMPERATURE DEPENDENCE OF THE WORK FUNCTION OF Cu LAYERS ON A W(110) PLANE
Robert Gomer Nov. 1985 19 p
(Contract N00014-77-C-0018)
(AD-A162573; AD-E900528; Rept-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

In the course of following the thermal desorption of CO adsorbed on Cu layers on W(110), i.e., W(110)/Cun/CO by work function changes a substantial temperature coefficient of work function was noted for the substrates and investigated in some detail. Temperature coefficients of work function for Cu layers in the range 0 < or = 6 where n is the number of monolayers were measured from 90 to 500 K by a Kelvin probe method. d phi/d sub T is negative at all coverages and has a strong maximum of -.00015 ev/K at n = 1 at 90 K. A qualitative discussion of these findings is given. The design and operating characteristics of the Kelvin probe are also described. GRA

N86-22429# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
DIFFUSION AND DEFECT CHARACTERIZATION STUDIES OF MERCURY CADMIUM TELLURIDE Semiannual Progress Report, 1 Feb. - 31 Jul. 1985
D. A. Stevenson 31 Jul. 1985 5 p
(Contract N00014-84-K-0423; ARPA Order 5019)
(AD-A162644) Avail: NTIS HC A02/MF A01 CSCL 20/12

During the last 6 months, progress has been made on the two major areas of this program: diffusion studies in mercury cadmium telluride (MCT), and growth studies. In the former area, self diffusion measurements have been made, with emphasis on the comparison of experiments using a pure Hg reservoir and experiments using a liquid + solid reservoir. In the growth studies, major emphasis has been on the analysis and theory of the isothermal vapor phase epitaxial growth process (IVPE). GRA

N86-22430# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
DEVELOPMENT OF A SYSTEM TO PRODUCE SEMICONDUCTOR INSULATOR MULTI-LAYER STRUCTURES Quarterly Report, 1 Mar. - 31 May 1985
David J. Dumin Jun. 1985 4 p
(Contract N00014-84-K-2015)
(AD-A162750; QR-3) Avail: NTIS HC A02/MF A01 CSCL 20/12

The construction of the epitaxial reactor to be used to grow the multilayer films and to begin to grow multiple silicon-insulator films was completed. The system was pressure tested and all lines hold pressure over night. During preliminary runs to coat the silicon carbide susceptor with silicon, it was noticed that the parts of the equipment surrounding the reaction chamber become quite hot during operation of the reactor. There are several causes for this over heating. The hydrogen flow is presently limited by the hydrogen regulator being used in the system. A higher pressure regulator is needed to increase the hydrogen flow and increase the cooling that higher hydrogen flow will provide. The susceptor presently being used is 1 in. thick. It will be necessary to use a thinner susceptor to lower the thermal mass in the system. It may be necessary to water cool the reaction chamber. The first films grown in the system were silicon-on-sapphire films. The SOS films were used to determine the quality of the epitaxial system. GRA

N86-22431# Pennsylvania State Univ., University Park. Materials Research Lab.
INVESTIGATIONS INTO THE ORIGINS OF THE PHYSICAL STRUCTURE OF THIN FILMS Annual Report, 1 Jul. 1984 - 30 Jun. 1985
Russell Messier 25 Oct. 1985 42 p
(Grant AF-AFOSR-0149-84)
(AD-A162772; AFOSR-85-1105TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

The random ballistic aggregation of atoms onto a surface under low adatom mobility conditions leads to clustering and evolution of growth cones from these random clusters. The connections between these basic physical processes and the resulting wide variety of thin film morphologies (both top surface and cross-section) are being made in an attempt to quantify morphology, and ultimately properties. The research can be divided into four research thrust areas: (1) controlled film preparation; (2) morphological characterization of the resulting films; (3) image enhancement/quantification of micrographs of morphology; and (4) conceptual and computer modeling of the morphology. Progress in each of these areas. GRA

N86-22432# Wisconsin Univ., Madison. Dept. of Chemistry.
EXCITED-STATE PROPERTIES OF SEMICONDUCTOR ELECTRODES AND THEIR APPLICATION TO OPTICAL ENERGY CONVERSION Final Report, 1 Jul. 1978 - 30 Jun. 1985
Arthur B. Ellis 26 Dec. 1985 6 p
(Contract N00014-78-C-0633)
(AD-A162774) Avail: NTIS HC A02/MF A01 CSCL 20/12

The luminescent properties of a variety of II-VI and III-V semiconductor electrodes have been investigated. The excited-state properties of semiconductor electrodes and their application to optical energy conversion is also discussed. GRA

N86-22433# Los Alamos National Lab., N. Mex.
SUPERCONDUCTIVITY IN THE ACTINIDES
J. L. Smith and A. C. Lawson 1985 6 p Presented at ACTINIDES 85, Aix-en-Provence, France, 1 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000786; LA-UR-85-3143; CONF-8509147-9) Avail: NTIS HC A02/MF A01

The trends in the occurrence of superconductivity in actinide materials are discussed. Most of them seem to show simple transition metal behavior. However, the superconductivity of americium proves that the f electrons are localized in that element and that actinides is the correct name for this row of elements. Recently the superconductivity of UBe13 and UPt3 has been shown to be extremely unusual, and these compounds fall in the new class of compounds now known as heavy fermion materials. DOE

N86-22256# Joint Publications Research Service, Arlington, Va.
MODULATION OF IR LASERS BY SEMICONDUCTING PLASMA Abstract Only
L. I. Berezhinskiy and A. I. Liptuga *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 2 Transl. into ENGLISH from Kvantovaya Elektronika (Kiev, USSR), v. 27, Oct. 1984 p 50-54 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22299# Joint Publications Research Service, Arlington, Va.
NONLINEAR PROPERTIES OF SUPERCONDUCTING POINT CONTACTS AND PROSPECTS FOR USE IN QUANTUM ELECTRONICS Abstract Only
M. V. Danilenko, V. E. Derkach, E. M. Belenov, V. I. Romanenko, and A. V. Uskov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-003) 5 Feb. 1986 p 48 Transl. into ENGLISH from Kvantovaya Elektronika (Kiev, USSR), v. 27, Oct. 1983 p 3-37 (For primary document see N86-22254 12-70)
Avail: NTIS HC A04

N86-22494# Danish Space Research Inst., Lyngby.
MEASUREMENTS OF INTRINSIC WIDTH AND MOSAICITY OF TEST CRYSTALS WITH A NOVEL FOUR-CRYSTAL X-RAY SPECTROMETER
F. E. Christensen, H. W. Schnopper, E. H. Silver (LLNL, Berkeley, Berkeley, Calif.), and N. J. Westergaard *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 213-220 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22504# Mullard Space Science Lab., Dorking (England).
X-RAY APPLICATIONS OF DEEP-DEPLETION CCDS
D. M. Walton, J. L. Culhane, R. A. Stern (Lockheed Aircraft Corp., Palo Alto, Calif.), and R. C. Catura *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 291-295 refs Sponsored by UK Science and Engineering Research Council and Lockheed Independent Research Program (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22505# Leicester Univ. (England).
X-RAY IMAGING SPECTROSCOPY WITH CCDS
A. Wells, D. Lumb, and R. Willingale *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 297-302 refs Sponsored by UK Science and Engineering Research Council and Lockheed Independent Research Program (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-22434# RAND Corp., Santa Monica, Calif.
CONCEPTS, PROBLEMS AND OPPORTUNITIES FOR USE OF ANNIHILATION ENERGY: AN ANNOTATED BRIEFING ON NEAR-TERM RDT/E TO ASSESS FEASIBILITY
B. W. Augenstein Jun. 1985 70 p
(Contract F49620-82-0018)
(AD-A161719; RAND/N-2302-AF/RC) Avail: NTIS HC A04/MF A01 CSCL 20/8

This note discussed several issues inherent in exploiting the energy released when matter and antimatter annihilate. It reviews some of the fundamental difficulties in produding Antimatter and means for storing it. If these difficulties have satisfactory solutions, a number of applications for antimatter are likely to emerge. The note emphasizes the fundamental importance of the very large classes of interesting research efforts underlying applications goals, and the anticipated rapid growth of science needs for antimatter at low energies. The authors suggests a near-term program to resovle the current uncertainities of suitable production and storage technologies, so that basic feasiblity of application of antimatter can be decided, and decisions on whether to undertake expanded production with appropriate storage can be objectively made. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-22435# Committee on Science and Technology (U. S. House).
NASA'S LONG RANGE PLANS
Washington GPO 1986 224 p Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, no. 57, 17, 19, 1985
(GPO-55-035) Avail: Subcommittee on Space Science and Applications

The long range planning schedule for NASA programs is reviewed. Objectives are summarized for programs in space flight, space science and applications, space stations, space technology, and Space tracking and Data Systems. B.G.

N86-22436# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN ANALYSIS OF FOREIGN SOURCE DEPENDENCE FOR CRITICAL MICROCIRCUITS OF USAF AVIONICS COMPONENTS M.S. Thesis
Thomas L. Bass and Robert W. Norman, Jr. Sep. 1985 139 p
(AD-A161311; AFIT/LS/GLM/85S-58) Avail: NTIS HC A07/MF A01 CSCL 01/4

An attempt is made to investigate the Air Force's dependency on foreign sources for the procurement of microcircuits used in avionics systems. The research was divided into two segments: a particular sample of microcircuits was analyzed to determine which microcircuits were procured directly from a foreign source and then determine the criticality of those foreign manufactured microcircuits; the second segment consisted of interviews with government officials, microcircuit suppliers/vendors, and manufacturing representatives to obtain their opinions as to the extent of U.S. dependency on foreign sources for the manufacture of ceramic dual-in-line microcircuits. It was discovered that the current method used by the Defense Electronics Supply Center and AFLC's Cataloging and Standardizations Center to identify foreign manufactured micorcircuits greatly understates this country's dependency on foreign sources for microcircuits. It was concluded that more effort should be expended by the Department of Defense to determine the actual capability of onshore manufacturers and to attempt to get manufacturers to move back onshore. GRA

N86-22437# Science Applications International Corp., McLean, Va. Behavioral Sciences Research Center.
ASPECTS OF COGNITIVE COMPLEXITY THEORY AND RESEARCH AS APPLIED TO A MANAGERIAL DECISION MAKING SIMULATION
Siegfried Streufert and Robert W. Swezey Sep. 1985 133 p
(Contract MDA903-79-C-0699; DA Proj. 2Q1-62722-A-791)

)-A161376; SAI-82-03-178; ARI-RN-85-96) Avail: NTIS
: A07/MF A01 CSCL 05/1

This research note is a post-1977 review of the literature in) areas of theory, research, and measurement of cognitive mplexity. It updates the previous major review effort of Streufert d Streufert (1978). Additional discussion is devoted to the proaches selected for measuring cognitive complexity with a ni-computer based Management Assessment and Training nulation System. Author (GRA)

16-22438# Naval Postgraduate School, Monterey, Calif.
I ORGANIZATIONAL DEVELOPMENT HANDBOOK S. Thesis
borah A. Gallo Sep. 1985 123 p
D-A161414) Avail: NTIS HC A06/MF A01 CSCL 05/1

Richard Beckhard defined Organizational Development as a anned effort, organization-wide, and managed from the top to crease organization effectiveness and health through planned lerventions in the organization's processes using behavioral-ience knowledge. This thesis is a compendium of some of eories, models, and tools of Organizational Development (OD) d serves as a guide for the author. It represents the current ate in the author's quest to apply these theories to the Navy's vironment and operational commitments. This OD Handbook arts with a definition and purpose of OD. A list of consultant mpetencies and behaviors are then generated along with arketing techniques and consultant ethics. Diagnostic models to ssist in analysis of the organization are presented. Consultant ools are discussed in terms of transition workshop, hints on data athering and feedback, strategic planning packages, guidance n contracting, and the stages of group development. GRA

186-22439# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. chool of Systems and Logistics.
NITIAL AND QUALIFICATION OPERATIONAL TEST AND EVALUATION IN THE ACQUISITION OF NON-MAJOR COM-IUNICATION SYSTEMS M.S. Thesis
orraine Y. Roemish Sep. 1985 93 p
AD-A161729; AD-E301835; AFIT/GLM/LSM/85S-69) Avail: ITIS HC A05/MF A01 CSCL 17/2

The use of operational test and evaluation (OT&E) results in he acquisition decision-making process has been increasingly mphasized in the past years and has gained even more promi-ence with the establishment of the Operational Test and Evaluation Office at the Department of Defense. Special emphasis as been placed on the use of OT&E in the production decision. nitial Operational Test and Evaluation (IOT&E) and Qualification Operational Test and Evaluation (QOT&E) are the types of test nd evaluation that are normally conducted on systems prior to he first major production decision in the acquisition process. While OT&E usually evaluates new systems and QOT&E usually valuates off-the-shelf systems, they both provide program decision nakers with valid estimates of operational effectiveness and perational suitability upon which they can base their decisions. This thesis has looked at how IOT&E and QOT&E reports written y the 1815th Tests and Evaluation Squadron (AFCC) are used in he acquisition of non-major communication systems. The results f this research reveal that the OT&E conducted by the 1815th is sually QOT&E performed on off-the-shelf systems. Since these ystems involve very little technical risk the OT&E are not usually he primary factor in production decisions. OT&E results are most seful in pointing out deficiencies requiring correction prior to ielding such systems. GRA

N86-22440# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics
RISK AND THE RIGHT MODEL
John A. Long 1985 11 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
AD-A161757) Avail: NTIS HC A02/MF A01 CSCL 05/1

All aspects of life in the world are subject to risk and uncertainty. Risk and uncertainty are key characteristics of any long range planning and cost conditions of any long range planning and cost estimation. Few, if any, decisions are made under conditions of certainty and without risk. Due to the complexities involved, analysts and decision makers must specifically and explicitly address this risk and uncertainty in performing their assigned tasks. Although the terms risk and uncertainty are often used interchangeably, they are not the same. Risk is the probability that a planned event will not be attained within constraints (cost, schedule, performance) by following a specified course of action. It is the task of analysts to try to reduce uncertainty to risk and then to meaningfully convey the risk to decision makers. This document defines risk analysis as a procedure for analyzing how randomness affects the total cost. GRA

N86-22441# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A METHODOLOGY FOR APPLYING BAR CODE TECHNOLOGY TO AIRCRAFT MAINTENANCE UNIT SUPPORT SECTIONS M.S. Thesis
Paul Valovcin Sep. 1985 97 p
(AD-A161783; AFIT/GLM/LSM/85S-79) Avail: NTIS HC A05/MF A01 CSCL 09/2

This study developed a methodology that decision makers can use as an aid to determine if bar code technology should be applied in Aircraft Maintenance Unit (AMU) Support Sections. The literature review revealed that the Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) steering group recommended that bar code technology applications be aggressively pursued across the logistics spectrum due to the success of the LOGMARS test program. Since AMU support sections perform many functions similar to those that have already benefited form this technology as it applies to an AMU support sections. Worksheets were designed to help collect and analyze the necessary cost/benefit information so that decision makers will be able to properly assess the expected cost and benefits for a particular support section. GRA

N86-22442# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
APPLICATIONS OF COMPUTERS AS AN AID TO DECISION-MAKING IN AIR FORCE SYSTEM PROGRAM OFFICES M.S. Thesis
Roger D. Koble Sep. 1985 171 p
(AD-A161784, AFIT/GSM/LS/85S-20) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis investigated the most advantageous areas for applying decision support systems to Air Force Systems Command program and project managers in System program Offices. Data was gathered by surveying a stratified sample of program and project managers. In this research, groups of program and project managers. In this research, groups of program and project managers where identified that may required different types of support based upon the influence the groups have in the decision process in the areas of cost and budget, schedule, technical performance, logistics, and administration. The following three rank groups were choosen as the basis for evaluation of different DSS needs: Lieutenants, Captains, and Majors through Colonels. Findings indicated that all three rank groups need similar support from any DSS development. An additional result of this empirical research was a prioritized list of program management techniques for DSS development and implementation. GRA

N86-22443# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT, FLIGHT DYNAMICS LABORATORY PLANS FOR FISCAL YEAR 1987 Final Report, Aug. 1984 - Jul. 1985
Jul. 1985 75 p Supersedes AFWAL-TR-84-3000, AD-A149648
(AD-A162792; AFWAL-TR-85-3000; AFWAL-TR-84-3000) Avail: NTIS HC A04/MF A01 CSCL 01/3

The document presents an overview of the Laboratory Technology Planning Objectives of the Flight Dynamics Laboratory omitting specific funding and timing information of an Official Use

Only nature. Technology planning objectives are described for Structures and Dynamics, Vehicle Equipment, Flight Control, Aeromechanics, and Technology Assessment. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-22444* National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 2: INDEXES (SUPPLEMENT 28)
Jan. 1986 478 p
(NASA-SP-7039(28); NAS 1.21:7039(28)) Avail: NTIS HC A21 CSCL 05B

A subject index is provided for over 4800 patents and patent applications for the period May 1969 through December 1985. Additional indexes list personal authors, corporate authors, contract numbers, NASA case numbers, U.S. patent class numbers, U.S. Patent numbers, and NASA accession numbers. Author

N86-22445*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SCIENTIFIC AND TECHNICAL INFORMATION OUTPUT OF THE LANGLEY RESEARCH CENTER FOR CALENDAR YEAR 1985
Jan. 1986 277 p
(NASA-TM-87655; NAS 1.15:87655) Avail: NTIS HC A13/MF A01 CSCL 05B

A compilation of the scientific and technical information that the Langley Research Center has produced during the calendar year 1985 is presented. Included are citations for Formal Reports, Quick-Release Technical Memorandums, Contractor Reports, Journal Articles and Other Publications, Meeting Presentations, Technical Talks, Computer Programs, Tech Briefs, and Patents. Author

N86-22446# Massachusetts Inst. of Tech., Lexington.
UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY, VOLUME 10 Report Bibliography, 15 Dec. 1983 - 31 Dec. 1984
31 Dec. 1984 79 p
(Contract F19628-85-C-0002)
(AD-A161752; ESD-TR-84-329) Avail: NTIS HC A05/MF A01 CSCL 09/1

Volume 10 of Unclassified Publications of Lincoln Laboratory lists reports published from 15 December 1983 to 31 December 1984, as well as updated information on earlier publications. Included are quarterly technical reports, semiannual technical summary reports, miscellaneous progress reports, technical reports, journal articles; meeting speeches; and author and subject indexes. Examples of titles listed. Angles-Only, Ground-Based, Initial Orbit Determination, Expected Energy Method for Electro-Optical SNR Calculations, Performance of Bayes-Optimal Angle-of-Arrival Estimators, Electronic Properties of Grain Boundaries in GaAs: A Study of Oriented Bicrystals Prepared by Epitaxial Lateral Overgrowth, The Lincoln Low-Rate Vocoder: A 1200/2400 bps LPC-10 Voice Terminal. Items are listed by the Lincoln Laboratory number, the title, the authors, the date published and the DTIC number. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-22447# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
LOW COST MANAGEMENT OF REPLICATED DATA Ph.D. Thesis
Thomas A. Joseph Jan. 1986 93 p
(Contract MDA903-85-C-0124; ARPA Order 5378)
(AD-A162771; TR-85-712) Avail: NTIS HC A05/MF A01 CSCL 09/2

A method for managing replicated data that eliminates latency is developed. This work can be viewed as a generalization of the results to systems with arbitrary types of data, with operations more powerful than reads and writes, and with other kinds of synchronization mechanisms than two-phase locking. Further, it is shown that it is possible to transmit the information required to maintain consistency using messages that would be sent between sites even if data were not replicated. In other words, the replication method requires no additional messages. The implication is that of the costs of replication described above, the only costs that need be incurred are the unavoidable costs of additional storage and local processing. A model for distributed systems is presented. Methods for managing replicated data are also presented. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-22448# Committee on Science and Technology (U. S. House).
AUTHORIZING APPROPRIATIONS FOR LANDSAT COMMERCIALIZATION
Washington GPO 1985 6 p Report to accompany H.R. 2800 presented to the Committee of the Whole House on the State of the Union by the Committee on Science and Technology, 99th Congress, 1st Session, 20 Jun. 1985
(HR-Rept-99-177; GPO-51-006) Avail: US Capitol, House Document Room

Amendments to the Land Remote Sensing Commercialization Act of 1984 to provide full authorization for the transfer to the private sector of the Federal Government's civil land remote sensing satellite (LANDSAT) system were summarized. Appropriations of $295 million for fiscal years 1985 through 1989, of which not more than $125 million is available for fiscal years 1985 and 1986, were authorized. Author

N86-22449# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
USE OF SPACE DEPENDENT ON DEVELOPMENT OF SPACE LAW M.S. Thesis
Gregory T. Noble Sep. 1985 147 p
(AD-A161397; AFIT/GLM/LSM/85S-57) Avail: NTIS HC A07/MF A01 CSCL 05/4

This thesis presents a brief background of the international law and legal bodies that exist for regulating the activities of man in space. This research additionally identifies specific areas where specified space law does not apply or where serious questions about legal applicability exist. One specific area, space militarization, is highlighted with the current legal deficiencies pertaining to this activity discussed in detail. Proposals are presented for dealing with the question of legal regulations over space militarization. These proposals, from the Soviet Union, United States, France and other lesser proposals, are evaluated in light of the problems they purport to solve. Recommendations are presented on what legal actions should be pursued in the space militarization issue, from the international and the U.S. national perspectives. Although recommendations are made, the overall conclusion is that legal control of space militarization in most respects is not feasible and the future for arms in space is unlikely to differ significantly from the history of arms on Earth. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-22450 Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany).
[ACTIVITIES REPORT OF THE AEROSPACE INDUSTRY IN WEST GERMANY] Annual Report, 1985 [LUFTHANSA JAHRBUCH 85]
Hans-Joachim Allgaier, ed. 31 May 1985 360 p In GERMAN
(ISSN-0176-5086) Copyright. Avail: Issuing Activity

Air traffic, air traffic market, efficiency, costs, Lufthansa national role and independence, and rates and regulation in civil aviation are discussed. The Airbus A320 program, the development of a propeller, the role of Lufthansa in aircraft development and in technical services, German cargo services, and aviation fuel are treated. Author (ESA)

N86-22451*# General Electric Co., Philadelphia, Pa.
TRANSFORMATION TOUGHENED CERAMICS FOR THE HEAVY DUTY DIESEL ENGINE TECHNOLOGY PROGRAM, PHASE 2 Final Report, Aug. 1984 - Jul. 1985
S. Musikant, S. C. Samanta, P. Architetto, and E. Feingold 1 Dec. 1985 86 p refs
(Contracts DEN3-339; DE-AI-80CS-50194)
(NASA-CR-175054; NAS 1.26:175054) Avail: NTIS HC A05/MF A01 CSCL 13F

The objective of this program is to develop an insulating structural ceramic for application in a heavy duty adiabatic diesel engine. The approach is to employ transformation toughening (TT) by additions of zirconia-hafnia solid solution (ZHSS). The feasibility of using ZHSS as a toughening agent in mullite and alumina has been demonstrated in Phase 1 of this work. Based on Phase 1 results, a decision was made to concentrate the Phase 2 effort on process optimization of the TT mullite. A strong factor in that decision was the low thermal conductivity and high thermal shock resistance of the mullite. Results of the Phase 2 effort indicate that optimum toughening of mullite by additions of ZHSS is difficult to achieve due to apparent sensitivity to morphology. The 48 ksi room temperature modulus-of-rupture (MOR) achieved in selected specimens is approximately 50% of the original strength target. The MOR deteriorated to 34 ksi at 800 C. Author

N86-22452*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PERSONNEL EMERGENCY CARRIER VEHICLE Patent Application
Otto H. Fedor and Lester J. Owens, inventors (to NASA) Filed 3 Jul. 1985 14 p
(NASA-Case-KSC-11282-1; NAS 1.71:KSC-11282-1;
US-Patent-Appl-SN-751644) Avail: NTIS HC A02/MF A01 CSCL 13F

A personnel emergency carrier vehicle is disclosed which includes a vehicle frame supported on steerable front wheels and driven rear wheels. A supply of breathing air is connected to quick connect face mask coupling and umbilical cord couplings for supplying breathing air to an injured worker or attendant either with or without a self-contained atmospheric protection suit for protection against hazardous gases at an accident site. A non-sparking hydraulic motor is utilized to drive the vehicle and suitable direction and throttling controls are provided for controlling the delivery of a hydraulic driving fluid from a pressurized hydraulic fluid accumulator. A steering axis is steerable through a handle to steer the front wheels through a linkage assembly. NASA

N86-22453# Mitre Corp., McLean, Va. METREK Div.
EXPLORING THE UTILITY OF A STAGED TECHNOLOGY ASSESSMENT PROCESS, VOLUME 1
R. Lay, E. Carlson, W. Fraize, G. Strasser, and G. Tomlinson Jan. 1985 78 p
(Grant NSF PRA-82-01177)
(PB86-109402; MTR-84W401-Vol-1; NSF/PRA-85013-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 05A

A procedure for selecting technology assessment candidates, and low cost, quick-response methodology for helping to decide, in advance of a major commitment of resources, whether a candidate warrants a full-scale effort are defined and evaluated. Selection of candidate technologies is addressed and the development of a baseline technology assessment (BLTA) is described. Conducting a BLTA includes five steps: technology definition, data gathering, review and analysis, preparation of recommendations, and monitoring and interpreting indicators. The BLTA is applied to two cases: higher energy-density battery technology and methanol as a fuel for spark-ignited automotive fuels. The BLTA approach is shown to have potential as a feasible, low cost method for indicating whether a full-scale in-depth technology assessment is warranted. GRA

N86-22454# Mitre Corp., McLean, Va. METREK Div.
EXPLORING THE UTILITY OF A STAGED TECHNOLOGY ASSESSMENT PROCESS, VOLUME 2
R. Lay, E. Carlson, W. Fraize, G. Strasser, and G. Tomlinson Jan. 1985 149 p refs 2 Vol.
(Grant NSF PRA-82-01177)
(PB86-109410; MTR-84W402-Vol-2; NSF/PRA-85014-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 05A

Technology assessment concepts were discussed in a workshop format. Subjects for technology assessment are reviewed, and biotechnology and automation emerge as dominant forces that may lead to potential discontinuities in the future. Resources and materials are also addressed, and water is identified as the top issue. Further, a number of topics are shown to center around the issues of industrial readiness; fragmentation of industry; relaxation of antitrust; impact of automation on labor markets; industrial readiness; collective research; and cooperation of labor, industry, and government. Finally, the status of the evolving baseline technology assessment methodology is reviewed, and the application of the methodology to high energy density storage systems is examined. GRA

N86-22455# Foersvarets Forskingsansalt, Stockholm (Sweden).
REPRESENTATION OF URBAN DISTRICTS IN A GEOGRAPHICAL INFORMATION SYSTEM
A. Andersson and E. Jungert Aug. 1985 33 p refs
(PB86-109451; FOA-C-30403-E1) Avail: NTIS HC A03/MF A01 CSCL 08A

Urban management and other similar fields where urban data are of interest are all main applications for geographical information systems (GIS). Hence, methods for representing urban districts in geographical information systems, must be investigated. The kind of information that might be of interest in various applications has to be analyzed as well. Different methods suitable for representation and generation of the map data in geographical information systems are described. GRA

88 SPACE SCIENCES (GENERAL)

N86-22456# Space Research Organization Netherlands, Utrecht.
[SPACE RESEARCH IN THE NETHERLANDS] Annual Report, 1984
1984 161 p refs
Avail: NTIS HC A08/MF A01

Dutch activities in solar research; astronomy in the ultraviolet and visual spectral region; cosmic X-ray astronomy; infrared

astronomy; spaceborne astronomy; gamma-ray astronomy; submillimeter wave astronomy; and crustal dynamics are described.
Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-22457*# National Aeronautics and Space Administration, Washington, D.C.
METHOD OF DETERMINING THE THERMAL DEFORMATIONS OF ASTRONOMICAL MIRRORS
Ye. G. Khablo-Grossvald Dec. 1986 9 p refs Transl. into ENGLISH from Izvestiia (USSR), no. 186, 1971 p 189-191 Original language document was announced in IAA as A72-37968 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77941; NAS 1.15:77941) Avail: NTIS HC A02/MF A01 CSCL 03A

Procedures are given for calculating thermal fields and associated thermal deformations in astronomical mirrors. A technique is described for thermal strain simulation when complex thermal fields develop in astronomical mirrors. Thermal strains in pyroceramic, quartz and pyrex mirrors can be effectively determined at temperatures ranging from -70 to 150 C by this technique.
Author

N86-22458*# Delaware Univ., Newark.
A SEARCH FOR OUTFLOWS FROM X-RAY BRIGHT POINTS IN CORONAL HOLES Final Report
D. J. Mullan and W. L. Waldron (Applied Research Corp., Landover, Md.) 7 Apr. 1986 84 p
(Grant NAG5-504)
(NASA-CR-176647; NAS 1.26:176647) Avail: NTIS HC A05/MF A01 CSCL 03A

Properties of X-ray bright points using two of the instruments on Solar Maximum Mission were investigated. The mass outflows from magnetic regions were modeled using a two dimensional MHD code. It was concluded that mass can be detected from X-ray bright points provided that the magnetic topology is favorable.
E.R.

N86-22459*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MULTISPECTRAL GLANCING INCIDENCE X-RAY TELESCOPE Patent Application
Richard B. Hoover, inventor (to NASA) Filed 15 Aug. 1986 16 p
(NASA-Case-MFS-28013-1; NAS 1.71:MFS-28013-1;
US-Patent-Appl-SN-765979) Avail: NTIS HC A02/MF A01 CSCL 03A

A multispectral glancing incidence X-ray telescope is illustrated capable of broadband, high-resolution imaging of solar and stellar X-ray and extreme ultraviolet radiation sources which includes a primary optical system preferably of the Wolter I type having a primary mirror system. The primary optical system further includes an optical axis having a primary focus at which the incoming radiation is focused by the primary mirrors. A plurality of ellipsoidal mirrors are carried at an inclination to the optical axis behind the primary focus. A rotating carrier is provided on which the ellipsoidal mirrors are carried so that a desired one of the ellipsoidal mirrors may be selectively positioned in front of the incoming radiation beam. In the preferred embodiment, each of the ellipsoidal mirrors has an identical concave surface carrying a layered synthetic microstructure coating tailored to reflect a desired wavelength of 1.5A or longer. Each of the identifical ellipsoidal mirrors has a second focus at which a detector is carried. Thus the different wavelength image is focused upon the detector irregardless of which mirror is positioned in front of the radiation beam.
NASA

N86-22460*# Auburn Univ., Ala. Dept. of Physics.
SURFACE ANALYSIS OF SPACE TELESCOPE MATERIAL SPECIMENS Final Report
Albert Thomas Fromhold and Kasra Daneshvar 15 Jun. 1985 120 p
(NASA Order H-78184B)
(NASA-CR-178712; NAS 1.26:178712) Avail: NTIS HC A06/MF A01 CSCL 03A

Qualitative and quantitative data on Space Telescope materials which were exposed to low Earth orbital atomic oxygen in a controlled experiment during the 41-G (STS-17) mission were obtained utilizing the experimental techniques of Rutherford backscattering (RBS), particle induced X-ray emission (PIXE), and ellipsometry (ELL). The techniques employed were chosen with a view towards appropriateness for the sample in question, after consultation with NASA scientific personnel who provided the material specimens. A group of eight samples and their controls selected by NASA scientists were measured before and after flight. Information reported herein include specimen surface characterization by ellipsometry techniques, a determination of the thickness of the evaporated metal specimens by RBS, and a determination of trace impurity species present on and within the surface by PIXE.
Author

N86-22461# European Space Agency, Paris (France).
PROCEEDINGS OF AN ESA WORKSHOP ON A COSMIC X-RAY SPECTROSCOPY MISSION
Norman Longdon, comp. and Olga Melita, comp. Sep. 1985 315 p refs Workshop held in Lyngby, Denmark, 24-26 Jun. 1985
(ESA-SP-239; ISSN-0379-6566) Avail: NTIS HC A14/MF A01

The ESA multi mirror module X-ray observatory (XMM) was discussed. Research in X-ray astrophysics with XMM; X-ray optics; and XMM and other X-ray astronomy instrumentation were considered. For individual titles, see N86-22462 through N86-22505.

N86-22462# Mullard Space Science Lab., Dorking (England).
CAPABILITIES OF SPECTROSCOPY IN THE CONTEXT OF X-RAY ASTRONOMY IN THE 1900'S
J. L. Culhane *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 5-14 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The mission philosophies and parameters of the NASA AXAF and ESA XMM X-ray astronomy observatories are reviewed. The scientific topics that require an observatory of the XMM class are outlined and the relevance of angular and spectral resolution to these aims is discussed. The observing requirements of surveys and point source detection; galatic clusters; active galatic nuclei; normal galaxies and halos; stars; X-ray binaries; supernova remnants; and the interstellar medium are considered.
Author (ESA)

N86-22463# Cambridge Univ. (England). Inst. of Astronomy.
THE X-RAY BACKGROUND c93
Paul Guilbert *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 15-18 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The spectrum of the X-ray background is discussed. Although fairly accurately measured, particlarly in the 3 to 100 keV energy range, its origin is uncertain. It is very isotropic and its bremsstrahlung-like spectrum in this energy range indicates a diffuse intergalactic gas as the source, but this is probably ruled out on cosmological grounds. Point sources with measured spectra cannot make up the background as their spectra are too steep. Evolution of these sources is expected, however, at the low and high luminosity limits. A major task of XMM spaceborne observatory is to measure the spectra of faint extragalactic sources at energies above 3 keV in order to identify the kinds of sources which make up the background.
Author (ESA)

N86-22464*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Lab. for High Energy Astrophysics.
THE X-RAY SPECTROSCOPY OF ACTIVE GALACTIC NUCLEI
Richard Mushotzky *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 19-23 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01 CSCL 03A

The scientific goals of X-ray spectroscopy of active galactic nuclei are discussed. The underlying energy source, the regions responsible for the optical emission lines, the different types of active galaxies, and cosmology are considered. The requirements for an X-ray mission of broad band width, large collecting area, modest spatial resolution and good spectral resolution are outlined. It is concluded that the ESA XMM mission meets these requirements. Author (ESA)

N86-22465# Copenhagen Observatory (Denmark).
HIGH RESOLUTION X-RAY SPECTROSCOPY OF CLUSTERS OF GALAXIES
H. U. Noorgaard-Nielsen *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 25-31 refs (For primary document see N86-22461 12-89)
(Grant DSB-1112-4/85)
Avail: NTIS HC A14/MF A01

The prospects for studying the X-ray emission from clusters of galaxies with the ESA observatory XMM are discussed. The improvement in sensitivity and spectral resolution of a factor of 10 to 100 means that detailed knowledge of the temperature and chemical abundance profiles can be obtained, an essential issue for further investigation of the cool X-ray components. High resolution Bragg spectroscopy resolves the Fe line at 6.7 keV and the kinematics of the X-ray gas can be studied in detail. For clusters of galaxies at z = 1, the medium resolution detectors provide information on temperature, abundances, and an estimate of the redshift. By combining the spectral data with direct imaging of the clusters, insight into cluster formation and evolution can be achieved. The optimal spatial resolution for these investigations are also discussed. It is shown that ROSAT, XMM and AXAF (NASA) complement each other in the study of clusters of galaxies. Author (ESA)

N86-22466*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
THE X-RAY PROPERTIES OF NORMAL GALAXIES. WHAT DO WE KNOW AND WHAT CAN WE LEARN WITH THE NEXT GENERATION OF X-RAY TELESCOPES?
G. Fabbiano *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 33-41 refs (For primary document see N86-22461 12-89)
(Contract NAS8-30751)
Avail: NTIS HC A14/MF A01 CSCL 03A

Einstein Observatory results are used to assess the possibilities of spaceborne X-ray astronomy projects such as XMM (ESA) and AXAF (NASA). Einstein observations show that normal galaxies of all morphological types are spatially extended sources of X-ray emission with 0.5 to 3.0 keV X-ray luminosities of 10 to the 39th to 41st power erg/sec. X-ray telescopes can study the end products of stellar evolution in galaxies of different morphological types. Phenomena linked to starburst nuclear activity can best be detected and studied in X-ray. Hot coronae or a hot phase of the interstellar medium can only be studied through their X-ray emission. It is shown that high spatial resolution is essential for studying normal galaxies and identifying different emission regions. Good spectral sensitivity and spectral imaging capability are essential for gaining a deeper understanding of the phenomena at work. Author (ESA)

N86-22467# Netherlands Foundation for Radio Astronomy, Dwingelo.
THE X-RAY SPECTROSCOPY OF SUPERNOVA REMNANTS
R. G. Strom *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 43-47 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Properties of the X-ray spectra of 20 galactic supernova remnants (SNR) and 6 in the Large Magellanic Cloud are reviewed. Uses of such data, including deciding whether the emission is predominantly thermal or nonthermal, determining excitation temperatures, and studying SNR kinematics are considered. Instrumental requirements important for X-ray spectroscopy of SNR are treated. Of particular importance to studies of galactic remnants are a substantial field of view, capability at an energy high enough to mitigate the effects of interstellar absorption, and sufficient angular resolution to permit spectroscopy of spatially distinct components. The requirements which such considerations place on the XMM ESA observatory are discussed. Author (ESA)

N86-22468# Observatoire de Besancon (France).
ACCRETING NEUTRON STARS IN CLOSE BINARY SYSTEMS c90
Sergio A. Ilovaisky *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 49-58 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Knowledge about accretion phenomena on neutron stars in X-ray binary systems is reviewed. The role played by X-ray spectroscopic measurements, particularly results from the TENMA and EXOSAT X-ray observatories, is emphasized. Author (ESA)

N86-22469# Osservatorio Astronomico, Palermo (Italy).
STELLAR ACTIVITY: THE X-RAY PICTURE c90
S. Serio *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 59-67 refs Sponsored by Italian Ministry for Public Education (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The post Einstein generation of stellar X-ray observations is discussed. Studies should include the origin of X-ray emission in early type stars; the dependence of the late type stellar X-ray emission on parameters such as age, rotation rate, and the depth of the convection zone; the determination of the boundary of the region of the HR diagram in which dynamo activity is present; the contribution of flares and winds to the mass budget of the interstellar medium and to the cosmic ray flux; and the geometrical and thermal structure of late type coronae. A moderate throughput X-ray telescope devoted to a full sky survey, such as ROSAT's, or a high spatial and spectral resolution observatory, such as NASA's AXAF, will advance knowledge in these areas. However, because of the low inherent stellar X-ray fluxes, a large part of the population studies relevant to the problems outlined above, and conducted to the faint limits as required, has to wait for the High Throughput X-ray mission. Author (ESA)

N86-22470# Nagoya Univ. (Japan). Dept. of Astrophysics.
THE X-RAY SPECTROSCOPIC STUDY OF THE INTERSTELLAR MEDIUM
S. Hayakawa *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 69-76 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Results of low resolution X-ray spectroscopy are described to show how the properties of interstellar and circumstellar media are obtained. Further information to be obtained with higher spectral resolutions is discussed by reference to the observations of emission lines, absorption lines and absorption edges. Once the emission lines or the absorption edges are observed, the results are more simply related to plasma properties than those in other ranges, since the optical depth in the X-ray range is in most cases smaller and radiation transfer is less complicated. For the study of hot plasmas, X-ray spectroscopy provides more direct means, while allowed transitions in the XUV range for the same ions are weaker and not always observable because of strong interstellar absorption. Advantages in X-ray spectroscopy counterbalance disadvantages due mainly to the difficulty in collecting enough photons. Author (ESA)

N86-22471# Danish Space Research Inst., Lyngby.
INSTRUMENTATION FOR X-RAY SPECTROSCOPY c19
Herbert W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 77-86 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Concentrator, spectroscopic, and imaging systems likely to be available when payload decisions for ESA's High Throughput X-ray Mission are made are described. Collecting area, spectral resolution, spatial resolution, and energy range are summarized, and the sensitivity of various combinations suitable for specific observational programs are illustrated. Author (ESA)

N86-22472# Osservatorio Astronomico, Rome (Italy).
THE X-RAY SPECTRUM OF EMISSION LINE STARS (SUPERLUMINOUS AND SYMBIOTIC)
G. B. Baratta, L. Piro (CNR, Bologna, Italy), R. Viotti (CNR, Frascati, Italy), A. Cassatella (ESA, Madrid, Spain), A. Altamore (Rome Univ., Italy), O. Ricciardi (Rome Univ., Italy), and M. Friedjung (CNRS, Paris, France) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 95-98 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The observation of the X-ray spectrum of peculiar emission line stars, whose atmospheric envelopes are characterized by extreme physical conditions, as a tool to investigate the processes of formation of high temperature plasmas is discussed. The superluminous object Eta Car, showing high and low temperature regions and an asymmetric wind, is described. EXOSAT observations of symbiotic stars are presented. Observations of AG Draconis at a minimum phase show a low temperature X-ray spectrum. A weak flux from the Mira variable R Aqr observed near maximum is also detected. Author (ESA)

N86-22473# Osservatorio Astronomico, Turin (Italy).
OPTICAL, UV AND X-RAY OBSERVATIONS OF X-RAY BINARIES
Luciana Bianchi and Manfred Pakull (Tech. Univ., Berlin, West Germany) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 99-106 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

X-ray binary candidates in the Galaxy and in the Magellanic Clouds were observed in the optical, far ultraviolet, and X-ray bands. Results on two sources for which the photometric and spectroscopic data suggest the presence of an accretion disk are presented. For another source (LMC X-1) observational evidence of interaction of the strong X-ray source with the surrounding HII region, and the discovery of an X-ray ionized HeIII region, are shown. Author (ESA)

N86-22474# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
NONIONIZATION EQUILIBRIUM EFFECTS IN THE SUPERNOVA REMNANT (SNR) RCW 86
J. J. Claas (Space Research Lab., Leiden, Netherlands) and A. Peacock *In its* Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 107-110 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Using nonionization models, the analysis of EXOSAT low energy X-ray data (0.4 to 2 keV) of the supernova remnant RCW 86 reveals a shell-like structure, consisting of 2 separate parts, producing relatively hard and soft X-rays respectively. The soft X-rays come from C-K and O-K emission lines, which implies a low NH (< or = 10 to the 20th power atoms/sqcm). The harder X-rays probably result from the Fe-L complex and Ne-K line. A low NH value may also imply the distance to be 1.6 kpc or slightly more. Author (ESA)

N86-22475# Tokyo Univ. (Japan). Dept. of Earth Science and Astronomy.
THE X-RAY SPECTRA OF BURSTING NEUTRON STARS: EFFECTS OF COMPTONIZATION AND BOUND-FREE OPACITY
Toshikazu Ebisuzaki and Kenichi Nomoto *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 111-116 refs Sponsored by Space Data Analysis Center, Inst. of Space and Aeronautical Science (For primary document see N86-22461 12-89)
(Grants MIN-ESC-58340023; MIN-ESC-59050046; MIN-ESC-60540152)
Avail: NTIS HC A14/MF A01

Atmospheric models and emitted X-ray spectra are calculated for X-ray bursting neutron stars taking into account the effects of Comptonization and free-free and bound-free emission and absorption. The color temperatures obtained from the calculated X-ray spectra are significantly higher than the effective temperatures. The theoretical color temperature to luminosity diagram is in good agreement with the observational diagram of MXB 1636-536 observed with TENMA and Exosat. Author (ESA)

N86-22476# Oslo Univ. (Norway). Inst. of Theoretical Astrophysics.
ON THE VARIABILITY OF SIGMA GEMINORUM: AN INTERESTING CANDIDATE FOR X-RAY STUDIES
O. Elgaroey, O. Engvold, and P. Joraas *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 117-120 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Observations of Sigma Gem in UV show that high excitation line fluxes increase with the emergence of a dark region from behind the approaching limb. A moderate increase in X-ray intensity occurs, together with the coming into view of another, weaker, spot region. Further observations of rotational modulation effects are desirable. Author (ESA)

N86-22477# Bogazici Univ., Istanbul (Turkey). Kandilli Observatory.
EXOSAT CMA OBSERVATIONS OF X0512-401 = NGC 1851
E. N. Ercan, U Kiziloglu (Middle East Tech. Univ., Ankara, Turkey) A. Esendemir (Middle East Tech. Univ., Ankara, Turkey), F. Tokedemir (Middle East Tech. Univ., Ankara, Turkey), and G. Branduardi-Raymont (Mullard Space Science Lab., Dorking, England) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 121-125 refs Sponsored by Turkish Education and Research Foundation (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

EXOSAT observations of the globular cluster X-ray source X0512-401=NGC1851 are reported. The observations covered 20,000 sec and were carried out with Lexan thin, aluminum Parylene and boron filters: these yielded counting rates of (6.83 + or - 0.57) x 0.1, (4.54 + or - 0.44) x 0.1, and (1.95 + or - 0.54) x 0.1 counts/sec respectively: Results of three-color spectroscopy are presented. Long (6 hr) uninterrupted, simultaneous soft and medium energy X-ray curves of X0512-401 are given. Author (ESA)

N86-22478# Kapteyn Astronomical Lab., Roden (Netherlands).
A RELATIVISTIC ROTATING MASSIVE OBJECT WITH SATURATION OF MAGNETIC MONOPOLES c90
Qiuhe Peng *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 127-128 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The critical content of monopoles, with which the horizon of the metric for the rotating object would disappear, and the saturation content of monopoles in a relativistic rotating object are found. Although the critical value cannot be reached, induced nucleon decay by monopoles prevents the massive object (galactic nuclei and quasars) from collapsing into a black hole. For a fast rotating collapsed object, with radius close to the Schwarzschild radius, the saturation content of monopoles in the polar regions is much more than that in the equator region, if a/R > or = 6.5*0.01. Author (ESA)

N86-22479# Kapteyn Astronomical Lab., Roden (Netherlands).
FORCES EXERTING ON A TEST PARTICLE OUTSIDE A RELATIVISTIC ROTATING MASSIVE OBJECT WITH SATURATION OF MAGNETIC MONOPOLES AND JETS FROM THE OBJECT
Qiuhe Peng *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 129-130 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The forces on a test particle outside a relativistic rotating massive object with saturation of magnetic monopoles are calculated. For a fast rotating collapsed massive object (such as galactic nuclei and quasars) with saturation of monopoles, most material and monopoles are driven into and concentrated in the polar regions. Due to the induced nucleon decay by monopoles, two jets in the opposite direction are ejected from the polar regions. Author (ESA)

N86-22480*# Pennsylvania State Univ., University Park.
SOFT X-RAY MAPS OF THE LARGE MAGELLANIC CLOUD (LMC)
K. P. Singh, J. A. Nousek, D. N. Burrows, and G. P. Garmire *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 131-136 refs (For primary document see N86-22461 12-89)
(Contract NAS5-26809)
Avail: NTIS HC A14/MF A01 CSCL 03A

Soft X-ray maps of the Large Magellanic Cloud (LMC) were obtained from scanning-observations with the HEAO-1 low energy detectors. Comparison of the 1/4 keV X-ray observations with the neutral hydrogen column densities in the LMC obtained from a 21 cm line survey, shows no evidence for absorption effects in the 1/4 keV X-ray flux from the LMC due to the neutral matter in the LMC. Instead, faint X-ray emission is detected from the LMC. The extent of this emission is smaller than the size of the halo or the disk of the LMC. Assuming this 1/4 keV emission to be diffuse, it is identified with a supergiant shell of optical nebulosity known as Shapley III, and the bar of the LMC. The X-ray luminosities of the regions are estimated to be 9 times 10 to the 38th power ergs/sec and 1.8 times 10 to the 39th power ergs/sec for the Shapley III region and the bar of the LMC respectively. Shapley III could be an X-ray superbubble. Author (ESA)

N86-22481# Science Research Council, Chilton (England).
INTERPRETATION OF THE OXYGEN 7 SOFT X-RAY SPECTRUM FROM THE PUPPIS-A SUPERNOVA REMNANT
A. H. Gabriel, L. W. Acton (Lockheed Research Lab., Palo Alto, Calif.), F. Bely-Dubau (Observatoire de Nice, France), and P. Faucher (Observatoire de Nice, France) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 137-140 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The soft X-Ray line spectrum from Puppis-A recorded with the Einstein observatory shows line ratios different from those anticipated. Previous interpretations were based upon high temperatures (> 5 million K) and departures from ionization equilibrium. It is shown that an alternative model can fit the observations, in which 1% of fast electrons are present in an otherwise thermal plasma at 1 to 2 million K. This plasma can be in steady-state ionization balance. Author (ESA)

N86-22482*# Wroclaw Univ. (Poland). Inst. of Astronomy.
THE X-RAY SPECTRA AND THE ROTATION-ACTIVITY CONNECTION OF RS CVN BINARIES
P. Majer, J. H. M. M. Schmitt (Max-Planck Inst. fuer Extraterrestrische Physik, Garching, West Germany), L. Golub (Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.), F. R. Harnden, and R. Rosner *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 141-147 refs (For primary document see N86-22461 12-89)
(Contract NAS8-30751; Grant NAG8-445)
Avail: NTIS HC A14/MF A01

Results from a survey of RS CVn binaries which were observed with the Imaging Proportional Counter (IPC) on board the Einstein Observatory are presented. Spectral analyses of the IPC pulse height spectra show that the coronae of RS CVn binaries always contain hot gas with temperatures > 10 million K, similar to active late-type main sequence stars, and that at least 2 temperature components are necessary to account for the higher quality IPC spectra (when absorption is unimportant). It is argued that these bimodal temperature distributions indicate true distributions of emission measure vs temperature that are continuous (just as is the case for magnetically-confined coronal plasma loops observed on the Sun). It is shown that none of the derivable X-ray characteristics of RS CVn binaries depend on rotation period, implying that claims of period-activity relationships in RS CVn binaries are unfounded. Author (ESA)

N86-22483# Tokyo Univ. (Japan). Inst. of Space and Astronomical Science.
IRON K X-RAY EMISSION LINES FROM COSMIC X-RAY SOURCES OBSERVE WITH TENMA
Masaru Matsuoka *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 149-154 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Gas scintillation proportional counters on board TENMA detected iron K X-rays at an energy of 6.5 keV from binary X-ray pulsars. This is satisfactorily explained by a picture in which continuum X-rays originating from a compact region excite fluorescent K X-rays in the surrounding cold matter. Intense K X-rays at 6.4 keV are detected from the Seyfert galaxy NGC4151. The emission line at an energy of 6.7 keV is observed from nonpulsating low mass X-ray binaries and Cyg X-3. This is also explained by fluorescent mechanisms in a hot gas region. On the other hand intense 6.7 keV lines are detected from supernova remnants, clusters of galaxies, and the galactic ridge on the plane. Various emission lines as well as the 6.7 keV lines are produced from hot plasma region in these sources. Author (ESA)

N86-22484# Copenhagen Observatory (Denmark).
EXOSAT OBSERVATIONS OF THE POOR CLUSTER OF GALAXIES 2A0335+096
H. U. Noorgaard-Nielsen, N. J. Westergaard (Danish Space Research Inst., Lyngby), L. Hansen, H. E. Joergensen, and H. W. Schnopper (Danish Space Research Inst., Lyngby) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 155-157 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

EXOSAT observed 2A0335+096 for 10hr. The low energy image shows an irregular structure, and the X-ray emission is not centered on the dominant galaxy. Optical emission lines are seen from a large region, and they indicate normal composition, whereas the medium energy spectrum suggests a very low metal content, implying that the ionized gas seen optically is not a product of the cooling flow inferred from previous X-ray observations. Author (ESA)

N86-22485# Danish Space Research Inst., Lyngby.
THE HYADES: EXOSAT BROAD BAND SPECTROSCOPY
Niels J. Westergaard, Hans Ulrik Noorgaard-Nielsen (Copenhagen Observatory, Denmark), Leif Hansen (Copenhagen Observatory, Denmark), H. E. Joergensen (Copenhagen Observatory, Denmark), I. L. Rasmussen, and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Scpectroscopy Mission Sep. 1985 p 159-162 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Two EXOSAT observation fields of the Hyades star cluster were combined with Einstein proportional counter data for three band filter spectroscopy. Although temporal variations disturb the picture, the coronal temperatures in nine stars are confined to the few million degree range. The column density is probably 1 or 2 times 10 to the 19th power/sqcm. Author (ESA)

N86-22486# State Univ. of Western Connecticut, Danbury.
LONG-TERM X-RAY VARIABILITY IN THE HYADES CLUSTER
Marie-Christine Zolcinski and Robert A. Stern (Lockheed Research Lab., Palo Alto, Calif.) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 163-169 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Twenty Hyades stars were observed over a period of 1.5 yr, by EXOSAT. Reliable results are obtained for seven of them. Only one star, the KOIII giant theta prime TAU does not exhibit X-ray variability. This result casts doubt about the activity cycle being the explanation for the wide range of X-ray luminosities seen among the Hyades giants. The 6 other dwarfs exhibit variability on a time scale of few days to 1.5 yr. Assuming that the X-ray emission is of coronal origin, implications on the stellar coverage variations are drawn. Author (ESA)

N86-22487# Lockheed Aircraft Corp., Palo Alto, Calif.
LIGHT WEIGHT ALUMINUM OPTICS
R. C. Catura and J. R. Vieira *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 173-175 (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Light weight mirror blanks were fabricated by dip-brazing a core of low mass aluminum foam material to thin face sheets of solid aluminum. The blanks weigh 40% of an equivalent size solid mirror and were diamond turned to provide reflective surfaces. Optical interferometry was used to assess their dimensional stability over 7 months. No changes in flatness are observed (to the sensitivity of the measurements of a half wavelength of red light). Author (ESA)

N86-22488*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
THE LAMAR TELESCOPE MODULE FOR HIGH THROUGHPUT IMAGING AND SPECTROSCOPY
P. Gorenstein, D. Fabricant, and L. Cohen *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 177-182 refs (For primary document see N86-22461 12-89)
(Contract NAS5-26613; Grant NsG5-138)
Avail: NTIS HC A14/MF A01 CSCL 03A

Kirkpatrick-Baez mirror assemblies for the LAMAR experiment of the Space Shuttle are described. The aperture is 20 cm x 30 cm and the distance from the front of the mirror to the focal plane is 3.4 m. The reflectors are made from 1.8 mm gold coated float glass. A prototype brassboard mirror was constructed with only one-third of the plates. Its angular resolution is 35 arcsec (HPW) in visible light. X-ray tests over small areas indicate very little scattering. The fabrication technique is applicable to larger mirror systems such as those of XMM. The use of flatter material for the reflectors results in better angular resolution. Author (ESA)

N86-22489# Danish Space Research Inst., Lyngby.
A THIN FOIL HIGH THROUGHPUT X-RAY TELESCOPE
P. Loekke Jensen and N. J. Westergaard *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 183-187 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

A thin foil reflector X-ray telescope was proposed for a high throughput spectroscopic satellite (XMM). A prototype of a single quadrant was built and the precision of test mirrors is being measured. Three types of foils are studied: rolled aluminum, electroformed Ni, and carbon fiber reinforced epoxy. Evaluation of the performance based on measurements by ray tracing gives a half energy width = 5.4', but improvements are possible. Author (ESA)

N86-22490# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
CARBON-FIBER REINFORCED EPOXY TECHNIQUES FOR THE X-RAY MULTIMIRROR MISSION (XMM) LOW-ENERGY (LE) TELESCOPES c24
P. A. J. deKorte (Space Research Lab., Leiden), J. Klug, G. Moreau (Instruments SA, France), and G. P. Whitcomb (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 189-193 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

A development study for low energy telescopes for the X-ray Multi-Mirror mission (XMM) was performed. An X-ray paraboloidal mirror was fabricated by the replica method developed for EXOSAT. Instead of the use of a beryllium carrier, the use of a carbon-fiber reinforced epoxy carrier, which would have a big advantage for the mass production envisaged, was studied. Results show the feasibility of the technique, in spite of problems with long term shape stability and print through of the fiber pattern in the optical surface. Author (ESA)

N86-22491*# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
ELECTROFORM REPLICATION OF GRAZING INCIDENCE X-RAY OPTICS c74
M. P. Ulmer, W. R. Purcell, D. Bedford (Birmingham Univ., England), and G. R. Simnett (Birmingham Univ., England) *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 195-198 ref Sponsored by UK Science and Engineering Research Council (For primary document see N86-22461 12-89)
(Grant NAG5-181)
Avail: NTIS HC A14/MF A01

Work to produce mirrors via electroform replication is reported. Work on small (6 cm by 9 cm) cylindrical pieces and on 40 cm long by 12 cm wide Wolter shaped mirrors is summarized. It is shown that electroforming is a viable technique for producing relatively inexpensive grazing incidence X-ray optics, as long as modest resolution (1 min of arc) and size (12 cm diameter by 40 cm long) are specified. Author (ESA)

N86-22492# Laboratorium voor Ruimteonderzoek, Utrecht (Netherlands).
DISPERSIVE X-RAY SPECTROSCOPY WITH TRANSMISSION GRATINGS
F. Paerels, J. A. M. Bleeker, A. C. Brinkman, J. H. Dijkstra, R. Mewe, and C. J. Schrijver *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 205-208 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The possibilities for plasma diagnostics with high throughput grating spectrometers are illustrated by presenting spectra of a coronal X-ray source (Capella), a Seyfert Galaxy (NGC 4151) and a BL Lac object (PKS 2155-304). Einstein and EXOSAT spectra are contrasted with computer-simulated AXAF or XMM spectra, to illustrate the increase of insight expected from grating spectroscopy with these instruments. Author (ESA)

N86-22493# Danish Space Research Inst., Lyngby.
THE XMM IMAGING BRAGG SPECTROMETER WITH A DOUBLY CURVED CRYSTAL c74
B. Byrnak, F. E. Christensen, N. J. Westergaard, and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 209-212 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

A spaceborne X-ray astronomy spectrometer sensitive in the energy range from 0.5 to 7 keV is presented. The Bragg reflected rays from a doubly bent crystal positioned downstream of the focal plane of a grazing-incidence concentrator are focused along the axis of a position sensitive detector. The main advantages are: simultaneous (scanning free) coverage of the spectral range of interest, nearly stigmatic imaging, and crystal limited resolution. Author (ESA)

N86-22494# Danish Space Research Inst., Lyngby.
MEASUREMENTS OF INTRINSIC WIDTH AND MOSAICITY OF

TEST CRYSTALS WITH A NOVEL FOUR-CRYSTAL X-RAY SPECTROMETER c76

F. E. Christensen, H. W. Schnopper, E. H. Silver (LLNL, Berkeley, Berkeley, Calif.), and N. J. Westergaard *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 213-220 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

An X-ray study of test crystals for which the mosaicity and the perfection of the microcrystallites were measured was performed for the XMM X-ray spectrometer. These parameters play a significant role in determining the overall efficiency and the achievable energy-resolution of the XMM spaceborne spectrometer. The measurements were done with a four crystal X-ray spectrometer using three perfect quartz-crystals as beam defining element. Results from measurements on test crystals ranging from LiF(2d = 2.85A) to KAP(2d = 26.6A) are presented. The measurements were performed on flat crystal pieces. The results are very encouraging for application of the proposed crystals as dispersive elements in a high resolution dispersive spectrometer for X-ray astronomy. Author (ESA)

N86-22495# Danish Space Research Inst., Lyngby.

MEASUREMENTS OF SURFACE SCATTERING FROM MIRRORED SURFACES USING A TRIPLE AXIS X-RAY SPECTROMETER

F. E. Christensen, P. L. Jensen, and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 221-228 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

In developing a high throughput X-ray telescope for XMM, various techniques were employed to deposit a thin film of Au on a smooth substrate. A triple axis X-ray spectrometer was employed to measure the reflectivity and surface scattering of the gold surface or the substrates. For comparison, the same kind of measurements were performed on a high quality Au-coated test flat for EXOSAT and a Pt-coated test flat for AXAF. In the triple axis spectrometer a perfect channel cut Si crystal extracts Fe K radiation from a conventional X-ray tube. The X-rays are incident on the thin film surface at grazing angles and the specularly reflected and scattered radiation from the thin film is analyzed by another perfect Si crystal. A tailless probe of the scattered X-rays is obtained when the X-rays are reflected several times through a channel in each of the perfect Si crystals. It is demonstrated that the technique provides an excellent and detailed test of the quality of the mirror surface. Author (ESA)

N86-22496# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).

BOLOMETERS AS SPECTROMETERS FOR X-RAY ASTRONOMY c35

N. Coron, G. Artzner, G. Dambier, G. Jegoudez, J. Leblanc, J. Y. Deschamps (CEA, Saclay, France), R. Rocchia (CEA, Saclay, France), A. Tarrius (CEA, Saclay, France), O. Testard (CEA, Saclay, France), H. R. Ravn (CERN, Geneva, Switzerland) et al *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 229-231 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

Use of composite diamond-germanium bolometers developed for IR astronomy for the individual detection of X-ray photons was investigated. The advantage of a composite bolometer is that it separates the absorption and detection functions. Diamond, as absorber, is especially interesting because of its high thermal diffusivity and low heat capacity. The thermalization time of the whole device for a 1 x 1 mm absorber is < 50 microsec, allowing detection of a few tens or hundreds counts per second without degradation of the spectral resolution. The theoretical energy resolution is proportional to T C1/2 where C, the specific heat of the bolometer, is a rapidly decreasing function of the temperature T. The expected value is < 10eV at 0.1K. Associated with a 1000 sqcm telescope, such a device, whose performance is essentially signal limited, is able to detect an emission line of 0.000001 ph/sqcm/sec in 100,000 sec in the spectrum of a faint X-ray source. Author (ESA)

N86-22497# Consiglio Nazionale delle Ricerche, Bologna (Italy). Ist. di Technologie e Studio delle Radiazioni Extraterrestri.

ROOM TEMPERATURE SOLID STATE SPECTROMETER FOR X-RAY ASTRONOMY c35

G. DiCocco, W. Dusi, C. Labanti, G. F. Spada, G. Ventura, and P. Siffert *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 233-236 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

The use of room temperature HgI2 solid state X-ray spectrometers in spaceborne experiments is proposed. The main factors which characterize the behavior of HgI2 detectors and their related electronics are presented. The performance of a position sensitive spectrometer, based on experimental results on HgI2 detectors, is described, and its application as a focal plane detector for X-ray imaging concentrators is suggested. Author (ESA)

N86-22498# California Univ., Berkeley. Dept. of Physics.

THE APPLICATION OF REFLECTION GRATINGS TO A LARGE AREA X-RAY SPECTROSCOPY MISSION: A DISCUSSION OF SCIENTIFIC REQUIREMENTS AND VARIOUS DESIGN OPTIONS c74

Steven M. Kahn and Michael C. Hettrick *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 237-244 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

Grazing incidence reflection grating design options for faint X-ray source spaceborne observation are considered. Geometries based on objective gratings and convergent beam varied line-space gratings are discussed. In-plane (classical) and off-plane (conical) grating mountings are compared. Author (ESA)

N86-22499# Danish Space Research Inst., Lyngby.

A MULTIWIRE PROPORTIONAL COUNTER FOR LOW ENERGY X-RAY IMAGING c35

M. M. Madsen, P. Jonasson, P. L. Jensen, H. E. Rasmussen, P. Orup, and H. W. Schnopper *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 245-254 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

Development of a detector for a high spectrometral resolution imaging Bragg spectrometer experiment including the test set-up and the read-out electronics is described. Examples of the position resolution at X-ray energies from aluminum and manganese K radiation (1.49 and 5.9 keV) are presented. A computer controlled test-stand with: a 50 micron collimated X-ray beam from a fine focus X-ray tube with replaceable anode caps; an X-ray translation table for positioning the detector; and an electronics system using the charge division method for event position determination was developed. Charge pulses from the detector are digitized and analyzed in a microprocessor where the position and energy spectra are stored. Background rejection is determined by energy, position, and risetime windows in the microprocessor software. Author (ESA)

N86-22500# Columbia Univ., New York. Astrophysics Lab.

X-RAY POLARIMETRY ON XMM c74

R. Novick, G. Chanan, and D. J. Helfand *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 265-275 refs (For primary document see N86-22461 12-89)

Avail: NTIS HC A14/MF A01

It is proposed that a single XMM Mirror Module be devoted to X-ray polarimetry. The instrument would exploit the polarization dependence of Bragg reflection from a variety of crystals and Thomson scattering from a lithium target. It would be sensitive over the full bandwidth of the mirror and could be used for studies of as many as 50 different astrophysical objects. The crystals

would provide measurements at discrete energies which could constrain the disk and/or wind geometries in X-ray binaries, constrain the radiation mechanisms in active galactic nuclei, and establish the existence of nonthermal components in supernova remnants. Broadband measurements with the lithium could be used to search for the dragging of inertial frames around the suspected black hole in Cyg X-1. Author (ESA)

N86-22501# Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
A MULTIPLEX CODING IMAGING SPECTROMETER FOR X-RAY ASTRONOMY
R. Rocchia, J. Y. Deschamps, L. Koch-Miramond, and A. Tarrius *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 277-281 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

A multiplex coding system associated with a solid state spectrometer Si(Li) to be placed at the focus of a grazing incidence telescope is described. The spectrometric and imaging functions are separated. The coding system consists of a movable mask with pseudo randomly distributed holes, located in the focal plane of the telescope. The pixel size lies in the range 100 to 200 microns. The close association of the coding system with an Si (Li) detector gives an imaging spectrometer combining the good efficiency (50% between 0.5 and 10 keV) and energy resolution (90 to 160 eV) of solid state spectrometers with the spatial resolution of the mask. Simulations and results obtained with a laboratory model are presented. Author (ESA)

N86-22502# Danish Space Research Inst., Lyngby.
OBJECTIVE CRYSTAL SPECTROMETER (OXS) FOR IMAGING EXTENDED COSMIC X-RAY SOURCES c35
H. W. Schnopper and B. Byrnak *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 283-286 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Results from HEAO-2 and EXOSAT demonstrate the need for a high resolution imaging spectrometer capable of studying sources with appreciable angular extent (up to 1 to 2 deg). Instruments which utilize curved Bragg crystals following the telescope as proposed for XMM and AXAF do not possess a sufficiently large field of view (FOV) and their off-axis resolution deteriorates rapidly. They also produce overlapping spectral images of extended sources. The instrument of choice for diffuse sources has a flat Bragg crystal located ahead of the telescope. As an example of its performance, a source emitting OVII with surface brightness = 100 photons/sqcm/sec/ster is detected in 7.8x7.8 arcmin pixels over a 2 deg radius FOV. A total observation of 300,000 sec maps the source in each of the three OVII helium-like emission lines with a spectral resolution > 600. Author (ESA)

N86-22503# Mullard Space Science Lab., Dorking (England).
THE PENNING GAS IMAGER IN A SPACE APPLICATION c35
Hugo E. Schwarz *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 287-290 refs Sponsored by UK Science and Engineering Research Council (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

The prototype Penning Gas Imager PGI(1) and its principles of operation are described. Data taken with laboratory detectors and the space version of the PGI are described. This 120 mm detector will be flown as a focal plane imager on the soft X-ray Telescope (SXT), an objective grating spectrometer. A background rejection scheme is discussed and experimental data obtained in the laboratory are presented. Application of the PGI to ESA's X-ray Multi Mirror mission is considered. Author (ESA)

N86-22504# Mullard Space Science Lab., Dorking (England).
X-RAY APPLICATIONS OF DEEP-DEPLETION CCDS c76
D. M. Walton, J. L. Culhane, R. A. Stern (Lockheed Aircraft Corp., Palo Alto, Calif.), and R. C. Catura *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 291-295 refs Sponsored bv UK Science and Engineering Research Council and Lockheed Independent Research Program (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

Results demonstrating the successful use of deep-depletion CCDs as single photon X-ray detectors are presented. As focal plane X-ray detectors for X-ray astronomy, CCDs offer high spatial resolution combined with good energy resolution. The importance of deep-depletion CCDs is a significantly higher X-ray quantum efficiency (QE) than that of conventional CCDs. The measured QE for a 56 micron deep CCD manufactured from 4000 ohm-cm Si is 76% at 6 keV, over 3 times that of a conventional (10 micrometer 10 ohm-cm) CCD. The spatial resolution and energy resolution are comparable with conventional CCDs. A further advantage of deep-depletion CCDs is that cosmic rays deposit 15keV in a deep-depletion CCD allowing 90% of cosmic ray events to be rejected using energy discrimination. The application of CCDs to an X-ray astronomy mission such as XMM is described. Author (ESA)

N86-22505# Leicester Univ. (England).
X-RAY IMAGING SPECTROSCOPY WITH CCDS c76
A. Wells, D. Lumb, and R. Willingale *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 297-302 refs Sponsored by UK Science and Engineering Research Council and Lockheed Independent Research Program (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

A high sensitivity broad band spectrometer operating in the energy band 1 to 10 keV for an ESA X ray spectroscopy mission is described. The detector system, based on a CCD imager, offers spectral resolution comparable with solid state Si(Li) detectors but with spatial resolution matched to the telescope, allowing simultaneous mapping of extended sources and discrimination between point sources in crowded fields. In results from EEV/GEC CCDs, and energy resolution of 150 eV at 5.9 keV is obtained with a P 8607 device, while the experimental high resistivity device P 8600-HR has an energy resolution of 245 eV combined with a quantum efficiency of 70% at 5.9 keV. The results are substantial advances over state-of-the-art X-ray imaging CCD's. Author (ESA)

N86-22506# Department of the Air Force, Washington, D.C.
SYNTHETIC APERTURE MULTI-TELESCOPE TRACKER APPARATUS Patent Application
Carreras, inventor (to Air Force) Filed 10 Jun. 1985 34 p (AD-D011981; US-Patent-Appl-SN-734338) Avail: NTIS HC A03/MF A01 CSCL 20/6

A plurality of telescopes provide output return signals which are applied both directly and in sampled form to a photo-detector cell. The detected signals from the photo-detector will represent the constant and transient errors of the telescope system. A low pass filter insures that the tracker provides only the constant or D.C. component of the error, while a high pass filter insures that the existing measuring devices for each telescope beam provide only the transient or A.C. component of the error. The A.C. and D.C. error signals are summed together with the appropriate applied gains on each channel such that the sum reconstructs the original telescope position error with good fidelity. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-22507*# National Aeronautics and Space Administration, Washington, D.C.
METEORITE CRATERS
B. A. Ivanov and A. T. Bazilevskiy Feb. 1986 26 p refs Transl. into ENGLISH from Priroda (USSR), no. 10, 1985 p 23-35 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)
(NASA-TM-78013; NAS 1.15:78013) Avail: NTIS HC A03/MF A01 CSCL 03B

The origin and formation of various types of craters, both on the Earth and on other planetary bodies, are discussed. Various models are utilized to depict various potential causes of the types and forms of meteorite craters in our solar system, and the geological structures are also discussed. Author

N86-22508*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ARCHIVE OF OBSERVATIONS OF PERIODIC COMET CROMMELIN MADE DURING ITS 1983-84 APPARITION
Z. Sekanina, ed. and M. Aronsson 15 Dec. 1985 259 p
(Contract NAS7-918)
(NASA-CR-176650; JPL-PUB-86-2; NAS 1.26:176650) Avail: NTIS HC A12/MF A01 CSCL 03B

This is an archive of 680 reduced observations of Periodic Comet Crommelin made during its 1984 apparition. The archive integrates reports by members of the eight networks of the International Halley Watch (IHW) and presents the results of a trial run designed to test the preparedness of the IHW organization for the current apparition of Periodic Comet Halley. Author

N86-22509# California Univ., San Diego. Dept. of Electrical Engineering and Computer Sciences.
USE OF INTERPLANETARY SCINTILLATION FOR EARTH SPACE ENVIRONMENT AND GEOMAGNETIC FORECASTING Final Report, 16 Nov. 1981 - 30 Apr. 1985
B. V. Jackson and B. J. Rickett Apr. 1985 50 p
(Contract F19628-82-K-0015)
(AD-A161621; AFGL-TR-85-0124) Avail: NTIS HC A03/MF A01 CSCL 03/2

A comparison is presented between solar wind velocities determined from IPS (Interplanetary Scintillation) observations made from 1973 to 1981 with those measured in situ by spacecraft instruments. The IPS method is indirect but it provides reasonably accurate estimates of the large scale and slowly varying velocity structures in the solar wind. Thus the corotating solar wind streams typical of 1973 to 1975 (declining and low solar activity) are well estimated; the slower average speed typical of 1979 to 1981 was also well estimated. However, the transient increases during this period of high solar activity were often not detected. The difficulties of interpretation are offset by the capacity to monitor the solar wind speed out of the ecliptic and over long periods of the time without the expense of a spacecraft. GRA

N86-22468# Observatoire de Besancon (France).
ACCRETING NEUTRON STARS IN CLOSE BINARY SYSTEMS
Sergio A. Ilovaisky *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 49-58 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22469# Osservatorio Astronomico, Palermo (Italy).
STELLAR ACTIVITY: THE X-RAY PICTURE
S. Serio *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 59-67 refs Sponsored by Italian Ministry for Public Education (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

N86-22478# Kapteyn Astronomical Lab., Roden (Netherlands).
A RELATIVISTIC ROTATING MASSIVE OBJECT WITH SATURATION OF MAGNETIC MONOPOLES
Qiuhe Peng *In* ESA Proceedings of ESA Workshop on a Cosmic X-Ray Spectroscopy Mission Sep. 1985 p 127-128 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-22510*# Lunar and Planetary Inst., Houston, Tex.
PAPERS PRESENTED TO THE WORKSHOP ON THE GEOLOGY AND PETROLOGY OF THE APOLLO 15 LANDING SITE
1985 80 p refs Workshop held in Houston, Tex., 13-15 Nov. 1985
(NASA-CR-176622; NAS 1.26:176622; LPI-Contrib-581) Avail: NTIS HC A05/MF A01 CSCL 03B

Samples from Apollo 15 flight were analyzed to develop models for lunar basin formation and evolution, basin geology, petrology, volcanology, stratigraphy, and geochemistry. For individual titles, see N86-22511 through N86-22530.

N86-22511*# Indiana Univ., Bloomington. Dept. of Geology.
REGOLITH EROSION AND REGOLITH MIXING AT THE APOLLO 15 SITE ON THE MOON
Abhijit Basu *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 1-3 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Regolith samples from the Apollo 15 landing site were used to trace soil mixing. Mixing model calculations were performed on the chemical compositions of soils from different stations. The model was constructed using modal abundance data on crystalline fragments and green glass spherules. B.G.

N86-22512*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO 15 MARE UNITS AND THEIR PETROGENESIS
A. A. Binder *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 4-6 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Samples from 12 different mare sites were identified and classified among the Apollo 15 samples. The genesis of the Apollo 15 mare units is summarized given the general model of mare basalt source regions and of more basalt genesis derived from a synthesis of the major oxide/major mineral, compatible siderophile, and incompatible trace element data and isotopic ratios of the Rb/Sr and Sm/Nd systems. B.G.

N86-22513*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COMPARISON OF PETROLOGY, GRAIN SIZES AND SURFACE MATURITY PARAMETERS FOR APOLLO 15 REGOLITH BRECCIAS AND SOILS
D. D. Bogard, D. S. McKay, R. V. Morris, P. Johnson (Northrup Services, Inc.), and S. J. Wentworth (Lockheed/LEMSCO) *In* Lunar and Planetary Inst. Papers Presented to the Workshop on tyhe Geology and Petrology of the Apollo 15 Landing Site 1985 p 7-9 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

A total of 28 Apollo 15 regolith breccias were analyzed for their petrographic and textural properties and for the surface exposure indices solar noble gases and I (sub s)/Fe 0. Similarities and differences in compositional components and irradiation history were examined between regolith breccias and local, present day soils. B.G.

N86-22514*# Houston Univ., Tex.
EXTRACTION OF INFORMATION FROM MAJOR ELEMENT CHEMICAL ANALYSES OF LUNAR BASALTS
J. C. Butler *In* Lunar and Planetary Inst. Papers Presented to

the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 10-12 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Major element chemical analyses often form the framework within which similarities and differences of analyzed specimens are noted and used to propose or devise models. When percentages are formed the ratios of pairs of components are preserved whereas many familiar statistical and geometrical descriptors are likely to exhibit major changes. This ratio preserving aspect forms the basis for a proposed framework. An analysis of compositional variability within the data set of 42 major element analyses of lunar reference samples was selected to investigate this proposal. B.G.

N86-22515*# State Univ. of New York, Albany. Dept. of Geological Science.
APOLLO 15 MARE VOLCANISM: CONSTRAINTS AND PROBLEMS
J. W. Delano *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 13-17 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The Apollo 15 landing site contains more volcanics in the form of crystalline basalts and pristine glasses, which form the framework for all models dealing with the mantle beneath that site. Major issues on the petrology of the mare source regions beneath that portion of Mare Imbrium are summarized. Author

N86-22516*# Arizona State Univ., Tempe. Dept. of Geology.
HADLEY RILLE, LAVA TUBES AND MARE VOLCANISM AT THE APOLLO 15 SITE
Ronald Greeley and Paul D. Spudis (Geological Survey, Flagstaff, Ariz.) *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 18-21 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Hadley Rille appears to be a collapsed lava tube/channel, whose formation history may be more intimately related to the mare units sampled at 15 than was previously thought. More work is needed relating samples and observations from Apollo 15 to the rille and its geologic evolution. As the only sinuous rille visited during the Apollo missions, Hadley Rille represents a data source that is directly applicable to the deciphering of processes involved in lunar mare volcanism. Author

N86-22517*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
THE GEOLOGIC HISTORY OF QUARTZ-NORMATIVE AND OLIVINE-NORMATIVE BASALTS IN THE VICINITY OF HADLEY RILLE (APOLLO 15)
T. L. Grove *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 22-24 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The geologic history of the quartz normative (QNB) and olivine normative (ONB) basalt types at Hadley Rille are discussed. A model for the geology of the mare basalts was constructed from a combination of field observations, sample chemistry, sample petrology and personal bias from terrestrial experience. The model proposes that the QNBs are the only mare lava type that is present as outcrop in the area traversed by the astronauts during the Apollo 15 mission. The returned QNB samples formed during a single eruptive phase of the Hadley Rille lava tube system. The ONB lavas are an exotic component transported to the site by a cratering event, or the ONBs are samples excavated from older are bedrock that was partly covered by the QNB lavas. Author

N86-22518*# Washington Univ., St. Louis, Mo. Dept. of Earth and Planetary Sciences.
CHEMICAL COMPONENTS OF THE APOLLO 15 REGOLITH
Randy L. Korotev *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 25-29 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The lunar regolith is a complex mixture of many components. Compositional data is used to identify and estimate the relative importance of the various chemical components of the regolith. The results and conclusions of four methods that were applied to Apollo 15 regolith data were reviewed to determine the important chemical components: graphical techniques, analysis of individual soil particles, factor analysis, and multicomponent mixing models. This synthesis relies heavily on data and conclusions from the literature as well as new analyses on 28 regolith breccia samples, 28 soil samples, and 50 individual 1 to 2 mm particles from soil 15272. Author

N86-22519*# Washington Univ., St. Louis, Mo. Dept. of Earth and Planetary Sciences.
PETROLOGY AND GEOCHEMISTRY OF HIGHLANDS SAMPLES FROM THE APENNINE FRONT
Marilyn M. Lindstrom *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 30-34 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Individual rocks from the Hadley Delta massif, part of the Apennine Front, are described beginning with the simplest samples to the most complex breccias. Relationship among the samples were evaluated. Geological interpretations of the samples were speculative because of the limited data set, but provided models to be tested when additional data are available. B.G.

N86-22520*# Yale Univ., New Haven, Conn.
ULTRAMAFIC PARENT MAGMAS FOR MARE BASALTS?
J. Longhi *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 35-37 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Solidification products of basaltic magmas (fine grained basalts and ultramafic glasses) at the Apollo 15 site were examined. Consideration of simple MgO-6IO2-Al2O3 systematics plus results of calculations of fractional crystallization was reviewed. Suggestions are presented to account for the lack of correlation between the ultramafic glasses and basalts. B.G.

N86-22521*# Hawaii Univ., Honolulu. Planetary Geoscience Div.
SPECTRAL REFLECTANCE STUDY OF THE HADLEY-APPENINE (APOLLO 15) REGION
P. G. Lucey and B. R. Hawke *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 38-40 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Twenty-three near infrared spectra were obtained from the Mauna Kea Observatory 2.2 m telescope. Results of an analysis of near infrared spectra obtained for surface units in the Hadley-Apennine region were presented. Compositional trends from the interior to exterior of the Imbrium are discussed. B.G.

N86-22522*# Lunar and Planetary Inst., Houston, Tex.
SAMPLES AT THE APOLLO 15 LANDING SITE: TYPES AND DISTRIBUTION
Graham Ryder *In its* Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 41-45 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Samples, consisting of more than 350 individually numbered samples of rock and regolith, were collected during the three EVAs on the Apollo 15 mission. Samples consisted of rock specimens,

and scooped, trenched, and cored regolith samples. Petrographic and chemical analysis are discussed. B.G.

N86-22523*# Tennessee Univ., Knoxville. Dept. of Geological Sciences.
APOLLO 15 MARE BASALTS: A DIVERSE SUITE OR TWO DISTINCT GROUPS?
Peter A. Salpas and Lawrence A. Taylor *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 46-48 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The literature geochemical data for 60 Apollo 15 mare basalts were compiled in order to evaluate possible intra-group relationships of the Apollo 15 mare basalts. The effects of olivine or pigeonite fractionation were discussed. Models were developed to explain the trace element characteristics of the samples. B.G.

N86-22524*# South Dakota School of Mines and Technology, Rapid City. Inst. for the Study of Mineral Deposits.
APOLLO 15 REGOLITH BRECCIAS AND SOILS: COMPARATIVE PETROLOGY AND CHEMISTRY
S. B. Simon, J. J. Papike (Battelle, Richland, Wash.), and J. C. Laul *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 49-51 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Soils and regolith breccias contain clues to the geologic processes that contributed to the evolution of the local regolith over time. A suite of ten regolith breccias from the Apollo 15 site were compared with the results of previous studies in order to learn more about the regolith evolution at that site. Author

N86-22525*# Geological Survey, Flagstaff, Ariz.
THE MATERIALS AND FORMATION OF THE IMBRIUM BASIN
Paul D. Spudis *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 52-56 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The deposits around the Imbrium basin form a widespread stratigraphic datum, to which other lunar geological units may be relatively dated. More importantly, as a relatively well preserved multi-ring basin, Imbrium provides an important target of geologic investigation to study the processes involved in lunar basin formation and evolution. Two Apollo missions (Apollo 14 and 15) were send to landing sites chosen specifically to address problems of the Imbrium basin geology. Data about the deposits of the Imbrium basin are reviewed. Formational mechanics of lunar basins in general and the relations of materials collected at the highlands adjacent to the Apollo 15 landing site to Imbrium and other basins are examined. Author

N86-22526*# Geological Survey, Flagstaff, Ariz.
THE APENNINE BENCH FORMATION REVISITED
P. D. Spudis and B. R. Hawke (Hawaii Univ., Honolulu) *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 57-59 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The Apennine Bench Formation consists of pre-mare light plains materials that crop out south of the crater Archimedes, inside the Imbrium basin. This material was ascribed to either impact or volcanic origins. The characteristics of Apollo 15 KREEP basalts and the Apennine Bench Formation are reviewed to determine whether their characteristics are compatible with a volcanic origin. Author

N86-22527*# Geological Survey, Flagstaff, Ariz.
SOME OBSERVATIONS ON THE GEOLOGY OF THE APOLLO 15 LANDING SITE
G. A. Swann *In* Lunar and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 60-64 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

High resolution (panoramic) and high geometric fidelity (metric) photos were taken from orbit of the lunar landing sites. Gamma ray and X-ray fluorescence spectroscopic measurement were taken to determine regional chemical composition of the Moon. Distinctive features of the Apennine Bench Formation are described. The structurally controlled topography of the Apennine Bench Formation is suggested of a lava channel or collapsed lava tube. B.G.

N86-22528*# California Univ., Los Angeles. Inst. of Geophysics.
THE ORIGIN OF PRISTINE KREEP: EFFECTS OF MIXING BETWEEN ur KREEP AND THE MAGMAS PARENTAL TO THE MG-RICH CUMULATES
Paul H. Warren *In* Lunary and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 65-67 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

The magnesium/incompatible elements paradox is explained by a model that considers not only the magmasphere, but also its aftermath. A systematic mixing of primitive magnesium rich material with residual liquid is discussed as a method to account for the paradox that KREEP basalts, despite their high incompatible element contents, have moderate magnesium ratios. The KREEP basalts are compared with mare basalts. B.G.

N86-22529*# Geological Survey, Menlo Park, Calif.
GEOLOGIC SETTING OF THE APOLLO 15 LANDING SITE
D. E. Wilhelms *In* Lunary and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 68-72 refs (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Returned Apollo 15 samples were used to provide a remarkably comprehensive sampling of the Moon's profile and geologic history. The geological structure of the Apennine Bench Formation is described. The large collection of pigeonite and olivine basalts from the landing sites were viewed in the context of the site's geology. B.G.

N86-22530*# Geological Survey, Menlo Park, Calif.
SELECTION OF THE APOLLO 15 LANDING SITE
D. E. Wilhelms *In* Lunary and Planetary Inst. Papers Presented to the Workshop on the Geology and Petrology of the Apollo 15 Landing Site 1985 p 73-75 (For primary document see N86-22510 12-91)
Avail: NTIS HC A05/MF A01 CSCL 03B

Telescopic studies in the early 1960's pinpointed the future Apollo 15 landing site as a potential exploration site because it included one of the largest lunar sinuous rilles, Rima Hadley, and some of the highest mountains, Montes Apenninus. Additional targets were identified once Apennine-Hadley emerged as a potential landing site. Site selection processes were discussed. B.G.

N86-22531*# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
VOYAGER SATURNIAN RING MEASUREMENTS AND THE EARLY HISTORY OF THE SOLAR SYSTEM
H. Alfven, I. Axnaes, N. Brenning, and P.-A. Lindquist Jul. 1985 31 p refs Sponsored by NASA, NSF and Swedish Natural Science Research Council
(NASA-CR-176638; NAS 1.26:176638; TRITA-EPP-85-07; ISSN-0348-7539) Avail: NTIS HC A03/MF A01 CSCL 03B

The mass distribution in the Saturnian ring system is investigated and compared with predictions from plasma cosmogony. According to this theory, the matter in the rings was once a magnetized plasma, in which gravitation is balanced by the centrifugal and electromagnetic forces. As the plasma is neutra-

lized, the electromagnetic forces disappear and the matter falls in to 2/3 of the original saturnocentric distance. This causes the cosmogonic shadow effect, demonstrated for the large scale structure of the Saturnian ring system. It is shown that many structures of the present ring system can be understood as shadows and antishadows of cosmogonic origin. These appear in the form of double rings centered around a position a factor 0.64 (slightly < 2/3) closer to Saturn than the causing feature. Voyager data agree with an accuracy > 1%. Author (ESA)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-22532 California Inst. of Tech., Pasadena.
SOLAR PHOTOSPHERIC AND CORONAL ABUNDANCES FROM SOLAR ENERGETIC PARTICLE MEASUREMENTS Ph.D. Thesis
H. Herbert Breneman 1985 178 p
Avail: Univ. Microfilms Order No. DA8522605

Observations fo solar energetic particles (SEPs) from 22 solar flares in the 1977 to 1982 time period are reported. The observations were made by the Cosmic Ray Subsystem on board the Voyager 1 and 2 spacecraft. SEP abundances have been obtained for all elements with 3 < or Z < or = 30 except Li, Be, B, F, Sc, V, Co and Cu, for which upper limits have been obtained. Statistically meaningful abundances of several rare elements (e.g., P, Cl, K, Ti, Mn) have been determined for the first time, and the average abundances of the more abundant elements have been determined with improved precision, typically a factor of three better than the best previous determinations. Previously reported results concerning the dependence of the fractionation of SEPs relative to photosphere on first ionization potential (FIP) have been confirmed and amplified upon with the new data. The monotonic Z-dependence of the variation between flares noted by earlier studies was found to be interpretable as a fractionation, produced by acceleration of the particles from the corona and their propagation through interplanetary space, which is ordered by the ionic charge-to-mass ratio Q/M of the species making up the SEPs. Dissert. Abstr.

N86-22533 Institut d'Aeronomie Spatiale de Belgique, Brussels.
A COMPUTER SIMULATION STUDY OF THE MICROSCOPIC STRUCTURE OF A TYPICAL CURRENT SHEET IN THE SOLAR WIND
M. A. Roth 1985 17 p refs Presented at 19th ESLAB Symposium on the Sun and the Heliosphere in Three Dimensions, Les Diablerets, Switzerland., 4-6 Jun. 1985 Submitted for publication (Aeronomica-Acta-A-301-1985) Avail: Issuing Activity

It is shown that the internal structure of a typical current sheet in the solar wind can be simulated numerically by a computer program based on the Vlasov theory of tangential discontinuities in collisionless plasma with multiple species. For each plasma species, moments of the velocity distribution function up to the third order were computed and are illustrated, together with the magnetic field, the electric potential, the electric field, and the charge density. It is shown that the thickness of the current layer is 20 proton gyro-radii. This means that, in order to resolve such layers, the time resolution of plasma measurements should not exceed 1sec. Author (ESA)

N86-22534*# Illinois Univ., Urbana. Aeronomy Lab.
SOLAR FLARE IONIZATION IN THE MESOSPHERE OBSERVED BY COHERENT-SCATTER RADAR
J. W. Parker and S. A. Bowhill 1 Jan. 1986 128 p refs
(Grants NsG-7506; NSF ATM-81-20371)
(NASA-CR-176649; NAS 1.26:176649; AR-118; ISSN-0568-0581; UILU-ENG-86-2501) Avail: NTIS HC A07/MF A01 CSCL 03B

The coherent-scatter technique, as used with the Urbana radar, is able to measure relative changes in electron density at one altitude during the progress of a solar flare when that altitude contains a statistically steady turbulent layer. This work describes the analysis of Urbana coherent-scatter data from the times of 13 solar flares in the period from 1978 to 1983. Previous methods of measuring electron density changes in the D-region are summarized. Models of X-ray spectra, photoionization rates, and ion-recombination reaction schemes are reviewed. The coherent-scatter technique is briefly described, and a model is developed which relates changes in scattered power to changes in electron density. An analysis technique is developed using X-ray flux data from geostationary satellites and coherent scatter data from the Urbana radar which empirically distinguishes between proposed D-region ion-chemical schemes, and estimates the nonflare ion-pair production rate. Author

N86-22535# Alaska Univ., Fairbanks. Geophysical Inst.
DEVELOPMENT OF A GEOMAGNETIC STORM PREDICTION SCHEME Final Report, 23 Feb. 1982 - 23 Apr. 1985
S. I. Akasofu and C. F. Fry Jun. 1985 40 p
(Contract F19628-82-K-0035)
(AD-A161651; AFGL-TR-85-0152) Avail: NTIS HC A03/MF A01 CSCL 08/14

Since present geomagnetic storm prediction schemes rely entirely on statistical results, so that they can't provide quantitative information on the intensity of a geomagnetic storm caused by a particular solar event, a first generation numerical prediction scheme. The scheme consists of two major computer codes which consist of a large number of subroutine codes and of empirical relationships. When a solar flare occurs, six flare parameters are determined as the input data set for the first code which is devised to show the simulated propagation of solar wind disturbances in the heliosphere to a distance of 2 AU. Thus, one can determine the relative location of the propagating disturbances with the earth's position. The solar wind speed and the three interplanetary magnetic field (IMF) components are then computed as a function of time at the Earth's location or any other desired (space probe) locations. These quantities become the input parameters for the second major code which computes the power of the solar wind-magnetosphere dynamo as a function of time. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-22536# Pennsylvania Univ., Philadelphia. Dept. of Physics.
SEARCH FOR MAGNETIC MONOPOLES, NEUTRINO OSCILLATIONS, AND SUPERHIGH ENERGY PARTICLES Technical Progress Report
K. Lande Oct. 1985 22 p
(Contract DE-AC02-81ER-40012)
(DE86-001548; DOE/ER-40012/01) Avail: NTIS HC A02/MF A01

The deep underground Large Area Scintillation Detector and surface air shower array at the Homestake Gold Mine are now in operation. Beginning in January 1985, the underground detector has been searching for muons from Cygnus X-3; the surface-underground telescope has been collecting cosmic ray data since the Spring of 1985. We describe these data, and discuss the experiments to search for magnetic monopoles, neutrinos, and high energy cosmic ray air showers with these instruments and with a new atmospheric Cerenkov detector. There are three elements in the Homestake detector: a deep underground 140-ton Large Area liquid Scintillation Detector (LASD), an extensive air shower array located on the surface above the underground detector, and a Cerenkov telescope to view cosmic ray primary interactions in the upper atmosphere. The combined Large Area Scintillation Detector - Air Shower Array - Cerenkov Detector system

is designed to: (1) search for massive magnetic monopoles; (2) measure the flux of high energy neutrinos, search for sources of these neutrinos, and look for neutrino oscillations; (3) measure the composition of very high energy cosmic rays; (4) search for and investigate the nature of the surface and underground flux from Cygnus X-3 and other binary pulsars; and (5) look for neutrino bursts from collapsing stars. DOE

N86-22463# Cambridge Univ. (England). Inst. of Astronomy.
THE X-RAY BACKGROUND
Paul Guilbert *In* ESA Proceedings of ESA Workshop on a Cosmic X Ray Spectroscopy Mission Sep. 1985 p 15-18 refs (For primary document see N86-22461 12-89)
Avail: NTIS HC A14/MF A01

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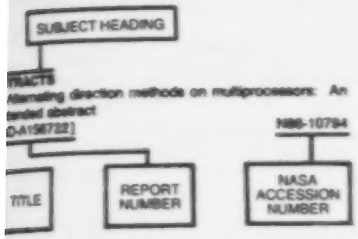

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BIBLIOGRAPHIES
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A synthesis of research on color, typography and graphics as they relate to readability
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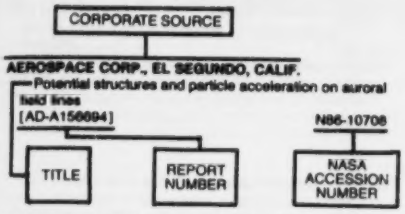

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Contribution of bending energy losses to the apparent tear energy
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General aviation pilot and aircraft activity survey
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Photochemical, electrochemical and thermochemical transformation and storage of solar energy: Thermodynamic aspects N86-21991

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An evaluation of study design for estimating a time-of-day noise weighting
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Two methods for viscous and inviscid free-wake analysis of helicopter rotors
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BRITISH LIBRARY LENDING DIV., BOSTON SPA (ENGLAND).
Estimation of the high temperature low cycle fatigue strength of welded joints. 1: Proposal of fundamental estimation methods
[BLL-RISLEY-TR-5236-(9091.9F)] N86-21876
Evalution of low cycle fatigue strength of welded joints at elevated temperature: Applicability of methods of evaluation and plastic restraint
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CALIFORNIA UNIV., IRVINE.
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CALIFORNIA UNIV., IRVINE, DAYTON, OHIO.
Toxic hazards research unit annual technical report: 1985
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CALIFORNIA UNIV., LOS ANGELES.
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CENTER FOR MATHEMATICS AND COMPUTER SCIENCE, AMSTERDAM (NETHERLANDS).
CWI Newsletter, no. 2, March 1984
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Colorado Water Resources Research Institute activities report, FY 1981-1984
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The influence of initial and boundary conditions on gaseous detonation waves
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Complexes of nitrocellulose with cupric chloride
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Low loss dielectrics with controllable values of specific permittivity
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Flow field measurements in the 3mx3m low speed wind tunnel of the DFVLR in Gottingen (West Germany)
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The icing research aircraft DO28, D-IFMP of DFVLR, and its measuring equipment
[DFVLR-MITT-85-12] N86-22064

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, STUTTGART (WEST GERMANY).
The other aspect of solar energy utilization. Solar technologies export enhancement: A central European point of view N86-21985
Population inversions of quantum levels in space and time-dependent fast recombining plasmas. Theory of the recombination laser
[DFVLR-FB-85-47] N86-22414

DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT, FRANKFURT AM MAIN (WEST GERMANY).
Activities report of the aerospace industry in West Germany
[ISSN-0176-5086] N86-22450

DRAPER (CHARLES STARK) LAB., INC., CAMBRIDGE, MASS.
A hierarchical approach to reliability modeling of fault-tolerant systems
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DUKE UNIV., DURHAM, N. C.
Finding critical sets
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EIDGENOESSISCHES INST. FUER REAKTORFORSCHUNG, WUERENLINGEN (SWITZERLAND).
Experiences with solar power N86-21994

ELECTRONICS RESEARCH LAB., ADELAIDE (AUSTRALIA).
Determination of the modulation transfer function of line scanned infrared imaging systems
[AD-A161521] N86-21922

ENVIRONMENTAL DEVICES CORP., SACRAMENTO, CALIF.
Coincidental chemical signature identifier
[AD-A161269] N86-21637

ENVIRONMENTAL PROTECTION AGENCY, ATLANTA, GA.
Freshwater wetlands for wastewater management environmental assessment handbook
[PB86-106964] N86-21975

ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Quality assurance for the acid precipitation measurement program in the US
[PB86-107034] N86-22011
Investigation of transient aspects of atmospheric dispersion processes in the wake of a building through video image analysis
[PB86-100989] N86-22015
EPA (Environmental Protection Agency) oxidant model: Description and evaluation plan
[PB86-103090] N86-22016

ESSEX CORP., HUNTSVILLE, ALA.
Emergency Management Computer-Aided Trainer (EMCAT)
[NASA-CR-178738] N86-21554

ESSEX CORP., ORLANDO, FLA.
Computer-Based Instruction (CBI): Considerations for a user-oriented technology data base
[AD-A161776] N86-22167

EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Algorithms for the automatic four-dimensional guidance of aircraft, taking into account the current wind situation
[ESA-TT-906] N86-21531
Solar energy 85: Resources, technologies, economics
[ESA-SP-240] N86-21983
Passive and hybrid solar systems N86-21986
Proceedings of an ESA Workshop on a Cosmic X-Ray Spectroscopy Mission
[ESA-SP-239] N86-22461

EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
Space applications of solar energy systems N86-21996
Nonionization equilibrium effects in the supernova remnant (SNR) RCW 86 N86-22474

EXXON RESEARCH AND ENGINEERING CO., ANNANDALE, N.J.
Fragmentation of small molecules following soft X-ray absorption near the carbon K-edge N86-22333
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FAILURE ANALYSIS ASSOCIATES, PALO ALTO, CALIF.
Fracture control for fixed offshore structures
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FAIRCHILD REPUBLIC CO., FARMINGDALE, N.Y.
Structural evaluation of superplastic aluminum. Part 1. Mechanical, corrosion, metallurgical data
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FEDERAL AVIATION ADMINISTRATION, ATLANTIC CITY, N.J.
Aircraft interior panel test criteria derived from full-scale fire tests
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FEDERAL AVIATION ADMINISTRATION, LONG BEACH, CALIF.
Controlled impact demonstration airframe bending bridges N86-21943

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Evaluation of a passenger mask modified with a rebreather bag for protection from smoke and fumes
[AD-A162473] N86-22116

FEDERAL AVIATION AGENCY, ATLANTIC CITY, N.J.
Controlled impact demonstration seat/cabin restraint systems: FAA N86-21937
Controlled impact demonstration flight data recorders/cockpit voice recorders N86-21944

FLIGHT SAFETY FOUNDATION, INC., ARLINGTON, VA.
Proceedings of Cabin Safety Conference and Workshop held on 11-14 December 1984
[AD-A160950] N86-21527

FLORIDA STATE UNIV., TALLAHASSEE.
Optimum allocation in multistate systems, with applications in reliability
[AD-A161392] N86-22135
Fault diversity in software reliability
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On the limit behavior of a multi-compartment storage model with an underlying Markov chain. Part II: With normalization
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FLORIDA UNIV., GAINESVILLE.
Investigation of chemical durability mechanism in fluoride glasses
[AD-A162740] N86-21693
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FOERSVARETS FORSKINGSANSALT, STOCKHOLM (SWEDEN).
Representation of urban districts in a geographical information system
[PB86-109451] N86-22455

FRAUNHOFER-INST. FUER SYSTEMTECHNIK UND INNOVATIONSFORSCHUNG, KARLSRUHE (WEST GERMANY).
Technology assessment of solar energy utilization N86-21995

G

GCA CORP., BEDFORD, MASS.
National acid precipitation assessment program emission inventory allocation factors
[PB86-104247] N86-22010

GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Burner liner thermal-structural load modeling
[NASA-CR-174892] N86-21932

GENERAL ELECTRIC CO., LARGO, FLA.
Quantitative methods for the chemical analysis of sealing glasses
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GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Damping in support structures for satellite equipment reliability: RELSAT N86-21922
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Development of spacecraft materials and structures fundamentals
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GENERAL MOTORS CORP., INDIANAPOLIS, IND.
Turbine vane external heat transfer. Volume 1: Analytical and experimental evaluation of surface heat transfer distributions with leading edge showerhead film cooling
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Desert studies: A global view
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GEOLOGICAL SURVEY, MENLO PARK, CALIF.
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GEORGIA INST. OF TECH., ATLANTA.
Analysis and experiments on interlaminar fracture toughness in resin matrix composites
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Fault diversity in software reliability
[AD-A162757] N86-22182

GEORGIA UNIV., ATHENS.
Time and frequency dependent behavior of a two dimensional electron gas at long wavelengths
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GESELLSCHAFT FUER SCHWERIONENFORSCHUNG M.B.H., DARMSTADT (WEST GERMANY).
Flow of nuclear matter
[DE86-001484] N86-22384

GORDON RESEARCH CONFERENCES, INC., KINGSTON, R.I.
Proceedings: Protons and Membrane Reactions held at Santa Barbara, California on 28 January - 1 February 1985
[AD-A161331] N86-22062

GRAZ UNIV. (AUSTRIA).
Project: Submicron phononics 1. 1. The problematics of phonon disturbances in d.c. Semiconductor transport
[AD-A162785] N86-21778

H

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Performance testing of refractory alloy-clad fuel elements for space reactors
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HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, CAMBRIDGE, MASS.
The X-ray properties of normal galaxies. What do we know and what can we learn with the next generation of X-ray telescopes? N86-22466
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HARVARD UNIV., CAMBRIDGE, MASS.
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HC CHEM RESEARCH AND SERVICE, SAN JOSE, CALIF.
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HERSHEY (MILTON S.) MEDICAL CENTER, HERSHEY, PA.
Vection-induced gastric dysrhythmias and motion sickness
[NASA-CR-176620] N86-22095

HOCHSCHULE DER BUNDESWEHR, MUNICH (WEST GERMANY).
New proposed dynamic vibration absorbers for excited structures N86-21908

HOUSTON UNIV., TEX.
X-ray microbursts and VLF chorus
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Powers of tests for constant regression coefficients under several alternative models N86-22229
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HUGHES AIRCRAFT CO., FULLERTON, CALIF.
ASIM (Automated interactive simulation modeling system) VAX version user's manual
[AD-A161558] N86-22162

HYDROLOGIC ENGINEERING CENTER, DAVIS, CALIF.
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IBM WATSON RESEARCH CENTER, YORKTOWN HEIGHTS, N.Y.
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ILLINOIS INST. OF TECH., CHICAGO.
Bifurcation and stability of complex flows
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ILLINOIS UNIV., URBANA.
Prediction of detonation transition in porous explosives from rapid compression loadings
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Solar flare ionization in the mesosphere observed by coherent-scatter radar
[NASA-CR-176649] N86-22534

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Friction damping studies at Imperial College N86-21893

INDIANA UNIV., BLOOMINGTON.
Microvoltammetric electrodes
[AD-A161653] N86-21642
Regolith erosion and regolith mixing at the Apollo 15 site on the moon N86-22511

INDUSTRIAL QUALITY, INC., GAITHERSBURG, MD.
High sensitivity, one-sided X-ray inspection system
[AD-A162567] N86-21875

INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Plasmoid motion across a tangential discontinuity (with application to the magnetopause)
[AERONOMICA-ACTA-A-297-1985] N86-22019
Dynamical plasmapause positions during the July 29-31/1977 storm period: A comparison of observations and time dependent model calculations
[AERONOMICA-ACTA-A-299-1985] N86-22020
Vertical distribution of acetonitrile in the atmosphere
[AERONOMICA-ACTA-A-300-1985] N86-22021
A computer simulation study of the microscopic structure of a typical current sheet in the solar wind
[AERONOMICA-ACTA-A-301-1985] N86-22533

INSTITUTE FOR DEFENSE ANALYSES, ALEXANDRIA, VA.
Nuclear winter: Smoke generation, deposition, and removal
[AD-A161807] N86-22004

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Characterization of emission rates from indoor combustion sources
[PB86-103900] N86-21874

INSTITUTO DE PESQUISAS ENERGETICAS E NUCLEARES, SAO PAULO (BRAZIL).
Determination of Tri-n-Butyl Phosphate (TBP) in the TBP-mVarsol-HNO3 system using precision densimetry
[DE86-001607] N86-21832

INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
TV-SAT final orbit acquisition optimization strategy
[INPE-3679-PRE/829] N86-21570
Analysis of the capture of the nominal equilibrium position for the first Brazilian satellite
[INPE-3694-PRE/839] N86-21571
Parameter optimization and attitude stabilization of a flexible spacecraft
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Atmospheric electric fields: A numerical approach
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INTEGRATED SYSTEMS, INC., PALO ALTO, CALIF.
Robust adaptive control
[AD-A161349] N86-22192

INTERNATIONAL SOCIETY OF ELECTROCHEMISTRY, LAUSANNE (SWITZERLAND).
Extended abstracts, 36th International Society of Electrochemistry held at Salamanca, Spain on 23-28 September 1985
[AD-A162434] N86-21644

INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY, VIENNA (AUSTRIA).
The 12th International Conference on Organometallic Chemistry held at Congress center Hofburg, Vienna on 9-13 September 1985. Abstracts
[AD-A161039] N86-21585

IOWA UNIV., IOWA CITY.
The role of endorphins in the pathophysiology of hemorrhagic and endotoxic shock in the subhuman primate
[AD-A162483] N86-22100
On Mini Conference on Order Restricted Inference held at Iowa University Campus on 11-13 September 1985
[AD-A162478] N86-22242

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J AND M SYSTEMS, ALBUQUERQUE, N. MEX.
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JAYCOR, ALEXANDRIA, VA.
Wind driven ocean modeling and ocean model development
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JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Effect of flow oscillations on cavity drag and a technique for their control
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Chemistry of MOS-LSI radiation hardening
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JOHNS HOPKINS UNIV., LAUREL, MD.
High frequency radar studies of the very high latitude ionosphere
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Japan report: Science and technology
[JPRS-JST-86-001] N86-21723
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Role of hydrogen in solar energy utilization: Problems and aspects of the hydrogen issue N86-21993

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KANSAS UNIV., LAWRENCE.
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KAPTEYN ASTRONOMICAL LAB., RODEN (NETHERLANDS).
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MITRE CORP., MCLEAN, VA.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
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Multispectral glancing incidence X-ray telescope
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
High band GaP 3-5 tunneling junction for silicon multijunction solar cells
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NATIONAL AEROSPACE LAB., TOKYO (JAPAN).
A viscous-inviscid interaction method to predict the aerodynamic performance of airfoils at transonic speed
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
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NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Calibration of a monochromator/spectrometer system for the measurement of photoelectron angular distributions and branching ratios
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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Relative accuracy of ALPEX aircraft data: An evaluation of the ALPEX intercomparison flight with the NCAR (National Center for Atmospheric Research) Electra, the NOAA (National Oceanic and Atmospheric Administration P3 and the DFVLR (Deutsche Forschungs- und Versuchsanstalt fuer Luft-und Raumfahrt) Falcon
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NATIONAL CLIMATIC CENTER, ASHEVILLE, N. C.
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[PB85-105723] N86-22081

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Data analysis of the NOAA-GIT (National Oceanic and Atmospheric Administration-Georgia Institute of Technology) millimeter-wave propagation experiment near Faltville, Illinois
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Studies of complex-terrain flows using acoustic remote sensors
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Comprehensive Ocean-Atmosphere Data Set (COADS), release 1
[PB85-105723] N86-22081

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.
Current celocity and hydrographic observations of the Straits of Florida: Subtropical Atlantic climate study (STACS) 1983 and 1984
[PB86-108602] N86-22079

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WASH.
Pacific Marine Environmental Laboratory
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SILVER SPRING, MD.
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NATIONAL OCEANOGRAPHIC DATA CENTER, WASHINGTON, D. C.
Mariners Weather Log, Volume 29, Number 3: Summer, 1985
[PB86-108313] N86-22066

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
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Aircraft accident report: Galaxy Airlines, Inc., Lockheed Electra-L-188C, N5532, Reno, Nevada, January 21, 1985
[PB86-910401] N86-21526

NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
WXR: Weather wire reformatting package (version 3.00) revised
[PB85-100815] N86-22069

NATIONAL WEATHER SERVICE, KANSAS CITY, MO.
Reliability of the bow echo as an important severe weather signature. Observation of bow echoes with the Marseilles radar system
[PB86-102340] N86-22070

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Maintenance planning for the 1990's (initial planning)
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NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and Seasonal Weather Outlook for Mid-September to Mid-October 1985, Volume 39, Number 18: September 14, 1985
[PB86-104584] N86-22071
Monthly and Seasonal Weather Outlook for September 1985, Volume 39, Number 17: August 30, 1985
[PB86-101672] N86-22072

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[AD-A162571] N86-22141
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NAVAL RESEARCH LAB., WASHINGTON, D. C.
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NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
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NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
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Improved amphoteric ion exchanger and its manufacturing method
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Final report on 3 Cr-1.5 Mo steels for gasifier pressure vessel construction
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Erosion-resistant TiB2 coatings formed by chemical vapor deposition
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Operating research plan. Volume 2: Inventory of research under the National Acid Precipitation Assessment Program
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Accreting neutron stars in close binary systems N86-22468
OESTERREICHISCHES FORSCHUNGSZENTRUM SEIBERSDORF G.M.B.H., VIENNA.
The dynamics of heat transfer in a turbulent pipe flow, part 2
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Fluid slosh studies for spinning spacecraft
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OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes. Volume 39, number 12
[AD-A161069] N86-21721
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PACIFIC NORTHWEST LAB., RICHLAND, WASH.
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PANAMETRICS, INC., WALTHAM, MASS.
Fabricate, calibrate and test a dosimeter for integration into the CRRES (Combined Release and Radiation Effects Satellite)
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User's guide for the multiple airshed (MASH) model
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
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The RTJ1200 video amplifier. Investigation of low noise, low distortion amplifiers for low source impedance
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The nightglow hydroxl (8-3) band emission: A comparison of experiment and theory N86-22031

R

RADIO TECHNICAL COMMISSION FOR AERONAUTICS, WASHINGTON, D. C.
Minimum operational performance standards for airborne Distance Measuring Equipment (DME) operation within the radio frequency range of 960-1215 megahertz
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Concepts, problems and opportunities for use of annihilation energy: An annotated briefing on near-term RDT/E to assess feasibility
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Airblast loading of wall panels
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Proceedings of the Gulf Stream Workshop held at West Greenwich, Rhode Island on 23-26 April 1985
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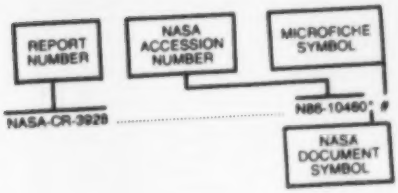

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35 INSTRUMENTATION AND PHOTOGRAPHY **2122**
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS **2124**
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING **2127**
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY **2129**
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **2134**
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) **2138**

43 EARTH RESOURCES **2140**
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION **2141**
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION **2146**
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS **2148**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY **2162**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **2168**
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **2171**
Includes genetics.

52 AEROSPACE MEDICINE **2178**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **2182**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **2182**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **2183**

60 COMPUTER OPERATIONS AND HARDWARE **2183**
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE **2188**
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS **2193**
Includes computer networks.

63 CYBERNETICS **2194**
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS **2194**
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **2196**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **2197**
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **2197**
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering.*

70 PHYSICS (GENERAL) **2197**
For geophysics see *46 Geophysics.* For astrophysics see *90 Astrophysics.* For solar physics see *92 Solar Physics.*

71 ACOUSTICS **2198**
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS **2200**
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS **2202**
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS **2209**
Includes light phenomena.

75 PLASMA PHYSICS **2209**
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS **2213**
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS **2216**
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **2216**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **2216**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **2217**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **N.A.**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **2217**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **2218**

89 ASTRONOMY **2222**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2223**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **2226**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **2227**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2228**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 13 / JULY 8, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-22537# Selenia Industrie Associate S.p.A., Rome (Italy).
RIVISTA TECHNICA SELENIA, VOLUME 9, NUMBER 3, 1985
1985 36 p refs
Avail: NTIS HC A03/MF A01

Electronic and communication automatic test systems are discussed, referring to the Tornado combat aircraft test systems. The subjects include system architecture, the role of advanced computer languages, software quality control, system design analysis and evolution trends. For individual titles, see N86-22538 through N86-22543.

N86-22538# Selenia Industrie Associate S.p.A., Rome (Italy).
THE MRCA AUTOMATIC TEST SYSTEM
Paolo Cecchini *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 1-6 ref (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

The automatic test system used to test the Tornado aircraft is described. Each piece of test equipment is dedicated to a single technological class, defined on the basis of the frequency range at which it operates, from low frequency to microwave. Avionics is conceived as a set of line replaceable units tested at self standing test stations including a controller, switching devices, input-output interfaces, and appropriate instrumental configuration (dedicated or common) which carry out the test under the test control program. The interface with the operator is a video display unit. As an example of system performance, the flight computer control time is reduced to one tenth of the normal time required. Author (ESA)

N86-22539# Selenia Industrie Associate S.p.A., Rome (Italy). Aircraft Support Equipment Group.
COMPLEX SYSTEMS INTEGRATED LOGISTIC SUPPORT: AUTOMATIC TEST EQUIPMENT (ATE) AND TEST ORIENTED LANGUAGES ROLE
Silvino dErcole *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 7-11 refs (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

The choice of language to be used in software design of automatic test equipment is discussed. The Abbreviated Test Language for Avionics Systems (ATLAS) is described and its performances are compared with those of Basic. A very important aspect introduced by ATLAS is that a change of the intrumentation used has no impact on an ATLAS test program. An example of the same program written in ATLAS and in Basic is given. It is also shown that the ATLAS program is considerably shorter.
Author (ESA)

N86-22540# Selenia Industrie Associate S.p.A., Rome (Italy). Aircraft Support Equipment Group.
SELENIA'S CONTRIBUTION TO THE DEVELOPMENT OF SYSTEMS SUPPORT: MICROWAVE AUTOMATIC TEST EQUIPMENT (ATE)
Antonio Tulli *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 12-16 (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

The facilities to support onboard radar systems, (active and passive) are described. A fundamental characteristic of the system is that the test simulates the whole of the operational conditions of the equipment itself. The system is implemented by functional elements including the test equipment, hydraulic system, dedicated boards and units, and line replacable unit adapters. The software is divided into base and applications, and is writen in ATLAS language.
Author (ESA)

N86-22541# Selenia Industrie Associate S.p.A., Rome (Italy). Defence System Div.
QUALITY OF THE TORNADO ATS SOFTWARE c61
Fabio Frontalini *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 17-21 (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

Software development management is discussed. The Tornado automatic test system, designed to work with a Siemens 330 computer, is implemented with a software written in ATLAS language. Its development is analyzed into several functional areas including precompiler (language ARINC 416-10), code generator, interpretative master program, supervisor, utility programs, and drivers for the test equipment dedicated instrumentation. The software quality assurance procedures are described. It is shown that the long term efficiency is enhanced, assuring an overall tried and tested procedure to support improvements of the project and overcoming the difficulties introduced by a multiplicity of companies participating in the project.
Author (ESA)

N86-22542# Selenia Industrie Associate S.p.A., Rome (Italy). Aircraft Support Equipment Group.
IMPLICIT ACTIVITIES IN THE POST DEVELOPMENT PHASE
Antonio Tulli and Silvino dErcole *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 22-27 (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

Development aspects of automatic test equipment to be supplied to a customer are discussed. A problem arises when a test system evolves after delivery. A study for third level support of automatic test equipment developed for second order level maintenance of the Tornado combat aircraft is included. Configuration control in three distinct intervention areas (documentation, hardware, and control) is also discussed.
Author (ESA)

N86-22543# Selenia Industrie Associate S.p.A., Rome (Italy). Aircraft Support Equipment Group.
LINES OF EVOLUTION
Antonio Tulli *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 28-31 (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

Advice on electronic test equipment choice criteria is given. The configuration and modularity of hardware and software are

examined. Global life cycle cost is negotiable against efficiency parameters at an early stage of system design. Author (ESA)

N86-22544# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
24 Jan. 1986 68 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-86-001) Avail: NTIS HC A04

Progress in transportation systems in the USSR is reported. Topics discussed include: civil aviation, motor vehicles and highways, rail systems, maritime and river fleets, ports and transshipments centers, and intersector network development. For individual titles, see N86-22545 through N86-22545.

N86-22545# Joint Publications Research Service, Arlington, Va.
SCIENTISTS ON AIRCRAFT DEVELOPMENT TRENDS
M. Golubeva and V. Zasimov *In its* USSR Report: Transportation (JPRS-UTR-86-001) 24 Jan. 1986 p 1-5 Transl. into ENGLISH from Grazhdanskaya Aviatsiya (Moscow, USSR), no. 9, Sep. 1985 p 22-23 (For primary document see N86-22544 13-01)
Avail: NTIS HC A04

Fuel consumption and the production of aircrafts and aviation fuels is discussed. Problems in producing synthetic fuels from shale oil, bituminous coal, and hydrogen are outlined. Fuel conservation which should be configurated in aircraft design, materials, and construction is discussed. Polymer composites for use in aircraft construction, such as high modulus fibers of graphite and boron are recommended. It is concluded that the introduction of the new technologies will improve aircraft performance and fuel efficiency. E.A.K.

N86-22775# Joint Publications Research Service, Arlington, Va.
FUZZY INFERENCE SYSTEM TO DIAGNOSE AIRCRAFT HYDRAULIC FAULTS
Shoupai Feng, Weigang Weng, and Liang Dong *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 134-141 refs Transl. into ENGLISH from Shuxue de Shijian yu Renshi (Beijing, China), no. 3, Jul. 1985 p 14-18 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-22546 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYSIS OF DYNAMIC STABILITY DERIVATIVES FOR HIGH ANGLE OF ATTACK AIRCRAFT Ph.D. Thesis
Joon Soo Ko 1985 184 p
Avail: Univ. Microfilms Order No. DA8521331

Modern, high performance aircraft are required to be able to fly and be controlled over a wide variety of flight conditions. In order to predict the aircraft behavior and control requirements over the entire flight regime it is necessary to have a proper aerodynamic model. In this research, wind tunnel experiments are performed on an F-5 aircraft model at high angles of attack, with small oscillations about the body oriented roll axis. In addition the free stream environment can be configured in one of three ways: (1) straight uniform flow, (2) curved flow to simulated a horizontal turn, and (3) rolling flow to simulated a roll motion about the relative velocity vector. A description of the wind tunnel velocity and the recently developed roll oscillatory rig is given. In addition new linearized equations of motion are developed for describing the small roll oscillation in the non-uniform flow environment. These equations are used to reduce the data obtained in the wind tunnel experiments in order to obtain the usual combined rotary and unsteady aerodynamic stability derivatives as well as new combinations of pure rotary derivatives obtainable only with the non-uniform flow conditions. Dissert. Abstr.

N86-22547 Virginia Polytechnic Inst. and State Univ., Blacksburg.
APPLICATION OF PANEL METHODS FOR SUBSONIC AERODYNAMICS Ph.D. Thesis
Meung Jung Kim 1985 186 p
Avail: Univ. Microfilms Order No. DA8516158

Several panel methods are developed to model subsonic aerodynamics. The vorticity panel method for two-dimensional problems is capable of handling general unsteady, potential, lifting flows. The lifting surface is modelled with a vortex sheet and the wakes by discrete vortices. As an imitation of the conditions at the trailing edge, stagnation conditions on both surfaces are used. The over-determined system is solved by an optimization scheme. The present predictions are in good agreement with experimental data and other computations. Moreover the present approach provides an attractive alternative to those developed earlier. Two panel methods for three-dimensional nonlifting problems are developed. One uses source distributions over curved elements and the other vorticity distributions over flat elements. For the source formulation, the effect of weakly nonlinear geometry on the numerical results is shown to accelerate the convergence of numerical values in general. In addition, the extensive comparisons between two formulations reveal that the vorticity panel method is even more stable and accurate than the curved source panel method. Dissert. Abstr.

N86-22548 California Univ., Los Angeles.
UNSTEADY AERODYNAMICS IN TIME AND FREQUENCY DOMAINS FOR FINITE-TIME ARBITRARY MOTION OF HELICOPTER ROTOR BLADES IN HOVER AND FORWARD FLIGHT Ph.D. Thesis
Mehran Asghar-Hessari-Dinyavari 1985 549 p
Avail: Univ. Microfilms Order No. DA8525824

Several incompressible finite-time arbitrary-motion airfoil theories suitable for coupled flag-lag-torsional aeroelastic analysis of helicopter rotors in hover and forward flight are derived. These theories include generalized Greenberg's theory, generalized Loewy's theory, and a staggered cascade theory. The generalized Greenberg's and staggered cascade theories were derived directly in Laplace domain considering the finite length of the wake and using operational methods. The load expressions are presented in the Laplace, frequency, and time domains. Approximate time domain loads for the various generalized theories are obtained by developing finite state models using Pade approximant of the appropriate lift deficiency functions. Three different methods for constructing Pade approximants of the lift deficiency functions were considered and the more flexible one was used. In the second part of this study the influence of finite-state arbitrary-motion time-domain aerodynamics on rotor blade aeroelastic stability was illustrated for hover and forward flight conditions. Dissert. Abstr.

N86-22549 Cornell Univ., Ithaca, N.Y.
MULTIGRID CALCULATION OF SUPERSONIC POTENTIAL FLOW PAST INCLINED ELLIPTIC CONES Ph.D. Thesis
Minwoo Park 1985 174 p
Avail: Univ. Microfilms Order No. DA8525784

A numerical method has been developed to study supersonic, potential flow past elliptic cones. Under the conical assumption, which implies that the flow properties do not vary with distance along straight rays from the vertex of the flow, the governing equation of motion reduces to a two-dimensional one on a cross-plane of the flow. A finite difference equation has been developed on this surface using the finite volume method in a fully conservative form. Both first- and second-order artificial viscosities are used to capture the shock waves in the cross-plane. An ADI method, in conjunction with the multigrid algorithm, is used to provide an efficient and fast iterative scheme. Computations have been performed for various flow situations and body geometries, including the flow past thin wings at angles of attack. Differences between the conservative and non-conservative formulations of the difference equation have been studied. Good

results have been obtained using both the first- and second-order artificial viscosity terms. The results are compared with other available data. Dissert. Abstr.

N86-22550*# Boeing Commercial Airplane Co., Seattle, Wash.
FLOW PREDICTION FOR PROPFAN ENGINE INSTALLATION EFFECTS ON TRANSPORT AIRCRAFT AT TRANSONIC SPEEDS Final Report
S. S. Samant and N. J. Yu Washington NASA Jan. 1986 93 p refs
(Contract NAS1-17250)
(NASA-CR-3954; NAS 1.26:3954) Avail: NTIS HC A05/MF A01 CSCL 01A

An Euler-based method for aerodynamic analysis of turboprop transport aircraft at transonic speeds has been developed. In this method, inviscid Euler equations are solved over surface-fitted grids constructed about aircraft configurations. Propeller effects are simulated by specifying sources of momentum and energy on an actuator disc located in place of the propeller. A stripwise boundary layer procedure is included to account for the viscous effects. A preliminary version of an approach to embed the exhaust plume within the global Euler solution has also been developed for more accurate treatment of the exhaust flow. The resulting system of programs is capable of handling wing-body-nacelle-propeller configurations. The propeller disks may be tractors or pushers and may represent single or counterrotation propellers. Results from analyses of three test cases of interest (a wing alone, a wing-body-nacelle model, and a wing-nacelle-endplate model) are presented. A user's manual for executing the system of computer programs with formats of various input files, sample job decks, and sample input files is provided in appendices. Author

N86-22551# National Aerospace Lab., Tokyo (Japan).
NUMERICAL ANALYSIS OF INVISCID FLOWS ABOUT WING-FUSELAGE COMBINATIONS. PART 1: DEVELOPMENT OF GRID GENERATION CODE YOKUDO-G
Tomiko Ishiguro, Nobuhiko Kamiya, and Keiko Oguchi Jul. 1985 61 p refs In JAPANESE:ENGLISH summary
(NAL-TR-864; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

The main purpose of this paper is to numerically analyze inviscid flows about wing-fuselage combinations. In the first series a numerical procedure is presented for grind generation about a wing-fuselage combination by the analytic mapping method. A user's manual for the FORTRAN code of the procedure is also described. Furthermore, many numerical examples are presented in order to show the utility of this code for several wing-fuselage combinations and in order to understand the role of the controllable variables which yield many patterns of mesh distributions. In the next series, numerical analysis of inviscid flows will be carried out under the grids generated by this numerical procedure. Author

N86-22552*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED WIND-TUNNEL TESTS OF SINGLE- AND COUNTER-ROTATION PROPELLERS
Dana Morris Dunham, Garl L. Gentry, Jr., and Paul L. Coe, Jr. Apr. 1986 46 p refs
(NASA-TM-87656; L-16077; NAS 1.15:87656) Avail: NTIS HC A03/MF A01 CSCL 01A

A low-speed (Mach 0 to 0.3) wind-tunnel investigation was conducted to determine the basic performance, force and moment characteristics, and flow-field velocities of single- and counter-rotation propellers. Compared with the eight-blade single-rotation propeller, a four- by four- (4 x 4) blade counter-rotation propeller with the same blade design produced substantially higher thrust coefficients for the same blade angles and advance ratios. The results further indicated that ingestion of the wake from a supporting pylon for a pusher configuration produced no significant change in the propeller thrust performance for either the single- or counter-rotation propellers. A two-component laser velocimeter (LV) system was used to make detailed measurements of the propeller flow fields. Results show increasing slipstream velocities with increasing blade angle and decreasing advance ratio. Flow-field measurements for the counter-rotation propeller show that the rear propeller turned the flow in the opposite direction from the front propeller and, therefore, could eliminate the swirl component of velocity, as would be expected. Author

N86-22553*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF SOME GEOMETRIC VARIATIONS ON MISSILE AERODYNAMIC CHARACTERISTICS AT SUPERSONIC SPEEDS
M. Leroy Spearman Feb. 1986 26 p refs Presented at the 24th AIAA Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986 Previously announced in IAA as A86-19958
(NASA-TM-87683; NAS 1.15:87683) Avail: NTIS HC A03/MF A01 CSCL 01A

A summary of some results from tests of a wing-body general research missile model is presented for a Mach number range up to 4.63. A basic ogive-cylinder body with a length-to-diameter ratio of 10 was used to which was attached a series of wing planforms. The planforms included a family of delta wings and a family of rectangular wings having a constant root chord but varying spans so that wings of constant exposed area could be compared. In addition, a cranked-tip planform was included and a rectangular planform with reduced chord. Some results are presented for wing-body-tail configurations - one utilizing a cranked wing planform and one with wings having a constant root chord and span, but tip chords that were 0, 20, and 40 percent of the root chord. Author

N86-22554*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERSONIC AXIAL-FORCE CHARACTERISTICS OF A RECTANGULAR-BOX CAVITY WITH VARIOUS LENGTH-TO-DEPTH RATIOS IN A FLAT PLATE
A. B. Blair, Jr. and Robert L. Stallings, Jr. Apr. 1986 21 p refs
(NASA-TM-87659; L-16075; NAS 1.15:87659) Avail: NTIS HC A02/MF A01 CSCL 01A

A wind-tunnel investigation has been conducted at Mach numbers of 1.50, 2.16, and 2.86 to obtain axial-force data on a metric rectangular-box cavity with various length-to-depth ratios. The model was tested at angles of attack from -4 deg to -2 deg. The results are summarized to show variations in cavity axial-force coefficient for deep- and shallow-cavity configurations with detached and attached cavity flow fields, respectively. The results of the investigation indicate that for a wide range of cavity lengths and depths, good correlations of the cavity axial-force coefficients (based on cavity rear-face area) are obtained when these coefficients are plotted as a function of cavity length-to-depth ratio. Abrupt increases in the cavity axial-force coefficients at an angle of attack of 0 deg. reflect the transition from an open (detached) cavity flow field to a closed (attached) cavity flow field. Cavity length-to-depth ratio is the dominant factor affecting the switching of the cavity flow field from one type to the other. The type of cavity flow field (open or closed) is not dependent on the test angles of attack except near the critical value of length-to-depth ratio. Author

N86-22555# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
RANDOM-CHOICE-METHOD SOLUTIONS FOR TWO-DIMENSIONAL PLANAR AND AXISYMMETRIC STEADY SUPERSONIC FLOWS
Z. C. Shi and J. J. Gottlieb Jan. 1986 98 p refs
(UTIAS-297; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

A random-choice method (RCM) is developed for obtaining fairly practical and efficient numerical solutions for two-dimensional planar and axisymmetric steady supersonic flows, such as those for sharp-edged planar airfoils, supersonic inlets of aircraft engines, pointed bodies of revolution, supersonic nozzles, and free jets. This method is based on the solution of a Riemann problem, which is the elemental solution of the hyperbolic equations of two-dimensional steady supersonic flows. The Riemann problem

consists of two waves separated by a slip stream, and each wave can be either an oblique shock wave or a Prandtly-Meyer expansion wave. Advanced techniques are given for solving the Riemann problem iteratively, handling the boundary conditions along body and free-jet surfaces, and computing only certain parts of flow fields of interest. Many interesting and practical numerical solutions are presented for different types of planar and axisymmetric flows, to demonstrate the applicability, capability, and limitations of the RCM. Numerical results are shown to be in excellent agreement with both known analytical solutions and results from the method of characteristics. Author

N86-22556*# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
VORTEX BOUNDARY-LAYER INTERACTIONS Semiannual Status Report, 1 Sep. 1985 - 31 Feb. 1986
P. Bradshaw 1986 14 p
(Grant NAGw-581)
(NASA-CR-176701; NAS 1.26:176701) Avail: NTIS HC A02/MF A01 CSCL 01A

Parametric studies to identify a vortex generator were completed. Data acquisition in the first chosen configuration, in which a longitudinal vortex pair generated by an isolated delta wing starts to merge with a turbulent boundary layer on a flat plate fairly close to the leading edge is nearly completed. Work on a delta-wing/flat-plate combination, consisting of a flow visualization and hot wire measurements taken with a computer controlled traverse gear and data logging system were completed. Data taking and analysis have continued, and sample results for another cross stream plane are presented. Available data include all mean velocity components, second order mean products of turbulent fluctuations, and third order mean products. Implementation of a faster data logging system was accomplished. B.G.

N86-22557# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
SIMULATION OF INVISCID FLOW AROUND AIRFOILS AND CASCADES BASED ON THE EULER EQUATIONS
Lars-Erik Eriksson 18 Jun. 1985 38 p refs
(Contract FMV-F-K-82260-83-146-25-001)
(FFA-TN-1985-20) Avail: NTIS HC A03/MF A01

The steady inviscid flow around an airfoil or through a cascade is computed by solving the Euler equations on an 0-type grid. A centered finite volume method with an explicit time integration scheme is used to solve the equations on a given grid. In the case of incompressible flow artificial compressibility is used to obtain a correct steady solution with the same time-marching technique as for compressible flow. The 0-type grid, which gives good resolution at the leading and trailing edges of the profiles, is generated by transfinite interpolation. Flow cases computed for airfoils and cascades are in good agreement with those of other numerical schemes for the Euler equations. Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-22558*# Ohio State Univ., Columbus. Aeronautical and Astronautical Research Lab.
WIND TUNNEL TESTS OF ROTOR BLADE SECTIONS WITH REPLICATIONS OF ICE FORMATIONS ACCRETED IN HOVER Final Report
John D. Lee, Jack H. Berger (Fluidyne Engineering Corp., Columbus, Ohio), and Timothy J. McDonald (Fluidyne Engineering Corp., Columbus, Ohio) Mar. 1986 31 p refs
(Grant NAG3-374)
(NASA-CR-175089; NAS 1.26:175089) Avail: NTIS HC A03/MF A01 CSCL 01C

Full scale reproductions of ice accretions molded during the documentation of a hover test program were fabricated by means of epoxy castings and used for a wind tunnel test program. Surface static pressure distributions were recorded and used to evaluate lift and pitching moment increments while drag was determined by wake surveys. Through the range of the tests, corresponding to those conditions encountered in hover and in flat pitch, integration of the pressure distributions showed negligible changes in lift and in pitching moment, but the drag was significantly increased. Author

N86-22559*# Fluidyne Engineering Corp., Columbus, Ohio.
DOCUMENTATION OF ICE SHAPES ACCRETED ON THE MAIN ROTOR OF A UH-1H HELICOPTER IN LEVEL FLIGHT Final Report
M. K. Hanson and John D. Lee (Ohio State Univ., Columbus) Mar. 1986 14 p refs
(Grant NAG3-374)
(NASA-CR-175088; NAS 1.26:175088) Avail: NTIS HC A02/MF A01 CSCL 01C

Icing tests were conducted on a UH-1H helicopter in level flight behind a spray tanker near Duluth, Minnesota, during the winter of 1983-84 as part of the joint NASA/Army HIFT program. On landing, the ice formations on the main rotor were documented by casting a set of ten-inch molds on the blade using a Dow-Corning silicone rubber compound which was initially liquid at sub-freezing temperatures. Such documentation was accomplished for eight flights in which the temperature ranged from -11 C to -22 C and the in-cloud flight times ranged from 5 to 9 minutes. Author

N86-22560# Aeronautical Research Labs., Melbourne (Australia).
THE AUSTRALIAN IMPLEMENTATION OF AMDAR/ACARS AND THE USE OF DERIVED EQUIVALENT GUST VELOCITY AS A TURBULENCE INDICATOR
Douglas J. Sherman Oct. 1985 42 p refs
(AR-004-51; ARL-Struc-R-418) Avail: NTIS HC A03/MF A01

AMDAR is a system of measuring wind speed, wind direction, air temperature and an indication of turbulence from INS equipped transport aircraft in flight. These data are transmitted by radio to the meteorological system. This report outlines the Australian AMDAR system presently coming into service on the Boeing 767 aircraft in the Ansett fleet. The data are telemetered using ACARS and the SITA/AIRCOM network of ground stations. Particular attention is paid to the indicator of turbulence. Because an aircraft flying through a given gust may encounter very different vertical accelerations depending on aircraft mass, airspeed and altitude, it is proposed that the AMDAR system compute the derived equivalent gust velocity from the aircraft acceleration and other parameters, and that this is used as an indicator of turbulence. Such an indicator has the additional advantage that it is more use for climatological studies of turbulence occurrence than simpler indicators such as the aircraft vertical acceleration. Severe turbulence corresponds to derived equivalent gust velocities in excess of g m/s. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-22561# Defence Research Information Centre, Orpington (England).
HYBRID NAVIGATION BY DECCA AND DEAD RECKONING
I. Okuda and E. Tanaka Jul. 1985 39 p refs Transl. into ENGLISH from Journal of Faculty of Marine Science and Technol-

ogy, Tokai Univ. (Japan), no. 19, 1984 p 59-76
(DRIC-T-7549; BR97252) Avail: NTIS HC A03/MF A01

Application of Decca to a dead reckoning navigation system is described. Determination of optimum initial values for Kalman filter calculation is outlined. Four computer simulation models: straight operation in constant current, ship speed reduction during operation, course change during operation, and straight operation in variable current were used for verification of system applicability. Results show that rms position error can be reduced to 1/50th of that obtained using Decca alone. Ocean current speed error can be < 0.01kt in constant current after 10 mn straight operation. In variable currents position errors are 0.003 to 0.005 nautical miles, estimates of currents are accurate to 0.1 to 0.2 kt. Author (ESA)

N86-22562# National Geodetic Survey, Rockville, Md.
PERFORMING CENTIMETER-LEVEL SURVEYS IN SECONDA WITH GPS (GLOBAL POSITIONING SYSTEM) CARRIER PHASE: INITIAL RESULTS
B. W. Remondi Oct. 1985 24 p
(PB86-125028; NOAA-TM-NOS-NGS-43) Avail: NTIS HC A02/MF A01 CSCL 17G

Two kinematic surveys were performed, using TI-4100s, which substantiate the author's earlier claim that centimeter-accuracy relative surveys can be accomplished within seconds. The first test was carried out in Arkansas using wide-bandwidth tracking. Although noisy, these data permitted the concepts and the data processing software to be verified. Based on results of this survey, a definitive kinematic survey experiment was designed and executed at the National Bureau of Standards, Gaithersburg, Md. The results of this experiment show that centimeter-level relative surveys can be performed in seconds. A prior geodetic coordinates of the initial location of the roving antenna are not required since they, too, can be determined within seconds. Author (GRA)

N86-22566# Joint Publications Research Service, Arlington, Va.
CHIEF ON UNFAVORABLE YEAR FOR SOVIET AIR TRAFFIC CONTROL
V. Shelkovnikov *In its* USSR Report: Transportation (JPRS-UTR-86-004) 12 Mar. 1986 p 1-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 12 Dec. 1985 p 2 (For primary document see N86-22565 13-05)
Avail: NTIS HC A05/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-22563*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPARISON OF MEASURED AND CALCULATED TEMPERATURES FOR A MACH 8 HYPERSONIC WING TEST STRUCTURE
Robert D. Quinn and Roger A. Fields Mar. 1986 140 p refs
(NASA-TM-85918; H-1271; A-85137; NAS 1.15:85918) Avail: NTIS HC A07/MF A01 CSCL 01C

Structural temperatures were measured on a hypersonic wing test structure during a heating test that simulated a Mach 8 thermal environment. Measured data are compared to design calculations and temperature predictions obtained from a finite-difference thermal analysis. Author

N86-22564# Department of the Air Force, Washington, D.C.
AIRCRAFT WINDOW CLAMPING DEVICE Patent Application
James H. DeOms, inventor (to Air Force) Filed 16 Oct. 1985 13 p
(AD-D011999; US-Patent-Appl-SN-788189) Avail: NTIS HC A02/MF A01 CSCL 13/5

An aircraft window clamping ring is used to hold an optical sensor window against an aircraft wall. The ring has a plurality of cantilevers having upper contacts that bear directly down on the window. Because of the flexibility in the vertical direction, thermal expansion is compensated for by movement of the cantilevers. Horizontal expansion of the window creates no additional stress because the upper contacts bear perpendicular to possible horizontal movement. The cantilevers can be designed to preload the window to take into account maximum thermal expansion. Author (GRA)

N86-22565# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
12 Mar. 1986 92 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-86-004) Avail: NTIS HC A05/MF A01

Transportation issues in the Soviet Union are reported. Topics discussed include: civil aviation, rail systems, maritime and river fleets, ports and transshipment centers, and intersector network development. For individual titles, see N86-22566 through N86-22569.

N86-22566# Joint Publications Research Service, Arlington, Va.
CHIEF ON UNFAVORABLE YEAR FOR SOVIET AIR TRAFFIC CONTROL c04
V. Shelkovnikov *In its* USSR Report: Transportation (JPRS-UTR-86-004) 12 Mar. 1986 p 1-4 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 12 Dec. 1985 p 2 (For primary document see N86-22565 13-05)
Avail: NTIS HC A05/MF A01

Careful selection and training of air traffic controllers are discussed. The interaction process between traffic services and ground services and improvement of aircraft traffic flow planning system to raise the quality of air traffic control are emphasized. The necessary continuation of finding ways to raise flight safety in air traffic control is reiterated. Human factors in traffic service are considered. E.A.K.

N86-22567# Joint Publications Research Service, Arlington, Va.
MORE ON NEW IL-96, IL-114 AIRCRAFT
V. Inozemtsev *In its* USSR Report: Transportation (JPRS-UTR-86-004) 12 Mar. 1986 p 9-11 Transl. into ENGLISH from Nedelya (Moscow, USSR), no. 46, 11-17 Nov. 1985 p 8 (For primary document see N86-22565 13-05)
Avail: NTIS HC A05/MF A01

The development of the Ilyushin Aircraft IL-96, the long range Russian airbus, is discussed. The airbus is reminescent of the IL-86, however, its dimensions are larger and the wing span is almost 10 m greater, and the tail fin is 2 m higher. The IL-96 is a two-decked aircraft, which can hold 300 passengers. The lower deck houses 15 standard baggage handling containers. The IL-96-300 is designed to make long flights, with two or three landings in a day. The design of the 60 seat IL-114 passenger turboprop is also described. Its cruising speed is 500 km/hr, and has two multiblade gas turbine engines. It has high aircraft efficiency. It has built-in ramps. It serves short and medium distances. E.A.K.

N86-22568# Joint Publications Research Service, Arlington, Va.
TUPOLEV BUREAU DEVELOPING TU-204 PASSENGER JET: TUPOLEV ON FEATURES
Aleksey Andreyevich Tupolev and N. Dombkovskiy *In its* USSR Report: Transportation (JPRS-UTR-86-004) 12 Mar. 1986 p 12-16 Transl. into ENGLISH from Trud (Moscow, USSR), 3 Jan. 1986 p 4 (For primary document see N86-22565 13-05)
Avail: NTIS HC A05/MF A01

The design and development of the TU-204 passenger jet is discussed. The latest methods in aerodynamics, engine construction, materials science and manufacturing were incorporated in the design. The cabin has more comfortable seats and wider aisles, and the aircrafts can carry 124 passengers. The TU-204 will replace the TU-154 passenger transport plane. The plane has an on-board computer system which will reduce the number of crew members to two or three. E.A.K.

N86-22569# Joint Publications Research Service, Arlington, Va.
DETAILS OF NEW Ka-126 HELICOPTER
I. Andreyev *In its* USSR Report: Transportation (JPRS-UTR-86-004) 12 Mar. 1986 p 17-19 Transl. into ENGLISH frcm Izvestiya (Moscow, USSR), 29 Jan. 1986 p 1 (For primary document see N86-22565 13-05)
Avail: NTIS HC A05/MF A01

The development and construction of the Ka-126 agricultural helicopter is discussed. The Ka-126 is a modification of the older Ka-26 helicopter. The helicopter is equipped with one gas-turbine engine and its characteristics are enumerated. The economy and profitability of the helicopter are outlined. The Ka-126 is not influenced by low temperatures so that is can be utilized during the winter months. E.A.K.

N86-22570# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
20 Feb. 1986 59 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-007) Avail: NTIS HC A04/MF A01

Progress in science and technology in the People's Republic of China is reported. Topics discussed include research and development in: computer sciences, applied sciences, acoustics, electronics, physics, and radiation protection. For individual titles, see N86-22571 through N86-22573.

N86-22571# Joint Publications Research Service, Arlington, Va.
ON COMPUTER-AIDED PROGRAMMING OF PAL DEVICES
c61
Xin Tao and Shuliang Pu *In its* China Report: Science and Technology (JPRS-CST-86-007) 20 Feb. 1986 p 13-26 refs Transl. into ENGLISH from Zhejiang Daxue Xuebao (Zengkan) (Hangzhou, China), 25 Jul. 1985 p 124-132 (For primary document see N86-22570 13-05)
Avail: NTIS HC A04/MF A01

Programmable Array Logic (PAL) is a new semiconductor device with powerful functions and broad applications. A PAL device programmer was designed which can be connected to any computer as long as it has a parallel interface. The hardware logic diagram and the software programming flowcharts are presented. E.A.K.

N86-22572# Joint Publications Research Service, Arlington, Va.
IMPROVED Y-7, Y-12 AIRCRAFT DESCRIBED
Shilin Bu *In its* China Report: Science and Technology (JPRS-CST-86-007) 20 Feb. 1986 p 27-29 Transl. into ENGLISH from Hangkong Zhishi (Beijing, China), no. 12, Dec. 1985 p 3 (For primary document see N86-22570 13-05)
Avail: NTIS HC A04/MF A01

The improved designs of the Y-7 and Y-12 aircrafts are described. The electronic equipment on the Y-7 was converted. The equipment included: environmental control system, atmospheric data system, ultrashortware radio station, magnetic navigation reference and attitude reference system, Omega navigation system, weather radar, guidance system, ranging device, and bearing receiver. The noise level was reduced. The interior of the Y-12 was changed and noise and vibration were reduced. The exterior was coated with high quality paint. E.A.K.

N86-22573# Joint Publications Research Service, Arlington, Va.
DETAILS OF Y-121 STOL AIRCRAFT PRESENTED
Zhaolin Song *In its* China Report: Science and Technology (JPRS-CST-86-007) 20 Feb. 1986 p 30-32 refs Transl. into ENGLISH fdrom Hangkong Zhishi (Beijing, China), no. 12, Dec. 1985 p 4-5 (For primary document see N86-22570 13-05)
Avail: NTIS HC A04/MF A01

The Y-121 is a newly developed, twin-engine turboprop, short take-off and landing multifunction airplane. It can be used for transportation, parachuting and for various applications in geology, agriculture and forestry; it can also be converted into a special-purpose airplane for precision search operation. The development design features, and technical performance of the Y-121 STOL aircraft are described. E.A.K.

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-22574*# Charles River Analytics, Inc., Cambridge, Mass.
A PRELIMINARY DESIGN FOR FLIGHT TESTING THE FINDS ALGORITHM Final Report
A. K. Caglayan and P. M. Godiwala Mar. 1986 85 p refs
(Contract NAS1-17719)
(NASA-CR-178043; NAS 1.26:178043; R8602) Avail: NTIS HC A05/MF A01 CSCL 01D

This report presents a preliminary design for flight testing the FINDS (Fault Inferring Nonlinear Detection System) algorithm on a target flight computer. The FINDS software was ported onto the target flight computer by reducing the code size by 65%. Several modifications were made to the computational algorithms resulting in a near real-time execution speed. Finally, a new failure detection strategy was developed resulting in a significant improvement in the detection time performance. In particular, low level MLS, IMU and IAS sensor failures are detected instantaneously with the new detection strategy, while accelerometer and the rate gyro failures are detected within the minimum time allowed by the information generated in the sensor residuals based on the point mass equations of motion. All of the results have been demonstrated by using five minutes of sensor flight data for the NASA ATOPS B-737 aircraft in a Microwave Landing System (MLS) environment. Author

N86-22575# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
COMPARATIVE EVALUATION OF REDUNDANT FLIGHT DATA RECORDED BY A DIGITAL AIRBORNE INTEGRATED DATA SYSTEM RECORDER (DAR) ON BOARD AN AIRBUS A-310 AIRCRAFT
O. Weber and G. Rosenau 1985 42 p refs
Avail: NTIS HC A03/MF A01

Flight data collected during scheduled Airbus A-310 flights by a Digital AIDS Recorder (DAR) were analyzed. The characteristics of the standard A-310 AIDS are compared to those of the A-300 AIDS. The A-310 reconstruction of the motion state of the aircraft is more complete than with the older equipment. The DAR A-310 permits a detailed and extensive check of the basic AIDS measuring channels through independently measured quantities. This check, however, is restricted to the measuring ranges encountered in normal flight conditions. It cannot be extrapolated to extreme flight conditions expected in accidents or incidents. In the flight conditions of the scheduled flights, the correspondence between basic AIDS measurements and quantities from the extended AIDS is very good. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-22576*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC INVESTIGATION OF CIRCULAR-TO-RECTANGULAR TRANSITION DUCTS FOR HIGH-ASPECT-RATIO NONAXISYMMETRIC NOZZLES
James R. Burley, II, Linda S. Bangert, and John R. Carlson Mar.

1986 55 p refs
(NASA-TP-2534; L-15874; NAS 1.60:2534) Avail: NTIS
HC A04/MF A01 CSCL 21E

An investigation was conducted in the static-test facility of the Langley 16-Foot Transonic Tunnel to determine the internal performance of a high-aspect-ratio nonaxisymmetric nozzle with five circular-to-rectangular transition ducts of varying design. Nozzle pressure ratio was varied from 1.5 to 5.3, and nozzle performance parameters were recorded. Author

N86-22577# Department of the Air Force, Washington, D.C.
IGNITER ELECTRODE LIFE CONTROL Patent Application
John C. Scott, inventor (to Air Force) Filed 7 Oct. 1985 11 p
(AD-D012007; US-Patent-Appl-SN-784986) Avail: NTIS
HC A02/MF A01 CSCL 11/3

The prevention of electrode material erosion by undercutting in the outer electrode shell of igniter electrodes of jet engine ignition systems is prevented by the application of an electrical insulation coating. The coating is applied to the surface of the outer electrode shell which faces the ceramic insulation around the center electrode where erosion patterns are known to occur. The insulation material is selected from electrical insulation substances such as oxides of aluminum, tungsten, magnesium, beryllium or zirconium by choosing a non-porous electrical insulating substance with thermal expansion characteristics approximately equalling those of the outer electrode shell. Since a typical outer electrode shell is composed of 446 stainless steel, an optimum choice for the electrical insulation coating is Al2O3 deposited with a coating thickness of between 5 and 10 mils. Author (GRA)

N86-22736# Joint Publications Research Service, Arlington, Va.
STATUE OF AIRCRAFT ENGINE RESEARCH AT NPU REVIEWED
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 40-45 refs Transl. into ENGLISH from Guoji Hangkong (Beijing, China), no. 10, Oct. 1985 p 4-6 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-22578 Tennessee Univ., Knoxville.
INVESTIGATION OF THE DYNAMIC RESPONSE OF AIRCRAFT TO MICROBURST (JAWS) WIND SHEAR Ph.D. Thesis
Ho-Pen Chang 1985 138 p
Avail: Univ. Microfilms Order No. DA8524117

A derivation of the governing equations of aircraft motion in variable wind field results in additional wind shear terms appearing in the force equations. Computer simulations of B727 type aircraft flying (landing and taking off) through the microburst (JAWS) wind shear data have been carried out and are in good agreement with those of the NASA/Ames B727 piloted simulator. The critical penetration heights through the center of the microburst are determined by computing the aircraft trajectory deviations from the intended flight path at the ILS Category 2 decision height window. It is found that the higher the magnitude of the wind gradient terms, the more influence they have on the aircraft performance, especially on sideslip angle, angle of attack, and rolling moment. The wind shear effects on three generic types of aircraft, a three-engine passenger airliner (PA), a twin-engines STOL (STOL), and an executive jet (EJ), are also investigated in this study. Dissert. Abstr.

N86-22579*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A METHODOLOGY FOR AIRPLANE PARAMETER ESTIMATION AND CONFIDENCE INTERVAL DETERMINATION IN NONLINEAR ESTIMATION PROBLEMS Ph.D. Thesis - George Washington Univ., Apr. 1985
Patrick C. Murphy Apr. 1986 56 p refs Revised
(NASA-RP-1153; L-16009; NAS 1.61:1153) Avail: NTIS
HC A04/MF A01 CSCL 01C

An algorithm for maximum likelihood (ML) estimation is developed with an efficient method for approximating the sensitivities. The ML algorithm relies on a new optimization method referred to as a modified Newton-Raphson with estimated sensitivities (MNRES). MNRES determines sensitivities by using slope information from local surface approximations of each output variable in parameter space. With the fitted surface, sensitivity information can be updated at each iteration with less computational effort than that required by either a finite-difference method or integration of the analytically determined sensitivity equations. MNRES eliminates the need to derive sensitivity equations for each new model, and thus provides flexibility to use model equations in any convenient format. A random search technique for determining the confidence limits of ML parameter estimates is applied to nonlinear estimation problems for airplanes. The confidence intervals obtained by the search are compared with Cramer-Rao (CR) bounds at the same confidence level. The degree of nonlinearity in the estimation problem is an important factor in the relationship between CR bounds and the error bounds determined by the search technique. Beale's measure of nonlinearity is developed in this study for airplane identification problems; it is used to empirically correct confidence levels and to predict the degree of agreement between CR bounds and search estimates. Author

N86-22580*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED STABILITY AND CONTROL CHARACTERISTICS OF A TRANSPORT MODEL WITH AFT-FUSELAGE-MOUNTED ADVANCED TURBOPROPS
Zachary T. Applin and Paul L. Coe, Jr. Apr. 1986 67 p refs
(NASA-TP-2535; L-16004; NAS 1.60:2535) Avail: NTIS
HC A04/MF A01 CSCL 01C

A limited experimental investigation was conducted in the Langley 4- by 7-Meter Tunnel to explore the effects of aft-fuselage-mounted advanced turboprop installations on the low-speed stability and control characteristics of a representative transport aircraft in a landing configuration. In general, the experimental results indicate that the longitudinal and lateral-directional stability characteristics for the aft-fuselage-mounted single-rotation tractor and counter-rotation pusher propeller configurations tested during this investigation are acceptable aerodynamically. For the single-rotation tractor configuration, the propeller-induced aerodynamics are significantly influenced by the interaction of the propeller slipstream with the pylon and nacelle. The stability characteristics for the counter-rotation pusher configuration are strongly influenced by propeller normal forces. The longitudinal and directional control effectiveness, engine-out characteristics, and ground effects are also presented. In addition, a tabulated presentation of all aerodynamic data presented in this report is included as an appendix. Author

N86-22581*# Information and Control Systems, Inc., Hampton, Va.
EXTENSIONS TO PIFCGT: MULTIRATE OUTPUT FEEDBACK AND OPTIMAL DISTURBANCE SUPPRESSION
John R. Broussard Mar. 1986 121 p refs
(Contract NAS1-17493)
(NASA-CR-3968; NAS 1.26:3968; IR-684105) Avail: NTIS
HC A06/MF A01 CSCL 01C

New control synthesis procedures for digital flight control systems were developed. The theoretical developments are the solution to the problem of optimal disturbance suppression in the presence of windshear. Control synthesis is accomplished using a linear quadratic cost function, the command generator tracker for trajectory following and the proportional-integral-filter control structure for practical implementation. Extensions are made to the optimal output feedback algorithm for computing feedback gains

so that the multirate and optimal disturbance control designs are computed and compared for the advanced transport operating system (ATOPS). The performance of the designs is demonstrated by closed-loop poles, frequency domain multiinput sigma and eigenvalue plots and detailed nonlinear 6-DOF aircraft simulations in the terminal area in the presence of windshear. E.A.K.

N86-22582*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE MEASUREMENT OF AIRCRAFT PERFORMANCE AND STABILITY AND CONTROL AFTER FLIGHT THROUGH NATURAL ICING CONDITIONS
Richard J. Ranaudo, Kevin L. Mikkelsen, Robert C. McKnight, Robert F. Ide, Andrew L. Reehorst, Jerry L. Jordan, William C. Schinstock, and Stewart J. Platz [1986] 46 p refs Presented at the 3rd Flight Testing Conference, Las Vegas, Nev., 2-4 Apr. 1986; cosponsored by AIAA, CASI, DGLR, IES, ISA, ITEA, SETP, and SFTE Prepared in cooperation with Kohlman Systems Research, Inc., Lawrence, Kansas
(NASA-TM-87265; E-2962; NAS 1.15:87265; AIAA-86-9758) Avail: NTIS HC A03/MF A01 CSCL 01C

The effects of airframe icing on the performance and stability and control of a twin-engine commuter-class aircraft were measured by the NASA Lewis Research Center. This work consisted of clear air tests with artificial ice shapes attached to the horizontal tail, and natural icing flight tests in measured icing clouds. The clear air tests employed static longitudinal flight test methods to determine degradation in stability margins for four simulated ice shapes. The natural icing flight tests employed a data acquisition system, which was provided under contract to NASA by Kohlman Systems Research Incorporated. This system used a performance modeling method and modified maximum likelihood estimation (MMLE) technique to determine aircraft performance degradation and stability and control. Flight test results with artificial ice shapes showed that longitudinal, stick-fixed, static margins are reduced on the order of 5 percent with flaps up. Natural icing tests with the KSR system corroborated these results and showed degradation in the elevator control derivatives on the order of 8 to 16 percent depending on wing flap configuration. Performance analyses showed the individual contributions of major airframe components to the overall degration in lift and drag. Author

N86-22583# European Space Agency, Paris (France).
ROBUSTNESS OF DISCRETE-TIME DYNAMICAL SYSTEMS: APPLICATION TO THE MULTIVARIABLE DIGITAL CONTROL OF COMBAT AIRCRAFT
Yves Joannic Oct. 1985 266 p refs Transl. into ENGLISH of "La Robustesse des Systemes Dynamiques a Temps Discret: Application au Pilotage Numerique Multivariable des Avions d'Armes" Rept. ONERA-NT-1984-2 ONERA, Paris, France, 1984 Original language document was announced as N85-19986
(ESA-TT-906; ONERA-NT-1984-2) Avail: NTIS HC A12/MF A01

A method for computing optimal feedback laws, capable of maintaining accurate tracking despite constantly acting disturbances was developed and applied to flight control of combat aircraft. A formalism reduces robustness to preservation of stability in a properly augmented system. This leads to theoretical results which quantify the generalized structural robustness of a recurrent nonlinear multiple-loop system. After extending the Lyapunov criterion to systems having dynamical feedback, the classical concepts of stability margin and of gain and phase margins are generalized to the multivariable discrete case. Analytical expressions which enable margins to be evaluated when dynamical or nonlinear perturbations affect the feedback channels are given. By applying theorems on external stability to a recurrent system, the tolerable additive perturbations which do not destabilize the controlled system are quantified. Author (ESA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-22737# Joint Publications Research Service, Arlington, Va.
SHANGHAI'S OUTDOOR AEROENGINE TEST FACILITY DETAILED
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 46-50 Transl. into ENGLISH from Hangkong Zhizao Gongcheng (Beijing, China), no. 7, 1 Jul. 1985 p 1-4 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

No abstracts in this category.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-22584# Royal Aircraft Establishment, Farnborough (England).
ORBIT DETERMINATION AND ANALYSIS FOR 1970-97B AT 14TH-ORDER RESONANCE
A. N. Winterbottom and D. G. King-Hele 3 Jun. 1985 24 p refs (RAE-TR-85054; RAE-Space-646; BR96950) Avail: NTIS HC A02/MF A01

The orbit of the satellite 1970-97B, the rocket of Cosmos 378, at inclination 74 deg, has been determined at 18 epochs between April and August 1971, when the effects of 14th-order resonance with the Earth's gravitational field were appreciable. The orbits were determined with the PROP 6 program from Hewitt camera, kinetheodolite, US Navy and visual observations, and an average accuracy of 90 m in perigee distance was achieved, despite the low perigee height (near 230 km) and the consequent high drag. The orbits, together with 13 previously evaluated, have been analyzed to reveal the effects of the 14th-order resonance and to evaluate six lumped geopotential harmonics of order 14. Because the orbit passed through resonance rapidly, the values are not as accurate as those from slow resonances; but they are more accurate than any others available for an inclination near 74 deg, and have proved their worth in a recent determination of individual 14th-order coefficients. Author (ESA)

N86-22585*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSPAS-SARSAT SATELLITE ORBIT PREDICTOR, VOLUME 6 Report, October 1985 - April 1986
Morton L. Friedman Oct. 1985 106 p
(NASA-TM-85015; NAS 1.15:85015) Avail: NTIS HC A06/MF A01 CSCL 22A

The satellite orbit predictor is a graphical aid for determining the relationship between the satellite (SARSAT or COSPAS) orbit, antenna coverage of the spacecraft and coverage of the Local User Terminal (LUTs). The predictor allows the user to quickly visualize if a selected position will probably be detected and is composed of a base map and a satellite track overlay for each

satellite. Additionally, a table of equator crossings for each satellite is included. Author

N86-22586# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SATELLITE-TO-SATELLITE TRACKING WITH POPSAT AND AN ERS-CLASS SATELLITE. MISSION AND SYSTEM ASSESSMENT STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report
B. Schuerenberg, L. Popken, H. Schuessler, R. Ockert, Ch. Reigber (Deutsches Geodaetisches Forschungsinstitut), E. C. Pavlis (Deutsches Geodaetisches Forschungsinstitut), J.-C. Raimondo (Deutsches Geodaetisches Forschungsinstitut), H. Mueller (Deutsches Geodaetisches Forschungsinstitut), K. F. Wakker (Tech. Univ., Delft), B. A. C. Ambrosius (Tech. Univ., Delft) et al Paris ESA Jun. 1985 61 p refs 3 Vol.
(Contract ESA-5715/83-NL-MS)
(ESA-CR(P)-2105-Vol-1) Avail: NTIS HC A04/MF A01

Orbit determination error analyses were carried for satellite-to-satellite tracking (SST) alternatives, on global and local scales. It is shown that radial orbit determination accuracies in the range of interest for radar altimetry applications can be achieved. Error analyses show that imperfect knowledge of the Earth gravity field introduces the dominant error contribution. Tracking concepts for precise low Earth orbit determination must be judged by their capability to provide accurately tailored gravity field models. Although the ultimate accuracy limits of gravity field determination are not established, deterministic simulations demonstrate that SST from POPSAT is the superior method for setting up dedicated gravity field models for LEO satellites and that improvements by a factor of six compared to SEASAT appear achievable. The selected SST concept was functionally defined. The performance of the S-band intersatellite link was analyzed and error budgets were set up. Author (ESA)

N86-22587# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SATELLITE-TO-SATELLITE TRACKING WITH POPSAT AND AN ERS-CLASS SATELLITE. MISSION AND SYSTEM ASSESSMENT STUDY. VOLUME 2: TECHNICAL RESULTS Final Report
B. Schuerenberg, L. Popken, H. Schuessler, R. Ockert, Ch. Reigber (Deutsches Geodaetisches Forschungsinstitut), E. C. Pavlis (Deutsches Geodaetisches Forschungsinstitut), J.-C. Raimondo (Deutsches Geodaetisches Forschungsinstitut), H. Mueller (Deutsches Geodaetisches Forschungsinstitut), K. F. Wakker (Tech. Univ., Delft), B. A. C. Ambrosius (Tech. Univ., Delft) et al Paris ESA Jun. 1985 416 p refs 3 Vol.
(Contract ESA-5715/83-NL-MS)
(ESA-CR(P)-2105-Vol-2) Avail: NTIS HC A18/MF A01

Orbit determination error analyses were carried for satellite-to-satellite tracking (SST) alternatives, on global and local scales. It is shown that radial orbit determination accuracies in the range of interest for radar altimetry applications can be achieved. Error analyses show that imperfect knowledge of the Earth gravity field introduces the dominant error contribution. Tracking concepts for precise low Earth orbit determination must be judged by their capability to provide accurately tailored gravity field models. Although the ultimate accuracy limits of gravity field determination are not established, deterministic simulations demonstrate that SST from POPSAT is the superior method for setting up dedicated gravity field models for LEO satellites and that improvements by a factor of six compared to SEASAT appear achievable. The selected SST concept was functionally defined. The performance of the S-band intersatellite link was analyzed and error budgets were set up. Author (ESA)

N86-22588# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SATELLITE-TO-SATELLITE TRACKING WITH POPSAT AND AN ERS-CLASS SATELLITE. MISSION AND SYSTEM ASSESSMENT STUDY. VOLUME 3: DEVELOPMENT PROGRAM Final Report
B. Schuerenberg, L. Popken, H. Schuessler, R. Ockert, Ch. Reigber (Deutsches Geodaetisches Forschungsinstitut), E. C. Pavlis (Deutsches Geodaetisches Forschungsinstitut), J.-C. Raimondo (Deutsches Geodaetisches Forschungsinstitut), H. Mueller (Deutsches Geodaetisches Forschungsinstitut), K. F. Wakker (Tech. Univ., Delft), B. A. C. Ambrosius (Tech. Univ., Delft) et al Paris ESA Jun. 1985 25 p refs 3 Vol.
(Contract ESA-5715/83-NL-MS)
(ESA-CR(P)-2105-Vol-3) Avail: NTIS HC A02/MF A01

The development program required for a satellite-to-satellite tracking (SST) mission is outlined. System elements are described in terms of needed hardware and software functions. Integration of the SST development program into the POPSAT development program and that of a typical LEO satellite is described. Verification aspects (from simulations up to final verification with the operational system) are covered. Author (ESA)

N86-22774# Joint Publications Research Service, Arlington, Va.
CALCULATING INTERCONTINENTAL VEHICLE RANGE, ACCURACY
Yongfang Cai *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 129-133 refs Transl. into ENGLISH from Shuxue de Shijian yu Renshi (Beijing, China), no. 3, Jul. 1985 p 1-4 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-22589# European Space Tribology Lab., Risley (England).
THE ESTL POINTING MECHANISM TEST FACILITY
E. W. Roberts and F. Golding Paris ESA Apr. 1985 52 p ref
(Contract ESA-5615/83-NL-PP)
(ESA-ESTL-74; ESA-CR(P)-2096) Avail: NTIS HC A04/MF A01

A test facility for assessment of spacecraft pointing mechanisms operating in ambient or thermal vacuum conditions over the temperature range minus 40 to plus 80 C was developed. The system employs vacuum-compatible sensors (inclinometers) to measure tilt angles statically and a laser-optics system for the dynamic measurement of small changes of tilt angle. In static measurements, the system displays high accuracy (+ or - 0.001 deg over the angular range + or - 7 deg); high resolution (0.0004 deg) and good repeatability (+ or - 0.0005 deg) and maintains these qualities over the full operational temperature range. In dynamic measurements over small angles (+ or - 0.5 deg), the system is capable of high resolution (0.0002 deg). To demonstrate the facility, tests were carried out on a breadboard pointing mechanism (based on the swash-plate principle) which, because of its prototype nature, was not built to the accuracies demanded of flight standard equipment. The assessment shows that the inherent errors of the mechanism are readily resolved by the test facility. Author (ESA)

N86-22601*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.
MATERIALS TEST LABORATORY ACTIVITIES AT THE NASA-JOHNSON SPACE CENTER WHITE SANDS TEST FACILITY (WSTF)
J. Stradling and D. L. Pippen *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials Space Environment Nov. 1985 p 71-74 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-23181# Libyan Arab Jamahiriya, Tripoli. Meteorological Dept.
POTENTIAL EVAPORATION IN DIFFERENT PARTS OF LIBYA
S. E. Hassan *In* WMO Casebook of Operational Assessment of

Areal Evaporation 1985 p 186-194 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-22590 Department of the Army, Washington, D. C.
SSICM (SPIN STABILIZED IMPULSIVELY CONTROLLED MISSILE) GUIDANCE AND CONTROL CONCEPT Patent
W. Max Howell, inventor (to Army) Issued 24 Sep. 1985 8 p (AD-D011970; US-Patent-4,542,870; US-Patent-Appl-SN-521490; US-Patent-Class-244-3.15) Avail: US Patent and Trademark Office CSCL 17/7

The guidance scheme utilizing wide beam width semiactive RF sensors, a precision roll attitude reference, and a controlled grade pitch, yaw and roll rate gyros to deliver high quality homing guidance information to a spin stabilized controlled missile is presented. A filtering system is utilized to eliminate errors caused by body roll signals generated due to the spin of the missiles. The nutational motion is used to calibrate the sensors. Impulsive maneuvers are utilized to intercept incoming ballistic targets. GRA

N86-22591# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AN APPROXIMATE FLIGHT PROFILE OF AN ARIANE LAUNCH VEHICLE Progress Report [EEN BENADERD VLUCHTPROFIEL VAN EEN ARIANE-DRAAGRAKET, VOORTGANGSRAPPORT 7]
B. Dijkshoorn Apr. 1983 49 p Partly in DUTCH and ENGLISH (VTH-M-462; PR-7) Avail: NTIS HC A03/MF A01

The flight trajectory of an Ariane launch vehicle, launched from Kourou (French Guyana) to put the satellites MARECS-B and SIRIO-2 in a geostationary transfer orbit, was approximated. The calculation was carried out to subject a panel 24 m from the nose to a heat flow, corresponding to the heat flow from the boundary layer in real flight. Height, flight speed (relative to the surrounding atmosphere) air density, dynamic pressure, air temperature, and Mach number were determined every 10 sec as a function of time from lift-off until the stopping of the rocket engines of the first stage 143.9 sec afterwards. Heat flow calculations show good agreement with published data.
Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-22905*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE TELEMETRY PERFORMANCE
J. W. Layland *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 203-213 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-22592# Instituto de Pecquisas Espaciais, Sao Jose dos Campos (Brazil).
TRUNCATED ELASTIC MODES COUPLING EFFECTS MINIMIZATION METHOD BY USING SPECIAL ATTITUDE CONTROL SCHEME
Decio Castilho Ceballos and Atair Rios Neto Jan. 1986 9 p refs Presented at the 3rd Internation Modal Analysis Conference, Orlando, Fla., Jan. 1985
(INPE-3782-PRE/880) Avail: NTIS HC A02/MF A01

An adaptive scheme is applied to minimize the truncated modes coupling effects for the attitude controlled spacecraft. The basic idea for the scheme is to nullify the accumulated effect of the truncated modes by using a correction in the control, such as to induce the physical system to have a behavior close to the model of work used in the synthesis and implementation of the control. This nullification provides the decoupling of the truncated modes from the work model. It is the decoupling that makes the truncated modes associated eigenvalues be identical for the controlled and constrained model. The importance of the result is that the eigenvalues for the constrained model are stable and frequently present a reasonable damping time. The proposed scheme is very easy to be implemented in on board control. The procedure was tested for the attitude control of a flexible spacecraft and the obtained results are presented. Author

N86-22593# European Space Agency, Paris (France).
PROCEEDINGS OF THIRD EUROPEAN SYMPOSIUM ON SPACECRAFT MATERIALS IN SPACE ENVIRONMENT
T. D. Guyenne, comp. and J. J. Hunt, comp. Nov. 1985 293 p refs Symposium held in Noordwijk, Netherlands, 1-4 Oct. 1985; sponsored by ESA, CNES, and Centre d'Etudes et de Recherches de Toulouse
(ESA-SP-232; ISSN-0379-6566) Avail: NTIS HC A13/MF A01

Spacecraft contamination; material behavior in low orbit; spacecraft charging; composite materials; and thermal control materials were discussed. For individual titles, see N86-22594 through N86-22626.

N86-22594*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPOSITE MATERIALS FOR SPACE STRUCTURES c24
D. R. Tenney, G. F. Sykes, and D. E. Bowles *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environments Nov. 1985 p 9-21 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The use of advanced composites for space structures is reviewed. Barriers likely to limit further applications of composites are discussed and highlights of research to improve composites are presented. Developments in composites technology which could impact spacecraft systems are reviewed to identify technology needs and opportunities. Author (ESA)

N86-22595# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materi-

als Section.

OUTGASSING AND CONTAMINATION MODEL BASED ON RESIDENCE TIME

M. vanEesbeek and A. Zwaal *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 25-34 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The long duration contamination and pressure predictions for the HIPPARCOS telescope are described. Multitemperature outgassing tests were performed to accelerate the outgassing phenomena. From these tests the acceleration factors and the residence times of the outgassing species were determined. The contamination and pressure model is based upon the outgassing rates, the residence times, and geometric parameters.
Author (ESA)

N86-22596# Centre National d'Etudes Spatiales, Toulouse (France).

EVALUATION OF ISOTHERMAL OUTGASSING KINETICS FOR SOME MATERIALS USED IN SPACE

J. Guillin *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 35-38 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Spacecraft material outgassing prediction using quartz crystal microbalances is described and data are presented. Data concern thermal control coatings, an adhesive film, an electrical wire, a carbon fiber reinforced plastic, and an adhesive. Kinetic parameters of outgassing required for modeling contamination assessment are discussed. It is assumed that the outgassing source involves several components and these are emitted according to order one of reaction.
Author (ESA)

N86-22597# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.

PHOTO-ENHANCED SPACECRAFT CONTAMINATION DEPOSITION

D. F. Hall, T. B. Stewart, and R. R. Hayes (Hughes Aircraft Corp., El Segundo, Calif.) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 39-47 refs (For primary document see N86-22593 13-18) (Contract AFOSR-F04701-83-C-0084)
Avail: NTIS HC A13/MF A01

Contaminant molecule adhesion to sunlit spacecraft surfaces, particularly radiators, was examined in laboratory experiments to determine the magnitude of this phenomenon and to study the underlying photochemical processes. Flight and laboratory evidence indicates that photolysis plays an important role in the deposition of contamination on spacecraft surfaces. The implications of this effect for the spacecraft contamination community are discussed.
Author (ESA)

N86-22598# MATRA Service Aerodynamique, Toulouse (France).

THE HIPPARCOS CLEANLINESS POLICY

S. Volf and A. Zwaal (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment 13 Nov. 1985 p 49-54 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The approach to molecular and particular contamination on the HIPPARCOS satellite is outlined. The simulation program indicates that the molecular contamination prediction of 0.0000005 g/sqcm is met. For particles > 1 micron the results are satisfactory. Further analyses and tests for particles < 1 micron are needed.
Author (ESA)

N86-22599# Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel.

CODUST: A NEW CONCEPT FOR A QUARTZ CRYSTAL MICROBALANCE c35

J. Sekler, H. E. Hintermann, and A. Zwaal (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 55-58 refs (For primary document see N86-22593 13-18) (Contract ESTEC-4907/81)
Avail: NTIS HC A13/MF A01

Problems with commercially available quartz crystal microbalances were investigated and the sources of major difficulties identified. The analysis shows the importance of a correct measurement of the real crystal temperature and of an efficient heat transfer control between crystal and cooling/heating elements. Methods to improve the existing concept are proposed. A prototype model proving feasibility was constructed.
Author (ESA)

N86-22600# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials Section.

THE SUMMATION OF THE OFFGASSING CHARACTERISTICS OF A TOTAL SPACELAB PAYLOAD

P. Jollet and M. D. Judd *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 63-69 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The requirement imposed on equipment to fly on board Spacelab that materials should have low offgassing characteristics (i.e., not release potentially toxic contaminants into the surrounding atmosphere) is discussed. Compliance with this requirement may be shown by tests either on materials or at black box level. In order to maintain visibility on the overall payload offgassing, a computational approach which enables specific offgassing data to be located at defined positions within a payload was developed. Full traceability through experiment facility/rack and payload is ensured together with data recall either by rack etc., or contaminant.
Author (ESA)

N86-22601*# National Aeronautics and Space Administration. White Sands Test Facility, N. Mex.

MATERIALS TEST LABORATORY ACTIVITIES AT THE NASA-JOHNSON SPACE CENTER WHITE SANDS TEST FACILITY (WSTF) c14

J. Stradling and D. L. Pippen *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials Space Environment Nov. 1985 p 71-74 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The NASA Johnson Space Center White Sands Test Facility (WSTF) performs aerospace materials testing and evaluation. Established in 1963, the facility grew from a NASA site dedicated to the development of space engines for the Apollo project to a major test facility. In addition to propulsion tests, it tests materials and components, aerospace fluids, and metals and alloys in simulated space environments.
Author (ESA)

N86-22602*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex. Materials Branch.

EFFECTS OF THE LOW EARTH ORBITAL ENVIRONMENT ON SPACECRAFT MATERIALS

L. J. Leger *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 75-80 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Recession of organic-polymer-based surfaces due to oxidation by atomic oxygen, the major component of the LEO environment, was studied in Space Shuttle flights 5, 8, and 41-G to measure reaction rates and the effects of various parameters on reaction rates. Surface recession on the flights indicates reaction rates of 3 x10 to the minus 24th power cc atom for unfilled organic polymers. Application of these rates to Space Station-type exposure for main structural items indicates that as much as 0.075 cm of surface recession occurs in 30 yr. Because of the importance of this effect on Space Station systems, additional experiments are planned to obtain better reaction rate measurements ensuring and adequate data base for Space Station design.
Author (ESA)

N86-22603*# Communications Research Centre, Ottawa (Ontario).

THE EFFECT OF LOW EARTH ORBIT SPACE ENVIRONMENT

ON POLYMERIC SPACECRAFT MATERIALS
D. G. Zimcik, R. C. Tennyson (Toronto Univ., Ontario), L. J. Kok (Toronto Univ., Ontario), and C. R. Maag (JPL, Pasadena, Calif.) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 81-89 refs Sponsored by NASA (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The Advanced Composite Materials Exposure to Space Experiment flown on shuttle mission STS-41G was designed to investigate the effect of low Earth orbit space environment on polymeric spacecraft materials. The effect of the phenomenon attributed to atomic oxygen on Kapton and advanced composite materials of carbon-epoxy and kevlar epoxy is described. The results of true space exposure are compared to duplicate specimens subjected to a simulated environment in an Earth-based nozzle beam test facility utilizing microwave discharge to form atomic oxygen. Although the energy level for atomic oxygen in the beam facility did not achieve the orbital energy level of 5 eV, similar effects of surface erosion and degradation are observed after equivalent exposure times. Author (ESA)

N86-22604# Lockheed Aircraft Corp., Palo Alto, Calif.
LABORATORY INVESTIGATION OF THE STABILITY OF ORGANIC COATINGS FOR USE IN A LEO ENVIRONMENT
M. McCargo, R. A. Dammann, T. Cummings, and C. Carpenter *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 91-97 refs Sponsored by LMSC (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The results of a laboratory investigation of protective coatings, and of the use of an oxygen plasma reactor to generate engineering data related to the orbit lifetime of the coated substrates are discussed. Changes in the surface optical and morphological properties and the rate of material mass loss are presented. Possible modes of degradation are suggested to explain the observed effects. Laboratory data are correlated with the flight data from shuttle missions, Solar Maximum Mission (SMM), and an experimental flight package. Author (ESA)

N86-22605# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials Section.
THE DEGRADATION OF METAL SURFACES BY ATOMIC OXYGEN c26
A. deRooy *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 99-108 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The influence of atomic oxygen on erosion-corrosion of metal surfaces, especially silver, is examined. Protection schemes for silver are investigated. Bare silver samples and partly coated silver samples were exposed to low Earth orbit conditions during shuttle flights STS-8 and STS-17. The silver specimens decrease 3 to 4.5 microns in thickness depending on the relative position to the velocity vector. The examination of the coated silver samples shows that 500 nm palladium, 50 nm aluminum and silicone DC6-1104 are successful in protecting the underlying silver against atomic oxygen attack. Author (ESA)

N86-22606# Centre d'Etudes et de Recherches, Toulouse (France). Dept. Technologie Spatiale.
CONDUCTIVITY AND SECONDARY EMISSION PROPERTIES OF DIELECTRICS AS REQUIRED BY NASCAP
L. Levy, D. Sarrail, and J. M. Siguier *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 113-123 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Spacecraft charging modeling by the computational code NASCAP is discussed. Conductivity and secondary emission are reviewed. Measurements methods and laboratory experiments are described. Results for commonly used external coatings are given. The impact of material properties on electrostatic behavior is illustrated. Author (ESA)

N86-22607# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
CONDUCTIVE COATINGS TO MINIMISE THE ELECTROSTATIC CHARGING OF KAPTON c27
D. Verdin and M. J. Duck *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 125-131 refs Sponsored by UK Ministry of Defence Procurement Executive (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

To reduce electrostatic charging of Kapton under electron irradiation, coatings with In2O3:polyimide ratios of up to 12:1 by weight and having a surface resistivity in the range 20,000 to 10 million ohm/sq and an alpha s/epsilon value of 0.63 were produced. These materials hold the surface below 250V during electron irradiation. The adhesion is 100% and does not deteriorate after 1100 cycles between +150 and -150 C; coatings prepared at 225 deg C exhibit negligible volatile material losses. The coatings are easily and economically prepared and may offer a practicable alternative to modified forms of Kapton when it is necessary to minimize its electrostatic charging. Author (ESA)

N86-22608# AEG-Telefunken, Wedel (West Germany).
DEVELOPMENTS OF SOLAR GENERATOR SUBSTRATES: SIMPLE ANTICHARGING (AC) AND CONDUCTIVE THERMAL CONTROL (TC) MATERIALS (GEO), AND SOME LEO ASPECTS c44
W. Schmitz *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 133-141 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Development work performed during the design phase for a large flexible solar blanket (L-SAT) requiring protection against electrostatic discharge anticharging (AC) on the whole substrate rearside and thermal control in certain blank (cell free) areas on the frontside is described. Efforts focused on the compromise with regard to conductivity (particularly important for AC) and thermooptical behavior and on the need for a simple solution concerning workability and adaptability. Soot and silver dispersions are discussed. Author (ESA)

N86-22609# AEG-Telefunken, Frankfurt am Main (West Germany). Forschungsinst.
ON DIELECTRIC LONG TERM STABILITY OF KAPTON-FILMS STRESSED BY ac AND dc UNDER USUAL ATMOSPHERIC CONDITIONS AND IN VACUUM c27
W. Goetz *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 143-148 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Voltage life curves of ac stressed polyimide films in accordance with Dakin's theory of voltage endurance were found. A first approximation of the characteristic parameters can be calculated directly from short time experiments with the threshold voltage obtained by a partial discharge detector. At ambient atmospheric pressure, as well as under vacuum, the inception of partial discharges is considered indicative for limited long term operation. Although the identification of the true threshold voltage of solar generators insulation layers may become difficult in high vacuum, and especially under dc stress, it is assumed to be well beyond the level of 1000 V. Author (ESA)

N86-22610# Imperial Chemical Industries, Wilton (England). New Science Group.
MECHANICAL AND FIRE PROPERTIES OF AROMATIC POLYMER COMPOSITES c27
D. C. Leach, P. J. Briggs, and D. R. Carlile *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 153-160 refs (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

Mechanical and fire properties of aromatic polymer composite APC-2 are discussed. Room temperature tensile properties of APC-2 are equivalent to or greater than those of a typical, thermosetting matrix composite using the same carbon fiber reinforcement. In damage tolerance, APC-2 shows significant improvements over thermosetting composites due to the high interlaminar fracture toughness of APC-2. The changes in mechanical properties with temperature are not large and even above the glass transition temperature of the Victrex PEEK matrix, APC-2 retains good mechanical performance due to the semicrystalline nature of the polymer. It is difficult to ignite and exhibits low flame propagation rates in standard laboratory tests. Flame penetration times at temperatures > 1000 C are significantly longer for APC-2 sheets than for aluminum alloy sheets. Smoke and toxic emission from APC-2 during a fire is amongst the lowest of all plastics. Author (ESA)

N86-22611# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Etablissement d'Aquitaine.

HOLOGRAPHY: THE NONDESTRUCTIVE TESTING OF COMPOSITE STRUCTURES **c35**

P. Barbier and C. LeFloch *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 161-165 refs (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

The principle of nondestructive testing by laser holographic interferometry, and the parts to be controled (parts of motor cases in composite materials) are discussed. The test facility, which involves a complex mechanical system, is described and the technical choices are justified. The economic aspects of the technique are outlined. Author (ESA)

N86-22612# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DEVELOPMENT OF STRUCTURAL-COMPOSITE REFLECTOR PANELS FOR A SUBMILLIMETER SPACE TELESCOPE **c24**

R. E. Freeland *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 167-172 refs Sponsored by NASA (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

Reflector panels for the Large Deployable Reflector (LDR) for a 20m, Earth-orbiting, submillimeter and infrared telescope were designed. The panels must be 1 to 2 m in diameter with surface precision and thermal stability of a few microns, and an areal density of < or = 10 kg/sqm. Using a combination of design, analytical modeling, panel fabrication, and testing, two sizes of graphite/epoxy panels were produced. One is 15 sqcm the other 60 sqcm, both weighing 5 to 7 kg/sqm with manufactured surface accuracies of a few tenths of a micron and thermal stability at LDR orbital temperatures of a few microns. Author (ESA)

N86-22613# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).

WINDING WITH THERMOPLASTIC POLYMERS **c27**

J. L. Tisne and J. Bouvard *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 173-178 refs Sponsored by ESA (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

Thermoplastic materials properties are compared to high temperature epoxy resins. Advantages in composite material manufactured by winding of continuous fiber with thermoplastic matrix are outlined. Processing problems are pointed out. Work to be done for space applications is discussed. Author (ESA)

N86-22614# Societe Nationale Industrielle Aerospatiale, Cannes (France).

DIMENSIONAL STABILITY OF CARBON-EPOXY COMPOSITE MATERIALS **c24**

V. Baudinaud and L. Massoni *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 179-184 ref (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

Temperature and moisture effects on the dimensional stability of carbon-epoxy composites are discussed, and test facilities to quantify the effects are described. To measure thermal expansion proper, it proved necessary to implement a laser interferometric method. Measurements can be made from minus 80 to plus 80 C. Two dilatometers placed in a programmable climatic chamber study temperature and moisture effects. Author (ESA)

N86-22615# Centre National d'Etudes Spatiales, Toulouse (France).

METAL MATRIX COMPOSITE MATERIALS FOR STRUCTURAL APPLICATIONS **c24**

Ph. Roy and A. Mamode *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 185-190 refs (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

A program to develop metal matrix composites for spacecraft structures is described. A prepeg showing adequate characteristics was made. Shaped pieces were manufactured in parallel, allowing the acquisition of the processes and characterization of the pieces. The manufacture of complex pieces such as tubes and gussets, made from C/Al and C/Mg, is envisaged. Using tubes and gussets, a structural assembly (truss) will be built and fully tested. When C/Mg elaboration is optimized, an industrial elaboration solution will be sought in order to achieve sufficient production of metal matrix composites in Europe, having quite good dimensional stability characteristics. Author (ESA)

N86-22616# Alcan International Ltd., London (England).

THE DEVELOPMENT OF ALUMINUM-LITHIUM ALLOYS FOR AEROSPACE APPLICATIONS **c26**

A. J. Cornish, A. Gray, W. S. Miller, and M. A. Reynolds *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 195-201 refs (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

The development of aluminum-lithium based alloys is described by considering the reasons for the rapid growth of interest in the alloy type, the property targets sought, the compositions on which the major effort is concentrated, the properties achieved, and manufacturing. The objective is to achieve a 10% reduction in density relative to standard high strength alloys, together with a 10% increase in stiffness, while matching the strength and other service properties associated with the standard alloys. Two aluminum-lithium based alloys are under development to match the service properties of alloys in the 2000 and 7000 series. One alloy is used in different tempers, either to match the properties of the medium strength alloy 2014 T6 or to give a low density replacement for the damage tolerant alloy 2024 T3. The second has a higher strength and matches the properties of 7075 T6. Author (ESA)

N86-22617# Societe Crouzet, Valence (France).

ADVANCED PRINTED WIRING BOARD (PWB) MATERIALS FOR SURFACE MOUNTED DEVICES IN AEROSPACE APPLICATIONS **c33**

G. Menozzi *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 203-213 refs Sponsored by CNES (For primary document see N86-22593 13-18)

Avail: NTIS HC A13/MF A01

Multilayer thick film hybrid and printed wiring board technologies for leadless ceramic chip carriers (LCCC) were developed. Copper clad invar MLBs prove to be a viable solution for LCCC interconnects. The CIC core MLB offers advantages such as large size, both-side mounting, an inner thermal plane for thermal management, an easier rework process, and better vibration tolerance. One disadvantage is the weight. Thermal coefficient of expansion measurements and calculations offer a quick approach

for material inspection and assembly evaluation. The thermal cycling test from minus 55 to plus 125 C widely used for evaluation programs consisting of several hundred cycles is not realistic for aerospace qualification tests. Author (ESA)

N86-22618# Du Pont (UK) Ltd., Stevenage (England).
MULTILAYER PRINTED CIRCUIT BOARD CHARACTERIZATION BY THERMAL ANALYSIS c33
J. N. Leckenby *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 215-222 refs Sponsored by International Computers Ltd., Kidsgrove, England and Fortin Industries Inc., Sylmar, Calif. (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Thermal analysis techniques used to test multilayer printed circuit boards are described. Differential scanning calorimetry laminate cure determination; thermomechanical analysis (TMA) delamination testing; gel time and resin flow determination by TMA; dynamic mechanical analysis (DMA) prepreg cure determination; cured laminate determination by DMA; thermogravimetric analysis (TGA) compositional analysis; and thermal stability kinetic studies by TGA are covered. Author (ESA)

N86-22619# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
HIGH VOLTAGE POTTING FOR THE FAINT OBJECT CAMERA (FOC) c35
R. Thomas *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 223-228 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Potting the high voltage parts on the photon detector of the Faint Object Camera (FOC) for the Space Telescope is described. The detector is required to have very high gain to provide a logic level signal for digital processing. Gain is provided by an image intensifier and a video camera tube, the former operating at up to 42KV (normally at 38KV) and the latter in the range -6.5 to -12KV (normally -10KV). Experience in developing the detector (including catastrophic failures) shows that when high voltage circuits are potted it is essential to define and control potentials on all surfaces. It is strongly recommended that a dummy unit be potted with pressure and stress gages to determine the forces involved in curing and environmental test cycles. The application of partial discharge testing is essential for assemblies and desirable for past screening (cables, correction techniques at least). Potting should be under vacuum and scrupulous attention must be paid to cleanliness of surfaces to be potted and all containers and equipment used for priming and potting. Author (ESA)

N86-22620# Selenia S.p.A., Rome (Italy).
MEASUREMENT OF THE THERMO-OPTICAL PROPERTIES OF VARYING PAINT THICKNESS ON CARBON FIBER COMPOSITES IN SPACECRAFT STRUCTURES c27
M. Giommi, M. Marchetti (Rome Univ., Italy), G. Salza, and P. Testa (Rome Univ., Italy) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 233-239 refs Sponsored by Max-Planck Inst. (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

Diffuse spectral reflectivity for solar radiation at normal incidence, spectral normal emissivity, and integrated normal emittance for PV 100 painted samples having different paint thickness and different (carbon fiber or non) substrates were measured. Results mainly for thickness > 70 microns show high spectral reflectivity or low spectral absorption coefficient while spectral emissivity has medium-high values. Limited effect (order of 10%) of the texture and thickness are pointed out. Author (ESA)

N86-22621# Centre National d'Etudes Spatiales, Toulouse (France).
NEW SPACE PAINTS c27
J. C. Guillaumon *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 239-243 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

White conductive paint with low solar absorptance (improvement of PCB-Z) (0.16 to 0.18); black conductive paint with low outgassing (improvement of PU1); white silicone paint with low solar absorptance (0.13); epoxy primer with low outgassing; and white conductive paint for launchers and aircraft were developed. Improvements under study are outlined. Author (ESA)

N86-22622# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.
LONG TERM TESTS OF CONTAMINATED OPTICAL SOLAR REFLECTORS (OSRS) UNDER COMBINED ENVIRONMENT c27
J. Marco and A. Paillous *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 245-253 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

A simulation program for 5 yr in geosynchronous orbit was carried out on thermal control coatings. Conductive and nonconductive optical solar reflectors (OSR's) were subjected to various thickness (50 to 500A) of contamination deposited in-situ at the start of the test, and irradiated. The variation in solar absorptance at the end of the test is 3 to 4 times greater for the OSR's having received 500 A of the products outgassed from the RTV 566 adhesive. The test data show that contamination is the most likely cause of the excessive degradations observed on many geosynchronous satellites. Author (ESA)

N86-22623# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials Section.
THE DEGRADATION AND CONTAMINATION EXPERIMENT FLOWN ON THE FIRST EUROPEAN COMMUNICATION SATELLITE ECS-1: PRELIMINARY RESULTS ON CONTAMINATION
G. Gourmelon and P. Jollet *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 255-258 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

An experiment on ECS-1 to study the in flight behavior of standard cerium doped optical solar reflectors is described. Three quartz crystal microbalances (QCMs) show a small increase of contamination certainly due to very light outgassing products at the beginning of the flight. During the first transfer orbit, a small reevaporation of these products occurred. At the firing of the apogee boost motor there is no detectable contamination on the QCMs. After 780 days in orbit QCM 1 and QCM 3 show the same level of contamination: 1200 ng/sqcm, comparable to the value measured on SCATHA, considered as a clean satellite. On QCM 2 the level is 700 ng/sq cm and lower than QCM 1 and 3. A decrease which appears after 120 days in orbit cannot be explained. Author (ESA)

N86-22624# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SCANNING LASER ACOUSTIC MICROSCOPY APPLIED TO THE EVALUATION OF MATERIAL INTERCONNECTIONS c36
B. D. Dunn and D. S. Collins *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 263-269 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The Scanning Laser Acoustic Microscope (SLAM) for the nondestructive inspection of materials and interconnections is introduced. The operational modes of the SLAM are illustrated during the assessment of spacecraft solar cell-to-silver interconnector weldments and electronic component chip solder-attachment to a ceramic carrier. Author (ESA)

N86-22625# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
PARTICLE FALLOUT PHOTOMETER (PFO) c35
M. VanEesbeek, R. Berkeljon, and H. Kuiper (URAMEC, Bilthoven, Netherlands) *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 271-274 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

The particle fallout photometer (PFO) for measuring particulate contamination on test surfaces is described. It is based on light scattering by settled particles when subjected to a stabilized light beam nearly parallel to a nonreflective sampling surface. Measuring range is from 0 to 1999 PPM. Particles of 5 microns can be determined. Author (ESA)

N86-22626# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ULTRAVIOLET RADIOMETERS c35
G. Gourmelon, H. Lyall (IRD, Newcastle upon Tyne, England), and R. Froud (IRD, Newcastle upon Tyne, England) *In its* Proceedings of 3rd European Symposium on Spacecraft Materials Space Environment Nov. 1985 p 275-276 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

A radiometer to measure ultraviolet radiation in a series of bands between 180nm and 450nm in a space simulation system was developed. A single channel ultraviolet detector based on the multiband ultraviolet radiometers, but featuring a more robust construction for general use, was also developed. The wavelength coverage is from 250 to 400nm with excellent rejection of visible radiation, and good temperature stability. Detectors with filters to measure a narrow band within the ultraviolet can be supplied. Author (ESA)

N86-22627# European Space Agency, Paris (France).
SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS, VOLUME 1
M. Dutat, J. Marco, and A. Paillous Aug. 1985 149 p refs Transl. into ENGLISH of 'Essais de Simulation d'Environmentale Spatial sur Revetements de Controle Thermique de Satellites, Tome 1" Rept. CERT-4128-Vol-1 Centre d'Etudes et de Recherche de Toulouse, France Original language document was announced as N85-17012 3 Vol.
(ESA-TT-891-Vol-1; CERT-4128-Vol-1) Avail: NTIS HC A07/MF A01

Simultaneous irradiation of satellite thermal control coatings by electrons, protons, and ultraviolet radiation, simulating 5 yr in geostationary orbit, was carried out. A layer of contaminant, originating from adhesive RTV566 by molecular flux, was applied to samples under controlled conditions. Changes were followed by microbalances and by measurements of optical reflectance over the spectrum. Samples of optical solar reflector (OSR) show a 3 to 4-fold increase in solar absorptance when contaminated by a layer of thickness 0.00005g/sq cm. The test covered four types of OSR: aluminized kapton, ITO-covered FEP, thin aluminized kapton stuck on to thick kapton, white conductive paint PCB Z, and black paint Electrodag 501. The change in solar absorptance of the materials as a function of time in orbit was determined. The electrical conductivity of ITO-covered FEP was observed. Author (ESA)

N86-22628# European Space Agency, Paris (France).
SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS. VOLUME 2, APPENDIX 1: DETAILED RESULTS OF OPTICAL MEASUREMENTS MADE AFTER THE VARIOUS STAGES OF THE FIRST TEST
Aug. 1985 139 p Transl. into ENGLISH of 'Essais de Simulation d'Environmentale Spatial sur Revetements de Controle Thermique de Satellites. Tome 2, Annexe 1: Resultats Detailles des Mesures Optiques Effectuees apres les Diverses Etapes du Premier Test" Rept. CERT-4128-Vol-2-App-1 Centre d'Etudes et de Recherche de Toulouse, France Original language document was announced as N85-17013 3 Vol.
(ESA-TT-891-Vol-2; CERT-4128-Vol-2-App-1) Avail: NTIS HC A07/MF A01

Simultaneous irradiation of satellite thermal control coatings by electrons, protons, and ultraviolet radiation, simulating 5 yr in geostationary orbit, was carried out. A layer of contaminant, originating from adhesive RTV566 by molecular flux, was applied to samples under controlled conditions. Changes were followed by microbalances and by measurements of optical reflectance over the spectrum. Results for optical measurements before deposition and for 0.2, 0.5, and 1 yr after are presented. Author (ESA)

N86-22629# European Space Agency, Paris (France).
SPACE ENVIRONMENT SIMULATION TO TEST SATELLITE THERMAL CONTROL COATINGS. VOLUME 2: APPENDICES 2, 3, AND 4. APPENDIX 2: DETAILED RESULTS OF OPTICAL MEASUREMENTS MADE AFTER THE VARIOUS STAGES OF THE SECOND TEST. APPENDIX 3: SUMMARY OF OPTICAL RESULTS OBTAINED DURING THE FIRST TEST. APPENDIX 4: SUMMARY OF OPTICAL RESULTS OBTAINED DURING THE SECOND TEST
Aug. 1985 259 p refs Transl. into ENGLISH of 'Essais de Simulation d'Environentale Spatial sur Revetements de Controle Thermique de Satellites. Tome 2: Annexe 2: Resultats Detailles des Mesures Optiques Effectuees apres les Diverses Etapes du Deuxieme Test. Annexe 3: Recapitulatif des Essais Optiques au Cours du Premier Test. Annexe 4: Recapitulatif des Mesures Optiques Effectuees au Cours du Deuxieme Test" Rept. CERT-4128-Vol-2-App-2-App-3-App-4 Centre d'Etudes et de Recherche de Toulouse, France Original language document was announced as N85-17014 3 Vol.
(ESA-TT-891-Vol-3; CERT-4128-Vol-2-App-2,3,4) Avail: NTIS HC A12/MF A01

Simultaneous irradiation of satellite thermal control coatings by electrons, protons, and ultraviolet radiation, simulating 5 yr in geostationary orbit, was carried out. A layer of contaminant, originating from adhesive RTV566 by molecular flux, was applied to samples under controlled conditions. Changes were followed by microbalances and by measurements of optical reflectance over the spectrum. Results at minus 35 and plus 2 C for up to 5.08 yr after deposition are presented. Author (ESA)

N86-22630# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. Systemes Balistiques et Spatiaux.
ACCOMMODATION STUDY OF THE CRHESUS CRYOSTAT ON THE EURECA PLATFORM Final Report
Paris ESA May 1985 109 p refs
(Contract ESTEC-5814/84-NL-B)
(SNIAS-1048ACA/LL/V; ESA-CR(P)-2104) Avail: NTIS HC A06/MF A01

The integration and operational constraints of CRHESUS cryostat as payload on EURECA are defined. The optimum configuration for CRHESUS on EURECA is proposed. The design of the structural support, and a mechanical analysis of the whole CRHESUS plus the structural interface are provided. The data system and the electric power system between CRHESUS and EURECA, and the passive thermal control of payloads are defined. Operational constraints of the system determine ground support equipment. Studies of necessary improvements on the cryostat for compliance as EURECA payload were performed and consequences on the thermal balance and lifetime of cryostat were identified. A development plan, a schedule, and interface requirements for flight of CRHESUS on EURECA are provided. Author (ESA)

N86-22631# MATRA Espace, Paris-Velizy (France). Espace Produits et Technologie.
KEY DESIGN PARAMETERS FOR A VERY LOW GRAVITY IN-ORBIT FACILITY Final Report
J. C. Amieux, C. Fournier, R. Strittmatter (Dornier-Werke GmbH, Friedrichshafen, West Germany), M. Baier (Dornier-Werke GmbH, Friedrichshafen, West Germany), D. Schmitt (ONERA, Paris, France), and J. Merlet (Intespace) Paris ESA Apr. 1985 372 p refs

(Contract ESTEC-5292/82-NL-PP(SC))
(MATRA-EPT/DT/VT068/098; ESA-CR(P)-2144) Avail: NTIS HC A16/MF A01

Vibration generation and propagation in orbital platforms, including Spacelab and EURECA, were analyzed. Attitude and orbit control subsystem vibration generators; vibrations induced by thermal control subsystems; measurement techniques and experimental aspects for a microgravity environment; vibration induced by microgravity-oriented payloads; and vibration reduction techniques were studied. Dynamic synthesis of a microgravity platform is discussed. Author (ESA)

N86-22742# Joint Publications Research Service, Arlington, Va.
SPECTER OF WAR IN SPACE DISCUSSED, PART 2
Xianmin Bao *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 1-7 Transl. into ENGLISH from Hangtian (Beijing, China), no. 6, Nov. 1985 p 8-11 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

N86-22818# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Data Relay Satellite Space Segment.
THE ESA DATA RELAY SATELLITE PROGRAM
D. L. Brown, K. G. Lenhart (ESOC, Darmstadt, West Germany), and M. Otter (ESOC, Darmstadt, West Germany) *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 51-56 (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-22833# Naval Observatory, Washington, D.C.
MODERN HIGH-PRECISION TIMEKEEPING
W. J. Klepczynski *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 165-173 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-22632*# Lockheed Missiles and Space Co., Huntsville, Ala.
DUCT FLOW NONUNIFORMITIES STUDY FOR SPACE SHUTTLE MAIN ENGINE
Juergen Thoenes Aug. 1985 129 p refs
(Contract NAS8-34507)
(NASA-CR-178734; NAS 1.26:178734; LMSC-HEC-TR-F042555)
Avail: NTIS HC A07/MF A01 CSCL 21H

To improve the Space Shuttle Main Engine (SSME) design and for future use in the development of generation rocket engines, a combined experimental/analytical study was undertaken with the goals of first, establishing an experimental data base for the flow conditions in the SSME high pressure fuel turbopump (HPFTP) hot gas manifold (HGM) and, second, setting up a computer model of the SSME HGM flow field. Using the test data to verify the computer model it should be possible in the future to computationally scan contemplated advanced design configurations and limit costly testing to the most promising design. The effort of establishing and using the computer model is detailed. The comparison of computational results and experimental data observed clearly demonstrate that computational fluid mechanics (CFD) techniques can be used successfully to predict the gross features of three dimensional fluid flow through configurations as intricate as the SSME turbopump hot gas manifold. Author

N86-22633*# Spectra Research Systems, Inc., Huntsville, Ala. Systems Technology Div.
SPACE SHUTTLE MAIN ENGINE (SSME) LOX TURBOPUMP PUMP-END BEARING ANALYSIS Final Report
6 Jan. 1986 60 p
(Contract NAS8-36183)
(NASA-CR-178746; NAS 1.26:178746; SRS/STD-TR86-007-535)
Avail: NTIS HC A04/MF A01 CSCL 21H

A simulation of the shaft/bearing system of the Space Shuttle Main Engine Liquid Oxygen turbopump was developed. The simulation model allows the thermal and mechanical characteristics to interact as a realistic simulation of the bearing operating characteristics. The model accounts for single and two phase coolant conditions, and includes the heat generation from bearing friction and fluid stirring. Using the simulation model, parametric analyses were performed on the 45 mm pump-end bearings to investigate the sensitivity of bearing characteristics to contact friction, axial preload, coolant flow rate, coolant inlet temperature and quality, heat transfer coefficients, outer race clearance and misalignment, and the effects of thermally isolating the outer race from the isolator. Author

N86-22634# Madrid Univ. (Spain). Dept. of Applied Physics.
FIELD EMISSION ELECTRIC PROPULSION: FURTHER STUDIES ON COLD CATHODE ELECTRON EMITTERS Final Report
Fernando Rueda Sanchez, Luis Galan, Lucia Adell, Juan A. Romero, and Raquel Diaz Paris ESA Feb. 1985 41 p
(Contract ESTEC-5052/82-NL-PS(SC))
(ESA-CR(P)-2150) Avail: NTIS HC A03/MF A01

The fabrication method and device properties of cold electron emitters used as ion beam neutralizers in field emission electron propulsion were studied. Overall emission efficiency of 2 mA/watt, imperviousness to atmospheric exposure, low voltage operation, and long term stability over many hundreds of hours were required. Best results are obtained by RF deposition of ITO, formation by heat treatment, deposition of electrical contacts of 90Ni-10Cr alloy by electron bombardment, and slow activation in a high vacuum. Ratios of emission to conduction currents of 10% stable for 1 hr are obtained. Emissions stable over many hundreds of hours are only obtained for lower ratios (1% for ITO and 3% for SnO2). These cold cathodes can be exposed to the atmosphere without further change in their emission characteristics in vacuum. Sets of three cold cathodes in parallel were tested, showing behavior similar to the individual ones in simultaneous operation. Overall efficiency is 0.3Ma/W. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-22635# Texas Technological Univ., Lubbock. Dept. of Chemistry.
METAL ION COMPLEXATION BY IONIZABLE CROWN ETHERS
R. A. Bartsch 10 Sep. 1985 7 p
(Contract DE-AS05-80ER-10604)
(DE86-001946; DOE/ER-10604/T1) Avail: NTIS HC A02/MF A01

Research on the synthesis and characterization of novel ionizable multidentate ligands and their application in competitive solvent extraction of alkali metal cations and alkaline earth cations is discussed. To explore the effect of ring size variation for the lipophilic crown ether salicylic acid derivatives, compounds with very large rings (crown ether = 27-crown-9 and 30-crown-10)

were prepared. Compounds were prepared to probe the influence of the ionized side arm upon cation complexation behavior. The additional series of lipophilic diionizable acyclic polyethers were prepared and investigated as solvent extraction agents for alkaline earth cations. These studies provided important insight into the influence of lipophilic group, ionizable group, and polyether chain length variation upon the efficiency and selectivity of alkaline earth cation extraction by such complexing agents. A series of lipophilic acyclic polyether monocarboxylic acids 8 was also synthesized in which R = H, CH3 and CH2C6H5 and n was varied. Such compounds were found to be suprisingly selective and efficient solvent extraction agents for lithium. DOE

N86-22636# California Univ., Berkeley. Lawrence Berkeley Lab.
STRUCTURE SENSITIVITY OF CATALYTIC REACTIONS
G. A. Somorjai and J. Carrazza Jul. 1985 41 p refs Presented at the 189th National Meeting of the American Chemical Society, Miami, Fla., 28 Apr. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001981; LBL-19628; CONF-850417-29) Avail: NTIS HC A03/MF A01

The rate and product distribution of chemical reactions catalyzed by metals can depend on the particle size of supported catalysts. This can be explained by the interaction between chemisorbed species and surface sites of different configuration in the metal associated with atoms in terrace, steps and kinks. Single-crystal catalysts are excellent models for studying these interactions. The contribution of single-crystal studies to the understanding of structure sensitivity in catalytic reaction is discussed. Reactions are classified in three types. Structure sensitive reactions, structure insensitive reactions and reactions that show both behaviors, depending on the experimental conditions. Several examples are discussed in each of the three categories. DOE

N86-22637# Pacific Northwest Lab., Richland, Wash.
CATALYTIC GASIFICATION OF BAGASSE FOR THE PRODUCTION OF METHANOL
E. G. Baker, M. D. Brown, and R. J. Robertus Oct. 1985 101 p refs
(Contract DE-AC06-76RL-01830)
(DE86-002551; PNL-5100) Avail: NTIS HC A06/MF A01

The purpose of the study was to evaluate the technical and economic feasibility of catalytic gasification of bagasse to produce methanol. In previous studies, a catalytic steam gasification process was developed which converted wood to methanol synthesis gas in one step using nickel based catalysts in a fluid-bed gasifier. Tests in a nominal 1 ton/day process development unit (PDU) gasifier with these same catalysts showed bagasse to be a good feedstock for fluid-bed gasifiers, but the catalysts deactivated quite rapidly in the presence of bagasse. Laboratory catalyst screening tests showed K2CO3 doped on the bagasse to be a promising catalyst for converting bagasse to methanol synthesis gas. PDU tests with 10 wt % K2CO3 doped on bagasse showed the technical feasibility of this type of catalyst on a larger scale. A high quality synthesis gas was produced and carbon conversion to gas was high. The gasifier was successfully operated without forming agglomerates of catalyst, ash, and char in the gasifier. There was no loss of activity throughout the runs because catalysts are continually added with the bagasse. Laboratory tests showed about 80% of the potassium carbonate could be recovered and recycled with a simple water wash. An economic evaluation of the process for converting bagasse to methanol showed the required selling price of methanol to be significantly higher than the current market price of methanol. Several factors make this current evaluation using bagasse as a feedstock less favorable: (1) capital costs are higher due to inflation and some extra costs required to use bagasse, (2) smaller plant sizes were considered, so economies of scale are lost, and (3) the market price of methanol in the US has fallen 44% in the last six months. DOE

N86-22638# National Bureau of Standards, Gaithersburg, Md. Organic Analytical Research Div.
DIRECT CALIBRATION OF GC/MS SYSTEMS USING SRM (STANDARD REFERENCE MATERIAL) GAS CYLINDERS Project Report, Jan. 1984 - Aug. 1985
G. D. Byrd, K. L. Richie, L. T. Sniegoski, and E. White Oct. 1985 32 p Sponsored by Environmental Monitoring Systems Lab., Research Triangle Park, N.C.
(PB86-110715; EPA-600/4-85-082) Avail: NTIS HC A03/MF A01 CSCL 07C

A cryogenic trapping system has been developed for use in calibrating GC/MS systems for the analysis of volatile organic compounds. This system provides for direct Standard Reference Material (SRM) traceability on data generated on gaseous samples. The cryogenic trap is a coil of stainless steel tubing immersed in a cryogen to trap and preconcentrate organic species present in a gaseous sample. The trap also contains a heated injection port for the addition of isotopically labeled compounds for use in isotope dilution measurements. The first part of this research is concerned with the development of IDMS as an independent method for the quantification of analytes in gaseous samples to be used as standards. Results are presented for the determination of bromobenzene in nitrogen at nominal concentrations of 1 and 25 ppb. In the second part of the research, a calibration curve method was developed for using these standards in auditing the performance of GC/MS systems. GRA

24 COMPOSITE MATERIALS

Includes laminates.

N86-22639 Columbia Univ., New York.
THE ELASTO-PLASTIC BEHAVIOR OF COMPOSITE LAMINATES Ph.D. Thesis
Lawrence Colin Bank 1985 85 p
Avail: Univ. Microfilms Order No. DA8523113

The elasto-plastic behavior of composite laminated plates or shells is analyzed in terms of the six plate stress resultants (membrane forces and bending moments) and the six plate generalized strains (midplane strains and curvatures). An elasto-plastic constitutive theory that is applied in such a stress-resultant formulation overlooks the matrix and fiber micro-mechanics of the composite material and describes the elasto-plastic response as a function of the properties of the composite laminate as a whole. The stress-resultant constitutive relations are developed for two different plasticity theories; a yield surface plasticity theory and a direct plasticity theory, and are applied to the analysis of both strain-hardening and strain-softening behavior of composite laminates. Both plasticity theories use a two-surface concept in which the inelastic behavior depends upon the distance between a current yield surface and a limit yield surface; each of which consists of piecewise curvilinear sections in the six-dimensional stress-resultant space. Dissert. Abstr.

N86-22640 California Univ., Los Angeles.
EDGE EFFECTS IN LAMINATED FIBER COMPOSITE PLATES SUBJECTED TO PLANE LOADING Ph.D. Thesis
Thomas Anthony Bockrath 1985 134 p
Avail: Univ. Microfilms Order No. DA8525836

A method is described for analyzing the behavior of laminated fiber reinforced composite plates near loaded or unloaded edges. The plates are treated as being composed of separate plies each of which is composed of unidirectional fibers and interfiber connecting material (matrix). Equilibrium is enforced for each ply. For the free edge condition, line forces involving the outward normal are held to zero for all plies when subjected to a temperature change, an axial load, a constant moment type loading, a shear type loading, or combinations thereof. Displacement field equations are expressed in terms of a mean displacement common to all plies and with differential displacement functions unique to each ply. Through the use of these equations, mathematically exact solutions yielding fiber strain, intralaminar shear and interlaminar shear for all plies are obtained for rectangular laminated fiber

reinforced composite plates subjected to various uniform edge loadings, including axial moment type loadings, in plane shear type loadings and thermal loadings. These solutions give the true maximum load carrying capacity of composite plates near edges, which are then used to examine the accuracy of the well known Hill-Tsai criterion for failure in composite structures. Dissert. Abstr.

N86-22641 Florida Univ., Gainesville.
MEASUREMENTS OF DAMPING FOR NONDESTRUCTIVELY ASSESSING THE INTEGRITY OF FIBER REINFORCED COMPOSITES Ph.D. Thesis
Bai-Tang Lee 1985 171 p
Avail: Univ. Microfilms Order No. DA8523856

The development of an experimental method to measure material damping and the assessment of the utility of damping measurements as a tool for quantitatively assessing the integrity of fiber reinforced composites were undertaken. An impulse technique using a noncontact probe displacement motion transducer was developed for the measurement of material damping up to the third mode of vibration. The test specimens, fixed free beams vibrating transversely, were fabricated from five types of composite materials. They were graphite/epoxy, Kevlar/epoxy, and glass/epoxy continuous fiber composites, chopped glass fiber composite, and hybrid composite. The severity of damage simulated by milling machine cuts correlates well with increased damping. There were no significant changes in damping of the specimens having mylar inserts to represent delaminations. For the type of damage from bending tests, no significant changes in damping were observed. An example is given to describe a graphic method to approximately locate and quantify damage. The results of the method give correct ranges in evaluations of the location and severity of the damage by milling machine cuts. Dissert. Abstr.

N86-22642 Pittsburgh Univ., Pa.
INTERACTIONS BETWEEN FLOW, HEAT AND MASS TRANSFER DURING FORMATION OF CARBON-FIBER REINFORCED EPOXY COMPOSITES Ph.D. Thesis
Yen-Seine Wang 1985 174 p
Avail: Univ. Microfilms Order No. DA852482

Reinforced epoxy composites that contain long carbon fibers have shown strength and durability when used in aircraft secondary structures. The curing process of epoxy composites is complex. The polymerization reaction, heat and mass transfer, and flow have to be analyzed simultaneously. The interaction of cure kinetics, chemo-rheology, heat and mass transfer, and flow consolidation is concerned. The pregelation cure kinetics was described in terms of the overall reaction rate parameters and heat of polymerization using differential scanning calorimeter techniques. Viscosity measurements of the epoxy resin as a function of time at constant temperature were made at Lockheed Company and were combined with the kinetic data. The simultaneous heat and mass transfer was modeled mathematically. The density and thermophysical properties of the curing prepreg such as specific heat and thermal diffusivity were measured. Experiments were done with practical composite, simulated composite and also a macroscopic system to study the flow phenomena. Dissert. Abstr.

N86-22643 Washington Univ., St. Louis, Mo.
FATIGUE AND ACOUSTIC EMISSION BEHAVIOR OF UNDIRECTIONAL COMPOSITES Ph.D. Thesis
Luis Lorenzo 1985 326 p
Avail: Univ. Microfilms Order No. DA85224763

Failure mechanisms in unidirectional composites under static tension and tension-tension fatigue were studied using model composite specimens. Ductile and brittle epoxy resins were combined with polyester- and epoxy-compatible glass fibers and T300 graphite fibers. Matrix cracking was detected very early before fracture of the fibers. The matrix cracks did not grow because of the constrained deformation of the matrix between the fibers. During fatigue, the matrix cracks grew along the fibers in glass specimens while they remained mostly stable in graphite specimens. Failure resulted from the transverse accumulation of fiber failures at a cross section. In the low-cycle region, glass fibers were more fatigue sensitive than graphite fibers. However, in the high-cycle region their fatigue sensitivities were similar. Acoustic emissions (AE) in static tension and fatigue were from fiber failures, matrix cracking and debonding. In glass specimens, matrix cracking and debonding affected wave parameters such as peak amplitude. For a resonant transducer, the recorded peak amplitude, ringdown counts and event duration were, on the average, related to one another. Dissert. Abstr.

N86-22644 Department of the Air Force, Washington, D.C.
VOID DETECTION AND COMPOSITION MEASUREMENTS IN COMPOSITE WIRES Patent
Charles Sve and Eric P. Muntz, inventors (to Air Force) Issued 29 Oct. 1985 8 p Supersedes AD-D010419
(AD-D011972; US-Patent-4,550,255; US-Patent-Appl-SN-511060; US-Patent-Class-250-359.1) Avail: US Patent and Trademark Office CSCL 11/4

This patent provides a novel method and system for the detection of voids or other composition anomalies in wires and particularly in composite wires; which comprises a source of penetrating radiation, such as an X-ray, gamma or neutron source for irradiating the wire; a fluid bath in which the wire may be moved, the bath containing a material having a linear coefficient of attenuation for the radiation closely matching that of a standard or ideal composition wire; and a detector system for observing and comparing the transmission of the radiation through the bath and wire with that through the bath only, or through the bath and wire with that through the bath containing a normal or standard wire. GRA

N86-22645# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
PREDICTION OF WARPAGE IN COMPONENTS OF COMPOSITE MATERIAL
F. L. Matthews and J. Sandhu Oct. 1984 186 p refs
(Contract MOD(PE)-2037/0257-XR/STR)
(BR93823) Avail: Issuing Activity

Warpage deformations in carbon fiber reinforced plastics during fabrication were studied to predict mold shapes. Deformation shapes of thin cross-ply and angle-ply unsymmetrical laminate plates were investigated experimentally and compared with previous results and those predicted by classical laminate theory. An elastic finite element analysis was carried out for the plates in two and three dimensions. A mold with different corner radii was constructed to investigate the warping of channel sections with a variety of lay-ups. An elastic finite element analysis was carried out to predict deformation. In an unsuccessful attempt to improve predictions, an incremental analysis was undertaken. It is concluded that nonlinear coupling effects between stress and temperature-variation of properties should be accounted for. Author (ESA)

N86-22646# Royal Aircraft Establishment, Farnborough (England).
FLEXURAL PROPERTIES OF CARBON FIBRE CLOTH/WOOD VENEER LAMINATES
J. H. Sewell 17 Apr. 1985 22 p refs
(RAE-TM-MAT/STR-1055; BR96647) Avail: NTIS HC A02/MF A01

Flexural tests were made on epoxy and phenolic resin bonded hybrid laminates comprising carbon fiber cloth outer layers on wood veneer cores. Breaking loads and stiffnesses of many of the hybrids exceed those of all carbon fiber cloth laminates of the same weight per unit area of panel. This improvement in flexural properties can be accompanied by a significant decrease in materials costs owing to the replacement of carbon fiber cloth by wood veneers. Significant weight savings may be achieved if carbon fiber laminates are replaced by hybrid laminates having the same flexural breaking strengths or stiffnesses. Author (ESA)

N86-22647*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE EFFECT OF RESIN TOUGHNESS AND MODULUS ON COMPRESSIVE FAILURE MODES OF QUASI-ISOTROPIC GRAPHITE/EPOXY LAMINATES

Mohsen M. Sohi (Washington Univ., St. Louis, Mo.), H. Thomas Hahn (Washington Univ., St. Louis, Mo.), and Jerry G. Williams Mar. 1986 47 p refs
(NASA-TM-87604; NAS 1.15:87604) Avail: NTIS HC A03/MF A01 CSCL 11D

Compressive failure mechanisms in quasi-isotropic graphite/epoxy laminates were characterized for both unnotched and notched specimens and also following damage by impact. Two types of fibers (Thornel 300 and 700) and four resin systems (Narmco 5208, American Cyanamid BP907, and Union Carbide 4901/MDA and 4901/mPDA) were studied. For all material combinations, failure of unnotched specimens was initiated by kinking of fibers in the 0-degree plies. A major difference was observed, however, in the mode of failure propagation after the 0-degree ply failure. The strength of quasi-isotropic laminates in general increased with increasing resin tensile modulus. The laminates made with Thornel 700 fibers exhibited slightly lower compressive strengths than did the laminates made with Thornel 300 fibers. The notch sensitivity as measured by the hole strength was lowest for the BP907 resin and highest for the 5208 resin. For the materials studied, however, the type of fiber had no effect on the notch sensitivity. Author

N86-22648# Construcciones Aeronauticas S.A., Madrid (Spain).
ADVANCED COMPOSITE STRUCTURES IN COMMERCIAL TRANSPORT AIRCRAFT
J. Koshorst (Airbus Industrie) Nov. 1984 29 p
(AI/TE3-384/82-Issue-2) Avail: NTIS HC A03/MF A01

Design factors which govern the introduction of advanced composite structures on transport aircraft are reviewed. The efforts made in this field of technology must be balanced either through weight saving, manufacturing considerations, or increased structural performance. The A-310 aircraft is used to demonstrate how these objectives are met. Author (ESA)

N86-22649# Fulmer Research Inst. Ltd., Stoke Poges (England).
GUIDELINES ON BASIC ASPECTS OF JOINTING TECHNOLOGY FOR ADVANCED FIBRE REINFORCED PLASTICS USED IN SPACE STRUCTURES
D. P. Bashford Paris ESA Sep. 1984 86 p refs
(Contract ESA-5497/83-NL-PB(SC))
(FRI-R878/15A; ESA-CR(P)-2034) Avail: NTIS HC A05/MF A01

Adhesive bonding and mechanical fastening of spacecraft composite-composite and composite-metal structures are reviewed. For most space structures using thin laminates (< 3 mm) adhesive bonding is the preferred means of joining. As section thickness and load carrying requirements increase, bolted or bonded/bolted joints become more applicable. Author (ESA)

N86-22650# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
PAL: A COMPUTER PROGRAM FOR ASYMMETRIC LAMINATES BUILT UP FROM SEVERAL MATERIALS [PAL - EEN COMPUTERPROGRAMMA VOOR A-SYMMETRISCHE LAMINATEN OPGEBOUWD UIT MEERDERE MATERIALEN]
P. A. Joosse Aug. 1983 33 p refs In DUTCH
(VTH-M-482) Avail: NTIS HC A03/MF A01

A program for asymmetric laminates consisting of layers with arbitrary thickness, orientation, and (synthetic) materials is described. Laminate behavior under the impact of temperature and humidity is expressed in laminate deformations and tensile stresses per layer. The safety factor of an external load is determined with the crack criterium of Tsai-Wu. Based on the classical laminated plate theory, a plane tensile stress condition in a laminate, which deforms as a whole, was studied. The accuracy of the theory is sufficient for design of wind turbine blades. An asymmetric aramid-carbon laminate was compared with a symmetric laminate, and an asymmetric laminate built up with directed fabrics. Author (ESA)

N86-22651# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
POTENTIAL OF COMPOSITE MATERIALS TO REPLACE CHROMIUM, COBALT AND MANGANESE IN CRITICAL APPLICATIONS
J. Clark 1985 160 p refs Sponsored by Office of Technology Assessment, Washington, D.C.
(PB86-123965) Avail: NTIS HC A08/MF A01 CSCL 11D

An analysis of the potential for substituting composite materials for critical materials in the jet engine, automotive and oil/gas equipment industries is given. It includes an assessment of the technical, economic and institutional factors contributing to direct and indirect substitution in these industries. GRA

N86-22594*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPOSITE MATERIALS FOR SPACE STRUCTURES
D. R. Tenney, G. F. Sykes, and D. E. Bowles *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environments Nov. 1985 p 9-21 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22612# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEVELOPMENT OF STRUCTURAL-COMPOSITE REFLECTOR PANELS FOR A SUBMILLIMETER SPACE TELESCOPE
R. E. Freeland *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 167-172 refs Sponsored by NASA (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22614# Societe Nationale Industrielle Aerospatiale, Cannes (France).
DIMENSIONAL STABILITY OF CARBON-EPOXY COMPOSITE MATERIALS
V. Baudinaud and L. Massoni *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 179-184 ref (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22615# Centre National d'Etudes Spatiales, Toulouse (France).
METAL MATRIX COMPOSITE MATERIALS FOR STRUCTURAL APPLICATIONS
Ph. Roy and A. Marnode *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 185-190 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22761# Joint Publications Research Service, Arlington, Va.
A STUDY OF THE FRACTURE OF CARBON-CARBON COMPOSITES Abstract Only
Jiaxiang Zhao *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 137 Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 4, 31 Oct. 1985 p 40-48 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-22652 Kentucky Univ., Lexington.
FLAME SPREADING IN BACKWARD BOUNDARY LAYERS Ph.D. Thesis
Muthuswamy Vedhanayagam 1985 99 p
Avail: Univ. Microfilms Order No. DA8523937

A theoretical model for the downward spread of a flame in the gas over a semi-infinitely thick fuel bed is presented. Gas phase chemistry is assumed to proceed at an infinite rate while the fuel is taken to pyrolyze at the surface in an Arrhenius fashion. The backward boundary layer character of the flow induced by the flame is exploited, and a transformation that shifts the singularity associated with boundary layer equations to a location, upstream of the leading edge of the flame, where the surface temperature is nearly ambient, is employed. The boundary-layer flow is matched asymptotically for large Grashof number to a potential flow that allows the flow induced by the flame and along the upstream surface of the fuel bed to be calculated. The gas phase formulation is applied to investigate the natural convective flow field associated with a flame spreading downward along a thin cellulosic fuel bed. Temperature and velocity predictions are shown to compare favorably with experimental measurements. Dissert. Abstr.

N86-22653 Pennsylvania State Univ., University Park.
PRESSURE-VOLUME-TEMPERATURE-COMPOSITION (PVTX) PROPERTIES OF THE SYSTEM H2O-NaCl AT ELEVATED TEMPERATURES AND PRESSURES Ph.D. Thesis
Robert John Bodnar 1985 199 p
Avail: Univ. Microfilms Order No. DA8525999

Phase equilibria in the system H2O-NaCl were determined from 550 to 1000 C and from 500 to 1300 bars using synthetic fluid inclusions formed by healing fractures in inclusion free Brazilian quartz in the presence of two coexisting, immiscible H2O-NaCl fluids. Salinities of the two coexisting phases were obtained from micro-thermometric analyses of those inclusions which trapped only a single, homogeneous fluid phase. Results combined with previously published data on the H2O-NaCl system at lower temperatures and pressures, indicate that the two-fluid-phase field extends well into the P-T range of most shallow magmatic-hydrothermal activity. As a consequence, chloride brines exsolved from many epizonal plutons during the process of second-boiling will immediately separate into a high salinity liquid phase and a lower salinity vapor phase and produce coexisting halite bearing and vapor rich fluid inclusions. With increasing salinity, partial molar volumes of NaCl become less negative and approach a constant value close to the molar volume of metastable, supercooled liquid NaCl, indicating saturation of the water structure with NaCl. Dissert. Abstr.

N86-22654 British Library Lending Div., Boston Spa (England).
THE THEORY OF THE DYNAMICS OF THE IMPREGNATION OF POROUS BODIES BY SOLUTIONS
A. A. Shatov, L. K. Filippov, and O. A. Zhukhovitskii 1985 7 p refs Transl. into ENGLISH from Iz. Vuz Chernaya Metall. (USSR), no. 7, 1985 p 39-41
(BLL-M-36578-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The capillary impregnation of materials, a particular type of brick, by different concentration aqueous solutions of different alcohols was considered. The concentrations of the sorbate close to the meniscus are determined. The dynamics of sorption are analyzed and it is concluded that the concentration close to the meniscus is related to some extent to the initial concentration if there is an inflection on the isotherm. Author

N86-22655# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.
CATALYTIC COMBUSTION IN A TRANSIENT HIGH PRESSURE FACILITY M.S. Thesis
D. R. J. Baxter Jul. 1985 181 p refs Sponsored by UK Ministry of Defence Procurement Executive
(BR96547) Avail: NTIS HC A09/MF A01

Temperature and composition measurements from experiments on the catalytic combustion of weak mixtures of hydrogen, methane, ethylene and liquid propane, in air initially at pressures up to 60 bar and temperatures up to 820 K are presented and are compared with a simple, theoretical model. The facility was not capable of sustaining catalytic combustion of methane at the test conditions available, but catalytic reactions were obtained using the other fuels tested. Premixed and injected fuels were studied, with the quantitative work concentrating on ethylene injection into air flows to give fully mixed equivalence ratios of 0.1 to 0.2. Results show that the transient facility produces high temperature and pressure air flows sufficiently steady to sustain surface oxidation processes. It is also possible to obtain relevant measurements of temperature and gas composition within the run period of 1 sec. Author (ESA)

N86-22656# Materials Quality Assurance Directorate, London (England).
A SCREENING TECHNIQUE FOR THE PRESENCE OF LEAD IN PAINT BY ATOMIC ABSORPTION SPECTROPHOTOMETRY
G. F. B. Hamilton and A. E. Morris Mar. 1984 10 p refs
(MQAD-TP-871; BR96573) Avail: NTIS HC A02/MF A01

A rapid, semiquantitative method for the determination of lead in decorative paints to identify samples which warrant a full quantitative lead determination is described. The procedure involves introducing the paint on hardened filter paper into the atomic absorption spectrophotometer flame without any prior sample preparation. The technique can be used with plastics, papers, and other materials and elements suitable for atomic absorption spectrophotometry. Author (ESA)

N86-22657# Defence Research Information Centre, Orpington (England).
SPECIFIC CHARACTER AND LIMITS OF SOME TECHNIQUES USED FOR THE ANALYSIS OF THIN FILMS
J. C. Pivin Jul. 1985 28 p refs Transl. into ENGLISH from Journal de Microscopie et de Spectroscopie Electroniques, vol. 9, no. 2, 1984 p 75-94
(DRIC-T-7534; BR97251) Avail: NTIS HC A03/MF A01

Spectroscopic techniques for the analysis of composition, electronic structure, short range order, and microstructure of thin films are reviewed. Electron spectrometry; absorption spectrometry; emission spectrometry with ion bombardment; and X-ray diffraction, diffusion, and resonance absorption are considered. Author (ESA)

N86-22658# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
LASER DOPPLER VELOCIMETRY INVESTIGATION OF THE TURBULENCE STRUCTURE OF AXISYMMETRIC DIFFUSION FLAMES
J. P. Sislian, L.-Y. Jiang, and R. A. Cusworth Feb. 1986 132 p refs
(UTIAS-291; ISSN-0082-5255) Avail: NTIS HC A07/MF A01

The influence of the combustion process on the turbulence structure of the combustible jet flow is considered, and data is provided against which results of numerical prediction methods for such flows embodying various turbulence and combustion models can be compared, with a view to improving the understanding of relevant transport processes and on guiding modelling and prediction efforts of such flows. A one dimensional laser velocimeter operating in forward scatter differential Doppler mode was used to obtain the measurements. Gas temperatures were measured by thermocouples. A visual study by schlieren photography was also conducted. It is found that the existence of the flame suppresses turbulence in the upstream region of the jet flow and enhances it in the downstream region, where turbulence intensities are substantially higher than in the corresponding cold jet flow. The combustion process was found to have also a marked influence on the turbulence macroscale. It is significantly smaller than in the cold jet flow in the upstream region and increases appreciably at downstream distances, the rate of this increase closely following the rate of temperature increase. Author

N86-22659# Battelle Columbus Labs., Ohio.
LASER PHOTOCHEMICAL PRODUCTION OF GERMANIUM AND DOPED-GERMANIUM FILMS
A. E. Stanley, R. A. Johnson, A. H. Roberts, and J. B. Turner Sep. 1985 42 p
(Contract DAAG29-81-D-0100)
(AD-A162576; AD-E950772) Avail: NTIS HC A03/MF A01 CSCL

07/5

Germanium and doped-germanium polycrystalline films have been formed using CO2 laser photochemistry. The compounds which were found to be the best candidates for the production of germanium were germane, ethylgermane and diethylgermane. The gas phase reactions were monitored using fourier transform infrared spectroscopy, also used for identification of end products. Scanning electron microscopy was used for analysis of the films. The products identified on irradiation of germane were germanium and hydrogen. Conversion rates on the order of 86% were observed, indicating possible cost savings over thermal processes. On irradiation, both diethylgermane and ethylgermane produce ethylene, germane, germanium and hydrogen. Germanium containing cadmium and aluminum was successfully produced by the irradiation of germane mixtures containing dimethylcadmium or trimethylaluminum respectively. Author (GRA)

N86-22660# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
MECHANISM OF PLUTONIUM METAL DISSOLUTION IN HNO3-HF-N2H4 SOLUTION
D. G. Karraker 1985 11 p refs Presented at ACTINIDES 85, Aix-en-Provence, France, 1 Sep. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001975; DP-MS-85-45; CONF-8509147-10) Avail: NTIS HC A02/MF A01

An oxidation-reduction balance of the products of the dissolution of plutonium metal and alloys in HNO3-HF-N2H4 solution shows that the major reactions during dissolution are the reduction of nitrate to NH3, N2 and N2O by the metal, and the oxidation of H free radicals to NH3 by N2H4. Reactions between HNO3 and N2H4 produce varying amounts of HN3. The reaction rate is greater for delta-Pu than alpha-Pu, and is increased by higher concentrations of HF and HNO3. The low yield of reduced nitrogen species indicates that nitrate is reduced on the metal surface without producing a significant concentration of species that react with N2H4. It is conjectured that intermediate Pu valences and electron transfer within the metal are involved. DOE

N86-22661# California Univ., Berkeley. Lawrence Berkeley Lab.
INTERACTION OF CO MOLECULES WITH EVAPORATED SILVER, GOLD, AND COPPER FILMS: AN INFRARED SPECTROSCOPIC INVESTIGATION USING A THERMAL DETECTION TECHNIQUE
P. Dumas, R. G. Tobin, and P. L. Richards Sep. 1985 9 p Presented at the 6th Vibrations At Surfaces Conference, Bowness-on-Windermere, England, 15 Sep. 1985 Prepared in cooperation with Centre National de la Recherche Scientifique, 94 - Thiais (France)
(Contract DE-AC03-76SF-00098)
(DE86-001987; LBL-19465; CONF-8509183-1) Avail: NTIS HC A02/MF A01

Infrared absorption spectroscopy is used to study the adsorption of CO at low temperatures on evaporated films of silver, gold, and copper as a function of the coverage of CO and the deposition temperature of the metal. For all three metals two distinct adsorption regimes are observed when the cold metal is exposed to CO gas. These regimes arise depending on whether the deposition temperature of the metal (or the highest temperature at which the metal has been annealed) is above or below a threshold temperature. For all three metals, the shift of the vibrational frequency with CO coverage has been analyzed, and the static and dynamic contributions separated. An analysis of infrared intensities and vibrational polarizabilities shows no evidence for any special infrared enhancement analogous to the large enhancement in Raman cross section peculiar to adsorption on rough noble metal films deposited at low temperatures. DOE

N86-22662# Utah Univ., Salt Lake City. Earth Sciences Lab.
PREFERRED METHODS OF ANALYSIS FOR CHEMICAL TRACERS IN MODERATE- AND HIGH-TEMPERATURE GEOTHERMAL ENVIRONMENTS
R. L. Kroneman, K. R. Yorgason, and J. N. Moore Dec. 1984 47 p refs
(Contract DE-AC07-79ID-12079)
(DE86-002008; DOE/ID-12079/128; ESL-84001-TR) Avail: NTIS HC A03/MF A01

This report describes the sampling and analytical techniques used for tracer analysis in the Raft River and East Mesa field tests. The collection procedures and sample preservation techniques, analytical methods and possible sources of contamination or error are discussed in detail. DOE

N86-22663# Notre Dame Univ., Ind.
[ACTIVITIES OF THE RADIATION LABORATORY, UNIVERSITY OF NOTRE DAME] Quarterly Report, 1 Jul. - 30 Sep. 1985
Oct. 1985 55 p
(Contract DE-AC02-76ER-00038)
(DE86-002458; DOE/ER-00038/2773; NDRL-2773) Avail: NTIS HC A04/MF A01

Seventy eight abstracts are presented in the fields of radiation chemistry and photochemistry. In addition, publication, external talks and presentations are listed. DOE

N86-22664# Los Alamos National Lab., N. Mex.
ELECTRONIC STRUCTURE AND REACTIONS OF TRANSITION METAL COMPLEXES USING EFFECTIVE CORE POTENTIALS
P. J. Hay and C. M. Rohlfing 1985 13 p refs Presented at the NATO Conference on Quantum Chemistry: The Challenge of Transition Metals and Coordination Chemistry, Strasbourg, France, 16 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000821; LA-UR-85-3322; CONF-8509184-1) Avail: NTIS HC A02/MF A01

Effective core potentials are employed to study the geometries and binding of the species MCO and M(CO)4 for M=Ni, Pd and Pt, and addition reactions of H2 to W(d(6)) and Pt(d(10)) centers. Moller-Plesset perturbation theory is assessed as a means of incorporating electron correlation effects in transition metal species. DOE

N86-22665# Oak Ridge National Lab., Tenn.
MULTI-COLUMN STEP-GRADIENT CHROMATOGRAPHY SYSTEM FOR AUTOMATED ION EXCHANGE SEPARATIONS
T. L. Rucker 1985 7 p Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002174; CONF-8510151-11) Avail: NTIS HC A02/MF A01

A multi-column step-gradient chromatography system has been designed to perform automated sequential separations of radionuclides by ion exchange chromatography. The system consists of a digital programmer with automatic stream selection valve, two peristaltic pumps, ten columns, and a fraction collector. The automation allows complicated separations of radionuclides to be made with minimal analyst attention and allows for increased productivity and reduced cost of analyses. Results are reported for test separations on mixtures of radionuclides by the system. DOE

N86-22666# Mound Lab., Miamisburg, Ohio.
MOUND ACTIVITIES IN CHEMICAL AND PHYSICAL RESEARCH, JANUARY - JUNE 1985
25 Oct. 1985 25 p
(Contract DE-AC04-76DP-00053)
(DE86-002541; MLM-3305) Avail: NTIS HC A02/MF A01

Additional experiments were run with carbon disulfide in order to further explore the relationship between the isotopic thermal diffusion factor and differences in molecular masses and moments. Experiments with materials at three levels of (34)S enrichment were used to get thermal diffusion factors for four binary molecular pairs, three involving sulfur substitution and one involving carbon substitution. An equation of the same form as that used for substituted benzenes was found to reproduce the data quite closely. The term involving the mass difference was nearly the same as

that for the benzenes. The effect of the second moment, however, was much larger for carbon disulfide. A liquid phase thermal diffusion column with a hot-to-cold wall spacing of 406 (MU)m was assembled and tested for calcium isotope separation. The experiment, which was done with a 36 wt % aqueous calcium nitrate solution, yielded a separation equivalent to a value of 0.150 for the logarithm of the (48)Ca/(40)Ca separation factor. The result is consistent with the value of 0.136 predicted on the basis of earlier experiments with a column having a nominal spacing of 305 (MU)m. Work on calcium isotope enrichment by ion exchange chromatography with a macrocyclic compound was completed. Calcium-crown complexes were found to be present in both fluid and solid phases of the chromatography column. Thermal diffusion factors for equimolar mixtures of neon and argon with carbon dioxide have been measured in the temperature range from 250 to 700 K. The data were obtained in a 20-tube trennschaukel or swing separator.DOE

N86-22667# M L Energia, Inc., Princeton, N.J.
ENHANCEMENT OF PREMIXED H2/AIR FLAMES WITH PHOTOCHEMICALLY PRODUCED RADICALS: ANALYTICAL MODELING
M. Lavid, J. G. Stevens, and C. K. Westbrook Oct. 1985 6 p refs Presented at the Fall Technical Meeting of the Eastern Section of the Combustion Institute: Chemical and Physical Processes in Combustion, Philadelphia, Pa., 4 Nov. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-002602; UCRL-93473; CONF-851133-1) Avail: NTIS HC A02/MF A01

Many combustion applications are presently limited by constraints associated with the combustion process itself, such as flammability, flame propagation, ignition and stability. As part of an Air Force sponsored program, initiation and enhancement of combustion by irradiation of unsensitized fuel-oxidizer mixtures is being investigated at M.L. ENERGIA, Inc. In this paper we report on our continuing analytical findings of radiative enhancement in hydrogen-air mixtures at atmospheric pressure. DOE

N86-22668# New York Univ., New York. Dept. of Chemistry.
PHYSICO-CHEMICAL METHODS FOR THE STUDY OF POLYCYCLIC AROMATIC HYDROCARBON - DNA INTERACTIONS
N. E. Geacintov 28 Oct. 1985 12 p refs
(Contract DE-AC02-78EV-04959)
(DE86-002970; DOE/EV-04959/7) Avail: NTIS HC A02/MF A01

By studying the reaction rate, intercalative noncovalent binding, and covalent binding of benzo(a)pyrene-7,8-diol-9,10-oxide to different synthetic polynucleotides, a deeper understanding of the reaction mechanisms of aromatic diol epoxide carcinogens with DNA has been obtained. Studies on the structures of the covalent adducts provide a good model for the mechanisms of interaction of these carcinogenic and tumorigenic molecules with DNA. DOE

N86-22669# Denver Univ., Colo.
PHOTODEGRADATION INHIBITORS FOR POLYACRYLONITRILE/Ag (PAN/Ag) FILMS Annual Report
C. A. Sergides, A. R. Chughtai, and D. M. Smith Sep. 1985 79 p
(Contract DE-AC02-83CH-10093)
(DE85-016864; SERI/STR-255-2723) Avail: NTIS HC A05/MF A01

Three types of UV stabilizers have been investigated for the photostabilization of PAN/Ag films. First, the effect of UV-absorber stabilizers, like the hydrohybenzophenone derivatives (UVINUL SERIES, BASF) absorbing UV radiation in the same region as PAN, was studied. Such additives generally had little effect, while in some cases, photodegradation of PAN was enhanced because of photosensitization. Second, the effect of quencher stabilizers like nickel chelate complexes (Irgastab 2002, CIBA-GEIGY) on the photodegradation of PAN/Ag films was examined. They resulted in marked decreases in the photodegradation of the polymer. Thirdly, antioxidant stabilizers, such as 2,6-di-tert-butyl-4-methylphenol derivatives (Irganox 1010, CIBA-GEIGY), were studied and also found to have a significant inhibiting effect on the photodegradation of PAN. Increasing the concentration of an effective stabilizer was observed to further decrease the photodegradation. The stabilizer concentration was kept generally low, and a combination of 1% wt antioxidant (Irganox 1010) and 0.5% wt quencher (Irgastab 2002) proved to be optimum. Irganox 1010 and Irgastab 2002 in separate preliminary experiments (in the absence of the polymer) were found to be stable to ultraviolet radiation of air mass one (WG 305). DOE

N86-22670# National Bureau of Standards, Boulder, Colo. Time and Frequency Div.
TRAPPED IONS AND LASER COOLING: SELECTED PUBLICATIONS OF THE ION STORAGE GROUP OF THE TIME AND FREQUENCY DIVISION, NBS, BOULDER, COLORADO
D. J. Wineland, W. M. Itano, J. C. Bergquist, and J. J. Bollinger Jul. 1985 195 p refs Sponsored by ONR and AFOSR
(PB86-110855; NBS-TN-1086) Avail: NTIS HC A09/MF A01; also available from SOD HC as 003-003-02666-2 CSCL 07D

The report contains selected publications of the Ion Storage Group of the Time and Frequency Division, NBS, Boulder, Colorado. Partial contents include: Laser Cooling of Atoms; Spectroscopy of a Single Mg(+) Ion; Laser Cooling of Ions Stored in Harmonic and Penning Traps; Spectroscopy of Stored Ions; Frequency Standard Research Using Stored Ions; Laser-Cooled-Atomic Frequency Standard. GRA

N86-22671# Romicon, Inc., Woburn, Mass.
DEVELOPMENT OF A LOW PRESSURE HOLLOW FIBER REVERSE OSMOSIS MEMBRANE UTILIZING INTERNAL FLOW FOR USE ON A LOW SALINITY WATER Final Report
J. G. Vouros and A. J. Testa 1985 131 p Sponsored in part by Geological Survey, Reston, Va.
(Contract DI-14-34-0001-0445)
Avail: NTIS HC A07/MF A01 CSCL 07A

An acrylic membrane prepared by crosslinking hydroxyethyl methacrylate-methacrylic acid copolymer on a flat sheet microporous support exhibited excellent chlorine resistance, 95% sodium chloride rejection and 20 gal/sq ft -day flux at 250 psi pressure. Polysulfone hollow fibers utilizing internal flow with inside diameters of 1.1 mm have been developed as composite membrane supports to operate continuously at 250 psi pressure. The acrylic thin film composite membrane was deposited on the inside surface of these polysulfone fiber supports and produced a composite membrane that yielded excellent chlorine stability, 70% sodium chloride rejection and 20 gal/sq ft. - day flux at 250 psi operating pressure. This membrane also exhibited cleanability via Romicon's conventional permeate backflushing and reverse flow techniques without experiencing performance degradation. Author (GRA)

N86-22672# Bureau of Mines, Amarillo, Tex. Helium Field Operations.
COMPUTER PROGRAM FOR CALCULATING GRAVIMETRIC PRIMARY STANDARD GAS MISTURES
E. W. Loya 1985 46 p refs
(PB86-127370; BM-IC-9031; LC-85-600064) Avail: NTIS HC A03/MF A01 CSCL 07D

The Bureau of Mines has developed a computer program for calculating the composition of gravimetric primary standard gas mixtures. The FORTRAN IV program applies corrections due to buoyancy variations of the cylinder and inaccuracies of the balance weights. The program also determines the statistical error due to the sensitivity and precision of the balance and applies the analytical error of the weighted gases. Author (GRA)

N86-22673# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CHEMISTRY
5 Feb. 1986 68 p Transl. into ENGLISH from various Russian articles
(JPRS-UCH-86-002) Avail: NTIS HC A04/MF A01

Progress in research and development in chemistry and chemical engineering is reported. The following topics are discussed: adsorption, analytical chemistry, biochemistry, catalysis, chemical industry, coal gasification, explosives and explosions, fertilizers, food technology, inorganic compounds, ion exchange, nitrogen compounds, organometallic compounds, petroleum processing technology, polymers and polymerization, radiation chemistry, rubber and elastomers, and wood chemistry. For individual titles, see N86-22674 through N86-22678.

N86-22674# Joint Publications Research Service, Arlington, Va.
STUDY OF METHAN ADSORPTION ON ETA-Al2O3 BY IR-SPECTROSCOPIC METHOD IN DIFFUSE-SCATTERED LIGHT Abstract Only
I. S. Muzyka, S. A. Zubkov, V. Yu. Borovkov, and V. B. Kazanskiy *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 1 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 2, 1985 p 391-394 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

Reaction of methane (deuteromethane) with the surface of eta-Al2O3 catalyst was studied by IR spectroscopy in diffusely scattered light. Molecular adsorption centers of methane (deuteromethane) and centers of its dissociative adsorption were noted on the surface of the treated eta-Al2O3. Reacting with CO2 molecules, the OH and OD groups converted to surface bicarbonates which are inactive in the H-D exchange with hydrogen and methane. It was shown that varous centers of molecular and dissociative adsorption of methane exist on dehydroxylated surface of Al2O3. The acid-base pairs Al+O- appear to be the centers of molecular adsorption on which the polarization of CH bonds of the adsorbed CH4 molecules takes place. E.A.K.

N86-22675# Joint Publications Research Service, Arlington, Va.
ULTRASOUND-BASED METHOD FOR STUDIES ON COMPRESSION MOLDING KINETICS OF PLASTICS Abstract Only c27
E. A. Tagiyev, Ye. B. Raskin, and M. S. Trizno *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 4 Transl. into ENGLISH from Plasticheskiye Massy (Moscow, USSR), no. 6, 1985 p 60-61 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

Technical details are presented on an ultrasound method to measure the kinetics of compression molding of plastics is presented. The design consists of a standard chamber with a plunger that functions simultaneously as a waveguide. Compression is achieved with a magnetostriction transformer, with a potential difference created by leads imbedded in the plunger and the bottom of the chamber. Changes in the current passing through the plastic material is recorded on an oscillograph. The method allows for continuous monitoring of solidification through the introduction of ultrasonic waves into the compresion zone. E.A.K.

N86-22676# Joint Publications Research Service, Arlington, Va.
APPLICATION OF CHN-2 ANALYZER IN DETERMINATION OF ELEMENTAL COMPOSITION OF ORGANIC POLYMERS Abstract Only c27
Z. N. Zigel, V. M. Ryabikova, O. G. Utkina, and I. T. Korzhova *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 4-5 Transl. into ENGLISH from Plasticheskiye Massy (Moscow, USSR), no. 6, 1985 p 43-45 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

Statistical analysis was conducted on the results of elemental analysis of certain simple and polymeric organic substances, using the CHN-2 analyzer for combustion analysis. Data are presented on the analysis of acetanilide, cystine, phenacetin, polyvinyl chloride, polystyrene, polyethylene, and styrene-acrylonitrile copolymer, giving the arithmetic mean, root mean square error, and precision at 95% reliability limit. The poor reproducibility of the determinations of carbon, hydrogen and nitrogen in the case of the polymers is ascribed to heterogeneous combustion conditions of intermediate, heat stable, low MW compounds. The decomposition of some polymers, is a highly endothermic depolymerization process that in itself limits the degree of combustion of the sample. E.A.K.

N86-22677# Joint Publications Research Service, Arlington, Va.
MANY FACES OF CATALYST
N. Ilinskaya *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 9 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 11 Oct. 1985 p 2 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

The mechanism of catalysis, was studied. It was found that catalysis depends on the concentration of additives and the temperature at which the process takes place. Under certain conditions, an accelerator-additive can act as a catalytic poison. An inhibitor is capable of making a reaction more active. A general theory was formulated which explains this ambiguity. The mechanism by which additives affect the activity of catalysts is explained, and a basis is provided for heightening the selective action of chemical processes. The synthesizing of highly effective catalysts and the development of processes for their production are practical applications of the discovery. E.A.K.

N86-22678# Joint Publications Research Service, Arlington, Va.
STEADY COMBUSTION OF INITIATING EXPLOSIVES AT HIGH PRESSURE Abstract Only
A. Ye. Fogelzang, V. Yu. Yegorshev, A. Yu. Pimenov, V. P. Sinditskiy, A. R. Saklantiy, and B. S. Sverlov *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 19 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 282, no. 6, 1985 p 1449-1452 (For primery document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

The first successful steady combustion of selected initiating explosives was obtained at pressures ranging from 0.1 to 40 MPa, employing a technique designed to yield a pore-free substance to avoid or preclude factors that may lead to convective situations and, thereby, to explosive events. Data are presented on the density, pressure range, rate of combustion, and calculated combustion temperature at 10 MPa for diazodinitrophenol, tricycloacetoneperoxide, hexamethyleneperoxidediamine, tetrazene, and cyanurtriazide. Any initiating explosive can be studied in this manner, with the possible exception of lead azide type-initiating explosives. E.A.K.

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-22679 Iowa State Univ. of Science and Technology, Ames.
A CRACK CLOSURE STUDY ON 2024 T315 ALUMINUM ALLOY BY THE MOIRE METHOD Ph.D. Thesis
Chwei-Goong Tseng 1985 99 p
Avail: Univ. Microfilms Order No. DA8524704

The validity of measuring crack opening displacements by using the high sensitivity Moire interferometry technique was evaluated. The stress intensity factor determination using the crack opening displacements was studied. The data on the crack opening displacement were used to obtain the crack tip opening load of a fatigue crack in an 2024 T351 aluminum alloy compact tension specimen. Near-tip and back-face strain gauges as well as a clip on gauge were employed to record the displacement load curves used to determine the crack-tip-opening load. The results of the crack opening load, as determined from these measurements could be separated into two groups: one was the near-tip locally influenced opening load, the other was the crack face globally influenced opening load. A discussion was given concerning the significance of these results. A residual stress intensity factor was proposed for the fatigue crack specimen. Dissert. Abstr.

N86-22680 Case Western Reserve Univ., Cleveland, Ohio.
STRESS CORROSION CRACKING AND HYDROGEN EMBRIT-

TLEMENT OF FERRITIC STAINLESS STEELS EFFECTS OF THERMOMECHANICAL TREATMENTS Ph.D. Thesis
Rajan Narayana Iyer 1985 162 p
Avail: Univ. Microfilms Order No. DA8525227

The influence of thermomechanical treatments on the stress corrosion crack initiation and hydrogen assisted crack growth of 26Cr-1Mo alloys in boiling 42% LiCl solutions and 5%H2SO4 solutions was investigated using a uniaxial constant load fixture. Annealing at temperatures where only recovery processes operate, reduces the susceptibility of prestrained low interstitial 26Cr-1Mo alloy (E-Brite) to SCC in boiling chloride solutions. Both slip step height and density, which are the major parameters controlling the breakdown of protective films in these alloys, are reduced substantially by annealing near 300 C for 1 hour. Continuous exposure of unfilmed metal to the aggressive environment is provided during SCC due to creep; this causes reduction in overall repassivation rate. Grain coarsening and prestraining operations result in larger slip step height and density due to increase in dislocation density. Dissert. Abstr.

N86-22681 Pittsburgh Univ., Pa.
THE INTERACTIONS BETWEEN EROSION AND OXIDATION OF METALS AT ELEVATED TEMPERATURES Ph.D. Thesis
Chih-Tsung Kang 1985 240 p
Avail: Univ. Microfilms Order No. DA8524837

An apparatus to provide well defined and controlled erosion-oxidation conditions, such as particle loading, velocity, temperature and angle of attack, was designed, constructed and tested. Samples of pure nickel, cobalt and nickel oxide were exposed to a variety of temperatures, velocities and atmospheres. The degradation rate of a sample was monitored by measuring the weight change of the sample and it is shown how such data are related to metal degradation. The surfaces and cross sections of the exposed specimens were examined using optical metallography, scanning electron microscopy with EDS analysis and X-ray diffraction techniques, in order to obtain detailed information about the processes by which materials is removed. It was found that the combined effects of erosion and oxidation are always more severe than either process alone. Three types of interactions between oxidation and erosion were identified. These interactions are discussed and degradation models are developed. By using a computer simulation technique, it was possible to demonstrate that certain commonly observed features are a result of plastic deformation alone and do not require materials removal for their formation Dissert. Abstr.

N86-22682 British Library Lending Div., Boston Spa (England).
MIGRATION OF CARBON IN NICKEL BY DIFFUSION DURING HIGH PRESSURE PULSES
S. V. Zemskii, A. R. Kutsar, E. A. Ryabchikov, and I. Z. Drogoveiko 1985 9 p refs Transl. into ENGLISH from Iz. Vuz Chernaya Metallurgiya (USSR), no. 7, 1985 p 112-116
(BLL-M-36586-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The movement of carbon between two sheets, one containing a carbon isotope and the other not containing it, when high pressures are applied is discussed. Figures are given for the depth to which carbon penetrates into the unmarked sheet. These figures are related to the temperature and pressure. This penetration exceeds the degree to which carbon enters steel under equivalent conditions. The possible mechanisms for this phenomenon are considered. Author

N86-22683# Defence Research Information Centre, Orpington (England).
SHAPE AND DEPTH OF THE CRYSTALLIZATION FRONT IN STEEL INGOTS REMELTED BY THE ELECTROSLAG METHOD DETERMINED WITH THE AID OF RADIOACTIVE PHOSPHORUS
E. Georgescu and A. Benescu Sep. 1985 16 p refs Transl. into ENGLISH from Metalurgia, vol. 35, no. 7, 1983 p 308-312
(DRIC-T-7561; BR97250) Avail: NTIS HC A02/MF A01

Labeling of metallic baths with Cu32p is described. Combined with the autoradiographic method, it is possible to obtain a visual record on special film (on a 1: 1 scale), the shape and dimensions of the solidification front, as well as the direction of growth of the crystals and their dimensions, as a function of the metal remelting and cooling parameters, and hence to study the crystallization mechanism and the types of defects appearing during the solidification process and their causes. The method is also interesting for investigations of a direct applicative nature or for basic research in the field of the solidification of metals and alloys, offering the possibility of directing and controling solidification processes. Author (ESA)

N86-22684# Defence Research Information Centre, Orpington (England).
PREVENTION OF THERMAL FATIGUE IN Cu-BASED SHAPE MEMORY ALLOYS
Y. Ikai and K. Murakami Aug. 1985 8 p refs Transl. into ENGLISH from Kogyo Zairyo, vol. 31, 1984 p 56-57
(DRIC-T-7589; BR97013) Avail: NTIS HC A02/MF A01

The improvement of mechanical properties (elongation to rupture, and mechanical strengths) of copper based shape memory alloys is discussed. The low mechanical properties of copper-based alloys are derived from their coarse grain size, so attempts were made to refine the grain size of the copper alloys by adding 4th and 5th alloying elements. The samples which were successful in grain refining the alloys show a great reduction in time-dependent deterioration of shape memory function and thermal fatigue properties. No solution for time-dependent deterioration is detected. Author (ESA)

N86-22685*# Auburn Univ., Ala.
ON THE DETERMINATION OF THE ORIGIN OF LINEAR ANOMALY IN THE MACROSTRUCTURE OF VPPA WELDED 2219-T87 ALUMINUM ALLOY: PRELIMINARY REPORT
W. A. Jemian Feb. 1986 29 p refs
(Grant NGT-01-008-021)
(NASA-CR-178745; NAS 1.26:178745) Avail: NTIS HC A03/MF A01 CSCL 11F

The cause and significance of the weld radiograph enigma, which is a linear anomaly in the features of the X-ray film is examined. By observing features on available radiographs and in studying published reports of similar features, it was possible to conclude that there are many manifestations of the enigma, and that they are all specific features of fine structure in radiographs due to natural processes connected with welding and to specific X-ray absorption and diffraction phenomena. These processes include the thermal distribution and liquid metal flow in welding, the development of microstructure, morphology, second phase particles and porosity due to the solidification process, and to the pattern of residual stresses after the weld metal has cooled to the ambient temperature. Microdensitometer traces were made across weld radiographs of standard enigmatic types. Similar patterns were produced by computer simulation. These show that the enigma is a relatively low contrast feature compared to real weld defects, such as undercuts or centerline cracks. The enigma can be distinguished from weld defects by these microdensitometer traces. The enigma effect on weld properties is not known but is expected to be minor. Author

N86-22686*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INFLUENCE OF FATIGUE CRACK WAKE LENGTH AND STATE OF STRESS ON CRACK CLOSURE
Jack Telesman and Douglas M. Fisher 1986 27 p refs Presented at the International Symposium on Fatigue Crack Closure, 1-2 May 1986; sponsored by the American Society for Testing and Materials
(NASA-TM-87292; E-2999; NAS 1.15:87292) Avail: NTIS HC A03/MF A01 CSCL 11F

The location of crack closure with respect to crack wake and specimen thickness under different loading conditions was determined. The rate of increase of K sub CL in the crack wake was found to be significantly higher for plasticity induced closure

in comparison to roughness induced closure. Roughness induced closure was uniform throughout the thickness of the specimen while plasticity induced closure levels were 50 percent higher in the near surface region than in the midthickness. The influence of state of stress on low-high load interaction effects was also examined. Load interaction effects differed depending upon the state of stress and were explained in terms of delta K sub eff.
Author

N86-22687*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CERAMIC THERMAL BARRIER COATINGS FOR ELECTRIC UTILITY GAS TURBINE ENGINES
Robert A. Miller 1986 15 p refs Presented at the 3rd Berkeley Conference on Corrosion, Erosion, and Wear of Materials, Berkeley, Calif., 29-31 Jan. 1986; sponsored by the National Association of Corrosion Engineers
(NASA-TM-87288; E-2994; NAS 1.15:87288) Avail: NTIS HC A02/MF A01 CSCL 11F

Research and development into thermal barrier coatings for electric utility gas turbine engines is reviewed critically. The type of coating systems developed for aircraft applications are found to be preferred for clear fuel electric utility applications. These coating systems consists of a layer of plasma sprayed zirconia-yttria ceramic over a layer of MCrAly bond coat. They are not recommended for use when molten salts are presented. Efforts to understand coating degradation in dirty environments and to develop corrosion resistant thermal barrier coatings are discussed.
Author

N86-22688*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
HIGH TEMPERATURE DISPERSION STRENGTHENING OF NiAl Final Report
Mark Sherman and Krishna Vedula Mar. 1986 15 p refs
(Grant NAG3-387)
(NASA-CR-175073; NAS 1.26:175073) Avail: NTIS HC A02/MF A01 CSCL 11F

A potential high temperature strengthening mechanism for alloys based on the intermetallic compound NiAl was investigated. This study forms part of an overall program at NASA Lewis Research Center for exploring the potential of alloys based on NiAl for high temperature applications. An alloy containing 2.26 at% Nb and produced by hot extrusion of blended powders was examined in detail using optical and electron microscopy. Interdiffusion between the blended Nb and NiAl powders results in the formation of intermediate phases. A fine dispersion of precipitates of a hexagonal, ordered NiAlNb phases in a matrix of NiAl can be produced and this results in strengthening of the alloy by interfering with dislocation motion at high temperature. These precipitates are, however, found to coarsen during the high temperature (1300 K) deformation at slow strain rates and this may impose some limitatioins on the use of this strengthening mechanism.
Author

N86-22689*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CORROSION FATIGUE OF 2219-T87 ALUMINUM ALLOY
Vernotto C. McMillan Feb. 1986 20 p
(NASA-TM-86537; NAS 1.15:86537) Avail: NTIS HC A02/MF A01 CSCL 11F

Corrosion fatigue studies were conducted on bare, chemical conversion coated, and anodized 2219-T87 aluminum alloy. These tests were performed using a rotating beam machine running at a velocity of 2500 rpm. The corrosive environments tested were distilled water, 100 ppm NaCl, and 3.5 percent NaCl. Results were compared to the endurance limit in air. An evaluation of the effect of protective coatings on corrosion fatigue was made by comparing the fatigue properties of specimens with coatings to those without.
Author

N86-22690# Denver Univ., Colo. Dept. of Physics.
HYDROGEN-INDUCED CRACKING IN PURE IRON
J. H. Armstrong and S. H. Carpenter 1985 5 p Presented at the Conference on Internal Friction and Ultrasonic Attenuation in Solids, Urbana, Ill., 3 Jun. 1985
(Contract DE-AC02-81ER-10958)
(DE86-002078; CONF-8506125-11) Avail: NTIS HC A02/MF A01

The modulus and internal friction of Armco iron were continuously measured during cathodic charging with hydrogen to investigate crack initiation and growth. The observed modulus decrease was attributed to crack initiation and growth. The internal friction increase during cathodic charging was attributed to plastic deformation accompanying the crack formation. Both the modulus and internal friction behavior were found to be a sum of two parallel exponential processes. The two exponential processes were consistent with different sources of carbon for the crack-producing hydrogen bubble nucleation.
DOE

N86-22691# Sandia National Labs., Albuquerque, N. Mex.
ANALYSIS OF FIVE-FOLD SYMMETRY BY MICROTWINNING IN RAPIDLY SOLIDIFIED Al-Mn ALLOYS
M. J. Carr Oct. 1985 24 p
(Contract DE-AC04-76DP-00789)
(DE86-002636; SAND-85-1872) Avail: NTIS HC A02/MF A01

The properties of small ensembles of cyclically twinned, rhombohedrally distorted face centered cubic crystals are examined and shown to be consistent with reported experimentally determined diffraction patterns and images of rapidly solidified Al-Mn alloys exhibiting icosahedral symmetry. Limitations of previously reported refutations of twinning models are discussed. Proposals are made for definitive tests between microtwinning and quasicrystalline models of these structures.
DOE

N86-22692# Argonne National Lab., Ill.
FREEZING CONTROLLED PENETRATION OF MOLTEN METALS FLOWING THROUGH STAINLESS STEEL TUBES
J. J. Sienicki, B. W. Spencer, D. L. Vetter, and R. H. Wesel 1985 11 p refs Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018394; CONF-850810-28) Avail: NTIS HC A02/MF A01

The freezing controlled penetration potential of molten metals flowing within stainless steel structure is important to the safety assessment of hypothetical severe accidents in liquid metal reactors. A series of scoping experiments has been performed in which molten stainless steel and nickel at various initial temperatures and driving pressures were injected downward and upward into 6.4 and 3.3 mm ID stainless steel tubes filled with argon gas and initially at room temperature. In all tests, there was no evidence that the solid tube wall was wetted by the molten metals. The penetration phenomena are markedly different for downward versus upward injections. The dependency upon tube orientation is explained in terms of the absence of wetting. Complete plugs were formed in all experiments halting the continued injection of melt. Calculations with a fluid dynamics/heat transfer computer code show that the injected masses limited by plugging are consistent with freezing through the growth of a stable solidified layer (crust) of metal upon the solid tube wall.
DOE

N86-22693# Argonne National Lab., Ill.
MECHANISTIC MODELING OF ZIRCALOY DEFORMATION AND FRACTURE IN FUEL ELEMENT ANALYSIS
F. A. Nichols Jun. 1985 31 p refs Presented at the 7th International Conference on Zirconium in the Nuclear Industry, Strasbourg, France, 24 Jun. 1985
(Contract W-31-109-eng-38)
(DE85-018415; CONF-850601-3) Avail: NTIS HC A03/MF A01

The comprehensive model developed in the 1960's at the Bettis Atomic Power Laboratory to explain the creep of Zircaloy during neutron irradiation and applied to fuel element analysis and design is discussed. The in-pile softening observed at low stresses was hypothesized to be due to a combination of the growth-directed Roberts-Cottrell yielding creep originally proposed for (ALPHA)-uranium and the formation of point defect loops

preferentially on certain planes in response to the applied stress, with the second process being of relatively greater importance. The in-pile hardening observed at high stresses (or strain-rates) was proposed to be due to the cutting by dislocations of radiation-produced obstacles. In this stress (strain-rate) region, in-pile behavior was proposed to be identical to post-irradiation behavior. At intermediate stresses (strain-rates) a mechanism of radiation-enhanced climb around obstacles was suggested as being rate controlling. As the stress is decreased, the climb process becomes easier and the rate was then predicted to be controlled by glide at a flow stress characteristic of unirradiated, annealed material, where radiation-enhanced diffusion enabled climbing around the normal strain-hardening obstacles. DOE

N86-22694# Argonne National Lab., Ill.
PREPARATION AND SOME PROPERTIES OF Cu-Li ALLOYS CONTAINING UP TO 20 AT. PERCENT Li
M. Mendelsohn, A. R. Krauss, and D. M. Gruen 1985 9 p Presented at the ASM Metals Congress - International Conference on Surface Modifications, Toronto, Ontario, Canada, 13 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-001786; CONF-8510160-4) Avail: NTIS HC A02/MF A01

Lithium strongly segregates to the surface of Cu-Li alloys, thus substantially lowering the Cu sputtering yield relative to pure Cu. Use of Cu-Li limiters or divertors in tokamaks can therefore be expected to be beneficial in limiting high-Z plasma impurity influx. A large scale (100 to 200 g) method for the preparation of Cu-Li alloys is described. Analysis reveals that on solidification from the melt stratification occurs which leads to compositional inhomogeneity. The results are discussed in the light of the Cu-Li binary phase diagram and rationalized on the basis of large density differences between Cu and Cu-Li solid solutions. It is concluded that obtaining homogeneous Cu-Li solid solutions is a nontrivial task. DOE

N86-22695# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
EFFECT OF POINT DEFECTS ON MECHANICAL PROPERTIES OF METALS Final Report
M. Meshii Oct. 1985 23 p
(Contract DE-AC02-76ER-01367)
(DE86-001882; DOE/ER-01367/160) Avail: NTIS HC A02/MF A01

The effects of hydrogen on plastic deformation, fracture and microstructure of iron; the effects of irradiation and solutes in flow stress of Nb single crystals; and surface film softening are discussed. DOE

N86-22696# California Univ., Berkeley. Lawrence Berkeley Lab.
PRESSURE DEPENDENCE OF THE SPECIFIC HEAT OF CeAl3
G. E. Brodale, R. A. Fisher, N. E. Phillips, J. Flouquet, and C. Marcenat Aug. 1985 13 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Centre National de la Recherche Scientifique, Grenoble, France
(Contract DE-AC03-76SF-00098)
(DE86-001990; LBL-20219; CONF-850890-20) Avail: NTIS HC A02/MF A01

The specific heat (C) of the heavy-fermion compound CeAl3 has been measured between 0.3 and 20(0)K at pressures to 8.2 kbar. A very strong and nonlinear dependence of C on pressure is observed. The maximum in C/T, which is a prominent feature of zero pressure measurements, disappears under pressure. DOE

N86-22697# Oak Ridge National Lab., Tenn.
EVALUATION OF ELECTROSLAG CASTINGS
R. R. Judkins and V. K. Sikka 1985 25 p Presented at the Workshop on Electroslag Processing for Marine Applications, Annapolis, Md., 5 Mar. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002210; CONF-8503188-1) Avail: NTIS HC A02/MF A01

Results of evaluations of electroslag castings of ferritic (2-1/4 Cr-1 Mo and 9 Cr-1 Mo) and austenitic (CF8M or type 316) steels are presented. The castings have been characterized for surface finish, cracking, solidification structure, chemical composition, hardness, ferrite distribution, tensile properties, Charpy impact properties, and creep properties. Pertinent data are compared with equivalent data for sand castings and wrought products of the same materials. Based on the results of these studies, the properties of electroslag castings compare favorably with those of sand castings and wrought materials. DOE

N86-22698# Oak Ridge National Lab., Tenn.
THERMAL ANNEALING OF VACANCY AND INTERSTITIAL LOOPS IN ION IRRADIATED COPPER
B. C. Larson, T. S. Noggle, and J. F. Barhorst Jan. 1985 7 p Presented at the Materials Research Society Annual Meeting, Boston, Mass., 26 Nov. 1984 Prepared in cooperation with Emerson Electric Co., St. Charles, Mo.
(Contract DE-AC05-84OR-21400)
(DE86-002272; CONF-841157-99) Avail: NTIS HC A02/MF A01

X-ray diffuse scattering has been used to study the thermal annealing of vacancy and interstitial loops in Ni-ion irradiated copper. The diffuse scattering formalism is reviewed and diffuse scattering measurements are reported on liquid-He temperature Ni-ion irradiated copper after annealing to 40, 275, and 300(0)C. Size distributions are presented for vacancy and interstitial loops after each anneal and the thermal-induced changes are discussed in terms of loop dissolution and coalescence. DOE

N86-22699# Massachusetts Inst. of Tech., Cambridge. Nuclear Reactor Lab.
ADIP RESEARCH AT MIT Status Report
N. J. Grant and O. K. Harling Sep. 1985 40 p
(Contract DE-AC02-78ER-10107)
(DE86-002585; DOE/ER-10107/29; MITNRL-014) Avail: NTIS HC A03/MF A01

This report emphasizes the progress made in the project period January to September 1985 in the areas of ferritic alloy development, copper alloy irradiation, and austenitic alloy irradiation. The progress described is also placed in the context of work done in previous project periods, giving a concise summary of the achievements made in these three areas. A summary of the status of the MIT miniature disk bend test is also given. DOE

N86-22700# Purdue Univ., Hammond, Ind.
MATRIX RESEARCH GROUP FOR MATERIALS RESEARCH UTILIZING NSLS Progress Report
G. L. Liedl Aug. 1985 23 p
(Contract DE-FG02-85ER-45183)
(DE86-002586; DOE/ER-45183/1) Avail: NTIS HC A02/MF A01

MATRIX is a group of scientists from nine institutions who have common interests in utilizing X-ray synchrotron radiation for materials research. This group has available to it a specialized beam line for a wide range of X-ray scattering studies at the National Light Synchrotron Source (NSLS). In the development of this beam line the MATRIX group was a leader in all phases of beam line development. During the past year, MATRIX completed the first operational X-ray scattering beam line at NSLS. In addition, the first X-ray scattering experiment at NSLS was conducted on this beam line. In the past year, eight publications have resulted from the MATRIX supported efforts. Among these publications are four studies related to the beam line development and characteristics. The other publications are research projects of preliminary studies for work at NSLS and include projects on catalysts and phase transformations. Full operational schedules covering the remainder of the calendar year for the beam line were initiated in June 1985. In addition to the first completed project on Diffraction Studies of Langmuir-Blodgett Films, a number of projects on phase transformations, surface studies, catalysts, and electronic materials are in progress. DOE

N86-22701# Lawrence Livermore National Lab., Calif.
THE (57)Fe MAGNETIC HYPERFINE FIELD IN Au-Fe ALLOYS (EVIDENCE FAVORING THE TWO Fe-ENVIRONMENT MODEL OF Au-Fe ALLOYS)

C. E. Violet, S. P. Verrill, D. J. Balaban, and R. J. Borg Sep. 1985 6 p Presented at the International Conference on Applications of the Mossbauer Effect, Leuven, Belgium, 16 Sep. 1985
(Contract W-7405-eng-48)
(DE86-002599; UCRL-93383; CONF-8509193-1) Avail: NTIS HC A02/MF A01

The results of analysis strongly support the two Fe environment hypothesis. The critical concentration at about 12 at. % suggests that the dependence of H(O, x) on x undergoes a fundamental change at this concentration. Furthermore, the so-called critical concentration at about 17 at. % apparently has little to do with any fundamental alloy property. Rather, it reflects the 12 at. % critical composition when properties are analyzed in terms of the average rather than the local Fe concentration. The two Fe environments appear to have differing configurations. DOE

N86-22702# Hanford Engineering Development Lab., Richland, Wash.
SENSITIZATION OF PARKER FITTINGS
W. W. Wilber Sep. 1985 8 p
(Contract DE-AC06-76FF-02170)
(DE85-018506; HEDL-7553) Avail: NTIS HC A02/MF A01

At your request, ferrules from 316 SS Parker-Hannifen compression fittings at the FFTF have been examined and evaluated to determine the metallurgical condition as related to carbide precipitation in grain boundaries (known as sensitization) and the implications this may have with regard to corrosion resistance. To accomplish this, two ferrules from new stock, two ferrules from old stock and two ferrules that had seen service were examined metallurgically. The samples were prepared for optical metallography. They were viewed in both the etched and unetched condition and analyzed on the scanning electron microscope (SEM) for elemental content. It was confirmed that the ferrules from new stock had a 5 mil thick nitrided layer on the ferrule ID at the lead end and that the 316 SS ferrule material was in the sensitized condition, indicating low resistance to aqueous corrosion. The material from old stock had no nitride layer but was in the sensitized condition indicating low resistance to aqueous corrosion. The ferrules that had seen service had not been nitrided and were not sensitized indicating high resistance to aqueous corrosion. DOE

N86-22703# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
FIELD EXPERIMENT TO PARTITION THE EFFECTS OF DRY AND WET DEPOSITION ON METALLIC MATERIALS
J. W. Spence, F. H. Haynie, E. O. Edney, and D. C. Stiles Sep. 1985 12 p
(PB86-100757; EPA-600/D-85-198) Avail: NTIS HC A02/MF A01 CSCL 11F

At a material exposure site located at the Research Triangle Park, N.C., the Environmental Protection Agency began in 1982 a study to partition the effects of dry and wet deposition on galvanized and weathering steel panels. At the site, air quality and meteorological parameters are continuously measured and reported as hourly averages. The concentration and chemistry of particles and the amount of rainfall and chemistry are also recorded. In this study a mobile device covers a set of panels only during each rain event. Another set of panels is exposed uncovered at the site. The panels are exposed and cleaned according to standard ASTM procedures. After two years of exposure the weight-loss of the galvanized steel for the uncovered exposure was nearly twice the weight-loss recorded for the covered condition. GRA

N86-22704# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
BRONZE, ZINC, ALUMINUM, GALVANIZED STEEL: CORROSION RATES AS A FUNCTION OF SPACE AND TIME OVER THE UNITED STATES
D. E. Patterson, R. B. Husar, and E. Escalante Sep. 1985 13 p refs
(PB86-102605; EPA-600/D-85-213) Avail: NTIS HC A02/MF A01 CSCL 11F

A data base of existing metal corrosion data has been compiled by the National Bureau of Standards. The data base contains only exposure studies that were conducted according to standard ASTM procedures and had adequate documentation of the site characteristics and period of exposure. The report presents work conducted at Washington University to examine the exposure data for evidence of key features which may clarify the likely importance of man-made pollutants on the corrosion of metals. GRA

N86-22705# Bureau of Mines, Avondale, Md.
METALLURGICAL EFFECTS OF IMPURITIES IN RECYCLED COPPER ALLOYS
H. V. Makar and W. D. Riley 1985 26 p
(PB86-126398; BM-IC-9033; LC-85-600046) Avail: NTIS HC A03/MF A01 CSCL 11F

As part of a continuing research program for conserving domestic mineral resources, the Bureau of Mines is investigating new and improved scrap identification techniques to improve sorted mixed scrap purity. This report focuses on various classes of wrought and cast copper alloys produced with recycled scrap. Based on a survey of the literature, principal alloys, such as the brasses and bronzes, are examined with respect to impurity elements and their effects on metallurgical behavior. Effects of elements such as lead, antimony, iron, chromium, and aluminum are discussed. The metallurgical effects described include hot shortness, fire cracking, and undesirable phase transformations. Author (GRA)

N86-22605# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials Section.
THE DEGRADATION OF METAL SURFACES BY ATOMIC OXYGEN
A. deRooy *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 99-108 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22616# Alcan International Ltd., London (England).
THE DEVELOPMENT OF ALUMINUM-LITHIUM ALLOYS FOR AEROSPACE APPLICATIONS
A. J. Cornish, A. Gray, W. S. Miller, and M. A. Reynolds *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 195-201 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-22706 Duke Univ., Durham, N. C.
STRESS-ASSISTED DIFFUSION IN SILICON Ph.D. Thesis
Michael Lee Manda 1985 204 p
Avail: Univ. Microfilms Order No. DA8523038

Anomalous diffusion behavior of substitional impurities in silicon under thin oxide or nitride films, near mask edges, and in the presence of lattice misfit may be attributable to stresses induced in the silicon wafer by these structures. The role of these process-induced stresses in B and As diffusion was investigated by performing diffusions in samples of ion implanted silicon subjected to 3-point bending. At stresses near the silicon yield stress, no significant enhancement or retardation of B and As diffusion was observed over impurity implant doses ranging from 10 to the 13th power to 10 to the 15th power/cm and annealing temperatures between 800 C and 1050 C. This was true even in plastically deformed samples with dislocation densities exceeding 1,000,000/cm. These results are consistent with both the multiple-charge-state-vacancy model and the activation volume model of

impurity diffusion in the presence of stress. Impurity diffusivities were calculated from concentration versus depth profiles, determined y SIMS analysis, by using a spreading Gaussian technique. The temperature variation of arsenic diffusivity agreed well with accepted values. Low dose boron diffusion, however, was best described by an activation energy of 2.65 + or - .13 eV, in contrast with the 3.46 eV activation energy obtained by most researchers. Dissert. Abstr.

N86-22707 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ROLE OF CRACKS IN CREEP OF BRITTLE, POLYCRYSTALLINE, STRUCTURAL CERAMICS Ph.D. Thesis
Anuradha Venkateswaran 1985 180 p
Avail: Univ. Microfilms Order No. DA8521365

An analytical study was conducted of the effect of cracks on creep of polycrystalline, brittle structural ceramics. Two independent mechanisms of contribution of cracks were defined. The mechanism of elastic creep by crack growth represents the rate of increase in strain, with time, resulting from the time-dependent decrease in elastic moduli of the material, due to crack growth. The mechanism of crack-enhanced creep provides a measure of the increase in creep rate over that in an identical but crack free material, due to the local stress field associated with the cracks and the resultant transfer of stress to the adjacent, crack-free material. Creep rates due to these mechanisms were quantified for simple crack geometries. It was shown that the contribution of cracks can result in an idealized 4-stage creep curve for a brittle polycrystalline ceramic, in contrast to the conventional 3-stage creep curve for metals. A simple model was presented for the effect of cracks on creep rate in bending, based on the time-rate of change of curvature of a bend specimen. Analysis of the effect of cracks on creep was extended to a general state of multiaxial stress, through matrix formulation of stress, creep rate and creep compliance tensors. Dissert. Abstr.

N86-22708 British Library Lending Div., Boston Spa (England).
CHROMIUM CARBIDE COATING OF KNT-16 TUNGSTEN-FREE HARD METAL ALLOY
I. Yu. Konyashin, V. I. Kostikov, I. V. Naratovskii, and A. I. Matlakhov 1985 6 p refs Transl. into ENGLISH from Iz. Vuz Chernaya Metallurgiya (USSR), no. 7, 1985 p 116-118
(BLL-M-36587-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Trials with tool inserts of hard metal coated by vapor phase deposition of chromium carbide are described. The inserts were tested in simple turning tests and gave much longer tool lives to a preset degree of wear on the flank face. The optimum coating thickness was found to be 6 to 9 microns. Author

N86-22709 British Library Lending Div., Boston Spa (England).
ACCELERATING THE PROCESS OF APPLYING MULTI-LAYER COATINGS TO WIRE
V. Sh. Pavlyutenkova and E. M. Romanova 1985 6 p ref Transl. into ENGLISH from Stal. (USSR), no. 7, 1985 p 61-62
(BLL-M-36571-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

A method of applying multiple copper-nickel coatings to wire is described. The final electrolyte includes nickel sulphamate. The coating sequence and application conditions are given. Accelerated corrosion tests on the wire have provided good results, and tests under natural conditions have shown it to have long life. Author

N86-22710# Imperial Coll. of Science and Technology, London (England). Tribology Section.
PHOSPHORUS ANTI-WEAR ADDITIVES IN HELICOPTER TRANSMISSIONS Final Report
I. N. Lacey, H. A. Spikes, and P. B. Macpherson Jun. 1985 85 p refs
(Contract MOD(RAE)-A12/1664)
(IC-TS015/85; BR96206) Avail: NTIS HC A05/MF A01

The action on helicopter transmissions of phosphonate ester antiwear additives was studied. It is shown that these additives form thick, polymeric films on rolling and rolling-sliding steel surfaces, and these films are able to greatly increase surface separation above that produced by normal elastohydrodynamic lubrication. Author (ESA)

N86-22711# Defence Research Information Centre, Orpington (England).
WATER-SOLUBLE HIGH POLYMERS AS FLOW ENHANCERS
Werner Interthal Jun. 1985 45 p refs Transl. into ENGLISH from Die Angewandte Makromolekular Chemie, vol. 123/124, 1984 p 387-417
(DRIC-T-7520; BR96257) Avail: NTIS HC A03/MF A01

The hydrodynamics of flow enhancement are modelled in terms of the uncoiling of the polymer molecules under longitudinal velocity gradients in turbulent boundary flow. Specifications can be derived for candidate molecules in terms of molecular weight, conformation linearity, and electrical charge distribution. Potential industrial applications are considered, giving hydrotransport of sand as an example. Author (ESA)

N86-22712# Defence Research Information Centre, Orpington (England).
THE SURFACE ROUGHNESS OF STRUCTURAL THERMOPLASTIC MOULDINGS
Jozef Koszkul Sep. 1985 9 p refs Transl. into ENGLISH from Polimery - Tworzywa Wielkoczasteczkowe, vol. 28. no. 6, 1983 p 277-279
(DRIC-T-7572; BR97169) Avail: NTIS HC A02/MF A01

The influence of the injection molding conditions and the roughness of the mold cavity on the roughness of moldings was tested. Results show that the greatest influence on the surface roughness of moldings is exerted by roughness of the mold cavity and the injection temperature. The influence of the injection pressure is less important. An increase in the roughness of the mold cavity causes an increase in the roughness of the molding surface, while an increase in the injection temperature and pressure causes a decrease in it. It is shown that it is possible to write the relationship between the surface roughness of moldings and the injection temperature and pressure as mathematical formulas constituting the result of tests performed according to the statistical multifactorial method of planning of experiments. Author (ESA)

N86-22713*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT Annual Report
Keith D. Sheffler and Jeanine T. DeMasi Nov. 1985 92 p refs (Contract NAS3-23944)
(NASA-CR-175087; NAS 1.26:175087; AR-1) Avail: NTIS HC A05/MF A01 CSCL 11G

A methodology was established to predict thermal barrier coating life in an environment simulative of that experienced by gas turbine airfoils. Specifically, work is being conducted to determine failure modes of thermal barrier coatings in the aircraft engine environment. Analytical studies coupled with appropriate physical and mechanical property determinations are being employed to derive coating life prediction model(s) on the important failure mode(s). An initial review of experimental and flight service components indicates that the predominant mode of TBC failure involves thermomechanical spallation of the ceramic coating layer. This ceramic spallation involves the formation of a dominant crack in the ceramic coating parallel to and closely adjacent to the metal-ceramic interface. Initial results from a laboratory test program designed to study the influence of various driving forces such as temperature, thermal cycle frequency, environment, and coating thickness, on ceramic coating spalling life suggest that bond coat oxidation damage at the metal-ceramic interface contributes significantly to thermomechanical cracking in the ceramic layer. Low cycle rate furnace testing in air and in argon clearly shows a dramatic increase of spalling life in the non-oxidizing environments. Author

N86-22714# Rutgers - The State Univ., Piscataway, N. J. High Pressure Materials Research Lab.

MEMORY BEHAVIOR OF AN ELASTOMERIC GLASS BY PRESSURE- AND TEMPERATURE-PERTURBATION METHODS
J. Vijayan and K. D. Pae 10 Dec. 1985 19 p
(Contract N00014-82-K-0608)
(AD-A162597; TR-6) Avail: NTIS HC A02/MF A01 CSCL 11/10

The memory behavior of structural relaxation of glass of Solithane 113 - a polyurethane elastomer, by pressure perturbation and also by temperature perturbation from an original state of pressure and temperature (P,T) of 2.5 KBar and 15 C, is reported. The Young's modulus, obtained from the compressive stress-strain curves of the glassy samples, is used as a parameter to study its aging behavior. The liquid samples were transformed to a glass at a fixed point 2.0 KBar and 15 C. They were subjected to different hydrostatic pressure levels above 2.5 KBar, viz., 3.0, 4.0 and 4.5 KBar at 15 C and held at those pressure levels for 10 hours. The pressure was released to 2.5 KBar and the samples were then tested in compression after different aging time. Temperature perturbation experiments were carried out similarly, i.e., the samples at 2.5 KBar were initially annealed for 10 hours at lower temperatures, viz., 10 C, 5 C and 0 C, heated back to 15 C and then tested after different aging time. In both cases, the perturbed glass shows higher initial Young's modulus than that of unperturbed glass, followed by gradual decrease with aging time. All relaxation curves trace eventually back to the unperturbed with longer aging time. The higher the perturbation, the shorter it takes to trace back to the unperturbed. GRA

N86-22715# Lawrence Livermore National Lab., Calif.
PROGRESS IN DEVELOPMENT OF LOW DENSITY POLYMER FOAMS FOR THE ICF PROGRAM
S. A. Letts, L. M. Lucht, R. J. Morgan, R. C. Cook, T. M. Tillotson, M. B. Mercer, and D. E. Miller 10 Jun. 1985 40 p
(Contract W-7405-eng-48)
(DE86-001928; UCID-20537) Avail: NTIS HC A03/MF A01

The status of CH foam development with densities of 50 mg/ccs and cell sizes of 1 micron for the ICF Program is described. Two approaches that both involve polymer phase separation are being investigated. The first involves a gelation-crystallization of high molecular weight polyethylene from solution, whereas the second approach involves the modification of the phase separation morphology of water-styrene emulsions by molecularly-tailored surfactants followed by polymerization of the continuous styrene phase. DOE

N86-22716# Oak Ridge National Lab., Tenn.
HIGH TEMPERATURE THERMAL CONDUCTIVITY OF A FIBROUS ALUMINA CERAMIC
R. E. Pawel, D. L. McElroy, F. J. Weaver, and R. S. Graves 31 Jul. 1985 26 p
(Contract W-7405-eng-48)
(DE86-002487; UCID-20551) Avail: NTIS HC A03/MF A01

Steady-state thermal conductivity measurements on a fibrous alumina specimen were made in neon and nitrogen gases at reduced pressures at temperatures from 400 to 1200 K. A radial heat flow apparatus was employed. A simplified parallel-series model for heat transport in a two-phase material was used to construct a functional representation for the thermal conductivity by means of standard curve-fitting procedures. These analyses defined the relative importance of the solid, gas, and radiative properties to the transport of heat in this material, and served as a basis for tentative extrapolations outside the range of our available data. DOE

N86-22717# Sandia National Labs., Albuquerque, N. Mex.
EVALUATION OF A NEW REMOVABLE ENCAPSULANT, MICROLITE 206
H. W. Arris Oct. 1985 18 p
(Contract DE-AC04-76DP-00789)
(DE86-002637; SAND-85-0979) Avail: NTIS HC A02/MF A01

Solvent removable bead foam encapsulants have been developed to provide a rework capability for complex and expensive weapon hardware. Recently, a new bead foam product, Microlite 206, became commercially available; this material is being considered as a removable encapsulant. Microlite 206 is a copolymer of vinylidene the same as polystryrene bead foams. Characterization studies indicated Microlite 206 has similar mechanical properties compared to polystyrene bead foams at equivalent densities; however, it was found to be incompatible with certain metals such as silver and copper. Since these metals are an integral part of most electronic components, the use of Microlite 206 as an encapsulant would not be recommended. Yet, for select applications Microlite 206 may be a satisfactory substitute for polystyrene bead foam. DOE

N86-22718# Sandia National Labs., Albuquerque, N. Mex.
MECHANICAL PROPERTIES OF AN ALUMINUM-FILLED EPOXY
W. A. Olsson and A. K. Jones Nov. 1985 23 p
(Contract DE-AC04-76DP-00789)
(DE86-003963; SAND-85-2133) Avail: NTIS HC A02/MF A01

A mechanical testing program has been carried out on an aluminum-filled epoxy. This material is used in the construction of stress gages that are used near underground explosions. The properties are needed to properly calibrate the gages. The block from which the test samples were taken was characterized by measuring density and ultrasonic compressional and shear wave velocities. Test types included hydrostatic compression, triaxial compression, uniaxial strain loading followed by uniaxial strain unloading, and uniaxial strain loading followed by biaxial unloading. The highest confining pressures reached were in the neighborhood of 700 MPa. The material was found to be nonlinear over the entire range of each of the investigated variables. The stress-strain response can be classified as nonlinear, plastic-hardening; there is no definite yield point. Hardening rates increase with increasing confining pressure. DOE

N86-22719# Lawrence Livermore National Lab., Calif.
VISCOELASTIC AND AGING CHARACTERISTICS OF POLYMER
W. W. Feng 1985 4 p Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE85-016083; UCRL-90085; CONF-850942-28) Avail: NTIS HC A02/MF A01

Study of mechanics for polymeric materials must consider both geometric and material nonlinearities. The additional viscoelastic and aging effects make the analytical study very difficult. In this paper, the viscoelastic effect of polymers subjected to simple extension is presented. The constitutive equation developed by Christensen is used. With two more material property functions, the constitutive equation is extended to include the aging effect of polymers. In experiments, the relaxation data for both unaged and aged specimens are obtained. Based on the formulation and test data, the viscoelastic and aging material properties are determined. DOE

N86-22720# Idaho National Engineering Lab., Idaho Falls.
INORGANIC MEMBRANE TECHNOLOGY
R. R. McCaffrey, R. E. McAtee, A. E. Grey, C. A. Allen, A. D. Appelhans, R. B. Wright, and J. G. Jolley 1985 21 p Presented at the 4th Symposium on Separation Science and Technology for Energy Applications, Knoxville, Tenn., 20 Oct. 1985
(Contract DE-AC07-76ID-01570)
(DE86-002313; EGG-M-04585; CONF-851011-4) Avail: NTIS HC A02/MF A01

The objective of this program is to develop a variety of inorganic based high temperature separation membranes. Organic membranes are limited by temperature (100 C) environments, and would be unsuitable for high temperature applications. The higher temperature stabilities of inorganic materials make them ideal candidates for high temperature membrane applications. Inorganic polymer materials, such as the polyphosphazenes, are being examined for mid-temperature membrane separation applications (100 C) to 350 C) Metallic and ceramic membrane materials are being examined for high temperature separation applications 350 C

to 1000 C). The liquid and gas membrane test systems developed for this program are described. Preliminary results on the separation properties of poly bis- (2,2,2 trifluoroethoxy) phosphazene membranes are reported for dilute aqueous methanol, ethanol, isopropanol, and phenol feedstreams. DOE

N86-22721# Sandia National Labs., Albuquerque, N. Mex.
MEASUREMENT OF MELT AND SOLIDIFICATION DYNAMICS DURING PULSED LASER IRRADIATION
P. S. Peercy 1985 58 p Presented at the NATO Advanced Study Institute, San Miniato, Italy, 2 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002589; SAND-85-1349C; CONF-8509150-2) Avail: NTIS HC A04/MF A01

Simultaneous measurements of the transient conductance and the time-dependent surface reflectance are reviewed. These real-time measurements have been applied in Si and Si-based alloys. Studies in silicon on sapphire demonstrate that melt initiates at the surface and propagates to some depth, whereupon the motion of the liquid/solid interface reverses, the material solidifies, and the interface returns to the surface. Comparison of solidification velocities for bulk Si with numerical heat flow calculations demonstrates that the laser melting process can be understood on the basis of a purely thermal model under equilibrium conditions. In amorphous Si, the transient conductance measurements permits the melting temperature of the amorphous phase to be determined. The melting temperature of amorphous Si is reduced by 225 K relative to the melting temperature of crystalline Si, and explosive crystallization of amorphous Si is observed to be mediated by a thin molten layer that propagates at approx. 14 m/s. The reduced melting temperature of amorphous Si is confirmed by studies on Si-Ge alloys. Measurements of the melt dynamics with short (approx. 3 ns) pulse irradiation are used to estimate the velocity-undercooling relationship in Si. In Si containing metastable concentrations of substitutional As, the effect of As on the solidification velocity permits the metastable melting temperatures to be determined. Combined transient conductance and surface reflectance studies permit examination of internal nucleation of melt and surface nucleation of solid. These buried molten layers lead to novel microstructures. Recent extensions of the technique to metallic systems are summarized. DOE

N86-22722# Tennessee Univ., Knoxville. Dept. of Physics and Astronomy.
VACUUM ULTRAVIOLET ELECTRONIC PROPERTIES OF LIQUIDS Annual Progress Report, 1 Feb. 1985 - 31 Jan. 1986
L. R. Painter Sep. 1985 24 p
(Contract DE-AS05-76EV-03861)
(DE86-001892; DOE/EV-03861/50) Avail: NTIS HC A02/MF A01

Topics covered in the Annual Report of the Tennessee University Department of Physics and Astronomy include collective oscillation in liquid silicone, electron emission, n-ethylene glycols, liquid water, and conductivity measurements. DOE

N86-22607# United Kingdom Atomic Energy Authority, Harwell (England). Chemistry Div.
CONDUCTIVE COATINGS TO MINIMISE THE ELECTROSTATIC CHARGING OF KAPTON
D. Verdin and M. J. Duck *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 125-131 refs Sponsored by UK Ministry of Defence Procurement Executive (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22609# AEG-Telefunken, Frankfurt am Main (West Germany). Forschungsinst.
ON DIELECTRIC LONG TERM STABILITY OF KAPTON-FILMS STRESSED BY ac AND dc UNDER USUAL ATMOSPHERIC CONDITIONS AND IN VACUUM
W. Goetz *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 143-146 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22610# Imperial Chemical Industries, Wilton (England). New Science Group.
MECHANICAL AND FIRE PROPERTIES OF AROMATIC POLYMER COMPOSITES
D. C. Leach, P. J. Briggs, and D. R. Carlile *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 153-160 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22613# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
WINDING WITH THERMOPLASTIC POLYMERS
J. L. Tiane and J. Bouvard *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 173-178 refs Sponsored by ESA (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22620# Selenia S.p.A., Rome (Italy).
MEASUREMENT OF THE THERMO-OPTICAL PROPERTIES OF VARYING PAINT THICKNESS ON CARBON FIBER COMPOSITES IN SPACECRAFT STRUCTURES
M. Giommi, M. Marchetti (Rome Univ., Italy), G. Salza, and P. Testa (Rome Univ., Italy) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 233-238 refs Sponsored by Max-Planck Inst. (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22621# Centre National d'Etudes Spatiales, Toulouse (France).
NEW SPACE PAINTS
J. C. Guillaumon *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 239-243 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22622# Centre d'Etudes et de Recherches, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.
LONG TERM TESTS OF CONTAMINATED OPTICAL SOLAR REFLECTORS (OSRS) UNDER COMBINED ENVIRONMENT
J. Marco and A. Paillous *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 245-253 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22675# Joint Publications Research Service, Arlington, Va.
ULTRASOUND-BASED METHOD FOR STUDIES ON COMPRESSION MOLDING KINETICS OF PLASTICS Abstract Only
E. A. Tagiyev, Ye. B. Raskin, and M. S. Trizno *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 4 Transl. into ENGLISH from Plasticheskiye Massy (Moscow, USSR), no. 6, 1985 p 60-61 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

N86-22676# Joint Publications Research Service, Arlington, Va.
APPLICATION OF CHN-2 ANALYZER IN DETERMINATION OF ELEMENTAL COMPOSITION OF ORGANIC POLYMERS Abstract Only
Z. N. Zigel, V. M. Ryabikova, O. G. Utkina, and I. T. Korzhova *In its* USSR Report: Chemistry (JPRS-UCH-86-002) 5 Feb. 1986 p 4-5 Transl. into ENGLISH from Plasticheskiye Massy (Moscow, USSR), no. 6, 1985 p 43-45 (For primary document see N86-22673 13-25)
Avail: NTIS HC A04/MF A01

N86-22765# Joint Publications Research Service, Arlington, Va.
DESIGNING OF BIOPOLYMERS DISCUSSED
Tatsuo Oci *In its* Japan Report: Science and Technology (JPRS-JST-86-006) 18 Mar. 1986 p 35-47 refs Transl. into ENGLISH from Bio Industry (Tokyo, Japan), Sep. 1985 p 41-49 (For primary document see N86-22764 13-31)
Avail: NTIS HC A04/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-22723# Naval Research Lab., Washington, D. C.
MIST FLAMMABILITY STUDIES OF CANDIDATE FIRE-RESISTANT HYDRAULIC FLUIDS
R. C. Little, S. Pande, and J. B. Romans 6 Nov. 1985 27 p
(AD-A161299; NRL-MR-5661) Avail: NTIS HC A03/MF A01 CSCL 11/8

Using NRL's mist flammability test apparatus, several commercial samples of 40% water-in-oil emulsion (fire-resistant hydraulic fluids) were screened for fire resistency. For comparison purposes, two other commercial fire-resistant hydraulic fluids were screened viz., a water-glycol solution and a phosphate ester. The Navy's currently used petroleum-type hydraulic fluid, 2190-TEP, was employed as the reference fluid. At the most severe conditions investigated (i.e., spray disk tangential velocity of 67.8 m/s, and fluid flow rate of 850 ml/min), none of the fire-resistant hydraulic fluids exhibited ignition leading to propagation in the presence of the propane test flame, indicating fire resistancy under these conditions. Under identical operating conditions, 2190-TEP exhibited gross ignition with propagation of flame ranging from 180 deg to 360 deg around the spinning disk, indicating it to be a potential fire hazard. The physical and chemical characteristics of the 40% water-in-oil emulsions suggest that this class of fire-resistant hydraulic fluids may be suitable replacement candidates for 2190-TEP. GRA

N86-22724# Suntech, Inc., Marcus Hook, Pa.
TURBINE FUELS FROM TAR SANDS BITUMEN AND HEAVY OIL. PHASE 1: PRELIMINARY PROCESS ANALYSIS Interim Report, 8 Jul. 1983 - 9 Apr. 1984
A. F. Talbot, V. Elanchenny, A. Macris, and J. P. Schwedock 9 Apr. 1985 183 p
(Contract F33615-83-C-2352)
(AD-A161300; AFWAL-TR-85-2013) Avail: NTIS HC A09/MF A01 CSCL 21/4

The strategic potential of domestic bitumens and heavy crude oils as substitutes for imported crude rests with their efficient conversion into aviation turbine fuels. In this Phase 1 study, preliminary analyses of several processing schemes have been performed. The comparison included both hydrogen addition and carbon rejection upgrading processes. Projected JP-4 yields, costs, and thermal efficiencies suggest further exploration of the hydrovisbreaking process. For Phase 2, laboratory scale demonstration of the recommended process is proposed. GRA

N86-22725# Lawrence Livermore National Lab., Calif.
DEVELOPMENT OF A DETAILED KINETIC REACTION MECHANISM FOR THE OXIDATION OF n-OCTANE AND Iso-OCTANE
C. K. Westbrook and E. Axelsson 1 Oct. 1985 27 p refs Presented at the Two Phase Combustion, Numerical Modelling of Combustion Processes: General Combustion Topics, Davis, Calif., 21 Oct. 1985 Prepared in cooperation with AB Volvo, Goeteborg, Sweden
(Contract W-7405-eng-48)
(DE86-001722; UCRL-93420; CONF-8510158-3) Avail: NTIS HC A03/MF A01

The development of detailed chemical kinetic reaction mechanisms for the oxidation of n-octane and iso-octane is described. The elementary reactions describing the thermal decomposition and H atom abstractions of the octane molecules, the thermal decomposition reactions of the resulting alkyl radicals, and the abstraction and addition reactions of the intermediate olefin and other species are discussed. In many cases, the assignment of specific rate expressions for these reactions is made, and the identification of probable reaction products is attempted. The reaction mechanisms for the two forms of octane are compared and contrasted, and the relationships between the two mechanisms are used to explain some of the observed differences in the combustion characteristics of the two fuels. DOE

N86-22726# Lawrence Livermore National Lab., Calif.
EIGHTH INTERNATIONAL SYMPOSIUM ON DETONATION, VOLUME 2
1985 208 p Proceedings of the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE86-002616; CONF-850706-Vol-2) Avail: NTIS HC A10/MF A01

Volume two contains twenty-three papers on chemical explosives and detonations. Papers are grouped under the following topics: equation of state; shock-to-detonation transition/deflagration-to-detonation transition; hot spots; detonation spectroscopy; initiation and sensitivity; and reaction zones. All papers have been processed for inclusion in the Energy Data Base. DOE

N86-22760# Joint Publications Research Service, Arlington, Va.
STUDY OF PREDICTION OF LIQUID FUEL CAPTURE BY FLAMEHOLDER DOWNSTREAM OF PLAIN ORIFICE INJECTOR UNDER UNIFORM CROSS AIR FLOW Abstract Only
Junyong Zhu, Rushan Jin, and Minghua Cao *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 136 Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 4, 31 Oct. 1985 p 8-15 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-22727# Royal Aircraft Establishment, Farnborough (England).
TRIAL OF THE INERT GAS SYSTEM ON RFA BAYLEAF
K. C. Hayden 16 Nov. 1984 16 p refs
(RAE-TM-NAV-ENG-1050; BR94940) Avail: NTIS HC A02/MF A01

The inert gas (IG) system and its operation are described and the benefits of IG on tanker safety are discussed. The effect of IG on AVCAT F-44 quality was determined during a trial on a tanker ship. No adverse effects on the AVCAT cargo are revealed and the benefits of employing IG systems on tankers are considerable if low flash point products are carried, e.g., CIVGAS F-50. For higher flash point fuels an IG system is not essential.
Author (ESA)

N86-22728# New Mexico Univ., Albuquerque. Engineering Research Inst.
PERMEABILITY EQUIPMENT FOR POROUS FRICTION SURFACES Interim Report, Oct. 1984 - Apr. 1985
Daniel L. Standiford, Richard A. Graul, and Lary R. Lenke Apr. 1985 54 p refs
(Contract F29601-84-C-0080)
(DOT/FAA/PM-85/31; ESL-TR-85-22) Avail: NTIS HC A04/MF A01

Hydroplaning is the loss of traction between tires and pavement due to the presence of a layer of water. This loss of traction can result in loss of vehicle control. A porous friction surface (PFS) applied over an existing pavement permits the water to drain laterally and vertically away from the tire path, effectively lowering

hydroplaning potential. Equipment used to measure pavement drainage (permeability) is discussed with respect to usage on porous friction surface. Background information on hydroplaning, flow theory, and PFS field performance as they are affected by permeability are also presented. Two dynamic test devices and four static devices are considered for measuring PFS permeability. Permeability tests are recommended to measure PFS permeability for maintenance purposes and construction control. Dynamic devices cited could possibly estimate hydroplaning potential; further research must be done to determine this. Permeability devices cannot be used to accurately estimate friction of a pavement surface, however, decreased permeability of a pavement infers a decrease in friction. Author

N86-22729# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BIMONTHLY BULLETIN, NUMBER 1985-1, 224/JANUARY-FEBRUARY
Claude Sevestre, ed. ESA Oct. 1985 70 p refs Transl. by ONERA into ENGLISH of 'La Recherche Aerospatiale, Bulletin Bimestriel" (Paris, France), No. 1985-1, 224/Jan.-Feb. 1985
(ESA-TT-915) Avail: NTIS HC A04/MF A01; print copy in ENGLISH available at ONERA, Paris FF70; original report in FRENCH available at ONERA, Paris FF70

Aerodynamic methods for designing advanced high-speed propellers; a holography stand for high-definition image recording of transparent or opaque images; numerical analysis of singular stress fields at the free edge of layered composites; structure calculations in cyclic viscoplasticity; aircraft pseudo-noise and noise; and use of a radiance amplifier for visualizing seeded aerodynamic flows are discussed. Author (ESA)

N86-22730# Lanchester Polytechnic, Coventry (England). Dept. of Mechanical Engineering.
VERIFICATION OF THE LIQUID CRYSTAL/HEATER TECHNIQUE FOR HEAT TRANSFER MEASUREMENT IN CONFINED FLOWS
M. R. Butcher, B. L. Button, D. Wilcock, and C. C. Wright 1985 7 p refs Presented at Developments in Measurements and Instrumentation in Engineering Conference, Hatfield, England, 11-13 Sep. 1985; sponsored by Hatfield Polytechnic and Institution of Mechanical Engineers Sponsored by UK Science and Engineering Council
(ISBN-0-85298-583-5) Avail: NTIS HC A02/MF A01

Heat transfer measurements using liquid crystals were carried out for fully developed turbulent flow in a horizontal pipe to verify the technique for confined flows using a well studied situation. Copper wire 90 diameters downstream of the entrance of the tube was wound around the tube for a length of 300 mm and produced the constant surface heat flux at the end of which the temperature profile was fully developed. It is found that the heat transfer distribution along the tube can be observed by noting the color distribution of the liquid crystal. The only significant heat loss is found to be that due to radiation. Excellent agreement is obtained with Engineering Sciences Data Unit (1977) data after accurate measurements of bulk temperature were made by measuring the center line temperature in the fully developed state and correcting for bulk temperature upstream. Author (ESA)

N86-22731# Bureau of Mines, Minneapolis, Minn.
BLAST VIBRATION MEASUREMENTS NEAR AND ON STRUCTURE FOUNDATION Investigations Report, 1985
D. E. Siskind and M. S. Stagg 1985 27 p
(PB86-106028; BM-RI-8969; LC-85-600074) Avail: NTIS HC A03/MF A01 CSCL 08I

Blasting year structures often involves measurement of vibrations for the assessment of damage potential. Several methods of measurement are in use worldwide, but there is no consensus as to which methods are technically sufficient and yet practical for all situations. This Bureau of Mines study examined five methods of vibration transducer placement to determine the best method for monitoring blasting vibrations. The methods examined were burial in soil next to the structure; attachment to the foundation at ground level, to the basement floor, or to a surface slab; and burial at a distance from the structure in undisturbed soil. Typical surface mine production blasts were used as vibration sources. GRA

N86-22732# Stirling Power Systems Corp., Ann Arbor, Mich.
PHASE 1-B DEVELOPMENT OF KINEMATIC STIRLING/RANKINE COMMERCIAL GAS-FIRED HEAT PUMP SYSTEM Annual Report, Sep. 1983 - Dec. 1984
L. Johansson, J. G. Agno, and W. H. Percival Jul. 1985 100 p
(Contract GRI-5083-242-0845)
(PB86-104767; GRI-85/0128) Avail: NTIS HC A05/MF A01 CSCL 13A

The goal of this project is to develop a commercial size Stirling engine-driven gas heat pump with a cooling capacity of 10-ton, and a COP (heating) of 1.8 and COP (cooling) of 1.1. The project is a multi-phase development with commercialization planned for 1989. To date, a piston type open shaft refrigeration compressor has been selected as the best match for the engine. Both the engine and compressor have been tested and characterized by performance maps, and the experimental heat pump systems designed. The manufacturer has continued to focus on improving the Stirling engine performance and reliability for the gas heat pump application. GRA

N86-22733# PEI Associates, Inc., Cincinnati, Ohio.
CARBON MONOXIDE ANALYSIS OF FUTURE ATTAINMENT OF THE NAAQS (NATIONAL AMBIENT AIR QUALITY STANDARD) IN WICHITA, KANSAS Final Report
G. J. Schewe Jun. 1985 110 p
(Contract EPA-68-02-3890)
(PB86-119906; EPA-907/9-85-004) Avail: NTIS HC A06/MF A01 CSCL 14B

In order to comply with the NAAQS for CO in Wichita, Kansas, a special study was performed to demonstrate that CO concentrations at a special purpose monitor (SPM) located near Douglas and Main Streets would give results less than the NAAQS by 1987. The SPM site is located near the urban core in an area characterized by high nighttime traffic volumes and congested traffic flow. A dispersion modeling analysis was performed using the CALINE-3 Model for dispersion, the MOBILE-3 Model for vehicle emissions and local or national traffic and ambient conditions. Results of modeling the SPM site for baseline (1983) emissions were calibrated with maximum measured CO concentrations. Several scenarios were analyzed in this analysis including with and without the inspection/maintenance program and with and without the left-turn ban from Douglas to Main Streets. GRA

N86-22734# Research Triangle Inst., Research Triangle Park, N.C.
ADVANCED ELECTROSTATIC ENHANCEMENT OF FABRIC FILTRATION
R. B. Mosley, L. S. Hovis, N. Plaks, T. Yamamoto, and A. S. Viner Oct. 1985 25 p
(Grant EPA-R-812281)
(PB86-117371; EPA-600/D-85-267) Avail: NTIS HC A02/MF A01 CSCL 13B

Laboratory and pilot plant studies of a modification of the U.S. EPA's Electrically Stimulated Fabric Filtration (ESFF) method in which corona voltage on a center-wire electrode replaces the subcorona electrodes at the bag surface are discussed. The electric field which affects enhancement results from the high potential maintained on the center wire. The mechanism that supports the observed increase in gas flow consistent with the theoretical model involves the nonuniform deposition of the charged dust as a result of forces exerted on the particles in the electric field perpendicular to the bag. Laboratory results show an extremely low rate of pressure drop increase during the filtration cycle, only 10 to 30% of the rate associated with conventional reverse-air fabric filtration. Pilot plant data indicate a corresponding increase in flow through electrified bags. The rudiments of a mathematical model for describing the electrical deposition of the dust are presented. GRA

N86-22735# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
28 Jan. 1986 109 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-004) Avail: NTIS HC A06/MF A01

Various areas of scientific research in China is reported. The increased use of computers in economic development, information systems and meteorological work is described. Aircraft engine design and testing facilities are briefly discussed. The biological treatment of waste water is another area of discussion. For individual titles, see N86-22736 through N86-22740.

N86-22736# Joint Publications Research Service, Arlington, Va.
STATUE OF AIRCRAFT ENGINE RESEARCH AT NPU REVIEWED **c07**
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 40-45 refs Transl. into ENGLISH from Guoji Hangkong (Beijing, China), no. 10, Oct. 1985 p 4-6 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

The aircraft engine research work at Northwest Polytechnic University is intended to satisfy the needs of national defense and the aviation industry on the one hand, and to serve China's economic development on the other. The efforts were devoted to the following two areas: (1) exploring advanced design methods of high-performance propulsion systems, studying new topics in jet propulsion technology, developing our experimental capabilities and striving to improve measurement techniques; and (2) providing wide range of technical services to the mechanical, power, energy exploration and local industries in the areas of product design, application of new technologies, and development of new energy sources. Modern jet propulsion technology is closely tied to state-of-the-art scientific development and the development of electronic computers; it has evolved from a single technical discipline to the combined study of many different disciplines. The areas of research are discussed briefly. Author

N86-22737# Joint Publications Research Service, Arlington, Va.
SHANGHAI'S OUTDOOR AEROENGINE TEST FACILITY DETAILED **c09**
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 46-50 Transl. into ENGLISH from Hangkong Zhizao Gongcheng (Beijing, China), no. 7, 1 Jul. 1985 p 1-4 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

In November 1983, the outdoor test facility of the Shanghai Aircraft Engine Factory was officially certified by the technical certification conference sponsored by the National Defense Science and Engineering Committee, and was named the Shanghia Outdoor Test Facility for Aircraft Engines. As China's first outdoor test facility, it was designed to perform the essential functions of new engine development, verification of engine performance, establishing momentum corrections for indoor test facilities, and studying the effect of weather and environmental conditions on engine performance. Author

N86-22738# Joint Publications Research Service, Arlington, Va.
APPLICATIONS OF HIRFL HEAVY ION ACCELERATOR SURVEYED **c73**
Guohua Wu *In its* China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 51-58 Transl. into ENGLISH from Wuli Tongbao (Baoding, China), no. 4, 10 Aug. 1985 p 23-28 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

China had a late start in the research of heavy ion physics, partly due to the lack of a suitable accelerator. In 1970 the Modern Physics Institute converted an ordinary 1.5m light particle accelerator into a heavy ion accelerator. A series of nuclear physics and nuclear chemistry studies using accelerated carbon, nitrogen and oxygen has led to encouraging results and filled the void in this area. However, this 1950 vintage accelerator is far from adequate. In 1973 a proposal was submitted for the construction of a new accelerator, an evaluation meeting was held in 1974, and in November 1976, the State officially granted the permission to build a heavy ion accelerator in Lanzhou. Today, the earth work construction has been essentially completed and components are being fabricated and tested for an opening date in 1988. This accelerator will provide the esearch and application of heavy ion physics with an advanced facility and will become China's own heavy ion physics research center. Author

N86-22739# Joint Publications Research Service, Arlington, Va.
ANAEROBIC BIOLOGICAL TREATMENT OF WASTEWATER CONTAINING TNT, RDX **c45**
Yuxiang Xue and Jainyong Jin *In its* China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 68-77 Transl. into ENGLISH from Zhongguo Huanjing Kexue (Beijing, China), v. 5, no. 5, 21 Oct. 1985 p 2-7 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

The anaerobic biological treatment of wastewater containing TNT, RDX, or a TNT-RDX mixture was tested through small scale and production scale trials with good results that meet the anticipated goals. After treatment, the TNT and RDX content of water and the major indicators such as COD and BOD all fall within the national discharge standards. At present, it has been formally put into operation and applied to the treatment of loading plant wastewater containing a mixture of TNT and DNN (dinitronaphthalene). Author

N86-22740# Joint Publications Research Service, Arlington, Va.
STUDIES OF THE PROPERTIES OF DEGRADATION OF INORGANIC CYANIDE IN THE GAS-PRODUCING WASTEWATER BY ARTIFICIAL SCREENING CYANIDE-DECOMPOSING BACTERIA STRAINS Abstract Only **c45**
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 89 refs Transl. into ENGLISH from Zhongguo Huanjing Kexue (Beijing, China), v. 5, no. 5, 21 Oct. 1985 p 27-32 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

Five highly efficient decyanide bacteria strains have been isolated from sludge of an effluent outlet of cyanide-containing gas-producing wastewater and the biofilm of a biological trickling filter tower of a synthetic ammonia factory. A strain of these cyanide-decomposing bacteria was identified as Arthrobacter sp. no. 8. Their average biodegradation efficiency for inorganic cyanides was 93.1 percent when the initial concentration of the cyanide was 25.02-27. 93 mg/1, while the highest removal efficiency was 96.8 percent. The results of tests indicate that Arthrobacter sp. no. 9 can use inorganic cyanides as the sole soruce of nitrogen and carbon for its growth. The similar high decomposition efficiency with total removal rate of 91.53 percent was obtained in the direct treatment of gas-producing wastewater containing inorganic cyanide by the mixed bacterial culture mainly of the above five artificial screening strains. Studies of the condition of CN- degradation in the process of growth of the decyanide strains are reported. Author

N86-22741# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
13 Feb. 1986 65 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-006) Avail: NTIS HC A04/MF A01

Several topics relative to Chinese science and technology are discussed. The lifetime of excimer lasers, space warfare, output obtained from XeCl excimer lasers, the measurement of the velocity distribution of atomic beams, plasma physics research and a screen editing program using Chinese characters are among the topics covered. For individual titles, see N86-22742 through N86-22747.

N86-22742# Joint Publications Research Service, Arlington, Va.
SPECTER OF WAR IN SPACE DISCUSSED, PART 2 **c18**
Xianmin Bao *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 1-7 Transl. into ENGLISH from Hangtian (Beijing, China), no. 6, Nov. 1985 p 8-11 (For primary document see N86-22741 13-31)

Avail: NTIS HC A04/MF A01

In the fall of 1968, the Soviet Union launched an artificial satellite Cosmos 249 into an elliptic orbit from the Tyuratam base near the Aral Sea. But shortly afterwards, the satellite drifted away from its perigee at 500 km altitude and exploded. Ten days later, the Cosmos 252, which was launched into a similar orbit, also disappeared after an explosion. The explosions of Cosmos 249 and Cosmos 252 occurred after the satellites had approached and rendezvoused with Cosmos 248. It was discovered that these were actually Soviet tests in which fragments from an exploding satellite were used to destroy enemy satellites. Subsequently, the Soviet Union tested other attack strategies: for example, attacking the target satellite from the same circular orbit; approaching the target satellite from an elliptic orbit before attacking; and attacking the target by a sudden climb maneuver without entering the target satellite orbit. In June 1982, the Soviet Union conducted a space war exercise which greatly surprised the United States. During the exercise, intercept satellites were first launched to destroy U.S. reconnaissance satellites and communications satellites; at the same time the satellites were being attacked, two ICBM's, an SLBM, an IRBM, the SS-20 and an anti-ballistic missile were also launched. Author

N86-22743# Joint Publications Research Service, Arlington, Va.
LIFETIME OF EXCIMER LASER STUDIED c36
Xuejin Hu, Zhensheng Zhao, Zhaolin Li, and Mingyu Che *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 8-13 refs Transl. into ENGLISH from Guangxue Xuebao [Acta Optica Sinica] (Shanghai, China), v. 5, no. 10, Oct. 1985 p 881-885 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

Long-term stable operations of XeCl excimer lasers depend considerably on the depletion of HCl. Experiments have shown that the lifetime of such device can be extended significantly by adding appropriate amount of an inexpensive donor gas HCl into the laser chamber made of epoxy resin pipe. In this way, more than 1.03 x one million pulses were obtained by one filling of Xe and Ar and then replenishing HCl at several appropriate times. For a repetition rate of 5.3 pulses per second and single-pulse energy of 100 mJ, the laser was still able to operate normally after working continuously for 54 hours. The maximum single-pulse energy of the laser was 160 mJ. The influence of the content of HCl on the output characteristics of the laser was also studied. Author

N86-22744# Joint Publications Research Service, Arlington, Va.
THE 1.36J OUTPUT OBTAINED FROM XeCl EXCIMER LASER c36
Xusan Cheng, Qihong Lou, and Runwen Wang *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 14-20 refs Transl. into ENGLISH from Guangxue Xuebao [Acta Optica Sinica] (Shanghai, China), v. 5, no. 10, Oct. 1985 p 865-869 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

The injecting locking of a XeCl excimer laser driven by a long transmission-line pulse-forming network was achieved with an unstable optical resonator. The injection-locked output energy was 1.36J (18 MW in peak power) with a linewidth of 8.9 x 0.001 A and a beam divergence of 0.2 m rad. Parameters of the injection locking and synchronization characteristics of discharge are also discussed. Author

N86-22745# Joint Publications Research Service, Arlington, Va.
VELOCITY DISTRIBUTION OF ATOMIC BEAMS MEASURED c72
Yuzhu Wang, Yudan Cheng, Shanyu Zhou, Weigang Huang, and Liang Liu *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 21-25 refs Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 11, 20 Nov. 1985 p 658-660 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

Measurement of the velocity distribution in an atomic beam by means of atomic beam deflection under resonance light pressure is reported. Both theoretical analysis and experimental results are given. Author

N86-22746# Joint Publications Research Service, Arlington, Va.
PROGRESS IN PLASMA FOCUS RESEARCH c75
Jinji Yang and Min Han *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 39-51 refs Transl. into ENGLISH from He Kexue Yu Gongcheng (Beijing, China), v. 5, no. 2, Jun. 1985 p 165-173 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

Progress in plasma focus research is discussed. Plasma focus devices, plasma focus discharge processes, neutron emission scaling laws, and recommendations for further research are discussed. R.J.F.

N86-22747# Joint Publications Research Service, Arlington, Va.
SCREEN EDITING PROGRAM IN CHINESE c61
Miaoping Mei *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 52-56 Transl. into ENGLISH from Xiaoxing Weixing Jisuanji Xitong (Shenyang, China), no. 2, 8 Feb. 1985 p 60-62 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

An existing Chinese on-screen editing program which is used in the C-10SP Chinese system on CROMEMCO, as well as on intelligent Chinese terminals is discussed. The on-screen editing program SCREEN supported by CDOS was modified to become an on-screen editing program in Chinese. All its capabilities were maintained. R.J.F.

N86-22748# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
27 Jan. 1986 144 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-003) Avail: NTIS HC A07/MF A01

This journal is divided into four areas of concern to the Chinese scientific community. They are: (1) national developments; (2) applied sciences; (3) physical sciences; and (4) astronautics and nuclear electronics. Many articles under these general topics are presented. For individual titles, see N86-22749 through N86-22763.

N86-22749# Joint Publications Research Service, Arlington, Va.
SIMPLE METHOD TO CONSTRUCT CUBIC SPLINE FUNCTION DESCRIBED c64
Fuqi Tan *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 52-58 refs Transl. into ENGLISH from Yingyong Shuxue He Lixue (Chongqing, China), v. 6, no. 6, Jun. 1985 p 567-472 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

A simple method to construct the cubic spline function is presented. In addition, relevant problems are discussed. Finally, various treatments for different situations are introduced. Author

N86-22750# Joint Publications Research Service, Arlington, Va.
MODEL FOR BOUNDARY INTEGRAL EQUATION IN SOLID MECHANICS c64
Xingfeng Wang and Xingfa Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 59-70 refs Transl. into ENGLISH from Yingyong Shuxue He Lixue (Chongqing, China), v. 6, no. 6, Jun. 1985 p 531-540 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

A computational model for boundary integral equations in solid mechanics is established. This model is used to calculate two solid mechanics problems. The significance of the delta function structure is used in the basic solution of the Dirichlet or Neumann problems to obtain a singular integral equation through Green equation. Based on that, this basic solution satisfies the Liepshi alpha exponent condition on the boundary, this singular integral equation is expanded to the practical stage. The boundary integral

of a biharmonic equation and a Navier equilibrium equation is presented. In addition, the stress expression in this computation model is also derived. Author

N86-22751# Joint Publications Research Service, Arlington, Va.
PASSIVE LOCATION, TRACKING FOR MOVING EMITTERS c32

Zhongkang Sun and Peng Zhang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 71-79 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 13, no. 2, Mar. 1985 p 74-79 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

Passive location and tracking method using multiple measuring stations is discussed for a moving target carrying an active emitter. Weighted least square estimation for target location and Kalman filtering for tracking and prediction are used in such a passive location system. Simulation results show that it is an efficient method for emitter location. The location accuracy depends on the number, measuring accuracy and geometry of the stations and the moving emitter trajectories. Author

N86-22752# Joint Publications Research Service, Arlington, Va.
OPTIMAL SELECTION OF PRODUCTION PLAN, SOFTWARE DESIGN c61

Fu Fan *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 80-88 refs Transl. into ENGLISH from Zidonghua Xuebao (Beijing, China), v. 11, no. 1, Jan. 1985 p 87-93 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

An actual example of applying a microcomputer to production management is introduced. The method to solve the problem and the software are discussed. The economic benefit of this software is expanding year after year. Author

N86-22753# Joint Publications Research Service, Arlington, Va.
COMPUTER-AIDED DESIGN OF OPTIMUM LINEAR CONTROL SYSTEMS c61

Qinyou Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 89-96 refs Transl. into ENGLISH from Zidonghua Xuebao (Beijing, China), v. 11, no. 1, Jan. 1985 p 38-43 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

A computer aided design method for optimum linear time-invariant systems satisfying both quadratic performance index and time-domain performance index is described. The function of the CAD package and the algorithm of spectral factoring to solve for the optimum system are presented. An actual example of the design has shown that the design method performs well. Author

N86-22754# Joint Publications Research Service, Arlington, Va.
GEOMETRIC NONLINEAR ANALYSIS OF SHELLS c61

Di Zhang and Zhongxiong Cai *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 97-111 refs Transl. into ENGLISH from Shuzhi Jisuan Yu Jisuanji Yingyong (Beijing, China), v. 6, no. 3, Sep. 1985 p 176-187 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The finite element method has many advantages when used in geometric nonlinear analysis and is a very effective tool for resolving complicated structures. Oblate shell elements are used as representatives to produce geometric nonlinear stiff matrix formulae that do not rely on the interpolation function of a particular element, as well as methods for writing routines. This allows originally complex calculations to become rather more convenient. Finally, numerical results for a flattened cylinder and for an oblate spheroid are provided. Author

N86-22755# Joint Publications Research Service, Arlington, Va.
HOLOGRAPHIC NDT OF THIN TITANIUM PLATE DESCRIBED c35

Rubiang Yang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 112-117 refs Transl. into ENGLISH from Xiyou Jinshu (Beijing, China), v. 9, no. 4, Jul. 1985 p 58-61 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

Holography is a technique for recording the amplitude and phase changes of an object on a photographic plate in the form of interference fringes. Because the holographic interference method can examine a component in the noncontact mode and is not bothered by complicated part shape or surface roughness, it has been widely used in nondestructive testing. In the rapidly developing aerospace industry, titanium and titanium alloy thin plates are used more and more but local delamination has been found in the production process of bonded titanium plates. Using ultrasonic methods, such defects are difficult to detect and large area delaminations with tightly closed edges can easily be missed. Other testing methods are also unsuccessful. A holographic method was developed for detecting defects in thin titanium plates and several high temperature alloy plates were tested. The testing equipment, methods and results are discussed. Author

N86-22756# Joint Publications Research Service, Arlington, Va.
RING DEFECT OF GaAs STUDIED c76

Jianbang Chen and Guoli Zhang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 118-122 Transl. into ENGLISH from Xiyou Jinshu (Beijing, China), v. 9, no. 4, Jul. 1985 p 21-23 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

Common defects in GaAs are dislocations, stacking faults, and precipitates. Etching with molten KOH often reveals the dislocation pits, and the number of dislocation pits is generally used as an indicator of the defect density of the single crystal. Recently, circular defects were observed in chemically etched Si-doped GaAs single crystals grown in a horizontal boat. Some of these circular defects have an indented central part and resemble the shape of lunar mountains. They are ring defects. The detection method of ring defects and the results of electron probe analysis are described in detail. Author

N86-22757# Joint Publications Research Service, Arlington, Va.
DESIGN OF NEW SYSTEM ARCHITECTURE WITH HYBRID REDUNDANCY (HCC) c60

Tongzhao Chen *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 123-131 refs Transl. into ENGLISH from Jisuanji Xuebao (Beijing, China), v. 8, Jul. 1985 p 314-320 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The current computer structure with hybrid redundancy (HCS) is analyzed and its problems are identified. A new hybrid redundancy system structure (HCC) is introduced. Compared to HCS, HCC recovers much more rapidly from failure. It can reuse modules cut off due to transient failure and thus becomes more reliable, neat in design, concise and easy to expand. Author

N86-22758# Joint Publications Research Service, Arlington, Va.
APPLICATION OF ADAPTIVE SEGMENTATION TO SIGNAL ANALYSIS IN UNDERWATER ACOUSTICS Abstract Only c71

Guoqing Wu *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 133 Transl. into ENGLISH from Yingyong Shengxue (Beijing, China), v. 4, no. 4, Oct. 1985 p 23-32 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The Generalized Likelihood Rati (GLR) segmentation technique is applied to the analysis of underwater echo signals. Many desirable results are obtained. This indicates the applicability of the GLR segmentation technique in processing signals obscured by noise. Analytical results of two kinds of signals are presented: echo waves from an island and from a submerged object. These signals are obscured by strong noises; some signals are undetectable by human ears. However, this segmentation technique is capable of detecting the signal boundary and determining the boundary position. The result shows the prospects of the linear prediction technique applied in processing underwater acoustic signals. Seven figures show the detection of single boundary, short

segment test, power change test, segmentation in noise, detection of signal boundary of island echo waves, echo from immersing target, and weak echo from immersing target. Author

N86-22759# Joint Publications Research Service, Arlington, Va.
APPLICATION OF CLASS-D POWER AMPLIFIER IN UNDERWATER SOUND PROJECTOR Abstract Only c71
Enping Sun *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 134 Transl. into ENGLISH from Yingyong Shengxue (Beijing, China), v. 4, no. 4, Oct. 1985 p 42; 43-44 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

In order to reduce energy consumption (power) and raise the operating efficiency of the underwater sound projector by emitting relatively high power with the use of small transistors, it is more desirable to use a transistorized class-D power amplifier. Sufficient proof has been gained in applications. Basic circuit characteristics are presented as is a test method using circuits as examples. The class-D power amplifier uses a transistor as an on-and-off switch. The transistor operates in the saturation and interruption zones of the volt-ampere characteristic curve. Since the saturated voltage drop of the transistor is quite low, this phenomenon reduces the transistor power consumption to a minimum and raises the energy conversion efficiency of the amplifier. Three figures show electrical principle of power surge stage and power amplification stage of an underwater acoustic signal transmitter, matching network of a transducer, and electrical principle of power testing. Author

N86-22760# Joint Publications Research Service, Arlington, Va.
STUDY OF PREDICTION OF LIQUID FUEL CAPTURE BY FLAMEHOLDER DOWNSTREAM OF PLAIN ORIFICE INJECTOR UNDER UNIFORM CROSS AIR FLOW Abstract Only c28
Junyong Zhu, Rushan Jin, and Minghua Cao *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 136 Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 4, 31 Oct. 1985 p 8-15 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

Based on the flat-fan spray model and fuel capture model proposed previously, liquid fuel spray captured by the V-gutter flameholder can be predicted. The study reported in the present paper includes: (1) the effect of different factors, such as air flow parameters, injector pressure drop and the distance between the V-gutter and injector on fuel spray capture by a horizontally positioned flameholder in a wide range of parameters; (2) a comparison between the fuel spray capture by horizontally and vertically positioned flameholders; (3) the fuel spray capture by a V-gutter flameholder positioned between horizontal and vertical installation; (4) fuel spray capture by a V-gutter from an injector which has been positioned with partially contra-sream injection; and (5) the correlation for maximum fuel spray capture is obtained. Analysis indicates that the installation angle of the V-gutter and partial contra-stream injection angle are two important design variables in controlling the fuel spray capture. Author

N86-22761# Joint Publications Research Service, Arlington, Va.
A STUDY OF THE FRACTURE OF CARBON-CARBON COMPOSITES Abstract Only c24
Jiaxiang Zhao *in its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 137 Transl. into ENGLISH from Yuhang Xuebao (Beijing, China), no. 4, 31 Oct. 1985 p 40-48 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The effect of testing parameters on the values of the work-of-fracture of carbon-carbon composites is studied, and the testing parameters for measuring the work-of-fracture of carbon-carbon composites are determined. The work-of-fracture of three different kinds of carbon-carbon composites (3D orthogonal fine woven carbon-carbon composite, carbon felt reinforced by carbon fibers carbon-carbon composite and semi-random chopped fibers carbon-carbon composite) is measured and compared with those of graphites, glassy carbons, glass and fused SiO2. The characteristic features of fracture for the different carbon-carbon composites are studied and the fracture modes and propgation of cracks as well as the weak links are pointed out. Author

N86-22762# Joint Publications Research Service, Arlington, Va.
A FAST LEADING-EDGE PULSE GENERATOR Abstract Only c33
Rendao Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 139 Transl. into ENGLISH from Hedianzixue Yu Tance Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 294-297 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The pulse generator consists of ECL semiconductor integrated circuits, high speed transistors and step restorer diodes, among others; its circuitry is simple. The leading edge of the output pulse is less than 100 ps, and the output impedance is 50 ohms. An ECL four-wire receiver connected as a closed loop circut is used in the oscillator section of the set. The pulse frequency varies as low as 10 Hz and as high as 100 MHz. The control of pulse with is based on the subtraction of two pulse widths. The output pulse width may be less than 10 ns and the maximum width may be as wide as an oscillator half cycle. The pulse amplitude is continuously adjustable from + or - 35 mV to + or - 5 V. The operating principle of the oscillator stage, a simplified logic diagram, waveforms at various points, a rectifier circuit in the first stage, positive pulse channel circuit, and an adjustable power source are shown. Author

N86-22763# Joint Publications Research Service, Arlington, Va.
TYPE GDB-110 LARGE AREA, FAST RESPONSE PHOTOMULTIPLIER Abstract Only c33
Yonglu Song, Deqi Xu, Biao Yu, and Shou Li *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 140 Transl. into ENGLISH from Hedianzixue Yu Tace Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 303-306 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

The model GDB-110 photomultiplier is a tube with an hyperbolic terminal window and a semitransparent bialkali photocathode. The effective cathode diameter is 110 mm; borosilicate glass is used for the window. The optical spectral region is 320 to 650 nm. the photomultiplier has high detection efficiency, high response speed, and large increments. The voltage divider of model GDB-110 is designed to meet performance and use requirements; it includes model A and B voltage dividers as is shown. During detection, whether scintillation or Cerenkov radiation, the radiation intensity is very low. Therefore, only by increasing the photocathode area can the collection efficieny be improved. The model GDB-110 is adaptable to the above-mentioned situation. The outside dimensions of the photomultiplier, the relationship between anode luminosity sensitivity and operating voltage, and between time and voltage, single electron spectrum and noise spectrum; and the relationship between the secondary emission coefficient and interpole voltage are shown. Author

N86-22764# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
18 Mar. 1986 57 p refs Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-006) Avail: NTIS HC A04/MF A01

Progress in science and technology in Japan is reported. Topics discussed include: biotechnology, and energy. For individual titles, see N86-22765 through N86-22766.

N86-22765# Joint Publications Research Service, Arlington, Va.
DESIGNING OF BIOPOLYMERS DISCUSSED c27
Tatsuo Oci *In its* Japan Report: Science and Technology (JPRS-JST-86-006) 18 Mar. 1986 p 35-47 refs Transl. into ENGLISH from Bio Industry (Tokyo, Japan), Sep. 1985 p 41-49 (For primary document see N86-22764 13-31)
Avail: NTIS HC A04/MF A01

The properties and structural principles of configuration of the biopolymers are described. Of the representative biopolymers,

nucleic acids and proteins, proteins have diverse and varied functions and structures. The present state of knowledge regarding the process of biosynthesis, the formation of a three-dimensional configuration following peptide chain synthesis, and the three-dimensional structure of a protein, and what sort of designing is feasible based on that knowledge are discussed. E.A.K.

N86-22766# Joint Publications Research Service, Arlington, Va.
DIRECTIONS OF TECHNOLOGICAL DEVELOPMENT BY ELECTRIC INDUSTRY **c33**
Keiji Narimatsu *In its* Japan Report: Science and Technology (JPRS-JST-86-006) 18 Mar. 1986 p 47-54 Transl. into ENGLISH from Enerugi Foramu (Tokyo, Japan) Jul. 1985 p 84-87 (For primary document see N86-22764 13-31)
Avail: NTIS HC A04/MF A01

The electric power industry in Japan, a resources poor country, has stepped up the development of alternative energies for oil, including the utilization of atomic power technology and energy saving. Moreover, while the prospect of technology to utilize natural energies such as sunlight and wind power has increased in probability, the energy situation and economic conditions have greatly changed. Strategies are formulated to meet the demands, secure security of energy, and decide on which technology to develop. E.A.K.

N86-22767# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
19 Mar. 1986 169 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-010) Avail: NTIS HC A08/MF A01

Progress in science and technology is highlighted in this China report. Specific topics discussed include: national developments; applied sciences; environmental quality publications and lasers. For individual titles, see N86-22768 through N86-22776.

N86-22768# Joint Publications Research Service, Arlington, Va.
EMISSION MECHANISM OF OXIDE CATHODE **c33**
Enqui Zhang *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 63-73 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 2, no. 2, Mar. 1983 p 33-39 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

The energy levels of single crystal BaO, SrO and CaO measured from thermal electrical conductivity, photoelectric conductivity, photoelectron emission and absorption spectra are so diverse that accurate energy band diagrams cannot be obtained. This suggests that the surface energy levels are more important than the bulk levels. The work function of single crystal BaO film on Ir(100) is single-valued. This is inconsistent with the wide distribution of total work function of carbonate measured by a low energy scanning electron probe, indicating that the semiconductor model cannot be used to accurately describe the oxide cathode. It was found that the coating was richer in oxygen than alkaline earth metal after 2000 hours by Auger electron spectroscopy. However, the capability to emit electrons was not affected. Thus, the oxygen vacancy donor concept is invalidated. The fact that excess barium are electron emission sources can be reconciled with decreasing alkaline earth metals during life by the dynamic surface emission center model. This model suggests that an aggregate of alkaline earth metal oxide molecules with excess absorbed bariumn atoms can effectively emit electrons. This concept can be used to interpret many phenomena observed on oxide cathodes using modern surface analysis techniques. Author

N86-22769# Joint Publications Research Service, Arlington, Va.
THEORY, CALCULATION OF LARGE SIGNAL CUT-OFF ZONE IBCFA **c32**
Ping Zhou and Keqian Zhang *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 74-85 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 2, no. 2, Mar. 1983 p 45-51 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

In a high gain injected beam cross field amplifier, the presence of a cut-off zone in the slow wave system is unavoidable. In this work, a physical model describing the drift process of a density modulated electron beam through the cut-off and the re-excitation of the slow wave by the high frequency field after the cut-off was introduced. The mathematical derivation and theoretical formulas are presented and a FORTRAN program was compiled. The results show that its error relative to experimental values is 7 to 20 percent. The length and position of the cut-off and the effect of electron drift in the cut-off on the power output were revealed by a series of calculations. The technique and program used in this work can be applied in CAD of IBCFA. Author

N86-22770# Joint Publications Research Service, Arlington, Va.
NEW PLA, ITS OPTIMIZATION ALGORITHM FOR COMPUTER-AIDED DESIGN **c60**
Chunhe Liu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 86-98 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 11, no. 4, Jul. 1983 p 52-60 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

This paper presents a new type of PLA (R-PLA) which is made up of AND-EXCLUSIVE-OR arrays. The multi-channel digital networks described by vector Boolean algebra and the adders with parity check and parity prediction are realized very conveniently by using the R-PLA. The R-PLA is also simple for generating test codes of Boolean difference. This paper provides CAD algorithms for finding optimal or near-optimal ring sum cover. Author

N86-22771# Joint Publications Research Service, Arlington, Va.
ACCURATE COMPUTER-AIDED DESIGN OF MMIC BROAD-BAND FET AMPLIFIERS **c61**
Yongshi Wu and Herbert J. Carlin (Cornell Univ., Ithaca, N.Y.) *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 99-111 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 11, no. 4, Jul. 1983 p 76-84 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

A computer-aided design procedure applicable to low-noise and broad-band MMIC FET, amplifiers is presented. The method takes into account the non-unilateral behavior of the FET, losses in the matching networks and complex termination mismatches. The design procedure is more complete and accurate than currently available CAD methods. Two design examples, an 8 approx. 12 GHz and a 6 approx. 15GHz MMIC FET amplifier, are presented to illustrate the applications. Author

N86-22772# Joint Publications Research Service, Arlington, Va.
ELECTROSTATIC LENS OF NEW TYPE FIELD EMISSION GUN **c32**
Yushan Tu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 112-116 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 12, no. 1, Jan. 1984 p 119-121 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

The construction and calculation results of a hyperboloidal field of unipotential electrostatic lens with low spherical aberration is presented, by which the performance of the electron optical system of the field emission gun can be easily improved. Author

N86-22773# Joint Publications Research Service, Arlington, Va.
TRENDS IN DEVELOPMENT OF ELECTRON OPTICS **c74**
Jiye Ximen *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 117-128 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 12, no. 2, Mar. 1984 p 90-96 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

The main trends in the development of electron optics are discussed. The following are noteworthy: rotationally symmetrical electron optics for the weak narrow electron beam, electron optical matrix algebra and optimization design, non-rotationally symmetrical multipole systems, the progress of scanning electron beam systems--a combined focusing deflection system electron optics

for the wide electron beam, electron and ion optical systems with a curvilinear axis, wave electron optics. The future development and applications of electron optics have also been outlined. Electron optics is a scientific field that studies the laws of electrons in focusing, image formation, and deflection in electromagnetic fields. Using classical dynamics, classical electrodynamics, and optics as the theoretical foundation and relying on the similarities between the movement of electrons and ions in electromagnetic fields and the propagation rays in optical media, adopting optics-like methods and concepts (such as variation principle, aberration function, refractivity, rays, lenses and aberration) people have established a complete theoretical system of electron optics to study and explain these laws. Author

N86-22774# Joint Publications Research Service, Arlington, Va.
CALCULATING INTERCONTINENTAL VEHICLE RANGE, ACCURACY **c13**
Yongfang Cai *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 129-133 refs Transl. into ENGLISH from Shuxue de Shijian yu Renshi (Beijing, China), no. 3, Jul. 1985 p 1-4 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

This articles provides a simplified means to calculate the range and accuracy of intercontinental rockets as well as working out the range and accuracy of China's first intercontinental rocket. Author

N86-22775# Joint Publications Research Service, Arlington, Va.
FUZZY INFERENCE SYSTEM TO DIAGNOSE AIRCRAFT HYDRAULIC FAULTS **c01**
Shoupai Feng, Weigang Weng, and Liang Dong *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 134-141 refs Transl. into ENGLISH from Shuxue de Shijian yu Renshi (Beijing, China), no. 3, Jul. 1985 p 14-18 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

Aircraft hydraulic systems, the drive systems which control attitude, extension and retraction of landing gear, and wing flaps, are composed of tens to over a hundred parts. These systems are complex and often give rise to puzzling faults. The application of computers in fault diagnosis can increase precision and speed so as to conveniently array the prerequisites which create the fault. This is one effective way to improve the quality of aircraft maintenance. The causes of system faults and the appearance of symptoms have a random or Fuzzy nature. In the process of diagnosis the language people use is also largely vague. Based on these statistics combined with fault mechanism analysis, this article takes natural languages and transforms it into machine language and crystallize human experience to simulate a Fuzzy inference system. The characteristic nature of the system is first to select from events a set of symptoms (input) and causes (output) of model fault events and store them in a computer. Then during diagnosis an input works in this system to diagnose the causes (output). B.W.

N86-22776# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF COLLIDING-MODE Nd:YAG LASER **c36**
Xing Lin, Wenzhen Zhang, Huiming Zhuang, and Fengtie Wu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 142-148 refs Transl. into ENGLISH from Guangxue Xuebao (Shanghai, China), v. 5, no. 9, Sep. 1985 p 794-798 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

The cavity configuration of a colliding-pulse mode-locked Nd:YAG laser is described. A stable mode-locked pulse train was observed with a 500-MHz oscilloscope; the average pulse width was about 10 ps. The relationship of the dye concentration to the mode locking threshold was studied in detail and mode-locked multiple pulses were shown to appear as the pumping energy was increased. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-22777 British Broadcasting Corp., Kingswood (England). Engineering Div.
THE SUBJECTIVE EFFECTS OF RANDOM BIT ERRORS IN YUV COMPONENT VIDEO SIGNALS
K. R. Slavin Dec. 1985 12 p refs
(BBC-RD-1985/17) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

This Report describes two sets of subjective test measurements of error visibility on pictures derived from digital YUV video signals sampled in compliance with CCIR Recommendation 601. The first set of tests measured the subjective picture impairment resulting from random, single-bit errors in either the luminance (Y) or chrominance (U/V) channels. The second set of tests measured the impairment in chroma-key performance produced by errors in the U or V components. The results show that one random single bit error per second in the most significant bit (MSB) of the Y channel is just perceptible, and 10 per second in the MSB of the U/V channel. In the chroma-key tests, errors in the MSB of both U and V were just perceptible at 3 per second, and in addition, errors in the lower bit significances of the U channel were more visible than the V channel. Author

N86-22778 British Broadcasting Corp., Kingswood (England). Engineering Div.
SIGNALLING IN PARITY: A BRIEF HISTORY
J. P. Chambers Dec. 1985 16 p refs
(BBC-RD-1985/15) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

Equipment built in British Broadcasting Company (BBC) Engineering Research Department in 1974 for use on an experimental 120 Mbits/s digital link required no additional signalling capacity for multiplex control and synchronization. The general technique of signalling in parity as used in that equipment and how it has found other applications over the last ten years in synchronization, control and robust transmission of auxiliary data are described. The technique features in several new services such as the Radio-Data System (RDS), digital stereo sound for television (DSSTV) and the sound multiplex of the C-MAC/packet system for direct broadcasting by satellite. Author

N86-22779 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL CODING RANGES FOR USE IN AN ALL-DIGITAL SOUND-STUDIO COMPLEX
W. I. Manson Dec. 1985 10 p refs
(BBC-RD-1985/16) Avail: BBC, Kingswood Warren, Tadsworth, Surrey, Engl.

The sound-signal coding-range requirements for different applications in digital studio complex, excluding the internal requirements of processing equipment are considered. It is suggested that the most demanding requirements should be met by a coding standard of 22 bits/sample for uncontrolled sound signals. At the output of the studio center, when no further processing of the signal is envisaged, the coding may be reduced to 16 bits/sample, or to 14 bits/sample with the aid of digital limiting for distribution. It is noted that 22 bits/sample linear coding is well beyond the capability of present analogue/digital converter technology, however, floating-point converters approaching this standard would be adequate. It is noted that the floating point techniques may have further application in digital recording, to provide equivalent wide-dynamic-range recording facilities. E.A.K.

N86-22780 Department of the Air Force, Washington, D.C.
BISTATIC PULSE-OVERLAP DOPPLER RADAR INTRUSION DETECTION APPARATUS Patent

Bryan L. Burns and Michael W. Callahan, inventors (to Air Force) Issued 10 Sep. 1985 6 p Supersedes AD-D010087
(AD-D012011; US-Patent-4,540,978; US-Patent-Appl-SN-447736; US-Patent-Class-340-554) Avail: US Patent and Trademark Office CSCL 17/5

An intrusion detection apparatus utilizing an array of bistatic pulse-overlap Doppler radar units to detect target Doppler frequency shifts is an enclosed sensitive volume and utilizing a single RF frequency with different pulse repetition rates to synchronize the bistatic receiver unit with its associated transmitter unit. Author (GRA)

N86-22781# Royal Signals and Radar Establishment, Malvern (England).
AN INVESTIGATION OF SYNTHETIC APERTURE RADAR AUTOFOCUS
I. P. Finley and J. W. Wood Apr. 1985 44 p refs
(RSRE-MEMO-3790; BR97350) Avail: NTIS HC A03/MF A01

The principles of SAR and the requirement for an autofocus system are discussed. Three autofocus methods are investigated: measurement of the power spectrum, constrast maximization, and registration of multilook images. The power spectrum is shown to be unreliable as an autofocus aid. Results of the contrast maximization and registration methods are compared, and show that both methods are suitable. Author (ESA)

N86-22782*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Electrical Engineering and Applied Physics.
MUTUAL COUPLING EFFECTS IN ANTENNA ARRAYS, VOLUME 1 Final Technical Report, 15 May 1982 - 31 Mar. 1986
R. E. Collin Mar. 1986 178 p refs
(Grant NAG3-291)
(NASA-CR-176699; NAS 1.26:176699; WGR-86-4-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 20N

Mutual coupling between rectangular apertures in a finite antenna array, in an infinite ground plane, is analyzed using the vector potential approach. The method of moments is used to solve the equations that result from setting the tangential magnetic fields across each aperture equal. The approximation uses a set of vector potential model functions to solve for equivalent magnetic currents. A computer program was written to carry out this analysis and the resulting currents were used to determine the co- and cross-polarized far zone radiation patterns. Numerical results for various arrays using several modes in the approximation are presented. Results for one and two aperture arrays are compared against published data to check on the agreement of this model with previous work. Computer derived results are also compared against experimental results to test the accuracy of the model. These tests of the accuracy of the program showed that it yields valid data. Author

N86-22783*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NOVEL METHOD OF CALCULATING FAR-FIELD PATTERNS OF LARGE APERTURE ANTENNAS
M. C. Bailey Mar. 1986 39 p
(NASA-TM-87644; NAS 1.15:87644 Avail: NTIS HC A03/MF A01 CSCL 20N

A method is described for calculation of the radiation pattern of large aperture antennas. A piece-wise linear approximation of the aperture field using overlapping pyramidal basis functions allows the radiation pattern of an aperture antenna to be calculated as though it were a two-dimensional array. The calculation of radiation pattern data versus theta and phi, suitable for 3-D or contour plot algorithms, is achieved by locating the array in the yz-plane and performing a summation over the aperture field data sampled on a square grid. A FORTRAN subroutine is provided for performing radiation pattern calculations. Numerical results are included to demonstrate the accuracy and convergence of the method. These numerical results indicate that typical accuracies of + or - 0.1 dB for Directivity, + or - dB for the 1st Sidelobe Level, and + - 2dB for the 2nd Sidelobe Level can be obtained with an aperture grid of 45x45 points and requires approximately 0.02 seconds CPU time per far-field data point on a VAX 11/750 with a floating point accelerator. Author

N86-22784*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT Progress Report, Oct. - Dec. 1985
E. C. Posner, ed. 15 Feb. 1986 275 p refs
(Contract NAS7-918)
(NASA-CR-176691; JPL-TDA-PR-42-84; NAS 1.26:176691) Avail: NTIS HC A12/MF A01 CSCL 17B

Deep Space Network progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations is documented. In addition, developments in Earth-based radio technology as applied to geodynamics, astrophysics and the radio search for extraterrestrial intelligence are reported. For individual titles, see N86-22765 through N86-22809.

N86-22785*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECT OF THE DYNAMIC WET TROPOSPHERE ON VLBI MEASUREMENTS
R. N. Treuhaft and G. E. Lanyi *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 1-17 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

Calculations using a statistical model of water vapor fluctuations yield the effect of the dynamic wet troposphere on Very Long Baseline interferometry (VLBI) measurements. The statistical model arises from two primary assumptions: (1) the spatial structure of refractivity fluctuations can be closely approximated by elementary (Kolmogorov) turbulence theory, and (2) temporal fluctuations are caused by spatial patterns which are moved over a site by the wind. The consequences of these assumptions are outlined for the VLBI delay and delay rate observables. For example, wet troposphere induced rms delays for Deep Space Network (DSN) VLBI at 20-deg elevation are about 3 cm of delay per observation, which is smaller, on the average, than other known error sources in the current DSN VLBI data set. At 20-deg elevation for 200-s time intervals, water vapor induces approximately 1.5 x 10 to the minus 13th power s/s in the Allan standard deviation of interferometric delay, which is a measure of the delay rate observable error. In contrast to the delay error, the delay rate measurement error is dominated by water vapor fluctuations. Water vapor induced VLBI parameter errors and correlations are calculated. For the DSN, baseline length parameter errors due to water vapor fluctuations are in the range of 3 to 5 cm. The above physical assumptions also lead to a method for including the water vapor fluctuations in the parameter estimation procedure, which is used to extract baseline and source information from the VLBI observables. Author

N86-22786*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NEW REFLECTIVE SYMMETRY DESIGN CAPABILITY IN THE JPL-IDEAS STRUCTURE OPTIMIZATION PROGRAM
D. Strain and R. Levy *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 18-25 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

The JPL-IDEAS antenna structure analysis and design optimization computer program was modified to process half structure models of symmetric structures subjected to arbitrary external static loads, synthesize the performance, and optimize the design of the full structure. Significant savings in computation time and cost (more than 50%) were achieved compared to the cost of full model computer runs. The addition of the new reflective symmetry analysis design capabilities to the IDEAS program allows processing of structure models whose size would otherwise prevent automated design optimization. The new program produced synthesized full model iterative design results identical to those of actual full model

program executions at substantially reduced cost, time, and computer storage. Author

N86-22787*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PRELIMINARY RESULTS TOWARD INJECTION LOCKING OF AN INCOHERENT LASER ARRAY c36
James Daher *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 26-34 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20E

The preliminary results of phase locking an incoherent laser array to a master source in an attempt to achieve coherent operation are presented. The techniques necessary to demonstrate phase locking are described along with some topics for future consideration. As expected, the results obtained suggest that injection locking of an array, where the spacing between adjacent longitudinal modes of its elements is significantly larger than the locking bandwidth, may not be feasible. Author

N86-22788*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LOW-LOSS OFF-AXIS FEEDS FOR SYMMETRIC DUAL-REFLECTOR ANTENNAS
T. Veruttipong, V. Galindo-Israel, and W. Imbriale *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 35-59 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

Circularly symmetric, dual reflector, high gain antenna systems often require feeds placed off the system's axis because of the need for multiple feeds to use the reflector antenna. Also, the constraint requiring the hyperboloid or shaped subreflector to remain circularly symmetric is sometimes added. In a Cassegrainian system, the subreflector and feed may be rotated off axis around the paraboloid focus and retain main reflector focusing. However, substantial spillover results in considerable noise with a high gain/low noise temperature system. In a shaped system, the tilt of the shaped subreflector and feed together results in substantial defocusing as well as spillover noise. If the subreflector is tilted approximately one-half the angle of the feed tilt in either the Cassegrainian or the dual shaped reflector antenna, it is found that spillover and noise are substantially reduced with tolerable defocusing. An extensive numerical analysis of these effects was conducted to determine the characteristics of a planned 70-meter, dual shaped reflector versus Cassegrainian antenna and to gain some understanding of the cause of the observed effects. Author

N86-22789*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A NOTE ON THE WIDEBAND GAUSSIAN BROADCAST CHANNEL
R. J. McEliece (California Inst. of Tech., Pasadena), E. C. Posner, and L. Swanson *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 60-65 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

It is well known that for the Gaussian broadcast channel, timeshared coding is not as efficient as more sophisticated broadcast coding strategies. However, the relative advantage of broadcast coding over timeshared coding is shown to be small if the signal-to-noise ratios of both receivers are small. One surprising consequence of this is that for the wideband Gaussian broadcast channel, which is defined, broadcast coding offers no advantage over timeshared coding at all, and so timeshared coding is optimal. Author

N86-22790*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ON THE DECODE ERROR PROBABILITY FOR REED-SOLOMON CODES
R. J. McEliece (California Inst. of Tech., Pasadena) and L. Swanson *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 66-72 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

Upper bounds on the decoder error probability for Reed-Solomon codes are derived. By definition, decoder error occurs when the decoder finds a codeword other than the transmitted codeword; this is in contrast to decoder failure, which occurs when the decoder fails to find any codeword at all. The results imply, for example, that for a t error correcting Reed-Solomon code of length q - 1 over GF(q), if more than t errors occur, the probability of decoder error is less than 1/t!. In particular, for the Voyager Reed-Solomon code, the probability of decoder error given a word error is smaller than 3 x 10 to the minus 14th power. Thus, in a typical operating region with probability 100,000 of word error, the probability of undetected word error is about 10 to the minus 14th power. Author

N86-22791*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SINGLE CHIP VLSI REED-SOLOMON DECODER c33
H. M. Shao, T. K. Truong, I. S. Hsu, L. J. Deutsch, and I. S. Reed (University of Southern California) *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 73-81 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 09A

A new VLSI design of a pipeline Reed-Solomon decoder is presented. The transform decoding technique used in a previous design is replaced by a time domain algorithm. A new architecture that implements such an algorithm permits efficient pipeline processing with minimum circuitry. A systolic array is also developed to perform erasure corrections in the new design. A modified form of Euclid's algorithm is implemented by a new architecture that maintains the throughput rate with less circuitry. Such improvements result in both enhanced capability and a significant reduction in silicon area, therefore making it possible to build a pipeline (31,15)RS decoder on a single VLSI chip. Author

N86-22792*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EFFECTS OF QUANTIZATION ON SYMBOL STREAM COMBINING IN A CONVOLUTIONALLY CODED SYSTEM
F. Pollara and L. Swanson *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 82-87 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

Symbol stream combining has been proposed as a method for arraying signals at different antennas. If the received symbol streams are recorded on tape, it is desirable to limit the required storage without significantly affecting the performance. It is shown that 4-bit quantized symbols introduce an E sub b/N sub o penalty of only 0.05 dB. Author

N86-22793*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ACQUISITION TIMES OF CARRIER TRACKING SAMPLED DATA PHASE-LOCKED LOOPS
S. Aguirre *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 88-92 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

Phase acquisition times of type II and III loops typical of the Advanced Receiver are studied by computer simulations when the loops are disturbed by gaussian noise. Reliable estimates are obtained by running 5000 trials for each combination of loop signal-to-noise ratio (SNR) and frequency offset. The probabilities of acquisition are shown versus time from start of acquisition for various loop SNRs and frequency offsets. For frequency offsets smaller than one-fourth of the loop bandwidth and for loop SNRs of 10 dB and higher, the loops acquire with probability 0.99 within 2.5 B sub L for type II loops and within 7/B sub L for type III loops. Author

N86-22794*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PHYSICAL OPTICS ANALYSIS OF A FOUR-REFLECTOR ANTENNA, PART 1 c74
A. G. Cha *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 94-100 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20F

Concern has been raised for the 64-m to 70-m antenna upgrade project that the 70-m system may experience greater S-band beam-pointing perturbations than the 64-m system. The S-band perturbations are due to minor (higher order) mode generation, causing subtle cross-polarization fields affecting beam pointing direction, as described herein. For the antennas in their present configuration (64 m), a slight S-band gain degradation of about 0.05 dB can be attributed to these effects. Therefore, a full physical optics analysis was performed for the present-day 64-m system, as described herein. The results were compared with past analyses and experimental observations in order to verify the algebra and computer code with the intent of deriving a valid analysis method for accurately analyzing the 70-m shaped dual reflector Cassegrainian antenna. The results of the new analysis appear to be in excellent agreement with previous analyses and experimental data. Author

N86-22795*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE CHARACTERISTICS FOR AN ARRAY OF TWO RECEIVING SYSTEMS WITH UNEQUAL PREDETECTION SIGNAL-TO-NOISE RATIOS AND ENHANCED RADIO FREQUENCY CARRIER MARGIN IMPROVEMENT
M. H. Brockman *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 101-111 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

Enhanced radio frequency carrier margin improvement for arrayed receiving systems for coherent reception of phase modulated signals with residual carrier provides a significant reduction in carrier loop phase noise and increase in signal to noise ratio in the RF carrier tracking loop with an attendant reduction in telemetry radio loss. A significant increase in Doppler frequency rate capability is also realized relative to operating at a narrower tracking loop bandwidth to obtain the same carrier sensitivity improvement. These performance characteristics are examined for an array of two receiving systems with unequal apertures and statistically independent predetection noise. Author

N86-22796*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERFORMANCE CHARACTERISTICS FOR AN ARRAY OF TWO RECEIVING SYSTEMS WITH EQUAL APERTURES AND ENHANCED RADIO FREQUENCY CARRIER MARGIN IMPROVEMENT
M. H. Brockman *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 112-126 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

Enhanced radio frequency carrier margin improvement for arrayed receiving systems for coherent reception of phase modulated signals with residual carrier provides a significant reduction in carrier loop phase noise and an increase in the signal to noise ratio in the RF carrier tracking loop with an attendant in telemetry radio loss. A significant increase in doppler frequency rate capability is also realized relative to operating at a narrower tracking loop bandwidth to obtain the same carrier sensitivity improvement. These performance characteristics are examined for an array of two receiving sysems with equal apertures and statistically independent prediction noise. Author

N86-22797*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A CONCEPTUAL 34-METER ANTENNA FEED CONFIGURATION FOR JOINT DSN/SETI USE FROM 1 TO 10 GHz
S. D. Slobin *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 127-134 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

The very satisfactory performance of a conceptual 34-m DSS-12 type HA-Dec antenna feed sysem over the frequency range of 1 to 10 GHz is demonstrated. A seven-feedhorn baseline design is developed which will allow Search for Extra-Terrestrial Intelligence (SETI) investigations using each horn over a 1.4:1 frequency range. A gain/system noise temperature (G/T) figure of merit is calculated for the frequency range of each horn; it is found that system performance down to 20 deg elevation is possible with a G/T degradation of less than 3 dB at every frequency. The design presented here will allow shared but independent antenna use by the Deep Space Network (DSN) and SETI with a minimum of operational impacts to DSN functions and no intrusions into the DSN microwave equipment configuration. Author

N86-22798*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSN COMMAND SYSTEM MARK IV-85
H. C. Thorman *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 135-142 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 17B

A functional description of the Deep Space Network Command System and its subsystem is presented. The DSP command system was implemented in 1986. Store and forward command functions are reviewed. Throughput command functions for Earth orbiter missions and subsystems configurations for Mark IV-85 system are summarized. Author

N86-22799*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE NETWORK RADIO SCIENCE SYSTEM FOR VOYAGER URANUS AND GALILEO MISSIONS c91
T. K. Peng and F. F. Donivan *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 143-151 (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

An overview is presented of major new requirements, challenges and conceptual designs for the DSN Radio Science System in the 1985 to 1988 period. The Voyager Uranus encounter is being supported with larger combined aperture, higher sample rate, and a centrally controlled network. The Galileo mission will be provided with a high resolution S-Band Faraday rotation detection capability and a high-stability Doppler system with X-Band uplink for gravitational wave search. Author

N86-22800*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SEARCH FOR REFERENCE SOURCES FOR DELTA VLBI NAVIGATION OF THE GALILEO SPACECRAFT c93
J. S. Ulvestad and R. P. Linfield *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 152-163 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

A comprehensive search was made in order to identify celestial radio sources that can be used as references for navigation of the Galileo spacecraft by means of VLBI observations. The astronomical literature was seached for potential navigation sources, and several VLBI experiments were performed to determine the suitability of those sources for navigation. The results of such work performed since mid-1983 is reported. A summary is presented of the source properties required, the procedures used to identify candidate sources, and the results of the observations of these sources. The lists of souces presented are not meant to be taken directly and used for VLBI navigation, but they do provide a means of identifying the radio sources that could be used at various positions along the Galileo trajectory. Since the reference sources nearest the critical points of Jupiter encounter and probe release are rather weak, it would be extremely beneficial to use a pair of 70-m antennas for the VLBI measurements. Author

N86-22801*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GAIN, PHASE AND FREQUENCY STABILITY OF DSS-42 AND DSS-43 VOR VOYAGE URANUS ENCOUNTER
A. G. Cha and R. Levy *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 164-175 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

Theoretically rigorous definitions are derived of such parameters as RF signal path length, phase delay, and phase/frequency stability in a Cassegrainian antenna applicable to a narrow bandwidth channel, as well as algorithms for evaluating these parameters. This work was performed in support of the Voyager spacecraft encounter with Uranus in January 1986. The information was needed to provide Voyager/Uranus radio science researchers with a rotational basis for deciding the best strategy to operate the three antennas involved during the crucial 5-hour occultation period of the encounter. Such recommendations are made at the end of the article. Author

N86-22802*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE ENCOUNTER OPERATIONS **c90**
N. Fanelli and D. Morris *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 176-185 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

The operations encompassing the International Cometary Explorer's (ICE) encounter with the Comet Giacobini-Zinner on September 11, 1985 are documented. The ICE mission presented new challenges for the Deep Space Network (DSN) 64 meter subnetwork. Because of poor telemetry link margin predicted for Giacobini-Zinner (GZ) encounter, supplemental support by the Japanese Institute for Space and Astronautical Sciences 64-meter antenna at Usuda, Japan and the 305-meter Arecibo Radio Observatory in Puerto Rico was required. To improve the 64 meter subnetwork telemetry performance the following were also implemented: (1) Real time antenna array of 64 meter and 34 meter at a single complex and the required performance testing; and (2) Nonreal time antenna array of two complexes was implemented as a backup in the event of ground or spacecraft failure. Author

N86-22803*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
USUDA DEEP SPACE CENTER SUPPORT FOR ICE **c90**
J. P. Goodwin *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 186-196 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

The planning, implementation and operations that took place to enable the Usuda, Japan, Deep Space Center to support the International Cometary Explorer (ICE) mission are summarized. The results show that even on very short notification our two countries can provide mutual support to help ensure mission success. The data recovery at the Usuda Deep Space Center contributed significantly to providing the required continuity of the experimental data stream at the encounter of the Comet Giacobini-Zinner. Author

N86-22804*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ARECIBO OBSERVATORY SUPPORT OF THE US INTERNATIONAL COMETARY EXPLORER MISSION ENCOUNTER AT COMET GIACOBINI-ZINNER **c90**
D. D. Gordon and M. T. Ward (NASA. Goddard Space Flight Center) *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 197-202 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

The Arecibo Observatory in Puerto Rico participated in the support of the U.S. International Cometary Explorer (ICE) mission when the ICE spacecraft passed through the tail of comet Giacobini-Zinner on September 11, 1985. The Arecibo Observatory is a research facility of the National Astronomy and Ionosphere Center (NAIC) operated by Cornell University under contract to the National Science Foundation (NSF). Coverage of the encounter involved the use of the observatory's 305-m (1000-ft) radio reflector antenna and RF and data system equipment fabricated or modified specifically for support of the ICE mission. The successful implementation, testing, and operation of this temporary receive, record, and data relay capability resulted from a cooperative effort by personnel at the Arecibo Observatory, the Goddard Space Flight Center, and the Jet Propulsion Laboratory. Author

N86-22805*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE TELEMETRY PERFORMANCE **c17**
J. W. Layland *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 203-213 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 09F

Acquiring telemetry data from the International Cometary Explorer (ICE) at its encounter with the comet Giacobini-Zinner on September 11, 1985 proved to be among the more difficult challenges the DSN has met in recent years. The ICE spacecraft began its life as an Earth orbiting monitor of the Solar Wind. At the comet, ICE was nearly 50 times as distant as in its initial role, with its signal strength diminished nearly 2500 times. Collecting enough of that weak signal to provide meaningful scientific data about the comet required unique new telemetry capabilities and special handling by the DSN. This article describes the development and validation of the DSN telemetry capability for ICE from its early planning stages through the successful comet encounter. Author

N86-22806*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PERIODIC VARIATIONS IN THE SIGNAL-TO-NOISE RATIOS OF SIGNALS RECEIVED FROM THE ICE SPACECRAFT
T. Nadeau *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 214-219 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

Data from the ICE probe to comet Giacobini-Zinner are analyzed to determine the effects of spacecraft rotation upon the signal to noise ratio (SNR) for the two channels of data. In addition, long-term variations from sources other than rotations are considered. Results include a pronounced SNR variation over a period of three seconds (one rotation) and a lesser effect over a two minute period (possibly due to the receiving antenna conscan). Author

N86-22807*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERCONTINENTAL ANTENNA ARRAYING BY SYMBOL STREAM COMBINING AT ICE GIACOBINI-ZINNER ENCOUNTER **c90**
W. J. Hurd, F. Pollara, M. D. Russell, B. Siev, and P. U. Winter *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 220-228 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

Deep space tracking stations on different continents were arrayed during the encounter of the International Cometary Explorer (ICE) spacecraft with the comet Giacobini-Zinner during September 9 through 12, 1985. This is the first time that telemetry signals received on different continents have been combined to enhance signal to noise ratio. The arraying was done in non-real time using the method of symbol stream combining. The improvement in signal to noise ratio was typically 2 dB over the stronger of the two stations in each array. Author

N86-22808*# California Inst. of Tech., Pasadena.
TIME AND SPACE INTEGRATING ACOUSTO-OPTIC FOLDED SPECTRUM PROCESSING FOR SETI
K. Wagner and D. Psaltis *In* JPL The Telecommunications and

Data Acquisition Report 15 Feb. 1986 p 229-248 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20N

Time and space integrating folded spectrum techniques utilizing acousto-optic devices (AOD) as 1-D input transducers are investigated for a potential application as wideband, high resolution, large processing gain specirum analyzers in the search for extraterrestrial intelligence (SETI) program. The space integrating Fourier transform performed by a lens channels the coarse spectral components diffracted from an AOD onto an array of time integrating narrowband fine resolution spectrum analyzers. The pulsing action of a laser diode samples the interferometrically detected output, aliasing the fine resolution components to baseband, as required for the subsequent charge coupled devices (CCD) processing. The raster scan mechanism incorporated into the readout of the CCD detector array is used to unfold the 2-D transform, reproducing the desired high resolution Fourier transform of the input signal. Author

N86-22809*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VITERBI ALGORITHM ON A HYPERCUBE: CONCURRENT FORMULATION c64
F. Pilara *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 249-255 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 12A

The similarity between the Fast Fourier Transform and the Viterbi algorithm is exploited to develop a Concurrent Viterbi Algorithm suitable for a multiprocessor system interconnected as a hypercube. The proposed algorithm can efficiently decode large constraint length convolutional codes, using different degrees of parallelism, and is attractive for VLSI implementation. Author

N86-22810 Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia). Div. of Atmospheric Research.
TOVPIX: SOFTWARE FOR EXTRACTION AND CALIBRATION OF TOVS DATA FROM THE HIGH RESOLUTION PICTURE TRANSMISSION FROM TIROS-N SATELLITES
D. M. OBrien 1985 44 p
(CSIRO-DAR-TP-10; ISBN-0-643-03974-0) Copyright. Avail: NTIS
Avail: Issuing Activity

Software which accepts High Resolution Picture Transmission (HRPT) service of the NOAA series of polar orbiting meteorological satellites, and extracts the data pertaining to the high Resolution Infrared Radiation Sounder (HIRS) and Microwave Sounding Unit (MSU) instruments of the TIROS Operational Vertical Sounder (TOVS) package is described. The output from the program is an impage containing the calibrated data for the 20 HIRS channels and 4 MSU channels, with the latter linearly interpolated to the HIRS spots. The output image is cast in the format for the Software for Satellite image processing (SLIP). Earth location of points on the image is accomplished by the satellite navigation package which was integrated with SLIP. The software is designed for routine application, with manual intervention only required whenever a new Satellite is launched or whenever NOAA updates the calibration parameters of the operational satellites. B.G.

N86-22811# European Space Agency, Paris (France).
PROCEEDINGS OF AN INTERNATIONAL SYMPOSIUM ON SATELLITE TRANSMISSIONS
E. J. Rolfe, comp. Nov. 1985 210 p refs Symposium held in Graz, Austria; sponsored by ESA, Austrian Solar and Space Agency, and Forschungsgesellschaft Joanneum Graz
(ESA-SP-245; ISSN-0379-6566) Avail: NTIS HC A10/MF A01

Satellite transmission systems and services; data transmission; wave propagation; and time measurement by satellites were discussed. For individual titles, see N86-22812 through N86-22835.

N86-22812# Technische Univ., Graz (Austria). Dept. of Communications and Wave Propagation.
CURRENT PROBLEMS IN SATELLITE TRANSMISSION RESEARCH
W. Riedler *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 5-11 (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Extension of the usable RF spectrum for satellite transmissions; information transmission by satellite; and timekeeping and time transfer problems in satellite transmission are discussed. Orbit overcrowding and ground station siting are considered. Author (ESA)

N86-22813# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ESA'S FUTURE PLANS IN THE FIELD OF SATELLITE TELECOMMUNICATIONS
P. Bartholome *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 15-20 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The European Space Agency's plans for applications of communications satellites for implementation in the 1990s are outlined. The most promising among these are satellites featuring multibeam phased-array antennas for maritime/aeronautical services in the Atlantic Ocean region and for land mobile services in Western Europe, satellites with on-board TST switching and multiple-bit-rate conversion capability for use in fixed services, and satellites with reconfigurable payloads for direct broadcasting and distribution to cable networks. The program comprises three phases: system definition and design, development of laboratory models as proofs of concepts, and full-scale demonstrations based on in-orbit flights. Author (ESA)

N86-22814# European Space Agency, Paris (France).
THE EUTELSAT SYSTEM OF SATELLITE DATA TRANSMISSIONS
Paul Barthmann (EUTELSAT, Paris, France) *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 21-34 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The EUTELSAT Organization and the satellites composing its space segments are presented. The Earth stations and the assumptions underlying the main characteristics are described. The possibilities offered by satellite multiservices (SMS) are indicated. Limitations of the SMS system are outlined, together with the reasons for certain choices. The approach in the link budgets and the determination of the system capacity are described and examples are given. Author (ESA)

N86-22815# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE OLYMPUS SATELLITE AND ITS UTILIZATION
C. D. Hughes *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 35-40 (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The Olympus satellite was designed to provide communication satellite technology for the 1990s. It has a lift-off mass > 2t and an in-orbit beginning of life mass of 1.5t. Olympus will carry a representative selection of payload elements needed for later operational missions to enable the components to be tested in-orbit and give the opportunity for potential service-providers to develop Earth stations and systems needed for later operational satellites. The satellite has four separate payloads on-board: direct broadcast payload; specialized services payload; 20/30 GHz communications payload, and propagation beacon package. Author (ESA)

N86-22816# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ADVANCED ON-BOARD PROCESSING SATELLITE SYSTEM CONCEPTS
S. E. Dinwiddy *In its* Proceedings of International Symposium on

Satellite Transmissions Nov. 1985 p 41-46 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Repeater systems for ESA communication satellites are described. The systems feature satellite switched TDMA to exploit multiple beams; on-board regeneration to improve TDMA time-plan efficiency; on-board bit-rate conversion to reduce Earth station transmitter power; beam hopping to serve low-traffic beams economically; and time-stages on-board to permit demand assignment. The Agency is concentrating on the development of on-board demodulators and a TST switching system. A payload with the full range of facilities to allow experimenters to run trials of simple and complex on-board-processing systems is proposed.
Author (ESA)

N86-22817# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
EXPERIMENTAL ON-BOARD PROCESSING PAYLOAD FOR ADVANCED COMMUNICATIONS SATELLITE c60
O. B. Millies-Lacroix *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 47-49 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

An in-orbit experiment to test demodulation, remodulation, TST switching, and beam hopping possibilities offered by multi-beam antennas and their corollaries such as frequency reuse and commutation matrices is proposed. The 20/30 GHz band would be used with FDMA initially and TDMA later to assess cost reduction for small user stations.
Author (ESA)

N86-22818# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Data Relay Satellite Space Segment.
THE ESA DATA RELAY SATELLITE PROGRAM c18
D. L. Brown, K. G. Lenhart (ESOC, Darmstadt, West Germany), and M. Otter (ESOC, Darmstadt, West Germany) *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 51-56 (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

A satellite data relay system (DRS) reference concept is described and economic arguments for a DRS are presented. The reference system concept envisages a spacecraft of the Ariane/SPELDA class with a microwave payload operating at S-band, compatible with TDRSS, and at Ka-band for the high data rate services, providing services to four users simultaneously, two in each frequency band. Maximum communication capacity is 2 x 500 Mbps at Ka-band, and 2 x 5 Mbps at S-band for the LEO-DRS-ground link. The spacecraft is compatible with any position in geostationary orbit and scans up to plus or minus 10 deg about the nadir (which corresponds to being able to track LEO spacecraft out to 1000 km altitude). The spacecraft should be able to carry, in its first flight configuration, a preoperational optical communications transceiver in addition to the operational microwave payload.
Author (ESA)

N86-22819# European Space Agency, Paris (France). Directorate of Telecommunications.
OPTIMIZATION TECHNIQUES IN SATELLITE TRANSMISSION DESIGN
L. Erup and R. A. Harris *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 59-69 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

A technique for the use of numerical optimization methods in satellite transmission system design is presented. This allows system designers to concentrate on the engineering aspects of the design process, leaving many of the low-level decisions to the computer. The implementation described, which uses Powell's optimization algorithm and features of the UNIX operating system, can be used with any design program (e.g., transmission simulators). Possibilities and limitations of the method, and examples of its application are outlined.
Author (ESA)

N86-22820# Science Research Council, Edinburgh (Scotland). Rutherford Appleton Lab.
THE USE OF SATELLITE CHANNELS FOR COMPUTER NETWORKING c62
J. W. Burren *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 71-78 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Experience gained from the experiments STELLA and Project Universe in computer networking via satellite is reviewed. In these experiments a broadcast satellite channel was used to provide wide area communication between local area networks at the sites involved. The requirements for this backbone network function are described and the effectiveness of a satellite in this role is assessed. In both experiments satellite access was gained using a minicomputer driving a satellite Earth-station via a microprocessor controller interface. Weaknesses in this design structure are outlined. A high performance controller based on the use of two microprocessor systems used in a parallel configuration, one for the uplink and one for the downlink is described. This controller uses variable rate block encoding and drives a variable rate burst modem.
Author (ESA)

N86-22821# Consiglio Nazionale delle Ricerche, Pisa (Italy). CNUCE Inst.
MIXING STREAM AND DATAGRAM TRAFFIC ON SATELLITE: A FIFO ORDER-BASED DEMAND ASSIGNMENT (FODA) TIME DIVISION MULTIPLE ACCESS (TDMA) SCHEME
R. Beltrame, A. B. Bonito, N. Celandroni, and E. Ferro *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 79-90 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

A FIFO Order based Demand Assignment (FODA) access scheme was designed to handle packetized data and voice traffic in a multiple access satellite broadcast channel of Mbits band. The channel is shared by as many as 64 simultaneously active stations in a range of 255 addressable stations. A sophisticated traffic environment is assumed, including different types of service requirements and an arbitrary load distribution among the stations. The results of 2Mbit/sec simulation tests for an existing hardware environment are presented.
Author (ESA)

N86-22822# Technische Univ., Graz (Austria). Dept. of Communications and Wave Propagation.
PERFORMANCE INVESTIGATIONS FOR DIGITAL DATA TRANSMISSION SYSTEMS
O. Koudelka and W. Riedler *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 91-97 refs Sponsored by Austrian Council for Scientific Research and Austrian Academy of Sciences (For primary document see N86-22811 13-32)
(Contract ESA-5085/82-NL-JS)
Avail: NTIS HC A10/MF A01

The results of a measurement program to characterize the reliability of an Mbit-per-second digital satellite data transmission system using small Earth terminals and OTS (ESA) are presented. The system was tested under various operational conditions and supporting investigations were made by simulations in a laboratory environment. Modem performance and the impact of forward error correction were emphasized. Results show that transmissions with low error rates can be performed. Author (ESA)

N86-22823# Danish Posts and Telegrams, Copenhagen. Radio Communications Office.
ERROR PERFORMANCE AND AVAILABILITY DUE TO PROPAGATION FOR A SIMULATED 64 kbit/sec SATELLITE LINK AT 11 AND 14 GHz
J. R. Larsen *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 99-102 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Based upon 11 and 14 GHz beacon attenuation data, re-

corded every 0.1 sec for the worst months of up to 6 yr, the bit error rate (BER) for a simulated up or down-path 64 kbit/sec link was calculated. A linearized model characteristic, assuming a clear-sky BER of 10 to the minus 7.7 power was used for the transformation of all attenuation samples to number of bit errors. Using the availability criterion of CCITT recommendation G.821, the compliance with the present and proposed CCIR recommendations for digital satellite links was investigated. The analysis indicates that for such a satellite link in Denmark the recommendations using higher BER are not violated, when a clear-sky BER better than 10 to the minus 7.7 power is achieved. Author (ESA)

N86-22824# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
RADIOMETRIC MEASUREMENTS OF SLANT-PATH ATTENUATION
G. Brussaard *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 105-107 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The results of a campaign of long-term measurements of attenuation on slant paths with the aid of radiometers are presented. The analysis of the measurements was supplemented by a theoretical study into radiative transfer of thermal noise in rain. This study provided the framework for an empirical calibration of the radiometric measurements in terms of attenuation on satellite-Earth paths. Author (ESA)

N86-22825# International Telecommunications Satellite Organization, Washington, D. C.
RADIOMETRIC PROPAGATION EXPERIMENTS IN TROPICAL REGIONS
B. Arbesser-Rastburg, D. K. McCarthy, and J. E. Allnutt *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 109-113 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

In order to reduce the data gap for tropical regions propagation prediction models, INTELSAT instituted a 12 GHz radiometric measurement campaign in tropical, high rainfall rate regions. Results from two experiments indicate that there may be considerable differences between temperate and tropical climates in the prediction of single-site and diversity gain statistics. Author (ESA)

N86-22826# Technische Univ., Graz (Austria).
RADIOMETRY, SCATTERING AND COHERENCE
R. Lang and W. Riedler *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 115-118 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The utilization of the theory of partial coherence in microwave propagation research is outlined. Connections between coherence theory and the theory of radiative transfer are discussed. These connections can be used to compare the results gained via the coherence theory with quantities commonly used in propagation research. Author (ESA)

N86-22827# Essex Univ., Colchester (England). Dept. of Mathematics.
COMMON VOLUME MODELLING FOR THE PREDICTION OF INTERFERENCE DUE TO SCATTERING BY HYDROMETEORS
D. G. Charlton and A. R. Holt *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 119-122 refs (For primary document see N86-22811 13-32)
(Contract RDA/84/108)
Avail: NTIS HC A10/MF A01

Factors affecting the calculation of common volumes of radio links subject to rain or ice scattering are discussed. Sidelobes modeled by envelope patterns may result in significant increases in the effective common volume. This effect is most noticeable when considering situations involving a terrestrial beam with its associated high level sidelobes. In considering sidelobes, the width of the antenna beams has increased to such an extent that assumptions made when developing interference models may be questioned. It is shown, for realistic geometries, that the effects due to the refractive index height profile may significantly alter calculations of the effective volume. Author (ESA)

N86-22828# Consiglio Nazionale delle Ricerche, Milan (Italy). Centro di Studio per le Telecomunicazioni Spaziali.
EXPERIMENTAL OPPORTUNITIES OFFERED BY ITALSAT IN TESTING SLANT-PATH PROPAGATION OF THE 20, 40 AND 50 GHz FREQUENCY BANDS
F. Carassa, E. Matricciani, and A. Paraboni *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 123-131 refs Prepared in cooperation with Politecnico di Milano (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Opportunities to measure atmospheric attenuation, depolarization by hydrometeors, wave-front angle of arrival and spatial coherence, phase distortion, amplitude distortion, incoherent radiation, and the transfer characteristics of the depolarizing channel using the ITALSAT satellite are described. Experiment configurations for 20, 40 and 50 GHz propagation are summarized. Author (ESA)

N86-22829# Politecnico di Milano (Italy). Dipt. di Elettronica.
A REALISTIC MODEL OF THE HORIZONTAL STRUCTURE OF RAIN CELLS
C. Capsoni, A. Paraboni, and A. Pawlina (CNR, Milan, Italy) *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 133-137 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

A large population of radar measured ground rain cells was used to devise and assess a rain cell model possessing a high degree of likelihood, for use in telecommunication applications. Various types of cell descriptors were studied to establish a basis for the identification of the model and for the evaluation of its degree of likelihood. It turns out that a population of cells characterized by exponentially shaped rain rate and marked spatial asymmetry in horizontal section best complies with the likelihood requirements. Author (ESA)

N86-22830# Technische Univ., Graz (Austria). Dept. of Communications and Wave Propagation.
QUADRUPLE-SITE RADIOMETRIC DIVERSITY MEASUREMENTS AT 11.6 GHz
W. L. Randeu, W. Riedler, and N. Witternigg *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 141-147 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Results from a quadruple-site radiometric diversity experiment at 11.6 GHz are presented. Data cover 1 yr of continuous measurements. Considerable diversity gain is observed for dual-site pairs. The use of more than two sites increases diversity gain only negligibly. Caused by specific local weather mechanisms, no consistent dependency of diversity gain on site and path-separation is observed. Extrapolation to 20 and 30 GHz, based on relationships obtained from multifrequency radiometer measurements in the same area, confirms the importance of site diversity application at these and higher frequencies. Author (ESA)

N86-22831# Politecnico di Milano (Italy). Dipt. di Elettronica.
ORBITAL DIVERSITY IN COMMUNICATION SYSTEMS AFFECTED BY RAIN
Emilio Matricciani *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 149-155 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The effectiveness of Orbital Diversity (OD) to reduce power margins needed to overcome rain attenuation when the radio links to or from two satellites are designed with unequal power margins is shown. Quantitative results of a study-case (ITALSAT-Olympus) in the 30/20 GHz bands are given. It is shown that OD can employ a number of spare channels of the order of 1%, or less

of the number of assisted stations and that it is little sensitive to system growth in terms of new stations. Experimental data are reported, together with analysis of SIRIO-OTS simultaneous time series at 12 GHz. Author (ESA)

N86-22832# Portsmouth Polytechnic (England). Microwave (Telecommunications) Systems Research Group.
MEASUREMENT AND MODELLING OF AMPLITUDE SCINTILLATIONS ON LOW-ELEVATION EARTH-SPACE PATHS AND IMPACT ON COMMUNICATION SYSTEMS
O. P. Banjo and E. Vilar *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 157-161 refs Sponsored in part by International Telecommunications Satellite Organization (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

Measurements of amplitude scintillations on low-elevation (7.1 and 8.9 deg) satellite downlinks at X-band, including information on the diurnal and seasonal variability of the scintillation are described. The statistical distributions of scintillation amplitude and rms intensity are approximated using the Moulsley-Vilar model. An analytical approximation of this model is presented as a means of predicting long-term system outage time due to scintillations. Theoretical estimates of the average bit-error rate for a digital satellite link subject to scintillation fading are presented for NCFSK and CPSK modulations. Other ways in which scintillations can affect a satellite link are outlined. Author (ESA)

N86-22833# Naval Observatory, Washington, D.C.
MODERN HIGH-PRECISION TIMEKEEPING c19
W. J. Klepczynski *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 165-173 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The incorporation of hydrogen masers into timekeeping systems and the availability of commercial stored ion devices, and how they will affect timekeeping are discussed. Data on the performance of time transfer systems used to intercompare geographically separated clocks are presented. Author (ESA)

N86-22834# Technische Univ., Graz (Austria). Dept. of Communications and Wave Propagation.
TIMING BY SATELLITE: METHODS, RECENT DEVELOPMENTS, AND FUTURE EXPERIMENTS
D. Kirchner and W. Riedler *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 175-186 refs Sponsored by Austrian Council for Scientific Research and Austrian Academy of Sciences (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The principles of timing by satellite are introduced, and the use of the NAVSTAR/Global Positioning System and of communication satellites is described. The satellite-laser experiment LASSO and conceivable experiments using communication and direct-broadcast satellites are explained. Two experiments using the Space Shuttle are described. Author (ESA)

N86-22835# Stuttgart Univ. (West Germany). Inst. for Navigation.
APPLICATION OF THE MICROWAVE TIME TRANSFER AND RANGING EXPERIMENTS (MITREX) MODEM TO RANGING AND NETWORK SYNCHRONIZATION
Ph. Hartl *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 187-193 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

The modem designed for Microwave Time Transfer and Ranging Experiments (MITREX) is described. Position determination of telecommunication satellites by trilateration is possible quickly and precisely with this method. The simulation of the navigation task for satellite rendezvous and docking maneuvers and long baseline determination are discussed. Proposals on how to use the MITREX-modems in TDMA-network synchronization are presented. They are based on separating the TDMA-data transmission and the related synchronization tasks by generating a time reference with the PN-signal by MITREX-modems. This can increase the overall TDMA-efficiency, reduce the complexity of the TDMA hardware, and simplify the network management, thus making TDMA more attractive for networks with a greater number of Earth stations. Author (ESA)

N86-22836*# Stanford Univ., Calif. Space Telecommunications and Radioscience Lab.
OBSERVATIONS OF SuB-LF ELECTROMAGNETIC FIELD PHENOMENA ASSOCIATED WITH MODULATED ELECTRON BEAMS ON STS-3 Final Technical Report, Apr. 1983 - Mar. 1984
Antony C. Fraser-Smith, Peter M. Banks, and Geoffery D. Reeves Aug. 1985 36 p
(Contract NAGW-235; AF Proj. 230-5)
(NASA-CR-176692; NAS 1.26:176692; AD-A162543; RADC-TR-85-152) Avail: NTIS HC A03/MF A01 CSCL 20/14

This report provides initial documentation of some of the Sub-LF (frequencies less than 30kHz) electromagnetic field phenomena observed during the first active electron beam/space plasma experiment on a Space Shuttle orbiter. The experiment took place in March 1982 as part of the third flight of an orbiter, and it was notable for its particularly complete instrumentation for plasma and electromagnetic wave diagnostic measurements. A number of anomalous electric and magnetic field phenomena are observed during the electron beam modulation experiments, including the generation of noise bands, extra harmonics, and a variety of side frequencies. In addition, discrete ELF tones are observed during some of the dc electron beam pulse sequences, and there are peculiarities in the harmonic structure of the electromagnetic fields produced during lower-ELF modulation of the electron beam. Studies of these effects are continuing. GRA

N86-22837# Army Missile Command, Redstone Arsenal, Ala. Test and Evaluation Directorate.
ELECTROMAGNETIC ENVIRONMENTAL CRITERIA FOR US ARMY MISSILE SYSTEMS: EMC (ELECTROMAGNETIC COMPATIBILITY), EMR (ELECTROMAGNETIC RADIATION), EMI (ELECTROMAGNETIC INTERFERENCE), EMP (ELECTROMAGNETIC PULSE), ESD (ELECTROSTATIC DISCHARGE), AND LIGHTNING
Charles D. Ponds Jan. 1985 59 p
(AD-A162577; AD-E950778; AMSMI/RT-85-14-TR) Avail: NTIS HC A04/MF A01 CSCL 16/4

This report presents the design and test requirements in developing an electromagnetic compatibility missile system. Environmental levels are presented for electromagnetic radiation hazards, electromagnetic radiation operational electrostatic discharge, lightning, and electromagnetic pulse (nuclear). Testing techniques and facility capabilities are presented for research and development testing of missile systems. Author (GRA)

N86-22838# Army Military Personnel Center, Alexandria, Va.
ESTIMATING COMPUTER COMMUNICATION NETWORK PERFORMANCE USING NETWORK SIMULATIONS Final Report
Albert B. Garcia Apr. 1985 154 p
(AD-A162580) Avail: NTIS HC A08/MF A01 CSCL 17/2

A generalized queueing model simulation of store-and-forward computer communication networks is developed and implemented using Simulation Language for Alternative Modeling (SLAM). The model includes an ACK/NAK data link protocol, four-level message precedence, finite queues and a response traffic scenario. Network performance, indicated by average message delay and message throughput is estimated using the simulation model. GRA

N86-22839# Rhode Island Univ., Kingston. Dept. of Electrical Engineering.
THE THEORY OF DETECTION IN INCOMPLETELY CHARACTERIZED NON-GAUSSIAN NOISE Report, Aug. 1984 - Jul. 1985
Steven Kay Nov. 1985 39 p
(Contract N00014-84-K-0527)

(AD-A162607; Rept-2) Avail: NTIS HC A03/MF A01 CSCL 09/3

The problem of detecting a signal known except for amplitude in non-Gaussian noise is addressed. The noise samples are assumed to be independent and identically distributed with a probability density function known except for a few parameters. Using a generalized likelihood ratio test it is proven that for a symmetric noise probability density function the detection performance is asymptotically equivalent to that obtained for a detector designed with a priori knowledge of the noise parameters. A computationally more efficient but equivalent test is proposed and a computer simulation performed to illustrate the theory.

Author (GRA)

N86-22840# Department of the Air Force, Washington, D.C.
SITUATION AWARENESS MODE Patent Application
Robert A. Phillips, inventor (to Air Force) Filed 5 Sep. 1985 30 p
(AD-D012015; US-Patent-Appl-SN-772813) Avail: NTIS HC A03/MF A01 CSCL 17/9

A modification is presented to improve radar systems, which normally track a single target, to enable them to perform a simultaneous search of a large space volume while maintaining track of a selected target. This modification entails an operating process in which a search is conducted with a controlled search pattern and search time so that the antenna is as close as possible to the tracked target position at the search conclusion and antenna slewing time is minimized. Finally, the present procedure can be implemented while adding as little as one thousand words of memory to the radar system. Author (GRA)

N86-22841# Department of the Army, Washington, D. C.
ERROR PROCESSING TECHNIQUE FOR MODIFIED READ CODE Patent Application
Stephen J. Urban and Charles D. Bodson, inventors (to Army) Filed 27 Sep. 1985 23 p
(AD-D012024; US-Patent-Appl-SN-780751) Avail: NTIS HC A02/MF A01 CSCL 17/2

A method of error processing is disclosed in which the first erroneous line detected in a facsimile transmission is decoded, and printed in the normal manner, up to the point in the line where an error is detected. An erroneous portion of the line is then defined to be the point in the line from which the error is detected as well as four color changes to the left. This erroneous portion is replaced by the corresponding picture elements in the immediately preceding line. The resulting corrected line is then used as new previous line and the process is repeated with the erroneous portion of each subsequent line being replaced with white until a full line is properly decoded. GRA

N86-22842# Mound Lab., Miamisburg, Ohio.
SIGNAL LINE CABLE EVALUATION
D. R. Knick and P. M. Meyers 22 Oct. 1985 15 p
(Contract DE-AC04-76DP-00053)
(DE86-002838; MLM-MU-85-70-0002) Avail: NTIS HC A02/MF A01

This technical evaluation compares the LDF4-50A and the RG-213/U signal line cables using N connectors. These two signal lines were considered for data acquisition lines in the Component Test Facility. The signal lines were evaluated for delay characteristics and frequency response. Other evaluation criteria were ease of handling, ease of attaching connectors, and cost. The signal line cable that most closely meets the goals of the Component Test Facility is the LDF4-50A. DOE

N86-22843# Argonne National Lab., Ill.
ELECTRONIC MAIL AT ANL
B. Finkel, M. Andre, and K. Janoski Sep. 1985 157 p
(Contract W-31-109-eng-38)
(DE86-002029; ANL/TM-431) Avail: NTIS HC A08/MF A01

Concepts, issues, and commands basic to electronic mail are discussed and the capabilities and limitations of the electronic mail systems currently in place at Argonne National Laboratory is described, with an emphasis on communication through the Bitnet network. The primary purpose of this document is to complement the detailed information found in vendor documents on electronic mail. You can find the details and procedures of specific electronic mail systems in the appropriate manuals listed in the Bibliography. DOE

N86-22844# MATRA Espace, Paris-Velizy (France).
GROUND SEGMENT CONCEPT FOR A DATA RELAY SATELLITE, PHASE 1 Final Report
A. Dignan, E. Golden, M. Hervieux, J. N. Moreau, P. Hansell (Logica Ltd.), and D. Nolan (Logica Ltd.) Paris ESA Jan. 1985 90 p
(Contract ESOC-5645/83-D-JS(SC))
(MATRA-140/MH.07385; ESA-CR(P)-2098) Avail: NTIS HC A05/MF A01

The functions and the architecture of a ground segment operating a European data relay system were defined, assuming that ESOC facilities located at Darmstadt (West Germany) are reused. The retained scheme is based on a centralized concept, where all the data transit (forward and return) to the data relay satellite is centralized by the ground segment. The main problems are: implementation of the diversity at the ground station (required in Ka band by link availability requirements); as the existing (and foreseen) communication networks are not adapted to the high rate data flow dissemination, the real time dissemination of such data pose a problem which was not solved. Author (ESA)

N86-22845# Bureau of Mines, University, Ala.
GROUND-PENETRATING RADAR FOR STRATA CONTROL Investigations Report, 1985
R. H. Church, W. E. Webb, and J. R. Boyle 1985 23 p
(PB86-108354; LC-84-600392; BM-RI-8954) Avail: NTIS HC A02/MF A01 CSCL 08I

As part of the Bureau of Mines health and safety research program in strata control, a ground-penetrating radar (GPR) system capable of penetrating approximately 10 ft into the mine roof has been devised to identify anomalistic conditions. The GPR system consists of a transmitter utilizing a dipole antenna, and a receiver, consisting of a dipole antenna fed into a sampler with a time base housed in a storage oscilloscope. A computer was utilized for data acquisition and data processing. Data analysis by computer enhancement revealed recognizable return radar signatures from the middle man rock and main roof of the test site. Early recognition of such features could lead to immediate corrective actions and result in the saving of lives. GRA

N86-22846# National Bureau of Standards, Washington, D.C. Electromagnetic Fields Div.
NEAR-FIELD ARRAY OF YAGI-UDA ANTENNAS FOR ELECTROMAGNETIC SUSCEPTIBILITY TESTING
D. A. Hill and G. H. Koepke Jul. 1985 84 p
(PB86-102688; NBS/TN-1082) Avail: NTIS HC A05/MF A01 CSCL 09E

A seven-element array of Yagi-Uda antennas was constructed at a frequency of 500 MHz to measure the electrosusceptibility of plane waves. The element weightings are determined by a near-field synthesis technique which optimizes the uniformity of the field throughout a rectangular test volume in the near field of the array. The amplitude and phase of the electric field were measured throughout the test volume with a short dipole probe, and it is found that the agreement with the theory is excellent. E.A.K.

N86-22847# Sigma Research, Inc., Seattle, Wash.
DEVELOPMENT OF A PIPE LOCATION SYSTEM, PHASES 2 AND 3 Final Report, Nov. 1981 - Oct. 1984
T. J. Davis Dec. 1984 74 p
(Contract GRI-5080-353-0335)
(PB86-102902; GRI-85/0162) Avail: NTIS HC A04/MF A01 CSCL 20N

Capability for high resolution imaging of buried gas pipe has been demonstrated under this research project. A synthetic aperture focusing technique (SAFT) was combined with ground penetrating radar for this application. Resolution of objects

separated by as little as 2 to 4 inches at depths of four feet was obtained. The technology appears capable, with some refinement, of providing the basis for field mapping systems. Extensive research was conducted to apply both radar and acoustic methods to the problem since the dual capability would accommodate a greater variety of soils. These methods were evaluated in conjunction with holographic imaging as well as SAFT. GRA

N86-22751# Joint Publications Research Service, Arlington, Va.
PASSIVE LOCATION, TRACKING FOR MOVING EMITTERS
Zhongkang Sun and Peng Zhang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 71-79 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 13, no. 2, Mar. 1985 p 74-79 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22769# Joint Publications Research Service, Arlington, Va.
THEORY, CALCULATION OF LARGE SIGNAL CUT-OFF ZONE IBCFA
Ping Zhou and Keqian Zhang *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 74-85 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 2, no. 2, Mar. 1983 p 45-51 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-22772# Joint Publications Research Service, Arlington, Va.
ELECTROSTATIC LENS OF NEW TYPE FIELD EMISSION GUN
Yushan Tu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 112-116 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 12, no. 1, Jan. 1984 p 119-121 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-22848 Arizona Univ., Tucson.
THE QUALITY OF SYNTHESIZED SPEECH USING LINEAR PREDICTIVE CODING ON FINITE WORDLENGTH INTEGRATED CIRCUITS Ph.D. Thesis
Gerrard Merrill Carlson 1985 174 p
Avail: Univ. Microfilms Order No. DA8525589

The quality of synthetic speech produced by integrated circuit (IC) hardware using fixed-point arithmetic and Linear Predictive Coding (LPC) was studied. A theoretical model explaining the combined effects of finite wordlength and parametric model order is developed. This model is used to predict the results obtained in the experimental phase. In the experimental phase, selected model utterances are synthesized under finite wordlength constraints using LPC parameters. The synthetic speech is evaluated in terms of the log area ratios which define objective speech quality as a parametric distance A theoretical model is developed to predict the experimental results. Simulations of this model produce data that predict the experimental results. The same information is extracted from the model as that obtained from actually running the fixed-point synthesizer simulator.
Dissert. Abstr.

N86-22849 Department of the Air Force, Washington, D.C.
TRI-STATE TYPE DRIVER CIRCUIT Patent
John J. Ennis and Robert K. Booher, inventors (to Air Force) Issued 10 Sep. 1985 9 p Supersedes AD-D010306
(AD-D012002; US-Patent-4,540,904; US-Patent-Appl-SN-491108) Avail: US Patent and Trademark Office CSCL 09/5

An FET complementary pair provides the output to a data line. A data input line is coupled to the gate of the P-FET via an OR gate configuration, and to the gate of the N-FET via an AND gate configuration. The output of each gate configuration is cross-connected to an input of the other. When the input data state changes, the two gate configurations provide delays which are effectively in tandem, so that the FET which was ON is first turned OFF, and after a short delay the other is turned ON. This delay ensures that both FET's are not ON at the same time, which prevents an undesirable power flow. To provide a high impedance float state, an enable input and its complement are connected to the AND and OR gate configurations respectively. Author (GRA)

N86-22850 Department of the Air Force, Washington, D.C.
NARROW DEVIATION VOLTAGE CONTROLLED CRYSTAL OSCILLATOR Patent
Michael M. Driscoll, inventor (to Air Force) Issued 27 Jan. 1984 7 p Supersedes AD-D012021
(AD-D012021; US-Patent-4,550,293; US-Patent-Appl-SN-574434; US-Patent-Class-331-116) Avail: US Patent and Trademark Office CSCL 09/5

A narrow band, voltage controlled crystal oscillator having a linear frequency versus tuning voltage response. The oscillator uses a composite resonator in a novel circuit configuration with a resulting improvement in oscillator output signal frequency stability. Author (GRA)

N86-22851 Department of the Air Force, Washington, D.C.
NARROW PULSEWIDTH PULSE GENERATOR CIRCUIT UTILIZING NPN MICROWAVE TRANSISTORS Patent
Stephen P. Caldwell and David R. Pedersen, inventors (to Air Force) Issued 8 Oct. 1985 6 p Supersedes AD-D010781
(AD-D012022; US-Patent-4,546,268; US-Patent-Appl-SN-559561; US-Patent-Class-307-265) Avail: US Patent and Trademark Office CSCL 10/2

A pulse generator circuit for providing pulses having pulse widths in the order of one nanosecond. The circuitry utilizes NPN microwave transistors exclusively to achieve this result.
Author (GRA)

N86-22852# Stanford Univ., Calif. Lab. of Physics.
ELECTROMAGNETIC SENSOR ARRAYS FOR NONDESTRUCTIVE EVALUATION AND ROBOT CONTROL Annual Report, 1 Sep. 1984 - 31 Aug. 1985
B. A. Auld, J. Kenney, T. Lookabaugh, and M. Gimple Oct. 1985 23 p
(Contract F49620-84-C-0095)
(AD-A161292; AFOSR-85-0970TR) Avail: NTIS HC A02/MF A01 CSCL 14/2

A conceptual base is being developed for the design of inductive (eddy-current) and capacitive sensor arrays capable of providing multifunction sensing, including proximity, tactile and edge recognition. Flaw detection and characterization is also included. The physical base for design is the electromagnetic reciprocity relation, which permits configuration of the probe structure to achieve desired performance characteristics. In this report the design, construction and testing of a novel 5-coil inductive sensor is described, and experimental results are given for its edge sensing function. GRA

N86-22853# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
THE EFFECTS OF ADDITIVES ON NICKEL ELECTRODE DISCHARGE KINETICS
Albert H. Zimmerman and Peter K. Effa 30 Sep. 1985 34 p
(Contract F04701-83-C-0084)
(AD-A161310; TR-0084A(5945-01)-1; SD-TR-85-68) Avail: NTIS HC A03/MF A01 CSCL 09/1

The effects of Ba, Cd, Co, Li, Mn, and Zn additives on the impedance of porous nickel electrodes have been measured. The resistance to proton diffusion in the charged electrode is decreased only by Li, Co, and Mn additives. The charge transfer resistance

of the nickel electrode can be decreased up to two orders of magnitude by Co and Li additives. The electronic resistance of the discharged active material is reduced significantly by Mn and Co and to a lesser extent by Li. Data are presented indicating that the resistance characteristics correlate with performance during high rate cycling, and that the effects of additives on the physical structure of the active material deposit can be just as important as changes on conductivity. GRA

N86-22854# Department of the Air Force, Washington, D.C.
TIW/SI SELF-ALIGNED GATE FOR GaAs MESFETs Patent Application
William V. McLevige, inventor (to Air Force) Filed 6 Jun. 1985 16 p
(AD-D012001; US-Patent-Appl-SN-741643) Avail: NTIS HC A02/MF A01 CSCL 09/5

A major difficulty with fabricating GaAs digital logic circuits using enhancement-mode MESFETs has been the large gate-source and gate-drain parasitic resistances inherent in conventional designs. A self-aligned gate process is presented, which incorporates a mushroom gate structure for self-aligning both an n+ implant and the source/drain contacts to the gate, thus minimizing the parasitic resistances. The mushroom gate consists of a two-layer TiW/Si metallization in which the bottom TiW layer is undercut with a closely controllable chemical etch. The process is compatible with the high temperature anneal necessary to activate ion-implanted GaAs. GRA

N86-22855# Department of the Air Force, Washington, D.C.
LINEAR GEOMETRY THYRATRON Patent Application
Stanley Byron, inventor (to Air Force) Filed 6 Mar. 1985 23 p
(AD-D012016; US-Patent-Appl-SN-708910) Avail: NTIS HC A02/MF A01 CSCL 09/1

The low pressure gas-filled thyratron is scalable in the long dimension. Internally the tube is formed as a tetrode, with an auxiliary grid placed between the cathode and the control grid. A dc or pulsed power source drives the auxiliary grid both to insure uniform cathode emission and to provide a grid-cathode plasma prior to commutation. The high voltage holdoff structure consists of the anode, the control grid and its electrostatic shielding baffles, and a main quartz insulator. A small gas flow supply and exhaust system is used that eliminates the need for a hydrogen reservoir and permits other gases, such as helium, to be used. The thyratron provides a low inductance, high current, long lifetime switch configuration: useful for switch-on applications involving large scale lasers and other similar loads that are distributed in a linear geometry. GRA

N86-22856# Department of the Air Force, Washington, D.C.
DIRECT MOAT SELF-ALIGNED FIELD OXIDE TECHNIQUE Patent Application
Cricchi, inventor (to Air Force) Filed 21 Oct. 1985 10 p
(AD-D012018; US-Patent-Appl-SN-789863) Avail: NTIS HC A02/MF A01 CSCL 09/5

A process is used to produce high density radiation hardened Complementary Metal Oxide Semiconductor (CMOS) circuits. The steps are as follows: (1) growing a field oxide layer including any specialized hardening techniques thereto on a silicon wafer; (2) depositing a material which will serve as an implant mask such as aluminum; (3) etching this layer to leave shapes where the thin oxide gate regions are to be; (4) depositing a spacer material such as sputtered nitride onto the shapes; (5) etching the spacer material; (6) depositing a field implant mask; (7) etching the implant mask; (8) implanting the field regions; (9) stripping the implant mask; (10) stripping the spacer material is used; (11) depositing a secondary masking layer such as Ti-W or W; (12) bias sputtering away secondary masking material at edges of aluminum shapes; (13) removing aluminum shapes using secondary material as a mask; (14) etching oxide under aluminum shapes to reach the silicon wafer; (15) stripping secondary masking layer; (16) growing gate oxide; (17) removing field oxide layer to expose source and drain regions in the wafer; and (18) placing electrodes into the drain, source and gate regions. GRA

N86-22857# Department of the Army, Washington, D. C.
SINGLE PLANE TRANSIENT VOLTAGE SUPPRESSION DEVICE ASSEMBLY Patent Application
Leon H. Riley, inventor (to Army) Filed 23 Sep. 1985 7 p
(AD-D012023; US-Patent-Appl-SN-778941) Avail: NTIS HC A02/MF A01 CSCL 10/2

This transient voltage suppression device (TVSDA) provides for two sets of connectors (one input and one output) to be mounted in a single plane. Voltage suppression devices are connected, in a low parasitic inductance fashion, between leads interconnecting separate connector pins and the body of the TVSDA. The TVSDA has a minimum VSD lead length. Author (GRA)

N86-22858# Lawrence Livermore National Lab., Calif.
POTENTIAL FOR EFFICIENT FREQUENCY CONVERSION AT HIGH AVERAGE POWER USING SOLID STATE NONLINEAR OPTICAL MATERIALS
D. Eimerl 28 Oct. 1985 138 p
(Contract W-7405-eng-48)
(DE86-001931; UCID-20565) Avail: NTIS HC A07/MF A01

High-average-power frequency conversion using solid state nonlinear materials is discussed. Recent laboratory experience and new developments in design concepts show that with current technology, a few tens of watts may be extended by several orders of magnitude. For example, using KD*P, efficient doubling (> 70%) of Nd:YAG at average powers approaching 100 KW is possible; and for doubling to the blue or ultraviolet regions, the average power may approach 1 MW. Configurations using segmented apertures permit essentially unlimited scaling of average power. High average power is achieved by configuring the nonlinear material as a set of thin plates with a large ratio of surface area to volume and by cooling the exposed surfaces with a flowing gas. The design and material fabrication of such a harmonic generator are well within current technology. DOE

N86-22859# California Univ., Berkeley. Lawrence Berkeley Lab.
Ge:Be FAR INFRARED PHOTOCONDUCTORS
N. M. Haegel and E. E. Haller Aug. 1985 16 p refs Presented at the IR Detector Technology Workshop, Mountain View, Calif., 13 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001979; LBL-20238; CONF-8508141-1) Avail: NTIS HC A02/MF A01

Germanium:Beryllium photoconductors have been optimized for the 30 to 50 micron m wavelength range. Crystal growth of detector quality material requires good control of both the Be and residual impurity doping. Detective quantum efficiencies of eta(sub d) = 46% at 5 A/W have been achieved at a photon background of 10 to the 8th power p/s. The responsivity of Ge:Be detectors can be strongly temperature-dependent when the residual shallow levels in the material are closely compensated. Transient responses on the order of approx. 1 second have been observed in some materials. The role of residual shallow impurities on the performance of photoconductors doped with semi-deep and deep impurities is discussed. DOE

N86-22860# California Univ., Berkeley. Lawrence Berkeley Lab.
STATUS OF NTD Ge BOLOMETER MATERIAL AND DEVICES
E. E. Haller, N. M. Haegel, and I. S. Park Aug. 1985 15 p refs Presented at the IR Detector Technology Workshop, Mountain View, Calif., 13 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001988; LBL-20237; CONF-8508141-2) Avail: NTIS HC A02/MF A01

The first IR Detector Technology Workshop took place at NASA Ames Research Center on July 12 and 13, 1983. The conclusions presented at that meeting are still valid. More has been learned about the physics of hopping conduction at very low temperatures which will be important for bolometer design and operation at ever decreasing temperatures. Resistivity measurements have been extended down to 50 mK. At such low temperatures, precise knowledge of the neutron capture cross sections sigma(sub n) of the various Ge isotopes is critical if one is to make an

accurate prediction of the dopant concentrations and compensation, and therefore resistivity, that will result from a given irradiation. An empirical approach for obtaining the desired resistivity material and is described the process of conducting a set of experiments which will improve the knowledge of the effective sigma(sub n) values for a given location in a particular reactor is discussed. A wider range of NTD Ge samples is now available. Noise measurements on bolometers with ion implanted contacts show that no 1/f noise component appears down to 1 Hz and probably lower. DOE

N86-22861# Oak Ridge National Lab., Tenn.
FRACTAL MODEL FOR THE ac RESPONSE OF A ROUGH INTERFACE
T. Kaplan, S. H. Liu, and L. J. Gray Aug. 1985 4 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE85-018093; CONF-851217-2) Avail: NTIS HC A02/MF A01

The ac response of an interface between two materials of very different conductivities (e.g., an electrode and an electrolyte) cannot be simply modeled by a resistor and a capacitor. Instead it is found necessary to include a constant-phase-angle (CPA) element whose impedance has the form Z((LC OMEGA)) infinity (j(LC OMEGA))(sup -eta), where (LC OMEGA) is the angular frequency, j = (RADICAL)-1, and 0 < eta < 1. Furthermore, it is observed that the parameter eta is intimately related to surface roughness, with eta approaching unity when the surface is made increasingly smooth. DOE

N86-22862# Sandia National Labs., Albuquerque, N. Mex.
DAMAGE DUE TO HOT-CARRIER AND RADIATION EFFECTS IN MOS TRANSISTORS
J. D. McBrayer, D. M. Fleetwood, R. A. Pastorek, and R. V. Jones 1985 5 p Presented at the 16th Semiconductor Interface Specialists Conference, Ft. Lauderdale, Fla., 5 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018275; SAND-85-2068C; CONF-851233-1) Avail: NTIS HC A02/MF A01

The relative types and magnitudes of damage produced by ionizing radiation and hot carriers for a current CMOS technology are discussed and these effects are related to each other. DOE

N86-22863# Bell Communications Research, Inc., Murray Hill, N.J.
ELECTRON MICROSCOPY OF REACTIONS ON COMPOUND SEMICONDUCTOR SURFACES
T. Sands, V. G. Keramidas, J. Washburn, and R. Gronsky Aug. 1985 29 p Presented at the Electronic Materials Conference, Boulder, Colo., 18 Jun. 1985 Prepared in cooperation with Lawrence Berkeley Lab., CA.
(Contract DE-AC03-76SF-00098)
(DE86-000623; LBL-19764; CONF-8506207-1) Avail: NTIS HC A03/MF A01

In compound semiconductor discrete devices and integrated circuits, interfacial structure and integrity in multilayered structures is of paramount importance. Ohmic contacts, Schottky barriers, interconnect metallizations, active and passive dielectric layers and implanted or chemically formed semiconductor heterojunctions are attained by the deposition of reactant species and subsequent thermal treatment. The performance criteria and long-term reliability of such structures require that the interfaces be planar and the reacted layers be laterally uniform. Application of transmission electron microscopy to the study of such structures leads to an understanding of the factors which influence and often control the evolution of interfacial compositions and morphologies during deposition and annealing. Four types of reactions on compound semiconductors (formation of layered binary compounds, formation of ternary phases, cation exchange and anion accumulation) are described and illustrated with electron microscopy results from selected examples. DOE

N86-22864# Stanford Univ., Calif. Integrated Circuits Lab.
NEW INTEGRATED POLYSILICON PHOTOCONDUCTORS FOR ULTRAFAST MEASUREMENTS ON SILICON
D. R. Bowman, R. B. Hammond, and R. W. Dutton 1985 18 p refs Presented at the IEEE International Electron Devices Meeting, Washington, D.C., 1 Dec. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-000820; LA-UR-85-3323; CONF-851237-1) Avail: NTIS HC A02/MF A01

A fully-integrated silicon-optical-switch technology is reported that demonstrates one picosecond sampling aperture when excited by a femtosecond laser. Fabrication of the polycrystalline-silicon-switch structure is accomplished with standard-integrated-circuit processing techniques to insure full compatibility with standard-VLSI processes. Photoresist-masked ion-beam irradiation is used to generate trapping sites in the photoconductive layer and tailor the switch on-time. Limited optimization of process parameters resulted in photoconductors demonstrating 3-dB measurement bandwidths over 100 GHz when used as sampling gates. A model for the device performance has been developed and is compared with experimental results. Application of the optical switch in a high speed sampling system for the measurement of striplines on a silicon wafer demonstrated dispersive effects that have been observed for the first time. DOE

N86-22865# California Univ., Berkeley. Lawrence Berkeley Lab.
FURTHER MEASUREMENTS OF ELECTRON TRANSMISSION AND AVALANCHE GAIN IN NARROW LEAD GLASS TUBING
I. Fujieda, T. A. Mulera, V. Perez-Mendez, and A. delGuerra Oct. 1985 7 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with Pisa Univ, Italy
(Contract DE-AC03-76SF-00098)
(DE86-001983; LBL-20366; CONF-851009-1) Avail: NTIS HC A02/MF A01

Measurements of electron transmission and multiplication in lead glass tube arrays, in which a resistive field shaping electrode is provided by reduction of a surface layer of lead oxide, have been continued. The transmission losses have been successfully modeled allowing the true avalanche gains to be extracted. Gains of up to 100 have been observed. Applications as a photon shield in Cherenkov imaging detectors are discussed. DOE

N86-22866# California Univ., Berkeley. Lawrence Berkeley Lab.
MACROSCOPIC QUANTUM EFFECTS IN THE ZERO VOLTAGE STATE OF THE CURRENT BIASED JOSEPHSON JUNCTION
J. Clarke, M. H. Devoret, J. Martinis, and D. Esteve May 1985 21 p Presented at the 3rd International Conference on Superconducting Quantum Devices, Berlin, West Germany, 25 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001985; LBL-19652; CONF-8506203-3) Avail: NTIS HC A02/MF A01

When a weak microwave current is applied to a current-biased Josephson tunnel junction in the thermal limit the escape rate from the zero voltage state is enhanced when the microwave frequency is near the plasma frequency of the junction. The resonance curve is markedly asymmetric because of the anharmonic properties of the potential well: this behavior is well explained by a computer simulation using a resistively shunted junction model. This phenomenon of resonant activation enables one to make in situ measurements of the capacitance and resistance shunting the junction, including contributions from the complex impedance presented by the current leads. For the relatively large area junctions studied in these experiments, the external capacitive loading was relatively unimportant, but the damping was entirely dominated by the external resistance. DOE

N86-22867# Los Alamos National Lab., N. Mex.
SSC KICKER IMPEDANCES
E. P. Colton and T. F. Wang 1985 9 p Presented at the SSC Impedance Workshop, Berkeley, Calif., 26 Jun. 1985
(Contract W-7405-eng-36)

(DE86-002434; LA-UR-85-3816; CONF-8506212-1) Avail: NTIS HC A02/MF A01

The longitudinal and transverse complex impedances Z/sub l//n and Z/sub t/, respectively, have been calculated for both the SSC injection and abort kickers. The calculations assumed that no attempt was made to shield the beam from the kickers. We took the injection and abort kickers to be as specified. The injection kickers were ferrite with a single-turn design, and the abort kickers were of a window-frame design with tape wound cores. DOE

N86-22868# Lawrence Livermore National Lab., Calif.
MODELING ON-RESISTANCE FOR SILICON PHOTOCONDUCTIVE SWITCHING DEVICES
J. D. Morse 22 Aug. 1985 21 p
(Contract W-7405-eng-48)
(DE86-002611; UCID-20533) Avail: NTIS HC A02/MF A01

Analytical models have been developed in order to characterize the on-resistance of silicon photoconductive switching devices as a function of the optical energy absorbed. It has been shown that by using a more exact mobility model which accounts for physical effects on the carrier mobility, significant changes in conductance are found for the same device structure. The effects accounted for in this more exact model are electric field degradation, carrier-carrier interactions, and temperature effects. Further work in this area should concentrate on obtaining experimental data to verify these results, along with the development of more exact numerical models to account for two-dimensional drift and diffusion effects on device performance. DOE

N86-22869# Los Alamos National Lab., N. Mex.
KIND OF HIGH-QUALITY TRIGGER CIRCUIT USED IN FIELD MEASUREMENT
Y. Yang and X. Zhang 1985 5 p Translated from Pao Cha Yu Ch'ung-chi (China), no. 1, 1981 p 97-98
(Contract W-7405-eng-36)
(DE86-002862; LA-tr-85-49) Avail: NTIS HC A02/MF A01

In field measurements, complicated working conditions and the one-time nature of the experiments place rather high operational stability requirements on the measuring system. For some measurements, the trigger circuit is a rather important link. Its performance not only affects whether or not measurement results are obtained, but also influences whether or not the results are satisfactory. This paper shows the advantages of the utilization of this trigger circuit. Its operation is stable and reliable, its resistance to interference is great, its circuit is simple, its volume is small, and it conserves electricity. In field measurements of numerous large scale blasts we obtained satisfactory results for several modes of usage. DOE

N86-22870# California Univ., Berkeley. Lawrence Berkeley Lab.
SPATIALLY-RESOLVED INVESTIGATION OF TRANSPORT IN SEMICONDUCTORS: A PHOTOTHERMAL DEFLECTION APPROACH
A. Skumanich, D. Fournier, A. C. Boccara, and N. M. Amer Jun. 1985 7 p Presented at the 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, Quebec, Canada, 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002872; LBL-20186; CONF-850886-5) Avail: NTIS HC A02/MF A01

The unique ability of photothermal deflection spectroscopy to probe the local index of refraction of matter is exploited to investigate, in a spatially-resolved manner, thermal and electronic transport in semiconductors. An added advantage of this approach is that it is contactless; hence, it obviates the classical problems associated with electrodes and contacts. The basic premise of the technique is the use of the heat associated with non-radiative processes (e.g., recombination of carriers) to deflect a focussed laser probe beam (sub-gap energy) propagating through the semiconductor. The deflection of the probe beam is caused by a change in the refractive index of the sample which is in turn governed by carrier diffusion and recombination. DOE

N86-22871# Tennessee Valley Authority, Chattanooga. Div. of Energy Demonstrations and Technology.
TEST AND EVALUATION OF THE CHLORIDE SPEGEL S1P108/30 ELECTRIC VEHICLE BATTERY CHARGER
R. L. Driggans and A. S. Keller Sep. 1985 52 p
(DE86-900228; TVA/PE/EDT-85/23) Avail: NTIS HC A04/MF A01

The Chloride Spegel Model S1P108/30 electric vehicle battery charger was tested by the Tennessee Valley Authority (TVA) as an account of work sponsored by the Electric Power Research Institute (EPRI). Charger input/output voltage, current, and power characteristics and input waveform distortion were measured; and induced electromagnetic interference was evaluated as the charger recharged a lead-acid battery pack. Electrical quantities were measured with precision volt-ampere-watt meters, frequency counters, a digital-storage oscilloscope, and a spectrum analyzer. THe Chloride charger required 8.5 hours to recharge a 216V tubular plate lead-acid battery from 100 percent depth of discharge (DOD). Energy efficiency was 83 percent, specific power was 37.4 W/kg (17.0 W/lb), input current distortion varied from 22.4 to 34.1 percent, and electromagnetic interference was observed on AM radio. Tests were conducted with the battery at initial DOD of 100, 75, 50, and 25 percent. Charge factor was 1.14 from 100-percent DOD, increasing to 1.39 from 25-percent DOD. DOE

N86-22872# Stanford Linear Accelerator Center, Calif.
MEAN LIFE OF KLYSTRONS
M. Sands 30 Oct. 1985 7 p
(Contract DE-AC03-76SF-00515)
(DE86-002381; SU-SLAC-CN-310) Avail: NTIS HC A02/MF A01

It would be useful to have the best possible estimate of this mean life-time of our new klystrons based on the most recent, available operating experience. A simple formula is given for this best estimate, based on the maximum likelihood method. This method also provides an indication of the reliability of the estimated lifetime. The results given here apply uniquely to a uniform klystron population for which we can assume that deaths occur randomly, and independently of the previous history (operating time) of any one klystron. DOE

N86-22873# Los Alamos National Lab., N. Mex.
RADIATION EFFECTS ON VIDEO IMAGERS
G. J. Yates, J. J. Bujnosek, S. A. Jaramillo, R. B. Walton, T. M. Martinez, and J. P. Black 1985 9 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with EG and G, Inc., Los Alamos, N. Mex.; EG and G, Inc., Albuquerque, N. Mex.
(Contract W-7405-eng-36)
(DE86-002435; LA-UR-85-3803; CONF-851009-8) Avail: NTIS HC A02/MF A01

Radiation sensitivity of several photoconductive, photoemissive, and solid state silicon-based video imagers was measured by analyzing stored photocharge induced by irradiation with continuous and pulsed sources of high energy photons and neutrons. Transient effects as functions of absorbed dose, dose rate, fluences, and ionizing particle energy are presented. DOE

N86-22874# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
A DESIGN OF CPV AND BIPOLAR ASSEMBLIES OF NICKEL/HYDROGEN CELL STACKS (SUMMARY ONLY)
T. L. Markin, S. Y. Moss, and D. N. E. Smith Paris ESA May 1985 10 p 2 Vol.
(Contract ESTEC-5719/83-NL-AN(SC))
(AERE-G-3349-Vol-1; ESA-CR(P)-2106-Vol-1) Avail: NTIS HC A02/MF A01

A conceptual design of a Common Pressure Vessel (CPV) assembly of nickel/hydrogen cell stacks is described. The design features two 85 Ah cell stacks, giving a capacity of 210 Wh in a cylindrical composite vessel. The design is estimated to yield a gravimetric energy density of 71 Wh/kg and a volumetric energy density of 85.5 Wh/l (60 bar), although the significance of the latter figure is qualified. The preference for the two-stack module

is largely influenced by the flexibility it allows for battery assembly. A study of bipolar assemblies identified interesting concepts, but no single preference. Simulations of the thermal performance of both designs for GEO and LEO cycles, against a number of idealized boundary conditions, indicate that the desired operating temperature range is maintainable with adequate boundary temperature control. Author (ESA)

N86-22875# United Nations Industrial Development Organization, Vienna (Austria).
APPROACH TO REGIONAL MICROELECTRONICS CO-OPERATION PROGRAMME
S. Wajnberg 24 Jun. 1985 14 p
(PB86-104668; UNIDO-ID/WG.440/11; V.85-28527) Avail: NTIS HC A02/MF A01 CSCL 09A

Regional cooperation in the ECLAC region in the field microelectronics (based on experience in Brazil) - covers (1) the electronics industry (2) approach to a relevant cooperation program (TCDC) (3) projects concerning microelectronic components including integrated circuits; finished products; input (4) research and development (5) education and training required to obtain experts and technical personnel. GRA

N86-22876# National Bureau of Standards, Gaithersburg, Md. Electrosystems Div.
HIGH VOLTAGE DIVIDER AND RESISTOR CALIBRATIONS Final Report
M. Misakian Jul. 1985 34 p
(PB86-105715; NBS/TN-1215) Avail: NTIS Avail: SOD HC $1.25 as 003-003-02672-7 CSCL 09A

A calibration service for determining the ratio of high voltage dc dividers and the resistance of high voltage resistors is described. Calibrations are performed with a Wheatstone bridge apparatus with a simple guard system. Sources of systematic error are identified and methods for characterizing the standard high voltage resistors are discussed. Ratio and resistance values can be determined between the voltages of 10 kV and 150 kV with an uncertainty of less than + or 0.01%. E.A.K.

N86-22617# Societe Crouzet, Valence (France).
ADVANCED PRINTED WIRING BOARD (PWB) MATERIALS FOR SURFACE MOUNTED DEVICES IN AEROSPACE APPLICATIONS
G. Menozzi *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 203-213 refs Sponsored by CNES (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22618# Du Pont (UK) Ltd., Stevenage (England).
MULTILAYER PRINTED CIRCUIT BOARD CHARACTERIZATION BY THERMAL ANALYSIS
J. N. Leckenby *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 215-222 refs Sponsored by International Computers Ltd., Kidsgrove, England and Fortin Industries Inc., Sylmar, Calif. (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22762# Joint Publications Research Service, Arlington, Va.
A FAST LEADING-EDGE PULSE GENERATOR Abstract Only
Rendao Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 139 Transl. into ENGLISH from Hedianzixue Yu Tance Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 294-297 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22763# Joint Publications Research Service, Arlington, Va.
TYPE GDB-110 LARGE AREA, FAST RESPONSE PHOTOMULTIPLIER Abstract Only
Yonglu Song, Deqi Xu, Biao Yu, and Shou Li *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 140 Transl. into ENGLISH from Hedianzixue Yu Tace Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 303-306 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22766# Joint Publications Research Service, Arlington, Va.
DIRECTIONS OF TECHNOLOGICAL DEVELOPMENT BY ELECTRIC INDUSTRY
Keiji Narimatsu *In its* Japan Report: Science and Technology (JPRS-JST-86-006) 18 Mar. 1986 p 47-54 Transl. into ENGLISH from Enerugi Foramu (Tokyo, Japan) Jul. 1985 p 84-87 (For primary document see N86-22764 13-31)
Avail: NTIS HC A04/MF A01

N86-22768# Joint Publications Research Service, Arlington, Va.
EMISSION MECHANISM OF OXIDE CATHODE
Enqui Zhang *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 63-73 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 2, no. 2, Mar. 1983 p 33-39 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-22791*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SINGLE CHIP VLSI REED-SOLOMON DECODER
H. M. Shao, T. K. Truong, I. S. Hsu, L. J. Deutsch, and I. S. Reed (University of Southern California) *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 73-81 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 09A

N86-23246# Joint Publications Research Service, Arlington, Va.
MAGNETOPHORE THERAPY
Igor Mosin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 54-55 Repr. from Moscow News (Moscow, USSR), no. 36, 15-22 Sep. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-22877 Georgia Inst. of Tech., Atlanta.
LASER DOPPLER DIAGNOSTICS OF THE FLOW BEHIND A BACKWARD FACING STEP Ph.D. Thesis
Wilhelmus Adrianus deGroot 1985 211 p
Avail: Univ. Microfilms Order No. DA8521246

A detailed investigation of two-dimensional backward facing step flows without and with mass addition from the bottom surface behind the step is reported. Ensemble averages of Laser Doppler Velocimeter measurements were used to obtain the mean velocities and turbulence quantities. Probability density functions constructed from these measurements and acoustic spectra obtained with a microphone probe do not indicate the presence of low frequency oscillations. No intermittency was discovered in the shear layer. It is shown that injection does not have an effect on the length of the reattachment zone and only a small effect on the total size of this zone. It is shown that turbulence quantities inside the recirculation zone exhibit a remarkable decrease with increasing injection. The maxima of these quantities do not markedly change with injection. Maximum Reynolds stresses are considerably higher than the stresses measured by other researchers. Dissert. Abstr.

N86-22878 Pennsylvania State Univ., University Park.
COMPUTATION OF INCOMPRESSIBLE FLOW BY A COUPLED IMPLICIT SCHEME Ph.D. Thesis
Dochul Choi 1985 139 p
Avail: Univ. microfilms Order No. DA8525669

The Linearized Block Alternating-direction implicit (LBI) scheme is studied to obtain steady state solutions of incompressible flow equations in generalized coordinates. The LBI scheme is applied to the incompressible equations by adding an artificial time derivative to the continuity equation. This modification allows both the pressure and velocity to be obtained implicity, in a fully coupled manner. Two dimentional inviscid solutions are attempted in two ways: by applying the LBI scheme to the hyperbolized incompressible equations, and by applying the scheme to preconditioned compressible equations. The preconditioning procedure is developed to achieve rapid convergence at the incompressible limit (low Mach number) of compressible flow equations. This procedure makes the convergence rate independent of Mach number and restores the convergence rates which are characteristic of high subsonic Mach numbers. Converged flowfields from both sets of equations are identical and agree well with those obtained from the Douglas-Neumann program. Stability characteristics of the scheme are carefully studied through Fourier analyses in vector form. Dissert. Abstr.

N86-22879 Pittsburgh Univ., Pa.
ASYMMETRIC ROTATING DISK FLOW. A NEW SET OF SOLUTIONS OF THE NAVIER-STOKES EQUATIONS Ph.D. Thesis
Ching-Yue Lai 1985 168 p
Avail: Univ. Microfilms Order No. DA8524839

Flows occurring between parallel rotating disks have recently been generalized by Parter and Rajagopal (1984) to include solutions that are not axisymmetric. They prove the existence of a one-parameter family of solutions for flows between two disks rotating about either a common axis or distinct axes. In light of the foregoing, one is advised to re-examine the classical problems of flow between two rotating disks and over a single rotating disk within the context of the establishing asymmetric solutions numerically. The Galerkin's method using B-splines are trial functions was used to solve for the basic flow and for the stability of the basic flow to infinitesimal disturbances. The flow between infline parallel disks appears to have multiple solutions (Holodniok, et. al., (1981)). In the classical Karman problem, each of these solutions give rise to an infinite number of asymmetric solutions. rotations about common axis and distinct axes were assumed in the calculation of asymmetric two disk flows. Dissert. Abstr.

N86-22880 California Univ., Berkeley.
RADIATIVE-CONVECTIVE HEAT TRANSFER TO SOLID SPHERICAL PARTICLES IN A VERTICAL CHANNEL FLOW Ph.D. Thesis
Joon Sik Lee 1985 151 p
Avail: Univ. Microfilms Order No. DA8525030

A numerical study has been conducted pertaining to the problem of radiative convective heat transfer to solid spherical particles in a vertical channel flow. The gas phase is treated within the context of an Eulerian (continuum) formulation. For the particulate phase, a Lagrangian approach has been employed that includes two-way coupling of momentum and heat transfer between phases. The gas flow is in laminar regime and the particle Reynolds number based on the particle radius and skip velocity between phases is of order one. The particulate phase is dilute enough that direct particle, particle interactions are negligible but particle volume fraction effects are retained in the transport equations for the gas phase. The particle and channel wall surfaces are taken as diffusely emitting and reflecting. For the particulate phase, radiative heat transfer is directly coupled with convective heat transfer through the energy conservation equation and for the walls, through the thermal boundary condition. Dissert. Abstr.

N86-22881 Cornell Univ., Ithaca, N.Y.
SOME PROBLEMS OF HYDRODYNAMIC STABILITY ARISING IN GEOPHYSICAL FLUID DYNAMICS Ph.D. Thesis
Sanjiva Keshava Lele 1985 328 p
Avail: Univ. Microfilms Order No. DA8525778

Two problems of hydrodynamic instability are considered. One concerns the linear and nonlinear dynamics of Langmuir circulations in the ocean arising from the stabilizing influence of current shear and wave action. The second considers instabilities of geophysical Ekman layers. The theoretical model of Leibovich (1977a) is used to investigate the influence of the thermal environment on Langmuir circulations. Stable stratification is found to limit both the strength and the vertical penetration of the circulation: strong thermoclines act as a virtual bottom. Linear stability characteristics for the finite layer problems with various combinations of mechanical and thermal boundary conditions are obtained numerically. Limit cases of interest are treated analytically, a case of particular interest establishes an analogy between Langmuir circulations and Marangoni convection. The nonlinear physics of Langmuir circulations is studied with carefully chosen finite difference simulations. Even with weak stable stratification the onset of steady circulations is subcritical. As the stratification is increased two classes of steady states differing in spatial form arise, one of which is generally unstable. Dissert. Abstr.

N86-22882 Iowa State Univ. of Science and Technology, Ames.
A BOUNDARY LAYER COMPUTATIONAL MODEL FOR PREDICTING THE FLOW AND HEAT TRANSFER IN SUDDEN EXPANSIONS Ph.D. Thesis
Jeffrey P. Lewis 1985 232 p
Avail: Univ. Microfilms Order No. DA8524673

Fully developed turbulent and laminar flows through symmetric planar and axisymmetric expansions with heat transfer were modeled using a finite-difference discretization of the boundary-layer equations. By using the boundary-layer equations to model separated flow in place of the Navier-Stokes equations, computational effort was reduced permitting turbulence modeling studies to economically carried out. The continuity and momentum equations were solved in a coupled matter. For laminar constant property flow, the equations were nodimensionalized so that the solution was independent of Reynolds number. Two different dependent hydrodynamic variable sets were tried: the primitive variable set (u-v), and the streamwise velocity steam function variable set (u-psi). The predictions of the boundary-layer equations for parameters associated with the trapped eddy compared well with the predictions of the Navier-Stokes equations and experimental measurements for laminar isothermal flow. Dissert. Abstr.

N86-22883 Illinois Univ., Chicago.
CONJUGATE MIXED CONVECTION-CONDUCTION HEAT TRANSFER IN POROUS MEDIA Ph.D. Thesis
Jin-Yuan Lin 1985 251 p
Avail: Univ. Microfilms Order No. DA8524812

This dessertation studies analytically the conjugate mixed-convection conduction heat transfer in porous media. Solutions for mixed convection flows about vertical plate and cylindrical fins embedded in a porous medium have been obtained by including the effects of interactions between the conduction in the solid boundaries (fins) and the convection in the boundary layer. It has been found that the governing parameters are the Prandtl number Pr, buoyancy force parameter Omega, convection conduction parameter Ncc, and the surface curvature parameter lambda. Extensive results for heat transfer characteristics are presented graphically and in tabular forms for the following ranges of parameters: 0.05 < or = Pr < or = 7.5, 0.0 < or = omega < or = 20.0, 0.0 < or = Ncc 2.0 and 0.5 < or = lambda < or = 5.0. Many results were found to have trends similar to those for classical fluids. In particular, the local heat transfer coefficients for mixed convection flows were found not to decrease monotonically as usual, but instead, the coefficients decreased first, attained a minimum value and then increased with increasing streamwise distance. This behavior is attributable to an enhanced buoyancy force resulting from an increase in the wall-to-fluid temperature difference along the streamwise direction. Dissert. Abstr.

N86-22884 Delaware Univ., Newark.
BUOYANCY EFFECT ON MIXING FLOW Ph.D. Thesis
Krishnamurthy Muralidhar 1985 281 p
Avail: Univ. Microfilms Order No. DA852581

The physical problem of two parallel streams of a fluid coming in contact is considered here. A whole class of flows arising from the velocity ratio as the parameter were identified. The physical mechanisms which come into play in low Reynolds number flow as it proceeds from laminar to turbulent state via hydrodynamic instability were studied. Flow modification arising from buoyancy and streamline curvature are examined. Numerical and experimental techniques were employed in the analysis. Turbulence was included by a kinetic energy-dissipation model. Experiments involve hot wire measurements of mean flow and turbulent fluctuations.
Dissert. Abstr.

N86-22885 Iowa State Univ. of Science and Technology, Ames.
MEASUREMENTS OF THE FLOW AND THERMAL CHARACTERISTICS OF TURBULET JETS IN CROSS FLOW Ph.D. Thesis
Sherif Ahmed Sherif 1985 547 p
Avail: Univ. Microfilms Order No. DA8524692

An experimental investigation of the flow, turbulence, and thermal characteristics of heated, cooled, and isothermal turbulent jets in cross flow is reported. The experiments were carried out in a water channel facility of the recirculation type. Hot or cold water was injected verically upward from a circular pipe located near the channel bottom to the cross-flowing stream in the channel. Hot and cold-film anemometers along with appropriate linearizers, bridges, filters, and probes were used. A new signal analysis method was developed for resolving the complex three-dimensional structure of the mean turbulent flow field resulting from the interaction between the free stream and the jet. A rotatable probe technique was used to measure the size components for the Reynolds stress tensor in isothermal flows of any turbulence intensity. New experssions that correct for the temperature contamination of the velocity signals in nonisothermal flows were developed for both the linearized and unlinearized anemometer responses. Mean velocity and turbulence intensity data were obtained for the isothermal jet at jet-to-free stream velocity ratios of 2, 4, and 6 both in and outside the jet plane of symmetry.
Dissert. Abstr.

N86-22886 British Library Lending Div., Boston Spa (England).
MATHEMATICAL MODEL OF LIQUID-PHASE CARRY-OFF FROM A GAS-AGITATED LAYER
N. K. Nikolaenko and G. S. Sborshchikov 1985 8 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metallurgiya (USSR), (no. 7), 1985 p 139-141
(BLL-M-36589-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A mathematical model is presented of a two dimensional stationary isobaric two phase jet, the flow being symmetrical about the longitudinal axis of the jet. It enables the mutual effects of liquid drops entrained in gas bubbled through a liquid bath, and the gas itself to be allowed for in calculations of the carry off of liquid in such processes.
Author

N86-22887 National Physical Lab., Teddington (England). Div. of Materials Applications.
ASPECTS OF FLUID FLOW OF RELEVANCE TO CORROSION FATIGUE AND STRESS CORROSION CRACKS
P. F. Easthope (British Maritime Technology Ltd.) and A. Turnbull Jul. 1985 42 p refs
(NPL-DMA(A)-105; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Experimental evidence for an effect of bulk fluid flow on crack chemistry and crack propagation rates prompted an analysis of the flow caracteristics associated with cracks. Flow along or across the crack mouth; flow through the crack; flow directed into a surface crack; and flow induced by cyclic displacement of the crack walls (as in a fatigue situation) were studied. The important characteristic parameters, dimensionless variables, and hydrodynamic equations are established. Model solutions from the literature are discussed. The effect on crack chemistry of flow of the bulk solution is predicted to be most significant for shallow cracks and for configurations in which the flow is directed into a surface crack or into an edge-crack in which the crack sides are open. Experimental evidence for the effect of bulk flow rate on crack chemistry and crack growth, though limited, supports the conclusions.
Author (ESA)

N86-22888# National Aerospace Lab., Tokyo (Japan).
NON-STEADY FLOW FIELD OF TWO-DIMENSIONAL SUPERSONIC NOZZLES
Noboru Abe 1985 15 p refs In JAPANESE; ENGLISH summary
(NAL-TR-855; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The non-steady flow field of an impulsively started dimensional nozzle was investigated, using double exposure interferometry. Two straight nozzles, one with a sharp-edged throat and the other with a rounded throat, were inserted into a 60mm x 150mm cross sectional shock tube. Incident shock Mach numbers were 2.0 and 2.4 in air. Continuous monitoring of wave interactions, incident shock, secondary shock, Mach stem, and slip line, were carried out using a streak camera technique. Time-wise development of the density distribution of the whole flow field showed a detailed structure of the starting process and the wave interactions. The steady flow field upstream of secondary shock obtained by the experiment was compared with a numerical calculation using a finite difference method with a shock capturing procedure. Very good agreement between them was obtained. Double exposure holographic interferometry provides a useful tool for generating a gas dynamic data base for evaluation of numerical calculations.
Author

N86-22889*# Bucknell Univ., Lewisburg, Pa.
HYDRODYNAMIC ASPECTS OF SHARK SCALES Contractor Report, 1982 -1983
William G. Raschi and John A. Musick (Coll. of William and Mary, Gloucester Point, Va.) Mar. 1986 117 p refs
(Contract NAS1-16042)
(NASA-CR-3963; NAS 1.26:3963) Avail: NTIS HC A06/MF A01 CSCL 20D

Ridge morphometrices on placoid scales from 12 galeoid shark species were examined in order to evaluate their potential value for frictional drag reduction. The geometry of the shark scales is similar to longitudinal grooved surfaces (riblets) that have been previously shown to give 8 percent skin-friction reduction for turbulent boundary layers. The present study of the shark scales was undertaken to determine if the physical dimensions of the ridges on the shark scales are of the right magnitude to be used by the sharks for drag reduction based on previous riblet work. The results indicate that the ridge heights and spacings are normally maintained between the predicted optimal values proposed for voluntary and burst swimming speeds throughout the individual's ontogeny. Moreover, the species which might be considered to be the faster posses smaller and more closely spaced ridges that based on the riblet work would suggest a greater frictional drag reduction value at the high swimming speeds, as compared to their more sluggish counterparts.
Author

N86-22890*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL VERIFICATION OF CORROSIVE VAPOR DEPOSITION RATE THEORY IN HIGH VELOCITY BURNER RIGS
Suleyman A. Gokoglu (Case Western Reserve Univ., Cleveland, Ohio) and Gilbert J. Santoro 1986 12 p refs Presented at 3rd Conference on High Temperature Alloys for Gas Turbines and Other Applications, Liege, Belgium, 6-9 October 1986; sponsored by Commission of the European Communities
(NASA-TM-87287; E-2993; NAS 1.15:87287) Avail: NTIS HC A02/MF A01 CSCL 20D

The ability to predict deposition rates is required to facilitate modelling of high temperature corrosion by fused salt condensates in turbine engines. A corrosive salt vapor deposition theory based on multicomponent chemically frozen boundary layers (CFBL) has been successfully verified by high velocity burner rig experiments. The experiments involved internally air-impingement cooled, both rotating full and stationary segmented cylindrical collectors located in the crossflow of sodium-seeded combustion gases. Excellent

agreement is found between the CFBL theory an the experimental measurements for both the absolute amounts of Na2SO4 deposition rates and the behavior of deposition rate with respect to collector temperature, mass flowrate (velocity) and Na concentration. Author

N86-22891*# Pennsylvania State Univ., University Park. Dept. of Aerospace Engineering.
COUPLING BETWEEN FLUID DYNAMICS AND ENERGY ADDITION IN ARCJET AND MICROWAVE THRUSTERS Final Technical Report, 1 Feb. 1985 - 1 Jan. 1986
Michael M. Micci 7 Apr. 1986 47 p refs
(NASA-CR-176690; NAS 1.26:176690) Avail: NTIS HC A03/MF A01 CSCL 20D

A new approach to numerically solving the problem of the constricted electric arcjet is presented. An Euler implicit finite difference scheme is used to solve the full compressible Navier Stokes equations in two dimensions. The boundary and initial conditions represent the constrictor section of the arcjet, and hydrogen is used as a propellant. The arc is modeled as a Gaussian distribution across the centerline of the constrictor. Temperature, pressure and velocity profiles for steady state converged solutions show both axial and radial changes in distributions resulting from their interaction with the arc energy source for specific input conditions. The temperature rise is largest at the centerline where there is a the greatest concentration arc energy. The solution does not converge for all initial inputs and the limitations in the range of obtainable solutions are discussed. Author

N86-22892*# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
HEAT TRANSFER TO TWO-PHASE AIR/WATER MIXTURES FLOWING IN SMALL TUBES WITH INLET DISEQUILIBRIUM Final Report
J. M. Janssen, L. W. Florschuetz, and J. P. Fiszdon Mar. 1986 100 p refs
(Grant NsG-3075)
(NASA-CR-175076; NAS 1.26:175076) Avail: NTIS HC A05/MF A01 CSCL 20D

The cooling of gas turbine components was the subject of considerable research. The problem is difficult because the available coolant, compressor bleed air, is itself quite hot and has relatively poor thermophysical properties for a coolant. Injecting liquid water to evaporatively cool the air prior to its contact with the hot components was proposed and studied, particularly as a method of cooling for contingency power applications. Injection of a small quantity of cold liquid water into a relatively hot coolant air stream such that evaporation of the liquid is still in process when the coolant contacts the hot component was studied. No approach was found whereby heat transfer characteristics could be confidently predicted for such a case based solely on prior studies. It was not clear whether disequilibrium between phases at the inlet to the hot component section would improve cooling relative to that obtained where equilibrium was established prior to contact with the hot surface. Author

N86-22893*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NON-REFLECTING BOUNDARY CONDITIONS FOR THE COMPRESSIBLE NAVIER-STOKES EQUATIONS Final Report
Saul Abarbanel (Tel-Aviv Univ.), Alvin Bayliss (Exxon Corp. Research Science Labs.), and Liviu Lustman Mar. 1986 28 p refs Presented at the 7th International Conference on Computing Methods in Applied Sciences and Engineering, Versailles, France, 9-13 Dec. 1985
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0136E-82)
(NASA-CR-178068; ICASE-86-9; NAS 1.26:178068) Avail: NTIS HC A03/MF A01 CSCL 20D

A small perturbation analysis, in the long wavelength regime, is used to obtain the downstream boundary condition for the pressure for the flow over a flat plate. The methodology is extendable to other geometries. Numerical results for high Reynolds number laminar flows show great improvement in convergence rate to steady state as well as the quality of the results. Author

N86-22894# Texas Technological Univ., Lubbock. Dept. of Mechanical Engineering.
THE INFLUENCE OF FLUID MECHANICS ON THE BEHAVIOR OF GAS-BLOWN SPARK GAP SWITCHES Final Report, 30 Sep. 1982 - 31 Jan. 1985
Herbert J. Carper, Jr. and Timothy T. Maxwell 29 Mar. 1985 76 p
(Grant AF-AFOSR-0327-82)
(AD-A161298; AFOSR-85-0903TR) Avail: NTIS HC A05/MF A01 CSCL 09/1

A research facility was designed and constructed to conduct experiments to determine the influence of fluid mechanics on the performance of gas-blown spark gap switches. The effects of gas flow velocity, electrode divergence angle and hydrodynamic boundary layer development were investigated for laminar flow in a switch consisting of a pair of electrodes mounted in a diverging nozzle configuration. The results of the experiments show that for a given set of operating conditions, a threshold gap velocity exists, and increasing the velocity above this value results in no improvement in switch performance. This threshold velocity is exponentially dependent on the electrode divergence angle, an increase in the latter resulting in a lower threshold velocity. The threshold velocity was found to vary nonmonotonically with the degree of hydrodynamic boundary layer development at the point of minimum gap spacing, and for the conditions investigated there is an optimum hydrodynamic entry length that results in a minimum threshold velocity. The effects of turbulence were investigated briefly with the results showing an improvement in switch performance with turbulence. A numerical model was developed to predict the transient gas density distribution produced in the flow by the arc. The results of the model prediction are compared with interferograms obtained during the experiments. GRA

N86-22895# Department of the Air Force, Washington, D.C.
HYDRAULIC PRESSURE INTENSIFIER Patent Application
Robert S. Andrews, inventor (to Air Force) Filed 1 Oct. 1985 12 p
(AD-D012008; US-Patent-Appl-SN-782630) Avail: NTIS HC A02/MF A01 CSCL 13/7

A hydraulic pressure intensifier is used to raise the pressure in an accumulator above a given input pressure. An oscillating piston provides a boost pressure while a pilot valve and a dump valve and restrictors allow the oscillating piston to move. Author (GRA)

N86-22896# National Bureau of Standards, Washington, D.C. Center for Building Technology.
VALIDATION TEST OF AN EARTH CONTACT HEAT TRANSFER ALGORITHM
G. N. Walton Oct. 1985 33 p
(Contract DE-AI01-76PR-06010)
(DE86-001897; NBSIR-85/3291) Avail: NTIS HC A03/MF A01

Experimental tests and numerical calculations are performed to determine the suitability of including a simplified earth contact heat transfer algorithm in building energy analysis computer simulations. There is very good agreement between the floor surface temperature of the NBS Passive Solar Test Facility and the temperature predicted by the test program. These results indicate that simplifications based upon the specific configuration can give good results for a simple calculation of the annual earth contact heat flux. There may be considerable differences in the hourly and daily heat flux values when the actual weather departs from the annual harmonic approximation of the simple method. It is recommended that any algorithm used in a large building energy analysis computer program include the capability of modeling the specific geometry under consideration instead of (or in addition to) using tables of coefficients which have been generated for a manual method. The algorithm should also include the ability to handle the same weather data that is used in the energy analysis. DOE

N86-22897# California Univ., Berkeley. Lawrence Berkeley Lab.
DETAILED NUMERICAL, GRAPHICAL, AND EXPERIMENTAL STUDY OF OBLIQUE-SHOCK-WAVE REFLECTIONS
H. M. Glaz, P. Colella, I. I. Glass, and R. L. Deschambault Apr. 1985 384 p refs
(Contract DE-AC03-76SF-00098)
(DE86-002005; LBL-20033) Avail: NTIS HC A17/MF A01

An extensive series of numerical calculations of oblique-shock-wave reflections in air and argon have been performed using a version of the second-order Eulerian Godunov scheme for inviscid compressible flow. The results have been compared with the best available interferometric data from the UTIAS 10 cm x 18 cm shock tube, for fifteen different cases. The objective of this portion of the study was to assess the accuracy of the computer code in computing two-dimensional shocked flow of an inviscid perfect gas. The analysis is devoted to the question of the extent of influence of viscous and vibrational nonequilibrium effects on the experimental flow fields. Further parametrized series of calculations were performed in an effort to study the feasibility of numerically constructing inviscid transition lines in the (M(sub s), theta(sub w))-plane. Good agreement with analytic predictions was found for low values of M(sub s) and, as might be expected, there are substantial discrepancies for M(sub s) = 8.75. The possibility of using such numerical results in the formulation of accurate transition criteria is discussed. DOE

N86-22898# United Technologies Research Center, East Hartford, Conn.
DEVELOPMENT OF LASER DRILLING TECHNIQUES TO FABRICATE CERAMIC DISTRIBUTOR PLATES Report, 15 Aug. 1984 - 15 Jun. 1985
D. H. Polk Aug. 1985 62 p refs
(Contract DE-AC07-84ID-12537)
(DE86-002297; DOE/ID-12537/1) Avail: NTIS HC A04/MF A01

Fluidized bed heat exchangers (FBHEX) offer the potentially cost effective recovery of high temperature waste heat from the 2000 to 3000F flue gases of many industrial processes. Such applications will require FBHEX distributor plates of ceramics that will withstand the high temperature and corrosive environment, and fabrication of the required perforated ceramic plates of 3 to 10% open area with holes as small as 0.01-in. in dia is not generally possible with conventional ceramic fabrication techniques. Laser drilling is examined as a means for producing the required closely spaced arrays of small holes or slots in selected ceramics. Silicon carbide, silicon nitride, 85% alumina, and a SiC fiber composite were all successfully drilled with 3% open area arrays of 0.01-in. dia holes, 0.06-in. dia holes, and 0.01 x 0.06-in. slots and with no loss of strength except from section area reduction and stress concentrations. For potential mass production systems, drilling costs were estimated to be $120-620/sq ft. The lower costs appear economically viable, and improvements appear possible with further development of the drilling process. DOE

N86-22899# Argonne National Lab., Ill.
EXPERIMENTAL OPERATION OF A SODIUM HEAT PIPE
R. E. Holtz, G. A. McLennan, and E. R. Koehl May 1985 55 p refs
(Contract W-31-109-eng-38)
(DE86-002550; ANL-85-61) Avail: NTIS HC A04/MF A01

This report documents the operation of a 28 in. long sodium heat pipe in the Heat Pipe Test Facility (HPTF) installed at Argonne National Laboratory. Experimental data were collected to simulate conditions prototypic of both a fluidized bed coal combustor application and a space environment application. Both sets of experiment data show good agreement with the heat pipe analytical model. The heat transfer performance of the heat pipe proved reliable over a substantial period of operation and over much thermal cycling. Additional testing of longer heat pipes under controlled laboratory conditions will be necessary to determine performance limitations and to complete the design code validation. DOE

N86-22900# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
SOLIDS CIRCULATION PATTERN AND PARTICLES MIXING IN A LARGE JETTING FLUIDIZED BED
W. C. Yang, B. Ettehadieh, and G. B. Haldipur 1985 32 p Presented at the American Institute of Chemical Engineers Annual Winter Meeting, Chicago, Ill., 10 Nov. 1985 Prepared in cooperation with KRW Energy Systems, Inc., Madison, Pa.
(Contract DE-AC21-84MC-21063)
(DE86-001655; CONF-851123-4) Avail: NTIS HC A03/MF A01

Macroscopic behavior of solids circulation in a large jetting fluidized bed was surveyed with a force probe. Particles mixing was studied by pulse injection of tracer particles and a simple mechanistic model was developed on the basis of the solids circulation patterns observed. The model compares favorably with experimental tracer concentration profiles. DOE

N86-22901# Oak Ridge National Lab., Tenn.
VISUALIZATION OF FLOW FIELDS AND INTERFACIAL PHENOMENA IN LIQUID-LIQUID SOLVENT EXTRACTION
T. C. Scott 1985 17 p refs Presented at the 4th Symposium on Separation Science and Technology for Energy Applications, Knoxville, Tenn., 20 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002224; CONF-851011-5) Avail: NTIS HC A02/MF A01

Use of a video camera apparatus with a helium-neon laser light source has enabled the detection of flow fields in and around a circulating aqueous droplet which is suspended in a flowing stream of 2-ethyl-1-hexanol. Droplet Reynolds numbers were in the range of 7 to 22. The behavior of the streamlines for flow both inside and outside the droplet was shown to be similar to that predicted for circulating droplets at low Reynolds numbers. Formation of stagnant caps of surfactant at the rear of the droplets was found to suppress the flow patterns inside the droplet and decrease the associated internal fluid velocities. DOE

N86-22902# California Univ., Berkeley. Lawrence Berkeley Lab.
HEAT DIFFUSION SOLUTIONS FOR THE NONRESONANT SPECTROPHONE
R. Gerlach and N. M. Amer Jun. 1985 5 p ref Presented at the 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, Quebec, Canada, 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002883; LBL-20188; CONF-850886-2) Avail: NTIS HC A02/MF A01

Analytic heat diffusion solutions for compressible gas in cylindrical cells for Gaussian and arbitrary beam profiles are compared to standard (neglecting compressibility) heat diffusion equation solutions. DOE

N86-22903# Argonne National Lab., Ill.
FLUID EXCITATION FORCES ACTING ON A TUBE ARRAY
S. S. Chen and J. A. Jendrzejczyk Sep. 1985 63 p
(Contract W-31-109-eng-38)
(DE86-003441; ANL-85-55) Avail: NTIS HC A04/MF A01

Fluid forces are important in the assessment of vibration of the Space Shuttle Main Engine liquid oxygen posts. This report summarizes the available data on fluid excitation forces acting on tube arrays in turbulent crossflow, and test results for an array of tubes subject to turbulent flow. The fluctuating drag and lift forces are measured as a function of Reynolds number, incoming flow conditions, and tube location in an array. DOE

N86-22904# Argonne National Lab., Ill.
ANALYSIS WITH THE 3-D COMMIX CODE
1985 17 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-006836; CONF-850810-8) Avail: NTIS HC A02/MF A01

A 3-D COMMIX model was set up to simulate the 1/7-scale Westinghouse natural convection test. The COMMIX model included the upper plenum, core, lower plenum, two hot legs, and two steam generators. The pressurizer tee was modeled as an

exit surface with continuous-mass-flow boundary condition. A total of 1464 computational cells and 81 surfaces were used for the COMMIX model. Three layers of vertical cells were used to model the hot leg. This model allows for reasonably accurate modeling of the countercurrent flows in the hot legs. The heat exchangers in the upper plenum and the steam generators were modeled by two-sided thermal structures. Thermal capacity of all the structures was modeled throughout the systems according to the physical dimensions and properties of the system. Volume porosity and surface porosities were calculated and used in the COMMIX model throughout the computational domain to correctly simulate the structures in the experiment. Results of the COMMIX calculations based on these models were compared with the experimental measurements. DOE

N86-22905# Mound Lab., Miamisburg, Ohio. Mound.
MEASUREMENT OF PYROTECHNIC IGNITION ENERGY BY THERMOGRAPHY
J. H. Mohler, L. D. Abney, and T. S. Chow 1985 7 p Presented at the 8th Thermosense Conference, Cambridge, Mass., 16 Sep. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract DE-AC04-76DP-00053)
(DE86-001754; MLM-3299(OP); CONF-8509181-2) Avail: NTIS HC A02/MF A01

Measuring the laser energy required to ignite pyrotechnic pellets is complicated by several factors that are difficult to control or predict. These include reflection of part of the incident laser energy, reemission from the heated sample, and heat conduction away from the ignition site. In addition to these factors, it is often difficult to control and/or measure the incident laser power. High-speed thermographic recording of the temperature distribution in the test sample makes it possible to calculate the heat content of the test pellet at any instant. Thus, one can actually observe the laser heating and on-set of reaction in the pellet and avoid having to make measurements or assumptions to account for possible energy losses. DOE

N86-22906# Lawrence Livermore National Lab., Calif.
APPLICATION OF HARDY'S MULTIQUADRIC INTERPOLATION TO HYDRODYNAMICS
E. J. Kansa Oct. 1985 8 p refs Presented at the Society for Computer Simulation Multiconference, San Diego, Calif., 23 Jan. 1986
(Contract W-7405-eng-48)
(DE86-001906; UCRL-93522; CONF-860119-2) Avail: NTIS HC A02/MF A01

Hardy's multiquadric interpolation (MQI) scheme is a global, continuously differentiable interpolation method for solving scattered data interpolation problems. It is capable of producing monotonic, extremely accurate interpolating functions, integrals, and derivatives. Derivative estimates for a variety of one and two-dimensional surfaces were obtained. MQI was then applied to the spherical blast wave problem of von Neumann. The numerical solution agreed extremely well with the exact solution. DOE

N86-22907# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A TIME DEPENDENT FREE BOUNDARY GOVERNED BY THE NAVIER-STOKES EQUATIONS
C. Cuvelier 1985 9 p refs Repr. from Physica (Netherlands), v. 218 p 170-174 Presented at 9th International Conference on Numerical Methods in Fluid Dynamics, Saclay, France, 25-29 Jun. 1984 Submitted for publication
(Rept-85-07) Avail: NTIS HC A02/MF A01

A two dimensional linearized nonstationary capillary free boundary problem governed by the Navier-Stokes equations is studied. A liquid in a smooth walled container subject to gravity is considered. The fluid is isothermal, incompressible, newtonian, with constant density, viscosity, and surface tension coefficient. Under these assumptions the equations of nonstationary motion, which are the equations for conservation of momentum and mass, reduce to the Navier-Stokes equations for the velocity and pressure. The effects of small perturbations are analyzed. Author (ESA)

N86-22908# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
COMPUTATIONAL FLUID DYNAMICS AND ITS APPLICATION TO LIQUID-ATOMIZATION AND SPRAY SYSTEMS
D. Brian Spalding Apr. 1985 45 p refs Lecture presented at ICLASS 1985, London, England, 1985
(CFD/85/3) Avail: NTIS HC A03/MF A01

The applicability of computational fluid dynamics to liquid-atomization and spray (LAS) systems is reviewed. While the computer simulation of many LAS phenomena presents difficulties that cannot yet be overcome, flows on or in a spinning-disk, spinning-cup, impinging-jet, swirl and diesel atomisers; and small-scale phenomena such as the impingement of a droplet on a wall, or the collision of two drops are suitable for computerized simulation. Aspects of LAS systems which must be handled by statistical methods are discussed. Three idealizations are described. It is suggested that a combination of two of the idealizations may permit realistic modeling of the ignition and burn-out processes undergone by fuel sprays. Author (ESA)

N86-22909# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
A TURBULENCE MODEL FOR BUOYANT AND COMBUSTING FLOWS
D. Brian Spalding Jul. 1985 21 p Lecture presented at NMTP4 1985, Swansea, Wales, 15-18 Jul. 1985
(CFD/85/10) Avail: NTIS HC A02/MF A01

Turbulent mixing and unmixing, including Rayleigh-Taylor and other instabilities are discussed. A two-fluid model of turbulence, and its relation to Prandtl's mixing-length hypothesis are outlined. Couette flows with and without curvature; channel flow with and without heating; and a combustion example are considered. The two-fluid model can be regarded as an extension of Prandtl's concept to include pressure-gradient-induced sifting. Unlike Prandtl, the model is not forced to replace differential equations by algebraic ones. Initial findings are encouraging: phenomena are explained which conventional turbulence models cannot comprehend, e.g., negative viscosity, flame-turbulence interactions. Author (ESA)

N86-22910# Institute of Oceanographic Sciences, Wormley (England).
WAVE-CURRENT INTERACTIONS: A REVIEW OF SOME PROBLEMS
M. A. Srokosz 1985 33 p refs Sponsored by UK Department of Energy
(IOS-212) Avail: NTIS HC A03/MF A01

Methods for calculating the interaction of water waves with a vertically varying current which is steady and uniform in the horizontal plane are assessed using experimental evidence on wave-current interactions. It is shown that the effect of current shear is important in determining the kinematics for the waves. Linear superposition of waves and currents is generally inadequate to describe their interaction. Doppler shift in wave frequency due to the current should be allowed for. For small amplitude waves, perturbation theory gives good agreement with laboratory measurements. For finite amplitude waves further comparisons between theory and experiment need to be carried out to check the theoretical results. The correct specification of the current profile in the calculations needs to be investigated. Author (ESA)

N86-22911# European Space Agency, Paris (France).
UNSTEADY THREE-DIMENSIONAL LIFTING SURFACE THEORY WITH THE FREE-SURFACE EFFECT
Jacques Leclerc and Pierre Salauen Oct. 1985 235 p refs Transl. into ENGLISH of "Theorie Lineaire des Forces Hydrodyn. Instationnaires sur une Surface Portante. Cas Supercritique" Rept. ONERA-P-1984-1 ONERA, Paris, France, 1984 Original language document was announced as N86-17683
(ESA-TT-933; ONERA-P-1984-1) Avail: NTIS HC A11/MF A01

The unsteady three-dimensional linearized lifting surface

problem with the free surface effect is solved in a supercritical case using the integral equation method. The kernel originating in the potential of Havelock source is expressed as a Fourier series with respect to the azimuth angle, the coefficients of which are simple integrals. The method of steepest descents provides asymptotic approximations for coefficients of large indices. It is shown that convergence disappears on the free surface downstream from the integration point. An asymptotic approximation for the remainder of the truncated series is used to find the singularity. The integral equation yielding the local lift coefficient is solved by a collocation method. Curves showing the numerical results for horizontal and vertical vibrating plates moving horizontally enable the ranges of the parameters over which the free-surface effects on the hydrodynamic derivatives are significant to be determined. Author (ESA)

N86-22912# European Space Agency, Paris (France).
STEADY LIFTING SURFACE THEORY WITH A FREE SURFACE
Jacques Leclerc and Pierre Salauen Nov. 1985 46 p refs Transl. into ENGLISH of "Probleme Portant Stationnaire avec Effet de la Surface Libre" Rept. ONERA-P-1984-2 ONERA, Paris, France, 1984 Original language document was announced as N86-17684 (ESA-TT-934; ONERA-P-1984-2) Avail: NTIS HC A03/MF A01

Steady lifting surface theory with a free surface is developed by an integral equation method. The local lift coefficient appears as a solution to an integral equation of the first kind whose kernel, deduced from a Havelock source potential, is expanded in a Fourier series with respect to the azimuth angle. The coefficients of this series are definite integrals. The method of steepest descents gives asymptotic approximations to coefficients of large index terms, and the remainder can be evaluated approximately in all cases. Numerical applications such as the calculation of the lift and drag for a lifting wing, and the hydrodynamic pressures arising from the turn of a ship are given. Author (ESA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-22913 British Library Lending Div., Boston Spa (England).
NEW THERMOCOUPLE PROBE FOR INVESTIGATING TEMPERATURE FIELDS IN BLAST FURNACES
I. W. Elke, G. Yu. Voronin, A. G. Ulyanov, and G. A. Polevoi 1985 7 p refs Transl. into ENGLISH from Stal. (USSR), no. 7, 1985 p 6-10
(BLL-M-36566-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A design of thermocouple probes for measuring temperatures of up to 1200 C along a radius of the blast-furnace stack is described. The probe takes 3 min or less to complete the set of radial measurements, has a low inertia and high sensitivity and operates reliably in large furnaces. Author

N86-22914*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN INTEGRATED DEVELOPMENT FACILITY FOR THE CALIBRATION OF LOW-ENERGY CHARGED PARTICLE FLIGHT INSTRUMENTATION Center Director's Discretionary Fund, Final Report
Alan P. Biddle and John M. Reynolds Oct. 1985 24 p refs
(NASA-TM-86526; NAS 1.15:86526) Avail: NTIS HC A02/MF A01 CSCL 14B

A system was developed for the calibration and development of thermal ion instrumentation. The system provides an extended beam with usable current rates, approx. 1 pA/sq cm, at beam energies as low as 1 eV, with much higher values available with increasing energy. A tandem electrostatic and variable geometry magnetic mirror configuration within the ion source optimizes the use of the ionizing electrons. The system is integrated under microcomputer control to allow automatic control and monitoring of the beam energy and composition and the mass and angle-dependent response of the instrument under test. The system is pumped by a combination of carbon vane and cryogenic sorption roughing pumps and ion and liquid helium operating pumps. E.A.K.

N86-22915*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE DETERMINATION OF THE DIRECTION OF THE OPTIC AXIS OF UNIAXIAL CRYSTALLINE MATERIALS
James A. Lock (Cleveland State Univ., Ohio), Harold J. Schock, and Carolyn A. Regan Apr. 1986 21 p refs
(NASA-TM-86892; E-2364; NAS 1.15:86892) Avail: NTIS HC A02/MF A01 CSCL 20F

The birefringence of crystalline substances in general, and of sapphire in particular, is described. A test is described whose purpose is to determine the direction of the optic axis of a cylindrically machined single crystal of sapphire. This test was performed on the NASA Lewis sapphire cylinder and it was found that the optic axis made an angle of 18 deg with the axis of symmetry of the cylinder. Author

N86-22916# Department of the Air Force, Washington, D.C.
TRANSIENT DETECTOR APPARATUS Patent Application
Lapeyrolerie, inventor (to Air Force) Filed 8 Aug. 1985 45 p
(AD-D012005; US-Patent-Appl-SN-763578) Avail: NTIS HC A03/MF A01 CSCL 09/4

A transient detector apparatus utilizing peak and slope detectors to determine the presence of transient signal in a logic signal. Individual slope measurements of the input signal are compared with a logic criteria to establish the occurrence of a transient. The peak voltage and pulse width of a transient are digitized in order to time tag or isolate a transient to a particular signal. GRA

N86-22917# EG and G Energy Measurements, Inc., Goleta, Calif.
MERCURIC IODIDE X-RAY CAMERA
B. E. Patt, A. DelDuca, R. Dolin, and C. Ortale 1985 4 p refs Presented at the IEEE Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract DE-AC08-83NV-10282)
(DE86-001103; EGG-10282-2068; CONF-851097-2) Avail: NTIS HC A02/MF A01

A prototype X-ray camera utilizing a 1.5- by 1.5-in., 1024-element, thin mercuric iodide detector array has been tested and evaluated. The microprocessor-based camera is portable and operates at room temperature. Events can be localized within 1 to 2 mm at energies below 60 keV and within 5 to 6 mm at energies on the order of 600 keV. DOE

N86-22918# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF A dc SQUID TO RF AMPLIFICATION: NQR
C. Hilbert, J. Clarke, T. Sleator, and E. L. Hahn May 1985 13 p Presented at the 3rd International Conference on Superconducting Quantum Devices, Berlin, West Germany, 25 Jun. 1985 Prepared in cooperation with California Univ., Berkeley
(Contract DE-AC03-76SF-00098)
(DE86-001986; LBL-19653; CONF-8506203-1) Avail: NTIS HC A02/MF A01

Superconducting QUantum Interference Devices (SQUIDs) have been used for more than a decade for the detection of magnetic resonance. Until recently, these devices had mostly been confined to operation in the audiofrequency range, so that experiments have been restricted to measurements of resonance at low frequencies, or of changes in the static susceptibility of a sample induced by RF irradiation at the resonant frequency. However, the recent extension of the operating range of low noise dc SQUIDs to radiofrequencies (RF) allows one to detect magnetic

resonance directly at frequencies up to several hundred megahertz. The properties of dc SQUIDs as tuned RF amplifers are summarized. The development of a SQUID system for the detection of pulsed nuclear quadrupole resonance (NQR) at about 30 MHz and is described and then, a novel technique for observing magnetic resonances in the absence of any externally applied RF fields is also described. DOE

N86-22919# Advanced Environmental Research Group, Cambridge, Mass.
HOLOGRAPHIC DIFFRACTIVE STRUCTURE FOR DAYLIGHTING, PHASE 1 Final Report, FY85
10 Oct. 1985 44 p
(Contract DE-AC03-84SF-15292)
(DE86-001268; DOE/SF-15292/T1) Avail: NTIS HC A03/MF A01

Advanced Environmental Research Group (AERG) has researched and developed a proprietary device which will passively track the Sun throughout a wide range of latitudes, hours of the day and seasons of the year. The Holographic Diffractive Structure (HDS), consists of novel holographic diffraction grating designs applied to a substrate suitable for mounting or incorporated into window glazings. The HDS installations will be a low cost system for the controlled management of sunlight in buildings for energy savings and an enhanced lighting environment. The HDSs act to intercept sunlight and redirect it away from the immediate window area towards the darker regions at the rear of the room, or (via light guides) to interior spaces without windows, or (used on the facade of a building) to redirect sunlight into dark urban canyons or onto the facades of other nearby buildings. DOE

N86-22920# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
URANIUM DETERMINATION ON-LINE USING REMOTE FIBER FLUORIMETRY
R. A. Malstrom 1985 32 p ref Presented at the 12th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pa., 29 Sep. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001971; DP-MS-85-76; CONF-8509157-3) Avail: NTIS HC A03/MF A01

Remote Fiber Fluorimetry (RFF) is being developed at Savannah River Laboratory for the on-line determination of uranium in plant process streams. A prototype system suitable for plant use has been designed and is being built. RFF has four major components: a laser, an optical fiber, an optrode, and a detector. Essentially, an optical fiber carries laser radiation from a laser to a process sampling point. An optrode (the optical analog of an electrode) couples the laser light into a sample solution. Fluorescence from the sample is collected by the optrode and goes back through the same fiber to a detector. Using an RFF system, the analysis can be made both simply and safely. The laser and detector are placed at a convenient remote location, such as the control room. Optical fibers run from the laser to either the sample aisle or process tanks. Multiplexing makes it possible to analyze several different sampling positions with one laser and detector. The incentives for demonstrating this technology include reduced analysis time and decreased sample load for the laboratory. Since RFF is a remote on-line technique, sample handling is avoided. Analysis time is five minutes (versus the four-hour minimum needed now), and the control laboratory has a decreased sample load. Finally, RFF could easily be incorporated into a large-scale process control system. DOE

N86-22921# Knolls Atomic Power Lab., Schenectady, N. Y.
CUSTOMIZED AUGER DATA ANALYSIS AND DISPLAY USING THE PHYSICAL ELECTRONICS MODEL 595 AUGER SPECTROMETER
R. A. Mulford and F. S. Ausin 27 Jun. 1985 45 p
(Contract DE-AC12-76SN-00052)
(DE86-002020; KAPL-4189) Avail: NTIS HC A03/MF A01

This report describes how customized data processing with the Physical Electronics MACS computer automation system and optional FORTRAN Linker Package can improve and simplify data display and quantitative analysis of Auger spectra acquired using the Physical Electronics Model 595 Scanning Auger Multiprobe. Techniques described are especially suited to the analysis of a series of spectra with similar data acquisition parameters and eliminate the repetitive steps necessary using the standard format of the manufactures software. Data quantification routines have a greatly improved capability to analyze closely spaced peaks (such as Cr and O), small peaks near the limit of detectability, and peaks that are changing during ion sputtering. All routines use the graphics display terminal and computer included in the MACS system, and no additional computer hardware is required. DOE

N86-22922# Oak Ridge National Lab., Tenn.
TANDEM MASS SPECTROMETER FOR THE DETECTION OF NITROAROMATIC COMPOUNDS AND OTHER ELECTRONEGATIVE SPECIES IN AMBIENT AIR
G. L. Glish, S. A. McLuckey, and H. S. McKown 1985 6 p Presented at the 28th Conference on Analytical Chemistry, Knoxville, Tenn., 30 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002202; CONF-850937-3) Avail: NTIS HC A02/MF A01

A tandem mass spectrometer has been constructed consisting of a quadrupole mass filter followed by a time-of-flight mass spectrometer. Ions are generated in an atmospheric pressure ionization (API) source, which allows for detection of certain types of compounds in ambient air. The combination of API with this tandem mass spectrometer offers the potential to do real-time monitoring of targeted compounds that are of environmental and other concern. DOE

N86-22923# Stanford Linear Accelerator Center, Calif.
SLAC SCANNER PROCESSOR APPLICATIONS IN THE DATA ACQUISITION SYSTEM FOR THE UPGRADED MARK 2 DETECTOR
T. Barklow, T. Glanzman, A. J. Lankford, and K. Riles Sep. 1985 4 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract DE-AC03-76SF-00515)
(DE86-002939; SU-SLAC-PUB-3781; CONF-851009-14) Avail: NTIS HC A02/MF A01

The SLAC Scanner Processor is a general purpose, programmable FASTBUS crate/cable master/slave module. This device plays a central role in the readout, buffering and pre-processing of data from the upgraded Mark 2 detector's new central drift chamber. In addition to data readout, the SSPs assist in a variety of other services, such as detector calibration, FASTBUS system management, FASTBUS system initialization and verification, and FASTBUS module testing. DOE

N86-22924# Lawrence Livermore National Lab., Calif.
USE OF GAS IMAGING AS AN EMERGENCY RESPONSE TOOL
T. G. McRae Oct. 1985 9 p refs Presented at the JANNAF Safety and Environmental Protection Subcommittee Meeting, Monterey, Calif., 4 Nov. 1985
(Contract W-7405-eng-48)
(DE86-001907; UCRL-92482; CONF-8511110-2) Avail: NTIS HC A02/MF A01

The Backscatter/Absorption Gas Imaging (BAGI) technique is a promising new concept for the location and tracking of hazardous gases. The fundamental principle of the technique is that if hazardous gases were visible to the human eye, it would be easy to locate the source of a leak or, in the case of an accidental spill, to determine the extent and direction of movement of the resulting vapor cloud. The ability to image these gases thus represents a very practical emergency response tool. The BAGI technique offers a simple way to accomplish these goals by integrating an infrared (IR) laser and an IR imaging system. An airborne BAGI system could be used to determine the location of hazardous gas clouds resulting from disabled vessels at sea, train derailments or tanker truck accidents. This real-time capability would provide valuable input for evacuation decisions facing emergency response teams. The BAGI technique shows promise

as a long-range detection system capable of quickly locating the sources of hazardous gas and monitoring the dispersion clouds even at very low concentration levels. The system is simple to operate and interpret, and is composed of field-proven instruments which should make commercialization easy. DOE

N86-22925# Oak Ridge National Lab., Tenn.
SELECTION OF SENSORS FOR MEASUREMENT AND CONTROL
G. N. Miller and R. L. Anderson 1985 18 p Presented at the Instrument Society of America International Conference and Exhibit, Philadelphia, Pa., 21 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002235; CONF-851045-4) Avail: NTIS HC A02/MF A01

Factors essential to the selection process are presented. Some factors considered are the parameters to be measured, range, environment, allowable uncertainty, desired output, medium in contact with sensor, and the tired and true versus the state of the art. DOE

N86-22926# Los Alamos National Lab., N. Mex.
INVESTIGATIONS OF FLUCTUATIONS IN INSTRUMENTAL RESPONSES BY PRINCIPAL COMPONENTS ANALYSIS
L. E. Wangen, G. E. Bentley, V. T. Hamilton, and E. J. Peterson 1985 8 p refs Presented at the 28th Oak Ridge National Laboratory Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002385; LA-UR-85-3544; CONF-8510151-12) Avail: NTIS HC A02/MF A01

Principal components analysis was evaluated as a chemometric method for investigating the sources of variation in multicomponent analytical instruments. Many measurements of a 20-element standard were made over several days of operation with a direct-current argon plasma emission spectrometer designed to simultaneously measure the emission intensity at 20 analytical wavelengths. The number of components necessary to account for signal variations and the interelement correlations were determined by a principal components analysis. These results were used to identify the minimum number of independent sources of instrument variation and therefore the minimum number of internal standards needed to correct nonrandom fluctuations in instrument response. Correlations of the analytical signals with the principal components provide guidance for selecting internal standards. DOE

N86-22927# Sira Inst. Ltd., Chislehurst (England).
DEVELOPMENT OF THE PRIMARY GRAVIMETRIC HYGROMETER FOR THE UK NATIONAL HUMIDITY STANDARD FACILITY
Andrew G. Forton and Robert F. Pragnell 1985 12 p refs Presented at 1985 International Symposium on Moisture and Humidity, Washington, D.C., 15-18 Apr. 1985
Avail: NTIS HC A02/MF A01

A primary gravimetric hygrometer for the measurement range from minus 50 to plus 80 C dewpoint was developed for the UK national standard. Determination of the mass of dry gas, and of water, and the microbalance and balance chamber are described. Author (ESA)

N86-22599# Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel.
CODUST: A NEW CONCEPT FOR A QUARTZ CRYSTAL MICROBALANCE
J. Sekler, H. E. Hintermann, and A. Zwaal (ESA/ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 55-58 refs (For primary document see N86-22593 13-18)
(Contract ESTEC-4907/81)
Avail: NTIS HC A13/MF A01

N86-22611# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Etablissement d'Aquitaine.
HOLOGRAPHY: THE NONDESTRUCTIVE TESTING OF COMPOSITE STRUCTURES
P. Barbier and C. LeFloch *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 161-165 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22619# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
HIGH VOLTAGE POTTING FOR THE FAINT OBJECT CAMERA (FOC)
R. Thomas *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 223-228 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22625# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
PARTICLE FALLOUT PHOTOMETER (PFO)
M. VanEesbeek, R. Berkeljon, and H. Kuiper (URAMEC, Bilthoven, Netherlands) *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 271-274 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22626# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ULTRAVIOLET RADIOMETERS
G. Gourmelon, H. Lyall (IRD, Newcastle upon Tyne, England), and R. Froud (IRD, Newcastle upon Tyne, England) *In its* Proceedings of 3rd European Symposium on Spacecraft Materials Space Environment Nov. 1985 p 275-276 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22755# Joint Publications Research Service, Arlington, Va.
HOLOGRAPHIC NDT OF THIN TITANIUM PLATE DESCRIBED
Ruixiang Yang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 112-117 refs Transl. into ENGLISH from Xiyou Jinshu (Beijing, China), v. 9, no. 4, Jul. 1985 p 58-61 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-23262# Joint Publications Research Service, Arlington, Va.
APPARATUS ASSEMBLY FOR PSYCHOPHYSICAL STUDIES ON VISUAL PERCEPTION Abstract Only
A. I. Nazarov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 121 Transl. into ENGLISH from Voprosy Psilhologii (Moscow, USSR), no. 3, May-Jun. 1985 p 159-162 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-22928 California Inst. of Tech., Pasadena.
DYNAMIC AND SPECTRAL FEATURES OF SEMICONDUCTOR LASERS Ph.D. Thesis
Kerry John Vahala 1985 175 p
Avail: Univ. Microfilms Order No. DA8522634

The discussion of fluctuations in lasers is a topic as old as the device itself. Surprisingly, however, several new chapters in this field are being written, because of certain pecularities only recently observed in semiconductor lasers. Chapters 2 and 3 of this thesis will consider these pecularities, which, as it turns out, are quite important in many potential system applications of these devices. One of the driving forces behind the development of semiconductor lasers has been their application as sources and local oscillators in optical communication systems. In general such

applications require lasers which have low phase and intensity noise, and which can be modulated at high data rates. As is often the case, these requirements are to a certain extent mutually exclusive. Chapter 4 introduces a technique which is an exception to this rule. It relies upon the semiconductor laser physics which produces the fluctuation abnormalities discussed in Chapter 2 and 3. The technique can be used to improve modulation speed while simultaneously reducing noise as compared to the conventional device. Dissert. Abstr.

N86-22929 New Mexico Univ., Albuquerque.
NUMERICAL PROCESSING OF WAVEFRONT ABERRATION MEASUREMENTS Ph.D. Thesis
Christopher Roy DeHainaut 1985 106 p
Avail: Univ. Microfilms Order No. DA8518560

It is found that noise effects are dominated by electron shot noise, which is essentially a classical phenomenon. The laser starup with noise is seen to be more realistic than with artificial seed pulses. In addition, the laser startup near the point of synchronous cavity length is much faster than with no noise and the laser operates weakly for cavity lengths longer than the synchronous length. The extension of the simulation of two dimensions causes no large changes in the behavior as long as the higher order radial modes are strongly attenuated. When the losses for the higher order modes are reduced, the range of cavity lengths over which the laser operates is reduced and the peak gain is increased. In addition, the small signal frequency is downshifted from the value for a single mode. A heuristic explanation for this phenomenon is advanced. The results of the simulation are compared with experimental results obtained from the Stanford laser. The cavity length detuning curve is shorter and the gain is lower than expected. No evidence is seen for the sideband instability which is anticipated from the simulations. Dissert. Abstr.

N86-22930 California Univ., Los Angeles.
NEODYMIUM: SODIUM BETA DOUBLE PRIME ALUMINA AS A LASER MEDIUM Ph.D. Thesis
Anthony James Alfrey 1985 178 p
Avail: Univ. Microfilms Order No. DA8525832

Sodium Beta Alumina is a solid ionic conductor in which trivalent rare-earths may be exchanged for sodium after a raw crystal is grown, in contrast to traditional laser hosts where the rare earth dopant is added to the basic crystal melt from the start. Samples of Sodium Beta Double Prime Alumina were exchanged with various concentrations of trivalent neodymium, absorption spectra have been taken for these samples, and a Judd/Ofelt analysis performed. Anomalously large values of oscillator strengths were observed for lines which depend strongly on a linear term in the crystal field. A point charge model with a simple modification for ligand dipole polarizability has been used to calculate Judd/Ofelt parameters for several possible deviations from near neighbor inversion symmetry. Parameters calculated for the types of distortions known to exist based on X-ray diffraction data agree moderately well with parameters calculated from spectra. The Judd/Ofelt parameters are used to calculated radiative lifetimes and stimulated emission cross sections, which are important data for potential laser candidates. Dissert. Abstr.

N86-22931 California Univ., Los Angeles.
UNSTABLE RESONATOR SEMICONDUCTOR LASERS Ph.D. Thesis
Richard Randall Craig 1985 150 p
Avail: Univ. Microfilms Order No. DA8525843

Wet chemical etching was used for the first time to produce unstable resonator Gallium Arsenide lasers. These devices use the mode selective property of the resonator to force a broad area (> 100 um wide) laser to operate in a single lateral and longitudinal mode. Single facet optical powers as high as 400 mW were obtained. The general theory of unstable resonators for laser cavities is presented along with design considerations specific to the GaAs/AlGaAs laser system. Details of the processing steps used to fabricate curved etched mirrors on the semiconductor wafer are given. Results of optical testing indicate that the laser oscillates in a single stable lateral mode as long as the cavity magnification is greater than 3.5. When operating in a single spatial mode the lasers often also emit in a single spectral mode. Tapered devices designed to optimize the differential efficiency at a single facet showed efficiencies as high as .15 W/A. Models for both the threshold current and the differential efficiency agreed well with experimental observations. Finally new unstable resonator geometries which should further improve the optical properties of this new class of semiconductor lasers are described. Dissert. Abstr.

N86-22932 Royal Signals and Radar Establishment, Malvern (England).
TRANSIENT ANNEALING OF SEMICONDUCTORS BY LASER ELECTRON-BEAM AND RADIANT HEATING TECHNIQUES
A. G. Cullis 1985 172 p refs Repr. from Repts. on Prog. in Phys., v. 48, no. 8, p 1155-1233
(RSRE-MEMO-3814) HC A08/MF A01

Annealing techniques which rely upon transient energy deposition in semiconductors from Q-switched and scanning continuous wave laser, electron beam, ion beam, and other radiant sources are reviewed. Advances achieved using transient annealing methods in fundamental and applied physics are described. Author (ESA)

N86-22933# Department of the Air Force, Washington, D.C.
DISCRETE PHASE CONJUGATE TECHNIQUE FOR PRECOMPENSATION OF LASER BEAMS TRANSMITTED THROUGH TURBULENCE Patent Application
Mac Govern, inventor (to Air Force) Filed 11 Jun. 1985 21 p
(AD-D012013; US-Patent-Appl-SN-743550) Avail: NTIS HC A02/MF A01 CSCL 20/5

A process and apparatus are disclosed for aligning a laser beam from a laser transmitter with an incoming laser beam, and driving any sensed tilt differences on an aperture and subaperture basis to zero. The apparatus uses a shared aperture component to sample the outgoing laser beam and the incoming target beam, a retroreflector array to reverse the direction of the subaperture samples of the outgoing beam, a common-mode wavefront sensor to measure subaperture tilt differences between the reversed samples of the laser and the incoming target beam, and a deformable mirror to drive any sensed tilt differences to zero. A transparent beamsplitter is used as the shared aperture component and an AC shearing interferometer is used as the basis for the common-mode sensing. By forcing the outgoing beam to be then conjugate of the incoming beam it is automatically precompensated for any aberrations in the transmission patch. GRA

N86-22934# California Univ., Berkeley. Lawrence Berkeley Lab.
DESIGN CONCEPTS OF A STORAGE RING FOR A HIGH POWER XUV FREE ELECTRON LASER
M. Cornacchia, J. Bisognano, S. Chattopadhyay, A. Garren, K. Halbach, A. Jackson, K. J. Kim, H. Lancaster, J. Peterson, and M. S. Zisman Aug. 1985 25 p Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contracts DE-AC02-76CH00016; DE-AC03-76SF-00098)
(DE86-001482; LBL-20216; CONF-850956-3) Avail: NTIS HC A02/MF A01

The study of a storage ring capable of sustaining an electron beam of the quality required for a High Gain Free Electron Laser in the vacuum ultraviolet and X-ray region is reported. A method is described for the optimization of the design of the storage ring, where several competing and often conflicting requirements come into play. An example design is presented of a ring that satisfies the required conditions of beam quality and is able to produce coherent radiation at 400 A with tens of megawatts of peak power. DOE

N86-22935# Pacific Northwest Lab., Richland, Wash.
TIME-RESOLVED TEMPERATURE DETERMINATIONS FROM

RAMAN SCATTERING OF TiO2 COATINGS DURING PULSED LASER IRRADIATION

G. J. Exarhos Aug. 1985 17 p Presented at the Boulder Damage Symposium, Boulder, Colo., 15 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-002057; PNL-SA-13432; CONF-8510101-3) Avail: NTIS HC A02/MF A01

Simultaneous measurement of Stokes/anti-Stokes Raman intensities for a particular vibrational mode allows instantaneous surface temperatures to be determined. Time-resolved Raman spectra were measured on a specially constructed spectrometer using pulsed laser excitation and gated detection techniques. Measurements on equilibrated coatings and uncoated substrates at several temperatures served to confirm the utility of the technique for temperature determination as well as calibrate the intensity response of the instrument. Pulsed irradiated SiO2 and Y(PO3)3 glass substrates yield no temperature increase at laser energies where surface damage is not apparent. At higher pulse energies, an increase in anti-Stokes scattered radiation is observed, signifying a temperature rise. Analogous results are seen in Raman spectra of low energy pulse-irradiated TiO2 coatings recorded at delays of 0 and 72 ns from the excitation pulse. At higher energies, increased coating temperatures are observed at these times as well as at short times preceding the peak maximum of the excitation pulse. Raman results are used to model the thermal response of pulsed laser-irradiated dielectric coatings. DOE

N86-22936# Pacific Northwest Lab., Richland, Wash.
RAMAN MICROPROBE OF LASER-INDUCED SURFACE DAMAGE REGIONS IN TiO2 COATINGS

D. M. Friedrich and G. J. Exarhos Aug. 1985 17 p Presented at the Boulder Damage Symposium, Boulder, Colo., 15 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-002059; PNL-SA-13433; CONF-8510101-2) Avail: NTIS HC A02/MF A01

The anatase-to-rutile phase transition, which attends pulsed laser-induced damage of anatase TiO2 thin films, is studied by simultaneous microphotography and Raman microprobe. The damage is distributed across the damage area in regions of distinct morphology and spectra. In multilayer coatings, a mechanical surface-fracture zone surrounds a set of thin, layered flat rings of distinct but irregular boundaries. These rings surround a rough, pitted transparent central crater in the quartz substrate. Raman difference spectroscopy is used to reveal damage regions containing the rutile phase and regions devoid of TiO2. DOE

N86-22937# Spectra Technology, Inc., Bellevue, Wash.
LASER TECHNOLOGIES FOR LASER ACCELERATORS Annual Report

May 1985 209 p
(Contract DE-AC06-83ER-40128)
(DE85-013588; DOE/ER-40128/T1) Avail: NTIS HC A10/MF A01

The primary result of the work reported is the determination of laser system architectures that satsify the requirements of high luminosity, high energy (about 1 TeV), electron accelerators. It has been found that high laser efficiency is a very hard driver for these accelerators as the total average laser output optical power is likely to fall above 10 MW. The luminosity requires rep rates in the kHz range, and individual pulse lengths in the 1 to 10 psec range are required to satisfy acceleration gradient goals. CO2 and KrF lasers were chosen for study because of their potential to simultaneously satisfy the given requirements. Accelerator luminosity is reviewed, and requirements on laser system average power and rep rate are determined as a function of electron beam bunch parameters. Laser technologies are reviewed, including CO2, excimers, solid state, and free electron lasers. The proposed accelerator mechanisms are summarized briefly. Work on optical transport geometries for near and far field accelerators are presented. Possible exploitation of the CO2 and DrF laser technology to generate the required pulse lengths, rep rates, and projected efficiencies is illustrated and needed development work is suggested. Initial efforts at developing a 50 GeV benchmark conceptual design and a 100 MeV demonstration experiment conceptual design are presented. DOE

N86-22938# Sandia National Labs., Albuquerque, N. Mex.
LASER-CONTROLLED WET CHEMICAL ETCHING FOR CORRECTIVE TRIMMING OF THIN FILMS: APPLICATION TO ALUMINUM

J. Y. Tsao and D. J. Ehrlich 1985 12 p Presented at the 168th Meeting of the Electrochemical Society, Las Vegas, Nev., 13 Oct. 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Lexington, Mass.
(Contract DE-AC04-76DP-00789)
(DE86-002168; SAND-85-2239C; CONF-851048-7) Avail: NTIS HC A02/MF A01

The localized enhancement of wet chemical etching by focussed laser beams for corrective trimming of thin films, and its application to the selective etching of aluminum, are discussed. Since wet etching can proceed rapidly even without irradiation, it is as important to consider methods to reduce background etching as to enhance localized etching. The process developed for aluminum etching is based upon moderate local heating to activate a reaction which is normally suppressed by a corrosion inhibitor. Another approach to reduce background etching is solution cooling: for the activation energies for typical wet-etching, it should be possible to obtain acceptable contrast ratios between laser-enhanced and background rates over the temperature range which many concentrated etching solutions are liquid. DOE

N86-22939# Lawrence Livermore National Lab., Calif.
LOW-COST LASER DIAGNOSTIC SYSTEM

T. J. Ramos, D. R. Lim, and A. C. Lingenfelter Oct. 1985 20 p Presented at the ICALEO International Congress on the Applications of Lasers and Electro-Optics, San Francisco, Calif., 11 Nov. 1985
(Contract W-7405-eng-48)
(DE86-002370; UCRL-93463; CONF-8511103-2) Avail: NTIS HC A02/MF A01

The principal feature of a new laser diagnostic system is real-time display of beam energy profile. This ensures on-line verification of beam mode and stability with capability for computer storage of this information for later analysis. This system provides low-cost control and repeatability, essential in precision metalworking operations. DOE

N86-22940# Los Alamos National Lab., N. Mex.
QUANTIZED FIELD FORMULATION OF THE FREE-ELECTRON LASER IN THE HEISENBERG PICTURE

H. Takeda 1985 15 p rel Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002392; LA-UR-85-3212; CONF-850956-5) Avail: NTIS HC A02/MF A01

The phase and amplitude operator equations valid for field intensities ranging from a single photon state to an intense laser state are derived by means of quantized field theory. Using the Dirac equation, driving current operators, which are expressed by radiation and electron fields, are separated into spontaneous, stimulated, and spin terms. Then, utilizing the semiclassical nature of the electron state, coherence condition and spectral equations are derived. From the spectral phase equation, a delay-time scaling for oscillator operation is obtained in good agreement with experiments. DOE

N86-22941# Los Alamos National Lab., N. Mex.
LOS ALAMOS KrF LASER PROGRAM

R. J. Jensen and D. C. Cartwright 1985 11 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002427; LA-UR-85-3851; CONF-851053-2) Avail: NTIS HC A02/MF A01

Los Alamos is currently developing the krypton fluoride (KrF) laser - a highly efficient laser able to emit very intense bursts of

short-wavelength photons - as a research tool for the general study of high-density matter, as well as for use in laser fusion. The KrF laser operates at 1/4 (micro)m, close to the short-wavelength limit for conventional optical material, but still in the region where standard optical techniques can be used. The excited-state lifetime of the KrF lasing medium is short - as a result of both spontaneous emission and deactivation from collisions - making it impossible to store energy within the lasing medium for times significant to electrical pumping. However, an optical multiplexing scheme is being developed that will generate short, intense pulses of 1/4-(micro)m light by overcoming the short storage time of the laser and taking advantage of the high gain of the KrF medium. DOE

N86-22942# Los Alamos National Lab., N. Mex.
NEW HIGH-BRIGHTNESS ELECTRON INJECTOR FOR FREE-ELECTRON LASERS DRIVEN BY RF LINACS
J. S. Fraser, R. L. Sheffield, and E. R. Gray 1985 22 p Presented at the 6th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000781; LA-UR-85-3176; CONF-850956-1) Avail: NTIS HC A02/MF A01

A free-electron laser oscillator, driven by an RF linac, requires a train of electron bunches delivered to an undulator. The brightness requirement exceeds that available from a conventional linac with RF bunchers. The demonstrated high brightness of laser-illuminated photoemitters indicates that the conventional buncher system might be eliminated entirely, thereby avoiding the usual loarge loss in brightness that occurs in bunchers. A photoemitter with a current density of about 200 A/sq cm is placed on an end wall of an RF cavity to accelerate a 60-ps bunch of electrons to 1 MeV as rapidly as possible. Preliminary experimental work, simulation calculations, and discussions on emittance measurement techniques and positive ion motion in the RF gun are presented. DOE

N86-22624# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SCANNING LASER ACOUSTIC MICROSCOPY APPLIED TO THE EVALUATION OF MATERIAL INTERCONNECTIONS
B. D. Dunn and D. S. Collins *In its* Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 263-269 (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

N86-22743# Joint Publications Research Service, Arlington, Va.
LIFETIME OF EXCIMER LASER STUDIED
Xuejin Hu, Zhensheng Zhao, Zhaolin Li, and Mingyu Che *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 8-13 refs Transl. into ENGLISH from Guangxue Xuebao [Acta Optica Sinica] (Shanghai, China), v. 5, no. 10, Oct. 1985 p 881-885 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

N86-22744# Joint Publications Research Service, Arlington, Va.
THE 1.36J OUTPUT OBTAINED FROM XeCl EXCIMER LASER
Xusan Cheng, Qihong Lou, and Runwen Wang *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 14-20 refs Transl. into ENGLISH from Guangxue Xuebao [Acta Optica Sinica] (Shanghai, China), v. 5, no. 10, Oct. 1985 p 865-869 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

N86-22776# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF COLLIDING-MODE Nd:YAG LASER
Xing Lin, Wenzhen Zhang, Huiming Zhuang, and Fengtie Wu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 142-148 refs Transl. into ENGLISH from Guangxue Xuebao (Shanghai, China), v. 5, no. 9, Sep. 1985 p 794-798 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-22787*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PRELIMINARY RESULTS TOWARD INJECTION LOCKING OF AN INCOHERENT LASER ARRAY
James Daher *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 26-34 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20E

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-22943 California Univ., Berkeley.
NONLINEAR SYSTEM CONTROLLER DESIGN BASED ON DOMAIN OF ATTRACTION Ph.D. Thesis
Philip S. Babcock, IV 1985 126 p
Avail: Univ. Microfilms Order No. DA8524884

A technique for analyzing and designing controllers for nonlinear systems based on measures of the domain of attraction is presented. The domain of attraction is the region of initial conditions that tend toward an attractor and it is delineated by randomly selecting initial conditions from the region of state space being investigated. Error determinations are found by repeating the domain simulations with independent samples. A reinfement of this region is the domain of performance which is the region of initial conditions that meet a performance criteria. In nonlinear systems, local stability does not insure stability over a larger region. The domain of attraction marks out this stability region; hence, it can be considered a measure of a nonlinear system's ability to recover from state perturbations. When considering random perturbations, the minimum radius of the domain is a measure of the magnitude of perturbations for which recovery is guaranteed. An advantage of this measure is that it is a vector length and, therefore, is applicable to systems with any dimension. The use of the domains of attraction and performance are demonstrated in controller design of an inverted pendulum. Dissert. Abstr.

N86-22944 Cornell Univ., Ithaca, N.Y.
NONLINEAR DYNAMICS OF IMPERFECT FLUID JOURNAL BEARINGS Ph.D. Thesis
Dazong Wang 1985 160 p
Avail: Univ. Microfilms Order No. DA8525680

A theoretical model for the study of effects of fluid journal bearing surface geometrical imperfection is developed. The imperfection on the journal and on the sleeve is considered separately. In each case, the analytical description of the imperfection includes a small sinusoidal term and the model is described by a set of nonlinear ordinary differential equations. Analytical approach is adopted in this investigation to a great extent. The conditions involved in Reynolds equation are examined in the context of surface imperfections. Ocvirk short bearing approximation is used and the cavitation problem is dealt with Half-Sommerfeld boundary condition. The symbolic computer software package MACSYMA proved invaluable in performing mathematical manipulations. For a sleeve imperfect system, the dynamic equations are autonomous. It is seen that the pressure distribution becomes more complicated. A perturbation technique is used to obtain the fluid force, based on which static equilibrium calculation and stability analysis are performed analytically. Dissert. Abstr.

N86-22945 Illinois Univ., Chicago.
HELICAL AND SPUR GEARS WITH NEW TYPES OF TOOTH SURFACES Ph.D. Thesis
Chung-Biau Patrick Tsay 1985 227 p
Avail: Univ. Microfilms Order No. DA8524820

Helical and spur gears were studied to improved performance. The research included helical gears with circular arc teeth, helical gears with pinion circular arc teeth and gear involute teeth, spur gears with pinion teeth of crowned surfaces, and gear involute

teeth. The following topics covered are: methods for generation of the above mentioned gears, derivation of the equations of the gear tooth surfaces; principal curvatures and directions of the gear tooth surfaces, dimensions and orientation of the contact ellipse; computer aided simulation of the conditions of meshing and bearing contact; influence of conditions of meshing and bearing contact; influence of manufacturing and assembly errors on the kinematical errors of the gears in mesh; and proposed methods for the adjustment of gears to compensate for the errors of assembly. The applications of the proposed methods are illustrated by computer aided numerical examples and computer graphics. Dissert. Abstr.

N86-22946 Department of the Air Force, Washington, D.C.
ADJUSTABLE BALANCE WEIGHT FOR ROTATING SHAFT Patent
David J. Wiebe, inventor (to Air Force) Issued 10 Sep. 1985 4 p Supersedes AD-D009704
(AD-D011988; US-Patent-4,539,864; US-Patent-Appl-SN-393267; US-Patent-Class-74-573) Avail: US Patent and Trademark Office CSCL 13/9

A balance weight mechanism which is attached to a tubular engine shaft for correcting unbalance in the engine is disclosed. The tubular shaft includes a stiffener plate mounted therein transversely to the rotational axis of the shaft. The balance weight mechanism includes a balance weight arm and a fastener for releasably fastening an end of the arm to a generally central location on the stiffener plate where the axis of rotation of the shaft intersects the plate. Spline teeth on the balance weight arm face toward the stiffener plate and are aligned to intermesh with an arc of an annular spline ring on the plate for holding the arm in a desired angularly adjusted position extending outwardly radially from the axis of rotation of the shaft when the arm is fastened tightly against the plate. GRA

N86-22947 Department of the Air Force, Washington, D.C.
FUEL PUMP VENT DRAIN SYSTEM Patent
Richard L. Stanley and George R. Henry, inventors (to Air Force) Issued 10 Sep. 1985 4 p Supersedes AD-D010870
(AD-D011993; US-Patent-4,539,809; US-Patent-Appl-SN-566445; US-Patent-Class-60-39.094) Avail: US Patent and Trademark Office CSCL 21/5

A novel drain system for venting excess fuel from the fuel pump of a jet engine, and particularly the augmenter pump of a jet engine afterburner is described. It comprises a drain line connected at a first end to the vent valve of the fuel pump and at a second end to the main fuel supply line for the engine, for draining the excess fuel from the pump to the main fuel line; a check valve in the drain line near the second end thereof for restricting fuel flow through the drain line in a direction from the first end to the second end; and a vent line having a restriction therein defining an orifice of predetermined size connecting the drain line to an overboard dump port open to ambient. GRA

N86-22948 Department of the Air Force, Washington, D.C.
LOADING DOLLY Patent
Lawrence E. Fielding, inventor (to Air Force) Issued 3 Sep. 1985 8 p Supersedes AD-D010492
(AD-D012010; US-Patent-4,538,792; US-Patent-Appl-SN-512062) Avail: US Patent and Trademark Office CSCL 13/3

A loading dolly has a loading frame adapted to be raised or lowered through horizontal movement of screw jacks which pivot mobile carriages, articulately coupled to the jacks and frame, in a generally vertical direction about the loading frame. Author (GRA)

N86-22949 Westland Helicopters Ltd., Yeovil (England). Dept. 142.
A PRELIMINARY STUDY OF BEARING RACE INTERFACE SLIP Final Report
S. G. Gillingham 1 Feb. 1985 58 p refs
(Contract A26B/80)
(MRR-20082; BR94941) Avail: Issuing Activity

Bearing race interface slip was studied to evolve an analytical design tool to predict the onset of slip for a variety of bearing configurations. It is possible to predict the onset of slip for a single rolling contact load knowing the stress distribution and coefficient of friction at the interface provided that the load distribution is uniform in the axial direction. This analytical method was extended for bearing applications by considering the effect of multiple contact loads. Experiments to validate this analysis were performed but because of significant variations of loading in the axial direction the results could not be used. Nevertheless, the treatment of multiple contact loads is believed to be correct. For nonuniform cases an empirical solution of the slip problem is proposed. Author (ESA)

N86-22950# Department of the Air Force, Washington, D.C.
TRANSLATIONAL MOUNT FOR LARGE OPTICAL ELEMENTS Patent Application
John D. German, inventor (to Air Force) Filed 12 Jun. 1985 24 p
(AD-D012004; US-Patent-Appl-SN-743845) Avail: NTIS HC A02/MF A01 CSCL 20/6

This patent application discloses a translational mount for supporting large optical elements, the mount having a stationary support, a mounting ring pivotally attached to the support, a first eccentric ring rotatably mounted within the mounting ring, a second eccentric ring rotatably mounted within the first ring, and an element rotatably mounted within the second ring securing the large optical element thereto. By the appropriate rotational movement of the pair of eccentric rings the optical element is displaced a predetermined amount in both the horizontal and vertical directions. GRA

N86-22951# Department of the Air Force, Washington, D.C.
MISSILE LONGITUDINAL SUPPORT ASSEMBLY Patent Application
Gassler, inventor (to Air Force) Filed 6 Aug. 1985 16 p
(AD-D012009; US-Patent-Appl-SN-762888) Avail: NTIS HC A02/MF A01 CSCL 15/5

A shock resistant missile longitudinal support assembly is described. It provides axial support to a canisterized missile while allowing the missile to translate under shock in any radial direction relative to the longitudinal axis of the canister. Author (GRA)

N86-22952# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
EVALUATION OF HEAT SHRINKABLE END CAPS FOR SEALING CUT ENDS OF PIPE
M. J. Rohe and W. N. Rankin 13 Aug. 1985 13 p ref
(Contract DE-AC09-76SR-00001)
(DE86-001969; DPST-85-670) Avail: NTIS HC A02/MF A01

Decontamination technology to: (1) reduce personnel exposure to penetrating radiation, (2) reduce the potential for uptake of radioactive material, and (3) increase safety is being investigated. The West Valley Demonstration Project has had good experience with using heat-shrinkable end caps for sealing the cut ends of pipe containing radioactive contamination during D and R operations. This procedure is attractive for use at SRL/SRP during D and R operations for both contamination control and for personnel protection against sharp edges. This procedure is quicker than taping cut pipe ends or dipping them in liquid plastic that hardens to form a seal. DOE

N86-22953# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
ROBOTIC SYSTEM FOR PROCESS SAMPLING
G. M. Dyches 1985 7 p Presented at the 33rd Conference on Remote Systems Technology, San Francisco, Calif., 11 Nov. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001967; DP-MS-85-46; CONF-8511117-1) Avail: NTIS HC A02/MF A01

A three-axis cartesian geometry robot for process sampling was developed at the Savannah River Laboratory (SRL) and implemented in one of the site radioisotope separations facilities. Use of the robot reduces personnel radiation exposure and

contamination potential by routinely handling sample containers under operator control in a low-level radiation area. This robot represents the initial phase of a longer term development program to use robotics for further sample automation. Preliminary design of a second generation robot with additional capabilities is also described. DOE

N86-22954# Oak Ridge National Lab., Tenn.
ROBOT NAVIGATION ALGORITHMS USING LEARNED SPATIAL GRAPHS
S. S. Iyengar, C. C. Jorgensen, S. V. N. Rao, and C. R. Weisbin 1985 37 p Presented at the 2nd Conference on Artificial Intelligence Applications, Miami Beach, Fla., 11 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002238; CONF-851245-2) Avail: NTIS HC A03/MF A01

Finding optimal paths for robot navigation in known terrain has been studied for some time but, in many important situations, a robot would be required to navigate in completely new or partially explored terrain. We propose a method of robot navigation which requires no pre-learned model, makes maximal use of available information, records and synthesizes information from multiple journeys, and contains concepts of learning that allow for continuous transition from local to global path optimality. The model of the terrain consists of a spatial graph and a Voronoi diagram. Using acquired sensor data, polygonal boundaries containing perceived obstacles shrink to approximate the actual obstacles' surfaces, free space for transit is correspondingly enlarged, and additional nodes and edges are recorded based on path intersections and stop points. Navigation planning is gradually accelerated with experience since improved global map information minimizes the need for further sensor data acquisition. Our method currently assumes obstacle locations are unchanging, navigation can be successfully conducted using two-dimensional projections, and sensor information is precise. DOE

N86-22955# Sandia National Labs., Albuquerque, N. Mex.
ALLOCATION OF TASKS TO ROBOTS FOR IMPROVED SAFETY
D. S. Kessel Oct. 1985 8 p refs Presented at the National Safety Council Congress, New Orleans, La., 30 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002366; SAND-85-2386C; CONF-8510193-1) Avail: NTIS HC A02/MF A01

The paper points out the potential contributions of industrial robots to the improvement of safety in the workplace. Ergonomic evaluation techniques were identified which may be used to identify overly stressful tasks which may result in overexertion injuries. DOE

N86-22956# National Engineering Lab., East Kilbride (Scotland). Thermal Systems Div.
PERFORMANCE OF DYNAMICALLY LOADED JOURNAL BEARINGS. PART 2: MEASUREMENT OF OIL FILM PRESSURES
W. L. Cooke Nov. 1983 43 p refs Sponsored by UK Department of Industry's Mechanical Engineering and Machine Tools Requirements Board
(NEL-688-Pt-2; ISSN-0305-1439) Avail: NTIS HC A03/MF A01

Experimentally measured values of oil film pressure in a dynamically loaded bearing are compared with values predicted by narrow bearing theory. The measurements suggest that peak oil film pressures in structurally rigid bearings are likely to be of the order of 65% of those calculated using narrow bearing theory with constant viscosity at average bearing temperature. Peak pressures in engine bearings can be further reduced by bearing flexure. Author (ESA)

N86-22957# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
RESONANCE COMPENSATING OF WIND POWER PLANTS WITH VARIABLE ROTOR SPEED
Tommy Svensson Nov. 1985 125 p refs In SWEDISH, ENGLISH summary
(FOA-C-20589-E3; ISSN-0347-3694) Avail: NTIS HC A06/MF A01

Methods to compensate resonance in the drive train of variable rotor speed windpowered generators are compared. Investigations show that the best results are obtained when the shaft torque is measured and used for the compensating. Items analyzed include: soft shafts (machine elements); resonance; turbine blades; the generator; turbine blade angle regulation; the regulation system; simulation language; simulation with or without compensation and with or without integration; and compensated or noncompensated systems. Author (ESA)

N86-22958# AiResearch Mfg. Co., Torrance, Calif.
OPEN-CYCLE CENTRIFUGAL VAPOR-COMPRESSION HEAT PUMP Annual Report, Mar. 1984 - Feb. 1985
T. L. Iles, L. R. Burgmeier, and A. Y. Liu Apr. 1985 69 p
(Contract GRI-5082-233-0745)
(PB86-103884; GRI-85/0118) Avail: NTIS HC A04/MF A01 CSCL 13A

The objectives of the program are to develop an open-cycle high-lift centrifugal steam compressor system that can be efficiently retrofitted to existing multieffect and high-temperature differential evaporators while maintaining the cost benefits of a single-stage centrifugal compressor and demonstrate the energy saving and cost benefits of driving the compressor with a natural-gas-fueled gas turbine engine. The turbine exhaust will be used for final drying of the product that was evaporated. The design and fabrication of the system and the test activities through February 1985 are described. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-22959 Drexel Univ., Philadelphia, Pa.
CLUTTER SUPPRESSION AND TEXTURE ESTIMATION IN NON-DESTRUCTIVE EVALUATION Ph.D. Thesis
Israel Amir 1986 165 p
Avail: Univ. Microfilms Order No. DA8524029

Two topics dealing with the reflection of ultrasound bursts from random media are discussed. A general formulation of the echo received from a random scatterer ensemble illuminated by a short electromagnetic or sonic signal was developed. A gradient in either scatterer concentration or in the field function of the transmitter/receiver will return an echo which is partially spatially coherent. Furthermore from the degree of coherency, the scatterer concentration and scattering cross section can be calculated. Experimentally the scattering concentration gradient creates a coherent reflection from whose degree of coherency the scattering concentrations can be estimated. Signal processing techniques for the reduction of clutter noise created by random media composed of a high concentration of point scatterers are explained. A method is described for clutter reduction that also uses the split spectrum principle. In this technique the optimum receiver is constructed for each range delay from the n outputs of the frequency windows. Dissert. Abstr.

N86-22960# Royal Armament Research and Development Establishment, Fort Halstead (England). Trials and Evaluation 1 Div.
A GUIDE TO RELIABILITY ACTIVITIES DURING DEVELOPMENT
Mar. 1985 69 p refs 2 Vol.
(RARDE-85004; BR96321; RTP-1099/02; FVJ/514/1) HC A04/MF A01

Reliability mathematics and modeling; reliability apportionment; design evaluation; growth analysis and monitoring; and acceptance testing are introduced. Author (ESA)

N86-22961# Royal Armament Research and Development Establishment, Fort Halstead (England). Trials and Evaluation 1 Div.
RELIABILITY MATHEMATICS AND METHODS
Mar. 1985 229 p refs 2 Vol.
(RARDE-85004-Suppl.; BR96322; RTP-1099/02; FVJ/514/1) HC A11/MF A01

The mathematics and statistical distributions necessary for reliability calculations and data analysis are introduced. It is shown how reliability, availability, and maintainability calculations for complex systems can be facilitated by the use of models based on Boolean algebra. An example of apportioned reliability requirements for a hypothetical system is given. Design evaluation techniques are discussed. Reliability growth models, and the mathematics used in acceptance testing are outlined.
Author (ESA)

N86-22962*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYTICAL ULTRASONICS IN MATERIALS RESEARCH AND TESTING
A. Vary Jan. 1986 357 p refs Conference held in Cleveland, Ohio, 13-14 Nov. 1984
(NASA-CP-2383; E-2486; NAS 1.55:2383) Avail: NTIS HC A16/MF A01 CSCL 20A

Research results in analytical ultrasonics for characterizing structural materials from metals and ceramics to composites are presented. General topics covered by the conference included: status and advances in analytical ultrasonics for characterizing material microstructures and mechanical properties; status and prospects for ultrasonic measurements of microdamage, degradation, and underlying morphological factors; status and problems in precision measurements of frequency-dependent velocity and attenuation for materials analysis; procedures and requirements for automated, digital signal acquisition, processing, analysis, and interpretation; incentives for analytical ultrasonics in materials research and materials processing, testing, and inspection; and examples of progress in ultrasonics for interrelating microstructure, mechanical properites, and dynamic response. For individual titles, see N86-22963 through N86-22963.

N86-22963*# Johns Hopkins Univ., Baltimore, Md.
ULTRASONIC NONDESTRUCTIVE MATERIALS CHARACTERIZATION c71
Robert E. Green, Jr. *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 1-29 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

A brief review of ultrasonic wave propagation in solid materials is presented with consideration of the altered behavior in anisotropic and nonlinear elastic materials in comparison with isotropic and linear elastic materials. Some experimental results are described in which ultrasonic velocity and attenuation measurements give insight into materials microstructure and associated mechanical properties. Recent developments with laser beam non-contact generation and detection of ultrasound are presented. The results of several years of experimental measurements using high-power ultrasound are discussed, which provide substantial evidence of the inability of presently accepted theories to fully explain the interaction of ultrasound with solid materials. Finally, a special synchrotron X-ray topographic system is described which affords the possibility of observing direct interaction of ultrasonic waves with the microstructural features of real crystalline solid materials for the first time.
Author

N86-22964*# Rockwell International Science Center, Thousand Oaks, Calif.
ULTRASONIC CHARACTERIZATION OF MICROSTRUCTURE IN POWDER METAL ALLOY c71
B. R. Tittmann, L. A. Ahlberg, and K. Fertig *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 31-47 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

The ultrasonic wave propagation characteristics were measured for IN-100, a powder metallurgy alloy used for aircraft engine components. This material was as a model system for testing the feasibility of characterizing the microstructure of a variety of inhomogeneous media including powder metals, ceramics, castings and components. The data were obtained for a frequency range from about 2 to 20 MHz and were statistically averaged over numerous volume elements of the samples. Micrographical examination provided size and number distributions for grain and pore structure. The results showed that the predominant source for the ultrasonic attenuation and backscatter was a dense (approx. 100/cubic mm) distribution of small micropores (approx. 10 micron radius). Two samples with different micropore densities were studied in detail to test the feasibility of calculating from observed microstructural parameters the frequency dependence of the microstructural backscatter in the regime for which the wavelength is much larger than the size of the individual scattering centers. Excellent agreement was found between predicted and observed values so as to demonstrate the feasibility of solving the forward problem. The results suggest a way towards the nondestructive detection and characterization of anomalous distributions of micropores when conventional ultrasonic imaging is difficult. The findings are potentially significant toward the application of the early detection of porosity during the materials fabrication process and after manufacturing of potential sites for stress induced void coalescence leading to crack initiation and subsequent failure.
Author

N86-22965*# Cornell Univ., Ithaca, N.Y.
STUDIES OF ACOUSTIC EMISSION FROM POINT AND EXTENDED SOURCES c71
Wolfgang Sachse, Kwang Yul Kim, and C. P. Chen *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 49-59 refs Sponsored in part by NSF and Navy (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The use of simulated and controlled acoustic emission signals forms the basis of a powerful tool for the detailed study of various deformation and wave interaction processes in materials. The results of experiments and signal analyses of acoustic emission resulting from point sources such as various types of indentation-produced cracks in brittle materials and the growth of fatigue cracks in 7075-T6 aluminum panels are discussed. Recent work dealing with the modeling and subsequent signal processing of an extended source of emission in a material is reviewed. Results of the forward problem and the inverse problem are presented with the example of a source distributed through the interior of a specimen. R.J.F.

N86-22966*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RESIDUAL STRESS MEASUREMENTS IN CARBON STEEL c71
Joseph S. Heyman and Namkung Min (William and Mary Coll., Williamsburg, Va.) *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 61-74 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

External dc magnetic field-induced changes in natural velocity of Rayleigh surface waves were measured in steel specimens under various stress conditions. The low field slopes of curves representing the fractional changes of natural velocity were proved to provide correct stress information in steels with different metallurgical properties. The slopes of curves under uniaxial compression, exceeding about one third of the yield stress, fell below zero in all the specimens when magnetized along the stress axis. The slopes under tension varied among different steels but remained positive in any circumstances. The stress effect was observed for both applied and residual stress. A physical interpretation of these results is given based on the stress-induced domain structure changes and the delta epsilon effect. Most importantly,

it is found that the influence of detailed metallurgical properties cause only secondary effects on the obtained stress information.
Author

N86-22967*# Ohio State Univ., Columbus.
ULTRASONIC MEASUREMENT OF POROSITY IN CASTS AND WELDS c71
Laszlo Adler and Shaio-Wen Wang *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 75-81 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

The development of a quantitative nondestructive method which involves ultrasonic attenuation measurements in frequency domain to determine volume fraction of porosity in aluminum cast is discussed. The aluminum alloy A357 casting samples were produced at the Ohio State University Foundry with controlled porosity contents ranging from 0% to 6%. A computer controlled system was used to direct ultrasonic beam to a test sample to different places to conduct ultrasonic attenuation measurements. The plot of attenuation coefficients as a function of frequency was then evaluated based on existing theories to determine volume fraction of porosity and pore size.
Author

N86-22968*# Johns Hopkins Univ., Baltimore, Md.
ANALYTICAL ULTRASONICS FOR CHARACTERIZATION OF METALLURGICAL MICROSTRUCTURES AND TRANSFORMATIONS c71
Moshe Rosen *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 83-102 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The application of contact (piezoelectric) and noncontact (laser generation and detection) ultrasonic techniques for dynamic investigation of precipitation hardening processes in aluminum alloys, as well as crystallization and phase transformation in rapidly solidified amorphous and microcrystalline alloys is discussed. From the variations of the sound velocity and attenuation the precipitation mechanism and kinetics were determined. In addition, a correlation was established between the observed changes in the velocity and attenuation and the mechanical properties of age-hardenable aluminum alloys. The behavior of the elastic moduli, determined ultrasonically, were found to be sensitive to relaxation, crystallization and phase decomposition phenomena in rapidly solidified metallic glasses. Analytical ultrasonics enables determination of the activation energies and growth parameters of the reactions. Therefrom theoretical models can be constructed to explain the changes in mechanical and physical properties upon heat treatment of glassy alloys. The composition dependence of the elastic moduli in amorphous Cu-Zr alloys was found to be related to the glass transition temperature, and consequently to the glass forming ability of these alloys. Dynamic ultrasonic analysis was found to be feasible for on-line, real-time, monitoring of metallurgical processes.
Author

N86-22969*# Argonne National Lab., Ill.
ANALYTICAL ULTRASONICS FOR STRUCTURAL MATERIALS c71
David S. Kupperman *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 103-115 refs Previously announced in IAA as N85-34600 Sponsored in part by NRC and DOE (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The application of ultrasonic velocity and attenuation measurements to characterize the microstructure of structural materials is discussed. Velocity measurements in cast stainless steel are correlated with microstructural variations ranging from equiaxed (elastically isotropic) to columnar (elastically anisotropic) grain structure. The effect of the anisotropic grain structure on the deviation of ultrasonic waves in cast stainless steel is also reported. Field-implementable techniques for distinguishing equiaxed from columnar grain structures in cast stainless steel structural members are presented. The application of ultrasonic velocity measurements to characterize structural ceramics in the green state is also discussed.
Author

N86-22970*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ULTRASONIC CHARACTERIZATION OF STRUCTURAL CERAMICS c71
Stanley J. Klima and George Y. Baaklini *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 117-126 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

Ultrasonic velocity and attenuation measurements were used to characterize density and microstructure in monolithic silicon nitride and silicon carbide. Research samples of these structural ceramics exhibited a wide range of density and microstructural variations. It was shown that bulk density variations correlate with and can be estimated by velocity measurements. Variations in microstructural features such as grain size or shape and pore morphology had a minor effect on velocity. However, these features had a pronounced effect on ultrasonic attenuation. The ultrasonic results are supplemented by low-energy radiography and scanning laser acoustic microscopy.
Author

N86-22971*# Iowa State Univ. of Science and Technology, Ames.
ON THE INTERACTION OF ULTRASOUND WITH CRACKS: APPLICATIONS TO FATIGUE CRACK GROWTH c71
O. Buck, R. B. Thompson, and D. K. Rehbein *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 127-140 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

Partial contact of two rough fatigue crack surfaces leads to transmission and diffraction of an acoustic signal at those contacts. Recent experimental and theoretical efforts to understand and quantify such contact in greater detail are discussed. The objective is to develop an understanding of the closure phenomenon and its application to the interpretation of fatigue data, in particular the R-ratio, spike overload/underload and threshold effects on crack propagation.
Author

N86-22972*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYTICAL ULTRASONICS FOR EVALUATION OF COMPOSITE MATERIALS RESPONSE. PART 1: PHYSICAL INTERPRETATION c71
Edmund G. Henneke, II and John C. Duke, Jr. *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 141-152 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The phenomena associated with the propagation of elastic waves in anisotropic materials are discussed. Wave modes propagating in general directions relative to the material coordinate system are not purely longitudinal nor transverse. Hence the generation of ultrasonic waves by common piezoelectric transducers will generate multiple modes to some extent. The received signals will likely be a combination of different modes. When using two transducers to send and receive ultrasonic waves, deviation of the energy flux vector may reduce the apparent value of the received signal unless the proper orientation of the two transducers with respect to one another is taken into account. And application of reflection from plane boundaries for the purposes of making certain measurements may lead to misinterpretation of results unless one is aware of the differences in multiple mode generation and critical angle phenomena between isotropic and anisotropic materials. When studies or characterizations of composite materials by ultrasonics are to be performed, these phenomena must be taken into consideration so that proper and correct application and interpretation of the measurements can be made. Finally, attention must be drawn again to the fact that composite materials

are heterogeneous by definition. The results discussed here have been determined for homogeneous materials only. While the assumption of homogeneity appears to be valid for certain wavelength ranges in composites, future work must continue to study the phenomena of wave propagation in anisotropic, nonhomogeneous materials. Author

N86-22973*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYTICAL ULTRASONICS FOR EVALUATION OF COMPOSITE MATERIALS RESPONSE. PART 2: GENERATION AND DETECTION c71
John C. Duke, Jr. and Edmund G. Henneke, II *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 153-168 refs (For primary document see N86-22962 13-38)
(Grants NsG3-172; NAG3-323)
Avail: NTIS HC A16/MF A01 CSCL 20A

To evaluate the response of composite materials, it is imperative that the input excitation as well as the observed output be well characterized. This characterization ideally should be in terms of displacements as a function of time with high spatial resolution. Additionally, the ability to prescribe these features for the excitation is highly desirable. Various methods for generating and detecting ultrasound in advanced composite materials are examined. Characterization and tailoring of input excitation is considered for contact and noncontact, mechanical, and electromechanical devices. Type of response as well as temporal and spatial resolution of detection methods are discussed as well. Results of investigations at Virginia Tech in application of these techniques to characterizing the response of advanced composites are presented. Author

N86-22974*# Iowa State Univ. of Science and Technology, Ames.
INFERENCE OF STRESS AND TEXTURE FROM ANGULAR DEPENDENCE OF ULTRASONIC PLATE MODE VELOCITIES c71
R. B. Thompson, J. F. Smith, and S. S. Lee *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 169-180 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

The theory for the angular dependence of the ultrasonic wave velocity in a symmetry plane of an orthorhombic, stressed material is presented. The two waves having polarizations in this plane are shown to have velocities which can be estimated from measurements of the SH sub 0 and S sub 0 guided modes of a thin plate: the relationship being exact for the SH sub 0 mode and requiring a 10% correction for the S sub 0 mode at long wavelength. It is then shown how stress and texture can be independently inferred from various features of the angular dependence of these two velocities. From the SH sub 0 data, the ability to determine the directions and differences in magnitudes of principal stresses is described and supported by experimental data on several materials. From a combination of the SH sub 0 and S sub 0 data, a procedure is proposed for determining the coefficients W sub 400, W sub 420 and W sub 440 of an expansion of the crystallite orientation distribution function in terms of generalized Legendre functions. Possible applications in process control are indicated. Author

N86-22975*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF STRESS ON ULTRASONIC PULSES IN FIBER REINFORCED COMPOSITES c71
John H. Hemann (Cleveland State Univ., Ohio) and George Y. Baaklini *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 181-191 refs Previously announced in IAA as N83-33180 (For primary document see N86-22962 13-38)
(Grant NAG3-106)
Avail: NTIS HC A16/MF A01 CSCL 20A

An acoustical-ultrasonic technique was used to demonstrate relationships existing between changes in attenuation of stress waves and tensile stress on an eight ply 0 degree graphite-epoxy fiber reinforced composite. All tests were conducted in the linear range of the material for which no mechanical or macroscopic damage was evident. Changes in attenuation were measured as a function of tensile stress in the frequency domain and in the time domain. Stress wave propagation in these specimens was dispersive, i.e., the wave speed depends on frequency. Wave speeds varied from 267,400 cm/sec to 680,000 cm/sec as the frequency of the signal was varied from 150 kHz to 1.9 MHz which strongly suggests that flexural/lamb wave modes of propagation exist. The magnitude of the attenuation changes depended strongly on tensile stress. It was further observed that the wave speeds increased slightly for all tested frequencies as the stress was increased. Author

N86-22976*# Massachusetts Inst. of Tech., Cambridge.
PATTERN RECOGNITION CHARACTERIZATIONS OF MICROMECHANICAL AND MORPHOLOGICAL MATERIALS STATES VIA ANALYTICAL QUANTITATIVF ULTRASONICS c71
James H. Williams, Jr. and Samson S. Lee *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 193-205 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01

One potential approach to the quantitative acquisition of discriminatory information that can isolate a single structural state is pattern recognition. The pattern recognition characterizations of micromechanical and morphological materials states via analytical quantiative ultrasonics are outlined. The concepts, terminology, and techniques of statistical pattern recognition are reviewed. Feature extraction and classification and states of the structure can be determined via a program of ultrasonic data generation. R.J.F.

N86-22977*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ULTRASONIC VERIFICATION OF MICROSTRUCTURAL CHANGES DUE TO HEAT TREATMENT c71
Edward R. Generazio *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 207-217 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

Ultrasonic attenuation was measured for polycrystalline samples of nickel and copper with various grain-size distributions produced by heat treatment. Attenuation as a function of frequency was determined for a sample having a known mean grain diameter. Once this function was determined, it could be scaled to determine the mean grain size of other samples of the same material with different mean grain diameters. These results were obtained by using broadband pulse-echo ultrasound in the 25 to 100 MHz frequency range. The results suggest an ultrasonic, nondestructive approach for verifying heat treatment of metals. R.J.F

N86-22978*# Lowell Univ., Mass.
ULTRASONIC MATERIAL PROPERTY DETERMINATIONS c71
Steven Serabian *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 219-232 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The use and potential offered by ultrasonic velocity and attenuation measurements to determine and/or monitor material properties is explored. The basis for such unique measurements along with examples of materials from a variety of industries are presented. Author

N86-22979*# Ohio State Univ., Columbus.
DYNAMIC MODULI AND LOCALIZED DAMAGE IN COMPOSITES c71
L. S. Fu *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 233-256 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The scatter of elastic waves due to a thin, flat ellipsoidal inhomogeneity, either penny shaped or elliptical is discussed. An average theorem appropriate for dynamic effective mass density and effective moduli was developed via a self-consistent scheme. Effective material properties of two-component media consisting of randomly distributed spheres are given here as a special case.
Author

N86-22980*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRANSFER FUNCTION CONCEPT FOR ULTRASONIC CHARACTERIZATION OF MATERIAL MICROSTRUCTURES c71
Alex Vary and Harold E. Kautz *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 251-297 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

The approach given depends on treating material microstructures as elastomechanical filters that have analytically definable transfer functions. These transfer functions can be defined in terms of the frequency dependence of the ultrasonic attenuation coefficient. The transfer function concept provides a basis for synthesizing expressions that characterize polycrystalline materials relative to microstructural factors such as mean grain size, grain-size distribution functions, and grain boundary energy transmission. Although the approach is nonrigorous, it leads to a rational basis for combining the previously mentioned diverse and fragmented equations for ultrasonic attenuation coefficients.
Author

N86-22981*# Ohio State Univ., Columbus. Dept. of Welding Engineering.
ADHESIVE JOINT EVALUATION BY ULTRASONIC INTERFACE AND LAMB WAVES c71
S. I. Rokhlin *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 299-310 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

Some results on the application of interface and Lamb waves for the study of curing of thin adhesive layers were summarized. In the case of thick substrates (thickness much more than the wave length) the interface waves can be used. In this case the experimental data can be inverted and the shear modulus of the adhesive film may be explicitly found based on the measured interface wave velocity. It is shown that interface waves can be used for the study of curing of structural adhesives as a function of different temperatures and other experimental conditions. The kinetics of curing was studied. In the case of thin substrates the wave phenomena are much more complicated. It is shown that for successful measurements proper selection of experimental conditions is very important. This can be done based on theoretical estimations. For correctly selected experimental conditions the Lamb waves may be a sensitive probe of adhesive bond quality and may be used or cure monitoring.
Author

N86-22982*# Massachusetts Inst. of Tech., Cambridge.
INPUT-OUTPUT CHARACTERIZATION OF AN ULTRASONIC TESTING SYSTEM BY DIGITAL SIGNAL ANALYSIS c71
James H. Williams, Jr., Samson S. Lee, and Hira Karagulle *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 311-339 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

Ultrasonic test system input-output characteristics were investigated by directly coupling the transmitting and receiving transducers face to face without a test specimen. Some of the fundamentals of digital signal processing were summarized. Input and output signals were digitized by using a digital oscilloscope, and the digitized data were processed in a microcomputer by using digital signal-processing techniques. The continuous-time test system was modeled as a discrete-time, linear, shift-invariant system. In estimating the unit-sample response and frequency response of the discrete-time system, it was necessary to use digital filtering to remove low-amplitude noise, which interfered with deconvolution calculations. A digital bandpass filter constructed with the assistance of a Blackman window and a rectangular time window were used. Approximations of the impulse response and the frequency response of the continuous-time test system were obtained by linearly interpolating the defining points of the unit-sample response and the frequency response of the discrete-time system. The test system behaved as a linear-phase bandpass filter in the frequency range 0.6 to 2.3 MHz. These frequencies were selected in accordance with the criterion that they were 6 dB below the maximum peak of the amplitude of the frequency response. The output of the system to various inputs was predicted and the results were compared with the corresponding measurements on the system
Author

N86-22983*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QUANTITATIVE FLAW CHARACTERIZATION WITH SCANNING LASER ACOUSTIC MICROSCOPY c71
Edward R. Generazio and Don J. Roth *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 341-358 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

Surface roughness and diffraction are two factors that have been observed to affect the accuracy of flaw characterization with scanning laser acoustic microscopy. In accuracies can arise when the surface of the test sample is acoustically rough. It is shown that, in this case, Snell's law is no longer valid for determining the direction of sound propagation within the sample. The relationship between the direction of sound propagation within the sample, the apparent flaw depth, and the sample's surface roughness is investigated. Diffraction effects can mask the acoustic images of minute flaws and make it difficult to establish their size, depth, and other characteristics. It is shown that for Fraunhofer diffraction conditions the acoustic image of a subsurface defect corresponds to a two-dimensional Fourier transform. Transforms based on simulated flaws are used to infer the size and shape of the actual flaw.
Author

N86-22984# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Systems Section.
THE ESA PRODUCT ASSURANCE SPECIFICATION SYSTEM PSS-01 SERIES, EXPLANATORY NOTE
Jul. 1985 8 p Previously announced as N85-13259 (ESA-PSS-01-Issue-7; ESA-PSS-01-Issue-6) Avail: NTIS HC A02/MF A01

The ESA product assurance specifications were rewritten and reidentified to fit into a three-level structure. The PSS-01-0 contains the basic requirements for product assurance and is the only document in the top level, i.e., level 1. Level 2 comprises 9 specifications each of which expands into detailed requirements a major discipline covered more generally in PSS-01-0. The remainder of the specifications are in level 3 and are supporting specifications, which cover methods, special processes, data, etc, and may be direct extensions of requirements in the level 2 specifications.
Author (ESA)

N86-22985# Rolls-Royce Ltd., Derby (England). Nondestructive Testing Div.
LIMITATIONS OF MANUAL NDT SYSTEMS AND THE NO EYES CONCEPT
R. G. Taylor 23 Jul. 1985 9 p
(PNR-90291) Avail: NTIS HC A02/MF A01

Defect tolerant design, particularly of aircraft components, and its links with nondestructive testing (NDT) are discussed. Engineering of the NDT technique, defect detection requirements, and human factors in the inspection cycle are considered.
Author (ESA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-22986 Ohio State Univ., Columbus.
FINITE ELEMENT RESPONSE MODELING OF CRACK GEOMETRIES INDUCED BY HYDRAULIC FRACTURING Ph.D. Thesis
Hussien A. Khattab 1985 123 p
Avail: Univ. Microfilms Order No. DA8526195

The mechanics of hydraulic fracturnig generally entails the controlled pumping of the selected proppant laden fracture fluid in a borehole. A vertical fracture system is subsequently induced in the pay zone by the pressurized fluid. To date, a considerable amount of research was conducted to predict hydraulic fracture geometry. However, applications of finite element methodology to this problem were limited. The finite element formulations associated with the fluid pressure profiles and fracture geometry of the two dimensional model are presented. The fluid leak off in the formation and the role of both Newtonian and non-Newtonian fluids are included in the formulations. A computer code for predicting the fracture width, length, pressure profile, and stress intensity factors is developed. Numerical results for selected cases involving height containment due to discontinuous tectonic stress fields are presented. Comparisons with hydraulic fracture configuration simulations reported in recent literature are also presented.
Dissert. Abstr.

N86-22987 Ohio State Univ., Columbus.
THERMO-ELASTOPLASTIC ANALYSIS OF WORK-HARDENING MATERIALS USING THE FINITE ELEMENT METHOD Ph.D. Thesis
Ali Mohamed Elrafei 1985 186 p
Avail: Univ. Microfilms Order No. DA8526173

Structural response evaluations of geological media and various engineering materials at elevated temperatures necessitate accurate determination of stress, strain and displacement fields. The thermo-elastoplastic response of a continuum is investigated by using the finite element method. Applications of this research to underground coal gasification are presented. The structure of the stress-strain relation is studied in the referential and spatial descriptions. Advantages and disadvantages of each description are delineated. A thermal cap model is proposed which takes into account the effect of temperature on the material properties in the plastic range. Temperature dependent material properties in the elastic domain are also included in the analysis. The finite element formulation is based on the principle of virtual work, the equilibrium and energy balance equations being uncoupled. The developed two-dimensional finite element code was evaluated against limiting cases available in the literature. Cases of large elastic deformations and elastoplastic behaviour under thermal and mechanical loads were investigated and excellent agreement is obtained.
Dissert. Abstr.

N86-22988 Illinois Univ., Chicago.
SUTURES IN STRETCHED MEMBRANES Ph.D. Thesis
Ty-Ping Lee 1985 157 p
Avail: Univ. Microfilms Order No. DA8524811

General suture problem in neo-Hookean membranes was investigated. The constitutive equations for plane stress theory are expressed by complex variable notations. The holes with various kinds of geometries were generated by the conformal mappings. A suture function defining a one-to-one correspondence between the opposite sides of a hole is introduced. Successive substitutions were used to solve the large finite strain problems. An analytic solution is provided for the second approximation to the exact value. Fast convergence is guaranteed by the fact the membrane is everywhere in tension. Graphical results for deformations are available for miscellaneous situations. Certain symmetries can be predicted by physical intuition. Applications to surgical operations are possible by the parametric analyses of the solutions.
Dissert. Abstr.

N86-22989 Illinois Univ., Chicago.
A CONTINUUM DAMAGE THEORY OF CREEP FOR POLYCRYSTALLINE METALS AT ELEVATED TEMPERATURES Ph.D. Thesis
Sebastine Selvaraj 1985 97 p
Avail: Univ. Microfilms Order No. DA8524816

A Continuum Damage Theory for time dependent deformation of polycrystalline metals at elevated temperatures is developed using the concept of internal state variables. Two sets of internal state variables, representing the viscous behavior caused by dislocations and the brittle phenomenon resulting from planar microcracks, were considered in the formulation. Thus the proposed theory is valid for materials ranging from perfectly brittle to purely ductile polycrystalline metals. The theory is based on the principles of thermodynamics using a rational form of Helmholtz free energy and a suitable flow potenial for isothermal cases with infinitesimal strains and small rotations. The validity of the theory is investigated by comparing the results with those available in literature. The proposed model leads to results which correlate well with experimental results for IN100.
Dissert. Abstr.

N86-22990 Wisconsin Univ., Madison.
CONSTITUTIVE RELATIONS AND FAILURE PREDICTIONS FOR NONLINEAR ORTHOTROPIC MEDIA Ph.D. Thesis
Jeffrey Charles Suhling 1985 320 p
Avail: Univ. Microfilms Order No. DA8516793

The mechanical behavior of nonlinear orthotropic media under the action of uniaxial and biaxial states of loading was studied using experimental, analytical, and numerical techniques. Paper and paperboard were the particular materials considered. During the initial stage of the program, an extensive set of experimental biaxial failure data were used to evaluate and modify existing strength criteria. Later analytical work was concerned with forming and applying biaxial nonlinear elastic constitutive equations. Experimental data were gathered to evaluate the material coefficients present. Additional biaxial experiments have verified the adequacy of the model. The deformations of a uniformly loaded clamped circular paperboard plate (Mullen test) are determined by utilizing a nonlinear theory of elastic plates and the finite element method. The plate theory is an extension of the classical von Karman theory to accommodate anisotropic nonlinear behavior. Theoretical results correlated well with experimental data obtained using the optical method of shadow moire.
Dissert. Abstr.

N86-22991 Case Western Reserve Univ., Cleveland, Ohio.
CRACK LAYER ANALYSIS OF FATIGUE CRACK PROPAGATION IN STEELS Ph.D. Thesis
Michael H. Bessendorf 1985 168 p
Avail: Univ. Microfilms Order No. DA8525250

Fatigue crack propagation experiments were performed on AISI 304 stainless and Fe3Si silicon iron steels; single edge notch specimens. An extensive damage zone consisting of slip bands, extrusions, and intrusions surrounds and precedes the propagating crack. The system of the crack and damage zone constitute the crack layer (CL). The results demonstrate that fracture propagates by the translation, expansion, and distortion of the part of CL called the active zone. Considerable differences in critical energy release rates are observed among specimens with different loading histories. This fact is attributed to the differences in the damage densities at the crack tip. Analysis of the results is carried out within the framework of CL theory. The crack growth rate and the rate of active zone expansion are considered thermodynamic fluxes. The path independent integrals J and M are parts of the conjugate thermodynamic forces. Stochastic and fractal analyses of the fracture surface were performed on two ensembles of AISI 304 steel samples. The fracture was shown to be strongly nonstationary. The correlation distance of the fracture process increases with the crack length. The fractal dimension of these trajectories were estimated.
Author

N86-22992 Syracuse Univ., N. Y.
STRESS ANALYSIS OF VARIABLE THICKNESS SANDWICH PLATES OF RECTANGULAR PLANFORM Ph.D. Thesis
Nasser Hamed Paydar 1985 277 p
Avail: Univ. Microfilms Order No. DA8524435

A small deflection theory is presented for the stresses and deformations in variable thickness elastic sandwich plates that are symmetric about a middle surface. In this analysis, the face sheets are treated as membranes, the core is assumed to be inextensible in the thickness direction, to carry only transverse shear stress on its cross sections normal to middle surface, and to be deformable in transverse shear. The theory takes into account the contribution of the face sheet membrane forces (by virtue of their slopes) to the transverse shear. Thermal effects, due to heating or cooling the face sheets, as well as force loading are considered in this analysis. The special case of unidirectional thickness variation is considered separately from the general case of arbitrary thickness variation, for it is a common geometry and permits special solution techniques. Dissert. Abstr.

N86-22993 Case Western Reserve Univ., Cleveland, Ohio.
GENERAL LINEAR AND NONLINEAR TORSIONAL VIBRATION IN ROTOR SYSTEMS Ph.D. Thesis
Fola Robert Soares 1985 366 p
Avail: Univ. Microfilms Order No. DA8525238

A general purpose rotor torsional vibrations computer code has been developed (STORV). This code embodies the state-of-the-art capability plus new developments not presently available in computer codes for torsional vibrations analysis and simulation. Accurate modeling of the rotor system including nonlinearities and component interactions and the development of algorithms to determine the total system dynamic response is provided. The finite element method (FEM) is the basic modeling technique. Parametric analysis of the rotor torsional dynamics with gear sets having tooth gear error is included. In summary the STORV code is configured to efficiently handle a wide range of specific problem and analysis types. Including: (1) system torsional natural frequencies (damped and undamped); (2) corresponding resonant mode shapes; (3) steady-state frequency-sweep analysis; (4) dynamically unstable operating speed ranges; (5) transient linear and nonlinear systems. Dissert. Abstr.

N86-22994 Iowa State Univ. of Science and Technology, Ames.
TRANSIENT THERMAL STRESS INTENSITY FACTORS OF NEAR SURFACE CRACKS Ph.D. Thesis
Wei-Chung Wang 1985 149 p
Avail: Univ. Microfilms Order No. DA8524707

The stress intensity factors were determined or cracks near a boundary when they experience a sudden temperature change. Different isochromatic fringe patterns were observed for the two tips of the cracks, one near the boundary and the other away from the boundary. A combination of modern digital image analysis and the idea of half-fringe photoelasticity was adopted to collect data from experimentally obtained photographs of the transient event. The photoelastic analysis of a hybrid multiparameter-multipoint approach was employed. Three power series were used to describe the effects due to opening mode, sliding mode and far field stresses, respectively. The accuracy of fringe measurement was obtained by iteration of the measured results through pattern recognition software supported on a local image processing system. The use of up to four coefficients for each power series gave well matched results for both tips between the experimentally obtained fringe patterns and the fringes regenerated from substituting the experimentally determined coefficients for the power series into the generalized Westergaard's equations for crack tip stress fields. Dissert. Abstr.

N86-22995 Leeds Univ. (England). Dept. of Mechanical Engineering.
HIGH STRAIN-RATE PROPERTIES OF MATERIALS Progress Report, 31 May 1985
J. L. Sturges, M. S. Bingley, B. Parsons, and B. N. Cole 1985 60 p refs
(Contract RARDE-2062/0111)
(BR96910) Avail: Issuing Activity

Vanadium free steel torsion specimens were re-heat-treated and tested. A flying wedge test facility was improved. Equivalent stress at instability and instability strains form a recognizable pattern. However, the observed instability strains, while following the general trend predicted by the carbide dissolution mode, are lower than those predicted, when calculated assuming homogeneous plastic deformation. White zones form in all test pieces. Metallographic examination shows that the local plastic strains in these regions are considerably higher than the calculated homogeneous plastic strains. Microhardness surveys show white zone hardness values of up to 690 HV, more than twice the value of as-quenched steel. Author (ESA)

N86-22996 National Physical Lab., Teddington (England). Div. of Materials Applications.
IMPACT ANALYSIS OF ORTHOTROPIC PLATES
D. H. Ferriss Sep. 1985 43 p refs
(NPL-DMA(A)-107; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Motion subsequent to a mass striking transversely a simply supported rectangular orthotropic plate was analyzed. A nonlinear contact law between impactor and plate was assumed, with the effect of gravity on the impactor included. Deflections of the plate were assumed small so that linear plate theory is applicable. The analysis results in a nonlinear integral equation for the time variation of the contact force. This integral equation is solved numerically allowing for multiple contact situations. Author (ESA)

N86-22997*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENAL AND ANALYTICAL GENERIC SPACE STAION DYNAMIC MODELS
W. Keith Belvin and Harold H. Edighoffer (Edighoffer, Inc.) Mar. 1986 90 p refs
(NASA-TM-87696; NAS 1.15:87696) Avail: NTIS HC A05/MF A01 CSCL 20K

A dynamic model used for verification of analytical and experimental methods is documented. The model consists of five substructures to simulate the multibody, low frequency nature of large space structures. Design considerations which led to a fundamental vibration frequency of less than one Hz are described. Finite element analysis used to predict the vibration modes and frequencies of the experimental model is presented. In addition, modeling of cable suspension effects using prestressed vibration analysis is described. Details of the expermental and analytical models are included to permit replication of the study. Results of the modal vibration tests and analysis are presented in a separate document. Author

N86-22998# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
INITIATION, GROWTH AND COALESCENCE OF SMALL FATIGUE CRACKS Final Scientific Report, 14 Jan. 1982 - 14 Jan. 1985
Alten F. Grandt, Jr. Jul. 1985 49 p
(Grant AF-AFOSR-0041-82)
(AD-A161305; AFOSR-85-0963TR) Avail: NTIS HC A03/MF A01 CSCL 20/11

The objective of this effort was to determine the manner in which small fatigue cracks initiate at notches, extend by cyclic loading, interact with adjacent flaws, and coalesce into a single dominant crack which controls final fracture. The desired product was a predictive scheme capable of analyzing the early stages of fatigue crack growth which are characterized by the growth and link-up of small cracks. Research toward this goal was directed at the following tasks: (1) Crack Growth Predictive Algorithm - A computer program was developed to predict the growth and coalescence of multiple cracks located at notches; (2) Crack Interaction Analysis Stress intensity factors solutions were computed for multiple cracks located at an open hole. These solutions were required for the multiple crack growth algorithm; (3) Crack

Coalescence Experiments - Fatigue tests were conducted with multiply cracked specimens to provide a data base to evaluate the predictive model. The model was verified with large crack results directed toward coalescence aspects of the problem as well as small crack experiments which focused on the initial stages of fatigue crack growth; and (4) Characterization of Small Cracks - This phase of the effort was directed toward the growth and coalescence of physically small cracks, which were expected to behave differently than large cracks. GRA

N86-22999# Argonne National Lab., Ill.
DYNAMIC PLASTIC DEFORMATION OF AN INFINITE PLATE
C. K. Youngdahl 1985 8 p Presented at the 3rd Symposium on Energy Engineering Sciences: Thermofluids and Solid Mechanics, University Park, Pa., 8 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-001801; CONF-8510176-2) Avail: NTIS HC A02/MF A01

A solution is derived for the dynamic plastic response of an infinite plate subjected to a general axisymmetric pressure pulse which varies both with position and time and is applied to a time-varying area of the plate. An approximation formula for the final plastic deformation is obtained in terms of three correlation parameters which are functions of simple integrals of the loading. The correlation parameters represent the effects of the applied impulse, the pulse shape, and the growth of the loaded region, respectively. DOE

N86-23000# Oak Ridge National Lab., Tenn.
SECOND INTERNATIONAL CONFERENCE ON FUNDAMENTALS OF FRACTURE. PROGRAM AND ABSTRACT BOOK, SUMMARIES
1985 197 p Conference held at Gatlinburg, Tenn., 4 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001859; ORNL/TM-9783; CONF-851104-Summs) Avail: NTIS HC A09/MF A01

The approximately 95 papers and abstracts are grouped under the following headings: atomic theory, continuum theory, experimental studies, environmental effects, fatigue, ceramics, high-temperature phenomena, and interfacial fracture. DOE

N86-23001# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
TORNADO RISK ANALYSIS AT SAVANNAH RIVER PLANT USING WINDSPEED DAMAGE THRESHOLDS AND SINGLE BUILDING STRIKE FREQUENCIES
D. H. Taylor, J. R. McDonald, and L. A. Twisdale 1985 24 p Presented at the DOE's Natural Phenomena Hazards Mitigation Conference, Las Vegas, Nev., 7 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001972; DP-MS-85-42; CONF-8510118-8) Avail: NTIS HC A02/MF A01

In order to evaluate the safety of existing structures and properly design new structures, an analysis of tornado resistance was conducted on each process building at SRP and other buildings by type. Damage estimates were cataloged for each Fujita class windspeed interval and windspeeds were cataloged as a function of increased levels of damage. The probability, for any structure, of a tornado exceeding each windspeed threshold was calculated using the TORRISK computer code which was developed for calculating the probability of a tornado strike on nuclear power generating plants. DOE

N86-23002# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
STANDARDIZATION OF NATURAL PHENOMENA RISK ASSESSMENT METHODOLOGY AT THE SAVANNAH RIVER PLANT
J. C. Huang and Y. S. Hsu 1985 12 p refs Presented at the DOE's Natural Phenomena Hazards Mitigation Conference, Las Vegas, Nev., 7 Oct. 1985 Prepared in cooperation with Georgia State Univ., Atlanta, Ga.
(Contract DE-AC09-76SR-00001)
(DE86-001977; DP-MS-85-47; CONF-8510118-7) Avail: NTIS HC A02/MF A01

Safety analyses at the Savannah River Plant (SRP) normally require consideration of the risks of incidents caused by natural events such as high-velocity straight winds, tornadic winds, and earthquakes. The probabilities for these events to occur at SRP had been studied independently by several investigators, but the results of their studies were never systematically evaluated. As part of the endeavor to standardize our environmental risk assessment methodology, these independent studies have been thoroughly reviewed and critiqued, and appropriate probability models for these natural events have been selected. The selected probability models for natural phenomena, high-velocity straight winds and tornadic winds in particular, are in agreement with those being used at other DOE sites, and have been adopted as a guide for all safety studies conducted for SRP operations and facilities. DOE

N86-23003# Sandia National Labs., Albuquerque, N. Mex.
DATA REPORT TRUPACT-I, UNIT 0
G. S. Mihalovich, M. Hudson, B. J. Joseph, and L. E. Romesberg Sep. 1985 312 p
(Contract DE-AC04-76DP-00789)
(DE86-002946; SAND-85-1695; TTC-0553) Avail: NTIS HC A14/MF A01

TRUPACT-I was tested to evaluate the design under the regulatory testing requirements defined in DOE Order No. 5480.1, Chapter 3. Tests were conducted both at the Drop Test Facility at Oak Ridge National Laboratories, Oak Ridge, Tennessee, and at Sandia National Laboratories, Albuquerque, New Mexico. The program consisted of 12-inch and 30-foot drop tests onto an essentially unyielding surface. 40-inch drop tests onto a puncture bar, and a thermal test. Instrumentation for the tests included accelerometers, strain gages, and thermocouples. Data from each test was stored on magnetic tape for later analysis. The test unit met all of the structural regulatory requirements during the impact events, with the possible exception of damage to the seal retainer bond line discovered during disassembly. The adhesive bonds on the seal retainer did not hold after the thermal test. The foam behind the puncture panel on the outer door burned during the thermal test, overheating and deteriorating the seals; the seals failed. This report presents the raw data from the testing program of TRUPACT-I, Unit 0. DOE

N86-23004# Sandia National Labs., Albuquerque, N. Mex.
CONTINUUM DAMAGE MECHANICS STUDIES ON THE DYNAMIC FRACTURE OF CONCRETE
E. P. Chen 1985 30 p refs Presented at the Cement-based Composites: Strain Rate Effect on Fracture Conference, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002584; SAND-85-0908C; CONF-851247-1) Avail: NTIS HC A03/MF A01

The dynamic fracture of concrete in tension is studied by applying a continuum damage model. In this model, the degree of damage in concrete corresponds to the fraction of concrete volume that has been tension relieved, and tensile microcracking has been taken as the damage mechanism. In compression, the concrete is assumed to respond in an elastic/perfectly plastic manner. Strain-rate effects have been explicitly included in the model. Accumulation of damage in the material is reflected by the progressive weakening of the material stiffness. Examples involving center- and edge-cracked plate specimens subjected to the action of step and ramp loads are used to demonstrate the material responses predicted by the model. The bulk pressure versus strain relationships at locations close to the crack tip clearly show strain-softening behavior. The damage tends to localize around the crack and its extent in the specimen is dependent upon both the crack geometry and the loading type. These results are presented and their implications are discussed. The model has been successfully applied to predict the responses of oil shale in blasting operations. DOE

N86-23005# Denver Univ., Colo. Dept. of Physics.
DETECTION OF HYDROGEN ASSISTED CRACK GROWTH Final Report
S. H. Carpenter Sep. 1985 7 p

(Contract DE-AC02-81ER-10958)
(DE86-001881; DOE/ER-10958/4) Avail: NTIS HC A02/MF A01

Changes in the elastic modulus of pure iron due to cracking produced by cathodic charging have been measured and related to the density of cracking, the size of the cracks and the effective depth of cracking. The effects of experimental variables such as the vibratory strain amplitude, the charging current density sample size and mode of vibration have been determined. Effects of applied stress and test temperature have also been investigated. An added result of the modulus measurements has been the generation of complimentary internal friction data. The acoustic emission generated during the pressurization and subsequent pressure holds of small pressure vessels with a high pressure hydrogen and helium gas have been measured and characterized. The occurrence of cracking has been related to the production of measurable acoustic emission. To completely characterize the sources of measured acoustic emissions a variety of mechanical tests have been carried out. Double cantilever beam (DCB) specimens have been tested in different conditions to elucidate the acoustic emission from crack growth and to determine the effects of hydrogen environments. DOE

N86-23006# National Engineering Lab., East Kilbride (Scotland). Plastics Engineering Center.
AXIAL BUCKLING OF REINFORCED PLASTIC CYLINDERS WITH SURFACE IMPERFECTION
A. J. Wootton and G. D. Scowen Oct. 1983 31 p refs Sponsored by UK Department of Industry's Mechanical Engineering and Machine Tools Requirement Board
(NEL-687; ISSN-0305-1439) Avail: NTIS HC A03/MF A01

Theories of axial compression buckling in fiber-reinforced plastics circular cylinders are compared with experiment. Favorable agreement is established between theory that included surface imperfections and experimental buckling data. The surface imperfection measurement was in terms of root mean square of the random surface deviation from the nominal surface of the cylinder. Buckling results for glass, aramid, and hybrid carbon/glass fiber composite cylinders are included. Shell theory predicts higher buckling instability thresholds than experiments. Author (ESA)

N86-23007# National Engineering Lab., East Kilbride (Scotland). Service Loading Div.
THE FATIGUE STRENGTH OF INTERNAL THREADS IN THREE MATERIALS
J. E. Field Nov. 1983 24 p refs Sponsored by UK Department of Industry's Mechanical Engineering and Machine Tools Requirements Board
(NEL-689; ISSN-0305-1439) Avail: NTIS HC A02/MF A01

Repeated tension fatigue tests were carried out on 3/4 to 16 UNF internally threaded specimens in a 60:40 brass, a normalized En 8 steel and a hardened and tempered En 26 steel. Ground threads do not give as high a fatigue strength as tapped threads, despite having a better root form; this is attributed to beneficial cold working effects in thread tapping. Increasing the outside diameter of the specimen from 1.4 to 1.7 D, where D is the nominal thread diameter, does not increase the limiting fatigue load in proportion to the increase in cross-sectional area. Despite having nearly double the static strength of the En 8 specimens, the En 26 specimens with ground threads only has the same high cycle fatigue strength as the En 8 specimens with ground threads. A wide range of endurance was covered. Author (ESA)

N86-23008# General Electric Co., Whetstone (England). Mechanical Engineering Lab.
EUROPEAN SPACE AGENCY THERMAL ANALYSIS NETWORK (ESATAN) Final Report
J. R. Turner Paris ESA May 1985 26 p refs
(Contracts ESA-4791/81-NL-DK; ESA-5141/82-NL-PB(SC))
(GEC-MEL34.0582; ESA-CR(P)-2102; FR-ESATAN-007-A) Avail: NTIS HC A03/MF A01

The computer program ESATAN was developed for the thermal analysis of steady state and transient engineering problems. The development of the package and deliverable items are described. Standards used during the development, with recommendations for improvements, are outlined. Author (ESA)

N86-23009# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
CALCULATIONS OF A SELF SUPPORTING STANDARD SHELL OF UNUSUAL SHAPE [BEREKENINGEN AAN EEN ZELFDRAGENDE STANDAARDSCHAAL VAN ONGEBRUIKELIJKE VORM]
A. W. M. Kok 1983 45 p In DUTCH
(ICES-STRUDL-83-8; B8575351) Avail: NTIS HC A03/MF A01

Strength calculations of a double crowned shell, used in series for modular constructions, were carried out. A number of load cases, i.e., shell weight, snow, wind, and the total load were applied. A preprocessor was written to determine the geometry of an arbitrary shell by means of a limited number of data. Load, stresses, moments, and cross forces in a number of cross sections were calculated, and the deformed geometry was plotted for each case. Author (ESA)

N86-23010# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AEROELASTIC RESEARCH ON WIND TURBINES Progress Report, 1 Jul. 1982 - 1 Jan. 1983 [ACHTSTE VOORTGANGSRAPPORT AERO-ELASTISCH ONDERZOEK AAN WINDTURBINES, PERIODE 1 JULI 1982 TOT 1 JANUARI 1983]
W. Kuik and W. P. Koppens Jan. 1983 11 p refs In DUTCH
(VTH-M-450; PR-8) Avail: NTIS HC A02/MF A01

Results and developments of aeroelastic investigations of tip vane wind turbines are presented. Smoke and wool fiber experiments on blades and vanes show an increase of the mass flow through the turbine, but a release of the flow at the windward-side of blades and vanes, increase the resistance. The average torsion vibration spectrum at the blade root was measured for a number of rpm values. Differences in aerodynamic conditions cause large peak variations and distributions. Using a four degrees of freedom model to determine flap-torsion, lag-flap, and lag torsion stability of a tip vane rotor, calculations on an experimental tip vane turbine were carried out. Tip vane air forces appear to decrease the critical rpm by 10% to 15%, while it is hardly influenced by lag movements. Author (ESA)

N86-23011# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
A FOUR DEGREES OF FREEDOM MODEL FOR THE AEROELASTIC STABILITY OF A WIND TURBINE BLADE [EEN VIER GRADEN VAN VRIJHEID-MODEL VOOR DE AERO-ELASTICHE STABILITEIT VAN EEN WINDTURBINE BLAD]
W. Kuik Mar. 1983 65 p refs In DUTCH
(VTH-M-454) Avail: NTIS HC A04/MF A01

A model for the description of frequency and damping curves of a tip vane rotor as a function of the rpm was developed to predict rpm at which instabilities (flutter or divergence) might occur in an experimental tip vane wind turbine project. A model with four degrees of freedom, i.e., rotation out of the rotor plane, in the rotor plane, and in torsion direction, was used. Via the transformation matrix of the relation between the deformation of the rotating blade and an inert axis-system, Lagrange equations of motion were derived. Adding stiffness and damping values, axis mass, and quasi-stationary aerodynamic forces, a model for a rotor with and without tip vanes was derived. Author (ESA)

N86-23012# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AEROELASTIC RESEARCH ON WIND TURBINES Progress Report, 1 Jan. - 1 Jul. 1983 [NEGENDE VOORTGANGSRAPPORT. AERO-ELASTISCH ONDERZOEK AAN WINDTURBINES PERIODE 1 JANUARI TOT 1 JULI 1983]
W. Kuik and W. P. Koppens Jun. 1983 5 p refs In DUTCH
(VTH-M-474; PR-9) Avail: NTIS HC A02/MF A01

Results and developments of aeroelastic investigations of tip vane wind turbines are presented. Aerodynamic (transfer) flow pieces were applied in the sharp angles between tip vanes and blades to reduce resistance caused by flow release. Analysis of

the power curve shows a flow resistance reduction. Helicopter blades appear not to be optimal aerodynamically. Torsional stress measurements on the blade root show a higher flutter rpm, induced by a reduced aerodynamic load of the tip vane. Programs to predict ground resonances and whirl-flutter of a two bladed rotor on a pylon with symmetric stiffness were developed. The programs are part of a stability program which describes a flexible rotor on a flexible pylon. Author (ESA)

N86-23013# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
MEP: A PROGRAM FOR CROSS SECTION MAGNITUDES OF A MULTICELL WING PROFILE [M.E.P. - EEN PROGRAMMA VOOR DOORSNEDEGROOTHEDEN VAN EEN MEERCELLIG VLEUGELPROFIEL]
P. A. Joosse Oct. 1983 49 p refs In DUTCH
(VTH-M-487) Avail: NTIS HC A03/MF A01

Based on undisturbed thin walled multicell closed cross sections, an interactive program for the determination of the center of gravity, stress center, shear center, and torsional stiffness of wind turbine blades was developed. In the case of bending it is assumed that the cross sections stay plane, and stress is proportionate to elasticity (Hookes law). Based on the Saint Venant principle, the shear center was calculated using shear flow caused by cross forces. Wing profiles with a thickness/chord ratio < 0.20 were assumed. Magnitudes of a three cell hexagon and a Kevlar NACA 23000 profile for tip vanes were calculated. Author (ESA)

N86-23014# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AEROELASTIC RESEARCH ON WIND TURBINES Progress Report, 1 Jul. 1983 - 1 Jan. 1984 [TIENDE VOORTGANGSRAPPORT. AERO-ELASTISCH ONDERZOEK AAN WINDTUBINES PERIODE 1 JULI 1983 TOT 1 JANUARI 1984]
W. P. Koppens and W. Kuik Jan. 1984 7 p refs In DUTCH
(VTH-M-501; PR-10) Avail: NTIS HC A02/MF A01

Tip vane flow resistance was investigated, replacing blades by pipes. Experiments show resistances on the windward side, leading to malfunctioning of the turbine. A cross flow to which the helicopter wing profile used is sensitive was established. Aeroelastic wind tunnel model experiments were started. The importance of stall flutter at tip vane rotors is shown. From calculations it appears that the stability of the rotor can be increased by the application of flapping hinges in the blade root, giving the generator a rotation direction opposite to the rotor, and placing the rotor behind the pylon. Author (ESA)

N86-23015# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
EVALUATION OF THE CAPABILITIES OF SUPERCOMPUTERS FOR SHELL COLLAPSE LOAD CALCULATIONS
J. Arbocz, T. J. vanBaten, and R. Liurba Apr. 1984 12 p refs In DUTCH
(VTH-M-505) Avail: NTIS HC A02/MF A01

The use of supercomputers in investigations of form impurities involved in the collapse of pressure loaded shell constructions was examined. Two programs, Extended Analysis and STAGS were tested on a CRAY-1. Extended Analysis, which determines the crack load of shells, was tested usng a parallel shooting method to resolve a nonlinear two point limiting condition problem; STAGS, a finite difference method for thin walled shells, was tested by transforming the problem into a large system of nonlinear equations, solved per block using iteration. Vectorization and optimization applications were tested. The computer considerably reduces investigation time. Author (ESA)

N86-23016# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
AEROELASTIC RESEARCH ON WIND TURBINES Progress Report, 1 Jan. - 1 Jul. 1984 [ELFDE VOORTGANGSRAPPORT. AERO-ELASTISCH ONDERZOEK AAN WINDTURBINES. PERIODE 1 JANUARI 1984 TOT 1 JULI 1984]
W. P. Koppens and W. Kuik Jun. 1984 9 p refs In DUTCH
(VTH-M-517; PR-11) Avail: NTIS HC A02/MF A01

Results and developments of aeroelastic investigations of tip vane wind turbines are presented. The Liebeck (Kolibrie helicopter) wing profile was replaced by a NACA-23012 and a profile specially developed for tip vanes. The Liebeck profile is sensitive to disturbances (torsion) reducing the power coefficient. Flow resistance experiments show that the resistance is caused by viscous and induced resistances. Power curves of a one-blade rotor with and without tip vane were determined in a wind tunnel. The neglect in aeroelastic literature of the contribution of the dynamic profile curvature in case the angle of attack is used instead of the 3/4 chord point appears not permissible. Author (ESA)

42 GEOSCIENCES (GENERAL)

N86-23017# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES Abstracts Only
31 Mar. 1986 56 p Transl. into ENGLISH from various Russian articles
(JPRS-UES-86-004) Avail: NTIS HC A04/MF A01

Progress is reported in U.S.S.R. earth sciences. Topics discussed include (1) meteorology; (2) oceanography; (3) terrestrial geophysics; (4) atmospheric physics; and (5) artic and antarctic research. For individual titles, see N86-23018 through N86-23024.

N86-23018# Joint Publications Research Service, Arlington, Va.
SELECTION OF METHOD FOR CALCULATING SCATTERING OF IMPURITIES IN ATMOSPHERE IN STANDARDIZING RELEASE OF RADIONUCLIDES FROM HIGH SOURCES Abstract Only c45
N. Ye. Artemova *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 2 Transl. into ENGLISH from Atomnaya Energiya (Moscow, USSR), v. 59, no. 3, Sept. 1985 p 216-221 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

Well-established methods existing in the USSR for calculating necessary smokestack height and maximum admissible emissions to maintain the maximum admissible concentration of harmful substances near the ground in the area surrounding an industrial enterprise or power plant for chemical substances and compounds for which maximum admissible concentrations exist. This article discusses methods suitable for making equivalent determination for radioactive elements. The modifications of the Gaussian model of dispersion of radionuclides around a source utilized in the USSR have not been tested at specific sites or in special experiments. The method of calculating the dilution factor developed by the State Committee for Hydrometeorology is recommended for formulating methods for standardizing the emission of radionuclides. The method is oriented toward definition of scientifically well-founded emission levels to assure radiation safety standards are not exceeded under any weather conditions. All types of continuously acting high sources are covered by the method. Details of the method are not described. Author

N86-23019# Joint Publications Research Service, Arlington, Va.
CRUSTAL MODELS FOR VARIOUS PACIFIC OCEAN BED STRUCTURES Abstract Only c46
G. I. Semenova *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 16 Transl. into ENGLISH from Tikhookeanskaya Geologiya (Novosibirsk, USSR), no. 4, Jul. - Aug. 1985 p 3-12 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

A comparison of seismic data in order to study lateral heterogeneities in crustal structure is possible only using the major parameters revealed by a variety of field methods and various interpretation approaches. This article summarizes deep seismic sounding data from the Pacific Ocean crust and suggests a plan

for regionalization of the crust reflecting the major features of its lateral heterogeneity. In the process of summarizing the seismic materials, histograms of values of crustal parameters of individual geomorphological structures were first constructed, then groups of structures were studied with similar distributions of parameters. The regionalization map, together with models of the crust in the areas in question, reflects the essential lateral heterogeneity of the Pacific Ocean floor crust and represents a three-dimensional model at the present level of understanding. Author

N86-23020# Joint Publications Research Service, Arlington, Va.
NEW DATA ON DEEP STRUCTURE OF MID-ATLANTIC RIDGE AT 20 DEG S Abstract Only **c48**
Yu. M. Pushcharovskiy, I. N. Yelynikov, and A. S. Perfilyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 21 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 5, Sep. - Oct. 1985 p 5-13 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

Results are presented from processing and interpretation of data on deep multichannel seismic profiling by the reflected waves method over the Mid-Atlantic ridge at 20 deg S during the seventh cruise of the research vessel Professor Shtokman. Total profile length was 293 km. The deep structure of the ridge is similar to the structure of the ridge in other areas, with significant differences. Volcanic cones with lava flows are clearly visible on the ridge slopes. Differences from other sections are discussed and two segments of the seismic profile are presented. The most clearly seen specific feature of the profile consists of zones of hard-plate deformations superimposed on the structure of the third layer in the central and partially in the western segments of the profile. These structures clearly dip to the east and remain within the third layer. The structures may have developed in the process of folding of the third layer of the oceanic crust beneath the axial zone of the ridge, but their genesis cannot be precisely determined at present. Author

N86-23021# Joint Publications Research Service, Arlington, Va.
HYDROCARBON GAS-HYDRATE FORMATION BENEATH BOTTOM OF SEAS AND OCEANS Abstract Only **c48**
V. Ya. Trotsyuk and I. A. Nemirovskaya *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 27 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), vol. 284, no. 4, Oct. 1985 p 976-978 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

The predictions of the early 1970's that there might be zones of hydrocarbon gas-hydrate formation beneath the ocean floor, a new type of nontraditional fuel-energy resource for the planet, have been confirmed. Data from recent marine expeditions by the authors are presented, indicating that formation of these zones in the ocean is controlled by thermodynamic factors and genetic factors, i.e., the scale of the gas generation processes. Gasometric and biogeochemical measurements were conducted using sealed sampling devices and high-precision express analyzers on a cruise in 1982 around the northern rim of the Pacific Ocean in an area selected to determine the nature of hydrocarbon gas saturation of bottom sediments. It is concluded that components migrate into the bottom environment over a focal area, bringing in additional nutrient matter and energy and stimulating the vital activity of microorganism and resulting in biogenic concentration of organic matter, including hydrocarbon gases. The increase in gas content in deep intervals of sediment columns indicates that in deeper sedimentary horizons under the necessary conditions of temperature and pressure, saturation of polar water with hydrocarbons could occur, creating the genetic conditions for development of gas formation zones. Author

N86-23022# Joint Publications Research Service, Arlington, Va.
NORTH ATLANTIC UPPER MANTLE HETEROGENEITIES Abstract Only **c48**
N. Ya. Kunin and S. V. Usenko *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 31 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Zemli (Moscow, USSR), no. 9, Sep. 1985 p 23-35 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

It is demonstrated that in much of the North Atlantic elastic wave boundary velocity values remain constant on profiles with differing orientation. Studies of the anisotropy of elastic wave boundary velocities are not useful in such areas. Regionalization of the North Atlantic based on these velocity values reveals three major areas differing in mean and modal velocities and distribution of velocities. It is found the heat flow, gravity anomalies and regional anomalies of the geoid correlate with these three areas, probably reflecting large lateral heterogeneities in the upper mantle, though they do not coincide with the continental margins or mid-oceanic ridge boundaries. The results are compared with regionalization of other geophysical parameters. The upper mantle of the North Atlantic and adjacent continental areas can be characterized by a single zonality, the areas distinguished in the homogeneous mantle generally continuing beyond the limits of the continents essentially unchanged. Author

N86-23023# Joint Publications Research Service, Arlington, Va.
HYDROCHEMICAL INDICATORS OF FRONTAL CYCLONIC EDDY IN ANTARCTIC CIRCUMPOLAR CURRENT Abstract Only **c47**
A. M. Chernyakova and S. O. Bordokin *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 41 Transl. into ENGLISH from Okeanologiya (Moscow, USSR), v. 25, no. 5, Sep. - Oct. 1985 p 740-743 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

The 30th cruise of the research vessel Dmitriy Mendeleyev studied synoptic variability of physical, chemical and biological parameters in sea water in relationship to eddy formation in the area of the Antarctic Circumpolar Current south of New Zealand. Analysis of the materials revealed an eddy formation, a cyclonic frontal ring, its area of formation and the evolution of its waters in time and space. The frontal cyclone was formed by separation of a meander of the southern branch of the Antarctic Circumpolar Current, then moved under the influence of the average current to the northeast, carrying an Antarctic water mass in its core. Meandering of the current is primarily related to bottom topography and is a constant source of eddies. Author

GEODYNAMIC RECONSTRUCTIONS AS METHOD FOR PREDICTING OIL AND GAS CONTENT OF POORLY STUDIED REGIONS (AS EXEMPLIFIED BY ANTARCTIC) Abstract Only **c43**
Ye. R. Aliyeva and Ye. V. Kucheruk *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 43 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Geologicheskaya (Moscow, USSR), no. 9, Sep. 1985 p 100-110 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

Geodynamic reconstruction based on plate tectonics, in contrast to other geological analogy geological methods, allows the drawing of conclusions not only on the current status, but also the history of geological development of a region. This article demonstrates the capabilities and limitations of application of the method in the example of the least studied continent, Antarctica. The broad stratigraphic diversity of the sedimentary cover, great thickness of sediments and presumably great variety of conditions for oil and gas formation and accumulation, allow the shelf and transition zones of the Weddell Sea to be considered among the most highly promising in the Antarctic for the search for oil and gas. The use of the geodynamic reconstruction method based on lithospheric plate tectonics, even when direct correlation across the ocean is impossible, allows general prediction of the types of basins of poorly studied Antarctic continental margins, the specifics of their geological structure, age and nature of sedimentation and possible conditions of oil and gas formation. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-23025# Sherbrooke Univ. (Quebec). Dept. de Geographie.
THE FUNDAMENTALS OF MICROWAVE REMOTE SENSING [LES MICRO-ONDES EN TELEDETECTION]
Paul Desfosses, Jean-Marie M. Dubois, and Ferdinand Bonn Oct. 1985 126 p refs In FRENCH; ENGLISH summary
(SU-84; SU-85; ISSN-0710-0868) Avail: NTIS HC A07/MF A01

Fundamentals of microwave remote sensing are presented. It is noted that there is a need for a simple introduction to this specialized subject. The fundamentals of microwave physics are introduced. Radar systems, wave interaction with natural surfaces and interpretation of radar imagery are discussed. E.A.K.

N86-23026# Kilkeary, Scott and Associates, Inc., Annapolis, Md.
REDUCING THE VARIABILITY IN MONTE-CARLO ITERATIONS OF OUTER CONTINENTAL SHELF MODEL Final Report
11 Oct. 1985 58 p
(Contract DE-AC01-80EI-10643)
(DE86-002043; DOE/EI-10643/T1) Avail: NTIS HC A04/MF A01

The major issues addressed are suggestions for improving the experimental design of the Monte-Carlo simulations used in the Outer Continental Shelf Model. The objective then is to reduce the variability arising from the sampling of remaining resources. The major recommendations may be summarized as: use of a modified Latin Square experimental design for the Monte-Carlo sampling of resources; an increase in the internal simulation run size (i.e., the number of records in the Field Locator) from 10 to 20; and an increase of external simulation run size from 50 to 100. DOE

N86-23027# Sandia National Labs., Albuquerque, N. Mex.
STABLE-ISOTOPE STUDIES OF GROUNDWATERS IN SOUTHEASTERN NEW MEXICO
S. J. Lambert 1985 23 p refs Presented at the Conference on the Rustler Formation, Carlsbad, N. Mex., 7 Mar. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002590; SAND-85-1978C; CONF-8503189-1) Avail: NTIS HC A02/MF A01

Oxygen-18/16 and deuterium/hydrogen ratio measurements have been made on groundwaters sampled according to specific field criteria applied during pump tests of the Rustler Formation (the uppermost Permian evaporite unit) in Nash Draw, a solution-subsidence valley west of the WIPP site in the northern Delaware Basin of southeastern New Mexico. Comparison of these data with similar measurements on other groundwaters from the northern Delaware Basin indicates two nonoverlapping populations of meteoric groundwaters in delta-0-18/delta-D space. Most of the Rustler waters in Nash Draw and at the WIPP site and older waters from the eastern two-thirds of the Capitan Limestone constitute one population, while unconfined groundwaters originating as observable modern surface recharge to alluvium, the near-surface Rustler in southwestern Nash Draw, and the Capitan in the Guadalupe Mountains (Carlsbad Caverns) constitute the other. The isotopic distinction suggests that Rustler groundwater in most of Nash Draw and at the WIPP site is not receiving significant modern meteoric recharge. A likely explanation for this distinction is that meteoric recharge to most of the Rustler and Capitan took place in the geologic past under climate conditions significantly different from the present. DOE

N86-23028# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
MAP DIGITIZATION OFFERS NEW POSSIBILITIES
F. A. Gerritsen and H. J. Bos 6 Aug. 1984 13 p Repr. from De Ingenieur (Utrecht, Netherlands), v. 96, no. 94, Apr. 1984 p 26-29 In DUTCH; ENGLISH summary Presented at Royal Netherlands Institute of Engineering (KLvL) Digital Maps Symposium, The Hague, Netherlands, 8 Feb. 1984 Original contains color illustrations
(NLR-MP-84061-U; B8571449) Avail: NTIS HC A02/MF A01

Alternatives for the digitization of map information, its application possibilities, costs, and required efforts are discussed. Structured geographic data bases for map production offer a large range or possibilities, but require large personnel efforts. Simple interactive use for presentation purposes demands a less complicated way of digitization, but requires relatively expensive apparatus. An automated system for flight route planning is mentioned. Author (ESA)

N86-23029# Construcciones Aeronauticas S.A., Madrid (Spain). Space and Systems Div.
OUT OF PLANE COEFFICIENT OF THERMAL EXPANSION AND ITS INFLUENCE ON REFLECTOR THERMAL DISTORSIONS
G. G. Reibaldi (ESA/ESTEC, Noordwijk, Netherlands), L. Fanchi (ESA/ESTEC, Noordwijk, Netherlands), P. Cordero, and M. Marchetti (Rome Univ., Italy) 1985 12 p refs Presented at 36th International Astronautical Federation Congress on Peaceful Space and Global Problems of Mankind, Stockholm, 7-12 Oct. 1985
(Contract ESA-5263/82-NL-GM)
(Preprint-IAF-85-221) Avail: NTIS HC A02/MF A01

A test program was carried out to measure the out of plane coefficient of thermal expansion (CTE) of spaceborne reflectors which require micron-order stability. Analytical models to predict the test results and to study the influence on the reflector thermal distortions were developed. Parametric studies to define the range of increasing importance for the out of plane coefficient of thermal expansion were carried out. Results show that finite element techniques can be reliably used for CTE prediction. The value of out of plane CTE is very high, aluminum dominated. Influence of the CFRP facing laminates translates into transverse effects higher than produced by aluminum alone, due to Poisson's ratio constraining effects. For antenna distorsions, simple models providing meaningful results can be made to support preliminary design phases. Author (ESA)

N86-23030# Office of Technology Assessment, Washington, D.C.
OIL AND GAS TECHNOLOGIES FOR THE ARCTIC AND DEEP-WATER
May 1985 235 p
(PB86-119948) Avail: NTIS HC A11/MF A01 CSCL 08I

Nearly 2 billion acres of offshore public domain is owned by the United States adjacent to Alaska and the lower 48 states. Much of the Nation's future domestic petroleum supply is expected to come from this area. Areas of highest potential apparently occur in deeper water and in the Arctic where operating conditions are severe, development costs high, and financial risks immense. As the pace of exploration increases in these frontier regions, questions arise about the technologies needed to safely and efficiently explore and develop oil and gas in harsh environments. The study explores the range of technologies required for exploration and development of offshore energy resources and assesses associated economic factors and financial risks. GRA

N86-23031# Geological Survey, Cheyenne, Wyo. Water Resources Div.
WATER RESOURCES DATA FOR WYOMING, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
S. A. Druse and S. J. Rucker Jun. 1985 482 p
(PB86-106127; USGS/WRD/HD-85/252; USGS/WDR/WY-84/1)
Avail: NTIS HC A21/MF A01 CSCL 08H

Water resources data for the 1984 water year for Wyoming consists of records of stage, discharge and water quality of streams; stage and contents of lakes and reservoirs; and water leves and water quality of ground water. This report contains discharge records for 186 gaging stations; stage and contents for 14 lakes and reservoirs; water quality for 72 gaging stations and 66 ungauged stations; and water levels for 4 observation wells. Also included are 32 crest-stage partial-record stations. GRA

N86-23032# Bureau of Mines, Amarillo, Tex. Helium Field Operations.
HELIUM RESOURCES OF THE UNITED STATES, 1983
R. D. Miller 1985 24 p
(PB86-107513; BM-IC-9028; LB-85-600006) Avail: NTIS HC A02/MF A01 CSCL 08G

The helium resources base of the United States was estimated by the Bureau of Mines to be 961 Bcf as of January 1, 1983. These resources are divided into four categories in decreasing degree of assurance of their existence: (1) helium in storage and in proved natural gas resources, estimated at 202 Bcf, (3) helium in possible natural gas resources, estimated to be 351 Bcf, and (4) helium in speculative natural gas resources, which makes up the remaining 137 Bcf. These helium resources are further divided into depleting, nondepleting, and stored classifications. These depleting resources are estimated to contain 789 Bcf of the total helium resource base. Helium resources contained in nondepleting natural gas resources, those in shut-in, abandoned, or otherwise nonproducing natural gas fields, are estimated to total 134 Bcf. There is 38 Bcf of helium in storage in the Federal Government-owned Cliffside Gas Field near Amarillo, TX. GRA

N86-23033# Geological Survey, Doraville, Ga. Water Resources Div.
WATER RESOURCES DATA FOR UTAH, WATER YEAR 1984 Annual Water Data Report, 1 Oct. 1983 - Sep. 1984
M. D. ReMillard, G. C. Andersen, G. A. Birdwell, and E. Hookano May 1985 473 p
(PB86-126968; USGS/WRD/HD-85/241; USGS/WDR/UT-84/1) Avail: NTIS HC A20/MF A01 CSCL 08H

Water resources data for the 1984 water year for Utah consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; water levels and water quality of ground water. Discharge records for 221 gaging stations; stage and contents for 18 lakes and reservoirs; water quality for 48 hydrologic stations and 166 wells; miscellaneous temperature measurements and field determinations for 162 stations; and water levels for 36 observation wells are reported. GRA

N86-23024# Joint Publications Research Service, Arlington, Va.
GEODYNAMIC RECONSTRUCTIONS AS METHOD FOR PREDICTING OIL AND GAS CONTENT OF POORLY STUDIED REGIONS (AS EXEMPLIFIED BY ANTARCTIC) Abstract Only
Ye. R. Aliyeva and Ye. V. Kucheruk *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 43 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Geologicheskaya (Moscow, USSR), no. 9, Sep. 1985 p 100-110 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-23034 New Mexico State Univ., University Park.
PHOTOVOLTAIC MODELING Ph.D. Thesis
Richard Moscatt Wabrek 1985 549 p
Avail: Univ. Microfilms Order No. DA8525440

A series of analyses and experiments were performed to identify the optimum circuit model for photovoltaic cells subject to concentrated irradiance levels and to evaluate the terrestrial, solar photon flux. The family of eight photovoltaic models consisting of the five-parameter model (parameters: generation current; dark current; junction parameter, A; series resistance; and shunt resistance) and its relevant degenerate versions was analyzed. The equations describing the current-voltage characteristic for members of this family were derived and employed to develop individual systems of boundary equations that describe model parameters in terms of measured quantities. The data analyzed consisted of thirty-nine current voltage curves made up of discrete data points. Three different silicon, p-n junction, photovoltaic cells were tested under constant irradiance levels and at constant operating temperatures. Published data for extraterrestrial, spectral, solar irradiance and an algorithm for atmospheric attenuation were employed to calculate spectral and integrated values of terrestrial solar photon flux as a function of the atmospheric/site parameters. Results of the simulations were used to examine the relationship between useful photon flux and total irradiance, the effects of environmental/site parameters on photon flux, and the limits on terrestrial, photovoltaic, energy conversion. Author

N86-23035*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ASSESSMENT OF COMMERCIALLY AVAILABLE AND EXPERIMENTAL HYDROGEN ELECTRODES
Jo Ann Charleston [1986] 9 p refs To be presented at the 32nd International Power Sources Symposium, Cherry Hill, N.J., 9-12 Jun. 1986; sponsored by Army
(NASA-TM-87264; E-2958; NAS 1.15:87264) Avail: NTIS HC A02/MF A01 CSCL 10A

NASA Lewis Research Center is currently involved in advanced cell component development for nickel-hydrogen cells and batteries. Long life, high energy density, improved performance and reliability are required for energy storage systems in future space missions. Commercially available as well as experimental hydrogen electrodes were assessed and copared to the state-of-the-art hydrogen electrode that is currently being used in nickel-hydrogen batteries. These electrodes were evaluated by scanning electron microscopy and standard electrochemical polarization measurements. Production variables such as Teflon content and platinum catalyst loading were considered in order to assess various hydrogen electrods with regard to the different electrode manufacturing processes. Author

N86-23036# Sandia National Labs., Albuquerque, N. Mex.
MULTIFACTORIAL EXPERIMENTAL EVALUATION OF LOW RESISTIVITY SI CONCENTRATOR CELLS
D. L. King 1985 7 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001912; SAND-85-1204C; CONF-851043-6) Avail: NTIS HC A02/MF A01

A detailed experimental evaluation of ASEC n/p textured Si concentrator cells has been completed. Cell measurements in conjunction with detailed modelling indicated that 21% efficient cells at 100X concentration are possible with current baseline technology. Front surface passivation was found to be the principal area for improvement, followed by the reduction of gridline metal/silicon contact recombination. These improvements should result in 22 to 23% efficiencies at 100 to 200X concentration. Achievement of Si concentrator cell efficiencies above 23% will require the development of thin lightly doped advanced Si devices. DOE

N86-23037# Sandia National Labs., Albuquerque, N. Mex.
THERMAL CHARACTERIZATION OF FLAT-PLATE PHOTOVOLTAIC ARRAYS
M. K. Fuentes 1985 6 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001914; SAND-85-1163C; CONF-851043-8) Avail: NTIS HC A02/MF A01

The net effect of an array's operating cell temperature on energy output can be characterized by a single effective cell temperature (ECT). ECT is that temperature at which an array would operate were it to operate at a constant cell temperature

and produce the same energy as it would in the natural environment. Since an array effectively produces all of its energy at ECT, an operating efficiency at ECT is also the overall efficiency of the array. A methodology for estimating ECT from the Nominal Operating Cell Temperature (NOCT)is presented. Also presented is new thermal model. The model has been incorporated into the photovoltaic (PV) performance model, PVFORM, and has been proven to be accurate to within 5 C. DOE

N86-23038# Sandia National Labs., Albuquerque, N. Mex.
PHOTOVOLTAIC CONCENTRATOR RESEARCH PROGRESS
D. E. Arvizu 1985 9 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001915; SAND-85-1268C; CONF-851043-7) Avail: NTIS HC A02/MF A01

A review of progress in the DOE sponsored, Sandia managed Photovoltaic Concentrator Research Project is provided. Research status, project goals and a discussion of concentrator economics is presented. Recent research accomplishments that will be discussed include 21% efficient baseline silicon cells by Applied Solar Energy Corporation and Sandia, 26% efficient GaAs cells by Varian Associates, and near 25% mechanically stacked multijunction GaAs/Si cells by Hughes Research, Applied Solar, and Sandia. In addition, improvements in breadboard module units (i.e. single lens/cell combination) such as a 19% GaAs unit by Varian and a near 17% silicon unit by ENTECH will be reviewed. It is concluded that the photovoltaic concentrator option is making excellent progress toward competitive cost-effectiveness and provides a strong photovoltaic alternative. DOE

N86-23039# California Univ., Berkeley. Lawrence Berkeley Lab.
DEACTIVATION AND POISONING OF FUEL CELL CATALYSTS, REVISION
P. N. Ross, Jr. Sep. 1985 39 p refs Presented at the 3rd International Symposium on Catalyst Deactivation and Poisoning, Berkeley, Calif., 19 Jun. 1985 Previously announced in IAA as N86-12521
(Contract DE-AC03-76SF-00098)
(DE86-001982; LBL-19766-Rev; CONF-850631-1-Rev) Avail: NTIS HC A03/MF A01

The unique aspects of catalysts in the electrical generating unit of fuel cells are discussed. Fuel cell catalysts suffer from deactivation and poisoning phenomena that are either identical to or strongly analogous to the processes which occur in heterogeneous catalysis. Fuel cell performance is degraded by poisoning from impurities, loss of surface area of noble metal, and physical deterioration of the catalyst structure. The fuel cell catalyst is an integral part of the physical structure of the electrical generator, and there are at present no designs which are able to employ catalyst regeneration. Therefore, catalyst deactivation and poisoning phenomena are even more serious technological problems in fuel cells than in conventional reactors. The deactivation and poisoning phenomena reviewed in this paper are: the poisoning of anode (fuel electrode) catalyst by carbon monoxide; the deactivation of the cathode (air electrode) catalyst by loss of Pt dispersion; and the deactivation of the cathode by corrosion processes. The fuel cell technology discussed in the context of this phenomena is the phosphoric acid fuel cell. The operating conditions for this technology are typically 180 to 210 C, 95 to 99% acid, and in pressurized versions 50 to 120 psig. DOE

N86-23040# Argonne National Lab., Ill.
THREE-DIMENSIONAL THERMAL MODELING OF ELECTRIC VEHICLE BATTERIES
J. Lee, K. W. Choi, N. P. Yao, and C. C. Christianson Oct. 1985 45 p
(Contract W-31-109-eng-38)
(DE86-002529; ANL-85-53) Avail: NTIS HC A03/MF A01

A generic three-dimensional thermal model was developed for analyzing the thermal behavior of electric-vehicle batteries. The model calculates temperature distribution and excursion of a battery during discharge, change, and open circuit. The model takes into account the effects of heat generation, internal conduction and convection, and external heat dissipation on the temperature distribution in a battery. The three-dimensional feature of the model permits incorporation of various asymmetric boundary conditions; thus the effects of cell orientation and packaging on thermal behavior can be analyzed for a multiple-cell battery pack. Various modes of boundary heat transfer such as radiation, insulation, and natural and forced convections were also included in the model. Model predictions agreed well with the temperature distributions measured in nickel/iron batteries. Application of the thermal model to a closely packed 330-Ah module of five cells indicated that excessive temperature rise will occur upon discharge. Forced air convection is not effective for cooling the module. DOE

N86-23041# Sandia National Labs., Albuquerque, N. Mex.
ANODIC REACTIONS IN THE Ca/CaCrO4 THERMAL BATTERY
R. A. Guidotti and F. W. Reinhardt Sep. 1985 29 p
(Contract DE-AC04-76DP-00789)
(DE86-002634; SAND-83-2271) Avail: NTIS HC A03/MF A01

The reaction of Ca with a CaCrO4-(LiCl-KCl eutectic) solution at temperatures of 400(0)C to 500(0)C was studied to better understand the nature of the chemical reactions and electrochemical processes that occur in the Ca/CaCrO4 thermal battery at the anode during activation and discharge. Limited tests also were conducted with a CaCrO4-(CaCl2-NaCl-KCl eutectic) solution at 550(0)C. Ca/CaCrO4 and CaLi2/CaCrO4 single cells were tested to observe the relative performance differences of Ca and CaLi2 anodes. The discharged cells were analyzed by optical microscopy, electron microprobe, Auger electron spectroscopy, and secondary-ion mass spectroscopy. These analytical data were used in conjunction with the results of chemical-reaction experiments to propose a discharge mechanism for the Ca/CaCrO4 thermal battery, consistent with experimental observations. DOE

N86-23042# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
WIND ENERGY TECHNICAL INFORMATION GUIDE
Mar. 1985 107 p
(Contract DE-AC02-83CH-10093)
(DE85-002940; SERI/SP-271-2684) Avail: NTIS HC A06/MF A01

Background is provided on wind energy development, including history and current status. Topics covered include wind technology research and design, wind energy system development, wind energy resources and systems performance, economics and applications, and environmental, safety, and legal issues. Directories are provided listing research centers and m chnical information sources. Also listed are wind energy mode design tools. DOE

N86-23043# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
THERMODYNAMIC SYSTEMS ANALYSIS OF OPEN-CYCLE OCEAN THERMAL ENERGY CONVERSION (OTEC)
B. K. Parsons, D. Bharathan, and J. A. Althof Sep. 1985 181 p
(Contract DE-AC02-83CH-10093)
(DE85-016867; SERI/TR-252-2234) Avail: NTIS HC A09/MF A01

This report describes an updated thermal-hydraulic systems analysis program called OTECSYS that studies the integrated performance of an open-cycle ocean thermal energy conversion (OTEC) plant, specifically, the effects of component performance, design parameters, and site specific resource data on the total system performance and plant size. OTECSYS can size the various open-cycle power cycle and hydraulic components. Models for the evaporator, mist eliminator, turbine-generator diffuser, direct-contact condenser, exhaust compressors, seawater pumps, and seawater piping are included, as are evaluations of the pressure drops associated with the intercomponent connections. It can also determine the required steam, cold seawater, and warm seawater flow rates. OTECSYS uses an approach similar to earlier work and integrates the most up-to-date developments in component

performance and configuration. The program format allows the user to examine subsystem concepts not currently included by creating new component models. It will be useful to the OTEC plant designer who wants to quantify the design point sizing, performance, and power production using site-specific resource data. Detailed design trade-offs are easily evaluated, and several examples of these types of investigations are presented using plant size and power as criteria. DOE

N86-23044# Westinghouse Research and Development Center, Pittsburgh, Pa.
RESEARCH ON THE BASIC UNDERSTANDING OF HIGH EFFICIENCY IN SILICON SOLAR CELLS Final Report, 1 Dec. 1982 - 30 Nov. 1984
A. Rohatgi, T. W. OKeefe, D. L. Meier, and P. Rai-Choudhury Sep. 1985 183 p
(Contract DE-AC02-83CH-10093)
(DE85-016870; SERI/STR-211-2766) Avail: NTIS HC A09/MF A01

High-efficiency silicon solar cells and cell efficiencies greater than 18% are achieved by employing innovative concepts of material preparation, cell design, and fabrication technology. Theoretical models for very high efficiency cell designs are developed designs experimentally verified, and the understanding of efficiency-limiting mechanisms such as heavy doping effects and bulk and surface recombination improved. Model calculations were made for optimum single- and multi-layer antireflective coatings. Consistent with the model calculations, a multilayer SiO2TiO2SiO2 A/R coating was fabricated. The model calculations and the experimental data were in excellent agreement. Also, 18% efficient solar cells were fabricated on 0.1 to 0.2 ohm-cm float-zone silicon by a combination of surface passivation and double-layer antireflective coating. An 18.3% efficient solar cell was fabricated on 0.25 ohm-cm Wacker float-zone silicon material having passivation and a double-layer AR coating. It was also shown that 0.4 keV hydrogen ion implantation in the web solar cells improves the efficiency, diffusion length, and the long-wavelength response of the cells. DOE

N86-23045# Chronar Corp., Princeton, N.J.
RESEARCH ON HIGH-EFFICIENCY, SINGLE-JUNCTION, MONOLITHIC THIN-FILM AMORPHOUS SILICON SOLAR CELLS Annual Progress Report, 1 Oct. 1983 - 30 Sep. 1984
Sep. 1985 159 p
(Contract DE-AC02-83CH-10093)
(DE85-016871; SERI/STR-211-2720) Avail: NTIS HC A08/MF A01

The research program in this work on high-efficiency, single-junction, monolithic thin-filmed amorphous silicon solar cells is divided into three major areas. The first concerns material problems associated with a-Si solar cells including materials research on active a-Si thin films (doped and undoped). Materials problems that are associated with nonsemiconducting contact layers, their preparation and their diffusional and chemical stability are investigated. Device-related problems are the subject of the second area of the program. Device analysis, modeling and optimization are studied. Research is conducted on the fabrication and analysis of monolithic submodules of a-Si solar cells. The third part of the program is the design, construction and operation of an in-line, multi-chamber deposition system. DOE

N86-23046# Pacific Northwest Lab., Richland, Wash.
OBSERVATIONS OF WAKE CHARACTERISTICS AT THE GOODNOE HILLS MOD-2 ARRAY
J. W. Buck and D. S. Renne Aug. 1985 77 p
(Contract DE-AC06-76RL-01830)
(DE85-018282; PNL-5565) Avail: NTIS HC A05/MF A01

The array of three MOD-2 wind turbines and two meteorological towers at Goodnoe Hills, Washington, provides an opportunity to evaluate turbine and wake interactions in a real environment. The triangular arrangement of the three turbines provides opportunities to study the effect of wakes on the performance of a downwind turbine at three different distances: 5, 7, and 10 rotor diameters (D), where 1 D is 300 ft. The information obtained from this test configuration is critical to future wind farm activities and is a key objective of the MOD-2 test program. This report describes the analysis of data measured at the turbines and towers from August 29 to November 12, 1982. The data are 2-min averages of 1-s values. Background flow characteristics were also examined to determine if flow variations across the site could mask wake measurements. For this analysis, one year's data gathered at the meteorological towers were analyzed. The results show some differences between characteristics measured at the towers, but these differences were not great enough to consider in evaluating wakes at the towers. DOE

N86-23047# Argonne National Lab., Ill.
POST-TEST ANALYSES OF Na/S CELLS AND AQUEOUS BATTERIES
J. E. Battles, J. A. Smaga, and J. J. Marr 1985 3 p Presented at the International Battery Testing Workshop, Heidelberg, West Germany, 29 Sep. 1985
(Contract W-31-109-eng-38)
(DE85-018441; CONF-8509154-2) Avail: NTIS HC A02/MF A01

Post-test examinations are conducted at Argonne National Laboratory to obtain quantitative information on electrode morphology, corrosion and degradation of the cell hardware, and mechanisms responsible for existing or future cell failures. These findings are reported to the organizations responsible for the construction of these cells and support their efforts in achieving improved cell performance, cycle life, and reliability. Results of post-test analyses of recent high-temperature sodium/sulfur cells, and of aqueous lead-acid and nickel/iron batteries are presented. In particular, the relationship between electrode performance and electrode morphology is examined for each of the three battery systems. DOE

N86-23048# United Technologies Corp., South Windsor, Conn. Power Systems Div.
DEVELOPMENT OF MOLTEN CARBONATE FUEL CELL POWER PLANT TECHNOLOGY Quarterly Technical Progress Report, 1 Jan. - 31 Mar. 1984
Oct. 1985 128 p
(Contract DE-AC21-79ET-15440)
(DE86-001004; DOE/ET-15440/1945; QTPR-18) Avail: NTIS HC A07/MF A01

This report summarizes the work performed to develop and verify the design of a prototype molten carbonate fuel cell stack which meets the requirements of a 1990's-competitive, coal-fired, electrical utility central station, or industrial cogeneration power plant. Fabrication of the cell components to be used in the 100-cell stack was completed successfully. Compressive creep of the anode to be used in the 100-cell stack was measured through 720 hours of testing at 1300(0)F. The data continue to support the creep resistance of this component. Anode and bubble barrier pore spectra data obtained after aging at 1300F confirmed the sintering resistance of these components. A parametric study of candidate separator material data obtained from retort corrosion tests was completed. Based on the study, cell testing of treated INCO 825 was begun. A 1000 hour cell test of Ni-201/316SS at accelerated test conditions showed no failure of this separator plate material. Single cell tests to evaluate Co-based and Ti-based alternate cathode materials were conducted. The cell test performance data and post test chemical analysis show both materials are unstable. Cell testing of a doped Fe-based cathode showed a reaction with the matrix used. A repeat test using a different matrix material is planned. Testing of the 20-cell Subscale Stack was completed on schedule following 2000 hours of operation. A post test analysis was begun in order to correlate the diagnostic test data with the physical evidence of component stability, including electrolyte containment. DOE

N86-23049# Exide Management and Technology Co., Yardley, Pa.
TESTING, DATA ANALYSIS AND ENGINEERING SERVICES ON LEAD-ACID LOAD LEVELING BATTERIES Final Contract

Report, 1 Jan. 1984 - 30 Jun. 1985
A. M. Chreitzberg 30 Jun. 1985 36 p
(Contract DE-AC04-76DP-00789)
(DE86-001133; SAND-85-7235) Avail: NTIS HC A03/MF A01

Preprototype 3100 Ah load-leveling cells, developed on ANL Contract 31-109-38-4951, have been cycled at 40 + or - 5 C on an 80% DoD, 2 cycles per day regime for 2340 cycles. Three of four competing designs continue to cycle, meeting all capacity and voltage requirements. This data at 40 + or - 5(0)C are compared to emerging cycle data from similar cells on test at ANL National Battery Test Laboratory at 50 and 60 C. Cycle life goals at 40 and 50 C have been met. Tests are continuing in an effort to demonstrate their equivalency to 4000 cycles at 25 C on the same regime. DOE

N86-23050# Nevada Univ., Las Vegas. Div. of Earth Sciences.
GEOTHERMAL UTILIZATION PLAN, MARINE CORPS AIR-GROUND COMBAT CENTER, TWENTYNINE PALMS, CALIFORNIA Final Report, Mar. 1 - 1 Sep. 1985
G. Ghusn, Jr. and T. Flynn Sep. 1985 47 p refs
(Contract DE-FG03-85SF-15555)
(DE86-001307; DOE/SF-15555/1) Avail: NTIS HC A03/MF A01

A preliminary engineering feasibility study of geothermal utilization was completed for the Marine Corps Air Ground Combat Center, Twentynine Palms, California. The study incorporated previous studies of the geology, geophysics, and environment performed for the Center. In addition, information about fuel consumption and current heating methodology was provided by the Center's personnel. This information was integrated with design assumptions based on the best estimates available for geothermal resource temperature and flow rate. The result of the study is a recommended pipeline alignment and suggested geothermal service area. The estimated costs for construction of the system range from $4.5 to $5 million. The estimated savings in offset natural gas consumption after capital recovery is $3.8 million over a twenty year period. DOE

N86-23051# Sandia National Labs., Albuquerque, N. Mex.
PVFORM: A NEW APPROACH TO PHOTOVOLTAIC SYSTEM PERFORMANCE MODELING
D. F. Menicucci 1985 6 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001752; SAND-85-2271C; CONF-851043-13) Avail: NTIS HC A02/MF A01

Over the past two years a number of studies have resulted in important changes in photovoltaic (PV) system simulation. For example, a Sandia National Laboratories (SNLA) study showed that the major cause of error in PV performance models is incorrect estimates of insolation in the plane of the array of the system under study. Other studies have resulted in improvements in the modelling of various array subsystems. SNLA has integrated improved modelling techniques into a simplified program named PVFORM that can be run on mainframe or personal computers. The new model simulates the hourly performance of a PV flat-plate system for a one-year period. Verification tests at SNLA have shown that predicted values from the PVFORM model are typically within 1% to 5% of measured values. This paper describes the PVFORM model and gives examples of its application to the design, testing, and evaluation of PV systems. DOE

N86-23052# Sandia National Labs., Albuquerque, N. Mex.
TESTS OF NICKEL/HYDROGEN AND LEAD-ACID BATTERY SYSTEMS
D. M. Bush 1985 5 p Presented at the Annual Battery and Electrochemical Energy Storage Contractors' Meeting, Washington, D.C., 18 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001916; SAND-85-2242C; CONF-851146-1) Avail: NTIS HC A02/MF A01

Sealed lead-acid batteries and nickel/hydrogen batteries are being developed. Both feature recombination of gases on overcharge. Cells and batteries were shipped to Sandia for evaluation and characterization. The work on the sealed lead-acid system has been completed, while the development of a terrestrial nickel/hydrogen system is ongoing. DOE

N86-23053# Sandia National Labs., Albuquerque, N. Mex.
DESIGN CONSIDERATIONS FOR LARGE PHOTOVOLTAIC SYSTEMS
G. J. Jones, H. N. Post, J. W. Stevens, and T. S. Key 1985 19 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002125; SAND-85-1189C; CONF-851043-14) Avail: NTIS HC A02/MF A01

The design of large photovoltaic systems has been the subject of many years of system and subsystem research. This research information can now be supplemented with data from numerous operating systems ranging in size from kilowatts to multi megawatts. The compilation of all results verify that the design process for the photovoltaic system is simple. Construction should be based on good engineering practice coupled with PV specific hardware and a few PV specific design guidelines. These guidelines include considerations related to the selection of collector type, hardware specification, array field configuration, and system installation and checkout. This paper presents a discussion of these photovoltaic specific design considerations. DOE

N86-23054# Sandia National Labs., Albuquerque, N. Mex.
RELIABILITY OF PHOTOVOLTAIC SYSTEMS: A FIELD REPORT
M. G. Thomas, M. K. Fuentes, C. Lashway, and B. D. Black 1985 6 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985 Prepared in cooperation with New Mexico Solar Energy Inst., Las Cruces and New Mexico Univ., Albuquerque
(Contract DE-AC04-76DP-00789)
(DE86-002130; SAND-85-1069C; CONF-851043-12) Avail: NTIS HC A02/MF A01

Performance studies and field measurements of photovoltaic systems indicate a 1 to 2% per year degradation in array energy production. The cause for much of the degradation has been identified as soiling, failed modules, and failures in interconnections. System performance evaluation continues to be complicated by the poor reliability of some power conditioning hardware that has greatly diminished the system availability and by inconsistent field ratings. Nevertheless, the current system reliability is consistent with degradation of less than 10% in 5 years and with estimates of less than 10% per year of the energy value for O and M. DOE

N86-23055# Johnson Controls, Inc., Milwaukee, Wis.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF LEAD-ACID BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1984
D. E. Bowman Aug. 1985 52 p
(Contract W-31-109-eng-38)
(DE86-002548; ANL/OEPM-85-5) Avail: NTIS HC A04/MF A01

Major activities focused on during 1984 were: (1) continued work on the development of the lead/plastic composite (combo) positive grid; (2) develop a process that would produce active materials that were crack-free (flow through); (3) develop a cell design that is leak-free; (4) study and determine workable specifications for flow rate, flow pressure and material permeabilities so as to achieve significant gains in positive active material (PAM) utilization; (5) submit cell to NBTL to show proof-of-concept of the forced electrolyte flow through; (6) continue work on defining failure modes (Advanced-1); and (7) continue work on driving profile testing. DOE

N86-23056# Sandia National Labs., Albuquerque, N. Mex.
INNOVATIVE DESIGNS FOR POWER CONDITIONING SUBSYSTEMS
T. M. Calloway and J. E. Leeman 1985 15 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985

(Contract DE-AC04-76DP-00789)
(DE86-002913; SAND-85-1190C; CONF-851043-16) Avail: NTIS HC A02/MF A01

The results of an effort to develop innovative designs for three-phase inverters for photovoltaic arrays are discussed. The capacity of the inverters is 50kVa with 480V output. Methods of estimating efficiency, cost and grid compatibility of the inverters are presented. DOE

N86-23057# Texas Technological Univ., Lubbock. Atmospheric Science Group.
CLOUD SHADING DIRECT SOLAR RADIATION MODEL FOR THE CROSBYTON SOLAR POWER PROJECT
R. E. Peterson and D. J. Smalley Jun. 1985 123 p
(Contract DE-AC04-83AL-21557)
(DE86-000002; DOE/AL-21557/T2) Avail: NTIS HC A06/MF A01

The CSPP was initiated to study the feasibility of using hemispheric bowl solar collectors for power generation. A non-spectral direct solar radiation (DSR) model was developed to aid in determining whether there exists a preferred spacing of these solar collectors based solely on meteorological considerations. The DSR model is applicable to the Northern Hemisphere and, with a few adjustments, to the Southern Hemisphere. The DSR model considers the reduction of direct insolation through the atmosphere due to Rayleigh scattering, uniformly mixed gases, ozone, precipitable water, and aerosols. It incorporates geographical information along with temperature, dew point, barometric pressure, and visibility data, updated every 15 minutes. This clear sky DSR model was verified against actual direct insolation data. DOE

N86-23058# Oak Ridge National Lab., Tenn.
PHOTOSYNTHETIC WATER SPLITTING FOR HYDROGEN FUEL SYNTHESIS
E. Greenbaum 1985 4 p Presented at the GRI Basic Research Contractor's Review Meeting on Gaseous Fuel Synthesis From Inorganic Resources, Chicago, Ill., 16 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-000092; CONF-8510162-1) Avail: NTIS HC A02/MF A01

Three key advances in photosynthesis research are reported. A significant advance in microalgal water splitting has been made. In the linear, low-intensity region of the light saturation curves, equivalent solar conversion efficiencies of 10% have been measured. A technological advance in the ability to genetically screen individual algal colonies has been made. Successive subcultures of anaerobiosis-stressed Chlamydomonas reinhardtii exhibited enhanced capacity for photoproduction of hydrogen and oxygen. DOE

N86-23059# American Solar Energy Society, Boulder, Colo.
PROGRESS IN SOLAR ENERGY. VOLUME 6: AGRICULTURE DIVISION
1983 28 p Presented at the American Solar Energy Society Meeting, Minneapolis, Minn., 1 Jun. 1983
(Contract DE-FG03-83SF-11947)
(DE86-000186; CONF-830622-Pt-1) Avail: NTIS HC A03/MF A01

Solar energy systems with applications to agriculture are studied in these presentations. Separate indexing has been prepared for each report for inclusion into the Energy Data Base. DOE

N86-23060# Micronesia Bound, Inc., Nett Point, Hawaii.
ARAMAS KAPW APPROPRIATE ENERGY DEMONSTRATION SITE Final Report
1982 8 p
(Contract DE-FG03-80R9-50006)
(DE86-000347; DOE/R9-50006/T1) Avail: NTIS HC A02/MF A01

The Nett Point, Aramas Kapw Base Camp was used as a project to demonstrate the use of sun, wind, and water for energy. The project was to result in two wind-powered electrical systems supplemented with a solar cell array to provide power for lighting, radio communication, navigational beacon, refrigeration, etc. Young people were trained. Workshops were held on hydro power and solar energy. DOE

N86-23061# Argonne National Lab., Ill.
ELECTRIC/HYBRID VEHICLE MODEL FOR ESTABLISHING OPTIMAL BATTERY REQUIREMENTS
W. W. Marr and W. J. Walsh 1986 7 p Presented at the Society for Computer Simulation (SCS) Multiconference, San Diego, Calif., 23 Jan. 1986
(Contract W-31-109-eng-38)
(DE86-001791; CONF-860119-1) Avail: NTIS HC A02/MF A01

A microcomputer program (HELEN) for establishing battery requirements for a heat engine/battery hybrid vehicle is described. The program permits least-cost analyses to identify the optimum combination of battery and heat engine characteristics for different vehicle types and missions. It can also be used for cost comparisons between heat-engine vehicles, all-electric (battery) vehicles, and hybrid vehicles. Simplified models are used for the transmission, motor/generator, controller, and other vehicle components, while a rather comprehensive model is employed for the battery. The heat engine performance model is based on engineering data for a production engine. A series/parallel configuration for the hybrid vehicle system is presently simulated. Energy management in the operation of the vehicle depends on the specified mission requirements, type and size of the battery, allowable battery depth of discharge, type and size of the heat engine, and the energy management strategy used. The program is written in PL/I language and can be run interactively on an IBM PC, COMPAQ, or other compatible microcomputer. DOE

N86-23062# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
PROPOSITION FOR THE MEASUREMENT OF POWER CHARACTERISTICS OF WIND TURBINES [EEN VOORSTEL VOOR HET METEN VAN VERMOGENSKARAKTERISTIEKEN VAN WINDTURBINES]
W. Kuik Jul. 1983 24 p refs In DUTCH
(VTH-M-473) Avail: NTIS HC A02/MF A01

A method to measure the power curve and the curve of the dimensionless power as a function of the high speed of a tip vane rotor with blades of a certain angle (Cp-lambda curve), was developed. The standardized bin method demands a 3 month measuring period, too long for tip vane design. From rough data the dispersion in torque direction was made small, so that mediation in wind velocity direction yields a good estimate of the wind velocity related to the torque. In experimental tip vane turbine measurements, a large part of the Cp-lambda curves were determined in 15 min. Author (ESA)

N86-23063# Idaho Univ., Moscow. Dept. of Chemistry.
IMPROVED ACID ELECTROLYTES FOR FUEL CELLS Final Annual Report, Jul. 1984 - Jul. 1985
J. M. Shreeve Jul. 1985 48 p refs Sponsored by Gas Research Inst.
(PB86-125119; GRI-85/0166) Avail: NTIS HC A03/MF A01 CSCL 10B

Twenty-three new acids have been synthesized as improved electrolytes for fuel cells and with the exception of SF5CFHSO3H, CF3CFHSO3H, CF3CFHCF2SO3H, C6F5SO3H, (CF3)2P(0)OH and CF3P(O)(OH)2 which are currently being evaluated, the remainder are being stored for future evaluation. GRA

N86-23064# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
ARMY'S PROCUREMENT OF BATTERIES: MAGNESIUM VERSUS LITHIUM
26 Sep. 1985 13 p
(PB86-110574; GAO/NSIAD-85-1:224; B-219919) Avail: NTIS HC A02/MF A01 CSCL 10C

The Army is in the process of switching from magnesium to lithium batteries, a change motivated by the magnesium battery's performance limitation at low temperatures and the operating capabilities of the lithium battery. GAO concludes that the

operational advantages of the lithium battery justifies this move. However, GAO was not able to confirm the validity of the Army's cost comparisons of the two batteries. GRA

N86-22608# AEG-Telefunken, Wedel (West Germany).
DEVELOPMENTS OF SOLAR GENERATOR SUBSTRATES: SIMPLE ANTICHARGING (AC) AND CONDUCTIVE THERMAL CONTROL (TC) MATERIALS (GEO), AND SOME LEO ASPECTS
W. Schmitz *In* ESA Proceedings of 3rd European Symposium on Spacecraft Materials in Space Environment Nov. 1985 p 133-141 refs (For primary document see N86-22593 13-18)
Avail: NTIS HC A13/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-23065 Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, The Hague (Netherlands).
DETERMINATION OF CHIMNEY HEIGHT [BEPALING VAN DE SCHOORSTEENHOOGTE]
P. J. H. Builtjes and R. A. J. Boelens Jul. 1984 79 p refs In DUTCH
(Lucht-26; ISBN-90-346-0311-3; B8473499) Copyright. Avail: Issuing Activity

A method for calculating chimney height with regard to air pollution was developed to adapt Dutch environmental legislation to surrounding countries. Based on the National Model and the Huygen method, average annual concentrations and higher percentile values are combined. Both methods are Gaussian plume models, describing the dispersion of chemically nonreactive matter from one chimney as a function of wind velocity and atmosphere stability. Correction rules for the calculation of heavy/wet plume effects and the impact of surrounding buildings are given. Author (ESA)

N86-23066# Oak Ridge Gaseous Diffusion Plant, Tenn.
CHARACTERIZATION OF THE SOLID, AIRBORNE MATERIALS CREATED WHEN UF6 REACTS WITH MOIST AIR FLOWING IN SINGLE-PASS MODE
P. W. Pickrell Oct. 1985 35 p
(Contract DE-AC05-84OT-21400)
(DE86-002283; K/PS-1134) Avail. NTIS HC A03/MF A01

A series of experiments has been performed in which UF6 was released into flowing air in order to characterize the solid particulate material produced under non-static conditions. In two of the experiments, the aerosol was allowed to stagnate in a static chamber after release and examined further but in the other experiments characterization was done only on material collected a few seconds after release. Transmission electron microscopy and mass measurement by cascaded impactor were used to characterize the aerosol particles which were usually single spheroids with little agglomeration in evidence. The goal of the work is to determine the chemistry and physics of the UF6-atmospheric moisture reaction under a variety of conditions so that information about resulting species and product morphologies is available for containment and removal (knockdown) studies as well as for dispersion plume modeling and toxicology studies. This report completes the milestone for reporting the information obtained from releases of UF6 into flowing rather than static air. DOE

N86-23067# Los Alamos National Lab., N. Mex.
FURTHER ASSESSMENT OF FEM3: A NUMERICAL MODEL FOR THE DISPERSION OF HEAVY GASES OVER COMPLEX TERRAIN
S. T. Chan and D. L. Ermak Oct. 1985 13 p refs Presented at the JANNAF Safety and Environmental Protection Subcommittee Meeting, Monterey, Calif., 4 Nov. 1985
(Contract W-7405-eng-48)
(DE86-001905; UCRL-92497; CONF-8511110-3) Avail: NTIS HC A02/MF A01

FEM3 is a three-dimensional numerical model for simulating the atmospheric dispersion of heavy gases over complex terrain. During the past few years, FEM3 has been assessed, using data from the Burro and Coyote series of LNG spill experiments conducted by LLNL at China Lake, California. In general, the model has been found to perform very well and it greatly complements the field experiments in enhancing our understanding of the phenomena associated with LNG vapor dispersion, including gravity spreading, heating from the ground surface, and terrain effects. In this paper, the FEM3 model is further applied to simulate the dispersion of nitrogen dioxide (NO2) for one of the LLNL conducted nitrogen tetroxide (N2O4) spill tests and also to simulate the dispersion of propane gas for four of the refrigerated liquid propane spills conducted by SHELL Research Limited at Maplin Sands. The main purpose of the NO2 simulation is to demonstrate the heavy gas effects in this test and the latter simulations are for assessing the performance of the current model for simulating the dispersion of propane gas. DOE

N86-23068# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
DOE/AMS AIR POLLUTION MODEL EVALUATION WORKSHOP: PROCEEDINGS OF VOLUME 1
A. H. Weber and A. J. Garrett Jul. 1985 722 p Presented at the DOE/AMS Air Pollution Model Evaluation Workshop, Charleston, S.C., 23 Oct. 1984
(Contract DE-AC09-76SR-00001)
(DE86-002159; DP-1701-1; CONF-8410165-Vol-1) Avail: NTIS HC A99/MF A01

A workshop, the second in a series on the modeling of mesoscale dispersion of pollutants in the atmosphere, was held at Kiawah, South Carolina during October 23 to 26, 1984. The workshop was co-sponsored by the Department of Energy and the American Meteorological Society, and hosted by the Savannah River Laboratory. The first such workshop was held in 1980 and was attended by representatives of the DOE affiliated laboratories (Buckner, 1981). Because of the success of the first workshop, a steering committee met at DOE headquarters to formulate objectives for the second workshop. Individual papers are processed separately for the data bases. DOE

N86-23069# Oak Ridge National Lab., Tenn.
ANALYSIS OF (81)Kr IN GROUNDWATER USING LASER RESONANCE IONIZATION SPECTROSCOPY
S. D. Kramer, G. S. Hurst, C. H. Chen, M. G. Payne, S. L. Allman, R. C. Phillips, B. E. Lehmann, H. Oeschger, H. H. Loosli, and R. D. Willis Oct. 1985 11 p Presented at the 3rd International Conference on Low-level Counting, Bratislava, Czechoslovakia, 21 Oct. 1985 Prepared in cooperation with Bern Univ., Switzerland, Atom Sciences, Inc., Oak Ridge, Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-002214; CONF-8510205-1) Avail: NTIS HC A02/MF A01

A new analytical technique based on resonant ionization of krypton with a vacuum ultraviolet (VUV) laser source was used to determine low-level (81)Kr concentrations in groundwater. The long half-life (210,000 years) and low concentration (1.3 x 10(3) (81)Kr atoms per liter of modern water at 10(0)C) make the detection of (81)Kr by radioactive counting techniques extremely difficult. In this method, krypton gas was removed from water taken from an underground Swiss aquifer using standard cryogenic and chromatographic techniques. Stable krypton isotopes were then reduced by a factor of 10(7) by a two-stage isotopic enrichment cycle using a commercially available mass spectrometer. The enriched gas containing about 10(8) stable krypton atoms and about 10(3) atoms of (81)Kr was implanted into a silicon disc. This disc was then placed in the high vacuum final counting chamber and the krypton was released by laser annealing. This chamber contained a quadrupole mass spectrometer which used a pulsed VUV laser source as the ionizer. The measured signal indicated that the sample contained 1200 (+ or - 300) atoms of (81)Kr. DOE

N86-23070# Argonne National Lab., Ill.
POTENTIAL ADVANTAGES AND PITFALLS IN DETERMINING COST-EFFECTIVE EMISSION CONTROL STRATEGIES TO REDUCE ACID DEPOSITION
D. G. Streets Nov. 1985 22 p Presented at the American Institute of Chemical Engineers Annual Winter Meeting, Chicago, Ill., 10 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-001794; CONF-851123-2) Avail: NTIS HC A02/MF A01
The advantages and disadvantages of various cost-effective strategies for acid rain control are discussed in comparison with the approaches taken in current congressional proposals: Aspin; Stafford; Udall-Cheny I and II; Sikorski-Waxman; Amended Stafford; and D'Amours. DOE

N86-23071# Institute of Oceanographic Sciences, Taunton (England).
IMPLICATIONS OF SEDIMENTOLOGICAL AND HYDROLOGICAL PROCESSES ON THE DISTRIBUTION OF RADIONUCLIDES IN A SALT MARSH NEAR SELLAFIELD, CUMBRIA
A. P. Carr and M. W. L. Blackley 1985 85 p refs Sponsored by UK Department of Energy
(IOS-197; DoE/RW/85/086; DGR-481/203) Avail: NTIS HC A05/MF A01
Sedimentological and hydrological processes affecting a salt marsh near a nuclear fuel reprocessing plant are discussed. The distribution of low-level radioactive effluent at the site was examined. Elevational measurements on sections across a subsidiary creek show mainly seasonal variations attributed to expansion of clay minerals. Transducers in the marsh sediment point to rapid changes in pore water pressure in response to the tidal cycle, and suggest infiltration of water and radionuclides from the coarse sediments below, especially during neap tides. Desiccation craking of the marsh clays provides preferential pathways from the surface. Results imply distribution of radionuclides by other mechanisms than simply accretion and emphasize the environmental diversity at this location. Author (ESA)

N86-23072# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
PROPOSED MECHANISMS ON THE FORMATION OF ACIDIC AEROSOLS FROM PRECURSORS
J. L. Durham and J. R. Brock Sep. 1985 21 p Sponsored in part by Texas Univ., Austin
(PB86-100765; EPA-600/D-85-199) Avail: NTIS HC A02/MF A01 CSCL 07E
Atmospheric particles acidify through the processes of nucleation, condensation, coagulation, and gas-particle chemical reactions. The gas-phase pathway depends on the generation of free radicals that oxidize sulfur dioxide, nitrogen dioxide, and organic compounds to acids, followed by either nucleation or condensation. The aqueous-phase pathway acidification proceeds through the reactions of dissolved reductants and oxidants. The pathways for accumulation of sulfuric acid, nitric acid and organic acids in particles may differ in responses to factors such as liquid water content of the particles and mass accommodation coefficients of reactants. Laboratory chemical kinetic results indicate that photochemical gas-phase and co-absorbed oxidant reaction pathways for S(IV) may be important simultaneously, for example, in industrial-urban air during the summer. Author (GRA)

N86-23073# Radian Corp., Research Triangle Park, N.C.
PRIMARY SULFATE EMISSION FACTORS FOR THE NAPAP (NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM) EMISSIONS INVENTORY Final Report, Sep. 1983 - Jul. 1985
J. B. Homolya Sep. 1985 55 p
(Contract EPA-68-02-3994)
(PB86-108263; EPA-600/7-85-037) Avail: NTIS HC A04/MF A01 CSCL 06T
An estimation of primary sulfate emission factors for use in the 1980 and 1985 National Acid Precipitation Assessment Program (NAPAP) emissions inventories is given. The estimates were developed from an assessment of existing measurements data for source categories including external combustion, chemical manufacturing, primary metals, wood products, mineral products, and petroleum refining. Initial elements of the assessment summarized primary sulfate formation mechanisms prevalent in combustion processes and reviewed the state-of-the-art methodology for primary sulfate sampling and analysis of source emissions. The Controlled Condensation System (CCS) was evaluated as the best primary sulfate emission measurement approach. The measurement data were then used to estimate primary sulfate emission factors for the corresponding source categories. GRA

N86-23074# Michigan Univ., Ann Arbor.
STATUS OF ORGANIC CONTAMINANTS IN LAKE HURON: ATMOSPHERE, WATER, ALGAE, FISH, HERRING GULL EGGS AND SEDIMENT Special Final Report
R. G. Kreis and C. P. Rice Aug. 1985 192 p refs Sponsored in part by EPA, Chicago, Ill.
(Grant EPA-R-00551)
(PB86-127040; SR-114) Avail: NTIS HC A09/MF A01 CSCL 08H
A wide array of cntaminants has been detected in the lake basin and biota of Lake Huron. Approximately 70 contaminants have been identified to be present to date. The contaminants reported most frequently and in highest concentrations are PCBs, DDT-R, dieldrin, and mercury. Lake Huron contaminant concentrations fall within the range reported for the other Great Lakes. Within the data set, Saginaw Bay generally contains the highest concentrations of organic compounds in water, sediment, and biota and the region that should receive the greatest amount of concern and future study. GRA

N86-23075*# International Bank for Reconstruction and Development, Washington, D.C.
AQUACULTURE: A COMPONENT OF LOW COST SANITATION TECHNOLOGY
P. Edwards 1985 66 p refs
(PB85-116431; WORLD-BANK-TP-36; ISBN-0-8213-0527-1; LC-85-6555) Avail: NTIS MF A01; HC available from World Bank, H Street, Northwest, Washington, D.C. CSCL 06C
The paper discusses all phases of aquaculture, including commercial viability, sanitary and biological considerations, public health, financial/economic and sociological aspects. Current studies are detailed and options are discussed for their potential applicability to developing countries, considering requirements for capital and labor skills as well as physical needs such as land. Author (GRA)

N86-23076# GCA Corp., Chapel Hill, N.C. Technology Div.
COST AND ECONOMIC ASSESSMENT OF ALTERNATIVE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR CARBON MONOXIDE, REVISED Final Report
M. G. Smith, S. E. Schechter, and T. McCurdy Jul. 1985 166 p Prepared in cooperation with Energy and Environmental Analysis, Inc., Arlington, Va.
(Contract EPA-68-02-3804)
(PB86-105772; EPA-450/5-85/008-Rev) Avail: NTIS HC A08/MF A01 CSCL 13B
The report presents cost and economic impact information needed to undertake a complete benefits/cost analysis of setting alternative carbon monoxide NAAQS. Four alternative 8-hour NAAQS were analyzed: 9 ppm, one observed excedance, and 9, 12, 15 ppm one expected excedance of daily maxima. The cost estimates are for both total societal and industrial sector control technology installation and operation. These include capital changes, annualized capital expenditures, and annual operating and maintenance/repair costs. Mobile source expenditures are analyzed separately from stationary source control costs. The economic impact analysis includes data on industry's ability to bear the capital expense and the inflationary and competitive impacts of incurring the control costs. Three time periods of analysis are used: 1987, 1990, and 1995. GRA

N86-23077# Washington State Univ., Pullman.
OZONE BEHAVIOR IN THE COMBINED BALTIMORE-WASHINGTON, D.C. PLUME Final Report
H. Westberg Oct. 1985 111 p
(Grant EPA-R-806683)
(PB86-120664; EPA-600/3-85-070) Avail: NTIS
HC A06/MF A01 CSCL 13B

An extensive air quality monitoring program was carried out in the Washington, D.C. - Baltimore region during the July 14 - August 15 period in 1980. The field study included data collection at numerous ground stations as well as the use of two aircraft sampling platforms. Measurements included ozone, oxides of nitrogen, individual hydrocarbons (C2-C10), condensation nuclei and visual distance plus numerous meteorological parameters. Specific areas of interest in the study included the acquisition of air quality data for: (1) developing and testing a regional air quality simulation model, and (2) gaining a better understanding of oxidant production and transport in plumes emanating from Washington, D.C. and Baltimore. The purpose of the report is to describe oxidant behavior downwind of these two cities in cases where plume interaction was observed. The authors have selected seven days during the 1980 study period when southwesterly winds carried the Washington, D.C. plume into the region occupied by the Baltimore plume. GRA

N86-22739# Joint Publications Research Service, Arlington, Va.
ANAEROBIC BIOLOGICAL TREATMENT OF WASTEWATER CONTAINING TNT, RDX
Yuxiang Xue and Jainyong Jin *In its* China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 68-77 Transl. into ENGLISH from Zhongguo Huanjing Kexue (Beijing, China), v. 5, no. 5, 21 Oct. 1985 p 2-7 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

N86-22740# Joint Publications Research Service, Arlington, Va.
STUDIES OF THE PROPERTIES OF DEGRADATION OF INORGANIC CYANIDE IN THE GAS-PRODUCING WASTEWATER BY ARTIFICIAL SCREENING CYANIDE-DECOMPOSING BACTERIA STRAINS Abstract Only
In its China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 89 refs Transl. into ENGLISH from Zhongguo Huanjing Kexue (Beijing, China), v. 5, no. 5, 21 Oct. 1985 p 27-32 (For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

N86-23018# Joint Publications Research Service, Arlington, Va.
SELECTION OF METHOD FOR CALCULATING SCATTERING OF IMPURITIES IN ATMOSPHERE IN STANDARDIZING RELEASE OF RADIONUCLIDES FROM HIGH SOURCES Abstract Only
N. Ye. Artemova *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 2 Transl. into ENGLISH from Atomnaya Energiya (Moscow, USSR), v. 59, no. 3, Sept. 1985 p 216-221 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-23078 Colorado Univ., Boulder.
SHORT-TERM VARIABILITY OF NITROGEN DIOXIDE IN THE WINTER STRATOSPHERE Ph.D. Thesis
Joseph Michael Zawodny 1985 157 p
Avail: Univ. Microfilms Order No. DA8522713

Measurements of limb radiance from the Solar Mesosphere Explorer satellite are used to infer the NO2 density at the 10 and 16 mB pressure levels from Jan. 9 to March 31 of 1982. A photochemical-dynamical model is developed using the accepted chemistry of the NOx family. The dynamical model produced isentropic trajectories which simulated the history of air parcels for which SME made measurements of the NO2 content. From the trajectories, the photochemical model calculated NO2 densities which were compared to those observed. The model reproduced the spatial and temporal variations well, although the long term trends of both disagreed. Further analysis indicated that the temperature sensitivity of the N2O5 photolysis cross sections could cause the disagreement in the amplitude of the short term variations. The long term/seasonal behavior of the NO2 density was found to be consistent with dynamical control of the NOx mixing ratio except at the very highest latitudes where the observed decrease in the NOx mixing ratio was large and abrupt. These rapid changes in NOx correlate well with the measured excess radiance (aerosols). A heterogeneous phase reaction of N2O5 with water aerosols to form the long lived species HNO3 may explain these trends. Dissert. Abstr.

N86-23079 Washington Univ., Seattle.
SPONTANEOUS EARTHQUAKE RUPTURE SIMULATED BY A FINITE ELEMENT CODE USING VARIABLE FRACTURE ENERGY ABSORPTION Ph.D. Thesis
Hannes George Zurcher 1985 281 p
Avail: Univ. Microfilms Order No. DA8521688

A three dimensional finite element code was used to simulate rupture on a vertical strike slip fault in a half space. Vertical and lateral variations in material parameters, as well as effects of the free surface of the Earth were included. Loading conditions represented a locked section of a long strike slip fault. The fracture strength is defined by the fracture toughness which is the critical stress intensity at the crack front when unstable propagation sets in. The simulations demonstrate that although the assumed fracture criterion does not effect the final configuration of the ruptured area, it has a pronounced effect on the manner in which the rupture front develops. Propagation of a rupture front through a structured barrier has been investigated. The complex nature of the barrier can lead to the establishment of a potential aftershock area of the size of the barrier, in that a strong section can protect a comparatively less strong section from rupturing by a type of shadow effect. Dissert. Abstr.

N86-23080 North Carolina State Univ., Raleigh.
INTERPRETATION OF ELECTROMAGNETIC DIPOLE-DIPOLE FREQUENCY SOUNDING DATA OVER A VERTICALLY STRATIFIED EARTH Ph.D. Thesis
Kang-Hyee Son 1985 161 p
Avail: Univ. Microfilms Order No. DA8518283

An inversion method has been developed to interpret electromagnetic (EM) frequency sounding data in terms of a multilayer conductivity model. The amount of computation, and the numerical difficulty (overparameterization) of the inversion inherent in the nonlinear least-squares method, are reduced by combining Marquardt's least-squares technique and the generalized inverse method. The inversion procedure is illustrated through the use of synthetic data based on multilayered earth models. When the method is applied to field data, the solutions are general agreement with information obtained from drilling. Uncertainty in the sensor altitude is resolved through the inversion process using high-frequency data for which the ocean may be considered as an infinite half-space. The effect of variation of the coil axis with respect to the sea surface can be resolved if the inclination is measured and incorporated into the inversion process. Dissert. Abstr.

N86-23081 Kentucky Univ., Lexington.
DIRECT BOUNDARY INTEGRAL EQUATION METHODS FOR A CLASS OF EARTH-STRUCTURE INTERACTION PROBLEMS Ph.D. Thesis
Mohsen Rezayat 1985 219 p
Avail: Univ. Microfilms Order No. DA8523930

Direct vector Boundary Integral Equation (BIE) formulations and numerical solution procedures are presented for problems of

three-dimensional wave radiation and scattering from arbitrary shaped obstacles. The radiation and scattering may occur in a homogeneous elastic full-space or a viscoelastic layered half-space. Initially, time is removed from the formulation as an independent variable by assuming that the field variables vary in a simple harmonic manner with time. Displacement and traction on an object surface are the primary variables, rather than wave potentials, and the integral formulas which are the basis for numerical computations are given in a form entirely free of integrals of the Cauchy Principle Value type. Indeed, signularities associated with the kernels are removed analytically before numerical quadrature is attempted. All integrations, all modeling for numerical purposes and the very description and solution of a problem are confined strictly to the surface of the obstacle. The soundness of the mathematical formulation and the integrity of the numerical procedures is established by comparing the results obtained by this method with other solutions when available. Dissert. Abstr.

N86-23082 Ohio State Univ., Columbus.
RECOVERY OF 1 DEG-MEAN ANOMALIES IN A LOCAL REGION FROM A LOW-LOW SATELLITE TO SATELLITE TRACKING MISSION Ph.D. Thesis
Chugiat Wichiencharoen 1985 138 p
Avail: Univ. Microfilms Order No. DA8526274

The accuracy of 1 degree-mean anomalies which could be recovered from the Geopotential Research Mission (GRM) data was simulated. The Earth's gravity field was defined by a set of potential coefficients of Rapp (1981) to degree 160. Line of sight accelerations were used as measurements in the recovery. The line of sight acceleration can be expressed in terms of potential coefficients, which makes data generation at a regular grid interval very efficient. An altitude of 160 kilometers above a spherical Earth and a separation of 200 kilometers were used in the data simulation. Three methods were used in the recovery: the least squares collocation method; a numerical integration procedure proposed by Rummel (1982) or the Rummel procedure; and the least squares adjustment. The results of the least squares collocation and the least squares adjustment indicated that an accuracy of 2.5 milligals for 1 the degree -mean anomalies was possible in an area of the smooth gravity field. The accuracy of the recovery over the rough gravity field was about 30 milligals. Dissert. Abstr.

N86-23083 Ohio State Univ., Columbus.
DISTURBANCE VECTOR IN SPACE FROM SURFACE GRAVITY ANOMALIES USING COMPLEMENTARY MODELS Ph.D. Thesis
Jaime Yap Cruz 1985 155 p
Avail: Univ. Microfilms Order No. DA8526164

This modeling of the external disturbance vector of the Earth from surface gravity anomaly data is discussed. The low frequency features of the signal are represented in spherical harmonic series. The recovery of the coefficients of the series from the given gravity anomalies is discussed focusing on the use of analytical continuation and ellipsoidal corrections to account for the Earth's topography and ellipticity. The spectrum and data response of the spatial disturbance vector are studied to aid the design of models and experiments. The local models studied to complement the globally valid spherical harmonic model are: (1) the residual topographic model (RTM), (2) the classical integral model, (3) three versions of the Dirac approach to collocation, and finally (4) two versions of the least squares collocation approach. Dissert. Abstr.

N86-23084 California Univ., Berkeley.
ESTIMATION OF SEISMIC WAVE COHERENCY AND RUPTURE VELOCITY USING THE SMART 1 STRONG MOTION ARRAY RECORDINGS Ph.D. Thesis
Norman Alan Abrahamson 1985 135 p
Avail: Univ. Microfilms Order No. DA8524872

The January 29, 1981 Taiwan earthquake (M sub L = 6.7) was recorded digitally by 27 triaxial force-balanced accelerometers in the SMART 1 strong motion array centered 30 km north-northwest of the epicenter. The seismic source of this event had a reverse mechanism with unilateral rupture from east to west. These array recordings are used to make direct measurements of the wave coherency and the time dependent rupture velocity. Frequency-wavenumber analysis shows that across the 4 km array, the P waves contain coherent energy from the source region at frequencies up to 6 Hz while the S waves contain coherent energy up to 3 Hz. Significant energy is present in the P and S waves at frequencies above these two levels, but it is incoherent or scattered energy. Some refinements of the traditional wavenumber spectra analysis for array measurements are developed. The time dependent rupture velocity is estimated by measuring the time dependent phasing of the coherent P and S waves across the array. This estimate is believed to be the first obtained with a 2-dimensional strong motion array. Dissert. Abstr.

N86-23085 California Univ., Los Angeles.
DEFORMATION OF THE SAN ANDREAS FAULT SYSTEM INFERRED FROM TRILATERATION MEASUREMENTS Ph.D. Thesis
Ching-Chau Abe Cheng 1985 386 p
Avail: Univ. Microfilms Order No. DA8525840

The San Andreas fault system is responsible for most of the deformation on the boundary between the North American and Pacific plates. The fault system was studied from the San Francisco Bay south to the Salton Trough because it is well covered by the USGS trilateration networks which have been measured almost every year or two since 1970. The measurements were examined to determine whether any systematic errors contribute a long term variation and how such errors influence estimates of secular fault deformation. Then, with Matsu'ura's fault model and given geological observations, trilateration measurements were used to calculate fault perameters. From San Francisco to Stalton Sea, the San Andreas fault system is divided into four regions. Cumulative fault displacements are high at Hollister/Bear Valley and Cajon Pass/Salton Sea, but low in the San Francisco Bay and in the Transverse Ranges. Shallow faultings from trilateration data match most surface displacements of locked and creeping faults. Dissert. Abstr.

N86-23086 California Univ., Berkeley.
GEOPHYSICAL EXPLORATION WITH AUDIO FREQUENCY MAGNETIC FIELDS Ph.D. Thesis
Victor Franklin Labson 1985 140 p
Avail: Univ. Microfilms Order No. DA8525022

Experience with the Audio Frequency Magnetic (AFMAG) method has demonstrated that an electromagnetic exploration system using the Earth's natural audiofrequency magnetic fields as an energy source, is capable of mapping subsurface electrical structure in the upper kilometer of the Earth's crust. The limitations are resolved by adapting the tensor analysis and remote reference noise bias removal techniques from the geomagnetic induction and magnetotelluric methods to the computation of the tippers. After a through spectral study of the natural magnetic fields, lightweight magnetic field sensors, capable of measuring the magnetic field throughout the year were designed. A digital acquisition and processing sytem, with the ability to provide audiofrequency tipper results in the field, was then built to complete the apparatus. The new instrumetnation was used in a study of the Mariposa, California site previously mapped with AFMAG. The usefulness of natural magnetic field data in mapping an electrical conductive body was again demonstrated. Several field examples are used to demonstrate that the proposed procedure yields reasonable results. Dissert. Abstr.

N86-23087 Uppsala Ionospheric Observatory (Sweden).
LOWER HYBRID PARAMETRIC PROCESSES IN THE IONOSPHERE AND MAGNETOSPHERE: THEORY AND APPLICATIONS Ph.D. Thesis - Uppsala Univ., Sweden
Hannu E. Koskinen 1985 84 p refs
(UIO-SR-85-04; ISSN-0349-2699) Copyright. Avail: Issuing Activity

The theory of parametric processes of lower hybrid waves in multispecies plasmas is applied to space plasma physics. Resonant

decay processes and processes involving nonresonant quasi-modes are considered. The parametric dispersion equation is derived in the dipole approximation and different channels of parametric processes are compared with each other using a model of magnetospheric plasma at an altitude of 2500 km along the auroral field lines. The validity and consequences of the dipole approximation and the effects of inhomogeneities in the background magnetic field and in plasma density are discussed. It is shown that the parametric processes can be active in a mechanism of energy transfer from precipitating auroral electrons. The theory is also applied to ionospheric sounding rocket experiments where lower hybrid waves were detected. Author (ESA)

N86-23088*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SAGE AEROSOL MEASUREMENTS. VOLUME 2: 1 JANUARY - 31 DECEMBER 1980
M. Patrick McCormick Jan. 1986 310 p refs 2 Vol.
(NASA-RP-1149; L-16028; NAS 1.61:1149) Avail: NTIS HC A14/MF A01 CSCL 04A

The stratospheric Aerosol and Gas Experiment (SAGE) satellite system, launched on February 18, 1979, provides profiles of aerosol extinction at wavelengths of 1.00 and 0.45 micron, ozone concentration, and nitrogen dioxide concentration. Data taken during sunset events in the form of zonal averages and seasonal averages of the aerosol extinction at 1.00 and 0.45 micron, ratios of the aerosol extinction to the molecular extinction at 1.00 micron, and ratios of the aerosol extinction at 0.45 micron to the aerosol extinction at 1.00 micron are presented. The averages for 1980 are shown in tables and in profile and contour plots (as a function of altitude and latitude). In addition, temperature data provided by the National Oceanic and Atmospheric Administration (NOAA) for the time and location of each SAGE measurement are averaged and shown in a similar format. Author

N86-23089*# Lunar and Planetary Inst., Houston, Tex.
WORKSHOP ON THE TECTONIC EVOLUTION OF GREENSTONE BELTS
1986 143 p refs Workshop held in Houston, Tex., 16-18 Jan. 1986
(Contract NASw-4066)
(NASA-CR-176619; NAS 1.26:176619; LPI-Contrib-584) Avail: NTIS HC A07/MF A01 CSCL 08G

The Workshop on the Tectonic Evolution of Greenstone Belts, which is part of the Universities Space Research Association, Lunar and Planetary Institute, of Houston, Texas, met there on Jan. 16-18, 1986. A number of plate tectonic hypotheses have been proposed to explain the origin of Archean and Phanerozoic greenstone/ophiolite terranes. These hypotheses are explored in the abstracts. For individual titles, see N86-23090 through N86-23137.

N86-23090*# Oregon State Univ., Corvallis. College of Oceanography.
HOT SPOT ABUNDANCE, RIDGE SUBDUCTION AND THE EVOLUTION OF GREENSTONE BELTS
Dallas Abbott and Sarah Hoffman *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 1-3 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

A number of plate tectonic hypotheses have been proposed to explain the origin of Archaean and Phanerozoic greenstone/ophiolite terranes. In these models, ophiolites or greenstone belts represent the remnants of one or more of the following: island arcs, rifted continental margins, oceanic crustal sections, and hot spot volcanic products. If plate tectonics has been active since the creation of the Earth, it is logical to suppose that the same types of tectonic processes which form present day ophiolites also formed Archaean greenstone belts. However, the relative importance of the various tectonic processes may well have been different and are discussed. Author

N86-23091*# Hope College, Holland, Mich. Dept. of Geology.
LITHOLOGY, AGE AND STRUCTURE OF EARLY PROTEROZOIC GREENSTONE BELTS, WEST AFRICAN SHIELD
Kodjo Attoh *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 4-6 (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Lithologic and chemical data have been compiled for belts in the Proterozoic terrane. Available stratigraphic information from geologic maps of these areas indicate that a typical sequence is comprised of predominately mafic lava flows (basalt-andesite) at the base, which are overlain by felsic volcanic rocks including pyroclastic rocks and lavas. Lithostratigraphic data indicate the volcanic succession is 6-8 km thick. This is followed by 3-4 km of basaltic lava flows which are locally pillowed, the top of the unit is marked by a distinctive manganese formation (MF) consisting of Mn-Fe rich cherts up to 200 m thick. The youngest volcanic unit consists of mafic tuffs and breccia with a distinctive fragmental texture. Of about 100 chemical analyses reported calc-alkaline rocks constitute 55% and tholeiites 45%. Quartz-normative basalt constitutes 99% of the rock type in the tholeiitic suite. In the calc-alkaline suite, 9% of the analyses is basalt, 45% andesite and the rest is dacite and rhycdacite. The available data lead to the conclusion that the minimum age for the volcanic activity must be between 2200 and 2100 million years. It is significant that Archean ages have not been reported from any of the volcanic belts (1-10). F.M.R.

N86-23092*# Missouri Univ., Columbia. Dept. of Geology.
CORRELATIONS AND CONTRASTS IN STRUCTURAL HISTORY AND STYLE BETWEEN AN ARCHAEAN GREENSTONE BELT AND ADJACENT GNEISS BELT, NE MINNESOTA
R. L. Bauer, P. J. Hudleston (Minnesota Univ., Minneapolis), and D. L. Southwick (Minnesota Geological Survey, St. Paul) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 7-8 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

An analysis of the deformation along the boundary between the Vermilion Granitic Complex (VGC) and the Vermilion district indicates that the two terranes have seen a similar deformation history since the earliest stages of folding in the area. Despite this common history, variations in structural style occur between the two terranes, such as the relative development of D sub 1 fabrics and D sub 2 shear zones, and these can be attributed to differences in the crustal levels of the two terranes during the deformation. Similarly, the local development of F sub 3 folds in the VGC, but not in the Vermilion district, is interpreted to be a result of later-D sub 2 pluton emplacement which was not significant at the level of exposure of ther Vermilion district. Author

N86-23093*# National Geophysical Research Inst., Hyderabad (India).
TECTONIC EVOLUTION OF GREENSTONE-GNEISS ASSOCIATION IN DHARWAR CRATON, SOUTH INDIA: PROBLEMS AND PERSPECTIVES FOR FUTURE RESEARCH
Y. J. Bhaskar Rao *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 9-10 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The two fold stratigraphic subdivision of the Archean-Proterozoic greenstone-gneiss association of Dharwar craton into an older Sargur group (older than 2.9 Ga.) and a younger Dharwar Supergroup serves as an a priori stratigraphic model. The concordant greenstone (schist)-gneiss (Peninsular gneiss) relationships, ambiguities in stratigraphic correlations of the schist belts assigned to Sargur group and difficulties in deciphering the older gneiss units can be best appreciated if the Sargur group be regarded as a trimodal association of: (1) ultrabasic-mafic metavolcanics (including komatiites), (2) clastic and nonclastic metasediments and paragneisses and (3) mainly tonalite/trondhemite gneisses and migmatites of diverse ages which could be as old as c. 3.4 ga. or even older. The extensive occurrence of this

greenstone-gneiss complex is evident from recent mapping in many areas of central and southern Karnataka State. Author

N86-23094*# Houston Univ., Tex. Dept. of Geosciences.
CAN TRACT ELEMENT DISTRIBUTIONS RECLAIM TECTONO-MAGMATIC FACIES OF BASALTS IN GREENSTONE ASSEMBLAGES?
J. C. Butler *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 11-13 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

During the past two decades many words have been written both for and against the hypothesis that the tectonic setting of a suite of igneous rocks is retained by the chemical variability within the suite. For example, it is argued that diagrams can be constructed from modern/recent basalt subcompositions within the system Ti-Zr-Y-Nb-Sr such that tectonomagmatic settings can be reclaimed. If one accepts this conclusion, it is tempting to inquire as to how far this hypothesis can be extended into other petrological realms. If chemical variations of metabasalts retain information relating to their genesis (tectonic setting), for example, this would be most helpful in reconstructing the history of basalts from greenstone belts. A discussion follows. Author

N86-23095*# Louisiana State Univ., Baton Rouge. Dept. of Geology.
BARBERTON GREENSTONE BELT VOLCANISM: SUCCESSION, STYLE AND PETROGENESIS
Gary R. Byerly and Donald R. Lowe *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 14-16 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Barberton Mountain Land is an early Archean greenstone belt along the eastern margin of the Kaapvaal Craton of southern Africa. Detailed mapping in the southern portion of the belt leads to the conclusion that a substantial thickness is due to original deposition of volcanics and sediments. In the area mapped, a minimum thickness of 12km of predominantly mafic and ultramafic volcanics comprise the Komati, Hooggenoeg, and Kromberg Formations of the Onverwacht Group, and at least one km of predominantly pyroclastic and epiclastic sediments derived from dacitic volcanics comprise the Fig Tree Group. The Barberton greenstone belt formed primarily by ultramafic to mafic volcanism on a shallow marine platform which underwent little or no concurrent extension. Vents for this igneous activity were probably of the non-constructional fissure type. Dacitic volcanism occurred throughout the sequence in minor amounts. Large, constructional vent complexes were formed, and explosive eruptions widely dispersed pyroclastic debris. Only in the final stages of evolution of the belt did significant thrust-faulting occur, generally after, though perhaps overlapping with, the final stage of dacitic igneous activity. A discussion follows. Author

N86-23096*# Geological Survey of Canada, Ottawa (Ontario).
TECTONIC SETTING AND EVOLUTION OF LATE ARCHAEAN GREENSTONE BELTS OF SUPERIOR PROVINCE, CANADA
K. D. Card *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 17-19 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Late Archean (3.0-2.5 Ga) greenstone belts are a major component of the Superior Province of the Canadian Shield where alternating, metavolcanic - rich and metasedimentary - rich subprovinces form a prominent central striped region bordered in part by high-grade gneiss subprovinces, the Pikiwitonei and Minto in the north, and the Minnesota River Valley in the south. The high-grade gneiss subprovinces are characterized by granulite facies gneiss of plutonic and supracrustal origin, and by abundant plutonic rocks. Minnesota River Valley has rocks older than 3.5 Ga; absolute ages of Pikiwitonei and Minto rocks are unknown but Minto does have north-south structural trends distinctive from the dominant east-west structures of Superior Province. A discussion follows. Author

N86-23097*# Royal Ontario Museum, Toronto. Geochronology Lab.
HIGH PRECISION U-PB GEOCHRONOLOGY AND IMPLICATIONS FOR THE TECTONIC EVOLUTION OF THE SUPERIOR PROVINCE
D. W. Davis, F. Corfu, and T. E. Krogh *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 20-22 refs (For primary document see N86-23089 13-46)
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The underlying mechanisms of Archean tectonics and the degree to which modern plate tectonic models are applicable early in Earth's history continue to be a subject of considerable debate. A precise knowledge of the timing of geological events is of the utmost importance in studying this problem. The high precision U-Pb method has been applied in recent years to rock units in many areas of the Superior Province. Most of these data have precisions of about + or - 2-3 Ma. The resulting detailed chronologies of local igneous development and the regional age relationships furnish tight constraints on any Archean tectonic model. Superior province terrains can be classified into 3 types: (1) low grade areas dominated by meta-volcanic rocks (greenstone belts); (2) high grade, largely metaplutonic areas with abundant orthogneiss and foliated to massive I-type granitoid bodies; and (3) high grade areas with abundant metasediments, paragneiss and S-type plutons. Most of the U-Pb age determinations have been done on type 1 terrains with very few having been done in type 3 terrains. A compilation of over 120 ages indicates that the major part of igneous activity took place in the period 2760-2670 Ma, known as the Kenoran event. This event was ubiquitous throughout the Superior Province. Author

N86-23098*# National Physical Research Lab., Pretoria (South Africa).
CRUSTAL STRUCTURE OF THE ARCHAEAN GRANITE-GREENSTONE TERRANE IN THE NORTHERN PORTION OF THE KAAPVAAL CRATON
J. H. deBeer, E. H. Stettler (Geological Survey, Pretoria, South Africa), J. M. Barton, Jr. (Rand Afrikaans Univ., Johannesburg, South Africa), D. D. vanReenen (Rand Afrikaans Univ., Johannesburg, South Africa), and J. R. Bearncombe (Rand Afrikaans Univ., Johannesburg, South Africa) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 23-24 (For primary document see N86-23089 13-46)
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Recent investigations of the electrical resistivity, gravity and aeromagnetic signatures of the various granite-greenstone units in the northern portion of the Kaapvaal craton have revealed three features of significance: (1) the Archean greenstone belts are shallow features, rarely exceeding 5 km in depth; (2) the high resistivity upper crustal layer typical of the lower grade granite-greenstone terranes is absent in the granulite facies terrane; and (3) the aeromagnetic lineation patterns allow the granite-greenstone terrane to be subdivided into geologically recognizable tectono-metamorphic domains on the basis of lineation frequency and direction. A discussion follows. Author

N86-23099*# Lunar and Planetary Inst., Houston, Tex.
EXTENSIONAL TECTONICS DURING THE IGNEOUS EMPLACEMENT OF THE MAFIC-ULTRAMAFIC ROCKS OF THE BARBERTON GREENSTONE BELT
M. J. deWit *In its* Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 25-26 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The simatic rocks (Onverwacht Group) of the Barberton greenstone belt are part of the Jamestown ophiolite complex. This ophiolite, together with its thick sedimentary cover occupies a complex thrust belt. Field studies have identified two types of early faults which are entirely confined to the simatic rocks and are deformed by the later thrusts and associated folds. The first type of fault (F1a) is regional and always occurs in the simatic rocks along and parallel to the lower contacts of the ophiolite-related cherts (Middle Marker and equivalent layers). These fault

zones have previously been referred to both as flaser-banded gneisses and as weathering horizons. In general the zones range between 1-30m in thickness. Displacements along these zones are difficult to estimate, but may be in the order of 1-100 km. The structures indicate that the faults formed close to horizontal, during extensional shear and were therefore low angle normal faults. F1a zones overlap in age with the formation of the ophiolite complex. The second type of faults (F1b) are vertical brittle-ductile shear zones, which crosscut the complex at variable angles and cannot always be traced from plutonic to overlying extrusive (pillowed) simatic rocks. F1b zones are also apparently of penecontemporaneous origin with the intrusive-extrusive igneous processs. F1b zones may either represent transform fault-type activity or represent root zones (steepened extensions) of F1a zones. Both fault types indicate extensive deformation in the rocks of the greenstone belt prior to compressional overthrust tectonics. F.M.R.

N86-23100*# Lunar and Planetary Inst., Houston, Tex.
A MID-ARCHAEAN OPHIOLITE COMPLEX, BARBERTON MOUNTAIN LAND
M. J. dewit, Roger Hart (Oregon State Univ., Corvallis), and Rodger Hart (Witwatersrand Univ., Johannesburg, South Africa) *In its* Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 27-32 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

New field observations and structurally restored geologic sections through the southern part of 3.5-3.6 Ga Barberton greenstone belt show that its mafic to ultramafic rocks form a pseudostratigraphy comparable to that of Phanerozoic ophiolites; this ancient ophiolite is referred to as the Jamestown ophiolite complex. It consists of an intrusive-extrusive mafic-ultramafic section, underlain by a high-temperature tectono-metamorphic residual peridotitic base, and is capped by a chert-shale sequence which it locally intrudes. Geochemical data support an ophiolitic comparison. Fraction of high temperature melting PGE's > 2500 C in the residual rocks suggest a lower mantle origin for the precursors of this crust. An oceanic rather than arc-related crustal section can be inferred from the absence of contemporaneous andesites. The entire simatic section has also been chemically altered during its formation by hyrothermal interaction with the Archean hydrosphere. The most primitive parent liquids, from which the extrusive sequence evolved, may have been picritic in character. Rocks with a komatiitic chemistry may have been derived during crystal accumulation from picrite-crystal mushes (predominantly olivine-clinopyroxene) and/or by metasomatism during one or more subsequent episodes of hydration-dehydration. The Jamestown ophiolite complex provides the oldest record with evidence for the formation of oceanic lithosphere at constructive tectonic boundaries. F.M.R.

N86-23101*# Energy, Mines and Resources Canada, Ottawa (Ontario). Earth Physics Branch.
HEAT FLOW AND HEAT GENERATION IN GREENSTONE BELTS
Malcolm J. Drury *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 33-35 refs (For primary document see N86-23089 13-46)
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Heat flow has been measured in Precambrian shields in both greenstone belts and crystalline terrains. Values are generally low, reflecting the great age and tectonic stability of the shields; they range typically between 30 and 50 mW/sq m, although extreme values of 18 and 79 mW/sq m have been reported. For large areas of the Earth's surface that are assumed to have been subjected to a common thermotectonic event, plots of heat flow against heat generation appear to be linear, although there may be considerable scatter in the data. The relationship is expressed as: Q = Q sub o + D A sub o in which Q is the observed heat flow, A sub o is the measured heat generation at the surface, Q sub o is the reduced heat flow from the lower crust and mantle, and D, which has the dimension of length, represents a scale depth for the distribution of radiogenic elements. Most authors have not used data from greenstone belts in attempting to define the relationship within shields, considering them unrepresentative and preferring to use data from relatively homogeneous crystalline rocks. A discussion follows. Author

N86-23102*# Lunar and Planetary Inst., Houston, Tex.
KOMATIITE GENESIS IN THE ARCHAEAN MANTLE, WITH IMPLICATIONS FOR THE TECTONICS OF ARCHAEAN GREENSTONE BELTS
D. Elthon *In its* Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 36-38 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The presence of ultramafic lavas (komatiites) associated with Archean greenstone belts has been suggested to indicate very high increments (50-80%) of partial melting of the Archean mantle. Such extensive melting of the Earth's mantle during the Archean might have profound effects on the early tectonic and chemical evolution of the planet, although problems associated with keeping the komatiite liquid in equilibrium with the residual mantle at such high increments of melting has cast doubt upon aspects of extensive melting. Two important aspects of the origin of komatiites are discussed below. Author

N86-23103*# Western Australian Inst. of Tech., Bentley.
THE YILGARN CRATON WESTERN AUSTRALIA: A TECTONIC SYNTHESIS
R. E. P. Fripp *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 39-40 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Yilgarn Craton in Western Australia is one of the larger contiguous preserved Archaean crustal fragments, with an area of about 650,000 square kilometres. Of this, by area, about 70% is granitoid and 30% greenstone. The Craton is defined by the Darling Fault on its western margin, by Proterozoic deformation belts on its southern and northwestern margins, and by unconformable younger sediments on its eastern and northeastern margins. A regional geotectonic synthesis at a scale of 1:500,000 is being prepared. This is based largely upon the 1:250,000 scale mapping of the Geological Survey of Western Australia together with interpretation using geophysical data, mainly airborne magnetic surveys. On a regional basis the granitoids are classied as pre-, syn- and post-tectonic with respect to greenstone belt deformation. The post-tectonic granitoids yield Rb-Sr isochrons of about 2.6 b.y., close to Rb-Sr ages for the greenstones themselves which are up to about 2.8 b.y. old, although data for the latter is sparse. Contacts between earlier granitoids and greenstones which are not obscured by the post-tectonic granitoids are most commonly tectonic contacts, intensely deformed and with mylonitic fabrics. The general concensus however is that there is a pre-tectonic, pre-greenhouse sialic gneiss preserved in places. A discussion follows. Author

N86-23104*# Cornell Univ., Ithaca, N.Y. Institute for the Study of the Continents.
TECTONICS OF SOME AMAZONIAN GREENSTONE BELTS
Allan K. Gibbs *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 41-43 refs Sponsored in part by the Guyana Geological Survey and Utah International, Ltd. (For primary document see N86-23089 13-46) (Grants NSF EAR-76-17026; NSF EAR-82-07422; NSF EAR-84-10379)
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Greenstone belts exposed amid gneisses, granitoid rocks, and less abundant granulites along the northern and eastern margins of the Amazonian Craton yield Trans-Amazonican metamorphic ages of 2.0-2.1 Ga. Early proterozoic belts in the northern region probably originated as ensimatic island arc complexes. The Archean Carajas belt in the southeastern craton probably formed in an extensional basin on older continental basement. That basement contains older Archean belts with pillow basalts and komatiites.

Belts of ultramafic rocks warrant investigatijon as possible ophiolites. A discussion follows. Author

N86-23105*# Bureau of Mineral Resources, Geology and Geophysics, Canberra (Australia). Div. of Petrology and Geochemistry.

SPATIAL GREENSTONE-GNEISS RELATIONSHIPS: EVIDENCE FROM MAFIC-ULTRAMAFIC XENOLITH DISTRIBUTION PATTERNS

A. Y. Glikson *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 44-46 (For primary document see N86-23089 13-46)

Avail: NTIS HC A07/MF A01 CSCL 08G

The distribution patterns of mafic-ultramafic xenoliths within Archaean orthogneiss terrain furnish an essential key for the elucidation of granite-greenstone relations. Most greenstone belts constitute mega-xenoliths rather than primary basin structures. Transition along strike and across strike between stratigraphically low greenstone sequences and xenolith chains demonstrate their contemporaneity. These terrains represent least deformed cratonic islands within an otherwise penetratively foliated deformed gneiss-greenstone crust. Whereas early greenstone sequences are invariably intruded by tonalitic/trondhjemitic/granodioritic gneisses, stratigraphically higher successions may locally overlap older gneiss terrains and their entrained xenoliths unconformably. The contiguity of xenolith patterns suggests their derivation as relics of regional mafic-ultramafic volcanic crustal units and places limits on horizontal movements between individual crustal blocks. F.M.R.

N86-23106*# State Univ. of New York, Albany. Dept. of Geological Sciences.

DISMEMBERED ARCHAEAN OPHIOLITE IN THE SOUTHEASTERN WIND RIVER MOUNTAINS, WYOMING: REMAINS OF ARCHAEAN OCEANIC CRUST

G. D. Harper *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 47-49 refs (For primary document see N86-23089 13-46)

Avail: NTIS HC A07/MF A01 CSCL 08G

Archean mafic and ultramafic rocks occur in the southeastern Wind River Mountains near Atlantic City, Wyoming and are interpreted to represent a dismembered ophiolite suite. The ophiolitic rocks occur in a thin belt intruded by the 2.6 Ga Louis Lake Batholith on the northwest. On the southeast they are in fault contact with the Miners Delight Formation comprised primarily of metagraywackes with minor calc-alkaline volcanics. The ophiolitic and associated metasedimentry rocks (Goldman Meadows Formation) have been multiply deformed and metamorphosed. The most prominant structures are a pronounced steeply plunging stretching lineation and steeply dipping foliation. These structural data indicate that the ophiolitic and associated metasedimentary rocks have been deformed by simple shear. The ophiolitic rocks are interpreted as the remains of Archean oceanic crust, probably formed at either a mid-ocean ridge or back-arc basin. All the units of a complete ophiolite are present except for upper mantle periodotities. The absence of upper mantle rocks may be the result of detactment within the crust, rather than within the upper mantle, during emplacement. This could have been the result of a steeper geothermal gradient in the Archean oceanic lithosphere, or may have resulted from a thicker oceanic crust in the Archean. F.M.R.

N86-23107*# Geological Survey, Laramie, Wyo.

PRELIMINARY REPORT ON THE GEOLOGY AND GOLD MINERALIZATION OF THE SOUTH PASS GRANITE-GREENSTONE TERRAIN, WIND RIVER MOUNTAINS, WESTERN WYOMING (US)

W. D. Hausel *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 50-51 refs (For primary document see N86-23089 13-46)

Avail: NTIS HC A07/MF A01 CSCL 08G

The South Pass granite-greenstone terrain lies near the southern tip of the Wind River Mountains of western Wyoming. This Archean supracrustal pile has been Wyoming's most prolific source of gold and iron ore. From 1962 to 1983, more than 90 million tons of iron ore were recovered from oxide-facies banded iron formation, and an estimated 325,000 ounces of gold were mined from metagreywacke-hosted shears and associated placers. Precambrian rocks at South Pass are unconformably overlain by Paleozoic sediments along the northeast flank, and a Tertiary pediment buries Archean supracrustals on the west and south. To the northwest, the supracrustals terminate against granodiorite of the Louis Lake batholith; to the east, the supracrustals terminate against granite of the Granite Mountains batholith. The Louis Lake granodiorite is approximately 2,630 + or - 20 m.y. old, and the Granite Mountains granite averages 2,600 m.y. old. The geometry of the greenstone belt is best expressed as a synform that has been modified by complex faulting and folding. Metamorphism is amphibolite grade surrounding a small island of greenschist facies rocks. The younger of the Archean supracrustal successions is the Miners Delight Formation. This unit yielded a Rb-Sr isochron of 2,800 m.y. A sample of galena from the Snowbird Mine within the Miners Delight Formation yielded a model age averaging 2,750 m.y. The Snowbird mineralization appears to be syngenetic and is hosted by metavolcanics of calc-alkaline affinity. Discussion follows. Author

N86-23108*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.

THE KOLAR SCHIST BELT: A POSSIBLE ARCHAEAN SUTURE ZONE

G. N. Hanson, E. J. Krogstad, V. Ragamani (Jawaharlal Nehru Univ., New Delhi, India), and S. Balakrishnan (Jawaharlal Nehru Univ., New Delhi, India) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 52-54 refs (For primary document see N86-23089 13-46)

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The Kolar Schist Belt represents a N-S trending discontinuity in the structures, lithologies, and emplacement and metamorphic ages of late Archean gneisses. The suggestion of a much older basement on the west side of the belt is not seen on the east. Within the schist belt amphibolites from each side have distinctly different chemical characteristics, suggesting different sources at similar mantle depths. These amphibolites were probably not part of a single volcanic sequence, but may have formed about the same time in two completely different settings. Could the amphibolites with depleted light REE patterns represent Archean ocean floor volcanics which are derived from a mantle source with a long term depletion of the light REE? Why are the amphibolites giving an age which may be older than the exposed gneisses immediately on either side of the belt? These results suggest that it is necessary to seriously consider whether the Kolar Schist Belt may be a suture between two late Archean continental terranes. Author

N86-23109*# Queens Univ., Kingston (Ontario). Dept. of Geological Sciences.

EVIDENCE FOR SPREADING IN THE LOWER KAM GROUP OF THE YELLOWKNIFE GREENSTONE BELT: IMPLICATIONS FOR ARCHAEAN BASIN EVOLUTION IN THE SLAVE PROVINCE

H. Helmstaedt and W. A. Padgham *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 55-58 refs (For primary document see N86-23089 13-46)

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The Yellowknife greenstone belt is the western margin of an Archean turbidite-filled basin bordered on the east by the Cameron River and Beaulieu River volcanic belts (Henderson, 1981; Lambert, 1982). This model implies that rifting was entirely ensialic and did not proceed beyond the graben stage. Volcanism is assumed to have been restricted to the boundary faults, and the basin was floored by a downfaulted granitic basement. On the other hand, the enormous thickness of submarine volcanic rocks and the presence of a spreading complex at the base of the Kam Group suggest that volcanic rocks were much more widespread than indicated by their present distribution. Rather than resembling volcanic sequences in intracratonic graben structures, the Kam Group and its tectonic setting within the Yellowknife greenstone

belt have greater affinities to the Rocas Verdes of southern Chile, Mesozoic ophiolites, that were formed in an arc-related marginal basin setting. The similarities of these ophiolites with some Archean volcanic sequences was previously recognized, and served as basis for their marginal-basin model of greenstone belts. The discovery of a multiple and sheeted dike complex in the Kam Group confirms that features typical of Phanerozoic ophiolites are indeed preserved in some greenstone belts and provides further field evidence in support of such a model. Author

N86-23110*# Montreal Univ. (Quebec). Dept. of Geology.
ARCHAEAN WRENCH-FAULT TECTONICS IN THE ABITIBI GREENSTONE BELT OF CANADA
C.202Ludden Hubert, J. N. *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 59-61 refs (For primary document see N86-23089 13-46)
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A tectonic model is proposed in which the southern Abitibi belt formed in a series of rift basins which dissected an earlier formed volcanic arc. Comparisons can be made with Phanerozoic areas such as, the Hokuroko basin of Japan, the Taupo volcanic zone of new Zealand and the Sumatra and Nicaragua volcanic arcs. In addition the identification of the major E - W thrust shears make it possible to speculate that the southern Abitibi belt comprises a collage of blocks of terrane which have been accreted against a more stable continental margin or microcontinent. If this interpretation is correct analogies can be made with the SW margin of the U.S.A. in which recently formed blocks of volcanic terrane are being accreted against its western margin. Author

N86-23111*# Minnesota Univ., Minneapolis. Dept. of Geology and Geophysics.
TRANSPRESSION AS THE MAIN DEFORMATIONAL EVENT IN AN ARCHAEAN GREENSTONE BELT, NORTHEASTERN MINNESOTA
P. J. Hudleston, D. Schultz-Ela, R. L. Bauer (Missouri Univ., Columbia), and D. L. Southwick (Minnesota Geological Survey, St. Paul) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 62-63 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Deformed and metamorphosed sedimentary and volcanic rocks of the Vermilion district constitute an Archean greenstone belt trending east-west between higher grade rocks of the Vermilion Granitic Complex to the north and the Giants Range batholith to the south. Metamorphic grade is low throughout, being lowest in the center of the belt (chlorite zone of the greenschist facies). All the measured strain, a cleavage or schistosity, and a mineral lineation in this belt are attributed to the main phase of deformation D sub 2 that followed an earlier nappe-forming event D sub 1, which left little evidence of penetrative fabric. Previous work assumed that the D sub 2 deformation resulted from north-south compression across the district. It is now believed that a significant component of this deformation resulted from dextral shear across the whole region. Thus the Vermilion fault, a late-state largely strike-slip structure that bounds the Vermilion district to the north, may simply be the latest, most brittle expression of a shear regime that was much more widespread in space and time. Features that are indicative of shear include ductile shear zones with sigmoidal foliation patterns, highly schistose zones with the development of shear bands, feldspar clasts or pyrite cubes with asymmetric pressure shadows, and the fact that the asymmetry of the F sub 2 folds is predominantly Z for at least 15 km south of the Vermilion fault. Author

N86-23112*# Natal Univ., Pietermaritzburg (South Africa). Dept. of Geology.
A CONTINUOUS RECORD OF TECTONIC EVOLUTION FROM 3.5 Ga TO 2.6 Ga IN SWAZILAND AND NORTHERN NATAL
D. R. Hunter, A. H. Wilson, J. A. Versfeld, A. R. Allen, R. G. Smith, D. W. W. Sleigh, P. B. Groenewald, G. M. Chutter, and V. A. Preston *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p64-68 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The approx. 3.5 Ga-old bimodal suite underlying an extensive area in southwestern Swaziland comprises the oldest-dated sialic rocks in the Kaapvaal structural province. The suite consists of leucocratic, layered tonalitic-trondhjemitic gneisses and amphibolites characterized by the effects of repeated high strains. This suite is considered to represent a sialic basement on which metavolcanic and metasedimentary rocks, now preserved as scattered greenstone remnants, accumulated. Direct evidence to confirm this temporal relationship is lacking, but structural data from the Dwalile, Assegaai and Commondale areas indicate that (1) the bimodal gneisses experienced a complex structural history prior to the first recognizable deformation in the supracrustal rocks (i.e., D1 in the supracrustals is equivalent to Dn + 1 in the gneisses) and (2) scattered remnants of the Dwalile rocks infolded with the bimodal suite structurally overlie the gneisses and are preserved in synformal keels. Significant proportions of metaquartzites and metapelites are present in the Assegaai greenstone sequence, the presence of which implies the existence of felsic crust in the source area from which these sediments were derived, a conclusion that is consistent with the structural data. Author

N86-23113*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
IS THE CAMERON RIVER GREENSTONE BELT ALLOCHTHONOUS?
Timothy M. Kusky *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 69-71 refs Sponsored in part by the Geological Society of America (For primary document see N86-23089 13-46)
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Many tectonic models for the Slave Province, N.W.T., Canada, and for Archean granite - greenstone terranes in general, are implicitly dependent on the assumption that greenstone belt lithologies rest unconformably upon older gneissic basement. Other models require originally large separations between gneissic terranes and greenstone belts. A key question relating to the tectonics of greenstone belts is therefore the original spatial relationship between the volcanic assemblages and presumed-basement gneisses, and how this relationship has been modified by subsequent deformation. What remains unclear in these examples is the significance of the so-called later faulting of the greenstone - gneiss contacts. Where unconformities between gneisses and overlying sediments are indisputable, such as at Point Lake, the significance of faults which occur below the base of the volcanic succession also needs to be evaluated. As part of an on-going investigation aimed at answering these and other questions, the extremely well-exposed Cameron River Greenstone Belt and the Sleepy Dragon Metamorphic Complex in the vicinity of Webb Lake and Sleepy Dragon Lake was mapped. Author

N86-23114*# Louisiana State Univ., Baton Rouge. Dept. of Geology.
SEDIMENTOLOGICAL AND STRATIGRAPHIC EVOLUTION OF THE SOUTHERN PART OF THE BARBERTON GREENSTONE BELT: A CASE OF CHANGING PROVENANCE AND STABILITY
Donald R. Lowe and Gary R. Byerly *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 72-74 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The sedimentological and stratigraphic evolution of the 3.5 to 3.3 Ga Barberton Greenstone Belt can be divided into three principal stages: (1) the volcanic platform stage during which at least 8 km of mafic and ultramafic volcanic rocks, minor felsic volcanic units, and thin sedimentary layers (Onverwacht Group) accumulated under generally anorogenic conditions; (2) a transitional stage of developing instability during which widespread dacitic volcanism and associated pyroclastic and volcaniclastic sedimentation was punctuated by the deposition of terrigerous debris derived by uplift and shallow erosion of the belt itself (Fig Tree Group); (3) an orogenic stage involving cessation of active

volcanism, extensive thrust faulting, and widespread deposition of clastic sediments representing deep erosion of the greenstone belt sequence as well as sources outside of the belt (Moodies Group). Author

N86-23115*# Esso Australia Ltd., Sydney.
EVIDENCE FOR STRUCTURAL STACKING AND REPETITION IN THE GREENSTONES OF THE KALGOORLIE DISTRICT, WESTERN AUSTRALIA
J. E. Martyn *In* Lunar and Planetary Inst. Workshp on the Tectonic Evolution of Greenstone Belts 1986 p 75-77 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Most previous stratigraphic interpretations of the southern part of the Norseman-Wiluna Greenstone Belt have proposed polycyclic sequences. These invoked two and sometimes three successive suites of mafic and/or ultimafic volcanics and intrusives separated by felsic volcanics and immature clastic sediments, however no distinctive lithological differences were reported between successive mafic-ultramafic sequences. When interpretations of the area further to the north are integrated, a total of four separate major mafic-ultramafic uites emerges for a large part of the Norseman-Wiluna Belt. Although the author does not intent to imply that all polycyclic stratigraphies are wrong in principle such a situation seems suspiciously over-complex and stimulates the need to look critically at the individual areas where the stratigraphies have seen erected. For the Kalgoorlie area in the south, some of the schemes have already provoked scepticism and a simpler model consisting of one cycle subject to structural repetition has been evolved by workers in the Geological Survey of Western Australia for part of this area. The latter drew attention to the carbon copy similarity between the elements of some polycyclic stratigraphies. Much more regionally extensive integrated structural and stratigraphic data is still required to evaluate the relationship between structure and stratigraphy more fully, an objective substantially limited by poor outcrop and deep weathering, but with due effort, far from unattainable. Author

N86-23116*# Massachusetts Univ., Amherst. Dept. of Geology and Geography.
PRELIMINARY STRUCTURAL MODEL FOR THE SOUTHWESTERN PART OF THE MICHIPICOTEN GREENSTONE BELT, ONTARIO
George E. Mcgill and Catherine H. Shrady *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 78-79 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The southwestern part of the Michipicoten Greenstone Belt includes a 100 sq km fume kill extending northeastwards from the twon of Wawa, Ontario. Except for a strip along the Magpie River that is covered by Pleistocene gravels, outcrop in the fume kill averages about 30-50%. Within this area are all the major lithologic belts characteristic of the southwestern fourth of the Michipicoten Greenstone Belt. All of the area mapped to date lies within Chabenel Township, recently mapped at 4' = 1 mile. Following a brief reconnaissance in 1983, mapping at a scale of 1' = 400' was begun within and adjacent to the fume kill in 1984. Two objectives are sought (1) determinaion of the geometry and sequence of folding, faulting, cleavage development, and intrusion; and (2) defining and tracing lithologic packages, and evaluating the nature of the contacts between these packages. Results for objective (1) are discussed in a companion abstract; this abstract will present tentative results for objective. Author

N86-23117*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.
THERMAL IMPLICATIONS OF METAMORPHISM IN GREENSTONE BELTS AND THE HOT ASTHENOSPHERE-THICK CONTINENTAL LITHOSHERE PARADOX
Paul Morgan *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 81-83 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

From considerations of secular cooling of the Earth and the slow decay of radiogenic heat sources in the Earth with time, the conclusion that global heat loss must have been higher in the Archean than at present seems inescapable. The mechanism by which this additional heat was lost and the implications of higher heat low for crustal temperatures are fundamental unknowns in our current understanding of Archean tectonics and geological processes. Higher heat loss implies that the average global geothermal gradient was higher in the Archean than at present, and the restriction of ultramafic komatiites to the Archean and other considerations suggests that the average temperature of the mantle was several hundred degrees hotter during the Archean than today. In contrast, there is little petrologic evidence that the conditions of metamorphism or crustal thickness (including maximum crustal thickness under mountains) were different in archean continental crust from the Phanerozoic record. Additionally, Archean ages have recently been determined for inclusions in diamonds from Cretaceous kimeberlites in South Africa, indicating temperatures of 900 to 1300 at depths of 150 to 215 km (45 to 65 kbar) in the Archean mantle, again implying relatively low geothermal gradients at least locally in the Archean. The thermal implications of metamorphism are examined, with special reference to greenstone belts, and a new thermal model of the continental lithosphere is suggested which is consistent with thick continental lithosphere and high asthenosphere temperatures in the Archean. Author

N86-23118*# National Geophysical Research Inst., Hyderabad (India).
GEOCHEMICAL CHARACTERS AND TECTONIC EVOLUTION OF THE CHITRADURGA SCHIST BELT: AN ARCHAEAN SUTURE (?) OF THE DHARWAR CRATON, INDIA
S. M. Naqvi *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 84-85 (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Chitradurga schist belt extending for about 450 km in a NS direction and 2-50 km across, is one of the most prominent Archean (2.6 b.y.) tectonic features of the Indian Precambrian terrain, comprising about 2 to 10 km thick sequence of volcano sedimentary rocks. The basal unit of this belt is composed of an orthoquartzite-carbonate facies, unlike many other contemporary greentone belts of the Gondwana land which begin with a basal mafic-ultramafic sequence. Eighty percent of the belt is made up of detrital and chemogenic sediments, their succession commencing with a poorly preserved quartz pebble basal conglomerate and current bedded quartzites which, in turn, rest on tonalitic gneisses, the latter having been further remobilized with along the schist belt. Deposition of current bedded matue arenites indicte the existence of platformal conditions near the shore line. Polymictic graywacke conglomerates, graywackes, shales, phyllites, carbonates, BIFs (oxide, carbonate and sulfide) BMF's (Banded Maganese Formations) and cherts thus constitute the main sedimentary rocks of the belt. The polymicitic conglomerates contain debris of rocks of older greenstone sequences, as well as an abundant measure of folded quartzites, BIF's and gneissic fragments which represent earlier orogenies. Author

N86-23119*# New Hampshire Univ., Durham. Dept. of Earth Sciences.
GEOCHEMICAL AND ISOTOPIC CONSTRAINTS ON THE TECTONIC SETTING OF SERRA DOS CARAJAS BELT, EASTERN PARA, BRAZIL
W. J. Olszewski, Jr., Allan K. Gibbs (Cornell Univ.,Ithaca, N.Y.), and Karl R. Wirth (Cornell Univ., Ithaca, N.Y.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 86-88 refs (For primary document see N86-23089 13-46)
(Grant NSF EAR-84-10379)
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The lower part of the Serra dos Carajas belt is the metavolcanic and metasedimentary Grao para Group (GPG). The GPG is thought to unconformably overlie the older (but undated) Xingu Complex,

composed of medium and high-grade gneisses and amphibolite and greenstone belts. The geochemical data indicate that the GPG has many features in common with ancient and modern volcanic suites erupted through continental crust. The mafic rocks clearly differ from those of most Archean greenstone belts, and modern MORB, IAB, and hot-spot basalts. The geological, geochemical, and isotopic data are all consistent with deposition on continental crust, presumably in a marine basin formed by crustal extension. The isotopic data also suggest the existence of depleted mantle as a source for the parent magmas of the GPG. The overall results suggest a tectonic environment, igneous sources, and petrogenesis similar to many modern continental extensional basins, in contrast to most Archean greenstone belts. The Hammersley basin in Australia and the circum-Superior belts in Canada may be suitable Archean and Proterozoic analogues, respectively. F.M.R.

N86-23120*# Paris (I. A.), Paris (France).
POLYPHASE THRUST TECTONIC IN THE BARBERTON GREENSTONE BELT
I. A. Paris *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 89-90 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

In the circa 3.5 by-old Barberton greenstone belt, the supracrustal rocks form a thick and strongly deformed thrust complex. Structural studies in the southern part of the belt have shown that 2 separate phases of over-thrusting (D sub 1 and D sub 2) successively dismembered the original stratigraphy. Thrust nappes were subsequently refolded during later deformations (D sub 3 and D sub 4). This report deals with the second thrusting event which, in the study region appears to be dominant, and (unlike the earlier thrusting), affects the entire supracrustal pile. The supracrustal rocks form a predominantly NE/SW oriented, SE dipping tectonic fan (the D sub 2 fan) in which tectonic slices of ophiolitic-like rocks are interleaved with younger sedimentary sequences of the Diepgezet and malalotcha groups. Structural and sedimentological data indicate that the D sub 2 tectonic fan was formed during a prolonged, multi-stage regional horizontal shortening event during which several types of internal deformation mechanisms were successively and/or simultaneously active. Movement appears to have been predominantly to the NW and to the N. During D sub 2, periods of quiescence and sedimentation followed periods of thrust propagation. Although the exact kinematics which led to the formation of this fan is not yet known, paleoenvironmental interpretations together with structural data suggest that D sub 2 was probably related to (an) Archean collision(s). F.M.R.

N86-23121*# Geological Survey of Canada, Ottawa (Ontario).
AGE CONSTRAINTS ON THE EVOLUTION OF THE QUETICO BELT, SUPERIOR PROVINCE, ONTARIO
J. A. Percival and R. W. Sullivan *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 91-93 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Much attention has been focused on the nature of Archean tectonic processes and the extent to which they were different from modern rigid-plate tectonics. The Archean Superior Province has linear metavolcanic and metasediment-dominated subprovinces of similar scale to cenozoic island arc-trench systems of the western Pacific, suggesting an origin by accreting arcs. Models of the evolution of metavolcanic belts in parts of the Superior Province suggest an arc setting but the tectonic environment and evolution of the intervening metasedimentary belts are poorly understood. In addition to explaining the setting giving rise to a linear sedimentary basin, models must account for subsequent shortening and high-temperature, low-pressure metamorphism. Correlation of rock units and events in adjacent metavolcanic and metasedimentary belts is a first step toward understanding large-scale crustal interactions. To this end, zircon geochronology has been applied to metavolcanic belts of the western Superior Province; new age data for the Quetico metasedimentary belt is reported, permitting correlation with the adjacent Wabigoon and Wawa metavolcanic subprovinces. Author

N86-23122*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ARCHAEAN MEGACRYSTIC PLAGIOCLASE UNITS AND THE TECTONIC SETTING OF GREENSTONES
W. C. Phinney, D. A. Morrison, and D. Maczuga (LEMSCO, Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 94-96 refs (For primary document see N86-23089 13-46)
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Large (up to 20 cm), equidimensional, commonly euhedral, plagioclase megacrysts of highly calcic composition (An sub 80-90) occur commonly in all Archean cratons in one or more of three distinct associations: (1) as cumulate crystal segregations of anorthosite or as megacrysts in basaltic dikes, sills, and flows in greenstone belts that vary in metamorphic grade from greenschist to granulite. Throughout 100's of thousands of square kilometers of northwestern Ontario and Manitoba the plagioclase megacrysts occur in pillowed and massive flows, sills, dikes, large inclusions in dikes, and intrusive anorthositic complexes with areas of up to a few 100 sq km and spanning a period of at least 100 m.y. in the 2.7 to 2.8 b.y. time frame; (2) as basaltic dike swarms in stable cratonic areas forming parallel to subparallel patterns over hundreds of thousands of square kilometers intruding both granitic gneisses and supracrustal belts including greenstones. These swarms include the Ameralik-Saglek system at 3.1 to 3.4 b.y., the Matachewan system at 2.5 to 2.6 b.y., and the Beartooth-Bighorn system at 2.2 to 2.3 b.y.; and, (3) as anorthositic complexes associated with marbles and quartzites (Sittampundi, India and Messina, South Africa) in granulite grade terrains. Initial attempts to correlate tectonic settings of similar modern crystbearing units with their Archean counterparts were only partially successful. Author

N86-23123*# Geological Survey of Canada, Ottawa (Ontario). Economic Geology and Mineralogy Div.
RAINY LAKE WRENCH ZONE: AN EXAMPLE OF AN ARCHAEAN SUBPROVINCE BOUNDARY IN NORTHWESTERN ONTARIO
K. Howard Poulsen *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 97-99 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Superior Province of the Canadian Shield comprises an alternation of subprovinces with contrasting lithological, structural and metamorphic styles. Rocks of the Rainly Lake area form a fault bounded wedge between two of these subprovinces, the Wabigoon granite-greenstone terrain to the north and the Quetico metasedimentary terrain to the south. The Quetico and Seine River-Rainy Lake Faults bound this wedge within which interpretation of the stratigraphy has been historically contentious. In the eastern part of the wedge, volcanic rocks and coeval tonalitic sills are unconformably overlain by fluviatile conglomerate and arenite of the Seine Group; in the western part of the wedge, metamorphosed wacke and mudstone of the Coutchiching Group are cut by granodioritic plutons. The Coutchiching Group has previously been correlated with the Seine Group and with the turbiditic Quetico metasediments of the Quetico Subprovince and these correlations are the cornerstone of earlier tectonic models which relate the subprovinces. The structural geology of the Rainy Lake area is characterized by attributes which compare favourably with the known characteristics of dextral wrench or 'transpressive zones based both on experimental data and natural examples. Much of this deformation involved the Seine Group, the youngest stratigraphic unit in the area, and predates the emplacement of late-to-post-tectonic granodioritic plutons for which radiometric data indicate a Late Archean age. Author

N86-23124*# Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Mineral Physics and Mineralogy.

A PALAEOMAGNETIC PERSPECTIVE OF PRECAMBRIAN TECTONIC STYLES

P. W. Schmidt and B. J. J. Embleton *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 100-101 refs (For primary document see N86-23089 13-46)
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The considerable success derived from palaeomagnetic studies of Phanerozoic rocks with respect to the tectonic styles of continental drift and plate tectonics, etc., have not been repeated by the many palaeomagnetic studies of Precambrian rocks. There are 30 years of research with results covering the major continents for Precambrian times that overlap considerably yet there is no concensus. There is good evidence that the usual assumptions employed by palaeomagnetism are valid for the Precambrian. The exisence of magnetic reversals during the Precambrian, for instance, is difficult to explain except in terms of a geomagnetic field that was predominantly dipolar in nature. It is a small concession to extend this notion of the Precambrian geomagnetic field to include its alignment with the Earth's spin axis and the other virtues of an axial geocentric dipole that characterize the recent geomagnetic field. In terms of greenstone terranes it is obvious that tectonic models postulated to explain these observations are paramount in understanding Precambrian geology. What relevance the current geographical relationships of continents have with their Precambrian relationships remains a paradox, but it would seem that the ensialic model for the development of greenstone terranes is favored by the Precambrian palaeomagnetic data.
F.M.R.

N86-23125*# Geological Survey, Reston, Va.

THE WISCONSIN MAGMATIC TERRANE: AN EARLY PROTEROZOIC GREENSTONE-GRANITE TERRANE FORMED BY PLATE TECTONIC PROCESSES

Klaus J. Schulz and Gene L. LaBerge (Wisconsin Univ., Oshkosh) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 102-104 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Wisconsin magmatic terrane (WMT) is an east trending belt of dominantly volcanic-plutonic complexes of Early Proterozoic age (approx. 1850 m.y.) that lies to the south of the Archean rocks and Early Proterozoic epicratonic sequence (Marquette Range Supergroup) in Michigan. It is separated from the epicratonic Marquette Range Supergroup by the high-angle Niagara fault, is bounded on the south, in central Wisconsin, by Archean gneisses, is truncated on the west by rocks of the Midcontinent rift system, and is intruded on the east by the post-orogenic Wolf river batholith. The overall lithologic, geochemical, metallogenic, metamorphic, and deformational characteristics of the WMT are similar to those observed in recent volcanic arc terranes formed at sites of plate convergence. It is concluded that the WMT represents an evolved oceanic island-arc terrane accreated to the Superior craton in the Early Proterozoic. This conclusion is strengthened by the apparent absence of Archean basement from most of the WMT, and the recent recognition of the passive margin character of the epicratonic Marquette Range Supergroup. F.M.R.

N86-23126*# Toronto Univ. (Ontario). Dept. of Geology.

NEW INSIGHTS INTO TYPICAL ARCHAEAN STRUCTURES IN GREENSTONE TERRANES OF WESTERN ONTARIO Abstract Only

W. M. Schwerdtner *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 105 (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Ongoing detailed field work in selected granitoid complexes of the western Wabigoon and Wawa Subprovinces, southern Canadian Shield, has led to several new conclusions: (1) Prominent gneiss domes are composed of prestrained tonalite-granodiorite and represent dense hoods of magmatic granitoid diapirs; (2) the deformation history of the prestrained gneiss remains to be unraveled; (3) the gneiss lacked a thick cover of mafic metavolcanics or other dense rocks at the time of magmatic diaprisim; (4) the synclinoral structure of large greenstone belts is older than the late gneiss domes and may have been initiated by volcano-tectonic processes; (5) small greenstone masses within the gneiss are complexly deformed, together with the gneiss; and, (6) no compelling evidence has been found of ductile early thrusting in the gneiss terranes. Zones of greenstone enclaves occur in hornblende-rich contaminated tonalite and are apt to be deformed magmatic septa. Elsewhere, the tonalite gneiss is biotite-rich and hornblende-poor. These conclusions rest on several new pieces of structural evidence; (1) oval plutons of syenite-diorite have magmatic strain fabrics and sharp contacts that are parallel to an axial-plane foliation in the surrounding refolded gneiss; (2) gneiss domes are lithologically composite and contain large sheath-like structures which are deformed early plutons, distorted earlier gneiss domes, or early ductile nappes produced by folding of planar plutonic septa, and (3) the predomal attitudes of gneissosity varied from point to point. Author

N86-23127*# Massachusetts Univ., Amherst. Dept. of Geology and Geography.

DEFORMATIONAL SEQUENCE OF A PORTION OF THE MICHIPICOTEN GREENSTONE BELT, CHABANEL TOWNSHIP, ONTARIO

Catherine H. Shrady and George E. McGill *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 106-107 refs (For primary document see N86-23089 13-46)
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Detailed mapping at a scale of one inch = 400 feet is being carried out within a fume kill, having excellent exposure, located in the southwestern portion of the Michipicoten Greenstone Belt near Wawa, Ontario. The rocks are metasediments and metavolcanics of lower greenschist facies. U-Pb geochronology indicates that they are at least 2698 + or - 11 Ma old. The lithologic packages strike northeast to northwest, but the dominant strike is approximately east-west. Sedimentary structures and graded bedding are well preserved, aiding in the structural interpretation of this multiply deformed area. At least six phases of deformation within a relatively small area of the Michipicoten Greenstone Belt have been tentatively identified. These include the following structural features in approximate order of occurrence: (0) soft-sediment structures; (1) regionally overturned rocks, flattened pebbles, bedding parallel cleavage, and early, approximately bedding parallel faults; (2) northwest to north striking cleavage; (3) northeast striking cleavage and associated folds, and at least some late movement on approximately bedding parallel faults; (4) north-northwest and northeast trending faults; and (5) diabase dikes and associated fracture cleavages. Minor displacement of the diabase dikes occurs on faults that appear to be reactivated older structures. F.M.R.

N86-23128*# McGill Univ., Montreal (Quebec). Dept. of Geological Sciences.

A CONTINENTAL RIFT MODEL FOR THE LA GRANDE GREENSTONE BELT

T. Skulski, A. Hynes, M. Liu (Arizona Univ., Tucson), D. Francis, B. Rivard, and K. Stamatelopoulou-Seymour (Concordia Univ., Montreal, Canada) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 108-110 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Stratigraphic relationships and the geochemistry of volcanic rocks contrain the nature and timing of the tectonic and magmatic processes in the pre-deformational history of the La Grande greenstone belt in the Superior Province of north-central Quebec. The lowermost supracrustals in this belt are obscured by syntectonic granitoid intrusives. The supracrustal succession in the western part of the belt consists of a lower sequence of immature clastic sediments and mafic volcanoclastics, overlain by pillowed and massive basalts. Further east, along tectonic strike, a lower sequence of mafic volcanoclastics and immature clastic sediments is overlain by a thick sequence of pillowed and massive basalts, and resedimented coarse clastic sediments and banded

iron formation. These are overlain by assive basaltic andesites, andesites and intermediate volcanoclastics intercalated with immature clastic sediments. In contrast, in the eastern part of the belt lenses of felsic volcanics and volcanoclastics occur at the base of the succession and pillowed and massive basalts are overlain by komatiites at the top. The La Grande greenstone belt can be explained as the product of continental rifting. The restricted occurence of komatiites, and eastwardly directed paleocurrents in clastic sediments in the central part of the belt are consistent with rifting commencing in the east and propagating westward with time. The increase in depth of emplacement and deposition with time of the lower three units in the central part of the belt reflects deposition in a subsiding basin. These supracrustal rocks are believed to represent the initial rift succession. F.M.R.

N86-23129*# Rand Afrikaans Univ., Johannesburg (South Africa). Dept. of Geology.
TWO CONTRASTING METAMORPHOSED ULTRAMAFIC-MAFIC COMPLEXES FROM GREENSTONE BELTS, THE NORTHERN KAAPVAAL CRATON AND THEIR SIGNIFICANCE IN ARCHAEN TECTONICS
C. A. Smit and J. R. Vearncombe *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 111-113 (For primary document see N86-23089 13-46)
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The character of Archaean ultramafic-mafic complexes can, given their prominance in greenstone belts, provide critical clues to help deduce the tectonic setting of these belts. Here are described two contrasting, metamorphosed, ultramafic-mafic complexes, the first a partially serpentinized dunitic body with associated chromite from Lemoenfontein, one of several peridotitic bodies occurring as discrete lenses and pods in granulite facies gneisses of the northern Kaapvaal craton. The second, the Rooiwater complex is a major layered igneous body, now metamorphosed in the amphibolite facies, but without pervasive deformation, which crops out in the northern Murchison greenstone belt. The Lemoenfontein chromites and associated ultramafic rocks are lithologically and chemically similar to their Phanerozoic equivalents of ophiolitic origin, interpreted as obducted oceanic crust. The Lemoenfontein complex is a rémnant of Archaean oceanic material. In contrast, the Rooiwater complex is, despite the lack of exposed intrusive contacts, similar to layered igneous complexes such as Ushushwana or Bushveld. These complexes are intrusive in continental environments. It is concluded that contrasting ultramafic-mafic complexes represent a heterogeneity in greenstone belts with either oceanic or continental environments involved. F.M.R.

N86-23130*# Toronto Univ. (Ontario). Div. of Geophysics.
ZIRCON Lu-Hf SYSTEMATICS: EVIDENCE FOR THE EPISODIC DEVELOPMENT OF ARCHAEAN GREENSTONE BELTS
P. E. Smith, M. Tatsumoto (Geological Survey, Federal Center, Miss.), and R. M. Farquhar *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 114-116 refs (For primary document see N86-23089 13-46)
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A combined U-Th-Pb and Lu-Hf isotopic study of zircons was undertaken in order to determine the provenance and age of an Archean granite-greenstone terrain and to test the detailed application of the Lu-Hf system in various Archean zircons. The eastern Wawa subprovince of the Superior province consists of the low grade Michipicoten and Gamitagama greenstone belts and the granitic terrain. The Hf isotopic data indicate that the typical lithological features of a greenstone belt cycle could be accommodated in a crustal growth model that involved decreasing depth of melting in three isotopically distinct reservoirs: mantle, lower crust and upper crust. The model age of the sources given by the intersection of the lower crustal curve with the bulk earth evolution curve is about 2900 My, in good agreement with the zircon U-Pb basement age. This linear array also has a similar intersection age to that of Proterozoic carbonatite complexes. The general convergence of the other reservoir vectors around this age suggests that mantle depletion, crustal extraction and intracrustal differentiation were all part of the same episodic event. It is also apparent that recycling of older basement was important in the formation of many of the later greenstone belt rocks. F.M.R.

N86-23131*# Geomysore Services, Bangalore (India).
EARLY PRECAMBRIAN CRUSTAL EVOLUTION OF SOUTH INDIA Abstract Only
R. Srinivasan *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 117 (For primary document see N86-23089 13-46)
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The Early Precambrian sequence in Karnataka, South India provides evidences for a distinct trend of evolution which differs from trends exhibited in many other Early Precambrian regions of the world. The supracrustal rock associations preserved in greenstone belts and as inclusions in gneisses and granulites suggest the evolution of the terrain from a stable to a mobile regime. The stable regime is represented by (1) layered ultramafic-mafic complexes, (2) orthoquartzite-basalt-rhyodacite-iron formation, and (30 ortho-quartzite-carbonate-Mn-Fe formation. The mobile regime, which can be shown on sedimentological grounds to have succeeded the stable regime, witnessed the accumulation of a greywacke-pillow basalt-dacite-rhyolite-iron formation association. Detrital sediments of the stable zone accumulated dominantly in fluvial environment and the associated volcanics are ubaerial. The volcanics of the stable regime are tholeiites derived from a zirconium and LREE-enriched sources. The greywackes of the mobile regime are turbidities, and the volcanic rocks possess continental margin (island-arc or back-arc) affinity; they show a LREE depleted to slightly LREE-enriched pattern. The evolution from a stable to a mobile regime is in contrast to the trend seen in most other regions of the world, where an early dominantly volcanic association of a mobile regime gives way upward in the sequence to sediments characteristic of a stable regime. Author

N86-23132*# Geological Survey of Canada, Ottawa (Ontario).
BASEMENT-COVER RELATIONS AND INTERNAL STRUCTURE OF THE CAPE SMITH KLIPPE: A 1.9 Ga GREENSTONE BELT IN NORTHERN QUEBEC, CANADA
M. R. St-Onge, P. F. Hoffman, S. G. Lucas (Brown Univ., Providence, R.I.), D. J. Scott (McMaster Univ., Hamilton, Ontario), and N. J. Begin (Queen's Univ., Kingston, Ontario) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 118-119 refs (For primary document see N86-23089 13-46)
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The Cape Smith Belt is a 380x60 km tectonic klippe composed of greenschistto amphibolite-grade mafic and komatiitic lava flows and fine-grained quartzose sediment, intruded by minor syn- to post-tectonic granitoids. Previously studied transects in areas of relatively high structural level show that the belt is constructed of seven or more north-dipping thrust sheets which verge toward the Superior Province (Archean) foreland in the south and away from an Archean basement massif (Kovik Antiform) external to the Trans-Hudson Orogen (Early Proterozoic) in the north. A field project (mapping and structural-stratigraphic-metamorphic studies) directed by MRS was begun in 1985 aimed at the structurally deeper levels of the belt and underlying basement, which are superby exposed in oblique cross-section (12 km minimum structural relief) at the west-plunging eastern end of the belt. Mapping now complete of the eastern end of the belt confirms that all of the metavolcanic and most of the metasedimentary rocks are allochthonous with respect to the Archean basement, and that the thrusts must have been rooted north of Kovik Antiform. The main findings follow. Author

N86-23133*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RHYOLITIC COMPONENTS OF THE MICHIPICOTEN GREENSTONE BELT, ONTARIO: EVIDENCE FOR LATE ARCHAEN INTRACONTINENTAL RIFTS OR CONVERGENT PLATE MARGINS IN THE CANADIAN SHIELD?
Paul J. Sylvester, Kodjo Attoh (Hope Coll., Holland, Mich.), and

Klaus J. Schulz (Geological Survey, Reston, Va.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 120-122 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Rhyolitic rocks often are the dominant felsic end member of the biomodal volcanic suites that characterize many late Archean greenstone belts of the Canadian Shield. The rhyolites primarily are pyroclastic flows (ash flow tuffs) emplaced following plinian eruptions, although deposits formed by laval flows and phreatomagmatic eruptions also are presented. Based both on measured tectono-stratigraphic sections and provenance studies of greenstone belt sedimentary sequences, the rhyolites are believed to have been equal in abundance to associated basaltic rocks. In many recent discussions of the tectonic setting of late Archean Canadian greenstone belts, rhyolites have been interpreted as products of intracontinental rifting . A study of the tectono-stratigraphic relationships, rock associations and chemical characteristics of the particularly ell-exposed late Archean rhyolites of the Michipicoten greenstone belt, suggests that convergent plate margin models are more appropriate. Author

N86-23134*# Department of Energy, Mines, and Resources, Ottawa (Ontario). Earth Physics Branch.
GEOPHYSICAL CHARACTERISTICS AND CRUSTAL STRUCTURE OF GREENSTONE TERRANES: CANADIAN SHIELD
M. D. Thomas, L. Losier (McGill Univ., Montreal, Canada), P. C. Thurston (Ontario Geological Survey, Toronto), V. K. Gupta (Ontario Geological Survey, Toronto), R. A. Gibb, and R. A. F. Grieve *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 123-125 refs (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Geophysical studies in the Canadian Shield have provided some insights into the tectonic setting of greenstone belts. Greenstone belts are not rooted in deep crustal structures. Geophysical techniques consistently indicate that greenstones are restricted to the uppermost 10 km or so of crust and are underlain by geophysically normal crust. Gravity models suggest that granitic elements are similarly restricted, although magnetic modelling suggests possible downward extension to the intermediate discontinuity around approx. 18 km. Seismic evidence demonstrates that steeply-dipping structure, which can be associated with the belts in the upper crust, is not present in the lower crust. Horizontal intermediate discontinuities mapped under adjacent greenstone and granitic components are not noticeably disrupted in the boundary zone. Geophysical evidence points to the presence of discontinuities between greenhouse-granite and adjacent metasedimentary errane. Measured stratigraphic thicknesses of greenstone belts are often twice or more the vertical thicknesses determined from gravity modelling. Explantations advanced for the discrepancy include stratigraphy repeated by thrust faulting and/or listric normal faulting, mechanisms which are consistent with certain aspects of conceptual models of greenstone development. Where repetition is not a factor the gravity evidence points to removal of the root zones of greenstone belts. For one region, this has been attributed to magmatic stopping during resurgent caldera activity. F.M.R.

N86-23135*# Geological Survey of Canada, Toronto (Ontario).
VOLCANOLOGICAL CONSTRAINTS OF ARCHAEAN TECTONICS
P. C. Thurston and L. D. Ayres (Manitoba Univ., Winnipeg) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 126-128 (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

Volcanological and trace element geochemical data can be integrated to place some constraints upon the size, character and evolutionary history of Archean volcanic plumbing, and hence indirectly, Archean tectonics. The earliest volcanism in any greenhouse belt is almost universally tholeitic basalt. Archean mafic magma chambers were usually the site of low pressure fractionation of olivine, plagioclase and later Cpx + or - an oxide phase during evolution of tholeitic liquids. Several models suggest basalt becoming more contaminated by sial with time. Data in the Uchi Subprovince shows early felsic volcanics to have fractionated REE patterns followed by flat REE pattern rhyolites. This is interpreted as initial felsic liquids produced by melting of a garnetiferous mafic source followed by large scale melting of LIL-rich sial. Rare andesites in the Uchi Subprovince are produced by basalt fractionation, direct mantle melts and mixing of basaltic and tonalitic liquids. Composite dikes in the Abitibi Subprovince have a basaltic edge with a chill margin, a rhyolitic interior with no basalt-rhyolite chill margin and partially melted sialic inclusions. Ignimbrites in the Uchi and Abitibi Subprovinces have mafic pumice toward the top. Integration of these data suggest initial mantle-derived basaltic liquids pond in a sialic crust, fractionate and melt sial. The inirial melts low in heavy REE are melts of mafic material, subsequently melting of adjacent sial produces a chamber with a felsic upper part underlain by mafic magma. Author

N86-23136*# Rand Afrikaans Univ., Johannesburg (South Africa). Dept. of Geology.
THE DEHYDRATION, REHYDRATION AND TECTONIC SETTING OF GREENSTONE BELTS IN A PORTION OF THE NORTHERN KAAPVAAL CRATON, SOUTH AFRICA
D. D. vanReenen, J. M. Barton, Jr., C. Roering, J. C. vanSchalkwyk, C. A. Smit, J. D. deBeer (CSIR, Pretoria, South Africa), and E. H. Stettler (Geological Survey, Pretoria, South Africa) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 129-131 (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

High-grade gneiss terranes and low-grade granite-greenstone terranes are well known in several Archaean domains. The geological relationship between these different crustal regions, however, is still controversial. One school of thought favors fundamental genetic differences between high-grade and low-grade terranes while others argue for a depth-controlled crustal evolution. The detailed examination of well-exposed Archaean terranes at different metamorphic grades, therefore, is not only an important source of information about the crustal levels exposed, but also is critical to the understanding of the possible tectonic and metamorphic evolution of greenstone belts with time. Three South African greenstone belts are compared. Author

N86-23137*# Saskatchewan Univ., Saskatoon. Dept. of Geological Sciences.
THE STRATIGRAPHY OF THE STEEP ROCK GROUP, N.W. ONTARIO, WITH EVIDENCE OF A MAJOR UNCONFORMITY
M. E. Wilks and E. G. Nisbet *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 132-134 ref (For primary document see N86-23089 13-46)
Avail: NTIS HC A07/MF A01 CSCL 08G

The Steep Rock Group is exposed 6 km north of Atikokan, 200 km west of Thunder Bay. It is situated on the southern margin of the Wabigoon Belt of the Archaean Superior Province, N. W. Ontario. Reinvestigation of the geology of the Group has shown that the Group lies unconformably on the Tonalite Complex to the east. This unconformity has been previously suspected, from regional and ine mapping but no conclusive outcrop evidence for its existence has as yet been published. The strike of the group, comprised of Basal Conglomerate, Carbonate Member, Ore Zone and Ashrock is generally north-northwest dipping steeply to the southwest. Of the 7 contacts between the Steep Rock Group and the Tonalite Complex, 3 expose the unconformity (The Headland, S. Roberts Pit, Trueman Point), and 4 are faulted. These three outcrops demonstrate unequivocally that the Steep Rock group was laid down unconformably on the underlying Tonalite Complex, which is circa 3 Ga old. Author

N86-23138*# Maryland Univ., College Park. Inst. for Physical Science and Technology.
SPECTRAL STUDIES RELATED TO DISSOCIATION OF HBr, HCl AND BrO Final Technical Report
Marshall L. Ginter Mar. 1986 92 p refs

(Grant NsG-7340)
(NASA-CR-176698; NAS 1.26:176698) Avail: NTIS HC A05/MF A01 CSCL 04A

Concern over halogen catalyzed decomposition of O3 in the upper atmosphere has generated need for data on the atomic and molecular species X, HX and XO (where X is Cl and Br). Of special importance are Cl produced from freon decomposition and Cl and Br produced from natural processes and from other industrial and agricultural chemicals. Basic spectral data is provided on HCl, HBr, and BrO necessary to detect specific states and energy levels, to enable detailed modeling of the processes involving molecular dissociation, ionization, etc., and to help evaluate field experiments to check the validity of model calculations for these species in the upper atmosphere. Results contained in four published papers and two major spectral compilations are summarized together with other results obtained. Author

N86-23139*# California Inst. of Tech., Pasadena. Seismological Lab.
THE SIZE DISTRIBUTIONS OF FRAGMENTS EJECTED AT A GIVEN VELOCITY FROM IMPACT CRATERS
John D. OKeefe and Thomas J. Ahrens 2 Apr. 1986 18 p refs (Grant NsG-7129)
(NASA-CR-176697; NAS 1.26:176697) Avail: NTIS HC A02/MF A01 CSCL 08K

The mass distribution of fragments that are ejected at a given velocity for impact craters is modeled to allow extrapolation of laboratory, field, and numerical results to large scale planetary events. The model is semi-empirical in nature and is derived from: (1) numerical calculations of cratering and the resultant mass versus ejection velocity, (2) observed ejecta blanket particle size distributions, (3) an empirical relationship between maximum ejecta fragment size and crater diameter, (4) measurements and theory of maximum ejecta size versus ejecta velocity, and (5) an assumption on the functional form for the distribution of fragments ejected at a given velocity. This model implies that or planetary impacts into competent rock, the distribution of fragments ejected at a given velocity is broad, e.g., 68% of the mass of the ejecta at a given velocity contains fragments having a mass less than 0.1 times a mass of the largest fragment moving at that velocity. The broad distribution suggests that in impact processes, additional comminution of ejecta occurs after the upward initial shock has passed in the process of the ejecta velocity vector rotating from an initially downward orientation. This additional comminution produces the broader size distribution in impact ejecta as compared to that obtained in simple brittle failure experiments. Author

N86-23140# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PREDICTION POSSIBILITIES OF AROSA TOTAL OZONE
R. P. Kane Jan. 1986 20 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3755-PRE/878) Avail: NTIS HC A02/MF A01

Using the periodicities obtained by a Maximum Entropy Spectral Analysis (MESA) of the Arosa total ozone data (CC') series for 1932 to 1971, the values predicted for 1972 onwards were compared with the observed values of the (AD) series. A change of level was noticed, with the observed (AD) values lower by about 7 D.U. Also, the matching was poor in 1980, 1981, 1982. It is suspected that some of the periodicities may be of a transient nature, with amplitudes and/or phases varying with time. Author

N86-23141# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMMENT ON GENERAL THEORY OF THE ALKALI METALS PRESENT IN THE EARTH'S UPPER ATMOSPHERE
Volker W. J. H. Kirchhoff Jan. 1986 17 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3784-PRE/881) Avail: NTIS HC A02/MF A01

Workers at the French observatory of Haute Provence published a theoretical work, General Theory of the Alkali Metals Present in the Earth's Upper Atmosphere, in three parts, separately analyzing the layer model, the seasonal variations, and the diurnal variations. The papers fail to achieve the objectives proclaimed in their titles and appear to be misleading. Several inconsistencies are discussed. B.G.

N86-23142# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MEASUREMENTS OF ATMOSPHERIC X AND GAMMA RAYS-BALLOON EXPERIMENTS AT SUBANTARCTIC REGION
U. B. Jayanthi, R. V. Correa, and F. G. Blanco Jan. 1986 19 p refs Presented at the I Simposio Regional da Sociedade Brasileira de Geofisica, Sao Jose dos Campos, Brazil, 27-29 Nov. 1985 Sponsored in part by Comissao Interministerial para os Recursos do Mar
(INPE-3780-PRE/879) Avail: NTIS HC A02/MF A01

The results of two stratospheric balloon experiments conducted to measure the atmospheric X-and gamma rays are presented. These experiments, conducted at Comandante Ferraz base in subantarctic region, have provided the spectrum of ground radioactivity in gamma rays (0.2 to 2.9 MeV) and atmospheric X-ray spectra at different altitudes. The observed ceiling spectrum of X-rays in the 28 to 180 KeV region observed at 7.0 g/sq cm are discussed. The data of other experiments with different telescope geometrics were utilized to evaluate the buildup effects due to cosmic ray secondaries in atmosphere. This behavior previously studied for atmospheric gamma rays, permitted the comparison of the up/down flux ratios to explain the observed atmospheric X-ray spectrum. Author

N86-23143 British Antarctic Survey, Cambridge (England).
GEOMAGNETIC MEASUREMENTS AT SOUTH GEORGIA 1975-1982
D. A. Simmons 1985 170 p refs
(ISBN-0-85665-111-7) Copyright. Avail: Issuing Activity

The results are given of the geomagnetic measurements made at South Georgia from January 1975 to March 1982. Full details of the site, the variometers and the absolute instruments are included. The installation of the La Cour magnetograph and the fluxgate magnetometer are described together with the calibration and use of the absolute instruments. The method of computing mean hourly values is described and the accuracy and reliability of the data is discussed. It is concluded that, apart from a possible discontinuity of approximately 5 nT in Z between December 1977 and January 1978, the mean s of H and Z are correct to + or - 6 nT throughout the time. Summary tables of monthly and annual means are provided for the three components H, D and Z as well as tables of hourly means for the whole period. Tables of the K indices are also provided. Author

N86-23144 British Antarctic Survey, Cambridge (England).
GEOMAGNETIC MEASUREMENTS AT ARGENTINE ISLANDS 1957-1982
P. A. Salino 1985 81 p refs
(ISBN-0-85665-114-1) Copyright. Avail: Issuing Activity

The operation of the magnetic observatory on the Argentine Islands from its opening in 1957 to the end of the 1982 are described. Full details of the site, buildings, instruments, and their operation are given. A normal and an insensitive La Cour Magnetograph were installed in 1955 and repositioned in 1971 and 1970 respectively. The Quartz Horizontal Magnetometer (OHM) was used throughout for measuring the horizontal component, a Quartz Declinometer replaced the Kew pattern magnetometer for measuring declination 1982 and the Proton Precission Magnetometers (PPM) replaced the Magnetometric Zero Balances (BMZ) for calculating the vertical component in 1979. The method of computing mean hourly values is described and the accuracy and reliability of the data is described and the accuracy and reliability of the data is discussed. Tables are given listing the monthly and annual means, and listing the mean diurnal variation for each month. These tables are for the H, D and Z components and list values for all days, quiet days and disturbed days. Author

N86-23145# Pacific-Sierra Research Corp., Los Angeles, Calif.
IONOSPHERIC MODIFICATION WITH OBLIQUELY INCIDENT WAVES: ELECTRON HEATING AND PARAMETRIC INSTABILITIES Interim Report, Dec. 1983 - Mar. 1985
E. C. Field, Jr. and C. R. Warber Oct. 1985 45 p
(Contract F19628-84-C-0014)
(AD-A162603; PSR-1506; RADC-TR-85-188) Avail: NTIS HC A03/MF A01 CSCL 04/1

Nearly all ionospheric modification experiments have been carried out with the modifying wave at vertical incidence. For many applications, however, the modifying wave would probably be at oblique incidence. This report identifies nonlinear phenomena tha could be caused by obliquely incident modifying waves. It concentrates on phenomena that might enhance or degrade the performance of high frequency (HF) radar or communications systems. The nonlinear processes that lead to ionospheric modification divide naturally into two categories: (1) ohmic heating, which alters temperature and hence, reaction rates, collision frequencies, and particle densities, and (2) generation of parametric instabilities, which causes a myriad of phenomena. As the incidence angle is increased, heating is affected by two competing trends. It is weakened by the increased path length, but is strengthened near caustics. A transmitter with a power-gain product on the order of 10 MW can launch and oblique wave strong enough to produce electric fields of several tenths of a volt per meter or more in the ionosphere. Such fields produce substantial temperature increases, which are initially concentrated near the caustics, but spread via heat conduction. GRA

N86-23146# Utah Univ., Salt Lake City. Earth Sciences Lab.
PW2D FINITE ELEMENT PROGRAM FOR SOLUTION OF MAGNETOTELLURIC RESPONSES OF TWO-DIMENSIONAL EARTH RESISTIVITY STRUCTURE. USER DOCUMENTATION
P. E. Wannamaker, J. A. Stodt, and L. Rijo Sep. 1985 75 p refs
(Contract DE-AC03-84SF-12196)
(DE86-002009; DOE/SAN-12196/13; ESL-158) Avail: NTIS HC A04/MF A01

Algorithm PW2D is a finite element program for simulation of magnetotelluric responses of two-dimensional earth resistivity structure. Linear interpolation of the unknown field parallel to strike over triangular subdomains is utilized in conjunction with the Galerkin method of basis weighting to derive a system of linear equations which approximates the governing Helmholtz equation. From the field parallel to strike, the auxiliary vertical and transverse fields obtain from a numerical approximation to Maxwell's equations. Both transverse electric (TE) and transverse magnetic (TM) modes of plane-wave excitation can be modeled. The algorithm described herein unlike previous versions of the program solves directly for secondary variations in the field parallel to strike, plus the subsequent auxiliary fields. This approach has circumvented a difficulty with numerical precision at low frequencies observed in total field solutions for the TM mode especially, but also for the TE mode. DOE

N86-23147# Department of Energy, Washington, D. C.
SUMMARIES OF PHYSICAL RESEARCH IN THE GEOSCIENCES
Sep. 1985 161 p
(DE86-001832; DOE/ER-0145/3) Avail: NTIS HC A08/MF A01

The summaries in this document describe the scope of the individual programs and detail the research performed during 1983 to 1984. The Geosciences Research Program includes research in geology, petrology, geophysics, geochemistry, hydrology, solar-terrestrial relationships, aeronomy, seismology, and natural resource analysis, including their various subdivisions and interdisciplinary areas. DOE

N86-23148# Los Alamos National Lab., N. Mex.
IMPULSIVE ION ACCELERATION IN EARTH'S OUTER MAGNETOSPHERE
D. N. Baker and R. D. Belian 1985 31 p Presented at the Chapman Conference Ion Acceleration, Wellesley, Mass., 3 Jun. 1985
(Contract W-7405-eng-36)
(DE86-000772; LA-UR-85-3232; CONF-8506196-1) Avail: NTIS HC A03/MF A01

Evidence is found that ions are accelerated to high energies in the outer magnetosphere during geomagnetic disturbances. The acceleration often appears to be quite impulsive causing temporally brief (10's of seconds), very intense bursts of ions in the distant plasma sheet as well as in the near-tail region. These ion bursts extend in energy from 10's of keV to over 1 MeV and are closely associated with substorm expansive phase onsets. Although the very energetic ions are not of dominant importance for magnetotail plasma dynamics, they serve as an important tracer population. Their absolute intensity and brief temporal appearance bespeaks a strong and rapid acceleration process in the near-tail, very probably involving large induced electric fields substantially greater than those associated with cross-tail potential drops. Subsequent to their impulsive acceleration, these ions are injected into the outer trapping regions forming ion drift echo events, as well as streaming tailward away from their acceleration site in the near-earth plasma sheet. DOE

N86-23149# Institute of Oceanographic Sciences, Wormley (England).
A COMPILATION OF GEOPHYSICAL DATA ON THE EAST GREENLAND CONTINENTAL MARGIN AND ITS USE IN GRAVITY MODELLING ACROSS THE CONTINENT-OCEAN TRANSITION
C. I. Uruski and L. M. Parson 1985 53 p refs Sponsored by UK Department of Energy
(IOS-214) Avail: NTIS HC A04/MF A01

Magnetic, gravity, and seismic reflection data on the East Greenland continental margin were collected. The data were used to model the ocean-continent transition, and to study the nature and distribution of dipping, subacoustic basement (sub B) seismic reflector sequences. Post-reflector B sediments and the structure of the region are discussed. Author (ESA)

N86-23150# Global Geochemistry Corp., Canoga Park, Calif.
ANALYSIS OF GASES IN THE EARTH'S CRUST Final Report, 1 Jan. 1982 - 28 Feb. 1985
P. D. Jenden Jun. 1985 222 p
(Contract GRI-5081-360-0533)
(PB86-103843; GRI-85/0106) Avail: NTIS HC A10/MF A01 CSCL 08D

The composition of natural gas accumulations is controlled by many factors, including source material, burial depth, geothermal gradient, migration history and the presence of reservoir oxidants. In order to investigate these factors, and in particular, to evaluate the economic significance of abiogenic, deep-earth gas, six hundred crustal gases have been analyzed for chemical and stable isotopic composition. Numerous accessory samples of oil, core and cuttings materials, carbonate cement, pyrite, soil, and vegetation have also been analyzed. GRA

N86-23151# Illinois State Geological Survey, Champaign.
EARLY PENNSYLVANIAN PALEOTOPOGRAPHY AND DEPOSITIONAL ENVIRONMENTS, ROCK ISLAND COUNTY, ILLINOIS, GUIDEBOOK
R. L. Leary and C. B. Trask 1985 48 p Presented at the 19th Annual Meeting of the North-Central Section of the Geological Society of America, DeKalb, Ill., 25-27 Apr., 1985 Prepared in cooperation with Illinois State Museum, Springfield
(PB86-111648; IL/SGS/GB-18) Avail: NTIS HC A03/MF A01 CSCL 08G

The Geological Society of America, North-Central Section, presents a one-day field trip to Rock Island County, Illinois, where there will be the opportunity to examine the pre-Pennsylvanian unconformity, overlying sediments, and an early Pennsylvanian upland compression flora. The guidebook itself is a reprint of Leary (1979). Some revisions have been made to update the guidebook with new exposures, new data, and new references. The geology of the field-trip area has been discussed by Leary (1981). Phillips

and Pepers (1984) have summarized regional paleoenvironmental patterns of coal swamps and discussed the effect of climate on coal occurrence in Euramerican coal fields. GRA

N86-23152# Illinois State Water Survey, Champaign.
GEOLOGICAL-GEOTECHNICAL STUDIES FOR SITING THE SUPERCONDUCTING SUPER COLLIDER IN ILLINOIS: PRELIMINARY GEOLOGICAL FEASIBILITY REPORT
J. P. Kempton, R. C. Vaiden, D. R. Kolata, P. B. DuMontelle, and M. M. Killey 1985 100 p
(PB86-124989; IL/SGS/EGN-111) Avail: NTIS HC A05/MF A01 CSCL 08G

Site suitability was determined from a geological perspective. A preliminary compilation of existing geologic maps, reports, and other readily available geologic data is reported. Maps and cross sections were prepared to focus on the geologic units relevant to ring siting; geologic units were described and characterized to a geologically and economically practical depth (about 600 ft (180 m)). The data provide a provisional base for determining overall geologic suitability for locating an accelerator up to 30 miles (48 km) in diameter. Problem areas and areas and geologic units that appear most suitable for the ring are indicated. E.A.K.

N86-23019# Joint Publications Research Service, Arlington, Va.
CRUSTAL MODELS FOR VARIOUS PACIFIC OCEAN BED STRUCTURES Abstract Only
G. I. Semenova *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 16 Transl. into ENGLISH from Tikhookeanskaya Geologiya (Novosibirsk, USSR), no. 4, Jul. - Aug. 1985 p 3-12 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-23153 Yale Univ., New Haven, Conn.
THE DYNAMICS OF OROGRAPHIC RAIN WITH LARGE LATENT HEAT RELEASE Ph.D. Thesis
Yuh-Lang Lin 1984 178 p
Avail: Univ. Microfilms Order No. DA8509739

In the analytical model, a time-dependent problem is solved for an elevated heat source turned on as a pulse in a moving fluid. There exists a region of growing upward displacement drifting with the mean wind, which develops with time until a maximum height is reached. The thermally induced circulation in the vicinity of this cloud is similar to that of a convective cloud in a quiescent fluid. The updraft at the center of the cloud is surrounded by compensating downdrafts. This downward displacement acts to limit the size and strength of the stationary orographic cloud. In the numerical model, the finite element Galerkin method is used to integrate the governing equations. A simple rain parameterization is used to simulate pseudoadiabatic process of rain formation. In a stable atmosphere, a locally steady state pattern of orographic cloud is reached as a drifting cloud departs downstream. The latent heating, gravity waves and mean wind are found to play important roles on the processes of cloud drifting, splitting and generation. Dissert. Abstr.

N86-23154 Melbourne Univ., Carlton (Australia).
ATMOSPHERIC CHARACTERISTICS INFERRED FROM ACOUSTIC RADAR DATA Ph.D. Thesis
Gregory Stewart Robinson 1985 349 p
Avail: Univ. Microfilms Order No. DA8516425

The work in this thesis examined data collected from a 3-axis Doppler acoustic radar system. The majority of these data were collected at sub-tropical Australian sites where vigorous convective activity was sometimes encountered during the day. In all, several weeks of data were recorded. A brief discussion of this remote-sensing technique is presented, together with a description of the equipment used and the sites at which data were collected. The fundamental data consisted of the recorded spectra of individual atmospheric echoes. Methods for extracting low-level information from these methods are discussed. The extracted data are further processed with several aims. Some interdependences between spectral parameters that may complicate routine processing are isolated and discussed. The behavior of the three major descriptors of the echo spectra, echo power, spectral broadening and Doppler-shift are then discussed in detail. Dissert. Abstr.

N86-23155 Columbia Univ., Palisades, N.Y.
INTERACTIONS AMONG PLANETARY WAVES AND THE GENERATION OF TRAVELING LONG WAVES Ph.D. Thesis
Walter A. Robinson 1985 275 p
Avail: Univ. Microfilms Order No. DA8523227

This thesis is an investigation of the mechanisms through which planetary waves interact. It is shown that waves interact when wave transience or dissipation causes wave-mean flow interactions, or when waves with different phase velocities coexist. These mechanisms are studied in a quasigeostrophic numerical model with 8 horizontal modes on 50 levels. Four different paradigms for wave-wave interactions are investigated. Wave-mean flow interactions resulting from dissipation cause interactions among stationary waves. The steady response of the model to stationary forcing is computed in order to elucidate the effects of wave-wave interactions on the structures of stationary waves. Wave-mean flow interactions resulting from wave transience also induce wave-wave interactions. Interactions between waves with different phase velocities are investigated by simultaneously forcing westward traveling and stationary waves. The results suggest an explanation for the observed negative correlation between the stratospheric amplitudes of waves 1 and 2. The interactions of traveling waves with stationary waves also lead to an instability of the stationary waves. Dissert. Abstr.

N86-23156 Utah Univ., Salt Lake City.
CLOUD AND RADIATION BUDGET STUDIES Ph.D. Thesis
George Geoffrey Koenig 1985 320 p
Avail: Univ. Microfilms Order No. DA8522904

The development of cloud and ERB climatologies using the AFGWC3DNEPH cloud information and the Nimbus-7 ERB data is presented. The climatologies consist of daily, monthly, and diurnal monthly cloud and ERB information. The NEpH cloud climatologies are compared to existing cloud climatologies. In addition, the outgoing IR flux at the top of the atmosphere is computed using the University of Utah IR parameterization model. These fluxes are compared with the appropriate ERB fluxes. The difference between the ERB and the model is used to modify both the zonal cloud parameters and the cloud parameters associated with a number of specific grid points. Finally, the cloud ERB climatologies are used to determine the sensitivity of the outgoing long and shortwave flux and the net radiation to changes in the total cloud amount. Zonal and global averages of these sensitivity factors are calculated. The magnitude of these factors gives the relative importance of the albedo and greenhouse effects. Dissert. Abstr.

N86-23157 New York Univ., New York.
THREE-RESEVOIR MODELS FOR CLIMATE EVOLUTION WITH A TWO-DIMENSION WORLD OCEAN Ph.D. Thesis
Ching-Tzong Hseh 1985 152 p
Avail: Univ. Microfilms Order No. DA8522044

A three reservoir parameterized climate model is formulated from the principle of energy balance. The system, composed of the atmosphere, ocean and land, covers pole-to-pole regions. The ocean part includes mixed layer and deep sea which has isopycnal structure. The model is designed to investigate the climatic responses to external and internal perturbations. Extent perturbations mainly refer to the seasonally varying solar radiation, whereas internal perturbations to the change of CO_2 concentration in the atmosphere. Seasonal responses to the seasonal variation of solar radiation for present CO_2 levels are tested to calibrate parameters of the model. Long term responses to the change of CO_2 level are also investigated. The model is coupled to curve-fit to a longwave radiation progam which calculates outgoing and downward longwave radiation. Steady state solutions are obtained by

giving step changes of CO2 level to the system, whereas transient solutions are obtained by giving a prescribed record of CO2. Zonally averaged temperatures at different latitudes are calculated. Temperature fields are obtained for air, water, land and ice temperatures. The calculated seasonal temperature field is compared with the observed data to test the performance of the model. Dissert. Abstr.

N86-23158 Florida State Univ., Tallahassee.
NUMERICAL WEATHER PREDICTION FOR THE WEST AFRICAN MONSOON EXPERIMENT Ph.D. Thesis
Joseph Adefemi Adejokun 1985 382 p
Avail: Univ. Microfilms Order No. DA8522739

The West African Monsoon Experiment (WAMEX) took place between 1 May to 31 August, 1979, over an area from 10 S to 25 N and 25 W to 25 E. Data collected during WAMEX were analyzed by a WMO WAMEX scientific group which selected four cases of monsoon disturbances that passed across West Africa during the WAMEX period. The four WAMEX cases were subjected to detailed observational and numerical prediction studies. The prediction experiments are a series of real data numerical weather prediction carried out using two single level models and the FSU multilevel global spectral model. Both the FGGE III-b data and the objectively analyzed FGGE III-b plus WAMEX data sets are separately utilized in the observational study and in the numerical integrations in order to evaluate the impact of the WAMEX data set and also to determine which data produces wave structures and characteristics that are closest to actual observations. Results of the comparative observational study indicate positive correlation between both data sets with no significant difference. Dissert. Abstr.

N86-23159*# Oklahoma Univ., Norman. National Severe Storms Lab.
ANALYSIS OF AIRBORNE DOPPLER LIDAR, DOPPLER RADAR AND TALL TOWER MEASUREMENTS OF ATMOSPHERIC FLOWS IN QUIESCENT AND STORMY WEATHER Contractor Report, 27 Apr. 1982 - 31 Jul. 1985
H. B. Bluestein, R. J. Doviak, M. D. Eilts, E. W. McCaul, R. Rabin, A. Sundara-Rajan, and D. S. Zrnic Washington NASA Feb. 1986 178 p refs
(Contract NAS8-34749)
(NASA-CR-3960; NAS 1.26:3960) Avail: NTIS HC A09/MF A01 CSCL 04B

The first experiment to combine airborne Doppler Lidar and ground-based dual Doppler Radar measurements of wind to detail the lower tropospheric flows in quiescent and stormy weather was conducted in central Oklahoma during four days in June-July 1981. Data from these unique remote sensing instruments, coupled with data from conventional in-situ facilities, i.e., 500-m meteorological tower, rawinsonde, and surface based sensors, were analyzed to enhance understanding of wind, waves and turbulence. The purposes of the study were to: (1) compare winds mapped by ground-based dual Doppler radars, airborne Doppler lidar, and anemometers on a tower; (2) compare measured atmospheric boundary layer flow with flows predicted by theoretical models; (3) investigate the kinematic structure of air mass boundaries that precede the development of severe storms; and (4) study the kinematic structure of thunderstorm phenomena (downdrafts, gust fronts, etc.) that produce wind shear and turbulence hazardous to aircraft operations. The report consists of three parts: Part 1, Intercomparison of Wind Data from Airborne Lidar, Ground-Based Radars and Instrumented 444 m Tower; Part 2, The Structure of the Convective Atmospheric Boundary Layer as Revealed by Lidar and Doppler Radars; and Part 3, Doppler Lidar Observations in Thunderstorm Environments. Author

N86-23160*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SITE SELECTION AND DIRECTIONAL MODELS OF DESERTS USED FOR ERBE VALIDATION TARGETS
W. Frank Staylor Apr. 1986 15 p refs
(NASA-TP-2540; L-16041; NAS 1.60:2540) Avail: NTIS HC A02/MF A01 CSCL 04B

Broadband shortwave and longwave radiance measurements obtained from the Nimbus 7 Earth Radiation Budget scanner were used to develop reflectance and emittance models for the Sahara, Gibson, and Saudi Deserts. These deserts will serve as in-flight validation targets for the Earth Radiation Budget Experiment being flown on the Earth Radiation Budget Satellite and two National Oceanic and Atmospheric Administration polar satellites. The directional reflectance model derived for the deserts was a function of the sum and product of the cosines of the solar and viewing zenith angles, and thus reciprocity existed between these zenith angles. The emittance model was related by a power law of the cosine of the viewing zenith angle. Author

N86-23161# Meteorological Satellite Center, Tokyo (Japan).
SUMMARY OF OPERATIONAL WIND DERIVATION SYSTEMS USED DURING AND AFTER FGGE PERIOD
Tadaaki Hamada 1985 202 p In JAPANESE; ENGLISH summary
(ISSN-0388-9653; MSC-TN-12) Avail: NTIS HC A10/MF A01

Topics addressed include operational wind derivation systems used during the First GARP Global Experiment; upper level wind derivation; future satellite systems; orbit generation for polar orbit satellites; utilization of space environment monitor; infrared imaging; visible and infrared spin scan radiometer; sea surface temperatures; and monthly mean cloudiness data. B.G.

N86-23162# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ROLE OF ANTARCTICA IN THE CLIMATE OF THE SOUTHERN HEMISPHERE AS REVEALED BY MODELING STUDIES: A BRIEF REVIEW
Prakki Satyamurti, Vadlamudi Brahmananda Rao, and Yoshihiro Yamazaki Jan. 1986 42 p refs
(INPE-3777-RPE/501) Avail: NTIS HC A03/MF A01

The observed features of climate of Antarctica and the results of climatic simulation are reviewed. Several interesting aspects of the climate of Antarctic region such as the role of topography and the effect of surface thermal inversions are discussed. The deficiencies of the General Circulation Models in simulating the observed features are mentioned. Author

N86-23163# Danish Meteorological Inst., Copenhagen.
OBJECTIVE ANALYSIS OF PRESSURE DESIGNED FOR DETERMINATION OF GEOSTROPHIC WINDS
Klaus Hedegaard 1985 76 p refs
(DMI-WSR-4; ISBN-897-7478-256-8) Avail: NTIS HC A05/MF A01

The 2-dimensional field of pressure reduced to mean sea level is analyzed by using different bivariate polynomials. Based on data from the gale of November 24, 1981, it is found that an optimum number of degrees of freedom in the polynomial is approx. n/3, n being the number of stations. A large increase in the number of degrees of freedom beyond this value may cause the noise of the pressure data to influence the analysis. Fine agreement is found between the relative windthrow of conifers in the Danish National Forests during the gale, and the areas of the highest geostrophic wind speeds derived from the pressure analysis. Harmonic analysis of an eight year time series of geostrophic winds from Copenhagen displays a clear diurnal cycle in the east-west component, but only a very weak diurnal variation in the north-south component. A detailed analysis shows this to be attributed to the diurnal temperature cycle over Skane in conjunction with the absence of a diurnal temperature cycle over the Baltic. The similar effects from the smaller land and water areas probably cannot be resolved by the analysis, and the observed oscillation of the geostrophic wind thus only reflects the major features of the difference in diurnal temperature cycles over the area. Author

N86-23164# Danish Meteorological Inst., Copenhagen.
THE SURFACE BOUNDARY LAYER WIND SPEED IN RELATION TO SOME EXTERNAL PARAMETERS

Klaus Hedegaard 1985 71 p refs
(DMI-WSR-5; ISBN-87-7478-257-6) Avail: NTIS HC A04/MF A01

The dependence of the surface wind speed upon different external parameters is studied by use of simple 2-layer models of the planetary boundary layer. With respect to the external stability parameter it is found that the 925 mb level is a better upper reference level than the 850 mb level. Concerning the reference wind speed, the study shows that the analyzed geostrophic wind speed gives a better result than a measured wind speed from the interval 1000 to 1500 m. Effects of baroclinity and instationarity in geostrophic wind speed are also studied. Concerning baroclinity it is found that of the two baroclinity parameters, only the one along the direction of the surface wind has a noticeable influence upon the surface wind speed. The influence of instationarity in geostrophic wind speed is studied by interpolating the geostrophic wind speed Delta t backwards in time. The best results are obtained using delta t = 1 hour, which is in agreement with scale considerations. Author

N86-23165# Danish Meteorological Inst., Copenhagen.
MODELLING OF POLAR LOWS IN A BAROTROPIC ENVIRONMENT USING THE DANISH OPERATIONAL LIMITED AREA MODEL
Peter Aakjaer and Erik Rasmussen (Copenhagen Univ., Denmark) 1985 51 p refs
(WSR-6; ISBN-87-7478-259-2) Avail: NTIS HC A04/MF A01

By means of an operational numerical Limited Area Model based on the ECMWF global model experiments with high resolution were carried out on polar low developments in a barotropic environment at rest. The vertical structure of the environment was chosen to be typical of cold air outbreaks over the Norwegian and Barents Sea area. An experiment with the fully parameterized model, including air/sea fluxes of latent and sensible heat, shows the development of a warm core polar low of the merry-go-round type, in which the initial low expands and forms smaller vortices embedded in the larger scale flow. The model low is compared to an observed merry-go-round polar low from December 1981. Sensitivity experiments, which show the importance of sensible and latent heat fluxes from the sea surface, are discussed, and some aspects of the precipitation parameterizations are investigated. Experiments with different sea surface temperatures suggest that polar lows do not develop in the area if the temperature is below 4 C. The three-dimensional structure of the fully developed low shows a significant secondary circulation which provides around half the latent heat which subsequently is released by the convection. Author

N86-23166# World Meteorological Organization, Geneva (Switzerland).
CASEBOOK ON OPERATIONAL ASSESSMENT OF AREAL EVAPORATION
1985 213 p refs
(WMO-635; ISBN-92-63-10635-5; OH-22) Avail: NTIS MF A01; print copy available at WMO, Geneva

Methods to estimate actual evaporation are presented in order to provide users with practical guidance on the subject. Direct measurement and indirect estimation methods are included. For individual titles, see N86-23167 through N86-23181.

N86-23167# Atmospheric Environment Service, Downsview (Ontario).
ESTIMATION OF SHALLOW LAKE EVAPORATION USING CLASS A PAN DATA
H. L. Ferguson, G. denHartog, and P. Y. T. Louie *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 3-10 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Evaporation loss from a small lake in the Canadian shield was studied. Standard installations of class A pans were operated at land sites near the lake. A class A pan partially submerged in the lake center was also used in an attempt to obtain direct measurements of lake evaporation loss. A large difference between the estimates from the lake pan and the two shore pans is found. The most likely reason is the sheltering and shading effect of the forest on the shore pans and a wetting and wall evaporation effect on the lake pan, caused by waves rocking the pan. Author (ESA)

N86-23168# Egyptian Meteorological Authority, Cairo.
EVAPORATION FROM THE ASWAN HIGH DAM LAKE (LAKE NASSAR)
M. H. Omar and M. M. El-Bakry *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 11-15 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A bulk aerodynamic method was used to measure lake evaporation. A meteorological floating station was installed 1 km upstream of the dam. Dry and wet bulb temperatures were measured by a mechanically aspirated psychrometer kept horizontal at 2 m level. A Lambrecht thermohygrograph and maximum and minimum thermometers were also used. A conversion factor was applied to the coefficients of the Marciano and Harbeck quasi-empirical equation, deduced from the relation of the absolute air temperatures of the two lakes. The accuracy of the evaporation results obtained is 15%. Author (ESA)

N86-23169# Geological Survey, Raleigh, N. C.
APPLICATION OF MASS-TRANSFER THEORY TO DETERMINE NATURAL AND FORCED EVAPORATION FROM HYCO LAKE, NORTH CAROLINA
G. L. Giese *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 16-31 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The application of a semiempirical mass transfer technique to determine monthly values of natural and forced evaporation from the lake is described. The lake is a 17.6 million sqm impoundment created by construction of a dam on the Hyco river. An expression derived from Harbeck's mass transfer equation is presented. Meteorological data and local measurements were used. A sample calculation of the net change in lake state adjusted for inflow, outflow, and rainfall is discussed. It is believed that monthly values of natural and forced evaporation from Hyco lake have a standard error of estimation of no more than 10%. Author (ESA)

N86-23170# World Meteorological Organization, Geneva (Switzerland).
DERIVATION OF EVAPOTRANSPIRATION MAPS OF A TROPICAL, HUMID ISLAND
K. Venkatasawmy (Meteorological Services, Vacoas, Mauritius) *In its* Casebook on Operational Assessment of Areal Evaporation 1985 p 34-43 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The preparation of an annual potential evaporation map of an island is described. Monthly Penman potential evaporation figures for an open water surface were computed for seven stations. The relation between the Penman estimates and those derived from other formulae was examined. Good correlation exists between Penman's estimates and Turc's formula estimates. Turc estimates were worked out for eight other stations. The comparison of the estimates with class A pan measurements gives a ratio of 0.94 to 1.08. The approximation is also good when compared with lysimeter readings (sugar cane fields). The obtained map is presented. Author (ESA)

N86-23171# Agricultural Research Inst., Nicosia (Cyprus).
PAN EVAPORATION AS A GUIDE FOR SCHEDULING IRRIGATION
Chr. Metochis *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 44-49 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Pan evaporation values are used in combination with predetermined monthly crop coefficients for scheduling irrigation of lucerne.

Comparison of potential evpotranspiration by six methods shows that pan evaporation values gave the best estimates, especially during the hot part of the season. The study was carried out at a farm in the central plains of Cyprus. Calculated potential evotranspiration and pan evaporation, as well as their ratios (crop coefficients) are presented for two irrigation seasons. Lucerne was always under optimum soil-moisture conditions and produced 25400 kg of dry matter per hectare a year. Author (ESA)

N86-23172# Meteorological Office, Bracknell (England).
EVAPORATION CALCULATION SYSTEMS USED IN THE UNITED KINGDOM
B. G. Wales-Smith and J. A. Arnott *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 50-78 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

An automatic computerized system designed to produce weekly statements and summaries of weather elements with a minimum of human intervention is described. The object is to provide a routine advisory service to the water industry, agriculture, and other interests. The basic input consists of the routine reports from synoptic weather stations. The calculations and software were developed around the United Kingdom climate situation. At the heart of the method lies the evaporation estimate provided by the combination equation of Penman. The interpolation procedures and other algorithms are described. Examples of computation are given. Author (ESA)

N86-23173# Institut Royal Meteorologique de Belgique, Brussels. Hydrology Section.
DAILY EFFECTIVE EVAPOTRANSPIRATION FROM A RIVER BASIN
F. Bultot and G. L. Dupriez *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 80-105 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A conceptual model where the only input variables are daily rainfall and potential evapotranspiration is presented. The potential evapotranspiration from the catchment is estimated by the energy-balance method. The first part of the model simulates the daily water balance in the vegatative canopy. Infiltration, runoff, and percolation simulation are also described. A summary of the results given by the model showing the input variables and the three components of the evapotranspiration is presented, including the water storage in the three reservoirs of the model and the intermediate terms of the balance (throughfall, surface runoff, infiltration and percolation). Author (ESA)

N86-23174# Institute of Meteorology and Water Management, Warsaw (Poland).
ESTIMATION OF ACTUAL EVAPOTRANSPIRATION BY MEANS OF A MATHEMATICAL MODEL
J. Jaworski *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 106-120 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A quantitative assessment of actual evapotranspiration is performed using a mathematical model which simulates the process and soil-moisture changes. The Fortran program estimates daily or hourly evapotranspiration on an Odra 1305 computer. Parameters and variable data needed are described. The model has three components. The first computes the diffusive crop canopy resistance, the second computes actual evapotranspiration, and the third allows the calculation of soil moisture at the end of the time interval by means of the water balance equations and two fictitious reservoirs. An example of computation is given. It is shown that the model allows a correct quantitative description of actual evapotranspiration for short time intervals. Author (ESA)

N86-23175# Geological Survey, Tucson, Ariz.
EVAPOTRANSPIRATION FROM SALTCEDAR (TAMARIX CHINENSIS)
T. E. A. vanHylckama *In* WMO Casebook on Operational Assessment of Areal Evaporation 1985 p 121-133 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A model to determine the amount of water given off to the air by an area covered with a dense stand of saltcedar is explored. It was estimated that saltcedar uses the equivalent of 1200 mm of water per year, which is a large amount in the reference west American areas where annual rainfall is often 400 mm or less. The study was carried out in Arizona. A combination of the mass balance and the energy balance approach of Penman was adopted. Computed results are close enough to measured data to give reliable evapotranspiration for daily or monthly periods, while computing evapotranspiration using averaged data leads to gross errors of > 30%. Author (ESA)

N86-23176# Norwegian Hydrodynamic Labs., Trondheim. Div. of River and Harbor Lab.
COMPUTATION OF MEAN AREAL EVAPOTRANSPIRATION BY THE WATER-BALANCE METHOD
A. Killingtveit *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 134-142 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The water budget methodology is reviewed and applied to a case study, the Sagelva hydrological research basin in Norway. The identification of precipitation distribution, the correction of precipitation data, and the areal precipitation computation are described. The accuracy and limitations of the method are discussed. The error analysis shows a total error of 7% where the most critical term is the water precipitation estimation. Author (ESA)

N86-23177# Meteorologischer Dienst der DDR, Berlin (East Germany). Research Inst. for Hydrometeorology.
COMPUTATION OF MONTHLY VALUES OF ACTUAL AREAL EVAPOTRANSPIRATION BY THE COMPLEX USSR METHOD
E. vonSchoenermark *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 143-148 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

An areal evapotranspiration method based on water balance was tested with data from the Selke catchment area in East Germany. The mathematical expressions include several different types of water storage estimates. The inputs necessary and derivations are discussed. The applications show that the method leads to satisfactory results for lowland and medium altitudes. The method is only suitable for catchment areas with measured runoffs. The case study estimate deviates by only 2 mm from the mean difference between the mean areal precipitation and the mean annual runoff. Author (ESA)

N86-23178# Research Inst. for Water Resources Development, Budapest (Hungary).
ESTIMATION OF EVAPOTRANSPIRATION FROM A WATERSHED
G. Szabo *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 149-158 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

An empirical method utilized for the estimation of the evapotranspiration of Lake Velence in Hungary is described. The aim is to describe the complex vapor transport process using a simple mathematical model and measured values. The method requires the determination of the potential evapotranspiration and the characterization of the vapor supply system (soil and vegetation together) based on the soil water resources available for evaporation and the type of vegetation cover. The empirical mathematical equations are detailed. The collected results are shown, and the variation of evapotranspiration values are discussed. The monthly values error is < 10%. Author (ESA)

N86-23179# Arizona Univ., Tucson. School of Renewable Natural Sources.

BOWEN RATIO ESTIMATES OF WILDLAND EVAPOTRANSPIRATION
L. W. Gay *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 159-169 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The methodology used to evaluate evapotranspiration by application of an energy budget method is described. The study is part of a larger study designed to test the effectiveness of antitranspirants in reducing evapotranspiration from riparian vegetation. The aim is to compare treated and untreated vegetation areas monitored throughout the day to deduce the effect of the treatments. The measurements extended over a 1 week period during the warm, dry summer of a semiarid south western region of the United States. The Bowen ratio method is a sequential analysis and the data required includes net radiation, change in heat storage in soil and vegetation, air temperature and vapor gradients in the lower atmosphere. The mean water loss according to the Bowen ratio is 8.8 mm, comparable to the mean of 9.15 mm from 2 lysimeters. The two methods are within 2% of their mean. The limitations of the method are discussed. Author (ESA)

N86-23180# Research Inst. for Irrigation, Prague (Czechoslovakia).
DETERMINATION OF EVAPOTRANSPIRATION OF AGRICULTURAL CROPS IN IRRIGATED AREAS OF CZECHOSLOVAKIA
M. Pycha *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 170-185 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Evapotranspiration of field crops was calculated on the basis of water balance in the soil profile to a depth of 100 cm. The soil humidity was determined by the gravimetric method at 12 depth points once a week. The humidity was determined before and after each irrigation and after a daily precipitation of > or = 10 mm. Water storages were calculated. The ratio of evapotranspiration to the sum of daily values of saturation deficit determines the coefficient of the biological curve of water requirement of crops. The reliability of the estimated values of irrigation water requirements is estimated and the probability curve for exceeding the irrigation requirements is given. Author (ESA)

N86-23181# Libyan Arab Jamahiriya, Tripoli. Meteorological Dept.
POTENTIAL EVAPORATION IN DIFFERENT PARTS OF LIBYA c14
S. E. Hassan *In* WMO Casebook of Operational Assessment of Areal Evaporation 1985 p 186-194 refs (For primary document see N86-23166 13-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A method based on the techniques of Penman and Lane was adopted after comparison with six other physical and empirical methods and used for a general survey to compute average potential evaporation from short grass covered surfaces for the period 1960 to 1969. Data analysis shows that the method agrees well with Penman estimates. Class A pan measurements show a slightly larger deviation. Author (ESA)

N86-23182# Lawrence Livermore National Lab., Calif.
BLAST FOCUSING AT AEDC AS A RESULT OF WEATHER CONDITIONS
B. A. Bowman May 1985 22 p
(Contract W-7405-eng-48)
(DE86-002842; UCID-20570) Avail: NTIS HC A02/MF A01

An assessment is made of the atmospheric focusing hazard associated with an accidental explosion at the Arnold Engineering Development Center near Tullamoma, Tennessee. The SIPS code is used to predict the locations and overpressures of focal points based on average weather data from the Nashville area and for some hypothetical weather profiles. Results indicate that average weather patterns will not result in focusing of the blast wave. DOE

N86-23183# National Academy of Sciences - National Research Council, Washington, D. C. Ad Hoc Committee on the Relationship between Land Ice and Sea Level.
GLACIERS, ICE SHEETS AND SEA LEVEL: EFFECT OF A CO2-INDUCED CLIMATIC CHANGE
Sep. 1985 345 p Presented at the National Research Council Conference on Ice, Sea Level and A CO/sub 2/-induced Climate Change, Seattle, Wash., 13 Sep. 1984
(Contract DE-FG01-84ER-60235)
(DE86-000722; DOE/ER-60235/1; CONF-8409290) Avail: NTIS HC A15/MF A01

The workshop examined the basic questions of how much water has been exchanged between land ice and ocean during the last century, what is happening now, and, given existing climate-modeling prediction, how much exchange can be expected in the next century. In addition, the evidence for exchange was examined and gaps in that evidence were identified. The report includes the 23 presentations made at the workshop, summarizes the workshop discussion, and presents the Committee's findings and recommendations. Separate abstracts have been prepared for the 23 presentations. DOE

N86-23184# World Meteorological Organization, Geneva (Switzerland).
METEOROLOGICAL SERVICES OF THE WORLD
1985 367 p refs
(WMO-2; ISBN-92-63-03002-2) Avail: NTIS MF A01; print copy available at WMO, Geneva

For World Meteorological Organization members, details of the state meteorological service; other state meteorological organizations dependent on the service; other state meteorological organizations independent of the service; meteorological institutes forming part of the service; meteorological institutes not forming part of the service; publications; and responsible authority for aeronautical meteorological services are listed. Author (ESA)

N86-23185# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
PROFILER STANDARD FORMAT FOR DATA EXCHANGE: PROFILER SITE TO HUB COMPUTER
J. Forberg and M. Barth Sep. 1985 32 p
(PB86-123734; NOAA-TM-ERL-WPL-126) Avail: NTIS HC A03/MF A01 CSCL 04B

The National Oceanic and Atmospheric Administration (NOAA) has established a Wind Profiler Demonstration Project. Its goal is to show that a network of wind Profilers can routinely support agencies such as the National Weather Service under operational conditions. Through the Wave Propagation Laboratory's Profiler Technology Transfer group, NOAA will deploy a network of wind Profilers in the Colorado-Kansas-Oklahoma area. This document describes the formats and content of the data transmitted by this network of Profilers to the central computer. This flexible set of formats will make possible automated exchange of Profiler data generated by this network or any other computer system. GRA

N86-23186# Alabama Univ., Dauphin Island. Marine Resources Lab.
ANALYSIS OF THE WINDS (1974-1984) AND SEA LEVEL ELEVATIONS (1973-1983) IN COASTAL ALABAMA
W. W. Schroeder and W. J. Wiseman (Louisiana State Univ., Baton Rouge) 1985 112 p Sponsored in part by NOAA, Rockville, Md. and Mississippi-Alabama Sea Grant Consortium, Ocean Springs, Miss.
(Grant NA81AA-D-00050)
(PB86-125515; MASGP-84-024) Avail: NTIS HC A06/MF A01 CSCL 04B

Monthly and annual wind roses, constructed from 10.5 years of data collected on Dauphin Island, Alabama, exhibit a high degree of variability. However, monthly composite roses present a recognizable seasonal pattern; northerly winter winds; easterly to southerly spring winds; southerly to westerly and back to easterly winds in the summer; and in the fall a return to north-easterly and northerly winds. Mean monthly wind speeds ranged from a high

of 8.1 k in January to a low of 5.2 kin in July. On a directional interval basis the highest mean speed 9.5 k, occurred during northerly winds while the lowest mean speed, 4.9 k, occurred during westerly winds. Sustained wind speeds of 30 k or greater were recorded during tropical cyclones, a winter cold front storm and a thunderstorm. GRA

N86-23187# National Severe Storms Forecast Center, Kansas City, Mo.
VERIFICATION OF SEVERE LOCAL STORM FORECASTS ISSUED BY THE NATIONAL SEVERE STORMS FORECAST CENTER, 1984 Final Report
P. W. Leftwich Nov. 1985 16 p
(PB86-128105; NOAA-TM-NWS-NSSFC-9) Avail: NTIS
HC A02/MF A01 CSCL 04B

The SELS Unit of the National Severe Storms Forecast Center routinely issues convective outlooks and severe local storm watches that delineates areas that are favorable for development of severe local storms. This report summarizes verification of those forecasts that were issued during 1984. Convective outlooks benefitted from later diagnostic analysis and additional numerical guidance. The highest degree of forecast skill was observed during the active months of spring. Skill in distinguishing the added threat of tornadoes in tornado watches was observed. High percentages of tornado-related fatalities (87%) and injuries (88%) were covered by valid severe local storm watches. GRA

N86-23188# National Weather Service, Silver Spring, Md. Techniques Development Lab.
APPLICATION OF CUMULUS MODELS TO MOS (MODEL OUTPUT STATISTICS) FORECASTS OF CONVECTIVE WEATHER
D. H. Kitzmiller Jun. 1985 58 p
(PB86-136686; NOAA-TM-NWS-TDL-76) Avail: NTIS
HC A04/MF A01 CSCL 04B

The National Weather Service currently issues twice-daily forecasts of thunderstorm and severe local storm probability based on Model Output Statistics. The probability forecasts are given by a weighted linear combination of meteorological predictors derived from NMC's limited-area fine mesh (LFM) model and TDL's three-dimensional trajectory models. In an effort to improve the resolution of forecasts, new predictors deprived from models of cumulus dynamics and thermodynamics have been developed and tested. A multiple linear screening regression procedure was used to derive new probability equations that utilize both the experimental and operational predictors. Author (GRA)

N86-23189# National Weather Service, Salt Lake City, Utah.
HEMISPHERIC SPECTRAL WAVE ANALYSIS (WAVES 0 TO 7)
M. F. Milkovich Aug. 1985 47 p
(PB86-108719; NOAA-NWS-WRCP-49) Avail: NTIS
HC A03/MF A01 CSCL 04B

This program performs a spectral analysis of 500 mb heights from hemispheric analyses and Medium Range Forecast (MRF) model data as received on AFOS. Wave energy amplitudes and wave phases are calculated over seven latitude circles (35N-55N) for waves 0 to 7. The program also chains to a graphics program which calculated phase speeds for waves 0 to 7 and produces an AFOS graphic depicting wave amplitudes and phase speeds. Both programs are designed to run on the Data General AOS system only. GRA

N86-23190# National Environmental Satellite Service, Washington, D. C.
MARINERS WEATHER LOG, VOLUME 29, NUMBER 3, SUMMER, 1985
1985 67 p
(PB86-113925) Avail: NTIS HC A04/MF A01 CSCL 04B

The Mariners Weather Log, Volume 29, No. 3, Summer 1985, reports on the following topics: under the Bangladesh cyclone; marine observations program; tips to the radio officer; the editor's desk; marine weather review. GRA

N86-23191# National Weather Service, Salt Lake City, Utah.
GREAT SALT LAKE EFFECT SNOWFALL: SOME NOTES AND AN EXAMPLE
D. M. Carpenter Oct. 1985 25 p
(PB86-119153; NOAA-TM-NWS-WR-190) Avail: NTIS
HC A02/MF A01 CSCL 04B

A lake effect snowfall along the Wasatch Front is typically a post cold frontal event in which the duration of snowfall downwind of the lee shore is extended in cold, northwest flow. The paper is based on data taken from lake effect cases that occurred in the northwest flow following the passage of an upper level trough. Occasionally it appears that a lake effect may have occurred in southwest flow, which enhances or produces snowfall close to the northeast shoreline. The necessity of a rapid infusion of cold air, usually in the form of a cold pocket, and the fact that this air would have to come from a southerly direction makes a conventional lake effect hard to come by. Even after limiting the study to storms that occur in northwest flow, the effect of the Great Salt Lake on snowfalls is not one that can be easily measured. Author (GRA)

N86-23192# National Weather Service, Garden City, N.Y.
FPCPLT:MOS TEMPERATURE AND PROBABILITY OF PRECIPITATION FORECAST PLOT
W. C. Randel Oct. 1985 26 p
(PB86-120029; NOAA-NWS-ERCP-34) Avail: NTIS
HC A03/MF A01 CSCL 04B

The program generates an AFOS plot of the MOS 12 hour - 4 period temperature and probability of precipitation (PoPS) forecasts from the AFOS cccFPCxxx product. Several stations can be plotted on one graphic. Frequently the forecasters in Cleveland would hand plot the MOS temperature and PoP forecasts for stations in and near the state to obtain a single display of the temperature and PoP forecasts. The data was obtained by displaying the eight AFOS graphic charts containing the temperature and PoP forecasts. FPCPLT automates this. GRA

N86-23193# National Weather Service, Fort Worth, Tex.
AUTOMATED PROCEDURE FOR COMPOSITION OF SEVERE WEATHER WATCH AREAL REDEFINING STATEMENTS Revised
G. A. Hammons Sep. 1985 23 p
(PB86-120730; NOAA-TM-NWS-SR-100) Avail: NTIS
HC A02/MF A01 CSCL 04B

Current National Weather Service (NWS) policy requires that when a Tornado or Severe Thunderstorm Watch (commonly referred to as a box) is issued by the National Severe Storms Forecast Center (NSSFC), each affected State Relay Center must issue a Redefining Statement (Areal Outline) describing the part of the state included in the Watch area. It is released to the public and is usually expressed in terms of whole counties, cities, or well-known geographical landmarks. Forecasters previously plotted the watch area on a map, then determined the affected counties visually. This procedure is relatively time-consuming, usually is done under some pressure at unscheduled times, and is subject to various errors. The Scientific Services Division of the Southern Region developed a FORTRAN program (REDEFINE) to produce the Redefining Statement automatically on AFOS, given only the size and orientation of the SELS watch box and the issue time. This memo decribes the program and its use, as well as changes to the program made since the original issuance in 1979. GRA

N86-23194# National Weather Service, Fort Worth, Tex.
FLORIDA EAST COAST THANKSGIVING HOLIDAY STORM OF 1984
B. Sylvern, C. Brock, F. Gonzales, and R. Biedinger Sep. 1985 27 p
(PB86-120748; NOAA-TM-NWS-SR-113) Avail: NTIS
HC A03/MF A01 CSCL 04B

During the period November 21 through 24, 1984, a low pressure system formed over the Atlantic Ocean near the southeast Florida coast and developed into an intense storm, unusually strong

and well defined for this area and season. The storm produced extensive damage, widespread coastal flooding and severe beach erosion along the Florida Atlantic coast from West Palm Beach northward to Fernandina Beach. A strong high pressure area over the northeast U.S. enhanced the severity of the storm.
Author (GRA)

N86-23195# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-OCTOBER TO MID-NOVEMBER, 1985, VOLUME 39, NUMBER 20, OCTOBER 15, 1985
15 Oct. 1985 10 p
(PB86-121183) Avail: NTIS HC A02/MF A01 CSCL 04B
The report gives temperature and precipitation probabilities for the monthly and seasonal weather for North America for the period mid-October to mid-November 1985. GRA

N86-23196# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR NOVEMBER 1985, VOLUME 39, NUMBER 21, OCTOBER 30, 1985
30 Oct. 1985 17 p
(PB86-121191) Avail: NTIS HC A02/MF A01 CSCL 04B
The report gives temperature and precipitation probabilities for the monthly and seasonal weather for North America for November 1985. GRA

N86-23197# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
FIELD MEASUREMENTS IN THREE DIMENSIONS OF PLUME DISPERSION IN THE HIGHLY CONVECTIVE BOUNDARY LAYER
W. L. Eberhard, W. R. Moninger, T. E. Uttal, S. W. Troxel, and J. E. Gaynor Oct. 1985 8 p
(PB86-121472; EPA-600/D-85-232) Avail: NTIS HC A02/MF A01 CSCL 04B
Previous laboratory experiments and numerical modeling have identified characteristics of plume dispersion in the highly convective mixed layer that deviate significantly from predictions of Gaussian models. To assess the validity of these observations, meteorologists conducted a field study named CONDORS (Convective Dispersion Observed with Remote Sensors). CONDORS demonstrated that radar measurements of chaff under convective conditions and lidar measurements of oil fog can succeed in describing not only general plume location and shape, but also relative tracer concentrations. With sufficient care in tracer generation, sensor operation, and signal processing, the tracer systems are semiconservative and losses that do occur can be reasonably balanced. GRA

N86-23198# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
RESEARCH ON DIFFUSION IN ATMOSPHERIC BOUNDARY LAYERS: A POSITION PAPER ON STATUS AND NEEDS
G. A. Briggs and F. S. Binkowski Nov. 1985 250 p
(PB86-122587; EPA-600/3-85-072) Avail: NTIS HC A11/MF A01 CSCL 04B
The introduction of a new understanding of atmospheric boundary layers (ABLs) has caused a major change in the view of the diffusion of pollutants. The turbulence parameters now standard in AFL work, have provided a method for systematically organizing diffusion parameters. Concurrently with these advances, alternatives to the operational models have emerged, but existing experimental data sets are inadequate for model comparisons and evaluations. The most important knowledge gap is the lack of an adequate specification of the relevant meteorology both at the point of release and downwind. A second major inadequacy is experimental measurements of plume characteristics up to 100 km from the release point. There is also a great need for formulating new operational based models upon this newly acquired experimental data and the new alternative approaches. Finally, it is recognized that a modest but steady effort is necessary. GRA

N86-23023# Joint Publications Research Service, Arlington, Va.
HYDROCHEMICAL INDICATORS OF FRONTAL CYCLONIC EDDY IN ANTARCTIC CIRCUMPOLAR CURRENT Abstract Only
A. M. Chernyakova and S. O. Bordokin *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 41 Transl. into ENGLISH from Okeanologiya (Moscow, USSR), v. 25, no. 5, Sep. - Oct. 1985 p 740-743 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-23199 California Univ., San Diego.
LABORATORY STUDIES OF INTERNAL GRAVITY WAVE CRITICAL LAYERS Ph.D. Thesis
Donald Brent Altman 1985 158 p
Avail: Univ. Microfilms Order No. DA8524561
A study of internal wave critical layers in accelerating mean flows is described. Alternatively this can be viewed as a study of stratified accelerating shear flows over topography. The work consists of three main parts: the development of an automated image processing system for the reading of streak photographs, the performance of a series of experiments on two-layer flows, and the performance of experiments on continuously-stratified flows. The image processing system is a collection of menu-driven FORTRAN programs that produce calibrated velocity measurements from a digitized particle-streak photograph. Operations include processing and filtering at the pixel level, automatic streak identification and connection, processing and filtering at the streak level, geometrical corrections and calibration, and the calculation of wavelength-averaged, depth-dependent flow measurements. The system is comparable to, or faster than, all other fluid-mechanics image processing systems examined. In the two-layer flow experiments, acceleration of the mean flow has been found to create a new scenario for instability. Dissert. Abstr.

N86-23200 Delaware Univ., Newark.
DIRECTIONAL WAVEMAKER: THEORY AND EXPERIMENT Ph.D. Thesis
Yung-Chao Wu 1985 169 p
Avail: Univ. Microfilms Order No. DA8525295
The three-dimensional structure of linear and nonlinear waves generated by infinite length and the finite length three-dimensional wavemakers is developed theoretically. The analytic solution of the wave field generated by a finite length wavemaker is very complex, therefore, a parabolic model is introduced to solve this problem. A three-dimensional wavemaker can exist only in theory. To generate directional waves in a wave tank, we use a multi-element wavemaker; therefore, the multi-element wavemaker theory and the relation between three-dimensional wavemaker and multi-element wavemaker is presented. The effect due to the finite length of elements (paddles) was examined theoretically. A wavemaker moving in simple-harmonic motion produces wave trains both at the frequency of the wavemaker and its harmonics. These waves consist of the Stokes waves as well as higher harmonic free waves due to the finite displacement of the paddles; a physical model was used at the Ocean Engineering Laboratory in the University of Delaware to detect the waves by the techniques of the wavenumber-frequency spectral analysis.
Dissert. Abstr.

N86-23201# Defence Research Information Centre, Orpington (England).
BIOLUMINESCENCE OF THE SEA
Aug. 1985 102 p refs Transl. into ENGLISH of the book "Bioluminescence of the Sea', Moscow, Nauka Publishers, p 40-67, 83-89, 126-152 and 160-171

(DRIC-T-7565; BR97393) Avail: NTIS HC A06/MF A01

The biological characteristics of the luminescence of marine bioluminescents are reviewed. Luminescence stimulation and the flash characteristics of individual organisms are considered. Laboratory techniques and procedures for measurement of bioluminescence in marine organisms are detailed, and instruments for the investigation of marine bioluminescence in situ are described. Geographical and vertical distribution of bioluminescence, including measurement and processing methods, and the effects of diurnal rhythms and migrations are discussed. Author (ESA)

N86-23202 Defence Research Information Centre, Orpington (England).

OCCURENCE OF EDDY FORMATION IN WIND-GENERATED WAVE PATTERN

V. A. Dulov, V. N. Kudryavtsev, and V. V. Malinovsky Oct. 1985 20 p refs Transl. into ENGLISH from Morskoi GGidrofizicheskii Zhurnal (USSR), vol. 2, 1985 p 44-52

(DRIC-T-7593; BR97523) Copyright. Avail: Issuing Activity

The influence of surface currents accompanying eddy formation on wind-generated ocean waves is analyzed. The kinematics and dynamics of waves in the eddy field are considered. Foam-covered sea surface fraction variations are evaluated. It is concluded that eddy formations with radii on the order of 10 km can occur in the distribution pattern of wind-generated wave parameters which may be remotely sensed by radiometry or radar. Author (ESA)

N86-23203# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.

PROCEEDINGS OF THE ARCTIC OCEANOGRAPHY CONFERENCE AND WORKSHOP HELD AT THE NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, NSTL, MS. ON JUNE 11-14, 1985

1985 293 p Conference held in Bay St. Louis, Miss., 11-14 Jun. 1985

(AD-A162578) Avail: NTIS HC A13/MF A01 CSCL 20/1

The four general subject areas were: Arctic Operations and acoustics; Buoys; and Sea Ice. Included titles are: MIZEX(Marginal Ice Zone Experiment) Operations; International Ice Patrol Operations; Remote Sensing for Polar Icebreaker Navigation in Sea Ice; Satellite Telemetry Buoys for Collection of Arctic Acoustic and Environmental Data; Arctic Temperature - Conductivity Buoys; Generation and Movement of Ice Islands near the Canadian Arctic Archipelago; Effect of the Physical Properties of Ice on the High Frequency Acoustic Backscatter from an Ice Keel Model; Simulation Model for High-Frequency Underice Acoustic Backscattering; High Frequency Acoustic Reflection from Flat Sea Ice; Use of Penetrators to Estimate the Properties of Ice in Arctic Regions; Acoustic Bottom Interaction Considerations in the Arctic; Horizontal Directionality of Ice Edge Noise; Characteristics of Industrial Sounds in the Shallow Beaufort Sea; A Multi-bounce, Single-scatter, Ray Theoretic Model for Under-ice Predictions, Frequency-domain Electromagnetic Ice-sounding; Radiometric Imagery of Sea Ice; Remote Sensing of the Marginal Ice Zone During MIZEX 83 and 84; Variations in Bering Sea Ice Coverage Related to Large-scale Atmospheric Circulation Patterns; Determining Sea Ice Type and Inferred Ice Thickness Distributions from Aerial Photographs; Pressure Ridge Morphology and Physical Properties of Sea Ice in the Greenland Sea. GRA

N86-23204# Miami Univ., Fla. Div. of Meteorology and Physical Oceanography.

MEASUREMENT OF GULF STREAM AND WIND INDUCED SHELF CIRCULATION IN THE SOUTH ATLANTIC BIGHT Final Report, 1 Jun. 1982 - May 31,1985

T. N. Lee Jan. 1985 32 p

(Contract DE-AS05-76EV-05163)

(DE86-002786; DOE/EV-05163/T1) Avail: NTIS HC A03/MF A01

The report discusses a study to determine the relative importance of the forces driving shelf circulation and exchange in the South Atlantic Bight and to measure the shelf waters' response over variable time and space scales. Results indicate the outer shelf is controlled by Gulf Stream frontal disturbances such as wave-like meanders and eddy motions, the midshelf by local wind forcing with occasional Gulf Stream intrusions and density induced motions, and the inner shelf by density effects from fresh water river runoff. DOE

N86-23205# Institute of Oceanographic Sciences, Wormley (England).

A LONG-RANGE SIDE-SCAN SONAR SURVEY OF THE MERIADZEK TERRACE, BAY OF BISCAY

N. H. Kenyon and P. M. Hunter 1985 17 p refs Sponsored by British Telecom

(IOS-210) Avail: NTIS HC A02/MF A01

The Geological Long Range Inclined Asdic (GLORIA) mapped the Bay of Biscay in an area destined for a transatlantic fiber optic cable. Strongly-reflective areas correspond to slopes > 10 deg. It is suspected that backscattering of sound from these slopes is due to their being free of the cover of mud that is usually found on the continental slope and in the deep ocean. These strongly reflective areas ought to be avoided. The Upper and Lower Meriadzek Terrace has gentle slopes, free from large obstacles. However, boulders or wrecks, although unlikely to be present, are too small to be resolved by GLORIA. The Terrace narrows upslope to a neck of only 4 km at a depth of 300 m. The sediment type along the planned route is little known. It is suspected that medium-sized sands will give way to muddy sand and mud at depths between 200 m and 500 m. Author (ESA)

N86-23206# Institute of Oceanographic Sciences, Wormley (England).

THE DISTRIBUTION OF GLACIAL ERRATICS IN THE NORTHEAST ATLANTIC Final Report

Quentin Huggett 1985 99 p refs

(IOS-213; DoE/RW/85/056; DGR-481/179) Avail: NTIS HC A05/MF A01

Information on glacial erratics, including examination of 288 dredge hauls, 1164 sediment cores, and 176 camera runs is summarized. Sufficient data are collected to estimate the impact risk of a point projectile with a glacial erratic, down to oxygen isotope stage 5 (127,000 yr) in 3 areas of the NE Atlantic: Porcupine seabight = 0.460%; King's Trough Flank = 0.502%; Great Meteor East = 0.015%. The estimates are for all erratics > 1.5 cm diameter and apply only down to oxygen isotope stage 5. Author (ESA)

N86-23207# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.

STRATEGIES FOR THE CALIBRATION AND OPERATIONAL USE OF THE ERS-1 SAR WAVE MODE Final Report

Andrew D. Goldfinger Paris ESA Mar. 1985 126 p refs Original contains color illustrations

(Contract ESTEC-5538/83)

(JHU/APL/SDO-7565; ESA-CR(P)-2097) Avail: NTIS HC A07/MF A01

Algorithms for estimating ocean wave spectra and tracking spectral peaks for ERS-1 Active Microwave instrument were studied. Procedures for calibrating the system and validating the algorithms are proposed. The ocean can be represented by a two-scale model in which random local phenomena cause small uncorrelated variations in the ocean spectrum that are superimposed on slowly changing excursions due to macroscopic effects. Macroscopic phenomena show correlation lengths of 50 to 100 km. Principal error sources in measuring spectral peak positions are: error inherent in measuring a static spectral peak; error due to dynamic tracking effects; and error due to localized ocean excursions. Two bit quantization of the SAR signals is not a significant error source. Spectra should be estimated from multilook imagery. If the number of looks is maximized, it does not matter how the fixed buffer of SAR data is broken up into subimages. Author (ESA)

N86-23208# National Science Foundation, Washington, D.C. Div. of Polar Programs.
ICE SHELVES OF ANTARCTICA
N. I. Barkov 1985 272 p Transl. into ENGLISH from the mono. "Shelfove Ledniki Antarktidy" Leningrad, USSR, Gidrometeorologicheskoe, 1971
(PB86-106986; TT-75-52081) Avail: NTIS HC A12/MF A01 CSCL 08L

The vast areas occupied by ice shelves and their peripheral location in Antarctica have attracted the attention of investigators for long. Their special features have been studied and their role in the mass budget of the continent's ice cover examined. Information on the ice shelves, published till 1968, has been examined in the monograph. The author describes the special conditions of existence of ice shelves, their movement, morphology, charging, the structure of the thermal regime, and their contribution to the development of glaciation on the continent. In this respect, particular attention has been paid to the study of the floating, most representative, part of such ice formations. GRA

N86-23209# National Science Foundation, Washington, D.C. Div. of Polar Programs.
PROBLEMS OF THE ARCTIC AND THE ANTARCTIC, COLLECTION OF ARTICLES, VOLUME 56, 1981
A. F. Treshnikov [1985] 167 p Transl. into ENGLISH of Problemy Arktiki i Antarktiki (USSR), Sbornik Statei, v. 56, 1981 p 1-159
(PB86-107109; TT-82-00-102) Avail: NTIS HC A08/MF A01 CSCL 08C

Many articles included in this volume deal with various aspects of the studies on sea ice, viz., conditions of regelation, thermal displacement, deformation and stresses, hummocking, morphology, and techniques of thickness measurements. Another group of articles deals with hydrometeorological forecasts, subsurface currents, water density fields, etc. GRA

N86-23210# Science Applications International Corp., McLean, Va.
UPPER OCEAN AND STRATIFICATION AND VARIABILITY IN THE NORTH ATLANTIC Technical Report, 8 Nov. 1982 - 31 Dec. 1984
R. B. Lambert and G. T. Hebenstreit May 1985 70 p
(Contract N00014-83-C-0057)
(PB86-110236; SAIC-84/1778) Avail: NTIS HC A04/MF A01 CSCL 08C

Upper ocean temperature data from Ocean Weather Station I are analyzed for variability of time scales from two weeks to ten years. Concurrent meteorological measurements were analyzed as forcing mechanisms, to which the ocean response could be compared. The dominant time scales of meteorological forcing were the annual and diurnal cycles of heating and cooling, and a proannounced five-day period associated with the passage of local weather systems. The dominant time scales of ocean variability were the annual cycle of near-surface stratification, interannual modifications of the annual cycle, and a one to three month period, probability attributable to mesoscale circulation features. A comparison of heat content of the upper 125 meters with the total heat flux led to the conclusion that lateral advection is a dominant process, at least over time scales less than a year. GRA

N86-23211# National Environmental Satellite Service, Washington, D. C.
ENVIRONMENTAL DATA SOURCES FOR THE CHESAPEAKE BAY AREA
Jun. 1985 66 p
(PB86-110640; NESDIS-ENVIRON-INVENT-3) Avail: NTIS HC A04/MF A01 CSCL 08C

Chesapeake Bay is one of the largest and most productive estuaries in the world. It is a unique, irreplaceable natural--as well as national--resource. Declining harvests of fish and shellfish, however, have served notice that the Bay's renewable living resources are endangered by deteriorating water quality and habitat destruction. The primary purpose of this publication is to provide information about environmental data for the Chesapeake Bay area that is available from the National Environmental Satellite, Data, and Information Service. GRA

N86-23212# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Environmental Research Lab.
LAKE SUPERIOR COOLING SEASON TEMPERATURE CLIMATOLOGY
R. A. Assel Mar. 1985 54 p
(PB86-110624; NOAA-TM-ERL-GLERL-58) Avail: NTIS HC A04/MF A01 CSCL 08G

A temperature climatology has been developed for the surface and ten 10-m layers along the normal ship route between the eastern and western ends of Lake Superior and for discrete areas along the ship route. Base period for the climatology includes winters 1973 to 1976 and falls 1976 to 1979. Daily average temperatures and extreme temperatures for the base period were calculated, and a six-wave Fourier equation fitted to the average temperature time series to define the temperature climatology. GRA

N86-23213# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
HEAT BUDGET AND CLIMATIC ATLAS OF THE EQUATORIAL ATLANTIC OCEAN DURING FGGE (FIRST GARP GLOBAL EXPERIMENT, 1979
E. Marmolejo, J. F. Festa, and R. L. Molinan Aug. 1985 82 p
(PB86-111622; NOAA-TM-ERL-AOML-61) Avail: NTIS HC A05/MF A01 CSCL 08J

Observations of surface oceanographic and meteorological fields collected during the first GARP Global Experiment (FGGE) in the equatorial Atlantic Ocean have been combined and averaged by month onto a 2 degree by 2 degree grid. Monthly distributions of sea-surface temperature, wind speed and direction, air temperature, specific humidity, and cloud cover have been generated for the period from December 1978 through November 1979. Net short-wave and long-wave radiation, and sensible and latent heat flux distributions have been generated from surface data using the bulk aerodynamic formulas. Standard errors of the mean values have been computed along with monthly contoured plots of each oceanographic and meteorological variable. GRA

N86-23214# Mississippi-Alabama Sea Grant Consortium, Ocean Springs, Miss.
POLLUTANT TRANSPORT IN MISSISSIPPI SOUND Final Report
T. F. Lytle and J. S. Lytle Jul. 1985 127 p refs Sponsored in part by Mississippi Bureau of Pollution Control, Jackson, Miss.
(Grants NA79AA-D-0049; NA80AA-D-00017)
(PB86-123809; MASGP-82-038) Avail: NTIS HC A07/MF A01 CSCL 08A

Pollution transport in the Mississippi Sound is reported. The following items are examined: (1) types of samples and analysis selection; (2) sample collection and analysis scheme; (3) pollutant distribution; (4) quantitative pollutant assessment; (5) environmental stress index; (6) use of scientific information. GRA

N86-23215# National Center for Atmospheric Research, Boulder, Colo.
CENOZOIC ORGANIC CARBON DEPOSITION IN THE DEEP SEA M.S. Thesis
J. L. Sloan 1985 211 p Sponsored in part by the National Science Foundation, Washington, D.C. Prepared in cooperation with Miami Univ., Fla.
(PB86-115524; NCAR/CT-89) Avail: NTIS HC A10/MF A01 CSCL 08A

Lithologic data and physical properties measurements for the sediment recovered by the Deep Sea Drilling Project (Legs 1-79), and age-depth relationships for each drill hole were used to study the Cenozoic world ocean in terms of: (1) the controls on the deposition and preservation of organic carbon in the deep sea, (2) the evidence for variation in average organic carbon accumulation rate, and (3) the flux of organic carbon to three major deposition environments of the deep sea. Results show that: (1) the pattern

of variation in organic carbon content with respect to bulk sediment accumulation rate for ancient marine sediments differs from that for recently deposited marine sediments; (2) the trends in average organic carbon accumulation rate with time are damped in comparison to previously determined trends in organic carbon sedimentation rate. GRA

N86-23216# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
PEGASUS CURRENT PROFILER MEASUREMENTS COLLECTED FOR EPOCS (EQUATORIAL PACIFIC OCEAN CLIMATE STUDIES), 1980 - 1983
D. Wilson, C. Roffer, and G. Thomas Aug. 1985 184 p
(PB86-113446; NOAA-DR-ERL-AOML-6) Avail: NTIS
HC A09/MF A01 CSCL 08C

Current velocity profiles recorded on nine AOML EPOCS (Equatorial Pacific Ocean Climate Studies) cruises during 1980 to 1983 using the Pegasus profiler are presented. The data were collected along several equatorial transects from 85 W to 110 W. Station locations and current profiles are shown for each cruise; the instrument and techniques of data acquisition and processing are also described. GRA

N86-23020# Joint Publications Research Service, Arlington, Va.
NEW DATA ON DEEP STRUCTURE OF MID-ATLANTIC RIDGE AT 20 DEG S Abstract Only
Yu. M. Pushcharovskiy, I. N. Yelynikov, and A. S. Perfilyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 21 Transl. into ENGLISH from Geotektonika (Moscow, USSR), no. 5, Sep. - Oct. 1985 p 5-13 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

N86-23021# Joint Publications Research Service, Arlington, Va.
HYDROCARBON GAS-HYDRATE FORMATION BENEATH BOTTOM OF SEAS AND OCEANS Abstract Only
V. Ya. Trotsyuk and I. A. Nemirovskaya *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 27 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), vol. 284, no. 4, Oct. 1985 p 976-978 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

N86-23022# Joint Publications Research Service, Arlington, Va.
NORTH ATLANTIC UPER MANTLE HETEROGENEITIES Abstract Only
N. Ya. Kunin and S. V. Usenko *In its* USSR Report: Earth Sciences (JPRS-UES-86-004) 31 Mar. 1986 p 31 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Zemli (Moscow, USSR), no. 9, Sep. 1985 p 23-35 (For primary document see N86-23017 13-42)
Avail: NTIS HC A04/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-23217 Defence Research Information Centre, Orpington (England).
DEMONSTRATION AND ROLE OF CHEMORECEPTION IN THE MARINE ZOOPLANKTON
S.-A. Poulet Jan. 1985 31 p refs Transl. into ENGLISH from Oceanis, vol. 10, no. 2, 1984 p 131-149
(DRIC-T-7456; BR94716) Copyright. HC A03/MF A01

Information on chemoreception in zooplankton is reviewed. Examples which suggest that chemoreception is responsible for the survival of plankton organisms by regulating reproduction, locomotion, and nutrition are discussed. Author (ESA)

N86-23218*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 4 Final Report
Lydia Razran Hooke, ed., Mike Radtke, ed., Victoria Garshnek, ed., Ronald Teeter, ed., and Joseph E. Rowe, ed. Feb. 1986 118 p refs
(Contract NASw-3676)
(NASA-CR-3922(04); NAS 1.26:3922(04)) Avail: NTIS
HC A06/MF A01 CSCL 06C

The fourth issue of NASA's USSR Space Life Science Digest includes abstracts for 42 Soviet periodical articles in 20 areas of aerospace medicine and space biology and published in Russian during the last third of 1985. Selected articles are illustrated with figures and tables from the original. In addition, translated introductions and tables of contents for 17 Russian books on 12 topics related to NASA's life science concerns are presented. Areas covered are: adaptation, biological rhythms, biospherics, body fluids, botany, cardiovascular and respiratory systems, cytology, developmental biology, endocrinology, exobiology, habitability and environmental effects, health and medical treatment, hematology, histology, human performance, immunology, mathematical modeling, metabolism, microbiology, musculoskeletal system, neurophysiology, nutrition, perception, personnel selection, psychology, and radiobiology. Two book reviews translated from the Russian are included and lists of additional relevant titles available in English with pertinent ordering information are given. Author

N86-23219# Yale Univ., New Haven, Conn.
USE OF MEMBRANE VESICLES AS A SIMPLIFIED SYSTEM FOR STUDYING TRANSPORT OF AUXIN Progress Report
M. H. Goldsmith 1985 2 p refs
(Contract DE-FG02-85ER-13337)
(DE86-002264; DOE/ER-13337/1) Avail: NTIS HC A02/MF A01

The accumulation of indoleacetic acid (IAA) inside microsomal vesicles depends on the presence of a pH gradient and is reversible when the (DELTA)pH is collapsed by ionosphores. Accumulation is stimulated by either napthylphthalamic acid or TIBA. The accumulation of IAA by the vesicles can be saturated. At concentrations of 1 microns or less, IAA, synthetic auxins, or auxin antagonists do not affect the pH gradient, but decrease the accumulation of (3)H-IAA, and therefore compete specifically for uptake. Concentrations of 10 microns and above, uptake of either the auxins or weak acids is sufficient to overcome the buffering capacity of the solution within the vesicles. The collapse of the pH gradient by such high concentrations affects uptake of either (3)H-IAA or (14)C-BA to similar extents and thus is nonspecific. DOE

N86-23220# Department of Energy, Washington, D. C.
ANNUAL REPORT AND SUMMARIES OF FY 1985 ACTIVITIES SUPPORTED BY THE DIVISION OF BIOLOGICAL ENERGY RESEARCH
Nov. 1985 48 p
(DE85-009132; DOE/ER-0147/3) Avail: NTIS HC A03/MF A01

The Biological Energy Research (BER) program of the Office of future energy-related biotechnologies are discussed. The study of green plants as producers of renewable resources is a key aspect of the program. Plant productivity encompasses a broad array of processes, integrated to form a complex whole, the producing plant. Another major aspect of the research program examines microbiological conversions that yield fuels and/or chemicals. These bioconversion processes can provide a substitute for fossil energy resources directly or through energy conserving measures in which biological mechanisms displace industrial energy input requirements (e.g., biological nitrogen fixation, recovery of key resources from dilute concentrations, and conversion of noxious waste products to usable materials [carbon monoxide to organic acids]). In each instance, the research is aimed at understanding the fundamental mechanisms of conversion rather than a description or optimization of a process. One hundred twenty-five projects are described with subject and investigator indexes. DOE

N86-23221# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF 60 Hz ELECTRIC FIELDS ON OPERANT AND SOCIAL STRESS BEHAVIORS OF NONHUMAN PRIMATES

Annual Report, 5 Aug. 1984 - 25 Oct. 1985
W. R. Rogers, J. H. Lucas, G. T. Moore, and J. L. Orr 1985 51 p
(Contract DE-AC02-80RA-50219)
(DE86-002587; DOE/RA-50219/T6) Avail: NTIS HC A04/MF A01

Operant behavioral methods have been used to assess the aversiveness of intense electric fields. One aspect of the aversiveness of a stimulus is the ability to act as a negative reinforcer. A negative reinforcer is a stimulus whose response contingent termination maintains behavior. Baboons were trained to perform an operant task to obtain food rewards, determined that the addition of an intense electric field did not disrupt performance, measured the background level of responding in the absence of any primary reinforcers, assessed the ability of electric field termination to maintain operant responding, and verified that the electric field could serve as a discriminative stimulus. DOE

N86-23222# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
8 Jan. 1986 119 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-002) Avail: NTIS HC A06

Research and development in Soviet life, biomedical, and behavioral sciences is reported. The different categories presented include: agrotechnology, biochemistry, biophysics, biotechnology, epidemiology, food technology, genetics, human factors engineering, immunology, marine mammals, medicine, microbiology, molecular biology, pharmacology and toxicology, physiology, public health, veterinary medicine, and virology. For individual titles, see N86-23223 through N86-23257.

N86-23223# Joint Publications Research Service, Arlington, Va.
BIOCHEMICAL MODELS FOR STUDY OF NERVE CELL PROCESSES
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 2 Transl. into ENGLISH from Meditsinskaya Gazeta (Moscow, USSR), 18 Sep. 1985 p 3 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Biochemical models for the study of nerve cells were developed to obtain knowledge of the human brain. Neurochemistry studies the most important processes in living organism that are connected with neural control, memory and thinking. To understand the mechanism of these processes means to recognize the form in which the nervous system receives external and internal information and reacts to it. Vitally important substances were isolated and studied. The information makes it possible to develop preparations for treating diseases of the nervous system, new anesthetics, and artificial memory systems built according to biological principles. E.A.K.

N86-23224# Joint Publications Research Service, Arlington, Va.
INTERACTION OF ASIALOGLYCOPROTEIN RECEPTOR OF HEPATOCYTES WITH CHEMICALLY GALACTOSILATED ACID ALPHA-GLUCOSIDASE Abstract Only
N. K. Bystrova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 3 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 4, Oct. 1985 p 994-996 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The interaction of a mouse hepatic asialoglycoprotein receptor with chemically galactosilated alphaglucosidase (AGC) was studied to determine the feasibility of using such receptors for introducing AGC into hepatic lysosomes. It was shown that binding was specific and predicated on the presence of the galactosyl residue in the AGC molecule. Various galactose-containing substances inhibited the binding to variable extent, with the greatest degree of inhibition exhibited by asialoorosomucoid. The EDTA inhibited binding by more than 79%, confirming the dependence of binding on the presence of calcium ions, a characteristic feature of asialoglycoprotein receptors. It is indicated that under in vitro conditions the receptor recognizes galactosilated AGC as a specific ligand, suggesting that such enzymes can be introduced in this way into hepatic parenchymal cells. This uggests a means of enzyme therapy in such cases as type II glycogenosis. E.A.K.

N86-23225# Joint Publications Research Service, Arlington, Va.
PROTEIN-PROTEIN INTERACTIONS IN SYSTEMS WITH SYNTHETIC POLYELECTROLYTES Abstract Only
A. L. Margolin, S. F. Sherstyuk, V. A. Izumrudov, V. K. Shvyadas, A. B. Zezin, and V. A. Kabanov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 4 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 284, no. 4, Oct. 1985 p 997-1001 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The efficiency of interaction of alpha-chymotrypsin (ACT) with its basic pancreatic inhibitor on the basis of kinetic data was assessed by using free ACT and ALT covalently linked to polyelectrolytes. The association rate constants in pH 7.5 phosphate buffer at 25 was determined and shows that for the free enzyme in solution, ACT-polymethacrylate complex, and for the CH-agarose linked preparation of ACT, the following values are calculated: 2.8 x 1/10,000, 18.0 x 1/10,000, and 1.4 x 1/10,000 M1/sec-1. The inhibition constants for the three versions of ACT were 3.60 x 10 to the 8th power, 0.40 x 10 to the 8th power and 26.0 x 10 to the 8th power M. It is shown that the methods of enzyme linkage to polyelectrolyte carrier and the nature of the carrier have a profound effect on the binding behavior of the enzyme, and that such facts can be used to alter enzyme behavior toward desired final effects. E.A.K.

N86-23226# Joint Publications Research Service, Arlington, Va.
EFFECT OF INTENSIVE VISIBLE LIGHT ON ACTIVITY OF GLUTATHIONE PEROXIDASE IN PIGMENTED EPITHELIUM OF EYE
N. R. Veliyeva, E. Yu. Yusifov, and Sh. V. Mamedov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 5-9 refs Transl. into ENGLISH from Doklady Akademii Nauk Azerbaydzhanskoy SSR (Baku, USSR), v. 41, no. 5, May 1985 p 24-27 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Functional visual damage caused by visible light was studied. The effect of bright light on glutathsione peroxidase (GP) and pigmented epithelium (PE) activity in the retina was investigated. It is shown that GP activity increases in the PE of a frog's eye in response to intense light, and it is suggested that this is associated with the adaptive response to intensified free radical oxidation reactions in the eye's tissues. The important role of GP in the PE is confirmed. E.A.K.

N86-23227# Joint Publications Research Service, Arlington, Va.
DISCOVERY REGARDING ELECTRON REDISTRIBUTION AMONG CELL MEMBRANES Abstract Only c52
I. Novodvorskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 12 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 27 Sep. 1985 p 3 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The transfer of electrons between individual membranes inside a cell and between cells in an organ or tissue. The process of redistribution of electrons between membranes combines all membranes into a single coordinated system. These chemical reactions are delayed and inhibited in a number of illnesses which involve changes in cells and constitute practical application of this discovery since it will help in the diagnosis of serious illnesses. E.A.K.

N86-23228# Joint Publications Research Service, Arlington, Va.
PRODUCTION OF GENE BANK FROM COTTON PLANT CHLOROPLAST DNA FOI HC/MF
M. Karimov, G. V. Afanasyeva, and N. I. Matviyenko *In its* USSR

Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 16-21 refs Transl. into ENGLISH from Doklady Akademii Nauk Tadzhiksoy SSR (Dushanbe, USSR), v. 28, no. 3, Mar. 1985 p 175-178 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The development of model systems that could make it possible to express eukaryotic genes is discussed. The symbiosis of Agrobacterium tumefaciens in higher plants is used to insert foreign genes into the plants. The plasma genes that are located in the cytoplasm organelles of higher plants, particularly in the chloroplasts are examined. Chloroplast DNA has enough information for the synthesis of a number of protein structures, and its amplification level relies on the expression of its own DNA and foreign DNA altered by genetic engineering techniques. Ribosomal RNA genes of plastids and a large subunit of riboso-diphospate carboxylase are encoded by a chloroplast gene. The insertion of strong promoters into these genes and their supplemental modification, affects the level of photosynthetic activity in plant tissue. One of the stages in changing a genetic program of agricultural plants is the creation of a gene bank of chloroplast DNA. It is demonstrated that the enzyme method of isolating protoplasts from cotton plant leaves followed by mechanical lysis and the lysis of chloropplasts in the presence of proteinase k and supplemental purification on biogel A-50, results in the separation of high polymerchloroplast DNA. E.A.K.

N86-23229# Joint Publications Research Service, Arlington, Va.
PRODUCTION OF GAMMA- AND ALPHA-INTERFERON BY HUMAN BLOOD LEUKOCYTES UNDER SUCCESSIVE INDUCTION CONDITIONS **c52**
T. G. Orlova, L. V. Zhdanova, M. N. Soloyeva, and L. M. Mentkevich *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 22-24 refs Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 196-198 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Alpha and Gamma interferons are produced by different blood cells--by B lymphocytes and T lymphocytes. This predetermines the possibility for simultaneous or successive induction of the same blood leukocytes by inducers eliciting formation of these types of interferon. When inducers interacting with different producer cells are used in this way, the interferon tolerance phenomenon is avoided. Successive induction means a savings of leukocytes, because the same cells can be used to obtain two yields of interferons. Favorable results in research on production of human gamma - and alpha-interferons involving successive use of gamma interferon inducers--phytohemagglutinin (PGA) and staphylococcal enterotoxin (SEA), and an alpha-interferon inducer--Newcastle disease virus (NDV)--are presented. It is concluded that the double successive induction method of the same human peripheral blood leukocytes allows yields of interferon from gamma and alpha interferons. E.A.K.

N86-23230# Joint Publications Research Service, Arlington, Va.
FARM ANIMALS AS SOURCE OF YERSINIOSIS Abstract Only **c52**
Ye. N. Kolos, I. N. Giutov, G. V. Yushchenko, and V. I. Dunayev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 25-26 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 77-80 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The role of farm animals as sources of yersiniosis in humans and as possible carriers was studied. The linear agglutination method was used to study the disease in cattle, sheep and goats, and swine. Samples from mucous membranes, blood and meat and excrement were analyzed. The clinical course of the disease was like that of dysentery. Study of 252 workers at a meat packing plant showed that as many as 42.5% had antibodies of strain 09, while 39.7% had antibodies of strain 03 and 24.6% had antibodies of strain 05B. Similarly, 42.9% of the workers at a pork processing plant had 03 antibodies, while lesser incidence of other strains was noted. At a milk plant, 30.9% showed antibodies of 05 and 26%, those of strain 08. It is suggested that the likely method of human infection from sheep and swine was by contact, while for cattle it was also alimentary. The Y enterocolitica is considered to be an occupational disease. E.A.K.

N86-23231# Joint Publications Research Service, Arlington, Va.
TEST OF ERYTHROCYTE ANTIGEN DIAGNOSTIC AGENT FOR DETECTING ANTIBODIES TO COXIELLA BURNETTI Abstract Only **c52**
N. K. Tokarevich, S. Shramek, and G. A. Bayar *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 26 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 51-55 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The development of a diagnostic procedure and its testing on laboratory models, naturally infected humans and domestic animals is reported. Procedures include determination of the optimum sensitizing dose of lipopolysaccharides (LPS) and preparation of various test and control compounds, and analysis of the retarding effect of passive hemagglutination with a homologous antibody. Negative findings are reported for the serum of laboratory animals not infected with C. burnetti, and there are no false positive results with unsensitized LPS erthrocytes of sheep and data of passive hemagglutination reaction tests with the homologous pathogen. It is indicated that time of detection, titers and the duration of antibody circulation determined by various tests differ markedly. Combined use of complement fixation and passive hemagglutination tests increases the effectiveness of serological detection of Q-fever ricketsiosis, and helps n predicting the course of such infections. E.A.K.

N86-23232# Joint Publications Research Service, Arlington, Va.
DETECTION OF HBsAg IN FAMILIES OF CHILDREN WITH VIRAL HEPATITIS B Abstract Only **c52**
A. R. Reyzis, A. N. Drondina, A. A. Asratyan, M. Yu. Ivanova, and L. K. Kozhevnikova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 27 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 48-51 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The incidence of viral hepatitis (VHB) iin a families of children with confirmed cases of the disease is reported. Over a period of 3 years 142 mothers, 81 fathers and 7 relatives of 162 sick children were studied. Control groups included 39 members of 30 children with HBs-negative VH. Serum studies and countercurrent electrophoresis, precipitation and modifications, and passive hemagglutination reaction tests were conducted. The presence of HBsAg was confirmed in 6.9% of the relatives of children with clinically and laboratory confirmed VHB. A lesser number of medical parental involvement was found in HBsAg-positive parents, which suggested domestic infection of the children by chronic carriers of VHB to be a common phenomenon. Use of passive hemagglutination and countercurrent electrophoresis increased the frequency of detection by a factor of 2.4. E.A.K.

N86-23233# Joint Publications Research Service, Arlington, Va.
HBeAg AND ITS ANTIBODIES IN CARRIERS OF HSsAg IN VARIOUS REGIONS OF USSR Abstract Only **c52**
M. I. Mikhaylov, S. A. Arakelov, T. Ye. Vorozhbiyeva, S. V. Zhavoronok, S. V. Zubov, A. Ye. Kozhukhar, G. N. Khorvat, and V. A. Ananyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 27-28 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 71-74 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The surface antigen of hepatitus B (HBsAg), was studied in

healthy carriers in regions showing various levels of incidence of the disease. Serum of 13,150 donors from the cities of Gorkiy, Vitebsk, Kishinev and Tashkent was studied by precipitation in gel and passive hemagglutination using a diagnostic approach. The HBeAg e-antigen and anti-HBe were determined and data indicate that regions with high incidence of HBsAg also have higher appearance of concentrations of the antigen which could be identified with gel precipitation procedures. The frequency of HBsAg appearance among carriers of the disease antigen is in direct relationship to the level of antigen incidence in a given region, while an inverse relationship is noted for HBeAg. While the level of HBsAg in Gorkiy, Kishinev and Tashkent is 1.4%, 5.0% and 9.0%, respectively, the corresponding figures for HBeAg are 5.5%, 12.3% and 13.3%. E.A.K.

N86-23234# Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF EPIZOOTIC PROCESS IN HEMORRHAGIC FEVER WITH RENAL SYNDROME Abstract Only c52
V. N. Bashkirtsev, Ye. V. Ryltseva, Ye. A. Tkachenko, and A. G. Stepanenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-022) 8 Jan. 1986 p 30 Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 463-468 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Wild rodents caught on natural foci of hemorrhagic fever with renal syndrome (HFRS) in Ufa were analyzed for the presence of specific antigen of HFRS virus, for antibodies to this pathogenic agent and for native HFRS virus. A specific relationship was shown between the infection rate of bank voles with HFRS virus and the levels of circulating antigen and antibody to this virus. The immunity of test animals differed with age, older animals had higher immunity while, the younger animals showed more frequent presence of live virus. When selecting various age groups for isolation of viruses, the younger ones should be taken which have not manifested antibodies to the HFRS virus. E.A.K.

N86-23235# Joint Publications Research Service, Arlington, Va.
AIDS-FREE USSR MONITORING POTENTIAL OUTBREAK THERE Abstract Only c52
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 32 ref Transl. into ENGLISH from TRUD (Moscow, USSR), 6 Oct. 1985 p 4 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Clinical factors about the nature of the acquired immune deficiency syndrome (AIDS) and information on its incidence in the USA and on efforts of medical researchers to find a way of fighting it are reported. World health organization data about AIDS and its incidence around the world, and what is known about the virus are summarized. It is stated, that no cases AIDS have been recorded in the USSR. It is assumed that the problem is largely a social one, which is associated with sexual licentiousness, which is tolerated in certain circles in the West, but contrary to the nature of Soviet society. Soviet scientists are studying all aspects of the new diease. Taking part in the general struggle of the medical profession against this exceptionally serious ailment, the Soviet scientists are ready to cooperate with specialists from other countries. E.A.K.

N86-23236# Joint Publications Research Service, Arlington, Va.
ANTIBIOTIC PROPERTIES OF BIFIDOBACTERIA Abstract Only c52
M. B. Sundukova, V. F. Semenikhina, V. I. Ganina, V. V. Pospelova, N. G. Rakhimova, and M. P. Khaleneva *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 33 Transl. into ENGLISH from Molochnaya Promyshlennost (Moscow, USSR), no. 8, Aug. 1985 p 36-38 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The spectrum of antibiotic activity of Bifidobacterium adolescentis MS-42, isolated from the GI-tract of a nursing infant was tested to determine the potential use of this bifidobacterium in the production of dairy products. Growth inhibition studies on Petri dishes showed that B. adolescentis MS-2 yielded inhibitation zones of 26 to 28 mm on streak plates with Shigella flexneri, Sh. sonnei, Straphylococcus aureus 209-p, Proteus vulgaris, and Proteus mirabilis. The antibiotic effects were confirmed with tube-dilution studies, which also encompassed Escherichia coli. In general, B. adolescentis was shown to exhibit greater antibiotic activity than B. bifidum, which is commonly used for enrichment of various darily products. Dietetic and therapeutic darily products were devsed which contain B. adolescentis MS-2. E.A.K.

N86-23237# Joint Publications Research Service, Arlington, Va.
EFFECT OF PLASMIDS ON VIRULENCE OF PSEUDOMONAS AERUGINOSA STRAINS IN MOUSE EXPERIMENTS Abstract Only
A. S. Yanenko, V. N. Krylov, Ye. S. Stanislavskiy, and Ye. V. Kholodkova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 34 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 19-22 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The effect of plasmids on the virulence of P. aeruginosa PAO strain is reported. Antigen characteristics of P. aeruginosa strains were studied in agglutination reaction on glass with the aid of poly or monovalent agglutinating O-serums of 20 different types. The virulence of 21 strains was studied on white mice. It is shown that the plasmids in PAO strains reduced the virulence of the pathogen. The plasmids that reduce virulence were from various groups of incompatibility and coded various medical resistant determinants with various effects on the growth of P. aeruginosa. Mutations of rpm that stabilized RP4 support in PAO cells also reduced virulence significantly. Chromosome rpm mutations caused changes in cell surfaces of P. aeruginosa. E.A.K.

N86-23238# Joint Publications Research Service, Arlington, Va.
ARTIFICIAL VACCINES AND STIMULATION OF IMMUNITY c52
Valentina Samoilova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 36-37 Repr. from Moscow News (Moscow, USSR), no. 33, 25 Aug. 1 Sep. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The creation of artificial vaccines and the possibility to produce an effective vaccine against any disease is discussed. Substances which could stimulate the organism's protective system, bypassing the gene patrol were examined. Such substances were found in some unsuitable polymeric molecules--polyelectrolytes. It is demonstrated that antigen-carrying polymer molecules include only those lymphocytes which can produce antibodies against the alien substance planted on the carrier. The new vaccines for preventing typhus in mice were tested. New vaccine injection into animals made it possible to save all of them from the disease. The dose of th eantigen was from 50 to 100 times less than in the usual vaccine. The virus has three main antigens two of them are proteins positioned on the surface of the virus particle, while the third is hidden int he membrane of the virus. The antigen planted on the polymeric molecule, ensures a strong generation of antibodies and protects the animals after they are infected with the virus. E.A.K.

N86-23239# Joint Publications Research Service, Arlington, Va.
ARTIFICIAL ANTIGENS, VACCINES REVIEWED c52
V. V. Pokrovskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 38-41 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 106-111 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The chemical synthesis of molecular structures with the desired immunobiological characteristics of antigens to agents of infectious

diseases in humans and animals is a new direction in constructing vaccine preparations and bacterial viral diagnostics. The artificial antigens which have a direct relationship to the agents of infectious diseases are examined. The artificial antigens the determinants are arranged in the form of offshoots from a polyacrylamide chain and these antigens possess the serological and immunoenic activity of he prototypes. The serological activity of the artificial antigen in a number of reactions is higher than the natural analog. The serological activity of artificial antigens was strictly group-specific. The unique properties of completely artificial antigens were usad in creating highly specific diagnostic systems for immunoenzyme analysis. The artificial antigens activate specific immunity without using adjuvant and protective activity which keeps animals from becoming infected with virulent strains of salmonella. E.A.K.

N86-23240# Joint Publications Research Service, Arlington, Va.
OBTAINING HYBRIDOMAS THAT SYNTHESIZE MONOCLONAL ANTIBODIES TO POLYSACCHARIDE OF GROUP A STREPTOCOCCUS Abstract Only c52
Ye. Yu. Pytyeva and E. I. Drobyshevskaya *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 42 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 35-39 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Production of monoclone antibodies (MCA) for A-polysaccharides for A-polysaccharides (A-PS) using group A streptococcus as the immune agent, and treating the resulting culture with pepsin is reported. Details of cell line identification, screening and storage of clones and production of ascites are summarized. Mice subsequently immunized with the compounds had the lowest titers for A-PS and for the vaccine with lower doses, and the highest with doses of 50 mcg/mouse. Analysis of experiments on determining optimum conditions for forming hybrids of spleen and myeloma cells mice. Screening was done with pepsin created vaccines of group A streptococcus and A-PS. It is shown that three of the monoclonal antibodies have ecipitation properties. Hybrid formation depends on the presence of immune splenocytes, rather than on ratios of myeloma cells and lymphocytes. The high yield of hybrids came with growth of cells in 80 to 100% of alveolic. E.A.K.

N86-23241# Joint Publications Research Service, Arlington, Va.
FAB-FRAGMENT OF HETEROLOGIC IMMUNOGLOBULIN FOR FLU PROPHYLAXIS AND TREATMENT Abstract Only c52
V. I. Degtyarenko, V. F. Zevakov, I. M. Maksimenko, and V. A. Divocha *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-022) 8 Jan. 1986 p 43 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1984 p 114-115 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Enzyme breakdown of heterologic immunoglobulin, particularly the bivalent Fab-fragment of antibodies, were studied for prophylactic and treatment effects. A Rivanol-alcohol method was used to separate the antiinfluenza immunoglobulin. After immunication, hyperimmune antiinfluenza serum was obtained from calves and subjected to enzyme hydrolysis. The effectiveness in neutralizing viruses was assessed. It is indicated that fundamentally new preparations should be studied for serum prophylaxis and serotherapy based on the Fab-fragment. E.A.K.

N86-23242# Joint Publications Research Service, Arlington, Va.
DESCRIPTION OF PREPARATION OF CAPSULAR ANTIGEN ISOLATED FROM YERSINIA PESTIS STRAIN EV Abstract Only c52
V. I. Veynblat, M. M. Titenko, M. S. Verenkov, P. I. Menshov, A. V. Kormilitsyn, O. T. Mozharov, A. A. Shcherbakov, A. S. Vasenin, and S. Yu. Zadumina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 19-23 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The capsule antigen (FI) plays an important role in the virulence of Y. pestis and is a leading component of antiplague vaccine. The antigen obtained under mild conditions from hydrolysates of animal protein cultivated at 37C for 38 to 46 hours described. The bacterial mass was separated, distilled and dialysed to obtain test materials for passive hemagglutination. Amino acids, sugars, proteins, nucleic acids, polysaccharides and nitrogen were measured, along with the immunochemical activity of FI in comparison to other antiserums. It is indicated that the physicochemical and immunochemical homogeneity and activity of the preparation, along with viscosity, molecular weight, sedimentation and the isoelectric point, are distinct from those of previously known FIA and FIB capsule antigens. The capsule antigen is pure protein and not a glucoproteide. EAK

N86-23243# Joint Publications Research Service, Arlington, Va.
STUDY OF CELL-WALL ANTIGEN DETERMINANTS IN RIBOSOMAL PREPARATIONS OF GROUP A STREPTOCOCCUS Abstract Only c52
A. R. Shikhman, L. V. Nikolayev, O. A. Kondrakova, B. B. Dzantiyev, Ye. I. Blinnikova, N. F. Dmitriyeva, Ye. P. Savelyev, and G. I. Petrov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 15-19 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Ribosomal vaccines offer maximum immunity and minimum secondary reactions. Group A29, M-type, streptococcus ribosomes collected in of antibodies to M-protein, lipoteichoic acid and A-polysaccharides was studied. Double immunodiffusion by the Ouchterlony method were included that immunization of animals with ribosomes of group A29, M-type streptococcus caused development of antibodies to A-polysaccharides and lipoteichoic acid. E.A.K.

N86-23244# Joint Publications Research Service, Arlington, Va.
HYPOXIA PROPHYLAXIS AGAINST RADIATION INJURY c52
Yuri Samoilov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 48-50 Repr. from Moscow News (Moscow, USSR), no. 32, 18-25 Aug. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

A method which enables patients to breathe mountainous air was developed. The method also reduces side effects resulting from radiotherapy treatment of malignant tumors. Method for the protection from ionizing radiation was developed. Air similar to that found at the mountain altitudes of 5.3 to 5.5 thousand meters above the s a level is pumped in through a face mask. Its oxygen content is twice as low as that of normal air on the plain. The effectiveness of oxygen-poor air is outlined. The reduction of oxygen content is considered to be a universal way to increase the adaptability potential of the organism, and its survivability under extreme conditions. E.A.K.

N86-23245# Joint Publications Research Service, Arlington, Va.
MANY MEDICAL USES FORESEEN FOR ARTIFICIAL SKIN c52
A. Pominov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Trud (Moscow, USSR), 25 Sep. 1985 p 4 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

An artificial biological skin was developed. In 5 to 7 days the skin took, and no scars remained. Skin covering the burn was clear and normal, exhibiting only a color difference at first. The artificial skin is a mixture of two liquids a turbid yellow solution and a crystalline coligen, the main protein in connective tissue. The living water is used for burns, serious injuries, cuts, and scratches. E.A.K.

N86-23246# Joint Publications Research Service, Arlington, Va.
MAGNETOPHORE THERAPY c33

Igor Mosin *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 54-55 Repr. from Moscow News (Moscow, USSR), no. 36, 15-22 Sep. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The development of magnetophore treatment for medical establishments is described. The magnetophores are applied in clinics, hospitals and research centers. Magnetophores are used to treat radiculitis, hypertension, and insomnia magnetophores are made cf various organic of mineral substances mixed with powdery magnetic fillers and later magnetized. E.A.K.

N86-23247# Joint Publications Research Service, Arlington, Va.
SEARCH FOR DNA HOST SFECIFICITY SYSTEMS IN SALMONELLA TYPHI Abstract Only
A. L. Pashenkov, I. I. Nikolskaya, T. G. Nigmatullin, and S. S. Debov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 57 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1984 p 3-6 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Most specificity systems and their components-restriction and modification enzymes were studied. DNA host specificity systems (HSS) in Salmonella typhi, using O- and Vi-bacteriophages were examined. Reduced effectiveness in phage cultivation was regarded as evidence of a restriction system in a given race. During cloning morphological features such as colony size and form, transparency and the size of negative colony centers and incomplete lysis were recorded. The 11 lines of Vi-phages and 6 lines of O-phages obtained are further classified according to size, transparency and titration potential. Test cross-titration showed DNA HSS in natural hosts and the test phages. It is shown that 10 strains among the titrated lines of S. typhi have DNA host specificity systems. E.A.K.

N86-23248# Joint Publications Research Service, Arlington, Va.
ELECTRIC SLEEP METHOD OF PREVENTING FATIGUE BUILD-UP IN SAILORS ON EXTENDED CRUISES c53
Yu. Stenko, I. I. Varenikov, and V. A. Skrupskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 60-65 refs Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 5, May 1985 p 42-44 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The effectiveness of drugs and the electric sleep method in the correction of sleep disturbances were compared. It is suggested that the maintenance of normal sleep and the correction of sleep disturbances is kept by prevention of fatigue build up in special forms of work organization in extended sea cruises. It is concluded that electric sleep therapy is the most effective method in the prevention of adverse effects which are the results of the impact of a ship's environmental factors over a period of many months, also includes the cumulative effects of noise. E.A.K.

N86-23249# Joint Publications Research Service, Arlington, Va.
CLONING AND EXPRESSION OF LEPTOSPIRA POMONA HEMOLYSIN GENE IN ESCHERICHIA COLI Abstract Only
A. A. Dayn, M. N. Rozinov, T. A. Goltsmayer, V. N. Gershanovich, and Yu. G. Chernukha *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 66 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 7-10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The cloning of the genes in E. Coli a approach to the study of microorganism pathogens is another The L. pomona, which in severe cases is accompanied by yellow jaundice, and its expression in E. coil was studied. Chromosome DNA of L. pomona was obtained by a Fisher-Lerman process, DNA phage by phenol extraction and plasmid DNA by alkaline extraction. Cloning involved a gene inventory of bank nd subsequent screening, using cosmides or vectors based on the lambda phage. Features of fragmentation and cloning are summarized. The recombinant phage carrying the hemolysine gene was selected from phage vector lambda l47.1, and also in the phoUC19 vector. Secretions of hemolysin in the culture of E. coli are not observed. E.A.K.

N86-23250# Joint Publications Research Service, Arlington, Va.
ASSESSMENT OF SELECTED PHYSIOLOGICAL INDICATORS IN ANTENNA OPERATORS AT SHORT-WAVE TRANSMITTING AND RECEIVING CENTERS c52
L. V. Pokhodzey *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 67-68 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 7, Jul. 1985 p 36-39 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The effects of electromagnetic emission on personnel servicing antenna feeder systems at short-wave transmitting and receiving stations were assessed. The workers in question were employed at low intermediate, and high wattage stations. No general or long-lasting effects were found on psychological and most physiological parameters, with the different levels of exposure generating a pattern of similar changes which differed somewhat in intensity. Deviations from normal noted, however subsided by the intensity. Deviations from normal noted, however subsided by the end of a working day. The visual analyzer noted functional lability at the end of a day, particularly in workers exposed to the higher intensity fields. Moderate hypotension persisted in workers exposed to moderate and high intensity fields. In all groups hand strength diminished by 18.6 to 25.4% at the end of a working week while the level of reduction in a control--unexposed--group was 10%. Determination of safe levels of electromagnetic exposure requires djustment of radiation intensity. E.A.K.

N86-23251# Joint Publications Research Service, Arlington, Va.
STATUS OF CALCIUM METABOLISM IN COAL MINERS WITH VIBRATION SICKNESS Abstract Only c52
V. V. Kolomiyets *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 75-76 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 9, Sep. 1985 p 13-16 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The status of calcium metabolism in coal miners with various degree of vibration sickness was with data from 32 healthy control males. Total and ionized serum calcium levels were significantly elevated in 94 coal miners with vibration sickness, the degree of elevation show a direct correlation with the clinical severity of the illness. The data show that renal calcium clearance and the calcium binding capacity of the serum in the patient group is diminished in comparison with the control subjects. Urine calcium levels did not show any statistical differences between these two gropus. It is indicated that vibration sickness is accompanied by a profound alteration in calcium homestasis, due in large to enhanced calcium resorption in the kidneys. E.A.K.

N86-23252# Joint Publications Research Service, Arlington, Va.
DISEASES IN CEMA COUNTRIES
Vladimir Petrunya *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86=002) 8 Jan. 1986 p 78-80 Repr. from New Times (Moscow, USSR), no. 36, Sep. 1985 p 22-23 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

The pooling of the efforts of medical specialists from several countries is outlined. The standing committee on cooperation in health services is an international organization which coordinates the need for organ transplants in East European countries. The commission has worked on 13 large-scale composite problems. Among these problems are cardiovascular diseases, malignant tumors, scientific elaboration and unification of methods and means of clinical laboratory diagnosis. Every participating country acts as coordinator of the work on one or another composite problem. Bulgaria coordintes effort in the field of labor hygiene and occupational diseases, Hungary in research in the standardization

of medicines, the G.D.R.--in infectious diseases, and Poland--in maternity and child protection. Czechoslovakia is coordinator of work in transplantation of organs and tissues. E.A.K.

N86-23253# Joint Publications Research Service, Arlington, Va.
MODEL OF EXPERIMENTAL PIXUNA VIRUS INFECTION IN WHITE MICE
N. P. Chizhov and R. I. Lukyanova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 91-93 refs Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 214-215 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Use of experimental models of virus-infected animals is an important prerequisite of evaluating the spectrum of action of promising antiviral drugs. The development and use of new experimental models of virus infections comparable or similar in pathogenesis to human diseases are significant in the determination of the preventive and therapeutic effectiveness of antiviral drugs. The development of a nonlethal model of experimental infection evoked by Pixuna alpha-virus which is suitable in the evaluation of the effectiveness of antiviral drugs is discussed. The model of nonlethal disease in white mice which is evoked by Pixuna alpha-virus can be used to evaluate the effectiveness of antiviral preparations and interferon inducers. The models critera for evaluating the effectivenss of antiviral preparations are heir influence on viruse reproduction in the spleen and brain. E.A.K.

N86-23254# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL EVALUATION OF PATHOGENICITY OF DIFFERENT VARIANTS OF LASSA VIRUS
A. S. Vladyko, L. Ye. Surikova, T. A. Vovk, I. A. Cherednichenko, and A. V. Torop *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences refs Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 454-457 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Lasso, Machupo and Khunin belong to the highly pathogenic group of the arenavirus family. Research is conducted with the less-pathogenic lymphocytic choriomeningitis (LCM) virus. One of the directions of research on arenavirus infections is concerned with the problems of the attenuation--acquisition of both nonpathogenic viruses and viruses with reduced pathogenicity. The characteristics (markers) by which the degree of attenuation of the infectious agent can be evaluated was examined. It is established, using LCM virus as an example, that a phenotypic characteristic such as plaque morphology can be used as such a marker. It was discovered that the color of plaques in viruses that do not evoke death of newborn mice differs from the color of plaques created by the initial virus. A dependence between plaque phenotype and pathogenicity is not discovered in LCM virus. The Lassa virus was used to demonstrate the presence of a dependence between plaque phenotype and pathogenicity. The possibility of reducing pathogenicity by conducting a number of passages of the virus in cell culture and in animals is accounted for. Plaque size serves as the phenotypic characteristic of attenuation of Lassa virus. E.A.K.

N86-23255# Joint Publications Research Service, Arlington, Va.
STANDARDIZATION OF CONDITIONS FOR MEASURING INTENSITY OF SPECIFIC FLUORESCENCE IN CONTINUOUS CELL CULTURES INFECTED WITH VARIANTS OF JAPANESE ENCEPHALITIS VIRUS Abstract Only
Yu. N. Cherednichenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 100 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 57-60 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Luminescent microscopy as a method for studying pathogenesis of human and animal viral infections is discussed. The dynamics of the intensity of imposed fluorescence of marked antibodies tied to the antigen of Japanese encephalitis in vitro were studied. Cells of various origins were tested a passive fluorescent antibody method. Procedures for standardization and perfection of methodology and statistical calculations are summarized. A direct linear correlation is found between pathogen activity of Japanese encephalitis and the intensity of imposed fluorescence of marked antibodies. Continuous Viro and L929 cell cultures are more suitable models for registering induced fluorescence than the HeLa line. E.A.K.

N86-23256# Joint Publications Research Service, Arlington, Va.
VACCINE PROTEINS R AND D ON SALYUT-7 Abstract Only
c52
T. Chesanova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 107 Transl. into ENGLISH from Leningradskaya Pravda (Leningrad, USSR), 13 Oct. 1985 p 2 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Experiments performed on Salyut orbiting stations were aimed, at obtaining extrapure hemagglutinin and other surfae proteins of the influenza virus, using the electrophoresis method. The space experiments demonstrated that such products can be obtained in conditions of zero gravity. A new-generation electrophoretic unit the EFU-Robot is used on the Salyut-7 station. The EFU-Robot can be programmed to select samples of substances purified in the course of experiments and automatically transfer the samples from the unit's working chamber to ampules, by syringes. E.A.K.

N86-23257# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL ADAPTATION RESEARCH AT BIOLOGY INSTITUTE Abstract Only
Vladimir Nikolayevich Chernyavskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 108-109 Transl. into ENGLISH from Trud (Moscow, USSR), 26 Sep. 1985 p 3 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

Natural mechanisms of anticipation of weather changes in animals and human beings, and effects of weather conditions on human behavior and working fitness were studied. A natural phenomenon, meteorological sounds noise of free atmosphere which is caused by turbulent motion of the air was discovered. The sound reflect the atmosphere properties in a certain area, including the appearance of new air masses in the upper atmosphere. Living organisms unconsciously perceive these sounds, analyze them and modify their behavior accordingly. A hypothesis of human meteorological adaptation proposed that the organism perceives and remembers whole meteorological sound-images which occur at certain intervals in certain localities, and corresponding programs for the readjustment of functional systems of the organism. The biological forecasting mechanism may lead to the development of improved weather-forecasting methods and equipment. An acoustic weather-forecasting method was used in the Rostov-na-Donu area. A medical forecasting method using primary data, based on the meteorological-adaptation hypothesis was also developed. Ecological factors are considered in the forecasting and prevention of illness. E.A.K.

N86-23258# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
12 Mar. 1986 147 p Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-004) Avail: NTIS HC A07/MF A01

Progress in research and development in USSR life, biomedical, and behavioral sciences is reported. The following areas of interest are discussed: agrotechnology, biochemistry, biophysics, biochemistry, biotechnology, ecology, epidemiology, genetics, immunology, laser effects, marine mammals, medicine, microbiology, molecular biology, pharmacology and toxicology, physiology, public health, psychology, and virology. For individual titles, see N86-23259 through N86-23264.

N86-23259# Joint Publications Research Service, Arlington, Va.
ESTIMATE OF EMOTIONAL STRESS DURING WORKING ACTIVITY BASED ON SYSTEMS ANALYSIS OF SKIN-GALVANIC REACTION Abstract Only c52
G. K. Rakov and Yu. A. Fadeyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 101 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 3, May - Jun. 1985 p 463-469 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

Emotional factors of labor and the nature of their relationship to emotional reactions of female electronics-industry workers during assembly and subsequent testing of the electronic-optical system of color kinescopes. Twenty healthy female workers 18 to 40 years of age were determined were studied during assembly of electronic equipment. Significant differences were found between three working stages: (1) pressing in of subassemblies; (2) testing of the capacitance of electron guns; and (3) attachment of cathods holders. It was found that the skin-galvanic reaction is an adequate indicator of emotional stress during working activity. Systems analysis of operations or pressing in assemblies in correlation with development of skin-galvanic responses revealed emotiogenic stages of activity. E.A.K.

N86-23260# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF COMPLEXITY OF CONTROL TASK ON LEVEL OF ACTIVATION OF OPERATORS PHYSIOLOGICAL FUNCTIONS WHEN WORKING WITH WAITING Abstract Only c52
M. A. Gritsevskiy and Zh. I. Zaytseva *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 102 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 3, May - Jun. 1985 p 504-510 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

Experiments were conducted to answer two questions: (1) do model experiments reveal differences in the functional status in comparing operator's work with various degrees of complexity; and (2) are these changes similar in nature to those manifestations of differing intensity discovered under production conditions. Programs with various specific shares of single and multiple movement control tasks were used to model operators work of varying degrees of complexity. During the experiments, reaction time, EEG, skin-galanic reaction and pulse rate were continually recorded. Differences in bioenergetic activity of the cerebral cortex and differences in autonomic activity and regulations were observed. It is indicated that waiting for signals requiring complex processing is accompanied by higher mobilization of preparedness of the operator. Decreased attention level was observed at the beginning of the day and toward the end of long days. E.A.K.

N86-23261# Joint Publications Research Service, Arlington, Va.
REVIEW OF BOOK ON PRINCIPLES OF AVIATION PSYCHOLOGY Abstract Only c53
A. Morozov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 118 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Dec. 1985 p 2 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

Aviation psychology substantiates interrelated principles of occupational screening, the structure of in-flight work, and flight capabilities which are connected with the instruction and training of future pilots is discussed. Psychological features of flight duty, problems of flight capabilities, occupational screening, the formation and maintenance of flight skills, the role of the personal factor in ensuring the quality of flights, the instruction and training of flight personnel, are examined. Recommendations for the use of psychological data to heighten flight safety are formulated. E.A.K.

N86-23262# Joint Publications Research Service, Arlington, Va.
APPARATUS ASSEMBLY FOR PSYCHOPHYSICAL STUDIES ON VISUAL PERCEPTION Abstract Only c35
A. I. Nazarov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 121 Transl. into ENGLISH from Voprosy Psilhologii (Moscow, USSR), no. 3, May-Jun. 1985 p 159-162 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

A schematic outline is presented of an apparatus assembly used for computerized study of visual perception in humans. A screen terminal is used for providing various visual stimuli, which is based on a fast phosphor (P-4). The assembly included a variety of electronic equipment and a newly designed apparatus for visual perception. The adaptability of the assembly is indicated by the fact that the basic set-up has been used for 5 years without significant modifications. E.A.K.

N86-23263# Joint Publications Research Service, Arlington, Va.
METHOD OF CHANGES IN REVERSIBLE PATTERN MASKING AS FACTOR IN VISUAL PERCEPTION Abstract Only c52
V. M. Krol and Ye. I. Bondar *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 122 Transl. into ENGLISH from Voprosy Psikhologii (Moscow, USSR), no. 3, May - Jun. 1985 p 162-164 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MFen1] A01

Temporal characteristics of form perception were analyzed in relation to masking patterns. It is demonstrated that different masks exert different effects on various stages of perception. Three stages were identified in form perception using stimuli consisting of alternating bands and lines arranged in horizontal patterns, and masking patterns consisting either of random curvilinear lines alone or supplemented with solid, short, bands. The different masking patterns exerted different effects (prolongation) on the threshold times for amorphous perception, approximate classification of test pattern, and on object identification. It is demonstrated that different masking patterns significantly affect different stages of form perception, and can be utilized in the analysis of the latter. E.A.K.

N86-23264# Joint Publications Research Service, Arlington, Va.
OXYGEN-LIBERATING MIXTURES FOR BREATHING APPARATUS Abstract Only c54
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 131 Transl. into ENGLISH from Sovetskaya Belorussiya (Minsk, USSR), 10 Dec. 1985 p 4 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

Mixtures which are capable at any time of releasing their stored oxygen were prepared. When heated, 100 grams of a substance ground into powder releases more than 40 liters of gas. This is enough to sustain human respiration for several hours in extreme conditions. Such a need may arises in medical practice, in mines, under water, and high in the mountains. The development of these alloys is the result of theoretical and experimental work. Their components are mixtures of salts and inorganic peroxides. E.A.K.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-23265* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CUMULATIVE INDEX TO THE 1985 ISSUES
Jan. 1986 291 p
(NASA-SP-7011(280); NAS 1.21:70011(280)) Avail: NTIS HC A13 CSCL 06E

This publication is a cumulative index to the abstracts contained in the Supplements 268 through 279 of Aerospace Medicine and Biology: A Continuing Bibliography. It includes seven indexes - subject, personal author, corporate source, foreign technology, contract number, report number, and accession number. Author

N86-23266 California Univ., Berkeley.
HUMAN HEAD/NECK/UPPER-TORSO MODEL RESPONSE TO

DYNAMIC LOADING Ph.D. Thesis
Yih-Charng Deng 1985 282 p
Avail: Univ. Microfilms Order No. DA8524927

A human head/neck/upper-torso replica was constructed and instrumented to study its reponse to impact and dynamic loading. The model consists of a water-filled cadaver skull; plastic vertebrae, sternum and ribs; silicon rubber disks and ligaments; and fabric muscles. The static behavior of the system under sagittal plane and lateral loading was adjusted so as to correspond to that of cadaver behavior under similar loading. The tests conducted involved impulsive loading to the torso generated by means of a sled and track system and by direct head impact with a suspended steel ball. A three-dimensional lumped-parameter model of the human head/neck/upper-torso was developed in order to predict its motion for any specified initial conditions that could also be used to compare with other investigators' results. The simulation results indicate favorable comparison with the human volunteer test data for both flexion and lateral whiplash. However, the physical structure appeared to be more flexible than the numerical model. Dissert. Abstr.

N86-23267 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
A SURVEY OF SPEECH AUDIOMETRY IN THE NATIONAL HEALTH SERVICE
H. C. Fuller and I. K. Moss Aug. 1985 52 p refs
(NPL-AC-105; ISSN-0143-7143) Copyright. Avail: Issuing Activity

Nine clinics in the UK National Health Service (NHS) were visited to discuss with the audiologists the technique of speech audiometry and to observe how the tests were conducted. The information gained was used to construct a questionnaire which was then circulated to NHS hearing aid clinics throughout the UK. Topics covered included the frequency of use of speech audiometry, word lists, recordings, equipment and test procedures, criticisms of test material, and limitations on the use of speech audiometry. Author (ESA)

N86-23268# British Aerospace Aircraft Group, Bristol (England). Human Factors Dept.
THE BAe D TARGET ACQUISITION MODEL ORACLE: AN OVERVIEW, 1984
J. L. Hinton Feb. 1984 30 p refs
(BAe-JS-10009; BR94986) Avail: Issuing Activity

The concepts used in the ORACLE model of human visual performance, and in system models that may be used with it are outlined. The state of the model is described, including the modeling of human visual performance and treatment of visual aids. Model uses are summarized. Author (ESA)

N86-23269# Sloan-Kettering Inst. for Cancer Research, New York.
BIOMEDICAL RESEARCH WITH CYCLOTRON PRODUCED RADIONUCLIDES Progress Report, 1 Aug. 1984 - 31 Jul. 1985
J. S. Laughlin 31 Aug. 1985 62 p refs
(Contract DE-AC02-77EV-04268)
(DE86-000327; DOE/EV-04268/T4) Avail: NTIS HC A04/MF A01

Nine interrelated studies are reported on experimental and clinical uses of nitrogen-13 or carbon-11. Chemical and enzymatical methods are provided for the production of labelled amino acids. Comparative distribution studies of N-13 ammonia, glutamine, (ALPHA)-aminobutyric acid, methionine, valine, leucine, and glutamate after retro-orbital injection have been completed. The data show most of the label (% dose/organ) going to liver and muscle regardless of the injected agent. DOE

N86-23270# Oak Ridge National Lab., Tenn.
RADIATION INDUCTION OF CANCER OF THE SKIN
R. J. M. Fry, J. B. Storer, and F. J. Burns 1985 13 p refs
Presented at the Workshop on Radiation Damage To Skin: Fundamental and Practical Aspects, Paris, France, 9 Oct. 1985
Prepared in cooperation with New York Univ., N.Y.
(Contract DE-AC05-84OR-21400)
(DE86-002201; CONF-851065-1) Avail: NTIS HC A02/MF A01

The induction of epidermal tumors was studied using exposures to 25 kV X-rays with or without subsequent exposures to 12-0-tetradeconyl phorbol-13 acetate (TPA) or ultraviolet radiation (UVR) 280 to 400 nm. Fractionation regimens and total exposure up to 4000R produced no squamous cell carcinomas. When these regimes were followed by TPA an incidence of about 80% was obtained, and incidence of 60% when UVR exposures followed the x-irradiation. A dose-dependent increase in fibrosarcomas was found when x-irradiation was followed by 24 weeks of topical treatment with TPA. These results support the contention that UVR can enhance the expression of cells initiated by X-rays. The experimental evidence is compared with the data from the tinea capitis patients treated with X-rays. In C3HF/He male mice exposed to 50, 100, 150 and 200 rads (137)Cs gamma rays the induction rate for fibrosarcomas was 2.9 x 10(-4) per cGy/per mouse. This result compares with 2.5 x 10(-6) transformations per surviving cell per cGy with 10T1/2 cells that are fibroblasts derived from C3H mice. DOE

N86-23271# Oak Ridge National Lab., Tenn.
PRODUCTION AND CHARACTERIZATION OF ANTIBODIES TO BENZO(A)PYRENE
G. D. Griffin, K. R. Ambrose, R. N. Thomason, C. M. Murchison, M. McManis, P. G. R. St.Wecker, and T. Vo-Dinh 1985 13 p refs Presented at the 10th International Symposium on Polynuclear Aromatic Hydrocarbons, Columbus, Ohio, 21 Oct. 1985 Prepared in cooperation with Tennessee Univ., Knoxville, Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-002204; CONF-851068-3) Avail: NTIS HC A02/MF A01

This report describes the preparation of antibodies to benzopyrene labelled bovine serum albumin. DOE

N86-23272# Food and Drug Administration, Rockville, Md. Center for Devices and Radiological Health.
MEASUREMENT TECHNIQUES FOR USE WITH TECHNIQUE/EXPOSURE GUIDES Final Report
E. F. Manny and R. L. Burkhardt Aug. 1985 30 p
(PB86-123718; HHS/PUB/FDA-85-8248; FDA/CDRH-86/7) Avail: NTIS HC A03/MF A01 CSCL 06E

The Center for devices and Radiological Health recommends that diagnostic radiology facilities evaluate the radiation exposure received by their patients. The technical factors which must be considered in instituting a radiation exposure measurement program as a basis for this evaluation are discussed. Center radiation exposure measurement methods are described. GRA

N86-23273# Food and Drug Administration, Rockville, Md. Center for Devices and Radiological Health.
EVALUATION OF RADIATION EXPOSURE FROM DIAGNOSTIC RADIOLOGY EXAMINATIONS: GENERAL RECOMMENDATIONS Final Report
Aug. 1985 10 p refs
(PB86-125903; HHS/PUB/FDA-85-8246; FDA/CDRH-86/5) Avail: NTIS HC A02/MF A01 CSCL 06E

Optimization of the medical radiation the public receives by minimizing unnecessary radiation exposure and improving the diagnostic benefit from the necessary exposure is discussed. Steps toward this goal include a performance standard for the manufacture and installation of X-ray equipment, quality assurance guidance for the maintenance of the equipment, training in the proper use of the equipment, and selection criteria for X-ray examinations. Recommendations are listed that introduce an additional basic step. GRA

N86-23274# Food and Drug Administration, Rockville, Md. Center for Devices and Radiological Health.
EVALUATION OF RADIATION EXPOSURE FROM DIAGNOSTIC RADIOLOGY EXAMINATIONS: TECHNIQUE/EXPOSURE GUIDES FOR THE CRANIOCAUDAL PROJECTION IN MAMMOGRAPHY Final Report
Aug. 1985 10 p refs

(PB86-126075; DHHS/PUB/FDA-85-8244; FDA/CDRH-86/4) Avail: NTIS HC A02/MF A01 CSCL 06E

Suggestions for appropriate Technique/Exposure guides for use with the mammographic craniocaudal projection are presented. This type of projection is the most commonly used mammographic view and much exposure data is available for it. Problems affecting radiation exposure and image quality with one projection often are problems affecting all projections conducted with a particular X-ray imaging systems. The use of T/E guides to detect and correct the problems with the craniocaudal projection will have a beneficial effect on exposure levels and image quality of other projections conducted on the same system. GRA

N86-23275# Food and Drug Administration, Rockville, Md. Center for Devices and Radiological Health.

BEHAVIORAL EFFECTS OF MICROWAVE RADIATION ABSORPTION Final Report

J. C. Monahan and J. A. DAndrea Aug. 1985 173 p refs Prepared in cooperation with Utah Univ., Salt Lake City

(PB86-113735; HHS/PUB/FDA-85-8238; FDA/CDRH-85/72) Avail: NTIS HC A08/MF A01 CSCL 06R

The need for an understanding of the biological effects induced by exposure to microwave radiation has increased in recent years because of increased usage and applications and also concerns about potential adverse health effects. Although many research studies have been conducted to examine the question of biological effects, the information is scattered in many diverse sources. This publication brings together in a single source the major research findings related to the behavioral consequences of microwave exposure. In addition it attempts to provide a critical assessment of this information and to provide a perspective upon which the reader can interpret the findings. This publication begins with a review of behavioral-microwave research in the Soviet Union and then proceeds to examine the work of researchers in the Western countries. Both learned and unlearned behaviors are examined in the context of microwave induced effects. GRA

N86-23276# Health Effects Research Lab., Research Triangle Park, N. C.

SYSTEM FOR MEASUREMENT OF SMALL VIBRATIONS AT MATERIAL INTERFACES INDUCED BY ELECTROSTRICTIVE FORCES

J. S. Ali and W. T. Joines Oct. 1985 157 p refs

(PB86-116530; EPA-600/1-85-021) Avail: NTIS HC A08/MF A01 CSCL 06B

The mechanisms of interaction of ELF and ELF-modulated RF fields with biological systems is presently an active area of research. Some models propose that field-induced forces may influence certain observed biological effects such as RF hearing and calcium ion efflux. To investigate the validity of the field-induced force model for the calcium-ion efflux effect, a system is needed which is capable of exposing samples to ELF fields or to ELF-modulated RF fields. At the same time the induced vibration caused by the forces of electrostriction must be monitored preferably by a non-contacting method. A microwave phase-sensitive receiver was designed to sense the small vibrations. Limitations on the receiver sensitivity imposed by phase noise is discussed. Phase noise measurement systems were designed and used to charactrize the key receiver components. A limiting amplifier in the IF section of the receiver eliminates the need for knowledge of the reflection coefficient of the object of interest for quantitative vibration measurements. GRA

N86-23277# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.

HUMAN REACTIONS TO TRANSIENT ELECTRIC CURRENTS Final Report

J. P. Reilly and W. D. Larkin Jun. 1985 172 p Sponsored in part by the Maryland Dept. of Natural Resources, Annapolis and the Canadian Electrical Association, Montreal, Quebec

(PB86-117280; PPSP/JHU/PPSE-T-34) Avail: NTIS HC A08/MF A01 CSCL 06P

Research carried out at the Johns Hopkins University Applied Physics Laboratory on aspects of human sensitivity to transient electrical stimulation is described. High-voltage short-duration currents of the kinds that may be encountered near power substations, transmission lines, or industrial apparatus are emphasized. Human sensitivity is measured for a variety of stimulating conditions, both at the threshold of perception and above it, up to the tolerance limit. A neural excitation model is invoked to account for a wide array of sensory effects, and to serve as a framework for predicting effects not studied. Among the factors studied are: voltage, capacitance; polarity, waveshape, and duration of the stimulating waveforms; ac versus dc stimulating; electrode approach velocity and contact force; skin temperature; skin resistance; skin hydration; electrode contact area; and stimulated body location. GRA

N86-23227# Joint Publications Research Service, Arlington, Va.

DISCOVERY REGARDING ELECTRON REDISTRIBUTION AMONG CELL MEMBRANES Abstract Only

I. Novodvorskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 12 Transl. into ENGLISH from Izvestiya (Moscow, USSR), 27 Sep. 1985 p 3 (For primary document see N86-23222 13-51)

Avail: NTIS HC A06

N86-23229# Joint Publications Research Service, Arlington, Va.

PRODUCTION OF GAMMA- AND ALPHA-INTERFERON BY HUMAN BLOOD LEUKOCYTES UNDER SUCCESSIVE INDUCTION CONDITIONS

T. G. Orlova, L. V. Zhdanova, M. N. Soloyeva, and L. M. Mentkevich *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 22-24 refs Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 196-198 (For primary document see N86-23222 13-51)

Avail: NTIS HC A06

N86-23230# Joint Publications Research Service, Arlington, Va.

FARM ANIMALS AS SOURCE OF YERSINIOSIS Abstract Only

Ye. N. Kolos, I. N. Giutov, G. V. Yushchenko, and V. I. Dunayev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 25-26 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 77-80 (For primary document see N86-23222 13-51)

Avail: NTIS HC A06

N86-23231# Joint Publications Research Service, Arlington, Va.

TEST OF ERYTHROCYTE ANTIGEN DIAGNOSTIC AGENT FOR DETECTING ANTIBODIES TO COXIELLA BURNETTI Abstract Only

N. K. Tokarevich, S. Shramek, and G. A. Bayar *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 26 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 51-55 (For primary document see N86-23222 13-51)

Avail: NTIS HC A06

N86-23232# Joint Publications Research Service, Arlington, Va.

DETECTION OF HBsAg IN FAMILIES OF CHILDREN WITH VIRAL HEPATITIS B Abstract Only

A. R. Reyzis, A. N. Drondina, A. A. Asratyan, M. Yu. Ivanova, and L. K. Kozhevnikova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 27 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 48-51 (For primary document see N86-23222 13-51)

Avail: NTIS HC A06

N86-23233# Joint Publications Research Service, Arlington, Va.

HBeAg AND ITS ANTIBODIES IN CARRIERS OF HSsAg IN VARIOUS REGIONS OF USSR Abstract Only

M. I. Mikhaylov, S. A. Arakelov, T. Ye. Vorozhbiyeva, S. V. Zhavoronok, S. V. Zubov, A. Ye. Kozhukhar, G. N. Khorvat, and

V. A. Ananyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 27-28 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 71-74 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23234# Joint Publications Research Service, Arlington, Va.
SOME CHARACTERISTICS OF EPIZOOTIC PROCESS IN HEMORRHAGIC FEVER WITH RENAL SYNDROME Abstract Only
V. N. Bashkirtsev, Ye. V. Ryltseva, Ye. A. Tkachenko, and A. G. Stepanenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-022) 8 Jan. 1986 p 30 Transl. into ENGLISH from Voprosy Virusologii (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 463-468 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23235# Joint Publications Research Service, Arlington, Va.
AIDS-FREE USSR MONITORING POTENTIAL OUTBREAK THERE Abstract Only
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 32 ref Transl. into ENGLISH from TRUD (Moscow, USSR), 6 Oct. 1985 p 4 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23236# Joint Publications Research Service, Arlington, Va.
ANTIBIOTIC PROPERTIES OF BIFIDOBACTERIA Abstract Only
M. B. Sundukova, V. F. Semenikhina, V. I. Ganina, V. V. Pospelova, N. G. Rakhimova, and M. P. Khaleneva *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 33 Transl. into ENGLISH from Molochnaya Promyshlennost (Moscow, USSR), no. 8, Aug. 1985 p 36-38 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23238# Joint Publications Research Service, Arlington, Va.
ARTIFICIAL VACCINES AND STIMULATION OF IMMUNITY
Valentina Samoilova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 36-37 Repr. from Moscow News (Moscow, USSR), no. 33, 25 Aug. 1 Sep. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23239# Joint Publications Research Service, Arlington, Va.
ARTIFICIAL ANTIGENS, VACCINES REVIEWED
V. V. Pokrovskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 38-41 refs Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 106-111 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23240# Joint Publications Research Service, Arlington, Va.
OBTAINING HYBRIDOMAS THAT SYNTHESIZE MONOCLONAL ANTIBODIES TO POLYSACCHARIDE OF GROUP A STREPTOCOCCUS Abstract Only
Ye. Yu. Pytyeva and E. I. Drobyshevskaya *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 42 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 7, Jul. 1985 p 35-39 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23241# Joint Publications Research Service, Arlington, Va.
FAB-FRAGMENT OF HETEROLOGIC IMMUNOGLOBULIN FOR FLU PROPHYLAXIS AND TREATMENT Abstract Only
V. I. Degtyarenko, V. F. Zevakov, I. M. Maksimenko, and V. A. Divocha *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-022) 8 Jan. 1986 p 43 Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1984 p 114-115 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23242# Joint Publications Research Service, Arlington, Va.
DESCRIPTION OF PREPARATION OF CAPSULAR ANTIGEN ISOLATED FROM YERSINIA PESTIS STRAIN EV Abstract Only
V. I. Veynblat, M. M. Titenko, M. S. Verenkov, P. I. Menshov, A. V. Kormilitsyn, O. T. Mozharov, A. A. Shcherbakov, A. S. Vasenin, and S. Yu. Zadumina *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 19-23 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23243# Joint Publications Research Service, Arlington, Va.
STUDY OF CELL-WALL ANTIGEN DETERMINANTS IN RIBOSOMAL PREPARATIONS OF GROUP A STREPTOCOCCUS Abstract Only
A. R. Shikhman, L. V. Nikolayev, O. A. Kondrakova, B. B. Dzantiyev, Ye. I. Blinnikova, N. F. Dmitriyeva, Ye. P. Savelyev, and G. I. Petrov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Moscow, USSR), no. 4, Apr. 1985 p 15-19 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23244# Joint Publications Research Service, Arlington, Va.
HYPOXIA PROPHYLAXIS AGAINST RADIATION INJURY
Yuri Samoilov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 48-50 Repr. from Moscow News (Moscow, USSR), no. 32, 18-25 Aug. 1985 p 10 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23245# Joint Publications Research Service, Arlington, Va.
MANY MEDICAL USES FORESEEN FOR ARTIFICIAL SKIN
A. Pominov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences Transl. into ENGLISH from Trud (Moscow, USSR), 25 Sep. 1985 p 4 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23250# Joint Publications Research Service, Arlington, Va.
ASSESSMENT OF SELECTED PHYSIOLOGICAL INDICATORS IN ANTENNA OPERATORS AT SHORT-WAVE TRANSMITTING AND RECEIVING CENTERS
L. V. Pokhodzey *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 67-68 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 7, Jul. 1985 p 36-39 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23251# Joint Publications Research Service, Arlington, Va.
STATUS OF CALCIUM METABOLISM IN COAL MINERS WITH VIBRATION SICKNESS Abstract Only
V. V. Kolomiyets *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 75-76 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 9, Sep. 1985 p 13-16 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23256# Joint Publications Research Service, Arlington, Va.
VACCINE PROTEINS R AND D ON SALYUT-7 Abstract Only
T. Chesanova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 107 Transl. into ENGLISH from Leningradskaya Pravda (Leningrad, USSR), 13 Oct. 1985 p 2 (For primary document see N86-23222

13-51)
Avail: NTIS HC A06

N86-23259# Joint Publications Research Service, Arlington, Va.
ESTIMATE OF EMOTIONAL STRESS DURING WORKING ACTIVITY BASED ON SYSTEMS ANALYSIS OF SKIN-GALVANIC REACTION Abstract Only
G. K. Rakov and Yu. A. Fadeyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 101 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 3, May - Jun. 1985 p 463-469 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

N86-23260# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF COMPLEXITY OF CONTROL TASK ON LEVEL OF ACTIVATION OF OPERATORS PHYSIOLOGICAL FUNCTIONS WHEN WORKING WITH WAITING Abstract Only
M. A. Gritsevskiy and Zh. I. Zaytseva *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 102 Transl. into ENGLISH from Fiziologiya Cheloveka (Moscow, USSR), v. 11, no. 3, May - Jun. 1985 p 504-510 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

N86-23263# Joint Publications Research Service, Arlington, Va.
METHOD OF CHANGES IN REVERSIBLE PATTERN MASKING AS FACTOR IN VISUAL PERCEPTION Abstract Only
V. M. Krol and Ye. I. Bondar *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 122 Transl. into ENGLISH from Voprosy Psikhologii (Moscow, USSR), no. 3, May - Jun. 1985 p 162-164 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MFen1] A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-23278# Defence Research Information Centre, Orpington (England).
PSYCHOLOGICAL SELECTION OF PERSONNEL FOR EMPLOYMENT IN THE ANTARCTIC
L. Crocq, J. Rivolier, and G. Cazes Mar. 1985 21 p Transl. into ENGLISH from Medecine et Armees vol. 1, no. 7, 1973
(DRIC-T-7449; BR95294) HC A02/MF A01

Selection methods and methods of behavior monitoring of subjects wintering in Antarctic bases are described. The psychological selection aims to predict the adaptability of the subject to the extreme environment. Procedures for carrying out objective studies in the field of individual and collective phenomena of maladjustment, and the factors which determine or promote them are discussed. Author (ESA)

N86-23279# Harvard Univ., Cambridge, Mass.
VISUAL HEMISPHERIC SPECIALIZATION: A COMPUTATIONAL THEORY Technical Report, 1 Apr. - 31 Oct. 1985
Stephen M. Kosslyn 31 Oct. 1985 82 p
(Contract N00014-85-K-0291)
(AD-A161296; TR-7) Avail: NTIS HC A05/MF A01 CSCL 12/1

Visual recognition, navigation, tracking and imagery are deposited to involve some of the same types of representations and processes. The first part of this paper develops a theory of some of the shared types of representations and processing modules. This theory is developed in light of computational, neuroanatomical, neurophysiological, and behavioral considerations. The second part of the paper develops a mechanism for the development of lateralization of visual function in the brain. This theory leads to predictions about the lateralization of the putative processing modules. The third part of the paper examines critical tests of these predictions, and reviews relevant empirical findings in the literature. Author (GRA)

N86-23280# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
REPORT FROM A BEHAVIORAL SCIENCE STUDY GRIP TO AUSTRALIA, 23 AUG. - 10 SEP. 1985
Gerry Larsson Oct. 1985 12 p refs In SWEDISH; ENGLISH summary
(FOA-C-50027-H3; ISSN-0347-7665) Avail: NTIS HC A02/MF A01

Mental stimulation and means to overcome stress are discussed. Practical techniques and measuring instruments for mental stimulation are commented on. A positive correlation between arousal level and performance, and negative correlation for anxiety and performance are considered. As both exist in variable proportions in practice, the total performance may be represented as an inverted U-curve. Decision making under stress conditions is analyzed. Author (ESA)

N86-23248# Joint Publications Research Service, Arlington, Va.
ELECTRIC SLEEP METHOD OF PREVENTING FATIGUE BUILD-UP IN SAILORS ON EXTENDED CRUISES
Yu. Stenko, I. I. Varenikov, and V. A. Skrupskiy *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-002) 8 Jan. 1986 p 60-65 refs Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 5, May 1985 p 42-44 (For primary document see N86-23222 13-51)
Avail: NTIS HC A06

N86-23261# Joint Publications Research Service, Arlington, Va.
REVIEW OF BOOK ON PRINCIPLES OF AVIATION PSYCHOLOGY Abstract Only
A. Morozov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 118 Transl. into ENGLISH from Vozdushnyy Transport (Moscow, USSR), 17 Dec. 1985 p 2 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-23281# Lawrence Livermore National Lab., Calif.
DESIGN GUIDELINES FOR THE USE OF AUDIO CUES IN COMPUTER INTERFACES
D. A. Sumikawa, M. M. Blattner, K. I. Joy, and R. M. Greenberg Jul. 1985 25 p Presented at the 19th Annual Hawaii International Conference on System Sciences, Honolulu, Hawaii, 8 Jan. 1986 Prepared in cooperation with California Univ., Davis, Calif.
(Contract W-7405-eng-48)
(DE85-015176; UCRL-92925; CONF-860107-1) Avail: NTIS HC A02/MF A01

A logical next step in the evolution of the computer-user interface is the incorporation of sound thereby using our senses of hearing in our communication with the computer. This allows our visual and auditory capacities to work in unison leading to a more effective and efficient interpretation of information received from the computer than by sight alone. In this paper we examine earcons, which are audio cues, used in the computer-user interface to provide information and feedback to the user about computer entities (these include messages and functions, as well as states and labels). The material in this paper is part of a larger study that recommends guidelines for the design and use of audio cues in the computer-user interface. The complete work examines the disciplines of music, psychology, communication theory, advertising, and psychoacoustics to discover how sound is utilized and analyzed in those areas. The resulting information is organized according

to the theory of semiotics, the theory of signs, into the syntax, semantics, and pragmatics of communication by sound. Here we present design guidelines for the syntax of earcons. DOE

N86-23264# Joint Publications Research Service, Arlington, Va.
OXYGEN-LIBERATING MIXTURES FOR BREATHING APPARATUS Abstract Only
In its USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-004) 12 Mar. 1986 p 131 Transl. into ENGLISH from Sovetskaya Belorussiya (Minsk, USSR), 10 Dec. 1985 p 4 (For primary document see N86-23258 13-51)
Avail: NTIS HC A07/MF A01

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-23282*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERACTIVE ALGEBRAIC GRID-GENERATION TECHNIQUE
R. E. Smith and M. R. Wiese (Computer Sciences Corp., Hampton, Va.) Mar. 1986 40 p refs
(NASA-TP-2533; L-16019; NAS 1.60:2533) Avail: NTIS HC A03/MF A01 CSCL 12A

An algebraic grid generation technique and use of an associated interactive computer program are described. The technique, called the two boundary technique, is based on Hermite cubic interpolation between two fixed, nonintersecting boundaries. The boundaries are referred to as the bottom and top, and they are defined by two ordered sets of points. Left and right side boundaries which intersect the bottom and top boundaries may also be specified by two ordered sets of points. when side boundaries are specified, linear blending functions are used to conform interior interpolation to the side boundaries. Spacing between physical grid coordinates is determined as a function of boundary data and uniformly space computational coordinates. Control functions relating computational coordinates to parametric intermediate variables that affect the distance between grid points are embedded in the interpolation formulas. A versatile control function technique with smooth-cubic-spline functions is presented. The technique works best in an interactive graphics environment where computational displays and user responses are quickly exchanged. An interactive computer program based on the technique and called TBGG (two boundary grid generation) is also described. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-23283*# National Aeronautics and Space Administration. Pasadena Office, Calif.
PROGRAMMABLE PIPELINED IMAGE PROCESSOR Patent Application
Donald B. Gennery and Brian Wilcox, inventors (to NASA) Filed 31 Dec. 1985 31 p
(Contract NAS7-918)
(NASA-Case-NPO-16461-1CU; NAS 1.71:NPO-16461-1CU; US-Patent-Appl-SN-815103) Avail: NTIS HC A03/MF A01 CSCL 09B

A pipelined image processor selectively interconnects modules in a column of a two dimensional array to modules of the next column of the array of modules 1,1 through M,N, where M is the number of modules in one dimension and N is the number of modules in the other direction. Each module includes two input selectors for A and B inputs, two convolvers, a binary function operator, a neighborhood comparison operator which produces an A output and an output selector which may select as a B output the output of any one of the components in the module, including the A output of the neighborhood comparison operator. Each module may be connected to as many as eight modules in the next column, preferably with the majority always in a different row that is up (or down) in the array for a generally spiral data path around the torus thus formed. The binary function operator is implemented as a look-up table addressed by the most significant 8 bits of each 12-bit argument. The table output includes a function a function value and the slopes for interpolation of the two arguments by multiplying the 4 least significant bits in multipliers and adding the products to the function value through adders. NASA

N86-23284# Department of the Air Force, Washington, D.C.
HIDDEN FAULT BIT APPARATUS FOR A SELF-ORGANIZING DIGITAL PROCESSOR SYSTEM Patent Application
Malcolm Frazier, inventor (to Air Force) Filed 21 Oct. 1985 14 p
(AD-D012006; US-Patent-Appl-SN-789862) Avail: NTIS HC A02/MF A01 CSCL 09/2

A hidden fault bit apparatus for a self-organizing digital processor system utilizing a single bit of non-volatile memory to store a hidden fault bit in each digital processor unit of the system. The hidden fault bit indicates that the digital processor which contains it, is believed to contain a hidden fault and therefore, should not participate in the self-organization process. Author (GRA)

N86-23285# Lawrence Livermore National Lab., Calif.
SOLID MODELING RESEARCH AT LAWRENCE LIVERMORE NATIONAL LABORATORY: 1982-1985
J. R. Kalibjian 1 Sep. 1985 14 p
(Contract W-7405-eng-48)
(DE86-002608; UCRL-53652) Avail: NTIS HC A02/MF A01

The Lawrence Livermore National Laboratory has sponsored solid modeling research for the past four years to assess this new technology and to determine its potential benefits to the Nuclear Weapons Complex. We summarize here the results of five projects implemented during our effort. First, we have installed two solid modeler codes, TIPS-1 (Technical Information Processing System-1) and PADL-2 (Part and Assembly Description Language), on the Laboratory's CRAY-1 computers. Further, we have extended the geometric coverage and have enhanced the graphics capabilities of the TIPS-1 modeler. To enhance solid modeler performance on our OCTOPUS computer system, we have also developed a method to permit future use of the Laboratory's network video system to provide high-resolution, shaded images at users' locations. Finally, we have begun to implement code that will link solid-modeler data bases to finite-element meshing codes. DOE

N86-23286# Los Alamos National Lab., N. Mex.
ALTERNATIVES TO MAINFRAMES FOR TEXT AND GRAPHIC PUBLISHING
G. W. Webb 1985 6 p Presented at the 7th Lasers in Graphics Annual Conference, Nashville, Tenn., 29 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000792; LA-UR-85-3512; CONF-8509188-1) Avail: NTIS HC A02/MF A01

For the past 10 years large publication facilities have been using mainframe computers and laser output devices to set pages of type with graphics and even photographs imbedded in the text.

Mainframe computers have some real advantages, such as software packages that produce beautiful graphs, very efficient word processing, and incomparable typesetting. But these computers are expensive to own and operate and would be excessive for the small publications shop. For a company that does not have $100,000 to spend on a computer, typesetter, and electronic publishing system there is an alternative: a microcomputer-based word processing system. A microcomputer coupled with a laser printer or even a phototypesetting unit can cost less than $25,000 and produce high-quality results. DOE

N86-23287# Allied Bendix Corp., Kansas City, Mo. Bendix Kansas City Div.
NUMERICAL CONTROL USER EXPERIENCE
J. Butler Oct. 1985 12 p Presented at the VIM-43 Conference, Minneapolis, Minn., 7 Oct. 1985
(Contract DE-AC04-76DP-00613)
(DE86-001298; BDX-613-3385; CONF-8510179-1) Avail: NTIS HC A02/MF A01

AUTOCON is an acronym for Automatic Contouring, a program which generates a contour toolpath for the external profile of printed writing boards (PWB) using ICEM DDN. AUTOCON originates from the Computer Aided Process Planning (CAPP) Procedure developed by Electrical Manufacturing at Allied Bendix. The CAPP program uses electronically transmitted graphics files received from a design agency to generate automatic panel layouts and travellers for Process Engineers. The objective of AUTOCON is to utilize the information from the CAPP program to generate Numerical Control tapes. If the CAPP program can be utilized to its full potential, it is estimated that a good portion of the 60 to 90 PWB tapes shipped each month from our Numerical Control Department could be eliminated from conventional N/C Programming. The purpose of AUTOCON is to automatically generate a toolpath around the external profile of a PWB with no user intervention. The Process Engineer can generate a profile contour N/C tape after he has completed the panel layout and traveller through CAPPS for a part. After the layout and traveller illustrations have been completed, the same geometry can then be utilized again for the N/C tape. An N/C Analysist then reviews the listing for a final checkout of the job. DOE

N86-23288# Oak Ridge National Lab., Tenn.
COLUMN LU FACTORIZATION WITH PIVOTING ON A HYPERCUBE MULTIPROCESSOR
G. J. Davis Nov. 1985 25 p
(Contract DE-AC05-84OR-21400)
(DE86-002555; ORNL-6219) Avail: NTIS HC A02/MF A01

A column-oriented algorithm is presented for LU factorization with partial pivoting. Two different mappings of columns to processors are considered. Forward and backsubstitution algorithms to use the factorization for solving linear systems are developed. Timing data, including processor utilization and load balancing, are provided by a hypercube simulator. DOE

N86-23289# Pacific Northwest Lab., Richland, Wash.
FACILITY/EQUIPMENT PERFORMANCE EVALUATION USING MICROCOMPUTER SIMULATION ANALYSIS
A. D. Chockie and C. J. Hostick Aug. 1985 6 p Presented at the American Nuclear Society Winter Meeting, San Francisco, Calif., 10 Nov. 1985
(Contract DE-AC06-76RL-01830)
(DE86-002814; PNL-SA-13279; CONF-851115-37) Avail: NTIS HC A02/MF A01

A computer simulation analysis model was developed at the Pacific Northwest Laboratory to assist in assuring the adequacy of the Monitored Retrievable Storage facility design to meet the specified spent nuclear fuel throughput requirements. The microcomputer-based model was applied to the analysis of material flow, equipment capability and facility layout. The simulation analysis evaluated uncertainties concerning both facility throughput requirements and process duration times as part of the development of a comprehensive estimate of facility performance. The evaluations provided feedback into the design review task to identify areas where design modifications should be considered. DOE

N86-23290# Oak Ridge National Lab., Tenn.
ORNL 25 MV TANDEM ACCELERATOR CONTROL SYSTEM
R. C. Juras, J. A. Biggerstaff, and D. E. Hoglund 1985 14 p Presented at the 2nd International Workshop on Accelerator Control Systems, Los Alamos, N. Mex., 7 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002211; CONF-8510194-1) Avail: NTIS HC A02/MF A01

The CAMAC-based control system for the 25 MV tandem electrostatic accelerator of the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL) was specified by ORNL and built by the National Electrostatics Corporation. Two Perkin-Elmer 32-bit minicomputers are used in the system, a message switching computer and a supervisory computer. The message switching computer transmits and receives control information on six serial highways. This computer shares memory with the supervisory computer. Operator consoles are located on a serial highway; control is by means of a console CRT, trackball, and assignable shaft encoders and meters. Two identical consoles operate simultaneously: one is located in the tandem control room; the other is located in the cyclotron control room to facilitate operation during injection of tandem beams into the cyclotron or when beam lines under control of the cyclotron control system are used. The supervisory computer is used for accelerator parameter setup calculations, actual accelerator setup for new beams based on scaled, recorded parameters from previously run beams, and various other functions. Nearly seven years of control system operation and improvements will be discussed. DOE

N86-23291# Computer Resources International A/S (Denmark).
STUDY OF HIGH THROUGHPUT CONCATENATED DECODER ASSESSMENT
J. Justesen, (Technical Univ. of Denmark, Copenhagen), E. Paaske, (Technical Univ. of Denmark, Copenhagen), T. Ruebner-Petersen, (Technical Univ. of Denmark, Copenhagen), G. Berliner, and K. K. Pedersen Paris ESA 26 Mar. 1985 103 p
(Contract ESTEC-5874/84-D-DK(SC))
(CRI/RSS/REPO/003; ESA-CR(P)-2090) Avail: NTIS HC A06/MF A01

Ways of increasing the speed performance of the Reed-Solomon-Viterbi-Decoder (RSVD) concatenated decoder system of the Giotto mission to reach a net data rate of 1 Mbit/sec were investigated. All parts of the RSVD decoder subsystem that need to be redesigned were identified. Solutions required to reach the 1 Mbit/sec net data rate are proposed. Proposals for very high speed performance, 10 Mbit/sec net data rate and above, are also given. Only a moderate additional cost is required to implement a 10 Mbit/sec decoder subsystem. Author (ESA)

N86-23292# Rijkswaterstaat, The Hague (Netherlands). Dienst Informatieverwerking.
REPORT MICROS 03 [RAPPORTAGE MICROS 03]
J. vanDomselaar and C. G. Langereis 7 Oct. 1985 48 p
(AD-1985-1521; B8575102) Avail: NTIS HC A03/MF A01

An inventory of standard microcomputer software to be used in the Dutch Ministry of Public Works is presented. Software environment for the integration of the systems, and data exchange between different systems are discussed. Author (ESA)

N86-23293# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
20 Mar. 1986 66 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UCC-86-003) Avail: NTIS HC A04/MF A01

Progress is reported in U.S.S.R. cybernetics, computers and automation technology. Specific topics discussed include: hardware; software; applications; computer networks; and theory of computations. For individual titles, see N86-23294 through N86-23310.

N86-23294# Joint Publications Research Service, Arlington, Va.
KARL-3 SYSTEM FOR AUTOMATED DESIGN OF PRINTED-BOARD CIRCUITS Abstract Only **c61**
I. G. Vintinzenko, I. G. Malykh, and Yu. F. Mirnykh *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 1 Transl. into ENGLISH from Avtomatizirovannyye Sistemi Upravleniya i Pribory Avtomatiki Vypusk 70 (Kharkov, USSR), 1984 p 93-99 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

Analysis of several computer-aided design systems led to the development of several versions of the compact and efficient KARL design system, which can be used on any YeS computer larger than the YeS-1020 with storage of at least 256 kbytes and MFT 4.1, MVT 4.1 and MVT 6.1 operating systems. The set of program modules is under the control of a monitor program in high-level PL/1 language and can be further developed and enlarged if necessary. There are no limitations on the dimensions of the boards or spacing of locations of elements and positioning on both sides or other circuit factors such as connections. Up to 500 designs can be handled simultaneously. The designer begins with a sketch of the design using groups of elements and the data base supplies necessary information as to elements and factors for further development while sketches are also printed out. The final output is a completed design. Documentation is also generated as well as punched control tape for photomask fabrication and execution of drilling by numerical control methods for the actual production of the boards. The KARL-3 is oriented towards a batch system of operation while the KARL-3T is preferable for dialogue mode work. Dynamic memory distribution is used. Author

N86-23295# Joint Publications Research Service, Arlington, Va.
MODEL OF MULTIPROGRAM OPERATION IN NONHOMOGENEOUS COMPUTER SYSTEM WITH STRICT MEMORY DIVISION Abstract Only **c62**
V. A. Vishnyakov and O. V. German *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 2 Transl. into ENGLISH from Avtomatika i Vychislitelnaya Tekhnika (Riga, USSR), no. 3, May - Jun. 1985 p 58-64 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

A computer network combines N nonhomogeneous computers with their own main memory. The system runs a batch of programs represented by a directed graph having a specified set of points and lines, where each point corresponds to a particular program module. Each computer can parallel process the current module and execute data input/output. The computer can start the processing of the next module if certain conditions are met. The control supervisor must plan the order of execution of the modules for each computer so that the generated schedules satisfy a minimum time requirement. The supervisor performs two functions: reduces time losses due to the waiting for the completion of I/O operations to a minimum and reduces time losses occasioned by nonoptimal planning of the graph with unweighted lines to a minimum. Some 20 examples were calculated for N = 2, 3, 4. The time requirement averaged 9.8% more than the optimal figure with the maximum time excess being 27.2%. The optimal results was achieved in 9 cases. The proposed model can be used in setting the supervisory for applied modules in computer scheduling problems. Author

N86-23296# Joint Publications Research Service, Arlington, Va.
SIMULATION AND ANALYSIS OF CHARACTERISTICS OF DISTRIBUTED MULTIPROCESSOR SYSTEMS Abstract Only
E. O. Akhmedov, A. A. Dzhavadov, S. F. Ismaylov, and B. G. Ismaylov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 2 Transl. into ENGLISH from Avtomatika i Vychislitelnaya Tekhnika (Riga, USSR), no. 3, May - Jun. 1985 p 70-75 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

A communications line delivers an input message flow to a supervisory microprocessor that is tied to an interface bus. An arbitrary number of homogeneous peripheral microprocessors and an input/output peripheral are also coupled to the bus. The supervisory microprocessor coordinates the real time operation of the system. It is necessary to assure a minimum loss of information with the minimum requisite system performance. This paper treats the microprocessor system as a single phase queuing configuration and determines the system efficiency in terms of the mean value of the probability of delay losses or losses due to system overloading. Expressions are found for the number of input claims, L sub q, awaiting servicing in three cases: for exponential, constant and Erlang servicing time. A graph is shown for these three cases (assuming a Poisson input flow) using the results of YeS-1022 computer simulation and shows L sub q as a function of the number of microprocessors. Author

N86-23297# Joint Publications Research Service, Arlington, Va.
SM-1810 DOMESTIC PERSONAL COMPUTERS AND DIALOG COMPUTER COMPLEX
Boris Mikhaylovich Rudzitskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 3-4 Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhnike: Seriya Radioelektronika i Svyaz (Moscow, USSR), no. 8, Sep. 1985 p 46-47 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

According to the designers' intentions, each type of personal computer should be developed and manufactured as a series of machines differing in the potentialities and nomenclature of external devices and in the capability for application to the solution of problems of various classes. The most powerful computer for the dialog computer complex series with developed functional potentialities is the Elektronika NTs 80-20/3. It represents a highly integrated desk computer. This is basic hardware intended for application in systems of data management and data processing, mathematical modeling and statistical analysis, and to engineering calculations and designing, and also in computer networks with complicated structure. The machine includes the following: a single-board Elektronika NTs 80-01D microcomputer the base, and other personal computers of this series; a video display graphic monitor; a thermal printing device; a keyboard; a floppy disc unit; and a plotter. This paper outlines the basic characteristics of the Elektronika NTs 80-20/3. B.W.

N86-23298# Joint Publications Research Service, Arlington, Va.
CONCEPT OF AUTOMATED MACRODESIGN OF NETWORKS OF AUTOMATED CONTROL SYSTEMS Abstract Only **c63**
Yu. Yu. Kess *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 5 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 7-11 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

Because of the increasing complexity of automated control systems (ASU), automated design systems must be replaced by automated macrodesign systems (SAMP) based on a modular and hierarchical concept of ASU networks. The control metaobject is the hierarchical aggregate of homogeneous design objects (for example, the motor transport equipment of a republic). The ASU and its modular components are synthesized by SAMP man/machine procedures and the designs must not depend on the actual realizations. The artificial intelligence concept of frame is applied to the design of the modules and macroelements are represented and manipulated on design screens with recourse to procedures which have results which cannot be predicted by users and the resulting designs are stored in libraries. Various users can work independently while a chief engineer solves conflicts. The SAMP system is also supposed to automatically produce and update technical documentation but problems have been encountered in the realization. An experimental SAMP was built using the PRIZ interactive development program system which utilizes semantic modules and the UTOPIST problem-oriented language. Author

N86-23299# Joint Publications Research Service, Arlington, Va.
VECTOR COMPUTATION PROGRAM SYSTEM Abstract Only c61
V. P. Razbegin, G. N. Kalyanov, and B. V. Kupriyanov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 6 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 1, Jul. - Aug. 1983 p 25-32 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

This study describes the VEKTOR procedural programming language, in which programs, procedures, and functions are the fundamental program units. Procedures and functions can be embedded, or can comprise autonomous modules. The language supports arithmetic and Logical VECTOR*VECTOR, SCALAR*VECTOR, and VECTOR*SCALAR element operations, convolution over a series of element operations, ANY and ALL quantors for logical vectors, and left and right cyclic shift operators. The VEKTOR programming system is designed to support software complexes for the PS-2000 in high-level VEKTOR language and PPS-2000 microcode, the configuration of program complexes, and linking of SM-2 applications programs with PPS-2000 programs, as well as PPS-2000 programming debugging in terms of the VEKTOR language. The features of the VEKTOR compiler, statistical analyzer, standard microprogram library, Sm-2 interaction control program library, and debugger are described. All of the programs making up the programming system comprise approximately 80,000 conventional instructions; the system has been in operation since early 1983, and has increased programming productivity 10 to 12-fold as compared with programming in lower level languages. Author

N86-23300# Joint Publications Research Service, Arlington, Va.
SYSTEM OF AUTOMATED TESTING FOR MIXAL PROGRAMS Abstract Only c61
V. L. Katkov and G. V. Yermakov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 6-7 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 50-58 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

MIXAL is a component of the MIX system and is used for teaching assembly programming. The principles are presented for the testing (as distinguished from the later debugging procedures) of the programs. In the MIX system testing is carried out in accord with a criterion for workable program transitions and is oriented toward automatic execution. Testing is carried out in batch rather than dialogue mode and the tests are stored in a library for repetitions and consultations. Automated testing is executed by the Avtotest subsystem which is part of the MIX system and the MIXAL program to be tested must be compatible with the Avtotest format. The test procedure begins with the initialization section in which initial data (variables, etc.) are checked and is followed by the assertion section in which results due to ASRT (assert) operators using a higher-level language than the MIXAL autocode are verified. The Avtotest subsystem consists of a control program, programs for processing control operators and accessing data in MIX storage for initialization data, programs for searching for MIXAL programs in libraries and programs for processing assertion results which check program syntax. Author

N86-23301# Joint Publications Research Service, Arlington, Va.
TRACING AND ANALYSIS OF COMPUTER SYSTEMS BY MEANS OF THE STAN PROGRAM Abstract Only c62
Ya. A. Kogan and L. B. Kozinskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 7-8 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 25-37 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

Monitors are used to evaluate loading of resources, system settings, and program performance, but system events for the three functions occur st different frequencies and this creates problems for the monitor whose operations may have a negative effect on computer operations. A tracing and analysis system (STAN) was developed for monitoring YeS computers involving mainly synchronous measurements but with some asynchronous operations. The system consists of tracing and analysis generators. The tracing generator performs interrupts for system monitoring and carries out priority commands and is an improvement on previous monitors since it can cover a brother spectrum of event frequencies. The special feature of STAN is that the control point values, which were set by the user in the operating system, can be monitored. Results are given for the application of STAN for three computer systems with different degrees of multiprogramming (M-4030 and YeS-1045 computers) and experimental applications are considered for raising productivity and studying the behavior of programming whose effectiveness is linked to the relative proximity in space and time in various forms of memory of data required by program commands. Author

N86-23302# Joint Publications Research Service, Arlington, Va.
ON THE THEORY OF OVERALL STORAGE ECONOMY Abstract Only
N. A. Vasilyev *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 8 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 82-85 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

Overall storage economy was treated by a theory linking memory economy and the coloring of the nodes of a graph for equal weighted statistical variables (scalars) for the class of closed operational circuits and standard circuits and which involves ordered colorings for these variables and the construction of memory distribution axiomatics (Lavrov-Yershov theory). For a given program there is a standard circuit consisting of a transition graph whose nodes are operators and the branches determine the transition of control from one operator to another between which are information links in which results from one operator become the argument of another. Correct memory distribution implies that there will be a single value for results and arguments in each data link. Data link routing requires transmission of a value along a single link and leads to the formation of a data graph whose edges and nodes can be treated as a coloring problem determining optimal ordering of the data organization for the initial program. It is proposed to extend this concept to the case of data groups considered as vectors which have weights greater than the scalars and are oriented with respect to memory addresses in a forward or backward directions. Author

N86-23303# Joint Publications Research Service, Arlington, Va.
GRAPH-TEXT CODING OF ALGORITHMS Abstract Only c61
V. A. Zhizhko *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 9 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 14-24 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

The problem considered is the improvement of the transformation of the two-dimensional graphic scheme into the linear sequence of symbols constituting the textural representation of the algorithm. The transformation (or coding) of the flowchart into the text is a routine process which does not require high qualifications and tends to be automated. An R-code procedure is available which produces structures isomorphic to the flowchart and uses a special translation language (R/TRAN). The usual computer symbols are used to reproduce the flowchart shapes by running together strings of characters resembling graph forms. The paper proposes an improvement (S-code) of the method with a more detailed breakdown of graph forms for reproduction by computer characters. The result is an S-graph which is translated into the object language (whether of FORTRAN or ALGOL types) by a program run in a preprocessor based on the node and edge structure of the graph. Certain problems in the establishment of the S-graphs are due to limits on the possible line dimensions of the computer input

which are dealt with by special constructions or sub-graphs.
Author

N86-23304# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF DIALOGUE MODE MICROCOMPUTER PROGRAMMING USING YeS COMPUTERS Abstract Only c61
A. A. Ilyukovich and V. Yu. Bobolovich *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 9-10 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 34-36 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

Microcomputers are increasingly used in integrated automated control systems and in processing networks, resulting in additional program needs. However, problems arise because of the small memories, limited operating systems and insufficient peripherals of the microcomputers in comparison with YeS computer resources. A cross-system utilizing large computer programs for preparing programs for the Elektronika-60 and other mini- and microcomputers of this architecture was developed. It operates on the YeS computer with a version 6.1 YeS operating system. The cross-system consists of a cross-translator and assembler, linkage editor, data set converter program, debugger and dialogue mode control program. The generated operating system has a telecommunication access component. Programs can be prepared in dialogue mode on YeS 7920 displays by eight users simultaneously on a time sharing basis. System operators and procedures are described. Experience showed that the YeS computer was most effectively used if there were six to eight simultaneous users. Author

N86-23305# Joint Publications Research Service, Arlington, Va.
ORGANIZATION OF A SINGLE SHARED EXTERNAL MEMORY FOR AUTOMATED DESIGN SYSTEM Abstract Only
S. N. Grishchenko, A. O. Ulybin, and V. A. Finikov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 10 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 42-46 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

A shared memory system is described for the BESM-6 computer involving dynamic distribution among users of memory space on tapes and discs with access to storage only through the system. The shared memory consists of system and user space with system space making up only .4% of the volume. Users are divided into groups and each group is dynamically assigned a certain space for a task in a manner compatible with the Dubna operating system. Spaces can be moved and regrouped. Procedures for control and optimization of space use are described. The system was realized in the form of 296 modules in MADLEN autocode in FORTRAN-GDR with a volume of about 60,000 BESM-€ commands. There must be a resident store. When the system is set up it is possible to set the main parameters, i.e, maximum number of tasks which can be handled simultaneously; maximum number of spaces available to user; maximum number of magnetic tapes or discs which can be accessed simultaneously. The monitor program occupies 52 storage cells. The system space has permanent and temporary statistical and dynamic tables which are constructed with sequential, index-sequential, direct, tree, list and stack organizations. Author

N86-23306# Joint Publications Research Service, Arlington, Va.
RIS SYSTEM FOR COMPUTER-AIDED PREPARATION OF GRAPHIC DOCUMENTATION Abstract Only c61
V. L. Katkov, A. Ye. Khlebtsevich, and A. I. Bliznets *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 11 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 74-77 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

The RIS system was developed for handling and introducing graphic material into computerized text editing. When the automated Strela text system encounters a graph the RIS system takes over and editing is possible from alpha-numeric keyboards. It utilizes primitives for composing the graphs and is largely independent of the type of computer used. RIS is oriented towards non-professional users and has a language close to natural Russian with word variations possible as to gender, number and case. Both text and graphs are in the form of alphanumeric sequences and both types of material can be handled simultaneously in batch or dialogue mode on standard displays. RIS was realized on YeS computers using SIPL-1 translator language and with OS YeS and PDO SVM YeS operating systems. After completion the RIS file is translated into a FORTRAN language GRAFOR graphic program or into a Calcomp magnetic tape file for the actual graphics output generation greater portability. Author

N86-23307# Joint Publications Research Service, Arlington, Va.
AUTOMATED DESIGN OF PROGRAMS FOR DATA BASE MANAGEMENT IN TELEPROCESSING MODE Abstract Only
Yu. B. Sytina, L. A. Gendelman, and I. A. Saprykina *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 11-12 Transl. into ENGLISH from Avtomatizirovannyye Sistemy Uprvaleniya i Pribory Avtomatiki Vypusk 70 (Kharkov, USSR), 1984 p 60-64 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

A data teleprocessing system was developed for YeS-7920 terminal data representation equipment consisting of a set of application programs each using the KAMA control system with time sharing. Each system carries out a function and tasks by means of the KAMA system which does not, however, have the necessary command functions which are supplied by the application programs. By means of a standard application package, standard facilities were created for the handling of data files including screen functions, query formats, data distribution on screen, dialogue facilities and the file processing algorithm, making it possible to automate application operations for the processing of sequential and index-sequential files and for realizing data input, searching and scanning, and correction. The program generation part of the package has a set of programs for generating programs for file processing and a group containing function generators implementing data handling. Each generator has a starting module into which the user loads data using assembly language with later translation and editing. The reason for the creation of the separate programs for various functions is that the KAMA system cannot productively handle programming requiring large data volumes.
Author

N86-23308# Joint Publications Research Service, Arlington, Va.
THE DEVELOPMENT OF AN IDENTIFIER SYSTEM FOR ELEMENTS OF A PRODUCTION SYSTEM ON THE SCALE OF AN ENTERPRISE
V. Ya. Sedush, G. V. Sopilkin, N. A. Chentsov, and V. I. Isayenko *In its* USSr Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 13-17 ref Transl. into ENGLISH from Klassifikatory i Dokumenty (Moscow, USSR), no. 7, Jul. 1985 p 25-29 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

A technological system in an enterprise is a complex of mechanical, electrical, electronic and other equipment. The contemporary trend towards improving equipment requires solving a different set of problem for each component in the technological system, all the way down to a nut or bolt. Therefore, devising codes for all equipment parts is necessary. In connection with the requirements of the equipment maintenance tasks, a coding system for identifying the parts in a technological system of an enterprise was designed. A technological system of an enterprise has six levels: (1) technological system proper-S (blooming mills, power system); (2) subsystem of the technological system-P (mechanical, electrical); (3) machine-M (an element of the subsystem, shearing machine and distribution device of 3 kilovolt); (4) unit-U (a part of the machine crank, tire); (5) part-D (bearing, insulator);

(6) hardware-fasteners-Ye (key, bolt). The complete nomenclature for the technological system consists of a code for every element at each level element at each level in the hierarchy. By an identifying code, the location of an element in the technological system and be defined. Author

N86-23309# Joint Publications Research Service, Arlington, Va.
PROGRAMMABLE HAND CALCULATORS IN AVIATION SPORT
A. Romanyuk *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 18-23 Transl. into ENGLISH from Krylya Rodiny (Moscow, USSR), no. 7, Jul. 1985 p 15-16 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

This research proposes that the MK-54 programmable hand calculator be used as a computer that calculates the points of participants in glider competitions. The cost of this and similar calculators (MK-56, BZ-34) varies between 50 and 100 rubles. The calculators feature a simple programming system, are easy to use and can muster most of the computational power required. It can execute point calculations in different glider class competitions when draws occur both in speed and distance competitions for any combination of finishers. The set-up time to run the calculations is less than 5 minutes, and the time required to calculate the results of one participant is less than 12 seconds. The program has been used in judging oblast competitions. A simplified flow chart of the algorithm used is presented, and a chart of the addressed registers is given. Author

N86-23310# Joint Publications Research Service, Arlington, Va.
FLEXIBLE PRODUCTION SYSTEMS AND THE DEVELOPMENT OF METHODS FOR THEIR CONTROL c63
A. M. Voychinskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 27-35 refs Transl. into ENGLISH from Standarty i Kachestvo (Moscow, USSR), no. 8, Aug. 1985 p 18-21 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

The creation of flexible production systems (GPS) makes it possible to successfully perform the task of increasing the efficiency of social production, when the entire chain of processes, from product design by means of CAD systems (SAPR) and automated systems for production engineering (ASTPP), to the control of the industrial process by means of ASUTP, to the control of production as whole. The control of automated production is accomplished with a four-level control system: the first (based on microprocessor equipment) controls each machine position, industrial robot, intermediate operational storage, and the sequence and nature of operations in order to attain the specified component form, dimensions and quality; the second (based on the Elktronika-80 microcomputer) controls a multifunctional robot configuration (RIK) or group of single-function automata along with their attendent storage and transport robots (robotized area); the third (based on the SM-4) controls production; and the fourth (based on the YeS computer and enterprise ASU) controls planning and system material and technical supply (MTO). Necessary conditions for the design and reliable, effective operations of flexible production systems are described in detail. Author

N86-22757# Joint Publications Research Service, Arlington, Va.
DESIGN OF NEW SYSTEM ARCHITECTURE WITH HYBRID REDUNDANCY (HCC)
Tongzhao Chen *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 123-131 refs Transl. into ENGLISH from Jisuanji Xuebao (Beijing, China), v. 8, Jul. 1985 p 314-320 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22770# Joint Publications Research Service, Arlington, Va.
NEW PLA, ITS OPTIMIZATION ALGORITHM FOR COMPUTER-AIDED DESIGN
Chunhe Liu *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 86-98 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 11, no. 4, Jul. 1983 p 52-60 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-22817# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
EXPERIMENTAL ON-BOARD PROCESSING PAYLOAD FOR ADVANCED COMMUNICATIONS SATELLITE
O. B. Millies-Lacroix *In its* Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 47-49 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-23311 Northwestern Univ., Evanston, Ill.
AN APPROACH TO SOFTWARE RAPID PROTOTYPING Ph.D. Thesis
Yen-Chou Chou 1985 176 p
Avail: Univ. Microfilms Order No. DA8523506

Rapid prototyping refers to the techniques to produce a software prototype early during the software life cycle and at low cost. The motivation of this study is due to the problem that the user and the designer are unable to understand and to verify the requirements specification whether the software system specified satisfies the real need. By examining a prototype, both the user and the designer can have better idea about what the requirements of the desired software system are and thus the total development cost is reduced. In this dissertation, an approach to produce a software prototype is presented. First, the requirement specification is transformed to a requirements model. In this model, the requirements of the software system are represented as a set of interconnected components, in which the control flow, the data flow and the data structures are defined. The requirements model is then transformed into a code skeleton of the target programming language by a set of transformation steps. The informal description left in code skeleton is then translated to code using a modified syntax-directed translation scheme. Dissert. Abstr.

N86-23312 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A PASCAL IMPLEMENTATION OF THE RSA ALGORITHM
A. A. Aruliah Sep. 1985 35 p refs
(NPL-DITC-66/85; ISSN-0262-5369) Copyright. Avail: Issuing Activity

The RSA algorithm, a public key cryptographic technique, is introduced. Although mathematically straightforward, the algorithm involves multilength integer calculation which is complex to program in a high level language. The PASCAL version presented allows more widespread use of the method. Author (ESA)

N86-23313# Royal Armament Research and Development Establishment, Fort Halstead (England).
A METHOD FOR THE DEVELOPMENT OF SIMULATIONS
M. R. Krick Mar. 1985 187 p refs
(RARDE-22/84; BR95245) HC A09/MF A01

A method for the development and maintenance of large computer simulations of the type used in operational research assessment tools is described. The method is based on a variant of the Jackson System Development methodology. The potential use of the Ada language as a means of implementation is discussed. Author (ESA)

N86-23314*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE STATION SOFTWARE RECOMMENDATIONS
Susan Voigt, ed. Dec. 1985 142 p refs Forum held in Huntsville,

Ala., 24-25 Apr. 1985
(NASA-CP-2394; L-16063; NAS 1.55:2394) Avail: NTIS HC A07/MF A01 CSCL 09B

Four panels of invited experts and NASA representatives focused on the following topics: software management, software development environment, languages, and software standards. Each panel deliberated in private, held two open sessions with audience participation, and developed recommendations for the NASA Space Station Program. The major thrusts of the recommendations were as follows: (1) The software management plan should establish policies, responsibilities, and decision points for software acquisition; (2) NASA should furnish a uniform modular software support environment and require its use for all space station software acquired (or developed); (3) The language Ada should be selected for space station software, and NASA should begin to address issues related to the effective use of Ada; and (4) The space station software standards should be selected (based upon existing standards where possible), and an organization should be identified to promulgate and enforce them. These and related recommendations are described in detail in the conference proceedings. For individual titles, see N86-23315 through N86-23318.

N86-23315*# National Aeronautics and Space Administration, Washington, D.C.
SPACE STATION: THE ROLE OF SOFTWARE
Dana Hall *In* NASA. Langley Research Center Space Station Software Recommendations Dec. 1985 p 3-38 (For primary document see N86-23314 13-61)
Avail: NTIS HC A07/MF A01 CSCL 09B

Software will play a critical role throughout the Space Station Program. This presentation sets the stage and prompts participant interaction at the Software Issues Forum. The presentation is structured into three major topics: (1) an overview of the concept and status of the Space Station Program; (2) several charts designed to lay out the scope and role of software; and (3) information addressing the four specific areas selected for focus at the forum, specifically: software management, the software development environment, languages, and standards. NASA's current thinking is highlighted and some of the relevant critical issues are raised. Author

N86-23316*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A VIEW OF SOFTWARE MANAGEMENT ISSUES
John H. Manley (Computing Technology Transition, Inc.) *In its* Space Station Software Recommendations Dec. 1985 p 39-83 (For primary document see N86-23314 13-61)
Avail: NTIS HC A07/MF A01 CSCL 09B

The Software Development Environment (SDE) Panel addressed key programmatic, scope, and structural issues raised by its members and the general audience regarding the proposed software development environment for the Space Station program. The general team approach taken by this group led to a consensus on 18 recommendations to NASA mangament regarding the acquisition and definition of the SDE. This approach was keyed by the initial issues presentation given to the general audience. Additional issues (for a total of 23) were developed by the panelists in their first closed session from which key areas were selected and discussed in open session. These discussions led to key recommendations which are summarized and described. Author

N86-23317*# TRW, Inc., Cleveland, Ohio.
A VIEW OF SOFTWARE DEVELOPMENT ENVIRONMENT ISSUES
Barry Boehm *In* NASA. Langley Research Center Space Station Software Recommendations Dec. 1985 p 84-117 (For primary document see N86-23314 13-61)
Avail: NTIS HC A07/MF A01 CSCL 09B

The unique and challenging nature of the Space Station Program requires that software standards be effectively used to control costs, facilitate enhancements and ensure safety. The Software Standards Panel identified and developed recommendations in four areas to help the Space Station Program achieve these objectives. The areas in which recommendations are offered are policy, organization, process and candidate software standards for the Space Station Program. The concensus process employed by the panel is given and recommendations are made. Author

N86-23318*# Tektronix, Inc., Beaverton, Oreg.
NASA SPACE STATION SOFTWARE STANDARDS ISSUES
George D. Tice, Jr. *In* NASA. Langley Research Center Space Station Software Recommendations Dec. 1985 p 118-131 refs (For primary document see N86-23314 13-61)
Avail: NTIS HC A07/MF A01 CSCL 09B

The selection and application of software standards present the NASA Space Station Program with the opportunity to serve as a pacesetter for the United States software in the area of software standards. The strengths and weaknesses of each of the NASA defined software standards issues are summerized and discussed. Several significant standards issues are offered for NASA consideration. A challenge is presented for the NASA Space Station Program to serve as a pacesetter for the U.S. Software Industry through: (1) Management commitment to software standards; (2) Overall program participation in software standards; and (3) Employment of the best available technology to support software standards Author

N86-23319*# Research Triangle Inst., Research Triangle Park, N.C.
DISPLAY SYSTEM SOFTWARE FOR THE INTEGRATION OF AN ADAGE 3000 PROGRAMMABLE DISPLAY GENERATOR INTO THE SOLID MODELING PACKAGE C.A.D. SOFTWARE
Contractor Report, 26 Sep. 1984 - 31 Mar. 1986
R. J. Montoya and H. H. Lane, Jr. Mar. 1986 159 p refs (Contract NAS1-17890)
(NASA-CR-178065; NAS 1.26:178065; RTI/3052/00-01F) Avail: NTIS HC A08/MF A01 CSCL 09B

A software system that integrates and ADAGE 3000 Programmable Display Generator into a C.A.D. software package known as the Solid Modeling Program is described. The Solid Modeling Program (SMP) is an interactive program that is used to model complex solid object through the composition of primitive geomeentities. In addition, SMP provides extensive facilities for model editing and display. The ADAGE 3000 Programmable Display Generator (PDG) is a color, raster scan, programmable display generator with a 32-bit bit-slice, bipolar microprocessor (BPS). The modularity of the system architecture and the width and speed of the system bus allow for additional co-processors in the system. These co-processors combine to provide efficient operations on and rendering of graphics entities. The resulting software system takes advantage of the graphics capabilities of the PDG in the operation of SMP by distributing its processing modules between the host and the PDG. Initially, the target host computer was a PRIME 850, which was later substituted with a VAX-11/785. Two versions of the software system were developed, a phase 1 and a phase 2. In phase 1, the ADAGE 3000 is used as a frame buffer. In phase II, SMP was functionally partitioned and some of its functions were implemented in the ADAGE 3000 by means of ADAGE's SOLID 3000 software package. Author

N86-23320*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
DEVELOPMENT OF COMPUTER PROGRAM NAS3D USING VECTOR PROCESSING FOR GEOMETRIC NONLINEAR ANALYSIS OF STRUCTURES Final Report, 20 Sep. - 31 Dec. 1985
P. D. Mangalgiri and R. Prabhakaran Jan. 1986 44 p refs (Contract NAS1-17993)
(NASA-CR-176707; NAS 1.26:176707) Avail: NTIS HC A03/MF A01 CSCL 09B

An algorithm for vectorized computation of stiffness matrices of an 8 noded isoparametric hexahedron element for geometric nonlinear analysis was developed. This was used in conjunction with the earlier 2-D program GAMNAS to develop the new program NAS3D for geometric nonlinear analysis. A conventional, modified Newton-Raphson process is used for the nonlinear analysis. New

schemes for the computation of stiffness and strain energy release rates is presented. The organization the program is explained and some results on four sample problems are given. The study of CPU times showed that savings by a factor of 11 to 13 were achieved when vectorized computation was used for the stiffness instead of the conventional scalar one. Finally, the scheme of inputting data is explained. Author

N86-23321*# Stanford Univ., Calif. Center for Reliable Computing.
DYNAMIC ASSERTION TESTING OF FLIGHT CONTROL SOFTWARE
Dorothy M. Andrews, Aamer Mahmood, and Edward J. McCluskey Jul. 1985 25 p refs
(Grant NAG2-246)
(NASA-CR-176715; NAS 1.26:176715; SU-HICSS-19) Avail: NTIS HC A02/MF A01 CSCL 09B

Digital Flight Control System (DFCS) software was used as a test case for assertion testing. The assertions were written and embedded in the code, then errors were inserted (seeded) one at a time and the code executed. Results indicate that assertion testing is an effective and efficient method of detecting errors in flight software. Most errors are eliminate at an earlier stage in the development than before. B.G.

N86-23322*# Stanford Univ., Calif. Center for Reliable Computing.
DYNAMIC ASSERTION TESTING OF FLIGHT CONTROL SOFTWARE
Dorothy M. Andrews, Aamer Mahmood, and Edward J. McCluskey Jul. 1985 25 p refs Submitted for publication
(Grant NAG2-246)
(NASA-CR-176712; NAS 1.26:176712) Avail: NTIS HC A02/MF A01 CSCL 09B

Assertions are used to dynamically test fault tolerant flight software. The experiment showed that 87% of typical errors introduced into the program would be detected by assertions. Detailed analysis of the test data showed that the number of assertions needed to detect those errors could be reduced to a minimal set. The analysis also revealed that the most effective assertions tested program parameters that provided greater indirect (collateral) testing of other parameters. Author

N86-23323*# Stanford Univ., Calif. Center for Reliable Computing.
A METHODOLOGY FOR TESTING FAULT-TOLERANT SOFTWARE
Dorothy M. Andrews, Aamer Mahmood, and Edward J. McCluskey Nov. 1985 26 p refs
(Grant NAG2-246)
(NASA-CR-176713; NAS 1.26:176713; SU-CRC-TR-85-22; SU-CSL-TN-85-282) Avail: NTIS HC A03/MF A01 CSCL 09B

A methodology for testing fault tolerant software is presented. There are problems associated with testing fault tolerant software because many errors are masked or corrected by voters, limiter, or automatic channel synchronization. This methodology illustrates how the same strategies used for testing fault tolerant hardware can be applied to testing fault tolerant software. For example, one strategy used in testing fault tolerant hardware is to disable the redundancy during testing. A similar testing strategy is proposed for software, namely, to move the major emphasis on testing earlier in the development cycle (before the redundancy is in place) thus reducing the possibility that undetected errors will be masked when limiters and voters are added. Author

N86-23324*# Stanford Univ., Calif. Center for Reliable Computing.
THE WATCHDOG TASK: CONCURRENT ERROR DETECTION USING ASSERTIONS
Aydin Ersoz, Dorothy M. Andrews, and Edward J. McCluskey Jul. 1985 65 p refs
(Grants NAG2-246; NSF DCR-82-00129)
(NASA-CR-176714; NAS 1.26:176714; SU-CRC-TR-85-8; SU-CSL-TR-85-267) Avail: NTIS HC A04/MF A01 CSCL 09B

The Watchdog Task, a software abstraction of the Watchdog-processor, is shown to be a powerful error detection tool with a great deal of flexibility and the advantages of watchdog techniques. A Watchdog Task system in Ada is presented; issues of recovery, latency, efficiency (communication) and preprocessing are discussed. Different applications, one of which is error detection on a single processor, are examined. Author

N86-23325*# Stanford Univ., Calif. Center for Reliable Computing.
DYNAMIC ASSERTION TESTING OF FLIGHT CONTROL SOFTWARE
Dorothy M. Andrews, Aamer Mahmood, and Edward J. McCluskey Aug. 1985 25 p refs
(Grant NAG2-246)
(NASA-CR-176716; NAS 1.26:176716; SU-CRC-TR-85-15; SU-CSL-TN-85-274) Avail: NTIS HC A02/MF A01 CSCL 09B

An experiment in using assertions to dynamically test fault tolerant flight software is described. The experiment showed that 87% of typical errors introduced into the program would be detected by assertions. Detailed analysis of the test data showed that the number of assertions needed to detect those errors could be reduced to a minimal set. The analysis also revealed that the most effective assertions tested program parameters that provided greater indirect (collateral) testing of other parameters. Author

N86-23326# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
PRISM TREES: AN EFFICIENT REPRESENTATION FOR MANIPULATING AND DISPLAYING POLYHEDRA WITH MANY FACES
Jean Ponce Apr. 1985 23 p
(Contracts N00014-80-C-0505; N00014-77-C-0389)
(AD-A162601; AI-M-838) Avail: NTIS HC A02/MF A01 CSCL 12/1

Computing surface and/or object intersections is a cornerstone of many algorithms in geometric and modelling computer Graphics, for example set operations between solids, or surfaces ray casting display. This document presents an object centered, information preserving, hierarchical representation for polyhedra called Prism Tree. The author uses the representation to decompose the intersection algorithms into two steps: the localization of intersections, and their processing. When dealing with polyhedra with many faces (typically more than one thousand), the first step is by far the most expensive. The Prism Tree structure is used to compute efficiently this localization step. A preliminary implementation of the Set operations and ray casting algorithms has been constructed. Author (GRA)

N86-23327# Stanford Univ., Calif. Dept. of Operations Research.
THEORY ON EXTENDING ALGORITHMS FOR PARAMETRIC PROBLEMS
B. C. Eaves and U. G. Rothblum Aug. 1985 100 p refs
(Contract DE-AS03-76ER-72018)
(DE86-002068; SOL-85-13) Avail: NTIS HC A05/MF A01

Given certain algorithms for certain problems, these algorithms can be encorporated in a lift, solve, and lower sequence to form algorithms for solving parametric versions of the problems. In the first phase of the sequence the parametric problem is lifted to an extended ordered field where it becomes a single problem, that is, nonparametric. Second, the original algorithm is run in the extended ordered field to solve the single problem. Finally, this solution to the single problem is lowered to the original ordered field to obtain a parametric solution to the original parametric problem. DOE

N86-23328# Oak Ridge National Lab., Tenn.
ROOTS: A PROGRAM TO GENERATE RADIONUCLIDE DECAY CHAINS
D. E. Fields and D. E. Dunning, Jr. Nov. 1985 41 p refs
(Contract DE-AC05-84OR-21400)

(DE86-002572; ORNL/TM-9452) Avail: NTIS HC A03/MF A01

A set of algorithms has been developed to support dosimetric and transport calculations. These subroutines read a radionuclide data file and prepare a decay chain showing branching fractions and radioactive half-lives of each member. One application of these subroutines has been their implementation as a set of FORTRAN subroutines for application in the PREREM code (Ryan and Fields, 1981). Recent use of these subroutines in stand-alone form required their expansion to print branching fractions. An expanded data set based on ICRP-38 radionuclide data (ICRP, 1983) was also prepared. This subroutine package is called Radionuclide Origin and Ontogeny Tracing Subroutines (ROOTS). The package is intended for execution on a Digital Equipment Corporation PDP-10 Computer System, and may require modification to run on other machines. DOE

N86-23329# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
AUTOMATION OF A REMOTE FIBER FLUORIMETRY SYSTEM
R. A. Malstrom and B. C. Osgood 1985 25 p Presented at the 12th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Philadelphia, Pa., 29 Sep. 1985
(Contract DE-AC09-76SR-00001)
(DE86-001970; DP-MS-85-70; CONF-8509157-4) Avail: NTIS HC A02/MF A01

The development of software for a multitasking computer to automate a remote analytical technique called remote fiber fluorimetry (RFF) will be discussed. The RFF system includes a Nd:YAG laser, fiber optics, a multiplexer, and a gated, intensified, diode-array detector. The system is designed to measure multi-wave-length time-resolved fluorescence spectra from various remote sampling points via fiber optics. The requirements of the system include a user-friendly interface for operators, archiving of results and spectra, online debugging capability, and control of the system by multiple users without interference. The RFF instrumentation is totally computer controlled. This includes control and diagnostics of the laser; stepper motor control; and gating, spectral accumulation, and readout from the diode-array. The techniques used to implement this computer control are varied, and range from assembly language routines watching interrupt lines, to RS232 communications with intelligent subcontrollers. Multitasking was an efficient way to design software for the instrument. DOE

N86-23330# Sandia National Labs., Albuquerque, N. Mex.
METHOD FOR INCORPORATING GAUSS' LAW INTO ELECTROMAGNETIC PIC CODES
B. Marder Oct. 1985 17 p refs
(Contract DE-AC04-76DP-00789)
(DE86-002635; SAND-85-2051) Avail: NTIS HC A02/MF A01

An algorithm is presented which solves a modified set of Maxwell's equations, none of them elliptic, in an electromagnetic PIC type code. The algorithm prevents large violations of Gauss' law by diffusing away numerical errors arising from the particle-to-grid apportionment method. There are no restrictions on the manner in which charge and current densities are determined from the particle distribution. In particular, point particles and simple linear interpolation are used. DOE

N86-23331# National Bureau of Standards, Washington, D.C.
NEW VERSION OF PTRACE, INTERNAL REPORT
S. Penner 30 Jan. 1985 6 p
(Contract DE-AT01-79ER-10527)
(DE86-002848; DOE/ER-10527/T5) Avail: NTIS HC A02/MF A01

A modified version of PTRACE was created containing some features that are useful in ray tracing calculations for the NBS microtron. The modified version, called STRACE, will run with an input data deck from PTRACE, producing essentially the same results but with improved numerical accuracy and slightly faster computation time. The new features and the changes in input data needed to activate them are discussed. DOE

N86-23332# Oak Ridge National Lab., Tenn.
LIFETIME: A COMPUTER PROGRAM FOR ANALYZING DOPPLER-SHIFT RECOIL-DISTANCE NUCLEAR LIFETIME DATA
J. C. Wells, M. P. Fewell, and N. R. Johnson Oct. 1985 99 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002903; ORNL/TM-9105) Avail: NTIS HC A05/MF A01

The program LIFETIME is designed to extract lifetimes of nuclear levels from Doppler-shift recoil-distance experiments by performing a least-square fit to the experimental data (shifted and unshifted photopeak intensities and branching ratios). Initial populations of levels and transition rates between levels are treated as variable parameters. In terms of these parameters the population of each level as a function of time is determined by the Bateman equations, and the shifted and unshifted intensities are calculated. DOE

N86-23333# Sandia National Labs., Albuquerque, N. Mex.
ARIES DATA STRUCTURE FILE
M. P. Sears May 1985 46 p
(Contract DE-AC04-76DP-00789)
(DE85-014341; SAND-85-0315) Avail: NTIS HC A03/MF A01

This paper describes version 2.0 of the ARIES data structure (ADS) file, and the subroutines used to access it. ADS files are very flexible neutral files which can be used in almost any finite element or finite difference data management application, including initial problem setup, cycle restart dumps, history and plot output, and even for internal data management. The ADS subroutine package is written in RATFOR, a pre-processed version of FORTRAN-77. The ADS files are hierarchically organized and may be accessed randomly, and the package supports multiple files. DOE

N86-23334# California Univ., Berkeley. Lawrence Berkeley Lab.
OUTLINE OF A FAILURE: A TRUE STORY OF NINE PRECEPTS, WITH TWO MORALS
D. F. Stevens Aug. 1985 7 p Presented at the 10th World Computer Congress, Dublin, Ireland, 1 Sep. 1986
(Contract DE-AC03-76SF-00098)
(DE86-000601; LBL-20084; CONF-860924-1) Avail: NTIS HC A02/MF A01

This is not a conventional case history. It is concerned with failure rather than with triumph, and further, with a personal definition of failure. Failure, like beauty, is in the eye of the beholder. The system I shall call SOS, when measured in terms of absolute achievement, might not be considered a failure. When measured against corporate plans and goals it might not be admitted to be a failure. But when measured against some aspects of the state-of-the-art it professed to advance, against fundamental ergonomic principles, and, especially, against its potential, it was a failure. Specifically, it failed to meet the expectations of one user. It is only fair, then, to begin by characterizing those expectations and giving some indication of their sources. Then follow five sections on various classes of failure. (The Precepts of the title are embedded in these sections.) The paper concludes with a brief discussion of the Two Morals. DOE

N86-23335# Logica Ltd., London (England).
STATIC ANALYSIS PACKAGE EXTENSIONS Final Report
R. H. Barlow, I. A. Inglis, and S. R. Patston Paris ESA 22 Apr. 1985 56 p
(Contract ESA-5685/83-NL-PP)
(Rept-74-4607; ESA-CR(P)-2093) Avail: NTIS HC A04/MF A01

The Static Analysis Package (SAP) a software quality assurance tool for FORTRAN programs which analyzes source code and creates a database of information to assist quality assessment, provide documentation, and determine test coverage was enhanced. The range of source code accepted was extended from pure ANSI FORTRAN X3.9 - 1978 to ANSI, VAX 11 and IBM VS versions of FORTRAN. Its reporting capabilities were also extended to meet the quality assurance demands of new language constructs. The operational use of SAP and clarity of its reporting were improved. Author (ESA)

N86-23336# ERA Ltd., Leatherhead (England).
DEVELOPMENT OF SOFTWARE FOR COMPUTING THE COUPLING COEFFICIENTS OF THE ERS-1 ANTENNAS Final Report
G. Y. Philippou, P. McAndrew, and B. Claydon Paris ESA Jan. 1985 189 p refs
(Contract ESTEC-5667/83-NL-PP)
(ERA-85-0011; ESA-CR(P)-2099) Avail: NTIS HC A09/MF A01

Software for computing the coupling between the antennas aboard the ERS-1 satellite was developed. The software is structured so that it can be readily modified to suit similar designs of satellite. The input data provides models for the antennas and the spacecraft. The output from the software can include the modified radiation patterns for the antennas as well as the coupling factors for the antennas in the form of coupling coefficients that relate the transmit antennas, the receive antennas, and the frequencies. The theory used to compute the coupling and the models for the antennas is discussed. The software was validated by comparison with measurements on a mock-up of the satellite. Guidelines for the use and validity of the results are given. Author (ESA)

N86-23337# Spur Electron Ltd., Havant (England).
USER REQUIREMENT DOCUMENT FOR A EEE DATABASE
Paris ESA Jan. 1985 61 p
(Contract ESTEC-6159/85-NL-AB(SC))
(SP-URD-001-25-01-84; ESA-CR(P)-2114) Avail: NTIS HC A04/MF A01

User requirements for the electromechanical, electrical, and electronic parts of a data base complying with ESA software standards are outlined. The guide is intended to be used as a stand alone document, and as an input to the Product Assurance Database. The list of files; file necessity; file content; interelationships, and security are covered. Author (ESA)

N86-23338# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
DISCUSSION PROPOSITION FOR COMPUTER AIDED DESIGN (CAD) DEVELOPMENTS IN ICES/STRUDL [DISCUSSIE VOORSTEL VOOR CAD ONTWIKKELINGEN IN ICES/STRUDL]
A. W. M. Kok and C. F. Vrijman Jan. 1983 14 p refs Partly in DUTCH and ENGLISH
(ICES-STRUDL-83-2; B8575345) Avail: NTIS HC A02/MF A01

A civil engineering project to contribute to CAD developments is discussed. For the structural design program ICES/STRUDL, the STRUPLOT system with color displays verification was chosen. For the structural analysis test facility program verification, the ETHICS subsystem was obtained. Using an interface between the STRUDL data base and the ETHICS check programs, verification facilities can be easily introduced at user level. Author (ESA)

N86-23339# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
THE GEOMETRY OF AN ARBITRARY SHELL, DEFINED BY REFERENCE POINTS
A. W. M. Kok 1983 12 p
(ICES-STRUDL-83-5; B8575348) Avail: NTIS HC A02/MF A01

The problem to determine the z-coordinate and the tangent axis XY-plane of an arbitrary point of a shell is studied. The shell surface between each of four grid points is approximated by Hermitian interpolation. Author (ESA)

N86-23340# National Bureau of Standards, Gaithersburg, Md. Center for Electronics and Electrical Engineering.
MOS1: A PROGRAM FOR TWO-DIMENSIONAL ANALYSIS OF SI MOSFETs Final Report
C. L. Wilson and J. L. Blue Apr. 1985 63 p
(PB86-102696; NBS/SP-400/77; LC-85-600520) Avail: NTIS HC A04/MF A02; also available SOD HC as 003-003-02657-3 CSCL 09C

The MOS1 program is a portable FORTRAN 77 program suitable for analysis of currents and fields in VLSI devices. The program solves three coupled nonlinear elliptic partial differential semiconductor device equations in two dimensions. Historically, these equations have been solved using a special-purpose program and batch runs on a large, fast computer. The authors use a general-purpose program which runs on a large minicomputer or scientific workstation. This report discusses the physical formulation of the semiconductor equations and the methods used to select the solution strategy. Author (GRA)

N86-22541# Selenia Industrie Associate S.p.A., Rome (Italy). Defence System Div.
QUALITY OF THE TORNADO ATS SOFTWARE
Fabio Frontalini *In its* Rivista Technica Selenia, Vol. 9, No. 3, 1985 1985 p 17-21 (For primary document see N86-22537 13-01)
Avail: NTIS HC A03/MF A01

N86-22571# Joint Publications Research Service, Arlington, Va.
ON COMPUTER-AIDED PROGRAMMING OF FAL DEVICES
Xin Tao and Shuliang Pu *In its* China Report: Science and Technology (JPRS-CST-86-007) 20 Feb. 1986 p 13-26 refs Transl. into ENGLISH from Zhejiang Daxue Xuebao (Zengkan) (Hangzhou, China), 25 Jul. 1985 p 124-132 (For primary document see N86-22570 13-05)
Avail: NTIS HC A04/MF A01

N86-22747# Joint Publications Research Service, Arlington, Va.
SCREEN EDITING PROGRAM IN CHINESE
Miaoping Mei *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 52-56 Transl. into ENGLISH from Xiaoxing Weixing Jisuanji Xitong (Shenyang, China), no. 2, 8 Feb. 1985 p 60-62 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

N86-22752# Joint Publications Research Service, Arlington, Va.
OPTIMAL SELECTION OF PRODUCTION PLAN, SOFTWARE DESIGN
Fu Fan *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 80-88 refs Transl. into ENGLISH from Zidonghua Xuebao (Beijing, China), v. 11, no. 1, Jan. 1985 p 87-93 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22753# Joint Publications Research Service, Arlington, Va.
COMPUTER-AIDED DESIGN OF OPTIMUM LINEAR CONTROL SYSTEMS
Qinyou Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 89-96 refs Transl. into ENGLISH from Zidonghua Xuebao (Beijing, China), v. 11, no. 1, Jan. 1985 p 38-43 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22754# Joint Publications Research Service, Arlington, Va.
GEOMETRIC NONLINEAR ANALYSIS OF SHELLS
Di Zhang and Zhongxiong Cai *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 97-111 refs Transl. into ENGLISH from Shuzhi Jisuan Yu Jisuanji Yingyong (Beijing, China), v. 6, no. 3, Sep. 1985 p 176-187 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22771# Joint Publications Research Service, Arlington, Va.
ACCURATE COMPUTER-AIDED DESIGN OF MMIC BROADBAND FET AMPLIFIERS
Yongshi Wu and Herbert J. Carlin (Cornell Univ., Ithaca, N.Y.) *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 99-111 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 11, no. 4, Jul. 1983 p 76-84 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-23294# Joint Publications Research Service, Arlington, Va.
KARL-3 SYSTEM FOR AUTOMATED DESIGN OF PRINTED-BOARD CIRCUITS Abstract Only
I. G. Vintinzenko, I. G. Malykh, and Yu. F. Mirnykh *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 1 Transl. into ENGLISH

from Avtomatizirovannyye Sistemi Upravleniya i Pribory Avtomatiki Vypusk 70 (Kharkov, USSR), 1984 p 93-99 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23299# Joint Publications Research Service, Arlington, Va.
VECTOR COMPUTATION PROGRAM SYSTEM Abstract Only
V. P. Razbegin, G. N. Kalyanov, and B. V. Kupriyanov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 6 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 4, Jul. - Aug. 1983 p 25-32 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23300# Joint Publications Research Service, Arlington, Va.
SYSTEM OF AUTOMATED TESTING FOR MIXAL PROGRAMS Abstract Only
V. L. Katkov and G. V. Yermakov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 6-7 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 50-58 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23303# Joint Publications Research Service, Arlington, Va.
GRAPH-TEXT CODING OF ALGORITHMS Abstract Only
V. A. Zhizhko *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 9 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 14-24 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23304# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF DIALOGUE MODE MICROCOMPUTER PROGRAMMING USING YeS COMPUTERS Abstract Only
A. A. Ilyukovich and V. Yu. Bobolovich *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 9-10 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 34-36 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23306# Joint Publications Research Service, Arlington, Va.
RIS SYSTEM FOR COMPUTER-AIDED PREPARATION OF GRAPIC DOCUMENTATION Abstract Only
V. L. Katkov, A. Ye. Khlebtsevich, and A. I. Bliznets *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 11 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 74-77 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-23341 Notre Dame Univ., Ind.
ANALYTICAL MODELS FOR PARALLEL PROCESSING SYSTEMS Ph.D. Thesis
Hany Hussein Ammar 1985 165 p
Avail: Univ. Microfilms Order No. DA8524392

With the advances of Computer and Communication technology, the notions of parallel and distributed processing have gained increased importance. In this dissertation, analytical models of parallel processing systems in which a job subdivides into several concurrent tasks are considered. The dissertation is divided into two parts. In the first part, the definition and classification of parallel jobs are described, and current analytical models, which are based on Queuing Networks (QNs), are reviewed. Analytical models using the Generalized Stochastic Petri Nets (GSPNs) are considered, and an approximate hierarchical model, using both QNs and GSPNs, is presented. In the second part of the dissertation, the analysis of GSPNs is considered. The current methods of analysis are reviewed, and a more general method is presented. Also techniques for reducing the analysis complexity such as reduction and aggregation are developed. The applications of such techniques to the approximate hierarchical decomposition of Stochastic Petri Nets are described, and the approximate lumping of synhronous parallel operations is considered. Dissert. Abstr.

N86-23342# Illinois Univ., Urbana. Center for Supercomputing Research and Development.
CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT (CEDAR) Progress Report, 25 Jan. 1985 - 24 Jan. 1986
D. J. Kuck, E. S. Davidson, D. H. Lawrie, and A. H. Sameh 1986 17 p
(Contract DE-FG02-85ER-25001)
(DE86-002051; DOE/ER-25001/1) Avail: NTIS HC A02/MF A01

The Center for Supercomputing Research and Development (CSRD) is building the Cedar System, a prototype multiprocessor. Clusters of 8 tightly-coupled processors are being bought from Alliant Computer Systems, which based its system design on earlier University of Illinois work by the CSRD group. CSRD efforts span the hardware, software, and applications areas. The hardware group is designing and building a global network and shared global memory, as well as an Alliant interface. This will allow 8 clusters (of 8 processors) to operate together in 1986 and up to 64 clusters in 1987. Synchronization and data sharing are allowed by powerful hardware primitives. The software group is developing a Unix-based multiprocessor operating system and a Paraphrase (KAP)-based restructuring compiler. The compiler will transform serial as well as parallel FORTRAN constructs to exploit the system, dealing with vector as well as multiprocessing parallelism. CSRD is working for a rapid architectural increase in speed across a number of applications. DOE

N86-22820# Science Research Council, Edinburgh (Scotland). Rutherford Appleton Lab.
THE USE OF SATELLITE CHANNELS FOR COMPUTER NETWORKING
J. W. Burren *In* ESA Proceedings of International Symposium on Satellite Transmissions Nov. 1985 p 71-78 refs (For primary document see N86-22811 13-32)
Avail: NTIS HC A10/MF A01

N86-23295# Joint Publications Research Service, Arlington, Va.
MODEL OF MULTIPROGRAM OPERATION IN NONHOMOGENEOUS COMPUTER SYSTEM WITH STRICT MEMORY DIVISION Abstract Only
V. A. Vishnyakov and O. V. German *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 2 Transl. into ENGLISH from Avtomatika i Vychislitelnaya Tekhnika (Riga, USSR), no. 3, May - Jun. 1985 p 58-64 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23301# Joint Publications Research Service, Arlington, Va.
TRACING AND ANALYSIS OF COMPUTER SYSTEMS BY MEANS OF THE STAN PROGRAM Abstract Only
Ya. A. Kogan and L. B. Kozinskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 7-8 Transl. into ENGLISH from Programmirovaniye (Moscow, USSR), no. 3, May - Jun. 1985 p 25-37 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-23343*# Scientific Systems, Inc., Cambridge, Mass.
FAULT-TOLERANT CONTROL OF LARGE SPACE STRUCTURES USING THE STABLE FACTORIZATION APPROACH Final Report
H. C. Razavi, R. K. Mehra, and M. Vidyasagar (Waterloo Univ., Ontario) Washington NASA Mar. 1986 38 p refs
(Contract NAS1-17946)
(NASA-CR-3964; NAS 1.26:3964; SSI-1103) Avail: NTIS HC A03/MF A01 CSCL 09B

Large space structures are characterized by the following features: they are in general infinite-dimensional systems, and have large numbers of undamped or lightly damped poles. Any attempt to apply linear control theory to large space structures must therefore take into account these features. Phase I consisted of an attempt to apply the recently developed Stable Factorization (SF) design philosophy to problems of large space structures, with particular attention to the aspects of robustness and fault tolerance. The final report on the Phase I effort consists of four sections, each devoted to one task. The first three sections report theoretical results, while the last consists of a design example. Significant results were obtained in all four tasks of the project. More specifically, an innovative approach to order reduction was obtained, stabilizing controller structures for plants with an infinite number of unstable poles were determined under some conditions, conditions for simultaneous stabilizability of an infinite number of plants were explored, and a fault tolerance controller design that stabilizes a flexible structure model was obtained which is robust against one failure condition. Author

N86-23344# Illinois Univ., Urbana. Decision and Control Lab.
TWO STABILITY RESULTS FOR DISCRETE ONE STEP AHEAD ADAPTIVE CONTROL M.S. Thesis
Douglas S. Rhode May 1985 58 p
(Contract N00014-84-C-0149)
(AD-A161306; DC-83; UILU-ENG-85-2220) Avail: NTIS HC A04/MF A01 CSCL 09/3

In this thesis, two stability results are developed for one step ahead adaptive controllers. In Chapter 2, an analysis is presented of the local behavior of a one step ahead adaptive controller around a tuned solution. Instead of placing assumptions on the order, delay or minimum phase properties of the plant, the existence of a unique tuned solution is assumed. This implies that for a particular reference model output there exists a unique stabilizing parameter vector such that the plant output will track the reference model output exactly. Assuming this tuned solution exists, the closed-loop system was shown to be locally stable, and small departures from the nominal do not disturb this stability. The second stability result presented in this thesis deals with the problems associated with direct adaptive control of a sampled data process. Even if a continuous time plant is minimum phase, sampling will often introduce nonminimum phase zeros in the equivalent discrete model. These nonminimum phase zeros cannot be cancelled if system stability is to be maintained. Johansson (1983) has shown that the minimum a priori knowledge needed is the unstable zero locations. Fortunately, Astrom et al. (1984) have established the location of these zeros for very rapidly sampled systems. Using this information, the algorithm presented in Section 3.2 retains the unstable zeros in the tracking transfer function. The analysis presented in Section 3.3 represents the first step towards establishing a robust direct adaptive scheme for sampled data systems. GRA

N86-23345# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
STUDY OF NONLINEARITIES IN OBSERVER CONTROL SYSTEMS WITH ANALOG COMPUTER SIMULATIONS
Curtis Johansson Aug. 1985 33 p refs In SWEDISH; ENGLISH summary
(FOA-C-20581-E3; ISSN-0347-3694) Avail: NTIS HC A03/MF A01

Observer control technique is compared with traditional feedback methods. The investigation was limited to a simple system (integration + oscillation) with ordinary feedback, or observer feedback; limitation, dead zone, and backlash were introduced. The results of measurements on nonlinear systems must be interpreted and applied in a more restricted manner than in linear systems. For systems with static (frequency independent) nonlinearities, e.g., limitations and dead zones, the stability problems seem to be independent of the type of feedback. For systems with dynamic (frequency dependent) nonlinearities, such as backlash, the stability problem is considerably more difficult with observer feedback. Author (ESA)

N86-23298# Joint Publications Research Service, Arlington, Va.
CONCEPT OF AUTOMATED MACRODESIGN OF NETWORKS OF AUTOMATED CONTROL SYSTEMS Abstract Only
Yu. Yu. Kess *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 5 Transl. into ENGLISH from Upravlyayushchiye Sistemy i Mashiny (Kiev, USSR), no. 3, May - Jun. 1985 p 7-11 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

N86-23310# Joint Publications Research Service, Arlington, Va.
FLEXIBLE PRODUCTION SYSTEMS AND THE DEVELOPMENT OF METHODS FOR THEIR CONTROL
A. M. Voychinskiy *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-003) 20 Mar. 1986 p 27-35 refs Transl. into ENGLISH from Standarty i Kachestvo (Moscow, USSR), no. 8, Aug. 1985 p 18-21 (For primary document see N86-23293 13-60)
Avail: NTIS HC A04/MF A01

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-23346# Royal Signals and Radar Establishment, Malvern (England).
LINE FINDING ALGORITHMS FOR SAR
J. W. Wood Jul. 1985 23 p refs
(AD-A162024; RSRE-MEMO-3841; BR97301) HC A02/MF A01

The problem of locating linear features, not necessarily straight, in SAR images is addressed. The characteristics of such features and the way in which these characteristics affect the desired properties of line finding algorithms are discussed. Two line detection algorithms are described: the Hough transform, and the dynamic programming technique. Results of applying both algorithms to simulated and real SAR images are given. The Hough transform is found to be too restricted to be useful for this application. The dynamic programming technique locates lines well. The problem of spurious lines appearing in clutter is considered. Author (ESA)

N86-23347 National Physical Lab., Teddington (England). Div. of Materials Applications.
NUMERICAL DETERMINATION OF THE MOTION OF A CABLE-BODY SYSTEMS BY THE METHOD OF CHARACTERISTICS
D. H. Ferriss Oct. 1985 30 p refs
(NPL-DMA(A)-109; ISSN-0143-7313) Copyright. Avail: Issuing Activity

Partial differential equations which describe the three-dimensional motion of a flexible, linearly elastic cable subjected to gravitational and hydrodynamic (or aerodynamic) loading are presented. One end of the cable is constrained to move in a given way and the other end is attached to a mass acted upon by drag and other forces representing the action of thrusters. The motion of the system from a given initial state is determined by

numerical solution of the six governing hyperbolic partial differential equations by the method of characteristics. Author (ESA)

N86-23348 ENR Technisch Wetenschappelijk Rekencentrum, Petten (Netherlands).
NUMBER OF UNIFIED MATHEMATICAL ROUTINE COLLECTIONS (NUMRCN): GENERAL SETUP, FACILITIES FOR INTERACTIVE RETRIEVAL AND THE GRAPHICS SUPPLEMENT [NUMRCN: ALGEMENE OPZET, FACILITEITEN VOOR INTERACTIEVE ONTSLUITING EN HET GRAFISCH SUPPLEMENT]
G. P. Leendertse, A. C. B. denOuden, and C. J. Warmer Jun. 1984 47 p refs In DUTCH
(Rept-10) Copyright. Avail: Issuing Activity
A software library for numerical and statistical problems is described. Within the NUMRCN system, on-line documentation (a catalog with rough information and a description file with user documentation per routine) of the collections are present. For the interactive retrieval of the on-line documentation, a keyword combination based system was developed. Author (ESA)

N86-23349# National Aerospace Lab., Tokyo (Japan).
FILTERING SAMPLER
Akira Tada 1985 20 p refs In JAPANESE; ENGLISH summary
(NAL-TR-863) Avail: NTIS HC A02/MF A01
This paper describes the algorism and effect of the filtering sampler, which was recently developed as a part of a time series data acquisition system. The fundamental operation is a moving average with the weightings of binomial coefficients over discrete data. Each application of the above operation at every other input timing reduces the sampling rate by half and filters out high frequency noise components. Such fundamental operation is repeatedly applied to the data in cascade, so that the total operation reduces the sampling rate by a factor of any arbitrary number to the power of 2. The algorism reduced the load of the microprocessor for the filtering. The anti-aliasing effect is also found to be excellent in the low frequency region. Author

N86-23350*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMBINED INTEGRATING AND DIFFERENTIATING MATRIX FORMULATION FOR BOUNDARY VALUE PROBLEMS ON RECTANGULAR DOMAINS Final Report
W. D. Lakin (Old Dominion Univ.) Mar. 1986 31 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178074; ICASE-86-12; NAS 1.26:178074) Avail: NTIS HC A03/MF A01 CSCL 12A
Integrating and differentiating matrices allow the numerical integration and differential of functions whose values are known at points of a discrete grid. Previous derivations of these matrices were restricted to one dimensional grids or to rectangular grids with uniform spacing in at least one direction. Integrating and differentiating matrices were developed for grids with nonuniform spacing in both directions. The use of these matrices as operators to reformulate boundary value problems on rectangular domains as matrix problems for a finite dimensional solution vector is considered. The method requires nonuniform grids which include near boundary points. An eigenvalue problem for the transverse vibrations of a simply supported rectangular plate is solved to illustrate the method. Author

N86-23351# Florida State Univ., Tallahassee. Dept. of Statistics.
ON THE LIMIT BEHAVIOR OF A MULTI-COMPARTMENT STORAGE MODEL WITH AN UNDERLYING MARKOV CHAIN. 1: WITHOUT NORMALIZATION
Eric S. Tollar Feb. 1985 20 p
(Contract DAAG29-82-K-0168)
(AD-A161293; FSU-STATISTICS-M693; TR-D-76-ARO; ARO-19367.30-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1
The present paper considers a multi-compartment storage model with one way flow. The inputs and outputs for each compartment are controlled by a denumerable state Markov chain. Assuming finite first moments, it is shown that certain compartments converge in distribution while others diverge, based on appropriate first moment conditions on the inputs and outputs. GRA

N86-23352# Sandia National Labs., Albuquerque, N. Mex.
GLOBAL ERROR ESTIMATION WITH ONE-STEP METHODS
L. F. Shampine Oct. 1985 23 p refs
(Contract DE-AC04-76DP-00789)
(DE86-002961; SAND-85-1377) Avail: NTIS HC A02/MF A01
The global, or true, error made by one-step methods when solving the initial value problem for a system of ordinary differential equations is studied. Some methods for approximating this global error are based on an asymptotic global error expansion. A new method based on such an expansion is presented. It exploits the fact that standard codes implement a pair of formulas in order to control the local error. A way of monitoring the computation so as to recognize when basic assumptions break down is proposed. Illustrative computations are provided. DOE

N86-23353# Los Alamos National Lab., N. Mex.
RELATION BETWEEN FINITE ELEMENT METHODS AND NODAL METHODS IN TRANSPORT THEORY
W. F. Walters 1985 19 p Presented at the International Seminar on Finite Element and Allied Methods for Reactor Physics and Shielding Calculations, London, England, 18 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000761; LA-UR-85-3276; CONF-850963-1) Avail: NTIS HC A02/MF A01
The relationship between nodal methods and finite-element methods for solving the discrete-ordinates form of the transport equation in x-y geometry is examined. Specifically, we the relation of three finite-element schemes to the linear-linear (LL) and linear-nodal (LN) nodal schemes is discussed. The three finite-element schemes are the linear-continuous-diamond-difference (DD) scheme, the linear-discontinuous (LD) scheme, and the quadratic-discontinuous (QD) scheme. A brief derivation of the (LL) and (LN) nodal schemes is given in the third section of this paper. The approximations that cause the LL scheme to reduce to the DD, LD, and QD schemes are then indicated. An extremely simple method of deriving the finite-element schemes is then introduced. DOE

N86-23354# Argonne National Lab., Ill.
ALGORITHMS FOR SOLVING FINITE DIMENSIONAL SYSTEMS OF NONLINEAR EQUATIONS AND INEQUALITIES THAT HAVE BOTH GLOBAL AND QUADRATIC CONVERGENCE PROPERTIES
J. Burke Aug. 1985 22 p
(Contract W-31-109-eng-38)
(DE86-001872; ANL/MCS-TM-54) Avail: NTIS HC A02/MF A01
Algorithms for solving finite dimensional systems of nonlinear equations and inequalities that have both global and quadratic convergence properties are presented. The techniques are based upon the Gauss-Newton type algorithms developed for the minimization of the distance function. Under the assumption of a constraint qualification, the algorithms are shown to be quadratically convergent. DOE

N86-23355# Sheffield Univ. (England). Dept. of Control Engineering.
TENSOR OPERATORS AND LIMIT CYCLES IN NONLINEAR SYSTEMS
S. P. Banks 1985 14 p refs
(RR-280-A) Avail: NTIS HC A02/MF A01
The theory of tensor operators is used to obtain criteria for the existence and nonexistence of limit cycles in nonlinear systems. A simple sufficient condition for the nonexistence of limit cycles in polynomial systems is given. By associating an infinite-dimensional tensor-valued system with the original nonlinear system and generalizing the Gersgorin circle theorem to tensors, linear spectral theory can be applied to show that the system oscillates if and only if the spectrum of the associated tensor operator

intersects the imaginary axis. The use of the method to predict the existence of limit cycles is much more difficult. It involves finding the spectrum of a tensor operator and showing the existence of an eigenvector of a specific form. Author (ESA)

N86-23356# Sheffield Univ. (England). Dept. of Control Engineering.
A PREDICTION ERROR AND STEPWISE REGRESSION ESTIMATION ALGORITHM FOR NONLINEAR SYSTEMS
S. A. Billings and W. S. F. Voon Sep. 1985 38 p refs
(Grant SERC-GR/B/31163)
(RR-281) Avail: NTIS HC A03/MF A01

The identification of nonlinear systems based on a nonlinear autoregressive moving average model with exogenous inputs model representation is considered and a combined stepwise regression/prediction error estimation algorithm is derived. The stepwise regression routine determines the model structure by detecting significant terms in the model, while the prediction error algorithm provides optimal estimates of the final model parameters. Implementation of the algorithms is discussed and simulated examples and industrial applications are included to illustrate that parsimonious models of nonlinear systems can be identified using the algorithm. Author (ESA)

N86-23357# Barcelona Univ. (Spain). Facultat d'Informatica de Barcelona.
STUDY ON THE GENERATION OF TRAJECTORIES FOR MULTIPLE TARGET FLYBY MISSIONS
E. Roth and J. Rodriguez Paris ESA Jul. 1985 242 p refs
(Contract ESOC-5646/83-D-JS(SC))
(FIB-RR-85/07; ESA-CR(P)-2139) Avail: NTIS HC A11/MF A01

The feasibility of asteroid exploratory missions was analyzed to set up models for the generation of ballistic traverses with restricted interflyby maneuvers. A preselection method based on neighborhood properties of close trajectories in an initial conditions space was developed. A very rich set of four and five body missions is shown to be feasible. With Ariane 4, missions of 6 asteroids are possible. Using mixed strategies, missions to nine bodies are feasible. Author (ESA)

N86-23358# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
TEST OF A SYSTEM FOR POSITIONING: SYLEDIS
Sven Modig Oct. 1985 16 p in SWEDISH; ENGLISH summary
(FOA-C-20588-D6; ISSN-0347-3694) Avail: NTIS HC A02/MF A01

A system for positioning was tested in a field trial. It shows a great sensitivity to signal reflections, which reduce false steps on the plot and thus make the positioning very uncertain. Average length of difference vectors (between measured and true position) for vectors < 500 m is 133 m, standard deviation 138 m. The system is not recommended. Author (ESA)

N86-22749# Joint Publications Research Service, Arlington, Va.
SIMPLE METHOD TO CONSTRUCT CUBIC SPLINE FUNCTION DESCRIBED
Fuqi Tan *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 52-58 refs Transl. into ENGLISH from Yingyong Shuxue He Lixue (Chongqing, China), v. 6, no. 6, Jun. 1985 p 567-472 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22750# Joint Publications Research Service, Arlington, Va.
MODEL FOR BOUNDARY INTEGRAL EQUATION IN SOLID MECHANICS
Xingfeng Wang and Xingfa Wang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 59-70 refs Transl. into ENGLISH from Yingyong Shuxue He Lixue (Chongqing, China), v. 6, no. 6, Jun. 1985 p 531-540 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22809*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VITERBI ALGORITHM ON A HYPERCUBE: CONCURRENT FORMULATION
F. Pilara *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 249-255 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-23359 Stanford Univ., Calif.
ALTERNATIVE VARIOGRAM ESTIMATORS IN GEOSTATICS Ph.D. Thesis
Karl Henning Omre 1985 281 p
Avail: Univ. Microfilms Order No. DA8522206

The variogram function carries information about the spatial variability of the regionalized variable. Most geostatistical analyses are based on the structural information represented in this function. The statistical properties of the variogram value at a given lag h are discussed. Problems associated with the estimation of the variogram value, and a discussion of the properties of the traditional variogram estimator are presented. The case for which the traditional estimator is optimal is defined as the Ideal Case for variogram estimation. This case entails strong assumptions about the distributional characteristics of the regionalized variable and the sampling procedure performed. In practice, deviations from the Ideal Case occur. Three frequently occuring deviation models are defined: the distributional, the sampling and the outlier deviation models. Problems associated with prefrential sampling are thoroughly discussed. Author

N86-23360# Oak Ridge National Lab., Tenn.
O-THEORY: A HYBRID UNCERTAINTY THEORY
E. M. Oblow Oct. 1985 32 p
(Contract DE-AC05-84OR-21400)
(DE86-002610; ORNL/TM-9759) Avail: NTIS HC A03/MF A01

A hybrid uncertainty theory is developed to bridge the gap between fuzzy set theory and Bayesian inference theory. Its basis is the Dempster-Shafer formalism (a probability-like, set-theoretic approach), which is extended and expanded upon so as to include a complete set of basic operations for manipulating uncertainties in approximate reasoning. The new theory, operator-belief theory (OT), retains the probabilistic flavor of Bayesian inference but includes the potential for defining a wider range of operators like those found in fuzzy set theory. The basic operations defined for OT in this paper include those for: dominance and order, union, intersection, complement and general mappings. A formal relationship between the membership function in fuzzy set theory and the upper probability function in the Dempster-Shafer formalism is also developed. Several sample problems in logical inference are worked out to illustrate the results derived from this new approach as well as to compare them with the other theories currently being used. A general method of extending the theory using the historical development of fuzzy set theory as an example is suggested. DOE

N86-23361# Sandia National Labs., Albuquerque, N. Mex.
MEASURE OF TOP-DOWN CORRELATION
R. L. Iman and W. J. Conover Oct. 1985 52 p Prepared in cooperation with Texas Tech Univ., Lubbock, Tex.
(Contract DE-AC04-76DP-00789)
(DE86-002530; SAND-85-0601) Avail: NTIS HC A04/MF A01

Many situations exist in which n objects are ranked by two independent sources. For example, n brands of a given type of food product are ranked by taste test by two different individuals; n input variables to a computer model are ranked with respect to their influence on the model output variables by two different

criteria; and company objectives are ranked by management and again by employees. In each of these settings, interest centers primarily on agreement in the top rankings, with disagreements on items at the bottom of the rankings being of little or no importance. That is, can consumers agree on the most preferred brands of a certain type of food product; do different techniques of measuring the sensitivity of an output variable to various input variables in a computer model agree on the selection of the most important variables; and is there agreement between management and employees on the most urgent objectives. A problem with Spearman's rho in the present setting is that it is equally influenced by disagreement on the assignment of rankings at all levels. In this paper, a measure of correlation is provided that is more sensitive to agreement on the top rankings. The statistic used in this setting is the ordinary correlation coefficient computed on Savage (1956) scores. The asymptotic normality of this statistic is shown, tables of the exact distribution are provided for n = 3(1)14, and models are presented for which this is the locally most powerful rank test. DOE

N86-23362# Oak Ridge National Lab., Tenn.
INDUCTIVE TIME SERIES MODELING PROGRAM
B. L. Kirk and B. W. Rust Oct. 1985 112 p refs
(Contract DE-AC05-84OR-21400)
(DE86-002553; ORNL/TM-7534) Avail: NTIS HC A06/MF A01

A number of features that comprise environmental time series share a common mathematical behavior. Analysis of the Mauna Loa carbon dioxide record and other time series is aimed at constructing mathematical functions which describe as many major features of the data as possible. A trend function is fit to the data, removed, and the resulting residuals analyzed for any significant behavior. This is repeated until the residuals are driven to white noise. In the following discussion, the concept of trend will include cyclic components. The mathematical tools and program packages used are VARPRO (Golub and Pereyra 1973), for the least squares fit, and a modified version of our spectral analysis program (Kirk et al. 1979), for spectrum and noise analysis. The program is written in FORTRAN. All computations are done in double precision, except for the plotting calls where the DISSPLA package is used. The core requirement varies between 600 K and 700 K. The program is implemented on the IBM 360/370. Currently, the program can analyze up to five different time series where each series contains no more than 300 points. DOE

N86-23363# Los Alamos National Lab., N. Mex.
PREDICTION APPROACH TO MULTISTAGE SAMPLING WHEN CLUSTER SIZES ARE UNKNOWN
E. J. Kelly and W. G. Cumberland 1985 10 p refs Presented at the American Statistical Association for Joint Statistical Meetings, Las Vegas, Nev., 5 Aug. 1985 Prepared in cooperation with California Univ., Los Angeles
(Contract W-7405-eng-36)
(DE86-000769; LA-UR-85-3237; CONF-8508115-6) Avail: NTIS HC A02/MF A01

A model for two-stage cluster sampling when sample cluster sizes are unknown is used to derive an optimal (model-based) estimator for the population total and to determine robust sampling strategies. In an empirical study using 1970 and 1980 census data for Los Angeles and surrounding counties, comparisons are made between the model based estimator and conventional estimators. The results favor the new estimator over those derived from randomization theory. In addition, the empirical study shows that the robust sampling strategies suggested by the theory can reduce biases, improve efficiency, and decrease the frequencies of large errors. DOE

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-23364# Harvard Univ., Cambridge, Mass. Computation Lab.
EXTENSION OF THE PARALLEL NESTED DISSECTION ALGORITHM TO THE PATH ALGEBRA PROBLEMS
Victor Pan and John H. Reif 1985 11 p
(Contract N00014-80-C-0647)
(AD-A161304; TR-15-85) Avail: NTIS HC A02/MF A01 CSCL 12/1

The authors' recent parallel nested dissection algorithm for solving linear systems is extended in order to substantially accelerate several path algebra computations in both cases of a single source path and of all pair paths where the path problem is defined by a sparse matrix whose associated graph has a family of small separators. Author (GRA)

N86-23365# Sheffield Univ. (England). Dept. of Control Engineering.
EXPERIMENTAL DESIGN AND IDENTIFIABILITY FOR NONLINEAR SYSTEMS
I. J. Leontaritis and S. A. Billings Sep. 1985 27 p refs
(RR-280-B) Avail: NTIS HC A03/MF A01

Experiment design for the identification of nonlinear systems based on the criterion that the accuracy of the parameter estimates should be maximized is discussed. In open-loop operation the optimum input sequence for a completely unknown nonlinear system is derived using results from information theory. The optimum input is an independent sequence with a Gaussian distribution for a power constraint on the input and an independent sequence with a uniform distribution for an amplitude constraint on the input. The results differ from the optimum input sequences for linear systems and it is shown that identifiability problems can arise if optimum sequences for linear systems are used as inputs for nonlinear systems. Practical guidelines for the design of experiments in closed-loop operation are given. Author (ESA)

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-23366# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
IN 1983 FALTINGS PROVED BY CONJECTURE BY MORDELL, SHAFAREVICH AND TATE
Frans Oort (Utrecht State Univ., Netherlands), Arjeh M. Cohen, Richard D. Gill, ed., and Jan Heering, ed. Dec. 1984 55 p refs
(CWI-Newsletter5,84; ISSN-0168-826x) Avail: NTIS HC A04/MF A01

The significance of the Mordell-Faltings theorem which confirms the Mordell's conjecture is discussed. The method of the proof is not effective. Author (ESA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-23367# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
DYNAMICS OF GYROELASTIC VEHICLES
Gabriele M. T. DEleuterio Jan. 1986 191 p refs
(UTIAS-300; ISSN-0082-5255) Avail: NTIS HC A09/MF A01

The dynamics of gyroelastic vehicles are analyzed. A gyroelastic vehicle consists of a number of flexible appendages, with distributions of gyricity, attached to a central rigid body, which may also have stored angular momentum. Constrained and unconstrained dynamics are discussed. The equation of motion is derived and cast into a general first order operator form. An extensive modal analysis is performed from which a set of orthogonality conditions for the mode shapes is obtained. The

theoretical results are demonstrated using a finite element procedure on a uniform cantilevered rod. The analytical results are verified by a series of numerical examples which also serve to illustrate different aspects of the theory: a uniform constrained rod, a rod with a rigid body, a rod with an internal joint, and a triorthogonal-boom spacecraft modal metamorphosis and the dependence of the vibrational frequencies on gyricity are closely studied. B.G.

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-23368 California Univ., Berkeley.
NOISE EFFECTS NEAR THE ONSET OF SIMPLE DYNAMICAL INSTABILITIES Ph.D. Thesis
Kurt Arn Wiesenfeld 1985 275 p
Avail: Univ. Microfilms Order No. DA8525155

The effect of random noise is expected to be most important for systems that are near an instability. Dynamical systems that display bifurcations of either time independent or time periodic solutions, with particular emphasis placed on codimension-one and codimension-two bifurcations are examined. Noise is introduced phenomenologically, and both state independent (additive) and state dependent (multiplicative) noises are considered. A general finding is that, for parameter values close to those for the onset of the instability, a great simplification in the description of the stochastic problem is possible. The methods employed parallel closely those familiar from bifurcation theory of deterministic dynamical systems. In a sense, the results of bifurcation theory are extended to include the effects of external noise. For bifurcations of time independent solutions, a procedure motivated by the Center Manifold Theorem is developed that drastically reduces the number of independent variables involved in the Fokker-Planck equation for the probability density. The van der Pol-Duffing oscillator is studied in detail. The scaling predictions were tested, and verified, experimentally for periodically driven p-n junctions. Dissert. Abstr.

N86-23369# Defence Research Information Centre, Orpington (England).
RADIATION PATTERN OF ACOUSTIC EMISSION
M. Otsu Sep. 1985 21 p refs Transl. into ENGLISH from Zairyo, vol. 32, no. 356, 1983 p 577-583
(DRIC-T-7599; BR97248) HC A02/MF A01

The suitability of consideration of acoustic emission (AE) wave motions as elastic wave motions generated from a dislocation mode is demonstrated on the basis of one AE waveform characteristic, the radiation pattern. Through application of a fracture source detection method, determination of dislocation model kinematic factors is established. This fracture source detection method can provide information in surveillance of microfractures in concrete structures. Author (ESA)

N86-23370*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NONLINEAR ACOUSTIC WAVE PROPAGATION IN ATMOSPHERE Final Report
S. I. Hariharan (Akron Univ., Ohio) Mar. 1986 29 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107; Grant NAG1-527)
(NASA-CR-178069; ICASE-86-01; NAS 1.26:178069) Avail: NTIS HC A02/MF A01 CSCL 20A

In this paper a model problem is considered that simulates an atmospheric acoustic wave propagation situation that is nonlinear. The model is derived from the basic Euler equations for the atmospheric flow and from the regular perturbations for the acoustic part. The nonlinear effects are studied by obtaining two successive linear problems in which the second one involves the solution of the first problem. Well-posedness of these problems is discussed and approximations of the radiation boundary conditions that can be used in numerical simulations are presented. Author

N86-23371*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
FREE JET FEASIBILITY STUDY OF A THERMAL ACOUSTIC SHIELD CONCEPT FOR AST/VCE APPLICATION-DUAL FLOW. COMPREHENSIVE DATA REPORT. VOLUME 1: TEST NOZZLES AND ACOUSTIC DATA
B. A. Janardan, J. F. Brausch, and A. O. Price Oct. 1984 501 p refs 2 Vol.
(Contract NAS3-22137)
(NASA-CR-174817; NAS 1.26:174817; R84AEB570) Avail: NTIS HC A22/MF A01 CSCL 20A

Acoustic and diagnostic data that were obtained to determine the influence of selected geometric and aerodynamic flow variables of coannular nozzles with thermal acoustic shields are summarized in this comprehensive data report. A total of 136 static and simulated flight acoustic test points were conducted with 9 scale-model nozzles The tested nozzles included baseline (unshielded), 180 deg shielded, and 360 deg shielded dual flow coannular plug configurations. The baseline configurations include a high radius ratio unsuppressed coannular plug nozzle and a coanuular plug nozzle and a coannular plug nozzle with a 20-chute outer stream suppressor. The tests were conducted at nozzle temperatures and pressure typical of operating conditions of variable cycle engine. Author

N86-23372*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
FREE-JET FEASIBILITY STUDY OF A THERMAL ACOUSTIC SHIELD CONCEPT FOR AST/VCE APPLICATION-DUAL STREAM NOZZLES. COMPREHENSIVE DATA REPORT. VOLUME 2: LASER VELOCIMETER AND SUPPRESSOR. BASE PRESSURE DATA
B. A. Janardan, J. F. Brausch, and A. O. Price Oct. 1984 234 p 2 Vol.
(Contract NAS3-22137)
(NASA-CR-174818; NAS 1.26:174818; R84AEB570) Avail: NTIS HC A11/MF A01 CSCL 20A

Acoustic and diagnostic data that were obtained to determine the influence of selected geometric and aerodynamic flow variables of coannular nozzles with thermal acoustic shields are summarized in this comprehensive data report. A total of 136 static and simulated flight acoustic test points were conducted with 9 scale-model nozzles. Aerodynamic laser velocimeter measurements were made for four selected plumes. In addition, static pressure data in the chute base region of the suppressor configurations were obtained to assess the influence of the shield stream on the suppressor base drag. Author

N86-23373# California Univ., Berkeley. Lawrence Berkeley Lab.
NEW THEORETICAL ASPECTS OF RESONANT PHOTOACOUSTIC SPECTROSCOPY
R. Gerlach, R. H. Johnson, and N. M. Amer Jun. 1985 6 p refs Presented at the 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, Quebec, Canada, 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002884; LBL-20187; CONF-850886-4) Avail: NTIS HC A02/MF A01

We derive the surface Q for an arbitrary mode, compare azimuthal to radial mode signal, discuss cell size considerations, and compare to nonresonant PAS. DOE

N86-23374# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ULTRASONIC PULSER AND RECEIVER/PREAMPLIFIER SYSTEM WITH EXTENDED DYNAMIC RANGE AND LOW BASELINE DISTORTION
L. S. Beller and L. C. Johnson Aug. 1985 9 p
(Contract DE-AC07-76ID-01570)
(DE86-002306; EGG-MS-6958) Avail: NTIS HC A02/MF A01

Conventional design practice in commercial and laboratory ultrasonic instrumentation results in performance which is less than ideal for many advanced applications in research and in automated systems. The major problems with most such instrumentation can be traced to inadequate dynamic range and to baseline distortion arising from AC coupling between stages. This is a preliminary report on an ultrasonic pulser and receiver/preamplifier system having greatly expanded sensitivity and lower noise characteristics in many ultrasonic applications. In at least one application of the new instruments, an improvement of 30 to 40 dB in dynamic range can be achieved. DOE

N86-22758# Joint Publications Research Service, Arlington, Va.
APPLICATION OF ADAPTIVE SEGMENTATION TO SIGNAL ANALYSIS IN UNDERWATER ACOUSTICS Abstract Only
Guoqing Wu *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 133 Transl. into ENGLISH from Yingyong Shengxue (Beijing, China), v. 4, no. 4, Oct. 1985 p 23-32 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22759# Joint Publications Research Service, Arlington, Va.
APPLICATION OF CLASS-D POWER AMPLIFIER IN UNDERWATER SOUND PROJECTOR Abstract Only
Enping Sun *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 134 Transl. into ENGLISH from Yingyong Shengxue (Beijing, China), v. 4, no. 4, Oct. 1985 p 42; 43-44 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

N86-22963*# Johns Hopkins Univ., Baltimore, Md.
ULTRASONIC NONDESTRUCTIVE MATERIALS CHARACTERIZATION
Robert E. Green, Jr. *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 1-29 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22964*# Rockwell International Science Center, Thousand Oaks, Calif.
ULTRASONIC CHARACTERIZATION OF MICROSTRUCTURE IN POWDER METAL ALLOY
B. R. Tittmann, L. A. Ahlberg, and K. Fertig *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 31-47 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22965*# Cornell Univ., Ithaca, N.Y.
STUDIES OF ACOUSTIC EMISSION FROM POINT AND EXTENDED SOURCES
Wolfgang Sachse, Kwang Yul Kim, and C. P. Chen *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 49-59 refs Sponsored in part by NSF and Navy (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22966*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RESIDUAL STRESS MEASUREMENTS IN CARBON STEEL
Joseph S. Heyman and Namkung Min (William and Mary Coll., Williamsburg, Va.) *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 61-74 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22967*# Ohio State Univ., Columbus.
ULTRASONIC MEASUREMENT OF POROSITY IN CASTS AND WELDS
Laszlo Adler and Shaio-Wen Wang *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 75-81 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22968*# Johns Hopkins Univ., Baltimore, Md.
ANALYTICAL ULTRASONICS FOR CHARACTERIZATION OF METALLURGICAL MICROSTRUCTURES AND TRANSFORMATIONS
Moshe Rosen *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 83-102 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22969*# Argonne National Lab., Ill.
ANALYTICAL ULTRASONICS FOR STRUCTURAL MATERIALS
David S. Kupperman *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 103-115 refs Previously announced in IAA as N85-34600 Sponsored in part by NRC and DOE (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22970*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ULTRASONIC CHARACTERIZATION OF STRUCTURAL CERAMICS
Stanley J. Klima and George Y. Baaklini *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 117-126 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22971*# Iowa State Univ. of Science and Technology, Ames.
ON THE INTERACTION OF ULTRASOUND WITH CRACKS: APPLICATIONS TO FATIGUE CRACK GROWTH
O. Buck, R. B. Thompson, and D. K. Rehbein *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 127-140 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22972*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYTICAL ULTRASONICS FOR EVALUATION OF COMPOSITE MATERIALS RESPONSE. PART 1: PHYSICAL INTERPRETATION
Edmund G. Henneke, II and John C. Duke, Jr. *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 141-152 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22973*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYTICAL ULTRASONICS FOR EVALUATION OF COMPOSITE MATERIALS RESPONSE. PART 2: GENERATION AND DETECTION
John C. Duke, Jr. and Edmund G. Henneke, II *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 153-168 refs (For primary document see N86-22962 13-38)
(Grants NsG3-172; NAG3-323)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22974*# Iowa State Univ. of Science and Technology, Ames.
INFERENCE OF STRESS AND TEXTURE FROM ANGULAR DEPENDENCE OF ULTRASONIC PLATE MODE VELOCITIES
R. B. Thompson, J. F. Smith, and S. S. Lee *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 169-180 refs (For primary document see N86-22962 13-38)
(Contract W-7405-eng-82)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22975*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF STRESS ON ULTRASONIC PULSES IN FIBER REINFORCED COMPOSITES
John H. Hemann (Cleveland State Univ., Ohio) and George Y. Baaklini *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 181-191 refs Previously announced in IAA as N83-33180 (For primary document see N86-22962 13-38)
(Grant NAG3-106)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22976*# Massachusetts Inst. of Tech., Cambridge.
PATTERN RECOGNITION CHARACTERIZATIONS OF MICROMECHANICAL AND MORPHOLOGICAL MATERIALS STATES VIA ANALYTICAL QUANTITATIVE ULTRASONICS
James H. Williams, Jr. and Samson S. Lee *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 193-205 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01

N86-22977*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ULTRASONIC VERIFICATION OF MICROSTRUCTURAL CHANGES DUE TO HEAT TREATMENT
Edward R. Generazio *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 207-217 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22978*# Lowell Univ., Mass.
ULTRASONIC MATERIAL PROPERTY DETERMINATIONS
Steven Serabian *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 219-232 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22979*# Ohio State Univ., Columbus.
DYNAMIC MODULI AND LOCALIZED DAMAGE IN COMPOSITES
L. S. Fu *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 233-256 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22980*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRANSFER FUNCTION CONCEPT FOR ULTRASONIC CHARACTERIZATION OF MATERIAL MICROSTRUCTURES
Alex Vary and Harold E. Kautz *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 251-297 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22981*# Ohio State Univ., Columbus. Dept. of Welding Engineering.
ADHESIVE JOINT EVALUATION BY ULTRASONIC INTERFACE AND LAMB WAVES
S. I. Rokhlin *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 299-310 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22982*# Massachusetts Inst. of Tech., Cambridge.
INPUT-OUTPUT CHARACTERIZATION OF AN ULTRASONIC TESTING SYSTEM BY DIGITAL SIGNAL ANALYSIS
James H. Williams, Jr., Samson S. Lee, and Hira Karagulle *In* NASA. Lewis Research Center Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 311-339 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

N86-22983*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QUANTITATIVE FLAW CHARACTERIZATION WITH SCANNING LASER ACOUSTIC MICROSCOPY
Edward R. Generazio and Don J. Roth *In its* Analytical Ultrasonics in Materials Research and Testing Jan. 1986 p 341-358 refs (For primary document see N86-22962 13-38)
Avail: NTIS HC A16/MF A01 CSCL 20A

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-23375 Pennsylvania Univ., Philadelphia.
RAMAN SCATTERING EXCITATION PROFILES AS A PROBE OF THE VALENCE ELECTRON EXCITATIONS OF MOLECULES ADSORBED ON METAL SURFACES Ph.D. Thesis
Andrew David Brotman 1985 179 p
HC A05/MF A01

Measurements of Raman scattering excitation profile spectra for totally symmetric and nontotally symmetric vibration modes of free base phthalocyanine molecules adsorbed on silver were used as a modulation spectroscopic probe to obtain information about the energies, widths and vibronic character of the singlet valence electron excitations and about the character of the bonding of the adsorbate by the substrate. The data show that the Q sub x and Q sub y excitations of isolated free-base phthalocyanine molecules, and broadened, and that the Q sub x and Q sub y energy separation is reduced by about a factor of two. The data indicate that the resonant Raman scattering at the Q sub x and Q sub y excitations is due primarily to a Herzberg-Teller mechanism that involves vibronic coupling of the nearly degenerate Q sub x and Q sub y states with one another and with higher singlet states. The results suggest that the pi electrons are not primarily involved in the bonding of the phthalocyanine to the silver substrate. Dissert. Abstr.

N86-23376# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE VARIATIONAL ALTERNANT MOLECULAR ORBITAL METHOD FOR 3-D AND 2-D HYDROGEN MOLECULE
E. A. deAndradaeSilva, I. C. daCunhaLima, and A. FerreiradaSilva Dec. 1985 23 p refs Submitted for publication
(INPE-3746-PRE/872) Avail: NTIS HC A02/MF A01

The variational alternant Molecular Orbital Method (VAMO) dimensional hydrogen molecules. The energies of the electron system are obtained, together with the equilibrium distances of the molecules. The integrals equivalent to the Slater's integrals of the nonvariational method are described. Applications of this method to realizable systems are also described. Author

N86-23377# California Univ., Berkeley. Dept. of Chemistry.
MOLECULAR SPECTROSCOPY BY STEPWISE TWO-PHOTON ION-PAIR PRODUCTION AT 71 nm
A. H. Kung, R. H. Page, R. J. Larkin, Y. R. Shen, and Y. T. Lee Jun. 1985 5 p Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with Lawrence Berkeley Lab., Calif.
(Contract DE-AC03-76SF-00098)
(DE86-001980; LBL-20069; CONF-850605-6) Avail: NTIS HC A02/MF A01

The Rydberg states of H2 have been a continuing subject of intensive study by various research groups. However, understanding of the high lying electronic states of this molecule has been inhibited by the lack of spectroscopic data in the region < nm. Experimental studies have been difficult because spectroscopic features are generally buried under an intense absorption or photoionization continuum. Intense, high-resolution excitation sources are not easily available. Recent developments on tunable, narrowband, coherent xuv sources provide new means of studying the spectroscopy in this region with high resolution (+ or - .0005 nm). The technique of stepwise two-photon excitation is used to study photoionization of H2 in a molecular beam using the two lowest excited states of

H2 as the intermediate level. This excitation, coupled with the detection of background-free H(-) ions has enabled us to uncover, for the first time, spectroscopic features that are difficult to observe in positive ion detection. These features have been successfully assigned to new Rydberg series converging to the high vibrations of the H2(+) ground electronic state. DOE

N86-23378# Aerodyne Research, Inc., Billerica, Mass. Center for Chemical and Environmental Physics.
STUDY OF A NEW SOURCE FOR POSITIVE AND NEGATIVE IONS Final Report
A. Freedman and P. Davidovits May 1985 42 p
(Contract DE-AC02-84ER-80135)
(DE86-002044; DOE/ER-80135/1; ARI-RR-473) Avail: NTIS HC A03/MF A01

The feasibility of a novel ion source based on the technique of photodissociation, which could provide both positive and negative ions at considerably higher intensities (potentially 10(15) cm(-3)) than are currently available is discussed. Ions are produced by irradiating a sample of a gaseous thallium halide salt with an argon fluoride excimer laser operating at 193 nm. At this wavelength, both thallium bromide and iodide will produce atomic ion pairs in a single photon process and molecular positive ions and an electron in a two-photon induced process. The potential traits of such an excimer-laser pumped thallium salt ion source include the following: high intensity and pulse rate, good spatial and temporal resolution, low temperature, good focusing properties, and production of heavy ions. A Phase I effort investigating the efficacy of this approach is reported. The last section will summarize the basic conclusions derived from these studies, as well as discuss potential advantages of an ion source derived from photolyzing thallium halide salts. DOE

N86-23379# Nebraska Univ., Lincoln. Dept. of Physics and Astronomy.
HYPERSPHERICAL COORDINATE THEORY OF TWO ELECTRON ATOMIC PROCESSES Performance Report, 1 Aug. 1984 - 31 Jul. 1985
J. Macek and A. F. Starace Sep. 1985 19 p refs
(Contract DE-AC02-82ER-12081)
(DE86-002462; DOE/ER-12081/11) Avail: NTIS HC A02/MF A01

State-of-the-art calculations employing hyperspherical coordinates are discussed. Work on the following seven specific problems has been completed: (1) Representation of two-electron wave functions for (1)S states in terms of a Fock expansion has been accomplished and a procedure for matching these series solutions onto an adiabatic hyperspherical representation has been developed. 2) In regions of configuration space where one electron is much further from the nucleus than the other, the R-matrix has been shown to be asymmetric. (3) Also in this region, the transformation of the coupled adiabatic hyperspherical channels to independent particle coordinates has been derived. (4) A study of the Wannier threshold law in Jacobi coordinates has been completed. (5) The electron doubly differential cross section for 0.5 MeV H(-)-H detachment collisions has been calculated. (6) The hyperspherical coordinate description of doubly excited states has been compared with other correlated models. (7) The length, velocity, and acceleration formulas for the electric dipole matrix element in hyperspherical coordinates have been derived. DOE

N86-23380# JAYCOR, San Diego, Calif.
LIMITATIONS IN THE STRESS PARAMETER APPROACH TO EVALUATING SIMULATION FIDELITY
W. Seidler, B. Passenheim, B. Kitterer, and W. Beezhold 1985 25 p Presented at the 6th JOWOG Meeting, Aldermaston, England, 7 Oct. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-001910; SAND-85-2177C; CONF-8510165-6) Avail: NTIS HC A02/MF A01

The stress parameter methodology of evaluating the fidelity of bremmsstrahlung X-ray simulators is examined by comparing the responses generated in simplified circuit boards exposed to the 155-keV Modular Bremsstrahlung Source (MBS) and 1.5-MeV Blackjack 5 (BJ5) environments. Comparisons between analytical estimates of the canonical stresses used to estimate fidelity and measurements indicate that the set of stress parameters was inadequate to predict whether box IEMP coupling would be overstressed or understressed for equal dose (silicon) in either simulator. An improved set of stress parameters is presented along with the accuracy requirements for our knowledge of electron yields. DOE

N86-23381# Sandia National Labs., Albuquerque, N. Mex.
RECENT ADVANCES IN SHORT PULSE X-RAY SIMULATORS
M. A. Hedemann, J. R. Lee, G. T. Baldwin, C. R. McClenahan, and P. W. Spence 1985 20 p Presented at the 6th JOWOG Meeting, Aldermaston, England, 7 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001911; SAND-85-2221C; CONF-8510165-5) Avail: NTIS HC A02/MF A01

Several bremsstrahlung X-ray simulators, with peak voltages from 1 to 2 MV, have recently become operational at Sandia Laboratories with pulse widths in the range of 10 to 40 nsec. Most of these simulator sources utilize the triaxial diode concept in order to efficiently couple generator energy into an electron beam. A description of the various simulator sources is given. DOE

N86-23382# Tennessee Univ., Knoxville.
ATOM CAPTURE AND LOSS IN ION MOLECULE COLLISIONS
M. Breinig, S. E. Lasley, and C. C. Gaither, III 1985 8 p refs Presented at the 14th International Conference on the Physics of Electronic and Atomic Collisions, Palo Alto, Calif., 24 Jul. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-002197; CONF-850701-5) Avail: NTIS HC A02/MF A01

Progress is reported in measuring the energy and angular distribution of protons emerging with velocity close to the beam velocity from the target region when Ar(+) beams collide with a CH4 target and ArH(+) beams collide with a He target at asymptotically high speeds. The protons result from the transfer of a target constituent to the projectile (atom capture) or from the dissociation of the projectile molecule in the collision (atom loss). For atom capture processes the Thomas peak is clearly observed. DOE

N86-23383# Oak Ridge National Lab., Tenn.
SPUTTER ATOMIZATION/RESONANCE IONIZATION MASS SPECTROMETRY FOR HIGH SENSITIVITY ISOTOPIC ANALYSIS
D. L. Donohue, W. H. Christie, D. E. Goeringer, D. H. Smith, and H. S. McKown 1985 7 p refs Presented at the 28th Conference on Analytical Chemistry, Knoxville, Tenn., 30 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002198; CONF-850937-2) Avail: NTIS HC A02/MF A01

Resonance Ionization Mass Spectrometry (RIMS) combines the selectivity and sensitivity of resonance ionization spectroscopy (RIS) with high performance mass spectrometry. Results from our laboratory and elsewhere have been reported for a variety of elements using thermal vaporization sources to produce the atom reservoir for laser-induced resonance ionization. In this paper we describe the use of ion beam sputtering as an ultrasensitive method of atom formation for RIMS. A commercial ion microprobe mass analyzer (IMMA) has been interfaced with a tunable pulsed dye laser for carrying out resonance ionization mass spectrometry of sputtered atoms. This paper will describe the changes necessary to adapt the IMMA instrument for resonance ionization, along with preliminary results for the elements Sm and U. DOE

N86-23384# Oak Ridge National Lab., Tenn.
SANS STUDIES OF MICELLAR AND MAGNETIC FLUIDS
J. B. Hayter Aug. 1985 31 p refs Presented at the Complex and Supermolecular Fluids International Symposium, Annandale, N.J., 17 Jun. 1985

(Contract DE-AC05-84OR-21400)
(DE86-002207; CONF-8506211-1) Avail: NTIS HC A03/MF A01

Small-angle neutron scattering (SANS) has proved to be an excellent technique for the study of complex fluids. This article introduces SANS from the viewpoint of such studies. The use of SANS to determine the structures of concentrated micellar fluids is then discussed within the framework of current one-component macrofluid (OCM) models, and experimental examples are taken from several contemporary studies. Finally, the discussion is extended to magnetic fluids (ferrofluids) in which the neutron magnetic interaction plays an important experimental role. DOE

N86-23385# Institute for Advanced Study, Princeton, N.J.
BASIC RESEARCH IN THEORETICAL HIGH ENERGY PHYSICS Progress Report, 30 Apr. 1984 - 30 Apr. 1985
S. L. Adler 1985 17 p refs
(Contract DE-AC02-76ER-02220)
(DE86-001840; DOE/ER-02220/14) Avail: NTIS HC A02/MF A01

Progress is reported on non-perturbative problems in quantum field theories, including a field-theoretic issue regarding the relationship between operators on the lattice and in the continuum. The phase diagram of SU(3) lattice gauge theories with light fermions was investigated as a function of the gauge coupling and the fermion mass. A formulation of higher derivative gravity on a simplicial lattice was developed. Analytical and numerical work was carried out in two- and four-dimensional lattice gravity to study the phase diagram of the theory, the existence of nontrivial fixed points, and the question of the renormalization of the cosmological constant. A study was conducted on hadronic decay amplitudes in lattice gauge theory. Other studies conducted include: a covariant functional Schroedinger formalism for quantum field theory in curved space-time, constraints on magnetic mass, anomalies in reparameterization invariance in Type I superstrings, the Wess-Zumino action as an effective description of the anomalies of a theory, quantum fluctuations that can produce small regions of chirally symmetric phase in QCD, and supersymmetry anomalies. DOE

N86-23386# Rochester Univ., N. Y. Dept. of Chemistry.
LOW ENERGY ION-MOLECULE REACTION DYNAMICS AND CHEMIIONIZATION KINETICS Progress Report, 1 Feb. 1985 - 31 Jan. 1986
J. M. Farrar 1985 10 p
(Contract DE-AC02-78ER-04694)
(DE86-001853; DOE/ER-04694/2) Avail: NTIS HC A02/MF A01

Topics covered in this Rochester University, Department of Chemistry, progress report include proton transfer reactions, carbon cation reactions, metal ion chemistry, reactive scattering from double minimum potentials, and oxygen-minus reactive scattering. DOE

N86-22745# Joint Publications Research Service, Arlington, Va.
VELOCITY DISTRIBUTION OF ATOMIC BEAMS MEASURED
Yuzhu Wang, Yudan Cheng, Shanyu Zhou, Weigang Huang, and Liang Liu *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 21-25 refs Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 11, 20 Nov. 1985 p 658-660 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-23387 Stanford Univ., Calif.
NEW SOURCES OF COHERENT RADIATION BY RELATIVISTIC ELECTRONS Ph.D. Thesis
Chi Keng Chen 1985 126 p
Avail: Univ. Microfilms Order No. DA8522125

Coherent radiation generation relativistic electrons has the potenial advantage of being of higher efficiency, and more broadly tunable than the conventional laser sources. The following new coherent radiation sources were investigated: stimulated synchrotron radiation, dispersive free electron laser, and two cavity optical klystron. The stimulated synchrotron radiation process occurs when electrons and an electromagnetic wave propagate approximately in the same direction in a transverse magnetic field. The dispersive free electron laser (dispersive FEL) is a normal free electron laser (FEL) with a dispersive magnetic field superimposed on some of the undulator magnets. The two cavity optical klystron is a modified optical klystron where the modulation and energy extraction section have separate cavities. The three sources are compared and evaluated. Dissert. Abstr.

N86-23388*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SYMMETRY CONSIDERATIONS IN THE SCATTERING OF IDENTICAL COMPOSITE BODIES
John W. Norbury (Old Dominion Univ., Norfolk, Va.), Lawrence W. Townsend, and Philip A. Deutchman (Idaho Univ., Moscow) 1986 19 p refs
(NASA-TP-2548; L-16035; NAS 1.60:2548) Avail: NTIS HC A02/MF A01 CSCL 20H

Previous studies of the interactions between composite particles were extended to the case in which the composites are identical. The form of the total interaction potential matrix elements was obtained, and guidelines for their explicit evaluation were given. For the case of elastic scattering of identical composites, the matrix element approach was shown to be equivalent to the scattering amplitude method. Author

N86-23389# Stanford Linear Accelerator Center, Calif.
MEASUREMENT OF THE DECAY UPSILON(2S) (YIELDS) (PI)(0)(PI)(0)UPSILON(1S)
D. M. Gelphman Sep. 1985 63 p
(Contract DE-AC03-76SF-00515)
(DE86-001927; SU-SLAC-286) Avail: NTIS HC A04/MF A01

The hadronic transitions UPSILON(2S) (YIELDS) (PI)(0)(PI) UPSILON(1S) (YIELDS) (GAMMA)(GAMMA)(GAMMA)(GAMMA)l(+)l(-) (l = (MU) or e) are investigated using the Crystal Ball detector. The analysis is based on 193,000 UPSILON(2S) events produced at the DORIS II e(+)e(-) storage ring from November 1982 to February 1984. We observe 44 events with a muon pair and 46 events with an electron pair in the final state. The signals in both channels are relatively background free. Assuming lepton universality, we average the results for the two channels and obtain the product branching ratio B(UPSILON(2S) (YIELDS) (PI)(0)(PI)(0) UPSILON(1S)) x B/sub ll/(UPSILON(1S)) = (2.3 +0.3 +- 0.3) x 10(-3) where the first error is statistical and the second is systematic. Using the present world average value of B(sub ll)(UPSILON(1S)) = (2.9 +- 0.3)% we derive a branching ratio B(UPSILON(2S) (YIELDS) (PI)(0)(PI)(0)UPSILON(1S)) = (8.0 +- 1.5)% where the statistical and systematic errors have been added in quadrature. This result is compared with previous results for the charged pion transitions UPSILON(2S) (YIELDS) (PI)(+)(PI)(-) UPSILON(1S) and with the expectation from theory. DOE

N86-23390# Texas A&M Univ., College Station.
STUDY OF THE NEUTRON-PROTON INTERACTION IN THE 300 TO 700 MeV ENERGY REGION Annual Progress Report, 1984 - 1985
L. C. Northcliffe 1985 20 p refs
(Contract DE-AS05-76ER-04449)
(DE86-001953; DOE/ER-04449/53) Avail: NTIS HC A02/MF A01

The principal activities during the past year have included five months of data taking to complete LAMPF Experiment No. 665 (The Measurement of the Initial State Spin Correlation Parameters C(sub LL) and C(sub SL) in n-p elastic scattering at 500, 650 and 800 MeV) and preparations for LAMPF Experiment No. 770 (The

Measurement of np Elastic Scattering Spin Correlation Parameters with L- and S-Type Polarized Beam and Target between 500 and 800 MeV). The latter experiment is running now and is scheduled for completion late in October, when preparations will begin for LAMPF Experiment No. 589 (Free Forward np Elastic Scattering Analyzing Power Measurement at 800 MeV), which is scheduled to run in November. DOE

N86-23391# California Univ., Berkeley. Lawrence Berkeley Lab.
REACTION HAMILTONIAN AND STATE-TO-STATE DESCRIPTION OF CHEMICAL REACTIONS
B. A. Ruf, V. Z. Kresin, and W. A. Lester, Jr. Aug. 1985 39 p refs Presented at the 5th International Congress on Quantum Chemistry, Montreal, Quebec, 19 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002006; LBL-20112; CONF-850859-1) Avail: NTIS HC A03/MF A01

A chemical reaction is treated as a quantum transition from reactants to products. A specific reaction Hamiltonian (in second quantization formalism) is introduced. The approach leads to Franck-Condon-like factor, and adiabatic method in the framework of the nuclear motion problems. The influence of reagent vibrational state on the product energy distribution has been studied following the reaction Hamiltonian method. Two different cases (fixed available energy and fixed translational energy) are distinguished. Results for several biomolecular reactions are presented. DOE

N86-23392# New York Univ., New York. Courant Inst. of Mathematical Sciences.
COMPUTATIONAL METHODS FOR THE NUCLEAR AND NEUTRON MATTER PROBLEM Progress Report
M. H. Kalos, J. Carlson, R. Panoff, and K. Schmidt Oct. 1985 42 p refs
(Contract DE-AC02-79ER-10353)
(DE86-002052; DOE/ER-10353/7) Avail: NTIS HC A03/MF A01

A new method is presented for treating fermion systems by Monte Carlo methods. This method is based on the concept of a mirror potential, which is a many-body potential that forces the Monte Carlo iteration to have a stable anti-symmetric component. The potential may be determined from the wave function and, within the framework of Green's Function Monte Carlo (GFMC), from the random walk whose density converges to the wave function. Further work has been given to the variational study of light nuclei. In particular, microscopic calculations of alpha-neutron scattering were performed. Techniques were also developed for performing variational calculations of heavier nuclei interacting with realistic interactions. A series of calculations on liquid He-3 at its experimental equilibrium density has also been done. DOE

N86-23393# Colorado Univ., Boulder.
REVISED FIELD PINCH EXPERIMENTS Annual Progress Report, 1 Jun. 1984 - 31 May 1985
S. Robertson 1985 38 p
(Contract DE-AC02-83ER-53164)
(DE86-002460; DOE/ER-53164/1) Avail: NTIS HC A03/MF A01

The dielectric breaks in the Reversatron vacuum chamber were replaced by bellows sections in December 1984, and operation was resumed in January 1985. The plasma current was limited to 20 kA due to the inefficiency of the air-core transformer. RFP discharges were not obtained due to the pinch parameter theta being below the required value of 1.6. Diagnostics indicated n approx. 4 x 10 to the -13 power/cu cm and T(sub e) approx. 75 eV. Inductively decoupled vertical field coils were used to vary the equilibrium position of the plasma and to maximize the plasma current. A new air-core transformer is being installed which will give an increased plasma current and pinch parameter. Operation with the shell in place will begin in June 1985. If adequate theta values and RFP discharges are obtained, operation without the shell will begin in October 1985. DOE

N86-23394# State Univ. of New York, Stony Brook.
EXPERIMENTAL HIGH ENERGY PHYSICS RESEARCH USING ELECTROMAGNETIC ENERGY CALORIMETRY Progress Report
M. D. Marx 1985 33 p
(Contract DE-AC02-80ER-10699)
(DE86-002466; DOE/ER-10699/5) Avail: NTIS HC A03/MF A01

Present research is concentrated on two major efforts - E734, the neutrino experiment at Brookhaven; and DO, the second generation collider experiment at Fermilab. E734 is in a mature phase, producing highly topical results on weak neutral current parameters, neutrino spectra and oscillations, with a final data run expected this year. DO, in its infancy, received this year formal DOE approval and high national priority ranking, and is currently in an R and D and design phase with major component construction to start next fiscal year. DOE

N86-23395# UNC Nuclear Industries, Inc., Richland, Wash.
COMPILATION OF CARBON-14 DATA
R. A. Paasch Jul. 1985 64 p
(Contract DE-AC06-76RL-01857)
(DE85-015170; UNI-3499) Avail: NTIS HC A04/MF A01

A review and critical analysis was made of the original sources of carbon-14 in the graphite moderator and reflector zones of the eight Hanford production reactors, the present physical and chemical state of the carbon-14, pathways (other than direct combustion) by which the carbon-14 could be released to the biosphere, and the maximum rate at which it might be released under circumstances which idealistically favor the release. Areas of uncertainty are noted and recommendations are made for obtaining additional data in three areas: (1) release rate of carbon-14 from irradiated graphite saturated with aerated water; (2) characterization of carbon-14 deposited outside the moderator and reflector zones; and (3) corrosion/release rate of carbon-14 from irradiated steel and aluminum alloys. DOE

N86-23396# Los Alamos National Lab., N. Mex.
STUDY OF NEUTRON NOISE FROM REFLECTED, METAL ASSEMBLIES WITH CRITICALITY SAFETY APPLICATIONS IN MIND
C. S. Barnett 20 Aug. 1985 43 p Presented at the DOE Subcritical Reactivity Measurements Workshop, Albuquerque, N. Mex., 26 Aug. 1985
(Contract W-7405-eng-48)
(DE85-017273; UCRL-93219; CONF-8508105-1) Avail: NTIS HC A03/MF A01

The statistics of detected neutrons that leaked from four subcritical reflected, enriched-uranium assemblies, are studied to explore the feasibility of developing a criticality warning system based on neutron noise analysis. The calculated multiplication factors of the assemblies are 0.59, 0.74, 0.82, and 0.92. Three possible discriminators are considered, i.e., three signatures that might be used to discriminate among assemblies of various multiplications. They are: (1) variance-to-mean ratio of the counts in a time bin (V/M); (2) covariance-to-mean ratio of the counts in a common time bin from two different detectors (C/M); and (3) covariance-to-mean ratio of the counts from a single detector in two adjacent time bins of equal length, which called the serial-covariance-to-mean ratio (SC/M). The performances of the three discriminators were not greatly different, but a hierarchy did emerge: SC/M greater than or equal to V/M greater than or equal to C/M. DOE

N86-23397# Department of Energy, Washington, D. C.
CONTROL SYSTEM FOR A SMALL FISSION REACTOR Patent Application
J. P. Burelbach, W. J. Kann, and J. G. Saiveau, inventors (to DOE) Filed Feb. 1985 20 p
(Contract W-31-109-eng-38)
(DE85-017798; US-Patent-Appl-SN-699887) Avail: NTIS HC A02/MF A01

A system for controlling the reactivity of a small fission reactor includes an elongated, flexible hollow tube in the general form of a helical coiled spring axially positioned around and outside of the reactor vessel in an annular space between the reactor vessel and a surrounding cylindrical-shaped neutron reflector. A neutron

absorbing material is provided within the hollow tube with the rate of the reaction controlled by the extension and compression of the hollow tube, e.g., extension of the tube increases reactivity while its compression reduces reactivity, in varying the amount of neutron absorbing material disposed between the reactor vessel and the neutron reflector. Conventional mechanical displacement means may be employed to control the coil density of the hollow tube as desired. DOE

N86-23398# Stanford Linear Accelerator Center, Calif.
GROUND MOTION AND ITS EFFECTS IN ACCELERATOR DESIGN
G. E. Fischer Jul. 1985 77 p Presented at the US Summer School on High Energy Particle Accelerator, Batavia, Ill., 13 Aug. 1984
(Contract DE-AC03-76SF-00515)
(DE86-001143; SU-SLAC-PUB-3392-Rev; CONF-840873-1-Rev) Avail: NTIS HC A05/MF A01

The effects of ground motion on accelerator design are discussed. The limitations on performance are discussed for various categories of motion. For example, effects due to ground settlement, tides, seismic disturbances and man-induced disturbances are included in this discussion. DOE

N86-23399# Stanford Linear Accelerator Center, Calif.
PLANS FOR POLARIZED BEAMS AT THE SLC
C. Y. Prescott Jul. 1985 12 p refs Presented at the Workshop on Tests of Electroweak Theories, Polarized Processes and Other Phenomena, Trieste, Italy, 10 Jun. 1985
(Contract DE-AC03-76SF-00515)
(DE86-001452; SU-SLAC-PUB-3728; CONF-8506204-1) Avail: NTIS HC A02/MF A01

Precision tests of the electroweak interactions will soon be possible at the SLC and LEP. The SLC will be capable of providing longitudinal polarization of one incoming beam, the electrons, for such tests. Plans at the SLC to provide and monitor these beams are described, and some physics objectives are discussed. DOE

N86-23400# Stanford Linear Accelerator Center, Calif.
TOPONIUM-Z(0) INTERFERENCE
P. J. Franzini Sep. 1985 5 p Presented at the Meeting of the Particles and Fields Division of the American Physical Society, Eugene, Oreg., 12 Aug. 1985
(Contract DE-AC03-76SF-00515)
(DE86-001458; SU-SLAC-PUB-3763; CONF-850869-4) Avail: NTIS HC A02/MF A01

A study of interference of the Z(0) boson and toponium states is presented. The simple case of the Z(0) mixing with one t anti t state is discussed in detail. Effects of mixing with the full t anti t spectrum, of the smearing due to beam spread, and of different potentials, are then shown. DOE

N86-23401# Lawrence Livermore National Lab., Calif.
PERSONNEL NEUTRON DOSIMETRY USING HOT, LOW-FREQUENCY ELECTROCHEMICAL ETCHING
D. E. Hankins, S. G. Homann, and J. M. Davis 19 Sep. 1985 5 p refs Presented at the 13th International Conference on Solid State Nuclear Track Detectors, Rome, Italy, 23 Sep. 1985
(Contract W-7405-eng-48)
(DE86-001561; UCRL-92652; CONF-850933-2) Avail: NTIS HC A02/MF A01

We have developed an electrochemical-etch procedure for the processing of large numbers of CR-39 dosimeters. Specially designed Homann-Type chambers can etch up to 24 CR-39 chips, or foils, at one time. In our two-step procedure, the second step, called blow-up, increases the tracks' size and makes them relatively uniform. The energy response is fairly flat from approx. 150 keV to 4.5 MeV, but drops by about a factor of three in the 13 to 16 MeV range. The sensitivity of the dosimetry system is 6 tracks/mrem with a background of 8 mrem, giving a lower limit of sensitivity of approximately 10 mrem for the dosimeter (when three foils are used). Because greater numbers of CR-39 foils can be accommodated at any one time, our procedure is quite efficient for operations with large numbers of dosimeters to be processed. DOE

N86-23402# Georgia Univ., Athens. Dept. of Physics and Astronomy.
NUCLEON-NUCLEUS AND ANTINUCLEON-NUCLEUS SCATTERING AT INTERMEDIATE ENERGIES
W. G. Love, A. Klein, and M. A. Franey 1985 23 p refs Presented at the Conference on Antinucleon and Nucleon-nucleus Interactions, Telluride, Colo., 18 Mar. 1985 Prepared in cooperation with Minnesota Univ., Minneapolis
(Contract DE-AC02-77ER-04215)
(DE86-001590; CONF-850315-12) Avail: NTIS HC A02/MF A01

Those aspects of nucleon-nucleon (NN) and antinucleon-nucleon (anti N N) couplings which appear to be most important for the calculation and interpretation of N-nucleus and anti N-nucleus scattering at intermediate energies are compared and discussed within a single scattering approximation based on the free NN and anti N N t-matrices. The role of distortion considerations is stressed and, in the case of nucleon scattering, medium corrections to the NN coupling embodied in a nuclear matter G-matrix approach are illustrated and some of their implications are discussed. Some of the most important characteristics of nucleons and antinucleons as probes of nuclear structure are illustrated explicitly in distorted wave calculations of inelastic scattering and charge exchange reactions. DOE

N86-23403# European Organization for Nuclear Research, Geneva (Switzerland).
LARGE TRANSVERSE MOMENTUM (PI)(0) PRODUCTION IN (ALPHA)(ALPHA), dd AND pp COLLISIONS AT THE CERN ISR
A. L. S. Angelis, G. Basini, H. J. Besch, R. E. Breedon, L. Camilleri, T. J. Chapin, C. Chasman, R. L. Cool, P. T. Cox, and C. vonGagem 1985 13 p Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract DE-AC02-81ER-40033)
(DE86-001628; DOE/ER-40033/88; CONF-850721-9) Avail: NTIS HC A02/MF A01

Results on the invariant cross-section of (PI)(0)-mesons produced in (ALPHA)(ALPHA), pp and dd collisions will be presented. The measurements were made at a centre-of-mass energy per nucleon pair of 31 GeV and in the transverse momentum range 3 < P sub t/< 8 GeV/c. The data show a very clear anomalous nuclear enhancement in (ALPHA)(ALPHA) collisions whereas no such effect is observed in dd collisions. DOE

N86-23404# Brookhaven National Lab., Upton, N. Y.
RELATIVISTIC HEAVY IONS AT BROOKHAVEN: HIGH ENERGY NUCLEAR BEAMS IN THE AGS AND RHIC
T. W. Ludlam 1985 22 p refs Presented at the 2nd International Conference on Nucleus-nucleus Collisions, Visby, Sweden, 10 Jun. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001725; BNL-37083; CONF-850672-7) Avail: NTIS HC A02/MF A01

The design and proposed experiments are presented for the Relativistic Heavy Ion Collider at Brookhaven. The plans are to begin with relatively light ions (A approx. = 32amu) and to extend over the mass range to A = 200. With these relativistic beams one will be able to investigate thermodynamic conditions with near-zero baryon number which can be compared with quantum chromodynamics. DOE

N86-23405# Brookhaven National Lab., Upton, N. Y.
SYNCHROTRON RADIATION DAMAGE OBSERVATIONS IN NORMAL INCIDENCE COPPER MIRRORS
P. Z. Takacs, J. Melendez, and J. Colbert Aug. 1985 21 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001732; BNL-37042; CONF-850734-16) Avail: NTIS HC A02/MF A01

Water-cooled copper mirrors used at near-normal incidence

on two beam lines at the NSLS are observed to undergo severe degradation upon exposure to the direct SR beam. These mirrors are used on beam lines designed to utilize radiation in the wavelength regions longer than 100 nm and are coated with a UV reflection-enhancing coating, consisting of one or more bilayers of aluminum with a MgF2 overcoat. Beamline performance degrades very rapidly following installation of a new set of mirrors. Analysis of the mirror surfaces by various non-destructive techniques indicates severe degradation of the coating and surface along the central strip where most of the X-ray power is absorbed from the beam. In one case where the mirror had three bilayer coatings, the outer coating layer has disappeared along the central strip. Rutherford backscatter measurements indicate compositional changes between layers and confirm the existence of a carbon deposit on the surface. Thermal modeling suggests that most of the damage is caused by direct photon interaction, since the temperature rise in the energy deposition region is small. DOE

N86-23406# Pacific Northwest Lab., Richland, Wash.
BETA FIELDS AND MEASUREMENT PRACTICES AT DOE FACILITIES
K. L. Swinth, L. A. Rathbun, and L. W. Brackenbush Sep. 1985 27 p refs Presented at the Workshop on Dosimetry of Beta Particles and Low Energy X-rays, Paris, France, 7 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001770; PNL-SA-13458; CONF-8510185-1) Avail: NTIS HC A03/MF A01

As part of a larger program, the beta measurement problem at DOE facilities was assessed through the use of a questionnaire and field visits to selected facilities. At 35% the facilities beta-emitting radionuclides can contribute enough to the radiation exposures that they must be considered in establishing protection requirements. Measurements were made in several facilities using scintillators, a surface barrier detector plus various dosimeters and survey instruments. Beta dose rates of several hundred mrad/hr were not unusual and beta:gamma ratios of greater than 30:1 were frequently observed. The agreement between the various measurement techniques was frequently unacceptable. DOE

N86-23407# Argonne National Lab., Ill.
DIFFRACTION SCATTERING AND THE PARTON MODEL IN QCD
A. White 1985 19 p Presented at the Workshop on Elastic and Diffractive Scattering At the Collider, Chateau de Blois, France, 3 Jun. 1985
(Contract W-31-109-eng-38)
(DE86-001792; CONF-8506197-2) Avail: NTIS HC A02/MF A01

Arguments are presented that the validity of the parton model for hadron scattering in QCD is directly related to the occurrence of the Critical Pomeron description of diffraction scattering. An attractive route suggested for Electroweak and Grand Unification is also briefly described. DOE

N86-23408# Argonne National Lab., Ill.
POLARIZATION PHENOMENA IN NUCLEON-NUCLEON SCATTERING AT INTERMEDIATE AND HIGH ENERGIES INCLUDING THE PRESENT STATUS OF DIBARYONS
A. Yokosawa 1985 30 p refs Presented at the 6th International Symposium on Polarization Phenomena in Nuclear Physics, Osaka, Japan, 26 Aug. 1985
(Contract W-31-109-eng-38)
(DE86-001799; ANL-HEP-CP-85-93; CONF-850807-10) Avail: NTIS HC A03/MF A01

We review experimental results concerning polarization phenomena in nucleon-nucleon scattering in which both the elastic scattering and hadron-production reaction are included. We also present summary of S = 0 dibaryon resonances and candidates by reviewing experimental data in the nucleon-nucleon system, (GAMMA)d channel, (PI)d elastic scattering, pp (YIELDS) (PI)d channel, deuteron break-up reactions, and narrow structures in missing-mass spectra. DOE

N86-23409# Florida Univ., Gainesville. Dept. of Physics.
INTRODUCTION TO THE THEORY OF RELATIVISTIC STRINGS
C. B. Thorn 1985 42 p Presented at the Workshop on Unified String Theories, Santa Barbara, Calif., 29 Jul. 1985
(Contract DE-AS05-81ER-40008)
(DE86-001950; DOE/ER-40008/77; CONF-850798-1) Avail: NTIS HC A03/MF A01

In these lectures we review the theory of relativistic bosonic strings. After a discussion of the classical string, we describe the quantum string using the light-cone parametrization of Goddard, Goldstone, Rebbi, and Thorn. We then discuss Lorentz covariant quantization and give an improved version of the Goddard-Thorn proof of the No-ghost Theorem. Finally, we discuss interacting strings as the continuum limit of an interacting discretized string theory following ideas of Giles and Thorn. We evaluate the continuum limit of the lowest order contribution to a simple process and explain how the critical dimension is singled out as the one for which this limit is finite. We present the string field equations in light-cone gauge with the discrete regularization in place, and we discuss the classical limit of those equations. DOE

N86-23410# California Univ., Berkeley. Lawrence Berkeley Lab.
ANGULAR DISTRIBUTION OF UNDULATOR POWER FOR AN ARBITRARY DEFLECTION PARAMETER K
K. J. Kim Aug. 1985 14 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Stanford, Calif., 29 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001994; LBL-20167; CONF-850734-15) Avail: NTIS HC A02/MF A01

A calculation of the angular distribution of power generated from an undulator, integrated over all frequencies, is presented. The result, valid for any arbitrary value of the deflection parameter K, reduces to the known expressions in the cases K (YIELDS) infinity and K (YIELDS) 0. DOE

N86-23411# Tennessee Univ., Knoxville. Dept. of Physics and Astronomy.
DOUBLY DIFFERENTIAL CROSS SECTIONS OF COLLISION-PRODUCED FORWARD ELECTRON EMISSION
S. B. Elston 1985 15 p refs Presented at the 14. International Conference on the Physics of Electronic and Atomic Collisions, Palo Alto, Calif., 24 Jul. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-002200; CONF-850701-4) Avail: NTIS HC A02/MF A01

The velocity space distribution of electrons emitted near the forward direction from collisions involving fast, highly stripped oxygen ions with gaseous and solid targets is presented and described in terms of multipole moments of the ejected charge distribution, which permits direct comparison with recent theory. The results are from a novel apparatus permitting rapid and efficient data acquisition by employing position-sensitive electron detection to combine angle definition with conventional electrostatic spectrometry. Excellent agreement is obtained between distribution observed for electron loss to projectile continuum processes and recent theory in the case of argon targets; less favorable results for simpler helium targets may indicate the need for theoretical study of higher order inelastic processes in that case. The multipole content observed with a solid target is consistent with a conceptual model of convoy electron production dominated by electron loss from the projectile within the bulk of the target and may signify the importance of steady-state production of excited states within the bulk solid. DOE

N86-23412# Oak Ridge National Lab., Tenn.
EXPERIMENTS ON ELECTRON-IMPACT EXCITATION AND IONIZATION OF IONS
R. A. Phaneuf 1985 66 p Presented at the NATO Advanced Study Institute on Physics of Electron-ion and Ion-ion Collisions, Han sur Lesse, Belgium, 30 Sep. 1985
(Contract DE-AC05-84OR-21400)

(DE86-002220; CONF-8509196-1) Avail: NTIS HC A04/MF A01

The present review covers some of the fundamental aspects of electron-impact ionization. Highlights are described of some of the important experimental results which have been produced since 1981. DOE

N86-23413# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Festkoerperphysik.

POINT CONTACT SPECTROSCOPY OF HEAVY FERMIONS

M. Moser, P. Wachter, J. J. M. Franse, G. P. Meisner, and E. Walker 1985 11 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with Amsterdam Univ., Netherlands, Geneva Univ., Switzerland and Los Alamos National Lab., N. Mex.

(Contract W-7405-eng-36)

(DE86-002431; LA-UR-85-3828; CONF-850890-22) Avail: NTIS HC A02/MF A01

Point contact spectroscopy (PCS) has been performed on the heavy fermion systems CeAl3, CeCu6, UPt3, U6Co and U2PtC2. The dynamical resistance dU/dI is a function of the electronic density of states (EDS) at E/sub F/. The width of the EDS inferred from the PC measurements can be compared with the (GAMMA)-value of the specific heat. DOE

N86-23414# Iowa State Univ. of Science and Technology, Ames.

SIZES AND SHAPES OF SHORT-LIVED NUCLEI VIA LASER SPECTROSCOPY Final Report

D. A. Lewis Oct. 1985 20 p refs

(Contract DE-AC02-79ER-10496)

(DE86-002795; DOE/ER-10496/6) Avail: NTIS HC A02/MF A01

This project, a collaboration involving Iowa State University, Argonne National Lab., and the University of Minnesota, was aimed at the determination of properties of short-lived nuclei through their atomic hyperfine structure and optical isotope shifts. The basic approach was to use a cryogenic He-jet system to thermalize, neutralize, and transport radioactive nuclei produced online into a region suitable for laser spectroscopy. The photon burst method was then used for high sensitivity with the resulting continuous atomic beam. The experiment was located on beamline of the ANL superconducting heavy-ion accelerator. The He-jet system developed would reliably transport approx. 10(2) nuclei into phase space useful for high resolution laser spectroscopy. The laser system developed could accurately and reproducibly sweep small frequency ranges for periods greater than or equal to 1 day and sensitivity limits less than or equal to 1 atom/s were achieved. However the nuclei were not transported as free atoms precluding nuclear determinations. Attempts to obtain free atoms by eliminating turbulence and contamination were not successful. DOE

N86-23415# Los Alamos National Lab., N. Mex.

ON RF BEAM-CURRENT, -PHASE AND -POSITION MONITORS

L. Young 12 Dec. 1984 12 p

(Contracts DE-AT01-79ER10527; W-7405-eng-36)

(DE86-002847; DOE/ER-10527/T6) Avail: NTIS HC A02/MF A01

A prototype RF beam monitor has been tested on the Racetrack Microtron's (RTM) 100 kV injector beam line at the National Bureau of Standards (NBS). This beam monitor is capable of measuring the current, the relative phase, and the position of the beam. The beam is bunched at 2380 MHz for acceleration by the linac in the injector beam line. This train of beam bunches passing through the beam monitor cavities excites the cavities at this resonance frequency of 2380 MHz. Probes in the cavities couple some of the beam-excited rf power out of the cavities. This RF power can be amplified if necessary and then analyzed by a double balanced mixer (DBM). The DBM can also be used as a phase detector. The effective shunt impedance of the cavities was measured with the CW beam. For the position monitor cavity, the shunt impedance is proportional to the displacement from the axis. The measured response of the prototype RF beam current monitor setup is a linear function of beam current. Response of the RF beam-position monitor is also shown. DOE

N86-23416# Sandia National Labs., Albuquerque, N. Mex.

TWO CAVITY AUTOACCELERATION OF AN INTENSE RELATIVISTIC ELECTRON BEAM

P. D. Coleman and T. R. Lockner 1985 8 p Presented at the Antigone and Delphi Workshop, Livermore, Calif., 23 Oct. 1985

(Contract DE-AC04-76DP-00789)

(DE86-002914; SAND-85-2315C; CONF-8510191-2) Avail: NTIS HC A02/MF A01

Two autoacceleration cavities have been used to accelerate an 11-kA electron beam from 2 MeV to approx. =2.8 MeV. The two 40-(UC OMEGA) cavities each accelerated the beam by approx. =400 kV with no observable interaction between the two cavities over several cavity transmit times. DOE

N86-23417# Lawrence Livermore National Lab., Calif.

SHELL-MODEL CALCULATIONS OF BETA-DECAY RATES FOR s- AND r-PROCESS NUCLEOSYNTHESES

K. Takahashi, G. J. Mathews, and S. D. Bloom Oct. 1985 6 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985

(Contract W-7405-eng-48)

(DE86-002988; UCRL-93518; CONF-850942-37) Avail: NTIS HC A02/MF A01

Examples of large-basis shell-model calculations of Gamow-Teller (BETA)-decay properties of specific interest in the astrophysical s- and r- processes are presented. Numerical results are given for: (1) the GT-matrix elements for the excited state decays of the unstable s-process nucleus Tc-99; and (2) the GT-strength function for the neutron-rich nucleus Cd-130, which lies on the r-process path. The results are discussed in conjunction with the astrophysics problems. DOE

N86-23418# Houston Univ., Tex.

COMMENTS ON THE EXISTENCE OF STRANGE DIBARYONS

E. V. Hungerford 1985 18 p refs

(Contract DE-AS05-76ER-03948)

(DE86-003460; DOE/ER-03948/T3) Avail: NTIS HC A02/MF A01

The present status and future prospects for strange dibaryon observation is reviewed. DOE

N86-23419# Massachusetts Inst. of Tech., Cambridge.

BEAM BRIGHTNESS FROM A RELATIVISTIC, FIELD-EMISSION DIODE WITH A VELVET COVERED CATHODE

G. Bekefi, R. E. Shefer, and S. C. Tasker Aug. 1985 15 p refs Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985

(Contract W-7405-eng-48)

(DE86-001112; CONF-850956-12) Avail: NTIS HC A02/MF A01

The beam emittance and brightness from a mildly relativistic (200 to 400 kV) high current density (0.5 to 3.5 kA/sq cm) planar, field emission diode provided with a velvet covered cathode have been studied experimentally as a function of the applied electric field (100 to 600 kV/cm). Transverse beam spreading has been measured using a conventional pinhole arrangement followed by a fluorescent screen and open shutter camera. Good turn-on, and a high normalized beam brightness (B(sub n) = 300 kA/sq cm-rad sq) have been observed. The results are compared with those obtained with a graphite cathode. DOE

N86-23420# Stanford Linear Accelerator Center, Calif.

T-EXPANSION: A SHORT REVIEW

M. Karliner Sep. 1985 7 p refs Presented at the Nuclear Chromodynamics Conference, Santa Barbara, Calif., 12 Aug. 1985

(Contract DE-AC03-76SF-00515)

(DE86-001459; SU-SLAC-PUB-3779; CONF-8508127-3) Avail: NTIS HC A02/MF A01

The t-expansion is a nonperturbative calculational tool recently developed for Hamiltonian systems. A short review of the method is given. It is followed by a summary of applications to two dimensional spin systems and to four dimensional non-abelian lattice gauge theories. DOE

N86-23421# Lawrence Livermore National Lab., Calif.
NUMERICAL DETERMINATION OF INJECTOR DESIGN FOR HIGH BEAM QUALITY
J. K. Boyd 15 Oct. 1985 12 p Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE86-002373; UCRL-93456; CONF-850956-9) Avail: NTIS HC A02/MF A01

The performance of a free electron laser strongly depends on the electron beam quality or brightness. The electron beam is transported into the free electron laser after it has been accelerated to the desired energy. Typically the maximum beam brightness produced by an accelerator is constrained by the beam brightness deliverd by the accelerator injector. Thus it is important to design the accelerator injector to yield the required electron beam brightness. The DPC (Darwin Particle Code) computer code has been written to numerically model accelerator injectors. DPC solves for the transport of a beam from emission through acceleration up to the full energy of the injector. The relativistic force equation is solved to determine particle orbits. Field equations are solved for self consistent electric and magnetic fields in the Darwin approximation. DPC has been used to investigate the beam quality consequences of A-K gap, accelerating stress, electrode configuration and axial magnetic field profile. DOE

N86-23422# Lawrence Livermore National Lab., Calif.
PROPERTIES OF THE ACCELERATOR-PRODUCED BEAM
G. J. Caporaso, F. W. Chambers, A. G. Cole, W. M. Fawley, and K. W. Struve 11 Oct. 1985 19 p Presented at the SDIO/DARPA Annual Propagation Review, Monterey, Calif., 24 Jun. 1985
(Contract W-7405-eng-48)
(DE86-002374; UCRL-92873; CONF-8506141-14) Avail: NTIS HC A02/MF A01

Obtaining detailed knowledge of the condition of the electron beam delivered to the experimental tank is of prime importance in the attempt to correlate the propagation data with theory. There are many interesting and unique features of the beam delivered by Advanced Test Accelerator (ATA) to the experimental tank. DOE

N86-23423# Los Alamos National Lab., N. Mex.
RUN PERMIT SOFTWARE FOR THE PROTON STORAGE RING
S. S. Bair 1985 14 p Presented at the 2nd International Workshop on Accelerator Control Systems, Los Alamos, N. Mex., 7 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002395; LA-UR-85-3584; CONF-8510194-2) Avail: NTIS HC A02/MF A01

The Run Permit system is intended to protect equipment from radiation effects caused by having beam enabled when required equipment is not operational. This system will not allow beam unless certain devices are ready and will drop beam if any of these devices become inoperative. A system to provide such protection might be implemented in hardware. However, because the several operating modes of the Proton Storage Ring/Weapons Neutron Research facility require certain devices to be in different states (depending on mode), a dynamic configuration capability is needed, that is, a software solution is more feasible. DOE

N86-23424# Los Alamos National Lab., N. Mex.
PROTON STORAGE RING: MAN/MACHINE INTERFACE
R. F. Lander and P. N. Clout 1985 26 p Presented at the 2nd International Workshop on Accelerator Control Systems, Los Alamos, N. Mex., 7 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002397; LA-UR-85-3582; CONF-8510194-5) Avail: NTIS HC A03/MF A01

The *human interface of the Proton Storage Ring Control* System at Los Alamos is described in some detail, together with the software environment in which operator interaction programs are written. Some examples of operator interaction programs are given. DOE

N86-23425# Brookhaven National Lab., Upton, N. Y.
STUDIES OF POSITIONAL STABILITY OF THE ELECTRON BEAM IN THE NSLS STORAGE RING
L. H. Yu, R. J. Nawrocky, and J. Galayda 1985 4 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract DE-AC02-76CH-00016)
(DE86-002505; BNL-36561; CONF-850504-293) Avail: NTIS HC A02/MF A01

The beam position monitor used at NSLS is described, with a resolution of 1 (MU)m without considering mirror vibration. An upper limit of the resolution is 11 (micro)m, given by a preliminary measurement of mirror angular vibration. Further improvement of this measurement can lower the upper limit. Preliminary result of long term beam movement and vibration of beam position is reported. These measurements are correlated with ambient and controlled mechanical vibration of a quadrupole. The 60 Hz vibration seems unlikely to be caused by quadrupole mechanical vibration, but 12 Hz beam vibration can be accounted for by this vibration. In time, correlation with ambient and controlled electrical variation will be measured. These measurements and more efforts on monitors at other beam ports to locate noise source are under way. DOE

N86-23426# Los Alamos National Lab., N. Mex.
POTENTIAL ENERGY FOR QUARKS
L. Heller 1985 17 p refs Presented at the Nuclear Chromodynamics Conference, Santa Barbara, Calif., 12 Aug. 1985
(Contract W-7405-eng-36)
(DE86-000754; LA-UR-85-3313; CONF-8508127-2) Avail: NTIS HC A02/MF A01

It is argued on theoretical and phenomenological grounds that confinement of quarks is intrinsically a many-body interaction. The Born-Oppenheimer approximation to the bag model is shown to give rise to a static potential energy that consists of a sum of two-body Coulomb terms and a many-body confining term. Following the success of this potential in heavy Q anti Q systems it is being applied to Q(2) anti Q(2). Preliminary calculations suggest that dimeson bound states with exotic flavor, such as bb anti s anti s, exist. DOE

N86-23427# Los Alamos National Lab., N. Mex.
POTENTIAL CAPABILITIES AT LAMPF TO STUDY NUCLEI FAR FROM STABILITY
W. L. Talbert and M. E. Bunker 1985 7 p refs Presented at the 190th American Chemical Society National Meeting, Chicago, Ill., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000770; LA-UR-85-3234; CONF-850942-27) Avail: NTIS HC A02/MF A01

Feasibility studies have shown that a He-jet activity transport line, with a target chamber placed in the LAMPF main beam line, will provide access to short-lived isotopes of a number of elements that cannot be extracted efficiently for study at any other type of on-line facility. The He-jet technique requires targets thin enough to allow a large fraction of the reaction products to recoil out of the target foils; hence, a very intense incident beam current, such as that uniquely available at LAMPF, is needed to produce yields of individual radioisotopes sufficient for detailed nuclear studies. The results of feasibility experiments on He-jet transport efficiency and timing are presented. Also present estimates on availability of nuclei far from stability from both fission and spallation processes. Areas of interest for study of nuclear properties far from stability are outlined. DOE

N86-23428# Los Alamos National Lab., N. Mex.
MUON NUMBER VIOLATING RARE DECAYS
M. D. Cooper 1985 3 p refs Presented at the International Europhysics Conference on High Energy Physics, Bari, Italy, 18 Jul. 1985
(Contract W-7405-eng-36)
(DE86-000775; LA-UR-85-3199; CONF-850721-5) Avail: NTIS HC A02/MF A01

The experimental status of rare decays that violate muon number conservation is summarized, giving upper limits of their branching ratios with 90% confidence. All of the muon experiments share several common elements. They aim to identify the process sought through the measurement of kinematical variables. Large solid angles are required to reach very high sensitivities. The need for good resolution stresses technology in high-rate environments to suppress backgrounds. In order to understand the detector response, known processes are measured where possible. A few experiments planned to detect muon number nonconserving processes are briefly described. DOE

N86-23429# Los Alamos National Lab., N. Mex.
ELECTRON-BEAM ENVELOPES AND MATCHING FOR A COMBINED WIGGLER AND ALTERNATING-GRADIENT QUADRUPOLE CHANNEL
T. F. Wang and R. K. Cooper 1985 14 p Presented at the 6th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-000783; LA-UR-85-3164; CONF-850956-2) Avail: NTIS HC A02/MF A01

The electron-beam envelopes and matching for a combined wiggler and alternating-gradient quadrupole field for a free-electron laser (FEL) that will be operated in the VUV or XUV wavelength region are discussed. The quadrupole field is assumed to vary continuously along the symmetry axis. The linearized equations of electron motion are solved analytically by using the two-scale perturbation method for a plane polarized wiggler. The electron-beam envelopes and the envelope equations, as well as the matching conditions in phase space, are obtained from the electron trajectories. A comparison with the numerical solution is presented. DOE

N86-23430# Los Alamos National Lab., N. Mex.
SOURCE-JERK ANALYSIS USING A SEMI-EXPLICIT INVERSE KINETIC TECHNIQUE
G. D. Spriggs and R. A. Pederson 1985 10 p refs Presented at the DOE Subcritical Reactivity Measurements Workshop, Albuquerque, N. Mex., 26 Aug. 1985
(Contract W-7405-eng-36)
(DE86-000803; LA-UR-85-3416; CONF-8508105-5) Avail: NTIS HC A02/MF A01

A method is proposed for measuring the effective reproduction factor, k, in subcritical systems. The method uses the transient response of a subcritical system to the sudden removal of an extraneous neutron source (i.e., a source jerk). The response is analyzed using an inverse kinetic technique that least-squares fits the exact analytical solution corresponding to a source-jerk transient as derived from the point-reactor model. It has been found that the technique can provide an accurate means of measuring k in systems that are close to critical (i.e., $0.95 < k < 1.0$). As a system becomes more subcritical (i.e., $k << 1.0$) spatial effects can introduce significant biases depending on the source and detector positions. However, methods are available that can correct for these biases and, hence, can allow measuring subcriticality in systems with k as low as 0.5. DOE

N86-23431# Carnegie-Mellon Univ., Pittsburgh, Pa.
EXPERIMENTAL MEDIUM ENERGY PHYSICS ANNUAL PROGRESS REPORT, JUNE 1984-MAY 1985
1985 127 p
(Contract DE-AC02-76ER-03244)
(DE86-001839; DOE/ER-03244/117) Avail: NTIS HC A07/MF A01

During the past year the principal activities of the CMU Medium Energy Physics Group have included the running of three previously approved experiments, the development of hardware and software for these experiments, and final analysis of previously accumulated data. In a two week run at LEAR at the beginning of this year 100 data tapes were collected on experiment PS-185. This spring sigma hyperon production in Lithium was studied in a run on AGS experiment E-774. We are AGS experiment E-788 is currently being set up in an investigation of Lambda weak decay in Helium hypernuclei. In addition a new experiment to search for strangeness S = -2 dibaryon production was presented and approved by the AGS program advisory committee for 1000 h (E-813). For these experiments extensive hardware and software development has taken place, requiring much of the group's effort. Analysis of LEAR experiment PS-185 is in full progress at CMU. Both the weak decay studies of C-12 (AGS E-759) and the pion annihilation studies in Lithium and Oxygen have now been fully analyzed with the results submitted for publication in several papers. DOE

N86-23432# Maryland Univ., College Park.
HIGH ENERGY ACCELERATOR AND COLLIDING BEAM USER GROUP Progress Report
Oct. 1985 92 p
(Contract DE-AC05-76ER-02504)
(DE86-001896; DOE/ER-02504-437) Avail: NTIS HC A05/MF A01

The OPAL project at LEP has begun to dominate the research activites at Maryland. A very large new laboratory has been commissioned in the Physics Building. In this laboratory wire chambers and pads are being assembleu and tested before shipment to CERN for insertion in the iron magnet calorimeter. Detailed design of most of the calorimeter has been completed, along with a plan for assembly and testing of the barrel calorimeter at CERN. A chamber production facility is being set up at Maryland to supplement the facility at Frascati that has been the source of all the chambers to date. The Frascati operation is carried out by our Bologna collaborators with some Maryland help. Production of part of the forward electromagnetic calorimeter has also begun in collaboration with University College, London. Excellent progress has been made on the problem of simulating the hadron calorimeter's response to multi GeV hadrons. Detailed Monte Carlos using a new OPAL program GEANT3/GHEISHA have been able to fit the Maryland calorimeter prototype test data taken at BNL. DOE

N86-23433# Hanford Atomic Products Operation, Richland, Wash. Rockwell Hanford Operations.
CHEMICAL PROCESSING MONTHLY REPORT, APRIL 1985
Apr. 1985 40 p
(Contract DE-AC06-77RL-01030)
(DE86-001942; RHO-PB-SR-10-B-CP-1) Avail: NTIS HC A03/MF A01

In the PUREX/UO3 operations, 151 tones of N reactor fuel were charged to the PUREX dissolvers in April 1985, bringing the Fiscal Year-to-Date (FYTD) total to 667, which is now only 61 tones behind the 1200 tone recovery plan. One hundred thirty-nine tonnes of UO3 were shipped to the Feed Materials Production Center (FMPC), bringing the FYTD total to 644 tones. Twenty-two percent of the PUO2 shipments were achieved, bringing the cumulative shipments to 52%. In the plutonium finishing (PF) plant/nuclear materials management program, 10% of plutonium nitrate was loaded out. Total Operating Efficiency for Plutonium Reclamation Facility (PRF) was 53% for the month, compared to a goal of 70%. Remote Mechanical C (RMC) metal line reactivation activities are 95% complete. Terminal clean out operations are about one month behind schedule, due to diversion of personnel to the RMC reactivation effort. Within the area of decontamination and decommissioning activities, removal of the Sorter/Chopper hood in 232-Z Building was completed. Design on B-339, vault safety and inventory system was completed on schedule. DOE

N86-22736# Joint Publications Research Service, Arlington, Va.
APPLICATIONS OF HIRFL HEAVY ION ACCELERATOR SURVEYED
Guohua Wu *In its* China Report: Science and Technology (JPRS-CST-86-004) 28 Jan. 1986 p 51-58 Transl. into ENGLISH from Wuli Tongbao (Baoding, China), no. 4, 10 Aug. 1985 p 23-28
(For primary document see N86-22735 13-31)
Avail: NTIS HC A06/MF A01

74 OPTICS

Includes light phenomena.

N86-23434 New Mexico Univ., Albuquerque.
NUMERICAL MEASUREMENTS OF WAVEFRONT ABERRATION Ph.D. Thesis
Christopher Roy DeHainaut 1985 182 p
Avail: Univ. Microfilms Order No. DA8518560

The estimation of wavefront aberrations is central to both optical testing and real time control of active optical systems. Optical measurements, whether wavefront tilts, optical path difference, or image plane intensitites, must be numerically transformed into meaningful aberrations. Accurate and more noise tolerant algorithms were developed to process these measurements. A number of generic estimation techniques are presented which are suitable for processing measurements taken at a single point in time. All of these static processing techniques prove to be variations on the Bayesian minimum variance estimator. Reviews of a point spread function measurement processor and a Hartman sensor processor serve as an introduction to practical aberration measurement processing. Two approaches to testing afocal telescopes with an array of small flats instead of the usual single large flat, called subaperture testing, are analyzed in detail. The static aberration measurement theory is then extended to accommodate sequences of measurements taken over a number of points in time. Dissert. Abstr.

N86-23435# Defence Research Information Centre, Orpington (England).
A SCATTERED-LIGHT COUNTING TECHNIQUE FOR DETERMINING CAVITATION-NUCLEI SPECTRA
A. Keller Sep. 1985 21 p refs Transl. into ENGLISH from Optik, vol. 32, no. 2, 1970 p 165-176
(DRIC-T-7593; BR97247) HC A02/MF A01

A technique for recording the spectra of free-bubble cavitation nuclei was developed. Results obtained from research on aerosols were used as the basis of the technique, which exploits the optical properties of the nuclei. The theoretical principles are discussed, as are experimental results obtained by the scattered-light counter. Results show that the device enables the spectrum of cavitation nuclei in water to be recorded quickly, without any disturbance. Author (ESA)

N86-23436*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
A LABORATORY INVESTIGATION OF THE VARIABILITY OF CLOUD REFLECTED RADIANCE FIELDS Final Technical Report
Thomas B. McKee and Stephen K. Cox [1986] 72 p refs
(Grant NAG5-387)
(NASA-CR-176612; NAS 1.26:176612) Avail: NTIS HC A04/MF A01 CSCL 20F

A method to determine the radiative properties of complex cloud fields was developed. A Cloud field optical simulator (CFOS) was constructed to simulate the interaction of cloud fields with visible radiation. The CFOS was verified by comparing experimental results from it with calculations performed with a Monte Carlo radiative transfer model. A software library was developed to process, reduce, and display CFOS data. The CFSOS was utilized to study the reflected radiane patterns from simulated cloud fields. B.G.

N86-23437# Department of the Air Force, Washington, D.C.
MODULATED OPTICAL ENERGY SOURCE Patent Application
Kenneth R. Matosian, inventor (to Air Force) Filed 16 Oct. 1985 25 p
(AD-D012012; US-Patent-Appl-SN-788188) Avail: NTIS HC A02/MF A01 CSCL 17/8

This patent application discloses an optical radiant energy source capable of far infrared spectrum operation and on-off energy modulation without interruption of the radiation sources operating temperature characteristics. Provisions for radiant energy dissipation as part of the modulation, for achieving uniform output beam dispersion over a specified area, and for airframe mounting of the disclosed apparatus are also included. GRA

N86-23438# Lawrence Livermore National Lab., Calif.
MEASURING NUMERICAL APERTURE AND ILLUMINATION DISTRIBUTION OF AN OPTICAL FIBER: AN INSTRUMENT AND A METHOD
F. A. Schumacher and R. P. Reedy 30 Sep. 1985 9 p
(Contract W-7405-eng-48)
(DE86-002844; UCRL-53664) Avail: NTIS HC A02/MF A01

A simple instrument to quickly and easily record the far-field or near-field pattern produced by an optical fiber was designed, constructed, and tested. The instrument can be used for quality assurance testing of terminated optical fibers. This instrument can also be used to experimentally characterize a large variety of terminated or unterminated optical fibers; to study the effects that mode stripping, mode scrambling, micro bending, wavelength, and launch conditions have on the illumination distribution coming from the fiber; to look for anomalies in the illumination distribution caused by a defective index profile or termination problem. DOE

N86-23439# Lawrence Livermore National Lab., Calif.
HIGH BRIGHTNESS TEST STAND
D. L. Birx, G. J. Caporaso, J. K. Boyd, S. A. Hawkins, S. E. Poor, L. L. Reginato, D. Rogers, Jr., and M. W. Smith Aug. 1985 13 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-48)
(DE86-002372; UCRL-93174; CONF-850956-7) Avail: NTIS HC A02/MF A01

The High Brightness Test Stand is a 2 MeV, less than or equal to 10 kA electron accelerator module. This accelerator module, designed as an upgrade prototype for the Advanced Test Accelerator (ATA), combines solid state nonlinear magnetic drives with state-of-the-art induction linac technology. The facility serves a dual role, as it not only provides a test bed for this new technology, but is used to develop high brightness electron optics. We will both further describe the accelerator, as well as present some of the preliminary electron optics measurements. DOE

N86-22773# Joint Publications Research Service, Arlington, Va.
TRENDS IN DEVELOPMENT OF ELECTRON OPTICS
Jiye Ximen *In its* China Report: Science and Technology (JPRS-CST-86-010) 19 Mar. 1986 p 117-128 refs Transl. into ENGLISH from Dianzi Xuebao (Beijing, China), v. 12, no. 2, Mar. 1984 p 90-96 (For primary document see N86-22767 13-31)
Avail: NTIS HC A08/MF A01

N86-22794*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL OPTICS ANALYSIS OF A FOUR-REFLECTOR ANTENNA, PART 1
A. G. Cha *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 94-100 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-23440# Iowa State Univ. of Science and Technology, Ames.
INVESTIGATION OF HADRONIC MATTER AT THE FERMILAB TEVATRON COLLIDER Technical Progress Report
E. W. Anderson 22 Oct. 1985 12 p refs
(Contract DE-AC02-85ER-40193)
(DE86-001877; DOE/ER-40193/T1) Avail: NTIS HC A02/MF A01

Hadronic matter at very high energy densities is investigated.

The present experimental effort is focused on a search for a new quark-gluon plasma phase expected to occur when temperatures of 240 MeV are achieved. Instrumentation for several unique signatures is being developed to exploit the first operation of the Fermilab Tevatron Collider in 1986. The capital projects funded under this contract are a 240-element trigger hodoscope array, and a segmented photon detector. For these projects $172K are requested for the period 1986 February 1 through 1987 January 31 to complete the trigger hodoscope, and $160K for the period 1987 February 1 through 1988 January 31 to construct a portion of the photon detector. These figures are as presented in the original proposal. Due to budget constraints on the Fermilab experimental support program, we will not be able to receive the full complement of necessary electronics from the Fermilab PREP pool in the required period. Consequently, an additional $35K is requested for the period 1986 February 1 through 1987 January 31 for a portion of the electronics for the 240-channel trigger hodoscope. For the same reasons, Fermilab cannot provide the required magnet on schedule; a one year delay is proposed. As this would seriously impact our physics goals, the collaboration is attempting to fund the magnet without delay through the universities. Efforts to date have concentrated on the design and testing of the hodoscope. Extensive measurements on the radiation levels and effects during the various accelerator cycles have been made. These data are essential to the proper selection of scintillator and design of electronics. These tests are now complete, and final construction is beginning. DOE

N86-23441# Texas Univ., Austin. Inst. for Fusion Studies.
SELF-CONSISTENCY CONSTRAINTS ON TURBULENT MAGNETIC TRANSPORT AND RELAXATION IN COLLISIONLESS PLASMA
P. W. Terry, P. H. Diamond, and T. S. Hahm Oct. 1985 10 p
(Contract DE-FG05-80ET-53088)
(DE86-002074; DOE/ET-53088/203; IFSR-203) Avail: NTIS HC A02/MF A01

Novel constraints on collisionless relaxation and transport in drift-Alfven turbulence are reported. These constraints arise due to the consideration of mode coupling and incoherent fluctuations and the proper application of self-consistency conditions. The result that electrostatic fluctuations alone regulate transport in drift-Alfven turbulence follows directly. Quasilinear transport predictions are discussed in light of these constraints. DOE

N86-23442# Lawrence Livermore National Lab., Calif.
VACUUM SYSTEM FOR HYPERVELOCITY RAILGUN EXPERIMENTS
A. R. Susoeff 12 Sep. 1985 9 p
(Contract W-7405-eng-48)
(DE86-002293; UCID-20564) Avail: NTIS HC A02/MF A01

In order for railguns to achieve very high velocities it will be necessary to operate at reduced atmospheric pressure, perhaps even high vacuum. Use of railguns in a space environment will also be facilitated by successful vacuum operation. Equation of state research requires projectile impact on target prior to a bow shock wave necessitating high vacuum environment. The H Division/LLNL Railgun Project achieved successful high vacuum operation. A modular, free-standing vacuum system was designed, fabricated and characterized to conduct experiments with single and multi-staged hypervelocity railguns. Operating environment for the experiments was in the low 10 to the -6 power torr pressure range, equivalent to the atmosphere at about 75/100 miles altitude. The first successful high vacuum region (i.e., low pressure side of the Paschen voltage breakdown curve) railgun experiments were performed with this apparatus. The vacuum system and its operating characteristics are described DOE

N86-23443# Oak Ridge National Lab., Tenn.
CALIBRATION OF THE ORNL TWO-DIMENSIONAL THOMSON SCATTERING SYSTEM
C. E. Thomas, Jr., E. A. Lazarus, R. R. Kindsfather, M. Murakami, and K. A. Stewart Oct. 1985 71 p
(Contract DE-AC05-84OR-21400)
(DE86-002556; ORNL/TM-9507) Avail: NTIS HC A04/MF A01

A unified presentation of the calibrations needed for accurate calculation of electron temperature and density from Thomson scattering data for the Oak Ridge National Laboratory two-dimensional Thomson scattering system (SCATPAK II) is made. Techniques are described for measuring the range of wavelengths to which each channel is responsive. A statistical method for calibrating the gain of each channel in the system is given, and methods of checking for internal consistency and accuracy are presented. The relationship between the constants describing the relative light collection efficiency of each channel and plasma light-scattering theory is developed, methods for measuring the channel efficiencies and evaluating their accuracy are described, and the effect on these constants of bending fiber optics is discussed. The use of Rayleigh or Raman scattering for absolute efficiency (density) calibration, stray light measurement, and system efficiency evaluation is discussed; the relative merits of Rayleigh vs Raman scattering are presented; and the relationship among the Rayleigh/Raman calibrations, relative channel efficiency constants, and absolute efficiencies is developed. DOE

N86-23444# Department of Energy, Washington, D. C.
COMPUTING FOR PARTICLE PHYSICS. REPORT OF THE HEPAP SUBPANEL ON COMPUTER NEEDS FOR THE NEXT DECADE
Aug. 1985 166 p
(DE86-002045; DOE/ER-0234) Avail: NTIS HC A08/MF A01

The increasing importance of computation to the future progress in high energy physics is documented. Experimental computing demands are analyzed for the near future (four to ten years). The computer industry's plans for the near term and long term are surveyed as they relate to the solution of high energy physics computing problems. This survey includes large processors and the future role of alternatives to commercial mainframes. The needs for low speed and high speed networking are assessed, and the need for an integrated network for high energy physics is evaluated. Software requirements are analyzed. The role to be played by multiple processor systems is examined. The computing needs associated with elementary particle theory are briefly summarized. Computing needs associated with the Superconducting Super Collider are analyzed. Recommendations are offered for expanding computing capabilities in high energy physics and for networking between the laboratories. DOE

N86-23445# GA Technologies, Inc., San Diego, Calif.
BIG DEE: A FLEXIBLE FACILITY OPERATING NEAR BREAKEVEN CONDITIONS
J. L. Luxon and L. G. Davis Mar. 1985 13 p Presented at the 6th Topical Meeting on the Technology of Fusion Energy, San Francisco, Calif., 3 Mar. 1985
(Contract DE-AC03-84ER-51044)
(DE86-001763; GA-A-17899; CONF-850310-118) Avail: NTIS HC A02/MF A01

The Doublet III tokamak facility is presently undergoing an upgrade to Big Dee, a device projected to be capable of producing plasmas with parameters approaching breakeven conditions, albeit in hydrogen plasmas. The goal of the upgrade has been to develop a facility capable of studying confinement and beta in non-circular discharges at parameters near breakeven conditions while maintaining the flexibility and accessibility necessary to allow a wide range of problems to be addressed. The upgrade replaces the vacuum vessel and outermost plasma shaping coils allowing higher plasma currents and improved access. DOE

N86-23446# Department of Energy, Washington, D. C.
FUSION CONNECTION: CONTRIBUTIONS TO INDUSTRY, DEFENSE AND BASIC SCIENCE RESULTING FROM SCIENTIFIC ADVANCES MADE IN THE MAGNETIC FUSION ENERGY PROGRAM
T. Finn, J. Woo, R. Temkin, D. Anderson, J. Anderson, D. Barbosa, R. Briggs, J. Callen, S. Colgate, and J. Cowles Oct. 1985 33 p
(DE86-001774; DOE/ER-0250) Avail: NTIS HC A03/MF A01

Fusion research has led to significant contributions in many

different areas of industry, defense, and basic science. This diversity is represented visually in the introductory figure which shows both a radio galaxy, and a microchip produced by plasma etching. Some of these spin-off technologies are discussed. DOE

N86-23447# Avco-Everett Research Lab., Mass.
MHD CHANNEL DEVELOPMENT Quarterly Report, Jan. - Mar. 1985
May 1985 156 p refs
(Contract DE-AC22-84PC-70507)
(DE86-002520; DOE/PC-70507/4) Avail: NTIS HC A08/MF A01

The cathode wall nonuniformity modeling was completed. Good agreement was obtained between the results of the model and experimental data. Secondary flow investigations were continued, with the use of channel heat flux data as an indicator. Work continued on the possible use of ceramic wall elements in the insulating walls adjacent to the cathode, paricularly in the regions where high voltage spikes exist. A summary of the evolution design, and testing of the CDIF power conditioning circuits is presented. The Mk VI and Mk VII facilities were operated for a total of 74 1/2 hours during this reporting period. Power was generated for 20 hours. DOE

N86-23448# Argonne National Lab., Ill.
OVERVIEW OF THE CHARACTERISTICS OF THE 6-GeV SYNCHROTRON RADIATION: A PRELIMINARY GUIDE FOR USERS
G. K. Shenoy and P. J. Viccaro Oct. 1985 72 p refs
(Contract W-31-109-eng-38)
(DE86-002540; ANL-85-69) Avail: NTIS HC A04/MF A01

In this document we present the characteristics of the electromagnetic radiation from various types of sources on a 6-GeV storage ring. The sources include bending magnets, undulators and wigglers. The characteristics are compared with those of other synchrotron sources when operated at their design specifications. The influence of positron beam size on the brilliance is discussed, along with the power distribution from these sources. The goal of this document is to provide users with enough information on the behavior of radiation from a 6-GeV storage ring so that a dialogue can be established with the accelerator physicists and engineers to acheive an optimal design. DOE

N86-23449# Washington Univ., Seattle.
RAMAN SCATTERING AND ASSOCIATED FAST ELECTRON PRODUCTION Final Technical Report, 16 Apr. 1984 - 15 Apr. 1985
R. D. Brooks and Z. A. Pietrzyk Aug. 1985 33 p
(Contract W-7405-eng-48)
(DE86-002623; UCRL-15722) Avail: NTIS HC A03/MF A01

High energy electrons in plasmas have been attributed to various causes including trapping by electron plasma waves created by stimulated Raman scattering. A theory, consistent with experimental results, based on the acceleration of trapped electrons by such electron plasma waves as they propagate in the presence of a density gradient away from the region where they are created is presented. Single particle simulations show accelerating voltages as high as 20 GV/m. DOE

N86-23450# Texas Univ., Austin. Inst. for Fusion Studies.
HEALING OF MAGNETIC STOCHASTICITY AND ISLANDS BY SELF-CONSISTENT PLASMA CURRENTS
M. Kotschenreuther Oct. 1985 14 p
(Contract DE-FG05-80ET-53088)
(DE86-002640; DOE/ET-53088/211; IFSR-211) Avail: NTIS HC A02/MF A01

When resonant magnetic perturbations are imposed on a toroidally confined plasma, magnetic stochasticity can arise. It is shown that the transport of electrons in the stochasticity can lead to self-consistent magnetic fields which can greatly reduce, or heal, the stochasticity in steady state. These currents occur if there is another plasma transport process operating in which the radial fluxes of electrons and ions are not automatically equal. The healing effect can be quite strong in stellarator plasma confinement devices for fusion applications. DOE

N86-23451# Lawrence Livermore National Lab., Calif.
THERMAL STRESS ANALYSIS OF THE SLAC MOVEABLE MASK, ADDENDUM 2
G. L. Johnson 15 Oct. 1985 33 p
(Contract W-7405-eng-48)
(DE86-002958; UCID-20498-Add-2) Avail: NTIS HC A03/MF A01

X-ray beams emerging from the new SLAC electron-positron storage ring (PEP) can impinge on the walls of tangential divertor channels. A moveable mask made of 6061-T6 aluminum is installed in the channel to limit wall heating. The mask is cooled with water flowing axially at 30C. Beam strikes on the mask cause highly localized heating in the channel structure. Analyses were completed to determine the temperatures and thermally-induced stresses due to this heating. The current design and operating conditions should result in the entrance to the moveable mask operating at a peak temperature of 88C with a peak thermal stress at 19% of the yield of 6061-T6 aluminum. DOE

N86-23452# Oak Ridge National Lab., Tenn.
IFSMTF POWER SUPPLY REGULATOR
J. M. Googe, L. E. Nickels, R. E. Wintenberg, and R. J. Wood 1985 4 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985 Prepared in cooperation with Tennessee Univ., Knoxville and Nickels Engineering, Inc., New Berlin, Wis.
(Contract DE-AC05-84OR-21400)
(DE86-003009; CONF-851102-6) Avail: NTIS HC A02/MF A01

The high-current, low voltage power supplies for the International Fusion Superconducting Magnet Test Facility at Oak Ridge National Laboratory has been redesigned to eliminate stability problems caused by limiting action and related system dynamics. This paper describes the redesign, simulation, and testing of the power supply regulator for a 2-H, 15,000-A superconducting coil. Included in the paper are circuit models, frequency domain block diagrams, and CSMP simulations of the regulator. The regulator consists of an inner voltage loop and an outer current loop and is provided with adjustable voltage and current limits. The simulation includes a nonlinear function to characterize the gate drive and rectifier units of the power supply. Experimental data demonstrating the performance of the regulator are included for comparisons with the simulation. DOE

N86-23453# Oak Ridge National Lab., Tenn.
ATFSR: A SMALL TORSATRON REACTOR
W. A. Houlberg, J. T. Lacatski, and N. A. Uckan 1985 5 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003010; CONF-851102-8) Avail: NTIS HC A02/MF A01

A small (average minor radius and a approx. = 1 m), moderate-aspect-ratio torsatron reactor based on the Advanced Toroidal Facility (ATF) is proposed as a starting point for improved stellarator reactor designs. The major limitation of the compact size is the lack of space under the helical coils for the blanket and shield. Neoclassical confinement models for helically trapped particles show that a large electric potential (radial electric field) is necessary to achieve ignition in a device of this size, although high-Q operation is still attainable with more modest potentials. DOE

N86-23454# Oak Ridge National Lab., Tenn.
ATF NEUTRAL BEAM INJECTION SYSTEM
M. M. Menon, R. N. Morris, and P. H. Edmonds 1985 5 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003012; CONF-851102-7) Avail: NTIS HC A02/MF A01

The Advanced Toroidal Facility is a stellarator torsatron being built at Oak Ridge National Laboratory to investigate improved plasma confinement schemes. Plasmas heating will be carried out

predominantly by means of neutral beam injection. This paper describes the basic parameters of the injection system. Numerical calculations were done to optimize the aiming of the injectors. The results of these calculations and their implications on the neutral power to the machine are elaborated. The effects of improving the beam optics and altering the focal length on the power transmitted to the plasma are discussed. DOE

N86-23455# Oak Ridge National Lab., Tenn.
PROBLEMS AND SOLUTIONS OF THE IFSMTF POWER AND SWITCH SYSTEM
R. J. Wood, R. E. Wintenberg, J. M. Googe, and L. E. Nickels 1985 5 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985 Prepared in cooperation with Tennessee Univ., Knoxville.; Nickels Engineering, Inc., New Berlin, Wis.
(Contract DE-AC05-84OR-21400)
(DE86-003015; CONF-851102-4) Avail: NTIS HC A02/MF A01

Solutions have been found for the problems encountered with the coil power and switching systems of the International Fusion Superconducting Magnet Test Facility (IFSMTF). The coil power system provides the filtered dc sources (+- 12 V dc; 25,000 A) for charging and discharging the coils of the IFSMTF experiment. The switching system provides the means of transferring the coil current into a dump resistor when a rapid discharge of a coil is required due to a coil failure (quench) or other system abnormalities. DOE

N86-23456# Princeton Univ., N. J. Plasma Physics Lab.
VARIETIES OF SAWTOOTH BEHAVIOR IN TFTR PLASMAS
V. K. Pare, K. McGuire, R. J. Colchin, P. C. Efthimion, E. Fredrickson, K. W. Hill, G. Taylor, and N. R. Sauthoff 1985 8 p Presented at the Course and Workshop on Basic Physical Processes in Fusion Plasmas, Varenna, Italy, 26 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002219; CONF-850806-3) Avail: NTIS HC A02/MF A01

The side-viewing soft-X-ray camera on the Tokamak Fusion Test Reactor (TFTR) has made possible the observation of several different forms of sawtooth oscillation, which can be categorized according to their position in the plasma, sequence of occurrence, and patterns of associated MHD oscillation. Some insight into the plasma conditions involved can be gained by examining the waveforms in detail, along with electron temperature profiles from electron cyclotron emission measurements. DOE

N86-23457# TRW, Inc., Redondo Beach, Calif.
ION CYCLOTRON RESONANCE HEATING (ICRH) START-UP ANTENNA FOR THE MIRROR FUSION TEST FACILITY (MFTF-B)
T. M. McCarville and T. E. Romesser 2 Oct. 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-002376; UCRL-92623; CONF-851102-2) Avail: NTIS HC A02/MF A01

The purpose of the ICRH start-up antenna on MFTF-B is to heat the plasma and control the ion distribution as the density increases during start-up. The antenna, consisting of two center fed half turn loops phased 180(0) apart, has been designed for 1 MW of input power, with a goal of coupling 400 kW into the ions. To vary the heating frequency relative to the local ion cyclotron frequency, the antenna is tunable over a range from 7.5 to 12.5 MHz. The thermal requirements common to low duty cycle ICRH antennas are especially severe for the MFTF-B antenna. The stress requirements are also unique, deriving from the possibility of seismic activity or JxB forces if the magnets unexpectedly quench. Considerable attention has been paid to contact control at high current bolt-up joints, and arranging geometries so as to minimize the possibility of voltage breakdown. DOE

N86-23458# Los Alamos National Lab., N. Mex.
FRX-C LARGE SOURCE MODIFICATION
R. E. Chrien, M. Tuszewski, E. J. Yavornik, G. A. Barnes, W. T. Armstrong, W. N. Hugrass, P. L. Klingner, K. F. McKenna, S. Okada, and D. J. Rej 1985 5 p Presented at the 7th US-Japan Workshop on Compact Toroids, Bellevue, Wash., 12 Nov. 1985
(Contract W-7405-eng-36)
(DE86-002428; LA-UR-85-3850; CONF-8511118-1) Avail: NTIS HC A02/MF A01

The FRX-C Large Source Modification (LSM) consists of a larger discharge tube and a larger radius coil connected to the existing FRX-C collector plates and capacitor banks. The objectives of LSM are to: (1) study the size dependences of processes governing FRC formation and poloidal flux trapping in order to improve the design of larger field-reversed theta pinch devices, (2) increase the parameter s (number of local ion gyroradii between the field null and separatrix) to seek access to predicted new regimes of improved confinement and possible instability, (3) search for evidence of internal tilt instability at higher values of s where the mode is predicted to grow more rapidly, and (4) observe the effect of s and larger size on FRC confinement. In this paper we will discuss the construction of LSM, the experimental plan, and preliminary experimental results. DOE

N86-23459# Bechtel Corp., San Francisco, Calif.
LIQUID HELIUM DUMP CONCEPT FOR A LARGE SCALE SUPERCONDUCTING MAGNETIC ENERGY STORAGE PLANT
S. M. Schoenung, R. J. Loyd, T. Nakamura, J. D. Rogers, and J. R. Purcell 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Los Alamos National Lab., New Mex., GA Technologies, Inc., San Diego, Calif.
(Contract W-7405-eng-36)
(DE86-000776; LA-UR-85-3196; CONF-850814-23) Avail: NTIS HC A02/MF A01

Superconducting Magnetic Energy Storage (SMES) is a potentially cost effective technology for electric utility load leveling. Design concepts and cost estimates of SMES plants capable of delivering 5000 MWh daily have been previously identified. An important feature of a large commercial plant is a system that will reliably shut down the magnet by thermally dissipating the stored energy in the event of an imminent or actual loss of superconductivity. To prevent damage to the coil during such a protective energy dump, the entire coil must be driven normal, i.e., resistive rather than superconducting, in a short period of time. This requires rapid removal of the liquid helium coolant surrounding the coil. A simple system that has been developed to rapidly remove the liquid helium from the helium vessel is described. The system requires only a small number of active components, no external helium storage, and is practical to reset and maintain. DOE

N86-23460# Bechtel Corp., San Francisco, Calif.
DESIGN AND COST OF A UTILITY SCALE SUPERCONDUCTING MAGNETIC ENERGY STORAGE PLANT
R. J. Loyd, T. Nakamura, S. M. Schoenung, D. W. Lieurance, M. A. Hilal, J. D. Rogers, J. R. Purcell, and W. V. Hassenzahl 1985 9 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with General Dynamics Corp., San Diego, Calif., Los Alamos National Lab., N. Mex., GA Technologies, Inc., San Diego, Calif., California Univ., Lawrence Berkeley Lab.
(Contract W-7405-eng-36)
(DE86-000777; LA-UR-85-3195; CONF-850814-26) Avail: NTIS HC A02/MF A01

Superconducting Magnetic Energy Storage (SMES) has potential as a viable technology for use in electric utility load leveling. The advantage of SMES over other energy storage technologies is its high net roundtrip energy efficiency. The major features and costs of a jointly developed 5000 MWh SMES plant design are described. DOE

N86-23461# Florida State Univ., Tallahassee. Dept. of Physics.
RESEARCH IN THEORETICAL NUCLEAR PHYSICS Progress

Report
D. Robson 1985 8 p refs
(Contract DE-AS05-79ER-10419)
(DE86-001955; DOE/ER-10419/4) Avail: NTIS HC A02/MF A01

A summary of results and findings for the past three years is reported. The goal of the work is to derive a successful theory for nuclear physics, and in this effort models are used which are based on a lattice gauge approach to Quantum Chromodynamics. Major results are presented for work in areas of relativistic wave equations, nucleon-nucleon systems, charmonium and upsilonium, and relativistic quark models with chiral symmetry. Future work and collaborations are discussed. DOE

N86-22746# Joint Publications Research Service, Arlington, Va.
PROGRESS IN PLASMA FOCUS RESEARCH
Jinji Yang and Min Han *In its* China Report: Science and Technology (JPRS-CST-86-006) 13 Feb. 1986 p 39-51 refs Transl. into ENGLISH from He Kexue Yu Gongcheng (Beijing, China), v. 5, no. 2, Jun. 1985 p 165-173 (For primary document see N86-22741 13-31)
Avail: NTIS HC A04/MF A01

N86-23524*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ELECTROSTATICS OF A DUSTY PLASMA
E. C. Whipple (California Univ., San Diego), D. A. Mendis (California Univ., San Diego), and T. G. Northrop *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-23462 Stanford Univ., Calif.
A HIGH TRANSITION TEMPERATURE SUPERCONDUCTING INTEGRATED CIRCUIT Ph.D. Thesis
Mark Steven Dilorio 1985 357 p
Avail: Univ. Microfilms Order No. DA8522129

The design and fabrication of the first superconducting integrated circuit capable of operating at over 10K. The primary component of the circuit is a dc Superconducting Quantum Interference Device (SQUID) which is extremely sensitive to magnetic fields. The dc SQUID consists of two superconductor-normal metal-superconductor (sNS) Josephson microbridges which are fabricated using a step edge process which permits the use of high transition temperature superconductors. By utilizing electron bean lithography in conjunction with ion beam etching, very small microbridges can be produced. Such microbridges lead to high performance dc SQUIDs with products of the critical current and normal resistance reaching mV at 4.2 K. These SQUIDs were extensively characterized, and exhibit excellent electrical characteristics over a wide temperature range. The completed circuits operated successfully over a wide temperature range, from 4.2 K to 14 K. Limitations were encountered in the form of an excess inductance. The origins of such an inductance have important and wide ranging ramifications for superconducting devices employing the high transition temperature materials. Dissert. Abstr.

N86-23463 Stevens Inst. of Tech., Hoboken, N. J.
A SURFACE STUDY OF MERCURY-CADMIUM-TELLURIDE Ph.D. Thesis
Vincent C. Lopes 1985 178 p
Avail: Univ. Microfilms Order No. DA8522795

Single crystals of Hg (sub 1-x) Cd (sub x) Te were studied to determine how changes in the surface conditions affected electrical properties, infrared detector grade material was used to examine the effects of changes in the surface charge density on electrical I/f noise. The surface charge density which was controlled by the pH of the aqueous solution was measured in a zeta meter which operated much like a Millikan oil drop experiment. The electrophoresis zeta potential measurements on (HgCd)Te have identified the active surface oxide as TeO2 and has also revealed information on the surface chemistry. Electrical I/f noise in-(HgCd)Te was found to be dominated by bulk and not surface effects at room temperature. Laser Raman and Auger spectroscopy were used to assess mechanical surface damage and anodic oxide composition. Dissert. Abstr.

N86-23464 Stanford Univ., Calif.
METAL AND OXYGEN INTERACTIONS WITH 3-5 COMPOUND SEMICONDUCTOR SURFACES Ph.D. Thesis
William George Petro 1985 250 p
Avail: Univ. Microfilms Order No. DA852213

Soft X-ray photoemission spectroscopy of the metal and semiconductor core levels, valence bands, and PL sub 2,3 VV Auger transitions were used to study the interactions of metals and oxygen with the cleaved GaAs(110) and InP(110) surfaces. The specific systems studied in detail are Au/GaAs, Au/InP, Ag/InP, Cu/InP, Tl/GaAs and oxygen/GaAs. It is found that the interactions observed for the noble metals can in some cases deviate from the predictions of simple bulk thermodynamic calculations. These surface related interactions are found to be distinct for each noble metal. The reactions are important in determining Schottky barrier heights. Results can be explained in terms of defect-formation model and are compared to theoretical calculations of the energy positions of native defects levels in the gap. The effect of low-intensity laser radiation during the oxidation of the GaAs(110) surface was studied using photoemission spectroscopy of the Ga 3d and As 3d core levels. Dissert. Abstr.

N86-23465# North Carolina State Univ., Raleigh.
AMORPHOUS HYDROGENATED SILICON-GERMANIUM ALLOY THIN FILMS Ph.D. Thesis
Ronald Alan Rudder 1985 140 p
Avail: Univ. Microfilms Order No. DA8518299

There were many problems associated with the deposition of amorphous hydrogenated silicon-germanium alloys (a.Si sub 1-x Ge sub x: H) that have good photoelectronic properties. Previous studies have shown that the addition of germanium creates defect states that could not be adequately compensated with hydrogen. To address these problems a dual magnetron sputtering system was designed and constructed which produces alloys that have improved photoconductivity over what was previously reported. The improved quality of these alloys was corroborated by subband gap absorption measurements which reveal that the electronic density of states at mid-gap is only about a factor of seven higher than in photovoltaic grade amorphous hydrogenated silicon. Correspondingly, infrared studies on these alloys have revealed that the germanium sites remain well hydrogenated. A model for the deposition process was proposed. This model had to account for the critical role that the germanium atoms were playing in the alloys to suppress the formation of polymerized silicon dihydride groups at the low substrate temperatures and high hydrogen partial pressures where polymerized silicon dihydride formation would occur in amorphous hydrogenated silicon films. Dissert. Abstr.

N86-23466 Stanford Univ., Calif.
PART 1: NONLINEAR ANALYSIS OF THREE COUPLED JOSEPHSON JUNCTIONS. PART 2: GENERAL BOND-TO-SITE MAPPING IN AGGREGATION Ph.D. Thesis
Philip Neil Strenski 1985 97 p
Avail: Univ. Microfilms Order No. DA8522232

A small array of Josephson junctions, superconducting devices of markedly, nonlinear behavior were analyzed. The components of the array are modelled as resistively-shunted junctions and are driven by direct currents. The validity and features of such a model for the case of a single junction are revealed, and background information on the subjects of bifurcation, chaos, and fractals is included. The array of three junctions is studied, first with one driving current and later with an additional bias current. The analysis

includes both numerical results from computer simulations and analytic computations using a perturbative approach. The two approaches are shown to be in good agreement. The behavior of the array is dominated by hysteresis effects. With a single driving current, four branches are seen in the current-voltage characteristics. The functional dependences of these curves, as well as the hysteretic cutoffs, are calculated. Small regions of bifurcations and chaotic behavior are also seen and examined. Dissert. Abstr.

N86-23467 Department of the Air Force, Washington, D.C.
INP:TE PROTECTIVE LAYER PROCESS FOR REDUCING SUBSTRATE DISSOCIATION Patent
Frank Z. Hawrylo, inventor (to Air Force) Issued 10 Sep. 1985 4 p
(AD-D011987; US-Patent-4,540,450; US-Patent-Appl-SN-661646; US-Patent-Class-148-171) Avail: US Patent and Trademark Office CSCL 20/12

In order to prevent the formation of indium droplets upon the surface of an indium phosphide wafer during liquid phase epitaxial growth, a doped protective layer is deposited by LPE upon said substrate before epitaxial growth of additional layers occurs. The doped protective layer is composed of indium phosphide doped with tellurium to a concentration of about high 10 to the 18th power to low 10 to the 19th power. This invention relates to the fabrication of semiconductor devices, and, more particularly, to the deposition of an epitaxial layer on the surface of an indium phosphide substrate. GRA

N86-23468*# Illinois Univ., Urbana-Champaign. Dept. of Electrical Engineering.
OPTICAL CONSTANTS OF GaAs-AlGaAs SUPERLATTICES AND MULTIPLE QUANTUM WELLS
K. B. Kahen and J. P. Leburton [1986] 24 p refs
(Grant NAG3-507)
(NASA-CR-176717; NAS 1.26:176717) Avail: NTIS HC A02/MF A01 CSCL 20L

The optical properties of GaAs-Al sub x Ga sub 1-xAs superlattices are calculated as a function of the frequency and superlattice structure. The comutations are performed using a partition method which combines the vectors k.p method with the pseudopotential technique. The influence of the super-structure on the electronic properties of the systems is accounted for by appropriate quantization conditions. The anisotropy and structure dependence of the dielectric constant result mainly from the contribution of the gamma region while the contributions of the other regions of the Brillouin zone are rather insensitive to the superlattice structure. The superlattice index of refraction values are shown to attain maxima at the various quantized transition energies, where for certain structures, the difference between the refractive indices of the superlattices and its corresponding Al sub x Ga sub 1-xAs alloy can be as large as 2%. In general results are in good agreement with the experimental data. Author

N86-23469# IBM Research Lab., Yorktown Heights, N. Y.
RESONANCE RAMAN SCATTERING AND FAST TIME-RESOLVED SPECTROSCOPY OF IMPURITY LEVELS IN 3-5 SEMICONDUCTOR ALLOYS Final Report, 1 Mar. 1980 - 14 Nov. 1984
Donald J. Wolford 1 Aug. 1985 254 p
(Contract N00014-80-C-0376)
(AD-A162482; Rept-51028) Avail: NTIS HC A12/MF A01 CSCL 07/4

We have performed experimental and theoretical studies of the electronic, vibrational, and kinetic properties of electronic bound states in 3-5, and silicon- and germanium-based semiconducting materials. This has included new CVD growth of crystals and thin-films and an advanced program of high-pressure (diamond anvil cell) techniques. Electronic states investigated have included intrinsic and defect-induced levels lying near or within the gap of the host materials. Experiments have involved: (1) photoluminescence (PL); (2) PL-excitation (PLE); (3) visible - and infrared-absorption; (4) resonant PL and Raman scattering; and (5) subnanosecond time-resolved luminescence performed at a variety of temperatures and hydrostatic pressures. Defects were selected for their model properties in a family of hosts and have included isoelectronic deep traps and resonances, shallow and deep simple donors and acceptors, and native-defect and impurity complexes incorporated during crystal growth or by implantation and annealing or diffusion. Materials included MOCVD-, MBE-, Cl-transport-VPE-, or LPE-prepared 3-5 compounds (e.g., GaAs, InP, GaP, AlP, and AlAs) and certain of their alloys; and thin-film amorphous silicon and germanium. GRA

N86-23470# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
DIFFUSION AND DEFECT CHARACTERIZATION STUDIES OF MERCURY CADMIUM TELLURIDE Report, 1 Aug. 1984 - 31 Jan. 1985
1985 4 p
(Contract N00014-84-K-0423; ARPA Order 5019)
(AD-A162586) Avail: NTIS HC A02/MF A01 CSCL 20/12

Two major areas are under study: epitaxial film growth of Hg1-xCdxTe(MCT); and diffusion in MCT. The objective of the film growth study is to evaluate mechanisms of the film growth process and to provide samples for property and device study in MCT. The objectives of the diffusion studies are to resolve inconsistencies in the literature regarding this important practical phenomenonal and to elucidate the dominant defects present in this ternary compound. A brief description of current activity and progress is given. GRA

N86-23471# California Univ., Berkeley. Lawrence Berkeley Lab.
NONLINEAR DYNAMICS OF SOLID STATE SYSTEMS
C. D. Jeffries Aug. 1985 17 p refs Presented at the Conference on Perspectives in Nonlinear Dynamics, Washington, D.C., 28 May 1985
(Contract DE-AC03-76SF-00098)
(DE86-001479; LBL-20177; CONF-8505207-1) Avail: NTIS HC A02/MF A01

A short review is given of a number of phenomena in solid state physics which display nonlinear dynamics. Two examples are discussed in more detail: plasma waves in germanium crystals and spin waves in ferrites. Solids are often well characterized and have diverse properties; they are quite interesting from the viewpoint of experimental and theoretical nonlinear dynamicists. A fundamental understanding of their dynamics will have significant bearing on solid state device technology and applications. DOE

N86-23472# California Univ., Berkeley. Lawrence Berkeley Lab.
SUPERCONDUCTING QUANTUM DEVICES. SUMMARY AND CONCLUSIONS
J. Clark Aug. 1985 12 p Presented at the 3rd International Conference on Superconducting Quantum Devices, Berlin, West Germany, 25 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001978; LBL-20059; CONF-8506203-4) Avail: NTIS HC A02/MF A01

Looking back over this, the third IC SQUID conference, and trying to compare the state of our field now with the way it was at the time of the second conference in 1980, the author realized that while there has been tremendous progress in some areas, in others there have been considerable disappointments and setbacks. In attempting to assess the many things that we have heard in the last four days, some idea of the status of the various subdivisions of the field was given. DOE

N86-23473# Sandia National Labs., Albuquerque, N. Mex.
CHEMISTRY OF GRAIN BOUNDARY AND BULK HYDROGEN IN POLYSILICON
D. S. Ginley and D. M. Haaland 1985 10 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002167; SAND-85-1565C; CONF-851043-15) Avail: NTIS HC A02/MF A01

Results are summarized on kinetic modeling and Fourier

transform infrared studies of the grain boundary passivation of polycrystalline silicon with monatomic hydrogen plasmas. By studying the electrical conductivity of polysilicon as a function of depth and time, considerable insight has been obtained concerning the overall pattern of hydrogen flow into the boundaries, and diffusion coefficients have been determined. In addition, FT-IR spectroscopy has yielded information about the detailed nature of the passivated sites and the exchange of hydrogen between sites during high temperature annealing. However, direct correlation between infrared band intensities and electrical conductivity have not been observed for treated polysilicon. In this paper we summarize our recent results in these two areas, discuss some limitations of these studies and pose important questions which need to be resolved. DOE

N86-23474# California Univ., Berkeley. Lawrence Berkeley Lab.
KINETICS OF PARTICLE VAPOR EQUILIBRIUM
A. W. Searcy Oct. 1985 6 p refs Presented at the 168th Meeting of the Electrochemical Society, Las Vegas, Nev., 13 Oct. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002869; LBL-20400; CONF-851048-8) Avail: NTIS HC A02/MF A01

A standard formulation of reaction kinetics is used to derive the condition for dynamic equilibrium between a crystalline particle and its self-adsorption layer. The result, when combined with the well-known condition for adsorption layer-vapor equilibrium, yields an expression for the relationship between the equilibrium vapor pressure and a vacancy-molecule distribution function for the particle. The effects of particle shape and size on vapor pressures are different from those of the Kelvin equation, but are consistent with the thermodynamic requirements that the internal free energy of the particle be a minimum at constant T and P. The classical theory, which neglects vacancies, is not. DOE

N86-23475# California Univ., Berkeley. Lawrence Berkeley Lab.
INVESTIGATION OF NONRADIATIVE RECOMBINATION IN SEMICONDUCTORS BY PHOTOTHERMAL DISPLACEMENT SPECTROSCOPY
H. Dersch and N. M. Amer Jun. 1985 6 p refs Presented at the 4th International Topical Meeting on Photoacoustic, Thermal and Related Sciences, Quebec, Canada, 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002882; LBL-20190; CONF-850886-3) Avail: NTIS HC A02/MF A01

The dynamics of nonradiative recombination processes are investigated by measuring the thermal expansion and subsequent displacement of a sample surface caused by the absorption of a modulated laser beam. DOE

N86-23476# Argonne National Lab., Ill.
HIGH FIELD PROPERTIES OF NbN RIBBON CONDUCTORS
D. W. Capone, II, R. T. Kampwirth, and K. E. Gray Aug. 1985 4 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract W-31-109-eng-38)
(DE85-018340; CONF-850814-30) Avail: NTIS HC A02/MF A01

This paper reports the first high field measurements on ribbon conductors composed of NbN and Cu deposited onto Hastelloy ribbons. These ribbons are 5 to 8 cm long, 1/8" wide, and have several microns of NbN, covered with several microns of Cu, deposited onto one side. Such samples have a T/sub c/ approx. 14.5 K, H/sub c2/ (2.0 K) approx. 26 T in the parallel direction and J/sub c/ (20 T, 2.0 K) up to 3 x 10(4) A/cm(2). DOE

N86-23477# Oak Ridge National Lab., Tenn.
DAMAGE ACCUMULATION IN CERAMICS DURING ION IMPLANTATION
C. J. McHargue, G. C. Farlow, G. M. Begun, J. M. Williams, C. W. White, B. R. Appleton, P. S. Sklad, and P. Angelini 1985 24 p Presented at the TMS/AIME Fall Meeting, Toronto, Canada, 13 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001360; CONF-8510168-2) Avail: NTIS HC A02/MF A01

The damage structures of (ALPHA)-Al2O3 and (ALPHA)-SiC were examined as functions of ion implantation parameters using Rutherford backscattering-channeling, analytical electron microscopy, and Raman spectroscopy. Low temperatures or high fluences of cations favor formation of the amorphous state. At 300K, mass of the bombarding species has only a small effect on residual damage, but certain ion species appear to stabilize the damage microstructure and increase the rate of approach to the amorphous state. The type of chemical bonding present in the host lattice is an important factor in determining the residual damage state. DOE

N86-23478# Naples Univ. (Italy). Dipartimento di Fisica Nucleare.
SUPERCONDUCTIVE TUNNEL STRUCTURES AS RADIATION DETECTORS
A. Barone and K. E. Gray Aug. 1985 6 p refs Presented at the 3rd International Conference on Superconducting Quantum Devices, Berlin, West Germany, 25 Jun. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-001797; CONF-8506203-2) Avail: NTIS HC A02/MF A01

A brief review is given on various aspects of the potential of superconducting tunnel junctions as detectors for atomic and nuclear radiations. On the basis of recent results main advantages and drawbacks are indicated providing a preliminary comparison with the presently used semiconductor detectors. The basic ideas underlying the physics of the interaction of nuclear particles and other radiations with superconducting junctions are outlined. DOE

N86-23479# California Univ., Los Angeles. School of Engineering and Applied Science.
EPITAXIAL OVERGROWTH OF Si ON SiO2 FILM
A. S. Yue Mar. 1985 17 p
(Contract W-7405-eng-48)
(DE86-002597; UCRL-15675) Avail: NTIS HC A02/MF A01

The novel approach to increase the performance of semiconductor devices is proposed. This approach is based on the concept of three-dimensional device fabrication where a single-crystalline Si layer is electrically isolated from a similar Si layer by a SiO2 film. The growth of this single-crystalline Si layer is accomplished by an epitaxial growth of Si on slots of the seed region of a Si substrate bordered with a SiO2 film and the overgrowth of Si on top of the SiO2 surface by the CVD technique. The single-crystallinity of the epilayer has been revealed by the presence of Kikuchi lines on its surface. DOE

N86-23480# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
DEVELOPMENT OF STANDARDS FOR SUPERCONDUCTORS Interim Report, Jan. 1982 - Dec. 1983
L. F. Goodrich, J. V. Minervini, A. F. Clakr, F. R. Fickett, and J. W. Ekin Jan. 1985 168 p
(Contract DE-AI01-76PR-06010)
(PB86-128733; NBSIR-85-3027) Avail: NTIS HC A08/MF A01 CSCL 20L

A cooperative program with the Department of Energy, the National Bureau of Standards, and private industry is in progress to develop standard measurement practices for use in large scale applications of superconductivity. The goal is the adoption of voluntary standards for the critical parameters and other characterizations of practical superconductors. Progress for the period January 82 through December 1983 is reported. The major effort was the procurement, selection, and certification of the first superconducting wire for critical current measurements as a Standard Reference Material (SRM 1457). Other work reported here includes: effect of geometry on current transfer; lap-joint resistance; and ac losses. GRA

N86-22756# Joint Publications Research Service, Arlington, Va.
RING DEFECT OF GaAs STUDIED

Jianbang Chen and Guoli Zhang *In its* China Report: Science and Technology (JPRS-CST-86-003) 27 Jan. 1986 p 118-122 Transl. into ENGLISH from Xiyou Jinshu (Beijing, China), v. 9, no. 4, Jul. 1985 p 21-23 (For primary document see N86-22748 13-31)
Avail: NTIS HC A07/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-23481 Maryland Univ., College Park.
A DESCRIPTION OF THE CROSSOVER FROM THE CRITICAL TO THE CLASSICAL BEHAVIOR OF THE THERMODYNAMIC PROPERTIES OF FLUIDS Ph.D. Thesis
Penrose Carballo Albright 1985 191 p
Avail: Univ. Microfilms Order No. DA8523047

A description of the thermophysical properties of pure fluids that is valid in, as well as away from, the critical region is presented. This crossover theory provides an accurate description of pure fluids near the critical point, yet evolves into classical behavior away from the critical point. The theory is well motivated within the renormalization group theory. The asymptotic (critical) theory is estimated. The renormalization group theory is presented, with emphasis put on those parts of the formalism needed to describe the crossover to the classical regime. The symmetric theory, appropriate for magnetic systems, is presented first; the changes needed to describe asymmetric systems, such as fluids, are then described. The transition from a magnetic theory is completed by considering the thermodynamic symmetries of fluid systems. The phenomenology of crossover in fluids is examined, and methods for implementing a crossover theory are described. A detailed study of the van der Waals equation of state, with crossover, is presented. Dissert. Abstr.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-23482# National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
ACADEMIC SCIENCE/ENGINEERING: R AND D FUNDS, FISCAL YEAR 1983 (DETAILED STATISTICAL TABLES)
Apr. 1985 159 p
(PB86-120706; NSF-85-308) Avail: NTIS HC A08/MF A01 CSCL 05A

The report contains tabular data on 562 institutions of higher education regarding scientific and engineering (S/E) R and D expenditures that are separately budgeted. The survey includes institutions that offer a doctorate or master's degree in S/E programs, as well as those schools with $50,000 or more in separately budgeted R and D expenditures. The 19 federally financed R and D centers also are included. Data are tabulated by: (1) sources of funds; (2) S/E disciplines; (3) character of work; (4) control of institution (public/private); (5) largest performers' ranking; (6) highest degree offered; (7) total and federally financed current fund expenditures for research equipment; and (8) capital expenditures for facilities and equipment for research, development, and instruction. Trend tables are included for most elements. The methodology and response rate are described and a reproduction of the survey instrument is included. GRA

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-23483# Department of Energy, Washington, D. C. Materials Sciences Div.
MATERIALS SCIENCES PROGRAMS. FISCAL YEAR 1985
Sep. 1985 258 p
(DE86-002089; DOE/ER-0143/3) Avail: NTIS HC A12/MF A01

The purpose of this report is to provide a convenient compilation and index of the DOE Materials Sciences Division programs. This compilation is primarily intended for use by administrators, managers, and scientists to help coordinate research. The report is divided into six sections. Section A contains all Laboratory projects, Section B has all contract research projects, Section C has projects funded under the Small Business Innovation Research Program, Sections D and E have information on DOE collaborative research centers, Section F gives distribution of funding, and Section G has various indexes. DOE

N86-23484# National Science Foundation, Washington, D.C.
GUIDE TO PROGRAMS, FISCAL YEAR 1986: GUIDE DESCRIBING NATIONAL SCIENCE FOUNDATION PROGRAMS AND ACTIVITIES
Oct. 1985 90 p
(PB86-125184; NSF-85-40) Avail: NTIS HC A05/MF A01 CSCL 05A

The guide describes all of the Foundation's programs and activities. It is divided into chapters reflecting NSF's major divisions and details the areas of scientific and engineering research supported by each. Also included: a current NSF organization chart and the National Science Board's Criteria for the Selection of Research Projects. Author

N86-23485# National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
FEDERAL SCIENTIFIC AND TECHNICAL WORKERS: NUMBERS AND CHARACTERISTICS, 1973 AND 1983 Final Report
Feb. 1985 42 p
(PB86-116670; NSF-85-312) Avail: NTIS HC A03/MF A01 CSCL 05A

The report, utilizing data from the Office of Personnel Management, examines trends between 1973 and 1983 in the magnitude, as well as the demographic and employment characteristics of federally employed scientists, engineers, and technicians (SET). Relying on data for 1973 and 1983, it compares major differences between Federal and other SET over the ten-year period, and key aspects of the changing composition of Federal SET. It also provides a wide-ranging look at Federal personnel trained as scientists or engineers, but who work in other areas. The following variables were used in the report: field of specialization, agency, age, sex, work activity, state, highest degree level and field, management/supervisory status, minority status, and non-science/engineering field. GRA

N86-23486# National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
FEDERAL SUPPORT TO UNIVERSITIES, COLLEGES, AND SELECTED NONPROFIT INSTITUTIONS: FISCAL YEAR 1983 Final Report
Oct. 1985 227 p
(PB86-119104; NSF-85-321) Avail: NTIS HC A11/MF A01 CSCL 05A

The report presents data from the National Science Foundation's annual Survey of Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, FY 1983. Obligations to the federally funded research and development centers (FFRDC's) administered by both universities and nonprofit institutions are reported separately. The survey is confined to the 15 Federal agencies that account for an estimated 95 percent of all obligations to universities and colleges and virtually all science and engineering

(S/E) funding for research and development to these institutions. The data are tabulated by: (1) source of funding; (2) type of activity; (3) S/E discipline; (4) geographic distribution; (5) institutional control (public/private); (6) rankings of recipients; and (7) highest degree offered. Trend tables are included for most distribution. GRA

N86-23487# Office of Technology Assessment, Washington, D.C.
US-SOVIET COOPERATION IN SPACE
Jul. 1985 113 p
(PB86-114758; OTA-TM-STI-27; LC-85-600561) Avail: NTIS HC A06/MF A01 CSCL 05A

This technical memorandum outlines the principal issues of the debate, the history and cooperation, and the experience of France, another country involved in space cooperation with the USSR. From a scientific and practical point of view, past experience has shown that cooperation in space can lead to substantive gains in some areas of space research and applications and can provide the US with improved insight into the Soviet space program and Soviet society as a whole. Past experience suggests that technology transfer from the US to the USSR will remain a major countervailing concern in any future space cooperation. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-23488# Sandia National Labs., Albuquerque, N. Mex.
INTERACTIVE PORTABLE DOCUMENTATION PROGRAM FOR A MATHEMATICAL SUBROUTINE LIBRARY, REVISION 1
D. D. Jones and R. J. Hanson Oct. 1985 39 p refs
(Contract DE-AC04-76DP-00789)
(DE86-002514; SAND-85-0877) Avail: NTIS HC A03/MF A01

An interactive documentation processor has been developed. It allows users of large mathematical subroutine packages to selectively obtain information by subroutine name, author, keyword, and category. It also provides selective information on subroutine linkage, calling sequences, table of contents, and local library information. It is written in portable FORTRAN with a small number of machine-dependent subroutines that are available for a wide variety of machines. The program is designed to run interactively and provides a self-documenting, or HELP capability. It has been applied to documenting the SLATEC Mathematical Subroutine Library. DOE

N86-23489# Oak Ridge National Lab., Tenn.
THE 1983 INTEGRATED DATA USERS WORKSHOP: PROCEEDINGS, SUMMARY
R. J. Olson, ed. and N. T. Millemann, ed. Oct. 1985 100 p The 4th Integrated Data Users Workshop held at Reston, Va., 1 Nov. 1983
(DE86-001444; CONF-831117-Summ) Avail: NTIS HC A05/MF A01

The Integrated Data Users Group (IDUG) is composed of people from various federal agencies and other organizations who have chosen to participate in a forum for exchange of information regarding use of integrated data. Integrated data are environmental, health, and socioeconomic data that are often found in large files, are ususally machine-readable, are frequently geographically oriented, cover large areas that may include the entire United States, and otherwise require combining data of dissimilar types and origins. The key field for merging files is usually a geographic area. Counties in the United States are commonly used geographic units, but other areas such as river basins may be used. The group's purpose is to address problems that cannot be adequately addressed using data from a single study or survey but require integration of data from different files. The goals are: (1) to increase our knowledge of the existence and availability of pertinent data bases; (2) to encourage transfer of those data among users; (3) to improve use of data file standards for completeness, accuracy, comparability to published sources, documentation, codes and nomenclatures; and (4) to promote development and use of affordable, simple, practical methods of acquiring, processing, evaluating, and reporting integrated data. The primary means of achieving these goals is through the annual Integrated Data Users Workshop. The conference sessions included: integrated data systems in the context of foresight and strategic planning; data clearinghouse roles and functions; data quality issues; socioeconomic and demographic data issues in data integration; political and economic barriers to data integrating; numeric data referral centers/clearinghouses; integrated systems in the context of anticipated technological changes; qualtiy assurance obligations for integrated data users; and practical applications of integrated data approaches. DOE

N86-23490# Commission of the European Communities, Petten (Netherlands). Directorate General 12: Science, Research and Development.
FACTUAL MATERIAL DATA BANKS
H. Kroeckel, K. W. Reynard, and G. Steven Luxembourg Commission of the European Communities 1985 181 p refs Presented at Commission of European Communities (CEC) Workshop, Petten, Netherlands, 14-16 Nov. 1984
(CD-NA-85-006-EN-C; EUR-9768-EN; ISBN-92-825-5322-1) Avail: NTIS HC A09/MF A01

Data bases of machine-readable factual data on technical properties of engineering materials were discussed. Author (ESA)

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-23491# Politecnico di Torino (Italy). Dept. of Aerospace Engineering.
[ACTIVITIES REPORT OF THE DEPARTMENT OF AEROSPACE ENGINEERING] Annual Report, 1984
Jul. 1985 35 p refs
Avail: NTIS HC A03/MF A01

Research activities in aeronautics and astronautics; fluid dynamics and propulsion; structures and materials; and systems engineering and management are summarized. Author (ESA)

N86-23492# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
SURVEY OF TRANSPORT SERVICE PROVISION IN NORTH WEST LEICESTERSHIRE Final Report
D. Gillingwater and J. Sutton Aug. 1985 68 p refs
(TT-8502) Avail: NTIS HC A04/MF A01

Conventional bus services, school buses, social services transport, voluntary sector transport, and the ambulance service in an English county were surveyed. Transport needs and possible improvements are discussed. Author (ESA)

88 SPACE SCIENCES (GENERAL)

N86-23493*# National Aeronautics and Space Administration, Washington, D.C.
INTERRELATIONSHIPS AMONG CIRCUMSTELLAR, INTERSTELLAR AND INTERPLANETARY DUST
Joseph A. Nuth, III, ed. and Robert E. Stencel, ed. Jan. 1986 351 p refs Workshop held in Wye, Md., 27 Feb. - 1 Mar. 1985 (NASA-CP-2403; NAS 1.55:2403) Avail: NTIS HC A16/MF A01 CSCL 03B

Proceedings of a workshop held from February 27 to March 1, 1985. The workshop was attended by 50 astronomers, astrophysicists, planetary scientists and meteoriticists; and emphasized the interdisciplinary nature of studies of cosmic dust. For individual titles, see N86-23494 through N86-23524.

N86-23494*# California Univ., Los Angeles. Dept. of Astronomy.
OBSERVATIONAL CONSTRAINTS ON CIRCUMSTELLAR DUST c90
M. Jura *In* NASA, Washington. Interrleationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 3-18 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

There is an enormous range in the properties of stars that are losing mass. The red giants responsible for injecting roughly half or more of the material into the interstellar medium are reviewed. The physical properties are described for the out flowing gases. Broadband observation constaints on the dust are described by use of spectrum analysis. Circumstellar dust is identified by carbon-carbon and carbon-hydrogen bonds. B.G.

N86-23495*# Princeton Univ. Observatory, N. J.
CIRCUMSTELLAR GRAIN FORMATION c90
B. T. Draine *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplantary Dust Jan. 1986 p 19-28 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Dust formation around cool giant and supergiant stars is examined in terms of grain formulation. Optical properties of small clusters, molecular physics of cluster nucleation and growth, circumstellar mass flows, and their application to alpha Ori are discussed. B.G.

N86-23496*# Wisconsin Univ., Madison.
OBSERVATIONS AND THEORIES OF INTERSTELLAR DUST c90
John S. Mathis *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 29-36 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The observational properties of dust are summarized based on: the extinction over a factor of 100 in wavelength (0.1 to 10 microns); polarization, both linear and circular; narrow emission and absorption features in the spectrom; and reflection nebulae. Author

N86-23497*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOCK PROCESSING OF INTERSTELLAR GRAINS c90
C. Gregory Seab and J. Michael Shull (Colorado Univ., Boulder) *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 37-54 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Shock processing plays an important role in the life of a typical interstellar grain. Shocks of 100 km/s-l or greater can destroy about 50% of the grain material under appropriate preshock conditions of density and magnetic field. The destruction occurs by grain-grain collisions and nonthermal sputtering for steady state radiative shocks and by thermal sputtering for fast adiabatic shocks. The evaluation of the lifetime of grains against shock destruction depends on models of the interstellar medium (ISM) structure and on supernova remnants (SNR) evolution. Results from various authors give lifetimes between 10 to the 8th and 10 to the 9th power years, compared to typical injection times for new grains of a few times 10 to the 9th power years. These numbers require that a major portion of the interstellar silicon bearing grain material must be formed by grain growth in the ISM. At the same time, the presence of isotopic anomalies in some meteorites implies that at least some grains must survive from their formation in SNRs or red giant winds through incorporation into the solar system. Author

N86-23498*# Washington Univ., St. Louis, Mo. Dept. of Physics.
LABORATORY STUDIES OF INTERPLANETARY DUST c90
R. M. Walker *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 55-70 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Interplanetary dust particles (IDPs) are a form of primitive extraterrestrial material. In spite of the formidable experimental problems in working with particles that are too small to be seen with the naked eye, it has proven possible to obtain considerable information concerning their properties and possible origins. Dust particles collected in the stratosphere were reviewed. These particles are the best available samples of interplanetary dust and were studied using a variety of analytical techniques. Author

N86-23499*# California Univ., Los Angeles. Inst. of Geophysics.
PRIMORDIAL MATERIAL IN METEORITES c90
John F. Kerridge *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 71-108 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Primordial is a term which applied to material that entered the solar system early and became incorporated into a meteorite without totally losing its identity. Identification of such material surviving in meteorites is so far solely through recognition of anomalous isotopic compositions of generally macroscopic entities contained within those meteorites. Isotopic anomalies are, by definition, isotopic compositions which differ from the canonical solar system abundances in ways which cannot be explained in terms of local processes such as mass dependent fractionation, cosmic ray induced spallation or decay of radionuclides. A comprehensive account of isotopic anomalies is impractical here, so it is necessary to be selective. Issues which are potentially addressable through the study of such primordial material are examined. Those issues will be illustrated with specific, but not exhaustive, examples. B.G.

N86-23500*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EXPERIMENTAL INVESTIGATIONS RELATING TO THE PROPERTIES AND FORMATION OF COSMIC GRAINS c90
Bertram Donn *In* NASA, Washington Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 109-134 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The interpretation of observations or theoretical analyses of

interstellar processes requires a sound knowledge of relevant data. In many instances this can only be obtained by experiments carried out under appropriate conditions. The availability of such data applicable to the subject and the techniques for obtaining the data are surveyed. Author

N86-23501*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CIRCUMSTELLAR DUST **c90**
Eli Dwek et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 17 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The presence of dust in the general interstellar medium is inferred from the extinction, polarization, and scattering of starlight; the presence of dark nebulae; interstellar depletions; the observed infrared emission around certain stars and various types of interstellar clouds. Interstellar grains are subject to various destruction mechanisms that reduce their size or even completely destroy them. A continuous source of newly formed dust must therefore be present for dust to exist in the various phases of the interstellar medium (ISM). The working group has the following goals: (1) review the evidences for the formation of dust in the various sources; (2) examine the clues to the nature and composition of the dust; (3) review the status of grain formation theories; (4) examine any evidence for the processing of the dust prior to its injection into the interstellar medium; and (5) estimate the relative contribution of the various sources to the interstellar dust population. Author

N86-23502*# Colorado Univ., Boulder.
INTERSTELLAR GRAINS **c90**
T. P. Snow et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 14 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

There are few aspects of interstellar grains that can be unambiguously defined. Very little can be said that is independent of models or presuppositions; hence issues are raised and questions categorized, rather than providing definitive answers. The questions are issues fall into three general areas; the general physical and chemical nature of the grains; the processes by which they are formed and destroyed; and future observational approaches. Author

N86-23503*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
INTERSTELLAR MATERIAL IN THE SOLAR SYSTEM **c90**
John A. Wood et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 46 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

All the substance of the Earth and other terrestrial planets once existed in the form of interstellar grains and gas. A major aspect of solar system formation (and undoubtedly of star formation generally) is the complex series of processes that converted infalling interstellar grains into planets. A cryptic record of these processes is preserved in certain samples of planetary materials, such as chondritic meteorites, that were preserved in a relatively unchanged form since the beginning. It is to be expected that some of these primitive materials might contain or even consist of preserved presolar interstellar grains. The identification and study of such grains, the ancestors of our planetary system, is a matter of intense interest. Types of primitive material accessible or potentially accessible, and component of or relationship to presolar interstellar grains are discussed. Author

N86-23504*# New York Univ., New York.
WORKING GROUP ON CIRCUMSTELLAR/INTERSTELLAR RELATIONSHIPS **c90**
A. E. Glassgold *In* NASA, Washington Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 6 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Stars of various types are believed to be the main source of interstellar (IS) dust grans. The most important confirmed source is evolved giant and supergiant stars. Supernovae also contribute to the mass loss. The differences between circumstellar (CS) and IS dust were reviewed using the following topics: alteration of CS dust grains, size distribution, space observation of CS and IS dust, comparison of infrared spectra, isotopic signatures, Magellanic clouds and nearby galaxies, life cycles of dust grains, and physical and chemical data. B.G.

N86-23505*# Rice Univ., Houston, Tex.
INTERRELATIONSHIPS BETWEEN INTERSTELLAR AND INTERPLANETARY GRAINS **c90**
D. D. Clayton *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 36 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The relationship between solar system dust (SSD) and interstellar dust particles (ISMD) is being reconsidered because of the discovery of isotopic anomalies in meteorites. Meteoritic, circumstellar/meteoritic, interstellar/meteoritic, planetary, and cometary data are reviewed. B.G.

N86-23506*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IONIZED POLYCYCLIC AROMATIC HYDROCARBONS IN SPACE **c90**
Lou Allamandola, John Barker (SRI International), Mike Crawford (California Univ., Berkeley), Xander Tielens (California Univ., Berkeley), and Gerard vanderZwet (Leiden Univ.) *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The mid-infrared spectrum of a continuously increasing number of stellar objects, planetary and reflection nebulae, H-II regions and extragalactic sources show a distinctive set of broad emission features at 3.3, 3.4, 6.2, 7.7, 8.6, and 11.3 micron known collectively as the unidentified infrared emission bands. A model is summarized in which the bands arise from positively charged polycyclic hydrocarbons (PAH's) on the basis of their low ionization potential and the excellent agreement between the emission bands and laboratory spectra of auto exhaust which contains these types of molecules. The proposed presence of PAHs in such a variety of objects points to their presence in the interstellar medium. Out of a previously published collection of solid state PAH radical cation spectra five were selected on the basis of the unique thermodynamic stability of their carrier and compared directly to the wavelengths of the DIB's. Although the match seems quite favorable, strongly suggesting that PAH radicals are the long sought after carrier of the diffuse interstellar absorption bands, much laboratory work must be done to test this hypothesis. B.G.

N86-23507*# Arizona State Univ., Tempe. Dept. of Geology.
CLEAN VERSUS DIRTY SILICATE GRAINS AND THE STATE OF CARBON CRYSTALLIZATION IN INTERSTELLAR AND CIRCUMSTELLAR DUST **c90**
Peter R. Buseck *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Possible compounds for the 9.7 micron spectral feature and the 2175A spectral bump are examined. Results from electron microscopy and high resolution transmission electron microscopy are discussed. Author

N86-23508*# Rice Univ., Houston, Tex.
EXCESS DEPLETION OF Al, Ca, Ti FROM INTERSTELLAR GAS **c90**
Donald D. Clayton *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)

Avail: NTIS HC A16/MF A01 CSCL 03B

Thermal condensation, cold sticking, and sputtering by interstellar shock are combined with a chemical memory of the condensation sequence to account for depletion of aluminum, calcium, and titanium in interstellar gas. The extra depletion of aluminum and calcium becomes an indicator of the structural history of the refractory parts of interstellar grains. B.G.

N86-23509*# Paris VII Univ. (France).
PREGRAPHITIC MOLECULES AND THE RED-RECTANGLE EMISSION c90
L. dHendecourt and A. Leger *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

In light of the recent identification of an infrared emission band at 3.3, 6.2, 7.7, 8.6, and 11 microns as emissions from pregraphitic molecules, the possibility that a large broad emission bump in the red part of the spectrum of the Red-Rectangle (AFGL 918) nebula is luminescence from the same molecules was investigated. The abundance, luminescence yield of the carrier, and the phosphorescence is discussed. B.G.

N86-23510*# National Aeronautics and Space Administration, Washington, D.C.
IUE AND IRAS OBSERVATIONS OF LUMINOUS M STARS WITH VARYING GAS-TO DUST RATIOS c90
Wendy Hagen (New Mexico Univ., Albuquerque), Kenneth G. Carpenter (JILA), and Robert E. Stencel *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Circumstellar gas and dust surrounding M giants and supergiants show luminous M stars to split into two distinct classes. Stars with a high gas to dust ratio all show chromospheric Ca II, H, and K emission. Stars with a high dust to gas ratio do not show chromospheric Ca II emission but are the only ones to show Balmer emission indicative of atmospheric shocks and are also the only ones to show maser emission. In order to determine whether all chromospheric indicators disappear in high dust to gas ratio stars, a survey of stars in both these classes was conducted with the IUE satellite. Long wavelength infrared fluxes for the program stars were obtained from the IRAS point source catalog. There is no obvious difference in the long wavelength observations between the two groups of stars. The long wavelength excess tends to follow the 10 micron excess and not the dust to gas ratio. B.G.

N86-23511*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE NATURE OF COMETARY GRAINS FROM REMOTE SENSING c90
Martha S. Hanner *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Physical property data of cometary grains are derived primarily from thermal emission measurement and optical scattering. Results consistent with the properties of micrometeorites collected in the stratosphere are described. B.G.

N86-23512*# HY-Tech Research Corp., Radford, Va.
AN EXPERIMENTAL STUDY OF PLASMA GRAIN INTERACTIONS c90
R. C. Hazelton and E. J. Yadlowsky *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p refs Sponsored in part by Aerospace Corp. (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Dust grains occur throughout the universe in many systems such as protostellar dust clouds, planetary ring structures and in a near earth environment as the result of man's activities. These grains interact with the local plasma and radiation environment and this interaction certainly influences the evolution of the dust grains. The interaction of bismuth dust particles were studied with a background plasma. Author

N86-23513*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
LABORATORY STUDIES OF THE INFRARED SMALL-PARTICLE EXTINCTION OF AMORPHOUS SILICATES c90
W. Kraetschmer *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 3 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The broad interstellar IR extinction features located at 9.7 and 18 microns wavelength are believed to originate from silicate dust grains. Cosmic abundances suggest that the silicate should have a chemical composition similar to that of olivine, $(Mg,Fe)_2SiO_4$. Olivine is a very common terrestrial silicate mineral of crystalline structure. However, crystalline olivine grains do not fit the interstellar features well. Based on spectroscopic data obtained in laboratory studies and astronomical observations it was concluded that the interstellar silicate grains consist of a material with amorphous rather than crystalline structure. The astronomical arguments and the results obtained in our laboratory experiments which support this view are reviewed. Author

N86-23514*# Paris VII Univ. (France). Groupe de Physique des Solides de l'ENS.
ARE AROMATIC HYDROCARBONS THE CARRIERS OF THE DIFFUSE INTERSTELLAR BANDS IN THE VISIBLE? Abstract Only c90
A. Leger and L. dHendecourt *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Large Polycyclic Aromatic Hydrocarbons (PAH) are the likely origin of the Unidentified Infrared Emission Feature. The molecules or their ions are also attractive candidates for the carriers of the Diffuse Interstellar Bands (DIBs) in the visible range. The PAHs have optically active transitions in the visible spectrum; have the ability to survive the ultraviolet photons in the Diffuse Interstellar Medium; and are the most abundant among the detected molecular species after H_2 and CO. In particular, PAHs are better candidates than the long carbon chains that were proposed previously. Author

N86-23515*# Wisconsin Univ., Madison.
GRAIN ALIGNMENT BY FERROMAGNETIC IMPURITIES Abstract Only c90
John S. Mathis *In* NASA, Washington: Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The observed wavelength dependence of linear polarization, and its variation from region to region can be explained by the following assumptions. Interstellar grains resemble interplanetary grains, in that they are composed of collections of small particles coagulated together into elongated masses. A fraction of the small particles are ferromagnetic. Presumably these are either metallic Fe or magnetite, Fe_3O_4. If and only if a large grain contains one or more magnetic particles is the grain aligned in the galactic magnetic field. The magnetic particles stick only to silicate grains because of chemical similarities, or (equivalently) any pure carbon grains in the diffuse interstellar medium (ISM) are too spherical to produce polarization. Grains in dense regions, such as the outer parts of molecular clouds, are larger than those in the diffuse ISM because of coagulation of the grains rather than accretion of icy mantles. These regions are known to have larger than normal values of lambda (max), the wavelength of the maximum of linear polarization. The above assumptions are sufficient to allow the calculation of the wavelength dependence of the polarization. Author

N86-23516*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPECTRAL CHARACTERISTICS OF DUST IN PLANETARY NEBULAE Abstract Only **c91**
H. Moseley and R. F. Silverberg *In* NASA, Washington Interrelationships among Circumstella, Interstellar and Interplanetary Dust Jan. 1986 1 p Previously announced as N85-17873 (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Some carbon-rich planetary nebulae exhibit a strong broad emission feature beginning at Lambda which is approximately 24 microns and extending to Lambda greater than 30 microns. Thirty to 55 micron spectrophotometry of Ic 418 and NGC 6572, both of which have the strong broad emission feature, allow the wavelength dependence of the emissivity of the dust responsible for the feature to be defined. Comparison with laboratory spectra of candidate materials which are likely to condense in a carbon-rich environment suggests that the feature arises from MgS. The implications of such a strong feature arising from a relatively minor dust constituent are discussed. The environment in which MgS may be found is considered. It is speculated that MgS will be seen in objects with C/O ratios only slightly greater than one, but not in extremely carbon rich objects. In objects with much higher carbon abundances, the formation of CS consumes S so that insufficient MgS can form to exhibit the strong feature. These observations imply that the emergent far infrared spectrum of carbon-rich objects are very different depending on the abundance of the low temperature condensate MgS. Author

N86-23517*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
THE EFFECTS OF CHARGED DUST GRAINS ON IR MOLECULAR EXCITATION **c90**
R. Puetter and I. Krinsky *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 4 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

A number of issues involving grain charging in the interstellar medium were discussed. Such effects include: (1) stark broadening of molecular spectral features, (2) electrostatic grain rupturing, (3) enhancements in particle-grain collision cross sections, and (4) excitation of molecular rotations and/or vibrations. Author

N86-23518*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
WHAT PREDICTIONS CAN BE MADE ON THE NATURE OF CARBON AND CARBON-BEARING COMPOUNDS (HYDROCARBONS) IN THE INTERSTELLAR MEDIUM BASED ON STUDIES OF INTERPLANETARY DUST PARTICLES? **c90**
Frans J. M. Rietmeijer *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 5 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The nature of hydrocarbons and properties of elemental carbon in circumstellar, interstellar, and interplanetary dust is a long standing problem in astronomy and meteorite research. The textures and crystallographical properties of poorly graphitized carbon (PGC) from carbonaceous chondrites and Chondritic Porous Aggregates (CPAs) are comparable with PGCs formed by dehydrogenation and carbonization of hydrocarbon precursors under natural terrestrial and experimental conditions. A multistage model of hydrocarbon diagenesis in CPA and carbonaceous chondrite (proto-) planetary parent bodies was proposed in which hydrocarbons are subjected to low temperature hydrous pyrolysis. Continued efforts to recognize hydrocarbons and elemental phases in CPAs may allow understanding of the multistage hydrocarbon/elemental carbon model. B.G.

N86-23519*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WHY DO INTERSTELLAR GRAINS EXIST? Abstract Only **c90**
C. G. Seab, D. J. Hollenbach, C. F. McKee (California Univ., Berkeley), and A. G. G. M. Tielens (California Univ., Berkeley) *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

There exists a discrepancy between calculated destruction rates of grains in the interstellar medium and postulated sources of new grains. This problem was examined by modelling the global life cycle of grains in the galaxy. The model includes: grain destruction due to supernovae shock waves; grain injection from cool stars, planetary nebulae, star formation, novae, and supernovae; grain growth by accretion in dark clouds; and a mixing scheme between phases of the interstellar medium. Grain growth in molecular clouds is considered as a mechanism or increasing the formation rate. To decrease the shock destruction rate, several new physical processes, such as partial vaporization effects in grain-grain collisions, breakdown of the small Larmor radius approximation for betatron acceleration, and relaxation of the steady-state shock assumption are included. Author

N86-23520*# National Aeronautics and Space Administration, Washington, D.C.
CHROMOSPHERIC DUST FORMATION, STELLAR MASERS AND MASS LOSS **c90**
Robert E. Stencel *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 5 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

A multistep scenario which describes a plausible mass loss mechanism associated with red giant and related stars is outlined. The process involves triggering a condensation instability in an extended chromosphere, leading to the formation of cool, dense clouds which are conducive to the formation of molecules and dust grains. Once formed, the dust can be driven away from the star by radiation pressure. Consistency with various observed phenomena is discussed. Author

N86-23521*# Los Alamos National Lab., N. Mex.
PREPARATION, ANALYSIS AND RELEASE OF SIMULATED INTERPLANETARY GRAINS INTO LOW EARTH ORBIT **c90**
John R. Stephens, I. B. Strong, and T. D. Kunkle *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 6 p refs (For primary document see N86-23493 13-88)
(LAUR-85-1979) Avail: NTIS HC A16/MF A01 CSCL 03B

Astronomical observations which reflect the optical and dynamical properties of interstellar and interplanetary grains are the primary means of identifying the shape, size, and the chemistry of extraterrestrial grain materials. Except for recent samplings of extraterrestrial particles in near-Earth orbit and in the stratosphere observations were the only method of deducing the properties of extraterrestrial particles. In order to elucidate the detailed characteristics of observed dust, the observations must be compared with theoretical studies, some of which are discussed in this volume, or compared with terrestrial laboratory experiments. The formation and optical characterization of simulated interstellar and interplanetary dust with particular emphasis on studying the properties on irregularly shaped particles were discussed. Efforts to develop the techniques to allow dust experiments to be carried out in low-Earth orbit were discussed, thus extending the conditions under which dust experiments may be performed. Author

N86-23522*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERSTELLAR GRAIN MANTLES **c90**
A. G. G. M. Tielens, L. J. Allamandola, J. Bregman, and F. C. Witteborn *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

Interstellar molecular grain mantles are an important component of the interstellar dust inside dense molecular clouds as evidenced by the detection of absorption bands at 2.97, 3.08, 4.61, 6.0 and

6.8 microns. Mantles may also be the precursors of more complex grain mantles in the diffuse interstellar medium. The molecular composition of these icy grain mantles were calculated employing gas phase as well as grain surface reactions. The calculated mixtures consist mainly of the molecules H2O, H2CO, N2, CO, O2, H2O2, NH2, and their deuterated counterparts in varying ratios. The exact compositions depend strongly on the physical conditions in the gas phase. The absorption spectra of H2O with other molecules was studied in the laboratory. Optical constants were determined for a few selected mixtures. Extinction and polarization cross sections across the 3 micron ice band were calculated. A comparison with the observations towards BN shows that the low frequency wing observed on this feature is due to absorption by a mixture of H2O and other molecules rather than scattering by large, pure H2O ice grains. Author

N86-23523*# National Aeronautics and Space Administration, Washington, D.C.
ULTRAVIOLET SPECTROSCOPY OF METEORIC DEBRIS OF COMETS c90
Thomas J. Wdowiak (Alabama Univ., Birmingham), William R. Kubinec (Charleston Coll., S. C.), and Joseph A. Nuth *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 3 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

It is proposed to carry out slitless spectroscopy at ultraviolet wavelengths from orbit of meteoric debris associated with comets. The Eta Aquarid and Orionid/Halley and the Perseid/1962 862 Swift-Tuttle showers would be principal targets. Low light level, ultraviolet video technique will be used during night side of the orbit in a wide field, earthward viewing mode. Data will be stored in compact video cassette recorders. The experiment may be configured as a GAS package or in the HITCHHIKER mode. The latter would allow flexible pointing capability beyond that offered by shuttle orientation of the GAS package, and doubling of the data record. The 1100 to 3200 A spectral region should show emissions of atomic, ionic, and molecular species of interest on cometary and solar system studies. Author

N86-23524*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ELECTROSTATICS OF A DUSTY PLASMA c75
E. C. Whipple (California Univ., San Diego), D. A. Mendis (California Univ., San Diego), and T. G. Northrop *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

The potential distribution in a plasma containing dust grains were derived where the Debye length can be larger or smaller than the average intergrain spacing. Three models were treated for the grain-plasma system, with the assumption that the system of dust and plasma is charge-neutral: a permeable grain model, an impermeable grain model, and a capacitor model that does not require the nearest neighbor approximation of the other two models. A gauge-invariant form of Poisson's equation was used which is linearized about the average potential in the system. The charging currents to a grain are functions of the difference between the grain potential and this average potential. Expressions were obtained for the equilibrium potential of the grain and for the gauge-invariant capacitance between the grain and the plasma. The charge on a grain is determined by the product of this capacitance and the grain-plasma potential difference. Author

N86-23525# Royal Observatory, Edinburgh (Scotland).
[ACTIVITIES REPORT IN ASTRONOMY] Annual Report, 1985
1985 98 p refs Original contains color illustrations
(ISSN-0267-6281) Avail: NTIS HC A05/MF A01

Research in cosmology (origin and evolution of radio galaxies); quasars and galaxies with active nuclei (automated quasar detection, radio emission from optically-selected quasars, quasars which vary, Seyfert galaxies, interacting galaxies); normal galaxies (spiral galaxies, galaxies in the Virgo cluster, Carina dwarf spheroidal galaxy, Magellanic Clouds, infrared studies of extragalactic supernovae); galactic structure (kinematics of the Galactic Spheroid, the Galactic center); star formation and the interstellar medium (bipolar outflows from young stars, outflow from the Orion complex, bipolar nebulae, OH/IR stars, rotation of young stars) and solar system (terrestrial catastrophism) is summarized. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-23526 Colorado Univ., Boulder.
OBSERVATIONAL CONSTRAINTS ON INTERSTELLAR DEPLETION MECHANISMS IN LINES OF SIGHT EXHIBITING PECULIAR EXTINCTION CURVES Ph.D. Thesis
Charles Lynn Joseph 1985 141 p
Avail: Univ. Microfilms Order No. DA8522673

The nature of dust-gas interactions, which are capable of modifying the size distribution of the grains and thus causing changes in the selective extinction curve, are investigated through depletion studies. The gaseous abundances of 16 elements were determined for several lines of sight toward moderately reddened stars, each having a so called anomalous extinction curve. Four lines of sight in the rho Ophiuchi dark cloud complex as well as several lines of sight through the diffuse interstellar medium were also analyzed for comparison. Two approaches are used to assess the strength of density-dependent depletion processes. First, the depletion pattern from element to element for each integrated line of sight is studied with particular emphasis being given to those species that are potential discriminators between the two major competing models of grain formation and growth. In the second approach, the relative abundances of neutral atoms, which are thought to form primarily in the densest portions of interstellar clouds, are studied. Both of these constraints are then compared to a theoretical extinction curve derived from a simple model for the size distribution of the grains based on the degree of mantling. Dissert. Abstr.

N86-23527 California Univ., San Diego.
INFRARED STUDIES OF SEYFERT GALAXIES AND OF THE IRREGULAR GALAXY M 82 Ph.D. Thesis
Jose Miguel Rodriguez Espinosa 1985 213 p
Avail: Univ. Microfilms Order No. DA8524578

Middle and far infrared studies of the irregular galaxy M 82 and of Seyfert galaxies are presented. M 82 was observed spectrophotometrically from 8 to 13 microns at 6 different positions selected across its 10 microns emitting region. A model is proposed which explains satisfactorily most of the observed properties of M 82 from X-ray to radio wavelengths. It is also suggested that a similar model may be applied to other active nuclei, like the emission line alaxy NGC 1614 and the classical Seyfert 1 galaxy NGC 7469. The far IR emission from Seyfert galaxies was also studied. Data analyzed are drawn from the recently released IRAS catalog. Seyfert galaxies are strong far infrared sources, but unlike the near and mid IR emission from these sources, the far IR emission does not appear to be produced by the active nucleus. Seyfert galaxies are depicted as composed of an active nucleus that powers the near and mid IR, plus a galactic envelope that supports the starburst episodes. Dissert. Abstr.

N86-23528 Princeton Univ., N. J.
A SEARCH FOR SHORT PERIOD PULSARS AND ITS IMPLICATION FOR THE PERIOD DISTRIBUTION OF PULSARS Ph.D. Thesis
Grant Stokes 1985 94 p
Avail: Univ. Microfilms Order No. DA8523995

The Princeton-NRAO Phase 2 pulsar survey, carried out at 390 MHz using the 92 m telescope in Green Bank, West Virginia

was described. This search is the first to have sensitivity to pulsars with periods as short as 0.004 s over a large portion of the galactic plane. 20 new pulsars were discovered and 67 previously known ones were detected. Though 6 pulsars were detected with periods below 0.200 s, none were found with periods shorter than 0.100 s. This result places strong upper limits on the population of short period pulsars, and effectively rules out the existence of a large, previously unobserved pulsar population with periods between 0.005 and 0.100 s. The observed period distribution is in good agreement with predicted models and can be accounted for without invoking either late turn-on or spin-up of pulsars. Timing measurements were carried out for all new pulsars discovered during both Phases 1 and 2 of the Princeton-NRAO search.
Dissert. Abstr.

N86-23529# Department of the Air Force, Washington, D.C.
ACTIVE SECONDARY MIRROR MOUNT Patent Application
Graham A. Horine, inventor (to Air Force) Filed 24 Sep. 1985 12 p
(AD-D012014; US-Patent-Appl-SN-779403) Avail: NTIS HC A02/MF A01 CSCL 20/6

An active secondary mirror mount is used in a telescope requiring the mount to have five degrees of freedom in movement. The spider legs are connected between the telescope tube and a central housing. Within the central housing are two concentrically mounted tubes. The outer tube is fixedly held by the central housing and the inner tube is flexibly held within the outer tube. The X-axis and Y-axis actuator rods pass through the spider legs to act upon the inner tube. The inner tube has a focus actuator mounted on one end with an actuator shaft passing through the inner tube to the other end having the secondary mirror mounted thereon. Flexures are mounted to the inner tube and have the actuator shaft passing therethrough.
Author (GRA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-23530 Rochester Univ., N. Y.
NONRADIAL OSCILLATIONS OF NEUTRON STARS Ph.D. Thesis
Patrick Neal McDermott 1985 223 p
Avail: Univ. Microfilms Order No. DA8516481

Realistic three component neutron star models consisting of a fluid core, solid crust, and a thin surface fluid, are capable of sustaining a wide variety of different normal modes of oscillation. There are two broad categories of oscillation modes, spheroidal and toroidal. The spheroidal modes consist of a number of subclasses: p-, f- and g-modes, well known in stellar pulsation theory, and two new classes of modes which are called s-modes and i-modes. The new modes arise from the crustal rigidity. The f- and p-modes have periods of a few tenths of milliseconds depending on the mean density of the model. There are two solid-fluid interfaces in realistic neutron star models; the core-crust boundary and the crust-surface fluid boundary. Waves can propagate on these interfaces, and normal modes of these waves are the interfacial (i) modes. The periods of the i-modes depend strongly on the local density and temperature at the interfaces. A variety of damping mechanism were investigated including: gravitation radiation, neutrino emission, electromagnetic radiation from an oscillating stellar magnetic field, nonadiabatic damping, and internal friction/viscosity.
Dissert. Abstr.

N86-23531 California Univ., Los Angeles.
SUPERNOVA REMNANTS AND MOLECULAR CLOUDS Ph.D. Thesis
Yi-Long Huang 1985 197 p
Avail: Univ. Microfilms Order No. DA8523181

Since reliable, direct estimates of the distances to supernova remnants (SNR) are generally unavailable, associated objects of known distance may provide a good indicator. Although the study of extragalactic supernovae suggests that Type II remnants tend to occur near large optical Population-I objects, their detection in our Galaxy is limited by heavy local obscuration. Large molecular clouds, which occur near most optical Population-I objects and are detectable up to great distances, are probably the most plausible objects to search for an association with galactic SNRs. The CO survey toward 26 SNR found that roughly half of them revealed a spatial coincidence with large clouds; most of these coincidences are probably associations, because it is statistically improbable that they result from chance superposition. Such associations are used to re-calibrate the Sigma-D relation and establish a good distance scale (a standard deviation of 28% for the uncertainty of a predicted distance) for the shell-like SNRs resultant from Type II events.
Dissert. Abstr.

N86-23532 Colorado Univ., Boulder.
THREE-DIMENSIONAL SIMULATIONS OF SUPERNOVAE-DOMINATED INTERSTELLAR MEDIA IN DISK GALAXIES Ph.D. Thesis
Denis Felix Coffi 1985 166 p
Avail: Univ. Microfilms Order No. DA8508845

Evolution of the interstellar media of spiral galaxies was studied on the assumption that their dynamical and thermal properties are dominated by supernova remnants (SNRs). To do this, a computer simulation was developed which uses standard SNR evolutionary solutions to redistribute mass and energy throughout a rectangular, three level grid which models the interstellar medium (SM). This comprehensive treatment includes bremsstrahlung or metal cooling, the creation and evaporation of clouds, mass injection and return from a galactic halo, multiple SNRs, and internally determined SNR lifetimes. The importance of spatially correlating supernovae sites, which can increase the global evolution rate of the (ISM) was confirmed. The simulations of primeval (zero metal abundance) galaxies revealed that the enhanced ability of bremsstrahlung-cooled SNR to transport mass can continually agitate the ISM, preventing the establishment of long lived tunnel networks. This demonstrated the inadequacy of porosity theory for predicting the topology of the ISM, because it does not account for mass transport.
Dissert. Abstr.

N86-23533 Florida Univ., Gainesville.
STARSPOT CYCLES OF RS CANUM VENATICORUM TYPE STARS Ph.D. Thesis
Young Woon Kang 1985 154 p
Avail: Univ. Microfilms Order No. DA8523845

The starspot model was used to account for the photometric variations of RS Canum Venaticorum binaries. The twelve light curves of eight epochs for RS CVn, eleven light curves of six epochs for AR Lac and twelve light curves of nine epochs for V711 Tau were analyzed to investigate the cyclic variations of these systems. The spot parameters, as well as other elements of the systems, were determined for each epoch by adjusting the parameters to fit the light curves. To avoid subjective parameter adjustment, the Wilson and Devinney differential correction computer program was adopted and modified for the adjustments of the spot parameters. Models were tested using one or two circular spots on the secondary stars. The adjustable parameters are latitudes, longitudes, radii, and temperatures of the spots, the surface potentials, albedos, temperatures of the two stars and the orbital inclination. The light curve fitting was done by adjusting the spot parameters and other parameters until a good fit to the entire light curve was obtained.
Dissert. Abstr.

N86-23534 California Univ., Los Angeles.
BUOYANCY LIMITS ON MAGNETIC VISCOSITY STRESS LAW SCALINGS IN QUASI-STELLAR OBJECT ACCRETION DISK MODELS Ph.D. Thesis
Philip Jon Sakimoto 1985 270 p
Avail: Univ. Microfilms Order No. DA8525879

Quasi-Stellar Objects (QSOs) apparently the excessively bright nuclei of distant galaxies, are thought to be powered by accretion disks surrounding supermassive black holes. Proof of this presump-

tion is hampered by major uncertainties in the viscous stress which is necessary for accretion to occur. Models generally assume an ad hoc stress law which scales the stress with the total pressure. Near the black hole, radiation pressure dominates gas pressure; scaling the stress with the radiation pressure results in disk models which are thermally unstable and optically thin. Radiation pressure scaling for the stress is not possible if the viscosity is due to turbulent magnetic Maxwell stresses. Thus, under the assumption of magnetic viscosity, radiation pressure stress law scalings are ruled out, while gas pressure stress law scalings are, in principle, possible. Differential shear in accretion disks makes all magnetic fields buoyant; therefore, complete disks models run by magnetic viscosity must account for the source of seed magnetic fields. Dissert. Abstr.

N86-23535# Lawrence Livermore National Lab., Calif.
ASTROPHYSICS OF BINARY STARS, SEYFERT GALAXIES, QUASARS AND GLOBULAR CLUSTERS Final Technical Report
W. H. Press 29 Mar. 1985 6 p Prepared in cooperation with Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
(Contract W-7405-eng-48)
(DE86-002604; UCRL-15680) Avail: NTIS HC A02/MF A01

Several problems were investigated. The time-steady accretion of gas irradiated by a self-consistently generated quasar-like continuum was studied. The observed X-ray sources near the core of the Orion molecular cloud were established to be sufficient to supply all the ionization that is needed to drive the molecular chemistry throughout that portion of the cloud in which the greatest density and diversity of molecular species is found. A new suggestion was put forth for a single pass, high gain, O(5+) ion laboratory laser at 1035 A. The only evidence for binaries in globular clusters was found to come from binaries in extreme states, cataclysmic variables, and X-ray sources. The various evolutionary paths possible for highly compact binaries in globular clusters where they come under the simultaneous influence of gravitational radiation and gravitational encounters with field stars were analyzed. The secular evolution of a highly compact binary stellar system, composed of a collapsed object and a low-mass secondary star, in the core of a globular cluster was calculated. The dynamics of the narrow line regions of Seyfert galaxies were investigated. New calculations of the soft X-ray opacity of gas having cosmic elemental abunances were developed for a variety of ionization states. Results were presented of the analysis of 28 Einstein SSS observations of 15 high X-ray luminosity quasars and Seyfert type I nuclei. DOE

N86-23536# California Inst. of Tech., Pasadena.
FORMATION OF GALACTIC HALOS IN THE COLD DARK MATTER UNIVERSE: COMPUTER SIMULATIONS
P. J. Quinn, J. K. Salmon, and W. H. Zurek 12 Sep. 1985 2 p Presented at the International Astronomical Union Meeting, Princeton, N.J., 24 Jun. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-000622; LA-UR-85-3315; CONF-8506199-2) Avail: NTIS HC A02/MF A01

The formation of structure on the galactic scale in the cold dark matter, (UC OMEGA) = 1 universe is simulated. DOE

N86-23537# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
STUDY ON THE ANALYTIC REPRESENTATION OF HALO ORBITS Final Report
C. Marchal Paris ESA 25 Jul. 1985 58 p refs
(Contract ESOC-5647/83-D-JS(SC))
(ONERA-RT-5/3605-SY; ESA-CR(P)-2138) Avail: NTIS HC A04/MF A01

The halo orbits about the Langrangian points L1 and L2 of the Sun-Earth system are discussed. The elliptic restricted three-body problem with the Sun at one focus and the mass Earth plus Moon at the other focus, i.e., at the barycenter of the Earth-Moon system, is solved up to the third-order. The small perturbative effects are shown to be almost negligible. For large halo orbits about the Lagrangian points L1 and L2, a third-order Lindstedt-Poincare method was developed. The two families of corresponding Halo orbits are presented. A simple stationkeeping procedure is outlined. The Lindstedt-Poincare equations program modules (FORTRAN) are given, with numerical tests.Author (ESA)

N86-22802*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ICE ENCOUNTER OPERATIONS
N. Fanelli and D. Morris *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 176-185 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

N86-22803*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
USUDA DEEP SPACE CENTER SUPPORT FOR ICE
J. P. Goodwin *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 186-196 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

N86-22804*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ARECIBO OBSERVATORY SUPPORT OF THE US INTERNATIONAL COMETARY EXPLORER MISSION ENCOUNTER AT COMET GIACOBINI-ZINNER
D. D. Gordon and M. T. Ward (NASA. Goddard Space Flight Center) *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 197-202 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

N86-22807*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERCONTINENTAL ANTENNA ARRAYING BY SYMBOL STREAM COMBINING AT ICE GIACOBINI-ZINNER ENCOUNTER
W. J. Hurd, F. Pollara, M. D. Russell, B. Siev, and P. U. Winter *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 220-228 refs (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

N86-23494*# California Univ., Los Angeles. Dept. of Astronomy.
OBSERVATIONAL CONSTRAINTS ON CIRCUMSTELLAR DUST
M. Jura *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 3-18 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23495*# Princeton Univ. Observatory, N. J.
CIRCUMSTELLAR GRAIN FORMATION
B. T. Draine *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplantary Dust Jan. 1986 p 19-28 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23496*# Wisconsin Univ., Madison.
OBSERVATIONS AND THEORIES OF INTERSTELLAR DUST
John S. Mathis *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 29-36 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23497*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOCK PROCESSING OF INTERSTELLAR GRAINS
C. Gregory Seab and J. Michael Shull (Colorado Univ., Boulder) *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 37-54 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23498*# Washington Univ., St. Louis, Mo. Dept. of Physics.
LABORATORY STUDIES OF INTERPLANETARY DUST
R. M. Walker *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 55-70 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23499*# California Univ., Los Angeles. Inst. of Geophysics.
PRIMORDIAL MATERIAL IN METEORITES
John F. Kerridge *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 71-108 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23500*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EXPERIMENTAL INVESTIGATIONS RELATING TO THE PROPERTIES AND FORMATION OF COSMIC GRAINS
Bertram Donn *In* NASA, Washington Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 p 109-134 refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23501*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CIRCUMSTELLAR DUST
Eli Dwek et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 17 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23502*# Colorado Univ., Boulder.
INTERSTELLAR GRAINS
T. P. Snow et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 14 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23503*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
INTERSTELLAR MATERIAL IN THE SOLAR SYSTEM
John A. Wood et al *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 46 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23504*# New York Univ., New York.
WORKING GROUP ON CIRCUMSTELLAR/INTERSTELLAR RELATIONSHIPS
A. E. Glassgold *In* NASA, Washington Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 6 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23505*# Rice Univ., Houston, Tex.
INTERRELATIONSHIPS BETWEEN INTERSTELLAR AND INTERPLANETARY GRAINS
D. D. Clayton *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 36 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23506*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IONIZED POLYCYCLIC AROMATIC HYDROCARBONS IN SPACE
Lou Allamandola, John Barker (SRI International), Mike Crawford (California Univ., Berkeley), Xander Tielens (California Univ., Berkeley), and Gerard vanderZwet (Leiden Univ.) *In* NASA, Washington Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23507*# Arizona State Univ., Tempe. Dept. of Geology.
CLEAN VERSUS DIRTY SILICATE GRAINS AND THE STATE OF CARBON CRYSTALLIZATION IN INTERSTELLAR AND CIRCUMSTELLAR DUST
Peter R. Buseck *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23508*# Rice Univ., Houston, Tex.
EXCESS DEPLETION OF Al, Ca, Ti FROM INTERSTELLAR GAS
Donald D. Clayton *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23509*# Paris VII Univ. (France).
PREGRAPHITIC MOLECULES AND THE RED-RECTANGLE EMISSION
L. dHendecourt and A. Leger *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23510*# National Aeronautics and Space Administration, Washington, D.C.
IUE AND IRAS OBSERVATIONS OF LUMINOUS M STARS WITH VARYING GAS-TO DUST RATIOS
Wendy Hagen (New Mexico Univ., Albuquerque), Kenneth G. Carpenter (JILA), and Robert E. Stencel *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23511*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE NATURE OF COMETARY GRAINS FROM REMOTE SENSING
Martha S. Hanner *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23512*# HY-Tech Research Corp., Radford, Va.
AN EXPERIMENTAL STUDY OF PLASMA GRAIN INTERACTIONS
R. C. Hazelton and E. J. Yadlowsky *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 2 p refs Sponsored in part by Aerospace Corp. (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23513*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
LABORATORY STUDIES OF THE INFRARED SMALL-PARTICLE EXTINCTION OF AMORPHOUS SILICATES
W. Kraetschmer *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 3 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23514*# Paris VII Univ. (France). Groupe de Physique des Solides de l'ENS.
ARE AROMATIC HYDROCARBONS THE CARRIERS OF THE DIFFUSE INTERSTELLAR BANDS IN THE VISIBLE? Abstract Only
A. Leger and L. dHendecourt *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493

13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23515*# Wisconsin Univ., Madison.
GRAIN ALIGNMENT BY FERROMAGNETIC IMPURITIES Abstract Only
John S. Mathis *In* NASA, Washington: Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23517*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
THE EFFECTS OF CHARGED DUST GRAINS ON IR MOLECULAR EXCITATION
R. Puetter and I. Krinsky *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 4 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23518*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
WHAT PREDICTIONS CAN BE MADE ON THE NATURE OF CARBON AND CARBON-BEARING COMPOUNDS (HYDROCARBONS) IN THE INTERSTELLAR MEDIUM BASED ON STUDIES OF INTERPLANETARY DUST PARTICLES?
Frans J. M. Rietmeijer *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 5 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23519*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WHY DO INTERSTELLAR GRAINS EXIST? Abstract Only
C. G. Seab, D. J. Hollenbach, C. F. McKee (California Univ., Berkeley), and A. G. G. M. Tielens (California Univ., Berkeley) *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23520*# National Aeronautics and Space Administration, Washington, D.C.
CHROMOSPHERIC DUST FORMATION, STELLAR MASERS AND MASS LOSS
Robert E. Stencel *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 5 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23521*# Los Alamos National Lab., N. Mex.
PREPARATION, ANALYSIS AND RELEASE OF SIMULATED INTERPLANETARY GRAINS INTO LOW EARTH ORBIT
John R. Stephens, I. B. Strong, and T. D. Kunkle *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 6 p refs (For primary document see N86-23493 13-88)
(LAUR-85-1979) Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23522*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERSTELLAR GRAIN MANTLES
A. G. G. M. Tielens, L. J. Allamandola, J. Bregman, and F. C. Witteborn *In* NASA, Washington. Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 1 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

N86-23523*# National Aeronautics and Space Administration, Washington, D.C.
ULTRAVIOLET SPECTROSCOPY OF METEORIC DEBRIS OF COMETS
Thomas J. Wdowiak (Alabama Univ., Birmingham), William R. Kubinec (Charleston Coll., S. C.), and Joseph A. Nuth *In its* Interrelationships among Circumstellar, Interstellar and Interplanetary Dust Jan. 1986 3 p refs (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-23538 Florida Univ., Gainesville.
AN OBSERVATIONALLY COMPATIBLE MODEL FOR JUPITER'S 10-RELATED DECAMETRIC EMISSION Ph.D. Thesis
Wan-xian Wang 1985 158 p
Avail: Univ. Microfilms Order No. DA8523894

A model for Jupiter's Io-related decametric radiation was adjusted to provide a close fit to observed contours of emission occurrence probability on the plane of Io phase vs the central meridian longitude for frequencies between 35 and 36 MHz. A nonlinear indirect emission mechanism was assumed in which Io-excited Alfven waves produce an electron beam, which in turn, after intermediate steps, results in the emission of fast extraordinary mode electromagnetic waves. This radiation is emitted into a hollow cone beam attached to the Io flux tube at a point where the wave frequency is slightly higher than the electron cyclotron frequency. A five-dipole representation of Jupiter's magnetic field was developed and used in this model; it closely matches the O4 field model and has the advantage of greater computational flexibility. The Voyager determined distribution of electron number density vs height above the cloud top level was used.
Dissert. Abstr.

N86-23539*# National Aeronautics and Space Administration, Washington, D.C.
PLANETARY EXPLORATION THROUGH YEAR 2000: A CORE PROGRAM, PART 1
1983 166 p Original doc. contains color illustrations
(NASA-TM-88653; NAS 1.15:88653) Avail: NTIS Avail: SOD HC $7.00 as 033-000-00882-1 CSCL 03B

Mission definitions and priorities; target selections; program strategy; historical settings; major scientific goals; spacecraft exploration; and planetary missions are examined. B.G.

N86-23540*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VOYAGER AT URANUS: 1986
1986 17 p
(NASA-CR-176706; NASA-JPL-Pub-400-268; NAS 1.26:176706)
Avail: NTIS HC A02/MF A01 CSCL 03B

The voyager 2 spacecraft begins its initial observations of Uranus November 4, 1985, and makes its final observation February 25, 1996. The data from the infrared interfermometer spectrometer, photopolarimeters, plasma wave, plasma detecter, and ultraviolet spectrometer will be processed to add a large block of information to the small amount already known. The trajectory of Voyager 2 is also discussed. B.G.

N86-22799*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEEP SPACE NETWORK RADIO SCIENCE SYSTEM FOR VOYAGER URANUS AND GALILEO MISSIONS
T. K. Peng and F. F. Donivan *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 143-151 (For primary document see N86-22784 13-32)
Avail: NTIS HC A12/MF A01 CSCL 03B

N86-23516*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPECTRAL CHARACTERISTICS OF DUST IN PLANETARY NEBULAE Abstract Only
H. Moseley and R. F. Silverberg *In* NASA, Washington Interrelationships among Circumstella, Interstellar and Interplanetary Dust Jan. 1986 1 p Previously announced as N85-17873 (For primary document see N86-23493 13-88)
Avail: NTIS HC A16/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-23541 Colorado Univ., Boulder.
PROPERTIES OF SOLAR FLAME PLASMA DERIVED FROM SOFT X-RAY LINE EMISSION Ph.D. Thesis
Patricia Lee Borinmann 1985 153 p
Avail: Univ. Microfilms Order No. DA8522647

A new observational property of soft X-ray line fluxes observed during the decay phase of solar flares is described and a new technique is presented for determining the plasma temperature and emission measure as functions of time based on this property. Results of this technique indicate the need for continuous heating or an intermediate energy storage mechanism during the flare. The soft X-ray line fluxes observed by SMM's FCS during the gradual phase of the 1980 November 5 flare did not decay at a constant rate. The line flux decay rate changed abruptly, with the line fluxes falling more rapidly later in the flare decay. These changes occurred at earlier times for lines formed at higher temperatures. This behavior is proposed to be due to the decreasing temperature of the flare plasma tracking the rise and subsequent fall of each line emissivity function. The proposed explanation for the rate changes was used to develop a technique for estimating the temperature and emission measure as a function of time during the gradual phase of solar flares. Dissert. Abstr.

N86-23542 California Univ., Berkeley.
HETERODYNE SPECTROSCOPY OF THE SUN AT 12 MICRONS USING A DIODE LASER AS THE LOCAL OSCILLATOR Ph.D. Thesis
John Jacob Ottusch 1985 152 p
Avail: Univ. Microfilms Order No. DA8525075

A heterodyne spectrometer using a tunable diode laser as the local oscillator was constructed for astronomical observations in the mid-infrared. The bench-top sized instrument employs a single mode PbSnTe diode laser cooled to 12K or above by a helium closed cycle refrigerator, and LN2 cooled HgCdTe photodiode detector, and appropriate beam combining optics. Spectra are obtained by scanning the local oscillator frequency while measuring the heterodyne signal in a single RF channel Frequency control to about + or - 10 MHz is achieved by means of precision laser current and temperature controllers. The spectrometer was installed at the Snow Solar Telescope of the Mount Wilson Observatory where it was used to investigate four lines in the pure rotation spectrum of solar OH near 12 microns. These lines are formed in LTE and are reliable indicators of physical properties in the upper photosphere. Resolved profiles of two lines in each of the ground and first excited vibrational states of OH were measured at several locations on the solar disk. All lines could be well fit by Gaussian profiles. Dissert. Abstr.

N86-23543# Stanford Univ., Calif. Center for Space Science and Astrophysics.
SUMMARY PROCEEDINGS OF THE STANDFORD WORKSHOP ON SOLAR FLARE PREDICTION HELD IN PARIS ON 28 FEBRUARY - 1 MARCH 1985
Spiro K. Antiochos, Taeil Bai, and Peter A. Sturrock 1 Mar. 1985 53 p Workshop hel in Paris, France, 28 Feb. - 1 Mar. 1985
(Contract N00014-85-K-0111)
(AD-A162608; CSSA-ASTRO-85-22) Avail: NTIS HC A04/MF A01 CSCL 03/2

A workshop on The Prediction of Solar Activity was held at Meudon Observatory in France in June 1984. During that meeting, a number of participants from the United States expressed interest in meeting together to discuss this topic with a view to exploring what actions might be taken to improve our predictive capability. This document contains abstracts of presentations made at the meeting. GRA

N86-23544# Lawrence Livermore National Lab., Calif.
RADIATION HYDRODYNAMICS IN SOLAR FLARES
G. H. Fisher 18 Oct. 1985 28 p refs Presented at the International Astronomical Union (IAU) Colloquium, Copenhagen, Denmark, 11 Jun. 1985
(Contract W-7405-eng-48)
(DE86-002991; UCRL-93541; CONF-8506205-2) Avail: NTIS HC A03/MF A01

Solar flares are rather violent and extremely complicated phenomena, and it should be made clear at the outset that a physically complete picture describing all aspects of flares does not exist. From the wealth of data which is available, it is apparent that many different types of physical processes are involved during flares: energetic particle acceleration, rapid magnetohydrodynamic motion of complex field structures, magnetic reconnection, violent mass motion along magnetic field lines, and the heating of plasma to tens of millions of degrees, to name a few. The goal of this paper is to explore just one aspect of solar flares, namely, the interaction of hydrodynamics and radiation processes in fluid being rapidly heated along closed magnetic field lines. The models discussed are therefore necessarily restrictive, and will address only a few of the observed or observable phenomena. DOE

N86-23545*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SOLAR WIND-MAGNETOSPHERE COUPLING AND THE DISTANT MAGNETOTAIL: ISEE-3 OBSERVATIONS
J. A. Slavin, E. J. Smith, D. G. Sibeck, D. N. Baker, R. D. Zwickl, S. I. Akasofu, and R. P. Lepping Sep. 1985 17 p refs Presented at the Chapman Conference on Solar Wind-magnetosphere Energy Coupling, Pasadena, Calif., 12 Feb. 1985 Prepared in cooperation with Jet Propulsion Lab., Pasadena, Calif.; California Univ., Los Angeles.; Alaska Univ., Fairbanks.; Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-002386; LA-UR-85-3525; CONF-850277-5) Avail: NTIS HC A02/MF A01

ISEE-3 Geotail observations are used to investigate the relationship between the interplanetary magnetic field, substorm activity, and the distant magnetotail. Magnetic field and plasma observations are used to present evidence for the existence of a quasi-permanent, curved reconnection neutral line in the distant tail. The distance to the neutral line varies from absolute value of X = 120 to 140 R/sub e near the center of the tail to beyond absolute value of X = 200 R/sub e at the flanks. Downstream of the neutral line the plasma sheet magnetic field is shown to be negative and directly proportional to negative B/sub z in the solar wind as observed by IMP-8. V/sub x in the distant plasma sheet is also found to be proportional to IMF B/sub z with southward IMF producing the highest anti-solar flow velocities. A global dayside reconnection efficiency of 20 +- 5% is derived from the ISEE-3/IMP-8 magnetic field comparisons. Substorm activity, as measured by the AL index, produces enhanced negative B/sub z and tailward V/sub x in the distant plasma sheet in agreement with the basic predictions of the reconnection-based models of substorms. The rate of magnetic flux transfer out of the tail as a function of AL is found to be consistent with previous near-Earth studies. Similarly, the mass and energy fluxes carried by plasma sheet flow down the tail are consistent with theoretical mass and energy budgets for an open magnetosphere. In summary, the ISEE-3 Geotail observations appear to provide good support for reconnection models of solar wind-magnetosphere coupling and substorm energy rates. DOE

N86-23546# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 491, JULY 1985. PART 1: (PROMPT REPORTS). DATA FOR JUNE 1985, MAY 1985 AND LATE DATA
Jul. 1985 106 p
(PB86-113768; SGD-491-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03B

Solar-Geophysical Data Report No. 491, July 9185, contains reports on the following: Detailed index for 1984 to 1985; Data for June 1985--(IUWDS Alert periods (Advance and Worldwide Solar activity indices; Solar flares, Solar radio emission, Stanford mean solar magnetic field); Data for May 1985--(Solar active regions; Sudden ionospheric disturbances, Pioneer XII interplanetary magnetic field magnitudes, Solar radio spectral observations, Cosmic ray measurements by neutron monitor, Geomagnetic indices, Radio propagation indices); Late data--(Cosmic rays; Calcium plage data). GRA

N86-23547*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 490, JUNE 1985. PART 1: (PROMPT REPORTS). DATA FOR MAY 1985, APRIL 1985 AND LATE DATA
H. E. Coffey, ed. Jun. 1985 110 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176703; NAS 1.26:176703; PB86-121985;
SGD-490-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03B

Contents include: detailed index for 1984 to 1985; data for May 1985--(IUWDS alert periods (Advance and Worldwide) solar activity indices, solar flares, solar radio emission, Stanford mean solar magnetic field); data for April 1985--(solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); and late data--(geomagnetic indices, cosmic rays, calcium plage data). GRA

N86-23548*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 489, MAY 1985. PART 2: (COMPREHENSIVE REPORTS). DATA FOR DECEMBER 1984, MARCH-MAY 1983 AND MISCELLANEA
H. E. Coffey, ed. Jun. 1985 92 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176704; NAS 1.26:176704; PB86-121993;
SGD-490-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 03B

Contents include: detailed index for 1984 to 1985; data for December 1984--(Meudon Carte Synoptique, solar radio bursts at fixed frequencies, solar X-ray radiation from GOES satellite graphs, mass ejections from the sun, active prominences and filaments, solar irradiance); and data for March, April and May 1983--(solar flares March 1983, solar flares April 1983, solar flares May 1983, number of flares August 1966 to May 1983). GRA

N86-23549*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 493, SEPTEMBER 1985. PART 1: (PROMPT REPORTS). DATA FOR AUGUST 1985, JULY 1985 AND LATE DATA
H. E. Coffey, ed. Sep. 1985 86 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176705; NAS 1.26:176705; PB86-125457) Avail: NTIS HC A05/MF A01 CSCL 03B

Topics covered include: detailed index for 1985; data for August 1985--(IUWDS alert periods (Advanced and Worldwide), solar activity indices, solar flares, solar radio emission, Stanford mean solar magnetic field); (solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); and late data--calcium plage data. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-23550 California Univ., Berkeley.
THE SPECTRUM OF THE COSMIC BACKGROUND RADIATION FROM 2.3/cm TO 11.0/cm Ph.D. Thesis
Jeffrey B. Peterson 1985 123 p
Avail: Univ. Microfilms Order No. DA8525087

Measurement of the spectrum of the cosmic background radiation is described. The instrument, a balloon-borne filter photometer, is described in detail. The photometer is liquid Helium cooled and calibrated in flight with a 3.2K blackbody. Data from the first flight are analyzed. The subtraction of the atmospheric component of the flux from the sky proved to be more difficult than was expected before the flight. A slow decrease of the measured flux from the sky limited the precision of the subtraction. Despite these difficulties the spectrum was measured. All five temperatures are consistent with temperatures in the range 2.78 K + or - 0.11 K. No significant deviation from a thermal spectrum was detected. Dissert. Abstr.

N86-23551*# Aerospace Corp., Los Angeles, Calif. Space Sciences Lab.
COSMIC RAY SIMULATION AND TESTING PROGRAM Final Report, Jan. - Nov. 1984
W. A. Kolasinski, R. Koga, C. G. King, and S. I. Imamoto 15 Apr. 1985 54 p refs
(Contract NAS5-27984)
(NASA-CR-177860; NAS 1.26:177860) Avail: NTIS HC A04/MF A01 CSCL 03B

Single event upset (SEU) and latchup vulnerabilities were determined for a number of parts of interest to NASA space programs. In cases where a threshold linear energy transfer (LET) for SEU could be measured, an upset rate in a low inclination Space Shuttle orbit was computed. The predicted upset rates are extremely low, except for the devices with LET thresholds below the geomagnetic cutoff for altitude and inclination of the Space Shuttle orbit. While some of the devices do exhibit latchup, the cross sections and threshold LETs are such that the risk associated with flying these devices in low, near equatorial orbits is small if not negligible. Author

N86-22800*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SEARCH FOR REFERENCE SOURCES FOR DELTA VLBI NAVIGATION OF THE GALILEO SPACECRAFT
J. S. Ulvestad and R. P. Linfield *In its* The Telecommunications and Data Acquisition Report 15 Feb. 1986 p 152-163 refs (For primary document see N86-22784 13-32)
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No abstracts in this category.

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Typical Subject Index Listing

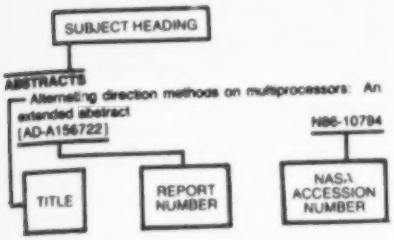

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7053).

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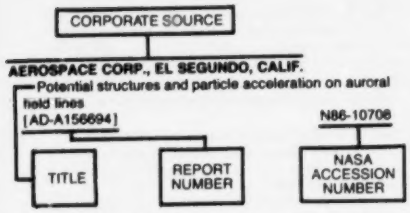

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DENVER UNIV., COLO.
Photodegradation inhibitors for polyacrylonitrile/Ag (PAN/Ag) films
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DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Summaries of physical research in the geosciences
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Annual report and summaries of FY 1985 activities supported by the Division of Biological Energy Research
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Control system for a small fission reactor
[DE85-017796] N86-23397
Computing for particle physics. Report of the HEPAP Subpanel on Computer Needs for the Next Decade
[DE86-002045] N86-23444
Fusion connection: Contributions to industry, defense and basic science resulting from scientific advances made in the Magnetic Fusion Energy Program
[DE86-001774] N86-23446
Materials Sciences Programs. Fiscal Year 1985
[DE86-002089] N86-23483
DEPARTMENT OF ENERGY, MINES, AND RESOURCES, OTTAWA (ONTARIO).
Geophysical characteristics and crustal structure of greenstone terranes: Canadian Shield N86-23134
DEPARTMENT OF THE AIR FORCE, WASHINGTON, D.C.
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DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
Satellite-to-satellite tracking with POPSAT and an ERS-class satellite. Mission and system assessment study. Volume 1: Executive summary
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Satellite-to-satellite tracking with POPSAT and an ERS-class satellite. Mission and system assessment study. Volume 2: Technical results
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Satellite-to-satellite tracking with POPSAT and an ERS-class satellite. Mission and system assessment study. Volume 3: Development program
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Multilayer printed circuit board characterization by thermal analysis N86-22618
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Mechanism of plutonium metal dissolution in HNO3-HF-N2H4 solution
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Point contact spectroscopy of heavy fermions
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ENERGY AND ENVIRONMENTAL ANALYSIS, INC., ARLINGTON, VA.
Cost and economic assessment of alternative national ambient air quality standards for carbon monoxide, revised
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ENERGY, MINES AND RESOURCES CANADA, OTTAWA (ONTARIO).
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ENR TECHNISCH WETENSCHAPPELIJK REKENCENTRUM, PETTEN (NETHERLANDS).
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Development of software for computing the coupling coefficients of the ERS-1 antennas
[ERA-85-0011] N86-23336

ESSEX UNIV., COLCHESTER (ENGLAND).
Common volume modelling for the prediction of interference due to scattering by hydrometeors
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ESSO AUSTRALIA LTD., SYDNEY.
Evidence for structural stacking and repetition in the greenstones of the Kalgoorlie district, western Australia
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EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, GENEVA (SWITZERLAND).
Large transverse momentum (PI)(0) production in (ALPHA)(ALPHA), dd and pp collisions at the CERN ISR
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EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Robustness of discrete-time dynamical systems: Application to the multivariable digital control of combat aircraft
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Proceedings of Third European Symposium on Spacecraft Materials in Space Environment
[ESA-SP-232] N86-22593
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EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
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EUROPEAN SPACE TRIBOLOGY LAB., RISLEY (ENGLAND).
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[ESA-ESTL-74] N86-22589

EXIDE MANAGEMENT AND TECHNOLOGY CO., YARDLEY, PA.
Testing, data analysis and engineering services on lead-acid load leveling batteries
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Numerical weather prediction for the west African monsoon experiment N86-23158
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Research in theoretical nuclear physics
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FLORIDA UNIV., GAINESVILLE.
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FLUIDYNE ENGINEERING CORP., COLUMBUS, OHIO.
Documentation of ice shapes accreted on the main rotor of a UH-1H helicopter in level flight
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FOOD AND DRUG ADMINISTRATION, ROCKVILLE, MD.
Measurement techniques for use with technique/exposure guides
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[PB86-126075] N86-23274
Behavioral effects of microwave radiation absorption
[PB86-113735] N86-23275

FULMER RESEARCH INST. LTD., STOKE POGES (ENGLAND).
Guidelines on basic aspects of jointing technology for advanced fibre reinforced plastics used in space structures
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GA TECHNOLOGIES, INC., SAN DIEGO, CALIF.
Big Dee: A flexible facility operating near breakeven conditions
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[DE86-000776] N86-23459
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GCA CORP., CHAPEL HILL, N.C.
Cost and economic assessment of alternative national ambient air quality standards for carbon monoxide, revised
[PB86-105772] N86-23076

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
Army's procurement of batteries: Magnesium versus lithium
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GENERAL DYNAMICS CORP., SAN DIEGO, CALIF.
Design and cost of a utility scale superconducting magnetic energy storage plant
[DE86-000777] N86-23460

GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Free jet feasibility study of a thermal acoustic shield concept for AST/VCE application-dual flow. Comprehensive data report. Volume 1: Test nozzles and acoustic data
[NASA-CR-174817] N86-23371
Free-jet feasibility study of a thermal acoustic shield concept for AST/VCE application-dual stream nozzles. Comprehensive data report. Volume 2: Laser velocimeter and suppressor. Base pressure data
[NASA-CR-174818] N86-23372

GENERAL ELECTRIC CO., WHETSTONE (ENGLAND).
European Space Agency Thermal Analysis Network (ESATAN)
[GEC-MEL34.0582] N86-23008

GENEVA UNIV. (SWITZERLAND).
Point contact spectroscopy of heavy fermions
[DE86-002431] N86-23413

GEOLOGICAL SURVEY, CHEYENNE, WYO.
Water resources data for Wyoming, water year 1984
[PB86-106127] N86-23031

GEOLOGICAL SURVEY, DORAVILLE, GA.
Water resources data for Utah, water year 1984
[PB86-126966] N86-23033

GEOLOGICAL SURVEY, LARAMIE, WYO.
Preliminary report on the geology and gold mineralization of the South Pass granite-greenstone terrain, Wind River Mountains, western Wyoming (US) N86-23107

GEOLOGICAL SURVEY, RALEIGH, N. C.
Application of mass-transfer theory to determine natural and forced evaporation from Hyco Lake, North Carolina
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GEOLOGICAL SURVEY, RESTON, VA.
The Wisconsin magmatic terrane: An Early Proterozoic greenstone-granite terrane formed by plate tectonic processes N86-23125

GEOLOGICAL SURVEY, TUCSON, ARIZ.
Evapotranspiration from saltcedar (Tamarix chinensis)
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GEOLOGICAL SURVEY OF CANADA, OTTAWA (ONTARIO).
Tectonic setting and evolution of late Archaean greenstone belts of Superior Province, Canada
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Rainy Lake wrench zone: An example of an Archaean subprovince boundary in northwestern Ontario
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Basement-cover relations and internal structure of the Cape Smith klippe: A 1.9 Ga greenstone belt in northern Quebec, Canada N86-23132

GEOLOGICAL SURVEY OF CANADA, TORONTO (ONTARIO).
Volcanological constraints of Archaean tectonics
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GEOMYSORE SERVICES, BANGALORE (INDIA).
Early Precambrian crustal evolution of south India
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GEORGIA INST. OF TECH., ATLANTA.
Laser Doppler diagnostics of the flow behind a backward facing step N86-22877

GEORGIA STATE UNIV., ATLANTA.
Standardization of natural phenomena risk assessment methodology at the Savannah River Plant
[DE86-001977] N86-23002

GEORGIA UNIV., ATHENS.
Nucleon-nucleus and antinucleon-nucleus scattering at intermediate energies
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GLOBAL GEOCHEMISTRY CORP., CANOGA PARK, CALIF.
Analysis of gases in the Earth's crust
[PB86-103843] N86-23150

H

HANFORD ATOMIC PRODUCTS OPERATION, RICHLAND, WASH.
Chemical Processing monthly report, April 1985
[DE86-001942] N86-23433

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Sensitization of Parker fittings
[DE85-018506] N86-22702

HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, CAMBRIDGE, MASS.
Astrophysics of binary stars, Seyfert galaxies, quasars and globular clusters
[DE86-002604] N86-23535

HARVARD UNIV., CAMBRIDGE, MASS.
Visual hemispheric specialization: A computational theory
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Extension of the parallel nested dissection algorithm to the path algebra problems
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HEALTH EFFECTS RESEARCH LAB., RESEARCH TRIANGLE PARK, N. C.
System for measurement of small vibrations at material interfaces induced by electrostrictive forces
[PB86-116530] N86-23276

HOPE COLLEGE, HOLLAND, MICH.
Lithology, age and structure of early proterozoic greenstone belts, West African shield N86-23091

HOUSTON UNIV., TEX.
Can trace element distributions reclaim tectonomagmatic facies of basalts in greenstone assemblages?
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Comments on the existence of strange dibaryons
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HY-TECH RESEARCH CORP., RADFORD, VA.
An experimental study of plasma grain interactions
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IBM RESEARCH LAB., YORKTOWN HEIGHTS, N. Y.
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IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
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IDAHO UNIV., MOSCOW.
Improved acid electrolytes for fuel cells
[PB86-125119] N86-23063

ILLINOIS STATE GEOLOGICAL SURVEY, CHAMPAIGN.
Early Pennsylvanian paleotopography and depositional environments, Rock Island County, Illinois, guidebook
[PB86-111648] N86-23151

ILLINOIS STATE MUSEUM, SPRINGFIELD.
Early Pennsylvanian paleotopography and depositional environments, Rock Island County, Illinois, guidebook
[PB86-111648] N86-23151

ILLINOIS STATE WATER SURVEY, CHAMPAIGN.
Geological-geotechnical studies for siting the superconducting super collider in Illinois: Preliminary geological feasibility report
[PB86-124989] N86-23152

ILLINOIS UNIV., CHICAGO.
Conjugate mixed convection-conduction heat transfer in porous media N86-22883
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ILLINOIS UNIV., URBANA.
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[DE86-002051] N86-23342
Two stability results for discrete one step ahead adaptive control
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ILLINOIS UNIV., URBANA-CHAMPAIGN.
Optical constants of GaAs-AlGaAs superlattices and multiple quantum wells
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IMPERIAL CHEMICAL INDUSTRIES, WILTON (ENGLAND).
Mechanical and fire properties of aromatic polymer composites N86-22610

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Vortex boundary-layer interactions
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INFORMATION AND CONTROL SYSTEMS, INC., HAMPTON, VA.
Extensions to PIFCGT: Multirate output feedback and optimal disturbance suppression
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INSTITUT ROYAL METEOROLOGIQUE DE BELGIQUE, BRUSSELS.
Daily effective evapotranspiration from a river basin N86-23173

INSTITUTE FOR ADVANCED STUDY, PRINCETON, N.J.
Basic research in theoretical high energy physics
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INSTITUTE OF METEOROLOGY AND WATER MANAGEMENT, WARSAW (POLAND).
Estimation of actual evapotranspiration by means of a mathematical model N86-23174

INSTITUTE OF OCEANOGRAPHIC SCIENCES, TAUNTON (ENGLAND).
Implications of sedimentological and hydrological processes on the distribution of radionuclides in a salt marsh near Sellafield, Cumbria
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INSTITUTE OF OCEANOGRAPHIC SCIENCES, WORMLEY (ENGLAND).
Wave-current interactions: A review of some problems
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INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT, WASHINGTON, D.C.
Aquaculture: A component of low cost sanitation technology
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INTERNATIONAL TELECOMMUNICATIONS SATELLITE ORGANIZATION, WASHINGTON, D. C.
Radiometric propagation experiments in tropical regions N86-22825

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
A crack closure study on 2024 T315 aluminum alloy by the Moire method N86-22679
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JAYCOR, SAN DIEGO, CALIF.
Limitations in the stress parameter approach to evaluating simulation fidelity
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JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Development of structural-composite reflector panels for a submillimeter space telescope N86-22612
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JOHNS HOPKINS UNIV., BALTIMORE, MD.
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JOHNS HOPKINS UNIV., LAUREL, MD.
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Human reactions to transient electric currents
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JOHNSON CONTROLS, INC., MILWAUKEE, WIS.
Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR report: Transportation
[JPRS-UTR-86-001] N86-22544
Scientists on aircraft development trends N86-22545
USSR report: Transportation
[JPRS-UTR-86-004] N86-22565
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[PB86-110855] N86-22670
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
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NATIONAL ENGINEERING LAB., EAST KILBRIDE (SCOTLAND).
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Mariners Weather Log, Volume 29, Number 3, Summer, 1985
[PB86-113925] N86-23190
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[PB86-110640] N86-23211

NATIONAL GEODETIC SURVEY, ROCKVILLE, MD.
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[PB86-125026] N86-22562

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
Solar-geophysical data number 491, July 1985. Part 1: (Prompt reports). Data for June 1985, May 1985 and late data
[PB86-113768] N86-23546
Solar-geophysical data number 490, June 1985. Part 1: (Prompt reports). Data for May 1985, April 1985 and late data
[NASA-CR-176703] N86-23547
Solar-geophysical data number 489, May 1985. Part 2: (Comprehensive reports). Data for December 1984, March-May 1983 and miscellanea
[NASA-CR-176704] N86-23548
Solar-geophysical data number 493, September 1985. Part 1: (Prompt reports). Data for August 1985, July 1985 and late data
[NASA-CR-176705] N86-23549

NATIONAL GEOPHYSICAL RESEARCH INST., HYDERABAD (INDIA).
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.
Heat budget and climatic atlas of the equatorial Atlantic Ocean during FGGE (First GARP Global Experiment, 1979
[PB86-111622] N86-23213
Pegasus current profiler measurements collected for EPOCS (Equatorial Pacific Ocean Climate Studies), 1980 - 1983
[PB86-113446] N86-23216

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
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[NPL-DMA(A)-109] N86-23347

NATIONAL PHYSICAL RESEARCH LAB., PRETORIA (SOUTH AFRICA).
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NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Ice shelves of Antarctica
[PB86-106986] N86-23206
Problems of the Arctic and the Antarctic, Collection of Articles, Volume 56, 1981
[PB85-107109] N86-23209
Academic science/engineering: R and D funds, fiscal year 1983 (detailed statistical tables)
[PB86-120706] N86-23482
Guide to programs, fiscal year 1986: Guide describing National Science Foundation Programs and Activities
[PB86-125184] N86-23484
Federal scientific and technical workers: Numbers and characteristics, 1973 and 1983
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Federal support to universities, colleges, and selected nonprofit institutions: Fiscal Year 1983
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NATIONAL SEVERE STORMS FORECAST CENTER, KANSAS CITY, MO.
Verification of severe local storm forecasts issued by the National Severe Storms Forecast Center, 1984
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NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
Automated procedure for composition of severe weather watch Areal redefining statements
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Florida east coast Thanksgiving holiday storm of 1984
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NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
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NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Application of cumulus models to MOS (Model Output Statistics) forecasts of convective weather
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NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and Seasonal Weather Outlook for Mid-October to Mid-November, 1985, Volume 39, Number 20, October 15, 1985
[PB86-121183] N86-23195
Monthly and Seasonal Weather Outlook for November 1985, Volume 39, Number 21, October 30, 1985
[PB86-121191] N86-23196

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NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
Proceedings of the Arctic Oceanography Conference and Workshop held at the Naval Ocean Research and Development Activity, NSTL, MS. on June 11-14, 1985
[AD-A162578] N86-23203

NAVAL RESEARCH LAB., WASHINGTON, D. C.
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
La Recherche Aerospatiale, bimonthly bulletin, number 1985-1, 224/January-February
[ESA-TT-915] N86-22729
Study on the analytic representation of halo orbits
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Resonance compensating of wind power plants with variable rotor speed
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Report from a behavioral science study grip to Australia, 23 Aug. - 10 Sep. 1985
[FOA-C-50027-H3] N86-23260
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ROYAL ARMAMENT RESEARCH AND DEVELOPMENT ESTABLISHMENT, FORT HALSTEAD (ENGLAND).
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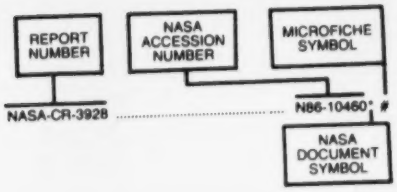

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Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING **2241**

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE **2241**

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION **2243**

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER **2243**

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 2245
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 2246
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 2249
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 2252
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 2258
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 2262
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 2262
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 2267
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 2270
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 2276
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 2285
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 2288
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 2291
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 2295
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 2296
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) N.A.

43 EARTH RESOURCES 2301
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 2303
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 2307
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 2311
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 2315
Includes weather forecasting and modification.

48 OCEANOGRAPHY 2329
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 2332
Includes genetics.

52 AEROSPACE MEDICINE 2333
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 2337
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 2337
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 2339
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 2341
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 2347
Includes computer networks.

63 CYBERNETICS 2348
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 2350
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 2354
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 2357
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 2359
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 2359
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 2365
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS 2368
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 2372
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS 2374
Includes light phenomena.

75 PLASMA PHYSICS 2376
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS 2380
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS 2383
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 2384
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 2390
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 2391
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS 2394
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE N.A.
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 2397
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) 2397

89 ASTRONOMY 2397
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 2398
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 2400
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS 2400
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 2407
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

99 GENERAL 2407

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N85-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N86-23552* National Aeronautics and Space Administration, Washington, D.C.
A CUMULATIVE INDEX TO A CONTINUING BIBLIOGRAPHY ON AERONAUTICAL ENGINEERING
1986 521 p
(NASA-SP-7037(196); NAS 1.21:7037(196)) Avail: NTIS HC A22 CSCL 01A

This bibliography is a cumulative index to the abstracts contained in NASA-SP-7037(184) through NASA-SP-7037(195) of Aeronautical Engineering: A Continuing Bibliography. NASA SP-7038 and its supplements have been compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and the National Aeronautics and Space Administration (NASA). This cumulative index includes subject, personal author, corporate source, foreign technology, contract, report number, and accession number indexes. Author

N86-23553* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING (A CONTINUING BIBLIOGRAPHY WITH INDEXES)
Mar. 1986 115 p
(NASA-SP-7037(198); NAS 1.21:7037(198)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 395 reports, articles, and other documents introduced into the NASA scientific and technical information system in February 1986. Author

N86-23554*# Kentron International, Inc., Hampton, Va.
AN AERODYNAMIC ANALYSIS COMPUTER PROGRAM AND DESIGN NOTES FOR LOW SPEED WING FLAP SYSTEMS Final Report
Harry W. Carlson and Kenneth B. Walkley Washington NASA Mar. 1983 75 p refs
(Contract NAS1-16000)
(NASA-CR-3675; NAS 1.26:3675) Avail: NTIS HC A04/MF A01 CSCL 01B

The expanded capabilities for analysis and design of low speed flap systems afforded by recent modifications of an existing computer program is described. The program provides for the simultaneous analysis of up to 25 pairs of leading-edge and trailing-edge flap deflection schedules. Among other new features of the program are a revised attainable thrust estimation method to provide more accurate predictions for low Mach numbers, and a choice of three options for estimation of leading-edge separation vortex flow effects. Comparison of program results with low speed experimental data for an arrow wing supersonic cruise configuration with leading-edge and trailing-edge flaps showed good agreement over most of the range of flap deflections. Other force data comparisons and an independent study of airfoil and wing pressure distributions indicated that wind-tunnel measurements of the aerodynamic performance of twisted and cambered wings and wings with leading-edge flaps can be very sensitive to Reynolds number effects. Author

N86-23555*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOME LESSONS LEARNED WITH WIND TUNNELS
M. Leroy Spearman Mar. 1986 40 p refs
(NASA-TM-87710; NAS 1.15:87710) Avail: NTIS HC A03/MF A01 CSCL 01B

A review is presented of some of the lessons learned from wind tunnel tests since World War II. Wind tunnels achieved a very high productivity rate during the war due in part to development testing of numerous military aircraft concepts. Following the war, in addition to development testing, a rapid increase in basic research testing occurred in order to explore areas of interest revealed by the conduct of war and to expand on advanced technology that became available from Germany and Italy. The research test areas discussed are those primarily related to the transition from subsonic flight to supersonic flight. Author

N86-23556# RAND Corp., Santa Monica, Calif.
DEPOT MAINTENANCE OF AVIATION COMPONENTS: CONTRACTOR VERSUS ORGANIC REPAIR
L. B. Embry, N. Y. Moore, J. Cave, and F. LaBrune Mar. 1985 116 p
(Contract N00014-83-C-0100)
(AD-A162071; RAND/N-2225-Navy) Avail: NTIS HC A06/MF A01 CSCL 01/3

Aviation and engine component repair requirements make up over half of the projected wartime depot-level maintenance workload. Organic (service-owned) ability to support this workload is particularly limited; at present, nearly half of the Navy's depot-level component repair is performed in contractor or other service facilities. Before major investments are made in the facilities and equipment needed to accomplish these repairs, it will be necessary to determine the appropriate mix of organic and contractor repair sources. This note addresses the economic and operational implications of alternative source-of-repair decisions. Based on analyses of the distribution of projected wartime demands, technical data limitations, the structure of the repair industry, the operational payoff of facilities characterized by broad scope of repair, and airline industry practices, it postulates a strategy for providing depot-level component support that can be used to specify the appropriate source of repair at different points in the weapon system and subsystem life cycle. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-23557 Department of the Air Force, Washington, D.C.
MULTIPLE JET BLOWING AROUND THE BLUNT TRAILING

EDGE OF A CIRCULATION CONTROLLED AIRFOIL Patent
John K. Harvell and Milton E. Franke, inventors (to Air Force) Issued 26 Nov. 1985 5 p Supersedes AD-D010872
(AD-D012079; US-Patent-4,555,079; US-Patent-Appl-SN-566753) Avail: US Patent and Trademark Office CSCL 01/3

A circulation controlled airfoil has a body structure with leading and trailing ends and upper and lower surfaces extending therebetween, and a cylindrical member disposed along the trailing end of the body structure between the upper and lower surfaces thereof so as to form a rounded, blunt trailing edge surface on the airfoil. A first blowing jet slot is defined between the outer surface of the cylindrical member and the trailing end of the body structure adjacent its upper surface. A second blowing jet slot is defined in a tubular wall of the cylindrical member. The latter member can be rotated to vary the distance of the second jet slot from the first jet slot and thereby adjust the point of separation of air flow along the airfoil from the outer surface of the blunt trailing edge surface formed by the cyclindrical member. In such manner the lift generated by the airfoil can be optimized by providing blowing that is specifically tailored to given flight conditions. Also, the separate plenums are provided for supplying air flow to the respective jet slots. GRA

N86-23558*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MACH 6 FLOW FIELD SURVEYS BENEATH THE FOREBODY OF AN AIRBREATHING MISSILE
Patrick J. Johnson and James L. Hunt Mar. 1986 155 p refs
(NASA-TP-2491; L-15973; NAS 1.60:2491) Avail: NTIS
HC A08/MF A01 CSCL 01A

Wall static, local stream static, and pitot pressure surveys were made on the windward side of a hypersonic airbreathing missile at full-scale length Reynolds numbers. In the inviscid part of the flow field, the experimental massflow ratios agreed with trends predicted by a three-dimensional method-of-characteristics solution. At a longitudinal station 3.5 diameters downstrea of the nose, the boundary layer was transitional or turbulent at zero incidence but became laminar as the angle of attack increased. The bell-shaped distribution of the boundary layer across the width of the body affected the mass flow distribution out to the bow shock and decreased the mass flow available the engine inlet. Author

N86-23559*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC INVESTIGATION OF TWO STOL NOZZLE CONCEPTS WITH PITCH THRUST-VECTORING CAPABILITY
Mary L. Mason and James R. Burley, II Apr. 1986 57 p refs
(NASA-TP-2559; L-165052; NAS 1.60:2559) Avail: NTIS
HC A04/MF A01 CSCL 01A

A static investigation of the internal performance of two short take-off and landing (STOL) nozzle concepts with pitch thrust-vectoring capability has been conducted. An axisymmetric nozzle concept and a nonaxisymmetric nozzle concept were tested at dry and afterburning power settings. The axisymmetric concept consisted of a circular approach duct with a convergent-divergent nozzle. Pitch thrust vectoring was accomplished by vectoring the approach duct without changing the nozzle geometry. The nonaxisymmetric concept consisted of a two dimensional convergent-divergent nozzle. Pitch thrust vectoring was implemented by blocking the nozzle exit and deflecting a door in the lower nozzle flap. The test nozzle pressure ratio was varied up to 10.0, depending on model geometry. Results indicate that both pitch vectoring concepts produced resultant pitch vector angles which were nearly equal to the geometric pitch deflection angles. The axisymmetric nozzle concept had only small thrust losses at the largest pitch deflection angle of 70 deg., but the two-dimensional convergent-divergent nozzle concept had large performance losses at both of the two pitch deflection angles tested, 60 deg. and 70 deg. Author

N86-23560*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATIC INTERNAL PERFORMANCE OF A THRUST VECTORING AND REVERSING TWO-DIMENSIONAL CONVERGENT-DIVERGENT NOZZLE WITH AN AFT FLAP
Richard J. Re and Laurence D. Leavitt Apr. 1986 113 p refs
(NASA-TP-2549; L-16025; NAS 1.60:2549) Avail: NTIS
HC A06/MF A01 CSCL 01A

The static internal performance of a multifunction nozzle having some of the geometric characteristics of both two-dimensional convergent-divergent and single expansion ramp nozzles has been investigated in the static-test facility of the Langley 16-Foot Transonic Tunnel. The internal expansion portion of the nozzle consisted of two symmetrical flat surfaces of equal length, and the external expansion portion of the nozzle consisted of a single aft flap. The aft flap could be varied in angle independently of the upper internal expansion surface to which it was attached. The effects of internal expansion ratio, nozzle thrust-vector angle (-30 deg. to 30 deg., aft flap shape, aft flap angle, and sidewall containment were determined for dry and afterburning power settings. In addition, a partial afterburning power setting nozzle, a fully deployed thrust reverser, and four vertical takeoff or landing nozzle, configurations were investigated. Nozzle pressure ratio was varied up to 10 for the dry power nozzles and 7 for the afterburning power nozzles. Author

N86-23561*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERODYNAMIC CHARACTERISTICS OF A SUPERSONIC FIGHTER AIRCRAFT MODEL AT MACH 0.40 TO 2.47
Francis J. Capone, E. Ann Bare, and Dorothy Arbiter (George Washington Univ., Hampton, Va.) Apr. 1986 105 p refs
(NASA-TP-2580; L-16017; NAS 1.60:2580) Avail: NTIS
HC A06/MF A01 CSCL 01A

The aerodynamic characteristics of an advanced twin-engine fighter aircraft designed for supersonic cruise have been studied in the Langley 16-Foot Transonic Tunnel and the Lewis 10- by 10-Foot Supersonic Tunnel. The objective of this investigation was to establish an aerodynamic data base for the configuration with flow-through nacelles and representative inlets. The use of a canard for trim and the effects of fairing over the inlets were assessed. Comparisons between experimental and theoretical results were also made. The theoretical results were determined by using a potential vortex lift code for subsonic speeds and a linear aerodynamic code for supersonic speeds. This investigation was conducted at Mach numbers from 0.40 to 2.47, at angles of attack from 0 deg to about 20 deg, and at inlet capture ratios of about 0.5 to 1.4. Author

N86-23562*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF UPPER-SURFACE NACELLES ON LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF HIGH-WING TRANSPORT CONFIGURATION
Lawrence E. Putnam Apr. 1986 70 p refs
(NASA-TP-2579; L-16062; NAS 1.60:2579) Avail: NTIS
HC A04/MF A01 CSCL 01A

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to determine the effects of installing and streamline contouring upper-surface nacelles on the longitudinal aerodynamic characteristics of a high-wing transport configuration. Also investigated were the effects of adding a fairing under the nacelle. The investigation was conducted at free-stream Mach numbers from 0.60 to 0.83 at angles fo attack from -2 deg to 4 deg. Flow-through nacelles were used. Streamline contouring the nacelles substantially reduced the interference drag due to installing the nacelles. Author

N86-23563*# Sverdrup Technology, Inc., Cleveland, Ohio.
AN LU IMPLICITY SCHEME FOR HIGH SPEED INLET ANALYSIS Final Report
Seokkwan Yoon and Antony Jameson (Princeton Univ., N.J.) Apr. 1986 17 p refs Prepared for presentation at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; cosponsored by AIAA, ASME, SAE, ASEE

(Contract NAS3-24105)
(NASA-CR-175098; NAS 1.26:175098; AIAA-86-1520) Avail: NTIS
HC A02/MF A01 CSCL 01A

A numerical method is developed to analyze the inviscid flowfield of a high speed inlet by the solution of the Euler equations. The lower-upper implicit scheme in conjunction with adaptive dissipation proves to be an efficient and robust nonoscillatory shock capturing technique for high Mach number flows as well as for transonic flows. Author

N86-23564*# Vanderbilt Univ., Nashville, Tenn. Dept. of Mechanical and Materials Engineering.
COMMENTARY ON THE 1985 NASA/VANDERBILT SYMPOSIUM ON FUTURE HYPERVELOCITY FLIGHT REQUIREMENTS Semiannual Status Report, 1 Sep. 1985 - 28 Feb. 1986
J. Leith Potter 1 Mar. 1986 16 p refs
(Grant NAG1-549)
(NASA-CR-176747; NAS 1.26:176747; SASR-2) Avail: NTIS
HC A02/MF A01 CSCL 01A

The discussion, started in Semiannual Status Report Number 1, on aerothermal problems of hypervelocity flight and experiments that may lead to significant improvements in analytical/computational predictive methods, continues. The commentary is based on presentations made by speakers at a symposium on this subject held in December 1985. Symposium participants focused on the serious deficiencies that exist in knowledge of real-gas, nonequilibrium thermochemical-kinetic processes, catalytic processes, surface and shock slip, gas/surface interaction, boundary layer transition, and vortical leeside flows under hypervelocity conditions. Programs of laboratory research and computations leading toward in-flight experiments were recommended. Feasibility of appropriate measurement techniques for the flight environment was assessed and problems for study in that area identified. A synopsis of the oral presentations is given. Author

N86-23565*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
USER'S GUIDE FOR NASCRIN: A VECTORIZED CODE FOR CALCULATING TWO-DIMENSIONAL SUPERSONIC INTERNAL FLOW FIELDS
Ajay Kumar Feb. 1984 70 p
(NASA-TM-85708; L-15678; NAS 1.15:85708) Avail: NTIS
HC A04/MF A01 CSCL 01A

A computer program NASCRIN has been developed for analyzing two-dimensional flow fields in high-speed inlets. It solves the two-dimensional Euler or Navier-Stokes equations in conservation form by an explicit, two-step finite-difference method. An explicit-implicit method can also be used at the user's discretion for viscous flow calculations. For turbulent flow, an algebraic, two-layer eddy-viscosity model is used. The code is operational on the CDC CYBER 203 computer system and is highly vectorized to take full advantage of the vector-processing capability of the system. It is highly user oriented and is structured in such a way that for most supersonic flow problems, the user has to make only a few changes. Although the code is primarily written for supersonic internal flow, it can be used with suitable changes in the boundary conditions for a variety of other problems. Author

N86-23566*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOCALLY LINEARIZED LONGITUDINAL AND LATERAL-DIRECTIONAL AERODYNAMIC STABILITY AND CONTROL DERIVATIES FOR THE X-29A AIRCRAFT
Gerald D. Budd Jan. 1984 480 p
(NASA-TM-84919; H-1203; NAS 1.26:84919) Avail: NTIS
HC A21/MF A01 CSCL 01A

The locally linearized longitudinal and lateral-directional aerodynamic stability and control derivatives for the X-29A aircraft were calculated for altitudes ranging from sea level to 50,000 ft, Mach numbers from 0.2 to 1.5, and angles of attack from -5 deg to 25 deg. Several other parameters were also calculated, including aerodynamic force and moment coefficients, control face position, normal acceleration, static margin, and reference angle of attack. Author

N86-23567*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GEOMETRIC AND STRUCTURAL PROPERTIES OF A RECTANGULAR SUPERCRITICAL WING OSCILLATED IN PITCH FOR MEASUREMENT OF UNSTEADY TRANSONIC PRESSURE DISTRIBUTIONS
Rodney H. Ricketts, Judith J. Watson, Maynard C. Sandford, and David A. Seidel Nov. 1983 19 p refs
(NASA-TM-85673; NAS 1.15:85673) Avail: NTIS
HC A02/MF A01 CSCL 01A

Wind-tunnel tests to measure unsteady aerodynamic data in the transonic region have been completed on an aspect ratio 2.0 rectangular wing with a supercritical airfoil. The geometric and structural properties of the wing are presented. (Other references contain the measured aerodynamic data.) Both measured and design airfoil coordinates are presented and compared. In addition, measured wing bending and torsional stiffness distributions and some trailing-edge flexibility influence coefficients are presented. Author

N86-23568*# Analytical Methods, Inc., Redmond, Wash.
INVESTIGATION TO ADVANCE PREDICTION TECHNIQUES OF THE LOW-SPEED AERODYNAMICS OF V/STOL AIRCRAFT
B. Maskew, D. Strash, J. Nathman, and F. A. Dvorak Feb. 1985 153 p refs
(Contract NAS2-11169)
(NASA-CR-166479; NAS 1.26:166479) Avail: NTIS
HC A08/MF A01 CSCL 01A

A computer program, VSAERO, has been applied to a number of V/STOL configurations with a view to advancing prediction techniques for the low-speed aerodynamic characteristics. The program couples a low-order panel method with surface streamline calculation and integral boundary layer procedures. The panel method--which uses piecewise constant source and doublet panels-includes an iterative procedure for wake shape and models boundary layer displacement effect using the source transpiration technique. Certain improvements to a basic vortex tube jet model were installed in the code prior to evaluation. Very promising results were obtained for surface pressures near a jet issuing at 90 deg from a flat plate. A solid core model was used in the initial part of the jet with a simple entrainment model. Preliminary representation of the downstream separation zone significantly improve the correlation. The program accurately predicted the pressure distribution inside the inlet on the Grumman 698-411 design at a range of flight conditions. Furthermore, coupled viscous/potential flow calculations gave very close correlation with experimentally determined operational boundaries dictated by the onset of separation inside the inlet. Experimentally observed degradation of these operational boundaries between nacelle-alone tests and tests on the full configuration were also indicated by the calculation. Application of the program to the General Dynamics STOL fighter design were equally encouraging. Very close agreement was observed between experiment and calculation for the effects of power on pressure distribution, lift and lift curve slope. Author

N86-23569*# Rockwell International Science Center, Thousand Oaks, Calif.
NONLINEAR POTENTIAL ANALYSIS TECHNIQUES FOR SUPERSONIC-HYPERSONIC AERODYNAMIC DESIGN
V. Shankar and W. C. Clever 7 Mar. 1984 57 p refs
(NASA-CR-172299; NAS 1.26:172299) Avail: NTIS
HC A04/MF A01 CSCL 01A

Approximate nonlinear inviscid theoretical techniques for predicting aerodynamic characteristics and surface pressures for relatively slender vehicles at supersonic and moderate hypersonic speeds were developed. Emphasis was placed on approaches that would be responsive to conceptual configuration design level of effort. Second order small disturbance and full potential theory was utilized to meet this objective. Numerical codes were developed for relatively general three dimensional geometries to evaluate

the capability of the approximate equations of motion considered. Results from the computations indicate good agreement with experimental results for a variety of wing, body, and wing-body shapes. Author

N86-23570# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
VALIDATION OF USAF STABILITY AND CONTROL DATCOM METHODOLOGIES FOR STRAIGHT-TAPERED SWEPTFORWARD WINGS Final Report, 1 Nov. 1980 - 30 Apr. 1984
Daniel G. Sharpes Jul. 1985 211 p
(AF Proj. 2403)
(AD-A161876; AFWAL-TR-84-3084) Avail: NTIS
HC A10/MF A01 CSCL 20/4

A detailed review of USAF Stability and Control Datcom methodologies was conducted to determine their validity for application to straight tapered, sweptforward wing configurations. To the extent possible the format found in the Datcom is repeated in this report. Several methods were modified to enable more accurate coefficient prediction (e.g., Wing Zero-Lift Angle of Attack, Downwash and Yawing Moment due to Yaw Rate) irrespective of sweep sign. At supersonic speeds, the reversibility theorem enabled most methodologies to be used without any modifications to account for sweptforward leading-edge designs. For the methodologies validated, sweptforward-wing estimation results were generally as accurate as the sweptback-wing results presented in the Datcom. Unfortunately, lack of test data prevented validation of several empirical methodologies (e.g., Subsonic High Angle-of-Attack Pitching Moment and Transonic Pitching Moment). No estimation methodologies are proposed in these cases. Author (GRA)

N86-23571# Oklahoma Univ., Norman. School of Aerospace Mechanical and Nuclear Engineering.
OPTIMIZATION OF TIP STORE MODELING Final Report, May 1983 - Sep. 1984
Alfred G. Striz and Sun-Kuk Jang Mar. 1985 105 p
(Grant AF-AFOSR-0184-83)
(AD-A162119; AFOSR-85-1089TR) Avail: NTIS
HC A06/MF A01 CSCL 20/4

Due to the high cost of performing detailed three-dimensional flutter analyses for aircraft which are carrying large numbers and types of external stores, it is often not economically feasible to include sophisticated store aerodynamics especially when they will not cause significant changes to the flutter results. Thus, the stores are presently often modeled as simple flat plates. This tends to decrease the accuracy of the computed pressure distributions as the spanwise flow field and the wing-body interaction are not represented correctly. In this report, therefore, two methods, a doublet lattice method for subsonic flow and a kernel function method for subsonic and supersonic flow are used for the computation of unsteady pressure distributions and forces on an F-5 wing with a tip mounted launcher/store combination for various store models consisting of simple flat plates, endplated, and axisymmetric bodies. The resulting aerodynamic data are compared to existing experimental and numerical results for the same wing/store combination. The store modeling was optimized for simplicity and accuracy with respect to the aerodynamic forces and pressures. The wing-body interaction was improved without a considerable increase in complexity, i.e., panel number, and thus computational effort. Author (GRA)

N86-23572# Indiana Univ.-Purdue Univ., Indianapolis. School of Engineering and Technology.
A ZONAL APPROACH TO THE DESIGN OF FINITE ELEMENT GRIDS FOR 3-D TRANSONIC FLOWS WITH COMPLEX GEOMETRIES Annual Report, 1 Jun. 1983 - 30 Jun. 1985
Akin Ecer 30 Jun. 1985 98 p
(Contract F49620-83-K-0034)
(AD-A162168; AFOSR-85-1061TR) Avail: NTIS
HC A05/MF A01 CSCL 20/4

A block-structured solution scheme is developed for the analysis of three-dimensional transonic flows. The scheme is based on the solution of potential flow equations for individual blocks representing part of the flow field. Based on a previously developed block-structured grid generation scheme, appropriate computational grids are generated for each of the blocks depending on the complexity of the local flow field. The equations are then solved to provide a solution of a large problem in terms of an assembly of smaller problems for each block. Numerical results illustrate the applicability of the method for a three-dimensional flow field around a wing profile (NACA0012). Different block structures are analyzed to demonstrate the robustness and the accuracy of the developed method. Finally a three-dimensional wing-body configuration is analyzed and the results are compared with previously obtained single block solutions. The method is expandable to the solution of Euler and Navier-Stokes equations. It is also suited to be executed in a parallel processing environment. GRA

N86-23573# Boeing Commercial Airplane Co., Seattle, Wash.
COUPLING LINEARIZED FAR-FIELD BOUNDARY CONDITIONS WITH NONLINEAR NEAR-FIELD SOLUTIONS IN TRANSONIC FLOW Annual Report, 1 Jul. 1983 - 1 Feb. 1985
William S. Rowe and F. E. Ehlers 1 Feb. 1985 82 p
(Contract F49620-83-C-0118)
(AD-A162334; D6-52895; AFOSR-85-1082TR) Avail: NTIS
HC A05/MF A01 CSCL 20/4

This investigation evaluated the feasibility of coupling linearized far-field finite differencing equations to reduce the size of grid networks required in present transonic flow calculations. A procedural change to an existing finite differencing program involved distributing sources on the solution interface boundary in order to develop the proper far-field outgoing wave boundary condition on a reduced size grid network. Validation of the modification procedure was established for zero thickness airfoils by comparing predicted two-dimensional results with results obtained from an exact procedure. A criterion based on the gradient of the flow field Mach number was developed for use in establishing the minimum size grid network necessary for accurate finite thickness unsteady loading predictions. Acceptable loading predictions were achieved for a nominal 5:1 gridsize reduction ratio with a 40% reduction in computer usage costs. GRA

N86-23574# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERODYNAMICA SINICA (SELECTED ARTICLES)
Mingke Huang, Shijun Luo, Huili Shen, Minggang Ji, and Zongwen Xing 22 Nov. 1985 95 p Transl. into ENGLISH from Zhongguo Quiliu Dongli Xue (China), no. 2, 66-72, 78-82, 87-92, 1984 p 19-40
(AD-A162351; FTD-ID(RS)T-0493-85) Avail: NTIS
HC A05/MF A01 CSCL 20/4

A Fast Algorithm of the Finite Difference Method for the Computation of the Transonic flow Past an Arbitrary Air foil with the Conservation of the Full Potential Equation; A Mixed Finite Difference Analysis of the Internal and External Transonic Flow Fields of Center Cone Inlet; Numerical Method for Viscous Shock-layer near the Stagnation Line of a Blunt Body; The Perfection and Application of the Flutter Subcritical Response Analysis; Calculation of Octagonal Wall Interference Factor Using Conformal Mapping; and Cryogenic High Reynolds Number Transonic Wind Tunnel with Pre-cooled and Restricted Flow. GRA

N86-23575# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERODYNAMICA SINICA (SELECTED ARTICLES)
Fenggan Zhuang, Hanxin Zhang, Guocan Ling, Shauwen Xiung, and Peiye Zhu 5 Dec. 1985 182 p Transl. into ENGLISH from Konggi Donglixue Xuebao (China), no. 4, 1984 p 1-4; 21-33; 41-97
(AD-A162993; FTD-ID(RS)T-0639-85) Avail: NTIS
HC A09/MF A01 CSCL 20/4

Titles include: Advances in the Study of Separated Flows; Problems in Discrete Vortex Numerical Modelling of Vortex Motion behind a Circular Cylinder; Calculation of Slender Delta Wing with Leading-edge Separation by Quasi-vortex-lattice Method; Calcula-

tion of Flow around Thick Wing with Separation Vortices; Split Coefficient Matrix Difference Method for Supersonic Three-dimensional Flow; Some Characteristics of the FLIC Method and Its Application to Calculation of Pitot Pressure of Dusty-Gas Shock Tube Flow; Experimental Investigation of Flap Turbulent Heat Transfer and Pressure Characteristics in Hypersonic Flow; Laser Doppler Anemometer Measurements for Leading Edge Vortex Core Velocity of a Strake-wing; Experimental Research of Boundary Layer Control Technique for Low Speed Multi-component Airfoils; A Simpler Implicit Method to Solve N-S Equation; Numerical Calculation of Separation Flow over Severely Indented Blunt Body; Implicit Technique for Calculating Separated Base Flow; Computation of Compressible Turbulent Separated Boundary Layer; Inverse Boundary Layer Method for Separated Flow; Wall Lift Interference Corrections in Ground Effect Testing. (Translations; China; Chinese language) GRA

N86-23576# Technische Hochschule, Darmstadt (West Germany). Fachgebeit Aerodynamik und Messtechnik.
INVESTIGATIONS IN THE FLOW FIELD OF AIRFOILS WITH VARIOUS GEOMETRIES IN THE DOMAIN OF HIGH ANGLES OF ATTACK. EXPERIMENTAL INVESTIGATIONS Final Report [UNTERSUCHUNGEN IM STROEMUNGSFELD VON FLUEGELN VERSCHIEDENER GEOMETRIE IM HOHEN ANSTELLWINKELBEREICH. EXPERIMENTELLE UNTERSUCHUNGEN]
Werner Moeller 2 Sep. 1985 111 p refs In GERMAN
(Contract DFG-Ha-514/63-2)
(Rept-A-13/85) Avail: NTIS HC A06/MF A01

A measuring system to determine flow fields of airfoils was developed. Pressure distribution measurements and pictures were taken to characterize all flight conditions in the domain of high angles of attack where flow separation phenomena are very important. The developed direct flow field measuring system uses hot-wire anemometry and enables the investigation of three-dimensional separation effects on an arrow wing. The results provide important information about the separation behavior of such wings and fundamentals for the development and testing of theoretical methods to calculate separated wing flow. Author (ESA)

N86-23859# Ochanomizu Women's Univ., Tokyo (Japan).
INTERACTIONS OF VORTICES
Yuko Oshima *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 3-15 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

N86-23860# Tokyo Univ. (Japan).
NUMERICAL STUDY OF TWO-DIMENSIONAL VORTEX STREET
Kazuhiro Tsuboi and Koichi Oshima *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 17-30 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

N86-23862# Tokyo Univ. (Japan).
NUMERICAL SIMULATION OF VORTICES SHED BEHIND A ROTATING WING
Naoki Izutsu and Hidesada Kanda (IBM Japan, Ltd.) *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 43-50 refs Sponsored in part by IBM Japan, Ltd. (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-23577*# Sverdrup Technology, Inc., Cleveland, Ohio.
ANALYTICAL DETERMINATION OF PROPELLER PERFORMANCE DEGRADATION DUE TO ICE ACCRETION Final Report
Thomas L. Miller Apr. 1986 138 p refs
(Contract NAS3-24105)
(NASA-CR-175092; NAS 1.26:175092) Avail: NTIS HC A07/MF A01 CSCL 01C

A computer code has been developed which is capable of computing propeller performance for clean, glaze, or rime iced propeller configurations, thereby providing a mechanism for determining the degree of performance degradation which results from a given icing encounter. The inviscid, incompressible flow field at each specified propeller radial location is first computed using the Theodorsen transformation method of conformal mapping. A droplet trajectory computation then calculates droplet impingement points and airfoil collection efficiency for each radial location, at which point several user-selectable empirical correlations are available for determining the aerodynamic penalities which arise due to the ice accretion. Propeller performance is finally computed using strip analysis for either the clean or iced propeller. In the iced mode, the differential thrust and torque coefficient equations are modified by the drag and lift coefficient increments due to ice to obtain the appropriate iced values. Comparison with available experimental propeller icing data shows good agreement in several cases. The code's capability to properly predict iced thrust coefficient, power coefficient, and propeller efficiency is shown to be dependent on the choice of empirical correlation employed as well as proper specification of radial icing extent. Author

N86-23578# Luftfahrt-Bundesamt, Brunswick (West Germany). Flugunfalluntersuchungsstelle.
RESULTS OF THE TECHNICAL INVESTIGATION OF ACCIDENTS DURING THE OPERATION OF GERMAN AIRCRAFT AT HOME AND ABROAD, AND OF FOREIGN AIRCRAFT IN GERMANY Annual Report, 1982 [ERGEBNISSE DER FACHLICHEN UNTERSUCHUNG VON UNFAELLEN BEI DEM BETRIEB DEUTSCHER LUFTFAHRZEUGE IM IN- UND AUSLAND SOWIE AUSLAENDISCHE LUFTFAHRZEUGE IM INLAND]
Jul. 1985 119 p In GERMAN
Avail: NTIS HC A06/MF A01

All aircraft accidents since January 1, 1973 were analyzed. Standardized tables giving a general overview are presented. Special statistics can be provided, for which selection criteria and table parameters can be freely chosen. Author (ESA)

N86-23579# Deutsche Lufthansa Aktiengesellschaft, Cologne (West Germany).
[DIGEST OF THE DEUTSCHE LUFTHANSA REPORT, 1984] Annual Report, 1984
1984 22 p
(ISSN-0415-603X) Avail: NTIS HC A02/MF A01

The economic status of the Lufthansa airline for the fiscal year 1984 is summarized. Company policy is outlined. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-23580 Department of the Air Force, Washington, D.C.
GLIDE SLOPE INDICATOR SYSTEM Patent
Ivan S. Wyatt and Harry L. Task, inventors (to Air Force) Issued

19 Nov. 1985 6 p Supersedes AD-D010173
(AD-D012077; US-Patent-4,554,543; US-Patent-Appl-SN-473392; US-Patent-Class-340-948) Avail: US Patent and Trademark Office CSCL 01/5

A glide slope indicator system in which light from an incoming aircraft's landing light is shaped by spherical/cylindrical lens combination into a line image which strikes a linear photodiode array. By determining which photodiode in the array the center of the line image strikes, the glide slope angle can be determined. An appropriate signal is communicated to the pilot via a pair of indicator lights mounted on the runway depending upon whether the aircraft is above, below or on the desired glide slope angle. GRA

N86-23581# IIT Research Inst., Annapolis, Md.
THE IMPACT OF A TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM ON THE AIR TRAFFIC CONTROL RADAR BEACON SYSTEM AND THE MODE S SYSTEM IN THE LOS ANGELES BASIN Final Report, 15 Jan. 1981 - 15 Jul. 1984
May 1985 133 p refs Prepared in part for Electromagnetic Compatability Analysis Center, Annapolis, Md.
(Contract F19628-80-C-0042)
(FAA-PM-84-30; ECAC-PR-84-003) Avail: NTIS HC A07/MF A01

An analysis was performed to predict the impact of the Traffic Alert and Collision Avoidance System (TCAS) on the performance of selected air traffic control and surveillance systems in the Los Angeles Basin. The predictions involved the impact of minimum TCAS II (TCAS II M) on both the Air Traffic Control Radar Beacon System (ATCRBS) interrogator at Long Beach, and a hypothetical Mode S sensor at Los Angeles (LAX-4), as well as the impact of the combined TCAS I and TCAS II M signal environment on the Long Beach ATCRBS interrogator. These predictions were made using a hypothetical peak Los Angeles Basin airborne deployment and subsets of that deployment. Author

N86-23582# Lear Siegler, Inc., Grand Rapids, Mich.
PRELIMINARY HAZARD ANALYSIS FOR SELF-CONTAINED NAVIGATION SYSTEM
J. T. Reeves 4 Oct. 1985 18 p
(Contract F09603-85-C-1224)
(AD-A161883; MISC-2037) Avail: NTIS HC A02/MF A01 CSCL 17/7

This document constitutes the Preliminary Hazard Analysis (PHA) for the C-130 Self-Contained Navigation System (SCNS) installation. It provides an initial risk assessment of the SCNS installation. The purpose of the PHA is to identify safety critical areas, evaluate hazards, and identify the safety design criteria to be used. The items covered in this analysis are to be used during the design phase and trade-off study period to prevent unsafe concepts, designs, or oversights that could lead to incorporation of hazards in the hardware, the system operation, handling, and maintenance. The scope of this analysis for Data Item 0103 is limited to the SCNS installation task A-kit components (viz wiring harness, brackets, racks, control panels, relay boxes, circuit breakers), B-kit components (e.g., ICDUs, BICU, DVS, INU), and the physical interfaces with existing equipment (e.g., CADC or Sensors, Radar, Air Data Sensors). These items will be analyzed in respect to safe installation, safe hardware, and safe usuage (e.g., installation, removal, in-place test, and handling). GRA

N86-23583# Air Force Armament Lab., Eglin AFB, Fla.
PROCEEDINGS OF THE 12TH BIENNIAL GUIDANCE TEST SYMPOSIUM HELD AT HOLLOMAN AFB, NEW MEXICO ON 22-24 OCTOBER 1985, VOLUME 1
Kenneth S. Morgan, Patricia Romanowski, L. Vallot, G. Stein, and D. Enns 15 Oct. 1985 252 p Symposium held at Holloman AFB, N. Mex., 22-24 Oct. 1985
(AD-A161990; AD-TR-85-54-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 17/7

These proceedings contain papers which were presented at the Twelfth Biennial Guidance Test Symposium. This symposium, hosted by the Central Inertial Guidance Test Facility, Holloman Air Force Base, New Mexico on 22 to 24 Oct. 1985, was directed toward the exchange of information, stimulation of new ideas, and discussion of current techniques associated with the development and evaluation of inertial guidance and navigation systems. The papers presented included such topics as new test and calibration techniques for accelerometers and ring laser gyros, advances in flight reference systems, new test equipment, and new software developments. Papers presented in the classified portion of the symposium are published as Volume 2. Critical technology papers are published as Volume 3. Author (GRA)

N86-23584# Department of the Navy, Washington, D. C.
AN APPARATUS FOR AND A METHOD OF DETERMINING COMPASS HEADINGS Patent Application
Daniel G. Jablonski, inventor (to Navy) Filed 24 Jun. 1985 12 p
(AD-D012051; US-Patent-Appl-SN-748248) Avail: NTIS HC A02/MF A01 CSCL 17/3

A compass system and method incorporating a global positioning system (GPS), such as the NAVSTAR/GPS multisatellite system, is configured to acquire accurate compass heading information without being affected by magnetic anomalies and without being dependent on the elapsed time since a previous position fix. The compass system comprises, inter alia, two antenna/preamplifiers located, for example, fore and aft a ship or aircraft separated by a predetermined distance d. A microprocessor/minicomputer portion of the system causes an electronic coaxial switch to switch a GPS receiver between the two antenna/preamplifiers automatically thereby measuring their absolute positions. The microprocessor/minicomputer computes and displays on a display unit a compass heading based on the knowledge of the absolute positions of the antenna/preamplifiers and the distance d there between. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-23585 Fraunhofer-Inst. fuer Betriebsfestigkeit, Darmstadt (West Germany).
STANDARDIZED FATIGUE LOADING SEQUENCES FOR HELICOPTER ROTORS (HELIX AND FELIX). PART 1: BACKGROUND AND FATIGUE EVALUATION. PART 2: FINAL DEFINITION OF HELIX AND FELIX
D. Schuetz, H.-G. Koebler, W. Schuetz (Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn, West Germany), M. Hueck (Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn, West Germany), J. B. deJonge (NLR, Emmeloord, Netherlands), A. A. tenHave (NLR, Emmeloord, Netherlands), F. Och (Messerschmitt-Boelkow-Blohm G.m.b.H., Munich, West Germany), G. Daske (Messerschmitt-Boelkow-Blohm G.m.b.H., Munich, West Germany), P. R. Edwards, comp. (RAE, Farnborough, England), J. Darts, comp. (RAE, Farnborough, England) et al 1985 235 p refs Sponsored by Bundesministerium fuer Forschung und Technologie
(LBF-FB-167; IABG-TF-1425/1; IABG-TF-1425/2; NLR-TR-84043-U-Pt-1; NLR-TR-84043-U-Pt-2; RAE-TR-84084; RAE-TR-84085; ISSN-0721-5320) Copyright. Avail: Issuing Activity

The Helix and Felix standard loading sequences for the main rotors of helicopters with articulated and semirigid rotors respectively are described. The definition of Helix and Felix, statistical content according to different counting methods, and the results of fatigue tests used to assess them are outlined. The defined form of the two standards is given in full length and shortened versions. The method of generation is extremely simple, although a considerable amount of data is required for the generation algorithm. A FORTRAN program for this purpose, together with complete data tables in the correct format, are presented. Author (ESA)

N86-23586*# Lightning Technologies, Inc., Pittsfield, Mass.
LIGHTNING PROTECTION GUIDELINES AND TEST DATA FOR ADHESIVELY BONDED AIRCRAFT STRUCTURES Final Report
J. E. Pryzby and J. A. Plumer Washington NASA Jan. 1984 175 p refs
(Contract NAS1-15884)
(NASA-CR-3762; NAS 1.26:3762; LT-83-155) Avail: NTIS HC A08/MF A01 CSCL 01C

The highly competitive marketplace and increasing cost of energy has motivated manufacturers of general aviation aircraft to utilize composite materials and metal-to-metal bonding in place of conventional fasteners and rivets to reduce weight, obtain smoother outside surfaces and reduce drag. The purpose of this program is protection of these new structures from hazardous lightning effects. The program began with a survey of advance-technology materials and fabrication methods under consideration for future designs. Sub-element specimens were subjected to simulated lightning voltages and currents. Measurements of bond line voltages, electrical sparking, and mechanical strength degradation were made to comprise a data base of electrical properties for new technology materials and basic structural configurations. The second base of the program involved tests on full scale wing structures which contained integral fuel tanks and which were representative of examples of new technology structures and fuel systems. The purpose of these tests was to provide a comparison between full scale structural measurements and those obtained from the sub-element specimens. Author

N86-23587*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MINIMUM TIME AND FUEL FLIGHT PROFILES FOR AN F-15 AIRPLANE WITH A HIGHLY INTEGRATED DIGITAL ELECTRONIC CONTROL (HIDEC) SYSTEM
Edward A. Haering, Jr. and Frank W. Burcham, Jr. Jun. 1984 25 p refs
(NASA-TM-86042; H-1242; NAS 1.15:86042) Avail: NTIS HC A02/MF A01 CSCL 01C

A simulation study was conducted to optimize minimum time and fuel consumption paths for an F-15 airplane powered by two F100 Engine Model Derivative (EMD) engines. The benefits of using variable stall margin (uptrim) to increase performance were also determined. This study supports the NASA Highly Integrated Digital Electronic Control (HIDEC) program. The basis for this comparison was minimum time and fuel used to reach Mach 2 at 13,716 m (45,000 ft) from the initial conditions of Mach 0.15 at 1524 m (5000 ft). Results were also compared to a pilot's estimated minimum time and fuel trajectory determined from the F-15 flight manual and previous experience. The minimum time trajectory took 15 percent less time than the pilot's estimate for the standard EMD engines, while the minimum fuel trajectory used 1 percent less fuel than the pilot's estimate for the minimum fuel trajectory. The F-15 airplane with EMD engines and uptrim, was 23 percent faster than the pilot's estimate. The minimum fuel used was 5 percent less than the estimate. Author

N86-23588*# Computer Sciences Corp., Hampton, Va.
IMPROVEMENTS TO THE FATOLA COMPUTER PROGRAM INCLUDING ADDED ACTIVELY CONTROLLED LANDING GEAR SUBROUTINES Final Report
G. H. Mall Apr. 1983 217 p
(Contract NAS1-16078)
(NASA-CR-166069; NAS 1.26:166069; TAO-33842) Avail: NTIS HC A10/MF A01 CSCL 01C

Modifications to a multi-degree-of-freedom flexible aircraft take-off and landing analysis (FATOLA) computer program, including a provision for actively controlled landing gears to expand the programs simulation capabilities, are presented. Supplemental instructions for preparation of data and for use of the modified program are included. Author

N86-23589# Hover Systems Federal Corp., Eddystone, Pa.
AFTER ACTION REPORT, CH-47 RECOVERY USING D-PAAC Report, 13 - 21 Jul. 1985
Jul. 1985 29 p
(Contract DAAK70-85-C-0014)
(AD-A161935) Avail: NTIS HC A03/MF A01 CSCL 13/2

On 12 July 1985, a request was made for use of the D-PAAC in a recovery operation for a crashed CH-47D, which had crashed in a fish and wildlife management area on the New Jersey shore near the Delaware river. Recovery operations were to be conducted with minimal damage to the environment and as quickly as possible. This report will cover the period from 13 to 21 July and will address the period in three sections. The first will cover preparation and movement from Duck, N.C., to Chester, Pa. The second will cover preparation at Chester, Pa., and movement to the crash site. The third will cover operations at the crash site and movement out of the area. The D-PAAC operated on cushions at all times. the concept of using air cushion craft for heavy lift recovery operations in terrain which offers no other accessibility was partially validated. Also, the feasibility of towing an air cushion vehicle over water by conventional tug in an inland waterway operation was proven. It must also be concluded that improved propulsion means are required as well as some self-recovery capability (on-board winch) to improve useability of future craft similiar to the D-PAAC. GRA

N86-23590# Naval Research Lab., Washington, D. C.
ELECTROSTATIC CHARGING OF THE CH-53E HELICOPTER
R. E. Pechacek, J. R. Greig, D. P. Murphy, and J. Spelz 29 Nov. 1985 48 p
(F41-411)
(AD-A161936; NRLMR-5676) Avail: NTIS HC A03/MF A01 CSCL 01/3

The effects of electrostatic charging on the CH-53E helicopter were examined. Measurements were made over a clean runway and over sandy terrain in basically desert conditions where electrostatic charging is known to be a problem. While the measured charging current (up to approx. 75 microAmp) and open circuit voltages (up to approx. 140 kV) cannot be claimed as maximum values attainable by the CH-53E, they show that the CH-53E is affected by electrostatic charging in much the same way as all other helicopters. Furthermore the range of data recorded in these tests has allowed us to formulate a model for the electrostatic charging of a hovering helicopter in both clean air and sandy air situations. This model is consistent with our own data and recorded prior experience with electrostatic charging of helicopters. It predicts that the CH-53E can readily attain short circuit currents of approx. 300 microAmp and open circuit voltages of approx. 400 kV. GRA

N86-23591# Army Science Board, Washington, D.C.
THE US ARMY'S LHX (LIGHT HELICOPTER FAMILY) PROGRAM Final Report, 1983 - 1984
Wesley L. Harris, John Blair, Gilbert F. Decker, and Robert L. McDaniel Dec. 1984 50 p
(AD-A161949) Avail: NTIS HC A03/MF A01 CSCL 01/3

Observations, analysis, conclusions and recommendations of the AHSG on selected critical issues related to the Army's LHX aircraft program are described. The basis of LHX, LHX program management, technology risk assessment, speed, and one versus two-man flight crew are discussed in the initial sections of this report. These issues constitute the more fundamental aspects of the Army's LHX program which were reviewed by the AHSG. Primary and secondary conclusions and recommendations are presented. Finally, a discussion of specific technologies and Army aviation programs is given in the appendices to this report. The discussion of each of these technologies and programs includes the AHSG's recommendations and conclusions on the same. A set of attachments follows the appendices. GRA

N86-23592# Drexel Univ., Philadelphia, Pa. Dept. of Materials Engineering.
A FUNDAMENTAL STUDY OF DROPLET IMPINGEMENT, SPREADING AND CONSOLIDATION Annual Report, 1 Jul. 1984 - 30 Jun. 1985
D. Apelian, A. Lawley, G. Gillen, and P. Mathur 1 Sep. 1985

32 p
(Contract N00014-84-K-0472)
(AD-A162035; TR-1) Avail: NTIS HC A03/MF A01 CSCL 07/1

Spray forming in the Osprey mode is a process in which gas atomized molten metal droplets are interrupted in flight by impingement on a substrate to form a relatively thick deposit. The overall objective of this research program is to develop a fundamental processing science base for the process. To this end, concurrent experimental and modeling studies focus on droplet velocity and temperature profiles, the mechanism(s) of droplet-substrate interactions, droplet spreading on impact and droplet solidification, and the relationship between process parameters and microstructural integrity of the deposit. On-going experimental studies are reviewed and some preliminary results of the modeling work are presented. GRA

N86-23593# Naval Postgraduate School, Monterey, Calif.
A SYSTEMS ENGINEERING METHODOLOGY FOR THE ADVANCED TACTICAL AIRCRAFT M.S. Thesis
Stephen J. Kapurch Sep. 1985 89 p
(AD-A162049) Avail: NTIS HC A05/MF A01 CSCL 05/1

The increasing specialization of the aerospace industry coupled with the technical complexity of new systems has caused emphasis to be placed on a systematic and logical methodology to design, develop, and produce new products. A systems engineering model to integrate functional management areas with organizational activities in the Advanced Tactical Aircraft program is presented. Special emphasis is placed in applying this systems approach throughout the life cycle of a project. A general methodology and a synopsis of principles are provided which might be utilized in the development of a systems engineering program. GRA

N86-23594# Sikorsky Aircraft, Stratford, Conn. Sikorsky Aircraft Div.
ADVANCED TECHNOLOGY HELICOPTER LANDING GEAR PRELIMINARY DESIGN INVESTIGATION Final Report, 1983 - 1984
D. Lowry Oct. 1985 135 p
(Contract DAAK51-83-C-0040; DA Proj. 1L1-62209-AH-76)
(AD-A162097; SER-510148; USAAVSCOM-TR-85-D-4) Avail: NTIS HC A07/MF A01 CSCL 01/3

A preliminary design investigation has been performed to develop weight and cost sensitivities of various landing gear systems for a 10,000-pound class LHX helicopter. Weights are established for three baseline main landing gear systems: a noncrashworthy retractable, a crashworthy retractable, and a crashworthy fixed. Each system is capable of kneeling the LHX helicopter. Weights are based on preliminary structural analysis of landing gear loads developed by a computer program KRASH. KRASH was used to obtain the design loads at various sink rates, and pitch and roll attitudes. The design loads were used to size the landing gear structure in order to develop the landing gear weight for the different impact conditions. Main landing gear system costs are developed from the weight data established. An aerodynamic drag assessment was performed. Criteria for crashworthy designs are recommended. The recommended criteria were developed from the weight trends, costs, and UH-60A Class A Mishaps. GRA

N86-23595# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.
ANALYSIS AND VERIFICATION OF THE ICING SCALING EQUATIONS. VOLUME 1 Final Report, 1 Aug. 1981 - 31 Mar. 1984
Gary A. Ruff Nov. 1985 80 p Sponsored by Air Force
(AD-A162226; AEDC-TR-85-30-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 17/2

The formation of ice on aircraft surfaces occurs during flight through supercooled droplets. Ice accretions on these surfaces usually degrade both aircraft performance and operational safety. For this reason, it has become important in the design and certification phases of system development to evaluate system performance degradation because of icing. A research program was conducted to evaluate the icing scaling requirements. The objectives of the study were (1) to evaluate the equations governing the icing process to identify proposed scaling parameters, (2) to develop a computer code to solve the various forms of the icing scaling equations, (3) to conduct tests to determine which, if any, of the proposed methods produced scale ice accretions, and (4) if an accurate set of icing scaling equations were found, to write a final computer code that could be used in icing tests. The scaling verification tests were conducted using full and half-scale circular cylinders and full, 1/3, and 1/6-scale airfoil sections. GRA

N86-23774# Joint Publications Research Service, Arlington, Va.
ROLLOUT OF XT-4 INTERMEDIATE CLASS TRAINING AIRCRAFT
In its Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 1-5 Transl. into ENGLISH from Aerospace Japan (Tokyo, Japan), Jun. 1985 p 31-33 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-23596# Air Force Human Resources Lab., Brooks AFB, Tex.
LOGISTICS ENGINEERING ANALYSIS TECHNIQUES FOR FAULT-TOLERANT AVIONICS SYSTEMS Final Report, Mar. 1982 - Mar. 1984
James C. McManus Nov. 1985 59 p
(Contract F33615-82-C-0002)
(AD-A161981; AFHRL-TR-84-60) Avail: NTIS HC A04/MF A01 CSCL 01/4

A technique which performs reliability, supportability, and survivability (RSS) analysis of fault-tolerant, dynamically reconfigurable systems during early design is presented. Implemented in the MIssion REliability Model (MIREM) computer program, this method analyzes the structure of functional components in a system. Use of MIREM will allow design engineers to apply RSS analysis before the design is fixed. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-23597*# California Univ., Irvine. Dept. of Mechanical Engineering.
EFFECT OF LIQUID DROPLETS ON TURBULENCE IN A ROUND GASEOUS JET Final Report
A. A. Mostafa and S. E. Elghobashi Feb. 1986 209 p refs
(Grant NAG3-176)
(NASA-CR-175063; NAS 1.26:175063) Avail: NTIS HC A10/MF A01 CSCL 21E

The main objective of this investigation is to develop a two-equation turbulence model for dilute vaporizing sprays or in general for dispersed two-phase flows including the effects of phase changes. The model that accounts for the interaction between the two phases is based on rigorously derived equations for turbulence kinetic energy (K) and its dissipation rate epsilon of the carrier phase using the momentum equation of that phase. Closure is achieved by modeling the turbulent correlations, up to

third order, in the equations of the mean motion, concentration of the vapor in the carrier phase, and the kinetic energy of turbulence and its dissipation rate for the carrier phase. The governing equations are presented in both the exact and the modeled formes. The governing equations are solved numerically using a finite-difference procedure to test the presented model for the flow of a turbulent axisymmetric gaseous jet laden with either evaporating liquid droplets or solid particles. The predictions include the distribution of the mean velocity, volume fractions of the different phases, concentration of the evaporated material in the carrier phase, turbulence intensity and shear stress of the carrier phase, droplet diameter distribution, and the jet spreading rate. The predictions are in good agreement with the experimental data.
Author

N86-23598*# Garrett Turbine Engine Co., Phoenix, Ariz.
LOW-COST SINGLE-CRYSTAL TURBINE BLADES, VOLUME 2
T. E. Strangman, R. E. Dennis, and B. R. Heath Apr. 1984 42 p refs
(Contract NAS3-20073)
(NASA-CR-174652; NAS 1.26:174652; G-21-4314-2) Avail: NTIS HC A03/MF A01 CSCL 21E

The overall objectives of Project 3 were to develop the exothermic casting process to produce uncooled single-crystal (SC) HP turbine blades in MAR-M 247 and higher strength derivative alloys and to validate the materials process and components through extensive mechanical property testing, rig testing, and 200 hours of endurance engine testing. These Program objectives were achieved. The exothermic casting process was successfully developed into a low-cost nonproperietary method for producing single-crystal castings. Single-crystal MAR-M 247 and two derivatives DS alloys developed during this project, NASAIR 100 and SC Alloy 3, were fully characterized through mechanical property testing. SC MAR-M 247 shows no significant improvement in strength over directionally solidified (DS) MAR-M 247, but the derivative alloys, NASAIR 100 and Alloy 3, show significant tensile and fatigue improvements. Firtree testing, holography, and strain-gauge rig testing were used to determine the effects of the anisotropic characteristics of single-crystal materials. No undesirable characteristics were found. In general, the single-crystal material behaved similarly to DS MAR-M 247. Two complete engine sets of SC HP turbine blades were cast using the exothermic casting process and fully machined. These blades were successfully engine-tested.
Author

N86-23599# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
THROTTLE DEPENDENT FORCES: A PRIMER Final Report, Aug. 1982 - Nov. 1984
Douglas L. Bowers Nov. 1985 129 p
(AD-A162939; AFWAL-TR-85-3055) Avail: NTIS HC A07/MF A01 CSCL 21/5

An introduction to the broad area of throttle dependent forces for airbreathing aircraft, primarily subsonic to supersonic capable is provided. Basic concepts and examples are presented for subsonic, supersonic and transonic inlet and nozzle applications. Experimental and analytical determination of throttle-dependent forces is discussed, including approaches and potential problems. A final reference section of basic definitions is included for completeness.
GRA

N86-23600# Ohio State Univ., Columbus.
FLOW TRANSITION IN GAS TURBINE AIRFOIL BOUNDARY LAYERS: FUNDAMENTALS AND EMPIRICISMS Final Report, 29 Mar. 1982 - 28 Dec. 1984
Gregory S. West and Lit S. Han Sep. 1985 169 p
(Contracts F33615-82-K-2218; MIPR-C-79073-D)
(AD-A162994; AFWAL-TR-85-2055) Avail: NTIS HC A08/MF A01 CSCL 20/4

Reshotko has suggested that transition may be viewed as the response of a very complex three-dimensional nonlinear oscillator (the laminar boundary layer) to a random and often statistically nonuniform forcing function (the disturbances). The first objective of this study concerns the phenomenon of flow transition in boundary layers on turbine airfoils--from the onset of turbulence to the transition completion. Transition studies, though fundamental to fluid mechanics, are unique in gas turbine cascades because of the compounding factors that act not in individual isolation, but as a collective group and that constitute by-pass mechanisms not amenable to linear analyses from a mathematical point of view. The second objective is to evolve an engineering method to account for surface roughness effects on heat transfer and turbulent boundary layer analyses, which have heretofore been studied in fragments. Transition prediction in gas turbine boundary layer flows is critical in assessing the cooling requirements for gas turbine vanes and blades. This report summarizes the classical, fundamental findings in transition prediction for simplified geometrics and discusses empirical rules curently in use for gas turbine environments.
GRA

N86-23601# Pratt and Whitney Aircraft, West Palm Beach, Fla. Engineering Div.
FRACTURE MECHANICS OF MULTIPLE CRACK INITIATIONS. AN APPLICATION FOR FRACTURE MECHANICS ANALYSIS OF GAS TURBINE ENGINE DISKS Interim Report, Feb. 1981 - Jun. 1983
B. A. Cowles, A. B. Thakker, and G. E. King Oct. 1985 44 p
(Contract F33615-80-C-5160; DARPA Order 3993)
(AD-A162998; PW/ED/FR-18778; AFWAL-TR-85-4110) Avail: NTIS HC A03/MF A01 CSCL 21/5

The purpose of this task was to investigate the current life prediction methodology for multiple crack growth in gas turbine engine components. To this end, experimental and analytical efforts were carried out. Current prediction methods for very small cracks (as small as 0.005 x 0.010 inches) were modified to address the larger interacting cracks produced by the controlled preflaw methods used in this program. The authors conclude that: (1) The modified crack growth life prediction technique currently in use resulted in acceptable but conservative predictions in all cases. Variability in the predictions was also acceptable and was similar to variability in predicted versus actual results for singular crack cases. (2) The multiple-degree-of-freedom approach also produced acceptable life predictions and, in fact, demonstrated reduced variability in predicted versus actual results. It was, however, more complicated to use and did not result in a consistent conservative bias in the life predictions. (3) Based on this study, the modified crack growth life prediction technique currently in use is considered adequate for Retirement-for-Cause applications. The multiple-degree-of-freedom approach offers potential improvements for future use.
GRA

N86-23602# Department of the Navy, Washington, D. C.
IMPROVED PSEUDORANDOM NOISE GENERATOR Patent Application
James R. Young, inventor (to Navy) Filed 17 Jun. 1985 9 p
(AD-D012066; US-Patent-Appl-SN-745155) Avail: NTIS HC A02/MF A01 CSCL 21/5

A circuit for generating a noise signal for use in a jet engine noise simulator which utilizes two component pseudorandom noise (PSN) generators and a combination field effect transistor (FET) and resistor circuit to which the outputs of the PSN generators are connected such that the signal from one PSN generator is modulated by the signal from the other PSN generator.
GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-23603*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT EXPERIENCE WITH A SIMPLE EXPERT SYSTEM DEMONSTRATOR FOR PILOT EMERGENCY PRO-

CEDURES
Michael VanNorman and Dale A. Mackall Feb. 1986 17 p refs
(NASA-TM-85919; H-1272; NAS 1.15:85919) Avail: NTIS HC A02/MF A01 CSCL 01C

Expert system techniques, a major application area of artificial intelligence (AI), are examined in the development of pilot associate to handle aircraft emergency procedures. The term pilot associate is used to describe research involving expert systems that can assist the pilot in the cockpit. The development of expert systems for the electrical system and flight control system emergency procedures are discussed. A simple, high-level expert system provides the means to choose which knowledge domain is needed. The expert systems were developed on a low-cost, FORTH-based package, using a personal computer. Author

N86-23604*# Tennessee Univ., Tullahoma. Atmospheric Science Div.
ANALYSIS OF DATA FROM NASA B-57B GUST GRADIENT PROGRAM Final Report
Walter Frost, Ming-Chang Lin, Ho-Pen Chang, and Erik Ringnes Sep. 1985 500 p refs
(Contracts NAS8-36177; NAS8-35347)
(NASA-CR-178736; NAS 1.26:178736) Avail: NTIS HC A21/MF A01 CSCL 01C

Statistical analysis of the turbulence measured in flight 6 of the NASA B-57B over Denver, Colorado, from July 7 to July 23, 1982 included the calculations of average turbulence parameters, integral length scales, probability density functions, single point autocorrelation coefficients, two point autocorrelation coefficients, normalized autospectra, normalized two point autospectra, and two point cross sectra for gust velocities. The single point autocorrelation coefficients were compared with the theoretical model developed by von Karman. Theoretical analyses were developed which address the effects spanwise gust distributions, using two point spatial turbulence correlations. B.G.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-23605 Department of the Air Force, Washington, D.C.
DIFFUSE INCANDESCENT RUNWAY MARKER LIGHT APPARATUS FOR OVERT/COVERT OPERATION Patent
Harry L. Task, inventor (to Air Force) Issued 19 Nov. 1985 4 p
Supersedes AD-D010634
(AD-D012067; US-Patent-4,554,544; US-Patent-Appl-SN-536142; US-Patent-Class-340-953) Avail: US Patent and Trademark Office CSCL 01/5

A diffuse incandescent runway marker light apparatus has a housing with a visible light diffusing plate mounted in one end and an infrared light diffusing plate mounted in the other end, and a pair of incandescent light sources mounted n the housing and aimed toward the respective housing end plates. A switch, when flipped to a first position, turns on one light source for producing visible illumination and turns off the other light source. The switch, when flipped to a second position, turns off the one light source and turns on the other light source for producing infrared illumination for marking the runway for overt or covert landing operation may be selected. When the switch is flipped to a third poision, both light sources are turned off. GRA

N86-23606*# College of William and Mary, Williamsburg, Va.
COMPUTER SIMULATION OF A WIND TUNNEL TEST SECTION WITH DISCRETE FINITE-LENGTH WALL SLOTS Final Report
William B. Kemp, Jr. Washington NASA Apr. 1986 98 p refs
(Contract NCC1-69)
(NASA-CR-3948; NAS 1.26:3948) Avail: NTIS HC A05/MF A01 CSCL 14B

A computer simulation of a slotted wind tunnel test section which includes a discrete, finite-length wall slot representation with plenum chamber constraints and accounts for the nonlinear effects of the dynamic pressure of the slot outflow jet and of the low energy of slot inflow air was developed. The simulation features were selected to be those appropriate for the intended subsequent use of the simulation in a wall interference assessment procedure using sparsely located wall pressure measurements. It is demonstrated that accounting for slot discreteness is important in interpreting wall pressure measured between slots, and that accounting for nonlinear slot flow effects produces significant changes in tunnel-induced velocity distributions and, in particular, produces a longitudinal component of tunnel-induced velocity due to model lift. A characteristic mode of tunnel flow interaction with constraints imposed by the plenum chamber and diffuser entrance is apparent in simulation results and is derived analytically through a simplified analysis. E.A.K.

N86-23607# New Mexico Univ., Albuquerque. Engineering Research Inst.
RUNWAY RUBBER REMOVAL SPECIFICATION DEVELOPMENT: FIELD EVALUATION RESULTS AND DATA ANALYSIS Interim Report, Jul. 1984 - Jul. 1985
Richard A. Graul and Lary R. Lenke Jul. 1985 108 p refs
(Contract F29601-84-C-0080)
(FAA/PM-85/32; ESL-TR-85-63; NMERI-WA5-6(5.04)) Avail: NTIS HC A06/MF A01

The phenomenon of runway touchdown zone rubber buildup which is a potentially hazardous problem is discussed. The use of pavement surface texture measurements is capable of determining pavement friction levels. The use of four economical texture measurement techniques and their relationship to friction levels as determined by the Mu-Meter are discussed. Good correlations are obtained by relating pavement surface texture measurements of friction. However, predictive errors preclude the use of these models in lieu of friction measurements for use in rubber removal guidelines. E.A.K.

N86-23608# National Aeronautical Establishment, Ottawa (Ontario).
RECENT IMPROVEMENTS TO THE NAE 5 FT. x 5 FT. BLOWDOWN WIND TUNNEL
L. H. Ohman, D. Brown, A. J. Bowker, and F. A. Ellis Aug. 1985 41 p
(AD-A162034; NAE-AN-31; NRC-24882) Avail: NTIS HC A03/MF A01 CSCL 14/2

Although the National Aeronautical Establishment (NAE) 5 ft x 5 ft Blowdown Wind Tunnel was conceived in the 1950's, with commissioning in 1962/63, it has stood the test of time very well and is still, in 1985, in heavy demand. Three main reasons for this situation are: (1) the basic wind tunnel design was fundamentally very sound; (2) the wind tunnel circuit and its auxiliary systems have frequently been improved and modernized so that it, even today, is a modern up-to-date facility; and (3) the high level of competence of the supporting staff. This report presents the major improvements made in recent years and the impact these have had on the performance of the facility. The improvements are: the rebuild of the settling chamber; the rebuild of the exhaust diffuser; the installation of active Mach number control for subsonic transonic operation; The incorporation of dual drive on the two-dimensional insert balance system; the suppression of edgetone noise; The incorporation of highly accurate digital pressure transducers; and the control and data processing system. Future plans for expanded use of the wind tunnel are outlined. GRA

N86-23609# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
INFORMATION ON AIRPORT AND AIRWAY TRUST FUND REVENUES AND OUTLAYS BY STATES AND LARGE AIRPORTS

30 Sep. 1985 38 p
(PB86-129665; GAO/RCED-85-153; B-219969) Avail: NTIS HC A03/MF A01 CSCL 01A

The Airport and Airway Trust Fund was established to ensure that taxes collected from commercial air passengers, private pilots, and other sources are expended only for the expansion, improvement, and maintenance of the nation's air transportation system. Estimates by states and large airports of taxes paid into the trust fund are presented. Selected trust fund moneys received in fiscal years 1979 to 1983 are estimated. GAO's ability to fully estimate trust fund revenues and outlays by states and large airports was restricted by data limitations that required GAO to make several broad assumptions. The GAO notes that by law, the primary purpose of the trust fund is to ensure the safe operation of this nation's airspace system, not to provide an even or equitable return of the tax revenues to airports and states. Author

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-23610# General Technology Systems Ltd., London (England).
NOTES FOR PHILIP LAPP ASSOCIATES CANADA ON THE FUTURE SPACE PROGRAMMES OF GERMANY, SWEDEN, ITALY, FRANCE AND INDIA IN SELECTED AREAS OF ACTIVITY
H. G. R. Robinson, comp. Jun. 1985 39 p
(GTS-85067) Avail: NTIS HC A03/MF A01

Science, materials processing, microgravity, remote sensing, and technology development aspects of the German, French, Italian, Swedish, and Indian space programs are summarized. Participation in ESA and NASA programs, and other forms of international cooperation are discussed. Author (ESA)

N86-23611*# Martin Marietta Aerospace, Denver, Colo.
SERVICERS SYSTEM DEMONSTRATION PLAN AND CAPABILITY DEVELOPMENT Final Technical Report
M. A. Bulboaca, J. A. Cuseo, W. L. DeRocher, Jr., R. W. Maples, P. C. Reynolds, and R. A. Sterrett Dec. 1985 496 p
(Contract NAS8-35625)
(NASA-CR-178714; NAS 1.26:178714; MCR-85-1365; DPD-650; DR-5) Avail: NTIS HC A21/MF A01 CSCL 22A

A plan for the demonstration of the exchange of Multi-Mission Modular Spacecraft (MMS) modules using the servicer mechanism Engineering Test Unit (ETU) was prepared and executed. The plan included: establishment of requirements, conceptual design, selection of MMS spacecraft mockup configuration, selection of MMS module mockup configuration, evaluation of adequacy of ETU load capability, and selection of a stowage rack arrangement. The MMS module exchange demonstration mockup equipment was designed, fabricated, checked out, shipped, installed, and demonstrated. Author

N86-23612*# National Aeronautics and Space Administration, Washington, D.C.
SUMMARY RESULTS OF THE INDUSTRY CONFERENCE ON THE COMMERCIAL USE OF SPACE
Reuse and R. P. Thuerbach Nov. 1985 29 p Transl. into ENGLISH of "Zusammengefasste Ergebnisse aus dem Industriegespraech ueber die Kommerzielle Nutzung der Raumfahrt" rept. Federal Ministry for Research and Technology, Bonn, West Germany, 25 Jun. 1985 p 1-29 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77679; NAS 1.15:77679) Avail: NTIS HC A03/MF A01 CSCL 22A

The future intentions of the Federal Republic of Germany in the area of the commercialization of space are presented. It is shown that significant advances in microgravity research, particularly in the areas of materials science, composite materials, physical chemistry, crystal growth, biology, and process engineering will have an effect on future plans for establishing sponsoring organizations to guide commercial interests in German space research. An organizational and functional outline of a proposed sponsoring organization to promote space commercialization under German supervision, including the objectives, the target group to be served, and the administrative structure, is presented. The role of the DFVLR (German Aerospace Research Establishment) and the BMFT (German Ministry for Research and Technology) as sponsoring organizations representing the interests of the German government is shown. Author

N86-23613# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
EVOLUTION AND LOGISTICS OF AN EARLY LUNAR BASE
B. Johenning and H. H. Koelle 1985 17 p refs
(ILR-Mitt-155) Avail: NTIS HC A02/MF A01

Mission, base, and logistics models were used to assess the feasibility of a lunar base. It is shown that a heavy lift launch vehicle (HLLV) using the present space shuttle main engine can serve as the backbone of such a lunar logistics system. A typical launch schedule reaching 24 flights in its 7th operational year is developed. This HLLV can carry 300 metric tons to the 530km space station orbit or 70 metric tons directly to the lunar surface. The lunar base model suggests landing the first 20 people on the Moon in 1999 and reaches a level of 120 people on the lunar base, plus 20 people in lunar orbit in its 8th year of operation. The lunar base facilities have a total mass of 4000 metric tons in its 10th year. Author (ESA)

N86-23614# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany). Space Technology Section.
LABORATORIES IN SPACE FOR MATERIALS RESEARCH, PROCESS TECHNOLOGY, AND FOR COMMERCIAL PURPOSES
G. Greger, ed. and G. Blechert, ed. 1985 18 p
(ISBN-3-88-135-127-2) Avail: NTIS HC A02/MF A01

The objectives and implementation of the West German space program to study reduced gravity and weightlessness effects are outlined. Objectives include the improvement of physical, chemical, biological, and technical processes, and development of processes which can only function in zero gravity. Implementation measures include Spacelab and sounding rocket flight. Author (ESA)

N86-24509*# Alabama Univ., Birmingham.
CONTAINERLESS PROCESSING OF HYPERMONOTECTIC AND GLASS FORMING ALLOYS USING THE MARSHALL SPACE FLIGHT CENTER 100 METER DROP TUBE FACILITY
J. Barry Andrews *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22A

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-23615# Range Commanders Council, White Sands Missile Range, N. Mex. Data Reduction and Computing Group.
DIRECTORY OF RANGE DATA CONVERSION AND PROCESSING SYSTEMS
Sep. 1985 548 p
(AD-A162844; DR/CG-157-84) Avail: NTIS HC A23/MF A01 CSCL 09/2

The members and associate members of the Data Reduction and Computing Group (DR/CG) of the Range Commanders Council (RCC) have exchanged information on the hardware and software systems in use at their respective ranges and agencies at regular intervals with great success. Since other range representatives found this information to be valuable, the group published a Directory of Data Conversion and Processing Systems, RCC Document 127-73, in 1973. This third edition, 157-84, also contains nine chapters, with information updated since the 1980 edition. The directory covers the following topics: Range data conversion, processing systems, pre/post flight computer systems, real-time computer systems, film readers, frequency and wave analysis system, data transmission system, printers and plotters, range instrumentation computer systems, telemetry front end systems, terminals and graphic displays, micrographics equipment, embedded computer. GRA

N86-24517*# Mississippi State Univ., Mississippi State. Dept. of Physics.
PRELIMINARY DESIGNS FOR X-RAY SOURCE MODIFICATIONS FOR THE MARSHALL SPACE FLIGHT CENTER'S X-RAY CALIBRATION FACILITY
W. L. Croft *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 19 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14B

N86-24615*# California Univ., La Jolla.
THE CONCEPT OF THE PINHOLE/OCCULTER FACILITY
Hugh S. Hudson *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 5-13 refs (For primary document see N86-24614 14-92)
(Grant NsG-7161)
Avail: NTIS HC A14/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-23616*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SSME FUELSIDE PREBURNER TWO-DIMENSIONAL ANALYSIS
Thomas J. VanOverbeke and Russell W. Claus [1986] 19 p refs Prepared for presentation at the Central States Meeting of the Combustion Inst., Cleveland, Ohio, 5-6 May 1986
(NASA-TM-87299; E-3010; NAS 1.15:87299) Avail: NTIS HC A02/MF A01 CSCL 20H

The flow field within the fuelside preburner of the Space Shuttle Main Engine is calculated using a reacting flow code (REACT2D). Inlet and modeling parameters involved in the numerical calculation are systematically varied to establish the sensitivity of the calculated exit temperature profile. It is found that differences in the inlet equivalence ratio have a large effect on the turbine inlet temperature profile. A variety of preburner inlet modeling changes such as inlet turbulence level, modeling the gases as burned, unburned, premixed, or unmixed, are shown to have a smaller effect on the calculated turbine inlet temperature profile. Also, the form of finite differencing used is shown to have an effect on the temperature profile. Author

N86-23617# TRG, Inc., Syosset, N.Y.
DESIGN SOUNDING ROCKET PAYLOAD SYSTEM TO STUDY VEHICLE CHARGING PHENOMENA Final Report, 1 Oct. 1979 - 31 Dec. 1984
Robert S. Hills 29 May 1985 90 p
(Contract F19628-80-C-0019)
(AD-A162149; C-184; AFGL-TR-85-0131) Avail: NTIS HC A05/MF A01 CSCL 22/1

The objectives of this contract are the following: (1) reassemble and test the A31.603 rocket payload, previously flown at WSMR in January of 1978. Conduct spacecraft charging tests in a plasma using the vacuum chamber at Johnson Space Flight Center, Texas; (2) design a sounding rocket payload for the measurement of vehicle charging due to charge ejection in accordance with the results of the reassembly and retest of the A31.603 payload, and in accordance with specifications for the instrumentation for the instrumentation for the spacecraft charging rocket-2 payload; (3) fabricate and test a negative charge ejection system; (4) fabricate and test rocket payload sensor systems to measure the vehicle-to-plasma potential difference; (5) fabricate and test sensor systems to measure and identify charged particle return to the payload; (6) fabricate and test sensor systems to measure rapid changes in vehicle potential; (7) fabricate and test a microprocessor-based sounding rocket experiment controller. (8) fabricate and test one set of ground support equipment; (9) integrate at contractor's facility the above sensor systems with a rocket payload structure and instrumentation provided by the government. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-23618*# National Aeronautics and Space Administration, Washington, D.C.
THE SPACE TRANSPORTATION SYSTEM AND ITS IMPACT ON LATIN AMERICAN DEVELOPMENT
F. R. Chang Diaz Nov. 1985 56 p refs Transl. into ENGLISH of El Sistema de Transporte Espacial y su Impacto en el Desarrollo de Latinoamerica (Houston, Tex.), Jun. 1984 p 1-20 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. was prepared by NASA. Johnson Space Center
(Contract NASw-4005)
(NASA-TM-77684; NAS 1.15:77684) Avail: NTIS HC A04/MF A01 CSCL 22A

The three components of the Space Transportation System: the space shuttle, the permanent orbital space station and the transorbital vehicle are described. The stages of completion of the various plans are discussed and the impact of the project's implementation is discussed with particular reference to Latin America and with special emphasis on the telecommunications sector. Author

N86-23619# Los Alamos National Lab., N. Mex.
MOON BASE/MARS BASE TRANSPORTATION DEPOT
P. W. Keaton Sep. 1985 15 p refs
(Contract W-7405-eng-36)
(DE86-003275; LA-10552-MS) Avail: NTIS HC A02/MF A01

Placement of the next space outpost, after the low-Earth-orbit

space station, will strongly affect the evolution of future space programs. The outpost will store rocket fuel and offer a haven to space workers, as well as provide a transportation depot for long missions. Ideally, it must be loosely bound to the Earth, easy to approach and leave, and available for launch at any time. One Lagrange equilibrium point, L1(SE), between the Sun and the Earth and another, L2(EM), in the Earth-Moon system have excellent physical characteristics for an outpost; L1(SE), for example, requires less than 2% additional rocket propellant for docking there on the way to Moon bases or Mars bases. We apply the rocket problem, the two-body problem, and the three-body problem in discussing alternative locations for space depots. We conclude that Lagrange point halo orbits are the standard by which other concepts for transportation depots must be gauged. DOE

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-23620*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SPACE STATION WORKSTATION TECHNOLOGY WORKSHOP REPORT

Karen L. Moe, Curtis M. Emerson, David R. Eike (Carlow Associates, Fairfax, Va.), and Thomas B. Malone (Carlow Associates, Fairfax, Va.) Mar. 1985 135 p

(Contract NAS5-28597)

(NASA-CP-2414; NAS 4033-85-1DRE; NAS 1.55:2414) Avail: NTIS HC A07/MF A01 CSCL 22B

This report describes the results of a workshop conducted at Goddard Space Flight Center (GSFC) to identify current and anticipated trends in human-computer interface technology that may influence the design or operation of a space station workstation. The workshop was attended by approximately 40 persons from government and academia who were selected for their expertise in some aspect of human-machine interaction research. The focus of the workshop was a 1 1/2 brainstorming/forecasting session in which the attendees were assigned to interdisciplinary working groups and instructed to develop predictions for each of the following technology areas: (1) user interface, (2) resource management, (3) control language, (4) data base systems, (5) automatic software development, (6) communications, (7) training, and (8) simulation. This report is significant in that it provides a unique perspective on workstation design for the space station. This perspective, which is characterized by a major emphasis on user requirements, should be most valuable to Phase B contractors involved in design development of the space station workstation. One of the more compelling results of the workshop is the recognition that no major technological breakthroughs are required to implement the current workstation concept. What is required is the creative application of existing knowledge and technology. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-23621*# Computer Sciences Corp., Hampton, Va.

THERMAL MODELING OF A METALLIC THERMAL PROTECTION TILE FOR ENTRY VEHICLES

Michael R. Wiese Apr. 1986 24 p refs

(Contract NAS1-17999)

(NASA-CR-178080; NAS 1.26:178080) Avail: NTIS HC A02/MF A01 CSCL 22B

The thermal Energy Flow Simulation (TEFS) computer program was developed to simulate transient heat transfer through composite solids and predict interfacial temperatures. The program and its usage are described. A simulation of the thermal response of a new thermal protection tile design for the Space Shuttle Orbiter is presented and graphically compared with actual data. An example is also provided which shows the program's usage as a design tool for theoretical models. Author

N86-23622*# National Aeronautics and Space Administration, Washington, D.C.

JAPAN'S PARTICIPATION IN SPACE STATION DESIGN: FEASIBILITY STUDY OF GaAs SOLAR CELLS FOR SPACE STATION APPLICATIONS

Mar. 1986 57 p Transl. into ENGLISH of "Bei Koku Uchu Kichi Keikaku Yobi Setsu Keisan ka GaAs Dei Tairo Denchi Sen: No u Chu Kichi e No Tsuyosei No Kento" rept. ST-E-0739 National Space Development Agency of Japan, Japan, 18 Dec. 1985 p 1-44 Transl. by The Corporate Word, Pittsburgh, Pa.

(Contract NASw-4006)

(NASA-TM-88384; NAS 1.15:88384; ST-E-0739) Avail: NTIS HC A04/MF A01 CSCL 22B

The report gives the results of feasibility studies and a cost analysis done on GaAs solar battery cells for space stations. The studies and their results are as follows: (1) Cell size - The 2 x 4 cm cell size was found superior to the 4 x 4 cm cell; (2) Manufacturing technology - Overall, LPE crystal growth was found more suitable than MO-CVD. Current technology for post-growth processes and applying large-area cover glass can be used with few or no modifications; (3) Cell assemblies - Tests for mechanical and thermal stresses encountered from assembly through operation are recommended; (4) Procuring materials - Steps should be taken to avoid sharp price increases due to a speculative gallium market. There are no problems with arsenic materials; (5) Production facilities - The capital investment needed remains to be determined, but a working area of 4000 m2 will be required; (6) Cell costs to be determined; (7) Cell development-supply plan - Two-year lead time will be needed to develop the necessary technology and prepare for production. Author

N86-23623*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ANALYSIS OF A SINGLE-FOLD DEPLOYABLE TRUSS BEAM PRELOADED BY EXTENSION OF SELECTED FACE DIAGONAL MEMBERS

K. Chauncey Wu and Mark S. Lake Apr. 1986 17 p refs

(NASA-TM-87673; NAS 1.15:87673) Avail: NTIS HC A02/MF A01 CSCL 22B

A technique for preloading a deployable box truss beam by extension of one face diagonal per bay was studied to determine if it would result in uniform loading of truss joints without causing excessive truss deformations. Results indicate that it is possible to accomplish uniform loading in the beam region way from beam boundaries, whereas in the regions near boundaries the member loading becomes non-uniform with magnitudes greater than those in the uniform load region. Also, the type of deformation which results in the beam depends on the pattern of preloaded members. Author

N86-23624# Tokyo Univ. (Japan). Institute of Space and Astronautical Science.

METHOD OF PACKAGING AND DEPLOYMENT OF LARGE MEMBRANES IN SPACE

Koryo Miura Dec. 1985 11 p refs

(ISAS-618; ISSN-0285-6808) Avail: NTIS HC A02/MF A01

A new concept of packaging and deployment of large membranes in space is presented. The problem of biaxially folding of a plane is transferred to the elastic problem of a biaxially compressed infinite plate. After solving the problem, the plate thickness is reduced infinitesimally small, and thus the results represents the isometric transfer of an infinite plane subject to biaxial shortening. As a result, the concave polyhedral surface is discovered, which is composed of a repetition of a fundamental region, which is further composed of four congruent parallelograms. It is shown that the packaging and deployment by this surface geometry satisfies various requirements as to operations in space. Author

N86-23625# Tokyo Univ. (Japan). Institute of Space and Astronautical Science.
VACUUM-ENVIRONMENT AROUND SPACELAB-1
Masahisa Yanagisawa, Nobuki Kawashima, Susumu Sasaki, and Tatsuzo Obayashi Aug. 1985 8 p refs
(ISAS-617; ISSN-0285-6808) Avail: NTIS HC A02/MF A01

The background pressure for the SEPAC experiments (Space Experiments with Particle Accelerators) was monitored by the vacuum gauge on the Spacelab pellet. The pressure during the whole mission shows a clear relationship with the orbiter's velocity vector. When the gauge is screened by the orbiter from the relative flow of the upper atmosphere (wake condition), the pressure is constantly low, but much higher than that of the model atmosphere. At present, it is best explained by gas leakage from Spacelab or some of its instruments. When the gauge is open to the flow (ram condition), the pressure is linearly related to the cosine of he incident angle and has a maximum at normal incidence. The maximum is more than one order of magnitude higher than the model pressure. This is interpreted as escape of incident atmosphere from the Spacelab's surface with thermal velocity. Author

N86-23626*# Computer Sciences Corp., Greenbelt, Md.
NAVIGATION STUDY FOR LOW-ALTITUDE EARTH SATELLITES
P. R. Pastor, B. T. Fang, and C. P. Yee Dec. 1985 171 p refs
(Contract NAS5-27888)
(NASA-CR-177855; NAS 1.26:177855; CSC/TM-85/6119) Avail: NTIS HC A08/MF A01 CSCL 22A

This document describes several navigation studies for low-altitude Earth satellites. The use of Global Positioning System Navigation Package data for LANDSAT-5 orbit determination is evaluated. In addition, a navigation analysis for the proposed Tracking and Data Aquisition System is presented. This analysis, based on simulations employing one-way Doppler data, is used to determine the agreement between the Research and Development Goddard Trajectory Determination System and the Sequential Error Analysis Program results. Properties of several geopotential error models are studied and an exploratory study of orbit smoother process noise is presented. Author

N86-23627# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ARTIFICIAL SATELLITE ATTITUDE CONTROL USING A SELF-TUNING CONTROLLER
Jose Francisco Ribeiro, Joao Moro, and Antonio Felix Martins Neto Feb. 1986 6 p refs Presented at TELECON '85, Rio d Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3789-PRE/884) Avail: NTIS HC A02/MF A01

A multivariable self-tuning attitude controller is proposed for use in a three axis stabilized sun-synchronous remote sensing satellite. By utilizing preprocessed measurements of the satellie sensors, a low order controller generates outputs that will drive gas jet or reaction wheel systems, keeping the on board observing camera pointed to the Earth Center and with angular velocities within a prescribed range. The controller parameters are updated on line by a variable forgetting factor least square method. Author

N86-23628*# Vanderbilt Univ., Nashville, Tenn. Dept. of Mechanical and Materials Engineering.
DISCUSSION OF FLIGHT EXPERIMENTS WITH AN ENTRY RESEARCH VEHICLE
J. Leith Potter 30 Jun. 1985 40 p refs
(Grant NAG1-549)
(NASA-CR-176724; NAS 1.26:176724; SASR-1) Avail: NTIS HC A03/MF A01 CSCL 22A

The focus of interest is the maneuvering flight of advanced entry vehicles operating at altitudes above 50 km and at velocities of 5 to 8 km/s. Information resulting in more accurate aerodynamic analysis is sought and measurement techniques that appear to be applicable are identified. Measurements discussed include: shock layer or boundary layer profiles of velocity, temperature, species mass fractions, and other gas properties associated with aerodynamic heating; surface energy transfer process; nonequilibrium flow processes and pressure distribution; separated, vortic leeside flow of nonequilibrium fluid; boundary layer transition on highly swept configurations; and shock and surface slip and gas/surface interaction. Further study should focus on evolving measurement techniques, installation requirements, and on identification of the portions of flights where successful results seem probable. B.G.

N86-23629*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL INVESTIGATION OF THE DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT, PHASE 2 Quarterly Report, 22 Sep. - 21 Dec. 1985
Enrico Lorenzini, David A. Arnold, Mario D. Grossi, and Gordon E. Gullahorn Feb. 1986 53 p
(Contract NAS8-36606)
(NASA-CR-178754; NAS 1.26:178754; QR-3) Avail: NTIS HC A04/MF A01 CSCL 22A

The development of a two dimensional analytical model that describes the dynamics of an n-mass vertical tethered system is reported. Two different approaches are described: in the first one the control quantities are the independent variables while in the second one the Cartesian coordinates of each mass expressed in the orbiting reference frame are the independent variables. The latter model was used in the 3-mass version to simulate the dynamics of the tethered system in applications involving the displacement of the middle mass along the tether. In particular, issues related to reproducing predetermined acceleration profiles and g-tuning are reported. Author

N86-23630# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A COST ANALYST'S GUIDE TO SATELLITE AUTONOMY AND FAULT-TOLERANT COMPUTING
Paul S. Killingsworth 1985 22 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A161853) Avail: NTIS HC A02/MF A01 CSCL 12/1

The trend in satellite design is toward greater autonomy in satellite functions, particularly in attitude determination and navigation. Fault-tolerant computing is a necessary condition for autonomy, and incurs costs in terms of computer memory, throughput, power and weight. Fault-tolerance and reliability issues need to be looked at and estimated early in the system development. This could prevent cost overruns due to lengthened test programs and unexpected redesigns. Finally, space logistics is becoming an area of increasing interest and study. The costs of space transportation and modular designs for on-orbit replacement of components need to be weighed against the cost of building increasingly intelligent and autonomous satellites. GRA

N86-23631# Texas A&M Univ., College Station.
A MODEL FOR PREDICTING THERMOMECHANICAL RESPONSE OF LARGE SPACE STRUCTURES Annual Technical Report, May 1984 - Apr. 1985
D. H. Allen and W. E. Haisler Jun. 1985 196 p
(Contract F49620-83-C-0067)
(AD-A162139; MM-4875-85-11; AFOSR-85-1016TR) Avail: NTIS HC A09/MF A01 CSCL 22/2

A model is being developed for predicting the thermomechanical response of large space structures to cyclic transient temperature loading conditions. The research is being conducted in the following stages: (1) selection and specialization of thermomechanical constitutive equations to be utilized in the analysis of large space structures; (2) construction (where necessary) of coupled energy balance equations (modified Fourier heat conduction equations) applicable to the constitutive models selected in item (1); (3) casting (where necessary) the resulting field laws into coupled and uncoupled variational principles suitable for use with the finite element method; (4) finite element discretization of the variational principles for several element types; (5) experimentation to determine material properties to be utilized in the constitutive models; and (6) parametric studies of the quasistatic and dynamic response of large space structures undergoing thermomechanically and environmentally degraded material properties. GRA

N86-23632# Georgia Inst. of Tech., Atlanta. Center for the Advancement of Computational Mechanics.
SIMPLIFIED NONLINEAR ANALYSIS OF LARGE SPACE-TRUSSES AND SPACE-FRAMES, USING EXPLICITLY DERIVED TANGENT STIFFNESSES AND ACCOUNTING FOR LOCAL BUCKLING Final Report, 1 May 1983 - 30 Apr. 1985
K. Kondoh, K. Tanaka, and S. N. Atluri Aug. 1985 193 p
(Contract F33615-83-K-3205)
(AD-A162319; GIT-CACM-SNA-14; AFWAL-TR-85-3079) Avail: NTIS HC A09/MF A01 CSCL 22/2

Simplified finite element methods for finite deformation, post-buckling analysis of large space trusses and space frames are presented. Arbitrarily large rigid translations and rigid rotations of each member are accounted for. Each 3-D truss member is assumed to withstand an axial force, while each 3-D frame member is assumed to withstand two bending moments, a twisting moment, and transverse and axial forces at each node. The influence of local (member) buckling on global instability is systematically examined. For both 3-D truss and frame members, explicit tangent stiffness matrices are derived. By explicit; it is meant that no element-wise basis functions are assumed and that no element-wise numerical integrations are involved. These explicit tangent stiffness matrices are very simply evaluated at any point in the load deformation history of a space truss, or space frame, undergoing large deformations, as well as in the postbuckled region of behavior of these structures. An arc-length method is implemented to trace the postbuckling behavior of these large space structures. A large number of examples are included to: (1) bring out the economy as well as accuracy of the simplified method developed; (2) indicate the effectiveness of the present method in creating reduced-order models of large space structures; and (3) delineate the process whereby the overall behavior of the structure can be vastly improved by controlling the deformation of individual members through active or passive mechanisms. GRA

N86-23633# Naval Postgraduate School, Monterey, Calif.
SPACECRAFT CONTAMINATION FROM A CHEMICAL LASER RING-JET PROGRESS REPORT Progress Report, Mar. - Aug. 1985
Joseph Falcovitz Nov. 1985 29 p
(AD-A162838; NPS67-85-010CR) Avail: NTIS HC A03/MF A01 CSCL 22/1

A review of work done at the Naval Postgraduate School (NPS) on the contaminating backflow from the exhaust plume of a chemical laser mounted on an Earth-orbiting spacecraft is presented. Various mechanisms that may give rise to a backflow are outlined, i.e., thermal backscattering, ambient scattering; and viscous effects. Detailed studies have been conducted at NPS on thermal backscattering. They are reviewed in this report, concluding that corrosive fluxes (HF,DF,F) due solely to this effect are negligible. The flux of light species (He,H2), however, is significant. GRA

N86-24511*# Florida Inst. of Tech., Melbourne. Dept. of Chemical Engineering.
SPACE STATION COMMON MODULE THERMAL MANAGEMENT: DESIGN AND CONSTRUCTION OF A TEST BED
Ronald G. Barile *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22B

N86-24512*# Purdue Univ., Indianapolis, Ind. Dept. of Mechanical Engineering.
METHODOLOGY OF DESIGN AND ANALYSIS OF EXTERNAL WALLS OF SPACE STATION FOR HYPERVELOCITY IMPACTS BY METEOROIDS AND SPACE DEBRIS
Fahim A. Batla *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 32 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22B

N86-24535*# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
ANALYTICAL DETERMINATION OF SPACE STATION RESPONSE TO CREW MOTION AND DESIGN OF SUSPENSION SYSTEM FOR MICROGRAVITY EXPERIMENTS
Frank C. Liu *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04

N86-24537*# Berry Coll., Mount Berry, Ga. Dept. of Physics.
A STUDY OF 35-GHZ RADAR-ASSISTED ORBITAL MANEUVERING VEHICLE/SPACE TELESCOPE DOCKING
Malcolm W. McDonald *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 31 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22A

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-23634# Air Force Geophysics Lab., Hanscom AFB, Mass.
REAL TIME: AUTOMATIC VEHICLE POTENTIAL DETERMINATION FROM ESA (ELECTROSTATIC ANALYZER) MEASUREMENTS. PART 2: THE DISTRIBUTION FUNCTION ALGORITHM
Stanley L. Spiegel and Herbert A. Cohen 6 May 1985 20 p
(AD-A162072; AFGL-TR-85-0103(2)-Pt-2; AFGL-ERP-916(2)-Pt-2)
Avail: NTIS HC A02/MF A01 CSCL 22/2

A technique has been developed that uses electrostatic analyzer positive ion count measurements to compute plasma distribution functions to infer high altitude vehicle potential in real time. Author (GRA)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-23635*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS. APPENDIX B: DATA BASE PLOTS FOR SSME TESTS 901-290 THROUGH 901-414 Final Report

Thomas Coffin Jan. 1986 462 p
(Contract NAS8-34343)
(NASA-CR-178809; NAS 1.26:178809; TR-66338-01-App-B) Avail: NTIS HC A20/MF A01 CSCL 21H

A dynamic pressure data base and data base management system developed to characterize the Space Shuttle Main Engine (SSME) dynamic pressure environment is described. The data base represents dynamic pressure measurements obtained during single engine hot firing tesets of the SSME. Software is provided to permit statistical evaluation of selected measurements under specified operating conditions. An interpolation scheme is also included to estimate spectral trends with SSME power level. Flow dynamic environments in high performance rocket engines are discussed. E.A.K.

N86-23636*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS. APPENDIX C: DATA BASE PLOTS FOR SSME TESTS 902-214 THROUGH 902-314 Final Report
Thomas Coffin Jan. 1986 47 p
(Contract NAS8-34343)
(NASA-CR-178810; NAS 1.26:178810; TR-66338-01-App-C) Avail: NTIS HC A03/MF A01 CSCL 21H

A dynamic pressure data base and data base management system developed to characterize the Space Shuttle Main Engine (SSME) dynamic pressure environment is reported. The data base represents dynamic pressure measurements obtained during single engine hot firing tests of the SSME. Software is provided to permit statistical evaluation of selected measurements under specified operating conditions. An interpolation scheme is included to estimate spectral trends with SSME power level. Flow Dynamic Environments in High Performance Rocket Engines are described. E.A.K.

N86-23637*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS. APPENDIX D: DATA BASE PLOTS FOR SSME TESTS 750-047 THROUGH 750-111 Final Report
Thomas Coffin Jan. 1986 412 p
(Contract NAS8-34343)
(NASA-CR-178811; NAS 1.26:178811; TR-66338-01-App-D) Avail: NTIS HC A18/MF A01 CSCL 21H

Space Shuttle Main Engine power spectra and dynamic pressure measurements from hot test firing are reported. B.G.

N86-23638*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS. APPENDIX E: DATA BASE PLOTS FOR SSME TESTS 750-112 THROUGH 750-118 Final Report
Thomas Coffin Jan. 1986 311 p
(Contract NAS8-34343)
(NASA-CR-178812; NAS 1.26:178812; TR-66338-01-App-E) Avail: NTIS HC A14/MF A01 CSCL 21H

Dynamic pressure measurements and power spectra obtained from hot test firing of the Space Shuttle Main Engine are reported for test stand A3. B.G.

N86-23639*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS. APPENDIX F: DATA BASE PLOTS FOR SSME TESTS 750-120 THROUGH 750-200 Final Report
Thomas Coffin Jan. 1986 276 p
(Contract NAS8-34343)
(NASA-CR-178813; NAS 1.26:178813; TR-66338-01-App-F) Avail: NTIS HC A13/MF A01 CSCL 21H

A dynamic pressure data base and data base management system developed to characterize the Space Shuttle Main Engine (SSME) dynamic pressure environment is presented. The data base represents dynamic pressure measurements obtained during single engine hot firing tests of the SSME. Software is provided to permit statistical evaluation of selected measurements under specified operating conditions. An interpolation scheme is also included to estimate spectral trends with SSME power level. Author

N86-23640*# Rockwell International Corp., Canoga Park, Calif. Advanced Combustion Devices.
ATOMIZATION AND MIXING STUDY
A. Ferrenberg, K. Hunt, and J. Duesberg 30 Dec. 1985 375 p refs
(Contract NAS8-34504)
(NASA-CR-178751; NAS 1.26:178751; RI/RD85-312) Avail: NTIS HC A16/MF A01 CSCL 21H

The primary objective was the obtainment of atomization and mixing performance data for a variety of typical liquid oxygen/hydrocarbon injector element designs. Such data are required to establish injector design criteria and to provide critical inputs to liquid rocket engine combustor performance and stability analysis, and computational codes and methods. Deficiencies and problems with the atomization test equipment were identified, and action initiated to resolve them. Test results of the gas/liquid mixing tests indicated that an assessment of test methods was required. A series of 71 liquid/liquid tests were performed. B.G.

N86-23641*# Wyle Labs., Inc., Huntsville, Ala.
ENGINEERING EVALUATION OF SSME DYNAMIC DATA FROM ENGINE TESTS AND SSV FLIGHTS Final Report
Feb. 1986 570 p
(Contract NAS8-33508)
(NASA-CR-178807; NAS 1.26:178807; TR-64058-03) Avail: NTIS HC A24/MF A01 CSCL 21H

An engineering evaluation of dynamic data from SSME hot firing tests and SSV flights is summarized. The basic objective of the study is to provide analyses of vibration, strain and dynamic pressure measurements in support of MSFC performance and reliability improvement programs. A brief description of the SSME test program is given and a typical test evaluation cycle reviewed. Data banks generated to characterize SSME component dynamic characteristics are described and statistical analyses performed on these data base measurements are discussed. Analytical models applied to define the dynamic behavior of SSME components (such as turbopump bearing elements and the flight accelerometer safety cut-off system) are also summarized. Appendices are included to illustrate some typical tasks performed under this study. Author

N86-23642*# Continuum, Inc., Huntsville, Ala.
COMPUTATIONAL ANALYSIS OF THE SSME FUEL PREBURNER FLOW Final Report
Ten-See Wang and Richard C. Farmer 28 Feb. 1986 59 p refs
(Contract NAS8-35509)
(NASA-CR-178803; NAS 1.26:178803; CI-FR-0084) Avail: NTIS HC A04/MF A01 CSCL 21H

A computational fluid dynamics model which simulates the steady state operation of the SSME fuel preburner is developed. Specifically, the model will be used to quantify the flow factors which cause local hot spots in the fuel preburner in order to recommend experiments whereby the control of undesirable flow features can be demonstrated. The results of a two year effort to model the preburner are presented. In this effort, investigating the fuel preburner flowfield, the appropriate transport equations were numerically solved for both an axisymmetric and a three-dimensional configuration. Continuum's VAST (Variational Solution of the Transport equations) code, in conjunction with the CM-1000 Engineering Analysis Workstation and the NASA/Ames CYBER 205, was used to perform the required calculations. It is concluded that the preburner operational anomalies are not due to steady state phenomena and must, therefore, be related to transient operational procedures. Author

N86-23643# Aeronautical Research Labs., Melbourne (Australia).
FURTHER DEVELOPMENTS IN A PARAMETRIC STUDY OF RAMROCKET PERFORMANCE
Lincoln Erm Apr. 1985 24 p

(AD-A161906; ARL-AERO-PROP-TM-424) Avail: NTIS
HC A02/MF A01 CSCL 21/5

The performance of a ramrocket is estimated for a set of reference conditions and then the effect on performance of variable altitude, radial injection of the primary jet, variable intake pressure recovery and different levels of secondary combustion efficiency are each examined in turn. The results are presented graphically in terms of specific impulse. GRA

N86-23644# Aerojet Strategic Propulsion Co., Sacramento, Calif.
AGING AND SURVEILLANCE PROGRAM MINUTEMAN 2/3 STAGE 2 PROGRAM PROGRESS Report, 15 Mar. - 31 Aug. 1985
Nov. 1985 272 p
(Contract F42600-84-D-1275)
(AD-A162884; ASPC-0162-06-SAAS-35) Avail: NTIS
HC A12/MF A01 CSCL 21/8

This semiannual report provides results of tests conducted between 15 March 1985 and 31 August 1985 in support of the Aging and Surveillance program for the Minuteman 2 and 3 Stage 2 motors. The primary objectives of the program are to provide assurance that (1) the reliability of the presently deployed motor will not degrade within a projected replacement time of 17 years, and (2) the service life of the remanufactured motor will be equal to or greater than that of the presently deployed motor population. Also summarized are results of work completed in a number of special areas. Topics include initial testing of plug samples from a late production motor, dissection of a weathersealed motor, investigation of a propellant crack in a field-returned motor, investigation of early age-out motors, and evaluation of Stage 2 igniters for re-use in remanufactured motors. GRA

N86-23645# Florida Univ., Gainesville. Dept. of Engineering Sciences.
RD: A PROGRAM FOR AUTOMATED ROCKET DESIGN
G. E. Nevill, Jr., L. T. Adams, Jr., C. N. Asbury, W. J. Genemaras, and G. H. Paul Apr. 1985 108 p
(Contract W-7405-eng-48)
(DE86-002330; UCRL-15724) Avail: NTIS HC A06/MF A01

An experimental automated rocket design program (RD) developed in ROSIE/INTERLISP to run in VMS on a VAX 11/750 is described. Design problems are defined by the user in terms of the external shell configuration, thrust, weight, burn time and safety requirements. Reasonable candidate thrusters, feed systems and tank systems are identified using a coarse reasonableness criteria. Specific designs are then chosen using heuristic rules based on consideration of components characteristics including weight, capacity, size, safety, design maturity, use of special materials and compatibility with other components. The program's goal is to suggest as many promising designs as possible rather than to identify the single best design. A FORTRAN graphics package (GRAPHIX) then chooses the best positioning of the components of each design and displays them at the user's request. These programs can also be used for direct interrogation of the data base and for placement and display of user selected designs. RD/GRAPHIX together demonstrate the potential of an expert system approach to conceptual design of mechanical systems and structures. In addition, the programs are readily convertible to the design of other systems of interest to LLNL. DOE

N86-23864# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.
TWO-DIMENSIONAL ANALYSIS OF A FLOW IN AN MPD THRUSTER
Hiroyuki Yamada, Takashi Ao, and Toshi Fujiwara *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 67-76 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

N86-24508*# Furman Univ., Greenville, S.C. Dept. of Computer Science.
A MONTE CARLO STUDY OF WEIBULL RELIABILITY ANALYSIS FOR SPACE SHUTTLE MAIN ENGINE COMPONENTS
Kenneth Abernethy *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 13 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 21H

N86-24524*# Tennessee Univ., Knoxville. Dept. of Mechanical and Aerospace Engineering.
INVESTIGATION AND MODELING OF SPACE SHUTTLE MAIN ENGINE SHUTDOWN TRANSIENT CHUGGING
Paul E. George, II *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 18 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 21H

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-23646# Iowa Univ., Iowa City. Dept. of Chemistry.
NEW APPROACHES TO THE SYNTHESIS OF FLUOROCARBONS Final Report, 15 Jul. 1984 - 14 Jul. 1985
Donald J. Burton 1 Oct. 1985 12 p
(Grant AF-AFOSR-0245-84)
(AD-A162020; AFOSR-85-1027TR) Avail: NTIS
HC A02/MF A01 CSCL 07/4

This grant was issued under the DOD University Research Instrumentation for the purpose of upgrading equipment at the universities in order to perform research in support of National Defense. The instrument acquired was a Jeol FX-90Q(II) Fourier Transform (FT) Multi-Nuclear Magnetic Resonance Spectrometer System with the Omni Probe. The instrument also contains variable temperature observation, internal and external lock systems and computer control of irradiation frequencies. GRA

N86-23647# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
ACID-CATALYZED DEGRADATION OF POLY(2-BUTYL-1,3,6-TRIOXOCANE
James C. W. Chien, C. Peter Lillya, and Bao-Bei Xu 21 Oct. 1985 33 p
(Contract N00014-83-K-0083)
(AD-A162038; TR-11) Avail: NTIS HC A03/MF A01 CSCL 07/3

Polyacetals, owing to the acid sensitivity of the acetal linkage, are attractive candidates for end uses in which acid sensitivity is a desirable property, e.g., photo- or electron-resists. Many polysaccharides belong to this general class and owe many of their special properties to the acetal linkage. We report here a study of acid-catalyzed decomposition of poly(2-butyl-1,36-trioxocane) under two sets of conditions: mild leading to depolymerization, and drastic leading to more profound degradation. A mechanism for depolymerization involving open chain oxycarbocation intermediates operates. GRA

N86-23648# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE SYNTHESIS AND THERMAL PROPERTIES OF ISOMERIC ACETYLENE TERMINATED QUINOXALINES Final Report, Jan. 1979 - Jun. 1981
Frederick L. Hedberg, Marilyn R. Unroe, and Donna L. Bush May 1985 35 p
(AD-A162157; AFWAL-TR-85-4036) Avail: NTIS
HC A03/MF A01 CSCL 07/3

A mixture of the halogenated quinoxaline isomers, 3-(3-bromophenyl)-2-phenyl-6-iodoquinoxaline and 2-(3-bromophenyl)-3-phenyl-6-iodoquinoxaline, was synthesized and the two isomers were separated and purified. A substantial difference in solubility and melting point behavior was found between the isomers. The

halogen terminated isomers were converted individually to the corresponding isomeric acetylene terminated quinoxalines which exhibited analogous solubility and melting point differences. The glass transition temperatures of the individual acetylene terminated quinoxalines and of various mixtures all fell within a range from 33 C to 54 C. The presence of isomer mixtures was found to inhibit reversion from the amorphous state to the crystalline state. The significance of this effect and of solubility and melting point differences with respect to melt processing of acetylene terminated quinoxaline resin systems is discussed. Author (GRA)

N86-23649# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN INVESTIGATION OF ALTERNATE SYNTHESIS FOR 2,2'-BIS (PHENYLETHYNYL)-5,5' -DIAMINOBENZIDINE Final Report, Sep. 1979 - Sep. 1982
Alan A. Shaffer, Patricia M. Lindley, and Frederick L. Hedberg May 1985 51 p
(AD-A162197; AFWAL-TR-85-4038) Avail: NTIS HC A04/MF A01 CSCL 07/3

Several routes were investigated to develop an improved lower cost synthesis of the cited tetramine; a critical monomer used in forming the polyphenylquinoxaline polymer system with 2,2'-bis(phenylethynyl) moieties for intramolecular cyclization to the fused dibenzoanthracene structure. An immediate precursor to the tetramine 4-bromo-5-phenylethynyl-0-phenylenediamine was prepared in 43% overall crude yield from 0-nitroamide. Activated coupling through the aryl bromide using the tris-(triphenylphosphine) Ni(0) species was unsuccessful. Substrate chelation of the Ni(0) via the 0-diamine functionality was suggested as an inhibiting mechanism. Author (GRA)

N86-23650# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
[STUDIES, USING MEASUREMENTS, TO EXPLAIN THE PROPERTIES OF FAST ION CONDUCTING GLASSES BY ELECTRICAL CONDUCTIVITY AND MECHANICAL RELAXATION AS WELL AS NORMAL CHARACTERIZATION MEASUREMENT]
C. A. Angell 30 Sep. 1985 30 p
(Contract N00014-84-K-0289)
(AD-A163029) Avail: NTIS HC A03/MF A01 CSCL 20/3

This document contains summaries of papers on the following topics: Mechanical vs Electrical Relaxation in AgI-based Fast Ion Conducting Glasses; Ambient Temperature Plastic Crystal Fast Ion Conductors (PLICFICS); All-Halide Superionic Glasses; Mechanical Relaxation by Mobile Ions Cu(+) and Ag(+) in Fast Ion Conducting Glasses; Recent Developments in Fast Ion Transport in Glassy and Amorphous Materials; Silver Alkali Halide Glasses and a Vitreous Analog of the RbAg4I5 Superionic Conductor; Fast Ion Phenomenology in Glassy Solids, Transport in Solids; and Recent Developments in Fast Ion Transport in Glassy and Amorphous Materials. GRA

N86-23651# Oak Ridge National Lab., Tenn.
EFFECT OF COPRODUCED ALCOHOLS AND KETONES ON THE EXTRACTION OF 1-BUTANOL FROM AQUEOUS SOLUTION BY THE ETHYL ESTERS OF SOYBEAN OIL FATTY ACIDS
W. L. Griffith, J. M. Googin, and A. L. Compere 1985 10 p refs Presented at the 4th Symposium on Separation Science and Technology for Energy Applications, Knoxville, Tenn., 20 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002245; CONF-851011-3) Avail: NTIS HC A02/MF A01

Bacterial fermentations generally produce 1-butanol together with acetone, ethanol, 2-propanol, or 1-pentanol. The effect of these materials on the extraction of 1-butanol from aqueous solution by the ethyl ester of soybean oil fatty acids was determined using a factorial experimental design. Concentrations of 1-butanol ranged from 0.1 to 4.1% w/v, while the concentrations of coproduced alcohols and ketones ranged up to 4.0% w/v. Acetone, ethanol, and 2-propanol had little effect on 1-butanol extraction, while a slight increase in extraction appeared with increasing 1-pentanol. The extraction of acetone, ethanol, 2-propanol, and 1-pentanol was not measured. DOE

N86-23652# Oak Ridge National Lab., Tenn.
REACTION OF FORMALDEHYDE AND NITRIC ACID IN A REMOTELY OPERATED THERMOSIPHON EVAPORATOR
R. Hall, B. D. Patton, and P. A. Haas 1985 7 p Presented at the American Nuclear Society Winter Meeting, San Francisco, Calif., 10 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002453; CONF-851115-33) Avail: NTIS HC A02/MF A01

Conditions have been developed for the safe and successful use of a method for reacting formaldehyde with excess nitric acid, while simulataneously concentrating a fissile uranium nitrate solution. This process, which is being conducted in a remotely operated thermosiphon evaporator, has been adapted to plant scale and is being used to process multikilogram batches. DOE

N86-23653# Sandia National Labs., Albuquerque, N. Mex.
RETENTION AND THERMAL RELEASE OF OXYGEN IMPLANTED IN GRAPHITE
W. R. Wampler and D. K. Brice 1985 11 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003235; SAND-85-1266C; CONF-851174-15) Avail: NTIS HC A02/MF A01

The retention of oxygen implanted in graphite at 1.5 and 3 keV was measured as a function of fluence. At fluences less than 10 to the 16th power O/sq cm the oxygen was all retained, but at higher fluences the retention saturated. Models describing the retention are discussed which include the effects of sputtering and a saturation limit to the local oxygen concentration. Thermal release of oxygen implanted to saturation at room temperature began at 250C and was 90% completed by 750C. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-23654 Virginia Univ., Charlottesville.
TRANSVERSE STRENGTH IMPROVEMENT OF COMPOSITES Ph.D. Thesis
Annette Teng Cheung 1984 157 p
Avail: Univ. Microfilms Order No. DA8515504

Tensile tests of SiC monofilament reinforced composites showed transverse strengths less than 4000 psi (28 MPa). Low strength was due mainly to poor SiC to Al matrix bonding. One solution was to make hybrid composites utilizing a different and smaller type of fiber to reinforce the transverse direction without adversely affecting axial strength. The reinforcing fibers used were the continuous Nicalon (SiC) and Fiber FP(Al2O3) multifilaments and the Silag whiskers (SiC). Measurements established that the Silag whiskers provided effective reinforcement resulting in ultimate tensile stresses up to 50,000 psi (345 MPa). Fracture and microstructural analyses of Silag composites and hybrids showed many features such as low fiber pullout population and the presence of three types of brittle particulates, which if eliminated could have raised strengths substantially. Dissert. Abstr.

N86-23655 Rensselaer Polytechnic Inst., Troy, N.Y.
IMPROVING THE STRENGTH PREDICTION FOR ADVANCED COMPOSITE MATERIAL WITH STRESS CONCENTRATION Ph.D. Thesis
Tsay-Hsin Gilbert Hu 1985 296 p
Avail: Univ. Microfilms Order No. DA8528661

The macro-mechanical approach is used to investigate the stress concentration problem for Advanced Composite Material. Two modifications of the Average Stress Criterion and one modification of the Weibull strength theory are proposed to improve the accuracy of notched strength prediction for composites. The experimental data from both uniaxial and biaxial loading condition are used to assess the validity and accuracy of these modifications. For the uniaxial loading condition, a large scale testing program

has been conducted to generate the experimental data. Five replicates for each configuration seem to be an optimum compromise between expenses and accuracy. Notch type, notch size, and lay-up are the parameters for this investigation. Meanwhile, the theoretical stress distribution of notched specimen is obtained from a finite element analysis. The most suitable modification can be determined by best fitting of all experimental data.
Dissert. Abstr.

N86-23656 Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
THE STRENGTH OF MECHANICALLY FASTENED JOINTS IN KEVLAR REINFORCED COMPOSITE MATERIALS
F. L. Matthews and P. Kalkanis Oct. 1984 162 p refs
(Contract MOD(PE)-2037/0258-XR/STR)
(BR93823) Avail: NTIS HC A08/MF A01

Structural use of Kevlar fiber reinforced plastic was examined by an experimental analysis of mechanical joints in various types of laminates, using woven fabric in 913 resin. Static tests on riveted joints (solid and hollow rivets) as well as pinned and bolted joints were carried out. Riveted joints in CFRP were tested for comparison. The investigation isolated variables such as geometric factors, bolt clamping pressure, and ply orientation. The effect of clamping load on rivets joints with solid rivets was investigated. It is found that the compressive properties of Kevlar fiber, combined with the characteristics of woven fabrics, cause unexpected behavior. Compared to CFRP laminates, the KFRP specimens exhibit metal-like features at failure. Strength depends strongly on lay-up and the imposition of through-thickness clamping causes a change in failure mode.
Author (ESA)

N86-23657*# National Aeronautics and Space Administration, Washington, D.C.
FAILURE CRITERION OF GLASS FABRIC REINFORCED PLASTIC LAMINATES
Osamu Haga, Noriyuki Hayashi, and Kazuo Kasuya Apr. 1986 11 p refs Transl. into ENGLISH from "Glass Cloth Sekiso Kyoka Plastic no Hakai Kijun" (Japan), v. 25, no. 273, Jun. 1976 p 516-520 Previously announced in IAA as A76-41242 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. was prepared by Chiba Univ., Japan
(Contract NASw-4004)
(NASA-TM-88406; NAS 1.15:88406) Avail: NTIS HC A02/MF A01 CSCL 11D

Failure criteria are derived for several modes of failure (in unaxial tensile or compressive loading, or biaxial combined tensile-compressive loading) in the case of closely woven plain fabric, coarsely-woven plain fabric, or roving glass cloth reinforcements. The shear strength in the interaction formula is replaced by an equation dealing with tensile or compressive strength in the direction making a 45 degree angle with one of the anisotropic axes, for the uniaxial failure criteria. The interaction formula is useful as the failure criterion in combined tension-compression biaxial failure for the case of closely woven plain fabric laminates, but poor agreement is obtained in the case of coarsely woven fabric laminates.
Author

N86-23658*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF FIBER BRIDGING IN DOUBLE CANTILEVER BEAM SPECIMENS
W. S. Johnson and P. D. Managalgiri Apr. 1986 21 p refs
(NASA-TM-87716; NAS 1.15:87716) Avail: NTIS HC A02/MF A01 CSCL 11D

The possibility to eliminate fiber bridging or at least to reduce it, and to evaluate an alternative approach for determination of in situ mode 7 fracture toughness values of composite matrix materials were investigated. Double cantilever beam (DCB) specimens were made using unidirectional lay-ups of T6C/Hx205 composite material in which the delaminating halves were placed at angles of 0, 1.5, and 3 degrees to each other. The small angles between the delaminating plies were used to avoid fiber nesting without significantly affecting mode I Teflon insert. The DCB specimens were fabricated and it was found that: (1) the extent which fiber bridging and interlaminar toughness increase with crack length can be reduced by slight cross ply at the delamination plane to reduce fiber nesting; (2) some fiber bridging may occur even in the absence of fiber nesting; (3) the first values of toughness measured ahead of the thin Teflon insert are very close to the toughness of the matrix material with no fiber bridging; (4) thin adhesive bondline of matrix material appears to give toughness values equal to the interlaminar toughness of the composite matrix without fiber bridging.
E.A.K.

N86-23659*# McDonnell-Douglas Corp., Long Beach, Calif.
GRAPHITE/EPOXY COMPOSITE STIFFENED PANEL FABRICATION DEVELOPMENT Final Report
R. J. Palmer Mar. 1984 135 p refs
(Contract NAS1-12675)
(NASA-CR-172204; NAS 1.26:172204) Avail: NTIS HC A07/MF A01 CSCL 11D

This report describes the manufacturing development procedures used to fabricate a series of carbon/epoxy panels with integrally molded stiffeners. Panel size was started at 6 inches by 18 inches and one stiffener and increased to 30 inches by 60 inches and six integral stiffeners. Stiffener concepts were optimized for minimum weight (or mass) to carry stress levels from 1500 lbs/inch to 25,000 lbs/inch compression load. Designs were created and manufactured with a stiffener configuration of integrally molded hat, J, I, sine wave I, solid blade, and honeycomb blade shapes. Successful and unsuccessful detail methods of tooling, lay-up methods, and bagging methods are documented. Recommendations are made for the best state-of-the-art manufacturing technique developed for type of stiffener construction.
Author

N86-23660*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMBINED BEARING AND BYPASS LOADING ON A GRAPHITE/EPOXY LAMINATE
J. H. Crews, Jr. and R. A. Naik Apr. 1986 35 p refs
(NASA-TM-87705; NAS 1.15:87705) Avail: NTIS HC A03/MF A01 CSCL 11D

A combined experimental and analytical study was conducted to determine the behavior of a graphite/epoxy laminate subjected to combined bearing and bypass loading. Single-fastener quasi-isotropic specimens were loaded at various bearing-bypass ratios until damage was produced at the fastener hole. Damage-onset strengths and damage modes were then analyzed using local hole-boundary stresses calculated by a finite-element analysis. The tension data showed the expected linear interaction for combined bearing and bypass loading with damage developing in the net-section tension mode. However, the compression bearing-bypass strengths showed an unexpected interaction involving the bearing mode. Compressive bypass loads reduced the bearing strength by decreasing the bolt-hole contact arc and thus increasing the severity of the bearing loads. The bearing stresses at the hole boundary were not accurately estimated by superposition of the stress components for separate bearing and bypass loading. However, superposition produced reasonably accurate estimates for tangential stresses especially near the specimen net-section.
Author

N86-23661*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FUNDAMENTAL STUDIES OF LOW VELOCITY IMPACT RESISTANCE OF GRAPHITE FIBER REINFORCED POLYMER MATRIX COMPOSITES Ph.D. Thesis
Kenneth J. Bowles Nov. 1985 241 p refs Previously announced as N86-10288
(NASA-TM-86886; E-2188; NAS 1.15:86886) Avail: NTIS HC A11/MF A01 CSCL 11D

A study was conducted to relate the impact resistance of graphite fiber reinforced composites with matrix properties through gaining an understanding of the basic mechanics involved in the deformation and fracture process, and the effect of the polymer

matrix structure on these mechanisms. It was found that the resin matrix structure influences the composite impact resistance in at least two ways. The integration of flexibilizers into the polymer chain structure tends to reduce the T sub g and the mechanical properties of the polymer. The reduction in the mechanical properties of the matrix does not enhance the composite impact resistance because it allows matrix controlled failure to initiate impact damage. It was found that when the instrumented drop-weight impact tester is used as a means for assessing resin toughness, the resin toughness is enhanced by the ability of the clamped specimen to deflect enough to produce sufficient membrane action to support a significant amount of the load. The results of this study indicate that crossplied composite impact resistance is very much dependent on the matrix mechanical properties. Dissert. Abstr.

N86-23662# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
CEMENTITIOUS MIXTURES FOR SEALING EVAPORITE AND CLASTIC ROCKS IN A RADIOACTIVE-WASTE REPOSITORY Final Report
Lillian D. Wakeley and Della M. Roy Sep. 1985 19 p
(Contract DE-AC02-83CH10140)
(AD-A161865; WES/MP/SL-85-16) Avail: NTIS
HC A02/MF A01 CSCL 11/1

Cement-based mixtures were proportioned for sealing a potential geologic repository for high-level radioactive waste in evaporite and related rock strata. The slightly expansive cementitious mixtures were based on Class H portland cement and Class C fly ash, with silica flour and calcium sulfate additives, and a low ratio of water to cementitious solids (w/s = 0.32). Both a salt-free and a salt-containing version were used in tests with anhydrite, siltstone, and halite. Although it is difficult to achieve strong bonding between anhydrite and cement-based mixtures, tensile bond strengths, interface permeability, and other properties of the composites as a whole indicate achievement of the desired chemical and physical compatibility between these materials. Integrity of bonding and low permeability to water (on the order of 0.000001 darcy) suggest the likelihood of attaining durable sealing of repository access shafts and boreholes through the use of such chemically tailored cementitious mixtures. Rock samples used in these sealing studies were obtained from various areas throughout the United States. The data in the present paper represent results for rocks obtained from the Palo Duro Basin, Tex., and, as such, typify bedded-salt strata. Author (GRA)

N86-23663# Royal Aircraft Establishment, Farnborough (England).
FLEXURAL PROPERTIES OF CARBON FIBRE CLOTH/WOOD VENEER LAMINATES
J. H. Sewell Apr. 1985 23 p
(AD-A161921; RAE-TM-MAT-STR-1055; DRIC-BR-96647) Avail: NTIS HC A02/MF A01 CSCL 11/5

Flexural tests have been made on epoxy or phenolic resin bonded hybrid laminates comprising carbon fiber cloth layers on wood veneer cores. Breaking loads and stiffnesses of many of the hybrids exceed those of all carbon fiber cloth laminates of the same weight per unit area of panel. This improvement in flexural properties can be accompanied by a significant decrease in materials costs owing to the replacement of expensive carbon fiber cloth by cheap wood veneers. Significant weight savings may be achieved if carbon fiber laminates are replaced by hybrid laminates having the same flexural breaking strengths or stiffnesses. GRA

N86-23664# Metal Matrix Composites Information Analysis Center, Santa Barbara, Calif.
A BRIEF INTRODUCTION TO METAL MATRIX COMPOSITES MATERIALS AND TECHNOLOGY
Louis A. Gonzalez Jan. 1985 14 p Presented at Advanced Materials Workshop, San Luis Obispo, Calif., 10-11 Dec. 1984
(Contract DLA900-80-C-4095)
(AD-A161954; MMCIAC-000663) Avail: NTIS HC A02/MF A01 CSCL 11/4

This paper presents a general introduction to metal matrix composites, including discussions on reinforcement and matrix materials, physical and mechanical properties of the composites, applications of the materials, and fabrication methods. GRA

N86-23665# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Civil Engineering.
ANALYSIS OF PROGRESSIVE MATRIX CRACKING IN COMPOSITE LAMINATES Final Report, 1 Sep. 1982 - 31 Aug. 1984
George J. Dvorak 31 Mar. 1985 70 p
(Grant AF-AFOSR-0308-82)
(AD-A162220; AFOSR-85-1064TR) Avail: NTIS
HC A04/MF A01 CSCL 11/4

This report summarizes recent results of studies on progressive ply cracking in fibrous laminates. Evaluation of stiffness changes caused by systems of aligned slit cracks which are parallel to the fiber direction in a unidirectional composite lamina is discussed. Results obtained by the self-consistent method are presented. Next, a procedure for estimating instantaneous crack densities and stiffness changes in a lamina subjected to a prescribed strain history is outlined. These results are extended to analysis of laminated composite plates under in-plane stresses. Specific examples and comparisons of analytical and experimental results are presented for two graphite-epoxy systems. GRA

N86-23666# Massachusetts Inst. of Tech., Cambridge.
STRUCTURE-PROPERTY RELATIONSHIPS IN INTERCALATED GRAPHITE Semiannual Report, 1 Oct. 1984 - 31 Mar. 1985
Mildred S. Dresselhaus and Gene Dresselhaus 10 Jul. 1985 22 p
(Contract F49620-83-C-0011)
(AD-A162326; AFOSR-85-0995TR) Avail: NTIS
HC A02/MF A01 CSCL 20/12

Experimental and theoretical studies have been carried out relevant to the structural, lattice electronic, magnetic and superconducting properties of synthetic metals prepared by intercalating graphite. New synthesis methods have been developed for preparing magnetic transition metal chloride and potassium-hydrogen graphite intercalation compounds. The use of ion implantation to enhance intercalation has been explored and promising results have been obtained. Structural studies using high resolution X-ray scattering and transmission electron microscopy have been applied to study two-dimensional structural phase transitions such as the commensurate to incommensurate stripe phase transition in bromine intercalated graphite and commensurate to glass phase transition in antimony pentachloride intercalated graphite. The construction of a Raman microprobe allows study of the spatial homogeneity (to 2 micron resolution) of the staging in specific intercalated graphite samples. The high field magnetoresistance anomaly in graphite identified with a charge density wave has been further explored with particular emphasis given to the role of impurities in pair breaking phenomena and pulsed electric fields in nonlinear nonohmic effects. The theoretical model developed to explain the superconducting behavior in the first stage alkali metal compounds has guided studies on superconducting graphite intercalation compounds with higher transition temperatures with particular relevance to their superconducting behavior and their related Fermi surface and phonon mode properties. Author (GRA)

N86-23667# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.
FRACTURE BEHAVIOR OF BORON ALUMINUM COMPOSITES AT ROOM AND ELEVATED TEMPERATURES Final Report, 1 Apr. 1979 - 14 Apr. 1985
Jonathan Awerbuch Apr. 1985 265 p
(Grant AF-AFOSR-0079-79)
(AD-A162352; AFOSR-85-1099TR) Avail: NTIS
HC A12/MF A01 CSCL 11/4

The results of research work on the deformation characteristics and failure mechanisms and processes of center-notched boron/aluminum laminates at room and elevated temperature are

described. This program has focused on the deformation characteristics in both the elastic and inelastic ranges, crack tip damage growth, notch sensitivity, toughness, failure mechanisms and processes and failure modes. The primary experimental technique has been to utilize the interferometric displacement gage (IDG) through which the actual crack opening displacement (COD) could be measured at room and elevated temperatures, resulting in precise load-COD and local compliance curves. Special attention has also been given to nondestructive examination techniques, in particular the acoustic emission technique, for monitoring internal damage initiation and progression during quasi-static and low cycle fatigue loading. Microstructural studies of the fracture surface morphologies have been conducted as well. The analytical study has focused in three major directions, namely: (1) predicting the elastic behavior; (2) application of semi-empirical fracture models for predicting the notch sensitivity; and (3) application, extension and modifications of approximate mechanistic models for predicting the deformation characteristics of unidirectional composites.
Author (GRA)

N86-23668# Aerotherm Acurex Corp., Mountain View, Calif.
IMPROVED PROCESSING OF CARBON-CARBON COMPOSITES Final Annual Report, Aug. 1984 - Sep. 1985
J. E. Zimmer and R. L. Weitz Nov. 1985 34 p
(Contract N00014-81-C-0641)
(AD-A162887; TR-85-21/ATD; FAR-4) Avail: NTIS HC A03/MF A01 CSCL 07/4

The objectives of this research program were to investigate the use of a catalyst to increase the char yield of petroleum pitch and thus increase the processing efficiency of carbon-carbon composites, and to investigate the use of an alternate pitch that forms a fine-isotropic matrix microstructure which may improve the interlaminar shear strength of bidirectional carbon-carbon composites. After the first carbonization and heat-treatment cycle, the composite with A240 petroleum-pitch matrix precursor with 20 w/o AlCl3 had a 4 percent higher bulk density. The composite with a fine-isotropic matrix microstructure from a thermal pitch from vacuum-distilled bottoms did not have higher interlaminar shear strength. This matrix was more viscous and did not infiltrate well the fiber bundles through which the shear fracture occurred. Further work is needed to better understand the relationships between char yield, viscosity, and microstructure, and to optimize these properties of the pitch matrix precursors. Author (GRA)

N86-24513*# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
DEVELOPMENT OF COMPOSITE MATERIAL TEST METHODOLOGY FOR FRACTURE TOUGHNESS/DAMAGE TOLERANCE
Mark V. Bower *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 21 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

N86-24522*# Embry-Riddle Aeronautical Univ., Daytona Beach, Fla. Dept. of Aeronautical Engineering.
PRELIMINARY DESIGN METHODS FOR FIBER REINFORCED COMPOSITE STRUCTURES EMPLOYING A PERSONAL COMPUTER
Charles N. Eastlake *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-23669 Princeton Univ., N. J.
STUDIES OF SLURRY DROPLET COMBUSTION AND BORON PARTICLE IGNITION Ph.D. Thesis
Paul Joseph Antaki 1986 214 p
Avail: Univ. Microfilms Order No. DA8529771

In the study of slurry droplet combustion, the transient droplet processes of liquid vaporization and internal heat conduction are investigated for two droplets models. The rigid porous shell model applies to a droplet with a large initial volume fraction of solid particles, and a constant overall droplet diameter. The contracting sphere model applies to a droplet with a small initial volume fraction of solid particles, and a diameter that decreases during part of the liquid vaporization period. For both models, the coupled equations for the rate of liquid surface regression and internal heat conduction are solved approximately by matched asymptotic expansions. The large or small expansion parameter is the ratio of the energy required to raise the slurry mixture to the liquid vaporization temperature, to that required for liquid vaporization. Results for both models include approximate expressions for liquid vaporization time, liquid surface regression and internal heat conduction. Selected results for both models are tested experimentally by vaporizing and buring the liquid JP-10 from single JP-10/boron droplets, suspended on quartz fibers in room temperature air. Dissert. Abstr.

N86-23670 Texas Univ., Austin.
DEVELOPMENT OF AN EIGHT-STEP KINETICS MECHANISM FOR PROPANE AND ITS APPLICATION IN A TRANSIENT, THIN GAP, ENGINE MODEL Ph.D. Thesis
Thomas Merill Kiehne 1985 464 p
Avail: Univ. Microfilms Order No. DA8527585

An accurate eight step kinetics mechanism for the oxidation of propane which is based on previous research was developed in ignition delay studies and investigations of freely propagating and quenching flames. Results from a detailed kinetics model and available experimental data were used for comparison and verification. One dimensional transient calculations were performed at pressures ranging from one to 40 atmospheres, unburned gas temperatures from 400 to 500 K, and near stoichiometric equivalence ratios. The detailed kinetics results confirm the existence of extensive postquench burnup of propane after the time of flame arrival at the wall. Based on the detailed kinetics results, an eight-step kinetics model developed from experiment is shown to be deficient in certain key areas. With the intent of extending the shear free, one dimensional, wall quench calculations to a two dimensional, transient, laminar shear flow enrichment, a thin gap model of combustion near top-dead-center in a piston engine is developed. This model couples the radial, compressible momentum equation to the axial flame equations with boundary conditions appropriate to enclosed flow in an engine cylinder. Cold flow calculations are used to establish pressure and, therefore, Reynold's number effects in both planar and axisymmetric geometries. Dissert. Abstr.

N86-23671# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
DISTRIBUTION OF CHLORIDE IN A SALT-SATURATED GROUT IN CONTACT WITH ROCK SALT Final Report
Lillian D. Wakeley and J. P. Burkes Sep. 1985 18 p
(Contract FAO-21-2348)
(AD-A161866; WES/MP/SL-85-15) Avail: NTIS HC A02/MF A01 CSCL 07/4

Bond strength of a sodium chloride-saturated grout to rock salt suggested chemical bonding existed across the interface.

Chemical analyses using scanning electron microscopy/energy-dispersive X-ray spectroscopy of various locations in the grout showed a significantly greater quantity of chloride near the interface than near the perimeter of specimens. The resultant concentration of chloride is at least partially controlled by the proximity of rock salt. Author (GRA)

N86-23672# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SAMPLE DIGESTION AND DRYING TECHNIQUES FOR OPTIMAL RECOVERY OF MERCURY FROM SOILS AND SEDIMENTS
James H. Cragin and Brian T. Foley Sep. 1985 21 p
(AD-A161948; CRREL-SR-85-16; AMXTH-TE-TR-85039) Avail: NTIS HC A02/MF A01 CSCL 08/4

Mercury in soils and sediments can be accurately determined over the concentration range of 0.04 to 2 micrograms Hg/g using amalgamation on thin gold films. Relative standard deviation of analysis is about 10%. A mild sample dissolution technique, involving HNO3 at 75 C, produced quantitative Hg recoveries for certified sediment samples and recoveries equivalent to those of rigorous Parr-bomb digestions for other soil and sediment samples. Oven drying of samples at 150 C resulted in significant losses of Hg from both soil and sediment samples. Air drying, oven drying at 60 C or freeze drying resulted in Hg recoveries that agreed within 20% of those for undried samples. Thus, any one of these three comparable methods is recommended for Hg determinations in soils and sediments. GRA

N86-23673# Frequency Systems, Inc., Nashua, N.H.
NEW DIAZO PROCESS Technical Report, 3 Dec. 1984 - 2 Dec. 1985
Sidney K. Tally 2 Dec. 1985 37 p
(Contract MDA903-85-C-0002; ARPA Order 5154)
(AD-A161962) Avail: NTIS HC A03/MF A01 CSCL 07/3

This project was initiated to explore diazo type compound with spectral response at 520 nm, and stability at ambient storage conditions. Such compounds would permit the direct copying of blue prints and result in major time and dollar savings to blueprint users including federal and municipal government agencies, the military, large and small industries and the construction industry. The photochemical sensitivity of the aromatic diazonium salts used in conventional diazo copying systems is limited to a narrow spectral region in the near ultraviolet and the blue, with maximum sensitivity from 375 nm to 400 nm. A new category of diazonium compound, with light sensitivity in the visible spectrum from 500 to 540 nm has been the goal of this project. There were four compounds picked to explore: 7-N,N-dimethylamino-2-fluorene diazonium chloride; 6-N,N-dimethylamino-1-pyrene diazonium chloride; 7-N,N-dimethylamino-2-pyrene diazonium chloride; and 7-N,N-dimethylamino-3-dibenzopyran diazonium chloride. These four compounds did not produce the required results. Naphthalene diazonium compounds meet the criteria specified for compounds to be investigated. Both 5-dimethylamino-1-napthalene diazonium chloride and 6-dimethylamino-2-naphthalene diazonium chloride possess the relatively long electrically conductive paths between appended polar nitrogens. GRA

N86-23674# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
SULFATE RESISTANCE OF HYDRAULIC CEMENTS CONTAINING BLAST-FURNACE SLAG Final Report
Alan D. Buck Sep. 1985 19 p Presented at a Workshop, Slag Cements: Research and Practice, 12-14 Mar. 1984, University Park, Pa.
(AD-A161985; WES/MP/SL-85-14) Avail: NTIS HC A02/MF A01 CSCL 11/2

As part of one US Army Corps of Engineers research program and one American Society for Testing and Materials (ASTM) cooperative program performed in the Concrete Technology Division of the Structures Laboratory of the US Army Engineer Waterways Experiment Station in the 1970's, five portland blast-furnace slag cements were tested for sulfate resistance. The major intent of this program was to develop a new standardized test for determining sulfate resistance that would be more applicable for testing blended cements than ASTM C 452. The test now exists; it is ASTM C 1012-84. That work included characterization of materials, periodic expansion measurements, periodic determinations of relative modulus of elasticity. Periodic chemical analysis of test solutions, and examination of the paste portion of mortar bars by X-ray diffraction after expansion testing. This report concentrates on expansion results, posttest examination by XRD, and materials characteristics. GRA

N86-23675# Texas Univ., Austin. Dept. of Chemistry.
DEVELOPMENT OF PRACTICAL MO TECHNIQUES FOR THE PREDICTION OF THE PROPERTIES AND BEHAVIOR OF MATERIALS Final Scientific Report, 1 Nov. 1982 - 30 Sep. 1985
Michael J. S. Dewar 8 Oct. 1985 23 p
(Contract F49620-83-C-0024)
(AD-A161992; AFOSR-85-1028TR) Avail: NTIS HC A02/MF A01 CSCL 07/2

A third generation semiempirical SCF MO treatment (AM1) has been developed in which the weaknesses of MNDO, in particular failure to reproduce hydrogen bonds, have been overcome. MNDO has been parameterized for Zn, Hg, Ge, Sn, Pb, Br, and I and reparametrized for Si and S. A version of MNDO with d AOs has been parametrized for chromium. Computer programs have been improved and collected into a single package (MOPAC) which allows calculations of a wide variety of molecular properties, and additional graphics packages developed. Extensive calculations for pericyclic reactions has led to a new general rule, that multibond processes are not normally synchronous. The Diels-Alder reactions in particular have been shown to involve unsymmetrical transition states. Studies of aniotic nucleophilic substitution have shown that the barriers in solution can be due entirely to desolvation of the anion, a result of major theoretical significance. A new explanation of the rates and specificities of enzyme reactions, refutation of FO Theory as an effective general treatment of chemical reactions. A new interpretation of sigma interactions in molecules (sigmaconjugation), and evidence that tunnelling can play a more general role in chemistry than previously thought have been developed. GRA

N86-23676# SRI International Corp., Menlo Park, Calif.
LASER-INDUCED KINETICS: AN EXPERIMENTAL AND THEORETICAL PROGRAM Final Report, 1 Oct. 1982 - 30 Sep. 1985
N. Selamoglu, M. J. Rossi, and D. M. Golden 25 Oct. 1985 78 p
(Contract F49620-83-K-0001)
(AD-A161994; AFOSR-85-1097TR) Avail: NTIS HC A05/MF A01 CSCL 07/5

The kinetics of CF3 and CH3 radical reactions have been investigated using the VLPO method. The reactions of interest were radical recombination and metathetical halogenation (Br-2, C-12). In addition to yielding gas-phase reaction rates, these studies pointed out the importance of gas-surface interactions in the chemistry. The VPLO technique was also used to investigate a radical-surface reaction: the reaction of the CF3 radicals on a silicon oxide surface. The latter study revealed that H2O on the surface plays a major role in the chemistry. The surface reaction was studied as functions of surface temperature (320 to 530 K) and CF3 concentration. GRA

N86-23677# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYNTHESIS OF ALPHA-OXIDES WITH A NITROGEN-CONTAINING SUBSTITUENT
N. A. Mukhitdinova 29 Oct. 1985 25 p Transl. into ENGLISH from the book "Sintez Novykh Monomerov" (USSR), 1973 p 78-95
(AD-A162055; FTD-ID(RS)T-0407-85) Avail: NTIS HC A02/MF A01 CSCL 07/2

A large number of works has been published on the obtaining of alpha-oxides with a N-containing substituent, but almost all of

them relate to the synthesis of epoxypropylamines. Only individual reports are known concerning the derivatives with the epoxyethyl radical. The structural formulas of the compounds are explained. The reactions of epichlorohydrin are studied and their structures listed in formulas. GRA

N86-23678# Science Applications International Corp., McLean, Va.
HIGH-TEMPERATURE THERMAL SIMULATOR: PHASE 1 Technical Report, 15 Aug. 1983 - 15 Sep. 1984
John A. Simmons and Michael D. McDonnell 28 Feb. 1985 114 p
(Contract DNA001-83-C-0224)
(AD-A162163; AD-E301844; SAIC-84/1715; DNA-TR-84-312) Avail: NTIS HC A06/MF A01 CSCL 20/13

This report describes the results of a study whose purpose was to determine how and to what extent the radiative output of DNA's Thermal Radiation Simulator (TRS) could be increased. Another purpose was to recommend a program for realizing that higher level of output. This study constituted the first phase of a program whose goals are to create a High Temperature Radiation Simulator (HTRS) producing: A radiative flux exceeding 160 cal/cm to the second power - sec and A radiation color temperature effectively greater than 4000 deg K. The study consisted of an examination of the pertinent literature and some theoretical analyses. The literature examined dealt primarily with the fundamental features of the combustion of metals with oxygen and the radiative and optical characteristics of metal-oxygen combustion products. The theoretical analyses focused on calculation of temperature and energy released from the combustion of various fuels with oxygen, estimation of radiation from a cloud of hot particulates, determination of the approximate relationships between radiative flux and flame height versus flame velocity, particle size and flame thickness, interpretation of combustion data to determine the burning rates of metal particles, and a qualitative analysis of the fluid dynamic and temperature structure of the present TRS's aluminum-oxygen flame. Based on the results, a set of techniques was defined which could lead to the attainment of the HTRS goals. Additionally, a program of experimental research was outlined to explore, develop and implement these techniques. GRA

N86-23679# Georgia Univ., Athens. Dept. of Chemistry.
TOPOLOGICAL INDICES AS CHEMICAL BEHAVIOR DESCRIPTORS
D. H. Rouvray 7 Nov. 1985 22 p
(Contract N00014-85-K-0365)
(AD-A162349; TR-8) Avail: NTIS HC A02/MF A01 CSCL 07/4

Graph theorists have contributed steadily to the development of chemistry but their contributions have been confined mainly to one or two applications. After briefly reviewing the principal applications of graph theory and combinatorics in chemistry, there are still numerous interesting mathematical problems waiting to be tackled. A number of these involve the various graph invariants used by chemists to characterize molecular graphs, usually referred to as topological indices (TIs). Many different TIs have been put forward to date and most have been employed to characterize chemical behavior dependent upon either: (1) molecular size, (2) molecular shape, and (3) specific molecular sites within a molecule. Three comparatively simple TIs based on the distance matrix are exhibited. The first of these has been used to predict the physicochemical properties of hydrocarbon molecules; the second, properties which depend on the degree of branching present in molecules (such as the octane number of fuels); and the third, the occurrence of carcinogencity, mutagenicity or tetratogencity in polycyclic aromatic species (polyhexes). GRA

N86-23680# Naval Research Lab., Washington, D. C.
PH DEPENDENT INTERACTIONS BETWEEN AQUEOUS IODIDE ION AND SELECTED OXIDIZERS
R. E. Pellenbarg 6 Dec. 1985 18 p
(AD-A162358; NRL-MR-5693) Avail: NTIS HC A02/MF A01 CSCL 07/2

Pseudo-first order rate constance for the reaction between the oxidizers peroxydisulfate, peroxide, percarbonate, and perborate ions and aqueous iodide have been measured pH 1, 4, 7, 9. Reactions were more rapid under acid conditions, and for the latter three test oxidizers, did not occur at all at pH 9. This fact has important implications for reactions to occur in seawater (pH about 8.3). Observed rate constants ranged from some .00065/sec (peroxydisulfate at pH 1), to no reaction at high pH for some anions. GRA

N86-23681# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
FLUCTUATIONS NEAR HOMOGENEOUS STATES OF CHEMICAL REACTIONS WITH DIFFUSION
Peter Kotelenez Nov. 1985 31 p
(Contract F49620-85-C-0144)
(AD-A162875; TR-126; AFOSR-85-1179TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Conditions are given under which a space-time jump Markov process describing the stochastic model of nonlinear chemical reactions with diffusion converges to the homogeneous state solution of the corresponding reaction-diffusion equation. The deviation is measured by a central limit theorem. This limit is a distribution valued Ornstein-Uhlenbeck process and can be represented as the mild solution of a certain stochastic partial differential equation. GRA

N86-23682# Department of the Navy, Washington, D. C.
CHEMICAL DETOXIFICATION OF POLYCHLORINATED BIPHENYLS (PCBS) Patent Application
Thomas Novinson, inventor (to Navy) Filed 4 Nov. 1985 9 p
(AD-D012072; US-Patent-Appl-SN-794928) Avail: NTIS HC A02/MF A01 CSCL 07/3

The present invention relates to the chemical detoxification of polychlorinated biphenyls by converting them to nonhazardous substances. In particular, the invention relates to chemically destroying polychlorinated biphenyls on site for decontamination purposes without creating pollution or hazardous situations. The invention provides a two-step process where polychlorinated biphenyls (PCBs), i.e., biphenyl having 2 to 10 chlorine atoms, are first reduced to unsubstituted biphenyl, then oxidized to a biodegradable dicarboxylic acid having the formula: $(CH_2)_n(CO_2H)_2$, where n=O to 10 possible -CH2- units for application in aqueous systems including water, mud and wet soil. GRA

N86-23683# Los Alamos National Lab., N. Mex.
MUTAGENICITY OF PHOTOCHEMICALLY-TRANSFORMED POLYCYCLIC AROMATIC AMINES
G. F. Strniste, J. W. Nickols, R. T. Okinaka, and T. W. Whaley 1985 22 p refs Presented at the Health and Environmental Research on Complex Organic Mixtures, Richland, Wash., 21 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002394; LA-UR-85-3594; CONF-851027-3) Avail: NTIS HC A02/MF A01

Polycyclic aromatic amines (PAA) constitute a class of suspect genotoxic chemicals found in certain energy-related complex organic mixtures. A variety of studies is reported on the photochemical transformation (oxidation) of polycyclic aromatic amines and the increase in genotoxicity of the resulting complex mixtures of radiation-generated products. Biological endpoints of cytotoxicity and mutagenicity were measured in the Ames/Salmonella standard-plate assay. Chemical fractionation and identification of various photoproducts was accomplished with h.p.l.c., UV and IR spectroscopic and mass spectrometric techniques. The benchmark PAA in these studies was aminofluorene (2-AF). Photooxidation of 2-AF can occur at both the exocyclic nitrogen and certain ring positions resulting in the formation of direct-acting and potent bacterial mutagens, including 2-nitrosofluorene, 2-nitrofluorene, and 2-nitrofluoren-9-one. UVA-irradiated 2-AF solutions also contain promutagenic compounds, i.e., is 2-aminofluoren-9-one. These results support the hypothesis that the critical step in the activation of major, identified direct-acting mutagenic 2-AF photoproducts is their

reduction by bacterial nitroreductase enzymes to reactive hydroxylamines. DOE

N86-23684# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.
DETECTION AND CHARACTERIZATION OF NOVEL METAL-BINDING PROTEINS First Year Report, 1984 - 1985
D. S. Holmes and R. D. Unterman Nov. 1985 21 p
(Contract DE-FG02-84ER-13278)
(DE86-003749; DOE/ER-13278/1) Avail: NTIS HC A02/MF A01

We have synthesized several model peptides based on the metallothionein (MT) protein sequence, and have used these, in conjunction with several naturally occurring proteins, to evaluate current methodologies for isolating and characterizing metal-binding proteins. Our off-contract research has indicated that High Pressure Liquid chromatography (HPLC) offers several distinct advantages compared to other techniques in this area. In addition, we have developed improved on-line analysis for the detection of sulfhydryl-containing proteins that have been separated by HPLC. DOE

N86-23685# Pacific Northwest Lab., Richland, Wash.
INVESTIGATION OF POTENTIAL ANALYTICAL METHODS FOR REDOX CONTROL OF THE VITRIFICATION PROCESS
D. S. Goldman Nov. 1985 41 p
(Contract DE-AC06-76RL-01830)
(DE86-003838; PNL-5581) Avail: NTIS HC A03/MF A01

An investigation was conducted to evaluate several analytical techniques to measure ferrous/ferric ratios in simulated and radioactive nuclear waste glasses for eventual redox control of the vitrification process. Redox control will minimize the melt foaming that occurs under highly oxidizing conditions and the metal precipitation that occurs under highly reducing conditions. The analytical method selected must have a rapid response for production problems with minimal complexity and analyst involvement. The wet-chemistry, Moessbauer spectroscopy, glass color analysis, and ion chromatography techniques were explored, with particular emphasis placed on the Moessbauer technique. In general, all of these methods can be used for nonradioactive samples. The Moessbauer method can readily analyze glasses containing uranium and thorium. A shielded container was designed and built to analyze fully radioactive glasses with the Moessbauer spectrometer in a hot cell environment. However, analyses conducted with radioactive waste glasses containing (90)Sr and (137)Cs were unsuccessful, presumably due to background radiation problems caused by the samples. The color of glass powder can be used to analyze the ferrous/ferric ratio for low chromium glasses, but this method may not be as precise as the others. Ion chromatography was only tested on nonradioactive glasses, but this technique appears to have the required precision due to its analysis of both Fe(+2) and Fe(+3) and its anticipated adaptability for radioactivity samples. This development would be similar to procedures already in use for shielded inductively coupled plasma emission (ICP) spectrometry. Development of the ion chromatography method is therefore recommended; conventional wet-chemistry is recommended as a backup procedure. DOE

N86-23686# Oak Ridge National Lab., Tenn.
PHYSICS DESIGN OPTIONS FOR COMPACT IGNITION EXPERIMENTS
N. A. Uckan 1985 50 p Presented at the U.S.-Japan Next Step Machine Design Workshop At JAERI, Mito, Japan, 21 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003084; CONF-8510209-1) Avail: NTIS HC A03/MF A01

This paper considers the following topics: (1) physics assessments-design and engineering impact, (2) zero-dimensional confinement studies relating to physics requirements and options for ignited plasmas, classes of devices with equivalent performance, and sensitivity to variations in confinement models, and (3) one and one-half dimensional confinement studies relating to dynamic simulations, critical physics issues, startup analyses, and volt-second consumption. DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-23687# Overseas Relations Branch Translation Service, London (England).
ELECTROLYTIC DEPOSITION OF LESS FREQUENTLY UTILIZED COATING METALS
A. Knoedler 30 Aug. 1985 7 p refs Transl. into ENGLISH from Jahrbuch der Oberflaechentech. (West Germany), v. 39, 1983 p 105-106
(BLL-OA-Trans-3249(6196.3)) Avail: British Library Lending Div., Boston Spa, Engl.

The properties of electrodeposited aluminum coatings, and the state-of-the-art in various countries are discussed. B.G.

N86-23688 Central Electricity Generating Board, London (England). Translation Section.
SOME PROPERTIES OF SIMULATED HEAT-AFFECTED ZONES IN Cr-Mo-V CAST STEEL
S. Asukura and M. Nihei [1985] 15 p refs Transl. into ENGLISH from Yosetsu Gakkaishi (Japan), v. 49, no. 2, 1980 p 143-148
(BLL-CE-Tr-8177-(9022.09-AC29)) Avail: British Library Lending Div., Boston Spa, Engl.

The notch ductility of the welding heat affected zone (HAZ) in low alloy steels like the Cr-Mo-V cast steel under test is sensitive to microstructural change in the course of cooling, and although the effect varies with the species and amount of alloying elements added, marked embrittlement occurs owing to increase in the amount of bainite if the preheating temperature used to prevent cracking is too high. Apart from cooling rate, the factors affecting notch ductility include the maximum heating temperature in the welding heat cycle, the various peak temperatures in a multiple heat cycle, the inter-pass temperature, and post heating conditions, the effects of which vary with the cooling time in the heat cycle. To clarify the relation between the above factors for the base metal under test, a continuous cooling transformation diagram (SH-CCT diagram) was constructed and the effect of various welding heat cycles and post hoating conditions on impact strength, hardness and microstructure by means of heat cycle simulation tests was examined. In addition, the relation between notch ductility and cooling rate was investigated for actual and simulated heat affected zones. Author

N86-23689 British Library Lending Div., Boston Spa (England).
KINETIC DECAY OF SUPERHEATED SOLID SOLUTIONS
S. I. Sandrakov and V. V. Usatyuk 1985 4 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metallurgiya (USSR), no. 7, 1985 p 159
(BLL-M-36594-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A resistometric method, and metallography and X-ray spectrometry were used to study the process of decay of solid solutions of copper and silicon in aluminum during superheating to temperatures in the solidus/liquidus range. Author

N86-23690 British Library Lending Div., Boston Spa (England).
MECHANISM OF PERITACTIC-EUTECTIC REACTION IN Fe-C-Cr SYSTEM
Yu. N. Taran, L. M. Snagovskii, and E. Ya. Vasilev 1985 4 p Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 7, 1985 p 159-160
(BLL-M-36595-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The peritectic-eutectic reaction in the Fe-C-Cr system was studied. The features of the occurrence and degree of completion of the reaction have an influence on the selection of the chemical composition of wear resistance in chromium pig iron. The methods of quenching from high temperature, differential thermal analysis, X-ray spectroscoy, and quantitative metallography were used. B.G.

N86-23691 British Library Lending Div., Boston Spa (England).
SURFACE HARDENING OF POLYCRYSTALLINE W-Zr-ALLOYS DURING INTERNAL SATURATION
M. Yu. Belomyttsev and B. G. Belyakov 1985 9 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metallurgiya (USSR), no. 7, 1985 p 126-129
(BLL-M-36588-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The structure of the internal saturation zone in alloys of tungsten with 0.5 to 1.5% Zr after annealing in a nitrogen atmosphere and also the changes in surface microhardness were investigated. A diffusion layer up to 250 microns thick with a complex, three zone structure was formed. The observed increase in the hardness of the layer formed by internal saturation was the result of precipitation of fine ZrO2 and ZrN particles in the tungsten matrix. Author

N86-23692 Texas Univ., Austin.
THE ROLE OF STRESS-ASSISTED DIFFUSION IN HYDROGEN-ASSISTED SUSTAINED-LOAD CRACKING OF METALS Ph.D. Thesis
John Edward Hack 1985 232 p
Avail: Univ. Microfilms Order No. DA8529854

The tendency for solute atoms to redistribute due to a stress induced chemical potential gradient has long been accepted. Such redistribution in the hydrostatic stress field at the tip of a loaded crack has been proposed as the rate-controlling step in hydrogen-assisted sustained load cracking in inert atmospheres, where the bulk hydrogen content is too low to cause embrittlement if randomly distributed. Calculation of the kinetics and degree of the redistribution of hydrogen about a loaded crack tip has been hindered by the lack of a suitable crack tip stress field. In the present study, a closed-form crack tip hydrostatic stress field was developed based upon the approach of Barenblatt. The solution is unique in that the stresses are finite and continuous at all points. Although an analytical solution to the governing partial differential equation is not possible at this time, a numerical procedure was established which incorporates the desired stress field. Calculated concentration profiles at observed incubation times for cracking in iron and titanium alloys have been obtained. Dissert. Abstr.

N86-23693 Oklahoma State Univ., Stillwater.
ENVIRONMENTALLY INDUCED FRACTURE OF NICKEL ALLOYS: A COMPARISON OF HYDROGEN AND MERCURY EMBRITTLEMENT WITH RESPECT TO TEMPERATURE Ph.D. Thesis
Randall K. King 1985 154 p
Avail: Univ. Microfilms Order No. DA8528103

Environmentally assisted cracking is receiving more and more study as materials are pushed to new limits. Previous OSU studies have compared electrolytic hydrogen embrittlement (HE) and liquid metal embrittlement (LME) by mercury for numerous nickel alloys. All alloys tested exhibited embrittlement to some degree with HE and LME having similar fractographies. The effect of temperature on HE and LME of Monel 400 over the range -30 and 80 C is examined. Slow strain rate tensile tests were conducted at two strain rates and two grain sizes. Intergranular, transgranular, and microvoid coalescence fractures can be obtained in both hydrogen and mercury. Fracture mode is governed by strain at fracture. Embrittlement ceases below -20 C in both environments, believed due to lack of mobility of adsorbed hydrogen and lack of wetting by mercury. LME is more severe than HE because hydrogen blunts cracks by promoting plasticity. LME fractures remain brittle to 80 C. The existence of a temperature window for LME can be explained on the basis of strain-activated localized wetting. Results are consistent with a decohesion mechanism producing intergranular fracture. Dissert. Abstr.

N86-23694# AiResearch Mfg. Co., Torrance, Calif.
DEVELOPMENT OF A NITRIDE DISPERSION STRENGTHENED (NDS) METALLIC ALLOY FOR HIGH-TEMPERATURE RECUPERATORS Final Report, 1 Oct. 1982 - 30 Sep. 1984
L. E. Kindlimann Jun. 1985 129 p
(Contract DAAG29-82-C-0081; DA Proj. 1L1-62105-AH-84)
(AD-A161958; Rept-84-21418; AMMRC-TR-85-16) Avail: NTIS HC A07/MF A01 CSCL 11/6

The objective of this program was to demonstrate the feasibility of using nitride dispersion strengthened (NDS) stainless steel in fabricating a recuperator for advanced gas turbine engines. Test results showed an alloy--designated NDS 300--to have tensile properties comparable to those of Inconel 625 at temperatures up to 1650 F, and at higher temperatures the properties of the NDS alloy exceeded those of the Inconel 625. However, creep test results showed a three-fold improvement in strength of NDS 300 over Inconel 625 at temperatures above 1500 F. The NDS material demonstrated adequate formability and joinability by brazing with a filler metal of nominal composition Ni-19Cr-10Si (J8100). The same filler metal proved to be a good coating for high-temperature oxidation resistance. Tests on specimens prepared to a typical plate-fin recuperator configuration confirmed the strength of the brazing alloy and demonstrated the marked superiority of the NDS material over Inconel 625. GRA

N86-23695# Arizona State Univ., Tempe. Coll. of Engineering and Applied Sciences.
INVESTIGATION OF MATERIAL PROBLEMS FOR HIGH TEMPERATURE, HIGH POWER SPACE ENERGY-CONVERSION SYSTEMS Annual Progress Report, 1 May 1984 - 30 Apr. 1985
Dean L. Jacobson, James F. Morris, Mysore Ramalingam, Shlomo Snir, and Charles Bice 1985 272 p
(Grant AF-AFOSR-0067-83)
(AD-A162227; AFOSR-85-1026TR; APR-2) Avail: NTIS HC A12/MF A01 CSCL 11/6

Specific areas of research include investigations of methods of decreasing creep at the high temperatures encountered in the space environment; investigations for improving the properties of refractory metals, tungsten in particular, by alloy additions of rhenium, thoria and hafnium carbide; and development of emissivity data for materials of interest at elevated temperatures. The baseline system of tungsten, rhenium alloys is being researched to improve recrystallization characteristics, creep resistance etc. Impurity distributions and their deleterious phenomena are studied. Microalloying with thorium and hafnium is being evaluated because of their obvious influences on recrystallization; impurity segregation and embrittlement; solution, precipitation and embrittlement; solution, precipitation and dispersion strengthening; as well as other effects of their intensive gettering capabilities. The alloys are sintered and swaged into rods and wires for various high-temperature mechanical and electronic testing. Testing devices include: a high-temperature thermionic-emission microscope; a specially designed high-temperature vacuum tensile-testing machine; a specially designed and built zone refiner for possible refining conventional metallographic procedures; SEM, TEM and Auger surface analyses. GRA

N86-23696# Army Construction Engineering Research Lab., Champaign, Ill.
CORROSION PROTECTION FOR MILITARY CONSTRUCTION IN THE MIDDLE EAST Interim Report
V. Hock, V. Shea, R. Lampo, and J. R. Myers Sep. 1985 120 p
(AD-A162258; CERL-IR-M-85/16) Avail: NTIS HC A06/MF A01 CSCL 13/3

Preliminary information is given for corrosion mitigation techniques that can be applied to U.S. Army construction in the Middle East. The environment in these countries is unique--desert sands, high winds, and warm, salt-laden air from the surrounding sea--allowing even the most durable materials to corrode. The current Saudi Oriented Guide Specifications were utilized as a basis from which recommendations were made to extend facility lifetime through application of state-of-the-art corrosion mitigation techniques. GRA

N86-23697# Auburn Univ., Ala. Dept. of Mechanical Engineering.
ORDERED CARBON-METAL ALLOYS FOR EXTRATER-

RESTRIAL POWER SYSTEMS Annual Report, Jun. 1984 - Jun. 1985
Bryan A. Chin, N. H. Madsen, K. C. Yeh, and P. F. Gills 9 Aug. 1985 37 p
(Grant AF-AFOSR-0168-83)
(AD-A162287; AFOSR-85-1041TR) Avail: NTIS
HC A03/MF A01 CSCL 11/6

The objective of this research is to investigate a new class of material composed of 30 to 60 atomic percent (C-Ti) for ultrahigh temperature applications in space power systems. The alloy system under investigation exhibits melting temperatures in excess of 2500 C and form long range ordered structures which are expected to yield materials with exceptional high temperature strength and resistance to environmental degradation. Author (GRA)

N86-23698# Rhode Island Univ., Kingston. Chemical Lab.
ROLE OF INTERFACES IN DEFORMATION AND STRENGTHENING Final Report, 5-9 Aug. 1985
William D. Nix and Alexander M. Cruickshank 30 Sep. 1985 21 p
(Grant AF-AFOSR-0219-85)
(AD-A162289; AFOSR-85-1035TR) Avail: NTIS
HC A02/MF A01 CSCL 11/6

The primary purpose of the conference concerned the mechanical properties of finely structured materials with interest in the structure and properties of interfaces. Many of the participants indicated that they had developed new ideas which they intended to pursue in the coming months. GRA

N86-23699# Columbia Univ., New York. Center for Strategic Materials.
UNDERSTANDING THE HIP (HOT ISOSTATIC PRESSING) CONSOLIDATION OF P/M NICKEL-BASE SUPERALLOYS Annual Progress Report, 1 Oct. 1982 - 30 Sep. 1983
John K. Tien 19 Jun. 1985 15 p
(Grant AF-AFOSR-0352-82)
(AD-A162387; AFOSR-85-0984TR) Avail: NTIS
HC A02/MF A01 CSCL 11/6

Superalloy powders have been completely characterized. The different size distributions of powders have been containerized and are ready for HIP at the commercial condition of pressure and temperature, which is 15 ksi at 2050 degrees F. All creep specimens are machined and creep tests are now under way (two creep runs have already been completed). Framework for the new HIP model has been developed in order to include unequal particle sizes. GRA

N86-23700# Cornell Univ., Ithaca, N.Y. Materials Science Center.
STRUCTURE-INDUCED SURFACE VIBRATIONAL RESONANCES ON METAL SURFACES Interim Report
M. Persson, J. A. Stroscio, and W. Ho Dec. 1985 11 p
(Contracts N00014-81-K-0505; N00014-82-K-0576)
(AD-A162820; TR-17) Avail: NTIS HC A02/MF A01 CSCL 11/6

A new class of surface vibrational resonances are shown to exist on surfaces having a non-monotonic bulk phonon dispersion as the result of their particular geometric structure. These resonances have previously been observed by electron energy loss spectroscopy on the (110) surfaces of Cu and Ni, and analysis based on surface lattice dynamics of measurements on the Al(110) and the Fe(111) surfaces are now reported. The resonance is observed on Fe but not on Al. GRA

N86-23701# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapon Systems Lab.
CRACK GROWTH BEHAVIOR OF ALUMINUM ALLOYS TESTED IN LIQUID MERCURY Final Technical Report
J. A. Kapp, D. J. Duquette, and M. H. Kamdar Sep. 1985 39 p
Presented at ASME Symposium, Crack Growth Behavior of Material Susceptible to Stress Corrosion, Dec. 1984, New Orleans, La.
(AD-A162852; AD-E440309; ARLCB-TR-85034) Avail: NTIS
HC A03/MF A01 CSCL 11/6

Crack growth rate measurements have been made in three mercury embrittled aluminum alloys each under three loading conditions. The alloys were 1100-0, 6061-T651, and 7075-T651. The loading conditions were fixed displacement static loading, fixed load static loading, and fatigue loading at two frequencies. The results showed that mercury cracking of aluminum was not unlike other types of embrittlement (i.e., hydrogen cracking of steels). Under fixed load static conditions no crack growth was observed below a threshold stress intensity factor (KILME). At K levels greater that KILME cracks grew on the order of cm/s, while under fixed displacement loading, the crack growth rate was strongly dependent upon the strength of the alloy tested. This was attributed to crack closure. In the fatigue tests, no enhanced crack growth occurred until a critical range of stress intensity factor (Kth) was achieved. The Kth agreed well with the KILME obtained from the static tests, but the magnitude of the fatigue growth rate was substantially less than was expected based on the static loading results. Observations of the fracture surfaces in the scanning electron microscope (SEM) suggested a brittle intergranular fracture mode for the 6061-T651 and the 7075-T651 alloys under all loading conditions. The fractographic features of the 1100-0 alloy under fixed load and fatigue loading conditions were also brittle intergranular. Under fixed displacement loading the cracks grew via a ductile intergranular mode. GRA

N86-23702# Florida Univ., Gainesville. Dept. of Materials Sciences and Engineering.
GRAIN REFINING AND MICROSTRUCTURAL MODIFICATION DURING SOLIDIFICATION Annual Report, Sep. 1984 - 31 Aug. 1985
G. J. Abbaschian, J. A. Patchett, R. Russell, S. P. Abeln, and R. Schmees 25 Oct. 1985 101 p
(Contract N00014-81-K-0730)
(AD-A162866; AR-4) Avail: NTIS HC A06/MF A01 CSCL 11/6

This report summarizes progress during the 1984 to 1985 fiscal year of a research program to study grain refining and microstructural modification during solidification, as affected by supercooling, solidification rate and/or innoculation. The report covers results of the current investigations on the kinetics of peritectic reactions during solidification of binary Al-Ni alloys, and high temperature phase transformations in binary Cr-Ni alloys. In addition, the report contains results of three other completed projects related to grain refining in Cu-Fe alloys, thermomechanical processing of rapidly solidified Al-Li-Mg-Zr alloy powder, and purification of Nb by electromagnetic levitation melting. Author (GRA)

N86-23703# Battelle Columbus Labs., Ohio.
MECHANICS ASPECTS OF MICROCRACK GROWTH IN INCONEL 718-IMPLICATIONS FOR ENGINE RETIREMENT FOR CAUSE ANALYSIS Final Report, 1 Jul. 1982 - 1 Jan. 1984
B. N. Leis, D. P. Goetz, J. Ahmad, A. T. Hopper, and M. F. Kanninen 18 Mar. 1985 166 p
(Contract F33615-81-C-5051)
(AD-A162886; AFWAL-TR-84-4041) Avail: NTIS
HC A08/MF A01 CSCL 11/6

Fatigue crack-growth rate predictions based on linear elastic fracture mechanics have been successfully applied in damage tolerance analyses for many years. These successes have prompted the Air Force Wright Aeronautical Laboratories to undertake the research needed to develop the technology to track the growth of defects in engine components. This application is not trivial because there is a growing body of experimental data that indicate that linear elastic fracture mechanics concepts do not always consolidate crack-growth-rate data. The lack of consolidation is particularly acute for physically short cracks and often the trend is toward much higher crack growth rates than expected. A literature review led to the conclusion that this short-crack effect arose primarily because of crack tip plasticity, transients from initiation to microcracking, and incorrect or incomplete implementation of LEFM. However, the data did not discriminate between these possible causes to that it was not clear which were significant. An experimental program was

undertaken to isolate or emphasize the factors thought to promote the short-crack effect. The material used in the study was Inconel 718 in a heat-treatment condition found in current advanced engines. This report presents the results of those experiments. GRA

N86-23704# California Univ., Berkeley. Lawrence Berkeley Lab.
NEW, COLD FORMABLE Fe/Al/C DUAL PHASE STEELS
G. Thomas Aug. 1985 29 p Presented at the Chinese Society for Metals Conference, Beijing, China, 4 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001996; LBL-20142; CONF-8511109-1) Avail: NTIS HC A03/MF A01

Alloy design programs in dual phase low carbon steels have adopted their physical metallurgy to batch plant processing conditions. The alloys are based on ferritic-martensitic low carbon steels containing aluminum, but without manganese or microalloying elements. The two-phase mixture rule provides a fairly good approximation of the mechanical behavior of these duplex systems, but it has been recognized that the properties of both the ferrite and martensite depend on the volume fraction of martensite produced in the final morphology. Thus ferrite strengthening can be effected by precipitation hardening, and the strength of martensite may increase due to carbon enrichment as its volume fraction is decreased. Utilization of both of these factors results in a composite whose properties do not depend very much upon the martensite volume fraction (up to about 0.4). This allows greater flexibility in heat treatment, and thus suggests that dual phase steel can be produced by batch processing without requiring strict temperature control to achieve consistent properties. DOE

N86-23705# Brookhaven National Lab., Upton, N. Y.
ALUMINUM AND BORON PHOSPHATES AS POSSIBLE PROTON CONDUCTORS
E. Montoneri, F. J. Salzano, and L. Giuffre May 1985 19 p Presented at the 4th IEA Task Workshop on Electrolytic Hydrogen Production, Julich, West Germany, 14 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-002508; BNL-36682; CONF-850799-2) Avail: NTIS HC A02/MF A01

The chemical stability and conductivity of boron and aluminum phosphates in steam are reported for P/B and P/Al atomic ratios greater than unity at temperatures from 100(0) to 280(0)C and steam pressures to 5 atmospheres. Al(PO3)3 and H2 AlP3O10 undergo the reactions Al (PO3)3 + H2) in equilibrium H2AlP3O10 and H2AlP3O10 (YIELDS) AlPO4 + H2O.P2O5(g). At 280(0)C and a steam pressure of 5 atmospheres gauge the product is mixture of AlPO4 and H2AlP3O10, while the conductivity of this solid is in the range of 10(-2) ohm(-1) cm(-1). The boron phosphates lose material and exhibit poor conductivity under similar conditions due to the instability of the BPO4 phase as a result of the reaction 2BPO4 + 6 H2O (YIELDS) B2O3.3H2O(g) + P2O5. 3H2O(g). As a result of dehydration or hydrolytic reactions an increase in water vapor pressure does not always lead to increased conductivity even at higher temperature. DOE

N86-23706# California Univ., Berkeley. Lawrence Berkeley Lab.
MAGNETO-MECHANICAL EFFECTS IN TWO STEELS WITH METASTABLE AUSTENITE
B. Fultz, G. O. Fior, G. M. Chang, R. Kopa, and J. W. Morris, Jr. Mar. 1985 15 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002865; LBL-19233; CONF-850814-29) Avail: NTIS HC A02/MF A01

Magneto-mechanical effects, or effects of magnetic fields on mechanical propeties of materials, are reported for two steels containing austenite that undergoes an fcc(YIELDS)bcc martensitic transformation during plastic deformation. Stress-strain curves from tensile tests of AISI 304 stainless steels and 9Ni steels were measured in magnetic fields as large as 18 T at temperatures of 4(0)K, 77(0)K and room temperature. Even in 18 T magnetic fields at cryogenic temperatures the magneto-mechanical effects were small, but they were reproducible and scaled with the strength of the magnetic field and the amount of transformation. Magneto-mechanical effects in steels with metastable austenite provide a unique means of determining how martensitic transformations affect mechanical behavior. The fcc(YIELDS)bcc transformation makes an important contribution to the work hardening of both AISI 304 and 9Ni steel, so the more rapid transformation during magnetic exposure results in a higher strength and a reduced elongation of tensile specimens. In AISI 304 stainless steel a reduced flow stress in the magnetic field was found at small plastic strains. DOE

N86-23707# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
MICROSTRUCTURAL CHARACTERIZATION OF RAPIDLY SOLIDIFIED TYPE 304 STAINLESS STEEL
R. N. Wright, J. E. Flinn, and G. E. Korth Nov. 1985 12 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC07-76ID-01570)
(DE86-003245; EGG-M-11985; CONF-851217-3) Avail: NTIS HC A02/MF A01

The microstructures of rapidly solidified Type 304 stainless steel powders produced by vacuum gas (VGA) and centrifugal (CA) atomization have been examined. The solidification morphology and phase distribution have been characterized using optical and scanning electron microscopy, and the relative amounts of ferrite and austenite have been quantified using X-ray diffraction. It has been found that most CA powder particles contain both fcc and bcc phases, with the bcc phase predominating at small particle sizes and the fcc phase at large particle sizes. The VGA powder generally contains less ferrite, with very little dependence on the particle size. In both powders the ferrite was found to be metastable and to transform to austenite on annealing at 900C. DOE

N86-23708# Oak Ridge National Lab., Tenn.
GRAIN BOUNDARY SLIDING IN WIRES WITH BAMBOO STRUCTURE
J. H. Schneibel and G. F. Petersen 1985 8 p Presented at the 4th Japan Institute of Metals International Symposium (JIMIS-4) on Grain Boundary Structure and Related Phenomena, Minakami Spa, Japan, 25 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002225; CONF-8511128-1) Avail: NTIS HC A02/MF A01

Grain boundary sliding during the torsional creep deformation of austenitic stainless steel wires (Fe-15 wt % Cr-15 wt % Ni) with bamboo structures has been investigated. At 1100(0)K, the sliding rate du/dt is approximately proportional to tau/sup 2.5/ where tau is the applied shear stress. Although Reading and Smith's [Phil. Mag. A, 51, 71 (1985)] model of lattice-dislocation grain boundary sliding has shortcomings, it predicts the observed sliding rates quite well. At sufficiently small grain sizes and low stresses, the observed nonlinear grain boundary sliding may inhibit diffusional creep. DOE

N86-23709# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
NUMERICAL CALCULATIONS OF ULTRASONIC FIELD/CRACK INTERACTIONS
J. A. Johnson and D. M. Tow 1985 8 p Presented at the Review of Progress in Quantitative NDE, Williamsburg, Va., 23 Jun. 1985
(Contract DE-AC07-76ID-01570)
(DE86-003230; EGG-M-09385; CONF-8506110-6) Avail: NTIS HC A02/MF A01

A program for calculating realistic ultrasonic fields in solids has been shown to be in good agreement with the model of Thompson and Gray. The program was used in combination with some simple field/flaw interaction models to predict the spectra of the returning echoes from the flaws, and these spectra have been compared to experimental measurements, with fair agreement for the best model. However, some details of the spectra have

only been partially reproduced, indicating that some improvement in the field/flaw interaction models is required. DOE

N86-23710# Bell Telephone Labs., Inc., Holmdel, N. J.
EARLY STAGES OF REACTION BETWEEN AMORPHOUS Ni-Nb AND CRYSTALLINE Au FILMS
E. A. Dobísz, H. G. Craighead, J. H. Perepezko, J. D. Wiley, B. L. Doyle, and P. S. Peercy 1985 11 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Wisconsin Univ., Madison and Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-003723; SAND-85-2619C; CONF-851217-10) Avail: NTIS HC A02/MF A01

Thin film interactions between a-(Ni-Nb) and polycrystalline Au overlayers were studied with high depth resolution (less than or equal to 17A) Rutherford backscattering (RBS) and TEM to obtain information on the early stages of reactions at the interface. The RBS spectra from Au indicated that the interdiffused samples consisted of two layers: an Au-Nb binary layer on the surface and a ternary Au-Ni-Nb compound layer beneath the binary layer. This growth kinetics of the ternary compound later differed for unrelated samples and samples which had been relaxed prior to Au deposition. Cross-section TEM showed that relaxed and unrelaxed samples exhibit different microstructures. The result indicates that the reaction stages in the relaxed samples are less advanced than those in the unrelaxed samples. DOE

N86-23711# Mound Lab., Miamisburg, Ohio.
PULSED LASER WELDABILITY OF ALUMINUM ALLOYS
L. A. Weeter 1985 9 p Presented at the ICALEO International Congress on the Applications of Lasers and Electro-optics, San Francisco, Calif., 11 Nov. 1985
(Contract DE-AC04-76DP-00053)
(DE86-003731; MLM-3320(OP); CONF-8511103-4) Avail: NTIS HC A02/MF A01

This study was undertaken to determine the weldability of six aluminum alloys (1100, 3003, 4043, 4047, 5356, and 6061) in similar alloy, dissimilar alloy, and similar alloy with a 4047 filler metal addition combinations. The Pulsed Laser Weldability Test was used to evaluate the weldability of the various alloy combinations. The Pulsed Laser Weldability Test rated the weldability of the six aluminum alloys from least crack sensitive to most crack sensitive as: 1100, 4047, 4043, 3003, 5356, 6061. The results of joining 1100, 3003, 5356, or 6061 to either 4043 or 4047 in an approximately 50% mixture revealed that all of these combinations were very crack sensitive. The addition of smaller amounts of 4047 to either 5356 or 6061 revealed the same phenomenon. 0.08, 0.13, and 0.25 millimeter thick sheets of 4047 were placed between two pieces of either 5356 or 6061 and the weldability test was performed. All of the filler metal additions made crack sensitive joints. A 0.38 mm thick sheet of 4047 was also tested between 5356 or 6061. However, this sheet was too thick for the Pulsed Laser Weldability Test for accurate evaluation. DOE

N86-23712# Hanford Engineering Development Lab., Richland, Wash.
NEW DEVELOPMENTS IN IRRADIATION-INDUCED MICROSTRUCTURAL EVOLUTION OF AUSTENITIC ALLOYS AND THEIR CONSEQUENCES ON MECHANICAL PROPERTIES
F. A. Garner, H. R. Brager, M. L. Hamilton, R. A. Dodd, and D. L. Porter 1985 29 p refs Presented at the Workshop on the Relation Between Mechanical Properties and Micro-structure Under Fusion Irradiation Conditions, Ebeltoft, Denmark, 27 Jun. 1985
(Contract DE-AC06-76FF-02170)
(DE86-004016; HEDL-SA-3353; CONF-8506165-4) Avail: NTIS HC A03/MF A01

A survey is presented of recent development in the study of radiation-induced changes in the microstructure of austenitic structural alloys that occur in fission reactors. The associated macroscopic consequences of these changes on both mechanical properties and dimensional stability are also reviewed. It is anticipated that some changes will occur in these phenomena as a result of the differences inherent in fission and fusion neutron spectra, but relevant data obtained to date do not indicate that the effects of helium and several other transmutation-related changes will be large. DOE

N86-23713# California Univ., Berkeley. Lawrence Berkeley Lab.
CHEMICAL AND OPTICAL PROPERTIES OF ELECTROCHROMIC NICKEL OXIDE FILMS
C. M. Lampert, T. R. Omstead, and P. C. Yu Aug. 1985 9 p Presented at the SPIE International Technical Symposium on Optical and Electro-optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-003997; LBL-20211; CONF-850887-42) Avail: NTIS HC A02/MF A01

Thin films of nickel oxide-nickel hydroxide are investigated to determine electrochromic switching properties. Crystalline nickel oxide films are synthesized by electrochemical deposition and by anodization of nickel electrodes. Electrochemical deposition using nickel sulfate-based chemistry is used to deposit films directly on doped tin oxide-coated glass. Spectral solar transmittance is obtained for films switched in liquid cells containing a KOH electrolyte. The solar transmittance (T sub s) can be switched from T sub s (bleached) = 0.73 to T sub s (colored) = 0.35 for films with thickness of about 500 A. Voltammetric data is correlated to known electrochemical processes for nickel electrodes. The nickel oxide films are chemically analyzed using a sputter-Auger microprobe and X-ray photoelectron spectroscopy. As a result of combined analysis, it was determined that these films transform from uncolored to colored states by the reversible transformation of nickel hydroxide Ni(OH)2 to nickel oxyhydroxide NiOOH and that dehydrated films correspond chemically to NiO. DOE

N86-23714# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
COMPARISON OF ALUMINUM ALLOYS CONCERNING STRENGTH AND DAMAGE TOLERANCE
Lueder Schwarmann 21 Aug. 1985 21 p refs
(MBB-UT-111/85; Rept-TE-374/0723/85) Avail: NTIS HC A02/MF A01

The static strength, crack growth, and residual strength of high strength aluminum alloys used in aircraft engineering were investigated using approved material data. Alloys having high static strengths show worse crack growth and residual strength behavior compared with alloys having lower static strengths. The 2024-materials show the best crack growth behavior. The 7475-materials show the best residual strength behavior. Heat-treatment influences the crack growth and strength behavior significantly. Product form does not influence crack growth and strength behavior. The casting material A 357 T6 shows nearly the same crack growth behavior as the plate material 2024-T351, but shows worse strength behavior as compared with all other materials considered. Author (ESA)

N86-23715# General Electric Co., Schenectady, N. Y. Materials Information Services.
STANDARDS AND METADATA REQUIREMENTS FOR COMPUTERIZATION OF SELECTED MECHANICAL PROPERTIES OF METALLIC MATERIALS Final Report
J. H. Westbrook Aug. 1985 50 p Sponsored in part by National Bureau of Standards, Gaithersburg, Md. and Army Materiel Development and Readiness Command, Alexandria, Va.
(PB86-129558; NBS/SP-702; LC-85-600585) Avail: NTIS HC A03/MF A01; also available SOD HC $2.00 as 003-003-02691-3 CSCL 11F

To assist in building a computerized information system on the engineering properties of materials, the standards and metadata requirements for a representative group of mechanical property categories are considered. These categories include: tensile behavior, hardness numbers, notch-bar impact test parameters and fatigue properties. For each property group, definitions of terms, synonyms (and non-synonyms), standard test methods, standards for reporting data, precision and accuracy, and correlations of

properties are addressed. The principal findings and recommendations are as follows. Existing test methods are generally adequate for the properties considered but better standards are needed for data reporting. Appraisal of materials variability and testing machine variability would be assisted by access to standard reference materials, certified as to their mechanical properties. GRA

N86-23716# Bureau of Mines, Avondale, Md.
SEPARATION OF CAST AND WROUGHT ALUMINUM ALLOYS BY THERMOMECHANICAL PROCESSING Report of Investigations, 1985
R. D. Brown, F. Ambrose, and D. Montagna 1985 21 p refs
(PB86-107885; BM-RI-8960; LC-85-600020) Avail: NTIS HC A02/MF A01 CSCL 11F

Techniques exist for separating aluminum alloys from mixed scrap, but there are no efficient ways to separate wrought aluminum from cast aluminum. A novel technique for separating mixed aluminum alloy scrap into cast and wrought aluminum alloy fractions is described. The technique, which uses conventional heating, fragmentizing, and screening equipment, exploits differences in the mechanical properties of cast and wrought aluminum alloys at elevated temperatures. GRA

N86-23717# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE EFFECT OF LONG TERM THERMAL AGEING ON THE MECHANICAL PROPERTIES OF ASTM A533B AND A508 STEELS IN THE QUENCHED AND TEMPERED AND SIMULATED HEAT AFFECTED ZONE CONDITIONS
S. G. Druce, G. Gage, and G. Jordan Apr. 1985 43 p refs
(AERE-R-11459) Copyright. Avail: Issuing Activity

Manganese-molybdenum-nickel steels are used commonly in the fabrication of critical components in the PWR primary circuit operating at temperatures up to 345 C for periods up to several hundred thousand hours. Demonstration of structural integrity throughout service life requires quantification of the effects of thermal ageing on mechanical properties. Thermal ageing in the temperature range 300 to 550 C for durations up to 2000 h was studied in quenched and tempered A533B plate and simulated heat-affected-zone (HAZ) microstructures in A533B and A508 materials. A combination of tensile, hardness and Charpy impact tests were used to assess changes in rheological and toughness related properties. Quantitative fractography and Auger spectroscopy were used to characterize associated changes in fracture mode and grain boundary composition. Author

N86-23718# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
INTERACTIONS OF FECRALLOY STEEL WITH SODIUM DISILICATE GLASS
M. G. Nicholas Sep. 1985 18 p refs
(AERE-R-11923) Copyright. Avail: Issuing Activity

Interactions of sodium disilicate glass with Fecralloy steel were analyzed in terms of the Pask chemical equilibrium theory. Sessile drops assumed contact angles of 38 to 47 degrees at 900 to 1100 C on polished substrates following interactions that led to significant weight losses. Up to 7% of aluminum and much smaller amounts of iron, chromium manganese and yttrium were taken into the glass. On preoxidized substrates, coated with alumina, near perfect wetting was achieved but once more aluminum was taken into the glass and weight losses suffered. These data can be interpreted as resulting from redox reactions between the aluminum in the alloy and the sodium monoxide in the glass. Author

N86-23719# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
SOME CHARACTERISTICS OF THE INITIATION PHASE OF PITTING CORROSION OF STAINLESS STEEL
D. E. Williams, M. Fleischmann, J. Stewart, and T. Brooks Aug. 1985 20 p refs
(AERE-M-3492) Copyright. Avail: Issuing Activity

For type 304L stainless steel in dilute aqueous NaCl solution (0.028M, 1000 ppm chloride), current pulses attributable to the occurrence of pits which initiate, grow for a while, and then die, are observable at potentials well cathodic to the so-called repassivation potential. The distribution of intervals between events was exponential, so the events themselves were randomly distributed in time. The event frequency depended upon electrode pontential; the dependence could be used to describe a threshold potential for pit initiation such that the probability of observing a pitting event was arbitrarily small at potentials cathodic to the threshold potential. The event frequency was sensitive to the presence of contaminants that had been leached from the apparatus. The event frequency did not seem to depend strongly upon the solution flow rate, for flow in both laminar and turbulent regimes. The event lifetimes were approximately exponentially distributed, corresponding to a fixed probability of death of an event. The lifetime distribution seems to be independent of electrode potential, and of solution flow in the laminar regime. Under turbulent flow conditions, the propagation of events, which had passed from the unstable into the stable pitting phase, was inhibited, and sometimes stopped. Author

N86-23720# United Kingdom Atomic Energy Authority, Harwell (England). Nuclear Physics Div.
A COMPARISON BETWEEN SURFACE TREATMENTS FOR METALLURGICAL APPLICATIONS
P. D. Goode Apr. 1985 42 p refs
(AERE-R-11643) Copyright. Avail: Issuing Activity

A number of surface treatments, excluding coating methods are briefly described to highlight their main features. Recent techniques and their advantages and disadvantages over the more conventional methods are considered. The aim is to provide guidance in the selection of techniques for particular applications. Author

N86-23776# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT, USES OF NEW METAL MATERIALS EXAMINED
J. Tada *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 18-40 Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Aug. 1985 p 89-100 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

N86-24510*# Alabama Univ., Birmingham. Dept. of Materials Engineering.
THE EFFECT OF GROWTH RATE ON THE COMPOSITIONAL VARIATIONS IN DIRECTIONALLY SOLIDIFIED Hg(1-x) CdSUBxSe
Rosalia N. Andrews *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 39 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

N86-24531*# Auburn Research Foundation, Inc., Ala. Dept. of Mechanical and Materials Engineering.
ON THE DETERMINATION OF THE ORIGIN OF LINEAR ANOMALY IN THE MACROSTRUCTURE OF VPPA WELDED 2219-T87 ALUMINUM ALLOY
Wartan A. Jemian *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 30 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

N86-24532*# Huntingdon Coll., Montgomery, Ala. Dept. of Chemistry.
ELECTROCHEMICAL CORROSION STUDIES
Ward W. Knockemus *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 19 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-23721 Akron Univ., Ohio.
THE EFFECT OF STEREOCHEMICAL STRUCTURE ON SOME SPECTROSCOPIC AND PHYSICAL PROPERTIES OF POLYSTYRENE Ph.D. Thesis
Arijit M. Dasgupta 1986 243 p
Avail: Univ. Microfilms Order No. DA85269525

Isotactic polystyrene was epimerized to different extents to obtain a series of polymers with varied stereochemical compositions, the structures of which were calculated by a Monte-Carlo simulation of the epimerization process. An investigation was carried out on the 300 and 400-MHz 1H-NMR spectra of the isotactic, epimerized polymers and atactic polystyrene as well as their acetylated derivatives. An interpretation was consequently developed for the methine proton resonance in terms of pentad stereosequences as well as for the ortho aromatic proton resonance of polystyrene. A procedure was also developed for the preparation of arylsulfonyl derivatives of polystyrene. The polymers were characterized by physical and spectroscopic methods. The FTIR spectra of the polystyrene samples were also investigated in order to attempt a quantitative interpretation of the changes in intensity of stereo-sequence-sensitive bands in terms of sequence distributions. A good correlation was obtained between FTIR and Monte-Carlo simulation results. Thermal properties of the polystyrene samples were determined. Dissert. Abstr.

N86-23722 Texas Univ., Austin.
DYNAMIC COMPRESSIBILITY OF HIGH POLYMERS Ph.D. Thesis
Tien-Sheng Lin 1985 99 p
Avail: Univ. Microfilms Order No. DA8529879

The combined effects of molecular weight, temperature, frequency, and pressure on the complex dynamic compressibility of several high polymers were investigated. A computer controlled apparatus was used, in which the polymer sample was subjected to sinusoidal pressure variation in a chamber small compared to the acoustic wavelength, with provisions for controlling frequency, temperature and hydrostatic pressure. Measurements were done from 0 to 56 C in the frequency range 0.25 to 1.0 kHz, at pressures of 12 and 81 atm. The polymers studied were polyvinyl acetate of three different molecular weights, polymethyl methacrylate (PMMA) of two different molecular weights, and TEFLON. The molecular weight dependence of the compressibility of polyvinyl acetate was examined here for the first time. It is found that the magnitude of this effect can be predicted from relationships, already in the literature, giving the dependence of the glass-point temperature on molecular weight. The combined effects of temperature and frequency on loss peak indicate that the limiting temperature sensitive process in the viscoelastic behavior of polyvinyl acetate is the same for shear deformation and for compression. Dissert. Abstr.

N86-23723# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ACETYLENE TERMINATED SULFONE RESIN PRECURSORS OF TAILORED LENGTH VIA A MODIFIED ULLMANN ETHER SYNTHESIS Final Report, Apr. 1981 - Aug. 1982
Marilyn R. Unroe and Frederick L. Hedberg May 1985 44 p
(AF Proj. 2419)
(AD-A161859; AFWAL-TR-85-4040) Avail: NTIS
HC A03/MF A01 CSCL 11/9

Air Force sponsored research in recent years has been directed toward the discovery and development of new composite resins which would display all of the advantages of epoxy resins, but without the moisture sensitivity problem. One of the first resins to show such potential was the AT resin, 4,4'-bis(3-ethynylphenoxy)-phenylsulfone (ATS). Its initial limitation, however, was very high cost. As a result, of contractual research for the Air Force at Gulf Research and Development Company, a new, low cost synthesis approach to ATS was developed. the Ullmann ether reaction of 4,4'-sulfonyl with 1,3-dibromobenzene was carried out in 2,4,6-collidine with cuprous oxide to afford high yields of a mixture of 4,4'-bis(3-bromophenoxy)phenylsulfone (BPDS) and its associated oligomers (OBPDS). This mixture is a low-cost precursor to the ATS composite resin system, formed by replacing the bromine atoms by terminal acetylene groups. The ratio of BPDS to OBPDS was found to be tailorable by varying stoichiometry, permitting selection of average ATS oligomer length for desired balances between processing and mechanical properties. GRA

N86-23724# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
IODINE MONOCHLORIDE AS A REAGENT FOR THE PREPARATION OF HETEROCYCLIC POLYMER PRECURSORS-UTILITY AND LIMITATIONS Final Report, Sep. 1980 - Sep. 1982
Patricia M. Lindley, Alan A. Shaffer, and Frederick L. Hedberg May 1985 11 p
(AF Proj. 2419)
(AD-A161860; AFWAL-TR-85-4039) Avail: NTIS
HC A02/MF A01 CSCL 07/2

Whereas iodine monochloride reacted with o-nitroaniline or p-nitroaniline to afford iodine substituted products useful for aromatic coupling or functional group introduction, the reaction of iodine monochloride with amide derivatives of o-phenylenediamine afforded predominantly chlorination. The scope of the reaction was investigated varying both substituted phenylenediamine amide substrate and solvents. Author (GRA)

N86-23725# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
IMPROVED SYNTHESIS OF BENZIL END-CAPPED ACETYLENE TERMINATED PHENYLQUINOXALINE RESINS Final Technical Report, Jun. 1980 - Aug. 1982
Frederick L. Hedberg, Patricia M. Lindley, and Marilyn E. Hunsaker May 1985 15 p
(AD-A161881; AFWAL-TR-85-4042) Avail: NTIS
HC A02/MF A01 CSCL 11/9

The synthesis of two acetylene-terminated phenylquinoxaline resin systems: BA-DAB-BA, derived from 4-(3-ethynylphenoxy) benzil, 3,3'-diaminobenzidine; and BATQ-H, derived from 4-(3-ethynylphenoxy)benzil, 3,3'-diaminobenzidine, and 1,4-bis(4-benziloxy)benzene, have been substantially improved by the use of ambient temperature conditions. Both ease of synthesis and purity of product were improved. Precipitation conditions were developed for BATQ-H which lowered the content of BA-DAB-BA, permitting tailoring of the average length for processing and mechanical properties studies. GRA

N86-23726# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A GENERAL PREPARATION OF TAILORED-LENGTH ACETYLENE TERMINATED RESINS FROM LOW-COST BISPHENOLS Final Report, Jun. 1981 - Dec. 1982
Frederick L. Hedberg, Marilyn R. Unroe, Patricia M. Lindley, and Marilyn E. Hunsaker May 1985 28 p
(AF Proj. 241-9)
(AD-A161902; AFWAL-TR-85-4041) Avail: NTIS
HC A03/MF A01 CSCL 11/4

An Ullmann ether reaction of 1,3-dibromobenzene or 1,4-dibromobenzene has been carried out with three low-cost bisphenols in 2, 4, 6-collidine with cuprous or cupric oxide to afford bromine terminated oligomer mixtures of stoichiometrically tailored average lengths. The use of bis-phenol A, 4, 4' - thiodiphenol and resorcinol provided three families of bromine terminated oligomer mixtures which were subsequently converted in two steps to acetylene terminated matrix resin systems for composites. Column chromatographic separations on the resins were used both to characterize the oligomer composition and to isolate for identification the major impurities present. Thermoanalytical data was obtained on the uncured and cured resins. This preparative method was also used to synthesize a monoethynyl terminated reactive diluent from 3-phenoxyphenol. GRA

N86-23727# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CREEP OF THERMOSOFTENING PLASTICS IN AIR AND IN A PHYSIOLOGICAL SOLUTION
G. I. Roytberg, V. N. Kestelman, and R. Z. Rakhimov 1 Nov. 1985 9 p Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (USSR), no. 5, 1972 p 81-84
(AD-A161925; FTD-ID(RS)T-0167-85) Avail: NTIS
HC A02/MF A01 CSCL 20/11

The creep of polymer materials is studied predominantly under conditions of static uniaxial tension. Established at present is the existence of elastic, elasto-elastic (nonstationary) and viscous (stationary) components of total creep strain. The total strain at a constant tensile load and temperature and also the duration of the loading are connected with each other. Liquid media under these conditions do not change the shape of the creep curves. It was of interest to clarify the possibility of using a equation for describing the creep of structural thermosoftening plastics with other forms of the stressed state in air and in liquid media. We studied the creep of polymers under normal conditions in air and in the model medium - the physiological solution (0.9% solution of NaCl in distilled water) under static bending and compression. GRA

N86-23728# Aerospace Corp., El Segundo, Calif. Materials Sciences Lab.
RAIN IMPACT ASSESSMENT OF ADVANCED THERMAL PROTECTION SYSTEM MATERIALS: PHASE 1 TEST RESULTS
Robert M. Cooper 5 Sep. 1985 78 p
(Contract F04701-83-C-0084)
(AD-A162131; TR-0084A(5935-04)-2; SD-TR-85-61) Avail: NTIS
HC A05/MF A01 CSCL 11/2

A rain impact test program, will study the durability of advanced thermal protection system (TPS) materials under exposure to rain conditions typical of flight. Damage threshold levels were bracketed or upper limits established for the rigid TPS materials. The borosilicate glass-coated TPS failed by flexure of the coating, and a rough correlation of rain impact resistance with the compressive modulus of the tile substrate material was found. The durability of the bare tile material was not substantially increased by the use of a SiC coating infiltrated and sintered in the surface layer. The testing technique used with the flexible cloth class of TPS entailed difficulties which precluded the acquisition of valid test data, and alternative approaches for obtaining the desired data are being explored. GRA

N86-23729# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.
PREDICTIVE TEST DEVELOPMENT FOR NAVY DIESEL ENGINE LUBRICATING OILS Final Report
Michael D. Klinkhammer Nov. 1985 24 p
(AD-A162318; DTNSRDC/SME-84/90) Avail: NTIS
HC A02/MF A01 CSCL 14/2

The objective of this project was to reduce the time and expense of qualification testing for candidate MIL-L-9000 diesel engine lubricating oils. Work was focused primarily on finding a short term test to correlate with Caterpillar 1G2 engine test deposit ratings. Because the 1G2 engine test deposit ratings have poor repeatability, bench test correlations were attempted using only reference oils, i.e., these oils having a large number of engine results. Three bench tests were evaluated: the Alcor 1G Deposition Test, a pressure differential scanning calorimetry method, and a microoxidation method. The Alcor Test gave good predictions of weighed total demerits by Caterpillar 1G2 for the seven reference oils available. The pressure differential scanning calorimetry method also gave a good correlation with 1G2 but only five reference oils were available for evaluation. The microoxidation method shows promise but needs more development. These tests should be evaluated further as additional 1G2 reference oils become available. GRA

N86-23730# SRI International Corp., Menlo Park, Calif.
SILICON NITRIDE JOINING Final Report, 1 Dec. 1980 - 30 Jun. 1985
Sylvia M. Johnson and David J. Rowcliffe Oct. 1985 75 p
(Contract F49620-81-K-0001)
(AD-A162337; AFOSR-85-1065TR) Avail: NTIS
HC A04/MF A01 CSCL 13/8

The results obtained during the investigation of a method of joining silicon nitride with an oxide glass are described. Joining methods for silicon nitride to ceramics and metals are reviewed in Appendix A. Chemical interactions between Si3N4 and glass are described in Appendix B. Both hot-pressed and a hot-isostatically pressed Si3N4 were used for joining experiments. The vaporization behavior of the materials as determined by mass spectrometry is described. A new method of joining Si3N4 which uses very little glass and which has potential for producing joined pieces which retain their strength to high temperatures was developed and preliminary results are presented. Author (GRA)

N86-23731# Dayton Univ., Ohio.
SMALL-ANGLE NEUTRON SCATTERING ON CROSSLINK DISTRIBUTION OF EPOXY NETWORKS Interim Report, Apr. 1983 - Aug. 1984
S. J. Bai Oct. 1985 28 p
(Contract F33615-84-C-5020)
(AD-A163085; UDR-TR-85-24; AFWAL-TR-85-4111) Avail: NTIS
HC A03/MF A01 CSCL 07/4

Crosslink distribution of epoxy network of diglycidyl ether of bisphenol A (DGEBA) cured with stoichiometric amounts of meta-phenylene diamine (mPDA) was examined by small-angle neutron scattering (SANS). A monodisperse DGEBA resin with the smallest molecular weight was used to enhance the crosslink density and to simplify the network structure for deuterium-labeling. Meta-phenylene-d4 diamine (mPDAd4) was applied to label definitively the crosslinks. SANS measurements covered a reciprocal space range from 0.016 to 0.220 A-1, or, equivalently, real-space distances from 400 to 30 A. Application of SANS on the deuterium-labeled epoxy networks consistently produces a constant excess intensity over the unlabeled epoxy networks. Since the scattering intensity from total correlation of the network was negligible, as evident from measurements of SANS on the unlabeled epoxy networks and small-angle X-ray scattering on the epoxy networks, the constant excess SANS intensity can only be attributed to a uniform spatial distribution of the amine curing agent. In other words, the crosslinks are distributed uniformly throughout the epoxy network. GRA

N86-23732# Colorado Univ., Boulder.
[TOPOLOGICAL STEREOCHEMISTRY] Annual Report
2 Dec. 1985 4 p
(Contract N00014-85-K-0228)
(AD-A163124) Avail: NTIS HC A02/MF A01 CSCL 07/4

During the past year, several exciting developments in topological stereochemistry have occurred, both theoretical and experimental. Concerning the theory of topological stereochemistry, the mathematics groups involved in the project have proven several of the conjectures presented in our Tetrahedron report, and exciting work on the topology front is in progress, as described in the report from the University of Iowa part of the consortium. With regard to the synthetic topological stereochemistry under way on the Boulder campus of the University of Colorado, efforts are, of course, focusing on synthesis of a molecular knotted ring. Recent results in two projects directed towards this goal are discussed in this report, one dealing with development of improved methods for breaking the rungs of the molecular Mobius ladders, and the other dealing with experiments on the four-rung THYME polyethers. A preprint of a paper accepted for publication in Tetrahedron describing this work in detail, is enclosed. GRA

N86-23733# Department of the Navy, Washington, D. C.
TRANSITION AND INNER TRANSITION METAL CHELATE POLYMERS FOR HIGH ENERGY RESIST LITHOGRAPHY Patent Application
Ronald D. Archer, Christopher J. Hardiman, Ryszard Grybos, and James C. Chieu, inventors (to Navy) Filed 14 Mar. 1985 20 p

(AD-D012053; US-Patent-Appl-SN-711786) Avail: NTIS HC A02/MF A01 CSCL 09/1

This invention relates to photoresists for lithographic purposes, and more particularly to transition and inner transition metal chelate polymers for high energy resist lithography. Such polymers are used as positive or negative resists of high sensitivity for lithographic purposes in integrated circuit chip fabrication requiring submicron resolution. The polymers when irradiated undergo scission or crosslinking events which affects their solubility in developer solvents. They are synthesized either in nonaqueous solution with subsequent removal of excess solvent or interfacially with almost instantaneous precipitation of the polymer at the interface. GRA

N86-23734# Department of the Navy, Washington, D. C.
ELECTRODEPOSITION OF REFRACTORY METAL SILICIDES
Patent Application
Kurt H. Stern, inventor (to Navy) Filed 12 Dec. 1985 11 p
(AD-D012073; US-Patent-Appl-SN-808326) Avail: NTIS HC A02/MF A01 CSCL 11/3

An object of the present invention is to protect metal surfaces of any shape from abrasive and erosive wear. Another object of this invention is to provide a process for producing a hard, dense, adherent coating of any desired thickness of a refractory metal silicide. A further object of this invention is to provide a process for producing a coating of a refractory metal silicide whereby the stoichiometry of the metal silicide coating produced can be controlled. These and other objects are achieved by electrodepositing a coating of a refractory metal silicide from a solution of a desired refractory metal fluoride mixture. An anode comprised of the desired refractory metal or silicon, a cathode comprised of the object to be coated and a platinum reference electrode are immersed in the melt. When a voltage is applied between the platinum electrode and the cathode the silicon and the refractory metal cations in the solution are simultaneously reduced at the cathode to form a metal silicide coating upon the object. GRA

N86-23735# Pacific Northwest Lab., Richland, Wash.
FABRICATION AND CHARACTERIZATION OF MCC APPROVED TESTING MATERIAL: ATM-1 GLASS
J. W. Wald Oct. 1985 37 p
(Contract DE-AC06-76RL-01830)
(DE86-003795; PNL-5577-1) Avail: NTIS HC A03/MF A01

The materials characterization center approved testing material ATM-1 is a borosilicate glass that incorporates nonradioactive constituents and uranium to represent high-level waste (HLW) resulting from the reprocessing of commercial nuclear reactor fuel. Its composition is based upon the simulated HLW glass type 76-68 to which depleted uranium has been added as UO2. Three separate lots of ATM-1 glass have been fabricated, designated ATM-1a, ATM-1b, and ATM-1c. Limited analyses and microstructural evaluations were conducted on each type. Each lot of ATM-1 glass was produced from a feedstock melted in an air atmosphere at between 1150 to 1200 C and cast into stress annealed rectangular bars. Bars of ATM-1a were nominally 1.3 x 1.3 x 7.6 cm (approx. 36 g each), bars of ATM-1b were nominally 2 x 2.5 x 17.5 cm (approx. 190 g each) and bars of ATM-1c were nominally 1.9 x 1.9 x 15 cm (approx. 170 g each). Thirteen bars of ATM-1a, 14 bars of ATM-1b, and 6 bars of ATM-1c were produced. Twelve random samples from each of lots ATM-1a, ATM-1b, and ATM-1c were analyzed. The concentrations (except for U and Cs) were obtained by Inductively-Coupled Argon Plasma Atomic Emission Spectroscopy analysis. Cesium analysis was performed by Atomic Absorption Spectroscopy, while uranium was analyzed by Pulsed Laser Fluorometry. The X-ray diffraction analysis of four samples indicated that lot ATM-1a had no detectable crystalline phases (< 3 wt %), while ATM-1b and ATM-1c contained approx. 3 to 5 wt % % iron-chrome spinel crystals. These concentrations of secondary spinel component are not considered uncommon. Scanning electron microscopy examination of fracture surfaces revealed only a random, apparently crystalline, second phase (1 to 10 micron m diam) and a random distribution of small voids or bubbles (approx. 1 micron m nominal diam). DOE

N86-23736# Pacific Northwest Lab., Richland, Wash.
RESULTS FROM THE LONG-TERM INTERACTION AND MODELING OF SRL-131 GLASS WITH AQUEOUS SOLUTIONS
D. M. Strachan, L. R. Pederson, and R. O. Lokken Nov. 1985 117 p
(Contract DE-AC06-76RL-01830)
(DE86-003800; PNL-5654) Avail: NTIS HC A06/MF A01

Leaching studies on SRL-131 simulated defense waste glass have been carried out for a duration of 2 years. This glass contained nonradioactive elements and depleted uranium to simulate the waste content. The leachants used in this study were deionized water, a sodium bicarbonate/silicic acid solution (silicate water), a synthetic groundwater, and a high ionic strength K-Mg-Na-Cl brine. Two temperatures were used: 40 C and 90 C. The long-term results were in fair agreement with modeling calculations performed using the PHREEQE geochemical code. The leachability of SRL-131 glass from results up to 2 years followed the trend: deionized water > silicate water > synthetic groundwater > salt brine at 40 C and deionized water approx. = synthetic groundwater > silicate water > salt brine at 90 C. Solid state analyses are reported along with an Appendix containing a complete data set. DOE

N86-23737# Pacific Northwest Lab., Richland, Wash.
FABRICATION AND CHARACTERIZATION OF MCC APPROVED TESTING MATERIAL: ATM-8 GLASS
J. W. Wald Oct. 1985 37 p refs
(Contract DE-AC06-76RL-01830)
(DE86-003801; PNL-5577-8) Avail: NTIS HC A03/MF A01

The Materials Characterization Center (MCC) Approved Testing Material ATM-8 is a borosilicate glass that incorporates elements typical of high-level waste (HLW) resulting from the reprocessing of commercial nuclear reactor fuel. Its composition is based upon the simulated HLW glass type 76-68 to which depleted uranium, technetium-99, neptunium-237 and plutonium-239 have been added at moderate to low levels. The glass was requested by the Nevada Nuclear Waste Storage Investigations (NNWSI) Project. ATM-8 glass was produced in April of 1984, and is the second in a series of testing materials for NNWSI. This report discusses its fabrication (starting materials, batch and glass preparation, measurement and testing equipment, other equipment, procedures, identification system and materials availability and storage, and characterization (bulk density) measurements, chemical analysis, microscopic examination, and X-ray diffraction analysis. DOE

N86-23738# Allied Bendix Corp., Kansas City, Mo.
EVALUATION OF HEAT-SHRINKABLE POLYOLEFIN TUBING
Final Report
F. N. Larsen Dec. 1985 14 p
(Contract DE-AC04-76DP-00613)
(DE86-004381; BDX-613-3358) Avail: NTIS HC A02/MF A01

Polyolefin heat-shrinkable tubing was evaluated for parameters leading to splitting of the tubing. It was concluded that temperature cycling from ambient to 250 F, which is above the polymer crystalline melt of 218 F induces stresses which cause splitting of the tubing. It was also determined that as-received (unshrunk) tubing is more susceptible to notch sensitivity and splitting than the shrunk tubing after processing. Lowering the thermal exposure temperature to 160 F eliminated the splitting problem. Chemical characterization of the straight tubing and a molded boot material showed similar composition regarding flame retardants and additives. The molded boot material should be an acceptable substitute for the tubing from an aging and compatibility viewpoint. DOE

N86-23739# Fraunhofer Inst. fuer Werkstoffmechanik, Freiburg (West Germany).
STRENGTH PROPERTIES OF CERAMIC MATERIALS UNDER LONG TERM LOADING AND UNDER THE INFLUENCE OF

RESIDUAL COMPRESSION STRESSES Final Report, Jun. 1983
Guenter Kleer, Herbert Richter, Rolf Pruemmer, and Hans-Wulf Pfeiffer-Vollmar Bonn Bundesministerium fuer Forschung und Technologie Oct. 1985 108 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-112; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22.50

Strength properties of SiC and Si3N4 ceramics were investigated at room temperature and at high temperatures. Crack growth experiments were performed on double torsion specimens, and strength tests were run on four-point bending specimens at different loading rates. The parameters characterizing material behavior at short and long term loading, especially at high temperatures were determined. Lifetimes were calculated on the basis of the measured crack growth parameters and were compared with experimental values; agreement is not found in all cases. The influence of the surface state on the strength was determined by X-ray stress analysis. The X-ray elastic constants describing the lattice strain-stress relation and the residual stress values are obtained. Author (ESA)

N86-23740# Volkswagen A.G., Wolfsburg (West Germany). Forschung Antriebstechnik.
CERAMIC TURBINE ROTORS Final Report, Jun. 1983
Manfred Langer and Johann Siebels Bonn Bundesministerium fuer Forschung und Technologie Oct. 1985 71 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-115; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

The development status of turbine rotors made of nonoxide ceramic materials, and the results of materials investigations are presented. The selected ceramic materials were silicon nitride and silicon carbide from various processes. For automotive gas turbine applications, hybrid rotor types with metallic hub and ceramic single blades were investigated. Monolithic rotor prototypes were tested for 50hr in a car under realistic diesel engine conditions. Materials tests concentrated on thermal stability, joining techniques, and microanalysis. Components and materials development are discussed. Author (ESA)

N86-23741# Battelle Columbus Labs., Ohio.
TIE MOLECULES IN POLYETHYLENE Final Report, Apr. 1982 - Jun. 1985
A. Lustiger Jun. 1985 130 p refs Sponsored by Gas Research Inst.
(PB86-125101; GRI-85/0129) Avail: NTIS HC A07/MF A01 CSCL 11I

On a molecular level, slow crack growth brittle-type fracture occurs through separation of lamellae. Tie molecules are the links which hold these lamellae together. The importance of tie molecules in long term strength, the existence of a craze at the crack tip, and an analytical technique to measure tie molecule concentration in polyethylene (PE) is developed. Environmental stress cracking was induced in polyethylene pipe to observe the preferential path for fracture initiation. Interlamellar links were found to break under environmental stress cracking conditions. For analytical measurement of tie molecules, three medium density polyethylene resins, were used. Torsion pendulum testing involved detection of a so-called upper glass transition temperature associated in the literature with restrained amorphous material. Infrared dichroism was used to measure amorphous orientation in strained polyethylene films. Trends in the latter results reflect presumed tie molecule concentration. GRA

N86-23742# Washington Univ., St. Louis, Mo. Materials Research Lab.
STRUCTURE AND PROPERTIES OF POLYETHYLENE Final Report, Jan. 1983 - Jun. 1984
J. L. Kardos, R. L. Powell, K. L. Jerina, N. Hosangady, and Y. Chen May 1985 195 p
(Contract GRI-5081-260-0561)
(PB86-125127; GRI-85/0177) Avail: NTIS HC A09/MF A01 CSCL 11I

Both isotropic and anisotropic (extruded pipe analogue) polyethylene sheets have been successfully modeled as composite materials, and the stiffness and yield strength predicted as a function of degree of orientation, volume fraction crystallinity, amorphous phase modulus, and crystallite aspect ratios. Three-dimensional property maps show that lower crystallite aspect ratios (and hence different crystallization/processing conditions) are needed to achieve maximum stiffness than are required for maximum strength. Optimization and feasible optimum algorithms were developed, which, for specified values of design strength and stiffness, yielded ranges for various pairs of variables which would be feasible under practical processing limitations. A rheological data base has been obtained for melts of the above three polymers, including steady-state viscosity-shear rate relations, linear viscoelastic properties and relaxation behavior. GRA

N86-23743# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
DISTRIBUTION OF HYDROGEN IN THE NPL STANDARD Ta SUB 2 O SUB 5 FILMS
H. E. Bishop Sep. 1985 17 p refs
(AERE-R-11922) Copyright. Avail: Issuing Activity

Well characterized tantalum pentoxide anodized films were produced for use as a thickness and depth resolution standard for profiling in surface analytical techniques. Very sharp interfaces for these films were demonstrated using Auger Electron Spectroscopy. Studying these films by dynamic Secondary Ion Mass Spectroscopy in the CAMECA IMSS 3F, well defined profiles with a sharp interface were obtained with an oxygen primary beam. More complex profiles were obtained with argon and caesium primary beams, apparently showing the presence of hydroxide at the metal/oxide interface and a high concentration of hydrogen in the metal near the surface. However, an argon primary beam with an oxygen flood gave the same type of profile as that obtained with an oxygen primary beam. Elastic Recoil Detection Analysis confirmed that there was no high concentration of hydrogen at the metal/oxide interface and showed that hydrogen in the tantalum was present at 1 atom %. Author

N86-23777# Joint Publications Research Service, Arlington, Va.
PRESENT STATUS AND PROSPECTS OF FINE CERAMICS
Eiji Kamijo *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 41-57 Transl. into ENGLISH from Kino Zairyo (Tokyo, Japan), Jul. 1985 p 14-23 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

N86-24519*# Calhoun Community Coll., Decatur, Ala. Dept. of Natural Sciences.
FOAM FLOTATION AS A SEPARATION PROCESS
Ben L. Currin *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 15 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11G

N86-24534*# Oregon Univ., Eugene. Dept. of Chemistry.
INVESTIGATIONS OF TOUGHENING MECHANISMS OF EPOXY RESINS
T. Koenig *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 22 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11B

N86-24538*# Athens Coll., Ala. Dept. of Chemistry.
DIELECTRIC CURE MONITORING OF THE 55A FILAMENT WOUND CASE RESIN

Ronald C. McNutt *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11B

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-23744*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
LIQUID HYDROGEN POLYGENERATION SYSTEM AND PROCESS Patent Application
Peter A. Minderman, Gary P. Gutkowski, Lawrence Manfredi, Julian V. King, and Frank S. Howard, Inventors (to NASA) Filed 15 Nov. 1985 23 p
(NASA Case-KSC-11304-2; NAS 1.71:KSC-11304-2; US-Patent-Appl-SN-789713) Avail: NTIS HC A02/MF A01 CSCL 21I

An integrated polygeneration system and process is disclosed for generating liquid hydrogen as a main energy product for use as a propellant for space vehicles. Secondary energy products and commodities for supporting a space center complex and launching of the space vehicle includes the production of electrical and thermal energy and gaseous nitrogen. The integrated process includes a coal gasification and gas cleanup system, a combined cycle power generation system, a hydrogen production and liquefaction system and a air separation system. A medium BTU gas is produced by the coal gasification system. Steam also produced in the coal gasification process is delivered to a steam turbine in the combined cycle power generation system. NASA

N86-23745# Southwest Research Inst., San Antonio, Tex.
MICROENCAPSULATION OF LITHIUM Final Report, 12 Feb. - 31 Dec. 1985
Mary Marshall 31 Dec. 1985 66 p
(Contract DAAK70-85-C-0008; DA Proj. 1L1-62733-AH-20)
(AD-A162987) Avail: NTIS HC A04/MF A01 CSCL 11/3

The U.S. Army Belvoir Research and Development Center requires protection of element lithium from reactive species (especially oxygen) during mixing and storage operations of lithium in explosives. Furthermore, it is required that the detonation not be hindered by the coating material. SwRI used microencapsulation technology to develop a protective coating for elemental lithium. The coating material studied was a blend of wax, PICCOLYTE, and polyethylene known to have good water barrier properties and combustion characteristics. SwRI prepared microspheres from a dispersion of micronized lithium metal in a matrix material (the protective barrier). The process to form microspheres is carried out in an inert atmosphere to prevent the micronized lithium metal from reacting prior to encapsulation. Highly reactive micronized lithium metal was successfully encapsulated under this program. The encapsulated lithium dramatically increases the shelf-life and decreases the associated hazards of the elemental lithium. Experimental procedure required that the encapsulation be performed in an inert atmosphere (lithium powder readily reacts with water, nitrogen, oxygen, etc.) and that non-reactive coating materials were developed. GRA

N86-23746# Argonne National Lab., Ill.
PRODUCTS OF THE NEUTRALIZATION OF HYDRAZINE FUELS WITH HYPOCHLORITE
K. L. Brubaker, J. R. Stetter, J. C. Demirgian, A. Boparai, and J. F. Schneider 1985 8 p Presented at the JANNAF Safety and Environmental Protection Subcommittee Meeting, Monterey, Calif., 4 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-004049; CONF-8511110-4) Avail: NTIS HC A02/MF A01

Neutralization of hydrazine fuels with hypochlorite is a recommended procedure for treatment of fuel spills. Earlier publications have reported some of the major reaction products and have suggested that incomplete reaction and reaction with impurities may lead to formation of environmentally and toxicologically significant substances. The results presented in this paper were obtained as part of a program to assess the environmental implications of using the hypochlorite method for treatment and disposal of hydrazine fuel spills. The fuel sample impurities analyzed, the analytical protocols used, and the chemical compounds produced by neutralization of hydrazine fuels with hypochlorite are discussed. The fuels examined were hydrazine, monomethylhydrazine, unsymmetrical dimethylhydrazine, and Aerozine-50. The neutralization products were determined under experimental conditions comparable to those expected for actual spills. Major products, as well as environmentally significant minor products, were identified using gas-chromatography/mass-spectrometry and gas-chromatography/Fourier-transform-infrared-spectroscopy. DOE

N86-23747# Pacific Northwest Lab., Richland, Wash.
UPGRADING BIOMASS LIQUID FUELS
D. C. Elliott and E. G. Baker Oct. 1985 18 p refs Presented at the Biomass Thermal Chemical Conversion Contractors' Meeting, Minneapolis, Minn., 15 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004020; PNL-SA-13476; CONF-8510167-3) Avail: NTIS HC A02/MF A01

Catalytic hydrotreating of wood-derived liquids is being studied using a continuous-feed, fixed-bed reactor. Commercial hydrotreating catalysts and conditions are used to hydrodeoxygenate and hydrocrack the biomass liquefaction products generated by high-pressure processing. Biomass flash pyrolyzates require alternate processing to first stabilize the products prior to catalytic hydrotreating. Experiments are performed in an upflow reactor wherein both liquid phase and gas phase reactions are considered to be important. Although hydrocarbons are not produced in any significant amount by thermochemical direct liquefaction of wood, the use of a secondary hydrogenation step to treat the initial product can result in nearly pure hydrocarbons. These hydrocarbons are primarily cyclics and aromatics which would be useful in gasoline blending. Experimental results with either cobalt/molybdenum or nickel/molybdenum catalyst show that deoxygenation of the primarily phenolic wood oil is achieved in either case. The extent of saturation of the liquid product is dependent on catalyst type, operating temperature and relative flows of oil feedstock and hydrogen gas. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-23748 Department of the Air Force, Washington, D.C.
MACHINING A COOLED CYLINDRICAL OPTIC TO COMPENSATE FOR PRESSURE DISTORTION Patent
Frederick G. Eitel, inventor (to Air Force) Issued 19 Nov. 1985 7 p Supersedes AD-D010418
(AD-D012068; US-Patent-4,553,457; US-Patent-Appl-SN-505166; US-Patent-Class-82-1C) Avail: US Patent and Trademark Office CSCL 20/4

A system for, and a method of, replicating the known (i.e., ascertained) operational coolant fluid flow local pressure in an optical surface (such as a mirror surface) of the heat exchanger portion of a fluid cooled cyclindrical optic is presented. The system essentially comprises a precision numerically controlled lathe having a selectively rotatable spindle on which is mounted, with a hollow adapter, the cylindrical optic in which is retained a fluid connector that is in communication with the adapter which, in

turn, is in communication with a source of pressurized fluid containing a fluid whose rate of flow and pressure can be regulated. The pressurized fluid flows serially into the adapter, the connector and the cylindrical optic and its optical surface, thereby replicating the operational fluid flow pressure through the entire optical surface, without the prior art problem of pressure drops in and pressure deflection of the optical surface which, in turn caused residual finish figure machining error in the optical surface. As a result of the use of this system, and of the performance of the steps comprising the method of replicating the operational fluid flow pressure in the entire optical surface, this prior art residual finish figure machining error is eliminated or at least is significantly minimized. GRA

N86-23749*# National Aeronautics and Space Administration, Washington, D.C.
CHINESE SPACE AND AVIATION INDUSTRIES SCORE MAJOR BREAKTHROUGHS
R. Hu Apr. 1986 16 p Transl. into ENGLISH from Xiandai Junshi (Conmilit) (Hong Kong), v. 9, no. 11, 1 Jan. 1986 p 88-91 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-87973; NAS 1.15:87973) Avail: NTIS HC A02/MF A01 CSCL 13H

An overview of the current status of China's aviation and aerospace industries is presented, as well as planned future development and areas of importance for China's future space programs. The development of China's CZ-1, CZ-2 and CZ-3 rocket program is discussed, as well as China's satellite launch capabilities. China's first geostationary communications satellite STW-1 is also mentioned, and further development of the second and third communications satellites to be launched in 1987 are shown. Other developments include a seventh low Earth orbiting photographic reconnaissance satellite, plans for an image transmitting remote sensing satellite to be launched in 1988 to 1990, and other satellite developments. The Chinese-designed Y-10 transport aircraft is discussed, as well as the TU-16 bomber aircraft and the co-production agreement with McDonnell Douglas for the MD-82 passenger aircraft. Author

N86-23750*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD FOR MACHINING HOLES IN COMPOSITE MATERIALS Patent Application
Johnny M. Clemons, Frank E. Ledbetter, Julia G. Daniels, and Benjamin G. Penn, inventors (to NASA) Filed 3 Dec. 1985 9 p
(NASA-Case-MFS-28044-1; NAS 1.71:MFS-28044-1; US-Patent-Appl-SN-804039) Avail: NTIS HC A02/MF A01 CSCL 13H

A method for boring well defined holes in a composite material such as graphite/epoxy is discussed. A slurry of silicon carbide powder and water is projected onto a work area of the composite material in which a hole is to be bored with a conventional drill bit. The silicon carbide powder and water slurry allow the drill bit, while experiencing only normal wear, to bore smooth, cylindrical holes in the composite material. NASA

N86-23751# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
USAF/SCEEE (UNITED STATES AIR FORCE/SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION) RESEARCH INITIATION PROGRAM RESEARCH REPORTS, VOLUME 1 Interim Report
Warren D. Peele Mar. 1985 125 p
(Contract F49620-82-C-0035)
(AD-A161907; AFOSR-85-0904TR-Vol-1) Avail: NTIS HC A06/MF A03 CSCL 09/3

A partial table of contents of this USAF/SCEE report follows: A Statistic For Measuring The Balance Of A Sample; Numerical And Analytical Study of High Resolution Limb Spectral Radiance From Non-Equilibrium Atmospheres; Electron Waves In The Electrical Breakdown of Gases, With Application to The Dart Leader in Lightning; Investigation of Liquid Sloshing In Spin-Stabilized Satellites; Surface Potential as a laser Damage Diagnostic; A Study of Slot Waveguides For Electrostatistically Variable SAW Delay Lines; Combustion Modeling of Homogeneous Solid Propellants with Selectively Absorbing Inert Particle Additives; Interim Report Development and Testing of an Animal Model of State Dependent Effects With Atrophine; Combined Blast and Fragment Loading of Reinforced Concrete; Infrared Spectroscopy of Extrinsic P-Type Silicon; Interfacing or Models and Information Systems: A Systematic Approach; the Proton In Multisolvent Clusters; Laser Damage in Crystalline Silicon Observed under RHEED; Analysis of Swirling Nozzle Flow by a Time-Dependent finite Difference Technique; Analysis of Condensation Phenomena for Conventional Heat Pipes; Avionics Reliability Analysis; and Communications network Simulation topics With a Computer network Simulation Model; GRA

N86-23752# Southeastern Center for Electrical Engineering Education, Inc., St. Cloud, Fla.
USAF/SCEEE (UNITED STATES AIR FORCE/SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION) RESEARCH INITIATION PROGRAM RESEARCH REPORTS, VOLUME 2 Interim Report
Warren D. Peele Mar. 1985 987 p
(Contract F49620-82-C-0035)
(AD-A161908; AFOSR 35-0905TR-Vol-2) Avail: NTIS HC A99/MF A03 CSCL 09/3

A partial contents of this USAF/SCEEE report follows: A Study in the Mechanical Characterization of Advanced Composite Laminates; Modeling of Multi-Echelon and Multi-Indenture Items with Limited Repair and Transportation During War Time Emergencies; The Effect of Moderate to High Pitching Rates on the Aerodynamic Performance of a NACA 0015 Airfoil at a Reynolds No. of 100,000; Kinetic Energy Dependence of Ion Polar Molecule Collision Rate Constants by Trajectory Calculations; A Dynamic Resource Allocation Model; Electron Paramagnetic Resonance Study of Defects in III-V Semiconductor; and Effect of the Graph on Comprehension and Long-Term Recalls of the Text: Eye Movements in Reading. GRA

N86-23753# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES. VOLUME 40, NUMBER 1
Larry E. Shaffer Jan. 1986 43 p
(AD-A162235; ESN-40-1) Avail: NTIS HC A03/MF A01 CSCL 05/2

European Science Notes is a monthly publication with brief articles on recent developments in European scientific research. Partial contents: Shallow Water Acoustic at the UK's Royal Aircraft Establishment; Immunology Research in Israel; Life Sciences Research at the Weizmann Institute of Science; Symposium on Macromolecules; Mass Spectrometry Meetings; Automation and Robotization in the Welding Industry; 3rd International Conference on Composite Structures; Conference on Quantum Electronics; Very Short Laser Pulse Research. GRA

N86-23754# Naval Postgraduate School, Monterey, Calif.
THE SIMULATION OF REMOTELY MEASURED PATHS OF UNDERWATER VEHICLES FOR THE PURPOSE OF MONITORING THE CALIBRATION OF TEST RANGES M.S. Thesis
Gene Gygax Sep. 1985 107 p
(AD-A162261) Avail: NTIS HC A06/MF A01 CSCL 17/1

This thesis analyses data of and builds a simulation model for the track of an underwater vehicle as perceived by a test range of three dimensional short baseline sonar arrays. In this way many random replications of track become available quickly and inexpensively. These simulations support a larger project whose object is to monitor the performance of the test range and provide clues for troubleshooting problems. In particular, joint values of sensor array estimated displacement and reorientation corrections are generated and their error distribution is quantified. Author (GRA)

N86-23755# Illinois Inst. of Tech., Chicago.
BASIC AND APPLIED MAGNETISM WITH A SQUID GRADIOMETER Final Report, Aug. 1982 - Aug. 1983

Harold Weinstock, M. N. Nisenoff, and T. Erber Dec. 1985 28 p
(Contract N00014-82-K-2042)
(AD-A162890) Avail: NTIS HC A03/MF A01 CSCL 14/2

A facility was established to evaluate the magnetic signatures of cryocoolers, i.e., small closed-cycle liquid helium refrigerators, by use of a (superconducting) SQUID gradiometer. This gradiometer also was utilized to study the: (1) threshold of Barkhausen emission and onset of hysteresis in iron, (2) detection of defects in metal pipes by remote sensing, and (3) magnetoelastic behavior in steel bars. GRA

N86-23756# Purdue Univ., West Lafayette, Ind. School of Industrial Engineering.
THE SCIENCE OF AND ADVANCED TECHNOLOGY FOR COST-EFFECTIVE MANUFACTURE OF HIGH PRECISION ENGINEERING PRODUCTS. VOLUME 3: GEOMETRIC ADAPTIVE CONTROL FOR ACCURACY AND STABILITY IN MACHINING CYLINDRICAL WORKPIECE Ph.D. Thesis Final Report, 1 Jan. 1983 - 15 Aug. 1985
Yhu-Tin Lin and C. R. Liu Sep. 1985 191 p
(Contract N00014-83-K-0385)
(AD-A163003) Avail: NTIS HC A09/MF A01 CSCL 13/8

A new geometric adaptive control (GAC) system has been developed for improving the accuracy and stability in machining cylindrical workpiece. The system takes into consideration error generation process, machine tool dynamics, and metrology. The new stochastic model constructed in this thesis provides not only insight into the nature of machining processes, but also a means for the systematic design of geometric adaptive controllers. The adaptive control algorithms for the GAC system are derived by using the theory of self-tuning control (STC). The algorithms are simple, robust, and suitable for microprocessor implementation. Whitehouse's multiprobe measurement is modified for use in the control system for the first time. Interesting properties of this measurement in control are analyzed and predicted. The results of simulation show that the GAC system can improve both the accuracy and the stability considerably. Through the theoretical analysis it was possible to resolve the control problems imposed by multiprobe measurement, and to achieve near optimum control performance. A comparison with another GAC system which uses FCC technique is made to show that the proposed GAC system does have better performance than other existing GAC systems in precision machining. Author (GRA)

N86-23757# Lawrence Livermore National Lab., Calif.
MATERIALS PHYSICS, H DIVISION Quarterly Report, Oct. - Dec. 1984
Aug. 1985 51 p
(Contract W-7405-eng-48)
(DE86-002901; UCID-18574-84-4) Avail: NTIS HC A04/MF A01

The following were studied: phase transition in fluid nitrogen at high densities and temperatures, recovery of shocked Nevada tuff to 1.2 Mbar, high pressure studies on Nd using diamond-anvil apparatus, pressure dissociation of solid nitrogen under 1 Mbar, liquid scaling equation of state revisited, test of 3d transition metal pair potentials in the T=0 solid, heat flow in solids, flow instabilities in liquid propellant combustion, and the effect of compliant material response on Tollmein-Schlichting instability growth rates. DOE

N86-23758# Industrial Environmental Research Lab., Research Triangle Park, N. C.
OPERATIONAL AND ENVIRONMENTAL IMPACTS OF CLOSED CYCLE COOLING SYSTEMS
T. G. Brna Oct. 1985 32 p
(PB86-117157; EPA-600/D-85-249) Avail: NTIS HC A03/MF A01 CSCL 13B

The paper give results of a study of operational and environmental impacts of closed cooling systems, used for about a quarter of the nation's steam-electric generating capacity. Conclusions relating to operational impacts include: (1) closed cycle cooling leads to increased power plant heat rates relative to an open cycle cooling system, but is finding increased application at power plants in order to meet environmental or siting constraints (the wet cooling tower is the most often selected closed cycle cooling system); and (2) closed cycle cooling systems are more costly, in terms of both capital and annualized costs, than open cycle cooling (wet cooling towers are usually the least costly closed cycle cooling system, while dry cooling towers are the most expensive). GRA

N86-23759# Solar Turbines International, San Diego, Calif.
CERAMIC RECUPERATOR MODULE VERIFICATION TESTS Topical Report, Jan. - Dec. 1984
M. E. Ward and T. A. Argabright Jul. 1985 23 p
(Contract GRI-5083-233-0872)
(PB86-104775; SR85-R-5126-17; GRI-85/0154) Avail: NTIS HC A02/MF A01 CSCL 13A

The project objective is to develop a ceramic recuperator suitable for high temperature, corrosive industrial process stack environments. This topical report covers the performance and thermal cycling tests of the prototype ceramic recuperator module. A full-size, self-contained ceramic recuperator module was constructed and subjected to 150 hours of testing which included 30 start-stop cycles and 500 thermal exclusions in a 2100 F simulated furnace exhaust gas stream. No degradation of the module was observed. GRA

N86-23760# California Univ., Berkeley. Earthquake Engineering Research Center.
SIMPLE MODEL FOR REINFORCING BAR ANCHORAGES UNDER CYCLIC EXCITATIONS
F. C. Filippou Mar. 1985 77 p
(PB86-112919; UCB/EERC-85/05) Avail: NTIS HC A05/MF A01 CSCL 13M

A simple and computationally attractive model of the hysteretic response of reinforcing bar anchorages under severe cyclic excitations is presented. The model is based on a piecewise linear approximation of the bond stress distribution function along the bar anchorage length. Only three intermediate points located between the ends of the bar suffice to yield results which match the finite element solution of the problem. The bond stress value at these intermediate points is established by iteratively satisfying the equilibrium and compatibility equations of the bond problem. The proposed model is used to calculate the response of the bottom reinforcing bars of an interior beam-column joint subjected to deformation reversals of increasing magnitude as well as the response of a single reinforcing bar subjected to cyclic push-pull. The results are compared with the finite element solution of the studied cases. Author (GRA)

N86-23761# California Univ., Berkeley. Earthquake Engineering Research Center.
SIMPLIFIED METHODS OF ANALYSIS FOR EARTHQUAKE RESISTANT DESIGN OF BUILDINGS
E. F. Cruz and A. K. Chopra Feb. 1985 260 p
(Grants NSF CEE-81-05790; NSF CEE-84-02271)
(PB86-112299; UCB/EERC-85/01; NSF/ENG-85020) Avail: NTIS HC A12/MF A01 CSCL 13M

The accuracy of the response spectrum analysis (RSA) for estimating the maximum response of a building directly from the earthquake design spectrum is evaluated with the objective of developing better simplified analysis procedures suitable for preliminary design of buildings and for inclusion in building codes. Recognizing that the earthquake response of many buildings can be estimated by considering only the first two vibration modes in the response spectrum analysis (RSA) procedure, a simplified response spectrum analysis (SRSA) procedure is presented. Formulas for base shear, height-wise distribution of lateral forces, and computation of overturning moments specified in three design documents -- Uniform Building Code, Mexico's Federal District Building Code, and ATC-3 design provisions -- are evaluated in light of the results of dynamic analysis of buildings. Author (GRA)

N86-23762# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
11 Feb. 1986 143 p Transl. into ENGLISH from various Chinese

articles
(JPRS-CST-86-005) Avail: NTIS HC A07/MF A01

Articles and abstracts from several Chinese publications are given. While most of the articles are devoted to science and technology of a national interest, some concern the applied sciences and the abstracts are in the area of infrared research, mining and metallurgy, optical science, and space science. For individual titles, see N86-23763 through N86-23767.

N86-23763# Joint Publications Research Service, Arlington, Va.
CHINA DEVELOPS ADVANCED LASER CRYSTAL c76
In its China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 119 Transl. into ENGLISH from Xinhua (Beijing, China), 23 Dec. 1985 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

China has developed an advanced laser crystal. The nonlinear optical material is an artificially grown monocrystal called potassium titanyl phosphate. It can turn invisible infrared laser light into a high frequency visible green laser light, increasing the penetrating capacity through sea water and other media. Scientists said that the new crystal will be used for submarine laser communications, continental shelf surveys, and satellite distance measurement. It can also be applied to laser therapy, detection of deep-sea fish schools, holography, and other fields. Experts here said that only China and the United States have such a crystal applicable to laser equipment. China developed the monocrystal in a little more than a year using an improved flux process, according to the experts. Author

N86-23764# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED HOLOGRAM CAMERA DEVELOPED Abstract Only c35
In its China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 120 Transl. into ENGLISH from Xinhua (Beijing, China), 12 Dec. 1985 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

A high speed hologram camera, believed to be world class, was developed by Tianjin University scientists. It can shoot four photos in succession in transients of 2-100,000th of a second, with an interval of 5-millionth of a second between photos. At present, two photos are the international norm for such instruments, according to a university spokesman. The camera, developed by faculty members of the university's department of precision instruments, is designed to shoot transient processes like the vibration of lathe tools at high speed rotation. The components of the camera are all made in China, the spokesman said. Author

N86-23765# Joint Publications Research Service, Arlington, Va.
STUDY ON NORMALIZATION OF INSTRUMENT FOR MEASURING MODULATED TRANSFER FUNCTION IN INFRARED RANGE AT ZERO SPATIAL FREQUENCY Abstract Only c35
Zhuoxiang Feng and Zhongben Liu *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 131-132 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), vol. 4, no. 5, Oct. 1985 p 335-340 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

While measuring the modulated transfer function (MTF), the normalization precision at zero spatial frequency can affect measurement accuracy of MTF. Two computing methods of instrument normalization are discussed for MTF measurement in the infrared range: rectangular grating and wagon wheel chopper. These two methods are compared with each other. An instrument was developed for measuring MTF in the infrared range. The instrument accurately measures for the 2 to 14 micrometer wave band. The optical system is shown. Author

N86-23766# Joint Publications Research Service, Arlington, Va.
FLUORESCENT SPECTRA OF Cr3+ IONS IN OXIDES OF HIGH VALENT-CATIONS, POSSIBILITY TO USE THEM AS TUNABLE LASER MATERIALS Abstract Only c76
Zundu Luo, Jiming Chen, and Tao Chen *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 132 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), v. 4, no. 5, Oct. 1985 p 355-360 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

The fluorescent spectra and fluorescent lifetime measurements of Cr3(+) ions in four oxides (potassium aluminum molybdate, aluminum tungstate, aluminum niobate and aluminum tantalate) are reported. The wavelength of the fluorescent peaks of these samples is longer and their bandwidth wider than that of alex-drite and many other chromium doped tunable laser materials. The crystal field of the Cr3(+) ions is weakened by the polarization effect of the high valent-cations. These materials have a strong enough electron-phonon coupling or large enough Huang-Rhys factors. In this way one can expect to obtain a series of tunable laser materials which have a broad tunable range and a wavelength of emission peaks longer than 800 nm. The fluorescent spectra and absorption spectra of Cr3(+) is shown, a fluorescent measurement device layout and its measurement of fluorescent lifetime using a pulse decay method. Author

N86-23767# Joint Publications Research Service, Arlington, Va.
DATA ANALYSIS OF INFRARED REFLECTION SPECTRA OF LiNbO3 AND OTHER CRYSTALS Abstract Only c76
Yan Liu and Liji Liao *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 137 Transl. into ENGLISH from Gunagxue Xuebao (Shanghai, China), v. 5, no. 11, Nov. 1985 p 1046-1055 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

Data analysis is made by using the classical oscillator fit method with preliminary data obtained form a Kramer-Kronig analysis which leads to a rapid convergence of the procedure. It was found that the procedure can be used satisfactorily for the analysis of infrared reflection spectra of both the crystals with separated bands, and LiNbO3 with overlapping bands having remarkably different intensities. Even those spectra with weak bands fading into strong ones can be processed satisfactorily. Author

N86-23768# Joint Publications Research Service, Arlington, Va.
USSR REPORT: MACHINE TOOLS AND METALWORKING EQUIPMENT
21 Mar. 1986 71 p Transl. into ENGLISH from various Russian articles
(JPRS-UMM-86-007) Avail: NTIS HC A04/MF A01

The development of machine tools and metal working equipment in the Soviet Union is reported. The following topics are discussed: industry planning and economics, metal cutting and metal forming machine tools, other metal working equipment, automated lines and aggregated machining systems, and robotics. For individual titles, see N86-23769 through N86-23772.

N86-23769# Joint Publications Research Service, Arlington, Va.
PRODUCTIVITY, COMPONENTS OF AUTOMATED PRODUCTION SYSTEMS VIEWED
V. I. Letsik *In its* USSR Report: Machine Tools and Metalworking Equipment (JPRS-UMM-86-007) 21 Mar. 1986 p 35-38 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 10, Oct. 1985 p 40-41 (For primary document see N86-23768 14-31)
Avail: NTIS HC A04/MF A01

The developmet and expanded use of robotics was initiated to increase labor productivity, ensure stable high quality instruments and necessary safety equipment, and to reduce the cost of products. Robotics was introduced to cold stamping machining, loading and unloading, transport and warehousing, etc. Approximately 200 robots were introduced which replaced 50 people. Robotics and robotized technology applied to industrial plants for automation flexible production systems, increase productivity, quality improvement, and reduction of manpower is discussed. E.A.K.

N86-23770# Joint Publications Research Service, Arlington, Va.
FLEXIBLE PRODUCTION SYSTEMS
A. D. Chudakov and D. D. Shchetinin *In its* USSR Report: Machine

Tools and Metalworking Equipment (JPRS-UMM-86-007) 21 Mar. 1986 p 39-44 Transl. into ENGLISH from Avtomobilnaya Promyshlennost (Moscow, USSR), no. 11, Nov. 1985 p 4-7 (For primary document see N86-23768 14-31)
Avail: NTIS HC A04/MF A01

Flexible production systems are a technological tool design to automate multiple product line manufacturing. Flexible production systems provide an efficient means of organizing combined equipment operations and bring the production organization nearer to an unmanned arrangement or one requiring a limited number of workers. This is achieved by intensifying and automating manufacturing processes; coordinating the automated processes involved in warehousing and materials transport to maintain a tight production path; and using computers to automate production preparation and production control. The prerequisites for a change to these new production structures include numerical control [NC] tools and machining centers, power connection points for robots, automated conveying and warehousing systems controlled by microelectronic devices and control computer complexes consisting primarily of microprocessor-based units capable of controlling equipment via a direct connection and on a real-time basis. The types of flexible production systems in operation are divided into three groups: (1) flexible automated lines (GAL), (2) flexible production modules (GPM); and (3) flexible production complexes (GPK). E.A.K.

N86-23771# Joint Publications Research Service, Arlington, Va.
ADVANCED MACHINE TOOLS, LOADING SYSTEMS VIEWED
V. I. Kharkov *In its* USSR Report: Machine Tools and Metalworking Equipment (JPRS-UMM-86-007) 21 Mar. 1986 p 45-59 Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Proizvodstva (Moscow, USSR), no. 11, Nov. 1985 p 5-9 (For primary document see N86-23768 14-31)
Avail: NTIS HC A04/MF A01

The machine-tooling complex built from a revolving lathe and a two-armed robot designed to machine short revolving bodies including parts with curvilinear and threaded surfaces from piece blanks in either small-series or series multiitem production is described. The complex consists of: (1) a model 1V340F30 revolving lathe with a vertical axis of rotation, 8-position revolving head on a cross carriage and an Elektronika NTs-31 on-line control system; (2) a gantry-style two-armed M20-Ts robot with a 20-kilogram (20 x 2) load capacity; and (3) an 8-position indexable blank table, one of whose positions is for initial unloading of finished parts. Subsequently, machined parts are set onto the position into which all of the blanks are unloaded. Complex enclosure allows adjustment and process correction during maintenance and convenient observation of the machining process. E.A.K.

N86-23772# Joint Publications Research Service, Arlington, Va.
TRANSPORT MANIPULATOR REVIEWED c37
V. Dzyuba, A. S. Mironenko, L. N. Timoshenko, and V. Ye. Kovtunenko *In its* USSR Report: Machine Tools and Metalworking Equipment (JPRS-UMM-86-007) 21 Mar. 1986 p 60-63 Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Proizvodstva (Moscow, USSR), no. 11, Nov. 1985 p 13-14 (For primary document see N86-23768 14-31)
Avail: NTIS HC A04/MF A01

Floor type transportation facilities for operational servicing of work positions, located on the line with intermediate products, fixtures and tools, make the most frequent use of cart-robots (transmanipulators) are described. The transport manipulator and the warehouse stacker move the same load in flexible production complexes, and it is recommended to have the manipulator grip in the shape of a lifting telescopic bracket moving to both sides, similar to the stacker. The manipulator does the following operations; carries packing to the work position, returns packing to the warehouse and exchanges it. In the exchange packing mode the manipulator operates in the following sequence: on a signal it obtains the packing or a satellite at the warehouse. This is determined by the production operation plan, and moves the load to the exchange table. E.A.K.

N86-23773# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
25 Mar. 1986 63 p Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-007) Avail: NTIS HC A04/MF A01

Progress in Japanese science and technology is reported. Topics discussed include: aerospace sciences, biotechnology, metallurgical industry, and new materials. For individual titles, see N86-23774 through N86-23777.

N86-23774# Joint Publications Research Service, Arlington, Va.
ROLLOUT OF XT-4 INTERMEDIATE CLASS TRAINING AIRCRAFT c05
In its Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 1-5 Transl. into ENGLISH from Aerospace Japan (Tokyo, Japan), Jun. 1985 p 31-33 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

The completion of an XT-4 intermediate class training aircraft is reported. The XT-4 is a high-performance training aircraft produced entirely in Japan. The work of matching its engine and airframe will begin and the airframe will be subjected to functional tests. It will then be subjected to in-house tests and it will be delivered to the Defense Agency and tested for 2 years. Its scheduled completion is set for 2 years. The XT-4 has excellent flight characteristics at a wide variety of speeds. It is equipped with transonic wings, and the airframe shape is modified. The XT-4 is a training aircraft, and is scheduled to be used for flight training, however, it is an excellent aircraft with performance and characteristics suitable for Japan's needs. It is outstanding for rate of climb and range performance. E.A.K.

N86-23775# Joint Publications Research Service, Arlington, Va.
TRENDS IN TACTILE BIOSENSORS, SMELL-SENSITIVE BIOSENSORS c35
Kohei Higuchi, Yoshie Kawana, and Jun Kimura *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 6-17 Transl. into ENGLISH from Bio Industry (Tokyo, Japan), Dec. 1985 p 38-45 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

Biosensors, which combine substances from living organisms such as enzymes with electrochemical transducers, are considered taste-sensitive biosensors. Touch sensors were analyzed using various pressure-sensitive elements, but no attempts were made to use substances from organisms. The sense of smell is a gase sensor for the body; there are numerous uncertainties about the meaning of smell-sensitive biosensors. Tactile biosensors and olfactor biosensors were examined. Biosensors include sensors directly apply materials extracted from organisms and sensors which copy sensors. E.A.K.

N86-23776# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT, USES OF NEW METAL MATERIALS EXAMINED c26
J. Tada *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 18-40 Transl. into ENGLISH from Nikko Materials (Tokyo, Japan), Aug. 1985 p 89-100 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

Superconductive metals (alloys) are discussed. The critical temperature (Tc) and the coercive magnetic field (Hc) are examined. Superconductivity is best utilized when Tc and Hc are high. Types and characteristics of superconductive metal materials, the development, and application of superconductive materials (such as alloys) are outlined. Market trends of new metal materials are investigated. E.A.K.

N86-23777# Joint Publications Research Service, Arlington, Va.
PRESENT STATUS AND PROSPECTS OF FINE CERAMICS c27
Eiji Kamijo *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 41-57 Transl. into ENGLISH

from Kino Zairyo (Tokyo, Japan), Jul. 1985 p 14-23 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

The ceramic industry has managed to meet the demand by applying a highly controlled process using refined raw materials of high purity. As a result, nonoxide base ceramics such as a nitrogeneous compound, carbide and boride, which do not occur in nature, have become new substances in addition to the existing oxide base ceramics. The existing ceramics using natural mineral raw materials, including porcelain, are called classic ceramics or traditional ceramics. The ceramics using refined artificial raw materials, whose characteristics are highly controlled, are called new ceramics or fine ceramics. High performance ceramics or advanced ceramics are important basic materials for staining advanced technologies. The application of the unlimited potential of fine ceramics as new materials which contribute to technological innovation in the next generation are outlined. The fine ceramics will contribute to the development of the electronics industry. The fine ceramics are considered to have far reaching technological effects and will fill needs in damage resistant materials required for advanced industries, activation of existing industries, and saving of energy and rare metal resources. E.A.K.

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-23778 Pennsylvania State Univ., University Park.
DETECTION OF VLF AND ELF LONG-PATH SIGNALS RADIATED FROM HEATED AND MODULATED IONOSPHERE CURRENT SYSTEMS Ph.D. Thesis
Ray James Lunnen, Jr. 1985 178 p
Avail: Univ. Microfilms Order No. DA8524828

The theoretical and experimental evidence of verified detection of very low frequency (VLF) and extremely low frequency (ELF) long-path signals radiated from a heated and modulated dynamo current system at mid-latitudes are described. A general background of the ionosphere current systems and prior research in VLF/ELF communications is followed by a complete description of the receiving subsystem. The on/off method of ionospheric heating with synchronous detection is the primary experimental technique. Phase reversal of the heating modulation envelope to create four-bit messages with synchronous averaging of the detected message is explained. The amplitude spectrum of background noise was compared to the amplitude spectrum of signal plus noise. All amplitudes were related to the magnitude of the horizontal component of the Earth's magnetic field, and the system detection threshold. Characterization of synchronously averaged four-bit messages at 1838.235 Hz detected locally at Los Canos, Puerto Rico is described. Study and analysis of similar messages in relation to the receiving system detection threshold is presented. Future research is suggested which is designed to further understand the promising communication potential displayed by experimental results. Dissert. Abstr.

N86-23779 Department of the Air Force, Washington, D.C.
DIPOLE RING ARRAY ANTENNA FOR CIRCULARLY POLARIZED PATTERN Patent
Douglas K. Waineo and Sam S. Wong, inventors (to Air Force) Issued 26 Nov. 1985 9 p Supersedes AD-D010881
(AD-D012075; US-Patent-4,555,708; US-Patent-Appl-SN-569642; US-Patent-Class-343-799) Avail: US Patent and Trademark Office CSCL 17/7

A NAVSTAR satellite has a navigation antenna array beamed toward the Earth. A communications antenna array for communicating with other satellites requires a pattern null near the axis and high gain to the sides with pattern null near the axis and high gain to the sides with minimum losses. This is achieved with a dipole ring array comprising eight elements surrounding the navigation array. The ring has a diameter of 1.1 wavelength, and is fed with equal amplitudes and a third mode phase progression, which produces good circular polarization in the far field. For a different sized dipole ring, there will still be an optimum phase distribution which will give good circularly polarized patterns. GRA

N86-23780 Deutsche Geodaetische Kommission, Munich (West Germany).
USE OF DISPERSION FOR ELECTROMAGNETIC DISTANCE MEASUREMENT Ph.D. Thesis - Technische Univ. Munich, West Germany [ZUR AUSNUTZUNG DER DISPERSION FUER DIE ELEKTROMAGNETISCHE STRECKENMESSUNG]
Wolfgang Huebner Bayerischen Akademie der Wissenschaften 1985 109 p refs In GERMAN; ENGLISH summary
(SER-C-310; ISBN-3-7696-9360-4; ISSN-0065-5325) Copyright. Avail: Issuing Activity

The possibilities of dispersion measurement with distance measuring equipment not conceived for this purpose are discussed. The atmospheric influence on the propagation velocity of emitted signals has to be determined for distance measurement using electromagnetic waves. The use of the dispersion reduces difficulties in getting the meterological parameters which are valid for the whole ray path. Equations for the calculation of distances are given, and possible sources of errors are analyzed. Modifications to the equipment allow the application of the two-wavelength method (two-color distance measurement). Author (ESA)

N86-23781*# Ohio State Univ., Columbus. ElectroScience Lab.
BROADCASTING SATELLITE SERVICE SYNTHESIS USING GRADIENT AND CYCLIC COORDINATE SEARCH PROCEDURES
Charles H. Reilly, Clark A. Mount-Campbell, David J. Gonsalvez, Clarence H. Martin, Curt A. Levis, and Cou-Way Wang Feb. 1986 39 p refs
(Grant NAG3-159)
(NASA-CR-176708; NAS 1.26:176708; TR-716548-4) Avail: NTIS HC A03/MF A01 CSCL 17B

Two search techniques are considered for solving satellite synthesis problems. Neither is likely to find a globally optimal solution. In order to determine which method performs better and what factors affect their performance, we design an experiment and solve the same problem under a variety of starting solution configuration-algorithm combinations. Since there is no randomization in the experiment, we present results of practical, rather than statistical, significance. Our implementation of a cyclic coordinate search procedure clearly finds better synthesis solutions than our implementation of a gradient search procedure does with our objective of maximizing the minimum C/I ratio computed at test points on the perimeters of the intended service areas. The length of the available orbital arc and the configuration of the starting solution are shown to affect the quality of the solutions found. Author

N86-23782# Naval Research Lab., Washington, D. C.
TEXT-DEPENDENT SPEAKER VERIFICATION USING VECTOR QUANTIZATION SOURCE CODING Memorandum Report, Oct. 1984 - Jun. 1985
D. K. Burton 26 Nov. 1985 21 p
(AD-A161875; NRL-MR-5662) Avail: NTIS HC A02/MF A01 CSCL 17/2

Several vector quantization approaches to the problem of text-dependent speaker verification are described. In each of these approaches, a source codebook is designed to represent a particular speaker saying a particular utterance. Later, this same utterance is spoken by a speaker to be verified and is encoded in the source codebook representing the speaker whose identity was claimed. The speak is accepted if the verification utterance's quantization distortion is less than a prespecified speaker-specific threshold. The best of the approaches achieved a 0.7% false acceptance rate and a 0.6% false rejection rate on a speaker population containing 16 admissible speakers and 111 casual

imposters. The approaches are described, and detailed experimental results are presented and discussed. GRA

N86-23783# Royal Signals and Radar Establishment, Christchurch (England).
AN INVESTIGATION OF SYNTHETIC APERTURE RADAR AUTOFOCUS
I. P. Finley and J. W. Wood Apr. 1985 44 p
(AD-A161912; RSRE-MEMO-3790; DRIC-BR-97350) Avail: NTIS HC A03/MF A01 CSCL 17/9

SAR imagery is generated by matched filtering the raw azimuth signal history, assuming uniform straight line motion of the aircraft. Unknown aircraft motions alter the matched filter required for processing. Autofocussing involves determinating from the raw data the appropriate matched filter. In this document the principles of SAR and the requirement for an autofocus system are discussed. Three autofocus methods are investigated: measurement of the power spectrum, contrast maximization, and registration of multilook images. The power spectrum is shown to be unreliable as an autofocus aid. Results of the contract maximisation and registration methods are compared. GRA

N86-23784# Naval Research Lab., Washington, D. C.
A DEMONSTRATION OF SURVEILLANCE-RADAR COMMUNICATION Final Report, Oct. 1981 - Sep. 1984
J. O. Coleman and J. J. Alter 4 Oct. 1985 16 p
(F12-131)
(AD-A161969; NRL-8925) Avail: NTIS HC A02/MF A01 CSCL 17/2

Success in multiplatform sensor integration will require a robust communication capability for transferring data. One way to communicate is to use the existing radar transmitters and antennas. Consequently, the Naval Research Laboratory (NRL) has investigated techniques for radar communications, and has constructed a simple radar communication demonstration system to illustrate a concept suitable both for new radar designs and for retrofitting onto existing radars. GRA

N86-23785# M/A-COM Linkabit, Inc., Vienna, Va.
DSCS (DEFENSE SATELLITE COMMUNICATIONS SYSTEM)/ WIDEBAND SHF (SUPER HIGH FREQUENCY) ENHANCEMENTS AND EHF (EXTREMELY HIGH FREQUENCY) ANTENNA RECOMMENDATIONS FOR THE MID-(1986 - 1991) AND FAR-TERM (1992 - 2000) PERIODS. PART 2 Final Report, 30 Apr. - 30 Nov. 1985
L. Ricardi 29 Nov. 1985 132 p
(Contract DCA100-84-C-0009)
(AD-A162116; DCA/MSO-85-3-Pt-2) Avail: NTIS HC A07/MF A01 CSCL 17/2

The primary purpose of this effort is to examine SHF modifications to DSCS/Wideband systems for all users in the mid (1986 to 1991) and far-term period (1992 to 2000). This report consists of two parts. Part 1 summarizes the recommendation for further study provided by the SHF Working Group during the July through November 1985 period. Part 1 also includes preliminary examination of the benefits of high power amplifier linearization techniques. Part 2 of this document provides detailed analysis and recommendations on the implementation and potential benefits of SHF frequency reuse through polarization diversity. Author (GRA)

N86-23786# Connecticut Univ., Storrs. Dept. of Technical Engineering and Computer Science.
AN EFFICIENT RANDOM ACCESS ALGORITHM FOR PACKET BROADCAST CHANNELS WITH LONG PROPAGATION DELAYS
M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos Nov. 1985 38 p
(Contract N00014-85-K-0547; Grant NSF ECS-81-19885)
(AD-A162152; UCT/DEECS-TR-85-9) Avail: NTIS HC A03/MF A01 CSCL 17/2

This paper introduces and analyzes an efficient algorithm for the random accessing of a broadcast channel by a large number of packet-transmitting, bursty users. The algorithm uses a minislot overhead, per packet, to extract detailed information regarding possible packet collisions. In the event of a collision, this information is used by the algorithm for accelerating the collision resolution process. The maximum stable throughput and the mean packet delay induced by the algorithm are evaluated via a systematic analysis method. The packet delay characteristics indicate that the proposed algorithm is well suited for operation on satellite channels, over a wide range of input traffic rates. Author (GRA)

N86-23787# Regis Coll., Weston, Mass.
PHYSICS OF NATURAL AND HF - INDUCED IONOSPHERIC DISTURBANCES AND THEIR EFFECTS ON RADIO COMMUNICATION Final Report, 1 Feb. 1983 - 30 Jun. 1985
Min-Chang Lee 30 Jun. 1985 86 p
(Contract F19628-83-K-0024)
(AD-A162159; AFGL-TR-85-0163) Avail: NTIS HC A05/MF A01 CSCL 17/2

We report a theoretical study of ionospheric disturbances caused by either natural or man-made processes. Thirteen papers published in either technical journals or conference proceedings are compiled in this report, These papers discuss: (1) the identification of the sources of free energy, the optimum conditions for plasma instabilities as the courses of naturally occurring ionospheric irregularities, and (2) the nonlinear effects leading to the HF ionospheric disturbances such as lower hybrid waves, upper hybrid waves, ionospheric irregularities, and geomagnetic field fluctuations. GRA

N86-23788# Naval Underwater Systems Center, Newport, R.I.
FIRST STEPS IN ESTABLISHING THE NUSC/NAVSEA VIDEO TELECONFERENCING SYSTEM
J. F. Griffin and R. G. Heroux 10 Sep. 1985 17 p
(AD-A162259; NUSC-TD-6448) Avail: NTIS HC A02/MF A01 CSCL 17/2

The initial steps taken by the Naval Underwater Systems Center (NUSC) to bring a three-site video teleconferencing system from the concept stage through approval and design to the stage of user development and incipient use are explained. The video conferencing system, due to be operational in October 1985, will link three sites: NUSC laboratories in Newport, R.I., and New London, Conn., and the Naval Sea Systems Command headquarters in Arlington, Virg. This document is intended as a guide to those considering the development of video teleconferencing systems and those planning to submit proposals for such systems. GRA

N86-23789# Naval Postgraduate School, Monterey, Calif.
FINLINE HORN ANTENNAS M.S. Thesis
Mumtaz ULHaq Sep. 1985 124 p
(AD-A162279) Avail: NTIS HC A06/MF A01 CSCL 09/1

This thesis presents the results of an experimental investigation of the finline horn antennas. Both near-field and far-field measurements were made for horns with differrent physical and electrical parameters. This revealed the influence of the various parameters on the radiation pattern and led to a design which appears to be close to the optimum with respect to gain and sidelobe levels. The application of these horns in a printed circuit monopulse comparator is also demonstrated. GRA

N86-23790# Naval Postgraduate School, Monterey, Calif.
A PERFORMANCE EVALUATION MODEL FOR THE STOCK POINT LOGISTICS INTEGRATED COMMUNICATION ENVIRONMENT (SPLICE) M.S. Thesis
Jonathan B. Schmidt Sep. 1985 69 p
(AD-A162313) Avail: NTIS HC A04/MF A01 CSCL 15/5

This thesis investigates ways of improving the real-time performance of the Stockpoint Logistics Integrated Communication Environment (SPLICE). Performance evaluation through continuous monitoring activities and performance studies are the principle vehicles discussed. The method for implementing this performance evaluation process is the measurement of predefined performance indexes. Performance indexes for SPLICE are offered that would measure these areas. Existing SPLICE capability to carry out

performance evaluation is explored, and recommendations are made to enhance that capability. GRA

N86-23791# Florida Univ., Gainesville. Dept. of Civil Engineering.
WHY A NETWORK ENERGY MONITORING AND CONTROL SYSTEM? M.S. Thesis
Robert B. Barron 1985 155 p
(AD-A162932) Avail: NTIS HC A08/MF A01 CSCL 13/1

By installing control instructions in a computer and connecting it to each piece of equipment, a building facility operator can use the computer to consistently implement control strategies pertaining to utility consumption. This essentially is what is known as an Energy Monitoring and Control System (EMCS). Typically, the building owner insists that the reduction in utility costs after the few years exceeds, or pays back, the installation cost of the EMCS. Due to the high cost of minicomputer equipment, early systems could only have one computer that was remoted through a communications network to many nearby buildings. However, inexpensive but capable microcomputers are available that can provide control for a single building. This report explores the desireability and cost of an EMCS system in general and of these two alternatives in particular. It is found that the quickest payback was found in systems implementing the fewest number of control strategies. Further, it appears that choice of a network over a single building control system depends on the number of buildings connected. GRA

N86-23792# Texas Univ., Austin. Center for Electromechanics.
PULSED POWER REQUIREMENTS FOR ELECTROMAGNETIC LAUNCHES
W. F. Weldon and H. H. Woodson 1986 4 p Presented at the 2nd IEEE Symposium, Electromagnetic Launch Technology, Boston, Mass., 11-14 Oct. 1983 Previously announced in IAA as A84-32001
(AD-A163080; PR-20) Avail: NTIS HC A02/MF A01 CSCL 19/6

Both linear (railgun) and coaxial (mass driver, etc.) electromagnetic launchers (EMLS) are treated as time-varying impedances to determine the relationships between acceleration force, payload velocity, and power supply voltage and current. These relationships are then examined in the light of electromagnetic parameters associated with each EML type ot establish a basis for determining and comparing power supply requirements for various EMLs. GRA

N86-23793# Naval Research Lab., Washington, D. C.
ADAPTIVE CANCELLER LIMITATIONS DUE TO FREQUENCY MISMATCH ERRORS Interim Report
Karl R. Gerlach 2 Jan. 1986 35 p
(AD-A163122; NRL-8949) Avail: NTIS HC A03/MF A01 CSCL 17/9

The effects of frequency mismatch errors on adaptive cancellers are investigated. Frequency mismatch errors occur because of errors in the synthesis process of the bandpass filters designed to be identical which are in each input channel. These frequency mismatches among the channels result in cancellation degradation. Tapped delay line transversal filters can be used to compensate for these frequency mismatches and thus improve cancellation performance. A pole/zero error model of the filters is developed whereby closed form solutions of the maximum achievable cancellation are obtained. This cancellation is a function of the order of the ideally matched frequency filters, the number of time delay taps in the compensating transversal filter, the bandwidth-tapped time delay product, and the constraints on these parameters. A design procedure is outlined for optimizing the canceller with respect to these parameters and their constraints. Specifically, results are presented for when the input filters are the Butterworth type. It is shown that an arbitrarily low output noise residue cannot be achieved by arbitrarily increasing the number of time delay taps. GRA

N86-23794# M/A-COM Linkabit, Inc., Vienna, Va.
INTEROPERABLE COMMERCIAL SATELLITE SYSTEM (ICSS) SPECIFICATION Draft Report, No. 168, Sep. - Nov. 1985
R. Carestio, J. Shattuck, G. Al-Kinani, and P. Chapell Nov. 1985 87 p
(Contract DCA100-84-C-0009)
(AD-A163130; AD-F630622) Avail: NTIS HC A05/MF A01 CSCL 17/2

This top-level system specification establishes the performance, design, development, and test requirements for an Interoperable Commercial Satellite System consisting of large C-band satellite assets with CONUS coverage. The purpose of the system is to augment the Public Switched Network in a post-nuclear attack environment. A separately bound appendix contains specific site information. GRA

N86-23795# Department of the Navy, Washington, D. C.
ADAPTIVE DOPPLER FILTER BANKS Patent Application
Bernard L. Lewis, inventor (to Navy) Filed 19 Aug. 1985 17 p
(AD-D012059; US-Patent-Appl-SN-767205) Avail: NTIS HC A02/MF A01 CSCL 17/9

A radar system for cancelling radar clutter with a minimum of equipment comprising an N-point Fast Fourier Transform for dividing the radar's Doppler space into N contiguous frequency subbands; a delay line disposed at each frequency output port for the FFT for obtaining a set of M+1 consecutive samples from each subband, with the sampling performed at the radar's pulse repetition rate divided by N; a single M degree-of-freedom adaptive canceller moving-target indicator; and M+1 commutating switches for consecutively applying different sets of M+1 subband samples to the MTI. This operation permits clutter cancellation in each subband with N different frequency zeros placed in the radar's Doppler space for each MTI degree-of-freedom. GRA

N86-23796# Sandia National Labs., Albuquerque, N. Mex.
TRANSIENT RESPONSE OF AN INFINITE WIRE IN A DISSIPATIVE MEDIUM
K. C. Chen Aug. 1985 48 p
(Contract DE-AC04-76DP-00789)
(DE86-003966; SAND-85-1096) Avail: NTIS HC A03/MF A01

Currents on a buried wire due to both a localized voltage source and a normal incident wave from above an air-ground interface are calculated using a theory developed earlier. The diffusion limit is carried out to give the following: (1) universal curves for numerical applications, and (2) the effect of an air-ground interface. DOE

N86-23797# Sandia National Labs., Albuquerque, N. Mex.
TRANSIENT RESPONSE OF AN INFINITE CYLINDRICAL ANTENNA IN A DISSIPATIVE MEDIUM
K. C. Chen May 1985 57 p
(Contract DE-AC04-76DP-00789)
(DE86-004230; SAND-85-1077) Avail: NTIS HC A04/MF A01

The transient response of an infinite cylindrical antenna in a dissipative medium to an impulse excitation is calculated via an exact solution in the form of definite integrals and a simple, accurate asymptotic formula. The transmission line solution is shown to be a limiting case of the exact solution. By-products of this study include extension of a general asymptotic method to a more complicated integral and evaluation of a new definite integral. DOE

N86-23798# Construcciones Aeronauticas S.A., Madrid (Spain). Space and Systems Div.
CONFORMAL ARRAY ANTENNA SUBSYSTEM Final Report
Paris ESA 25 Apr. 1985 148 p refs Prepared in cooperation with Instituto de Electronica de Comunicaciones, Madrid, Spain
(Contract ESA-5824/84-NL-PP(SC))
(CASA-ES-85/I-004/E/AR; ESA-CR(P)-2124) Avail: NTIS HC A07/MF A01

An antenna subsystem to communicate between Ariane 4 and a data relay satellite was studied, concluding that the original ideas on ring antennas should be corrected due to the wide margin of coverage required in elevation for such antennas, which implies the need of splitting the coverage. Nevertheless, the study of

cylindrical and conical conformal arrays was continued in view of their intrinsic interest. Needed coverages with specified gain can be obtained with a set of microstrip circular patch antennas. For the lower stage, a single patch is enough. For geostationary missions, one horizontal array is used, and for heliosynchronous missions two horizontal arrays and a vertical one. The numerical study carried out on omniazimuthal ring antennas shows that a tendency to omnidirectional pattern exists in spite of the directivity of the elementary radiators. A small pointing improvement of the meridian pattern can be obtained by means of conical arrays instead of the cylindrical ones. Author (ESA)

N86-23799# Thomson-CSF, Montreuil (France). Div. Composants Microonde.
COMMUTATION ASSEMBLY FOR ERS-1, PHASE 2 Final Report
G. Baran Paris ESA 22 Feb. 1985 99 p In FRENCH
(Contract ESTEC-5703/83-NL-PP)
(Rept-GB/NT-85.5095; ESA-CR(P)-2128) Avail: NTIS HC A05/MF A01

The static and dynamic characteristics of a switching system for the ERS-1 satellite are described. The selected device, working at 5,3 GHz, includes a polarizing magnetic field supplied by an electromagnet with a silica protected gap. A model to work with 400 W average power, and 140 microsec pulses was built. The measured performance indicates a commutation time < 0.001 sec. The dielectric gap and the choice of a ferromagnetic material, adapted to long pulses, results in greater losses, yet compatible with the overall specification. Improvements and overall system design are discussed. Author (ESA)

N86-23800# National Bureau of Standards, Boulder, Colo. Center for Electronics and Electrical Engineering.
TRANSPARENT METROLOGY OF SIGNAL TO NOISE RATIOS OF NOISY BAND-LIMITED DIGITAL SIGNALS
D. Halford Jun. 1985 32 p
(PB86-105277; NBS/TN-1077) Avail: NTIS HC A03/MF A01 CSCL 17B

The author propose the use of a template method for quantitative, correct, and transparent measurement of signal power to additive noise power ratios (SNR) of digital signals and systems under full operating conditions. The author discusses the significance of transparent metrology, the measurement of various SNR's by the template method, and the general applicability of the template method for measurements on any noisy digital signal. The template method can provide transparent metrology procedures for other basic measurands, e.g., intersymbol interference, multiplicative noises, and synchronization. Author (GRA)

N86-24528*# University of Southern Mississippi, Hattiesburg. Dept. of Engineering Technology.
AUTOMATION OF ELECTROMAGNETIC COMPATABILITY (EMC) TEST FACILITIES
Cecil A. Harrison *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 17 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20N

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-23801 Department of the Air Force, Washington, D.C.
ELEVATED TRANSIENT TEMPERATURE LEAK TEST FOR UNSTABLE MICROELECTRONIC PACKAGES Patent
Harold Goldfarb, Kenneth L. Perkins, and Bernard L. Weigand, inventors (to Air Force) Issued 19 Nov. 1985 5 p Supersedes AD-D010494
(AD-D012078; US-Patent-4,553,435; US-Patent-Appl-SN-515240; US-Patent-Class-73-40.7) Avail: US Patent and Trademark Office CSCL 09/1

A novel method and apparatus for detecting leaks in glass-to-metal seals of microelectronic devices and the like are described which comprise a double-gasketed vacuum station including a base plate having a central hole an a first gasket for exposing one side of the seals to a leak detector; a vacuum fixture surrounding the device provides a marginal region therearound which can be evacuated to prevent helium from permeating the first gasket; the vacuum fixture includes a central opening to expose the other side of the seals to a helium containing atmosphere within a shroud enclosing the device and vacuum fixture; a second gasket provides a seal between the vacuum fixture and device periphery at the central opening in the fixture. For leak tests under controlled time/temperature conditions, an adjacent infrared lamp is used to radiantly heat the package containing the glass-to-metal seals, and a mask is included to avoid direct radiant heating of the gaskets and glass-to-metal seals. GRA

N86-23802 Department of the Air Force, Washington, D.C.
CHARGE-COUPLED DEVICE GAUSSIAN CONVOLUTION METHOD Patent
Jay P. Sage, inventor (to Air Force) Issued 26 Nov. 1985 6 p Supersedes AD-D011755
(AD-D012080; US-Patent-4,555,770; US-Patent-Appl-SN-541820; US-Patent-Class-364-819) Avail: US Patent and Trademark Office CSCL 09/5

A Gaussian convolution is produced in a CCD imager or shift register by a method involving a special clocking sequence. The principle of operation, analagous to the process of diffusion, involves the deliberate intermixing of adjacent charge packets in a controlled way. Amounts of charge are exchanged between adjacent pixels a number of times, the result approximating the convolution of the image with a Gausian function whose width is dependent upon the number of mixing cycles. GRA

N86-23803# Rome Air Development Center, Griffiss AFB, N.Y.
A RATIONALE AND APPROACH FOR DEFINING AND STRUCTURING TESTABILITY REQUIREMENTS Report, Jun. 1983 - Jan. 1985
Jerome Klion Aug. 1985 44 p
(AF Proj. 233-8)
(AD-A162617; RADC-TR-85-150) Avail: NTIS HC A03/MF A01 CSCL 09/3

Testability concepts and requirements are being applied to many Air Force electronic equipment/system development programs. Insufficient guidance exists as to the definition and structure of testability requirements and the interface between such requirements and maintainability, availability, and integrated diagnostics. The purpose of this report is to provide one logical approach and associated guidance to the definition and structure of testability needs and: (1) the relationship of testability to other system parameters; (2) the translation of testability needs to testability requirements; (3) the interpretation of testability terms, concepts and requirements; (4) the structure and scope of testability requirements; (5) and the identification of those factors, constraints and contingencies which must be considered when invoking testability requirements. GRA

N86-23804# Denver Research Inst., Colo.
HUMAN TROUBLESHOOTING IN ELECTRONICS: IMPLICATIONS FOR INTELLIGENT MAINTENANCE AIDS Final Report, Oct. 1984 - Nov. 1985
Robert A. Keller Nov. 1985 28 p
(Contract F33615-82-C-0013)
(AD-A161832; AFHRL-TR-85-34) Avail: NTIS HC A03/MF A01 CSCL 09/5

The purpose of this paper is to synthesize the literature on human troubleshooting in electronics and derive implications for

designing human interfaces for intelligent maintenance aids. After a background and overview, the nature of human troubleshooting performance is examined; particular attention is devoted to the research that delinates the limitations of human troubleshooting abilities. The implications of this research for the development and application of intelligent aids are discussed. Specific considerations for human-systems interfacing that best addresses the nature and needs of human troubleshooting are presented. GRA

N86-23805# Illinois Univ., Urbana. Cognitive Psychophysiology Lab.
A STUDY OF RELAXATION TECHNIQUES FOR THE TRANSIENT ANALYSIS OF DIGITAL CIRCUITS Ph.D. Thesis
Wei-Kong Chia 3 Jun. 1985 154 p
(Contract N00014-84-C-0149)
(AD-A161854; UILU-ENG-85-2203; R-1028) Avail: NTIS HC A08/MF A01 CSCL 09/3

In the VLSI microelectronics era, the cost of the immense CPU time and memory storage for a standard circuit simulator has become prohibitive. In order to achieve dramatic improvement in the performance of the circuit simulator, there are two principal points of departure from the standard simulation approach, namely, tearing decomposition and relaxation decomposition. This research is to study the numerical convergence and stability properties of several of the relaxation algorithms that have been proposed for the simulation of VLSI circuits. The time-point Gauss-Seidel method with prediction, the exploitation of latency and event scheduling algorithms are implemented into a general purpose circuit simulator SLATE-R (a Simulator with Latency and Tearing--Relaxed version). The performance of the SLATE-R program in the analysis of various types of integrated circuit technologies is studied. GRA

N86-23806# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia).
NOVEL METHODS OF DIGITAL PHASE SHIFTING TO ACHIEVE ARBITRARY VALUES OF TIME DELAY
A. Mohammed Sep. 1985 44 p
(AD-A161918; DREA-85/106) Avail: NTIS HC A03/MF A01 CSCL 09/5

In many signal processing applications such as in underwater acoustic array beamforming, the need arises to implement digital phase shifters. Conventional methods of implementation make use of digital interpolation and decimation to derive FIR (Finite-duration Impulse Response) realizations. Such filters, however, are capable of providing delays that are only rational fractions of the unit delay. To obtain delays that are arbitrary factors of the unit delay, two novel methods are presented: the first method makes use of a windowing technique and the second method makes use of a frequency-sampling approach. In both methods the constraint of exactly linear phase is relaxed and the departures from linear phase are kept very small. To ensure that the new phase shifters attain a high level of performance, comprehensive error measures have been developed and applied; these performance measures consists of a normalized rms error, the phase delay error and the group delay error. Moreover, these error measures are applicable to any method of designing digital phase shifters. In addition, for the frequency-sampling designs, the concept of an effective filter length is introduced; this concept takes into account the wrap-around error that arises in fast-convolution signal processing operations. Aside from the presentation of the design procedures and error measures, examples are included to illustrate the salient features of the two new methods. GRA

N86-23807# Naval Research Lab., Washington, D. C.
A CIRCUIT ANALYSIS PROGRAM Memorandum Report, Jan. 1984 - Jan. 1985
M. Raleigh 26 Nov. 1985 30 p
(AD-A161943; NRL-MR-5692) Avail: NTIS HC A03/MF A01 CSCL 09/5

Two versions of a program for analyzing linear, passive electrical circuits are described. The first version is analytic and calculates steady state frequency response, while the second is numerical and calculates complete response to initial conditions and/or forcing functions. Both versions prompt the user to describe the circuit by specifying the number of nodes and the components which interconnect them. Any interconnection of resistors, capacitors and inductors is allowed. Both versions are presently written in IBM PC basic. Author (GRA)

N86-23808# Naval Research Lab., Washington, D. C.
DESIGN OF A 10 GHz, 10 MW GYROTRON Memorandum Report, Aug. 1984 - Jun. 1985
M. E. Read and G. Bergeron 27 Nov. 1985 61 p
(AD-A161968; NRL-MR-5629) Avail: NTIS HC A04/MF A01 CSCL 09/5

A design for a 10 MW, 10 GHz gyrotron with a maximum pulse length of 100 microsec has been described. The design appears without major risks. Two cavities and their respective electron guns have been investigated. The TE (1,4) cavity is more satisfactory when it is examined without regard for mode competition, but is predicted to suffer strongly from this problem. The TE(1,3) cavity may operate satisfactory with suppression of unwanted modes. although prudence indicates that suppression methods be prepared. The gyrotron using this mode should have good efficiency (about 28%) and a margin of safety is power of over 40%. The gun should produce a beam with an acceptable velocity spread, and its operation is predicted to be stable to changes of current and voltage. Therefore, the TE(1,3) mode will be used initially as the operating mode. GRA

N86-23809# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
PICOSECOND OPTOELECTRONIC MEASUREMENT OF MICROSTRIP DISPERSION
D. E. Cooper 30 Sep. 1985 17 p
(Contract F04701-83-C-0084)
(AD-A161980; TR-0084A(5945-06)-1; SD-TR-85-72) Avail: NTIS HC A02/MF A01 CSCL 09/5

Very short electrical pulses can be produced by optically triggering optoelectronic switches incorporated into microstrip transmission lines. However, microstrip dispersion causes short electrical pulses to broaden and distort as they propagate. Conventional continuous-wave (CW) dispersion measurements on microstrip have been limited to 18-GHz bandwidth. Here we report optoelectronic generation and sampling of electrical pulses with 5-psec temporal resolution and the use of these pulses to probe dispersion effects of the high-frequency microstrip propagation modes. Theoretical calculations of the dispersed pulse shapes were performed. Results confirm the predictions. Fourier analysis of the dispersed pulse shapes yields the microstrip dispersion curve to about 150 GHz. The measured curve is much less dispersive than an approximate analytical dispersion curve, which may be due to the small dimensions of the microstrips used. GRA

N86-23810# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ENERGY CHARACTERISTICS OF SYNCHRONOUS IMPULSE-EXCITED OSCILLATORS WITH RESISTIVE LOAD
G. A. Sipaylov, A. V. Loos, and E. I. Sobko 31 Oct. 1985 17 p
Transl. into ENGLISH from Elektrichestvo (USSR), no. 4, Apr. 1983 p 78-80
(AD-A162008; FTD-ID(RS)T-0122-85) Avail: NTIS HC A02/MF A01 CSCL 10/2

For nourishment of pulse users of energy with active type of load and values of energies, measured by ten megajoules, use/application of synchronous impulse-excited oscillators becomes effective. However, for the effective use/application of impulse-excited oscillators during the physical investigations it is necessary to calculate their energy characteristics, which would make it possible to produce the agreement of generator and load, to determine the fundamental parameters of the generatable impulses/momenta/pulses and other operating characteristics. Universal energy characteristics obtained are given on base of solutions of complete system of differential equations of electro-

mechanical transient process of single-phase impulse-excited oscillator with feed of resistive load. GRA

N86-23811# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEMS OF THE STABILITY OF THE OUTPUT PARAMETERS OF SELF-EXCITED ELECTROSTATIC GENERATORS DURING PROLONGED CONTINUOUS OPERATION
Yu. G. Leleko 31 Oct. 1985 15 p Transl. into ENGLISH from Izvestiya Tomskogo Politekhnicheskogo Instituta imeni S. M. Kirova (USSR), no. 244, 1972 p 24-27
(AD-A162009; FTD-ID(RS)T-0254-85) Avail: NTIS
HC A02/MF A01 CSCL 10/2

Small/miniature self-excited electrostatic generators (ESG), whose design concept and fundamental characteristics are described, is intended for continuous operation for several hours for active or capacitive load, whose value for this time is changed over the wide limits. However, the results, described are obtained during the relatively short-term modes/conditions of the work of generator and give representation only about the maximum possibilities of generator. In mode/conditions of continuous prolonged operation, fundamental characteristic, determining the possibility of practical use/application of self-excited generator, is stability of output parameters, i.e., degree of change in voltage/stress and current of load in dependence on operating time of generator. Purpose of this work is explanation of degree of stability of output parameters in mode/conditions of continuous prolonged operation and reasons, which call their change, which will make it possible to refine recommendations regarding construction of self-excited ESG and to determine optimum mode of their operation. GRA

N86-23812# Yale Univ., New Haven, Conn. Dept. of Computer Science.
COUPLED AND DECOUPLED ALGORITHMS FOR SEMICONDUCTOR SIMULATION
Thomas Kerkhoven Dec. 1985 58 p
(Contracts N00014-82-K-0184; DE-AC02-81ER10996)
(AD-A162132; AD-E440307; YALEU/DCS/RR-429) Avail: NTIS
HC A04/MF A01 CSCL 12/1

Algorithms for the numerical simulation are analyzed by computers of the steady state behavior of MOSFETs. The discretization and linearization of the nonlinear partial differential equations as well as the solution of the linearized systems are treated systematically. Thus we generate equations which do not exceed the floating point representations of modern computers and for which charge is conserved while appropriate maximum principles are preserved. A typical decoupling algorithm of the solution of the system of pde is analyzed as a fixed point mapping T. Bounds exist on the components of the solution and for sufficiently regular boundary geometries higher regularity of the derivatives as well. T is a contraction for sufficiently small variation of the boundary data. It therefore follows that under those conditions the decoupling algorithm coverges to a unique fixed point which is the weak solution to the system of pdes in divergence form. A discrete algorithm which corresponds to a possible computer code is shown to converge if the discretizaion of the pde preserves the regularity properties mentioned above. A stronger convergence result is obtained by employing the higher regularity for enforcing the weak formulations of the pde more strongly. The execution speed of a modification of Newton's method, two versions of a decoupling approach and a new mixed solution algorithm are compared for a range of problems. The asymptotic complexity of the solution of the linear systems is identical for these approaches in the context of sparse direct solvers if the ordering is done in an optimal way. GRA

N86-23813# ITT Aerospace/Optical Div., Fort Wayne, Ind.
STUDY IN SPURIOUS SENSITIVITY OF ELECTRONICS IN SPACE Final Report, Jan. - Aug. 1984
David M. Yeager 1 Aug. 1985 61 p
(Contract F49620-83-C-0153)
(AD-A162300; AFOSR-85-0983TR) Avail: NTIS
HC A04/MF A01 CSCL 09/1

The results of ar experimental investigation into the interaction of protons, E = 318 MeV and 132 MeV, with selected multiplier phototubes and silicon photodiodes are presented. The devices were chosen because of their spaceborne applications and previous gamma ray, electron, and lower energy proton measurements. The energies are representative of those expected of particle beam weapons. A discussion of the operation of each device and its expected response to protons is presented. Testing at Los Alamos Meson Physics Facility demonstrated the temporal response of multiplier phototubes to be nanoseconds but requires microseconds for decay. Another test at the Harvard Cyclotron Lab. determined the transient response of these sensors to 132 MeV protons in the range of 100,000 to 2 X 10 to the 8th power P/sq cm sec. The response was very nearly linear, but was slightly less for most devices. The radiation sensitivity of each device was calculated as expected. The multiplier phototubes were the least sensitive. Author (GRA)

N86-23814# Martin Marietta Aerospace, Denver, Colo. Engineering Dept.
ADVANCED INVERTER TECHNOLOGY Final Report, Oct. 1982 - Oct. 1985
C. R. Griesbach and R. L. Moser Oct. 1985 186 p
(Contract F33615-82-C-2239)
(AD-A162360; MCR-85-613; AFWAL-TR-85-2065) Avail: NTIS
HC A09/MF A01 CSCL 10/2

This report gives the results of all Program tasks for the Advanced Inverter Technology Program. APL has three existing series resonant inverter-based power converters. The control and protection circuits are different for the three units. The purpose of this program was to produce a control and protection architecture and functional circuits that would work with all three power stage topologies. The requirements for the three existing power stages were determined. The three existing control and protection circuits were analyzed. An IC technology study was performed to determine the optimum technology and fabrication method for SRI control and protection circuits. A control and protection architecture utilizing common functional circuits that would work with the three existing topologies as developed and block diagrams drawn. The functional tasks were partitioned into five custom parts. The requirements for the custom parts were described. A study was performed to assess the potential present and future functions for a microprocessor in a series resonant inverter. A packaging and thermal study was performed to investigate the problems associated with space deployment of a 200-kW series resonant inverter. GRA

N86-23815# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECTIVE PARAMETERS OF A CASCADE THERMOPILE
I. A. Rezgol 18 Nov. 1985 10 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR, Energetika i Transport (USSR), no. 6, Nov. - Dec. 1969 p 137-140
(AD-A162396; AD-E801225; FTD-ID(RS)T-1114-85) Avail: NTIS
HC A02/MF A01 CSCL 20/13

For the description of the working characteristics of a multicascade thermopile equations are proposed which are simple in their mathematical structure, and in which the physical properties of the individual cascades are replaced by effective parameters, giving a concept about the properties of the chain of cascades as a whole. Calculation formulas are given for the calculation of effective parameters based on the results of tests of a cascade thermopile. The physical meaning of the effective parameters is discussed and their interconnection with the properties of the individual cascades is shown. GRA

N86-23816# Clarkson Univ., Potsdam, N.Y.
ENERGY DEPOSITION IN GALLIUM ARSENIDE Final Report
Peter J. McNulty 12 Nov. 1985 19 p
(Contract N00014-84-C-2318)
(AD-A162823) Avail: NTIS HC A02/MF A01 CSCL 09/5

The single-event-upset phenomena in microelectronic circuits with emphasis on those resulting from nuclear reactions induced

by energetic protons is described. The goal is to understand the detailed physical mechanisms leading to SEUs sufficiently to put calculating SEUs on a sound quantitative basis. Previously there was considerable success in predicting the charge generation in well defined slabs of silicon. The purpose of this contract was to try extending the model and the associated simulation codes to GaAs and to begin the experimental measurements necessary to test them. The Clarkson Nuclear Reaction models were modified to handle proton-induced nuclear reactions in gallium arsenide. The codes were immediately useful in analyzing the significance that the edge-effect phenomena, discovered in microbeam studies of GaAs gates, would play in increasing the SEU rates for GaAs memories. Techniques were developed using these codes for calculating SEU rates for select circuits flown in space (9). Two of these circuits, the 2901B and the 93L422 are responsible for SEU problems aboard US satellites. Charge-Collection Measurements have been carried out using the GaAs Fat-FET test structures from the Rockwell memories. GRA

N86-23817# Naval Research Lab., Washington, D. C.
ANALYTICAL THERMAL ANALYSIS OF THE I-BAND TRANSMITTER REPLACEMENT Final Report
Timothy J. Bennett 15 Nov. 1985 44 p
(AD-A162832; NRL-8929) Avail: NTIS HC A03/MF A01 CSCL 09/5

An L-band transmitter was designed to replace an existing unit. Increased transmitter reliability and increased mean time between failures were of primary concern for the new design. This report details the thermal analysis and design for a transmitter which operates in a sol-air temperature of 110 F (43 C) with zero wind speed. The thermal modeling programs used are Radiation View Factor (RAVFAC) and Systems Improved Numerical Differencing Analyzer (SINDA). The RAVFAC program is supported by a plotting program, Ravplot, and a date reduction program, Colaps. Author (GRA)

N86-23818# Naval Research Lab., Washington, D. C.
THEORY OF MULTICAVITY GYROKLYSTRON AMPLIFIER BASED ON A GREEN'S FUNCTION APPROACH Final Report
A. K. Ganguly, A. W. Fliflet, and A. H. McCurdy 29 Nov. 1985 17 p Previously announced in IAA as A86-17558
(AD-A163099; NRL-8935) Avail: NTIS HC A02/MF A01 CSCL 09/5

Presented is an application of a self-consistent field theory for gyrotrons to a multicavity gyroklystron configuration. The coupled radio frequency field equation and the Lorentz equations are solved in the slow-time scale formulation by using a Green's function technique to satisfy appropriate boundary conditions. An analytical expression for the small signal gain is obtained by successive approximation. The theory has been developed for cylindrical TE sub mnl mode as well as rectangular sub 101 mode. The theory is applied to calculate the small signal performance characteristics of a three-cavity configuration operating with rectangular TE sub 101 mode. GRA

N86-23819# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
JOINT SERVICES ELECTRONICS PROGRAM Annual Progress Report, 1 Apr. - 31 Dec. 1985
M. Tinkham 31 Dec. 1985 83 p
(Contract N00014-84-K-0465)
(AD-A163108; APR-99) Avail: NTIS HC A05/MF A01 CSCL 09/5

This annual report of the JSEP (Joint Services Electronic Program) in solid state electronics, quantum electronics, information electronics, control and optimization, and electromagnetic phenomenon is presented. Results of the research to date are summarized and significant accomplishments are discussed. GRA

N86-23820# University of Southern California, Los Angeles. School of Engineering.
JOINT SERVICES ELECTRONICS PROGRAM Annual Report, 1 Apr. - 31 Dec. 1985
William H. Steier 31 Dec. 1985 34 p
(Contract F49620-85-C-0071)
(AD-A163109) Avail: NTIS HC A03/MF A01 CSCL 09/5

This Annual Report summarizes the accomplishments and progress of fourteen research units for research performed during the reporting period under the Joint Services Electronics Program at The University of Southern California. GRA

N86-23821# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
HEAVY-ION INDUCED SINGLE EVENT UPSETS IN A BIPOLAR LOGIC DEVICE
Wojciech A. Kolasinski, Rokutaro Koga, and David L. Chenette 30 Dec. 1985 25 p
(Contract F04701-85-C-0086)
(AD-A163117; TR-0086(6940-05)-14; SD-TR-85-96) Avail: NTIS HC A02/MF A01 CSCL 09/5

Heavy ion test results for a bipolar logic device of moderate complexity are presented in this report. Such devices required the implementation of special techniques for testing circuits of varying upset sensitivity, and unlike similar MOS devices, present problems with test data interpretation. GRA

N86-23822# Department of the Army, Washington, D. C.
FILTERING TRANSIENT VOLTAGE SUPPRESSION DEVICE ASSEMBLY Patent Application
Leon H. Riley, inventor (to Army) Filed 22 Nov. 1985 7 p
(AD-D012056; US-Patent-Appl-SN-801024) Avail: NTIS HC A02/MF A01 CSCL 09/5

This filtering transient voltage suppression device assembly adequately provides for filtering of electrical noise and transients. It also provides a circuit with reduced parasitic inductance of the voltage suppression device (VSD). It provides for connector units to be mounted in planes at each end of the assembly. This mounting arrangement enables bulkhead mounting of the FTVSDA. Filters and VSD's are connected, in a low parasitic inductance fashion, between leads interconnecting separate connector pins and the body of the device. A mounting plate inside the device provides structure and electrical connections for assembly, as well as easy access. GRA

N86-23823# Department of the Navy, Washington, D. C.
A SCHOTTKY DIODE AND METHOD OF FABRICATION Patent Application
N. A. Papanicolaou, inventor (to Navy) Filed 30 Sep. 1985 15 p
(AD-D012057; US-Patent-Appl-SN-781560) Avail: NTIS HC A02/MF A01 CSCL 09/1

A Schottky diode and method of making same in which a n+ doped layer, an n doped layer and an undoped layer of a semi-insulating material selected from the group consisting of gallium arsenide, aluminum gallium arsenide and indium phosphide is grown consecutively on a semi-insulating substrate made of the same material. A mesa with acute angled sides is etched on the undoped layer to such a depth that the n doped layer is exposed. A Schottky an ohmic contact are then deposited on opposite sides of the mesa. The exposed n layer is then bombarded with protons at normal incidence. GRA

N86-23824# Department of the Navy, Washington, D. C.
TUNABLE MICROWAVE FILTERS UTILIZING A SLOTTED LINE CIRCUIT Patent Application
Carmine Vittoria, inventor (to Navy) Filed 25 Sep. 1985 15 p
(AD-D012062; US-Patent-Appl-SN-780068) Avail: NTIS HC A02/MF A01 CSCL 09/5

A slottled line tunable microwave filter of the type having a metallic layer having slot patterns thereon, and an insulating layer, the filter also including a variable bias D.C. magnetic field source, for imposing a magnetic field on a dielectric junction in the metallic layer, which may be varied to tune the filter resonant frequency. In one embodiment of the invention the slot pattern comprises a first set of slots and a second set of slots. The first set of slots comprises a first slot disposed coincident with a negative x axis

and the second set of slots comprises a second slot disposed coincident with a positive x axis. GRA

N86-23825# Department of the Navy, Washington, D. C.
N-BIT PROPAGATORY ANALOG-TO-DIGITAL CONVERTER SYSTEM. Patent Application
Bobby R. Jarrett, inventor (to Navy) Filed 25 Nov. 1981 22 p
(AD-D012071; US-Patent-Appl-SN-324895) Avail: NTIS HC A02/MF A01 CSCL 09/5

The application of peristaltic charge-coupled-devices to an analog delay line provides an ultrahigh speed n-bit propagatory analog-to-digital converter system. The system also includes somewhat unconventional ECL weighted current source digital-to-analog converters. The analog delay line comprised of the peristaltic charge-coupled-devices is clocked in exact synchronism with a digital delay line. Operation at conversion rates above 100MHz are made possible. GRA

N86-23826# Oak Ridge National Lab., Tenn.
USE OF A GENERAL-PURPOSE DEVELOPMENT SYSTEM IN SUPPORT OF A LARGE-SCALE ELECTRICAL DISTRIBUTION CONTROL SYSTEM
G. R. Wetherington, Jr., E. R. Broadaway, and R. R. Bentz 1985 18 p Presented at the International Load Management Conference and Exposition, Chicago, Ill., 9 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002229; CONF-851215-1) Avail: NTIS HC A02/MF A01

A software development and testing system is being used to support the operation and experimental utilization of a large-scale electrical distribution automation system. The testing system provides the mechanisms to simulate the characteristics of both the large-scale control system and the electrical distribution system that is being controlled. DOE

N86-23827# General Electric Co., Lenox, Mass. High Voltage Transmission Research Facility.
STUDY OF ELECTRIC FIELD AND ION EFFECTS OF HVDC LINES Technical Progress Report
G. B. Johnson Aug. 1985 101 p
(Contract DE-AC02-80RA-50153)
(DE86-002465; DOE/RA-50133/T1; TPR-9) Avail: NTIS HC A06/MF A01

Characterization of the electrical environment downwind of an HVDC transmission line requires the measurement of the charge carried downwind by low mobility aerosols. Both the bulk parameters of the space charge, such as charge density and electric field, and the micro parameters, such as the aerosol size distribution and the charge distribution on the aerosols, must be measured in order to characterize the space charge. Measurements of the space charge density downwind of the main line at the High Voltage Transmission Research Facility (HVTRF) have been made, for monopolar operation of the line, out to a distance of 300m for several different wind speeds. The measurements and instrumentation are reported in Section 2 of this report. Section 3 describes a preliminary attempt to fit a mathematical predictive formula to the data on the downwind charge densities reported in Section 2. DOE

N86-23828# California Univ., Berkeley. Lawrence Berkeley Lab.
EVIDENCE FOR ROOM TEMPERATURE TUNNELING RECOMBINATION IN AMORPHOUS SILICON
H. Dersch and N. M. Amer Jun. 1985 5 p Presented at the 11th International Conference on Amorphous Semiconductors, Rome, Italy, 2 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002873; LBL-20185; CONF-8509201-1) Avail: NTIS HC A02/MF A01

Room temperature nonradiative recombination in a-Si:H is directly studied by measuring the thermal expansion of the sample due to the heat released during recombination. The nonradiative lifetime is longest for undoped and shortest for doped material. This is the opposite of the photoconductivity behavior. It is concluded that the recombination rates are decoupled from the free carrier densities which is direct evidence that recombination proceeds via tunneling between localized states even at room temperature. DOE

N86-23829# Los Alamos National Lab., N. Mex.
PROGRESS IN RADIATION IMMUNE THERMIONIC INTEGRATED CIRCUITS
D. K. Lynn, comp. and J. B. McCormick, comp. Aug. 1985 149 p
(Contract W-7405-eng-36)
(DE86-003286; LA-10466-MS) Avail: NTIS HC A07/MF A01

This report describes the results of a program directed at evaluating the thermionic integrated circuit (TIC) technology for applicability to military systems. Previous programs under the sponsorship of the Department of Energy, Office of Basic Energy Sciences, have developed an initial TIC technology base and demonstrated operation in high-temperature and high-radiation environments. The program described in this report has two parts: (1) a technical portion in which experiments and analyses were conducted to refine perceptions of near-term as well as ultimate performance levels of the TIC technology and (2) an applications portion in which the technical conclusions were to be evaluated against potential military applications. This report draws several conclusions that strongly suggest that (1) useful radiation-hard/high-temperature operable integrated circuits can be developed using the TIC technology; (2) because of their ability to survive and operate in hostile environments, a variety of potential military applications have been projected for this technology; and (3) based on the above two conclusions, an aggressive TIC development program should be initiated to provide the designers of future systems with integrated circuits and devices with the unique features of the TICs. DOE

N86-23830# Pacific Northwest Lab., Richland, Wash.
PHYSICAL AND NUMERICAL MODELING OF JOULE-HEATED MELTERS
L. L. Eyler, R. J. Skarda, R. S. Crowder, III, D. S. Trent, C. R. Reid, and D. L. Lessor Oct. 1985 175 p refs
(Contract DE-AC06-76RL-01830)
(DE86-003793; PNL-5491) Avail: NTIS HC A08/MF A01

The Joule-heated ceramic-lined melter is an integral part of the high level waste immobilization process under development by the US Department of Energy. Scaleup and design of this waste glass melting furnace requires an understanding of the relationships between melting cavity design parameters and the furnace performance characteristics such as mixing, heat transfer, and electrical requirements. Developing empirical models of these relationships through actual melter testing with numerous designs would be a very costly and time consuming task. Additionally, the Pacific Northwest Laboratory (PNL) has been developing numerical models that simulate a Joule-heated melter for analyzing melter performance. This report documents the method used and results of this modeling effort. Numerical modeling results are compared with the more conventional, physical modeling results to validate the approach. Also included are the results of numerically simulating an operating research melter at PNL. Physical Joule-heated melters modeling results used for qualiying the simulation capabilities of the melter code included: (1) a melter with a single pair of electrodes and (2) a melter with a dual pair (two pairs) of electrodes. The physical model of the melter having two electrode pairs utilized a configuration with primary and secondary electrodes. The principal melter parameters (the ratio of power applied to each electrode pair, modeling fluid depth, electrode spacing) were varied in nine tests of the physical model during FY85. Code predictions were made for five of these tests. Voltage drops, temperature field data, and electric field data varied in their agreement with the physical modeling results, but in general were judged acceptable. DOE

N86-23831# Fermi National Accelerator Lab., Batavia, Ill.
RABBIT SYSTEM. LOW COST, HIGH RELIABILITY FRONT END ELECTRONICS FEATURING 16 BIT DYNAMIC RANGE
G. Drake, T. F. Droege, C. A. Nelson, Jr., K. J. Turner, and T. K.

Ohska Oct. 1985 7 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with National Lab. for High Energy Physics, Oho, (Japan).
(Contract DE-AC02-76CH-03000)
(DE86-003030; FNAL/C-85/156; CONF-851009-21) Avail: NTIS HC A02/MF A01

A new crate-based front end system has been built which features low cost, compact packaging, command capability, 16 bit dynamic range digitization, and a high degree of redundancy. The crate can contain a variety of instrumentation modules, and is designed to be situated close to the detector. The system is suitable for readout of a large number of channels via parallel multiprocessor data acquisition. DOE

N86-23832# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
A DESIGN STUDY OF CPV AND BIPOLAR ASSEMBLIES OF NICKEL/HYDROGEN CELL STACKS
T. G. Markin, S. Y. Moss, and D. N. E. Smith Paris ESA Apr. 1985 396 p refs 2 Vol.
(Contract ESTEC-5719/83-NL-AN(SC))
(AERE-G-3349-Vol-2; ESA-CR(P)-2106-Vol-2) Avail: NTIS HC A17/MF A01

A conceptual design of a Common Pressure Vessel (CPV) assembly of nickel/hydrogen cell stacks is described. The design features two 85 Ah cell stacks, giving a capacity of 210 Wh in a cylindrical compostie vessel. The design is estimated to yield a gravimetric energy density of 71 Wh/kg and a volumetric energy density of 85.5 Wh/1 (60 bar), although the significance of the latter figure is qualified. The preference for the two-stack module is largely influenced by the flexibility it allows for battery assembly. A study of bipolar assemblies identified interesting concepts, but no single preference. Simualtions of the thermal performance of both designs for GEO and LEO cycles, against a number of idealized boundary conditions, indicate that the desired operating temperatrue range is maintainable with adequate boundary temperature control. Author (ESA)

N86-23833# National Bureau of Standards, Gaithersburg, Md. Center for Electronics and Electrical Engineering.
DIGITAL METHODS IN WAVEFORM METROLOGY Final Report
Barry A. Bell, ed. Oct. 1985 177 p refs Seminar held in Gaithersburg, Md., 18-19 Oct. 1985
(PB86-134871; NBS/SP-707; LC-85-600591) Avail: NTIS HC A09/MF A01; also available SOD HC as 003-003-02694-8 CSCL 09A

Modern electron instrumentation metrology in the low frequency regime (dc-10 MHz) was discussed in lecture talks and papers. The seminar program was oranized into four main session topics. This special publication contains complete papers providing more technical details of the subjects presented at the seminar. For the sessions on Precision Waveform Synthesis, Precision Waveform Sampling, and Data Converter Characterization, six formal papers are given describing the hardware and software techniques used for developing NBS laboratory standards and apparatus for testing ac sources and voltmeters, phase angle meters, transient waveform recorders, wideband wattmeters, and digital-to-analog and analog-to-digital converters. For the informal session on Instrumentation Metrology, three subsequent papers have been written for publication. These have been included in the Appendices for completeness. For individual titles, see N86-23834 through N86-23842.

N86-23834# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
DIGITAL WAVEFORM SYNTHESIS TECHNIQUES
N. Michael Oldham *In its* Digital Methods in Waveform Metrology Oct. 1985 p 1-13 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09C

Digital waveform generators provide an economical means for producing stable, high fidelity signals over a limited frequency range. Some theoretical properties and practical limitations are described, with emphasis on sinewave reconstruction. Digital synthesis, however, is particularly suited to the construction of complex waveforms which are extremely difficult to produce by conventional analog means. Instrumentation is commercially available which allows the user to program arbitrary waveforms with 8 to 12 bit resolution at sampling frequencies up to 5 MHz. Author

N86-23835# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
PHASE ANGLE STANDARDS AND CALIBRATION METHODS
Raymond S. Turgel *In its* Digital Methods in Wareform Metrology Oct. 1985 p 15-30 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09C

Phase angle is one of the quantities that describes the properties of ac circuits. Its measurement is important in a wide variety of applications which include analysis of feedback amplifiers, servo-systems, communications circuits, oscillator and filter circuits, transformer characteristics, and other applications ranging from navigation to power systems and even to plasma physics experiments. Accuracy requirements differ widely for many of these applications, but from the point of view of the standards laboratory, calibration accuracy must be sufficient to handle precision commercial phase-angle meters with typical measurement uncertainties of 0.05 degrees and resolution of 0.01 degrees. Calibration methods and the accuracy thereof are discussed. Author

N86-23836# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
CHARACTERIZATION OF WAVEFORM RECORDERS c35
Donald R. Flach *In its* Digital Methods in Waveform Metrology Oct. 1985 p 31-53 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 14C

Although transient waveform recorders have been in use for more than 15 years, no commonly accepted test procedures were in use for these instruments, particularly for the evaluation of errors associated with dynamic input signals. Within the past few years, however, manufacturers and others have begun to use test methods which involve the application of steady state, repetitive waveforms to evaluate the dynamic performance characteristics of these instruments. Parameters measured with these procedures include quantizing errors, differential linearity errors, integral linearity errors, missing codes, and aperture uncertainty. An advantage of the above method is that a sinusoidal waveform is employed for many of the tests, and these are easily generated and well characterized for frequencies up to 1 MHz. Some disadvantages include the necessity for generating low distortion sine waves at frequencies above 1 MHz, and the difficulty of generating linear ramp-like waveforms with the required linearity at repetition frequencies greater than a fw kilohertz. Several test methods are described. Author

N86-23837# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
DUAL-CHANNEL SAMPLING SYSTEMS
Gerard N. Stenbakken *In its* Digital Methods in Waveform Metrology Oct. 1985 p 55-73 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09C

The application of dual channel sampling techniques to the measurement of electrical power is described, and, to a lesser extent, so is the application of electrical phase angle measurements. Theoretical relationships are developed for describing these sampling measurements and their associated errors. The procedures that can be used to calibrate such dual channel instruments for these applications are also described. A diagram of the basic dual channel sampling system to be analyzed is given. Author

N86-23838# National Bureau of Standards, Gaithersburg, Md Electronic Instrumentation and Metrology Electrosystems Div.

DATA CONVERTER TEST METHODS c60
T. M. Souders *In its* Digital Methods in Waveform Metrology Oct. 1985 p 75-85 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09B

A/D and D/A converters are presentedly being produced in a vast array of types and models, exhibiting a wide range of design approaches, operating speeds, and accuracies for a wide variety of applications. As might be expected, an equally large number of test methods has been developed, with each addressing the measurement of some specific characteristics of one or more of these types or models. The more useful test methods pertinent to the characterization of data converters for use in measurement or control instrumentation applications are reviewed. The focus was narrowed by concentratng mostly on static or quasistatic test methods, partly because relatively few dynamic tst methods have been proposed, and in part because some dynamic test methods are being addressed in other presentations of this seminar. Author

N86-23839# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
SETTLING TIME MEASUREMENTS c70
Howard K. Schoenwetter *In its* Digital Methods in Waveform Metrology Oct. 1985 p 87-108 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 20C

Methods of measuring device settling times (STs) from 5 microseconds to less than 20 ns with corresponding accuracies of 1 ppm and 0.1% are described. Most of these methods are thought to represent state-of-the-art techniques, developed at NBS and in industry. Some of the ST measurement methods discussed are described in a March, 1983 paper. Only a brief review of these methods will be given, showing only the salient features. Some of the NBS work has been concerned with measuring thermally induced transients and offsets in devices under test (DUTs). Methods of measuring these effects with ST measuring circuits are described. Author

N86-23840# National Bureau of Standards, Gaithersburg, Md.
AN AUTOMATIC AC/DC THERMAL VOLTAGE CONVERTER AND AC VOLTAGE CALIBRATION SYSTEM
K. J. Lentner, D. R. Flach, and B. A. Bell *In its* Digital Methods in Waveform Metrology Oct. 1985 26 p refs Previously announced in IAA as A85-30304 (For primary document see N86-23833 14-33) (NBSIR-84-2973) Avail: NTIS HC A09/MF A01

An automatic ac/dc difference calibration system is described which uses direct measurement of thermoelement emfs. In addition to ac/dc difference testing, the system can be used to measure some important characteristics of thermoelements, as well as to calibrate ac voltage calibrators and precision voltmeters. The system operates over a frquency range from 20 Hz to 100 kHz, covering the voltage range from 0.5 V to 1 kv. For all voltages the total measurement uncertainties expected (including the uncertainty of the specific reference thermal converters used) were 50 parts per million (ppm) at frequencies from 20 Hz to 20 kHz, inclusive, and 100 ppm at higher frequencies up to 100 kHz. Author (GRA)

N86-23841# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
GALLIUM ARSENIDE (GaAs)-BASED PHOTOCONDUCTIVE SWITCHES FOR PULSE GENERATION AND SAMPLING APPLICATIONS IN THE NANOSECOND REGIME
Barry A. Bell, Arnold G. Perrey, and Robert A. Sadler (ITT Gallium Arsenide Technology Center, Roanoke, Va.) *In its* Digital Methods in Waveform Metrology Oct. 1985 21p refs Presented at the Instrumentation and Measurements Technology Conference, 22 Mar. 1985 Submitted for publication (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09A

The design of a set of optoelectronic switches having an interdigitated electrode structure and implemented with high resistivity GaAs photoconductive substrates is described. A theoretical analysis is developed for determining the pulsed light ON state resistance (peak conductance), OFF state (dark) resistance, and the associated capacitances for the various designed gap geometries. Data are provided on the processing steps used in successfully fabrication a working set of switches based on the theoretical design. A test apparatus is used to make measurements of the pulsed light conductance of these devices having nominal gap spacings of 5, 10, 20, and 40 micrometers. Author

N86-23842# National Bureau of Standards, Gaithersburg, Md. Electrosystems Div.
AN APPROACH TO ATE CALIBRATION VIA PERFORMANCE VERIFICATION AT THE SYSTEM INTERFACE c70
Thomas F. Leedy *In its* Digital Methods in Waveform Metrology Oct. 1985 4 p refs Presented at the Measurement Science Conference, 17-18 Jan. 1985 Submitted for publication (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 20C

A method of verifying the performance of automatic test equipment (ATE) in its normal operating environment and configuration is presented as the best approach to achieving an overall system calibration. The method consists of the transport of well characterized signal sources to the ATE station and the application of these electrical stimuli directly to a well defined electrical interface on the test station. Data is presented on typical accuracies that have been obtained on limited parameters and ranges during the testing process, using calibrated commercial equipment. Author

N86-24515*# Tuskegee Inst., Ala. Dept. of Electrical Engineering.
INVESTIGATION OF POTENTIAL DRIVER MODULES AND TRANSMISSION LINES FOR A HIGH FREQUENCY POWER SYSTEM ON THE SPACE STATION
Harold T. Brush *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N86-23843 Minnesota Univ., Minneapolis.
EFFECT OF SPATIALLY PERIODIC HEATING OR AN ABRUPT CONTRACTION AT INLET ON TRANSITIONAL AND TURBULENT HEAT TRANSFER IN A DUCT Ph.D. Thesis
Alfonso GarciaGutierrez 1985 177 p
Avail: Univ. Microfilms Order No. DA8528811

A three-part investigation of convective heat and mass transfer from a one-sided-heated flat rectangular duct with fully developed transitional and turbulent flow was performed both experimentally and numerically. Quasi-local mass transfer results were obtained via the napthalene sublimation technique. The heat/mass transfer analogy permitted conversion into heat transfer results. First, the duct active wall is held isothermal. Experimental and numerical mass transfer results were generated for Sc = 2.5, supplemented by numerical results for heat transfer to air (Pr = 0.7). Second, the duct active wall is spatially periodically heated (i.e., successive adiabatic and heated segments). Experimental and numerical results were also obtained. Finally, experimental results are obtained for a duct with an unsymmetric contraction of the flow cross section. For the first case, the experimental Sherwood number distributions displayed typical entrance region variations.

The fully developed data agreed very well with well-established correlations. Dissert. Abstr.

N86-23844 State Univ. of New York, Buffalo.
TRANSPORT AND HYDRODYNAMIC STABILITY OF AN EXTENSIVE FLUID SUDDENLY HEATED FROM BELOW Ph.D. Thesis
Hechmi Hamouda 1985 247 p
Avail: Univ. Microfilms Order No. DA8528261

The hydrodynamic stability of the growing conduction layer in an extensive fluid above a horizontal surface has been investigated both analytically and experimentally. The analysis involved a study of the stability of convective flows in the vicinity of a horizontal surface suddenly generating a spatially uniform and time independent heat flux in an extensive fluid. The transport phenomenon occurring next to such a horizontal flat surface is formalized herein in terms of new hydrodynamic stability equations, which constitute a two-point-boundary-value eigenvalue problem. These equations were derived using conservation laws and by assuming that periodic small disturbances are superimposed on a base flow. A simple new dimensionless parameter arose. These stability equations are stiff and were integrated using a computer code designed for especially precise solutions of two-point-value problems. Associated measurements using color Schlieren photography and a data acquisition system were conducted to verify this analysis. Dissert. Abstr.

N86-23845 Minnesota Univ., Minneapolis.
ENDWALL BOUNDARY LAYER, CYLINDER DIAMETER, REYNOLDS NUMBER, AND SURFACE INJECTION EFFECTS ON LOCAL MASS TRANSFER FROM A CYLINDER IN CROSS-FLOW Ph.D. Thesis
Jakov Karni 1985 255 p
Avail: Univ. Microfilms Order No. DA8528818

A naphthalene sublimation technique is used to determine the circumferential and longitudinal variations of mass transfer from a smooth circular cylinder in a crossflow of air. The study is divided into two parts. In the first part, the effects of cylinder diameter and endwall boundary layer on the approaching flow are investigated for a cylinder Reynolds number of 10,000-80,000. High transfer coefficients are detected near the base of the cylinder, and enhancement of the mass transfer over values obtained where the flow is two-dimensional is seen up to a distance of 3.5 cylinder diameters from the tunnel wall. It is shown that the spanwise extent of the strip near the cylinder base where high coefficients are observed is proportional to the cylinder diameter. Mass transfer values near the endwall increase rapidly with Reynolds number; they also depend on the ratio of cylinder length to diameter (the aspect ratio) and the ratio of mainstream boundary layer displacement thickness to cylinder diameter. Dissert. Abstr.

N86-23846 Manchester Univ. (England).
TURBULENCE MODELLING OF FLOWS WITH NON-UNIFORM DENSITY Ph.D. Thesis
Jordan M. MacInness 1985 266 p
Avail: Univ. Microfilms Order No. DA8527403

Large differences in flux density may be expected to alter the processes determining turbulent transport. The correct simulation of these alternations is important in many practical flows, notably in turbulent combustion. This thesis examines the problem of modelling non-uniform density turbulence and develops an appropriate second-moment closure. Careful consideration is given to the role of each exact term in the averaged conservation equations and in the equations for the second moment correlations. Where high order terms depending on density gradients or density fluctuations might make a significant contribution, approoriate representations are developed. Several new models are introduced which reflect the effect of density non-uniformity on the pressure scrambling process and on the way fluctuation energy is transferred from large-scale motions where turbulence is produced to the finest scales where it is destroyed. Dissert. Abstr.

N86-23847 Rensselaer Polytechnic Inst., Troy, N.Y.
DEVELOPMENT OF HIGHER ORDER NUMERICAL PROCEDURES FOR THE SOLUTION OF FLUID FLOW AND HEAT TRANSFER EQUATIONS Ph.D. Thesis
Richard James Lounsbury 1985 322 p
Avail: Univ. Microfilms Order No. DA8528664

The objective of this thesis is to develop and analyze two higher order numerical schemes for the solution of fluid flow and heat transfer equations. These schemes are derived on the same theme as the well known exponential differencing scheme. The exponential differencing scheme is based on the locally one-dimensional profile assumption that the total flux (i.e. conduction and diffusion) is constant between grid points. Therefore, if the problem is one-dimensional and the source term in the convection-diffusion equation is equal to zero, the exponential scheme will produce the exact solution. However, most practical problems are multidimensional and involve significant source terms. For such problems, the exponential scheme is generally not very accurate. The first scheme that is developed in this thesis, called LOAD0, is derived on the assumption that the total flux has a linear variation between grid points. The second new scheme, called LOAD1, is derived on the assumption that the total flux has a quadratic variation between grid points. Dissert. Abstr.

N86-23848 Arkansas Univ., Fayetteville.
A STUDY OF THE PLASTIC FLOW AROUND A HARDNESS INDENTATION USING THE FINITE ELEMENT METHOD Ph.D. Thesis
Mahmoud Mosavi-Mashagi 1984 128 p
Avail: Univ. Microfilms Order No. DA8528933

Important mechanical properties governing metal forming processes are yield strength, ultimate tensile strength and uniform elongation, which are usally determined from tensile tests. The relative high costs of tensile tests has resulted in considerable interest in finding alternative methods to evaluate these properties. Hardness testing was suggested as a good alternative, because of its simplicity and low cost. Hardness test results were related to yield stress and ultimate tensile strength. The finite element method is used to study material flow around a hardness indentation and determine analytical correlations between elongation and ductility parameter (h/r) and other material parameters: uniform elongation, yield strength, load and Poisson's ratio. A test piece was modeled and a Nastran computer program was used to obtain numerical solutions to an ideal hardness indentation processes. Dissert. Abstr.

N86-23849 Texas A&M Univ., College Station.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF A DUAL PASSAGE, MONOGROOVE HEAT PIPE Ph.D. Thesis
George Paul Peterson 1985 165 p
Avail: Univ. Microfilms Order No. DA8528365

A parametric study of the forces governing the liquid vapor interface as performed for the purpose of determining the capillary priming characteristics of Grumman's dual passage, monogroove heat pipe when subjected to microgravitational conditions. The static liquid-vapor interface configuration was determined through the minimization of the free surface energies and two different mathematical models which described the time to prime were developed. In addition to the priming time modeling, a parametric study of the defining equations which govern the steady state operational characteristics of the heat pipe was completed. These defining equations were combined to form the basis of a model which described the operational and performance characteristics. Two experiments were designed, one testing the priming time when subjected to a microgravity field and one to determine the operational and transport characteristics as a function of the adverse tilt. Data from these experiments were correlated with the modeling predictions in an effort to verify the modeling techniques. Information from these two models, when combined, can be used to predict the maximum heat transport of the heat pipe while, experiencing external accelerations. Dissert. Abstr.

N86-23850 California Univ., Irvine.
A TWO-EQUATION TURBULENCE MODEL FOR FREE AND BOUNDED TWO-PHRASE FLOWS Ph.D. Thesis
Mostafa Abdel-Hamed Taha Aly Rizk 1985 209 p
Avail: Univ. Microfilms Order No. DA8527434

A theoretical investigation of turbulent, free and bounded, two-phase flows has been conducted. The objective is to develop a two-equation turbulence model which accounts for the interaction between the two phase for two-dimensional, isothermal, free and confined turbulent flows. The two equations describe the conservation turbulence kinetic energy and dissipation rate of that energy for the carrier fluid. The suspension is assumed to be dilute. The dispersed phase is assumed to consist of particles spherical in shape and uniform in size. The physical properties of each phase are assumed to be constant. The two conservation equations are rigorously derived from the momentum equations of the carrier fluid. Closure for high Reynolds number turbulence is obtained by modeling the turbulent correlations up to third order. Predictions obtained with the high-Reynolds number closure of the model are in very good agreement with available experimental data for the flow of a turbulent round jet laden with spherical, uniform-size solid particles. Dissert. Abstr.

N86-23851*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYTICAL AND NUMERICAL STUDIES OF THE THERMOCAPILLARY FLOW IN A UNIFORMLY FLOATING ZONE
William W. Fowlis and Glyn O. Roberts (Roberts Associates, Inc., Vienna, Va.) 1986 42 p refs
(NASA-TP-2576; NAS 1.60:2576) Avail: NTIS HC A03/MF A01 CSCL 20D

The microgravity environment of an orbiting vehicle permits crystal growth experiments in the presence of greatly reduced buoyant convection in the liquid melt. Crystals grown in ground-based laboratories do not achieve their potential properties because of dopant variations caused by flow in the melt. The floating zone crystal growing system is widely used to produce crystals of silicon and other materials. However, in this system the temperature gradient on the free sidewall surface of the melt is the source of a thermocapillary flow which does not disappear in the low-gravity environment. The idea of using a uniform rotation of the floating zone system to confine the thermocapillary flow to the melt sidewall leaving the interior of the melt passive is examined. A cylinder of fluid with an axial temperature gradient imposed on the cylindrical sidewall is considered. A half zone and the linearized, axisymmetric flow in the absence of crystal growth is examined. Rotation is found to confine the linear thermocapillary flow. A simplified model is extended to a full zone and both linear and nonlinear thermocapillary flows are studied theoretically. Analytical and numerical methods are used for the linear flows and numerical methods for the nonlinear flows. It was found that the linear flows in the full zone have more complicated and thicker boundary layer structures than in the half zone, and that these flows are also confined by the rotation. However, for the simplified model considered and for realistic values for silicon, the thermocapillary flow is not linear. The fully nonlinear flow is strong and unsteady (a weak oscillation is present) and it penetrates the interior. Some non-rotating flow results are also presented. Since silicon as a large value of thermal conductivity, one would expect the temperature fields to be determined by conduction alone. This is true for the linear and weakly nonlinear flows, but for the stronger nonlinear flow the results show that temperature advection is also important. Uniform rotation may still be a means of confining the flow and the results obtained define the procedure to be used to examine this hypothesis. Author

N86-23852*# Vigyan Research Associates, Inc., Hampton, Va.
DESIGN OF FUSELAGE SHAPES FOR NATURAL LAMINAR FLOW Final Report
S. S. Dodbele, C. P. vanDam, and P. M. H. W. Vijgen (Kansas Univ., Lawrence, Kas.) Washington NASA Mar. 1986 41 p refs
(Contract NAS1-17926)
(NASA-CR-3970; NAS 1.26:3970) Avail: NTIS HC A03/MF A01 CSCL 20D

Recent technological advances in airplane construction techniques and materials allow for the production of aerodynamic surfaces without significant waviness and roughness, permitting long runs of natural laminar flow (NLF). The present research effort seeks to refine and validate computational design tools for use in the design of axisymmetric and nonaxisymmetric natural-laminar-flow bodies. The principal task of the investigation involves fuselage body shaping using a computational design procedure. Analytical methods were refined and exploratory calculations conducted to predict laminar boundary-layer on selected body shapes. Using a low-order surface-singularity aerodynamic analysis program, pressure distribution, boundary-layer development, transition location and drag coefficient have been obtained for a number of body shapes including a representative business-aircraft fuselage. Extensive runs of laminar flow were predicted in regions of favorable pressure gradient on smooth body surfaces. A computational design procedure was developed to obtain a body shape with minimum drag having large extent of NLF. Author

N86-23853*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SIMULATION OF THE TURBULENT RAYLEIGH-BENARD PROBLEM USING A SPECTRAL/FINITE DIFFERENCE TECHNIQUE Final Report
T. M. Eidson (Georgia Inst. of Technology, Atlanta), M. Y. Hussaini, and T. A. Zang Feb. 1986 44 p refs Presented at EUROMECH 199 Direct and Large Eddy Simulation of Turbulent Flows, Munich, Germany, 30 Sep. - 2 Oct. 1985
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178027; ICASE-86-6; NAS 1.26:178027) Avail: NTIS HC A03/MF A01 CSCL 20D

The three-dimensional, incompressible Navier-Stokes and energy equations with the Bousinesq assumption have been directly simulated at a Rayleigh number of 3.8 x 10 to the 5th power and a Prandtl number of 0.76. In the vertical direction, wall boundaries were used and in the horizontal, periodic boundary conditions were used. A spectral/finite difference numerical method was used to simulate the flow. The flow at these conditions is turbulent and a sufficiently fine mesh was used to capture all relevant flow scales. The results of the simulation are compared to experimental data to justify the conclusion that the small scale motion is adequately resolved. Author

N86-23854*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LIQUID-VAPOR INTERFACE LOCATIONS IN A SPHEROIDAL CONTAINER UNDER LOW GRAVITY
Michael J. Carney Apr. 1986 27 p refs
(NASA-TM-87147; E-2936; NAS 1.15:87147) Avail: NTIS HC A03/MF A01 CSCL 20D

As a part of the general study of liquid behavior in low gravity environments, an experimental investigation was conducted to determine if there are equilibrium liquid-vapor interface configurations that can exist at more than one location in oblate spheroidal containers under reduced gravity conditions. Static contact angles of the test liquids on the spheroid surface were restricted to near 0 deg. The experiments were conducted in a low gravity environment. An oblate spheroidal tank was tested with an eccentricity of 0.68 and a semimajor axis of 2.0 cm. Both quantitative and qualitative data were obtained on the liquid-vapor interface configuration and position inside the container. The results of these data, and their impact on previous work in this area, are discussed. Of particular interest are those equilibrium interface configurations that can exist at multiple locations in the container. Author

N86-23855*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SPECTRAL MULTI-DOMAIN TECHNIQUE WITH APPLICATION TO GENERALIZED CURVILINEAR COORDINATES
Michele G. Macaraeg and Craig L. Streett Mar. 1986 25 p refs Prepared for presentation at the 6th International Conference on

Finite Element Methods in Flow Problems, Antibes, France, 16-20 Jun. 1986
(NASA-TM-87701; NAS 1.15:87701) Avail: NTIS HC A02/MF A01 CSCL 20D

Spectral collocation methods have proven to be efficient discretization schemes for many aerodynamic and fluid mechanic problems. The high order accuracy and resolution shown by these methods allows one to obtain engineering accuracy solutions on coarse meshes, or alternatively, to obtain solutions with very small error. One drawback to these techniques was the requirement that a complicated physical domain must map into a simple computational domain for discretization. This mapping must be smooth if the high order accuracy and expontential convergence rates associated with spectral methods are to be preserved. Additionally even smooth stretching transformations can decrease the accuracy of a spectral method, if the stretching is severe. A further difficulty with spectral methods was in their implementation on parallel processing computers, where efficient spectral algorithms were lacking. The above restrictions are overcome by splitting the domain into regions, each of which preserve the advantages of spectral collocation, and allow the ratio of the mesh spacing between regions to be several orders of magnitude higher than allowable in a single domain. Such stretchings would be required to resolve the thin viscous region in an external aerodynamic problem. Adjoining regions are interfaced by enforcing a global flux balance which preserves high-order continuity of the solution, regardless of the type of the equations being solved. Author

N86-23856*# Garrett Turbine Engine Co., Phoenix, Ariz.
DILUTION JET MIXING PROGRAM, SUPPLEMENTARY REPORT
R. Srinivasan and C. White Mar. 1986 397 p refs
(Contract NAS3-22110)
(NASA-CR-175043; NAS 1.26:175043; Rept-21-4705) Avail: NTIS HC A17/MF A01 CSCL 20D

The velocity and temperature distributions predicted by a 3-D numerical model and experimental measurements are compared. Empirical correlations for the jet velocity trajectory developed are presented. The measured velocity distributions for all test cases of phase through phase 3 are presented in the form of contour and oblique plots. quantification of the effects of the following on the jet mixing characteristics with a confined crossflow are: (1) orifice geometry momentum flux ratio and density ratio; (2) nonuniform mainstream temperature and velocity profiles upstream of dilution orifices; (3) cold versus hot jet injection; (4) cross-stream flow are a convergence as encountered in practical dilution zone geometries; (5) 2-D slot versus circular orifices; (6) discrete noncircular orifices; (7) single-sided versus opposed jets; (8) single row of jets. E.A.K.

N86-23857*# Sverdrup Technology, Inc., Cleveland, Ohio.
PREDICTION OF HEAT RELEASE EFFECTS ON A MIXING LAYER Final Report
Mohammed Farshchi Feb. 1986 26 p refs Presented at the 24th Aerospace Science Meeting, Reno, Nev., 6-9 Jan. 1986; sponsored by American Inst. of Aeronautics and Astronautics Previously announced in IAA as A86-22676
(Contract NAS3-24105)
(NASA-CR-175044; E-2845; NAS 1.26:175044) Avail: NTIS HC A03/MF A01 CSCL 20D

A fully second-order closure model for turbulent reacting flows is suggested based on Favre statistics. For diffusion flames the local thermodynamic state is related to single conserved scalar. The properties of pressure fluctuations are analyzed for turbulent flows with fluctuating density. Closure models for pressure correlations are discussed and modeled transport equations for Reynolds stresses, turbulent kinetic energy dissipation, density-velocity correlations, scalar moments and dissipation are presented and solved, together with the mean equations for momentum and mixture fraction. Solutions of these equations are compared with the experimental data for high heat release free mixing layers of fluorine and hydrogen in a nitrogen diluent. Author

N86-23858# Tokyo Univ. (Japan). Inst. of Space and Astronomical Science.
PROCEEDINGS OF THE SYMPOSIUM ON MECHANICS FOR SPACE FLIGHT
Mar. 1985 169 p refs Symposium held in Tokyo, Japan, 8-10 Nov. 1984
(ISAS-SP-3; ISSN-0288-433X) Avail: NTIS HC A08/MF A01

Various topic relative to space flight mechanics are discussed. Vortex interactions, a numerical study of a two-dimensional flow, a simulation of vortices shed behind a rotating wing, gas flow in binary stars, and the development of heat pipes for use in space are among the topics covered. For individual titles, see N86-23859 through N86-23872.

N86-23859# Ochanomizu Women's Univ., Tokyo (Japan). c02
INTERACTIONS OF VORTICES
Yuko Oshima *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 3-15 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

Interaction of vortex filaments are one of the elementary process taking place in turbulent flow, and some interesting interaction phenomena among them are studied. Firstly, several vortex rings are ejected in series along the same axis into still air through a circular orifice and the interactions of them are experimentally analyzed together with the simple numerical simulation micro-computer using discrete vortex method in which each vortex is represented by seven vortex filaments. Secondly, an elliptic vortex ring is ejected through an elliptic orifice and the deformation of the ring due to the self interaction is followed. Thirdly, two vortex rings are ejected simultaneously from two identical circular orifices separated with a certain distance and their merging, splitting and interchanging are observed. Author

N86-23860# Tokyo Univ. (Japan).
NUMERICAL STUDY OF TWO-DIMENSIONAL VORTEX STREET c02
Kazuhiro Tsuboi and Koichi Oshima *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 17-30 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

Two-dimensional Karman type vortex street, which consists of two infinite parallel rows of finite area vortices, is numerically investigated using discrete vortex approximation, in which each vortex is represented by a bundle of a number of point vortices. The numerical experiment was performed for wide range of the initial conditions of the vortex street in order to make clear such characteristic features as the deformation of each vortex, the merging within each row and the formation of secondary vortex street. Also, the result showed that the initial ratio of the transverse-to-longitudinal separations of the vortices must be within 0.3 to 0.5 for stable formation of the secondary vortex street. Author

N86-23861# Nagoya Univ. (Japan). Dept. of Applied Physics.
VORTON MODEL ANALYSIS
Sinzi Kuwabara *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 31-42 refs Sponsored in part by the Ministry of Education, Japan (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

The basic equations for the vorton analysis are derived from the cell discretization of the vorticity field. This model analysis is applied to the birst phenomena in the turbulent boundary layer and the entangled two vortex rings. In these calculations, the vortons change continuously in the initial stage from an aligned vorton state, and develop rapidly and independently after that stage. The helicity, which sould be conserved in the inviscid motion, is constant the initial stage, but changes rapidly and strongly after that. Author

N86-23862# Tokyo Univ. (Japan).
NUMERICAL SIMULATION OF VORTICES SHED BEHIND A

ROTATING WING c02

Naoki Izutsu and Hidesada Kanda (IBM Japan, Ltd.) *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 43-50 refs Sponsored in part by IBM Japan, Ltd. (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

The vortices shed behind a 15%-thick, two dimensional elliptic cylinder rotating around its spanwise axis perpendicularly to a uniform flow were numerically analyzed using discrete vortex-blob method. The color coded vorticity distributions in the flow field were displayed in both cases of the forced and autorotation. Moreover, a 16 mm animation movie of it was made to visualize vortex interactions. By means of this color graphic simulation, the merging rearrangement, interaction and splitting of the vortices in the wake flow of a rotating wing were demonstrated making these processes clearly understandable. Author

N86-23863# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.

NUMERICAL SIMULATIONS IN COSMIC GAS DYNAMICS: GAS FLOWS IN BINARY STARS c90

Takuya Matsuda *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 51-66 refs Sponsored in part by the Ministry of Education, Science and Culture, Japan (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

Examples of numerical simulation in cosmic gasdynamics, i.e. gas flows in close binary stars, are presented. The first example is a calculation of Roche lobe overflow in a semidetached binary system. The second one is an interaction of stellar wind blowing from the mass losing star with another star. The third example is a mass loss from a contact binary system. Finite difference schemes are used to calculate gas flows. In either cases shock waves are formed because of gravitational focusing effect. Author

N86-23864# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.

TWO-DIMENSIONAL ANALYSIS OF A FLOW IN AN MPD THRUSTER c20

Hiroyuki Yamada, Takashi Ao, and Toshi Fujiwara *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 67-76 refs (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

The present study deals with the numerical simulation of a magneto-hydrodynamic two-dimensional flow based on the one-fluid model, using a second-order-accurate difference scheme. The thruster is composed of a hollow cylindrical anode and a cone-cylinder-shaped cathode. The calculated domain is also enlarged in comparison with a previous analysis. This simulation attempted to reproduce actual phenomena observed in experiments. Author

N86-23865# Nagoya Univ. (Japan). Dept. of Aeronautical Engineering.

A KINETIC THEORY ANALYSIS OF TRANSIENT EVAPORATION PROBLEM

Takeo Soga *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 77-90 refs (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

A transient evaporation from a condensed phase surface was studied based upon a kinetic model equation that yields correct Prandtl number Pr. The kinetic equation was reduced to a set of linear differential equations with the aid of half-range Hermite polynomials and the resultant equations were solved by the use of the Laplace transformation. A quasisteady solution for t approximately > 1 was obtained and the results showed that the evaporation rate and the uniform flow behind the evaporation wave or adjacent to the Knudesn layer were little dependent upon Pr but the behavior of the dissipative wave (contact surface) was rightly dependent upon Pr. The evaporation rate obtained showed a good agreement with the one in a previous paper. Author

N86-23866# Tsukuba Univ. (Japan). Institute of Engineering Mechanics.

APPLICATION OF POROUS SOLID NITROGEN TO SPACE BORNE COOLING MISSIONS

Naoki Ichikawa, Masahide Murakami, and Hirotaka Nakai *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 91-104 refs Sponsored in part by Tokyo Univ., Japan (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

A basic experiment of the sublimation heat transfer of solid cryogen has been conducted for its potential applications to cryogenic cooling of onboard instruments. The most serious concern is the separation of solid cryogen from a cooling section caused by local rapid sublimation (dry-out). The condition of the dry-out initiation and the heat transfer performance in the dry-out state was especially pursued. The order of the effective thermal conductivity of porous solid nitrogen was found to be almost the same as that of pure one and far smaller than that predicted in the sublimation-filtration-condensation (SFC) process. Application of the solid nitrogen to onboard cooling is also discussed. Author

N86-23867# Tokyo Univ. (Japan).

EFFECT OF NON-CONDENSABLE GAS ON THE VAPOR FLOW IN THERMOSIPHONS

Tsuyoshi Matsumoto and Yasunori Kobayashi *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 105-112 refs (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

A detailed flow field survey was conducted to get a better insight into condensation mechanism of vapor flow onto the cooled plate in the enclosure. A two-dimensional thermosyphon was used as an experimental apparatus and special attention was paid to the effect of non-condensable gas in the thermosiphon. Generally it is understood that the non-condensable gas in the thermosiphon in its steady state operation occupies an upper region of the condensation section, and that there exists an interfacial layer separating vapor flow from non-condensable gas which will move vertically according to the heat input rate applied to the thermosiphon. However the structural properties of this interfacial layer and the boundary layer on the wall of condensation section, such as location of layers, thickness, temperature or density variation across them, have not been thoroughly investigated. A real time laser holographic interferometer was used to visualize a flow field in the thermosiphon. Temperature distribution was measured to evaluate the total heat transfer coefficient in the condensation section. Author

N86-23868# Osaka Univ. (Japan). Dept. of Aeronautical Engineering.

HEAT TRANSFER PERFORMANCES OF A THERMOSYPHON CONTAINED NON-CONDENSIBLE GAS (1)

Kenichi Kaneko and Kanji Negishi *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 113-118 refs (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

The heat transfer performances of the thermosiphon contained non-condensible gas with the working fluid were obtained by an experimental study. The relations among the heat transfer rate, the effectively working length of condenser, the temperature difference between the evaporator and the condenser, and the over-all heat transfer coefficient are described. Author

N86-23869# Nippon Inst. of Tech. (Japan).

PERMEABILITY OF A SCREEN WICK

Yoshio Ikeda *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 119-126 (For primary document see N86-23858 14-34)

Avail: NTIS HC A08/MF A01

Permeability of a screen wick for a heat pipe is given by the equation of Blake-Kozeney, but through inspection of this equation, it is expected to be influenced by the magnitude of porosity. Porosity is indistinct because of tightness of the installed wick, influence of the holding spring, etc., and it seems that there is much

difference between actual porosity and porosity calculated by the equation of Marcus. By assuming that the shape of a wire is a series of circular arcs and by considering a model which has arbitrary gaps between layers, the influence of the coefficient of shrinkage, layer gap, the number of layers and so forth on porosity of a screen wick was made evident. Author

N86-23870# Nippon Inst. of Tech. (Japan).
EFFECTIVE THERMAL CONDUCTIVITY OF A SCREEN WICK
Yoshio Ikeda, Makoto Kamata, and Akihiro Shimizu (Tokyo National Coll. of Tech., Japan) *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 127-134 ref (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

Effective thermal conductivity of a screen wick filled with working fluid in the case that phase transformation is not considered was calculated by the equation of Maxwell or the equation of Gorring and Churchill. Both of the equations are described as a function of thermal conductivity of working fluid and wick materials, and porosity of the wick. Although, there is much difference for the same porosity, and it is difficult to estimate porosity itself. Here, with consideration of diameter of a wire for a screen wick, mesh number, layer gap and coefficient of shrinkage, the equation to calculate effective thermal conductivity of a screen wick was derived. Author

N86-23871# Tsukuba Univ. (Japan). Institute of Engineering Mechanics.
FLOW OF He 2 THROUGH POROUS-PLUG PHASE SEPARATORS
Hirotaka Nakai, Masahide Murakami, and Naoki Ichikawa *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 135-156 refs Sponsored in part by Tokyo Univ., Japan (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

A porous-plug is one of the important components for onboard cooling systems which separates the vapor from the liquid helium (He 2). Flow characteristics through porous-plugs and physical situations of He II flow inside plugs are experimentally investigated by examining the temperature distributions inside plugs. It is clarified that He 2 flows ideally, i.e., London's relation is held, in flows through the most part of a plug and turns into vapor phase near the downstream end of it. The flow of the normal fluid component remains laminar in plugs in any experimental conditions. The liquid-vapor phase boundary is formed just at the downstream end and goes down toward the upstream side as the mass flow rate increases. The thermodynamic states of He 2 are also revealed from these flow characteristics. Author

N86-23872# Tokyo Univ. (Japan).
DEVELOPMENT OF TITANIUM HEAT PIPES FOR USE IN SPACE
Masaru Ishizuka, Tomiya Sasaki, and Yoshiro Miyazaki (Toshiba Corp., Japan) *In its* Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 157-165 refs (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

Titanium heat pipe design, manufacture and tests are discussed. The heat pipes developed are a titanium-ammonia heat pipe with axial grooves (FCHP) and a titanium-ammonia-gas loaded variable heat pipe which has a heated reservoir (VCHP). Nitrogen was charged to the VCHP as non-condensible gas. In this heat pipe development program, the manufacturing processes were studied successfully and it was clarified that titanium is very desirable as heat pipe material for use in space. Author

N86-23873# Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.
THREE-DIMENSIONAL FLOW IN COMPRESSORS AND CHANNELS Final Report, 1 Mar. 1979 - 30 Sep. 1985
T. C. Adamson, Jr. and A. F. Messiter Nov. 1985 23 p
(Contract N00014-79-C-0285)
(AD-A161858) Avail: NTIS HC A02/MF A01 CSCL 20/4

This project was begun in 1979 as a study of three dimensional transonic flows through channels and between compressor blades. In the latter problem, the blades were to be lightly loaded. In 1981, a 3 year study with the broadened goal of studying flow problems in turbomachines was initiated. Specifically, the work was to include a continuation of that in progress on three-dimensional transonic flows through a lightly loaded compressor blade row, supersonic flow over a compression ramp with a turbulent boundary layer, and consideration of transonic flows over heavily loaded blades in a compressor, starting with a two-dimensional cascade and then going to a three-dimensional rotor if the calculations for the cascade was successful. The work in heavily loaded cascades was to build on the experience gained in the lightly loaded case. The work on the compression ramp has application at blade-shroud interfaces in transonic and supersonic flows. Asymptotic methods of analysis have been employed in all the problems to be described, with numerical methods of solution used as needed in some of the inner regions of the flow fields and to illustrate results for example problems. GRA

N86-23874# Naval Research Lab., Washington, D. C.
ENERGY DISSIPATION OF LIQUIDS IN NUTATING SPHERICAL TANKS MEASURED BY A FORCED MOTION-SPIN TABLE Final Report, Jul. 1982 - Jul. 1984
Michael F. Zedd and Franklin T. Dodge 30 Oct. 1985 29 p
(AD-A161864; NRL-8932) Avail: NTIS HC A03/MF A01 CSCL 21/4

A specially constructed drive table is described that can spin and nutate scale-model propellant tanks. Results of typical tests are given in which the liquid resonant frequencies and liquid forces and moments are presented as a function of spin rate, nutation frequency, nutation cone angle, liquid filling level, and liquid viscosity. Also described is an empirical mechanical model composed of a pendulum, a rotor, and dashpots that simulate the liquid resonances (slosh and inertial waves) and the liquid forces and moments. The parameters of the model are determined from the propellant motions. Author (GRA)

N86-23875# Duke Univ., Durham, N. C. Dept. of Mechanical Engineering and Materials Science.
ANALYTICAL PREDICTION OF TURBULENT HEAT TRANSFER PARAMETERS Final Report, 1 Oct. 1980 - 30 Sep. 1984
Adrian Bejan Apr. 1985 92 p
(Contract N00014-79-C-0006; RR)-24)
(AD-A161889; DU-AB-1) Avail: NTIS HC A05/MF A01 CSCL 20/4

The objective of this research is to construct a purely theoretical foundation for the phenomenon of turbulent heat transfer. The research consisted of: (1) identifying the domain covered only the present theory; and (2) identifying the intersection between the present theory and older theories. A complete summary of published articles, books, and theses is appended. GRA

N86-23876# Calspan Field Services, Inc., Arnold AFS, Tenn.
A NONPERTURBING BOUNDARY-LAYER TRANSITION DETECTOR Final Report, Oct. 1983 - Sep. 1985
J. E. OHare Nov. 1985 23 p
(AD-A161976; AEDC-TR-85-62) Avail: NTIS HC A02/MF A01 CSCL 20/4

A laser interferometer technique is being applied to the characterization of boundary-layer conditions on models in supersonic and hypersonic wind tunnels. The boundary-layer transition detector (BLTD), based on lateral interferometry, is applicable for determining the turbulence frequency spectrum of boundary layers in compressible flow. The turbulence, in terms of air density fluctuations, is detected by monitoring interferometric fringe phase shifts (in real time) formed by one beam which passes through the boundary layer and a reference beam which is outside the boundary layer. This technique is nonintrusive to the flow field unlike other commonly used methods such as pitot tube probing and hot-wire anemometry. Data which depict boundary-layer transition from laminar to turbulent flow are presented to provide comparisons of the BLTD with other measurement methods.

Spectra from the BLTD reveals the presence of a high-frequency peak during transition which is characteristic of spectra obtained with hot wires. The BLTD is described along with operational requirements and limitations. Author (GRA)

N86-23877# Naval Ocean Systems Center, San Diego, Calif.
COMPARISON OF THE WALL PRESSURE FLUCTUATIONS IN ARTIFICIALLY GENERATED TURBULENT SPOTS, NATURAL TRANSITION AND TURBULENT BOUNDARY LAYERS Final Technical Report
T. S. Mautner Aug. 1985 19 p
(DA Proj. SR0-2301)
(AD-A162114; NOSC/TR-1053) Avail: NTIS HC A02/MF A01 CSCL 20/4

Knowledge of the wall pressure fluctuations beneath transitional and turbulent flows is required in order to understand and reduce aerodynamically and hydrodynamically generated noise. Measurements inside and outside turbulent boundary layers indicate that the wall pressure fluctuations generated by turbulence may well be the dominant mechanism in the generation of near field noise (self-noise) and, if the wall pressure fluctuations are coupled with the vibratory modes of the structure, there will be a significant increase in the sound level radiated into the far field. Wall pressure fluctuations were measured in the plane of symmetry of turbulent spots convecting in a laminar boundary layer having zero, favorable and adverse pressure gradients. The results show that the magnitude of the rms(root mean square) wall pressure and the spectra of the turbulent spot phase of boundary layer transition are strongly influenced by the local mean flow pressure gradient. The data also verifies that boundary layer transition in the presence of an adverse pressure gradient produces rms wall pressure fluctuations which are 1.5 to 2.5 times larger than those found in either a zero or favorable pressure gradient. GRA

N86-23878# Scientific Research Associates, Inc., Glastonbury, Conn.
NUMERICAL SIMULATION OF UNSTEADY THREE-DIMENSIONAL TURBULENT STRUCTURES IN BOUNDARY LAYER FLOWS Final Report, Nov. 1984 - May 1985
Nan S. Lui, Stephen J. Shamroth, and Henry McDonald 15 May 1985 45 p
(Contract F49620-34-C-0107)
(AD-A162130; R85-910011-F; AFOSR-85-1059TR) Avail: NTIS HC A03/MF A01 CSCL 20/4

The capabilities for numerical simulations of the dynamical effects of the underlying structures occurring in turbulent boundary layers have been developed. A mathematically operational model of hairpin vortex, which closely resembles the experimentally observed underlying structure of wall turbulence, has been constructed and the evolution of this incipient hairpin vortex as well as the distortion of a background laminar boundary layer has been successfully simulated. The height of the incipient hairpin vortex is about 1/5 of the local boundary layer thickness. The calculated results not only exhibit most of the prominent features associated with turbulent spots and turbulent boundary layer flows, but also reveal dynamic processes which have been very difficult to observe in experimental studies, notably, the formation and intensification of another counter rotating hairpin vortex immediately upstream of the incipient hairpin vortex. GRA

N86-23879# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A COMPREHENSIVE ANALYSIS ALGORITHM FOR ABLATION, TEMPERATURE FIELDS, AND THERMAL STRESSES OF CARBON-BASED NOSETIP MATERIALS
Zhenzhong Huang 6 Nov. 1985 27 p Transl. into ENGLISH from Yuhang Xuebao (China), no. 3, 1984 p 30-38
(AD-A162359; FTD-ID(RS)T-0701-85) Avail: NTIS HC A03/MF A01 CSCL 07/4

This paper provides the principles for calculations of ablation, conduction, and thermal stresses of flight vehicles in a re-entry environment, as well as a few techniques beyond these principles. In regards to the chemical reactions of carbon-based material ablative surfaces, a selective calculation result is used to simplify the thermochemical ablation calculations. A spaced and non-spaced three-level explicit difference scheme was chosen for use in the calculation of temperature fields. Thermal stresses were calculated using the finite element method within the hypothesis of linear elasticity, based on the incomplete principles of variational potential energy, wherein it is possible to calculate the influences of many different types of displacement boundary conditions. During compilation of these comprehensive analysis procedures, an automated mesh dividing technique was found which has application in selective calculations. GRA

N86-23880# Mitre Corp., McLean, Va.
SUPPRESSION OF CAPILLARY WAVES BY SURFACE-ACTIVE FILMS
David Nelson Nov. 1985 50 p
(Contract F19628-86-C-0001)
(AD-A162881; JSR-85-206) Avail: NTIS HC A03/MF A01 CSCL 20/4

Minute amounts of ampiphillic molecules at an air-water interface can have striking effects on both the damping and generation of capillary waves. The theory of these effects within linearized hydrodynamics is reviewed. The conventional wisdom is that oil calms troubled waters by increasing the rate of capillary wave damping. Although surface-active films can increase the damping rate by factors of two to four, a potentially more important effect is the suppression of capillary wave generation by the wind. In particular, generation by the components of fluctuating Reynold's stresses in the atmosphere parallel to the surface can be reduced by an order of magnitude or more. The theory predicts a more modest suppression of the effect of Reynold's stresses normal to the surface. GRA

N86-23881# Naval Ship Research and Development Center, Bethesda, Md.
CALCULATION OF TWO-DIMENSIONAL NONLINEAR FLUID FLOW RESULTING FROM LARGE-AMPLITUDE FORCED HEAVE MOTION OF A u-SHAPED CYLINDER IN A FREE SURFACE Final Report
John G. Telste Dec. 1985 59 p
(AD-A162969; DTNSRDC-85/086) Avail: NTIS HC A04/MF A01 CSCL 20/4

Progress in developing a tool to compute large amplitude ship motions is reported. In particular, a method to calculate transient two-dimensional potential flow about a body moving in a free surface is described. The flow problem is formulated as an initial-boundary value problem in which the velocity potential along the free surface and the positions of the moving boundaries are sought as solutions of a coupled system of differential equations. An implicit finite-difference method is used to advance the solution of the coupled system of equations in time. The auxiliary problem of computing the velocity potential inside the fluid region is solved by a method which is based on boundary-fitted coordinates and is directly extensible to three-dimensional flows. Results from calculating the potential flow about a body in forced heave motion are presented. The hydrodynamic force on the body has been obtained and compared with the hydrodynamic force predicted from second-order perturbation theory. GRA

N86-23882# Pittsburgh Univ., Pa.
PHYSICS OF PATTERN FORMATION AT LIQUID INTERFACES
1985 9 p
(Contract DE-FG02-84ER-45131)
(DE86-002103; DOE/ER-45131/001) Avail: NTIS HC A02/MF A01

Brief summaries are given of research in the following areas: viscous fingering in Hele-Shaw flow; search for instability on a quenched liquid interface; and binary liquid gels. DOE

N86-23883# Argonne National Lab., Ill.
NONLINEAR STABILITY CONTROL AND SECONDARY BIFURCATION
S. S. Chen, J. A. Jendrzejczyk, W. Edelstein, and E. L. Reiss

1985 6 p Presented at the 3rd Symposium on Energy Engineering Sciences: Thermofluids and Solid Mechanics, University Park, Pa., 8 Oct. 1985 Prepared in cooperation with Northwestern Univ., Evanston, IL.
(Contract W-31-109-eng-38)
(DE86-001813; CONF-8510176-1) Avail: NTIS HC A02/MF A01

Integrated theoretical and experimental studies are performed with the purpose to enhance the understanding of nonlinear stability phenomena involving both fluids and solid structures and their interaction. The objectives are to contribute to the explanation of observed phenomena and, ultimately, to the solution of engineering design problems by means of stability control. This paper presents the results of theoretical and experimental studies of stability control for elastic tubes conveying fluid. DOE

N86-23884# Oak Ridge Gaseous Diffusion Plant, Tenn.
ANALYSIS OF CALIBRATED HOT BOX DATA FOR THREE CONCRETE WALLS
K. W. Childs Sep. 1985 51 p
(Contract DE-AC05-84OT-21400)
(DE86-003157; K/CSD/TM-56) Avail: NTIS HC A04/MF A01

Three walls constructed of concrete with different densities were tested in a calibrated hot box at the Construction Technology Laboratories of the Portland Cement Association. The observed dynamic performance of these walls was not in good agreement with analytical solutions based on the assumption of linear heat conduction through the walls. Several sources of potential errors in the data from the hot box were explored. While some of these errors do appear to be real, they do not fully explain the discrepancy between experimental and analytical results. The experimentally determined values of the specific heats for the three concrete walls were identified as the most likely cause for the discrepancies. This report presents the analysis of the data from the hot box experiments and suggestions for future investigation. DOE

N86-23885# Sandia National Labs., Albuquerque, N. Mex.
RADIATIVE TRANSFER IN A SOLAR ABSORBING PARTICLE LADEN FLOW
W. G. Houf and R. Greif Nov. 1985 24 p Presented at the National Heat Transfer Conference, Denver, Colo., 4 Aug. 1985 Prepared in cooperation with California Univ., Berkeley
(Contract DE-AC04-76DR-00789)
(DE86-002840; SAND-84-8929; CONF-850810-31) Avail: NTIS HC A02/MF A01

A possible receiver configuration is a cavity in which a falling sheet of solid particles is directly irradiated by the concentrated solar flux passing through the aperture. Regardless of the particular geometry, the radiative transfer within the falling particle curtain must be studied in order to determine the net radiative heating rate for the particles. A discrete ordinate radiative transfer model has been developed to predict the radiative coupling within the falling particle curtain. The model determines how much energy is absorbed by the particles, how much is transmitted to the rear wall of the receiver, and determines the effects of particle scattering and thermal emission on the net radiation absorbed by the particles. The model accounts for the directional nature of the radiation field, particle scattering, and the wavelength dependence of the optical properties. The discrete ordinate model has been used to assess the influence of the pertinent radiation transfer parameters in determining the local and overall particle heating rates. The results of this study are discussed as well as the analysis. DOE

N86-23886# Oak Ridge Gaseous Diffusion Plant, Tenn.
FINITE ELEMENT ANALYSIS OF FLOW IN A GAS FILLED ROTATING ANNULUS
M. H. Berger Sep. 1985 31 p refs
(Contract DE-AC05-84OT-21400)
(DE86-004009; K/OA-5968) Avail: NTIS HC A03/MF A01

Linearized multidimensional flow in a gas centrifuge can be described away from the ends by Onsager's pancake equation. However, a rotating annulus results in a slightly different set of boundary conditions than the usual symmetry conditions at the axis of rotation. In this process the problem on an annulus becomes ill-posed and requires some special attention. We treat linear inner and outer rotor temperature distributions and velocity slip. An existence condition for a class of nontrivial, one-dimensional solutions is given. New exact solutions in the infinite bowl approximation have been derived containing terms that are important at finite gap width and nonvanishing velocity slip. The usual one-dimensional axially symmetric solution is obtained as a limit. Our previously reported finite element algorithm has been extended to treat this new class of problems. Effects of gap width, temperature, and slip conditions are illustrated. We report on the compressible, finite length, circular Couette flow for the first time. DOE

N86-23887# Aeritalia S.p.A., Torino (Italy). Gruppo Sistemi Spaziali.
HEAT REJECTION SYSTEM TECHNOLOGY DEMONSTRATION MODEL, PHASE 3 Final Report
L. Costamagna, P. Messidoro, P. Buratti, and F. Capolongo Paris ESA 14 Feb. 1985 99 p refs
(Contract ESTEC-5184/82-NL-AK(SC))
(TD-RP-AI-010; ESA-CR(P)-2130) Avail: NTIS HC A05/MF A01

A fluid loop radiator system to be used for environmental control of advanced spacecraft and/or payloads is discussed. A technology demonstration model (TDM) was built and tested in a vacuum chamber to verify its thermohydraulic performance and the achievement of the requirements previously defined. The model characteristics include Freon coolant at 8 bar loop pressure, automatic control capability, 60 days maximum mission duration, 1 side only radiating panel, 6 Kg weight per sq m, 200 min to 350 max Watt/sq m heat rejection at 40 C fluid inlet temperature, and 910 Kg/hr flow rate in coldest case. The performance test results are presented. Author (ESA)

N86-23888# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
FLUID PHYSICS INSTRUMENTATION STUDY. PART 1: SYSTEM ASPECTS Final Report
J. P. B. Vreeburg, R. H. Huijser, and A. A. M. Delil Paris ESA 18 Jan. 1985 154 p refs 4 Vol.
(Contracts ESA-5188/82-NL-HP(SC); NIVR-1050)
(NLR-TR-85017-L-Pt-1; ESA-CR(P)-2133-Vol-1) Avail: NTIS HC A08/MF A01

Diagnostic methods relevant to the investigation of fluid physics experiments in micro-g were assessed to select instrumentation for a multiuser facility. Many considerations, rooted in power, weight, safety, operation, etc., are shown to have an impact on instrument performance. An optical diagnosis system is defined. The only real limitation imposed on the system is the absence of a parallel illumination beam with a cross-section comparable to the size of the experiment volume. This feature is less important for the classes of problems represented by fluid physics. A diffusely illuminated experiment volume which is a necessary condition for the visualization of edge and gradient distributions was chosen. The system provides the flexibility to install a variety of diagnostic aids. It also offers the possibility to investigate phase objects by interferometry, with a field-of-view 1 sq cm. Since the interesting part of an object can, in most cases, be identified a priori, this restriction on field-of-view is not considered to be a major demerit. Author (ESA)

N86-23889# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
FLUID PHYSICS INSTRUMENTATION STUDY. PART 2: DESIGN REPORT Final Report
R. H. Huijser Paris ESA 28 Feb. 1985 132 p refs 4 Vol.
(Contracts ESA-5188/82-NL-HP(SC); NIVR-1050)
(NLR-TR-85017-L-Pt-2; ESA-CR(P)-2133-Vol-2) Avail: NTIS HC A07/MF A01

A proposed optical diagnostics instrument (PODI) for fluid physics studies in microgravity is described. Components to be used in a breadboard system for PODI are identified and performance predictions for this system are assessed. Photography (and photogrammetry) are used for the definition of positions (P)

within the field of view as related to the determination of locations, shapes, etc., of free liquid surfaces, bubbles, etc. Photography is executed in a diffusely illuminated environment, provided by a white light source and diffuser. Refractive index gradients are studied by observing the deflection of light beams participating in the imaging processes (object grating G1 on reference grating G2 and P on P') in a sharp focused Schlieren system. Grating G1 is diffusely back-illuminated by a white light source. Quantitative local diagnosis is achieved by determining optical path lengths by a system fitted with a Michelson interferometer. The system can be moved over the field of view of the main (wide field) optical system. It employs a laser light source and is provided with suitable relay optics in order to record the interferometric information by means of the (wide field) camera. Author (ESA)

N86-23890# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
FLUID PHYSICS INSTRUMENTATION STUDY. PART 3: BREADBOARD DESCRIPTION AND TEST RESULTS Final Report
D. vandenAssem Paris ESA 28 Feb. 1985 128 p Original contains color illustrations 4 Vol.
(Contracts ESA-5188/82-NL-HP(SC); NIVR-1050)
(NLR-TR-85017-L-Pt-3; ESA-CR(P)-2133-Vol-3) Avail: NTIS HC A07/MF A01

A breadboard of a proposed optical diagnostic instrument for fluid physics research in microgravity was built and tested. The influence of changes at subsystem level were investigated. Vignetting, resolution and distortion of the whole-field system; vignetting and resolution of the interferometer; diagnostic performance of the breadboard using a test experiment set-up (thermal plume); observation tests with a measurement problem, i.e., a block of Schlieren-free optical glass that simulates a class of fluid physics experiments; and instrument operation are described. Further research areas and hardware improvements are identified. Author (ESA)

N86-23891# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
FLUID PHYSICS INSTRUMENTATION STUDY. PART 4: EXECUTIVE SUMMARY, CONCLUSIONS AND RECOMMENDATIONS Final Report
J. P. B. Vreeburg Paris ESA 12 Mar. 1985 23 p refs 4 Vol.
(Contracts ESA-5188/82-NL-HP(SC); NIVR-1050)
(NLR-TR-85017-L-Pt-4; ESA-CR(P)-2133-Vol-4) Avail: NTIS HC A02/MF A01

A fluid physics instrumentation study was conducted to select a fluid physics diagnostic facility for research in microgravity. The study included identification and description of candidate investigative methods; the instrusiveness of measurement technique; and identification and description of representative physical problems for measurements in fluid physics. A breadboard model was built and tested. Author (ESA)

N86-23892# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
ON THE FREE CONVECTION PROFILE
M. Claussen and W. V. R. Malkus (MIT, Cambridge, Mass.) 24 Jul. 1985 12 p refs Presented at IAMAP/IAPSO Joint Assembly, Honolulu, Hawaii, 5-16 Aug. 1985
(GKSS-85/E/36; ISSN-0344-9629) Avail: NTIS HC A02/MF A01

The existence of z sup-1 and z sup -1/3 profiles (z being the distance from a boundary) of mean temperature, is examined using results from studies of mechanically similar cylindrical Couette flow. Extension of Malkus' theory leads to a z sup -1/3 boundary law for mean circulation, and to the possibility of a positive gradient on mean circulation in the interior, both features being observed in Couette flow experiments and for mean temperature in data of turbulent convection. It is suggested that these features are consequences of the three-dimensional structure of the mean flow. Author (ESA)

N86-23893# Karlsruhe Univ. (West Germany). Sonderforschungsbereich 210.
THE FLOW ABOUT AND DRAG BEHAVIOR OF WALLS IN TURBULENT BOUNDARY LAYER FLOWS
M. Rau, R. Friedrich, and E. Plate Sep. 1985 127 p refs In GERMAN
(KU-SFB-210/T/8) Avail: NTIS HC A07/MF A01

Wind tunnel investigations of the effect of a two-dimensional, flat plate in a turbulent boundary layer on the flow phenomena and flow forces are reviewed. The flow about a plate is described, and the approaches to calculate the velocity field of single partial domains are outlined. The method to determine drag coefficients is given. Author (ESA)

N86-23894# Karlsruhe Univ. (West Germany). Sonderforschungsbereich 210.
CALCULATION OF FLOW AND POLLUTANT DISPERSION IN MEANDERING CHANNELS
A. O. Demuren and W. Rodi Aug. 1985 50 p refs Sponsored by Deutsche Forschungsgemeinschaft
(KU-SFB-210/T/9) Avail: NTIS HC A03/MF A01

A mathematical model which takes full account of the three-dimensionality of the flow and pollutant concentration fields is presented. It is based on the solution of the momentum equations governing the flow, in the lateral, vertical, and longitudinal directions with a 3D numerical procedure along with the continuity equation. The turbulent stresses appearing in the momentum equations are calculated with a version of k-epsilon turbulence model that accounts for streamline curvature effects on turbulence. The pollutant concentration field is obtained from a solution to its transport equation. The model is tested by application to three different meanders for which velocity and concentration measurements are available, with channel width-to-depth ratios in the range 4 to 20, smooth and rough beds, and various pollutant-discharge locations. Comparisons of the velocity and concentration fields show good agreement. Author (ESA)

N86-23895# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE NUMERICAL COMPUTATION OF MULTI-PHASE FLOWS
D. Brian Spalding Aug. 1985 26 p refs Presented at Polymodel 8: Industrial Fluid Flow Computation Conference, Cleveland, England, 22 May 1985
(CFD/85/7) Avail: NTIS HC A03/MF A01

The mathematical problem of predicting multiphase flow phenomena by finite volume equations is reviewed. Features shared by multiphase and single phase flows are mentioned. The staggered grid system; terms in the balance equations; and interpolation are outlined. Solving for volume fractions, velocities, and pressures; and convergence are considered. Computer programs for multiphase flow, including PHOENICS, are discussed. Author (ESA)

N86-23896# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
APPLICATION OF VARIABLE-BLOCKAGE METHOD TO STEADY FLOWS OVER CURVED BEDS
Liu Jun Sep. 1985 50 p refs
(CFD/85/12) Avail: NTIS HC A03/MF A01

The variable blockage method of simulating flow problems with a free-surface is described. The method is based upon the fact that the surface pressure of water flow in open air is uniform, and the idea that the space occupied by the atmosphere can be numerically made inaccessible to the water by the setting of relevant blockage factors. Advantages of the method are its ability to predict steady free-surface problems and its easy application to nonpotential flows, i.e., to those which are not free of viscous effects. The method was applied to the prediction of steady flows over curved beds. Experimental verification of numerical free-surface form and bed-pressure profile validate the physical realism of the method. Although the method is only evaluated against experimental observation under the shallow flow condition, application to deep flow predictions may be found without introduction of any extra difficulties. The method is very easy to

use when the computer program is equipped with the ability to assign the blockage factors. Author (ESA)

N86-24364# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF COMPRESSED GAS ENERGY CONVERSION TO LASER RADIATION Abstract Only
V. V. Breyev and V. P. Panchenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 8 Transl. into ENGLISH from Teplofizika Vysokikh Temperatur (Moscow, USSR), v. 22, no. 6, Nov. - Dec. 1984 p 1196-1199 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24365# Joint Publications Research Service, Arlington, Va.
SHOCKWAVE PROPAGATION IN TRANSVERSE GLOW DISCHARGE PLASMA IN ARGON Abstract Only
I. V. Basargin and G. I. Mishin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 9 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 4, 26 Feb. 1985 p 209-214 Previously announced in IAA as A86-13886 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24366# Joint Publications Research Service, Arlington, Va.
THERMAL FEATURES OF SUPERSONIC GAS FLOW Abstract Only
G. Ye. Skvortsov and N. Yu. Vasilyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 10 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 230-232 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24367# Joint Publications Research Service, Arlington, Va.
INTERACTION OF GENERATORS WITH EXCITATION AND THE PROBLEM OF TURBULENCE Abstract Only
P. S. Landa and S. M. Perminov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 12 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Fizika (Tomak, USSR), v. 27, no. 11, Nov. 1984 p 22-25 Original language document was announced in IAA as A85-22457 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24368# Joint Publications Research Service, Arlington, Va.
A GROUP OF OPERATORS OCCURRING IN THE DYNAMICS OF A COMPRESSIBLE STRATIFIED FLUID Abstract Only
S. A. Gabov and K. S. Mamedov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 14 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 23-26 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24369# Joint Publications Research Service, Arlington, Va.
COMBUSTION IN TURBULENT BOUNDARY LAYER FOLLOWING SHOCK WAVE Abstract Only
I. N. Zvyeryev, M. I. Ramodanov, and T. V. Ramodanova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 16-17 Transl. into ENGLISH from Vestnik Moskovoskogo Univ. Seriya 1: Matematika, Mekhanika (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 52-55 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24516*# Tennessee Univ. Space Inst., Tullahoma.
LOW DENSITY GAS DYNAMIC WALL BOUNDARY CONDITIONS
Frank G. Collins *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20D

N86-24542*# Memphis State Univ., Tenn. Dept. of Mechanical Engineering.
TURBULENT FLOW FIELD PREDICTIONS IN SHARPLY CURVED TURN AROUND DUCTS
L. Michael Santi *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 38 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20D

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-23897 State Univ. of New York, Stony Brook.
PHOTORESIST HOLOGRAPHIC OPTICAL ELEMENTS ON A SPHERICAL SUBSTRATE FOR HIGH RESOLUTION LASER SCANNING APPLICATIONS Ph.D. Thesis
Weiwu Alex Kuo 1985 173 p
Avail: Univ. Microfilms Order No. DA8529798

Theoretical and experimental study of a new type of laser scanner, a holographic scanner recording on a spherical substrate using photoresist technology, is undertaken in this dissertation. A material well-suited for recording holographic scanners and mass producing holograms is photoresist, because it possesses high resolution, high efficiency, tough physical properties and replication capability. Little information is available in the literature concerning the experimental technique, which has to be carefully controlled for optimum results. The work reported here establishes the detailed characteristics of the Shipley AZ-1450J photoresist for the recording of holographic optical elements. The modulation depth has been modeled and experimentally studied as a function of the various relevant parameters. As currently utilized in a variety of tasks in sampling, scanning, digitizing or reconstructing information, classical laser scanners suffer from several disadvantages. Dissert. Abstr.

N86-23898 Rochester Univ., N. Y.
PARTICLE DISPLACEMENT AND VELOCITY MEASUREMENT USING HOLOGRAPHY Ph.D. Thesis
Philip Herbert Malyak 1985 233 p
Avail: Univ. Microfilms Order No. DA8528552

A method of measuring particle displacements and velocities in the transform plane of a double-exposure hologram is examined both theoretically and experimentally. The analysis begins with a study of the transform patterns obtained from single-exposure holograms. The Fourier transform patterns of double-exposure holograms are then examined, and it is shown that each pair of particles images related to translation contributes a set of osine fringes to the total diffraction pattern. The frequency and onentation of the fringes are related to the magnitude and direction, respectively, of a given particle's displacement or velocity. The transform patterns corresponding to 1- and 2-dimensional distributions of displacement are examined in detail. For the 1-dimensional case, a theoretical analysis indicates that the probability density function characterizes the distribution of displacements that may be determined by properly processing intensity data measured in the transform plane of a doubly exposed hologram. Dissert. Abstr.

N86-23899*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS AND FURNACE FOR CONTAINERLESS PROCESSING OF HIGH TEMPERATURE MATERIALS IN SPACE Patent Application

Michael B. Robinson and Lewis L. Lacy, inventors (to NASA) Filed 5 Dec. 1985 13 p
(NASA-Case-MFS-28087-1; NAS 1.71:MFS-28087-1;
US-Patent-Appl-SN-805010) Avail: NTIS HC A02/MF A01 CSCL 14B

The electron bombardment furnace consists of two confinement grid sections which may be moved and separated from each other. Inside the bombardment furnace, a tungsten element is enclosed. The material specimen is located within the tungsten element and grounded by means of grounded support wires connected to the respective sections of the furnace. The material specimen is supported on the ground wires and heated by electron bombardment until melt occurs. The furnace sections are separated in opposite directions causing the ground wires to pull from the surfaces of the specimen, leaving the specimen freely suspended in the process chamber without the action of external forces. The specimen remains in its melt condition in the processing chamber where it can be undercooled without external forces acting on the specimen, which would cause dynamic nucleation. NASA

N86-23900# Naval Health Research Center, San Diego, Calif.
CHRONIC SWINE INSTRUMENTATION TECHNIQUES UTILIZING THE GOR-REX PERITONEAL CATHETER Interim Report
C. C. Gray, F. C. White, R. P. Crisman, J. Wisniewski, and D. McKirnan May 1985 20 p
(AD-A162173; NAVHLTHRSCHC-85-16) Avail: NTIS
HC A02/MF A01 CSCL 06/16

The GORE-TEX peritoneal catheter interface is an effective skin interface device for many types of instrumentation in the swine. When properly utilized, the interface allows the development of a stable and effective biological seal which will reduce or eliminate sinus tract formation and resultant systemic infection. The interface is suitable for running any wire or catheter (up to about 2.5mm diameter) through the integument of the animal, thus increasing the possibilities for chronic instrumentation while maintaining a healthy animal. The lack of evidence of any growth phenomenon acting to extrude the interface segment, similar to that observed using other synthetic materials, and the superior biological seal which the interface develops, may allow many chronic studies which were previously not feasible. Using special catheter adapter stubs and an intermittent infusion plug, a sterile, sealed catheter system has decreased the possibilities for introducing pathogens while allowing ready access to the blood stream. Detailed descriptions of surgical implantation techniques and catheter set up and maintenance techniques are included. GRA

N86-23901# Department of the Navy, Washington, D. C.
AN APPARATUS FOR AND A METHOD OF MEASURING MAGNETIC EFFECTS DUE TO EDDY CURRENTS Patent Application
Paul B. Tarr, inventor (to Navy) Filed 24 Jun. 1985 21 p
(AD-D012061; US-Patent-Appl-SN-748376) Avail: NTIS
HC A02/MF A01 CSCL 14/2

An eddy current effects measurement apparatus employs, inter alia, a reference sensor located so that it measures an applied field and any environmental fields but does not measure eddy current effects. Then an estimate(s) of the applied field at the locus of a plurality of measurement sensors is constructed and stored. Next, a conductive object or material to be measured is placed in the applied field in the vicinity of the plurality of measurement sensors away from the reference sensor and measurements are made of the applied field, any environmental fields and any fields due to the effects of eddy currents induced into the conductive object or material. Finally, the aforementioned stored estimate(s) are used to compensate the applied field at the locus of the plurality of measurement sensors so that the eddy current effects due to the placement of the conductive object or material can be observed on a keyboard/display or printed via a printer/plotter. GRA

N86-23902# Department of the Navy, Washington, D. C.
COMBUSTOR FIBERSCOPE Patent Application
W. W. Morey and E. Snitzer, inventors (to Navy) Filed 6 Sep. 1985 14 p
(AD-D012063; US-Patent-Appl-SN-773276) Avail: NTIS
HC A02/MF A01 CSCL 14/2

A fiberscope of the viewing of the interior of an operating engine combustor is provided with a fused coherent fiber bundle as an image conduit to transmit the image of said interior through the wall of the combustor. Illumination may be provided through the use of a second optical fiber or bundle and a coherent light source aligned with the image conduit. GRA

N86-23903# Department of the Navy, Washington, D. C.
THERMALLY BUFFERED SODIUM-NEON LASER TARGET FOR COHERENT X-RAY PRODUCTION Patent Application
Frederick Cochran, Jack Davis, and John Apruzese, inventors (to Navy) Filed 2 Dec. 1985 22 p
(AD-D012070; US-Patent-Appl-SN-795795) Avail: NTIS
HC A02/MF A01 CSCL 14/2

Objects of this patent application include: generating coherent X-rays; using Na and Ne to produce X-rays; and providing a thermal buffer between Na and Ne to prevent the Na from heating and overionizing the Ne and precluding the generation of coherent X-rays. These and other objects are accomplished with an apparatus for generating coherent X-rays comprising: an Na layer; a Ne layer; a thermal transparent buffer layer located between and in contact with the Na layer and the Ne layer; a lower power laser to heat the Ne layer; and a higher power laser to heat the Na layer. GRA

N86-23904# Lawrence Livermore National Lab., Calif.
FIBER OPTICS TEMPERATURE AND PRESSURE PROBE Progress Report, 1984 - 1985
G. Haugen and T. Hirschfeld Oct. 1985 74 p
(Contract W-7405-eng-48)
(DE86-002379; UCID-20563) Avail: NTIS HC A04/MF A01

The feasibility of remote sensing of pressure in a hostile or inaccessible environment using a single fiber and a spectroscopic sensor is described. This type of system is immune to electromagnetic noise, low in cost, rugged, and has a sensing volume of less than 4 x 10 to the -6 power/cm cu. In particular, a ruby crystal was evaluated as an optical fiber-spectroscopic sensor for pressure, because ruby has been used as a hydrostatic pressure sensor in gasketted diamond anvil cells. It is anticipated that remote pressure measurements will be non-isothermal in contrast to the isothermal diamond anvil pressure measurements. Since the coefficients of linear compression are isotropic and the thermal coefficients are anisotropic, this suggests that a ruby sensor could measure both temperature and pressure. This article examines the practicality of using a ruby sensor as a non-isothermal pressure sensor. The design criteria for an optical-fiber/ruby-sensor fluorometer was critically characterized. DOE

N86-23905# Los Alamos National Lab., N. Mex.
INSTRUMENTATION TECHNIQUES FOR MONITORING SHOCK AND DETONATION WAVES
R. D. Dick and R. L. Parrish 1985 9 p refs Presented at the Society of Experimental Mechanics Fall Conference, Grenelefs, Fla., 17 Nov. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract W-7405-eng-36)
(DE86-002388; LA-UR-85-3521; CONF-8511106-2) Avail: NTIS
HC A02/MF A01

CORRTEX (Continuous Reflectometry for Radius Versus Time Experiments), SLIFER (Shorted Location Indication by Frequency of Electrical Resonance), and pin probes were used to monitor several conditions of blasting such as the detonation velocity of the explosive, the functioning of the stemming column confining the explosive, and rock mass motion. CORRTEX is a passive device that employs time-domain reflectometry to interrogate the two-way transit time of a coaxial cable. SLIFER is an active device that monitors the changing frequency resulting from a change in length of a coaxial cable forming an element of an oscillator circuit. Pin probes in this application consist of RG-174 coaxial cables,

each with an open circuit, placed at several known locations within the material. Each cable is connected to a pulse-forming network and a voltage source. When the cables are shorted by the advancing wave, time-distance data are produced from which a velocity can be computed. Each technique, installation of the gauge, examples of the signals, and interpretation of the records are described. DOE

N86-23906# Los Alamos National Lab., N. Mex.
HIGH RANGE GAMMA RADIATION METER
W. Baird, G. O. Bjarke, and Y. Eisen 1985 8 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002413; LA-UR-85-3663; CONF-851009-2) Avail: NTIS HC A02/MF A01

A low power meter has been constructed and tested to measure gamma fields from .1 R/hr to 1500 R/hr over the energy range of 60 keV to 1.2 MeV. The portable, battery-powered meter consists of a local display unit and remote probe. The display unit indicates gamma intensities via a 4-1/2 digit liquid crystal display (LCD) and a 50-segment bargraph LCD. DOE

N86-23907# Los Alamos National Lab., N. Mex.
SOLID STATE DIRECTIONAL GAMMA DETECTOR
W. Baird, W. P. Unruh, G. O. Bjarke, and P. K. Beauchamp 1985 11 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002414; LA-UR-85-3643; CONF-851009-4) Avail: NTIS HC A02/MF A01

A solid-state gamma-ray detector has been developed which exhibits directionality. Four PIN diode detectors are backed with Pb and arranged in a square array which exhibits an angular response to gamma rays. The high-Z material provides directionality and also enhances the sensitivity of the detectors to high-energy gammas by means of the X-ray fluorescence accompanying photon interactions in the backing. The array responses are used to identify the quadrant containing the source and obtain the radiation level. Ratios of the counting rates in opposite pairs of detectors are used to determine the angular position of the source within the quadrant. DOE

N86-23908# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
ONLINE FIBER-OPTIC PHOTOMETER
D. R. VanHare, W. S. Prather, D. A. Boyce, and W. A. Spencer 1985 17 p Presented at the Du Pont Process Analytical Symposium, Wilmington, Del., 16 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-003142; DP-MS-85-127; CONF-8510178-2) Avail: NTIS HC A02/MF A01

The development and implementation of a fiber-optic photometer for process control at the Savannah River Plant (SRP) will be discussed. The instrument is a modified Du Pont 400 photometric analyzer which incorporates quartz fiber-optic cables, a high-intensity tungsten-halogen lamp source, and a sight glass with sealed optics. Six of these photometers have been installed at SRP to monitor the elution of neptunium or plutonium from anion exchange columns. The fiber optics allow the instrument to be located 50 feet from the sight glass, which is in a highly radioactive area. This ensures easy access to the instrument and minimizes radiation exposure to personnel. The modifications to the analyzer and its application to process control will be presented. DOE

N86-23909# Los Alamos National Lab., N. Mex.
RADIATION MONITOR FOR SURVEILLANCE OF MOVING VEHICLES
R. F. Dvorak Sep. 1985 18 p
(Contract W-7405-eng-36)
(DE86-003287; LA-10446-MS) Avail: NTIS HC A02/MF A01

A radiation monitor has been developed that will scan each vehicle leaving the Clinton P. Anderson Los Alamos Meson Physics Facility site. If an increase in radiation level is sensed, an alarm light and a Klaxon horn are activated, inviting the driver to return to the Health Physics office for check. A photograph showing the vehicle license number is also taken. A radiation source that doubles the detector count rate when stationary will cause an alarm at vehicle speeds up to about 24 km/h (15 mph). The technique used to prevent false alarms because of radiations from nearby buildings or from plumes of low-level radioactive gas is described. DOE

N86-23910# Mound Lab., Miamisburg, Ohio.
DESIGN, DEVELOPMENT AND APPLICATION OF A THERMAL ANALYSIS MASS SPECTROMETER
R. O. Yelton, T. L. Shell, and D. M. Colman 30 Sep. 1985 6 p
(Contract DE-AC04-76DP-00053)
(DE86-003746; MLM-3295) Avail: NTIS HC A02/MF A01

To supplement the information that can be obtained with differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA), a thermal analysis mass spectrometer system has been developed. In this system, instruments for DSC and TGA are interfaced to a computer-controlled quadrupole mass spectrometer. Configured from traditional equipment modified for this use plus an IBM personal computer, the thermal analysis mass spectrometer provides a new capability in that gaseous by-products can be identified while the parent materials, such as plastics and energetic materials, are undergoing thermal analysis. DOE

N86-23911# Farran Research Associates, (Ireland).
SUB-MILLIMETER (FAR IR) HETERODYNE SPECTROMETER (DEMONSTRATION MODEL) Final Report
W. M. Kelly, S. U. Lidholm, G. T. Wrixon, J. Coughlan, E. Redmond, T. Murphy, and B. OSullivan Paris ESA Jun. 1985 50 p
(Contract ESTEC-5499/83-NL-PP)
(FTL-068519; ESA-CR(P)-2119) Avail: NTIS HC A03/MF A01

Submillimeter heterodyne receiver measurement results of the lower frequency band, 330 to 378 GHz, where the lowest receiver noise temperature (TMXR) = 6000K and conversion loss (LMXR) = 11dB are given. Measurement results of the higher frequency band, 400 to 462 GHz, are given where TMXR = 19400K (DSB) at fLO = 462 GHz and DSB mixer noise temperature = 13200K, and LMXR = 17.1dB. The methods used in measuring the receiver noise temperature, mixer conversion losses, and mixer noise temperatures are outlined. Phase lock loop performance is discussed. Receiver measurements indicate that further alignement of the receiver is required, which is non trivial due to the complexity of the optics. This could reduce the coupling loss by 3dB, resulting in a DSB receiver noise temperature of 4500K at 365 GHz (TMXR = 3000K and LMXR = 8dB) and a noise temperature of 9700K at 465 GHz (TMXR = 6600 and LMXR = 14dB). Author (ESA)

N86-23912# Max-Planck-Inst. fuer Quantenoptik, Munich (West Germany).
PLANS FOR A LARGE GRAVITATIONAL WAVE ANTENNA IN GERMANY
Walter Winkler, Karl Maischberger, Albrecht Ruediger, Roland Schilling, Lise Schnupp, and David Hoemaker Aug. 1985 14 p refs Presented at 4th Marcel Grossmann Meeting, Rome, Italy, Jun. 1985
(MPQ-101) Avail: NTIS HC A02/MF A01

A gravitational wave antenna design is outlined. Arms 3 km in length are proposed, as a tradeoff between cost and the influence of thermal mirror motion. Tunnels, completely or partly below the surface, are to house the vacuum tubes. Besides the standard single 90 deg interferometer, a redundant triangular configuration consisting of three 60 deg interferometers is considered. The size of the mirrors depends on the choice between delay lines and Fabry-Perot cavities. A set of relatively large mirrors is to be manufactured and tested. Components for light modulation and guiding need research. Light power enhancing techniques (injection locking, recycling) are to be investigated. Improved frequency stabilization is to be developed, and phase modulation of the laser light (to reduce noise due to scattered light) is to be tried. Author (ESA)

N86-23913# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-K.
TIMING APPARATUS [TIMING APPARATUUR]
P. Timmer 2 Nov. 1985 17 p refs In DUTCH
(LINO-124) Avail: NTIS HC A02/MF A01

The apparatus required for bundle-synchronous timing is described.. Bundle-synchronous timing signals are used along accelerators and in experimental stations. The apparatus consists of a trigger modulator, a trigger detector, a delayed pulse generator, and a pulse output module. The excitation and detection of bundle-synchronous triggers, and the pulse output module are described. The trigger network, including modulator and detector, is explained. Author (ESA)

N86-23914# Agricultural Research Service, Beltsville, Md.
EXPERIMENTAL DELAYED-LIGHT-EMISSION METER FOR HORTICULTURAL CROPS
W. R. Forbus, G. A. Hardigree, and J. H. Adams Sep. 1985 13 p
(PB86-110079; ARS-41) Avail: NTIS HC A02/MF A01 CSCL 02D

Equipment for measuring the delayed light emission (DLE) from horticultural crops was developed for use in a long-range study to determine the feasibility of sorting different fruits and vegetables according to maturity by measuring the light emitted from them several seconds after illumination by a controlled light source. Preliminary tests with tomatoes showed that the magnitude of detector response to DLE decreased during apparent ripening as indicated by an increase in red color. GRA

N86-23764# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED HOLOGRAM CAMERA DEVELOPED Abstract Only
In its China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 120 Transl. into ENGLISH from Xinhua (Beijing, China), 12 Dec. 1985 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

N86-23765# Joint Publications Research Service, Arlington, Va.
STUDY ON NORMALIZATION OF INSTRUMENT FOR MEASURING MODULATED TRANSFER FUNCTION IN INFRARED RANGE AT ZERO SPATIAL FREQUENCY Abstract Only
Zhuoxiang Feng and Zhongben Liu *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 131-132 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), vol. 4, no. 5, Oct. 1985 p 335-340 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

N86-23775# Joint Publications Research Service, Arlington, Va.
TRENDS IN TACTILE BIOSENSORS, SMELL-SENSITIVE BIOSENSORS
Kohei Higuchi, Yoshie Kawana, and Jun Kimura *In its* Japan Report: Science and Technology (JPRS-JST-86-007) 25 Mar. 1986 p 6-17 Transl. into ENGLISH from Bio Industry (Tokyo, Japan), Dec. 1985 p 38-45 (For primary document see N86-23773 14-31)
Avail: NTIS HC A04/MF A01

N86-23836# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
CHARACTERIZATION OF WAVEFORM RECORDERS
Donald R. Flach *In its* Digital Methods in Waveform Metrology Oct. 1985 p 31-53 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 14C

N86-24518*# Oregon Univ., Eugene. Inst. of Theoretical Science.
CALCULATIONS ON THE PRODUCTION AND USE OF SUPERFINE HOLOGRAPHIC X-RAY GRATINGS FOR ASTROPHYSICAL OBSERVATIONS
Paul L. Csonka *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 14 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04

N86-24545*# California Univ., San Diego. Center for Astrophysics and Space Science.
AUTOMATED CALIBRATION OF A FLIGHT PARTICLE SPECTROMETER
Roy B. Torbert *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 18 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-23915 California Univ., Santa Barbara.
CLASSICAL AND QUANTUM APPROACHES TO THE FREE ELECTRON LASER Ph.D. Thesis
Piermario Bosco 1985 133 p
Avail: Univ. Microfilms Order No. DA8528603

The classical spontaneous emission from relativistic electrons injected into conventional and tapered free electron lasers undulators is investigated both theoretically, by solving the relative equations of motion, and numerically, using the obtained results. The evolution of the optical field in the undulator's cavity is analyzed both quantum mechanically, by solving perturbatively the Dirac equation in the laboratory frame and the Schrodinger equation in a realtivistic moving frame. The classical aspect of the results obtained is emphasized. The evolution of the fields is then studied classically for electron beams with a realistic energy and angular spread. The relative gain formulas are then derived and compared to the formula found both classically and quantum-mechanically. Dissert. Abstr.

N86-23916 Deutsche Geodaetische Kommission, Munich (West Germany).
SYSTEMS ANALYSIS OF LASER RANGEFINDING Ph.D. Thesis - Tech. Univ. Munich, West Germany
Dieter Egger Bayerischen Akademie der Wissenschaften 1985 163 p refs In GERMAN; ENGLISH summary
(Ser-C-311; ISBN-3-7696-9361-2; ISSN-0065-5325) Copyright.
Avail: Issuing Activity

Rangefinding by measuring round-trip travel times of laser pulses was studied using a systems analysis approach. A detailed model of the measurement process was developed and implemented on a mainframe computer. Ranging to LAGEOS, STARLETTE and GEOS-3, to the Moon, and to a terrestrial target were simulated. Simulation of laser ranging provides estimates of corrections to travel times due to the atmosphere, reflector array, trigger etc., as well as their statistical confidence. Arbitrary variants of components and variations of parameter settings of the measurement system (e.g., laser, telescope, trigger, satellite) can be examined, in particular those which are not yet technically realized. Author (ESA)

N86-23917# Iowa Univ., Iowa City.
A LASER TRAP FOR NEUTRAL ATOMS Annual Report, 15 Nov. 1984 - 14 Nov. 1985
William C. Stwalley 12 Nov. 1985 18 p
(Contract N00014-83-K-0646)
(AD-A161834; IATRAP-85-1) Avail: NTIS HC A02/MF A01 CSCL 20/7

A laser trap for neutral atoms, initially potassium (K) is constructed. At low densities, such a trap could be used to address a number of fundamental questions, e.g., the interaction of an individual atom with an electromagnetic field, collision dynamics and recombination. The feasibility and limitations of a purely laser trap concept, a corner cube trap, are studied for trapping neutral K atoms. The confinement of the atoms in the two dimensions perpendicular to the laser will be provided in the cavity of a high

power alexandrite laser operating in the doughnut mode tuned slightly to the blue side of the 4s 2S1/2 to 2P3 resonance line of the K atom. This trap concept employs not laser cooling, but rather counterstreaming 4He atoms which are cooled to about 1.5 K, to drastically cool the K atoms to thermal energies well below the trap depth (expected to be about 10 K). K atoms can be lost to the trap if they are multiphoton ionized, if they are heated by absorption and emission of many photons (recoil or diffusional heating), if they simply have much higher energy than the vast majority of other atoms at 1.5 K, or if they recombine with He atoms to form KHe (or KHe2, etc.). GRA

N86-23918# Dartmouth Coll., Hanover, N.H.
A RAMAN FEL (FREE ELECTRON LASER) AT 2mm WAVELENGTH. DESIGN OF AN EFFICIENCY-ENHANCED RAMAN FEL OSCILLATOR Annual Technical Summary and Status Report, Oct. 1984 - Oct. 1985
J. Masud, F. G. Yee, T. C. Marshall, and S. P. Schlesinger Oct. 1985 36 p
(Contract N00014-79-C-0760)
(AD-A161955) Avail: NTIS HC A03/MF A01 CSCL 20/5

The nonlinear physics of the free electron laser (FEL) involves waves set up in a nearly cold electron beam when it passes through the undulator. In addition to the pump field and the growing scattered EM wave moving parallel to the electrons, there is a disturbance in the beam space charge caused by the ponderomotive force. In this paper we discuss initial experimentation using a simple Raman oscillator and amplifier. The purpose of the oscillator is to define initially the regions of substantial gain by observing the emission wavelength. Following this, the gain is observed in and amplifier configuration, using a CO sub 2 laser pumping an NH sub 3 gaseous laser at 140 GHz (2.14mm). GRA

N86-23919# Maryland Univ., College Park. Dept. of Electrical Engineering.
STUDY OF COLD-CATHODE AND RF-EXCITATION FOR LOW POWER CO2 WAVEGUIDE LASERS Final Report
U. Hochuli Oct. 1985 35 p
(Contract N00014-79-C-0312; RR0-1107)
(AD-A162037) Avail: NTIS HC A03/MF A01 CSCL 20/5

Initial results indicate that transversely RF excited 2W CW CO2 waveguide lasers can be built to last in excess of 10000 hours. This result has been achieved with either internal electrodes or capacitive wall coupling and with either CO-or N2-bearing gas mixtures. On-off switching seems to be quite well tolerated. RF conductance and starting voltage measurements for six different gas mixtures and four pressure parameters are given. GRA

N86-23920# LTV Aerospace and Defense Co., Dallas, Tex. Missiles and Advanced Programs Div.
PHOTON AVALANCHE LASER IMPROVEMENT PROGRAM Final Report, Nov. 1983 - Nov. 1984
M. E. Koch Dec. 1984 73 p
(Contract N00014-84-C-2019; ARPA Order 4320)
(AD-A162100; Rept-3-32300/5CR-9; R-93000/3P-4) Avail: NTIS HC A04/MF A01 CSCL 20/5

The main thrust of this program was to increase the output power and efficiency of a photon avalanche laser demonstrated in an earlier and related program. However, material problems plagued the effort from the outset. Identification and solution of these problems has led to an enormous increase in production yield of Pr doped LaCl3 laser crystals as well as the discovery of a contaminate which needs to be eliminated in future work. Overall, an increase in laser power output has not achieved, but new insights may lead to large payoffs in the near future. GRA

N86-23921# Rockwell International Science Center, Thousand Oaks, Calif.
LASER EVAPORATION STUDIES Annual Report, 1 Sep. 1984 - 30 Jun. 1984
H. Sankur Jul. 1985 41 p
(Contract F49620-84-C-0091)
(AD-A162346; SC5411.2AR; AFOSR-85-0992TR; AR-1) Avail: NTIS HC A03/MF A01 CSCL 20/6

The use of a pulsed laser to evaporate dielectric materials for optical thin film depoeition was investigated. Studies were performed to analyze the species present in the evaporant plume generated by a 1.5 Joule TEA-CO2 laser. the materials investigated were Al2O3, SiO2, ZnO, PbF2, TiO2, and HfO2. Experiments were performed in a cryopumped system with a base pressure of 10 to the 8th power torr. The evaporant plume was characterized using luminescence spectroscopy, mass spectroscopy, and ion current analysis. Luminescence studies indicated the existence of excited state neutrals and singly, doubly and triply ionized species. Plasma electron temperatures of 6500 K were deduced from a study of neutrals in the plumes of SiO2 and Al2O3. Molecular species were found in significant concentrations only for higher (.001 torr) residual gas pressures. Ion current analysis demonstrated the existence of several species for each compound, each with different velocities. Velocities of 15 million cm/sec indicated very high kinetic energies for the ionized species. In the following phase of the program, the effects of excited state and energetic species on thin film growth will be investigated. GRA

N86-23922# Stanford Univ., Calif. Lab. of Physics.
DIODE PUMPED FIBER LASER Interim Report, 1 Sep. 1983 - 2 Jul. 1984
Cel Gaeta and Michel Digonnet Dec. 1984 101 p
(Contract F33615-82-C-1749)
(AD-A163106; GL-3756; AFWAL-TR-84-1159) Avail: NTIS HC A06/MF A01 CSCL 20/5

Work conducted in the area of single crystal fiber optical devices is described. Miniature Nd:YAG 1.32 micron lasers were fabricated using both free space (unguided) and single crystal fiber configurations. Bulk lasers with thresholds as low as 19 mw and near optimum slope efficiencies of 36% were demonstrated. Several guided fiber lasers were also successfully brought to oscillation. The best device has a threshold of 12 mw, a slope efficiency of 22%, and a maximum recorded output power at 1.32 micrometers of 22 mw. Fiber scattering properties inferred from these measurements indicate that the crystal fiber used in this work exhibit a much higher quality than the fibers used in earlier phases of this work as a result of improved growth conditions. A theoretical investigation of 1.32 micrometers optically-pumped lasers was also developed for interpretation of experimental data. A feasibility study of Q-switched fiber lasers operating near lambda = 1.06 micrometers was also conducted. Theoretical expressions for the laser output peak power, pulse width and energy were cast in a simple form by implementing the formalism of normalized mode overlap coefficient introduced earlier in this work. Peak powers on the order of 100 to 500 watts and pulse widths of a few nanoseconds are anticipated for fiber lasers were also reviewed and compared to provide a recommended guideline for future laser work. GRA

N86-23923# Los Alamos National Lab., N. Mex.
COMPARISON OF THE RESULTS OF THEORETICAL CALCULATIONS WITH EXPERIMENTAL MEASUREMENTS FROM THE LOS ALAMOS FREE-ELECTRON LASER OSCILLATOR EXPERIMENT
J. C. Goldstein, B. E. Newnam, R. W. Warren, and R. L. Sheffield 1985 34 p Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002382; LA-UR-85-3556; CONF-850956-4) Avail: NTIS HC A03/MF A01

A comparison between some of the measurements made with a uniform wiggler during the Los Alamos free-electron laser oscillator experiment and the results of one-dimensional pulse propagation calculations using the mathematical model of Colson and Ride will be presented. Small-signal gain data will be discussed. Calculated output power vs. optical resonator length will be compared with data. Time-integrated optical spectral data, which show clear evidence for Raman sidebands, will be compared with calculated spectra as a function of resonator length. The calculated electron energy distribution function, using the measured electron-

beam micropulse shape, and the associated extraction efficiency will be compared with measurements. DOE

N86-23924# Los Alamos National Lab., N. Mex.
STATUS OF THE LOS ALAMOS FREE-ELECTRON LASER
J. M. Watson 1985 9 p Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-003656; LA-UR-85-4071; CONF-850956-15) Avail: NTIS HC A02/MF A01

Since the initial oscillator experiments were completed last year, the Los Alamos FEL has undergone some major modifications and additions in preparation for the next set of experiments. The laser performance is projected to be substantially enhanced, the rf energy-recovery technique will be demonstrated, and FEL physics measurements will be expanded. The accelerator is now being tuned with very promising performance. The above experiments will be completed during the next year. DOE

N86-23925# Los Alamos National Lab., N. Mex.
KINETICS OF PROPOSED GAMMA-RAY LASERS
G. C. Baldwin 1985 14 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003682; LA-UR-85-3957; CONF-851053-6) Avail: NTIS HC A02/MF A01

Gamma-ray lasers, although proposed for many years, remain undeveloped because pumping can destroy conditions essential for gain. We review many of the solutions (viz, narrowed-line, explosive neutron pump, two-stage pump, two-step pump) proposed so far, with emphasis on kinetics. The most promising approach requires fast interlevel transfer from a separated isomer to initiate a superradiant Bormann mode in a solid host. However, suitable nuclear transitions and nondestructive transfer mechanisms have yet to be identified. DOE

N86-23926# California Univ., Berkeley. Lawrence Berkeley Lab.
SOME CONCEPTS TO IMPROVE THE PERFORMANCE OF dc ELECTROMAGNETIC WIGGLERS
K. Halbach Oct. 1985 22 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002956; LBL-20502; CONF-850956-17) Avail: NTIS HC A02/MF A01

Electromagnetic wigglers have serious performance limitations when the period needs to be small. After a discussion of the nature of these limitations, some concepts will be described that lead to dc electromagnetic wigglers with improved performance. This is accomplished by a better choice of the geometrical arrangement of the soft iron and the coils, and by judicious use of permanent magnet material. DOE

N86-23927# North Carolina Univ., Asheville. Dept. of Physics.
DITHER-FREE STABILIZATION OF CO2 LASERS FOR FAR INFRARED PUMPING: A PHOTOACOUSTIC APPROACH
C. A. Bennett, Jr. and D. P. Hutchinson 1985 3 p Presented at the International Conference on Infrared and Millimeter Waves, Lake Buena Vista, Fla., 8 Dec. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-003006; CONF-851238-3) Avail: NTIS HC A02/MF A01

A method based on the photoacoustic technique is described for dither-free frequency stabilization of the optical pump in a CH3OH laser operating at 119 (MU)m. Heterodyne measurements on two independently locked FIR lasers indicate excellent long-term frequency and power stability. This stabilization scheme should be applicable to all optically pumped FIR lasants. DOE

N86-23928# Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
LASER-INDUCED FLUORESCENCE OF EUROPIUM-DOPED YTTRIUM OXIDE FOR REMOTE HIGH-TEMPERATURE THERMOMETRY
M. R. Cates, S. W. Allison, L. A. Franks, H. M. Borella, B. R. Marshall, and B. W. Noel 1985 6 p Presented at the ICALEO International Congress on the Applications of Lasers and Electro-optics, San Francisco, Calif., 11 Nov. 1985 Prepared in cooperation with EG and G Energy Measurements, Inc., Goleta, Calif.; Los Alamos National Lab., N. Mex.
(Contract DE-AC08-83NV-10282)
(DE86-003028; EGG-10282-2083; CONF-8511103-3) Avail: NTIS HC A02/MF A01

The refractory, Y2O3, doped with Eu, is suitable for high-temperature surface thermometry when activated by a UV laser. The 612-nm fluorescence lifetime has a logarithmic dependence with temperature from about 700(0)C to beyond 930(0)C. Many applications are possible, with specific emphasis on rapidly rotating turbine components operating at high temperatures. DOE

N86-23929# Max-Planck-Inst. fuer Quantenoptik, Munich (West Germany).
PROGRESS WITH THE GARCHING (WEST GERMANY) 30 METER PROTOTYPE FOR A GRAVITATIONAL WAVE DETECTOR
David Shoemaker, Walter Winkler, Karl Maischberger, Albrecht Ruediger, Roland Schilling, and Lise Schnupp Aug. 1985 13 p refs Presented at 4th Marcel Grossmann Meeting, Rome, Italy, Jun. 1985
(MPQ-100) Avail: NTIS HC A02/MF A01

Mechanical noise, thermally or seismically driven, in a 30 m gravitational wave detector was considerably reduced by separate (extremely simple) suspensions for the two near mirrors and the beam splitter. Fluctuations in laser beam geometry were efficiently reduced by using a single-mode fiber that ends in the vacuum on a (separately suspended) beam-steering block. Laser frequency stabilization was considerably improved in a second control loop, using the total optical path in the interferometer as reference. The interferometer was operated with 50 and 110 beams in the delay line (optical paths of 1.5 and 3.3 km, respectively). From 500 Hz to 6kHz, the noise measured is close to the shot noise for the 100 mW of available light power. Resonance peaks around 10 kHz were identified as being due to the Pockels cell mounting. From 1 kHz downward, a gradual increase in noise is observed, the origin of which is not known. Improvements in the isolation from ground noise and increases in light power will help to identify the sources of the remaining excess noise. Author (ESA)

N86-24372# Joint Publications Research Service, Arlington, Va.
WORK ON FEMTOSECOND LASERS AT VILNYUS UNIVERSITY VIEWED Abstract Only
Algis Piskarskas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 27 Transl. into ENGLISH from KomsomolskayaPravda (Moscow, USSR), no. 1, 1 Jan. 1985 p 1 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24373# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF CHARACTERISTICS OF CO-2 WAVEGUIDE LASER Abstract Only
Yu. B. Konev, N. I. Lipatov, P. P. Pashinin, and A. M. Prokhorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 30 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), no. 44 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24374# Joint Publications Research Service, Arlington, Va.
LASER WITH DYNAMIC DISTRIBUTED FEEDBACK FORMED BY COUNTER-PROPAGATING PUMPING BEAMS Abstract Only
M. V. Bondar, L. V. Vovk, Ya. I. Zabello, and Ye. A. Tikhonov *In its* USSR Report: Physics and Mathematics (JPRS-PUM-86-004) 7 Feb. 1986 p 31 Transl. into ENGLISH from Ukrainskiy Fizicheskiy Zhurnal (Kiev, USSR), v. 29, no. 7, 1984 p 988-993

For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24375# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF GEOMETRY OF ACTIVE ELEMENT ON RADIATION PARAMETERS OF GAS-DISCHARGE LASERS Abstract Only
V. Ye. Privalov and Ye. G. Chulyayeva *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 34 Transl. into ENGLISH from Optika I Spektroskopiya (Leningrad, USSR), v. 57, no. 6, Dec. 1984 p 1056-1059 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24376# Joint Publications Research Service, Arlington, Va.
BLEACHING OF COLOR CENTERS IN NEODYMIUM GLASS LASER Abstract Only
M. I. Dzhibladzye, G. G. Mshvelidzye, R. R. Erikashvili, and Z. G. Esiashvili *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 36 Transl. into ENGLISH from Soobshcheniya Akademii Nauk Gruzinskoy SSR (Tbilisi, USSR), v. 115, no. 2, Aug. 1985 p 265-268 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24377# Joint Publications Research Service, Arlington, Va.
THRESHOLD CONDITIONS FOR IGNITION AND PROPAGATION OF OPTICAL DISCHARGE IN NEODYMIUM LASER BEAM Abstract Only
I. A. Bufetov, A. M. Prokhorov, V. B. Fedorov, and V. K. Fomin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 38 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 96-102 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-23930 California Univ., Berkeley.
DESIGN OF EXTERNALLY PRESSURIZED GAS BEARINGS FOR DYNAMIC APPLICATIONS Ph.D. Thesis
Jeffrey William Roblee 1985 209 p
Avail: Univ. Microfilms Order No. DA8525106

The dynamic stiffness of gas bearings over a broad frequency range was predicted and show that externally pressurized gas bearings can exhibit significant damping when properly designed. A new hybrid model of the dynamic stiffness of externally pressurized gas bearings is developed that incorporates the dominant distributed parameter characteristics of the bearing. This is accomplished by extending the analysis of squeeze films to include time-dependent-pressure boundary conditions and by linearly approximating the nonlinear frequency dependence of the flowrate and load solutions, including the geometry of the film. A dimensionless formulation of the model isolates the dominant bearing parameters to the extent possible and facilitates the dynamic analysis of thrust bearings with a large interior region. The model is validated by numerical analyses and by experiments. The hybrid model of dynamic stiffness is more accurate than a lumped parameter model over a wide frequency range, and it maintains a linear frequency dependence, which eases bearing design. Dissert. Abstr.

N86-23931 Princeton Univ., N. J.
THE DYNAMICS OF DRY FRICTION DAMPED SYSTEMS Ph.D. Thesis
Aldo Anthony Ferri 1985 246 p
Avail: Univ. Microfilms Order No. DA8529034

Dry friction damping has received considerable interest from the designers of turbomachinery and aerospace structures as a means of suppressing free vibration, limiting structure response to forced excitation and improving the stability of potentially unstable systems. Several types of dry friction damped systems are considered. Single and multiple-degree-of-freedom systems under harmonic excitation are studied analytically using traditional, one harmonic techniques and nontraditional, multiharmonic techniques. Results are compared with time integration results and with experimental results. It is found that frequency domain techniques can be very effective in studying the behavior of dry friction damped systems. In particular, it is seen that a substantial improvement in accuracy can be obtained by including higher harmonics in the analysis. An examination of the ability of dry friction damping to suppress flutter in turbine and compressor blades is also performed. Dissert. Abstr.

N86-23932 Texas A&M Univ., College Station.
ANALYSIS AND TESTING FOR ROTORDYNAMIC COEFFICIENTS OF GROOVED TURBULENT ANNULAR SEALS Ph.D. Thesis
Chang-Ho Kim 1985 186 p
Avail: Univ. Microfilms Order No. DA8528337

An analysis for turbulent grooved seals which are the most common design in commercial pumps was developed and tested to predict leakage and dynamic coefficients, as related to rotor dynamics. The grooved surface roughness pattern is formulated as an inhomogeneous directivity in surface shear stresses. The governing equations are expanded in the eccentricity ratio to yield zeroth and first-order perturbation solutions. Comparisons between analysis and experimental data are carried out in terms of effective stiffness, effective damping, and effective inertia coefficients for both tapered and constant-clearance circumferentially-grooved seals. Agreement between test results and analysis for net-damping coefficients is satisfactory, but the stiffness predictions have mixed results. Analytical results are presented for helically-grooved seals in the High Pressure Oxygen Turbopump (HPOTP) of the Space Shuttle Main Engine (SSME) to determine the influence of seal parameters on dynamic coefficients, stability estimates, leakage performance, and power consumption. The proper selection of seal parameters improves the seal performance in terms of leakage and stability. Dissert. Abstr.

N86-23933 Iowa Univ., Iowa City.
DYNAMIC ANALYSIS AND CONTROL SYNTHESIS OF INTEGRATED MECHANICAL SYSTEMS Ph.D. Thesis
Dwo-Gee Liang 1985 190 p
Avail: Univ. Microfilms Order No. DA8527981

A general methodology for dynamic analysis and control synthesis of integrated mechanical/control/hydraulic systems is presented. A control/hydraulic simulation program is developed for either independent simulation of control systems or integral simulation of controlled mechanical systems in conjunction with a general mechanical systems simulation program. The system topology is automatically identified by processing a symbolic loop matrix that represents the algebraic relationship between the internal control node variables. This process yields a minimal set of state variables resulting in more efficiency in numerical calculations. A geometric approach to the solution of the dynamic response of constrained mechanical systems is proposed. A continuous and differentiable basis of the constraint null space is automatically generated using the Gram-Schmidt process. A state space decomposition method is proposed to synthesize a control that will allow an arbitrary system trajectory to be specified. Examples are presented to demonstrate the generality and effectiveness of the proposed methods and the computer program. Dissert. Abstr.

N86-23934 Cincinnati Univ., Ohio.
COMPUTER-AIDED DESIGN AND ANALYSIS OF SPUR GEAR DYNAMICS Ph.D. Thesis
Hsiang-Hsi Lin 1985 184 p
Avail: Univ. Microfilms Order No. DA8526564

An analytical approach, developed specifically for application of computer in the design and analysis of spur gear systems, is

presented. This method and associated computer program are capable of determining the dynamic response of spur gear systems with involute tooth profile and normal contact ratio. Various parameters affecting the system dynamic behavior were examined. Results generated from the computer program were compared with semi-empirical formula AGMA formula, and experimental data. Good correlation existed between the experimental results and the computer simulation. Two design approaches were proposed to reduce dynamic response within system operating speed-range. One used geometric modification of gear tooth profile. The other used modification of system mass and stiffness distributions. Some examples showed that the proposed design approaches were effective. Dissert. Abstr.

N86-23935 Department of the Air Force, Washington, D.C.
FUEL VAPOR GENERATOR Patent
Vann Y. Won, inventor (to Air Force) Issued 5 Nov. 1985 9 p
(AD-D012081; US-Patent-4,551,153; US-Patent-Appl-SN-586956; US-Patent-Class-48-102R) Avail: US Patent and Trademark Office CSCL 13/6

A fuel vapor generator capable of being incorporated within a carburetor having a housing defining a chamber at the bottom thereof. An input line is attached to the lower portion of the housing for removing any excess liquid from the chamber and returning the excess liquid to the chamber. Located within the chamber is a level regulating system which, by being operably connected to both the inlet and removal lines is capable of regulating the liquid level within the chamber. In addition, an atomizer is located within the chamber in order to spray the liquid fuel in mist form into the upper portion of the housing for vaporization thereof prior to introduction into the Venturi tube of a carburetor. GRA

N86-23936*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
EXTENDED PARAMETRIC REPRESENTATION OF COMPRESSOR FANS AND TURBINES. VOLUME 1: CMGEN USER'S MANUAL Final Report, Aug. 1982 - Oct. 1983
G. L. Converse and R. G. Giffin Mar. 1984 60 p refs 3 Vol.
(Contract NAS3-23055)
(NASA-CR-174645; NAS 1.26:174645; R84AEB378-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 13I

A modeling technique for fans, boosters, and compressors has been developed which will enable the user to obtain consistent and rapid off-design performance from design point input. The fans and compressors are assumed to be multi-stage machines incorporating front variable stators. The boosters are assumed to be fixed geometry machines. The modeling technique has been incorporated into time sharing program to facilitate its use. Because this report contains a description of the input output data, values of typical inputs, and examples cases, it is suitable as a user's manual. This report is the first of a three volume set describing the parametric representation of compressors, fans, and turbines. The titles of the three volumes are as follows: (1) Volume 1 CMGEN USER's Manual (Parametric Compressor Generator); (2) Volume 2 PART USER's Manual (parametric Turbine); (3) Volume 3 MODFAN USER's Manual (Parametric Modulating Flow Fan). Author

N86-23937*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
EXTENDED PARAMETRIC REPRESENTATION OF COMPRESSOR FANS AND TURBINES. VOLUME 2: PART USER'S MANUAL (PARAMETRIC TURBINE) Final Report, Aug. 1982 - Oct. 1983
G. L. Coverse Mar. 1984 61 p refs 3 Vol.
(Contract NAS3-23055)
(NASA-CR-174646; NAS 1.26:174646; R84AEB379-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 13I

A turbine modeling technique has been developed which will enable the user to obtain consistent and rapid off-design performance from design point input. This technique is applicable to both axial and radial flow turbine with flow sizes ranging from about one pound per second to several hundred pounds per second. The axial flow turbines may or may not include variable geometry in the first stage nozzle. A user-specified option will also permit the calculation of design point cooling flow levels and corresponding changes in efficiency for the axial flow turbines. The modeling technique has been incorporated into a time-sharing program in order to facilitate its use. Because this report contains a description of the input output data, values of typical inputs, and example cases, it is suitable as a user's manual. This report is the second of a three volume set. The titles of the three volumes are as follows: (1) Volume 1 CMGEN USER's Manual (Parametric Compressor Generator); (2) Volume 2 PART USER's Manual (Parametric Turbine); (3) Volume 3 MODFAN USER's Manual (Parametric Modulation Flow Fan). Author

N86-23938*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
EXTENDED PARAMETRIC REPRESENTATION OF COMPRESSOR FANS AND TURBINES. VOLUME 3: MODFAN USER'S MANUAL (PARAMETRIC MODULATING FLOW FAN) Final Report, Aug. 1982 - Oct. 1983
G. L. Converse Mar. 1984 50 p refs 3 Vol.
(Contract NAS3-23055)
(NASA-CR-174647; NAS 1.26:174647; R84AEB380-Vol-3) Avail: NTIS HC A03/MF A01 CSCL 13I

A modeling technique for single stage flow modulating fans or centrifugal compressors has been developed which will enable the user to obtain consistent and rapid off-design performnce from design point input. The fan flow modulation may be obtained by either a VIGV (variable inlet guide vane) or a VPF (variable pitch rotor) option. Only the VIGV option is available for the centrifugal compressor. The modeling technique has been incorporated into a time-sharing program to facilitate its use. Because this report contains a description of the input output data, values of typical inputs, and examples cases, it is suitable as a user's manual. This report is the last of a three volume set describing the parametric representation of compressor fans, and turbines. The titles of the three volumes are as follows: (1) Volume 1 CMGEN USER's Manual (Parametric Compressor Generator); (2) Volume 2 PART USER's Manual (Parametric Turbine); (3) Volume 3 MODFAN USER's Manual (Parametric Modulating Flow Fan). Author

N86-23939*# Spectra Research Systems, Inc., Huntsville, Ala. Aerospace and Commercial Systems Dept.
BEARING TESTER DATA COMPILATION, ANALYSIS, AND REPORTING AND BEARING MATH MODELING Annual Report
Jan. 1986 117 p refs
(Contract NAS8-36183)
(NASA-CR-178748; NAS 1.26:178748; SRS/STD-TR86-014-535) Avail: NTIS HC A06/MF A01 CSCL 13I

A test condition data base was developed for the Bearing and Seal Materials Tester (BSMT) program which permits rapid retrieval of test data for trend analysis and evaluation. A model was developed for the Space shuttle Main Engine (SSME) Liquid Oxygen (LOX) turbopump shaft/bearing system. The model was used to perform parametric analyses to determine the sensitivity of bearing operating characteristics and temperatures to variations in: axial preload, contact friction, coolant flow and subcooling, heat transfer coefficients, outer race misalignments, and outer race to isolator clearances. The bearing program ADORE (Advanced Dynamics of Rolling Elements) was installed on the UNIVAC 1100/80 computer system and is operational. ADORE is an advanced FORTRAN computer program for the real time simulation of the dynamic performance of rolling bearings. A model of the 57 mm turbine-end bearing is currently being checked out. Analyses were conducted to estimate flow work energy for several flow diverter configurations and coolant flow rates for the LOX BSMT. B.G.

N86-23940*# Texas A&M Univ., College Station. Dept. of Mechanical Engineering.
SSME SEAL TEST PROGRAM: TEST RESULTS FOR SAW-

TOOTH PATTERN DAMPER SEAL Interim Progress Report
Dara W. Childs Feb. 1986 101 p refs
(Contract NAS8-35824)
(NASA-CR-178801; NAS 1.26:178801; TRC-Seal-1-86) Avail: NTIS HC A06/MF A01 CSCL 11A

Direct and transverse force coefficients for 11, sawtooth-pattern, and damper-seal configurations were examined. The designation damper seal uses a deliberately roughened stator and smooth rotor to increase the net damping force developed by a seal. The designation sawtooth-pattern refers to a stator roughness pattern. The sawtooth pattern yields axial grooves in the stator which are interrupted by spacer elements which act as flow constrictions or dams. All seals use the same smooth rotor and have the same, constant, minimum clearance. The stators examined the consequences of changes in the following design parameters: (1) axial-groove depth; (2) number of teeth: (3) number of sawtooth sections; (4) number of spacer elements; (5) dam width; (6) axially aligned sawtooth sections versus axially-staggered sawtooth sections; and (7) groove geometry. It is found that none of the sawtooth-pattern seal performs as well as the best round-hole-pattern seal. Maximum damping configurations for the sawtooth and round-hole-pattern stators have comparable stiffness performance. Several of the sawtooth pattern stators outperformed the best round-hole pattern seal. E.A.K.

N86-23941# Duke Univ., Durham, N. C. Dept. of Civil and Environmental Engineering.
COMPLIANT ROBOTIC STRUCTURES Report, 1 Jun. 1984 - 31 May 1985
James F. Wilson Aug. 1985 128 p
(Contract MDA903-84-C-0243; ARPA Order 5092)
(AD-A161897; DUKE-CE-001-85-1; R-1) Avail: NTIS HC A07/MF A01 CSCL 13/9

A complaint robotic structure is one or more continuously flexible arms that can be controlled to manipulate objects. A typical arm is comprised of orthotropic tube elements placed end-to-end where each element is designed to move in a particular way (bend, twist or extend) when pressurized. The results of the first year studies are reported in three chapters. Chapter 1 focuses on the mechanics and structure of an elephant trunk. Chapter 2 involves the analysis of computer controlled compliant element systems that bend and coil similar to elephant trunks. Chapter 3 focuses on the analysis of compliant orthotropic tube elements that can be used as torsion actuators when pressurized. GRA

N86-23942# Aeronautical Research Labs., Melbourne (Australia).
A PRELIMINARY EVALUATION OF SOME GEAR DIAGNOSTICS USING VIBRATION ANALYSIS
S. C. Favaloro Jul. 1985 28 p
(AD-A161939; ARL-AERO-RPOP-TM-427) Avail: NTIS HC A03/MF A01 CSCL 13/8

Several conditions monitoring methods for gears, which use the signal average of gear vibrations in both the time and frequency domain, have been investigated during a 1500 hour test on a gear rig. Results have shown that although heavy wear, in the form of fine pitting and scuffing, occurred over most of the tooth surfaces, the time domain procedures and levels of the fundamental and first harmonic of meshing frequency did not respond to damage to the gears. Total vibration and the ratio of sideband to total energy showed only marginal response to wear. GRA

N86-23943# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
RELIABILITY OF THE FLEXIBLE PAVEMENT DESIGN MODEL Final Report
John C. Potter Sep. 1985 22 p
(AD-A162004; WES/MP/GL-85-27) Avail: NTIS HC A02/MF A01 CSCL 13/2

The design of flexible pavements by the US Army Corps of Engineers is currently based on the California bearing ratio (CBR) curve. The CBR curve is empirical, and the current design approach is deterministic. A probabilistic approach, providing more reliable designs at potentially lower costs, can be developed from the current design procedure, except that the reliability of the CBR curve is uncertain. This study was undertaken to establish the reliability of the current CBR-based flexible pavement design model, using existing data from accelerated traffic tests. The reliability of the design model was found to be 50 percent, excluding the effects of conservative estimates of the design parameters. GRA

N86-23944# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
EFFECTS OF REINFORCEMENT CONFIGURATION ON RESERVE CAPACITY OF CONCRETE SLABS Final Report
S. C. Woodson and S. B. Garner Aug. 1985 117 p
(AD-A162155; WES/TR/SL-85-5) Avail: NTIS HC A06/MF A01 CSCL 13/3

Fifteen one-way reinforced concrete slabs were statically tested under uniform surface pressure either to failure, or to deflections that exceeded 17 to 24 percent of slab clear span. The main objective was to determine principal reinforcement configurations that would enhance tensile membrane behavior at large deflections. Each slab had a clear span of 24 inches and was 2-5/16 inches thick. Grade-60 reinforcement and 4,000-psi concrete were used. The total amount of principal reinforcement was about the same in every test, but the percentages of reinforcement in tension and compression zones were varied. The slabs were supported in a reaction structure and restrained at the supports. A modified three-hinged mechanism was formed, and rupture of reinforcement prohibited the development of pure tensile membrane behavior in most of the slabs. Posttest analysis applying tensile membrane theory agreed with the experimental tensile membrane slope, when the area of ruptured reinforcement was deleted. Based on these test results, principal reinforcement details were recommended for a blast shelter roof slab design. GRA

N86-23945# Clarkson Univ., Potsdam, N.Y. Dept. of Mechanical and Industrial Engineering.
NONLINEAR ANALYSIS AND OPTIMAL DESIGN OF DYNAMIC MECHANICAL SYSTEMS FOR SPACECRAFT APPLICATION Annual Technical Report, 1 Feb. 1984 - 31 Jan. 1985
K. D. Wilmert and M. Sathyamoorthy Feb. 1985 32 p
(Grant AF-AFOSR-0076-84)
(AD-A162194; AFOSR-85-1017TR) Avail: NTIS HC A03/MF A01 CSCL 20/11

A nonlinear finite element procedure has been developed for the dynamic vibrational analysis of planar mechanisms. The analysis takes into account the effects of geometric and material nonlinearities, vibrational effects and coupling of deformations. The effects of nonlinearities have been found to be significant on the dynamic behavior. Due to the complex nature of this nonlinear analysis procedure, an efficient optimal design approach using an optimality criterion technique was developed. The new optimization technique, called the Gauss Nonlinearly Constrained Technique, was developed in such a way that is applicable to design problems with nonlinear objective functions and constraints. The applicability of this method has been demonstrated with example problems consisting of objective functions of various complexities. Complete details of the nonlinear finite element procedure as well as the optimization technique are available in the appendix. GRA

N86-23946# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE MOTION OF A PUSHED, SLIDING OBJECT. PART 1: SLIDING FRICTION Interim Report
M. A. Peshkin and A. C. Sanderson Sep. 1985 54 p
(AD-A162276; CMU-RI-TR-85-18-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 20/11

In many robotic applications, manipulation planning for an object free to slide on a surface is an important problem. Physical analysis of the object's motion is made difficult by the absence of information about the distribution of support of the object, and of the resulting frictional forces. This paper describes a new approach to the analysis of sliding motion. The instantaneous motion of the object can be described as a pure rotation about a center of rotation (COR) somewhere in the plane. In this paper we find the

locus of CORs for all possible distributions of support forces. We assume zero friction at the pusher-object contact, and we assume that the support force distribution is confined to a disk. In one application to robotic manipulation, bounds on the distance an object must be pushed to come into alignment with robot finger or a fence are determined. Author (GRA)

N86-23947# Alabama Univ., Huntsville. Dept. of Engineering Mechanics.
CONCEPTUAL DESIGN OF A ROBOTIC LOADER SYSTEM FOR REMOTE MISSILE LAUNCHERS
James L. Hill and Charles W. Warren Sep. 1985 85 p Supersedes report dated May 1983, AD-A141270
(Contract DAAH01-83-P-1020)
(AD-A162341; CR-84-1; AMSMI/RL-AD-E950771) Avail: NTIS HC A05/MF A01 CSCL 16/1

This report deals with the conceptual design of a robotic missile reloading system. This system will be the supply center for several unmanned, remotely controlled missile launchers. The supply center will contain robot equipment sufficient to handle the task of reloading the missile. The motivation for this is to accomplish the reloading in a minimum of time with a minimum of manpower. A review of the major robot configurations is given followed by several ideas for grippers and sensing procedures. A final conceptual design is presented after each of the systems components have been scrutinized. An extensive survey of the state of technology in robotics and application of robotic equipment was conducted. The survey included technical literature as well as product literature obtained from robotics manufacturers. Author (GRA)

N86-23948# Rensselaer Polytechnic Inst., Troy, N.Y. School of Engineering.
A LASER TRIANGULATION RANGING SYSTEM FOR MOBILE ROBOTS
Albert Lester Hoogeveen May 1983 57 p
(Contract MDA903-82-K-0168; DARPA Order 4467)
(AD-A162846; RPI-MP-81) Avail: NTIS HC A04/MF A01 CSCL 17/7

A laser triangulation system for short range obstacle avoidance for mobile robots is discussed. The system was designed as an improvement over an earlier laser triangulation system. The new system was designed for use with an Adaptive Suspension Vehicle and the Mars Roving Vehicle; however, the new system is not limited to these two applications. A system overview is given, and then each component is discussed in detail. This report has discussed new scanning techniques and shown the feasibility of these in a new Multilaser/Multidetector system (ML/MD) laser triangulation system. A holographic scanner is used for rapid azimuth scanning, a galvanometric scanner is used for elevation scanning, special optics and optical fibers are used with individual detectors, a high power laser diode is used as the laser source, and a microprocessor and programmable timing module are used to control the system operation. Each element in the system is an improvement over existing scanning elements. And when a prototype is constructed, the author is fairly confident that the improvement over the existing ML/MD system will be tremendous. The new system should demonstrate high scan rates, high efficiencies, greater scan ranges, faster data collection, and greater flexibility. GRA

N86-23949# Department of the Navy, Washington, D. C.
MOORING LINE LOCKUP MECHANISM Patent Application
Robert G. Walden, inventor (to Navy) Filed 27 Aug. 1985 16 p
(AD-D012054; US-Patent-Appl-SN-644475) Avail: NTIS HC A02/MF A01 CSCL 08/10

An Air Deployed Oceanographic Mooring when assembled for deployment has a multitude of components suitable for separation by explosive bolts upon deployment of the system. A parachute system is connected to a surface buoy. The components that separate from each other upon deployment comprise a parachute system, a surface float, a subsurface buoy, an anchor shell and a bottom finder. All components except for the parachute system have interconnecting flexible lines upon deployment. A novel locking mechanism for limiting the paying out of the line between the anchor shell and subsurface buoy is triggered by the slackening of the line between the bottom finder and anchor shell when the bottom finder hits the bottom of the ocean. Author (GRA)

N86-23950# Department of the Navy, Washington, D. C.
ANCHORING SYSTEM FOR CONCRETE FLOATING PIER Patent Application
Tung Y. Lin, inventor (to Navy) Filed 22 Jul. 1985 16 p
(AD-D012074; US-Patent-Appl-SN-757402) Avail: NTIS HC A02/MF A01 CSCL 13/2

The present invention relates to floating piers and particularly to a system for anchoring a concrete floating piers and similar marine structures. The device is a floating pier with a sliding pile anchoring system arrangement that avoids rigid connections to the pier and allows the pier to rise and lower with the tides and to remain level during lateral displacement while avoiding substantial tilt or rotation of the pier during seismic and maximum static loading. Preferrably, piles that are arranged in pairs and are spaced along the centerline of the floating pier ride in pile guide assemblies attached to the pier deck, and include shear fail means which operate during overload conditions. GRA

N86-23951# Southwest Research Inst., San Antonio, Tex.
INVESTIGATION OF THE POTENTIAL FOR IMPROVING THE EFFICIENCY OF A SPARK-IGNITION ENGINE OPERATING ON NATURAL GAS FUEL Final Report
Oct. 1985 117 p
(Contract DE-AC01-84CE-50072)
(DE86-002090; DOE/CE-50072/1) Avail: NTIS HC A06/MF A01

Since natural gas (mostly methane) is readily available and enjoys a favorable cost advantage through lower taxes and some price regulations, the popularity of conversion of gasoline engines to natural gas has increased significantly in recent years. However, fuel cost rather than energy efficiency has been the primary motivation behind these engine conversions, and little emphasis has been placed on the anti-knock, wide flammability, and emissions characteristics of methane. A data base was established in Phase 1 utilizing a wedge-shaped combustion chamber to show effects of equivalence ratio, ignition timing, and compression ratio for engine operation on natural gas whose primary component was methane. Baseline performance data were obtained for engine operation on research grade indolene and natural gas. The reoptimization process for the engine operating on natural gas fuel included determining minimum best torque spark timing as a function of equivalence ratio from 120% of the stoichiometric fuel rate to the lean limit fuel rate for a range of compression ratios from 8.4:1 to 18.5:1. The optimum compression ratio for the wedge-shaped combustion chamber was selected based on data for both part throttle and wide-open throttle operation. In Phase 2, a hemispherical combustion chamber was used to show the effects of changing combustion chamber configuration on the pertinent engine operating parameters. DOE

N86-23952# Oak Ridge National Lab., Tenn.
CLEAN VACUUM SYSTEMS FOR RFTF
R. L. Livesey 1985 4 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002448; CONF-851174-13) Avail: NTIS HC A02/MF A01

The three vacuum systems to be used on the test facility are briefly described and their performance noted. DOE

N86-23953# Lawrence Livermore National Lab., Calif.
DESIGN OF EXTERNALLY PRESSURIZED GAS BEARINGS FOR DYNAMIC APPLICATIONS
J. W. Roblee 30 Sep. 1985 211 p
(Contract W-7405-eng-48)
(DE86-003443; UCRL-53643) Avail: NTIS HC A10/MF A01

Externally pressurized gas bearings are a common element in machines. Because the transverse vibration of externally pressurized gas bearings exhibits damping only over a narrow frequency

band, gas bearings are reputed to be poorly damped. In addition, no systematic design procedure for the frequency-dependent damping is available. This work accurately predicts the dynamic stiffness of gas bearings over a broad frequency range, and shows that externally pressurized gas bearings can exhibit significant damping when properly designed. DOE

N86-23954# New Mexico Univ., Albuquerque.
TASK PLANNING FOR CONTROL OF A SENSOR-BASED ROBOT
R. C. Lennox, G. F. Luger, and R. W. Harrigan Dec. 1985 36 p
Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-004225; SAND-85-0958) Avail: NTIS HC A03/MF A01

This paper is divided into four major sections. The first is an introduction to the research area. The second provides a brief overview of the history of planning in artificial intelligence (AI), while the third part of the paper describes the representational power of very-high-level computer languages and how this power may be brought to planning in robotics research. Finally, we describe our PROLOG-driven Planner for controlling a PUMA arm used for object manipulation and note the future directions of this work. DOE

N86-23955# Southampton Univ. (England). Inst. of Sound and Vibration Research.
ON THE PREDICTION OF LOSS FACTORS DUE TO SQUEEZE FILM DAMPING MECHANISMS
L. C. Chow and R. J. Pinnington Oct. 1985 88 p refs Sponsored by UK Science and Engineering Research Council
(ISVR-TR-130) Avail: NTIS HC A05/MF A01

Machinery panels were damped by attaching an auxiliary plate parallel to the surface, thereby trapping a thin layer of air. Relative vibration of the plates pumps this air at high velocities, resulting in energy loss due to the air viscosity. Loss factors of the order of 0.1 are achieved without the sensitivity to heat and oil associated with viscoelastic materials. The damping over the whole frequency range above and below critical was measured and compared with prediction. The agreement in results is remarkably good. Below the critical frequency, the damping is pumping controled, while above critical the plate couplings are the controlling factor. Author (ESA)

N86-23956# Wyle Labs., Inc., Huntsville, Ala.
TEST PROCEDURE FOR CONTAINER SPECIFICATION 49 CFR 178.51 WELDED OR BRAZED STEEL CYLINDERS MADE OF DEFINITELY PRESCRIBED STEELS (4BA)
Sep. 1985 47 p Sponsored in part by DOT, Washington, D.C.
(PB86-111655; DOT/RSPA/DMT12-84/30) Avail: NTIS
HC A03/MF A01 CSCL 13D

The test procedure to test containers meeting DOT Specifications (4BA) are described. The Test Procedure is designed to determine whether or not a given 4BA container meets the safety aspects of the Hazardous Materials Transportation Act of 1974 (P.L. 93-633) and the rules and regulations for the manufacture and testing of containers contained in the Federal Register (49 CFR 178.51). The Test Procedure describes the tests to be conducted by the Office of Operations and Enforcement, Materials Transportation Bureau to verify that manufacturers of containers are producing products that comply with the rules and regulations contained in the Federal Register (49 CFR 178.51). GRA

N86-23772# Joint Publications Research Service, Arlington, Va.
TRANSPORT MANIPULATOR REVIEWED
V. Dzyuba, A. S. Mironenko, L. N. Timoshenko, and V. Ye. Kovtunenko *In its* USSR Report: Machine Tools and Metalworking Equipment (JPRS-UMM-86-007) 21 Mar. 1986 p 60-63 Transl. into ENGLISH from Mekhanizatsiya i Avtomatizatsiya Proizvodstva (Moscow, USSR), no. 11, Nov. 1985 p 13-14 (For primary document see N86-23768 14-31)
Avail: NTIS HC A04/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-23957*# Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
A GEOMETRIC APPROACH TO FAILURE DETECTION AND IDENTIFICATION IN LINEAR SYSTEMS
Mohammad-Ali Massoumnia Feb. 1986 187 p refs
(Grant NAG1-126)
(NASA-CR-176750; NAS 1.26:176750; SSL-5-86) Avail: NTIS
HC A09/MF A01 CSCL 14D

Using concepts of (C,A)-invariant and unobservability (complementary observability) subspaces, a geometric formulation of the failure detection and identification filter problem is stated. Using these geometric concepts, it is shown that it is possible to design a causal linear time-invariant processor that can be used to detect and uniquely identify a component failure in a linear time-invariant system, assuming: (1) The components can fail simultaneously, and (2) The components can fail only one at a time. In addition, a geometric formulation of Beard's failure detection filter problem is stated. This new formulation completely clarifies of output separability and mutual detectability introduced by Beard and also exploits the dual relationship between a restricted version of the failure detection and identification problem and the control decoupling problem. Moreover, the frequency domain interpretation of the results is used to relate the concepts of failure sensitive observers with the generalized parity relations introduced by Chow. This interpretation unifies the various failure detection and identification concepts and design procedures. Author

N86-23958# City Coll. of the City Univ. of New York. Dept. of Mathematics.
RELIABILITY ASSESSMENT FOR SYSTEMS SUBJECT TO MAINTENANCE AND REPAIR Annual Report, 1 Apr. 1984 - 30 Jun. 1985
Mark Brown Aug. 1985 9 p
(Grant AF-AFOSR-0095-84)
(AD-A162029; AFOSR-85-1084TR) Avail: NTIS
HC A02/MF A01 CSCL 14/4

The main thrust of the research under this grant is to develop the methodology to deal with more realistic models for the quantitative reliability assessment and analysis of complex systems. Inequalities for increasing failure rate distributions have been derived. A new theory of age-weighted distributions is being developed. Work is beginning on exploiting properties of a partial ordering of distribution. GRA

N86-23959# California Univ., Los Angeles. Graduate School of Management.
SEQUENTIAL DECISION MODELS IN RELIABILITY Final Report, 1 Oct. 1982 - 30 Sep. 1985
Bruce L. Miller 31 Oct. 1985 7 p
(Grant AF-AFOSR-0305-82)
(AD-A162332; AFOSR-85-1093TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The research topics under this grant included optimal stockage policies for parts which replaced failed components, optimal inspection policies, quality control, and queuing theory applications to inventory. The common thread of this research is the sequential or dynamic aspect of reliability problems. This dynamic aspect showed up in various ways: What order to examine components of a failed part. What ordering rules to use for the failed parts, taking into account that it is is possible to order again later in the future. The mathematical technique applied to the above problems was dynamic programming. When we shifted attention to quality control and the production of components, the dynamic aspect of the problem was still paramount. Now the question was to determine the quality level of a production process using past quality data. The mathematical technique applied to this problem

was time series. We have also considered the related decision problem of when the production process should be corrected.
GRA

N86-23950# Northwestern Univ., Evanston, Ill.
MONTE CARLO RELIABILITY ANALYSIS Annual Technical Report, 1 Sep. 1984 - 31 Aug. 1985
E. E. Lewis 4 Nov. 1985 3 p
(Grant AF-AFOSR-0340-84)
(AD-A162379; AFOSR-85-1092TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The work carried out during the 1984/85 contract year is divided into two parts. First, three classes of component dependency models have been successfully incorporated into the Markov Monte Carlo formulation: standby systems, shared load systems and shared repair crews. These models have been implemented in a computer code and used for the analysis of a number of complex systems. Second, the investigation of the Monte Carlo simulation of time-dependent failure was begun. Two different sampling techniques were formulated, and evaluation is continuing into the 1985/86 contract period. Author (GRA)

N86-24526*# Jackson State Univ., Miss.
APPLICATION OF WEIBULL ANALYSIS TO SSME HARDWARE
Lou Allen Bell Gray *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14D

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-23961 West Virginia Univ., Morgantown.
A FINITE ELEMENT SIMULATION OF ELASTO-PLASTIC CONTACT PROBLEMS Ph.D. Thesis
Steve H. Chang 1985 157 p
Avail: Univ. Microfilms Order No. DA8523762

A direct finite element method for elastoplastic bodies with isotropic and/or kinematic hardening was developed and used to study the influence of material plasticity on contact behavior. The method subdivides the problem into a series of conditions, each of which occurs over an increment in load. The sequence of conditions is decided by scaling the residual load so that either the contact region changes or the yeilded region grows and choosing that condition requiring minimum load. A cross product technique is used to detect contact and the von Mises criterion to determine yielding. Interpenetrations are prevented by two sets of constraint equations depending on smooth or rough surface contacts. After each condition, boundary conditions and material properties are updated to be consistent with the deformation and stress state. Phenomena are discovered for the two-dimensional Hertz problem. In plane strain, yielding initiates about 70% of the half contact length beneath the contact plane, but in plane stress, yielding initiates at the contact plane. As in elastic contact, friction plays a weak role in elastoplastic contact. Contact between elastoplastic bodies requires less load to develop the same contact extent as for elastic bodies and it distributes the pressure more evenly over the contact length. Dissert. Abstr.

N86-23962 Maryland Univ., College Park.
A MIXED FORMULATION TRIANGULAR FINITE ELEMENT MODEL FOR THIN SHELL ANALYSIS Ph.D. Thesis
Chung Chin Dai 1985 160 p
Avail: Univ. Microfilms Order No. DA8523068

A finite element modeling technique which utilizes a triangular element called TSHEL with 45 degrees of freedom and seven point integration was tested for analysis of thin plate and shell structures. The element formulation is based on the degenerate solid shell concept and the mixed formulation with assumed independent inplane and transverse shear strains. Numerical result indicates effectiveness of the present modeling technique which features combined use of elements with kinematic modes and those without kinematic modes in order to eliminate both locking and spurious kinematic modes at global structural level.
Dissert. Abstr.

N86-23963 Northwestern Univ., Evanston, Ill.
SCATTERING OF ULTRASONIC WAVES BY A SUBSURFACE CRACK AND DYNAMIC STRESS INTENSITY FACTORS Ph.D. Thesis
Weichuan Lin 1985 127 p
Avail: Univ. Microfilms Order No. DA8523557

The steady-state and transient scattering for a subsurface line crack in an homogeneous, isotropic and linearly elastic solid, which may be submerged in fluid, were investigated. The problem is formulated as one for plane strain. The problem is approached by the use of Green's function techniques in the frequency domain. The field generated by a line potential source is derived. The Green's function due to a line force is constructed in terms of the derived displacement potentials, and an integral representation for the scattered displacement field is obtained. By applying Hooke's law, coupled integral equations, which correlate the incident stresses and unknown dislocation densities, are constructed. Stress intensity factors at each crack tip are evaluated after numerically solving for the dislocation densities. The scattered field generated by dislocation densities is, then, obtained from the integral representation. The time domain response is obtained by using the fast Fourier transform. The results contain: (1) stress intensity factors due to the longitudinal and transverse waves applied on the surface; (2) steady-state and transient scattering for a subsurface crack for both near and far field; and (3) a simulation of the submerging test in which transducers and the testing solid are both submerged in a water bath. Dissert. Abstr.

N86-23964 Stanford Univ., Calif.
ASPECTS OF FRACTURE MECHANICS FOR ELASTIC SOLIDS COUPLED TO OTHER FIELDS Ph.D. Thesis
Yukeun Eugene Pak 1985 141 p
Avail: Univ. Microfilms Order No. DA8522209

In elastostatics, the energy-release rates associated with translation, rotation and self-similar expansion of cavities or cracks in solids are expressed by the path-independent integrals J, L and M, respectively. It is shown that, for a crack subjected to far field homogeneous stresses, and, an insulated crack disturbing a uniform heat flow, these integrals may be evaluated by first considering an elliptical cavity and then performing a limiting process. Employing this limiting process and using certain special properties of the M-integral makes it possible to find stress intensity factors without solving the corresponding boundary value problem. The elastic dielectric problem was considered to investigate whether the connection between path-independent integrals and energy release rates extends to continua coupled with other fields. An analogous path-independent integral is derived for a dielectric material subjected to an external electric field. To show that this integral has the same physical implication as the J-integral of elastostatics, the dielectric crack problem was solved. The solution is obtained by the use of an integral transform technique and the stresses are expressed in closed form. The crack extension force is evaluated. The critical external electric field which will cause unstable crack propagation for PMMA is predicted. Dissert. Abstr.

N86-23965 California Univ., Los Angeles.
ASYMMETRIC STEADY STATE ELASTIC WAVE SCATTERING BY GLOBAL LOCAL FINITE ELEMENT METHOD Ph.D. Thesis
Jeffrey Austin Clements 1985 84 p
Avail: Univ. Microfilms Order No. DA8525841

A Global Local Finite Element Method is developed for computing the scattering behavior of an oblique plane incident elastic wave propagating in a homogenous isotropic host medium.

The wave is assumed steady state and incident upon an axisymmetric inclusion having inhomogeneous orthotropic elastic material properties. Isoparametric Finite Elements are used to represent the inclusion. Global wave functions representing the incident and scattered field are used to match displacements and tractions at the Finite Element boundary. The method was verified, using a spherical inclusion for both compressional and shear waves, by comparing the results obtained by the current method with these obtained from exact solution also generated in this dissertation. The current method is applied to three classes of scattering problems which examined the effects of oblique plane incident waves, inclusion geometry variations, and spacing between adjacent circular cylindrical inclusion. All results are presented in terms of scattering cross sections to allow a consistent basis for comparisons. Dissert. Abstr.

N86-23966 Polish Academy of Sciences, Warsaw.
SOME PROBLEMS OF MULTICRITERIA OPTIMIZATION OF CABLE STRUCTURES
Stefan Jendo 1985 53 p refs
(ISSN-0208-5658) Avail: Issuing Activity

Multicriteria structural optimization of cable structures are discussed. A general formulation of multicriteria optimization problem is presented. Some applications concerning the simple and double layer-cable systems are considered. Minimum weight and maximum of the lowest natural frequency of free vibration are taken as optimization criteria. The permissible stresses and displacements are taken as behavioral constraints. The optimization problem is solved by nonlinear programming and metric function methods. E.A.K.

N86-23967 Texas Univ., Austin.
THE DETECTION AND QUANTITATIVE CHARACTERIZATION OF SUBCRITICAL CRACKS FROM ACOUSTIC EMISSION SOURCES Ph.D. Thesis
Hyman A. Feldstein 1985 183 p
Avail: Univ. Microfilms Order No. DA8527561

Experimental results are presented when three simultaneous acoustic emission measurements: sum of counts vs stress, sum of counts vs events and log-sum amplitude distribution; are developed on uncracked tensile specimens to characterize the sources of acoustic emission in a precipitation hardened aluminum alloy. The measurements are extended to specimens containing nonpropagating through thickness cracks, which detect the crack and evaluate its proximity to fracture. These findings are based on the sources that generate acoustic emission ahead of the crack's leading edge: dislocations breaking away from precipitate pinning points in multitudes and subsequent cracking of precipitate particles. A mathematical model is developed for a non-propagating through thickness crack, where the dislocation generated emissions are a function of applied stress, with crack length contained as an unknown quantity. The analysis is based on experimental results, atomic dislocation mechanism, and physical response of the measurement. The analysis characterizes the source in terms of: atomic dislocation variables that account for the energy required for one dislocation to surmount its precipitate barriers, and number of dislocations that evolve this energy when the source is activated by the flow stress. Dissert. Abstr.

N86-23968 Georgia Inst. of Tech., Atlanta.
EFFECT OF DELAMINATION ON AXIALLY-LOADED PLATE- AND SHELL-LIKE ELEMENTS Ph.D. Thesis
Sayed Nageb Sallam 1985 161 p
Avail: Univ. Microfilms Order No. DA8528639

The delamination of both flat (plates) and curved (cylindrical shells) structural elements is investigated. For flat elements, a simple one dimensional model is developed to predict delamination buckling loads of an across the width delamination in an axially loaded plate. The model is employed to predict critical loads for both simply supported and clamped boundary conditions. Parametric studies are carried out to investigate the effects of delamination position and size on the critical loads. Moreover, the delamination growth problem is also investigated. In order to study the possibility of spreading of the damaged (delaminated) area to the undamaged one, the postbuckling solution is employed. The energy release rate is used to determine whether the delamination growth is stable or unstable. Moreover, the present model is used to study the effect of the presence of coupling between bending and stretching on the delamination growth. Finally, the effect of circumferential delamination on the critical loads, for a laminated circular cylindrical shell and subjected to compressive axial loading, is also studied. Dissert. Abstr.

N86-23969 Iowa Univ., Iowa City.
FATIGUE AND DEFORMATION UNDER PROPORTIONAL AND NONPROPORTIONAL BIAXIAL LOADING Ph.D. Thesis
Ali Fatemi 1985 210 p
Avail: Univ. Microfilms Order No. DA8527968

Fatigue and deformation behavior of thin-walled tubular specimens subjected to biaxial in-phase and out-of-phase tension-torsion constant amplitude loading in strain control and at room temperature was investigated using 1045 HR steel. The in-phase data were already available from a previous study conducted at the University of Illinois. The out-of-phase tension-torsion tests were performed with a 90 degree phase difference along both elliptical and rectangular train paths. Several fatigue life prediction methods were employed to correlate the experimental results including Tresca, von Mises, Zamrik's total strain parameter, Brown and Miller's critical plane approach and a proposed critical plane model. The proposed model is based on the maximum shear strain amplitude and either the maximum principal stress or the normal stress on the plane of maximum shear strain amplitude depending upon the cracking mode. The cyclic deformation behavior of the material under proportional and nonproportional loads was also investigated employing both the Tresca and von Mises yield criteria. Dissert. Abstr.

N86-23970 New York Univ., New York.
FORCED MOTION OF INITIALLY STRESSED ELASTIC SOLIDS: ANALYTICAL AND FINITE ELEMENT METHODS Ph.D. Thesis
Young Doo Kwon 1985 206 p
Avail: Univ. Microfilms Order No. DA8528269

The present thesis develops a finite element procedure to calculate displacements, strains and stresses in three-dimensional, initially stressed solids subjected to static or time-dependent loading conditions. As a point of departure, Hamiltonn's principle is employed to obtain a system of (linear) algebraic equations of motion (or equilibrium) characterizing the displacements in a solid which, for the sale of approximation, has been subdivided into a large number of finite elements. In the static case (i.e., time-independent loading function) inertia terms in the equations of motion are deleted. In this case the Gauss elimination method is used to solve the resulting equations for the displacement field. When the loading function is dependent upon time, the equations of motion must be integrated with respect to time. Newmark's direct integration method is readily applied to this problem to obtain the displacements as a function of time. An alternative method for the solution of the time-dependent problem is provided by mode superposition method. Dissert. Abstr.

N86-23971 Cincinnati Univ., Ohio.
INVESTIGATION OF MULTIPLE INPUT FREQUENCY RESPONSE FUNCTION ESTIMATION TECHNIQUES FOR EXPERIMENTAL MODAL ANALYSIS Ph.D. Thesis
Robert William Rost 1985 237 p
Avail: Univ. Microfilms Order No. DA8526568

The accurate measurement of the frequency response function is vital to the estimation of the modal parameters of a system. The use of single input/output theory to formulate the equations for the frequency response function can be replaced by an equivalent theory involving multiple inputs. The results of this approach provide frequency response functions that are comparable to the single input/output case but with an increase in the consistency of modal frequency and damping values estimated from different frequency response functions. The concept of MAC, Modal Assurance Criterion, was expanded to include the possibility

of multiple reference data. Numerous tests were conducted to evaluate and prove the techniques presented. The structures range from machine tools, airplanes, automobiles, electric generators, and encompass almost any large structure imaginable.
Dissert. Abstr.

N86-23972 Texas Univ., Austin.
DEVELOPMENT AND APPLICATION OF A THEORY OF FINITE ELASTOPLASTICITY BASED ON GENERALIZED POTENTIALS
Ph.D. Thesis
Seung Jo Kim 1985 167 p
Avail: Univ. Microfilms Order No. DA8527588

A theory of materials of type N is proposed as thermomechanically plausible theory of finite elastoplasticity along with a new definition of a strain measure for large deformations. The theory requires two scalar-valued potential representations (the free energy and the flow potential) in addition to the field equations. By applying the concept of Clarke-Rockafellar derivatives, it is possible to consider potentials which are neither convex nor differentiable. The thermodynamic constraints of the theory produce in a natural way a rotation-free stress quantity, which is called Dieness stress, as a dual variable to the proposed rotation-free strain rate. General forms of the free energy and the flow potential are provided and it is shown that some of the classical theories of plasticity can be obtained from these two potentials as special cases. A set of constitutive equations is deduced from Bodner and Partom's constitutive equations according to the theory of materials of type N, which provide a thermomechanically sound theory.
Dissert. Abstr.

N86-23973*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HEX BALL TORQUE TEST
B. A. Robinson and C. L. Foster Jan. 1986 110 p refs
(NASA-TM-86534; NAS 1.15:86534) Avail: NTIS
HC A06/MF A01 CSCL 20K

A series of torque tests were performed on four flight-type hex ball universal joints in order to characterize and determine the actual load-carrying capability of this device. The universal joint is a part of manual actuation rods for scientific instruments within the Hubble Space Telescope. It was found that the hex ball will bind slightly during the initial load application. This binding did not affect the function of the universal joint, and the units would wear-in after a few additional loading cycles. The torsional yield load was approximately 50 ft-lb, and was consistent among the four test specimens. Also, the torque required to cause complete failure exceeded 80 ft-lb. It is concluded that the hex ball universal joint is suitable for its intended applications. Author

N86-23974*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POCKETING MECHANICS OF SRM NOZZLE LINER
Vincent S. Verderaime 1986 27 p refs
(NASA-TP-2577; NAS 1.60:2577) Avail: NTIS HC A03/MF A01
CSCL 20K

A systems approach was adopted to study the pocketing phenomena on a solid rocket nozzle liner. The classical thermoelastic analysis was used to identify marginally strained regions on the composite liner erosion surface and at a depth coincident with the peak value of the across ply coefficient of thermal expansion. A failure criterion was introduced which included a thermal term and permitted failure assessment over the charred liner. The method was verified by satisfactory application to a reported related experiment. Liner pocketing mechanism was attributed to very localized material degradation caused during manufacturing process either by reduction of fiber strength and/or by concentration of resin volume fraction. Pocketing scenario over the degraged material was constructed with supporting formulation to predict size of fissures with respect to degraded material size and location in the liner and with burn time. Sensitivities of liner material parameters were determined to influence test programs designed to update mechanical data base of carbon cloth phenolic over the char temperature range. Author

N86-23975*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DESIGN AND VERIFICATION GUIDELINES FOR VIBROACOUSTIC AND TRANSIENT ENVIRONMENTS
Mar. 1986 27 p refs
(NASA-TM-86538; NAS 1.15:86538) Avail: NTIS
HC A03/MF A01 CSCL 20K

Design and verification guidelines for vibroacoustic and transient environments contain many basic methods that are common throughout the aerospace industry. However, there are some significant differences in methodology between NASA/MSFC and others - both government agencies and contractors. The purpose of this document is to provide the general guidelines used by the Component Analysis Branch, ED23, at MSFC, for the application of the vibroacoustic and transient technology to all launch vehicle and payload components and payload components and experiments managed by NASA/MSFC. This document is intended as a tool to be utilized by the MSFC program management and their contractors as a guide for the design and verification of flight hardware. Author

N86-23976# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
ON THE ANALYSIS OF SHELL STRUCTURES SUBJECTED TO A BLAST ENVIRONMENT: A FINITE ELEMENT APPROACH, PART 1
Glenn R. Heppler Feb. 1986 210 p refs
(UTIAS-302-Pt-1; ISSN-0082-5255) Avail: NTIS
HC A10/MF A01

The development of a finite element technique designed specifically for the analysis of blast loaded (chemical explosions) or combined blast and thermally loaded (nuclear explosions) circular cylinders is outlined. Following a brief introduction the formulation of the stiffness matrix is presented which includes discussions of the material and geometric nonlinearities included in the finite element model. The consistent force vector calculation is illustrated, including techniques used to deal with thermal loading and blast wave loading. Subsequently examples and results are presented which verify the accuracy and versatility of the static formulation of the problem. Author

N86-23977# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
ON THE ANALYSIS OF SHELL STRUCTURES SUBJECTED TO A BLAST ENVIRONMENT: A FINITE ELEMENT APPROACH, PART 2
Glenn R. Heppler Feb. 1986 231 p refs
(UTIAS-302-Pt-2; ISSN-0082-5255) Avail: NTIS
HC A11/MF A01

The development of a finite element technique designed specifically for the analysis of blast loaded (chemical explosions) or combined blast and thermally loaded (nuclear explosions) circular cylinders is outlined. To lead into the dynamic analysis the consistent mass matrix development is presented along with that for a companion diagonal mass matrix which exhibits dynamically correct behavior. The requirements of temporal integration schemes are investigated and the necessary and sufficient conditions for a liner single step integration method to be stable when operating on a system of motion equations in which the damping matrix is nonproportional are presented. Finally, examples of dynamic analyses, including a cylinder loaded by a nuclear burst, using the methods outlined herein are presented. Author

N86-23978# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AN APPROACH FOR ORDER REDUCTION AND PLACEMENT OF ACTUATORS/SENSORS FOR THE CONTROL OF A CLASS OF DISTRIBUTED PARAMETERS SYSTEMS
Paulo Tadeu M. Lourencao Feb. 1986 9 p refs Presented at TELECON 85, Rio de Janeiro, Brazil, 10-13 Dec.
(INPE-3791-PRE/886) Avail: NTIS HC A02/MF A01

Aspects of the dynamics and control of a class of distributed parameter system are considered. The vibrating structures

techniques for order reduction are discussed and compared taking into account their applicability to the control of those structures. Two structures, a free-free beam and a completely free rectangular plate are considered to investigate the influence of the number, position and type of actuators and sensors on the reduced model. Mode dominance distributions are presented for both structures corresponding to different configurations of actuators/sensors. It is shown that the dominance measure originally proposed for the selection of critical modes can be also used to specify convenient actuators/sensors arrangements. E.A.K.

N86-23979# Aeronautical Research Labs., Melbourne (Australia).
A NUMERICAL INVESTIGATION INTO THE PLASTIC STRESS AND STRAIN FIELDS AROUND A SURFACE CRACK
R. J. M. Heller and J. T. Barnby Jan. 1985 22 p
(AD-A161937; ARL-STRUC-414) Avail: NTIS HC A02/MF A01 CSCL 20/11

Two finite element approaches for the three dimensional elastic-plastic analysis of a surface crack are presented. The distributions of the stress and strain fields around the crack are discussed in detail and it is shown that both approaches yield similar values for the strain energy distribution around the crack. Author (GRA)

N86-23980# Cambridge Univ. (England).
DEFORMATION AND FRACTURE MAPS FOR CELLULAR MATERIALS AND SOLID POLYMERS Final Technical Report, 18 Sep. 1984 - 10 Sep. 1985
Michael F. Ashby, Peter W. R. Beaumont, L. J. Gibson, D. G. Gilbert, and S. K. Maiti 31 Oct. 1985 44 p
(Contract DAJA45-84-M-0426; DA Proj. 1L1-61102-BH-57)
(AD-A161947; CUED/C/MAPS/TR118) Avail: NTIS HC A03/MF A01 CSCL 11/9

The mechanical properties of 3 types of cellular solids (flexible, plastic and brittle) have been measured as a function of density. The results are compared with models for the stiffness, strength and densification; and constitutive laws are developed. Data and models for each type of cellular solid are combined to develop mechanism-mode maps which summarize the properties in a single diagram. Natural cellular materials fit the same pattern; maps are presented, as an example, for wood. The maps help in design and in the selection of materials for load-bearing and energy-absorbing applications. GRA

N86-23981# Southwest Research Inst., San Antonio, Tex.
NONLINEAR FRACTURE MECHANICS ANALYSIS WITH THE BOUNDARY INTEGRAL METHOD Annual Technical Report, 2 Apr. 1984 - 29 Mar. 1985
T. A. Cruse and E. Z. Polch 30 Apr. 1985 36 p
(Contract F49620-84-C-0042)
(AD-A162027; AFOSR-85-1072TR) Avail: NTIS HC A03/MF A01 CSCL 20/11

The current research makes use of the boundary integral equation (BIE) method, as modified to account exactly for the elastic crack problem. The usual BIE formulation for elastic problems reduces the numerical problem to one of modeling the boundary data, while preserving the complete interior solution of the field equations. In the elastic fracture mechanics problem, the Green's function approach is used wherein the BIE is modified to account for the presence of a stress free crack at an arbitrary location within the structure. The use of the Green's function for the crack eliminates the need to model the boundary of the crack, and provides a complete mathematical description of the elastic strain field within the body, due to the crack. This clearly contrasts with the finite element method which requires that the crack surface and the interior strains be modeled with some set of interpolation functions. However, extension of the fracture mechanics model with the Green's function approach has not been previously demonstrated. The current work reports on the successful extension of the special Green's function formulation for the fracture mechanics problem to the elastoplasticity formulation. Author (GRA)

N86-23982# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
MIXED MODE 1 AND 2 FULLY PLASTIC CRACK GROWTH FROM SIMULATED WELD DEFECTS Technical Report
George A. Kardomateas 23 Oct. 1985 210 p
(Contract N00014-82-K-0025)
(AD-A162108) Avail: NTIS HC A10/MF A01 CSCL 13/8

In symmetric specimens, the crack advances into the relatively undamaged region between two plastic shear zones. A crack near a weld or shoulder, loaded into the plastic range, may have only a single shear band, along which the crack grows in prestrained and damaged material with less ductility than the usual symmetrical configurations. A crack ductility can be defined as the minimum displacement per unit crack growth. A low crack ductility requires higher stiffness of the surrounding structure for fracture-stable design. Tests of six alloys showed that, for the low hardening alloys, the crack ductility in the asymmetric case is less than a third of the symmetric. In the higher hardening alloys the crack ductility in the asymmetric case is smaller by a factor of 1.2 at most. A noteworthy result is the presence of a Mode 1 opening component even with asymmetry, as is shown by the far field displacement vector being more than 45 deg from the transverse direction. The crack direction is less than 45 deg, indicating the effect of triaxiality on cracking. Finally, a logarithmic tensile singularity in the mean stress was found for rigid-plastic flow past a growing crack of finite angle with rigid flanks under combined shear and tension. The tensile singularity predicts yielding of the crack flanks. GRA

N86-23983# Cornell Univ., Ithaca, N.Y.
THE RELIABILITY OF LOAD SHARING SYSTEMS Final Technical Report, 1 Jun. 1984 - 31 May 1985
Howard M. Taylor Nov. 1985 6 p
(Grant AF-AFOSR-0165-84)
(AD-A162121; AFOSR-85-1096TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In a load sharing system, the failure of one or more components increases the load on other nonfailed components, thereby increasing their chances of failure, and the failure of the system. Examples of load sharing systems include many mechanical, thermal and electrical structures. System reliability is measured by the probability that the system is capable of performing its prescribed task or surviving for a prescribed duration. Traditional reliability models often postulate that component failures are statistically independent and, thus, do not describe load sharing systems. The optimal replacement theory for fault tolerant load sharing systems was developed under the support of the grant. As components fail, the system deteriorates. Where failed components cannot be replaced individually, and algorithm was found that determines the optimal policy for replacing the entire system. GRA

N86-23984# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
NONDESTRUCTIVE TESTING OF MATERIALS Final Report
5 Dec. 1985 19 p
(AD-A162266; TOP-3-2-807) Avail: NTIS HC A02/MF A01 CSCL 14/2

Standard techniques and facilities for evaluating surface and subsurface characteristics of metallic/nonmetallic materials are described. It identifies current nondestructive test methods and ultrasonic test techniques applicable to cannon tubes, cast armor plate, welded joints, projectile fuzes, vehicle track shoes, and other items in which detection of cracks, voids, corrosion, and thickness variations is important. GRA

N86-23985# Defence Research Establishment, Ottawa. (Ontario).
EXAMINATION OF THE LOAD-ELONGATION PROPERTIES OF FABRICS, YARNS AND FIBRES AT 20 AND 40 C
Rita M. Crow and Malcolm M. Dewar Jun. 1985 36 p
(AD-A162324; DREO-923) Avail: NTIS HC A03/MF A01 CSCL 11/5

A previous study by the authors on the effect of low tempera-

tures on coated and uncoated fabrics raised certain points which were left unanswered. This study addresses these points. It was found that the load-elongation curve of the fabric is not necessarily the same as that of a yarn or a filament; differences in the percent elongation at break of a fabric and its yarn depend on the physical properties of the yarn; inconsistent differences in the percent change in the percent elongation at break for warps and wefts of the same fabric as the temperature is decreased is procedure-dependent and it is the fabric, yarn and filament working in concert which give each fabric its unique load-elongation curve.
GRA

N86-23986# Georgia Inst. of Tech., Atlanta. School of Engineering Science and Mechanics.
BUCKLING OF DELAMINATED SHELLS AND MULTI-ANNULAR PLATES Final Report, 1 Sep. 1984 - 31 Aug. 1985
George J. Simitses, Sayed Nageb Sallam, and Yeoshua Frostig Oct. 1985 159 p
(Grant AF-AFOSR-0243-83)
(AD-A162371; AFOSR-85-1081TR) Avail: NTIS HC A08/MF A01 CSCL 20/11

Buckling of delaminated thin cylindrical shells is investigated. The thin cylinders are axially-loaded and their geometry is virtually isotropic. The effects of boundary conditions, delamination size, and delamination position on the buckling load are studied. Buckling analysis of multi-annular plastes is also presented. The annular sections are made of different materials, their size is varied, and the composite circular plates are supported in various ways. The rigidities of the various parts are varied in order to cover the cases of plates with holes, with rigid inclusion, and ring stiffeners.
GRA

N86-23987# Akron Univ., Ohio. Inst. of Polymer Science.
COMPRESSION OF RUBBER LAYERS BONDED BETWEEN TWO PARALLEL RIGID CYLINDERS OR BETWEEN TWO RIGID SPHERES
A. N. Gent and Byoungkyeu Park Dec. 1985 27 p
(Contract N00014-85-K-0222)
(AD-A162902; TR-1) Avail: NTIS HC A03/MF A01 CSCL 11/10

The stiffness of bonded rubber blocks under small compressive deformations has been studied extensively. A recent review deals with the problem in connection with the use of elastomenc laminaes as bridge bearings. However, previous studies have been mainly concerned with a flat rubber block bonded between two flat rigid plates. An approximate treatment is given here for the stiffness of a rubber layer bonded between two opposed curved rigid surfaces, cylindrical or spherical in shape. The predictions of the theoretical treatment are then compared with measured values of compressive stiffness for various initial separations (and hence rubber layer thicknesses) of the two rigid surfaces, relative to their diameter.
GRA

N86-23988# Illinois Univ., Urbana.
NONLINEAR EARTHQUAKE ANALYSIS OF CONCRETE BUILDING STRUCTURES Final Report
Daniel P. Abrams Sep. 1985 80 p
(Contract N00014-83-D-0689)
(AD-A162967) Avail: NTIS HC A05/MF A01 CSCL 13/13

Proportioning of strength in an earthquake resistant structure is usually based on a linear elastic analysis and a set of equivalent static lateral forces. This design procedure has proven to be reliable on the basis of observed building damage caused by past earthquakes and has been adopted by present building codes. Presently, inelastic design of concrete structures subjected to load reversals is an art much like design of continuous structures subjected to gravity loadings was in the earlier part of the century. Inelastic stiffness characteristics of concrete components have been shown through experiments to be influenced by parameters not previously considered for analysis of structures subjected to montonically increasing forces. Hysteretic behavior of members and connections have been shown to be dependent on opening and closure of flexural and shear cracks, bond-slip mechanisms, softening of reinforcement, and inelasticity of concrete in compression. Because of the complexity of inelastic behavior and the uncertain sequence of ground excitations, several analyses need to be done so that an engineer may develop the judgement needed to implement a particular design. A simple tool needs to be developed for these analyses. The purpose of study described in this report is to develop an analytical technique that considers explicitly both the history of the ground motion, and the nonlinear hysteretic behavior of the structure. The technique is developed using nonlinear resistance characteristics of reinforced concrete structures, however, the basis of the method is applicable to any type of building structure.
GRA

N86-23989# California Univ., Berkeley. Lawrence Berkeley Lab.
COMPARISON OF FATIGUE CRACK PROPAGATION IN MODES 1 AND 3
R. O. Ritchie Jun. 1985 47 p Presented at the 18th American Society for Testing and Materials Symposium, Boulder, Colo., 1 Jun. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002877; LBL-19828; CONF-850679-3) Avail: NTIS HC A03/MF A01

The propagation behavior of fatigue cracks in Mode 3 (anti-plane shear), measured under cyclic torsion, is described and compared with more commonly encountered behavior under Mode 1 (tensile opening) loads. It is shown that a unique, global characterization of Mode 3 growth rates, akin to the Paris law in Mode 1, is only possible if characterizating parameters appropriate to large-scale yielding are employed and allowance is made for crack tip shielding from sliding crack surface interference (i.e., friction and abrasion) between mating fracture surfaces. Based on the crack tip stress and deformation fields for Mode 3 stationary cracks, the cyclic crack tip displacement, (DELTA)CTD/sub III/, and plastic strain intensity range (DELTA)GAMMA/sub III/, have been proposed and are found to provide an adequate description of behavior in a range of steels, provided crack surface interference is minimized. The magnitude of this interference, which is somewhat analogous to crack closure in Mode 1, is further examined in the light of the complex fractography of torsional fatigue failures and the question of a fatigue threshold for Mode 3 crack growth. Finally, micro-mechanical models for cyclic crack extension in anti-plane shear are briefly described, and the contrasting behavior between Mode 3 and Mode 1 cracks subjected to simple variable amplitude spectra is examined in terms of the differing role of crack tip blunting and closure in influencing shear, as opposed to tensile opening, modes of crack growth.
DOE

N86-23990# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.
CALCULATION OF CREEP DEFORMATIONS UNDER RIGOROUS APPLICATION OF THE CONTINUUM-MECHANICAL EQUILIBRIUM CONDITIONS
H. Cords, G. Kleist, and R. Zimmermann Jul. 1985 82 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(JUEL-Spez-321; ISSN-0343-7639) Avail: NTIS HC A05/MF A01

Deformation characteristics and stress changes under the application of rigorous equilibrium conditions were calculated. It is shown that the instability problems of finite element creep calculations are caused by residual restraining. A numerical method to impose creep strains without restraints is examined. The two methods were used to calculate stress relaxation in a thick-walled tube under thermal load and internal as well as external pressure. The results for stress relaxation, which in the case of unrestraining creep strains is treated as an independent relaxation process, are different for the two methods. Creep properties of a circumferentially notched bolt under uniform tension were investigated. The calculations show that in the state of stationary creep the minimum cross section retains its diameter. Experimental results confirm this property for the initial change of the specimen shape. However, a long term extrapolation on a steady state creep

basis underestimates the creep deformations at the notch.
Author (ESA)

N86-23991# Ministerie van Onderwijs en Wetenschappen, s'Gravenhage (Netherlands). Technische Wetenschappelijke Dienst.
INVESTIGATION OF THE NATURE AND IMPORTANCE OF CRACK FORMATION IN A CREEP-LOADED T-SHAPED COMPONENT 4 NIL-RLD [ONDERZOEK NAAR AARD EN OMVANG VAN SCHEURVORMING IN EEN KRUIP BELAST T-STUK (KOMPONENT 4 NIL-RLD PROG.)]
M. Kornalijnslijper and R. Bambach 1 Aug. 1985 17 p In DUTCH
(TWD-87815) Avail: NTIS HC A02/MF A01

The nature and importance of crack formation in a T-shaped component were investigated. The crack occurs in the cheek of the T-shaped component at the bottom of the weld in the heat-affected zone and covers 20% of the circumference (65 mm). The maximum depth is 1.5 to 2 mm, i.e., 15% of cheek thickness. The origin of this very localized damage is found to be creep. The cumulation of factors such as dimensioning, geometry, and the heat treatment accelerate the crack initation and propagation.
Author (ESA)

N85-24523*# John Brown Univ., Siloam Springs, Ark. Dept. of Mechanical Engineering.
A PHOENICS MODEL FOR THE TRIAXIAL LOADING OF AN INITIALLY CYLINDRICAL MASS OF RATE-TYPE MATERIAL WITH PROVISIONS FOR BULGING AND YIELD
kenneth W. French, Jr. *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20K

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-23992 Deutsche Geodaetische Kommission, Munich (West Germany).
RECTIFICATION OF SCANNER IMAGES USING PREDICTION APPROACHES Ph.D. Thesis - Bonn Univ. [ENTZERRUNG VON SCANNERBILDERN MIT PRAEDIKTIONSANSAETZEN]
Andreas Rose Bayerischen Akademie der Wiessenschaften 1984 85 p refs In GERMAN
(SER-C-303; ISBN-3-7696-9353-1; ISSN-0065-5325) Copyright. Avail: Issuing Activity

The rectification of airborne scanner data was investigated. The concept on which the covariance estimation is based, and the resulting prediction formulas are explained; the common ground and differences with the Ebner method are discussed. The developed method was tested on airborne scanner images. The prediction of the image rectification results from the prediction of orientation parameters; the model combines interpolation and parametric methods. A modular programming system was developed to conduct the rectification work; the programming package consists of a prediction and an image processing part. The test results satisfy expectations; a substantial increase in accuracy is obtained. The improvements depend on the number and the quality of the control points.
Author (ESA)

N86-23993# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite, Data, and Information Service.
HYDROLOGIC AND LAND SCIENCES APPLICATIONS OF NOAA POLAR-ORBITING SATELLITE DATA
Michael Matson and Frances Parmenter-Holt [1985] 24 p refs Original document contains color illustrations
Avail: NTIS HC A02/MF A01

Hydrologic and land sciences applications of NOAA polar orbiting satellites presented include: continental snow cover; river basin snow mapping and flood monitoring; soil moisture analysis; vegetation progress and seasonal changes; fire detection and monitoring; urban effects; volcanoes; and geologic assessment.
B.G.

N86-23994*# Delaware Univ., Newark. Coll. of Marine Studies.
REMOTE SENSING INVESTIGATIONS OF WETLAND BIOMASS AND PRODUCTIVITY FOR GLOBAL BIOSYSTEMS RESEARCH Final Technical Report, 1 Nov. 1982 - 1 Apr. 1986
V. Klemas 15 Apr. 1986 25 p refs
(Grant NAGw-374)
(NASA-CR-176725; NAS 1.26:176725) Avail: NTIS HC A02/MF A01 CSCL 08B

The relationship between spectral radiance and plant canopy biomass was studied in wetlands. Spectroradiometer data was gathered on Thematic Mapper wavebands 3, 4, and 5, and correlated with canopy and edaphic factors determined by harvesting. The relationship between spectral radiance and plant canopy biomass for major salt and brackish canopy types was determined. Algorithms were developed for biomass measurement in mangrove swamps. The influence of latitudinal variability in canopy structure on biomass assessment of selected plants was investigated. Brackish marsh biomass estimates were obtained from low altitude aircraft and compared with ground measurements. Annual net aerial primary productivity estimates computed from spectral radiance data were compiled for a Spartina alterniflora marsh. Spectral radiance data were expressed as vegetation or infrared index values. Biomass estimates computed from models were in close agreement with biomass estimates determined from harvests.
Author

N86-23995*# Operations Research, Inc., Landover, Md.
EOS RADIOMETER CONCEPTS FOR SOIL MOISTURE REMOTE SENSING Final Report
Jim Carr 10 Feb. 1986 175 p
(Contract NAS5-28648)
(NASA-CR-177854; NAS 1.26:177854) Avail: NTIS HC A08/MF A01 CSCL 08B

Preliminary work with aperture synthesis concepts for EOS is reported. The effects of nonvanishing bandwidths on image reconstruction in aperture synthesis system was studied. It is found that nonvanishing bandwidths introduce errors in off-axis pixels when naive Fourier processing is used. The net effect is for bandwidth to limit sensor field-of-view. To quantify this effect a computer program was written which is documented. Example runs are included which illustrate the resultant radiometric errors and effective fields-of-view for a plausible simple sensor.
Author

N86-23996# Hydrospace Research Corp., Rockville, Md. Physical Acoustics Div.
THREE-DIMENSIONAL ELASTO-PLASTIC ANALYSIS FOR SOILS Annual Report, 15 Jun. - 14 Aug. 1985
George E. Blandford and Bobby O. Hardin 26 Sep. 1985 170 p
(Grant AF-AFOSR-0195-84)
(AD-A162063; AFOSR-85-1090TR) Avail: NTIS HC A08/MF A01 CSCL 08/13

This report presents the first year accomplishments perfecting the elastoplastic soil constitutive equations of Hardin (1978) and their implementation into Elasto-Plastic Soil Analysis Program (EPSAP). The elastoplastic soil constitutive equations reflect the

essential features of soil behavior that result from the soil skeleton being particulate. Constitutive equation modeling improvements include: (1) crushing of soil particles; (2) strength of soils in terms of effective stress; and (3) modification of the class 1 plastic potential function. The EPSAP is a three-dimensional finite element code which is being developed as part of the research. The developments for EPSAP include expressing the two classes of soil loading in matrix form and their subsequent finite element implementation. The EPSAP includes a three node line load element, six node triangular and eight node quadrilateral surface load elements, and fifteen node prism and twenty node hexahedron domain elements. A predictor-corrector solution algorithm for solving the nonlinear equation and the out-of-core nonsymmetric skyline solver are discussed. Results for a triaxial compression simulation are presented. GRA

N86-23997# Lockheed Missiles and Space Co., Palo Alto, Calif. Research and Development Div.
NUMERICAL GENERATION OF 3D CURVILINEAR COORDINATE SYSTEMS AND COMPUTATIONAL GRIDS FOR AIRCRAFT CONFIGURATIONS Final Technical Report, May 1982 - Jul. 1984
P. D. Thomas and A. K. Whitney Mar. 1985 22 p
(Contract F49620-82-C-0065)
(AD-A162249; LMSC/F035606; AFOSR-85-1058TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report describes the progress in research on the properties of the Lockheed 3-D elliptic grid generation procedure and improvement of its capabilities for treating complex geometric features characteristic of aircraft configurations. Two areas of weakness in the original technique relate to the fundamentally important capability for generating curved-surface grids as a necessary prerequisite for generating 3-D space grids. These weaknesses were: (1) difficulties associated with the limitations of Cartesian coordinates for describing convex surfaces; and problems in controlling the orthogonality of the grid near boundaries. The bulk of the first year's research resulted in development of a generalized system of elliptic grid generation equations that allow both the surface and the grid to be described in terms of an arbitrary system of curvilinear coordinates. Research in the second year was concerned primarily with the problem of grid orthogonality near boundaries. Three approaches investigated to improve the control that the user has over the angle at which grid lines intersect the boundaries were: (1) refinement of the original techniques; (2) development of techniques for marching from a given boundary using the angle as an initial condition; and (3) derivation of a fourth-order system that permits additional boundary conditions on the grid intersection angle. GRA

N86-23998# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
USERS MANUAL FOR THE GENERALIZED COMPUTER PROGRAM SYSTEM OPEN-CHANNEL FLOW AND SEDIMENTATION TABS-2: MAIN TEXT AND APPENDICES A THROUGH O Final Report
William A. Thomas and William H. McAnally, Jr. Aug. 1985 680 p
(AD-A162390; WES/IR/HL-85-1) Avail: NTIS HC A99/MF A02 CSCL 13/2

TABS-2 is a generalized numerical modeling system for open-channel flows, sedimentation, and constituent transport. It consists of more than 40 computer programs to perform modeling and related tasks. The major modeling components--RMA-2V, STUDH, and RMA-4--calculate two-dimensional, depth-averaged flows, sedimentation, and dispersive transport, respectively. The other programs in the system perform digitizing, mesh generation, data management, graphical display, output analysis, and model interfacing tasks. Utilities include file management and automatic generation of computer job control instructions. TABS-2 has been applied to a variety of waterways, including rivers, estuaries, bays, and marshes. It is designed for use by engineers and scientists who may not have a rigorous computer background. Use of the various components is described in Appendices A-O. GRA

N86-23999# Tulsa Univ., Okla.
STABILITY OF NATURAL GAS IN THE DEEP SUBSURFACE Final Report
C. Barker Jul. 1985 86 p refs
(Contract DE-FG05-84ER-13220)
(DE86-002177; DOE/ER-13220/T1) Avail: NTIS HC A05/MF A01

A computer program has been developed for calculating the stabilities of natural gas components in reservoirs of various mineralogies. It finds the minimum free energy in multi-component (up to 70), multiphase (up to 20) systems for conditions corresponding to temperatures and pressures down to 40,000 ft. (12 km) and does not assume ideal gas behavior. These calculations show that methane has considerable stability in sandstone reservoirs even in the presence of feldspars and their clay breakdown products. However, if there is appreciable calcite cement, this tends to thermally decompose at high temperatures and the evolved carbon dioxide then dilutes the methane to give overall gas compositions that are unlikely to be economic. In carbonate systems the main factor influencing methane stability is the presence of sulfur-bearing phases such as anhydrite. The sulfur compounds lead to hydrogen sulfide production and methane is eliminated so that at 40,000 feet the predicted gas composition is CO2-H2S. A computer-controlled, fast-scanning mass spectrometer system has been developed to analyze individual fluid inclusions in deep cements because these contain uncontaminated gas samples from the growth environment. Fluid inclusions are opened in vacuum by thermally-induced decrepitation and the computer program recognizes the abrupt rise in partial pressures for any, or all, of six selected components. The mass spectrometer scans from mass 1 to 65 every 25 msec (which is within the time constraints of a bursting inclusion) and determines each peak height. Fluid inclusions have been analyzed successfully in quartz, calcite, feldspars, galena and other minerals. Calcite cements from the deep Smackover Formation of the Gulf Coast (approx.20,000 feet) show methane-carbon dioxide-hydrogen sulfide compositions that are within the range calculated theoretically. DOE

N86-24000# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
SATELLITE-BORNE 90 GHz RADIOMETER EXPERIMENT (SABREX), PHASE A1
D. Salzer, H. Kietzmann, P. Sliwinski, B. Aumiller, H. Bloetscher, and R. Schmid Jun. 1985 174 p refs
(DFVLR-Mitt-85-13; ISSN-0176-7739) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 51

Flight configurations for a 90 GHz satellite radiometer on a Stretched ROHINI Satellite bus are discussed. The satellite can be flown with its longitudinal symmetry axis in nadir direction (configuration 1) and with its longitudinal symmetry axis in direction of the velocity vector (configuration 2). Configuration 2 has a longer feeding system, lower overall noise due to lower feed system sidelobes, and better scanning possibilities. The main scientific objective of this experiment is the analysis of the capabilities of a 90 GHz satellite radiometer to determine the fluid water content of clouds, to measure low rain rates, to map the cloud cover and extended targets (diameter > 1 km) and to map snow cover. Instrument design, radiometer calibration, data processing, ground support, and development schedule are considered. Author (ESA)

N86-24001# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Hauptabt. Verkehrsforschung.
A TRAVEL DEMAND MODEL BASED ON STATE VARIABLES OF GROUPS OF PERSONS HAVING AN EQUAL SOCIO-ECONOMIC STRUCTURE
Normann Treinies Jan. 1985 83 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-85-51; ISSN-0171-1342) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 26

A model to describe long distance travel activities, using a trip-type variable was derived. This variable is a combination of

travel mode and distance. The individuals are allocated to groups of equal household structure and travel accessibility constraints. Each group has distinct distributions of trip types. The distributions can be interpreted as variables of state of the groups. For such groups an entropy close to a theoretical maximum can be calculated. This can be interpreted as a condition of equilibrium and therefore the observed state of the groups can be expected to be stable if the constraints do not change. Author (ESA)

N86-24002# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Hochfrequenzverfahren.
ARCHIMEDES PROJECT REMOTE SENSING OF OIL SPILLS NORTH SEA EXPERIMENT, OCTOBER 1983. REPORT ON DFVLR (SIDE-LOOKING AIRBORNE RADAR (SLAR) CONTRIBUTION
Franz Witte Sep. 1985 30 p
(DFVLR-FB-85-54; ISSN-0171-1342) Avail: NTIS
HC A03/MF A01; DFVLR, Cologne DM 13

Oil pollution monitoring by SLAR was assessed in flight tests using specially created slicks. The SLAR-system demonstrates its ability to detect and image oil slicks even on a smooth water surface. The received radar backscatter as a function of surface roughness and angle of incidence fluctuates considerably, so the probability to detect oil slicks increases by using steeper depression angles than normal to obtain a large swath width. An important tool to improve the accuracy of classification is the data correction algorithm. The classification quality strongly depends on viewing direction (best perpendicular to the waves) and on the sea state. As expected VV-polarization is the preferable solution for oil slick monitoring with a SLAR. Author (ESA)

N86-24003# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Systems Space Group.
MOMS-01 (MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER) FOR EARTH OBSERVATION: FIRST RESULTS OF STS-7 MISSION
D. Meissner, H. Laucht, J. Bodechtel, and R. Haydn 1985 15 p refs Presented at 1983 Joint International Geoscience and Remote Sensing Symposium (IGARSS 83) and National Radio Science Commission F Meeting, FA-4, San Francisco, Calif., 31 Aug. - 2 Sep. 1983 Previously announced in IAA as A85-35050 Original contains color illustrations
Avail: NTIS HC A02/MF A01

The MOMS design is outlined and results from STS-7 are described. The mission included mapping of different ground targets with low to high contrast and albedo in visible and near infrared part of the spectrum over arid areas, areas with dense and sparse natural vegetation, coastal zones, mountainous regions and open ocean islands. System verification was achieved under space conditions for a 2-channel version to demonstrate the capability for scan line extension and the ability to combine pixel-coincident modules. Author (ESA)

N86-24004# Agricultural Research Service, Beltsville, Md.
NEAR INFRARED REFLECTANCE SPECTROSCOPY (NIRS): ANALYSIS OF FORAGE QUALITY
G. C. Marten, J. S. Shenk, and F. E. Barton Aug. 1985 97 p
(PB86-111523; AGRICULTURE/HB-643) Avail: NTIS
HC A05/MF A01 CSCL 02A

Near infrared reflectance spectroscopy (NIRS) is a nonconsumptive, instrumental method for fast, accurate and precise evaluation of the chemical composition and associated feeding value attributes of forages and other feedstuffs provided the proper procedures are followed. Each of the major organic feed components has absorption characteristics in the near infrared region that are specific to the component. The absorption characteristics primarily determine diffuse reflectance, which gives the means to assess composition. The history of NIRS use for forage quality analysis is reviewed, available equipment and computer software, conventional and NIRS procedures for analysis of forage quality are summarized. GRA

N86-24005# DMEA Ltd., Scottsdale, Ariz.
EXPLORATION FOR STRATEGIC MATERIALS
B. F. Dickerson and C. A. OBrien 1985 210 p refs Sponsored by the Office of Technology Assessment
(PB86-126463) Avail: NTIS HC A10/MF A01 CSCL 08I

The report by the Office of Technology Assessment discusses technologies, methodologies, and the effects of technical and nontechnical factors on exploration for on-shore deposits of strategic materials. Author

N86-24006# Bureau of Mines, Juneau, Alaska. Field Operations Center.
ANALYSIS OF SAMPLING VARIANCE FROM CERTAIN PLATINUM AND PALLADIUM DEPOSITS IN ALASKA Report of Investigations, 1985
J. C. Barker, D. L. Thomas, and D. B. Hawkins 1985 34 p refs
(PB86-108743; BM-RI-8948; LC-84-27421) Avail: NTIS
HC A03/MF A01 CSCL 08I

The analytical variability encountered when sampling for platinum-group metals (PGM) was statistically evaluated. Sampling procedures were designed to systematically incorporate commonly used reconnaissance exploration techniques under actual field conditions. Analytical variability was evaluated at each procedural step. Analytical data from each sample from a single deposit grouped relatively well around the calculated mean for that deposit. GRA

N86-24547*# Alabama Univ., Birmingham. Dept. of Physics.
SOME ENERGY CONSIDERATIONS IN GAMMA RAY BURST LOCATION DETERMINATIONS BY AN ANISOTROPIC ARRAY OF DETECTORS
John H. Young *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03B

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-24007*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.
SUPERLATTICES AND NIPI STRUCTURES IN NEW FORMS OF CASCADE SOLAR CELLS Semiannual Report, 23 Oct. 1985 - 22 Apr. 1986
J. P. Leburton and K. Hess [1986] 11 p
(Grant NAG3-507)
(NASA-CR-176718; NAS 1.26:176718; SAR-4) Avail: NTIS
HC A02/MF A01 CSCL 10A

The activity in the field of photovoltaic semiconductor superstructures is described. Progress was accomplished in the two principal directions previously defined in our initial proposal, i.e.: (1) Theoretical investigation of the optical properties of superlattices; and (2) New solar cell concepts and device modeling. Although important information concerning the optical constants of superlattices and multiple quantum well structures was obtained from our computer model, most of the theoretical efforts have progressively shifted from the former to the latter aspect of the project because of the discovery of a new kind of photovoltaic device which may exhibit improved performances with respect to conventional solar cells. Author

N86-24008*# Tennessee Univ. Space Inst., Tullahoma.
AN EXACT SOLUTION FOR THE SOLIDIFICATION OF A LIQUID SLAB OF BINARY MIXTURE Final Report, 2 Jan. 1985
B. N. Antar, F. G. Collins, and A. E. Aumalia Washington NASA Mar. 1986 77 p refs
(Contract NAS8-34268)
(NASA-CR-3962; NAS 1.26:3962) Avail: NTIS HC A05/MF A01 CSCL 11F

The time dependent temperature and concentration profiles of a one dimensional finite slab of a binary liquid alloy is investigated during solidification. The governing equations are reduced to a set of coupled, nonlinear initial value problems using the method outlined by Meyer. Two methods will be used to solve these equations. The first method uses a Runge-Kutta-Fehlberg integrator to solve the equations numerically. The second method comprises of finding closed form solutions of the equations. Author

N86-24009*# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.
FUEL CELL ELECTROCATALYSIS Annual Report, 1985
P. N. Ross, Jr. Jan. 1986 15 p refs
(Contract DE-AC03-76SF-00098)
(NASA-CR-176746; NAS 1.26:176746; LBL-21038; UC-93-A) Avail: NTIS HC A02/MF A01 CSCL 10A

Commercialization of phosphoric acid fuel-cell technology requires a capital cost reduction and an extension of power section life compared to currently available technology. Significant capital cost reduction can be achieved if an oxygen-reduction catalyst which is catalytically more active than Pt supported on graphitized carbon black can be developed. The physical and chemical understanding of oxygen-platinum-ligand interaction necessary for the rational selection of alloying components were studied. Fundamental studies of the Pt alloy-electrolyte interface using modern surface science techniques should provide the means to optimize the alloy ligand or to redirect the search for more active materials along the most rational paths. Alloying may have significant beneficial effects on electrode performance above and beyond effects on the oxygen-reduction kinetics, (reduced Pt dissolution and surface-area loss). These additional alloying effects will also be studied at the atomic level, (surface reconstruction and surface self-diffusion). Author

N86-24010*# National Academy of Sciences - National Research Council, Washington, D. C.
SPACE STATION ENGINEERING AND TECHNOLOGY DEVELOPMENT. PROCEEDINGS OF THE PANEL ON SOLAR THERMODYNAMICS RESEARCH AND TECHNOLOGY DEVELOPMENT, JULY 31, 1985
Oct. 1985 88 p Meeting held in Cleveland, Ohio, 31 Jul. 1985
(Contract NASw-4003)
(NASA-CR-176756; NAS 1.26:176756; PB86-140076) Avail: NTIS HC A05/MF A01 CSCL 10A

Solar thermodynamics research and technology is reported. Comments on current program activity and future plans with regard to satisfying potential space station electric power generation requirements are provided. The proceedings contain a brief synopsis of the presentations to the panel, including panel comments, and a summary of the panel's observations. Selected presentation material is appended. Onboard maintainability and repair in space research and technology plan, solar thermodynamic research, program performance, onboard U.S. ground based mission control, and technology development rad maps from 10 C to the growth station are addressed. GRA

N86-24011# GA Technologies, Inc., San Diego, Calif.
VARIABLE BAND GAP MATERIALS FOR THERMOPHOTOVOLTAIC GENERATORS Final Technical Report, 15 Aug. 1984 - 15 Aug. 1985
Lawrence D. Woolf, John C. Bass, and Norbert B Elsner Sep. 1985 132 p
(Contract F49620-84-C-0105)
(AD-A161987; GA-A18140; AFOSR-85-1069TR) Avail: NTIS HC A07/MF A01 CSCL 10/2

Thermophotovoltaic (TPV) properties of InGaAs cells with band gaps of either 1.15 or 1.2 eV, GaAs cells, and Si cells were investigated. In particular, dark and illuminated current vs voltage characteristics were obtained for a number of these concentrator cells at cell temperatures ranging from 300 to 550 K and currents varying from 10 to the minus 8th power to 10 A. Based on these data, the temperature dependence of the TPV efficiency for each of these cells was inferred for a fixed value of the parasitic absorption of the below-band-gap energy photons. For a given weighted parasitic absorption of 5%, the InGaAs cells have a significantly higher TPV efficiency than the GaAs or Si cells. TPV efficiencies approaching 40% at 300 K and 26% at 500 K appear feasible for the InGaAs cells. Based on these data, it was calculated that the specific mass of a space-based nuclear-TPV energy conversion system would be 10 kg/KW if InGaAs cells with 5% weighted parasitic absorption were used. In addition, a theoretical model was developed for determining the optimum efficiency of single and multiple band gap cells in TPV energy conversion. GRA

N86-24012# Minnesota Univ., Minneapolis. Dept. of Mechanical Engineering.
HIGH-TEMPERATURE SOLAR ENERGY RESEARCH AT THE UNIVERSITY OF MINNESOTA Technical Report, 1 Jul. 1984 - 31 Oct. 1985
Edward A. Fletcher 15 Nov. 1985 15 p
(Contract N00014-82-K-0523)
(AD-A162047; TR-7) Avail: NTIS HC A02/MF A01 CSCL 10/2

Solar energy, coming from a 5800K source, has thermodynamic value that is now becoming widely recognized for use in thermodynamic processes. For about ten years a small group at the Univ. of Minnesota has been conducting analytical and experimental studies which have the objective of using the sun's thermodynamic potential, both for chemical processing and for solar energy storage. This paper summarizes the published work, describes ongoing as yet unpublished work, and suggests future work. The emphasis is on both shorter and long range applications to industrial processes. GRA

N86-24013# Army Construction Engineering Research Lab., Champaign, Ill.
PHOTOVOLTAIC POWER SYSTEM PERFORMANCE: A CASE STUDY AT FORT HUACHUCA, ARIZONA Final Report
D. M. Joncich and R. A. Ducey Oct. 1985 24 p
(Contract MIPR-A1049)
(AD-A162248; CERL-TR-E-86/01) Avail: NTIS HC A02/MF A01 CSCL 10/2

A 5-kW-peak, grid-connected, photovoltaic (PV) power system is described. The PV system in service at the Holman Guest House, Fort Huachuca, Ariz., is evaluated for baseline data that will allow comparisons to be made with other PV systems. Designed and installed at a cost of $112,000, the system was funded by the Department of Energy's Federal Photovoltaic Utilization Program. Performance data gathered during 1983 by Arizona State University are summarized. The Holman Guest House power system provided nearly 8600 kWh of electricity during the test period, with no system failure and only minimal maintenance. This corresponds to approximately 11 percent of the facility's electrical requirement. If the system operates reliably for 20 years, the cost of photovoltaic energy would be roughly $0.50/kWh. Based on information gained from the demonstration project, the feasibility of future photovoltaic systems is discussed. GRA

N86-24014# National Bureau of Standards, Gaithersburg, Md. Ceramics Div.
SURVEY OF ALTERNATE STORED CHEMICAL ENERGY REACTIONS Annual Report, 25 May 1984 - 25 May 1985
L. P. Cook and E. R. Plante Dec. 1985 109 p
(Contracts N00014-83-F-0117; N00014-84-F-0204)
(AD-A163094; NBSIR-85-3282) Avail: NTIS HC A06/MF A01 CSCL 20/13

A survey of eight alternative liquid metal stored chemical energy reactions has been made for purposes of comparison with the lithium-aluminum/water, lithium/sulfur hexafluoride, and other

reaction schemes. The objective of this study was to survey the potential of these eight reactions as alternate stored chemical energy systems and to develop priorities for future study. Experimental data on the products of reaction and kinetics of reaction are presented for: Li/H2O; H2/O2, Li/H2O; NaO2/H2O; H2/O2, MgAl/H2O; H2/O2, and LiAl/ClO3F. These data have been collected using thermogravimetry and Knudsen effusion mass spectrometry, with X-ray diffraction analysis of experimental products. Among other results, the data show that the aluminum component of the fuels is relatively inert to oxidation up to 650 C. Above this temperature, materials limitations have hampered the collection of experimental data. Thermodynamic analysis has been used to extend the data on each of the eight reaction schemes, and to predict the chemical reaction which best represents the complete oxidation of each fuel by the indicated oxidant at 1100 K. Enthalpies have been calculated for each fuel/oxidant combination. Safety considerations are also discussed for each. GRA

N86-24015# Naval Surface Weapons Center, Silver Spring, Md.
CALCULATED AND MEASURED BATTERY VOLTAGES - THERMODYNAMICS AIDS IN IDENTIFYING ELECTROCHEMICAL REACTIONS Final Report, Mar. - Jun. 1984
Larry E. DeVries Feb. 1985 20 p
(AD-A163103; NSWC/TR-85-228) Avail: NTIS HC A02/MF A01 CSCL 10/3

Both the open and closed circuit voltages of a battery depend on the thermodynamic conditions inside the cell. When the actual electrochemical reaction of a particular battery is unknown, thermodynamic calculations can help to identify it. Using thermodynamics data, the open circuit voltages for alternatively electrochemical reactions can be calculated. When accurate data are available, the calculated voltage for the correct electrochemical reaction will agree to within millivolts with the measured value. For the Cl2-Li molten salt system, the calculated and measured values are both 3.612V at 2773K. For alkaline zinc batteries, the data indicate that Zn0 is the discharge product at the anode under ambient conditions. for the acid Mn02-Zn system, under the thermodynamic conditions, a two electron reduction of Mn02 occurs. Initially, in the alkaline Mn02-Zn system. Mn(OH) 4 is the discharge product at the cathode. GRA

N86-24016# Department of the Navy, Washington, D. C.
AN AIR-ELECTRIC POWERED HYBRID MOTOR Patent Application
Warren Seering, inventor (to Navy) Filed 2 Jul. 1985 11 p
(AD-D012052; US-Patent-Appl-SN-750952) Avail: NTIS HC A02/MF A01 CSCL 10/2

An air-electric powered hybrid motor combines the high performance and lightweight characteristics of a pressurized air-powered motor means which is coupled to an electric motor means having a high positional accuracy. The hybrid motor can be made reversible by interchanging symmetrical air input and output ports. GRA

N86-24017# Sandia National Labs., Albuquerque, N. Mex.
GaAs/SILICON MECHANICALLY STACKED, MULTIJUNCTION SOLAR CELL
J. M. Gee, R. Y. Loo, G. S. Kamath, and R. C. Knechtli 1985 15 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985 Prepared in cooperation with Hughes Research Labs., Malibu, Calif.
(Contract DE-AC04-76DP-00789)
(DE86-002119; SAND-85-1205C; CONF-851043-9) Avail: NTIS HC A02/MF A01

A GaAs/silicon mechanically stacked, multijunction solar cell has been experimentally and theoretically investigated. Theoretical calculations predict efficiencies over 30% for this cell and indicate that the penalty for using a non-optimal combination of bandgaps is small when the cells are operated independently. Preliminary experiments achieved 24.7% at 70X. A detailed analysis of the experimental results allowed estimation of the various loss mechanisms in the stack and projection of the performance of an optimized stacked cell. An optimized GaAs/silicon MSMJ cell should be able to achieve efficiencies near 30% under concentration. DOE

N86-24018# Sandia National Labs., Albuquerque, N. Mex.
COMPARISON OF PHOTOVOLTAIC SYSTEM OPTIONS FOR TODAY'S AND TOMORROW'S TECHNOLOGIES
H. N. Post, D. E. Arvizu, and M. G. Thomas 1985 13 p Presented at the 18th IEEE Photovoltaic Specialists Conference, Las Vegas, Nev., 21 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002120; SAND-85-1186C; CONF-851043-10) Avail: NTIS HC A02/MF A01

This paper presents a detailed cost comparison of five competing photovoltaic (PV) system options for large-size power plants. These five options include fixed, one-axis tracking and two-axis tracking flat plate collectors as well as concentrator collectors utilizing linear and point focus Fresnel optics. Total estimated system costs for each option are developed reflecting current technology as well as future technology expected in the mid-1990's timeframe. The main conclusion drawn from this comparison is that none of the five competing options in a high insolation location is a clear winner over the others for tomorrow's technologies. DOE

N86-24019# Pacific Northwest Lab., Richland, Wash.
BUSINESS DEVELOPMENTS OF NONTHERMAL SOLAR TECHNOLOGIES
S. A. Smith, R. L. Watts, and T. A. Williams Oct. 1985 45 p
(Contract DE-AC06-76RL-01830)
(DE86-002150; PNL-5628) Avail: NTIS HC A03/MF A01

Information on the developments of nonthermal solar technologies is presented. The focus is on the success of wind energy conversion systems (WECS) and photovoltaics. Detailed information on the installed generating capacity, market sectors, financing sources, systems costs and warranties of WECS and photovoltaic systems is summarized. DOE

N86-24020# Los Alamos National Lab., N. Mex.
GENERAL-PURPOSE HEAT SOURCE SAFETY VERIFICATION TEST SERIES: SVT-7 THROUGH SVT-10
T. G. George and D. Pavone Sep. 1985 53 p
(Contract W-7405-eng-36)
(DE86-003282; LA-10408-MS) Avail: NTIS HC A04/MF A01

The General-Purpose Heat Source (GPHS) is a modular component of the radioisotope thermoelectric generator that will supply power for the Galileo and Ulysses (formerly ISPM) space missions. The GPHS provides power by transmitting the heat of (238)PuO2 (ALPHA)-decay to an array of thermoelectric elements. Because the possibility of an orbital abort always exists, the heat source was designed and constructed to minimize plutonia release in any accident environment. The Safety Verification Test (SVT) series was formulated to evaluate the effectiveness of GPHS plutonia containment after atmospheric reentry and Earth impact. The first report (covering SVT-1 through SVT-6) described the results of flat and side-on module impacts. This report describes module impacts at angles of 15(0) and 30(0). DOE

N86-24021# Oak Ridge National Lab., Tenn.
ENERGY STORAGE OPTIONS FOR SPACE POWER
H. W. Hoffman, J. F. Martin, and M. Olszewski 1985 31 p Presented at the 2nd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 14 Jan. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003307; CONF-850103-13) Avail: NTIS HC A03/MF A01

Including energy storage in a space power supply enhances the feasibility of using thermal power cycles (Rankine or Brayton) and providing high-power pulses. Review of storage options (superconducting magnets, capacitors, electrochemical batteries, thermal phase-change materials (PCM), and flywheels) suggests that flywheels and phase-change devices hold the most promise. Latent heat storage using inorganic salts and metallic eutectics offers thermal energy storage densities of 1500 to 2000 kJ/kg at temperatures to 1675 K. Innovative techniques allow these media

to operate in direct contact with the heat engine working fluid. Enhancing thermal conductivity and/or modifying PCM crystallization habit provide other options. Flywheels of low-strain graphite and Kevlar fibers have achieved mechanical energy storage densities of 300 kJ/kg. With high-strain graphite fibers, storage densities appropriate to space power needs (approx. 550 kJ/kg) seem feasible. Coupling advanced flywheels with emerging high power density homopolar generators and compulcators could result in electric pulse-power storage modules of significantly higher energy density. DOE

N86-24022# Pacific Northwest Lab., Richland, Wash.
ROTATIONALLY SAMPLED WIND AND MOD-2 WIND TURBINE RESPONSE Final Report
J. R. Connell, R. L. George, V. R. Morris, and V. A. Sandborn Nov. 1985 131 p
(Contract DE-AC06-76RL-01830)
(DE86-003367; EPRI-AP-4335) Avail: NTIS HC A07/MF A01

In an effort to learn more about how wind behaves near wind turbines, researchers rotationally sampled winds by attaching sensors to the blades of a MOD-2 wind turbine. This fieldwork demonstrates the feasibility of a blade-mounted measuring technique and provides new data on the winds encountered by a rotating turbine blade. DOE

N86-24023# Pacific Northwest Lab., Richland, Wash.
LONG-TERM PERFORMANCE AND COST GOALS FOR SOLAR THERMAL TECHNOLOGY
T. A. Williams Apr. 1985 18 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004023; PNL-SA-13036; CONF-851125-18) Avail: NTIS HC A02/MF A01

Long term performance and cost goals recently developed for the solar thermal technology are described. These goals were developed in support of the draft 1985 to 1989 National Solar Thermal Technology Program Five Year Research and Development Plan, and are intended to aid in planning research activities needed to make solar thermal energy an option which is both technically and economically attractive (DOE 1984). Goals were developed for both utility electric applications and for industrial process heat applications. Solar thermal technology goals are intended to provide targets, which when met, would result in the widespread usage of solar thermal technologies in the marketplace. The goals described include system goals and component goals. System goals are energy price targets which must be met for solar thermal to be economically viable in a given market. Component goals are performance and cost targets for the primary elements of a solar thermal plant (concentrators, receivers, etc.) which would allow achievement of the system level goal. DOE

N86-24024# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse de Systemes.
THE REDUCTION OF RADIATION DAMAGE IN SOLAR CELLS. A STUDY OF RADIATION DEFECTS IN SILICON Final Report
Jacques Bernard (ONERA, Toulouse, France), Rene Reulet (ONERA, Toulouse, France), Michel Roux (ONERA, Toulouse, France) 06(Inst. Superieur d'Electronique du Nord, Lille, France), Danielle Bielle-Daspet, Michel Lagouin, Jacques Bourgoin, Didier Stievenard (Inst. Superieur d'Electronique du Nord, Lille, France), Luis Castaner-Munoz (Escuela Tecnica Superior de telecomunicacion, Barcelona, Spain), Ramon Alcubilla (Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Barcelona, Spain), Luis Prat (Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Barcelona, Spain) et al Paris ESA Jan. 1983 219 p refs
(Contract ESTEC-4510/80-NL-JS)
(LAAS-2755; ESA-CR(P)-2118) Avail: NTIS HC A10/MF A01

In order to quantitatively predict the degradtion of solar cells under space conditions a theoretical and experimental study was carried out. The effects of resistivity (10 and 1 ohm cm), doping (boron or gallium) and oxygen on the degradation induced by energetic electrons and illumination on silicon solar cells were evaluated. The room temperature degradation of GaAs strucures was studied. A Gallium doped silicon appears promising for improved solar cells. Capacitance transient spectroscopy results show that the behavior of hole traps agrees with the variation of the solar cell parameters. The GaAs results indicate that the total recovery of the 1 MeV irradiation defects is obtained by 20 min annealing at 220 C, but defect production and recovery may vary with the structure technology. Author (ESA)

N86-24025# AEG-Telefunken, Wedel (West Germany).
ALTERNATIVE MODULE CONFIGURATIONS FOR ADVANCED SOLAR ARRAYS ON LOW ORBIT AND EXTENDED LIFETIME MISSIONS (AMOC 1) Final Report
D. Gringel, J. Koch, and W. Schmitz Paris ESA Jan. 1985 166 p
(Contract ESTEC-5508/83-NL-PB(SC))
(ESA-CR(P)-2129) Avail: NTIS HC A08/MF A01

The applicability and power improvement of the p-grid solar cell for low Earth orbit missions were assessed. The power improvement predicted analytically is confirmed by electrical performance measurements. Two measurement methods were used: separate illimination of front and rearside; and simultaneous illumination of front and rearside. Bifacial cells were bonded onto window type and continuous type substrates for electrical performance determination. Test samples composed of different substrate materials covered with solar cells or glass dummies were tested with respect to the expected thermal environment and mechanical behavior. Three favorable substrate designs were selected for a thermal cycling test: glass or carbon fiber reinforced Kapton modules, and treated glass cloth module. Electric performance increase is 10% to 15% after 15,000 cycles at plus or minus 100 C, compared to standard BSFR cells. Author (ESA)

N86-24026# Consultancy Services Wind Energy Developing Countries, Amersfoort (Netherlands).
COST OF WINDMILL IRRIGATION. COST ANALYSIS OF WIND PUMPS AND DIESEL PUMPS USED FOR SMALL SCALE IRRIGATION
A. M. Mueller and A. M. Jansen Jun. 1984 15 p
(CWD-84-3) Avail: NTIS HC A02/MF A01

A cost analysis and a method to make a quick economic comparison between wind pumps (water-pumping windmills) and diesel pumps (diesel powered water pumps) intended for use in small-scale lift irrigation are described. The analysis compares CWD wind pumps, designed for production in developing countries, with commercially available, traditional multiblade wind pumps. The variables required for comparison are: static lift, daily water requirement, and average wind speed during the period of irrigation. The analysis shows that for farmers engaged in small-scale lift irrigation on areas of up to 1 ha (2.5 acres), CWD wind pumps are economically more attractive than diesel pumps for average wind speeds during the irrigation season of > 3.5 m/sec (7.8 mph). Commercial wind pumps are more attractive than diesel pumps for an average wind speed of > 4.5 m/sec (10.1 mph). Author (ESA)

N86-24027# Consultancy Services Wind Energy Developing Countries, Amersfoort (Netherlands).
TECHNICAL SPECIFICATIONS WIND PUMP MODELS CWD 2000, CWD 2740 AND CWD 5000 CW
1985 4 p
Avail: NTIS HC A02/MF A01

Technical specifications for windpowered pumps designed for developing countries are presented. Specifications include a service life of 10 yr, the use of locally available materials, the use of elementary construction techniques and equipment, and easy maintenance and servicing. The designs enable a decentralized production of windmills, while servicing may largely be done by the users themselves. Author (ESA)

N86-24028# Brookhaven National Lab., Upton, N. Y.
FUEL CELL REACTIONS IN SUPER ACID ELECTROLYTES

Annual Report, Jun. 1984 - Jun. 1985
W. E. OGrady Oct. 1985 36 p Sponsored by Gas Research Inst.
(PB86-125135; GRI-5081-260-0584) Avail: NTIS HC A03/MF A01 CSCL 07D

The series of acids including (CF3)2POOH, C6FCHFSO3H, SF5CHFSO3H, (CF3SO2)2CH2, CF3CHFSO3H and CF3CHFCF2WO3H have been tested as fuel cell electrolytes. The (CF3)2POOH and CgF5SO3H both have high vapor pressures and hence will not be useful as fuel cell electrolytes. Oxygen reduction in SF5CHFSO3H, (CF3SO2)2CH2 and CF3CHFSO3H is comparable to that obtained in the perfluoro mono and disulfonic acids tested previously and they show some promise. The CH3CHFCH2SO3H appears to have a different mechanism for oxygen reduction than all the previously tested acids. There is some question about the stability of CF3CHFCF2SO3H. It has been demonstrated that the entropy change occurring at the hydrogen electrode in the perfluorosulfonic acid is higher in normal mineral acids and it is a function of the acid concentration. GRA

N86-24529*# Alabama Univ., Huntsville. Dept. of Electrical and Computer Engineering.
MODELING AND ANALYSIS OF CASCADE SOLAR CELLS
Fat Duen Ho *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 23 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 10A

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-24029 California Univ., Davis.
RELATIONSHIP BETWEEN MODEL COMPLEXITY AND DATA BASE QUALITY FOR COMPLEX TERRAIN TRACER EXPERIMENTS AUT 01LANGE, ROLF Ph.D. Thesis
1985 150 p
Avail: Univ. Microfilms Order No. DA8521213

The relationship between numerical air quality model complexity and experimental data base quality (density) is examined for tracer scenarios in complex terrain under stable nighttime drainage flow conditions. To eliminate model to model incompatibilities and resolution variables, a single particle-in-cell model is developed that can be operated in a range of complexity, from a three-dimensional time variable transport and K-theory diffusion model with terrain to a simple steady state Gaussian plume model. The experimental data set used, consists of extensive meteorological data and tracer samples taken during a nighttime drainage flow tracer release scenario in an eight kilometer long valley. A matrix of computer runs was made on a CDC 7600, using a mass conservative transport and diffusion model in version of decreasing skill representing the rows, and meteorological input data sets of decreasing quality representing the columns. Dissert. Abstr.

N86-24030 Arkansas Univ., Fayetteville.
A LABORATORY STUDY OF SINGLE SULFATE AEROSOLS USING ELECTRODYNAMIC SUSPENSION Ph.D. Thesis
James Frederick Spann, Jr. 1984 107 p
Avail: Univ. Microfilms Order No. DA8528950

Bithermal isopiestic measurements of the water vapor pressure of the (NH4)2SO4-NH4HSO4-H2O system at room temperature were made using single nanogram particles electrodynamically suspended in a modified quadrupole trap. Particle composition changed from NH4HSO4 to (NH4)2SO4 as NH3 gas was absorbed in situ. Particle relative mass during solid liquid phase transformations was measured with an electrostatic balance. Constant water activity curves for both dilute and supersaturated solutions are displayed on a (NH4)2SO4-NH4HSO4-H2O phase diagram. From these measurements, a model is presented to explain the dynamics of dissolving mixed crystals. Applying electrolyte solution thermodynamics, values of the activity coefficient for aqueous solutions of (NH4)2SO4 and NH4HSO4 are calculated. The measured water activity of the various ammonium-hydrogen-sulfate solutions is compared to the predicted value of two models. The free energy of formation for the three crystalline structures of (NH4)2SO4, (NH4)3H(SO4)2 and NH4HSO4 is approximated using the Gibbes-Duhem relation and our measured values of saturated solutions. Dissert. Abstr.

N86-24031 Washington Univ., St. Louis, Mo.
THE CONTRIBUTION OF FINE PARTICLE SULFATES TO LIGHT SCATTERING IN ST. LOUIS Ph.D Thesis
Teri Lynn Vossler 1985 135 p
Avail: Univ. Microfilms Order No. DA8529983

The extent to which sulfates produce visibility reduction in the St. Louis area was examined. The contribution of fine aerosol sulfates to total light scattering was calculated from measured sulfur size distributions and Mie theory of light scattering. The aerosol was collected during both a summer and a winter season. Short sampling intervals (10 minutes to 3 hours) permitted observation of the fine structure of the sulfur size distribution and concentration, and involved only small changes in meteorology. Size separation was accomplished with an 8 stage low pressure impactor. Elemental sulfur was measured by flash volatilization and flame photometric detection. All fine sulfur was assumed to be in the form of (NH4)2SO4. Water which might be associated with this deliquescent aerosol was estimated. Two basic types of sulfur size distributions were observed. The most common type observed during the summer had a major sulfur mass peak between 0.5 micrometer and 1.0 micrometer in diameter. This size particle scatters light more efficiently than other particles. Calculation of individual sample scattering efficiencies indicated that during the summer, the (NH4)2SO4 fraction of the total particle light scattering increased with decreasing visibility. No such pattern was observed for the winter samples. The combination of large sulfate particles and high sulfate loadings led to the dominance of sulfates in visibility reduction during the summer. Dissert. Abstr.

N86-24032# Naval Ocean Systems Center, San Diego, Calif.
SPECIFICATION OF BUTYLTINS AND METHYLTINS IN SEAWATER AND MARINE SEDIMENTS BY HYDRIDE DERIVATIZATION AND ATOMIC ABSORPTION DETECTION Interim Technical Report, Jan. 1983 - Mar. 1985
A. O. Valkirs, P. F. Seligman, G. Vafa, P. M. Stang, and V. Homer Jul. 1985 44 p
(AD-A161872; NOSC-TR-1037) Avail: NTIS HC A03/MF A01 CSCL 08/10

A sensitive and selective speciation method for direct determination of butyltins in seawater and marine sediments has been developed from published methods previously discussed in scientific literature. Monobutyltin, dibutyltin, and tributyltin may be detected in natural seawater samples at concentrations below 0.01 microgram/liter. Sample stability during frozen storage in polycarbonate plastic containers were evaluated and found to be consistent over a 100-day storage period. Analysis of seawater samples by standard additions has compared well with butyltin concentrations, determined by callibration curve calculations in samples collected from open harbor sites. Less agreement between standard addition and calibration curve calculation of butyltin concentrations was seen when marine sediments were analyzed by direct borohydride derivatization. Greater problems with sample homogeneity and potential matrix interferences from high hydrocarbon and sulfide concentrations complicate marine sediment analysis. Some form of a sample pretreatment may be necessary to better determine butyltin concentrations in complex marine sediments. Author (GRA)

N86-24033# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
SOUTHWEST MISSISSIPPI TRIBUTARIES STUDY AREA ENVIRONMENTAL INVENTORY: WILDLIFE RESOURCES Final Report

Wilma A. Mitchell and Chester O. Martin Sep. 1985 41 p
(AD-A161894; WES/MLP/EL-85-3) Avail: NTIS
HC A03/MF A01 CSCL 06/3

This report is an inventory and assessment of wildlife resources of the Southwest Mississippi Tributaries Basin. The study provides information on physiographic features, soils, land use and cover types, forest communities (including data and maps on forest cover), wildlife management areas, hunting and recreational uses of wildlife (including tabular summaries of harvest data), fur harvest and prices, nongame species, and threatened and endangered species. Supplemental information includes descriptions of the soils of countries within the basin, habitat capability indices for the Homochitto National Forest, fur bearer harvest data for counties in the basin for 1979 to 1983 breeding bird survey data obtained in Southwest Mississippi between 1966 and 1983, and 1973 to 1982 Christmas bird counts taken at Natchez, Miss. GRA

N86-24034# Army Cold Regions Test Center, APO Seattle, Wash. 98733.
VEGETATION AND ENVIRONMENTAL GRADIENTS OF THE PRUDHOE BAY REGION, ALASKA
Donald A. Walker Sep. 1985 238 p
(AD-A162022; CRREL-85-14) Avail: NTIS HC A11/MF A01 CSCL 06/3

The following topics are discussed: description of the region (topography, geology, climate, soils, wildlife, oil-field facilities, environmental impacts); microscale gradients; plant communities along the major microscale gradients, aerial analysis of vegetation and other geobotanical units, influence of microscale patterns on soil factors and individual plant taxa; mesoscale gradients; macroscale gradients; floristic analysis; growth of salix lanata along the summer temperature gradient; annotated plant checklist for the Prudhoe Bay region; environmental and species data for the permanent study plots; environmental and vegetation data summaries for all stand types; supplementary floristic data. GRA

N86-24035# Cambridge Univ. (England). Dept. of Engineering.
A WORKSHOP ON ENVIRONMENTAL TECHNOLOGY ASSESSMENT HELD AT THE UNIVERSITY OF CAMBRIDGE, ENGLAND HELD ON 24-26 APRIL, 1985
P. W. R. Beaumont, R. K. Jain, and R. S. Engelbrecht 1985 431 p Workshop held in Cambridge, England, 24-26 Apr. 1985
(Contract DAJA45-84-M-0363)
(AD-A162879) Avail: NTIS HC A19/MF A01 CSCL 13/2

The following topics are discussed: regulative and technical measures for air pollution control in the Federal Republic of Germany; abatement technologies for air pollutants; economic issues in the control of air pollution; megatrends in water treatment technologies; emerging technologes in the water supply industry, trends in water treatment technology (disinfection, oxidation and adsorption); water treatment research and development: a European viewpoint; wastewater treatment and management of resulting residues; wastewater treatment with coagulating chemicals; waste water treatment by fixed films in biological aerated filters; technologies for treatment and management of selected hazardous/toxic wastes; cement-based stabilization/solidification processes for the disposal of toxic wastes; hazardous waste: status and future trends of treating technologies; the EEC Directive on Environmental Assessment and its effect on UK environmental policy; environmental regulation formulation and administration; UK pollution control - legal perspectives; and evolution of technology strategies in environmental policy formulation. GRA

N86-24036# Spectral Sciences, Inc., Burlington, Mass.
HCL MONITOR. PHASE 1 Final Report, 19 Sep. 1984 - 19 Mar. 1985
L. S. Bernstein, M. W. Matthew, and F. Bien Dec. 1985 35 p
(Contract F08634-84-C-0312)
(AD-A163119; TR-74; AFESC/ESL-TR-85-25) Avail: NTIS
HC A03/MF A01 CSCL 17/5

Because of potential environmental effects from the large quantities of HCl released into the atmosphere from Space Shuttle launches it is important to monitor the transport of HCl in both vapor and aerosol form into the surrounding areas. During Phase 1 of the Air Force 1984 to 1985 SBIR program, Spectral Sciences, Incorporated investigated the feasibility of developing a man portable HCl monitor capable of unattended operation. The major Phase 1 objectives were to experimentally demonstrate a novel infrared light source and to design an HCl monitor, based on the new infrared source, which would be build and field tested in Phase 2. The spectral output of the HCl infrared lamp was measured and was found to be consistent with earlier theoretical predictions. This HCl lamp was used in conjunction with a room temperature HCl absorption cell to demonstrate the potential sensitivity of the approach to measure small ambient HCl concentrations. Even with the relatively crude nature in which the emission-absorption measurements were made, it was possible to demonstrate detectable absorption down to 2 ppm for a field instrument. With the improved HCl lamp design and the real time self calibrating optical layout presented in this proposal, there is confidence that ambient HCl concentrations as low as 0.1 ppm can be detected with the Phase 2 instrument. GRA

N86-24037# Brookhaven National Lab., Upton, N. Y.
TRACE GAS AND AEROSOL MEASUREMENTS AT WHITEFACE MOUNTAIN, NEW YORK
T. J. Kelly Sep. 1985 116 p
(Contract DE-AC02-76CH-00016)
(DE86-002504; BNL-37110) Avail: NTIS HC A06/MF A01

This report presents the results of a 12-month program of atmospheric chemical measurements performed at Whiteface Mountain, New York. The purpose of this program was to study the concentrations and seasonal variability of several atmospheric chemical species which are of importance in the acid deposition issue. Whiteface Mountain (WFM) was chosen as the site of these measurements because it lies in the Adirondack Mountains of New York State, one of the areas considered susceptible to ecological damage from acid deposition. These measurements were the first long term study of atmospheric chemistry in the Adirondacks. Continuous real-time measurements of SO2 and NO sub x were made with commercial instruments modified for increased sensitivity and stability, and aerosol composition, HNO3 and SO2 were measured with a three-stage filter pack. The main conclusions of this work are: (1) that concentrations of gaseous SO2 and NO sub x are highest in the winter months, whereas their oxidation products SO4(2-) and HNO3 were highest in summer; (2) that aerosol acidity is closely associated with SO4(2-), aerosol NO3(-) concentrations being very low in all seasons; (3) and that the relative importance of aerosol acidity and HNO3 vary with season, because the strong seasonal variation in SO4(2-) results in a very strong seasonal variation in aerosol acidity. DOE

N86-24038# Brookhaven National Lab., Upton, N. Y.
POTENTIAL HEALTH AND SAFETY HAZARDS ASSOCIATED WITH THE PRODUCTION OF CADMIUM TELLURIDE, COPPER INDIUM DISELENIDE AND ZINC PHOSPHIDE PHOTOVOLTAIC CELLS
P. D. Moskowitz, V. M. Fthenakis, and J. C. Lee Apr. 1985 84 p
(Contract DE-AC02-76CH-00016)
(DE86-003122; BNL-51832) Avail: NTIS HC A05/MF A01

In large-scale manufacture of cadmium telluride, copper indium diselenide, and zinc phosphide photovoltaic cells, the materials and equipment used may present potential health and safety hazards to workers and the public. These hazards were identified by reviewing data on process materials, availability of control technology, biomedical effects, and health and environmental standards. Quantitative estimates of material inputs and outputs, and control technology costs for selected processes were based on preliminary engineering designs for hypothetical 10-MWp/yr photovoltaic cell production facilities. In the fabrication of these devices, unusually large quantities of some toxic gases may be used; large demands for phosphine and hydrogen selenide are of special concern. Because projected usage of these materials is much larger than the current one, a thorough evaluation of engineering controls will be needed before the technologies are commercialized. These materials could also present occupational

health hazards. Some management options to reduce occupational exposures to these materials are presented. Although specific federal and state regulations have not been promulgated for emissions from the photovoltaic industry, prudent engineering practice should be applied to all waste streams - solid, atmospheric, or liquid - containing toxic pollutants to limit discharges of these materials. Control costs for most atmospheric waste streams should not be large (<0.01 cent per watt); for phosphine, however, costs are potentially much larger (4.4 cents per watt). Some processes may also produce large quantities of solid waste defined as toxic or hazardous under US Environmental Protection Agency guidelines. Disposal costs for these materials are presented. DOE

N86-24039# Argonne National Lab., Ill.
PRACTICAL ASPECTS OF MEASURING DRY DEPOSITION, REVISION
M. L. Wesely and B. B. Hicks 1985 7 p Presented at the EPA/USGS/EPRI Workshop on Acid Deposition Monitoring and Analysis, Raleigh, N. C., 30 Apr. 1985 Prepared in cooperation with National Oceanic and Atmospheric Administration, Oak Ridge, Tenn.
(Contract W-31-109-eng-38)
(DE86-003054; CONF-8504158-2-Rev) Avail: NTIS HC A02/MF A01

The task of evaluating dry deposition presently falls into two categories: monitoring and direct measurement. The distinction is made because there is no simple method of direct measurement that can be used routinely. All of the currently popular flux-measurement methods (surface sampling, eddy correlation, etc.) are practical only for intensive studies of dry deposition processes. In this paper, our primary interest is in monitoring rather than short-term intensive studies of dry deposition. Dry deposition data are urgently needed for use in assessments and other activities for the National Acid Precipitation Assessment Program (NAPAP), for the following three types of applications: to document trends, both spatial and temporal; to provide information supporting effects studies; and to evaluate numerical models. DOE

N86-24040# Argonne National Lab., Ill.
DEVELOPMENT OF MONTHLY EMISSIONS TRENDS FOR RECENT YEARS
D. Knudson 1985 15 p Presented at the Annual Emissions Inventory Symposium, Charleston, S. C., 12 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-004038; CONF-851155-2) Avail: NTIS HC A02/MF A01

As atmospheric transport and deposition modeling capabilities increase and monitoring data are accumulated, it becomes desirable to also have representative emissions data. The methodology and results of an effort to generate state-total source category-specific monthly SO2 and NO/sub x/ emission estimates for the period 1975-1983 are described. These data complement other data bases and support a variety of analytical efforts. The basis of the monthly emission estimates are source category-specific state-total SO2 and NO(sub x) emission values from the 1980 NAPAP emissions inventory. Annual emissions from the electric utility industry are allocated to monthly values using actual monthly fuel use for each year in the period. Annual emission values for other source groups were apportioned to monthly values using data which provides an indication of the monthly activity for each source group in the inventory year (1980). Annual state-total source category emission for other years in the period were derived from the EPA emissions trends data. The results indicate that intre-annual variability of SO2 and NO(sub x) emissions for each state depend on the variability of source categories contributing most to state total emissions. In states with SO2 emissions dominated by the electric utility sector, maximum emissions occur in the summer and winter. The relative of these two peaks depend on such factors as climate and utility prime mover and fuel mix. Monthly NO(sub x) emissions variations are also a function of the variability of source groups contributing the most to total state NO(sub x) emissions. In all states, vehicle fuel consumption contributes substantially to total state NO(sub x) emissions. Monthly variability of NO(sub x) emissions attributable to this source category shows only small variability in most states. DOE

N86-24041# Argonne National Lab., Ill.
ENHANCEMENT OF THE TOXIC VAPOR IDENTIFICATION CAPABILITY OF PORTABLE SENSORS USING PATTERN RECOGNITION TECHNIQUES
J. R. Stetter, S. L. Rose, P. C. Jurs, and J. O. Stull 1985 8 p Presented at the JANNAF Safety and Environmental Protection Subcommittee Meeting, Monterey, Calif., 4 Nov. 1985 Prepared in cooperation with Naval Research Lab., Washington, D.C., Pennsylvania State Univ., University Park, Coast Guard, Washington, D.C.
(Contract W-31-109-eng-38)
(DE86-004048; CONF-8511110-5) Avail: NTIS HC A02/MF A01

A portable instrument is being developed that can detect, identify, and warn US Coast Guard emergency response personnel of the presence of hazardous concentration of toxic gases and vapors. The toxic compounds are detected by an array of inexpensive, semiselective electrochemical sensors, and the complex output is analyzed using pattern recognition methods. The phototype device incorporates an array of four different electrochemical sensors, each of which can be operated in four different modes. The device thus obtains 16 channels of data for each chemical species present in the air sample. Pattern recognition analysis of these data can be used to determine the uniqueness of the information obtained for each of the 16 channels. A set of patterns for 22 gases and vapors detected with a chemical sensor array was examined. Results indicate that approximately half of the channels provide unique information and the data from 8 to 10 channels are sufficient to identify individual compounds. DOE

N86-24042# Oregon State Univ., Corvallis.
SIMULATED ACID RAIN ON CROPS
M. D. Plocher, S. C. Perrigan, R. J. Hevel, R. M. Cooper, and D. N. Moss Oct. 1985 74 p Sponsored in part by Corvallis Environmental Research Lab., Oreg.
(PB86-110772; EPA-600/3-85-068) Avail: NTIS HC A04/MF A01 CSCL 02D

In 1981, simulated H2SO4 acid rain was applied to alfalfa and tall fescue and a 2:1 ratio of H2SO4:HNO3 acid rain was applied to alfalfa, tall fescue, barley, wheat, potato, tomato, radish, and corn crops growing in the open field at Corvallis, Oregon. Effects of the acid rain on the appearance of the foliage were observed, and the effects on yield were measured. Because the effect of pH 4.0 rain on corn yield was the only significant effect noted in the 1981 studies, in 1982, more extensive studies of the effect of simulated H2SO4/HNO3 rain on corn were conducted. No significant effects of acid rain are found on foliage appearance, or on yield of grain or stover in the 1981 studies. GRA

N86-24043# Economic Research Service, Washington, D. C. Natural Resource Economics Div.
EFFECTS OF AIR POLLUTION AND ACID RAIN ON AGRICULTURE: AN ANNOTATED BIBLIOGRAPHY
J. R. Barse, W. Ferguson, and V. Whetzel Oct. 1985 186 p
(PB86-111630; AGES-850702) Avail: NTIS HC A09/MF A01 CSCL 02D

Ozone and sulfur dioxide-gaseous air pollutants can reduce the yields of key agricultural crops such as soybeans, corn, wheat, citrus fruit, cotton, and peanuts by interfering with plant photosynthesis. In general, the greater the pollutant concentration, the greater the yield reduction. Evidence on the biological impacts of acid rain on crops, soils, and forests is much less clear, often ambiguous. Some acid rain impacts can be favorable, because rainfall acids contain nitrogen and sulfur, major plant nutrients. GRA

N86-24044# Dartmouth Coll., Hanover, N.H. Dept. of Chemistry.
MEASUREMENTS OF POLYCYCLIC AROMATIC HYDROCARBONS IN AMBIENT AIR PARTICULATES IN NORTHERN NEW ENGLAND

J. F. Hornig, A. Barefoot, C. Parravano, and R. H. Soderberg Oct. 1985 17 p Sponsored in part by Environmental Protection Agency, Research Triangle Park, N.C. Prepared in cooperation with State Univ. of New York, Purchase
(PB86-117405; EPA-600/D-85-248) Avail: NTIS HC A02/MF A01 CSCL 07D

Polycyclic aromatic hydrocarbons (PAHs) in ambient air particulates in northern New England were measured. Standard high-volume filter samples of ambient-air particulates were collected during several heating seasons in a semirural village, a rural area, and in residential and institutional neighborhoods. A convenient and reproducible procedure based on extraction of the filters with cyclohexane using ultrasonic agitation, chromatography on silica gel, and extraction of the PAH fraction into dimethylsulfoxide was developed. Concentrations of 13 PAHs were determined by high performance liquid chromatography and by gas chromatography using both flame ionization and mass spectrometric detection. During 2 weeks of intensive sampling in late January 1982, the rural site showed the lowest PAH concentration, with Benz(a)pyrene (BaP) averaging about 1 microgram/cu m, compared to about 3 m/cu m in residential Hanover, N.H. The variations in both the concentrations of individual PAHs among sites and the variations in the relative concentrations of the different PAHs were surprisingly small. Both the total suspended particulates and the PAH concentrations correspond well with the degree-day weather. GRA

N86-24045# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
CHEMISTRY AND CORROSIVENESS OF DEW
W. E. Wilson, E. O. Edney, and D. C. Stiles Oct. 1985 7 p
(PB86-119070; EPA-600/D-85-259) Avail: NTIS HC A02/MF A01 CSCL 07D

The impact of the deposition of acidic species on the degradation of commercially important materials such as metals and paints were examined. An effort was made to develop damage functions that can be employed to predict the extent of corrosion or erosion for a given set of environmental conditions. Regression analyses on corrosion data obtained from field studies were conducted which shed some light on which environmental factors play major roles in accelerating the degradation process above that expected due to natural weathering. It was established that the ambient SO2 concentration and the time the exposed surfaces are wet play important roles in the corrosion rate of metals. In order to evaluate the economic impact of various control strategies, reliable damage functions must be developed to predict the impact of a reduction in ambient SO2 concentration or the pH of the rain on the degradation process. GRA

N86-24046# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
MODERN METHODS TO MEASURE AIR POLLUTANTS
R. K. Stevens Oct. 1985 62 p
(PB86-129798; EPA-600/D-85-260) Avail: NTIS HC A04/MF A01 CSCL 07D

The requirements for the collection and analysis of ambient particles to satisfy data requirements for source and receptor models as applied to pollution control applications are discussed. The following analytical procedures as applied to receptor modeling are described: X-ray fluorescence (XRF), neutron activation (NAA), ion exchange chromatography (IC), X-ray diffraction (XRD), optical microscopy (OM) and scanning electron microscopy (SEM), and the recent application of gas phase denuders to measure a wide range of pollutants, including nitric acid and ammonia. GRA

N86-24047# GCA Corp., Chapel Hill, N.C. Technology Div.
ASSESSMENT OF NOx EMISSION FACTORS FOR DIRECT-FIRED HEATERS Final Report, Dec. 1983 - Jan. 1985
C. R. Newman Oct. 1985 97 p
(Contract EPA-68-02-2693)
(PB86-119112; GCA-TR-CH-84-02; EPA-600/7-85-047) Avail: NTIS HC A05/MF A01 CSCL 06T

Emission factors for major categories of direct-fired heaters are reviewed. Systematic studies were analyzed to develop emission factors for oxides of nitrogen (NOx) at various levels of combustion air preheat used in major energy--consuming industries. Industrial fuel use in non-boiler applications amounted to about 60% of total industrial fuel consumption in 1980. The increasing use and potential for use of preheated combustion air for energy conservation may result in increased emissions of NOx from direct-fired process heaters. It is shown that NOx emission rates rise as combustion air temperature increases. It is indicated that a significant market for high temperature heat recovery equipment for use with many types of industrial sources will exist as they become proven and are applied to both new and existing sources. If these devices, which can preheat combustion air to 1093-plus C, are applied extensively, nationwide emissions of NOx could increase significantly. GRA

N86-24048# California State Dept. of Health, Berkeley. Air and Industrial Hygiene Lab.
CARCINOGENS AND MUTAGENS IN AMBIENT AIR PARTICULATE MATTER: SOURCES AND TRENDS IN CONTRA COSTA COUNTY Final Report
P. Flessel, G. Guirguis, K. Chang, and J. Lecocq Jun. 1985 191 p
(Contract ARB-A1-162-32)
(PB86-123841; CA/DOH/AIHL/SP-35; ARB-R-85/263) Avail: NTIS HC A09/MF A01 CSCL 13B

A method for measuring aerosol mutagens, the identification of sources of mutagens and the analysis of trends in mutagen and polycyclic aromatic hydrocarbon (PAH) levels in particulate organic matter (POM) is described. The microsuspension test was applied to measure the mutagenic activity in organic extracts of community aerosols. Application of the test made possible high resolution diurnal studies of mutagenicity in air samples of only 2 hours duration. The origins of mutagens in POM were investigated during seasonal pollution episodes. Samples were analyzed for mutagenic activity, PAH, NO3(-1), pollutant gases and elemental source tracers. Industrial contributions to mutagenic aerosols were suggested by significant positive correlations between mutagens and S at stations near oil refineries and chemical plants. Mutagens and PAH were also positively correlated with tracers for motor vehicles, (Br, CO) and secondary aerosols (NO3(-1). Levels of most pollutants, including mutagens and PAH, were highest in the winter. A positive trend in the concentration of mutagenic aerosols, despite decreasing or constant levels of other pollutants including PAH is revealed. GRA

N86-24049# Natioanl Center for Toxicological Research, Jefferson, Ark.
APPLICATION OF ATMOSPHERIC PRESSURE IONIZATION MASS SPECTROMETRY Final Report
R. K. Mitchum Oct. 1981 83 p refs
(PB86-117116; FDA/NCTR-86-29) Avail: NTIS HC A05/MF A01 CSCL 06T

Atmospheric pressure ionization mass spectrometry was developed. The stabilities of phenoxide anions was probed. Methodology was developed to analyze trace amounts of the phenoxy herbicide, 2,4,5-trichlorophenoxyacetic acid and its metabolites in diverse matrix components. The method was applied to the quantitation of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in tissue samples. Using a capillary column gas chromatograph interfaced directly to the atmospheric pressure ionization mass spectrometer, the concentration of TCDD was determined in environmentally exposed fish and wildlife. Isolation of TCDD from tissue samples was accomplished via a multistep fish high pressure liquid chromatography cleanup incorporating ring-labeled (sup 13)C(12)-TCDD as an isotope dilute. It is found that Polychlorinated biphenyls do not to interfere with the TCDD analyses at the low ppt level. The detection limit was found to be 10 ppt based upon a 50 g tissue sample. GRA

N86-24050# Illinois State Environmental Protection Agency Springfield. Div. of Air Pollution Control.
ILLINOIS ANNUAL AIR QUALITY REPORT, 1984
Jun. 1985 133 p

(PB86-110780; IEPA/APC/85-006) Avail: NTIS HC A07/MF A01 CSCL 13B

Ambient air quality measurements obtained in Illinois during the calendar year of 1984 are summarized. Air quality data obtained for each site, statistical summaries, air quality violations and trend data where available are discussed. Back ground information is included converning sources of air pollutants, health effects, air quality standards and ambient monitoring methodologies. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-24051 Cornell Univ., Ithaca, N.Y.
EQUATORIAL ELECTRIC FIELDS: A NUMERICAL MODEL Ph.D. Thesis
Enivaldo Bonelli 1985 157 p
Avail: Univ. Microfilms Order No. DA8525767

Tidal winds in the ionospheric F region cause polarization charges to build up by blowing the ions perpendicular to the geomagnetic field. The intensity of the electric field so created is inversely related to the E region Pedersen conductivity. The reason for this is that the E region can short out F region electric fields through currents flowing along the magnetic field lines. The total electric field in the F region due to both these dynamos causes a plasma drift, affecting the interaction between neutrals and ions, and this closes the cycle. In the F region, the electron density is assumed to be a simple Chapman layer and the neutral density and temperature are obtained from Jacchia. The E region is treated as a thin layer, for which the conductivities are height integrated. This investigation studies the effects on the plasma drift of individual parameters such as the Pedersen conductivity of the E region, the phase of the (1,-2) tide in the E region, the motion of the F-peak, etc. The results for maximum and minimum solar activity agree well with the experimental data from Jicamarca, and our neutral wind exhibits a super rotation which increases with solar activity. A general result is that the velocity of the vertical drifts increases with altitude. Dissert. Abstr.

N86-24052 Cornell Univ., Ithaca, N.Y.
IONOSPHERIC TURBULENCE: CASE STUDIES IN EQUATORIAL SPREAD F AND DEVELOPMENT OF A ROCKET-BORNE INTERFEROMETER Ph.D. Thesis
James William LaBelle, III 1985 293 p
Avail: Univ. Microfilms Order No. DA8525716

In March, 1983, two rockets were launched into the disturbed nighttime equatorial F-region from Punta Lobos, Peru. The plasma density measurements from these flights confirm that the topside spread F plumes identifiable in the backscatter power maps produced at the nearly Jicamarca Radar Observatory are correlated with large scale density depletions. The downward gradients of these depletions are highly structured, consistent with the linear theory of the gravitational instability. The wavenumber spectrum associated with these density irregularities occasionally exhibits a K (spura-1.5) form for wavelengths longer than about one kilometer. These observations are shown to be consistent with the nonlinear theory of Sudan and Keskinen, although they also may be explained by at least two linear mechanisms: the generation of turbulence on the steepened walls of spread F bubbles, and the nonlocal role of the E-region in the development of spread F. In an attempt to resolve the ambiguities involved in measuring wavenumber spectra with sounding rockets, a number of rocket experiments involving spatially separated plasma density probes were performed at both high and low latitudes. Dissert. Abstr.

N86-24053 California Univ., Berkeley.
A SOUNDING ROCKET STUDY OF AURORAL ELECTRON PRECIPITATION Ph.D. Thesis
James Patrick McFadden 1985 141 p
Avail: Univ. Microfilms Order No. DA8525049

Measurement of energetic electrons in the auroral zone have proved to be one of the most useful tools in investigating the phenomena of auroral arc formation. A detailed analysis of the electron data from two sounding rocket campaigns and interprets the measurements in terms of existing auroral models. The results include the measurement of a narrow, magnetic field aligned electron flux at the edge of an arc. The payload also made simultaneous measurements of both energetic electrons and 3 MHz plasma waves in an auroral arc. The BIDARCA campaign consisted of two sounding rockets. The payloads reached respective apogees of 1020 km and 637 km while traveling within 50 km of the same magnetic field line. The measurements include 2 to 20 Hz fluctuations of a field aligned component of the electron distribution. This field aligned flux occurred over a broad energy range below the monoenergetic energy flux peak and showed dispersion between different energies. Dissert. Abstr.

N86-24054 California Univ., Berkeley.
SEISMIC VELOCITIES IN THE UPPER PART OF THE EARTH'S CORE Ph.D. Thesis
Patricia Ellen Murtha 1985 121 p
Avail: Univ. Microfilms Order No. DA8525062

The presence or absence of a significant boundary layer at the top of the outer core was investigated by determining an improved mean velocity model in this region. The data used in the velocity inversion are short period observations of the seismic phases SKS and ScS over the distance range 55 deg < Delta < 110 deg. For forward modeling, the distance range of SKS most sensitive to variations in the velocity at the top of the outer core is seen to be Delta < 90 deg, and the position of Delta sub A, the distance where the first SKS ray entering the core emerges at the Earth's surface, is found to be extremely sensitive to the velocity at the top of the outer core. The ability to discriminate and identify SKS and ScS period data. Differential times between SKS and ScS phases as short as 4 s are read at distances of approximately 69 degrees. Observations of transversely polarized SKS are primarily due to anisotropy in the mantle and crust, as opposed to scattering near the core-mantle boundary, as was previously thought. Dissert. Abstr.

N86-24055 Texas A&M Univ., College Station.
FREE-AIR GRAVITY AND GEOID ANOMALIES OF THE NORTH ATLANTIC OCEAN AND THEIR TECTONIC IMPLICATIONS Ph.D. Thesis
Woo-Yeol Jung 1985 222 p
Avail: Univ. Microfilms Order No. DA8528335

A free air gravity anomaly map of the North Atlantic Ocean was constructed at a 10 mgal contour interval utilizing all available surface ship and pendulum gravity measurements. The map shows values more positive to the north of approx. 32 N than to the south and values more negative in the western North Atlantic Ocean basin than in the eastern basin. The Mid-Atlantic Ridge area and topographic highs such as volcanic islands, seamounts are associated with positive values while the rift valley and fracture zone valleys are characterized by elongated negative values. The seaward edge of the continental shelf is characterized by a belt of positive free air gravity anomalies; negative gravity values are observed just seaward of the continental slope and rise. A total of 3032 1 x 1 deg averaged free air gravity anomalies were determined from the surface ship gravity map. A gravimetric geoid was computed from these 1 x 1 deg averaged gravity anomalies by employing Stokes' integral theorem. Comparisons were made between the 1 x 1 deg surface ship gravity and the 1 x 1 deg SEASAT altimeter derived gravity as well as the 1 x 1 deg surface ship gravimetric geoid and the 1 x 1 deg SEASAT altimeter derived geoid. The results show very good agreement in contour trends, wavelengths and amplitudes. Author

N86-24056 Minnesota Univ., Minneapolis.
MEASUREMENT OF TRACE GASES IN THE STRATOSPHERE WITH A MASS SPECTROMETER SYSTEM Ph.D. Thesis

Daniel Mark Murphy 1985 88 p
Avail: Univ. Microfilms Order No. DA8526493

Measurements of trace gases in the stratosphere were performed with a balloon borne molecular beam sampling system and mass spectrometer. The sensitivity the mass spectrometer was extended by a microchannel plate detector system that simultaneously collected ions over a wide range of masses. The microchannel plate detector operates in an ion counting mode. Ions striking the microchannel plate release pulses of electrons which are amplified and accelerated to a phosphor layer. The resulting flash of light is carried by a fiber optic bundle to a photodiode array. The output of the array is then fed through a discriminator to find the locations of the pulses. Each mass can be measured independently at count rates between 0.02 and 1000 counts/s. A profile of ozone was obtained and noble gas isotopes with mixing ratios in the ppb range were measured. Detection limits of 50 ppt are possible for the mass spectrometer system. This will allow the measurement of several species of great interest in stratospheric chemistry, including ClO and the isotopes of ozone. Dissert. Abstr.

N86-24057 Colorado Univ., Boulder.
A THEORETICAL AND OBSERVATIONAL INVESTIGATION OF THE RESPONSE OF OZONE TO SHORT-TERM VARIATIONS IN THE SOLAR ULTRAVIOLET IRRADIANCE Ph.D. Thesis
Richard Scott Eckman 1985 216 p
Avail: Univ. Microfilms Order No. DA8528481

An analysis of the response of middle atmospheric ozone to short-term variations in the solar ultraviolet irradiance is presented. Measurements of ozone from the Solar Mesosphere Explorer (SME) ultraviolet spectrometer (UVS) are compared to the calculations of a one dimensional, radiative-photochemical model of the upper stratosphere and lower mesosphere. The model uses temporally varying solar UV irradiances measured by the SME solar spectrometer. Measurements made by the SME UVS in the 0.1 to 1 mb range show evidence that tropical ozone responds to solar rotational variation when analyzed using both frequency and time domain techniques. Analysis of ozone variations at extratropical latitudes revealed different periodicities that were not correlated with solar variations. Calculations of the amplitude and phase of the ozone response due to solar UV oscillations made by the model show that the effects of the coupling of radiation and photochemistry in the region near the stratopause may not be neglected. Dissert. Abstr.

N86-24058 Alaska Univ., Fairbanks.
AURORAL ZONE THERMOSPHERIC DYNAMICS USING FABRY-PEROT INTERFEROMETRIC MEASUREMENTS OF THE OI 15867K EMISSION Ph.D. Thesis
Robert Joseph Sica 1984 245 p
Avail: Univ. Microfilms Order No. DA8528691

Forty-four nights of thermospheric neutral wind and temperature measurements were obtained from College, Alaska during solar maximum using a ground based Fabry-Perot interferometer. When averaged by increasing geomagnetic activity, the wind exhibits two main features. First, the general flow pattern, poleward and westward in the evening, changing to southward and eastward in the morning, persists with increasing activity. The flow velocity increases and the change in direction occurs earlier in magnetic local time as the geomagnetic activity increases. Second, as the activity increases, the meridional wind pattern shifts equatorward with the auroral oval. Consequently, the low geomagnetic activity average wind pattern in the north is similar to the moderate activity average pattern in the south. The average thermospheric temperature is governed by the geomagnetic activity and by the previous day's 10.7 cm solar flux. The increase in temperature with solar flux is about the same as with auroral activity. The dynamical behavior of individual nights highlights the importance of local auroral substorms, which can cause large deviations from both global models and the observed averages. Author

N86-24059*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
STUDIES OF EXTENDED PLANETARY ATMOSPHERES Final Report, 1 Oct. 1979 - 30 Sep. 1985
D. M. Hunten, S. T. Massie, and L. L. Hood 14 Apr. 1986 5 p
(Grant NsG-7485)
(NASA-CR-176719; NAS 1.26:176719) Avail: NTIS
HC A02/MF A01 CSCL 04A

There was a theoretical study of physical and chemical processes in the stratosphere, later broadened to include the mesosphere. Particular emphasis was laid on testing of proposed height profiles of the eddy diffusion coefficient against observed tracer data. Eventually the effort shifted to study of ozone time series in satellite data, and interpretation in terms of aeronomical processes. Since all this work is computer-intensive, the first year of funding also contributed to the acquisition of a powerful minicomputer system, in collaboration with several other faculty members. This proved to be highly successful and cost effective. Author

N86-24060*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRICAL CONDUCTIVITY OF ROCKS AT HIGH PRESSURES AND TEMPERATURES
E. I. Parkhomenko and A. T. Bondarenko Jan. 1986 299 p refs
Transl. into ENGLISH of the book " Elektroprovodnost Gornykh Porod Privysokikh Davleniyakh i Temperaturakh" Moscow (USSR), Nauka, 1972 p 1-212 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77687; NAS 1.15:77687) Avail: NTIS
HC A13/MF A01 CSCL 08G

The results of studies of the electrical conductivity in the most widely distributed types of igneous rocks, at temperatures of up to 1200 C, at atmospheric pressure, and also at temperatures of up to 700 C and at pressures of up to 20,000 kg/sq cm are described. The figures of electrical conductivity, of activaation energy and of the preexponential coefficient are presented and the dependence of these parameters on the petrochemical parameters of the rocks are reviewed. The possible electrical conductivities for the depository, granite and basalt layers of the Earth's crust and of the upper mantle are presented, as well as the electrical conductivity distribution to the depth of 200 to 240 km for different geological structures. Author

N86-24061*# Montana State Univ., Bozeman. Dept. of Earth Sciences.
AN ARCHEAN SUTURE ZONE IN THE TOBACCO ROOT MOUNTAINS? (1984) EVOLUTION OF ARCHEAN CONTINENTAL CRUST, SW MONTANA (1985) Final Technical Report
David W. Mogk and Lawrence Kain 1985 144 p refs
(Grant NAG9-68)
(NASA-CR-176726; NAS 1.26:176726) Avail: NTIS
HC A07/MF A01 CSCL 08G

The Lake Plateau area of the Beartooth Mountains, Montana were mapped and geochemically sampled. The allochthonous nature of the Stillwater Complex was interpreted as a Cordilleran-style continental margin. The metamorphic and tectonic history of the Beartooth Mountains was addressed. The Archean geology of the Spanish Peaks area, northern Madison Range was addressed. A voluminous granulite terrain of supracrustal origin was identified, as well as a heretofore unknown Archean batholithic complex. Mapping, petrologic, and geochemical investigations of the Blacktail Mountains, on the western margin of the Wyoming Province, are completed. Mapping at a scale of 1:24000 in the Archean rocks of the Gravelly Range is near completion. This sequence is dominantly of stable-platform origin. Samples were collected for geothermometric/barometric analysis and for U-Pb zircon age dating. The analyses provide the basis for additional geochemical and geochronologic studies. A model for the tectonic and geochemical evolution of the Archean basement of SW Montana is presented. E.A.K.

N86-24062# Indian Inst. of Geomagnetism, Bombay.
INDIAN INSTITUTE OF GEOMAGNETISM: PROGRESS IN

RESEARCH Annual Report, 1983-1984
[1984] 87 p
Avail: NTIS HC A05/MF A01

Progress and aspects is the study of the geomagnetic variations in the Indian region on quiet and disturbed days, equatorial electrojet field, electromagnetic induction in the earth, magnetic pulsations, aeronomy, radio scintillations, magnetosphere and solar wind, and solar-terrestrial relationships were reported. E.A.K.

N86-24063*# Colorado Univ., Boulder. Dept. of Astrophysical, Planetary and Atmospheric Sciences.
CONSTRAINTS ON GEOMAGNETIC SECULAR VARIATION MODELING FROM ELECTROMAGNETISM AND FLUID DYNAMICS OF THE EARTH'S CORE Final Report, 18 Oct. 1984 - 28 Feb. 1986
Edward R. Benton 28 Feb. 1986 58 p refs
(Contract NAS5-28617)
(NASA-CR-177857; NAS 1.26:177857) Avail: NTIS HC A04/MF A01 CSCL 08N

A spherical harmonic representation of the geomagnetic field and its secular variation for epoch 1980, designated GSFC(9/84), is derived and evaluated. At three epochs (1977.5, 1980.0, 1982.5) this model incorporates conservation of magnetic flux through five selected patches of area on the core/mantle boundary bounded by the zero contours of vertical magnetic field. These fifteen nonlinear constraints are included like data in an iterative least squares parameter estimation procedure that starts with the recently derived unconstrained field model GSFC (12/83). Convergence is approached within three iterations. The constrained model is evaluated by comparing its predictive capability outside the time span of its data, in terms of residuals at magnetic observatories, with that for the unconstrained model. Author

N86-24064# Naval Research Lab., Washington, D. C.
THEORY OF THE CURRENT-DRIVEN ION CYCLOTRON INSTABILITY IN THE BOTTOMSIDE IONOSPHERE
P. Satyanarayana, P. K. Chaturvedi, M. J. Keskinen, J. D. Huba, and S. L. Ossakow 11 Nov. 1985 49 p
(AD-A161862; NRL-MR-5656) Avail: NTIS HC A03/MF A01 CSCL 04/1

A theory of the current-driven electrostatic ion cyclotron(EIC) instability in the collisional bottomside ionosphere is presented. It is found that the electron collisions are destabilizing and are crucial for the excitation of the EIC instability in the collisional bottomside ionosphere. Furthermore, the growth rates of the ion cyclotron instability in the bottomside ionosphere maximize for (K-perpendicular) (rho sub i) > or = 1 where 2 pi/K-perpendicular is the mode scale size perpendicular to the magnetic field and rho sub i the ion gyroradius. Realistic plasma density and temperature profiles typical of the high latitude ionosphere are used to compute the altitude dependence of the linear growth rate of the maximally growing modes and critical drift velocity of the EIC instability. The maximally growing modes corresponds to observed meter size irregularities and the threshold drift velocity required for the excitation of EIC instability is lower for heavier (NO+0+) ions than that for the lighter (H+) ions. Dupree's resonance broadening theory is used to estimate nonlinear saturated amplitudes for the ion cyclotron instability in the high latitude ionosphere. Comparison with experimental observations is also made. It is conjectured that the EIC instability in the bottomside ionosphere could be a source of transversely accelerated heavier ions and energetic heavy ion conic distributions at higher altitudes. GRA

N86-24065# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE AFGL (AIR FORCE GEOPHYSICS LABORATORY) ABSOLUTE GRAVITY SYSTEM'S ERROR BUDGET REVISTED Environmental Research Papers, Jan. 1984 - May 1985
Robert L. Iliff and Roger W. Sands 8 May 1985 24 p
(AD-A162230; AFGL-TR-85-0102; AFGL-ERP-915) Avail: NTIS HC A02/MF A01 CSCL 20/8

The error budget for the absolute gravity measuring instrument has been reevaluated for the purpose of locating and correcting an apparent bias that appeared in the data at the gravity lab early in 1981. The results of this analysis reveal a major equipment-induced error and minor data reduction errors. Revised gravity values at various sites across the U.S. and Sevres, France are given along with values obtained with other instruments at collocated sites. GRA

N86-24066# Florida Univ., Gainesville. Dept. of Civil Engineering.
GENERALIZED PHENOMENOLOGICAL CYCLIC STRESS-STRAIN-STRENGTH CHARACTERIZATION OF ANISOTROPIC GRANULAR MEDIA Annual Report, 1 May - 1 Jun. 1985
Devo Seereeram, Michael C. McVay, and Paul F. Linton 27 Jun. 1985 264 p
(Grant AF-AFOSR-0108-84)
(AD-A162348; AFOSR-85-1023TR) Avail: NTIS HC A12/MF A01 CSCL 08/13

An analytical and experimental investigation into the influences of material anisotropy and principal plane rotation on the stress-strain and strength behavior of granular soil (Reid-Bedford Sand) is conducted. The laboratory investigation entailed the performance of approximately fifteen triaxial tests under conventional compression and extension loading, and five through initial shear, followed by hydrostatic compression. The initial tests with an additional fifteen experiments were used in characterizing the influence of inherent anisotropy and principal plane rotations on material response. The latter were employed to delineate the effects of stress-induced anisotropy. A review of existing elasto-plastic theory as related to soil mechanics showed only a few models of a phenomenological nature which of the multi-surface isotropic/kinematic hardening characterizations, Prevost's pressure sensitive model, was used in the prediction of the hollow cylinder tests. Although the model reasonably reproduced the response along its calibration path, it did not quantitatively or qualitatively predict the laboratory results along other stress paths which involved principal plane and the need for improved analytical representation. GRA

N86-24067# Naval Research Lab., Washington, D. C.
PRODUCTION AND CONTROL OF ION CYCLOTRON INSTABILITIES IN THE HIGH LATITUDE IONOSPHERE BY HIGH POWER RADIO WAVES
P. K. Chaturvedi, M. J. Keskinen, and S. L. Ossakow 30 Dec. 1985 22 p
(AD-A163075; NRL-MR-5667) Avail: NTIS HC A02/MF A01 CSCL 04/1

The possible generation and suppression of ion cyclotron waves in a collisional plasma by external high power electromagnetic (EM) waves with frequency close to the local upper-hybrid frequency is considered. It is shown that the ion cyclotron instability can be destabilized or (stabilized) for omega(o) < omega (UH) Omega(o) >Omega(UH), where omega(o) is the pump frequency of the EM wave. The results are applied to naturally occurring ion cyclotron instabilities in the high latitude ionosphere. GRA

N86-24068*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
FORCE-FREE MAGNETIC FIELDS
W. H. Yang, S. K. Antiochos, and P. A. Sturrock Nov. 1985 29 p
(Grants NGL-05-020-272; NAGw-92; Contract N00014-85-K-0111)
(NASA-CR-176767; NAS 1.26:176767; AD-A163090;
SU-CSSA-ASTRO-85-35) Avail: NTIS HC A03/MF A01 CSCL 03/2

The problem under discussion is that of calculating magnetic field configurations in which the Lorentz force j x B is everywhere zero, subject to specified boundary conditions. We choose to represent the magnetic field in terms of Clebsch variables in the form B = grad alpha x grad beta. These variables are constant on any field line so that each field line is labeled by the corresponding values of alpha and beta. When the field is described in this way, the most appropriate choice of boundary conditions is to specify the values of alpha and beta on the bounding surface. We show that such field configurations may be calculated by a

magneto-frictional method. We imagine that the field lines move through a stationary medium, and that each element of magnetic field is subject to a frictional force parallel to and opposing the velocity of the field line. This concept leads to an iteration procedure for modifying the variables alpha and beta, that tends asymptotically towards the force-free state. We apply the method first to a simple problem in two rectangular dimensions, and then to a problem of cylindrical symmetry that was previously discussed by Barnes and Sturrock (1972). In one important respect, our new results differ from the earlier results of Barnes and Sturrock, and we conclude that the earlier article was in error. GRA

N86-24069# Lawrence Livermore National Lab., Calif.
PHYSICAL PHENOMENA INDUCED BY PASSAGE OF INTENSE ELECTROMAGNETIC PULSES (INCLUDING CO2 LASERS) THROUGH THE ATMOSPHERE
J. H. Yee, D. J. Mayhall, and R. Alvarez 23 Oct. 1985 14 p refs Presented at the 7th international Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract W-7405-eng-48)
(DE86-002132; UCRL-93523; CONF-851053-1) Avail: NTIS HC A02/MF A01

The electron fluid equations are combined with Maxwell's equations to investigate the physical phenomena that occurs when short, intense electromagnetic pulses (including the CO2 laser pulse) interact with the atmosphere. The phenomena of tailed erosion occurs when the pulse intensity exceeds the air-breakdown threshold. In some cases, the erosion of the pulse occurs first in the middle of the pulse and then occurs in the tail of the pulse. In addition, we discovered that the amount of the energy that a pulse carries through the atmosphere is independent of whether it is propagating vertically upward from the Earth's surface or vertically downward toward the Earth's surface, provided the distance the pulse travels is the same for both directions of the propagation. DOE

N86-24070# Sandia National Labs., Albuquerque, N. Mex.
ESTIMATION OF SEISMIC SPATIAL COHERENCE AND ITS APPLICATION TO A REGIONAL EVENT
J. P. Claassen Nov. 1985 113 p refs
(Contract DE-AC04-76DP-00789)
(DE86-003792; SAND-85-2093) Avail: NTIS HC A06/MF A01

Inhomogeneities in the Earth's crust produce scattering, multipathing, reverberation and mode conversion. The degree to which the signals are correlated is dependent on the geologic structure beneath the array, between the event and the array, and to some degree around the event. Since coherent beam formation requires replicated signals except for noise at each receiver, the diameter of seismic arrays must be restricted to spans over which the signals remain spatially coherent. If seismic arrays are to be important elements in a regional network that performs seismic verification functions for a Comprehensive Test Ban Treaty, the influence of crustal geology on seismic spatial coherence must be well understood. This report was written to: (1) address problems in estimating the spatial coherence of seismic signals, (2) demonstrate a coherence estimator on a single event, (3) show how spatial coherence influences the performance of regional seismic arrays in a seismic verification context, and (4) establish parameters useful for designing arrays in geologic shields. Specifically, it is shown that the Blackman-Tukey spectral estimation method can be adapted in a straightforward way to estimate spatial coherence. The pitfalls in estimating spatial coherence are discussed and practical methods for abating their effects are introduced. The spatial coherence estimation theory is then applied to a single regional event that had been observed by the Norwegian Regional Seismic Array (NRSA) on the Fenno-Scandinavian shield. The distances over which the signals remain coherent are then inferred from the coherence estimates through an exponential model for spatial decorrelation. Correlation distances at various frequencies over a 1 to 20 Hz bandwidth for the four regional arrivals, P sub n, P sub g, S sub n, and L sub g, are identified. DOE

N86-24071# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
MAGNETOSPHERE-IONOSPHERE COUPLING
C.-G. Faelthammar May 1985 77 p refs Presented at ESA Workshop on Future Missions in Solar, Heliospheric and Space Plasma Phys., Garmisch-Partenkirchen, West West Germany, 30 Apr. - 3 May 1985
(TRITA-EPP-85-06; ISSN-0348-7539) Avail: NTIS HC A05/MF A01

Magnetosphere-ionosphere coupling, and the role of Birkeland currents, magnetic-field aligned electric fields, and Alfven waves are discussed. In addition to transporting energy and momentum between the magnetosphere and the ionosphere, the Birkeland curents cause a redistribution of matter within and between these regions. They do so directly via exchange of charge carriers, and indirectly via instabilities and acceleration processes that they excite in the plasmas. The spatial distribution of magnetic-field aligned electric fields, and the way they are supported are unclear. Changes in electric fields and plasma convection are communicated between the magnetosphere and the ionosphere by Alfven waves. Observations of high power low frequency noise, which fits an Alfven wave description, and which has a net downward Poynting flux of 100 million W integrated over the auroral regions are reported. Individual Alfven waves, upward and downward propagating, are observed. Oblique Alfven waves are a key feature of a model for auroral arc formation. Author (ESA)

N86-24072# Ohio State Univ., Columbus. Inst. of Polar Studies.
SCIENTIFIC PLAN FOR DEEP ICE CORE DRILLING IN CENTRAL GREENLAND (GISP 2: GREENLAND ICE SHEET PROJECT)
E. Mosley-Thompson, A. J. Gow, M. M. Herron, K. Jezek, and B. Kamb 1985 108 p refs
(Contract NSF DPP-84-13028)
(PB86-123197; NSF-DPP84-13028) Avail: NTIS HC A06/MF A01 CSCL 08L

Ice sheets are natural archival systems that continously collect and preserve the physical and chemical history of the Earth's atmosphere. Ice cores drilled from the ice sheets offer a practical way to study the layers of ice. Deep ice cores have been drilled to bedrock only three times: at Camp Century, Greenland, in 1966 (1,384 meters), at Byrd Station, Antarctica, in 1968 (2,164 meters), and at Dye-3, Greenland, in 1979 (2,037 meters). The Dye-3 core was collected as part of the Greenland Ice Sheet Project (GISP). The scientific objective of GISP 2 is to unlock the 200-millenia or longer record of climate and atmospheres in the 3,200-meter-thick ice of central Greenland. The report describes objectives of U.S. scientists; Danish and Swiss objectives are similar. A science plan includes establishing the depth-age scale, temperature and precipitation history, history of atmospheric gases and aerosols, dynamics and physical state of the ice sheet, modeling, and complimentary studies. GRA

N86-24073# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
ATMOSPHERIC DIFFUSION MODELING BASED ON BOUNDARY LAYER PARAMETERIZATION Final Report
J. S. Irwin, S. E. Gryning, A. A. M. Holtslag, and B. Sivertsen Sep. 1985 55 p refs Prepared in cooperation with Riso National Lab., Roskilde, Denmark, Norsk Inst. for Luftorskning, Lillestroem, Norway and Royal Netherlands Meteorological Inst., De Bilt, Netherlands
(PB86-103660; EPA-600/3-85-056) Avail: NTIS HC A04/MF A01 CSCL 04A

Methods for processing meteorological data for use in air quality diffusion modeling are outlined. The current concepts for the idealized states of the planetary boundary layer were applied. A number of models are recommended. Several of the models characterize directly the crosswind integrated concentration at the surface, thus avoiding whenever justified the assumption of a Gaussian distribution of material in the vertical. The goal is to characterize the meteorological conditions affecting the diffusion

for transport distances on the order of 10 km or less. Procedures are suggested for estimating the fundamental scaling parameters. For obtaining the meteorological data needed for estimating the scaling parameters, a minimum measurement program is recommened. Methods are presented for the determination of the scaling parameters and methods are suggested for estimating the vertical profiles of wind velocity, temperature, and the variances of the vertical and lateral wind velocity fluctuations. Author

N86-24074# Norsk Inst. for Luftforskning, Lillestroem.
ATMOSPHERIC DISPERSION MODELING BASED UPON BOUNDARY LAYER PARAMETERIZATION
B. Silvertsen, S. E. Gryning, A. A. M. Holtslag, and J. S. Irwin
Oct. 1985 21 p refs Sponsored by EPA
(PB86-110699; EPA-600/D-85-224) Avail: NTIS
HC A02/MF A01 CSCL 04A

Characteristic scaling parameters in the planetary boundary layer have been applied to estimate the dispersion of nonbuoyant gaseous pollutants. Vertical and lateral spread are tested separately, and the choice of parameters for the dispersion models depends upon the actual state of the planetary boundary layer. The lateral concentration distribution at the surface was usually found to be a Gaussian distribution. The vertical concentration distribution was more often other than Gaussian. For the different scaling regions of the atmosphere, methods are proposed for estimating the crosswind integrated concentrations, as functions of distance from the source, and are compared using results from tracer experiments. The proposed methods estimate the transport and dispersion directly from the turbulent state of the atmosphere. The turbulence, and thus the dispersion, is better explained and modeled in the surface layer of the atmosphere (stable and unstable), than within the layers above the surface layer. GRA

N86-24520*# North Georgia Coll., Dahlonega. Dept. of Physics.
DENSITY AND PRESSURE VARIABILITY IN THE MESOSPHERE AND THERMOSPHERE
T. Michael Davis *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-24075 National Oceanic and Atmospheric Administration, Washington, D. C.
NOAA ATLAS: AN ATLAS OF SATELLITE-DERIVED NORTHERN HEMISPHERIC SNOW COVER FREQUENCY
Michael Matson, Chester F. Ropelewski, and Marylin S. Varnadore
Mar. 1986 149 p
Avail: NTIS HC A07/MF A01

This atlas presents 15 years (1967 to 1981) of satellite derived snow cover data in the form of monthly and midmonth to midmonth snow cover frequency maps. The maps are in two general formats: frequency of snow cover incremented in 10 percent intervals and contour maps incremented in 25 percent intervals. In addition to the maps, tables and time series of Eurasian and North American snow cover are presented. Author

N86-24076 Colorado Univ., Boulder.
A COMPARISON OF TWENTIETH CENTURY CLIMATIC ANOMALIES IN NORTHERN NORTH AMERICA WITH RECONSTRUCTED PATTERNS OF TEMPERATURE AND PRECIPITATION BASED ON POLLEN AND TREE-RING DATA Ph.D. Thesis
Henry Frank Diaz 1985 255 p
Avail: Univ. Microfilms Order No. DA8528479

The possibility of significant climatic changes over the next century or two resulting from anthropogenic modification of atmospheric composition and vegetative alterations makes it important to determine the ranges associated with different climatic regimes that have occurred during the present interglacial. The approach taken was to use the modern observational record to identify the surface anomaly patterns and the associated midtropospheric circulation features characteristic of the principal modes of interannual variance in this region. These anomaly patterns were analyzed within the context of the annual cycle by looking at seasonal variations and by comparison with the mean season-to-season changes. Principal component analysis was one major tool used to derive objectively the characteristic anomaly fields at both the surface and upper levels and to assess their temporal relationships. The surface patterns were contrasted to those derived using climate proxy data, such as variations in tree ring growth and fossil pollen variations in order to infer plausible circulation regimes based on the degree of pattern similarity. Areas of consistent response during warm and/or cold periods operating at time scales varying from years to decades to centuries and finally to the order of millennia were identified and their existence was explained in terms of the possible redistribution (i.e., changes in the mean position and strength) of the planetary-scale waves in this region. Dissert. Abstr.

N86-24077 Minnesota Univ., Minneapolis.
CLIMATE SENSITIVITY OF A NUMERICAL MODEL OF ICE-SHEET DYNAMICS AND THERMODYNAMICS Ph.D. Thesis
Brian Harley Hanson 1985 201 p
Avail: Univ. Microfilms Order No. DA8526418

The climate of the Earth is a complex of interacting parts, of which ice sheets vary most slowly. Ice sheets have been coupled to climate only in the simplest models because of the great differences in the time scales of their responses, and because the models previously used for ice sheets have had limited physical capabilities in their responses to climatic influences. A finite element model developed here responds realistically to climatic forcing. The model uses the method of weighted residuals to solve the general equations for steady motion of a nonlinear viscous medium and for energy conservation with forced advection, internally generated heat, and diffusion in a two dimensional, vertical flow-plane. Model performance is verified against theoretical solutions for velocity and temperature in idealized geometries, including a transient temperature solution developed here. A number of experiments using the finite element model simulated a flowplane on the south dome of Barnes Ice Cap on Baffin Island. Velocity calculations show that while shear stresses still play the major role in the stress balance of the ice sheet, much of the apparent deformation of the ice results from longitudinal stresses. The response of the model to small, forced changes in boundary condition temperature is linear and symmetric with respect to rising or falling temperatures. Dissert. Abstr.

N86-24078 Kansas Univ., Lawrence.
THE ADVANCE OF PHENOLOGICAL SPRING ACROSS EASTERN AND CENTRAL NORTH AMERICA Ph.D. Thesis
Mark Donald Schwartz 1985 95 p
Avail: Univ. Microfilms Order No. DA8529151

Links among atmospheric processes and plant life stages are difficult to establish, because phenological data have been unavailable, and atmospheric mechanisms associated with life stage events are unclear. The annual onset of the spring season during the period is traced. Three hypotheses are tested with regression models that use 20 years of first leaf observations from cloned lilacs at 110 locations in eastern and central North America, thermal energy accumulation variables, daily solar radiational data, and 850 to 700 mb temperatures and winds. The first model was based on a theory that plant development is a smooth function driven by gradual changes in thermal and solar energy; it predicted first leaf dates with a mean absolute error of 8.0 days. A second model tested a hypothesis that certain synoptic events alone are responsible for phenological changes, and had a mean absolute error of 7.5 days. A third hypothesis was constructed from important parts of the first two. This theory assumed that synoptic systems are superimposed on a general

seasonal increase in thermal and solar energy. Other analyses showed that particular synoptic events occur at 5 to 7 day intervals before the phenological event, and that this relationship varies in phase across the study area. Dissert. Abstr.

N86-24079 Colorado Univ., Boulder.
A STUDY OF TROPICAL-EXTRATROPICAL INTERACTION ASSOCIATED WITH EQUATORIAL CONVECTION Ph.D. Thesis
George Nicholas Kiladis 1985 146 p
Avail: Univ. Microfilms Order No. DA8528498

Relationships between equatorial convection and synoptic scale features at 250 mb are examined on seasonal to daily time scales. Convection is defined on the basis of a satellite derived index of Highly Reflective Cloud (HRC), with circulation statistics based on National Meteorological Center tropical grid data. The seasonal position of maximum HRC is related to some extent to the state of the Southern Oscillation (SO). Anticyclonic flow anomalies occur poleward and slightly to the west of convection displaced to the east of normal over the equatorial Pacific, with equally strong cyclonic anomalies found with convection displaced to the west of normal. Other regions such as southern Asia and the mid-latitudes of the Pacific also show pronounced signals, in agreement with previous observational and modelling studies. Dissert. Abstr.

N86-24080 Florida State Univ., Tallahassee.
ON THE ASIAN MONSOON HEAT SOURCES AND ENERGETICS Ph.D. Thesis
Long-Chuan Quah 1985 226 p
Avail: Univ. Microfilms Order No. DA8528705

The Asian monsoon heat sources during the Northern Hemisphere winter and summer are evaluated by a physical approach using the GDFL FGGE III-b analyses supplemented by a mix of independent measurements. For the winter component, the analysis covers the entire period of FGGE SOP-1, and for the summer component, the analysis spans a 40-day period in the early summer of FGGE year. The evolution of monsoon heat sources and the salient regional characteristics of diabatic heating over several key monsoon subdomains are examined. The relationship between the diabatic heating and large-scale monsoon circulations are then studied from the principle of energy, within the framework of the energetics of rotational and divergent flows, and Lorentz's available potential energy formulation. The heat sources evaluated over the winter and summer MONEX domains are assessed by comparing the results with independent studies. This is followed by a detailed examination of the time mean and pentad (5-day mean) averaged vertically integrated heat sources over the analysis periods. Author

N86-24081 Deutscher Wetterdienst, Offenbach am Main (West Germany).
[ACTIVITIES REPORT IN METEOROLOGY IN WEST GERMANY] Annual Report, 1984 [JAHRESBERICHT 1984]
1985 90 p refs In GERMAN
(ISBN-3-88148-223-7; ISSN-0433-8251) Avail: Issuing Activity

The status of the German weather station networks is described. The activities of the weather forecasting service, the climatological service, the agrometeorological service, the aerological service, the radioactivity measurement service, the instrumental organization, the weather communication service, and the computer center are reported. Research activities of the German meteorological service are discussed. International cooperation is mentioned. Author (ESA)

N86-24082*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CURRENT SCIENTIFIC ISSUES IN LARGE SCALE ATMOSPHERIC DYNAMICS
Timothy L. Miller, comp. Washington Jan. 1986 46 p refs Workshop held in Huntsville, Ala., 20-21 Jun. 1985
(NASA-CP-2410; M-506; NAS 55:2410) Avail: NTIS HC A03/MF A01

Topics in large scale atmospheric dynamics are discussed. Aspects of atmospheric blocking, the influence of transient baroclinic eddies on planetary-scale waves, cyclogenesis, the effects of orography on planetary scale flow, small scale frontal structure, and simulations of gravity waves in frontal zones are discussed. For individual titles, see N86-24083 through N86-24088.

N86-24083*# Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
OBSERVED ASPECTS OF ATMOSPHERIC BLOCKING
Stephen J. Colucci *In* NASA. George C. Marshall Space Flight Center Crrent Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 5-15 (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

An important problem in large-scale atmospheric dynamics is understanding the evolution of these blocking systems. Inspection of a large number of cases of 500 mb cyclonic and anticyclonic blocking vortices during recent winter seasons reveals that the occurrence of these systems is preceded by high amplitude (but not necessarily stationary) planetary waves at 500 mb and by intense synoptic-scale surface cyclone activity. A possible relationship between the cyclones and planetary waves during block evolution is thus hypothesized. Detailed diagnostic study of blocking cases during January 1977, February 1978 and November 1980 discloses that the development of 500 mb anticyclonic blocking vortices is preceded in time by the intense surface cyclogenesis between 500 mb planetary scale troughs and ridges, whereas blocking cyclonic vortices form following cyclogenesis near the axes of 500 mb troughs. A positive feedback between the cyclone and planetary waves is thus implied. The 500 mb height changes accompanying the above processes were analyzed in terms of quasi-geostrophic potential vorticity. During anticyclonic vortex development, there are spatially and temporally persistent calculated quasi-geostrophic height rises due to anticyclonic potential vorticity advections occurring near the cyclone track. Similarly, during cyclonic vortex development, there are spatially and temporally persistent calculated quasi-geostrophic height falls due to cyclonic potential vorticity advections occurring near the cyclone track. R.J.F.

N86-24084*# Miami Univ., Fla.
INFLUENCE OF TRANSIENT BAROCLINIC EDDIES ON PLANETARY-SCALE WAVES
Lee E. Branscome *In* NASA. George C. Marshall Space Flight Center Current Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 17-22 refs (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

Low-order models with a mean zonal flow forced by zonally symmetric heating and one planetary-scale wave forced by topography have multiple flow equilibria. Two stable equilibria are characterized by strong zonal flow with low wave amplitude (high index circulation) and weak zonal flow with a high wave amplitude (low index circulation) fixed in phase with the topography. These two states presumably represent normal zonal circulation and a blocking configuration, respectively. When a shorter, baroclinically unstable wave is dded to this low-order model, the planetary-scale wave no longer stays in stable equilibrium states. Instead, the long wave remains in weather regimes or preferred regions in phase space. These regimes are, in general, different from the equilibria of the model with the planetary-scale wave only. Thus, the short unstable wave adds some randomness to planetary-scale circulation and changes its position with respect to the planetary-scale topography. The Reinhold and Pierrehumbert model is further explored here by adding a long-wave in the thermal forcing and exploring wider parameter space. When the symmetric thermal forcing is weak so that the short wave is stable, the planetary scale wave is fixed in amplitude and phase by the asymmetric forcing. However, when the symmetric forcing is increased to an unstable level, the planetary-scale wave becomes less organized. With asymmetric thermal forcing only (i.e., no topography) the long-wave is randomly distributed through phase space. Thermal

forcing seems to be less effective in organizing weather regimes than topographic forcing. R.J.F.

N86-24085*# Miami Univ., Fla.
CYCLOGENESIS
Rainer Bleck *In* NASA. George C. Marshall Space Flight Center Current Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 23-24 refs (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

In order to extend the conventional baroclinic instability concept, one has to picture the growth process as resulting from the superposition of two neutrally stable baroclinic waves, an upper and a lower one, each wave propagating along a near-discontinuity in the potential vorticity (PV) field. The PV discontinuity for the lower wave is given by the non-uniformity of the thermal field at the ground, while the discontinuity for the upper wave is given by the contrast, in the 400 to 200 mb range, between the high-PV polar stratosphere and the low-PV subtropical troposphere. The horizontal PV radients mentioned are approximately opposed to each other, causing the wo waves to travel in the opposite direction. As Hoskins et al. (1985) show convincingly, a phase lock between the upper and lower wave may occur, coupled with a tendency toward mutual amplification. The conceptual model just outlined is particularly attractive to synoptic meteorologists because it does not require the two waves to be of initially small amplitude and thus does not fly in the face of observational evidence. This model, by allowing a finite perturbation velocity and a considerable range of relative phase speeds at the time when the upper and lower wave reach the proper phase lag for amplification, may lead to growth rates larger than those predicted by linear theory. R.J.F.

N86-24086*# Yale Univ., New Haven, Conn.
EFFECTS OF OROGRAPHY ON PLANETARY SCALE FLOW
Ronald B. Smith *In* NASA. George C. Marshall Space Flight Center Current Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 25-27 (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

The earth's orography is composed of a wide variety of scales, each contributing to the spectrum of atmospheric motions. A well studied subject (originating with Charney and Eliassen) is the direct forcing of planetary scale waves by the planetary scale orography: primarily the Tibetan plateau and the Rockies. However, because of the non-linear terms in the equations of dynamic meteorology, even the smallest scales of mountain induced flow can contribute to the planetary scale if the amplitude of the small scale disturbance is sufficintly large. Two possible mechanisms for this are illustrated. First, preferentially located lee cyclones can force planetary waves by their meridional transport of heat and momentum (Hansen and Chen). Recent theories are helping to explain the phenomena of lee cyclogenesis (e.g., Smith, 1984, J.A.S.). Second, mesoscale mountain wave and severe downslope wind phenomena produce such a large local drag, that planetary scale waves can be produced. The mechanism of upscale transfer is easy to understand in this case as the standing planetary scale wave has a wavelength which depends on the mean structure of the atmosphere, and not on the width of the mountain (just as in small scale lee wave theory). An example of a theoretical description of a severe wind flow with very large drag is shown. R.J.F.

N86-24087*# National Center for Atmospheric Research, Boulder, Colo.
SMALL SCALE FRONTAL STRUCTURE: DYNAMICS OR DETAILS?
David B. Parsons *In* NASA. George C. Marshall Space Flight Center Current Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 29-36 refs (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

Four topics concerning frontal circulations are discussed. The results of retrieving pressure and buoyancy perturbations from Doppler radar taken in an intense cold front, recent results on instabilities that occur along well detined frontal boundaries, the initiation of convection by frontal circulations, and the present crisis in the understanding of occluded frontal systems are discussed. R.J.F.

N86-24088*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SIMULATIONS OF GRAVITY WAVES IN FRONTAL ZONES
Robert Gall *In its* Current Scientific Issues in Large Scale Atmospheric Dynamics Jan. 1986 p 37-42 (For primary document see N86-24082 14-47)
Avail: NTIS HC A03/MF A01

Recent observations of frontal systems passing over the PROFS network in Colorado by Shapiro (1984) indicate the horizontal scale of some fronts can be on the order of a few kilometers or less. Motivated by Shapiros results, esearchers re-ran an earlier numerical simulation of frontogenesis by Williams (1972) (where a very simple stretching deformation forcing of a front is considered) using as high a resolution in both the vertical and horizontal as was possible. Highest resolution that we considered consisted of a grid with a vertical spacing of 32 meters and a horizontal spacing of 260 meters in the immediate vicinity of the surface front. The purpose was to examine development of the frontal structures as the scale of the front became very small. Two sources for banded structures in clouds were found: (1) in the stationary waves above the front and (2) in waves propagating upward from breaking waves under the front. R.J.F.

N86-24089*# Institute for Atmospheric Optics and Remote Sensing, Hampton, Va.
DEVELOPMENT OF A GLOBAL MODEL FOR ATMOSPHERIC BACKSCATTER AT CO2 WAVELENGTHS Final Report, 7 Dec. 1983 - 6 Apr. 1985
G. S. Kent, P. H. Wang, U. Farrukh, A. Deepak, and E. M. Patterson (Georgia Technology Research Inst., Atlanta) Washington NASA Feb. 1986 388 p refs
(Contract NAS8-35594)
(NASA-CR-3959; NAS 1.26:3959) Avail: NTIS HC A17/MF A01 CSCL 04B

The variation of the aerosol backscattering at 10.6 micrometers within the free troposphere was investigated and a model to describe this variation was developed. The analysis combines theoretical modeling with the results contained within three independent data sets. The data sets used were obtained by the SAGE I/SAM II satellite experiments, the GAMETAG flight series, and by direct backscatter measurements. The theoretical work includes use of a bimodal, two component aerosol model, and the study of the microphysical and associated optical changes occurring within an aerosol plume. A consistent picture is obtained that describes the variation of the aerosol backscattering function in the free troposphere with altitude, latitude, and season. E.A.K.

N86-24090*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATISTICAL ANALYSIS OF DIRECT-STRIKE LIGHTNING DATA (1980 TO 1982)
Larry D. Lee, George B. Finelli, Mitchel E. Thomas, and Felix L. Pitts Jan. 1984 30 p refs
(NASA-TP-2252; L-15686; NAS 1.60:2252) Avail: NTIS HC A03/MF A01 CSCL 04B

Electromagnetic measurements are being made during direct lightning strikes by NASA Langley Center using a specially instrumented F-106B aircraft. The research is to aid refinement, characterization, and understanding of the lightning-aircraft interaction process and the lightning hazards to aircraft. Statistical methods are applied to characterize some aspects of the lightning data obtained from 176 strikes to the aircraft. Specific attention is given to the problem of estimating the upper extreme quantiles of the distributions of peak-to-peak values for currents and rates of change in the magnetic and flux densities. A formal treatment via a general location-scale family of models allows the estimation

method to be adapted to the realized shapes the distributions. The shapes are examined by probability plotting methods. Author

N86-24091*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE 1982 DIRECT STRIKE LIGHTNING DATA
Mitchel E. Thomas and Felix L. Pitts Mar. 1983 491 p refs
(NASA-TM-84626; NAS 1.15:84626) Avail: NTIS HC A21/MF A01 CSCL 04B

Wideband waveforms data which were obtained during the 1982 direct-strike lightning tests utilizing the NASA F106-B aircraft specially instrumented for lightning electromagnetic measurements. The aircraft was operated in a thunderstorm environment to elicit strikes to the aircraft during this testing period. Electromagnetic field data were recorded to both attached lightning and free field excitation of the aircraft. E.A.K.

N86-24092# National Weather Service, Silver Spring, Md. Techniques Development Lab.
VERY SHORT RANGE STATISTICAL FORECASTING OF AUTOMATED WEATHER OBSERVATIONS Interim Report, Oct. 1984 - Sep. 1985
Robert G. Miller Mar. 1986 96 p refs
(Contract DTFA01-83-Y-20625)
(DOT/FAA/PM-86/10) Avail: NTIS HC A05/MF A01

A procedure was developed to provide weather forecasting guidance over the short period of 10, 20, 30, and 60 minutes. The procedure uses automated surface observation elements as predictors and predictands. The model is founded on Markov assumption and utilizes multivariate linear regression as the statistical operator. The construction of the Generalized Equivalent Markov (GEM) model is outlined and compared with other objective methods such as climatology and persistence. It is found that GEM succeeds in bettering persistence and does so uniformly over the six projection periods of 10, 20, 30, and 60 minutes. E.A.K.

N86-24093# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CURRENT TRENDS TOWARD THE IMPROVEMENT OF SCIENTIFIC INSTRUMENTS FOR WEATHER SATELLITE APPLICATION
K. Ya. Kondratyev 7 Nov. 1985 16 p Transl. into ENGLISH from Meteorologiya i Gidrologiya (USSR), no. 3, Mar. 1973 p 107-112
(AD-A161839; FTD-ID(RS)T-0728-85) Avail: NTIS HC A02/MF A01 CSCL 04/2

A survey is given of the major trends and results in the development of weather satellite instrumentation designed to resolve inverse problems on-board the spacecraft. The discussion focuses on spacecraft similar to the American TIROS-M and ITOS weather satellites. Author (GRA)

N86-24094# Argonne National Lab., Ill.
SURVEY AND EVALUATION OF FIELD DATA SUITABLE FOR SMOKE HAZARD MODEL EVALUATION Technical Report, 1984 - 1985
Anthony J. Policastro and William E. Dunn Sep. 1985 68 p Sponsored in part by Army Medical Engineering Research and Development Lab., Fort Detrick, Md. Prepared in cooperation with Illinois Univ., Urbana
(AD-A161880; ANL/ER-85-3) Avail: NTIS HC A04/MF A01 CSCL 04/2

A summary and critical evaluation of the existing data on the dispersion of military smokes is presented. Emphasis is placed on fog oil smokes in terms of the measurement of concentration, dosage, particle size distribution, and mass deposition rate. The suitability of the available data for evaluating atmospheric dispersion models for health and environmental impacts purposes is marginal. Several questions remain as to the adequacy of the sampling techniques used and the validity of some of the supporting meteorological data. The best of the existing data on fog oil smoke dispersion were acquired during the Smoke Week 3 and 4 experiments. GRA

N86-24095# OptiMetrics, Inc., Bedford, Mass.
PROBABILITY AND CONDITIONAL PROBABILITY OF CUMULATIVE CLOUD COVER FOR SELECTED STATIONS WORLDWIDE Final Report, Dec. 1983 - Jul. 1985
William O. Gallery, John R. Hummel, and David A. Farmer Jul. 1985 229 p
(Contract F19628-84-C-0049)
(AD-A162210; OMI-139; AFGL-TR-85-0154) Avail: NTIS HC A11/MF A01 CSCL 04/2

Cloud cover has a major impact on both visible and infrared electro-optical sensors. Climatological statistics of the probability of cloud cover would be useful to tactical commanders planning missions over hostile or contested territory where observations are unavailable. This report presents tables of the historical probability, by okta, of cumulative cloud cover at or below 15 given altitudes. The data consist of routine surface weather observations from the ETAC DATSAV database. Out of 41 stations considered from four regions (Germany, Korea, the Middle East, and Central America), 29 stations had data suitable for analysis. Analyses performed for each station were broken down by season and time of day (0000 to 0559, 0600 to 1159, 1200 to 1759, and 1800 to 2359 local time), then averaged separately over season and over time of day, and over all seasons and times of day. Graphical and tabular results are presented for all stations for the average over all seasons and time of day; and for a selected station (Bitburg, West Germany) averages by season and time of day are given. The full set of tables is available on tape. Another goal is to answer the question: suppose that a remote measurement indicates that a cloud is or is not present at or below a given altitude, how much additional information does this measurement add to the historical probabilities--i.e., how much different are the conditional probabilities of cumulative cloud cover given that a cloud is or is not reported compared to the unconditional (historical) probabilities? Tables of these conditional probabilities are presented. GRA

N86-24096# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
MILLIMETER WAVE MOISTURE SOUNDER FEASIBILITY STUDY: THE EFFECT OF CLOUD AND PRECIPITATION ON MOISTURE RETRIEVALS Final Report, 8 Aug. 1984 - 7 Feb. 1985
R. G. Isaacs, G. Deblonde, R. D. Worsham, and M. Livshits 6 Mar. 1985 46 p
(Contract F19628-84-C-0134)
(AD-A162231; P110F; AFGL-TR-85-0040) Avail: NTIS HC A03/MF A01 CSCL 04/2

A simulation model applicable to the design specification of a millimeter wave moisture sounder is described. The algorithm is capable of treating the response of a multifrequency radiometer to realistic variations in vertical profiles of atmospheric temperature and moisture, surface emissivity, cloud and precipitation. Analyses were performed to investigate the sensitivity of proposed moisture sounder channels to changes in the vertical distribution of atmospheric water vapor and the presence of cloud and rain. Preliminary studies based on statistical inversion methods demonstrate moisture retrieval capabilities in clear, cloudy, and precipitating cases. Results indicate that cloud and precipitation will most likely degrade moisture sounder performance. Investigation of moisture retrieval methodologies which explicitly treat cloud effects is recommended. GRA

N86-24097# Naval Postgraduate School, Monterey, Calif.
A DIAGNOSTIC STUDY OF BAROCLINIC DISTURBANCES IN POLAR AIR STREAMS Ph.D. Thesis
Mark R. Sinclair Sep. 1985 194 p
(AD-A162254) Avail: NTIS HC A09/MF A01 CSCL 04/2

Model-generated data and FGGE analyses are used to calculate quasi-Lagrangian budgets of mass, vorticity, heat and moisture following disturbances that form within polar air streams.

These polar lows grow primarily through basic baroclinic instability processes and exhibit many features of larger maritime extratropical cyclones. Polar lows that originate on the equatorward side of a nearly straight upper-level jet are contrasted with lows that form on the poleward side of the jet and have considerable midtropospheric positive vorticity advection at formation time. The absence of favorable coupling to a jet stream was the missing factor in two model-generated polar lows that failed to develop. Although the vorticity balance is initially different for the two types of polar lows, the vorticity budgets during later stages are similar. The heat budget and the thickness tendency equation demonstrate that the self-development process that is present in larger maritime cyclones is also important for polar low intensification.
Author (GRA)

N86-24098# Naval Postgraduate School, Monterey, Calif.
UTILIZATION OF SATELLITE-OBSERVED CLOUD PATTERNS TO IMPROVE ANALYSES OF EXPLOSIVE EXTRATROPICAL MARITIME CYCLOGENESIS M.S. Thesis
Dock David Williams, Jr. Sep. 1985 87 p
(AD-A162306) Avail: NTIS HC A05/MF A01 CSCL 04/2

On the basis of analysis of satellite imagery, a set of designated cloud patterns is explored to evaluate their potential for improving the forecasts of explosively deepening extratropical cyclones. An analysis of 23 western Atlantic Ocean cases included correlation of infrared satellite imagery with derived pressure diagrams and synoptic data. The study includes: (1) quantitative pattern definition, (2) frequency of occurrence statistics and (3) objective evaluations of usage potential. Specific findings include: (1) a high number of dual cloud element storms; (2) distinct developmental segments in pressure fall rates of the storms; (3) varying degrees of reliability for the designated cloud patterns and (4) discussion of the practicability of formulating a storm developmental analog from the designated cloud patterns. GRA

N86-24099# Gould, Inc., Middletown, R.I. Ocean Defense Div.
THE TURBULENT GRAVITY WAVE-CRITICAL LEVEL ENCOUNTER IN THE EVOLUTION OF ATMOSPHERIC FLOW Final Report
John R. Grant Jun. 1985 32 p
(Contract F49620-84-C-0048)
(AD-A162335; OSD-771-HYDRO-CR-85-03; AFOSR-85-1006TR) Avail: NTIS HC A03/MF A01 CSCL 04/1

The extended objective of this work is to contribute to understanding the short term response of the atmosphere to short term influences. The particular influence studied is internal gravity wave motion, specifically the encounter of a gravity wave with a critical level, a height where the component of the wind speed in the direction of the horizontal phase propagation matches the horizontal component of wave phase speed. Two major effects of such encounters are the deposition in the wind of momentum transported by the wave motion and the generation of turbulence by the wave motion. Both phenomena modify the wind in the vicinity of the critical level. Several nonturbulent and turbulent calculations of a gravity wave-critical level encounter were performed. The simulated signatures will aid in the examination of interpretation of the records of the Poker Flats and Sunset Doppler radars. Of those events which can be identified as critical level encounters, one or two will be selected for numerical simulation, for which key parameters are matched to those extracted from the observations. GRA

N86-24100# Air Force Geophysics Lab., Hanscom AFB, Mass.
STORM PRECIPITATION AND WIND STRUCTURE DURING AIRCRAFT STRIKE LIGHTNING EVENTS Environmental Research Papers
Alan R. Bohne and Albert C. Chmela 24 May 1985 38 p
(AD-A162338; AFGL-TR-85-0121; AFGL-ERP-917) Avail: NTIS HC A03/MF A01 CSCL 04/1

A limited set of in situ aircraft and ground-based radar data acquired during the 1981 and 1982 Joint Agency Turbulence Experiment are used to study the relationship of aircraft lightning strikes to storm precipitation, turbulence severity, and wind shear. The strikes are found to be strongly correlated with vertical drafts, predominantly downdrafts. The strikes were also well correlated with regions of strong turbulence. However, since most strong turbulence episodes were not associated with lightning, use of lightning location methods to locate hazardous turbulence within storms is considered unreliable. The strikes occurred in storm regions having radar reflectivity factor between 25 to 35 dBZ. These regions were generally on the boundaries of the dominant storm precipitation cores. Storm wind shear was frequently high in regions near aircraft strikes. The strong correlations with strong turbulence, downdraft boundaries, and precipitation core boundaries suggest that the strikes occurred in regions of charge separation. GRA

N86-24101# Naval Environmental Prediction Research Facility, Monterey, Calif.
DESIGN CONSIDERATIONS FOR AN ADVANCED TROPICAL CYCLONE MODEL Final Report, 3-4 Jan. 1985
Russell L. Elsberry and Michael Fiorino Oct. 1985 151 p
(AD-A162813; NEPRF-TR-85-03) Avail: NTIS HC A08/MF A01 CSCL 04/2

A project planning meeting on dynamical tropical cyclone models was held January 3 to 4 1985 at NAVENVPREDRSCHFAC to guide development of a next-generation forecast model, or Advanced Tropical Cyclone Model (ATCM). The meeting was structured in three groups: an Operational group (OP) to provide forecaster needs and real world constraints; a Numerical Aspects group (NUM) with expertise in the numerical modeling issues; and a Data Analysis and Initialization group (DAI) to guide the development of the data analysis and initialization component of ATCM. GRA

N86-24102# Air Force Systems Command, Patrick AFB, Fla.
METEOROLOGICAL RANGE SUPPORT REQUIREMENTS AND IMPLICATIONS FOR THE FUTURE OF SHUTTLE OPERATIONS Progress Report, 1984 - 1985
Edward F. Kolczynski, Thomas M. Myers, and Billie F. Boyd 1985 14 p Previously announced in IAA as A86-19687
(AD-A162877; ESMC-TR-85-05) Avail: NTIS HC A02/MF A01 CSCL 04/2

The addition of a landing facility at the Kennedy Space Center (KSC) and an increased launch rate for the space shuttle required a significant change in meteorological requirements. The joint USAF-NASA efforts for improved support are discussed, including past efforts and future plans. Meteorological constraints to Shuttle operations are presented, forecasting benefits of the various systems are reviewed and weather impacts on specific missions are discussed. GRA

N86-24103# Air Force Systems Command, Patrick AFB, Fla.
INTERACTIVE INFORMATION AND PROCESSING SYSTEMS USED FOR METEOROLOGICAL SUPPORT TO THE EASTERN TEST RANGE Progress Report, 1984 - 1985
Billie F. Boyd and Thomas M. Myers 1985 17 p
(AD-A162878; ESMC-TR-85-06) Avail: NTIS HC A02/MF A01 CSCL 04/2

The report details various interactive meteorological systems in use at the Cape Canaveral Forecast Facility (CCFF) to support the space shuttle and missile launch operations at the Eastern Test Range (ETR). Weather requirements are discussed and data input/output described. GRA

N86-24104# Air Force Systems Command, Patrick AFB, Fla.
LIGHTNING AT KENNEDY SPACE CENTER Progress Report, 1984 - 1985
William C. Gibbons, Billie F. Boyd, and William Jafferis 1985 10 p
(AD-A162947; ESMC/TR-85-07) Avail: NTIS HC A02/MF A01 CSCL 04/2

The Kennedy Space Center/Cape Canaveral Air Force Station (KSC/CCAFS) area borders the area of highest frequency of thunderstorms in the United States. Since the majority of the thunderstorms occur in the summer months, lightning frequencies

in the area during these months approach the highest level of any location in the world. This high level of frequency presents three major problems: danger to personnel damage to equipment and property and loss of time in order to minimize the previous items. Two major lightning detection systems currently in use in the KBC/CCAFS area are the Launch Pad Lightning Warning System (LPLWS) and the Lightning Location and Protection (LLP) system. Lightning activity in the KSC/CCAFS area is both a curse and a blessing. The high lightning frequency is a threat to life and slows space vehicle operations. Yet, the presence of numerous lightning strikes as well as sophisticated lightning detection systems make KSC an ideal location for lightning research to perfect lightning detection and protection. GRA

N86-24105# Control Data Corp., Minneapolis, Minn. Meteorology Research Center.
THE INTERACTION AND VARIATION OF WAVES AND TURBULENCE FROM MST RADAR DATA *Final* **Report, 1 Feb. 1982 - 30 Sep. 1985**
G. D. Nastrom 27 Nov. 1985 11 p
(Contract F49620-82-C-0029)
(AD-A162983; AFOSR-85-1138TR) Avail: NTIS HC A02/MF A01 CSCL 17/9

This report summarizes research results obtained using data from clear-air Doppler radars in Alaska, Colorado, and France. Among other variables, these radars measure the vertical velocity over the height range from about three to twenty kilometers. A brief climatology of the variability of vertical velocity was prepared, including a study of its relationship to synoptic weather events. Comparisons of the time-averaged vertical velocity to estimates of the vertical velocity computed from the equations of motion and routine meteorological data showed that these radars provide a measure of the sub-synoptic scale vertical velocity of the atmosphere, at least under certain conditions. Details of the echoing mechanism for vertically directed antenna systems were studied to help interpret the measurements. Another variable provided by MST radars is the backscattered echo power, which is directly related to the refractivity turbulence structure constant (C-sub-n-squared) when the antenna beam is not directed vertically. GRA

N86-24106# Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
CYCLONE TRACKS AND WAVE CLIMATES AT CAPE HATTERAS, NORTH CAROLINA
Richard A. Wayland and Bruce P. Hayden Aug. 1985 73 p
(Contract N00014-81-K-0033)
(AD-A162999; TR-31) Avail: NTIS HC A04/MF A01 CSCL 04/2

The tracks of individual tropical and extratropical cyclones are an important determinant of the magnitude and duration of the water waves that will be produced along the mid-Atlantic coast. Based on a data set covering the years 1942 to 1984, an eastward displacement in the mean track of extratropical cyclones associated with increasing wave magnitude and duration is evident. Tropical cyclones show a westward shift in the mean track with increasing wave magnitude, but little change with duration. No temporal pattern could be identified in the frequency of extratropical storms while the number of tropical cyclones has declined over the past fifteen years. The relationship between sea-surface temperatures, the Gulf Stream, and upper latitude blocking and cyclone movement is briefly discussed as possible reasons for the changes in the mean storm tracks. GRA

N86-24107# Los Alamos National Lab., N. Mex.
SUMMARY OF MATHEW/ADPIC MODEL EVALUATION STUDIES
M. H. Dickerson Oct. 1985 13 p refs Presented at the International Symposium on Emergency Planning and Preparedness for Nuclear Facilities, Rome, Italy, 4 Nov. 1985
(Contract W-7405-eng-48)
(DE86-002139; UCRL-92319; CONF-851117-2) Avail: NTIS HC A02/MF A01

This report summarizes model evaluation studies conducted for the MATHEW/ADPIC transport and diffusion models during the past ten years. These models support the US Department of Energy Atmospheric Release Advisory Capability, an emergency response service for atmospheric releases of nuclear material. Field campaigns involving tracer releases used in these studies cover a broad range of meteorology, terrain and tracer release heights, the three most important aspects of estimating air concentration values resulting from airborne releases of toxic material. Results of these studies show that these models can estimate air concentration values within a factor of 2, 20% to 50% of the time and a factor of 5, 40% to 80% of the time. As the meteorology and terrain become more complex and the release height of the tracer is increased the accuracy of the model calculations degrades. This band of uncertainty appears to correctly represent the capability of these models at this time. DOE

N86-24108# Los Alamos National Lab., N. Mex.
ATMOSPHERIC PERTURBATIONS OF LARGE-SCALE NUCLEAR WAR
R. C. Malone 1985 23 p refs Presented at the Symposium on the Medical Implications of Nuclear War, Washington, D.C., 20 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002410; LA-UR-85-3671; CONF-8509194-1) Avail: NTIS HC A02/MF A01

Computer simulation of the injection into the atmosphere of a large quantity of smoke following a nuclear war are described. The focus is on what might happen to the smoke after it enters the atmosphere and what changes, or perturbations, could be induced in the atmospheric structure and circulation by the pressure of a large quantity of smoke. DOE

N86-24109# Argonne National Lab., Ill.
INVESTIGATIONS OF THE CONVECTIVE PLANETARY BOUNDARY LAYER USING A MULTIPLE FREQUENCY SODAR
R. L. Coulter and T. J. Martin 1985 15 p refs Presented at the 3rd International Symposium on Acoustic Remote Sensing of the Atmosphere and Oceans, Paris, France, 14 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-003040; CONF-8510214-1) Avail: NTIS HC A02/MF A01

The multifrequency, bistatic sodar system currently in operation at Argonne National Laboratory is described. Estimates of horizontal convergence within thermal plumes show good consistency between horizontal and vertical wind fields. Values of convergence associated with thermal plumes near 0.001 s(-1) were observed, when a circularly symmetric model for the deviation from the mean horizontal and vertical wind fields is assumed. DOE

N86-24110# National Weather Service, Fort Worth, Tex.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) DATA ANALYSIS PROGRAMS
P. D. Bothwell Oct. 1985 81 p
(PB86-123759; NOAA-TM-NWS-SR-114) Avail: NTIS HC A05/MF A01 CSCL 04B

AFOS (Automation of Field Operations and Services) Data Analysis Programs have been designed to maximize the information available from conventional surface and upper-air data. GRA

N86-24111# National Weather Service, Honolulu, Hawaii.
SKYWARN-HAWAII
M. J. Morrow Dec. 1984 12 p
(PB86-107505; NOAA-NWSTM-PR-28) Avail: NTIS HC A02/MF A01 CSCL 04B

The operation of the Oahu/Statewide SKYWARN Net is clarified the setup as it presently exists (December 1984) is described. In general, Hawaiian weather is benign, but on occasion a hurricane or severe winter storm may create a problem. It is at these times that the SKYWARN Net is called into service. GRA

N86-24112# National Oceanic and Atmospheric Administration, Seattle, Wash. Marine Environmental Lab.
RELATIONSHIPS BETWEEN SURFACE OBSERVATIONS OVER

THE GLOBAL OCEANS AND THE SOUTHERN OSCILLATION
P. B. Wright, T. P. Mitchell, and J. M. Wallace Jan. 1985 70 p
Prepared in cooperation with Washington Univ., Seattle
(PB86-110038; NOAA-DR-ERL-PMEL-12) Avail: NTIS
HC A04/MF A01 CSCL 04B

The atlas contains maps of correlation and regression coefficients between seasonal anomalies of surface meteorological fields over the global oceans and Darwin, Australia annual-mean sea-level pressure anomalies. The statistics were calculated for six consecutive seasons defined relative to the Darwin index. The resulting charts provide a description of the time evolution of meteorological anomalies associated with the Southern Oscillation over the global oceans. GRA

N86-24113# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
SUB-SYNOPTIC WEATHER ANALYSIS AND THE FORECASTING OF CONVECTIVE WEATHER EVENTS IN THE SOUTHEASTERN UNITED STATES
C. A. Liles Mar. 1985 158 p
(PB86-110228; NOAA-TM-ERL-ESG-17) Avail: NTIS
HC A08/MF A01 CSCL 04B

Conventionally analyzed surface and upper-air data are reanalyzed, employing sub-synoptic analysis and enhancement techniques and discussed in detail. The potential of these procedures for improving short-range weather forecasts is shown through numerous examples that compare conventional and sub-synoptic analysis techniques. Sub-synoptic analysis has been an integral part of the forecasting routine for several years. The Technical Memorandum is not a complete answer to operational problems posed by significant convective storms, but the case studies considered substantiate the value of intensive analysis procedures. Author (GRA)

N86-24114# National Weather Service, Silver Spring, Md. Office of Hydrology.
PROBABLE MAXIMUM PRECIPITATION ESTIMATES FOR DRAINAGE ABOVE DEWEY DAM, JOHNS CREEK, KENTUCKY
D. D. Fenn Aug. 1985 42 p Sponsored in part by Soil Conservation Service, Portland, Oreg.
(PB86-111333; NOAA-TM-NWS-HYDRO-41) Avail: NTIS
HC A03/MF A01 CSCL 04B

Estimates of probable maximum precipitation (Pmp) for the drainage of Johns Creek, Kentucky above Dewey Dam are discussed. Estimates are given for durations from 1 to 72 hr for the drainage. Part of the procedure used to evaluate terrain effects required selection of proxy observations of precipitation since there were no reporting locations within the drainage. The total PMP estimates are the products of the drainage average depth of nonorographic PMP and the orographic intensification factor representing the evaluation of terrain effects within the drainage. GRA

N86-24115# National Center for Atmospheric Research, Boulder, Colo.
APPLICATIONS OF A NEW VERIFICATION METHODOLOGY FOR REGIONAL-SCALE NUMERICAL MODELS M.S. Thesis
P. A. Stamus 1985 163 p Sponsored in part by National Science Foundation, Washington, D.C. Prepared in cooperation with Oklahoma Univ., Norman
(PB86-111317; NCAR/CT-94) Avail: NTIS HC A08/MF A01 CSCL 04B

A verification methodology was developed for regional models using a combination of traditional statistical scores and scale separation on both primary and derived variables. The scale separation was performed using the Errico technique (Errico, 1985). This methodology was applied to two numverical models--the Operational Limited-Area Fine-Mesh Model (LFM-II) and the Anthes/Warner NCAR/PSU Mesoscale Model (MM3). Verification was performed on both the initial analyses and the model forecasts for three cases. Author (GRA)

N86-24116# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR OCTOBER 1984, VOLUME 39, NUMBER 19, SEPTEMBER 28, 1985
Sep. 1985 10 p
(PB86-112703) Avail: NTIS HC A02/MF A01 CSCL 04B

Monthly and seasonal weather outlooks for North America are presented. GRA

N86-24117# National Weather Service, Salt Lake City, Utah.
OBJECTIVE CONTOUR ANALYSIS USING THE SURFACE OF LEAST BENDING (SPLINE ANALYSIS)
L. Colin Nov. 1985 44 p
(PB86-128675; NOAA-NWS-WRCP-52) Avail: NTIS
HC A03/MF A01 CSCL 04B

Objective height and vorticity contour analysis is done on upper air plot data over a limited geographical region by fitting a surface of least elastic bending to the data. All height and wind data are fit exactly, as implied by the second law of thermodynamics. The least bending surface has the greatest probability of reconstructing the original field from the given data points. The program was written to provide the most accurate reconstruction possible of the original fields which generated the height and wind data. A barotropic forecast model derived from spline analysis is written. GRA

N86-24118# Texas A&M Univ., College Station. Sea Grant College Program.
HURRICANE RELOCATION PLANNING FOR CAMERON AND WILLACY COUNTIES
C. Ruch Sep. 1985 156 p Sponsored in part by NOAA, Rockville, Md. and Texas Governor's Div. of Emergency Management, Austin
(Contract NA83AA-D-00061)
(PB86-127594; TAMU-SG-86-601) Avail: NTIS HC A08/MF A01 CSCL 04B

The Governor's Division of Emergency Management has been active in preparing coastal areas for the impact of hurricanes. Three studies are anticipated for each coastal area--a relocation/evacuation study; a vulnerability analysis study; and a contingency planning study. All three studies have been completed for the Houston-Galveston and the Corpus Christi areas. Relocation/evacuation and vulnerability analysis studies are complete for the Lake Sabine area and this report represents the first study for the Brownsville area. GRA

N86-24119# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR DECEMBER 1985, VOLUME 39, NUMBER 23, NOVEMBER 28, 1985
28 Nov. 1985 10 p
(PB86-131802) Avail: NTIS HC A02/MF A01 CSCL 04B

Temperature and precipitation probabilities for the Northern Hemisphere on a periodic and seasonal basis are reported. GRA

N86-24120*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Physical Sciences, Mathematics and Resources.
PROCEEDINGS OF THE FIRST NATIONAL WORKSHOP ON THE GLOBAL WEATHER EXPERIMENT: CURRENT ACHIEVEMENTS AND FUTURE DIRECTIONS, VOLUME 1 Final Report
Oct. 1985 89 p refs Workshop held in Woods Hole, Mass., 9-20 Jul. 1984
(Grant NSF ATM-80-25329)
(NASA-CR-176720; NAS 1.26:176720) Avail: NTIS
HC A05/MF A01 CSCL 04B

A summary of the proceedings in which the most important findings stemming from the Global Weather Experiment (GWE) are highlighted, additional key results and recommendations are comered, and the presentations and discussion are summarized. Detailed achievements, unresolved problems, and recommendations are included. Author

N86-24121*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Physical Sciences, Mathematics, and Resources.
PROCEEDINGS OF THE FIRST NATIONAL WORKSHOP ON THE GLOBAL WEATHER EXPERIMENT: CURRENT ACHIEVEMENTS AND FUTURE DIRECTIONS, VOLUME 2, PART 1 Final Report
Oct. 1985 384 p refs Workshop held in Woods Hole, Mass., 9-20 Jul. 1984 Sponsored in cooperation with NASA and NOAA 3 Vol.
(Grant NSF ATM-80-25329)
(NASA-CR-176721; NAS 1.26:176721; PB86-139169) Avail: NTIS HC A17/MF A01 CSCL 04B

Topics covered include: data systems and quality; analysis and assimilation techniques; impacts on forecasts; tropical forecasts; analysis intercomparisons; improvements in predictability; and heat sources and sinks. For individual titles, see N86-24122 through N86-24141.

N86-24122*# Wisconsin Univ., Madison.
SATELLITE OBSERVED THERMODYNAMICS DURING FGGE
William L. Smith *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 3-18 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

During the First Global Atmospheric Research Program (GARP) Global Experiment (FGGE), determinations of temperature and moisture were made from TIROS-N and NOAA-6 satellite infrared and microwave sounding radiance measurements. The data were processed by two methods differing principally in their horizontal resolution. At the National Earth Satellite Service (NESS) in Washington, D.C., the data were produced operationally with a horizontal resolution of 250 km for inclusion in the FGGE Level IIb data sets for application to large-scale numerical analysis and prediction models. High horizontal resolution (75 km) sounding data sets were produced using man-machine interactive methods for the special observing periods of FGGE at the NASA/Goddard Space Flight Center and archived as supplementary Level IIb. The procedures used for sounding retrieval and the characteristics and quality of these thermodynamic observations are given.
Author

N86-24123*# National Meteorological Center, Camp Springs, Md.
CLOUD-DRIFT WIND ESTIMATES DURING PGGE
Ronald D. McPherson *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 19-36 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Cloud drift winds constitute an important component of the First Global Atmospheric Research Program Experiment data base. Data was generated by far different centers, using somewhat different procedures. Image data transformation to wind vectors is discussed. Emphasis is placed on the differences between the processing techniques employed in each system. The use of cloud drift data by global data assimulation systems is reviewed, including quality control and relative weighting.
B.G.

N86-24124*# National Oceanic and Atmospheric Administration, Rockville, Md. Office of Climatic and Atmospheric Research.
BUOY SYSTEMS DURING THE PGGE
Rex J. Fleming *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 37-50 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

The data quality, impact, and application of various buoy systems deployed during the FGGE are discussed. Three general categories of buoy systems provided critical coverage of environmental phenomena in the Arctic Ocean basin, the tropical oceans, and the Southern Hemisphere. Results of the added pressure information in the Arctic are presented. The impacts of the Southern Hemisphere buoy systems on pressure fields, SST fields, and ocean circulation are provided. Those findings from the tropical drifters, relevant to the FGGE time scales, are indicated. All three types of buoy systems, each uniquely engineered for application in different regions of our planet, contributed to the broad objective of advancing weather and climate predictions in several special ways. Comments are provided about the role of buoys in a future observing system, and a consortium of interested countries is strongly advocated in order to accelerate this role.
Author

N86-24125*# Dalhousie Univ., Halifax (Nova Scotia). Dept. of Mathematics.
THE TROPICAL SPECIAL OBSERVING SYSTEM
Paul R. Julian *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 51-68 refs Prepared in cooperation with National Center for Atmospheric Center, Boulder, Colo. (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

The performance summaries of the components of the Tropical Observing System is covered. Some of the more important points concerning the quality of the data from each of the observing systems is emphasized, and examples of the assimilation of the Level IIb data are shown.
Author

N86-24126*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBJECTIVE ANALYSIS AND ASSIMILATION TECHNIQUES USED FOR THE PRODUCTION OF FGGE 3b ANALYSES
Roger W. Daley (National Center for Atmospheric Research, Boulder, Colo.), Anthony Hollingsworth (European Center for Medium Range Weather Forecasts, Reading, England), Jeffrey J. Ploshay (Princeton Univ., N.J.), Kikuro Miyakoda (Princeton Univ., N.J.), Wayman E. Baker, Eugenia Kalnay, C. Dey (National Meteorological Center, Camp Springs, Md.), T. N. Krishnamurti (Florida State Univ., Tallahasee), and E. Barker (Naval Environmental Prediction Research Facility, Monterey, Calif.) *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 71-82 (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

A system of seven tables, which cover analysis archiving, observation types, quality control, data assimilation cycles, assimilating models, initialization, and analysis techniques was adopted. The set of prepared tables allows side-by-side comparison of the characteristics of the six data assimilation systems (European Center for Medium Range Weather Forecasts, Geophysical Fluid Dynamics Laboratory, Goddard Laboratory for Atmospheric Science, National Meteorological Center, Florida State University, and Naval Environmental Prediction Research Facility) used to produce FGGE IIIb analyses.
Author

N86-24127*# European Centre for Medium-Range Weather Forecasts, Reading (England).
RESULTS FROM TWO RECENT OVSERVING SYSTEM EXPERIMENTS
S. Uppala, P. Kallberg, Anthony Hollingsworth, and S. Tibaldi *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 85-118 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Two Observing System Experiments were carried out at (ECMWF). The European Center for Medium Range Weather Forecasting impact of various observing systems were examined for two periods during the EGGE year: November 8 to 9, 1979 (OSE-1) and February 22 to March 7, 1979 (OSE-II). Attempts were made to understand the effect of the observing systems on both the analyses and the quality of the short and medium range forecasts. The results confirm that the impact of a particular observing system (e.g., SATEM) is dependent on the level of synoptic activity present in the areas where this particular observing system is the main soruce of meteorological information. SATOB data are also shown to be improtant for the analyses of tropical regions, whereas SATEM data are of paramount importance for the extratropical analyses over ocean areas. Aircraft data, where available, are an invaluable addition to the global observational

data base. These results therefore demonstrate clearly the value of each of the observing systems. The fact that, in particular circumstances, there may be some redundancy between the systems is a strength rather than a weakness of the composite global observing system. Author

N86-24128*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLAS EXPERIMENTS ON THE IMPACT OF FGGE SATELLITE DATA ON NUMERICAL WEATHER PREDICTION
Eugenia Kalnay, R. Atlas, Wayman E. Baker, and Joel Susskind *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 121-145 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Simulation studies and pre-FGGE data impact studies were briefly reviewed. Impact of Goddard Laboratory for Atmospheric Science temperature soundings and cloud tracked winds was also examined. B.G.

N86-24129*# Australian Numerical Meteorology Research Center, Melbourne.
THE IMPACT OF THE FGGE OBSERVING SYSTEMS IN THE SOUTHERN HEMISPHERE
Kamal Puri, W. Boourke, and R. Seaman *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiments, Vol. 2, Pt. 1 Oct. 1985 p 146-160 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Results of studies carried out at the Australian Numerical Meteorology Research Centre (ANMRC) and the Australian Bureau of Meteorology to assess the impact of FGGE on numerical weather prediction in the Southern Hemisphere are presented. These studies inducate that the FGGE data base had a significant impact on analysis and numerical weather prediction. From the operational standpoint, the most outstanding contribution was made by the drifting buoy data that enabled reliable routine surface pressure analyses to be made over the entire hemisphere. The results of a limited study using the MNMRC data assimilation scheme show that the quality of prediction to 48 hours hinges crucially on both the buoy pressure data and satellite temperature soundings with single level satellite winds having a small impact. Author

N86-24130*# Florida State Univ., Tallahassee. Dept. of Meteorology.
NUMERICAL WEATHER PREDICTION IN LOW LATITUDES
T. N. Krishnamurti *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 163-187 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Based on the results of a number of numerical prediction experiments, the differential heating between land and ocean is an important and critical factor for investigation of phenomenon such as the onset of monsoons over the Indian subcontinent. The pre-onset period during the month of May shows a rather persistent flow field in the monsoon region. At low levels the circulation exhibits anticyclonic excursions over the Arabian Sea, flowing essentially parallel to the west coast of India from the north. Over the Indian subcontinent the major feature is a shallow heat low over northern India. As the heat sources commence a rapid northwestward movement toward the southern edge of the Tibetan Plateau, an interesting configuration of the large-scale divergent circulation occurs. A favorable configuration for a rapid exchange of energy from the divergent to the rotational kinetic energy develops. Strong low level monsoonal circulations evolve, attendant with that the onset of monsoon rains occurs. In order to test this observational sequence, a series of short-range numerical prediction experiments were initiated to define the initial heat sources. Author

N86-24131*# European Centre for Medium-Range Weather Forecasts, Reading (England).
ON THE IMPACT OF THE FGGE ON TROPICAL FORECASTS
William A. Heckley *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 188-208 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

It has become evident from operational experience that a good forecast requires, in general, a good analysis. This is as true in the tropics as it is in the extratropics. One can find many examples of bad data being accepted by the analysis scheme and significantly degrading the subsequent forecast. Equally, a lack of data may result in a forecast completely missing the early development of, for example, a midlatitude cyclone or tropical depression. Also, single level data may be misinterpreted by an analysis scheme. These problems are compounded in the tropics by our relative ignorance of the dynamics, the necessarily crude descriptions of many important physical processes, and fundamental in analysis. The impact of the FGGE on tropical analysis/forecasting is reviewed. Author

N86-24132*# Dalhousie Univ., Halifax (Nova Scotia).
SOME COMPARISON OF ECMWF 3b AND GFDL 3b ANALYSES IN THE TROPICS
Paul R. Julian *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 211-216 refs Prepared in cooperation with National Center for Atmospheric Research, Boulder, Colo. (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

Owing to the problems that data assimilation procedures have in analyzing data in the tropics and to the apparent differences in the descriptions of the European Center for Medium Range Weather Forecasts (ECMWF) and Geophysical Fluid Dynamics Laboratory (GFDL) assimilation suites, a brief comparison was done of the resulting analyses in the tropics. Three cases each were selected for Standard Operating Procedures 1 and 2 at the 200 and 850 mb levels, the wind fields for 25 deg N 25 deg S were partitioned into a rotational and divergent component, and various statistics of each were calculated. Author

N86-24133*# European Centre for Medium-Range Weather Forecasts, Reading (England).
THE RESPONSE OF NUMERICAL WEATHER PREDICTION ANALYSIS SYSTEMS TO FGGE 2b DATA
Anthony Hollingsworth, Andrew Lorenc (United Kingdom Meteorological Office, Bracknell, England), Steven Tracton (National Meteorological Center, Washington, D.C.), K Arpe, G. Cats (Koninklijk Nederlands Meteorologisch Inst., De Bilt), S. Uppala, and P. Kallberg (Swedish Meteorological and Hydrological Inst., Norrkoeping) *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 217-227 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

An intercomparison of analyses of the main PGGE Level IIb data set is presented with three advanced analysis systems. The aims of the work are to estimate the extent and magnitude of the differences between the analyses, to identify the reasons for the differences, and finally to estimate the significance of the differences. Extratropical analyses only are considered. Objective evaluations of analysis quality, such as fit to observations, statistics of analysis differences, and mean fields are discussed. In addition, substantial emphasis is placed on subjective evaluation of a series of case studies that were selected to illustrate the importance of different aspects of the analysis procedures, such as quality control, data selection, resolution, dynamical balance, and the role of the assimilating forecast model. In some cases, the forecast models are used as selective amplifiers of analysis differences to assist in deciding which analysis was more nearly correct in the treatment of particular data. Author

N86-24134*# National Center for Atmospheric Research, Boulder, Colo.

ANALYSIS AND FORECAST INTERCOMPARISONS USING THE FGGE SOP-1 DATA BASE

David P. Baumhefner *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 228-246 refs (For primary document see N86-24121 14-47)

Avail: NTIS HC A17/MF A01 CSCL 04B

The First GARP Global Experiment (FGGE) data base has provided the research community with the most complete global coverage of meteorological informaiton since measurements were first taken. It is important to understand the characteristics of the FGGE data base in terms of its accuracy and representativeness compared to the true state of the atmosphere. The uncertainty associated with the initial conditions used in a numerical model plays a significant role in subsequent error growth as shown by predictability theory. The ultimate limit of forecast skill is directly related to the initial uncertainty. The accuracy of analyses using FGGE data base coupled with the errors due to modeling imperfections determines the present skill of numerical models. An estimte of initial uncertainty is determined by examining differences in several FGGE analyses. The estimate is then used to determine an ultimate limit of forecast skill from derived predictability error growth rates. Several different calculations of predictability error growth are also compared. Finally, present-day forecast skill using FGGE analyses is contrasted to the estimates of ultimate skill, and the partition of model error versus initial uncertainty is discussed. Author

N86-24135*# Iowa State Univ. of Science and Technology, Ames. Dept. of Earth Sciences.

A COMPARISON STUDY OF SPECTRAL ENERGETICS ANALYSIS USING VARIUS FGGE 3b DATA

Tsing-Chang Chen and Yen-Huei Lee *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 247-266 refs (For primary document see N86-24121 14-47)

(Grants NAG5-105; NA82AA-D-00035; NSF ATM-82-06798)

Avail: NTIS HC A17/MF A01 CSCL 04B

The atmospheric spectral energetics studies performed before the First GARP Global Experiment (FGGE) were reviewed, and the deficiencies of these studies were pointed out. The data generated by the FGGE IIIb analyses of the European Center for Medium Range Weather Forecasts, the Geophysical Fluid Dynamics Laboratory, and the Goddard Laboratory for Atmospheric Sciences over the entire globe during the FGGE summer and winter are used to analyze the atmospheric spectral energetics. Comparisons were made between the results using three FGGE IIIb analyses, and between previous and current studies with the spectral energetics of the Southern Hemisphere. Author

N86-24136*# European Centre for Medium-Range Weather Forecasts, Reading (England).

MEDIUM RANGE FORECASTING: THE EXPERIENCE OF ECMWF

Lennart Bengtsson *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 269-291 refs Previously announced in IAA as A86-14416 (For primary document see N86-24121 14-47)

Avail: NTIS HC A17/MF A01 CSCL 04B

The results of five years of operational medium-range forecasts at ECMWF is discussed. It is shown that a considerable improvement in predictive skill has taken place, resulting in more accurate forecasts and an extension in time of useful predictive skill. For the Northern Hemisphere extratropics, the improvement in skill during the winter season is about three days for the 500-mb geopotential compared to the very first experiments in the early 1970s. Three are large geographical and temporal variations in the performance of the model, as well as large-scale errors of a systematic nature. Numerical experiments have indicated great sensitivity to the representation of orography and to tropical forcing. Author

N86-24137*# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.

A MONTHLY FORECAST EXPERIMENT: PRELIMINARY REPORT

Kikuro Miyakoda, J. Sirutis, and Jeffrey J. Ploshay *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 292-296 refs (For primary document see N86-24121 14-47)

Avail: NTIS HC A17/MF A01 CSCL 04B

An experiment on monthly forecasts with eight winter cases is being carried out, using a 1980 general circulation model (GCM), which incorporates a set of dubgrid-scale physics characterized by the Melion-Yamada turbulence closure (hierarchy level 2.5), the Monin-Obukhov parameterization for the layer next to the ground surface, Manabe's cumulus parameterization, and the soil heat conduction. The sample cases adopted are for the month of January in the years from 1977 to 1983, which include the extraordinarily severe winter of 1977 and the most pronounced E1 Nino year of 1983. Each case is predicted by prescribing the climatologically normal sea surface temperature as the lower boundary conditions and by using an ensemble means of three individual integrations. These integrations start with three different initial conditions based on the Level data generated separately at the Geophysical Fluid Dynamics Laboratory, the National Meteorological Center, and the European Centre for Medium Range Weather Forecasts. Author

N86-24138*# Wisconsin Univ., Madison. Space Science and Engineering Center.

THE PLANETARY DISTRIBUTION OF HEAT SOURCES AND SINKS DURING FGGE

Donald R. Johnson and Ming-Ying Wei *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 299-316 refs Sponsored in part by the National Science Foundation and NOAA (For primary document see N86-24121 14-47)

Avail: NTIS HC A17/MF A01 CSCL 04B

Heating distributions from analysis of the National Meteorological Center and European Center for Medium Range Weather Forecasts data sets; methods used and problems involved in the inference of diabatic heating; the relationship between differential heating and energy transport; and recommendations on the inference of heat soruces and heat sinks for the planetary show are discussed. Author

N86-24139*# National Center for Atmospheric Research, Boulder, Colo.

PRELIMINARY EVALUATION OF DIABATIC HEATING DISTRIBUTION FROM FGGE LEVEL 3b ANALYSIS DATA

Akira Kasahara and Arthur P. Mizzi *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiments, Vol. 2, Pt. 1 Oct. 1985 p 317-329 refs (For primary document see N86-24121 14-47)

(Grant NA84AA-G-01214)

Avail: NTIS HC A17/MF A01 CSCL 04B

A method is presented for calculating the global distribution of diabatic heating rate. Preliminary results of global heating rate evaluated from the European center for Medium Range Weather Forecasts Level IIIb analysis data is also presented. Author

N86-24140*# Sao Paulo Univ. (Brazil). Dept. of Meteorology.

THE PARTITION OF ENERGY ASSOCIATED WITH TROPICAL HEAT SOURCES

Pedro L. Silva-Dias and Julia N. Paegle (Utah Univ., Salt Lake City) *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 331-360 refs Sponsored in part by FAPESP and FINEP, Brazil (For primary document see N86-24121 14-47)

(Grants NAG5-127; NSF ATM-82-19198; NA84AA-G-01214)

Avail: NTIS HC A17/MF A01 CSCL 04B

Data sets derived from observations during the First GARP Global Experiment (FGGE) have permitted the study of the behavior of the tropical atmosphere to an extent not possible before. The

present summary discusses characteristics of the tropical atmosphere which may be a result of tropical heating. It is shown that the meridional component of the divergent wind is of the same order of magnitude an he rotational meridional wind for the planetary tropical scales. Furthermore, the first and second internal modes dominate over most of the tropics, and it is shown that gravity and Kelvin codes are the main contributors to the total tropical divergence. Comparison with averaged station precipitation data and heating estimates obtained from Goddard Laboratory for Atmospheric Science (GLAS)/National Aeronautics and Space Administration (NASA) show good correspondence between areas with maximum internal mode energy and regions with pronounced latent heat release. Author

N86-24141*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF ATMOSPHERIC AND SURFACE PARAMETERS FROM HIRS2/MSU ON TIROS-N
Joel Susskind and Eugenia Kalnay *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 1 Oct. 1985 p 361-384 refs (For primary document see N86-24121 14-47)
Avail: NTIS HC A17/MF A01 CSCL 04B

At the Goddard Laboratory for Atmospheric Sciences (GLAS) a physically based satellite temperature sounding retrieval system was developed, involving the simultaneous analysis of sounding data, for determining atmospheric and surface conditions that are consistent with the observed radiances. In addition to determining accurate atmospheric temperature profiles even in the presence of clouds, the system provides global estimates of day and night sea or land surface temperatures, snow and ice cover, cloud amounts, cloudtop heights and temperatures, and albedo. The characteristics of the atmospheric and surface parameters derived from the GLAS Physical Retrieval System are reviewed, results for the FGGE year are presented and, whenever possible, compared with other measurements of the same fields. Some of the model-derived diagnostic fields available from the GLAS Analysis/Forecast System are also discussed. These fields may lead to more accurate determination of the source terms of the atmospheric heat and moisture budgets. Author

N86-24142*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Physical Sciences, Mathematics, and Resources.
PROCEEDINGS OF THE FIRST NATIONAL WORKSHOP ON THE GLOBAL WEATHER EXPERIMENT: CURRENT ACHIEVEMENTS AND FUTURE DIRECTIONS, VOLUME 2, PART 2 Final Report
Oct. 1985 414 p refs Workshop held in Woods' Hole, Mass., 9-20 Jul. 1984 Sponsored in cooperation with NASA and NOAA 3 Vol.
(Grant NSF ATM-80-25329)
(NASA-CR-176722; NAS 1.26:176722; PB86-139177) Avail: NTIS HC A18/MF A01 CSCL 04B

An assessment of the status of research using Global Weather Experiment (GWE) data and of the progress in meeting the objectives of the GWE, i.e., better knowledge and understanding of the atmosphere in order to provide more useful weather prediction services. Volume Two consists of a compilation of the papers presented during the workshop. These cover studies that addressed GWE research objectives and utilized GWE information. The titles in Part 2 of this volume include General Circulation Planetary Waves, interhemispheric, Cross-Equatorial Exchange, Global Aspects of Monsoons, Midlatitude-Tropical Interactions During Monsoons, Stratosphere, Southern Hemisphere, Parameterization, Design of Observations, Oceanography, Future Possibilities, Research Gaps, with an Appendix. For individual titles, see N86-24143 through N86-24164.

N86-24143*# Maryland Univ., College Park. Dept. of Meteorology.
FGGE AND ATMOSPHERIC PREDICTABILITY Final Report
Ferdinand Baer *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 387-397 refs (For primary document see N86-24142 14-47)
(Grant NSF ATM-82-12201)
Avail: NTIS HC A18/MF A01 CSCL 04B

FGGE data and its analyses have made significant impact on the prediction community and its understanding of the atmosphere. The detail available from the FGGE data makes understanding of specific issues more precise and opens up new questions not previously recognized. The spectrum of issues to which FGGE data may be addressed includes time scales (stationary and transient), space scales (global versus local), regionality (tropics and oceans), specific weather phenomena (blocking and monsoons), and energetics. In addition to identifying and highlighting atmospheric processes, FGGE data can and were applied to improved atmospheric predictability. This was achieved through model initialization, improved parameterization of model forcing, and more thorough validation of model forecasts. Of particular interest is the increased understanding of the atmosphere and subsequently its predictability, which may be obtained through an assessment of the statistical characteristics of the FGGE data. Author

N86-24144*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
IMPACT OF FGGE ON DIAGNOSES OF THE GENERAL CIRCULATION Final Report
Richard D. Rosen *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 398-421 refs (For primary document see N86-24142 14-47)
(Grant NSF ATM-83-11714)
Avail: NTIS HC A18/MF A01 CSCL 04B

Several studies have pointed out that a number of significant differences exist in circulation fields derived from the various Level IIIb analyses. For example, differences in the strength of the January Hadley cell between the GFDL and ECMWF analyses are as large as 35 percent, and there are some locations over the Northern Hemisphere where the 200 mb zonal wind in January differs by 10 m/s between these two analyses. Calculations of the global energy cycle based on the GFDL and ECMWF analyses are significantly different as well. In addition, the uncertain quality of some of the FGGE IIIb moisture and vertical motion fields raises doubts about whether new insights into the role of these fields in the general circulation will be gained from the FGGE data. Overall, therefore, a sense of disappointment emerges that the FGGE analyses have thus far failed to live up to the expectation that they would yield more definitive general circulation statistics. The shortcomings in the Level IIIb analyses need to be rectified before full confidence can be placed in results pertaining to the general circulation that are based on such modern data assimilation approaches. Author

N86-24145*# Florida State Univ., Tallahassee. Geophysical Fluid Dynamics Inst.
REVIEW OF RESEARCH ON WAVE MEAN FLOW INTERACTIONS USING FGGE DATA Final Report
Richard L. Pfeffer *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 422-437 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Comparison is made between the conventional Eulerian diagnostics of wave mean flow interactions in the atmosphere and the diagnostics introduced by Andrews and McIntyre (1976). In the latter, the meridional circulation is represented by a residual circulation, and the eddy torque in the zonal momentum equation by the Eliassen-Palm (1960) flux divergence (or equivalently, by the poleward eddy flux of geostrophic potential vorticity). It is found that, while the new diagnostics are useful in studying stratospheric warmings and transports of conservative quantities, the conventional diagnostics are more useful in studying global energetics and wave mean flow interactions in the troposphere and lower stratosphere. Case studies diagnosed with FGGE IIIb

data are presented to illustrate this point. Kung and Tanaka's (1983) comparisons of the atmospheric energy cycle for SOP-1 and SOP-2, estimated with the use of the ECMWF and GFDL FGGE IIIb data bases, are used to assess the uncertainty in calculations of energetics based on the use of FGGE IIIb data. These results demonstrate the high degree of model dependence in the FGGE IIb data sets. Author

N86-24146*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ROLE OF FGGE DATA IN THE UNDERSTANDING AND PREDICTION OF ATMOSPHERIC PLANETARY WAVES Final report
Wayman E. Baker *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 438-450 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

The augmented observational data base provided by FGGE offers a unique opportunity to improve the understanding and prediction of atmospheric planetary waves. Substantial progress was made, but a number of problems remain. The research on planetary waves conducted thus far with FGGE data is reviewed. Areas of progress are summarized, and some remaining problems are discussed. Author

N86-24147*# Utah Univ., Salt Lake City. Dept. of Meteorology.
INTERHEMISPHERIC INTERACTIONS Final Report
Jan Paegle *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 453-468 refs (For primary document see N86-24142 14-47)
(Grants NAG5-127; NSF ATM-82-19198; NSF ATM-80-18158)
Avail: NTIS HC A18/MF A01 CSCL 04B

Diagnoses of global data sets are presented that indicate strong coupling between the regions of enhanced tropical convection of the summer hemisphere and subtropical jet stream maxima of the winter hemisphere. One curious aspect of this coupling is that it tends to occur through zones of easterly winds at upper tropospheric levels. This characterizes the El Nino event of 1983, an upper connection of the Asian monsoon to the Australian jet in FGGE and DST data and shorter term transitions during the First Special Observing Period of FGGE. The reasons for the apparent propagation through easterly wind zones remain to be clarified. Author

N86-24148*# Scripps Institution of Oceanography, La Jolla, Calif. Climate Research Group.
PLANETARY WAVE PREDICTION: BENEFITS OF TROPICAL DATA AND GLOBAL MODELS Final Report
Richard C. J. Somerville *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 469-472 refs (For primary document see N86-24142 14-47)
(Grants NAG5-236; NSF ATM-82-05392)
Avail: NTIS HC A18/MF A01 CSCL 04B

Skillful numerical predictions of midlatitude atmospheric planetary waves generally require both tropical data for the initial conditions and a global domain for the forecast model. The lack of either adequate tropical observations or a global domain typically leads to a significant degradation of forecast skill in middle latitudes within the first one to three days of the forecast period. These effects were first discovered by numerical experimentation. They were subsequently explained theoretically, and their importance for practical forecasting was confirmed in a series of prediction experiments using FGGE data. Author

N86-24149*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
ANALYSIS OF CROSS-HEMISPHERIC INFLUENCES ON THE MONSOON TROUGH AND TROPICAL CYCLONE GENESIS DURING FGGE AND DIURNAL SUBSIDENCE DIFFERENCES Final Report
William M. Gray and Cheng-Shang Lee *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 475-494 refs Sponsored in part by the National Science Foundation (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

For a number of years our project has been studying the cross-equatorial (winter to summer hemisphere) processs that can lead to the day-to-day alterations in the strength of the monsoon trough. These processes are also related to the genesis and intensification of tropical storms. The cross-hemispheric processes that occurred during the FGGE year are currently being studied with the use of the ECMWF analysis. How the winter hemisphere can affect low level cold surge penetration across the equator following cold front passage, and how upper tropospheric anticyclones of the winter hemisphere can produce an intensification of a tropical cyclone of the opposite hemisphere is described. ECMWF analysis of the 00Z versus 12Z diurnal difference in the clear region (10 deg diameter) subsidence occurring in the subtropical Pacific Ocean during FGGE is presented. The general reliability of the FGGE ECMWF analysis with regard to the specification of the large scale structure of tropical cyclones is shown. Author

N86-24150*# Wisconsin Univ., Madison. Dept. of Meteorology.
CROSS-EQUATORIAL AND BOUNDARY LAYER EXCHANGE: A FGGE REVIEW Final Report
John A. Young *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 495-516 refs (For primary document see N86-24142 14-47)
(Grant NSF ATM-82-10229)
Avail: NTIS HC A18/MF A01 CSCL 04B

The Global Weather Experiment (FGGE) provided unique data on the interesting phenomenon of cross-equatorial flow. Such motion is a key element of the seasonal cycle of the tropics, especially in monsoonal regions. The IIb obserations, IIIb assimilations, and implied dynamics of the flows are reviewed. Additional emphasis is given to the low level branches concentrated in the planetary boundary layer, including air sea interaction and vertical turbulence processes. The results of a recent MONEX Boundary Layer Workshop are summarized. Author

N86-24151*# Hawaii Univ., Honolulu. Dept. of Meteorology.
GLOBAL ASPECTS OF MONSOONS Final Report
Tako Murakami *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 517-540 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Recent developments are studied in three areas of monsoon research: (1) global aspects of the monsoon onset, (2) the orographic influence of the Tibetan Plateau on the summer monsoon circulations, and (3) tropical 40 to 50 day oscillations. Reference was made only to those studies that are primarily based on FGGE Level IIIb data. A brief summary is given. Author

N86-24152*# Naval Postgraduate School, Monterey, Calif. Dept. of Meteorology.
MIDLATITUDE TROPICAL INTERACTIONS DURING WINTER Final Report
C.-P. Chang *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 543-560 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Pre-FGGE and FGGE/MONEX data are used to identify short term midlatitude tropical and longitudinal interactions during the winter monsoon. These interactions occur as cold surges, which develop over the East Asian continent and penetrate deep into the tropics with fast gravity wave speed. The observed interactions that occur after a surge include cyclogenesis and enhanced convection in the equatorial region, feedback from equatorial convection to midlatitude circulation systems, tropical east-west

(Walker) circulations, and cross-equatorial influence. These interactions are also studied theoretically by analytical solutions of linearized shallow water equations. Response to transient forcing (monsoon surges) are mainly in Rossby and Kelvin modes. When the forcing time scale is short, significant gravity modes are also excited. The responses closely resemble observed winter monsoon flow. Responses to stationary forcing show that deep (barotropic) motions propagate energy away into high latitudes and that shallow (baroclinic) motions are trapped around the equator. It is shown that the barotropic teleconnection-type response to tropical sources found in previous numerical studies was due to the specified vertical wind shear and surface friction. Author

N86-24153*# California Univ., Los Angeles. Dept. of Atmospheric Sciences.

STRATOSPHERIC WARMINGS DURING THE WINTER OF 1979 Final Report

Carlos R. Mechoso *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 563-580 refs (For primary document see N86-24142 14-47)

Avail: NTIS HC A18/MF A01 CSCL 04B

Some of the arguments crucial to the current understanding of stratospheric warmings are recapitulated briefly. The circulation at 10 mb during the winter of 1979 is described. A review of numerical forecasts of stratospheric warmings reveals that, in general, these events are predictable from several days in advance. In some cases, however, relatively small errors in the predicted tropospheric zonal mean wind produce large differences in upward wave propagation and, consequently, in the stratospheric forecast. Author

N86-24154*# Washington Univ., Seattle. Dept. of Atmospheric Sciences.

DYNAMICAL PHENOMENA IN THE EQUATORIAL MIDDLE ATMOSPHERE DURING NORTHERN WINTER 1978-1979 Final Report

Conway B. Leovy and Matthew H. Hitchman *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 581-594 refs (For primary document see N86-24142 14-47)

(Grant NsG-7085)

Avail: NTIS HC A18/MF A01 CSCL 04B

Data from the Limb Infrared Monitor of the Stratosphere (LIMS) on the Nimbus-7 spacecraft were used to calculate the temperature and zonal wind structure of the equatorial stratosphere and lower mesosphere during the period October 25, 1978 to May 28, 1979. Interactions between the descending westerly shear zone of the semiannual oscillation and upward propagating Kelvin waves are described. Inertial instability may be influencing the zonal wind in midwinter. Author

N86-24155*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE ZONAL HARMONIC AND THE YEARLY AND HALF-YEARLY WAVES ON THE SOUTHERN HEMISPHERE IN FGGE COMPARED WITH THE MEAN Final Report

Harry vanLoon (National Center for Atmospheric Research, Boulder, Colo.) and Kingtse C. Mo *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 595-645 (For primary document see N86-24142 14-47)

Avail: NTIS HC A18/MF A01 CSCL 04B

The dominant component in the mean annual cycle of sea level pressure in the latitudes north of approx. 40 deg S is the yearly wave, whereas to the south of this latitude a half-yearly wave dominantes. In FGGE, however, the usually small yearly wave was large in the Antarctic, owing to the extraordinarily low pressure there in the winter of 1979. The half-yearly wave's amplitude was appreciably above normal in the center of each ocean in middle latitudes, and below normal at high latitudes. The yearly wave in the zonal geostrophic wind was larger than normal over the Antarctic Ocean. Similar results are obtained at 500 mb. The three month mean stationary waves (zonal harmonic waves) were larger than the mean in FGGE. The intra-annual variation of both amplitude and phase of the monthly mean harmonic waves in FGGE was large, which is not surprising as they contain an appreciable transient component, unlike the long term monthly mean waves. Author

N86-24156*# National Center for Atmospheric Research, Boulder, Colo.

THE SOUTHERN HEMISPHERE CIRCULATION DURING THE FGGE AND ITS REPRESENTATIVENESS Final Report

Kevin E. Trenberth and John R. Christy (Illinois Univ., Urbana) *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 646-668 refs (For primary document see N86-24142 14-47)

(Grant NSF ATM-82-11560)

Avail: NTIS HC A18/MF A01 CSCL 04B

An analysis of the global redistribution of mass during the FGGE year indicates that the global circulation was highly anomalous in several respects, especially from April to July 1979. For the 56 to year period 1924-1980, sea-level pressures over the northern hemisphere during the FGGE year were second highest in spring and highest in summer. In April and June, the anomalies were 1-in-100-year events. At the same time, sea-level pressure deficits and an exceptionally deep circumpolar trough were recorded over the Southern Hemisphere. Such compensation between the hemispheres, through the constraint of conservation of mass, provides support for the highly typical nature of the circulation analyzed to exist over the Southern Hemisphere throughout the FGGE year. The Southern Hemisphere circulation was characterized by an exceptionally deep circumpolar trough, an increase in westerlies from 40 deg to 70 deg S, and a decrease in westerlies to the north. In winter, the subtropical jet was weaker and the polar jet stronger than normal, so that a pronounced double jet structure prevailed. In summer, the jet was shifted south by 3 deg latitude. A southward shift in storm tracks accompanied these changes year round in a manner consistent with theory. Author

N86-24157*# Illinois Univ., Urbana. Dept. of Atmospheric Sciences.

RESPONSE OF CUMULUS CLOUDS TO LARGE-SCALE FORCING AND CUMULUS PARAMETERIZATION Final Report

Yoshimitsu Ogura *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 671-688 refs Sponsored in part by NOAA (For primary document see N86-24142 14-47)

(Grants NSF ATM-82-11786; NSF ATM-82-10130)

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Using the cumulus ensemble model (Soong and Ogura, 1980), statistical properties of cumulus clouds that occur in response to the imposed large scale forcing were investigated both in the tropical and midlatitude situtations. A strong drying process was found to occur in the boundary layer in association with deep convection in a midlatitude case. The Arakawa-Schubert (1974) cumulus parameterization scheme was tested semi-prognostically against both the model result and the observation in a tropical rain event that occurred in GATE. The Cloud heating and drying effects predicted by the Arakawa-Schubert scheme were found to agree well both with the observation and the model result. However, it was also found that the Arakawa-Schuber scheme underestimates both condensation and evaporation rates substantially. An inclusion of the downdraft effect, as formulated by Johnson (1976), appears to alleviate this deficiency. This downdraft effect may be important in predicting the behavior of the boundary accurately. Author

N86-24158*# State Univ. of New York, Albany. Dept. of Atmospheric Sciences.

ADVANCES IN PARAMETERIZATION OF CUMULUS CONVECTION IN NUMERICAL MODELS Final Report

John Molinari *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 689-705 refs (For primary document see N86-24142

14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Observational studies over the last decade have revealed new sources of difficulty in the already complex problem of parameterization of precipitating cumulus convection in large scale numerical weather prediction models. The structure of mesoscale updrafts and downdrafts and the difficulties they present for cumulus parameterization is reviewed. An approach is proposed which follows Kuo (1974) but includes cumulus and mesoscale downdrafts in the vertical distributions of heating and moistening. The development of a realistic life cycle behavior in the numerical prediction of a mesoscale convective complex will be shown.

Author

N86-24159*# European Centre for Medium-Range Weather Forecasts, Reading (England).
A NEW CONVECTIVE ADJUSTMENT SCHEME
Alan K. Betts *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 706-724 refs (For primary document see N86-24142 14-47)
(Grant NSF ATM-81-20444)
Avail: NTIS HC A18/MF A01 CSCL 04B

A marked divergence in philosophy is presented. The primary objective of the proposed parameterization scheme is to ensure that the local vertical temperature and moisture structures, which in nature are strongly constrained by convection, be realistic in the large scale model. The concept of a quasi-equilibrium between the cloud field and the large-scale forcing has been well established. This means that convective regions have characteristic temperature and moisture structures that can be documented observationally and used as the basis of a convective adjustment procedure. In the scheme proposed here, the temperature and moisture structures will be adjusted simultaneously toward observed quasi-equilibrium structures. This ensures that on the grid scale a global model always maintains a realistic vertical temperature and moisture structure in the presence of convection. The saturation point formulation of moist thermodynamics will be used to introduce the observational and theoretical basis of the proposed convective adjustment. The scheme is then applied to a series of data sets from GATE, BOMEX, ATEX and an Arctic air-mass transformation to show the sensitivity of the scheme to different parameters and develop a parameter set suitable for both shallow and deep convection in a global model.

Author

N86-24160*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SIMULATION STUDIES RELATED TO THE DESIGN OF POST-FGGE OBSERVING SYSTEMS Final Report
Milton Halem, R. Atlas, and Joel Susskind *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 727-760 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

The results of three detailed simulation studies are presented. The first study consists of a comparative assessment of the performance of an advanced moisture/temperature sounder (AMTS) being proposed by NASA as a follow-on replacement to the current HIRS-2 operational sounder aboard the NOAA weather satellites. The second study was concerned with assessing the relative accuracies of inferred atmospheric states for idealized lidar wind profiling systems, temperature profiling systems, temperature profiling systems, surface pressure systems, and composite systems. The third study incorporated the above systems into a highly realistic data analysis/forecast cycle from which a series of forecast impact studies were conducted. These studies, taken together, give us a picture of the potential that emerging technoloies can offer in the determination of the basic atmospheric variables required for long-range numerical weather and climate prediction.

Author

N86-24161*# Scripps Institution of Oceanography, La Jolla, Calif.
SEA SURFACE TEMPERATURE FROM SATELLITES: THE IMPACT OF FGGE Final Report
Robert L. Bernstein *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 761-764 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Spacecraft instruments first launched at the beginning of the FGGE year are now producing sea surface temperature data accurate to about 1 C. At larger scales, the errors are dominated by systematic effects, some of which are instrumental, but most are geophysical, i.e., correlated with volcanic aerosols, atmospheric water vapor, clouds, and surface wind. Progress is being made to identify and eliminate such errors and thereby provide sea surface temperature data on a global basis consistently accurate to 0.5 C, which will be needed for studies of climate variability.

Author

N86-24162*# National Oceanic and Atmospheric Administration, Seattle, Wash.
MODELING SEA-SURFACE TEMPERATURE AND ITS VARIABILITY Final Report
Edward S. Sarachik *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 765-778 refs (For primary document see N86-24142 14-47)
(Grant NGL-22-007-228)
Avail: NTIS HC A18/MF A01 CSCL 04B

A brief review is presented of the temporal scales of sea surface temperature variability. Progress in modeling sea surface temperature, and remaining obstacles to the understanding of the variability is discussed.

Author

N86-24163*# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Lab.
HEAT BALANCES OF THE SURFACE MIXED LAYER IN THE EQUATORIAL ATLANTIC AND INDIAN OCEAN DURING FGGE
Robert L. Molinari *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 779-790 refs (For primary document see N86-24142 14-47)
Avail: NTIS HC A18/MF A01 CSCL 04B

Surface meteorological and surface and subsurface oceanographic data collected during FGGE in the equatorial Atlantic and Indian Oceans are used to estimate the terms in a heat balance relation for the mixed layer. The first balance tested is between changes in mixed layer temperature (MLT) and surface energy fluxes. Away from regions of low variance in MLT time series and equatorial and coastal upwelling, surface fluxes can account for 75 percent of the variance in the observed time series. Differences between observed and estimated MLTs indicate that on the average, maximum errors in surface flux are of the order of 20 to 30 W/sq m. In the Atlantic, the addition of zonal advection does not significantly improve the estimates. However in regions of equatorial upwelling, the eastern Atlantic vertical mixing and meridional advection can play an important role in the evolution of MLTs.

Author

N86-24164*# New York Univ., New York. Inst. of Mathematical Sciences.
FUTURE POSSIBILITIES IN OJBECTIVE ANALYSIS AND DATA ASSIMILATION FOR ATMOSPHERIC DYNAMICS Final Report
M. Ghil *In* NAS-NRC Proceedings of the First National Workshop on the Global Weather Experiment, Vol. 2, Pt. 2 Oct. 1985 p 794-802 refs (For primary document see N86-24142 14-47)
(Contract NAS5-27612; Grant NsG-5130)
Avail: NTIS HC A18/MF A01 CSCL 04B

The role that dynamics plays in estimating the state of the atmosphere from incomplete and noisy data is reviewed. Objective analysis represents an attempt at relying mostly on the data and minimizing the role of dynamics in the estimation. Data assimilation tries to balance properly the roles of dynamical and observational information. Sequential estimation is presented as the proper

framework for understanding this balance, and the Kalman filter as the ideal, optimal procedure for data assimilation. The optimal filter computes forecast error covariances of a given atmospheric model exactly, and hence data assimilation should be closely connected with predictability studies. This connection is described, and consequences drawn for currently active areas of the atmospheric and related sciences, namely, mesoscale meteorology, long range forecasting, and upper ocean dynamics. Possibilities offered by judicious data assimilation in understanding barotropic adjustment, a phenomenon that appears to play a crucial role in atmospheric behavior on the scale of weeks to months, and hence in long range forecasting are addressed. Author

N86-24165# National Weather Service, Salt Lake City, Utah.
LARGE SCALE PATTERNS ASSOCIATED WITH MAJOR FREEZE EPISODES IN THE AGRICULTURAL SOUTHWEST
R. S. Hamilton and G. R. Lussky Dec. 1985 43 p
(PB86-144474; NOAA-TM-NWS-WR-191) Avail: NTIS HC A03/MF A01 CSCL 04B

The Technical Memorandum is geared toward those who are responsible for forecasting minimum temperatures for growers of frost-sensitive agriculture. It is slanted toward forecasting in California, though the prinicples applied in this document may also apply to other Western region locales as well. The primary goal of this paper is to get forecasters thinking about frost and to prepare them to forecast frost and freeze conditions before the winter months arrive. This paper will help prepare the forecasters to recognize, in advance, the situations which often lead to freezing conditions in the agricultural regions of the western United States. GRA

N86-24521*# Texas A&M Univ., College Station. Dept. of Meteorology.
OBSERVATIONAL AND NUMERICAL STUDIES OF THE LOW-LEVEL JET STREAM IN THE ATMOSPHERE
Dusan Djuric *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 21 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-24166# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DEVELOPMENT OF A SATELLITE-TRACKED OCEANOGRAPHIC DRIFTING BUOY FOR THE BRAZILIAN ANTARCTIC PROGRAM, PART 1
Merritt R. Stevenson and Eduardo M. B. Alonso Feb. 1986 24 p refs Submitted for publication
(INPE-3793-PRE/888) Avail: NTIS HC A02/MF A01

The project Measurement of the Antarctic Current (MEDICA) which was to develop, build and launch drifting oceanographic buoys, located by System ARGOS, in Antarctica is presented. The basis of the drifting buoy was to used a data collection platform (DCP). A biconic geometry was used for the buoy hull to provide good vertical stability and resistance to entrapment by ice. Fiberglass was used for its high strength to weight ratio, and the facility to use molds for production of the hulls. Sandwich construction was incorporated and provided for outer and inner hulls of fiberglass with polyurethane foam between the walls. Within the hull, the DCP unit and its interface box are mounted within a metal conical rack. The transmitting antenna is mounted on a metal base-plane disc and, in turn, is secured atop the rack. A power supply, consisting of several hundred alkaline dry cells, suitably interconnected and sealed within a plastic housing, resides below the rack for maximum buoy stability. An additional thermistor is mounted in a housing on the conical cover of the buoy and provides air temperature readings. The physical specifications and measuring capabilities of the sensors. E.A.K.

N86-24167# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VARIATIONS IN TEMPERATURE, SALINITY AND DENSITY IN BRANSFIELD STRAIT, 9-14 MARCH, 1985, PART 2
Merritt R. Stevenson, Hector M. InostrozaV, and Jose L. Stech Feb. 1986 23 p refs Submitted for publication
(INPE-3794-PRE/889) Avail: NTIS HC A02/MF A01

During a test experiment of a drifting buoy, 7 hydrographic stations were made in Bransfield Strait during 9 to 14 March. Each station consisted of 2 hydrographic casts with Nansen bottles and reversing thermometers, made to a maximum depth of 300 m, to obtain temperature measurements and water samples for salinity determinations. Horizontal maps of temperature (T), salinity (S) and sigma-t (density) were constructed for 0 m and 10 m depth. Warmer surface water was observed along the west side of the Strait, in comparison with temperatures of 0.51 to 0.56 C along the east side. Surface salinity had a similar pattern with less saline water on the west side and salinities of 34.22 to 34.24 on the east side. The surface density field agreed with the combined effects of T and S, with less dense water on the west side and denser water on the east side. Warmest, less saline and least dense water was found just to the SE of Deception Island (Station 1). Maps of T, S and sigma-t for 10 m depth were generally similar to those at 0 m, but with cooler, more saline and dense water at 10 m depth. The relative geostrophic velocity field, was also determined, for 0 m and 10 m. Surface geostrophic flow was toward 020 deg at 4 cm/s near Deception Island. A T-S Diagram analysis of station data showed these data to be a combination of Brc and Brw water types. Author

N86-24168# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPARISON OF CIRCULATION ESTIMATES AND WINDS BASED ON SHIPBOARD AND SATELLITE-TRACKED BUOY DATA IN BRANSFIELD STRAIT, 9-14 MARCH, 1985, PART 3
Merritt R. Stevenson, Hector M. InostrozaV, Jose Luiz Stech, and Eduardo M. B. Alonso Feb. 1986 21 p refs Submitted for publication
(INPE-3795-PRE/890) Avail: NTIS HC A02/MF A01

The INPE freely drifting prototype oceanographic buoy (System ARGOS) was launched successfully on 9 March at 19:31 GMT, for a several day test experiment. During the 9 to 14 March, 1985, interval, a set of 7 hydrographic stations was made in the Bransfield Strait to obtain information about temperature, salinity and density. Results of the several day drifter trajectory are presented together with a comparison with geostrophic circulation, surface winds and air and sea temperatures. Mean drifter velocity was 27.0 cm/s toward 042 deg and confirmed a predicted NE movement for the surface water layer. The surface geostrophic current was toward 020 deg at 4 cm/s, at 10 m depth the current was toward 045 deg at 5 cm/s. Best agreement was found between the rifter trajectory and the geostrophic current at 10 m depth. At the time of buoy launch and for about one day thereafter, winds were weak and toward 090 deg; after another day, however, the surface winds changed and blew generally toward 250 deg at speeds that gradually increased up to 16 kts, in opposition to the surface water motion. Air and water temperatures measured from the buoy are also discussed and compared with measurements made at the hydrographic stations. Author

N86-24169# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
PRELIMINARY ENVIRONMENTAL ASSESSMENT OF THE PROJECT GEMINI SITE CORPUS CHRISTI, TEXAS
J. E. Matthews, P. J. Bucca, and W. H. Geddes Sep. 1985 31 p
(AD-A161895; NORDA-120) Avail: NTIS HC A03/MF A01 CSCL 20/1

This report is a preliminary assessment of the environment along parts of the continental shelf off Corpus Christi, Texas, and predicts acoustic propagation for a specific site within the area. A

geoacoustic model is developed, based upon archived high-resolution seismic and sediment core data. Theoretical bottom loss, transmission loss, and mode attenuations are calculated using these environmental models as input. Finally, an environmental acoustic evaluation is presented for guidance in the post-experiment analysis, and a comparison is made between the present evaluation and a previous acoustic experiment conducted at this location. GRA

N86-24170# SACLANT ASW Research Center, La Spezia (Italy).
AN ATLAS OF ORIGINAL AND MERCATOR-TRANSFORMED SATELLITE-DATA IMAGES OF THE ALBORAN SEA, AUGUST-OCTOBER 1983
Elvio Nacini 1 Aug. 1985 132 p
(AD-A161898; SACLANTCEN-SR-89) Avail: NTIS HC A07/MF A01 CSCL 14/5

A collection of satellite (NOAA7) images of the Alboran Sea in High Resolution Picture Transmission (HRPT) and Automatic Picture Transmission (APT) format in the visible, near-infrared, and thermal infrared fields is presented. Some of them have been transformed to Mercator projection in order to show how the use of such images can aid in the preparation and conduct of oceanographic and other operations. The contents include: image collection and processing, transformation to Mercator projection, application to oceanographic studies, water masses, temperature profiling, comparison with synoptic weather charts, and tidal data. GRA

N86-24171# Woods Hole Oceanographic Institution, Mass.
ESTIMATION OF PLANETARY WAVE PARAMETERS FROM THE DATA OF THE 1981 OCEAN ACOUSTIC TOMOGRAPHY EXPERIMENT Ph.D. Thesis
Ching-Sang Chiu Oct. 1985 265 p
(Contract N00014-82-C-0019)
(AD-A161983; WHOI-85-33) Avail: NTIS HC A12/MF A01 CSCL 20/1

Using the maximum-likelihood estimation method and minimization techniques, quasi-geostrophic wave solutions were fitted to the observations of the 1981 Ocean Acoustic Tomography Experiment. The experiment occupied a 300 km square area centered at 26 N, 70 W, and had a duration of approx. 80 days. The data consisted of acoustic travel-time records, and ship surveys, respectively. While the latter two were conventional spot measurements, the former corresponds to integral measurements of the temperature (or sound-speed) field. The optimal fit to the data corresponded to 3 waves in the first baroclinic mode, evolving under the presence of a westward mean flow with vertical shear. The flow was estimated to be weak (approx. 2 cm/s), but it changed the wave periods significantly by producing large Doppler shifts. The waves were dynamically stable to the mean flow, had weak nonlinear interactions with each other and did not form a resonant traid; thus they constituted a fully linear solution. Evidence for the existence of the waves was strongly supported by the high correlation (approx. 0.9) between the data and the fit, the large amount of signal energy resolved (approx. 80 percent), the excellent quality of the wave-parameter estimate (only about 10 percent in error), and the general agreement between the observations and quasi-geostrophic linear dynamics. Author (GRA)

N86-24172# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
OCEAN WAVE SLOPE STATISTICS FROM AUTOMATED ANALYSIS OF SUN GLITTER PHOTOGRAPHS Final Report
Matthew Lybanon Jun. 1985 65 p
(AD-A161995; NORDA-103) Avail: NTIS HC A04/MF A01 CSCL 08/3

The image of the Sun reflected from the rough surface of the sea forms a diffuse pattern, whose details depend on the nature of the surface waves and swell. Consequently, statistics of the slope distribution of the sea surface are related to the statistics of the Sun's glitter on the sea surface. Aerial photographs are a convenient medium for recording the glitter pattern. The mathematical relationship to derive the sea surface slope statistics can be determined from an analysis of the imaging geometry. However, analysis of the photographs can be a labor-intensive procedure. The problem was first studied over thirty years ago. Now, there are modern digital image processing systems and techniques that greatly increase the practicality of the analysis. This report derives the relevant equations and describes an implementation on the Interactive Digital Satellite Image Processing System (IDSIPS). The IDSIPS system is operated by the Remote Sensing Branch of the Naval Ocean Research and Development Activity (NORDA). The report includes full formal documentation of the computer software. Author (GRA)

N86-24173# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
CONTRIBUTIONS TO THE OCEANOGRAPHY OF THE WESTERN ALBORAN SEA Final Report
R. Arnone, R. Barcala, G. Dawson, F. Fiedler, and G. Heburn Apr. 1985 120 p Presented at the 29th Congress and Plenary Session of the International Commission for the Scientific Exploration of the Mediterranean Sea, Lucerne, Switzerland, 11-19 Oct. 1984
(AD-A162019; NORDA-TN-315) Avail: NTIS HC A06/MF A01 CSCL 08/3

This compilation includes the following articles: Donde Va? An Oceanographic Experiment in the Alboran Sea. The Donde Va Group; The Hydrographic Structure of the Alboran Sea Gyre, June and October 1982; NIMBUS-7/CZCS Derived Maps of Near-Surface Chlorophyll; The Flow of Atlantic Water into the Alboran Sea During Donde Va; A Time Series Station at the Eastern Entrance of the Strait of Gibraltar; A Preliminary Study of a Standing Interval Wave in the Western Approaches to the Strait of Gibraltar; Effects of Wind Versus Hydraulic Forcing on the Dynamics of the Western Mediterranean Sea; and Computational Methods for Two Problems in Air-Sea Interaction. GRA

N86-24174# Royal Australian Navy Hydrographic Service, Canberra.
REPORT OF THE HYDROGRAPHIC SERVICE ROYAL AUSTRALIAN NAVY FOR THE YEAR ENDED 30TH JUNE 1985, ISSUE NUMBER 21 Annual Report, 1 Jul. 1984 - 30 Jun. 1985
1985 48 p
(AD-A162023) Avail: NTIS HC A03/MF A01 CSCL 08/10

This compilation includes the following articles and features: Hydrographic Survey Operations and Plans; Oceanographic Operations; Oceanography and Meteorology; Personnel; Training; Chart Production and Maintenance; Chart Distribution; Notices to Mariners; Sailing Directions, Nomenclature, and Maritime Boundaries; Tides; Equipment; and Records and Library; System Support. Author (GRA)

N86-24175# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
SEAFLOOR GEOSCIENCES DIVISION. MISSIONS, TECHNICAL SPECIALTIES, ACCOMPLISHMENTS AND ACTIVITIES, CALENDAR YEAR 1984 Final Report
F. L. Nastav and Richard H. Bennett Jul. 1985 48 p
(AD-A162040; NORDA-TN-318) Avail: NTIS HC A03/MF A01 CSCL 08/10

The Seafloor Geosciences Div. provides the Navy with expanded and advanced capabilities to conduct comprehensive geological, geophysical, and geotechnical investigations of the sea floor and sub-sea floor. Basic and applied research studies contribute to the fundamental knowledge of the oceanic crust and overlying sediments and the effective utilization of the sea floor. Interdisciplinary seafloor science and engineering investigations are ongoing in support of Navy probiems, systems design, construction, and operations. Studies provide quantitative and qualitative description and understanding of the seafloor geological materials and environmental parameters directed toward advancing the state-of-the-art. This report summarizes the division's research accomplishments and professional activities for calendar year 1984. GRA

N86-24176# Naval Postgraduate School, Monterey, Calif.
HYDROGRAPHIC DATA FROM THE OPTOMA PROGRAM, OPTOMA17: OPTOMA17 P, 21 JULY 1985, OPTOMA17 LEG DI, 10-22 AUGUST 1985, OPTOMA17 LEG DII, 23 AUGUST - 5 SEPTEMBER 1985 Report, Oct. 1982 - Sep. 1985
Paul A. Wittmann, Edward A. Kelley, Jr., and Christopher N. K. Mooers Oct. 1985 133 p
(AD-A162067; NPS68-85-026) Avail: NTIS HC A07/MF A01 CSCL 08/3

The Ocean Prediction Through Observations, Modeling and Analysis (OPTOMA) Program seeks to understand the mesoscale (fronts, eddies, and jets) variability and dynamics of the California Current System and to determine the scientific limits to practical mesoscale ocean forecasting. To help carry out the aims of this project, a series of cruises has been planned in two subdomains, NOCAL and CENCAL. The two cruises and one AXBT flight comprising OPTOMA17 were undertaken in the USNS DE STEIGUER and a Reserve Patrol Wing P3B aircraft. Hydrographic data were acquired off the coast of California in an area which covered and extended the NOCAL region. On each of these cruises, hydrographic stations were occupied at approximately 19 km along the track. For the AXBT flight, the along-track station spacing varied between about 28 km and about 46 km. Data acquired during Legs DI and DII include XBT and CTD profiles; whereas data acquired during Leg P are AXBT profiles. Bucket surface temperatures were taken at all CTD stations. A Rosette sampler was used to acquire deep salinity samples. These salinity samples were used for calibration purposes as well as contributions to the data base. GRA

N86-24177# Naval Postgraduate School, Monterey, Calif.
VARIATION OF THE DRAG COEFFICIENT WITH WIND AND WAVE STATE M.S. Thesis
Beverly J. Byars Sep. 1985 111 p
(AD-A162252) Avail: NTIS HC A06/MF A01 CSCL 04/2

The dissipation method is used to obtain estimates for the friction velocity U sub *, as well as values for the neutral drag coefficient, CDN, for data collected from a coastal tower off San Diego, California. C sub DN is found to be independent of the ten-meter height windspeed, U sub 10, for velocities between 4-9 m/sec. Its value is estimated to be (0.94 + or - 0.4)1000 which compares well with values by Smith (1980) and Large and Pond (1981). Definite trends in C sub DN with fetch and sea state are also observed. Drag coefficient estimates are found to be higher for short fetch than for long fetch conditions. C sub DN is also seen to increase sharply just before frontal passages and during sea breeze conditions when the waves are actively growing. With the windspeed and wave field reaching equilibrium, C sub DN is found to decrease with time to a smaller and more constant value. Author (GRA)

N86-24178# Scripps Institution of Oceanography, La Jolla, Calif.
ANALYSIS OF MSS (MARINE SEISMIC SYSTEM) AND OBS (OCEAN BOTTOM SEISMOGRAPH) DATA COLLECTED DURING THE NGENDEI SEISMIC EXPERIMENT Semiannual Report, 1 Jan. 1984 - 30 Aug. 1985
John A. Orcutt Aug. 1985 66 p
(Grant AF-AFOSR-0043-84; DARPA Order 4983)
(AD-A162354; AFOSR-85-1102TR) Avail: NTIS HC A04/MF A01 CSCL 08/11

The results of the first year's data analysis employing data collected during the NGENDEI seismic experiment in the southwest Pacific are presented. This experiment tested the DARPA Marine Seismic System and verified the improved signal-to-noise ratio achieved by burying the instrument within the oceanic crust. The experiment, which took place on the Deep Sea Drilling Project Leg 91, was designed to test the Marine Seismic System (MSS) in a realistic environment near an active trench environment. An earlier test of the system in the northwest Pacific had been unsuccessful because of difficulties in drilling an acceptable borehole in the seafloor. The MSS was recorded aboard the D/V Glomar Challenger for several days of earthquake, refraction and environmental noise experiments. The subsequent deployment of an autonomous recording package on the seafloor was successful. GRA

N86-24179# Coastal Engineering Research Center, Vicksburg, Miss.
EVALUATION OF SEISMOMETER WAVE GAGE AND COMPARATIVE ANALYSIS OF WAVE DATA AT YAQUINA AND COQUILLE BAYS, OREGON Final Report, Jun. 1984 - Feb. 1985
Edward F. Thompson, Gary L. Howell, and Jane M. Smith Sep. 1985 62 p
(AD-A162940; CERC-85-12) Avail: NTIS HC A04/MF A01 CSCL 08/11

A preliminary evaluation of the seismometer wave gage system developed by Oregon State University (OSU) is provided.. The background and theoretical basis for the OSU system is reviewed. An empirical evaluation is obtained by comparing Yaquina Bay seismometer analyses with data from a pressure gage in the same area during 22 February to 5 March 1984. The pressure gage was funded by the US Army Engineer District, Portland. The OSU system appears to be well suited as a sea state indicator for real-time operational purposes. The system has inherent limitations, particularly for estimating wave period. Comparisons with the pressure gage indicate significant wave heights from the seismometer system are relatively reliable. The correlation coefficient is 0.98, and the mean significant heights differ by 8 percent. Suggestions for improving the seismometer system are provided. The OSU method for analyzing seismometer strip chart records is compared wtih Coastal Engineering Research Center (CERC) method developed for this study. The CERC method appears to have small advantages. Guidelines for interpreting past OSU analyses are provided. A 2-month comparison between the seismometer and a pressure gage near Coquille Bay is also included. This site has the nearest available coastal gage record with longer-term operation. The gage is funded by the Corps of Engineers' Field Data Collection Program. Despite the distance between sites the comparison is favorable, particularly during high-energy winter wave conditions. Author (GRA)

N86-24180# Lamont-Doherty Geological Observatory, Palisades, N. Y.
MARGINAL ICE ZONE EXPERIMENT - 1984, PHYSICAL OCEANOGRAPHY REPORT: USNS LYNCH AND HELICOPTER-BASED STD DATA
T. O. Manley Dec. 1985 291 p
(Contract N00014-84-C-0132)
(AD-A163096; LDGO-85-7) Avail: NTIS HC A13/MF A01 CSCL 08/10

During the summer of 1984, the Arctic Oceanography Department of Lamont-Doherty Geological Observatory acquired a total of 222 helicopter-based C/STD stations within the ice-covered region of the Fram Strait to a nominal depth of 500 m. This program was accomplished as part of an international experiment known as MIZEX East 1984. The two ships used in helicopter operations the F/S Polarstern and the M/V Polarqueen. The USNS Lynch was also used to obtain 26 CTD stations from two separate legs into the Fram Strait. The first leg primarily consisted of an open water transect of the strait at a latitude of 79 N. Stations were typically taken to within 10 m of the bottom and extended from the ice edge onto the shelf of Svalbard. The second leg was more acoustically oriented and confined to the southern region of the Yermak Plateau. During this leg, 11 stations to a nominal depth of 450 m were taken. Standard level listings of temperature, potential temperature, salinity, sigma-t, specific volume anomaly, dynamic height, and sound velocity are given for each cast along with profiles of temperature, salinity and sigma-t. Author (GRA)

N86-24181# Lamont-Doherty Geological Observatory, Palisades, N. Y.
PHYSICAL OCEANOGRAPHY REPORT: CAMP-BASED AND HELICOPTER-BASED STD DATA FROM THE DRIFTING ICE STATION FRAM 3

T. O. Manley and Dennis B. Camp Dec. 1985 339 p
(Contract N00014-84-C-0132)
(AD-A163097; LDGO-85-8) Avail: NTIS HC A15/MF A01 CSCL 08/10

During the spring of 1981, a manned camp was established on a drifting ice floe north of Spitzbergen. During the 61 days of occupation, the Arctic Oceanography Department of Lamont-Doherty Geological Observatory obtained a total of 194 STD stations from the combined efforts of personnel in charge of camp-based and helicopter-based operations. This report describes the methods used in the acquisition and processing of the data and provides output for each case. The output consists of standard level listings of temperature, potential temperature, salinity, sigma-t, specific volume anomaly, dynamic height, and sound velocity, along with corresponding profiles of temperature, salinity and sigma-t.
Author (GRA)

N86-24182# National Science Foundation, Washington, D.C. Div. of Polar Programs.
PROBLEMS OF THE ARCTIC AND THE ANTARCTIC, COLLECTION OF ARTICLES, VOL. 57, 1981
A. F. Treshnikov, ed. 1985 151 p Transl. into ENGLISH of Sbornik Statei (USSR), v. 57, 1981 p 1-142
(PB86-106994; TT-82-00-104) Avail: NTIS HC A08/MF A01 CSCL 08C

Problems of polar oceanography; hydrochemical studies in the Arctic Ocean; general distribution variability of ice in the World Ocean as a climate-forming factor; air-sea interaction in the Arctic basin and the North Atlantic; physics of ice and the ocean; long-range meteorological forecasts are reported. GRA

N86-24183# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environment Lab.
UNPOLARIZED IRRADIANCE REFLECTANCES AND GLITTER PATTERNS OF RANDOM CAPILLARY WAVES ON LAKES AND SEAS, BY MONTE CARLO SIMULATION
R. W. Preisendorfer and C. D. Mobley Sep. 1985 148 p refs
(PB86-123577; NOAA-TM-ERL-PMEL-63) Avail: NTIS HC A07/MF A01 CSCL 08J

A Monte Carlo procedure is developed for estimating the unpolarized irradiance reflectances and glitter patterns of a wind-roughened sea surface as a function of environmental lighting conditions and wind speed, given the statistical properties of the surface. The procedure includes the effects of multiple scattering of light rays and their shielding by wave facets. As the optical properties of the sea surface are determined primarily by capillary waves, even in the presence of gravity waves, our attention is directed mainly at the proper treatment of the capillary wave case. However, for completeness and possible future use, a model also is developed which allows an exact calculation of the optical properties of a wind-roughened surface which has the form of a spatially stationary process over the full capillary-gravity range of water waves.
GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-24184# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
US DEPARTMENT OF AGRICULTURE/CORPS OF ENGINEERS COOPERATIVE AQUATIC PLANT CONTROL RESEARCH. ANNUAL REPORT FOR FY 1983; CHEMICAL CONTROL TECHNOLOGY Final Report
Thai K. Van, Kerry K. Steward, Ann O. Jones, Richard D. Conant, Jr., and Howard E. Westerdahl Sep. 1985 70 p
(AD-A161867; WES/MP/A-85-3) Avail: NTIS HC A04/MF A01 CSCL 06/6

Of the several controlled release herbicide formulations evaluated in FY83, two monolithic polycaprolactone fibers containing fluridone have been found to have significant potential. These fibers, designed to maintain herbicide-plant contact over a period of four to 6 weeks, were proven effective in controlling hydrilla (Hydrilla verticillata Royle) at 2.2 kg a.i./ha (active ingredient per hectare) in flowing water in large outdoor aquaria. Under the same conditions, the commercial formulation Sonar 4AS provided no hydrilla control. Two silicate capsules of dichlobenil showed promising results in the laboratory and were selected for evaluations in large outdoor aquaria in which long-term control of hydrilla regrowth was assessed. Research concerning application of glyphosate indicated that decreasing carrier volume increased phytotoxicity of glyphosate to waterhyacinth, mainly by enhancing herbicide retention and penetration. A treatment of 1.7 kg a.e./ha (acid equivalent per hectare) glyphosate in 438 L/ha water carrier resulted in faster and longer lasting control than did 2.8 kg a.e./ha in 935 L/ha. Long-term effects from glyphosate on torpedograss in standing water were significantly reduced compared to activity achieved on ditchbanks. Studies with 14C-glyphosate indicated that herbicide translocation was impeded in standing water. Sulfumeturon at 0.02 kg a.i./ha completely eradicated waterhyacinth in a 0.07-ha pond in Fort Lauderdale. Residue analyses indicated that levels of 1.3 to 1.6 microgram/L sulfumeturon were present in water 24 hr after application; then decreased rapidly.
GRA

N86-24185# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Life Sciences.
STUDY OF BIOTECHNOLOGY APPLIED TO RESEARCH AND DEVELOPMENT
8 Jan. 1985 43 p
(Contract N00014-83-G-0024)
(AD-A161877) Avail: NTIS HC A03/MF A01 CSCL 15/2

This report contains summaries of a conference on biosensors, along with the deliberations of the Commitee on Biotechology Applied to Naval Needs. For the purposes of this report, biosensors are defined as devices that utilize some principles or elements of biology, broadly defined, to generate a signal in response to a specific material substance or condition. The committee considered that the appropriate areas of biology to consider were the study of receptors, enzymology, the use of DNA as a detector, immunology, and the development of synthetic analogs to the relevant natural biological reactions. In contrast to a recent report prepared by the NRC's Board on Army Science and Technology, entitled Assessment of Chemical and Biological Sensor Technologies, which was written in response to a very narrowly and sharply defined charge, the present report focuses on basic biology relevant to biosensors. GRA

N86-24186# Army Medical Research Inst. of Infectious Diseases, Fort Detrick, Md.
CLONING AND ANALYSIS OF GENES FOR ANTHRAX TOXIN COMPONENTS
Stephen H. Leppla, Donald L. Robertson, Susan L. Welkos, Leonard A. Smith, and Michael H. Vodkin 29 Aug. 1985 6 p
(S18-06)
(AD-A161901) Avail: NTIS HC A02/MF A01 CSCL 06/15

Genetic analysis and DNA cloning techniques have been used to study the plasmids and genes which determine synthesis of the three protein components of anthrax toxin. After plasmid curing and transfer experiments showed that all three genes were probably located on the large B. anthracis plasmid pX01, DNA libraries of pX01 DNA were constructed. Five colonies containing at least part of the lethal factor gene and six colonies containing protective antigen DNA were identified, and their plasmids were mapped by restriction enzyme digestion. The absence of an equal number of edema factor (EF) recombinants was attributed to the possibility that the EF adenylate cyclase is toxic to the host E. coli.
Author (GRA)

N86-24187# Army Medical Research Inst. of Infectious Diseases, Fort Detrick, Md.
IDENTIFICATION OF VACCINE RESISTANT ISOLATES OF BACILLUS ANTHRACIS
Stephen F. Little and Gregory B. Knudson 13 Nov. 1985 23 p

(AD-A162002) Avail: NTIS HC A02/MF A01 CSCL 06/13
Several strains of Bacillus anthracis have been reported previously to cause fatal infection in immunized guinea pigs. In this study, guinea pigs were immunized with either a protective antigen vaccine or a live Sterne strain spore vaccine, then challenged with virulent B. anthracis strains isolated from various host species from the United States and foreign sources. The authors concluded that antibodies to toxin components may not be sufficient to provide protection against all strains of B. anthracis, and that other antigens may play a role in active immunity. As a practical matter, it follows that the efficacy of anthrax vaccines must be tested by using vaccine-resistant isolates if protection against all possible challenge strains is to be assured. GRA

N86-24188# Naval Ocean Systems Center, San Diego, Calif.
THE EFFECTS OF BIS (TRI-N-BUTYLTIN) OXIDE ON THREE SPECIES OF MARINE PHYTOPLANKTON Final Technical Report, Jun. - Jul. 1982
S. M. Salazar May 1985 19 p
(DA Proj. Z08-29; DA Proj. ZR0-0001)
(AD-A162115; NOSC/TR-1039) Avail: NTIS HC A02/MF A01 CSCL 07/2
The effects of three concentrations of bis (tri-n-butyltin) oxide (TBTO) 1.5, 3.0, and 6.0 ppb) on three species of marine phytoplankton were assessed. Parameters measured were in vivo fluorescence and DCMU induced fluorescence. Fluorescence ratios were calculated from these values. The effects of TBTO exposure varied considerably from species to species. Gymnodinium splendens was the most sensitive, affected by all concentrations of TBTO. Dunaliella sp. demonstrated inhibition of growth at 3.0 and 6.0 TBTO after 3 days. No measurable effects were detected for Phaedactylum tricornutum at any of the TBTO exposures. These data indicate the effect of TBTO on marine phytoplankton may be species specific. GRA

N86-24189# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE EFFECTS OF KETAMINE ON RHESUS MONKEY SKELETAL DYNAMICS
Kristin N. Swenson, K. C. Smith, Clarence M. Oloff, and Marvin E. Souder Sep. 1985 52 p
(AF Proj. 723-1)
(AD-A162848; AAMRL-TR-85-060) Avail: NTIS HC A04/MF A01 CSCL 06/15
Four young male Rhesus monkeys were exposed to intramuscular injections of ketamine anesthetic (15 mg/kg) on eight selected days of a 28 day experiment. The subjects were dosed with bone labeling compounds to determine the effect ketamine had on bone modeling/remodeling dynamics. Trabecular bone sections of T sub 9 and L sub 4, and cortical bone sections of proximal femur and midshaft femur were used for histomorphometric analysis. Urine creatinine and calcium, and serum alkaline phosphatase and calcium levels were determined. Vertebral centrum compression tests were conducted on selected thoracic and lumbar levels. Stiffness, ultimate load and modulus showed significant increases in the ketamine exposure group. The results of the trabecular histomorphometry showed a possible increase in mineralization lag time or slower mineralization. Cortical bone histomorphometry could indicate activation of the skeletal system. The experimental results lead to the conclusion that something affected the mechanical strength parameters and the bone remodeling dynamics of the ketamine exposure group. It is unclear as to whether these differences are strictly due to ketamine as stress and age difference were other influencing factors. GRA

N86-24190# California Univ., Berkeley. Lawrence Berkeley Lab.
BIOLOGICAL EFFECTS AND PHYSICAL SAFETY ASPECTS OF NMR IMAGING AND IN VIVO SPECTROSCOPY
T. S. Tenforde and T. F. Budinger Aug. 1985 60 p refs Presented at the American Association of Physicists in Medicine Summer School, Portland, Ore., 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002966; LBL-20053; CONF-8508145-1) Avail: NTIS HC A04/MF A01
An assessment is made of the biological effects and physical hazards of static and time-varying fields associated with the NMR devices that are being used for clinical imaging and in vivo spectroscopy. A summary is given of the current state of knowledge concerning the mechanisms of interaction and the bioeffects of these fields. Additional topics that are discussed include: (1) physical effects on pacemakers and metallic implants such as aneurysm clips, (2) human health studies related to the effects of exposure to nonionizing electromagnetic radiation, and (3) extant guidelines for limiting exposure of patients and medical personnel to the fields produced by NMR devices. On the basis of information available at the present time, it is concluded that the fields associated with the current generation of NMR devices do not pose a significant health risk in themselves. However, rigorous guidelines must be followed to avoid the physical interaction of these fields with metallic implants and medical electronic devices. DOE

N86-24191# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Space Div.
STUDY OF BIOSAMPLE PRESERVATION, HANDLING, AND OBSERVATION FACILITIES Final Report
Paris ESA May 1985 199 p refs Prepared in cooperation with Brunel Univ., Uxbridge, England Original contains color illustrations
(Contract ESTEC-5655/83-NL-PR)
(ESA-CR(P)-2126) Avail: NTIS HC A09/MF A01
An autonomous facility for biology experiments in space, to be flown on platforms such as EURECA is proposed. It is a modular, multiuser facility, capable of 6 months automated operation. It includes an experiment area for specimen growth in 1 g and micro-g, sample storage and transport facilities, and observation and data processing units. Tests on breadboards of critical subsystems (culturing, workstation, containers, cameras) show the feasibility of the design. Author (ESA)

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-24192* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 283)
Apr. 1986 69 p
(NASA-SP-7011(283); NAS 1.21:7011(283)) Avail: NTIS HC A04 CSCL 06E
This bibliography lists 184 reports, articles, and other documents introduced into the NASA scientific and technical information system in March 1986. Author

N86-24193 Institut fuer Flugmechanik, Brunswick (West Germany).
THE EFFECT OF HIGH FREQUENCY ELECTROMAGNETIC FIELDS ON HUMAN BEINGS (FREQUENCY RANGE BETWEEN 1 kHz AND 1000 GHz) [DIE WIRKUNG HOCHFREQUENTER ELEKTROMAGNETISCHER FELDER AUF DEN MENSCHEN (1kHz UND 1000 GHz)]
Adolf-Henning Frucht (Deutschen Zentralinstituts fuer Arbeitsmedizin, Berlin-Lichtenberg, West Germany), Norbert Krause, Guenter Nimtz (Technische Univ., Berlin), and Hans Schaefer 1984 128 p refs In GERMAN
Avail: Issuing Activity
The biological effects of high frequency electromagnetic fields were investigated to provide information for industrial safety personnel. The high frequency radiation problem is described. Medicinal and technical applications of high frequency electromagnetic fields are presented. The interactions between high frequency electromagnetic waves and matter are explained. Health problems due to these fields are depicted. Diathermy as a source of danger

is discussed. A case of death after extreme exposure to radar radiation is given. Tasks and possibilities for epidemiological research are presented. It is concluded that health damage due to high frequency electromagnetic fields do not occur as long as the known power thresholds are not exceeded. Author (ESA)

N86-24194# Ohio State Univ., Columbus.
OPTICAL AND EVENT-DURATION VARIABLES AFFECTING SELF-MOTION PERCEPTION Interim Paper Jan. 1984 - Apr. 1985
Dean H. Owen Nov. 1985 198 p
(Contract F33615-83-K-0038)
(AD-A161836; AFHRL-TP-85-23) Avail: NTIS HC A09/MF A01 CSCL 01/4

Four experiment sections are included in this paper. The first pair of experiments investigated the usefulness of optical flow acceleration in detecting descent. When sink rate and ground speed are constant, optical flow accelerates. Holding fractional loss in altitude constant throughout a descent event also holds flow rate invariant, eliminating flow acceleration as a potential source of information. Detection of descent was accomplished easily without flow acceleration, and it was found that at least one of the remaining functional optical variables specifying fractional loss in altitude must be highly salient. Also, the effect of optical texture density was optimal when linkages with other relevant variables were taken into account. The third experiment compared eyeheight and ground-unit size as metrics for global optical information specifying descent. Given that flow acceleration is not an essential source of information, the study focused on eyeheight-scaled change in optical display and ground-unit-scaled change in optical density as functional specifiers of fractional loss in altitude. The fourth experiment investigated the interation between global optical flow rate and duration of a constant-speed preview period. Of particular interest was the possibility that preview periods of different durations would differentially favor or interfere with sensitivity given particular optical conditions, e.g., different flow rates. GRA

N86-24195# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
THE ENERGY COST OF COMBAT ENGINEER TASKS
W. S. Myles and T. T. Romet Aug. 1985 20 p
(AD-A161861; DCIEM-85-R-31) Avail: NTIS HC A02/MF A01 CSCL 06/19

Canadian combat engineers performed abatis (blocking a road by falling trees), minelaying and road cratering for 8 hours each day on four consecutive days. Energy expenditure was estimated from heart rate continuously recorded using the VITALOG personal monitoring system (PMS-8). The average heart rates were below 120 bpm for all three combat engineer tasks indicating that, for these subjects, energy expenditure did not exceed 35 to 40% of their VO2max. Since abatis, minelaying and cratering are considered to be the most physically demanding tasks performed by combat engineers, it seems safe to conclude that the average energy expenditure for sustained operations will be at, or below, this level. This experiment also provided an opportunity to evaluate the PMS-8 as a means of collecting physiological data in a nonintrusive manner during military maneuvers. The system proved to be very robust, reliable and, because data collection is continuous, ideal for intermittent work of varying intensity. In addition, the PMS-8 appears to have considerable potential as a means of monitoring the effect of sleep deprivation and fatigue on the work/recovery cycle in sustained operations. Author (GRA)

N86-24196# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
DRUGS OF ABUSE IN AVIATION FATALITIES. 1: MARIJUANA
Delbert J. Lacefield, Patricia A. Roberts, and Paula M. Grape Aug. 1985 6 p
(AD-A161911; DOT/FAA/AM-85/8) Avail: NTIS HC A02/MF A01 CSCL 06/15

Isopropyl alcohol swabs taken from the oral cavities of pilots killed in general aviation accidents were analyzed for marijuana by the modified Duquenois-Levine test. During the 2-year period from October 1982 through September 1984, 289 pilot fatalities (of 809 sampled for other toxicological reasons) were sampled for marijuana; a positive test indicated the recent use of marijuana. Six of the pilots' samples (2.1%) were positive. GRA

N86-24197# Army Research Inst. of Environmental Medicine, Natick, Mass.
ENVIRONMENTAL STRESS AFTER ATROPINE TREATMENT
Margaret A. Kolka, Lou A. Stephenson, and Richard R. Gonzalez Oct. 1985 23 p
(DA Proj. 3M2-63764-D-995)
(AD-A161923) Avail: NTIS HC A02/MF A01 CSCL 06/15

Atropine administration resulted in higher skin temperatures in both sensible and insensible environments and a higher core temperature in the hot environment, due to the reduction in whole body sweating. The effect of heat storage (significantly higher after atropine) was shown to be greater in the hot environment due to inadequate sweat secretion for subsequent evaporative cooling. In the warm environment, enhanced skin blood flow resulted in more effective thermoregulation. The results suggest that exercise in the heat can be accomplished during environmental stress at warm temperatures after atropine treatment.
Author (GRA)

N86-24198# Army Research Inst. of Environmental Medicine, Natick, Mass.
RESPIRATORY RESPONSE AND MUSCLE FUNCTION DURING ISOMETRIC HANDGRIP EXERCISE AT HIGH ALTITUDE
Richard L. Burse, Allen Cymerman, and Andrew J. Young 15 Jul. 1985 33 p
(AD-A162003; USARIEM-M-2/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

The purpose of this investigation was to determine if the hyperventilatory response to fatiguing isometric exercise at sea level could predict resting ventiliation and acute mountain sickness (AMS) at 4300 m altitude. Exercise consisted of four successive endurance handgrips held to complete fatigue at 40% of maximum isometric handgrip strength (MHS). There was no relationship between the magnitude or pattern of exercise-induced hyperventilation at sea level and the severity of AMS later at altitude. Sea level hyperventilatory response was not predictive of resting ventilation at altitude. Altitude exposure progressively increased both the incidence and magnitude of the hyperventilatory response to exercise and prolonged it for 60 to 90 s into the recovery period, providing support for the central command theory of ventilatory control during isometric exercise. MHS was significantly increased at altitude, by 11% on day 2 and 16% on day 6. Endurance times to fatigue were reduced, but not always significantly so. GRA

N86-24199# Illinois Univ., Chicago. Chicago Circle Dept. of Bioengineering.
REMOTE SENSING OF BODY SIGNS AND SIGNATURES Final Report, 1 Aug. 1982 - 30 Sep. 1985
James C. Lin and Karen H. Chan Oct. 1985 82 p
(Contract N00014-82-C-0659)
(AD-A162106; BES-5) Avail: NTIS HC A05/MF A01 CSCL 17/9

This report describes the development of a microprocessor-based remote sensing system for noncontact detection of heart rate and respiration. Low power sinusoidal microwave signal at a frequency of 10.525 GHz is generated by a Gunn diode oscillator in an integrated Doppler transceiver. A standard gain horn is used to direct the microwave energy to the chest of a subject at a distance of a few centimeters. Since movements associated with the contraction of the heart and expansion of the lungs are translated into motions of the chest wall, the Doppler microwave reflected from the chest is processed to yield information on the frequency and regularity of these cardiopulmonary events. The microprocessor-based battery-powered system is designed to provide continuous operation for approximately one hour. It allows selection of heart rate or respiration to be displayed on a 3-digit

LCD. An analog output jack is provided for oscilloscope display or chart recording. The design range of heart rates is from 40 to 200 beats per minute and that for respiration is from 3 to 30 breaths per minute. The signal acquisition times for heart rate and respiration determinations are 12 and 48 seconds, respectively. GRA

N86-24200# Illinois Univ., Urbana-Champaign. Inst. of Aviation.
ANTIEMETIC DRUGS AND PILOT PERFORMANCE Interim Report, Feb. 1983 - Feb. 1984
Henry L. Taylor, John A. Dellinger, Martha H. Weller, Bruce C. Richardson, and Fred C. Hyman Nov. 1985 44 p Prepared in cooperation with Michigan Univ., Ann Arbor
(Contract F33615-83-K-0612)
(AD-A162109; USAFSAM-TR-84-52) Avail: NTIS HC A03/MF A01 CSCL 06/15

This study evaluated the effects on human performance of three antiemetic drugs. The effects on pilot performance in a flight simulator were determined using the commonly prescribed dosages, standardized for a 70 kg person, of thiethylperazine (10 mg), promethazine hydrochloride (25 mg) cimetidine (300 mg), and a placebo control. Two tasks, a two-dimensional tracking task which part of an instrument landing system (ILS) approach and the Sternberg choice reaction time task, were used to generate pilot performance data. A Latin square design was used to balance treatment order effects, and each subject received each treatment condition. Log root mean square (RMS) deviation values, computed from the simulator flight data (altitude straight and level, altitude turning, localizer (lateral) tracking, glideslope (vertical tracking) were used in a multivariate analysis of variance to test the main effects. An approximate F-test, based on Wilk's criterion, resulted in $F(12,87) = 2.47$, ($P < 0.0008$) for the treatment main effect (drug). Univariate analyses resulted in a significant drug main effect on two primary task variables--altitude straight and level and localizer tracking. Contrasts between the three antiemetic drugs and the placebo were used to test the hypothesis of no significant difference between treatment pairs. The contrasts between promethazine hydrochloride and the control were significant for altitude straight and level and for glideslope tracking. The other contrasts were not significant except for the control-thiethylperazine contrast for the localizer tracking variable. GRA

N86-24201# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
CHARACTERISTICS OF MEDICALLY DISQUALIFIED AIRMAN APPLICANTS IN CALENDAR YEARS 1982 AND 1983
Shirley J. Dark Sep. 1985 23 p
(AD-A162209; DOT/FAA/AM-85/9) Avail: NTIS HC A02/MF A01 CSCL 06/5

This study presents comprehensive data reflecting pertinent denial rates with respect to the medical and general attributes of those airmen denied medical certification in calendar years 1982 and 1983. The study updates previously reported data with respect to medical certification denials. The denial data were obtained from computer files as of July 1, 1983, for calendar year (CY) 1982 applicants and July 1, 1984, for CY 1983 applicants. The data were summed for the 2 calendar years to provide a larger group for comparison with the December 31, 1982, active airman population, the midpoint population date for the denied applicant group. The annual denial rate based on the airman applicants is 6.2 per 1,000 airmen. By class of certificate applied for, the annual denial rate per 1,000 applicants is 3.3 for first class, 3.8 for second class, and 8.6 for third class. As anticipated, general aviation and new applicants contribute greatly to total denials. The most significant causes for denial (regardless of class applied for) are cardiovascular, the miscellaneous pathology category (endocrinopathies, disqualifying medications, and administrative denials), neuropsychiatric, and at a substantially lower level, eye pathology. The updated data on medically disqualified applicants are consistent with expectations and previous findings, with cardiovascular diseases still the number one cause for denial. GRA

N86-24202# Army Research Inst. of Environmental Medicine, Natick, Mass.
EFFECTS OF WEARING NBC (NUCLEAR, BIOLOGICAL AND CHEMICAL) PROTECTIVE CLOTHING IN THE HEAT ON DETECTION OF VISUAL SIGNALS
John L. Kobrick and Lynn A. Sleeper Feb. 1985 26 p
(DA Proj. 3M1-61102-BS-10)
(AD-A162321; USARIEM-T7/85) Avail: NTIS HC A03/MF A01 CSCL 06/16

Sensitivity for detection of visual signals distributed at various locations throughout the visual field was studied in 16 male subjects during degrees of ambient heat exposure (91F/61%RH; 70F/35%RH; 55F/35%RH), in combination with and without wearing of the Army NBC protective clothing system (MOPP-IV). Response time for signal detection increased systematically and significantly with peripheralization of stimulus locations, was most impaired in the superior and inferior visual field areas, and least affected along the horizontal axis area. The data support previous results obtained using this task. Both the heat and the heat+MOPP-IV exposure conditions produced highly significant systematic increases in response time to all signals; the worst performance occurred under the heat+MOPP-IV combination. Implications for visual performance while wearing chemical protective gear are discussed. GRA

N86-24203# Army Research Inst. of Environmental Medicine, Natick, Mass.
AN EVALUATION OF TESTS OF ANAEROBIC POWER
John F. Patton and Andrew Duggan Dec. 1985 22 p
(AD-A162826; USARIEM-M7/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

The objectives of this study were to examine the relationship between two laboratory tests of anaerobic power (AnP) and to compare these tests to field measures of AnP. Fifteen Soldiers, aged 20 to 34 yrs, performed: (1) a 30S maximal cycle ergometer test (Wingate test, WT); (2) a 60S isokinetic knee extension test (isokinetic endurance test, IET); (3) a 50m spring; (4) a 200m sprint; and (5) the Margaria stairclimb test. Significant correlations ranging from 0.52 to 0.76 were found between the WT and IET for peak and mean values of power and torque, respectively. Indices from both these tests also correlated significantly with the field tests of AnP. The best single index was mean power from the WT which had correlations of -0.79, -0.82, and 0.74 with the 50m and 200m sprint times and the Margaria test, respectively. The data suggest that both the WT and IET represent valid laboratory tests for evaluating high-intensity short-term exercise in which the muscle is primarily dependent upon anaerobic processes for energy release. Author (GRA)

N86-24204# IIT Research Inst., Chicago, Ill.
EXTREMELY LOW FREQUENCY (ELF) COMMUNICATIONS SYSTEM BIO-EFFECTS LIBRARY DEVELOPMENT Final Technical Report, Mar. - Oct. 1985
M. M. Abromavage, J. J. English, L. M. Kudia, and M. S. MacIntyre Oct. 1985 255 p
(Contract N00039-84-C-0070)
(AD-A162839; IITRI-E06549-21) Avail: NTIS HC A12/MF A01 CSCL 06/3

The professional literature published and available since August 1984 on the biological, ecological and health effects from exposure to Extremely Low Frequency (ELF) electromagnetic fields is compiled alphabetically by principal author. Each of the 485 citations is categorized according to electromagnetic field characteristics. Key biological and engineering terms are provided, and species of interest are identified. Author (GRA)

N86-24205# IIT Research Inst., Chicago, Ill.
ELF (EXTREMELY LOW FREQUENCY) BIOLOGICAL EFFECTS LITERATURE DATA BASE MANAGEMENT SYSTEM Final Report
John J. English and Linda M. Kudia Oct. 1985 44 p
(Contract N00039-84-C-0070)
(AD-A162900; IITRI-E06549-20) Avail: NTIS HC A03/MF A01 CSCL 09/2

Described are the functions and operation of the ELF biological effects literature data base management system. It covers functional requirements, system implementation, data base description, system operations, and detailed procedures. The system utilizes an IBM PC/XT computer and dBASE-III software. GRA

N86-24206# Naval Health Research Center, San Diego, Calif.
CHANGES IN FITNESS AND SHIPBOARD TASK PERFORMANCE FOLLOWING CIRCUIT WEIGHT TRAINING PROGRAMS FEATURING CONTINUOUS OR INTERVAL RUNNING Final Report
E. J. Marcinik, J. A. Hodgdon, C. E. Englund, and J. J. OBrien Aug. 1985 18 p
(AD-A163110; NAVHLTHRSCHC-85-33) Avail: NTIS HC A02/MF A01 CSCL 05/9

This investigation compared physical fitness and work performance changes following participation in circuit weight training regimes featuring either interval or continuous running programs. Results indicated that participation in the circuit weight training/run regimes was associated with differential changes in fitness but not shipboard work performance. Furthermore, the association between training induced fitness gains and relative improvement in job performance appeared to be specific to the task modelled. Important predictors of criterion job performance included measures of both upper and lower torso muscular strength. Regression analyses yielded the following prediction equation: Composite shipboard performance(s) = 194.15097-1.59492 (arm curl)-, 18369 (leg press) r=0.74. GRA

N86-24207# Naval Health Research Center, San Diego, Calif.
L-TRYPTOPHAN ADMINISTERED TO CHRONIC SLEEP-ONSET INSOMIACS: LATE-APPEARING REDUCTION OF SLEEP LATENCY Final Report, Dec. 1980 - Nov. 1985
Cheryl L. Spinweber 1 Nov. 1985 19 p
(AD-A163115; NAVHLTHRSCHC-85-42) Avail: NTIS HC A02/MF A01 CSCL 06/16

The effects of 3 g 1-tryptophan on sleep, performance, arousal threshold, and brain electrical activity during sleep were assessed in 20 male, chronic sleep-onset insomniacs (mean age 20.3 + or - 2.4 years). Following a sleep laboratory screening night, all subjects received placebo for 3 consecutive nights (single-blind), 10 subjects received 1-tryptophan and 10 subjects received placebo on 2 withdrawal nights (single-blind). There was no effect of 1-tryptophan on sleep latency during the first 3 nights of administration. On the 4th-6th nights of administration, sleep latency was significantly reduced. Unlike benzodiazepine hypnotics, 1-tryptophan did not alter sleep stages, impair performance, elevate arousal threshold, or alter brain electrical activity during sleep. GRA

N86-24208# Harvard Univ., Cambridge, Mass. Energy and Environmental Policy Center.
ANALYSIS OF HEALTH EFFECTS RESULTING FROM POPULATION EXPOSURES TO AMBIENT PARTICULATE MATTER. HEALTH AND ENVIRONMENTAL EFFECTS DOCUMENT, 1985
J. D. Spengler Sep. 1985 77 p refs
(Contract DE-AC02-81EV-10731)
(DE86-002161; DOE/EV-10731/5) Avail: NTIS HC A05/MF A01

Findings from our recent epidemiologic analyses reported here indicate variations in ambient fine particle mass (d sub a < 2.5 (MU)m toxic substances include arsenic, cadmium, sulfur, and carbonaceous compounds). SO4 sup = mass are more important to public health than variations in the levels of particle mass measures which also include coarse particles (d sub a > 2.5 (MU)m). Sulfates and FP mass wsere often very significant predictors of variations in residual mortality throughout the US, even after controlling for socio-economic factors. Analysis of 12 years of daily mortality and air pollution in New York City showed that aerosol extinction coefficient (b sub ext), a good surrogate for fine particles, is significantly associated with observed mortality. DOE

N86-24209# Oak Ridge National Lab., Tenn.
FIBEROPTICS IMMUNOFLUORESCENCE SPECTROSCOPY FOR CHEMICAL AND BIOLOGICAL MONITORING
T. Vo-Dinh, G. D. Griffin, K. R. Ambrose, M. J. Sepaniak, and B. J. Tromberg 1985 17 p Presented at the 10th International Symposium on Polynuclear Aromatic Hydrocarbons, Columbus, Ohio., 21 Oct. 1985 Prepared in cooperation with Tennessee Univ., Knoxville
(Contract DE-AC05-84OR-21400)
(DE86-002239; CONF-851068-2) Avail: NTIS HC A02/MF A01

The feasibility of the fluoroimmuno-sensor (FIS) detection of IgG proteins tagged with fluorescein isothiocynate was demonstrated. In view of the biotechnological advances in the area of monoclonal antibodies and the production of anti-hapten sera it is believed that fiberoptics-based FIS could be generally useful in a wide spectrum of biochemical and clinical analyses. Specifically, the FIS could be employed in the assessment of an individual's exposure to chemical PAH carcinogens, response to drug therapy, or in the characterization of naturally occurring biochemicals. For example, studies investigating the presence of carcinogens and carcinogen-DNA adducts in tissues and body fluids could be performed with the FIS using immunochemical techniques. An integration of fluorescence immunoassay principles with laser-based fiberoptics systems is planned in order to develop FIS which should be capable of providing reliable analytical data for such studies. DOE

N86-24210# Los Alamos National Lab., N. Mex.
EFFECTS: DOCUMENTATION AND VERIFICATION FOR A BEIR 3 CANCER RISK MODEL BASED ON AGE, SEX AND POPULATION DYNAMICS FOR BIOTRAN
W. J. Wenzel and A. F. Gallegos Sep. 1985 108 p refs
(Contract W-7405-eng-36)
(DE86-003285; LA-10371-MS) Avail: NTIS HC A06/MF A01

The computer simulation code EFFECTS is coupled with the radionuclide uptake and environmental transport strategies of the BIOTRAN code to predict cancer risks and deaths in a dynamic human population. Total mortalities due to all causes are incorporated with projected radiation-induced cancer mortalities caused by all previous chronic or acute radiation exposures of the population as a function of age and sex. Superpositioning radiation-induced cancer mortalities on current total mortalities in each age group allows a realistic and dynamic estimate of cancer risks for complex radiation exposure scenarios. EFFECTS was developed on the CDC 7600 and can be executed on the Cray computer system at Los Alamos National Laboratory. EFFECTS can simulate the upper boundary of cancer risk estimates where population exposures occur over many years and where organ burdens are integrated over the lifetime of the individual. This report gives new insight on age-specific cancer risks. As part of the code verification, the simulated impacts to a small population from natural background uranium and an accidental release of airborne plutonium are compared. For the long-term continuous exposure to natural background uranium, the impact to the population is very small (2 x 10(-6) to 7 x 10(-6) deaths/10,000 people) with young adults receiving the largest bone doses and risks. For the long-term intakes following a simulated accidental air release of plutonium, young teenagers receive the highest bone doses while young adults receive the largest risk. Simulating these two scenarios, using BIOTRAN/HUMTRN/EFFECTS, illustrates sufficient resolution to predict the age/sex-specific response from human populations from contaminants in our environment. DOE

N86-24211# Health Effects Research Lab., Research Triangle Park, N. C.
USING ASHFORD'S GENERAL MODEL TO AID IN THE UNDERSTANDING OF A PESTICIDE'S NEUROTOXIC EFFECT THROUGH PESTICIDE-DRUG MIXTURE EXPERIMENTS
D. J. Svendsgaard and K. M. Crofton Nov. 1985 15 p Prepared in cooperation with North Carolina Univ., Chapel Hill
(PB86-130028; EPA-600/D-85-241) Avail: NTIS HC A02/MF A01 CSCL 06T

A framework for interpreting the joint action of mixtures of drugs is discussed. The concepts are applied to the situation in which the mechanism of three drugs are fairly well understood and mixtures of pesticides and drugs are studied to aid in the understanding of the mechanism of certain types of pesticides. Laboratory data are fit by nonlinear regression to suggested models. The conclusions drawn from fitting these models and the implication of the design of experiments for further studies are discussed. GRA

N86-24212# Resources for the Future, Inc., Washington, D. C.
EXECUTIVE SUMMARY: AMBIENT OZONE AND HUMAN HEALTH: AN EPIDEMIOLOGICAL ANALYSIS Final Report
P. R. Portney and J. Mullahy Aug. 1985 23 p
(Contract EPA-68-02-3583)
(PB86-114089; EPA-450/5-85-005D) Avail: NTIS HC A02/MF A01 CSCL 06T

The report by the Office of Air Quality Planning and Standards of the Environmental Protection Agency is the executive summary of an analysis of the relationship between ozone and human health benefits. GRA

N86-24213# Resources for the Future, Inc., Washington, D. C.
AMBIENT OZONE AND HUMAN HEALTH: AN EPIDEMOLOGICAL ANALYSIS, VOLUME 3 Final Report
P. R. Portney and J. Mullahy Jun. 1985 180 p refs
(Contract EPA-68-02-3583)
(PB86-114105; EPA-450/5-85-005C) Avail. NTIS HC A09/MF A01 CSCL 06F

The report is the third volume by the Air Quality Planning and Standards Office of EPA of an analysis of the relationship between ozone and human health benefits. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-24214# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision.
A METHODOLOGY FOR THE ANALYSIS AND DESIGN OF HUMAN INFORMATION PROCESSING ORGANIZATIONS Ph.D. Thesis
Kevin L. Boettcher Sep. 1985 199 p
(Contracts N00014-77-C-0532; N00014-84-K-0519)
(AD-A162083; LIDS-TH-1501) Avail: NTIS HC A09/MF A01 CSCL 05/10

The design of human organizations in which members perform routine tasks under the pressure of time is considered, particularly the problem of where and how in the design process to take into account human behavior and limitations. A three-phase design approach is suggested. In the first phase, the impact of human characteristics is neglected and attention is focused on aspects of organization structure that are external to individual members. In the second phase, implementations for these decision rules are devised and models of actual human behavior and induced workload for the tasks established for each member are developed. The descriptions are determined as a function of parameters that relate to features of the task set-up and to the options provided to the member for accomplishing his task. A final design phase places these parameters for best organization performance and in view of the workload limitations of individual members. The result is an organization design. The three-phase approach has been formalized as a multi-step methodology. Discussion and illustration is given for each design step. In addition, the methodology is exercised on a specific problem and the resulting organization design has been built. Operation of the organization has been tested under several conditions and experimentally observed results match those predicted for the design, which in turn supports the validity of the design approach. GRA

N86-24215# Navy Personnel Research and Development Center, San Diego, Calif.
DEVELOPMENT OF A COMPUTER-MANAGED READINESS ASSESSMENT SYSTEM Final Report, Jul. 1982 - Sep. 1984
W. F. Thode and P. G. Buletza Dec. 1985 55 p
(AD-A162931; NPRDC-TR-86-8) Avail: NTIS HC A04/MF A01 CSCL 05/9

Readiness of operational units, especially Fleet Air Reconnaissance Squadron TWO (VQ-2), is difficult to assess, particularly during operational cycles when the units are fulfilling their missions. This effort was conducted to develop a readiness training assessment system for VQ-2 to provide accurate, timely, and efficient assessments of the operational readiness of aircrew personnel while maintaining the highest possible state of readiness to perform the squadron's mission. The readiness training system for maintaining readiness and training data for VQ-2 aircrew personnel consists of: (1) a matrix for the EP-3E and the EA-3B aircraft of all the events that affect the readiness of the personnel assigned to the 10 crew positions in the EP-3E and the 5 crew positions in the EA-3B for each of the four VQ-2 mission area; (2) a computer-managed system to enter, process, store, and produce the readiness training manual that contains all VQ-2's references on training and readiness. Author (GRA)

N86-24546*# Lambuth Coll., Jackson, Tenn. Dept. of Physics, Mathematics and Computer Science.
A PRELIMINARY STUDY OF FLAT-PANEL DISPLAYS
Kenneth E. Yancey *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 16 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09C

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-24216 Kansas State Univ., Manhattan.
STOCHASTIC MODELS OF MAN–MACHINE SYSTEM EFFECTIVENESS Ph.D. Thesis
Kang Won Lee 1985 360 p
Avail: Univ. Microfilms Order No. DA8528018

A human performance reliability model was developed to introduce the human operator effect into the system effectiveness model. The model can predict quantitatively how much the human aspects of the man-machine system contribute to the system unreliability. Mission effectiveness models that provide a realistic measurement of system effectiveness are presented. It depicts interrelationships between the components of the mission system and shows a way to properly integrate the human operator into mission effectiveness. For situations in which there are too many computational difficulties in developing the models, the simulation approach is more practical than the analytical approach. To demonstrate the sensitivity of the probabilistic assumptions for the system variables to the mission effectiveness, a robustness test is performed. To identify system variables sensitive to mission effectiveness can be obtained by allocating more effort to estimating these variables. The models developed will lead to a more valid effectiveness analysis output and provide a useful tool for consistent system evaluation. Dissert. Abstr.

N86-24217*# Essex Corp., Huntsville, Ala. Space Systems Group.
THE SYSTEM INTEGRATION AND VERIFICATION TESTING OF AN ORBITAL MANEUVERING VEHICLE FOR AN AIR BEARING FLOOR Final Report
Nicholas L. Shields, Jr., Mary Frances Martin, Karen R. Paulukaitis, John W. Haslam, Jr., and David E. Henderson 22 Feb. 1986 125 p refs

(Contract NAS8-35636)
(NASA-CR-178350; NAS 1.26:178350; H-86-02) Avail: NTIS HC A06/MF A01 CSCL 05H

The teleoperator and Robotics Evaluation Facility (TOREF) is composed of a 4,000 square foot precision air bearing floor, the Teleoperator Motion Base, the Target Motion and Support Simulator, the mock-ups of the Hubble Space Telescope, Multi-mission Modular Spacecraft, and the Orbital Maneuvering Vehicle (OMV). The TOREF and its general capabilities to support the OMV and other remote system simulations; the facility operating procedures and requirements; and the results of generic OMV investigations are summarized. B.G.

N86-24218# Army Research Inst. of Environmental Medicine, Natick, Mass.
EFFECT OF HEAT AND CHEMICAL PROTECTIVE CLOTHING ON COGNITIVE PERFORMANCE Final Report
Bernard J. Fine and John L. Kobrick Nov. 1985 27 p
(AD-A162001; USARIEM-M-4/86) Avail: NTIS HC A03/MF A01 CSCL 06/17

This study examined the effects of heat on the sustained cognitive performance of sedentary soldiers clad in chemical protective clothing, Twenty males trained for 2 weeks on selected military tasks. Then, they performed the tasks for 7-hour periods on 4 successive days in hot (32.8C.,61%rh) and normal (21. 1C35%rh) conditions, with and without protective clothing. After 4 to 5 hours in the heat wearing protective clothing, the cognitive performance of the group began to deteriorate markedly. By the end of 7 hrs. of heat, increases in % group error on investigator-paced tasks ranged from 17% to 235 over control conditions. Virtually all of the decrements were due to increases in errors of omission. The productivity of the group on a self-paced task (map plotting) diminished by approximately 40% from control conditions after 6 hrs. in the heat in protective clothing; accuracy of plotting was not markedly affected. GRA

N86-24219# Army Research Inst. of Environmental Medicine, Natick, Mass.
EFFECTIVENESS OF AN AIR-COOLED VEST USING SELECTED AIR TEMPERATURE AND HUMIDITY COMBINATIONS
Nanvy A. Primental, Henry M. Cosimini, Michael N. Sawka, and C. B. Wenger Nov. 1985 25 p
(AD-A162026; USARIEM-M5/86) Avail: NTIS HC A02/MF A01 CSCL 06/17

We evaluated the effectiveness of an air-cooled vest in reducing thermal strain when supplied with five different dry bulb (db) and dew point (dp) temperature combinations. The combinations were selected to determine minimal air conditioning requirements for various military vehicles. Four male soldiers attempted twelve, 300-min heat exposures (49 C db, 20 C dp) at metabolic rates of 175 and 315 W. They wore chemical protective clothing over the combat vehicle crewman uniform; on ten of the test days, they also wore the air-cooled vest. Air supplied to the vest ranged from 20-27 C db, 7-18 C dp. Without the vest, endurance times were 118 min (175 W) and 73 min (315 W). Endurance times with the vest were 300 min (175 W) and 242-300 min (315 W). Rectal temperatures, heart rates and sweating rates were reduced dramatically with the air at the lower dry bulb temperature. We conclude that effective combinations of cooled and dehumidified air can be provided on military vehicles to reduce the crewmen's thermal strain, with minimized size and weight penalties. GRA

N86-24220# Naval Postgraduate School, Monterey, Calif.
THE DESIGN OF NATURAL LANGUAGE INTERFACES M.S. Thesis
Ioannis Kotrozos Sep. 1985 110 p
(AD-A162181) Avail: NTIS HC A06/MF A01 CSCL 05/8

One of the possible solutions to the problem of designing effective man-machine interfaces seems to be the use of natural languages. This thesis examines the principles of design of effective man-machine interfaces, the role of natural languages in achieving effective man-machine communication and the implementation issues and techniques for their use as interfaces. GRA

N86-24221# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN EXAMINATION OF THE LIFE SUPPORT EQUIPMENT DEVELOPMENT AND ACQUISITION PROCESS M.S. Thesis
Jeffrey J. Moyer Sep. 1985 66 p
(AD-A162241; AFIT/GSM/XPX/85S-24) Avail: NTIS HC A04/MF A01 CSCL 15/5

The process of life support equipment development and acquisition is examined. This research identified the how the present process works, and the problems of the process. The research was limited to the development and acquisition of life support equipment for tactical aircraft. However, most of the problems and steps of the process are shared by life support equipment programs for other users. The process was determined by referring to applicable regulations and interviewing people involved in the process. Problems were identified during interviews, and by examining the process as a whole. Seven problems are identified, of which five are considered correctable in the current defense acquisition framework. Four of the five problems deal with the management of the acquisition and development process, and combined indicate the lack of an integrated approach. Solutions were developed from suggestions obtained during the interviews and through qualitative analysis of the problems. An integrated solution is proposed in the recommendations. GRA

N86-24222# Naval Postgraduate School, Monterey, Calif.
HUMAN FACTORS ENGINEERING AND OPERABILITY IN THE DESIGN OF ELECTRONIC WARFARE SPACES ABOARD UNITED STATES NAVAL COMBATANTS M.S. Thesis
David J. Blauser, Jr. Sep. 1985 118 p
(AD-A162251) Avail: NTIS HC A06/MF A01 CSCL 17/4

The purpose of this thesis is to present and discuss a a method of assessing the effectiveness of a work space layout. In addition, this method will provide the framework for pinpointing those areas of layout design where redesign will be most cost effective. The objective is to address inefficiencies in the layout of warfare modules on U.S. Navy combatants. In particular, the Electronic Warfare Module on aircraft carriers is assessed due to the highly time-critical nature of electronic warfare. The method chosen in this thesis is a modification of two techniques of assessment: Integration Analysis and Mission Operability Assessment Technique (MOAT). The portions of these techniques used are Link Analysis, Task Analysis, and Operability Analysis. The application herein concludes that the EW Module layout design on the latest NIMITZ-class aircraft carriers was less than 40% effective in promoting mission accomplishment. GRA

N86-24223# Essex Corp., Westlake Village, Calif. Human Factors and Training Systems Group.
PERSON COMPUTER DIALOGUE: A HUMAN ENGINEERING DATA BASE SUPPLEMENT
Brian E. Shaw and Michael E. McCauley Jan. 1985 148 p
(Contract F33615-82-C-0513)
(AD-A163074; AFAMRL-TR-85-013) Avail: NTIS HC A07/MF A01 CSCL 09/2

This report was prepared as a Human Engineering Data Base Supplement to the Integrated Information for Designers (IPID) Engineering Data Compendium. It was specifically written to aid computer system designers. The body of literature on person-computer dialogue has been gathered and organized into an integrated format. Major topic areas include conceptual comparisons of person-computer dialogue, models for evaluation of dialogue systems, unique considerations of specific user groups, and specific user-system dialogue design considerations. These major areas are subdivided into succinct discussions of highly focused design considerations. Each discussion of design considerations includes a general description, statement of applications, constraints, and key references in addition to the graphic/tabular formatted design guidelines. An extensive bibliography of literature on person-computer dialogue is included. GRA

N86-24527*# Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.

STANDARDIZATION OF CARBON-PHENOLIC COMPOSITE TEST METHODOLOGY
William B. Hall *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-24224*# National Aeronautics and Space Administration. Pasadena Office, Calif.
NEIGHBORHOOD COMPARISON OPERATOR Patent Application
Donald B. Gennery, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 31 Dec. 1985 13 p
(Contract NAS7-918)
(NASA-Case-NPO-16464-1CU; NAS 1.71:NPO-16464-1CU; US-Patent-Appl-SN-515099) Avail: NTIS HC A02/MF A01 CSCL 09B

Digital values in a moving window are compared by an operator having nine comparators connected to line buffers for receiving a succession of central pixels together with eight neighborhood pixels. A single bit of program control determines whether the neighborhood pixels are to be compared with the central pixel or a threshold value. The central pixel is always compared with the threshold. The comparator output plus 2 bits indicating odd-even pixel/line information about the central pixel addresses a lookup table to provide 14 bits of information, including 2 bits which control a selector to pass either the central pixel value, the other 12 bits of table information, or the bit-wise logical OR of all nine pixels through circuit that implements a very wide OR gate. NASA

N86-24225*# National Aeronautics and Space Administration. Pasadena Office, Calif.
CONVOLVER Patent Application
Brian Wilcox, inventor (to NASA) (JPL, Pasadena, Calif.) Filed 31 Dec. 1985 14 p
(Contract NAS7-918)
(NASA-Case-NPO-16462-1CU; NAS 1.71:NPO-16462-1CU; US-Patent-Appl-SN-815106) Avail: NTIS HC A02/MF A01 CSCL 09B

A 3-by-3 convolver utilizes 9 binary arithmetic units connected in cascade for multiplying 12-bit binary pixel values P sub i which are positive or two's complement negative binary numbers by 5-bit magnitude (plus sign) weights W sub i which may be positive or negative. The weights are stored in registers including the sign bits. For a negative weight, the one's complement of the pixel value to be multiplied is formed at each unit by a bank of 17 exclusive or gates G sub i under control of the sign of the corresponding weight w sub i, and a correction is made by adding the sum of the absolute values of all the negative weights for each 3x3 kernel. Since this correction value remains constant as long as the weights are constant, it can be precomputed and stored in a register as a value to be added to the product PW of the first arithmetic unit. NASA

N86-24226# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
THE GEONAMES PROCESSING SYSTEM FUNCTIONAL DESIGN SPECIFICATION. VOLUME 4: ADVANCED SYMBOL PROCESSING Final Report
Gail Langran Mar. 1985 45 p
(AD-A161874; NORDA-101) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes the Geonames Processing System attributes and serves as a basis for understanding between the user and the developer. The subsystems referred to are: Advanced Symbol Processing, Advanced Type Placement, Geographic Names Data Base, and Automated Alphanumeric Data Entry System. Contents: Introduction-Overview of Geonames Processing System: Advanced Symbol Processing Overview; Word Processing; Data Base Manipulation; Output Processing; Job Management; File Management; Processing Flow; Data Sets; Interfaces to Other Subsystems; Assumptions and Constraints; Performance Requirements; and Hardware Requirements. GRA

N86-24227# American Society for Engineering Education, Washington, D. C.
DESIGN OF GRAPHIC DISPLAYS IN COMPUTERIZED SYSTEMS Final Report, 1 Sep. 1984 - 1 Sep. 1985
Kevin Bennett 1 Sep. 1985 37 p
(Contract N00014-83-D-0689)
(AD-A161890) Avail: NTIS HC A03/MF A01 CSCL 09/2

The user's mental model of a computerized, perceptual database system was investigated in three experiments. The system consisted of a database of multidimensional sounds, command to search the database, and one of three separate displays (two graphic displays for training, an alpha-numeric display for testing). The graphic displays presented different conceptualizations of the database; training with a different graphic display was predicted to cause the formation of a different mental model of the system. The results of three experiments indicated that users trained with one graphic display identified two-dimensional sounds with significantly lower latency (Experiment 1) than users trained with the second graphic display. For three-dimensional sounds these findings with both displays this interaction disappeared (Experiment 3). The results indicate that display design can influence the user's mental model of a system and that this has implications for performance with the system. Author (GRA)

N86-24228# Yale Univ., New Haven, Conn. Dept. of Chemistry.
ALTERNATING DIRECTION METHODS ON MULTIPROCESSORS
S. L. Johnsson, Youcef Saad, and Martin H. Schultz Oct. 1985 15 p
(Contracts N00014-84-K-0084; N00014-84-K-0043)
(AD-A161973; YALEU/DCS/RR-382) Avail: NTIS HC A02/MF A01 CSCL 09/2

A new implementation of the Alternating Direction Method for solving parabolic partial differential equations on multiprocessors is proposed. A careful complexity analysis of these implementations shows that, contrary to what is generally believed, the method can be made highly efficient on parallel architectures by using pipelining and variations of the classical Gaussian elimination algorithm for solving tridiagonal systems. An earlier work showed that linear speedups could be obtained for moderate numbers of processors in a ring architecture. This paper discusses Extensions

to a large number of processors in a 2-D grid architecture and a hypercube are discussed. Author (GRA)

N86-24229# Defence Research Establishment Suffield, Ralston (Alberta).
PROPOSED IMPLEMENTATION OF A COMPUTER AIDED DESIGN AND DRAFTING (CAD/D) CAPABILITY AT DRES (DEFENCE RESEARCH ESTABLISHMENT SUFFIELD)
Steven G. Penzes Sep. 1985 36 p
(AD-A162006; DRES-SM-1111) Avail: NTIS HC A03/MF A01 CSCL 09/2

The feasibility of installing a CAD/D system at DRES is investigated with the constraints that the recommended system cost less than $150K (1982) and be a turnkey installation. The ANVIL 4000L software package, compatible with the recently acquired central computer, a Honeywell DPS8/70C, is recommended. GRA

N86-24230# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
GPIB INTERFACE AND TIMING GENERATOR FOR THE HEWLETT-PACKARD 2401C INTEGRATING DIGITAL VOLTMETER
Martin F. Bottjer, Walter A. Johnson, Tsutomu T. Mori, and Donald Y. Watanabe 30 Sep. 1985 38 p
(Contract F04701-83-C-0084)
(AD-A162189; TR-0084A(5925-08)-1; SD-TR-85-67) Avail: NTIS HC A03/MF A01 CSCL 14/2

GPIB interface logic and a timing generator for the Hewlett-Packard 2401C integrating digital voltmeter were designed, constructed, and checked out. This logic enables the control of the 2401C by a Hewlett Packard 9825T calculator. This hardware is described herein. Also described is software for a typical usage for the voltmeter, calculator, and interface system with a printer and plotter as outputting devices. GRA

N86-24231# Stanford Univ., Calif. Dept. of Computer Science.
GUIDON-WATCH: A GRAPHIC INTERFACE FOR VIEWING A KNOWLEDGE-BASED SYSTEM Technical Report
Mark H. Richer and William J. Clancey Aug. 1985 44 p
(Contract N00014-85-K-0305)
(AD-A162190; SU-STAN-CS-85-1068; KSL-85-20) Avail: NTIS HC A03/MF A01 CSCL 09/2

GUIDON-WATCH, a graphic interface that uses multiple windows and a mouse to allow a student to browse a knowledge base and view reasoning processes during diagnostic problem solving is described. Methods are presented for providing multiple views of hierarchical structures, overlaying results of a search process on top of static structures to make the strategy visible, and pictorially expressing evidence relations between findings and hypotheses. This work demonstrates the advantages of stating a diagnostic search procedure in a well-structured, rule-based language, separate from domain knowledge. A number of issues in software design are also considered, including the automatic management of a multiple-window display. Author (GRA)

N86-24232# Naval Postgraduate School, Monterey, Calif.
TENSOR FORMULATIONS FOR THE MODELLING OF DISCRETE-TIME NONLINEAR AND MULTIDIMENSIONAL SYSTEMS Ph.D. Thesis
Peter J. Lenk Sep. 1985 197 p
(AD-A162340; CR-84-1) Avail: NTIS HC A09/MF A01 CSCL 12/1

The modelling of nonlinear and multidimensional systems from input and/or output measurements is considered. Tensor concepts are used to reformulate old results and develop several new ones. These results are verified through non-trivial computer simulations. A generalized tensor formulation for the modelling of discrete-time stationary nonlinear systems is presented. Tensor equivalents of the normal equations are derived and several efficient methods for their solution are discussed. Conditions are established that ensure a diagonal correlation tensor so that a solution can be obtained directly without matrix inversion. Using a tensor formulation, a new proof of the Generalized Lattice Theory is obtained. Tensor extensions of the Levinson and Schur algorithms are presented. New two-dimensional lattice parameter models are derived. Using the tensor form of the Generalized Lattice Theory the 2-D multi-point error order-updates are decomposed into 0(N2) single point updates. 2-D extensions of the Levinson and Schur algorithms are given. The quarter plane lattice is considered in detail, first in a general form, then in forms which reduce the computational complexity by assuming shift-invariance. Based on the 2-D lattice, a new nonlinear lattice model is developed. The model is capable of updates in the nonlinear as well as time order. Author (GRA)

N86-24233# Spectra Research Systems, Inc., Vandenberg AFB, Calif.
FEASIBILITY STUDY FOR A STATIC AIRCRAFT FLIGHT Final Technical Report, Oct. 1984 - Jun. 1985
Charles H. Hightower 14 Jun. 1985 55 p
(Contract N61339-84-C-0069)
(AD-A163129; SRS0069-0001; NAVTRASYSCEN-85-C-0069) Avail: NTIS HC A04/MF A01 CSCL 09/2

The feasibility of embedding training software in modern flight aircraft to maintain pilot proficiency while parked was investigated. Candidate training scenarios critical to pilot performance were identified. Feasibility was demonstrated based on current and projected capabilities of the AYK-14 mission computers performing the weapons and navigation calculations in the Navy's F/A-18 Hornet. It was shown that the version 6 AYK-14 computer with dual single card processors (SCP's) would provide a suitable host for training software. The F/A-18 avionic and display systems are also shown to support the SAFES (Static Aircraft Flight Environment Simulator) concept. A number of candidate SAFES implementations are defined and one selected for feasibility demonstration remove fastener. Author (GRA)

N86-24234# Lawrence Livermore National Lab., Calif.
INSTALLATION OF THE PADL-2 SOLID MODELER ON THE CRAY-1
J. R. Kalibjian Aug. 1985 9 p
(Contract W-7405-eng-48)
(DE86-002841; UCID-20478) Avail: NTIS HC A02/MF A01

We describe in detail the method used to install the PADL-2 solid modeler on the CRAY-1 at Lawrence Livermore National Laboratory (LLNL), and document the solutions required to successfully implement two versions of this VAX native source code. Inadequate PADL-2 documentation and PADL-2's dependence on many non-standard FORTRAN features delayed bringing up Version 1.0. Additional problems resulted from little known quirks in LTSS system routines such as 8-bit character data losses (in CIVIC) on byte data transfers to subroutines and binary incompatibility between CIVIC and CFT logical variables and syntax conflicts with PRECOMP. We installed the second version, PADL-2/1.2, with much less difficulty because the code was cleaner and most implementation problems had already been identified. Yet, other problems were discovered such as CFT compiler differences from standard FORTRAN-77 and lack of LTSS support libraries for list directed and file I/O. Finally, modifications to the original Lexidata and Tektronix graphic interface routines let us generate: (1) color high-resolution, shaded pictures on the laboratory's Dicomed film recorder; (2) low-resolution black-and-white dithered pictures of shaded objects displayable on TMDS and RJET; and (3) wireframe pictures of parts also displayable on both TMDS and RJET. DOE

N86-24235# Societe Crouzet, Valence (France). Div. Aerospatial.
IMPLEMENTATION TECHNIQUES FOR LARGE ONBOARD MEMORY SYSTEMS Final Report [TECHNIQUES DE CONDITIONNEMENT POUR DE GRANDS SYSTEMES DE MEMOIRE DE BORD]
G. Menozzi, A. Bricard, and M. Lepertel Paris ESA Feb. 1985 83 p refs In FRENCH
(Contract ESTEC-4896/81-NL-HP)
(Rept-C.SE.MEMP.DS.002; ESA-CR(P)-2125) Avail: NTIS HC A05/MF A01

The preliminary analysis aimed to examine several technological solutions compatible with a short term space utilization. A leadless chip carrier module on multilayer ceramic support with a 1 Mbit memory capacity was selected and a chip and wire second solution was kept to provide a reference. The module dimensions are 278 by 163 mm and 11,6 mm depth. Mechanical and thermal studies were carried out giving a 200 Hz resonant frequency and 18 C junction temperature. The evaluation shows the aptitude for space utilization. A module was manufactured for electrical tests that were carried out at 2.5 MHz access frequency. The results permit the conception of memory systems working at up to 100 Mbits/sec. Author (ESA)

N86-24236# Ministerie van Sociale Zaken en Werkgelegenheid, 's'Gravenhage (Netherlands).
STIMULATION OF COMPUTER SCIENCES Progress Report [INFORMATICASTIMULERING, VOORTGANGSRAPPORTAGE, SEPTEMBER 1985]
Sep. 1965 28 p In DUTCH
(Rept-19-158-No-1-2; B8575278) Avail: NTIS HC A03/MF A01
The progress made after 1.5 yr in the framework of the computer science stimulation plan is described. The purposes and financing of the plan are explained. The integration of the plan in the Dutch education system is presented. The management policy aims at the broadening of the market in the field of computer technologies. The applications of computer technologies in government services are described. Author (ESA)

N86-23838# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
DATA CONVERTER TEST METHODS
T. M. Souders *In its* Digital Methods in Waveform Metrology Oct. 1985 p 75-85 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 09B

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-24237*# Virginia Univ., Charlottesville. Dept. of Computer Science.
A SECOND GENERATION EXPERIMENT IN FAULT-TOLERANT SOFTWARE
J. C. Knight Mar. 1986 59 p refs
(Grant NAG1-511)
(NASA-CR-176723; NAS 1.26:176723; UVA/528235/CS86/102) Avail: NTIS HC A04/MF A01 CSCL 09B
The primary goal was to determine whether the application of fault tolerance to software increases its reliability if the cost of production is the same as for an equivalent nonfault tolerance version derived from the same requirements specification. Software development protocols are discussed. The feasibility of adapting to software design fault tolerance the technique of N-fold Modular Redundancy with majority voting was studied. B.G.

N86-24238# Cornell Univ., Ithaca, N.Y. School of Operations Research and Industrial Engineering.
TESTS FOR INITIALIZATION BIAS IN COMPUTER SIMULATION EXPERIMENTS
David Goldsman and Lee W. Schruben Dec. 1984 34 p Prepared in cooperation with Georgia Inst. of Tech., Atlanta
(Contract N00014-81-K-0037)
(AD-A161963; TR-J-84-16) Avail: NTIS HC A03/MF A01 CSCL 09/2
Although many of the rules for detecting and dealing with initialization bias in computer simulation experiments are easy to understand and implement, they are nonetheless heuristic. This paper uses the theory of standardized times series to construct tests which (under certain conditions) detect significant initialization bias in a process. Previous tests for initialization bias can be viewed as special cases of the general family of tests to be presented here. Author (GRA)

N86-24239# Washington Univ., Seattle.
A PRACTICAL APPLICATION OF LOTUS 1-2-3 (TRADEMARK) IN CONSTRUCTION MANAGEMENT M.S. Thesis
Kenneth Rachko 1985 103 p
(Contract N66314-72-A-0096)
(AD-A161990) Avail: NTIS HC A06/MF A01 CSCL 09/2
Some of the capabilities of a popular microcomputer (IBM PC) coupled with a popular software package (LOTUS 1-2-3) are reviewed, as these can be easily tailored to various aspects of the construction industry. It can be used as a tool by the owner or project manager and the builder or contractor. While each of these two major participants would be interested in some similar aspects of construction administration, their perspective and required data would necessarily be different. The report presents some uses for identifying, tracking and thereby controlling various aspects of the construction process. Examples are given using the spreadsheet and database capabilities of the LOTUS 1-2-3 program for managing project change orders, construction submittals and inventory control. Also included is a simple example of the graphics capability of LOTUS to illustrate the effectiveness of a pictorial representation of reported numbers. GRA

N86-24240# Naval Postgraduate School, Monterey, Calif.
AN IMPLEMENTATION OF THE PROJECTIVE ALGORITHM FOR LINEAR PROGRAMMING M.S. Thesis
Guenter W. Bretschneider Sep. 1985 44 p
(AD-A162048) Avail: NTIS HC A03/MF A01 CSCL 12/1
An algorithm to solve linear programming problems is presented in this thesis which is based on Karmarkar's projective method. The algorithm includes a practical method to project a general linear programming problem onto a unit simplex and eliminates the a priori need to know the optimal value of the objective function. The implementation conserves sparsity. The key part of the implementation is the solution of a linear least-squares problem to find an improving direction: a direct and an iterative method are implemented to solve this problem. The direct method employs the minimum-degree heuristic to reorder the system of normal equations, and thus conserve sparsity during the following Cholesky factor of the normal equation matrix as a preconditioner for conjugate gradient iterations which are performed implicity on the preconditioned matrix. The study concludes with implementation remarks, and computational results. GRA

N86-24241# Naval Postgraduate School, Monterey, Calif.
FUNCTION PLOTTING SOFTWARE FOR THE IBM-PC AND IBM-7371/7372 PLOTTERS
Alvin F. Andrus Nov. 1985 24 p
(AD-A162066; NPS55-85-029) Avail: NTIS HC A02/MF A01 CSCL 09/2
This report contains a program and user instructions for plotting functions and line graphs on the IBM-7371 or 7372 color plotter. Program input and operation are illustrated and explained. Examples that illustrate program capabilities are included. The program is written in IBM BASICA. The program eliminates the requirement for discrete coordinate inputs in order to plot functions. Continuous single valued functions are defined using the construction rules for standard BASIC expressions. These function definitions then become the program inputs. The program will also accept (X,Y) points and plot a line graph connecting the points. GRA

N86-24242# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
AISIM (AUTOMATED INTERACTIVE SIMULATION MODEL) INSTALLATION AND ACCEPTANCE TEST PLANS AND PROCEDURES Final Report
S. Kneeburg Feb. 1985 220 p
(Contract F33615-81-C-5098)
(AD-A162082; ESD-TR-85-128) Avail: NTIS HC A10/MF A01

CSCL 09/2

This document describes the procedures for installing the automated interactive simulation modeling system (AISIM) on a Vax 11/780 computer and for conducting acceptance testing of the system. This document also contains a description of the contents of the AISIM delivery tapes and the tapes and the steps for building the AISIM system. The description of the AISIM delivery tapes includes a list of all of the files on the tapes and a brief description of each file. The instructions for building AISIM include steps on dumping the tape files to disk and changing all necessary execution command files so that AISIM will execute on a new host. GRA

N86-24243# Duke Univ., Durham, N. C. Dept. of Computer Science.

FINDING TEST-AND-TREATMENT PROCEDURES USING PARALLEL COMPUTATION

L. D. Duval, R. A. Wagner, Y. Han, and D. W. Loveland Oct. 1985 27 p

(Grant AF-AFOSR-0205-83)

(AD-A162141; CS-1985-23; AFOSR-85-1049TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A parallel algorithm for the NP-hard problem test-and-treatment is presented for a machine whose number of connections is 3p 2 sq, where p is the number of processing elements (PEs), and where the PEs are simple enough such that a machine with 2 to the 20th power PEs is currently implementable and to the 30th power PE machine is feasible. The speedup of O sub p log p is realizable because we are able to transform the dynamic programming solution into the ASCEND/DESCEND scheme with considerable attention to the communication problem. This algorithm is realized on the Boolean Vector Machine, a fully designed cube-connected-cycle system where processor allocation and other control issues have been faced. The particular NP-hard problem is of independent interest; it generalizes the binary testing problem by introducing treatments on an equal basis with tests. Applications of this test-and-treatment problem are found in medical diagnosis, systematic biology, machine fault location, laboratory analysis and many other fields. Author (GRA)

N86-24244# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.

A STUDY OF ERROR DETECTION AND CORRECTION CODES Final Scientific Report, 1 Feb. 1982 - 31 Jul. 1985

Jack K. Wolf 23 Sep. 1985 12 p

(Grant AF-AFOSR-0061-82)

(AD-A162196; AFOSR-85-0990TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

This research was concerned with a number of topics related to error control for noisy communications channels. Specific topics included: probability of undetected error for error detection codes, coding for discrete-time continuous-amplitude signalling, tail-biting for convolutional codes, combined modulation and coding using amplitude, phase and frequency modulation, and coding for fault tolerant systems and VLSI. GRA

N86-24245# Massachusetts Inst. of Tech., Cambridge.

NUMERICAL ALGORITHMS & PARALLEL TASKING Annual Report, 12 Oct. 1984 - 15 Sep. 1985

Virginia Kelma 12 Sep. 1985 50 p

(Grant AF-AFOSR-0210-82)

(AD-A162221; AFOSR-85-0988TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The long term goals of this research activity are derived from concurrent computing with emphasis on numerical algorithms that support a variety of scientific applications. Among the applications of immediate interest are signal processing, high statistical methods such as the bootstrap. The shorter term focus has been the refinement and enhancement of the concurrent computing environment itself and the numerical algorithms that form the foundation for the applications. The computer systems that support this research use hardware manufactured by Intel -- with the 8086 cpu and the 8087 floating point processor at the heart of each node. The nodes are contained in workstations (with up to seven Workers and a Manager in a workstation) that can operate independently or can be linked together during execution. Worker structure and memory are configurable to support experiments conducted in the course of this research. GRA

N86-24246# Duke Univ., Durham, N. C. Dept. of Computer Science.

THE CORRECTION OF ILL-FORMED INPUT USING HISTORY-BASED EXPECTATION WITH APPLICATIONS TO SPEECH UNDERSTANDING

Pamela K. Fink and Alan W. Biermann Oct. 1985 46 p

(Grants NSF MCS-79-04120; AF-AFOSR-0205-83; NSF MCS-81-13491)

(AD-A162222; AFOSR-85-1052TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

A method for error correction if ill formed input is described which acquires dialogue patterns in typical usage and uses these patterns to predict new inputs. Error correction is done by strongly biasing parsing toward expected meanings unless clear evidence from the input shows the current sentence is not expected. A dialogue acquisition and tracking algorithm is presented along with a description of its implementation in a power of the error correction methodology when stereotypic dialogue occurs. Author (GRA)

N86-24247# Stanford Univ., Calif. Dept. of Computer Science.

ACQUIRING, REPRESENTING, AND EVALUATING A COMPETENCE MODEL OF DIAGNOSTIC STRATEGY

William J. Clancey Aug. 1985 93 p

(Contract N00014-85-K-0305)

(AD-A162223; SU-STAN-CS-85-1067; TR-13) Avail: NTIS HC A05/MF A01 CSCL 09/2

NEOMYCIN is a computer program that models one physician's diagnostic reasoning within a limited area of medicine. NEOMYCIN's diagnostic procedure is represented in a well-structured way, separately from the domain knowledge it operates upon. We are testing the hypothesis that such a procedure can be used to simulate both expert problem-solving behavior and a good teacher's explanations of reasoning. The model is acquired by protocol, analysis, using a framework that separates an expert's causal explanations of evidence from his descriptions of knowledge relations and strategies. The model is represented by a procedural network of goals and rules that are stated in terms of the effect the problem solver is trying to have on his evolving model of the world. The model is evaluated for sufficiency by testing it in different settings requiring expertise, such as providing advice and teaching. The model is evaluated for plausibility by arguing that the constraints implicit in the diagnostic procedure are imposed by the task domain and human computational capability. This paper discussed NEOMYCIN's diagnostic procedure in detail, viewing it as a memory aid, as a set of operators, as proceduralized constraints, and as a grammar. GRA

N86-24248# Bedford Research Associates, Mass.

MASK.DOC

J. Stevens Aug. 1985 38 p

(Contract F19628-83-C-0090)

(AD-A162224; AFGL-TR-85-0169; SR-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

MASK.DOC is a description of the MASK Programming System for the designing microwave integrated circuits. It is divided into six major parts: (1) part 1 is an introduction to the MASK program. It describes briefly the function of all the modules and related programs of MASK; (2) part 2 describes how a user goes about creating a MASK layout, converting it to CIF, and translating it to either Cornell or Electromask code. It is also explains how to transfer the code to a magnetic tape and how to verify the tape; (3) this section explains how to add a new MASK structure to the structure. It tells which modules to change and how to go about it; (4) this is a programmer's description of MASK. It explains the function of each subroutine in all modules and related programs; (5) this section informs the user how to compile and link all the modules and related programs so as to ready the programs for

execution; and (6) special structures are described here. This section describes the structures that are limited to translation to either Electromask or Cornell format but not both. Author (GRA)

N86-24249# Naval Postgraduate School, Monterey, Calif.
A PRELIMINARY SOFTWARE DESIGN FOR A PERSONAL COMPUTER-BASED ANTISUBMARINE WARFARE TACTICAL FLIGHT SIMULATOR M.S. Thesis
Harold R. Whalen, III Sep. 1985 75 p
(AD-A162255) Avail: NTIS HC A04/MF A01 CSCL 15/1

This thesis provides a preliminary software design for an Antisubmarine Warfare Tactical Flight Simulator. The simulation uses AN/ASN-123 Tactical Navigation Set (TACNAV) display symbology and selectable graphic functions to track and localize a single fully-evasive submarine. The primary design objectives are flexibility, utility, and understandability. A composite design methodology including levels of abstraction, information hiding, coupling, and cohesion as modularization criteria is used to effect a top-down modular decomposition of the simulation. A hierarchical structure is developed and modular packaging is discussed. Some aspects of physical implementation are also discussed and appropriate recommendations made. Author (GRA)

N86-24250# Pittsburgh Univ., Pa. Dept. of Industrial Engineering.
THE APPLICATION OF GENERALIZED GEOMETRIC PROGRAMMING (CONJUGATE DUALITY) TO THE ANALYSIS AND SOLUTION OF CONVEX PROGRAMS Final Technical Report, 16 Jul. 1983 - 15 Jul. 1985
Thomas R. Jefferson 15 Jul. 1985 10 p
(Grant AF-AFOSR-0234-83)
(AD-A162288; AFOSR-85-1055TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The research in this grant involves the application of generalized geometric programming (conjugate duality) to a variety of problems. The duality theory constructs a dual program which can provide insight into the problem and assist in solution. Composite geometric programming was developed as an important new class of mathematical programming. Applications studied included machining economics, resource allocation, assignment, nonlinear multicommodity network flow problems, mineral processing, statistical analysis of ordinal categorical data, and estimation. Geometric programming was extended from functions of polynomial form to functions which include exponential, logarithmic and other factors by the development of composite geometric programming. This class retains the power of geometric programming while addressing new problems. Certain machining economics problems and chemical equilibrium problems fall into this new class of mathematical programs. Research on the machining economics problem resulted in the problem being reduced from a nonlinear program to a one-dimensional search. In addition, duality theory provided easy parametric analysis. GRA

N86-24251# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF TWO ADVANCED SMOOTHING ALGORITHMS M.S. Thesis
Jose A. Vasquez, Jr. Sep. 1985 166 p
(AD-A162305) Avail: NTIS HC A08/MF A01 CSCL 12/1

This thesis examines two smoothing algorithms which deviate from the classical method of using only one neighborhood size in the smoothing procedure. The Supersmooth algorithm uses three neighborhood sizes with local cross-validation in order to estimate an optimal neighborhood size. The Split Linear Fit algorithm uses any number of neighborhood sizes and computes a family of linear fits corresponding to each neighborhood size; the final smooth points are a weighted average of the linear fits. These two advanced smoothers are evaluated against the results produced by previously validated, commonly used smoothers and regression techniques. The measure of performance is the quality of the smooth curves and the value of the sum of squared residuals. Author (GRA)

N86-24252# Naval Underwater Systems Center, New London, Conn.
EXTRACTING SIGNAL INFORMATION FROM CONTAMINATED DATA WITH A TWO-DIMENSIONAL ARRAY
Roger F. Dwyer 5 Apr. 1985 45 p
(AD-A162316; NUSC-TM-851054) Avail: NTIS HC A03/MF A01 CSCL 09/4

The use of sensors configured into various geometrical shapes called arrays are important in extracting signal information in many applications. This paper explores the effectiveness of a two-dimensional or planar array in extracting signal information from digitized data when additive Gaussian noise and additive impulsive interference are present. Based on the likelihood ratio approach the data output of each sensor is first passed through a zero-memory device. The zero-memory device is neither a nonlinearity or linearity depending on whether the interference is present or not present, respectively. Further processing utilizes a receiver which converts the data at the output of each zero-memory device into frequency components using a discrete-Fourier transform. The frequency components are then weighted and summed over all spatial sensors. The weights are chosen by maximizing a defined performance measure. It is shown that this optimization procedure does not take into account the debilitating effects of impulsive interference. In order to treat theoretically the inclusion of a nonlinearity, to combat impulsive interference, the concept of an ideal nonlinearity is introduced. GRA

N86-24253# Stanford Univ., Calif. Dept. of Computer Science.
HEURISTIC CLASSIFICATION Technical Report, Jun. 1985
William J. Clancey Aug. 1985 82 p
(Contract N00014-85-K-0305)
(AD-A162344; SU-STAN-CS-85-1066; TR-12) Avail: NTIS HC A05/MF A01 CSCL 09/2

A broad range of well-structured problems--embracing forms of diagnosis, catalog selection, and skeletal planning--are solved in expert systems by the method of heuristic classification. These programs have a characteristic inference structure that systematically relates data to a pre-enumerated set of solutions by abstraction, heuristic association, and refinement. In contrast with previous descriptions of classification reasoning, particularly in psychology, this analysis emphasizes the role of a heuristic in routing problem solving as a non-hierarchical, direct association between concepts. In contrast with other descriptions of expert systems, this analysis specifies the knowledge needed to solve a problem, independent of its representation in a particular computer language. The heuristic classification problem-solving model provides a useful framework for characterizing kinds of problems, for designing representation tools, and for understanding non-classification (constructive) problem-solving methods. Author (GRA)

N86-24254# RAND Corp., Santa Monica, Calif.
ROSIE (TRADEMARK): A PROGRAMMING ENVIRONMENT FOR EXPERT SYSTEMS Interim Report
Henry A. Sowizral and James R. Kipps Oct. 1985 54 p
(Contract MDA903-82-C-0061)
(AD-A162356; RAND/R-3246-ARPA) Avail: NTIS HC A04/MF A01 CSCL 09/2

ROSIE(Rule-Oriented Systems for Implementing Expertise) is an English-like programming language that has evolved over the years into a highly readable, expressive, and powerful tool for building expert systems. Because the language mirrors English, it also serves as a medium of interaction between the knowledge engineer (the computer expert who creates the expert system) and the domain expert (the person whose expertise the system reflects.) This report describes the ROSIE language, emphasizing recent changes and additions, which include meta-elements, shared databases, and demons. Meta-elements capture specific linguistic structures; shared databases provide a facility for coordinating interactions among multiple experts without introducing significant changes to the language; and demons are programs that awaken on specific conditions. The report describes the new facilities, discusses ROSIE's advantages and disadvantages, and considers future directions. Author (GRA)

N86-24255# Arinc Research Corp., Washington, D.C.
SOFTWARE SIZING AND COST ESTIMATION STUDY
Stephen Gross, Kenneth B. Tom, and Everett E. Ayers Sep. 1985 5 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162386) Avail: NTIS HC A02/MF A01 CSCL 09/2

This study investigated techniques that would assist Navy programs in more accurately estimating software size in new weapon system developments. The study was exploratory in nature, and presents a description of existing software sizing and estimation methods and an evaluation of their strengths and weaknesses, in addition to a description and tabulation of a sizing data base collected and the estimating relationships developed. GRA

N86-24256# Northwestern Univ., Evanston, Ill. Dept. of Mechanical and Nuclear Engineering.
COMPUTER-AIDED ENGINEERING
H. H. Fong, F. M. Skalak, W. K. Liu, J. Y. Leung, and K. H. Hsu 26 Jun. 1985 6 p Presented at Pressure Vessels and Piping Conference and Exhibition, New Orleans, La 23-26 Jun. 1985
(AD-A162811; AFOSR-85-1108TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The procedures for analog Monte Carlo simulation of Markov processes are examined. Two variance reduction techniques are then included in a nonanalog formulation to increase the sampling efficiency for highly reliable systems, and a method for incorporating uncertainty in failure and repair rate data is outlined. Models for three classes of component dependencies appearing in reliability and availability problems are incorporated into the Markov formulation. They are: (1) shared repair crews between components, (2) load sharing between components, and (3) standby mode. Results are given for a series of model problems to demonstrate the efficiency of the methods as well as the effects of the dependencies on system unreliability and unavailability. GRA

N86-24257# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
COMMUNICATION AND MISCOMMUNICATION
Bradley A. Goodman Oct. 1985 234 p
(Contracts N00014-77-C-0378; N00014-85-C-0079)
(AD-A162843; BBN-5681) Avail: NTIS HC A11/MF A01 CSCL 09/2

This report discusses one aspect of enabling people to communicate in natural language with computers. The central focus of this work is a study on how one could build robust natural language processing systems that can detect and recover from miscommunication. The study of miscommunication is a necessary task within such a context since any computer capable of communicating with humans in natural language must be tolerant of the complex, imprecise, or ill-devised utterances that people often use. This goal first required an inquiry into how people communicate and how they recover from problems in communication. This led to the development of techniques for avoiding failures of reference that were employed in the reference identification component of a natural language understanding program. The traditional approaches to reference identification in previous natural language systems were found to be less elaborate than people's real behavior. To model a listener's behavior, a new component was added to the traditional reference identification mechanism to resolve difficulties in a speaker's description. GRA

N86-24258# Maryland Univ., College Park. Center for Automation Research.
UPDATING PROPERTIES OF DIRECTED ACYCLIC GRAPHS ON A PARALLEL RANDOM ACCESS MACHINE
Shaunak Pawagi and I. V. Ramakrishnan Sep. 1985 24 p
(Contracts F49620-83-C-0082; N00014-84-K-0530; Grant NSF ECS-84-04399)
(AD-A162954; CAR-TR-148; CS-TR-1551; AFOSR-85-1124TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

Fast parallel algorithms are presented for updating the transitive closure, the dominator tree, and a topological ordering of a directed acyclic graph (DAG) when an incremental change has been made to it. The kinds of changes that are considered here include insertion of a vertex or insertion and deletion of an edge. The machine model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper require O(log n) time and use (O cu n) processors. These algorithms are efficient when compared to previously known O(log sq n) time algorithms for initial computation of the above mentioned properties of DAGs. A new algorithm for initial computation of the dominator tree of a DAGis described. The algorithm improves the processor complexity of a previously known algorithm by a factor of n, but does not affect the time complexity, which remains O(log sq n). Author (GRA)

N86-24259# Sandia National Labs., Livermore, Calif.
TOPAZ: THE TRANSIENT ONE-DIMENSIONAL PIPE FLOW ANALYZER. CODE VALIDATION AND SAMPLE PROBLEMS
W. S. Winters Oct. 1985 102 p
(Contract DE-AC04-76DP-00789)
(DE86-002143; SAND-85-8236) Avail: NTIS HC A06/MF A01

TOPAZ is a user friendly computer code for modeling the one-dimensional-transient physics of multi-species gas transfer in arbitrary arrangements of pipes, valves, vessels, and flow branches. This document presents a series of sample problems designed to aid potential users in creating TOPAZ input files. To the extent possible, sample problems were selected for which analytical solutions currently exist. TOPAZ comparisons with such solutions are intended to provide a measure of code validation. DOE

N86-24260# Illinois Univ., Urbana. Dept. of Computer Science.
COMPUTATIONAL METHODS AND SOFTWARE FOR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS Annual Report, 16 Nov. 1984 - 15 Nov. 1985
C. W. Gear 1985 12 p
(Contract DE-AC02-76ER-02383)
(DE86-002145; DOE/ER-02383/0110) Avail: NTIS HC A02/MF A01

This report summarizes the progress on the project over the last twelve months. Work has continued in two areas: numerical techniques for differential equations and software tools for scientific problem solving. Within these areas we have been working on the following: (1) Syntax-directed editors for mathematical software, (2) Polylith: a system for module interconnection, (3) mathematical expression input and editing, (4) a tool for examining fill-in in Gauss elimination, (5) a theoretical examination of fill-in, (6) a technique for determining the structural index of a differential-algebraic system, (7) invariant-conserving methods for differential equations, (9) iterative methods for stiff equations, (10) singular two-point boundary value problems, (11) initial value problems in Banach spaces, (12) computational error estimates for stiff ODEs, (13); multigrid solution of collocation equations, and (14) parallel techniques for ordinary differential equations. DOE

N86-24261# Rensselaer Polytechnic Inst., Troy, N.Y.
SOFTWARE SUMMARIES FOR COMPUTER-AIDED CONTROL SYSTEM DESIGN
D. K. Frederick, comp., C. J. Herget, comp., and F. McFarland, comp. Jun. 1985 29 p Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-002294; UCID-20556) Avail: NTIS HC A03/MF A01

This is a listing of brief summaries of computer-aided control system design software packages, as compiled by Professor Dean K. Frederick of Rensselaer Polytechnic Institute and Dr. Charles J. Herget and Fran McFarland of Lawrence Livermore National Laboratory. DOE

N86-24262# Los Alamos National Lab., N. Mex.
SOPHISTICATED GAMMA-RAY DATA ACQUISITION SYSTEM BASED ON AN IBM PC/XT COMPUTER
C. E. Moss 1985 6 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract W-7405-eng-36)

(DE86-002439; LA-UR-85-3755; CONF-851009-9) Avail: NTIS HC A02/MF A01

It is easy to assemble and program an automated gamma-ray data acquisition system consisting of an IBM PC/XT computer and several computer-controllable modules. Our system features pattern recognition to determine the energy calibration, automatic gain setting, automatic efficiency calibration, detector-positioner control, and source-changer control in addition to the more conventional operations. DOE

N86-24263# Oak Ridge National Lab., Tenn.
GRESS: GRADIENT-ENHANCED SOFTWARE SYSTEM. VERSION D, USER'S GUIDE
E. M. Oblow Jul. 1985 72 p
(Contract DE-AC05-84OR-21400)
(DE86-002906; ORNL/TM-9658) Avail: NTIS HC A04/MF A01

GRESS is a FORTRAN pre-compiler that enhances conventional FORTRAN programs with analytic differentiation of arithmetic statements. GRESS handles any standard FORTRAN code which contains arithmetic text material as part of the source program. The GRESS pre-compiler reads the FORTRAN source code text, redefines the variables and their storage locations, searches for arithmetic statements, translates the latter for gradient calculations, and then generates a new source program which now includes gradient capabilities in all arithmetic statements. GRESS therefore, allows any standard FORTRAN code to be upgraded to calculate any derivatives required, whether they be for internal use in a calculation (e.g., for iteration) or for external use (e.g., sensitivity studies). The independent variables with respect to which the partial derivatives are calculated in the FORTRAN source code may be freely selected, and the only theoretical restriction is that the sequence of computations must be continuous and differentiable. The gradients are calculated according to the chain rule of differential calculus and are propagated from operation to operation by the standard chain rule. Thus, no numerical difference scheme is involved and the results are as accurate as any arithmetic computations on the host computer. In this process, the analytic formulas representing the derivatives are neither generated explicitly nor saved. At any stage in the program execution, therefore, the only additional information available in the original code is the numerical value of the gradients. DOE

N86-24264# Los Alamos National Lab., N. Mex.
TOPS: A MULTIGROUP OPACITY CODE
J. Abdallah, Jr. and R. E. H. Clark Oct. 1985 14 p refs
(Contract W-7405-eng-36)
(DE86-003279; LA-10454) Avail: NTIS HC A02/MF A01

From T-4 Opacity Library Data, the TOPS code calculates multigroup opacities that can be written in a variety of formats for use in radiation transport codes. Arbitrary mixture of any elements for which OPLIB data exist is supported. Versions of the code exist for both the CRAY-1 and the CRAY X-MP. DOE

N86-24265# Sandia National Labs., Albuquerque, N. Mex.
LINEAR VISCOELASTIC MATERIAL MODE FOR SANCHO
L. S. Costin and C. M. Stone Oct. 1985 52 p
(Contract DE-AC04-76DP-00789)
(DE86-003190; SAND-85-1836) Avail: NTIS HC A04/MF A01

A linear viscoelastic material model has been written for the finite element computer code SANCHO. This material subroutine is capable of modeling linear materials which exhibit both bulk and shear relaxation. In addition, temperature-dependent material response is included in the model in a manner consistant with the theory of thermorheologically simple materials. Both fluid-like and solid-like behavior can be modeled. The formulation used in the subroutine can be applied to problems where both large strains and finite rotations occur. The results of several sample calculations are presented and compared with analytical solutions. DOE

N86-24266# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
PROGRAMMING STANDARD
F. S. Miyasaki Jun. 1985 61 p
(Contract DE-AC07-76ID-01570)
(DE86-003210; EGG-RST-6999) Avail: NTIS HC A04/MF A01

Standards are established for the design and coding of scientific computer programs by the Scientific Programming and Advanced Graphics of the Reactor Systems Technology Division of EG and G Idaho, Inc. Subjects covered include background, program design, style, traceability, defensive programming, portability, efficiency, program maintenance and program performance evaluation. DOE

N86-24267# Business and Technological Systems, Inc., Seabrook, Md.
MkD-DELIGHT Final Report
Aug. 1985 231 p
(Contract W-7405-eng-48)
(DE86-003364; UCRL-15729) Avail: NTIS HC A11/MF A01

This report is presented as documentation of the MkD MARV Accuracy Analysis Program, as installed in the DELIGHT system on the ICDC VAX 11/780 computer at LLNL. The INTRODUCTION is intended to provide a background and general description of the generic MkD model and program. The ANALYSIS MANUAL fleshes out the details and description of the model. Finally, the DELIGHT INTERFACE describes the relationship between the MkD model and the DELIGHT system and is essentially a user's manual. The program is intended to provide the user with the capacity to calculate MkD RV contributions to impact errors, and to propagate externally-supplied booster covariance matrices through the MkD trajectory to impact. In addition, these two groups of errors are combined statistically in the program to give their total contribution to the overall system error. DOE

N86-24268# Sandia National Labs., Albuquerque, N. Mex.
SANDIA TASK8: A SUBROUTINED ELECTRON MICROPROBE AUTOMATION SYSTEM
W. F. Chambers Nov. 1985 124 p
(Contract DE-AC04-76DP-00789)
(DE86-003791; SAND-85-2037) Avail: NTIS HC A06/MF A01

The TASK8 is a Flextran program designed to provide instrument control, data acquisition, and data reduction for electron microprobes and scanning electron microscopes equipped with up to seven wavelength-dispersive spectrometers and up to four stage motions (X, Y, Z, and rotation). Instrument control and data acquisition are achieved through a group of mnemonic commands which can be combined into storable subroutines to provide automatic control. The TASK8 also acts as a host program for specialized auxiliary routines which are automatically called as a particular command needs them. Through the use of this technique, it is possible to perform an entire quantitative analysis by issuing the command QUANT and answering the few questions which follow. The SANDIA TASK8 is a systems approach to microprobe automation. Since the majority of the code is in subroutines which are stored in virtual memory, its expansion capabilities are limited by the user's imagination rather than the memory of the machine. The program set currently encompasses TASK8, the master program with its subroutines for machine control and data collection and analysis; CONFIG8, a program for defining instrument operating conditions; and various quantitative analysis programs with their subroutines. Bence-Albee, ZAF, and phi(rhoZ) quantitative techniques are supported. Up to 50 oxides may be analyzed by Bence-Albee or 30 elements by the other techniques. Of special interest to geologists are the abilities to automatically perform end-member calculations and to perform a quantitative analysis by specifying its mineral code. The SANDIA TASK8 software system is used on Cameca MBX microprobes with 2, 3, and 4 spectrometers, on 3, 4, and 5-spectrometer JEOL-733's and on a 5-spectrometer ARL-SEMQ. DOE

N86-24269# Stanford Linear Accelerator Center, Calif.
IMPLEMENTATION AND OPERATING EXPERIENCE WITH A CENTRALIZED MULTI-DISCIPLINARY CAD CAM SYSTEM
R. S. Larsen and J. P. Steffani Sep. 1985 7 p Presented at the 4th DOE Workshop on Computer Aided Engineering, Upton, N.Y.,

10 Oct. 1985
(Contract DE-AC03-76SF-00515)
(DE86-003860; SU-SLAC-PUB-3793; CONF-851060-1) Avail: NTIS HC A02/MF A01

The Stanford Linear Accelerator Center (SLAC) has installed a centralized CAD CAM System to support Electronics, Mechanical, Mechanical Fabrication and Architectural Engineering and Design. The various phases of implementing this system are described, including problems of selection, system software support, maintenance, training, performance evaluation, and future expansion. Some emphasis will be given to the experience with the Electronics disciplines. DOE

N86-24270# Pacific Northwest Lab., Richland, Wash.
EVALUATION OF GRAPHICAL TECHNIQUES FOR DATA IN DIMENSIONS 3 TO 5: SCATTER PLOT MATRIX, GLYPH AND STEREO EXAMPLES
D. B. Carr and W. L. Nicholson 1985 8 p Presented at the American Statistical Association for Joint Statistical Meetings, Las Vegas, Nev., 5 Aug. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004021; PNL-SA-13252; CONF-8508115-7) Avail: NTIS HC A02/MF A01

Numerous methods are available for displaying data in dimensions three through five. While results concerning elementary perceptual tasks are applicable, they do not necessarily indicate the strengths and weaknesses of the display methods for higher-order tasks such as looking for functional form, density patterns (including symmetry and independence), outliners, and local dimensionality. This paper suggests that guidance concerning preferred display techniques can be developed. The approach suggested is the subjective evaluation of graphical techniques as applied to constructed data sets. Constructed data sets serve as informative reference examples, or counter examples, for evaluating the effectiveness of particular techniques. For illustration, several display techniques are applied to a mystery data set with the expressed goal of looking for functional form. Some techniques do not perform well for this example. DOE

N86-24271# Argonne National Lab., Ill.
IMPLEMENTING DENSE LINEAR ALGEBRA ALGORITHMS USING MULTITASKING ON THE CRAY X-MP-4 (OR APPROACHING THE GIGAFLOP)
J. J. Dongarra and T. Hewitt Aug. 1985 6 p
(Contract W-31-109-eng-38)
(DE86-004093; ANL/MCS-TM-55) Avail: NTIS HC A02/MF A01

This note describes some experiments on simple, dense linear algebra algorithms. These experiments show that the CRAY X-MP is capable of small-grain multitasking arising from standard implementations of LU and Cholesky decomposition. The implementation described here provides the fastest execution rate for LU decomposition, 718 MFLOPS for a matrix of order 1000. DOE

N86-24272# MATRA Espace, Toulouse (France). Systems Analysis and Simulations Group.
A CAD TOOL FOR LEO SPACECRAFT POWER SUBSYSTEM DESIGN (EBLOS UPGRADING) Final Report
B. Fieux Paris ESA Aug. 1985 134 p refs
(Contract ESA-5457/83-NL-PP(SC))
(MATRA-CMT-RS/101/RT/05.85; ESA-CR(P)-2131) Avail: NTIS HC A07/MF A01

The EBLOS software is upgraded to include an improved description and computation of the power profiles, taking into account eclipse conditions, relay visibility, geographical coverage, logical operation modes, and grouping of equipment units. The program also provides a visualization of the results on an Earthmap, a library of models, and postprocessing of the results of the simulation. A graphical description of the system architecture is given and a complete test case is presented. The size of the CAD tool is 42,000 lines of Fortran code. Author (ESA)

N86-24273# Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (West Germany).
GRAPHICAL AND NUMERICAL OPERATING METHOD (GNOM): PROCEDURE LIBRARY [GNOM: DIE GRAPHISCHE UND NUMERISCHE OPERATIONSMETHODE: PROZEDUR-BIBLIOTHEK]
31 Aug. 1985 202 p In GERMAN
(GSI-85-6; ISSN-0171-4546) Avail: NTIS HC A10/MF A01

The status of the GNOM subroutine library is presented. Graphical and preliminary defined objects procedures are explained. Editing and input-output procedures are given. General commands and special commands for programmers are outlined. Author (ESA)

N86-24274# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
SOFTWARE MAINTENANCE MANAGEMENT Final Report
J. A. McCall, M. A. Herdon, and W. M. Osborne Oct. 1985 71 p Prepared in cooperation with Science Applications, Inc., La Jolla, Calif.
(PB86-126745; NBS/SP-500/129; LC-85-600596) Avail: NTIS HC A04MF A01; also available SOD HC $2.75 as 003-003-02681-6 CSCL 09B

The report presents an overview of the various aspects of software maintenance, and provides an indepth analysis of the associated problems, giving particular attention to the most pressing ones. It identifies tools, techniques, and procedures which aid in reducing these problems. This report also provides detailed guidance for managing software maintenance as a separate organizational entity. It also provides assistance needed to develop and employ improved maintenance practices and procedures, that result in reduced software costs and which help to insure that quality software is developed for and by the Federal ADP community. Author (GRA)

N86-24275# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
CHARACTERISTICS AND FUNCTIONS OF SOFTWARE ENGINEERING ENVIRONMENTS Research Report, 1 Oct. 1984 - 19 Sep. 1985
R. C. Houghton and D. R. Wallace Sep. 1985 45 p Prepared in cooperation with Duke Univ., Durham, N.C.
(PB86-129749; NBSIR-85/3250) Avail: NTIS HC A03/MF A01 CSCL 09B

As part of the program to provide information to Federal agencies on software tools for improving quality and productivity in software development and tenance, data was collected on software engineering environments. Software engineering environments surround their users with software tools necessary for systematic development and maintenance of software. The purpose of this report is to characterize software engineering environments by type and by their relationship to the software life cycle and by their capabilities, limitations, primary users, and levels of support. This report provides examples of existing software engineering environments that are available commercially or in research laboratories with the features and characteristics they provide. GRA

N86-24514*# Oklahoma State Univ., Stillwater.
A TECHNIQUE FOR INCORPORATING THE NASA SPACELAB PAYLOAD DEDICATED EXPERIMENT PROCESSOR SOFTWARE INTO THE SIMULATION SYSTEM FOR THE PAYLOAD CREW TRAINING COMPLEX
Dale A. Bremmer *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 13 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

N86-24525*# Oakwood Coll., Huntsville, Ala. Dept. of Systems Software.
A STUDY OF THE VERY HIGH ORDER NATURAL USER LANGUAGE (WITH AI CAPABILITIES) FOR THE NASA SPACE STATION COMMON MODULE
Esther N. Gill *In* NASA. Marshall Space Flight Center Research

Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

N86-24533*# New Mexico State Univ., University Park. Dept. of Mathematical Sciences.
ANALYSIS OF HIGH-ORDER LANGUAGES FOR USE ON SPACE STATION APPLICATION SOFTWARE
Arthur Knoebel *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

N86-24536*# Alabama Univ., Birmingham. Dept. of Computer and Information Science.
MACHINE VISION AND THE OMV
Michael A. McAnulty *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 24 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N86-24276*# SoHaR, Inc., Los Angeles, Calif.
FAULT-TOLERANT SOFTWARE FOR THE FIMP Final Report
Herbert Hecht and Myron Hecht Mar. 1984 82 p refs
(Contract NAS1-15336)
(NASA-CR-166070; NAS 1.26:166070) Avail: NTIS HC A05/MF A01 CSCL 09B

The work reported here provides protection against software failures in the task dispatcher of the FTMP, a particularly critical portion of the system software. Faults in other system modules and application programs can be handled by similar techniques but are not covered in this effort. Goals of the work reported here are: (1) to develop provisions in the software design that will detect and mitigate software failures in the dispatcher portion of the FTMP Executive and, (2) to propose the implementation of specific software reliability measures in other parts of the system. Beyond the specific support to the FTMP project, the work reported here represents a considerable advance in the practical application of the recovery block methodology for fault tolerant software design. Author

N86-24277*# Carnegie-Mellon Univ., Pittsburgh, Pa.
FAULT-FREE VALIDATION OF A FAULT-TOLERANT MULTI-PROCESSOR: BASELINE EXPERIMENTS AND WORKOAD IMPLEMENTATION
Frank Feather, Daniel Siewiorek, and Zary Segall Apr. 1986 59 p refs
(Grant NAG1-190)
(NASA-CR-178075; NAS 1.26:178075) Avail: NTIS HC A04/MF A01 CSCL 09B

In the future, aircraft employing active control technology must use highly reliable multiprocessors in order to achieve flight safety. Such computers must be experimentally validated before they are deployed. This project outlines a methodology for doing fault-free validation of reliable multiprocessors. The methodology begins with baseline experiments, which test single phenomenon. As experiments progress, tools for performance testing are developed. This report presents the results of interrupt baseline experiments performed on the Fault-Tolerant Multiprocessor (FTMP) at NASA-Langley's AIRLAB. Interrupt-causing excepting conditions were tested, and several were found to have unimplemented interrupt handling software while one had an unimplemented interrupt vector. A synthetic workload model for realtime multiprocessors is then developed as an application level performance analysis tool. Details of the workload implementation and calibration are presented. Both the experimental methodology and the synthetic workload model are general enough to be applicable to reliable multi-processors besides FTMP. Author

N86-24278# Administrative Sciences Corp., Alexandria, Va.
RISK ASSESSMENT PREPROCESSOR (RAPP)
Colin Hammon, Joseph Augusta, and Susan Fitzgerald 1985 14 p Presented at the 19th Annual Dept. of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A161914) Avail: NTIS HC A02/MF A01 CSCL 09/2

The Navy's Office for Acquisition Research tasked Administrative Sciences Corporation to develop a management oriented procedure to simplify the selection of the most appropriate risk assessment technique(s) so that project managers will use them to improve management of their programs. Under this tasking the different techniques available for risk assessment were examined and it was concluded that network simulation is both cost effective and feasible for use in almost all acquisition programs. As a result of a critical review of the existing procedures and available software packages, it was concluded that front-end help in getting started was necessary - specifically, assistance in network creation and data preparation and input. The risk assessment preprocessor (RAPP) was created to provide this help. The RAPP is a computer-based procedure for simplifying the process of creating networks and preparing the data for use with a network simulator. RAPP is interactive, easy to use software which will help the user create a network of program activities and input distribution parameters. It does not actually do the risk assessment. The RAPP's output is a data file which is input to one of the several currently available network simulators. It is a tool that makes risk assessment using Monte Carlo simulation easier and less expensive because it reduces the need for senior analysts to structure the network and prepare the data file for input to a risk assessment package. The RAPP allows risk assessment to be used more easily as a tool for project management. GRA

N86-24279# Yale Univ., New Haven, Conn. Dept. of Chemistry.
DATA COMMUNICATION IN HYPERCUBES
Youcef Saad and Martin H. Schultz Oct. 1985 18 p
(Contract N00014-82-K-0184)
(AD-A161975; YALEU/DCS/RR-425) Avail: NTIS HC A02/MF A01 CSCL 12/1

Several algorithms are considered for exchanging data among processors in a hypercube network. The data transfer problems considered are those arising from classical numerical algorithms such as Gaussian elimination, conjugate gradient methods, and the N-body problem. We propose some estimates for the timings of the various algorithms which reveal that multiprocessors based on the hypercube topology can be very efficient in performing data exchange operations. GRA

N86-24280# Duke Univ., Durham, N. C. Dept. of Computer Science.
ASSOCIATIVE NETWORKS ON A MASSIVELY PARALLEL COMPUTER M.S. Thesis
Gary Jackoway Oct. 1985 84 p
(Grant AF-AFOSR-0205-83)
(AD-A162234; AFOSR-85-1050TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

A generalization of semantic networks, called an associative network is mapped onto a massively parallel processor which is currently under development. The results show: the time required to process a query is dependent strictly on the pattern of the query, not on the size of the classes being processed; the order of processing a query does not affect the speed; although we do not receive anywhere near an n-fold speedup by using n processors, we still receive significant performance benefits over a single processor; the associative network may be used not just as a semantic network, for example, it also allows some problems involving numerical minimizations to be solved efficiently. The primary result is that a large number of simple processors, each responsible for a small piece of information, can work in unison

to answer queries significantly faster than a single, highly complex processor can. GRA

N86-24281# Naval Postgraduate School, Monterey, Calif.
DESIGN OF USER FRIENDLY PROTOCOL TO EFFECT A TRANSPARENT INTERNETWORK TRANSACTION FACILITY THROUGH SPLICE (STOCK POINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT) AND THE DEFENSE DATA NETWORK M.S. Thesis
Stephen M. Carr Sep. 1985 144 p
(AD-A162263) Avail: NTIS HC A07/MF A01 CSCL 17/2

This thesis explores transparent internetwork connectivity requirements for SPLICE (Stock Point Logistics Integrated Communications Environment). SPLICE nodes shall be interconnected via the DDN (Defense Data Network) to form a wide area network supporting distributed processing. Implementation problems, short and long-term requirements for user terminal to server host transparent connectivity, electronic mail, and process to process internetworking connectivity are presented. Distributed processing through implementation of a DDS (Directory/Dictionary System) is explored. MILSTRIP requisition referral by Stock Points through distributed processing is presented. Implementation of Tandem Corporation's EXPAND/X.25 protocols versus DDN TCP/IP and higher level DDN protocols are discussed. Packet switching, the CCITT X.25 and X.75 protocol standards, and an overview of the DDN TCP/IP protocols are offered in the Appendices.
Author (GRA)

N86-24282# Aerospace Corp., El Segundo, Calif. Information Processing Div.
LOCAL AREA NETWORK IMPLEMENTATION PLAN
William E. Naylor, Stephen D. Crocker, and Andrew W. Sills 1 Nov. 1985 43 p
(Contract F04701-85-C-0086)
(AD-A162317; TR-0086(6920-03)-1; SD-TR-85-83) Avail: NTIS HC A03/MF A01 CSCL 17/2

In this document, a plan is described to deploy a local area network linking together several dispersed computing facilities within The Aerospace Corporation in order to promote the sharing of these internal resources and to provide access to the unique resources of the ARPANET. This plan has grown out of two independent efforts to meet particular communication requirements: (1) in support of VLSI research there is a need for the CAD VAX in D8 to communicate with the ISRO VAX in A2 and with the ARPANET; (2) a LABNET, linking together several existing laboratory computers and a new medium sized computer (called the Lab VAX), is required to satisfy the general resource sharing needs within the Laboratory Operations. The proposed local network meets these needs. The authors propose the use of two technologies for the implementation of this network. ProNET(a token passing ring using various media including fiber optic links) has been selected to provide interbuilding communication. This selection was made because of its relatively long range(2.5 km) and because hardware is available to use fiber optic cable as a medium. Ethernet(a contention bus using 50 ohm coaxial cable) has been selected as the intrabuilding network because of its reduced cost and wide vendor support. The introduction of ETHERNETS should be taken into account during the procurement of new computing equipment(minicomputers, personal computers, word processing systems, etc.). New devices which are compatible with or contain interfaces to ETHERNET can benefit from network services while others cannot. GRA

N86-24283# Los Alamos National Lab., N. Mex.
DATA ACQUISITION AND CONTROL USING ETHERNET
E. P. Elkins 1985 13 p refs Presented at the 2d International Workshop on Accelerator Control Systems, Los Alamos, N. Mex., 7 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002396; LA-UR-85-3583; CONF-8510194-4) Avail: NTIS HC A02/MF A01

A distributed computer control system has been developed to monitor and control a linear accelerator. This system consists of two PDP-11s and eight LSI 11/23s linked together with ETHERNET. The higher level systems (control consoles, etc.) use the RSX11M operating system, whereas the data acquisition and control is performed using the RSX11S operating system downline loaded from a central host computer. Locally written ETHERNET drivers are used to reduce the CPU overhead and therefore improve system response. The ETHERNET system permits remote file access by means of operator or program interaction, as well as supporting downline system loading. Control-system functions supported are supervisory control, closed-loop control, data monitoring, and data recording. DOE

N86-24284# Los Alamos National Lab., N. Mex.
32-BIT FASTBUS COMPUTER
J. M. Blossom, J. P. Hong, and R. G. Kellner 1985 4 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002437; LA-UR-85-3781; CONF-851009-10) Avail: NTIS HC A02/MF A01

Los Alamos National Laboratory is building a 32-bit FASTBUS computer using the NATIONAL SEMICONDUCTOR 32032 central processing unit (CPU) and containing 16 million bytes of memory. The board can act both as a FASTBUS master and as a FASTBUS slave. It contains a custom direct memory access (DMA) channel which can perform 80 million bytes per second block transfers across the FASTBUS. DOE

N86-24285# Lawrence Livermore National Lab., Calif.
PASSCAL FIELD DATA MANAGEMENT PLAN (PFDMP)
J. Scheimer, G. Pavlis, D. Blankenship, R. Phinney, S. Malone, B. Karsh, C. Johnson, and W. Prothero Aug. 1985 28 p
(Contract W-7405-eng-48)
(DE86-003192; UCID-20575) Avail: NTIS HC A03/MF A01

The PFDMP is the official planning document for PASSCAL in the area of field data management. It is to be revised and updated from time to time to reflect up-to-date status of the effort. This planning document is concerned less with hardware than with the functional requirements for the field computer systems. Given the rapid changes now happening in the technology of microcomputers and peripherals, it may be safety assumed that systems procured at diferent times will involve different vendors and have different capabilities, costs and specifications. A salient goal is to define the software and database environments with enough flexibility to allow these different models of field computers to function well in the overall data management environment.DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-24286 Rensselaer Polytechnic Inst., Troy, N.Y.
DIRECT ADAPTIVE CONTROL IN HILBERT SPACE Ph.D. Thesis
John Ting-Yung Wen 1985 184 p
Avail: Univ. Microfilms Order No. DA8528672

Though great advances have been reported in adaptive control for single-input/single-output (SISO) systems and some multi-input/multi-output (MIMO) systems a large amount of a priori structural information of the plant is needed for most of the methods proposed. This is unsatisfying because all physical systems have some unmodelled dynamics and structure and operate in noisy environment. In fact, in many high performance control system design, the distributed nature of the plant must be taken into account. These distributed parameter systems may be modelled by delayed differential equations, partial differential equations or integral equations. They must be analyzed in the appropriate infinite-dimensional state space. A particular approach, model reference adaptive control (MRAC) with command generator tracker

(CGT) concept, adopts a set of assumptions that are not system dimension dependent. In this thesis, the scheme is modified in order to make the transition of this theory from finite dimensions to the infinite-dimensional Hilbert Space mathematically rigorous. Dissert. Abstr.

N86-24287*# Martin Marietta Aerospace, Denver, Colo.
EVALUATION OF AUTOMATED DECISION MAKING METHODOLOGIES AND DEVELOPMENT OF AN INTEGRATED ROBOTIC SYSTEM SIMULATION: STUDY RESULTS
D. C. Haley, B. J. Almand, M. M. Thomas, L. D. Krauze, K. D. Gremban, J. C. Sanborn, J. H. Kelley, T. M. Depkovich, W. J. Wolfe, and T. Nguyen Mar. 1986 39 p refs
(Contract NAS1-16759)
(NASA-CR-178050; NAS 1.26:178050; MCR-85-665) Avail: NTIS HC A03/MF A01 CSCL 09B

The implementation of a generic computer simulation for manipulator systems (ROBSIM) is described. The program is written in FORTRAN, and allows the user to: (1) Interactively define a manipulator system consisting of multiple arms, load objects, targets, and an environment; (2) Request graphic display or replay of manipulator motion; (3) Investigate and simulate various control methods including manual force/torque and active compliance control; and (4) Perform kinematic analysis, requirements analysis, and response simulation of manipulamotion. Previous reports have described the algorithms and procedures for using ROBSIM. These reports are superseded and additional features which were added are described. They are: (1) The ability to define motion profiles and compute loads on a common base to which manipulator arms are attached; (2) Capability to accept data describing manipulator geometry from a Computer Aided Design data base using the Initial Graphics exchange Specification format; (3) A manipulator control algorithm derived from processing the TV image of known reference points on a target; and (4) A vocabulary of simple high level task commands which can be used to define task scenarios. Author

N86-24288# Office of Naval Research, London (England).
SUMMARY OF EUROPEAN FEEDBACK CONTROL RESEARCH
Charles J. Holland 19 Nov. 1985 16 p
(AD-A162107; ONRL-R-7-85) Avail: NTIS HC A02/MF A01 CSCL 14/2

Feedback control will continue to be an important research area in Europe as well as internationally. This is not only because of applications in traditional areas, ranging from (perhaps mundane) boiler and industrial control to missile guidance, but also because of newer applications areas in robotics and distributed systems such as flexible space structures. Increased performance requirements for US Navy weapons and vehicles will require improved, multivariable-control design analysis and synthesis techniques. Robustness techniques accommodating uncertainty based upon infinity and semiinfinite programming methodologies offer hope for meeting these increased performance requirements. Successful implementation of these theoretical ideas will require the development of reliable numerical algorithms and computer-aided design procedures that incorporate these algorithms. Research in these directions is active both in Europe and in the US. Research in control theory relates to the general area of control (and/or systems theory) and covers a wide range of topics. GRA

N86-24289# Brown Univ., Providence, R. I. Center for Dynamical Systems.
ASYMPTOTIC BEHAVIOR OF CONSTRAINED STOCHASTIC APPROXIMATIONS VIA THE THEORY OF LARGE DEVIATIONS Interim Technical Report
Paul Dupuis and Harold J. Kushner Jul. 1985 55 p
(Grant AF-AFOSR-0116-81)
(AD-A162156; LCDS-85-12; AFOSR-85-1053TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document describes a projected recursive (or stochastic approximation) algorithm which arises frequently in applications in control and communications theory. There is a sizeable literature concerning its asymptotic properties as epsilon approaching limit of o with epsilon sub n approaching limit of t or epsilon n approaching infinity. GRA

N86-24290# Naval Postgraduate School, Monterey, Calif.
AUTOMATED POLE PLACEMENT ALGORITHM FOR MULTIVARIABLE OPTIMAL CONTROL SYNTHESIS M.S. Thesis
Wah K. Chow Sep. 1985 171 p
(AD-A162269) Avail: NTIS HC A08/MF A01 CSCL 12/1

This thesis addresses the application of numerical optimization technique to the pole-placement problem in multivariable optimal control. An algorithm is developed to select a set of weighting matrix element such that the conventional transient response criteria are satisfied. General properties of the optimal system in terms of stability, robustness and relative weights between state and control variables were explored by applying the method to the design of two multivariable systems. Results indicated that this method provides good insight to the problem for the designer and is therefore a useful tool in multivariable control synthesis. Author (GRA)

N86-24291# Brown Univ., Providence, R. I. Center for Dynamical Systems.
NEARLY OPTIMAL STATE FEEDBACK CONTROLS FOR STOCHASTIC SYSTEMS WITH WIDEBAND NOISE DISTURBANCES Interim Report
Harold J. Kushner and W. Runggaldier Jul. 1985 42 p
(Contracts DAAG29-84-K-0082; N00014-83-K-0542; Grant AF-AFPSR-0116-81)
(AD-A162271; LCDS-85-23; AFOSR-85-1054TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Much of optimal stochastic control theory is concerned with diffusion models. Such models are often only idealizations (or limits in an appropriate sense) of the actual physical process, which might be driven by a wide bandwidth (not white) process or be a discrete parameter system with correlated driving noises. Optimal or nearly optimal controls, derived for the diffusion models, would not normally be useful or even of much interest, if they were not also nearly optimal for the physical system which the diffusion approximates. It turns out that, under quite broad conditions, the nearly optimal controls for the diffusions do have this desired robustness property and are nearly optimal for the physical (say wide band noise driven) process, even when compared to controls which can depend on all the (past) driving noise. The authors treat the problem over a finite time interval, as well as the average cost per unit time problem. Extensions to discrete parameter systems, and to systems stopped on first exit from a bounded domain are also discussed. Weak convergence methods provide the appropriate analytical tools. GRA

N86-24292# Stanford Univ., Calif. Dept. of Computer Science.
REVIEW OF SOWA'S CONCEPTUAL STRUCTURES
William J. Clancey Aug. 1985 24 p
(Contract N00014-85-K-0305)
(AD-A162312; SU-STAN-CS-85-1065; KSL-MEMO-85-31; TR-11) Avail: NTIS HC A02/MF A01 CSCL 05/8

Conceptual Structures is a bold, provocative synthesis of logic, linguistics, and artificial intelligence research. At the very least Sowa has provided a clean, well-grounded notation for knowledge representation that many researchers will want to emulate and build upon. At its best, Sowa's notation and proofs hint at what a future Principia Mathematica of knowledge and reasoning may look like. No other AI text achieves so much in breadth, style, and mathematical precision. This is a book that everyone in AI and cognitive science should know about, and that experienced researchers will profit from studying in some detail. Author (GRA)

N86-24293# Brown Univ., Providence, R. I. Div. of Engineering.
CONTROL AND IDENTIFICATION OF TIME VARYING SYSTEMS Final Technical Report, 1 Jul. 1982 - 29 Jun. 1985
Allan E. Pearson 22 Oct. 1985 12 p
(Grant AF-AFOSR-0230-82)
(AD-A162336; AFOSR-85-1086TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research is summarized on a finite dimensional approach to the feedback stabilization of state delayed control systems via the use of a reducing transformation. Research is described in the parameter identification of time lag systems using a variable projection functional to decouple the estimation of the delay parameters from the remaining system parameters. Research is also described in the use of Fourier based modulating functions for identifying linear, bilinear and polynomial input-output differential systems. GRA

N86-24294# Cornell Univ., Ithaca, N.Y.
NONLINEAR DYNAMICS AND CHAOTIC MOTIONS IN FEEDBACK CONTROLLED ELASTIC SYSTEMS Annual Report, 1 Dec. 1983 - 30 Nov. 1984
P. J. Holmes, F. C. Moon, and R. H. Rand Aug. 1985 29 p
(Grant AF-AFOSR-0051-84)
(AD-A162385; AFOSR-85-1087TR) Avail: NTIS
HC A03/MF A01 CSCL 12/1

Local and global bifurcation studies of nonlinear systems subject to linear and nonlinear feedback forces have been completed which have application to robotic devices or controlled elastic structures. Related to these studies has been the application of mathematical knot theory to trace certain bifurcation sequences for two-dimensional maps. This work has led to the conclusion that many other routes to chaos in dynamical systems exist besides period doubling when the map is two-dimensional. The use of computer algebra (MACSYMA) has been developed as a tool to study nonlinear systems. In one application the investigators explored a new control scheme for flexible space structures based on controlling the stiffness matrix. MACSYMA was used along with normal form theory to predict the stability properties of a stiffness controlled systems. Other studies using MACSYMA related to problems in robotic dynamics were also completed or started. Finally, experimental work was completed involving the application of mathematics to chaotic motion of flexible structures. GRA

N86-24295# SRI International Corp., Menlo Park, Calif.
KNOWLEDGE REPRESENTATION AND NATURAL-LANGUAGE SEMANTICS Final Report, 1 Jun. 1982 - 30 May 1985
Robert C. Moore Aug. 1985 349 p
(Contract F49620-82-K-0031)
(AD-A162389; AFOSR-85-1098TR) Avail: NTIS
HC A15/MF A01 CSCL 05/7

This report summarizes three years of research on a project to produce formalisms, suitable for manipulation by computer, for the representation of specific concepts that are important for natural-language semantics, and to give an independent account of the meaning of such representations using the tools of formal logic. Specific topics on which progress was made include: a logic that characterizes systems that represent and reason with information about their own beliefs, a formalism for the representation of information about the interdependence of knowledge and action, a semantical analysis of adverbial modifiers and event sentences, a formal model of belief based on deduction, additional results on the formal semantics of our logic for reasoning about one's own beliefs, a belief logic that makes weaker than usual assumptions about introspection, and a mathematically rigorous theory of plan synthesis. GRA

N86-24296# Yale Univ., New Haven, Conn. Dept. of Electrical Engineering.
A 4(n + 1)-DIMENSIONAL MODEL REFERENCE ADAPTIVE CONTROL FOR THE STABILIZATION OF ANY STRICTLY PROPER MINIMUM PHASE LINEAR SYSTEMS WITH RELATIVE DEGREE NOT EXCEEDING TWO AND DIMENSION NOT EXCEEDING n
A. S. Morse 10 Jun. 1985 8 p
(Grant AF-AFOSR-0242-84)
(AD-A162808; AFOSR-85-0959TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

In a recent paper it was shown that there are smooth, nonlinear, three-dimensional controllers, not incorporating probing signals, which are capable of adaptively stabilizing any single-input, single-output, minimum phase, relative degree two or less linear system of any dimension. Controllers of this type are based on minimal dynamic compensator synthesis. While such controllers are simple in structure they do not have a model-following capability. In this paper we develop a new algorithm based on observer theory, which can adaptively stabilize and achieve model-following as well. The controller, which is a smooth nonlinear dynamical system of dimension $4(n+1)$, can adaptively stabilize any physical process with scalar input u and scalar output y, provided the process can be modelled by a strictly-proper, minimum phase, linear system of dimension not exceeding n and relative degree not exceeding two. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-24297*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONVERGENCE OF SPECTRAL METHODS FOR HYPERBOLIC INITIAL-BOUNDARY VALUE SYSTEMS Final Report
David Gottlieb (Tel-Aviv Univ., Israel), Liviu Lustman, and Eitan Tadmor (Tel-Aviv Univ., Israel) Jan. 1986 16 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107; Grants AF-AFOSR-0303-85; NSF DMS-85-03294; DAAG29-85-K-0190) (NASA-CR-178063; ICASE-86-8; NAS 1.26:178063) Avail: NTIS
HC A02/MF A01 CSCL 12A

A convergence proof for spectral approximations is presented for hyperbolic systems with initial and boundary conditions. The Chebyshev collocation is treated in detail, but the final result is readily applicable to other spectral methods, such as Legendre collocation or tau-methods. Author

N86-24298# SACLANT ASW Research Center, La Spezia (Italy). Spezia (Italy).
FAST FOURIER TRANSFORMATION ALGORITHMS: EXPERIMENTS WITH MICROCOMPUTERS
Brian W. Conolly and Ole F. Hastrup 16 Sep. 1985 15 p
(AD-A161915; SACLANTCEN-SM-182) Avail: NTIS
HC A02/MF A01 CSCL 09/2

Experiments intended to exploit the potential of modern microcomputers for harmonic analysis are described. The findings are a contribution to the discussion of how far modern microcomputers can complement, compete with, and, in certain circumstances, substitute for the mainframe. Harmonic analysis is fundamental to signal processing which, in turn, has many applications both in civilian and military contexts. The publication of so-called Fast Fourier Transform algorithms revolutionised digital analysis: results which previously required many hours of computation could be obtained in minutes. Microcomputers can not yet compete with mainframes in terms of speed but they do have the important advantages of portability and lower cost. Experience shows that equipment exists which combines the advantages of speed and an accuracy adequate for contaminated data, with portability, availability, and versatility that are characteristic of the microcomputer. GRA

N86-24299# Yale Univ., New Haven, Conn. Dept. of Chemistry.
DEFLATED LANCZOS PROCEDURES FOR SOLVING NEARLY SINGULAR SYSTEMS
Tony F. Chan and Youcef Saad Oct. 1985 22 p
(Contracts N00014-82-K-0184; DE-AC02-81-ER10996)
(AD-A161971; YALEU/DCS/RR-403) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The solution of the linear sytem $Ax = b$, where A is nearly singular is considered. The solution x can be uniquely decomposed into two parts: a generally large component in the direction of the approximate null space of A, and a part that is orthogonal to it. In

many applications, it is desirable to compute this deflated decomposition in a stable and efficient manner. An iterative algorithm based on the Lanczos process is proposed for the case where A is symmetric. The method requires access to A only in the form of a matrix-vector product Av and is efficient for large problems. No a priori knowledge of the approximate null space is needed. Author (GRA)

N86-24300# Yale Univ., New Haven, Conn. Dept. of Chemistry.
COMPLEX SHIFT AND INVERT STRATEGIES FOR REAL MATRICES
Beresford N. Parlett and Youcef Saad Oct. 1985 19 p
(Contracts N00014-76-C-0013; DE-AC02-81ER10996)
(AD-A161974; YALEU/DCS/RR-424) Avail: NTIS HC A02/MF A01 CSCL 12/1

When using an iterative method for solving a generalized nonsymmetric eigenvalue problem of the form Fu = lambda Mu, where f and M are real matrices, it is often desirable to work with the shifted and inverted operator B = (K -A-M) to the minus first power M in order to enhance the eigenvalue separation and improve efficiency. Unfortunately, the shift sigma is generally complex and so is the matrix B. The question then is whether it is possible to avoid complex arithmetic while preserving the advantages of bandedness of the pair (F,M). For the classical problem where M = I and F is banded, complex arithmetic can be avoided by using double shifts, i.e., by working with the real matrix BB whose bandwidth is double that of F. This satisfactory solution extends to the case where M is diagonal as well. In the generalized case the answer to the above question is negative, in the sense that complex arithmetic can be avoided only at the expense of losing the advantage of bandedness. One solution is to factor the shifted matrix F - sigma M in complex arithmetic but employ real arithmetic subsequently in the iterative procedure. Author (GRA)

N86-24301# Yale Univ., New Haven, Conn. Dept. of Computer Science.
STABILITY ANALYSIS OF DIFFERENCE SCHEMES FOR VARIABLE COEFFICIENT SCHRODINGER TYPE EQUATIONS
Tony F. Chan and Longjun Shen Sep. 1985 19 p
(Contracts N00014-82-K-0814; DE-AC02-81ER10996)
(AD-A161989; YALEU/DCS/RR-413) Avail: NTIS HC A02/MF A01 CSCL 12/1

The stability of difference schemes for the solution of the initial boundary value problem for equation where u, A, B, c and f are complex valued functions is considered. Using energy methods, the stability of a general two level scheme which includes Euler's method, Crank-Nicolson's method and the backward Euler method is established. If the coefficient A(x,t) is purely imaginary, the explicit Euler's method is unconditionally unstable. For this case, propose a new scheme is proposed with appropriately chosen artificial dissipation, which is proven to be conditionally stable. GRA

N86-24302# Yale Univ., New Haven, Conn. Dept. of Computer Science.
A DOMAIN-DECOMPOSED FAST POISSON SOLVER ON A RECTANGLE
Tony F. Chan and Diana C. Resasco Aug. 1985 15 p
(Contracts N00014-82-K-0184; DE-AC02-81ER10996)
(AD-A162007; YALEU/DCS/RR-409) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document presents a new domain decomposed fast Poisson solver on a rectangle divided into parallel strips or boxes. The method first performs uncoupled fast solves on each subdomain, and then the interface variables are computed exactly by fast Fourier transform, without computing or inverting the capacitance matrix explicitly. Finally, the solution on the interior of the subdomains can be computed by one more fast solve on each subdomain. This method, as opposed to others, does not involve any iteration in the solution of the system for the interface variables. It is especially suited for parallel implementation, since the independent problems in the subdomains can be solved in parallel, and the communication involves the interface variables only. Author (GRA)

N86-24303# Naval Postgraduate School, Monterey, Calif.
ALGORITHMS AND HEURISTICS FOR TIME-WINDOW-CONSTRAINED TRAVELING SALESMAN PROBLEMS M.S. Thesis
Bock J. Chun and Sang H. Lee Sep. 1985 104 p
(AD-A162118) Avail: NTIS HC A06/MF A01 CSCL 12/1

This thesis reports on methods for solving traveling salesman problems with time-window constraints. Two types of windows are considered: hard time windows, which are inviolable, and soft time windows, which are violable at a cost. For both cases, we develop several heuristic procedures, including some that are based on Stewart's effective heuristics for the traveling salesman problem without time-window constraints. In addition, we develop exact algorithms for each case, which are based on the state-space relaxation dynamic programming method of Christofides, Mingozzi, and Toth. Computational experience is reported for all the heuristics and algorithms we develop. GRA

N86-24304# Massachusetts Univ., Amherst. Dept. of Mathematics and Statistics.
A BIRTH AND DEATH PROCESS APPROXIMATION FOR THE SLOTTED ALOHA ALGORITHM Technical Report
W. Rising and W. Rosenkrantz Aug. 1985 16 p
(Grant AF-AFOSR-0167-82)
(AD-A162153; AFOSR-85-1048TR) Avail: NTIS MF A01 CSCL 12/1

Many authors have concerned themselves with the bistable behavior of the finite-user slotted ALOHA protocol under heaving loading. Recently Nelson used a catastrophe-theoretic approach to demonstrate that under a fluctuating load the protocol suffers hysteresis as well as bistability. He uses results from catastrophe theory to give a possible improved control algorithm. Central to Nelson's approach is a diffusion approximation of the queue of backlogged users. This approximation has the advantage of yielding a continuing probability density for the process, thus allowing the use of (stochastic) catastrophe theory. Unfortunately, as will be seen later, the approximation requires difficult numerical integration and yields no closed form solution. It is being proposed here that the process should remain discrete, and that it can be approximated reasonably well as a birth-death process. This allows rapid computation of the approximate stationary distribution. GRA

N86-24305# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
AN INEQUALITY CONCERNING THE DEVIATION BETWEEN THEORETICAL AND EMPIRICAL DISTRIBUTIONS Technical Report
Lin-Cheng Zhao Aug. 1985 17 p
(Contract F49620-85-C-0008)
(AD-A162169; TR-85-30; AFOSR-85-0978TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper the author established an inequality concerning the uniform deviation between theoretical and empirical distributions. An application in strong convergence of nearest neighbor density estimate is also discussed. Author (GRA)

N86-24306# State Univ. of New York, Stony Brook. Dept. of Applied Mathematics and Statistics.
CONTINUUM STRUCTURE FUNCTIONS Annual Report, 23 Jul. 1984 - 22 Jul. 1985
Laurence A. Baxter 30 Sep. 1985 17 p
(Grant AF-AFOSR-0243-84)
(AD-A162353; AFOSR-85-1095TR; AR-1) Avail: NTIS HC A02/MF A01 CSCL 12/1

A continuum structure function is a nondecreasing mapping from the unit hypercube to the unit interval. The theory of such functions generalizes the traditional theory of binary and multistate structure functions, permitting more realistic and flexible modelling of systems subject to reliability growth, component degradation and partial availability. During the first year of work or this topic,

the PI has developed a theory of modules (i.e., subsystems), calculated various sets of bounds on the distribution of the structure function when the component states are random variables, deduced axiomatic characterizations of two important special cases and derived a definition of the reliability importance of the various components. Author (GRA)

N86-24307# Brown Univ., Providence, R. I. Center for Dynamical Systems.
HETEROCLINIC ORBITS FOR RETARDED FUNCTIONAL DIFFERENTIAL EQUATIONS
Jack K. Hale and X. B. Lin Dec. 1984 51 p
(Contract DAAG29-83-K-0029; Grants AF-AFOSR-0376-84; NSF DMS-82-05355)
(AD-A162374; LCDS-84-39; AFOSR-85-1018TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

The purpose of this paper is to determine conditions for the occurrence of a heteroclinic orbit gamma function sub micron in a neighborhood of this function for micron in a neighborhood of zero. The authors also want to specify these conditions in terms of computable quantities which can be used to determine either the transversality or the order of nontransversality of the heteroclinic orbit. GRA

N86-24308# Iowa State Univ. of Science and Technology, Ames. Dept. of Mathematics.
NUMERICAL SOLUTION OF ILL POSED PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS Annual Technical Report, 1 Oct. 1984 - 30 Sep. 1985
Howard A. Levine Nov. 1985 12 p
(Grant AF-AFOSR-0252-84)
(AD-A162378; AFOSR-85-1094TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research was undertaken on questions concerning the existence, uniqueness, continuous data dependence and numerical computations of solutions of various ill posed problems in partial differential equations. It was shown that a potential well theory is possible for certain hyperbolic problems in which a nonlinear boundary condition is prescribed and not possible in certain cases when the forcing term in the differential equation is singular. Several papers were accepted or submitted during this period. Examples of titles are: Inequalities between Dirichlet and Neumann eigenvalues, and A potential well theory for the heat equation with a nonlinear boundary condition. Author (GRA)

N86-24309# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
AN ALGEBRAIC APPROACH TO TIME SCALE ANALYSIS AND CONTROL Ph.D. Thesis
Xi-Cheng Lou Oct. 1985 225 p
(Contract DAAG29-84-K-0005; Grant AF-AFOSR-0258-82)
(AD-A162806; LIDS-TH-1505; AFOSR-85-1129TR) Avail: NTIS HC A10/MF A01 CSCL 12/1

An algebraic approach is developed for multiple time scale decomposition of a linear system using the Smith structure of the system matrix viewed as the matrix of functions of a small parameter c. This derivation makes clear that both the necessary and sufficient multiple semi-stability (MSST) condition, which ensures well-defined multiple time scale behavior and the time-scale-decomposed system structure which approximates the original system are closely related to the so-called Schur complements of a certain matrix. Furthermore, this decomposition has been extended to a larger class of systems, satisfying the so-called multiple semi-simple nullstructure (MSSNS) condition. The algebraic approach is also applied to examine the questions of the feedback control of the linear systems. Specifically this document presents results on time scale modifications by state feedback. GRA

N86-24310# South Carolina Univ., Columbia. Dept. of Mathematics and Statistics.
SOME CONVERGENCE RESULTS FOR KERNEL-TYPE QUANTILE ESTIMATORS UNDER CENSORING
Y. L. Lio and W. J. Padgett Nov. 1985 18 p
(Contract MIPR-ARO-139-85; Grant AF-AFOSR-0156-84)
(AD-A162837; TR-108; AFOSR-85-1122TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Based on right-censored data from a lifetime distribution, a kernel-type estimator of a certain quantile function is studied. This estimator is smoother than a product-limit quantile function. This document also covers: asymptotic normality; asymptotic mean equivalence; and mean square convergence. GRA

N86-24311# California Univ., San Diego. Inst. for Cognitive Science.
STRUCTURAL UNDERSTANDING IN PROBLEM SOLVING. SPECIFYING AND INSTRUCTING COGNITIVE OBJECTIVES IN BASIC ELECTRICITY Progress Report,
Mary S. Riley 30 Aug. 1985 10 p
(Contract N00014-84-K-0579)
(AD-A162845; PR-1) Avail: NTIS HC A02/MF A01 CSCL 05/10

A common instructional objective in domains of math and science is the capability to use formulas and arithmetic procedures to solve problems. Although students are explicitly taught the relevant formulas and principles, are shown worked-out examples, and are given practice, they frequently experience considerable difficulty when asked to solve similar problems. Previous research suggested that difficulties often result from mechanical application of rules and formulas with little understanding of important structural relations between the elements in the problem domain. The objective of this research is to analyze in greater detail what is meant by structural understanding within the domain of basic electricity, the role this understanding plays in performance and learning, and the extent to which important structural relations can be taught more directly. Research has involved: (1) empirical studies of the knowledge students acquire (and fail to acquire) both from the Navy's Basic Electricity and Electronics (BE&E) course material and from alternative instructional materials and (2) theoretical analyses in the form of computer simulation models that represent detailed hypotheses about the knowledge underlying student's performance and learning. GRA

N86-24312# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ON A JOINT STRONG APPROXIMATION THEOREM FOR RECORD AND INTER-RECORD TIMES
Dietmar Pfeifer Oct. 1985 15 p
(Contract F49620-85-C-0144)
(AD-A162868; TR-120; AFOSR-85-1180TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report presents a simple joint strong approximation for the logarithms of record and inter-record times from an exchangeable sequence, including an exact estimation for the rate of convergence in terms of upper and lower class functions of a Wiener process. The approach chosen here allows for simple proofs of exact and asymptotic (joint) results for record and inter-record times, such as the Law of Large Numbers, Central Limit Theorem and Law of the Interated Logarithm, and others. Author (GRA)

N86-24313# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mathematical Sciences.
NON-LINEAR SYSTEMS IN INFINITE DIMENSIONAL STATE SPACES Final Report, 15 Jun. 1981 - 14 Sep. 1985
M. Slemrod Oct. 1985 9 p
(Grant AF-AFOSR-0172-81)
(AD-A162869; AFOSR-85-1121TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

During the period covered by this grant the principal investigator wrote 17 papers. The titles of which include: Scanning Control of a Vibrating String, Dynamic Phase Transitions in a Van Der Waals Fluid, The Viscosity-capillarity Admissibility for Shocks and Phase Transitions, Lax-Friedrichs and the Viscosity-capilarity Criteria and Temporal and Spatial Chaos in a Van der Waals Fluid due to Periodic Thermal Fluctuations. GRA

N86-24314# Florida State Univ., Tallahassee. Dept. of Statistics.
PEAKEDNESS OF WEIGHTED AVERAGES OF JOINTLY DISTRIBUTED RANDOM VARIABLES
Wai Chan, Dong Ho Park, and Frank Proschan Oct. 1985 10 p
Prepared in cooperation with Nebraska Univ., Lincoln and Ohio State Univ., Columbus
(Contract F49620-82-K-0007)
(AD-A162876; FSU-STATISTICS-M712; TR-85-184; AFOSR-85-1123TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This note extends the Proschan (1965) result on peakedness comparison for a convex combination of i.i.d. random variables from a PF sub 2 density. Now the underlying random variables are jointly distributed from a Schur-concave density. The result permits a more refined description of convergence in the Law of Large Numbers. Author (GRA)

N86-24315# Washington Univ., Seattle. Dept. of Psychology.
THE DESIGN OF BALLANTINES
Earl Hunt 15 Aug. 1985 26 p
(Contract N00014-84-K-5553)
(AD-A162889; TR-8) Avail: NTIS HC A03/MF A01 CSCL 12/1

The widespread availability of computational graphics for personal computers has greatly increased the potential for visual displays of data. The display of pairwise correlations between two and three variables is of special interest to psychologists. To motivate the subsequent development, consider a case that arose in our own laboratory. College students participated in three tasks, an auditory dichotic listening task, a visual scanning task, and an arithmetic task. Our interest was in the extent to which variance was shared between pairs of tasks, with some portion of the variance in the third task held constant. Part and partial correlations may be used to express the statistical relations. However this method of summarization was not appropriate for verbal presentations of our results, especially to audiences who were not familiar with advanced methods of correlational analysis. An alternative to the statistical summary is to use a visual display, in which the variance of each variable is represented by a circle. Shared variance is represented by the overlap between two circles. If three variables are represented the resulting figure is called a ballantine. The ballantine is a useful display of shared and unique variance because each component of variance can be identified visually in the geometric form. GRA

N86-24316# Yale Univ., New Haven, Conn. Dept. of Computer Science.
ANALYSIS OF PRECONDITIONERS FOR DOMAIN DECOMPOSITION
Tony F. Chan Aug. 1985 13 p
(Contract DE-AC02-81ER10996)
(AD-A162925; YALEU/DCS/RR-408) Avail: NTIS HC A02/MF A01 CSCL 09/2

Domain decomposition is a class of techniques that is designed to solve elliptic problems on irregular domains and on multiprocessor systems. Typically, a domain is decomposed into many smaller regular subdomains and the capacitance system governing the interface unknowns is solved by some version of the preconditioned conjugate gradient method. In this paper, we show that for a simple model problem -Poisson's equation on a rectangle decomposed into two smaller rectangles -- the capacitance system can be inverted exactly by fast Fourier transform. No iteration is needed. An exact eigen-decomposition of the capacitance matrix also makes possible a comparison of various preconditioners that have been proposed in the literature. For example, we show that in the limit as the aspect ratio of the two rectangles tend to infinity, the preconditioner proposed by Golub-Mayers becomes exact, but the one proposed by Dryja does not. Both preconditioners, however, are poor when the aspect ratio is small. Author (GRA)

N86-24317# Stanford Univ., Calif. Center for Large Scale Scientific Computation.
ON DOMAIN DECOMPOSITION
Christopher R. Anderson Oct. 1985 45 p
(Contract N00014-82-K-0335; Grant NSF MCS-83-11685)
(AD-A162933; CLASSIC-85-09) Avail: NTIS HC A03/MF A01 CSCL 12/1

This report discusses aspects of the method of domain decomposition for the solution of elliptic boundary value problems in two dimensions. The basic idea behind the technique is to piece together local solutions of the elliptic problem to form a global solution. There are several reasons for wanting to use such a procedure. The first is that a given domain may be irregular, but can be subdivided into regular pieces for which solutions are computationally efficient to obtain. Another reason is that the method may be suitable for solving elliptic problems on multiple processor machines. If, for example, one breaks up the domain into many small pieces and allocates a processor to each piece, then there is the possibility of decreasing the computational time by constructing the local solutions in parallel and gluing them together. The purpose of this report is to examine model problems with the intention of providing motivation and insight concerning results previously presented as well as offer some new observations that may aid in the implementation of the method. GRA

N86-24318# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
A MARTINGALE CHARACTERIZATION OF MIXED POISSON PROCESSES Technical Report, 1 Sep. 1985 - 31 Aug. 1986
Dietmar Pfeifer Oct. 1985 11 p
(Contract F49620-85-C-0144)
(AD-A162957; TR-119; AFOSR-85-1177TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is shown that an elementary pure birth process is a mixed Poisson process if the sequence of post-jump intensities forms a martingale with respect to the delta-fields generated by the jump times of the process. In this case, the post-jump intensities converge a.s. to the mixing random variable of the process. Author (GRA)

N86-24319# Stanford Univ., Calif. Lab. for Computational Statistics.
NONPARAMETRIC LIKELIHOOD RATIO INTERVALS
Art Owen Nov. 1985 18 p
(Contract N00014-83-K-0472)
(AD-A162978; LCS-TR-6) Avail: NTIS HC A02/MF A01 CSCL 12/1

This article discusses the well-known nonparametric maximum likelihood estimate of a distribution function F sub 0 and explores interval estimation where R is a nonparametric likelihood ratio function for distributions. GRA

N86-24320# Rhode Island Univ., Kingston. Dept. of Electrical Engineering.
SIMPLE, EFFECTIVE COMPUTATION OF PRINCIPAL EIGENVECTORS AND THEIR EIGENVALUES AND APPLICATION TO HIGH-RESOLUTION ESTIMATION OF FREQUENCIES Final Report, Oct. 1984 - Oct. 1985
Donald W. Tufts and Costas D. Melissinos Oct. 1985 36 p
(Contracts N00014-83-K-0664; N00014-84-K-0445; Grant NSF ECS-84-08997)
(AD-A163107) Avail: NTIS HC A03/MF A01 CSCL 12/1

The results of an investigation of the Prony-Lancozos (P-L) method 14,38 and the power method 39 for simple computation of approximations to a few eigenvectors and eigenvalues of a Hermitian matrix are presented. The realization of high-resolution signal processing in an integrated circuit is anticipated. The computational speeds of the above methods are analyzed. They are completely dependent on the speed of a matrix-vector product operation. If only a few eigenvalues or eigenvectors are needed, the suggested methods can substitute for the slower methods of the LINPACK or EISPACK subroutine libraries. The accuracies of the suggested methods are evaluated using matrices formed from simulated data consisting of two sinusoids plus gaussian noise. Comparisons are made with the corresponding eigenvalues and eigenvectors obtained using LINPACK. Also the accuracies of

frequency estimates obtained from the eigenvectors are compared. GRA

N86-24321# Massachusetts Inst. of Tech., Cambridge. Lab. of computer Science.
A GENERALIZED APPROACH TO EQUATIONAL UNIFICATION M.S. Thesis
Katherine A. Yelick Aug. 1985 105 p
(Contract N00014-83-K-0125)
(AD-A163112; MIT/LCS/TR-344) Avail: NTIS HC A06/MF A01 CSCL 12/1

Given a set of equational axioms and two terms containing function symbols and variables, the equational unification problem is to find a uniform replacement of terms for the variables that makes the terms provably equal from the axioms. In the general case, the two terms may contain symbols not appearing in the axioms, there may be more than one instance of a set of axioms, and there may be more than one set of axioms. This thesis presents a method for combining equational algorithms to handle the terms with mixed sets of function symbols. For example, given one algorithm for unifying associative-cummutative operators, and another for unifying commutative operators, the author's algorithm provides a method for unifying terms containing both kinds of operators. It is based on a general strategy for decomposing terms and combining unifiers. Attention is restricted to set of axioms whose function symbols are pairwise disjoint. GRA

N86-24322# Brookhaven National Lab., Upton, N. Y.
PRECONDITIONED ITERATIVE METHODS APPLIED TO SINGULARLY PERTURBED ELLIPTIC BOUNDARY VALUE PROBLEMS
C. I. Goldstein 1985 63 p
(Contract DE-AC02-76CH-00016)
(DE86-003125; BNL-51916) Avail: NTIS HC A04/MF A01

A class of multigrid preconditioners is developed, analyzed, and tested in connection with the iterative solution of multidimensional boundary value problems for which the magnitude of the coefficients of the lower order terms are large compared to the coefficients of the highest order terms. In particular, this occurs in connection with singularly perturbed elliptic boundary value problems, where the coefficients are characterized by a parameter, epsilon, that varies over a specified parameter range. Conjugate gradient type iterative methods are applied to the large, sparse system of linear equations arising from a finite element or finite difference discretization. It is proved for variable coefficient partial differential operators that the condition number of the preconditioned matrix is uniformly bounded for all epsilon, provided the number of grid levels in a partial multigrid cycle is suitably chosen as a function of epsilon. The multigrid cycle is applied to the five-point scheme for the Dirichlet problem, even when more complicated differential operators and higher order discretizations are considered. This preconditioner is well suited for implementation on vector and parallel computers. DOE

N86-24323# Argonne National Lab., Ill.
PROJECTED NEWTON METHOD FOR l/SUB p/ NORM LOCATION PROBLEMS
P. H. Calamai and A. R. Conn Aug. 1985 37 p refs
(Contract W-31-109-eng-38)
(DE86-003165; ANL/MCS-TM-56) Avail: NTIS HC A03/MF A01

This paper is concerned with the numerical solution of continuous minisum multifacility location problems involving the l sub p norm, where $1 < p <$ infinity. This class of problems is potentially difficult to solve because the objective function is not everywhere differentiable. After developing conditions that characterize the minimum of the problems under consideration, a second-order algorithm is presented. This algorithm is based on the solution of a finite sequence of linearly constrained subproblems. Descent directions for these subproblems are obtained by projecting the Newton direction onto the corresponding constraint manifold. Univariate minimization is achieved via a specialized linesearch which recognizes the possibility of first derivative discontinuity (and second derivative unboundedness) at points along the search direction. The algorithm, motivated by Calamai and Conn and related to methods recently described by Overton and Dax, is shown to possess both global and quadratic convergence properties. Degeneracy can complicate the numerical solution of the subproblems. This degeneracy is identified, and a method for handling this degeneracy is outlined. An implementation of the algorithm, that exploits the intrinsic structure of the location problem formulation, is then described along with a discussion of numerical results. DOE

N86-24324# Sandia National Labs., Albuquerque, N. Mex.
MONITORING STABILITY WHEN SOLVING ODEs NUMERICALLY
L. F. Shampine Nov. 1985 15 p refs
(Contract DE-AC04-76DP-00789)
(DE86-003796; SAND-85-2297) Avail: NTIS HC A02/MF A01

A simple and inexpensive way to monitor the stability of the common numerical schemes for the solution of the initial value problem for a system of ordinary differential equations (ODEs) is proposed. An important application to the solution of stiff problems by extrapolation of a semi-implicit midpoint rule is made. DOE

N86-24325# Argonne National Lab., Ill.
COMMENTS ON THE SOLUTION OF SPARSE LINEAR EQUATIONS
I. S. Duff Sep. 1985 18 p
(Contract W-31-109-eng-38)
(DE86-003984; ANL/MCS-TM-58) Avail: NTIS HC A02/MF A01

We consider primarily direct methods for the solution of sparse linear equations. We first illustrate the wide range of sparse matrix types that arise in different application areas. It is clear that methods taking advantage of a particular structure should do better than a general technique designed for all classes of sparse matrices. We comment on this both philosophically and empirically. We discuss the techniques used in general solution schemes and those used in particular applications - for example, the solution of equations resulting from discretizations of partial differential equations. We also consider the use of direct methods as a preconditioning to iterative methods for solution. We look at work in combinatorial algorithms that relates to the solution of sparse equations and comment on some of the open problems in this and other areas. Throughout we comment on available software and the relative performance of the methods as implemented in those software packages. DOE

N86-24530*# Alabama Univ., Tuscaloosa. Dept. of Mathematics.
A METHOD FOR LINEARIZING A NONLINEAR SYSTEM WITH SIX STATE VARIABLES AND THREE CONTROL VARIABLES
Wei-Shen Hsia *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p ref (For primary dbcument see N86-24507 14-80) Avail: NTIS HC A99/MF E04 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-24326# Naval Research Lab., Washington, D. C.
INDEPENDENCE AND BAYESIAN UPDATING METHODS
R. W. Johnson 6 Nov. 1985 8 p
(AD-A161863; NRL-MR-5689) Avail: NTIS HC A02/MF A01 CSCL 12/1

Duda, Hart, and Nilsson have set forth a method for rule-based inference systems to use in updating the probabilities of hypotheses on the basis of multiple items of new evidence. Pednault, Zucker, and Muresan claimed to give conditions under which independence assumptions made by Duda et al, preclude updating - that is, prevent the evidence from altering the probabilities of the hypotheses. Glymour refutes Pednault et al.'s claim with a counterexample of a rather special form (one item of

evidence is incompatible with all but one of the hypotheses); he raises, but leaves open, the question whether their result would be true with an added assumption to rule out such special cases. We show that their result does not hold even with the added assumption, but that it can nevertheless be largely salvaged. Namely, under the conditions assumed by Pednault et al., at most one of the items of evidence can alter the probability of any given hypothesis; thus, although updating is possible, multiple updating for any of the hypotheses is precluded. GRA

N86-24327# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia).
A LEAST SQUARES ALGORITHM FOR FITTING PIECEWISE LINEAR FUNCTIONS ON FIXED DOMAINS
B. A. Trenholm Sep. 1985 41 p In ENGLISH; Abstract in FRENCH
(AD-A161870; DREA-TM-85/215) Avail: NTIS HC A03/MF A01 CSCL 12/1

A least squared error algorithm is presented for fitting a piecewise linear function to observed data, when the slope of the function is allowed to change only at specified points. The algorithm can be used to estimate piecewise linear trends in data, where the locations of possible changes in trend are known. Furthermore, it can be used to reduce large quantities of data to manageable sizes. In addition, the algorithm is robust to problems of data dropout provided it is used cautiously. An example of a possible application is the fitting of a linear segment bathythermal profile (temperature vs depth) to a large quantity of data. Author (GRA)

N86-24328# Cornell Univ., Ithaca, N.Y. School of Operations Research and Industrial Engineering.
ON SELECTING THE BEST OF K SIMULATED SYSTEMS: AN EXPOSITORY SURVEY Final Technical Report, 31 Mar. 1984 - 31 Aug. 1985
David Goldsman and Lee W. Schruben 15 Nov. 1985 32 p
(Contract N00014-81-K-0037)
(AD-A161903; TR 596) Avail: NTIS HC A03/MF A01 CSCL 12/2

This research has focused on simulation analysis using two new techniques, frequency domain experiments and standardized time series. The problem of selecting the best one of k arbitrary systems or alternatives is investigated. Consider one observation from each of the k systems. By best, meant that system which has the highest probability of yielding the most desirable of the k observations. The term most desirable is defined according to some criterion of goodness determined by the experimenter. It is shown that this problem can be formulated as a multinomial selection problem. Hence, multinomial selection procedures are, in a sense, nonparametric procedures. An up-to-date survey of such multinomial procedures is given. Further, how some of these procedures can be adapted for use in the simulation environment is described. GRA

N86-24329# Institute for Defense Analyses, Alexandria, Va.
A TECHNIQUE TO HELP CHOOSE BETWEEN ALTERNATIVE FUNCTIONAL FORMS OF THE REGRESSION EQUATION
Thomas P. Frazier 1985 10 p Presented at the 19th Annual Dept. of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A161909) Avail: NTIS HC A02/MF A01 CSCL 12/1

The cost analyst is often faced with the problem of choosing among several different functional forms of a regression equation. For example, a problem frequently encountered in empirical cost research is the choice between a linear and a log-linear equation. Ideally, theory tells the researcher which to choose. However, in the absence of any firm theoretical indication, the cost researcher must resort to some ad hoc procedure in choosing between the functional forms. If the appropriate functional form is not used the estimate may be biased and/or inefficient. A procedure often used is to run both functional forms and select the one with the largest coefficient of determination (R-square). Unfortunately, the R-square statistic of equations 1 and 2 cannot be meaningfully compared because the dependent variables in the two equations are different. The specification of the model, the error terms, and the computation of R-square for these two equations are entirely different and provide no common ground for comparison of the relative performance of these equations on the basis of computation of R-square. GRA

N86-24330# Cornell Univ., Ithaca, N.Y. School of Operations Research and Industrial Engineering.
NEW CONFIDENCE INTERVAL ESTIMATORS USING STANDARDIZED TIME SERIES
David Goldsman and Lee W. Schruben Dec. 1984 12 p
(Contract N00014-81-K-0037)
(AD-A161978; TR-J-84-15) Avail: NTIS HC A02/MF A01 CSCL 12/1

We develop new confidence interval estimators for the underlying mean of a stationary simulation process. These estimators can be viewed as generalizations of Schruben's so-called standardized time series area confidence interval estimators. Various properties of the new estimators are given. GRA

N86-24331# Cornell Univ., Ithaca, N.Y.
FREQUENCY DOMAIN EXPERIMENTS: SPECTRAL AMPLIFICATION, INPUT-OUTPUT CORRELATIONS AND MODEL PARAMETERS Interim Report, 31 Mar. 1984 - 25 Aug. 1985
V. J. Cogliano and Lee W. Schruben 25 Aug. 1985 10 p
(Contract N00014-81-K-0037)
(AD-A161979) Avail: NTIS HC A02/MF A01 CSCL 20/14

A frequency domain approach to identifying a polynomial response model for a system was presented in an earlier document. Frequency domain experiments can help identify important input factors (or parameters) and interactions in systems where one can change factor values during an experimental trial and observe the response at periodic intervals. An example of such a system is a simulation run on a computer. The relationships between spectral amplification, input-output correlation, and factor values for such experiments are considered. Conditions are also given for which the frequency domain approach is equivalent to ranking prospective terms in a response model by their correlation with the output. Author (GRA)

N86-24332# George Washington Univ., Washington, D.C. Inst. for Management Science and Engineering.
RESULTS OF A SIMULATION STUDY TO MEASURE THE EFFECTIVENESS OF EMPIRICAL BAYES' ESTIMATES OF MULTIPLE PROBABILITIES
S. S. Brier, Z. Zacks, and W. H. Marlow 10 Jul. 1985 20 p
(Contract N00014-83-K-0216)
(AD-A161982; GWU/IMSE/SERIAL-T-499/85) Avail: NTIS HC A02/MF A01 CSCL 12/1

Empirical Bayes' methods have been used by Brier, Zacks, and Marlow (1985) to estimate a set of parameters where each parameter is a k-dimensional vector consisting of the probabilities that a Marine combat unit will successfully complete requirements in each of k different categories. This paper assesses the performance of the empirical Bayes' estimators by simulating parameters from a multivariate normal distribution and simulating the observed sample counts from the binomial distribution. The empirical Bayes' estimators are compared to the sample proportion in terms of mean square error and absolute deviations. Using both criteria, the Bayes' estimators are shown to provide considerable improvement across a wide range of parameter values. The results suggest that empirical Bayes' estimates are useful in a variety of situations where a set of multivariate binomial probabilities are to be estimates. GRA

N86-24333# State Univ. of New York, Buffalo. Buffalo Dept. of Psychology.
INTER-DOMAIN FIT AND THE PERCEIVED QUALITY OF LIFE Interim Technical Report
Robert W. Rice, Michael R. Frone, and Dean B. McFarlin Oct. 1985 22 p
(Contract N00014-84-K-0002)

(AD-A161993; TR-4-ONR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Survey responses from a 1977 national probability sample of 1515 employed Americans working at least 20 hours per week provided a test of competing predictions concerning the incremental utility of perceived inter-domain fit in predicting overall perceived quality of life (pQL). If additive models are inadequate in the sense of failing to consider inter-domain interactions, measures of perceived inter-domain fit should add substantially to the prediction of overall pQL. On the other hand, if additive models are adequate, measures of inter-domain fit should not add substantially to the prediction of overall pQL. GRA

N86-24334# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

EFFECT OF ADDITIONAL VARIABLES IN PRINCIPAL COMPONENT ANALYSIS, DISCRIMINANT ANALYSIS AND CANONICAL CORRELATION ANALYSIS

Y. Fujikoshi, P. R. Krishnaiah, and J. Schmidhammer Aug. 1985 20 p

(Contracts F49620-85-C-0008; F49620-82-K-0001)

(AD-A162069; TR-85-31; AFOSR-85-0980TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this paper, the authors derived asymptotic distributions of changes in certain functions of the eigenvalues of the sample covariance matrix, MANOVA matrix and canonical correlation matrix when some variables are added to the original sets of variables. The above results are useful in finding out as to whether the new variables give additional information for statistical inference, multivariate analysis, and Wishart distribution. Author (GRA)

N86-24335# Alphatech, Inc., Burlington, Mass.

PERFORMANCE ANALYSIS FOR HYBRID STATE ESTIMATION PROBLEMS Final Report

R. B. Washburn, T. G. Allen, and D. Teneketzia Oct. 1985 98 p

(Contract N00014-84-C-0370)

(AD-A162225) Avail: NTIS HC A05/MF A01 CSCL 12/1

Hybrid state estimation problems are statistical estimation problems in which both continuous-valued and discrete-valued states and parameters occur. The hybrid state model provides both a natural formulation for many types of surveillance and tracking problems and a powerful framework for deriving theoretically optimal and practical suboptimal tracking algorithms. This report describes research in developing tools for evaluatng the performance of optimal hybrid state estimation problems. GRA

N86-24336# Naval Underwater Systems Center, New London, Conn.

SPECTRAL ANALYSIS VIA LAG-RESHAPING OF THE CORRELATION ESTIMATE; PROGRAMS AND SIMULATION RESULTS

Albert H. Nuttall 16 Aug. 1985 63 p

(AD-A162229; NUSC-TR-7511) Avail: NTIS HC A04/MF A01 CSCL 09/3

The fundamental performance of the generalized spectral analysis technique employing quadratic frequency-smoothing of Fourier-transformed, overlapped, weighted data segments was thoroughly investigated analytically and reported. The analysis exists to do lag-reshaping of the first-stage correlation estimate, and thereby realize effective spectral window with low sidelobes and good decay rates, without the need for overlap or any temporal weighting. However, no programs or simulation result. This situation is rectified by presenting programs for achieving maximally stable low-sidelobe spectral estimates via the lag-reshaping procedure and then employing these routines to exhibit some simulation results for data with tones and noise. Attention is given to the case of abutting rectangular temporal weightings with no overlap; this procedure is done with appropriate lag-reshaping. GRA

N86-24337# Naval Postgraduate School, Monterey, Calif.

TIME SERIES MODELS WITH A SPECIFIED SYMMETRIC NON-NORMAL MARGINAL DISTRIBUTION M.S. Thesis

Lee S. Dewald, Sr. Sep. 1985 254 p

(AD-A162262) Avail: NTIS HC A12/MF A01 CSCL 12/1

Time series models with autoregressive, moving average and mixed autoregressive-moving averager correlation structure and with symmetric, heavy-tailed, non-normal marginal distributions, called (letter)-Laplace, are considered. First, a flexible mixed model NLARMA(p,q) with Laplace (double exponential) marginals is investigated. Second, a family of continuous random coefficient models with I-Laplace distributions are examined. The Laplace distribution is described along with a useful transformation. Thirdly, the NLAR(1) and the BELAR(1) processes are compared using higher order residual analyses based on the uncorrelated, but dependent linear residuals, (R sub n). Finally, open problems, as well as possible extensions and applications of the analyses given in this thesis are discussed. GRA

N86-24338# Pittsburgh Univ., Pa. Center for Multivariate Analysis.

OPTIMALITY ROBUSTNESS OF TESTS IN TWO POPULATION PROBLEMS

Takeaki Kariya and Bimal K. Sinha Aug. 1985 17 p

(Contract F49620-85-C-0008)

(AD-A162265; TR-85-32; AFOSR-85-0979TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The problems of testing the equality of two location parameters (without the presence of scale parameters) and the equality of two scale parameters (with or without the presence of location parameters) based on two independent samples are considered. It is shown that, under some mild conditions on the underlying distributions, the standard optimum invariant tests derived under normality or exponentiality continue to be optimum for a wide class of distributions. However, the tests are not null robust. As a technical tool, Wijsman's representation theorem is used. Author (GRA)

N86-24339# Technion Research and Development Foundation Ltd., Haifa (Israel).

THEORY AND APPLICATIONS OF RANDOM FIELDS Final Report, 1 May 1984 - 30 Sep. 1985

Robert J. Adler Oct. 1985 16 p

(Grant AF-AFOSR-0104-84)

(AD-A162277; AFOSR-85-0987TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The main results described in this report include: (1) A discussion of rough surfaces and their modelling by chi-squared processes and fields. Results which describe how the theory of the latter differs from the Gaussian theory; (2) A development of a new methodology for determining deviation from normality in process and field data; (3) New results on the distribution of the maxima of general Gaussian processes; and (4) Development of a new representation of generalized Gaussian fields and those fields subordinated to it via central limit theorems for additive functionals of Markov processes. GRA

N86-24340# Duke Univ., Durham, N. C. Dept. of Computer Science.

TRANSIENT SOLUTION OF ACYCLIC MARKOV CHAINS

Raymond Marie, Andrew Reibman, and Kishor Trivedi Aug. 1985 61 p

(Grant AF-AFOSR-0132-84)

(AD-A162314; CS-1984-23; AFOSR-85-0981TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Continuous time Markov chains are commonly used in system reliability modeling. Increasing system complexity and non-Markovian behavior can drastically increase the size of a Markov model's state space. Special approximation techniques and numerical methods have been introduced to reduce the resources needed to solve Markov chain models. This paper discusses a method for automatically deriving exact transient solutions of Markov chains. The solutions derived are symbolic in t. The authors' approach can also provide solutions that are symbolic in other parameters. They extend our method to include parametric sensitivity analysis of the transient solution, and to provide cumulative measures of Markov chain behavior. They present three

examples, one to show the use of our method in evaluating approximate solution techniques, one showing parametric sensitivity analysis of a large Markov model, and one demonstrating the computation of cumulative measures for an acyclic Markov reward processes. Author (GRA)

N86-24341# Brown Univ., Providence, R. I. Center for Dynamical Systems.
ASYMPTOTIC GLOBAL BEHAVIOR FOR STOCHASTIC APPROXIMATIONS AND DIFFUSIONS WITH SLOWLY DECREASING NOISE EFFECTS: GLOBAL MINIMIZATION VIA MONTE CARLO Interim Report
H. J. Kushner Apr. 1985 42 p
(Contracts DAAG29-84-K-0082; N00014-84-C-0577; Grant AF-AFOSR-0166-81; AF Proj. 2304)
(AD-A162333; AFOSR-85-1022TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document studies the asymptotic behavior of a system involving a sequence of random variables. GRA

N86-24342# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ON TESTS FOR SELECTION OF VARIABLES AND INDEPENDENCE UNDER MULTIVARIATE REGRESSION MODEL
T. Kariya, Y. Fujikoshi, and P. R. Krishnaiah Aug. 1985 50 p
(Contract F49620-85-C-0008)
(AD-A162382; TR-85-33; AFOSR-85-0874TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this paper, the authors consider various procedures for testing the hypotheses of independence of two sets of variables and certain regression coefficients are zero under the classical multivariate regression model. Various properties of these procedures and the asymptotic distributions associated with these procedures are also considered. Author (GRA)

N86-24343# North Carolina Univ., Chapel Hill. Dept. of Statistics.
RESEARCH IN STOCHASTIC PROCESSES Final Report, 1 Nov. 1981 - 31 Aug. 1985
Raymond J. Carroll, Gopinath Kallianpur, and M. R. Leadbetter Sep. 1985 80 p
(Contract F49620-82-C-0009)
(AD-A162393; AFOSR-85-1088TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

The research of four principal investigators as well as the operations of the Center for Stochastic Processes was supported by this grant. Substantial research progress was made in stochastic processes and in statistical estimation and inference. More than 135 journal articles were published or accepted for publication. The work of 19 visiting scholars was supported. Author (GRA)

N86-24344# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
OPTIMUM TWO-STAGE SELECTION PROCEDURES FOR WEIBULL POPULATIONS
Shanti S. Gupta and Klaus J. Miescke Oct. 1985 12 p Prepared in cooperation with Illinois Univ., Chicago
(Contract N00014-84-C-0167; Grant AF-AFOSR-0347-85)
(AD-A162824; TR-85-30) Avail: NTIS HC A02/MF A01 CSCL 12/1

LET PI,...,PIK BE Weibull populations with a common known shape parameter, and with unknown scale parameters. The goal is to find the population with the largest scale parameter. From each population, Type II-censored obse.vations are available at two stages, where censoring at stage 1 occurs at the q-th (r-th) failure. Two-stage procedures with screening at the first stage are considered which are optimum permutation invariant in terms of the risk with respect to a large class of loss functions. For the procedure with a fixed subset size at stage 1, the least favorable parameter configuration under the indifference zone approach is of the slippage type, which makes it feasible to control the infimum of the probability of a correct selection. Some extensions of the results are discussed at the end. Author (GRA)

N86-24345# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
PRODUCT STOCHASTIC MEASURES
Victor Perez-Abreu Oct. 1985 30 p
(Contract F49620-85-C-0144)
(AD-A162833; TR-118; AFOSR-85-1178TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The concept of symmetric tensor product of a Hilbert space is used to construct a product measure of orthogonally scattered measures. The result is applied to the construction of an sq L-valued product stochastic measure (p.s.m.) of non-identically distributed sq-L-valued independently scattered measures. Using the theory of vector valued measures we construct multiple integrals with respect to the p.s.m. A relationship between the theory of multiple stochastic integrals and the theory of vector valued measures is established. GRA

N86-24346# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
EMPIRICAL BAYES RULES FOR SELECTING GOOD BINOMIAL POPULATIONS, REVISION
Shanti S. Gupta and TaChen Liang Oct. 1985 24 p
(Contract N00014-84-C-0167)
(AD-A162867; TR-84-37-Rev) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper deals with the problem of selecting good binomial populations compared with a standard or a control through the empirical Bayes approach. Two cases have been studied: one with the prior distribution completely unknown and the other with the prior distribution symmetrical about $p = 1/2$, but otherwise unknown. In each case, empirical Bayes rules are derived and their rates of convergence are shown to be of order $O(\exp(-cn))$ for some $c > O$, where n is the number of accumulated post experiences at hand. Author (GRA)

N86-24388# Joint Publications Research Service, Arlington, Va.
ESTIMATES OF NUMBER OF BOOLEAN COMPARISON OPERATIONS FOR ORDER STATISTICS Abstract Only
V. V. Ivanov and V. N. Korzhova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 76 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR. Seriya A. Fiziko-Matematicheskiye I Tekhnicheskiye Nauki (Kiev, USSR), no. 3, Mar. 1985 p 59-62 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24389# Joint Publications Research Service, Arlington, Va.
DEGREE OF DYNAMIC CORRELATION AND THE PROBLEM OF DETERMINING THE DYNAMIC NATURE OF RANDOM PROCESSES Abstract Only
Yu. A. Kravtsov and V. S. Etkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) p 80 Transl. into ENGLISH from Radiotekhnika I Elektronika (Moscow, USSR), v. 29, no. 12, Dec. 1984 p 2358-2364 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24544*# Calhoun Community Coll., Decatur, Ala.
SIMULATION AND STUDY OF SMALL NUMBERS OF RANDOM EVENTS
Russell D. Shelton *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 12A

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-24347*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PERFORMANCE TRADEOFFS IN STATIC AND DYNAMIC LOAD BALANCING STRATEGIES Final Report
M. Ashraf Iqbal, Joel H. Saltz, and Shahid H. Bokhart Mar. 1986 25 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178073; ICASE-86-13; NAS 1.26:178073) Avail: NTIS HC A02/MF A01 CSCL 12B

The problem of uniformly distributing the load of a parallel program over a multiprocessor system was considered. A program was analyzed whose structure permits the computation of the optimal static solution. Then four strategies for load balancing were described and their performance compared. The strategies are: (1) the optimal static assignment algorithm which is guaranteed to yield the best static solution, (2) the static binary dissection method which is very fast but sub-optimal, (3) the greedy algorithm, a static fully polynomial time approximation scheme, which estimates the optimal solution to arbitrary accuracy, and (4) the predictive dynamic load balancing heuristic which uses information on the precedence relationships within the program and outperforms any of the static methods. It is also shown that the overhead incurred by the dynamic heuristic is reduced considerably if it is started off with a static assignment provided by either of the other three strategies. Author

N86-24348# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
A LAGRANGE MULTIPLIER/SEGMENT PROCEDURE FOR SOLUTION OF THREE-DIMENSIONAL CONTACT PROBLEMS Contract Report, Jan. - Aug. 1984
A. B. Chaudhary and K. J. Bathe Oct. 1985 76 p
(Contract DAAK11-84-K-0015; DA Proj. 1L1-61102-AH-43)
(AD-A161838; BRL-CR-544) Avail: NTIS HC A05/MF A01 CSCL 12/1

A solution procedure for finite element analysis of three-dimensional contact conditions is presented. The area of contact can vary, frictional conditions are included using Coulomb's law of friction and static or dynamic conditions can be considered. Various sample solutions are presented to demonstrate the applicability of the solution algorithm. GRA

N86-24349# Illinois Univ., Urbana. Coordinated Science Lab.
PARAMETER ESTIMATION FOR THE CLASS A MIDDLETON MODEL M.S. Thesis
Serena M. Zabin Jul. 1985 97 p
(Contracts N00014-81-K-0014; N00014-84-C-0149)
(AD-A161916; UILU-ENG-85-2223; R-1048) Avail: NTIS HC A05/MF A01 CSCL 20/1

The principal aim of this study is to propose an estimator of the parameters of the Class A impulsive noise model with desirable asymptotic properties, namely, consistency and asymptotic efficiency. Four estimators are proposed and analyzed. The inherent drawbacks of using some classical estimators to estimate the Class A parameters are identified and explained. In particular, a consistent, asymptotically normal, and asymptotically unbiased estimator of the model parameters which can be implemented easily is established via the method of moments. Though an analysis of the relative mean-norm error reveals this estimator's inefficiency, its use as a first approximation leads to a consistent and asymptotically efficient estimator (Moment/Newton-step procedure) of the parameters of the Class A model. GRA

N86-24350# Cornell Univ., Ithaca, N.Y.
SIGNIFICANT FACTOR IDENTIFICATION USING DISCRETE SPECTRAL METHODS Interim Technical Report, 31 Mar. - 25 Aug. 1984
Paul J. Sanchez and Lee W. Schruben Mar. 1985 81 p
(Contract N00014-81-K-0037)
(AD-A161933; TR-654) Avail: NTIS HC A05/MF A01 CSCL 12/1

Discrete event simulations are computer models of complex systems. The accuracy of the model in reflecting the behavior of the real system is determined by, among other things, the values of parameters for distributions used in the model. The modeller could allocate experimental resources more effectively without loss of accuracy in the model if he or she could identify those parameters to which the response of interest has the greatest sensitivity. One method of doing this is to try to model the response as a polynomial function of the model parameters. We are then interested in those terms in the polynomial which have non-zero coefficients. This report attempts to extend the Schruben/Cogliano methodology to cover a more general class of models which includes discrete-valued parameters, such as policy decisions or capacities of queues. We evaluated the use of discrete-valued functions as a basis for spectral analysis. Several function sets were considered as possibilities, and Walsh functions were selected as the best choice. GRA

N86-24351# Iowa Univ., Iowa City.
SPECIFICATION FOR MIDAS-GR. MANAGEMENT OF INFORMATION FOR DESIGN AND ANALYSIS OF SYSTEM. GENERALIZED RELATIONAL MODEL Interim Technical Report, Jul. - Dec. 1984
J. S. Arora and S. Mukhopadhyay 3 Dec. 1984 92 p
(Grant AF-AFOSR-0322-82)
(AD-A162086; CAD-SS-84.24; AFOSR-85-1062TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report presents specification of a database management system currently under development. It is specifically designed to meet the requirements of engineering applications. The stress in design lies on the flexibility of data definition capabilities, efficient management of large volume of I/O, and dynamic creation and deletion of data objects. In data definition the system takes unified approach for relational and numerical data models. It also defines a set of frequently used special data types (sparse matrix etc.) and provides uniform data structure for their efficient manipulation. The system also provides powerful data language which can be used directly from a terminal on ad hoc basis or from a host programming language. This language is non-procedural; so for a large class of problems user need not resort to branching or loops. Also, since it is precompiled instead of being interpreted at run time, it is inherently much faster. It is expected that this system will play central role in design and implementation of future systems in design optimization area. Author (GRA)

N86-24352# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
RESEARCH ON PROBLEM-SOLVING SYSTEMS Interim Report, 1 Oct. 1984 - 30 Sep. 1985
David E. Wilkins 22 Oct. 1985 26 p
(Contract F49620-85-K-0001)
(AD-A162095; AFOSR-85-1091TR) Avail: NTIS HC A03/MF A01 CSCL 12/2

Research on planning and problem-solving systems was begun at SRI International in September 1979 under AFOSR sponsorship. The present report describes the research conducted during the past year. This program developed powerful methods of representing, generating, and executing hierarchical plans that contain parallel actions. Execution involves monitoring the state of the world and, possibly, replanning if things do not proceed as expected. Over the last few years SRI has designed and implemented a system, called SIPE (System for Interactive Planning and Execution Monitoring), the purpose of which is to demonstrate the heuristic adequacy of our approach to this problem. SRI's basic approach is to work within the heuristic-planning methodology, representing plans in procedural networks - as has been done in NOAH7 and other systems. Several extensions of previous planning systems have been implemented, including the development of a perspicuous formalism for describing operators and objects, the use of constraints for the partial description of objects, the creation of mechanisms that permit concurrent exploration of alternative plans, the incorporation of heuristics for reasoning about resources, and an implementation of a deductive capability. Research this year has concentrated on interfacing the abstract, high-level plans

produced by SIPE with the low-level information used by the sensors and effectors that might interact with the real world (e.g., those installed on a robot vehicle). This has compelled us to add extensions to SIPE. GRA

N86-24543*# Alabama Univ., Huntsville. Dept. of Mathematics.
MISSION ANALYSIS FLOW SEQUENCING OPTIMIZATION
McKinley Scott *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 14 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 12B

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-24353# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Applications.
THE APPLICATION OF A SEQUENCE NOTATION TO THE DESIGN OF SYSTOLIC COMPUTATIONS
Rami Melhem Oct. 1985 49 p
(Contract N00014-85-K-0339)
(AD-A161972; ICMA-85-87) Avail: NTIS HC A03/MF A01 CSCL 09/2

The sequence notation suggested in an earlier work provides a tool for the clear and precise specification of systolic computations. Namely, it separates the static and dynamic levels of the specification. At the static level, the topology of the network and the function of each cell are described by a system of causal equations on sequences, and at the dynamic level, the data flow is described by the elements of the individual sequences. This paper describes a method for the transformation of a given algorithm into a system of causal sequence equations/input-output description which specifies a systolic computation. The basic idea of the method is to pack arrays of variables along one or more dimensions into sequences. Doing this, however, may result in a system of equations that is not causal, and hence, a transformation of indices in the original algorithm may be essential in order to guarantee causality (the positive increment of time). GRA

N86-24354# Florida Univ., Gainesville.
APPLICATIONS OF DIFFERENTIAL TOPOLOGY TO GRID GENERATION Final Report, 1 Jun. 1983 - 31 May 1984
D. C. Wilson 25 Nov. 1985 46 p
(Grant AF-AFOSR-0158-83)
(AD-A162834; AFOSR-85-1165TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The purpose of this paper is to indicate how smoothing techniques from Differential Topology can be applied to the area of algebraic grid generation in Computational Fluid Dynamics. The basic method is to patch together one global grid from a number of smaller ones. The smoothing theory allows one to blend the grid from one section into the grid of an adjacent one. Author (GRA)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-24355# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
A RELATIVE-MOTION MICROWORLD M.S. Thesis
Linda E. Morecroft Sep. 1985 249 p
(Contract N00014-83-K-0125)
(AD-A161856; MIT/LCS/TR-347) Avail: NTIS HC A11/MF A01 CSCL 05/9

A relative-motion microworld has been designed to aid high-school students in understanding the concepts of relative motion and frames of reference. Relative motion and frames of reference are usually introduced in a high-school physics or mathematics course. Most students, and many teachers too, have difficulty understanding the concepts and applying them to solve problems. The traditional approach to relative motion uses vector algebra. However, vector terminology is complex. The relative-motion uses a new representation for thinking about motion, based on the intrinsic, local and procedural characteristics of turtle geometry. This representation provides the student with a simple framework for understanding motion and relative motion, that overcomes the problems associated with the traditional approach. The microworld allows students to set up their own motion problems, in order to view the motion from different reference frames. Four key primitives have been designed: these make an object, give an object a motion, select a reference frame, and move all the objects that have been set up. These four primitives are the building blocks that can be used to set up complex problems. Problems from a variety of motion situations can be explored using the relative-motion microworld. These include rectilinear motion, non-parallel rectilinear motion, motion under gravity, and rotational motion. A student text and teacher's reference manual accompany the microworld. GRA

N86-24356# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BIMONTHLY BULLETIN, NUMBER 1985-2, 225/MARCH-APRIL
Claude Sevestre, ed. ESA Dec. 1985 80 p refs Transl. into ENGLISH of La Recherche Aerospatiale, Bulletin Bimestriel (Paris, France), No. 1985-2, 225/Mar.-Apr. 1985
(ESA-TT-925) Avail: NTIS HC A05/MF A01; print copy in ENGLISH available at ONERA, Paris FF 70; original report in FRENCH available at ONERA, Paris FF 70

Parametric modeling and radar signal processing; grid optimization for computing high Reynolds number viscous flows; computation of unsteady transonic flows with an implicit numerical method for solving the Euler equations; local effects in mechanics; a capacity comet dust detector for the Giotto space probe to Halley's comet (Capacitor Impact Sensor); and noise generated by a stretching vortex are discussed. Author (ESA)

N86-24357# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BIMONTHLY BULLETIN, NUMBER 1985-3, 226/MAY-JUNE
Claude Sevestre, ed. ESA Dec. 1985 61 p refs Transl. into ENGLISH of La Recherche Aerospatiale, Bulletin Bimestriel (Paris, France), No. 1985-3, 226/May-Jun. 1985
(ESA-TT-937) Avail: NTIS HC A04/MF A01; print copy in ENGLISH available at ONERA, Paris FF 70; original report in FRENCH available at ONERA, Paris FF 70

Characterization of moving targets by radar signature; multiprocessor systems for parallel numerical applications; multidomain method for the Euler equations application to overlapping subdomains; modeling of edge effects in a multilayer composite plate; effect of fiber orientation near the free edge of a laminated plate; and streaklines for an unsteady flow are discussed. Author (ESA)

N86-24358# Joint Publications Research Service, Arlington, Va.
USSR REPORT: PHYSICS AND MATHEMATICS
7 Feb. 1986 101 p Transl. into ENGLISH from various Russian articles
(JPRS-UPM-86-004) Avail: NTIS HC A06

Research in physics and mathematics is high lighted. Topics covered in this U.S.S.R. report include: acoustics; crystals; laser glasses and semiconductors; gas dynamics; fluid dynamics; high-temperature physics; lasers; magnetohydrodynamics; molecular physics; nuclear physics-optics; and spectroscopy; plasma physics; technical physics; thermodynamics; logic and game theory; numerical analysis and algorithms; probability and statistics; control theory; operations research; and differential equations. For individual titles, see N86-24359 through N86-24389.

N86-24359# Joint Publications Research Service, Arlington, Va.
AMPLIFICATION OF ACOUSTIC PERTURBATIONS DURING REFLECTION FROM CRITICAL LAYER IN SUPERSONIC FLOWS Abstract Only **c71**
P. I. Kolykhalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 1 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 95-98 Original language document was announced in IAA as A85-24181 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The paper is concerned with the propagation of acoustic perturbations in a medium moving at a variable velocity. It is shown that on reflection from the critical layer (i.e., the layer where the flow velocity is equal to the phase velocity of the perturbations), the perturbation amplitude increases if the change of flow velocity on scales of the order of the perturbation wavelength exceeds the velocity of sound. V.L. (IAA)

N86-24360# Joint Publications Research Service, Arlington, Va.
RESISTANCE OF YAG:Nd SUP 3+ LASER FREQUENCY CONVERTERS TO IONIZING RADIATION Abstract Only **c76**
B. I. Zakharkin, L. A. Kulevskiy, V. N. Nikolayev, and G. N. Toropkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 3 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), no. 58 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

This study presents a review of published work on the radiation resistance of YAG:Nd sup 3+ laser frequency converters, and describes the results of experiments on the influence of gamma-irradiation of nonlinear crystals on the output characteristics of YAG:Nd sup 3+ lasers with second-harmonic generation inside or outside the cavity. The influence of radiation on the optical properties of nonlinear crystals is investigated. It is found that radiation degrades the generation of optical harmonics in YAG:ND sup 3+ lasers employing nonlinear elements made of SDA, DSDA, LiIO3 and DKDR crystals, starting at doses of 10 to the 5th power - 10 to the 6th power rad. Deuterized nonlinear crystals are found to be more resistant to ionizing radiation. Author

N86-24361# Joint Publications Research Service, Arlington, Va.
RAMAN SCATTERING OF LIGHT IN GALLIUM-ARSENIDE CRYSTALS EXPOSED TO SUBNANOSECOND LASER PULSES Abstract Only **c76**
I. I. Reshina, O. V. Smolskiy, and A. N. Vasilyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 4 Transl. into ENGLISH from Fizika I Tekhnika Poluprovodnikov (Leningrad, USSR), v. 19, no. 2, Feb. 1985 p 252-256 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Raman scattering and reflection in the visible region of the spectrum are used to investigate single-crystal laser-amorphized gallium-arsenide. The thickness of the amorphous layer and the quality of the recrystallized material are determined as a function of the crystallographic orientation of the target and the laser energy. The specimens were irradiated by a single second-harmonic pulse from a YaG:Nd sup 3+ laser (lambda = 532 nm). The irradiation produced a spot 1 - 2 nm in diameter on the surface of the specimen within which from 1 to 3 annular regions with slightly different brightness could be observed. The light peripheral ring was found to characterize the region of the amorphous phase, which has a slightly larger reflection coefficient than the crystalline phase. The combined measurements of reflection and Raman scattering spectra made it possible to identify the regions of amorphous and crystalline phases in GaAs crystals with different orientation. It is hypothesized that an amorphous layer exists beneath the recrystallized layer. Author

N86-24362# Joint Publications Research Service, Arlington, Va.
LACK OF CORRESPONDENCE OF LATTICE PERIODS AND INTENSITY OF PHOTOLUMINESCENCE IN GInSbAs/GaSb HETEROCOMPOSITIONS Abstract Only **c76**
N. A. Bert, V. I. Vasilyev, S. G. Konnikov, V. I. Kuchinskiy, A. S. Lazutka, V. A. Mishurnyy, and Ye. L. Portnoy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 5 Transl. into ENGLISH from Pisma Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 4, 26 Feb. 1985 p 193-196 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The influence of lattice discrepancy of luminescence efficiency in G a sub (1-x)I n sub (x)S b sub (1-y)A s usb y/GaSb heterocompositions is investigated. Photoluminescence was investigated by using a specimen with a specimen with a heteroepitaxial layer 1.5 micro m thick that passed only a small amount of the driving radiation to the substrate. It is found that the absence of dislocations is not enough to obtain efficient luminescence in compositions with a comparatively wide range of pseudomorphic growth, which significantly narrows the possibility of reducing the level of residual elastic stresses in heterocompositions intended for use in radiating devices. Author

N86-24363# Joint Publications Research Service, Arlington, Va.
BLEACHING EFFECT IN ALKALI-HALIDE CRYSTALS WITH ELECTRON COLOR CENTERS Abstract Only **c76**
B. A. Medvedev, T. G. Silkina, and G. V. Simonenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 6 Transl. into ENGLISH from Optika I Spektroskopya (Leningrad, USSR), v. 57, no. 6, Dec. 1984 p 1026-1028 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Laser media with two types of color centers connected by radiative and non-radiative energy transfers are investigated. Alkali-halide crystals containing two types of color centers with overlapping absorption and luminescence bands in a LiF crystal are examined. The real center is approximated by four energy levels, including the laser pumping exciting centers (1), and the luminescence of centers (1) and pumping centers (2). Balance equations and Maxwell equations describing the processes occurring in this system are derived. The contour of the absorption (amplification) line in a bleaching channel is investigated. The findings expand the capabilities of nonlinear high-resolution spectroscopy of multicomponent systems, and make it possible to optimize the parameters of existing binary dye lasers and color center lasers. Author

N86-24364# Joint Publications Research Service, Arlington, Va.
EFFICIENCY OF COMPRESSED GAS ENERGY CONVERSION TO LASER RADIATION Abstract Only **c34**
V. V. Breyev and V. P. Panchenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 8 Transl. into ENGLISH from Teplofizika Vysokikh Temperatur (Moscow, USSR), v. 22, no. 6, Nov. - Dec. 1984 p 1196-1199 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

This study investigates the use of a series of reservoirs in which gas is heated by passing from one reservoir to the next as an auxiliary heat source for a gas dynamic laser. The characteristics and efficiency of such a laser system are assessed. It is found that the coefficient of conversion of compressed gas energy to laser radiation can be as high as approximately 10-2 % for a helium mixture, and approximately half that for an air mixture (CO2 + N2 + 02 + H20), because of the low energy transmission factor in the system of reservoirs. The findings, while not optimum, provide a clear idea of the characteristic efficiency value of the system and its components. Author

N86-24365# Joint Publications Research Service, Arlington, Va.
SHOCKWAVE PROPAGATION IN TRANSVERSE GLOW DISCHARGE PLASMA IN ARGON Abstract Only **c34**
I. V. Basargin and G. I. Mishin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 9 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 4, 26 Feb. 1985 p 209-214 Previously announced in IAA as A86-13886 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Shock waves traveling perpendicularly to a glow discharge in an Ar plasma and Ar with no plasma were observed experimentally to examine the dissipation of shock wave energy. A piezoelectric gage attached to a quartz rod furnished the pressure pulse data by which the shock velocities could be monitored at two points in the ambient medium. The shock wave propagated almost three times as fast in the plasma. No connection was found between the speed-up of a shock and decreases in the shock wave amplitude. A correlation was found between the radial change in the shock velocity and the radial electron temperature profile. It is concluded that ion acoustic waves forming ahead of the shock induce an acceleration of the neutral particles and thereby an increase in the velocity of the shock wave. M.S.K. (IAA)

N86-24366# Joint Publications Research Service, Arlington, Va.
THERMAL FEATURES OF SUPERSONIC GAS FLOW Abstract Only **c34**
G. Ye. Skvortsov and N. Yu. Vasilyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 10 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 230-232 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The features of a steady-state gas flow with thermal factor governed by the physical-chemical conversions or the direct action of heat on the stream are investigated. Flow instability is detected for a certain cooling level, and an interpretation of recent experiments on shockwave propagation in a glow discharge plasma is presented. An anomaly noted during cooling, which corresponds to possible shockwave instability, is discussed. Author

N86-24367# Joint Publications Research Service, Arlington, Va.
INTERACTION OF GENERATORS WITH EXCITATION AND THE PROBLEM OF TURBULENCE Abstract Only **c34**
P. S. Landa and S. M. Perminov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 12 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy Fizika (Tomak, USSR), v. 27, no. 11, Nov. 1984 p 22-25 Original language document was announced in IAA as A85-22457 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

A turbulence-generation model is proposed which explains the appearance of complex quasi-periodic motion with a practically continuous spectrum after several bifuractions. It has been shown that turbulence excitation is rigid, i.e., that there exists a wide Reynolds-number range in which laminar flow is stable with respect to small perturbations and is unstable with respect to finite-amplitude perturbations. Hence, there is reason to consider the set of potentially excitable modes as a set of coupled rigid-excitation generators, for some of which self-excitation conditions are satisfied. It is shown that asynchronous excitation of underexcited generators can occur in such a system, which is analogus to the asynchronous excitation of a single rigid-excitation generator subjected to an external force at a nonresonant frequency. B.J. (IAA)

N86-24368# Joint Publications Research Service, Arlington, Va.
A GROUP OF OPERATORS OCCURRING IN THE DYNAMICS OF A COMPRESSIBLE STRATIFIED FLUID Abstract Only **c34**
S. A. Gabov and K. S. Mamedov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 14 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 23-26 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Small movements of a compressible stratified fluid are investigated in a Cartesian system of coordinates (x sub 1, x sub 2, x sub 3). The fluid is assumed to be exponentially stratified along the x sub 3 axis, i.e., its density in the unperturbed state is assumed to be a function of x sub 3 alone. Boundary conditions are derived for the equation describing small movements of this fluid in a gravitational field. An eigenvalue problem (a problem of normal oscillations) is derived that reduces in an equivalent fashion to a group of operators in which the operator S is only bounded, and not entirely continuous, as was assumed in previous studies. It is found that the condition of strong spectral decoupling is always satisfied in cases of practical interest involving the sound propagation velocity in water. Author

N86-24369# Joint Publications Research Service, Arlington, Va.
COMBUSTION IN TURBULENT BOUNDARY LAYER FOLLOWING SHOCK WAVE Abstract Only **c34**
I. N. Zvyeryev, M. I. Ramodanov, and T. V. Ramodanova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 16-17 Transl. into ENGLISH from Vestnik Moskovoskogo Univ. Seriya 1: Matematika, Mekhanika (Moscow, USSR), no. 2, Mar. - Apr. 1985 p 52-55 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The temperature in the chemically reacting turbulent boundary layer following a shock wave is calculated in the presence of evaporation of fuel from the walls and combustion of the vapors within the boundary layer. A two-layer turbulent layer is assumed in which the Prandtl and Schmidt numbers, as well as their turbulenct analogs, are equal to unity. The coefficient of diffusion of the multicomponent mixture is replaced with the coefficient of a binary mixture consisting of the initial reagents and the final combustion products. It is found that practically no combustion develops in the laminar sublayer. The temperature profiles exhibit clearly defined extrema that correspond to the most intense combustion. The maximum temperature practically stops increasing in a nonself-similar boundary layer at a certain distance from the shock wave front that depends upon the shock wave velocity, indicating that the chemical reactions become less intense as the longitudinal coordinate x increases. Author

N86-24370# Joint Publications Research Service, Arlington, Va.
LOCALIZATION AND THERMAL STABILITY OF DEFECTS CAUSED BY LASER RADIATION OF GERMANIUM Abstract Only **c76**
P. K. Kashkarov and A. V. Petrov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 18 Transl. into ENGLISH from Fizika I Tekhnika Poluprovodnikov (Leningrad, USSR), v. 19, no. 2, Feb. 1984 p 234-236 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

This study investigates the localization and thermal stability of charge carrier recombination and trapping centers occurring in the surface layers of germanium when high-resistance single crystals are irradiated by nanosecond pulses from a neodymium laser. The surface of (111) high-resistance single crystals of n-type germanium etched in H2O2 at 310 K was examined. Irradiation was provided by a monopulse neodymium Q-switched laser. It is suggested that defect generation during laser irradiation below 10 MW/sq cm is associated with electron-vibrational excitation of the trapping centers and radiationless recombination of nonequilibrium charge carriers. This excitation may change the properties of existing defects, and also lead to the occurrence of new centers. It is found that different systems of centers are responsible for surface recombination and trapping of charge carriers. Author

N86-24371# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LASER RADIATION WAVELENGTH ON PARAMETERS OF FORMING PLASMA Abstract Only **c75**
A. V. Dobkin and I. V. Nemchinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 24 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 10, no. 20, 12 Dec. 1984 p 1426-1430 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

A wide range of laser radiation quantum energies epsilon sub 0 = 1 - 300 eV is investigated for moderate flux densities (10 to the 8th power - 10 to the 10th power w/sq cm.) and durations of up to 0.1 - 1 micro sec in support of a theoretical study of the processes underlying the interaction of monochromatic radiation

at different wavelengths with a barrier. Inverse brehmsstrahlung is found to be the dominant mechanism for longwave radiation. The absorption of harder radiation by vapor at low temperatures is determined by photoionization. In the constant-mass heating condition, the plasma temperature is found to increase rapidly; as the quantum energy increases the plasma temperature drops and the pressure increases on the surface of the obstacle. The estimates and numerical calculations indicate that the plasma parameters vary nonmonotonically as the laser radiation quantum energy. Author

N86-24372# Joint Publications Research Service, Arlington, Va.
WORK ON FEMTOSECOND LASERS AT VILNYUS UNIVERSITY VIEWED Abstract Only **c36**
Algis Piskarskas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 27 Transl. into ENGLISH from KomsomolskayaPravda (Moscow, USSR), no. 1, 1 Jan. 1985 p 1 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Advances in shortening the duration of laser pulses from the nanosecond to picosecond to femtosecond ranges at the laser research center of Vil'nyus University over the past 20 years are reviewed. Physicists, mathematicians, chemists, biologists, and medical personnel are all involved in the development of lasers for various branches of science at the university's laser research center. A picosecond laser spectrometer was developed for measuring very rapid jumps of electrons, for example. The speed of electrons over a distance of 20 angstroms reportedly has been measured with this instrument. Personnel of the center have been using computers in work on laser methods for studying crystals in which electron jumps occur that are still more rapid, the author relates. A femtosecond parametric laser employing new crystals and pumping sources has been designed for this purpose. Such a unit is capable of emitting a pulse only 200 femtoseconds in duration. Author

N86-24373# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF CHARACTERISTICS OF CO-2 WAVEGUIDE LASER Abstract Only **c36**
Yu. B. Konev, N. I. Lipatov, P. P. Pashinin, and A. M. Prokhorov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 30 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), no. 44 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The characteristics of the linear amplification mode, as well as the lasing mode, of typical CO2 waveguide lasers are modeled numerically assuming no degradation of the working mixture of the laser during the discharge process. The modeling is based on balance equations for the average number of vibrational quanta, taking into account the flow of quanta to levels above the minimum of the trinor distribution function of the asymmetrical mode of the CO2 molecule. The assumption of severe degradation of the working mixture of the laser when pumping power densities are high results in a divergence between theoretical and experimental results. The influence of the diameter of the discharge channel on the lasing power is insignificant for a helium-rich 1:1:8 mixture; however, a 1.5-mm waveguide is found to provide approximately 20% higher lasing power mixture. Author

N86-24374# Joint Publications Research Service, Arlington, Va.
LASER WITH DYNAMIC DISTRIBUTED FEEDBACK FORMED BY COUNTER-PROPAGATING PUMPING BEAMS Abstract Only **c36**
M. V. Bondar, L. V. Vovk, Ya. I. Zabello, and Ye. A. Tikhonov *In its* USSR Report: Physics and Mathematics (JPRS-PUM-86-004) 7 Feb. 1986 p 31 Transl. into ENGLISH from Ukrainskiy Fizicheskiy Zhurnal (Kiev, USSR), v. 29, no. 7, 1984 p 988-993 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The effectiveness of dynamic distributed feedback formed by the interference between two waves in the active medium is investigated in cavity lasers. The characteristics of distributed feedback lasers employing counter-propagating pumping beams are compared with those of lasers employing following beams. The latter are found to provide significant advantages in gain, lasing line width and emission divergenece. A scheme is developed in which the lasing wavelength is relatively independent of uncontrollable temperature fluctuations and mechanical vibration and in which the delay between the interfering beams is small, permitting the use of ultrashort pumping pulses. This scheme is useful for exploratory experiments on dynamic periodic structures and for working with media having small optical densities at the pumping frequencies. Author

N86-24375# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF GEOMETRY OF ACTIVE ELEMENT ON RADIATION PARAMETERS OF GAS-DISCHARGE LASERS Abstract Only **c36**
V. Ye. Privalov and Ye. G. Chulyayeva *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 34 Transl. into ENGLISH from Optika I Spektroskopiya (Leningrad, USSR), v. 57, no. 6, Dec. 1984 p 1056-1059 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

A model is proposed for the radiation frequency shift of a helium-neon laser as a function of the pressure and composition of the mixture that explains the influence of the geometry of the active element on the frequency shift. The gas separation effect is interpreted as causing frequency shifts in helium-neon lasers, with the main role being played by the distribution of the neon along the discharge, rather than the distribution of the overall pressure or partial pressure of the helium. Measurements performed by optically heterodyning the radiation from two lasers with neon absorption cells to validate the model are described. The use of the same scheme to investigate shifts in the center of the Doppler neon contour as a function of helium pressure is explained. It is confirmed that the main contribution to the frequency shift comes from redistribution of the partial pressure of the neon along the discharge, so that the wavelengths of helium-neon lasers that are stabilized by the characteristic points of the Doppler radiation contour can differ, even with the same filling pressure. A pressure of about 800 Pa is recommended for filling the absorption cells in stabilized lasers. Author

N86-24376# Joint Publications Research Service, Arlington, Va.
BLEACHING OF COLOR CENTERS IN NEODYMIUM GLASS LASER Abstract Only **c36**
M. I. Dzhibladzye, G. G. Mshvelidzye, R. R. Erikashvili, and Z. G. Esiashvili *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 36 Transl. into ENGLISH from Soobshcheniya Akademii Nauk Gruzinskoy SSR (Tbilisi, USSR), v. 115, no. 2, Aug. 1985 p 265-268 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The mechanism underlying the bleaching of short-lived color centers in a neodymium glass laser, which causes passive Q-modulation of the cavity, is investigated. Experiments to investigate the amplification of series of short-lived light pulses by neodymium glass fibers are described. It is found that the gain of the laser drops off monotonically toward the end of the pulse rain in the absence of color center, but that in the presence of color centers the micropulses at the front of the chain are amplified significantly more weakly than subsequent micropulses. It is concluded that passive Q-modulation by short-lived color centers in neodymium glass lasers results mainly from destruction by emission from the neodymium. Author

N86-24377# Joint Publications Research Service, Arlington, Va.
THRESHOLD CONDITIONS FOR IGNITION AND PROPAGATION OF OPTICAL DISCHARGE IN NEODYMIUM LASER BEAM Abstract Only **c36**
I. A. Bufetov, A. M. Prokhorov, V. B. Fedorov, and V. K Fomin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 38 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 96-102

(For primary document see N86-24358 14-70)
Avail: NTIS HC A06

This study describes the experimental investigation of an optical discharge maintained by neodymium laser radiation. The development of the discharge was investigated by high speed photography of the plasma glow. The length of the discharge was determined as a function of the propagation time and velocity of the discharge fronts. The power of the incident radiation and the radiation passing through the discharge were recorded and used to find the coefficient of absorption of the plasma. It was found that the temperature of the discharge plasma is the same for all investigated diameters near the propagation threshold, because of the abrupt reduction in the stream of plasma radiation that moves the front of the discharge. The power absorbed by the discharge and the discharge plasma temperature are found to depend little upon the intensity of the incident radiation for intensities above the threshold because of the rapid drop in absorption in the plasma as the intensity increases. It is found that an optical discharge at lambda = 1.06 micro m can be sustained with powers of the order of 0.1 MW. Such low discharge thresholds make it possible to use them to obtain neodymium lasers with lasing parameters easily achievable at present. Author

N86-24378# Joint Publications Research Service, Arlington, Va.
MHD OSCILLATIONS ON PERIPHERY OF PLASMA FILAMENT IN L-2 STELLARATOR DURING OHMIC HEATING Abstract Only c75
S. Ye. Grebenshchikov, B. I. Kornev, and S. V. Shchepetov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 41 Transl. into ENGLISH from Akademiya Nauk SSSR, Inst. Obshchey Fiziki (Moscow, USSR), 1984 (For primary document see N86-24358 14-70)
(Preprint-178) Avail: NTIS HC A06

Fluctuations of the poloidal magnetic field in the L-2 stellarator in ohmic plasma heating modes are investigated experimentally. The field fluctuations were measured by a system of magnetic probes placed near the exterior surface of the vacuum discharge chamber. The measurements were processed automatically by computing the cross-correlation functions of the probe signals and performing Fourier-series expansion. The current density perturbations are found to be of the spiral mode (m,n) type. The poloidal and toroidal numbers of the perturbations are relatively large, and depend upon the ohmic heating current and the small radius of the plasma. The experimental findings are in complete accord with contemporary theoretical conceptions of the principles underlying the dynamics of resistive MHD instabilities in stellarators. Author

N86-24379# Joint Publications Research Service, Arlington, Va.
ROTATIONAL-VIBRATIONAL RESONANCES IN ELECTRON TRANSITION SPECTRA OF XeCl MOLECULES Abstract Only c72
N. G. Basov, I. S. Gorban, V. A. Danilychyev, N. C. Zubrilin, and M. G. Chernomorets *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 42 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 1, Mar. 1985 p 64-66 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The rotational structure of the energy spectrum of XeCl molecules is established, providing new information on the dynamic properties of the XeCl molecule and to measure the parameters of the potential X-state function and more accurately. The spontaneous luminescence and induced radiation spectra were obtained on two different systems - a beam system and an electric discharge system. The fine structure of the electron-vibrational bands in the spectra of spontaneous and induced emission of XeCl molecules is detected. The spectroscopic characteristics of the structure indicate the occurrence of resonant interaction between vibrational and rotational modes in the lower electron state. Author

N86-24380# Joint Publications Research Service, Arlington, Va.
INELASTIC INTERACTIONS OF HIGH ENERGY HADRONS WITH NUCLEONS AND NUCLEI OF PHOTOEMULSION AND THE CLUSTERIZATION PHENOMENON Abstract Only c73
Marianna Ivanovna Tretyakova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 45 Transl. into ENGLISH from Akademiya Nauk SSSR Ordena Lenina Fizicheskiy Inst. Imeni P. N. Lebedeva (Moscow, USSR), 1984 p 3-48 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The multiple generation of particles is investigated experimentally in inelastic collisions of hadrons (protons and ions) with hadrons and nuclei in the region of accelerator energies (10-400 Gev) and cosmic rays 10 to the 3rd power - 10 to the 3rd power Gev by the nuclear photoemulsion method. Extensive information is obtained on the characteristics of inelastic interactions of hadrons over a wide range of proton and pi-meson energies. The total material analyzed comprised approximately 50,000 stars found along the trails of primary particles over a total length of about 18 km. Unique information is obtained on the multiperipheral cluster nature of inelastic processes in elementary events and on the space-time development of the formation of secondary particles and hadron structure, thus providing new information on the properties of strong interaction of elementary particles. Author

N86-24381# Joint Publications Research Service, Arlington, Va.
COMPLETE INTERACTION CROSS-SECTIONS OF ULTRACOLD NEUTRONS WITH GASEOUS DEUTERIUM Abstract Only c73
Ye. Z. Akhmetov, V. N. Barshentsev, M. M. Kadykenov, D. K. Kaipov, M. D. Kaipov, and N. K. Kospanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 46 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR: Seriya Fiziko-Matematicheskaya (Alma-Ata, USSR), no. 6, Nov. - Dec. 1984 p 1-2 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The complete interaction cross-sections of ultracold neutrons moving at velocities of from 3.2 to 5.7 m/sec with gaseous deuterium are measured at 300 K (in an equilibrium mixture consisting of one-third paradeuterium and two-thirds orthodeuterium). The complete cross-sections are also analyzed for an equilibrium mixture of ortho- and para-modifications of deuterium as a function of temperature for average ultracold neutron velocity of 4.8 m/sec. The measurement results confirm the calculated cross-sections. Author

N86-24382# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL INVESTIGATION OF RADIATION SCATTERING BY MULTICOMPONENT POLYDISPERSE SYSTEMS OF PARTICLES Abstract Only c74
F. B. Yurevich, G. M. Yatskevich, V. A. Fogelev, and S. M. Karas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 48 Transl. into ENGLISH from Teplofizika Vysokikh Temperatur (Moscow, USSR), v. 22, no. 6, Nov. - Dec. 1984 p 1146-1151 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

An experimental setup is described for finding the relationship between the optical properties of heat protective materials on radiation wavelength, fractional composition, temperature, component concentration and other parameters. The optical properties of a three-component gas-and-dust mixture containing 36% carbon, 32% magnesium oxide and 32% silicon dioxide by weight are studied. The experimental method and software employed are described in detail. The optical properties of the gas-and-dust mixture were measured at disperse phase temperatures of 300 and 1200 K; cold-jet sounding was performed at lambda = 0.633 micrometers, and hot-jet at lambda = 0.488 micrometers. The scattering index for forward scattering is found to agree satisfactorily with the calculated values; the agreement is not as good for the Sc lambda criterion or the coefficient of asymmetry eta lambda, which confirms the suitability of the spherical particles model and the method for determining the characteristic dimensions of the

particles. The complex index of refraction is found to influence the effectiveness of screening radiation by a gas mixture through angular energy redistribution. Author

N86-24383# Joint Publications Research Service, Arlington, Va.
DIFFRACTION OF LIGHT BY ULTRASOUND IN OPTICALLY ACTIVE UNIAXIAL CRYSTALS Abstract Only c74
G. Ye. Zilberman, L. F. Kupchenko, and G. F. Goldvyanskaya *In its* USSR Report Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 51 Transl. into ENGLISH from Radiotekhnika I Elektronika (Moscow, USSR), v. 29, no. 12, Dec. 1984 p 2449-2454 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The diffraction of light by ultrasound is examined in uniaxial crystals exhibiting optical activity for small angles between the incident wave and the axis of the crystal (where optical activity masks diffraction phenomena) and for angles of the order of Bragg angles. Expressions are found for the fundamental and diffraction components of a light field. New Bragg angles are found that lie in the interval between the ordinary angles occurring for epsilon sub c = 0. The new Bragg angles observed differ significantly from the old values for gyration tensor component values that exceed the values for TeO2 by factors of several hundred. The nonmutual effect in the acoustic field is described; it is found that optical activity apparently does not change the order of nonmutuality. Author

N86-24384# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF DESIGN PARAMETERS OF PARABOLIC MIRROR SEGMENT ON IMAGE CHARACTERISTICS IN COHERENT OPTICAL PROCESSING SYSTEM Abstract Only c74
Ye. A. Dudkina *In its* USSR Report Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 59 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 7, Jul. 1984 p 26-27 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The relationship between the design parameters of parabolic mirror segments and the characteristics of the processed image in a coherent optical processing system are investigated in order to assess the influence of individual factors (such as the wavelength of the radiation, the diameter the image being processed and the focal length of the parabolic mirror) on the image quality in the spectral plane. Formulas are derived for assessing this influence that can also be used to solve the inverse problem of finding the design parameters of the parabolic mirror and its accuracy requirements on the basis of the requirements for the image quality in the spectral plane and the characteristics of the processed image. Author

N86-24385# Joint Publications Research Service, Arlington, Va.
LASER RADIATION WAVEFRONT CONJUGATION IN FIBER OPTIC LIGHTGUIDES Abstract Only c74
A. A. Chertkov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 61 Transl. into ENGLISH from Pisma V. Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 10, no. 23, 12 Dec. 1984 p 1214-1420 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

Wavefront conjugation precision during stimulated brillouin scattering is investigated in a monofiber with spatially homogeneous and inhomogeneous beams at lambda = 106 micrometer. A Q-modulated YAG:Nd sup 3+ laser with initial transmission of 25% was employed as the radiation source. The energy of the incident and reflected radiation was measured by means of F-28 photoelements outputting their signals to an S8-12 oscilloscope. The behavior of the coefficient of reflection from the stimulated Brillouin scattering mirror as a function of the amount by which the pumping energy exceeded the threshold was found to be the same for all types of fibers, and to be independent of astigmatism and angular beam divergence. The wavefront conjugation quality as a function of the energy level was also the same for all of the lightguides employed: quartz, silicate and silicate-quartz. The good wavefront conjugation observed for astigmatic and spatially inhomogeneous beams make it possible to compensate satisfactorily for inhomogeneities in the distorting wavefront of the beam. Author

N86-24386# Joint Publications Research Service, Arlington, Va.
MAGNETIC REARRANGEMENT AND CHANGE IN PLASMA CONCENTRATION DURING DISRUPTION OF CURRENT LAYER Abstract Only c75
S. Yu. Bogdanov, G. V. Dreyden, I. I. Komissarova, V. S. Markov, G. V. Ostrovskaya, Yu. I. Ostrovskiy, V. N. Filippov, A. G. Frank, A. Z. Khodzhayev, and Ye. N. Shedova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 65 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), 1984 (For primary document see N86-24358 14-70)
(Preprint-179) Avail: NTIS HC A06

The rapid breakdown of a plane current layer is investigated experimentally. Measurements of the magnetic field in the vicinity of the current layer, and of the electron concentration therein, are used to find the structure of the magnetic field, the spatial distributions of the current density, the current velocity and the average transverse particle energy in the layer, as well as their behavior over time. The magnetic field structure and current distribution within the layer are analyzed. Changes in the electron concentrations during successive stages of evolution of the current layer are explained. It is found that the abrupt breakdown of the current layer is a complex process, during which numerous characteristics change abruptly: the structure of the magnetic field and the geometry of the layer, the conductivity of the plasma, the current velocity and the characteristic energy of the particles. The process occurs in two stages. Author

N86-24387# Joint Publications Research Service, Arlington, Va.
NUMERICAL MODELING OF UNIDIMENSIONAL QUASILINEAR RELAXATION OF RELATIVISTIC ELECTRON BEAM IN INHOMOGENEOUS PLASMA WITH COLLISIONS Abstract Only c75
K. G. Gureyev, M. G. Nikulin, and A. B. Sionov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 68 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 215-217 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

A numerical solution is found to the problem of unidimensional quasilinear relativistic electron beam relaxation in an inhomogeneous plasma with collisions, making it possible to track the dynamics of the process and to establish the system parameter values for which the electron collisions and longitudinal inhomogeneity of the plasma density retard the beam relaxation significantly, thus increasing the transport length. The results of a calculation for an initial angular dispersion of the beam particles of 0.1 and thermal noise with spectral energy density of 10 to the minus 4 power are presented. Author

N86-24388# Joint Publications Research Service, Arlington, Va.
ESTIMATES OF NUMBER OF BOOLEAN COMPARISON OPERATIONS FOR ORDER STATISTICS Abstract Only c65
V. V. Ivanov and V. N. Korzhova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 76 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR. Seriya A. Fiziko-Matematicheskiye I Tekhnicheskiye Nauki (Kiev, USSR), no. 3, Mar. 1985 p 59-62 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

An algorithm is investigated for finding the k-smallest sample for which the average number of Boolean (bit by bit) comparison operations is found asymptotically with respect to N, ranging from N to rho N, as a function of the distribution of the sample (where N is the sample size); the sample of numbers is assumed to be assigned as an array of nonnegative rho-bit binary integers. The first digit of the array of N numbers is compared, after which the entire array is then divided into two parts, one of which contains

the numbers with zero as the high-order (first) bit, and the other with 1. The arrays are then arranged in order from 1 to N, with the array having a first digit of 1 being the lowest. The sought digit is that occurring in the kth place. After rho steps, the k-smallest number will be in the kth place. Author

N86-24389# Joint Publications Research Service, Arlington, Va.
DEGREE OF DYNAMIC CORRELATION AND THE PROBLEM OF DETERMINING THE DYNAMIC NATURE OF RANDOM PROCESSES Abstract Only c65
Yu. A. Kravtsov and V. S. Etkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) p 80 Transl. into ENGLISH from Radiotekhnika I Elektronika (Moscow, USSR), v. 29, no. 12, Dec. 1984 p 2358-2364 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

The property of partial predictability of processes generated by autostochastic systems is analyzed. The generally accepted characteristic of predictability--the mean square difference between the observed and predicted processes--is employed in conjunction with a new statistical characteristic--the degree of dynamic correlation, which is characterized by the degree of statistical connection between the prediction and observation. It is shown that autostochastic systems admit prediction over a finite amount of time called the dynamic memory time. The latter is a new characteristic time of the strange attractor which is determined by instrumentation noise and random internal signals and which determines the interval of determinate (predictable) behavior of the system and can be used to discover the dynamic nature of random processes. The error in predicting autostochastic systems subjected to random forces, and the error for systems with exponential trajectory divergence are estimated. The use of the degree of dynamic correlation to discover the structure of dynamic systems is analyzed. Author

N86-23839# National Bureau of Standards, Gaithersburg, Md. Electronic Instrumentation and Metrology Electrosystems Div.
SETTLING TIME MEASUREMENTS
Howard K. Schoenwetter *In its* Digital Methods in Waveform Metrology Oct. 1985 p 87-108 refs (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 20C

N86-23842# National Bureau of Standards, Gaithersburg, Md. Electrosystems Div.
AN APPROACH TO ATE CALIBRATION VIA PERFORMANCE VERIFICATION AT THE SYSTEM INTERFACE
Thomas F. Leedy *In its* Digital Methods in Waveform Metrology Oct. 1985 4 p refs Presented at the Measurement Science Conference, 17-18 Jan. 1985 Submitted for publication (For primary document see N86-23833 14-33)
Avail: NTIS HC A09/MF A01 CSCL 20C

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-24390 California Univ., San Diego.
DEEP SEAFLOOR ACOUSTIC BACKSCATTERING MEASUREMENTS USING SEA BEAM Ph.D. Thesis
Christian deMoustier 1985 160 p
Avail: Univ. Microfilms Order No. DA8524565

Multibeam echo-sounders such as Sea Beam allow detailed bathymetric surveys of large areas of the seafloor. However, bathymetry only reveals the shape of seafloor features to the resolution of the sounding system, and in order to make geological interpretations the nature of the seafloor surveyed needs to be characterized. Because bottom roughness and/or variations in bottom substrate cause fluctuations in the backscattered acoustic signal received by an echo-sounder, such characteristics can be inferred in part by analyzing the structure and the variations of this signal over several transmission cycles. The approach taken was to record digitally the detected echo envelopes of the Sea Beam's 16 narrow beams over a variety of seafloor environments, and process these data to determine whether the acoustics held enough information to differentiate between bottom types. Significant results derived from these acoustic data concern the Sea Beam system's performance, its potential for mapping acoustic boundaries, and the display of the echoes received in a side looking sonar-like picture. Dissert. Abstr.

N86-24391*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTRODUCTION TO TIME SERIES ANALYSIS
Jay C. Hardin Mar. 1986 168 p refs
(NASA-RP-1145; L-15958; NAS 1.61:1145) Avail: NTIS HC A08/MF A01 CSCL 20A

The field of time series analysis is explored from its logical foundations to the most modern data analysis techniques. The presentation is developed, as far as possible, for continuous data, so that the inevitable use of discrete mathematics is postponed until the reader has gained some familiarity with the concepts. The monograph seeks to provide the reader with both the theoretical overview and the practical details necessary to correctly apply the full range of these powerful techniques. In addition, the last chapter introduces many specialized areas where research is currently in progress. Author

N86-24392*# Bionetics Corp., Hampton, Va.
THE RELATIVE EFFECT OF NOISE AT DIFFERENT TIMES OF DAY: AN ANALYSIS OF EXISTING SURVEY DATA
James M. Fields Washington NASA Apr. 1986 80 p refs
(Contracts NAS1-16978; DTFA01-834-10564)
(NASA-CR-3965; NAS 1.26:3965) Avail: NTIS HC A05/MF A01 CSCL 20A

This report examines survey evidence on the relative impact of noise at different times of day and assesses the survey methodology which produces that evidence. Analyses of the regression of overall (24-hour) annoyance on noise levels in different time periods can provide direct estimates of the value of the parameters in human reaction models which are used in environmental noise indices such as LDN and CNEL. In this report these analyses are based on the original computer tapes containing the responses of 22,000 respondents from ten studies of response to noise in residential areas. The estimates derived from these analyses are found to be so inaccurate that they do not provide useful information for policy or scientific purposes. The possibility that the type of questionnaire item could be biasing the estimates of the time-of-day weightings is considered but not supported by the data. Two alternatives to the conventional noise reaction model (adjusted energy model) are considered but not supported by the data. Author

N86-24393*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONSIDERATION OF SOME FACTORS AFFECTING LOW-FREQUENCY FUSELAGE NOISE TRANSMISSION FOR PROPELLER AIRCRAFT
John S. Mixson and Louis A. Roussos Apr. 1986 28 p refs
(NASA-TP-2552; L-14994; NAS 1.60:2552) Avail: NTIS HC A03/MF A01 CSCL 20A

Possible reasons for disagreement between measured and predicted trends of sidewall noise transmission at low frequency are investigated using simplified analysis methods. An analytical model combining incident plane acoustic waves with an infinite flat panel is used to study the effects of sound incidence angle, plate structural properties, frequency, absorption, and the difference between noise reduction and transmission loss. Analysis shows that these factors have significant effects on noise transmission but they do not account for the differences between measured and predicted trends at low frequencies. An analytical model combining an infinite flat plate with a normally incident acoustic wave having exponentially decaying magnitude along one coordinate is used to study the effect of a localized source

distribution such as is associated with propeller noise. Results show that the localization brings the predicted low-frequency trend of noise transmission into better agreement with measured propeller results. This effect is independent of low-frequency stiffness effects that have been previously reported to be associated with boundary conditions. Author

N86-24394*# DSMA Engineering Corp., Orlando, Fla.
MODIFICATIONS TO THE 4x7 METER TUNNEL FOR ACOUSTIC RESEARCH: ENGINEERING FEASIBILITY STUDY Final Report
Mar. 1986 83 p refs
(Contract NAS1-17892)
(NASA-CR-178079; NAS 1.26:178079; Rept-4054/R128) Avail: NTIS HC A05/MF A01 CSCL 20A

The NASA-Langley Research Center 4 x 7 Meter Low Speed Wind Tunnel is currently being used for low speed aerodynamics, V/STOL aerodynamics and, to a limited extent, rotorcraft noise research. The deficiencies of this wind tunnel for both aerodynamics and aeroacoustics research have been recognized for some time. Modifications to the wind tunnel are being made to improve the test section flow quality and to update the model cart systems. A further modification of the 4 x 7 Meter Wind Tunnel to permit rotorcraft model acoustics research has been proposed. As a precursor to the design of the proposed modifications, NASA is conducted both in-house and contracted studies to define the acoustic environment within the wind tunnel and to provide recommendations or the reduction of the wind tunnel background noise to a level acceptable to acoustics researchers. One of these studies by an acoustics consultant, has produced the primary reference documents that define the wind tunnel noise sources and outline recommended solutions. Author

N86-24395# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ON DETECTION OF NUMBER OF SIGNALS IN PRESENCE OF COLORED NOISE USING INFORMATION THEORETIC CRITERIA
L. C. Zhao, P. R. Krishnaiah, and Z. D. Bai Oct. 1985 36 p
(Contracts N00014-85-K-0292; F49620-85-C-0008)
(AD-A161847; TR-85-39; AFOSR-85-1131TR) Avail: NTIS HC A03/MF A01 CSCL 09/4

Information theoretic criteria are proposed for detection of the number of signals when the noise is colored. The strong consistency of these criteria is also established. GRA

N86-24396# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
MEASUREMENT OF SOUND PROPAGATION, DOWN SLOPE TO A BOTTOM-LIMITED SOUND CHANNEL
William M. Carey, I. Gereben, B. A. Brunson, and M. R. Bradley Aug. 1985 46 p Presented at the 109th Meeting of the Acoustical Society of America, Austin, Tex., 8-12 Apr. 1985
(AD-A161855) Avail: NTIS HC A03/MF A01 CSCL 20/1

Signal transmission loss and spatial coherence data for source-receiver separations between 100 and 250 km were acquired in the Gulf of Mexico with a calibrated seismic measurement system (400 m deep), a towed projector (100 m deep) which emitted 67 and 173 Hz tones, and a moored Webb sound source at 988 m depth driven at 175 Hz. Environmental data such as the range dependent bathymetry and sound velocity profiles were measured. GRA

N86-24397# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia).
A TWO-ENDED SHOOTING TECHNIQUE FOR CALCULATING NORMAL MODES IN UNDERWATER ACOUSTIC PROPAGATION
Dale D. Ellis Sep. 1985 45 p
(AD-A161965; DREA-85/105) Avail: NTIS HC A03/MF A01 CSCL 20/1

An algorithm for the calculation of acoustic normal modes in the ocean is described. The algorithm is valid for an arbitrary sound speed and density profile in the water column and bottom. Losses due to volume absorption in the water and bottom, surface and bottom roughness, and shear waves in the bottommost layer can be calculated as perturbations. The essential feature of the algorithm is a two-ended shooting method in which the trial solution is started separately at the surface and bottom and numerically integrated to a matching depth in the middle, usually near the minimum sound speed. The trial solution is iterated until a continuous function with a continuous derivative is obtained. Shooting from both ends results in a more stable algorithm and gives more accurate eigenfunctions than are obtained using conventional single-ended shooting methods. For completeness, equations are given for calculating group velocities, propagation loss in a range-dependent environment, and losses due to volume absorption, surface and bottom roughness, and shear waves in the bottommost layer. GRA

N86-24398# Naval Postgraduate School, Monterey, Calif.
PARAMETRIC ANALYSIS OF ECHOSOUNDER PERFORMANCE M.S. Thesis
Robert J. Fuller Sep. 1985 156 p
(AD-A162138) Avail: NTIS HC A08/MF A01 CSCL 20/1

An echosounder is used to probe various atmospheric parameters. An acoustic wave is transmitted into the atmosphere and information deduced from the backscattered energy. This thesis seeks to understand the range limitations of the echosounder and to explore methods to quantify atmospheric turbulence parameters at a given range. The propagation of the acoustic energy, including the effects of excess attenuation, are modeled to predict the performance of an echosounder when various parameters are changed. The electronics of an existing echosounder are investigated to understand inherent or design limitations. Author (GRA)

N86-24399# Air Force Geophysics Lab., Hanscom AFB, Mass.
VIBRO-ACOUSTIC FORECASTS FOR STS (SPACE TRANSPORTATION SYSTEM) LAUNCHES AT V23, VANDENBERG AFB: RESULTS SUMMARY AND THE PAYLOAD PREPARATION ROOM
James C. Battis 8 May 1985 85 p
(AD-A162192; AFGL-TR-85-0133; AFGL-ERP-922) Avail: NTIS HC A05/MF A01 CSCL 22/4

The launch induced vibro-acoustic environments have been forecast for several Ground Support System structures at V23, the STS launch facility at Vandenberg, AFB. These forecasts are based on site particular vibration and pressure responses determined by an explosive sounding program conducted at V23. The responses are coupled with an STS acoustic pressure term established by measurement of STS launches at KSC. This report provides a summary of the results of this effort and provides the forecasts for the vibration environment in the PPR. Motion levels in the PPR are found to be substantially below all levels of concern. However, companion studies have shown that high accelerations can be anticipated in the OFS Room and the PCR. In addition, pounding could occur between PCR and PPR. Strong reverberations on acoustic records from V23 indicate that launch overpressures at V23 will be significantly altered from those at KSC for the shuttle at altitude and clear of the ground. Finally, the potential of pounding due to earthquake ground motions is discussed. GRA

N86-24400# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN ULTRASONIC DEVICE FOR SIGNAL PROCESSING
S. V. Kulakov, A. G. Leks, S. P. Semenov, and G. K. Ulyanov 15 Nov. 1985 6 p Transl. into ENGLISH of Russian Patent 341 121 (6 Jun. 1972) p 1-2
(AD-A162368; FTD-ID(RS)T-1610-84) Avail: NTIS HC A02/MF A01 CSCL 20/1

The invention concerns the field of analog processing of the signals of phased antenna arrays in sonar and radar. The ultrasonic signal processor announced in USSR Patent 319986 does not eliminate spurious signals. In the present device, in order to remove spurious signals, the polygon is in the form of a piezoceramic plate, at one side of which the electrodes of a retransmitting

array and the electrodes of a counting array are jointly deposited, while the edges of this side are covered with an absorber of ultrasonic surface waves. GRA

N86-24401# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN ULTRASONIC DEVICE FOR SIGNAL PROCESSING
S. V. Kulakov, A. G. Leks, S. P. Semenov, and G. K. Ulyanov 15 Nov. 1985 6 p Transl. into ENGLISH of Russian Patent 319 986 (2 Nov. 1971) p 1-2
(AD-A162369; FTD-ID(RS)T-1567-84) Avail: NTIS HC A02/MF A01 CSCL 20/1

The invention concerns the field of radioengineering and can be used in analog processors of the signals of phased antenna arrays. There are familiar devices for processing the signals of phased antenna arrays. However these are large in size, structurally complicated, and contain expensive parts. In the proposed device, for the purpose of simplification and cheapening the design and reducing the dimensions, the counting system is in the form of a receiving acoustical array, the elements of which are hooked up to a television-type indicator. GRA

N86-24402# Naval Submarine Medical Center, Groton, Conn.
HEARING AND UNDERWATER NOISE EXPOSURE Final Report
Paul F. Smith 27 Aug. 1985 26 p
(AD-A162380; NSMRL-923) Avail: NTIS HC A03/MF A01 CSCL 06/10

Exposure of divers to intense noise in water is increasing, yet there is no general hearing conservation standard for such exposures. This paper reviews three theories of underwater hearing as well as empirical data in order to identify some requirements that an underwater conservation standard must meet. Among the problems considered are hearing sensitivity in water, the frequency and dynamic ranges of the water-immersed ear, and nonauditory effects of underwater sound. It is concluded that: first, no well developed theoretical basis exists for extrapolating hearing conservation standards for airborne noise to the underwater situation; second, the empirical data on underwater hearing suggest that the frequency range covered by an underwater hearing conservation standard must be broader than is the case in air; third, in order to establish a general hearing conservation standard for underwater noise exposure further research is required on the dynamic range of the ear in water; fourth, underwater noise exposure may involve hazards to other body systems than the ear; and fifth, some exposure conditions may interfere with job performance of divers. GRA

N86-24403# Weston Observatory, Mass.
ACOUSTIC FORECAST FOR SHUTTLE LAUNCHES AT VANDENBERG AFB
Francis A. Crowley 13 Nov. 1985 6 p Presented at the AIAA Shuttle Environment and Operations 2 Meeting, Houston, Tex., 13-15 Nov. 1985 Previously announced in IAA as A86-14397
(Contract F19628-84-C-0011)
(AD-A162862; AFGL-TR-85-0335; SR-3) Avail: NTIS HC A02/MF A01 CSCL 20/1

Acoustic loads on ground support structures for Shuttle launches at Vandenberg AFB are forecast in a way that satisfies local reverberations. Acoustic spectra at points neighboring the Vandenberg Launch Mount are expected to be enhanced by as much as 15 db by site specific acoustics. Simulated launch loads on the east face of the Payload Preparation Room have a maximum overall sound power level of 156 db. The corresponding sound power maximum for the same averaging time, bandwidth and distance at Kennedy Space Center over a path free of reverberations and ground water cloud attenuation is 149 db. The peak pressure on the Payload Preparation Room after 10 launches is predicted to be 165 db. After a lifetime of 100 launches, peak pressure on the facility is expected to reach 167 db. GRA

N86-24404# Florida Inst. of Tech., Melbourne.
FERROFLUID HYDROACOUSTIC PROJECTOR Final Report, Sep. 1980 - Dec. 1983
Mark S. Ptak and Pieter S. Dubbelday 30 Nov. 1985 57 p
(Contract N00014-80-C-0932)
(AD-A163077; NRL-MR-5644) Avail: NTIS HC A04/MF A01 CSCL 20/1

A hydroacoustic projector has been constructed with a ferrofluid as the magneto-acoustic transduction material. It has a toroidal shape; a dc magnetic bias field magnetizes the particles, and an ac field causes bulk movement of the fluid inside the toroid, as contrasted with magnetostriction. The construction of a prototype projector is described. As predicted by theory, the frequency of the acoustic field without bias field is predominantly double that of the exciting frequency; with bias field the single frequency appears in the acoustic measurements. The experimental results show strong resonances from 10 to 100 Hz. They are tentatively ascribed to flexural resonances in the walls of the tank. Further experiments are needed to definitely rule out other sources of sound not originating in the ferrofluid. GRA

N86-24405# Southampton Univ. (England). Inst. of Sound and Vibration Research.
ACOUSTICALLY COMPACT TRANSIENT SOURCES FOR UNDERWATER MEASUREMENT AND CALIBRATION
J. Nedwell Apr. 1985 42 p ref Sponsored by UK Ministry of Defence Procurement Executive
(ISVR-TR-129) Avail: NTIS HC A03/MF A01

Explosives, rupture diaphragms, exploding bridgewires, hydrophones, and underwater sparks were assessed to develop an acoustically compact source for underwater calibration and measurement. Explosive sources display variations in pressure waveform and are thus not generally suitable for calibration. Rupture diaphragms are not a suitable acoustically compact source for generating transients. Exploding bridgewires are safe, reliable, and repeatable but are best suited to one-off calibration purposes due to the long reloading time. Hydrophones are highly repetitive and stable sources, but suffer from a tendency to oscillation, and produce low acoustic power. Underwater sparks are inherently dangerous due to the high voltages required and emit powerful interference. They are reliable and rapidly repeatable, stable in waveform, but suffer from variations in amplitude. If scaling can be performed, the use of a reference hydrophone may reduce the effect of variations in amplitude. Careful electrode design is required to retain the circular symmetry of the acoustic field. Author (ESA)

N86-24406# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
CHARACTERIZATION OF MICROSTRUCTURES USING ULTRASONICS: A COMPARISON OF THEORY AND EXPERIMENT
C. M. Sayers and R. L. Smith Jul. 1985 10 p refs
(AERE-R-11589) Copyright. Avail: Issuing Activity

The scattering of ultrasound in polycrystalline and two phase materials is discussed. Scattering theory is in good agreement with experiment for discrete inclusions. For a second phase formed by segregation at a grain boundary, the scattering by a spherical shell is considered. This should be applicable to Fe-C alloys, but analysis of the data shows the changes in attenuation to be accounted for by absorption rather than by differences in scattering. This is consistent with the small thickness of the cementite layer. Author

N86-24407# United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
TEXTURE AND STRESS DETERMINATION IN METALS USING ULTRASONIC RAYLEIGH WAVES AND NEUTRON DIFFRACTION
C. M. Sayers, D. R. Allen, G. E. Haines, and G. G. Proudfoot Jul. 1985 31 p refs
(AERE-R-11860) Copyright. Avail: Issuing Activity

Polycrystalline metals often contain significant levels of texture and internal stress. Plastic anisotropy originates from the texture, or crystallographic alignment, and can affect the formability of the metal, whereas the presence of internal stress can seriously limit

the lifetime of a component. In the presence of either texture or stress, the ultrasonic velocity in the material depends on the propagation and polarization directions, and there is considerable interest in exploiting this anisotropy for nondestructive texture and stress determination. An analytical expression for the angular dependence of the Rayleigh wave velocity in polycrystalline metals with small anisotropy typical of rolled plate is given. Surface wave velocity measurements can be combined with the normal shear wave birefringence technique to give a texture independent determination of the difference in principal stresses in the plane of the plate. The theory is tested by comparing ultrasonic measurements on two aluminum plates with the behavior predicted using a neutron diffraction determination of the crystallite orientation distribution function. Author

N86-24408# United Kingdom Atomic Energy Authority, Harwell (England). Theoretical Physics Div.
HARWELL COMPUTER MODELS FOR ULTRASONIC NDT
J. A. Ogilvy and J. A. G. Temple Jun. 1985 66 p refs
(AERE-R-11830) Copyright. Avail: Issuing Activity

A suite of 8 computer programs, created and installed on the Harwell central computer, for modelling various aspects of ultrasonic nondestructive testing are described. The report is not a comprehensive user's guide to the programs since mathematical details of the models are not included. It aims to given an idea of the score of each computer code and improvements which are likely to be made. Details of all the input parameters to the computer codes and examples of job control language for the Harwell machines are given. This should be sufficient information to enable anyone who is interested to try out the codes for their own problems. It is hoped that the codes are of sufficiently wide interest and applicability to be used outside the Atomic Energy Authority (UKAEA). Author

N86-24409# United Kingdom Atomic Energy Authority, Harwell (England). Theoretical Physics Div.
ULTRASONIC WAVE SCATTERING FROM ROUGH DEFECTS: THE ELASTIC KIRCHHOFF APPROXIMATION
J. A. Ogilvy Jun. 1985 80 p refs
(AERE-R-11866) Copyright. Avail: Issuing Activity

The effect of surface roughness on ultrasonic wave scattering from defects is examined theoretically. Far field expressions for the scattered displacement amplitudes are found for both the direct and mode converted signals. Elastic Green's Theorem was used to obtain an explicit representation for the scattered displacements in terms of the unknown displacements and stresses on the defect surfaces when an infinite plane wave is incident. Elastic Kirchhoff theory is used to approximate these unknown fields and the resulting surface integral is evaluated in the far field. The resulting expressions, valid for defects of arbitrary shape, are specialized for the case of a rectangular defect whose surfaces have statistically described roughness. The reflected amplitude is decreased due to the presence of roughness. A greater decrease is noted for scattering involving shear (SV) waves than for compression waves. These effects were quantified and changes in frequency or surface roughness effect the scattering amplitudes were determined. Author

N86-24359# Joint Publications Research Service, Arlington, Va.
AMPLIFICATION OF ACOUSTIC PERTURBATIONS DURING REFLECTION FROM CRITICAL LAYER IN SUPERSONIC FLOWS Abstract Only
P. I. Kolykhalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 1 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 95-98 Original language document was announced in IAA as A85-24181 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-24410# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
PARTICLE DISTRIBUTIONS AND LASER-PARTICLE INTERACTIONS IN AN RF DISCHARGE OF SILANE Interim Report
Kenneth G. Spears, Timothy J. Robinson, and Richard M. Roth 20 Nov. 1985 18 p
(Contract N00014-79-C-0622)
(AD-A161922; TR-9) Avail: NTIS HC A02/MF A01 CSCL 20/9

A capacitively coupled, RF discharge of silane in argon was studied to determine particle distributions by light scattering and particle photophysics. Ultraviolet lasers cause silicon atom formation in both ground and excited states. Atoms were not formed with 354 or 532 nm excitation, but the discharge chemistry was affected by 354 nm excitation. GRA

N86-24411# George Washington Univ., Washington, D.C. Dept. of Chemistry.
THE AUGER LINESHAPE OF GRAPHITE
J. W. Rogers, J. E. Houston, R. R. Rye, R. L. Hutson, and D. E. Ramaker Oct. 1985 6 p
(Contract N00014-80-K-0852; DA Proj. PP0-1308)
(AD-A161959; TR-19) Avail: NTIS HC A02/MF A01 CSCL 07/4

The C KVV Auger lineshape of graphite is quantitatively interpreted. Localization, static and dynamic screening effects, and intrinsic plasmon loss effects are discussed in the context of the theoretical model and found to contribute significantly to the lineshape. Author (GRA)

N86-24412# George Washington Univ., Washington, D.C. Dept. of Chemistry.
AN INTERPRETATION OF THE O2 AUGER ELECTRON SPECTRUM
Hideo Sambe and David E. Ramaker Oct. 1985 23 p
(Contract N00014-80-K-0852; PP0-1308)
(AD-A161960; TR-20) Avail: NTIS HC A02/MF A01 CSCL 07/4

The Auger electron spectrum of O2 is interpreted by comparing with other spectra, such as photoelectron spectrum, the electron impact mass spectrum, and the double charge transfer spectrum. Each of these four spectra obeys their own selection rules; the difference in the selection rules plays a key role in our interpretation. Auger decays following a core shake-up excitation are identified for the first time. Many of the previous assignments are revised. GRA

N86-24413# General Electric Co., Schenectady, N. Y.
DETERMINATION OF ELECTRONIC AND ATOMIC STRUCTURAL PARAMETERS DURING FAST ION TRANSPORT Final Report, 1 Jul. 1983 - 30 Nov. 1985
F. W. Lytl and T. R. Beck Nov. 1985 21 p Prepared in cooperation with Boeing Co., Seattle, Wash.
(Contract N00014-83-C-0620)
(AD-A161977; FR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

X-ray absorption spectroscopy was used to determine the valence state and local structure in a vanadium bronze and a tungsten bronze series of fast ion conducting materials. The structure parameters confirm previous X-ray diffraction results; however, the direct determination of valence state(s) is a unique result. X-ray methods appear to offer real advantages for in situ characterization. X-ray absorption spectroscopy is able to single out each different kind of element in a complex material because the core-level absorption edges are well separated in energy. The region near the absorption edge, X-ray absorption near edge structure (XANES) contains information on the valence state and local symmetry of the absorbing atom. The etended X-ray absorption fine structure (EXAFS) above the absorption edge is caused by scattering of the ejected photoelectron and may be used to determine near neighbor structural parameters. GRA

N86-24414# George Washington Univ., Washington, D.C. Dept. of Chemistry.
THE RELATIONSHIP BETWEEN THE AUGER LINESHAPE AND THE ELECTRONIC PROPERTIES OF GRAPHITE
J. E. Houston, J. W. Rogers, R. R. Rye, F. L. Hutson, and David E. Ramaker Oct. 1985 28 p Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contracts N00014-80-K-0852; DE-AC04-76DP-00789; PP0-1308)
(AD-A162042; TR-24) Avail: NTIS HC A03/MF A01 CSCL 07/4

The experimental carbon Auger lineshape corrected for the effects of the secondary-electron background and extrinsic losses and placed on an absolute energy scale through the use of photoelectron measurements. The resulting lineshape is compared to a model which consists of the self-convolution of the graphite one-electron density of states, including atomic values for the symmetry determined Auger matrix elements. A poor comparison results from this simple model which is considerably improved by the inclusion of dynamic initial-state screening effects. Further improvements results from accounting for final-state hole-hole interactions. The final state is characterized by effective hole-hole interaction energies of 2.2 eV, corresponding to two holes in the sigma band, 1.5 eV for one hole in the sigma and one in the pi band, and 0.6 eV for both holes in the pi band. The remaining discrepancies in our model comparison are suggested to be due to a plasmon emission intrinsically coupled to the Auger final state. GRA

N86-24415# George Washington Univ., Washington, D.C. Dept. of Chemistry.
MECHANISMS FOR EXCITED NEUTRALS AND NEGATIVE AND POSITIVE ION DESORPTION FROM SURFACES
David E. Ramaker Oct. 1985 12 p
(Contract N00014-80-K-0852; PP0-1308)
(AD-A162043; TR-18) Avail: NTIS HC A02/MF A01 CSCL 07/5

In this review we summarize and generalize the results of a recent detailed comparative investigation of OH*, OH+, and H+ desorption from OH/TiO2, H2O(s), and H2O(g), and O- and O+ desorption from O/W and O/Mo(10). Two mechanisms for O- and OH* desorption have been proposed which were not revealed in the positive ion desorption yields. These additional electron attachment mechanisms are placed in the context of the previously proposed ionic desorption mechanisms and are discussed in detail. GRA

N86-24416# George Washington Univ., Washington, D.C. Dept. of Chemisty.
A CONSISTENT QUANTITATIVE INTERPRETATION OF THE AUGER LINESHAPES OF CARBON IN MOLECULES AND SOLIDS
David E. Ramaker and F. L. Hutson Oct. 1985 7 p
(Contract N00014-80-K-0852; PP0-1308)
(AD-A162044; TR-25) Avail: NTIS HC A02/MF A01 CSCL 07/4

In this work we have theoretically interpreted the C KVV Auger lineshapes for benzene and cyclohexane in a procedure consistent with that used previously for graphite and diamond. The one-electron density of states are obtained empirically and localization effects are included within the Cini-Sawatzky model. The empirically determined final state hole-hole repulsions are seen to be very similar to those obtained for the corresponding solids. GRA

N86-24417# George Washington Univ., Washington, D.C. Dept. of Chemistry.
DESORPTION OF EXCITED NEUTRALS FROM SURFACES VIA AN ELECTRON ATTACHMENT MECHANISM
David E. Ramaker Oct. 1985 14 p
(Contract N00014-80-K-0852; PP0-1308)
(AD-A162045; TR-23) Avail: NTIS HC A02/MF A01 CSCL 07/5

A detailed comparative investigation of OH and OH+ desorption from OH/TiO2, H2O(s), and H2O(g) indicates four different mechanisms are responsible for the OH desorption. Two of these involve a resonant excitation-dissociative attachment-mechanism. The other two mechanisms involve non-resonant excitation or ionization processes similar to that responsible for the OH+ desorption. GRA

N86-24418# George Washington Univ., Washington, D.C. Dept. of Chemistry.
DYNAMIC CORE-HOLE SCREENING EFFECTS IN THE C(KVV) AUGER LINESHAPE OF GRAPHITE
J. E. Houston, David E. Ramaker, J. W. Rogers, R. R. Rye, and F. L. Hutson Oct. 1985 8 p
(Contract N00014-80-K-0852; PP0-1308)
(AD-A162046; TR-22) Avail: NTIS HC A02/MF A01 CSCL 07/4

Evidence is presented for the presence of a shakedown satellite near threshold in the C(KVV) Auger spectrum of graphite. Its origin is shown to be an electron in a relatively long-lived valence/core excitonic level (populated as a result of dynamic core-hole screening) which participates in the Auger decay. Modeling the shakedown contribution considerably improves agreement in the threshold region between the experimental lineshape and a simple one-electron model. GRA

N86-24419# Physical Sciences, Inc., Andover, Mass.
KINETICS OF IODINE MONOFLUORIDE EXCITATION BY ENERGETIC NITROGEN Final Report, 16 Jun. 1983 - 16 Aug. 1984
Laurence G. Piper, W. J. Marinelli, B. D. Green, W. T. Rawlins, and H. C. Murphy Oct. 1985 112 p
(Contract F29601-83-C-0051)
(AD-A162085; PSI-051/TR-460; AFWL-TR-84-156) Avail: NTIS HC A06/MF A01 CSCL 07/4

We studied the production and loss of IF (Iodine MonoFluoride) in our flow system using a laser-induced fluorescence diagnostic for measuring IF number densities. We related the production of F-atoms to the residence time of CF4 in the microwave discharge and found a yield of about 0.3 F-atoms per CF4 molecule under typical operating conditions. We identified flow conditions that produce complete reaction of CF3I in the injector and showed that a negligible amount of IF is destroyed in the injector under these conditions. Some loss of IF in the main flow tube was found at low flow velocities; however, this loss appeared to be negligible at higher velocities and permitted us to operate in a regime where IF number densities were directly related to the amount of CF3I flowing into the injector. We also found that operation of the injector using excess CF3I resulted in the deposition of an optically opaque thin film on the reactor walls. This required us to operate in excess F-atoms and eliminated the need to measure absolute F-atom number densities. GRA

N86-24420# George Washington Univ., Washington, D.C. Dept. of Chemistry.
AN INTERPRETATION OF THE N2 PHOTOELECTRON SPECTRUM
Hideo Sambe and David E. Ramaker Oct. 1985 12 p
(Contract N00014-80-K-0852)
(AD-A162103; TR-21) Avail: NTIS HC A02/MF A01 CSCL 07/4

The inner-valence (20-36eV) photoelectron spectrum of N2 is interpreted by comparing with various spectra (such as absorption, N(+) yield, fluorescence-yield, and core-level photoelectron spectra) and with previously published theoretcal calculations. This empirical interpretation allows for unique assignments, and enables us to distinguish between the four previously published theoretical calculations which lead to inconsistent assignments. GRA

N86-24421# State Univ. of New York, Buffalo. Dept. of Chemistry.
THERMALIZATION IN MULTIPHOTON EXCITATION OF MOLECULES Interim Technical Report
Xi-Yi Huang and Thomas F. George Nov. 1985 13 p
(Contract N00014-80-C-0472)

(AD-A162113; UBUFFALO/DC/85/TR-71) Avail: NTIS HC A02/MF A01 CSCL 07/4

The thermalization of coherent multiphoton excitation of molecules is examined. An inspection of the level distribution of a driven anharmonic oscillator, which is subject to energy and phase dissipation to a bath, reveals that phase relaxation (dephasing) due to the bath perturbation plays a major role in the thermalization process. GRA

N86-24422# Lowell Univ., Mass. Center for Atmospheric Research.

MICROWAVE AND INFRARED ABSORPTION PROPERTIES OF ATMOSPHERIC SPECIES WITH SPECIAL EMPHASIS ON LINE WIDTHS AND SHIFTS Final Report, 29 Apr. 1982 - 29 Jul. 1985

Robert R. Gamache Jul. 1985 125 p

(Contract F19628-82-K-0043)

(AD-A162154; ULRF-428/CAR; AFGL-TR-85-0168) Avail: NTIS HC A06/MF A01 CSCL 07/4

In this report the work performed on updating the HITRAN data base and hot gas atlas is described and the list of data given. Our work on the development of the QFT-ID theory for collision broadened halfwidths of asymmetric rotors, i.e. 03 and H20, is described. A review of second order perturbation schemes to calculate the line shift and width is given with application to H20. The temperature dependence of the line shift and halfwidth is formulated and results are presented for the 03-N2 and 03-02 systems. GRA

N86-24423# Wisconsin Univ., Madison. Dept. of Physics.

INFRARED EMISSION AND ATOMIC TRANSITIONS Annual Technical Report, 1 Aug. 1984 - 31 Jul. 1985

Chun C. Lin 5 Aug. 1985 3 p

(Grant AF-AFOSR-0312-83)

(AD-A162245; AFOSR-85-1101TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The general objective of this research project is to study radiative transitions in atoms and molecules especially those relevant to infrared radiation. Major efforts include: (1) determination of optical emission cross sections for atomic oxygen transitions produced by electron-impact dissociation of O2, (2) electron excitation from a metastable level to a higher level, (3) excitation behaviors of Na atoms, and (4) production of excited N atoms b electron impact on N2. GRA

N86-24424# State Univ. of New York, Buffalo. Dept. of Chemistry.

VIBRATIONAL DEPHASING AND ENERGY RELAXATION OF ADMOLECULES BY PHONONS

Michael Hutchinson and Thomas F. George Dec. 1985 18 p

(Contract N00014-86-K-0043)

(AD-A162315; UBUFFALO/DC/85-TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

An investigation is made of the vibrational dephasing of a diatomic molecule absorbed on a surface. Explicit analytic forms for the rate of dephasing by phonons are derived. For comparison, an expression for energy relaxation is given which is appropriate for OH on SiO2. It is found that the dephasing rate is considerably faster for this system than the energy relaxation rate. These conclusions are compared with the results of a recent experiment. GRA

N86-24425# Florida Univ., Gainesville. Dept. of Chemistry.

ATOMIC AND MOLECULAR GAS PHASE SPECTROMETRY Summary Report, 1 Oct. 1983 - 30 Sep. 1985

J. D. Winefordner Oct. 1985 40 p

(Contract F49620-84-C-0002)

(AD-A162339; AFOSR-85-1034TR) Avail: NTIS HC A03/MF A01 CSCL 21/2

The major goals of this research have been to develop diagnostical spectroscopic methods for measuring spatial/temporal temperatures and species of combustion flames and plasmas and to develop sensitive, selective, precise, reliable, rapid spectrometric methods of trace analysis of elements present in jet engine lubricating oils, metallurgical samples, and engine exhausts. The diagnostical approaches have been based upon the measurement of metal probes introduced into the flame or plasmas and the measurement of OH in flames. The measurement approaches have involved the use of laser-excited fluorescence, saturated absorption, polarization, and linear absorption. The spatial resolution in most studies is less than 1 cu mm and the temporal resolution is less than 10 ns with the use of pulsed lasers. Single pulse temperature and species measurements have also been carried out. Other diagnostical studies have involved the measurement of collisional redistribution of radiatively excited levels of Na and Tl in acetylene/02/Ar flames and the measurement of lifetimes and quantum efficiencies of atoms and ions in the inductively coupled plasmas, ICP. The latter studies indicate that the high electron number densities in ICPs are not efficient quenchers of excited atoms/ions. Temperatures of microwave atmospheric plasmas produced capacitatively and cool metastable N2 discharge produced by a dielectric discharge have also been measured. GRA

N86-24426# Naval Research Lab., Washington, D. C.

A COMPARISON OF QUANTUM, CLASSICAL, AND SEMICLASSICAL DESCRIPTIONS OF A MODEL, COLLINEAR, INELASTIC COLLISION OF TWO DIATOMIC MOLECULES

M. Page, E. S. Oran, J. P. Boris, D. Miller, and R. E. Wyatt 13 Dec. 1985 47 p

(AD-A162357; NRL-MR-5700) Avail: NTIS HC A03/MF A01 CSCL 20/8

The collinear dynamics of a model diatom-diatom system is investigated. The collision partners are harmonic oscillators for which the masses and force constants are chosen to correspond to those of the nitrogen and oxygen molecules. The interaction between the molecules arises from a Lennard-Jones 6-12 potential acting between the inside atoms in the collinear system. Quantum mechanical close coupled calculations are performed for several collision energies ranging from 1.0 ev to 2.25 ev. The state-to-state transition probabilities which are extracted from these calculations are then used as a benchmark for comparison. Semiclassical calculations are performed within the framework of a classical path approximation. A simple scheme to modify the classical path to reflect energy exchange between the collision coordinate and the internal degrees of freedom is found to improve the results. On the whole, the agreement between the semiclassical and the quantum mechanical results is surprisingly good. The classical trajectory calculations correctly display many of the qualitative features of the collisions but the numerical agreement is not as close. Unexpectedly, the classical results do not appear to be improving as the collision energy is increased. GRA

N86-24427# Argonne National Lab., Ill.

AB INITIO MOLECULAR ORBITAL CALCULATIONS OF THE VIBRATIONAL FREQUENCIES OF XY4/SUP -n/ ANIONS

L. A. Curtiss and R. Nichols 1985 8 p refs Presented at the 5th International Symposium on Molten Salts, Las Vegas, Nev., 14 Oct. 1985

(Contract W-31-109-eng-38)

(DE86-001817; CONF-8510177-2) Avail: NTIS HC A02/MF A01

The vibrational frequencies of a seris of XY4/sup -n/ anions (BeF4(-2), BF4(-), AlF4(-), MgCl4(-2), and AlCl4(-)) have been calculated by ab initio molecular orbital theory using the 3-21G and 6-31G* basis sets. The predicted harmonic frequencies are for the most part in good agreement with the observed frequencies of these anions in molten alkali halide mixtures. At the 3-21G basis set level the average difference between the observed and predicted frequencies is 12% while at the 6-31G* basis set level the average difference is 6%. Calculations of this type may be helpful in predicting the vibrational frequencies of other anions in molten salts. DOE

N86-24428# Oak Ridge National Lab., Tenn.

DIELECTRONIC RECOMBINATION MEASUREMENTS ON MULTICHARGED IONS

P. F. Dittner, S. Datz, P. D. Miller, and P. L. Pepmiller 1985 11 p refs Presented at the Workshop on Atomic Spectra and Collisions in External Fields, Gaithersburg, Md., 22 Oct. 1984
(Contract DE-AC05-84OR-21400)
(DE86-002255; CONF-8410237-4) Avail: NTIS HC A02/MF A01

Coaxial electron beams and multiply charged ion beams are used to study dielectronic recombination. The study includes recombination of boron, carbon and sulfur. DOE

N86-24429# Los Alamos National Lab., N. Mex.
APPLICATIONS OF CROSS SECTIONS FOR ELECTRON-MOLECULE COLLISION PROCESSES
D. C. Cartwright 1985 9 p refs Presented at the Joint Symposium on Swarm Studies and Inelastic Electron-molecule Collisions, Tahoe, Calif., 19 Jul. 1985
(Contract W-7405-eng-36)
(DE86-002389; LA-UR-85-3519; CONF-850776-2) Avail: NTIS HC A02/MF A01

The role of electron-molecule collision cross sections is discussed for the study of the ionospheric and auroral processes in planetary atmospheres and of discharge-pumped lasers. These two areas emphasize the importance of further theoretical and experimental studies concerning electron-impact processes. DOE

N86-24430# GA Technologies, Inc., San Diego, Calif.
ENERGY CONFINEMENT IN DOUBLET 3
T. Ohkawa and R. D. Stambaugh 1985 18 p Presented at the 12th European Conference on Controlled Fusion and Plasma Physics, Budapest, Hungary, 2 Sep. 1985
(Contract DE-AC03-84ER-51044)
(DE86-002492; GA-A-18189; CONF-850927-9) Avail: NTIS HC A02/MF A01

Studies of ion confinement in Doublet 3 show that the ion thermal diffusivity chi sub i exceeds the neoclassical value by a factor of two to four at r = 0.2a increasing to a factor of ten at r = 0.7a. It appears that chi sub e and chi sub i are always closely equal, suggesting turbulence underlies the diffusion. Scaling data for energy confinement time dependence on heating power, density, current, and toroidal field are reviewed to constrain the formulation of a transport model base on turbulence. A model based on trapped electron turbulence is proposed which produces the correct scaling behavior of tau sub E in both low and high collisionality regimes. DOE

N86-24431# Lawrence Livermore National Lab., Calif.
OPTIMUM RANGES FOR X-RAY THICKNESS MEASUREMENTS
R. W. Ryon 15 Oct. 1985 26 p
(Contract W-7405-eng-48)
(DE86-003186; UCID-20581) Avail: NTIS HC A03/MF A01

Film thicknesses can be measured by two X-ray methods: X-ray absorption (gauging or radiography) and X-ray fluorescence. Optimization of both methods is discussed. DOE

N86-24432# Los Alamos National Lab., N. Mex.
ION BEAM CHARACTERIZATION OF MULTI-LAYER DIELECTRIC REFLECTORS
J. G. Beery, M. G. Hollander, C. J. Maggiore, A. Redondo, R. T. Westervelt, and T. N. Taylor 1985 8 p Presented at the 17th Annual Symposium on Optical Materials for High-power Lasers, Boulder, Colo., 28 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003689; LA-UR-85-3785; CONF-851052-1) Avail: NTIS HC A02/MF A01

Energetic ion beams were used to characterize multilayer dielectric reflectors. Alpha-particle beams with beam spot sizes between 10 microns and a few millimeters were scattered from reflectors consisting of 32-layer SiO2/HfO2 and 38-layer MgF2/ThF4. The RBS spectra reveal the nature of the laser damage processes by providing information on diffusion, mixing, and loss of material in the coatings. The particle-induced X-ray emission (PIXE) technique gave complimentary results on low-concentration impurities in the coatings. DOE

N86-24433# Argonne National Lab., Ill.
RECENT PROGRESS IN POSITRON ANNIHILATION RESEARCH AT ARGONNE NATIONAL LABORATORY
L. C. Smedskjaer and R. W. Siegel Sep. 1985 8 p Presented at the Murr Slow Positron Beam Workshop, Columbia, Mo., 1 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-003046; CONF-8510220-1) Avail: NTIS HC A02/MF A01

The present work describes the most recent research activity in the positron group at Argonne. Our efforts have been centered around bringing our 2-D ACRR system on line, and a short description of its properties are given here. In addition, recent positron measurements on boron doped Ni3Al, done in collaboration with A. DasGupta from the Metals and Ceramics Division, Oak Ridge National Laboratory, will be presented as well. DOE

N86-24434# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INTEGRAL SCATTERING CROSS SECTIONS OF HIGHLY VIBRATION-EXCITED LI2 MOLECULES Thesis [INTEGRALE STREUQUERSCHNITTE HOCH SCHWINGUNGSANGEREGTER LI2-MOLEKUELE]
M. Fuchs May 1985 186 p refs In GERMAN
(MPIS-8/1985; ISSN-0436-1199) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38

The Franck-Condon method to prepare vibration-excited molecular states was applied in a molecular beam experiment in order to determine integral scattering cross sections of the system Li2-noble gas atom. The experimental setup, the measuring method, and the spectroscopic fundamentals of the excitation process are described. Model calculations show good agreement with the experimentally determined integral cross sections. Author (ESA)

N86-24435# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
MOLECULAR BEAM EXPERIMENT OF THE REACTIVE SCATTERING D+H2 YIELDS HD+H Thesis [MOLEKULARSTRAHLEXPERIMENT DER REAKTIVEN STREUUNG D+H2 YIELDS HD+H]
R. Goetting May 1985 161 p refs Sponsored by Gesellschaft fuer Wissenschaftliche Datenverabeitung, Goettingen, West Germany
(MPIS-13/1985; ISSN-0436-1199) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

The reaction D+H2 yields HD+H was investigated in a molecular beam at a translational energy > 1.0 eV, scanning the potential hypersurfaces in the same energy domain as the reaction of vibration-excited hydrogen molecules. Angular and product velocity distributions of the reactions were determined. The differential scattering cross section at high collision energies is found to be strongly broadened compared with calculations and experiments at lower energies. The measured angular and time-of-flight distributions can satisfactorily be fitted with quasiclassical trajectory data calculated on potential hypersurfaces. The HD angular distribution is described with a model calculation. This calculation describes a narrower product velocity distribution (angle independent) in contrast with a more accurate theory.
Author (ESA)

N86-24379# Joint Publications Research Service, Arlington, Va.
ROTATIONAL-VIBRATIONAL RESONANCES IN ELECTRON TRANSITION SPECTRA OF XeCl MOLECULES Abstract Only
N. G. Basov, I. S. Gorban, V. A. Danilychyev, N. C. Zubrilin, and M. G. Chernomorets *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 42 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 281, no. 1, Mar. 1985 p 64-66 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-24436 Cornell Univ., Ithaca, N.Y.
TOPICS IN PARTICLE PHYSICS PHENOMENOLOGY Ph.D. Thesis
James Thomas Pantaleone 1985 163 p
Avail: Univ. Microfilms Order No. DA8516898

Heavy quark physics, spine dependent forces in heavy quark systems, bound state effects in the Upsilon yields gamma + resonance, compatibility of free fractional charge, and Dirac magnetic monopoles are discussed. Using the results of the fourth-order quark-antiquark interactions in perturbative quantum chromodynamics (QCD), the spin dependent potentials in the formalism of Eichten and Feinberg and Gromes have to be generalized to include the quark mass dependence. The recently observed hyperfine and fine structure splittings in the J/Psi and Tau systems are found to agree with the purely perturbative QCD results for the scale parameter. The effect of particle-antiparticle bound state dynamics on the reaction Upsilon yields gamma + resonance were studied. The existence of a free fractionally charged particle together with a monopole that has magnetic charge g = 1/2 e poses an apparent conflict. This conflict may be resolved by enlarging the exact gauge symmetry. The resulting constraint on GUTs is discussed and illustrated with an SU(9) GUT. Under certain assumptions, SU(9) is the smallest group to satisfy the constraints. Dissert. Abstr.

N86-24437 Virginia Polytechnic Inst. and State Univ., Blacksburg.
STUDIES OF LEPTON AND QUARK INTERACTIONS Ph.D. Thesis
Ping Wang 1985 119 p
Avail: Univ. Microfilms Order No. DA8521367

All possible experiments which test the SU(2) sub L x U(1) sub R x U(1) sub sub B-L model and SU(2) sub R x U(1) sub B-L model using the LEP e-e collider and HERA e-p collider are calculated and the most sensitive experiments are examined. (Q antiq) and (Q antiq) mesons are calculated using a QCD motivated potential model. It is discovered that by including a long distance relativistic correction term derived by Grome, the Coulomb + Linear potential works not only for c and b quarks, but s quark as well. The leptonic decay constants of various (Q antiq) mesons together with their masses are predicted. The topponium states are also discussed. Dissert. Abstr.

N86-24438# Naval Research Lab., Washington, D. C.
EFFECT OF FINITE CURRENT CHANNEL WIDTH ON THE COLLISIONAL ION CYCLOTRON INSTABILITY
J. D. Huba and P. K. Chaturvedi 21 Nov. 1985 28 p
(AD-A162070; NRL-MR-5683) Avail: NTIS HC A03/MF A01 CSCL 04/1

The effect of a finite transverse width, magnetic field-aligned current on the collisional ion cyclotron instability is studied. It is found that a finite current width has a stabilizing influence on the instability. The results are discussed in the context of auroral ionosphere. The field-aligned currents in the auroral ionosphere are an integral part of the ionosphere-magnetosphere coupling system and it is fairly well established now that these currents can be highly nonuniform in structure. Often, the current system is in the form of sheets which have variable thicknesses. An attempt to study the effect of finite width of a current sheet on the current driven collisionless ion acoustic instability was made with applications to the auroral situation. This paper investigated the effects of a finite width current channel on the collisional ion cyclotron (CICI) instability. The instability can also be stabilized for sufficiently narrow current channels. GRA

N86-24439# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
NEUTRAL BEAM INTERACTIONS WITH MATERIALS Final Report, 1 Jun. 1984 - 31 Oct. 1985
R. M. Gilgenbach, J. J. Duderstadt, and R. S. Ong 22 Nov. 1985 104 p
(Grant AF-AFOSR-0130-84)
(AD-A162330) Avail: NTIS HC A06/MF A01 CSCL 20/9

The basic approach involves coupling a one-dimensional hydrodynamic code to an ionization dynamics and an energy deposition model. Radiation emitted by the plasma is an important diagnostic tool. The ionization dynamics is very carefully accomplished by developing an ionization dynamics model which considers a large number of excited states and atomic processes. The atomic processes which are considered in our model are: (1) collisional ionization; (2) three body recombination; (3) collisional excitation; (4) collisional de-excitation; (5) spontaneous emission; (6) radiative recombination; and (7) dielectric recombination. A model to calculate the stopping power for energetic, structured (those carrying electrons into the target) low Z ions has been developed. Low Z ions are both energetic and structured at typical specific energies of a few hundred keV/amu (e.g., 1 MeV helium). The atomic structure is taken into account by describing the electron cloud of the projectile with elastic form factors in the first Born approximation. However, at these energies the first Born approximation begins to break down. Hence, two corrections are included: the Bloch correction to account for the scattering of wave packets (instead of plane waves) for close collisions, and the Barkas effect which corrects for deviations from pure Rutherford scattering due to the displacement of an oscillating electron. Structure is introduced more approximately in these two terms. An attempt has been made to allow sufficient generality to describe ionized targets as well as neutral solids. GRA

N86-24440# Los Alamos National Lab., N. Mex.
IFR CODE FOR SECONDARY PARTICLE DYNAMICS
M. R. Teague and S. S. Yu 11 Oct. 1985 12 p Presented at the SDIO/DARPA Annual Propagation Review, Monterey, Calif., 24 Jun. 1985
(Contract W-7405-eng-48)
(DE86-002135; UCRL-92876; CONF-8506141-13) Avail: NTIS HC A02/MF A01

A numerical simulation has been constructed to obtain a detailed, quantitative estimate of the electromagnetic fields and currents existing in the Advanced Test Accelerator under conditions of laser guiding. The code treats the secondary electrons by particle simulation and the beam dynamics by a time-dependent envelope model. The simulation gives a fully relativistic description of secondary electrons moving in self-consistent electromagnetic fields. The calculations are made using coordinates t, x, y, z for the electrons and t, ct-z, r for the axisymmetric electromagnetic fields and currents. Code results, showing in particular current enhancement effects, will be given. DOE

N86-24441# Stanford Linear Accelerator Center, Calif.
LIFETIME OF HEAVY FLAVOUR PARTICLES
V. Lueth Oct. 1985 30 p refs Presented at the 5th International Conference on Physics in Collision, Autun, France, 3 Jul. 1985 Prepared in cooperation with European Organization for Nuclear Research, Geneva, Switzerland
(Contract DE-AC03-76SF-00515)
(DE86-002157; SU-SLAC-PUB-3808; CERN-EP-85-142; CONF-850785-4) Avail: NTIS HC A03/MF A01

Recent measurements of the lifetime of the tau leptons and charm and beauty hadrons are reviewed and their significance for the couplings of the charged weak current, flavor mixing, and models relating quarks to hadron decay are discussed. DOE

N86-24442# Oak Ridge National Lab., Tenn.
ION MICROPROBE MASS SPECTROMETRY USING SPUTTERING ATOMIZATION AND RESONANCE IONIZATION
D. L. Donohue, W. H. Christie, and D. E. Goeringer 1985 4 p refs Presented at the 5th International Conference on Ion Mass

Spectrometry, Washington, D.C., 29 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002270; CONF-8509197-1) Avail: NTIS HC A02/MF A01

Resonance ionization mass spectrometry (RIMS) has recently been developed into a useful technique for isotope ratio measurements. Studies performed have been reported for a variety of elements using thermal vaporization sources to produce the atom reservoir for laser-induced resonance ionization. A commercial ion microprobe mass analyzer (IMMA) has been interfaced with a tunable pulsed dye laser for carrying out resonance ionization mass spectrometry of sputtered atoms. The IMMA instrument has many advantages for this work, including a micro-focused primary ion beam (2 microns in diameter) of selected mass, complete sample manipulation and viewing capability, and a double-focusing mass spectrometer for separation and detection of the secondary or laser-generated ions. Data were obtained demonstrating the number and type of ions formed along with optical spectral information showing the wavelengths at which resonance ionization occurs. DOE

N86-24443# Los Alamos National Lab., N. Mex.
DO NUCLEONS DISSOLVE
T. Goldman 1985 13 p refs Presented at the Nuclear Chromodynamics Conference, Santa Barbara, Calif., 12 Aug. 1985
(Contract W-7405-eng-36)
(DE86-002407; LA-UR-85-3700; CONF-8508127-5) Avail: NTIS HC A02/MF A01

A model is presented which describes multiquark, nuclear-like systems in a manner consistent with QCD, and with nuclear properties. Within the model, it is found that quasi-nucleon structures describe the minimum energy state of the system. This result is due to a balance between quarks lowering their kinetic energy by spreading out through the system, and lowering their color-magnetic spin-spin interaction energy by forming nucleon-like clusters. A strong core repulsion is evident, as is a realistic dip in the central matter density of the (4)He-like, 12-quark system. DOE

N86-24444# Argonne National Lab., Ill.
HEAVY MESON DECAYS AND p ANTI p COLLISIONS
E. L. Berger, P. H. Damgaard, and K. Tsokos 1985 6 p Presented at the International Conference on Hadron Spectroscopy, College Park, Md., 20 Apr. 1985 Prepared in cooperation with European Organization for Nuclear Research, Geneva, Switzerland and Maryland Univ., College Park
(Contract W-31-109-eng-38)
(DE86-003044; ANL/HEP-CP-85-111; CONF-8504133-11) Avail: NTIS HC A02/MF A01

We use the formalism of exclusive processes at high momentum transfer, to give predictions for the decay of the 2(++)chi state into a p anti p pair and the production cross section for chi in p anti p collisions. DOE

N86-24445# Stanford Linear Accelerator Center, Calif.
RECENT OPERATIONAL PERFORMANCE OF THE CERN OMEGA RING IMAGING CERENKOV DETECTOR
R. J. Apsimon, P. S. Flower, K. A. Freeston, G. D. Hallewell, J. A.G. Morris, J. V. Morris, C. N. Paterson, P. H. Sharp, C. N. Uden, and M. Davenport Oct. 1985 10 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with Rutherford Appleton Lab., Chilton, England, European Organization for Nuclear Research, Geneva, Switzerland, Manchester Univ., England and Sheffield Univ., England
(Contract DE-AC03-76SF-00515)
(DE86-002810; SU-SLAC-PUB-3816; CONF-851009-6) Avail: NTIS HC A02/MF A01

We discuss the design and construction of the Time Projection Chambers (TPCs) of the Omega Ring Imaging Cerenkov Detector (RICH). Details are given of the TPC high voltage system and its monitoring and control. In addition, the operation and monitoring of the readout is described together with results of tests on the performance of the front end amplifiers. The operation of the RICH TPCs and electronics during the first data run of WA69, in 1984, is discussed together with relevant results from laboratory tests. Results from the preliminary analysis of a sample of data from the 1984 run are also presented. DOE

N86-24446# California Univ., Berkeley. Lawrence Berkeley Lab.
STEADY-STATE FEL: PARTICLE DYNAMICS IN THE FEL PORTION OF A TWO-BEAM ACCELERATOR
E. Sternbach and A. M. Sessler Sep. 1985 37 p Presented at the 7th International Free-electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002866; LBL-19939; CONF-850956-10) Avail: NTIS HC A03/MF A01

Motivated by its use in a Two-Beam Accelerator, we have studied a steady-state FEL; i.e., a periodic but very long structure in which the electron beam energy is replenished once a period with a short induction acceleration unit. We have studied longitudinal particle motion in such a device using a 1-D simulation code. We show that after an initial start-up section, particle detrapping from the pondermotive wave is minimal in a steady-state FEL of several kilometers. A simple linear model of particle diffusion is shown to describe the numerical results quite well. DOE

N86-24447# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
CAPABILITIES OF THE ATHENA COMPUTER CODE FOR MODELING THE SP-100 SPACE REACTOR CONCEPT
C. D. Fletcher Sep. 1985 48 p
(Contract DE-AC07-76ID-01570)
(DE86-003213; EGG-RST-7025) Avail: NTIS HC A03/MF A01

The capability to perform thermal-hydraulic analyses of an SP-100 space reactor was demonstrated using the ATHENA computer code. The preliminary General Electric SP-100 design was modeled using Athena. The model simulates the fast reactor, liquid-lithium coolant loops, and lithium-filled heat pipes of this design. Two ATHENA demonstration calculations were performed simulating accident scenarios. A mask for the SP-100 model and an interface with the Nuclear Plant Analyzer (NPA) were developed, allowing a graphic display of the calculated results on the NPA. DOE

N86-24448# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Mar. 1984
R. W. Zocher, comp. and T. G. George, comp. Aug. 1985 31 p
(Contract W-7405-eng-36)
(DE86-003278; LA-10511-PR) Avail: NTIS HC A03/MF A01

This technical monthly report covers studies related to the use of PuO2-238 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos Laboratory. They are divided into: general-purpose heat source, lightweight radioisotope heater unit, and safety technology program. DOE

N86-24449# Los Alamos National Lab., N. Mex.
ION SOURCES FOR HIGH-FREQUENCY ACCELERATORS
R. Keller 1985 45 p refs Translation into ENGLISH of "Ionenquellen fur Hochfrequenzbeschleuniger" Rept. 41-18-02 VDI-Bildungswerk, Berlin, West Germany, 3 May 1982 Prepared in cooperation with Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt, West Germany
(Contract W-7405-eng-36)
(DE86-003563; LA-tr-85-16-Rev) Avail: NTIS HC A03/MF A01

Ion sources are being applied increasingly in many areas of physics and technology, from basic research in nuclear and atomic physics to energy research, isotope separation, implanation technology, surface processing and analysis all the way to biomedicine. It is impossible within the framework of this discussion to provide a comprehensive survey of the variety of available source types. The function and problems of the types important for high-frequency accelerators are to be explained using a few individual examples in order to stimulate a basic understanding

for this technically sophisticated and little-known equipment. The sources discussed here supply singly or multiply charged, positive ions. DOE

N86-24450# Stanford Linear Accelerator Center, Calif.
SLAC THREE-BODY PARTIAL WAVE ANALYSIS SYSTEM
D. Aston, T. A. Lasinski, and P. K. Sinervo Oct. 1985 37 p refs
(Contract DE-AC03-76SF-00515)
(DE86-003794; SLAC-287) Avail: NTIS HC A03/MF A01

We present a heuristic description of the SLAC-LBL three-meson partial wave model, and describe how we have implemented it at SLAC. The discussion details the assumptions of the model and the analysis, and emphasizes the methods we have used to prepare and fit the data. DOE

N86-24451# Argonne National Lab., Ill.
PRODUCTION OF VIBRATIONALLY COLD IONS USING A RADIO FREQUENCY STORAGE ION SOURCE
A. Sen 1985 15 p refs Presented at the Symposium of Northeastern Accelerator Personnel, Argonne, IL., 14 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-004056; CONF-851040-3) Avail: NTIS HC A02/MF A01

A storage ion source has been built for the production of vibrationally cold H2(+) and H3(+) ions. Using a gas mixture of H2 and rare gases (Ne and He) in the source at high pressure, higher vibrational states of these ions have been effectively depleted by ion-molecule reactions and collisional deactivation. The internal energy of the cold ions were determined by the threshold measurement of collision-induced dissociation. With a mixture of H2 and Ne (ratio 1:5) in the source operated at 80 mtorr, H2(+) ions were found to be in v = 0 and 1 states only and the H3(+) ions were in the ground vibrational state. DOE

N86-24380# Joint Publications Research Service, Arlington, Va.
INELASTIC INTERACTIONS OF HIGH ENERGY HADRONS WITH NUCLEONS AND NUCLEI OF PHOTOEMULSION AND THE CLUSTERIZATION PHENOMENON Abstract Only
Marianna Ivanovna Tretyakova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 45 Transl. into ENGLISH from Akademiya Nauk SSSR Ordena Lenina Fizicheskiy Inst. Imeni P. N. Lebedeva (Moscow, USSR), 1984 p 3-4[r] (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24381# Joint Publications Research Service, Arlington, Va.
COMPLETE INTERACTION CROSS-SECTIONS OF ULTRACOLD NEUTRONS WITH GASEOUS DEUTERIUM Abstract Only
Ye. Z. Akhmetov, V. N. Barshentsev, M. M. Kadykenov, D. K. Kaipov, M. D. Kaipov, and N. K. Kospanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 46 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR: Seriya Fiziko-Matematicheskaya (Alma-Ata, USSR), no. 6, Nov. - Dec. 1984 p 1-2 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

74 OPTICS

Includes light phenomena.

N86-24452 Rochester Univ., N. Y.
UNIQUENESS AND OTHER ASPECTS OF THE OPTICAL PHASE PROBLEM Ph.D. Thesis
Bryan Joseph Brames 1985 267 p
Avail: Univ. Microfilms Order No. DA8528538

The phase problem is examined as it occurs in stellar speckle interferometry, wherein one assumes that the image to be reconstructed is of finite spatial extent. Algorithms for reconstructing the Fourier phase of an image are studied, as well as a detailed investigation of the two-dimensional uniqueness question undertaken. Criteria for unique phase retrieval are derived for two-dimensional discrete objects, with particular emphasis placed on the importance of support constraints. It is established that some, such as Eisenstein's support, ensure a single solution independent of the function defined on that region, excluding mild restrictions necessary to define the region. An alternate method of demonstrating the solution uniqueness associated with Eisenstein's support is presented. Moreover, this approach is generalized to produce a large number of supports which are not described by Eisenstein's criterion, but which nonetheless guarantee solution uniqueness. Dissert. Abstr.

N86-24453# Stanford Univ., Calif. Information Systems Lab.
OPTICAL COMPUTING RESEARCH Annual Report, 18 May 1984 - 17 May 1985
Joseph W. Goodman, Raymond Kostuk, Ellen Ochoa, and Bradley Cylmer 1 Jun. 1985 124 p
(Grant AF-AFOSR-0166-83)
(AD-A162272; SU-ISL-L722-10; AFOSR-85-1037TR) Avail: NTIS HC A06/MF A01 CSCL 09/3

Research accomplished under AFOSR Grant No. AFOSR 83-0166 during the time period 18 May 1984 through 17 May 1985 is described. The work covers Several different areas of optical computing and related topics are discussed. The primary emphasis of the work is on applications of optics to interconnections in the area of microelectronics. A second area of investigations is the inversion of images and wavefronts using photorefractive crystals, and the applications of such nonlinear operations to spatial filtering problems. Work has also been completed on the wavefront inversion using holograms and on the suppression of speckle in coherently formed images. Publications during the last year arising out of the grant are also listed. Author (GRA)

N86-24454# Aerodyne Research, Inc., Billerica, Mass.
OPTICAL SYSTOLIC ARRAY PROCESSORS Final Report, Jun. 1984 - Jun. 1985
H. J. Caulfield, Scott Israel, and Roger Putnam Sep. 1985 49 p
(Contract F30602-84-C-0130)
(AD-A162383; ARI-4657; RADC-TR-85-162) Avail: NTIS HC A03/MF A01 CSCL 09/2

Multiplication with 16 bit accuracy can be accomplished by optical means and is competitive and superior in speed to fully electronic devices if a sum-of-products algorithm is being implemented. The advantage of optics is not in the multiply function where electronic multipliers will be generally faster due to the extra analog-to-digital converters needed in the optical device. The optics advantage appears when many of the resulting numerical products need to be added which is accomplished by integrating sequential light pulses onto one detector. The bottleneck for digital addition is the arithmetic carry terms which are evaluated sequentially. We also present and analyze a threshold logic analog-to-digital converter intended for the optical multiplier which demonstrates increased speed over a successive approximation A/D without the complexity of a flash converter. We also present a significant step which is the sideways summer. The sideways summer greatly reduces the time required for the one step of electronic addition which is part of the digital-multiplication by analog-convolution algorithm. This electronic addition is needed to convert the resulting mixed binary form of the output into a normal binary number. GRA

N86-24455# Honeywell, Inc., Bloomington, Minn.
NONLINEAR OPTICAL PHENOMENA IN SOLIDS Final Technical Report, 1 Sep. 1981 - 15 Jun. 1985
Paul W. Kruse and David K. Arch 15 Jul. 1985 31 p
(Contract F49620-81-C-0034)
(AD-A162394; AFOSR-85-1036TR) Avail: NTIS HC A03/MF A01 CSCL 20/12

The nonlinear optical properties of Hg(1-x)Cd(x)Te for x values between 0.20 and 0.23 have been evaluated experimentally under C02 laser excitation at 295 K, 77K, and 12 K. Optical phase conjugation arising from conduction band nonparabolicity and the photoexcited plasma mechanisms has been studied. A new effect in which the phase conjugate signal is erased or quenched by means of a separate C02 laser has been observed. The mechanism

depends upon an enhanced Auger recombination rate due to two-photon absorption. Optical absorption data were obtained on eight samples of Hg(1-x)Cd(x)Te over the interval from 10 to 40 micrometers and interpreted theoretically in terms of interband, intraband, impurity, and lattice absorption measurements. The temporal behavior of degenerate four-wave mixing and optical bistability was studied theoretically for a superlattice or quantum well for both absorptive (photoexcited plasma) and dispersive (conduction band nonparabolicity) mechanisms. The third order susceptibility due to both conduction band nonparabolicity and the photoexcited plasma mechanisms in both GaAs/Al(x)Ga(1-x)As and Hg(1-x)Cd(x)Te/Hg(1-y)Cd(y)Te superlattices has been investigated theoretically. GRA

N86-24456# Science Applications International Corp., McLean, Va.
PROCEEDINGS OF IMAGE UNDERSTANDING WORKSHOP HELD AT MIAMI, FLORIDA ON 9-10 DECEMBER 1985 Annual Technical Report, Oct. 1984 - Dec. 1985
Lee S. Baumann Dec. 1985 534 p Workshop held in Miami, Fla., 9-10 Dec. 1985
(Contract MDA903-84-C-0160; ARPA Order 3456)
(AD-A162898; SAIC-85/1149) Avail: NTIS HC A23/MF A01 CSCL 20/6

Presented are the outlines of annual progress reports and technical papers of the research activities in Image Understanding, sponsored by the Information Processing Techniques Office; Defense Advanced Research Projects Agency. The papers were delivered at a workshop conducted on 9-10 December 1985, in Miami Beach, Florida. Also included are copies of invited papers presented at the workshop and additional technical papers from the research activities which were not presented due to lack of time but are germane to this research field. Author (GRA)

N86-24457# United Technologies Research Center, East Hartford, Conn.
COMPOSITE INTEGRAL RESPONSE SENSING Final Technical Report, Aug. 1982 - Mar. 1985
J. R. Dunphy, G. Meltz, and R. M. Elkow Sep. 1985 116 p
(Contract F08635-83-C-0287)
(AD-A163136; AD-E801242; UTRC/R85-926546-20; AFATL-TR-85-37) Avail: NTIS HC A06/MF A01 CSCL 20/6

The investigation of a new concept for measurement of distributed strain is described. Implementation of the technique utilizes a fiber optic device with twin, coupled cores, a single input and a single output. Multiple wavelength operation of the sensor yields a diagnosis of the waveguide coupling perturbations imposed by mechanical disturbances. A general theory for the device has been derived in the form of an integral equation that relates the sensor core contrast to an arbitrary bending strain or curvature. In many cases of interest the curvature is small and slowly varying. For these conditions theory shows the core crosstalk spectrum is directly related to the Fourier transform of the strain distribution on a cantilevered beam. GRA

N86-24458# Department of the Navy, Washington, D. C.
HIGH STABILITY FIBER OPTIC MAGNETIC FIELD SENSOR WITH ENHANCED LINEAR RANGE USING MAGNETIC FEEDBACK NULLING Patent Application
K. P. Koo, G. H. Sigel, A. B. Tveten, and A. Danridge, inventors (to Navy) Filed 7 Nov. 1985 16 p
(AD-D012055; US-Patent-Appl-SN-795949) Avail: NTIS HC A02/MF A01 CSCL 20/3

This patent application discloses a fiber optic interferometer-type magnetic field sensor which uses an automatic feedback system to limit the range of the magnetic field experienced by the sensor element. A high frequency bias field is mixed with the external magnetic field to be measured and the resulting interferometer output signal is converted to an electric output signal. The electric output signal is mixed with a reference signal having the same frequency as the bias signal to form a baseband negative feedback signal which is converted to a magnetic field and mixed with the bias and external fields to provide automatic feedback. GRA

N86-24459# Department of the Navy, Washington, D. C.
FIBER OPTIC MICROBEND PHASE SHIFTER AND MODULATOR Patent Application
Henry F. Taylor, inventor (to Navy) Filed 26 Sep. 1985 15 p
(AD-D012060; US-Patent-Appl-SN-780495) Avail: NTIS HC A02/MF A01 CSCL 20/6

The present invention relates generally to a fiber optic phase shifter and intensity modulator and more particularly to fiber optic phase shifters and modulators that utilize a microbend transducer. The ability to shift the phase of light propagating in a single mode fiber is quite useful in fiber optic sensors and may also be used in fiber-optic communications. A conventional way to shift the phase of light propagating in a single mode fiber is by stretching the fiber. This is done by wrapping and gluing the fiber around a cylinder of piezoelectric material. When a voltage is applied to the material, the cylinder expands thereby stretching the fiber. Long lengths on the order of 10 meters of fiber and large voltages are needed to drive the piezoelectric cylinder. The ability to modulate the intensity of light propagating in a optic fiber is also useful in fiber optic communication and sensing systems. Such modulation can be performed by a device external to the fiber such as an electrooptic modulator formed in a lithium niobate crystal. GRA

N86-24460# Department of the Navy, Washington, D. C.
GLASS COMPOSITIONS FOR PRODUCING PRESSURE AND TEMPERATURE INSENSITIVE OPTICAL FIBER COATINGS AND OPTICAL FIBERS THEREFROM Patent Application
Douglas Blackburn, Albert Feldman, and Nicolas Lagakos, inventors (to Navy) Filed 10 Dec. 1985 27 p
(AD-D012069; US-Patent-Appl-SN-807150) Avail: NTIS HC A03/MF A01 CSCL 11/2

This invention relates generally to glass compositions and more particularly to low compressibility, low expansivity glass compositions for use with optical fibers. Pressure and temperature insensitive optical fibers are produced using a Ta205 based glass composition which has a high bulk modulus and a low thermal expansion coefficient. The glass composition can function as the classing in the optical fiber or as a protective coating which surrounds the cladding thereby protecting the fiber from fluctuations in temperature and pressure. GRA

N86-24461# California Univ., Berkeley. Lawrence Berkeley Lab.
DETERMINING OPTIMUM SECTOR SIZE FOR AUTOMATIC LIGHTING CONTROLS
F. Rubinstein, R. Verderber, and M. Karayel Jul. 1985 23 p Presented at the Illuminating Engineering Society (IES) Annual Technical Conference, Detroit, Mich., 21 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE86-004103; LBL-19474; CONF-8507101-1) Avail: NTIS HC A02/MF A01

Automatic lighting controls can significantly reduce operating costs in commercial buildings. However, the design of these dynamically operated lighting systems has not kept pace with advancements in equipment. This paper focuses on determining how many lights should be grouped into sectors and controlled as a unit in order to minimize the life-cycle cost of an automatically controlled lighting system. The analysis is based on occupant behavior patterns, the cost of the lighting controls, the energy costs, and a decision criterion based on life-cycle cost. DOE

N86-24462# Systemberatung Informatik, Karlsruhe (West Germany).
DEVELOPMENT OF AN OPTICAL DATA PROCESSOR DEMONSTRATION MODEL Final Report
M. Bohner, P. Gemmar, H. Kazmierczak, and F. Zimmermann Paris ESA Jul. 1984 174 p refs
(Contract ESTEC-4672/81-NL-HP)
(ESA-CR(P)-2127) Avail: NTIS HC A08/MF A01

A hybrid-optical correlator combined with digital electronics for

flexible data selection and exploitation as a compact, transportable opto-electric arrangement for remote sensor downlinking is discussed. The improvement and fabrication of a liquid crystal image transducer used in the optical correlator, and the performance of incoherent and coherent image conversion are described. Optical and electronic system parts, and their control and operation are outlined. Theoretical limits of optical correlation achieved from digital simulation are compared with experimental results from the implemented hybrid optical-electronic correlator interfaced to a host computer. Automatic location and verification of binary patterns in an image scene are demonstrated with the correlator system. Hybrid-optical correlation for real time and real world applications is assessed. Author (ESA)

N86-24463# National Bureau of Standards, Washington, D.C. Electromagnetic Technology Div.
DIRECT MEASUREMENT OF THE ELECTRIC FIELD OF A LASER PULSE-THEORY
E. G. Johnson Aug. 1985 60 p
(PB86-132743; NBS/TN-1084) Avail: SOD HC $2.25 as SN003-003-02697-2 CSCL 20F

An electric field measuring apparatus is considered using optical processing, tapered optical filters, and a pair of detectors at the end of each optical fiber. Using an appropriate computer-generated optical filter, the author shows it is possible to discriminate among a set of orthonormal modes used to represent the spatial features of the electric field with a signal-to-noise ratio of at least 100 to 1. If the positioning accuracies for various parts of the apparatus are properly set up, it is expected that the signal-to-noise ratio could be bout 1000. The purpose of the tapered and graded-index fiber is to select the fundamental propagating mode in a fiber and to attenuate the other modes. The existence of this fiber allows the precise determination of the strength of each of the orthonormal fields before the optical processing. The paper presents the conflicts in the design and gives a solution. The complete evaluation requires assembly of the proposed apparatus to assess final accuracy. GRA

N86-24382# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL INVESTIGATION OF RADIATION SCATTERING BY MULTICOMPONENT POLYDISPERSE SYSTEMS OF PARTICLES Abstract Only
F. B. Yurevich, G. M. Yatskevich, V. A. Fogelev, and S. M. Karas *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 48 Transl. into ENGLISH from Teplofizika Vysokikh Temperatur (Moscow, USSR), v. 22, no. 6, Nov. - Dec. 1984 p 1146-1151 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24383# Joint Publications Research Service, Arlington, Va.
DIFFRACTION OF LIGHT BY ULTRASOUND IN OPTICALLY ACTIVE UNIAXIAL CRYSTALS Abstract Only
G. Ye. Zilberman, L. F. Kupchenko, and G. F. Goldvyanskaya *In its* USSR Report Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 51 Transl. into ENGLISH from Radiotekhnika I Elektronika (Moscow, USSR), v. 29, no. 12, Dec. 1984 p 2449-2454 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24384# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF DESIGN PARAMETERS OF PARABOLIC MIRROR SEGMENT ON IMAGE CHARACTERISTICS IN COHERENT OPTICAL PROCESSING SYSTEM Abstract Only
Ye. A. Dudkina *In its* USSR Report Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 59 Transl. into ENGLISH from Optiko-Mekhanicheskaya Promyshlennost (Leningrad, USSR), no. 7, Jul. 1984 p 26-27 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24385# Joint Publications Research Service, Arlington, Va.
LASER RADIATION WAVEFRONT CONJUGATION IN FIBER OPTIC LIGHTGUIDES Abstract Only
A. A. Chertkov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 61 Transl. into ENGLISH from Pisma V. Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 10, no. 23, 12 Dec. 1984 p 1214-1420 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24621*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
OPTICAL IMAGING SPECTROSCOPY
Richard C. Canfield *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 120-131 refs (For primary document see N86-24614 14-92)
(Grants NsG-7406; NSF AST-83-20306; NSF ATM-84-15793; AF-AFOSR-3071-76; AF-AFOSR-0092-82)
Avail: NTIS HC A14/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*

N86-24464 Cornell Univ., Ithaca, N.Y.
ON THE KELVIN-HELMHOLTZ INSTABILITIES OF SUPERSONIC/SUPERALFVENIC SHEAR LAYERS Ph.D. Thesis
Sudipto Roy Choudhury 1985 224 p
Avail: Univ. Microfilms Order No. DA8516958

A number of space and astrophysical plasma configurations are characterized by velocity shear layers with a velocity change across layer of thickness. The stability properties of finite-thickness compressible shear layers is examined. Two different velocity profiles are investigated in detail using the analogy between the pressure distribution, and the bound and scattering wave states of the one dimensional Schrodinger equation. By analytical and numerical methods, fairly complete contour maps were generated for the real and imaginary parts of the wave frequency as a function of the two free dimensionless parameters, the reduced Mach number, and the wavenumber. The stability of finite-thickness, compressible, magnetized shear layers is also investigated numerically. A formulation is derived for investigating the stability of low temperature, collisionless shear layers in the presence of a magnetic field parallel to the macroscopic flow. The numerical rsults obtained are applied to the boundary of the solar wind and the Earth's magnetosphere. Connections to satellite observations are discussed. A method of studying the nonlinear saturation of the fastest growing traveling wave modes is considered. Dissert. Abstr.

N86-24465 Stevens Inst. of Tech., Hoboken, N. J.
AN EXPERIMENTAL INVESTIGATION OF HIGH ENERGY ION BEAM PRODUCTION IN THE PLASMA FOCUS Ph.D. Thesis
Charles William Powell 1985 192 p
Avail: Univ. Microfilms Order No. DA8522796

The energy spectrum of the ion beam produced along the electrode axis of a 5 kJ plasma was determined for ion energy values in the interval 0.3 MeV $< E <$ 7.6 MeV (for D + ions). The characteristics of the experiment are: the analyzed energy range extends far beyond the maximum of other laboratory determinations; a high resolution delta E/E which is substantially higher than the best resolution obtained in any other determination; measurement of the energy/charge state spectrum of heavy (impurity) ions present in the ion beam is extended beyond previous energy limits; possibility to detect the presence of quasi-neutral ion clusters, whose small magnetic deflection would prevent them from being separated from the neutral beam component of the plasma focus emission in smaller spectrometers; and determination of the energy spectrum dependence on such important plasma focus parameters as filling pressure and D-D fusion neutron yield. Dissert. Abstr.

N86-24466 Princeton Univ., N. J.
FAST ION EFFECTS ON MAGNETIC INSTABILITIES IN THE PDX TOKAMAK Ph.D. Thesis
Dean Alan Buchenauer 1985 224 p
Avail: Univ. Microfilms Order No. DA8529031

Modification and excitation of nondisruptive magnetic instabilities due to near perpendicular neutral beam injection on the PDX tokamak were made to determine the importance of these instabilities at low q. The instabilities consisted of resistive MHD modes, beam driven ideal MHD modes, and beam driven ion cyclotron modes. Evidence of enhanced transport is presented for several of these instabilities as well as comparison of the experimental results with theory. Possible consequences for reactor type tokamaks and high power auxiliary heating systems are discussed. Dissert. Abstr.

N86-24467 Colorado Univ., Boulder.
THE ROLE OF THREE-WAVE SCATTERING IN THE SATURATION OF ELECTRON-BEAM DRIVEN LANGMUIR WAVES Ph.D. Thesis
Jeffrey Allen Casey 1985 153 p
Avail: Univ. Microfilms Order No. DA8528469

Theory predicts that the three wave backscatter of electron beam driven Langmuir waves is stimulated by ion-acoustic waves of frequency 2 omega sub pC sub s/V sub b (omega sub p = plasma frequency, c sub s = ion acoustic speed, v sub b = beam velocity). Suppression of Langmuir wave growth should therefore result from scattering away from wave-numbers destabilized by the electron beam. This effect is observed in an unmagnetized double plasma device (electron temperature is approximately 5 eV, electron density approximately 3 x 10 to the 8th power/cu. cm. in argon), by externally introducing narrow band ion acoustic turbulence into an electron beam plasma system. Suppression of electron beam resonant Langmuir wave growth is seen when tuning the low frequency turbulence through the predicted resonance at 2 omega sub p c sub s/v sub b. In addition, as the intensity of ion-acoustic waves increases, greater suppression of Langmuir wave growth occurs. Also presented are design details of the automated, computerized electron distribution function analysis system; and exact numerical calculations of the dispersion relation for driven Langmuir waves. Dissert. Abstr.

N86-24468 Princeton Univ., N. J.
SOME ASPECTS OF ANOMALOUS TRANSPORT IN TOKAMAKS: STOCHASTIC MAGNETIC FIELDS, TEARING MODES AND NONLINEAR BALLOONING INSTABILITIES Ph.D. Thesis
Steven Charles Cowley 1985 139 p
Avail: Univ. Microfilms Order No. DA8529033

Various problems int he theory of anomalous transport in tokamaks are investigated. A general overview of the current theories of confinement is presented. The q greater than one and less than two region is studied since this region is the thermall insulating region of the tokamak. Stochastic magnetic field transport is not important to the insulating region, because drift tearing modes are stable in this region. A discussion of flux surface breakup is given. Tearing modes are shown to be, stable in an equilibrium without islands and unstable in an equilibrium with islands. It is therefore proposed that tearing modes observed in experiments originate as equilibrium islands which may be caused by nonaxisymmetry of the device. The nonlinear evolution of ideal ballooning modes in a simple model is investigated. The saturation mechanism is shown to be the flattening of the density gradient by the instability. One surprising feature of the evolution is the lack of mode coupling in the poloidal wavenumber spectrum. Dissert. Abstr.

N86-24469 Colorado Univ., Boulder.
THEORETICAL INVESTIGATION OF LAMINAR AND TURBULENT UNSTEADY BOUNDARY LAYERS ALONG A FLAT PLATE Ph.D. Thesis
Ismail Omar Hindash 1985 152 p
Avail: Univ. Microfilms Order No. DA8528491

Viscous, incompressible, and unsteady boundary layer flows along flat plates were investigated. Unsteady flows are divided into two major parts. First laminar and impulsive, constant and other types of accelerated fluid flows, starting from rest, are solved by using similarity variables. A physical model is presented and justified for these type of flows. The solutions are enerated by computer. The results provide the first singularity free semi-similar solutions that show the development and growth of the boundary layer long a semi-infinite flat plate. Self-generated unsteadiness, turbulence, is divided into two kinds. The first kind is the turbulent boundary layer fluid flows, with constant mainstream velocity, along a semi-infinite flat plate. The numerical results show the development of the boundary layer starting from the laminar through the fully developed turbulent regions, including transition. The second kind is the turbulent boundary layer fluid flows, with constant and impulsively started mainstream velocity, along an infinite flat plate. The computer results show the growth of the boundary layer from laminar through the fully turbulent regions, including transition. Dissert. Abstr.

N86-24470# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
STUDY OF LOW-Z COATINGS FOR JET UNDER EXPOSURE TO ELECTRONS, LASER RADIATION AND ATOMIC HYDROGEN
A. A. Haasz, J. W. Davis, O. Auciello, and P. C. Stangeby Feb. 1986 38 p refs
(UTIAS-303; ISSN-0082-5255) Avail: NTIS HC A03/MF A01

In an attempt to lower radiation losses due to metal plasma impurities in the JET fusion device, the use of low-Z wall coatings has been proposed (Si, TiC, SiC, TiO2, Al2O3 and MgAl2O4 on Inconel 600). Experimental results tained by exposing these samples to electron, laser radiation and atomic hydrogen impact are presented. The studies performed include measurements of (1) gases evolved due to low energy (3000 eV) electron bombardment, (2) inherent gas content in the near-surface region, and (3) retained deuterium subsequent to exposure to sub-eV D sup 0. Electron impact desorption rates for hydrogen and methane due to electron bombardment span the range 10 to the minus 1 power to 10 to the minus 3 power H2/e(-) and 10 to the minus 2 to < 10 to the minus 4 power Ch4/e(-). Following normal system bakeout at 500 K for 24h, the major species released by laser heating were found to be H2 and CO, with levels up to approx. 7 x 10 to the 16th power H/sq cm and approx. 4 x 10 to the 16th power CO/sq cm. A similar concentration of argon was found for the TiC coating produced by sputter ion plating. Further heating of the samples to 800 to 900K for 1h resulted in a reduction of hydrogen and CO release levels by about an order of magnitude. Subsequent to the 800 to 900 K heating procedure, the samples were exposed to sub-eV D sup 0 atoms to fluences of approx. 2; x 10 to the 19th power D sup zero/sq cm, and deuterium retention levels were measured to be of the order of 10 to the 14th power - 10 to the 15th power D/sq cm for the various coatings. Implications of these results for JET's first wall tritium inventory are discussed. Author

N86-24471# Nagoya Univ. (Japan). Inst. of Plasma Physics.
BEHAVIOUR OF THE PERIPHERAL PLASMA IN THE REVERSED FIELD PINCH
A. Matsuoka, K. I. Sato, H. Arimoto, S. Yamada, A. Nagata, and H. Murata Jan. 1986 14 p refs
(IPPJ-763) Avail: Issuing Activity

By using Langmuir probes installed behind limiters, time behavior of the peripheral plasma in the Reversed Field Pinch (RFP) are investigated. The behavior of the peripheral plasma is strongly affected by the confined RFP plasma and is divided into three phases (the initial phase before setting up the RFP configuration, the current rising phase, and the quiescent phase), which is just the same as those of the confined RFP plasma. Typical behavior of the peripheral plasma have relations to the pump out phenomena and of the toroidal flux generation. Author

N86-24472# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PRODUCTION OF HIGHLY RELATIVISTIC IONS AND ELECTRONS BY QUASI-PERPENDICULAR MAGNETOSONIC SHOCK

WAVES
Yukiharu Ohsawa Jan. 1986 14 p refs
(IPPJ-764) Avail: Issuing Activity

It is shown that a non-relativistic theory for laminar shocks breaks down for a plasma having a rather high Alfven speed, V sub A approx. > sq r + c (m sub e/m subi). By using a 2-1/2 dimension, fully relativistic, fully electromagnetic particle code, time evolution of quasi-perpendicular shocks in such plasmas is studied. Some ions and electrons are accelerated simultaneously to highly relativistic speeds by the shock. Author

N86-24473# Stevens Inst. of Tech., Hoboken, N. J.
MEGA-AMP OPENING SWITCH WITH NESTED ELECTRODES/ PULSED GENERATOR OF ION AND ION CLUSTER BEAMS
Annual Report, 1 Jul. 1984 - 30 Jun. 1985
V. Nardi, C. M. Luo, and C. W. Powell 1 Jul. 1985 36 p
(Grant AF-AFOSR-0228-84)
(AD-A162850; AFOSR-85-1125TR) Avail: NTIS HC A03/MF A01 CSCL 20/9

During the first year of the research program on the use of a plasma focus machine (PF) as a M Amp opening switch we have: (1) Improved the performance of our presently functioning system by finding a new method of increasing the surge of anamalous (i.e., noncollisional) resistivity which controls the switch opening function (specifically, the rate of disintegration of the PF pinch where the current is concentrated); (2) Devised new methods to monitor the rate of disintegration of the PF pinch via the changes of the particle emission spectra as a function of time (on a nanosec scale) and of position (on a 50 micrometer scale) inside the pinch; and (3) Made substantial progress in the construction of an upgraded system which can operate at higher current levels as compared to the present 0.5 - 0.7 MA. Author (GRA)

N86-24474# Oak Ridge National Lab., Tenn.
WEIGHT CHANGE MEASUREMENTS OF EROSION/ DEPOSITION AT BERYLLIUM LIMITER TILES IN ISX-B
J. B. Roberto, P. H. Edmonds, A. C. England, A. Gabbard, and R. A. Zuhr Jul. 1985 13 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002246; CONF-851174-12) Avail: NTIS HC A02/MF A01

The weight changes of Be tiles which functioned as a rail limiter in ISX-B for more than 3500 beam-heated discharges have been determined. The net weight loss for the limiter was 2.0 g, with the central tiles losing a total of 3.2 g and inboard tiles gaining 1.2 g. The weight loss is attributed primarily to the release of Be droplets as a result of limiter surface melting. The weight gains resulted from an inward flow of molten material along the limiter surface. The results indicate high erosion (melt loss) with incomplete and nonuniform redeposition (melt flow) of limiter material during periods of limiter melting. DOE

N86-24475# Los Alamos National Lab., N. Mex.
OBSERVATION OF THE 16.7 MeV D-T FUSION GAMMA USING A GAS CERENKOV DETECTOR
J. S. Ladish, J. W. Toevs, C. S. Young, P. Nash, S. Iversen, P. Zagarino, L. Jennings, and R. D. Seno 1985 4 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with Edgerton, Germeshausen and Grier, Inc., Goletta, Calif. and Edgerton, Germeshausen and Grier, Las Vegas, Nev.
(Contract W-7405-eng-36)
(DE86-002411; LA-UR-85-3674; CONF-851009-5) Avail: NTIS HC A02/MF A01

A measurement of the 16.7 MeV gamma production in a D-T fusion plasma was performed, using a four channel carbon dioxide gas Cerenkov detector system to measure the Cerenkov light generated by the gamma conversion electrons produced in a thin aluminum foil. DOE

N86-24476# Los Alamos National Lab., N. Mex.
DISCRETE-COIL INVESTIGATIONS OF MODULAR STELLARATOR CONFIGURATIONS
C. G. Lilliequist Oct. 1985 47 p
(Contract W-7405-eng-36)
(DE86-003280; LA-10504-MS) Avail: NTIS HC A03/MF A01

The existence of a vacuum magnetic well is generally accepted as a prerequisite to start-up. The special set of modular-stellarator configurations selected for the present computational investigation was derived from coefficients and equations that produced finite-beta wells in a continuous-current-sheet representation. The corresponding coils did not produce magnetic wells in a vacuum when their field configuration was investigated with a discrete-coil code. Vacuum magnetic wells have been identified through the use of this discrete-coil code in previous Heliac and stellarator studies. Therefore, these finite-beta magnetic wells could be the consequence of the continuous-current-sheet model, a conjecture that is supported by the linear scaling of the magnetic hills found in the present work as a function of the separation between the coils used. In addition to magnetic field profiles, comparisons are shown here of ripple, rotational transform, and flux-surface shapes for the discrete-coil, modular stellarators under study. Initially, each of the significant parameters affecting the shape of the control surface upon which the coils lie and the deformation of the individual coils was varied separately in search of a vacuum magnetic well in the parameter neighborhood of the successful finite-beta configuration. DOE

N86-24477# Oak Ridge National Lab., Tenn.
POTENTIAL MEASUREMENTS IN TANDEM MIRRORS
J. C. Glowienka Nov. 1985 19 p
(Contract DE-AC05-84OR-21400)
(DE86-002902; ORNL/TM-9705) Avail: NTIS HC A02/MF A01

The US mirror program has begun conducting experiments with a thermal barrier tandem mirror configuration. This configuration requires a specific axial potential profile and implies measurements of potential for documentation and optimization of the configuration. This report briefly outlines the motivation for the thermal barrier tandem mirror and then outlines the techniques used to document the potential profile in conventional and thermal barrier tandem mirrors. Examples of typical data sets from the world's major tandem mirror experiments, TMX and TMX-U at Lawrence Livermore National Laboratory (LLNL) and Gamma 10 at Tsukuba University in Japan, and the current interpretation of the data are discussed together with plans for the future improvement of measurements of plasma potential. DOE

N86-24478# Texas Univ., Austin. Inst. for Fusion Studies.
DIAMAGNETIC STABILITY LIMIT FOR HOT PARTICLE PLASMAS
H. L. Berk and Y. Z. Zhang Oct. 1985 41 p
(Contract DE-FG05-80ET-53088)
(DE86-003127; DOE/ET-53088/199; IFSR-199) Avail: NTIS HC A03/MF A01

The layer precessional mode is analyzed at arbitrary drift reversal by using a cylindrical model with embedded currents which simulate the role of field line curvature in actual mirror experiments. New effects are included by taking into account the Landau damping arising from the spread of hot particle drift orbits. It is found that the mode is destabilized slightly below the value that drift reversal is achieved. Its growth rate is proportional to N(-4) where N(-2) is a coupling constant. In addition the unstable interaction of the precessional layer mode with surface waves which can propagate below and above the ion cyclotron frequency is described. Below the ion cyclotron frequency the surface wave resembles the Alfven wave, while above the ion cyclotron frequency the surface wave resembles a whistler wave. DOE

N86-24479# Los Alamos National Lab., N. Mex.
MULTIPOINT THOMSON SCATTERING SYSTEM AND MEASUREMENTS ON THE LOS ALAMOS SPHEROMAK COMPACT TOROID EXPERIMENT
R. Gribble, T. R. Jarboe, H. W. Hoida, J. Lipson, and E. W. Newman Sep. 1985 13 p
(Contract W-7405-eng-36)

(DE86-003297; LA-10528-MS) Avail: NTIS HC A02/MF A01

A multipoint Thomson scattering system providing radial electron temperature and density profiles of plasma in a single shot is an on-line diagnostic on the spheromak device of CTX. The system includes a 22-joule, dual-beam ruby laser, large collection optics, and a spectrophotometer that contains a 40-mm dual chevron micro-channel-plate image intensifier tube as shutter and first stage of light amplification. A unique method of calibration that uses an 870-mm-long tungsten rod light source for instrument transmission and linearity measurements is described. Examples of data and temperature profiles are presented. DOE

N86-24480# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

LOWER HYBRID HEATING EXPERIMENTS IN TOKAMAKS: AN OVERVIEW

M. Porkolab Oct. 1985 29 p Presented at the Course and Workshop on Applications of RF Waves To Tokamak Devices, Varenna, Italy, 5 Sep. 1985

(Contract DE-AC02-78ET-51013)

(DE86-003363; DOE/ET-51013/162; PFC/CP-85-9; CONF-8509192-2) Avail: NTIS HC A03/MF A01

Lower hybrid wave propagation theory relevant to heating fusion grade plasmas (tokamaks) is reviewed. A brief discussion of accessibility, absorption, and toroidal ray propagation is given. The main part of the paper reviews recent results in heating experiments on tokamaks. Both electron and ion heating regimes will be discussed. The prospects of heating to high temperatures in reactor grade plasmas will be evaluated. DOE

N86-24481# JAYCOR, San Diego, Calif.

PRODUCTION OF ULTRAHIGH MAGNETIC FIELDS Technical Progress Report

25 Oct. 1985 103 p

(Contract DE-FG03-84ER-13302)

(DE86-003735; DOE/ER-13302/1) Avail: NTIS HC A06/MF A01

The objective was to produce and measure controlled ultra-high magnetic fields by imploding a plasma in which a magnetic field has been entrained. The novel method for producing the ultrahigh fields using a gas-puff Z pinch was tested successfully and found to work as well as predicted in some respects and better in others, such as field amplification. Moreover, in testing this concept, we may have created the only megagauss facility in the world with a 3 minute repetition rate and long lifetime. Most megagauss facilities are single-shot, owing to material deformations or the use of explosives. DOE

N86-24482# Sandia National Labs., Albuquerque, N. Mex.

DEVELOPMENT OF A TWELVE-PLASMA GUN, SINGLE-PULSER COMBINATION FOR USE IN THE PBFA-1 HYBRID ION DIODE

P. F. McKay Oct. 1985 26 p refs

(Contract DE-AC04-76DP-00789)

(DE86-003797; SAND-85-1741) Avail: NTIS HC A03/MF A01

A twelve-plasma gun, single-pulser combination for use in the PBFA-I 15-cm Hybrid Ion Diode is described. Each gun will generate a plasma density of 1 x 10(12) cm(-3) at a distance of 15 cm. Included are results of preliminary experiments to determine the required pulser energy and a practical gun geometry. DOE

N86-24483# Lawrence Livermore National Lab., Calif.

ODRIC: A ONE-DIMENSIONAL LINEAR RESISTIVE MHD CODE IN CYLINDRICAL GEOMETRY

A. A. Mirin, R. J. Bonugli, N. J. ONeill, and J. Killeen Oct. 1985 36 p

(Contract W-7405-eng-48)

(DE86-003798; UCRL-93503) Avail: NTIS HC A03/MF A01

The primitive resistive MHD equations in cylindrical geometry are time-advanced. Fourier analysis in the poloidal and toroidal directions and subsequent linerization are performed, resulting in a 1-D (radial) system for the perturbed quantities. Separate equations for the electron and ion temperature perturbations are solved. Hall terms and the thermal force vector are included in Ohm's law. Anisotropic thermal conductivity and viscosity are included in the model. DOE

N86-24484# Oak Ridge National Lab., Tenn.

SIMPLE CONTOUR ANALYSIS OF IGNITION CONDITIONS AND PLASMA OPERATING REGIMES IN TOKAMAKS

N. A. Uckan, J. Sheffield, and E. C. Selcow 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985

(Contract DE-AC05-84OR-21400)

(DE86-003324; CONF-851102-14) Avail: NTIS HC A02/MF A01

Contour plots of ignition, auxiliary power requirements, heating and operating windows, optimal path to ignition, ignition margin, etc., are generated analytically in terms of a small number of parameters for classes of devices with equivalent performance. Numerical studies are carried out to map the physics design space. Considering both the Murakami density limit results from analytic calculations indicate that in a standard tokamak geometry devices with a b02q sub * approx. 20 should be ignitable provided confinement does not degrade with heating power; however, aB02q sub * approx. 30 to 25 may be required for minimal ignition for a typical L- (H-) mode confinement scaling. Increased plasma elongation (kappa approx. 2) may help to reduce these requirements. DOE

N86-24371# Joint Publications Research Service, Arlington, Va.

INFLUENCE OF LASER RADIATION WAVELENGTH ON PARAMETERS OF FORMING PLASMA Abstract Only

A. V. Dobkin and I. V. Nemchinov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 24 Transl. into ENGLISH from Pisma V Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 10, no. 23, 12 Dec. 1984 p 1426-1430 (For primary document see N86-24358 14-70)

Avail: NTIS HC A06

N86-24378# Joint Publications Research Service, Arlington, Va.

MHD OSCILLATIONS ON PERIPHERY OF PLASMA FILAMENT IN L-2 STELLARATOR DURING OHMIC HEATING Abstract Only

S. Ye. Grebenshchikov, B. I. Kornev, and S. V. Shchepetov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 41 Transl. into ENGLISH from Akademiya Nauk SSSR, Inst. Obshchey Fiziki (Moscow, USSR), 1984 (For primary document see N86-24358 14-70)

(Preprint-178) Avail: NTIS HC A06

N86-24386# Joint Publications Research Service, Arlington, Va.

MAGNETIC REARRANGEMENT AND CHANGE IN PLASMA CONCENTRATION DURING DISRUPTION OF CURRENT LAYER Abstract Only

S. Yu. Bogdanov, G. V. Dreyden, I. I. Komissarova, V. S. Markov, G. V. Ostrovskaya, Yu. I. Ostrovskiy, V. N. Filippov, A. G. Frank, A. Z. Khodzhayev, and Ye. N. Shedova *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 65 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), 1984 (For primary document see N86-24358 14-70)

(Preprint-179) Avail: NTIS HC A06

N86-24387# Joint Publications Research Service, Arlington, Va.

NUMERICAL MODELING OF UNIDIMENSIONAL QUASILINEAR RELAXATION OF RELATIVISTIC ELECTRON BEAM IN INHOMOGENEOUS PLASMA WITH COLLISIONS Abstract Only

K. G. Gureyev, M. G. Nikulin, and A. B. Sionov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 68 Transl. into ENGLISH from Zhurnal Tekhnicheskiy Fiziki (Leningrad, USSR), v. 55, no. 1, Jan. 1985 p 215-217 (For primary document see N86-24358 14-70)

Avail: NTIS HC A06

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-24485# Dayton Univ., Ohio. Research Inst.
13(C) NMR AND X-RAY CRYSTALLOGRAPHIC DETERMINATION OF THE STRUCTURES OF SOME ISOMERIC PHENYLQUINOXALINES Final Report, May 1979 - Oct. 1981
Frederick L. Hedberg, Donna L. Bush, Mary T. Ryan, Robert A. Harvey, and Albert V. Fratini May 1985 28 p Prepared in cooperation with Arizona Univ., Tucson
(Contracts F33615-78-C-5126; F33615-80-K-5156)
(AD-A161882; AFWAL-TR-85-4037) Avail: NTIS HC A03/MF A01 CSCL 07/4

The good thermal and hydrolytic stability of polyphenylquinoxalines has prompted many investigations for characterization and property correlations for these polymers. The presence of isomers in polyphenylquinoxalines as a result of the ring forming polymerization reaction has been noted. The existence of isomers contributes to the amorphous form of these polymers and inhibits crystalline polymer formation. Unequivocal structural assignments were made for the two isomeric quinoxalines isolated from the reaction of 3-bromobenzil with 4-iodo-O-phenylenediamine as well as for their respective acetylene terminated derivatives. The higher melting isomers were assigned the structures 3-(3-bromophenyl)-2-phenyl-6-iodoquinoxaline and 3-(3-ethynylphenyl)-2-phenyl-6-ethynylquinox-aline, and the lower melting isomers were assigned the structures 2-(3-bromophenyl)-3-phenyl-6-iodoquinoxaline and 2-(3-ethynylphenyl)-3-phenyl-6-ethynylquinoxaline. Both X-ray crystallographic analysis and C-13 NMR analyses were used and were in complete agreement. GRA

N86-24486# State Univ. of New York, Stony Brook. Dept. of Physics.
X-RAY ABSORPTION FINE STRUCTURE STUDIES OF SEMICONDUCTOR SUPERLATTICES Annual Report, 1 Aug. 1984 - 31 Jul. 1985
Yi-Han Kao 30 Aug. 1985 6 p
(Contract N00014-83-K-0675)
(AD-A162031) Avail: NTIS HC A02/MF A01 CSCL 07/4

First application of extended X-ray absorption fine structure (EXAFS) technique to measurements of interatomic distance, local order, and strain in semiconductor superlattices and heterostructures has been successfully demonstrated. This result opens many possibilities for obtaining unique structural information in various semiconductors. GRA

N86-24487# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mechanical Engineering Aeronautical Engineering and Mechanics.
ANALYTICAL INVESTIGATIONS OF BULK WAVE RESONATORS IN THE PIEZOELECTRIC THIN FILM ON GALLIUM-ARSENIDE CONFIGURATION Annual Report, 1 Sep. 1984 - 31 Aug. 1985
Harry F. Tiersten 30 Sep. 1985 10 p
(Grant AF-AFOSR-0351-84)
(AD-A162068; AFOSR-85-1042TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

Trapped energy modes in the piezoelectric thin film on semiconductor composite resonator are explained and contrasted with modes that do not trap energy. The results of calculation of the quality factor of the fundamental essentially thickness-extensional mode in the composite resonator due to radiation into the bulk semiconductor wafer are discussed. The calculations were performed for two configurations of the composite resonator thick in which the mode is not trapped and for a configuration in which the mode is trapped. The combination of materials was aluminum-nitride on gallium-arsenide. The calculations show that when trapping is not present the quality factor is a very rapidly varying function of the ratio of the composite resonator thickness to the wafer thickness and that the range of variation is very large, i.e., between one and two orders of magnitude. The calculations also reveal that when trapping is present the quality factor is always much larger and its range of variation with thickness ratio much smaller than when trapping is not present. GRA

N86-24488# Massachusetts Inst. of Tech., Cambridge.
INFRARED NONLINEAR PROCESSES IN SEMICONDUCTORS Semiannual Technical Report, 1 Dec. 1984 - 31 May 1985
P. A. Wolff, R. L. Aggarwal, D. M. Larsen, S. Y. Yuen, and E. Isaacs 24 Jun. 1985 7 p
(Contract F49620-84-C-0010)
(AD-A162096; AFOSR-85-0994TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

Observation of exceedingly narrow spin flip lines in n-InSb suggests the existence of spin waves in this crystal. Si:P has been shown to have a large nonlinear optic coefficient at the metal-insulator transition; the effect is believed to be due to electron promotion from localized to delocalized states. Preliminary nonlinear optic experiments imply that hole kinetics in p-type InGaAs/GaAs strained layer superlattices are different from those of bulk p-GaAs. Author (GRA)

N86-24489# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
FABRICATION AND PROPERTIES OF MULTILAYER STRUCTURES Final Technical Report, 1 Nov. 1982 - 30 Jun. 1985
William A. Tiller Oct. 1985 318 p
(Contract MDA903-83-K-0041)
(AD-A162347; SU-DMS-86-R-1) Avail: NTIS HC A14/MF A01 CSCL 20/2

Computer modeling of Si and SiC surfaces and surface processes relevant to crystal growth from the vapor and molecular beam epitaxy has been carried out. Surface point defect energies, ledge energies and face energies, as well as the surface stress tensor, have been calculated. The strongly compressive surface stress tensor has been found to dominate all surface reconstruction processes. Experimental studies of SiC film formation via dual source and single source sputtering processes is described in an attempt to produce almost single crystal SiC films. GRA

N86-24490# Army Military Personnel Center, Alexandria, Va.
THE EFFECT OF A BIMODAL GRAIN SIZE DISTRIBUTION ON THE COMPRESSIVE STRENGTH OF POLYCRYSTALLINE ICE M.S. Thesis
James L. Laughlin Dec. 1985 105 p
(AD-A162361) Avail: NTIS HC A06/MF A01 CSCL 08/12

Previous studies have shown that grain size directly affects the strength of fresh-water equiaxed polycrystalline ice Ih, where strength decreases as grain size increases. This has been shown both in tension and compression at constant strain rates over a range of temperatures. The mechanical behavior of the ice is well described by the Hall-Petch relation. This thesis presents the results of a study to examine the effect of a bimodal grain size distribution on the compressive strength of equiaxed randomly oriented polycrystalline ice Ih. Laboratory prepared specimens of right circular ice consisting of different amounts of large (5.5 mm) and small(2.0 mm) grains by volume (75%/25L%, 50%/50%, 25%-75%) were tested at -10 C in uniaxial unconfined compression. Tests were conducted at two strain rates, 0.00001/S and 0.001/s. Building on the results of Cannon (1985), this work establishes the law of mixtures for the compressive strength of a specimen composed of a bimodal mix of grains. First hypotheisized by Lee(1985), the law of mixtures states that the strength of a bimodal specimen is linearly dependent on the volume fraction of large and small grains. A single significant grain size may be used to charcterize the mechanical behavior of the specimen. Two possible candidates of a significant grain size are examined, one derived from the use of the Hall-Petch relation and the second being the average of the two grain sizes. Results show the use of the average is more expedient with little loss in accuracy. GRA

N86-24491# Northwestern Univ., Evanston, Ill. Dept. of Physics.

SUPERLATTICE EFFECTS IN GRAPHITE INTERCALATION COMPOUNDS Annual Report, 1 Oct. 1984 - 30 Sep. 1985
R. S. Markiewicz 22 Oct. 1985 30 p
(Contract F49620-82-C-0076)
(AD-A162373; AFOSR-85-1038TR) Avail: NTIS HC A03/MF A01 CSCL 20/3

A new kind of two-dimensional, field-induced phase transition has been discovered in Br2 graphite intercalation compounds. Similar to, but much more pronounced than Condon domain formation in three-dimensions, it is a Landau level instability which results in two types of domains having different numbers of Landau levels occupied. The domains display a striking nonlinear dynamics in an a.c. magnetic field, with phenomena including resonance, hysteresis, and a quasiperiodic route to chaos. A theoretical basis for analyzing the data has been developed, and the high frequency resonance appears to be a transverse vibration of the domain array, similar to that predicted for the superconducting intermediate state. Author (GRA)

N86-24492# Akron Univ., Ohio. Inst. of Polymer Science.
INELASTIC ELECTRON TUNNELING SPECTROSCOPY OF SILANE COUPLING AGENTS ADSORBED ON ALUMINA
J. D. Alexander, A. N. Gent, and P. N. Henriksen Dec. 1985 33 p
(Contract N00014-85-K-0222)
(AD-A162849; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/4

Inelastic electron tunneling spectroscopy (IETS) has been used to obtain vibrational spectra of alkoxysilanes adsorbed on aluminum oxide. The spectra reveal that: (1) monoalkoxysilanes are not adsorbed whereas trialkoxysilanes are readily adsorbed, (2) the reaction mechanism of triethoxysilanes and trimethoxysilanes is the same, and (3) the reaction mechanism under anhydrous conditions utilizes surface OH o OD groups present on alumina. All of these results suggest the following hypotheses: Trialkoxysilanes can condense directly with OH groups on an alumina surface to form siloxane interfacial bonds. Such bonds are probably stabilized subsequently by condensation between chemisorbed silane molecules to form siloxane oligomers. On the other hand, monoalkoxysilanes appear to be unable to bond to an alumina surface, either because their reactivity is intrinsically lower or because they are not able to condense further to form a nonvolatile polysiloxane layer in situ. Their intrinsic reactivity will, of course, be reduced because they have fewer reactive sites per molecule. Nevertheless, they clearly act as catalysts for further oxidation of the aluminum surface, as evidenced by the rapid increase in junction resistance on doping the substrate with them. GRA

N86-24493# Lawrence Livermore National Lab., Calif.
MOLECULAR DYNAMICS STUDIES OF ENERGY TRANSFER PROCESSES IN CRYSTAL SYSTEM Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
Arnold M. Karo and Franklin E. Walker 17 Dec. 1985 12 p
(Contracts N00014-85-F-0005; W-7405-eng-48)
(AD-A163132; AD-F630622; UCID-20620) Avail: NTIS HC A02/MF A01 CSCL 20/4

Computer molecular dynamics studies have been carried out on the problem of attaining a fundamental understanding of shock-induced initiation of energetic materials. The studies focus on an important specific facet of this problem, namely, the energy transfer processes in crystal systems, particularly in molecular lattices. Code development for the CRAY computer during the preceding year is reviewed and the shock studies that were carried out are listed. Plans for additional studies of the underlying mechanisms of intermolecular-intramolecular energy transfer and the dynamics of intramolecular energy exchange in shock-loaded systems are presented. GRA

N86-24494# Sandia National Labs., Albuquerque, N. Mex.
RAMAN SPECTROSCOPY OF BORON CARBIDES AND RELATED BORON-CONTAINING MATERIALS
J. A. Shelnutt, B. Morosin, D. Emin, A. Mullendore, G. Slack, and C. Wood 1985 26 p Presented at the International Conference on the Physics and Chemistry of Boron and Boron-rich Borides, Albuquerque, N. Mex. 29 Jul. 1985 Prepared in cooperation with General Electric Co., Schenectady, N.Y., and Jet Propulsion Lab., Pasadena, Calif.
(Contract DE-AC04-76DP-00789)
(DE86-002126; SAND-85-1438C; CONF-850786-4) Avail: NTIS HC A03/MF A01

Raman spectra of crystalline boron, boron carbide, boron arsenide (B12As2), and boron phosphide (B12P2) are reported. The spectra are compared with other boron-containing materials containing the boron icosahedron as a structural unit. The spectra exhibit similar features some of which correlate with the structure of the icosahedral units of the crystals. The highest Raman lines appear to be especially sensitive to the B-B distance in the polar triangle of the icosahedron. Such Raman structural markers are potentially useful in efforts to tailor electronic properties of these high temperature semiconductors and thermoelectrics. Raman spectroscopy is also useful in characterizing methods of preparation of boron-based materials. For example, inclusions of carbonaceous material in the boron carbides can be detected by the presence of two broad Raman lines near 1370 and 1580 cm(-1). In the hot-pressed samples that exhibited the lines the carbonaceous material is amorphous and much like carbon black or pyrolytic glassy carbon. DOE

N86-24495# Emory Univ., Atlanta, Ga. Dept. of Physics.
FAR INFRARED STUDIES OF SUPERCONDUCTING V3SI, Nb3Ge AND b Final Report
S. Perkowitz 29 Aug. 1985 6 p
(Contract DE-AS05-79ER-10436)
(DE86-002318; DOE/ER-10436/5) Avail: NTIS HC A02/MF A01

Far infrared spectroscopy between 10 and 250 cm(-1) is an effective probe of superconductivity because typical gap and phonon energies lie in this region. Between 1979 and 1985, this DOE contract supported far infrared research in homogeneous high-T sub c superconductors and in granular superconductors. Results in both areas are summarized in this report. DOE

N86-24496# California Univ., Berkeley. Lawrence Berkeley Lab.
INFLUENCE OF DANGLING BOND DEFECTS ON RECOMBINATION IN A-SI:H
H. Dersch, A. Skumanich, and N. M. Amer Jun. 1985 5 p Presented at the 11th International Conference on Amorphous Semiconductors, Rome, Italy, 2 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002874; LBL-20184; CONF-8509201-2) Avail: NTIS HC A02/MF A01

Time resolved photoinduced absorption (PIA) and steady state photoconductivity experiments (PC) are used to study recombination processes in electron-irradiated hydrogenated amorphous silicon (a-Si:H). Defect densities measured by ESR range from 5 x 10(15)/cm(3) to 10(18)/cm(3). It is found that while increasing the dangling bond density reduces the PC, the PIA decay rate increases. The results are discussed in the context of a recombination model where the defect density determines whether the carriers recombine through a fast bimolecular or a slower monomolecular process. DOE

N86-24497# Sandia National Labs., Albuquerque, N. Mex.
EPITAXIAL FORMATION OF RARE EARTH SILICIDES BY RAPID ANNEALING
J. A. Knapp and S. T. Picraux 1985 12 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003568; SAND-85-1333C; CONF-851217-6) Avail: NTIS HC A02/MF A01

Rapid electron beam and lamp heating have been used to form thin epitaxial films of rare-earth silicides by reacting overlayers of the rare earths with (111) Si substrates. Of the metals Y, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu, all but Gd are found to form epitaxial silicide layers by rapid solid-phase reaction, while silicides of Gd, Dy, Tm, Yb and Lu have been formed epitaxially by liquid phase reaction. For all but Er this is the first demonstration of

epitaxial growth on Si. Details obtained from ion beam channeling analysis and transmission electron microscopy confirm the expected epitaxial structure and also show that the Si vacancies in the silicide form an ordered superlattice, rather than a random array as had been assumed before. DOE

N86-24498# Sandia National Labs., Albuquerque, N. Mex.
CONDUCTION BAND ENERGY LEVELS IN SUPERLATTICES WITH COMPLEX UNIT CELLS
G. C. Osbourn 1985 10 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003715; SAND-85-1636C; CONF-851217-9) Avail: NTIS HC A02/MF A01

The conduction band energy levels and wavefunctions in a number of superlattices with more than two layers per unit cell have been calculated using an effective mass model. Many of these structures exhibit energy levels which can be modeled as resulting from a conventional superlattice with a modified bulk conduction band minimum in the effective wells. These structures should be useful for extending the size of the superlattice periods in strained-layer superlattices. DOE

N86-24499# California Univ., Berkeley. Lawrence Berkeley Lab.
DETECTION OF CHARGED PARTICLES IN AMORPHOUS SILICON LAYERS
S. N. Kaplan, J. R. Morel, T. A. Mulera, V. Perez-Mendez, G. Schnurmacher, and R. A. Street Oct. 1985 7 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with Xerox Palo Alto Research Center, Calif.
(Contract DE-AC03-76SF-00098)
(DE86-003992; LBL-19665; CONF-851009-30) Avail: NTIS HC A02/MF A01

The successful development of radiation detectors made from amorphous silicon could offer the possibility for relatively easy construction of large area position-sensitive detectors. We have conducted a series of measurements with prototype detectors, on signals derived from alpha particles. The measurement results are compared with simple model calculations, and projections are made of potential applications in high-energy and nuclear physics. DOE

N86-24500# California Univ., Berkeley. Lawrence Berkeley Lab.
TRANSLATIONS AND STRUCTURE IN SYMMETRICAL TILT BODY-CENTERED-CUBIC GRAIN BOUNDARIES
E. A. Kamenetzky, R. Gronsky, and Y. T. Chou Oct. 1985 11 p Presented at the 4th Japan Institute of Metals International Symposium (JIMIS-4) on Grain Boundary Structure and Related Phenomena, Minakami Spa, Japan, 25 Nov. 1985 Prepared in cooperation with Lehigh Univ., Bethlehem, PA.
(Contract DE-AC03-76SF-00098)
(DE86-004099; LBL-20487; CONF-8511128-2) Avail: NTIS HC A02/MF A01

A simple geometrical method has been developed to calculate grain boundary translations that preserve first- and second-nearest neighbor coordination across the interface. These translations form interlocking polyhedral groups of atoms that define a mechanically stable boundary. Further individual atom relaxations can be easily recognized from the geometry of the atom arrangements. The description of boundary structure that results from this model is equivalent to a soft sphere description where a range of interatomic distances between the first and second-nearest neighbors exist at the grain boundary. A number of possible structures exist for each boundary; the relationship between these structures and the implications on grain boundary phenomena are discussed. A structural unit description results for particular sets of translations. DOE

N86-23763# Joint Publications Research Service, Arlington, Va.
CHINA DEVELOPS ADVANCED LASER CRYSTAL
In its China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 119 Transl. into ENGLISH from Xinhua (Beijing, China), 23 Dec. 1985 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

N86-23766# Joint Publications Research Service, Arlington, Va.
FLUORESCENT SPECTRA OF Cr3+ IONS IN OXIDES OF HIGH VALENT-CATIONS, POSSIBILITY TO USE THEM AS TUNABLE LASER MATERIALS Abstract Only
Zundu Luo, Jiming Chen, and Tao Chen *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 132 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), v. 4, no. 5, Oct. 1985 p 355-360 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

N86-23767# Joint Publications Research Service, Arlington, Va.
DATA ANALYSIS OF INFRARED REFLECTION SPECTRA OF LiNbO3 AND OTHER CRYSTALS Abstract Only
Yan Liu and Liji Liao *In its* China Report: Science and Technology (JPRS-CST-86-005) 11 Feb. 1986 p 137 Transl. into ENGLISH from Gunagxue Xuebao (Shanghai, China), v. 5, no. 11, Nov. 1985 p 1046-1055 (For primary document see N86-23762 14-31)
Avail: NTIS HC A07/MF A01

N86-24360# Joint Publications Research Service, Arlington, Va.
RESISTANCE OF YAG:Nd SUP 3+ LASER FREQUENCY CONVERTERS TO IONIZING RADIATION Abstract Only
B. I. Zakharkin, L. A. Kulevskiy, V. N. Nikolayev, and G. N. Toropkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 3 Transl. into ENGLISH from Akademiya Nauk SSSR Inst. Obshchey Fiziki (Moscow, USSR), no. 58 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24361# Joint Publications Research Service Arlington, Va.
RAMAN SCATTERING OF LIGHT IN GALLIUM-ARSENIDE CRYSTALS EXPOSED TO SUBNANOSECOND LASER PULSES Abstract Only
I. I. Reshina, O. V. Smolskiy, and A. N. Vasilyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 4 Transl. into ENGLISH from Fizika I Tekhnika Poluprovodnikov (Leningrad, USSR), v. 19, no. 2, Feb. 1985 p 252-256 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24362# Joint Publications Research Service, Arlington, Va.
LACK OF CORRESPONDENCE OF LATTICE PERIODS AND INTENSITY OF PHOTOLUMINESCENCE IN GaInSbAs/GaSb HETEROCOMPOSITIONS Abstract Only
N. A. Bert, V. I. Vasilyev, S. G. Konnikov, V. I. Kuchinskiy, A. S. Lazutka, V. A. Mishurnyy, and Ye. L. Portnoy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 5 Transl. into ENGLISH from Pisma Zhurnal Tekhnicheskoy Fiziki (Leningrad, USSR), v. 11, no. 4, 26 Feb. 1985 p 193-196 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24363# Joint Publications Research Service, Arlington, Va.
BLEACHING EFFECT IN ALKALI-HALIDE CRYSTALS WITH ELECTRON COLOR CENTERS Abstract Only
B. A. Medvedev, T. G. Silkina, and G. V. Simonenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 6 Transl. into ENGLISH from Optika I Spektroskopya (Leningrad, USSR), v. 57, no. 6, Dec. 1984 p 1026-1028 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24370# Joint Publications Research Service, Arlington, Va.
LOCALIZATION AND THERMAL STABILITY OF DEFECTS CAUSED BY LASER RADIATION OF GERMANIUM Abstract Only
P. K. Kashkarov and A. V. Petrov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-004) 7 Feb. 1986 p 18 Transl. into ENGLISH from Fizika I Tekhnika Poluprovodnikov (Leningrad, USSR), v. 19, no. 2, Feb. 1984 p 234-236 (For primary document see N86-24358 14-70)
Avail: NTIS HC A06

N86-24540*# Claflin Coll., Orangeburg, S.C. Dept. of Mathematics, Physics and Computer Science.
INVESTIGATION OF LOW-TEMPERATURE SEMICONDUCTOR DEVICES
D. R. Overcash *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 11 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20L

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-24501 Louisiana State Univ., Baton Rouge.
1. TOWARD THE QUANTUM LIMIT IN GRAVITATIONAL WAVE DETECTORS. 2: SEVERAL THEORETICAL PROBLEMS IN CONDENSED MATTER PHYSICS Ph.D. Thesis
Bu-Xin Xu 1985 227 p
Avail: Univ. Microfilms Order No. DA8526392

A gravity wave detector consisting of a Weber type resonant antenna, an inductive transducer and a dc SQUID coupling system were analyzed. The complete set of equations of motion were derived for the system and their implications and solutions were discussed in detail. The results obtained are applied to the LSU gravity wave detector, and the optimum system parameters are calculated. It is possible to approach quantum limited sensitivity for the detector if these optimum system parameters and matching conditions are properly satisfied. Preliminary experimental results were presented. A critical comparison of the work of Ramana and Rajagopal (RR) with the work of McDonald (MD) on the spin polarized relativistic electron gas system was presented. After correcting some errors in previous work of RR, a new analytical expression for exchange energy and exchange potential which are convenient for practical applications are then derived. The effects of the underlying crystal structure and the surface/interface normal on spin waves at surfaces and interfaces for cubic crystals described by the Heisenberg Hamiltonian were examined. Dissert. Abstr.

N86-24502 Texas Univ., Austin.
THE HAMILTONIAN FORMULATION OF SUPERGRAVITY IN ELEVEN DIMENSIONS Ph.D. Thesis
Alvaro Hernan Diaz 1985 75 p
Avail: Univ. Microfilms Order No. DA8527555

The Hamiltonian for 11 dimensional supergravity is computed. Throughout the work the freedom to perform local supersymmetric transformations, local Lorentz rotations of the orthonormal frame, and coordinate reparametrizations was maintained. Next, the form of the algebra of generators of localized translations, supersymmetry transformations, localized rotations, and gauge transformations of the three index photon for supergravity in eleven dimensions is determined. Dissert. Abstr.

N86-24503# State Univ. of New York, Binghamton. Dept. of Chemistry.
CONGRUENT VAPORIZATION IN THE v-si SYSTEM AS STUDIED BY HIGH TEMPERATURE KNUDSEN CELL MASS SPECTROMETRY
Clifford E. Myers and Robert J. Kematick 26 Nov. 1985 7 p Presented at the Annual Conference, Mass Spectrometry and Allied Topics (33rd), San Diego, Calif., 26-31 May 1985
(Contract N00014-82-K-0501)
(AD-A162285; TR-4) Avail: NTIS HC A02/MF A01 CSCL 07/4

The vaporization behavior of vanadium silicides has been investigated by Knudsen cell mass spectrometry in the temperature range 1800-2000K. It was demonstrated that at about 1900-2000K the congruently vaporizing composition is within the V3Si single phase region. Thermodynamic activities relative to the solid elements were obtained by direct comparison. Free energies and enthalpies of phase formation for V3Si(s) and V5Si3(s) were calculated from the experimental data and were found to be in good agreement with data obtained elsewhere. GRA

N86-24504# State Univ. of New York, Binghamton. Dept. of Chemistry.
VAPORIZATION THERMODYNAMICS OF CHROMIUM SILICIDES
C. E. Myers, G. A. Murray, R. J. Kematick, and M. A. Frisch 26 Nov. 1985 15 p Presented at the Symposium, High Temperature Materials Chemistry 3, Las Vegas, Nev., 13-18 Oct. 1985
(Contract N00014-82-K-0501)
(AD-A162286; TR-5) Avail: NTIS HC A02/MF A01 CSCL 07/2

The vaporization thermodynamics of the chromium-silicon system have been investigated in the temperature range 1300-1600K by Knudsen cell mass spectrometry. Both magnetic sector and quadrupole instruments were employed. Thermodynamic activities were obtained by direct comparison with the elements. Standard free energies of formation at 1500K, Delta G deg (sub f)/R (kilokelvins) are: 1/3 CrSi2, -3.07; 1/2 CrSi, -3.62; 1/8 Cr5Si3, -3.73; 1/4 Cr3Si, -3.28. These data, when combined with heat capacity and entropy data from the literature, give standard enthalpies of formation at 298.15K, Delta H deg (sub f)/R (kilokelvins): 1/3 CrSi2, -3.36; 1/2 CrSi, -3.20; 1/8 Cr5Si3, -3.38; 1/4 Cr3Si, -3.39. The CrSi2 phase was found to contain the congruently vaporizing composition. GRA

N86-24505# Texas Univ., Austin. Center for Studies in Statistical Mechanics.
BEHAVIOR OF MATTER UNDER NONEQUILIBRIUM CONDITIONS: FUNDAMENTAL ASPECTS AND APPLICATIONS IN ENERGY-ORIENTED PROBLEMS
I. Prigogine 1985 27 p refs
(Contract DE-AS05-81ER-10947)
(DE86-003771; DOE/ER-10947/4) Avail: NTIS HC A03/MF A01

During the past year we attempted to clarify the way bifurcations of periodic solutions are organized near a homoclinic orbit associated with an unstable periodic solution. Our principal motivation is to explain various types of bifurcations sequences observed in nonlinear dynamic. DOE

N86-24506# California Univ., Berkeley. Lawrence Berkeley Lab.
QUANTUM CHEMISTRY BY QUANTUM MONTE CARLO: BEYOND GROUND-STATE ENERGY CALCULATIONS
P. J. Reynolds, R. N. Barnett, B. L. Hammond, R. Grimes, and W. A. Lester, Jr. Aug. 1985 17 p refs Presented at the 5th International Congress on Quantum Chemistry, Montreal, Quebec, 19 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-003993; LBL-20089; CONF-850859-2) Avail: NTIS HC A02/MF A01

We present recent advances with the quantum Monte Carlo (QMC) method in its application to molecular systems. The QMC method is a procedure for solving the Schroedinger equation statistically, by the simulation of an appropriate random process. The formal similarity of the Schroedinger equation with a diffusion equation allows one to calculate quantum mechanical expectation values as Monte Carlo averages over an ensemble of random walks. We have previously obtained highly accurate correlation energies for a number of molecules, as well as the singlet-triplet splitting in methylene and the barrier height for the H + H2 exchange reaction. Recently we have begun a program of extending the QMC approach to the calculation of analytic derivatives of the energy. A brief description of the approach is presented here, together with some preliminary results. In addition, we are now computing expectation values of properties other than the energy. We summarize how standard QMC must be modified, and present some results for H2 and N2. Finally, we describe preliminary work

toward the goal of obtaining accurate molecular excited states through QMC. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-24507*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESEARCH REPORTS: 1985 NASA/ASEE SUMMER FACULTY FELLOWSHIP PROGRAM Final Report
Gerald R. Karr, ed. (Alabama Univ., Huntsville), T. Leroy Osborn, ed., James B. Dozier, ed., and L. Michael Freeman, ed. (Alabama Univ., Tuscaloosa) Jan. 1986 966 p refs Program held in Huntsville, Ala., 2-16 August 1985
(Contract NGT-01-008-021)
(NASA-CR-178709; NAS 1.26:178709) Avail: NTIS HC A99/MF E04 CSCL 05I

A compilation of 40 technical reports on research conducted by participants in the 1985 NASA/ASEE Summer Faculty Fellowship Program at Marshall Space Flight Center (MSFC) is given. Weibull density functions, reliability analysis, directional solidification, space stations, jet stream, fracture mechanics, composite materials, orbital maneuvering vehicles, stellar winds and gamma ray bursts are among the topics discussed. For individual titles, see N86-24508 through N86-24547.

N86-24508*# Furman Univ., Greenville, S.C. Dept. of Computer Science.
A MONTE CARLO STUDY OF WEIBULL RELIABILITY ANALYSIS FOR SPACE SHUTTLE MAIN ENGINE COMPONENTS c20
Kenneth Abernethy *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 13 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 21H

The incorporation of a number of additional capabilities into an existing Weibull analysis computer program and the results of Monte Carlo computer simulation study to evaluate the usefulness of the Weibull methods using samples with a very small number of failures and extensive censoring are discussed. Since the censoring mechanism inherent in the Space Shuttle Main Engine (SSME) data is hard to analyze, it was decided to use a random censoring model, generating censoring times from a uniform probability distribution. Some of the statistical techniques and computer programs that are used in the SSME Weibull analysis are described. The methods documented in were supplemented by adding computer calculations of approximate (using iteractive methods) confidence intervals for several parameters of interest. These calculations are based on a likelihood ratio statistic which is asymptotically a chisquared statistic with one degree of freedom. The assumptions built into the computer simulations are described. The simulation program and the techniques used in it are described there also. Simulation results are tabulated for various combinations of Weibull shape parameters and the numbers of failures in the samples. R.J.F.

N86-24509*# Alabama Univ., Birmingham.
CONTAINERLESS PROCESSING OF HYPERMONOTECTIC AND GLASS FORMING ALLOYS USING THE MARSHALL SPACE FLIGHT CENTER 100 METER DROP TUBE FACILITY c12
J. Barry Andrews *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22A

Two separate projects were carried out to study alloys whose solidification structures can be strongly influenced by the presence of a container during melting and solidifications. One project involved containerless solidification of hypermonotectic Au35Rh65 alloys. This alloy exhibits liquid immiscibility over a temperature range. It has been suggested that containerless melting might be one solution to the problem of sedimentation in the dispersions of immiscible liquid phases. However, surface tension driven flows could also lead to accumulation of the minority liquid phase at the external surface of a containerlessly melted alloy. The research underway is a first step in determining the influence of containerless, microgravity processing on immiscible alloys. Nickel-niobium alloys were studied using the drop tube facility. One alloy in this system, a Ni60Nb40 alloy, is a good candidate for the formation of a bulk metallic glass. Amorphous alloys of this composition were produced using thin film and mechanical alloying techniques. However, theory indicates that if heterogeneous nucleation can be avoided, it should be possible to produce an amorphous structure in this system using a moderate cooling rate from the melt. The containerless melting and solidification capabilities of the drop tube facility provide ideal conditions for a study of this type. To date, several Ni60Nb40 samples have been levitated, melted and cooled during 4.6 seconds of free fall in the 100 meter drop tube. Structures obtained are discussed. R.J.F.

N86-24510*# Alabama Univ., Birmingham. Dept. of Materials Engineering.
THE EFFECT OF GROWTH RATE ON THE COMPOSITIONAL VARIATIONS IN DIRECTIONALLY SOLIDIFIED Hg(1-x) CdSUBxSe c26
Rosalia N. Andrews *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 39 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

Several Hg1-xCdxSe crystals of composition x = 0.2 were grown in a bridgman-type directional solidification furnace at varying translation rates. The influence of growth rate on both the longitudinal and radial compositional uniformity for the crystals was determined using density measurements and infrared transmission-edge mapping. Author

N86-24511*# Florida Inst. of Tech., Melbourne. Dept. of Chemical Engineering.
SPACE STATION COMMON MODULE THERMAL MANAGEMENT: DESIGN AND CONSTRUCTION OF A TEST BED c18
Ronald G. Barile *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22B

In this project, a thermal test bed was designed, simulated, and planned for construction. The thermal system features interior and exterior thermal loads and interfacing with the central-radiator thermal bus. Components of the test bed include body mounted radiator loop with interface heat exchangers (600 Btu/hr); an internal loop with cabin air-conditioning and cold plates (3400 Btu/hr); interface heat exchangers to the central bus (13,00 0 Btu/hr); and provisions for new technology including advanced radiators, thermal storage, and refrigeration. The apparatus will be mounted in a chamber, heated with lamps, and tested in a vacuum chamber with LN2-cooled walls. Simulation of the test bed was accomplished using a DEC PRO 350 computer and the software package TKISolver. Key input variables were absorbed solar radiation and cold plate loads. The results indicate temperatures on the two loops will be nominal when the radiation and cold plate loads are in the range of 25% to 75% of peak loads. If all loads fall to zero, except the cabin air system which was fixed, the radiator fluid will drop below -100 F and may cause excessive pressure drop. If all loads reach 100%, the cabin air temperature could rise to 96 F. R.J.F.

N86-24512*# Purdue Univ., Indianapolis, Ind. Dept. of Mechanical Engineering.
METHODOLOGY OF DESIGN AND ANALYSIS OF EXTERNAL WALLS OF SPACE STATION FOR HYPERVELOCITY IMPACTS BY METEOROIDS AND SPACE DEBRIS c18

Fahim A. Batia *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 32 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22B

The development of criteria and methodology for the design and analysis of Space Station wall elements for collisions with meteoroids and space debris at hypervelocities is discussed. These collisions will occur at velocities of 10 km/s or more and can be damaging to the external wall elements of the Space Station. The wall elements need to be designed to protect the pressurized modules of the Space Station from functional or structural failure due to these collisions at hypervelocities for a given environment and population of meteoroids and space debris. The design and analysis approach and the associated computer program presented is to achieve this objective, including the optimization of the design for a required overall probability of no penetration. The approach is based on the presently available experimental and actual data on meteoroids and space debris flux and damage assessments and the empirical relationships resulting from the hypervelocity impact studies in laboratories. Author

N86-24513*# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
DEVELOPMENT OF COMPOSITE MATERIAL TEST METHODOLOGY FOR FRACTURE TOUGHNESS/DAMAGE TOLERANCE **c24**
Mark V. Bower *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 21 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

Fracture toughness testing techniques for composite materials are reviewed for simplicity, applicability to filament wound systems, and correlation with fracture mechanics preinciples. Toughness test results are repesented for homogeneous epoxy and graphite reinforced epoxy. Author

N86-24514*# Oklahoma State Univ., Stillwater.
A TECHNIQUE FOR INCORPORATING THE NASA SPACELAB PAYLOAD DEDICATED EXPERIMENT PROCESSOR SOFTWARE INTO THE SIMULATION SYSTEM FOR THE PAYLOAD CREW TRAINING COMPLEX **c61**
Dale A. Bremmer *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 13 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

The feasibility of some off-the-shelf microprocessors and state-of-art software is assessed (1) as a development system for the principle investigator (pi) in the design of the experiment model, (2) as an example of available technology application for future PI's experiments, (3) as a system capable of being interactive in the PCTC's simulation of the dedicated experiment processor (DEP), preferably by bringing the PI's DEP software directly into the simulation model, (4) as a system having bus compatibility with host VAX simulation computers, (5) as a system readily interfaced with mock-up panels and information displays, and (6) as a functional system for post mission data analysis. Author

N86-24515*# Tuskegee Inst., Ala. Dept. of Electrical Engineering.
INVESTIGATION OF POTENTIAL DRIVER MODULES AND TRANSMISSION LINES FOR A HIGH FREQUENCY POWER SYSTEM ON THE SPACE STATION **c33**
Harold T. Brush *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09C

The objective was to assess the feasibility of using the Series Resonant inverter as the driver module for the high frequency power system on the Space Station. This study evaluates the performance of the Series Resonant driver when it was operated with a dc input voltage and run through a series of tests to determine its start-up performance, response to load changes, load regulation, and efficiency. Also, this study compares the Series Resonant driver to another kind of driver that uses a Power Transistor snubber. An investigation of the various types of transmission lines is initiated. In particular, a simplified approach is utilized to describe the optimal transmission line. Author

N86-24516*# Tennessee Univ. Space Inst., Tullahoma.
LOW DENSITY GAS DYNAMIC WALL BOUNDARY CONDITIONS **c34**
Frank G. Collins *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20D

Low density nozzles or large expansion ratio nozzles used in space experience rarefaction effects near their exit in the form of velocity slip and temperature jump at the walls. In addition, the boundary layers become very thick and there is a very strong viscous/inviscid interaction. For these reasons no existing design technique has been found to accurately predict the nozzle flow properties up to the nozzle exit. The objective of this investigation was to examine the slip boundary conditions and formulate them in a form appropriate for use with a full Navier-Stokes numerical code. The viscous/inviscid interaction would automatically be accounted for by using a compressible Navier-Stokes code. Through examination of the interaction of molecules with solid surfaces, a model for the distribution function of the reflected molecules has been determined and this distribution function has been used to develop a new slip boundary condition that can be shown to yield more realistic surface boundary conditions. Author

N86-24517*# Mississippi State Univ., Mississippi State. Dept. of Physics.
PRELIMINARY DESIGNS FOR X-RAY SOURCE MODIFICATIONS FOR THE MARSHALL SPACE FLIGHT CENTER'S X-RAY CALIBRATION FACILITY **c14**
W. L. Croft *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 19 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14B

The objective of this investigation is to develop preliminary designs for modifications to the X-ray source of the MSFC X-Ray Calibration Facility. Recommendations are made regarding: (1) the production of an unpolarized X-ray beam, (2) modification of the source to provide characteristic X-rays with energies up to 40 keV, and (3) addition of the capability to calibrate instruments in the extreme ultraviolet wavelength region. Author

N86-24518*# Oregon Univ., Eugene. Inst. of Theoretical Science.
CALCULATIONS ON THE PRODUCTION AND USE OF SUPERFINE HOLOGRAPHIC X-RAY GRATINGS FOR ASTROPHYSICAL OBSERVATIONS **c35**
Paul L. Csonka *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 14 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04

Superfine holograhic X-ray gratings may be produced by transferring onto metal an interference pattern generated by two branches of a sufficiently coherent X-ray beam, emitted in the form of synchrotron radiation from high energy electron storage rings. Generation of the coherent beam requires restrictions on the beam size. A calculation is presented which allows an exact evaluation of this restriction. The effect of defocusing optics on the expected resolution is also studied. Author

N86-24519*# Calhoun Community Coll., Decatur, Ala. Dept. of Natural Sciences.

FOAM FLOTATION AS A SEPARATION PROCESS c27
Ben L. Currin *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 15 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11G

The basic principles of foam separation techniques are discussed. A review of the research concerning bubble-particle interaction and its role in the kinetics of the flotation process is given. Most of the research in this area deals with the use of theoretical models to predict the effects of bubble and particle sizes, of liquid flow, and of various forces on the aperture and retention of particles by bubbles. A discussion of fluid mechanical aspects of particle flotation is given. Author

N86-24520*# North Georgia Coll., Dahlonega. Dept. of Physics.
DENSITY AND PRESSURE VARIABILITY IN THE MESOSPHERE AND THERMOSPHERE c46
T. Michael Davis *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 04A

In an effort to isolate the essential physics of the mesosphere and the thermosphere, a steady one-dimensional density and pressure model has been developed in support of related NASA activities, i.e., projects such as the AOTV and the Space Station. The model incorporates a zeroth order basic state including both the three-dimensional wind field and its associated shear structure, etc. A first order wave field is also incorporated in period bands ranging from about one second to one day. Both basic state and perturbation quantities satsify the combined constraints of mass, linear momentum and energy conservation on the midlatitude beta plane. A numerical (iterative) technique is used to solve for the vertical wind which is coupled to the density and pressure fields. The temperature structure from 1 to 1000 km and the lower boundary conditions are specified using the U.S. Standard Atmosphere 1976. Vertical winds are initialized at the top of the Planetary Boundary Layer using Ekman pumping values over flat terrain. The model also allows for the generation of waves during the geostrophic adjustment process and incorporates wave nonlinearity effects. Author

N86-24521*# Texas A&M Univ., College Station. Dept. of Meteorology.
OBSERVATIONAL AND NUMERICAL STUDIES OF THE LOW-LEVEL JET STREAM IN THE ATMOSPHERE c47
Dusan Djuric *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 21 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 04B

Two cases of low-level jet (LLJ) support the hypothesis that the LLJ is an integral part of synoptic-scale cyclogenesis. The appearance of an arch with a row of cumulonimbus is discovered at the front of the LLJ. The inertia oscillations in the LLJ are pointed out as part of the quasi-diurnal variation. A plan for further research by numerical modelling is proposed, which will bring more clarification of the mechanics of the LLJ. Author

N86-24522*# Embry-Riddle Aeronautical Univ., Daytona Beach, Fla. Dept. of Aeronautical Engineering.
PRELIMINARY DESIGN METHODS FOR FIBER REINFORCED COMPOSITE STRUCTURES EMPLOYING A PERSONAL COMPUTER c24
Charles N. Eastlake *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

The objective of this project was to develop a user-friendly interactive computer program to be used as an analytical tool by structural designers. Its intent was to do preliminary, approximate stress analysis to help select or verify sizing choices for composite structural members. The approach to the project was to provide a subroutine which uses classical lamination theory to predict an effective elastic modulus for a laminate of arbitrary material and ply orientation. This effective elastic modulus can then be used in a family of other subroutines which employ the familiar basic structural analysis methods for isotropic materials. This method is simple and convenient to use but only approximate, as is appropriate for a preliminary design tool which will be subsequently verified by more sophisticated analysis. Additional subroutines have been provided to calculate laminate coefficient of thermal expansion and to calculate ply-by-ply strains within a laminate. Author

N86-24523*# John Brown Univ., Siloam Springs, Ark. Dept. of Mechanical Engineering.
A PHOENICS MODEL FOR THE TRIAXIAL LOADING OF AN INITIALLY CYLINDRICAL MASS OF RATE-TYPE MATERIAL WITH PROVISIONS FOR BULGING AND YIELD c39
kenneth W. French, Jr. *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20K

This work traces the response of a granular material via the Ten Coefficient Truesdell rate-type constituitive model into the simplest meaningful loading: the triaxial test configuration. A functional relation has been posed for computing the rather peculiar relation between average applied stress and average porosity. Using that relation an attack has been mounted on the dilemma that exists between dynamic and constitutive use of the pressure variable; that is relating dynamic pressure, thermodynamic pressure, stress deviator and higher stress invariants. The resolution was as a linear superposition with a one-way feedback, in that while the dynamic component could not effect the constituitive component, the converse was not true since density appears in the momentum transport relation. Author

N86-24524*# Tennessee Univ., Knoxville. Dept. of Mechanical and Aerospace Engineering.
INVESTIGATION AND MODELING OF SPACE SHUTTLE MAIN ENGINE SHUTDOWN TRANSIENT CHUGGING c20
Paul E. George, II *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 18 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 21H

The space shuttle main engines experience a low frequency pressure pulsation in both the fuel and oxidizer preburners during the shutdown transient. This pressure pulsation, called chugging, has been linked to undesirable bearing loads and possible damage to the spark ignitor supply piping for the fuel preburner. The problem is briefly described and a model is proposed that includes: (1) a transient stirred tank reactor model for the combustion chamber, (2) a resistance capacitance model for the supply piping and (3) purge gas/liquid oxygen interface tracking. Author

N86-24525*# Oakwood Coll., Huntsville, Ala. Dept. of Systems Software.
A STUDY OF THE VERY HIGH ORDER NATURAL USER LANGUAGE (WITH AI CAPABILITIES) FOR THE NASA SPACE STATION COMMON MODULE c61
Esther N. Gill *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

The requirements are identified for a very high order natural language to be used by crew members on board the Space Station. The hardware facilities, databases, realtime processes, and software support are discussed. The operations and capabilities that will be required in both normal (routine) and abnormal (nonroutine) situations are evaluated. A structure and syntax for

an interface (front-end) language to satisfy the above requirements are recommended. Author

N86-24526*# Jackson State Univ., Miss.
APPLICATION OF WEIBULL ANALYSIS TO SSME HARDWARE c38

Lou Allen Bell Gray *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14D

Generally, it has been documented that the wearing of engine parts forms a failure distribution which can be approximated by a function developed by Weibull. The purpose here is to examine to what extent the Weibull distribution approximates failure data for designated engine parts of the Space Shuttle Main Engine (SSME). The current testing certification requirements will be examined in order to establish confidence levels. An examination of the failure history of SSME parts/assemblies (turbine blades, main combustion chamber, or high pressure fuel pump first stage impellers) which are limited in usage by time or starts will be done by using updated Weibull techniques. Efforts will be made by the investigator to predict failure trends by using Weibull techniques for SSME parts (turbine temperature sensors, chamber pressure transducers, actuators, and controllers) which are not severely limited by time or starts. Author

N86-24527*# Mississippi State Univ., Mississippi State. Dept. of Chemical Engineering.
STANDARDIZATION OF CARBON-PHENOLIC COMPOSITE TEST METHODOLOGY c54

William B. Hall *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11D

The objective of this study was to evaluate the residual volatiles, filler content, and resin flow test procedures for carbon-phenolic prepreg materials. The residual volatile test procedure was rewritten with tighter procedure control which was then evaluated by round robin testing by four laboratories on the same rolls of prepreg. Results indicated that the residual volatiles test was too operator and equipment dependent to be reliable, and it was recommended that the test be discontinued. The resin flow test procedures were rewritten with tighter procedure control, and it is now considered to be an acceptable test. It was recommended that the filler content determination be made prior to prepregging. Author

N86-24528*# University of Southern Mississippi, Hattiesburg. Dept. of Engineering Technology.
AUTOMATION OF ELECTROMAGNETIC COMPATABILITY (EMC) TEST FACILITIES c32

Cecil A. Harrison *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 17 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20N

Efforts to automate electromagnetic compatibility (EMC) test facilities at Marshall Space Flight Center are discussed. The present facility is used to accomplish a battery of nine standard tests (with limited variations) deigned to certify EMC of Shuttle payload equipment. Prior to this project, some EMC tests were partially automated, but others were performed manually. Software was developed to integrate all testing by means of a desk-top computer-controller. Near real-time data reduction and onboard graphics capabilities permit immediate assessment of test results. Provisions for disk storage of test data permit computer production of the test engineer's certification report. Software flexibility permits variation in the tests procedure, the ability to examine more closely those frequency bands which indicate compatibility problems, and the capability to incorporate additional test procedures. Author

N86-24529*# Alabama Univ., Huntsville. Dept. of Electrical and Computer Engineering.
MODELING AND ANALYSIS OF CASCADE SOLAR CELLS c44

Fat Duen Ho *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 23 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 10A

A brief review is given of the present status of the development of cascade solar cells. It is known that photovoltaic efficiencies can be improved through this development. The designs and calculations of the multijunction cells, however, are quite complicated. The main goal is to find a method which is a compromise between accuracy and simplicity for modeling a cascade solar cell. Three approaches are presently under way, among them (1) equivalent circuit approach, (2) numerical approach, and (3) analytical approach. Here, the first and the second approaches are discussed. The equivalent circuit approach using SPICE (Simulation Program, Integrated Circuit Emphasis) to the cascade cells and the cascade-cell array is highlighted. The methods of extracting parameters for modeling are discussed. Author

N86-24530*# Alabama Univ., Tuscaloosa. Dept. of Mathematics.
A METHOD FOR LINEARIZING A NONLINEAR SYSTEM WITH SIX STATE VARIABLES AND THREE CONTROL VARIABLES c64

Wei-Shen Hsia *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 25 p ref (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 12A

A nonlinear system governed by $x = f(x,u)$ with six state variables and three control variables is considered in this project. A set of transformations from (x,u) - space to (z,v) - space is defined such that the linear tangent model is independent of the operating point in the z-space. Therefore, it is possible to design a control law satisfying all operating points in the transformed space. An algorithm to construct the above transformations and to obtain the associated linearized system is described in this report. This method is applied to a rigid body using pole placement for the control law. Results are verified by numerical simulation. Closed loop poles in x-space using traditional local linearization are compared with those pole placements in the z-space. Author

N86-24531*# Auburn Research Foundation, Inc., Ala. Dept. of Mechanical and Materials Engineering.
ON THE DETERMINATION OF THE ORIGIN OF LINEAR ANOMALY IN THE MACROSTRUCTURE OF VPPA WELDED 2219-T87 ALUMINUM ALLOY c26

Wartan A. Jemian *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 30 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

The objective was to determine the cause and significance of the weld radiograph enigma, which is a linear anomaly in the features of the X-ray film. By observing features on available radiographs and in studying published reports of similar features it was possible to conclude that there are many manifestations of the enigma, and that they are all specific features of fine structure in radiographs due to natural processes connected with welding and to specific X-ray absorption and diffraction phenomena. These processes include the thermal distribution and liquid metal flow in welding, the development of microstructure, morpohology, second phase particles and porosity due to the solidification process and to the pattern of residual stresses after the weld metal has cooled to the ambient temperature. Microdensitometer traces were made across weld radiographs of standard and enigmatic types. Similar patterns were produced by computer simulation. These show that the enigma is a relatively low contrast feature compared to real weld defects, such as undercuts or centerline cracks. The enigma can be distinguished from weld defects by these microdensitometer

traces. The enigma effect on weld properties is not known but is expected to be minor. Author

N86-24532*# Huntingdon Coll., Montgomery, Ala. Dept. of Chemistry.
ELECTROCHEMICAL CORROSION STUDIES c26
Ward W. Knockemus *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 19 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11F

The objective was to gain familiarity with the Model 350 Corrosion Measurement Console, to determine if metal protection by grease coatings can be measured by the polarization-resistance method, and to compare corrosion rates of 4130 steel coated with various greases. Results show that grease protection of steel may be determined electrochemically. Studies were also conducted to determine the effectiveness of certain corrosion inhibitors on aluminum and steel. Author

N86-24533*# New Mexico State Univ., University Park. Dept. of Mathematical Sciences.
ANALYSIS OF HIGH-ORDER LANGUAGES FOR USE ON SPACE STATION APPLICATION SOFTWARE c61
Arthur Knoebel *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

Considered in this study is the general and not easily resolved problem of how to choose the right programming language for a particular task. This is specialized to the question of which versions of what languages should be chosen for the multitude of tasks that the Marshall Space Flight Center will be responsible for in the Space Station. Four criteria are presented: theoretical considerations, quantitative matrices, qualitative benchmarks, and the monitoring of programmers. Specific recommendations for future studies are given to resolve these questions for the Space Station. Author

N86-24534*# Oregon Univ., Eugene. Dept. of Chemistry.
INVESTIGATIONS OF TOUGHENING MECHANISMS OF EPOXY RESINS c27
T. Koenig *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 22 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11B

Composite material technology was applied to the solid rocket booster by the development of a carbon filament-epoxy resin case which yields a net increase of 4000 lbs. in payload in the shuttle. The question of reusability of the new composite tanks has not yet been answered and will depend on the toughness of the matrix resin. The present study was aimed at providing conditions whereby test specimens of the epoxy resin (EPON/85) and curing agents of systematically varied structures could be produced in a controlled manner. Three sets of conditions were found that might allow the isolation of the structural effects on toughness from the cure effects. The kinetic methods leading to the determination of these conditions are described. Author

N86-24535*# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
ANALYTICAL DETERMINATION OF SPACE STATION RESPONSE TO CREW MOTION AND DESIGN OF SUSPENSION SYSTEM FOR MICROGRAVITY EXPERIMENTS c18
Frank C. Liu *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 36 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04

The objective of this investigation is to make analytical determination of the acceleration produced by crew motion in an orbiting space station and define design parameters for the suspension system of microgravity experiments. A simple structural model for simulation of the IOC space station is proposed. Mathematical formulation of this model provides the engineers a simple and direct tool for designing an effective suspension system. Author

N86-24536*# Alabama Univ., Birmingham. Dept. of Computer and Information Science.
MACHINE VISION AND THE OMV c61
Michael A. McAnulty *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 24 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09B

The orbital Maneuvering Vehicle (OMV) is intended to close with orbiting targets for relocation or servicing. It will be controlled via video signals and thruster activation based upon Earth or space station directives. A human operator is squarely in the middle of the control loop for close work. Without directly addressing future, more autonomous versions of a remote servicer, several techniques that will doubtless be important in a future increase of autonomy also have some direct application to the current situation, particularly in the area of image enhancement and predictive analysis. Several techniques are presentet, and some few have been implemented, which support a machine vision capability proposed to be adequate for detection, recognition, and tracking. Once feasibly implemented, they must then be further modified to operate together in real time. This may be achieved by two courses, the use of an array processor and some initial steps toward data reduction. The methodology or adapting to a vector architecture is discussed in preliminary form, and a highly tentative rationale for data reduction at the front end is also discussed. As a by-product, a working implementation of the most advanced graphic display technique, ray-casting, is described. Author

N86-24537*# Berry Coll., Mount Berry, Ga. Dept. of Physics.
A STUDY OF 35-GHZ RADAR-ASSISTED ORBITAL MANEUVERING VEHICLE/SPACE TELESCOPE DOCKING c18
Malcolm W. McDonald *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 31 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 22A

An experiment was conducted to study the effects of measuring range and range rate information from a complex radar target (a one-third scale model of the Edwin P. Hubble Space Telescope). The radar ranging system was a 35-GHz frequency-modulated continuous wave unit developed in the Communication Systems Branch of the Information and Electronic Systems Laboratory at Marshall Space Flight Cneter. Measurements were made over radar-to-target distances of 5 meters to 15 meters to simulate the close distance realized in the final stages of space vehicle docking. The Space Telescope model target was driven by an antenna positioner through a range of azimuth and elevation (pitch) angles to present a variety of visual aspects of the aft end to the radar. Measurements were obtained with and without a cube corner reflector mounted in the center of the aft end of the model. The results indicate that range and range rate measurements are performed significantly more accurately with the cooperative radar reflector affixed. The results further reveal that range rate (velocity) can be measured accurately enough to support the required soft docking with the Space Telescope. Author

N86-24538*# Athens Coll., Ala. Dept. of Chemistry.
DIELECTRIC CURE MONITORING OF THE 55A FILAMENT WOUND CASE RESIN c27
Ronald C. McNutt *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 11B

Studies were conducted to correlate data from dielectric cure monitoring of 55A filament would case resins using the Micromet

System II with differential scanning calorimetry and resin strength tests. Strength tests for resin bonding at various time intervals and DSC are standard accepted techniques for monitoriong resin cure cycles. They are time consuming, destructive, and non-continuous. The Micromet System II will yield reliable information on degree of cure and other parameters, which should allow better quality control on filament wound case resin cure. Author

N86-24539*# Naval Postgraduate School, Monterey, Calif. Dept. of Physics.
RADIATIVELY DRIVEN WINDS FROM MAGNETIC, FAST-ROTATING STARS **c90**
Steven Nerney *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 16 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03B

An analytical procedure is developed to solve the magnetohydrodynamic equations for the stellar wind problem in the strong-magnetic field, optically thick limit for hot stars. The slow-mode, Alfven, and fast-mode critical points are modified by the radiation terms in the force equation but in a manner that can be treated relatively easily. Once the velocities at the critical points and the distances to the points are known, the streamline constants are determined in a straight-forward manner. This allows the structure of the wind to be elucidated without recourse to complicated computational schemes. Author

N86-24540*# Claflin Coll., Orangeburg, S.C. Dept. of Mathematics, Physics and Computer Science.
INVESTIGATION OF LOW-TEMPERATURE SEMICONDUCTOR DEVICES **c76**
D. R. Overcash *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 11 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20L

The objectives of this investigation were to determine the characteristics of semiconductor devices at low temperatures. The output characteristics of several currently available semiconductor devices and devices fabricated at Marshall Space Flight Center were measured over a range of gate voltages. Large variations in low-temperature performance, not only from type to type, but from field effect transistor (FET) to FET of the same type were obtained. By increasing the carrier concentrations at low temperatures through extra heavy doping, metal oxide semiconductor field effect transistor (MOSFET) device was fabricated that operated at 4.2K. To verify the low-temperature operation of a heavily doped device, this procedure was repeated. Their noise spectrum was analyzed at 4.2K. Suggestions were made as to possible fabrication methods, techniques, and other semiconductor materials that might improve the device charactersitics at low temperatures. A procedure for using an electric field to drift dopants through the insulating oxide to produce a very thin, heavily doped region under the gate of a MOSFET was initiated. Capacitance as a function of voltage plots was suggested as a method for determining the level of dopant drift. Author

N86-24541*# Tennessee Technological Univ., Cookeville. Dept. of Mathematics and Computer Science.
RELIABILITY MODELS APPLICABLE TO SPACE TELESCOPE SOLAR ARRAY ASSEMBLY SYSTEM **c89**
S. A. Patil *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 26 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03A

A complex system may consist of a number of subsystems with several components in series, parallel, or combination of both series and parallel. In order to predict how well the system will perform, it is necessary to know the reliabilities of the subsystems and the reliability of the whole system. The objective of the present study is to develop mathematical models of the reliability which are applicable to complex systems. The models are determined by assuming k failures out of n components in a subsystem. By taking k = 1 and k = n, these models reduce to parallel and series models; hence, the models can be specialized to parallel, series combination systems. The models are developed by assuming the failure rates of the components as functions of time and as such, can be applied to processes with or without aging effects. The reliability models are further specialized to Space Telescope Solar Arrray (STSA) System. The STSA consists of 20 identical solar panel assemblies (SPA's). The reliabilities of the SPA's are determined by the reliabilities of solar cell strings, interconnects, and diodes. The estimates of the reliability of the system for one to five years are calculated by using the reliability estimates of solar cells and interconnects given n ESA documents. Aging effects in relation to breaks in interconnects are discussed. Author

N86-24542*# Memphis State Univ., Tenn. Dept. of Mechanical Engineering.
TURBULENT FLOW FIELD PREDICTIONS IN SHARPLY CURVED TURN AROUND DUCTS **c34**
L. Michael Santi *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 38 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 20D

In this investigation, two-dimensional turbulent flow of incompressible Newtonian fluids in sharply curved 180 deg turn around ducts is studied. Results of an approximate numerical flow field analysis utilizing an orthogonal, body-fitted, curvilinear coordinate system are compared to results based on a traditional cylindrical reference frame. Qualitative indication of general streamfield characteristics as well as quantitative benchmarks for the planning of future experimentation are provided. In addition, preliminary results of an augmented kappa-epsilon turbulence model analysis, which explicitly accounts for the effects of streamline curvature and pressure strain in internal turbulent flows, are presented. Specific model difficulties are discussed and comparisons with standard kappa-esilon model predictions are included. Author

N86-24543*# Alabama Univ., Huntsville. Dept. of Mathematics.
MISSION ANALYSIS FLOW SEQUENCING OPTIMIZATION **c66**
McKinley Scott *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 14 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 12B

This investigation is an extension of a project dealing with the problem of optimal use of ground resources for future space missions. This problem was formulated as a linear programming problem using an indirect approach. Instead of minimizing the inventory level of needed ground resources, the overlapping periods during which the same types of resources are used by various flights are minimized. The model was built upon the assumption that during the time interval under consideration, the costs of various needed resources remain constant. Under other assumptions concerning costs of resources, the objective function, in general, assumes a non-linear form. In this study, one case where the form of the objective function turns out to be quadratic is considered. Also, disadvantages and limitations of the approach used are briefly discussed. Author

N86-24544*# Calhoun Community Coll., Decatur, Ala.
SIMULATION AND STUDY OF SMALL NUMBERS OF RANDOM EVENTS **c65**
Russell D. Shelton *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 20 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 12A

Random events were simulated by computer and subjected to various statistical methods to extract important parameters. Various forms of curve fitting were explored, such as least squares, least distance from a line, maximum likelihood. Problems considered were dead time, exponential decay, and spectrum extraction from

cosmic ray data using binned data and data from individual events. Computer programs, mostly of an iterative nature, were developed to do these simulations and extractions and are partially listed as appendices. The mathematical basis for the compuer programs is given. Author

N86-24545*# California Univ., San Diego. Center for Astrophysics and Space Science.
AUTOMATED CALIBRATION OF A FLIGHT PARTICLE SPECTROMETER c35
Roy B. Torbert *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 18 p (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 14B

A system for calibrating both electron and ion imaging particle spectrometers was devised to calibrate flight instruments in a large vacuum facility in the Space Science Laboratory at the Marshall Space Flight Center. An IBM-compatible computer was used to control, via an IEEE 488 buss protocol, a two-axis gimbled table, constructed to fit inside the tank. Test settings of various diagnostic voltages were also acquired via the buss. These spectrometers constructed by the author at UCSD were calibrated in an automatic procedure programmed on the small computer. Data was up-loaded to the SSL VAX where a program was developed to plot the results. Author

N86-24546*# Lambuth Coll., Jackson, Tenn. Dept. of Physics, Mathematics and Computer Science.
A PRELIMINARY STUDY OF FLAT-PANEL DISPLAYS c53
Kenneth E. Yancey *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 16 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 09C

Six display technologies that might be of future value in a spacelab workstation are discussed. Some have been developed to the point where they could be used as a computer display while others have not. The display technologies studied are electroluminescents, light-emitting didodes, gas plasma, liquid crystal, electrochromic, and electrophoretic. An explanation of each mechanism is provided along with the state-of-the-art development. Author

N86-24547*# Alabama Univ., Birmingham. Dept. of Physics.
SOME ENERGY CONSIDERATIONS IN GAMMA RAY BURST LOCATION DETERMINATIONS BY AN ANISOTROPIC ARRAY OF DETECTORS c43
John H. Young *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 27 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03B

The anisotropic array of detectors to be used in the Burst and Transient Experiment (BATSE) for locating gamma ray burst sources is examined with respect to its ability to locate those sources by means of the relative response of its eight detectors. It was shown that the energy-dependent attenuation effects of the aluminum window covering each detector has a significant effect on source location determinations. Location formulas were derived as a function of detector counts and gamma ray energies in the range 50 to 150 keV. Deviation formulas were derived and serve to indicate the location error that would be caused by ignoring the influence of the passive absorber. Author

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-24548# Department of the Air Force, Washington, D.C.
GIVING A NEW FOCUS TO RESOURCE MANAGEMENT
Donald C. Prettol 1985 9 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A161840) Avail: NTIS HC A02/MF A01 CSCL 05/1

In Army resource management, for the past several years a management anarchronism has been perpetuated. The move through the Planning, Programming, Budget and Execution System (PPBES) process, is not accompanied by the continuity necessary to find out how well decisions in the earlier phases of the process actually turn out. This key management process has been allowed to exist without any formal, systematic feedback loop--the key step necessary to evaluate the quality of decisions and to improve the quality of future decision making. In the planning phase of the management process, is developed The Army Plan by function. Over all priorities are established and decisions made for the future in terms of those functions and their relationship to the overall goals of the Army's leadership for the next five and following ten years. In the programming phase of the process, resources are programmed o support specific missions and initiatives within each of the functions--identifying first the action required to support the plan for each of the functions, then the resources necessary to accomplish these missions. GRA

N86-24549# Naval Ocean Systems Center, San Diego, Calif.
THE TECHNICAL ASSISTANCE PROGRAM: A PROGRAM PLAN Final Report, Sep. 1984 - Jul. 1985
R. November Sep. 1985 118 p
(Z08-35)
(AD-A161893; NOSC/TD-832) Avail: NTIS HC A06/MF A01 CSCL 05/1

The Technical Assistance Program (TAP) is authorized by Public Law 96-480 of 21 October 1980, known as the Stevenson-Wydler Technology Innovation Act of 1980. Functions include: to provide and disseminate information on federally owned or originated products, processes, and services having potential application to state and local governments and to private industry, and to provide technical assistance in response to requests from state and Government officials. It encourages the establishment of technical volunteer programs as a resource to complement and support domestic technology transfer activities. The TAP will use retirees and current employees to translate the products of the Naval Ocean System Center to state and local governments and to the private sector in a broker capacity. They will act as a transfer agent, on donated time, to match the requirements necessary to respond to technology transfer requests received. This report is provided as a guide on how to establish a TAP. All examples and forms are based on NAVOCEANSYSCEN instructions. Any Federal laboratory may adopt the program by simply revising the plan to suit their organization. GRA

N86-24550# Mitre Corp., Bedford, Mass.
AIR FORCE GEOPHYSICS LABORATORY MANAGEMENT INFORMATION SYSTEM DEVELOPMENT PLAN Final Report
Alice A. Hayen and C. K. Reid Aug. 1985 53 p
(Contract F19628-84-C-0001)
(AD-A162005; MTR-9528; ESD-TR-85-134) Avail: NTIS HC A04/MF A01 CSCL 09/2

As part of a plan to modernize operations and services, the Air Force Geophysics Laboratory (AFGL) is implementing a management information system (MIS) for AFGL top- and middle-level managers. This document specifies the plan and schedule for implementation of the AFGL MIS. The approach to the MIS implementation, system architecture, and functions of the previously defined implementable subsystems are stated. Tasks are identified and scheduled. GRA

N86-24551# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
REPRESENTATION OF ACTIVITY KNOWLEDGE FOR PROJECT MANAGEMENT Interim Technical Report
Arvind Sathi, Mark S. Fox, and Mike Greenberg Sep. 1985 62 p Submitted for publication
(AD-A162309; CMU-RI-TR-85-17) Avail: NTIS HC A04/MF A01

CSCL 05/1

Representation of activity knowledge is important to any application which must reason about activities, such as new product management, factory scheduling, robot control, vehicle control, software engineering and air traffic control. This article provides an integration of the underlying theories needed for modeling activities. Using the domain of large computer design projects as example, the semantics of activity modeling is described. While past research in Knowledge Representation has discovered most of the underlying concepts, our attempt is towards their integration. This includes the epistemological concepts for erecting the required knowledge structure; the concepts of Activity, State, Goal and Manifestation for the adequate description of the plan and the progress; and the concepts of Time and Causality to infer the progression among the activities. We also address the issues which arise due to the integration of aggregation, time and causality among activities and states. GRA

N86-24552# Naval Postgraduate School, Monterey, Calif.
MICROCOMPUTER-BASED DETACHMENT ADMINISTRATIVE MANAGEMENT SYSTEM FOR THE LAMPS (LIGHT AIRBORNE MULTI-PURPOSE SYSTEM) COMMUNITY. A REQUIREMENTS ANALYSIS M.S. Thesis
Gregory F. Smith Sep. 1985 157 p
(AD-A162366) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis presents a requirements analysis of a microcomputer based system to be used by sea-going Light Airborne Multipurpose System (LAMPS) detachment for administrative data management and recurring reports generation. Included are the results of user interviews which were conducted to determine possible system functions. These functions, through analysis, are presented in a hierarchical charting with data flow diagrams and accompanying processing narratives. System data is then presented in data dictionary format. Recommendations are made as to possible system implementation and design. GRA

N86-24553# Analytics, Inc., Dayton, Ohio.
DETERMINING THE COST OF ACQUISITION DATA PACKAGES Final Report, 4 Sep. 1984 - 28 Jun. 1985
Thomas M. McCann and Michael N. Ward 28 Jun. 1985 87 p
(Contract F33615-84-C-5077)
(AD-A163001; Rept-1958-TR-04; BRMC-84-5077) Avail: NTIS HC A05/MF A01 CSCL 05/1

The true cost of data needed for acquisition of spare parts on past and current systems is unknown. Therefore, tradeoff decisions are made which can result in inadequate technical data for competitive acquisition of spare parts. The objective of this research is to develop a methodology for determining the reasonableness of contractor's acquisition data cost proposals. The methodology must be validated and have practical application on a day-to-day basis in the acquisition environment. The ultimate goal of this research effort is to provide DoD acquisition personnel with a tool for determining the reasonableness of contractor acquisition data package proposals. This tool will aid in negotiation in data cost and cost benefit analyses on engineering data for competitive procurement of repairable and nonrepairable spare parts. Successful completion of the task involves integrating both the factors which influence data cost and associated cost information into a methodology which can be used by the PCO or price analyst in the evaluation of contractor proposals. GRA

N86-24554# Horizon Inst. for Advanced Design, Inc., Rockville, Md.
COMPARISON OF SCIENTIFIC AND TECHNICAL PERSONNEL TRENDS IN THE UNITED STATES, FRANCE, WEST GERMANY AND THE UNITED KINGDOM SINCE 1970
J. Mintzes and W. Tash Mar. 1985 253 p
(Grant NSF SRS-82-15756)
(PB86-133030; NSF-84-335) Avail: NTIS HC A12/MF A01 CSCL 05A

Comparative data on the number of natural scientists and engineers showed that in the early 1980's, the United States had 2.6 million natural scientists and engineers in the labor force compared with 621 thousand for West Germany, 633 thousand for France, and 592 thousand for the United Kingdom. Although the United States has more natural scientists and engineers in the labor force than these three countries combined, the U.S. proportion of natural scientists and engineers in the labor force in the early 1980's was about the same as that of other countries. It is agreed that scientists and engineers in the United States demonstrate a higher degree of mobility (geographic and occupational) than do their counterparts in the European countries. Engineers in France and West Germany more frequently move into top management positions than do those in the United States and the United Kingdom. Less attention is given in the United States to the systematic training of technicians and establishment of standards than in the European countries. Updating of skills of scientists and engineers is also more systematic in the European countries than in the United States with special tax-supported programs, notably in France. In the United States, larger firms often carry out such training for their staff and, more often than in Europe, it is up to the individuals. GRA

N86-24555# Michigan Univ., Ann Arbor. Graduate School of Business Administration.
SURVEY OF THE LITERATURE ON PRODUCTION SCHEDULING AS IT PERTAINS TO FLEXIBLE MANUFACTURING SYSTEMS
N. Raman Aug. 1985 89 p Sponsored in part by National Bureau of Standards, Gaithersburg, Md.
(PB86-106754; NBS/GCR-85/499) Avail: NTIS HC A05/MF A01 CSCL 13H

A survey of the existing literature on machine scheduling from the perspective flexible manufacturing systems is presented. It is the first of a series of papers planned to document research in scheduling for the Automated Manufacturing Research Facility (AMRF) at the National Bureau of Standards. An overview of the hierarchical production planning process is given. Deterministic, non-preemptive scheduling of open shops are covered, since a typical flexible manufacturing system (FMS) operates under these conditions. Both due-date based and flow-time based objectives are addressed for single stage single machine, single stage parallel machines, flow shops and job shops. Research in assembly line balancing is similarly covered since it is possible to treat an FMS as a transfer line for repetitive discrete manufacture. The analytical approaches to these problems have focussed primarily on the objectives of maximizing production rate, minimizing in-process inventory, and maximizing machine utilization. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N86-24556 Texas Univ., Austin.
A SELF-ORGANIZING RETRIEVAL SYSTEM FOR GRAPHS Ph.D. Thesis
Robert Arlen Levinson 1985 101 p
Avail: Univ. Microfilms Order No. DA8527601

The theory, design, and implementation of a graph-based, self-organizing database retrieval system. The system is designed to support the expert problem solving tasks of recall, design, and discovery. The fundamental design principle is the production of a partial ordering by the relation subgraph-of. This relation is considered to be equivalent to more-general-than. This document discusses this design from 3 different levels: an abstract level in which the nodes in he partial ordering are concepts, the implementation level described above (the nodes are graphs), or an application level in which the nodes are domain specific objects such as molecules or reactions. The primary problem domain explored is organic chemistry. A large database of organic reactions and starting materials can be queried to extract reactions or

molecules that match, either exactly or approximately, desired structures. The system may also suggest precursors to a desired target molecule. The queries are answered by exploiting a set of concepts that are common subgraphs of molecule or reaction graphs. Dissert. Abstr.

N86-24557 Ohio State Univ., Columbus.
ADAPTIVE CONCURRENCY CONTROL FOR DISTRIBUTED DATABASE SYSTEMS Ph.D. Thesis
Amet Pravin Sheth 1985 274 p
Avail: University Microfilms Order No. DA8526249

A distributed database system needs a concurrency control mechanism to maintain consistency of the database in presence of concurrent execution of transactions. While there has been a proliferation of proposed concurrency control mechanisms, there are few studies that compare performance of various mechanisms. A distributed database environment is characterized by four sets of parameters: network parameters, failure parameters, transaction parameters, and database parameters. The two main goals of this research are: (1) evaluate the effect on the performance due to the changes in various parameters, and (2) propose adaptive mechanisms that attempt to minimize the performance degradation in changing environment. the performance is studied in context of relaxing three important assumptions made in most of the earlier research. These assumptions are: (1) Constant transmission time, (2) no failure, and (3) identical transactions. Three adaptive schemes are propsed to deal with the changes in four sets of parameters. Dissert. Abstr.

N86-24558 George Washington Univ., Washington, D.C.
A DESIGN METHODOLOGY FOR ON-LINE MENU-DRIVEN INFORMATION RETRIEVAL SYSTEMS Ph.D. Thesis
Agha Kamal Ghahari 1985 239 p
Avail: Univ. Microfilms Order No. DA8526773

Currently, there are thousands of information specialists, each one handling hundreds of queries per year. All information, if it is available for quick retrieval, has to be held in some sort of database as part of an information system. This thesis investigates a methodology for designing on-line menu-driven information retrieval systems that meet requirements for ease of use and quick response. The dissertation characterizes an interactive user interface based on a menu-driven system. The characterization begins by describing the menu-driven interface and goes on to model the basic menu systems. To address some of the more practical issues the design and implementation of HC Online Information System is discussed: an interactive and menu-based information system with quick response time. The design methodology is applied to HC Online using a hierarchical searching keys concept and inverted file techniques. Dissert. Abstr.

N86-24559# Fachinformationszentrum fuer Energie, Physik, Mathematik G.m.b.H., Karlsruhe (West Germany). Inst. fuer Anorganische Chemie der Univ.
INORGANIC CRYSTAL STRUCTURE DATABASE IN CONJUNCTION WITH CRYSTAL STRUCTURE INFORMATION SYSTEM AND ITS APPLICATION TO CCDF (CAMBRIDGE CRYSTALLOGRAPHIC DATA FILE) AND MDF (METAL DATA FILE)
G. Bergerhoff, B. Kilger, C. Witthauer, R. Hundt, and R. Sievers 1984 56 p
Avail: NTIS HC A04/MF A01

The dialogue oriented system CRYSTIN was developed in order to enable online searches of crystal structure data bases. Commands and descripter classes are summarized. Examples of simple searches are presented. B.G.

N86-24560# Defense Technical Information Center, Alexandria, Va.
GOVERNMENT ACRONYMS AND ALPHABETIC ORGANIZATIONAL DESIGNATIONS USED IN DTIC (DEFENSE TECHNICAL INFORMATION CENTER) Report, Period Ending Oct. 1985
Loretta M. Brown Nov. 1985 274 p Supersedes DTIC/TR-84/5 (AD-A161900; DTIC/TR-85/18; DTIC/TR-84/5) Avail: NTIS HC A12/MF A01 CSCL 05/2

This compilation is a guide to acronyms as assigned by the Defense Technical Information Center (DTIC). The listing contains entries from the Department of Defense (DoD), Federal Government and foreign military organizations. The acronyms reflect reports processed into the DTIC collections. In all instances the acronyms are those actually use by the organization itself. GRA

N86-24561# Mitre Corp., Bedford, Mass.
AIR FORCE GEOPHYSICS LABORATORY MANAGEMENT INFORMATION SYSTEM STUDY Final Report
Alice A. Hayen Nov. 1985 40 p
(Contract F19628-84-C-0001)
(AD-A161910; MTR-9338; ESD-TR-85-114) Avail: NTIS HC A03/MF A01 CSCL 05/1

MITRE has conducted a study to define the management information needs of Air Force Geophysics Laboratory (AFGL) managers and to investigate alternative approaches forthe implementation of a management information system (MIS) at AFGL. The study summarizes current management and administrative practices at AFGL. Requirements have been identified for automating several currently manual functions to compile accurate and timely information to better manage and plan AFGL programs. This document describes the functions and relative priorities of five MIS subsystems and provides suggestions for implementation solutions. Creation of a detailed Development Plan is recommended as the follow-on task. Author (GRA)

N86-24562# DOD Security Review Commission, Washington, D.C.
KEEPING THE NATION'S SECRETS: A REPORT TO THE SECRETARY OF DEFENSE BY THE COMMISSION TO REVIEW DoD SECURITY POLICIES AND PRACTICES Final Report
Richard G. Stilwell 19 Nov. 1985 121 p
(AD-A161998) Avail: NTIS HC A06/MF A01 CSCL 05/1

The report contains an introduction, executive summary, overview and a three part report with sixty-three recommendations for change in DoD security policies and procedures related to the protection of classified material. Policy and Procedures, the first section of the report's main body, includes classified information access (clearances, investigations, adjudication, cryptographic controls, personnel supervisory evaluations and personnel information collection), managing and controlling classified information (classification, dissemination, transmission, retention and storage, special access program and international transfer agreements), and detecting anc countering hostile intelligence, security awareness, reporting of possible espionage, and detecting and investigating security violators). Management and execution, the second part of the report, includes command emphasis, organizational arrangements, research, training, career development and program oversight. Resource management is the third and final section of the report. GRA

N86-24563# Defense Technical Information Center, Alexandria, Va. Office of Information Systems and Technology.
CURRENT DOCUMENT HANDLING PROCEDURES AT DEFENSE TECHNICAL INFORMATION CENTER Final Report
R. L. Bixby Nov. 1985 97 p
(AD-A162000; DTIC/TR-85/19) Avail: NTIS HC A05/MF A01 CSCL 05/2

The Defense Technical Information Center (DTIC) is responsible for the collection control, and dissemination of scientific and technical information for the Defense community. Thousands of technical reports enter DTIC each year, and thousands of reproductions are distributed to DTIC's users. The processing of these reports is a complicated procedure, involving many steps and decisions. This paper tracks the document handling process that was in effect as of 1 September 1985, and comments on areas which could be improved. GRA

N86-24564# Iowa Univ., Iowa City. Applied-Optimal Design Lab.
DATABASE DESIGN METHODOLOGY AND DATABASE MANAGEMENT SYSTEM FOR COMPUTER-AIDED STRUCTURAL DESIGN OPTIMIZATION Interim Technical Report, Jul. - Dec.

1984
T. S. Murthy and J. S. Arora Dec. 1984 144 p
(Grant AF-AFOSR-0322-82)
(AD-A162101; CAD-SS-84-20; AFOSR-85-1071TR) Avail: NTIS HC A07/MF A01 CSCL 05/1

A study is made to integrate finite element-based-optimal structural design methods and computer-science methods into a computer-based system containing a data base, a program library and man-machine communication link. Emphasis is placed upon database management concepts for structural design. Important components required to build a computer-aided structural design system are described. A number of data base management concepts -- hierarchical, network and relational data models, conceptual, internal and external and external view of data organization, normalization of data, and integrity of data base are discussed with reference to structural design data. A methodology to design a data base are discussed with reference to structural design data. A methodology to design a database is proposed. Three levels of data organization-conceptual, internal and external are suggested. A methodology to construct a numerical data model is described. A numerical data model supports data of various types of large matrices such as banded, skyline and hyper matrices. Requirements of data base management system and components needed to develop it are discussed. GRA

N86-24565# Naval Postgraduate School, Monterey, Calif.
EVALUATION OF A DATA DICTIONARY DURING APPLICATION PROGRAM DESIGN BASED UPON THE FOCUS DBMS (DATA BASE MANAGEMENT SYSTEM) M.S. Thesis
Robert C. Repp Sep. 1985 124 p
(AD-A162117) Avail: NTIS HC A06/MF A01 CSCL 09/2

This thesis considers the design and uses of a data dictionary within the FOCUS DBMS package. The thesis details the background and design considerations of an application program for the Director of Admissions at the Naval Postgraduate School. The program will aid in the assignment of an Academic Profile Code for newly commissioned Naval Officers. A data dictionary is designed and implemented, and its use during application program development is discussed. Features from commercial DBMSs, fourth generation languages, and data dictionaries are compared and their impact on information systems considered. Author (GRA)

N86-24566# Naval Postgraduate School, Monterey, Calif.
DATA DICTIONARY/DIRECTORY SYSTEMS A TOOL IN SYSTEMS DEVELOPMENT LIFE CYCLE M.S. Thesis
Christos Drakoulis Sep. 1985 101 p
(AD-A162182) Avail: NTIS HC A06/MF A01 CSCL 05/1

Although data resources have some characteristics with other corporate resources, such as people, goods or money, they do not have two specific characteristics. They are not relatively scarce, neither are they inherently allocatable. However, they do have value, both positive or negative. The value is derived from the fact that the entire enterprise depends on their availability for the proper management of all the other resources. Organizations are now beginning to treat data as a resource, which requires the same degree of administration and control as is involved in the management of other resources. A key component in this management and control is the Data Dictionary/Directory System. It is a useful tool, throughout a System Development Life Cycle. GRA

N86-24567# Defense Communications Agency, Washington, D.C. Technical and Management Information Center.
USING ONLINE DATABASES TO DETERMINE THE CORRELATION BETWEEN RANKED LISTS OF JOURNALS Final Report, 1 Jul. - 30 Dec. 1984
Donald A. Guerriero 30 Dec. 1984 25 p
(AD-A162202) Avail: NTIS HC A02/MF A01 CSCL 09/2

This research showed the feasibility of using online databases to help librarians in the selection of journals for the Defense Communications Agency. The purpose of the study was to use citation analysis and statistical testing in journal selection. Bibliographic databases, available to most technical libraries, were used in the research. Development of a selection policy for journals requires authoritative evidence from several sources to justify the cost of the journals selected. The results of the research implied that the procedure may be useful in developing journal selection policies for the Defense Communications Agency. GRA

N86-24568# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A MODIFICATION TO THE COMPUTER GENERATED ACQUISITION DOCUMENTS SYSTEM (CGADS) FOR MICROCOMPUTER USE IN A PROGRAM OFFICE ENVIRONMENT M.S. Thesis
Lynn M. Zabker and Karen M. Zimmerman Sep. 1985 379 p
(AD-A162273; AFIT/GSM/LSY/85S-33) Avail: NTIS HC A17/MF A01 CSCL 09/2

The Computer Generated Acquisition Documents System (CGADS) was designed to assist the program manager (PM) in developing acquisition documents including Statements of Work (SOWs) and Contract Data Requirements Lists (CDRLs) for all phases of the acquisition cycle. CGADS will produce draft versions of these documents which must then be tailored to meet the needs of the particular program. The current CGADS has several shortfalls. PMs outside of ESD have difficulty accessing the system. The system must also be maintained on a mainframe computer since it requires too much disk space to be adapted to a micro-computer. Finally, the output obtained from CGADS is not in the Work Breakdown Structure (WBS) format required by the military handbook on SOW preparation. The main objective of this research was to simplify the PM's job in writing a Full-Scale Development (FSD) SOW/CDRL. This was accomplished by developing a system called Micro-Computer Generated Acquisition Documents Systems or MGADS. The MGADS program was written in COBOL of an MSDOS operating system on a Zenith Z-100 micro-computer. MGADS was developed to overcome the shortfalls of CGADS. Attention was focused only on the FSD SOW/CDRL to allow the program to fit onto a micro-computer. This also eliminates the problem of having to access CGADS over modem/telephones lines. The ouput of MGADS was restructed into WBS format in accordance with the current military handbook. MGADS is an interactive system used to develop a draft version of the FSD SOW/CDRL. GRA

N86-24569# Naval Postgraduate School, Monterey, Calif.
FUNCTIONAL MANAGERS GUIDE TO INFORMATION SYSTEMS DEVELOPMENT M.S. Thesis
William B. Shaner Sep. 1985 145 p
(AD-A162367) Avail: NTIS HC A07/MF A01 CSCL 09/2

The development of large integrated information systems has had a spotty success record. This thesis investigates the role of the user-management team in the development of these systems and what principal problems the organization must face. The study recommends that the user is the individual with ultimate responsibility for the development of the system. Further the problems that must be faced, in descending order of importance, are: (1) the organization power structure, (2) the people in the organization and (3) the technical issues of data processing. GRA

N86-24570# Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.
AFOSR (AIR FORCE OFFICE OF SCIENTIFIC RESEARCH) TECHNICAL REPORT SUMMARIES Quarterly Report, Jul. - Sep. 1985
Barbara J. Wert Sep. 1985 105 p
(AD-A162372; AFOSR-85-0985TR) Avail: NTIS HC A06/MF A01 CSCL 05/2

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly as of March, June, September, and December of each calender of each calender year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports. The purpose of this report is to inform Air Force

Laboratories about the science that the Air Force Office of Scientific Research is supporting. GRA

N86-24571# California Univ., Berkeley. Electronics Research Lab.
A GENERALIZED DBMS TO SUPPORT DIVERSE DATA Annual Scientific Report, 1 Jul. 1983 - 30 Jun. 1984
L. Rowe, M. Stonebraker, and E. Wong 9 Sep. 1985 93 p
(Grant AF-AFOSR-0254-83)
(AD-A162384; AFOSR-85-0989TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

The authors proposed a research program to develop a generalized database manager to support diverse kinds of data including text, icons, forms, maps and other spatial data. The proposed research also included investigating support for integrated data browsers to allow end-users to query, step through, and update diverse data. Specific topics to be investigated included query language facilities to support text and geometric data, user-defined abstract data types in a DBMS, an ordered relation access method for text and other ordered data, extended secondary indexes, main memory databases, concurrency control for data browsers, and an application program interface based on windows. This paper reports on our progress during the first year of this program. The major advances have been made in the areas of abstract data types, main memory data bases and extended secondary indexes. Author (GRA)

N86-24572# Allied Bendix Corp., Kansas City, Mo.
KEEPING TRACK OF ARCHIVED DRAWINGS: A CASE STUDY
B. C. Gault Oct. 1985 21 p Presented at the Applicon Users Group Fall Technical Meeting, Boston, Mass., 28 Oct. 1985
(Contract DE-AC04-76DP-00613)
(DE86-003129; BDX-613-3386; CONF-8510207-2) Avail: NTIS HC A02/MF A01

The Drafting Systems organization at Allied Corporation, Bendix Kansas City Division (BKC), is responsible for the creation of computer-readable media used for producing photoplots, phototools, and production traveler illustrations. From 1977 when the organization acquired its first Applicon system, until now, there have been over 50,000 different plots produced. Keeping track of what plot is on what archived tape has become a very tedious and time consuming task. This paper describes a software package using Datatrieve and TDMS running on a VAX 11/750 and how it has solved this problem. DOE

N86-24573# National Bureau of Standards, Gaithersburg, Md. Public Information Div.
NBS (NATIONAL BUREAU OF STANDARDS) RESEARCH REPORTS, SEPTEMBER 1985
S. Shaffer Sep. 1985 37 p
(PB86-129707; NBS-SP-680-4; LC-85-600575) Avail: NTIS HC A03/MF A01 CSCL 05B

Research at the Nationa Bureau of Standards (NBS) is reported. The following topics are included: research update; NBS high-tech ceramics program geared to needs of industry; NBS advanced-ceramics expertise, facilities available to industry; fiber optics-lighting the way to a communications revolution; new technique for measuring antenna performance pays off; seven NBS inventions picked as significant technological advances; assets frozen as researchers put pollution problems on ice; new instrument allows observation of surface magnetic microstructure; open systems in software; new publications; conference calendar. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-24574# Defense Systems Management School, Fort Belvoir, Va.
AIDS IN VALIDATING A CONTRACTOR'S COST ESTIMATE
Bernard H. Rudwick 1985 20 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A161871) Avail: NTIS HC A02/MF A01 CSCL 05/1

One method that a government reviewer can use in validating a contractor's cost estimate is to motivate the contractor to generate the cost estimate properly, and to forward the entire analysis, including all of the data used, to the government for review. If the analysis has been done properly, the government's effort is reduced to one of checking, rather than independent cost estimating. Furthermore, if several contractors are providing estimates, the government review team can check corresponding parts of the analysis against one another, draw their own conclusions of what the CER input values should be (including the range of uncertainty of each input characteristic), and obtain a good bounded range of the estimated cost. This paper describes and illustrates the type of instructions which can be given to the contractors to provide such motivations, and how the government can use the contractor's data to obtain its own estimate. GRA

N86-24575# Clemson Univ., S.C.
COST UNCERTAINTY ASSESSMENT METHODOLOGY: A CRITICAL OVERVIEW
K. T. Wallenius Sep. 1985 19 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep 1985
(AD-A161920) Avail: NTIS HC A02/MF A01 CSCL 14/1

An appraisal of the quality of methodology and software for performing cost uncertainty analysis will be given. It will be argued that the standard practice of developing a most likely cost and then generating an uncertainty distribution associated with that figure is a consequence of historical precedent and places the cart before the horse. It will also be argued that methodology for encoding subjective probability distributions are out of date, being, for the most part, modifications of the PERT techniques of the sixties. Additionally, methodology for processing elemental uncertainty assessments into uncertainty distributions over higher order structures (e.g., subsystem CER's or total system cost) often ignores important sources of variability, and extent computer software designed to implement cost uncertainty analysis methodology is often poorly written and, in some cases, may lead to conclusions which are inconsistent with the inputs. This is a paper presented at a cost analysis symposium. GRA

N86-24576# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
ANALYSIS OF THE COST EFFECTIVENESS AND APPLICABILITY OF THE RELIABILITY TASKS OF MIL-STD-785B M.S. Thesis
Caren E. Atterbury Sep. 1985 70 p
(AD-A161952; AFIT/GSM/LSY/85S-1) Avail: NTIS HC A04/MF A01 CSCL 15/5

This thesis analyzed the cost effectiveness of the 18 tasks specified in MIL-STD-785B, Reliability Program for Systems and Equipment Development and Production. The purposes of the tasks are described and each task was evaluated according to six criteria. Cost effectiveness tables were developed for Airframe/Mechanical Equipment, Avionics/Electrical Equipment, and Space and Missile Systems. The tables shows averages taken from surveys completed by reliability instructors teaching at AFIT and reliability engineers employed by Aeronautical Systems Divisions and Air Force Aquisition Logistics Center. This analysis also includes a discussion of the applicability of the tasks according to program phase. GRA

N86-24577# Watervliet Arsenal, N.Y.
A1: A COMPUTER PROGRAM FOR ECONOMIC ANALYSIS
Augustine A. Stagliano 20 Sep. 1985 28 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162011) Avail: NTIS HC A03/MF A01 CSCL 09/2

Economic Analysis enjoys widespread use in the Department of Defense as an aid to insure that available funding is invested wisely. The post data collection stage of a cost study requires that analytical techniques, collectively termed economic analysis,

be performed. The resultng number crunching (pre-decision making stage), when performed manually, may require hours to complete. A1 is an interactive BASIC program modeled after format A-1 found in Army regulation 11-28. Written for the IBM PC, it may readily be converted for use with microcomputer systems throughout the Department of Defense. A1 is easy to use, requiring no computer experience. The results are highly reliable, with human error reduced to a minimum. A1 enjoys a high degree of applicability and allows for multiple runs (sensitivity analysis) with a minimum of effort. GRA

N86-24578# Department of the Navy, Washington, D. C.
STATISTICAL IMPROVEMENTS IN THE UNMANNED SPACECRAFT COST MODEL, MONOGRAPH 1
Brian Flynn Jun. 1985 26 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162016) Avail: NTIS HC A03/MF A01 CSCL 05/3

The purpose of this monograph is to test some of the CER's in the Unmanned Spacecraft Cost Model for non-constant error variances, or heteroskedasticity, and to take corrective statistical action if and where the problem is found. The Unmanned Spacecraft Cost Model is a set of regression equations or Cost Estimating Relationships (CER's) designed to explain the costs of spacecraft subsystems, such as electrical power supplies, apogee kick motors, and communication electronics. Technical and performance characteristics are used to explain costs, with the model based on 35 military, communications, weather, experimental, and lunar-probe spacecraft. The model presents equations for explaining both first-unit recurring costs and total nonrecurring costs, using normalized and unnormalized data. This paper, the first of five statistical monographs on the spacecraft model. GRA

N86-24579# Department of the Air Force, Washington, D.C.
IMPACT OF RELIABILITY/MAINTAINABILITY (R/M) ON LOGISTICS COSTS FOR USAF AIRCRAFT
Andrew J. Sherbo and J. Lochbaum 20 Sep. 1985 42 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162204) Avail: NTIS HC A03/MF A01 CSCL 15/5

The purpose of this study is to develop some cost estimating relationships (CERs) that supports the contention that higher R&M results in lower logistics support costs, and can be used in a variety of ways. Our primary need is a methodology that enables us to quantify the impact of R&M changes or levels on existing and new aircraft in terms of logistics support costs. The CERs we are searching for need to be at the weapon system level as opposed to the subsystem or component level. GRA

N86-24580# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
COMPARISON OF QUANTITY VERSUS QUALITY USING PERFORMANCE, RELIABILITY, AND LIFE CYCLE COST DATA. A CASE STUDY OF THE F-15, F-16, AND A-10 AIRCRAFT M.S. Thesis
David C. Merker Sep. 1985 100 p
(AD-A162238; AFIT/GSM/LSQ/85S-23) Avail: NTIS
HC A05/MF A01 CSCL 14/1

The quantity versus quality issue is examined and a cost-effectiveness model designed to aid in evaluating it. This model incorporates mission effectiveness, readiness, and life cycle costs. The research effort was hinged around a case study comparison of the F-15, F-16, and A-10 aircraft. These aircraft were chosen because they represented varying system complexities and were used as surrogates to high, medium, and low complexity respectively. The comparisons made were intended to demonstrate the usefulness of using aircraft effectiveness, readiness and cost data in a mathematical cost-effectiveness model. The methodology followed combined multi-attribute value theory, aircraft readiness data, and aircraft life cycle cost information. The result was a series of cost-effectiveness ratios, and a cost-effectiveness curve which incorporated the three close air support aircraft. The cost-effectiveness curve provided the costs, adjusted by both effectiveness and readiness values. Author (GRA)

N86-24581# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN EVALUATION OF COMPONENT DEPENDENCE IN COST-RISK ANALYSIS M.S. Thesis
Robert E. Devaney and Philip T. Popovich Sep. 1985 279 p
(AD-A162274; AFIT/GSM/LSQ/85S-27) Avail: NTIS
HC A13/MF A01 CSCL 05/1

This thesis project developed a cost-risk assessment method that incorporated the effects of cost dependency between components in a system. The method uses program personnels' subjective assessments of component dependency as inputs. A simulation model was developed and employed to test the method under various levels of component dependence strength and direction, estimation error, and system size. The analysis was accomplished by performing sensitivity analysis on the predictive capabilities of the cost-risk assessing method. Results indicate that the model has strong predictive capability when component size is small and when the direction of the component dependencies is mixed. It was also determined that the use of component dependency assessments produced more realistic total system cost variances than those produced under the assumption of component cost independence. GRA

N86-24582# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
RETENTION AND VALUE OF USAF COST ANALYSTS M.S. Thesis
Charles F. McNitt, Jr. Sep. 1985 65 p
(AD-A162275; AFIT/GSM/LSB/85S-22) Avail: NTIS
HC A04/MF A01 CSCL 14/1

The questions of retention of and value of USAF cost analysts were examined in this thesis. The literature review covered meta-analysis, utility analysis, and human resource accounting to establish the method and validity of quantifying the value of an individual in the language of business, the dollar. The method is applicable to any career field. Published pay surveys and employment agencies were consulted to determine salary information, leading to the determination of the individual's value. The basic formula is S (separation costs) + R (replacement costs) + T (training costs) + IV (individual value) = TV (total value). There did not appear to be a problem with retention of USAF cost analysts at ths time. The value (loss to the Air Force) of a cost analyst varies greatly, but can be significant in absolute dollar terms. GRA

N86-24583# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN IDENTIFICATION OF OPERATING AND SUPPORT COST DRIVERS FOR COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE SYSTEMS M.S. Thesis
Elise K. Pitterle Sep. 1985 162 p
(AD-A162280; AFIT/GSM/LSY/85S-26) Avail: NTIS
HC A08/MF A01 CSCL 05/3

This thesis researched the problems with life cycle costing of command, control, communication, and intelligence systems (C3I). As operating and support costs skyrocket it is imperative that the military design systems for reliability and maintainability to slow escalating costs. However, the cost drivers are unknown and no life cycle cost model exists specifically for C3I systems. This thesis used actual cost data categorized by type of equipment (radar, radio, wire, special/combination) and by usage mode (ground, portable, transportable, fixed, and mobile). A discriminant analysis showed that the four groups in the type category were significantly different based on cost data, and, likewise, that the five model groups differed significantly. Next a regression was performed, and the resultant correlation table indicated which variable was the cost driver for each group. The simple regression yielded the regression coefficients and y-intercept for the regression equations. These equations are the cost estimating relationships for C3I systems, based on the cost drivers identified by this thesis. GRA

N86-24584# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN EVALUATION OF CPRA (COST PERFORMANCE REPORT ANALYSIS) ESTIMATE AT COMPLETION TECHNIQUES BASED UPON AFWAL (AIR FORCE WRIGHT AERONAUTICAL LABORATORIES) COST/SCHEDULE CONTROL SYSTEM CRITERIA DATA M.S. Thesis
James B. Price Sep. 1985 67 p
(AD-A162282; AFIT/GSM/LSY/85S-28) Avail: NTIS HC A04/MF A01 CSCL 14/2

This thesis examined techniques used to derive estimates of the cost at completion for various research and development programs. The six methods examined were the methods used in the Cost Performance Report Analysis (CPRA) computer program to calculate estimates at completion. The analysis is based on a linear regression between the cost at completion for each technique available. The techniques were ranked by coefficient of determination and a general linear test was performed to test for equality among the regression lines. The results of this investigation indicate that an estimate at completion based upon weighted cost and schedule indices minimizes the unexplained error (as a percentage of total error) and is thought to be the superior forecaster of costs at completion. The general linear test for equality among the regression lines generated by the different techniques did not indicate the existence of commonality between regression lines. This means that each technique tested provided a unique estimate at completion. GRA

N86-24585# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
EVALUATION OF SPARING MODELS FOR A MISSILE SYSTEM M.S. Thesis
Lloyd A. Greene Sep. 1985 139 p
(AD-A162283; AFIT/GSM/LSY/85S-15) Avail: NTIS HC A07/MF A01 CSCL 14/1

This study investigated pipeline spares calculation with four life cycle cost models for the Maverick Missile System. The research goal was to evaluate any differences in the pipeline costs that were calculated by the Hughes Cost of Ownership Model, the Maverick Life Cycle Cost Model, and the Modified METRIC Maverick Model, and a variation of the Modified METRIC Maverick. The analysis was accomplished by identifying the independent variables with a Factor Analysis. A Factorial Design of three factors and five levels was used to develop the observations that were used by the life cycle costs models to calculate pipeline costs. The relative affect that each of the independent variables had upon the pipeline costs was evaluated by an Analysis of Variance. Differences in life cycle cost models pipeline costs were determined by Tukey's procedure. The results indicated that costs produced by the Hughes Cost of Ownership Model and the Modified MOD-METRIC Maverick calculated equal pipeline costs, but the Maverick Life Cycle Cost Model and the MOD-METRIC Maverick did not compute costs equal to any other life cycle cost model. The independent variables of Mean time Between Failure and the Depot Cycle Time had the most effect upon each of the life cycle costs models pipeline costs. Author (GRA)

N86-24586# Defense General Supply Center, Richmond, Va.
LOGMARS (LOGISTICS APPLICATIONS OF AUTOMATED MARKING AND READING SYMBOLS) CLEARINGHOUSE, APPLICATIONS DIRECTORY
Sep. 1985 134 p
(AD-A162327) Avail: NTIS HC A07/MF A01 CSCL 15/5

The DOD challenge is to improve material readiness, while also seeking ways to lower overall costs. The Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) Program, using bar code technology in automated logistics systems, is ideally suited to achieve these objectives. Implementation of LOGMARS will increase productivity, reduce error rates, and improve the responsiveness of automated systems. This directory lists applications initiated by the various DOD components and the status of each. It is intended to eliminate duplicative development efforts within the components where application efforts are similiar. GRA

N86-24587# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
USE OF DATA ENVELOPMENT ANALYSIS IN COST ANALYSIS AND ESTIMATING
William F. Bowlin Sep. 1985 25 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162377) Avail: NTIS HC A02/MF A01 CSCL 14/1

Data Envelopment Analysis (DEA) was developed with the idea of evaluating the performance (measuring productivity or efficiency) of not-for-profit organizations. However, it appears that DEA also has potential as a tool for use in traditional cost estimating/analysis roles. The purpose of this paper is to briefly introduce the DEA methodology to the cost analysis community. We proceed in this paper by first presenting the DEA model formulation. This is followed by a description of the characteristics and conventions of the DEA model. The next section provides an example of the formulation of the DEA model for a specific analysis. The paper concludes with a discussion on possible avenues of DEA use in cost estimating/analysis. GRA

N86-24588# Space Command, Peterson AFB, Colo. Cost and Economic Analysis Div.
PRIMER ON OPERATING AND SUPPORT (O AND S) COSTS FOR SPACE SYSTEMS
Robert H. Lamontagne Sep. 1985 16 p Presented at the 19th Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A162381) Avail: NTIS HC A02/MF A01 CSCL 14/1

Currently, the most common space system is the satellite with its associated ground-based support facilities. However, other systems are currently being developed such as the Strategic Defense Initiative (SDI), Space Station, space based radar, anti-satellite weapon, and others. Our difficulty in the cost community is in developing O&S cost estimates for all these systems. As a result HQ Space Command/ACM is in the process of developing a primer on O&S costs for Space Systems. It is intended to provide some guidelines and fundamentals for estimating the O&S cost for space systems; to address the O&S costs associated with space systems; and to present methodologies and factors to estimate the O&S costs. An O&S cost element structure will be developed for space systems. The primer will result in providing cost visibility for space systems for developing budget and life cycle cost estimates and analyses. GRA

N86-24589# Logistics Management Inst., Washington, D. C.
DISCOUNTED CASH FLOW MODEL FOR THE INDUSTRIAL MODERNIZATION INCENTIVES PROGRAM
Myron G. Myers, Paul R. McClenon, Michael J. Konvalinka, and Geneese Gottschalk Nov. 1985 47 p
(Contract MDA903-85-C-0139)
(AD-A162968; LMI-RE301) Avail: NTIS HC A03/MF A01 CSCL 05/3

Determining the appropriate productivity savings reward under an Industrial Modernization Incentives Program agreement requires identification of the total potential reduction in contract price. The contract price must be determined for each of two situations, one with business as usual and one after the proposed productivity enhancement. Finding these two sets of expected contract prices requires consideration of changes in direct and indirect cost and changes in profit objectives in each year of the period under analysis. Discounted cash flow analysis is the appropriate tool for evaluating the financial attractiveness to the contractor of a proposed investment. Contractor-related cash flow includes payments based on depreciation, imputed cost of money, and profit, which is influenced by cost and by facilities capital employed. Contractor return on investment is usually evaluated in after-tax terms, which implies a need to consider the accelerated cost recovery system and investment tax credit provisions of the Internal Revenue Code. The cash flow model documented in this report provides evaluations of proposed savings share provisions. It identifies the benefit to DOD and to the U.S. Government (including income tax effects). It measures the internal rate of return to the

contractor. The parties are expected to evaluate several possible savings share arrangements in the process of developing an equitable contractural agreement. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-24590*# Integral Technologies, Inc., Westmont, Ill.
METHODS FOR HEAT TRANSFER AND TEMPERATURE FIELD ANALYSIS OF THE INSULATED DIESEL PHASE 2 PROGRESS REPORT Interim Report
Thomas Morel, Rifat Kerlbar, Edward F. Fort, and Paul N. Blumberg
Sep. 1985 319 p refs
(Contracts DEN3-342; DE-AI01-80CS-50194)
(NASA-CR-175072; DOE/NASA/0342-2; NAS 1.26:175072) Avail: NTIS HC A14/MF A01 CSCL 13F

This report describes work done during Phase 2 of a 3 year program aimed at developing a comprehensive heat transfer and thermal analysis methodology for design analysis of insulated diesel engines. The overall program addresses all the key heat transfer issues: (1) spatially and time-resolved convective and radiative in-cylinder heat transfer, (2) steady-state conduction in the overall structure, and (3) cyclical and load/speed temperature transients in the engine structure. During Phase 2, radiation heat transfer model was developed, which accounts for soot formation and burn up. A methodology was developed for carrying out the multidimensional finite-element heat conduction calculations within the framework of thermodynamic cycle codes. Studies were carried out using the integrated methodology to address key issues in low heat rejection engines. A wide ranging design analysis matrix was covered, including a variety of insulation strategies, recovery devices and base engine configurations. A single cylinder Cummins engine was installed at Purdue University, and it was brought to a full operational status. The development of instrumentation was continued, concentrating on radiation heat flux detector, total heat flux probe, and accurate pressure-crank angle data acquisition. Author

N86-24591# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY. FRG INFORMATION TECHNOLOGY Annual Report, 1984
28 Mar. 1986 60 p
(JPRS-WST-86-015) Avail: NTIS HC A04/MF A01

The guiding principles of research and technology policy as well as the resources that exist in the Federal Republic of Germany (FRG) in the areas of science, research and development are described. Research activities and facilities that are supported by the federal and state governments as well as an overview comparing the international cooperation and support for scientific investigation carried out by the FRG are presented. Author

N86-24592# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
[ACTIVITIES REPORT IN AEROSPACE IN WEST GERMANY] Annual Report, 1984
Aug. 1984 119 p In GERMAN; ENGLISH summary Original contains color illustrations
(ISSN-0070-3966) Avail: NTIS HC A06/MF A01

Research and development in air traffic management; aircraft technology; turbopropulsion and turbomachinery; nonnuclear energy systems; satellite communication and localization; remote sensing of the Earth; space systems; advanced technologies; and technology transfer are summarized. Project management, organization, DFVLR personnel, and financial development are presented. Author (ESA)

N86-24593# Kernforschungsanlage, Juelich (West Germany). Programmgruppe Technik und Gesellschaft.
THE TRANSFER OF SCIENTIFIC KNOWLEDGE TO THE GENERAL PUBLIC FROM THE POINT OF VIEW OF SCIENTISTS. RESULTS OF A SURVEY AMONG THE SCIENTIFIC PERSONNEL OF THE KERNSFORSCHUNG, JUELICH, WEST GERMANY [DER TRANSFER WISSENSCHAFTLICHEN WISSENS IN DIE OEFFENTLICHKEIT AUS DER SICHT VON WISSENSCHAFTEN. ERGEBNISSE EINER BEFRAGUNG DER WISSENSCHAFTLICHEN MITARBEITER DER KERNFORSCHUNGSANLAGE JUELICH]
H. P. Peters and J. Krueger Jul. 1985 88 p In GERMAN; ENGLISH summary
(JUEL-Spez-323; ISSN-0343-7639) Avail: NTIS HC A05/MF A01

A survey of 800 scientists at a nuclear research institute was conducted to analyze the attitudes and experiences of scientists regarding the mass media and general public. Nearly all scientists agree that they have responsibilities to disseminate information about their work, not only to colleages but also to the general public; two-thirds perceive personal benefits. Most scientists rate the interest of the population in reports on science at least as medium, but most of them are sceptical of the population's ability to understand those reports. Only a minority perceives hostility against science among the public. About 40% of the respondants had contact with journalists, often with negative experiences such as incorrect reporting in the media. There are indications that scientists do not see science reporting solely as a task of journalists. However, their ideas of good science reporting contradict the journalistic approach. Therefore, the collision of scientific standards and values with those of journalism leads to experiences which are frustrating for both sides, although scientists and journalists agree on the general goal of public information. Author (ESA)

88 SPACE SCIENCES (GENERAL)

N86-24594# Technische Univ., Berlin (West Germany). Inst. fuer Astronomie und Astrophysik.
[ACTIVITIES REPORT OF THE INSTITUTE OF ASTRONOMY AND ASTROPHYSICS] Annual Report, 1984 [JAHRESBERICHT, 1984]
R. Wielen 1985 10 p refs In GERMAN
Avail: NTIS HC A02/MF A01

Research concerning stars and interstellar matter (variable stars and X-ray sources, dust formation); and stellar systems (astronomy satellite HIPPARCOS, stars close to the Sun, star clusters, Milky way and galaxies, galactic clusters) is summarized. Author (ESA)

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-24595 Delaware Univ., Newark.
A STUDY OF HYBRID ATMOSPHERE STARS: TRANSITION

REGION MODELING AND CHROMOSPHERIC EMISSION VARIABILITY Ph.D. Thesis
Jeffrey W. Brosius 1985 148 p
Avail: Univ. Microfilms Order No. DA8525286

Models of the transition regions of six hybrid atmosphere stars are presented. The models include mass loss, and are based on an analysis of IUE data. The equations which were used to describe the mass loss are sufficiently general that the momentum and energy deposition rates which are required at each level of the atmosphere can be evaluated. This approach allows a self-consistency check on the model at the critical point in the flow, thereby restricting the acceptable models to a small region of parameter space. Final models for all 6 stars have loss rates which lie below the current VLA upper limits by factors of 2 to 0.5 R,). The IUE has also used data to study temporal variations of the Mg II h and k emission lines in the hybrids and two additional late-type giants. Dissert. Abstr.

N86-24596 Princeton Univ., N. J.
THEORETICAL STELLAR LUMINOSITY FUNCTIONS AND GLOBULAR CLUSTER AGES AND COMPOSITIONS Ph.D. Thesis
Stephen Jackson Ratcliff 1985 287 p
Avail: Univ. Microfilms Order No. DA8529046

The ages and chemical compositions of the stars in globular clusters are of great interest, particularly because age estimates from the well known exercise of fitting observed color-magnitude diagrams to theoretical predictions tend to yield ages in excess of the Hubble time in standard cosmological models. Relatively little use was made of the stellar luminosity functions of the globular clusters to constrain the ages or compositions. The comparison of observed luminosity functions to theoretical ones allows the use of information not usually considered, and has the advantage of being relatively insensitive to lack of knowledge of the detailed structure of stellar envelopes and atmospheres. A computer program was developed to apply standard stellar evolutionary theory, using the most recently available input physics to the calculation of the evolution of low-mass Population II stars. A comparison of the computed theoretical luminosity functions to an observed, though still preliminary, luminosity function for the cluster M13 demonstrates the viability of this approach. Dissert. Abstr.

N86-24597*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
WORLD ATLAS OF LARGE OPTICAL TELESCOPES (SECOND EDITION)
Stephen Paul Meszaros Apr. 1986 44 p refs
(NASA-TM-87775; NAS 1.15:87775) Avail: NTIS HC A03/MF A01 CSCL 03A

By early 1986 there will be over 120 large optical telescopes in the world engaged in astronomical research with mirror or lens diameters of one meter (39-inches) and larger. This atlas gives information on these telescopes and shows their observatory sites on continent sized maps. Also shown are observatory locations considered suitable for the construction of future large telescopes. Of the 126 major telescopes listed in this atlas, 101 are situated in the Northern Hemisphere and 25 are located in the Southern Hemisphere. The totals by regions are as follows: Europe (excluding the USSR), 30; Soviet Union, 9; Asia (excluding the USSR), 5; Africa, 9; Australia, 6; The Pacific, 4 (all on Hawaii); South America, 17; North America, 46 (the continental US has 38 of these). In all, the United States has 42 of the world's major telescopes on its territory (continental US plus Hawaii) making it by far the leading nation in astronomical instrumentation. Author

N86-24598*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
BALLOON-BORNE THREE-METER TELESCOPE FOR FAR-INFRARED AND SUBMILLIMETER ASTRONOMY Semiannual Status Report
Giovanni G. Fazio Apr. 1986 38 p refs
(Grant NAGw-509)
(NASA-CR-176748; NAS 1.26:176748; SASR-5) Avail: NTIS HC A03/MF A01 CSCL 03A

The drawbacks uncovered in the initial gimbal design are reviewed. The behavior of ball bearings are considered and two candidate gimbal designs are proposed which overcome the problems the initial flex pivot based design. Author

N86-24541*# Tennessee Technological Univ., Cookeville. Dept. of Mathematics and Computer Science.
RELIABILITY MODELS APPLICABLE TO SPACE TELESCOPE SOLAR ARRAY ASSEMBLY SYSTEM
S. A. Patil *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 26 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03A

N86-24616*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
THE SUN AT HIGH SPATIAL RESOLUTION: THE PHYSICS OF SMALL SPATIAL STRUCTURES IN A MAGNETIZED MEDIUM
Robert T. Rosner *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 14-27 refs (For primary document see N86-24614 14-92) (Grants NAGw-79; NAGw-112)
Avail: NTIS HC A14/MF A01 CSCL 03A

N86-24639*# Naval Research Lab., Washington, D. C. Center for Space Research.
THE PINHOLE/OCCULTER AS A TOOL FOR X-RAY ASTRONOMY
Kent S. Wood *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 277-295 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-24599 Ohio State Univ., Columbus.
PROTON THRESHOLD STATES IN Al-26 AND THEIR ROLE IN ASTROPHYSICS Ph.D. Thesis
Vythilingam Wijekumar 1985 114 p
Avail: Univ. Microfilms Order No. DA8526275

The energy levels of Al-25 between E sub x = 6.3 and 6.5 S.5 MeV, corresponding to proton threshold energies in the mg-25+p reaction from E subp = 0 Al-26 to 200 keV, were investigated using the reactions a doublet at E sub x = 6362 keV, most subsequent work reported a single state with conflicting spin and parity assignments. The presence of the doublet is established and the conflicts resolved. There are six states in this excitation energy region, including a new state at E sub x = 6410 + or - 5 keV. The limits on the branching ratios from these states to the ground state of Al-26 were obtained by using the reaction Al-27(He-3, alpha, gamma)Al-26. Finally by combining the results of the above experiments, stellar reactions rates of the mg-25(p, gamma)Al-26 reaction were calculated. Results conclude that the reduction rate of Al-26 in stellar environments from the reaction mg-25(p,gamma)Al-26 is substantially higher than what was calculated from other work. Dissert. Abstr.

N86-24600 Arizona Univ., Tucson.
THE INFLUENCE OF GALAXY INTERACTIONS OF NUCLEAR ACTIVITY Ph.D. Thesis
Roc Michael Curti 1985 187 p
Avail: Univ. Microfilms Order No. DA8525594

This dissertation examines empirically the effects of gravitational interactions between galaxies on their respective nuclei with the primary motivation of investigating the possible connection between such interactions and the presence of vigorous nuclear

activity. To carry out this work, ground based near and mid-infrared observations, along with the mid- and far infrared data of IRAS of a statistically complete sample of interacting galaxies drawn from the Catalog of Isolated Pairs of Galaxies in the Northern Hemisphere (Karachentsev 1972) were utilized. Also performed were detailed probes of four known active, interacting and possible interacting systems, which made use of infrared multiaperture photometry and spectrophotometry. Comparison of the nuclear infrared properties of the interacting galaxies with samples of non-interacting galaxies shows that abnormal activity, characterized by excess 10 micro m emission or extremely red or blue near infrared colors, is much more common in the interacting systems. In particular, a population of nuclei with extremely luminous 10 micro m emission appears to be unique to the interacting sample. Dissert. Abstr.

N86-24601 California Inst. of Tech., Pasadena.
A STUDY OF THE FORMATION AND DYNAMICS OF GALAXIES Ph.D. Thesis
James Arthur Fillmore 1985 160 p
Avail: Univ. Microfilms Order No. DA8522612

The first half of this thesis is a study on the growth of perturbations in the early universe which might lead to galaxies, clusters of galaxies, or regions void of galaxies. The growth of self-similar perturbations in an Einstein-deSitter universe with cold, collisionless particles is investigated. Three classes of solutions are obtained; one each with planar, cylindrical, and spherical symmetry. The solutions follow the development of structure in both the linear and nonlinear regimes. Self-similar spherical voids which develop from initially underdense regions are also investigated. The character of each solution depends upon the initial density deficit. The second half of this thesis details solutions of steady-state axisymmetric models of elliptical and disk galaxies, and considers which observable properties can be used as diagnostics of the kinematic configuration of the spheroidal component of these systems. Two component mass models are fitted to surface brightness measurements and used to fit kinematic models to the velocity data. Dissert. Abstr.

N86-24602 Cornell Univ., Ithaca, N.Y.
GAS DYNAMICAL STRIPPING OF GALAXIES Ph.D. Thesis
Terrance Joseph Gaetz 1985 198 p
Avail: Univ. Microfilms Order No. DA8525692

Results are presented for a series of numerical models of gas dynamical stripping of spherical galaxies moving through a uniform intergalactic medium. The models include replenishment of the interstellar medium by stellar deaths, removal of cold dense gas by a nominal star formation process, and radiative cooling by both thermal bremsstrahlung and collisionally-excited line emission. The effective distributions for the gas replenishment are chosen to mimic cases in which the replenished gas is mildly stirred by galactic fountains; this generates a broader distribution of gas than indicated by the distribution of luminous material in galaxies, but the injection of energy by supernovae is not sufficient to drive an actual galactic wind. The galaxy starts out with no interstellar gas; replenishment of the interstellar medium by star deaths begins at t = 0. Because sinks for the gas production are provided in addition to sources, the flow can evolve to a true steady state, unlike previous models without cooling flows or star formation. The stripping of gas from galaxies is found to proceed by a combination of the following mechanisms: (1) sufficient momentum is transferred from the intergalactic gas to accelerate the interstellar gas to escape velocity; (2) sufficient kinetic energy is converted into heat to unbind the interstellar gas; (3) gas is stripped off by a rarefaction wave in the wake. Dissert. Abstr.

N86-24603 State Univ. of New York, Stony Brook.
THE EQUATION OF STATE AND GENERAL RELATIVITY IN SUPERNOVAE Ph.D. Thesis
Edward Arthur Baron 1985 127 p
Avail: Univ. Microfilms Order No. DA8527931

The results of an extensive numerical study of the outcome of massive star collapse and subsequent shock formation and propagation are presented. The stiffness of the equation of state at high density is shown to play a crucial role, a softer equation of state being helpful to shock production and propagation. The effect of neutrinos is investigated in a simple manner by varying the neutrino transport from a simple trapping density to a simple leakage scheme. With a softer equation of state the maximum central densities reached are high enough that general relativity may become important. The effects of general relativity are investigated in detail. It is shown that while general relativity is generally harmful to the shock, once the equation of state becomes soft enough, general relativistic effects may conspire to transfer large amounts of energy from the gravitational field to the shock, resulting in powerful explosions. This is first investigated using simplified initial conditions, the initial models being constructed in an ad hoc fashion to facilitate numerical investigation. Dissert. Abstr.

N86-24604 Clemson Univ., S.C.
ANALYSIS OF COLOR-MAGNITUDE DIAGRAMS FROM THREE LARGE MAGELLANIC CLOUD CLUSTERS Ph.D. Thesis
Joseph Heilman Jones 1985 230 p
Avail: Univ. Microfilms Order No. DA8527701

The color-magnitude diagrams of three large Magellanic Cloud (LMC) clusters and a field were derived from photographic and CCD data provided by Dr. P. J. Flower of Clemson University and Dr. R. Schommer of Rutgers University. The photographic data were scanned and converted to intensity images at KPNO. The stellar photometry program RICHFLD was used to measure the raw magnitudes from these images. Problems with the standard sequence on the plate kept the color terms for the photographic data from being well determined. A version of DAOPHOT was installed on the VAX 11/280s at Clemson and was used to measure the magnitudes from the CCD images of NGC 2249. These magnitudes were used to define another photoelectric sequence for the photographic data which were used to determine a well defined transformation into the standard BV system. Dissert. Abstr.

N86-24605 Minnesota Univ., Minneapolis.
THE DISTRIBUTION AND KINEMATICS OF NEUTRAL HYDROGEN GAS AND THE RADIO CONTINUUM EMISSION IN BARRED SPIRAL GALAXIES Ph.D. Thesis
Marc Philip Ondrechen 1985 222 p
Avail: Univ. Microfilms Order No. DA8526496

Very Large Array (VLA) radio synthesis observations of three barred spiral galaxies, NGC 1097, NGC 1365 and M83 were presented. Neutral hydrogen spectral line observations were made, as well as continuum observations at wavelengths of 6 cm and 20 cm. The continuum observations of the bars of NGC 1097 and M83 reveal that the radio emission is coincident with the linear dust lanes in the bars, that is nonthermal in origin, and is moderately polarized. These data show that the dust lanes are generated by shocks, confirming a major theoretical prediction of bar structure. Spectral line observations of the neutral hydrogen gas reveal many interesting properties of these galaxies. Direct observation of the gas flow in the bar of NGC 1097 has confirmed the presence of noncircular motions, of similar magnitude to those predicted based on the presence of the bar and its associated shocks. Non-circular motions in the spiral arms of NGC 1097 and NGC 1365 were also found. Dissert. Abstr.

N86-24606 Tufts Univ., Boston, Mass.
PROPERTIES AND CONSEQUENCES OF TOPOLOGICAL STRUCTURES IN THE EARLY UNIVERSE Ph.D. Thesis
Tanmay Vachaspati 1985 132 p
Avail: Univ. Microfilms Order No. DA8526853

Grand Unified Theories predict the existence of topological structures in the early universe. The properties and consequences of having such topological structures in the early universe are examined. The statistical properties of the system of strings produced at a phase transition in the early universe are studied using a Monte Carlo simulation. The fractal dimension of the strings and the size distribution of closed loops are determined. Gravitational radiation from oscillating loops of strings is studied

both analytically and numerically. The intensity and the spectrum of the stochastic gravitational wave background produced by the loops are calculated. The momentum radiation rate from loops is calculated. The order of magnitude of the emission rate of electromagnetic waves, and of massive scalar particles is calculated from oscillating strings and domain walls. Results are used to analyze the cosmological evolution of strings. Formation of domain walls and walls bounded by strings is also discussed.
Dissert. Abstr.

N86-24607# Delaware Univ., Newark. Research Foundation.
PARTICLE THEORY AND COSMOLOGY Progress Report, 1 Apr. 1985 - 31 Mar. 1986
T. K. Gaisser and G. Steigman 15 Nov. 1985 10 p refs
(Contract DE-AC02-78ER-05007)
(DE86-003169; DOE/ER-05007/22) Avail: NTIS HC A02/MF A01

A review of work in progress is given for models, using properties of particle interactions to extrapolate to energy realms which exceed accelerator limits. In addition models are discussed for cosmology and astrophysics. DOE

N86-24608# Fermi National Accelerator Lab., Batavia, Ill.
SEARCHING FOR CYGNETS
E. W. Kolb Sep. 1985 11 p refs Presented at the 5th International Conference on Physics in Collision, Autun, France, 3 Jul. 1985
(Contract DE-AC02-76CH-03000)
(DE86-002994; FNAL/C-85/134-A; CONF-850785-5; CONF-8506195-2) Avail: NTIS HC A02/MF A01

The reported observation in underground detectors of high-energy muons from the direction of the compact binary X-ray source CYG X-3 (2030 + 4047) cannot be explained by conventional physics. In this paper some explanations for the effect based upon unconventional physics are reviewed. DOE

N86-24609# California Univ., Berkeley. Lawrence Berkeley Lab.
EVIDENCE FOR NEMESIS: A SOLAR COMPANION STAR
R. A. Muller Jan. 1985 20 p refs Presented at the Conference on the Galaxy and the Solar System, Tucson, Ariz., 10 Jan. 1985
(Contract DE-AC03-76SF-00098)
(DE86-003991; LBL-20438; CONF-850183-1) Avail: NTIS HC A02/MF A01

The evidence that the Sun has a companion star Nemesis responsible for periodic mass extinctions is reviewed. A gaussian ideogram of the rates of family extinctions in the oceans shows periods of 26 and 30 Myr. Analysis of impact cratering on the earth shows a period of either 28.4 or 30 Myr, depending on the crater selection. Models which attempt to explain these periods with either oscillations through the galactic plane, or through the effects of a tenth planet, are seriously flawed. If the periods seen in the data are real (and not a spurious result of a statistical fluctuation) then the Nemesis hypothesis is the only suggested explanation that has survived close scrutiny. The Nemesis model predicts that the impacts took place during brief storms of several million years duration, perhaps accounting for the extended nature of the mass extinctions. A search for Nemesis is under way at Berkeley. DOE

N86-23863# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL SIMULATIONS IN COSMIC GAS DYNAMICS: GAS FLOWS IN BINARY STARS
Takuya Matsuda *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight Mar. 1985 p 51-66 refs Sponsored in part by the Ministry of Education, Science and Culture, Japan (For primary document see N86-23858 14-34)
Avail: NTIS HC A08/MF A01

N86-24539*# Naval Postgraduate School, Monterey, Calif. Dept. of Physics.
RADIATIVELY DRIVEN WINDS FROM MAGNETIC, FAST-ROTATING STARS
Steven Nerney *In* NASA. Marshall Space Flight Center Research Reports: 1985 NASA/ASEE Summer Faculty Fellowship Program Jan. 1986 16 p refs (For primary document see N86-24507 14-80)
Avail: NTIS HC A99/MF E04 CSCL 03B

N86-24629*# Colorado Univ., Boulder. Dept. of Astrophysical, Planetary and Atmospheric Sciences.
RADIO IMAGING OF FLARES
George A. Dulk *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 178-190 refs (For primary document see N86-24614 14-92)
(Grants NsG-7287; NAGw-91)
Avail: NTIS HC A14/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-24610 Colorado Univ., Boulder.
THE AERONOMY AND RADIATIVE TRANSFER OF THE MARTIAN ATMOSPHERE Ph.D. Thesis
Bernhard Leo Lindner 1985 492 p
Avail: Univ. Microfilms Order No. DA8528505

A radiative-photochemical computer model was used to study the aeronomy and radiative transfer of the Martian winter-polar atmosphere. The discrete ordinate method and exponential-sum approximation are used to combined scattering, emission and absorption by dust, clouds and gas. Infrared modifications to the discrete ordinate method are addressed. The photochemistry of a cloudy, dusty atmosphere is examined for a variety of conditions. The observed O3 maximum is reproduced. Clouds reduce ozone abundances a few percent. Typical dust abundances induce 10 to 30% increases in ozone abundances. Annual, latitudinal and seasonal variations in O3 are discussed. Photodissociation rates are drastically reduced by the dust. The efficacy of the reflectance spectroscopy technique to observe the total ozone column abundance is questioned. Dissert. Abstr.

N86-24611# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
COMETARY ATMOSPHERES: MODELING THE SPATIAL DISTRIBUTION OF OBSERVED NEUTRAL RADICALS Interim Report, Dec. 1985 - Feb. 1986
Michael R. Combi Apr. 1986 8 p refs
(Contract NASw-3950)
(NASA-CR-176753; NAS 1.26:176753) Avail: NTIS HC A02/MF A01 CSCL 03B

A re-analysis of published observational data concerning the spatial distributions of cometary C3 and OH has begun. Haser model scale lengths have been compiled for twelve brightness profiles. Very preliminary results for C3 show a much larger variation of scale lengths with changing heliocentric distance than has been previously recognized. Scale lengths found for OH are somewhat larger than currently accepted values. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-24612 Wisconsin Univ., Madison.
THE SOFT X-RAY BACKGROUND AS A BLAST WAVE VIEWED FROM INSIDE Ph.D. Thesis
Richard John Edgar 1985 146 p

Avail: Univ. Microfilms Order No. DA8519761

A model of the soft X-ray background is presented in which the Sun is assumed to be inside an active supernova blast wave. The broadband surface brightnesses can be explained by such a blast wave with an explosion energy of E sub o is equal to or greater than 5 x 10 to the 50th power ergs and radius 80 to 100 pc, using solar abundances. The dynamical model used includes the effects of thermal conduction, as the electrons are assumed to be heated by non-Coulomb processes in the shock front. At early times these effects are important, but as the temperature drops with time, they fade away and the structure approaches that of an adiabatic blast wave. An approach to treating the problem of large anisotropies in the ambient medium is also explored, accommodating the observed anticorrelation between the soft X-ray surface brightness and the column density of neutral hydrogen. It is found that only for post shock temperatures below 1,000,000 6 K will a shock propagating into a density enhancement be dimmer than a shock of similar pressure in a medium of lower density.

Dissert. Abstr.

N86-24613 Colorado Univ., Boulder.

IMPULSIVE BRIGHTENINGS IN QUIESCENT SOLAR PROMINENCES Ph.D. Thesis

George David Toot 1985 250 p

Avail: Univ. Microfilms Order No. DA8528529

At large spatial scales, quiescent solar prominences appear static in nature, but are dynamic at smaller scales. High resolution observations of quiescent prominences using the tunable, Universal Birefringent Filter and the echelle spectrograph on the Vacuum Tower Telescope at Sacramento Peak Observatory are presented. More than 40 hours of wavelength scans of H alpha and He D3 disclose a class of activity near the edges of quiescent prominences, characterized by enhancement of H alpha radiative power by as much 4 x 10 to the 24th power erg/s and enhanced line widths of up to 0.92 A, over areas 5 to 25 arcseconds across, for lifetimes of tens of minutes; this activity is called impulsive brightenings. The H alpha and profile is centrally reversed by as much as 25% in some, while others contain significant line-of-sight velocities. Three models for impulsive brightenings are considered: a layer of cool material between the observer and the prominence, magnetic reconnection as an energy source for the activity, and condensation of coronal material into the prominence.

Dissert. Abstr.

N86-24614*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SOLAR FLARES AND CORONAL PHYSICS USING P/OF AS A RESEARCH TOOL

Einar Tandberg, ed., Robert M. Wilson, ed., and Robert M. Hudson, ed. (California Univ., San Diego, La Jolla) Apr. 1986 307 p refs Workshop held in Huntsville, Ala., 8-10 May 1985

(NASA-CP-2421; M-523; NAS 1.55:2421) Avail: NTIS HC A14/MF A01 CSCL 03B

This NASA Conference Publication contains the proceedings of the Workshop on Solar High-Resolution Astrophysics Using the Pinhole/Occulter Facility held at NASA Marshall Space Flight Center, Alabama, on May 8 to 10, 1985. These proceedings include primarily the invited tutorial papers, extended abstracts of contributed poster papers, and summaries of subpanel (X-Ray and Coronal Physics) discussions. Both observational and theoretical results are presented. Although the emphasis of the Workshop was focused primarily on topics peculiar to solar physics, one paper is included that discusses the P/OF as a tool for X-ray astronomy. For individual titles, see N86-24615 through N86-24639.

N86-24615*# California Univ., La Jolla.

THE CONCEPT OF THE PINHOLE/OCCULTER FACILITY c14

Hugh S. Hudson *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 5-13 refs (For primary document see N86-24614 14-92) (Grant NsG-7161)

Avail: NTIS HC A14/MF A01 CSCL 14B

The Pinhole/Occulter Facility is based on a simple idea for obtaining high angular resolution in astronomical X-ray observations, for example for solar flares at energies > 10 keV. The scheme uses a coded aperture device (multiple pinhole camera) with a large separation between the aperture encoder and the detector. Such an imaging device can have an angular resolution much better than 1 arc s if desired. A large structure would also make it possible to have a large external occulter, which would have powerful applications, notably for high-sensitivity observations of the corona in EUV and white light. This capability leads to the definition of the Pinhole/Occulter Facility, which combines both X-ray and coronal observations. The present concept is based on a 35-m deployable boom, erected in the cargo bay of the Space Shuttle and pointed in the solar direction by the Instrument Pointing System of Spacelab.

Author

N86-24616*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.

THE SUN AT HIGH SPATIAL RESOLUTION: THE PHYSICS OF SMALL SPATIAL STRUCTURES IN A MAGNETIZED MEDIUM c89

Robert T. Rosner *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 14-27 refs (For primary document see N86-24614 14-92) (Grants NAGw-79; NAGw-112)

Avail: NTIS HC A14/MF A01 CSCL 03A

An attempt is made to provide a perspective on the problem of spatial structuring on scales smaller than can presently be directly and regularly observed from the ground or with which current space-based instrumentation can be anticipated. There is abundant evidence from both observations and theory that such spatial structuring of the solar outer atmosphere is ubiquitous not only on the observed scales, but also on spatial scales down to (at least) the subarcsecond range. This is not to say that the results to be obtained from observations on these small scales can be anticipated: quite the opposite. What is clear instead is that many of the classic problems of coronal and chromospheric activity - involving the basic dissipative nature of magnetized plasmas - will be seen from a novel perspective at these scales, and that there are reasons for believing that dynamical processes of importance to activity on presently-resolved scales will themselves begin to be resolved on the sub-arcsecond level. Since the Sun is the only astrophysical laboratory for which there is any hope of studying these processes in any detail, this observatioinal opportunity is an exciting prospect for any student of magnetic activity in astrophysics.

Author

N86-24617*# Laboratorium voor Ruimteonderzoek, Utrecht (Netherlands).

THE FLARE KERNEL IN THE IMPULSIVE PHASE

Cornelis deJager *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 29-40 refs (For primary document see N86-24614 14-92)

Avail: NTIS HC A14/MF A01 CSCL 03B

The impulsive phase of a flare is characterized by impulsive bursts of X-ray and microwave radiation, related to impulsive footpoint heating up to 50 or 60 MK, by upward gas velocities (150 to 400 km/sec) and by a gradual increase of the flare's thermal energy content. These phenomena, as well as non-thermal effects, are all related to the impulsive energy injection into the flare. The available observations are also quantitatively consistent with a model in which energy is injected into the flare by beams of energetic electrons, causing ablation of chromospheric gas, followed by convective rise of gas. Thus, a hole is burned into the chromosphere; at the end of impulsive phase of an average flare the lower part of that hole is situated about 1800 km above the photosphere. H alpha and other optical and UV line emission is radiated by a thin layer (approx. 20 km) at the bottom of the flare kernel. The upward rising and outward streaming gas cools down by conduction in about 45 s. The non-thermal effects in the initial phase are due to curtailing of the energy distribution function by escape of energetic electrons. The single flux tube model of a flare does not fit with these observations; instead we

propose the spaghetti-bundle model. Microwave and gamma-ray observations suggest the occurrence of dense flare knots of approx. 800 km diameter, and of high temperature. Future observations should concentrate on locating the microwave/gamma-ray sources, and on determining the kernel's fine structure and the related multi-loop structure of the flaring area. Author

N86-24618*# Laboratorium voor Ruimteonderzoek, Utrecht (Netherlands).
X-RAY IMAGING OF FLARE LOOPS AND CORONAL ARCHES
Zdenek Svestka *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 41-66 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

HXIS (Hard X-ray Imaging Spectrometer) results related to preflare, flare-decay, and post-flare phases in the solar corona are summarized. Particularly discussed are miniflares, long-lived X-ray enhancements along filament channels, flare precursors (some signifying the flare position, others possibly related to the onset of mass ejections), growth of post-flare loops, images of sites of field-line reconnections late in the flare development, giant post-flare coronal arches with energy contents comparable to coronal transients, and hot loops interconnecting active regions. The extremely low HXIS background, in particular, made it possible to discover many new, previously unknown features in the solar corona. Also emphasized are some problems that have appeared during the evaluation of HXIS data, for the benefit of those who plan future hard X-ray imaging experiments. Author

N86-24619*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RESULTS FROM THE SOLAR MAXIMUM MISSION
Brian R. Dennis *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 67-97 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

The major results from SMM (Solar Max Mission) are presented as they relate to the understanding of the energy release and particle transportation processes that led to the high energy X-ray aspects of solar flares. Evidence is reviewed for a 152- to 158-day periodicity in various aspects of solar activity including the rate of occurrence of hard X-ray and gamma-ray flares. The statistical properties of over 7000 hard X-ray flares detected with the Hard X-Ray Burst Spectrometer are presented including the spectrum of peak rates and the distribution of the photo number spectrum. A flare classification scheme is used to divide flares into three different types. Type A flares have purely thermal, compact sources with very steep hard X-ray spectra. Type B flares are impulsive bursts which show double footpoints in hard X-rays, and soft-hard-soft spectral evolution. Type C flares have gradually varying hard X-ray and microwave fluxes from high altitudes and show hardening of the X-ray spectrum through the peak and on the decay. SSM data are presented for examples of Type B and Type C events. New results are presented showing coincident hard X rays, O V, and UV continuum observations in Type B events with a time resolution of < 128 ms. The subsecond variations in the hard X-ray flux during < 10% of the stronger events are discussed and the fastest observed variation in a time of 20 ms is presented. The properties of Type C flares are presented as determined primarily from the non-imaged hard X-ray and microwave spectral data. A model based on the association of Type C flares and coronal mass ejections is presented to explain many of the characteristics of these gradual flares. Author

N86-24620*# California Univ., Berkeley. Space Sciences Lab.
INTERPLANETARY ENERGETIC PARTICLES, CORONAL FLARES AND HARD X-RAY MICROFLARES
Robert P. Lin *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 98-119 refs (For primary document see N86-24614 14-92)
(Grants NAG5-376; NAGw-516; NGL-05-003-017; NSF ATM-84-02231)
Avail: NTIS HC A14/MF A01 CSCL 03B

Solar electron phenomena which can produce low levels of hard X-ray emission at the Sun are reviewed. Small approx. 2 to 100 keV solar electrons events, the most common type of impulsive solar particle emission, appear to originate in flare-like bursts high in the corona. These events often are accompanied by approx. 1 MeV/nucleon to the 3rd power He-rich particle events in which lower energy ions are apparently accelerated as well. Long-lived (many days) streams associated with large flares or interplanetary shocks dominate the interplanetary electron fluxes, but even at the quietest times a significant outflow of non-thermal approx. 2 keV electrons occurs. These electron phenomena are accompanied by coronal and interplanetary radio emission. High sensitivity hard X-ray measurements show that microflares, bursts with peak > keV fluxes 10 to 100 times smaller than observed in small solar flares, may occur as often as once every 5 min near solar maximum. The proposed Pinhole/Occulter Facility hard X-ray instrumentation provides the increase in sensitivity required to image these phenomena for the first time. Author

N86-24621*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
OPTICAL IMAGING SPECTROSCOPY c74
Richard C. Canfield *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 120-131 refs (For primary document see N86-24614 14-92)
(Grants NsG-7406; NSF AST-83-20306; NSF ATM-84-15793; AF-AFOSR-3071-76; AF-AFOSR-0092-82)
Avail: NTIS HC A14/MF A01 CSCL 20F

During the recent solar maximum the combination of imaging and spectroscopy in the visible part of the spectrum became a powerful tool for observational study of flares primarily because of the development of two-dimensional charge-coupled-device (CCD) arrays. In combination with appropriate new operational methods, this has led to the ability to observe, for the first time, the preflare and impulsive-phase physical processes associated with spatially resolved features of flare loops. As a result of concurrent theoretical developments, modeling progressed from an empirical to a physical level. This made it possible to interpret imaging spectra in terms of coronal pressure and heat flux, particle beam heating, chromospheric evaporation, and explosive chromospheric dynamics at the footpoints of flare loops. There is clear potential for further advances in the near future, taking advantage of improvements in digital recording speed (approx. 10-fold), number of photosensitive elements per array (approx. 10-fold), real-time data pre-reduction (potentially 10- to 100-fold), and using multiple CCD arrays. By the time of the next solar maximum imaging spectroscopy is expected to achieve spatial resolution < or approx. arc 1 arc s, temporal resolution < or approx. 5 s, and simultaneous critically-sampled spectroscopy of several lines and continua. As a result, continued increase in our understanding of the physical processes and configurations of solar flares in the chromosphere, temperature minimum region, and photosphere can be anticipated. Even greater progress toward a more global understanding of flares will obviously come about when simultaneous optical, X-ray, and gamma-ray imagng spectroscopy are possible. Author

N86-24622*# Alabama Univ., Huntsville. Dept. of Physics.
THEORETICAL MOTIVATION FOR HIGH SPATIAL RESOLUTION, HARD X-RAY OBSERVATIONS DURING SOLAR FLARES
A. Gordon Emslie *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 132-138 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

The important role played by hard X-ray radiation as a diagnostic of impulsive phase energy transport mechanism is reviewed. It is argued that the sub-arc second resolution offered by an instrument such as the Pinhole/Occulter Facility (P/OF) can greatly increase our understanding of such mechanisms. Author

N86-24623*# Berkeley Research Associates, Inc., Calif.
THE ROLE OF HIGH RESOLUTION OBSERVATIONS IN DETERMINING ENERGY RELEASE AND TRANSPORT PROCESSES
Dean F. Smith *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 139-141 refs Prepared in cooperation with Colorado Univ., Boulder (For primary document see N86-24614 14-92)
(Contract NASw-3603; Grant NSF ATM-83-14511)
Avail: NTIS HC A14/MF A01 CSCL 03B

With present observations from the Solar Maximum Mission, we are seeing a very selective sample of spatially large flares in the soft part (10 to 50 keV) of the hard X-ray spectrum. The spatial resolution is at best 5600 km with a corresponding time resolution of 4.5 s for adequate count statistics. This resolution gives rise to the following problems: We cannot resolve the minor radii of the loops involved or tell where and how the energy release occurs. The manner in which loops interact and the relationship between the soft and hard > or approx 00 keV) parts of hard X-rays remains elusive. We cannot see how energy propagates in most cases. Thus it is desirable to determine the minimum increase in spatial and temporal resolution required to solve ,these problems. Spatially we need to resolve the minor radius of a small loop which is about 800 km or 1 arc s. Upper limits to observed speeds of conduction fronts and shocks are approx km/s with theoretical limits running about a factor of 2 higher. Thus, a compatible minimum time resolution is in the range of 0.2 to 0.4 s. With these spatial and temporal resolutions, sufficient count statistics are required to go up to approx 120 keV with a sufficient number of energy bands to obtain spectra. Author

N86-24624*# Air Force Geophysics Lab., Hanscom AFB, Mass. National Solar Observatory.
WHY P/OF SHOULD LOOK FOR EVIDENCES OF OVER-DENSE STRUCTURES IN SOLAR FLARE HARD X-RAY SOURCES
Donald F. Neidig, Sharad R. Kane (California Univ., Berkeley), J J. Love (California Univ., Berkeley), and E. W. Cliver *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 142-145 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

White-light and hard X-ray (HXR) observations of two white-light flares (WLFs) show that if the radiative losses in the optical continuum are powered by fast electrons directly heating the WLF source, then the column density constraints imposed by the finite range of the electrons requires that the WLF consist of an over-dense region in the chromosphere, with density exceeding 10 to the 14th power/cu cm. Thus, we recommend that P/OF search for evidences of over-dense structures in HXR images obtained simultaneously with optical observations of flares. Author

N86-24625*# California Univ., Berkeley. Space Sciences Lab.
THE HEATING OF THE THERMAL PLASMA WITH ENERGETIC ELECTRONS IN SMALL SOLAR FLARES
Hua-An Lin and Robert P. Lin *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 146-149 refs (For primary document see N86-24614 14-92)
(Grant NAG5-376)
Avail: NTIS HC A14/MF A01 CSCL 03B

The energetic electrons deduced from hard X-rays in the thick target model may be responsible for heating of soft X-ray plasma in solar flares. It is shown from OSO-7 studies that if a cutoff of 10 keV is assumed, the total electron is comparable to the thermal plasma energy. However, (1) the soft X-ray emission often appears to begin before the hard X-ray burst, (2) in about one-third of flares there is no detectable hard X-ray emission, and (3) for most events the energy content (assuming constant density) of soft X-ray plasma continues to rise after the end of the hard X-ray burst. To understand these problems we have analyzed the temporal relationship between soft X-rays and hard X-rays for 20 small events observed by ISEE-3 during 1980. One example is shown. The start of soft X-ray and hard X-ray bursts is defined as the time when the counting rates of the 4.8 to 5. keV and 25.8 to 43.2 keV channels, respectively, exceed the background by one standard deviation. Author

N86-24626*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HARD X-RAY IMAGING AND THE RELATIVE CONTRIBUTION OF THERMAL AND NONTHERMAL EMISSION IN FLARES
Gordon D. Holman *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 150-157 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

The question of whether the impulsive 25 to 100 keV X-ray emission from solar flares is thermal or nonthermal has been a long-standing controversy. Both thermal and nonthermal (beam) models have been developed and applied to the hard X-ray data. It now seems likely that both thermal and nonthermal emission have been observed at hard X-ray energies. The Hinotori classification scheme, for example, is an attempt to associate the thermal-nonthermal characteristics of flare hard X-ray emission with other flare properties. From a theoretical point of view, it is difficult to generate energetic, nonthermal electrons without dumping an equal or greater amount of energy into plasma heating. On the other hand, any impulsive heating process will invariably generate at least some nonthermal particles. Hence, strictly speaking, although thermal or nonthermal emission may dominate the hard X-ray emission in a given energy range for a given flare, there is no such thing as a purely thermal or nonthermal flare mechanism. Author

N86-24627*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
SUPER ACTIVE REGIONS AND PRODUCTION OF MAJOR SOLAR FLARES
Taeil Bai *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 153-157 refs (For primary document see N86-24614 14-92)
(Grants NAGw-92; HGL-05-020-272; Contract N00014-75-C-0673)
Avail: NTIS HC A14/MF A01 CSCL 03B

The success of imaging detectors with small fields of veiw such as HXIS or P/OF (Pinhole/Occulter Facility) depends heavily on pointing to the right place at the right time. During the solar maximum years many active regions coexist on the solar disk. Therefore, in order to point the imaging detector to the right place, it is important to know which active region is most likely to produce major flares. This knowledge is also important for flare prediction. As a first step toward this goal active regions have been identified which produced major flares observed by HXRBS (Hard X-Ray Burst Spectrometer) on SMM during February 1980 through December 1983. For this study the HXRBS Event List, an updated flare list compiled by the HXRBS group, and the Comprehensive Reports of the Solar Geophysical Data were used. During this period, HXRBS detected hard X-rays from approx 7000 solar flares, out of which only 441 flares produced X-rays with peak count rates exceeding 1000 counts/s. Flares with such high peak count rates are major flares. During the same time period about 2100 active regions passed across the solar disk, out of which only 153 were observed to produce major flares. (Some active regions are known to persist for several solar rotations, but at each passage new active region numbers are assigned and the estimate is based on active region numbers.) Out of these 153 active regions, 25 were observed to produce 5 or more major flares. Considering their high productivity of major flares, we may call these active regions super active regions. These 25 super active regions produced 209 major flares, accounting for 51% of all the major flares with identified active regions. Author

N86-24628*# Observatoire de Paris-Meudon (France).
THE SOLAR RADIO CORONA: MANIFESTATIONS OF ENERGETIC ELECTRONS
Monique Pick *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr.

1986 p 159-177 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

Radio observations are powerful tools which are complementary to the space missions devoted to the physics of the flares, of the corona, or of the interplanetary medium. To undertake this task two multifrequency radioheliographs presently exist: the Nancay instrument (the multifrequency facility will be in operation by the end of 1985) observes the middle corona at decimeter-meter wavelengths, and the Clark Lake radioheliograph, operating at decameter wavelengths, is the only one in the world to have the ability of observing the outer corona above the disk. Author

N86-24629*# Colorado Univ., Boulder. Dept. of Astrophysical, Planetary and Atmospheric Sciences.
RADIO IMAGING OF FLARES **c90**
George A. Dulk *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 178-190 refs (For primary document see N86-24614 14-92)
(Grants NsG-7287; NAGw-91)
Avail: NTIS HC A14/MF A01 CSCL 03B

High resolution (arcseconds to ten of arcseconds) mapping of solar microwave bursts has recently been achieved. The properties of the radio images that have been reported and, so far as possible, the relation of the radio sources to X-ray observations of the same flares are discussed. Author

N86-24630*# California Inst. of Tech., Pasadena.
HIGH-SPECTRAL RESOLUTION SOLAR MICROWAVE OBSERVATIONS
Gordon J. Hurford *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 191-200 refs (For primary document see N86-24614 14-92)
(Contract F19628-84-K-0023; Grants NSF AST-83-15217; NSF ATM-83-09955)
Avail: NTIS HC A14/MF A01 CSCL 03B

The application of high-spectral resolution microwave observations to the study of solar activity is discussed with particular emphasis on the frequency dependence of microwave emission from solar active regions. A shell model of gyroresonance emission from active regions is described which suggest that high-spectral resolution, spatially-resolved observations can provide quantitative information about the magnetic field distribution at the base of the corona. Corresponding observations of a single sunspot with the Owens Valley frequency-agile interferometer at 56 frequencies between 1.2 and 14 Ghs are presented. The overall form of the observed size and brightness temperature spectra was consistent with expectations based on the shell model, although there were differences of potential physical significance. The merits and weaknesses of microwave spectroscopy as a technique for measuring magnetic fields in the solar corona are briefly discussed. Author

N86-24631*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SINGLE-DISH HIGH SENSITIVITY DETERMINATION OF SOLAR LIMB EMISSION AT 22 AND 44 GHz
J. E. R. Costa, J. L. Homor, and P. Kaufmann *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 201-207 refs Original language document was announced as N85-30999 Sponsored in part by FINEP and FAPESP, Brazil (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

A large number of solar maps were obtained with the use of Itapetinga 45 ft antenna at 22 GHz and 44 GHz. A statistical study of these maps, reduced using original techniques, permitted the establishment of the solar radius with great accuracy at the two frequencies. It is found that 22 GHz and 44 BHz radiation originates at 16,00 km and 12,500 km above the photosphere, respectively. Excess emission due to active regions was clearly identified at lower solar latitudes above and below the equator, extending up to 26,000 km and 16,500 km above the photosphere, at 22 GHs and 44 GHz, respectively. Author

N86-24632*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SHORT-LIVED SOLAR BURST SPECTRAL COMPONENT AT f APPROXIMATELY > 100 GHz
P. Kaufmann, E. Correia, J. E. R. Costa, and A. M. Zodi Vaz *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 208-214 refs Original language document was announced as N86-16178 Sponsored in part by FINEP, Brazil (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

A new kind of burst emission component was discovered, exhibiting fast and distinct pulses (approx. 60 ms durations), with spectral peak emission at f approx. 100 GHz, and onset time coincident to hard X-rays to within approx. 128 ms. These features pose serious constraints for the interpretation using current models. One suggestion assumes the f approx. 100 GHz pulses emission by synchrotron mechanism of electrons accelerated to ultrarelativistic energies. The hard X-rays originate from inverse Compton scattering of the electrons on the synchrotron photons. Several crucial observational tests are needed for the understanding of the phenomenon, requiring high sensitivity and high time resolution (approx. 1 ms) simultaneous to high spatial resolution (0.1 arcsec) at f approx. 110 GHz and hard X-rays. Author

N86-24633*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
POLAR-CAP AND CORONAL-HOLE-ASSOCIATED BRIGHTENINGS OF THE SUN AT MILLIMETER WAVELENGTHS
T. Kosugi, M. Ishiguro (Nobeyama Radio Observatory, Nagano, Japan), and K. Shibasaki (Nagoya Univ., Japan) *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 215-219 refs Submitted for publication (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

Mapping observations of the Sun at millimeter wavelengths were made on 16 to 22 July 1984 with the 45-m telescope of the Nobeyama Radio Observatory. Seven 36-GHz (8.3-mm) maps and five 98-GHz (3.1-mm) maps were taken with half-power beam widths of 46 arc sec and 17 arc sec, respectively. Instead of the conventional rastering technique, a radial-scan method was adopted in which every scan passes through the disk center. Accordingly, the variation of the atmosphere attenuation due to changes in the weather conditions can be easily estimated and removed by using the brightness values at the disk center as calibration data. Also, the pointing errors of the telescope due to the high-speed scans can be corrected by using the solar limbs as position references. The rms residual errors in relative brightness and position after the corrections were estimated to be approx. 2% and approx. 5 arc sec respectively. To further reduce these errors, enabled us to make high-quality maps with with < or approx. 1% uncertainty in brightness. Here and in the following, brightness is expressed in terms of the average brightness of the solar disk as a unit. Note that the brightness temperature of the quiet Sun is approx. 8000 K and approx. 6000 K at 36 GHz and 98 GHz, respectively. Author

N86-24634*# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
CORONA AND SOLAR WIND
George L. Withbroe *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 221-240 refs (For primary document see N86-24614 14-92)
(Grant NAGw-249)
Avail: NTIS HC A14/MF A01 CSCL 03B

The Pinhole/Occulter Facility is a powerful tool for studying the physics of the extended corona and origins of the solar wind. Spectroscopic data acquired by the P/OF coronal instruments can

greatly expand empirical information about temperatures, densities, flow velocities, magnetic fields, and chemical abundances in the corona out to r > or approx. 10 solar radii. Such information is needed to provide tight empirical constraints on critical physical processes involved in the transport and dissipation of energy and momentum, the heating and acceleration of plasma, and the acceleration of energetic particles. Because of its high sensitivity, high spatial and temporal resolutions, and powerful capabilities for plasma diagnostics, P/OF can significantly increase our empirical knowledge about coronal streamers and transients and thereby advance the understanding of the physics of these phenomena. P/OF observations can be used to establish the role in solar wind generation, if any, of small-scale dynamical phenomena, such as spicules, macrospicules and coronal bullets, and the role of the fine-scale structures, such as polar plumes. Finally, simultaneous measurements by the P/OF coronal and hard X-ray instruments can provide critical empirical information concerning nonthermal energy releases and acceleration of energetic particles in the corona. Author

N86-24635*# Naval Research Lab., Washington, D. C. Center for Space Research.
SOLWIND OBSERVATIONS OF CORONAL MASS EJECTIONS DURING 1979-1985
N. R. Sheeley, Jr., R. A. Howard, M. J. Koomen (Sachs/Freeman Associates, Bowie, Md.), and D. J. Michels *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 241-256 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

Coronal observations have been processed for parts of each year during the interval 1979-1985. Around sunspot maximum, coronal mass ejections (CMEs) occurred at the rate of approximately 2 per day, and had a wide range of physical and morphological properties. During the recent years of relatively low sunspot number, CMEs occurred at the rate of only 0.2 per day, and were dominated by the class of so-called streamer blowout. These special CMEs maintained a nearly constant occurrence rate of roughly 0.1 per day during the entire interval. Author

N86-24636*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
INTERPRETATION OF CORONAL SYNOPTIC OBSERVATIONS
Richard H. Munro and Richard R. Fisher *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 257-261 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

Three-dimensional reconstruction techniques used to determine coronal density distributions from synoptic data are complicated and time consuming to employ. Current techniques also assume time invariant structures and thus mix both temporal and spatial variations present in the coronal data. The observed distribution of polarized brightness, pB, and brightness, B, of coronal features observed either at eclipses or with coronagraphs depends upon both the three-dimensional distribution of electron density within the structure and the location of the feature with respect to the plane-of-the-sky. By theoretically studying the signature of various coronal structures as they would appear during a limb transit, it is possible to recognize these patterns in real synoptic data as well as estimate temporal evolutionary effects. Author

N86-24637*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
WAVE SPEEDS IN THE CORONA AND THE DYNAMICS OF MASS EJECTIONS
Steven T. Suess and Ronald L. Moore *In its* Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 262-267 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

A disturbance or coronal mass ejection being advected by the solar wind will expand at the fastest local characteristic speed - typically approximately the fast-mode speed. To estimate this characteristic wave speed and the velocity field in the ambient corona, it is necessary to know the magnetic field, temperature, and density. Only the density is known from coronal observations. The temperature, magnetic field, and velocity are not yet directly measured in the outer corona and must be estimated from a model. In this study, it is estimated that the magnetic field, solar wind velocity, and characteristic speeds use the MHD model of coronal expansion between 1 and 5 solar radii (R solar radii) with a dipole magnetic field at the base. This model, for a field strength of about 2 gauss at the base, gives flow speeds at low latitudes (near the heliospheric current sheet) of < 250 km/s at 5 R solar radii and, < 50 km/s at 2 solar radii, and fast-mode speeds to 400 to 500 km/s everywhere between 2 and 5 solar radii. This suggests that the outer edge of a velocity of mass ejection reported by MacQueen and Fisher (1983) and implies that the acceleration mechanism for coronal mass ejections is other than simple entrainment in the solar wind. Author

N86-24638*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ON THE FORMATION OF CORONAL CAVITIES
Chang-Hyuk An, Steven T. Suess, Einer Tandberg-Hanssen, and Richard S. Steinolfson (California Univ., Irvine) *In its* Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 268-273 refs Sponsored in part by NAS-NRC (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03B

A theoretical study of the formation of a coronal cavity and its relation to a quiescent prominence is presented. It is argued that the formation of a cavity is initiated by the condensation of plasma which is trapped by the coronal magnetic field in a closed streamer and which then flows down to the chromosphere along the field lines due to lack of stable magnetic support against gravity. The existence of a coronal cavity depends on the coronal magnetic field strength; with low strength, the plasma density is not high enough for condensation to occur. Furthermore, we suggest that prominence and cavity material is supplied from the chromospheric level. Whether a coronal cavity and a prominence coexist depends on the magnetic field configuration; a prominence requires stable magnetic support. Author

N86-24639*# Naval Research Lab., Washington, D. C. Center for Space Research.
THE PINHOLE/OCCULTER AS A TOOL FOR X-RAY ASTRONOMY c89
Kent S. Wood *In* NASA. Marshall Space Flight Center Solar Flares and Coronal Physics Using P/OF as a Research Tool Apr. 1986 p 277-295 refs (For primary document see N86-24614 14-92)
Avail: NTIS HC A14/MF A01 CSCL 03A

The two X-ray transform telescopes on the Pinhole/Occulter Facility (P/OF) will provide sub-arcsecond angular resolution, high sensitivity imaging in hard X-rays for the first time, as well as improved capabilities for timing studies and spectroscopy. Although the design was driven by solar observing requirements, the result is an instrument of major importance for astronomical as well as solar observations. Fundamental astrophysical measurements could be made on supernova remnants, clusters of galaxies, active galaxy cores, accreting binary systems, and active coronae of nearby stars. Ways in which astronomical observations will benefit solar research are discussed. Author

N86-24640# California Inst. of Tech., Pasadena.
APPLICATION OF MICROWAVE SPECTROSCOPY TO THE STUDY OF CORONAL FIELD CHANGES ASSOCIATED WITH A DISAPPEARING SUNSPOT
G. J. Hurford Mar. 1985 18 p
(Contract F19628-84-K-0023)
(AD-A162191; AFGL-TR-85-0092; SR-1) Avail: NTIS HC A02/MF A01 CSCL 03/2

A critical physical parameter affecting solar activity is the distribution of coronal magnetic fields. Microwave observations provide the only technique for the quantitative measurement of

these fields. This report presents the preliminary analysis of high spatial and spectral resolution observations designed to measure the distribution and evolution of the coronal magnetic fields of a disappearing sunspot. Data at 56 frequencies between 1.2 and 14 GHz were acquired with the three-element frequency-agile interferometer. This system directly measured the size of coronal microwave sources at each frequency and polarization. The temperature of the source was determined from the ratio of source flux to area. This yielded the size and brightness temperature spectra of the microwave sources associated with a sunspot as it disappeared over three successive days. On the basis of gyro-resonance opacity, the corona would be expected to be opaque at microwave frequencies at surfaces corresponding to specific values of coronal field strength. GRA

N86-24641# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
X-RAY LINE RATIOS FOR fe 17 OBSERVED IN THE SOLAR CORONA
Hugo R. Rugge and David L. McKenzie 2 Dec. 1985 36 p
(Contract F04701-85-C-0086)
(AD-A162320; TR-0086(6940-01)-1; SD-TR-85-86) Avail: NTIS HC A03/MF A01 CSCL 03/2

Selected solar spectra from the SOLEX B X-ray spectrometers aboard the USAF P78-1 satellite were analyzed in order to compare Fe XVII line flux ratios with theory. The spectra were chosen to cover a wide range of solar activity from quiescent active regions to large flares. For purposes of comparison with theory, a temperature scale based on a ratio of Fe XVIII to Fe XVII line fluxes has been derived. Fe XVII line ratios involving one line with a 3s outer electron in the upper state and the other with a 3d electron are potentially the most useful, since such ratios are predicted, by theory, to have a significant temperature dependence. The data do not support the theoretical predictions. The dependence of the 3s/3d line ratios on temperature is found to be very weak, and the ratios are unlikely to be useful as temperature diagnostics. Measurements of the ratios involving only 3s upper levels or only 3d upper levels also disagree with theory. Improved theoretical calculations are needed to interpret the large amount of high-quality data that are now becoming available. Resonance scattering. GRA

N86-24642*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
CONFIRMATION OF A 152-DAY PERIODICITY IN THE OCCURRENCE OF SOLAR FLARES INFERRED FROM MICROWAVE DATA
Richard S. Bogart and Taeil Bai Sep. 1985 12 p Previously announced in IAA as A86-20333
(Grants NGL-05-020-272; NAGw-92; Contract N00014-76-C-0207; N00014-85-K-0111; Grant NSF ATM-77-20580)
(NASA-CR-176755; NAS 1.26:176755; AD-A163091;
SU-CSSA-ASTRO-85-20) Avail: NTIS HC A02/MF A01 CSCL 03B

Evidence for a periodicity of about 155 + or - 5 days in the production of energetic solar flares has been reported by Rieger et al. (1984) and Kiplinger et al. (1984). The data on which these analyses were based are restricted to the years 1980 through early 1984. To see whether this periodicity is a persistent phenomenon, we have examined the occurrences of flares inferred from microwave data, which are available for most of the present and previous solar cycles. We find strong confirmation of a 152-day periodicity in the time interval previously studied, demonstrating that these flares are a useful indicator for the observed periodicity. We find evidence for persistence of the periodicity in the previous cycle (Cycle 20). In Cycle 20 the periodic modulation of the flare occurrence rate was weaker than in Cycle 21, but the phase has apparently remained coherent through both cycles. GRA

N86-24643*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
SUPER-ACTIVE REGIONS AND PRODUCTION OF MAJOR SOLAR FLARES
Taeil Bai Oct. 1985 8 p
(Grants NGL-05-020-272; NAGw-92; Contract N00014-85-K-0111
(NASA-CR-176768; NAS 1.26:176768; AD-A163104;
SU-CSSA-ASTRO-85-24) Avail: NTIS HC A02/MF A01 CSCL 03B

The success of imaging detectors with small fields of view such as HXIS or the Pinhole/Occulter Facility (P/OF) depend strongly on the ability to point the right place at the right time During solar maximum years many active regions coexist on the solar disk. Therefore, in order the imaging detector to the right plane, it is important to know which active region is most likely to produce major flares. This knowledge is also important for flare prediction. GRA

N86-24644*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
TWO CLASSES OF GAMMA-RAY/PROTON FLARES: IMPULSIVE AND GRADUAL. REVISION
Taeil Bai Nov. 1985 59 p
(Grants NGL-05-020-272; NAGw-92; Contract N00014-85-K-0111
(NASA-CR-176769; NAS 1.26:176769; AD-A163105;
SU-CSSA-ASTRO-85-26-Rev) Avail: NTIS HC A04/MF A01 CSCL 03B

We have studied various properties of gamma ray/proton flares, which produce nuclear gamma rays and/or interplanetary energetic protons. We have found that there exist two classes of gamma ray/proton (GR/P) flares, with each class having many distinct characteristics in common. Gradual GR/P flares (so named because of gradual variations of hard X-ray fluxes with duration of spike bursts longer than 90 s) have the following characteristics: long duration (> 10 min) hard/X-ray and microwave emission, gradual variation of microwave flux, relatively large ratios of microwave to hard X-ray fluxes, large H-alpha areas, long-duration soft X-ray emission (> 1 hr), hard X-ray emission from extended coronal loops, interplanetary type II emission, coronal mass ejections, and production of large numbers of interplanetary energetic protons. Impulsive GR/P flares display directly opposing behavior in the above respects. However, the two classes of GR/P flares have a few characteristics common to both of them. GRA

N86-24645# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
SUPERPOSED EPOCH ANALYSIS OF COROTATING INTERACTION REGIONS (CIR), AT 0.3 AND 1.0 AU: A COMPARATIVE STUDY
A. K. Richter and A. H. Luttrell Sep. 1985 20 p refs Revised
(MPAE-W-79-85-03) Avail: NTIS HC A02/MF A01

The superposed epoch analysis technique was applied to 16 and to 31 well defined, nonshock associated stream-stream interaction regions observed by HELIOS 1 and 2 between 0.3 and 0.4 AU and between 0.9 and 1.0 AU, respectively, to obtain the average azimuthal variations of the solar wind density, velocity and temperature of the magnetic field strength, and of the total proton plasma plus magnetic field pressure at these two radial distances. For the radial evolution of these interaction regions, comparison shows that due to compressional and rarefactional effects, the amplitudes of all parameters along the leading and trailing parts of the interaction steadily increase, with the most pronounced increase in pressure. The leading portion of the velocity profile steepens. Positions in azimuth of the overall maximum values of the solar wind density and temperature, of the magnetic field strength and of the plasma plus magnetic field pressure get lined-up in longitude. The leading portions of all profiles steepen into discontinuous, shock-like structures.
Author (ESA)

N86-24646# National Oceanic and Atmospheric Administration Silver Spring, Md. Air Resources Lab.
SOLAR RADIATION AT THE BARROW, ALASKA, GMCC (GEOPHYSICAL MONITORING FOR CLIMATIC CHANGE) BASELINE OBSERVATORY, 1976-1983
E. G. Dutton, J. J. DeLuisi, and D. J. Endres Aug. 1985 121
(PB86-110087; NOAA-DR-ERL-ARL-6) Avail: NTIS

HC A06/MF A01 CSCL 04A

Details of, and data from, an ongoing solar radiation measurement program administered by NOAA/Geophysical Monitoring for climatic Change from 1976 through 1983 are presented. The data include daily sums of downward global solar flux and discrete measurements of direct beam solar flux in clear skies. Also included are the data for passive remote sensing of atmospheric aerosol properties, using the Sun as a source. The remote sensing measurements were made in the spring of 1982 and 1983. Data are presented in reduced form such that direct application to research studies can be made. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-24647 California Univ., Berkeley.
A MEASUREMENT OF THE COSMIC BACKGROUND RADIATION TEMPERATURE AT 3.3 mm WAVELENGTH Ph.D. Thesis
Chris Witebsky 1985 165 p
Avail: Univ. Microfilms Order No. DA8525158

Measurements of the cosmic background radiation (CBR) at 3.3 mm wavelength (90 GHz) have yielded a brightness temperature of 2.57 with a 1 sigma uncertainty of + or - 0.12 K. The observations were made from the Barcroft Laboratory of the White Mountain Research Station, at an altitude of 3800 m, initially on 5 and 6 July 1982 and again on 4, 5, and 6 September 1983, as part of a program to measure the spectrum of the CBR at five wavelengths from 12.0 cm to 3.3 mm. The weighted mean of the temperature mesurements at all five wavelengths is 2.72 + or - 0.04 K. The instrument used for the 3.3-mm measurements is a differential, dual-antenna, Dicke-switched, superheterodyne radiometer. Simultaneous zenith scans at 9.1 and 3.3 mm were used to check the atmospheric models of Waters and Liebe. Neither model predicts the correct relationship between atmospheric emission at 9.1 and 3.3. mm. When the results are combined with other measurements of the CBR temperature, the resulting spectrum is consistent with a 2.72 + or - 0.02 K blackbody. Dissert. Abstr.

N86-24648 Wisconsin Univ., Madison.
ANALYSIS OF ASTRONOMICALLY-INDUCED MONTHLY AND ZONALLY AVERAGED EXTRA-ATMOSPHERIC IRRADIANCE VARIATIONS FOR THE LAST 500,000 YEARS Ph.D. Thesis
Edward John Hopkins 1985 956 p
Avail: Univ. Microfilms Order No. DA8516763

Zonally and temporally averaged irradiance and illumination geometry data and their annaul and long term variability are produced in greater detail than previously available. The computational algorithm (the HELIO-DAY algorithm) evaluates zonally averaged irradiance data and supporting information describing the latitudinally dependent illumination geometry (solar zenith angles and daylight duration) on a daily basis, provided an input of mean annual orbital elements applicable to the epoch are inserted; numerical summation of each day's irradiation within an interval generates multiday average irradiance for any zone. The accuracy of this methodology was tested with results consistent with theoretical evaluations. Using Berger's (1978) computational formulae to produce the time sequence of pertinent orbital elements, arrays of monthly and tri-monthly extra-atmospheric irradiance were produced by the HELIO-DAY algorithm. Dissert. Abstr.

N86-24649 Texas Univ., Austin.
AN INVESTIGATION OF COSMIC RAY SCINTILLATIONS IN MUONS NEAR SEA LEVEL Ph.D. Thesis
Robert Henry Benson 1985 115 p
Avail: Univ. Microfilms Order No. DA8528302

An investigation of scintillations in ground-level cosmic ray muons has been conducted using a muon telescope constructed at Texas A&M University. The power density spectrum of the muon counting rate was calculated and the resultant slope of -1.36 is in excellent agreement with accepted theory. Dissert. Abstr.

N86-24650# Argonne National Lab., Ill.
UNDERGROUND MUONS FROM CYGNUS X-3
L. E. Price 1985 9 p refs Presented at the Meeting of the Particles and Fields Division of the American Physical Society, Eugene, Oreg., 12 Aug. 1985
(Contract W-31-109-eng-38)
(DE86-004055; CONF-850869-9) Avail: NTIS HC A02/MF A01

Underground detectors, intended for searches for nucleon decay and other rare processes, have recently begun searching for evidence of astrophysical sources, particularly Cygnus X-3, in the cosmic ray muons they record. Some evidence for signals from Cygnus X-3 has been reported. The underground observations are reported here in the context of previous (surface) observations of the source at high energies. DOE

99 GENERAL

N86-24651*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REFORM OF GENERAL EDUCATION AND VOCATIONAL TRAINING IN THE U.S.S.R.
M. Leroy Spearman Mar. 1986 16 p refs
(NASA-TM-87693; NAS 1.15:87693) Avail: NTIS HC A02/MF A01 CSCL 05I

Extensive school reform measures were initiated in the U.S.S.R. in 1984. The essence of the reform is to improve the quality of instruction, improve the content of education, strengthen the Marxist-Leninist world view, and ensure that all secondary school graduates master an occupation. Author

Typical Subject Index Listing

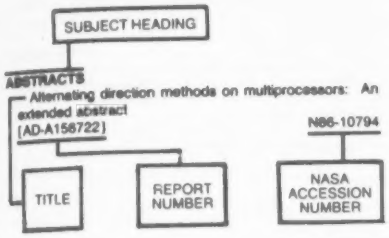

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7053).

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[JPRS-JST-86-007] N86-23773
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USAF/SCEEE (United States Air Force/Southeastern Center for Electrical Engineering Education) Research Initiation Program research reports, volume 1
[AD-A161907] N86-23751
On the analysis of shell structures subjected to a blast environment: A finite element approach, part 1
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[AD-A162993] N86-23575
BOUNDARY LAYER FLOW
The flow about and drag behavior of walls in turbulent boundary layer flows
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[AD-A162993] N86-23575
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[AD-A162994] N86-23600
A nonperturbing boundary-layer transition detector
[AD-A161976] N86-23876
Comparison of the wall pressure fluctuations in artificially generated turbulent spots, natural transition and turbulent boundary layers
[AD-A162114] N86-23877
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[NASA-CR-176767] N86-24068
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[NASA-CR-178063] N86-24297
Stability analysis of difference schemes for variable coefficient schrodinger type equations
[AD-A161989] N86-24301
Numerical solution of ill posed problems in partial differential equations
[AD-A162378] N86-24308
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Seafloor geosciences division. Missions, technical specialties, accomplishments and activities, calendar year 1984
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Report of the Hydrographic Service Royal Australian Navy for the year ended 30th June 1985, issue number 21
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Hydrographic data from the OPTOMA program, OPTOMA17: OPTOMA17 P, 21 July 1985, OPTOMA17 leg DI, 10-22 August 1985, OPTOMA17 leg DII, 23 August - 5 September 1985
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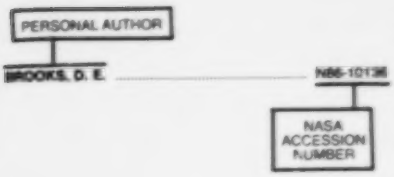

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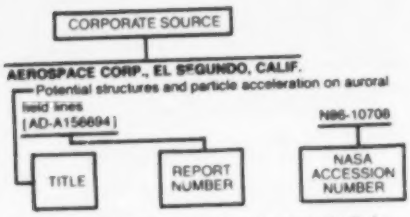

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Development of a Nitride Dispersion Strengthened (NDS) metallic alloy for high-temperature recuperators
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The effect of stereochemical structure on some spectroscopic and physical properties of polystyrene
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SOURCE

ALABAMA UNIV., BIRMINGHAM.

Compression of rubber layers bonded between two parallel rigid cylinders or between two rigid spheres
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Inelastic electron tunneling spectroscopy of silane coupling agents adsorbed on alumina
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ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, WATERVLIET, N. Y.

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Sample digestion and drying techniques for optimal recovery of mercury from soils and sediments
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US Department of Agriculture/Corps of Engineers cooperative aquatic plant control research. Annual report for FY 1983; chemical control technology
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ARMY MEDICAL RESEARCH INST. OF INFECTIOUS DISEASES, FORT DETRICK, MD.

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Examination of the load-elongation properties of fabrics, yarns and fibres at 20 and 40 C
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DEFENCE RESEARCH ESTABLISHMENT SUFFIELD, RALSTON (ALBERTA).
Proposed implementation of a computer aided design and drafting (CAD/D) capability at DRES (Defence Research Establishment Suffield)
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A travel demand model based on state variables of groups of persons having an equal socioeconomic structure
[DFVLR-FB-85-51] N86-24001
Activities report in aerospace in West Germany
[ISSN-0070-3966] N86-24592

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).
Satellite-borne 90 GHz radiometer experiment (SABREX), phase A1
[DFVLR-MITT-85-13] N86-24000
Archimedes project remote sensing of oil spills North Sea experiment, October 1983. Report on DFVLR (Side-Looking Airborne Radar (SLAR) contribution
[DFVLR-FB-85-54] N86-24002

DEUTSCHE GEODAETISCHE KOMMISSION, MUNICH (WEST GERMANY).
Use of dispersion for electromagnetic distance measurement
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Digest of the Deutsche Lufthansa report, 1984
[ISSN-0415-603X] N86-23579

DEUTSCHER WETTERDIENST, OFFENBACH AM MAIN (WEST GERMANY).
Activities report in meteorology in West Germany
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Exploration for strategic materials
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DOD SECURITY REVIEW COMMISSION, WASHINGTON, D.C.
Keeping the nation's secrets: A report to the Secretary of Defense by the Commission to Review DoD Security Policies and Practices
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Person computer dialogue: A human engineering data base supplement
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Standardized fatigue loading sequences for helicopter rotors (Helix and Felix). Part 1: Background and fatigue evaluation. Part 2: Final definition of Helix and Felix
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Information on airport and airway trust fund revenues and outlays by states and large airports
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Extended parametric representation of compressor fans and turbines. Volume 1: CMGEN user's manual
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Extended parametric representation of compressor fans and turbines. Volume 2: Part user's manual (parametric turbine)
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[AD-A162044] N86-24416
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Dynamic core-hole screening effects in the C(KVV) Auger lineshape of graphite
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GEORGIA UNIV., ATHENS.

Topological indices as chemical behavior descriptors
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GESELLSCHAFT FUER SCHWERIONENFORSCHUNG M.B.H., DARMSTADT (WEST GERMANY).

Graphical and Numerical Operating Method (GNOM): Procedure library
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Ion sources for high-frequency accelerators
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GKSS-FORSCHUNGSZENTRUM GEESTHACHT (WEST GERMANY).

On the free convection profile
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GOULD, INC., MIDDLETOWN, R.I.

The turbulent gravity wave-critical level encounter in the evolution of atmospheric flow
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HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.

New developments in irradiation-induced microstructural evolution of austenitic alloys and their consequences on mechanical properties
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HARVARD-SMITHSONIAN CENTER FOR ASTROPHYSICS, CAMBRIDGE, MASS.

The Sun at high spatial resolution: The physics of small spatial structures in a magnetized medium N86-24616

Corona and solar wind N86-24634

HARVARD UNIV., CAMBRIDGE, MASS.

Joint services electronics program
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Analysis of health effects resulting from population exposures to ambient particulate matter. Health and environmental effects document, 1985
[DE86-002161] N86-24208

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Global aspects of monsoons N86-24151

HEALTH EFFECTS RESEARCH LAB., RESEARCH TRIANGLE PARK, N. C.

Using Ashford's general model to aid in the understanding of a pesticide's neurotoxic effect through pesticide-drug mixture experiments
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Nonlinear optical phenomena in solids
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HORIZON INST. FOR ADVANCED DESIGN, INC., ROCKVILLE, MD.

Comparison of scientific and technical personnel trends in the United States, France, West Germany and the United Kingdom since 1970
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HOVER SYSTEMS FEDERAL CORP., EDDYSTONE, PA.

After action report, CH-47 recovery using D-PAAC
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HUGHES AIRCRAFT CO., FULLERTON, CALIF.

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Three-dimensional elasto-plastic analysis for soils
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ELF (Extremely Low Frequency) biological effects literature data base management system
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ILLINOIS INST. OF TECH., CHICAGO.

Basic and applied magnetism with a squid gradiometer
[AD-A162890] N86-23755

ILLINOIS STATE ENVIRONMENTAL PROTECTION AGENCY, SPRINGFIELD.

Illinois annual air quality report, 1984
[PB86-110780] N86-24050

ILLINOIS UNIV., CHICAGO.

Remote sensing of body signs and signatures
[AD-A162106] N86-24199

Optimum two-stage selection procedures for Weibull populations
[AD-A162824] N86-24344

ILLINOIS UNIV., URBANA.

A study of relaxation techniques for the transient analysis of digital circuits
[AD-A161954] N86-23805

Nonlinear earthquake analysis of concrete building structures
[AD-A162967] N86-23966

Survey and evaluation of field data suitable for smoke hazard model evaluation
[AD-A161880] N86-24094

Response of cumulus clouds to large-scale forcing and cumulus parameterization N86-24157

Computational methods and software for differential equations and their applications
[DE86-002145] N86-24260

Parameter estimation for the class A middleton model
[AD-A161916] N86-24349

ILLINOIS UNIV., URBANA-CHAMPAIGN.

Superlattices and NiPi structures in new forms of cascade solar cells
[NASA-CR-176718] N86-24007

Antiemetic drugs and pilot performance
[AD-A162109] N86-24200

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).

The strength of mechanically fastened joints in Kevlar reinforced composite materials
[BR93823] N86-23656

The numerical computation of multi-phase flows
[CFD/85/7] N86-23895

Application of variable-blockage method to steady flows over curved beds
[CFD/85/12] N86-23896

INDIAN INST. OF GEOMAGNETISM, BOMBAY.

Indian Institute of Geomagnetism: Progress in research N86-24062

INDIANA UNIV.-PURDUE UNIV., INDIANAPOLIS.

A zonal approach to the design of finite element grids for 3-D transonic flows with complex geometries
[AD-A162168] N86-23572

INDUSTRIAL ENVIRONMENTAL RESEARCH LAB., RESEARCH TRIANGLE PARK, N. C.

Operational and environmental impacts of closed cycle cooling systems
[PB86-117157] N86-23758

INSTITUT FUER FLUGMECHANIK, BRUNSWICK (WEST GERMANY).

The effect of high frequency electromagnetic fields on human beings (frequency range between 1 kHz and 1000 GHz) N86-24193

INSTITUTE FOR ATMOSPHERIC OPTICS AND REMOTE SENSING, HAMPTON, VA.

Development of a global model for atmospheric backscatter at CO2 wavelengths
[NASA-CR-3959] N86-24089

INSTITUTE FOR DEFENSE ANALYSES, ALEXANDRIA, VA.

A technique to help choose between alternative functional forms of the regression equation
[AD-A161909] N86-24329

INSTITUTO DE ELECTRONICA DE COMMUNICACIONES, MADRID (SPAIN).

Conformal array antenna subsystem
[CASA-ES-85/I-004/E/AR] N86-23798

INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).

Artificial satellite attitude control using a self-tuning controller
[INPE-3789-PRE/984] N86-23627

An approach for order reduction and placement of actuators/sensors for the control of a class of distributed parameters systems
[INPE-3791-PRE/985] N86-23976

Development of a satellite-tracked oceanographic drifting buoy for the Brazilian Antarctic Program, part 1
[INPE-3793-PRE/988] N86-24166

Variations in temperature, salinity and density in Bransfield Strait, 9-14 March, 1985, part 2
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[INPE-3795-PRE/990] N86-24168

Single-dish high sensitivity determination of solar limb emission at 22 and 44 GHz N86-24631

Short-lived solar burst spectral component at f approximately 100 GHz N86-24632

INTEGRAL TECHNOLOGIES, INC., WESTMONT, ILL.

Methods for heat transfer and temperature field analysis of the insulated diesel phase 2 progress report
[NASA-CR-175072] N86-24590

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.

A comparison study of spectral energetics analysis using varius FGGE 3b data N86-24135

Numerical solution of ill posed problems in partial differential equations
[AD-A162378] N86-24308

IOWA UNIV., IOWA CITY.

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[AD-A161834] N86-23917

Dynamic analysis and control synthesis of integrated mechanical systems N86-23933

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Specification for MIDAS-GR. Management of information for design and analysis of system. Generalized relational model
[AD-A162086] N86-24351

Database design methodology and database management system for computer-aided structural design optimization
[AD-A162101] N86-24564

ITT AEROSPACE/OPTICAL DIV., FORT WAYNE, IND.

Study in spurious sensitivity of electronics in space
[AD-A162300] N86-23813

J

JACKSON STATE UNIV., MISS.

Application of Weibull analysis to SSME hardware N86-24526

JAYCOR, SAN DIEGO, CALIF.

Production of ultrahigh magnetic fields
[DE86-003735] N86-24481

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.

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[NASA-CASE-NPO-16464-1CU] N86-24224

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[NASA-CASE-NPO-16462-1CU] N86-24225

Raman spectroscopy of boron carbides and related boron-containing materials
[DE86-002126] N86-24494

JOHN BROWN UNIV., SILOAM SPRINGS, ARK.

A phoenics model for the triaxial loading of an initially cylindrical mass of rate-type material with provisions for bulging and yield N86-24523

JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.

China report: Science and technology
[JPRS-CST-86-005] N86-23762

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Study on normalization of instrument for measuring modulated transfer function in infrared range at zero spatial frequency N86-23765

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USSR report: Machine tools and metalworking equipment
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[JPRS-JST-86-007] N86-23773

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USSR report: Physics and mathematics
[JPRS-UPM-86-004] N86-24358

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West Europe Report: Science and Technology. FRG information technology
[JPRS-WST-86-015] N86-24591

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KANSAS STATE UNIV., MANHATTAN.
Stochastic models of man-machine system effectiveness N86-24216
KANSAS UNIV., LAWRENCE.
The advance of phenological spring across eastern and central North America N86-24078
KARLSRUHE UNIV. (WEST GERMANY).
The flow about and drag behavior of walls in turbulent boundary layer flows
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Calculation of flow and pollutant dispersion in meandering channels
[KU-SFB-210/T/9] N86-23894
KENTRON INTERNATIONAL, INC., HAMPTON, VA.
An aerodynamic analysis computer program and design notes for low speed wing flap systems
[NASA-CR-3675] N86-23554
KERNFORSCHUNGSANLAGE, JUELICH (WEST GERMANY).
Calculation of creep deformations under rigorous application of the continuum-mechanical equilibrium conditions
[JUEL-SPEZ-321] N86-23990
The transfer of scientific knowledge to the general public from the point of view of scientists. Results of a survey among the scientific personnel of the Kernforschung, Juelich, West Germany
[JUEL-SPEZ-323] N86-24593
KYOTO UNIV. (JAPAN).
Numerical simulations in cosmic gas dynamics: Gas flows in binary stars N86-23863

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LABORATORIUM VOOR RUIMTEONDERZOEK, UTRECHT (NETHERLANDS).
The flare kernel in the impulsive phase N86-24617
X-ray imaging of flare loops and coronal arches N86-24618
LAMBUTH COLL., JACKSON, TENN.
A preliminary study of flat-panel displays N86-24546
LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N. Y.
Marginal ice zone experiment - 1984, physical oceanography report: USNS Lynch and helicopter-based STD data
[AD-A163096] N86-24180
Physical oceanography report: Camp-based and helicopter-based STD data from the drifting ice station FRAM 3
[AD-A163097] N86-24181
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Materials Physics, H Division
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ODRIC: A one-dimensional linear resistive MHD code in cylindrical geometry
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Molecular dynamics studies of energy transfer processes in crystal system
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LEAR SIEGLER, INC., GRAND RAPIDS, MICH.
Preliminary hazard analysis for self-contained navigation system
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LIGHTNING TECHNOLOGIES, INC., PITTSFIELD, MASS.
Lightning protection guidelines and test data for adhesively bonded aircraft structures
[NASA-CR-3762] N86-23586
LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Numerical generation of 3D curvilinear coordinate systems and computational grids for aircraft configurations
[AD-A162249] N86-23997
LOGISTICS MANAGEMENT INST., WASHINGTON, D. C.
Discounted cash flow model for the industrial modernization incentives program
[AD-A162988] N86-24589
LOS ALAMOS NATIONAL LAB., N. MEX.
Moon base/Mars base transportation depot
[DE86-003275] N86-23619
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Solid state directional gamma detector
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MANCHESTER UNIV. (ENGLAND).

Comparison of the results of theoretical calculations with experimental measurements from the Los Alamos free-electron laser oscillator experiment
[DE86-002382] N86-23923
Status of the Los Alamos Free-Electron Laser
[DE86-003856] N86-23924
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[DE86-003282] N86-24020
Summary of MATHEW/ADPIC model evaluation studies
[DE86-002139] N86-24107
Atmospheric perturbations of large-scale nuclear war
[DE86-002410] N86-24108
EFFECTS: Documentation and verification for a BEIR 3 cancer risk model based on age, sex and population dynamics for BIOTRAN
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Sophisticated gamma-ray data acquisition system based on an IBM PC/XT computer
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[DE86-003280] N86-24476
Multipoint Thomson scattering system and measurements on the Los Alamos spheromak compact toroid experiment
[DE86-003297] N86-24479
LOUISIANA STATE UNIV., BATON ROUGE.
1. Toward the quantum limit in gravitational wave detectors. 2: Several theoretical problems in condensed matter physics N86-24501
LOWELL UNIV., MASS.
Microwave and infrared absorption properties of atmospheric species with special emphasis on line widths and shifts
[AD-A162154] N86-24422
LTV AEROSPACE AND DEFENSE CO., DALLAS, TEX.
Photon avalanche laser improvement program
[AD-A162100] N86-23920
LUFTFAHRT-BUNDESAMT, BRUNSWICK (WEST GERMANY).
Results of the technical investigation of accidents during the operation of German aircraft at home and abroad, and of foreign aircraft in Germany N86-23578

M

M/A-COM LINKABIT, INC., VIENNA, VA.
DSCS (Defense Satellite Communications System)/Wideband SHF (Super High Frequency) enhancements and EHF (Extremely High Frequency) antenna recommendations for the Mid-(1986 - 1991) and far-term (1992 - 2000) periods. Part 2
[AD-A162116] N86-23785
Interoperable commercial satellite system (ICSS) specification
[AD-A163130] N86-23794
MANCHESTER UNIV. (ENGLAND).
Turbulence modelling of flows with non-uniform density N86-23846
Recent operational performance of the CERN omega ring imaging Cerenkov detector
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MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Servicers system demonstration plan and capability development
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[AD-A162360] N86-23814
Evaluation of automated decision making methodologies and development of an integrated robotic system simulation: Study results
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Laser-induced fluorescence of europium-doped yttrium oxide for remote high-temperature thermometry
[DE86-003028] N86-23928
MARYLAND UNIV., COLLEGE PARK.
Study of cold-cathode and RF-excitation for low power CO2 waveguide lasers
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FGGE and atmospheric predictability N86-24143
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[AD-A162954] N86-24258
Heavy meson decays and p anti p collisions
[DE86-003044] N86-24444
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Structure-property relationships in intercalated graphite
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A geometric approach to failure detection and identification in linear systems
[NASA-CR-176750] N86-23957
Mixed mode 1 and 2 fully plastic crack growth from simulated weld defects
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A LaGrange Multiplier/Segment procedure for solution of three-dimensional contact problems
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[DE86-003363] N86-24480
Infrared nonlinear processes in semiconductors
[AD-A162096] N86-24488
MASSACHUSETTS UNIV., AMHERST.
Acid-catalyzed degradation of Poly(2-butyl-1,3,6-trioxocane
[AD-A162038] N86-23647
A study of error detection and correction codes
[AD-A162196] N86-24244
A birth and death process approximation for the slotted ALOHA algorithm
[AD-A162153] N86-24304
MATRA ESPACE, TOULOUSE (FRANCE).
A CAD tool for LEO spacecraft power subsystem design (EBLOS upgrading)
[MATRA-CMT-RS/101/RT/05.85] N86-24272
MAX-PLANCK-INST. FUER AERONOMIE, KATLENBURG-LINDAU (WEST GERMANY).
Superposed epoch analysis of corotating interaction regions (CIR), at 0.3 and 1.0 AU: A comparative study
[MPAE-W-79-85-03] N86-24645
MAX-PLANCK-INST. FUER QUANTENOPTIK, MUNICH (WEST GERMANY).
Plans for a large gravitational wave antenna in Germany
[MPQ-101] N86-23912
Progress with the Garching (West Germany) 30 meter prototype for a gravitational wave detector
[MPQ-100] N86-23929
MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Integral scattering cross sections of highly vibration-excited Li2 molecules
[MPIS-8/1985] N86-24434
Molecular beam experiment of the reactive scattering D+H2 yields HD+H
[MPIS-13/1985] N86-24435
MCDONNELL-DOUGLAS CORP., LONG BEACH, CALIF.
Graphite/epoxy composite stiffened panel fabrication development
[NASA-CR-172204] N86-23859
MEMPHIS STATE UNIV., TENN.
Turbulent flow field predictions in sharply curved turn around ducts N86-24542
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., BREMEN (WEST GERMANY).
Comparison of aluminum alloys concerning strength and damage tolerance
[MBB-UT-111/85] N86-23714
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
MOMS-01 (Modular Optoelectronic Multispectral Scanner) for Earth observation: First results of STS-7 mission N86-24003
METAL MATRIX COMPOSITES INFORMATION ANALYSIS CENTER, SANTA BARBARA, CALIF.
A brief introduction to metal matrix composites materials and technology
[AD-A161954] N86-23664
MIAMI UNIV., FLA.
Influence of transient baroclinic eddies on planetary-scale waves N86-24084
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MICHIGAN UNIV., ANN ARBOR.
Three-dimensional flow in compressors and channels
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Survey of the literature on production scheduling as it pertains to flexible manufacturing systems
[PB86-106754] N86-24555
MINISTERIE VAN ONDERWIJS EN WETENSCHAPPEN, S'GRAVENHAGE (NETHERLANDS).
Investigation of the nature and importance of crack formation in a creep-loaded T-shaped component 4 NIL-RLD
[TWD-87815] N86-23991
MINISTERIE VAN SOCIALE ZAKEN EN WERKGELEGENHEID, S'GRAVENHAGE (NETHERLANDS).
Stimulation of computer sciences
[REPT-19-158-NO-1-2] N86-24236
MINNESOTA UNIV., MINNEAPOLIS.
Effect of spatially periodic heating or an abrupt contraction at inlet on transitional and turbulent heat transfer in a duct N86-23843
Endwall boundary layer, cylinder diameter, Reynolds number, and surface injection effects on local mass transfer from a cylinder in crossflow N86-23845
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MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
Preliminary designs for X-ray source modifications for the Marshall Space Flight Center's X-ray calibration facility N86-24517
Standardization of carbon-phenolic composite test methodology N86-24527
MITRE CORP., BEDFORD, MASS.
Air Force Geophysics Laboratory management information system development plan
[AD-A162005] N86-24550
Air Force Geophysics Laboratory management information system study
[AD-A161910] N86-24561
MITRE CORP., MCLEAN, VA.
Suppression of capillary waves by surface-active films
[AD-A162881] N86-23880
MONTANA STATE UNIV., BOZEMAN.
An archean suture zone in the Tobacco Root Mountains? (1984) Evolution of Archean Continental Crust, SW Montana (1985)
[NASA-CR-176726] N86-24061
MOUND LAB., MIAMISBURG, OHIO.
Pulsed laser weldability of aluminum alloys
[DE86-003731] N86-23711
Design, development and application of a thermal analysis mass spectrometer
[DE86-003746] N86-23910

N

NAGOYA UNIV. (JAPAN).
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A kinetic theory analysis of transient evaporation problem N86-23865
Behaviour of the peripheral plasma in the reversed field pinch
[IPPJ-763] N86-24471
Production of highly relativistic ions and electrons by quasi-perpendicular magnetosonic shock waves
[IPPJ-764] N86-24472
NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
Timing apparatus
[LINO-124] N86-23913
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Space Station Engineering and Technology Development. Proceedings of the Panel on Solar Thermodynamics Research and Technology Development, July 31, 1985
[NASA-CR-176756] N86-24010
Proceedings of the First National Workshop on the Global Weather Experiment: Current Achievements and Future Directions, volume 1
[NASA-CR-176720] N86-24120
Proceedings of the First National Workshop on the Global Weather Experiment: Current Achievements and Future Directions, volume 2, part 1
[NASA-CR-176721] N86-24121
Proceedings of the First National Workshop on the Global Weather Experiment: Current Achievements and Future Directions, volume 2, part 2
[NASA-CR-176722] N86-24142
Study of biotechnology applied to research and development
[AD-A161877] N86-24185
NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
Recent improvements to the NAE 5 ft. x 5 ft. blowdown wind tunnel
[AD-A162034] N86-23808
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
A cumulative index to a continuing bibliography on aeronautical engineering
[NASA-SP-7037(196)] N86-23552
Aeronautical Engineering (a continuing bibliography with indexes)
[NASA-SP-7037(198)] N86-23553
Summary results of the Industry Conference on the Commercial Use of Space
[NASA-TM-77679] N86-23612
The space transportation system and its impact on Latin American development
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Japan's participation in space station design: Feasibility study of GaAs solar cells for space station applications
[NASA-TM-88384] N86-23622
Failure criterion of glass fabric reinforced plastic laminates
[NASA-TM-88406] N86-23657
Chinese space and aviation industries score major breakthroughs
[NASA-TM-87973] N86-23749
Electrical conductivity of rocks at high pressures and temperatures
[NASA-TM-77687] N86-24060
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 283)
[NASA-SP-7011(283)] N86-24192
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Locally linearized longitudinal and lateral-directional aerodynamic stability and control derivatives for the X-29A aircraft
[NASA-TM-84919] N86-23566
Minimum time and fuel flight profiles for an F-15 airplane with a Highly Integrated Digital Electronic Control (HIDEC) system
[NASA-TM-86042] N86-23587
Development experience with a simple expert system demonstrator for pilot emergency procedures
[NASA-TM-85919] N86-23603
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OBSERVATOIRE DE PARIS-MEUDON (FRANCE).
The solar radio corona: Manifestations of energetic electrons N86-24628
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Interactions of vortices N86-23859
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
La Recherche Aerospatiale, bimonthly bulletin, number 1985-2, 225/March-April
[ESA-TT-925] N86-24356
La Recherche Aerospatiale, bimonthly bulletin, number 1985-3, 226/May-June
[ESA-TT-937] N86-24357
OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes. Volume 40, number 1
[AD-A162235] N86-23753
Summary of european feedback control research
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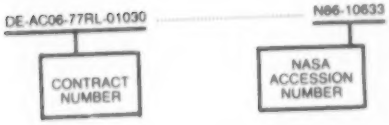

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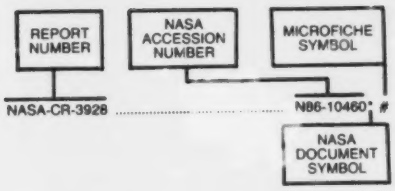

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AD-A163104 ..... N86-24643* #
AD-A163105 ..... N86-24644* #
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AD-A163124 ..... N86-23732 #
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AD-D012079 ..... N86-23557
AD-D012080 ..... N86-23802
AD-D012081 ..... N86-23935

AD-E301844 ..... N86-23678 #
AD-E440307 ..... N86-23612 #
AD-E440309 ..... N86-2370[illegible] #
AD-E801225 ..... N86-23815 #
AD-E801242 ..... N86-24457 #

AD-F630622 ..... N86-23794 #
AD-F630622 ..... N86-24493 #

AD-TR-85-54-VOL-1 ..... N86-23583 #

AEDC-TR-85-30-VOL-1 ..... N86-23595 #
AEDC-TR-85-62 ..... N86-23876 #

AERE-G-3349-VOL-2 ..... N86-23832 #

AERE-M-3492 ..... N86-23719 #

AERE-R-11459 ..... N86-23717 #
AERE-R-11589 ..... N86-24406 #
AERE-R-11643 ..... N86-23720 #
AERE-R-11830 ..... N86-24408 #
AERE-R-11860 ..... N86-24407 #
AERE-R-11866 ..... N86-24409 #
AERE-R-11922 ..... N86-23743 #
AERE-R-11923 ..... N86-23718 #

AFAMRL-TR-85-013 ..... N86-24223 #

AFATL-TR-85-37 ..... N86-24457 #

AFESC/ESL-TR-85-25 ..... N86-24036 #

AFGL-ERP-915 ..... N86-24065 #
AFGL-ERP-916(2)-PT-2 ..... N86-23634 #
AFGL-ERP-917 ..... N86-24100 #
AFGL-ERP-922 ..... N86-24399 #

AFGL-TR-85-0040 ..... N86-24096 #
AFGL-TR-85-0092 ..... N86-24640 #
AFGL-TR-85-0102 ..... N86-24065 #
AFGL-TR-85-0103(2)-PT-2 ..... N86-23634 #
AFGL-TR-85-0121 ..... N86-24100 #
AFGL-TR-85-0131 ..... N86-23617 #
AFGL-TR-85-0133 ..... N86-24399 #
AFGL-TR-85-0154 ..... N86-24095 #
AFGL-TR-85-0163 ..... N86-23787 #
AFGL-TR-85-0168 ..... N86-24422 #
AFGL-TR-85-0169 ..... N86-24248 #
AFGL-TR-85-0335 ..... N86-24403 #

AFHRL-TP-85-23 ..... N86-24194 #

AFHRL-TR-84-60 ..... N86-23596 #
AFHRL-TR-85-34 ..... N86-23804 #

AFIT/GSM/LSB/85S-22 ..... N86-24582 #

AFIT/GSM/LSQ/85S-23 ..... N86-24580 #
AFIT/GSM/LSQ/85S-27 ..... N86-24581 #

AFIT/GSM/LSY/85S-1 ..... N86-24576 #
AFIT/GSM/LSY/85S-15 ..... N86-24585 #
AFIT/GSM/LSY/85S-26 ..... N86-24583 #
AFIT/GSM/LSY/85S-28 ..... N86-24584 #
AFIT/GSM/LSY/85S-33 ..... N86-24568 #

AFIT/GSM/XPX/85S-24 ..... N86-24221 #

AFOSR-85-0874TR ..... N86-24342 #
AFOSR-85-0904TR-VOL-1 ..... N86-23751 #
AFOSR-85-0905TR-VOL-2 ..... N86-23752 #
AFOSR-85-0959TR ..... N86-24296 #
AFOSR-85-0978TR ..... N86-24305 #
AFOSR-85-0979TR ..... N86-24338 #
AFOSR-85-0980TR ..... N86-24334 #
AFOSR-85-0981TR ..... N86-24340 #
AFOSR-85-0983TR ..... N86-23813 #
AFOSR-85-0984TR ..... N86-23699 #
AFOSR-85-0985TR ..... N86-24570 #
AFOSR-85-0987TR ..... N86-24339 #

AFOSR-85-0988TR ..... N86-24245 #
AFOSR-85-0989TR ..... N86-24571 #
AFOSR-85-0990TR ..... N86-24244 #
AFOSR-85-0992TR ..... N86-23921 #
AFOSR-85-0994TR ..... N86-24488 #
AFOSR-85-0995TR ..... N86-23666 #
AFOSR-85-1006TR ..... N86-24099 #
AFOSR-85-1016TR ..... N86-23631 #
AFOSR-85-1017TR ..... N86-23945 #
AFOSR-85-1018TR ..... N86-24307 #
AFOSR-85-1022TR ..... N86-24341 #
AFOSR-85-1023TR ..... N86-24066 #
AFOSR-85-1026TR ..... N86-23695 #
AFOSR-85-1027TR ..... N86-23646 #
AFOSR-85-1028TR ..... N86-23675 #
AFOSR-85-1034TR ..... N86-24425 #
AFOSR-85-1035TR ..... N86-23698 #
AFOSR-85-1036TR ..... N86-24455 #
AFOSR-85-1037TR ..... N86-24453 #
AFOSR-85-1038TR ..... N86-24491 #
AFOSR-85-1041TR ..... N86-23697 #
AFOSR-85-1042TR ..... N86-24487 #
AFOSR-85-1048TR ..... N86-24304 #
AFOSR-85-1049TR ..... N86-24243 #
AFOSR-85-1050TR ..... N86-24280 #
AFOSR-85-1052TR ..... N86-24246 #
AFOSR-85-1053TR ..... N86-24289 #
AFOSR-85-1054TR ..... N86-24291 #
AFOSR-85-1055TR ..... N86-24250 #
AFOSR-85-1058TR ..... N86-23997 #
AFOSR-85-1059TR ..... N86-23878 #
AFOSR-85-1061TR ..... N86-23572 #
AFOSR-85-1062TR ..... N86-24351 #
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AFOSR-85-1072TR ..... N86-23981 #
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AFOSR-85-1082TR ..... N86-23573 #
AFOSR-85-1084TR ..... N86-23958 #
AFOSR-85-1086TR ..... N86-24293 #
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AFOSR-85-1098TR ..... N86-24295 #
AFOSR-85-1099TR ..... N86-23667 #
AFOSR-85-1101TR ..... N86-24423 #
AFOSR-85-1102TR ..... N86-24178 #
AFOSR-85-1108TR ..... N86-24256 #
AFOSR-85-1121TR ..... N86-24313 #
AFOSR-85-1122TR ..... N86-24310 #
AFOSR-85-1123TR ..... N86-24314 #
AFOSR-85-1124TR ..... N86-24258 #
AFOSR-85-1125TR ..... N86-24473 #
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AFOSR-85-1131TR ..... N86-24395 #
AFOSR-85-1138TR ..... N86-24105 #
AFOSR-85-1165TR ..... N86-24354 #
AFOSR-85-1177TR ..... N86-24318 #
AFOSR-85-1178TR ..... N86-24345 #
AFOSR-85-1179TR ..... N86-23681 #
AFOSR-85-1180TR ..... N86-24312 #

AFWAL-TR-84-1159 ..... N86-23922 #
AFWAL-TR-84-3084 ..... N86-23570 #
AFWAL-TR-84-4041 ..... N86-23703 #
AFWAL-TR-85-2055 ..... N86-23600 #
AFWAL-TR-85-2065 ..... N86-23814 #
AFWAL-TR-85-3055 ..... N86-23599 #
AFWAL-TR-85-3079 ..... N86-23632 #
AFWAL-TR-85-4036 ..... N86-23648 #
AFWAL-TR-85-4037 ..... N86-24485 #
AFWAL-TR-85-4038 ..... N86-23649 #
AFWAL-TR-85-4039 ..... N86-23724 #
AFWAL-TR-85-4040 ..... N86-23723 #
AFWAL-TR-85-4041 ..... N86-23726 #
AFWAL-TR-85-4042 ..... N86-23725 #
AFWAL-TR-85-4110 ..... N86-23601 #
AFWAL-TR-85-4111 ..... N86-23731 #

AFWL-TR-84-156 ..... N86-24419 #

AGES-850702 ..... N86-24043 #

AGRICULTURE/HB-643 ..... N86-24004 #

AIAA-85-1520 ..... N86-23563* #

AMMRC-TR-85-16 ..... N86-23694 #

AMSMI/RL-AD-E850771 ..... N86-23947 #

AMXTH-TE-TR-85039 ..... N86-23672 #

ANL/ER-85-3 ..... N86-24094 #

ANL/HEP-CP-85-111 ..... N86-24444 #

ANL/MCS-TM-55 ..... N86-24271 #
ANL/MCS-TM-56 ..... N86-24323 #
ANL/MCS-TM-58 ..... N86-24325 #

APR-2 ..... N86-23695 #
APR-99 ..... N86-23816 #

AR-1 ..... N86-23921 #
AR-1 ..... N86-24306 #
AR-4 ..... N86-23702 #

ARB-R-85/263 ..... N86-24048 #

ARI-4657 ..... N86-24454 #

ARL-AERO-PROP-TM-424 ..... N86-23643 #

ARL-AERO-RPOP-TM-427 ..... N86-23942 #

ARL-STRUC-414 ..... N86-23979 #

ARLCB-TR-85034 ..... N86-23701 #

ARS-41 ..... N86-23914 #

ASPC-0162-06-SAAS-35 ..... N86-23644 #

B-219969 ..... N86-23609 #

BBN-5581 ..... N86-24257 #

BDX-613-3356 ..... N86-23738 #
BDX-613-3386 ..... N86-24572 #

BES-5 ..... N86-24199 #

BLL-CE-TR-8177-(9022.09-AC29) N86-23688

BLL M-36588-(5828.4) N86-23691
BLL-M-36594-(5828.4) N86-23689
BLL-M-36595-(5828.4) N86-23690

BLL-OA-TRANS-3249(6196.3) ..... N86-23687 #

BM-RI-8948 ..... N86-24006 #
BM-RI-8960 ..... N86-23716 #

BMFT-FB-T-85-112 ..... N86-23739 #
BMFT-FB-T-85-115 ..... N86-23740 #

BNL-36582 ..... N86-23705 #
BNL-37110 ..... N86-24037 #
BNL-51832 ..... N86-24038 #
BNL-51916 ..... N86-24322 #

BRL-CR-544 ..... N86-24348 #

BRMC-84-5077 ..... N86-24553 #

BR93823 ..... N86-23656

B8575278 ..... N86-24236 #

C-184 ..... N86-23617 #

CA/DOH/AIHL/SP-35 ..... N86-24048 #

CAD-SS-84.24 ..... N86-24351 #
CAD-SS-84-20 ..... N86-24564 #

CAR-TR-148 ..... N86-24258 #

CASA-ES-85/I-004/E/AR ..... N86-23798 #

CERC-85-12 ..... N86-24179 #

CERL-IR-M-85/16 ..... N86-23696 #

CERL-TR-E-86/01 ..... N86-24013 #

CERN-EP-85-142 ..... N86-24441 #

CFD/85/7 ..... N86-23895 #
CFD/85/12 ..... N86-23896 #

CHPH-2084 ..... N86-23642* #

CLASSIC-85-09 ..... N86-24317 #

CMU-RI-TR-85-17 ..... N86-24551 #
CMU-RI-TR-85-18-PT-1 ..... N86-23946 #

CONF-850103-13 ..... N86-24021 #
CONF-850183-1 ..... N86-24609 #
CONF-850679-3 ..... N86-23969 #
CONF-850776-2 ..... N86-24429 #
CONF-850785-4 ..... N86-24441 #
CONF-850785-5 ..... N86-24608 #
CONF-850786-4 ..... N86-24494 #
CONF-850799-2 ..... N86-23705 #
CONF-850810-31 ..... N86-23885 #
CONF-850814-29 ..... N86-23706 #
CONF-850859-2 ..... N86-24506 #
CONF-850869-9 ..... N86-24650 #
CONF-850887-42 ..... N86-23713 #
CONF-850927-9 ..... N86-24430 #
CONF-850956-4 ..... N86-23923 #
CONF-850956-10 ..... N86-24448 #
CONF-850956-15 ..... N86-23924 #
CONF-850956-17 ..... N86-23926 #
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CONF-851009-21 ..... N86-23831 #
CONF-851009-30 ..... N86-24499 #
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CONF-851117-2 ..... N86-24107 #
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CONF-8410237-4 ..... N86-24428 #
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CONF-8504158-2-REV ..... N86-24039 #
CONF-8506110-6 ..... N86-23709 #
CONF-8506141-13 ..... N86-24440 #
CONF-8506165-4 ..... N86-23712 #
CONF-8506195-2 ..... N86-24608 #
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CONF-8508127-5 ..... N86-24443 #
CONF-8508145-1 ..... N86-24190 #
CONF-8509192-2 ..... N86-24480 #
CONF-8509194-1 ..... N86-24106 #
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CONF-8511128-1 ..... N86-23708 #
CONF-8511128-2 ..... N86-24500 #

CR-84-1 ..... N86-23947 #
CR-84-1 ..... N86-24232 #

CRREL-SR-85-16 ..... N86-23672 #

CRREL-85-14 ..... N86-24034 #

CS-TR-1551 ..... N86-24258 #

CS-1984-23 ..... N86-24340 #
CS-1985-23 ..... N86-24243 #

CSC/TM-85/6119 ..... N86-23626* #

CUED/C/MAPS/TR118 ..... N86-23980 #

CWD-84-3 ..... N86-24026 #

DCA/MSO-85-3-PT-2 ..... N86-23785 #

DCIEM-85-R-31 ..... N86-24195 #

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NASA-CR-176721 ..... N86-24121* #
NASA-CR-176722 ..... N86-24142* #
NASA-CR-176723 ..... N86-24237* #
NASA-CR-176724 ..... N86-23628* #
NASA-CR-176725 ..... N86-23994* #
NASA-CR-176726 ..... N86-24061* #
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NASA-CR-176747 ..... N86-23564* #
NASA-CR-176748 ..... N86-24598* #
NASA-CR-176750 ..... N86-23957* #
NASA-CR-176753 ..... N86-24611 #
NASA-CR-176755 ..... N86-24642* #
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NASA-CR-176768 ..... N86-24643* #
NASA-CR-176769 ..... N86-24644* #
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NASA-CR-177855 ..... N86-23626* #
NASA-CR-177857 ..... N86-24063* #
NASA-CR-178027 ..... N86-23853* #
NASA-CR-178050 ..... N86-24287* #
NASA-CR-178063 ..... N86-24297* #
NASA-CR-178073 ..... N86-24347* #
NASA-CR-178075 ..... N86-24277* #
NASA-CR-178079 ..... N86-24394* #
NASA-CR-178080 ..... N86-23621* #
NASA-CR-178350 ..... N86-24217* #
NASA-CR-178709 ..... N86-24507* #
NASA-CR-178714 ..... N86-23611* #
NASA-CR-178736 ..... N86-23604* #
NASA-CR-178748 ..... N86-23939* #
NASA-CR-178751 ..... N86-23640* #
NASA-CR-178754 ..... N86-23629* #
NASA-CR-178801 ..... N86-23940* #
NASA-CR-178803 ..... N86-23642* #
NASA-CR-178807 ..... N86-23641* #
NASA-CR-178809 ..... N86-23635* #
NASA-CR-178810 ..... N86-23636* #
NASA-CR-178811 ..... N86-23637* #
NASA-CR-178812 ..... N86-23638* #
NASA-CR-178813 ..... N86-23639* #

NASA-RP-1145 ..... N86-24391* #

NASA-SP-7011(283) N86-24192*
NASA-SP-7037(196) N86-23552*
NASA-SP-7037(198) N86-23553*

NASA-TM-77679 ..... N86-23612* #

NASA-TM-77684 ..... N86-23618* #
NASA-TM-77687 ..... N86-24060* #
NASA-TM-84826 ..... N86-24091* #
NASA-TM-84919 ..... N86-23566* #
NASA-TM-85673 ..... N86-23567* #
NASA-TM-85708 ..... N86-23565* #
NASA-TM-85919 ..... N86-23603* #
NASA-TM-86042 ..... N86-23587* #
NASA-TM-86534 ..... N86-23973* #
NASA-TM-86538 ..... N86-23975* #
NASA-TM-86886 ..... N86-23661* #
NASA-TM-87147 ..... N86-23854* #
NASA-TM-87299 ..... N86-23616* #
NASA-TM-87673 ..... N86-23623* #
NASA-TM-87693 ..... N86-24651* #
NASA-TM-87701 ..... N86-23855* #
NASA-TM-87705 ..... N86-23660* #
NASA-TM-87710 ..... N86-23555* #
NASA-TM-87716 ..... N86-23658* #
NASA-TM-87775 ..... N86-24597* #
NASA-TM-87973 ..... N86-23749* #
NASA-TM-88384 ..... N86-23622* #
NASA-TM-88406 ..... N86-23657* #

NASA-TP-2252 ..... N86-24090* #
NASA-TP-2491 ..... N86-23558* #
NASA-TP-2549 ..... N86-23560* #
NASA-TP-2552 ..... N86-24393* #
NASA-TP-2559 ..... N86-23559* #
NASA-TP-2576 ..... N86-23851* #
NASA-TP-2577 ..... N86-23974* #
NASA-TP-2579 ..... N86-23562* #
NASA-TP-2580 ..... N86-23561* #

NAVHLTHRSCHC-85-16 ..... N86-23900 #
NAVHLTHRSCHC-85-33 ..... N86-24206 #
NAVHLTHRSCHC-85-42 ..... N86-24207 #

NAVTRASYSCEN-85-C-0069 ..... N86-24233 #

NBS-SP-680-4 ..... N86-24573 #

NBS/GCR-85/499 ..... N86-24555 #

NBS/SP-500/129 ..... N86-24274 #
NBS/SP-702 ..... N86-23715 #
NBS/SP-707 ..... N86-23830 #

NBS/TN-1077 ..... N86-23800 #
NBS/TN-1084 ..... N86-24463 #

NBSIR-84-2973 ..... N86-23840 #
NBSIR-85-3282 ..... N86-24014 #
NBSIR-85/3250 ..... N86-24275 #

NCAR/CT-94 ..... N86-24115 #

NEPRF-TR-85-03 ..... N86-24101 #

NLR-TR-84043-U-PT-1 ..... N86-23585
NLR-TR-84043-U-PT-2 ..... N86-23585
NLR-TR-85017-L-PT-1 ..... N86-23888 #
NLR-TR-85017-L-PT-2 ..... N86-23889 #
NLR-TR-85017-L-PT-3 ..... N86-23890 #
NLR-TR-85017-L-PT-4 ..... N86-23891 #

NMERI-WA5-6(5.04) ..... N86-23607 #

NOAA-DR-ERL-ARL-6 ..... N86-24646 #

NOAA-DR-ERL-PMEL-12 ..... N86-24112 #

NOAA-NWS-WRCP-52 ..... N86-24117 #

NOAA-NWSTM-PR-28 ..... N86-24111 #

NOAA-TM-ERL-ESG-17 ..... N86-24113 #

NOAA-TM-ERL-PMEL-63 ..... N86-24183 #

NOAA-TM-NWS-HYDRO-41 ..... N86-24114 #

NOAA-TM-NWS-SR-114 ..... N86-24110 #

NOAA-TM-NWS-WR-191 ..... N86-24165 #

NORDA-TN-315 ..... N86-24173 #
NORDA-TN-318 ..... N86-24175 #

NORDA-101 ..... N86-24226 #
NORDA-103 ..... N86-24172 #
NORDA-120 ..... N86-24169 #

NOSC-TR-1037 ..... N86-24032 #

NOSC/TD-832 ..... N86-24549 #

NOSC/TR-1039 ..... N86-24188 #
NOSC/TR-1053 ..... N86-23877 #

NPRDC-TR-86-8 ..... N86-24215 #

NPS55-85-029 ..... N86-24241 #
NPS67-85-010CR ..... N86-23633 #
NPS68-85-026 ..... N86-24176 #

NRC-24882 ..... N86-23608 #

NRL-MR-5629 ..... N86-23808 #
NRL-MR-5644 ..... N86-24404 #
NRL-MR-5656 ..... N86-24064 #
NRL-MR-5662 ..... N86-23782 #
NRL-MR-5667 ..... N86-24067 #
NRL-MR-5683 ..... N86-24438 #
NRL-MR-5689 ..... N86-24326 #
NRL-MR-5692 ..... N86-23807 #
NRL-MR-5693 ..... N86-23680 #
NRL-MR-5700 ..... N86-24426 #

NRL-8925 ..... N86-23784 #
NRL-8929 ..... N86-23817 #
NRL-8932 ..... N86-23874 #
NRL-8935 ..... N86-23818 #
NRL-8549 ..... N86-23793 #

NRLMR-5676 ..... N86-23590 #

NSF-DPP84-13028 ..... N86-24072 #

NSF-84-335 ..... N86-24554 #

NSF/ENG-85020 ..... N86-23761 #

NSMRL-923 ..... N86-24402 #

NSWC/TR-85-228 ..... N86-24015 #

NUSC-TD-6448 ..... N86-23788 #

NUSC-TM-851054 ..... N86-24252 #

NUSC-TR-7511 ..... N86-24336 #

OMI-139 ..... N86-24095 #

ONRL-R-7-85 ..... N86-24288 #

ORNL/TM-9658 ..... N86-24263 #
ORNL/TM-9705 ..... N86-24477 #

OSD-771-HYDRO-CR-85-03 ..... N86-24099 #

PB86-103660 ..... N86-24073 #
PB86-104775 ..... N86-23759 #
PB86-105277 ..... N86-23800 #
PB86-106754 ..... N86-24555 #
PB86-106994 ..... N86-24182 #
PB86-107505 ..... N86-24111 #
PB86-107885 ..... N86-23716 #
PB86-108743 ..... N86-24006 #
PB86-110038 ..... N86-24112 #
PB86-110079 ..... N86-23914 #
PB86-110087 ..... N86-24646 #
PB86-110228 ..... N86-24113 #
PB86-110699 ..... N86-24074 #
PB86-110772 ..... N86-24042 #
PB86-110780 ..... N86-24050 #
PB86-111317 ..... N86-24115 #
PB86-111[illegible] ..... N86-24114 #
PB86-11[illegible] ..... N86-24004 #
PB86-111630 ..... N86-24043 #
PB86-111655 ..... N86-23956 #
PB86-112299 ..... N86-23761 #
PB86-112703 ..... N86-24116 #
PB86-112919 ..... N86-23760 #
PB86-114089 ..... N86-24212 #
PB86-114105 ..... N86-24213 #
PB86-117116 ..... N86-24049 #
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PB86-117405 ..... N86-24044 #
PB86-119070 ..... N86-24045 #
PB86-119112 ..... N86-24047 #
PB86-123197 ..... N86-24072 #
PB86-123577 ..... N86-24183 #
PB86-123759 ..... N86-24110 #
PB86-123841 ..... N86-24048 #
PB86-125101 ..... N86-23741 #
PB86-125127 ..... N86-23742 #
PB86-125135 ..... N86-24028 #
PB86-126463 ..... N86-24005 #
PB86-126745 ..... N86-24274 #
PB86-127594 ..... N86-24118 #
PB86-128075 ..... N86-24117 #

PB86-129558 ..... N86-23715 #
PB86-129665 ..... N86-23609 #
PB86-129707 ..... N86-24573 #
PB86-129749 ..... N86-24275 #
PB86-129796 ..... N86-24046 #
PB86-130028 ..... N86-24211 #
PB86-131802 ..... N86-24119 #
PB86-132743 ..... N86-24463 #
PB86-133030 ..... N86-24554 #
PB86-134871 ..... N86-23833 #
PB86-139169 ..... N86-24121* #
PB86-139177 ..... N86-24142* #
PB86-140076 ..... N86-24010* #
PB86-144474 ..... N86-24165 #

PFC/CP-85-9 ..... N86-24480 #

PNL-SA-13036 ..... N86-24023 #
PNL-SA-13252 ..... N86-24270 #
PNL-SA-13476 ..... N86-23747 #

PNL-5491 ..... N86-23830 #
PNL-5577-1 ..... N86-23735 #
PNL-5577-8 ..... N86-23737 #
PNL-5581 ..... N86-23685 #
PNL-5628 ..... N86-24019 #
PNL-5654 ..... N86-23736 #

PR-1 ..... N86-24311 #
PR-20 ..... N86-23792 #

PREPRINT-178 ..... N86-24378 #
PREPRINT-179 ..... N86-24386 #

PSI-051/TR-460 ..... N86-24419 #

PW/ED/FR-18778 ..... N86-23601 #

P110F ..... N86-24096 #

QR-3 ..... N86-23629* #

R-1 ..... N86-23941 #
R-1028 ..... N86-23805 #
R-1048 ..... N86-24349 #
R-93000/3P-4 ..... N86-23920 #

RADC-TR-85-150 ..... N86-23803 #
RADC-TR-85-162 ..... N86-24454 #

RAE-TM-MAT-STR-1055 ..... N86-23663 #

RAE-TR-84084 ..... N86-23585
RAE-TR-84085 ..... N86-23585

RAND/N-2225-NAVY ..... N86-23556 #

RAND/R-3246-ARPA ..... N86-24254 #

REPT-A-13/85 ..... N86-23576 #

REPT-C.SE.MEMP.DS.002 ..... N86-24235 #

REPT-GB/NT-85.5095 ..... N86-23799 #

REPT-TE-374/0723/85 ..... N86-23714 #

REPT-3-32300/5CR-9 ..... N86-23920 #
REPT-19-158-NO-1-2 ..... N86-24236 #
REPT-21-4705 ..... N86-23856* #
REPT-84-21418 ..... N86-23694 #
REPT-1958-TR-04 ..... N86-24553 #
REPT-4054/R128 ..... N86-24394* #

RI/RD85-312 ..... N86-23640* #

RPI-MP-81 ..... N86-23948 #

RSRE-MEMO-3790 ..... N86-23783 #

R84AEB378-VOL-1 ..... N86-23936* #
R84AEB379-VOL-2 ..... N86-23937* #
R84AEB380-VOL-3 ..... N86-23938* #
R85-910011-F ..... N86-23878 #

SACLANTCEN-SM-182 ..... N86-24298 #

SACLANTCEN-SR-89 ..... N86-24170 #

SAIC-84/1715 ..... N86-23678 #
SAIC-85/1149 ..... N86-24456 #

SAND-84-8929 ..... N86-23885 #
SAND-85-0958 ..... N86-23954 #
SAND-85-1077 ..... N86-23797 #
SAND-85-1096 ..... N86-23796 #

SAND-85-1186C ..... N86-24018 #
SAND-85-1205C ..... N86-24017 #
SAND-85-1266C ..... N86-23653 #
SAND-85-1333C ..... N86-24497 #
SAND-85-1438C ..... N86-24494 #
SAND-85-1636C ..... N86-24496 #
SAND-85-1741 ..... N86-24482 #
SAND-85-1836 ..... N86-24265 #
SAND-85-2037 ..... N86-24268 #
SAND-85-2093 ..... N86-24070 #
SAND-85-2297 ..... N86-24324 #
SAND-85-2619C ..... N86-23710 #
SAND-85-8236 ..... N86-24259 #

SAR-4 ..... N86-24007* #

SASR-1 ..... N86-23628* #
SASR-2 ..... N86-23564* #
SASR-5 ..... N86-24598* #

SC5411.2AR ..... N86-23921 #

SD-TR-85-61 ..... N86-23726 #
SD-TR-85-67 ..... N86-24230 #
SD-TR-85-72 ..... N86-23809 #
SD-TR-85-83 ..... N86-24262 #
SD-TR-85-86 ..... N86-24641 #
SD-TR-85-96 ..... N86-23821 #

SER-C-303 ..... N86-23992
SER-C-310 ..... N86-23780
SER-C-311 ..... N86-23916

SER-510148 ..... N86-23594 #

SLAC-287 ..... N86-24450 #

SR-1 ..... N86-24248 #
SR-1 ..... N86-24640 #
SR-3 ..... N86-24403 #

SRS/STD-TR86-014-535 ..... N86-23939* #

SRS0069-0001 ..... N86-24233 #

SR85-R-5126-17 ..... N86-23759 #

SSL-5-86 ..... N86-23957* #

ST-E-0739 ..... N86-23622* #

SU-CSSA-ASTRO-85-20 ..... N86-24642* #
SU-CSSA-ASTRO-85-24 ..... N86-24643* #
SU-CSSA-ASTRO-85-26-REV ..... N86-24644* #
SU-CSSA-ASTRO-85-35 ..... N86-24068* #

SU-DMS-86-R-1 ..... N86-24489 #

SU-ISL-L722-10 ..... N86-24453 #

SU-SLAC-PUB-3793 ..... N86-24269 #
SU-SLAC-PUB-3808 ..... N86-24441 #
SU-SLAC-PUB-3816 ..... N86-24445 #

SU-STAN-CS-85-1065 ..... N86-24292 #
SU-STAN-CS-85-1066 ..... N86-24253 #
SU-STAN-CS-85-1067 ..... N86-24247 #
SU-STAN-CS-85-1068 ..... N86-24231 #

TAMU-SG-86-601 ..... N86-24118 #

TAO-33842 ..... N86-23588* #

TD-RP-AI-010 ..... N86-23887 #

TOP-3-2-807 ..... N86-23984 #

TPR-9 ..... N86-23827 #

TR-J-84-15 ..... N86-24330 #
TR-J-84-16 ..... N86-24238 #

TR-1 ..... N86-23592 #
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TR-4-ONR ..... N86-24333 #
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TR-7 ..... N86-24012 #
TR-8 ..... N86-23679 #
TR-8 ..... N86-24315 #
TR-9 ..... N86-24410 #
TR-11 ..... N86-23647 #
TR-11 ..... N86-24292 #
TR-12 ..... N86-24253 #
TR-13 ..... N86-24247 #

TR-17 ..... N86-23700 #
TR-18 ..... N86-24415 #
TR-19 ..... N86-24411 #
TR-20 ..... N86-24412 #
TR-21 ..... N86-24420 #
TR-22 ..... N86-24418 #
TR-23 ..... N86-24417 #
TR-24 ..... N86-24414 #
TR-25 ..... N86-24416 #
TR-31 ..... N86-24106 #
TR-74 ..... N86-24036 #
TR-84-37-REV ..... N86-24346 #
TR-85-21/ATD ..... N86-23668 #
TR-85-30 ..... N86-24305 #
TR-85-30 ..... N86-24344 #
TR-85-31 ..... N86-24334 #
TR-85-32 ..... N86-24338 #
TR-85-33 ..... N86-24342 #
TR-85-39 ..... N86-24395 #
TR-85-184 ..... N86-24314 #
TR-108 ..... N86-24310 #
TR-115 ..... N86-24345 #
TR-119 ..... N86-24318 #
TR-120 ..... N86-24312 #
TR-126 ..... N86-23681 #
TR-596 ..... N86-24328 #
TR-654 ..... N86-24350 #
TR-0084A(5925-08)-1 ..... N86-24230 #
TR-0084A(5925-04)-2 ..... N86-23728 #
TR-0084A(5945-06)-1 ..... N86-23809 #
TR-0086(6920-03)-1 ..... N86-24282 #
TR-0086(6940-01)-1 ..... N86-24641 #
TR-0086(6940-05)-14 ..... N86-23821 #
TR-64058-03 ..... N86-23641* #
TR-66338-01-APP-B ..... N86-23635* #
TR-66338-01-APP-C ..... N86-23636* #
TR-66338-01-APP-D ..... N86-23637* #
TR-66338-01-APP-E ..... N86-23638* #
TR-66338-01-APP-F ..... N86-23639* #
TR-716548-4 ..... N86-23781* #

TRC-SEAL-1-86 ..... N86-23940* #

TRITA-EPP-85-06 ..... N86-24071 #

TT-82-00-104 ..... N86-24182 #

TWD-87815 ..... N86-23991 #

UBUFFALO/DC/85-TR-2 ..... N86-24424 #
UBUFFALO/DC/85/TR-71 ..... N86-24421 #

UC-93-A ..... N86-24009* #

UCB/EERC-85/01 ..... N86-23761 #
UCB/EERC-85/05 ..... N86-23760 #

UCID-18574-84-4 ..... N86-23757 #
UCID-20478 ..... N86-24234 #
UCID-20556 ..... N86-24261 #
UCID-20563 ..... N86-23904 #
UCID-20575 ..... N86-24285 #
UCID-20581 ..... N86-24431 #
UCID-20620 ..... N86-24493 #

UCRL-15724 ..... N86-23645 #
UCRL-15729 ..... N86-24267 #
UCRL-53643 ..... N86-23953 #
UCRL-92319 ..... N86-24107 #
UCRL-92676 ..... N86-24440 #
UCRL-93503 ..... N86-24483 #
UCRL-93523 ..... N86-24069 #

UCT/DEECS-TR-85-9 ..... N86-23786 #

UDR-TR-85-24 ..... N86-23731 #

UILU-ENG-85-2203 ..... N86-23805 #
UILU-ENG-85-2223 ..... N86-24349 #

ULRF-426/CAP ..... N86-24422 #

US-PATENT-APPL-SN-324895 ..... N86-23825 #
US-PATENT-APPL-SN-473392 ..... N86-23580
US-PATENT-APPL-SN-505166 ..... N86-23748
US-PATENT-APPL-SN-515240 ..... N86-23801
US-PATENT-APPL-SN-536142 ..... N86-23605
US-PATENT-APPL-SN-541620 ..... N86-23802
US-PATENT-APPL-SN-566153 ..... N86-23557
US-PATENT-APPL-SN-569642 ..... N86-23779
US-PATENT-APPL-SN-586956 ..... N86-23935
US-PATENT-APPL-SN-644475 ..... N86-23949 #
US-PATENT-APPL-SN-711786 ..... N86-23733 #
US-PATENT-APPL-SN-745155 ..... N86-23602 #
US-PATENT-APPL-SN-746248 ..... N86-23564 #
US-PATENT-APPL-SN-748376 ..... N86-23901 #

US-PATENT-APPL-SN-750952 ..... N86-24016 #
US-PATENT-APPL-SN-757402 ..... N86-23950 #
US-PATENT-APPL-SN-767205 ..... N86-23795 #
US-PATENT-APPL-SN-773276 ..... N86-23902 #
US-PATENT-APPL-SN-780068 ..... N86-23824 #
US-PATENT-APPL-SN-780495 ..... N86-24459 #
US-PATENT-APPL-SN-781560 ..... N86-23823 #
US-PATENT-APPL-SN-789713 ..... N86-23744* #
US-PATENT-APPL-SN-794928 ..... N86-23682 #
US-PATENT-APPL-SN-795795 ..... N86-23903 #
US-PATENT-APPL-SN-795949 ..... N86-24458 #
US-PATENT-APPL-SN-801024 ..... N86-23822 #
US-PATENT-APPL-SN-804039 ..... N86-23750* #
US-PATENT-APPL-SN-805010 ..... N86-23899* #
US-PATENT-APPL-SN-807150 ..... N86-24460 #
US-PATENT-APPL-SN-808326 ..... N86-23734 #
US-PATENT-APPL-SN-815099 ..... N86-24224* #
US-PATENT-APPL-SN-815106 ..... N86-24225* #

US-PATENT-CLASS-48-102R N86-23935
US-PATENT-CLASS-73-40.7 ..... N86-23801
US-PATENT-CLASS-82-1C N86-23748
US-PATENT-CLASS-340-948 ..... N86-23580
US-PATENT-CLASS-340-953 ..... N86-23605
US-PATENT-CLASS-343-799 ..... N86-23779
US-PATENT-CLASS-364-819 ..... N86-23802

US-PATENT-4,551,153 ..... N86-23935
US-PATENT-4,553,435 ..... N86-23801
US-PATENT-4,553,457 ..... N86-23748
US-PATENT-4,554,543 ..... N86-23580
US-PATENT-4,554,544 ..... N86-23605
US-PATENT-4,555,079 ..... N86-23557
US-PATENT-4,555,708 ..... N86-23779
US-PATENT-4,555,770 ..... N86-23802

USAAVSCOM-TR-85-D-4 ..... N86-23594 #

USAFSAM-TR-84-52 ..... N86-24200 #

USARIEM-M-2/86 ..... N86-24198 #
USARIEM-M-4/86 ..... N86-24218 #

USARIEM-M5/86 ..... N86-24219 #
USARIEM-M7/86 ..... N86-24203 #

USARIEM-T7/85 ..... N86-24202 #

UTIAS-302-PT-1 ..... N86-23976 #
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For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 2417

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 2418

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) 2419

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 2419

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 2420

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 2420

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 2421

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING 2421

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 2422

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 2424

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 2424

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **N.A.**
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **2426**
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY **2428**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS **2432**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **2438**
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **2441**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) **2443**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **2444**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING **2449**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER **2453**
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY **2458**
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS **2461**
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING **2463**
Includes auxiliary systems (non-power), machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY **2465**
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **2466**
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) **2469**

43 EARTH RESOURCES **2470**
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION **2471**
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION **2473**
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS **2475**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY **2477**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **2480**
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **2481**
Includes genetics.

52 AEROSPACE MEDICINE **2482**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **2483**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **2483**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **N.A.**

60 COMPUTER OPERATIONS AND HARDWARE **2485**
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE **2487**
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS **2490**
Includes computer networks.

63 CYBERNETICS **2490**
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS **2492**
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **2496**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **N.A.**
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **2497**
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) **2497**
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS **2498**
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS **2499**
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS **2501**
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS **2501**
Includes light phenomena.

75 PLASMA PHYSICS **2503**
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS **2505**
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS **2508**
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **2508**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **2509**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS **2511**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **2511**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **2511**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **2512**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2512**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **2513**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS **2514**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2514**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

99 GENERAL **2514**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 15 / AUGUST 8, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-24652# National Aeronautics and Space Administration, Washington, D.C.
SELECTIONS FROM FLUG REVUE UND FLUGWELT INTERNATIONAL. A. ON THE BORDER OF TIME-HYPERSONIC FLIGHT. B. NASA PROGRAMS PAVE THE WAY FOR THE HYPERSONIC AIRCRAFT. C. SHUTTLE FLIGHT 61-B; CONSTRUCTION IN SPACE. D. FASTER THAN A BULLET; HYPERSONIC MILITARY AIRCRAFT
H. Penner, K. Mueller, H. Muller, G. Wange, and N. Lynn May 1986 40 p Transl. into ENGLISH of Flug Revue and Flugwelt International (West Germany), Feb. 1986 p 9-22 and 46-50 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88418; NAS 1.15:88418) Avail: NTIS HC A03/MF A01 CSCL 01B

Planned research and future developments in hypersonic aircraft, including possible military applications of hypersonic transport aircraft are discussed. NASA's development of hypersonic aircraft is discussed. Other topics include an overview of the 61-B Space Shuttle mission that pertains to the construction of space structures. Author

N86-24653 National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 199)
Apr. 1986 121 p
(NASA-SP-7037(199); NAS 1.21:7037(199)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 428 reports, articles, and other documents introduced into the NASA scientific and technical information system in March 1986. Author

N86-24654# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OUR WINGS A01
31 Dec. 1985 44 p
(AD-A163608; FTD-ID(RS)T-0173-85) Avail: NTIS HC A03/MF A01 CSCL 01/3

This article on the history of Soviet aviation is taken from an August 1970 issue of Sovetsky Voin. Several Russian aviators and scientists are interviewed. Conversations cover such categories as aerial combat,aircraft construction from 1921, types of aircraft, and the role of the Soviet government in aviation and the space program. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-24655 Princeton Univ., N. J.
NUMERICAL SOLUTION OF THE EULER EQUATIONS BY IMPLICIT SCHEMES WITH MULTIPLE GRIDS Ph.D. Thesis
Seokkwan Yoon 1985 134 p
Avail: Univ. Microfilms Order No. DA8529050

Three implicit schemes for solving the Euler equations are described. New implicit dissipation models are developed to improve the high frequency damping characteristics of the Alternating Direction Implicit scheme. The convergence and the accuracy of the LU implicit scheme are enhanced by the use of effective spectral radii and by splitting the computational domain. It is shown that a symmetric successive over-relaxation method for solving the unfactored implicit scheme is equivalent to a modified form of the LU implicit scheme. A multigrid method is developed for implicit schemes to produce rapidly convergent algorithms for calculating steady state solutions of the Euler equations for transonic flows. The number of time steps required to reach a steady state is reduced by an order of magnitude by the introduction of multiple grids. The LU implicit scheme is found to be promising for three-dimensional and unsteady flow calculations and two-dimensional steady flow analysis. Dissert. Abstr.

N86-24656 British Library Lending Div., Boston Spa (England).
AERODYNAMIC CHARACTERISTICS OF GAS CUSHION FOR CYLINDERS
A. A. Ionin, V. I. Sobolev, V. Yu. Starov, A. G. Klevtsov, and M. A. Buz 1986 9 p ref Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 9, 1985 p 133-137
(BLL-M-36671-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The rules governing the formation of a gas cushion under cylindrical bodies, such as tubes, were investigated on an isothermal model of an experimental-industrial furnace. The factors investigated included the height of lift of the piece above the grid, the gas pressure before the grid and in the gas cushion itself, the gas flow rate and the grid free cross section. An equation was obtained for the height of lift in terms of the main parameters. The formula can be used for designing gas cushion arrangements for furnaces for different purposes. Author

N86-24657*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNSTEADY TRANSONIC FLOW CALCULATIONS FOR WING-FUSELAGE CONFIGURATIONS
John T. Batina Mar. 1986 16 p refs Presented at the 27th AIAA/ASME/ASCE/AHS Structures, Structural Dynamics and Materials Conference, San Antonio, Tex., 19-21 May 1986

(NASA-TM-87707; NAS 1.15:87707; AIAA-86-0862) Avail: NTIS HC A02/MF A01 CSCL 01A

Unsteady transonic flow calculations are presented for wing-fuselage configurations. Calculations are performed by extending the XTRAN3S unsteady transonic small-disturbance code to allow the treatment of a fuselage. Details of the XTRAN3S fuselage modeling are discussed in the context of the small-disturbance equation. Transonic calculations are presented for three wing-fuselage configurations with leading edge sweep angles ranging from 0 deg to 46.76 deg. Simple bending and torsion modal oscillations of the wing are calculated. Sectional lift and moment coefficients for the wing-alone and wing-fuselage cases are compared and the effects of fuselage aerodynamic interference on the unsteady wing loading are revealed. Tabulated generalized aerodynamic forces used in flutter analyses, indicate small changes in the real in-phase component and as much as a 30% change in the imaginary component when the fuselage is included in the calculation. These changes result in a 2 to 5% increase in total magnitude and a several degree increase in phase. E.A.K.

N86-24658*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

A NUMERICAL ANALYSIS APPLIED TO HIGH ANGLE OF ATTACK THREE-DIMENSIONAL INLETS

Danny P. Hwang 1986 16 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE, and ASEE

(NASA-TM-87298; E-3004; NAS 1.15:87298; AIAA-86-1627) Avail: NTIS HC A02/MF A01 CSCL 01A

The three-dimensional analytical methods used to analyze subsonic high angle of attack inlets are described. The methods are shown to be in good agreement with experimental results for various three-dimensional high angle of attack inlets. The methods are used to predict aerodynamic characteristics of scarf and slotted-lip inlets. E.A.K.

N86-24659*# Boeing Commercial Airplane Co., Seattle, Wash.

NATURAL LAMINAR FLOW FLIGHT EXPERIMENTS ON A SWEPT WING BUSINESS JET-BOUNDARY LAYER STABILITY ANALYSES Contractor Report, Sep. 1983 - Mar. 1985

Rodger A. Rozendaal May 1986 98 p refs

(Grant NAG1-401)

(NASA-CR-3975; NAS 1.26:3975; D6-53071) Avail: NTIS HC A05/MF A01 CSCL 01A

The linear boundary layer stability analyses and their correlation with data of 18 cases from a natural laminar flow (NLF) flight test program using a Cessna Citation 3 business jet are described. The transition point varied from 5% to 35% chord for these conditions, and both upper and lower wing surfaces were included. Altitude varied from 10,000 to 43,000 ft and Mach number from 0.3 to 0.8. Four cases were at nonzero sideslip. Although there was much scatter in the results, the analyses of boundary layer stability at the 18 conditions led to the conclusion that crossflow instability was the primary cause of transition. However, the sideslip cases did show some interaction of crossflow and Tollmien-Schlichting disturbances. The lower surface showed much lower Tollmien-Schlichting amplification at transition than the upper surface, but similar crossflow amplifications. No relationship between Mach number and disturbance amplification at transition could be found. The quality of these results is open to question from questionable wing surface quality, inadequate density of transition sensors on the wing upper surface, and an unresolved pressure shift in the wing pressure data. The results of this study show the need for careful preparation for transition experiments. Preparation should include flow analyses of the test surface, boundary layer disturbance amplification analyses, and assurance of adequate surface quality in the test area. The placement of necessary instruments and usefulness of the resulting data could largely be determined during the pretest phase. Author

N86-24660*# Computer Sciences Corp., Hampton, Va.

USSAERO VERSION D COMPUTER PROGRAM DEVELOPMENT USING ANSI STANDARD FORTRAN 77 AND DI-3000 GRAPHICS

Michael R. Wiese Washington NASA May 1986 105 p refs

(Contract NAS1-17999)

(NASA-CR-3980; NAS 1.26:3980) Avail: NTIS HC A06/MF A01 CSCL 01A

The D version of the Unified Subsonic Supersonic Aerodynamic Analysis (USSAERO) program is the result of numerous modifications and enhancements to the B01 version. These changes include conversion to ANSI standard FORTRAN 77; use of the DI-3000 graphics package; removal of the overlay structure; a revised input format; the addition of an input data analysis routine; and increasing the number of aeronautical components allowed. Author

N86-24661*# Old Dominion Univ., Norfolk, Va.

VAPOR-SCREEN FLOW-VISUALIZATION EXPERIMENTS IN THE NASA LANGLEY 0.3-m TRANSONIC CRYOGENIC TUNNEL Final Report

Gregory Vincent Selby Washington NASA May 1986 38 p refs

(Grant NGT-47-003-029)

(NASA-CR-3984; NAS 1.26:3984) Avail: NTIS HC A03/MF A01 CSCL 01A

The vortical flow on the leeward side of a delta-wing model has been visualized at several different tunnel conditions in the NASA Langley 0.3-Meter Transonic Cryogenic Tunnel using a vapor-screen flow-visualization technique. Vapor-screen photographs of the subject flow field are presented and interpreted relative to phenomenological implications. Results indicate that the use of nitrogen fog in conjunction with the vapor-screen technique is feasibile. Author

N86-24662*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

R4 AIRFOIL DATA CORRECTED FOR SIDEWALL BOUNDARY-LAYER EFFECTS IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL

Renaldo V. Jenkins May 1986 114 p refs

(NASA-TP-2565; L-16066; NAS 1.60:2565) Avail: NTIS HC A06/MF A01 CSCL 01A

Corrected aerodynamic data for the R4 airfoil at Mach numbers from 0.60 to 0.78 and angles of attack from -2.0 deg. to 4.5 deg. are presented. The test Reynolds numbers were 4 million, 6 million, 10 million, 15 million, 30 million, and 40 million based on the 152.32-mm chord of the airfoil. Corrections for data were previously published in NASA Technical Memorandum 85739. The design goal of a normal-force coefficient of 0.65 at a Mach number of 0.73 and a Reynolds number of 30 million was successfully obtained with this airfoil. Author

N86-24663*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

NONISENTROPIC UNSTEADY THREE DIMENSIONAL SMALL DISTURBANCE POTENTIAL THEORY

M. D. Gibbons, W. Whitlow, Jr., (Purdue Univ., West Lafayette, Ind.), and M. H. Williams, (Purdue Univ., West Lafayette, Ind.) Apr. 1986 12 p refs Presented at the 27th AIAA/ASME/ASCE/AHS Structures, Structural Dynamics and Materials Conference, San Antonio, Tex., 19-21 May 1986

(Grant NAG1-372)

(NASA-TM-87726; NAS 1.15:87726; AIAA-Paper-86-0863) Avail: NTIS HC A02/MF A01 CSCL 01A

Modifications that allow for more accurate modeling of flow fields when strong shocks are present were made into three dimensional transonic small disturbance (TSD) potential theory. The Engquist-Osher type-dependent differencing was incorporated into the solution algorithm. The modified theory was implemented in the XTRAN3S computer code. Steady flows over a rectangular wing with a constant NACA 0012 airfoil section and an aspect ratio of 12 were calculated for freestream Mach numbers (M) of 0.82, 0.84, and 0.86. The obtained results are compared using the modified and unmodified TSD theories and the results from a three dimensional Euler code are presented. Nonunique solutions

in three dimensions are shown to appear for the rectangular wing as aspect ratio increases. Steady and unsteady results are shown for the RAE tailplane model at M = 0.90. Calculations using unmodified theory, modified theory and experimental data are compared. Author

N86-24664*# United Technologies Corp., East Hartford, Conn.
ALESEP. PART 2: A COMPUTER PROGRAM FOR THE ANALYSIS OF LEADING EDGE SEPARATION BUBBLES ON INFINITE SWEPT WINGS
R. L. Davis 3 Feb. 1986 75 p refs
(Contract NAS1-16585)
(NASA-CR-178015; NAS 1.26:178015) Avail: NTIS HC A04/MF A01 CSCL 01A

A program called ALESEP is presented for the analysis of the inviscid-viscous interaction which occurs due to the presence of a closed laminar-transitional separation bubble on an airfoil or infinite swept wing. The ALESEP code provides an iterative solution of the boundary layer equations expressed in an inverse formulation coupled to a Cauchy integral representation of the inviscid flow. This interaction analysis is treated as a local perturbation to a known solution obtained from a global airfoil analysis; hence, part of the required input to the ALESEP code are the reference displacement thickness and tangential velocity distributions. Special windward differencing may be used in the reversed flow regions of the separation bubble to accurately account for the flow direction in the discretization of the streamwise convection of momentum. The ALESEP code contains a forced transition model based on a streamwise intermittency function, a natural transition model based on a solution of the integral form of the turbulent kinetic energy equation, and an empirical natural transition model. Author

N86-24665*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ROTOR PERFORMANCE CHARACTERISTICS FROM AN AEROACOUSTIC HELICOPTER WIND-TUNNEL TEST PROGRAM
Danny R. Hoad, Joe W. Elliott, and Nettie M. Orie May 1986 99 p refs
(DA Proj. 1L1-62209-AH-76)
(NASA-TM-87661; L-16078; NAS 1.15:87661;
AVSCOM-TM-86-B-1) Avail: NTIS HC A05/MF A01 CSCL 01A

An investigation of helicopter rotor noise at model scale was conducted in the Langley 4 by 7 meter tunnel. The program described was the first of a planned three-phase project whose purpose was to examine the characteristic noise mechanism involved in main rotor/tail rotor interaction noise. This first phase was conducted with a main rotor only, in order to identify the characteristic noise generated by only the main rotor. The aerodynamic operating conditions of the rotor system were defined during the test. The acoustic data were properly referenced. Author

N86-24666# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
THE BEHAVIOUR AND PERFORMANCE OF LEADING EDGE VORTEX FLAPS
D. G. Ellis Feb. 1986 79 p refs
(CAR-8601; ISBN-0-947767-34-7) Avail: NTIS HC A05/MF A01

A series of leading edge vortex flaps was studied in subsonic wind tunnel tests to determine the possibility of improving the lift/drag ratio. Various flap sizes and deflection angles, and trailing edge flap effects on leading edge vortex flap behavior were investigated. Lift/drag ratio improvements of more than 2% are found at moderate angles of attack. It is indicated that the vortex flap can improve the efficiency of slender wings when operating in aerodynamic environments which are governed by leading edge separation and flow. E.A.K.

N86-24667*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IN-FLIGHT MEASUREMENTS OF WING ICE SHAPES AND WING SECTION DRAG INCREASES CAUSED BY NATURAL ICING CONDITIONS
Kevin Mikkelsen, Nikola Juhasz, Richard Ranaudo, Robert McKnight, Robert Freedman, and John Greissing May 1986 27 p refs
(NASA-TM-87301; E-3013; NAS 1.15:87301) Avail: NTIS HC A03/MF A01 CSCL 01A

Aircraft icing flight research was performed in natural icing conditions with a twin engine computer type STOL aircraft. In-flight measurements were made of the icing cloud environment, the shape of the ice accretion on the wing, and the corresponding increase in the wing section drag. Results are presented for three icing encounters. On one flight, the wing section drag coefficient increased 35 percent over the uniced baseline for cruise conditions while a 43 percent increase was observed at an aircraft angle of attack of 6.2 degrees. Author

N86-24668# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF ROLLING-UP AND INTERACTION OF LEADING-EDGE AND TRAILING-EDGE VORTEX SHEETS ON A SLENDER DELTA WING
Xieyuan Yin, Nan Xia, and Guohua Deng 15 Jan. 1986 24 p refs Transl. into ENGLISH from Lixue Xueboa (China), v. 16, no. 5, Sep. 1984 p 454-462
(AD-A163692; FTD-ID(RS)T-1041-85) Avail: NTIS HC A02/MF A01 CSCL 20/4

The objective of this paper is to establish a simple two-dimensional theoretical model in an attempt to use a computer to numerically simulate the experimental results of Hummel regarding the rolling-up and interaction of the leading-edge and trailing edge vortex sheets on a delta wing. It was found experimentally that when the leading vortex is present the trailing-edge vortex sheet will roll up another vortex downstream from the trailing-edge. Furthermore, the circulation of the leading-edge vortex is opposite in direction to that of the trailing-edge vortex. The numerical results are in good agreement with the experimental pictures. GRA

N86-24669# Texas Univ., Austin. Dept. of Aerospace Eng. and Eng. Mech.
EXPERIMENTAL STUDY OF THE SUPERSONIC TURBULENT BOUNDARY LAYER ON A BLUNTED AXISYMMETRIC BODY Final Report, 1 Aug. 1982 - 31 Jul. 1985
D. S. Dolling 30 Sep. 1985 25 p refs
(Contract DAAG29-84-M-0432)
(AD-A163736; ARO-22362.1-EG) Avail: NTIS HC A02/MF A01 CSCL 20/4

Surface pressure distributions and turbulent boundary layer velocity profiles have been measured on a tangent-ogive cylinder model at small angles of attack (0-4.5 deg) in a high Reynolds number, Mach 3 airflow. The model wall temperature was approximately adiabatic. The measurements were made using pointed, tangent-hemisphere and flat-faced nose tips. The effects of tip blunting on the wind- and leeside velocity profiles, integral thicknesses, shape factor, power law exponent, skin friction coefficient and wake strength parameter are presented. It is shown that the results obtained using different geometry tips can be correlated using a bluntness length-scale obtained by integration of the local tip surface angle from the stagnation point to the point corresponding to shock detachment. GRA

N86-24670# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
USE OF STATE ESTIMATION TO CALCULATE ANGLE-OF-ATTACK POSITION ERROR FROM FLIGHT TEST DATA M.S. Thesis
Thomas H. Thacker Oct. 1985 99 p refs
(AD-A163962; AFIT/GAE/AA/85J-3) Avail: NTIS HC A05/MF A01 CSCL 20/4

This thesis determined the position errors of an aircraft's angle-of-attack (AOA) sensor using state estimation with flight test data. The position errors were caused by local flow and upwash and were found to be a function of AOA and Mach number. The test aircraft used in this project was a T-38A Talon supersonic trainer from the USAF Test Pilot School configured with a Vought

yaw and pitch system noseboom and an internal Aydin-Vector data acquisition system (DAS). The position errors were found by calculating the true AOA using equations of motion and DAS parameters. The data from the DAS were noise corrupted and had to be filtered. This was accomplished using state estimation in a Kalman filter. The estimated AOA was compared to the measured AOA from the noseboom sensor to obtain the position error. Accurate position errors were obtained, even in dynamic maneuvers. This method should be considered in future AOA error testing. The method was accurate enough to identify a hysteresis error in the T-38's AOA sensor of + or - 0.5 degrees, which was confirmed by ground calibration. GRA

N86-24671 Colorado Univ., Boulder.
THE DEVELOPMENT OF VORTICITY AND VORTICES FROM FORCED UNSTEADY FLOW SEPARATION Ph.D. Thesis
Michael Cales Robinson 1985 164 p
Avail: Univ. Microfilms Order No. DA8528519

Much of the new impetus for research into unsteady separated flows has resulted from the potential exploitation of large scale vortices for improving aerodynamic performance. Transient lift and moment coefficients produced by dynamic airfoil motions can be four to five times greater than steady state counterparts. However, before a realistic utilization of unsteady vortical structures is possible, many fundamental questions regarding the physics of vortex initiation and development must be answered. Large scale vortex development induced by forced unsteady flow separation was examined across an extended range of test conditions. Dynamic sinusoidal airfoil oscillations, spanwise vortex generation, and pulsed air injection normal to the airfoil surface were used to produce forced unsteady flow separation. Phase locked multiple exposure photographs in conjunction with hotwire anemometry and multi-port surface pressure measurements documented the development of temporally and spatially synchronous leading and trailing edge vortices. Airfoil motion history was observed to directly influence vortex initiation, development and strength. Much of the new impetus for research into unsteady separated flows has resulted from the potential g forced unsteady flow separation. Dissert. Abstr.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-24672*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOADS AND MOTIONS OF AN F-106B FLYING THROUGH THUNDERSTORMS
Roger M. Winebarger May 1986 53 p refs
(NASA-TM-87671; L-16014; NAS 1.15:87671) Avail: NTIS HC A04/MF A01 CSCL 01C

Data are presented on loads and motions of a NASA F-106B airplane flying inside thunderstorms. No significant differences in piloting techniques were observed among the three pilots involved. It is indicated that airliners in normal operations occasionally encounter turbulence almost as severe as those encountered in these thunderstorm flights. E A.K.

N86-24673*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ICE DETECTOR Patent Application
Leonard M. Weinstein, inventor (to NASA) Filed 31 Mar. 1986 14 p
(NASA-Case-LAR-13403-1; NAS 1.71:LAR-13403-1; US-Patent-Appl-SN-846429) Avail: NTIS HC A02/MF A01 CSCL 01C

An ice detector for aircraft that can accurately determine the presence and thickness of ice and control devices to remove it is proposed. A small depression on the surface of an aircraft structure is filled with a plastic or epoxy material. Two capacitance gauges and a temperature gauge are embedded in this material near the surface. When moisture forms on the surface the capacitance of each of the gauges changes. This signal combined with the signal from a temperature gauge determines whether the moisture is water or ice. If ice is present its thickness may be measured based on the output of the second capacitance gauge. Once the presence of ice is determined, the thickness is easily determined. The output of the device may be used to provide an indication to the pilot or to automatically control heating elements to remove the ice. Author

N86-24674# Naval Postgraduate School, Monterey, Calif.
APPLICATION OF ARTIFICIAL INTELLIGENCE TO IMPROVE AIRCRAFT SURVIVABILITY M.S. Thesis
William L. Decker Dec. 1985 76 p refs
(AD-A164172; AD-E750890) Avail: NTIS HC A05/MF A01 CSCL 06/4

The hazards associated with the critical flight phases of civil as well as military flight operations can seriously degrade pilot efficiency, and therefore aircraft survivability, if the number or complexity of tasks that the pilot must manage exceeds his/her capabilities. This thesis explores the feasibility of applying artificial intelligence (AI) research to the construction of a Survivability Manager (SM) knowledge based system (KBS) that will assist the pilot by assuming a portion of the survivability task management load. The application of KBS principles to survivability management is illustrated using the normal and emergency management procedures for a hypothetical engine fuel supply system as a working example. Though the SM is not a reality today, there is considerable research in both AI and survivability enhancement studies to draw upon. It is recommended that a prototype be developed using currently available assets to further investigate the feasibility of the Survivability Manager. GRA

N86-24675# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT/INCIDENT SUMMARY REPORTS: DENVER, COLORADO, AUGUST 19, 1983; BLOUNTVILLE, TENNESSEE, JULY 16, 1983; TUCSON, ARIZONA, FEBRUARY 6, 1983, COCKEYSVILLE, MARYLAND, APRIL 28, 1984; AKRON, OHIO, SEPTEMBER 30, 1984; SEATTLE, WASHINGTON, OCTOBER 18, 1984; MIAMI, FLORIDA, NOVEMBER 11, 1983
30 Sep. 1985 63 p
(PB85-910409; NTSB/AAR-85/01/SUM) Avail: NTIS HC A04/MF A01; HC also available on subscription, North American Continent price $60.00, all others write for quote CSCL 13L

Reports of eight separate aircraft accidents investigated by the National Transportation Safety Board are presented. The accident locations and their dates are as follows: Denver, Colorado, August 19, 1983; Blountville, Tennessee, July 16, 1983; Tucson, Arizona, February 6, 1983; Sioux Falls, South Dakota, December 20, 1983; Cockeysville, Maryland, April 28, 1984; Akron, Ohio, September 30, 1984; Seattle, Washington, October 18, 1984; and Miami, Florida, November 11, 1983. A brief containing the probable cause of accident is included for each case. GRA

N86-24676# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
SAFETY STUDY. AIRLINE PASSENGER SAFETY EDUCATION: A REVIEW OF METHODS USED TO PRESENT SAFETY INFORMATION
25 Oct. 1985 157 p
(PB85-917014; NTSB/SS-85/09) Avail: NTIS HC A08/MF A01; also available on subscription, North American continent HC $60.00,—all others write for quote CSCL 03L

The study provides a comprehensive review of accidents, Safety Board recommendations, earlier studies, the chronology of FAA rulemaking actions, and attempts by the industry to improve the passenger safety information. Additionally, the flight attendant oral briefings, demonstrations, safety cards and videotaped

briefings are compared to FAA and industry recommended guidelines to determine how well these guidelines are being followed. The study represents a systematic review and comparison of the four briefing methods and makes subjective observations as to the apparent efficacy of each method. Twelve new recommendations are made to the FAA, and three to the airline industry. Three previous recommendations are reiterated to the FAA. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-24677*# Ohio State Univ., Columbus. ElectroScience Lab.
A STUDY OF A COLLISION AVOIDANCE SYSTEM MOUNTED ON A CURVED GROUND PLANE Semiannual Report
Philip H. Law, W. D. Burnside, and R. G. Rojas Mar. 1986 114 p refs
(Grant NsG-1498)
(NASA-CR-176771; NAS 1.26:176771; Rept-716199-8) Avail: NTIS HC A06/MF A01 CSCL 17G

Research conducted on a traffic advisory and collision avoidance system (TCAS 2) mounted on a curved ground plane is described. It is found that a curved finite ground plane can be used as a good simulation model for the fuselage of an aircraft but may not be good enough to model a whole aircraft due to the shadowing of the vertical stabilizer, wings, etc. The surface curvature of this curved disc significantly affects the monopulse characteristics in the azimuth plane but not as much in the elevation plane. These variations of the monopulse characteristics verify the need of a lookup table for the 64 azimuth beam positions. The best location of a TCAS 2 array on a Boeing 737 is to move it as far from the vertical stabilizer as possible. Author

N86-24678*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
THE EVALUATION OF THE OSGLR ALGORITHM FOR RESTRUCTURABLE CONTROLS Final Report, Dec. 1985 - Apr. 1986
W. F. Bonnice, E. Wagner, S. R. Hall, and P. Motyka Mar. 1986 177 p refs
(Contract NAS1-17556)
(NASA-CR-178083; NAS 1.26:178083; CSDL-R-1849) Avail: NTIS HC A08/MF A01 CSCL 09B

The detection and isolation of commercial aircraft control surface and actuator failures using the orthogonal series generalized likelihood ratio (OSGLR) test was evaluated. The OSGLR algorithm was chosen as the most promising algorithm based on a preliminary evaluation of three failure detection and isolation (FDI) algorithms (the detection filter, the generalized likelihood ratio test, and the OSGLR test) and a survey of the literature. One difficulty of analytic FDI techniques and the OSGLR algorithm in particular is their sensitivity to modeling errors. Therefore, methods of improving the robustness of the algorithm were examined with the incorporation of age-weighting into the algorithm being the most effective approach, significantly reducing the sensitivity of the algorithm to modeling errors. The steady-state implementation of the algorithm based on a single cruise linear model was evaluated using a nonlinear simulation of a C-130 aircraft. A number of off-nominal no-failure flight conditions including maneuvers, nonzero flap deflections, different turbulence levels and steady winds were tested. Based on the no-failure decision functions produced by off-nominal flight conditions, the failure detection performance at the nominal flight condition was determined. The extension of the algorithm to a wider flight envelope by scheduling the linear models used by the algorithm on dynamic pressure and flap deflection was also considered. Since simply scheduling the linear models over the entire flight envelope is unlikely to be adequate, scheduling of the steady-state implentation of the algorithm was briefly investigated. Author

N86-24679# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
PRESSURE BASED SEPARATION IN THE UPPER AIRSPACE
M. E. Eshelby Feb. 1986 13 p
(CAR-8614; ISBN-0-947767-39-8) Avail: NTIS HC A02/MF A01

The vertical separation between aircraft above FL290 is 2000 ft which imposes a severe restriction on operations in the upper airspace. The possibility of reducing separations to 1000 ft has been discussed for many years but does not appear to be possible if current altimetry methods are used. The use of atmospheric pressure is proposed as the means of providing upper airspace separation. Current technology in altimetry would be adequate to enable separations based on pressure differentials to be used which allow a 50% increase in airspace utilization FL290 and FL350. The implementation cost of such a system is minimal. Author

N86-24680# Transportation Systems Center, Cambridge, Mass.
RELIABILITY OF NAVIGATION SERVICE PROVIDED BY THE GLOBAL POSITIONING SYSTEM Final Report, Dec. 1983 - Nov. 1984
Rudolph M. Kalafus May 1985 73 p refs
(AD-A163541; DOT-TSC-FAA-85-4; FAA/ES-85/4) Avail: NTIS HC A04/MF A01 CSCL 17/7

The planned NAVSTAR/GPS satellite constellation of 18 satellites plus 3 active will provide excellent coverage over the continental United States (CONUS) if all are operating properly. This report examines the coverage under conditions of one satellite failure. It turns out that the failure of any satellite results in service outages of up to half an hour somewhere in the CONUS. While altimeter aiding eliminates most of these outages, still remain 14 outage events each day. Furthermore, coasting the navigation solution with a stable clock is not effective in handling these outages. One technique which does appear to be effective is using a mask angle of 5 degrees or less. At these low angles the signal is down in amplitude due to antenna rolloff, and it is more affected by tropospheric refraction and multipath, but it is better to use even a corrupted signal than to suffer a service outage. Also examined in this report is the impact of adding satellites to the constellation. It is shown that a 24-satellite consellation still provides 100% availability in the CONUS when one satellite fails. GRA

N86-24681# Federal Aviation Agency, Atlantic City, N.J.
COMPUTED CENTERLINE MLS (MICROWAVE LANDING SYSTEM) APPROACH DEMONSTRATION AT WASHINGTON NATIONAL AIRPORT
James H. Remer Oct. 1985 42 p refs
(AD-A163722; DOT/FAA/CT-TN85/63) Avail: NTIS HC A03/MF A01 CSCL 17/7

This report describes the Computed Centerline Microwave Landing System (MLS) Approach Demonstration Project at the Washington National Airport. The purpose of this project was to demonstrate the capability of generating and flying a computed centerline approach for a nonstandard MLS siting. Specifically, the system which was developed enables final approaches to be made to runways which have azimuth units offset from the runway centerline. This system was successfully flight tested at the Federal Aviation Administration (FAA) Technical Center, Atlantic City Airport, NJ, and at the Washington National Airport. Runway 33 was used at Washington, with its MLS azimuth unit situated 275 feet to the right of the centerline. Conclusions derived from this project indicate that computed centerline approaches are indeed feasible. Precautions must be taken however, to properly tailor the course width. Site geometry and minima also impact system performance. In addition to the flight test data plots, the report contains system hardware and software design data. GRA

N86-24682# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
GYRO AND ACCELEROMETER BASED NAVIGATION SYSTEM FOR A MOBILE AUTONOMOUS ROBOT Final Report, Jan. - Dec. 1985
Roland J. Bloom and William J. Ramey, Jr. 2 Dec. 1985 254 p refs
(AD-A164036; AFIT/GA/GE/ENG/85D-33) Avail: NTIS HC A12/MF A01 CSCL 17/7

A navigation system for a mobile autonomous robot is presented. The navigation system is based on a directional gyroscope and a single axis accelerometer which enables a robot to navigate independent of wheel optical shaft encoders and other commonly used positioning apparatus. The computer controlled navigation system is capable of providing absolute heading, heading rate (angular velocity), and linear velocity to a user computer. These data from the navigation system (heading and velocity) are used to compute the present location of the robot. In addition, the heading data is used to form a closed loop feedback control system for maintaining the robot on a desired course. The navigation system was designed specifically for application on an existing Air Force Institute of Technology (AFIT) robot; however, it could be easily adapted to any robot system with a standard IEEE RS-232 serial communication interface. Test results are provided which demonstrate the use of closed loop heading control on the AFIT robot and which identify problems associated with the use of an accelerometer system for distance measurement. This thesis includes all schematics, parts lists, software listings, and operating instructions for the navigation system. A new robot world modeling and path planning. technique is also presented. GRA

N86-24683# Transportation Systems Center, Cambridge, Mass.
TEST RESULTS FOR DEVELOPING REVISED LORAN-C PROTECTION CRITERIA AD-A164139 DOT-TSC-CG-85-4 DOT-CG-N-1-86 HC A04/MF A01 Final Report, Aug. - Oct. 1984
F. W. Mooney, W. L. Polhemus, and Martin C. Poppe, Jr. Nov. 1985 58 p refs
(Grant DTRS-83-C-00029)
(AD-A164139; DOT-TSC-CG-85-4; DOT-CG-N-1-86) Avail: NTIS HC A04/MF A01 CSCL 17/7

This report presents the results obtained from a series of tests and related analyses studying the effect of harmful RF interference on LORAN-C receivers. The effects of interference in the 70 to 130 kHz band on typical LORAN-C receivers were assessed. Recommendations were developed for signal-to-interference ratios and protection boundaries that would permit proper receiver operation during conditions of interference. GRA

N86-24684# Naval Postgraduate School, Monterey, Calif.
RELATIVE POSITIONING OF OCEAN BOTTOM BENCHMARKS AD-A164177 HC A05/MF A01 M.S. Thesis
Feng-Yu Kuo Dec. 1985 77 p refs
(AD-A164177) Avail: NTIS HC A05/MF A01 CSCL 17/7

A sea floor benchmark experiment was conducted in an area about 16 nmi west of Pt. Lobos, California (36 degrees 30 min N x 122 degrees 17 min W) during 18-22 May 1985. Two baseline-crossing methods were used to determine the relative positions of acoustic bottom transponders. The method of least-squares adjustment was used to analyze the data. Relative position determination of the transponder array is discussed and recommendations are made for further improvement. The advantage of these methods is their simplicity. Their disadvantage is the relatively large amount of ship time they require to achieve acceptable accuracies. Transponder arrays such as the one deployed can be used for solving many types of problems in sea floor engineering, which will be of increasing importance in the future. Author (GRA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-24685*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROUND VIBRATION TEST OF AN F-16 AIRPLANE WITH MODIFIED DECOUPLER PYLONS
F. W. Cazier, Jr.. and M. W. Kehoe (NASA. Dryden Flight Research Center) Apr. 1986 64 p refs
(NASA-TM-87634; L-16065; NAS 1.15:87634) Avail: NTIS HC A04/MF A01 CSCL 01C

The decoupler pylon is a passive wing/store flutter suppression device. It was modified to reduce friction following initial flight tests. A ground vibration test was conducted on an F-16 aircraft loaded on each wing with a one-half-full (center bay empty) 370-gallon fuel tank mounted on a standard pylon, a GBU-8 store mounted on the decoupler pylon, and an AIM-9J missile mounted on a wingtip launcher. The test was conducted prior to flight tests with the modified pylon to determine modal frequencies, mode shapes, and structural damping coefficients. Data presented include frequency response plots, mode shape plots, and limited force-effect plots. Author

N86-24686*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL OPTIMIZATION BY GENERALIZED, MULTILEVEL DECOMPOSITION
J. Sobieszczanski-Sobieski, B. B. James, and M. F. Riley Oct. 1985 19 p refs Prepared in cooperation with Kentron International, Inc., Hampton, Va.
(NASA-TM-87605; NAS 1.15:87605) Avail: NTIS HC A02/MF A01 CSCL 01C

The developments toward a general multilevel optimization capability and results for a three-level structural optimization are described. The method partitions a structure into a number of substructuring levels where each substructure corresponds to a subsystem in the general case of an engineering system. The method is illustrated by a portal framework that decomposes into individual beams. Each beam is a box that can be further decomposed into stiffened plates. Substructuring for this example spans three different levels: (1) the bottom level of finite elements representing the plates; (2) an intermediate level of beams treated as substructures; and (3) the top level for the assembled structure. The three-level case is now considered to be qualitatively complete. E.A.K.

N86-24687*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
AN ENGINEERING APPROACH TO THE USE OF EXPERT SYSTEMS TECHNOLOGY IN AVIONICS APPLICATIONS
Eugene L. Duke, Victoria A. Regenie, Marylouise Brazee, and Randal W. Brumbaugh (PRC Kentron, Edwards, Calif.) May 1986 12 p refs Presented at the IEEE National Aerospace and Electronics Conference (NAECON), Dayton, Ohio, 19-23 May 1986
(NASA-TM-88263; H-1364; NAS 1.15:88263) Avail: NTIS HC A02/MF A01 CSCL 01D

The concept of using a knowledge compiler to transform the knowledge base and inference mechanism of an expert system into a conventional program is presented. The need to accommodate real-time systems requirements in applications such as embedded avionics is outlined. Expert systems and a brief comparison of expert systems and conventional programs are reviewed. Avionics applications of expert systems are discussed before the discussions of applying the proposed concept to example systems using forward and backward chaining. Author

N86-24688# Boeing Military Airplane Development, Seattle, Wash.
FIREPROOF HYDRAULIC BRAKE SYSTEM Final Report, 1 Jul. 1983 - 31 Jul. 1985
Don W. Huling and Floyd H. Hillman Oct. 1985 318 p refs
(Contract F33615-83-C-2322)
(AD-A163542; AFWAL-TR-85-2072) Avail: NTIS
HC A14/MF A01 CSCL 01/3

The design, development, and manufacture of a flightworthy two-fluid fireproof hydraulic brake system (FHBS) kit for flight testing on a C/KC-135 has been accomplished. The results of system concepts trade studies, the concept selection procedure and rational, component and system design analyses, and component and system testing are summarized herein. The FHBS design selected is a two-fluid concept that uses nonflammable chlorotrifluoroethylene (CTFE) in the high fire-potential area of the brake and landing gear area. The barrier between the CTFE fluid and the MIL-H-5606 hydraulic fluid is a new component; a reservoir/separator. Based on the analysis and laboratory testing, it was concluded that the FHBS design is both flightworthy and has braking performance equivalent to the C/KC-135 brake system for runway/tire friction coefficients of 0.2 to 0.5. It is recommended that the FHBS kit be installed on a C/KC-135 and flight testing be accomplished. Recommendations regarding test conditions and instrumentation for flight testing are included. GRA

N86-24689# Department of the Air Force, Washington, D.C.
FRAMELESS TRANSPARENCIES FOR AIRCRAFT COCKPIT ENCLOSURES Patent Application
William R. Pinnell, inventor (to Air Force) Filed 4 Dec. 1985 18 p refs
(AD-D012155; US-Patent-Appl-SN-805008) Avail: NTIS
HC A02/MF A01 CSCL 01/3

This patent application is for a frameless aircraft cockpit enclosure comprising transparent panels of polycarbonate or other plastics of varying thickness and material properties. The edges of the transparent panels are made thicker than the rest of the panels to engage aircraft canopy and windshield arch sections and aircraft sill structures to thus eliminate prior art frames and edge reinforcements. Fibers may be embedded in the thicker edges to add strength. The material properties of the transparent panel may be varied to provide higher static load strength near aircraft sill structures and higher dynamic load strength and plastic behavior near the center of a canopy where bird impact may occur. The material properties of the panel may also be varied to minimize over a pilot's head or near aircraft critical equipment the amplitude of a flexure wave in an aircraft transparency resulting from a bird impact. Direct forming methods, such as injection molding, are discussed as a means for making the frameless aircraft transparencies. GRA

N86-24690# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EXPERIMENTAL ASSESSMENT OF VORTEX RETAINING CAVITY FLAPS FOR MANEUVERABILITY IMPROVEMENT ON DELTA WING FIGHTER AIRCRAFT M.S. Thesis
Huland C. Smith Dec. 1985 244 p refs
(AD-A164104; AFIT/GAE/AA/85D-13) Avail: NTIS
HC A11/MF A01 CSCL 01/3

An experimental study was conducted to determine the effectiveness of cavity flaps on delta wing aircraft maneuverability. Cavity flaps are conformal control surfaces deployed in the apex region on the wing's lower surface. A 60 degree swept delta wing model was built and tested in the Air Force Institute of Technology five-foot diameter, subsonic wind tunnel. Ten different cavity flap configurations were tested at deflection angles ranging from 30 degrees to 90 degrees for both asymmetric and symmetric deployments. Coefficients of aerodynamic forces and moments versus angle of attack along with the lift to drag ratio versus lift coefficient and the drag polar were plotted for each flap configuration. The changes to the aerodynamic coefficients produced by adding the cavity flaps were also plotted. Results indicate that for longitudinal, lateral and directional maneuverability, the best cavity flap deflection angle will vary depending on the desired response. Data results also indicated it is best not to have the cavity flap hinge line located along or parallel to the fuselage for rolling and pitching moment considerations. Hinge Line Sweep. GRA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-24691*# John Carroll Univ., Cleveland, Ohio. Dept. of Physics.
TIME DOMAIN REFERENCING IN INTENSITY MODULATION FIBER OPTIC SENSING SYSTEMS Final Report
Grigory Adamovsky Apr. 1986 9 p refs Presented at 1986 Quebec Symposium on Optical and Optoelectronics Applied Sciences and Engineering, Quebec, Ontario, 2-6 Jun. 1986; sponsored by Society of Photo-Optical Instrumentation Engineers
(Grant NAG3-366)
(NASA-CR-175109; E-3049; NAS 1.26:175109) Avail: NTIS
HC A02/MF A01 CSCL 01D

Intensity modulation sensors are classified depending on the way in which the reference and signal channels are separated: in space, wavelength (frequency), or time domains. To implement the time domain referencing different types of fiber optic (FO) loops have been used. A pulse of short duration sent into the loop results in a series of pulses of different amplitudes. The information about the measured parameter is retrieved from the relative amplitudes of pulses in the same train. Author

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-24692# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
PROPULSION AND ENERGETICS PANEL WORKING GROUP 14 ON SUITABLE AVERAGING TECHNIQUES IN NON-UNIFORM INTERNAL FLOWS [PANEL DE PROPULSION ET D'ENERGETIQUE GROUPE DE TRAVAIL 14 METHODES D'ESTABLISSEMENT DE CARACTERISTIQUES MOYENNES DANS LES ECOULEMENTS INTERNES HETEROGENES]
M. Pianko, ed. and F. Wazelt, ed. (Technische Hochschule, Darmstadt, West Germany) Loughton, England Aug. 1983 183 p refs In FRENCH; ENGLISH summary
(AD-A133968; AGARD-AR-182(FR); ISBN-92-835-2110-2) Avail: NTIS HC A09/MF A01 CSCL 21/5

The averaging techniques used for nonuniform internal flow of gas turbine systems, in which the actual flows are usually heterogeneous and three-dimensional was studied. The test analysis and performance prediction methods are based upon simple one-dimensional models. Current practices were reviewed and a theoretical analysis of the relations which may be correctly applied to steady flow was undertaken and known averaging methods were classified. Refinements to known methods and a new approach to averaging for use with engine components and propulsion system analysis are proposed. A variety of possible averaging techniques are identified and compared by preparing a number of sample calculations in ducted flows, turbojet components and a complete propulsion system. The merits and the limitations of the methods studied are outlined. One method is recommended for stagnation temperature averaging. E.A.K.

N86-24693*# United Technologies Research Center, East Hartford, Conn.
ADVANCED TURBOPROP VIBRATORY CHARACTERISTICS Final Report
A. V. Srinivasan and G. B. Fulton Apr. 1984 104 p refs
(Contract NAS3-23533)
(NASA-CR-174708; NAS 1.26:174708; R84-956627-1) Avail: NTIS HC A06/MF A01 CSCL 21E

The assembly of SR5 advanced turboprop blades to develop a structural dynamic data base for swept props is reported. Steady state blade deformation under centrifugal loading and vibratory characteristics of the rotor assembly were measured. Vibration was induced through a system of piezoelectric crystals attached to the blades. Data reduction procedures are used to provide deformation, mode shape, and frequencies of the assembly at predetermined speeds. Author

N86-24694*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW-SPEED PERFORMANCE OF AN AXISYMMETRIC, MIXED-COMPRESSION, SUPERSONIC INLET WITH AUXILIARY INLETS
Charles J. Trefny and Joseph W. Wasserbauer Feb. 1986 63 p refs
(NASA-TP-2557; E-2771; NAS 1.60:2557) Avail: NTIS HC A04/MF A01 CSCL 21E

A test program was conducted to determine the aerodynamic performance and acoustic characteristics associated with the low-speed operation of a supersonic, axisymmetric, mixed-compression inlet with auxiliary inlets. Blow-in-auxiliary doors were installed on the NASA Ames P inlet. One door per quadrant was located on the cowl in the subsonic diffuser selection of the inlet. Auxiliary inlets with areas of 20 and 40 percent of the inlet capture area were tested statically and at free-stream Mach numbers of 0.1 and 0.2. The effects of boundary layer bleed inflow were investigated. A JT8D fan simulator driven by compressed air was used to pump inlet flow and to provide a characteristic noise signature. Baseline data were obtained at static free-stream conditions with the sharp P-inlet cowl lip replaced by a blunt lip. Auxiliary inlets increased overall total pressure recovery of the order of 10 percent. Author

N86-24695*# Beech Aircraft Corp., Wichita, Kans.
EVALUATION OF PROPFAN PROPULSION APPLIED TO GENERAL AVIATION
Randal W. Awker Dec. 1985 146 p refs
(Contract NAS3-24349)
(NASA-CR-175020; NAS 1.26:175020) Avail: NTIS HC A07/MF A01 CSCL 21E

Propfan propulsion on business aircraft was evaluated. Comparisons, in terms of cost and performance, were made between propfan propulsion systems and conventional turbofan propulsion systems on a typical business aircraft. In addition, configuration and cost sensitivity studies were conducted to further assess the potential of propfan propulsion. Author

N86-24696# Federal Aviation Administration, Washington, D.C.
EVALUATING TURBINE ENGINE OPERATING CHARACTERISTICS
19 Mar. 1986 10 p
(FAA-AC-25.939-1) Avail: NTIS HC A02/MF A01

Guidelines for the evaluation of turbine engine (turbojet, turboprop, and turboshaft) operating characteristics for subsonic transport category aircraft are provided. The guidelines describe a method of demonstrating compliance with the applicable airworthiness requirements. Like all advisory circular material, these guidelines are not mandatory and do not constitute a regulation. Derived from Federal Aviation Administration experience in establishing compliance with the airworthiness requirements, they represent the means and methods found to be acceptable to all aircraft designs. Each design should be examined to determine whether the suggested methods of evaluation are adequate or if other methods in addition to these may be appropriate. Author

N86-24697*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A REAL-TIME SIMULATION EVALUATION OF AN ADVANCED DETECTION, ISOLATION AND ACCOMMODATION ALGORITHM FOR SENSOR FAILURES IN TURBINE ENGINES
Walter C. Merrill and John C. DeLaat 1986 17 p refs Presented at the American Control Conference, Seattle, Wash., 18-20 Jun. 1986; sponsored by IEEE
(NASA-TM-87289; E-2995; NAS 1.15:87289) Avail: NTIS HC A02/MF A01 CSCL 21E

An advanced sensor failure detection, isolation, and accommodation (ADIA) algorithm has been developed for use with an aircraft turbofan engine control system. In a previous paper the authors described the ADIA algorithm and its real-time implementation. Subsequent improvements made to the algorithm and implementation are discussed, and the results of an evaluation presented. The evaluation used a real-time, hybrid computer simulation of an F100 turbofan engine. Author

N86-24698 Department of the Air Force, Washington, D.C.
ONE-PIECE HPTR BLADE SQUEALER TIP Patent
Richard L. Horvath, inventor (to Air Force) Issued 10 Sep. 1985 4 p
(AD-D012003; US-Patent-4,540,339; US-Patent-Appl-SN-616380; US-Patent-Class-416-92) Avail: US Patent and Trademark Office CSCL 21/5

An improved high pressure turbine rotor blade and tip cap structure is provided which comprises a tip end closure for the blade bonded to the end wall of the blade casting. It includes a base plate member and a pair of upstanding side walls defining a peripheral contour coincidental with and faired to the cambered side walls of the casting. The base plate member has a plurality of radially outwardly opening passageways through it and disposed along the chord of the blade and communicating with a channel included in the radially outwardly facing surface of the casting along a chord of the blade. The passageways are disposed along axes at angles to the base plate whereby coolant fluid flowing through it is directed against the tip side wall surfaces. An opening is provided through the end wall of the casting in the form of a slit or a plurality of holes along the chord of the blade and intersecting the channel, to define an outlet through the end wall for passage of coolant fluid through the blade. GRA

N86-24699# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TWO-DIMENSIONAL CONFINED JET THRUST VECTOR CONTROL WITH FLOW VISUALIZATION AND VARIABLE FLOW GEOMETRY M.S. Thesis
James W. Cates Dec. 1985 68 p refs
(AD-A164214; AFIT/GAE/AA/85D-2) Avail: NTIS HC A04/MF A01 CSCL 21/5

In this experimental investigation, the performance parameters considered were axial force, side force, and vector angle. Variables included primary pressure, exit-to-throat area ratio, and exit-to-throat axial length. With each test configuration, it was possible to define specific operating modes where the flow was oscillatory, vectored/switchable, and vectored/unswitchable. Only one test configuration yielded a stable axial flow on which secondary injection could be used to study vectoring. Switchable flows existed only at low pressure below the range of test pressures making it impossible to study switching characteristics. Because the flows were attached over the entire range of test pressures, geometric effects were based on the study of these attached flows. Results indicate that the theoretical equations for predicting wall separation points in unconfined nozzles do not accurately predict the separation points in confined jet nozzles. Small variations in axial length, as examined in this study, had a minimal impact on nozzle performance. Primary pressure and exit-to-throat area ratio have the most significant impact on two-dimensional nozzle performance. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-24700*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SWASHPLATE CONTROL SYSTEM Patent Application
Richard J. Peyran, inventor (to NASA) (Army Aviation Engineering Flight Activity, Edwards AFB, Calif.), Georgene H. Laub, inventor (to NASA) (Army Aviation Engineering Flight Activity, Edwards AFB, Calif.), and H. Andrew Morse, inventor (to NASA) (Army Aviation Engineering Flight Activity, Edwards AFB, Calif.) Filed 31 Mar. 1986 13 p
(NASA-Case-ARC-11633-1; NAS 1.71:ARC-11633-1; US-Patent-Appl-SN-846439) Avail: NTIS HC A02/MF A01 CSCL 01C

A mechanical system to control the position of a rotating swashplate is developed. This system provides independent lateral cyclic, longitudinal cyclic and collective pitch control of a helicopter rotor attached to the swashplate, without use of a mixer box. The system also provides direct, linear readout of cyclic and collective swashplate positions. A swashplate control system has a first gimbal ring pivotally mounted along a longitudinal axis. A second gimbal ring is pivotally attached to the first gimbal ring along a lateral axis. A longitudinal cyclic actuator pivots the first gimbal ring along the longitudinal axis. A lateral cyclic actuator pivots the second gimbal ring along the lateral axis. The lateral cyclic actuator is mounted on the first gimbal ring. A swashplate is rotatably mounted on the second gimbal ring. Prior swashplate control systems required use of a mixer box to provide true decoupling of lateral and longitudinal cyclic input to the swashplate. Author

N86-24701# National Aeronautics and Space Administration, Washington, D.C.
EIGENSTRUCTURE ASSIGNMENT AND ITS APPLICATION IN DESIGN OF FLIGHT CONTROL SYSTEMS
Zheng Geng and Daoli Fu May 1986 15 p refs Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88411; NAS 1.15:88411) Avail: NTIS HC A02/MF A01 CSCL 01C

The present paper is concerned with an extension of the basic concept and the algorithm of eigenstructure assignment. A general conclusion is drawn regarding the assignment of freedoms in the case of the eigenstructure, taking into account a completely controllable linear time-invariant system. The new algorithms are provided for assigning the eigenstructure with multiple eigenvalues and/or with complex conjugate eigenvalues. The application of the eigenstructure assignment method to the design of a flight control system is illustrated with the aid of a numerical example involving an aircraft flight control system. Author

N86-24702*# Georgetown Univ., Washington, D.C. School of Engineering and Applied Science.
A RESEARCH PROGRAM IN ACTIVE CONTROL/ AEROELASTICITY Final Semiannual Status Report, May - Oct. 1985
Oct. 1985 15 p
(Grant NAG1-199)
(NASA-CR-176773; NAS 1.26:176773) Avail: NTIS HC A02/MF A01 CSCL 01C

In this research period a synthesis methodology for multifunctional robust aeroservoelastic systems was developed. The development consisted of the following stages: (1) development of an universal diagram to determine phase and gain margins of a multi-input multi-output (MIMO) system using singular value based stability margin criteria; (2) determination of singular value gradients with respect to design parameters and their application to improve stability margins of multiloop system; and (3) application of constrained optimization techniques to synthesize a low order robust controller for a high order MIMO aeroservoelastic system while satisfying several design constraints on the dynamic loads and responses and stability margins at the plant input and output. Overall research activities are summarized. Author

N86-24703*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LATERAL AND LONGITUDINAL AERODYNAMIC STABILITY AND CONTROL PARAMETERS OF THE BASIC VORTEX FLAP RESEARCH AIRCRAFT AS DETERMINED FROM FLIGHT TEST DATA
William T. Suit and James G. Batterson Apr. 1986 38 p
(NASA-TM-87711; NAS 1.15:87711) Avail: NTIS HC A03/MF A01 CSCL 01C

The aerodynamics of the basic F-106B were determined at selected points in the flight envelope. The test aircraft and flight procedures were presented. Aircraft instrumentation and the data system were discussed. The parameter extraction procedure was presented along with a discussion of the test flight results. The results were used to predict the aircraft motions for maneuvers that were not used to determine the vehicle aerodynamics. The control inputs used to maneuver the aircraft to get data for the determination of the aerodynamic parameters were discussed in the flight test procedures. The results from the current flight tests were compared with the results from wind tunnel test of the basic F-106B. B.G.

N86-24704*# Systems Technology, Inc., Hawthorne, Calif.
SPACE SHUTTLE FLYING QUALITIES CRITERIA ASSESSMENT. PHASE 5: DATA ACQUISTION AND ANALYSIS Final Report
T. T. Myers, D. E. Johnston, and D. T. McRuer 1986 136 p refs
(Contract NAS2-11431)
(NASA-CR-166618; NAS 1.26:166618; STI-TR-1206-1) Avail: NTIS HC A07/MF A01 CSCL 01C

The development of flying qualities experiments (OFQ) as a part of the Orbiter Experiments Program (OEX) was continued. The data base was extended to use the ground based cinetheodolite measurements of orbiter approach and landing. Onboard the cinetheodolite data were analyzed from flights STS 2 through 7 to identify the effective augmented vehicle dynamics, the control strategy employed by the pilot during preflare, shallow glide, and final flare segments of the landing, and the key approach and touchdown performance measures. A plan for an OFQ flying qualities data archive and processing is presented. Author

N86-24705# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EXPERIMENTAL STUDY OF APEX FENCES FOR LIFT ENHANCEMENT ON A HIGHLY SWEPT DELTA WING CONFIGURATION M.S. Thesis
Michael Stuart Dec. 1985 197 p refs
(AD-A163877; AFIT/GAE/AA/85D-14) Avail: NTIS HC A09/MF A01 CSCL 12/1

The longitudinal stability characteristics of a 60 deg. delta wing/body model equipped with various types of apex fences were studied experimentally. The experimental effort used force balance instrumentation and oil flow visualization. The locations of the fence-generated vortices and leading-edge vortices associated with highly swept wings were also determined. Five major fence parameters (shape, surface area, cant, length-to-height, movement) were studied and the results are given in a qualitative analysis. Results indicate a favorable application of apex fences for STOL operations. The fences increase lift and positive pitching moment which dictates the use of trailing edge flaps, further increasing the available maximum lift for takeoff and landing. Accompanying this is a large increase in drag at low angles of attack and a marginal increase at moderate to high angles. The relative strength of nose-down pitching moments at high (above 35 deg.) angles of attack produced by apex fences is slight. Apex fences seem to be a technology whose time may have come. Further research of the lateral behavior of a fenced aircraft appears warranted. GRA

N86-24706# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MULTIVARIABLE CONTROL LAW DESIGN FOR ENHANCED AIR COMBAT MANEUVERING. F-15/STOL (SHORT TAKE-OFF AND LANDING) DERIVATIVE FIGHTER M.S. Thesis
Kevin A. Sheehan Dec. 1985 378 p refs
(AD-A164017; AFIT/GE/EE/85D-38) Avail: NTIS
HC A17/MF A01 CSCL 01/2

Proportional plus integral controllers are designed for the longitudinal mode using a multivariable control law theory developed by Professor Brian Porter of the University of Salford, England. Control laws are formulated by use of a computer-aided multivariable design program entitled MULTI. In addition MULTI performs a digital closed-loop simulation for controller performance analysis. The aircraft model is developed from linearized data. Decoupling of the longitudinal output variables is achieved and demonstrated by four maneuvers (pitch-pointing, vertical translation, direct climb, and constant g pull-up). Plant parameter variation effects are also examined. Destabilizing effects to include actuator and sensor dynamics computational time delay random Gaussian sensor noise and simulation nonlinearities are included. Results show stable responses for all simulations. Except for the most demanding simulations (all destabilizing effects considered), controller responses are smooth and well behaved. Recommendations include proposed future work in thrust vector modeling and suggested improvements to the computer-aided design program, MULTI. GRA

N86-24707# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN LQG UP-AND AWAY FLIGHT CONTROL DESIGN FOR THE STOL F-15 AIRCRAFT M.S. Thesis
Robert A. Houston Dec. 1985 243 p refs
(AD-A164108; AFIT/GE/ENG/85D-21) Avail: NTIS
HC A11/MF A01 CSCL 01/4

A robust controller for the STOL F-15 aircraft is developed using the LQG/LTR (linear system model, quadratic cost, Gaussian models of uncertainty used for controller synthesis, with loop transfer recovery techniques of tuning the filter in the loop for control robustness enhancement) methods. Full state feedback controllers are synthesized using CGT/PI (Command Generator Tracking feedforward compensator to provide direct incoporation of flying qualities into the design process, with proportional plus integral feedback control) synthesis, using implicit model following techniques to improve full state robustness characteristics. Finally, a Kalman filter is used to replace the unrealistic assumption of full state availability with estimated states, using a LTR scheme to recover as much full state robustness characteristics as possible. GRA

N86-24708# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
LQG/LTR DESIGN OF A ROBUST FLIGHT CONTROLLER FOR THE STOL F-15 M.S. Thesis
Gregory L. Gross Dec. 1985 182 p refs
(AD-A164111; AFIT/GAE/ENG/85D-1) Avail: NTIS
HC A09/MF A01 CSCL 17/7

A robust controller for the approach and landing phase of the Short Take-off and Landing (STOL) F-15 is developed via LQG/LTR (Linear System model, Quadratic cost, Gaussian models of uncertainty, used for controller synthesis, with Loop Transmission Recovery techniques of tuning the filter in the loop for control robustness enhancement) methods. Reduced-order full-state feedback controllers are synthesized using CGT/PT (Command Generator Tracking feedforward compensator to incorporate handling qualities, with Proportional plus Integral feedback) synthesis, specifically using implicit model following to provide good robustness characteristics in the full-state feedback case. The robustness is fully assessed using realistic simulations of the real-world system with meaningful deviations from design conditions. Once a Kalman filter is embedded into the loop to estimate states rather than assuming artificial access to all states, LTR methodology is used to preserve as much robustness as possible. A full assessment of performance and robustness of these final implementable designs is provided. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-24709*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC MEASUREMENT OF TOTAL TEMPERATURE, PRESSURE AND VELOCITY IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
Charles B. Johnson and P. Calvin Stainback May 1986 45 p refs
(NASA-TP-2584; L-16099; NAS 1.60:2584) Avail: NTIS
HC A03/MF A01 CSCL 14B

There is theoretical and experimental evidence which indicates that a sudden or step change in the rate at which the liquid nitrogen is injected into the circuit of a cryogenic wind tunnel can cause a temperature front in the flow for several tunnel circuit times. A temperature front, which occurs at intervals equal to the circuit time, is a sudden increase or decrease in the temperature of the flow followed by a nearly constant temperature. Since these fronts can have an effect on the control of the tunnel as well as the time required to establish steady flow conditions in the test section of cryogenic wind tunnel, tests were conducted in the settling chamber in the Langley 0.3-meter Transonic Cryogenic Tunnel (0.3-m TCT) in which high response instrumentation was used to measure the possible existence of these temperature fronts. Three different techniques were used to suddenly change the rate of liquid nitrogen being injected into the tunnel and the results from these three types of tests showed that temperature fronts do not appear to be present in the 0.3-m TCT. Also included are the velocity and pressure fluctuations measured in the settling chamber downstream of the screens and the associated power spectra. Author

N86-24710*# National Aeronautics and Space Administration, Washington, D.C.
WIND TUNNEL TECHNOLOGY FOR THE DEVELOPMENT OF FUTURE COMMERCIAL AIRCRAFT
Joachim Szodruch Mar. 1986 45 p refs Transl. into ENGLISH Conference Paper "Windkanaltechnologie fur die Entwicklung Zukunftiger Verkehrsflugzeuge" Hamburg, West Germany, DGLR Paper 84-127 Presented at the German Aerospace Society Annual Convention, Hamburg, West Germany, 1-3 Oct. 1984 Original language doc. was announced in IAA as A85-40340 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. prep. by Deutsche Gesellschaft fur Luft- und Raumhafrt
(Contract NASw-4004)
(NASA-TM-88390; NAS 1.15:88390; DGLR-Paper-84-127) Avail: NTIS HC A03/MF A01 CSCL 14B

Requirements for new technologies in the area of civil aircraft design are mainly related to the high cost involved in the purchase of modern, fuel saving aircraft. A second important factor is the long term rise in the price of fuel. The demonstration of the benefits of new technologies, as far as these are related to aerodynamics, will,for the foreseeable future, still be based on wind tunnel measurements. Theoretical computation methods are very successfully used in design work, wing optimization, and an estimation of the Reynolds number effect. However, wind tunnel tests are still needed to verify the feasibility of the considered concepts. Along with other costs, the cost for the wind tunnel tests needed for the development of an aircraft is steadily increasing. The present investigation is concerned with the effect of numerical aerodynamics and civil aircraft technology on the development of wind

tunnels. Attention is given to the requirements for the wind tunnel, investigative methods, measurement technology, models, and the relation between wind tunnel experiments and theoretical methods. F.M.R.

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-24711 National Aeronautics and Space Administration, Washington, D.C.
SPACE STATION SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 1)
Mar. 1986 158 p
(NASA-SP-7056(01); NAS 1.21:7056(01)) Avail: NTIS HC A07 CSCL 22A

This bibliography lists 624 reports, articles, and other documents introduced into the NASA scientic and technical information system between January 1, 1985 and June 30, 1985. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. The coverage includes documents that define major systems and subsystems, servicing and support requirements, procedures and operations, and missions for the current and future Space Station. Author

N86-24712*# Essex Corp., Huntsville, Ala.
THE GREAT OBSERVATORIES FOR SPACE ASTROPHYSICS
Martin Harwit (Cornell Univ., Ithaca, N.Y.) and Valerie Neal 9 Jan. 1986 51 p Original contains color illustrations
(NASA Order H-78175-B)
(NASA-CR-176754; NAS 1.26:176754) Avail: NTIS HC A04/MF A01 CSCL 22A

Motivated by the ancient urge to observe, measure, compute, and understand the nature of the Universe, the available advanced technology is used to place entire observatories into space for investigations across the spectrum. Stellar evolution, development and nature of the Universe, planetary exploration, technology, NASA's role, and careers in astronomy are displayed. B.G.

N86-24713*# National Aeronautics and Space Administration, Washington, D.C.
TECHNOLOGY FOR LARGE SPACE SYSTEMS: A BIBLIOGRAPHY WITH INDEXES
Mar. 1986 111 p
(NASA-SP-7046(13); NAS 1.21:7046(13)) Avail: NTIS HC A06 CSCL 22A

This bibliography lists 399 reports, articles and other documents introduced into the NASA scientific and technical information system between January 1, 1985 and June 30, 1985. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. Author

N86-24714*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RENEWING SOLAR SCIENCE: THE SOLAR MAXIMUM REPAIR MISSION
Valerie Neal 1985 20 p Original contains color illustrations
(NASA-EP-206; NAS 1.19:206) Avail: NTIS HC A02/MF A01; also available from SOD CSCL 22A

The purpose of the Solar Maximum Repair Mission is to restore the operational capacity of the satellite by replacing the attitude control system module and servicing two of the scientific instruments on board. The mission will demonstrate the satellite servicing capacity of the Space Shuttle for the first time. B.G.

N86-24715# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OVERVIEW OF SPACE TECHNOLOGY
Zhongcheng Yang 15 Jan. 1986 12 p refs Transl. into ENGLISH from Hangkong Zhishi (China), v. 6, no. 11, Nov. 1984 p 14-16
(AD-A163887; FTD-ID(RS)T-1029-85) Avail: NTIS HC A02/MF A01 CSCL 22/1

The history and current status of space technology in the United States, the Soviet Union and other nations are discussed. Topics include standardized design and modularized components and synchronous orbits. GRA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-24716# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DISTRIBUTED FIFO ALLOCATION OF IDENTICAL RESOURCES USING SMALL SHARED SPACE Technical Report, 1 Apr. 1984 - 30 Nov. 1985
Michael J. Fischer, Nancy A. Lynch, James E. Burns, and Allan Borodin Oct. 1985 38 p refs
(Contract DAAG29-84-K-0058)
(AD-A163988; MIT/LCS/TM-290; ARO-20519.17-EL) Avail: NTIS HC A03/MF A01 CSCL 09/2

A simple and efficient algorithm is presented for the FIFO allocation of K identical resources among asynchronous processes which communicate via shared memory. The algorithm simulates a shared queue but uses exponentially fewer shared memory values, resulting in practical savings of time and space as well as program complexity. The algorithm is robust against processes failure through unannounced stopping, making it attractive also for use in an environment of processes of widely differing speeds. In addition to its practical advantages we show the algorithm is optimal (to within a constant factor) with respect to shared space complexity. GRA

N86-24717# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DETUMBLING OF AN AXIALLY SYMMETRIC SATELLITE WITH AN ORBITAL MANEUVERING VEHICLE BY NONLINEAR FEEDBACK CONTROL M.S. Thesis
Kirk R. Fleming 13 Dec. 1985 61 p refs
(AD-A163989; AFIT/GA/AA/85D-5) Avail: NTIS HC A04/MF A01 CSCL 22/2

The problem of detumbling a freely spinning and precessing axisymmetric satellite is considered. Detumbling is achieved with another axisymmetric orbital maneuvering vehicle (OMV) joined to the target satellite with a universal joint. The joint provides two rotational degrees of freedom and is translated across the surface of the OMV during the detumbling process. The target satellite and the OMV with its three momentum wheels are modelled as a five body system using Eulerian-based equations of motion developed by Hooker and Margulies. A Liapunov technique is applied to derive a nonlinear feedback control law which drives the system asymptotically to a final spin-stabilized state. State and control histories are presented and indicate that the detumbling process is benign. Constraint force and moment loads at the connection between the OMV and target satellites are also presented, and indicate that no extreme loads are encountered during the despinning and detumbling process. Author (GRA)

N86-24718 Texas Univ., Austin.
A SEMI-ANALYTIC THEORY FOR SATELLITE ORBIT PREDICTION Ph.D. Thesis
Ahmed Hussein Ahmed 1985 181 p
Avail: Univ. Microfilms Order No. DA8527510

A semianalytical theory for satellite orbit prediction was developed. The conservative perturbation affecting the satellite is handled analytically using the Lie-Hori approach, and a numerical version of the method of averaging is used to average the nonconservative perturbation over one revolution of the satellite. The generalized Lie-Hori method and the averaging method are compared. In the comparison the equivalence of the two methods to the second order in the small parameter is shown. However, the approach used can be extended to demonstrate the equivalence for higher orders. To illustrate the equivalance, Duffing's equation, the van der Pol equation, the oscillator with quadratic damping problem, and the oscillator with linear damping problem are solved using each method. The equivalence is used to develop a semi-analytical theory for satellite orbit prediction. The mean element rates are numerically integrated, and the osculating elements are recovered by transforming to the osculating element space. The semianalytical method developed is compared with numerical integration. Dissert. Abstr.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-24719*# Lockheed Missiles and Space Co., Huntsville, Ala.
FEASIBILITY STUDY AND VERIFIED DESIGN CONCEPT FOR NEW IMPROVED HOT GAS FACILITY Final Report
7 Feb. 1986 111 p ref
(Contract NAS8-36304)
(NASA-CR-178828; NAS 1.26:178828; LMSC-HEC-TR-D065122) Avail: NTIS HC A06/MF A01 CSCL 14B

The MSFC Hot Gas Facility (HGF) was fabricated in 1975 as a temporary facility to provide immediate turnaround testing to support the SRB and ET TPS development. This facility proved to be very useful and was used to make more than 1300 runs, far more than ever intended in the original design. Therefore, it was in need of constant repair and needed to be replaced with a new improved design to support the continuing SRB/ET TPS product improvement and/or removal efforts. MSFC contracted with Lockheed-Huntsville to work on this improved design through contract NAS8-36304 Feasibility Study and Verified Design Concept for the New Improved Hot Gas Facility. The results of Lockheed-Huntsville's efforts under this contract are summarized. Author

N86-24720*# Dayton Univ., Ohio. Impact Physics Lab.
LASER-PHOTODETECTOR TIMING STATION INSTRUCTION AND MAINTENANCE MANUAL
Edward A. Strader Apr. 1986 13 p refs
(Contract NAS8-36646)
(NASA-CR-178835; NAS 1.26:178835; UDR-TM-86-02) Avail: NTIS HC A02/MF A01 CSCL 14B

A laser photodetector station is used for detecting the arrival of a projectile at a specific point along a ballistic range. The system can be employed on either an open or evacuated range, with small projectiles, and at hypervelocities. The setup procedures, maintenance, and system components are described. B.G.

N86-24721# National Bureau of Standards, Gaithersburg, Md. Center for Radiation Research.
RADIOMETRIC CALIBRATION PROCEDURES USING THE NBS (NATIONAL BUREAU OF STANDARDS) MARBLE ELECTRONICS PACKAGE Final Report
M. E. Mickelson, L. E. Larson, and J. Fowler Sep. 1985 23 p
Prepared in cooperation with Denison Univ., Granville, Ohio
(PB86-129756; NBS/TN-1216) Avail: NTIS HC A02/MF [en1] A01; also available SOD HC $1.00 as 003-003-02692-1 CSCL 14B

The National Bureau of Standards MARBLE electonics package, designed to support calibration of radiometric detectors including self-calibration of Si photodiodes, is described. GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-24722*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PASSIVE EDDY-CURRENT DAMPING AS A MEANS OF VIBRATION CONTROL IN CRYOGENIC TURBOMACHINERY
Robert E. Cunningham Feb. 1986 14 p refs
(NASA-TP-2562; E-2762; NAS 1.60:2562) Avail: NTIS HC A02/MF A01 CSCL 13I

Lateral shaft vibrations produced by a rotating unbalance weight were damped by means of eddy currents generated in copper conductors that were precessing cyclicly in the gap formed by the pole faces of C-shaped, permanent magnets. The damper assembly, which was located at the lower bearing support of a vertically oriented rotor was completely immersed in liquid nitrogen during the test run. The test rotor was operated over a speed range from 800 to 10,000 rpm. Three magnet/conductor designs were evaluated. Experimental damping coefficients varied from 180 to 530 N sec/m. Reasonable agreement was noted for theoretical values of damping for these same assemblies. Values of damping coefficients varied from 150 to 780 N sec/m. The results demonstrate that passive eddy-current damping is a viable candidate for vibration control in cryogenic turbomachinery. Author

N86-24723# Air Force Accounting and Finance Center, Denver, Colo.
STRATEGIC MISSILE (MINUTEMAN) OPERATING AND SUPPORT COST FACTORS
Michael W. Eaton 20 Sep. 1985 37 p refs Presented at the 19th Annual Dept. of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A163534) Avail: NTIS HC A03/MF A01 CSCL 16/4

The objective of this special study was to review the spectrum of available cost models and cost studies addressing strategic missiles, evaluate the elements of cost pertaining to operation and support, establish a comprehensive cost element structure to serve as both a standard or checklist in accomplishing cost estimates and the basis from which to develop Air Force cost factors. And finally, actually develop operations and support cost factors for Air Force strategic missiles and make them available to the cost community through publication in AFR 173-13. This paper was presented at the Annual DOD Cost Analysis Symposium. GRA

N86-24724# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STABILITY OF SPINNING ICBM (INTERCONTINENTAL BALLISTIC MISSILE) IN FIRST STAGE BOOST PHASE M.S. Thesis
Robert W. Bandstra Dec. 1985 111 p refs
(AD-A164019, AFIT/GA/AA/85D-01) Avail: NTIS HC A06/MF A01 CSCL 16/4

A computer program is developed to model a spinning intercontinental Ballistic Missile (IICBM) during the first stage boost phase. The equations of motion are derived and presented and a full rotation matrix is used to show the relationship between a launch-centered, nonrotating earth inertial reference frame and the missile body reference frame. The moments of inertia and aerodynamic forces are derived and presented. A feedback controller is derived which proved to be a necessary additiion to the system in order to reduce the angle of attack. The angle of attack of the missile produced adverse effects on the burnout vector without the feedback controller, but the effects are reduced considerably with the controller included. Problem areas include

possibly excessive nozzle gimbal rates caused by the feedback controller and the need to change the initial kick angle if the missile is spinning in order to achieve the same burnout conditions as a nonspinning missile. Author (GRA)

N86-24725# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ESTIMATION OF ICBM (INTERCONTINENTAL BALLISTIC MISSILE) PERFORMANCE PARAMETERS M.S. Thesis
Ronald A. Worley Dec. 1985 163 p refs
(AD-A164021; AFIT/GA/AA/85D-10) Avail: NTIS HC A08/MF A01 CSCL 22/2

A Bayes filter was used to estimate launch vehicle performance parameters, and reenter the main Bayes filter to process subsequent stage observation data. The state model consisted of the parameters, and reenter the main Bayes filter to process subsequent stage observation data. The state model consisted of the vehicle position and velocity vectors, the exhaust velocity and the mass ratio. Results indicated that the staging event could be successfully detected by comparing the position of the vehicle as represented by the observation data and the position as represented by the numerical integrator. Exhaust velocity and mass ratio of the next stage could not be estimated independently. The staging estimater state model was then altered to estimate the product of the exhaust velocity and mass ratio. Problems encountered reentering the main Bayes filter were identical to the ones the staging estimator had. It was then determined that there was a possible observability problem with the main algorithm. It was recommended that the main state vector be altered to include the product of the exhaust velocity and mass ratio rather than their independent estimation. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-24726# Presidential Commission on the Space Shuttle Challenger Accident, Washington, D.C.
REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, VOLUME 1
William P. Rogers, Neil A. Armstrong, David C. Acheson, Eugene E. Covert, Richard P. Feynman, Robert B. Hotz, Donald J. Kutyna, Sally K. Ride, Robert W. Rummel, Joseph F. Sutter et al 6 Jun. 1986 260 p refs Original contains color illustrations 5 Vol.
Avail: NTIS MF A01; also available GPO HC $18.00

The findings of the Commission regarding the circumstances surrounding the Challenger accident are reported and recommendations for corrective action are outlined. All available mission data, subsequent tests, and wreckage analyses were reviewed and specific failure scenarios were developed. The Commission concluded that the cause of the Mission 51-L accident was the failure of the pressure seal in the aft field joint of the right solid rocket motor. The failure was due to a faulty design unacceptably sensitive to a number of factors. These factors were the effects of temperature, physical dimensions, the character of materials, the effects of reuse, processing, and the reaction of the joint to dynamic loading. In addition to analyzing the material causes of the accident, the Commission examined the chain of decisions that culminated in approval of the launch. It concluded that the decision making process was flawed in several ways including (1) failure in communication resulting in a launch decision based on incomplete and misleading information, (2) a conflict between engineering data and management judgements, and (3) a NASA management structure that permitted flight safety problems to bypass key Shuttle managers. M.G.

N86-24727# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
UNSTEADY SOLUTION OF THE BOUNDARY LAYER EQUATIONS WITH APPLICATION TO SPACE SHUTTLE TILES M.S. Thesis
Karen J. Lange Jun. 1985 111 p refs
(AD-A164105; AFIT/GAE/ENY/84D-11) Avail: NTIS HC A06/MF A01 CSCL 20/13

Wind tunnel tests were conducted on space shuttle orbiter insulating articles. The data, processed by a heat estimation computer program, revealed a large discrepancy in magnitude of the heat transfer coefficient over the space shuttle tile when compared to that yielded by flat plate theory and thin skin test results. A suggested cause of this discrepancy was the nonisothermal wall effect. The boundary layer equations were transformed, using the Dorodnitsyn transformation to allow the equations to be solved similar to incompressible equations. These equations were then transformed to the computational plane and approximated by finite differences. Optimized successive overrelaxation was used to solve the difference equations. The grid used for this program is optimized based on the Blasius solution. Upon running this program, leading edge startup problems arose so a similarity solution is assumed at the leading edge which corrects the problem. The program was verified with an incompressible case which was in good agreement with the Blasius solution, and a compressible case with an isothermal wall which agreed well with approximate theory. The isothermal case showed the solution was dependent on the grid. The steady state and transient nonisothermal wall cases displayed the same trend as the approximate nonisothermal solution. All cases had the same dramatic decrease in the heat transfer coefficient and the subsequent recovery. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-24728# Ballistic Research Labs., Aberdeen Proving Ground, Md.
MEASUREMENT OF INTERIOR BALLISTIC PERFORMANCE USING FM/FM RADIO TELEMETRY TECHNIQUES
James W. Evans Dec. 1985 97 p refs
(AD-A164150; BRL-TR-2699) Avail: NTIS HC A05/MF A01 CSCL 09/6

The continuous measurement of ballistic performance during the interior ballistic cycle of cannon launched projectiles is important to on-going research programs being conducted at the Ballistic Research Laboratory (BRL). These measurements, such as propelling gas pressure, projectile acceleration, and projectile-bore interactions, are necessary to evaluate existing weapon systems and validate newly formulated interior ballistic models. Of particular interest is the resistance to projectile motion and the behavior of the projectile during the engraving process. The measurement of forces on projectiles and projectile-bore interactions requires that transducers be located on-board the projectile. In-bore measurements of ballistic performance are made at the BRL using an FM/FM, S-band telemeter. Standard artillery projectiles are modified and instrumented with telemetry transmitting systems. These projectiles are test fired and data extracted via the real time telemetry link. The projectile systems are expendable free-flight rounds and those modified for recovery in the BRL Large Caliber Soft Recovery System (LCSRS). The instrumentation package for the recoverable rounds is configured so it can be removed from the projectile, recalibrated after exposure to the launch environment, and used on subsequent rounds. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-24729* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SHUTTLE-LAUNCH TRIANGULAR SPACE STATION Patent
William C. Schneider, inventor (to NASA), REginald B. Berka, inventor (to NASA), C. Kavanaugh, inventor (to NASA), Kornel Nagy, inventor (to NASA), Richard C. Parish, inventor (to NASA), John A. Schliesing, inventor (to NASA), Paul D. Smith, inventor (to NASA), Frederick J. Stebbins, inventor (to NASA), and Clarence J. Wesselski, inventor (to NASA) Issued 1 Apr. 1986 9 p Filed 9 Mar. 1984 Sponsored by NASA
(NASA-CASE-10676-1; US-Patent-4,579,302;
US-Patent-Appl-SN-587764; US-Patent-Class-244-159) Avail: US Patent and Trademark Office CSCL 22B

A triangular space station deployable in orbit is described. The framework is comprized of three trusses, formed of a pair of generally planar faces consistine of foldable struts. The struts expand and lock into rigid structural engagement forming a repetition of equilater triangles and nonfolding diagonal struts interconnecting the two faces. The struts are joined together by node fittings. The framework can be packaged into a size and configuration transportable by a space shuttle. When deployed, the framework provides a large work/construction area and ample planar surface area for solar panels and thermal radiators. A plurity of modules are secured to the framework and then joined by tunnels to make an interconnected modular display. Thruster units for the space station orientation and altitude maintenance are provided.

Official Gazette of the U.S. Patent and Trademark Office

N86-24730*# Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
GENERALIZED PARITY RELATIONS FOR LARGE SPACE STRUCTURES WITH UNCERTAIN PARAMETERS M.S. Thesis
Jean R. Dutilloy Jan. 1986 72 p refs
(Grant NAG1-126)
(NASA-CR-176762; NAS 1.26:176762; Rept-2-86) Avail: NTIS HC A04/MF A01 CSCL 22B

The generalized parity relations method is a technique that can be used to detect sensor and actuator failures on a large space structure. A model of a grid structure was used to evaluate the performance of these relations. It shows their relative sensitivity to modeling errors. A method using sensor outputs and actuator inputs is required for the design of the generalized parity relations. Three different estimators are studied. The last estimator can generate relations optimized for the detection of a particular failure which are interesting when the level of sensor noise is high.

E.A.K.

N86-24731*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL PERFORMANCE OF SPACE STATION TRUSSES WITH MISSING MEMBERS
John T. Dorsey May 1986 35 p refs
(NASA-TM-87715; NAS 1.15:87715) Avail: NTIS HC A03/MF A01 CSCL 22B

Structural performance of orthogonal tetrahedral and Warren-type full truss beams and platforms are compared. In addition, degradation of truss structural performance is determined for beams, platforms and a space station when individual struts are removed from the trusses. The truss beam, space station, and truss platform analytical models used in the studies are described. Stiffness degradation of the trusses due to single strut failures is determined using flexible body vibration modes. Ease of strut replacement is assessed by removing a strut and examining the truss deflection at the resulting gap due to applied forces. Finally, the reduction in truss beam strength due to a missing longeron is determined for a space station transverse boom model. Author

N86-24732*# Rockwell International Corp., Huntsville, Ala.
SPACE PLATFORM EXPENDABLES RESUPPLY CONCEPT DEFINITION STUDY Final Report, Jan. - Oct. 1985
Dec. 1985 116 p
(Contract NAS8-35618)
(NASA-CR-178819; NAS 1.26:178819; STS85-0174-Add) Avail: NTIS HC A06/MF A01 CSCL 22B

NASA has recognized that the capability for remote resupply of space platform expendable fluids will help transition space utilization into a new era of operational efficiency and cost/effectiveness. The emerging Orbital Maneuvering System (OMV) in conjunction with an expendables resupply module will introduce the capability for fluid resupply enabling satellite lifetime extension at locations beyond the range of the Orbiter. This report summarizes a supplemental study to the original Phase A study and is presented as addenda to that study. Author

N86-24733*# Rockwell International Corp., Downey, Calif.
SPACE PLATFORM EXPENDABLES RESUPPLY CONCEPT DEFINITION STUDY. VOLUME 1: EXECUTIVE SUMMARY Report, Mar. - Dec. 1984
Dec. 1984 36 p 4 Vol.
(Contract NAS8-35618)
(NASA-CR-178820; NAS 1.26:178820; STS-85-0174-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 22B

NASA has recognized that the capability for remote resupply of space platform expendable fluids will help transition space utilization into a new era of operational efficiency and cost/effectiveness. The emerging Orbital Maneuvering System (OMV) in conjunction with an expendables resupply module will introduce the capability for fluid resupply enabling satellite lifetime extension at locations beyond the range of the Orbiter. This report summarizes a Phase A study of a remote resupply module for the OMV. Volume 1 is the executive summary. Author

N86-24734*# Rockwell International Corp., Downey, Calif.
SPACE PLATFORM EXPENDABLES RESUPPLY CONCEPT DEFINITION STUDY, VOLUME 2 Technical Report, Mar. - Dec. 1984
Dec. 1984 295 p 4 Vol.
(Contract NAS8-35618)
(NASA-CR-178821; NAS 1.26:178821; STS-85-0174-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 22B

NASA has recognized that the capability for remote resupply of space platform expendable fluids will help transition space utilization into a new era of operational efficiency and cost/effectiveness. The emerging Orbital Maneuvering System (OMV) in conjunction with an expendables resupply module will introduce the capability for fluid resupply enabling satellite lifetime extension at locations beyond the range of the Orbiter. This report summarizes a Phase A study of a remote resupply module for the OMV. Volume 2 represents study results. Author

N86-24735*# Rockwell International Corp., Downey, Calif.
SPACE PLATFORM EXPENDABLES RESUPPLY CONCEPT DEFINITION STUDY. VOLUME 3: WORK BREAKDOWN STRUCTURE AND WORK BREAKDOWN STRUCTURE DICTIONARY Technical Report, Mar. 1984 - Dec. 1984
Dec. 1984 13 p 4 Vol.
(Contract NAS8-35618)
(NASA-CR-178822; NAS 1.26:178822; STS-85-0174-Vol-3) Avail: NTIS HC A02/MF A01 CSCL 22B

The work breakdown structure (WBS) for the Space Platform Expendables Resupply Concept Definition Study is described. The WBS consists of a list of WBS elements, a dictionary of element definitions, and an element logic diagram. The list and logic diagram identify the interrelationships of the elements. The dictionary defines

the types of work that may be represented by or be classified under each specific element. The Space Platform Expendable Resupply WBS was selected mainly to support the program planning, scheduling, and costing performed in the programmatics task (task 3). The WBS is neither a statement-of-work nor a work authorization document. Rather, it is a framework around which to define requirements, plan effort, assign responsibilities, allocate and control resources, and report progress, expenditures, technical performance, and schedule performance. The WBS element definitions are independent of make-or-buy decisions, organizational structure, and activity locations unless exceptions are specifically stated. Author

N86-24736*# National Aeronautics and Space Administration, Washington, D.C.
SPACECRAFT ARCHITECTURE
V. V. Zefeld Mar. 1986 9 p refs Transl. into ENGLISH from Arkhitektura Kosmicheskikh Obyektov (Moscow, USSR), Nauka, 1977 p 187-191 Original language doc. was announced in IAA as A78-13592 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77908; NAS 1.15:77908) Avail: NTIS
HC A02/MF A01 CSCL 22B

Three requirements for a spacecraft interior are considered. Adequate motor activity in the anatomical-physiological sense results from attention to the anthropometric characteristics of humans. Analysis of work requirements is a prerequisite for the planning of adequate performance space. The requirements for cognitive activity are also elucidated. The importance of a well-designed interior during a long space flight is discussed. Author

N86-24737*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPUTER MODELING METHODOLOGY AND TOOL FOR ASSESSING DESIGN CONCEPTS FOR THE SPACE STATION DATA MANAGEMENT SYSTEM
William R. Jones Apr. 1986 45 p refs
(NASA-TM-87647; NAS 1.15:87647) Avail: NTIS
HC A03/MF A01 CSCL 22B

A computer modeling tool is being developed to assess candidate designs for the Space Station Data Management System (DMS). The DMS is to be a complex distributed computer system including the processor, storage devices, local area networks, and software that will support all processing functions onboard the Space Station. The modeling tool will allow a candidate design for the DMS, or for other subsystems that use the DMS, to be evaluated in terms of parameters. The tool and its associated modeling methodology are intended for use by DMS and subsystem designers to perform tradeoff analyses between design concepts using varied architectures and technologies. Author

N86-24738# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CONTROL OF A LARGE SPACE STRUCTURE USING DIRECT OUTPUT FEEDBACK AND MODAL SUPPRESSION M.S. Thesis
Eric E. Keller Dec. 1985 106 p refs
(AD-A163960; AFIT/GAE/AA/85D-10) Avail: NTIS
HC A06/MF A01 CSCL 22/2

Direct output feedback control using one or two controllers is applied to the NASA Ground Test Facility offset antenna model. This is a test structure designed to have the vibration characteristics associated with large space structures. The control problem is transformed from physical variables into modal variables and reformulated into a first order system. This system is truncated to a reduced order model with residual modes used only in performance evaluation. Optimal linear quadratic regulator techniques are used to design the gain matrices and full state feedback is approximated by use of generalized inverses of the observation matrices. Spillover is eliminated through the use of transformation matrices. The structure is shown to be controllable with this method. Alternative sensor placement is explored and found to cause improvement in performance. The torsion modes are found to be particularly important to the performance of the structure but need more sensing and actuation to be adequately controlled. Two controller systems require more sensors and actuators than available to achieve acceptable performance with this structure. GRA

N86-24739# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE EFFECT OF ENERGY DISSIPATION DUE TO FRICTION AT THE JOINT OF A SIMPLE BEAM STRUCTURE M.S. Thesis
Robert P. Donnelly, Jr. Dec. 1985 81 p refs
(AD-A163975; AFIT/GAE/AA/85D-5) Avail: NTIS
HC A05/MF A01 CSCL 22/2

The Strategic Defense Initiative has generated new interest in the development of more stable space structures. This interest has increased the need for more detailed knowledge of the behavior of engineering structures under dynamic loading. Interests lie in decreasing the amount of vibration by both passively and actively damping the structure. A means exists to passively damp structures by friction damping resulting from relative slip between joint interfaces. It may be feasible to increase the damping in a structure by allowing more friction damping than is normal and thereby controlling the vibration response. This thesis incorporates friction damping in a one-dimensional model. Finite element techniques are used to accomplish the numerical analysis. A clamped-clamped beam is used as the physical model. The mid-point of the two element beam is allowed to slip in rotation, but not in translation. Because the one-dimensional program cannot handle rotations at continuous nodes, the beam is modeled by symmetry about the joint and a cantilever beam with an applied end moment is studied. Results for the response of a beam in vibration are presented showing displacement of the joint, relative rotation at the joint, and relative angular velocity at the joint; all versus time. Various clamping pressures and initial loads are explored. Diagrams of the beam shape versus time show the shape the beam takes on when slip occurs at the joint. GRA

N86-24740# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MOVING-BANK MULTIPLE MODEL ADAPTIVE ALGORITHMS APPLIED TO FLEXIBLE SPACECRAFT CONTROL M.S. Thesis
Paul G. Filios Dec. 1985 182 p refs
(AD-A164016; AFIT/GE/ENG/85D-14) Avail: NTIS
HC A09/MF A01 CSCL 22/2

Critical to the performance of the moving-bank multiple model adaptive estimator is the decision logic used to determine which elemental filters are implemented in the bank, and when to change this decision. The decision logics discussed focus on three situations: initial acquisition of the unknown parameter values through reducing bank discretization; tracking the unknown parameter values through bank movement; and reacquisition of the unknown parameters following a large jump change in their values through expanding bank discretization. Ambiguity function analysis is used to predict performance in these situations. The system to be controlled is a simplified model of a large scale space structure. Its equations of motion are developed and placed in state space form, the states being the positions and velocities of the rigid body mode and the second and fourth bending modes. The state space matrices describing the system are computed based on nominal values for all physical parameters with the exception of the mass density of the structure arms and their modulus of elasticity. GRA

N86-24741# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A PROPOSED DESIGN FOR AN INTERIM SPACE RESCUE FERRY VEHICLE M.S. Thesis
James D. Halsell, Jr. Dec. 1985 211 p refs
(AD-A164039; AFIT/GSO/ENY/85D-2) Avail: NTIS
HC A10/MF A01 CSCL 22/2

This investigation proposed a method of connecting the

Personnel Rescue Enclosure to the Manned Maneuvering Unit using a modified flight-qualified hardware item the Apogee Kick Motor Capture Device. The resulting configuration is an immediately available but non-optimum vehicle for transferring stranded astronauts housed within Personnel Rescue Enclosures from a rotating stranded spacecraft to a nearby rescue spacecraft. The flying qualities of this Interim Rescue Vehicle (IRV) were simulated using an existing NASA spaceflight simulation computer program. The results showed that the Manned Maneuvering Unit's control system was capable of limiting uncommanded IRV rotations to within the control law deadbands during all simulated maneuvers and in all control modes except during transverse translations in the backup control mode. The IRV's increased mass and increased center-of-mass/center-of-thrust offset significantly degraded acceleration capability and specific propellant consumption. Plume impingement however was found to be of minor importance. The satellite stabilization mode was found to have significant rotational-to-translational coupling which made it undesirable for IRV use. Finally procedures were outlined for using the IRV in an orbiter-to-orbiter rescue scenario. Author (GRA)

N86-24742# Integrated Systems, Inc., Palo Alto, Calif.
ADAPTIVE CONTROL TECHNIQUES FOR LARGE SPACE STRUCTURES Annual Technical Report, 1 Jun. 1984 - 31 May 1985
Robert L. Kosut and Michael G. Lyons 18 Oct. 1985 121 p refs
(Contract F49620-84-C-0054)
(AD-A164240; ISI-63; AFOSR-85-1241TR) Avail: NTIS
HC A06/MF A01 CSCL 22/2

The Large Space Structure (LSS) research program was originally formulated in late 1982 in response to the increasing concern that performance robustness of Air Force LSS type systems would be inadequate to meet mission objectives. In particular, uncertainties in both system dynamics and disturbance spectra characterizations (both time varying and stochastic uncertainty) significantly limit the performance attainable with fixed gain, fixed architecture controls. Therefore, the use of an adaptive system, where disturbances and/or plant models are identified prior to or during control, gives systems designers more options for minimizing the risk in achieving performance objectives. The aim of adaptive control is to implement in real time and on-line as many as possible of the design functions now performed off-line by the control engineer; to give the controller intelligence. To realize this aim, both a theory of stability and performance of such inherently nonlinear controls is essential as well as a technology capable of achieving the implementation. As has been noted, recent advances in each of these fronts have brought us to the position where adaptive control has been applied to many processes and standard adaptive controllers can be purchased. GRA

N86-24743# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
WEATHER SATELLITE COSTS HAVE INCREASED, PROBLEMS HAVE OCCURRED IN THEIR MANUFACTURING QUALITY CONTROL
31 Oct. 1985 29 p
(PB86-131398; GAO/RCED-86-28; B-216229) Avail: NTIS
HC A03/MF A01 CSCL 22B

The National Oceanic and Atmospheric Administration (NOAA) operates the nation's civilian weather satellite system. The cost of buying these satellites has risen steeply over the years and some of them have failed in orbit earlier than expected. The report discusses the reasons for increased satellite costs and failures and the actions taken. The report also discusses two problems with the manufacturing quality control of the weather satellites: contractors installation in the satellites of parts not approved by NASA and a shortage of government quality control inspectors at some contractor plants during fiscal year 1984. GRA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-24744*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HALOGEN OCCULTATION EXPERIMENT INTERGRATED TEST PLAN
L. E. Mauldin, III and A. J. Butterfield (Bionetics Corp., Hampton, Va.) May 1986 225 p
(NASA-TM-87709; NAS 1.15:87709) Avail: NTIS
HC A10/MF A01 CSCL 22B

The test program plan is presented for the Halogen Occultation Experiment (HALOE) instrument, which is being developed in-house at the Langley Research Center for the Upper Atmosphere Research Satellite (UARS). This comprehensive test program was developed to demonstrate that the HALOE instrument meets its performance requirements and maintains integrity through UARS flight environments. Each component, subsystem, and system level test is described in sufficient detail to allow development of the necessary test setups and test procedures. Additionally, the management system for implementing this test program is given. The HALOE instrument is a gas correlation radiometer that measures vertical distribution of eight upper atmospheric constituents: O3, HC1, HF, NO, CH4, H2O, NO2, and CO2. Author

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-24745*# Allied Bendix Aerospace, Teterboro, N.J.
EVALUATION OF A DOUBLE GIMBAL IPACS DESIGN
P. R. Burke and P. A. Coronato May 1986 28 p refs
(Contract NAS1-17658)
(NASA-CR-178040; NAS 1.26:178040) Avail: NTIS
HC A03/MF A01 CSCL 10C

The suitability of various integrated power/attitude control systems (IPACS) rotor materials was analyzed. Three materials were investigated: (1) 6A1-4V-Titanium (the current IPACS rotor material); (2) B120 VCA Titanium; and (3) Custom 455 stainless steel. The preliminary linear vibration analysis was updated to include the weights and stiffnesses of the gimbals design. A belleville washer spring preload mechanism was designed to replace the existing helical spring and interference fit preload mechanism. E.A.K.

N86-24746*# Martin Marietta Aerospace, Denver, Colo.
ADVANCED ORBIT TRANSFER VEHICLE PROPULSION SYSTEM STUDY Final Report
J. A. Cathcart, T. W. Cooper, R. M. Corringrato, S. T. Cronau, S. C. Forgie, M. J. Harder, J. G. McAllister, T. J. Rudman, V. W. Stoneback et al Feb. 1985 174 p refs
(Contract NAS3-23858)
(NASA-CR-174843; NAS 1.26:174843) Avail: NTIS
HC A08/MF A01 CSCL 21H

A reuseable orbit transfer vehicle concept was defined and subsequent recommendations for the design criteria of an advanced LO2/LH2 engine were presented. The major characteristics of the vehicle preliminary design include a low lift to drag aerocapture capability, main propulsion system failure criteria of fail operational/fail safe, and either two main engines with an attitude control system for backup or three main engines to meet the failure criteria. A maintenance and servicing approach was also established for the advanced vehicle and engine concepts.

Design tradeoff study conclusions were based on the consideration of reliability, performance, life cycle costs, and mission flexibility. B.G.

N86-24747*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland. Ohio.
SPACE STATION 20-kHz POWER MANAGEMENT AND DISTRIBUTION SYSTEM
Irving G. Hansen and Gale R. Sundberg 1986 11 p refs Presented at the Power Electronics Specialists Conference, Vancouver, Bristish Columbia, 23-27 Jun. 1986; sponsored by Inst. of Electrical and Electronics Engineers
(NASA-TM-87314; E-3045; NAS 1.15:87314) Avail: NTIS HC A02/MF A01 CSCL 22B

During the conceptual design phase a 20-kHz power distribution system was selected as the reference for the space station. The system is single-phase 400 VRMS, with a sinusoidal wave form. The initial user power level will be 75 kW with growth to 300 kW. The high-frequency system selection was based upon considerations of efficiency, weight, safety, ease of control, interface with computers, and ease of paralleling for growth. Each of these aspects will be discussed as well as the associated trade-offs involved. An advanced development program has been instituted to accelerate the maturation of the high-frequency system. Some technical aspects of the advanced development will be discussed. Author

N86-24748*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE AND ENDURANCE TESTS OF A MULTIPROPELLANT RESISTOJET FOR SPACE STATION AUXILIARY PROPULSION
W. Earl Morren, Margaret V. Whalen, and James S. Sovey 1986 19 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE, and ASEE
(NASA-TM-87278; E-2981; NAS 1.15:87278) Avail: NTIS HC A02/MF A01 CSCL 21H

This paper presents the results of an effort to demonstrate the technology readiness of a long-life multipropellant resistojet for space station auxiliary propulsion. Experiments were performed to evaluate the compatibility of grain-stabilized platinum tubes at temperatures up to 1400 deg C in environments of CO2, CH4, NH3, H2O, and H2. All samples tested showed extrapolated lifetimes in excess of 10,000 hr based on 10 percent mass loss as end-of-life. However, samples tested in an ammonia atmosphere at 1400 deg C showed severe pitting, which raised concerns about the compatibility of grain-stabilized platinum with ammonia-containing atmospheres. Additional tests showed that reducing the metal temperature to about 900 deg C (+ or - 100 deg C) significantly reduced this adverse effect. Author

N86-24749*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA ELECTROTHERMAL AUXILIARY PROPULSION TECHNOLOGY
James R. Stone 1986 26 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE
(NASA-TM-87281; E-2986; NAS 1.15:87281; AIAA-86-1703) Avail: NTIS HC A02/MF A01 CSCL 21H

Electrothermal auxiliary propulsion systems provide high performance options which can have major mission benefits. There are several electrothermal concepts which offer a range of characteristics and benefits. Resistojets are the highest thrust to power option and are currently operational at mission average values of specific impulse, I sub sp approximately 295 sec. Long life, multipropellant resistojets are being developed for the space station, and resistojet technology advancements are being pursued to improve the I sub sp by more than 20 percent for resistojets used in satellite applications. Direct current arcjets have the potential of I sub sp over 400 sec with storable propellants and should provide over 1000 sec with hydrogen. Advanced concepts are being investigated to provide high power density options and possible growth to primary propulsion applications. Broad based experimental and analytical research and technology programs of NASA are summarized and recent significant advances are reviewed. Author

N86-24750*# Wyle Labs., Inc., Huntsville, Ala.
A DATA BASE AND ANALYSIS PROGRAM FOR SHUTTLE MAIN ENGINE DYNAMIC PRESSURE MEASUREMENTS Final Report
Thomas Coffin Jan. 1986 192 p
(Contract NAS8-34343)
(NASA-CR-178808; NAS 1.26:178808; Rept-66338-01) Avail: NTIS HC A09/MF A01 CSCL 21H

A dynamic pressure data base management system is described for measurements obtained from space shuttle main engine (SSME) hot firing tests. The data were provided in terms of engine power level and rms pressure time histories, and power spectra of the dynamic pressure measurements at selected times during each test. Test measurements and engine locations are defined along with a discussion of data acquisition and reduction procedures. A description of the data base management analysis system is provided and subroutines developed for obtaining selected measurement means, variances, ranges and other statistics of interest are discussed. A summary of pressure spectra obtained at SSME rated power level is provided for reference. Application of the singular value decomposition technique to spectrum interpolation is discussed and isoplots of interpolated spectra are presented to indicate measurement trends with engine power level. Program listings of the data base management and spectrum interpolation software are given. Appendices are included to document all data base measurements. Author

N86-24751*# Michigan State Univ., East Lansing. Coll. of Engineering.
GENERATION OF FREE RADICALS AND IONS FOR SPACECRAFT PROPULSION Final Report, 15 Aug. 1979 - 10 Mar. 1984
J. Asmussen, Martin Hawley, and Ronald Kerber 1985 6 p refs
(Contract NASw-3299)
(NASA-CR-176672; NAS 1.26:176672) Avail: NTIS HC 2/MF A01 CSCL 21H

The long-term objective at this research grant was to examine the feasibility of several electric propulsion concepts that employ microwave electricity as the source of energy. These electric propulsion concepts were (1) a microwave free radical engine, (2) a microwave ion engine and (3) a microwave electrothermal engine. The research not only involved the conceptualization of practical microwave engine concepts but also included special experimental studies which produced and measured concentrations of ions, excited species and free radicals in a microwave discharge under a wide range of experimental conditions. These conditions included continuous wave input microwave power levels of a few watts to over 1000 W, discharge pressures from less than one micron to over one atmosphere and under flowing and nonflowing gaseous environments. Major accomplishments of the research are discussed. Author

N86-24752# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
RADIATION AUGMENTED PROPULSION FEASIBILITY Final Report, 17 Sep. 1984 - 28 Sep. 1985
S. C. Hurlock, V. Quan, J. Blauer, J. R. Hall, and R. I. Wagner Dec. 1985 113 p refs
(Contract F04611-84-C-0047)
(AD-A163983; RI/RD85-257; AFRPL-TR-85-068) Avail: NTIS HC A06/MF A01 CSCL 10/1

Gas phase absorption of solar radiation has been suggested as an energy source to power space propulsion systems. The absorbing gas could be an expendable propellant or could be used in a closed cycle, exchanging heat with an expendable propellant. This study was conducted in order to develop basic data and understanding useful for the evaluation of such a system with the absorbing gas being a halogen or an interhalogen.

Experiments and analysis were conducted to characterize the absorption of ultraviolet and visible radiation and subsequent energy release in chlorine gas, iodine monochloride vapor, and mixtures of hydrogen gas and chlorine gas. Xenon flashlamps were used to provide the radiation. Measurements included lamp electrical and optical characteristics, light energy absorbed, pressure rise in the closed reactor and reactants remaining after the reaction. Analysis included detailed kinetic modeling of the single shot experiments. GRA

N86-24753# Tennessee Univ. Space Inst., Tullahoma.
LASER THERMAL PROPULSION Annual Report, 15 Jan. 1984 - 14 Apr. 1985
Dennis Keefer 29 Aug. 1985 6 p refs
(Grant AF-AFOSR-0043-83)
(AD-A164163; AFOSR-86-0029TR) Avail: NTIS HC A02/MF A01 CSCL 21/3

The principal objective of this research investigation is to determine experimentally the effects of a forced convection environment and optical geometry on the stability, fractional power absorption, plasma structure, and fluid mixing in a laser sustained plasma (LSP). A continuous, 1.5 kw, axial flow, carbon dioxide laser was used to create the LSP in a cylindrical quartz flow channel. The convection flowfield surrounding the plasma was controlled by the volume flow through the test chamber, and the optical geometry was determined by the focal length of the lens. Data were obtained for argon plasmas at pressures from 1 to 2.3 atmospheres, mean incident flow velocities to cm/s and nominal incident laser power of 1 kw. Spatially resolved measurements of the plasma temperature were obtained from spectral images of the LSP and, using these measured temperatures, it was possible to determine the spatially resolved laser power absorption and thermal emission within the plasma. Substantial differences in plasma shape, absorbed power, and pressure dependence were found for lenses of different focal length. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

No abstracts in this category.

24 COMPOSITE MATERIALS

Includes laminates.

N86-24754 British Library Lending Div., Boston Spa (England).
DAMPING PROPERTIES OF GRANULE-BASED COMPOSITE MATERIALS
V. N. Brinza and E. V. Kolyadina 1985 4 p refs Transl. into ENGLISH from Izvestiya (USSR), no. 9, 1985 p 172-173
(BLL-M-36692-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The damping capacity of composite materials, compacted from mixtures of granules of dissimilar aluminum alloys, is demonstrated to be a function of the weight and size ratios of the hardening to plasticizing granules in the mixture. The investigated composite granular materials are now being used to make certain parts of automatic cold heading machines. Author

N86-24755*# Wyoming Univ., Laramie.
ANALYSIS OF THE STRESS STATE IN AN IOSIPESCU SHEAR TEST SPECIMEN Technical Report, May 1982 - May 1983
David E. Walrath and Donald F. Adams Jun. 1983 86 p refs
(Grant NAG1-272)
(NASA-CR-176745; NAS 1.26:176745; UWME-DR-301-102-1) Avail: NTIS HC A05/MF A01 CSCL 11D

The state of stress in a Iosipescu shear test specimen is analyzed, utilizing a finite element computer program. The influence of test fixture configuration on this stress state is included. Variations of the standard specimen configuration, including notch depth, notch angle, and notch root radius are modeled. The purpose is to establish guidelines for a specimen geometry which will accommodate highly orthotropic materials while minimizing stress distribution nonuniformities. Materials ranging from isotropic to highly orthotropic are considered. An optimum specimen configuration is suggested, along with changes in the test fixture Author

N86-24756*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMOVISCOPLASTIC NONLINEAR CONSTITUTIVE RELATIONSHIPS FOR STRUCTURAL ANALYSIS OF HIGH TEMPERATURE METAL MATRIX COMPOSITES
Christos C. Chamis and Dale A. Hopkins 1985 25 p ref Presented at First Symposium on Testing Technologyof Metal Matrix Composites, Nashville, Tenn., 18-20, 1985; sponsored by American Society for Testing Materials
(NASA-TM-87291; E-2998; NAS 1.15:87291) Avail: NTIS HC A02/MF A01 CSCL 11D

A set of thermoviscoplastic nonlinear constitutive relationships (1VP-NCR) is presented. The set was developed for application to high temperature metal matrix composites (HT-MMC) and is applicable to thermal and mechanical properties. Formulation of the TVP-NCR is based at the micromechanics level. The TVP-NCR are of simple form and readily integrated into nonlinear composite structural analysis. It is shown that the set of TVP-NCR is computationally effective. The set directly predicts complex materials behavior at all levels of the composite simulation, from the constituent materials, through the several levels of composite mechanics, and up to the global response of complex HT-MMC structural components. E.A.K.

N86-24757*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A UNIQUE SET OF MICROMECHANICS EQUATIONS FOR HIGH TEMPERATURE METAL MATRIX COMPOSITES
Dale A. Hopkins and Christos C. Chamis 1985 27 p refs Presented at the 1st Symposium on Testing Technology of Metal Matrix Composites, Nashville, Tenn., 18-20 Nov. 1985; sponsored by American Society for Testing and Materials
(NASA-TM-87154; E-2780; NAS 1.15:87154) Avail: NTIS HC A03/MF A01 CSCL 11D

A unique set of micromechanic equations is presented for high temperature metal matrix composites. The set includes expressions to predict mechanical properties, thermal properties and constituent microstresses for the unidirectional fiber reinforced ply. The equations are derived based on a mechanics of materials formulation assuming a square array unit cell model of a single fiber, surrounding matrix and an interphase to account for the chemical reaction which commonly occurs between fiber and matrix. A three-dimensional finite element analysis was used to perform a preliminary validation of the equations. Excellent agreement between properties predicted using the micromechanics equations and properties simulated by the finite element analyses are demonstrated. Implementation of the micromechanics equations as part of an integrated computational capability for nonlinear structural analysis of high temperature multilayered fiber composites is illustrated. E.A.K.

N86-24758*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EFFECTS OF SEAWATER AND DEIONIZED WATER AT 0 TO 80 DEG C ON THE FLEXURAL PROPERTIES OF A GLASS/EPOXY COMPOSITE
B. G. Penn, J. G. Daniels, F. E. Ledbetter, III, M. L. Semmel, B. G. Goldberg, W. T. White, and J. M. Clemons Mar. 1986 11 p refs
(NASA-TM-86544; NAS 1.15:86544) Avail: NTIS HC A02/MF A01 CSCL 11D

The effect on the flexural properties of a glass/epoxy composite of immersion in deionized water or seawater at 0, 25, and 80 C for 451 hr was examined. The percent weight gain at 0 and 25 C was low (0.06 to 0.17 percent) and there was no significant change in the flexural properties for these environmental conditions. At 80 C there was a decrease in the flexural strength of 17 and 20 percent in seawater and deionized water, respectively. This is a comparison to control samples exposed to 80 C heat alone. These decreases were found to be nearly reversible once the samples were dried. Optical microscopy did not reveal cracking of the matrix. The flexural modulus was essentially unaffected by exposure to deionized water and seawater at 80 C. Author

N86-24759*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIMPLIFIED COMPOSITE MICROMECHANICS FOR PREDICTING MICROSTRESSES
Christos C. Chamis 1986 27 p refs Presented at 41st Annual Conference of the Society of the Plastics Industry (SPI) Reinforced Plastics/Composites Inst., Atlanta, Ga., 27-31 Jan. 1986
(NASA-TM-87295; E-2782; NAS 1.15.87295) Avail: NTIS HC A03/MF A01 CSCL 11D

A unified set of composite micromechanics equations is summarized and described. This unified set is for predicting the ply microstresses when the ply stresses are known. The set consists of equations of simple form for predicting three-dimensional stresses (six each) in the matrix, fiber, and interface. Several numerical examples are included to illustrate use and computational effectiveness of the equations in this unified set. Numerical results from these examples are discussed with respect to their significance on microcrack formation and, therefore, damage initiation in fiber composites. Author

N86-24760*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
EVALUATION OF CAPILLARY REINFORCED COMPOSITES Contractor Report, Sep. 1984 - Sep. 1985
J. E. Cahill, J. F. Halase, W. K. South, and L. J. Stoffer Sep. 1985 141 p Original contains color illustrations
(Contract NAS3-24386)
(NASA-CR-175061; NAS 1.26:175061) Avail: NTIS HC A07/MF A01 CSCL 11D

Anti-icing of the inlet of jet engines is generally performed with high pressure heated air that is directed forward from the compressor through a series of pipes to various manifolds located near the structures to be anti-iced. From these manifolds, the air is directed to all flowpath surfaces that may be susceptible to ice formation. There the anti-icing function may be performed by either heat conduction or film heating. Unfortunately, the prospect of utilizing lightweight, high strength composites for inlet structures of jet engines has been frustrated by the low transverse thermal conductivity of such materials. It was the objective of this program to develop an advanced materials and design concept for anti-icing composite structures. The concept that was evaluated used capillary glass tubes embedded on the surface of a composite structure with heated air ducted through the tubes. An analytical computer program was developed to predict the anti-icing performance of such tubes and a test program was conducted to demonstrate actual performance of this system. Test data and analytical code results were in excellent agreement. Both indicate feasibility of using capillary tubes for surface heating as a means for composite engine structures to combat ice accumulation. Author

N86-24761*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
INVESTIGATION OF PARAMAGNETIC RESPONSE OF METALLIC EPOXIES Final Report, 1 Jun. - 31 Aug. 1985
Robert L. Ash and Hoshang Chegini Apr. 1986 13 p refs
(Contract NAS1-17993)
(NASA-CR-176551; NAS 1.26:176551) Avail: NTIS HC A02/MF A01 CSCL 11D

The paramagnetic properties of epoxies which were impregnated with metal ions were examined as the primary task in this research. A major conclusion was that the quality control of the epoxies was insufficient to permit reliable evaluation. Subsequently, a new set of specimens is being prepared. As an additional task, a new method is investigated for estimating heats of combustion for saturated hydrocarbons. The results of that investigation have shown that the empirical approach is a promising method for on-line measurements. Author

N86-24762# Martin Marietta Aerospace, Denver, Colo.
DAMPING CHARACTERISTICS OF METAL MATRIX COMPOSITES Quarterly Letter Report, 15 Sep. - 11 Dec. 1985
Mohan S. Misra 11 Dec. 1985 6 p refs
(Contract N00014-85-C-0857)
(AD-A163569; MCR-85-721) Avail: NTIS HC A02/MF A01 CSCL 11/4

Fiber reinforced metal matrix composites (MMC) are candidate structural materials for Large Space Structures because of their high specific stiffness, specific strength, and low coefficient of thermal expansion. In addition, MMC exhibits higher damping than structural alloys of aluminum or titanium, and the potential exists for designing MMC with predetermined damping, strength, and stiffness properties. In the present investigation P55/6061 Al composites with different fiber-fiber (consequently, fiber volume) spacing have been selected to study the damping characteristics. GRA

N86-24763# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DETERMINATION OF THE NATURAL FREQUENCIES AND MODE SHAPES FOR ANISOTROPIC LAMINATED PLATES INCLUDING THE EFFECTS OF SHEAR DEFORMATION AND ROTATORY INERTIA M.S. Thesis
John A. Bowlus Sep. 1985 124 p refs
(AD-A164040; AFIT/GA/AA/85S-1) Avail: NTIS HC A06/MF A01 CSCL 11/4

An analytical study was conducted to determine the natural frequencies and mode shapes for laminated anisotropic plates, including the effects of shear deformation and rotatory inertia, by using the Galerkin Technique. Three different boundary conditions, simply-supported, clamped, and two opposite sides clamped, two opposite sides simply-supported, were considered. Two different graphite epoxy symmmetric plates were used in the analysis. Convergence characteristics and the effects of length to thickness ratios were investigated. Comparison to classical results and contour plots for several mode shapes are provided. It was found that as the length to thickness ratios were reduced, shear deformation effects significantly lowered the natural frequencies. Analysis also showed that rotatory inertia effects were very small. Convergence characteristics for all three boundary conditions were very good and excellent agreement with classical solutions was achieved. GRA

N86-24764# California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering.
A MIXTURE MODEL FOR UNIDIRECTIONALLY FIBER-REINFORCED COMPOSITES Technical Report, Jul. 1984 - Dec. 1985
H. Murakami and G. A. Hegemier Dec. 1985 37 p refs
(Contract N00014-84-K-0468)
(AD-A164136) Avail: NTIS HC A03/MF A01 CSCL 11/4

A binary mixture theory with microstructure is constructed for unidirectionally fiber-reinforced elastic composites. Model construction is based on a asymptotic scheme with multiple scales and the application of Reissner's new mixed variational principle (1984). In order to assess the accuracy of the model, comparison of the mixture model predictions with available experimental data on dispersion of harmonic waves is made for boron/epoxy and tungsten/aluminum composites. Formulas for the effective moduli are also presented, and the results are compared with the test data and other available predictions. GRA

N86-24765# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
DAMAGE MODELS FOR DELAMINATION AND TRANSVERSE FRACTURE IN FIBROUS COMPOSITES Annual Technical Report, 15 Feb. 1984 - 14 Feb. 19
R. A. Schapery, J. R. Weatherby, and R. D. Tonda May 1985 74 p refs
(Grant AF-AFOSR-0068-84)
(AD-A164164; MM-5034-85-8; AFOSR-85-1226TR) Avail: NTIS HC A04/MF A01 CSCL 11/5

Theoretical and experimental work on the deformation and fracture of fibrous composites with distributed damage is described. Emphasis is on establishing the existence of potentials analogous to strain energy and on using these so-called work potentials in fracture studies. The difference between loading and unloading behavior is accounted for by using one work potential for changing damage (loading) and another for constant damage (unloading). First, using work potentials in a finite element representation, a new method for predicting crack growth is described which is believed to be applicable to many different materials. The results confirm the previously predicted path independence of the J integral for a crack in a continuum with distributed damage; the damage is modelled in this initial study using deformation plasticity theory for loading and elasticity theory for unloading. Described next are investigations of flat rectangular bar specimens and thin-walled tubes under axial and torsional loading. The limited amount of experimental data presently available on angle-ply laminates confirms the existence of a potential even when there are large increases in microcracking. Author (GRA)

N86-24766# United Technologies Research Center, East Hartford, Conn.
DETECTION AND LOCATION OF BALLISTIC DAMAGE IN COMPOSITE MATERIALS USING ACOUSTIC EMISSION METHODS Final Report, Sep. 1984 - Oct. 1985
J. F. Jaminet, M. W. Hawman, and R. S. Williams Dec. 1985 75 p refs
(Contract DAAG29-84-C-0054; DA Proj. 1L1-62105-AH-84)
(AD-A164183; MTL-TR-85-37) Avail: NTIS HC A04/MF A01 CSCL 19/4

A method for increasing survivability is described whereby the acoustic emissions generated by ballistic impacts on composite helicopter structural components are recorded and analyzed using a preliminary digital transient data recording test system, the Digital Acoustic Emission System (DAES) and lightweight sensors utilizing polyvinylidene fluoride (PVDF) film. A total of 77 ballistic impacts on six composite test segments using a variety of fragment simulating projectiles (FSP) with different muzzle velocities and impact energies are described. The results verify the capability of the measurement system to detect, locate, and analyze the severity of ballistic impacts. The ratio of the peak RMS value of the output signal from two sensors is shown to be a good indicator of impact energy absorption, or damage severity. Calculated hit locations are found with a mean error of 7% of the sensor array edge distance. GRA

N86-24767# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
RESIDUAL-STRESS INDUCED DAMAGE IN COMPOSITE MATERIALS Annual Technical Report, 1 Feb. 1984 - 31 Jan. 198
Y. Weitsman Apr. 1985 19 p refs
(Grant AF-AFOSR-0069-84)
(AD-A164191; MM-5022-85-5; AFOSR-85-1224TR) Avail: NTIS HC A02/MF A01 CSCL 11/4

The main objective of this research is to evaluate the role of temperature and moisture as damage inducing agents in composites. This objective is to be achieved by subjecting composite coupons to several excursions of temperature and humidity, with variations in both amplitudes and rates, and inspecting the resulting damage. Furthermore, the formation and growth of damage are to be modelled analytically in order to relate them to material properties and ambient environmental conditions. GRA

N86-24768 Rensselaer Polytechnic Inst., Troy, N.Y.
THREE DIMENSIONAL FINITE ELEMENT ANALYSIS OF FAILURE IN COMPOSITE LAMINATES Ph.D. Thesis
Jieh-Ren Yeh 1985 133 p
Avail: Univ. Microfilms Order No. DA8528673

A compact finite element formulation based on singularity transformation is presented and used to analyze the mathematical nature of stress singularities at the boundary-layer in laminated composites. The stress singularities depend on material properties of adjacent laminae and local boundary conditions. Next, three dimensional elastic response of laminated composites to thermomechanical loading is formulated and analyzed using the finite element method. Individual laminae are modeled as homogeneous and transversely anisotropic. Particular attention is given to the interlaminar stresses near free edges. Three dimensional intralaminar and interlaminar failure criteria of unidirectional fiber composites are established. Six distinct failure modes including tensile fiber, tensile matrix, compressive matrix, tensile delamination and compressive delamination failure modes are modeled separately. The three dimensional finite element analysis in conjunction with the intralaminar and interlaminar failure criteria is developed to analyze the failure behavior of laminated composites with free edge. A compact finite element formulation based on singularity transformation is presented and ised laminated composites with free edge. Results obtained by the present analysis are compared with the experimental data, good agreement is achieved. Dissert. Abstr.

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-24769*# National Aeronautics and Space Administration, Washington, D.C.
CONDUCTIMETRIC DETERMINATION OF DECOMPOSITION OF SILICATE MELTS
C. Kroeger and K. Lieck Mar. 1986 20 p refs Transl. into ENGLISH from Zeitschrift fuer anorganische und allgemeine Chemie, v. 279, 1955, p 300-312 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88394; NAS 1.15:88394) Avail: NTIS HC A02/MF A01 CSCL 07D

A description of a procedure is given to detect decomposition of silicate systems in the liquid state by conductivity measurements. Onset of decomposition can be determined from the temperature curves of resistances measured on two pairs of electrodes, one above the other. Degree of decomposition can be estimated from temperature and concentration dependency of conductivity of phase boundaries. This procedure was tested with systems PbO-B2O3 and PbO-B2O3-SiO2. Author

N86-24770# National Aeronautics and Space Administration, Washington, D.C.
THE THALLIUM MONOBORATE-BORIC ACID ANHYDRIDE BINARY SYSTEM
R. Bouaziz and M. Toubcul Mar. 1986 8 p refs Transl. into ENGLISH of "Le System Binaire Monoborate de Thallium-Anhydride Borique" (Paris, France) v. 264, no. 16, Ser. C., 17 Apr. 1967 p 1374-1477 Transl. by the Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88393; NAS 1.15:88393) Avail: NTIS HC A02/MF A01 CSCL 07D

Direct thermal analysis of Ti2O-B2O2 mixtures containing 13 to 15 wt.% B2O2 in a Pt crucible with a Pt-(Pt-10% Rh) thermocouple is described. The mixtures were heat treated to obtain a well crystallized product. Five borates were characterized. Radiocry-

stallography could not be done for the alpha varieties. Powder diagrams were presented. BG

N86-24771# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
ANALYTIC SOLUTION OF THE MOLECULAR ORNSTEIN-ZERNIKE EQUATION FOR NON-SPHERICAL MOLECULES SPHERES WITH ANISOTROPIC SURFACE ADHESION Interim Technical Report
Peter T. Cummings and Lesser Blum 15 Oct. 1985 40 p refs
Prepared in cooperation with Virginia Univ., Charlottesville
(Contract N00014-81-C-0776)
(AD-A163451; AD-E401440; TR-19) Avail: NTIS HC A03/MF A01 CSCL 07/4

The molecular Ornstein-Zernike equation is solved for a fluid of hard spheres with anisotropic surface adhesion yielding a small set of non-linear algebraic equations which must be solved numerically in order to obtain structural and thermodynamic properties. It is argued that such a model mimics the short-ranged, anisotropic interactions encountered in hydrogen-bonded fluids such as water. GRA

N86-24772# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
AN IMPROVED CLOSURE OF THE BORN-GREEN-YVON EQUATION FOR THE ELECTRIC DOUBLE LAYER Interim Technical Report
C. Caccamo, G. Pizzimenti, and L. Blum 15 Oct. 1985 41 p refs
(Contract N00014-81-C-0776)
(AD-A163452; AD-E401440; TR-20) Avail: NTIS HC A03/MF A01 CSCL 07/4

An extensive series of calculations are made to compare an improved closure of the Born-Green-Yvon (BGY) equation for the electric double layer of primitive electrolytes to existing Monte Carlo simulation and other theories, such as the modified Poisson Boltzmann (version: 5) (MPB5) and the Hypernetted chain/mean spherical approximation (HNC,MSA) and its recent improvements. In contrast to these theories the BGY equation satisfies the contact theorem always. Furthermore, the bulk pair correlations function used are the most accurate available, namely the HNC bulk results. The results show very good general agreement to the computer work for high densities and surface charges. In particular, higher densities are obtained than those hitherto published in the literature. For low density 2-2 and 2-1 electrolytes the agreement is not as good. GRA

N86-24773# Army Armament Research and Development Command, Dover, N. J.
CARS (COHERENT ANTI-STOKES RAMAN SCATTERING) SPECTROSCOPY OF THE REACTION ZONE OF METHANE-NITROUS OXIDE AND RDX PROPELLANT FLAMES Technical Report, Oct. 1984 - Sep. 1985
L. E. Harris Jan. 1986 54 p refs Presented at 10th International Colloquim on Dynamics of Explosives and Reactive Systems, Berkeley, Calif., Aug. 1985
(AD-A163465; AD-E401440; ARAED-TR-85007) Avail: NTIS HC A04/MF A01 CSCL 19/1

CARS spectra were obtained for a phi = 3.2 CH4/N20 model and nitramine propellant flames throughout the reaction and post-flame zones in order to assess kinetic mechanisms occurring in these flames. The reaction zone of the rich CH4/N20 flame was studied primarily to provide a stationary flame analog to the transient propellant flame. In the CH4/N20 flame, the decay of the initial products was observed through the Q-branch of the nu 1 and nu 3 modes of N20 and the Q, O and S branches of nu 2 and 2 nu 2 modes of CH4. The formation of the products N2, H2 Q(v' = 0 and v' = 1) and S(5) - S(9), and CO2 were also observed. Temperatures were obtained from both the H2 and N2 Q-branches. In the nitramine propellant flame, the upper bound of the gas-surface interface temperature was measured as 900 K + or 100 K from the H2 Q-branch. Near the surface of the propellant, reactant RDX (1599 cm-1 tentatively assigned as asymetric NO2 stretch) and transients HCN (NU1) and NO are observed as moderate concentration (> or = 1%). The final product N2 is observed at low concentration, (approx. 1%), H2 (Q and S beaches) and CO are observed at higher concentration (> or = 10%). RDX and HCN decay within 2 mm of the propellant surface while NO remains constant until 4 mm where it decays with a concommitant rise in N2 concentration and temperature. H2 and CO also increase in temperature and concentration. GRA

N86-24774# Naval Surface Weapons Center, Silver Spring, Md.
A VOLUMETRIC METHOD FOR TITRIMETRIC ANALYSIS OF HYDROGEN PEROXIDE
Walter G. Cox 6 May 1985 18 p refs
(AD-A163582; NSWC/TR-85-210) Avail: NTIS HC A02/MF A01 CSCL 07/4

This report documents an oxidation-reduction scheme for the volumetric analysis of hydrogen peroxide in the approximate range of 30 percent, but it is not limited to this range. The purpose of the proposed method is to provide a titrimetric, noninstrumental method for the analysis of hydrogen peroxide. GRA

N86-24775# California Univ., San Diego, La Jolla. Dept. of Chemistry.
CATALYSIS OF HYDROLYSIS REACTIONS BY PLATINUM AND NICKEL PHOSPHINE COMPLEXES Final Report, 1 Oct. 1983 - 30 Sep. 1985
William C. Trogler 10 Oct. 1985 14 p refs
(Contract DAAG29-83-K-0175)
(AD-A163666; ARO-20979.6-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Synthesis and mechanistic characterization of transition metal complexes that are catalysts for hydration and hydrolysis reactions is the major focus. Oxidative addition of water to a metal center generates a metal hydrido-hydroxy species. In this way the nucleophilicity of water increases greatly. Among the reactions studied are hydration of olefins, nitriles, alkynes, and dienes as well as hydrolysis of phosphate esters. Practical goals of the research are the discovery of catalysts for the synthesis of key industrial chemicals and for the neutralization of toxic chemical agents. Progress has been made in three areas; (1) photochemical and thermal sources of NiL2, PdL2, and PtL2 catalyst precursors; (2) catalytic hydrolysis of nitrile, olefinic, and phosphate ester groups as well as studies of the mechanism of catalysis; and (3) synthesis and characterization of silica supported platinum catalysts for hydrosilation and hydrolysis. GRA

N86-24776# California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering Science
MECHANISMS OF COMBUSTION OF HYDROCARBON/ALCOHOL FUEL BLENDS Final Report, 15 Sep. 1982 - 30 Sep. 1985
Kalyanasundaram Seshadri and Anthony P. Hamins Dec. 1985 103 p refs
(Contract DAAG29-82-K-0079)
(AD-A163737; ARO-19434.9-EG) Avail: NTIS HC A06/MF A01 CSCL 21/2

Results reported here directly support the U.S. Army's research and development program in alternative fuels. Liquid fuels which are homogeneous solutions of hydrocarbon and alcohol fuels are considered here. Since combustion of diesel fuel resembles that in a diffusion flame, and because turbulent nonpremixed combustion can be considered as a statistical collection of strained, laminar flamelets, studies were performed on the structure and mechanisms of extinction of strained, laminar diffusion flames and strained laminar partially premixed diffusion flames. Use of alternate fuels often results in soot formation which causes easy detection of the vehicle. Therefore, studies were also performed to clarify the chemical mechanisms of soot formation in diffusion flames. For a well controlled laboratory experiment it is essential that the composition of the fuel be known. Petroleum based fuels are often a blend of aromatics and aliphatic fuels. Therefore experiments were performed on representative fuels namely homogeneous solutions of heptane, toluene and methanol. Results were analyzed by use of asymptotic theories. The experimental apparatus is

described in Chapter 2. Results of the research are discussed in Chapters III - IX. Each chapter has a brief abstract describing the results. GRA

N86-24777# SRI International Corp., Menlo Park, Calif. Chemical Kinetics Dept.
DETERMINATION OF INITIAL CHEMICAL STEPS IN THE GAS-PHASE DECOMPOSITION OF ENERGETIC MOLECULES Final Technical Report, Sep. 1982 - Aug. 1985
Donald F. McMillen and David M. Golden 9 Jan. 1986 60 p refs
(Contract DAAG29-82-K-0169)
(AD-A163751; ARO-19328.1-CH) Avail: NTIS HC A04/MF A01 CSCL 07/4

Laser-powered homogeneous pyrolysis (LPHP) has been successfully used to provide conditions where surface-sensitive substrates can be indirectly heated by an infrared laser and allowed to react while remote from potentially catalytic surfaces. The use of the comparative rate technique with LPHP provides an accurate indirect temperature measurement and has made practical the extraction of thermal, decomposition Arrhenius parameters. A laser-heated, GC/MS-monitored, stirred-flow reaction cell has been used with cyclohexene as the internal temperature standard to determine Arrhenius parameters for the homogeneous gas phase thermal decomposition of nitrotoluene (o-NT), and 2,4-dinitrotoleune (2,4-DNT). In all cases the principal rate-limiting step is the homolysis of the Ar-NO2 bond. The measured Arrhenius parameters for homolysis range from log A = 14.5 to 16.4, and from Ea = 67.0 to 70.0 kcal/mol. The bond dissociation energies derived from the results are 71.4, 73.2, 71.4, 70.2 and 70.6 kcal/mol, respectively, for the above series of compounds. GRA

N86-24778# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CONVECTIVE HEATING OF ENERGETIC MATERIALS Final Technical Report
Richard A. Beyer and Mark A. DeWilde Dec. 1985 28 p refs
(AD-A163919; BRL-TR-2701) Avail: NTIS HC A03/MF A01 CSCL 21/2

The pyrolysis and ignition dynamics of propellants and their components have been explored using convective heating at a flow rate of about 1 m/s at atmospheric pressure. Two major techniques were used for the dynamics studies. The first was a video camera and recorder which were used to record flame luminescence. Also used to study ignition dynamics was a high-speed shadow photography system which characterized regions of heat release following immersion of single propellant grains in the hot flow. A key observation was an unusual two-stage flame observed with NOSOL 363; no previous report has shown similar behavior with this propellant. Gas released during pyrolysis was analyzed using grab samples and infrared absorption spectroscopy. Key observations with HMX were: (1) the increase in relative amount of NO2 with respect to other species with increasing temperature, and (2) the probable detection of substantial amounts of formic acid. This latter has not previously been observed in HMX pyrolysis studies. GRA

N86-24779# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
HIGH RESOLUTION COHERENT ANTI-STOKES RAMAN SPECTROSCOPY OF DEUTERIUM GAS M.S. Thesis
David A. Russell Dec. 1985 74 p refs
(AD-A163946; AFIT/GEO/ENP/85D-4) Avail: NTIS HC A04/MF A01 CSCL 07/4

Coherent anti-Stokes Raman spectroscopy (CARS) is a third order nonlinear optical mixing process primarily used to probe gases. Two laser beams interact with the medium being studied producing a weak, third beam with a higher frequency than either of the lasers. High resolution CW coherent anti-Stokes Raman spectroscopy (CARS) was performed in molecular deuterium gas. Single mode argon ion and ring dye lasers were used to make accurate measurements of the Raman linewidths of the Q(0) through Q(4) transitions. These lines were examined at room temperature at pressures ranging from 0.35 to 20 atmospheres. The pressure broadening coefficient and the self diffusion coefficient of each line were obtained in this study and compared with other work. Additionally, the transition frequency of each line was measured and the frequency shift coefficients were obtained. GRA

N86-24780# Department of the Air Force, Washington, D.C.
NON-PERTURBING BEAM DEFLECTION SYSTEM AND METHOD FOR HIGH REPETITION RATE TEMPERATURE MEASUREMENT OF COMBUSTION FLAMES Patent Application
Larry P. Goss, inventor (to Air Force) Filed 24 Oct. 1985 26 p refs
(AD-D012154; US-Patent-Appl-SN-790714) Avail: NTIS HC A03/MF A01 CSCL 21/2

A novel laser beam deflection system and method for temperature measurement of combustion flames of known composition is described which comprises a thin wire for placement at a predetermined location within the flame; a pulsed laser source for directing a pulsed beam onto the wire for heating the wire and immediately surrounding gases of the flame to produce an acoustic pulse in the flame; a pair of probe laser sources for directing parallel probe beams through the flame in predetermined spaced relationship to each other and to the wire, and a pair of detectors and associated electronics for detecting the respective deflections of the probe beams resulting from interactions with the pulse and measuring the time difference between respective deflections of the probe beams to determine the speed of the acoustic pulse through the flame and the temperature of the flame from the speed determination. GRA

N86-24781# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
ALTITUDE IGNITION/LEAN DECEL STUDY Final Report, Aug. 1983 - Jan. 1985
Dean Andreadis Nov. 1985 88 p
(Contract F33615-83-C-2329)
(AD-A163052; P/W/GPD-FR-18710; AFWAL-TR-85-2054) Avail: NTIS HC A05/MF A01 CSCL 21/2

Analytical tasks consisting of new or improved models for predicting altitude ignition and lean deceleration blowout are developed. The approach taken was to describe the ignition and flame stabilization limits in terms of characteristic time models. Characterisitic times associated with chemical kinetics, fuel evaporation and hot flow residence are quantified for ignition and lean deceleration blowout limits. These expressions were interrelated according to the criteria for successful ignition and flame stabilization. Statistical analysis was used to compare the various expressions and select the appropriate terms that formulate models which best fit the data for altitude ignition and lean deceleration blowout. The models linearly correlate variations in combustor pressure, inlet temperature, fuel-air ratio, fuel temperature, air velocity, pressure drop, combustor front end geometry and injector size using existing data from USAF, Navy, NASA and P&W sponsored programs on operability performance of military and commercial gas turbine combustors. These models have been based entirely on full scale engine test. GRA

N86-24782# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MODEL FOR OXYGEN ATOM RECOMBINATION ON A SILICON DIOXIDE SURFACE Ph.D. Thesis
William A. Seward Dec. 1985 117 p refs
(AD-A163990; AFIT/DS/AA/85-1) Avail: NTIS HC A06/MF A01 CSCL 07/4

A steady state model for oxygen atom recombination for temperatures from 300 K to 2000 K on a silicon dioxide surface was developed based on the Langmuir-Rideal heterogeneous recombination mechanism. The bonding of atomic oxygen to the surface and the thermal desorption of atomic oxygen from the surface were also included in the model. The hypothesis was made that the gas-phase oxygen atoms combine directly with the oxygen atoms that constitute the silicon dioxide surface, with other gas-phase oxygen atoms replacing the lost atoms that were

bonded on the silicon dioxide surface matrix. The model agrees with the experimental data that is available in the literature, and provides an insight into the processes that control the recombination as a function of temperature. A set of two-dimensional, steady-state, laminar boundary-layer calculations was made using explicit numerical methods to demonstrate the use of this model and to explore the rational limits which may be placed on the role of catalysis for oxygen recombination on a silicon dioxide surface like that of the Space Shuttle. The predicted catalycity of the silicon dioxide surface did reduce the overall heating below that which would be predicted by a fully catalytic surface. GRA

N86-24783# Ballistic Research Labs., Aberdeen Proving Ground, Md.
COMPETING UNIMOLECULAR REACTIONS OF FLAME RADICALS. PART 1: ISOMERIZATION AND DISSOCIATION OF THE METHOXY RADICAL Final Technical Report
George F. Adams Nov. 1985 30 p refs
(AD-A164154; BRL-TR-2692) Avail: NTIS HC A03/MF A01 CSCL 07/4

Flame chemistry models for even simple chemical oxidations include hundreds of chemical reactions. The methoxy radical, CH30, appears as a constituent in chemical models that describe the oxidation of fuels, especially combustion systems. Ab initio electronic structure calculations provide chemical energy differences necessary for statistical mechanical rate coefficient estimates. We report the results of many-body perturbation theory results for two unimolecular reactions of the methoxy radical. Rate coefficient estimates for the dissociation (H-atom scission), and isomerization (1,2-hydrogen shift) reactions infer that these reactions compete at high temperatures. The results of this study do not provide a definitive demonstration that the isomerization reaction of the methoxy radical competes with the dissociation reaction. One simplified dynamical model suggests that the reactions do compete at high temperature. However, Troe's model for two-channel thermal unimolecular reactions predicts that the isomerization reaction does not compete with the dissociation reaction. The latter result, however, depends strongly upon the details of the energy-transfer processes that control the low-pressure rates, and on the rather gross approximations we've used in applying that model. GRA

N86-24784# Imperial Coll. of Science and Technology, London (England). Dept. of Chemical Engineering and Chemical Technology.
OPTICAL STUDIES OF ELECTRICAL DISCHARGE-LIQUID PROPELLANT INTERACTIONS
Fred B. Carleton, George Cherivan, Nathan Klein, and Felix J. Weinberg Jan. 1986 30 p refs
(Contract DAJA45-83-C-0040; DA Proj. 1L2-63627-D-155)
(AD-A164156; BRL-TR-2706) Avail: NTIS HC A03/MF A01 CSCL 21/2

In the course of investigating the ignition of liquid propellants by electrically initiated plasma discharges, it became clear that a number of complex and important processes were taking place within the reaction chamber, commonly called a plasma plug. This report describes the development of transparent plugs that permit optical access to the reaction chamber, and optical and electronic systems for high speed cine schlieren, shadow, and direct photography of events taking place within the cavity. A number of observations are presented and briefly discussed that demonstrate the power and versatility of the equipment. GRA

N86-24785# Illinois Univ., Urbana. Dept. of Chemistry.
TRANSPORT AND RELAXATION PROCESSES IN SUPERCRITICAL FLUIDS Technical Progress Report, 1 Jul. - 30 Sep. 1985
J. Jonas 1985 9 p
(Contract DE-FG22-82PC-50800)
(DE86-002921; DOE/PC-50800/T12) Avail: NTIS HC A02/MF A01

Among the studies presented in this report are: FTIR measurements of solubilities of anthracene in supercritical carbon dioxide, and NMR study of solid naphthalene solubilities in supercritical carbon dioxide near the upper critical end point. Experimental work on transport and relaxation properties of solid-supercritical fluid systems is in progress. DOE

N86-24786# National Bureau of Standards, Gaithersburg, Md.
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS, VOLUME 90, NUMBER 4, JULY-AUGUST 1985
Aug. 1985 69 p
(PB86-137627) Avail: NTIS HC A04/MF A01 CSCL 07D

This issue of the journal presents articles on many subjects of interest to the NBS. Some representative titles are: Recalibration of the U.S. National Prototype Kilogram; Density comparison of silicon artifacts between NML(Australia) and NBS(U.S.); Mass comparator for in-situ calibration of large mass standards; Determination of the enthalpies of combustion and formation of substituted triazines in an adiabatic rotating bomb calorimeter; Metrics and techniques to measure microcomputer productivity; Field effects on Rydberg atoms: International assembly discusses mechanisms of DNA damage repair; and Microbes play a considerable role in corrosion. E.J.R.

N86-24787# National Bureau of Standards, Gaithersburg, Md. Office of Standard Reference Data.
CHEMICAL THERMODYNAMICS IN STEAM POWER CYCLES DATA REQUIREMENTS
O. Jonas and H. J. White Jul. 1985 291 p refs Proceedings of a workshop held at Gaithersburg, Md., 8-9 Feb. 1983 Sponsored in part by the American Society of Mechanical Engineers, New York and the Electric Power Research Inst., Palo Alto, Calif.
(PB86-130937; NBSIR-85/3205) Avail: NTIS HC A13/MF A01 CSCL 07D

Data needs for chemical thermodynamics in power cycles are examined. The needs of the US power industry for reference data to solve corrosion problems in steam power systems, with emphasis on the thermodynamic data are reviewed. The desirability of establishing a data center to meet these needs are considered. The chemical substances, ranges of parameters, and types of data that should be involved are established. aba

N86-24788# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
DATA SOURCES FOR PARAMETERS USED IN PREDICTIVE MODELING OF FIRE GROWTH AND SMOKE SPREAD
D. Gross Sep. 1985 41 p
(PB86-130986; NBSIR-85/3223) Avail: NTIS HC A03/MF A01 CSCL 13L

Sources of data needed for predictive modeling of fire growth by FAST and ASET, two computer codes developed at the Center for Fire Research, are identified for a few selected materials. Data includes thermophysical properties of compartment lining materials and burning rates and combustion product generation rates for typical combustible contents. GRA

N86-24789# Centre d'Essais Aeronautique Toulouse (France).
PES (PLASTICIZER) LEVELS OF A BSL 914 RESIN (CEAT C76 REFERENCE) FROM DIFFERENT STANDARDS
Melle Pavand and M. Harribey 1985 27 p In FRENCH; ENGLISH summary
(PB86-120854; NT-15/M/85) Avail: NTIS HC A03/MF A01 CSCL 07D

In light of the tests which are the subject of the technical note, it is assumed that the various PES samples and all PES (polyether sulfone) contained in the different lots of Resin 914 analyzed at present have the same origin and demonstrate a characteristic CLHP peak. The first results given by the CEAT (PV No. 6977, Partial 1) are confirmed: The analytical method of CLHP of the PES in the special case of Resin 914 associated with an AS4 or T300 fiber seems therefore valuable: The absence of interaction fiber PES allows putting PES in solution and subsequently its CLHP dosage. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-24790 British Library Lending Div., Boston Spa (England).
REASONS FOR LOW PLASTICITY OF STEEL OF TYPE 25-20
N. V. Podobedova, V. P. Ostapenko, and A. V. Rabinovich 1985 4 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metallurgiya (USSR), 1985, no. 7 p 167-168
(BLL-36604-Ser-M-5828.4) Avail: British Library Lending Div., Boston Spa, Engl.

Despite the implementation of a number of measures recommended in the literature, ingots of grades [10,20] Kh23N18 steel from individual heats have an unsatisfactory deformability. This has necessitated a more detailed study of the reasons for the reduction in the plasticity of the metal and for the development of tears and cracks. Metallographic, X-ray crystallographic, and X-ray spectral analysis revealed that steel with poor deformability contains precipitations of phase containing approx. 35%Cr, approx. 10%Ni, 0.5%Si, 0.5%Mn, remainder Fe. Steel with satisfactory deformability has a single-phase austenitic structure. Using torsion, elongation, rolling, and forging the authors tested longitudinal specimens cut from 30 kg ingots of steel obtained by means of 12 process variants. The Cr/Ni concentration ratio was varied beween 1.23 and 1.47 and the addition of deoxidants (aluminum, REM, zirconium, calcium) was varied. B.W.

N86-24791 British Library Lending Div., Boston Spa (England).
USING REM OXIDES TO MODIFY STEEL
Yu. I. Shish, L. G. Volkov, and Yu. I. Gladilin 1985 4 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metallurgiya (USSR), no. 8, 1985 p 148-149
(BLL-M-36639-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

It was established that rare earth elements began to have a marked effect on metal quality only when their consumption was increased to 1.5 to 2.0 kg/t steel with a simultaneous rise in the residual content of aluminum from 0.010 to 0.012 to 0.027 to 0.032%, i.e. when the rare earth metal (REM) began to act not so much as a deoxidant than as a modifier. The impact strength of the trial metal at both normal and low (-20 and -40 C) temperatures was 1.5 to 1.7 times higher than that obtained by the usual technology. The sulphur content in the steel after the addition of REM to it fell by 15 to 20%. The macro- and microstructure of the finished steel were improved. E.R.

N86-24792 British Library Lending Div., Boston Spa (England).
SILICON DISTRIBUTION IN SYNTHETIC CAST IRON
V. I. Machikin, A. M. Zborshchik, and A. N. Smirnov 1985 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 9, 1985 p 169-170
(BLL-M-36689-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

An examination is made of the use of additional pulsation agitation of pig iron in the ladle to ensure uniform silicon distribution in synthetic cast iron produced by ladle addition of ferrosilicon. Author

N86-24793 British Library Lending Div., Boston Spa (England).
EFFECTIVENESS OF LASER TREATMENT OF MATERIALS BY SCANNING BEAM
V. V. Beletskii, A. N. Veremeevich, and A. V. Spivak 1985 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 9, 1985 p 170-171
(BLL-M-36690-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The comparative effectiveness of laser treatment of articles with a scanning and a stationary beam is discussed. Scanning by laser beam improves the output of the process and the uniformity of treatment. Author

N86-24794 British Library Lending Div., Boston Spa (England).
PROPERTIES OF 14Kh17N2 STEEL IN CORROSIVE ENVIRONMENT
V. I. Alimov, V. T. Shiryaev, and V. G. Onoprienko 1985 4 p refs Transl. into ENGLISH from Iz. (USSR), no. 9, 1985 p 171-172
(BLL-M-36691-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Simulation of the conditions experienced by the 14Kh18N2 steel hooks-and-swivels used on trolleys for conveying butcher's meat carcasses (ichor environment) and tensile and impact toughness tests of the steel following subjection to these conditions indicate that 14Kh18N2 steel should be used in the cold-rolled state as it then exhibits higher ductility and toughness properties and there is a lower fraction of brittle component in its fracture. It is also established that the strength of 14Kh18N2 steel is greater than that of the 12Kh18N9T steel used for the same purpose. Author

N86-24795 British Library Lending Div., Boston Spa (England).
DEPOSITION OF CHROMIUM CARBIDES ON STEEL IN ATMOSPHERE OF CARBON TETRACHLORIDE
V. F. Loskutov, A. F. Terentiev, and V. G. Khizhnyak 1985 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 9, 1985 p 173
(BLL-M-36693-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

X-ray diffraction analysis was used in a study of the influence of the temperature at which carbon tetrachloride is introduced into the reaction chamber atmosphere on the phase composition and thickness of chromium carbide-base coatings applied to steels 20, 45, U8A, and U10A. Author

N86-24796 British Library Lending Div., Boston Spa (England).
MELTING OF SOLID SOLUTION DURING CRYSTALLIZATION OF ALLOY WHITE CAST IRON
Yu. N. Taran, L. M. Snagovskii, and E. Ya. Vastilev 1985 3 p refs
(BLL-M-36677-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The processes of structure formation in white cast irons alloyed with vanadium and chromium are studied. In Fe-C-Cr systems a peritectic-eutectic reaction takes place, the basis of which is the process of breakdown of previously crystallized special carbide and its replacement by alloyed cementite. The breakdown of the special carbide occurs by way of its solution either in the melt or in the adjacent areas of solid solution. In both cases the process results in enrichment of the melt with carbon and alloying element due to the special carbide. After the melt has reached a peritectic composition it crystallizes into ledeburite. This phenomenon is associated with the directed mass transfer of carbon and alloying element through the primary austenite during the peritectic-eutectic reaction. Defects in the crystal lattice then act as traps for atoms of carbon and alloying element and can create the localized concentration of these elements necessary for the described process to occur. It is concluded that part of the so called secondary carbides in iron alloyed with chromium or vanadium are of a crystallization origin. E.R.

N86-24797 British Library Lending Div., Boston Spa (England).
THE THERMODYNAMIC PARTICULARS OF AMORPHOUS COBALT ALLOYS
K. V. Zakharchenko, D. K. Belashchenko, I. B. Kutsenok, and V. A. Geiderikh 1985 6 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metall., (USSR), 1985 no. 9
(BLLD-5828.4-M-36658) Avail: British Lending Library, Boston Spa, England

The method of instantaneously recording electromotive forces for studying the thermodynamic properties of an amorphous alloy of cobalt containing boron and silicon is presented. The alloy strip was produced by rapid cooling giving it shiny and matt sides, and it was found that the thermodynamic activity of the cobalt was higher at the shiny side. The chemical potential of the cobalt

is characteristically high in the alloys concerned, dropping appreciably when it has initially been annealed at a temperature below that at which solidification begins. Author

N86-24798 British Library Lending Div., Boston Spa (England).
MATHEMATICAL MODEL OF TEMPERATURE CONDITIONS OF COOLING OF METAL DURING PLASTIC DEFORMATION
A. M. Kushnir and E. I. Kazantsev 1985 10 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 9, p 81-86
(BLLD-5828.4-M-36663) Avail: British Library Lending, Boston Spa, England

Analytical solution of the heat conduction problem is given for an unlimited uniformly deformed plate, with the problem formulated in dimensionless criterion form. Obtained dependences can be used to model the temperature state of plastically deformed bodies in a wide range of processes of mechanical working of metals. Author

N86-24799 British Library Lending Div., Boston Spa (England).
METHOD OF PRODUCING A THREE-DIMENSIONAL COORDINATE GRID
O. I. Shavrin, V. B. Dementev, and N. A. Kokorin 1985 5 p refs Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 9
(BLLD-5828.4-M-36664) Avail: British Library Lending, Boston Spa, England

The three dimensional coordinate grid developed consists of a billet made up on concentric cylinders with different diameters in the form of alternate layers of metals similar in physical and mechanical properties to, but differing in etchability from the metal of the investigated billet with wire made of a metal differing in physical and mechanical properties from the materials of the cylinders threaded in longitudinal grooves cut every 60 degrees around the outside surfaces of the cylinders. Use of the given method of preparing a three dimensional coordinate grid increases the accuracy of determination of the deformation parameters throughout the volume of the specimen owing to the fact that the dimensions of the coordinate grid remain constant and the fact that the strong mutual welding of the cylinders in the specimen enable it to be used as a continuous (monolithic) specimen. Author

N86-24800 British Library Lending Div., Boston Spa (England).
COMPACTING KINETICS OF METAL POWDERS DURING PRESSING
V. G. Bakhtin, P. I. Polukhin, and A. B. Kudrin 1986 6 p refs Transl. into ENGLISH from Izvestiya (USSR), no. 9,1985 p 97-100
(BLLD-5828.4-M-36666) Avail: British Library Lending, Boston Spa, England

It is demonstrated that the compacting kinetics of a powder material can be investigated by the method of holographic interferometry employing a special die rig with a front glass wall of special material and thickness to ensure the conditions of the plane problem, i.e. no loss of flatness by the powder, for the stepwise production of holographic interferograms. It was established that change in the main compacting mechanism of a powder material during pressing results in a change in the nature of the three dimensional distribution of the deformations in the investigated briquette. Author

N86-24801 British Library Lending Div., Boston Spa (England).
THE HEAT TREATMENT OF Ti-Al-V SYSTEM ALLOY FOIL PRODUCED BY VACUUM PRECIPITATION
Ya. B. Ulanovskii, Yu. A. Skakov, and G. I. Dubnik 1986 9 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 9, 1985 p 112-115
(BLLD-5828.4-M-36668) Avail: British Library Lending, Boston Spa, England

The effects of heat treatment on the structure and properties of Ti-3Al-2V and Ti-6Al-4V alloy foil produced by vacuum precipitation are discussed. The base strip and annealing temperatures providing the best results are detailed. Author

N86-24802 British Library Lending Div., Boston Spa (England).
HEAT TREATMENT OF TOOL JOINTS FOR DRILL PIPES
M. N. Lobanov, V. A. Korotkov, and I. A. Tolstov 1986 6 p refs Transl. into ENGLISH from Izvestiya VUZ (USSR), no. 9, 1985 p 127-128
(BLLD-5828.4-M-36669) Avail: British Library Lending, Boston Spa, England

The authors determined the mechanical properties of 40KhN steel after normal and isothermal quenching to compare strength and ductility owing to the tendency of hardened threads to fracture in service. Isothermal quenching resulted in higher impact strength for constant static and fatigue strength than normal quenching. A heat treatment schedule is described for improving the seizing resistance and fracture strength of tool joint threads. Author

N86-24803 British Library Lending Div., Boston Spa (England).
INFLUENCE OF LIME ADDITIONS ON SILICOTHERMIC REDUCTION OF TITANIUM
Yu. A. Deryabin, L. A. Smirnov, and A. V. Mukhacheva 1986 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 8, 1985 p 147-148
(BLLD-5828.4-M-36638) Avail: British Library Lending, Boston Spa, England

A study was made of the processes of silicothermic reduction of titanium from slags of the melting of Kachkanar pellets. Titanium slag was mixed with ferrosilicon and lime and heated in graphite crucibles in a Tamman furnace until complete meltdown of the charge. After isothermal holding, the crucible was removed from the furnace and cooled in air.The influence of the ferrosilicon and lime contents of the charge on the concentration of titanium in the complex metallic alloy was established. Author

N86-24804 British Library Lending Div., Boston Spa (England).
DEGREE TO WHICH NATURAL GAS IS DISSOCIATED DURING THERMAL OXIDATION PYROLYSIS
G. V. Vornov, L. I. Prudnikova, V. A. Nyrko, E. G. Zorin, and N. N. Eremeeva 1986 8 p refs Transl. into ENGLISH from Izvestiya (USSR), p 111-113
(BLL-M-36630-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

To simplify calculation of the dissociation of natural gas during thermal dioxidizing pyrolysis, the authors consider that all heavy hydrocarbons should be represented as equivalent amounts of methane; natural gas is then regarded as a mixture of methane to which N2, CO2, etc. have been added as ballast. The assumption can only be made in the case of natural gas. The calculations described make it possible to evaluate the highest temperature for the thermal dissociation of methane for prescribed values of the temperature of the products of thermal oxidizing pyrolysis and the coefficient of consumption of air. Author

N86-24805 British Library Lending Div., Boston Spa (England).
INFLUENCE OF PARAMETERS OF MICROSTRUCTURE ON PROCESS OF HOT DEFORMATION OF TWO-PHASE STEEL
A. N. Rostovtsev, L. P. Laricheva, V. N. Peretyatko, and A. M. Levius 1986 7 p refs Transl. into ENGLISH from Izvestiya (USSR), no. 8, 1985 p 40-42
(BLL-M-36626-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The influence of the stereological parameters of microstructure on the plastic deformation process of a two phase steel is investigated mathematically. Refinement of the austenite grain, decrease in the energy of the packing defects and increase in the combination level of the austenite result in high-temperature work hardening of the austenite in a steel with a small amount of delta-ferrite. Increase in the area of the interphase surface results in an increase in the degree of softening. Author

N86-24806 British Library Lending Div., Boston Spa (England).
ENTHALPIES OF MIXING OF ALKALINE-EARTH METALS WITH IRON AND NICKEL
E. D. Pletneva, Yu. O. Esin, V. V. Litovskii, and S. E. Demin 1986 7 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya

Metallurgiya (USSR), no. 8, 1985 p 10-12
(BLLD-5828.4-M-36625) Avail: Bristish Library Lending Div., Boston Spa, Engl.

The Kohler and Gromakov methods were used to estimate the integral enthalpies of formation of liquid alloys Fe-Ca, Fe-Ba, Ni-Ca, and Ni-Ba. These binary systems were examined as components of the ternary systems Fe-Si-Ca, Fe-Si-Ba, Ni-Si-Ca, and Ni-Si-Ba. Results of experimental calorimetric investigations of the concentration dependences of the enthalpies of formation of liquid alloys are discussed. Author

N86-24807 British Library Lending Div., Boston Spa (England).
THERMOKINETIC DIAGRAM OF EMBRITTLEMENT OF MARAGING STEEL 03N18K9M5T-VD
Yu. G. Andreev, V. N. Tolstikov, and O. K. Revyakina 1986 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 8, 1985 p 156-157
(BLLD-5828.4-M-36648) Avail: Bristish Library Lending Div., Boston Spa, Engl.

The influence of cooling rate in the temperature range 750-1200C on the degree of embrittlement of maraging steel 03N18K9M5T-VD was studied with the aim of plotting the thermokinetic diagram of the process. The influence of the steel-making method and the carbon content of the steel on the kinetics and degree of embrittlement was also determined. Author

N86-24808 British Library Lending Div., Boston Spa (England).
INFLUENCE OF OXIDATION ON COEFFICIENT OF HYDROGEN DIFFUSION IN MERAGING STEELS
V. V. Lobanov, M. G. Svidorov, and N. P. Zvonareva 1986 3 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 8, 1985 p 155-158
(BLL-M-36647-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The influence of the oxidizing time and the thickness of scale were examined in VNS-2M steels. The kinetics of scale formation was studied on flat control specimens. B.G.

N86-24809 British Library Lending Div., Boston Spa (England).
INFLUENCE ON WEAR OF TRANSLATIONAL VELOCITY OF SPECIMENS DURING LASER BORIZING OF STEEL
L. S. Lyakhovich, S. A. Isakov, and V. M. Kartoshkin 1986 3 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 8, 1985 p 155
(BLL-M-36646-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

For comparison of the degrees of wear, specimens borized in furnaces under conditions ensuring the attainement of monophase (Fe2B) and two phase (FeB, Fe2B) layers were worn under the same conditions. The degree of wear was determined as the arithmetic mean of 6 trials. Two factors were found to positively influence the degree of specimen wear: burning up of the boron and the phase composition of the layer. The pattern of wear is the same for specimens after furnace borizing. B.G.

N86-24810 British Library Lending Div., Boston Spa (England).
INFLUENCE OF ANNEALING TEMPERATURE ON DUCTILE PROPERTIES OF STEEL WIRE
V. I. Alimov, B. Kabrera, and A. P. Shtykhno 1986 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 8, 1985 p 153-154
(BLL-M-36645-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The ductile properties of fine steel wire after annealing in a wide temperature range were studied through an evaluation of the number of bends and twists to fracture. The investigations were carried out on 0.9 mm diameter wire prepared from sections of 3.0 mm diameter semi of high alloy steel 75 (0.74% C) and on samples of wire of the same diameter taken from a normalized semi of low alloy steel 10 (0.09% C). Annealing was carried out two months after drawing at a range of temperatures between 125 and 700 C with a heating time of 1 h. Annealing at temperatures not exceeding 300 C either maintains or slightly increases the number of bends and twists that the wire of both grades of steel can withstand. A higher annealing temperature (300 to 500 C) leads to a drop in the values of these properties for the high carbon steel 75, whereas for the low carbon steel 10 over this temperature range there is a continuous increase in the ductile properties. At annealing temperatures above 500 C the number of bends and twists varies non-monotonically owing to the ambiguous influence of grain size and type and the type of cementite. M.G.

N86-24811 British Library Lending Div., Boston Spa (England).
STUDY OF PHASE DISTRIBUTION IN UNSTABLE AUSTENITE STEEL USING THERMOELECTROMOTIVE FORCES
A. N. Bogomolov, V. R. Baraz, and A. N. Makhankov 1986 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 8, 1985 p 152-153
(BLL-M-36644-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The method of measuring thermoelectromotive forces U is known to be one of the most sensitive in the study of phase transformations in metallic alloys and it can be used for solving particular tasks in metal science. In the present work the authors consider the influence of plastic deformation on variation in the thermoelectromotive force over the cross section of 2 mm dia. wire specimens of 12Khs17N8G2S2MF unstable austenitic steel. The steel was quenched form 1080 deg C and suquently drawn with an overall reduction of 85%. Some of the specimens were tested in the quenched (purely austenitic) state. For comparison, a parallel study was made of 13Kh18N10G3S2M2 stable austenitic steel subjected to the same treatment process. The measurements were carried out on a unit with a tungsten probe with a temperature difference of 100 deg between the hot and cold contacts. The specimens were subjected to electrolytic polishing to remove the work hardened layer that had formed during their preparation. It should be noted that the residual stresses can themselves have a certain influence on the thermoelectromotive force, but in the present case the main factor is the change in the phase composition of the deformed steel. Author

N86-24812 British Library Lending Div., Boston Spa (England).
MAGNETIC SUSCEPTIBILITY OF Fe-Cr-O ALLOYS
V. E. Sidorov, V. S. Gushchin, and B. A. Baum 1986 4 p refs Transl. into ENGLISH from Izvestiya VUZ Chernaya Metall. (USSR), no. 8, 1985 p 152
(BLL-M-36643-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

In the present work the Faraday method was used to study the magnetic susceptibility chi of Fe-Cr-O alloys in the range of chromium contents from 0 to 2% and of oxygen concentrations from 0.002 to 0.07%, in the temperature range 1000-1800 deg C. The measurements were made in an atmosphere of high-purity helium in alumina crucibles. The error in determining absolute values of chi did not exceed + or - 19%. The specimens were subjected to chemical analysis for chromium and oxygen before and after the experiments. It was revealed that the chromium concentration scarcely varied during the experiments, but the oxygen content fell on average by 5-7% from the initial value. The results of the measurements are presented. A strong non-additive influence of chromium on the magnetic properties of the iron is revealed. Author

N86-24813*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF AN ATMOSPHERIC PRESSURE SAMPLING MASS SPECTROMETER TO CHLORINATION REACTIONS
Nathan S. Jacobson 1986 20 p refs Presented at the 115th TMS-AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986; sponsored by Metallurgical Society
(NASA-TM-87270; E-2888; NAS 1.15:87270) Avail: NTIS HC A02/MF A01 CSCL 11F

An atmospheric pressure mass spectrometric sampling system, based on a free jet expansion was used to study certain M-Cl-O reactions at high temperatures. The apparatus enables

the volatile species from a 1-atm chemical process to be directly identified with a mass spectrometer which operates at approx. 10 to the minus 8th power torr. Studies for both pure metals and alloys are discussed. It is shown that this mass spectrometer system aids in identifying the volatile species, and provides fundamental information on the reaction mechanism. E.A.K.

N86-24814*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIFFUSION OXYGEN BARRIER COATING A02/MF A01 Patent Application
Jalaiah Unnam, inventor (to NASA) (Analytical Services and Materials, Inc., Tabb, Va.) and Ronald Keith Clark, inventor (to NASA) Filed 18 Mar. 1986 15 p
(NASA-Case-LAR-13474-1-SB; NAS 1.71:LAR-13474-1-SB; US-Patent-Appl-SN-840900) Avail: NTIS HC A02/MF A01 CSCL 11F

A method for coating a titanium panel or foil with aluminum and amorphous silicon to provide an oxygen barrier abrogating oxidation of the substrate metal is developed. The process is accomplished with known inexpensive procedures common in materials research laboratories, i.e., electron beam disposition and sputtering. The procedures are conductive to treating foil gage titanium and result in submicron layers which virtually add no weight to the titanium. There are no costly heating steps. The coatings blend with substrate titanium until separate mechanical properties are subsumed by those of the substrate eliminating cracking and spallation. This method appreciably increases the ability of titanium to perform in high thermal environments such as those witnessed on structures of space vehicles during re-entry. The novelty of this method is the ability to greatly enhance the operating envelope of titanium metal, particularly in thermal protection system applications. Author

N86-24815*# National Aeronautics and Space Administration, Washington, D.C.
ANISOTROPY OF HIGH TEMPERATURE STRENGTH IN PRECIPITATION-HARDENED NICKEL-BASE SUPERALLOY SINGLE CRYSTALS
Y. G. Nakagawa, H. Terashima, H. Yoshizawa, Y. Ohta, and K. Murakami Mar. 1986 25 p refs Transl. into ENGLISH from Ishikawajima-Harima Engineering Review (Japan), v. 25, Jan. 1985 p 5-10 Original language doc. was announced in IAA as A85-38443 Transl. by Kanner (Leo) Associates, Redwood City,iCalif.
(Contract NASw-4005)
(NASA-TM-88387; NAS 1.15:88387; ISSN-0578-7904) Avail: NTIS HC A02/MF A01 CSCL 11F

The anisotropy of high temperature strength of nickel-base superalloy, Alloy 454, in service for advanced jet engine turbine blades and vanes, was investigated. Crystallographic orientation dependence of tensile yield strength, creep and creep rupture strength was found to be marked at about 760C. In comparison with other single crystal data, a larger allowance in high strength off-axial orientation from the 001 axis, and relatively poor strength at near the -111 axis were noted. From transmission electron microscopy the anisotropic characteristics of this alloy were explained in terms of available slip systems and stacking geometries of gamma-prime precipitate cuboids which are well hardened by a large tantalum content. 100 cube slip was considered to be primarily responsible for the poor strength of the -111 axis orientation replacing the conventional 111 plane slip systems. Author

N86-24816*# National Aeronautics and Space Administration, Washington, D.C.
CONTRIBUTION TO THE STUDY OF THE ELECTRIC ARC: EROSION OF METALLIC ELECTRODES Thesis
A. Castro May 1986 67 p refs Transl. into ENGLISH of "Contribution a l'Etude de l'Arc Electrique. Erosion des Electrodes Metalliques" Paris XI (Orsay, France), 12 Jan. 1978 p 1-82 Presented at Annual Convention of the German Aerospace Society, Hamburg, West Germany, 1-3 Oct. 1984; Sponsored by Deutsche Gesellschaft fuer Luft- und Raumhafrt Original language document was previously announced in IAA as A79-23426 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77855; NAS 1.15:77855) Avail: NTIS HC A04/MF A01 CSCL 11F

A procedure is described for determining the extent of arc electrode erosion (excluding erosion due to transfer of material) from measurements of emitted spectral beam intensity. The relation between emission intensity and plasma temperature is ascertained. Experimental study of several combinations of monometallic electrodes shows that the method is suitable for determining cathode erosion, although the anode metal affects the extent of erosion. Combinations of electrodes which lead to low erosion of silver are reported. M.L.

N86-24817# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
CORROSION OF NICKEL AND COBALT BASE ALLOYS IN SULFATE MELTS AT 750 DEG C Final Report
Ajay K. Misra Apr. 1986 31 p refs Presented at the 169th Meeting of the Electrochemical Society, Boston, Mass., 4-9 May 1986
(Contract NCC3-43)
(NASA-CR-175111; E-3035; NAS 1.26:175111) Avail: NTIS HC A03/MF A01 CSCL 11F

The corrosion of Ni, Co, plus several nickel and cobalt-base alloys was studied at 750 C in the presence of molten sulfate mixtures and in an atmosphere consisting of O_2 + 0.12% SO_2+SO_3. The melt system selected were Na_2SO_4-Li_2SO_4 and Na_2SO_4-$CoSO_4$. The corrosion of pure metals took place by the formation of a mixed oxide plus sulfide scale. A mixed oxide plus sulfide of the base metal is also formed during the initial stage of corrosion of the alloys; however, subsequently a Cr rich sulfide is formed underneath the outer base metal rich scale. With time, the outer part of the inner scale oxidizes to an oxide and more sulfides are formed beneath the oxide. The inner scale is formed as a continuous layer for the low Cr containing alloys and the inner scale is formed in localized sites in the form of pits for the higher Cr containing alloys. Author

N86-24818*# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
THERMAL-MECHANICAL FATIGUE BEHAVIOR OF NICKEL-BASE SUPERALLOYS Final Report
R. M. Pelloux and N. Marchand Mar. 1986 186 p refs
(Grant NAG3-280)
(NASA-CR-175048; NAS 1.26:175048; USAAVSCOM-TR-86-C-4) Avail: NTIS HC A09/MF A01 CSCL 11F

The main achievements of a 36-month research program are presented. The main objective was to gain more insight into the problem of crack growth under thermal mechanical fatigue (TMF) conditions. This program was conducted at M.I.T. for the period of September 1982 to September 1985. The program was arranged into five technical tasks. Under Task I, the literature of TMF data was reviewed. The goal was to identify the crack propagation conditions in aircraft engines (hot section) and to assess the validity of conventional fracture mechanics parameters to address TMF crack growth. The second task defined the test facilities, test specimen and the testing conditions needed to establish the effectiveness of data correlation parameters identified in Task I. Three materials (Inconel X-750, Hastelloy-X, and B-1900) were chosen for the program. Task II was accomplished in collaboration with Pratt & Whitney Aircraft engineers. Under Task III, a computerized testing system to measure the TMF behavior (LCF and CG behaviors) of various alloys systems was built. The software used to run isothermal and TMF tests was also developed. Built around a conventional servohydraulic machine, the system is capable of push-pull tests under stress or strain and temperature controlled conditions in the temperature range of 25C to 1050C. A crack propagation test program was defined and conducted under Task IV. The test variables included strain range, strain rate (frequency) and temperature. Task V correlated and generalized the Task IV data for isothermal and variable temperature

conditions so that several crack propagation parameters could be compared and evaluated. The structural damage (mode of cracking and dislocation substructure) under TMF cycling was identified and contrasted with the isothermal damage to achieve a sound fundamental mechanistic understanding of TMF. Author

N86-24819# Sandia National Labs., Albuquerque, N. Mex.
MICROSTRUCTURES OF SURFACE-MELTED ALLOYS
D. M. Follstaedt and S. T. Picraux 1985 86 p Presented at the ASM Metals Congress, International Conference on Surface Modifications, Toronto, Ontario, Canada, 13 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002916; SAND-85-1961C; CONF-8510160-8) Avail: NTIS HC A05/MF A01

The microstructures formed by rapid melting and solidification of surface alloys on metal substrates are described for fast laser and electron beam heating. Primary emphasis is placed on developing a general perspective on the materials science of rapid solidification. Surface melting produces controllable and calculable thermal histories, which allow quantitative evaluation of kinetic and thermodynamic alloy parameters affecting the microstructures produced by rapid solidification. The heating and cooling rates obtainable with surface melting (up to 10 to the 10th power K/s) allow faster quenching regimes to be examined. The wide range of microstructures which can be accessed by surface melting is illustrated in turn for pure metals, ion-implanted surface alloys, deposited layer alloys and engineering alloys. DOE

N86-24820# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.
ADVANCED PROCESSING AND PROPERTIES OF HIGH PERFORMANCE ALLOYS Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Donald A. Koss 29 Nov. 1985 19 p refs
(Contract N00014-85-K-0427)
(AD-A163469; TR-3) Avail: NTIS HC A02/MF A01 CSCL 11/6

Progress is reviewed for a research whose purpose is to provide a fundamental understanding of the applications and consequences of selected advanced processing techniques to high performance alloys. The research ranges from modelling studies of the fracture of alloys containing porosity to the high temperature deformation of rapidly solidified, dispersion-strengthened titanium alloys. Many aspects of the research are also fundamental studies of fracture utilizing engineering alloys containing processing-induced defects. Progress for the period October 1, 1984 to September 30, 1985 is reviewed for the following studies comprising this research program: (1) the influence of void/pore distributions on ductile fracture; (2) the effect of porosity on low cycle fatigue; (3) hot isostatic pressing of metallic powders; (4) deformation of rapidly solidified Ti alloys at elevated temperatures; and (5) the combined effect of stress state and grain size on hydride-induced hydrogen embrittlement. Author (GRA)

N86-24821# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CONSTANT-LOAD-AMPLITUDE FATIGUE CRACK GROWTH TESTING OF CAST ALUMINUM ALLOYS A201-T7 AND A357-T6 Final Report, Mar. 1983 - Apr. 1984
J. D. Tirpak Nov. 1985 60 p refs
(AD-A163494; AFWAL-TR-85-4096) Avail: NTIS HC A04/MF A01 CSCL 11/6

This report is a repository of constant-load-amplitude fatigue crack growth rate data for cast aluminum alloys A201-T7 and A357-T6. Conditions were R=0.1, room temperature, lab air, and growth rates were above .0000001 m/cycle. The data herein was published for use by the aerospace community. From this data, it appears as if cast aluminum alloys possess some variability with respect to fatigue crack growth rate. For the most part though, the data is to serve as a nucleus for evaluating fatigue and fracture data for aluminum casting alloys, and generating impetus for further evaluation of these alloys with respect to fracture. GRA

N86-24822# Integrated Systems Analysts, Inc., National City, Calif.
CORROSION-CONTROL (CC) PROGRAM SIMA (SHORE INTERMEDIATE MAINTENANCE ACTIVITY) PILOT CC (CORROSION-CONTROL) SHOP SERVICE TEST AND TECHNICAL SUPPORT. VOLUME 1. SECTIONS 1 TO 8 Final Report, 1 Aug. - 30 Nov. 1985
W. Adkins, S. Kullerd, C. McPherron, M. Miller, and O. OBrien 30 Nov. 1985 175 p refs
(Contract N66001-85-C-0350)
(AD-A163670; ISA(WC)-107-Vol-1) Avail: NTIS HC A08/MF A01 CSCL 11/6

The objective of the SIMA Corrosion-Control Program was to develop a functional and production capability for SIMAs to deliver and support corrosion-control coating systems being used by the Navy in new construction ships and in the maintenance, repair and overhaul of ships in service. The results of the one-year Service Test of the SIMA San Diego Pilot Corrosion Control Shop at SIMAs are presented. The one-year Service Test was completed on 30 November 1985. The establishment and operation of the Pilot Shop are summarized. For the Production Shop, recommendations are included for organization, manning, equipment, shop operation, shipboard operation, installation kits, planning and training to implement the establishment of a SIMA Production Shop. GRA

N86-24823# Integrated Systems Analysts, Inc., National City, Calif.
CORROSION-CONTROL (CC) PROGRAM SIMA (SHORE INTERMEDIATE MAINTENANCE ACTIVITY) PILOT CC (CORROSION-CONTROL) SHOP SERVICE TEST AND TECHNICAL SUPPORT. VOLUME 2: APPENDICES A3, A4, A6, A8 Report, 1 Aug. - 30 Nov. 1985
W. Adkins, S. Kullerd, C. McPherron, M. Miller, and O. OBrien 30 Nov. 1985 390 p refs
(Contract N66001-85-C-0350)
(AD-A163671; ISA(WC)-107-Vol-2) Avail: NTIS HC A17/MF A01 CSCL 11/6

The objective of the SIMA Corrosion-Control Program was to develop a functional and production capability for SIMAs to deliver and support corrosion-control coating systems being used by the Navy in new construction ships and in the maintenance, repair and overhaul of ships in service. Appendices a3, a4, a6, and a8 are given. GRA

N86-24824# Integrated Systems Analysts, Inc., National City, Calif.
CORROSION-CONTROL (CC) PROGRAM SIMA (SHORE INTERMEDIATE MAINTENANCE ACTIVITY) PILOT CC (CORROSION-CONTROL) SHOP SERVICE TEST AND TECHNICAL SUPPORT. VOLUME 3: APPENDIX A7 Report, 1 Aug. - 30 Nov. 1985
W. Adkins, S. Kullerd, C. McPherron, M. Miller, and O. OBrien 30 Nov. 1985 303 p refs
(Contract N66001-85-C-0350)
(AD-A163672; ISA(WC)-107-Vol-3) Avail: NTIS HC A14/MF A01 CSCL 11/6

The objective of the SIMA Corrosion-Control Program was to develop a functional and production capability for SIMAs to deliver and support corrosion-control coating systems being used by the Navy in new construction ships and in the maintenance, repair and overhaul of ships in service. Appendix A7 is given. GRA

N86-24825# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RELYING ON PROGRESS OF TECHNOLOGY, TO DEVELOP OUR ALLOY STEEL
Dong Yang 3 Jan. 1986 18 p refs Transl. into ENGLISH from Gangtie (China), v. 18, no. 8, Aug. 1983 p 1-6
(AD-A163690; FTD-ID(RS)T-0927-85) Avail: NTIS HC A02/MF A01 CSCL 11/6

Since the establishment of the new People's Republic of China, the national production of alloy steel as well as the technology development have improved very much from almost nonexistent to current status. The annual yield of alloy steel increased from two to three thousand tons in 1949 to the maximum production of two and a half million tons in 1979. We have now more than

six hundred alloy steel products. Basic types such as plate, pipe, wire, belt, cake, ring and shape are complete. The quality of alloy steel has improved significantly in recent years also. One hundred and twenty three types of alloy steel products have been recognized to meet national, ministry, province and municipal standards. However, when compared with the requirement of continuous development for national economy and other advanced industrial countries' standards, there still remains quite a gap. Therefore, it is our honor and difficult responsibility to develop a new era of alloy steel production. This work also meets the instruction of Premier Chao to advance our nation's industries of alloy steel and low alloy steel. GRA

N86-24826 Department of the Air Force, Washington, D.C.
METHOD TO REVEAL MICROSTRUCTURES IN SINGLE PHASE ALLOYS Patent
Isaac Weiss, inventor (to Air Force), Francis H. Froes, inventor (to Air Force), and Daniel Eylon, inventor (to Air Force) Issued 20 Mar. 1986 5 p
(AD-D012020; US-Patent-4,548,903; US-Patent-Appl-SN-595153; US-Patent-Class-436-5) Avail: US Patent and Trademark Office CSCL 11/6

A method for revealing the microstructure of metal alloys comprises the steps of polishing the sample, chemically etching the polished metal surface, thermally etching the chemically etched surface and quenching the thermally etched sample. This method allows observation of deformed and recrystallized grains on the same polished surface and provides the opportunity to correlate recrystallized grains to their nucleation sites. GRA

N86-24827# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
SYNTHESIS AND PROPERTIES OF ELEVATED TEMPERATURE P/M ALUMINUM ALLOYS Final Report, 1 Oct. 1981 - 30 Sep. 1985
Morris E. Fine and Julia R. Weertman 30 Nov. 1985 114 p refs
(Grant AF-AFOSR-0005-82)
(AD-A164158; AFOSR-85-1258TR) Avail: NTIS HC A06/MF A01 CSCL 11/6

The microstructure of the aluminum base-iron-cerium and iron-molybdenum-vanadium alloys, which were developed for use up to 316 degrees centigrade, is not stable at 425 degrees centigrade (three-quarters of the absolute melting temperature of aluminum). Metastable dispersed phases are replaced by stable phases and particles of these coarsen rather rapidly with time. Creep loading accelerates these processes. Trialuminum-zirconium was predicted to be a preferable dispersed phase for strengthening aluminum for the 425 C temperature range because of good lattice matching with the aluminum matrix giving a low interfacial energy. This is true for the thermodynamically stable tetragonal phase but especially true for the metastable cubic phase. Dilute alloys were prepared by arc melting and these were aged to form precipitate dispersed phase. Substitution of vanadium for zirconium improved the lattice parameter matching for both cubic and tetragonal trialuminum-zirconium as well as increasing the stability of the cubic form. The coarsening rates of the particles at 425 C were 100 to 1000 times slower than for the aluminum-iron-cerium or molybdenum alloys, the aluminum-zirconium-vanadium alloy being better than the binary aluminum-zirconium alloy in this respect. These alloys are very promising as the basis for better high temperature aluminum alloys. Author (GRA)

N86-24828# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineeri
NON-LINEAR OPTICAL TECHNIQUES FOR VISIBLE AND UV LASERS AND THIN FILM DEPOSITION Final Report, 1 Oct. 1984 - 30 Sep. 1985
J. G. Eden Nov. 1985 18 p refs
(Contract F49620-83-C-0003)
(AD-A164186, AFOSR-85-1222TR) Avail: NTIS HC A02/MF A01 CSC 07/5

Thin metal films have been deposited by a multiphoton ionization technique. Laser-initiated semiconduct thin-film growth has been demonstrated and laser irradiation of the substrate has produced higher quality films than that obtained by growth without the laser. Also, laser induced breakdown (LIB) has been shown to be a highly sensitive technique for detecting minute impurities. In addition, a significant improvement in XeCl laser energy output has been realized by the injection of a low intensity UV laser pulse into the XeCl laser cavity. GRA

N86-24829# Naval Research Lab., Washington, D. C.
CRACKING RESISTANCE IN A 4.5-INCH (114-MM) PLATE OF 7075-T7351 ALUMINUM ALLOY Final Report
G. R. Yoder, L. A. Cooley, T. J. Watson, and T. W. Crooker 12 Dec. 1985 49 p refs
(AD-A164229; NRL-MR-5699) Avail: NTIS HC A03/MF A01 CSCL 11/6

After an anodizing treatment, peculiarities were observed in the appearance of structural components for the Space Shuttle, thought to be indicative of flaws in the Al-7075-T7351 material. Consequently, work was undertaken to explore structural integrity aspects of this material as well as the nature of any material defects. The material contains a number of macro- and microstructural inhomogeneities which could be classed as defects or potential crack-like defects, viz. stringers of brittle constituent particles, shrinkage cavities, and in one instance, a long line of sponge-like porosity. Nonetheless, uniaxial strength level was found to exceed design requirements. Similarly, results for cracking resistance- in terms of fracture toughness, fatigue crack growth rates (DA/DN) and rotating beam fatigue life (S/N), appear to meet or exceed handbook levels. However, the very largest defects are so infrequently observed that their presence in the crack tip process zone of an individual fracture mechanics specimen is something less than likely. The unusual macroappearance of anodized components may be attributable to entrapment of anodizing solution by microshrinkage cavities and/or microcracks along constituent particle stringer interfaces, with subsequent seepage and staining adjace nt to these and/or other flaws. GRA

N86-24830# Georgia Univ., Athens. Dept. of Chemistry.
METAL CLUSTER TOPOLOGY. PART 3: PLATINUM CARBONYL CLUSTERS
R. B. King 29 Jan. 1986 24 p refs
(Contract N00014-85-K-0365)
(AD-A164241; TR-17) Avail: NTIS HC A02/MF A01 CSCL 07/4

Previously discussed topological models of metal cluster bonding are now extended to the treatment of stacked platinum carbonyl clusters, whose structure and bonding exhibit a variety of new features. The stacked triangle cluster dianions Pt3k(CO) 6k(2-) (k=2,3,4,5) are best regarded as built from edge-localized bonds with additional Mobius delocalization on both the top and bottom triangles of the stack. These stacked triangles thus appear to be the first examples of stable chemical species having planar rings of atoms exhibiting Mobius rather than untwisted Huckel delocalization. Such Mobius delocalization can naturally arise from the phase changes of appropriated orbitals of each of the platinum atoms in the top and bottom triangles of the stack. The more complicated tetraanion Pt19(CO)22(4-) can be regarded structurally as a threaded tube in which a Pt15 stack of three pentagons is the tube and a Pt4 chain is the thread. Edge-localized bonding is then seen to occur within both the Pt15 stack (25 edges) and the Pt4 thread (3 edges) with additional delocalized bonding within the pentagonal pyramidal chambers at each end of the stack. These seemingly rather exotic topological bonding models are consistent with the general principles of metal cluster bonding and reproduce exactly the observed electron counts for the stacked platinum carbonyl clusters. GRA

N86-24831# Argonne National Lab., Ill.
STRUCTURAL STUDY OF MULTILAYERED VANADIUM/NICKEL SUPERLATTICES
Hitoshi Homma, Yves Lepetro, James M. Murduck, Ivan K. Schuller, and C. F. Majkrzak (Brookhaven National Lab., Upton, N.Y.) Jul.

1985 7 p refs Presented at the SPIE 29th Annual International Technical Symposium on Applications of Thin-Film Multilayered Structures to Figured X-Ray Optics, San Diego, Calif., 18-23 Aug. 1985 Sponsored in part by DOE
(Contract N00014-83-F-0031)
(DE85-018396; CONF-850887-38) Avail: NTIS HC A02/MF A01

The microstructure of V/Ni metallic superlattice was studied by using X-ray and neutron diffraction. A sharp and broad rocking curve around the first order Bragg peak was found, which is attributed to a columnar structure which gives rise to two modulation structures: one the ordinary layered structure within the columns and the other the averaged modulation structure which produces the sharp rocking peak. E.A.K.

N86-24832# California Univ., Berkeley. Lawrence Berkeley Lab.
ACCURATE STURCTURE FACTOR DETERMINATION OF BINARY CUBIC SOLID SOLUTIONS
A. G. Fox and R. M. Fisher 15 Apr. 1986 6 p Presented at the Electron Microscopy and Analysis Group Conference, Newcastle-Upon-Tyne, England, 2 Sep. 1985 Prepared in cooperation with Wolverhampton Polytechnic, Engl.
(Contract DE-AC03-76SF-00098)
(DE86-002891; LBL-19947; CONF-8509168-3) Avail: NTIS HC A02/MF A01

The Critical Voltage technique (V(sub C)) in HEED can measure low angle X-ray structure factors of crystalline materials to within 0.1% provided accurate higher angle structure factors and Debye-Waller factors are available. The extension of this technique to a range of alloys in the systems CuAu, CuAl and FeCr is presented. DOE

N86-24833 United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
TRANSVERSE MICROSECTIONS OF THIN OXIDE SCALES FOR AEM STUDIES
J. A. Desport Apr. 1984 37 p refs
(AERE-R-11266) Copyright. Avail: Issuing Activity

Procedures are described for the preparation of transverse sections of oxide scales formed on metals and alloys for subsequent transmission electron microscopic examination. Equipment was designed and assembled specifically to mechanically prepare flat and parallel sections of thin fragile oxide scales to less than 10 micron thickness. Improvements were made to commercial equipment for the ion beam thinning of the scales to electron transparency. Methods and equipment were designed additionally for safe specimen handling and storage. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-24834# California Dept. of Transportation, Sacramento. Office of Transportation Lab.
LOW-SOLVENT PRIMER AND FINISH COATS FOR USE ON STEEL STRUCTURES Final Report
R. Warness Jan. 1985 90 p Sponsored in part by the Federal Highway Administration, Sacramento, Calif.
(PB86-139326; FHWA/CA/TL-85/02) Avail: NTIS HC A05/MF A01 CSCL 11C

Low solvent coatings designed for application of protection of steel in bridges and other structures of structural steel were evaluated. Coatings determined to provide the best performance from laboratory studies were water-borne primers based on a styrene acrylic emulsion and water-borne finish coats based on a 100% acrylic emulsion. GRA

N86-24835*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A PRELIMINARY STUDY OF ESTER OXIDATION ON AN ALUMINUM SURFACE USING CHEMILUMINESCENCE
William R. Jones, Jr., Michael A. Meador, and Wilfredo Morales 1986 32 p refs Presented at the Annual Meeting of the American Society of Lubrication Engineers, Toronto, Ontario, 12-15 May 1986
(NASA-TM-87242; E-2647; NAS 1.15:87242) Avail: NTIS HC A03/MF A01 CSCL 11C

The oxidation characteristics of a pure ester (trimethyolpropane triheptanoate) were studied by using a chemiluminescence technique. Tests were run in a thin-film micro-oxidation apparatus with an aluminum alloy catalyst. Conditions included a pure oxygen atmosphere and a temperature range of 176 to 206 C. Results indicated that oxidation of the ester (containing 10 to the minus 3 power M diphenylanthracene as an intensifier) was accompanied by emission of light. The maximum intensity of light emission (I sub max) was a function of the amount of ester, the concentration of intensifier, and the test temperature. The induction period or the time to reach one-half of maximum intensity (t sub 1/2) was an inverse function of test temperature. Decreases in light emission at the later stages of a test were caused by depletion of the intensifier. Author

N86-24836*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IMPROVED CONSOLIDATION OF SILICON CARBIDE
Marc R. Freedman and Michael L. Millard (General electric co., Evendale ,Ohio) 1986 14 p refs Presented at the 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19-22 Jan. 1986; sponsored by American Ceramic Society
(NASA-TM-87243; E-2921; NAS 1.15:87243) Avail: NTIS HC A02/MF A01 CSCL 11C

Alpha silicon carbide powder was consolidated by both dry and wet methods. Dry pressing in a double acting steel die yielded sintered test bars with an average flexural strength of 235.6 MPa with a critical flaw size of approximately 100 micro m. An aqueous slurry pressing technique produced sintered test bars with an average flexural strength of 440.8 MPa with a critical flaw size of approximately 25 micro m. Image analysis revealed a reduction in both pore area and pore size distribution in the slurry pressed sintered test bars. The improvements in the slurry pressed material properties are discussed in terms of reduced agglomeration and improved particle packing during consolidation. Author

N86-24837*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADEQUACY OF SURFACE ANALYTICAL TOOLS FOR STUDYING THE TRIBOLOGY OF CERAMICS
Harold E. Sliney Apr. 1986 21 p refs
(NASA-TM-87308; E-2756; NAS 1.15:87308) Avail: NTIS HC A02/MF A01 CSCL 11C

Surface analytical tools are very beneficial in tribological studies of ceramics. Traditional methods of optical microscopy, XRD, XRF, and SEM should be combined with newer surface sensitive techniques especially AES and XPS. ISS and SIMS can also be useful in providing additional compositon details. Tunneling microscopy and electron energy loss spectroscopy are less known techniques that may also prove useful. Author

N86-24838*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ABRASION AND DEFORMED LAYER FORMATION OF MANGANESE-ZINC FERRITE IN SLIDING CONTACT WITH LAPPING TAPES
Kazuhisa Miyoshi, Donald H. Buckley, and Kyuichiro Tanaka (Kanazawa Univ. Japan) 1986 27 p refs Presented at the ASME/ASLE Tribology Conference, Pittsburgh, Pa., 19-22 Oct. 1986
(NASA-TM-87249; E-2891; NAS 1.15:87249) Avail: NTIS HC A03/MF A01 CSCL 11C

Wear experiments were conducted using replication electron microscopy and reflection electron diffraction to study abrasion and the deformed layers produced in single-crystal Mn-Zn ferrite simulated heads during contact with lapping tapes. The crystaline

state of the head is changed drastically during the abrasion process. Crystalline states ranging from nearly amorphous to highly textured polycrystalline can be produced on the wear surface of a single-crystal Mn-Zn ferrite head. The total thickness of the deformed layer was approximately 0.8 microns. This thickness increased as the load and abrasive grit size increased. The anisotropic wear of the ferrite was found to be inversely proportional to the hardness of the wear surface. The wear was lower in the order 211> 111> 10 0>110. The wear of the ferrite increased markedly with an increase in sliding velocity and abrasive grit size. Author

N86-24839*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PARTICLE SIZE REDUCTION OF Si3N4 WITH Si3N4 MILLING HARDWARE
Thomas P. Herbell, Marc R. Freedman, and James D. Kiser 1986 19 p refs Presented at the 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19-24 Jan. 1986; sponsored by the American Ceramic Society
(NASA-TM-86864-Rev; E-2328-1; NAS 1.15:86864-Rev) Avail: NTIS HC A02/MF A01 CSCL 11C

The grinding of Si3N4 powder using reaction bonded Si3N4 attrition, vibratory, and ball mills with Si3N4 media was examined. The rate of particle size reduction and the change in the chemical composition of the powder were determined in order to compare the grinding efficiency and the increase in impurity content resulting from mill and media wear for each technique. Attrition and vibratory milling exhibited rates of specific surface area increase that were approximately eight times that observed in ball milling. Vibratory milling introduced the greatest impurity pickup. Author

N86-24840*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR CROSSLINKING METHYLENE-CONTAINING AROMATIC POLYMERS WITH IONIZING RADIATION Patent Application
Vernon L. Bell, inventor (to NASA) and Stephen J. Havens, inventor (to NASA) (Kentron International, Inc., Hampton, Va) Filed 11 Mar. 1986 29 p
(NASA-Case-LAR-13448-1; NAS 1.71:LAR-13448-1; US-Patent-Appl-SN-838654) Avail: NTIS HC A03/MF A01 CSCL 11B

A process for crosslinking aromatic polymers containing radiation-sensitive methylene groups (-CH2-) by exposing the polymers to ionizing radiation thereby causing crosslinking of the polymers through the methylene groups is described. Crosslinked polymers are resistant to most organic solvents such as acetone, alcohols, hydrocarbons, methylene, chloride, chloroform, and other halogenated hydrocarbons,to common fuels and to hydraulic fluids in contrast to readily soluble uncrosslinked polymers. In addition, the degree of crosslinking of the polymers depends upon the percentage of the connecting groups which are methylene which ranges from 5 to 50% and preferably from 25 to 50% of the connecting groups, and is also controlled by the level of irradiation which ranges from 25 to 1000 Mrads and preferably from 25 to 250 Mrads. The temperature of the reaction conditions ranges from 25 to 200C and preferably at or slightly above the glass transition temperature of the polymer. The crosslinked polymers are generally more resistant to degradation at elevated temperatures such as greater than 150C, have a reduced tendency to creep under load, and show no significant embrittlement of parts fabricated from the polymers. Author

N86-24841*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLY(CARBONATE-MIDE) POLYMER Patent Application
Terry L. St.Clair, inventor (to NASA), Shubha Maudgal, inventor (to NASA), and J. Richard Pratt, inventor (to NASA) (Mississippi Univ. For Women., Columbus) Filed 27 Feb. 1986 25 p
(NASA-Case-LAR-13292-1; NAS 1.71:LAR-13292-1; US-Patent-Appl-SN-834978) Avail: NTIS HC A02/MF A01 CSCL 11B

A novel series of polymers and copolymers based on a polymide backbone with the incorporation of carbonate moieties along the backbone is presented. The preparation process for the polymers and copolymers is disclosed together with a novel series of dinitrodiphenyl carbonates and diaminodiphenyl carbonates. The novel polymers and copolymers exhibit high temperature capability and because of the carbonate unit, many exhibit a high degree of order and/or crystallinity. NASA

N86-24842# National Aeronautics and Space Administration, Washington, D.C.
MANUFACTURE OF CERAMIC SINTERS
G. Ando and Y. Katano Mar. 1986 26 p refs Transl. into ENGLISH from Japanese patent no. 60-11276 (Appl. 58-115949, 29 Jun. 1983) 13 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88398; NAS 1.15:88398) Avail: NTIS HC A03/MF A01 CSCL 11B

A ceramic body made by injection molding is assembled with another ceramic body made by hydrostatic pressing, but having similar deresination, and sintered to give a ceramic sinter. The process is suitable for the manufacture of ceramic sinters having a complex shape. Thus, a mixture of SiC powder 96, B 0.1, and phenolic resin 4 parts was spray-dried mixed with polystyrene 8, polyethylene 5, ester wax 3.6, di-Bu phthalate 5, and fatty acid ester 1.5 parts, pelletized, injection molded, and heated in N gas at 900 deg C for 2h to prepare a blade part for a turbine rotor. The axle part was made from the mixture containing SiC powder 96, B 0.1, and phenolic resin 4 parts by adding 35 volume % organic binder, hydrostatic press molding, and heated in N gas at 900 deg for 2 hours. The axle was inserted into the blade, hydrostatically pressed at 2 ton/sq cm, and sintered at 2100 degrees for 2 hours to give a crack free rotor. Author

N86-24843# National Aeronautics and Space Administration, Washington, D.C.
INTERPARTICLE INTERFERENCE DURING LIGHT SCATTERING BY SUBMICROINHOMOGENEOUS GLASS
N. S. Andreyev and T. I. Yershova Apr. 1986 10 p refs Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88407; NAS 1.15:88407) Avail: NTIS HC A02/MF A01 CSCL 11B

Anomalies observed in Na silicate and Na borosilicate glasses were studied. A comparison was made of the index value rho and turbidity tau with structure data obtained by the method of scattering X-rays at small angles. The investigated glasses were held in a gradient furnace and quenched in air. Author

N86-24844# National Aeronautics and Space Administration, Washington, D.C.
BINDERS FOR COMPACTING NITRIDE TYPE CERAMICS
Katsutoshi Maeda Apr. 1986 8 p Transl. into ENGLISH from Japanese Patent no. 60-5064 (Appl. no. 58-110366, 20 Jun. 1983) Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88397; NAS 1.15:88397) Avail: NTIS HC A02/MF A01 CSCL 11B

The binders contain substance(s) selected from ammonium salt type surfactants, silane coupling agents containing amino or imino groups, and amino-modified polyolefins. Sintered nitride-type ceramics obtained by injection molding materials containing the binders have decreased voids and no cracks. Thus, a mixture composed of dry-milled Si nitride, diallylammonium-styrene copolymer, polystyrene, dioctyl phthalate and other additives was kneaded and injection molded to form a green compact disk. The kneaded material showed no dilatancy. The disk was degreased to show no crack formation, and alternately heated and rapidly cooled 5 times to show no crack formation. Author

N86-24845*# TRW, Inc., Redondo Beach, Calif. Energy Div.
IMPROVED PISTON RING MATERIALS FOR 650 DEG C SERVICE Final Report

W. D. Bjorndahl Mar. 1986 115 p refs
(Contract DE-AI01-80CS-50194)
(NASA-CR-175058; DOE/NASA-0307/1; NAS 1.26:175058; Rept-40933-6021-UT-00) Avail: NTIS HC A06/MF A01 CSCL 11B

A program to develop piston ring material systems which will operate at 650C was performed. In this program, two candidate high temperature piston ring substrate materials, Carpenter 709-2 and 440B, were hot formed into the piston ring shape and subsequently evaluated. In a parallel development effort ceramic and metallic piston ring coating materials were applied to cast iron rings by various processing techniques and then subjected to thermal shock and wear evaluation. Finally, promising candidate coatings were applied to the most thermally stable hot formed substrate. The results of evaluation tests of the hot formed substrate show that Carpenter 709-2 has greater thermal stability than 440B. Of the candidate coatings, plasma transferred arc (PTA) applied tungsten carbide and molybdenum based systems exhibit the greatest resistance to thermal shock. For the ceramic based systems, thermal shock resistance was improved by bond coat grading. Wear testing was conducted to 650C (1202F). For ceramic systems, the alumina/titania/zirconia/yttria composition showed highest wear resistance. For the PTA applied systems, the tungsten carbide based system showed highest wear resistance. Author

N86-24846# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
JOINING OF CERAMICS FOR ADVANCED HEAVY-DUTY DIESELS
A. J. Moorhead and H. Keating Mar. 1986 63 p refs Sponsored by NASA
(Contract DE-AC05-84OR-21400)
(NASA-CR-175019; DOE/NASA/4148-1; NAS 1.26:175019; ORNL-6262) Avail: NTIS HC A04/MF A01 CSCL 11C

The wettability and adherence in vacuum of a series of metal alloys on several oxide ceramics were investigated with the goal of identifying those compositions suitable as filler metals for direct brazing of ceramics in uncooled diesel engine applications. Wetting behavior was determined by the sessile-drop technique. Adherence was measured by several tests including sessile-drop shear, flexure strength of ceramics brazed in a butt-joint configuration, fracture toughness using a composite double cantilever beam specimen, and in the case of ceramic-metal brazements, by a bar/pad shear test. Compositions were identified in both the Cu-Ag-Ti and Cu-Au-Ti ternary systems that wet and strongly adhered to high-purity aluminas, partially stabilized zirconia ceramics, and alumina reinforced with SiC whiskers. Excellent flexural strengths, at temperatures up to 600 C of brazements containing these filler materials indicate that these materials are good candidates for use in advanced heavy-duty diesel engines. Author

N86-24847# Southwest Research Inst., San Antonio, Tex.
EVALUATION OF ARMY ENGINE OILS IN HYDRAULIC/POWER TRANSMISSION SYSTEM COMPONENTS Final Report, Aug. 1984 - Nov. 1985
H. W. Marbach, Jr. and S. J. Lestz Nov. 1985 38 p refs
(Contract DAAK70-84-C-0071)
(AD-A163527; BFLRF-203) Avail: NTIS HC A03/MF A01 CSCL 11/8

The objective of the MACI Hydraulic System and Components Program is to perform technical evaluation and assessment of commerically available qualified and fielded Army engine oils and to determine if such oils can be used as hydraulic fluids in Army commercial construction equipment and material handling equipment. Five Army specification engine lubricants--four MIL-L-2104D (one grade 10W, one grade 30, two grade 15W-40) and one MIL-L-46167, grade 0W-20--were evaluated using four critical component performance tests used by manufacturers. Data compiled from this and previous work have shown that the limiting factors of the Army engine oils used as hydraulic and multipurpose power transmission fluids appear to be (1) wet-brake chatter noise, (2) hydraulic pump wear problems with some piston pumps using MIL-L-46167 Arctic engine oils at temperatures hotter than expected Arctic conditions, and possibly (3) copper corrosion. The prime area of concern is the wet-brake chatter noise. Author (GRA)

N86-24848# Pennsylvania State Univ., University Park. Dept. of Chemistry.
SYNTHESIS OF ALKYL AND ARYL PHOSPHAZENE HIGH POLYMERS Final Report, Aug. 1981 - May 1984
Harry R. Allcock 29 Jan. 1986 4 p refs
(Contract N00014-75-C-0685)
(AD-A163543) Avail: NTIS HC A02/MF A01 CSCL 07/3

New synthetic methods are developed that would allow the synthesis of new polymers with inorganic elements in the backbone. Specifically, organometallic chemistry is used to prepare poly (organophosphazenes) that bear alkyl-or aryl-units as side groups attached to the polyphosphazene chain. This chemistry was carried out at two levels. First, the new reactions were developed at the small-molecule cyclotriphosphazene level to yield cyclic trimers that were subjected to ring-opening polymerization to yield linear high polymers. Second, the same organometallic reactions were conducted with high polymeric phosphazenes to give the alkyl-or arylphosphazene high polymers directly. GRA

N86-24849# Rensselaer Polytechnic Inst., Troy, N.Y.
LUBRICANT FOAMING AND AERATION STUDY, PART 2 Final Report, 1 Mar. 1984 - 1 Jul. 1985
Sydney Ross Dec. 1985 128 p refs
(Contract F33615-80-C-2017)
(AD-A163696; AFWAL-TR-84-2001-Pt-2) Avail: NTIS HC A07/MF A01 CSCL 11/8

This investigation is directed toward obtaining a fundamental understanding of lubricant foaming and aeration. On the practical side, foam tests showed that the surface activity of additives varies from one production batch to another, requiring continuing testing before acceptance. On the fundamental side, three independent techniques were developed to measure dynamic (nonequilibrium) surface tensions of oils containing additives, to obtain simpler correlative physical properties of oil surfaces than the complex multivariant effects that underlie the phenomena of foaming and aeration. These techniques to detect and measure dynamic surface tensions are: measuring changes of surface tension on cycling area contractions and expansions; measuring the damping of capillary ripples; and measuring the rate of ascent of a single bubble in an oil solution. These techniques are able to disclose the presence of surface activity in oil solutions, even before it develops to the state of an overt foam problem. GRA

N86-24850# Ohio State Univ., Columbus.
HOT GAS CORROSION OF SILICON BASED CERAMICS Final Report, 1 Jun. 1982 - 30 Sep. 1985
Eric R. Kreidler and Dennis W. Readey 13 Dec. 1985 88 p refs
(Contract DAAG29-82-K-0149)
(AD-A163810; ARO-18141.2-MS) Avail: NTIS HC A05/MF A01 CSCL 11/2

The hot gas corrosion of Silicon carbide (SiC) and Silica (SiO_2) has been studied in a preliminary way, using two instruments constructed at the Ohio State University for this purpose. The two ceramics are not corroded by atmospheres containing 10% HCl in argon at temperatures up to 1150 C. However noticeable attack occurs in hydrogen at 1300 C when the water vapor pressure is below -5 atm. Most of the work on the project has concentrated on the construction and debugging of a high temperature, high pressure mass spectrometer sampling device to be used for quantitative studies of the chemistry and thermodynamics of corrosion reactions. A high temperature thermogravimetric system has also been constructed to study the kinetics of the hot gas corrosion reactions. Theoretical calculations of the chemical equilibria, to be expected in a number of corrosion reactions, have been carried out and are discussed. GRA

N86-24851# Aerospace Corp., El Segundo, Calif.
ADHESION AND THE SURFACE BEHAVIOR OF THE SILICONE ELASTOMER
R. S. Bretzlaff, T. A. Freitab, and A. Y. Lee 1 Nov. 1985 51 p refs
(Contract F04701-85-C-086)
(AD-A163815; TR-0086(6935-03)-1; SD-TR-85-79) Avail: NTIS HC A04/MF A01 CSCL 11/10

The silicon elastomer RTV-142 is often used as a particle-getter material inside electronics packages. The adhesion mechanism that forms the bond between the particle and the cured adhesive has been investgigated. One expects, theoretically, that polymer chains exhibit a temperature-dependent mobiiity. This is consistent with the hypothesis that flow of polymer chain segments around asperities on the foreign particles causes adhesion. Calculations of the surface energy of an idealized polymer system are presented which support the concept of an entropically driven flow of chain segments into pores and around asperities. Polymer surface-chain mobility is investigated experimentally by the scanning electron microscope analysis of a fractured, cut, and particle-decorated surface. Surface appearance changes were noted as a function of temperature. Scanning electron micrographs indicate that polymer chain movement is temperature dependent. Such findings support the proposed adhesion mechanism. GRA

N86-24852# Brookhaven National Lab., Upton, N. Y.
PHYSICO-CHEMICAL FACTORS AFFECTING HYDROTHERMAL RESISTANCE AND BONDING OF POLYMERIC COMPOSITES TO STEEL SURFACES Final Report, Aug. 1982 - Jul. 1985
T. Sugama, L. E. Kukacka, N. R. Carciello, and J. B. Warren Nov. 1985 165 p refs
(Contracts DE-AC02-76CH-00016; MIPR-ARO-62-82)
(AD-A163906; BNL-37376; ARO-19708.7-MS) Avail: NTIS HC A08/MF A01 CSCL 11/3

The failure upon exposure to hydrothermal conditions of most conventional polymers containing functional groups in which any two atoms selected from N, O, and S are joined to the same carbon atom, is generally due to: (1) high segmental mobility of molecular chains, (2) low thermal relaxation of the polymers, (3) an increase in hydrophilic groups, and (4) low dynamic mechanical properties. Each of these factors must be considered in attempting to provide the total protection needed for long service life in hydrothermal environments. Therefore, the physico-chemical factors that determine the hydrothermal stability and the bonding characteristics of inorganic macromolecule-ionomer composite films have been investigated. GRA

N86-24853 Department of the Air Force, Washington, D.C.
METHOD FOR MAKING HETEROCYCLIC BLOCK COPOLYMER Patent
Tsu-Tsu Tsai, inventor (to Air Force) and Fred E. Arnold, inventor (to Air Force) Issued 1 Oct. 1985 4 p
(AD-D011971; US-Patent-4,544,713; US-Patent-Appl-SN-610912; US-Patent Class-525-432) Avail: US Patent and Trademark Office CSCL 07/3

Described are thermally stable automatic heterocyclic block copolymers as prepared by reacting a diamine monomer and terephthalic acid to form a carboxy-terminated rigid rod segment and then polymerizing a carbonxy-monoamine monomer to form flexible segments grafted onto the rigid rod segments. GRA

N86-24854 Department of the Air Force, Washington, D.C.
PROTECTED ETHYNLATED PHENOLS Patent
J. S. Wallace, inventor (to Air Force) and Fred E. Arnold, inventor (to Air Force) Issued 10 Sep. 1985 6 p
(AD-D012019; US-Patent-4,540,833; US-Patent-Appl-SN-592033; US-Patent Class-568-766) Avail: US Patent and Trademark Office CSCL 07/3

Alpha-hydroxy-, alpha-alkyl;-substituted acetylene compounds are discussed. A new method for adding terminal acetylene groups to a molecule is provided. A novel acetylenic end-capping agent for oligomers is also described. A method for preparing novel acetylenic end-capping agents is discussed. A method is also provided for adding terminal acetylene groups to a molecule which comprises reacting a halogen-terminated molecule with the above-described end-capping agent followed by base-catalyzed cleavage. GRA

N86-24855# Pennsylvania State Univ., University Park. Dept. of Ceramic Science and Engineering.
TAILORING MULTIPHASE CERAMICS Final Report, 1 Jun. - 30 Sep. 1985
Richard E. Tressler and Robert E. Newnham 9 Dec. 1985 21 p refs
(Grant AF-AFOSR-ISSA-85-00093)
(AD-A164010; AFOSR-86-0003TR) Avail: NTIS HC A02/MF A01 CSCL 11/2

The Tailoring Multiphase Ceramics Conference emphasized the discussion and analysis of the properties of multiphase ceramic materials in which the microstructure is deliberately tailored for specific applications or properties. A number of internationally recognized authorities presented keynote and invited lectures on topics dealing with processing and fabrication of multiphase and composite ceramics, multiphase electroceramics, fiber and whisker reinforced composites, and high temperature multiphase ceramics. The results of recent research were presented in oral and poster sessions by leading researchers from several countries. Author (GRA)

N86-24856# Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
CRACK HEALING IN POLYMERS Final Report, 18 Apr. 1983 - 30 Sep. 1985
R. P. Wool 20 Dec. 1985 17 p refs
(Contract DAAG29-83-K-0073)
(AD-A164130; ARO-19990.6-MS) Avail: NTIS HC A02/MF A01 CSCL 11/9

When two similar polymers contact in the melt to form a polymer-polymer interface, interdiffusion of random-coil chains occurs. For this case, we determine a set of properties, H, as a function of time, t, and molecular weight, M. They include the number of chains, n, number of bridges, p, average monomer interpenetration depth, X, the total monomer depth, X sub o, the center of mass diffusion, X sub cm, the average contour interpenetration length, l, the total contour length, L sub O, and the average bridge length, l sub p. The time dependent, H(t), and equilibrium solutions, H infinity, are summarized. When two similar amorphous polymers make good contact to form a polymer-polymer interface, we ask how strength develops as a function of contact time, t, and molecular weight, M, of the polymers. Fracture stress, sigma, shear stress tau, critical fracture energy, G sub IC, and fatigue crack propagation rates, da/dN, are determined as functions of t and M. Solutions to this problem have application to polymer processing, internal weld-lines, coatings, welding, lamination and the physics of fracture mechanics. The problem is divided into three parts. The first part consists of determining a set of molecular properties for the interface, H(t). The second part relates the properties of the interface to the mechanical properties via a set of deformation mechanisms involving chain disentanglement and bond rupture. The third part of the solution consists of determining the fracture. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-24857# Ballistic Research Labs., Aberdeen Proving Ground, Md.
RADICAL FLUORESCENCE STUDIES WITH LIQUID PROPELLANTS Final Report

Richard A. Beyer Dec. 1985 21 p refs
(AD-A163472; BRL-MR-3488) Avail: NTIS HC A02/MF A01 CSCL 19/1

In the development of liquid propellants for regenerative guns, the physical location of ignition and combustion of a jet or spray of propellant as it enters the combustion chamber can provide insight into the rate of energy release in these systems. Radical fluorescence emission has been characterized for the combustion of typical liquid monopropellants composed of hydroxylammonium nitrate, an aliphatic ammonium nitrate, and water. Ignition of the samples was done by injection of a spray into a hydrogen-air diffusion flame. Positive identification was made of the following key radical species: NH, CN, C2, CH, and NO2. Possible signals from NH2 were also observed. The OH radical, already present in the flame, gave diminished emission due to the cooling effect of the LP on these flames at atmospheric pressure. NCO was likely present, but would not have been observed under the conditions of these observations. From the convolution of light intensity and detector response, the radical CN is the clear choice for maximum signal-to-noise ratio. Preliminary two-dimensional imaging of the fluorescence was done to demonstrate the utility of the technique for the study of liquid propellant sprays. Thus, the probability of success for active laser probing of LP spray combustion looks excelle nt, with the prime candidate for probing being the CN molecule. Other candidates such as C2 and NO2 are possible candidates with continuous or high rate metal vapor lasers. GRA

N86-24858# Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A TEST METHOD TO DETERMINE POTENTIAL PEROXIDE CONTENT IN TURBINE FUELS Interim Report, 1 May 1984 - 31 Mar. 1985
G. E. Fodor, D. W. Naegeli, K. B. Kohl, and J. P. Cuellar, Jr. 1 Jun. 1985 41 p refs
(Contracts DAAK70-85-C-0007; DAAK70-82-C-0001)
(AD-A163590; BFLRF-199; NAPC-PE-137C) Avail: NTIS HC A03/MF A01 CSCL 11/7

A test method was developed for the prediction of peroxide potential of fuels, experimental conditions were sought so that the oxidative tendencies of fuels could be assessed within a reasonable time i.e., less than 48 hours. Through the generally accepted 43 C (110 F) bottle storage method fo accelerated fuel aging, the relative ratings of four selected fuels' oxidative tendencies were established. A matrix of experiments was designed to allow selection of those short-term reaction conditions that would give results comparable to the 43 C bottle storage experiments. Additionally, the results of these experiments would allow the development of global reaction kinetics to aid the determination of fuel peroxidation potential. From a partially completed experimental matrix, fuel stressing was completed at 60 and 100 C under an initial oxygen pressure of 689 kPa (100 psig). Experimental results at 60 C gave inconclusive results. Results of the 100 C experiments produced essentially self-consistent results that also agreed with those of the bottle storage for the most stables and least stable fuels. Results of the two intermediate stability fuels, however were interchanged. GRA

N86-24859# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATED RESEARCH ON THE ENERGETIC CHARACTERISTIC OF TN IN COMPOSITE SOLID PROPELLANT
Wei Zhang and Deyu Tian 6 Jan. 1986 15 p refs Transl. into ENGLISH From Yuhang Xueboa (China), no. 2, 1984 p 84-90 Original language document announced as A84-43361
(AD-A163691; FTD-ID(RS)T-0905-85) Avail: NTIS HC A02/MF A01 CSCL 21/9

This paper discussed briefly the properties of a new organic oxidizer -- 2,3,5,6 -- Tetranitrato- 1,4-Dinitropiperazine (TN). On the basis of the method of White's Minimization of Gibbs Free Energy, we also studied the energetic characteristics of TN in Composite Solid Propellant by means of electronic computer. The calculated results show that the theoretic specific impulse of the system of TN, AL and HTPB reaches 276 seconds, about ten seconds higher than the system of AP, Al and HTPB. This shows that TN does act as a high energetic oxidizer. The paper also did an initial research on the energetic characteristics of composite solid smokeless propellant consisting of TN and HTPB. GRA

N86-24860# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NON-DESTRUCTIVE LASER HOLOGRAPHIC TESTING OF SOLID PROPELLANT FOR UNBONDING DEFECTS
Yongbao Wang 15 Jan. 1986 17 p refs Transl. into ENGLISH from Wusung Jiance (China), v. 6, no. 1, Feb. 1984 p 4-7
(AD-A163694; FTD-ID(RS)T-0964-85) Avail: NTIS HC A02/MF A01 CSCL 21/8

This paper describes the feasibility and sensitivity of using a laser holographic technique to detect unbonding defects in solid propellant rocket components. Its conclusions are: 1) laser holography can detect the unbonding defects between the propellant, coating, insulating layer and shell. X-ray could not detect such defects in similar specimens; 2) the sensitivity of detection depends on the H/d ratio. The ratio is around 2.9 for the propellant. When the H/d ratio is equal to or less than this value, even 1 mm diameter unbonding defects can be detected; 3) the value of H/d is related to the nature of the material (modulus of elasticity). The H/d value of the coat is around 0.7. 4. The sensitivity of detection also depends on the gas content at the defect. The sensitivity of detecting an unseparated defect is decreased by more than one half of that of detecting a separated defect. GRA

N86-24861# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA ARMAMENTARII (SELECTED ARTICLES)
6 Jan. 1986 25 p refs Transl. into ENGLISH from Binggong Xuebao (China), no. 3, Aug. 1984 p 61-64
(AD-A163713; FTD-ID(RS)T-0913-85) Avail: NTIS HC A02/MF A01 CSCL 21/8

Among the articles in this report are the following: SES Examination of Molybdenum Nozzle and Investigation of the Erosion Mechanism; Experimental Method to Measure Erosive Burning Speed of Propellant Using High Speed Photography Technique. GRA

N86-24862# Science Applications International Corp., McLean, Va. Military Operations Analysis Div.
FIRE RESISTANT FUEL PROGRAM ANALYSIS AND PROGRAM MANAGEMENT DOCUMENTATION Final Report, Dec. 1985 - Jan. 1986
C. A. Dye 31 Jan. 1986 49 p refs
(Contract DAAK70-84-D-0053)
(AD-A163724; SAIC-86/1024) Avail: NTIS HC A03/MF A01 CSCL 21/4

There was an urgent need to transfer management of the Fire Resistant Fuel (FRF) Program from the Materials Fuels and Lubricants Laboratory (MFLL) to the Logistics Support Directorate (LSD). It is recommended that the LSD develop program management documentation (PMD) that support a Milestone 1 review as soon as possible to include the following: System Concept Paper, Concept Formulation Package and a Test Evaluation Master Plan. This report describes programmatic analyses and subsequent programmatic recommendations. GRA

N86-24863# Chemical Research and Development Center, Aberdeen Proving Ground, Md.
A DIMENSIONAL ANALYSIS APPROACH FOR CHARACTERIZING PRYOTECHNIC MIXTURE SYSTEMS Technical Report, Mar. - Apr. 1984
Khong Q. Truong and Cecil D. Hassell Dec. 1985 19 p
(DA Proj. 1L1-62622-A-554)
(AD-A163018; CRDC-TR-84131) Avail: NTIS HC A02/MF A01 CSCL 19/1

The objective of this work was to correlate pyrotechnic mixture dissemination/characterization variables such as activation energy, heat capacity, packing density, and burning rate by using the technique of dimensional analysis. Dimensional groupings have

been generated and will be verified eventually by actual experimental data from variant pyrotechnic mixture systems. GRA

N86-24864# Naval Postgraduate School, Monterey, Calif.
HOLOGRAPHIC INVESTIGATION OF SOLID PROPELLANT COMBUSTION IN A THREE-DIMENSIONAL MOTOR M.S. Thesis
Sang Chu Yoon Dec. 1985 39 p refs
(AD-A164217) Avail: NTIS HC A03/MF A01 CSCL 21/8

An investigation was conducted to determine the feasibility of obtaining holographic recordings of particulate behavior during the combustion process of solid propellant in a three-dimensional, windowed rocket motor. Transmittance measurements through the combustion chamber were made in order to select the appropriate neutral density filters which would yield the proper scene beam to reference beam intensity ratio. Holographic recordings were successfully made at combustion chamber pressures up to 185 psia using an HTPB-AP propellant containing 2.0% aluminum and 0.25% Fe203. The laser had to be fired manually because of the unreliability of the current igniter/grain design. For high combustion pressures, it is recommended that the laser beam power density be increased to penetrate the more opaque combustion products. Also, it is strongly recommended that a remote controlled laser firing device be used to improve the timing sequence for the hologram. GRA

N86-24865# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
EMISSIONS FROM A LIGHT-DUTY DIESEL: AMBIENT TEMPERATURE AND FUEL EFFECTS
P. Gabele, W. Karches, W. Ray, and N. Perry NOAA Oct. 1985 32 p refs Prepared in cooperation with Northrop Services, Inc., Research Triangle Park, N.C.
(PB86-131349; EPA-600/D-85/272) Avail: NTIS HC A03/MF A01 CSCL 21D

Exhaust emissions from a diesel passenger car were characterized and measured to examine the effect of ambient temperature on emissions performance. The vehicle was tested at three temperatures on a chassis dynamometer located within a cold cell. Three driving cycles and three fuels of varying quality were used. The effort include measurements of regulated exhaust gases and particles, particulate organic fractions and their molecular-weight distributions, particulate fractions under 2 microns in diameter, trace metal contents, and fuel economy. Results indicate that reductions in ambient temperature had little effect on emissions or fuel economy in the study. In some cases, statistically significant increases in NOx emissions were measured with decreases in ambient test temperature. Other differences related to temperature effect occured more frequently with the lower quality fuels. Author (GRA)

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-24866# National Bureau of Standards, Gaithersburg, Md. National Engineering Lab.
HEAT TRANSFER IN COMPARTMENT FIRES NEAR REGIONS OF CEILING JET-WALL IMPINGEMENT
Leonard Y. Cooper 1985 5 p refs Presented at the Fall Technical Meeting Eastern Section of the Combustion Inst., Philadelphia, Pa., 4-6 Nov. 1985
Avail: NTIS HC A02/MF A01

As a fire grows in an enclosure, the elevated temperature air and products of combustion which leave the zone of the burning object form a fire plume and are convected upward by buoyancy. When the upward movement of the plume constituents are blocked by the ceiling they spread radially outward forming a relatively thin turbulent ceiling jet. Depending on the proximity of vertical surfaces, this ceiling jet either loses most of its moment far out on its trajectory or can be expected to interact vigorously with these bounding surfaces by forming a downward wall jet flow which is eventually turned back upward by its own buoyancy. Once the ceiling jet gases are blocked by bounding vertical surfaces, they begin to redistribute themselves across the entire ceiling area of the enclosure. Eventually a relatively quiescent, stably stratified, upper gaslayer is formed below the ceiling jet activity. An experimental program to study the wall flow is underway. To use the results of this program on wall flows requires an understanding of the ceiling jet turning region near ceiling jet-wall impingement. It is the objective of the present work to begin to develop such an understanding. As a fire grows in an enclosure, the elevated temperature air and products of combustion which study the wall flows is underway. To use the results of this program and anticipated future results on wall flows requires an understanding, not now available, of the ceiling jet turning region near ceiling jet-wall impingement. It is the objective of the present work to begin to develop such an understanding. B.W.

N86-24867*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEPLOYABLE GEODESIC TRUSS STRUCTURE A01 Patent Application
Martin M. Mikulas, Jr., inventor (to NASA), Marvin D. Rhodes, inventor (to NASA), and J. Wayne Simonton, inventor (to NASA) Filed 20 Feb. 1986 15 p
(NASA-Case-LAR-13113-1; NAS 1.71:LAR-13113-1; US-Patent-Appl-SN-831371) Avail: NTIS HC A02/MF A01 CSCL 13B

A deployable geodesic truss structure which can be deployed from a stowed state to an erected state is described. The truss structure includes a series of bays, each bay having sets of battens connected by longitudinal cross members which give the bay its axial and torsional stiffness. The cross members are hinged at their mid point by a joint so that the cross members are foldable for deployment or collapsing. The bays are deployed and stabilized by actuator means connected between the mid point joints of the cross members. Hinged longerons may be provided to also connect the sets of battens and to collapse for stowing with the rest of the truss structure. The truss structure has the capability of serving a structural function even when only partly deployed. NASA

N86-24868# National Aeronautics and Space Administration, Washington, D.C.
THE LONG-RANGE SHELLING OF PARIS AND PHYSICAL CHEMISTRY PROBLEMS OF EXTREMELY LONG-RANGE FIRING
A. Stettbacher Apr. 1986 22 p refs Transl. into ENGLISH from Zeitschrift fuer das Gesamte Schiess- und Sprengstoffwesen (Munich, West Germany), v. 14, no. 16, Aug. 1919 p 265-267 Presented at the Physics Society, Zurich, Switzerland, 8 May 1919 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88416; NAS 1.15:88416) Avail: NTIS HC A02/MF A01 CSCL 13B

The 128-km long-range artillery shelling of Paris is discussed considering its physical and chemical make-up from the vantage point of the technology in 1919. It compares this shelling with a hypothetical 240-km shelling and concludes that the most important influence on shelling range distance to be air resistance. The amount of air resistance and the resulting velocity deceleration depend on the air's density and the shell's velocity and configuration. Auhtor

N86-24869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CRITERIA FOR SIGNIFICANCE OF SIMULTANEOUS PRESENCE OF BOTH CONDENSIBLE VAPORS AND AEROSOL PARTICLES ON MASS TRANSFER (DEPOSITION) RATES
Sueleyman A. Goekoglu (Case Western Res. Univ., Cleveland Ohio) Feb. 1986 17 p refs
(NASA-TM-87247; E-2929; NAS 1.15:87247) Avail: NTIS HC A02/MF A01

The simultaneous presence of aerosol particles and condensible vapors in a saturated boundary layer which may affect deposition rates to subcooled surfaces because of vapor-particle interactions is discussed. Scavenging of condensible vapors by aerosol particles may lead to increased particle size and decreased vapor mass fraction, which alters both vapor and particle deposition rates. Particles, if sufficiently concentrated, may also coagulate. Criteria are provided to assess the significance of such phenomena when particles are already present in the mainstream and are not created inside the boundary layer via homogeneous nucleation. It is determined that there is direct proportionality with: (1) the mass concentration of both condensible vapors and aerosol particles; and (2) the square of the boundary layer thickness to particle diameter ratio (delta d sub p) square. Inverse proportionality was found for mainstream to surface temperature difference if thermophoresis dominates particle transport. It is concluded that the square of the boundary layer thickness to particle diameter ratio is the most critical factor to consider in deciding when to neglect vapor-particle interactions. Author

N86-24870# California Univ., Davis.
IMPROVED NUMERICAL IMPLEMENTATION OF THE BOUNDING SURFACE PLASTICITY MODEL FOR COHESIVE SOILS Final Report, Jan. - Sep. 1985
Leonard R. Herrmann, Victor Kaliakin, and C. K. Shen Dec. 1985 61 p refs
(Contract N62583-85-M-T176)
(AD-A163572; NCEL-CR-86.004) Avail: NTIS HC A04/MF A01 CSCL 08/13

A substantially more robust numerical algorithm for the evaluation of the bounding surface plasticity model for cohesive soils is developed. The robustness of the new algorithm assures accurate results for reasonably sized solution steps and qualitatively correct predictions, even for exceptionally large steps. The improved predictions are illustrated for three examples. GRA

N86-24871# Purdue Univ., West Lafayette, Ind. School of Industrial Engineering.
THE SCIENCE OF AND ADVANCED TECHNOLOGY FOR COST-EFFECTIVE MANUFACTURE OF HIGH PRECISION ENGINEERING PRODUCTS. VOLUME 4. THERMAL EFFECTS ON THE ACCURACY OF NUMERICALLY CONTROLLED MACHINE TOOL Final Report, 1 Jan. 1983 - 15 Aug. 1985
Raghunath Venugopal, Moshe M. Barash, and C. R. Liu Oct. 1985 365 p 4 Vol.
(Contract N00014-83-K-0385)
(AD-A163598) Avail: NTIS HC A16/MF A01 CSCL 13/9

Thermal effects on the accuracy of numerically controlled machine tools are specially important in the context of unmanned manufacture or under conditions of precision metal cutting. Removal of the operator from the direct control of the metal cutting process has created problems in terms of maintaining accuracy. The objective of this research is to study thermal effects on the accuracy of numerically controlled machine tools. The initial part of the research report is concerned with the analysis of a hypothetical machine. The thermal characteristics of this machine are studied. Numerical methods for evaluating the errors exhibited by the slides of the machine are proposed and the possibility of predicting thermally induced errors by the use of regression equations is investigated. A method for computing the workspace error is also presented. The final part is concerned with the actual measurement of errors on a modern CNC machining center. Thermal influences on the errors is the main objective of the experimental work. Thermal influences on the errors of machine tools are predictable. Techniques for determining thermal effects on machine tools at a design stage are also presented. GRA

N86-24872# National Bureau of Standards, Gaithersburg, Md. Office of Product Standards Policy.
PROCEEDINGS OF CONFERENCE ON INTERNATIONAL STANDARDS
E. A. Vadelund Aug. 1985 128 p Conference held in Gaithersburg, Md., Aug. 1985
(PB86-130044; NBSIR-83/3228) Avail: NTIS HC A07/MF A01 CSCL 05C

The Overview of the Conference distills the main themes and points of discussion during the meeting. It identifies the strictures set forth in the OMB Circular A-119 which govern and give guidance to Federal agencies functioning in the international standards area either as participants or users. Three areas of concern to Federal agencies are identified as suitable topics for the Interagency Committee on Standards Policy to pursue. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-24873 Minnesota Univ., Minneapolis.
WAVE ATTENUATION IN PERIODIC STRUCTURES Ph.D. Thesis
Ajit Kumar Roy 1985 145 p
Avail: Univ. Microfilms Order No. DA8528833

The attenuation of bending waves in a periodic structure is examined. A study of the traveling waves in a uniform beam was made in preparation for the study of the attenuation of the waves in the periodic structure. The traveling bending waves in the beams were induced by a transverse impact. For the uniform beam the force-time impact history was calculated by integrating the dynamic equations of the beam and the impactor. The time history of the bending moment of the traveling waves at any point was then obtained by taking an inverse Fast Fourier Transform (FFT) of the bending moment power spectral density with appropriat2 phase shift which is a function of distance and frequency. The periodic structure was constructed by fastening transverse cantilevers to the uniform beam at regular intervals. Two analytical models for this periodic beam were developed; one was for an infinite array of identical sections and the other was for a finite array of periodic sections in an infinite beam. The stop and pass bands for the infinite model was found by an eigenvalue technique. A dynamic stiffness matrix technique and transfer matrices were used to calculate the attenuation for the finite model. Dissert. Abstr.

N86-24874 British Broadcasting Corp., Kingswood (England). Engineering Div.
COLOUR ENCODING AND DECODING TECHNIQUES FOR LINE-LOCKED SAMPLED PAL AND NTSC TELEVISION SIGNALS
C. K. P. Clarke Mar. 1986 38 p refs
(BBC-RD-1986/2) Copyright. Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

For many years subcarrier-locked sampling was preferred for digital processing of composite video signals. However, the use of line-locked sampling in composite signal coders and decoders is advantageous for compatibility with studio component signals, and for operation with monochrome signals, and for color signals in which the subcarrier to sync. frequency relationship is incorrect. Digital techniques are described for generating, from a line-locked sampling frequency, quadrature subcarrier signals for use in composite color encoders and for locking these signals to the incoming reference burst in color decoders. This allows the advantages of the more stable, better defined performance obtained with digital implementation to extend to coders and decoders without the need for sample rate conversion to digital studio component signals. Although the main description is for the PAL system, modifications necessary for NTSC signals are also included. Author

N86-24875*# Martin Marietta Aerospace, Denver, Colo.
SATELLITE VOICE BROADCAST. VOLUME 1: EXECUTIVE

SUMMARY Final Report, Apr. 1984 - Jun. 1985
E. E. Bachtell, S. S. Bettadapur, J. V. Coyner, and C. E. Farrell Nov. 1985 17 p refs
(Contract NAS3-24233)
(NASA-CR-175016; NAS 1.26:175016) Avail: NTIS HC A02/MF A01 CSCL 17B

An Executive Summary of the Satellite Voice Broadcast System Study designs are synthesized for direct sound broadcast satellite systems for HF-, VHF-, and Ku-bands. Methods are developed and used to predict satellite weight, volume, and RF performance for the various concepts considered. Cost and schedule risk assessments are performed to predict time and cost required to implement selected concepts. Technology assessments and tradeoffs are made to identify critical enabling technologies that require development to bring technical risk to acceptable levels for full scale development. Author

N86-24876*# Martin Marietta Aerospace, Denver, Colo.
SATELLITE VOICE BROADCAST. VOLUME 2: SYSTEM STUDY Final Report, Apr. 1984 - Jun. 1985
Eric E. Bachtell, Shailesh S. Bettadapur, John V. Coyner, and Curtis E. Farrell Nov. 1985 261 p refs 2 Vol.
(Contract NAS3-24233)
(NASA-CR-175017; NAS 1.26:175017; MTR-85-556-Vol-2) Avail: NTIS HC A12/MF A01 CSCL 17B

The Technical Volume of the Satellite Broadcast System Study is presented. Designs are synthesized for direct sound broadcast satellite systems for HF-, VHF-, L-, and Ku-bands. Methods are developed and used to predict satellite weight, volume, and RF performance for the various concepts considered. Cost and schedule risk assessments are performed to predict time and cost required to implement selected concepts. Technology assessments and tradeoffs are made to identify critical enabling technologies that require development to bring technical risk to acceptable levels for full scale development. Author

N86-24877*# TRW Space Technology Labs., Redondo Beach, Calif. Federal Systems Div.
SATELLITE VOICE BROADCAST SYSTEM STUDY, VOLUME 2 Technical Report, 11 Apr. 1984 - 11 Jul. 1985
Michael Horstein Jul. 1985 335 p refs 3 Vol.
(Contract NAS3-24232)
(NASA-CR-174905; NAS 1.26:174905) Avail: NTIS HC A15/MF A01 CSCL 17B

This study investigates the feasibility of providing Voice of America (VOA) broadcasts by satellite relay, rather than via terrestrial relay stations. Satellite voice broadcast systems are described for three different frequency bands: HF (26 MHz), VHF (68 MHz), and L-band (1.5 GHz). The geographical areas of interest at HF and L-band include all major land masses worldwide with the exception of the U.S., Canada, and Australia. Geostationary satellite configurations are considered for both frequency bands. In addition, a system of subsynchronous, circular satellites with an orbit period of 8 hours is developed for the HF band. VHF broadcasts, which are confined to the Soviet Union, are provied by a system of Molniya satellites. Satellites intended for HF or VHF broadcastinbg are extremely large and heavy. Satellite designs presented here are limited in size and weight to the capability of the STS/Centaur launch vehicle combination. Even so, at HF it would take 47 geostationary satellites or 20 satellites in 8-hour orbits to fully satisfy the voice-channel requirements of the broadcast schedule provided by VOA. On the other hand, three Molniya satellites suffice for the geographically restricted schedule at VHF. At L-band, only four geostationary satellites are needed to meet the requirements of the complete broadcast schedule. Moreover, these satellites are comparable in size and weight to current satellites designed for direct broadcast of video program material. Author

N86-24878*# TRW, Inc., Redondo Beach, Calif.
SATELLITE VOICE BROADCASE SYSTEM STUDY. VOLUME 1: EXECUTIVE SUMMARY Contractor Report, 11 Apr. 1984 - 11 Jul. 1985
Michael Horstein Jul. 1985 46 p , 1-45 NOV.
(Contract NAS3-24232)
(NASA-CR-174904; NAS 1.26:174904) Avail: NTIS HC A03/MF A01 CSCL 17B

The feasibility of providing Voice of America (VOA) broadcasts by satellite relay was investigated. Satellite voice broadcast systems are described for three different frequency bands: HF, FHV, and L-band. Geostationary satellite configurations are considered for both frequency bands. A system of subsynchronous, circular satellites with an orbit period of 8 hours was developed for the HF band. The VHF broadcasts are provided by a system of Molniya satellites. The satellite designs are limited in size and weight to the capability of the STS/Centaur launch vehicle combination. At L-band, only four geostationary satellites are needed to meet the requirements of the complete broadcast schedule. These satellites are comparable in size and weight to current satellites designed for the direct broadcast of video program material. Author

N86-24879*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD AND APPARATUS FOR MEASURING DISTANCE Patent Application
Christopher L. Lichtenberg, inventor (to NASA), Paul W. Shores, inventor (to NASA), and Herbert S. Kobayashi, inventor (to NASA) Filed 20 Feb. 1986 34 p
(NASA-Case-MSC-20912-1; NAS 1.71:MSC-20912-1;
US-Patent-Appl-SN-831183) Avail: NTIS HC A03/MF A01 CSCL 17I

The invention employs a continuous wave radar technique and apparatus which can be used as a distance measuring system in the presence of background clutter, by utilizing small passive transponders. A first continuous electromagnetic wave signal S sub 1 at a first frequency f sub 1 is transmitted from a first location. A transponder carried by a target object positioned at a second (remote) location receives the transmitted signal, phase-coherently divides the f sub 1 frequency and phase therefore, and re-transmits the transmitted signal as a second continous electromagnet wave signal S sub 2 at a lower second frequency f sub 2 which is a subharmonic of f sub 1. The re-transmitted signal is received at the first location where a measurement of the phase difference is made between the signals S sub 1 and S sub 2, such measurement being indicative of the distance between the first and second locations. In a preferred embodiment, the transponder is a passive divide-by-two parametric oscillator employing the energy from the transmitted signal S sub 1 incident thereon to generate the re-transmitted signal S sub 2. NASA

N86-24880*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEASUREMENT APPARATION AND PROCEDURE FOR THE DETERMINATION OF SURFACE EMISSIVITIES Patent Application
Hans-Juergen C. Blume, inventor (to NASA) Filed 3 Dec. 1985 27 p
(NASA-Case-LAR-13455-1; NAS 1.71:LAR-13455-1;
US-Patent-Appl-SN-804040) Avail: NTIS HC A03/MF A01 CSCL 20N

A method and apparatus for independently determining the electromagnetic surface emissivity of a material is developed, which is particularly useful in the design of large deployable space antennas employing mesh membrane surfaces. The system is a closed one with respect to unwanted or uncorrelated radiation outside the system. The present embodiment comprises a radiometer connected to a horn antenna, a test section sealed to the horn antenna and a cryogenically cooled matched load (cryoload) exposed to the interior of the system. The material is enclosed in a convection test chamber within the test section, heated by convection within a test chamber and allowed to radiate within the system such that a component of the radiation energy of the material is measured by the radiometer in terms of brightness temperature. A matched load serves as the stabilized source of uncorrelated radiation within the system. The actual physical temperature of the material is also measured during the heating

process with a thermometer. The difference in brightness temperature over a selected period of time when divided by the physical temperature over the same period of time is the emissivity of the material according to a derivation of the Raleigh - Jeans approximation for an ideal system free from all uncorrelated radiation.
Author

N86-24881*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IMPACT OF THE 1985 SPACE WORLD ADMINISTRATIVE RADIO CONFERENCE ON FREQUENCY/ORBIT PLANNING AND USE
Edward F. Miller 1986 8 p refs Presented at the 11th Annual Communications Satellite Systems Conference, San Diego, Calif., 16-20 Mar. 1986; sponsored by the American Inst. of Aeronautics and Astronautics
(NASA-TM-87285; E-2976; NAS 1.15:87285) Avail: NTIS HC A02/MF A01 CSCL 17B

The 1985 World Administrative Radio Conference (WARC-ORB-85) was held to determine which space radio services should be planned and which planning methods should be used. The second session of this Conference (WARC-ORB-88) will meet to develop the required plans. This paper presents the results of WARC-ORB-85, assesses the impact of those decisions, and identifies the intersessional work to be conducted by administrations and the CCIR (Consultative Committee on International Radio). The major decisions of WARC-ORB-85 were: (1) the restriction of additional planning to the fixed satellite service at identified frequencies; and (2) the selection of a planning method consisting of two parts (a) an allotment plan, and (b) improved procedures. The paper also discusses WARC-ORB-85 decisions relative to the Region 2 broadcast satellite service plans at 12 GHz, feederlink planning for Regions 1 and 3 broadcast satellites at 12 GHz, and sound broadcast satellite service.
Author

N86-24882# Ohio State Univ., Columbus. Electroscience Lab.
NCTR USING A POLARIZATION-AGILE COHERENT RADAR SYSTEM Final Report
E. K. Walton, D. L. Moffatt, F. D. Garber, A. Kamis, and C. Y. Lai Jan. 1986 66 p refs
(AD-A163528; ESL-716559-2) Avail: NTIS HC A04/MF A01 CSCL 17/9

This report describes the results of the first year of a research project performed by the Ohio State University ElectroScience Laboratory (OSU/ESL) for the Naval Weapons Center (NWC). The goal of this project is to explore the use of the polarization properties of the signal scattered from a radar target for the purpose of radar target identification. Various radar target identification algorithms were applied to the case of a full polarization coherent radar system, and were tested using a specific data base and noise model. The data base used to test the performance of the radar target identification algorithms developed here is a unique set of measurements made on scale models of aircraft. Measurements were made using the OSU/ESL Compact Radar Measurement Range. The range was operated in a broad-band (1-12 GHZ) mode and the full polarization matrix was measured. Calibrated values (amplitude and phase) of the RCS for the three polarization states were thus available. The polarization states are listed below.
Author (GRA)

N86-24883# Army Aviation Systems Command, St. Louis, Mo.
VHF-FM COMMUNICATIONS ANTENNAS FOR PROJECT SINCGARS (UH-1 TAIL WHIP AND CABIN ROOF BENT WHIP EVALUATION)
Joseph Caralyus, Joseph Miller, Carlos Gratacos, and Frank Cansler Dec. 1985 103 p refs
(AD-A163561; USAAVSCOM-TR-85-E-3) Avail: NTIS HC A06/MF A01 CSCL 17/2

The American Electronics Laboratory (AEL), Allaire, NJ, was tasked by the U.S. Army Avionics Research and Development Laboratory (SAVAA-M), Fort Monmouth, NJ, to develop replacement breadband matching modules for the CU-942B and the FM 10-30-1 antenna to satisfy specified requirements for Project SINCGARS. AEL was further tasked to test various candidate antennas provided by commercial vendors that are mechanically interchangeable with the CU-942B and the FM 10-30-1. After completion of the AEL development/test program, AVRADA tasked an independent, non-based Government antenna test facility to conduct prescribed antenna verification tests in accordance with an agreed upon test plan. This technical report describes communications antenna systems provided by Dayton-Granger, Inc (DGI), American Electronics Lab (AEL), and Avionics Antenna Systems (AVANT). The test measurements were conducted at the Naval Air Development Center, Antenna Test Facility located in Warminster, PA. The information in this report provides, in part, the technical data for the protection data package of adequate VHF-FM Communications antennas for the UH-1 helicopter when used with the new SINCGARS Radio.
Author (GRA)

N86-24884# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CIRCUITS AND EXCHANGE PARAMETERS AT THE C2 INTERFACE IN THE CASE OF SEQUENTIAL INPUT-OUTPUT OF DISCRETE INFORMATION
10 Jan. 1986 37 p refs
(AD-A163688; FTD-ID(RS)T-0010-86) Avail: NTIS HC A03/MF A01 CSCL 17/2

The present standard extends to circuits and exchange parameters between terminal data equipment (OOD) and data transmission equipment (APD) and the case of sequential input-output of data, and also to both sides of intermediate equipment, which can be hooked up between terminal data equipment and data transmission equipment. The standard establishes the nomenclature of the interface circuits, the electrical parameters of the signals sent over these circuits, and the technical requirements. Instructions on the selection of interface circuits are given in this appendix. The present standard is applicable to: (1) synchronous and asynchronous systems of data transmission; (2) the transmission of data over noncommutated communication channels when using connections between two points or a multipoint connection; (3) the transmission of data by way of a commutated network with the use of manual and automatic establishment of connection; (4) to short connecting cables between terminal data equipment data transmission equipment.
GRA

N86-24885# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ELECTROMAGNETIC PULSE: THE FIFTH FACTOR IN THE IMPACT OF A NUCLEAR EXPLOSION
Zbigniew Jastak 16 Jan. 1986 33 p refs Transl. into ENGLISH from Przeglad Wojsk Ladowych (Poland), no. 7, Jul. 1971 p 100-119
(AD-A163695; FTD-ID(RS)T-1176-85) Avail: NTIS HC A03/MF A01 CSCL 18/3

Three ionization zones form during high-altitude nuclear explosions, (1) a short-lived ionization zone in the area of the nuclear explosion; (2) a radioactive cloud hovering over the center of the explosion. The cloud consists of ionized volatile products from the explosion and lingers for several hours or even days; and (3) a large zone ofincreased ionization resulting from gamma and x-ray radiation as well as from neutrons. The zone forms at an altitude of 40 to 70 kilometers and remains for several days. Increased ionization zones have an impact on radio wave propagation and interfere with radio communication as well as the operation of radar stations. Radiation emitted from the increased ionization zone can have an impact on changing the parameters of elements in electronic devices, especially semiconductors. This can in turn interfere with the operation of other equipment, including radio stations, radars, and infrared telescopes, and can also damage this equipment.
GRA

N86-24886# Royal Signals and Radar Establishment, Malvern (England).
MODE 5 DATA LINK PHASE CODING
P. T. Humphrey and R. J. Larkin Jul. 1985 22 p refs
(AD-A163745; RSRE-MEMO-3859; DRIC-BR-98168) Avail: NTIS

HC A02/MF A01 CSCL 17/2

Suggested are some improvements to a proposed method of phrase coding for the Mode S Data Link and some testing of the phrase programming language described. Author (GRA)

N86-24887# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.

ELECTROMAGNETIC SCATTERING FROM A SLOTTED TM CYLINDRICAL CONDUCTOR BY THE PSEUDO-IMAGE METHOD Interim Technical Report

Joseph R. Mautz, Xingchao Yuan, and Roger F. Harrington Sep. 1985 59 p refs

(Contract DAAG29-84-K-0078)

(AD-A163782; SYRU/DECE/TR-85/3; ARO-21378.3-EL; IR-2) Avail: NTIS HC A04/MF A01 CSCL 20/14

The generalized network formulation for aperture problems is a well-established method for determining electromagnetic scattering from an aperture-perforated conducting surface. This method is easily implemented for an aperture in an infinite conducting plane because the field due to a sheet of magnetic current M on the surface of a conducting plane is, by the method of images, the field of 2M in free space. The method is more difficult to implement for an aperture in a curved conducting surface because the electric current induced by M on this surface can not be accounted for by imaging. This current must be calculated. Its calculated values are often inaccurate and so are those of the aperture field. In the present work, a more accurate aperture field is obtained for a particular TM curved cylindrical surface by means of the generalized network formulation for aperture problems in conjunction with a new method called the pseudo-image method. This aperture field was calculated by means of computer programs. GRA

N86-24888# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ALGORITHM DEFINITION FOR THE VLSI DESIGN IMPLEMENTATION OF THE ELECTROMAGNETIC RADIATION INTEGRAL M.S. Thesis

Lawrence E. Jones Dec. 1985 131 p refs

(AD-A163825; AFIT/GE/ENG/85D-23) Avail: NTIS HC A07/MF A01 CSCL 20/14

A classic method used to solve for the electric (E) and magnetic (H) fields produced by a radiating source involves first solving for the vector potential (A) through the evaluation of the radiation integral. This study was undertaken to define a numerical algorithm that solves for A, so that a reduction in computation time can be realized through VLSI design implementation. Fast Fourier Transforms, Newton-Cotes numerical integration, and variable parameterization, were applied to the problem with unsuccessful results. A numerical summation approximation proved to have all the desired qualities for the algorithm. Verification of the numerical solution was accomplished by comparing the results it produced for a dipole antenna with a triangular shaped current density against the far-field approximation, and an incomplete cylindrical functions solution developed by Lee. Solution for E and H involves taking derivatives of A. Complications that arise from numerical techniques dictate that numerical differentiation should be performed before numerical integration. GRA

N86-24889# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

PHYSICAL OPTICS MODEL OF SIDE LOBE NULLING BY DISCS ON A PARABOLIC REFLECTOR M.S. Thesis

Dick A. Trapp Dec. 1985 90 p refs

(AD-A163826; AFIT/GE/ENG/85D-51) Avail: NTIS HC A05/MF A01 CSCL 20/14

By mounting small disc reflectors that are moveable relative to the inner reflector surface of a parabolic dish antenna, nulls can be generated in the side lobe region of the power radiation pattern with minimal distortion effects to the main beam. A physical optics model of this antenna system is developed to investigate in a simplified direct manner the phenomena of phase nulling caused by disc movement. Array theory using isotropic radiators is used to sample the aperture distribution to approximate the far field electric field of the dish. A physical optics approximation for scattering off a flat metal disc is used for discs and feed blockage effects. GRA

N86-24890# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

CHARACTERISTICS OF BAYESIAN MULTIPLE MODEL ADAPTIVE ESTIMATION FOR TRACKING AIRBORNE TARGETS M.S. Thesis

Allan S. Netzer Dec. 1985 336 p refs

(AD-A163830; AFIT/GAE/ENG/85D-2) Avail: NTIS HC A15/MF A01 CSCL 17/5

Previous studies at the Air Force Institute of Technology have led to the development of a multiple model adaptive filter (MMAF) tracking algorithm which provides significant improvements in tracker performance against highly-dynamic airborne targets over the currently used correlation trackers. A forward looking infra-red (FLIR) sensor is used to provide a target shape function to the tracking algorithm in the form of an 8 x 8 array of intensities projected onto a field of view (FOV). This target image measurement is correlated with an estimate of the target image template, to produce linear offset pseudo-measurements from the center of the FOV, which are provided as measurements to a bank of linear Kalman filters, in the multiple model adaptive filtering (MMAF) structure. The output of the MMAF provides the state estimates used in pointing the FLIR sensor, and generating the new target image estimate. This study investigates the characteristics of this algorithm in order to evaluate its performance against various target scenarios. Author (GRA)

N86-24891# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

DESIGN METHODOLOGY OF AN AUTOMATED SCATTERING MEASUREMENT FACILITY M.S. Thesis

David G. Mazur Dec. 1985 108 p refs

(AD-A163896; AFIT/GE/ENG/85D-26) Avail: NTIS HC A06/MF A01 CSCL 17/9

This thesis addresses the design methodology surrounding an automated scattering measurement facility. A brief historical survey of radar cross-section (RCS) measurements is presented. The electromagnetic theory associated with a continuous wave (CW) background cancellation technique for measuring RCS is discussed as background. In addition, problems associated with interfacing test equipment, data storage and output are addressed. The facility used as a model for this thesis is located at the Air Force Institute of Technology, WPARB, OH. The design methodology applies to any automated scattering measurement facility. A software package incorporating features that enhance the operation of AFIT's facility by students is presented. Finally, sample output from the software package illustrate formats for displaying RCS data. GRA

N86-24892# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AIRBORNE BISTATIC RADAR LIMITATIONS AND SAMPLE CALCULATIONS M.S. Thesis

William P. Thomson Dec. 1985 127 p refs

(AD-A163941; AFIT/GE/ENG/85D-49) Avail: NTIS HC A07/MF A01 CSCL 17/9

This thesis examined the effects of system configuration and transmitted waveform as applied to an airborne bistatic radar. The study concentrates on the limiting effects of the transmitted signal parameters, the signal to clutter ratio, and the Doppler spread of the receiver beam. The analysis was performed by constructing a computer model to graphically display the results of the applicable equations. The equations developed in this study are: The power limited equation, the isorange equation, the isodoppler equation, and the signal to clutter ratio. These equations and those of ellipsoidal geometry were used to develop the bistatic radar model. GRA

N86-24893# Department of the Air Force, Washington, D.C.
INTERACTIVE COMMUNICATION CHANNEL Patent
Robert H. Chan, inventor (to Air Force), Martin R. Mann, inventor (to Air Force), and John A. Ciarrocchi, inventor (to Air force) Issued 8 Oct. 1985 30 p
(AD-D011968; US-Patent-4,546,429; US-Patent-Appl-SN-686954; US-Patent Class-364200) Avail: US Patent and Trademark Office
CSCL 17/2

Discussed is an interactive communications channel (ICC) for providing a digital computer with high-performance multi-channel interfaces. Sixteen full duplex channels can be serviced in the ICC with the sequence or scan pattern being programmable and dependent upon the number or channels and their speed. A channel buffer system is used for line interface, and character exchange. The channel buffer system is on a byte basis. The ICC performs frame start and frame end functions, bit stripping and bit stuffing. Data is stored in a memory in block format (256 bytes maximum) by a program control and the ICC maintains byte address information and a block byte count. Data exchange with a memory is made by cycle steals. Error detection is also provided for using a cyclic redundancy check technique. GRA

N86-24894# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
A COMPREHENSIVE MODEL OF THE PHOTOPHORETIC FORCE ON A SPHERICAL MICROPARTICLE
Antonio B. Pluchino and Steve Arnold 23 Aug. 1985 17 p
(Contract F49620-80-C-0077; Grant NSF ATM-84-13574)
(AD-A163022; ATR-85(8463)-2) Avail: NTIS HC A02/MF A01
CSCL 20/6

Recently there has been a great deal of interest in the local field which is produced by electromagnetic radiation on the surface and within the interior of a microparticle. The photophoretic force is described by a comprehensive model containing aspects of both the optical local field and gas dynamic properties. It is shown that the model is in good agreement with detailed experimental data, and provides a new means for measuring optical constants of microparticles. GRA

N86-24895# Systems Control Technology, Inc., Palo Alto, Calif.
TIME DOMAIN ALGORITHMS Final Report, Apr. 1984 - Apr. 1985
Benjamin Friedlander and J. O. Smith Sep. 1985 143 p
(Contract F30602-84-C-0016)
(AD-A163054; PA-6502-01; RADC-TR-85-167) Avail: NTIS
HC A07/MF A01 CSCL 17/2

Research results aimed at addressing signal processing issues related to the non-stationary time-varying nature of signals propagating through communication channels are summarized. The Constant Modulus Algorithm is studied and extended and a convergence proof is provided. A class of time-varying waveguide digital filters is derived and its properties analyzed. The application of time-varying autoregressive models to modeling a class of non-stationary signals is presented. GRA

N86-24896# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMPARISON OF BACKGROUND CHARACTERISTICS OF AN RCS (RADAR CROSS SECTION) MEASUREMENT RANGE USING A CW-NULLING TECHNIQUE AND A PULSE-GATING TECHNIQUE M.S. Thesis
George R. Simpson Dec. 1985 109 p refs
(AD-A163965; AFIT/GE/ENG/85D-40) Avail: NTIS
HC A06/MF A01 CSCL 17/9

This thesis compares the relative performance of a CW-nulling technique versus a pulse-gating technique for radar cross section (RCS) measurements. The purpose is (1) to provide a detailed comparison of these two systems in terms of system noise figure and systems losses, and (2) to demonstrate the effectiveness of time-separating the target area from the surrounding chamber when using the pulse-gating technique. The pulse-gating system is shown to have far superior system noise figure characteristics than the CW-nulling system. Pulse-gating has only a slightly greater system loss due to the added complexity of the pulse modulating and range gating components. The combined effect is that the pulse-gating technique is capable of improving signal-to-noise, thus increasing the reliability of making accurate RCS measurements. GRA

N86-24897# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
REAL-TIME FLIGHT TEST PCM DATA ACQUISITION MONITOR M.S. Thesis
John R. Croasdale Sep. 1985 268 p refs
(AD-A164035; AFIT/GE/ENG/85S-1) Avail: NTIS
HC A12/MF A01 CSCL 17/2

A computer based system utilizing an inexpensive off-the-shelf personal computer and original interface design centered around a 68000 microprocessor for real-time monitoring of a time division multiplexed pulse code modulated (TDM/PCM) data stream was designed and constructed. This system is a prototype of a low-cost, portable PCM data acquistion monitor intended for use in flight test programs by the 4950th Test Wing at Wright-Patterson AFB, Oh. It will accept a single Armed Forces Instrumentation Standard NRZ or split-phase (Manchester) baseband data stream at rates up to 100 KBPS, display selected data words in graphical or numerical format, and alarm the user when data exceeds certain limits. It will provide a real-time verification that the data being generated and recorded during a test is of acceptable quality, allowing the option of continuation of the test, or termination. The system is capable of automatically determining the data rate and signaling format and synchronizing itself with the incoming signal. GRA

N86-24898# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SIMULATION OF CHAFF CLOUD SIGNATURE M.S. Thesis
Richard P. Fray Dec. 1985 58 p refs
(AD-A164106; AFIT/GE/ENG/85D-16) Avail: NTIS
HC A04/MF A01 CSCL 17/4

In this thesis time-varying radar cross sections of chaff clouds are generated for use in radar/ECM computer simulations, under the assumption that scattering from chaff clouds is a wide sense stationary random process. For a jointly gaussian random process, second order statistics are developed from correlated samples of radar cross sections. Applicable statistical tests are performed to validate a set of generated samples. The goodness of fit of the samples compared to the prespecified density function is determined along with a comparison of the correlation coefficients from the generated set to the desired correlation coefficients. Rayleigh and Weibull statistics are also derived from gaussian variables to present an alternative way of describing the probability distributions of chaff cloud cross sections. Topics for further study are suggested. GRA

N86-24899# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF INTEGRATED AND NONINTEGRATED VOICE AND DATA NETWORKS FOR DOD COMMUNICATIONS M.S. Thesis
Stephen L. Walker Sep. 1985 146 p refs
(AD-A164176; AFIT/GCS/ENG/85S-2) Avail: NTIS
HC A07/MF A01 CSCL 17/2

The primary question to be addressed in this thesis is: what is the best switching approach, with or without voice and data integration, that will maximize mission essential needs of DOD communications? This question can be answered by modeling integrated voice and data networks and separate voice and data networks. Included in this modeling will be the analysis of different switching techniques to determine the best switching approach. Mathematical analysis results are used to verify a simulation model. This simulation model is used to analyze different possibilities of meeting DOD requirements. These DOD requirements and performance criteria for switching are defined and presented in chapter II. Specific conditions are set to insure performance changes based on the switching techniques, and the percentages of voice and

data in a system. The approach taken in this research was to use analytical techniques and to develop a simulation model for analyzing different voice and data integrated and nonintegrated environments. GRA

N86-24900# Naval Postgraduate School, Monterey, Calif.
JAMMING EFFECTS ON DIGITAL COMMUNICATION RECEIVERS (TIMING ERRORS AND FREQUENCY ERRORS) M.S. Thesis
Suk H. Lee Dec. 1985 88 p refs
(AD-A164199) Avail: NTIS HC A05/MF A01 CSCL 17/4

A refinement of the results obtained for optimum energy constrained jamming of digital receivers is obtained by modeling the jammer as a random process. In the modeling process, a random time arrival or random frequency errors are accounted for by including these effects in the representation of the jamming waveforms. Performance analyses are carried out in order to determine the effect of random time of arrival and random frequency errors on the part of the jammer, on the receiver probability of error. The mathematical results derived are programmed, evaluated on the computer, and compared against ideal optimum energy constrained jamming strategies previously studied. Results for both coherent and incoherent receivers are derived and analyzed utilizing conventional binary modulation schemes. Results show that generally some but not a great deal of jammer effectiveness is lost due to random time arrival or random frequency errors associated with the jammer waveform. GRA

N86-24901# Naval Postgraduate School, Monterey, Calif.
OPTIMAL ESTIMATION OF TARGET IN CLUTTER (CHAFF) FROM RADAR M.S. Thesis
Akylas D. Katsicogiannis Dec. 1985 80 p refs
(AD-A164200) Avail: NTIS HC A05/MF A01 CSCL 17/9

This work produced a simulation capable of giving the effectiveness of chaff used in the self-protective mode. Signal processing techniques were studied in chaff discrimination in crucial missile conditions. A missile-ship-chaff model will be constructed to provide the optimum confusion of the missile. The radar included in this simulation is a tracking radar with conical-scan modulation. Results of simulation runs illustrate the effects of varying chaff radar cross section when ship and chaff are in the same resolution cell. GRA

N86-24902# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
OMEGA LONG-TERM PHASE ADVANCES
H. H. Sauer, W. N. Spjeldvik, and F. K. Steele Jun. 1985 55 p
Prepared in cooperation with National Telecommunications and Information Administration, Boulder, Colo.
(PB85-233211; NOAA-TM-ERL-SEL-73) Avail: NTIS HC A04/MF]en1] A01 CSCL 17G

Anomalous advances of OMEGA Navigation System 10.2-kHz signals during three extended periods (totaling 60 days) of solar cosmic ray event activity during 1982 are examined and compared with energetic proton, alpha particle, and electron precipitation into the polar cap ionoshere. Time profiles of the OMEGA 10.2-kHz Hawaii-to-Norway path phase advance are found to be almost congruent with the time profiles of the logarithms of the fluxes of energetic protons precipitating into the polar cap as determined from instruments aboard the polar-orbiting NOAA-6 satellite and the GOES-2 geostationary satellite. Although both energetic alpha particles and electrons contribute to the anomalous phase advance experienced by the 10.2-kHz Hawaii-to-Norway OMEGA signal, a simple, empirical algorithm reasonably relates the observed phase advance to the observed differential fluxes of 6-MeV solar cosmic ray protons. GRA

N86-24903# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
TECHNICAL EVALUATION REPORT ON THE ELECTROMAGNETICWAVE PROPAGATION PANEL SYMPOSIUM ON PROPAGATION EFFECTS ON MILITARY SYSTEMS IN THE HIGH LATITUDE REGION
R. D. Hunsucker Nov. 1985 15 p
(AGARD-AR-218; ISBN-92-835-1514-7) Avail: NTIS HC A02/MF A01

Propagation effects on military systems in the high latitude region were examined. Topics discussed include: experimental studies of ionospheric irregularities and regular structure, results of ionospheric modification (HF heating) experiments,theoretical studies of ionospheric irregularity formation, global survey of ground conductivities,disturbance modeling studies, high latitude effects on HF radio communicaton, transionospheric communications, satellite synthetic aperture radar (SAR), MF radio broadcasting, spatially adaptive propagation, HF digital, Skywave HF sea state radar, and meteor burst communication. E.A.K.

N86-24904 Texas Univ., Austin.
SPECTRAL CHARACTERISTICS OF RADAR ECHOES FROM AIRCRAFT-DISPENSED CHAFF Ph.D. Thesis
Wilmot Jackson Estes 1985 203 p
Avail: Univ. Microfilms Order No. DA8529841

Experimental amplitude and phase measurements of radar echoes from chaff both in the wake of the dispensing aircraft (new chaff) and after the aircraft has left the area (mature chaff) are described. UHF and X-band coherent radars are used to obtain experimental data for both continuously-dispensed chaff and discrete chaff units. The mean radial velocity v sub 0 and the velocity standard deviation o sub v of the chaff cloud are estimated from complex-envelope spectraldensity estimates. No apparent correlation between the magnitude of o sub v and either radar frequency of chaff type is found. A theoretical model is developed which relates the complex-envelope spectral density to the probability density function of the dipole radial velocities. This model is used in the derivation of expressions which show the effects of range-gate movement and conical scanning on the spectral density. The theoretical model is also used to characterize the distribution of pulse-to-pulse phase changes. Experimental amplitude and phase measurements of radar echoes from chaff both in the wake of the ectiveness of chaff as a countermeasure against radars and guided missiles. Dissert. Abstr.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-24905*# Georgia Inst. of Tech., Atlanta. Microelectronics Research Center.
THEORETICAL AND MATERIAL STUDIES ON THIN-FILM ELECTROLUMINESCENT DEVICES Monthly Report, 1 Apr. - 30 Sep. 1985
C. J. Summers and K. F. Brennan Feb. 1986 47 p refs
(Grant NAG1-586; Proj. A-4168)
(NASA-CR-176710; NAS 1.26:176710; MR-1) Avail: NTIS HC A03/MF A01 CSCL 09A

Electroluminescent materials and device technology were assessed. The evaluation strongly suggests the need for a comprehensive theoretical and experimental study of both materials and device structures, particularly in the following areas: carrier generation and multiplication; radiative and nonradiative processes of luminescent centers; device modeling; new device concepts; and single crystal materials growth and characterization. Modeling of transport properties of hot electrons in ZnSe and the generation of device concepts were initiated. B.G.

N86-24906*# Hughes Research Labs., Torrance, Calif.
DESIGNING A 25-KILOWATT HIGH FREQUENCY SERIES RESONANT
R. R. Robson Apr. 1984 16 p refs Presented at POWERCON

11, 11th Annual International Power Electronics Conference and Exhibit, Dallas, Tex., 9-13 Apr. 1984
(Contract NAS3-23159)
(NASA-CR-176774; NAS 1.26:176774) Avail: NTIS HC A02/MF A01 CSCL 09C

The feasibility of processing 25 kW of power with a single, transistorized, 20 kHz, series resonant converter stage has been demonstrated by the successful design, development, fabrication, and testing of such a device. It employs four Westinghouse D7ST transistors in a full-bridge configuration and operates from a 250-to-350-Vdc input bus. The unit has an overall worst-case efficiency of 93.5% at its full rated output of 1000 V and 25 A dc. A solid-state dc input circuit breaker and output-transient-current limiters are included in and integrated into the design. Circuit details of the converter are presented along with test data. Author

N86-24907*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF OPTICALLY CONTROLLED MICROWAVE/ MILLIMETER WAVE DEVICE STRUCTURES
Rainee N. Simons and Kul B. Bhasin 1986 17 p refs Presented at International Microwave Symposium, Baltimore, Md., 2-4 Jun. 1986; sponsored by IEEE
(NASA-TM-87246; E-2926; NAS 1.15:87246) Avail: NTIS HC A02/MF A01 CSCL 09C

The light-induced voltage and the change in the source-to-drain channel current under optical illumination higher than the semiconductor bandgap for GaAs MESFET, InP MESFET, Al0.3Ga0.7As/ GaAs high electron mobility transistor (HEMT) and GaAs permeable base transistor (PBT) were analytically obtained. The GaAs PBT and GaAs MESFET have much higher sensitivity than InP MESFET. The Al0.3Ga0.7As/GaAs HEMT is observed to have the highest sensitivity. Variation in device parasitics due to optical illumination and its effect on the cutoff frequencies f sub T and f sub max are also investigated. Author

N86-24908*# National Aeronautics and Space Administration. Pasadena Office, Calif.
FLOATING EMITTER SOLAR CELL JUNCTION TRANSISTOR Patent Application
Chih Tang Sah, inventor (to NASA) and Li-Jen Cheng, inventor (to NASA) Filed 11 Mar. 1986 26 p
(Contract NAS7-919)
(NASA-Case-NPO-16467-1-CU; NAS 1.71:NPO-16467-1-CU; US-Patent-Appl-SN-838648) Avail: NTIS HC A03/MF A01 CSCL 09A

A front surface contact floating emitter solar cell transistor is provided in a semiconductor body (n-type), in which floating emitter sections (p-type) are diffused or implanted in the front surface. Between the emitter sections, a further section is diffused or implanted in the front surface, but isolated from the floating emitter sections, for use either as a base contact to the n-type semiconductor body, in which case the section is doped n+, or as a collector for the adjacent emitter sections, in which case the section is doped p+. In the first case, the structure is diffused or implanted p+ on the back in a section that serves as a collector, and in the second case the structure is diffused or implanted n+ all across the back to serve as a base contact. In either case, the semiconductor material on the back may be a starting substrate of suitably doped semiconductor material. A major advantage is that no wafer edge groove is necessary since the floating emitter solar cell transistors are isolated from saw damge, so long as a cut is not made through the well. NASA

N86-24909*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLAT-PANEL, FULL-COLOR ELECTROLUMINESCENT DISPLAY Patent Application
James B. Robertson, inventor (to NASA) Filed 3 Dec. 1985 13 p
(NASA-Case-LAR-13407-1; NAS 1.71:LAR-13407-1; US-Patent-Appl-SN-804196) Avail: NTIS HC A02/MF A01 CSCL 09A

This invention relates to a flat-panel, electroluminescent display capable of achieving full color and is particularly useful in achieving a bright display with high resolution. The invention uses red, green and blue phosphors in two layers separated by layers of insulating material and layers of electrodes that are used to excite the electrodes. In operation, the display is addressed by supplying sufficient voltage between selected electrodes. This places an electric field across the phosphor at each picture element located between the overlap of the selected electrodes, causing the phosphor to emit light at this location. The display can be addressed in line-at-a-time fashion in rapid enough sequence to display information at standard TV frame rates. The novelty of this invention resides in the combining of a partial side-by-side design with a partial stacked layer design to produce a flat-panel, full-color display which has a better combination of resolution, brightness, contrast ratio and fabrication simplicity than any of the prior designs. Author

N86-24910# National Aeronautics and Space Administration, Washington, D.C.
MICROWAVE TUBE COLLECTORS. COLLECTOR SYSTEMS OF UHF DEVICES WITH LONGITUDINAL INTERACTIONS
A. N. Sandalov and V. E. Rodyakin Mar. 1986 32 p refs Transl. into ENGLISH from Radioelektronika (USSR),no. 3, 1984 p 63-76 Transl. by Kanner (Leo) Associates, Redwood City,iCalif.
(Contract NASw-4005)
(NASA-TM-88399; NAS 1.15:88399) Avail: NTIS HC A03/MF A01 CSCL 09C

A comparison is made of different types of collectors in UHF devices. The main problems involved in designing collectors are discussed with a survey of available literature. It is concluded that improvement in the methods of theoretical study makes it possible to reduce the weight and dimensions of collectors thus increasing the safety and service life of UHF devices with longitudinal interaction. Author

N86-24911# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A METHOD FOR FABRICATING MAGNETODIELECTRIC CORES
Yu. M. Alter, V. P. Geraskov, Yu. G. Kiryanov, A. S. Sakhiyev, and G. V. Korolev 20 Dec. 1985 5 p refs Transl. into ENGLISH from Russian Patent no. 343310 (28 Aug. 1972) p 1-2
(AD-A163457; AD-E401440; FTD-ID(RS)T-1228-85) Avail: NTIS HC A02/MF A01 CSCL 20/3

This patent relates to a method for fabricating magnetodielectric cores based on carbonyl iron, which are used in radio-electronic equipment. The method described in this patent is distinguished by the fact that, in order to simplify the manufacturing process, a low-viscosity monomer, selected from a group containing alkylene-, oxyalkylene dimethacrylate in the amount from 3 to 6 weight %, is used as the binding reagent. Heat treatment is done at 75 to 90 C. GRA

N86-24912# Naval Civil Engineering Lab., Port Hueneme, Calif.
TEST RESULTS FOR THE 2.5-kVA GROUND FAULT PROTECTOR Final Report, Jan. 1982 - Sep. 1984
L. Tucker Sep. 1985 47 p refs
(AD-A163501; NCEL-TN-1734) Avail: NTIS HC A03/MF A01 CSCL 09/3

Divers using electrical equipment are exposed to shock hazards. The Naval Civil Engineering Laboratory tested commercially available ground fault protection devices designed for terrestrial use and found that none of them met Navy BUMED criteria for protection against electrical shock. NCEL then developed a prototype model ground fault protection system that could meet the BUMED criteria. This prototype incorporated the most desirable features of the commercial systems. The prototype was capable of detecting low-level (less than 5 mA) currents and shutting down in 10 msec or less. Author (GRA)

N86-24913# Naval Postgraduate School, Monterey, Calif.
SIMULATION AND PERFORMANCE OF BRUSHLESS dC

MOTOR ACTUATORS Progress Report, Oct. 1984 - Sep. 1985
Alex Gerba, Jr. Dec. 1985 48 p refs
(AD-A163725; NPS69-85-028) Avail: NTIS HC A03/MF A01 CSCL 10/2

The simulation model for a Brushless D.C. Motor and the associated commutation power conditioner transistor model are presented. The necessary conditions for maximum power output while operating at steady-state speed and sinusoidally distributed air-gap flux are developed. Comparison of simulated model with the measured performance of a typical motor are done both on time response waveforms and on average performance characteristics. These preliminary results indicate good agreement. Plans for model improvement and testing of a motor-driven positioning device for model evaluation are outlined. Author (GRA)

N86-24914# EMTEC Engineering, Inc., Los Angeles, Calif.
CONFIGURATION STUDY OF NEW LOW-LOSS MM (MILLIMETER) WAVE GUIDING STRUCTURES Final Report, 1 Oct. 1984 - 30 Sep. 1985
Cavour Yeh 12 Nov. 1985 14 p refs
(Contract DAAG29-84-C-0025)
(AD-A163784; MM-85-1; ARO-22454.1-PH-S) Avail: NTIS HC A02/MF A01 CSCL 09/1

The result of the research carried out at EMtec Engineering, Inc., Los Angeles, under Contract DAAG 29-84-C-0025 with the Army Research Office is discussed. The primary objective was to learn whether there exists a dielectric waveguide configuration which offers lower loss figure than a circular dielectric rod. Important evidence was found which showed that it is feasible to optimize a configuration to achieve low-loss guidance of mm waves. Future research areas are also described. GRA

N86-24915# Aerospace Corp., El Segundo, Calif. Materials Science Lab.
PARTIAL-DISCHARGE TESTS OF MULTIWINDING HIGH-VOLTAGE TRANSFORMERS FOR SPACE TWTAS (TRAVELING-WAVE TUBE AMPLIFIERS)
Francis Hai and Kenneth W. Paschen 23 Sep. 1985 70 p refs
(Contract F04701-83-C-0084)
(AD-A163882; TR-0084A(5935-03)-1; SD-TR-85-64) Avail: NTIS HC A04/MF A01 CSCL 09/1

The high-voltage transformer is a key component in the power supply, converting a single low voltage from the power bus of a communication satellite to multiple high voltages required by a traveling-wave tube amplifier. Partial-discharge (corona) tests (PDT) are performed on this component to establish high-voltage integrity and to screen out units with high-voltage defects. These defects are usually voids and cracks occurring in the insulation of the transformer. Investigations conducted to determine how to perform effective partial-discharge tests on transformers to screen out defective units are discussed. The aspects of partial-discharge testing that were examined include (1) the test medium (air, vacuum, or dielectric fluid); (2) the test mode (60 Hz ac, ac on dc, or dc); (3) the test configuration (i.e., the testing of each insulation barrier in sequence or the simultaneous testing of all barriers); (4) test voltage magnitude (to four times the operating voltage); (5) test data; and (6) pass/fail criteria. Destructive physical analysis (DPA) was performed on both defective and defect-free transformers to confirm the effectiveness of the recommended PDT procedures. GRA

N86-24916# California Univ., Berkeley. Electronics Research Lab.
RESEARCH ON DEVICES FOR INTEGRATED MILLIMETER WAVE SYSTEMS Final Report, 18 Jun. 1979 - 31 Jul. 1985
S. E. Schwarz Oct. 1985 11 p refs
(Contracts DAAG29-82-K-0166; DAAG29-79-C-0134)
(AD-A163903; ARO-19300.4-EL; ARO-16472.7-EL) Avail: NTIS HC A02/MF A01 CSCL 09/5

Planar technology for millimeter wave circuits has been studied. Coplanar waveguide filters have been developed. A fully planar monolithic 35-GHz oscillator and a planar 70-GHz receiver have been built. GRA

N86-24917# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ARITHMETIC CIRCUITRY FOR HIGH SPEED VLSI WINOGRAD FOURIER TRANSFORM PROCESSOR M.S. Thesis
Paul W. Coutee Dec. 1985 132 p refs
(AD-A163943; AFIT/GE/ENG/85D-11) Avail: NTIS HC A07/MF A01 CSCL 09/5

The objective of this thesis is to define, design, and implement an efficient VLSI architecture which computes the Discrete Fourier Transform using the Winograd Fourier Transform Algorithm. The architecture includes circuitry to perform input/output, WFT calculations, parity checking and generation, and scale factor generation. GRA

N86-24918# Department of the Air Force, Washington, D.C.
ORIENTATION OF CIRCULAR CONNECTORS USING VISION PROCESSING Patent Application
William P. McConnell, inventor (to Air Force) Filed 3 Dec. 1985 29 p refs
(AD-D012153; US-Patent-Appl-SN-804201) Avail: NTIS HC A03/MF A01 CSCL 09/2

The determination of the angular orientation of circular connectors is made using a first and second camera in order to enable an automated system to successfully connect cables. Vision processing is used to locate a key and keyway on a metal ring forming an annular mating surface on each male and female mating surface. As the first camera records an image of the male connector, the threshold between black and white is adjusted so that the keyway appears in the form of a break in the metal ring around the connector. As the second camera observes the female connector, the threshold between black and white is adjusted by a control signal from the automated system so that the keys appear as protrusions from an unbroken ring. Finally, by isolating the background beyond a certain radius, the first and second cameras are able to produce a first and second video signal in which the plurality of pins and holes in each connector are isolated against a background. The first and second video signals thereby contain sufficient information to enable the automated system to successfully connect cables while maximizing unattended operation times. GRA

N86-24919# Department of the Air Force, Washington, D.C.
METHOD OF MAKING A RESONATOR HAVING A DESIRED FREQUENCY FROM A QUARTZ CRYSTAL RESONATOR PLATE Patent Application
John R. Vig, inventor (to Air Force) Filed 17 Jan. 1986 24 p refs
(AD-D012157; US-Patent-Appl-SN-819652) Avail: NTIS HC A02/MF A01 CSCL 09/1

The general object of this invention is to provide a method of making a resonator from a quartz crystal resonator plate. A more particular object of the invention is to provide such a method in which the resonator will have a desired frequency. A further object of the invention is to provide such a method of making a high frequency fundamental mode resonator in which the resonator will have a desired frequency. A still further object of the invention is to provide such a method that is dry, that is inexpensive to set up and operate, that produces no surface damage or high levels of ionizing radiation, that permits the direct and precise monitoring of the resonator frequency during the method, that permits the independent adjustment of individual electrodes on multiple electrode devices (such as monolithic crystal filters), and that minimizes the aging due to oxidation of the electrodes. It has been found that the aforementioned objects can be attained by a method including the steps of etching the quartz crystal resonator plate to a frequency slightly higher than the desired frequency, and depositing metallic electrodes onto the active area of the resonator plate to lower the frequency that very closely approaches the desired frequency. GRA

N86-24920# Massachusetts Inst. of Tech., Lexington. Lexington Lab.
LOW PASS FILTERS WITH LINEAR PHASE

Robert M. Lerner 12 Dec. 1985 46 p refs
(Contract F19628-85-C-0002)
(AD-A163984; TR-729; ESD-TR-85-240) Avail: NTIS
HC A03/MF A01 CSCL 09/5

This report is intended as a modern sequel to Band Pass Filters with Linear Phase, published over 20 years ago. Here, the linear phase algorithms are adapted to low-pass integrated active circuit topologies for potential use as the input filter in sampled data control systems and other low-pass applications for which traditional coil-capacitor-transformer filter designs are no longer appropriate. The linear phase algorithm is applicable to a variety of circuit topologies which are not mathematically equivalent. Application to the overall transfer function (the simple approach) results in transmission that is nearly equal-ripple in both amplitude and phase, the errors being equivalent to echos in a misterminated transmission line. The resulting filters compare favorably with modest order Tchebychef filters (lacking phase control). Application to branches of a feedback topolgy (mathematically equivalent to a lattice) leads to control of echoes and stop-band zeros at the cost of extra elements. The results compare favorably with ordinary Butterworth filters (lacking phase control) having the same total number of poles. Practical means for inserting stop band zeros without redesign of the pass-band are considered. Circuits of both the R-C and switchcap types are discussed. Author (GRA)

N86-24921# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CONTROL CIRCUITRY FOR HIGH SPEED VLSI (VERY LARGE SCALE INTEGRATION) WINOGRAD FOURIER TRANSFORM PROCESSORS M.S. Thesis
Paul C. Rossbach Dec. 1985 352 p refs
(AD-A164043; AFIT/GE/ENG/85D-35) Avail: NTIS
HC A16/MF A01 CSCL 09/5

The calculation of the Discrete Fourier Transform has long been a significant bottleneck in many Digital Signal Processing applications. With the arrival of Very Large Scale Integration and new DFT algorithms, system architectures that significantly reduce the DFT bottleneck are possible. This thesis addresses the design, simulation, implementation, and testing of the control circuitry for a high speed, VLSI Winograd Fourier Transform (WFT) processor. Three WFT processors are combined into a pipelined architecture that is capable of computing a 4080-point DFT on complex input data approximately every 120 microseconds when operating with 70 MHz clock signals. The chip control architecture features a special Programmable Logic Array (PLA) to control the on-chip arithmetic circuitry, and a dense, 54K ROM to generate data addresses for the external RAM. The PLA controller was fabricated in 3 micron CMOS and functioned properly for clock rates of over 60 MHz. The address generator ROM was designed and submitted for fabrication in 3 micron CMOS, and SPICE simulations predict an access time of 60 nanoseconds. Software that automatically generates a ROM layout description from a data file was developed to ensure the correctness of the final design. The transistor minimization procedure i s based on a graph partitioning heuristic, and the drain removal procedure is based on an algorithm that near-optimally solves the Traveling Salesman Problem. GRA

N86-24922# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STUDY AND ANALYSIS OF AlGaAs/GaA MODULATION DOPED FIELD-EFFECT TRANSISTORS INCORPORATING P-TYPE SCHOTTKY GATE BARRIERS M.S. Thesis
Kevin L. Priddy Dec. 1985 152 p refs
(AD-A164103; AFIT/GEO/ENG/85D-1) Avail: NTIS
HC A08/MF A01 CSCL 09/5

The design and dc performance of enhanced Schottky barrier modulation doped transistors (ESMODFETs) is presented. The theory required to estimate the layer thicknesses and dopings required for a desired barrier height is developed. The experimental results show an increase from 0.8eV to 1.6eV for the ESMODFET versus the standard MODFET, with good correlation between theory and experiment. The ohmic contact resistance of the ESMODFET is comparable to that of the MODFET. The process used to fabricate the ESMODFET is similar to that used for the MODFET. GRA

N86-24923# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MICROCOMPUTER-BASED MENU-DRIVEN CHIP LAYOUT LANGUAGE M.S. Thesis
Steven C. Morrese Dec. 1985 321 p refs
(AD-A164109; AFIT/GCS/ENG/85D-11) Avail: NTIS
HC A14/MF A01 CSCL 09/5

The Menu Driven Chip Layout Language (MDCLL) is a microcomputer-based design tool used for representing the physical layout of integrated circuit designs in the Caltech Intermediate Form (CIF). MDCLL is based on the Chip Layout Language (CLL) created by Tim Saxe of Stanford University and as modified at the Air Force Institute of Technology. MDCLL leads the user through interactive menu-driven functions, allowing the user to represent a circuit design in CIF; however, the user sees a language similar to CLL even though the file is stored on disk as CIF. The output CIF file is suitable for use with other Computer Aided Design tools or for use in the fabrication process. MDCLL uses a cell-oriented design methodology in which the user defines cell, and then the user combines these cells with the necessary interconnects to form the layout of an entire integrated circuit. Cell interconnections are possible by placing wires, abutting cells, or by overlapping cells. The main functions of MDCLL are to create a new cell, delete a cell, place a cell, move a cell, modify a cell, interconnect cells, and print the CIF file of a cell. GRA

N86-24924# Ohio State Univ., Columbus. Electroscience Lab.
JOINT SERVICES ELECTRONICS PROGRAM Final Report, Oct. 1983 - Sep. 1985
R. G. Kouyoumjian, D. L. Moffatt, E. H. Newman, P. H. Pathak, and J. H. Richmond Dec. 1985 16 p refs
(Contract N00014-78-C-0049)
(AD-A164151; ESL-710816-19) Avail: NTIS HC A02/MF A01
CSCL 09/5

This document presents a brief overview in the following areas: (1) Time Domain Studies and Slope Diffraction Techniques Studies; (2) Hybrid Studies; (3) Diffraction Studies; (4) Time Domain or Transient Studies; (5) Integral Equation Studies; and (6) Microstrip antennas. GRA

N86-24925# General Electric Co., Schenectady, N. Y.
ADVANCED ARTIFICIAL DIELECTRIC MATERIALS FOR MILLIMETER WAVELENGTH APPLICATIONS. PART A Annual Technical Report, 1 Aug. 1984 - 30 Sep. 198
Israel S. Jacobs 30 Dec. 1985 36 p refs
(Contract N00014-83-C-0447)
(AD-A164195; Rept-85-SRD-030) Avail: NTIS HC A03/MF A01
CSCL 09/3

This is Part A of a two-part Annual Report. (Part B, dealing with magneto-dielectrics, is classified.) This part describes a continuation of work on artificial dielectric composites based on a polymeric binder and alloy powder particles that are oxide-coated for isolation and ferromagnetic below room temperature for packing determination. Characterization studies show the surface oxide on the alloy powder. Microstructural study of the composites shows wide variations in local packing density, characteristic of random loading. Permittivity measurements extended to 35 GHz correlate qualitatively with modern theories of heterogeneous media but evidence deviations that may arise from the observed clumping. Higher frequency measurements of permittivity and induced permeability are under way. An alternative inorganic binder material and process (with higher dielectric constant) has been developed with properties suitable for the morphological, electromagnetic, and mechanical requirements. GRA

N86-24926# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
KALMAN FILTER DESIGN FOR THE LONG RANGE INTERCEPT FUNCTION OF THE F-4E/G FIRE CONTROL SYSTEM M.S. Thesis

Robert C. Halbert Dec. 1985 366 p refs
(AD-A164205; AFIT/GE/ENG/85D-20) Avail: NTIS
HC A16/MF A01 CSCL 17/9

This study examines reduced-order Kalman filters designed to improve performance of the F-4E/G long range air-to-air missile capability (LRI function). Operational requirements dictate a high degree of accuracy and constraints imposed by existing hardware mandate minimal complexity. Two linear dynamics models are proposed, one based on constant target velocity, and the other based on time-correlated target acceleration. Both are defined in inertial Cartesian coordinates aligned with north, east, and down. A nonlinear model is developed for measurements available in the existing F-4E/G hardware, including range, range rate, radar antenna gimbal angles, and radar antenna rates. The models are implemented in extended Kalman filter formulations employing linear propagation equations to avoid on-line numerical integration. Performance evaluations are performed on three test trajectories using Monte Carlo analysis. Filter tuning, error budgets, adaptive techniques, and observability issues are addressed during filter evaluation. Results of the evaluation indicate the filter designs can meet the requirements of the F-4E/G fire control system. Recommendations are made for continued testing and for operational implementation. GRA

N86-24927# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ON DETECTION OF NUMBER OF SIGNALS IN PRESENCE OF WHITE NOISE
L. C. Zhao, P. R. Krishnaiah, and Z. D. Bai Oct. 1985 30 p refs
(Contracts N00014-85-K-0212; F49620-85-C-0008)
(AD-A164211; TR-85-37; AFOSR-86-0039TR) Avail: NTIS
HC A03/MF A01 CSCL 09/4

In this paper, the authors propose procedures for the detection of the number of signals in presence of Gaussian white noise. The methods used fall within the framework of the model selection procedures using an information theoretic criterion. The strong consistency of the estimates of the number of signals, under different situations, is established. Extensions of the results are also discussed for the case when the noise is not necessarily Gaussian. GRA

N86-24928# National Bureau of Standards, Gaithersburg, Md.
CALIBRATION OF TEST SYSTEMS FOR MEASURING POWER LOSSES OF TRANSFORMERS Final Report
O. Petersons and S. P. Mehta Sep. 1985 108 p refs Prepared in cooperation with ASEA Electric, Inc., Waukesha, Wis.
(PB86-132032; NBS/TN-1204) Avail: NTIS HC A06/MF A01; also available SOD HC $3.75 as 003-003-02677-8 CSCL 09C

A calibration system for accuracy verification and alignment of test systems for measuring transformer losses is described. Methodologies are presented for assessing measurement uncertainties and for evaluating overall accuracy of test systems. Procedures are suggested for continuing maintenance and calibration of standard instruments and test systems to ensure traceable measurements. GRA

N86-24929# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
RADIO-FREQUENCY POWER DELIVERY SYSTEM: PROCEDURES FOR ERROR ANALYSIS AND SELF-CALIBRATION
M. Kanda and R. D. Orr Aug. 1985 28 p
(PB86-115680; NBS/TN-1083) Avail: NTIS HC A03/MF A01; also available SOD HC $1.00 as 003-003-02670-1 CSCL 09E

An expression was developed for net power delivered to a load in terms of the indicated forward and reflected power and the system S-parameters and reflection coefficients. The dual directional coupler is treated as nonideal with power reflections assumed between all ports. The system itself is used to evaluate the major S-parameter terms in net power computation, and uncertainty in the computed power is derived from origins in the power meter readings and incompletely known S-parameters. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Staustical Physics.*

N86-24930*# State Univ. of New York, Albany. Atmospheric Sciences Research Center.
WATER JET/SPRAY MEASUREMENT ANALYSIS Final Report
G. Garland Lala Jan. 1986 12 p refs
(NASA Order H-78743-B)
(NASA-CR-178802; NAS 1.26:178802) Avail: NTIS
HC A02/MF A01 CSCL 20D

The objective of this study was to provide analysis of data obtained under a previous contract entitled Characterization of Drop Spectra from High Volume Flow Water Jets. Measurements of drop spectra were obtained in the spray resulting from the breakup of high volume flow water jets from a variety of nozzle types. The drop spectra measurements were obtained from two drop spectrometers covering a range from 10 microns to 12 millimeters diameter. The task addressed was to select representative spectra from the individual tests and provide analyses in both numerical and graphical formats as outlined in the proposal. The intended application of these results is an evaluation of the feasibility of fog clearing by high volume water sprays. During the tests, a fog event occurred making it possible to test the concept of fog clearing. Visual range data and fog drop spectra were analyzed, with particular emphasis placed on the modification of these parameters due to the water spray. Author

N86-24931*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
BURNER LINER THERMAL/STRUCTURAL LOAD MODELING: TRANCITS PROGRAM USER'S MANUAL
R. Maffeo Aug. 1985 45 p refs
(Contract NAS3-23272)
(NASA-CR-174891; NAS 1.26:174891; R85AEB452) Avail: NTIS
HC A03/MF A01 CSCL 20D

Transfer Analysis Code to interface Thermal/Structural Problems (TRANCITS) is discussed. The TRANCITS code satisfies all the objectives for transferring thermal data between heat transfer and structural models of combustor liners and it can be used as a generic thermal translator between heat transfer and stress models of any component, regardless of the geometry. The TRANCITS can accurately and efficiently convert the temperature distributions predicted by the heat transfer programs to those required by the stress codes. It can be used for both linear and nonlinear structural codes and can produce nodal temperatures, elemental centroid temperatures, or elemental Gauss point temperatures. The thermal output of both the MARC and SINDA heat transfer codes can be interfaced directly with TRANCITS, and it will automatically produce stress model codes formatted for NASTRAN and MARC. Any thermal program and structural program can be interfaced by using the neutral input and output forms supported by TRANCITS. E.A.K.

N86-24932*# Brown Univ., Providence, R. I. Div. of Engineering.
CONTRIBUTIONS TO THE UNDERSTANDING OF LARGE-SCALE COHERENT STRUCTURES IN DEVELOPING FREE TURBULENT SHEAR FLOWS
J. T. C. Liu Apr. 1986 219 p refs
(Grants NAG1-379; NAG3-673; NSF MSM-83-20307; NSF INT-85-14196; NATO-343/85)
(NASA-CR-176772; NAS 1.26:176772) Avail: NTIS
HC A10/MF A01 CSCL 20D

Advances in the mechanics of boundary layer flow are reported. The physical problems of large scale coherent structures in real, developing free turbulent shear flows, from the nonlinear aspects of hydrodynamic stability are addressed. The presence of fine

grained turbulence in the problem, and its absence, lacks a small parameter. The problem is presented on the basis of conservation principles, which are the dynamics of the problem directed towards extracting the most physical information, however, it is emphasized that it must also involve approximations. E.A.K.

N86-24933*# Kansas Univ. Center for Research, Inc., Lawrence.
STATISTICAL PREDICTION OF DYNAMIC DISTORTION OF INLET FLOW USING MINIMUM DYNAMIC MEASUREMENT. AN APPLICATION TO THE MELICK STATISTICAL METHOD AND INLET FLOW DYNAMIC DISTORTION PREDICTION WITHOUT RMS MEASUREMENTS Final Report
William G. Schweikhard and Yen-Sen Chen Apr. 1986 216 p refs 2 Vol.
(Grant NAG3-11)
(NASA-CR-176764; NAS 1.26:176764) Avail: NTIS HC A10/MF A01 CSCL 20D

The Melick method of inlet flow dynamic distortion prediction by statistical means is outlined. A hypothetic vortex model is used as the basis for the mathematical formulations. The main variables are identified by matching the theoretical total pressure rms ratio with the measured total pressure rms ratio. Data comparisons, using the HiMAT inlet test data set, indicate satisfactory prediction of the dynamic peak distortion for cases with boundary layer control device vortex generators. A method for the dynamic probe selection was developed. Validity of the probe selection criteria is demonstrated by comparing the reduced-probe predictions with the 40-probe predictions. It is indicated that the the number of dynamic probes can be reduced to as few as two and still retain good accuracy. E.A.K.

N86-24934*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
UNSTEADY HEAT TRANSFER AND DIRECT COMPARISON TO STEADY-STATE MEASUREMENTS IN A ROTOR-WAKE EXPERIMENT
J. E. OBrien, R. J. Simoneau, J. E. LaGraff (Syracuse Univ.), and K. A. Morehouse Jan. 1986 21 p refs Presented at the 8th International Heat Transfer Conference, San Francisco, Calif., 17-22 Aug. 1986
(NASA-TM-87220; E-2757; NAS 1.15:87220) Avail: NTIS HC A02/MF A01 CSCL 20D

Circumferentially local and time-resolved heat transfer measurements were obtained for a circular cylinder in crossflow located downstream of a rotating spoked wheel wake generator in a steady flow tunnel. The unsteady heat transfer effects were obtained by developing an extension of a thin film gauge technique employed to date exclusively in short-duration facilities. The time-average thin film results and conventional steady-state heat transfer measurements were compared. Time-averaged wake-induced stagnation heat transfer enhancement levels above the nowake case were about 10% for the four cylinder Reynolds numbers. This enhancement level was nearly independent of bar passing frequency and was related directly to the time integral of the heat transfer spikes observed at the bar passing frequency. It is observed that the wake-induced heat transfer spikes have peak magnitudes averaging 30 to 40% above the interwake heat transfer level. E.A.K.

N86-24935*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIQUID SEEDING ATOMIZER Patent Application
Henry L. B. Seegmiller, inventor (to NASA) Filed 31 Mar. 1986 12 p
(NASA-Case-ARC-11631-1; NAS 1.71:ARC-11631-1; US-Patent-Appl-SN-846428) Avail: NTIS HC A02/MF A01 CSCL 20D

An atomizer for a liquid having an air supply is described. Liquid supply tubes extend longitudinally along the air supply tube. The air supply tube has at least one air orifice extending from an inner surface of the tube through the tube. The liquid supply tubes are positioned on either side of the air orifices and the liquid tubes are sealed to the air supply tube. The liquid supply tubes with facing liquid orifices are positioned adjacent to each of the air orifices. The liquid supply tubes are laterally spaced apart at the liquid orifices at a distance less than the diameter of the air orifices to enable a beneficial venturi effect when the atomizer is in operation. NASA

N86-24936# National Aeronautics and Space Administration, Washington, D.C.
AN EXPERIMENTAL INVESTIGATION ON LOCATION OF BOUNDARY LAYER TRANSITION ON THE NACA 0012 USING SURFACE HOT FILM GAGES
Tie-cheng Wang Mar. 1986 10 p refs Transl. into ENGLISH from Acta Aeronautica et Astronautica Sinica, v. 5, no. 4, Dec. 1984 p 401-405 Original language document was announced in IAA as A85-43231 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. was prep. by Nanjing Aeronautical Inst.
(Contract NASw-4004)
(NASA-TM-88285; NAS 1.15:88285) Avail: NTIS HC A02/MF A01 CSCL 20D

Hot film gages were attached flush to the upper surface of a NACA-type 0012 airfoil in order to locate the boundary layer transitions corresponding to a range of distances from the leading edge. The measurements were carried out in a low-speed wind tunnel at Nanjing Aeronautical Institute. During the wind-tunnel tests, Reynolds numbers were kept constant at 200,000 Re(b), while the angle of attack of the airfoil was varied continuously. The locations on the airfoil of boundary layer separation and turbulent boundary layer attachment are shown in a diagram. It is found that the location of boundary layer transitions using hot film gages is a feasible and practical technique. Author

N86-24937*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A COMPUTATIONAL STUDY OF MULTIPLE JET AND WALL INTERACTION
Warren Campbell Feb. 1986 13 p refs
(NASA-TM-86541; NAS 1.15:86541) Avail: NTIS HC A02/MF A01 CSCL 20D

In the fuel preburner of the Space Shuttle Main Engine, face plate, injector, and baffle erosion have been observed. The observed patterns of erosion suggest that flame attachment to the walls is a contributing factor. To better understand the physical phenomena involved, a portion of the preburner was modeled computationally. The simulated 'preburner' had three two-dimensional jets entering a cavity adjacent to a baffle. The computational model employed the Patankar Spalding algorithm with upwind differencing. The turbulence model was a standard k-epsilon model with wall functions. The effects of incoming boundary conditions on turbulent kinetic energy and dissipation, k and epsilon, was studied. The results indicate a very strong sensitivity to these boundary conditions over certain ranges of values. Author

N86-24938*# Garrett Turbine Engine Co., Phoenix, Ariz.
DILUTION JET MIXING PROGRAM, PHASE 3 Final Report
R. Srinivasan, E. Coleman, G. Myers, and C. White Sep. 1985 186 p refs
(Contract NAS3-22110)
(NASA-CR-174884; NAS 1.26:174884; GARRETT-21-5418) Avail: NTIS HC A09/MF A01 CSCL 20D

The main objectives for the NASA Jet Mixing Phase 3 program were: extension of the data base on the mixing of single sided rows of jets in a confined cross flow to discrete slots, including streamlined, bluff, and angled injections; quantification of the effects of geometrical and flow parameters on penetration and mixing of multiple rows of jets into a confined flow; investigation of in-line, staggered, and dissimilar hole configurations; and development of empirical correlations for predicting temperature distributions for discrete slots and multiple rows of dilution holes. Author

N86-24939# Ohio State Univ., Columbus.
SEPARATED FLOWS Final Report, 1 Aug. 1975 - 31 Dec. 1982

Odus R. Burggraf 29 Jan. 1986 15 p refs
(Contract N00014-76-C-0333)
(AD-A163551; OSURF-760325/712792) Avail: NTIS HC A02/MF A01 CSCL 20/4

This report contains a study of separation of three-dimensional steady flows and two-dimensional unsteady flows. During this reporting period, an analytical model of the laminar separation region in supersonic flow at high Reynolds number was formulated and shown to be in reasonable agreement with experimental results. The model gives scaling laws for the flow properties and length scales for the separation region. It was also shown that triple-deck theory is the valid limit for high Reynolds-number flows involving laminar separation and reattachment, on the basis of interacting boundary-layer theory. Another analysis demonstrated the nature of the flow near an abrupt change of surface height, such as steps and bases. Unsteady effects on three-dimensional boundary layers at large Reynolds number were analyzed and were found to fall into three distinct regimes of frequency parameter, based on triple-deck arguments. Algorithms were developed to treat separated flow problems, avoiding the difficulty of the separation singularity by use of time-marching in one case, and using a spectral method in the other case. Results have been obtained for both two and three-dimensional flows involving relatively large regions of separation. GRA

N86-24940# California Inst. of Tech., Pasadena.
STRUCTURE AND MIXING IN TURBULENT SHEAR FLOWS Final Report, 1 Mar. 1982 - 30 Jun. 1985
Anatol Roshko and Theodore VonKarman 30 Jun. 1985 8 p refs
(Contract N00014-76-C-0260)
(AD-A163584) Avail: NTIS HC A02/MF A01 CSCL 20/4

The research problems studied under this contract were the following: mixing in a forced plane shear layer; turbulent structure in two dimensional far wakes; effect of external excitation on separated flow; effect of curvature on free-shear-layer structure and mixing; structure and mixing in transverse jets. Significant results obtained are briefly summarized in the following Discussion. Complete descriptions of the research and of the results are contained in the references cited. GRA

N86-24941# Wisconsin Univ., Madison. Mathematics Research Center.
STATIONARY MOTIONS AND INCOMPRESSIBLE LIMIT FOR COMPRESSIBLE VISCOUS FLUIDS Technical Summary Report
H. B. DaVeiga Nov. 1985 27 p
(Contract DAAG29-80-C-0041)
(AD-A163600; MRC-TSR-2883) Avail: NTIS HC A03/MF A01 CSCL 20/4

This paper considers the non-linear system of partial differential equation, describing the barotropic stationary motion of a compressible fluid, in a bounded region Omega. Assume that the total mass of fluid inside Omega is fixed, and equal to (m) abs. vol. Omega, where the mean density m is given. For small f and g, there exists a unique solution u(x), rho(x) in a neighborhood of (0, m). Here, u(x) is the field of velocities, rho(x) the density of the fluid, p(rho(x)) the pressure field, and f(x) the external force field (in the physical interesting case one has g = 0). Moreover, the solutions of system converge to the solution of the Navier-Stokes equation as lambda approaches + infinity, i.e. when the Mach number becomes small. The solution of the Navier-Stokes equations are the incompressible limit of the solutions of the compressible Navier-Stokes equations. The proofs given here, apply, without supplementary difficulties, in the context of Sobolev spaces H superscript k,p, and other functional spaces. The results can be extended to the heat depending case, too. GRA

N86-24942# Wisconsin Univ., Madison. Mathematics Research Center.
L(2) STABILITY FOR WEAK SOLUTIONS OF THE NAVIER-STOKES EQUATIONS IN R(3) Technical Summary Report
Paolo Secchi Nov. 1985 12 p
(Contract DAAG29-80-C-0041)
(AD-A163612; MRC-TSR-2885) Avail. NTIS HC A02/MF A01 CSCL 20/4

We consider the motion of a viscous fluid filling the whole space R3, governed by the classical Navier-Stokes equations (1). Existence of global (in time) regular solutions for that system of non-linear partial differential equations is still an open problem. Up to now, the only available global existence theorem (other than for sufficiently small initial data) is that of weak (turbulent) solutions. From both the mathematical and the physical point of view, an interesting property is the stability of such weak solutions. We assume that v(t,x) is a solution, with initial datum vO(x). We suppose that the initial datum is perturbed and consider one weak solution u corresponding to the new initial velocity. Then we prove that, due to viscosity, the perturbed weak solution u approaches in a suitable norm the unperturbed one, as time goes to + infinity, without smallness assumptions on the initial perturbation. GRA

N86-24943# Wisconsin Univ., Madison. Mathematics Research Center.
ON K-BKZ AND OTHER VISCOELASTIC MODELS AS CONTINUUM GENERALIZATION OF THE CLASSICAL SPRING-DASHPOT MODELS Technical Summary Report
Amitabh Narain Dec. 1985 51 p refs
(Contract DAAG29-80-C-0041)
(AD-A163703; MRC-TSR-2895) Avail: NTIS HC A04/MF A01 CSCL 20/4

An alternate constitutive formulation for visco-elastic materials, with particular emphasis on macromolecular viscoelastic fluids, is presented by generalizing Maxwell's idealized separation of elastic and relaxation mechanisms. The notion of relative rate of change of elastic stress is identified, abstracted, and formulated with the help of the established theory of finitely elastic isotropic materials. This gives a local rate type constitutive relation for an elastic mechanism in a simple material. For the simplest class of viscoelastic polymer melts, the notion of rate of change of elastic stress and its damped accumulation is identified and formulated. Under conditions of moderate strain rates, this scheme implies the reliable K-BKZ model for a class of polymer melts. An obvious extension generalizes the remaining classical spring-dashpot models. GRA

N86-24944# Department of the Air Force, Washington, D.C.
DUAL MODE HEAT EXCHANGER Patent Application
Frank E. Altoz, inventor (to Air Force) Filed 3 Dec. 1985 18 p refs
(AD-D012156; US-Patent-Appl-SN-804193) Avail: NTIS HC A02/MF A01 CSCL 20/13

The invention comprises a compact, light weight, dual mode heat transfer device. The dual mode heat transfer device provides for air cooling of heat dissipating electronic components at moderate aircraft speeds and when available ambient air is below a preselected temperature. At elevated aircraft speeds when the ambient air temperature is above the preselected temperature a coolant liquid is converted to steam or vapor in order to cool the heat dissipating electronic components. A preferred embodiment of the invention includes a cold plate for conducting heat away from the heat dissipating components and radiator fins for dissipating cold plate heat to a air cooling flow. GRA

N86-24945# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN EXPERIMENTAL STUDY OF CLUSTERED NOZZLES WITH VARIABLE SHROUDS M.S. Thesis
James R. Moran Dec. 1985 82 p refs
(AD-A163961; AFIT/GAE/AA/85D-11) Avail: NTIS HC A05/MF A01 CSCL 20/4

The research of this thesis involved the investigation of pressure and flow fields in the base region of clustered nozzles during cold flow testing. Nozzle exit conditions simulating altitudes up to 75,000 feet and chamber-to-back pressure ratios up to 200 were used. The nozzle clusters considered were made up of sets of two and three dimensional supersonic convergent-divergent

nozzles with a square shroud around the cluster. The two dimensional nozzles had design exit Mach numbers of 3.68 and 2.94. The three dimensional nozzles had a design exit Mach number of 2.64. The nozzle clusters were studied using various configurations and with two shroud lengths. A schlieren system that allowed for both still photographs and motion pictures film was used to investigate the flow fields. The results of this study indicate that the pressure fields in the base region of a nozzle cluster are dependent on both geometry and on the operating altitude. The outer wall of the test section (shroud) adjacent to the nozzles was observed to significantly affect the flow patterns and measured pressures. Potential influences in performance exist due both to changes in the gas dynamics of the flow and the appearance of additional pressure-area forces. GRA

N86-24946# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

EFFECTS OF SURFACE ROUGHNESS ON PRESSURE DISTRIBUTION AND BOUNDARY LAYER OVER COMPRESSOR BLADES AT HIGH REYNOLDS NUMBER IN A TWO-DIMENSIONAL CASCADE M.S. Thesis

Larry D. Williams Dec. 1985 87 p refs
(AD-A163974; AFIT/GAE/AA/85D-17) Avail: NTIS
HC A05/MF A01 CSCL 20/4

In this evaluation of the effects of surface roughness on the pressure distribution and boundary layer over compressor blades, the cascade consisted of seven NACA 65-A506 airfoils with a two inch chord and an aspect ratio of one. The blades were set in the test section at an angle of attack of 15 deg. The test section unit Reynolds number for the evaluation was in excess of two million/foot. Changes to the cascade blade pressure distribution were minimal for moderate average roughness (Ra=24.8 microns) to low average roughness values (Ra=.18 micron), except for pressures near the leading edge which were more pronounced. The pressures near the leading edge which were more prounced. The pressure distribution for a blade surface roughness of 53.8 microns differed considerably from the baseline case. The cascade test blade experienced laminar flow separation with turbulent reattachment at moderate to low roughness levels, and fully turbulent flow at high roughness levels. The blade suction surface boundary layer thickness increased with roughness values but was most responsive to the transition from laminar to turbulent flow. GRA

N86-24947# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

FLAT PLATE AND TURBINE VANE CASCADE HEAT TRANSFER INVESTIGATION USING A SHOCK TUBE M.S. Thesis

Patrick K. Fillingim Dec. 1985 89 p refs
(AD-A163992; AFIT/GAE/AA/85D-7) Avail: NTIS
HC A05/MF A01 CSCL 20/4

A shock tube was used to initiate boundary layer growth on a splitter plate at zero incidence. The heat transfer rate determined from a thin film semiconductor gage was compared to theoretical values for the flat plate heat transfer problem. Correlation between theoretical laminar and turbulent boundary layer equations and the experimental data for various shock Mach number flows showed excellent agreement. The shock tube was also used to generate high temperature gas flows which were allowed to pass through a turbine vane cascade. Thin film semiconductor and resistance gages provides temperature histories at four locations along the suction side of a turbine vane over a range of shock strengths. Heat transfer rates were determined from these temperature histories using a finite differencing scheme to approximate the energy equation for a semi-infinite solid. The rate of heat transfer along the suction side of the vane was shown to decrease with chordwise position from the stagnation point at the leading edge to the half chord position. At the three quarter chord position heat transfer rates were higher than the preceding chord points. GRA

N86-24948# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

ADAPTIVE-GRID OPTIMIZATION FOR MINIMIZING STEADY-STATE, TRUNCATION ERROR M.S. Thesis

Donald E. Coffey, Jr. Dec. 1985 154 p refs
(AD-A164038; AFIT/GA/AA/85D-4) Avail: NTIS
HC A08/MF A01 CSCL 20/4

This thesis develops an adaptive grid method which minimizes the truncation error in the finite difference solution. The study solves compressible, steady state, boundary layer equations assuming perfect gas flow over an isothermal wall. The Dorodnitsyn, compressibility transformation changes the boundary layer equations, as expressed in two dimensional, cartesian coordinates, into an incompressible form. The equations are then transformed into variables of a computational plane. Implicit Successive Over Relaxation (SOR) solves the finite differenced, computational, boundary layer equations. Comparison of the computed solution for incompressible flow over a flat plate to Blasius' exact solution shows the boundary layer code is accurate. The adaptive grid method uses Powell's method to optimize the solution grid by minimizing the sum of the third derivative in the computational plane of the tangential velocity component. This study tests the sum of the squares of the first, second, and third derivative of the tangential velocity as minimized functions. The accuracy of the optimized, adaptive grid solution is greater than the original, fixed grid solution. The study then applies the optimization to supersonic and hypersonic problems. The computed, adaptive grid solutions show good correlation with theoretical models for supersonic and hypersonic flow developed by Van Driest and Eckert. GRA

N86-24949# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A SCHLIEREN AND HOT-WIRE INVESTIGATION OF KARMAN VORTEX STREETS M.S. Thesis

John B. Wissler 13 Dec. 1985 135 p refs
(AD-A164101; AFIT/GAE/AA/85D-18) Avail: NTIS
HC A07/MF A01 CSCL 20/4

This thesis involved taking schlieren and hot-film anemometer data on Karman vortex streets, then developing a means of characterizing the individual vortices in a street using a schlieren picture and the corresponding anemometer trace. A Thermo-Systems, Inc. IFA-100 anemometer system, with a Tektronix 425 oscilloscope, was used to record an anemometer trace. The trace was captured on photographic film. The oscilloscope also fired a Cordin Model 5401 spark lamp, which provided, via a schlieren optical system, a physical picture of the Karman streets formed behind a 5/16-inch dia cylinder in a 2-inch by 2-inch square cross-section test region with a Mach 0.43 flow. Distance and angle information were obtained from the schlieren photographs, and timing and anemometer output voltage were obtained from the anemometer trace photograph using an HP-9874A digitizer. The data were analyzed using a Newton-Raphson method to solve for two constants, which should have completely characterized the vortices in the vortex street, assuming the vortices followed the theoretical equation for a combined free and forced vortex. It was assumed that the superposition of two vortices plus the mean flow were the parameters influencing the flow at any point in space and time. GRA

N86-24950# Naval Postgraduate School, Monterey, Calif.

EXPERIMENTAL INVESTIGATION OF TURBULENT HEAT TRANSFER IN STRAIGHT AND CURVED RECTANGULAR DUCTS M.S. Thesis

George G. Galyo Dec. 1985 110 p refs
(AD-A164142) Avail: NTIS HC A06/MF A01 CSCL 20/13

An experimental apparatus has been constructed and tested to examine the convective heat transfer in straight and curved ducts of rectangular cross-section. The channel can be configured with both walls independently heated at a constant heat flux, or one wall at a constant heat flux and the opposite wall adiabatic. Local and average Nusselt numbers can be calculated and used to evaluate the effect of curvature on heat transfer. Experiments were conducted at steady state of turbulent flow with one wall heated at a constant flux and the opposite wall adiabatic. The heat transfer characteristics of the straight and curved sections,

on both the inner and outer walls, were compared. The heat transfer rate of the concave curved wall proved to be enhanced over both the convex curved wall and both straight sections. GRA

N86-24951# Ballistic Research Labs., Aberdeen Proving Ground, Md.
NUMERICAL FLOW FIELD CALCULATIONS FOR A MISSILE CONFIGURATION AT M = .6 Final Report
Jubaraj Sahu and Charles J. Nietubicz Jan. 1986 48 p refs
Supersedes BRL-IMR-831 dated Dec. 1984
(AD-A164155; BRL-MR-3491; BRL-IMR-831) Avail: NTIS HC A03/MF A01 CSCL 20/4

Large separated flow region can seriously degrade the effectiveness of fins or any other control surface located in that region. A knowledge of the expected flow field can thus be very important in the initial design phase of a missile or projectile. The Aerodynamics Technology Branch of the US Army Missile Laboratory has requested numerical flow field data for a new missile design. Numerical computations have been made for the requested missile configuration at M = 0.6 and the results of these computations are presented in this report. A thin-layer Navier-Stokes base flow code has been used to compute the flow field for a full missile configuration including the base region. Numerical calculations have been made for both laminar and turbulent flow conditions. Details of the computed flow field are presented in the form of plots showing surface pressure distribution, velocity vectors, stream function and Mach number contours, particle paths and boundary layer parameters. Author (GRA)

N86-24952# General Electric Co., Pittsfield, Mass. Ordnance Systems Div.
TECHNICAL NOTES ON ORIFICE TESTS Final Report
Mel J. Bulman and John Mandzy Jan. 1986 72 p refs
(Contract DAAK11-78-C-0054)
(AD-A164227; BRL-CR-548) Avail: NTIS HC A04/MF A01 CSCL 20/4

The purpose of this task was to study the high speed flow of monopropellant through orifices in order to develop criteria for safe and efficient designs. Flow tests were conducted in a clear plastic, low pressure fixture and firing tests in a specially designed steel fixture. The initial injector studied was known to behave poorly in regenerative gun fixture firings. The flow tests revealed that it was subject to flow separation. The steel fixture tests with this injector exhibited strong evidence for flameholding inside the injector. Steel fixture firing tests were also performed on straight-through hole injectors. These showed evidence of flameholding in the orifice. The basic goal of this effort was not met. It is believed that neither the basic designs of the steel test fixture nor the instrumentation used were adequate for this task. Although no quantitative data was generated, a number of useful qualitative design guidelines were obtained. GRA

N86-24953# Los Alamos National Lab., N. Mex.
VORTICITY PRODUCTION IN DELAYED ASYMMETRIC CYLINDRICAL IMPLOSIONS
R. C. Mjolsness Oct. 1985 8 p
(Contract W-7405-eng-36)
(DE86-004369; LA-10564-MS) Avail: NTIS HC A02/MF A01

A model for vorticity production via asymmetric implosions is considered and it is seen that this mechanism may possibly account for macroscopic inward jetting of shocked material along one direction of the asymmetry midplane. However, any such conclusion is extremely model-dependent; specifically, it depends on the azimuthal interactions among unevenly shocked fluid elements, which are not adequately treated in the present analytical model. The direct numerical evaluation of the analytical model suggests that the effect may be marginal. DOE

N86-24954# Los Alamos National Lab., N. Mex.
VAPOR PHASE HEAT TRANSPORT SYSTEMS
J. C. Hedstrom and D. A. Neeper Sep. 1985 65 p
(Contract W-7405-eng-36)
(DE86-004360; LA-10487-MS) Avail: NTIS HC A04/MF A01

Progress in theoretical and experimental investigations of various forms of a vapor transport system for solar space heating is described, which could also be applied to service water heating. The refrigerant is evaporated in a solar collector, which may be located on the external wall or roof of a building. The vapor is condensed in a passively discharged thermal storage unit located within the building. The condensed liquid can be returned to the collector either by a motor-driven pump or by a completely passive self-pumping mechanism in which the vapor pressure lifts the liquid from the condenser to the collector. The theoretical investigation analyzes this self-pumping scheme. Experiments in solar test cells compared the operation of both passive and active forms of the vapor system with the operation of a passive water wall. The vapor system operates as expected, with potential advantages over other passive systems in design flexibility and energy yield. DOE

N86-24955*# Kansas Univ. Center for Research, Inc., Lawrence.
REVIEW AND EVALUATION OF RECENT DEVELOPMENTS IN MELIC INLET DYNAMIC FLOW DISTORTION PREDICTION AND COMPUTER PROGRAM DOCUMENTATION AND USER'S MANUAL ESTIMATING MAXIMUM INSTANTANEOUS INLET FLOW DISTORTION FROM STEADY-STATE TOTAL PRESSURE MEASUREMENTS WITH FULL, LIMITED, OR NO DYNAMIC DATA Final Report
William G. Schweikhard and Stephen R. Dennon Apr. 1986 257 p refs
(Grant NAG3-11)
(NASA-CR-176765; NAS 1.26:176765) Avail: NTIS HC A12/MF A01 CSCL 20D

A review of the Melick method of inlet flow dynamic distortion prediction by statistical means is provided. These developments include the general Melick approach with full dynamic measurements, a limited dynamic measurement approach, and a turbulence modelling approach which requires no dynamic rms pressure fluctuation measurements. These modifications are evaluated by comparing predicted and measured peak instantaneous distortion levels from provisional inlet data sets. A nonlinear mean-line following vortex model is proposed and evaluated as a potential criterion for improving the peak instantaneous distortion map generated from the conventional linear vortex of the Melick method. The model is simplified to a series of linear vortex segments which lay along the mean line. Maps generated with this new approach are compared with conventionally generated maps, as well as measured peak instantaneous maps. Inlet data sets include subsonic, transonic, and supersonic inlets under various flight conditions. Author

N86-24956 Houston Univ., Tex.
STUDIES OF VERTICAL ANNULAR GAS-LIQUID FLOWS Ph.D. Thesis
George J. Zabaras 1985 364 p
Avail: Univ. Microfilms Order No. DA8528720

Three types of vertical flowing films were studied. These are the free falling film, the falling film in the presence of countercurrent gas flow and the upward moving film due to concurrent flow of gas. An experimental program was performed based on a new electrochemical method for the dynamic measurement of the magnitude and the direction of the wall shear stress, and on a conductance wire probe for the simultaneous measurement of the film thickness. The data obtained for the free falling film reveal a strong length effect on the wavy film structure. Analysis of the data taken with countercurrent flow of gas shows that even at the flooding condition, the film flow is controlled by downward wave motion. Analyses of upward film flow data in a variety of ways suggest that at low gas rates the motion of the interface is controlled by a process of switching between steady states of the system. Dissert. Abstr

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-24957*# United Technologies Research Center, East Hartford, Conn.

INVESTIGATION OF BREADBOARD TEMPERATURE PROFILING SYSTEM FOR SSME FUEL PREBURNER DIAGNOSTICS

Final Technical Report, Oct. 1983 - May 1985

John Allen Shirley Jan. 1986 44 p refs

(Contract NAS8-34655)

(NASA-CR-178799; NAS 1.26:178799; R85-956642) Avail: NTIS HC A03/MF A01 CSCL 14B

The feasibility of measuring temperatures in the space shuttle main engine (SSME) fuel preburner using spontaneous Raman scattering from molecular hydrogen was studied. Laser radiation is transmitted to the preburner through a multimode optical fiber. Backscattered Raman-shifted light is collected and focused into a second fiber which connects to a remote-located spectrograph and a mutlichannel optical detector. Optics collimate and focus laser light from the transmitter fiber defining the probe volume. The high pressure, high temperature preburner environment was simulated by a heated pressure cell. Temperatures determined by the distribution of Q-branch co-vibrational transitions demonstrate precision and accuracy of 3%. It is indicated heat preburner temperatures can be determined with 5% accuracy with spatial resolution less than 1 cm and temporal resolution of 10 millisec at the nominal preburner operation conditions. E.A.K.

N86-24958*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

BEAM-MODULATION METHODS IN QUANTITATIVE AND FLOW VISUALIZATION HOLOGRAPHIC INTERFEROMETRY

Arthur Decker 1986 21 p refs Presented at Advanced Instrumentation for Engine Components, Philadelphia, Pa., 19-23 May 1986; sponsored by AGARD

(NASA-TM-87306; E-3029; NAS 1.15:87306) Avail: NTIS HC A02/MF A01 CSCL 14E

This report discusses heterodyne holographic interferometry and time-average holography with a frequency shifted reference beam. Both methods will be used for the measurement and visualization of internal transonic flows, where the target facility is a flutter cascade. The background and experimental requirements for both methods are reviewed. Measurements using heterodyne holographic interferometry are presented. The performance of the laser required for time-average holography of time-varying transonic flows is discussed. Author

N86-24959*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPARATUS FOR ELECTRICAL MEASUREMENTS OF THIN FILMS FROM 77 TO 1000 K

Lawrence G. Matus and Robert L. Summers Mar. 1986 7 p refs

(NASA-TM-87256; E-2839-1; NAS 1.15:87256) Avail: NTIS HC A02/MF A01 CSCL 14B

A novel method of mounting thin samples for electrical measurements is described. A vacuum chuck holds a mounting plate, which, in turn, holds the sample. Contacts on the mounting plate establish electrical connection to the sample. The attachment of wires directly to the samples is unnecessary. Measurements can be made at temperatures from 77 to 1000 K. As an application of the apparatus, resistivity and Hall measurements of a thin silicon carbide sample are presented. Author

N86-24960*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

INDUCTIVE ENERGY FOR RAPID STRAIN GUAGE ATTACHMENT Patent Application

Timothy D. Schott, inventor (to NASA), Robert L. Fox, inventor (to NASA), and John D. Buckley, inventor (to NASA) Filed 20 Feb. 1986 11 p

(NASA-Case-LAR-13237-1; NAS 1.71-LAR-13237-1; US-Patent-Appl-SN-831372) Avail: NTIS HC A02/MF A01 CSCL 14B

A new method of bonding strain gauges to base structures was found. Induction heating is used to concentrate high temperature levels in the bonding of a strain gauge to a substrate. By using new method embodiments, the adhesive curing schedules of the prior art were reduced from a matter of hours to a matter of minutes. A method is provided for installing a strain gauge device on a base. According to another aspect of the present method invention, the layer of ferric material is a thin plate of ferric material which is placed substantially adjacent to the upper surface of the strain gauge device prior to the heating of the layer of ferric material by induction heating. By utilizing the separate plate of ferric material, the present invention may be utilized to bond strain gauges to low reluctance bases such as aluminum or to no reluctance bases such as fiberglass. Author

N86-24961*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CHARACTERIZATION OF SIMULATED SMALL-DROPLET FUEL SPRAYS

Robert D. Ingebo 1986 10 p refs Proposed for presentation at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-19 Jun. 1986; sponsored by the AIAA, ASME, SAE and ASEE

(NASA-TM-87286; E-2987; NAS 1.15:87286) Avail: NTIS HC A02/MF A01 CSCL 14B

A two-fluid pneumatic atomizer operating at relatively high liquid and gas pressures produced water sprays that simulated small-droplet clouds of liquid fuel for use in studying vaporization and fuel-air mixing effects on combustor performance and emissions. To characterize the sprays, a scattered-light scanning instrument was developed and measurements of volume median or volume mean diameter, D sub V.5, were correlated with D sub O, W sub w, and W sub n, i.e., orifice diameter, water, and nitrogen gas flow rates, respectively, to give the general expression: D sub v.5 approx. (D sub o sup 0.2) (W sub w sup m) (W sub n sup n), which yields D sub v.5 = 45 (D sub o sup 0.2) (W sub w sup 0.2) (W sub w sup - 1.2). Values of D sub o, W sub w, and W sub n are in centimeters and grams/second, respectively. Farther downstream at an axial distance of 6.7 cm, exponent m increased from 0.2 to 0.4 and exponent n decreased from -1.2 to -1.0 and at a distance of 25 cm downstream of the atomizer, n decreased to -0.8. The increase in exponent m and decrease in exponent n was attributed to a loss of very small droplets from the spray due primarily to vaporization and diffusion effects on clouds of small droplets traveling a distance of 25 cm. Author

N86-24962*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MEASUREMENT OF VISCOSITY OF GASEOUS MIXTURES AT ATMOSPHERIC PRESSURE

Jag J. Singh, Gerald H. Mall (Computer Sciences Corp., Hampton, Va), and Hoshang Chegini (Old Dominion Univ.) May 1986 19 p refs

(NASA-TP-2582; L-16103; NAS 1.60:2582) Avail: NTIS HC A02/MF A01 CSCL 14B

Coefficients of viscosity of various types of gas mixtures, including simulated natural-gas samples, have been measured at atmospheric pressure and room temperature using a modified capillary tube method. Pressure drops across the straight capillary tube section of a thermal mass flowmeter were measured for small, well-defined, volume flow rates for the test gases and for standard air. In this configuration, the flowmeter provides the volumetric flow rates as well as a well-characterized capillary section for differential pressure measurements across it. The

coefficients of viscosity of the test gases were calculated using the reported value of 185.6 micro P for the viscosity of air. The coefficients of viscosity for the test mixtures were also calculated using Wilke's approximation of the Chapman-Enskog (C-E) theory. The experimental and calculated values for binary mixtures are in agreement within the reported accuracy of Wilke's approximation of the C-E theory. However, the agreement for multicomponent mixtures is less satisfactory, possible because of the limitations of Wilkes's approximation of the classical dilute-gas state model. Author

N86-24963*# University of Southern Mississippi, Hattiesburg. Dept. of Physics and Astronomy.
SET-UP AND DEMONSTRATION OF A LOW ENERGY ELECTRON MAGNETOMETER (LEEM)
Grayson H. Rayborn May 1986 46 p refs
(Contract NAS1-17435)
(NASA-CR-178091; NAS 1.26:178091) Avail: NTIS HC A03/MF A01 CSCL 14B

Described are the design, construction and test results of a Low Energy Electron Magnetometer (LEEM). The electron source is a commercial electron gun capable of providing several microamperes of electron beam. These electrons, after acceleration through a selected potential difference of 100-300 volts, are sent through two 30 degree second-order focussing parallel plate electrostatic analyzers. The first analyzer acts as a monochromator located in the field-free space. It is capable of providing energy resolution of better than 10 to the -3 power. The second analyzer, located in the test field region, acts as the detector for electrons deflected by the test field. The entire magnetometer system is expected to have a resolution of 1 part in 1000 or better. Author

N86-24964*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RAMP-INTEGRATION TECHNIQUE FOR CAPACITANCE-TYPE BLADE-TIP CLEARANCE MEASUREMENT
Garimella R. Sarma and John P. Barranger 1986 13 p refs
Presented at the Aerospace Industries/Test Measurement Symposium, Seattle, Wash., 5-8 May 1986; sponsored by Instrument Society of America
(NASA-TM-87241; E-2916; NAS 1.15:87241) Avail: NTIS HC A02/MF A01 CSCL 14B

The analysis of a proposed new technique for capacitance type blade tip clearance measurement is presented. The capacitance between the blade tip and a mounted capacitance electrode within a guard ring forms one of the feedback elements of a high speed operational amplifier. The differential equation governing the operational amplifier circuit is formulated and solved for two types of inputs to the amplifier - a constant voltage and a ramp. The resultant solutions shows an output that contains a term that is proportional to the derivative of the product of the input voltage and the time constant of the feedback network. The blade tip clearance capacitance is obtained by subtracting the output of a balancing reference channel followed by integration. The proposed sampled data algorithm corrects the environmental effects and varying rotor speeds on-line, making the system suitable for turbine instrumentation. System requirements, block diagrams, and typical application are included. Author

N86-24965# Stanford Univ., Calif. Center for Space Science and Astrophysics.
THE DEVELOPMENT AND TEST OF A PULSE-COUNTING IMAGING DETECTOR SYSTEM FOR SOLAR SYSTEM STUDIES AT ULTRAVIOLET AND VISIBLE WAVELENGTHS Final Report
J. G. Timothy May 1986 7 p
(Grant NAGw-627)
(NASA-CR-176671; NAS 1.26:176671) Avail. NTIS HC A02/MF A01 CSCL 14B

The goal of this program is the development of light-weight, pulse-counting imaging detector tubes for solar system missions. The Multi-anode Microchannel Array (MAMA), have demonstrated the best combination of spatial resolution and dynamic range of any pulse-counting detector system available to date. Under this grant, compact sealed MAMA detector tubes compatible with the weight and volume limitations of deep space missions were fabricated for the first time. The principal task of the development program to date has been the definition of the appropriate processes for conditioning the high-gain, curved-channel microchannel plate (MCP) by means of bake and scrub procedures. The curved-channel MCPs currently available are fabricated from Corning 8161 glass or equivalent, and a bake at temperatures in excess of 300 C for a period well in excess of 48 hours is required to completely desorb the internal surface area and arrive at a pressure asymptote. Following this, a scrub by stimulating the MCP with either 600 eV electrons or with UV radiation from a mercury penray lamp is required to further clean up the internal surfaces and to reach a stable gain plateau. After conditioning, a stable response to an accumulated signal level of greater than 2.5 x 10 to the 11th power counts sq/mm has far been demonstrated. Author

N86-24966*# Dayton Univ., Ohio. Impact Physics Lab.
HALL STATION AND CAMERA SYSTEM OPERATION AND MAINTENANCE MANUAL
Andrew J. Piekutowski and Edward A. Strader Apr. 1986 22 p
(Contract NAS8-36646)
(NASA-CR-178836; NAS 1.26:178836; UDR-TM-86-03) Avail: NTIS HC A02/MF A01 CSCL 14B

The major components of the Hall station and camera system are described. The Hall film record of an event provides the time of flight of the projectile between the slits. A time mark generator is used to supply extremely short pulses of light at a known frequency. These pulses of light are used to produce timing marks on the edge of the film. Comparison of these marks with the spacing of the projectile images provides the information necessary to determine the time of flight of the projectile. Since the slits are installed with a known separation distance, calculation of the velocity of any object passing both slits is a simple matter. B.G.

N86-24967*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBINED FRINGE AND FABRY-PEROT LASER ANEMOMETER FOR THREE COMPONENT VELOCITY MEASUREMENTS IN TURBINE STATOR CASCADE FACILITY
Richard G. Seasholtz and Louis J. Goldman 1986 23 p refs
Presented at the 67th Symposium of the AGARD Propulsion and Energetics Panel on Advanced Instrumentation for Aero Engine Components, 19-23 May 1986, Philadelphia, Pa.
(NASA-TM-87322; E-3058; NAS 1.15:87322) Avail: NTIS HC A02/MF A01 CSCL 14B

A laser anemometer is described that was developed for use in a 508 mm diameter annular turbine stator cascade facility. All three velocity components are measured through a single restricted optical port, both within the stator vane row and downstream of the vanes. The measurements are made through a cylindrical window in the casing that matches the tip radius of the cascade. The stator tested has a contoured hub endwall that results in a large radial flow near the hub. The anemometer uses a standard fringe configuration (LFA) with a fluorescent aerosol seed to measure the axial and circumferential velocity components. The radial component is measured with a confocal Fabry-Perot interferometer. The two configurations are combined in a single optical system and can operate simultaneously. Data are presented to illustrate the capabilities of the system. Author

N86-24968# Air Force Weapons Lab., Kirtland AFB, N. Mex.
AN ULTRAVIOLET LASER SHADOWGRAPHY SYSTEM FOR THE SHIVA-STAR FAST CAPACITOR BANK Final Report, 5 Nov. 1984 - 30 Jun. 1985
Carl Enhole Nov. 1985 23 p refs
(AD-A163867; AFWL-TR-85-82) Avail: NTIS HC A02/MF A01 CSCL 14/5

An ultraviolet laser shadowgraphy has been developed which is sensitive to plasma densities in the few 10 to the 16th power/cu cm regime. It is fast enough (< 10 ns exposure time) to freeze

the motion of even fast-moving plasmas, and it is capable of operating in an environment where there is a high level of both background light and electrical noise. System setup and adjustments as well as interpretation of data from a coaxial-geometry experiment are discussed. GRA

N86-24969# Department of the Air Force, Washington, D.C.
TOTAL TEMPERATURE PROBE BUFFER AMPLIFIER Patent
William E. Ott, inventor (to Air Force) Issued 8 Oct. 1985 5 p
(AD-D011967; US-Patent-4,546,320; US-Patent-Appl-SN-580979; US-Patent Class-328-3) Avail: US Patent and Trademark Office
CSCL 14/2

Discussed is the elimination of undesirable thermally induced changes of electrical characteristics of signal components accomplished by three operational amplifiers, which provide electrical power to a system critical component and produces a reference output signal composed of the desirable function produced by the system critical components plus the undesirable thermally induced signal components produced by the changes of the electrical characteristics of two identical lead wires connected to the system critical component. The second operational amplifier circuit senses the voltage drop in one of the two identical lead wires attached to the critical component. The second operation amplifier produces a sensing output signal that changes in value with the undesirable thermally induced changes of the electrical characteristics of one of the lead wires. Since the two lead wires are identical in resistance characteristics the sensing output signal varies proportionately with the total undesirable electrical signal components encountered. The third operational amplifier circuit is a subtraction circuit producing a system output signal proportionate with the difference between the reference output signal and the sensing output signal. The result is a system output signal with all undesirable thermally induced signal components eliminated. GRA

N86-24970# Naval Research Lab., Washington, D. C.
A GATED MICROCHANNEL PLATE IMAGE INTENSIFIER PACKAGED IN A REFLEX CAMERA BACK Interim Report
S. Hauver, R. E. Pechacek, J. R. Grieg, D. P. Murphy, and M. Raleigh 19 Dec. 1985 22 p
(AD-A163015; NRL-MR-5702) Avail: NTIS HC A02/MF A01
CSCL 14/5

A fast (exposure down to approx. 10 ns) electrically triggered camera back/shutter designed for use with the Hasselblad 500C still camera is described. This camera back contains a microchannel plate image intensifier which can be gated and provides a gain of approximately X1000. It reads out on to Polaroid film through a fiber optic face plate. The gated camera back is interchangeable with the regular Polariod back (or any other) for the Hasselbald 500C and maintains the through the lens focussing. GRA

N86-24971# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN OF A DIGITAL CONTROLLER FOR AN ULTRAGRAVIMETRIC MICROBALANCE M.S. Thesis
Christopher J. Bolan Dec. 1985 117 p refs
(AD-A164014; AFIT/GE/ENG/85D-4) Avail: NTIS
HC A06/MF A01 CSCL 14/2

The design and construction of a digital control system for an Ultragravimetric pivotal beam microbalance has been performed. The digital system replaces the present analog control circuitry of the microbalance. Included in the design is a hardware circuit, a Z-151 computer which has been interfaced to the circuit, and software to control the circuit and to operate the microbalance. An analysis of the present analog control circuit is first presented. This analysis gives the overall function of the circuit as well as an indepth view of the configuration of a particular operational amplifier: the derivative compensator. The hardware for the digital control system is described followed by the development of the software which controls the system. Studies performed on the experimental design revealed that the system satisfactorily simulates the analog control circuit. Tests show that the system automatically zeros the balance, weighs the sample, stores the data onto a disk file, and terminates the experiment. GRA

N86-24972# Naval Postgraduate School, Monterey, Calif.
RECIPROCITY CALIBRATION IN A PLANE WAVE RESONATOR Ph.D. Thesis
Charles L. Burmaster Dec. 1985 434 p refs
(AD-A164149; NPS61-86-006) Avail: NTIS HC A19/MF A01
CSCL 14/2

A non-standard method for the electroacoustic reciprocity calibration of a condenser microphone is theoretically developed and experimentally employed to calibrate a WE640AA laboratory standard microphone. The average experimental calibration so obtained was found to be in absolute agreement with a pressure coupler comparison calibration of the same microphone made at the National Bureau of Standards to within an experimental uncertainty (sigma) of 0.03 dB over the frequency range of 245 to 1470 Hz. using a 70 cm. plane wave resonant cavity, and to within an experimental uncertainty (sigma) of 0.06 dB over the frequency range of 735 to 1470 Hz. using a 23 cm. plane wave resonant cavity. Above 1470 Hz., the difference between the resonant plane wave reciprocity calibrations and the pressure coupler comparison calibration increased linearly with frequency to a maximum of 0.61 dB at 5145 Hz. GRA

N86-24973# Florida State Dept. of Transportation, Tallahassee. Bureau of Topography.
AERIAL CAMERA RESEARCH: ACCURACY COMPARISON USING THE ZEISS RMK 15/23 AND THE JENA LMK AERIAL CAMERAS
W. C. DeLoach, D. E. Merkel, W. C. Johnson, and E. S. Rhodes Apr. 1985 19 p Sponsored in part by the Federal Highway Administration, Tallahassee, Fla. Prepared in cooperation with Florida State Department of Transportation, Gainesville
(PB86-126836; FHWA/FL/BMR-85/291) Avail: NTIS
HC A02/MF A01 CSCL 14E

The primary purpose of the project was to provide an accuracy comparison between cross sections produced from photography flown simultaneously with each of the cameras, the JENA LMK and the ZEISS RMK 15/23. An additional goal was to provide a comparison of color infrared photography produced using the JENA LMK with color infrared photography produced using the ZEISS camera. GRA

N86-24974# Interior Dept., Washington, D.C.
IMPROVED DETECTOR FOR THE MEASUREMENT OF GAMMA RADIATION Patent Application
F. B. Zelt, inventor (to Interior Dept. Filed 25 Jul. 1985 12 p
(PB86-106945; US-Patent-Appl-SN-758899) Avail: NTIS
HC A02/MF A01 CSCL 18D

The present invention lies in the field of gamma ray spectrometry of geologic deposits and other materials, such as building materials (cement, asphalt, etc.) More specifically, the invention is an improved device for the gamma ray spetcrometery of gelogical deposits as a tool for petroleum exploration, geologic research and monitoring of radio-active materials such as in uranium mill tailings and the like. Improvement consists in enlarging the area of the receptor face and without any necessarily substantial increase in the volume of the receptor crystal over the current cylindrical shapes. The invention also provides, as a corollary of the increase in area receptor crystal face, a reduction in the weight of the amount of material necessary to provide effective shielding of the crystal from atmospheric radiation and radiation from deposits not under examination. The area of the receptor crystal face is increased by forming the crystal as a truncated cone with the shielding shaped as a hollow frustrum of a cone. A photomultiplier device is secured to the smaller face of the crystal. The improved detector shape can also be used in scintillometers which measure total gamma radiation. GRA

N86-24975# National Bureau of Standards, Boulder, Colo. Electromagnetic Technology Div.
METROLOGY FOR ELECTROMAGNETIC TECHNOLOGY: A BIBLIOGRAPHY OF NBS (NATIONAL BUREAU OF STANDARDS) PUBLICATIONS
K. E. Kline and M. E. DeWeese Jul. 1985 70 p

(PB86-130234; NBSIR-85/3029) Avail: NTIS HC A04/MF A01 CSCL 14B

The bibliography lists the publications of the personnel of the Electromagnetic Technology Division of NBS in the period from January 1970 through December 1984. A few earlier references that are directly related to the present work of the Division are included. GRA

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-24976 British Broadcasting Corp., Kingswood (England). Engineering Div.

EXPERIMENTS WITH DIGITALLY MASTERED LASERVISION OPTICAL DISCS

M. A. Parker Mar. 1986 18 p refs

(BBC-RD-1986/1) Copyright. Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

Experimental tests in which digital data was mastered onto a LaserVision disc to examine its potential as a source for a new BBC 1 channel logo are described. The logo had been electronically generated on a graphics computer and stored as digitally coded television frames. The tests involved mastering a disc with segments of a short video sequence derived from the data for the new logo, and with pseudo-random data. Conventional pressings from this digital master were then replayed on a domestic player. After minor modification to the replay signal path and to the control system of the player both signal types were successfully recovered and various performance characteristics of the system were measured. From the test it was estimated that replay data rates up to 50 Mbit/s could be achieved and that errors in the replayed data could be corrected with an overhead of about 7%. Although the replay data rates were satisfactory, the current degree of mechanical reliability of the domestic player makes the system unsuitable as a source for animated television logos. Author

N86-24977*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

LASER RANGING AND VIDEO DISPLAY SYSTEM Patent Application

Jim Kevin Russell, inventor to (NASA) (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) Filed 18 Mar. 1986 23 p

(NASA-Case-MSC-20870-1; NAS 1.71:MSC-20870-1; US-Patent-Appl-SN-840825) Avail: NTIS HC A02/MF A01 CSCL 17I

Ranging data and video display systems, and, more particularly, methods and apparatus for generating measurements of range and range rate and display in conjunction with video imagery are developed. Method and apparatus are disclosed for deriving laser ranging information and generating a video display combining an image of the target with alpha-numeric indications of the ranging information. A television camera and laser ranger are boresighted parallel to one another and aimed at a remote target object. An infrared laser diode in the ranger is pulsed. Corresponding light pulses reflected from the target are detected by the ranger. Elapsed time between transmission of each of a plurality of such pulses and receipt by the ranger is measured and an average time derived. Processor circuitry derives ranges and range rate of the target from the time average, generates alpha-numeric indications, and superimposes them with target video images generated by the television camera on a television monitor. Author

N86-24978*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

DUAL MODE LASER VELOCIMETER Patent Application

William D. Gunter, Jr., inventor (to NASA), Ralph W. Donaldson, inventor (to NASA), and Alma G. Anderson, Jr., inventor (to NASA) Filed 31 Mar. 1986 16 p

(NASA-Case-ARC-11634-1; NAS 1.71:ARC-11634-1; US-Patent-Appl-SN-846427) Avail: NTIS HC A02/MF A01 CSCL 20E

This invention relates to a laser Doppler velocimeter (LDV) that is capable of operating with a small focus diameter for analyzing fluid flows at low velocity with high spatial resolution, or with a larger focus diameter to measure fluid flows at higher velocities accurately. More particularly, it relates to such an LDV in which a simple reversal of a lens pair will allow the LDV to operate in the two focus diameter modes. M.G.

N86-24979# Aerospace Corp., El Segundo, Calif.

REVERSE-WAVE SUPPRESSOR MIRROR EFFECTS ON CW HF UNSTABLE RING LASER PERFORMANCE

Jay M. Bernard, Richard A. Chodzko, and Harold Mirels 30 Sep. 1985 34 p refs

(Contract F04701-83-C-0084)

(AD-A163529; TR-0084A(5764)-1; SD-TR-85-92) Avail: NTIS HC A03/MF A01 CSCL 20/5

The effect of a reverse-wave suppressor (RWS) mirror on the performance of a CW HF unstable ring laser has been measured in terms of forward/reverse-wave power ratio (R) and forward-wave beam quality. It was found that a well-aligned RWS mirror gave the best suppression R = approx. 100 and diffraction-limited beam quality. Resonator performance degraded rapidly with misalignment of the RWS mirror: a 200-microrad tilt reduced R to 2.5 and the beam quality by a factor of 2. The forward-wave near-field pattern showed distinct fringes as the RWS mirror was misaligned, suggesting that a higher-order mode was causing the beam quality to degrade. A novel technique was developed to reduce the alignment sensitivity of the RWS mirror. By use of a distorted relay mirror, an aberrated (approx. = 2 lambda) reverse wave was fed back into the ring. The aberrated reverse-wave feedback greatly reduced the sensitivity of resonator performance to RWS mirror tilt. Diffraction-limited beam quality and good suppression (R = approx. 20) was observed over a tilt range of 600 microrad. It is postulated that the aberrated RWS mirror provides sufficient feedback to suppress the reverse wave over a wide angular range, yet not enough to produce higher-order transverse modes in the forward wave. GRA

N86-24980# Naval Research Lab., Washington, D. C.

NONLINEAR ANALYSIS OF EFFICIENCY ENHANCEMENT IN UBITRON/FREE-ELECTRON LASER AMPLIFIERS Interim Report

H. P. Freund and A. K. Ganguly 21 Jan. 1986 31 p

(AD-A163619; NRL-MR-5703) Avail: NTIS HC A03/MF A01 CSCL 20/5

A technique for efficiency enhancement in Ubitron/Free-Electron Laser amplifiers is analyzed which makes use of both tapered wiggler and axial guide magnetic fields. A set of model equations is derived which describes the coupling between an ensemble of electrons and the radiation field. The analysis is fully three-dimensional, and treats the propagation of an electron beam of finite cross-sectional area through a loss-free cylindrical waveguide in the presence of a helically symmetric wiggler field and an axial guide magnetic field. The model equations are solved numerically, and substantial enhancements in the interaction efficiency are found for a variety of choices of the model parameters. The efficiency enhancement is observed to be a sensitive function of both the degree of taper in the wiggler and axial magnetic fields as well as the point at which the taper is begun. In order to illustrate the physical mechanism underlying the efficiency enhancement, a modified pendulum equation which describes the interaction is derived from the orbit equations under a set of idealized assumptions, and used to construct a small-signal theory of the efficiency enhancement. GRA

N86-24981# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.

LASER PROBING AND MODIFICATION OF MOCVD AND VPE REACTOR KINETICS Final Report, 1 Jul. 1984 - 31 Dec. 1985

J. G. Eden Oct. 1985 12 p refs

(Grant DAAG29-84-G-0007)

(AD-A163860; ARO-21933.1-PH-RI) Avail: NTIS HC A02/MF A01 CSCL 20/5

Experiments are described in which the potential of dye vapor and HgBr as tunable visible lasers is under investigation. A near UV optically pumped HgBr laser has been demonstrated and transient excited-state absorption in HgBr has been observed. Intense stable discharges in POPOP and coumarin 6 vapor have been obtained and gain measurements are underway. GRA

N86-24982# Stanford Univ., Calif. Lab. of Physics.
STUDIES ON RADIATIVE COLLISIONAL AND ULTRAVIOLET LASERS Final Report, 1 Jan. 1983 - 31 Dec. 1985
S. E. Harris and J. F. Young Nov. 1985 24 p refs
(Contracts F49620-83-C-0016; MIPR-ARO-103-85)
(AD-A163901; ARO-20117.4-PH) Avail: NTIS HC A02/MF A01 CSCL 20/5

Significant accomplishments of this program include: the first microwave pumping of an excimer laser; the first use of pulsed hollow-cathode technology to produce substantial quantities of core-excited metastable atoms; the use of these metastable atoms to delineate a partial Grotrian diagram for core-excited Na; the proposal of the concept of quasi-metastable quartet levels and the experimental verification of their importance in the column I metals; and the proposal for short wavelength systems based on super Coster-Kronig transitions. GRA

N86-24983# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
OPTICAL FEEDBACK STABILIZATION OF LASER DIODES FOR PASSIVE RESONANCE RING LASER GYRO APPLICATIONS M.S. Thesis
Daniel J. Stech Dec. 1985 63 p refs
(AD-A163942; AFIT/GE/ENG/85D-44) Avail: NTIS HC A04/MF A01 CSCL 17/7

Reduced cost, greater reliability, and compatibility with integrated optics are some of the advantages gained by incorporating semiconductor lasers into the design of passive resonant ring laser gyroscopes (PRRLG). Unfortunately, the large spectral linewidth typical of semiconductor lasers greatly limits the sensitivity of such a configuration. This research details the modification of a laser diode to obtain a stable, single mode, narrow spectral output. Optical feedback configuration compatible with the input optics to a PRRLG was designed. Spectral narrowing and modal dynamics of the external coupled cavity laser were measured. By temperature stabilization and optical feedback a free running linewidth of 60 MHz was reduced to below 13 MHz and was maintained in a single mode for 20 minutes or more. GRA

N86-24984 Department of the Air Force, Washington, D.C.
LASER BEAM DUCT PRESSURE CONTROLLER SYSTEM Patent
Arnold J. Laderman, inventor (to Air Force) and Frederick M. Bergthold, Jr., inventor (to Air Force) 3 Sep. 1985 5 p
(AD-D012017; US-Patent-4,538,635; US-Patent-Appl-SN-539352; US-Patent Class-137-114) Avail: US Patent and Trademark Office CSCL 20/4

Disclosed is a laser beam duct pressure controller system for maintaining a spatially uniform pressure in a flowing gas volume which is subjected to temporal pressure variations. This desired result is accomplished with cooperating structural components (and gases therein), which eliminate the axial flow of a conditioning gas within the laser beam duct by matching the time rate of change of the pressure of the flowing conditioning gas to the time rate of change of the pressure in the cavity of an operably associated laser beam turret. GRA

N86-24985# Naval Research Lab., Washington, D. C.
THE AXIAL INJECTION TEM ORBITRON MASER
John M. Burke and Wallace M. Manheimer 31 Jan. 1986 58 p refs
(AD-A164166; AD-E750890; NRL-MR-5675) Avail: NTIS HC A04/MF A01 CSCL 20/5

The linear theory of the TEM orbitron maser models, the interaction of axially injected electrons orbiting the positively charged center conductor of a coaxial waveguide with the TEM waveguide mode, is discussed. The theory treats electrons with arbitrary values of angular momentum. The threshold values of the cavity Q multiplied by the electron beam power required for self-oscillation in a finite length oscillator configuration is presented as well as the spacial growth rate calculated for an infinite length TEM orbitron amplifier. The basic design equations for the axial injection scheme are developed. GRA

N86-24986# Naval Research Lab., Washington, D. C.
INDUCED RESONANCE ELECTRON CYCLOTRON (IREC) QUASI-OPTICAL MASER
P. Sprangle, Cha-Mei Tang, and P. Serafim 31 Jan. 1986 19 p refs
(AD-A164167; AD-E750890; NRL-MR-5678) Avail: NTIS HC A02/MF A01 CSCL 20/5

This paper analyzes an induced resonance electron cyclotron (IREC) quasioptical maser configuration. This configuration has the unique features of being highly efficient and at the same time relatively insensitive to the detrimental effects of poor beam quality. A system of nonlinear coupled orbit equations, describing the dynamics of electrons in a spatially varying external magnetic field and the electromagnetic field of a steady state oscillator, are derived and analyzed. We show that with the proper choice for the index of refraction, the high frequency cyclotron interaction can be made insensitive to a beam energy spread. The interaction can, however, be sensitive to the beam's pitch angle spread. The necessary conditions on beam quality for high efficiency operation are derived and shown to be in good agreement with out numerical solutions. Furthermore, we show that by appropriately tapering the magnetic field an induced resonance condition can be achieved which results in high interaction efficiencies. It is anticipated that an efficient, high power millimeter, submillimeter and infrared radiation source can be realized with the IREC quasioptical maser configuration. GRA

N86-24987 Rochester Univ., N. Y.
ANALYSIS OF THE GAIN-COUPLED DISTRIBUTED FEEDBACK LASER AS A SOURCE OF SHORT OPTICAL PULSES Ph.D. Thesis
Irl Noel Duling, III 1985 192 p
Avail: Univ. Microfilms Order No. DA8528543

The results of an investigation of the distributed feedback laser (DFL) as a source for short optical pulses is reported in this thesis. The DFL provides a uniquely simple and inexpensive alternative to synchronously pumped dye lasers. The fundamental difference is the use of a modulation of the refractive index of the gain medium to provide feedback instead of external cavity mirrors. This feedback method allows the laser to produce short pulses from a single pump pulse. The modulation also limits the bandwidth of the oscillation so that the pulses are constrained to be transform limited. To determine the optimal conditions for the production of short pulses a semiclassical rate equation model of the DFL was developed. The output duration of the laser pulse is shown to rely primarily on the cavity length and the pump pulse duration. A curve which combines these two dependences is presented which is capable of predicting the performance of any given DFL. The results of an investigation of the distributed feedback laser (DFL) as a source for short DFL was conducted. The output was observed on a picosecond synchronized stream camera. In addition a probe pulse was scattered from the transit feedback of the laser providing a direct measurement of the modulation present. In the course of this investigation a number of Nd:YAG laser systems were constructed and evaluated as pump sources for the DFL. One such system, the CW-pumped regenerative amplifier represents a significant technological advance over previous systems for providing high power, high repetition rate, stable pulses at 1.06 micron. The use of these systems as the pump for synchronous dye amplifier systems is also presented. Dissert. Abstr.

N86-24988 Colorado Univ., Boulder.
MICROLENS SYSTEM FORMED ON THE END OF A SINGLE MODE FIBER FOR LASER APPLICATIONS Ph.D. Thesis
Kyung Shik Lee 1985 190 p
Avail: Univ. Microfilms Order DA8528502

In this thesis microlenses on the end of single mode fibers were designed, fabricated and tested. In designing this microlens-ended single mode fiber (MSMF) system for laser applications the focusing beam parameters such as minimum spot size W sub 02, minimum spot size position Z sub m, Rayleigh range Z sub R and maximum intensity position Z sub p are very important. These theories state that the focusing beam parameters depend on the lens system parameters and change due to the finite size of the incident beam, finite size of the lens aperture and aberrations. The various types of photoresist microlenses were fabricated on the ends of single mode optical fibers as well as multimode optical fibers using the photolithographic process. The thickness and the radius of curvature of microlenses developed depend on the total exposing energy in the photolithographic process. The developed microlenses were tested by measuring the focusing beam parameters and the intensity distribution near the waist position. Measured focusing beam parameters of microlenses closely follow those expected from the paraxial theory or from the diffraction theory. The shape of the lens also roughly matches the lens shape predicted under some assumptions. Both measured and expected values for (at 830 nm) WO2, Zm and Zr are 0.7 approximately 3.0 micron, 3.5 approximately 20 micron and 0.9 approximately 13 micron, respectively. Various testing apparatus for the spot size measurement, waist position measurement, examination of the intensity distributiona study of the lens surface were built. The minimum spot sizes and minimum spot size positions were measured using the interferometric knife-edge scanning system. The sizes of microlenses were determined by using the scanning electron microscope. Finally, tolerance criteria for the degree of aperturing and spherical aberration in MSMF systems (cutoff wavelength of optical fiber = 690 nm, wavelength of an incident beam = 830 nm) are a/W less than 0.95, a 2 less than 0.4 x 10-3 lambda. These tolerance criteria were obtained from the Modified Strehl intensity. Dissert. Abstr.

N86-24989 Arkansas Univ., Fayetteville.
CHAOS IN LASER-MATTER INTERACTIONS Ph.D. Thesis
Mei-Li Shih 1985 154 p
Avail: Univ. Microfilms Order No. DA8528947

There is much interest in deterministic chaos which can appear in nonlinear dynamical systems. Various nonlinear systems in quantum optics have been investigated and found to admit chaotic behavior with well-defined routes to chaos. For instance, the well-known Maxwell-Bloch equations for a Doppler-broadened, unidirectional ring laser have been found to have chaotic behavior for parameters in the region of the so-called Casperson instability. Numerical results are found to be in reasonable qualitative agreement with recent universal routes to chaos found experimentally are also found in the numerical computations performed during this research. A model of a coupled-mode homogeneously broadened laser has also been found to give rise to chaotic time evolution, and there is a period-doubling route to chaos as the degree of spatially nonuniform pumping is increased. A model of multi-photon excitation of molecules in infrared fields has also been studied following recent work by Ackerhalt, et al. The decay of a certain correlation function due to chaos is found to lead to fluence-dependent absorption. Dissert. Abstr.

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-24990*# Akron Univ., Ohio. Dept. of Mechanical Engineering.
SYSTEM LIFE AND RELIABILITY MODELING FOR HELICOPTER TRANSMISSIONS Final Report
M. Savage and C. K. Brikmanis Washington Apr. 1986 202 p refs
(Grant NAG3-55)
(NASA-CR-3967; E-2889; NAS 1.26:3967) Avail: NTIS HC A10/MF A01 CSCL 05C

A computer program which simulates life and reliability of helicopter transmissions is presented. The helicopter transmissions may be composed of spiral bevel gear units and planetary gear units - alone, in series or in parallel. The spiral bevel gear units may have either single or dual input pinions, which are identical. The planetary gear units may be stepped or unstepped and the number of planet gears carried by the planet arm may be varied. The reliability analysis used in the program is based on the Weibull distribution lives of the transmission components. The computer calculates the system lives and dynamic capacities of the transmission components and the transmission. The system life is defined as the life of the component or transmission at an output torque at which the probability of survival is 90 percent. The dynamic capacity of a component or transmission is defined as the output torque which can be applied for one million output shaft cycles for a probability of survival of 90 percent. A complete summary of the life and dynamic capacity results is produced by the program. Author

N86-24991*# Irwin (Arthur S.) Co., Inc., Bemus Point, N.Y.
REVIEW AND CRITICAL ANALYSIS: ROLLING-ELEMENT BEARINGS FOR SYSTEM LIFE AND RELIABILITY Final Report
Arthur S. Irwin, William J. Anderson, and William J. Dernar Mar. 1985 234 p
(Contract NAS3-23520)
(NASA-CR-174710; NAS 1.26:174710; USAAVSCOM-TR-85-F-1)
Avail: NTIS HC A11/MF A01 CSCL 13I

A ball and cylindrical roller bearing technical specification which incorporates the latest state-of-the-art advancements was prepared for the purpose of improving bearing reliability in U.S. Army aircraft. The current U.S. Army aviation bearing designs and applications, including life analyses, were analyzed. A bearing restoration and refurbishment specification was prepared to improve bearing availability. Author

N86-24992*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TESTING OF YUH-61A HELICOPTER TRANSMISSION IN NASA LEWIS 2240-kW (3000-hp FACILITY
Andrew M. Mitchell, Fred B. Oswald, and Fredrick T. Schuller Mar. 1986 28 p refs
(NASA-TP-2538; E-2801; NAS 1.60:2538) Avail: NTIS HC A03/MF A01 CSCL 01C

A helicopter transmission that was being considered for the Army's Utility Tactical Transport Attack System (UTTAS) was tested in the NASA Lewis 2240-kW (3000-hp) test facility to obtain the transmission's operational data. The results will form a vibration and efficiency data base for evaluation similar-class helicopter transmissions. The transmission's mechanical efficiency was determined to be 98.7 percent at its rated power level of 2080 kW (2792 hp). At power levels up to 113 percent of rated the transmission displayed 56 percent higher vibration acceleration levels on the right input than on the left input. Both vibration signature analysis and final visual inspection indicated that the right input spiral-bevel gear had poor contact patterns. The highest vibration meter level was 52 g's rms at the accessory gear, which had free-wheeling gearsets. At 113 percent power and 100 percent rated speed the vibration meter levels generally ranged from 3 to 25 g's rms. Author

N86-24993*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADJUSTABLE MOUNT FOR ELECTRO-OPTIC TRANSDUCERS IN AN EVACUATED CRYOGENIC SYSTEM Patent Application
Edward A. Crossley, Jr., inventor (to NASA), David P. Hayes, inventor (to NASA), Howard C. Jones, inventor (to NASA), and Irby W. Jones, inventor (to NASA) Filed 20 Feb. 1986 16 p

(NASA-Case-LAR-13100-1; NAS 1.71:LAR-13100-1; US-Patent-Appl-SN-831377) Avail: NTIS HC A02/MF A01 CSCL 13I

The invention is a five-degree of freedom adjustable mounting device for positioning an electro-optic transducerr in an evacuated, cryogenic chamber. Electro-optic transducers are used in this manner as high sensitivity detectors of gas emission lines in spectroscopic analysis. The mount is made up of an adjusting mechanism and a transducer mount. This combination avoids many difficulties with prior devices by permitting the use of an internal lens and allowing independent adjustment of each degree of freedom. The transducer mount, although attached to the adjusting mechanism, is isolated thermally such that a cryogenic environment can be maintained at the transducer while the adjusting mechanism remains at room temperature. Radiation shields also are incorporated to further reduce heat flow to the transducer location. Features of this invention include the use of an internal lens and mechanizing of an adjustment device which allows for independent adjustments. An adjustment of one parameter will not affect the setting of any other parameter. This result is achieved by locating the centers of rotation of the angular adjustment at the focal point of the internal lens. NASA

N86-24994# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.

FATIGUE RATED FASTENER SYSTEMS

H. H. vanderLinden, ed. Loughton, England 1985 96 p refs (AGARD-R-721; ISBN-92-835-1512-9) Avail: NTIS HC A05/MF A01

In recent years the aerospace industry has developed many ways of joining parts together; despite all innovations, however, the most common means of doing this remains the mechanical fastener. The designer needs to know which fastener systems are the most efficient from his point of view; this report is the outcome of a collaborative program (sponsored by the Structures and Materials Panel of AGARD) which aimed to evaluate some of the available Fatigue-rated Fastener Systems. The program studied a number of systems; tests covered not only the fasteners themselves but also the preparation of the holes and the quality of fit. Author

N86-24995# Cornell Univ., Ithaca, N.Y.

THE DESIGN AND CONSTRUCTION OF A MAGNETIC BEARING

Timothy P. Malone Dec. 1981 74 p refs (AD-A163552; FDA-81-11) Avail: NTIS HC A04/MF A01 CSCL 13/9

The design and construction of a practical magnetic bearing are discussed. Specifically, the advantages of magnetic levitation, the structure and components, the control system used, a second order simulation, and a simulation using actual magnet characteristics, and the special power amplifiers built for this project are discussed. The physical structure described in this report has not been completed so the question of whether this suggested design will work is still in doubt. The problems encountered during construction and the preliminary tests indicate the difficulty of the project. The project is not hopeless though since SKF Industries is now marketing a magnetic bearing. Author (GRA)

N86-24996# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

ADAPTIVE CONTROL, LEARNING, AND COST-EFFECTIVE SENSOR SYSTEMS FOR ROBOTICS OR ADVANCED AUTOMATION SYSTEMS Final Report, 1 Aug. 1984 - 31 Dec. 1985

J. L. Nevins, A. C. Edsall, T. M. Stepien, M. E. Kaliski, and A. A. Karatenis 31 Dec. 1985 80 p (Contract N00014-83-K-0587) (AD-A163615; CSDL-R-1829) Avail: NTIS HC A05/MF A01 CSCL 06/4

The hypothesis of this grant is that the non-deterministic class of problems is amenable to the techniques and methodologies of control system engineering; a discipline which provides a tractable approach for addressing the issues for intelligent systems with cost effectiveness and performance optimality. The objectives of this grant are: (1) To explore the use of adaptive-learning control systems to complex processes or engineering-based expert systems to an inspecton type task. Both types of tasks which are usually performed by humans involve modeling and control or automatic data interpretation in the presence of noisy data with incomplete and time-varying models. (2) To determine the relevance of these approaches to research on intelligent robotic systems. (3) To determine a focus for testing these theories both analytically and experimentally, if possible. GRA

N86-24997# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

AUTOMATING KNOWLEDGE ACQUISITION IN A FLIGHTLINE ROBOT M.S. Thesis

William M. Clifford Dec. 1985 170 p refs (AD-A163829; AFIT/GE/ENG/85D-7) Avail: NTIS HC A08/MF A01 CSCL 06/4

Robots enjoy widespread use in industry on simplistic repetitive tasks in a controlled environment. Tasks in the military domain, particularly the flightline, require mobility and intelligence. While the mobility issue is being addressed, the intelligence issue is not. By giving the robot the ability to learn from a novice, the robot could be placed on the flightline and learn what it needs to know from the domain experts. Rather than deal with a toy problem, this work takes the actual refueling Job Guides for two aircraft and shows how these can be used directly by a computer. The process involves three steps. First, the text is transformed into a common natural language processor form. Second, the forms are examined to allow the commonalty between the two refueling tasks to be extracted. The forms are expanded by applying expert system and planning techniques to include missing domain and world knowledge. Finally, the forms are examined to allow the commanalty between the two refueling tasks to be extracted. GRA

N86-24998# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.

EFFECT OF FORCED CONVECTION HEAT TRANSFER ON WELD POOLS

M. E. Wells and W. E. Lukens Jan. 1986 41 p refs (AD-A163970; DTNSRDC/SME-85/62) Avail: NTIS HC A03/MF A01 CSCL 11/6

A method has been developed to apply forced convection heat transfer by gas jet impingement to weld metals deposited by the Gas Tungsten Arc Welding (GTAW) process at heat inputs in excess of 100 kJ/in. The method involves the use of multiple gas jets directed at the surface of the weld pool to increase convective heat transfer (i.e., forced convective cooling). Autogenous bead-on-plate welds were made in a titanium alloy with and without forced convective cooling. All welding variables were maintained constant, only the introduction of the cooling gas during welding was different. The weld pool geometry, temperature distributions, macrostructure and microstructure of the welds were evaluated. The results of visual and macrostructural observations indicate that forced convective cooling forms a refined weld metal macrostructure through control of the weld pool geometry. In addition to grain refinement, forced convective cooling modifies the shape of the weld bead. The depth to width ratio of the weld bead increases and the width of the weld HAZ decreases. The results of temperature measurements indicate that forced convective cooling increases the weld metal cooling rate. By increasing the cooling rate the time at transformation is suppressed and a finer weld metal microstructure is produced. Additionally, the weld pool surface temperature decreases and thermal gradients near the solid-liquid interface also decrease. GRA

N86-24999# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A ROBOT VISION SYSTEM Ph.D. Thesis

James R. Holten, III Dec. 1985 209 p refs (AD-A164202; AFIT/DS/ENG/85D-1) Avail: NTIS HC A10/MF A01 CSCL 17/7

This project includes the design and implementation of a

vision-based goal achievement system. The system relies only on ambient light, and through the use of a passive vision system, allows an autonomous roving vehicle to traverse an environment to a goal. The project includes visual processing of stereo optical image sequences into a 3-dimensional model, and the generation of a path through the model. The system outputs the sequence of robot commands necessary to traverse the path, modifying the path as needed during the traversal to compensate for vehicle and environment variations from the model. A unit designed with these characteristics can act as the heart of a general purpose autonomous vehicle transport platform. This dissertation achieved the implementation and evaluation of a stereo vision system, as well as outlining the modelling requirements, and proposing modelling and path-finding algorithms to support the full project. GRA

N86-25000# National Aeronautics and Space Administration, Washington, D.C.
STRUCTURAL DESIGN AND KINEMATIC CONFIGURATION OF TWO-ARMED ROBOTS
I. I. Pavlenko, ed. 1985 13 p refs Transl. into ENGLISH from Vestnik Mashinostroyeniya (USSR), No. 12, Dec. 1983 p 5-9 Previously announced as N85-27037 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88419; NAS 1.15:88419) Avail: NTIS HC A02/MF A01 CSCL 05H

It is best to determine the structural design and kinematic variants of two-armed robots without considering the degrees of mobility of the kinematics of the base or the degrees of mobility common to the kinematically coupled arms of the kinematics of the wrists, since these motions comprise separate kinematic groups to be analyzed independently. The structural configurations of two-armed robots are those which are distinguished by distribution of the degrees of mobility between the arms, the composition of the kinematic pairs, the kinds of motions they can execute and the relative positioning with respect to each hand. Five degrees of mobility for the robot arms with nine different variants of the distribution of degrees of mobility between the arms are defined and the possible configurations of the kinematic pairs are analyzed. The options are summarized in tabular form and a set of schematic drawings. Author

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-25001*# College of William and Mary, Williamsburg, Va. Dept. of Physics.
QUANTITATIVE NON-DESTRUCTIVE TESTING Annual Report, 1 May 1984 - 30 Apr. 1985
C. S. Welch 1985 43 p refs
(Contract NCC1-50)
(NASA-CR-176761; NAS 1.26:176761) Avail: NTIS HC A03/MF A01 CSCL 14D

The work undertaken during this period included two primary efforts. The first is a continuation of theoretical development from the previous year of models and data analyses for NDE using the Optical Thermal Infra-Red Measurement System (OPTITHIRMS) system, which involves heat injection with a laser and observation of the resulting thermal pattern with an infrared imaging system. The second is an investigation into the use of the thermoelastic effect as an effective tool for NDE. As in the past, the effort is aimed towards NDE techniques applicable to composite materials in structural applications. The theoretical development described produced several models of temperature patterns over several geometries and material types. Agreement between model data and temperature observations was obtained. A model study with one of these models investigated some fundamental difficulties with the proposed method (the primitive equation method) for obtaining diffusivity values in plates of thickness and supplied guidelines for avoiding these difficulties. A wide range of computing speeds was found among the various models, with a one-dimensional model based on Laplace's integral solution being both very fast and very accurate. Author

N86-25002*# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
STRESS WAVES IN TRANSVERSELY ISOTROPIC MEDIA: THE HOMOGENEOUS PROBLEM Final Report
Elizabeth R. C. Marques and James H. Williams, Jr. Washington NASA May 1986 48 p refs
(Grant NAG3-328)
(NASA-CR-3977; E-2949; NAS 1.26:3977) Avail: NTIS HC A03/MF A01 CSCL 14D

The homogeneous problem of stress wave propagation in unbounded transversely isotropic media is analyzed. By adopting plane wave solutions, the conditions for the existence of the solution are established in terms of phase velocities and directions of particle displacements. Dispersion relations and group velocities are derived from the phase velocity expressions. The deviation angles (e.g., angles between the normals to the adopted plane waves and the actual directions of their propagation) are numerically determined for a specific fiber-glass epoxy composite. A graphical method is introduced for the construction of the wave surfaces using magnitudes of phase velocities and deviation angles. The results for the case of isotropic media are shown to be contained in the solutions for the transversely isotropic media. Author

N86-25003*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
LIFE PREDICTION AND CONSTITUTIVE MODELS FOR ENGINE HOT SECTION ANISOTROPIC MATERIALS PROGRAM Annual Status Report
G. A. Swanson, I. Linask, D. M. Nissley, P. P. Norris, T. G. Meyer, and K. P. Walker Feb. 1986 203 p refs
(Contract NAS3-23939)
(NASA-CR-174952; NAS 1.26:174952; PWA-5968-19) Avail: NTIS HC A09/MF A01 CSCL 14D

This report presents the results of the first year of a program designed to develop life prediction and constitutive models for two coated single crystal alloys used in gas turbine airfoils. The two alloys are PWA 1480 and Alloy 185. The two oxidation resistant coatings are PWA 273, an aluminide coating, and PWA 286, an overlay NiCoCrAlY coating. To obtain constitutive and/or fatigue data, tests were conducted on coated and uncoated PWA 1480 specimens tensilely loaded in the < 100 >, < 110 >, < 111 >, and < 123 > directions. A literature survey of constitutive models was completed for both single crystal alloys and metallic coating materials; candidate models were selected. One constitutive model under consideration for single crystal alloys applies Walker's micromechanical viscoplastic formulation to all slip systems participating in the single crystal deformation. The constitutive models for the overlay coating correlate the viscoplastic data well. For the aluminide coating, a unique test method is under development. LCF and TMF tests are underway. The two coatings caused a significant drop in fatigue life, and each produced a much different failure mechanism. Author

N86-25004# University of South Florida, Tampa. Dept. of Electrical Engineering.
MICROENVIRONMENTAL MOISTURE RESEARCH Final Technical Report
J. M. Ammons, J. H. Linn, M. G. Kovac, and W. E. Swartz Griffiss AFB, N.Y. RADC Apr. 1985 124 p refs
(Contract F30602-80-C-0169)
(AD-B157859; RADC-TR-85-58) Avail: NTIS HC A06/MF A01 CSCL 09/5

The advancement of reliability physics is the foundation for increased microelectronic circuit reliability. A common denominator for many types of failure mechanisms in integrated circuits is water trapped within the package cavity. An understanding of the

fundamental interaction of water with package materials is essential. The nature of its sources, dynamics of interaction, and its role in failure mechanisms were elucidated. The nature and history of surfaces are known to influence adsorption/desorption properties particularly with respect to water. The chemical composition and morphology of the surface under investigation must be established. All test structures and their treatment should closely approximate those found in production run packages in order to infer parallel response characteristics. The preparation and treatment of test samples for use was done to simulate various stages of manufacturing. Comparison to production samples was done where possible. B.G.

N86-25005# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
VERIFICATION OF A MONTE CARLO SIMULATION METHOD TO FIND LOWER CONFIDENCE LIMITS FOR THE AVAILABILITY AND RELIABILITY OF MAINTAINED SYSTEMS M.S. Thesis
Karen S. Barland Dec. 1985 60 p refs
(AD-A163832; AFIT/GSO/MA/85D-2) Avail: NTIS
HC A04/MF A01 CSCL 14/4

This thesis determined the feasibility and efficiency of a Monte Carlo method of simulating the lower confidence limits for the availabilities and reliabilities of maintained systems. The steady-state availabilities of single-unit systems and the time-constrained availabilities and reliabilities of two-unit parallel systems were simulated. First, a baseline of true exponentially-distributed Mean Time Between Failures (MTBFs) and Mean Time To Repairs (MTTRs) were simulated using the chi-square distribution. Then other MTBFs and MTTRs were simulated to represent sampling of other systems. The availabilities and reliabilities were found using these simulated MTBFs and MTTRs. Next, simulated availabilities and reliabilities were ordered, and lower confidence limits were found. These lower confidence limit point estimates were compared against the systems' exact availabilities and reliabilities. Lastly, the success of this Monte Carlo method is determined by how well the simulated lower confidence limit availability and reliability point estimates cover the exact availabilities and reliabilities. Author (GRA)

N86-25006# Florida State Univ., Tallahassee.
FAILURE TIMES IN MAINTENANCE MODELS
Wai Chan and Jayaram Sethuraman Sep. 1985 26 p refs
(Contract DAAG29-82-K-0168)
(AD-A163891; FSU-Statistics-M709; TR-D-83-ARO;
ARO-19367.32-MA) Avail: NTIS HC A03/MF A01 CSCL 15/5

Several kinds of repairs and maintenance models are described. After studying some properties of the stochastic process of failure times, the authors compare different maintenance models by comparing the expected number of failures in time. Author (GRA)

N86-25007# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.
RADC (ROME AIR DEVELOPMENT CENTER) NONELECTRONIC RELIABILITY NOTEBOOK. REVISION B Interim Report, Jul. 1982 - Aug. 1985
John E. Angus, Jack M. Finkelstein, Mal Yerasi, and Donald W. Fult Oct. 1985 610 p refs Supersedes RADC-TR-75-22
(Contract F30602-82 C-0127)
(AD-A163900; HAC-FR84-16-446-Rev-B; RADC-TR-85-194-Rev-B; RADC-TR-752-Rev-B) Avail: NTIS HC A99/MF A01 CSCL 13/9

Failure data and reliability methods pertaining to a variety of applications are discussed. The objective was the collection, analysis, and presentation of nonelectronic component failure data and the presentation of analytical methods that form the state-of-the-art in nonelectronic reliability analysis. Topics include: applicable statistical methods for nonelectronic reliability; reliability specifications; special application methods for reliability prediction; part failure characteristics; and reliability demonstration tests. GRA

N86-25008# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ROBUST ESTIMATION OF THE LOCATION PARAMETER OF LIFE DISTRIBUTIONS M.S. Thesis
Linda M. Allen Dec. 1985 59 p refs
(AD-A163993; AFIT/GSO/MA/85D-1) Avail: NTIS
HC A04/MF A01 CSCL 12/1

This thesis determined that for time to failure distributions that are moderate deviations from the negative exponential distribution, a robust estimate of the minimum life could be arrived at by assuming the underlying distribution was exponential and using the minimum variance, unbiased, maximum likelihood estimator. It was found that estimators using the minimum distance statistics of Kolmogorov, Cramer-von Mises, and Anderson-Darling did not perform well with the asymmetric distributions explored in this thesis. However, they may still prove useful for life distributions with larger shape parameters. The analysis was accomplished by using Monte Carlo techniques to generate random samples of time to failure data from specific distributions, and using this empirical data to estimate the actual minimum life of the distribution. Five estimators were explored: the minimum variance, unbiased, maximum likelihood estimator of the two-parameter negative exponential distribution; the first ordered statistic; and the three minimum distance methods. The performance of these estimators was evaluated by comparing their mean square errors with the mean square error of the chosen best estimator. GRA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N86-25009 United Kingdom Atomic Energy Authority, Risley (England). Northern Div.
STATIC AND DYNAMIC TENSILE TESTS ON WIDE X 6 CrNi 18 11 STEEL PLATES TO DEMONSTRATE THE INTEGRITY OF THE REACTOR TANK FOR THE SNR 300 FAST SODIUM-COOLED REACTOR
H. Breitling, H. Laue, P. Julisch, W. Stradtmueller, D. Sturm, and J. Wiedemann Oct. 1985 26 p ref Transl. into ENGLISH from "Statische und Dynamische Zugpruefungen mit Grossplatten aus Werkstoff X 6 CrNi 18 11 zum Integritaetsnachweis des Reaktortanks fuer den Schnellen Natriumgekuehlten Reaktor SNR 300" Stuttgart, West Germany Presented at the 11th MPA Seminar, 10-11 Oct. 1985, Stuttgart, West Germany
(BLL-Risley-TR-5280-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

The reactor tank of the SNR 300 fast sodium cooled reactor was subjected to a safety assessment which took account of the results of wide plate tensile tests, in which the elongation at maximum load was applied as the instability criterion. The wide plates were, to the greater part, welded in the longitudinal and transverse directions and incorporated experimental flaws, approximately 60 mm long and of defined depth and orientation, in order to take account of any undetected cracks in the original component. The tensile tests were carried out at temperatures up to 550 deg C and included dynamic tests as well as conventional quasistatic, so as to simulate stressing conditions in the tank during a hypothetical power excursion. The reference strain rate during these tests was epsilon = 1/s. Under quasistatic loading, flaw free plates reached elongations of approximately 33% and approximately 7.5% under dynamic loading with artificial defects in the form of a central slit or fatigue crack. With comparable plates, no significant differences were observed between the results of quasistatic and dynamic tests. Author

N86-25010 United Kingdom Atomic Energy Authority, Risley (England). Northern Div.

BEHAVIOUR OF DYNAMICALLY LOADED PIPES WITH CIRCUMFERENTIAL FLAWS UNDER INTERNAL PRESSURE AND EXTERNAL BENDING LOADS

D. Sturm, W. Stoppler, and J. Schiedermaier 1985 38 p refs Transl. into ENGLISH from "Verhalten Dynamisch Beanspruchter Rohre mit Umfangsfehlern Unter Innendruck- und Biegebeanspruchung" (West Germany) Presented at the 11th MPA Seminar, 10-11 Oct. 1985, Stuttgart, West Germany

(BLL-Risley-TR-5278-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Comparative bending tests performed on cylindrical vessels of various dimensions and materials, weakened by notches in the circumferential directions and stressed by internal pressure and external bending moments, produced no significant differences as regards load carrying capacity between bending loads applied statically and dynamically. Dynamically tested ferritic steel pipes exhibited a slightly smaller ductile fracture component on the fracture surface as compared with those stressed quasistatically. In all other cases, fracture occurred after considerable plastic deformation in the cross section under test. The engineering method used for theoretical calculation of the leak before break and corresponding flaw curves proved in all cases to lie on the safe side. Author

N86-25011 United Kingdom Atomic Energy Authority, Risley (England). Northern Div.

BEHAVIOUR OF WB 35 PIPE STEEL UNDER DYNAMIC LOADING IN HIGH-SPEED TENSILE TESTS

D. Sturm, R. Zirn, and R. Haas Apr. 1986 49 p Transl. into ENGLISH from "Verhalten des Rohrleitungswerkstoffes WB 35 bei Dynamischer Beanspruchung im Schnellzerreissversuch" Stuttgart, West Germany Presented at the 11th MPA Seminar, Stuttgart, West Germany, 10-11 Oct. 1983

(BLL-Risley-TR-5279-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Tensile tests were carried out on smooth and notched pipe strip specimens at different loading rates in order to determine the strength, deformation, and fracture behavior of type 17 MnMoV 6 4 (WB 35) steel used for pipework components. Apart from the influence of notched bar striking energy, the effect of artificial defects in the form of erosively produced notches were examined, not only in the parent metal, but also in the welds, over the temperature range of -30 to 250 C. A hydraulic high speed tensile testing machine with a zero load acceleration distance was used for carrying out the tests. At pull down speeds of approximately 7 m/s, mean stress build up rates of approximately 6 MN/sq mm s (elastic region) were reached together with integral strain rates to specimen fracture of up to 30 l/s, normalized to the measurement length L sub o (150 mm). Author

N86-25012 British Library Lending Div., Boston Spa (England).

QUESTION OF APPLICATION OF METHOD OF FINITE ELEMENTS TO PROBLEMS OF DEFORMATION OF INCOMPRESSIBLE MEDIA

E. N. Chumachenko, A. N. Skorkhodov, and A. I. Aleksandrovych 1986 7 p refs Transl. into ENGLISH from Izvestiya (USSR), no. 9, 1985 p 89-92

(BLLD-5828.4-M-36665) Avail: British Library Lending, Boston, Spa, Engl.

The authors assert that the problem of the deformation of bodies of arbitrary shape, made up of triangular or tetrahedral finite elements cannot be correctly formulated for incompressible media within the framework of the method of finite elements. A quarter of the cross-section of a flat rectangular specimen, subjected to upsetting with the complete adhesion at the contact surface is investigated. This zone is broken down into finite rectangular elements. The possible displacements of the nodes are investigated on the assumption that the condition of incompressibility is accurately met. Computer calculations were made with the full system of equations for a number of the breakdowns. Results are discussed. Author

N86-25013 British Library Lending Div., Boston Spa (England).

COMPUTERIZED UPPER-BOUNDARY-VALUE SOLUTIONS OF PROBLEMS IN MECHANICAL WORKING OF METALS

Yu. N. Reznikov, A. Z. Zhuravlev, and A. S. Belikov 1986 8 p refs Transl. into ENGLISH from Izvestiya (USSR), no. 8, 1985 p 59-63

(BLL-M-36627-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Upper-boundary-value solutions to OMD (mechanical metal working) problems are obtained with a computer from minimization of the flow function in rectangular elements, into which the calculation field has been divided, and a first-order polynomial was used. The developed program enables the deformation forces and metal flow speeds in the separate zones of the billet to be determined, thus enabling the examined theoretical approach to be used for solving a wide range of practical OMD problems. Author

N86-25014 British Library Lending Div., Boston Spa (England).

DETERMINATION OF MAIN STRENGTH PROPERTIES OF 9KhF ROLL STEEL

V. M. Timonin, M. V. Yaroshenko, V. A. Nikolaev, and G. N. Merinov 1986 7 p refs Transl. into ENGLISH from Stal (USSR), no. 9, 1985 p 71-72

(BLL-M-36651-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The strength, ductility, fatigue strength, and fracture toughness of 9KhF steel used for back-up roll sleeves in strip mills were studied. It is found that 9KhF steel has high static and fatigue strength but low resistance to brittle fracture. The fatigue properties show a wide scatter range and are affected by the direction and position of the specimen. E.A.K.

N86-25015 British Library Lending Div., Boston Spa (England).

DETERMINATION OF STRESS STATE FROM STRAIN STATE

V. P. Fedotov, V. N. Trubin, and A. I. Golomidov 1985 4 p refs

(BLL-M-36642-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

An examination is made of an algorithm for calculating the stresses at an arbitrary point of a body. It can be used in conditions of low elastoplastic strains with simple loading. Author

N86-25016 British Library Lending Div., Boston Spa (England).

CRACK GROWTH ON A PWR-RPV NOZZLE CORNER UNDER CYCLIC THERMAL SHOCK LOAD

J. Jansky, R. Schmitt, and G. Katzermeier 1986 23 p Transl. into ENGLISH from West German article Presented at the 11th MPR Seminar, Stuttgart, West Germany, 10-11 Oct. 1985

(BLL-Risley-TR-5284-(9091.9F)) Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The cyclic thermal shock tests on the reactor pressure vessel (RPV) nozzle corner A2 of the pressurized water reactor (PWR) plant have shown that the combined effects of the material, medium and loading require that the following factors be taken into account: (1) material, sulphur content and orientation of manganese sulphides, quality of the protective layer of magnetite, and original toughness of the materials; (2) medium, oxygen and CO2 content, concentration of the medium in the crack (fissure), and conductivity; and (3) loading, internal stresses, mean stress, interaction between cracks (if a crack field is present), coating of the crack tips (rounding off or corroding out), and loading sequence. These factors can be globally described using the K sub s values and the calculated stress distribution by means of weighting factors. The crack tip values calculated in this way generally lie below the theoretical values for single cracks. This illustrates the conservatism of the single crack analysis performed to date for the safety assessment of the PWR thermal shock tests. For the same reason previous predictions for crack growth have also been considerably overestimated. Further experiments to investigate crack growth on components under operational conditions are required, as well as testing samples in autoclaves, in order to quantify the effect of the individual factors. Author

N86-25017# California Inst. of Tech., Pasadena. Space Radiation Lab.
RESEARCH IN PARTICLES AND FIELDS Semiannual Status Report, 1 Apr. 1985 - 31 Mar. 1986
E. C. Stone, L. Davis, Jr., R. A. Mewaldt, and T. A. Prince 5 May 1986 39 p refs
(Grant NGR-05-002-160)
(NASA-CR-176763; NAS 1.26:176763) Avail: NTIS HC A03/MF A01 CSCL 20K

Research activities in cosmic rays, gamma rays, and astrophysical plasmas are reported. The astrophysical aspects of cosmic rays and gamma rays, and the radiation and electromagnetic field environment of the Earth and other planets are investigated. The investigations are carried out by energetic particle and photon detector systems flown on spacecraft and balloons. The program is directed toward the investigation of galactic, solar, interplanetary, and planetary energetic particles and plasmas. Precision measurements with high resolution in charge, mass, and energy are emphasized. E.A.K.

N86-25018*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STATISTICAL CORRELATION ANALYSIS FOR COMPARING VIBRATION DATA FROM TEST AND ANALYSIS
T. G. Butler, R. F. Strang, L. R. Purves, and D. J. Hershfeld Feb. 1986 92 p
(NASA-TM-86081; Rept-84B0561; NAS 1.15:86081) Avail: NTIS HC A05/MF A01 CSCL 20K

A theory was developed to compare vibration modes obtained by NASTRAN analysis with those obtained experimentally. Because many more analytical modes can be obtained than experimental modes, the analytical set was treated as expansion functions for putting both sources in comparative form. The dimensional symmetry was developed for three general cases: nonsymmetric whole model compared with a nonsymmetric whole structural test, symmetric analytical portion compared with a symmetric experimental portion, and analytical symmetric portion with a whole experimental test. The theory was coded and a statistical correlation program was installed as a utility. The theory is established with small classical structures. E.A.K.

N86-25019*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MATHEMATICAL CORRELATION OF MODAL PARAMETER IDENTIFICATION METHODS VIA SYSTEM REALIZATION THEORY
Jer-Nan Juang Apr. 1986 47 p refs
(NASA-TM-87720; NAS 1.15:87720) Avail: NTIS HC A03/MF A01 CSCL 20K

A unified approach is introduced using system realization theory to derive and correlate modal parameter identification methods for flexible structures. Several different time-domain and frequency-domain methods are analyzed and treated. A basic mathematical foundation is presented which provides insight into the field of modal parameter identification for comparison and evaluation. The relation among various existing methods is established and discussed. This report serves as a starting point to stimulate additional research towards the unification of the many possible approaches for modal parameter identification. Author

N86-25020# California Univ., Los Angeles. School of Engineering and Applied Science.
STRESS-STRAIN BEHAVIOR AND FAILURE UNIAXIAL COMPOSITES IN COMBINED COMPRESSION AND SHEAR-2 Interim Technical Report
S. B. Batdorf and Robert W. C. Ko 1 Oct. 1985 17 p refs
(Contract N00014-85-K-0667)
(AD-A163477; UCLA-ENG-85-28) Avail: NTIS HC A02/MF A01 CSCL 20/11

This paper presents a theoretical approach to the problem of finding the stress-strain relations for composites under combined compression and shear. To this end, the 1-element model is replaced by a 2-element model. Both elastic and inelastic composites are explored employing graphical methods. A numerical example is worked out to illustrate the effects of combined loads on the stiffness and strength of a composite. The present theory employs a nonlinear algebraic equation. An alternative approach would be to use a linear incremental theory, leading to a linear differential equation. An analysis is offered to show that the latter approach leads to substantially the same results as the 1-element model. GRA

N86-25021# Illinois Univ., Urbana.
NONLINEAR EARTHQUAKE ANALYSIS OF CONCRETE BUILDING STRUCTURES Final Report, Jan. - Aug. 1985
Daniel P. Abrams Jan. 1986 85 p refs
(Contract N00014-83-D-0689)
(AD-A163517; NCEL-CR-86.005) Avail: NTIS HC A05/MF A01 CSCL 13/13

An initial effort aimed at development of suitable algorithms for nonlinear, dynamic response of reinforced concrete frame buildings is discussed. These algorithms employ SDOF systems and are programmed in an interactive mode for use on a microcomputer. Nonlinearity is introduced through generalized hysteresis models that are based on laboratory experiments with sub-scale, multi-story reinforced concrete buildings. Recommendations for further work include verification and sensitivity studies, experimental checking of generalized hysteresis model, and extension to a two DOF model. GRA

N86-25022# Admiralty Research Establishment, Portland (England).
FORTRAN PROGRAM FOR VIBRATION AND SOUND RADIATION OF SPHERICAL SHELL
J. H. James Jan. 1986 20 p refs
(AD-A163752; ARE/TM-(N1)-86501; DRIC-BR-98230) Avail: NTIS HC A02/MF A01 CSCL 20/1

Mathematical formulae and a FORTRAN program listing are given for calculating the response and sound radiation due to prescribed time-harmonic excitation. The program is useful for bench-mark studies. Numerical results illustrate the applicability of the various DAA forms of the exterior fluid loading term. The principal features of the work contained herein are these: (1) a FORTRAN computer program which can be used for bench-mark studies of purely numerical formulations of the vibration and sound radiation of submerged elastic structures; (2) numerical results of vibration and sound radiation which augment those obtained from other published studies, and reinforce the view that better fluid loading approximations are required in the intermediate frequency regime where resonances occur. GRA

N86-25023# Royal Signals and Radar Establishment, Malvern (England).
A DATABASE FOR COMPOUNDING STRESS INTENSITY FACTORS
A. M. Prior, D. P. Rooke, and D. J. Cartwright Apr. 1985 30 p refs
(AD-A163779; RAE-TR-85046; DRIC-BR-97684) Avail: NTIS HC A03/MF A01 CSCL 20/11

The compounding method enables stress intensity factors to be evaluated for complex geometrical configurations using the known results of simpler ancillary configurations. Implementation of the method on a computer system requires that a data file of known results be available, and that a program be written to compound solutions from that data file. A procedure is described to convert available graphical data on stress intensity factors to numerical data and store it in a direct access computer file together with identification parameters. A computer program is then described which uses the data in that file to compound stress intensity factors for other configurations. It is shown that the errors in the results from this program are within acceptable engineering tolerances. GRA

N86-25024# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE BUCKLING OF COMPOSITE CYLINDRICAL PANELS

CONSIDERING ENVIRONMENTAL EFFECTS M.S. Thesis
Anthony D. Straw Dec. 1985 127 p refs
(AD-A163878; AFIT/GAE/AA/85D-15) Avail: NTIS HC A07/MF A01 CSCL 20/11

An analytical study was conducted to determine the influence of moisture, temperature, and curvature on the bifurcation load of cylindrical, composite panels subjected to a simple shear loading. Two laminate ply orientations, (0/45/-45/90)s and (45/-452)s, were analyzed for six radii, four temperatures, and two initial moisture conditions. The eight-ply composite panels were assumed to be manufactured from a graphite/epoxy, As/3501-5. To evaluate the influence of moisture and temperature, the transverse modulus, E2, and shear modulus, G12, were degraded based on experimental test data for the AS/3501-5 system. Each ply orientation, for a 12 in. panel radius, was evaluated at 20 time/temperature conditions that ranged from 80 to 300 F, and moisture concentrations ranging from a zero moisture content to an equilibrium moisture distribution. The investigation of curvature was conducted only for the (45/-452)s laminate and at a limited number of time/temperature conditions. The bifurcation loads were determined using the STAGS-C1 finite elements shell analysis program. This reduction in the bifurcation load is significantly influenced by the change in curvature at elevated temperatures and moisture content. GRA

N86-25025# Iowa Univ., Iowa City. Coll. of Engineering.
DYNAMIC AND DESIGN SENSITIVITY ANALYSIS OF RIGID AND ELASTIC MECHANICAL SYSTEMS WITH INTERMITTENT MOTION Final Report, 12 Mar. 1982 - 30 Jun. 1985
Edward J. Haug 12 Dec. 1985 9 p refs
(Contract DAAG29-82-K-0086)
(AD-A163982; ARO-18576.15-MA) Avail: NTIS HC A02/MF A01 CSCL 20/11

Methods developed for analysis of intermittent motion, flexible system dynamics, design sensitivity, and differential-algebraic equations are summarized. New techniques for dynamics of multibody flexible systems include mixed vibration and static correction modes. Dynamic design sensitivity analysis methods were developed, using singular value decomposition. Numerical integration methods for mixed differential-algebraic equations developed are based on singular value decomposition and hybrid generalized coordinate partitioning-constraint stabilization. Citations to sixteen published papers/reports are made. GRA

N86-25026# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PREDICTING THE EFFECTS OF OVERLOADS ON SUSTAINED-LOAD CRACK GROWTH IN A HIGH-TEMPERATURE SUPERALLOY M.S. Thesis
Robert L. Hastie, Jr. Dec. 1985 140 p refs
(AD-A164018; AFIT/GA/AA/85D-6) Avail: NTIS HC A07/MF A01 CSCL 11/6

This thesis investigates methods of modeling the effects of overloads on high-temperature sustained-load crack growth. In addition to a model previously developed for this specific problem, a computer program developed for low-temperature, high-frequency cyclic load applications was evaluated. Sustained-load hold times were converted to equivalent fatigue cycles to analyze a load spectrum, consisting of sustained-load with periodic overloads. The CRACKS crack growth program was used with the Wheeler and Willenborg models used to account for crack growth retardation due to overloads. Crack measurements were made using a electric potential system. The application of the electric potential system to crack growth measurement following overloads was extensively evaluated. GRA

N86-25027# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
A COMPUTATIONAL MODEL FOR CONTACT STRESS PROBLEMS AD-A164190 Interim Report
J. N. Reddy and P. R. Heyliger Jan. 1986 36 p refs
(Contract N00014-84-K-0552)
(AD-A164190; VPI-E-86.2) Avail: NTIS HC A03/MF A01 CSCL 20/11

A mixed finite element model based on the incremental, updated Lagrangian, nonlinear description of continuum was developed using a mixed virtual work statement, and its application to planar elastic contact problems is discussed. The computational model is evaluated by comparing the numerical results with those obtained by a displacement finite element model. The mixed model, which contains displacements and stresses as nodal degrees of freedom, yields accurate stresses while the displacements are no better than those of the displacements finite element model. Author (GRA)

N86-25028# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
DYNAMIC MOIRE INTERFEROMETRY IN MECHANICS RESEARCH
J. S. Epstein, V. A. Deason, and W. G. Reuter 1985 13 p Presented at the DOE Symposium on Engineering Energy Sciences, State College, Pa., 11 Oct. 1985
(Contract DE-AC07-76ID-01570)
(DE86-004128; EGG-M-25885; CONF-8510237-1) Avail: NTIS HC A02/MF A01

A brief review of moire interferometry is provided and some of the innovative concepts being pursued in dynamic moire interferometry outlined. Two areas are highlighted: the stress wave crack diffraction problem in steel, and the local effects of structural crack tip resonance in steel. DOE

N86-25029# Oak Ridge National Lab., Tenn.
SOME ADVANCES IN FRACTURE STUDIES UNDER THE HEAVY-SECTION STEEL TECHNOLOGY PROGRAM
C. E. Pugh, W. R. Corwin, R. H. Bryan, and B. R. Bass 1985 29 p Presented at the 11th MPA Seminar, Oak Ridge, Tenn., 10-11 Oct. 1985
(Contract DE-AC05-84OR-21400)
(TI85-018096; CONF-8510153-1) Avail: NTIS HC A03/MF A01

Recent results are summarized from HSST studies in three major areas that relate to assessing nuclear reactor pressure vessel integrity under pressurized-thermal-shock (PTS) conditions. These areas are irradiation effects on the fracture properties of stainless steel cladding, crack run-arrest behavior under nonisothermal conditions, and fracture behavior of a thick-wall vessel under combined thermal and pressure loadings. A stainless steel overlay cladding, applied by a submerged arc, single-wire, oscillating-electrode method, was irradiated. Yield strength increases up to 27% and a slight increase in ductility was observed. Charpy V-Notch data showed a ductile-to-brittle transition behavior caused by temperature-dependent failure of the delta-ferrite phase. The type 308 cladding, microstructurally typical of that in reactor pressure vessels, showed very little degradation in either upper-shelf energy or transition temperature due to irradiation. Crack-arrest behavior of A533 grade B class 1 steel was examined for temperatures extending above the onset of Charpy upper-shelf. Recent results are summarized from HSST studies in three major areas that relate to assessing Charpy upper-shelf. DOE

42 GEOSCIENCES (GENERAL)

N86-25030*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOPOTENTIAL RESEARCH MISSION SCIENCE, ENGINEERING AND PROGRAM SUMMARY
Thomas Keating, ed., Patrick Taylor, ed., Werner Kahn, ed., and Francis Lerch, ed. May 1986 203 p refs
(NASA-TM-86240; NAS 1.15:86240) Avail: NTIS HC A10/MF A01 CSCL 08B

The accumulated scientific and engineering studies pertaining to the Geopotential Research Mission (GRM) are presented. The scientific need and justification for the measurement of the Earth's

gravity and magnetic fields are discussed. Emphasis is placed on the studies and conclusions of scientific organizations and NASA advisory groups. The engineering design and investigations performed over the last 4 years are described, and a spacecraft design capable of fulfilling all scientific objectives is presented. In addition, critical features of the scientific requirements and state-of-the-art limitations of spacecraft design, mission flight performance, and data processing are discussed. Author

N86-25031# Geological Survey, Reston, Va.
A STRATEGY FOR ADOPTION OF ACCELERATOR MASS SPECTROMETRY BY THE EARTH SCIENCES
B. R. Doe, Louis Brown (Carnegie Institution of Washington, D.C.), David Elmore (Rochester Univ., N.Y.), Gregory Herzog (Rutgers - The State Univ., New Brunswick, N.J.), Theodore Kruse (Rutgers - The State Univ., New Brunswick, N.J.), Roy Middleton (Pennsylvania Univ., Philadelphia), John Morgan, R. A. Muller (California Univ., Berkeley), and John Reynolds (California Univ., Berkeley) 1984 38 p
(TI85-901777; USGS-OFR-84-664) Avail: NTIS HC A03/MF A01

Four steps are involved in mass spectrometry for the analysis of the isotopes of an element: (1) volatilization; (2) ionization of the element; (3) acceleration of the ions through a potential field; and (4) separation of the isotopes. Accelerator mass spectrometers (AMS) produce ions with much higher energies in the megavolt range than conventional mass spectrometry. The cyclotron was the first accelerator used for radioisotope dating, and was followed by measurements with tandem Van de Graaff accelerators. Decrease in the use of lower-energy tandem Van de Graaff accelerators for nuclear physics stimulated their use in Earth science. The tandem Van de Graaff's advantages as a mass spectrometer, are discussed. It is found that accelerator mass spectrometry is in a particularly precarious state. The great potential of the use of terrestrial cosmogenic radionuclides, some of which can only be practically determined by AMS, is examined. The development of a strategy for adoption of accelerator mass spectrometry by the Earth sciences is discussed. E.A.K

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-25032# National Aeronautics and Space Administration. National Space Technology Labs., Bay Saint Louis, Miss.
DUCKS UNLIMITED JOINT RESEARCH PROJECT Final Report
C. L. Hill Dec. 1985 175 p refs
(NASA-TM-88755; NAS 1.15:88755; ERL-238) Avail: NTIS HC A08/MF A01 CSCL 13B

The feasibility of using LANDSAT thematic mapper (TM) data and geographic information system technology as part of a waterfowl habitat inventory and assessment program was determined. The TM data analysis offers interesting results in wetland mapping. The best technique is the one that utilizes a distance derived mask as input to a modified orthogonal parallelepiped classifier. The classification technique (CLPIPE) and the statistical software module (FIND) are incorporated into a production software runstream (DUCK.CAN). The production runstream allows analysis with geographically referenced raw data, to complete the classification process, develop statistical reports, and produce final output products in the form of maps and tables. It is concluded that the TM has the capability to spectrally identify wetland categories. E.A.K.

N86-25033# National Aeronautics and Space Administration, Washington, D.C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES (ISSUE 49)
Apr. 1986 152 p
(NASA-SP-7041(49); NAS 1.21:7041(49)) Avail: NTIS HC A06 CSCL 05B

This bibliography lists 515 reports, articles, and other documents introduced into the NASA scientific and technical information system. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. B.G.

N86-25034*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONCEPTUAL DESIGN STUDY: FOREST FIRE ADVANCED SYSTEM TECHNOLOGY (FFAST)
J. David Nichols and John R. Warren (Department of Agriculture, Washington, D.C.) 15 Feb. 1986 132 p refs
(Contract NAS7-918)
(JPL-Publ-86-5) Avail: NTIS HC A07/MF A01 CSCL 02F

An integrated forest fire detection and mapping system that will be based upon technology available in the 1990s was defined. Uncertainties in emerging and advanced technologies related to the conceptual design were identified and recommended for inclusion as preferred system components. System component technologies identified for an end-to-end system include thermal infrared, linear array detectors, automatic georeferencing and signal processing, geosynchronous satellite communication links, and advanced data integration and display. Potential system configuration options were developed and examined for possible inclusion in the preferred system configuration. The preferred system configuration will provide increased performance and be cost effective over the system currently in use. Forest fire management user requirements and the system component emerging technologies were the basis for the system configuration design. A preferred system configuration was defined that warrants continued refinement and development, examined economic aspects of the current and preferred system, and provided preliminary cost estimates for follow-on system prototype development. B.G.

N86-25035# Los Alamos Scientific Lab., N. Mex.
CHEMICAL, PETROGRAPHIC AND K-Ar AGE DATA TO ACCOMPANY RECONNAISSANCE GEOLOGIC STRIP MAP FROM KINGMAN TO SOUTH OF BILL WILLIAMS MOUNTAIN, ARIZONA
Barbara Arney, Fraser Goff, and Andrea C. Eddy Apr. 1985 28 p refs Sponsored by DOE
(DE85-014242; LA-10409-HDR) Avail: NTIS HC A03/MF A01

As part of a reconnaissance mapping project, 40 chemical analyses and 13 potassium/argon age dates were obtained from Tertiary volcanic and Precambrain granitic rocks between Kingman and Bill Williams Mountain, Arizona. The dated volcanic rocks range in age from 5.5 + or - 0.2 Myr for basalt in the East Juniper Mountains to about 25 Myr for a biotite pyroxene andesite. The date for Picacho Butte, a rhyodacite in the Mt. Floyd volcanic field, was 9.8 + or - 0.07 Myr, making it the oldest rhyodacite dome in that volcanic field. Dated rocks in the Fort Rock area range from 20.7 to 24.3 Myr. No ages were obtained on the Precambrian rocks. Compositionally, the volcanic rocks analyzed range from alkali basalt to rhyolite, but many rocks on the western side of the map area are unusually potassic. The granites chosen for analysis include syenogranite from the Hualapai Mountains, a muscovite granite from the Picacho Butte area, and two other granites. The chemical and K/Ar age data and petrographic descriptions included in this report accompany the reconnaissance geologic strip map published as LA-9202-MAP. DOE

N86-25036# EG and G Energy Measurements, Inc., Las Vegas, Nev.
COMPREHENSIVE INTEGRATED REMOTE SENSING FOR US

DEPARTMENT OF ENERGY APPLICATIONS
L. R. Tinney and J. G. Lackey 1985 10 p refs Presented at the International Conference on Man's Role in Changing the Global Environment, Venice, Italy, 21 Oct. 1985
(Contract DE-AC08-83NV-10282)
(DE86-002101; EGG-10282-1096; CONF-8510222-1) Avail: NTIS HC A02/MF A01

A major remote sensing program of the Department of Energy (DOE) is described and examples of processed data are presented. The program is termed Comprehensive Integrated Remote Sensing, or CIRS, and involves equipment and personnel of the DOE Remote Sensing Laboratory. Data is being collected to support environmental and emergency response functions for large DOE sites. Integration of the data is being enhanced by implementation of a geographic information system. DOE

N86-25037# Geological Survey, Syosset, N. Y. Water Resources Div.
WATER RESOURCES DATA FOR NEW YORK, WATER YEAR 1984. VOLUME 2: LONG ISLAND Annual Water Data Report, 1 Oct. 1983 - 30 Sep. 1984
A. G. Spinello, J. H. Nakao, W. J. Flipse, and J. G. Carcaci May 1985 292 p
(PB86-137338; USGS/WRD/HD-85/246; USGS/WRD/NY-84/2) Avail: NTIS HC A13/MF A01 CSCL 08H

Water resources data for the 1984 water year for New York consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water wells. The volume contains records of water discharge at 17 gaging stations; water quality at 17 gaging stations, 884 wells; and water levels at 139 observation wells. Also included are data for 79 low-flow partial-record stations. GRA

N86-25038# Geological Survey, Doraville, Ga. Water Resources Div.
WATER RESOURCES DATA FOR GEORGIA, WATER YEAR 1984 Annual Water Data Report, 1 Oct. 1983 - 30 Sep. 1984
W. R. Stokes, T. W. Hale, J. L. Pearman, and G. R. Buell Jul. 1985 394 p
(PB86-127016; USGS/WRD/HD-85/259; USGS/WRD/GA-85/1) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1984 water year for Georgia consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and ground water levels. Discharge records of 108 gaging stations; stage for 11 gaging stations; stage and contents for 17 lakes and reservoirs; water quality for 14 continuous stations, 109 periodic stations and miscellaneous sites; peak stage and discharge only for 130 crest stage partial record stations and 44 miscellaneous sites; and water levels of 27 observation wells are presented. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-25039*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRINCIPLES FOR SYSTEM LEVEL ELECTROCHEMISTRY
Lawrence H. Thaller 1986 13 p refs Presented at the 15th International Power Sources Symposium, Brighton, England, 7-11 Sep. 1986
(NASA-TM-87283; E-2908; NAS 1.15:87283) Avail: NTIS HC A02/MF A01 CSCL 10C

The higher power and higher voltage levels anticipated for future space missions have required a careful review of the techniques currently in use to preclude battery problems that are related to the dispersion characteristics of the individual cells. Not only are the out-of-balance problems accentuated in these larger systems, but the thermal management considerations also require a greater degree of accurate design. Newer concepts which employ active cooling techniques are being developed which permit higher rates of discharge and tighter packing densities for the electrochemical components. This paper will put forward six semi-independent principles relating to battery systems. These principles will progressively address cell, battery and finally system related aspects of large electrochemical storage systems. Author

N86-25040*# United Technologies Corp., South Windsor, Conn. Fuel Cell Operations.
ADVANCED ON-SITE POWER PLANT DEVELOPMENT TECHNOLOGY PROGRAM Annual Report, 1983
Jun. 1984 155 p refs
(Grant DEN3-289; Contract DE-AI21-80ET-17088)
(NASA-CR-174709; DOE/NASA/0289-1; NAS 1.26:174709; PSD-FCR-5715) Avail: NTIS HC A08/MF A01 CSCL 10B

A 30-cell, full area short stack containing advanced cell features was tested for 2900 hours. A stack acid addition approach was selected and will be evaluated on the stack at 5000 hours test time. A brassboard inverter was designed and fabrication was initiated. Evaluation of this brassboard inverter will take place in 1984. A Teflon coated commercial heat exchanger was selected as the preferred approach for the acid condenser. A reformer catalyst with significantly less pressure drop and equivalent performance relative to the 40-K baseline catalyst was selected for the development reformer. The early 40-kW field power plant history was reviewed and adjustments were made to the On-Site Technology Development Program to address critical component issues. Author

N86-25041# National Aeronautics and Space Administration, Washington, D.C.
PROCESS FOR PRODUCING AN ELECTRODE MEMBRANE UNIT FOR HYDROGEN/BROMINE CELLS
Karl Hoehne Apr. 1986 9 p refs Transl. into ENGLISH of West German patent no. DE-3334330-A1 (4 Apr. 1985) p 1-9 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88396; NAS 1.15:88396) Avail: NTIS HC A02/MF A01 CSCL 10C

A method for producing an electrode membrane unit for hydrogen/bromine cells, consisting of catalyst material and a cation exchange membrane made of perfluorosulfonated polytetrafluoroethylene is described. Author

N86-25042*# Georgia Inst. of Tech., Atlanta.
TECHNOLOGY FOR SATELLITE POWER CONVERSION Semiannual Technical Report
M. A. Gouker, D. P. Campbell, and J. J. Gallagher 16 May 1986 10 p refs
(Grant NAG3-282)
(NASA-CR-176777; NAS 1.26:176777) Avail: NTIS HC A02/MF A01 CSCL 10A

The work performed in this reporting period has concentrated on the metal-oxide-metal (MOM) diode. The fabrication procedure begins with the deposition of gold probing pads to provide a non-oxidizing contact to test the dc characteristics to the diode accurately. A thin patch capped with an insulating SiO2 layer, is deposited next to form the first half of the diode. The other half of the diode, typically Ni, is deposited completing the conduction path from the oxidized edge of the Ni patch to the opposite gold probing pad. It is important in this step that the last metallization take place without exposing the newly oxidized surface to the atmosphere. Successful production of diodes has been achieved. Work on millimeter wave frequency rectennas incorporating known semiconductor diode technology has been initiated. Author

N86-25043*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SILICON PRODUCTION IN A FLUIDIZED BED REACTOR Final Report
Naresh K. Rohatgi Apr. 1986 72 p refs
(Contract NAS7-918; JPL Proj. 5101-296; Contract DE-AI01-85CE-89008)
(JPL-Publ-86-17; DOE/JPL-1012-123) Avail: NTIS HC A05/MF A01 CSCL 10A

Part of the development effort of the JPL in-house technology involved in the Flat-Plate Solar Array (FSA) Project was the investigation of a low-cost process to produce semiconductor-grade silicon for terrestrial photovoltaic cell applications. The process selected was based on pyrolysis of silane in a fluidized-bed reactor (FBR). Following initial investigations involving 1- and 2-in. diameter reactors, a 6-in. diameter, engineering-scale FBR was constructed to establish reactor performance, mechanism of silicon deposition, product morphology, and product purity. The overall mass balance for all experiments indicates that more than 90% of the total silicon fed into the reactor is deposited on silicon seed particles and the remaining 10% becomes elutriated fines. Silicon production rates were demonstrated of 1.5 kg/h at 30% silane concentration and 3.5 kg/h at 80% silane concentration. The mechanism of silicon deposition is described by a six-path process: heterogeneous deposition, homogeneous decomposition, coalescence, coagulation, scavenging, and heterogeneous growth on fines. The bulk of the growth silicon layer appears to be made up of small diameter particles. This product morphology lends support to the concept of the scavenging of homogeneously nucleated silicon.
Author

N86-25044*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OVERVIEW OF SOFTWARE DEVELOPMENT AT THE PARABOLIC DISH TEST SITE
C. K. Miyazono 15 Jul. 1985 83 p
(Contract NAS7-918; JPL Proj. 5105-155; Contract DE-AM04-80AL-13137)
(JPL-Publ-85-56; DOE/JPL-1060-90) Avail: NTIS HC A05/MF A01 CSCL 10A

The development history of the data acquisition and data analysis software is discussed. The software development occurred between 1978 and 1984 in support of solar energy module testing at the Jet Propulsion Laboratory's Parabolic Dish Test Site, located within Edwards Test Station. The development went through incremental stages, starting with a simple single-user BASIC set of programs, and progressing to the relative complex multi-user FORTRAN system that was used until the termination of the project. Additional software in support of testing is discussed including software in support of a meteorological subsystem and the Test Bed Concentrator Control Console interface. Conclusions and recommendations for further development are discussed.
Author

N86-25045*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ENVIRONMENTAL TESTS OF METALLIZATION SYSTEMS FOR TERRESTRIAL PHOTOVOLTAIC CELLS
Paul Alexander, Jr. 31 Dec. 1985 79 p refs
(Contract NAS7-918; JPL Proj. 5101-280; Contract DE-AI01-76ET-20356)
(JPL-Publ-85-86; DOE/JPL-1012-113) Avail: NTIS HC A05/MF A01 CSCL 10A

Seven different solar cell metallization systems were subjected to temperature cycling tests and humidity tests. Temperature cycling excursions were -50 deg C to 150 deg C per cycle. Humidity conditions were 70 deg C at 98% relative humidity. The seven metallization systems were: Ti/Ag, Ti/Pd/Ag, Ti/Pd/Cu, Ni/Cu, Pd/Ni/Solder, Cr/Pd/Ag, and thick film Ag. All metallization systems showed a slight to moderate decrease in cell efficiencies after subjection to 1000 temperature cycles. Six of the seven metallization systems also evidenced slight increases in cell efficiencies after moderate numbers of cycles, generally less than 100 cycles. The copper based systems showed the largest decrease in cell efficiencies after temperature cycling. All metallization systems showed moderate to large decreases in cell efficiencies after 123 days of humidity exposure. The copper based systems again showed the largest decrease in cell efficiencies after humidity exposure. Graphs of the environmental exposures versus cell efficiencies are presented for each metallization system, as well as environmental exposures versus fill factors or series resistance.
Author

N86-25046*# Hughes Research Labs., Malibu, Calif.
LONG LIFE NICKEL ELECTRODES FOR A NICKEL-HYDROGEN CELL: CYCLE LIFE TESTS
H. S. Lim and S. A. Verzwyvelt 1985 14 p refs Previously announced as N84-33698
(Contract NAS3-22238)
(NASA-CR-174815; NAS 1.26:174815) Avail: NTIS HC A02/MF A01 CSCL 10C

In order to develop a long life nickel electrode for a Ni/He cell, the cycle life of nickel electrodes was tested in Hi/H2 boiler plate cells. A 19 test cell matrix was made of various nickel electrode designs including three levels each of plaque mechanical strength, median pore size of the plaque, and active material loading. Test cells were cycled to the end of their life (0.5v) in a 45 minute low Earth orbit cycle regime at 80% depth-of-discharge. It is shown that the active material loading level affects the cycle life the most with the optimum loading at 1.6 g/cc void. Mechanical strength does not affect the cycle life noticeably in the bend strength range of 400 to 700 psi. It is found that the best plaque is made of INCO nickel powder type 287 and has median pore size of 13 micron.
R.J.F.

N86-25047# Energy Research Corp., Danbury, Conn.
DEVELOPMENT OF 3 AND 5 kW FUEL CELL POWER PLANTS Final Technical Report, Oct. 1979 - Jul. 1985
S. Abens and M. Farooque 12 Dec. 1985 119 p
(Contract DAAK70-79-C-0249; DA Proj. 1V4-63702-DG-11)
(AD-A163603) Avail: NTIS HC A06/MF A01 CSCL 10/2

Phosphoric acid fuel cell power plants for use as tactical utility power sources have been developed. The power plants operate on 58% methanol-42% water fuel. Two fully automatic 3kW units were built, tested, and delivered. Thermal efficiency was 23% with ac and 26% with dc output. A brassboard 3kW power plant operating on neat methanol was also constructed, tested, and delivered. The methanol-water premix fuel cell power plant operates on a 1:1.3 molar mixture of methanol and water which is converted in a steam reformer, operating at 300 C, to hydrogen-rich product gas. The fuel cell uses 60 to 65% of the hydrogen to produce dc electricity, and the balance is combusted in a burner to supply heat required for the endothermic reforming process. The phosphoric acid fuel cell stack is air-cooled and operates at a temperature of 190 C. The fuel cell power plant is capable of delivering either regulated dc or ac electrical power through the use of interchangeable power conditioners. A microprocessor based controller provides event sequencing and system control during startup, shutdown and operation of the power plant. GRA

N86-25048# Ultrasystems, Inc., Irvine, Calif.
BIOMASS ECONOMY Final Report, Jun. 1984 - Nov. 1985
Stuart J. Crow Nov. 1985 136 p refs
(Contract F08635-84-C-0229)
(AD-A163647; AFESC/ESL-TR-85-27) Avail: NTIS HC A07/MF A01 CSCL 14/1

The objective of this effort was to perform an updated life cycle cost assessment of biomass energy conversion systems capable of meeting facility and process energy needs of Eglin AFB, FL. System capabilities examined in this study were 25 MWe and 15-MWe. Results of this study are that although the biomass fuel is available at a reasonable cost, construction and other operating costs are too high to justify implementation of this technology based on the current cost of electricity at Eglin AFB, FL.
GRA

N86-25049# Energy Research Corp., Danbury, Conn.
DEVELOPMENT OF PARTIAL OXIDIZER/REFORMER FOR PAFC POWER PLANTS Final Technical Report, 22 Apr. 1983 - 22 Oct. 198
Larry G. Christner and George Steinfeld 15 Nov. 1985 85 p refs
(Contract DAAK70-83-C-0035; DA Proj. 1L1-62733-AH-20)
(AD-A163781) Avail: NTIS HC A05/MF A01 CSCL 10/2

The development of a methanol partial oxidation reformer designed to provide hydrogen to a 3 kW Phosphoric Acid Fuel Cell Powerplant is discussed. The partial oxidation reformer operates on neat methanol and utilizes the fuel cell cathode exhaust stream as the oxidant. GRA

N86-25050 Department of the Air Force, Washington, D.C.
VMJ SOLAR CELL FABRICATION PROCESS USING MASK ALIGNER Patent
Diane K. Hufford, inventor (to Air Force) Issued 20 Mar. 1986 4 p
(AD-D011966; US-Patent-4,547,958; US-Patent-Appl-SN-610911; US-Patent Class-29-572) Avail: US Patent and Trademark Office CSCL 10/2

A novel method and device are described for accurately aligning a substrate comprising a silicon wafer in the fabrication of a silicon vertical junction solar cell, which comprise a base plate having a recess defining an opening for snugly receiving the wafer. The recess includes a substantially straight portion for mating with a cleaved edge of known crystallographic orientation provided on the wafer, and a mask plate for covering the base plate and water. The mask includes a pattern in predetermined configuration through which the wafer may be exposed in the fabrication process for the solar cell. GRA

N86-25051# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
NICKEL HYDROGEN BATTERY CELL TESTING DATA BASE: AN INDUSTRY AND GOVERNMENT SURVEY
Charles C. Badcock and Martin J. Milden 31 Dec. 1985 21 p
(Contract F04701-85-C-0086)
(AD-A163017; TR-0086(6524-04)-1; SD-TR-85-88) Avail: NTIS HC A02/MF A01 CSCL 10/3

Both government and industry were surveyed to determine the level of testing of nickel hydrogen (NiH2) battery cells and to evaluate the demonstrable capabilities of the couple. Only flight-type cells undergoing ground test were incorporated in the data base; no boilerplate cells or flight batteries were included. Both USAF-design and COMSAT-design cells, as well as a few cells produced by SAFT, were listed. The USAF design is in test in both high and low Earth orbit simulations, whereas the COMSAT design, intended specifically for high-orbit applications, is being tested predominantly in high orbits. The data from over 400 cells show that the reliability and capability of both designs for high-orbit applications are reasonably established out to ten years in geosynchronous orbit, and to approximately 3000 cycles in other high-orbit applications. However, the data base is weak and incomplete for applications of the USAF cell in low Earth orbit. This results from the harsh testing environment to which these cells have been subjected, as well as from various minor design questions that were not resolved when these cells began testing. GRA

N86-25052# Naval Postgraduate School, Monterey, Calif.
A SEAWATER BATTERY MONITOR WITH FIBER OPTIC REMOTE DATA ACQUISITION CAPABILITY M.S. Thesis
Yeon-Deog Koo Dec. 1985 53 p refs
(AD-A164178) Avail: NTIS HC A04/MF A01 CSCL 10/3

This thesis presents the basic design of the system to test the voltage of a 1 volt underwater battery at a long distance by using a fiber optic system. This system contains the voltage-to-frequency converter which converts the voltage of the battery to a variable frequency pulse train, the optical transmitter, the fiber optic receiver, and a frequency-to-voltage converter which converts the variable frequency pulse train not an output voltage. This system has small error but if we use more precise components, we can get more exact result. Additionally, the lifetime of two kinds of batteries were measured by using this circuit. GRA

N86-25053# Oak Ridge National Lab., Tenn.
TESTIMONY OF FRED R. MYNATT, ASSOCIATE DIRECTOR FOR NUCLEAR AND ENGINEERING TECHNOLOGIES, OAK RIDGE NATIONAL LABORATORY, BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH AND PRODUCTION OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, US HOUSE OF REPRESENTATIVES
9 Oct. 1985 8 p
(Contract DE-AC05-84OR-21400)
(DE86-002234; DOE/OR-21400/T204) Avail: NTIS HC A02/MF A01

Space nuclear power technology, current activities at Martin Marietta Energy Systems, future directions of research and development, and proposed recommendations are discussed. B.G.

N86-25054# Stanford Univ., Calif. Dept. of Chemistry.
ENERGY TRANSFER AND PHOTOCHEMISTRY IN BIOMIMETIC SOLAR CONVERSION Annual Report, Oct. 1984 - Sep. 1985
S. G. Boxer 30 Aug. 1985 16 p refs
(Contract GRI-5083-260-0824)
(PB86-142114; GRI-85/0190) Avail: NTIS HC A02/MF A01 CSCL 07E

Photoinduced electron transfer has been studied in a chlorophyllide dimer in which the macrocycles are positioned at 14A separation. Electron transfer between large rigid macrocycles is the initial step in natural photosynthesis, and this dimer attempts to mimic the high quantum thermodynamic efficiencies of this process. The photophysics of these molecules is consistent with rapid, efficient charge separation. The role of the protein medium in facilitating natural photosynthesis is studied using semisynthetic chlorophyll-apomyoglobin complexes. The authors have cloned the gene for human myoglobin and expressed it in high yield in E. coli. Using the technique of site-directed mutagenesis, the authors changed amino acid residues in the vicinity of the heme binding pocket to create novel, structurally characterized, environments for the heme(chlorophyll) macrocycle. DOE

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-25055# Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia). Div. of Atmospheric Research.
DESCRIPTION OF A TWO-DIMENSIONAL ATMOSPHERIC TRANSPORT MODEL
I. G. Enting and J. V. Mansbridge 1986 23 p refs
(DAR-TP-11; ISBN-0-643-04018-8) Avail: NTIS HC A02/MF A01

A description is given of a new two-dimensional atmospheric transport model, suitable for studying atmospheric tracers with relatively long lifetimes. The numerical conventions and input requirements are outlined and a detailed description of the numerical processes is given. Author

N86-25056# Naval Facilities Engineering Command, Washington, D. C. Chesapeake Div.
CENTERVILLE BEACH. PROJECT COMPLETION REPORT
Jul. 1977 63 p refs
(AD-A163461; AD-E401440; CHES/NAVFAC-FPO-1-77(3)) Avail: NTIS HC A04/MF A01 CSCL 13/11

This report describes the development of a unique liquid transfer facility, designed and constructed as a solution for a sewer outfall at Centerville Beach, California. The beach in this area has an active surf zone and a rugged shore terrain that prevented the cost-effective installation of ordinary pipeline materials. To overcome these environmental conditions, ocean engineers selected a 4-inch ID, high-density polyethylene pipe protected by

helically-wrapped, steel-armored wires, and having jute and tar coverings. The use of plastic pipe for liquid transfer is not new, but use of such pipe in the oceans has been limited by its lack of abrasion-resistance and durability. The helically-wound, steel-armored wires provided abrasion resistance, weight, strength, and resistance to pipe collapse. The major conclusion resulting from this project is that the pipeline material and its installation method introduced a new underwater construction capability, one which can be applied to similar projects. GRA

N86-25057# Army Military Personnel Center, Alexandria, Va.
CONTROLLING NONPOINT POLLUTION IN VIRGINIA'S URBANIZING AREAS: AN INSTITUTIONAL PERSPECTIVE M.S. Thesis Final Report
Gordon M. Wells 20 Jan. 1986 170 p refs
(AD-A163693) Avail: NTIS HC A08/MF A01 CSCL 13/2

This paper evaluates the effectiveness of the institutional framework of the Commonwealth of Virginia in the implementation and enforcement of nonpoint source (NPS) pollution control measures in the state's urbanizing areas. The institutional framework is developed primarily around the existing governmental framework. The federal, state and local roles are examined in terms of the relevant legislative and executive NPS control activities already taking place. The judicial function is considered in terms of constitutional guarantees of protection of private property and the potential for liability stemming from the implementation of structural and nonstructural best management practices (BMP's). Three generic categories of BMP's are evaluated in light of this institutional environment: on-site BMP's, off-site BMP's, and nonstructural BMP's. Where they are relevant, various subcategories of the institutional environment are examined: mechanisms and responsibility for financing and maintenance, managing future urban growth and mediating interjurisdictional arrangements. The introduction and first four chapters develop this material and the final chapter is an analysis of the existing state programs (the Erosion and Sediment Control Law and the State Water Control Board's voluntary Urban NPS Control and Abatement Program). The product of this analysis is the conclusion that both state programs are weak due to a lack of adequate state oversight. GRA

N86-25058# Department of Energy, Washington, D. C.
REMOVAL OF SULFUR AND NITROGEN CONTAINING POLLUTANTS FROM DISCHARGE GASES Patent Application
J. I. Joubert, inventor (to DOE) Filed 8 Feb. 1985 15 p Sponsored by DOE
(DE85-017799; US-Patent-Appl-SN-699889) Avail: NTIS HC A02/MF A01

Oxides of sulfur and of nitrogen are removed from waste gases by reaction with an unsupported copper oxide powder to form copper sulfate. The resulting copper sulfate is dissolved in water to effect separation from insoluble mineral ash and dried to form solid copper sulfate pentahydrate. This solid sulfate is thermally decomposed to finely divided copper oxide powder with high specific surface area. The copper oxide powder is recycled into contact with the waste gases requiring cleanup. A reducing gas can be introduced to convert the oxide of nitrogen pollutants to nitrogen. DOE

N86-25059# Los Alamos National Lab., N. Mex.
STRATOSPHERIC TRITIUM SAMPLING Final Progress Report
A. S. Mason and H. G. Oestlund Sep. 1985 9 p
(Contract W-7405-eng-36)
(DE86-004368; LA-10546-PR) Avail: NTIS HC A02/MF A01

Stratospheric tritium sampling was part of Project Airstream (sponsored by the US Department of Energy) between 1975 and 1983. Data from the final deployment in November 1983 are reported here, and the results of the 9 years of effort are summarized. DOE

N86-25060# Research Triangle Inst., Research Triangle Park, N.C.
MODELING TRANSPORT BY CONVECTIVE CLOUDS FOR REGIONAL AIR POLLUTION MODELS
F. M. Vukovich Dec. 1985 8 p
(Contract EPA-68-02-4059)
(PB86-144623; EPA-600/D-86-002) Avail: NTIS HC A02/MF A01 CSCL 04A

A model was developed to account for regional scale vertical transport of pollutants from the mixed layer to the overlying free troposphere by an ensemble of nonprecipitating cumulus convective clouds. The model determines acceptable cloud classes for given atmospheric state represented by the moist static energy distribution. The cloud classes are defined by dry entrainment rate, cloud depth and convective cloud amounts. The clouds are driven by regional scale heat and moisture convergence. Empirical data were collected and used to formulate a closure scheme to obtain the necessary cloud parameters. A statistical model which predicts the vertical distribution of cloud amount from cloud base is developed. The vertical variation of cloud amounts depends on the distribution of clouds with different depths. GRA

N86-25061# National Ocean Service, Anchorage, Alaska. Ocean Assessments Div.
OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM. REPORTS OF PRINCIPAL INVESTIGATORS, VOLUME 33 Final Report
Jul. 1985 459 p refs Sponsored by Minerals Management Service
(PB86-134780) Avail: NTIS HC A20/MF A01 CSCL 08C

A compilation of five reports is presented dealing with the distribution and dynamics of heavy metals in Alaskan Shelf environments; characterization of organic matter in sediments; distribution of trace elements in bottom sediment of the Northern Bering Sea; aspects of size distributions, clay mineralogy, and geochemistry of sediments of the Beaufort Sea and adjacent deltas; and the natural distribution and dynamics of hydrocarbons on the Alaskan continental shelf. GRA

N86-25062# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
ATMOSPHERIC MODELING: MODEL AND ACCURACY
K. L. Demerjian Nov. 1985 6 p refs
(PB86-128683; EPA-600/D-85-280) Avail: NTIS HC A02/MF A01 CSCL 07D

The development of models to assess the emission control requirements of primary precursor pollutants in the production of photochemical oxidants has been underway for approximately 20 years. Over the period there has been a considerable increase in our understanding of the basic scientific processes associated with the production of photochemical oxidants in the atmosphere and a concomitant advance in the analytical sophistication by which these processes are incorporated to derive quantitative precursor relationships. The establishment of air quality standards implies the use of such quantitative relationships to describe the link between emissions and air quality in order to consider an effective and cost efficient control program. The paper maps out the progress that has been made in the endeavor, discussing the successes and shortcomings of the present generation of modeling tools. Model performance evaluations, accuracy, uncertainty and sensitivity analyses are also discussed. GRA

N86-25063# National Ocean Service, Anchorage, Alaska. Ocean Assessments Div.
OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM: REPORTS OF PRINCIPAL INVESTIGATORS, VOLUME 30
Apr. 1985 631 p refs Sponsored by Minerals Management Service
(PB86-134756) Avail: NTIS HC A99/MF A01 CSCL 08A

A compilation of eight final reports is presented dealing with population and trophics studies of seabirds in the Northern Bering and Chukchi Seas; population estimates and trends of Pribilof Island Seabirds; pelagic distribution of marine birds on the central Bering Sea Shelf; assessment of oil spill risk to birds; and simulation

modeling of marine bird population energetics, food consumption and sensitivity to perturbation. GRA

N86-25064# National Ocean Service, Anchorage, Alaska. Ocean Assessments Div.
OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM: REPORTS OF PRINCIPAL INVESTIGATORS, VOLUME 31 Final Report
May 1985 671 p
(PB86-134764) Avail: NTIS HC A99/MF A01 CSCL 08A
Appendices to a report dealing with ecological studies in the Bering Sea region which was prevously published in Volume 2 of the OCSEAP Final Reports series are presented. GRA

N86-25065# National Ocean Service, Anchorage, Alaska. Ocean Assessment Div.
OUTER CONTINENTAL SHELF ENVIRONMENT ASSESSMENT PROGRAM: REPORTS OF PRINCIPAL INVESTIGATORS, VOLUME 32 Final Report
Jun. 1985 523 p refs Sponsored by Minerals Management Service
(PB86-134772) Avail: NTIS HC A22/MF A01 CSCL 08A
This document represents a compilation of four final reports dealing with the infauna of the northeastern Bering and southeastern Chukchi seas. The objectives of this study were: (1) a quantitative inventory of dominant infaunal invertebrates at selected stations in the study areas; (2) a description of spatial distribution patterns of species in the designated study areas; and (3) limited observations of biological interrelationships, emphasizing trophic interactions between selected segments of the benthic biota. Multivariate techniques were employed to examine grouping of stations and taxa in the study areas. Author

N86-25066# Georgia State Univ., Atlanta.
FUNGI AND HYDROCARBONS IN THE MARINE ENVIRONMENT
D. G. Ahearn and S. A. Crow Sep. 1985 12 p refs Sponsored in part by Environmental Research Lab. Gulf Breeze, Fla.
(PB86-109964; EPA-600/D-85-222) Avail: NTIS HC A02/MF A01 CSCL 08A
Hydrocarbons from various sources (anthropogenic pollution, marine seeps, marine algae, atmospheric fallout, and terrestrial runoff) enter the ocean daily. These complex hydrocarbon mixtures are dispersed and degraded by abiotic and biogenic processes. Most commonly, bacteria are considered the primary degraders, with algae and fungi having minor roles. Although implied in a number of cases, the degradation of complex hydrocarbon mixtures by a successional microflora containing temporally isolated populations of bacteria and fungi, was inadequately studied. GRA

N86-25067# Battelle Columbus Labs., Ohio.
AEROSOL BEHAVIOR MODELING. TASK 3: SUPPORT SERVICES FOR RESEARCH AND EVALUATION OF SEVERE ACCIDENT PHENOMENA AND MITIGATION
H. Jordan and V. Kogan Oct. 1985 75 p
(Contract NRC-04-84-127; Grant NRC FIN-B7499)
(TI86-900242; NUREG/cr-4388; BMI-2130) Avail: NTIS HC A04/MF A01
Synergistic modeling of containment atmosphere thermodynamics coupled to steam condensation (evaporation) on (from) wall and particles surfaces was examined. Since wall heat and mass transfer models on containment temperature and pressure were previously analyzed, the influence of steam supersaturation (steam condensation on particles) of wall surface transfer models was addressed. The CONTAIN code treatment of aerosol/thermodynamics coupling was rigorously checked. The QUICKM aerosol behavior code was modified as a reference code for much larger system codes. B.G.

N86-25068# Marine Environmental Sciences Consortium, Dauphin Island, Ala.
THE ECOLOGY OF IRREGULARLY FLOODED SALT MARSHES OF THE NORTHEASTERN GULF OF MEXICO: A COMMUNITY PROFILE
Judy P. Stout Dec. 1984 117 p
(TI86-900237; FWS-OBS-85(7.1)) Avail: NTIS HC A06/MF A01
A good deal of information is available on primary production rates and rates of carbon and mineral loss during in situ decay of aerial plant tissues of dominant species such as Juncus and Spartina alterniflora. Most other plant species are the subject of only one study at a single location along the gulf. Only preliminary data is available on belowground pools of materials, and the technology and methodology to assess the production component is still quite primitive. Mechanisms and forms of export or storage of primary production from marsh plants are poorly understood and existing information is at best variable, if not contradictory. Answers are needed to questions pertaining to detritus utilization and its impact on secondary production; the fate and turnover rate of the nutrients released in decomposition; the impact of meteorological, sedimendary, and geomorphological events on nutrient utilization and accretion; and nutrient translocation between shoots and roots prior to death and decomposition. Author

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-25069*# California Inst. of Tech., Pasadena. Seismological Lab.
DYNAMICALLY SUPPORTED GEOID HIGHS OVER HOTSPOTS: OBSERVATION AND THEORY
Mark A. Richards, Bradford Hager, H., and Norman H. Sleep (Stanford Univ., Calif.) 1986 93 p refs Sponsored in part by Sloan Foundation Fellowship
(Grants NAG5-315; NsG-7610)
(NASA-CR-176766; NAS 1.26:176766) Avail: NTIS HC A05/MF A01 CSCL 08G
Hotspots are associated with long wavelength geoid highs, an association that is even stronger when the geoid highs associated with subduction zones are removed. These associations are quantified by expanding the hotspot distribution in spherical harmonics and calculating correlation coefficients as a function of harmonic degree. The hotspot distribution spectrum is essentially white, with peaks at degrees 2 and 6. It is correlated positively with the slab residual geoid for degrees 2 to 6, with low seismic velocity in the lower mantle at degree 2, and with low seismic velocity in the upper mantle at degree 6. A variety of fluid mechanical models were tested for hotspots, including lithospheric delamination and hot plumes, by calculating their predicted dynamic geoid responses and comparing them to the observations. These models include the effects of temperature dependent rheology. The preferred hotspot model, based on observations of the geoid and seismic tomography, has plumes preferentially occurring in regions of large scale background temperature highs in a mantle with substantial viscosity increase with depth, although other models are possible. Author

N86-25070*# Polytechnic Inst. of New York, Farmingdale.
A MORPHOLOGICAL STUDY OF WAVES IN THE THERMOSPHERE USING DE-2 OBSERVATIONS Final Technical Report
Stanley H. Gross, Spencer P. Kuo, and Jerry Shmoys May 1986 57 p refs
(Grant NAG5-479)
(NASA-CR-176775; NAS 1.26:176775; POLY-MRI-1451-86) Avail: NTIS HC A04/MF A01 CSCL 04A
Theoretical model and data analysis of DE-2 observations for determining the correlation between the neutral wave activity and plasma irregularities have been presented. The relationships between the observed structure of the sources, precipitation and

joule heating, and the fluctuations in neutral and plasma parameters are obtained by analyzing two measurements of neutral atmospheric wave activity and plasma irregularities by DE-2 during perigee passes at an altitude on the order of 300 to 350 km over the polar cap. A theoretical model based on thermal nonlinearity (joule heating) to give mode-mode coupling is developed to explore the role of neutral disturbance (winds and gravity waves) on the generation of plasma irregularities. Author

N86-25071# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
PLASMA OBSERVATIONS IN THE AURORAL AND POLAR CAP REGION
Joseph F. Fennell 15 Dec. 1985 37 p refs
(Contract F04701-85-C-0086)
(AD-A163654; TR-0086(6940-05)-12; SD-TR-85-91) Avail: NTIS HC A03/MF A01 CSCL 04/1

An overview is given of the plasma conditions which obtain throughout much of the auroral region. It covers the diffuse and discrete auroral electron precipitation in the morning and evening oval, cusp, and polar cap. The ionospheric ion outflow throughout the high latitude regime is also described and related to the electron observations. GRA

N86-25072# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
ELECTRON PRECIPITATION PATTERNS IN THE VICINITY OF A VLF TRANSMITTER
Alfred L. Vampola 15 Dec. 1985 25 p refs
(Contract F04701-85-C-0086)
(AD-A163716; TR-0086(6940-05)-2; SD-TR-85-89) Avail: NTIS HC A02/MF A01 CSCL 04/1

Using high resolution pitch angle measurements made by a magnetic focusing electron spectrometer on the S3-3 satellite, angular distributions of 235 keV electrons precipitated by a ground-based VLF transmitter are compared with the pitch angle distributions that would be produced by various patterns of longitudinal interaction regions. The observed electrons are in the drift loss cone, necessitating the use of a trace-back-to-longitude-of-origin technique coupled with a two-dimensional convolution program describing the response of the electron spectrometer. The data are well-fit with both theoretical calculations of ionospheric field intensity patterns above a transmitter and with a similar pattern of received field intensities measured along a traverse in the conjugate region. The agreement between the data and field patterns implies a linear or quasi-linear wave-particle interaction. The energy-frequency relationship between the electrons and the waves implies an interaction region low on the magnetic field line, perhaps near or at the unperturbed mirror point. GRA

N86-25073# California Univ., Los Angeles. Center for Plasma Physics and Fusion Engineering.
MODIFICATION OF THE IONOSPHERIC ELECTRON VELOCITY DISTRIBUTION FUNCTION DUE TO RESONANT ABSORPTION OF HF WAVES
Merit Shoucri, G. J. Morales, and J. E. Maggs Dec. 1985 44 p
(Contract N00014-75-C-0476)
(AD-A163025; PPG-913) Avail: NTIS HC A03/MF A01 CSCL 04/1

The nonlinear modification of the electron distribution function caused by the interaction with a resonant electrostatic field is studied analytically using a perturbation analysis. This interaction produces tail heating, and for a range of parameter values, can form a bump in the distribution, which leads to emission of secondary waves. These results are applied to the ionosphere's F and upper E regions in the context of ionospheric modification experiments using ground-based powerful HF transmitters. Analogies between these results and experimental measurements are discussed. The purpose of the present work is to calculate the modification in the electron velocity distribution function resulting from the resonant excitation of electrostatic oscillations in the ionosphere. It is hoped that the analytic results may help illuminate some of the various experimentally observed phenomena, and perhaps suggest new experiments which would probe the nature of the electron acceleration mechanisms. GRA

N86-25074# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
A PLASMA WAVE INSTRUMENT ON THE AMPTE/IRM (ACTIVE MAGNETOSPHERIC PARTICLE TRACING EXPLORERS/ION RELEASE MODULE) SPACECRAFT Annual Letter Report, 1 Dec. 1984 - 30 Nov. 1985
30 Nov. 1985 5 p
(Contract N00014-82-K-0183)
(AD-A163048) Avail: NTIS HC A02/MF A01 CSCL 04/1

The primary purposes of the Active Magnetospheric Particle Tracing Explorers (AMPTE) program were: (1) to carry out the release and monitoring of lithium and barium ions in the solar wind and within the distant magnetosphere in order to study the access of solar wind ions to the magnetosphere, the convective-diffusive transport and energization of magnetospheric particles, and the instabilities and wave-particle interactions associated with the release and the subsequent evolution of the injected clouds; and (2) to generate massive release of barium in the dawn and dusk magnetosheath in order to create visible artificial comets in the flowing solar wind plasma within which studies of diamagnetic effects, ionization, momentum exchange, ion transport, and visible phenomena could be made. GRA

N86-25075# Duke Univ., Durham, N. C.
MOLECULAR ABSORPTION OF ATMOSPHERIC SPECIES Final Report, 7 May 1984 - 1 Sep. 1985
Frank C. DeLucia 17 Dec. 1985 14 p refs
(Contract DAAG29-84-K-0073)
(AD-A164024; ARO-21756.1-PH) Avail: NTIS HC A02/MF A01 CSCL 04/1

The propagation of microwaves and millimeterwaves through the disturbed atmosphere is affected by molecular absorption that can be significantly different than the absorption in the ambient atmosphere. This is due to two factors. First, the constituents of the ambient atmosphere will exhibit significantly different electromagnetic properties at elevated temperatures. Second, many additional species that are strong absorbers of microwaves, such as HNO3, HNO2, O3, NO2, H202, OH, and N20, are present in the disturbed atmosphere. This work addressed both of these issues. A preliminary version of a code that utilized the previously available molecular data base was written in a form that would be compatible with NORSE. This code was turned over to PRi (the keeper of the NORSE code) and is currently being integrated into it. In addition, measurements to 1000K were made on one transition of H20 as a check on the extrapolation to higher temperature that was used in this code. GRA

N86-25076# National Academy of Sciences - National Research Council, Washington, D. C.
EARTH SCIENCE INVESTIGATIONS IN THE UNITED STATES ANTARCTIC RESEARCH PROGRAM (USARP) FOR THE PERIOD JULY 1, 1984 - JUNE 30, 1985
1985 87 p Sponsored in part by the National Science Foundation, Washington, D.C.
(Grant NSF DPP-82-07098)
(PB86-143773) Avail: NTIS HC A05/MF A01 CSCL 08G

A listing of earth science research activities was conducted as part of the U.S. Antarctic Research Program for the year July 1, 1984, through June 30, 1985. Publications resulting from the research are also listed. Information was obtained by a survey of participants in the U.S. Antarctic Program, with respondents providing the data on their work in camera-ready format. GRA

N86-25077# Los Alamos National Lab., N. Mex.
MONTE CARLO SIMULATION OF TWO-PARTICLE RELATIVE DIFFUSION USING EULERIAN STATISTICS: EXTENDED ABSTRACT
J. T. Lee, G. L. Stone, R. E. Lawson, and M. Shipman Oct. 1985 8 p refs Sponsored in part by EPA, Research Triangle Park, N.C. Prepared in cooperation with Northrop Services, Inc., Research

Triangle Park, N.C.
(PB86-116548; EPA-600/D-85-231) Avail: NTIS
HC A02/MF A01 CSCL 04A

A Monte Carlo technique for the simulation of two-particle relative diffusion is developed using the Eulerian statistical properties of the turbulence. Numerical results are presented which clarify the role of interparticle velocity correlations and reveal the importance of an Eulerian parameter that is not present in Lagrangian theories of relative diffusion. Data on the absolute diffusion and meandering of a plume in a field of grid-generated wind tunnel turbulence are presented. These data are in agreement with the Monte Carlo simulations. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-25078*# Colorado Univ., Boulder. Cooperative Inst. for Res. in Environ. Studies.
EMPIRICAL AND MODELED SYNOPTIC CLOUD CLIMATOLOGY OF THE ARCTIC OCEAN Final Report
Roger G. Barry, J. P. Newell, A. Schweiger, and Robert G. Crane (Pennsylvania State Univ., State College) Apr. 1986 104 p refs (Grant NAG5-417)
(NASA-CR-176752; NAS 1.26:176752) Avail: NTIS
HC A06/MF A01 CSCL 04B

A set of cloud cover data were developed for the Arctic during the climatically important spring/early summer transition months. Parallel with the determination of mean monthly cloud conditions, data for different synoptic pressure patterns were also composited as a means of evaluating the role of synoptic variability on Arctic cloud regimes. In order to carry out this analysis, a synoptic classification scheme was developed for the Arctic using an objective typing procedure. A second major objective was to analyze model output of pressure fields and cloud parameters from a control run of the Goddard Institue for Space Studies climate model for the same area and to intercompare the synoptic climatatology of the model with that based on the observational data. B.G.

N86-25079# Naval Research Lab., Washington, D. C.
AN ASSESSMENT OF DATA QUALITY AND QUANTITY FROM AIRBORNE CLOUD PHYSICS PROJECTS FROM 1974 THROUGH 1984 Final Report, Apr. 1983 - Dec. 1984
Richard K. Jeck Dec. 1985 144 p refs
(Contract DTFA03-83-A-00309)
(DOT/FAA/CT-85/37; NRL-8951) Avail: NTIS HC A07/MF A01

Airborne cloud physics projects are reviewed to assess the quantity, quality, and availability of microphysical data from clouds above the freezing level. In particular, available information is analyzed to determine whether adequate data on supercooled liquid water content (SLWC) and snow currently exist for reliably characterizing aircraft icing conditions at altitudes up to 30,000 feet over the conterminous United States (CONUS). About 1700 flights in cold clouds over CONUS are documented, and the number and value of flights having data on SLWC, snow and other hydrometeors are tabulated. B.G.

N86-25080# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY FOR 1986
William M. Gray 29 May 1986 24 p refs Sponsored in part by NSF
Avail: NTIS HC A02/MF A01

Forecasting of tropical cyclone activity which might occur in the Atlantic Ocean region (including the Caribbean Sea and the Gulf of Mexico) in 1986 is discussed. Research relates seasonal activity to four factors: the El Nino; the Quasi-Biennial Oscillation of the equatorial stratospheric wind; Caribbean Basin and Gulf of Mexico sea level pressure anomaly; and lower latitude Caribbean Basin 200 mb zonal wind anomaly in June and July. A brief background description of the methodology of the forecasting scheme and verification information on the 1984 and 1985 seasons are also given. B.G.

N86-25081# Army Electronics Research and Development Command, White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
THE BEHAVIOR OF CLOUD DROPLETS IN AN ACOUSTIC FIELD: A NUMERICAL INVESTIGATION
Michael P. Foster Aug. 1985 107 p refs
(AD-A163704; ERADCOM/ASL-TR-0181) Avail: NTIS
HC A06/MF A01 CSCL 04/2

The theory and practice of acoustic agglomeration have been evolving steadily including advances in fields such as pollution control using the principles of acoustic agglomeration. With respect to the field of meteorology, there have been attempts in the past to modify atmospheric fogs using intense acoustic energy. These efforts enjoyed only mixed success and were abandoned. However, the theory of acoustic agglomeration suggests that clouds with higher liquid water contents and greater number concentrations than fogs may be more sensitive to acoustic waves and may undergo significant changes in their spectra when acoustic energy is propagated through them. Thus, the application of the principles of acoustic agglomeration to the study of atmospheric phenomena may provide insight to the effect of thunder on cloud and precipitation processes as well as providing the basis for a new technology in weather modification. In this thesis the theory of acoustic agglomeration is described and a one-droplet model is developed to study the effects of acoustic waves on cloud droplets. A stochastic model used to predict changes in cloud droplet spectra due to gravitational sedimentation is modified to simulate the application of acoustic energy to various cloud volumes. The results are discussed and suggestions are made for further study of the phenomenon. GRA

N86-25082# Naval Postgraduate School, Monterey, Calif.
EVALUATION OF NOGAPS 2.1 (NAVY OPERATIONAL GLOBAL ATMOSPHERIC PREDICTION SYSTEM 2.1) SYSTEMATIC ERROR - WINTER 1983 - 1984
James S. Boyle and Carlyle H. Wash Nov. 1985 74 p refs
(AD-A163812; NPS63-85-002) Avail: NTIS HC A04/MF A01
CSCL 04/2

An evaluation of the systematic error of the Navy Operational Global Atmospheric Prediction System (NOGAPS 2.1) for the winter of 1983 to 1984 is given. The systematic error is just the mean of the forecast error. The error is the difference between the NOGAPS forecast and the NOGAPS analysis at verification time. The fields examined are the 9235, 500 and 250 mb heights, the 925 and 250 mb winds, the 925-500 mb thickness and sea-level pressure. The forecasts are those started on the 0000 GMT watch for 120 h and are evaluated at intervals of 24 hours. The error and analysis fields are also fourier decomposed along latitude circles to ascertain the scale structure of the errors. In addition, anomaly correlations and root mean square error are computed over various latitude bands to provide an overview of the model performance. GRA

N86-25083# SRI International Corp., Menlo Park, Calif.
A MODEL OF AIRFLOW AND DIFFUSION IN COMPLEX TERRAIN (MADICT)
F. L. Ludwig Nov. 1985 172 p refs
(Contract DAAG29-83-K-0009)
(AD-A163819; ARO-19630.5-GS) Avail: NTIS HC A08/MF A01
CSCL 04/2

A model of transport and diffusion during time- and space-varying meteorological conditions is described, along with relevant supporting theory. The model calculates 3-dimensional wind fields in complex terrain from limited observational input. Superposition of previously calculated mass-conserving wind field solutions is used to keep the required calculations to a minimum. Limited discussions of the required wind calculations are included, along with listings of applicable computer codes. The transport and diffusion module uses puffs to simulate continuous plume behavior.

Techniques are described for minimizing the required calculations. The report includes complete user instructions, a FORTRAN77 computer code and two sample problems for the transport and diffusion model. GRA

N86-25084# Naval Postgraduate School, Monterey, Calif.
SATELLITE CLOUD AND PRECIPITATION ANALYSIS USING A MINICOMPUTER Technical Report, Oct. 1983 - Oct. 1985
Carlyle H. Wash, Laura A. Spray, and Lang C. Chou Nov. 1985 94 p refs
(AD-A163821; NPS63-85-003) Avail: NTIS HC A05/MF A01 CSCL 04/2

A satellite-derived cloud and precipitation analysis program has been developed for an interactive mini-computer system. The program utilizes geostationary infrared and visual data with operational upper air and surface temperature analyses to specify cloud-type, cloud amount, cloud-top temperature, cloud-top height and estimated precipitation intensity. Five cases of GOES-East data (2 x 2 n mi visual and 2 x 4 n mi infrared) for an approximately 1600 x 1600 n mi area over the eastern United States and western North Atlantic Ocean are used in evaluating the model's performance. Each satellite-derived, cloud and precipitation analysis is evaluated subjectively, using conventional synoptic data, radar measurements and manual nephanalysis for verification, and objectively using surface synoptic observations for verification. Successful estimates of cloud amount for overcast and clear skies were obtained; however, broken and scattered conditions were underestimated. The majority of stratiform cloud types and multi-layered clouds were analyzed correctly by the model. Classification errors occurred with cumuliform clouds and thin cirrus. Reasonable precipitation intensity and cloud-top temperature/height analyses were produced by the NPS model. GRA

N86-25085# Jackson State Univ., Miss.
DIAGNOSTIC STUDY OF ATMOSPHERE-TERRAIN INTERACTION LEADING TO THE FORMATION OF DUST CLOUDS AND POOR VISIBILITIES OVER THE NEAR EAST DESERT AREAS Final Report, 24 May 1982 - 31 Oct. 1985
Pieter J. Feteris 30 Sep. 1985 23 p refs
(Grant DAAG29-82-G-0110)
(AD-A163891; ARO-19612.1-GS-H) Avail: NTIS HC A02/MF A01 CSCL 04/2

To compare the frequency of occurrence of poor visibilities in areas and during periods of intense agricultural, industrial and military activity with that in sparsely populated areas unaffected by war and military maneuvers, three years of surface reports from 850 stations in the Near East and adjacent North Africa were screened for visibilities coded as 90 through 95 and 9 through 10. Seasonal maps of the locations of stations reporting poor visibilities, a calendar of poor visibility for each station and maps of the distribution of those stations reporting fog rain, fog/snow/drifting snow and sand/dust were prepared for most of the three year period. Only the most reliable and important results are shown. In mountainous regions poor visibilities occurred frequently all year round. Low frequencies of poor visibility reports were found in Eastern Tunesia, Western Lybia, West Africa and the Sudan. GRA

N86-25086# Naval Postgraduate School, Monterey, Calif.
APPLICATIONS OF WIND EMPIRICAL ORTHOGONAL FUNCTIONS IN TROPICAL CYCLONE MOTION STUDIES M.S. Thesis
Thomas B. Schott Dec. 1985 100 p refs
(AD-A164170; AD-E750890) Avail: NTIS HC A05/MF A01 CSCL 04/2

An empirical orthogonal function (EOF) analysis is used to represent environmental wind fields associated with selected western North Pacific tropical cyclones from 1979 to 1983. Composite synoptic patterns within five past-motion categories of cyclones are studied using 5, 10, 20 and 35 EOF modes. Significant differences in the composite fields are found between categories, which suggests that the wind EOFs are capable of representing synoptic patterns associated with tropical cyclone motion. Regression equations are developed to postprocess the forecast track of the One-way Tropical Cyclone Model (OTCM). The predictors for the regression analysis include the EOF coefficients, past motion, storm position, date, intensity, backward extrapolation and forward track displacements. For the dependent sample, the mean 72-h track forecast error for the modified OTCM is 383 km, which represents a 210 km improvement relative to the unmodified OTCM. Thus, the regression scheme has great potential for operational application. Author (GRA)

N86-25087# Oregon Graduate Center for Study and Research, Beaverton.
REMOTE SENSING OF ATMOSPHERIC WINDS BY UTILIZING SPECKLE-TURBULENCE INTERACTION AND OPTICAL HETERODYNE DETECTION Final Report, 1 Jun. 1983 - 30 Sep. 1985
J. F. Holmes and V. S. R. Gudimetla 21 Nov. 1985 59 p refs
(Contract DAAG29-83-K-0077)
(AD-A164187; ARO-20218.2-GS) Avail: NTIS HC A04/MF A01 CSCL 04/2

Speckle turbulence interaction has the potential for allowing single ended remote sensing of the path averaged vector crosswind in a plane perpendicular to the line of sight to a target. If a laser transmitter is used to illuminate a target, the resultant speckle field generated by the target is randomly perturbed by the atmospheric turbulence as it propagates back to the location of the transmitter-receiver. When a crosswind is present, this scintillation pattern will move with time across the receiver aperture; and consequently, the time delayed statistics of the speckle field at the receiver are dependent on the crosswind velocity. A continuous wave laser transmitter of modest power level (a watt or two) in conjunction with optical heterodyne detection has been used to exploit the speckle-turbulence interaction and measure the crosswind. The use of a CW transmitter at 10.6 microns and optical heterodyne detection has many advantages over direct detection and a double pulsed source in the visible or near infrared. These advantages include the availability of compact, reliable and inexpensive transmitters; better penetration of smoke, dust and fog; stable output power; low beam pointing jitter; and considerably reduced complexity in the receiver electronics. In addition, with a CW transmitter, options exist for processing the received signals for the crosswind that do not require a knowledge of the strength of turbulence. GRA

N86-25088# National Oceanic and Atmospheric Administration, Washington, D. C. National Environ. Satellite, Data and Info. Svc.
MARINERS WEATHER LOG, VOLUME 29, NUMBER 4, FALL 1985
1985 71 p
(PB86-142072) Avail: NTIS HC A04/MF A01 CSCL 04B

A mariner's weather log is presented. Topics include: (1) genesis of Atlantic lows experiment; (2) Western North Pacific typhoons, 1984; (3) North Indian Ocean tropical cyclones, 1984; (4) central North Pacific tropical cyclones,1984; (5) marine observations program; (6) tips to the radio officer; and (7) marine weather review for April, May, and June, 1985. GRA

N86-25089# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Natural Disasters.
LOS ANGELES, CALIFORNIA TORNADO OF MARCH 1, 1983
1985 50 p
(Grants NSF CEE-82-19358; NSF CEE-84-13362)
(PB86-141991; CETS-CND-024) Avail: NTIS HC A03/MF A01 CSCL 04B

The March 1, 1983, downtown metropolitan area of Los Angeles tornado is discussed. The path of the tornado moved in approximately a south to north direction and passed within a quarter mile of major highrise buildings. Due to the lack of historical tornadoes in the area and the absence of the typical meteorological events preceeding a midwestern tornado, the National Weather Service did not issue a tornado watch. The meteorological situation before and after the tornado is summarized, the observed structural damage to buildings and lifelines are discussed, and the emergency

planning and preparedness for such an event in the City of Los Angeles are examined. GRA

N86-25090# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-NOVEMBER TO MID-DECEMBER 1985, VOLUME 39, NUMBER 22, NOVEMBER 14, 1985
14 Nov. 1985 10 p
(PB86-128097) Avail: NTIS HC A02/MF A01 CSCL 04B
Temperature and precipitation probabilities for the Northern Hemisphere are given on a periodic and seasonal basis. GRA

N86-25091# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-DECEMBER 1985 TO MID-JANUARY 1986, VOLUME 39, NUMBER 24, DECEMBER 14, 1985
14 Dec. 1985 10 p
(PB86-142262) Avail: NTIS HC A02/MF A01 CSCL 04B
Precipitation and temperature probabilities are presented for the Northern Hemisphere on a periodic and seasonal basis. GRA

N86-25092# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR JANUARY 1986, VOLUME 40, NUMBER 1, DECEMBER 31, 1985
31 Dec. 1985 10 p
(PB86-142270) Avail: NTIS HC A02/MF A01 CSCL 04B
Temperature and precipitation probabilities are given for the Northern Hemisphere on a periodic and seasonal basis. GRA

N86-25093# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-JANUARY TO MID-FEBRUARY 1986, VOLUME 40, NUMBER 2, JANUARY 14, 1986
14 Jan. 1986 10 p
(PB86-145828) Avail: NTIS HC A02/MF A01 CSCL 04B
The report gives temperature and precipitation probabilities for the Northern Hemisphere on a periodic and seasonal basis. GRA

N86-25094# National Weather Service, Fort Worth, Tex.
NATIONAL WEATHER SERVICE (NWS) SOUTHERN REGION QPF (QUANTITATIVE PRECIPITATION FORECASTING) WORKSHOP
Apr. 1985 120 p Workshop held in San Antonio, Tex., 28-30 Jan. 1985
(PB85-199164; NOAA-TM-NWS-SR-112) Avail: NTIS HC A06/MF A01 CSCL 04B
This Technical Memorandum and the workshop it summarizes, marks a milestone in Quantitative Precipitation Forecasting (QPF). Although a national QPF program has existed for many years, field forecasters in the late 1970's recognized the need to develop localized QPF techniques to enhance national products and improve local forecast and warning services. The initial emphasis appears to have begun at WSFO Lubbock because of unique terrain, data void problems, and hydrological and meteorological responsibilities along the international river boundary, the Rio Grande. The success of the program and the relocation of some of the originators of the Lubbock QPF program opened opportunities to expand the effort. Author

N86-25095# National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
GEOPHYSICAL FLUID DYNAMICS LABORATORY ACTIVITIES FY 1985, PLANS FY 1986
Sep. 1985 178 p
(PB86-113545) Avail: NTIS HC A09/MF A01 CSCL 04B
A summary of the work accomplished at the Geophysical Fluid Dynamics Laboratory (GFDL) and the near future direction of research plans are given. The major research areas that correspond to NOAA's mission in oceanography and meteorology which include weather service; climate; atmospheric quality; marine quality; and ocean service are discussed. Goals, recent achievements and future plans for climate dynamics, middle atmosphere dynamics and chemistry, experimental prediction, oceanic circulation, planetary circulations, observational studies, hurricane dynamics, mesoscale dynamics, and convection and turbulence are discussed. GRA

N86-25096# National Center for Atmospheric Research, Boulder, Colo.
CLIMATE SENSITIVITY OF A NUMERICAL MODEL OF ICE-SHEET DYNAMICS AND THERMODYNAMICS Ph.D. Thesis
B. H. Hanson 1985 205 p Prepared in cooperation with Minnesota Univ., Minneapolis
(Grant NSF ATM-82-17015)
(PB86-119617; NCAR/CT-91) Avail: NTIS HC A10/MF A01 CSCL 08L
The climate of the Earth is a complex of interacting parts, of which ice sheets vary most slowly. Ice sheets have been coupled to climate only in the simplest models because of the great differences in the time scales of their responses, and because the models previously used for ice sheets have had limited physical capabilities in their responses to climatic influences. A finite-element model developed here responds realistically to climatic forcing. The model uses the method of weighted residuals to solve the general equations for steady motion of a nonlinear viscous medium and for energy conservation with forced advection, internally generated heat, and diffusion in a two-dimensional, vertical flow-plane. A number of experiments using the finite-element simulated a flowplane on the south dome of Barnes Ice Cap on Baffin Island. Shear stresses play the major role in the stress balance. GRA

N86-25097 Washington Univ., Seattle.
A ONE-LEVEL MESOSCALE MODEL FOR DIAGNOSING SURFACE WINDS IN MOUNTAINOUS AND COASTAL REGIONS Ph.D. Thesis
David Prescott Dempsey 1985 199 p
Avail: Univ. Microfilms Order No. DA8529897
A one-level mesoscale model (Mesmod) for diagnosing surface winds in complex terrain was developed. Mesmod explicitly solves momentum and temperature tendency equations in pressure-sigma coordinates only at the surface. Under the hydrostatic assumption, the vertically-integrated temperature profile determines the surface pressure. Mesmod parameterizes friction, subgrid-scale horizontal diffusion, and diabatic heating/cooling. Mesmod is integrated from an initially unbalanced state to a nearly steady state without diabatic forcing, and is then integrated, driven by a specified, time-dependent diabatic heating or cooling term. At internal Froude numbers Mesmod approximately reproduces the surface pressure pattern normally associated with gravity waves in flow past three-dimensional topography. Mesmod shows that rotation and nonlinear advection can create a line of convergence downstream of isolated, mesoscale mountains. Mesmod reproduces pronounced lines of convergence observed in three of the cases downwind of the Olympic Mts., an isolated mesoscale mountain range. Dissert. Abstr.

N86-25098 Colorado Univ., Boulder.
A DIAGNOSTIC ANALYSIS OF THE PYRENEES LEE WAVE EVENT OF 21-23 MARCH 1982 Ph.D. Thesis
Karl William Cox 1985 192 p
Avail: Univ. Microfilms Order No. DA8528472
Synoptic and instrumented aircraft data, obtained during the Alpine Experiment (ALPEX) of the Global Atmospheric Research Program, for the 21 to 23 March 1982 lee wave event that occurred in northerly flow over the Pyrenees were analyzed. It is indicated that a vertically propagating mountain wave was present above the Pyrenees ridge, with partially trapped lee waves extending downstream and exhibiting a slight three-dimensionality. Analysis of this event is supplemented by use of model calculations. Scorer's model of two-dimensional, inviscid, steady-state flow over a mountain ridge is adopted, while a continuous variation in the vertical atmospheric structure is retained. The actual topography

is employed, and low-level blocking of the airstream on the windward side of the Pyrenees are considered in the lower boundary condition. The diagnostic model captures the low-level trapped wave response on 21 March, but the horizontal wavelength is slightly underestimated when condensation effects are neglected. The model indicates that strongly trapped lee waves probably persisted through 22 March, evolving to the observed pattern of partially trapped waves on 23 March as a result of a decrease in the northerly wind speed in the middle and upper troposphere. The results of an analysis of synoptic and instrumented aircraft data, obtained during the model derived estimates of the vertical flux of horizontal momentum are provided for each day of this event. Dissert. Abstr.

N86-25099# Geological Survey, Reston, Va.
REMOTE MONITORING OF PROCESSES THAT SHAPE DESERT SURFACES: THE DESERT WINDS PROJECT
J. F. McCauley, C. S. Breed, P. J. Helm, G. H. Billingsley, D. J. MacKinnon, M. J. Grolier, and C. K. McCauley (Museum of Northern Arizona, Flagstaff) 1985 23 p refs
(TI86-900108; USGS-BULL-1634; LC-84-601115) Avail: NTIS HC A02/MF A01

Investigations of wind as a geologic agent have been hampered by a scarcity of long-term onsite measurements of wind velocity (including peak gusts, direction, and periodicity), precipitation frequency and intensity, relative humidity, and soil and air temperatures in key desert localities. A new long-term study, using data obtained by meteorologic and geologic sensors coupled to nonattended solar-powered data-collector platforms is described. Data obtained from these geometeorologic (Geomet) stations in desert type areas of Arizona are automatically relayed by the Geostationary Operational Environmental Satellite (GOES) to the U.S. Geological survey in Flagstaff, Ariz., in real time, and converted to graphic form. Preliminary computer analysis of the data indicates strikingly different meteorologic patterns that control, in great part, the local surficial geology of different desert areas. Author

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-25100*# Applied Science Associates, Inc., Apex, N.C.
STUDIES RELATED TO OCEAN DYNAMICS. TASK 3.2: AIRCRAFT FIELD TEST PROGRAM TO INVESTIGATE THE ABILITY OF REMOTE SENSING METHODS TO MEASURE CURRENT/WIND-WAVE INTERACTIONS Final Report
N. E. Huang, W. A. Flood, and G. S. Brown May 1975 74 p refs
(Contract NAS6-2520)
(NASA-CR-168349; NAS 1.26:168439) Avail: NTIS HC A04/MF A01 CSCL 08C

The feasibility of remote sensing of current flows in the ocean and the remote sensing of ocean currents by backscattering cross section techniques was studied. It was established that for capillary waves, small scale currents could be accurately measured through observation of wave kinematics. Drastic modifications of waves by changing currents were noted. The development of new methods for the measurement of capillary waves are discussed. Improvement methods to resolve data processing problems are suggested. E.A.K.

N86-25101# California Univ., Santa Cruz.
PHYSICAL OCEANOGRAPHIC DATA MARGINAL ICE ZONE EXPERIMENT R/V POLAR QUEEN, JUNE-JULY 1984 Final Report
Theodore D. Foster, Bruce S. McNamara, T. M. Bandurraga, and Eric G. Eckert 30 Dec 1985 170 p refs
(Contract N00014-84-K-0144)
(AD-A163591) Avail: NTIS HC A08/MF A01 CSCL 08/12

This report contains temperature and salinity profiles taken from the R/V POLAR QUEEN in the nothern Greenland Sea during the Marginal Ice Zone Experiment in June and July 1984. These data were obtained with a Neil Brown Mark III CTD about once a day while the ship was moored to ice floes and drifting. GRA

N86-25102# Woods Hole Oceanographic Institution, Mass.
CURRENT VARIABILITY NEAR THE SOUTHEAST NEWFOUNDLAND RIDGE
N. P. Fofonoff and R. M. Hendry Jul. 1985 25 p refs
(Contract N00014-76-C-0197)
(AD-A163644; WHOI-CONTRIB-5593) Avail: NTIS HC A02/MF A01 CSCL 08/3

A cooperative moored array experiment measured currents and temperatures in the vicinity of the Southeast Newfoundland Ridge over a 14 month period. Measurements were obtained from an incoherent exploratory array of nine moorings instrumented at 500, 800, 1500 and 4000 m levels. The objectives were to explore the amplitude, spatial variability and time scales of the eddy field in the decay region of the Gulf Stream. An additional experiment to examine the influx of Norwegian Sea overflow water into the western North Atlantic Basin was imbedded in the array. Supplementary CTD and XBT profiles and a single current profile were taken during deployment and recovery cruises to aid in interpretation of the moored measurements and identification of water masses. Mean velocities were weak compared with rms eddy velocities and were not determined with statistical significance at many locations. Maximum daily-averaged speeds ranged from 0.3 to 0.6 m/s at 500 m and 0.09 to 0.3 m/s at 4000 m. Eddy kinetic energies at 500 m ranged from 0.034 J/kg near the ridge to 0.005 J/kg in the southeastern corner of the array. Deep energies were reduced by a factor of 4 to 12 with the 4000 m level showing bottom intensification at most locations. Topographic effects were noted in the orientation of eddy velocities and reduction of low-frequency components near the Ridge. The eddy field showed no clear-cut evidence of wavelike propagation of advection in streamfunction plots. GRA

N86-25103# Woods Hole Oceanographic Institution, Mass.
A COMPILATION OF MOORED CURRENT METER AND WIND RECORDER DATA. VOLUME 38. LONG-TERM UPPER OCEAN STUDY (LOTUS) (MOORINGS 787, 788, 789, 790, 792), APRIL 1983 - MAY 1984
Susan A. Tarbell, Ellyn T. Montgomery, and Melbourne G. Briscoe Dec. 1985 167 p refs
(Contracts N00014-76-C-0197; N00014-84-C-0134)
(AD-A163897; WHOI-85-39) Avail: NTIS HC A08/MF A01 CSCL 08/3

The Long-Term Upper Ocean Study (LOTUS) was a two-year field experiment near 34 deg N 70 deg W designed to acquire a continuous set of measurements of currents and temperatures in the upper, open ocean together with local hydrography meteorology, and mesoscale oceanographic features. The first scientific moorings were deployed in May 1982. The first year of mooring data from May 1982 to April 1983 is presented by Tarbell, Pennington and Briscoe (1984 W.H.O.I. Tech. Rept. 84-36). The second year of mooring data, from April 1983 to May 1984, when the final mooring recovery occurred, is presented here. GRA

N86-25104# Hawaii Inst. of Geophysics, Honolulu.
MONTHLY MAPS OF SEA LEVEL ANOMALIES IN THE PACIFIC, 1975-1981. REPORT ON THE IGOSS (INTEGRATED GLOBAL OCEAN SERVICES SYSTEM) SEA LEVEL PILOT PROJECT
Klaus Wyrtki and Shikiko Nakahara Aug. 1984 96 p
(Grant NA80RA-H-00002)
(AD-A163061; HIG-84-3; JIMAR-84-0085) Avail: NTIS HC A05/MF A01 CSCL 08/3

Sea level data obtained on islands in the tropical and subtropical Pacific Ocean are used to compile maps of the sea level anomaly for each month of the period January 1975 to December 1981. The maps reveal the large horizontal coherence of sea level anomalies with space scales of several thousand kilometers. Coherence scales are larger in the east-west than in the north-south

direction. The anomalies are also coherent over many months indicating a dominance of low-frequency variations. GRA

N86-25105# Texas A&M Univ., College Station. Ocean Engineering Program.
NONPARAMETRIC AND PARAMETRIC ESTIMATION OF WAVE STATISTICS AND SPECTRA
H. Yamazaki and J. B. Herbich Oct. 1985 189 p refs Sponsored in part by NOAA, Rockville, Md.
(Grant NA83AA-D-00061)
(PB86-141967; COE-279; TAMU-SG-86-202) Avail: NTIS HC A09/MF A01 CSCL 08C

A nonparametric bivariate density estimation technique is developed employing tensor product B-splines to provide a concise wave data summary. Most of the existing nonparametric techniques involve a certain level of subjectivity in the choice of smoothing parameters. A criterion based on the least squares concept is proposed to remove the subjective choice of smoothing parameters. An alternative spectral estimation procedure is proposed. The alternative spectrum is the second moment of the wave height of the joint probability density function (pdf) in terms of the frequency domain, and is named the PDF spectra. The nonparametric joint pdf provides a concise representation of long-term wave data from which one can obtain not only the usual wave statistics, but the wave spectra as well. That is, the wave spectrum is simply a subset statistical function contained in the bivariate pdf for wave height and period. GRA

N86-25106# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
MANAGEMENT INFORMATION (WAVE PROPAGATION LABORATORY, BOULDER, COLORADO)
Oct. 1985 50 p
(PB86-139524) Avail: NTIS HC A03/MF A01 CSCL 08C

The nation's geophysical research and service is to be improved through creation and application of new remote measurement systems. Essential functions include: Wave propagation studies; Technique development; Atmospheric and Oceanic research; Technology transfer. GRA

N86-25107 State Univ. of New York, Stony Brook.
ON STRATIFICATION AND WIND-INDUCED MIXING IN THE CHESAPEAKE BAY Ph.D. Thesis
David Milliken Goodrich 1985 148 p
Avail: Univ. Microfilms Order No. DA8527473

Seasonal stratification in Chesapeake Bay is analyzed using multiyear time series of salinity and velocity from moored current meter arrays. In the mid-Bay region, the fall-winter period is characterized by wind induced destratification events followed by rapid restratification. In spring, a stable pycnocline is established. In early fall, surface cooling causes a temperature inversion which reduces the vertical density gradient by about 20%, destratification then occurs during strong wind events that generally occur in late September. Wind-induced mixing is neither local nor confined to surface waters. A homogeneous water column persisted during a one month period for at least one of these stations. The mechanism of wind-induced destratification in the mid-Bay region is associated with the generation of internal velocity shear. Following mixing, frictional coupling of surface and bottom water is increased and internal shear is reduced. Wind over a stratified water column generates flow response which is depth dependent. When the water column is well mixed, both surface and bottom water are frictionally coupled to the wind, and response to wind is depth-independent. Locally and nonlocally forced transport through the Bay entrance is shown to cause large subtidal variability in salinity. Dissert. Abstr.

N86-25108 Washington Univ., Seattle.
NEAR-INERTIAL WAVE PROPAGATION IN GEOSTROPHIC SHEAR Ph.D. Thesis
Eric L. Kunze 1985 102 p
Avail: Univ. Microfilms Order No. DA8529918

Near-inertial and geostrophic motions have similar horizontal scales in the ocean. This implies that interaction terms involving mean flow shear of the form (v x nabla (V)) as well as the mean flow itself (v x nabla (v)) must be retained in the equations of motion. An approximate dispersion relation for near-inertial internal waves propagating in geostrophic shear is formulated that includes straining by the mean flow shear. Under these conditions, the geostrophic vorticity zeta shifts the lower bond of the internal waveband from the planetary value of the Coriolis frequency f to an effective Coriolis frequency f sub eff = f + zeta/2. A ray tracing approach is adopted to examine the propagation behavior of near-inertial waves in a model geostrophic jet. Trapping and critical-layer amplification are found to occur in regions of negative vorticity where a near-inertial wave's intrinsic frequency omega sub 0 can be less than the effective Coriolis frequency of the surrounding ocean. Waves that are not trapped are focussed into tight beams as they leave the jet. Observations confirm these predictions. Intense downward-propagating near-inertial waves have been observed as the base of upper ocean negative vorticity in the North Pacific Subtropical Front, warm-core rings, a Gulf Stream cold-core ring and an anticyclonic eddy in the Sargasso Sea. Dissert. Abstr.

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-25109# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 5 Final Report
Lydia Razran Hooke, ed., Mike Radtke, ed., Victoria Garshnek, ed., Ronald Teeter, ed., and Joseph E. Rowe, ed. (Library of Congress, Washington, D.C.) Washington NASA Apr. 1986 119 p
(Contract NASw-3676)
(NASA-CR-3922(05); NAS 1.26:3922(05)) Avail: NTIS HC A06/MF A01 CSCL 06C

This is the fifth issue of NASA's USSR Space Life Sciences Digest. It contains abstracts of 37 papers recently published in Russian language periodicals and bound collections and of 11 new Soviet monographs. Selected abstracts are illustrated with figures and tables from the original. Additional features include a translated interview, a book review and a conference description and abstracts or titles of relevant Soviet papers presented in English at international conferences. The materials covered in this issue have been identified as relevant to 26 areas of aerospace medicine and space biology. These areas are biological rhythms, biospherics, body fluids, botany, cardiovascular and respiratory systems, endocrinology, exobiology, genetics, group dynamics, habitability and environment effects, health and medical treatment, hematology, human performance, immunology, mathematical modeling, metabolism, microbiology, morphology and cytology, musculoskeletal system, neurophysiological, nutrition, perception, personnel selection, psychology, and radiobiology. Author

N86-25110# Army Research Inst. of Environmental Medicine, Natick, Mass.
RESEARCH ANIMAL STANCHION AND TRANSPORTER
Vincent A. Fore, Jr. and William A. Sawyer Jan. 1986 16 p refs
(AD-A163907; USARIEM-M-12/86) Avail: NTIS HC A02/MF A01 CSCL 06/3

A stanchion has been designed to restrain mid-size laboratory animals such as goats, dogs, and pigs while performing respiratory and surgical procedures. The restraint device permits control of the animal during induction and recovery from general anesthesia, provides transportation between locations, and constrains the animal during surgery without the need of a shackle device. GRA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-25111 National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 284)
May 1986 59 p
(NASA-SP-7011(284); NAS 1.21:7011(284)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 148 reports, articles, and other documents introduced into the NASA scientific and technical information system in April 1986. Author

N86-25112# Norwegian Defence Research Establishment, Kjeller. Forsvarets Forskningsinstitutt.
CHEMICALLY INDUCED DAMAGE TO THE HIPPOCAMPAL FORMATION
Liv Unni Naalsund May 1986 91 p refs Sponsored in cooperation with the Royal Norwegian Council for Scientific and Industrial Research
(NDRE/PUBL-86/1002; ISSN-0800-4412) Avail: NTIS HC A05/MF A01

Degeneration of the hippocampal formation after trimethyltin (TMT) administration can be detected at an early phase by electric recordings from intrahippocampal electrodes. The anatomical distribution of the damage can be studied by histochemistry, and was shown to include the CA3 and CA4 subfields in the initial period and spreading to the CA1 after a complete destruction of the pyramidal cells in CA3 and CA4. The degeneration was shown to be specific for glutamergic neurons in the hippocampus, high affinity uptake of [3H] glutamate being the only biochemical parameter which was changed. In vitro TMT increased the efflux of [3H] glutamate from synaptosomes in the resting state, but had no effect on the efflux of [3H] GABA. The synaptosomal reuptake of transmitter and receptor binding were both inhibited in the presence of TMT. In relation to reports on TMT as an anion conductor, the effect of changes in extracellular Cl(-) concentration on transmitter release was investigated. A reduction in the external Cl(-) concentration was shown to have a much larger effect on the efflux of transmitter from glutamergic than from GABAergic synaptosomes. The sensitivity of the hippocampal electric activity to changes after exposure to toxic compounds was utilized for the investigation of a put active neurotoxic effect of long term exposure to low levels of toluene. An increased synchronization together with an increased frequency in the theta waves was observed during the first period of toluene exposure. The later phase was characterized by a gradually increasing disruption in regular waves and a reduction in the theta frequency. No improvements regarding regularity or frequency was seen during one month after termination of exposure, indicating that irreversible changes in neuronal functions have occurred. Author

N86-25113# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
A REVIEW OF THE PILOT BACKACHE PROBLEM IN THE CH113 LABRADOR HELICOPTER
A. Beach Dec. 1985 26 p refs
(AD-A164011; DCIEM-85-R-49) Avail: NTIS HC A03/MF A01 CSCL 06/19

In response to an Unsatisfactory Condition Report, complaints of back pain and discomfort induced by the pilots' seat of the CH113 Labrador helicopter were investigated. Several published reports dealing with the problem are reviewed and summarized in terms of incidence and prevalence rates, frequency, intensity, duration, location and time to pain onset. A questionnaire was developed and distributed to CH113 Labrador helicopter pilots in order to determine how closely the backache characteristics of the pilots match the characteristics reported by the general population. In addition, an evaluation of the size and shape of the Labrador seat was conducted and results were compared to published seat design guidelines and recommendations. Questionnaire results indicate that the typical backache reported by Labrador pilots is similar to the backache reported by other helicopter pilots. It is usually a dull pain in the lumbar area, most often experienced during flight and usually lasting after the mission ends. Subjective results also indicate that backache may be negatively correlated with regular exercise. Based on the symptoms identified in the questionnaire and the causes identified by other investigators, design principles for an improved seat incorporating an inflatable lumbar support and a more effective load bearing seat cushion were established. GRA

N86-25114# Toronto Univ., Downsview (Ontario). Defence and Civil Inst. of Environmental Medicine.
REVIEW OF MODIFIED HEMOGLOBIN SOLUTIONS FOR USE AS TEMPORARY BLOOD SUBSTITUTES
Lucjan J. J. Hronowski Dec. 1985 31 p refs
(AD-A164210; DCIEM-85-R-51) Avail: NTIS HC A03/MF A01 CSCL 06/15

The present review will focus on blood substitutes using hemoglobin solutions as oxygen carriers. It will review the more recent developments and discuss the limitations and problems associated with the present hemoglobin preparations. This will be covered under the headings of purification of hemoglobin, modification and polymerization of the hemoglobin molecule and the biological activities of the hemoglobin solutions. Polymerization of hemoglobin is currently the only means of obtaining a physiological concentration of hemoglobin which is iso-oncotic with plasma. Polymerized pyridoxylated hemoglobin is currently the most widely used example of such an iso-oncotic hemoglobin solution having normal oxygen carrying capacity. Such solutions, however, are heterogeneous polydispersed mixtures of widely different molecular weight. In addition, these solutions still contain about 20% of the unpolymerized tetramer which is rapidly eliminated in the urine. These solutions also have oxygen affinities which are considerably higher than those found in the red blood cells. In addition to their effectiveness, the hemoglobin solutions must be shown to be safe. Safety studies on the polymerized and modified homoglobin solutions must address issues such as hematological responses, vasoactive ef fects, effect on the reticuloendothelial system, effect on immunocompetence, antigenicity, nephrotoxicity, and iron toxicity. GRA

N86-25115# California Univ., Irvine.
MULTIDISCIPLINARY STUDIES ON EXCITATORY AMINO ACIDS AS TRANSMITTERS IN THE BRAIN Final Report, 27 Sep. 1982 - 26 Sep. 1985
Carl W. Cotman 7 Nov. 1985 9 p refs
(Contract DAAG29-82-K-0194)
(AD-A164258; ARO-19016.14-LS) Avail: NTIS HC A02/MF A01 CSCL 06/1

The major goal has been to analyze the excitatory amino acid receptors in the brain, particularly those mediating responses by glutamate and aspartate. Acidic amino acids, principally L-glutamate and L-aspartate, appear to be the major excitatory transmitters in the CNS. As such, these molecules may be the most abundant CNS neurotransmitter class. L-Glutamate shows many of the characteristics of other neurotransmitters. Glutamate is present in high levels in the brain and is relatively enriched in select neurons. Transmitter glutamate is supplied to nerve terminals by synthesis, primarily via the enzyme glutaminase, and by high affinity uptake. The mechanism for transmitter inactivation in the synapse appears to be the rapid removal by a high affinity uptake system. Both endogenous L-glutamate and L-glutamate derived from exogenously supplied radiolabelled precursors exhibit Ca(++)- dependent release upon depolarization. A transport system responsible for the loading of L-glutamate into synaptic vesicles has also been identified. Excitatory amino acids act on a variety of distinct receptor types, and there are now available many compounds which can mimic or block synaptic activity at excitatory amino acid using synapses. Our approach has involved the analysis of these receptors in isolated synaptic membranes and their further definition

and anatomical localization via light microscopic autoradiography. GRA

N86-25116# Indiana Univ., Bloomington. Dept. of Chemistry.
ISOTOPIC STUDY OF THE INHALATION TOXICOLOGY OF OXIDANTS
J. M. Hayes and J. Santrock Jun. 1985 200 p Sponsored in part by Health Effects Research Lab.
(PB86-109485; EPA-600/1-85-013) Avail: NTIS HC A09/MF A01 CSCL 06T

The purpose was to develop novel methods to investigate the biological fate of inhaled ozone and other oxygen-containing pollutants in animal and human tissues using the heavy isotope of oxygen, oxygen-18 (18O). Methods were developed which facilitated the conversion of tissue oxygen to CO2 and the subsequent trapping of the CO2 so that it could be subjected to isotope-ratio mass spectrometry. The ratios of the various masses of evolved CO2 were used to calculate the 18O content of the original tissues, thus enabling the detection of isotopic enrichments as small as 0.4%. The above procedures were performed by modification of a commercially available elemental analyzer to include effluent columns and trapping devices, development of oxygen isotopic standards, and derivation of mathematical models for correction of blank and memory effects originating during sample pyrolysis. These techniques were applied with success to the determination of the biological fate of inhaled ozone, and to the measurement of tissue oxidation induced by a model peroxidation initiator, carbon tetrachloride. Author

N86-25117# Federal Communications Commission, Washington, D. C. Office of Science and Technology.
EVALUATING COMPLIANCE WITH FCC (FEDERAL COMMUNICATIONS COMMISSION) SPECIFIED GUIDELINES FOR HUMAN EXPOSURE TO RADIOFREQUENCY RADIATION
R. F. Cleveland Oct. 1985 58 p
(PB86-127081; OST/BULL-65) Avail: NTIS HC A04/MF A01 CSCL 06R

The technical bulletin provides information and guidelines for use in evaluating compliance with FCC-specified environmental rules dealing with human exposure to radiofrequency (RF) radiation. It provides assistance in determining whether an FCC-regulated facility might create a significant environmental effect due to human exposure to levels of RF radiation in excess of specified radiation protection guides. Emphasis is placed on exposure from broadcast facilities. However, the bulletin also contains information relevant to certain other RF-emitting sources. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-25118# Air Force Academy, Colo.
BEHAVIORAL CONSIDERATIONS FOR SPACE STATION DESIGN Final Report, Oct. 1984 - Dec. 1985
Frank R. Wood and Karen O. Dunivin Jan. 1986 69 p refs
(AD-A163478; USAFA-TR-86-3) Avail: NTIS HC A04/MF A01 CSCL 05/10

Flight crews are more than just the sum of the members' individual technical skills. They are dynamic and constantly changing systems of interacting units. The critical factor in this system is the interaction process. Factors which affect this interaction process are design considerations critical to the successful operation of the human system in space. Future space missions will be longer and will involve more routine tasks. Crews will be larger and more heterogeneous. These conditions make proper consideration of group dynamics principles imperative. Formal design of future space missions should consider critical design factors which promote the group process. The real change to current NASA mission design suggested by this report is that greater consideration be given to the informal processes characteristic of the human system. Consideration of these factors will pay large dividends in terms of human system performance and neglect of these factors will incur costs. GRA

N86-25119# Colorado Univ., Boulder. Center for Research on Judgment and Policy.
GENERALIZING OVER CONDITIONS BY COMBINING THE MULTITRAIT MULTIMETHOD MATRIX AND THE REPRESENTATIVE DESIGN OF EXPERIMENTS
Kenneth R. Hammond, Robert M. Hamm, and Janet Grassia Jan. 1986 64 p refs
(Contracts N00014-81-C-0591; BRSG-RR-07013-14)
(AD-A163685; CRJP-255A) Avail: NTIS HC A04/MF A01 CSCL 05/10

Analytical methods should be substituted for the current largely intuitive methods for generalizing results over conditions. Toward that end we present a methodology that combines Campbell and Fiske's (1959) multitrait multimethod matrix and Brunswik's (1956) representative design of experiments. A description of a study of expert judgement and a critique of current practices illustrate the methodology. GRA

N86-25120# Stanford Univ., Calif.
STATISTICAL INFERENCES IN CROSS-LAGGED PANEL STUDIES
Lawrence S. Mayer Nov. 1985 51 p refs
(Contract DAAG29-82-K-0156)
(AD-A163892; TR-15; ARO-19065.16-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

Cross-lagged panel studies are statistical studies in which two or more variables are measured for a large number of subjects at each of several waves or points in time. The variables divide naturally into two sets and the primary purpose of the analysis is to estimate and test the cross-effects between the two sets. Such studies are found in the mainstreams of social behavioral and business research. One approach to this analysis is to express the cross-effects as parameters in regression equations and then use regression methods to estimate and test the parameters. We contribute to this approach by extending the regression model to a multivariate model that captures the correlation between the dependent variables. We develop estimators for the parameters of this model and hypothesis tests for assessing the presence of effects and cross-effects. We demonstrate our results with the analysis of a cross-lagged panel study of the perceptions and attitudes of patients toward a health maintenance organization. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-25121*# Essex Corp., Huntsville, Ala. Space Systems Group.
THE DESIGN, FABRICATION AND DELIVERY OF A MANIPULATOR FOOT RESTRAINT MOCKUP FOR SPACE TELESCOPE DEVELOPMENT TESTING Final Report
Michael A. Hollingsworth 11 Apr. 1986 12 p refs
(Contract NAS8-36366)
(NASA-CR-178837; NAS 1.26:178837; H-86-05) Avail: NTIS HC A02/MF A01 CSCL 05H

The Manipulator Foot Restraint (MFR) is a subsystem of the Remote Manipulator System (RMS) which plays a major role in servicing the Hubble Space Telescope (HST) in orbit. Flight drawings were used to construct the MFR to guarantee that the mockup components were functionally equivalent to the flight MFR. Material surface finishes and tolerances that were compatible to the Neutral Buoyance Simulator (NBS) environment were used. Recommendation for improvements are discussed. B.G.

N86-25122*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PHYSICAL, ANTHROPOMETRICAL, AND BODY COMPOSITION CHARACTERISTICS OF WORKERS AT KENNEDY SPACE CENTER
Mary L. Lasley Sep. 1985 55 p refs
(Contract NAS10-10285)
(NASA-TM-83102; NAS 1.15:83102) Avail: NTIS HC A04/MF A01 CSCL 05H

At the Kennedy Space Center, workers are often exposed to cardiovascular and muscular stress in job-related activities which may require a high level of physical fitness in order to safely complete the work task. Similar tasks will be performed at other launch and landing facilities and in space for the Space Station. One such category includes workers who handle toxic propellants and must wear Self-Contained Atmospheric Protective Ensembles (SCAPE) that can weigh 56 lbs. with the air pack. These suits provide a significant physical challenge to many of the workers in terms of carrying this load while moving about and performing work. Furthermore, under some conditions, there is a significant thermal stress. The physical characteristics of these workers are, therefore, of consequence. The purpose of this study was to analyze the anthropometry, body composition, strength, power, endurance, flexibility, aerobic fitness, and blood variables of a representative sample of male KSC SCAPE workers and to compare them with characteristics of other male workers at KSC (total population N=110). Three separate comparisons were made. Author

N86-25123# Naval Postgraduate School, Monterey, Calif.
MAN-MACHINE SYSTEMS OF THE 1990 DECADE: COGNITIVE FACTORS AND HUMAN INTERFACE ISSUES
Paul J. Hoffman Aug. 1985 53 p refs
(AD-A163865; NPS74-85-002) Avail: NTIS HC A04/MF A01 CSCL 05/8

This paper presents the primary psychological concepts which are fundamental to the design of man-machine interfaces for intelligent systems of the 1990's. These concepts embrace perception, learning motivation, and cognitive capacities of human operators, in systems which require a high degree of operator-machine interaction. The central role of feedback is emphasized through simple schematic examples, designed to provide an understanding of the reciprocity requirements in man-machine communication. Cognitive theory and recent experimental data form the basis for discussion of visual image storage, short-term memory, long-term memory, transfer rates and buffering of information being processed by the human operator, under control of a central processor with a cycle time of roughly 70 milliseconds. Systems of the 1990 era will provide increased capability for high-speed processing of data and will utilize increasing numbers of decision-aides, spreadsheets and AI tools. Users of these systems will be components of networks, linked via efficient communication systems to other users and other subsystems. These developments will lead to fundamental changes in the work place. GRA

N86-25124# Naval Submarine Medical Research Lab., Groton, Conn.
THE EFFECT OF COLD TRAINING AND THE WEARING OF GLOVES ON MANUAL PERFORMANCE IN THE COLD: A COMPARISON OF PURE ABILITY AND OPERATIONAL TASKS Final Report
William H. Rogers 14 Nov. 1985 19 p refs
(AD-A163893; NSMRL-1067) Avail: NTIS HC A02/MF A01 CSCL 06/17

Cold-induced manual performance decrements pose a serious problem for military cold weather operations. Experiments were based on the notion that the amount of decrement, and possibly the best means for reducing that decrement, depend on the specific motor abilities required to perform a given task. Experiments have been performed using a battery of pure-ability tasks so that ultimately results could be generalized to any task. The study conducted here had the following goals: (1) to complement the previous studies in terms of the cold temperatures tested, and obtain profiles of performance of decrements and cold-injury dangers across a range of cold temperatures; (2) to assess the wearing of gloves and temperature-specific training as potential methods of reducing or eliminating cold-induced manual performance decrements; and (3) to validate and compare results previously and currently obtained using pure-ability tasks with those obtained using operational tasks. A battery of five pure ability and four operational tasks were administered to six four-man groups of U.S. Marines. Three groups practiced the tasks at room temperature on the first of three training days and at -10 C on the other two training days, while the other three groups practiced at room temperature on all three days. GRA

N86-25125# Naval Submarine Medical Research Lab., Groton, Conn.
AN EVALUATION OF COLOR SETS FOR CRT DISPLAYS Interim Report
D. F. Neri, A. R. Jacobson, and S. M. Luria 31 Dec. 1985 30 p refs
(AD-A163894; NSMRL-1068) Avail: NTIS HC A03/MF A01 CSCL 06/16

Ten subjects performed a color matching task with ten sets of seven colors, adapted from sets recommended in the literature. The color sets covered a wide range in color difference values. Performance with some color sets was significantly better than that with others on a task where color discrimination was important and the colors needed to be discriminated quickly and accurately. Effectiveness of a color set did not depend on the inclusion of any particular colors; rather, the relationships among colors proved to be important. The larger the color difference value between the two most perceptually similar members of a set, the shorter the reaction time and the fewer the errors on the color matching task. Author (GRA)

N86-25126# National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Biomedical and Behavioral Science.
COMPENDIUM OF PROTECTIVE EYEWEAR
C. E. Moss Mar. 1985 87 p refs
(PB86-135779) Avail: NTIS HC A05/MF A01 CSCL 06Q

Wearing apropriate eye and face protection devices will prevent or minimize most eye and/or facial injuries. However, at present there is no data source available on commercially available eye and face protectors. To provide characteristics and other product information, this compendium has been developed to list all commercially available eyewear products manufactured in the United States as of July 1, 1984. The protectors listed in this compendium include spectacles, goggles, welding helmets/hand shields, face shields, and filter plates. The information provided will assist the health and safety community in selecting appropriate eye and face protection for the job. GRA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-25127# Rome Air Development Center, Griffiss AFB, N.Y.
OPTICAL DISK TECHNOLOGY FOR LARGE SCALE MASS STORAGE Report, Jan. - Apr. 1985
Jack D. Petruzelli Dec. 1985 33 p refs
(AD-A163453; AD-E401440; RADC-TM-85-17) Avail: NTIS
HC A03/MF A01 CSCL 09/2

Optical disks have been under intense investigation as a digital mass storage mechanism since the mid 1970's. Since that time, even before potential manufacturers had systems in hand, the technology has been touted as the panacea to cure all the supposed ills of magnetic based storage mechanisms. It is very important to gain an understanding of the digital optical disk and what it can or cannot do in a particular application scenario before deciding if it is the answer to a storage problem. The potential techniques employed to overcome some of the perceived shortcomings are discussed. GRA

N86-25128# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics and Logistics Dept.
PERMANENT FILE BACKUP FOR THE CDC MASS STORE SYSTEM Final Report
Mary T. Novak Nov. 1985 24 p refs
(AD-A163524; DTNSRDC/CMLD-85/13) Avail: NTIS
HC A02/MF A01 CSCL 09/2

The Mass Store system is used to store a large number of user files. Users store files on Mass Store from the NOS/BE machines. The idea behind storage on Mass Store is that a large amount of information can be saved on Mass Store with no worries of reaching full disk capacity. Files that have not been accessed recently are written to cartridge and the disk space is released. Also, there is no limit to how long a file can exist; a file will not be purged due to lack of use. A presentation is given of a locally designed procedure that ensures that each file stored on Mass Store is also backed up by Mass Store. This procedure replaces the previous method which used standard nine-track tapes as the backup media. GRA

N86-25129# Naval Postgraduate School, Monterey, Calif.
A SINGLE BOARD MULTIPROCESSOR FOR REAL-TIME CONTOUR SURFACE DISPLAY GENERATION
Michael J. Zyda and Robert A. Walker Jan. 1986 22 p refs
(AD-A163587; NPS52-86-003) Avail: NTIS HC A02/MF A01
CSCL 09/2

This document presents an integrated systems design for a VLSI multiprocessor capable of generating contour surface displays in real-time (one-thirtieth of a second). It begins by examining an application that requires real-time contour surface display generation. The authors sketch some outlines for an architecture based upon a decomposable algorithm recently published. They then propose an architecture for a single board VLSI contour surface display generator that is pluggable into the Multibus of the Silicon Graphics, Inc. IRIS workstation. GRA

N86-25130# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
UNIFIED MATRICES FOR ELECTRONIC COMPUTERS
27 Jan. 1986 5 p refs
(AD-A163689; FTD-ID(RS)T-0036-86) Avail: NTIS
HC A02/MF A01 CSCL 09/2

This standard extends to the ferrite-core matrices operating on the ZD principle, which are intended for the storage units of the general-purpose electronic computers using the number system with a base of 2. GRA

N86-25131# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DEVELOPMENT OF A RUN TIME MATH LIBRARY FOR THE 1750A AIRBORNE MICROCOMPUTER M.S. Thesis
Steven A. Hotchkiss Dec. 1985 204 p refs
(AD-A163905; AFIT/GCS/MA/85D-5) Avail: NTIS
HC A10/MF A01 CSCL 09/2

A run-time math library for the MIL-STD-1750A embedded computer architectures is discussed. The math library consists of the circular trigonometric functions and their inverses. In addition, the steps required for the performance analysis of the math library have been outlined. Several approximation methods were investigated, but the Chebysher Economization of the Maclaurin series polynomials, and rational approximations derived from the second algorithm of Remes were determined to be the best available. Each function's implementation was designed to take advantage of features of MIL-STD-1750A architectures. The recommended test procedures will provide measures of the average and worst case generated errors within each approximation. The computer program is provided. GRA

N86-25132# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ARCHITECTURE AND NUMERICAL ACCURACY OF HIGH-SPEED DFT (DISCRETE FOURIER TRANSFORM) PROCESSING SYSTEMS M.S. Thesis
Kent Taylor Dec. 1985 222 p refs
(AD-A163963; AFIT/GE/ENG/85D-47) Avail: NTIS
HC A10/MF A01 CSCL 09/1

This thesis examines a very large-scale integrated (VLSI) circuit implementation of the Winograd and Good-Thomas Algorithms for computing discrete Fourier transforms (DFTs) with composite blocklengths after developing the theoretical background for calculating DFTs, the algorithms of interest are presented. A VLSI architecture, which exploits the parallelism and pipelining inherent in the algorithms, is then discussed. Winograd processors use both the small and large Winograd algorithms to compute DFTs with blocklengths of 15, 16, and 17. Longer blocklength DFTs (240, 255, 272, and 4080) are computed using a pipeline of Winograd processors, dual-port memories, and an interface processor; the pipeline uses the Good-Thomas prime factor algorithm. Fault tolerant is computed in the initial design of the VLSI architecture. Watchdog processors check both data and addresses of active Winograd processors, while parity checking circuits incorporated in the Winograd processors augment memory error-correction coding. A software simulation determined the numerical accuracy of the VLSI circuit. The signal-to-noise ratio was used as the accuracy metric. The signal was the output of a standard module, which used double-precision arithmetic, while the noise was the difference between the standard and the simulation module. The simulation module used integer arithmetic to exactly mimic operation of the VLSI circuit. Outputs of the standard module were compared with a direct evaluation of the DFT. GRA

N86-25133# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CONTENT-ADDRESSABLE MEMORY MANAGER: DESIGN AND EVALUATION M.S. Thesis
Mark C. Rowe Dec. 1985 355 p refs
(AD-A164037; AFIT/GE/ENG/85D-36) Avail: NTIS
HC A16/MF A01 CSCL 09/2

This research covers basic issues in implementing a Content-Addressable Memory (CAM) for a microcomputer. The thesis compares the various types of CAM organizations and presents a set of standards to distinguish true CAM from CAM-like memory. Issues such as the meaning of content to the host computer are discussed. This discussion leads to the implementation issues of how the CAM should operate with the host computer. The two configurations addressed in detail: a completely integrated approach and a peripheral approach. The thesis does not address the associative processor configurations found in PEPE, STARAN, or MPP. The case is presented that the peripheral device approach is the most practical approach. The peripheral device,

CAM board, using the AFIT CAM IC chips, will be controlled from a dedicated device that is designed and evaluated in this thesis. The architecture and operation of the CAM IC chip controller (CAM Manager) is derived from the desire to have a general purpose device that will have a small instruction set. The instructions will allow for efficient operations on applications as diverse as LISP garbage collection, database searching, and array arithmetic. This thesis compares a conventional computer executing the test applications and the same computer using the CAM board. The test applications were: (1) addition over all elements of an array, (2) LISP garbage collection, and (3) image recognition. The CAM board can enhance the performance of the host microcomputer. GRA

N86-25134# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT AND IMPLEMENTATION OF THE X.25 PROTOCOL FOR THE UNIVERSAL NETWORK INTERFACE DEVICE (UNID) 2. VOLUME 2 M.S. Thesis
Mark W. Weber Dec. 1985 241 p refs
(AD-A164042; AFIT/GE/ENG/85D-52-Vol-2) Avail: NTIS HC A11/MF A01 CSCL 17/2

This thesis describes the continued development of an improved Universal Network Interface Device (UNID II). The UNID II's architecture was based on a preliminary design project at the Air Force Institute of Technology. The UNID II contains two main hardware modules; a local module for the network layer software and a network module for the data link layer software and physical layer interface. Each module is an independent single board computer (SBC) residing on an Intel multibus chassis, complete with its own memory (EPROM and RAM), serial link interfaces, and multibus interface. The local module is an iSBC 544 and the network module is an iSBC 88/45. The network layer software supports the CCITT X.25, datagram option, protocol and the data link layer software supports the CCITT X.25 LAPB (HDLC) protocol. This report documents the further implementation of the CCITT X.25 protocol in the UNID II design. GRA

N86-25135# Naval Postgraduate School, Monterey, Calif.
INTRODUCTION TO THE MICROCOMPUTERS FOR SOLVING RADAR AND ELECTRONIC WARFARE PROBLEMS M.S. Thesis
Constantinos D. Vergos Dec. 1985 252 p refs
(AD-A164143) Avail: NTIS HC A12/MF A01 CSCL 17/9

This thesis has been written to solve different types of problems through microcomputers in the radar and electronic warfare field. These problems are offered as subjects at the Naval Postgraduate School in Courses EC 4432/33, EC 4484, and EC 3431. The computer programs that solve these computer problems have been written in an interactive method because it is user friendly and also so that anyone can change any given parameter or characteristics of radars and jammers and thus study their performance for the purpose of using or designing them. In solving these problems, the following have been taken into account: the performance of the radars, the ability of the radars to track targets, the design of radars for special purposes, and the design and study of different types of jammers. Special emphasis has been given to select these problems so that there would be a diverse field of different types of radars and jammers for numerous purposes, including their use in different conditions of operations. This selection of problems has been done in such a way that they can help a training officer to comprehend and perceive or to help an engineer evaluate a radar or a jammer he/she may wish to design. GRA

N86-25136# Naval Postgraduate School, Monterey, Calif.
MICROPROCESSOR CONTROLLER WITH NONVOLATILE MEMORY IMPLEMENTATION M.S. Thesis
Jay W. Wallin Dec. 1985 130 p refs
(AD-A164152) Avail: NTIS HC A07/MF A01 CSCL 09/2

In support of the Naval Postgraduate School's space program, a small, self-sufficient, low power microprocessor controller with nonvolatile memory has been designed, constructed and tested. Because of limited battery power availability, Complementary Metal-Oxide Semiconductor components have been used. The controller uses the National semiconductor NSC800 CPU along with three NSC810A RAM-I/O-Timers. Other features include a 16 channel analog-to-digital converter, a real time clock, local memory in the form of EPROM and RAM, and the Intel BPK 72 Bubble Memory System. The general nature of the controller allows it to be reprogrammed and utilized in a variety of applications. Prior research using the NSC888 Self-Contained NSC800 Evaluation System Ref. 1 has been expanded upon in this thesis project. Author (GRA)

N86-25137# Naval Postgraduate School, Monterey, Calif.
ANALYSIS AND DESIGN OF A PARAMETERIZED PROTOCOL CONVERTER M.S. Thesis
Berle Garris, Jr. Dec. 1985 109 p refs
(AD-A164171; AD-E750890) Avail: NTIS HC A06/MF A01 CSCL 09/2

Designed to circumvent the incompatibilities between communicating computer systems, a parameterized protocol convertor permits the use of communication equipment supporting variations of the same communication protocol or completely different framing technique protocols. The analysis of the conversion process includes the engineering trade-offs between speed of conversion and flexibility, and the use of an alternative flow architecture. Flexibility is enhanced through user selection of input and output protocol types, and the designation of functional specifics, such as code type, header length, and error detection methods, with variable parameters. The speed of conversion is increased through the parallel processing of the framing, transparency, and error control subfunctions and the use of a single byte storage technique. The single byte storage technique imposes some limitations in the use of transparent data. Author (GRA)

N86-25138# Naval Postgraduate School, Monterey, Calif.
IMAGE SEGMENTATION USING THE MILITARY SPECIFICATION 1750A M.S. Thesis
Percy D. Cody, III Dec. 1985 81 p refs
(AD-A164180) Avail: NTIS HC A05/MF A01 CSCL 09/2

The use of digital computers to process various types of sensor data is becoming increasingly common, in both civilian and military applications. One example of this use is the enhancement of photographs to increase their clarity, or emphasize a particular detail. Previously, the computers used to perform this processing did it in specialized circuits, mainframe or minicomputers. More recently, extremely powerful microprocessors have become available that show potential to be applied in this area. This thesis explores a particular class of image processing, known as Image Segmentation, implemented on a particular microprocessor. The microprocessor is the Fairchild F9450, the first civilian version of the 1750A military specification microprocessor. This microprocessor, along with its associated chip set, appears well suited to image processing, having high speed capability, direct floating point arithmethic instructions, multiprocessing capacity, and the ability to address up to sixteen megabytes of memory. Additionally, a sophisticated software development tool set, known as Microprocessor Pascal, is available to develop and test software for the 1750A/F9450 microprocessor. This tool set allows software to be developed on the VAX-11/780 minicomputer, targeted for final use on the 1750A/F9450. GRA

N86-25139# National Weather Service, Garden City, N.Y.
ROTODRAW
T. Niziol Nov. 1985 21 p
(PB86-131828; NOAA-NWS-ERCP-35) Avail: NTIS HC A02/MF A01 CSCL 09B

The ROTORDRAW program draws a graphic product from a set of data points that are easily entered into an AFOS product from ADM. The user has the ability to zoom, offset, and rotate the object on the GDM screen. The zoom feature of the program is much more precise than the standard AFOS zoom. Up to 700 sets of x-y data points can be plotted. The program uses the AFOS Graphics Library, AG.LB, extensively. Drawing graphics is relatively straightforward, via the AFOS data product. GRA

N86-25140# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
TECHNOLOGY ASSESSMENT: METHODS FOR MEASURING THE LEVEL OF COMPUTER SECURITY Final Report, 1980 - 1981
W. Neugent, J. Gilligan, L. Hoffman, and Z. G. Ruthberg 1985 208 p Prepared in cooperation with System Development Corp., McLean, Va. and George Washington Univ., Washington, D.C.
(PB86-129954; NBA/SP-500/133; LC-85-600600) Avail: NTIS HC A10/MF A01; also available SOD HC $8.00 as SN003-003-02686-7 CSCL 09B

The document is a companion to FIPS PUB 102, Guideline for Computer Security Certification and Accreditation. Since a security certification depends upon a technical security evaluation, this document is meant to provide information on twenty-five evaluation methods in common use today in the security, EDP audit, and risks analysis communities. GRA

N86-25141 Colorado Univ., Boulder.
THE USE OF CONTROLLED REDUNDANCY IN SELF-ADAPTIVE DATABASES Ph.D. Thesis
Nabil Nessim Kamel 1985 118 p
Avail: Univ. Microfilms Order No. DA8528496

A new approach for multiple query optimization in a centralized database is investigated. Given an arbitrary sequence of queries, it is shown that significant performance improvements can be obtained by considering the special statistical patterns inherent in the query stream and in the distribution of data. In order to realize these potential improvements, the optimal management of redundant temporaries, called the Derived Data Base is addressed. The problem is approached in a self-adaptive fashion by periodically reorganizing the contents of the temporaries to suit the common usage patterns. This approach differs from batched query processing in that the queries are not known in advance. The approach taken to handle updates is to keep the main database always up to date and to optimally select the contents of the temporaries based on their update history. In addition, a system of differential files is kept to retain the changes made in the temporaries. Dissert. Abstr.

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-25142*# Virginia Univ., Charlottesville. Dept. of Computer Science.
THE IMPLEMENTATION AND USE OF ADA ON DISTRIBUTED SYSTEMS WITH HIGH RELIABILITY REQUIREMENTS Annual Report
J. C. Knight Mar. 1986 92 p refs
(Grant NAG1-260)
(NASA-CR-176760; NAS 1.26:176760; UVA/528213/CS86/108) Avail: NTIS HC A05/MF A01 CSCL 09B

The use and implementation of Ada in distributed environments in which reliability is the primary concern were investigted. A distributed system, programmed entirely in Ada, was studied to assess the use of individual tasks without concern for the processor used. Continued development and testing of the fault tolerant Ada testbed; development of suggested changes to Ada to cope with the failures of interest; design of approaches to fault tolerant software in real time systems, and the integration of these ideas into Ada; and the preparation of various papers and presentations were discussed. B.G.

N86-25143*# TRW Systems Group, Huntsville, Ala.
GROUND SOFTWARE MAINTENANCE FACILITY (GSMF) SYSTEM MANUAL Final Report
D. Derrig and G. Griffith 26 Feb. 1986 78 p
(Contract NAS8-32350)
(NASA-CR-178804; NAS 1.26:178804; TRW-41849-G159-024) Avail: NTIS HC A05/MF A01 CSCL 09B

The Ground Software Maintenance Facility (GSMF) is designed to support development and maintenance of spacelab ground support software. THE GSMF consists of a Perkin Elmer 3250 (Host computer) and a MITRA 125s (ATE computer), with appropriate interface devices and software to simulate the Electrical Ground Support Equipment (EGSE). This document is presented in three sections: (1) GSMF Overview; (2) Software Structure; and (3) Fault Isolation Capability. The overview contains information on hardware and software organization along with their corresponding block diagrams. The Software Structure section describes the modes of software structure including source files, link information, and database files. The Fault Isolation section describes the capabilities of the Ground Computer Interface Device, Perkin Elmer host, and MITRA ATE. B.W.

N86-25144*# TRW Defense and Space Systems Group, Huntsville, Ala.
GROUND SOFTWARE MAINTENANCE FACILITY (GSMF) USER'S MANUAL. APPENDICES NASA-CR-178806 NAS 1.26:178806 REPT-41849-G159-026-APP HC A05/MF A01 Final Report
V. Aquila, D. Derrig, and G. Griffith 28 Feb. 1986 86 p refs
(Contract NAS8-32350)
(NASA-CR-178806; NAS 1.26:178806; Rept-41849-G159-026-App) Avail: NTIS HC A05/MF A01 CSCL 09B

Procedures are presented that allow the user to assemble tasks, link, compile, backup the system, generate/establish/print display pages, cancel tasks in memory, and to TET an assembly task without having to enter the commands every time. A list of acronyms is provided. Software identification, payload checkout unit operating system services, data base generation, and MITRA operating procedures are also discussed. B.G.

N86-25145*# Research Triangle Inst., Research Triangle Park, N.C. Software Research and Development.
AN EMPIRICAL STUDY OF FLIGHT CONTROL SOFTWARE RELIABILITY Final Report
Janet R. Dunham and John L. Pierce Mar. 1986 46 p refs
(Contract NAS1-16489)
(NASA-CR-178058; NAS 1.26:178058; Rept-412U-2094-22) Avail: NTIS HC A03/MF A01 CSCL 09B

The results of a laboratory experiment in flight control software reliability are reported. The experiment tests a small sample of implementations of a pitch axis control law for a PA28 aircraft with over 14 million pitch commands with varying levels of additive input and feedback noise. The testing which uses the method of n-version programming for error detection surfaced four software faults in one implementation of the control law. The small number of detected faults precluded the conduct of the error burst analyses. The pitch axis problem provides data for use in constructing a model in the prediction of the reliability of software in systems with feedback. The study is undertaken to find means to perform reliability evaluations of flight control software. E.A.K.

N86-25146# National Aeronautics and Space Administration, Washington, D.C.
DATA ANALYSIS ON THE ROTOR TEST STAND PROGRAM FOR INTERACTIVE PROCESSING
Wolfgang Breustedt Nov. 1985 32 p refs Transl. into ENGLISH of "Datenauswertung am Rotorversuchsstand Programm zur Interaktiven Auswertung" (Cologne, West Germany), DFVLR, 20 Sep. 1985 p 1-21 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77948; NAS 1.15:77948) Avail: NTIS HC A03/MF A01 CSCL 09B

A program is introduced, with which data from a rotor testing stand can be interactively processed. The Quick-Look-Data-Processing during the experiments at Deutsch Niederlandische Windkanal (DNW) (German-Dutch Windtunnel), where only one rotor revolution can be analyzed, yields usable results. The applied

mathematical principles and the data structure are explained.
Author

N86-25147# Rockwell International Corp., El Segundo, Calif. North American Aicraft Div.
CADS: A COMPUTER AIDED DESIGN SYSTEM, VOLUME 1 Final Report, Dec. 1981 - May 1985
Michael C. Less and Susan Manuel Dec. 1985 4u p 2 Vol.
(Contract F33615-81-C-3229)
(AD-A163556; AFWAL-TR-85-3066-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This is the final summary report for the Computer Aided Design System, CADS. CADS is a pre and post processor for structural analysis and optimization programs based on the finite element method. The system supports five functional modules controlled by an Executive Monitor. All of these modules communicate with a data base through a data manager. In addition a post output translator, CADSPP, is available which processes output from finite element programs, e.g., NASTRAN, directly into the data base. This report gives an overview of the capability available in CADS. Several illustrations demonstrate the functions of the Preprocessor, Display, and Postprocessor Modules. GRA

N86-25148# RAND Corp., Santa Monica, Calif.
THE RAND-ABEL (TRADEMARK) PROGRAMMING LANGUAGE: REFERENCE MANUAL Interim Report
Norman Z. Shapiro, H. E. Hall, Robert H. Anderson, and Mark LaCasse Oct. 1985 122 p refs
(Contract MDA903-85-C-0030)
(AD-A163564; RAND/R-2367-NA) Avail: NTIS HC A06/MF A01 CSCL 09/2

This reference manual describes the RAND-ABEL programming language. In designing the RAND-ABEL language, we determined that RAND-ABEL should be suitable for large, rule-based systems; RAND-ABEL should be suitable for war gaming and multiscenario sensitivity analysis; RAND-ABEL should be suitable for use by any of several governmental gaming and analysis organizations. GRA

N86-25149# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMPARISON OF ABSORPTION AND RADIATION BOUNDARY CONDITIONS USING A TIME-DOMAIN THREE-DIMENSIONAL FINITE DIFFERENCE ELECTROMAGNETIC COMPUTER CODE M.S. Thesis
Clifford F. Williford Dec. 1985 186 p refs
(AD-A163828; AFIT/GE/ENG/85D-53) Avail: NTIS HC A09/MF A01 CSCL 20/3

The Three-Dimensional Finite Difference (3DFD) computer code is compared using Absorption Boundary Conditions (ABS) versus Radiation Boundary Conditions (RBC). This comparison is made when the 3DFD code is used to study the interaction of lightning with an aircraft. The 3DFD computer code is a modified version of Rymes' 3DFD. The aircraft modeled for the paper is and F-16 Fighting Falcon. The ABC used simulates an infinite free-space by setting the conductivity of the boundary space to that of distilled water, to absorb the outgoing electromagnetic waves. The RBC simulates free-space by assigning the boundary fields to a previously calculated value. The value is calculated with a parabolic interpolation of three previous field values, which are offset in space. Therefore, the calculated value is also extrapolated to account for the time delay and position change. The results of incorporating RBC were dramatic. The ten locations sampled for the test showed marked improvement in the waveforms when using RBC's. Depending on the purpose of the analysis, this improved waveform output may be overshadowed by the 25% increase in CPU time that is needed for the more sophisticated RBC. GRA

N86-25150# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMPUTER ASSISTED INSTRUCTION FOR THE C PROGRAMMING LANGUAGE ON THE ZENITH Z-100 MICROCOMPUTER SYSTEM AFIT/GCS/MA/85D-2 HC A11/MF A01 M.S. Thesis
Frank W. DeMarco Dec. 1985 227 p refs
(AD-A163842; AFIT/GCS/MA/85D-2) Avail: NTIS HC A11/MF A01 CSCL 09/2

The field known as computer assisted instruction, or CAI as support since the advent of the microcomputer. More and more people, including those in supervisory positions are beginning to see the advantages, both cost and time, in having training available in the workplace. This thesis developed a training package for use on the Zenith Z-100 microcomputer. The package consists of six lessons and three programs. The six lessons cover various topics dealing with the C programming language. The objective of these lessons is to present an introduction to the C programming language. The three programs are written in the Pascal programming language and are used to provide a means of displaying the lesson material, to provide a means of checking student progress, and to provide a means of displaying course statistics. GRA

N86-25151# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
USING ADA IN THE REAL-TIME AVIONICS ENVIRONMENT ISSUES AND CONCLUSIONS M.S. Thesis
Donald J. Witt Dec. 1985 121 p refs
(AD-A163844; AFIT/GCS/MA/85D-6) Avail: NTIS HC A06/MF A01 CSCL 09/2

This project involved studying the real-time avionics environment in which Ada will become the primary programming language in the near future. A set of issues of concern regarding the use of Ada within this environment was identified and described. Test programs, including the new Prototype Ada Compiler Evaluation Capability, were evaluated as to their applicability to these issues. The applicable test program were compiled and executed using two validated Ada compilers. Compile time and run time statistics were gathered to form a baseline against which other Ada compilers (preferably MIL-STD-1750a Ada compilers) may be compared.
GRA

N86-25152# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF A COMPUTER AIDED DESIGN PACKAGE FOR CONTROL SYSTEM DESIGN AND ANALYSIS FOR A PERSONAL COMPUTER (ICECAP-PC), VOLUME 1 M.S. Thesis
Susan K. Mashiko and Gary C. Tarczynski Dec. 1985 239 p refs
(AD-A163940; AFIT/GE/ENG/85D-46-Vol-1) Avail: NTIS HC A11/MF A01 CSCL 09/2

This thesis describes a computer-aided design (CAD) package for control system design and analysis. The package was implemented on different varieties of small personal computers. Structured design and other software engineering techniques were applied during the development effort. The program consists of a keyword-driven menu structure and a set of control system analysis procedures. The analysis procedures allow input of systems which are defined by transfer functions, polynomials, and matrices. Polynomials and matrices can be manipulated mathematically, and some block diagram manipulation can be performed on transfer functions as well. Author (GRA)

N86-25153# Harvard Univ., Cambridge, Mass. Dept. of Statistics.
ROBUST/RESISTANT TECHNIQUES OF DATA ANALYSIS Final Report, 1 May 1982 - 31 Aug. 1985
David C. Hoaglin and Frederick Mosteller 28 Oct. 1985 16 p refs
(Contract DAAG29-82-K-0085)
(AD-A163972; ARO-19236.10-MA) Avail: NTIS HC A02/MF A01 CSCL 09/2

Research under this contract focused on three basic problem areas: (1) critical data analysis (whose aim is to provide more formal inferences accompanying techniques of exploratory data analysis), (2) distribution shapes that end to arise in real data, and (3) computer implementation of some advanced techniques in exploratory data analysis. This final report summarizes the

research and the major results within each of these three areas. GRA

N86-25154# Colorado Univ., Boulder. Dept. of Computer Science.
A TRUST REGION ALGORITHM FOR NONLINEARLY CONSTRAINED OPTIMIZATION
Richard H. Byrd, Robert B. Schnabel, and Gerald A. Schultz Oct. 1985 36 p refs Sponsored in part by NSF
(Contract DAAG29-81-K-0108)
(AD-A163986; CU-CS-313-85; ARO-18197.7-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

Presented is a trust region-based method for the general nonlinearly equality constrained optimization problem. The method works by iteratively minimizing a quadratic model of the Lagrangian subject to a possibly relaxed linearization of the problem constraints and a trust region constraint. The model minimization may be done approximately with a dogleg type approach. It is shown that this method is globally convergent even if singular or indefinite Hessian approximations are made. A second order correction step that brings the iterates closer to the feasible set is described. If sufficiently precise Hessian information is used, this correction step allows us to prove that the method is also locally quadratically convergent and that the limit satisfies the second order necessary conditions for constrained optimization. An example is given to show that, without this correction, a situation similar to the Maratos effect may occur where the iteration is unable to move away from a saddle point. GRA

N86-25155# Kestrel Inst., Palo Alto, Calif.
KNOWLEDGE-BASED TRANSFORMATIONAL SYNTHESIS OF EFFICIENT STRUCTURES FOR CONCURRENT COMPUTATION Final Report, Oct. 1984 - Sep. 1985
Richard M. King 30 Sep. 1985 191 p refs
(Contract F49620-85-C-0015)
(AD-A164022; KES.U.85.5; AFOSR-85-1259TR) Avail: NTIS HC A09/MF A01 CSCL 09/2

The object of our research is the codification of programming knowledge for the synthesis of concurrent programs. This is important because concurrency is a way of securing better performance on amenable problems than is available on non-concurrent computers. We divide this knowledge into two sections: knowledge for the synthesis of arrays of processors that could be connected in a geometrically regular manner (crystalline concurrency), and knowledge for the synthesis of tree structure (tree concurrency). We use a transformational approach. The transformational system has rules each of which contains two predicates: an antecendent and a consequent. If the antecedent of a rule is true of a given object, the rule applies and the object is modified to make the consequent true. Author (GRA)

N86-25156# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF A COMPUTER AIDED DESIGN PACKAGE FOR CONTROL SYSTEM DESIGN AND ANALYSIS FOR A PERSONAL COMPUTER (ICECAP-PC). VOLUME 2 M.S. Thesis
Susan K. Mashiko and Gary C. Tarczynski Dec. 1985 395 p refs
(AD-A164044; AFIT/GE/ENG/85-D-46-Vol-2) Avail: NTIS HC A17/MF A01 CSCL 09/2

This appendix contains the data dictionary. The name, description, make-up, source, destination and the use of each of the variables, constants, type definitions and procedures are contained in this section. The entries are self-explanatory. Author (GRA)

N86-25157# Maryland Univ., College Park. Center for Automation Research.
PARALLEL PROCESSING OF REGION BOUNDARIES
Angela Y. Wu, S. K. Bhaskar, and Azriel Rosenfeld Nov. 1985 18 p refs
(Contract F49620-85-K-0009)
(AD-A164112; CAR-TR-159; CS-TR-1573; AFOSR-85-1216TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

A region may be represented by specifying the curves that bound it. When p processors are available, typical operations on regions so represented can be performed much faster than using a single processor. This paper presents parallel algorithms to determine properties of regions, such as area; to perform operations on regions, such as union and intersection; to determine if a point lies inside a region; and to determine whether a given digital curve could be the boundary of a region. Some of the algorithms involve sorting, the time complexity of which depends on the particular model of parallel computation used. Author (GRA)

N86-25158# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
COMPUTER MODEL OF A PASSIVE SYNTHETIC APERTURE IMAGING SYSTEM M.S. Thesis
Christopher P. Kane Dec. 1985 123 p refs
(AD-A164144; AFIT/GEO/ENP/85D-2) Avail: NTIS HC A06/MF A01 CSCL 20/6

This thesis was concerned with the development of a computer model of a passive synthetic aperture imaging system. The research was divided into three parts. They were (1) applying an understanding of partial coherence theory and its relationship to the impulse response of the system, (2) developing the computer model, and (3) exercising the computer model to perform a sensitivity analysis. The system modeled consisted of two lenses mounted on a movable platform. The lenses were separated by a fixed distance and travelled in a direction parallel to this separation. The coherence of radiation present at each lens emanating from a real source was measured yielding the Fourier transform of the source intensity distribution according to the van Cittert-Zernike theorem (2:510). The transform was then multiplied by an effective aperture (obtained from the motion and position of the lenses relative to the source). An inverse Fourier transform was then applied to this result yielding the image. This is the process modeled by the computer. The results indicated that new means of image interpretation must be developed in order to make the results useful. This is due to the fact that the system behaves much like a high pass filter and the image is edge enhanced and not a scaled version of the geometric image. Author (GRA)

N86-25159# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF A DISTRIBUTED DECISION ALGORITHM M.S. Thesis
Sung C. Hahn Dec. 1985 78 p refs
(AD-A164181) Avail: NTIS HC A05/MF A01 CSCL 09/2

Distributed decision problems arise whenever two or more sensors and their associated computers must work cooperatively to make a decision about a commonly observed event. Typical examples are in target detection and classification. The problem is usually characterized by a limited bandwidth of the communication link between the sensors. This thesis develops and evaluates an algorithm for distributed decision and compares it to a non-distributed or centralized form of the algorithm. Analysis of the algorithm is carried out for some low-dimensional cases. Computer simulations were carried out for higher dimensional cases. The simulation work was done in FORTRAN under CMS on an IBM 370/3033 computer. GRA

N86-25160# Lawrence Livermore National Lab., Calif.
POSSOL: POISSON EQUATION SOLVER
William J. Orvis Aug. 1985 29 p
(Contract W-7504-eng-48)
(DE86-002292; UCID-20539) Avail: NTIS HC A03/MF A01

POSSOL is a two-dimensional Poisson solver for problems with arbitrary nonuniform gridding in cartesian coordinates. Actually, it will solve the Helmholtz equation on an arbitrary, non-uniform grid on a rectangular domain with unmixed boundary conditions. The routine is similar to PWSCRT developed by Schwarstrauber and Sweet at the National Center for Atmospheric Research. The routine is also amenable to the capacitance matrix technique which can be used to solve problems with mixed boundary conditions. Author

N86-25161# Los Alamos National Lab., N. Mex.
EXAMINATION OF THE CIRCLE SPLINE ROUTINE
R. M. Dolin and D. L. Jaeger Nov. 1985 44 p
(Contract W-7405-eng-36)
(DE86-004361; LA-10521-MS) Avail: NTIS HC A03/MF A01

The Circle Spline routine is a library file with several subroutines, which can generate splines in two and three dimensions. By using two programs, FUNCTION and CSPLINE, data points were generated, a data file, and a series of blended arcs linking data points produced. The insertion of the proper number of subpoints allows the blending of two arcs into one spline segment. Up to the critical number of subpoints, the accuracy and smoothness of the spline increased as more subpoints were used. Experiments revealed, however, that the blending process began to develop errors if too many subpoints were used and that persistent errors developed in cases of extreme variation of curvature (as in a cigar-shaped ellipse). The Circle Spline routine generally compares favorably with the Wilson-Fowler routine, the current DOE-NWC standard spline routine. DOE

N86-25162# National Bureau of Standards, Gaithersburg, Md.
BENCHMARK ANALYSIS OF DATABASE ARCHITECTURES: A CASE STUDY Final Report
S. B Yao, A. R. Hevner, and D. R. Benigni Oct. 1985 100 p Prepared in cooperation with Software Systems Technology, Inc., College Park, Md.
(PB86-126687; NBS/SP-500/132; LC-85-600599) Avail: NTIS HC A05/MF A01; also available SOD HC $7.50 as SN003-003-02684-1 CSCL 09B

This guideline presents an application of the generalized performance analysis methodology for the benchmarking of database systems that was reported in NBS Special Publication 500-118. The principal objectives of this guide are to benchmark the performance of three distinct database system architectures: (1) a microcomputer database system; (2) a microcomputer database system; and (3) a database machine. This guide not only proves the viability of the benchmarking methodology in evaluating real systems, but it also provides comparable observations as to the capabilities of database systems based upon different architectures. Together with NBS Special Publication 500-118, this report serves as a reference for the benchmarking of database systems by providing a complete description of the benchmarking framework and a detailed application showing how to implement it. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-25163# M/A-COM Linkabit, Inc., Vienna, Va.
DSCS NETWORK PERFORMANCE SOFTWARE SUPPORT. REVISION Final Report, Dec. 1984-29 Nov. 1985
S. V. Trees, D. Hughes, S. Huffman, B. Maples, and J. Shattuck 7 Jan. 1986 134 p refs
(Contract DCA100-84-C-0009)
(AD-A163530; FR-170) Avail: NTIS HC A07/MF A01 CSCL 09/2

The purpose of this task was to evaluate the utilization of the DSCS Operational Control System (DOCS) and to provide version release test support for the DSCS Network Planning Software (DNPS). This report also examines the development of multiple beam antenna (MBA) algorithms to calculate beam weights that provide minimum mean square error (MSE) performance between desired and actual gain contour patterns. GRA

N86-25164# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT OF A DIGITAL INTERACTIVE CONTROLLER EVALUATION SYSTEM (DICES) M.S. Thesis
Scott B. Eckert Dec. 1985 440 p refs
(AD-A163966; AFIT/GE/ENG/85D-13) Avail: NTIS HC A19/MF A01 CSCL 09/5

The Digital Interactive Conotroller Evaluation System (DICES) is a user interactive system which permits the implementation of digital controller designs based on the TMS32010 digital-signal-processing microprocessor for a given single input-single output plant model. DICES partitions the controller design into second-order 3D filter sections and quantizes the coefficients. These coefficients are loaded into a generic filter program written in TMS32010 assembly language, which are then assembled and loaded into the TMS32010 for execution. The controller can be placed in the forward or feedback path of an analog computer system which reflects the plant model. Performance data is obtained via IEEE-488 controlled instruments under control of a VAX 11/780. GRA

N86-25165# Naval Postgraduate School, Monterey, Calif.
AN ADAPTIVE COLLISION RESOLUTION PROTOCOL FOR RANDOM ACCESSED CHANNELS M.S. Thesis
Turhan Gurer Dec. 1985 97 p refs
(AD-A164169; AD-E750890) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis investigates the performance of two collision resolution protocols for a random accessed channel. The two proposed protocols are basically multislot collision resolution algorithms. In the first protocol, the number of slots opened is equal to the number of users involved in a collision. Each user randomly selects a slot. The second protocol is an adaptive version of the first protocol. Both of them are investigated numeric calculations and simulations. GRA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-25166*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
COMBINING AND CONNECTING LINEAR, MULTI-INPUT, MULTI-OUTPUT SUBSYSTEM MODELS
Eugene L. Duke Apr. 1986 33 p ref
(NASA-TM-85912; H-1264; NAS 1.15:85912) Avail: NTIS HC A03/MF A01 CSCL 09B

The mathematical background for combining and connecting linear, multi-input, multi-output subsystem models into an overall system model is provided. Several examples of subsystem configurations are examined in detail. A description of a MATRIX (sub x) command file to aid in the process of combining and connecting these subsystem models is contained. Author

N86-25167*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHIFTING THE CLOSED-LOOP SPECTRUM IN THE OPTIMAL LINEAR QUADRATIC REGULATOR PROBLEM FOR HEREDITARY SYSTEMS Final Report
J. S. Gibson and I. G. Rosen Mar. 1985 48 p refs Submitted for publication Prepared in cooperation with California Univ., Los Angeles and University of Southern California, Los Angeles
(Contracts NAS1-17070; NAS1-18107; Grants AF-AFOSR-0309-84; AF-AFOSR-0393-84)
(NASA-CR-178082; ICASE-86-16; NAS 1.26:178082) Avail: NTIS HC A03/MF A01 CSCL 12A

In the optimal linear quadratic regulator problem for finite dimensional systems, the method known as an alpha-shift can be used to produce a closed-loop system whose spectrum lies to the left of some specified vertical line; that is, a closed-loop system with a prescribed degree of stability. This paper treats the extension of the alpha-shift to hereditary systems. As infinite dimensions, the shift can be accomplished by adding alpha times the identity to the open-loop semigroup generator and then solving an optimal regulator problem. However, this approach does not work with a new approximation scheme for hereditary control problems recently

developed by Kappel and Salamon. Since this scheme is among the best to date for the numerical solution of the linear regulator problem for hereditary systems, an alternative method for shifting the closed-loop spectrum is needed. An alpha-shift technique that can be used with the Kappel-Salamon approximation scheme is developed. Both the continuous-time and discrete-time problems are considered. A numerical example which demonstrates the feasibility of the method is included. Author

N86-25168*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THEORETICAL THREE-AND FOUR-AXIS GIMBAL ROBOT WRISTS
L. Keith Barker and Jacob A. Houck May 1986 38 p refs
(NASA-TP-2564; L-16042; NAS 1.60:2564) Avail: NTIS
HC A03/MF A01 CSCL 09B

In high-performance flight simulations, a four-axis gimbal system allows all possible rotations with acceptable gimbal angle rates while it avoids the so-callled 'gimbal lock' that occurs when gimbal rotational axes are colinear. In this paper, pertinent equations (including quaternions) are assembled for a hypothetical robot wrist, functionally equivalent to this four-axis gimbal system, and also for a true three-axis gimbal robot wrist. These equations are used to simulate the rotation of a robot hand by the robot wrist in response to operator rotational velocity commands to the robot hand. Near gimbal lock (wrist singularity), excessive rotational rates occur. Scaling the rates, which is necessary for the three-gimbal robot wrist to prevent rate limiting, introduces an undesirable time delay in the robot hand rotation with respect to the commanded rotation. However, the merit of the four-gimbal robot wrist is that the fourth gimbal angle keeps the robot wrist away from the singularity so that the robot hand moves exactly as commanded. It appears that in a 'worst-type' maneuver of the robot hand, the fourth gimbal angle can be defined so that none of the gimbal angle rates exceed about twice the commanded rates. Author

N86-25169*# California Univ., Los Angeles.
AN APPLICATION OF ADAPTIVE LEARNING TO MALFUNCTION RECOVERY Final Report
Robert Edward Cruz May 1986 46 p refs
(Grant NAG2-302)
(NASA-CR-166620; H-1325; NAS 1.26:166620) Avail: NTIS
HC A03/MF A01 CSCL 09B

A self-organizing controller is developed for a simplified two-dimensional aircraft model. The Controller learns how to pilot the aircraft through a navigational mission without exceeding pre-established position and velocity limits. The controller pilots the aircraft by activating one of eight directional actuators at all times. By continually monitoring the aircraft's position and velocity with respect to the mission, the controller progressively modifies its decision rules to improve the aircraft's performance. When the controller has learned how to pilot the aircraft, two actuators fail permanently. Despite this malfunction, the controller regains proficiency at its original task. The experimental results reported show the controller's capabilities for self-organizing control, learning, and malfunction recovery. Author

N86-25170# Yale Univ., New Haven, Conn. Dept. of Computer Science.
EDUCATION AND COMPUTERS: AN AI (ARTIFICIAL INTELLIGENCE) PERSPECTIVE
Roger C. Schank and Stephen Slade Oct. 1985 41 p
(Contracts N00014-85-K-0108; N00014-82-K-0149)
(AD-A163618; YALEU/CSD/RR-431) Avail: NTIS
HC A03/MF A01 CSCL 05/10

Our work at the Yale Artificial Intelligence Project has provided key scientific insights into human cognitive behavior in general and learning in particular. These scientific developments can be applied to education. At the heart of thinking is the need to explain the unfamiliar. We regard intellectual curiosity as a major educational resource to be nurtured and promoted. Our computer models of human cognitive behavior indicate that explanation plays a critical role in learning. Unfortunately the educational system has been unable to foster and exploit what should be central in our schools, namely the love of learning. Primary and secondary education today face many problems. Children aren't learning the basic skills of reading writing and math. The introduction of computers in the classrooms has not provided the predicted panacea, but has instead brought problems of its own, primarily due to inadequate software for the core curriculum. Most of the available educational software is terrible. It is ineffective, costly, unproven, and inappropriate. We discuss the tremendous potential of the computer in education and offer standards for achieving high-quality educational software for all parts of the curriculum. In particular, computers offer a unique opportunity to cultivate the student's natural desire to explore and explain the world. GRA

N86-25171# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
REASONING IN REAL-TIME FOR THE PILOT ASSOCIATE: AN EXAMINATION OF A MODEL BASED APPROACH TO REASONING IN REAL-TIME FOR ARTIFICIAL INTELLIGENCE SYSTEMS USING A DISTRIBUTED ARCHITECTURE M.S. Thesis
Douglas O. Norman Dec. 1985 159 p refs
(AD-A163947; AFIT/GCS/ENG/85D-12) Avail: NTIS
HC A08/MF A01 CSCL 06/4

The use of artificial intelligence (AI) techniques for pilot aiding in real-time (DOD Pilot Associate--PA) introduces some seemingly intractable problems. Most algorithms which will be used in a PA are search intensive with exponential-order-time-complexities. The thesis outlines the problem and explores the possibility of using parallel processing for minimizing the computational costs. Methods for, and results from, distributing data and functions among many processors are presented. An extension to the blackboard structure used in many AI systems called a virtual blackboard is introduced. The results and techniques are bundled into a prototype distributed data-flow constraint-network application system called DDAFCON. DDAFCON is discussed, and a flight-planning application is presented using DDAFCON. The results are discussed. It is shown that the maximum speedup due to parallel processing is bounded by the number of processors which a problem solution can accept. The thesis concludes that generalized AI structures and reasoning paradigms (specifically, deep models), although seemingly required for the performance level desired for applications such as the PA may not be realizable for many real-time applications. A change in emphasis for developing real-time AI systems is suggested. GRA

N86-25172# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
THE STRUCTURES OF DISCOURSE STRUCTURE
B. J. Grosz and C. L. Sidner Nov. 1985 71 p
(Contract N00014-85-C-0079)
(AD-A163024; BBN-6097; CSLI-85-39) Avail: NTIS
HC A04/MF A01 CSCL 05/7

The development of a computational theory of discourse structure is described. The theory is based on the thesis that discourse structure is a composite of three structures: the structure of the sequence of utterances, the structure of intentions conveyed, and the attentional state. The distinction among these components is essential to provide adequate explanations of such discourse phenomena as clue words, referring expressions, and interruptions. The application of this theory to such phenomena is illustrated and the recognition of intentions in discourse discussed. GRA

N86-25173# Stanford Univ., Calif. Dept. of Computer Science.
DECISION PROCEDURES
Matthew I. Ginsberg May 1985 24 p
(Contract N00014-81-K-0004)
(AD-A163049; SU-STAN-CS-85-1064) Avail: NTIS
HC A02/MF A01 CSCL 12/1

Distributed artificial intelligence is the study of how a group of individual intelligent agents can combine to solve a difficult global problem; the usual approach is to split the original problem into simpler ones and to attack each of these independently. This paper discusses in very general terms the problems which arise if the subproblems are not independent, but instead interrelate in

some way. We are led to a single assumption, which we call common rationality, that is provably optimal (in a formal sense) and which enables us to characterize precisely the communication needs of the participants in multi-agent interactions. An example of a distributed computation using these ideas is presented. GRA

N86-25174# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STUDY OF THE EFFECTS OF DISCRETIZING QUANTITATIVE FEEDBACK THEORY ANALOG CONTROL SYSTEM DESIGNS M.S. Thesis
John S. Coucoules Dec. 1985 208 p refs
(AD-A164209; AFIT/GE/ENG/85D-10) Avail: NTIS HC A10/MF A01 CSCL 01/3

This thesis examines the feasibility and a method of extending continuous domain Quantitative Feedback Theory (QFT) flight control system designs to the discrete domain. The results of two previous QFT analog design efforts are modified for a digital implementation. The first design effort is for the KC-135 transport aircraft. Robust analog fixed compensators are designed for three different flight conditions. The second design effort is for the AFTI/F-16 aircraft. In this design, parameter variation is due to both varying flight conditions and different aircraft configurations caused by failed surfaces. GRA

N86-25175 Kansas State Univ., Manhattan.
REAL-TIME ADAPTIVE CONTROL OF A ROBOTIC MANIPULATOR USING THREE-DIMENSIONAL STEREOSCOPIC VISION FEEDBACK Ph.D. Thesis
John Robert Rasure 1985 202 p
Avail: Univ. Microfilms Order No. DA8528024

The tools necessary to analyze adaptive control with vision feedback were built in the simulation phase of the research. The implementation phase of the research validated simulation techniques and also made evident some of the limitations of robot manipular visual navigation. The vision system and control system were mathematically modeled and then simulated with C language computer programs. Modeling the geometry of 3D stereoscopic vision was a three step process: first, a camera model was developed in the form of a homogeneous transform matrix to map object coordinates to image coordinates, then this model was used to design optimal stereo camera configurations, and finally a three-dimensional vision model was developed to efficiently map the coordinates of two images to a 3-D object location. Dissert. Abstr.

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-25176*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUMERICAL APPROXIMATION FOR THE INFINITE-DIMENSIONAL DISCRETE-TIME OPTIMAL LINEAR-QUADRATIC REGULATOR PROBLEM Final Report
J. S. Gibson and I. G. Rosen Mar. 1986 83 p refs Submitted for publication Prepared in cooperation with California Univ., Los Angeles and University of Southern California, Los Angeles
(Contracts NAS1-17070; NAS1-18107; Grants AF-AFOSR-0309-84; AF-AFOSR-0393-84)
(NASA-CR-178081; ICASE-86-15; NAS 1.26:178081) Avail: NTIS HC A05/MF A01 CSCL 12A

An abstract approximation framework is developed for the finite and infinite time horizon discrete-time linear-quadratic regulator problem for systems whose state dynamics are described by a linear semigroup of operators on an infinite dimensional Hilbert space. The schemes included the framework yield finite dimensional approximations to the linear state feedback gains which determine the optimal control law. Convergence arguments are given. Examples involving hereditary and parabolic systems and the vibration of a flexible beam are considered. Spline-based finite element schemes for these classes of problems, together with numerical results, are presented and discussed. Author

N86-25177# National Aeronautics and Space Administration, Washington, D.C.
OPTIMAL QUADRATIC ASYMPTOTIC DESIGN APPROACH AND ITS APPLICATIONS
Yuxian Jiang and Weini Wang May 1986 14 p refs Transl. into ENGLISH from Acta Automatica Sinica (Beijing, China), v. 11, no. 2, Apr. 1985 Transl. by SCITRAN, Inc., Santa Barbara, Calif. Original doc. was prepared by Inst. of Aeronautics, Beijing, China
(Contract NASw-4004)
(NASA-TM-88389; NAS 1.15:88389) Avail: NTIS HC A02/MF A01 CSCL 12A

The determination of weighting matrices by using the expected eigenvalues and eigenvectors in closed loop systems and the method to determine the initial matrix of the iterative solutions to the Riccati algebraic equation by the asymptotic behavior of the optimal regulator were studied. Based on this study, an optimal quadratic asymtotic design approved for linear systems was proposed. A program was written and the experimental results showed that this method is feasible. Author

N86-25178# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A THEORY FOR CLASSIFIED QUANTITIES
Carlos Jose Zamlutti Feb. 1986 19 p refs Submitted for publication
(Contract FINEP-537/CT)
(INPE-3788-PRE/883) Avail: NTIS HC A02/MF A01

A unified theory for classified quantities is proposed. The aim is to establish some mathematical bases with application to all branches of natural sciences. Author

N86-25179# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STATE ESTIMATION PROCEDURE BASED UPON THE DUALITY CONCEPT
Atair Rios Neto and Agenor deToledo Fleury Feb. 1986 6 p refs Presented at TELECON'85, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3796-PRE/891) Avail: NTIS HC A02/MF A01

The development of a new estimator for the approximate estimation of the state of nonlinear dynamic systems is presented. This estimator uses the duality between state estimation and optical control problems to create an adaptive algorithm. This algorithm is then implemented in a digital computer to estimate the orbit of a low Earth orbit satellite under simulated conditions. Numerical results are presented and discussed, as well as the theoretical aspects of the estimation algorithm. Author

N86-25180# National Aeronautical Lab., Bangalore (India). Structures Div.
MECHANICS OF FIELD-CONSISTENCY IN FINITE ELEMENT ANALYSIS: A PENALTY FUNCTION APPROACH
C. Ramesh Babu, G. Subramanian (Indian Inst. of Technology, Madras), and G. Prathap Oct. 1985 53 p refs
(NAL-TM-ST-8514) Avail: NTIS HC A04/MF A01

C(O) continuous beam, plate and shell elements are very popular. In displacement type finite formulations, the difficulties of shear locking, parasite shear, and stress oscillation are rationalized by using field consistency concepts. A priori quantitative error estimate of these difficulties can be made by using an operational procedure, the functional reconstitution technique. The mechanics of these concepts are demonstrated by using the simplest shear flexible beam element as an example. Its a priori projections are verified through digital computations. The rationale behind the use of optimal stress sampling at Gaussian points is derived directly from these arguments. Author

N86-25181# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.

POISSON APPROXIMATION OF BERNOULLI POINT PROCESSES AND THEIR SUPERPOSITIONS, VIA COUPLING
Alan F. Karr and Robert J. Serfling Dec. 1985 16 p refs
(Contract N00014-79-C-0801)
(AD-A163442; TR-458; ONR-TR-85-7) Avail: NTIS HC A02/MF A01 CSCL 12/1

A maximal coupling of a Bernoulli point process on an arbitrary compact space by a Poisson process is constructed. Exact computation of the variation distance between the probability laws follows as a consequence. For certain values of the parameters this coupling yields the optimal Poisson approximation of the given Bernoulli process. A procedure is derived for embedding a triangular array of Bernoulli processes within a single Poisson process. Classical Poisson limit theorems are deduced. Author (GRA)

N86-25182# Stanford Univ., Calif. Dept. of Statistics.
TESTS FOR THE EXTREME VALUE AND WEIBULL DISTRIBUTIONS BASED ON NORMALIZED SPACINGS
R. A. Lockhart, F. OReilly, and M. A. Stephens 19 Dec. 1985 25 p
(Contract N00014-76-C-0475)
(AD-A163566; SU-TR-369) Avail: NTIS HC A02/MF A01 CSCL 12/1

In this article we compare tests of the null hypothesis HC that a sample, which may be censored at one or both ends, comes from an extreme-value distribution with unknown location and scale parameters; such tests can also be used to test that observations come from a Weibull distribution with origin zero, and scale and shape parameters unknown. Such tests of HO are important in many applications, in particular in reliability theory and survival analysis. GRA

N86-25183# Wisconsin Univ., Madison. Mathemnatics Research Center.
CHARACTERIZATION OF THE CONSISTENT WEIGHTED REGRESSION ESTIMATORS Technical Summary Report
Lih-Yuan Deng Sep. 1985 26 p
(Contract DAAG29-80-C-0041)
(AD-A163605; MRC-TSR-2867) Avail: NTIS HC A03/MF A01 CSCL 12/1

The ratio estimator can be justified by a linear superpopulation model without intercept and the error variance proportional to the size of the covariate. If either of the assumptions is violated, then other estimators may be considered. We study the consistency of several estimators which are based on different assumptions about variance structure of the error. Some decompositions of the finite population are introduced. Roughly speaking, we fit a weighted regression line to the finite population with the weight chosen according to the estimator under consideration. We show that any estimators in that class, except the ratio estimator, are inconsistent unless some conditions on the population's characteristics are satisfied. Based on the decomposition, modifications can be made to get a consistent estimator. For the case of p-auxiliary variables, we characterize the class of consistent weighted least squares estimators. The result is extended to the infinite population problem using a completely different approach. GRA

N86-25184# Naval Postgraduate School, Monterey, Calif.
SURFACE CONSTRUCTION FROM PLANAR CONTOURS
Patrick G. Hogan and Michael J. Zyda Jan. 1986 51 p
(AD-A163610; NPS-52-86-002) Avail: NTIS HC A04/MF A01 CSCL 12/1

Many scientific and technical endeavors require the reconstruction of a three-dimensional solid from a collection of two-dimensional contours. One method for this reconstruction involves a procedure whereby individual pairs of contours are mapped together to form triangular surface patches. In this paper, we present an algorithm which not only handles mapping situations of simple, closed contours but also mappings of multiple contours per plane and partial contour mappings. Also included is a discussion of the algorithm's limitations and heuristics. GRA

N86-25185# Naval Postgraduate School, Monterey, Calif.
HIGHER ORDER RESIDUAL ANALYSIS FOR NONLINEAR TIME SERIES WITH AUTOREGRESSIVE CORRELATION STRUCTURES
Peter A. W. Lewis and Anthony J. Lawrance Dec. 1985 27 p
(AD-A163611; NPS-55-85-030) Avail: NTIS HC A03/MF A01 CSCL 12/1

The paper considers nonlinear time series whose second order autocorrelations satisfy autoregressive Yule-Walker equations. The usual linear residuals are then uncorrelated, but not independent, as would be the case for linear autoregressive processes. Two such types of nonlinear model are treated in some detail: random coefficient autoregression and multiplicative autoregression. The proposed analysis involves crosscorrelation of the usual linear residuals and their squares. This function is obtained for the two types of model considered, and allows differentiation between models with the same autocorrelation structure in the same class. For the random coefficient models it is shown that one side of the crosscorrelation function is zero, giving a useful signature of these processes. The non-zero features of the other side of the crosscorrelations are informative of the higher order dependency structure. In applications this residual analysis requires only standard statistical calculations, and extends rather than replaces the usual second order analysis. GRA

N86-25186# Wisconsin Univ., Madison. Mathematics Research Center.
THE CHINESE REMAINDER PROBLEM AND POLYNOMIAL INTERPOLATION Technical Summary Report
I. J. Schoenberg Nov. 1985 10 p
(Contract DAAG29-80-C-0041)
(AD-A163626; MRC-TSR-2889) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Chinese Remainder Problem (Ch.R.P) is to find an integer x such that x = a sub i(mod m sub i) (i=1,...,n), where mi are pairwise relatively prime moduli and a sub i are given integers. In the 1950's I learnt orally from Marcel Riesz that the CH.R.P. is an analogue of the polynomial interpolation problem P(x sub i) = Y sub i(i=1,...,n), P(x) is a subset of pi sub n-1, and that the Ch.R.P. can be solved by an analogue of Lagrange's interpolation formula. The author now adds the remark that the Ch.R.P. can be solved, even more economically, by an analogue of Newton formula using successive divided differences. GRA

N86-25187# Wisconsin Univ., Madison. Mathematics Research Center.
IMPROVED INTERVAL BOUNDS FOR RANGES OF FUNCTIONS Technical Summary Report
L. B. Rall Nov. 1985 22 p
(Contract DAAG29-80-C-0041)
(AD-A163627; MRC-TSR-2888) Avail: NTIS HC A02/MF A01 CSCL 12/1

Evaluation of a real function f on an interval X using interval arithmetic yields an interval extension F(X) containing the range R(f;X) of f on X. Unfortunately, F(X) is sometimes excessively wider than R(f;X). Evaluation of f epsilon C1 by interval differentiation arithmetic gives F(X) and the extension F'(X) of f' on X. If F'(X) > 0 (or F'(X) < 0), then f is monotone on X = (a,b), and R(f;X) = (f(a), f(b)) (or R(f;X) = (f(b), f(a))), giving improved bounds for R(f;X). If 0 epsilon int(F'(X)), then X is divided into subintervals on which f is either guaranteed to be monotone or has possible extremal points. A Pascal-SC program for this simple algorithm is given, and numerical results are presented. As a byproduct of the computation, possible extremal points of f are isolated. GRA

N86-25188# Wisconsin Univ., Madison. Mathematics Research Center.
MAXIMUM LIKELIHOOD RECURSION AND STOCHASTIC APPROXIMATION IN SEQUENTIAL DESIGNS Technical Summary Report
C. F. J. Wu Nov. 1985 22 p
(Contract DAAG29-80-C-0041)
(AD-A163628; MRC-TSR-2890) Avail: NTIS HC A02/MF A01

CSCL 12/1

When the saving of sample size is an important consideration, sequential design of experiments is often used. By efficiently utilizing the information in the past experiments, it determines how the next experiment should be conducted. Statistical theory for sequential designs has been developed for normal and binomial variations. For the problem of determining the solution of an unknown nonlinear equation, we have developed a class of sequential design procedures that can handle very general variations described by the generalized linear models. In special cases it includes a new adaptive version of the Robbins-Monro stochastic approximation and a maximum likelihood recursion scheme for quantal responses. Its relation to the stochastic approximation and the role the link function plays are studied. Theoretical issues such as consistency, robustness, asymptotic normality and second-order properties are discussed. GRA

N86-25189# Wisconsin Univ., Madison. Mathematics Research Center.

REMARKS ON THE EXISTENCE AND UNIQUENESS OF UNBOUNDED VISCOSITY SOLUTIONS OF HAMILTON-JACOBI EQUATIONS Technical Summary Report

Michael G. Crandall and Pierre-Louis Lions Oct. 1985 34 p refs
(Contract DAAG29-80-C-0041)
(AD-A163701; MRC-TSR-2875) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper is concerned with various questions about the existence and uniqueness of solutions of Hamilton-Jacobi equations in RN. The issues treated have to do with the interaction between structure properties of the Hamiltonian (in particular, continuity and growth properties), properties of the solutions and the existence and uniqueness. Uniqueness is exhibited in appropriate growth classes depending on the Hamiltonian and existence is exhibited in these classes when the assumptions are slightly strengthened. Existence results are also given under assumptions for which uniqueness fails, existence of minimal solutions is shown given the existence of a subsolution, and examples are given to indicate the sharpness of some of the results. GRA

N86-25190# Wisconsin Univ., Madison. Mathematics Research Center.

CONVERGENCE OF CUBIC SPLINE INTERPOLATION WITH THE NOT-A-KNOT CONDITION Technical Summary Report

Carl DeBoor Oct. 1985 9 p refs
(Contract DAAG29-80-C-0041)
(AD-A163705; MRC-TSR-2876) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is shown that cubic spline interpolation with the Not-A-Knot side condition converges to any C squared without any mesh-ratio restriction as the mesh size goes to zero. GRA

N86-25191# Wisconsin Univ., Madison. Mathematics Research Center.

A PROOF OF GRACE'S THEOREM BY INDUCTION Technical Summary Report

A. W. Goodman and I. J. Schoenberg Oct. 1985 11 p refs
(Contract DAAG29-80-C-0041)
(AD-A163714; MRC-TSR-2874) Avail: NTIS HC A02/MF A01 CSCL 12/1

Grace's theorem states: Let the polynomials be apolar. If the circular region C contains all the zeros of A(z), then C must contain at least one of the zeros of B(z). By a circular region is meant either the closed interior of a circle, or the closed exterior of a circle, or a closed half-plane. This document gives a proof of Grace's theorem by mathematical induction on the degree n. GRA

N86-25192# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A COMPARISON OF ESTIMATION TECHNIQUES FOR THE THREE PARAMETER PARETO DISTRIBUTION M.S. Thesis

Dennis J. Charek Dec. 1985 121 p refs
(AD-A163831; AFIT/GSO/MA/85D-3) Avail: NTIS HC A06/MF A01 CSCL 12/1

The purpose is to compare the minimum distance estimation technique with the best linear unbiased estimation technique to determine which estimator provides more accurate estimates of the underlying location and scale parameter values for a given Pareto distribution. Two forms of the Kolmogorov, Anderson-Darling, and Cramer-von Mises minimum distance estimators are tested. A Monte Carlo methodology is used to generate the Pareto random variates and the resulting estimates. A mean square error comparison is then performed to evaluate which estimator provides the best results. Additionally, various sample sizes and shape parameters are also used to determine whether they have an influence on a given estimator's performance. GRA

N86-25193# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

MODIFIED KOLMOGOROV-SMIRNOV, ANDERSON-DARLING, AND CRAMER-VON MISES TESTS FOR THE PARETO DISTRIBUTION WITH UNKNOWN LOCATION AND SCALE PARAMETERS M.S. Thesis

James E. Porter, III Dec. 1985 184 p refs
(AD-A163837; AFIT/GSO/MA/85D-6) Avail: NTIS HC A09/MF A01 CSCL 12/1

This thesis develops goodness-of-fit tests for the Pareto distribution by generating critical value tables for the modified Kolmogorov-Smirnov, Anderson-Darling, and Cramer-von Mises statistics. These tables can be used to test whether a set of observed values follows a Pareto distribution when the location and scale parameters are unspecified and must be estimated from the observed sample data. Additionally, the power of each of the three goodness-of-fit tests is studied and compared. Finally, the functional relationship between the critical values and the Pareto shape parameter is determined. GRA

N86-25194# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A NEW METHOD FOR COMPUTING THE GENERALIZED INVERSES OF A MATRIX AND ITS APPLICATION TO THE LYAPUNOV MATRIX EQUATION M.S. Thesis

Craig F. Murray Dec. 1985 132 p refs
(AD-A163840; AFIT/GOR/MA/85D-2) Avail: NTIS HC A07/MF A01 CSCL 12/1

This thesis examines a new method for computing four generalized inverses of a matrix. This method, the ST method, is based on the careful selection of a sequence of matrix multiplications and partitionings which provide a new foundation for computing four generalized inverses. Central to this approach is the partitioning of the two submatrices, R and C, where the product of their submatrices will give the generalized inverses of interest. Thus using this new representation, the generalized inverses of a matrix can be computed in a simple and direct manner. In this work, four generalized inverses are derived and computed in a systematic manner from this representation. These results are strongly tied to the solution of the matrix equation Ax=b where the general solution is given in terms of this new representation and computational technique. The computational technique is presented with an example and also as an algorithm. Included with the algorithm is an analysis of its computer implementation. The use of one generalized inverse is used to find the solution of a Lyapunov matrix equation. GRA

N86-25195# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

SOLUTIONS OF NONLINEAR MATRIX EQUATIONS M.S. Thesis

Bruce W. Colletti Dec. 1985 116 p refs
(AD-A163841; AFIT/GOR/MA/85D-1) Avail: NTIS HC A06/MF A01 CSCL 12/1

This thesis seeks the solutions to a system of equations (equalities) in n variables by expressing the system in matrix algebraic form. Properties of the solutions to the ensuing matrix equation are investigated using similarity transformations. The three types of matrix equations to be studied are: the linear equation - AX = b; the Lypunov equation - AX - XB = C; the second-order

Riccati equation - XDX + AX + XB + C = 0; and the third-order Riccati equation = XAXBX + XCX + DX + XE + F = 0. Because adding and multiplying matrices (having multivariate polynomial entries) is tedious in practice, an interactive BASIC program is presented in the appendix. This program, which can be used on a personal computer, permits the user to perform operations on matrices having multivariate polynomial entries.

GRA

N86-25196# Ballistic Research Labs., Aberdeen Proving Ground, Md.

A FUZZY SET APPROACH TO VULNERABILITY ANALYSIS

AD-A163921 BRL-TR-2697 HC A03/MF A01

Palmer R. Schlegel, Ralph E. Shear, and Malcolm S. Taylor Dec. 1985 37 p refs

(AD-A163921; BRL-TR-2697) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document illustrates how vagueness or uncertainty can be modeled by fuzzy sets and how this uncertainty is reflected in the final measure of vulnerability. Its emphasis will be on the computation of vulnerable area of a surrogate system with uncertainty present in the cell probabilities. The uncertainty in the cell probabilities can be attributed to uncertainty in assigning component kill probabilities, to error in engineering judgement in determining critical areas of components and component kill criteria and to unknown synergistic effects. Other contributions to uncertainty are of course present, starting from the target description through a myriad of subjective decisions and engineering judgements inherent in the vulnerability analysis. For the purpose of completeness and comparison, a point estimate of the vulnerable area of the surrogate system will also be determined as it is currently done in vulnerability analysis. A point and interval estimate of the vulnerable area will be determined by a statistical procedure known as bootstrapping. Finally, a fuzzy vulnerable area will be calculated and the different approaches compared.

Author (GRA)

N86-25197# Massachusetts Univ., Amherst.

[CONNECTING MATHEMATICS, SCIENCE AND HIGH TECHNOLOGY: RESEARCH ON SOLUTIONS TO NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS, BIFURCATION PHENOMENA, AND CONSTRUCTIVE METHODS FOR IMPLEMENTING THE CALCULUS OF VARIATIONS FOR RELEVANT, PHYSICAL PROBLEMS] Final Report, 29 Jan. 1984 - 28 Jul. 1985

M. S. Berger 4 Sep. 1985 4 p

(Grant AF-AFOSR-0059-84)

(AD-A162827; AFOSR-85-1109TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The titles of eleven research papers written by an Air Force investigator are as follows: Vortex Phenomena; Some Nonlinear Analytic Aspects of VLSI Semiconductor Device Modeling; The Confinement Problem in Nonlinear Gauge Theories and New Ideas in the Calculus of Variations in the Large; and Variational Principles for Equilibrium Figures of Fluid Without Symmetry Assumptions.

GRA

N86-25198# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

NUMERICAL GRID GENERATION FOR PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS USING MARCHING TECHNIQUES M.S. Thesis

Steven G. Miller Dec. 1985 142 p refs

(AD-A164020; AFIT/GA/AA/85D-7) Avail: NTIS HC A07/MF A01 CSCL 20/4

Two- and three-dimensional surface normal grids are generated in Cartesian coordinates around a supersonic/hypersonic waverider configuration using parabolic partial differential equations. The elliptic partial differential equations for grid generation are parabolized in the xi direction in two dimesions, and in the xi and zeta directions in three dimensions. This is consistent with spatial marching flow solutions. The parabolized grid equations march in the xi direction for two dimensions and in both the xi and zeta directions for three dimensions, without iteration. The following problems are investigated: describing the boundary points, generating grids around the waverider's wing tip, using approximations to the elliptic grid generation equations too far downstream around a convex corner, and grid crossover in concave regions when orthogonality is specified. The degree of grid smoothing in the marching directions is related to the positioning of the approximations to the elliptic grid generation equations. Highly stretched surface orthogonal grids are accurately and efficiently generated without grid embedding for high Reynold's number flows.

GRA

N86-25199# Naval Postgraduate School, Monterey, Calif.

ABSOLUTE BOUNDS ON SET INTERSECTION AND UNION SIZES FROM DISTRIBUTION INFORMATION

Neil C. Rowe Sep. 1985 51 p refs

(AD-A164025; NPS52-85-014) Avail: NTIS HC A04/MF A01 CSCL 09/2

Estimation of set intersection and union sizes is important for access method selection for a database. Absolute bounds on sizes are often much easier to compute than size estimates, requiring no distributional or independence assumptions, and can answer many of the same needs. We present a large compendium of quick closed-form bounds on set intersection and union sizes, each applying to a different situation; they can be expressed as rules, and managed by rule-based or knowledge-base architecture. These methods use general-purpose statistics precomputed on the data, and exploit homomorphisms (onto mappings) of the data items onto distributions that can be more easily analyzed. Our methods can be used anytime, but tend to work best when there are strong or complex correlations in the data. This circumstance is poorly addressed by the standard methods of independence-assumption and distributional-assumption estimates, and hence our methods fill a need.

GRA

N86-25200# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

PRELIMINARY KALMAN FILTER DESIGN TO IMPROVE AIR COMBAT MANEUVERING TARGET ESTIMATION FOR THE F-4E/G FIRE CONTROL SYSTEM M.S. Thesis

Ross B. Anderson Dec. 1985 449 p refs

(AD-A164034; AFIT/GE/ENG/85D-2) Avail: NTIS HC A19/MF A01 CSCL 19/5

Currently, the F-4E/G uses a Wiener-Hopf filter for estimating target position, velocity, and acceleration during air combat maneuvering. As implemented, the errors between the actual target variables and the estimate of these variables are too large. The purpose of this study is to evaluate the feasibility of replacing the Wiener-Hopf filter with a Kalman filter in order to obtain better estimates. The evaluation is made by first designing an appropriate preliminary design Kalman filter and then testing the design through a Monte Carlo computer simulation analysis. The computer simulation results indicate that the Kalman filter is capable of significantly outperforming the Wiener-Hopf filter and as such should be developed into a final design. The Kalman filter contains nine states (three relative target position, three total target velocity, and three total target acceleration states). Filter propagation is based on linear time-invariant dynamics primarily because of the limited capabilities of the on-board aircraft computer. The linear dynamics permits propagation by a state transition matrix. Discrete-time sampled-data designs are included.

Author (GRA)

N86-25201 Texas Univ., Austin.

MOTION IN THE RESTRICTED PROBLEM OF THREE BODIES FOR SMALL VALUES OF THE MASS PARAMETER Ph.D. Thesis

Ronald Glenn Hopkins 1985 219 p

Avail: Univ. Microfilms Order No. DA8527579

Many applications of the restricted problem of three bodies involve planetary systems, asteroids, or ring particles, where the mass parameter is extremely small in value. The third body moves about the larger primary on an approximately circular orbit, perturbed by the smaller primary. The nonlinear differential equations of motion for such an orbit may be written in terms of

deviations from a constant reference orbit. By performing an expansion in the dependent variables and truncating terms of second order and higher, a set of linear, inhomogeneous differential equations of motion is produced. Using an infinite series expansion, an analytic solution is obtained which describes the motion of the third body. The necessary initial conditions are derived from those of the circular restricted problem, along with the constants which define the reference orbit. The solution is rewritten in a simpler and more readily usable form. An analysis is performed of the types of motion resulting from different initial conditions and values of the mass parameter. The special conditions required to produce mixed secular, rather than periodic motion, are also discussed, along with examples of such orbits. Dissert. Abstr.

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-25202# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
KALMAN FILTERING STATE NOISE ADAPTIVE ESTIMATION
Atair Rios Neto and Helio Koiti Kuga Feb. 1986 6 p refs
Presented at TELECON '85, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3790-PRE/885) Avail: NTIS HC A02/MF A01

In the presence of estimates divergence due to errors in system dynamics modelling and to algorithm numerical ill-conditioning, Kalman filter usefulness is serously impaired. A procedure to estimate the state noise level adaptively and in real time in order to represent the errors and to prevent divergence is proposed. The adequate noise level is adjusted by using a criterion of statistical consistency between estimated errors and observation residues. Results of preliminary tests, in the case of artificial satellite orbit determination in real time, are presented and show the procedure capability of avoiding divergence and of giving results of acceptable accuracy. Author

N86-25203# Wisconsin Univ., Madison. Mathematics Research Center.
BIAS AND EFFICIENCY OF THE CONSISTENT WEIGHTED REGRESSION ESTIMATORS IN FINITE POPULATION SAMPLING HC A03/MF A01 Technical Summary Report
Lih-Yuan Deng Sep. 1985 27 p
(Contract DAAG29-80-C-0041)
(AD-A163601; MRC-TSR-2870) Avail: NTIS HC A03/MF A01 CSCL 12/1

The leading terms of the bias of the ratio and regression estimators are known to be of order n to the minus 1 power. We use a finite population decomposition to give a different expression for the leading term of the bias. Fitting a regression line to the finite population, we show that the intercept of the regression line causes the bias of the ratio estimator. Fitting a quadratic regression to the finite population, we show that the bias of the regression estimator is caused by the quadratic term. We also give a compact and intuitive formula for the leading term of the bias of the weighted regression estimators for p-auxiliary variables. Using the same decomposition, we can rewrite the variance formula of some popular estimators in terms of some simple and interpretable population characteristics. We prove that under simple random sampling scheme the unweighted regression estimator is the most efficient estimator. The extension for the p-auxiliary variates is also given. GRA

N86-25204# Florida State Univ., Tallahassee. Dept. of Statistics.
A TEST FOR PROGRAM EFFECT IN THE ABSENCE OF A PROPER CONTROL GROUP
Eric S. Tollar Sep. 1985 19 p refs
(Contract DAAG29-82-K-0168)
(AD-A163783; FSU-STATISTICS-M710; TR-D-81-ARO; ARO-19367.33-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

A statistical method is proposed to analyze certain designs for program effect when no proper control group is present. It is shown that under certain partially verifiable assumptions the data can be analyzed by standard analysis of variance techniques. If these assumptions are doubtful, then a statistic is proposed which is shown to have an asymptotic t distribution. The analysis is then carried out on some research data. GRA

N86-25205# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A COMPARISON OF ESTIMATION TECHNIQUES FOR THE TWO PARAMETER CAUCHY DISTRIBUTION M.S. Thesis
John O. Sours Dec. 1985 101 p refs
(AD-A163833; AFIT/GSO/MA/85D-7) Avail: NTIS HC A06/MF A01 CSCL 12/1

Minimum distance estimators are compared to the maximum likelihood estimator of the location and scale parameters of the two parameters Cauchy distribution. Statistical sample sizes of 6,8,10,12, and 16 are randomly drawn from a Cauchy distribution and used to estimate the parameters by the maximum likelihood method. Minimum distance techniques are then used to try to improve upon the maximum likelihood estimates. One thousand samples for each sample size are generated and the mean squared error and relative efficiencies are computed. Comparison of the two methods is done by comparing the relative efficiencies. Both censored and non-censored samples are used to compute the minimum distance estimates. GRA

N86-25206# Ballistic Research Labs., Aberdeen Proving Ground, Md.
INTRODUCTION TO KERNEL DENSITY ESTIMATION Final Technical Report
Wendy A. Winner Dec. 1985 90 p refs
(AD-A163920; BRL-TR-2705) Avail: NTIS HC A05/MF A01 CSCL 12/1

Kernel density estimators are one technique for producing nonparametric estimates of a sample's underlying probability density function. Although there are numerous kernel functions, the reader is only introduced to the Gaussian, truncated Gaussian, mode centering Lognormal and median centering Lognormal kernels. These kernels are applied to two samples from the Fire Support Team (FIST) Force Development Testing and Experimentation 2 conducted by the US Army Field Artillery Board (Fort Sill, OK), at Fort Riley, KS, during April and May 1984. Analysis of the performance of the Gaussian and truncated Gaussian kernels is achieved by applying a recursive formula, developed by Richard A. Tapia and James R. Thompson, optimizing the kernel function's smoothing parameter for the FIST FDT&E II samples and for Monte Carlo simulations. Author (GRA)

N86-25207# Stanford Univ., Calif. Lab. for Computational Statistics.
EXPLORATORY PROJECTION PURSUIT
Jerome H. Friedman Nov. 1985 45 p
(Contract N00014-83-K-0472)
(AD-A163019; SU-LCS-TR-18) Avail: NTIS HC A03/MF A01 CSCL 12/1

Exploratory projection pursuit is concerned with finding relatively highly revealing lower dimensional projections of high dimensional data. The intent is to discover views of the multivariate data set that exhibit nonlinear effects clustering, concentrations near nonlinear manifolds - that are not captured by the linear correlation structure. A new algorithm for this purpose is presented that has both statistical and computational advantages over previous methods. A connection to density estimation is established. Examples are presented and issues related to practical application are discussed. GRA

N86-25208# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MODIFIED KOLMOGOROV-SMIRNOV, ANDERSON-DARLING, AND CRAMER-VON MISES TEST FOR THE CAUCHY DISTRIBU-

TION WITH UNKNOWN LOCATION AND SCALE PARAMETERS M.S. Thesis
Frank Ocasio Dec. 1985 56 p refs
(AD-A164204; AFIT/GSO/MA/85D-5) Avail: NTIS HC A04/MF A01 CSCL 12/1

The Kolmogorov-Smirnov, Anderson-Darling, and Cramer-von Mises critical values are generated for the Cauchy distribution. The critical values are used for testing the null hypothesis that a set of observations follow a Cauchy distribution when the location and scale parameters are unknown and estimated from the sample. A Monte Carlo simulation, using 5000 repetitions, was used to generate the critical values for sample sizes of 5(5)30 and 50. A power study was performed using Monte Carlo simulation for the Kolmogorov-Smirnov, Anderson-Darling, and Cramer-von Mises goodness of fit tests. Sample sizes of 5, 15, 25 and 50 were used for six alternate distributions, for alpha levels of .05 and .01. Analyzing by sample size shows very poor power for a sample size of five. As the sample size increases so does the power, so that at a sample size of fifty, the powers against three of the six distributions is .5 or better. Among the three tests, the Kolmogorov-Smirnov is consistently more powerful, regardless of sample size or alpha level. Author (GRA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-25209# Wisconsin Univ., Madison. Mathematics Research Center.
A CONVERGENCE THEOREM FOR NEWTON'S METHOD IN BANACH SPACES Technical Summary Report
Tetsuro Yamamoto Oct. 1985 26 p
(Contract DAAG29-80-C-0041)
(AD-A163625; MRC-TSR-2879) Avail: NTIS HC A03/MF A01 CSCL 12/1

To find sharper error bounds for iterative solution of nonlinear equations under assumptions as weak as possible is of basic importance in numerical analysis. This paper gives a convergence theorem for Newton's method in Banach spaces which improves the theorems of Kantorovich, Lancaster and Ostrowski. The error bounds obtained improve the recent results of Potra. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-25210# Naval Surface Weapons Center, Silver Spring, Md.
UNIFORM TRANSVERSE MAGNETIC FIELD INSIDE A LONG CYLINDER
K. T. Nguyen and H. S. Uhm 17 Sep. 1985 13 p refs
(AD-A163459; AD-E401440; NSWC/MP-85-466) Avail: NTIS HC A02/MF A01 CSCL 20/3

For applications where uniform transverse magnetic field is required over a substantial distance, the use of dipole magnets can be quite cumbersome. This illustrative article presents a simple technique to achieve a uniform and uniaxial transverse magnetic field inside a long cylinder, which can be easily carried out. GRA

N86-25211# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE TWO-PHASE STEFAN PROBLEM WITH INTERFACIAL ENERGY AND ENTROPY Technical Summary Report
Morton E. Gurtin Dec. 1985 70 p refs
(Contracts DAAG29-82-K-0002; DAAG29-80-C-0041; Grant NSF DMS-84-04116)
(AD-A163715; MRC-TSR-2894) Avail: NTIS HC A04/MF A01 CSCL 20/13

The classical Stefan theory for the melting of a solid or the freezing of a liquid is too simplistic to describe phenomena such as supercooling, in which a liquid supports temperatures below its freezing point, or superheating, the analog for solids, or dendritic growth, in which simple shapes evolve to complicated tree-like structures. This paper develops a general theory for two-phase phenomena of this type. It develops partial differential equations satisfied in the phase regions and free-boundary conditions satisfied on the interface between phases, and gives arguments which indicate that the resulting boundary-value problems predict the formation of dendrites. GRA

N86-25212# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
QUANTUM THEORY OF ION MOTION AND LASER COOLING IN A RADIO FREQUENCY QUADRUPOLE TRAP M.S. Thesis
Ann Laurie Wells Dec. 1984 51 p refs
(AD-A163838; AFIT/GEP/PH/84D-12) Avail: NTIS HC A04/MF A01 CSCL 07/4

The problem of ion motion and laser cooling in a radio frequency quadrupole trap is considered. It is shown by a simple numerical calculation that for ion motion in the absence of laser cooling the effect of the time varying potential v(R-bar)cos(Omega x t) can be approximated by a time independent effective potential whenever the frequency of oscillation of the electric field, Omega is sufficiently greater than a resonant frequency, (Omega)squared = (sq. root of (2) times eVo)/M were e is the electronic charge, Vo is the maximum potential applied to the trap electrodes, and M is the mass of the ion. Equations for the Hamiltonian matrix elements in the presence of laser cooling, in the Lambe-Dicke limit are derived and studied to determine the cooling transitions. The equations of motion for the density matrix in the Lambe-Dicke limit are derived using a simple representation of spontaneous emission. Author (GRA)

N86-25213# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELECTRON MICROSCOPY OBSERVATION OF ELECTRO-TRANSPORT M.S. Thesis
James V. Maskowitz and William E. Rhoden Dec. 1985 181 p refs
(AD-A164107; AFIT/GE/ENG/85D-25) Avail: NTIS HC A09/MF A01 CSCL 20/3

An investigation of electromigration has resulted in the development of apparatus and test vehicles for use in conducting research in situ both in the scanning and transmission electron microscope (SEM and TEM) respectively. The unique design of test vehicles and modification of equipment allows for the experimental use of a prototype Joule-Thompson microminiature refrigerator. The refrigerator inside the SEM allows for the direct observation of electromigration experiments while controlling the temperature of the test vehicle. Research was performed in a temperature range lower than any previous effort (93K to 373K). Results agree with published literature. The patent-pending design and fabrication of the TEM specimen probe and its associated test vehicles provides the means for conducting in situ research into the crystalline structures and crystallographic changes associated with electromigration. The design provides the previously unattainable ability to monitor structure changes during the electromigration process in a non-contaminating environment which exists in the TEM. Results agree with published literature. GRA

N86-25214 Texas Univ., Austin.
PARTICLE SIMULATION OF LOW FREQUENCY FLUCTUATIONS IN A SHEARED MAGNETIC FIELD Ph.D. Thesis
Richard Dwayne Sydora 1985 286 p
Avail: Univ. Microfilms Order No. DA8527654

The tools of particle simulation are used to investigate the physics of density gradient-driven low frequency fluctuations in a sheared magnetic field. This is important for the understanding of anomalous plasma losses in toroidal confinement devices. Two types of fluctuations are studied. The first is the electrostatic drift wave in a sheared magnetic field. The existence of absolutely stable drift wave eigenmodes, localized about a single mode rational surface, is established in the sheared slab geometry. From the simulation results in the strong shear limit the eigenmode frequency and mode structure agree with the linear theory. The second kind of fluctuation studied is the resistive interchange (g) mode in a sheared magnetic field. The saturation and nonlinear evolution of the instability is compared in single and multiple rational surface configurations. Dissert. Abstr.

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*

N86-25215*# Bionetics Corp., Hampton, Va.
PREDICTION OF THE FAR FIELD NOISE FROM WIND ENERGY FARMS
Kevin P. Shepherd and Harvey H. Hubbard Apr. 1986 34 p refs
(Contract NAS1-16978)
(NASA-CR-177956; NAS 1.26:177956) Avail: NTIS HC A03/MF A01 CSCL 20A

The basic physical factors involved in making predictions of wind turbine noise and an approach which allows for differences in the machines, the wind energy farm configurations and propagation conditions are reviewed. Example calculations to illustrate the sensitivity of the radiated noise to such variables as machine size, spacing and numbers, and such atmosphere variables as absorption and wind direction are presented. It is found that calculated far field distances to particular sound level contours are greater for lower values of atmospheric absorption, for a larger total number of machines, for additional rows of machines and for more powerful machines. At short and intermediate distances, higher sound pressure levels are calculated for closer machine spacings, for more powerful machines, for longer row lengths and for closer row spacings. E.A.K.

N86-25216*# United Technologies Research Center, East Hartford, Conn.
HELICOPTER ROTOR NOISE DUE TO INGESTION OF ATMOSPHERIC TURBULENCE Final Report
John C. Simonich, Roy K. Amiet, Robert H. Schlinker, and Edward M. Greitzer (Massachussetts Inst. of Technology, Cambridge) Washington NASA May 1986 150 p refs
(Contract NAS1-17096)
(NASA-CR-3973; NAS 1.26:3973) Avail: NTIS HC A07/MF A01 CSCL 20A

A theoretical study was conducted to develop an analytical prediction method for helicopter main rotor noise due to the ingestion of atmospheric turbulence. This study incorporates an atmospheric turbulence model, a rotor mean flow contraction model and a rapid distortion turbulence model which together determine the statistics of the non-isotropic turbulence at the rotor plane. Inputs to the combined mean inflow and turbulence models are controlled by atmospheric wind characteristics and helicopter operating conditions. A generalized acoustic source model was used to predict the far field noise generated by the non-isotropic flow incident on the rotor. Absolute levels for acoustic spectra and directivity patterns were calculated for full scale helicopters, without the use of empirical or adjustable constants. Comparisons between isotropic and non-isotropic turbulence at the rotor face demonstrated pronounced differences in acoustic spectra. Turning and contraction of the flow for hover and low speed vertical ascent cases result in a 3 dB increase in the acoustic spectrum energy and a 10 dB increase in tone levels. Compared to trailing edge noise, turbulence ingestion noise is the dominant noise mechanism below approximately 30 rotor harmonics, while above 100 harmonics, trailing edge noise levels exceed turbulence ingestion noise by 25 dB. Author

N86-25217*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ESTIMATE OF THE ENROUTE NOISE OF AN ADVANCED TURBOPROP AIRPLANE NASA-TM-87302 E-3020 NAS 1.15: 87302 HC A02/MF A01
James H. Dittmar Apr. 1986 24 p refs
(NASA-TM-87302; E-3020; NAS 1.15:87302) Avail: NTIS HC A02/MF A01 CSCL 20A

The enroute noise of an Advanced Turboprop powered aircraft was estimated. The measured noise levels were roughly equivalent in annoyance to the noise 15.24 m from an automobile traveling at 80 km/h. It is felt that these levels would not illicit noise complaints from urban areas during the day but might be a slight annoyance in rural areas or in urban areas at night. Although it is not felt that the enroute noise is a major problem, it is indicated that a reduction in the enroute noise could improve the acceptability of advance turboprop airplanes. Author

N86-25218*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN EXPERIMENTAL INVESTIGATION OF REDUCING ADVANCED TURBOPROP CABIN NOISE BY WING SHIELDING
James H. Dittmar 1986 37 p refs Presented at the 10th Aeroacoustics Conference, Seattle, Wash., 9-11 Jul. 1986; sponsored by AIAA
(NASA-TM-87112; E-2713; NAS 1.15:87112) Avail: NTIS HC A03/MF A01 CSCL 20A

An experimental investigation was undertaken to determine if wing shielding could reduce the noise impacting the fuselage of an advanced turboprop airplane. Four wings were tested behind two eight-bladed propeller models. Significant shielding of the propeller noise was observed and a particular wing-propeller geometry was identified to provide the most shielding. Specifically, an up-inboard rotation would be needed for a low-wing airplane and a down-inboard rotation for a high-wing airplane. As the axial Mach number was increased, the position where the shielding starts moved farther downstream. This shift in the start of shielding was roughly a straight line with respect to Mach number between $M = 0.7$ and $M = 0.8$. At $M = 0.85$ the start of shielding does not shift any farther downstream. A simple barrier noise-reduction model gave the same trends with transducer positions as did the data, and, if corrected for Mach number shift, the model might be used to provide estimates of the wing shielding. Besides providing a barrier to the noise reaching the shielded area, the wing also reflects some of the noise back onto the unshielded area. This can make the noise difference between the unshielded and shielded areas of the fuselage larger than would be expected by simple wind shielding. Author

N86-25219*# United Technologies Corp., East Hartford, Conn.
JET SHIELDING OF JET NOISE Final Report
John C. Simonich, Roy K. Amiet, and Robert H. Schlinker Washington NASA Apr. 1986 182 p refs
(Contract NAS1-16689)
(NASA-CR-3966; NAS 1.26:3966) Avail: NTIS HC A09/MF A01 CSCL 20A

An experimental and theoretical study was conducted to develop a validated first principle analysis for predicting the jet noise reduction achieved by shielding one jet exhaust flow with a second, closely spaced, identical jet flow. A generalized fuel jet noise analytical model was formulated in which the acoustic radiation from a source jet propagates through the velocity and temperature discontinuity of the adjacent shielding jet. Input

variables to the prediction procedure include jet Mach number, spacing, temperature, diameter, and source frequency. Refraction, diffraction, and reflection effects, which control the dual jet directivity pattern, are incorporated in the theory. The analysis calculates the difference in sound pressure level between the dual jet configuration and the radiation field based on superimposing two independent jet noise directivity patterns. Jet shielding was found experimentally to reduce noise levels in the common plane of the dual jet system relative to the noise generated by two independent jets. Author

N86-25220*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRCRAFT NOISE PREDICTION PROGRAM THEORETICAL MANUAL: PROPELLER AERODYNAMICS AND NOISE
William E. Zorumski, ed. and Donald S. Weir, ed. (PRC Kentron, Inc., Hampton, Va.) Jun. 1986 256 p refs 3 Vol.
(NASA-TM-83199; L-15937; NAS 1.15:83199) Avail: NTIS HC A12/MF A01 CSCL 20A

The prediction sequence used in the aircraft noise prediction program (ANOPP) is described. The elements of the sequence are called program modules. The first group of modules analyzes the propeller geometry, the aerodynamics, including both potential and boundary-layer flow, the propeller performance, and the surface loading distribution. This group of modules is based entirely on aerodynamic strip theory. The next group of modules deals with the first group. Predictions of periodic thickness and loading noise are determined with time-domain methods. Broadband noise is predicted by a semiempirical method. Near-field predictions of fuselage surface pressrues include the effects of boundary layer refraction and scattering. Far-field predictions include atmospheric and ground effects. Author

N86-25221# Naval Underwater Systems Center, New London, Conn.
EFFECTS OF CONVERGENCE ZONE MULTIPATH ON CROSS-CORRELATION
Walter S. Hauck, III, E. R. Robinson, and Azizul H. Quazi 7 Jan. 1986 18 p refs
(AD-A163650; NUSC-TD-7563) Avail: NTIS HC A02/MF A01 CSCL 20/1

The object of the current study is to examine the effect of CZ multipath on cross-correlation of frequency hopped pulses. The sensitivity of the correlation to source or receiver depth and the location of the source within a convergence zone is examined using the Generic Sonar Model. GRA

N86-25222# Naval Research Lab., Washington, D. C.
A TRANSDUCER FOR BOTTOM-SCATTERING MEASUREMENTS Final Report, Jan. 1981 - Jan. 1982
A. C. Tims, T. A. Henriquez, and J. G. Williams 31 Dec. 1985 25 p refs
(AD-A163987; NRL-MR-5616) Avail: NTIS HC A02/MF A01 CSCL 17/1

An omnidirectional 25-kHz transducer has been designed for use in bottom-scattering measurements. The transducer can be used either as a projector or, when fitted with a preamplifier, as a hydrophone. The requirements for the design are presented and solved with mathematical modeling and analysis. A comparison between theory and measured performance is given. The design of a low-noise preamplifier with integrated circuits is described. GRA

N86-25223 Washington Univ., St. Louis, Mo.
PHASE-INSENSITIVE DETECTION AND THE METHOD OF MOMENTS FOR ULTRASONIC TISSUE CHARACTERIZATION Ph.D. Thesis
Patrick Henry Johnston 1985 287 p
Avail: Univ. Microfilms Order No. DA8529972

This thesis addresses the physics underlying the propagation and detection of ultrasound in the presence of an inhomogeneous medium such as soft tissue. As an approach toward the problem of quantitative characterization of an inhomogeneous medium using ultrasound, experimental methods are explored for extracting information about the medium from changes in the spatial distribution and the frequency content of ultrasonic energy transmitted through or scattered by the medium. Emphasis is placed upon techniques based on phase-insensitive detection implemented by means of a two-dimensional array of point-like receiving elements whose output is characterized using the method of moments. The two-dimensional pseudo-array approach to phase-insensitive detection is demonstrated in a variety of transmission measurements. Dissert. Abstr.

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-25224# Kansas State Univ., Manhattan.
INTRODUCTION TO FREE ATOMS AND PARTICLES
Kenneth J. Klabunde Jan. 1986 25 p refs
(Contract N00014-85-K-0821)
(AD-A163586; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

An introduction to materials, uses, and methods of free atoms and particles is presented. High temperature evaporation methods such as resistive heating, electron beam, lasers, sputtering and magnetron sputtering, and induction heating are discussed. Chemical reactivity patterns of free atoms and particles are outlined. Much data on melting point, boiling point, evaporation temperatures, vapor composition, and films and their uses are given. GRA

N86-25225# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Materials Sci.
POSITRON ANNIHILATION STUDIES OF VERY FINE STRUCTURED MATERIALS Final Report, 1 Jul. - 31 Aug. 1985
Phillip L. Jones 17 Dec. 1985 13 p refs
(Contract DAAG29-85-K-0197)
(AD-A163822; ARO-23141.1-MS) Avail: NTIS HC A02/MF A01 CSCL 20/3

A Fe-Nd-B permanent magnet alloy (Crumax 30) has been evaluated as a function of thermal treatment by means of positron annihilation lifetime spectroscopy. The results of this preliminary study indicate that the room temperature lifetime spectra can be accurately modeled using either a two-component or a partially constrained three-component fit. The thermally-induced variations in lifetime spectra can be correlated with the concomitant decrease in magnetic coercivity in a manner that is consistent with thermally-induced microstructural transformations reported in the literature. The demonstrated sensitivity of positron annihilation lifetime spectroscopy to thermally-induced changes in both microstructure and magnetic coercivity suggests that a more thorough systematic positron annihilation evaluation of Fe-R-B alloys could provide further insight into the relationship between processing, structure and magnetic properties. GRA

N86-25226# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
QUANTUM MECHANICAL ATOMIC ENERGY OPERATOR M.S. Thesis
William Roc White Dec. 1984 75 p refs
(AD-A153839; AFIT/GEP/PH/84D-13) Avail: NTIS HC A04/MF A01 CSCL 20/10

Various forms of the atomic Hamiltonian are examined as the energy operator for an atom in an electromagnetic field, using the semiclassical approach. The unperturbed Hamiltonian and the full atomic Hamiltonian have been favorite choices in the past, but these give different predictions if treated as the energy operator. The A dot p versus r dot e controversy is also examined and clarified. Both choices have conflicts with observations or physical laws. Gauge invariance and the Stark effect are considered. The multipole Hamiltonian is presented and argued as the correct energy operator. Calculations for three photon absorption in a two level atom, using time dependent perturbation theory, yield

significant differences in the predictions for absorption rate and resonant frequency. GRA

N86-25227# Wisconsin Univ., Madison. Dept. of Chemistry.
TIME AND STATE RESOLVED STUDIES OF MOLECULAR DECOMPOSITION Final Report, 1 Aug. 1982 - 31 Jul. 1985
F. F. Crim 12 Dec. 1985 21 p refs
(Contract DAAG29-82-K-0150)
(AD-A163881; ARO-19204.3-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

The combination of laser excitation of overtone vibrations with time resolved spectroscopic detection of reaction products provides uniquely detailed data on the rates and disposal of energy into products in unimolecular decompositions. The decomposition of a cyclic peroxide, tetramethyldioxetane, is the first example of a vibrational overtone initiated reaction studied in a free jet expansion, where the thermal energy content of the reacting molecules is small. Low pressure gas phase data on hydrogen peroxide reveal the partitioning of the excess energy of the reaction in the OH products and provide new data on the vibrational overtone spectroscopy of this molecule. A new molecular beam apparatus has been constructed for extending these studies to a wider range of molecules using additional detection techniques. GRA

N86-25228# Wayne State Univ., Detroit, Mich. Dept. of Physics.
DISSOCIATIVE ELECTRON ATTACHMENT TO ROVIBRATIONALLY EXCITED MOLECULES Annual Technical Report, 1 Aug. 1984 - 30 Sep. 1985
J. M. Wadehra 16 Apr. 1986 11 p
(Grant AF-AFOSR-0143-84)
(AD-A163065; AFOSR-85-1133TR; ATR-1) Avail: NTIS HC A02/MF A01 CSCL 20/8

The aim of this project is to investigate the dependence of the cross sections for dissociative electron attachment to a molecule on the initial rovibrational state of the molecule. An enhancement of the cross section results in the enhancement of the rate of production of negative ion beams. Preliminary investigations reveal that for lithium dimers, Li(2), the peak attachment cross sections can increase by almost an order of magnitude if the molecule is initially vibrationally excited to the v = 1 level. Excitation to higher vibrational levels would result in further enhancement of the attachment rates. As part of present investigations, the cross sections for vibrational excitation of various molecules, using both resonant and nonresonant mechanisms is calculated. GRA

N86-25229# Washington Univ., Seattle. Dept. of Chemistry.
HIGH TEMPERATURE GAS ENERGY TRANSFER Final Summary Report, 1975 - 1985
B. S. Rabinovitch 16 Dec. 1985 11 p
(Contract N00014-75-C-0690)
(AD-A163020) Avail: NTIS HC A02/MF A01 CSCL 20/8

A summary of a report on high temperature gas energy transfer discusses the following topics: (1) development of a new method called the Diffusion Cloud Method for the study of intermolecular vibrational energy transfer in reacting unimolecular systems; (2) development of the theory and method of a new technique called the Variable Encounter Method for the study of sequential vibrational energy transfer between gas molecules and hot surfaces; (3) a critique of the exact vibrational state computational algorithmn of Beyer-Swinehart-Stein-Rabinovitch was given; (4) a theoretical illustration of a model for V-T,R vibrational energy transfer restricted by angular momentum conservation was given; and (5) theoretical treatment of a Boltzmann strong collision model has led to generalizations on energy transfer efficiency as a function of both molecule size ambient temperature and hot molecule energy level. GRA

N86-25230# Washington Univ., Seattle. Dept. of Chemistry.
VIBRATIONAL ENERGY TRANSFER AT A LIQUID GALLIUM SURFACE. ACTIVATION OF UNIMOLECULAR CYCLOBUTENE ISOMERIZATION
D. A. Oswald, W. B. Nilsson, and B. S. Rabinovitch 26 Dec. 1985 17 p
(Contract N00014-75-C-0690)
(AD-A163023; TR-33) Avail: NTIS HC A02/MF A01 CSCL 07/4

Single collision vibrational energy transfer for a canonical ensemble (t=300K) of cyclobutene molecules at a heated liquid gallium surface has been studied from 450K to 700K. Transport above the reaction threshold for isomerization to butadiene (E sub 0 = 32.4 kcal/mole) was used as the criterion for efficiency of vibrational energy accommodation. The efficiency was found to fall below strong collider behavior above 625K. Evidence of surface catalysis became important below 525K. The observed behavior is reminiscent of that found previously for other liquid (Sn) and solid (Au) metal surfaces. GRA

N86-25231# Massachusetts Inst. of Tech., Cambridge.
ENERGY AND CHEMICAL CHANGE Final Report, 1981 - 1985
R. D. Levine and J. L. Kinsey 20 Nov. 1985 15 p refs
(Grant AF-AFOSR-0030-81)
(AD-A164147; AFOSR-86-0030TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The introduction and application of an algebraic approach to molecular structure and dynamics is reviewed. The key points which are discussed are the motivation and basic elements of the formalism, applications to vibrational overtone spectroscopy of triatomic molecules, the interpretation of the approach in geometrical terms, the extension to scattering and to time dependent phenomena, the characterization of quantum chaos, dynamic surprisal synthesis and stochastic processes. GRA

N86-25232# Aerospace Corp., Los Angeles, Calif. Chemistry and Physics Lab.
A QUANTUM MECHANICAL INVESTIGATION OF VIBRATIONAL ENERGY TRANSFER IN O ((3)P) + H SUB 2 O COLLISIONS
Bernard R. Johnson 15 Jan. 1986 24 p refs
(Contract F04701-85-C-0086)
(AD-A164159; TR-0086(6945-04)-2; SD-TR-85-85) Avail: NTIS HC A02/MF A01 CSCL 07/4

Cross sections for the vibrational excitation of H20 in collision with 0(3P) are calculated for relative collision energies of 0.5 to 3.0 eV by the vibrational close-coupling rotational infinite order sudden method using an accurate potential energy surface. The excitation cross sections obtained by this quantum mechanical calculation are compared to results of a recently published quasiclassical trajectory study which used the same potential surface. Very large differences between the quantum mechanical and classical trajectory results are found. GRA

N86-25233# California Univ., Berkeley. Lawrence Berkeley Lab.
SEARCH FOR RIGHT-HANDED CURRENTS BY MEANS OF MUON SPIN ROTATION Ph.D. Thesis
David PHilip Stoker Sep. 1985 141 p
(DE86-002870; LBL-20324) Avail: NTIS HC A07/MF A01

A muon spin rotation (mu SR) technique has been used to place limits on right-handed weak currents in mu(+) decay. A beam of almost 100% polarized surface muons obtained from the TRIUMF M13 beamline was stopped in essentially non-depolarizing > 99.99% pure metal foils. The mu(+) spins were precessed by 70-G or 110-G transverse fields. Decay e(+) emitted within 225 mrad of the beam direction and with momenta above 46 MeV/c were momentum-analyzed to 0.2%. Comparison of the mu SR signal amplitude with that expected for (V-A) decay yields an endpoint asymmetry xi P(sub mu)delta/rho > 0.9951 with 90% confidence. In the context of manifest left-right symmetric models with massless neutrinos the results imply the 90% confidence limits M(W sub 2) > 381 GeV/c(2) and 0.057 < zeta < 0.044, where W sub 2 is a predominantly right-handed gauge boson and zeta is the left-right mixing angle. Limits on M(W sub 2) for M(nu sub mu R) does not equal 0 are also presented. The endpoint asymmetry is used to deduce limits on the nu sub mu L mass and helicity in pi(+) decay, non-(V-A) couplings in helicity projection form, and the mass scale of composite leptons. M.G.

N86-25234# Massachusetts Univ., Amherst.
NUCLEAR STRUCTURE STUDIES BY THE SCATTERING OF MEDIUM-ENERGY ELECTRONS Progress Report, 1 Sep. 1984 - 31 Aug. 1985
G. A. Peterson and R. S. Hicks Sep. 1985 48 p
(Contract DE-AC02-76ER-02853)
(DE86-002265; DOE/ER-02853/24) Avail: NTIS
HC A03/MF A01

The ratio of longitudinal to transverse scattering from various nuclei as part of the high energy program was begun. The electrodisintegration of the deutron, the search for discrete resonances in the continuum of He-4, high momentum transfer of elastic scattering from B-10,C-13, and N-14, and the transverse isoscalar excitation of Mg-24 were studied. Publications were listed and the status of the VAX computer was given. The computer peripherals were described which allow access to the Nuclear Physics computer. B.G.

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-25235# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NUMERICAL SOLUTIONS OF SELECTED PROBLEMS WHICH ARISE IN THE THEORY OF PARTICLE BEAMS M.S. Thesis
James A. Mobley Dec. 1985 106 p refs
(AD-A164041; AFIT/GAE/MA/85D-1) Avail: NTIS
HC A06/MF A01 CSCL 20/7

A previous study led to the development of a closed form solution to the dynamic behavior of a charged particle beam. This solution was found for a simple, but nontrivial, single degree of freedom model (the electrostatic approximation model). This thesis investigates the characteristics of this closed form solution using three different types of inputs. The closed form solution is then verified by using finite difference to generate compatible results. Also investigated are the characteristics of the dynamic model prior to the implementation of the electrostatic approximation. GRA

N86-25236# Nuclear Regulatory Commission, Washington, D. C. Div. of Radiation Programs and Earth Sciences.
DISPOSAL OF HIGH-LEVEL RADIOACTIVE WASTES IN THE UNSATURATED ZONE: TECHNICAL CONSIDERATIONS AND RESPONSE TO COMMENTS Final Report
C. J. Hackbarth, T. J. Nicholson, and D. D. Evans Oct. 1985 47 p refs
(TI86-900170; NUREG-1046-F) Avail: NTIS HC A03/MF A01

On July 22, 1985, the U. S. Nuclear Regulatory Commission (NRC) promulgated amendments to 10 CFR Part 60 concerning disposal of high level radioactive waste (HLW) in geologic repositories in the unsaturated zone (50 FR 29641). The principal technical issues considered by the NRC staff during the development of these amendments was discussed. Certain technical discussions originally presented in draft NUREG-1046 were revised based on public comment letters and an increasing understanding of the physical, geochemical, and hydrological processes operative in unsaturated geologic media. The following issues related to disposal of HLW within the unsaturated zone were discussed: hydrogeologic properties and conditions, heat dissipation and temperature, geochemistry, retrievability, potential for exhumation of the radioactive waste by natural causes and by human intrusion, the effects of future climatic changes on the level of the regional water table, and transport of radionuclides in the gaseous state. On July 22, 1985, the U. S. Nuclear Regulatory Commission (NRC) promulgated amendments to 10 CFR meter depth for waste emplacement, limitations on exploratory boreholes, backfill requirements, waste package design criteria, and provisions for ventilation. Author

74 OPTICS

Includes light phenomena.

N86-25237# National Aeronautics and Space Administration, Washington, D.C.
OPTICAL STAR COUPLER WITH LARGE NUMBER OF INPUTS AND OUTPUTS
J. Saniter, F. Schmidt, and T. Hermes Mar. 1986 27 p refs
Transl. into ENGLISH of W. German patent no. 3423221A1 (29 Nov. 1984) p 1-27 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA-TM-88395; NAS 1.15:88395) Avail: NTIS
HC A03/MF A01 CSCL 20F

Attenuation based on the power division is made linearly dependent on the maximum number of inputs and outputs, by cascading coupler elements. The coupler elements are connected together in such a way that only after the last cascade step does each outgoing line present the same composition of components of all incoming signals. Author

N86-25238# Naval Postgraduate School, Monterey, Calif.
INFRARED BACKGROUND AND TARGET MEASUREMENT HC A05/MF A01 M.S. Thesis
Alexander Manolopoulos Dec. 1985 98 p refs
(AD-A163567) Avail: NTIS HC A05/MF A01 CSCL 20/6

This thesis describes measurements of IR background radiance. To provide background radiance values for the development of the AN/SAR - 8 (IRSTD) system, the radiance of clouds and buildings was measured using the AGA Thermovision 780. The measurement values given in Isotherm Units (photon flux equivalent) were translated into radiance values (W/cc sr). The emissivity of the different objects was also computed for the 8-14 micrometers window assuming that their emissivity in the 3-5.6 micrometers band is close to that of a blackbody. The average radiance of clouds was found to be .0003302 W/cc sr in the 3-5.6 micrometers window and .003544 w/cc sr in the 8-14 micrometers window. The corresponding values for buildings were .0003587 W/cc sr and .004552 W/cc sr respectively. GRA

N86-25239# Naval Postgraduate School, Monterey, Calif.
REMOTE MEASUREMENT OF THE ATMOSPHERIC ISOPLANATIC ANGLE AND DETERMINATION OF REFRACTIVE TURBULENCE PROFILES BY DIRECT INVERSION OF THE SCINTILLATION AMPLITUDE COVARIANCE FUNCTION WITH TIKHONOV REGULARIZATION Ph.D. Thesis
Kurt B. Stevens Dec. 1985 169 p
(AD-A163629; NPS-61-86-008) Avail: NTIS HC A08/MF A01
CSCL 20/6

It is difficult to propagate a diffraction-limited laser beam through the atmosphere, since the atmosphere contains random index of refraction fluctuations. Two parameters that characterize the atmosphere for optical propagation are the atmospheric isoplanatic angle, theta sub 0, and the refractive turbulence structure parameter, (C sub n) squared. This thesis deals with improved methods for measuring theta sub 0 and (C sub n) squared profiles using optical techniques. By apodizing the receiver telescope aperture, one can improve the weighting function for isoplanatic angle measurement substantially over previous systems. The weighting function is not found significantly affected by inner scale changes with altitude and that the error in isoplanatic angle measurement from strong low altitude turbulence ($z < 1$ km) with this weighting function is small. Data collected with the improved isoplanometer shows temporal trends in the isoplanatic angle on the order of 90 seconds that have not been observed before. Direct inversion of the amplitude covariance function (including aperture averaging effects) to yield refractive turbulence profiles is known to be ill-posed. I suppress this condition using Tikhonov

regularization and reproduce refractive turbulence profiles from actual (C sub n) squared data with some success. GRA

N86-25240# Royal Signals and Radar Establishment, Malvern (England).
ROUTING OF HIGH DATA RATE SIGNALS USING DEGENERATE FOUR WAVE MIXING IN BSO
C. L. West and M. S. Hazell 1985 12 p refs
(AD-A163746; RSRE-MEMO-3891; DRIC-BR-98309) Avail: NTIS HC A02/MF A01 CSCL 20/6

Non-linear optical phase conjugation can be directly applied to real time spatial and/or temporal information processing of electromagnetic waves. In photorefractive materials the process may be described in terms of dynamic holography. The speed at which grating formation takes place is limited by the physical properties of the crystal and the intensities of the optical beams used to write the grating. The speed at which diffraction may occur from this grating does not, however, suffer such limitations and in this memorandum we demonstrate the use of degenerate four wave mixing in BSO to direct the flow of data whose information bandwidth exceeds 1MHz. GRA

N86-25241# Environmental Research Inst. of Michigan, Ann Arbor.
PARALLEL IMAGE TRANSMISSION THROUGH A SINGLE OPTICAL FIBER Final Report, 10 Jun. 1981 - 9 Nov. 1985
Anthony M. Tai Jan. 1986 62 p refs
(Contract DAAG29-81-K-0129)
(AD-A163809; ERIM-155700-18-F; ARO-18203.5-PH) Avail: NTIS HC A04/MF A01 CSCL 20/6

New approaches for the transmission of two-dimensional images through a single optical fiber are developed to take better advantages of the bandwidth and the relative immunity to interference offered by optical fibers. Approaches studied include phase-conjunction, matched filtering, axial-angle multiplexing, wavelength multiplexing and various combinations of the approaches. Possible system designs employing these approaches are presented and their merits are discussed. GRA

N86-25242# California Univ., Berkeley. Dept. of Physics.
FAR INFRARED HETERODYNE DETECTION WITH GALLIUM DOPED GERMANIUM PHOTOCONDUCTORS Final Report, 1 Apr. 1982 - 31 Mar. 1985
Charles H. Townes and Reinhard Genzel 26 Nov. 1985 10 p refs
(Contract DAAG29-82-K-0117)
(AD-A163879; ARO-19253.1-PH) Avail: NTIS HC A02/MF A01 CSCL 17/5

This contract has been directed at the examination of the bandwidth and sensitivity of semiconducting heterodyne detectors for far infrared radiation (FIR). Germanium detectors variously doped with gallium have been of prime interest. However, HeCdTe detectors have also been tested. While efforts to find good FIR heterodyne detectors have been slow, towards the end of the contract period substantial success was achieved and measurements have continued even past the contract period to round out what we regard as important quantitative measurements of improved detection. We have measured faster, more responsive detectors and have reduced our system temperature. We have also seen for the first time a change in detector bandwidth with bias voltage. We believe we have proceeded in the correct direction in detector fabrication and doping levels to produce faster detectors while retaining high responsivity. GRA

N86-25243 Department of the Air Force, Washington, D.C.
HIGH EFFICIENCY PULSE ULTRAVIOLET LIGHT SOURCE Patent
James P. OLoughton, inventor (to Air Force) Issued 20 Mar. 1986 5 p
(AD-D011965; US-Patent-4,550,275; US-Patent-Appl-SN-539889; US-Patent Class-315-241) Avail: US Patent and Trademark Office CSCL 13/1

A high efficiency pulsed ultraviolet light source is described. Which comprises a flashlamp containing a noble gas, for example xenon, at low pressure, and having a pair of electrodes between a discharge through the gas may be impressed. and an electrical pulse forming circuit connected to the flashlamp comprising a lamp resistance and high voltage source connected in series with the lamp, and a capacitor and switch connected in parallel to the lamp, the capacitor and resistance selected to minimize the total inductance of the circuit and to maximize the voltage stress on the gas contained within the lamp. GRA

N86-25244# Naval Postgraduate School, Monterey, Calif.
DETECTION AND EXPLOITATION OF VIBRATION INDUCED OPTICAL AMPLITUDE MODULATION M.S. Thesis
George R. Scott Dec. 1985 77 p refs
(AD-A164179) Avail: NTIS HC A05/MF A01 CSCL 17/8

The remote sensing of surface vibrations on an object via optical methods has many applications. Current techniques use phase coherent methods which are difficult to apply against a noncooperative target, or one at great distances. A simple method of exploiting the apparent amplitude modulation imposed on a light beam reflecting from a vibrating surface is explored. This method requires no phase reference between source and detector, and can use reflected sunlight as its sensor beam. The design and construction of an experimental receiver is presented, and its sensitivity against targets of varying reflectivity, specularity, and mechanical compliance is tested. Impact detection at a distance using this technique is demonstrated, as is identification of the impacted object from its recovered acoustic spectrum. Theoretical range curves are developed, and suggestions for additional uses of the technology are discussed. GRA

N86-25245# Maryland Univ., College Park. Center for Automation Research.
CONTINUOUS REPRESENTATIONS OF DIGITAL IMAGES
Chung-Nim Lee and Azriel Rosenfeld Oct. 1985 35 p refs
(Contract F49620-85-K-0009)
(AD-A164189; CAR-TR-158; CS-TR-1569; AFOSR-85-1218TR) Avail: NTIS HC A03/MF A01 CSCL 20/6

A 2D digital image S is represented conventionally by the union of grid squares containing pixels of S which we denote by F(S). This gives the correct topology for S with 8-adjacency, and with a little imagination, 4-adjacency can also be properly handled. However, one encounters difficulty in extending basic 2D results to 3D digital images. The last few years have seen the need for better methods which give a closer link with well developed continuous topology, especially with the advent of digital surface theory. We define a new continuous model F(S) by refining F(S). We show that this gives a better bridge between the two subjects, digital and continuous topologies. We also show how this space F(S) is related to two other continuous models. Although we concentrate only on 2D images in this paper, the concepts and general ideas extend to 3D images. A 3D version of this paper is in preparation. GRA

N86-25246# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PSEUDO-COLOR DISPLAY OF LASER RADAR IMAGERY M.S. Thesis
Norman Barsalou 2 Dec. 1985 203 p refs
(AD-A164213; AFIT/GE/ENG/85D-3) Avail: NTIS HC A10/MF A01 CSCL 14/5

A pseudocolor representation of Carbon Dioxide 2 laser radar data is developed. The pseudo color scheme is based on the dilution of a set of baseline hues by white. The synthetic generation of laser radar scenes is used for display creation, and the results of analysis on synthetic scenes is applied to data collected by a CO2 pulsed radar system. GRA

N86-25247# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF CONTRAST SENSITIVITY AND SPECTRAL RESPONSE OF IMAGING SYSTEMS M.S. Thesis
Young Soo Kim Dec. 1985 47 p refs
(AD-A164228) Avail: NTIS HC A03/MF A01 CSCL 09/1

The characteristics of imaging systems CID, CCD, and VID-

CCD were investigated in terms of the contrast sensitivity and the spectral response in the near infrared region. The object distance of 83.5 cm, the radiant flux density of 0.93 microwatts/sq cm and a black and white bar chart were used for the measurement of CTF. The spectral response was measured at 2520 K using a tungsten light source. The CID image sensor has high sensitivity, resolving capability and spectral response at low light level comparing to the CCD or VIDICON. The limited resolution values of 23.0 line-pairs/mm for CCD and 28.4 line-pairs/mm for VIDICON, the cutoff wavelengths of 1.0 micrometers for CCD and 0.94 micrometers for VIDICON were determined. The limiting resolution value and the cutoff wavelength for CID were much higher than those of CCD or VIDICON and lay outside the range of this experiment. GRA

N86-25248# Los Alamos National Lab., N. Mex.
SHUTTERING EFFICIENCIES OF NANOSECOND-GATED PHOTOEMISSIVE SHUTTER TUBES
George J. Yates, Steven A. Jaramillo, Thomas S. Pagano (Edgerton, Germeshausen and Grier, Inc., Albuquerque, N. Mex.), and J. Paul Black (Edgerton, Germeshausen and Grier, Inc., Albuquerque, N. Mex.) 1985 9 p refs Presented at 1985 SPIE, San Diego, Calif., 19-23 Aug. 1985
(DE85-015728; LA-UR-85-2743; CONF-850887-14) Avail: NTIS HC A02/MF A01

Recent studies show that effective shuttering of photoemissive tubes, such as Silicon-Intensified-Target Vidicons (SITVS) and Microchannel-plate Image Intensifier Tubes (MCPTs), can vary widely depending upon the extent of their opacity to an input flux of photons. Optical feedthrough signals from photon transmission through the photocathode to the target or phosphor ranging from 10 to the-4 to 10 to the-9 power (when compared with gated signals) were measured for a large sampling of commercially available units. Effective shutter ratios of 10 to the 5th to 10 to the 8th power measured for units operated in quiescently dark environments can be substantially reduced by optical feedthrough. Furthermore, ineffective suppression of photoemission can cause further reductions in shutter ratio. Reductions are roughly correlated with the ratio of optical gate duration to light pulse duration. Experimentation with various thicknesses of aluminum depositions on MCPT phosphors and chromium layering on SITV silicon targets indicate substantial reductions (2x to 15x) in transmission with minimal increases in threshold voltages required for gain. These results, together with exploratory studies of external coating of output fiber optics with transmission filters spectrally matched to minimize feedthrough to P-20 phosphors are reported. DOE

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-25249# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ADVANCED ICRF ANTENNA DESIGN FOR R-TOKAMAK
E. Kako, R. Ando, M Ichimura, Y. Ogawa, T. Amano, and T. Watari Jan. 1986 46 p refs
(IPPJ-759) Avail: NTIS HC A03/MF A01

The advanced ICRF antennas designed for the R-TOKAMAK (a proposal in the Institute of Plasma Physics, Nagoya University) are described. They are a standard loop antenna and a panel heater antenna for fast wave heating, and a waveguide antenna for ion Bernstein wave heating. The standard loop antenna is made of Al-alloy and has a simple structure to install because of radioactivation by D-T neutrons. For high power heating, a new type antenna called Panel heater antenna is proposed. It has a wide radiation area and is able to select a parallel wave number k. The field pattern of the panel heater antenna is measured. The feasibility of the waveguide antenna is discussed for ion Bernstein wave heating. The radiation from the aperture of the double ridge waveguide is experimentally estimated with a load simulating the plasma. Author

N86-25250# Niigata Univ. (Japan). Dept. of Physics.
KINK STABILITY OF LONG ION LAYERS
Akio Ishida Jan. 1986 29 p refs Prepared in cooperation with Nagoya Univ., Japan
(IPPJ-758) Avail: NTIS HC A03/MF A01

By means of the two-fluid model, the kink stability of a long thin field-reversed ion layer immersed in a dense low-temperature background plasma is studied theoretically. The two-fluid variational quadratic form with assumption of rigid displacements in the radial direction yields a new kink stability condition that includes the effect of the non-zero real frequency of the modes, which is due to the inertia of the ion layer. This effect is essential to explain the numerical results of Harned. As the ratio of the density of the background plasma to that of the ion layer increases, this new kink stability condition reduces to the conventional condition. The physical mechanism for the kink instability is discussed by the analogy with the electrostatic two-stream instability. Author

N86-25251# Nagoya Univ. (Japan). Inst. of Plasma Physics.
TAIL ANISOTROPY INSTABILITY DURING PLASMA CURRENT RISE BY LOWER-HYBRID WAVES IN A TOKAMAK
Mitsuru Yamagiwa Jan. 1986 41 p refs
(IPPJ-756) Avail: NTIS HC A03/MF A01

Tail anisotropy instability during lower-hybrid current rise is investigated. Tail formation by lower hybrid waves is studied by using a Fokker-Planck equation combined with the return field and the RF associated terms. Quasi-linear relaxation of the electron tail distribution under the influence of the plasma waves excited due to the instability is examined. It is found that the instability condition is related to the strength of the parallel diffusion by lower hybrid waves and the ratio of the electron cyclotron frequency to the electron plasma frequency. The time scale between the instability spikes and the suppression of the instability by electron cyclotron heating are also discussed. Author

N86-25252# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ACTIVE DIAGNOSTICS OF MAGNETICALLY CONFINED ALPHA PARTICLES BY PELLET INJECTION
M. Sasao, K. N. Sato, Y. Nakamura (Kyoto Univ.), and M. Wakatani (Kyoto Univ.) Jan. 1986 19 p refs
(IPPJ-757) Avail: NTIS HC A02/MF A01

Confined alpha-particle diagnostics by pellet injection is proposed. The alpha-particle density can be obtained from the number of decaying photons emitted from He(+ •) (n or = 2) ions which are produced through the one-electron transfer reaction of an alpha-particle from the probing ion ablated from the pellent before it is fully ionized. The counting rate estimated with theoretical cross sections and the calculated pellet ablation rate is sufficient for observation under a bremmstrahlung background. The alpha-particle velocity distribution will be also obtained from the Doppler broadening of the spectral lines. Author

N86-25253# Nagoya Univ. (Japan). Inst. of Plasma Physics.
VOLUME PRODUCED H(-), D(-) ION SOURCE FOR PROTON ACCELERATOR AND THERMO-NUCLEAR FUSION RESEARCH BY SHEET PLASMA (1)
Joshin Uramoto Jan. 1986 31 p refs
(IPPJ-760) Avail: NTIS HC A03/MF A01

In order to apply a sheet plasma type of volume produced H(-), D(-) ion source to injection of proton accelerators and neutral beam injection of thermo-nuclear fusion researches, a large sheet plasma of width 20 to approx. 25 cm and length 30 cm is produced under a discharge current of 175 A, a H2 gas pressure of about 2.5 x 10 to the -3 power Torr and gas flow of (2.0 to approx. 2.5) Torr l/sec in a magnetic field of (60 to approx. 110) gauss. Thus, H(-) or D(-) ion current is extracted in a current density up to 19 mA/sq cm or 16 mA/sq cm which is uniform within 10% over a large area (above 250 sq cm) of the sheet plasma surface, and in an acceleration voltage up to 4.5 kV. Then, an electron current

accelerated with H(-) or D(-) ions is reduced negligibly beyond a distance of 2 cm from the final acceleration electrode. Author

N86-25254# Nagoya Univ. (Japan). Inst. of Plasma Physics.
EXCITATION ANISOTROPY IN LASER-INDUCED-FLUORESCENCE SPECTROSCOPY: BROAD-LINE EXCITATION CASE
A. Hirabayashi, Y. Nambu, and T. Fujimoto Jan. 1986 37 p refs
(IPPJ-761) Avail: NTIS HC A03/MF A01

Treatment of excitation anisotropy for Laser-Induced-Fluorescence Spectroscopy (LIFS) is extended to the intense excitation case. The depolarization coefficient is derived for intense excitation limit (linearly-polarized or unpolarized light excitation), and the result is presented in tables. For the region of intermediate intensity between the weak and intense excitation limits, the master equation is solved for specific example of transitions and its result is compared with experiment. Author

N86-25255# Nagoya Univ. (Japan). Inst. of Plasma Physics.
LECTURES ON TOPICS IN MAGNETIC RECONNECTION AND TRANSPORT IN FUSION DEVICES
Russell M. Kulsrud (Princeton Univ., N.J.) Jan. 1986 40 p
(IPPJ-762) Avail: NTIS HC A03/MF A01

Magnetic reconnection in the confinement of plasmas in fusion devices is discussed in relationship to the formation of magnetic islands in magnetostatic equilibrium for systems of imperfect symmetry; breakup of magnetic surfaces due to nonideal instabilities such as resistive modes or drift waves; and tearing modes which break up magnetic surfaces and form islands. Particle motions that lead to ripple transport in stellarators and other nonaxisymmetric geometries such as heliotrons and torsatrons are described. The physics of nonlinear ballooning modes are explained. B.G.

N86-25256# Nagoya Univ. (Japan). Institute of Plasma Physics.
THE INFLUENCE OF A HOT PARTICLE COMPONENT ON PLASMA STABILITY
Adel M. El-Nadi Dec. 1985 15 p refs
(IPPJ-755) Avail: NTIS HC A02/MF A01

A hot particle component introduced into a background plasma can significantly alter the properties of both the equilibrium and perturbed states. Various aspects of the problem are reviewed together with the underlying physics. Author

N86-25257# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GRAPHICAL STUDY OF ELECTROMAGNETIC WAVE ACCESSIBILITY IN TOKAMAK PLASMAS NEAR THE ELECTRON-CYCLOTRON FREQUENCY
C. S. Shibata and A. Montes Feb. 1986 30 p refs Proposed for presentation at the 38th Annual Meeting of the SBPC, Curitiba, Brazil, 9-16 Jul. 1986
(INPE-3810-PRE/896) Avail: NTIS HC A03/MF A01

The accessibility of electron-cyclotron frequency range electromagnetic waves in magnetized inhomogeneous tokamak plasmas is studied using the cold plasmas model. Simple equations for cutoff and resonance surfaces are obtained for parabolic density profile plasma. Using cartesian coordinates in the poloidal cross section of the tokamak, these equations are arranged in a convenient standard form, in order to facilitate the plotting of the various surfaces simultaneously. Graphical outputs for several cases are presented, together with the principal cutoff and resonance frequency profiles along the minor radius. Author

N86-25258# Nagoya Univ. (Japan). Inst. of Plasma Physics.
PROCEEDINGS OF TOPICAL MEETING ON PARTICLE BEAM FUSION AND ITS RELATED PROBLEMS, VOLUME 1
Keishiro Niu, ed. Mar. 1986 260 p refs Meeting held in Nagoya, Japan, 31 Oct. - 2 Nov. 1985
(IPPJ-769-Vol-1) Avail: NTIS HC A12/MF A01

The following topics in the field of pulsed power techniques and particle beam fusion were discussed: ion beam propagation, calculation methods for target implosions, X-ray driven inertial fusion confinement, high density plasmas, power plants, ion trapping, plasma production, heavy ion acceleration, and linear accelerators. B.G.

N86-25259# Nagoya Univ. (Japan). Inst. of Plasma Physics.
THERMAL BARRIER POTENTIAL OF A TANDEM MIRROR
I. Katanuma, Y. Kiwamoto, K. Ishii, and S. Miyoshi Mar. 1986 46 p refs
(IPPJ-768) Avail: NTIS HC A03/MF A01

The relation between the electrostatic potential and the low energy electron density under electron cyclotron resonance heating (ECRH) in the thermal barrier of a tandem mirror is investigated analytically and numerically. The distribution function of mirror trapped electrons at low energy is found to stretch out in the perpendicular direction to the magetic field and to be well approximated by bi-Maxwellian rather than by Maxwellian equations. The Boltzman law for barrier depth is modified to include central cell electron temperature. A bounce averaged Fokker-Planck simulation of the thermal barrier potential was performed and a scaling of the barrier potential depth against the low energy electron density in the barier was obtained. A comparison was made betwen the model obtained and the experimental results of GAMMA 10. B.G.

N86-25260# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A SOLIDARY WAVE OF A RELATIVISTIC MAGNETOSONIC WAVE PROPAGATING PERPENDICULARLY TO A MAGNETIC FIELD
Yukiharu Ohsawa Mar. 1986 24 p refs
(IPPJ-767) Avail: NTIS HC A02/MF A01

A relativistic theory for a nonlinear magnetosonic wave propagating perpendicularly to a magnetic field is developed. On the basis of a relativistic two fluid cold plasma model, the structure of a stationary magnetosonic wave is studied. Relativistic effects become important for the parameter regime omega sub ce/omega sub pe is approximate or greater than 1, because the fluid electron velocity perpendicular to a magnetic field and parallel to the wave front takes values close to the speed of light for such plasma parameters. It is found that there exists a stationary solitary wave solution even in the relativistic model. Some properties of the solitary wave, such as the soliton width, are discussed. Author

N86-25261# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MEASUREMENT OF DENSITY FLUCTUATIONS ON THE JIPP T-II TOKAMAK PLASMA BY MILLIMETER AND SUB-MILLIMETER WAVE SCATTERING
Tsutomu Tetsuka Feb. 1986 140 p refs
(IPPJ-766) Avail: NTIS HC A07/MF A01

Scattering experiments with a 2 mm microwave oscillator and a 337 micron HCN laser were performed to measure density fluctuations on the JIPP T-II/T-IIU tokamak in a wide variety of the plasma density. An instability and an externally excited wave was observed during radio frequency heating. From the measurements of the frequency and wave number spectra of the instability, the density fluctation shows characteristics of a turbulence which is originated in the instability of drift type. The dependence of the fluctuation level on the plasma parameters was investigated and compared with the scaling law of the energy confinement time of the plasma. The relationship between the density fluctuation level and the confinement time was obtained. The fluctuation level decreases as the electron density is increased. The plasma temperature dependence of the density fluctuation was also investigated. The excited wave during the ion-cyclotrom range of frequency heating experiment was studied by the HCN laser scattering. The influence of magnetohydrodynamic activity on the mode converted ion Berstein wave was examined. Author

N86-25262# Naval Research Lab., Washington, D. C.
LASER INTERACTION IN LONG-SCALELENGTH PLASMAS Interim Report
J. H. Gardner, F. C. Herbst, M. J. Young, J. A. Stamper, and S. P. Obenschain 31 Dec. 1985 65 p

(AD-A163604; NRL-MR-5651) Avail: NTIS HC A04/MF A01 CSCL 20/9

Absorption of a short-pulse, high-intensity Nd-laser beam (vacuum irradiance of 10 to the 14th power to 10 to the 15th power W/sq cm) by preformed plasmas of different density scalelengths is investigated. Increased effects of plasma instabilities are found at longer scalelengths. The amount of backscattered light increases with plasma scalelength and limits the absorption fraction at the longest scalelength. The onset of suprathermal electron production, deduced from observations of energetic (20 to 50 keV) X-rays, occurs at lower laser irradiance for longer scalelength plasmas. A correlation between energetic X-rays and 3 omega sub 0/2 emission suggests that the suprathermal electrons are produced by a plasma instability at quarter-critical density. At higher intensities there is evidence for severe perturbations of the preformed plasma and for self-focusing of the incident beam. GRA

N86-25263# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

ENERGY CONFINEMENT STUDIES OF LOWER HYBRID CURRENT DRIVEN DISCHARGES IN THE ALCATOR C TOKAMAK

S. Knowlton, P. Bonoli, C. Fiore, S. McCool, S. McDermott, M. Porkolab, Y. Takase, and S. Texter Jun. 1985 10 p Presented at the 6th Topical Conference on Radio Frequency Plasma Heating, Pine Mountain, Ga., 13 May 1985

(Contract DE-AC02-78ET-51013)

(DE85-014754; DOE/ET-51013/153; PFC/CP-85-4; CONF-8505130-9) Avail: NTIS HC A02/MF A01

The energy confinement properties of purely rf-driven plasmas on Alcator C are being investigated by experimental measurements of the bulk electron and ion temperature profiles, and by numerical modelling of the lower hybrid wave propagation and thermal energy transport. Power balance studies are performed on plasmas with parameters n bar(sub e) = 3 - 7 x 10 to the 13th power/cu cm, B = 7 - 11 T, I(sub p) = 100 - 200 KA, and q (a) greater than or equal to 8, and with rf powers up to 1 MW at 4.6 GHz. The temperature measurements from rf-driven discharges are compared with those from similar ohmic discharges (identical current and density). The gross energy confinement time is lower in the rf-driven discharges than in the ohmic ones by a factor of 1.5 to 4, depending on the plasma conditions and rf power. While tau (sub E) in ohmic discharges increases with density and is independent of the toroidal field, the confinement time in the rf-driven discharges decreases with rf power, is independent of density in the range n bar(sub e) = 3 - 7 x 10 to the 13th power/cu cm, and increases with the toroidal magnetic field. The confinement degrades slightly with increasing current in both rf-driven and ohmic discharges. The code used to simulate these results employs a lower hybrid ray tracin g package, a Koffer-Planck code for the evolution of the fast electron tail, and enhanced thermal transport models for auxiliary-heated plasmas. DOE

N86-25264# SRI International Corp., Menlo Park, Calif.

STUDIES OF AUTOIONIZING STATES RELEVANT TO DIELECTRONIC RECOMBINATION

T. F. Gallagher 11 Oct. 1985 41 p refs

(Contract DE-AT03-79ER-10376)

(DE86-002908; DOE/ER-10376/T6) Avail: NTIS HC A03/MF A01

Dielectronic recombination, the inverse of autoionization, is a process leading to significant power loss in CTR plasmas. Although it is known that dielectronic recombination proceeds via autoionization Rydberg states, few data exist on autoionizing states and how they are affected by conditions found in a CTR plasma. Under this research program we have been using a novel laser excitation technique developed at SRI to study autoionizing states and the perturbing effects of electric fields found in CTR plasmas. We describe experimental investigations of the spectroscopy of autoionizing Rydberg states, the energy analysis of electrons ejected from autoionizing states, autoionizing in electric fields, and the autoionization induced by an electric field. DOE

N86-25265 Texas Univ., Austin.

THEORETICAL STUDIES OF MAGNETIZED PLASMA TURBULENCE: ION-CYCLOTRON TURBULENCE, AND SHEAR FLOW TURBULENCE AND ITS APPLICATIONS TO TOKAMAK EDGE PHENOMENA Ph.D. Thesis

Tzihong Chiueh 1985 275 p

Avail: Univ. Microfilms Order No. DA8529831

Analytical theories of current driven ion cyclotron turbulence, treating incoherent phase space density granulations (clumps), and strongly magnetized electrostatic MHD turbulence are studied. For the former, the local structure as well as global effects (instability and anomalous transport) of clumps are examined. For the latter, two shear flow driven systems in the limit of vanishing magnetic shear, thus strictly two dimensional flows are also examined. Subsequently, the analysis is extended to a shear flow with finite magnetic shear, in an attempt to explain the turbulence characteristics observed in the tokamak edge. For ion-cyclotron turbulence, a weak collective dissipation regime, where waves and clumps coexist is studied. For two dimensional flows, mixing-layer and wake (or jet) turbulence is also studied. That the mixing layer expands linearly in time, is predicted using a quasi-linear model. This theory is applied to tokamak edge turbulence, where dc electric field induced poloidal flow exists. Dissert. Abstr.

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-25266 United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.

CRYSTALLOGRAPHIC TEXTURE: EXPERIMENTAL GEOMETRY AND DEFOCUSSING CORRECTION

B. E. Sheldon Aug. 1984 34 p refs

(AERE-R-11723) Avail: Issuing Activity

X-ray measurements of crystallite orientation distributions (crystallographic texture) have been performed at Harwell since 1975, and the results obtained have been invoked in attempts to describe the anisotropic behavior of bulk materials. Most of the data have been produced for zirconium alloys wherein the hexagonal-close-packed (h.c.p.) lattice imposes constraints upon polycrystalline aggregates which lead to their anisotropy. The details of the technique used at Harwell have not been well publicized, hence this paper attempts to identify the salient parameters and compare them with those used by other workers. Although the method is basically sound, certain areas of doubt have been identified and recommendations made as to their resolution. Author

N86-25267*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPENSATION IN EPITAXIAL CUBIC SiC FILMS

B. Segall (Case Western Univ., Cleveland, Ohio), S. A. Alterovitz, E. J. Haugland, and L. G. Matus Mar. 1986 12 p refs

(NASA-TM-87269; E-2918; NAS 1.15:87269) Avail: NTIS HC A02/MF A01 CSCL 20L

Hall measurements on four n-type cubic SiC films epitaxially grown by chemical vapor deposition on SiC substrates are reported. The temperature dependent carrier concentrations indicate that the samples are highly compensated. Donor ionization energies, E sub D, are less than one half the values previously reported. The values for E sub D and the donor concentration N sub D, combined with results for small bulk platelets with nitrogen donors, suggest the relation E sub D (N sub D) = E sub D(O) - alpha N sub N sup 1/3 for cubic SiC. A curve fit gives alpha is approx 2.6x10/5 meV cm and E sub D (O) approx 48 meV, which is the generally accepted value of E sub D(O) for nitrogen donors in cubic SiC. E.A.K.

N86-25268*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AUGER ELECTRON SPECTROSCOPY, SECONDARY ION MASS SPECTROSCOPY AND OPTICAL CHARACTERIZATION OF a-C-H AND BN FILMS
John J. Pouch, Samuel A. Alterovitz, and Joseph D. Warner 1986 13 p refs Presented at Symposium on Plasma Processing at the Spring Meeting of the Materials Research Society, Palo Alto, Calif., 15-18 Apr. 1986
(NASA-TM-87258; E-2950; NAS 1.15:87258) Avail: NTIS HC A02/MF A01 CSCL 20L

The amorphous dielectrics a-C:H and BN were deposited on III-V semiconductors. Optical band gaps as high as 3 eV were measured for a-C:H generated by C4H10 plasmas; a comparison was made with bad gaps obtained from films prepared by CH4 glow discharges. The ion beam deposited BN films exhibited amorphous behavior with band gaps on the order of 5 eV. Film compositions were studied by Auger electron spectroscopy (AES), X-ray photoelectron spectroscopy (XPS) and secondary ion mass spectrometry (SIMS). The optical properties were characterized by ellipsometry, UV/VIS absorption, and IR reflection and transmission. Etching rates of a-C:H subjected to O2 dicharges were determined. Author

N86-25269*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD OF MEASURING FIELD FUNNELING AND RANGE STRAGGLING IN SEMICONDUCTOR CHARGE-COLLECTING JUNCTIONS Patent Application
John A. Zoutendyk, inventor (to NASA) Filed 27 Nov. 1985 19 p
(Contract NAS7-918)
(NASA-Case-NPO-16584-1-CU; NAS 1.71:NPO-16584-1-CU; US-Patent-Appl-SN-802769) Avail: NTIS HC A02/MF A01 CSCL 20L

Electric-field funneling length is measured while irradiating a semiconductor charge-collecting junction with electron-hole-pair generating charged particles at a first junction bias voltage. The bias voltage is then reduced to a second level in order to reduce the depth of the depletion region such that the total charge can no longer be collected by drift and measured in the energy band previously displayed in the multichannel analyzer. This is representative of the maximum electric field funneling length which may be calculated by measuring the difference at the second bias voltage level of the depletion width and the ion penetration range. The bias voltage is further lowered to a third level at which the particles are collected over a spread of energy levels while at least some of the particles are still collected at the selected energy level. From this the different depths of penetration of the particles are determined while additional effects due to diffusion are minimized. NASA

N86-25270# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Sci.
OVERLAYER-INDUCED ENHANCED OXIDATION OF GaAs SURFACES Interim Report
S. Chang, A. Rizzi, C. Caprile, P. Philip, and A. Wall 31 Dec. 1985 26 p refs
(Contract N00014-84-K-0545)
(AD-A163450; AD-E401440; IR-5) Avail: NTIS HC A03/MF A01 CSCL 20/12

Thin metal overlayers deposited on GaAs (110) cleavage surfaces enhance the surface oxidation rate several orders of magnitude above the clean surface value. The magnitude of this effect depends on the chemistry of the overlayer, on the local morphology of the overlayer-semiconductor interface region and on the nature of the gaseous reactants. We present a synchrotron radiation photoemission investigation of the GaAs surface interaction with oxygen in the presence of Ag, Au and Cr overlayers, and of the GaAs-H2O reaction in the presence of Cr overlayers. We find that the promotion effect is maximum in the presence of Cr overlayers, and that the nature of the surface reaction products changes if oxygen or water is employed. In particular, in the case of oxygen, Ga and As-oxide phases are found with high atomic oxidation states present. If water is employed, only Ga oxide/hydroxyl phases are found at the surface, on top of a Cr-As subsurface layer that remains largely unaffected by oxidation. GRA

N86-25271# Duke Univ., Durham, N. C. Dept. of Chemistry.
ISOLATION AND CHARACTERIZATION OF AN ORGANOGALLIUM-ARSENIC CLUSTER: CRYSTAL STRUCTURE OF ((PhAsH)(R2Ga)(PhAs)6(RGa)4)(R=Me3SiCH2)
Richard L. Wells, Andrew P. Purdy, Andrew T. McPhail, and Colin G. Pitt 10 Jan. 1985 11 p refs
(Contract N00014-83-K-0572)
(AD-A163485; DU/DC/TR-01) Avail: NTIS HC A02/MF A01 CSCL 20/2

(PhAsH)(R2Ga)(PhAs)6(RGa)4 (R = Me3SiCH2) has been isolated as a product of the reaction of PhAsH2 with (Me3SiCH2)3Ga and determined by X-ray crystallographic analysis to be a cluster containing an As7Ga5 core. As part of our studies of synthetic methods and the identification of substituents which will permit the isolation of monomeric and oligomeric gallium-arsenic compounds, we investigated the reaction of PhAsH2 with (Me3SiCH2)3Ga. Primarily, it was of interest to ascertain if steric bulk would permit the isolation of compounds of the type (PhAsGaCH2SiMe3)n(n=1-4) and suppress formation of polymers similar to the nonvolatile polymeric material reported to be the primary product of the reaction of PhAsH2 with Me3Ga. GRA

N86-25272# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF ZnSiP2 AND ZnGeP2 SINGLE CRYSTALS Annual Report, Mar. 1985 - Feb. 1986
G-Q. Yao, H-S. Shen, R. Kershaw, K. Dwight, and Aaron Wold 24 Jan. 1986 4 p refs
(Contract N00014-85-K-0177)
(AD-A163537) Avail: NTIS HC A02/MF A01 CSCL 20/2

Single crystals of ZnSiP2 and ZnGeP2 have been grown by several techniques and their electronic and optical properties were compared. It was found that Fe(III) could not be substituted for equal amounts of Zn (II) and Ge (IV) in the II-IV-V2 chalcopyrites. However, 0.5 atomic percent of Mn(II) was successfully substituted in the structure for Zn(II). GRA

N86-25273# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF ZnSiP2 AND ZnGeP2 SINGLE CRYSTALS Technical Report, Mar. 1985 - Jan. 1986
Guang-Qing Yao, He-Sheng Shen, Robert Kershaw, Kirby Dwight, and Aaron Wold 27 Jan. 1986 12 p refs
(Contract N00014-85-K-0177)
(AD-A163559; TR-1) Avail: NTIS HC A02/MF A01 CSCL 20/2

Single crystals of ZnSiP2 and ZnGeP2 have been grown by several techniques and their electronic and optical properties were compared. It was found that Fe(III) could not be substituted for equal amounts of Zn(III) and Ge(IV) in the II-IV-V2 chalcopyrites. However, 0.5 atomic percent of Mn(II) was successfully substituted in the structure for Zn(II). GRA

N86-25274# IBM Research Lab., San Jose, Calif.
PROPERTIES OF ORGANIC SUPERCONDUCTORS Final Report, Sep. 1982 - Sep. 1983
R. L. Green and E. M. Engler Sep. 1983 23 p refs
(Contract N00014-80-C-0792)
(AD-A163573) Avail: NTIS HC A02/MF A01 CSCL 20/3

The major results were: 1. Discovery of a new class of organic superconductors based on the (BEDT-TTF) molecule. This discovery has proven to be very important since recent chemical modification of our (BEDT-TTF) compound has led to a superconducting transition temperature of 8K quite high for an organic solid. This offers the possibility that superconductivity can be found at temperatures greater than inorganic materials. The characterization of the (BEDT-TTF)2X superconductors included transport, magnetic and structural properties and these are discussed in the reference. 2. Measurement of the far IR properties of (TMTSF)2

C1O4. These results proved that a large superconductivity gap does not exist in (TMTSF)2 C1O4, contrary to previous speculations and erroneous interpretation of data by other workers. This rules out the possibility of superconducting fluctuations in the (TMTSF)2X class of organic superconductors. 3. Observation of now features of the magnetic-field-induced transition in (TMTSF)2 C1O4. The field-induced-transition (FIT) is quite anomalous and appears to be unique in solid state physics. The Hall effect and the magnetoresistance of (TMTSF)2 C1O4 was measured as a function of magnetic field up to 20T. GRA

N86-25275# Aerojet Electrosystems Co., Azusa, Calif.
SCHOTTKY BARRIER SURFACE SCIENCE Final Report
Patricia M. George Jul. 1985 31 p refs
(Contract N00014-83-C-0680)
(AD-A163574; AESC-7855) Avail: NTIS HC A03/MF A01 CSCL 07/4

Thermal desorption mass spectrometry (TDMS) and X-ray photoelectron spectroscopy (XPS) are utilized to study GaAs(100) surfaces prepared by MBE and chemical etching. XPS results on the chemically etched GaAs samples revealed As present in GaAs and As(+3) in the form of As2O3. TDMS of both the chemically etched and MBE prepared GaAs showed several impurities such as H2, H2O, CO2 and CO. Also, the surface reactions of water and ammonia with atomically clean GaAs survaces are studied with XPS and TDMS. These results help identify possible contaminants that may interfere with GaAs device performance. GRA

N86-25276# Brown Univ., Providence, R. I.
THE PHOTOELECTROCHEMICAL PROPERTIES OF MoS SUB2 SINGLE CRYSTALS GROWN IN THE PRESENCE OF COBALT
D. M. DAmbra, J. Kershaw, R. Baglio, K. Dwight, and Aaron Wold 29 Jan. 1986 17 p refs
(Contract N00014-77-C-0387)
(AD-A163592; TR-39) Avail: NTIS HC A02/MF A01 CSCL 20/2

Molybdenum Disulfide single crystals have been grown in the presence of cobalt. Photoresponse has been measured and compared with that from undoped MoS2. The results are consistent with the segregation of cobalt on the surface edges of the doped crystals. GRA

N86-25277# California Univ., Los Angeles. School of Engineering and Applied Science.
THEORETICAL INVESTIGATION OF POINT DEFECTS OF MERCURY CADMIUM TELLURIDE A01 Final Report, 20 Mar. 1981 - 19 Sep. 1985
Dee-Son Pan 1 Nov. 1985 180 p refs
(Contract DAAG29-81-K-0054)
(AD-A163735; ARO-17684.3-EL) Avail: NTIS HC A09/MF A01 CSCL 20/2

We have investigated a number of electronic properties related to point defects in the Hg(1-x)Cdx Te alloy system. A detailed calculation for the electronic starter for mercury vacancies was carried out and we found those mercury vacancies are shallow double acceptors. Both the first and second ionization energies are calculated for the whole range of alloy composition. The theoretical results are consistent with current experimental data. But more conclusive and accurate data are required. We have investigated other native point defects as well. Interesting qualitative conclusions were reached. We have looked into the substitutional disorder in Hg(1-x)CdxTe alloy system. An empirical pseudopotential theory for alloy fluctuation potential in this case was proposed. We have applied the theory to study the band gap bowing, and level broadening of shallow donors and acceptor, as well as bound excitons. The theoretical results agree well with the only available data from bound exciton broadening and from band gap bowing in Hg(1-x)Cdx Te. Nonparabolic effects in a narrow band gap Hg(1-x)Cdx Te were also investigated. Interesting results on energy level of shallow donors and transport properties are reported. GRA

N86-25278# Westinghouse Research and Development Center, Pittsburgh. Pa.
THIN FILM TECHNOLOGY OF HIGH-CRITICAL-TEMPERATURE SUPERCONDUCTING ELECTRONICS Final Report, 1 Aug. 1982 - 30 Sep. 1985
J. Talvacchio, A. I. Braginski, J. R. Gavaler, and M. A. Janocko 11 Dec. 1985 159 p
(Contract N00014-82-C-0617)
(AD-A136053; Rept-85-909-TUDEV-R1) Avail: NTIS HC A08/MF A01 CSCL 09/5

The objective of this three-year program was to develop a technology of Josephson tunnel junctions capable of operating at temperatures above 10K. The superconducting electrode materials investigation were V3Si, Nb3Sn and Mo-Re. Tunnel barriers were formed mostly by oxidizing metallic overlayers of Al and Y. Superconductor/barrier interfaces were characterized by surface-analytical techniques. The results of characterization permitted fabrication of junction with Nb3Sn and Mo-Re base electrodes and Pb, Pb-Bi and Mo-Re counterelectrodes having nearly ideal current-voltage characteristics. These counterelectrodes were deposited at temperatures not exceeding T = 100 C. The Mo-Re counterelectrode formed at low T had a critical temperature, Tc, of only 8K. A high-critical-temperature Nb3Sn counterelectrode requiring high deposition temperatures could not be fabricated successfully. The main cause of this negative result was the nonuniform coverage of the base with overlays which contained thin or defective spots. In contrast to Nb3Sn high-Tc-NbN counterelectrodes were successfully fabricated and sumgap voltages exceeding 5 mV were measured at 4.2K. The report contains new information on artificial barriers and on Mo-Re and Nb3Sn superconducting films. GRA

N86-25279# Florida Univ., Gainesville.
A CHARACTERIZATION OF THE CHEMICAL VAPOR DEPOSITION OF GALLIUM ARSENIDE AND INDIUM PHOSPHIDE IN THE HYDRIDE AND CHLORIDE SYSTEMS Interim Report, Jan. 1982 - Dec. 1984
D. J. Meyer and T. J. Anderson Dec. 1985 215 p refs
(Contract F19628-82-K-0008)
(AD-A164259; RADC-TR-85-224) Avail: NTIS HC A10/MF A01 CSCL 20/12

The fundamental chemistry surrounding the chemical vapor deposition of GaAs and InP in the hydride and chloride processes was investigated. Chemical equilibrium calculations showed that ICl, V4 and V2 were the dominant group III and V species in the vapor phase. These calculations also demonstrated that vapor phase silicon species, formed by the interaction of H2 and HCl with the reactor wall, may be present at compositions up to 1 ppm under typical operation conditions. It was shown that the formation of vapor phase silicon species can be suppressed by the addition of small amounts of H20 or by replacing the H2 carrier gas with an inert gas. The unintentional incorporation of silicon into III-V epitaxial layers may be decreased by reducing the amount of silicon species in the vapor phase or by shifting these silicon species from hydrogen rich to chlorine rich species through the addition of HCl or VCl3. The use of solid and liquid group III sources in the chloride process was compared. In the GaAs system, the liquid source yielded a much greater degree of supersaturation than did the solid source. This difference was much less pronounced for the InP system. The equilibrium chemistry of the hydride process was found to behave similarly to that of the chloride process. The degree of supersaturation present in the hydride process was found to be lower than that in the chloride process. The thermal decompositions of NH3, PH3, and Ash3 were studied in a constant volume reactor using a mass spectrometer. GRA

N86-25280# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
IMPURITY DIFFUSION IN NIO GRAIN BOUNDARIES
A. Atkinson and R. I. Taylor Apr. 1985 30 p refs
(AERE-R-11763) Avail: Issuing Activity

The diffusion of Ce-139 and Cr-51 in polycrystalline NiO has

been studied in the temperature range 600-1100C in oxygen at a pressure of 1 atm. These impurities were chosen because of their different effective charges and segregation behavior and because of their relevance to the oxidation of metals at elevated temperature. The solubility of Ce in the NiO lattice is negligible, but Ce is soluble at NiO grain boundaries and dislocations. Consequently Ce tracer only diffused along these pathways and the resulting profiles were analyzed straightforwardly to give grain boundary and dislocation diffusion coefficients. The lattice solubility of Cr, on the other hand, is not negligible and Cr also segregates strongly to NiO grain boundaries. A procedure for analysing penetration profiles of such an impurity has been developed in which parameters describing segregation and grain boundary diffusion are deduced self-consistently. When combined with previous measurements of Ni and Co diffusion it is found that grain boundary coefficients decrease in the order Co, Ni, Cr, Ce as is also found for lattice diffusion (except for Ce, which has negligible lattice solubility). The implication of the results for the distribution of Cr and Ce in NiO films formed by metal oxidation is discussed. Author

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-25281 Whitcombe (David W.), Manhattan Beach, Calif.
THE BI-METRIC ABSOLUTE DIFFERENTIAL CALCULUS WITH APPLICATIONS TO GENERAL RELATIVITY
David W. Whitcombe 1986 112 p refs
Copyright. Avail: Issuing Activity

The Bi-Metric Absolute Differential Calculus (BMADC) is developed as an extension of the Levi-Civita/Ricci absolute differential calculus g sup-alpha beta. It includes both a reference metric g and a space curvature metric g sup-alpha beta. In the application to general relativity, the reference metric is chosen as the Galilean metric. The space curvature metric is obtained as a solution of the field equations. It is then shown that the difference in the Christoffel symbols formed with respect to these metrics is a tensor. It is conjectured that the field quantities may be identified with this tensor. It is felt that the electric, magnetic and quantum fields are similar in nature and origin to the gravitational field. Hence, there is no reason why the Einstein field equations should not also apply to these fields. Intuitive derivations are included to support these considerations. This analysis requires that the energy source tensor t sub mu upsilon be revised to include a radiation energy source term. The Hamiltonian formulation, introduced by Einstein, has been extended to include four new tensors. Author

N86-25282 British Library Lending Div., Boston Spa (England).
ENTHALPIES OF FORMATION OF LIQUID THREE-COMPONENT IRON-CERIUM-ALUMINIUM ALLOYS
M. S. Petrushevskii and G. M. Ryss 1986 7 p refs Transl. into ENGLISH from Izvestiya Vysshe Ucheb Zaved Chernaya Metallurgiya (USSR), no. 8, 1985 p 3-6
(BLL-M-36623-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The integral enthalpies of formation of iron-cerium-aluminum melts at 1870K in the entire composition range of the concentration triangle of this system are calculated on the basis of the microinhomogeneous structure of liquid alloys. Formulae for estimating the partial molar enthalpies of solution of components are given. Author

N86-25283# California Univ., Berkeley. Dept. of Physics.
SUPERCONDUCTING QUANTUM DEVICES, SUMMARY AND CONCLUSIONS
J. Clarke Aug. 1985 12 p Presented at the Third International Conference on Superconducting Quantum Devices, Berlin, West Germany, 25-28 Jun. 1985
(Contract DE-AC03-76SF-00096)
(DE86-001978; LBL-20059) Avail: NTIS HC A02/MF A01

Progress in the field of Squid detectors is reviewed. Topics discussed include: tunnel junctions, localized states in barriers, resonant tunneling, grain boundaries, nonlinear dynamics and chaos, macroscopic quantum tunneling, wave functions, nonequilibrium superconductivity, flux quantization, and the Aharonov-Bohm effect. B.G.

N86-25284*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL DESORPTION STUDY OF PHYSICAL FORCES AT THE PTFE SURFACE
D. R. Wheeler and S. V. Pepper 1986 15 p refs Presented at the International Conference on Surface and Colloid Chemistry, Potsdam, N.Y., 24-28 Jun. 1985; sponsored by American Chemical Society
(NASA-TM-87090; E-2680; NAS 1.15:87090) Avail: NTIS HC A02/MF A01 CSCL 20C

Thermal desorption spectroscopy (TDS) of the polytetrafluoroethylene (PTFE) surface was successfully employed to study the possibile role of physical forces in the enhancement of metal-PTFE adhesion by radiation. The thermal desorption spectra were analyzed without assumptions to yield the activation energy for desorption over a range of xenon coverage from less than 0.1 monolayer to more than 100 monolayers. For multilayer coverage, the desorption is zero-order with an activation energy equal to the sublimation energy of xenon. For submonolayer coverages, the order for desorption from the unirradiated PTFE surface is 0.73 and the activation energy for desorption is between 3.32 and 3.36 kcal/mol; less than the xenon sublimation energy. The effect of irradiation is to increase the activation energy for desorption to as high as 4 kcal/mol at low coverage. Author

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-25285# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AGARD BULLETIN: MEETINGS, PUBLICATIONS, MEMBERSHIP
Jan. 1986 77 p refs
(AGARD-Bull-86/1) Avail: NTIS HC A05/MF A01

Information on all planned 1986 AGARD meetings, including dates, locations and brief descriptions of their themes are contained. Also included is a list of all AGARD publications which were issued in 1985, together with their abstracts. B.G.

N86-25286# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
LEADERSHIP ON THE FLIGHT DECK: THE INFLUENCE OF CREW SOCIAL RELATIONS AND CREW MEMBER EXPERIENCE ON LEADERSHIP STYLE EFFECTIVENESS IN CIVIL AVIATION FLIGHT CREWS
John R. Harris and H. C. Muir Jan. 1986 30 p refs
(CAR-8612; ISBN-0-947767-37-1) Avail: NTIS HC A03/MF A01

Effective leadership is now recognized as a major influence of

flight crew performance. Following research on other work groups, this study examined the proposition that, rather than one leadership style being universally ideal, the effectiveness of a given style is determined by the group situation in which the leader finds himself. To this end, a survey of civil aviation captains was conducted, eliciting descriptions of incidents in which the respondent felt his leadership to be most effective. Details of leader-member social relations and crew member experience were included. In addition, leadership style of each respondent was assessed by the Least Preferred Co-worker (LPC) scale. (High LPC scores are theorized to indicate primary concern with establishing good working relations in the group. Low LPC scores indicate primary concern with orderly task completion). Author

N86-25287# Administrative Sciences Corp., Alexandria, Va.
A SURVEY OF O AND S (OPERATING AND SUPPORT) COST MODELS
16 Dec. 1985 53 p refs
(Contract N00014-85-C-0863)
(AD-A163438; ASC-R-147) Avail: NTIS HC A04/MF A01 CSCL 05/1

In Sep. 1985, a contract was awarded to develop procedures to estimate outyear operating and support (O&S) costs for new weapon system. The procedures to be developed were to differ from existing O and S cost models in sensitivity to design decisions and how design decisions impact O and S costs. As task I of this effort, contractors were to review existing methodologies for estimating operating and support costs of weapons systems. This report documents the team's efforts to date. Chapter 2 describes the approach used to review existing methodologies. It also summarizes findings. Chapters 3 and 4 discuss the methodologies reviewed. Chapter 3 addresses Navy models while Chapter 4 discussed the other services models. GRA

N86-25288# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
NASA'S FIA (NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S FINANCIAL INTEGRITY ACT) PROGRAM: NASA'S PROGRESS IN IMPLEMENTING FINANCIAL INTEGRITY ACT REQUIREMENTS
Nov. 1985 54 p
(PB86-135100; GAO/NSIAD-86-3; B-216946) Avail: NTIS HC A04/MF A01 CSCL 05A

The National Aeronautics and Space Administration's (NASA's) continuing efforts to implement and comply with the Federal Manager's Financial Integrity Act (FIA) of 1982 (31 U.S.C. 3512 (b) and (c)) are reported. The review is part of a government wide assessment of 23 federal agencies. The GAO performed the reviews as part of their effort to enhance the federal government's ability to evaluate and improve internal controls and accounting systems. GRA

N86-25289# Coopers and Lybrand, Washington, D.C.
EVALUATING R AND D AND NEW PRODUCT DEVELOPMENT VENTURES: AN OVERVIEW OF ASSESSMENT METHODS $12.00/MF A01
Jan. 1986 56 p Prepared in cooperation with Commerce Dept., Washington, D.C.
(PB86-110806) Avail: NTIS HC $12.00/MF A01 CSCL 05A

Techniques to assess the business potential of technology projects are introduced. The intent is to familiarize decisionmakers with the range of available techniques. The principles involved are applicable to all those involved in the process of technological innovation: investors, financial intermediaries, individual entrepreneurs and other personnel who screen projects for possible commercial application. The assessment techniques include: checklist analyses, constraint analysis, environmental scoring model, profitability measures, sensitivity analysis, risk analysis, decision analysis and decision trees, and assessment of probabilities. GRA

N86-25290# National Planning Association, Washington, D. C.
TRENDS IN INDUSTRIAL R AND D ACTIVITIES IN THE UNITED STATES, EUROPE AND JAPAN, 1963-83
D. M. Levy and N. E. Terleckyj 26 Sep. 1985 53 p refs Presented at the Conference on Productivity Growth in Japan and The United States, Cambridge, Mass., 26-28 Aug. 1985
(Grant NSF SRS-83-07769)
(PB86-141371) Avail: NTIS HC A04/MF A01 Prepared in cooperation with George Mason Univ., Fairfax, Va. CSCL 05A

The growth in industrial R and D activity in the United States in relation to R and D expenditures in Western Europe and Japan is examined. The effects of foreign industrial R and D expenditures on private R and D expenditures in the United States are considered, with R and D expenditures performed under contract for the United States Government taken into account. A clear and positive relationship is shown between private R and D expenditures and R and D expenditures performed under government contract. In addition, the influence of foreign industrial R and D expenditures on U.S. expenditures is explored econometrically. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-25291*# Ecosystems International, Inc., Gambrills, Md.
A DEFINITION STUDY OF AN ADVANCED DATA COLLECTION AND LOCATION SYSTEM (ADCLS) Final Report
Jan. 1986 126 p refs
(Contract NAS5-28791)
(NASA-CR-177867; NAS 1.26:177867) Avail: NTIS HC A07/MF A01 CSCL 05B

The technical and economic advantages of developing an Advanced Data Collection and Location System (ADCLS) to operate within the Earth Observation System (EOS) planned for Polar Platform, as a replacement and/or augmentation of the existing ARGOS data collection system were assessed. The cost/effectiveness of ADCLS with respect to ARGOS hinges on the traffic and quality of service demand of the future user constituency. Author

N86-25292*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BRAILLE READING SYSTEM Patent Application
H. Douglas Garner, inventor (to NASA) Filed 31 Mar. 1986 11 p Sponsored by NASA
(NASA-Case-LAR-13306-1; NAS 1.71:LAR-13306-1; US-Patent-Appl-SN-846430) Avail: NTIS HC A02/MF A01 CSCL 05B

A Braille reading system wherein the display of characters is controlled by moving a position sensor is developed. A text recorded on a cassette tape is removed by a cassette player under the control of loading logic. The logic controls the cassette player to remove one or two pages of the text at a time. The removed text is stored in buffer memory. One character at a time is retrieved from memory and received by solenoid drivers. These drivers control a series of solenoids and pins to present a standard Braille representation of the character selected. The Braille display is mounted on a mouse which may be manually moved by the operator. When the mouse is moved, an optical pickoff determines the amount of movement of the mouse and forwards signals to an up down counter to record its position. When the mouse is moved a predetermined distance, the character to be displayed is changed to the next character in the text. Author

N86-25293# Maryland Univ., College Park. Computer Vision Lab.
APPLICATION OF HIERARCHICAL DATA STRUCTURES TO GEOGRAPHICAL INFORMATION SYSTEMS Final Report, Nov.

1984 - Nov. 1985
Hanan Samet and Azriel Rosenfeld Dec. 1985 71 p refs
(Contract DAAK70-81-C-0059)
(AD-A163674; ETL-0411) Avail: NTIS HC A04/MF A01 CSCL 08/2

The purposes of this investigation were twofold: (1) to construct a geographic information system based on the quadtree hierarchical data structure; and (2) to gather statistics to allow the evaluation of the usefulness of this approach in geographic information system organization. To accomplish the above objectives, Phase I contained three maps supplied under the terms of the contract. These maps described the floodplain, elevation contours and land use classes of a region in California. In Phase 2, a quadtree-based Geographic Information System was partially implemented, allowing manipulation of images which store area, point and line data. Phase 3 primarily dealt with enhancements and alterations to this information system package, an evaluation of some of the design decisions and the collection of empirical results to indicate the utility of the software and to justify the indicated design decisions. Phase 4 primarily dealt with developing new structures for storing linear feature data. The attribute attachment package was extended to point and linear feature data. Existing area map algorithms were improved to yield significant efficiency speedups by reducing node accesses. The efficiency of the linear quadtree was compared to that of the pixel array for computation of several important geographic functions. GRA

N86-25294# Naval Postgraduate School, Monterey, Calif.
DEFENSE DATA NETWORK/TOPS-20 TUTORIAL: AN INTERACTIVE COMPUTER PROGRAM M.S. Thesis
Mark K. H. Herkert and Sheri L. Smith Dec. 1985 136 p refs
(AD-A163675) Avail: NTIS HC A07/MF A01 CSCL 09/2

The DDNTUT program is an interactive tutorial, located on the ISIA host computer in Marina del Rey, California. The program is designed to first acquaint the new user on the Defense Data Network with the TOPS-20 operating system and its executive level commands. Following this, the user is taken step by step through nine different programs available on TOPS-20, knowledge of which is integral to effective use of the network. The user can, at any time, quit the tutorial, return to previously studied sections and/or skip sections he may be familiar with. GRA

N86-25295# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND IMPLEMENTATION OF A CENTRALIZED DATA DIRECTORY FOR A DISTRIBUTED DATABASE MANAGEMENT SYSTEM M.S. Thesis
James A. Wedertz Dec. 1985 149 p refs
(AD-A163843; AFIT/GCS/ENG/85D-24) Avail: NTIS HC A07/MF A01 CSCL 09/2

This thesis refined and implemented a design of a centralized data directory for distributed database management system (DDBMS) begun in a previous study for use in the AFIT Digital Engineering Laboratory. This directory contains information about all the data stored in the distributed databases. By following the life cycle programming method to develop the system, this project completed a requirements analysis, detailed design and implementation of the directory as well as partial implementation of the DDBMS to test the operation of the centralized data directory. The requirements analysis outlined the functions of the central site which contained the centralized directory. This project used Structured Analysis Design Technique (SADT) diagrams to document the central site's functions. These included initializing the DDBMS, updating the centralized directory, sending changes to other local directories at the remote sites, reconfiguring the DDBMS and servicing requests for information in the directory. Next, the project refined the detailed design of the directory processing and depicted the functional decomposition in structure charts. The following step implemented on two microcomputers only those modules necessary to show how the centralized directory worked. Tests verified that one DDBMS node which received a query could request and receive location information from the other node. GRA

N86-25296# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DESIGN AND IMPLEMENTATION OF A RELATIONAL TO NETWORK QUERY TRANSLATOR FOR A DISTRIBUTED DATABASE MANAGEMENT SYSTEM M.S. Thesis
Kevin H. Mahoney Dec. 1985 554 p refs
(AD-A164013; AFIT/GCS/ENG/85D-7) Avail: NTIS HC A24/MF A01 CSCL 09/2

A translation program was implemented for the translation of generic relational queries into the Data Management Language (DML) of the TOTAL data base management system. The objectives of this thesis were to propose and detail a method of supporting a global relational query language for a heterogeneous distributed database management system (DDBMS), design generic query translators for the translation of global relational queries into local hierarchical and network DML, and partially implement translation software for the conversion of relational queries into TOTAL DML. The initial portion of the thesis presents an overall analysis of data partitioning, query decomposition and global query management in the DDBMS. Specific proposals are advocated concerning the specific approach to be taken toward a global query manager and the design of the global schema over current databases. The second portion formalizes the assumptions and constraints present in the global relational model, and presents generic algorithms for the translation of relational queries into hierarchical and network DML. The last portion details the implementation and testing of the relational to TOTAL translator. The approach used was to take information returned from the local data directory of the distributed d atabase in response to a relational query, and compile that information into a generated Pascal program containing the TOTAL DML commands. GRA

N86-25297# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A NETWORK MONITORING FACILITY FOR A DISTRIBUTED DATA BASE MANAGEMENT SYSTEM M.S. Thesis
Janice F. Rowe Dec. 1985 132 p refs
(AD-A164129; AFIT/GCS/EE/85D-14) Avail: NTIS HC A07/MF A01 CSCL 09/2

This thesis designed and implemented a hybrid network monitoring facility on an existing Distributed Data Base Management System. Analysis of the performance evaluations goals and objectives for the complete distributed system (both the layered protocol network and distributed data base) was accomplished. Two monitoring programs were developed. The on-line analysis monitor is designed to work with existing software to calculate metrics involving arrival rates, packet counts and arrival times. The off-line analysis monitor, using the packets saved during the on-line session, completes a more detailed analysis, providing user selectable metrics in the area of throughput, response times and utilization. Both programs were extensively tested using a four phased process which encompassed unit level, integration, systems and operational testing. Operational testing was accomplished using an artificial traffic generator program, designed to produce realistic network traffic. GRA

N86-25298# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 40, NUMBER 3 ESN-40-3 HC A03/MF A01 Monthly Report
David L. Venezky Mar. 1986 43 p refs
(AD-A164182; ESN-40-3) Avail: NTIS HC A03/MF A01 CSCL 05/2

European Science Notes is a monthly publication with brief articles on recent developments in European scientific research. Partial contents: Biological sciences; Material Sciences; Mechanics; Physics; and News and Notes. GRA

N86-25299# Office of Management and Budget, Washington, D.C.

MANAGING FEDERAL INFORMATION RESOURCES: REPORT UNDER THE PAPERWORK REDUCTION ACT OF 1980
Sep. 1985 54 p refs
(PB86-247682; AR-4) Avail: NTIS HC A04/MF A01 CSCL 05B

Topics covered include: controlling paperwork (information collection reviews, the information collection budget, other paperwork reduction act activities, legislative activites and issues, delegation of clearance authority); information policy (information technology planning process, federal information policy circular, federal telecommunications systems, security of information technology systems, protecting personal privacy, coordination of U.S. Government information flows in support of international affairs, Office of Management and Budget's leadership role); and statistical policy (long range planning, evaluation, coordination standards, major statistical policy issues addressed in 1984 to 1985). GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-25300# Army Aviation Systems Command, St. Louis, Mo.
COST ESTIMATING RELATIONSHIPS FOR FIXED WING AIRCRAFT: LIST PRICE VERSUS EMPTY WEIGHT Final Report
William J. Ditto Sep. 1985 15 p refs
(AD-A164196; USAAVSCOM-TM-85-F-7) Avail: NTIS HC A02/MF A01 CSCL 15/5

This Cost Estimating Relationship (CER) for fixed wing aircraft was developed to estimate the unit cost of a twin engine, commercial, turboprop aircraft procured off the shelf. The Army has a limited fixed wing capability and most of this capability is procured in a commercial environment instead of through a typical rotor wing procurement cycle. The list price in the commercial market includes both engines and standard avionics, while in a typical government rotor wing procurement these items are Government Furnished Equipment. Therefore, this CER was developed using the parameter of empty weight and aircraft commercial list price. The data collected were analyzed using the Statistical Analysis System (SAS) on the AVSCOM Scientific and Engineering Computer System. The program developed is a linear regression of the form ($y = a + bx$), and the results are shown in the report. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-25301# Committee on Science and Technology (U. S. House).
SCIENCE POLICY STUDY. VOLUME 7: INTERNATIONAL COOPERATION IN SCIENCE
1985 1146 p refs Hearings before the Task Force on Science Policy of the Committee on Science and Technology, 99th Congress, 1st Session, No. 50, 18-20; 27 Jun. 1985
(GPO-52-283) Avail: Committee on Science and Technology

A reuseable orbit transfer vehicle concept was defined and subsequent recommendations for the design criteria of an advanced LO2/LH2 engine were presented. The major characteristics of the vehicle preliminary design include a low lift to drag ratio aerocapture capability, main propulsion failure criteria of fail operational/fail safe and either two main engines with an attitude control system for backup or three main engines to meet the failure criteria. A maintenance and servicing approach was also established for the advanced vehicle and engine concepts. Design tradeoff study conclusions were based on the consideration of reliability, performance, life cycle cost and mission flexibility. BG

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-25302*# Stirling Thermal Motors, Inc., Ann Arbor, Mich.
EXPERIMENTAL ASSESSMENT OF ADVANCED STIRLING COMPONENT CONCEPTS Final Report
Benjamin Ziph Oct. 1985 106 p
(Contracts DEN3-351; DE-AI01-77CS-51040)
(NASA-CR-174994; DOE/NASA/0351-1; NAS 1.26:174994) Avail: NTIS HC A06/MF A01 CSCL 10B

The results of an experimental assessment of some advanced Stirling engine component concepts are presented. High performance piston rings, reciprocating oil scrapers and heat pipes with getters and with mechanical couplings were tested. The tests yielded the following results: (1) Bonded, split, pumping piston rings, in preliminary testing, proved a promising concept, exhibiting low leakage and friction losses. Solid piston rings proved impractical in view of their sensitivity to the operating temperature; (2) A babbit oil scraper in a compliant housing performed well in atmospheric endurance testing. In pressurized tests the scraper did not perform well as a containment seal. The latter tests suggest modifications which may adapt Ti successfully to that application; and (3) Heat pipe endurance tests indicated the adequacy of simple, inexpensive fabrication and filling procedures. Getters were provided to increase the tolerance of the heat pipes to the presence of air and commercially available couplings were demonstrated to be suitable for heat pipe application. In addition to the above tests, the program also included a design effort for a split shaft applicable to a swashplate driven engine with a pressurized crank-case. The design is aimed, and does accomplish, an increase in component life to more than 10,000 hours. Author

N86-25303*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STIRLING POWERED VAN PROGAM OVERVIEW Final Report
Richard K. Shaltens 1986 14 p Presented at the International Congress and Exposition, Detroit, Mich., 24-28 Feb. 1986; sponsored by Society of Automotive Engineers Revised
(Contract DE-AI01-85CE-50112)
(NASA-TM-87227; DOE/NASA-50112/62-Rev; E-2896; NAS 1.15:87227) Avail: NTIS HC A02/MF A01 CSCL 13F

The Stirling Powered Van Program (SPVP) is a multiyear, multiphase program to evaluate the automotive Stirling engine (ASE) in Air Force vans under realistic conditions. The objective of the SPVP is to transfer to manufacturer and end user(s) (i.e., on the path to commercialization) the second-generation Mod 2 ASE upon completion of the Automotive Stirling Engine Program in 1987. In order to meet this objective, the SPVP must establish Stirling performance, integrity, reliability, durability and maintainability. The ASE program background leading to the van program is reviewed and plans for evaluating the kinematic Stirling engine in Air Force vans examined. Also discussed are the NASA technology transfers to industry that have been accomplished and those which are currently being developed. Author

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-25304# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
IS G305.8-0.2 A YOUNG OBJECT?
J. W. S. VilasBoas, E. Scalise, Jr., and C. G. Sanzovo Feb. 1986 12 p refs Submitted for publication
(INPE-3787-PRE/882) Avail: NTIS HC A02/MF A01

Observations of water vapor and silicon monoxide were conducted in the direction of G305.8-0.2. No emission of SiO, above 7 Jy of flux density, was detected. The short time water maser variability of the source suggests that it could be a protostellar object. Measurements of the visual extinction distributions in the direction of the water maser source do not show relevant darkness effect. Author

N86-25305*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THERMAL PERFORMANCE EVALUATION OF THE INFRARED TELESCOPE DEWAR SUBSYSTEM
Eugene W. Urban Apr. 1986 127 p ref
(NASA-TM-86543; NAS 1.15:86543) Avail: NTIS HC A07/MF A01 CSCL 03A

Thermal performance evaluations (TPE) were conducted with the superfluid helium dewar of the Infrared Telescope (IRT) experiment from November 1981 to August 1982. Test included measuring key operating parameters, simulating operations with an attached instrument cryostat and validating servicing, operating and safety procedures. Test activities and results are summarized. All objectives are satisfied except for those involving transfer of low pressure liquid helium (LHe) from a supply dewar into the dewar subsystem. E.A.K.

N86-25306 Texas Univ., Austin.
A POLARIMETRIC STUDY OF THE INSTERSTELLAR MEDIUM IN TAURUS DARK CLOUDS Ph.D. Thesis
Jinchung Hsu 1985 180 p
Avail: Univ. Microfilms Order No. DA8527580

An optical linear polarimeter survey was completed for more than 300 stars in an area of 6.5 x 10 deg. toward the Taurus Dark Clouds Complex. The orientation of the magnetic field was roughly perpendicualr to the elongation direction of the dust lanes, indicating cloud contraction along the magnetic field lines. Distance to the front edge of the dark clouds in Taurus was determined to be 126 pc. There was only an insignificant amount of obscuring material between the cloud complex and the sun. Beside the polarization data, the reddenings of about 250 stars were also obtained from the UBV photometry. The mean polarization to reddening ratio in the Taurus region was 4.6, which is similar to that of the general interstellar matter. A statistical analysis was carried out for the reddening and polarization data of the Taurus region. The characteristic scale of the fluctuations was about 0.5 pc for both the reddening and the Stokes parameters, if an exponential correlation function was added. Dissert. Abstr.

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-25307* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERNATIONAL ULTRAVIOLET EXPLORER ATLAS OF O-TYPESPECTRA FROM 1200 TO 1900 ANGSTROM
Nolan R. Walborn (Space Telescope Science Inst., Baltimore, Md.), Joy Nichols-Bohlin, and Robert J. Panek (Wellsley Coll.) Dec. 1985 153 p
(NASA-RP-1155; NAS 1.61:1155) Avail: NTIS HC A08/MF A01 CSCL 03B

The IUE archives provide an unprecedented sample of uniform, high-quality ultraviolet stellar spectra. In particular, they contain high-resolution SWP data for nearly 200 different O stars. We have undertaken a survey of the 1200-1900 A region in about 120 of them having homogeneous optical spectral classifications to investigate systematically the behavior of the ultraviolet features, incuding the prominent stellar wind profiles and the degree to which they correlate with the optical types. The standard extracted spectrograms have been rebinned to a constant wavelength resolution of 0.25A and uniformly normalized (not dereddened) at the GSFC RDAF. They are then plotted at 10A/cm, with reseau, photometric quality and echelle order junction flags available. This atlas contains such plots for about 100 stars, arranged in spectral-type, luminosity and peculiar object sequences. The results show a high degree of correlation between the ultraviolet features, both photospheric and stellar-wind, and the optical classifications for the majority of the O-type stars. Author

N86-25308 Princeton Univ., N. J.
ON STELLAR STREAMING MOTIONS IN TRIAXIAL OBJECTS: THE CASE OF THE GALACTIC BULGE Ph.D. Thesis
Mario Vietri 1985 69 p
Avail: Univ. Microfilms Order No. DA8529049

The dynamical consequences of the hypothesis that the gas ring which is seen in HI emission to be tilted by 22 deg to the galactic plane, is in steady state, i.e. that it circulates on closed, stable, non-self-interesecting orbits tilted with respect to the galactic disk is studied. This implies that the galactic bulge is triaxial and that its figure is rotating in the direction opposite to that of the disk material. The rotation period of the bulge is determined by requiring that the potential has an anomalous orbit of the correct size at the observed tilt. The bulge is modeled as a triaxial object with axial ratios and rotation period. These values are consistent with those needed to explain an analogous feature detected in CO-13 and a relation of the model with observations of the inner pc is suggested. Two self-consistent models were constructed for a bulge immersed in the galactic potential modeled by Bahcall et al. Dissert. Abstr.

N86-25309 Texas Univ., Austin.
MOLECULAR OUTFLOWS AND MASS LOSS IN PRE-MAIN-SEQUENCE STARS Ph.D. Thesis
Russel Martin Levreault 1985 359 p
Avail: Univ. Microfilms Order No. DA8529878

A survey for molecular outflows toward pre-main-sequence stars using the J = 2 yields 1 transition CO was conducted. Outflows were detected toward 21 of these objects. The outflow sources range in mass from 0.5 to 30 solar mass in luminosity from 4 to 1.1 x 10 to the 5th power solar luminosity and in age from < 10,000 to 1 million years. In the H-R diagram the outflow sources form a distinct band running across the top of the diagram. In addition to the CO(J = 2 to 1 data, we have obtained CO(J = 1 to 0) and CO-13 (J = 1 to 0) observations which enable use to estimate the excitation temperature and optical depth in each outflow, leading to the derivation of outflow masses. The observed outflows range in age from approximately 1000 to 500,000 years old and have masses from 0.01 to 56 solar mass. Simple momentum conservation arguments are then used to deduce the mass loss necessary to produce the observed outflows; the results range from 9 x 10 to the -9 power to 8 x 10 to the -4 power Solar mass/yr. The observed pre-main-sequence winds could have important consequences for planetary formation, particularly of the terrestrial planets. Quantitative tests of self-regulated low-mass star formation suggest that this mechanism can support a 100 A survey for molecular outflows toward pre-main-sequence stars using the J = yields 1 solar mass molecular cloud against collapse for 50 million years. Such a lifetime can explain the observed age spread in nearby star forming regions. Dissert. Abstr.

N86-25310*# Akron Univ., Ohio. Dept. of Civil Engineering.
EFFECTS OF STATE RECOVERY ON CREEP BUCKLING UNDER

VARIABLE LOADING Final Report
D. N. Robinson and S. M. Arnold Apr. 1986 45 p refs
(Grant NAG3-379)
(NASA-CR-175094; NAS 1.26:175094) Avail: NTIS
HC A03/MF A01 CSCL 03B

Structural alloys embody internal mechanisms that allow recovery of state with varying stress and elevated temperature, i.e., they can return to a softer state following periods of hardening. Such material behavior is known to strongly influence structural response under some important thermomechanical loadings, for example, that involving thermal ratchetting. The influence of dynamic and thermal recovery on the creep buckling of a column under variable loading is investigated. The column is taken as the idealized (Shanley) sandwich column. The constitutive model, unlike the commonly employed Norton creep model, incorporates a representation of both dynamic and thermal (state) recovery. The material parameters of the constitutive model are chosen to characterize Narloy Z, a representative copper alloy used in thrust nozzle liners of reusable rocket engines. Variable loading histories include rapid cyclic unloading/reloading sequences and intermittent reductions of load for extended periods of time; these are superimposed on a constant load. The calculated results show that state recovery significantly affects creep buckling under variable loading. Structural alloys embody internal mechanisms that allow recovery of state with varying stress and time. Author

N86-25311*# Lick Observatory, Santa Cruz, Calif.
METALLICITY AND THE LEVEL OF THE ULTRAVIOLET RISING BRANCH IN ELLIPTICAL GALAXIES Final Report, 1 Jul. 1984 - 31 Mar. 1986
Sandra M. Faber 1986 8 p
(Grant NAG5-436)
(NASA-CR-176670; NAS 1.26:176670) Avail: NTIS
HC A02/MF A01 CSCL 03B

This final report concerns a project to study the systematics of the ultraviolet flux level in elliptical galaxies. Prior to the inception of this work, the systematic behavior of the ultraviolet flux level was basically unknown and ultraviolet fluxes were observed to vary greatly from galaxy to galaxy. There was a suggestion, however, that there might be a dependence of ultraviolet flux on galaxy metallicity, but the correlation was based on just six galaxies. IUE spectra of elliptical galaxies have been reanalyzed and placed on a consistent, homogenous flux system. The major conclusion is a confirmation of the original hypothesis: galaxies with stronger Mg2 lines show enhanced ultraviolet flux. Author

N86-25312# Massachusetts Inst. of Tech., Cambridge. Lincoln Lab.
THE ANALYSIS OF NEAR-EARTH SATELLITE ASTROMETRIC DATA AT THE ETS
Laurence G. Taff 12 Dec. 1985 31 p refs
(Contract F19628-85-C-0002)
(AD-A163902; ETS-76; ESD-TR-85-263) Avail: NTIS
HC A03/MF A01 CSCL 22/3

The activities at the ETS have expanded from observations of deep-space artificial satellites during the dark hours to observations of near-Earth satellites near noon. Not only do these varying tasks require different video cameras and associated equipment, they can benefit from a tailored analysis of the resulting astrometric data. In particular, the observation of near-Earth artificial satellites very near the astronomical zenith has become a frequent mode of operation. For some of these satellites, a parallax can be discerned when both ETS telescopes are used. For others, their nearly circular orbit coupled with a zenith passage suffices to fix their element set. GRA

N86-25313# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE ACCESSIBILITY OF EARTH-APPROACHING ASTEROIDS M.S. Thesis
Philip W. Somers Dec. 1985 149 p refs
(AD-A163976; AFIT/GSO/AA/85D-1) Avail: NTIS
HC A07/MF A01 CSCL 22/3

The purpose of this thesis is to analyze the accessibility of Earth-approaching asteroids using a computer program that was practical to run on a microcomputer. This analysis employs techniques that can easily be adapted to find optimal trajectories for a variety of orbital intercept applications. The mathematical analysis was adapted from recently developed algorithms that were designed to run on main frame computers using extensive software libraries and data resources. The computer program developed for this paper was designed to operate on an IBM PC equipped with an 8087 math co-processor chip. Programming was done in Turbo PASCAL Version 3.0 which supports the 8087 mathematical capabilities. The program was designed to be self contained except for data files of orbital elements. The program was also designed to operate efficiently and quickly while retaining much of the accuracy found on the main frame implementations. Only nonperturbed Keplerian motion was modelled. Every effort was made to ensure the program was as flexible as possible. Any object in the solar system in heliocentric orbit can be used as either the departure or arrival body. Orbital element data files are included for all the planets, several periodic comets, all the recently discovered Earth-approaching asteroids and many of the main belt asteroids. This flexibility permits not only rendezvous missions to be calculated, but can just as easily handle fly by trajectories and return-to-Earth missions. GRA

N86-25314 Clemson Univ., S.C.
B AND V PHOTOELECTRIC PHOTOMETRY AND LIGHT CURVE SOLUTION OF THE INTERACTING BINARY SYSTEMS HI PUPPIS, BL ERIDANI AND SY HOROLOGII Ph.D. Thesis
James Robert Kern 1985 265 p
Avail: Univ. Microfilms Order No. DA8527702

The first photoelectric observations of the eclipsing binary systems HI Puppis, BL Eridani and SY Horologii were obtained and complete B and V lights curves are presented. Improved light elements were derived for all three systems. The light curves of HI Puppis were analyzed by the computer models of Wilson and Devinney, Binnendijk and Wood to get the geometrical and photometric elements of the system. HI Puppis is shown to be a classic A type W Ursae Majoris system. The BL Eridani system is found to be a near contact system with the primary component filling its Roche lobe and the secondary nearly filling its lobe with a fill out ratio of approximately 1.0. The SY Horologii system is a near contact system with the secondary component filling its Roche lobe and the primary nearly filling its lobe with a fill out ratio of approximately 1.0. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-25315*# National Aeronautics and Space Administration, Washington, D.C.
PRELIMINARY RESULTS OF THE VEGA 1 AND VEGA 2 OPTICAL INVESTIGATION OF AEROSOL IN THE ATMOSPHERE OF VENUS AT 30-60 KM
B. Ye. Moshkin, V. I. Moroz, V. I. Gnedykh, and A. V. Grigoryev Apr. 1986 14 p refs Transl. into ENGLISH from Predvaritelnyye Rezultaty Opticheskikh Issledovaniy Aerozolnoy Sredy v Atmosfere Venery na Vysotakh 30-60 km s Pomoshchyu AMS Vega-1 i Vega-2, Pisna v AZH (USSR), v. 12, no. 1,1986 p 85-93 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. was prep. by Academy of Sciences Space Research Inst., Moscow, USSR
(Contract NASw-4005)
(NASA-TM-88414; NAS 1.15:88414) Avail: NTIS
HC A02/MF A01 CSCL 03B

Aerosol concentration profiles were measured by an aerosol spectrometer above the landing sites of the Vega 1 and Vega 2

landers. Approximately the same altitude zones were found as in previous experiments: a three-layered basic cloud cover, an intermediate zone and subcloud haze. There were significant quantitative differences in the concentrations of particles, however, and especially in the spectra of their dimensions. Nightglow was found in the troposphere of Venus at a wavelength of about 1 micron. The backscatter coefficient and the extinction coefficient changé very little between 32 and 63 km. Large numbers of submicron particles apparently exist in the atmosphere above the landing sites. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-25316*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE POSSIBLE IMPORTANCE OF SYNCHROTRON/INVERSE COMPTON LOSSES TO EXPLAIN FAST MM-WAVE AND HARD X-RAY EMISSION OF A SOLAR EVENT
E. Correia (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), P. Kaufmann (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), J. E. R. Costa (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), A. M. Zodi Vaz (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil), and B. R. Dennis Feb. 1986 11 p refs Presented at the SMM Topical Workshop on Rapid Fluctuations in Solar Flares, Lanham, Md., 30 Sep. - 4 Oct. 1985 Submitted for publication
(NASA-TM-88659; NAS 1.15:88659; INPE-3809-PRE/895) Avail. NTIS HC A02/MF A01 CSCL 03B

The solar burst of 21 May 1984 presented a number of unique features. The time profile consisted of seven major structures (seconds), with a turnover frequency > or approx. 90 GHz, well correlated in time to hard X-ray emission. Each structure consisted of multiple fast pulses (.1 seconds), which were analyzed in detail. A proportionality between the repetition rate of the pulses and the burst fluxes at 90 GHz and > or approx. 100 keV hard X-rays, and an inverse proportionality between repetition rates and hard X-rays power law indices have been found. A synchrotron/inverse Compton model has been applied to explain the emission of the fast burst structures, which appear to be possible for the first three or four structures. Author

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N86-25317# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GAMMA-RAY BACKGROUND INDUCED IN A DOUBLE Ge(Li) SPECTROMETER AT BALLOON ALTITUDES IN THE HEMISPHERE
N. A. BuiVan, J. Braga, J. O. D. Jardim, and G. Vedrenne Feb. 1986 26 p refs Submitted for publication Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3797-PRE/892) Avail: NTIS HC A03/MF A01

A double coaxial Ge(Li) spectrometer was flown in the Southern Hemisphere to study the induced background at ceiling in the diodes. During the flight, different anticoincidence modes were operated to estimate the local production. The atmospheric 511 KeV line results show that the fluxes detected by the upper diode are in good agreement with previous measurements and indicate a probable contamination of the lower diode. The techniques demonstrate a promising method to reject induced background in the gamma-ray Ge(Li) telescope. E.A.K.

N86-25318 Washington Univ., Seattle.
ABUNDANCES OF HEAVY COSMIC RAYS AT ENERGIES UP TO 1000 GeV/amu Ph.D. Thesis
Michael David Jones 1985 172 p
Avail: Univ. Microfilms Order No. DA8529973

Using the Heavy Nuclei Experiment (HNE) aboard the third High Enery Astronomy Observatory, abundances were measured for the elements from Ar-18 to Ni-28 from energies of 500 MeV/amu to nearly 1000 GeV/amu. This extends the energy scale for single elements in this charge region by an order of magnitude. In particular, the technique of using the relativistic rise in an ion chamber as a measure of energy for heavy nuclei combined with the large area and exposure of the HNE have allowed exploration of this energy region. For the elements expected to be secondary cosmic rays the ratios to Fe can be expressed as simple power laws in energy up to the highest measured energies. For the elements Ar-18 and Ca-20 that have primary components, values were derived for the primary components, independent of galactic propagation calculations. Dissert. Abstr.

N86-25319 Washington Univ., St. Louis, Mo.
ABUNDANCES AND ENERGY SPECTRA OF HIGH ENERGY HEAVY COSMIC-RAY NUCLEI Ph.D. Thesis
Scott Douglas Barthelmy 1985 188 p
Avail: Univ. Microfilms Order No. DA8529963

The relative abundances of the cosmic rays were measured in the iron group region at energies from a few GeV/amu to approximately 70 GeV/amu. This was done using a balloon-borne instrument flown from Palestine, Texas for a total exposure of 62 sq. m/ster/hr at an average atmospheric depth of 4 g/sq. cm. The elemental charge was determined from a combination of the scintillator and plastic Cerenkov detectors. The energy determination was made using the relativistic rise portion of the Bethe-Bloch curve for gas ionization loss chambers. By including previously published cosmic ray Fe energy spectra, the slope of the ion chamber calibration was obtained. Results are reported on the Ti-22/Fe-26, Cr-24/Fe-26, Ca-20/Fe-26, and Ni-28/Fe-26 abundance from 2 to 70 GeV/amu. Dissert. Abstr.

99 GENERAL

N86-25320*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RESEARCH AND TECHNOLOGY, FISCAL YEAR 1985 Annual Report
1985 150 p Original contains color illustrations
(NASA-TM-88753; NAS 1.15:88753) Avail: NTIS HC A07/MF A01 CSCL 05A

Capabilities in spacecraft subsystems, sensors, space communications and navigation, the acquisition of data from space missions and the extraction of information from that data were reviewed. The use of satellite data in the study of the Earth's atmosphere and climate, the dynamics of its crust and the monitoring of land and water resources were examined. A review of NASA flight projects for 1985 was presented. B.G.

N86-25321*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESEARCH AND COMPETITION: BEST PARTNERS
John M. Shaw 1986 12 p Presented at the 90th Casting Congress, Minneapolis, Minnesota, 11-15 May 1986; sponsored by the American Foundrymen's Society
(NASA-TM-87313; E-3044; NAS 1.15:87313) Avail: NTIS HC A02/MF A01 CSCL 05A

NASA's Microgravity Science and Applications Program is directed toward research in the science and technology of processing materials under conditions of low gravity. The objective is to make a detailed examination of the constraints imposed by gravitational forces on Earth. The program is expected to lead

ultimately to the development of new materials and processes in Earth-based commercial applications, adding to this nation's technological base. An important resource that U.S. researchers have readily available to them is the new Microgravity Materials Science Laboratory (MMSL) at NASA Lewis Research Center in Cleveland. A typical scenario for a microgravity materials experiment at Lewis would begin by establishing 1-g baseline data in the MMSL and then proceeding, if it is indicated, to a drop tower or to simulated microgravity conditions in a research aircraft to qualify the project for space flight. A major component of Lewis microgravity materials research work involves the study of metal and alloy solidification fundamentals. Author

Typical Subject Index Listing

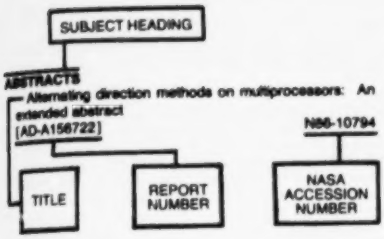

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7053).

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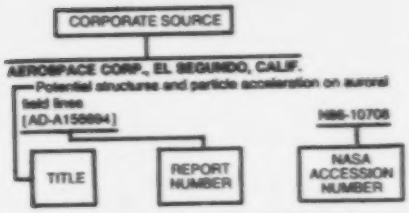

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. DRYDEN (HUGH L.) FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
An engineering approach to the use of expert systems technology in avionics applications
[NASA-TM-88263] N86-24687
Combining and connecting linear, multi-input, multi-output subsystem models
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Renewing solar science: The solar maximum repair mission
[NASA-EP-206] N86-24714
Statistical correlation analysis for comparing vibration data from test and analysis
[NASA-TM-86081] N86-25018
Geopotential research mission science, engineering and program summary
[NASA-TM-86240] N86-25030
International Ultraviolet Explorer Atlas of O-typespectra from 1200 to 1900 angstrom
[NASA-RP-1155] N86-25307
The possible importance of synchrotron/inverse Compton losses to explain fast MM-wave and hard X-ray emission of a solar event
[NASA-TM-88659] N86-25316
Research and technology, fiscal year 1985
[NASA-TM-88753] N86-25320

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Physical, anthropometrical, and body composition characteristics of workers at Kennedy Space Center
[NASA-TM-83102] N86-25122

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Method and apparatus for measuring distance
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
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R4 airfoil data corrected for sidewall boundary-layer effects in the Langley 0.3-meter transonic cryogenic tunnel
[NASA-TP-2585] N86-24662
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[NASA-TM-87726] N86-24663
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[NASA-TP-2584] N86-24709
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Measurement of viscosity of gaseous mixtures at atmospheric pressure
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Adjustable mount for electro-optic transducers in an evacuated cryogenic system
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Numerical approximation for the infinite-dimensional discrete-time optimal linear-quadratic regulator problem
[NASA-CR-178081] N86-25176
Aircraft Noise Prediction Program theoretical manual: Propeller aerodynamics and noise
[NASA-TM-83199] N86-25220
Braille reading system
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
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Passive eddy-current damping as a means of vibration control in cryogenic turbomachinery
[NASA-TP-2562] N86-24722
Space station 20-kHz power management and distribution system
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Impact of the 1985 Space World Administrative Radio Conference on frequency/orbit planning and use
[NASA-TM-87285] N86-24881
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[NASA-TM-87302] N86-25217
An experimental investigation of reducing advanced turboprop cabin noise by wing shielding
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
Shuttle-launch triangular space station
[NASA-CASE-10676-1] N86-24729

Effects of seawater and deionized water at 0 to 80 deg C on the flexural properties of a glass/epoxy composite
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A computational study of multiple jet and wall interaction
[NASA-TM-86541] N86-24937
Thermal performance evaluation of the infrared telescope dewar subsystem
[NASA-TM-86543] N86-25305

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. NATIONAL SPACE TECHNOLOGY LABS., BAY SAINT LOUIS, MISS.
Ducks Unlimited Joint Research Project
[NASA-TM-88755] N86-25032

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
Floating emitter solar cell junction transistor
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Method of measuring field funneling and range straggling in semiconductor charge-collecting junctions
[NASA-CASE-NPO-16584-1-CU] N86-25269

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Radio-frequency power delivery system: Procedures for error analysis and self-calibration
[PB86-115680] N86-24929
Metrology for electromagnetic technology: A bibliography of NBS (National Bureau of Standards) publications
[PB86-130234] N86-24975

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Radiometric calibration procedures using the NBS (National Bureau of Standards) MARBLE electronics package
[PB86-129756] N86-24721
Journal of Research of the National Bureau of Standards, volume 90, number 4, July-August 1985
[PB86-137627] N86-24786
Chemical Thermodynamics in Steam Power Cycles Data Requirements
[PB86-130937] N86-24787
Data sources for parameters used in predictive modeling of fire growth and smoke spread
[PB86-130986] N86-24788
Heat transfer in compartment fires near regions of ceiling jet-wall impingement N86-24866
Proceedings of Conference on International Standards
[PB86-130044] N86-24872
Calibration of test systems for measuring power losses of transformers
[PB86-132032] N86-24928
Technology assessment: Methods for measuring the level of computer security
[PB86-129954] N86-25140
Benchmark analysis of database architectures: A case study
[PB86-126687] N86-25162

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Climate sensitivity of a numerical model of ice-sheet dynamics and thermodynamics
[PB86-119617] N86-25096

NATIONAL INST. FOR OCCUPATIONAL SAFETY AND HEALTH, CINCINNATI, OHIO.
Compendium of protective eyewear
[PB86-135779] N86-25126

NATIONAL OCEAN SERVICE, ANCHORAGE, ALASKA.
Outer Continental Shelf Environmental Assessment Program. Reports of principal investigators, volume 33
[PB86-134780] N86-25061
Outer Continental Shelf Enviromental Assessment Program: Reports of principal investigators, volume 30
[PB86-134756] N86-25063
Outer Continental Shelf Environmental Assessment Program: Reports of principal investigators, volume 31
[PB86-134764] N86-25064
Outer Continental Shelf Environment Assessment Program: Reports of principal investigators, volume 32
[PB86-134772] N86-25065

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Omega long-term phase advances
[PB85-233211] N86-24902
Management Information (Wave Propagation Laboratory, Boulder, Colorado)
[PB86-139524] N86-25106

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, PRINCETON, N.J.
Geophysical Fluid Dynamics Laboratory activities FY 1985, plans FY 1986
[PB86-113545] N86-25095

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
Mariners Weather Log, volume 29, number 4, fall 1985
[PB86-142072] N86-25088

NATIONAL PLANNING ASSOCIATION, WASHINGTON, D. C.
Trends in industrial R and D activities in the United States, Europe and Japan, 1963-83
[PB86-141371] N86-25290

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, BOULDER, COLO.
Omega long-term phase advances
[PB85-233211] N86-24902

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident/incident summary reports: Denver, Colorado, August 19, 1983; Blountville, Tennessee, July 16, 1983; Tucson, Arizona, February 6, 1983, Cockeysville, Maryland, April 28, 1984; Akron, Ohio, September 30, 1984; Seattle, Washington, October 18, 1984; Miami, Florida, November 11, 1983
[PB85-910409] N86-24675
Safety study. Airline passenger safety education: A review of methods used to present safety information
[PB85-917014] N86-24676

NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
National Weather Service (NWS) Southern Region QPF (Quantitative Precipitation Forecasting) Workshop
[PB85-199164] N86-25094

NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
ROTODRAW
[PB86-131828] N86-25139

NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and seasonal weather outlook for mid-November to mid-December 1985, volume 39, number 22, November 14, 1985
[PB86-128097] N86-25090
Monthly and seasonal weather outlook for mid-December 1985 to mid-January 1986, volume 39, number 24, December 14, 1985
[PB86-142262] N86-25091
Monthly and seasonal weather outlook for January 1986, volume 40, number 1, December 31, 1985
[PB86-142270] N86-25092
Monthly and seasonal weather outlook for mid-January to mid-February 1986, volume 40, number 2, January 14, 1986
[PB86-145826] N86-25093

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Test results for the 2.5-kVA ground fault protector
[AD-A163501] N86-24912

NAVAL FACILITIES ENGINEERING COMMAND, WASHINGTON, D. C.
Centerville Beach. Project completion report
[AD-A163461] N86-25056

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
Application of artificial intelligence to improve aircraft survivability
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NAVAL RESEARCH LAB., WASHINGTON, D. C.
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Laser interaction in long-scalelength plasmas
[AD-A163604] N86-25262

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Effect of forced convection heat transfer on weld pools
[AD-A163970] N86-24998

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Permanent file backup for the CDC mass store system
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NAVAL SUBMARINE MEDICAL RESEARCH LAB., GROTON, CONN.
The effect of cold training and the wearing of gloves on manual performance in the cold: A comparison of pure ability and operational tasks
[AD-A163893] N86-25124
An evaluation of color sets for CRT displays
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NAVAL SURFACE WEAPONS CENTER, SILVER SPRING, MD.
A volumetric method for titrimetric analysis of hydrogen peroxide
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Uniform transverse magnetic field inside a long cylinder
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NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Effects of convergence zone multipath on crosscorrelation
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NIIGATA UNIV. (JAPAN).
Kink stability of long ion layers
[IPPJ-758] N86-25250
NORTHROP SERVICES, INC., RESEARCH TRIANGLE PARK, N. C.
Emissions from a light-duty diesel: Ambient temperature and fuel effects
[PB86-131349] N86-24885
Monte Carlo simulation of two-particle relative diffusion using Eulerian statistics: Extended abstract
[PB86-116548] N86-25077
NORTHWESTERN UNIV., EVANSTON, ILL.
Synthesis and properties of elevated temperature P/M aluminum alloys
[AD-A164158] N86-24827
NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
Chemically induced damage to the hippocampal formation
[NDRE/PUBL-86/1002] N86-25112
NUCLEAR REGULATORY COMMISSION, WASHINGTON, D. C.
Disposal of high-level radioactive wastes in the unsaturated zone: Technical considerations and response to comments
[TI86-900170] N86-25236

O

OAK RIDGE NATIONAL LAB., TENN.
Joining of ceramics for advanced heavy-duty diesels
[NASA-CR-175019] N86-24846
Some advances in fracture studies under the Heavy-Section Steel Technology Program
[TI85-018096] N86-25029
Testimony of Fred R. Mynatt, Associate Director for Nuclear and Engineering Technologies, Oak Ridge National Laboratory, before the Subcommittee on Energy Research and Production of the Committee on Science and Technology, US House of Representatives
[DE86-002234] N86-25053
OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, D. C.
Managing federal information resources: Report under the Paperwork Reduction Act of 1980
[PB86-247682] N86-25299
OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes, Volume 40, Number 3 ESN-40-3 HC A03/MF A01
[AD-A164182] N86-25298
OHIO STATE UNIV., COLUMBUS.
A study of a collision avoidance system mounted on a curved ground plane
[NASA-CR-176771] N86-24677
Hot gas corrosion of silicon based ceramics
[AD-A163810] N86-24850
NCTR using a polarization-agile coherent radar system
[AD-A163528] N86-24862
Joint services electronics program
[AD-A164151] N86-24924
Separated flows
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OLD DOMINION UNIV., NORFOLK, VA.
Vapor-screen flow-visualization experiments in the NASA Langley 0.3-m transonic cryogenic tunnel
[NASA-CR-3984] N86-24661
Investigation of paramagnetic response of metallic epoxies
[NASA-CR-176551] N86-24761
OREGON GRADUATE CENTER FOR STUDY AND RESEARCH, BEAVERTON.
Remote sensing of atmospheric winds by utilizing speckle-turbulence interaction and optical heterodyne detection
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Synthesis of alkyl and aryl phosphazene high polymers
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Tailoring multiphase ceramics
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PITTSBURGH UNIV., PA.
On detection of number of signals in presence of white noise
[AD-A164211] N86-24927
POLYTECHNIC INST. OF NEW YORK, FARMINGDALE.
A morphological study of waves in the thermosphere using DE-2 observations
[NASA-CR-176775] N86-25070
PRATT AND WHITNEY AIRCRAFT, EAST HARTFORD, CONN.
Life prediction and constitutive models for engine hot section anisotropic materials program
[NASA-CR-174952] N86-25003
PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Altitude ignition/lean decel study
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PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, WASHINGTON, D.C.
Report of the Presidential Commission on the Space Shuttle Challenger Accident, volume 1 N86-24726
PRINCETON UNIV., N. J.
Numerical solution of the Euler equations by implicit schemes with multiple grids N86-24655
On stellar streaming motions in triaxial objects: The case of the galactic bulge N86-25308
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Analytic solution of the molecular Ornstein-Zernike equation for non-spherical molecules spheres with anisotropic surface adhesion
[AD-A163451] N86-24771
An improved closure of the Born-Green-Yvon equation for the electric double layer
[AD-A163452] N86-24772
PURDUE UNIV., WEST LAFAYETTE, IND.
The science of and advanced technology for cost-effective manufacture of high precision engineering products. Volume 4. Thermal effects on the accuracy of numerically controlled machine tool
[AD-A163598] N86-24871

R

RAND CORP., SANTA MONICA, CALIF.
The RAND-ABEL (Trademark) programming language: Reference manual
[AD-A163564] N86-25148
RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Three dimensional finite element analysis of failure in composite laminates N86-24768
Lubricant foaming and aeration study, part 2
[AD-A163696] N86-24849
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N.C.
Modeling transport by convective clouds for regional air pollution models
[PB86-144623] N86-25060
An empirical study of flight control software reliability
[NASA-CR-178058] N86-25145
ROCHESTER UNIV., N. Y.
Analysis of the gain-coupled distributed feedback laser as a source of short optical pulses N86-24987
ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Radiation augmented propulsion feasibility
[AD-A163983] N86-24752
ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Space platform expendables resupply concept definition study. Volume 1: Executive summary
[NASA-CR-178820] N86-24733
Space platform expendables resupply concept definition study, volume 2
[NASA-CR-178821] N86-24734
Space platform expendables resupply concept definition study. Volume 3: Work breakdown structure and work breakdown structure dictionary
[NASA-CR-178822] N86-24735
ROCKWELL INTERNATIONAL CORP., EL SEGUNDO, CALIF.
CADS: A Computer Aided Design System, volume 1
[AD-A163556] N86-25147
ROCKWELL INTERNATIONAL CORP., HUNTSVILLE, ALA.
Space platform expendables resupply concept definition study
[NASA-CR-178819] N86-24732
ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Optical disk technology for large scale mass storage
[AD-A163453] N86-25127
ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Mode S data link phase coding
[AD-A163745] N86-24886
A database for compounding stress intensity factors
[AD-A163779] N86-25023
Routing of high data rate signals using degenerate four wave mixing in BSO
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SANDIA NATIONAL LABS., ALBUQUERQUE, N. MEX.
Microstructures of surface-melted alloys
[DE86-002916] N86-24819
SCIENCE APPLICATIONS INTERNATIONAL CORP., MCLEAN, VA.
Fire resistant fuel program analysis and program management documentation
[AD-A163724] N86-24862
SOFTWARE SYSTEMS TECHNOLOGIES, INC., COLLEGE PARK, MD.
Benchmark analysis of database architectures: A case study
[PB86-120687] N86-25162
SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
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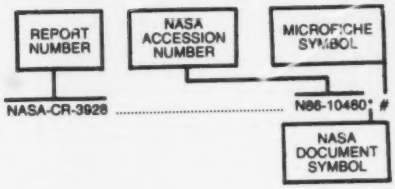

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

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09 RESEARCH AND SUPPORT FACILITIES (AIR) 2528
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For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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45 ENVIRONMENT POLLUTION **2617**
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LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

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53 BEHAVIORAL SCIENCES **2632**
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54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **2633**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
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MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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PHYSICS

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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
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For related information see *03 Air Transportation and Safety, 16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

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Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

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91 LUNAR AND PLANETARY EXPLORATION N.A.
Includes planetology; and manned and unmanned flights.
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Note: N.A. means that no abstracts were assigned to this category for this issue.

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N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.
CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL
C. P. Chen Aug. 1985 22 p refs
(Contract NASw-3458)
(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS
HC A02/MF A01 CSCL 20D

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-25322* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 194)
Dec. 1985 108 p
(NASA-SP-7037(194); NAS 1.21:7037(194)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 369 reports, articles and other documents introduced into the NASA scientific and technical information system in November 1985. Author

N86-25323* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 200)
1986 136 p
(NASA-SP-7037(200); NAS 1.21:7037(200)) Avail: NTIS HC A07 CSCL 01A

This bibliography lists 484 reports, articles, and other documents introduced into the NASA scientific and technical information system in April 1986. Author

N86-25324# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE CURRENT SITUATION OF THE CAAC (CIVIL AVIATION ADMINISTRATION OF CHINA)
14 Jan. 1986 10 p refs Transl. into ENGLISH from Hangkong Zhishi (China), no. 1, Jan. 1985 p 11-12
(AD-A164464; FTD-ID(RS)T-0946-85) Avail: NTIS HC A02/MF A01 CSCL 01/2

This reprinted article discusses the Civil Aviation of China (CAAC)--its equipment and service. After diplomatic relations were restored with the U.S., CAAC began buying Boeing - 737s and 747s. This improved service CAAC flew to more places, served better meals and quit buying planes from Russia and quit renting planes from Pakistan. The CAAC controls all Chinese commercial airlines from purchasing planes to managing runways and airport buildings. They fly 3.8 million passengers a year, employ 50, 000 people and own 500 airplanes. This is large even compared to U.S. standards. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-25325 ESDU International Ltd., London (England).
INCREMENTS IN AEROFOIL MAXIMUM LIFT COEFFICIENT DUE TO DEPLOYMENT OF VARIOUS HIGH-LIFT DEVICES
Dec. 1985 36 p refs
(ESDU-85033; ISBN-0-85679-539-9; ISSN-0141-397X) Avail: ESDU

This data item ESDU 85033, an addition to the Aerodynamics Sub-Series, uses a semi-empirical method to predict the increase in the maximum lift coefficient from that of the basic aerofoil either estimated by the method of ESDU 84026 or obtained by test. Devices considered are plain leading-edge flaps, slats, Krueger flaps with or without vents, and plain and split trailing-edge flaps. The method applies to low speed flow for a practical range of Reynolds number and geometries, and also yields the zero lift incidence with the devices deployed. Comparison of prediction with test is made, and standard deviations are tabulated for each type of device. The overall accuracy for all devices over 141 experimental points is a standard deviation of 0.018 in maximum lift coefficient. Author

N86-25326# Sandia National Labs., Albuquerque, N. Mex.
EXPERIMENTAL STUDY OF THE PERFORMANCE OF CLUSTERED PARACHUTES IN A LOW-SPEED WIND TUNNEL
B. K. Baca Dec. 1985 39 p
(Contract DE-AC04-76DP-00789)
(DE86-004977; SAND-85-0813) Avail: NTIS HC A03/MF A01

Recent interest in clusters of parachutes prompted a review of cluster drag data and inflation characteristics. This examination indicated that very little well-documented data exist that are suitable for broad applications. A low-speed wind-tunnel test program was devised to measure the effects of variations in four important parameters on the terminal drag and stability of clusters of parachutes. The parameters studied were canopy number, canopy type, riser length, and reefing. Efforts were made to account for effects stemming from the experiment's design, especially wind-tunnel blockage. Many of the results of the wind-tunnel tests were validated by a series of drop tests. Terminal drag and stability data are presented here along with proposed explanations for observed phenomena. DOE

N86-25327*# Mississippi Univ., University.
RADIATIVE COUPLED NONEQUILIBRIUM FLOW FIELDS ASSOCIATED WITH AEROASSISTED ORBITAL TRANSFER Final Contractors Report, Jul. 1984 - Mar. 1986
T. E. Horton 1986 36 p refs
(Grant NAG1-496)
(NASA-CR-176790; NAS 1.26:176790) Avail: NTIS HC A03/MF A01 CSCL 01A

Development of an algorithm which will allow nonequilibrium flow field codes to be coupled to radiative transfer codes (currently limited to equilibrium applications) was initiated. The algorithm consists of an equation for the prediction of electronic state population fractions (electronic state temperature) and equations for the computation of spectral absorption coefficients and source functions. These expressions represent a thorough treatment in

the context of the bandless model which in the past has proven adequate for equilibrium radiative transfer predictions. Perhaps the approach is more than adequate as the current algorithm requires four temperatures for each transition. Clearly, a more sophisticated model can be developed; however, it would require more information, such as rotational temperatures of the electronic levels. B.G.

N86-25328*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
TRANSONIC AIRFOIL ANALYSIS AND DESIGN IN NONUNIFORM FLOW
Jen-Fu Chang and C. Edward Lan Washington NASA Jun. 1986 84 p refs
(Grant NAG1-308)
(NASA-CR-3991; NAS 1.26:3991; CRINC-FRL-602-2) Avail: NTIS HC A05/MF A01 CSCL 01A

A nonuniform transonic airfoil code is developed for applications in analysis, inverse design and direct optimization involving an airfoil immersed in propfan slipstream. Problems concerning the numerical stability, convergence, divergence and solution oscillations are discussed. The code is validated by comparing with some known results in incompressible flow. A parametric investigation indicates that the airfoil lift-drag ratio can be increased by decreasing the thickness ratio. A better performance can be achieved if the airfoil is located below the slipstream center. Airfoil characteristics designed by the inverse method and a direct optimization are compared. The airfoil designed with the method of direct optimization exhibits better characteristics and achieves a gain of 22 percent in lift-drag ratio with a reduction of 4 percent in thickness. Author

N86-25329# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PITCH-LOCATION EFFECTS ON DYNAMIC STALL M.S. Thesis
Robert L. Dimmick Dec. 1985 188 p refs
(AD-A164322; AFIT/GAE/AA/85D-4) Avail: NTIS HC A09/MF A01 CSCL 20/4

Experimental investigations were conducted in the AFIT Smoke Tunnel to study the effects of pitch-location on dynamic stall. A NACA 0015 airfoil was rotated about four different locations at a constant angular rate and digital position and pressure information were recorded. This information was then converted into airfoil pressure distributions and integrated numerically to obtain airfoil force coefficients. Results of this investigation showed a direct relationship between the dynamic-stall angle of attack and the non-dimensionalized angular rotation rate, ND, defined as one-half the airfoil chord length times the angular rate divided by the freestream velocity. Based on the rotation points forward of the mid-chord, it was also shown that dynamic stall is delayed as the pitch location is moved aft from the leading edge. Experimental data was obtained for pitch locations of .08c, .25c, .50c and .61c and non-dimensional angular rates between .011 and .065. GRA

N86-25330# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ESTIMATING WATER VAPOR CONDENSATION EFFECTS FOR TRANSONIC AND SUPERSONIC FLOW FIELDS Final Report, 1 Oct. 1982 - 31 Aug. 1985
C. E. Robinson and R. C. Bauer Dec. 1985 37 p Sponsored by AEDC, AFS, Tenn. Prepared in cooperation with Calspan Field Services, Inc., Arnold AFS, Tenn.
(AD-A163146; AEDC-TR-85-63) Avail: NTIS HC A03/MF A01 CSCL 20/4

A computer code was developed which estimates the effect of water vapor condensation in two- and three-dimensional flow fields using the Euler equations. The program computes the effect by including the energy release due to condensation in the energy equation. In this manner, the local effect of condensation is included in the calculation of the flow-field properties. A species equation for the conservation of water vapor is also included, as well as an empirical method of predicting the onset of condensation. To evaluate the versatility of the code, calculations of the transonic flow field about a two-dimensional airfoil, a cone at angle of attack, and the flow in planar, two-dimensional and axisymmetric supersonic nozzles have been made for discrete values of specific humidity. In general, the effects of local condensation and revaporization estimated by the code are in good agreement with the experiment data found in the literature. GRA

N86-25531# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIRECTIONAL INJECTION AND SUCTION ON CHARACTERISTICS OF LAMINAR BOUNDARY LAYER WITH NEGATIVE PRESSURE GRADIENT Abstract Only
M. N. Kiselev, V. P. Motulevich, and E. D. Sergiyevskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 75-76 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no.4, iss.1, Mar. 1985 p 94098 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25532# Joint Publications Research Service, Arlington, Va.
WAVE DRAG OF SOLIDS OF REVOLUTION WITH FRONTAL SEPARATION ZONE IN SUPERSONIC STREAM Abstract Only
I. A. Belov, S. A. Isayev, A. Yu. Mitin, and V. N. Konovalov *In its* USSR Report: Engineering Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 77-78 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no. 4, iss. 1, Mar. 1985 p 47-51 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25533# Joint Publications Research Service, Arlington, Va.
TRANSIENT AERODYNAMIC CHARACTERISTICS OF FOIL IN STREAM WITH SEPARATION FLOW NEAR WAVY WALL Abstract Only
L. V. Mikhaylova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 78 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk, no. 4, iss. 1, Mar. 1985 p 56-60 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25534# Joint Publications Research Service, Arlington, Va.
HYPERSONIC FLOW AROUND A WING AT LARGE ANGLES OF ATTACK WITH DETACHED COMPRESSION JUMP Abstract Only
V. N. Golubkin and V. V. Negoda *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 87 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidosti i Gaza (USSR), no. 3, May-Jun. 1985 p 149-157 Original language document was announced in IAA as A85-44788 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25536# Joint Publications Research Service, Arlington, Va.
SPECIFICS OF FLOW NEAR STAGNATION POINT WITH SUPERSONIC FLOW AROUND EXPONENTIALLY SHAPED BODIES Abstract Only
V. N. Karlovskiy and V. A. Levin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 88 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidoti i Gaza (USSR), no. 3, May-Jun. 1985 p. 138-142 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25537# Joint Publications Research Service, Arlington, Va.
STABILITY OF SUBSONIC BOUNDARY LAYER UPON HEATING OF A SURFACE OF A FLAT PLATE NEAR THE LEADING EDGE Abstract Only
A. V. Kazakov, M. N. Kogan, and V. A. Kuparev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 89 Transl. into ENGLISH from Izvesitya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 3, May - Jun. 1985 p 68-72 Original language document was announced

in IAA as A85-44783 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25538# Joint Publications Research Service, Arlington, Va.
INCREASED STABILITY OF SUBSONIC BOUNDARY LAYER DURING HEATING OF SURFACE NEAR LEADING EDGE OF BODY IMMERSED IN STREAM Abstract Only
A. V. Kazakov, M. N. Kogan, and V. A. Kuparev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 91 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 333-335 Original language document was announced in IAA as A85-46029 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25551# Joint Publications Research Service, Arlington, Va.
ACID RAIN, OTHER FACTORS STUDIED IN DESTRUCTION OF PINE FORESTS
Shuwen Yu, Ziwen Yu, Houtian Liu, Jianmin Shu, Guangjing Ma, and Xiangyan Zhu *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 92-98 refs Transl. into ENGLISH from Huanjing Kexue (Beijing, China), v. 6, no. 5, 30 Oct. 1985 p 63-66 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

N86-25552# Joint Publications Research Service, Arlington, Va.
NUMERICAL PREDICTION OF SUPERSONIC BOUNDARY-LAYER TRANSITION Abstract Only
Guanghua Zhang and Hui Yang *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 99 Transl. into ENGLISH from Kongqidongliuxe Xuebao (Mianyang, China), no. 4, 1985 p 9-18 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

N86-25554# Joint Publications Research Service, Arlington, Va.
KERNEL FUNCTION METHOD FOR UNSTEADY TRANSONIC FLOW PAST LOW-FREQUENCY OSCILLATING BODIES OF REVOLUTION Abstract Only
Jianyu Cheng and Lixian Zhuang *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 101 Transl. into ENGLISH from Kongqidongliuxe Xuebao (Mianyang, China), no. 4, 1985 p 45-54 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

N86-25558# Joint Publications Research Service, Arlington, Va.
SUPERSONIC FLOW AROUND BLUNT PERFORATED SHIELDS Abstract Only
S. V. Guvernyuk, K. G. Savinov, and G. S. Ulyanov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 2 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 143-149 Original language document was announced in IAA as A85-28442 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25559# Joint Publications Research Service, Arlington, Va.
AERODYNAMIC INDUCTANCE OF SUBSONIC WIND TUNNELS WITH AXISYMMETRIC TEST ZONE Abstract Only
O. Yu. Starikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 150-154 Original language document was announced in IAA as A85-28443 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25560# Joint Publications Research Service, Arlington, Va.
FLOW AROUND DELTA WINGS WITH BROKEN-LINE LEADING EDGES Abstract Only
A. I. Shvets *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 171-175 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25562# Joint Publications Research Service, Arlington, Va.
MOVEMENT OF FLEXIBLE WING AT SUPERSONIC VELOCITY UNDER INFLUENCE OF RANDOM GUST Abstract Only
B. A. Yershov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 4-5 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Matematika, Mekhanika, Astronomiya (Leningrad, USSR), no. 1, Jan. - Mar. 1985 p 59-63 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25565# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR TEMPERATURE AND STRAIN GAUGES Abstract Only
M. T. Gorbachuk, V. V. Mitin, Yu. M. Shvarts, and Yu. A. Tkhorik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 40 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 21-22 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-25331# Lockheed-California Co., Burbank.
KRASH DYNAMICS ANALYSIS MODELING: TRANSPORT AIRPLANE CONTROLLED IMPACT DEMONSTRATION TEST Final Report, Jan. 1984 - Sep. 1984
Gil Wittlin and Bill LaBarge Mar. 1986 178 p refs Revised (Contract DTFA03-84-C-00004)
(DOT/FAA/CT-85/9-Rev; LR-30776-Rev) Avail: NTIS HC A09/MF A01

A transport airplane Controlled Impact Demonstration (CID) test is analyzed with program KRASH. Prior to modeling the test conditions, supporting analysis of both narrow-body and wide-body transport airplane frame segments were modeled with KRASH and compared to existing test results. The results of the analysis are utilized as input data for the KRASH CID model. Prior to the CID test a narrow body transport airplane was impacted with the ground, via a free fall drop, to obtain structure crush and damage data. The KRASH modeling of this test was used to refine the CID KRASH model. The CID KRASH model is exercised to obtain anticipated floor acceleration, underside crush, fuselage forces, and deflections. All KRASH modeling is performed utilizing current enhancement features. Recent KRASH85 coding changes; KRASH models and results for both narrow-body and wide-body transport airplane frame section drop tests; KRASH model and results for a narrow-body airplane drop test; KRASH model and results for a CID test; and conclusions based on the CID pre-test analysis results are presented. Author

N86-25332# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: AIR CANADA FLIGHT 797, MCDONNELL DOUGLAS DC-9-32, C-FTLU, GREATER CINCINNATI INTERNATIONAL AIRPORT, COVINGTON, KENTUCKY, JUNE 2, 1983
31 Jan. 1986 118 p
(PB86-910402; NTSB-AAR-86-02) Avail: NTIS MF A01; also available on subscription, North American Continent price HC $60.00/year; all others write for quote CSCL 01B

On June 2, 1983, Air Canada Flight 797, a McDonnell Douglas DC-9-32, of Canadian Registry C-FTLU, was a regularly scheduled international passenger flight from Dallas, Texas, to Montreal, Quebec, Canada, with an en route stop at Toronto, Canada. The flight left Dallas with 5 crewmembers and

41 passengers on board. About 1903, eastern daylight time, while en route at flight level 330, the cabin crew discovered a fire in the aft lavatory. After contacting air traffic control (ATC) and declaring an emergency, the crew made an emergency descent, and ATC vectored Flight 797 to the Greater Cincinnati International Airport, Covington, Kentucky. At 1920.09, eastern daylight time, Flight 797 landed on runway 27L at the Greater Cincinnati International Airport. As the pilot stopped the airplane, the airport fire department was in place and began firefighting operations. 23 passengers were not able to get out of the plane and died in the fire. The airplane was destroyed. GRA

N86-25333# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT/INCIDENT SUMMARY REPORTS: CONCORD, CALIFORNIA, JULY 14, 1984; ATLANTA, GEORGIA, SEPTEMBER 24, 1984; JASPER, ALABAMA, DECEMBER 16, 1984; AVALON, CALIFORNIA, JANUARY 30, 1984; CHARLOTTESVILLE, VIRGINIA, FEBRUARY 17, 1984; KANSAS CITY, KANSAS, JANUARY 9, 1985
31 Dec. 1985 46 p
(PB86-910410; NTSB-AAR-85-02-SUM) Avail: NTIS MF A01; also available on subscription, North American Continent price HC $60.00/year; all others write for quote CSCL 01B

The publication is a compilation of the reports of six separate aircraft accidents investigated by the National Transportation Safety Board. The accident locations and their dates are as follows: Concord, California, July 14, 1984; Atlanta, Georgia, September 24, 1984; Jasper, Alabama, December 16, 1984; Avalon, California, January 30, 1984; Charlottesville, Virginia, February 17, 1984; and Kansas City, Kansas, January 9, 1985. A Brief of Accident containing the probable cause is included for each case. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-25334# Massachusetts Inst. of Tech., Lexington.
PILOT EVALUATION OF TCAS IN THE LONG RANGER HELICOPTER
John W. Andrews 3 Jun. 1986 30 p refs Sponsored by Massachusetts Inst. of Tech., Lexington. Prepared in cooperation with Federal Aviation Administration,Washington, D.C.
(Contracts F19628-85-C-0002; DOT-FA77WAI-817)
(FAA/PM-85/30; ATC-136) Avail: NTIS HC A03/MF A01 CSCL 17G

A specially modified version of the Traffic Alert and Collision Avoidance System (TCAS) was installed in a Bell Long Ranger helicopter in order to investigate the feasibility of TCAS operation in rotorcraft. This installation employed TCAS air-to-air surveillance to provide automated traffic advisories that were displayed in the cockpit on a color cathode ray tube display. As part of this study, 12 subject pilots evaluated the utility of the installation through brief test flights in the vicinity of a major airport. Among the topics investigated were the rate of alarms, the computer logic for issuing advisories, the bearing accuracy, and the display symbology. Several recommendations for adapting TCAS to the rotorcraft environment resulted from the testing. Author

N86-25335*# Douglas Aircraft Co., Inc., Long Beach, Calif.
GUIDANCE STUDIES FOR CURVED, DESCENDING APPROACHES USING THE MICROWAVE LANDING SYSTEM (MLS)
J. B. Feather May 1986 90 p refs
(Contract NAS1-16202)
(NASA-CR-178030; NAS 1.26:178030) Avail: NTIS HC A05/MF A01 CSCL 17G

Results for the Microwave Landing System (MLS) guidance algorithm development conducted under the Advance Transport Operating System (ATOPS) Technology Studies (NAS1-16202) are documented. The study consisted of evaluating guidance law for vertical and lateral path control, as well as speed control, for approaches not possible with the present Instrument Landing System (ILS) equipment. Several specific approaches were simulated using the MD-80 aircraft simulation program, including curved, descending (segmented glide slope), and decelerating paths. Emphasis was placed on development of guidance algorithms specifically for approaches at Burbank, where proposed flight demonstrations are planned. Results of this simulation phase are suitable for use in future fixed base simulator evaluations employing actual hardware (autopilot and a performance management system). Author

N86-25336# Applied Science Analytics, Inc., Canoga Park, Calif.
ASTROGEODETIC-INERTIAL METHODS FOR VERTICAL DEFLECTION DETERMINATION Final Report, 28 Sep. 1984 - 28 Oct. 1985
Sam C. Bose Dec. 1985 57 p refs
(Contract DACA72-84-C-0017)
(AD-A164304; ASA-TR-85-7; ETL-0414) Avail: NTIS HC A04/MF A01 CSCL 17/7

Considerable progress has been made in inertial surveying by the Position and Azimuth Determining System (PADS). Following the installation of an improved vertical accelerometer and other modifications, the PADS has been renamed Inertial Positioning System (IPS). The IPS, with some software changes as to gyro error control has served as the Rapid Gravity Survey System (RGSS) for ETL. The present RGSS operates as a quasi-local level system and permits Kalman stochastic error control using observed velocity errors at vehicle stops. A new optimal data reduction method for estimating the deflections of the vertical is presented. The method requires RGSS horizontal velocity errors at each stop and the inertial system real-time Kalman filter update gains. Storage of real-time convariance data is not necessary. Survey traverse initial and terminal astrogeodetic deflections are utilized along with terminal platform azimuth error observation to estimate approximate gyro biases. The error models used preserve the inertial system dual horizontal interaction and exploits statistical collocation techniques to preserve correlations between the two components of the deflection of the vertical which are least squares estimated using all data simultaneously. GRA

N86-25337# Massachusetts Inst. of Tech., Cambridge. Sea Grant College Program.
WIDE BANDWIDTH POSITIONING SYSTEMS FOR SPACE AND UNDERWATER VEHICLES
H. Kazerooni and T. B. Sheridan Jun. 1985 20 p
(Grant NA84AA-D-00046)
(PB86-152394; MITSG-85-34) Avail: NTIS HC A02/MF A01 CSCL 17G

The report presents a method for wide bandwidth stiff position control of unmanned underwater and space vehicles. With feedback alone the vehicle may not behave like a stiff platform in the presence of a wide frequency range of disturbances. Given this limitation, the authors suggest that the vehicle must be connected to environmental structures by means of cables or grabbers. These connecting cables will develop dynamic and kinematic constraints on the vehicle motion. This problem led to the development of a method that allows for control of the motion of constrained underwater or space vehicles. This method is called impedance control. The authors explain how, with the help of this method, a vehicle connected to a structure by means of cables can be positioned with high stiffness while at the same time the cable tensions are also under control. Author (GRA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-25338 ESDU International Ltd., London (England). Engineering Sciences Data Unit.
CONVERSION OF AIR-DATA SYSTEM PRESSURE ERRORS INTO HEIGHT AND SPEED CORRECTIONS
Nov. 1985 37 p refs
(ESDU-85036; ISBN-0-85679-542-9; ISSN-0141-4054) Avail: ESDU

Approximate formulae for converting errors in pitot and static pressure into corrections to height, Mach number and indicated airspeed are presented as both equations and graphs. The methods give acceptable accuracy for constructing charts or tables of height and speed corrections for flight and operating manuals when pressure errors are not large. Exact methods for correcting speed and height are also included for use when the pressure errors are large, and guidance is included on the correction procedure under nonsteady conditions when any of the errors may depend on the height, Mach number or airspeed. A practical work example illustrates the use of the method. Author

N86-25339# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EVALUATION OF A FREQUENCY RESPONSE TECHNIQUE FOR AIRCRAFT SYSTEM IDENTIFICATION M.S. Thesis Final Report, Feb. 1984 - Oct. 1985
Allan T. Reed 31 Oct. 1985 108 p refs
(AD-A164367; AFIT/GAE/AA/85J-2) Avail: NTIS HC A06/MF A01 CSCL 01/1

This paper presents the results of a project which used frequency analysis methods applied to flight test data in order to identify aircraft parameters. Computer programs were developed to generate simulated flight test data so the frequency response programs could be tested using a noise free data source. Once the simulated data programs were complete, the frequency response methods were developed. The frequency response method uses the cross-spectral density technique to generate magnitude and phase information. The program also generates the power spectral density functions. Noise contamination studies were made. The programs were used with the test project, HAVE DELAY, which was conducted at the USAF Test Pilot School. The frequency response program worked well up to a frequency of about 15 radians per second. Above 15 radians per second the programs suffer from additional noise and aliasing effects. Recommendations were made to study means of reducing noise effects to include anti-aliasing filters and noise processing schemes for digital data. GRA

N86-25340# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MULTIVARIABLE OUTPUT CONTROL LAW DESIGN FOR THE STOL (SHORT TAKEOFF AND LANDING) F-15 IN LANDING CONFIGURATION M.S. Thesis
Bruce H. Acker Dec. 1985 294 p refs
(AD-A164516; AFIT/GE/ENG/85D-1) Avail: NTIS HC A13/MF A01 CSCL 01/2

Using the MULTI computer aided design and simulation program, multivariable, output feedback digital control laws are designed for the F-15 STOL aircraft in the landing configuration. The STOL F-15 landing configuration includes canards and reversible thrust in addition to conventional F-15 control surfaces. The additional controls allow decoupling of the output variables in the longitudinal plane. Longitudinal aircraft dynamics, derived from data provided by the prime contractor, McDonnell-Douglas, are presented in linearized state space form for the design procedure. Control laws are developed to stabilize the aircraft to perform longitudinal landing maneuvers (flight path control and flare) at six flight conditions. The design encompasses actuator dynamics, computational delay, sensor dynamics, sensor noise, and plant nonlinearities. Designs of two of the flight conditions are sufficiently insensitive to plant variations to be used at all but one of the remaining flight conditions. The technique of multivariable output feedback, with the MULTI program provides good robust designs for the STOL F-15. GRA

N86-25341# Aeronautical Research Labs., Melbourne (Australia).
REPORT ON INTEREST EXPRESSED IN SOME AUSTRALIAN DEFENCE ESTABLISHMENT PRODUCTS DISPLAYED AT THE 1985 PARIS AIR SHOW
U. R. Krieser Aug. 1985 29 p
(AD-A160807; ARL-AERO-PROP-TM-429; AR-004-040) Avail: NTIS HC A03/MF A01 CSCL 01/3

During June 1985 a number of aerospace products developed in Australia were displayed at the Paris Air Show. The Department of Defense was one of 16 exhibitors, and presented 14 products which it considered to have commercial potential on the world market. Considerable interest was shown in the Department of Defense products presented in Paris, and subsequent visits to aerospace companies in Israel, further demonstrated strong overseas interest in both manufacture and purchase of these products. Author

N86-25564# Joint Publications Research Service, Arlington, Va.
LIMITS OF HEAT TRANSFER INTENSIFICATION IN COMPACT HEAT EXCHANGERS Abstract Only
V. I. Subbotin, V. F. Gordeyev, V. V. Kharitonov, and A. A. Plakseyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 25 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 279, no. 4, Dec. 1984 p 888-891 Original language document was announced in IAA as A85-20092 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25601# Joint Publications Research Service, Arlington, Va.
INFORMATION ON NEW AN-124 GIANT CARGO PLANE Abstract Only
N. Dombkovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 4 Transl. into ENGLISH from Trud (Leningrad, USSR), 23 May 1985 p 1 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25602# Joint Publications Research Service, Arlington, Va.
DATA ON MI-26 HELICOPTER Abstract Only
L. Chernov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 7-8 Transl. into ENGLISH from Kommunist (Moscow, USSR), 19 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-25342*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
DIGITAL ELECTRONIC ENGINE CONTROL (DEEC) FLIGHT EVALUATION IN AN F-15 AIRPLANE
Mar. 1984 243 p refs Symposium held in Edwards, Calif., 25-26 May 1983
(NASA-CP-2298; H-1201; NAS 1.55:2298) Avail: NTIS HC A11/MF A01 CSCL 21E

Flight evaluation in an F-15 aircraft by digital electronic engine control (DEEC) was investigated. Topics discussed include: system description, F100 engine tests, effects of inlet distortion on static pressure probe, flight tests, digital electronic engine control fault detection and accommodation flight evaluation, flight evaluation of a hydromechanical backup control, augmentor transient capability of an F100 engine, investigation of nozzle instability, real time in flight thrust calculation, and control technology for future aircraft propulsion systems. It is shown that the DEEC system is a powerful and flexible controller for the F100 engine. For individual titles, see N86-25343 through N86-25356.

N86-25343*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
DIGITAL ELECTRONIC ENGINE CONTROL F-15 OVERVIEW
Berwin Kock *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 1-14 (For primary document see N86-25342 16-07)
(Paper-1) Avail: NTIS HC A11/MF A01 CSCL 21E

A flight test evaluation of the digital elctronic engine control (DEEC) system was conducted. An overview of the flight program is presented. The roles of the participating parties, the system, and the flight program objectives are described. The test program approach is discussed, and the engine performance benefits are summarized. A description of the follow-on programs is included. Author

N86-25344*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
DIGITAL ELECTRONIC ENGINE CONTROL HISTORY
Terrill W. Putnam *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 15-31 (For primary document see N86-25342 16-07)
(Paper-2) Avail: NTIS HC A11/MF A01 CSCL 21E

Full authority digital electronic engine controls (DEECs) were studied, developed, and ground tested because of projected benefits in operability, improved performance, reduced maintenance, improved reliability, and lower life cycle costs. The issues of operability and improved performance, however, are assessed in a flight test program. The DEEC on a F100 engine in an F-15 aircraft was demonstrated and evaluated. The events leading to the flight test program are chronicled and important management and technical results are identified. Author

N86-25345*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
F-15 DIGITAL ELECTRONIC ENGINE CONTROL SYSTEM DESCRIPTION
Lawrence P. Myers *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 33-53 (For primary document see N86-25342 16-07)
(Paper-3) Avail: NTIS HC A11/MF A01 CSCL 21E

A digital electronic engine control (DEEC) was developed for use on the F100-PW-100 turbofan engine. This control system has full authority control, capable of moving all the controlled variables over their full ranges. The digital computational electronics and fault detection and accomodation logic maintains safe engine operation. A hydromechanical backup control (BUC) is an integral part of the fuel metering unit and provides gas generator control at a reduced performance level in the event of an electronics failure. The DEEC's features, hardware, and major logic diagrams are described. Author

N86-25346*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
NASA LEWIS F100 ENGINE TESTING
Roger A. Werner, Ross G. Willoh, Jr., and Mahmood Abdelwahab *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 55-71 refs (For primary document see N86-25342 16-07)
(Paper-4) Avail: NTIS HC A11/MF A01 CSCL 21E

Two builds of an F100 engine model derivative (EMD) engine were evaluated for improvements in engine components and digital electronic engine control (DEEC) logic. Two DEEC flight logics were verified throughout the flight envelope in support of flight clearance for the F100 engine model derivative program (EMPD). A nozzle instability and a faster augmentor transient capability was investigated in support of the F-15 DEEC flight program. Off schedule coupled system mode fan flutter, DEEC nose-boom pressure correlation, DEEC station six pressure comparison, and a new fan inlet variable vane (CIVV) schedule are identified. Author

N86-25347*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
EFFECTS OF INLET DISTORTION ON A STATIC PRESSURE PROBE MOUNTED ON THE ENGINE HUB IN AN F-15 AIRPLANE
Donald L. Hughes and Karen G. Mackall *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 73-89 refs (For primary document see N86-25342 16-07)
primary document see N86-25342 16-07)
(Paper-5) Avail: NTIS HC A11/MF A01 CSCL 21E

Problems encountered in obtaining good engine face pressure data were studied. A single static measurement located upstream of the engine hub in the stream flow was found to provide a pressure signal suitable for engine control. Two identical probes for measuring fan inlet static (PS2) pressure were designed and mounted on the hub of the left F100-PW-100 turbofan engine installed in the F-15 test aircraft for flight evaluation. The probe is used as a static pressure sensor for a digital engine control system. Author

N86-25348*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
FLIGHT TESTING THE DIGITAL ELECTRONIC ENGINE CONTROL IN THE F-15 AIRPLANE
Lawrence P. Myers *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 91-105 (For primary document see N86-25342 16-07)
(Paper-6) Avail: NTIS HC A11/MF A01 CSCL 21E

The digital electronic engine control (DEEC) is a full-authority digital engine control developed for the F100-PW-100 turbofan engine which was flight tested on an F-15 aircraft. The DEEC hardware and software throughout the F-15 flight envelope was evaluated. Real-time data reduction and data display systems were implemented. New test techniques and stronger coordination between the propulsion test engineer and pilot were developed which produced efficient use of test time, reduced pilot work load, and greatly improved quality data. The engine pressure ratio (EPR) control mode is demonstrated. It is found that the nonaugmented throttle transients and engine performance are satisfactory. Author

N86-25349*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
DIGITAL ELECTRONIC ENGINE CONTROL FAULT DETECTION AND ACCOMMODATION FLIGHT EVALUATION

Jennifer L. Baer-Ruedhart *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in n F-15 Airplane Mar. 1984 p 107-126 (For primary document see N86-25342 16-07)
(Paper-7) Avail: NTIS HC A11/MF A01 CSCL 21E

The capabilities and performance of various fault detection and accommodation (FDA) schemes in existing and projected engine control systems were investigated. Flight tests of the digital electronic engine control (DEEC) in an F-15 aircraft show discrepancies between flight results and predictions based on simulation and altitude testing. The FDA methodology and logic in the DEEC system, and the results of the flight failures which occurred to date are described. E.A.K.

N86-25350*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
AIRSTART PERFORMANCE OF A DIGITAL ELECTRONIC ENGINE CONTROL SYSTEM ON AN F100 ENGINE
Frank W. Burcham, Jr. *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 127-139 (For primary document see N86-25342 16-07)
(Paper-8) Avail: NTIS HC A11/MF A01 CSCL 21E

The digital electronic engine control (DEEC) system installed on an F100 engine in an F-15 aircraft was tested. The DEEC system incorporates a closed-loop air start feature in which the fuel flow is modulated to achieve the desired rate of compressor acceleration. With this logic the DEEC equipped F100 engine can achieve air starts over a larger envelope. The DEEC air start logic, the test program conducted on the F-15, and its results are described. Author

N86-25351*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
FLIGHT EVALUATION OF A HYDROMECHANICAL BACKUP CONTROL FOR THE DIGITAL ELECTRONIC ENGINE CONTROL SYSTEM IN AN F100 ENGINE
Kevin R. Walsh and Frank W. Burcham *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 141-155 (For primary document see N86-25342 16-07)
(Paper-9) Avail: NTIS HC A11/MF A01 CSCL 21E

The backup control (BUC) features, the operation of the BUC system, the BUC control logic, and the BUC flight test results are described. The flight test results include: (1) transfers to the BUC at military and maximum power settings; (2) a military power acceleration showing comparisons bvetween flight and simulation for BUC and primary modes; (3) steady-state idle power showing idle compressor speeds at different flight conditions; and (4) idle-to-military power BUC transients showing where compressor stalls occurred for different ramp rates and idle speeds. All the BUC transfers which occur during the DEEC flight program are initiated by the pilot. Automatic transfers to the BUC do not occur. Author

N86-25352*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
BACKUP CONTROL AIRSTART PERFORMANCE ON A DIGITAL ELECTRONIC ENGINE CONTROL-EQUIPPED F100-ENGINE
J. Blair Johnson *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 157-170 refs (For primary document see N86-25342 16-07)
(Paper-10) Avail: NTIS HC A11/MF A01 CSCL 21E

The air start capability of a backup control (BUC) was tested for a digital electronic engine control (DEEC) equipped F100 engine, which was installed in an F-15 aircraft. Two air start schedules were tested. Using the group 1 start schedule, based on a 40 sec timer, an air speed of 300 knots was required to ensure successful 40 and 25% BUC mode spooldown airstarts. If core rotor speed (N2) was less than 40% a stall would occur when the start bleed closed, 40 sec after initiation of the air start. All jet fuel starter (JFS) assisted air starts were successful with the group 1 start schedule. For the group 2 schedule, the time between pressurization and start bleed closure ranged between 50 sec and 72 sec. Idle rps was lower than the desired 65% for air starts at higher altitudes and lower air speeds. Author

N86-25353*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
AUGMENTOR TRANSIENT CAPABILITY OF AN F100 ENGINE EQUIPPED WITH A DIGITAL ELECTRONIC ENGINE CONTROL
Frank W. Burcham, Jr. and G. David Pai *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 171-199 (For primary document see N86-25342 16-07)
(Paper-11) Avail: NTIS HC A11/MF A01 CSCL 21E

An F100 augmented turbofan engine equipped with digital electronic engine control (DEEC) system was evaluated. The engine was equipped with a specially modified augmentor to provide improved steady state and transient augmentor capability. The combination of the DEEC and the modified augmentor was evaluated in sea level and altitude facility tests and then in four different flight phases in an F-15 aircraft. The augmentor configuration, logic, and test results are presented. Author

N86-25354*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
INVESTIGATION OF A NOZZLE INSTABILITY ON AN F100 ENGINE EQUIPPED WITH A DIGITAL ELECTRONIC ENGINE CONTROL
Frank W. Burcham, Jr. and John R. Zeller (NASA, Lewis Research Center, Cleveland, Ohio) *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 201-214 (For primary document see N86-25342 16-07)
(Paper-12) Avail: NTIS HC A11/MF A01 CSCL 21E

An instability in the nozzle of the F100 engine, equipped with a digital electronic engine control (DEEC), was observed during a flight evaluation on an F-15 aircraft. The instability occurred in the upper left hand corner (ULMC) of the flight envelope during augmentation. The instability was not predicted by stability analysis, closed-loop simulations of the the engine, or altitude testing of the engine. The instability caused stalls and augmentor blowouts. The nozzle instability and the altitude testing are described. Linear analysis and nonlinear digital simulation test results are presented. Software modifications on further flight test are discussed. Author

N86-25355*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
REAL-TIME IN-FLIGHT THRUST CALCULATION ON A DIGITAL ELECTRONIC ENGINE CONTROL-EQUIPPED F100 ENGINE IN AN F-15 AIRPLANE
Ronald J. Ray (California Polytechnic State Univ., San Luis Obispo) and Lawrence P. Myers *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 231-247 (For primary document see N86-25342 16-07)
(Paper-13) Avail: NTIS HC A11/MF A01 CSCL 21E

Computer algorithms which calculate in-flight engine and aircraft performance real-time are discussed. The first step was completed with the implementation of a real-time thrust calculation program on a digital electronic engine control (DEEC) equiped F100 engine in an F-15 aircraft. The in-flight thrust modifications that allow calculations to be performed in real-time, to compare results to predictions, are presented. Author

N86-25356*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
CONTROL TECHNOLOGY FOR FUTURE AIRCRAFT PROPULSION SYSTEMS
John R. Zeller, John R. Szuch, Walter C. Merrill, Bruce Lehtinen, and James F. Soeder *In its* Digital Electronic Engine Control (DEEC) Flight Evaluation in an F-15 Airplane Mar. 1984 p 231-247 (For primary document see N86-25342 16-07)
(Paper-14) Avail: NTIS HC A11/MF A01 CSCL 21E

The need for a more sophisticated engine control system is discussed. The improvements in better thrust-to-weight ratios demand the manipulation of more control inputs. New technological solutions to the engine control problem are practiced. The digital electronic engine control (DEEC) system is a step in the evolution to digital electronic engine control. Technology issues are addressed to ensure a growth in confidence in sophisticated electronic controls for aircraft turbine engines. The need of a control

system architecture which permits propulsion controls to be functionally integrated with other aircraft systems is established. Areas of technology studied include: (1) control design methodology; (2) improved modeling and simulation methods; and (3) implementation technologies. Objectives, results and future thrusts are summarized. E.A.K.

N86-25357*# Douglas Aircraft Co., Inc., Long Beach, Calif.
TURBOFAN AFT DUCT SUPPRESSOR STUDY PROGRAM LISTING AND USER'S GUIDE Final Report
M. C. Joshi and R. E. Kraft May 1983 104 p
(Contract NAS3-22766)
(NASA-CR-175067; NAS 1.26:175067) Avail: NTIS HC A06/MF A01 CSCL 21E

A description of the structure of the Annular Flow Duct Program (AFDP) for the calculation of acoustic suppression due to treatment in a finite length annular duct carrying sheared flow is presented. Although most appropriate for engine exhaust ducts, this program can be used to study sound propagation in any duct that maintains annular geometry over a considerable length of the duct. The program is based on the modal analysis of sound propagation in ducts with axial segments of different wall impedances. For specified duct geometry, wall impedance, flow and acoustic conditions in the duct (including mode amplitude distribution of the source) and duct termination reflection characteristics, the program calculates the suppression due to the treatment in the duct. The presence of forward and backward traveling modes in the duct due to the reflection and redistribution of modes at segment interfaces and duct end terminations are taken into account in the calculations. The effects of thin wall boundary layers (with a linear or mean flow velocity profile) on the acoustic propagation are also included in the program. A functional description of the major subroutines is included and a sample run is provided with an explanation of the output. M.G.

N86-25358# Ohio State Univ., Columbus. Research Foundation.
TURBULENT FLOW OVER ROUGH TURBINE AIRFOILS Final Report, Jun. 1983 - Dec. 1984
Lit S. Han Aug. 1985 83 p
(Contract F33615-82-K-2218)
(AD-A163005; OSURF-763057/714467; AFWAL-TR-85-2056)
Avail: NTIS HC A05/MF A01 CSCL 21/5

A method to analyze turbulent boundary layer over rough turbine vanes or blades is developed. A new formulation of the mixing length model, expressed in the velocity-space variable, is instrumental in the modeling effort, and the surface roughness effect is embedded in an amplification factor as a multiplier to the mixing length. (The amplification factor ranges from unity for a smooth surface upward for rough surfaces, with its variation depending on the type of roughness). For demonstration, the new method is applied to the analysis of turbulent flow over a flat plate with two surface roughnesses. For a plate length with a length Reynolds number of 10 million, skin friction is increased by as much as 60 percent, if the roughness-to-length ratio is 0.0001. GRA

N86-25359# Adiabatics, Inc., Columbus, Ind.
FORMATION OF A NATURAL GAS ENGINE DATA BASE Final Report, Apr. 1984 - Jan. 1985
R. Kamo and L. Kamo Oct. 1985 60 p refs
(Contract GRI-5084-233-0969)
(PB86-154010; GRI-85/0112) Avail: NTIS HC A05/MF A01 CSCL 21E

A study was conducted to assess the present natural gas engine technology with the objective of laying the groundwork for the development of advanced natural gas powerplants. Literature search, consultations, field trips, oversea visits, and analyses were performed to identify the critical path and a network diagram for the future was constructed. Today's engine base was reviewed and, worldwide, natural gas engines in the five to 1000 horsepower range are presented. Problem areas of the natural gas engines were identified with near term fixes and long term development work. Some new powerplant technologies; namely, adiabatic turbocompound, two-stroke engines, the rotary engine and gas turbines are beginning to show potential for natural gas powerplants. For high engine performance, a Miller cycle with fuel injection, lean combustion, high compression ratio and turbocharging is recommended together with adequate use of ceramic and other advanced materials for long life (40,000 hours) natural gas engines. Author

N86-25360# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.
DAMAGE TOLERANCE CONCEPTS FOR CRITICAL ENGINE COMPONENTS
Loughton, England Oct. 1985 295 p refs Presented in San Antonio, Tex., 22-26 Apr. 1985
(AGARD-CP-393; ISBN-92-835-0380-5) Avail: NTIS HC A13/MF A01

The proceedings of a specialist meeting called by the AGARD Structures and Materials Panel on damage tolerance concepts for critical engine components is presented. The meeting discussed the overall philosophy of damage tolerance as applied to aircraft engine parts, considered and refined the parameters important in DTC, reviewed specialist techniques needed for the support of DTC, and surveyed the prospects for and experiences of the implementation of DTC. For individual titles, see N86-25361 through N86-25383.

N86-25361# Rolls-Royce Ltd., Derby (England).
DAMAGE TOLERANCE CONCEPTS FOR CRITICAL ENGINE COMPONENTS
R. H. Jeal *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 12 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

The cost of failures in gas turbines has always been so high, both in human and financial terms, that it has been recognized since the earliest days that the behavior of components had to be fully characterized before the engines were used in service. The integrity of the gas turbine has therefore always been based upon two separate phases of development. The first has been the basic design itself where, as well as ensuring that the individual components meet their basic mechanical purpose, the designer attempts to match his understanding of the operating conditions to his perception of the capability of material chosen. The second has been the development phase where the actual behavior of the component has been assessed either as part of an operating engine - bench engine testing or as an individual component - rig testing - under conditions which are related to those the engine is expected to see in service. The results of this work are then used, together with prior experience, to identify the critical components of the engine, those that prejudice the safety of the aircraft if they fail. The development of damage tolerance concepts is traced from the earliest days, the current situation is examined in light of design needs and available technology, and possible directions are examined. E.R.

N86-25362# Naval Air Propulsion Test Center, Trenton, N.J. Systems Development and Evaluation Group.
ENGINE CYCLIC DURABILITY BY ANALYSIS AND TESTING: HIGHLIGHTS OF THE SPRING 1984 PEP MEETING
Albert A. Martino *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Research on gas turbine engine development during the past decade in NATO nations has concentrated heavily on gaining better understanding of the relationship between material characteristics, failure mechanisms, structural analysis and validation testing for increased service life. Recognizing this intense interest and activity level the Propulsion and Energetics Panel (PEP) sponsored a specialists' meeting that surveyed the state-of-art technical areas related to improving engine life and considered the technical and economical problems and possibilities of advanced cyclic testing

in the development of engines. Discussions focused on relationships between engine use and failure modes, accelerated mission testing (AMT) development, critical material characteristics, component life assessment methods, recent results of component and engine cyclic testing, and future requirements. Author

N86-25363# Air Force Systems Command, Wright-Patterson AFB, Ohio.
DAMAGE TOLERANCE DESIGN CONCEPTS FOR MILITARY ENGINES
T. T. King, W. D. Cowie, and W. H. Reimann *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

The damage tolerance requirements that are applied to Air Force engine development programs are summarized. These requirements are an integral part of the Engine Structural Integrity Program (ENSIP). Application of damage tolerance requirements to existing inventory engines (F100 and TF34) has resulted in implementation of enhanced nondestructive evaluation methods at manufacturing and at field/depot. Experience has shown that these inspections have been successful in detecting early cracking and accelerating corrective actions. It has been highlighted that several development efforts in the last five years have identified FPI process improvements that must be implemented within industry and Air Force depots to improve flaw detection reliability. The need to quantify detection reliability for imbedded defects is also identified. The engine development process has been evolutionary in terms of application of upgraded requirements. The new process is contained in ENSIP. Recent experience clearly demonstrates that the damage tolerance requirement is cost effective when assessed on a life cycle basis. Author

N86-25364# Toronto Univ. (Ontario). Dept. of Mechanical Engineering.
PARAMETERS THAT INPUT TO APPLICATION OF DAMAGE TOLERANCE CONCEPTS TO CRITICAL ENGINE COMPONENTS
D. W. Hoeppner *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Numerous parameters affect the application of damage tolerance concepts to engine components. These parameters are reviewed in relation to overall integration of each parameter into the damage tolerance design methodology. Parameters such as initial crack size, defect level associated with the material and process, and model of the initial crack are discussed as related to nondestructive inspection and modelling the discontinuity within a framework such as generalized fracture mechanics. Subsequent to characterization of the initial discontinuity or heterogeneity (d,h), or the likelihood of forming one in the service cycle, it is necessary to evaluate the potential for growth of a (d,h). Factors that affect the growth of a discontinuity in engines are: material, manufacturing route, stress magnitude, stress state, (uniaxial, biaxial, triaxial), residual stress, temperature, loading waveform, frequency of loading, loading spectrum, chemical environment. Furthermore, material properties of importance are thresholds of growth, fatigue crack growth behavior, and toughness. Numerous synergisms such as creep fatigue, corrosion fatigue, and fretting fatigue occur and must be considered. Evaluation of these parameters is discussed, gaps are identified, and an overall plan to integrate these into a safety critical component design methodology is presented. Author

N86-25365# Rolls-Royce Ltd., Derby (England). NDT Technology.
LIMITATIONS OF MANUAL NDT SYSTEMS AND THE NO EYES CONCEPT
R. G. Taylor *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs Previously announced as N86-14215 (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Defect tolerant design, particularly of aircraft components, and its links with nondestructive testing (NDT) are discussed. Engineering of the NDT technique, defect detection requirements, and human factors in the inspection cycle are considered. Author

N86-25366# Royal Aircraft Establishment, Farnborough (England). Propulsion Dept.
THE ROLE OF THERMAL AND STRESS ANALYSES IN THE APPLICATION OF DAMAGE TOLERANT DESIGN
G. F. Harrison and T. H. Edmunds (Rolls-Royce Ltd., Bristol, England) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 16 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Some of the important factors affecting the accuracy of proven analysis techniques in support of a damage tolerant design methodology are illustrated. Temperature sensitivity analysis and the relevance of component geometry in controlling characterized material behavior into models suitable in stress analysis is demonstrated. Examples indentifying critical stresses and critical locations in typical engine discs are presented. The implementation of fracture mechanics analysis methods to these regions is discussed. Finally their relevance to damage tolerant design concepts is evaluated. Author

N86-25367# Minho Univ., Braga (Portugal).
DAMAGE TOLERANCE ACCEPTANCE METHODS IN STRUCTURAL COMPONENTS OF A MEDIUM CARBON STEEL AND A MEDIUM STRENGTH Al-Mg ALLOY
C. M. Branco *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 16 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

A review of damage tolerance methodology is presented referring to main factors, parameters and computational procedure for the assessment of flaws in the structure in order to avoid fatigue failures. Flaw acceptance and fatigue design methods are also reviewed and dicussed. Results of a defect tolerance study in cruciform welded joints of low and medium strength steels are presented. Theoretical defect tolerance curves relating initial flaw sizes, applied nominal stress, endurance and weld and plate geometry are obtained. The results are compared with some experimental data and also with the medium strength Al-Mg alloy 5083. COD and J integral data for this material is presented in the temperature range -120 C to 200 C. Author

N86-25368# Systems Research Labs., Inc., Dayton, Ohio. NDE Systems Div.
MANUFACTURING TECHNOLOGY FOR NONDESTRUCTIVE EVALUATION (NDE) SYSTEM TO IMPLEMENT RETIREMENT FOR CAUSE (RFC) PROCEDURES FOR GAS TURBINE ENGINE COMPONENTS
Donald L. Birx and Dena G. Doolin *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 8 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

An automated NDE inspection system to detect surface flaws and inclusions in jet engine rotary parts was developed. The system implements the Air Force Retirement for Cause philosophy in which good, used engine parts are returned to service, and flawed components are retired for cause. Emphasis has thus been placed on improving current flaw detection and characterization techniques by using computer algorithms (removing the human decision process) and achieving basic inspection and predictive capabilities via automated eddy current and ultrasonic inspection techniques. Author

N86-25369# National Aerospace Lab., Amsterdam (Netherlands).
AGARD COOPERATIVE TEST PROGAMME ON TITANIUM ALLOY ENGINE DISC MATERIAL
A. J. A. Mom and M. D. Raizenne (National Research Council of Canada, Ottawa, Ontario) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 15 p refs (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

In recent years a strong interest in the application of damage tolerance techniques for lifing of gas turbine engine discs has developed. Before the damage tolerance approach can be safely implemented it requires sensitive and reliable crack detection techniques, operational loading information and improved knowledge of fatigue crack growth and fracture under service conditions. This latter aspect is the main subject of an international test program, in which a number of laboratories from North America and Europe participate under AGARD coordination. The first phase of the program is directed to test and specimen standardization and calibration of the different laboratories. The second phase will specifically address parameters relevant for real service operation like mission loading, sequence and dwell effects, temperature, fatigue threshold, etc. The background and first phase of the program are discussed. Author

N86-25370# Cambridge Univ. (England). Dept. of Metallurgy and Materials Science.

ASPECTS OF SMALL CRACK GROWTH c26

M. N. James and J. F. Knott *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 16 p refs (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

The nature of small defects which occur in engineering components and structures, and their subsequent growth to a size detectable by nondestructive inspection techniques are discussed. Consideration is given to fundamental aspects such as the modifying influence of residual stresses and crack closure on the growth of small cracks. Possible differences between laboratory test data and in-service crack growth are highlighted. Practical aspects are illustrated with specific reference to the example of the safety-critical high pressure turbine disc of an aeroengine. Author

N86-25371# Royal Aircraft Establishment, Farnborough (England). Propulsion Dept.

CRACK GROWTH IN NEAR-ALPHA TITANIUM ALLOYS c38

C. R. Gostelow *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 5 p refs (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

Ever since the first gas turbine aero engine entered into service there has been pressure to develop more powerful yet more efficient and lightweight units. To this end manufacturers have endeavored to increase overall pressure ratios and maximum cycle temperatures while trying to limit engine size by using materials having higher strength-to-weight ratios and higher temperature capability. Two main material approaches were followed in order to help meet these requirements. These are the development of high strength, high temperature capability nickel base superalloys for extensive use in the turbine and the replacement of heavy steels and nickel alloys in the compressor by advanced lightweight titanium alloys. The latter approach was the driving force behind the development in the UK of a unique range of creep-resistant near-alpha titanium alloys suitable for use up to 600 C. A variety of parameters are described which can influence the crack growth characteristics of near-alpha titanium alloys, with particular reference to the UK alloy IMI685. The relevance of these laboratory data to actual engine operation is assessed. Author

N86-25372# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

CRACK GROWTH, STRAIN AND DAMAGE MEASUREMENTS USING AN IMPROVED POTENTIAL DROP TECHNIQUE c26

Humbert Policella, Georges Baudin, and Georges Cailletaud *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs In FRENCH; ENGLISH summary (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

An improved version of the potential drop technique and its applications to crack length, strain and damage measurements is presented. The electronic device, developed at ONERA, which supplies the specimen with a pulsed current is described. Two types of applications are then presented. In the first type several tests were conducted on two dimensional cracked specimens, made of different materials at different temperatures. An extension of the method was also made to three dimensional crack fronts. The potential drop in an uncracked strained solid was the sum of three terms, respectively due to elastic strain, plastic strain and damage. Applications were performed on AISI 316 steel at room temperature, INCO 718 at 650 C and UN 100 at 900 C and 1000 C. The plastic strain and damage determined with the P.D. technique are then compared with the ones measured using others methods. Author

N86-25373# Fiat Research Center, Orbassano, Turin (Italy).

SMALL DEFECT CHARACTERIZATION IN POWDER METALLURGY MATERIALS c39

S. Re Fiorentin and H. Walther (Fiat Aviazione S.p.A., Turin, Italy) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 12 p refs (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

Powder metallurgy nickel base superalloys are becoming important structural materials for the manufacturing of critical complex-shaped aircraft components (e.g. turbine disks). Since fatigue life is largely affected by the presence of defects, in order to extend the limit of application of PM materials as far as possible, the need is felt for a nondestructive technique capable of detecting defects of size down to approximately 50 micrometers. An ultrasonic technique is presented which allows the detection and characterization of such small defects. It is based on the analysis of the signals backscattered by the material lying in the focal region of a short pulse transducer. During a first overall inspection of the component a real time data processing allows both the detection of critical defects and the evaluation of average grain size. In successive local inspections, confined in the regions where inclusions have been detected, further information on their characteristics may be collected. Some experimental results obtained on powder metallurgy samples containing seeded inclusions are presented. Author

N86-25374# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

ADVANCED EXPERIMENTAL METHODS FOR MONITORING THE BEHAVIOR OF SMALL CRACKS c26

James M. Larsen *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs (For primary document see N86-25360 16-07)

Avail: NTIS HC A13/MF A01

Two specialized techniques for monitoring the behavior of small fatigue cracks are discussed. The first of these is an automated photomicroscopic system that produces a permanent photographic record of the growth of small surface cracks. The system is automated by a microcomputer which controls fatigue testing and operates a 35 mm camera. Data are obtained for the growth of small cracks of approximate sizes ranging from 25 micrometers to fracture. The precision of the photographic measurements is approximately 1 micrometer for cracks of the order of 25 micrometers in length. In addition to the photographic technique, a unique Interferometric displacement gage (IDG) which monitors the crack mouth opening behavior of small surface cracks is discussed. The IDG measurements produce a complete record of applied load vs. crack opening displacement. The load-displacement data are analyzed to determine effective crack length from compliance calibrations and to determine crack closure behavior. The capabilities of both the photomicroscopic and the interferometric techniques are discussed, and typical small crack data are presented. Author

N86-25375# TRW, Inc., Cleveland, Ohio.

MULTIAXIAL AND THERMOMECHANICAL FATIGUE CONSIDERATIONS IN DAMAGE TOLERANT DESIGN c39

Gail E. Leese and Robert C. Bill (Army Research and Technology Labs., Cleveland, Ohio) *In* AGARD Damage Tolerance Concepts

for Critical Engine Components Oct. 1985 17 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

In considering damage tolerant design concepts for gas turbine hot section components, several challenging concerns arise: Complex multiaxial loading situations are encountered; thermomechanical fatigue loading involving very wide temperature ranges is imposed on components; some hot section materials are extremely anisotropic; and coatings and environmental interactions play an important role in crack propagation. The effects of multiaxiality and thermomechanical fatigue are considered from the standpoint of their impact on damage tolerant design concepts. Recently obtained research results as well as results from the open literature are examined and their implications for damage tolerant design are discussed. Three important needs required to advance analytical capabilities in support of damage tolerant design become readily apparent: (1) a theoretical basis to account for the effect of nonproportional loading (mechanical and mechanical/thermal); (2) the development of practical crack growth parameters that are applicable to thermomechanical fatigue situations; (3) the development of crack growth models that address multiple crack failures. Author

N86-25376# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
ADVANCED QUANTITATIVE METHODS FOR NONDESTRUCTIVE EVALUATION **c26**
Dale E. Chimenti and Thomas J. Moran *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 17 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Over the past decade and a half progress in nondestructive evaluation (NDE) methods which yield quantitative flaw information has been considerable and has sparked a revolution in the way industry and government view the capabilities and benefits of quality assurance or component integrity. Almost no NDE technique, new or established, is selected for research and development without examining its potential for providing accurate, quantitative defect information. Concurrent with this trend has been the increasing use of fracture mechanics in the design and life management of aircraft systems, placing in turn stringent requirements on quantitative nondestructive evaluation (QNDE). Nowhere are these demands heavier than in the case of advanced aircraft engine alloys where critical flaw sizes are measured in hundredths of an inch. Research in NDE, therefore, has concentrated on improving defect sensitivity and reliability and providing the quantitative information essential to the new system maintenance philosophies, such as Retirement-for-Cause. In addition to the well-known quantitative capabilities of standard techniques like radiography, dye penetrant, and in some cases, eddy current, developments in quantitative ultrasonics, eddy current, thermal wave techniques and exploitation of new medicial X-ray imaging methods offer alternatives with enhanced capabilities and possibly reduced cost. The state of the art in QNDE is discussed, as well as advanced methods currently in development. Author

N86-25377# Naval Air Development Center, Warminster, Pa.
STATISTICAL ANALYSIS OF SPIN PIT FAILURE DATA TO PREDICT INSERVICE B.1 LIVES OF GAS TURBINE DISKS **c39**
R. Mahorter, S. Fowler, and J. Salvino (Naval Air Propulsion Test Center, Trenton, N.J.) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 15 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Currently used analytical predictive methods for establishing gas turbine disk lives have basic limitations associated with stress, thermal, and mission analyses among other factors. The difference between predicted life and actual in-service life is usually not known since most parts are removed from service prior to crack formation. The Navy is developing a predictive method based on statistical analysis of data from parts run to crack initiation in spin pit testing. As part of this work, the minimum number of disks needed to establish a viable predictive method is determined. Although data from the small sample size (5) used has a great deal of statistical uncertainty, it appears that analytical predictions may be anticonservative. Author

N86-25378# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
FRACTURE MECHANICS AND LCF-PROPERTIES OF ENGINE DISCS OF TI 6Al-4V, INCONEL 718 AND UDIMET 700 P/M-HIP
Walter Schuetz and R. Heidenreich refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Over the last decade IABG has carried out a large number of tests on gas turbine materials to determine the materials data necessary for the conventional lifing approach, that is LCF data, including dwell time effects and some HCF data. The data necessary for a damage tolerance approach as well as crack propagation properties were also determined. These tests were done at room and typical service temperatures. The materials were Ti 6A1 4V, Inconel 718 and Udimet 700 P/M-HIP. The specimens were machined from a number of nominally identical compressor discs of Ti A16 V4, from compressor discs of Inconel 718 and from disc-shaped pancakes of Udiment 700 P/M-HIP. Constant amplitude tests under strain control with unnotched specimens and under stress control with notched specimens were carried out, as well as a number or relatively simple variable amplitude tests. Author

N86-25379# Technische Univ., Munich (West Germany). Materials Lab.
EVALUATION OF CYCLIC SPIN PIT TESTS FOR THE DAMAGE TOLERANCE OF DISKS
H. Huff and G. W. Koenig *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

In order to determine the damage tolerance at critical areas of nickelbase engine disks (bore, eccentric hole, blade slot) the crack propagation behavior was investigated. The experiments include cyclic spin pit tests on disks and fracture mechanics tests on small crack specimens. The results of the spin pit tests are compared with the crack propagation behavior predicted by fracture mechanics. The tolerance of engine disks with respect to small crack-like defects is estimated and the potential of the crack propagation life for application in service is discussed. It was found that at low and intermediate temperatures the crack propagation life is sufficient to cover a substantial portion of the life required for disks. With increasing temperature the influence of time dependent processes results in a very strong reduction of the defect tolerance. Author

N86-25380# National Aerospace Lab., Amsterdam (Netherlands).
TURBISTAN: A STANDARD LOAD SEQUENCE FOR AIRCRAFT ENGINE DISCS **c38**
A. J. A. Mom, W. J. Evans (Royal Aircraft Establishment, Farnborough, England), and A. A. tenHave *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 12 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

The development of TURBISTAN is a joint international effort to derive a loading standard representative for fighter aircraft engine disc usage. A representative loading standard offers considerable potential advantages over the present zero-max type of loading used for disc material evaluation. This is because the standard incorporates the effects of subcycles, their number, magnitude and sequence, which are known to seriously affect disc life and for which current life prediction techniques only partly account. Therefore usage of the standard in fatigue tests provides an improved evaluation of material properties, structural details, fabrication techniques, surface quality and life prediction. The compilation of operational flight data is described along with their analysis and the generation of a preliminary TURBISTAN sequence for cold compressor discs. The sequence contains

about 8000 cycles which represent 100 flights. In addition, the background and philosophy of a material testing program meant to assess the effectiveness of the standard and to explore the validity of the assumptions made in its derivation is described.
Author

N86-25381# Rolls-Royce Ltd., Derby (England).
AN ANALYSIS OF RIG TEST DISC FAILURES c38
G. Asquith *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 10 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

A major objective in gas turbine engineering is the design and manufacture of discs that are reliable in service. Much depends on the accurate prediction of safe total lives and inspection intervals. Accurate predictions come from a complete understanding of material behavior involving experimentation, interpretation and quantification, for which a balanced program of laboratory specimen and full sized disc evaluation is required. Cyclic testing of full size discs is essential, this allows each disc to do its own Monte Carlo evaluation of the large number of variables that affect the final result. Where life can be predicted entirely by linear elastic fracture mechanics some simplification can be introduced; this encourages studies in the quantification of short crack propagation behavior.
Author

N86-25382# National Aerospace Lab., Amsterdam (Netherlands).
CONTRIBUTION OF TURBINE BLADE SERVICE FAILURES TO A DAMAGE TOLERANCE APPROACH c39
R. J. H. Wanhill and A. J. A. Mom *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

Modified repair of uprated first stage turbine blades from large turbofans was followed by several fatigue failures in service. The failure mode was low and high cycle fatigue starting at leading edge cooling holes. Fractographic and metallographic analysis indicated that insufficient thickness of the leading edge walls was a primary cause of failure. A more comprehensive investigation by the engine manufacturer showed that other parameters besides leading edge wall thickness could be primary causes of failure, namely the leading edge and serpentine airflows and the backflow margin. Relative life reduction factors based on combinations of all four parameters were estimated for many failed, cracked and nominally undamaged blades. Then it became possible to reject blades with unacceptable life reduction factors both before and after repair. This is effectively a life-on-condition damage tolerance approach to blade use.
Author

N86-25383# National Research Council of Canada, Ottawa (Ontario).
PRACTICAL EXPERIENCE WITH DAMAGE TOLERANCE BASED LIFE EXTENTION OF TURBINE ENGINE COMPONENTS c38
A. K. Koul, R. Thamburaj (Carleton Univ., Ottawa, Ontario), M. D. Raizenne, W. Wallace, and M. C. DeMalherbe *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

A detailed experimental and statistical analysis carried out to determine the risks and benefit of implementing a damage tolerance based lifing procedure for the General Electric J85-CAN40 engine is described. This is a post-facto investigation, using components of this engine retired by the Canadian Forces and the data available regarding these used parts. The emphasis is on the 5th stage compressor disk, which is one of the most crack prone components of this engine. A number of procedures were demonstrated by which the safe life and the safe inspection interval for this component can be calculated reliably. The possibility of improving the existing lifing procedure through a damage tolerance approach, and the limitations of the damage tolerance approach are discussed on the basis of experimental observations and information available from field experience.
Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-25384# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN LQG UP-AND AWAY FLIGHT CONTROL DESIGN FOR THE STOL F-15 AIRCRAFT M.S. Thesis
Robert A. Houston Dec. 1985 243 p refs
(AD-A164108; AFIT/GE/ENG/85D-21) Avail: NTIS
HC A11/MF A01 CSCL 01/4

A robust controller for the STOL F-15 aircraft is developed using the LQG/LTR (linear system model, quadratic cost, gaussian models of uncertainty used for controller synthesis, with loop transfer recovery techniques of tuning the filter in the loop for control robustness enhancement) methods. Full state feedback controllers are synthesized using CGT/PI (Command Generator Tracking feedforward compensator to provide direct incoporation of flying qualities into the design process, with proportional plus integral feedback control) synthesis, using implicit model following techniques to improve full state robustness characteristics. Finally, a Kalman filter is used to replace the unrealistic assumption of full state availability with estimated states, using a LTR scheme to recover as much full state robustness characteristics as possible.
GRA

N86-25563# Joint Publications Research Service, Arlington, Va.
OSCILLATIONS IN JET STRIKING BARRIER Abstract Only
V. Ye. Kuzmina *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 5 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Matematika, Mekhanika, Astronomiya (Leningrad, USSR), no. 1, Jan. - Mar. 1985 p 63-69 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25603# Joint Publications Research Service, Arlington, Va.
ROLE OF OPTIMIZATION METHODS IN IMPROVEMENT OF FLIGHT CONTROL FOR AIRPLANES Abstract Only
G. M. Kashin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 10 Transl. into ENGLISH from Standarty i Kachestvo (Moscow, USSR), no. 12, Dec. 1984 p 15-18 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-25385# Drexel Univ., Philadelphia, Pa. Dept. of Civil Engineering.
MATERIALS FOR EMERGENCY REPAIR OF RUNWAYS Final Report, 1 Apr. 1984 - 14 Feb. 1985
Sandor Popovics 20 Mar. 1985 236 p refs
(Grant AF-AFOSR-0245-83)
(AD-A164225; Rept-001120-1; AFOSR-85-1229TR) Avail: NTIS
HC A11/MF A01 CSCL 11/2

The primary objective of this project was to identify or develop an inorganic cementing material that is suitable for emergency repair of damaged airport runways under war conditions. In the first half of the work several commercially available rapid hardening cements were screen-tested as presented in an earlier progress report. It was established on this basis that the SET-45 formulas and their modifications appeared to be the most promising for

achieving the given objectives of this project. These objectives were: at least 2000 psi compressive strength at the age of 1 hour; adequately long setting time; good bond to old concrete; and minimum shrinkage under every weather condition. Since then both mechanical (compressive and flexural strengths, bond, shrinkage, etc.) and physicochemical tests (X-ray diffraction, scanning electron microscopy, infrared spectroscopy, etc.) were performed with these materials to see the technically important properties of these cements under various curing conditions and learn about the basic nature of these materials. GRA

N86-25386# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
BOMB CRATER REPAIR TECHNIQUES FOR PERMANENT AIRFIELDS, SERIES 2 AND 3 TESTS
Samuel J. Alford and George M. Hammitt, II Oct. 1985 79 p refs
(AD-A164394; WES-TR-GL-81-12; Rept-2) Avail: NTIS HC A05/MF A01 CSCL 13/12

This study is a continuation of Report 1 of this series that described Series 1 tests which were performed using different field methods of repair and restoration of bomb craters. Results from Series 1 tests showed problem areas that needed correction when the crater repairs were trafficked with full-scale loading. Two series, Series 2 and 3, of tests were run to determine if: (1) the loose stone problem at the surface could be eliminated from the well-graded crushed limestone, (2) materials could be used that would neither be affected by the weather nor require any compaction equipment, (3) a crushed aggregate that engineering troops in Germany were trying to use could be stabilized under traffic, (4) a way could be found to place grout with a minimum of equipment, (5) it was possible to cut down on portland cement concrete curing time, and (6) an unconventional pavement repair could be used. Testing consisted of accelerated traffic using either single- and/or multiple-wheel gear assemblies. Author (GRA)

N86-25387# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF THE PERFORMANCE OF THE FANS OF A WIND TUNNEL AT THE NAVAL POSTGRADUATE SCHOOL M.S. Thesis
Marcos L. Pereira Dec. 1985 94 p refs
(AD-A164492; AD-E900539) Avail: NTIS HC A05/MF A01 CSCL 20/4

The large subsonic academic wind tunnel at NPS, powered by two counter-rotating fans, never achieved the design specifications. The reason for the poor performance of the tunnel was unknown but believed to be due to either poorly designed fan blades or to separation in the diffuser. Being easier to analyze, the fan blades were chosen for initial study. The approach used is a new blade element method for calculating the performance of high and intermediate solidity fans. Although this new method predicts some deviations from the original isolated blade analysis, it was found that the design was adequate and, therefore, the tunnel problem is most probably due to separation in the diffuser. GRA

N86-25388# Department of the Air Force, Washington, D.C.
TIMED PRIMATE ROTO-POSITIONER Patent Application
Clarence M. Oloff, inventor (to Air Force) Filed 17 Oct. 1985 13 p
(AD-D012101; US-Patent-Appl-SN-788199) Avail: NTIS HC A02/MF A01 CSCL 06/12

This abstract discloses an apparatus for rotating subhuman primate animal test subjects about one or more axes to minimize trauma during simulated zero or micro-gravity studies. The timed roto-positioning apparatus has a frame, a subframe rotatably attached to the frame and a carrier for a primate restraint system rotatably attached to the subframe. Two motors, controlled by a programmable controller, individually rotate the subframe and the carrier according to a preselected sequence. The preferred embodiment is a modified A-frame structure made from welded channel aluminum beans and equipped with casters and lifters to move and securely position the apparatus. A tube with rotatable fittings is used to supply drinking water to test animals and electrical slip rings are used for transmitting physiological sensor signals from the test animal through the rotating connections of the carrier, subframe and frame. Radio telemetry may be used in place of the electrical slip rings. The invention also includes the method of rotating an immobilized or immobile test subject or patient along at least one axis to minimize trauma and to simulate weightlessness. GRA

N86-25561# Joint Publications Research Service, Arlington, Va.
APPLICATION OF AVERAGING METHOD TO PROBLEM OF CONTROL SYNTHESIS Abstract Only
A. P. Vyazovik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 4 Transl. into ENGLISH from Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 6-13 (For primary document see N86-25556 16-31) Avail: NTIS HC A06/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

No abstracts in this category.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-25389# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DISTRIBUTED FIFO ALLOCATION OF IDENTICAL RESOURCES USING SMALL SHARED SPACE Technical Report, 1 Apr. 1984 - 30 Nov. 1985
Michael J. Fischer, Nancy A. Lynch, James E. Burns, and Allan Borodin Oct. 1985 38 p refs
(Contract DAAG29-84-K-0058)
(AD-A163988; MIT/LCS/TM-290; ARO-20519.17-EL) Avail: NTIS HC A03/MF A01 CSCL 09/2

A simple and efficient algorithm is presented for the FIFO allocation of K identical resources among asynchronous processes which communicate via shared memory. The algorithm simulates a shared queue but uses exponentially fewer shared memory values, resulting in practical savings of time and space as well as program complexity. The algorithm is robust against processes failure through unannounced stopping, making it attractive also for use in an environment of processes of widely differing speeds. In addition to its practical advantages we show the algorithm is optimal (to within a constant factor) with respect to shared space complexity. GRA

N86-25390# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MINIMUM IMPULSE ORBITAL EVASIVE MANEUVERS M.S. Thesis
Roger C. Burk Dec. 1985 102 p refs
(AD-A163996; AFIT/GSO/AA/85D-3) Avail: NTIS HC A06/MF A01 CSCL 22/2

A threat to a satellite is modeled as a sphere of a given radius. The satellite may be required to be outside of the sphere at a given time or never to enter the sphere at all. The threat sphere may be inertially fixed or may move in a keplerian orbit. A method is described of finding the smallest impulsive maneuver that can be made at a given time to avoid the threat. Using the linearized relationship between the satellite state vector at the maneuver time and the state at the intercept time, iterative algorithms are developed that converge on the optimal evasive

maneuver. A computer program that implements the algorithms is described. The results of the algorithm are given for several cases. An interception taken from a plausible real-world scenario is used as a basis for investigating how maneuver size varies with the geometry of the interception. GRA

N86-25391# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
TECHNICAL BASIS FOR THE GEOSTATIONARY SATELLITE ORBIT ANALYSIS PROGRAM (GSOAP), VERSION 2
H. Akima Nov. 1985 66 p refs
(PB86-151750; NTIA-86/183) Avail: NTIS HC A04/MF A01 CSCL 22B

The Geostationary Satellite Orbit Analysis Program (GSOAP) is computer software that analyzes system performance and mutual interference of communication satellites using the geostationary satellite orbit. Calculation of the carrier-to-interference ratio margins is an essential part of GSOAP. It involves a (CIR) variety of technical problems, i.e., Earth-station and satellite antenna radiation patterns, radio wave propagation models, and related problems such as the polarization angles of linearly polarized emissions, combining of the transmitting and receiving antenna gains, and percent of the time for which the CIR is to be protected. Various transponder arrangements in the satellites may contribute to the complexity of the calculation. The technical basis for GSOAP is described. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N86-25392# Dugway Proving Ground, Utah.
SITE INFLUENCES ON THE XM76 GRID
John White, Rick Ewald, and Christopher Biltoft 3 Feb. 1986 27 p refs
(AD-A164291; DPG-FR-86-701) Avail: NTIS HC A03/MF A01 CSCL 19/1

The XM76 Grid is a new testing location for smoke munitions where terrain and meteorological tower influences on meteorological measurements have not been previously analyzed. The primary objective is to quantify site influences on wind and turbulence data collected at the XM76 Grid. A secondary objective is to evaluate the capability of Smith and Turner stability categories to order turbulence data. Sigma A/Sigma E ratios are used to quantify terrain influences at low and high wind speeds for fetches over low, moderate, and high roughness terrain. Tower shadowing effects on wind and turbulence measurements are also quantified as a function of wind speed. Preliminary analysis of Smith versus Turner stability category techniques indicates superiority of the Smith technique for the horizontal component of turbulence. GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-25393# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
THE EFFECT OF ATMOSPHERIC TURBULENCE ON THE DISPERSION OF UNGUIDED MISSILES
R. I. Harris and M. Curcin Feb. 1986 44 p refs Sponsored by Cranfield Inst. of Tech., Bedford (England). Prepared in cooperation with Vojnotehnicki Inst.,Belgrade (Yugoslavia)
(CAR-8613; ISBN-0-947767-38-X) Avail: NTIS HC A03/MF A01

A technique for calculating the dispersion of unguided missiles due to strong turbulent wind is presented. The three components of turbulent wind velocity are simulated along a trajectory by means of a moving average process. Variations of the statistics of turbulent wind with height are taken into account. A six degree of freedom program is used to calculate a trajectory. The effect of turbulent wind on both powered and unpowered flight is considered. The results of the calculation for two types of missiles are presented. Author

N86-25394# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LIMIT CYCLE OF THE PLANAR NON-LINEAR MOTION OF A FINNED PROJECTILE
Zipeng Han 23 Jan. 1986 18 p refs Transl. into ENGLISH from Binggong Xuebao (China), no. 1 Feb. 1985 p 62-67
(AD-A164311; FTD-ID(RS)T-1040-85) Avail: NTIS HC A02/MF A01 CSCL 19/1

The planar non-linear motion of a finned projectile with small damp and weak non-linear static moment was studied. The stable limit cycle is used to explain the self-oscillation generated by some projectiles. The unstable limit cycle is used to investigate the causes for the fortuitous fall of some finned projectiles. In order to alleviate the effect of self-oscillation and to eliminate the fortuitous fall of projectiles, the non-linear portion of the damp moment and that of lift should be increased and the non-linear part of the drag should be decreased. GRA

N86-25395# Naval Postgraduate School, Monterey, Calif.
THE EFFECTS OF DIGITAL CONTROL ON LONGITUDINAL AUTOPILOTS FOR BANK-TO-TURN AND SKID-TURN MISSILES M.S. Thesis
Ioannis C. Karaiskos Dec. 1985 140 p refs
(AD-A164507) Avail: NTIS HC A07/MF A01 CSCL 17/7

In the development, the classical design and analysis were reviewed using the continuous uncoupled pitch channel autopilot for circular airframe. Then, applying analog-to-digital conversion, the corresponding discrete autopilot was designed. The performance of both continuous and discrete open loop systems was analyzed according to the desired requirements. In the following section, utilizing modern control design techniques for the discrete pitch channel autopilot, the control law was designed, assuming availability of all the states and taking the desired poles to be at the same place as in the classical design. Therefore the discrete state-feedback autopilot was obtained and analyzed. The next step was the design of an estimator which estimates the entire state vector, given measurements of the portion of the state. The performance of the estimator was analyzed too. Finally coupling the discrete pitch and roll channel autopilots the overall performance of the discrete system was obtained and analyzed. The resulting design was also proved to be robust. GRA

N86-25396# Naval Postgraduate School, Monterey, Calif.
DESIGN AND ANALYSIS OF DISCRETE LATERAL AUTOPILOTS FOR COORDINATED BANK-TO-TURN MISSILES M.S. Thesis
Christos I. Karadimas Dec. 1985 165 p refs
(AD-A164518) Avail: NTIS HC A08/MF A01 CSCL 17/7

This thesis addresses the design and analysis of discrete lateral autopilots for application to BTT missiles. The first part reviews the classical design and analysis of the continuous uncoupled yaw and roll channels. Then, applying analog-to-digital conversion, the corresponding discrete autopilots were designed and analyzed in terms of their transient responses. The second part uses modern control design techniques for the single-input discrete lateral autopilots. At first, assuming availability of all states for feedback purposes, a discrete state-feedback autopilot is obtained. Next, since the state vector is not always available to direct measurement, an estimator is introduced to implement control. The state-feedback and estimator designs are analyzed for both lateral channels and found to have satisfactory time responses. Finally, coupling the

discrete pitch and roll channel autopilots, a state-feedback and estimator are designed and found to be robust. GRA

N86-25397# Department of the Army, Washington, D. C.
SPIN STABILIZED IMPULSIVELY CONTROLLED MISSILE (SSICM) Patent
James I. Crawford, inventor (to Army) and W. Max Howell, inventor (to Army) Issued 24 Dec. 1985 9 p
(AD-D012103; US-Patent-4,560,120; US-Patent-Appl-SN-524627; US-Patent-Class-244-3.22) Avail: US Patent and Trademark Office CSCL 16/4

This patent is for the Spin Stabilized Impulsively Controlled Missile (SSICM). SSICM is a missile configuration which employs spin stabilization, nutational motion, and impulsive thrusting, and a body mounted passive or semiactive sensor to achieve very small miss distances against a high speed moving target. SSICM does not contain an autopilot, control surfaces, a control actuation system, nor sensor stabilization gimbals. SSICM spins at a rate sufficient to provide frequency separation between body motions and inertial target motion. Its impulsive thrusters provide near instantaneous changes in lateral velocity, whereas conventional missiles require a significant time delay to achieve lateral acceleration. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-25398*# National Aeronautics and Space Administration, Washington, D.C.
AN OVERVIEW OF EUROPEAN SPACE TRANSPORTATION SYSTEMS
R. E. Lo Nov. 1985 31 p refs Transl. into ENGLISH of conf. paper "Europaeische Raumfahrt-Transportsysteme" presented at the DGLR Annual Conference, 1985 p 1 24 Conference held in Bad Godesberg, West Germany, 30 Sep. - 2 Oct. 1985 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77683; NAS 1.15:77683; DGLR-85-100) Avail: NTIS HC A03/MF A01 CSCL 22A

With the completion of the launch rocket series Ariane 1 to 4, Europe will have reached the same capacity to transport commercial payloads as the USA has with the Space Shuttle and the kick stages which are presently operative. The near term development of these capacities would require Europe to develop a larger launch rocket, Araine 5. Further motivations for this rocket are access to manned spaceflight, the development of an European space station, and the demand for shuttle technology. Shuttle technology is the subject of research being done in France on the winged re-entry vehicle Hermes. Operation of the European space station Columbus will require development of an interorbital transport system to facilitate traffic between the various segments of the space station. All European space transportation systems will have to match their quality to that of the other countries involve in space flight. All areas of development are marked not only by possible cooperation but also by increased competition because of increasing commercialization of space flight. Author

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-25399# Massachusetts Inst. of Tech., Cambridge. Sea Grant College Program.
DESIGN AND PERFORMANCE ANALYSIS OF DIGITAL ACOUSTIC UNDERWATER TELEMETRY SYSTEM
J. A. Catipovic, A. B. Baggeroer, K. vonderHeydt, and D. E. Koelsch Nov. 1985 56 p refs
(Contract NA81AA-D-00069)
(PB86-156510; MITSG-85-12) Avail: NTIS HC A04/MF A01 CSCL 09E

The work discusses the design and performance characteristics of a Digital Acoustic Telemetry System (DATS) which incorporates the current state-of-the-art technology and is capable of reliable data transmission at rates useful to a wide range of ocean exploration and development gear. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-25400# Lawrence Livermore National Lab., Calif.
MaRV PENETRATION STUDY: A 2-D SIMULATION APPROACH
L. C. Ng 22 Nov. 1985 70 p
(Contract W-7405-eng-48)
(DE86-004493; UCID-20598) Avail: NTIS HC A04/MF A01

The performance assessment of a maneuverable re-entry vehicle (MaRV) in terms of its probability of penetration (POP) during re-entry and the subsequent circular error probability (CEP) at impact is a very complex problem. A thorough study of this problem will require the development of a number of analytical and simulation tools. This report summarizes the preliminary simulation development effort of the realism that can only come from a 3-D model, it nevertheless served as a good stepping stone in the study and development of the terminal engagement strategy from a conventional ballistic RV (BRV) to a MaRV system. DOE

N86-25401*# Alabama Univ., University. Environmental and Energy Center.
PERSONNEL OCCUPIED WOVEN ENVELOPE ROBOT Progress Report
F. C. Wessling 1 Jun. 1986 45 p refs
(Grant NAGw-847)
(NASA-CR-176832; NAS 1.26:176832) Avail: NTIS HC A03/MF A01 CSCL 22B

The use of nonmetallic or fabric structures for space application is considered. The following structures are suggested: (1) unpressurized space hangars; (2) extendable tunnels for soft docking; and (3) manned habitat for space stations, storage facilities, and work structures. The uses of the tunnel as a passageway: for personnel and equipment, eliminating extravehicular activity, for access to a control cabin on a space crane and between free flyers and the space station are outlined. The personnal occupied woven envelope robot (POWER) device is shown. The woven envelope (tunnel) acts as part of the boom of a crane. Potential applications of POWER are outlined. Several possible deflection mechanisms and design criteria are determined. E.A.K.

N86-25402# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODAL ASSIGNMENT EFFECTS ON DECENTRALIZED CONTROL OF A LARGE SPACE STRUCTURE M.S. Thesis
Jonathan B. Sumner Dec. 1985 158 p refs
(AD-A163977; AFIT/GA/AA/85D-9) Avail: NTIS HC A08/MF A01 CSCL 22/2

The more modes a designer can keep in the model of the system/space structure, the less inaccurate it will be. But the computational burden to an online computer, functioning as the controller, grows also. The thrust of this thesis is to implement time response output for the nontrivial model and investigate the effect on time response of certain modal assignments by fixed groups to any of the three controllers with another fixed group assigned as residuals. The inclusion of residuals provides in a limited sense a truth model for the analysis of stability and performance. There may be significant differences in time response caused by the fact that a controller is known to provide more relative controllability and less observability, or vice versa for its assigned modes. The investigation will involve initially the fixing of certain baseline parameters to allow a parallel comparison of reasonable results. Then line-of-sight pointing and defocus performance will be generated for comparison among various cases. The simulation model is a version of the so-called Draper-2 space structure model. The next section describes the selected model configuration and discusses its finite element representation. Then the modal control and matrix transformation methods will be explained. The implementation of the simulation program will be discussed. The last sections will detail the investigation, results, conclusions and recommendations. GRA

N86-25403# National Environmental Satellite Service, Washington, D. C.
PLAN FOR SPACE STATION POLAR-ORBITING PLATFORM Final Report
J. H. McElroy, S. R. Schneider, D. B. Miller, and J. W. Sherman, III Jun. 1985 105 p refs
(AD-A164405) Avail: NTIS HC A06/MF A01 CSCL 22/2

This ENVIROSAT-2000 Report concerns utilization of the polar platform component of NASA's Space Station program. Issues covered in the report include instrument payloads, altitudes, orbits, serviceability, communications, and data processing. A scenario is set forth for operational utilization of the platform, including issues surrounding integration of operational and research missions. The discussion is broken down by discipline: oceanography, meteorology, land sciences, atmospheric sciences, and solar-terrestrial investigations. A cost analysis shows that performing NOAA operations from the polar platforms would prove extremely beneficial by replacing the expendable two Polar-orbiting Operational Environmental Satellite (POES) system that NOAA now maintains. GRA

N86-25404# New Mexico State Univ., Las Cruces. Physical Science Lab.
SHARP (STABILIZED HIGH ALTITUDE RESEARCH PLATFORM) Final Technical Report, Jul. 1983 - Aug. 1985
Sep. 1985 18 p refs
(Contract F19628-81-C-0127)
(AD-A164459; SD-838-1108; AFGL-TR-85-0056) Avail: NTIS HC A02/MF A01 CSCL 01/3

The Stabilized High Altitude Research Platform (SHARP) is a balloon-borne payload separable into two structures. The lower section, which is recoverable in mid-air, carries a gyroscopically-stabilized platform designed to stare at or scan an area on or above the Earth's surface. Commands from the ground define the target or type of motion required. GRA

N86-25619# Joint Publications Research Service, Arlington, Va.
MOTION OF SATELLITE RELATIVE TO CENTER OF MASS CAUSED BY MOMENTS OF LIGHT-PRESSURE FORCES Abstract Only
D. D. Leshchenko and A. S. Shamayev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 60 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 14-21 Original language document was announced in IAA as A85-28902 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25620# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF ORIENTING AND STABILIZING SYSTEMS FOR SPACECRAFT WITH CONTROLLABLE GRAVITATIONAL STABILIZER Abstract Only
Ye. M. Potapenko *In its* USSR Report: Engineering and Eduction (JPRS-UEQ-86-002) 7 Feb. 1986 p 69-70 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 22-30 Original language document was announced in IAA as A85-28903 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25621# Joint Publications Research Service, Arlington, Va.
CORRECTION OF SPACE TACHOMETER - STABILIZING GYRO SYSTEM Abstract Only
A. I. Tkachenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 70 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 31-36 Original language document was announced in IAA as A85-28904 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-25405# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
OFFICE OF NAVAL RESEARCH PUBLICATIONS, PATENTS, PRESENTATIONS, HONORS REPORT Report, 1 Oct. 1983 - 30 Sep. 1985
Donald A. Gurnett 30 Sep. 1985 6 p refs
(Contract N00014-82-K-0183)
(AD-A164343) Avail: NTIS HC A02/MF A01 CSCL 03/2

This is a list of papers, etc., on the Plasma Wave Instrument on the AMPTE/IRM Spacecraft. Each entry, of which there are 12, lists authors, titles of articles, journals and conferences. GRA

N86-25406# Naval Postgraduate School, Monterey, Calif.
DESIGN OF A SPACE BASED SENSOR TO PREDICT THE INTENSITY AND LOCATION OF EARTHQUAKES FROM ELECTROMAGNETIC RADIATION M.S. Thesis
Michael L. Whyms Dec. 1985 84 p refs
(AD-A164357) Avail: NTIS HC A05/MF A01 CSCL 08/11

A proposed design for a space-based sensor to predict and detect earthquakes is presented. A free standing radiofrequency noise measurement and recording system is described to research the correlation between earthquakes and increased background electromagnetic noise at 30.45 MHz and 150.75 MHz. GRA

N86-25526# Joint Publications Research Service, Arlington, Va.
AUTOMATED MULTIDIMENSIONAL ANALYZER BASED ON SM-3 KAMAK Abstract Only
R. Kupchak, A. Soltan, N. K. Skobelev, M. Levitovich, A. Yankovski, and G. Baluka *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 1-2 refs Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow), no. 2, Mar.-Apr. 1985 p 203-206 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25527# Joint Publications Research Service, Arlington, Va.
SELECTIVE COATINGS FOR SOLAR-TO-THERMAL ENERGY CONVERTERS Abstract Only
M. I. Umarova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 20 refs Transl. into ENGLISH from Izv. Akad. Nauk Tadzhiksoy SSR Otd. Fiz.-Mat., Fiz. i Geol. Nauk (USSR), no. 2 (92), Apr. - Jun. 1984 p 61-71 Previously announced as N85-28144 (For primary document see

N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25622# Joint Publications Research Service, Arlington, Va.
HARMONIC VIBRATIONS OF VISCOELASTIC SHELLS OF PIEZOCERAMIC MATERIAL WITH ATTENDANT HEATING Abstract Only
V. G. Karnaukhov and I. F. Kirichok *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-82-006) 7 Feb. 1986 p 71 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 60-67 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-25407*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOWER POWER dc ARCJET OPERATIONS WITH HYDROGEN HYDROGEN/NITROGEN PROPELLANT MIXTURES
Francis M. Curran and Shigeo Nakanishi (Analex Corp., Cleveland, Ohio) 1986 23 p refs Presented at 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and American Society for Ecological Education
(NASA-TM-87279; E-2982; NAS 1.15:87279) Avail: NTIS HC A02/MF A01 CSCL 21H

The arcjet assembly from a flight model system was modified with a new thoriated tungsten nozzle insert and has been tested with hydrogen-nitrogen mixtures simulating the decomposition products of ammonia and hydrazine. Arcjet power consumption ranged from 0.7 to 1.15 kW depending on low rate, input current, and mixture composition. At a nominal 1 kW power level the ammonia mixtures thrust efficiency was about 0.31 at specific impulse values ranging between 460 and 500 sec. Hydrazine mixtures gave similar thrust efficiencies at the same power level with specific impulse values between 395 and 430 sec. Large, spontaneous voltage mode changes were not observed once the thruster had passed a period of instability immediately following start up. This period of instability, and the startup at low pressure, were seen as major causes of constrictor damage during the tests. Author

N86-25408*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRUCTURAL INTEGRITY AND DURABILITY FOR SPACE SHUTTLE MAIN ENGINE AND FUTURE REUSABLE SPACE PROPULSION SYSTEMS
Stanley J. Marsik and Henry T. Gawrylowicz 1986 18 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Alabama, 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE, and ASEE
(NASA-TM-87280; E-2983; NAS 1.15:87280) Avail: NTIS HC A02/MF A01 CSCL 21H

NASA is conducting a program which will establish a technology base for the orderly evolution of reusable space propulsion systems. As part of that program, NASA initiated a Structural Integrity and Durability effort for advanced high-pressure oxygen-hydrogen rocket engine technology. That effort focuses on the development of: (1) accurate analytical models to describe flow fields; aerothermodynamic loads; structural responses; and fatigue/fracture, from which life prediction codes can be evolved; and (2) advanced instrumentation with capabilities to verify the codes in an SSME-like environment as well as the potential for future use as diagnostic sensors for real-time condition monitoring of critical engine components. Author

N86-25409*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POWER ELECTRONICS FOR A 1-KILOWATT ARC JET THRUSTER
Robert P. Gruber 1986 23 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE
(NASA-TM-87340; E-3089; NAS 1.15:87340) Avail: NTIS HC A02/MF A01 CSCL 21H

After more than two decades, new space mission requirements have revived interest in arcjet systems. The preliminary development and demonstration of new, high efficiency, power electronic concepts for start up and steady state control of dc arcjets is reported. The design comprises a pulse width modulated power converter which is closed loop configured to give fast current control. An inductor, in series with the arcjet, serves the dual role of providing instantaneous current control, as well as a high voltage arc ignition pulse. Benchmark efficiency, transient response, regulation, and ripple data are presented. Tests with arcjets demonstrate that the power electronics breadboard can start thrusters consistently with no apparent damage and transfer reliably to the nondestructive high voltage arc mode in less than a second. Author

N86-25410# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA ARMAMENTARII (SELECTED ARTICLES)
Yanhuang Zhou, Xingchang Sun, Hebao Yin, Xingquan Chen, and Guang Li 23 Jan. 1986 33 p refs Transl. into ENGLISH from Binggong Xuebao (China), no. 4, Nov. 1984 p 11-14
(AD-A164313; FTD-ID(RS)T-0907-85) Avail: NTIS HC A03/MF A01 CSCL 21/8

This journal presents foreign technology articles from China. Some titles are: Study of the Effect of Particle Density and Particle Size in a Gas-Solid Flow on the Drag Coefficient; and, A New Method of Rocket Nozzle Design. E.R.

N86-25411# Naval Postgraduate School, Monterey, Calif.
BOOST CONTROL DESIGN FOR SPINNING MISSILE M.S. Thesis
Richard L. Park, Jr. Dec. 1985 97 p refs
(AD-A164505) Avail: NTIS HC A05/MF A01 CSCL 16/4

A compensation scheme is presented for the pitch-yaw control system of a strategic missile which maintains stability and performance while the missile spins. The conventional missile control design for boost has uncoupled pitch, yaw and roll channels ideally suited for a non-rolling missile. The effect roll has on the conventional pitch-yaw controller is discussed and the development and simulation of a modified system is presented. GRA

N86-25412# Department of the Air Force, Washington, D.C.
PULSED INTEGRAL ROCKET Patent Application
Nagy, inventor (to Air Force) Filed 21 Oct. 1985 13 p
(AD-D012138; US-Patent-Appl-SN-789864) Avail: NTIS HC A02/MF A01 CSCL 21/8

The prevention of over-acceleration of air-launched air-breathing missiles which are boosted by a solid fueled rocket is accomplished by replacing the solid fueled rocket with a two-section solid motor arrangement designed for a choice between simultaneous burning and sequential burning. When a host aircraft is flying at relatively low velocities, the two-section motors should be fired simultaneously to boost the ramjet of the air-breathing missile to operational velocities (Mach 3 to Mach 5). When the host aircraft is flying at relatively high velocities, the two-section motors should be fired sequentially to avoid over-acceleration and extend the operational range of the missile. While the ramjet and the two-section rocket motor may all be housed in the same casing, they must be separated from each other by thermal insulation and must have their own igniter which is controlled separately. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-25413*# National Aeronautics and Space Administration, Washington, D.C.
DICARBOXYLIC ACID ANHYDRIDE CONDENSATION WITH COMPOUNDS CONTAINING ACTIVE METHYLENE GROUPS. 4: SOME 4-NITROPHTHALIC ANHYDRIDE CONDENSATION REACTIONS
V. Oskaja and J. Rotberg Sep. 1985 14 p refs Transl. into ENGLISH from Latvijas PSR Zinatnu Akad. Vestis, Kimijas Serija, LZAKAM, no. 1, 1967 p 63-69 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77918; NAS 1.15:77918) Avail: NTIS HC A02/MF A01 CSCL 07A

By 4-nitrophthalic anhydride condensation with acetoacetate in acetic anhydride and triethylamine solution with subsequent breakdown of the intermediate condensation product, 5-nitroindanedione-1,3 was obtained. A 4-nitrophthalic anhydride with acetic anhydride, according to reaction conditions, may yield two products: in the presence of potassium acetate and at high temperatures 4-(or 5-)-nitro-2-acetylbenzoic acid is formed: in the presence of triethylamine and at room temperature 5-(or 6-)-nitrophthalic acetic acid is isolated. A 4-nitrophthalic anhydride and malonic acid in pyridine solution according to temperature yield either 5-(or 6-)-nitrophthalic acetic acid or 4-(or 5-)-nitro-2-acetylbenzoic acid.
Author

N86-25414# Puerto Rico Univ., Rio Piedras.
THE SYNTHESIS AND ORGANIC CHEMISTRY OF THE BORON-SILICON BOND Final Report, 1 Oct. 1980 - 30 Sep. 1985
Gerald L. Larson 12 Dec. 1985 7 p refs
(Grant DAAG29-80-G-0008)
(AD-A164073; ARO-17858.1-CH-H) Avail: NTIS HC A02/MF A01 CSCL 07/3

The synthesis of the boron-silicon bond via the reaction of methyldiphenylsilyllithium with 9-borabicyclo 3.3.1 nonane and treatment of the hydridoborate complex with acid was accomplished. The B-silyl-9-BBN was difficult to separate and purify, but was nevertheless fully characterized. It showed very little reactivity, however. For example, it oxidized well with alkaline hydrogen peroxide and slowly in air, but was inert to methanol, water, bromine and tributyltin hydride. In addition it did not react with carbonyl compounds, nor with olefins or acetylenes under a variety of conditions. The reaction of silyllithium reagents with 9-BBN in the presence of N,N,N',N'-tetramethylethylenediamine produced the corresponding borate in excellent yield as judged by 11B NMR analysis. These systems too were very unreactive, reacting well only with unhindered alcohols and very poorly with aldehydes and even acid chlorides. Attempts to prepare a stable, crystalline amine complex were unsuccessful.
GRA

N86-25415# Puerto Rico Univ., Rio Piedras. Dept. of Chemistry.
PHASE TRANSFER HYDROLYSIS OF ALKYL AND ACYL HALIDES AD-A164254 ARO-17861.4-CH HC A04/MF A01 Final Report, 29 Sep. 1980 - 31 Dec. 1984
H. Dupont Durst 1 Nov. 1985 52 p refs
(Grant DAAG29-80-G-0015)
(AD-A164254; ARO-17861.4-CH) Avail: NTIS HC A04/MF A01 CSCL 07/3

This proposal describes the design of a co-catalytic phase transfer catalytic system for the hydrolysis of alkyl and acyl halides. This system is designed to function in a non-aqueous organic phase in contact with a non-mixing basic aqueous phase. The mechanism of action of the system is the phase transferred nucleophilic displacement of the halide by the carboxylate anion followed by the intramolecular lactone formation and subsequent hydrolysis. The rapid conversion of alkyl halides into alcohols is in effect a detoxification reaction. Results show that the use of commercially available phase transfer catalysts and lactones enhance the hydrolysis, as predicted, as well as the observation of a peculiar cation (K+ > Na+) effect on hydrolysis rate. Hydrolysis of acyl (and phosphoryl) halides is difficult to quantify using the ptc system. Results indicate the co-catalytic lactone system most useful against alkyl halides (e.g., mustard); however the rate enhancements are not extraordinary. A synthetic study was initiated to design more effective ptc agents. Lariat ethers (modified crown ethers) show enhanced binding and possible novel reaction modes.
GRA

N86-25545# Joint Publications Research Service, Arlington, Va.
THE STRUCTURE OF ZSM-5 MOLECULAR SIEVES AT HIGH TEMPERATURE Abstract Only
Zhenyi Liu, Wanjing Zhang, Bingxiong Lin, Wei Zhu et al *In* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 86 Transl. into ENGLISH from Ranliao Huaxue Xuebao (Taiyuan, China), v. 13, no. 2, Jun. 1985 p 106-113 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

24 COMPOSITE MATERIALS

Includes laminates.

N86-25416* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LAMINATE COMPRISING FIBERS EMBEDDED IN CURED AMINE TERMINATED BIS-IMIDE Patent
Devendra Kumar, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.), George M. Fohlen, inventor (to NASA), and John A. Parker, inventor (to NASA) Issued 1 Apr. 1986 7 p Filed 30 Aug. 1985 Sponsored by NASA
(NASA-CASE-ARC-11421-3; US-Patent-4,579-782; US-Patent-Appl-SN-771538; US-Patent-Class-428-473.5; US-Patent-Class-428-474.4; US-Patent-Class-428-477.7; US-Patent-Class-528-170; US-Patent-Class-528-220; US-Patent-Class-528-321; US-Patent-Class-528-322) Avail: US Patent and Trademark Office CSCL 11D

Amine terminated bisaspartimides are prepared by a Michael type reaction of an aromatic bismaleimide and an aromatic diamine in an aprotic solvent. These bisaspartimides are thermally polymerized to yield tough, resinous polymers crosslinked through -NH- groups. Such polymers are useful in applications requiring materials with resistance to change at elevated temperatures.
NASA

N86-25417*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FRACTURE CHARACTERISTICS OF ANGLEPLIED LAMINATES FABRICATED FROM OVERAGED GRAPHITE/EPOXY PREPREG
Carol A. Ginty and Christos C. Chamis 1985 22 p refs Presented at Symposium on Fractography of Modern Engineering Materials, Nashville, Tenn., 18-19 Nov. 1985; Sponsored by American Society for Testing and Materials
(NASA-TM-87266; E-2968; NAS 1.15:87266) Avail: NTIS HC A02/MF A01 CSCL 11D

A series of angleplied graphite/epoxy laminates was fabricated from overaged prepreg and tested in tension to investigate the effects of overaged or advanced cure material on the degradation of laminate strength. Results, which include fracture stresses, indicate a severe degradation in strength. In addition, the fracture surfaces and microstructural characteristics are distinctly unlike any features observed in previous tests of this prepreg and laminate configuration. Photographs of the surfaces and microstructures reveal flat morphologies consisting of alternate rows of fibers and hackles. These fracture surface characteristics are independent of the laminate configurations. The photomicrographs are presented

and compared with data from similar studies to show the unique characteristics produced by the overage prepreg. Analytical studies produced results which agreed with those from the experimental investigations. Author

N86-25418# Brookhaven National Lab., Upton, N. Y.
LIGHTWEIGHT POLYMER CONCRETE COMPOSITES
J. J. Fontana, M. Steinberg, and W. Reams Aug. 1985 17 p
Presented at the American Concrete Institute Conference, Chicago, Ill., 29 Sep. - 4 Oct. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001734; BNL-37024; CONF-8509186-1) Avail: NTIS HC A02/MF A01

Lightweight polymer concrete composites have been developed with excellent insulating properties. The composites consist of lightweight aggregates such as expanded perlites, multicellular glass nodules, or hollow alumina silicate microspheres bound together with unsaturated polyester or epoxy resins. These composites, known as Insulating Polymer Concrete (IPC), have thermal conductivities from 0.09 to 0.19 Btu/h-ft-(0)F. Compressive strengths, dependent upon the aggregates used, range from 1000 to 6000 psi. These materials can be precast or cast-in-place on concrete substrates. Recently, it has been demonstrated that these materials can also be sprayed onto concrete and other substrates. An overlay application of IPC is currently under way as dike insulation at an LNG storage tank facility. The composites have numerous potentials in the construction industry such as insulating building blocks or prefabricated insulating wall panels. DOE

N86-25419*# Washington Univ., St. Louis, Mo. Center for Composites Research.
COMPRESSION FAILURE MECHANISMS OF COMPOSITE STRUCTURES Final Report, 1 Aug. 1982 - 31 Jul. 1985
H. Thomas Hahn, Mohsen Sohi, and Suresh Moon Washington NASA Jun. 1986 117 p refs
(Grant NAG1-295)
(NASA-CR-3988; NAS 1.26:3988; WU/CCR-85/5) Avail: NTIS HC A06/MF A01 CSCL 11D

An experimental and analytical study was conducted to delineate the compression failure mechanisms of composite structures. The present report summarizes further results on kink band formation in unidirectional composites. In order to assess the compressive strengths and failure modes of fibers them selves, a fiber bundle was embedded in epoxy casting and tested in compression. A total of six different fibers were used together with two resins of different stiffnesses. The failure of highly anisotropic fibers such as Kevlar 49 and P-75 graphite was due to kinking of fibrils. However, the remaining fibers--T300 and T700 graphite, E-glass, and alumina--failed by localized microbuckling. Compressive strengths of the latter group of fibers were not fully utilized in their respective composite. In addition, acoustic emission monitoring revealed that fiber-matrix debonding did not occur gradually but suddenly at final failure. The kink band formation in unidirectional composites under compression was studied analytically and through microscopy. The material combinations selected include seven graphite/epoxy composites, two graphite/thermoplastic resin composites, one Kevlar 49/epoxy composite and one S-glass/epoxy composite. Author

N86-25420*# National Aeronautics and Space Administration, Washington, D.C.
MANUFACTURE OF SINTERED SILICON NITRIDES
T. Iwai Oct. 1985 10 p Transl. into ENGLISH from Japanese Patent no. 5988373 (Appl. no. 58169291, 23 Apr. 1981) p 1-3 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-77927; NAS 1.15:77927) Avail: NTIS HC A02/MF A01 CSCL 11D

Sintered silicon nitrides are manufactured by sintering Si3N powder containing 2 to 15% in wt of a powder mixture composed of nitride powder of lanthanide or Y 100 parts and AlN powder less than 100 parts at 1500 to 1900 deg. temperature under a pressure of less than 200 Kg/sq. cm. The sintered Si3N has high mechanical strength in high temperature. Thus, Si3N4 93.0, Y 5.0 and AlN 2.0% in weight were wet mixed in acetone in N atom, molded and sintered at 1750 deg. and 1000 Kg/sq. cm. to give a sintered body having high hardness. Author

N86-25421# Naval Postgraduate School, Monterey, Calif.
A COMPARISON OF TWO METHODS FOR FIBER DIAMETER MEASUREMENT AND A SYSTEM DESIGN FOR THE STUDY OF COMPOSITE RELIABILITY M.S. Thesis
Thomas A. Bennett Dec. 1985 73 p refs
(AD-A164355) Avail: NTIS HC A04/MF A01 CSCL 11/4

This thesis involves the design and construction of an integrated fiber diameter measurement and strength test system for the purpose of conducting a study of the reliability of a composite material. The emphasis of this thesis is placed on the comparison of two methods of fiber diameter measurement using the light diffraction pattern formed by the obstruction of a laser beam by a fiber sample. GRA

N86-25422# California Univ., San Diego, La Jolla. Dept. of Applied Mechanics and Engineering.
A COMPOSITE PLATE THEORY FOR ARBITRARY LAMINATE CONFIGURATIONS Technical Report, Jul. 1984 - Dec. 1985
A. Toledano and H. Murakami Dec. 1985 35 p refs
(Contract N00014-84-K-0468)
(AD-A164370) Avail: NTIS HC A03/MF A01 CSCL 11/7

In order to improve the accuracy of in-plane responses of shear deformable composite plate theories, a new laminated plate theory was developed for arbitrary laminate configuration based upon Reissner's (1984) new mixed variational principle. To this end, across each individual layer, piecewise linear continuous displacements and quadratic transverse shear stress distributions were assumed. The accuracy of the present theory was examined by applying it to the cylindrical bending problem of laminated plates which had been solved exactly by Pagano (1969). A comparison with the exact solutions obtained for symmetric, antisymmetric and arbitrary laminates indicates that the present theory acurately estimates in-plane responses, even for small span-to-thickness ratios. Author (GRA)

N86-25423# California Univ., San Diego. Dept. of Applied Mechanics and Engineering.
A HIGH-ORDER MIXTURE MODEL FOR PERIODIC PARTICULATE COMPOSITES Technical Report, Jul. 1984 - Dec. 1985
A. Toledano and H. Murakami Dec. 1985 32 p refs
(Contract N00014-84-K-0468)
(AD-A164389) Avail: NTIS HC A03/MF A01 CSCL 11/4

A deterministic mixture theory is presented for periodic particulate composites. The model is constructed by introducing convenient microdisplacement and microstress variables and by using a regular asymptotic technique with multiple scales. Governing equations and appropriate boundary conditions are then deduced from Ressiner's mixed variational principle (1950). In order to test the accuracy of the present model, harmonic wave propagation is examined and compared with available experimental data for Glass/Epoxy and Steel/PMMA composites reported by Kinra and Ker (1983). Also, the effective elastic moduli are computed, and the results compared with other analytical methods. GRA

N86-25424# Dyna East Coast Corp., Philadelphia, Pa.
CUMULATIVE DAMAGE MODEL FOR ADVANCED COMPOSITE MATERIALS Final Technical Report, Aug. 1983 - Apr. 1985
A. S. D. Wang, Pei Chi Chou, Charles S. Lei, and Ronald B. Bucinell 15 Oct. 1985 278 p refs
(Contract F33615-80-C-4104)
(AD-A164392; AFWAL-TR-85-4104) Avail: NTIS HC A13/MF A01 CSCL 11/4

This report represents the details of a methodology in which cumulative damage in composite laminates is mathematically modeled. The basic concept adopted in the theoretical development is to regard the accumulation of damage in laminates as a

load and/or time dependent process. The process begins with the initiation of sublaminate cracks at locations where dominating material flaws exist. Under a sustaining load, the requirement of the model is to be able to describe the process as a function of loading history. In this research program, the cumulative damage model is developed from five stages of effort: numerical, experimental, theorization, simulation, and prediction/correlation. GRA

N86-25425# California Univ., San Diego. Dept. of Applied Mechanics and Engineering.
A HIGH-ORDER LAMINATED PLATE THEORY WITH IMPROVED IN-PLANE RESPONSES Technical Report, Jul. 1984 - Dec. 1985
A. Toledano and H. Murakami Dec. 1985 39 p refs
(Contract N00014-84-C-0468)
(AD-A164396) Avail: NTIS HC A03/MF A01 CSCL 11/4

In order to improve the accuracy of the in-plane responses of the shear deformable laminated composite plate theories, a new high-order laminated plate theory was developed based upon Reissner's new mixed Variational Principle. To this end, a zig-zag shaped C sub 0 function and Legendre polynomials were introduced into the approximate in-plane displacement distributions across the plate thickness. The accuracy of the present theory was examined by applying it to the cylindrical bending problem of laminated plates which had been solved exactly by Pagano. A comparison with the exact solutions obtained for several symmetric and asymmetric cross-ply laminates indicates that the present theory accurately estimates in-plane responses, even for small span-to-thickness ratio. Author (GRA)

N86-25426# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF SYMMETRIC REINFORCEMENT OF GRAPHITE/EPOXY HONEYCOMB SANDWICH PANELS WITH A CIRCULAR CUTOUT UNDER UNIAXIAL COMPRESSIVE LOADING
Patrick D. Sullivan Dec. 1985 343 p refs
(AD-A164490; AD-E900539) Avail: NTIS HC A15/MF A01 CSCL 11/4

An experimental and computational analysis was made of stress/strain concentrations around a reinforced circular 1.00 inch diameter circular cutout in HMF330C/34 (cloth) graphite/epoxy (G/Ep) and fiberglass/phenolic honeycomb sandwich panels under uniaxial compressive loading. The test specimens were 10.00 in. x 8.50 in., eight ply quasi-isotropic panels. The reinforcement consisted of either one or two additional G/Ep plies co-cured to the outside of each facesheet. Three general reinforcement configurations were considered: round, square and strips parallel to the applied load. The analytical results demonstrated that small amounts of reinforcement could greatly increase the strength-to-weight ratio. The indication was that concentrating the reinforcement close to the cutout yielded the greatest decrease in stress concentration. A computer program of experimental validation of the analytical results experienced some problems with premature panel failure caused by the facesheets separating from the core. It generally confirmed the analytical results, however. Further experimental tests on promising reinforcement configurations are justified based on these results. Properly designed reinforcement around cutouts in composite panels can significantly reduce the stress concentration and holds the promise of far lighter and stronger aerospace structures. Author (GRA)

N86-25427 Iowa Univ., Iowa City.
ANALYTICAL AND EXPERIMENTAL STUDY ON MICROPOLAR ELASTIC BEHAVIOR IN COMPOSITE MATERIALS Ph.D. Thesis
Hyun Chul Park 1985 154 p
Avail: Univ. Microfilms Order No. DA8527992

Micropolar elastic behavior of composite materials was investigated analytically and experimentally. A boundary value problem of torsion of a prismatical bar of square cross sections of a micropolar elastic solid was solved analytically and shear strain was computed as a function of position on the lateral surfaces of the bar based on the analytic solution. Warping of the square cross section was found to differ from the warp in the classically elastic solid. Contrary to the classical case, a nonzero shear strain was predicted to occur at the edge of the bar. Elastic shear strain was measured by means of strain gage rosette on the surface of human femoral compact bone as a function of position subjected to twisting moment. The torsional creep of human compact bone was performed while immersed in Ringer's solution. In the study of elastic modulus of bone particle impregnated PMMA, the modulus of elasticity was measured experimentally. The results showed that the modulus increased with bone particle concentration. Dissert. Abstr.

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-25428* National Aeronautics and Space Administration. Pasadena Office, Calif.
SOLAR HEATED OIL SHALE PYROLYSIS PROCESS Patent
Shaik A. Qader, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) Issued 15 Apr. 1985 7 p Filed 23 Jul. 1984 Sponsored by NASA
(NASA-CASE-NPO-16392-1; US-Patent-4,582,590; US-Patent-Appl-SN-633363; US-Patent-Class-208-11; US-Patent-Class-48-197-R; US-Patent-Class-8-DIG.9) Avail: US Patent and Trademark Office CSCL 07D

An improved system for recovery of a liquid hydrocarbon fuel from oil shale is presented. The oil shale pyrolysis system is composed of a retort reactor for receiving a bed of oil shale particules which are heated to pyrolyis temperature by means of a recycled solar heated gas stream. The gas stream is separated from the recovered shale oil and a portion of the gas stream is rapidly heated to pyrolysis temperature by passing it through an efficient solar heater. Steam, oxygen, air or other oxidizing gases can be injected into the recycle gas before or after the recycle gas is heated to pyrolysis temperature and thus raise the temperature before it enters the retort reactor. The use of solar thermal heat to preheat the recycle gas and optionally the steam before introducing it into the bed of shale, increases the yield of shale oil. B.G.

N86-25429*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MASS SPECTROMETRIC GAS COMPOSITION MEASUREMENTS ASSOCIATED WITH JET INTERACTION TESTS IN A HIGH-ENTHALPY WIND TUNNEL
Beverley W. Lewis, Kenneth G. Brown (Old Dominion Univ., Norfolk, Va.), George M. Wood, Jr., Richard L. Puster, Patricia A. Paulin, Charles E. Fishel, and D. Alan Ellerbe Jun. 1986 33 p refs
(NASA-TM-87642; L-16074; NAS 1.15:87642) Avail: NTIS HC A03/MF A01 CSCL 07D

Knowledge of test gas composition is important in wind-tunnel experiments measuring aerothermodynamic interactions. This paper describes measurements made by sampling the top of the test section during runs of the Langley 7-Inch High-Temperature Tunnel. The tests were conducted to determine the mixing of gas injected from a flat-plate model into a combustion-heated hypervelocity test stream and to monitor the CO_2 produced in the combustion. The Mass Spectrometric (MS) measurements yield the mole fraction of N_2 or He and CO_2 reaching the sample inlets. The data obtained for several tunnel run conditions are related to the pressures measured in the tunnel test section and at the MS ionizer inlet. The apparent distributions of injected gas species and tunnel gas (CO_2) are discussed relative to the sampling techniques. The measurements provided significant real-time data for the distribution of injected gases in the test section. The jet N_2 diffused readily from the test stream, but the jet He was mostly entrained. The

amounts of CO2 and Ar diffusing upward in the test section for several run conditions indicated the variability of the combustion-gas test-stream composition. Author

N86-25430# Mound Lab., Miamisburg, Ohio.
ANALYSIS OF HYDROGEN GETTER MIXTURES
D. W. Firsich and R. O. Yelton 1985 3 p Presented at the 13th Department of Energy (DOE) Compability Meeting, 1985
(Contract DE-AC04-76DP-00053)
(DE86-003450; MLM-3311(OP); CONF-8510232-3) Avail: NTIS HC A02/MF A01

Acetylenic compounds are used to scavenge hydrogen in some weapons applications. Such compounds are screened for their suitability by reacting them with hydrogen and analyzing the products. Sometimes the reactions produce an oily product, an undesirable result because of the contamination potential of an oil. DD-31 and MTU-9 are the names of mixtures which are products of the type of screening test mentioned above. DD-31 and MTU-9 were produced at Sandia; the former is solid in appearance, while the latter is an oily mixture. The object of this study was to rationalize the different physical states of these mixtures, and to identify as many of the components as possible in each sample. In addition to structural characterization, it was desirable to determine whether each component was a solid or an oil. DOE

N86-25431*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IGNITION DELAY TIMES OF BENZENE AND TOLUENE WITH OXYGEN IN ARGON MIXTURES
Alexander Burcat (Israel Inst. of Tech., Haifa.), Christopher Snyder, and Theodore Brabbs May 1985 15 p refs
(NASA-TM-87312; E-3041; NAS 1.15:87312) Avail: NTIS HC A02/MF A01 CSCL 20B

The ignition delay times of benzene and toluene with oxygen diluted in argon were investigated over a wide range of conditions. For benzene the concentration ranges were 0.42 to 1.69 percent fuel and 3.78 to 20.3 percent oxygen. The temperature range was 1212 to 1748 K and the reflected shock pressures were 1.7 to 7.89 atm. Statistical evaluation of the benzene experiments provided an overall equation which is given. For toluene the concentration ranges were 0.5 to 1.5 percent fuel and 4.48 to 13.45 percent oxygen. The temperature range was 1339 to 1797 K and the reflected shock pressures were 1.95 to 8.85 atm. The overall ignition delay equation for toluene after a statistical evaluation is also given. Detailed experimental information is provided. Author

N86-25432*# National Aeronautics and Space Administration, Washington, D.C.
METHOD FOR PRODUCING TETRAPHENOXIDE-N-ANILOXY CYCLO PHOSPHAZOTRIENE
Ye. I. Khofbauer and V. G. Kolesnikov May 1986 6 p Transl. into ENGLISH from Russian Patent no. 320498 (24 Jan. 1972) 6 p Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88430; NAS 1.15:88430) Avail: NTIS HC A02/MF A01 CSCL 07D

A method for producing tetraphenoxide-n-aniloxy cyclophosphazotriene, distinguished by the fact that tetraphenoxide dichlorocyclophosphazotriene is processed with an alkaline metal n-acetamidophenolate in an organic solvent, for example pyridine, during heating, after which the resulting compound is saponified in the presence of a mineral or organic acid, for example, hydrochloric, and the desired product separated by well known techniques. Author

N86-25433# Morgan State Univ., Baltimore, Md.
MOSSBAUER INVESTIGATION OF INTERMETALLIC HYDRIDES Final Report, 1 Nov. 1982 - 31 Oct. 1985
Frederick W. Oliver and Windsor Morgan 21 Dec. 1985 6 p refs
(Grant DAAG29-83-G-0001)
(AD-A163762; ARO-19957.3-PH-H) Avail: NTIS HC A02/MF A01 CSCL 07/4

This research was a study of hydrogen absorption in intermetallic hydrides. Mossbauer and X-ray diffraction measurements were used to aid in a determination of the hydrogen absorbing mechanism occurring in hydriding. Information was sought which would provide insight into the nature of bonding and interaction between the absorbed hydrogen and the various sites in the intermetallics. We were also interested in observing what happened to Sn in intermetallic compounds when hydrided. Studies were made of the changes in isomer shift and linewidth upon hydriding. GRA

N86-25434# Polytechnic Inst. of New York, Farmingdale. Dept. of Chemistry.
INFRARED AND ULTRASONIC SPECTRA OF SODIUM THIOCYANATE AND LITHIUM THIOCYANATE IN TETRAHYDROFURAN
D. Saar and S. Petrucci Jan. 1986 29 p refs
(Contract DAAG29-85-K-0051)
(AD-A163765; ARO-21758.4-CH) Avail: NTIS HC A03/MF A01 CSCL 07/4

Infrared spectra of sodium thiocyanate solutions and of lithium thiocyanate solutions in tetrahydrofuran (THF) in the wavenumber range 2000 to 2200/cm are reported. The digitized spectral envelope, which is due to the out of phase stretch of the SCN anion, is quantitatively described by the sum of three Gaussian-Lorentzian product functions. The three spectral bands are assigned respectively to the N-bonded pairs (approx. 2057/cm for NaNCS, approx. 2064/cm for LiNCS), to the dimers or quadrupoles (approx. 2043/cm for (NaNCS)2), 2040/cm for (LiNCS)2, and tentatively to triple ions (2074/cm for sodium thiocyanate, approx. 2086/cm for lithium thiocyanate). The maximum absorbances per unit length of cell are expressed as a function of concentrations by cubic polynomial functions. Ultrasonic spectra for sodium thiocyanate solutions in the THF in the frequency range 0.5 to 400 MHz are described by the sum of two Debye relaxation functions. For lithium thiocyanate solutions in the THF, the ultrasonic spectra are described by a single Debye relaxation function. GRA

N86-25435# University of Southern California, Los Angeles. Dept. of Mechanical Engineering.
TRANSIENT COMBUSTION DYNAMICS Final Report, 1 Jun. 1982 - 31 May 1985
P. R. Choudhury, Melvin Gerstein, and Reza Mojaradi 22 Oct. 1985 44 p refs
(Grant AF-AFOSR-0222-82)
(AD-A163997; AFOSR-85-1236TR) Avail: NTIS HC A03/MF A01 CSCL 21/2

Many dump combustors exhibit low frequency longitudinal combustion instability in the frequency range of 80 to 300 hz. Although the exact causes of combustion instability are not known precisely, it is generally accepted that the interaction of the shock induced pressure pulsation and the coherent vortex shedding at the dump plane induces combustion instability. During this study a characteristic system frequency associated with sudden expansion steps and a resulting coherent beat phenomenon have been identified. It is also shown that combustion oscillation can occur when the induced forced frequency is approximately equal to the mean of the beat frequency. When the coherence of the shear layer at the dump plane is disrupted either by gasjets or by upstream protrusions the effect of combustion instability is found to be minimized. The control system suggested in this report is based upon the idea of disrupting the shear layer at the dump plane by means of pulsing gasjets. The control system senses the critical combination of frequency, amplitude and phase angle upstream of the combustor and actuates the gasjets at the dump plane at an appropriate combination of frequency, amplitude and phase angle to partially negate the effect of upstream pressure pulsation. Experiments in two laboratory scale dump combustors using premixed propane-air mixtures show the feasibility of reducing chamber pressure amplitude by such a technique. GRA

N86-25436# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
THE SPECTROSCOPY AND REACTION KINETICS OF COORDINATED UNSATURATED METAL CARBONYLS Annual Report, Oct. 1984 - Oct. 1985
Eric Weitz 20 Oct. 1985 49 p refs
(Grant AF-AFOSR-0372-83)
(AD-A164003; AFOSR-86-0032TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line tunable CO laser to record spectral and kinetic information by means of probing absorptions in the CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe(CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are briefly discussed. GRA

N86-25437# Advanced Mechanical Technology, Inc., Newton, Mass.
DEVELOPMENT OF A MODEL FOR HOT-SURFACE IGNITION OF COMBUSTIBLE LIQUIDS Final Report, Oct. 1983 - May 1984
Elia P. Demetri and B. F. White Dec. 1985 80 p refs
(Contract F33615-83-C-2380)
(AD-A164057; AFWAL-TR-85-2090) Avail: NTIS HC A05/MF A01 CSCL 21/2

There are many military systems requiring the storage and use of combustible liquids which can accidentally contact a hot surface resulting in a potential fire or explosion hazard. The optimum design of appropriate safety measures is severely hampered by the fact that the thermal ignition of liquids is not well understood. A research study has been conducted to develop and experimentally verify a model of the hot-surface ignition phenomenon for combustible liquids. A large number of parametric tests have been performed to measure surface ignition temperature and delay time for a wide variety of conditions. A simple analytical model has been derived and successfully applied in correlating the experimental data. The results obtained in the study demonstrate the utility of the analytical and experimental techniques which have been developed. GRA

N86-25438# Texas Southern Univ., Houston.
THE STUDY OF SOME EARLY TRANSITION METALS IN OXIDATION STATE 4 USING THE POTASSIUM POLY(PYRAZOLYL) BORATES AS LIGANDS Final Report, 22 Sep. 1980 - 16 Sep. 1985
Bobby L. Wilson 11 Oct. 1985 7 p refs
(Grant DAAG29-80-G-0006)
(AD-A164074; ARO-17759.1-CH-H) Avail: NTIS HC A02/MF A01 CSCL 07/4

The primary purpose of this investigation was to gain a better understanding of the fundamental chemistry of the early transition elements in their high oxidation states. The work involved the preparation and characterization of titanium, zirconium and hafnium poly(pyrazolyl) borate complexes with emphasis on the structure, mode of bonding and magnetic behavior of these complexes. GRA

N86-25439# Rochester Univ., N. Y. Dept. of Chemistry.
STEREOSELECTIVE OXIDATIVE ADDITION OF HYDROGEN TO IRIDIUM(I) COMPLEXES. KINETIC CONTROL BASED ON LIGAND ELECTRONIC EFFECTS
Curtis E. Johnson and Richard Eisenberg 20 Jan. 1986 37 p refs
(Contract N00014-83-K-0154)
(AD-A164235; TR-7) Avail: NTIS HC A03/MF A01 CSCL 07/4

The oxidative addition of H2 to the iridium(I) chelates IrX(CO)(dppe) (X(-) = Cl(-), Br(-), I(-), Cn(-), H(-), PPh3; dppe = 1, 2-bis-(diphenylphosphino)ethane) proceeds with > 99% stereoselectivity to yield a cis dihydride product with one hydride trans to P(dppe) and the other hydride trans to CO. For X = Cl, Br, and I, the kinetic product of formula IrH2X(CO)(dppe) equilibrates with a more stable cis isomer which has one hydride trans to P and the other trans to X (K sub eq = 41, 35, and 13, respectively). The stereochemical assignments based on chemical shifts of the hydride ligands are confirmed by single crystal X-ray diffraction analysis of the thermodynamic isomer for X = Br. The complex IrH2Br(CO)(dppe) crystallizes in an orthorhombic space group. The isomerization reaction between the two dihydride isomers was studied mechanistically in acetone and benzene solvents. In acetone, the isomerization of IrH2Br(CO)(dppe) proceeds with first-order kinetics in iridium complex (k = 0.011/min), and the mechanism likely involves a two step H2 reductive elimination/oxidative addition process. For X = CN, the kinetic dihydride isomer is the most stable isomer, but it does thermally equilibrate with two other isomers. For X(-) = H(-) or PPh3, only a single isomer is observed and it appears to be the most stable isomer. The stereoselectivity of D2 oxidative addition for X = H is established by generating the reactive species IrH(CO)(dppe) in situ by dehydrohalogenation of IrH2. GRA

N86-25440# California Univ., Santa Barbara.
PICOSECOND PHOTOCONDUCTIVITY IN TRANS-POLYACETYLENE Technical Report, Jul. - Dec. 1985
M. Sinclair, D. Moses, and A. J. Heeger 4 Feb. 1986 16 p refs
(Contract N00014-85-K-0098)
(AD-A164373; TR-2) Avail: NTIS HC A02/MF A01 CSCL 07/5

Fast transient photoconductivity measurements of trans-polyacetylene as a function of temperature and photon energy indicate a relatively high quantum efficiency for the photoproduction of mobile, charged, nonlinear excitations. Excitation by a 20ps pulse at 590nm with 10 to the 15th power photons/sq cm results in a transient photoconductivity of approx. 0.3 S/cm (at 50 ps) with time scale for decay similar to that measured in picosecond photoinduced absorption experiments. The temperature independence of the fast photoconductivity is interpreted in terms of the photoproduction of hot soliton excitations. GRA

N86-25441# Naval Postgraduate School, Monterey, Calif.
PARAMETRIC ANALYSIS OF COMBUSTION OF POROUS MEDIUM M.S. Thesis
Antonio C. S. Serapiao Dec. 1985 136 p refs
(AD-A164488; AD-E900539) Avail: NTIS HC A07/MF A01 CSCL 21/2

A computer program for a transient one dimensional mathematical model of combustion in porous medium was used to investigate the effect of medium thickness, permeability and reaction order on combustion. In addition, the effect of heat input on combustion was also studied. GRA

N86-25442# Naval Postgraduate School, Monterey, Calif.
ANALYSIS OF COMBUSTION OF A POROUS MEDIUM M.S. Thesis
Do Sung Park Dec. 1985 61 p refs
(AD-A164491; AD-E900539) Avail: NTIS HC A04/MF A01 CSCL 21/2

A numerical analysis of a heat transfer and combustion model for a porous medium within a circular cylinder is carried out. The basic mechanisms considered in the theory are: a carbon energy conservation equation, energy balance on the air, and an oxygen mass balance equation, energy balance on the air, and an oxygen mass balance equation. Heat transfer mechanisms included in the model are conduction, convection, and radiation. A heat generation term arising from combustion of the carbon is included in the model. Transport mechanisms for oxygen mass transfer are molecular diffusion and convective transport. The governing heat and mass transfer equations are solved numerically by the Galerkin formulation of the Finite Element Method. The results show the effects of permeability, porosity, geometry and initial condition on the behavior of the system. GRA

N86-25443# Los Alamos National Lab., N. Mex.
THEORETICAL STUDIES OF THE C4 MOLECULE
J. P. Ritchie, H. F. King, and W. S. Young 1985 13 p refs Presented at the NATO Advanced Study Inst.: Advances in Chemical Reaction Dynamics, Iraklion, Crete, 25 Aug. 1985 Prepared in cooperation with State Univ. of New York, Buffalo
(Contract W-7405-eng-36)
(DE86-002429; LA-UR-85-3846; CONF-8508119-2) Avail: NTIS HC A02/MF A01

Optimized geometries and relative energies for three states of the C4 molecule have been obtained from single-reference configuration interaction (SRCI) calculations. At the SRCI level, a rhombic form is calculated to lie 1.1 kcal below the triplet form; consideration of the Davidson correction reduces this difference to 0.4 kcal, while more complete basis sets are expected to increase the difference only by about 0.2 kcal. Consideration of these effects and difference in zero-point energy leads to a final estimated splitting of 1.2 kcal, favoring the rhombus. To aid the determination of the ground state, preliminary estimates of the lowest optical transitions were obtained from SRCI calculations and vibrational frequencies were obtained from SCF calculations. Comparison of the calculated results with experimentally obtained spectra suggest the possibility that both the linear triplet and the rhombus may have already been observed. DOE

N86-25444# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
ALUMINUM, BORON AND MERCURY MEASUREMENT VIA ION-EXCHANGE
S. L. Maxwell, III 15 Apr. 1986 7 p refs Presented at the 28th Oak Ridge National Lab. Conference on Analytical Chemistry, Knoxville, Tenn., 1 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-003147; DP-MS-85-66; CONF-8510151-13) Avail: NTIS HC A02/MF A01

The accurate measurement of aluminum, boron, and mercury in process dissolver solutions at the Savannah River Plant (SRP) is important. Costs for the processing of non-SRP uranium fuels are based in part on the measured aluminum content of the fuel. Boron is a nuclear safety control in some dissolutions and mercury (II) is a catalyst in the dissolution of uranium-plutonium oxide fuels. In analyses, ion exchange is used for selective separations and for removing high activity constituents in dissolver solutions prior to measurement via direct current argon plasmas (DCAP) spectrometry. Aluminum is separated via anion exchange using oxalate-hydrochloric acid mixtures, boron is separated via cation exchange using 0.05 M nitric acid, and mercury (II) is separated via cation exchange using 40% ethanol-0.2 M hydrochloric acid. The aluminum content is measured with a precision of better than + or - 1.0% (RSD) using gravimetric dilutions and sample measurements bracketted by standard measurements. Boron and mercury are measured with a precision of better than + or - 3.0% (RSD) using volumetric dilutions. DOE

N86-25445# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
FORCED SMOLDER PROPAGATION AND THE TRANSITION TO FLAMING IN CELLULOSIC INSULATION Final Report
T. J. Ohlemiller Oct. 1985 50 p refs Sponsored in part by DOE
(PB86-166659; NBSIR-85/3212) Avail: NTIS HC A03/MF A01 CSCL 21B

A smoldering fuel responds to an increased oxygen supply by becoming faster and hotter until, eventually, flames erupt. This sequence is examined quantitatively for thick horizontal layers of a permeable fuel, i.e., cellulosic insulation. Two configurations are possible, forward and reverse smolder; both are investigated experimentally. The influence of combustion retardants is also investigated; these include boric acid, a smolder retardant; and borax, a flaming retardant. Both prevent the transition to flaming in the absence of adjacent flammable material but are less effective in its presence. The overall response of these various fuel mixtures and configurations suggests that both kinetics and oxygen supply rate (not the latter alone) play substantial roles in dictating smolder response to an air flow. GRA

N86-25446# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
X-RAY OPTICS AND MICROANALYSIS. TRANSACTIONS OF THE INTERNATIONAL CONFERENCY (8TH) ON X-RAY OPTICS AND MICROANALYSIS HELD AT MOSCOW-KIEV ON JULY 9-16, 1974
I. B. Borovskii and N. I. Komyak 1985 460 p refs Transl. into ENGLISH of mono. "Optika Rentgenovskikh Luchei i Mikroanaliz" Leningrad, USSR, Mashinostroenie, 1976 Conference held in Moscow-Kiev, USSR, 9-16 Jul. 1974 Sponsored by NSF Prepared for National Bureau of Standards, Gaithersburg, Md.
(PB86-155173; TT-81-52155) Avail: NTIS HC A20/MF A01 CSCL 07D

Over the past decade, many new localized techniques have come into use, such as the method of secondary ion emission, x-ray photoelectron spectroscopy, electron spectroscopy in solutions, spectroscopy at threshold potentials, x-ray spectral probe microanalysis, etc. A high resolution in depth, which varies between 0.2-0.5 and 4-5 nm, is characteristic of all these methods. The volume includes articles presented at the VII International Conference on X-RAY Optics and Microanalysis by leading Soviet and foreign scientists. It covers a wide range of problems relating to the technique of quantitative localized analysis and presents the results of practical application of localized methods in metal physics, physical metallurgy, mineralogy and in the study of semiconductors. It contains a number of articles devoted to the principles of designing instruments for localized analysis. GRA

N86-25447# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
LITERATURE REVIEW OF THE CHEMICAL NATURE AND TOXICITY OF THE DECOMPOSITION PRODUCTS OF POLYETHYLENES
M. Paabo and B. C. Levin Jan. 1986 68 p refs Sponsored by Consumer Product Safety Commission, Bethesda, Md.
(PB86-163409; NBSIR-85/3268) Avail: NTIS HC A04/MF A01 CSCL 07D

The literature on polyethylenes has been reviewed with an emphasis on the identification of gaseous products generated under various thermal decomposition conditions and the toxicity of those products. The review is limited to publications in English through 1984. The analytical chemical studies of the thermal decomposition products generated under vacuum, inert and oxidative experimental conditions are described. In oxidative atmosphere, which most closely simulate real fire conditions, carbon monoxide (CO) was found to be the predominant toxicant. Acrolein was another toxicant often noted in these reviewed studies. More acrolein was generated under non-flaming than under flaming conditions. Results from seven different test procedures were considered in assessing the acute inhalation toxicity of combustion products from various polyethylene formulation. The combustion products generated from the polyethylenes studied in the non-flaming mode appeared to be slightly more toxic than those produced in the flaming mode. GRA

N86-25448# Natioanl Center for Toxicological Research, Jefferson, Ark.
HIGH-FIELD NMR (NUCLEAR MAGNETIC RESONANCE) FOR STRUCTURAL ANALYSIS OF COMPLEX POLYCYCLIC AROMATIC HYDROCARBONS Final Report
F. E. Evans and D. W. Miller Mar. 1985 17 p
(PB86-150653; NCTR-6077; FDA/NCTR-86/56) Avail: NTIS HC A02/MF A01 CSCL 07D

High-field NMR for structural analysis of complex polycyclic aromatic hydrocarbons 1H nuclear magnetic resonance (NMR) spectroscopy measurements were carried out at 270 MHz on several polycyclic aromatic hydrocarbons (PAHs) and their metabolites and on aromatic amine derivative. Several new NMR techniques were tested and found to be applicable to spectral analysis and structure elucidation. The 500 MHz NMR spectra exhibited a high level of peak dispersion. The combination of high

field measurements with resolution enhancement techniques resulted in considerable resolvable fine structure in the NMR spectra, due to long-range coupling constants. The analysis of long-range coupling, with the aid of homonuclear decoupling, demonstrated that long-range coupling constant data provide a practical approach to structural studies of PAHs and aromatic amines in general. Nuclear Overhauser effect (NOE) difference spectra are shown to provide an alternative method of spectral analysis, which is complementary to the coupling constant data. GRA

N86-25449# United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
CHARACTERISATION BY RAMAN SPECTROSCOPY OF OXIDE SCALES FORMED ON A 20%Cr/25%Ni/NIOBIUM STABILISED STAINLESS STEEL
W. A. England, M. F. Bennett, D. A. Greenhaigh, S. N. Jenny, and C. F. Knights May 1985 20 p refs
(AERE-R-11816; AGR/FPWG/P(85)675) Avail: Issuing Activity

Laser Raman Spectroscopy (LRS) was used to examine the composition of 0.3 to 2 micron thick scales formed on the 20%Cr/25%Ni/Nb (20/25/Nb) stabilized stainless steel during oxidation, at 600 to 950 C, in CO_2 and in CO_2 + 4%/Co + 350 vpm CH_4 + 300 vpm H_2. All the scales contained iron rich spinel oxides, except in carbon dioxide at 600 C, where Fe_2O_3 predominated. This difference was responsible for the greater attack of the 20/25/Nb stainless steel at 600 C in carbon dioxide than in the mixed gas environment. At 800 and up the spinel composition was modified by manganese incorporation and Cr_2O_3 was also a major constituent of the scales formed in both environments. The major scale constituents identified by LRS are both in accordance with thermodynamic predictions and understanding of scale development on the 20/25/Nb steel. E.A.K.

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-25450 British Library Lending Div., Boston Spa (England).
PERFECTING ECONOMIC METHODS OF CONTROLLING THE QUALITY OF METAL FOR IMPORTANT APPLICATIONS
I. I. Ivanov and N. I. Astakhova 1986 11 p refs Transl. into ENGLISH from Izvestiya VUZ, Chernaya Metall. (USSR), no. 9, 1981 p 145-150
(BLLD-5828.4-M-36674) Avail: British Library Lending Div., Boston Spa, Engl.

The effectiveness for the national economy of the USSR of producing and using metal of improved quality, particularly steels and alloys obtained with the use of electroslag and other remelting processes, is considered. This effectiveness can be substantially raised by improving the planning and pricing system. A better pattern of utilization of steels and alloys with allowance for changes in the user properties of the products would also help. Author

N86-25451 British Library Lending Div., Boston Spa (England).
CONTROLLING THE AUSTENITE GRAIN IN A HIGH SPEED STEEL
S. G. Morozenko, B. E. Natapov, L. D. Moshkevich, and V. M. Ryabkina 1986 6 p Transl. into ENGLISH from Stal (USSR), no. 9, 1985 p 74
(BLLD-5828.4-M-36652) Avail: British Library Lending, Boston Spa, England

Details are given for using the Schneider-Graf method of calculating the number of grain intersections on matt microscope glass (or micro-photographs) in different lengths with different magnifications; the data are plotted as a nomogram. The results provided are compared with those obtained by other methods. It is concluded that the method of comparison with the GOST 5639-82 scales can normally be used, but that in cases of argument or of metal for export the Schneider-Graf method should be used. Author

N86-25452 British Library Lending Div., Boston Spa (England).
INFLUENCE OF ATMOSPHERE ON TITANIUM OXIDATION LOSSES DURING ALLOYING OF STAINLESS STEEL WITH TITANIUM
G. O. Neigebauer, A. N. Naboko, and N. A. Rozhkova 1986 4 p ref Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 8, 1985 p 149-150
(BLLD-5828.4-M-36640) Avail: British Library Lending, Boston Spa, England

The influence of atmosphere on oxidation losses of titanium was assessed in comparative laboratory tests on ladle alloying of stainless steel 08-12Kh18N10T with ground 70% ferrotitanium in an air atmosphere (open ladle) and an argon atmosphere (closed ladle). Author

N86-25453*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TENSILE BEHAVIOR OF Fe-40Al ALLOYS WITH B AND Zr ADDITIONS
Darrell J. Gaydosh and Michael V. Nathal 1986 27 p refs Presented at the 1986 TMS-AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986
(NASA-TM-87290; E-2997; NAS 1.15:87290) Avail: NTIS HC A03/MF A01 CSCL 11F

Both Fe-40Al and Fe-40Al-0.1Zr with and without B were produced by the hot extrusion of powdered metal. Tensile properties were determined from room temperature to 1100 K in air. All of the materials possessed some ductility at room temperature, and addition of B caused an increase in ductility and a change in fracture mode from intergranular to transgranular cleavage. At high temperatures, failure was caused primarily by the formation of grain boundary cavities in all of the alloys. The effect of Zr addition was unclear because of the complexity of the various microstructures. Comparison of air and vacuum testing at high temperatures revealed that an apparent oxidation assisted mechanism reduced high temperature ductility in these alloys, especially at 900 K. Author

N86-25454*# Pennsylvania State Univ., University Park. Dept. of Engineering Science and Mechanics.
AXIAL AND TORSIONAL FATIGUE BEHAVIOR OF WASPALOY Final Report
S. Zamrik, M. Mirdamadi, and F. Zahiri Apr. 1986 27 p
(Grant NAG3-264)
(NASA-CR-175052; NAS 1.26:175052; USAAVSCOM-TR-86-C-14) Avail: NTIS HC A02/MF A01 CSCL 11F

The cyclic flow response and crack growth behavior of Waspaloy at room temperature and 650 C under tensile loading and torsional loading was studied, for two conditions of Waspaloy: fine grain, large gamma prime size; coarse grain, small gamma prime size. The fine grain material showed 5 to 10 percent hardening after about 10 percent of life, with sequent softening to failure at both themperature levels. The coarse grain material showed either stable response or monotonic softening to failure. Early crack initiation was observed on planes of maximum shear, with eventual branching to principle planes under torsional loading; cracks were always normal to load axis under tensile loading. Also, crack paths were intergranular at 650 C, mostly transgranular at room temperature. Author

N86-25455*# Georgia Inst. of Tech., Atlanta. School of Materials Engineering.
YIELDING AND DEFORMATION BEHAVIOR OF THE SINGLE CRYSTAL NICKEL-BASE SUPERALLOY PWA 1480
Walter W. Milligan, Jr. May 1986 96 p refs
(Grant NAG3-503)
(NASA-CR-175100; NAS 1.26:175100; USAAVSCOM-TR-86-C-18) Avail: NTIS HC A05/MF A01 CSCL 11F

Interrupted tensile tests were conducted to fixed plastic strain levels in < 100 > ordered single crystals of the nickel based

superalloy PWA 1480. Testing was done in the range of 20 to 1093 C, at strain rate of 0.5 and 50%/min. The yield strength was constant from 20 to 760 C, above which the strength dropped rapidly and became a stong function of strain rate. The high temperature data were represented very well by an Arrhenius type equation, which resulted in three distinct temperature regimes. The deformation substructures were grouped in the same three regimes, indicating that there was a fundamental relationship between the deformation mechanisms and activation energies. Models of the yielding process were considered, and it was found that no currently available model was fully applicable to this alloy. It was also demonstrated that the initial deformation mechanism (during yielding) was frequently different from that which would be inferred by examining specimens which were tested to failure. Author

N86-25456# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELEVATED TEMPERATURE PROPERTIES OF CAST ALUMINUM ALLOYS A201-T7 AND A357-T6 Final Report, Dec. 1982 - Dec. 1984
J. D. Tirpak Nov. 1985 52 p refs
(AD-A163487; AFWAL-TR-85-4114) Avail: NTIS HC A04/MF A01 CSCL 11/6

The tensile, fatigue, fracture toughness, and fatigue crack growth properties of cast aluminum alloys A201-T7 and A357-T6 were evaluated at 250 F and 400 F. The tensile strength of A201-T7 decreased slightly at 250 F and dropped markedly at 400 F. The A201-T7 elongation increased as temperature increased. The tensile strength of A357-T6 decreased as test temperature increased. A357-T6 ductility increased then decreased as temperature increased. Valid fracture toughness values were difficult to obtain for both alloys. A201-T7 had an average K sub Ic of 22.3 ksi in at 250 F and an average K sub Q of 25.0 ksi in at 400 F. For A357-T6 K sub Q values were 27.5 ksi in and 18.1 ksi in at 250 F and 400 F, respectively. Constant load amplitude fatigue strength decreased for both alloys. At low Ks, fatigue crack growth resistance decreased as test temperature increased. GRA

N86-25457# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
A STUDY INTO THE MECHANISM(S) FOR THE ELECTRO-PLASTIC EFFECT IN METALS AND ITS APPLICATION TO METALWORKING Final Report, 1 May 1981 - 31 Oct. 1985
Hans Conrad 31 Dec. 1985 74 p refs
(Contract DAAG29-81-K-0075)
(AD-A163785; ARO-18184.12-MS) Avail: NTIS HC A04/MF A01 CSCL 11/6

High density (approx. 100,000 A/sq. cm.) d.c. current pulses (approx. 100 microsec) produced a marked decrease in the flow stress of polycrystalline metals (Al, Cu, Ni, Fe, Nb, W, Ti) tested in tension and in the force to draw Cu wire. A significant fraction of the decrease in stress or force could be attributed to drift electron-dislocation interactions, a major component of which was an electron wind with a push coefficienct of approx. 0.0001 dyn-sec/sq. cm. High density current pulses also enhanced the rates of sintering Al powder compacts, the recovery, recrystallization and grain growth of Cu and grain growth in Ti. In addition, the current pulses reduced the annealing twin frequency in Cu and sharpened the grain size distribution in Ti. No significant effect of current pulses on H-embrittlement of Fe at 300K was found. A continuous d.c. current of 650 A/sq. cm. retarded the tempering rate of a hardened tool steel. On the other hand, no changes were noted in the fatigue life of 316 stainless steel for continuous currents of 10 to 100 A/sq.cm., nor in the annealing behavior of Cu for currents of 200 to 3100 A/sq.cm. The deformation kinetics of Nb single crystals in the normal state were determined over the temperature range of 4.2 to 300K, employing a magnetic field at temper atures below 10K to retain the normal state. The results led to the conclusion that the rate controlling mechanism was thermally-activated overcoming of the Peierls hills by the nucleation and migration of kink-pairs on screw dislocations, the kink-pair energy for Nb being 0.66 ev. GRA

N86-25458# Georgia Univ., Athens.
METAL CLUSTER TOPOLOGY. PART 4: RHODIUM CARBONYL CLUSTERS HAVING FUSED POLYHEDRA
R. B. King 29 Jan. 1986 32 p refs
(Contract N00014-84-K-0365)
(AD-A164218; TR-18) Avail: NTIS HC A03/MF A01 CSCL 07/3

Previously discussed topological models of metal cluster bonding are now extended to the treatment of anionic rhodium carbonyl clusters having structures consisting of fused polyhedra. Examples of such rhodium carbonyl clusters built from fused octahedra include the biphenyl analogue Rh12(CO)30(-2), the face-sharing naphthalene analogue Rh9(CO)19(3-), and the perinaphthene analogue, Rh11(CO)23(3-). More complicated anionic rhodium carbonyl clusters discussed include the Rh13(CO)24H5-q (q-) anions (q = 2,3,4) having an Rh13 centered cuboctahedron, the Rh14(CO)25H4-q(q-) (q = 3,4) and Rh14(CO)26(2-) anions based on a centered pentacapped cube, the Rh15(CO)30(3-) anion having an Rh15 centered 14-vertex deltahedron, the Rh15(CO)27(3-) anion having a tricapped centered 11-vertex polyhedron, the Rh17(CO)30(3-) anion having a tetracapped centered cuboctahedron, and the Rh22(CO)37(4-) anion having a hexacapped centered cuboctahedron fused to an octahedron so that the octahedron and the cuboctahedron share a triangular face. Analyses of the bonding topologies in Rh9(CO)19(3-), Rh17(CO)30(3-), and Rh22(CO)37(4-) indicate that a polyhedral network containing several fused globally delocalized polyhedral chambers will not necessarily have a multicenter core bond in the center of each such polyhedral chamber. This observation is of potential importance in extending topological models of metal cluster bonding to bulk metals. GRA

N86-25459# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE INFLUENCE OF MICROSTRUCTURE ON THE STRENGTH AND TOUGHNESS AND THE FATIGUE CRACK PROPAGATION IN CrWMn STEELS
Litong Huang and Yunbo Chen 24 Jan. 1986 23 p refs Transl. into ENGLISH from Jin Shu Re Chu Li (China), no. 2, 1984 p 22-30
(AD-A164312; FTD-ID(RS)T-1156-85) Avail: NTIS HC A02/MF A01 CSCL 11/6

In this paper, we describe the interrelation between the microstructures of CrWMn high carbon steels of cold punch dies and strength, fracture resistance at static bending state, deflection and fracture toughness after various heat treatments. The influence of microstructures on the pregnant period of the fatigue crack No and the fatigue crack growth rate da/dN is also studied. Our experimental results show that after carbides refining pretreatment, the quenching and tempering structures have maximum strength, the No increases remarkably and the da/dN decreases at the low stress intensity factore Delta K range. After carbides refining pretreatment, the isothermal quenching structures have the best combination of strength and toughness of a mixed martensite structure with 50% bainite is obtained. It also can prolong the pregnant period of nucleation of fatigue cracks and reduce da/dN at the midstream intensity factor Delta K range. According to the examination of fatigue fractures by a scattering electron microscope, the fracture of a conventional quenching and tempering structure with coarse carbides is mainly intergranular. GRA

N86-25460# California Univ., Santa Barbara. Dept. of Physics.
NON-LOCAL SCREENING IN METAL SURFACES Technical Report, Jun. - Dec. 1985
E. Krotscheck and W. Kohn 10 Feb. 1986 17 p refs
(Contract N00014-84-K-0548)
(AD-A164340; TR-7) Avail: NTIS HC A02/MF A01 CSCL 11/6

The effect of the non uniform environment on the static screening of the Coulomb potential causes a major change in the calculated surface energy of simple metals. GRA

N86-25641# Georgia Univ., Athens. Dept. of Chemistry.
METAL CLUSTER TOPOLOGY. 1: OSMIUM CARBONYL

CLUSTERS
R. B. King 29 Jan. 1986 30 p refs
(Contract N00014-85-K-0365)
(AD-A164372; TR-15) Avail: NTIS HC A03/MF A01 CSCL 07/4

Important theoretical approaches to metal cluster bonding including the Wade-Mingos skeletal electron pair method, the Teo topological electron count, the King-Rouvray graph theory derived method, and Lauher's extended Huckel calculations are shown to agree in their apparent skeletal electron counts for the most prevalent metal cluster polyhedra including the tetrahedron, the trigonal bipyramid (both ordinary and elongated), square pyramid, octahedron, bicapped tetrahedron, pentagonal bipyramid, and capped octahedron. The graph theory derived method is used to treat osmium carbonyl clusters containing from five to eleven osmium atoms. in this connection most osmium carbonyl clusters can be classified into the following types: (1) clusters exhibiting edge-localized bonding containing multiple tetraheural chambers; and (2) capped octahedral clusters derived from osmium carbonyl fragments. Other more unusual osmium carbonyl clusters such as the planar, the Os9 cluster, and the Os11 cluster can also be treated satisfactorily by this methods. GRA

N86-25462# Georgia Univ., Athens. Dept. of Chemistry.
METAL CLUSTER TOPOLOGY. 2: GOLD CLUSTERS
R. B. King 29 Jan. 1986 30 p refs
(Contract N00014-85-K-0365)
(AD-A164395; TR-16) Avail: NTIS HC A03/MF A01 CSCL 07/2

Previously developed methods for the treatment of polyhedral boranes, carbonranes, and metal clusters are extended to the treatment of gold clusters, which present a variety of new problems. In most cases gold atoms in such cluster compounds do not employ the usual 9-orbital sp superscript 3 d superscripts spherical bonding orbital manifold. Instead almost all non-tetrahedral gold clusters consist of a center gold atom surrounded by a puckered polygonal belt of peripheral gold atoms generally with one or more additional peripheral gold atoms in distal positions above and/or below the belt. The peripheral gold atoms in such clusters use a 7-orbital spd superscripts cylindrical bonding orbital manifold, but their residual two orthogonal antibonding p orbitals can receive electron density from the filled d orbitals of adjacent peripheral gold atoms through backbonding leading to bonding distances between adjacent peripeheral gold atoms. Centered gold clusters can be classified into either spherical or toroidal clusters. The topology of the core bonding in gold clusters mimics the toplogy of the polyhedron formed by the surface atoms. Examples of non-centered gold clusters treated in this paper include the squashed pentagonal bipyramidal Au7(PPH3)7+ and the edge-fused bitetrahedral (Ph3P)4Au6Co(CO)42 which may be regarded as a peraurаethylene in which the six cluster gold atoms correspond to the six atoms of ethylene including a double bond between the two gold atoms corresponding to the two ethylene carbon atoms. GRA

N86-25463# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECT OF SURFACE APPLIED REACTIVE ELEMENT OXIDES ON THE OXIDATION OF Cr-CONTAINING BINARY ALLOYS
P. Y. Hou and J. Stringer 15 Apr. 1986 29 p Presented at the 168th Meeting of the Electrochemical Society, Las Vegas, Nev., 13 Oct. 1985 Prepared in cooperation with Electric Power Research Inst., Palo Alto, Calif.
(Contract DE-AC03-76SF-00098)
(DE86-002878; LBL-20326; CONF-851048-9) Avail: NTIS HC A03/MF A01

The influence of surface applied Ca, Ce, Hf, La, Y, and Zr nitrate-converted oxides on the oxidation behavior of Co-15 wt% Cr, Co-25 wt % Cr and Ni-25 wt % Cr alloys at 1000 C in 1 atm O2 has been studied. The surface oxides appeared to be most beneficial on the established Cr203 forming alloy, showed no effects on the non-Cr203 forming alloy and acted as a semi-barrier on the borderline Cr203 former. Results are compared and discussed with the effects found when the reactive element oxides are present as dispersions within the alloys. DOE

N86-25464# Brookhaven National Lab., Upton, N. Y.
QUASICRYSTALLINE STRUCTURES OF TRANSITION METAL/METALLOID GLASSES
R. E. Watson and L. H. Bennett 1985 9 p Presented at the International Conference on Magnetism, San Francisco, Calif., 26 Aug. 1985 Prepared in cooperation with National Bureau of Standards, Washington, D.C.
(Contract DE-AC02-76CH-00016)
(DE86-002932; BNL-37168; CONF-850890-24) Avail: NTIS HC A02/MF A01

The Wigner-Seitz method has been used to specify the near-neighbor environments in glass-forming TM crystalline phases, where T = Cr, Mn, Fe, Cu, Ni and M = P, B, Si. The crystal structures fall into different topological classes which may well account for the polymorphism in the glasses. DOE

N86-25465# Allied Bendix Corp., Kansas City, Mo.
AUTOMATED ION CHROMATOGRAPHIC ANALYSIS OF PLATING SOLUTIONS
R. E. Smith and P. L. Annable Nov. 1985 15 p refs
(Contract DE-AC04-76DP-00613)
(DE86-003128; BDX-613-3373) Avail: NTIS HC A02/MF A01

Ion chromatography is an analytical technique that is capable of rapid, multi-component analysis of a variety of samples. The method is based on chromatographic separation of the various components followed by detection using any of three available detectors. Three general types of columns are used: anion exchange, cation exchange, and nonpolar. Conductivity, electrochemical, and ultraviolet-visible (UV-Vis) detectors can be used with any of the columns. This provides the analyst with sufficient versatility to analyze the complex mixtures present in many plating baths. It is especially useful to employ automation to provide maximum efficiency in analysis time. The analyses required most frequently must be outlined so that the appropriate columns and detectors can be properly installed. This paper will describe the basic principles of ion chromatography and will list the columns and detectors required for analyzing different plating solutions so that the individual analysts can optimize their systems. DOE

N86-25466# Oak Ridge National Lab., Tenn.
METALLOGRAPHIC EXAMINATION OF RESPONSE OF 3 Cr-1.5 Mo STEEL TO HEAT TREATMENT
R. W. Swindeman, A. M. Nasreldin, R. L. Klueh, and J. F. King Nov. 1985 38 p refs
(Contract DE-AC05-84OR-21400)
(DE86-004589; ORNL/TM-9691) Avail: NTIS HC A03/MF A01

The influence of austenitizing temperature, cooling rate, and tempering conditions on the microstructure of 3 Cr-1.5 Mo steels was examined in order to establish the heat treatment needed to produce fine-grained bainitic microstructures. Most of the work was performed on samples from an 8-ton commercial heat of a composition developed by the Climax Molybdenum Company that contained a manganese addition for hardenability and a vanadium addition for strength. This material was examined in both the normalized-and-tempered and the quenched-and-tempered conditions. The material was found to be fully bainitic in both the coarse- and fine-grained conditions. Additional studies were performed on another 8-ton commercial heat of a composition developed by the University of California, Berkeley, that contained more nickel and less manganese. This material also possessed adequate hardenability to produce bainitic microstructures for cooling conditions that would result in some proeutectoid ferrite in standard 2.25 Cr-1 Mo steel. Both compositions developed the microstructures and concomitant strength and toughness needed to be competitive with other developing microalloyed steels for use in hydrogen service. DOE

N86-25467# Lawrence Livermore National Lab., Calif.
ELECTROCHEMICAL EVALUATION OF THE EFFECT OF HEAT TREATMENT AND STRESS ON THE CORROSION CHARACTER-

ISTICS OF 7050 ALUMINUM IN 3.5 PERCENT NaCl SOLUTION
R. S. Glass and J. C. Estill Nov. 1985 26 p
(Contract W-7405-eng-48)
(DE86-004181; UCID-20597) Avail: NTIS HC A03/MF A01

Potentiodynamic polarization curves have been used to evaluate (in a survey mode) the effect of heat treatment and stress on the corrosion behavior of 7050-XX aluminum in deaerated 3.5% NaCl solutions. Specimens, which were machined from extruded ring material, were examined in the as-received condition and following heat treatment at 580 F for 0.5 min. The stress levels used in this study ranged from 40 to 90% of the 0.2% offset yield strength. Results indicate that within this stress range, using the given experimental method, medium, and timescales, that there is no significant trend for the effect of stress on the electrochemical-corrosion behavior for the materials examined. The heat-treated specimens have lower uniform corrosion rates than the as-received forms, but are more susceptible to pitting. However, pitting is not spontaneous for either material in this environment. In addition to investigating the variables of stress and heat treatment, also compared were the behavior of specimens machined from three different orientations within extruded ring material. Generally, the longitudinal and circumferentially oriented specimens were more similar electrochemically than specimens obtained from the radial orientation. The radial specimens generally showed lower uniform corrosion rates and appeared to be less susceptible to pitting. DOE

N86-25468# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
ENVIRONMENTAL FACTORS AFFECTING THE CORROSION OF WEATHERING STEEL
F. H. Haynie Dec. 1985 12 p
(PB86-136074; EPA-600/D-85-294) Avail: NTIS HC A02/MF A01 CSCL 11F

Weathering steel samples were exposed for periods of up to 30 months at nine air monitoring sites in the St. Louis, Missouri area. Climatic and air quality data were recorded during the exposure period and subjected to a rigorous evaluation to eliminate recording errors and to estimate missing values. Weight loss was used as the measure of steel corrosion. Corrosion rate was evaluated with respect to: (1) flux of pollutants to the steel during both wet and dry periods; (2) temperature; and (3) exposure history. Different definitions of when the steel was wet were evalauted to determine the most likely critical relative humidity. Non-linear multiple regression techniques were used to determine the statistical significance of each factor and develop a theoretically consistent environmental damage function. Author (GRA)

N86-25469# National Bureau of Standards, Gaithersburg, Md. Inst. for Materials Science and Engineering.
METALLURGY TECHNICAL ACTIVITIES, 1985
E. N. Pugh and J. G. Early Nov. 1985 116 p refs
(PB86-165032; NBSIR-85-3191) Avail: NTIS HC A06/MF A01 CSCL 11F

The FY1985 activities of the Metallurgy Division of the National Bureau of Standards are summarized. The research centers upon the structure-processing-properties relations of metals and alloys, and on the methods of their measurement. Task efforts comprise studies of synchrotron radiation research for materials characterization, metallurgical processing, wear and mechanical properties, chemical metallurgy, corrosion and protection of metals, electrodeposition, and nondestructive characterization. The work herein described includes three cooperative data programs with American professional societies and industry: the American Society for Metals-NBS Alloy Phase Diagram Program, the National Association of Corrosion Engineers-NBS Corrosion Data Program, and the American Iron and Steel Institute-NBS Steel Sensor Program. The scientific publications, invited talks, committee participation, and other professional interactions of the 91 full-time and part-time members of the Metallurgy Division and its 33 guest researchers are identified. GRA

N86-25470# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
DIFFUSION AND STRUCTURE OF METALS
S. Z. Bokshtein 1985 177 p refs Transl. into ENGLISH of book "Diffuziya i Struktura Metallov" Moscow, Metallurgiya, 1973 Sponsored in part by National Science Foundation, Washington, D.C. Prepared for National Bureau of Standards, Gaithersburg, Md.
(PB86-156742; TT-79-52022) Avail: NTIS HC A09/MF A01 CSCL 11F

Diffusion is a process which determines the structure and properties of metals and, as a result, their characteristics under service conditions. The monograph examines various methods of studying diffusion, the influence of structural defects and especially diffusion in mutliphase systems during the occurrence of complex processes. The book is recommended for researchers in physical metallurgy and metal physics, for engineers, and for students of metallurgy. GRA

N86-25471# National Materials Advisory Board, Washington, D. C.
BASIC AND STRATEGIC METALS INDUSTRIES: THREATS AND OPPORTUNITIES Final Report
21 Oct. 1985 161 p Sponsored by Federal Emergency Management Agency
(Contract EMW-83-C-1350)
(PB86-154499; NMAB-425) Avail: NTIS HC A08/MF A01 CSCL 11F

Five strategic metals processing industries (iron and steel, copper, aluminum, titanium, and superalloys) are assessed in terms of their capability and survival problems in the worldwide competitive marketplace. The availability and economic issues of four critical alloying elements (chromium, cobalt, columbium, and tantalum) are discussed. An overview of the current status of each of these industries is presented in terms of its unique characteristics and needs. Some innovative technologies and processing steps are identified as having merit for improving the competitive posture of these industries. Author (GRA)

N86-25472 City Univ., London (England).
A CONSTITUTIVE MODEL FOR THE INELASTIC MULTIAXIAL CYCLIC RESPONSE OF A NICKEL BASE SUPERALLOY RENE 80 Ph.D. Thesis
V. G. Ramaswamy 1985 251 p
Avail. Univ. Microfilms Order No. DA8527447

A unified constitutive equation which can model a variety of nonlinear material phenomena observed in Rene 80 between 538C and 982C is developed. Five unified constitutive models were reviewed to evaluate their capabilities and limitations. Two models, a generic back stress drag stress model and the Bodner model, were then used to model the behavior of Rene 80 at 982C. Both models were found to have some advantageous features. However, neither proved adequate for Rene 80. A new constitutive model was proposed based on back stress and drag stress. The tensorial back stress was used to model directional effects; whereas, the scalar drag stress was used to model isotropic effects and cyclic hardening or softening. A flow equation and evolution equations for the state variables were developed in multiaxial form. Procedures were developed to generate the material parameters. The model predicted very well the monotonic tensile, cyclic, creep and stress relaxation behavior of Rene 80 at 982C. Dissert. Abstr.

N86-25370# Cambridge Univ. (England). Dept. of Metallurgy and Materials Science.
ASPECTS OF SMALL CRACK GROWTH
M. N. James and J. F. Knott *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 16 p refs
(For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25372# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CRACK GROWTH, STRAIN AND DAMAGE MEASUREMENTS USING AN IMPROVED POTENTIAL DROP TECHNIQUE

Humbert Policella, Georges Baudin, and Georges Cailletaud *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs In FRENCH; ENGLISH summary (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25374# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ADVANCED EXPERIMENTAL METHODS FOR MONITORING THE BEHAVIOR OF SMALL CRACKS
James M. Larsen *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25376# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Materials Lab.
ADVANCED QUANTITATIVE METHODS FOR NONDESTRUCTIVE EVALUATION
Dale E. Chimenti and Thomas J. Moran *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 17 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-26104# Joint Publications Research Service, Arlington, Va.
IMPACT DEFORMATION OF METALS TAKING INTO ACCOUNT BULK MODULUS AND TEMPERATURE Abstract Only
V. P. Mayboroda and N. N. Kholin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 76-77 refs Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 103-110 (For primary document see N86-26099 16-26)
Avail: NTIS HC A06/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-25473*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPUTTERED CADMIUM OXIDE AS A SURFACE PRETREATMENT FOR GRAPHITE SOLID LUBRICANT FILMS
Robert L. Fusaro 1986 32 p refs To be presented at the ASME/ASLE Tribology Conf., Pittsburgh, Pa., 19-22 Oct. 1986
(NASA-TM-87300; E-3011; NAS 1.15:87300) Avail: NTIS HC A03/MF A01 CSCL 11H

Sputtered films of cadmium oxide were applied to sand blasted AISI 440C HT stainless steel disks as a surface pretreatment for the application of rubbed graphite films. Mixtures of cadmium oxide and graphite were applied to the nonpretreated sandblasted metal and evaluated. The results were compared to graphite films applied to other commercially available surface pretreatments. It is found that sputtered CdO pretreated surfaces increase the endurance lives of the graphite films and decrease the counterface steady state wear rate of the pins almost an order of magnitude compared to commercially available pretreatments. The CdO additions in general improved the tribological properties of graphite. The greatest benefit occurred when it was applied to the substrate rather than mixing it with the graphite and that sputtered films of CdO perform much better than rubbed CdO films. Author

N86-25474*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IMPROVED PERFLUOROALKYLETHER FLUID DEVELOPMENT
W. R. Jones, Jr., K. Paciorek (Ultrasystems, Inc., Irvine, Calif.), J. Nakahara, M. Smythe, and R. Kratzer 1986 18 p refs Presented at the International Symposium on Chemical Aspects of Wear, Friction, and Lubrication, NewYork, N.Y., 14-18 April 1986; sponsored by American Chemical Society
(NASA-TM-87276; E-2928; NAS 1.15:87276) Avail: NTIS HC A02/MF A01 CSCL 11C

The feasibility of transforming a commercial linear perfluoroalkylether fluid into a material stable in the presence of metals and metal alloys in oxidizing atmospheres at 300 C without the loss of the desirable viscosity temperature characteristics was determined. The approach consisted of thermal oxidative treatment in the presence of catalyst to remove weak links, followed by transformation of the created functional groups into phospha-s-triazine linkages. It it found that the experimental material obtained in 66% yield from the commercial fluid exhibits, over an 8 hr period at 300 C in the presence of Ti(4Al, 4Mn) alloy, thermal oxidative stability better by a factor of 2.6x1000 based on volatiles evolved than the commercial product. The viscosity and molecular weight of the developed fluid are unchanged and are essentially identical with the commercial material. No metal corrosion occurs with the experimental fluid at 300 C. E.A.K.

N86-25475*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE PREPARATION OF NEW PERFLUOROETHER FLUIDS EXHIBITING EXCELLENT THERMAL-OXIDATIVE STABILITIES
W. R. Jones, Jr., T. R. Bierschenk (Exfluor Research Corp., Austin, Tex.), T. J. Juhlke, H. Kawa (Exfluor Research Corp.), and R. J. Lagow (Exfluor Research Corp., Austin, Tex.) 1986 19 p refs Presented at the International Symposium on Chemical Aspects of Friction, Wear and Lubrication, New York, N.Y., 13-18 Apr. 1986; sponsored by the American Chemical Society
(NASA-TM-87284; E-2919; NAS 1.15:87284) Avail: NTIS HC A02/MF A01 CSCL 11C

A series of low molecular weight perfluoroalkylethers (PFAE) were synthesized by direct fluorination. Viscosity-temperature properties and oxidation stabilities were determined. Viscosity-temperature correlations indicated that increases in branching and increases in the size of the branching substituent caused a deterioration in viscometric properties (i.e., an increase in ASTM slope). In addition, increasing the ratio of carbon to oxygen in these compounds also increased the ASTM slope. Preliminary oxidation stability tests indicated that highly branched PFAE fluids. (i.e., those containing quaternary carbons) may be less stable than either those containing a single trifluoromethyl pendant group or those containing no branching at all. Author

N86-25476*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TRIBOLOGY OF SELECTED CERAMICS AT TEMPERATURES TO 900 DEG C
H. E. Sliney, T. P. Jacobson, D. Deadmore, and K. Miyoshi 1986 23 p refs Presented at 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla.,19-24 Jan. 1986; sponsored by American Ceramic Society
(NASA-TM-87267; E-2969; NAS 1.15:87267) Avail: NTIS HC A02/MF A01 CSCL 11B

Results of fundamental and focused research on the tribological properties of ceramics are discussed. The basic friction and wear characteristics are given for ceramics of interest for use in gas turbine, adiabatic diesel, and Stirling engine applications. The importance of metal oxides in ceramic/metal sliding combinations is illustrated. The formulation and tribological additives are described. Friction and wear date are given for carbide and oxide-based composite coatings for temperatures to at least 900 C. Author

N86-25477*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR CROSSLINKING AND EXTENDING CONJUGATED DIENE-CONTAINING POLYMERS Patent Application
Vernon L. Bell, inventor (to NASA) and Stephen J. Havens, inventor (to NASA) (PRC Kentron, Inc., Hampton, Va.) Filed 11 Mar. 1986 17 p
(NASA-Case-LAR-13452-1; NAS 1.71:LAR-13452-1; US-Patent-Appl-SN-838655) Avail: NTIS HC A02/MF A01 CSCL 11B

A process using a Diels-Adler reaction which increases the

molecular weight and/or crosslinks polymers by reacting the polymers with bisunsaturated dienophiles is developed. The polymer comprises at least 75% by weight based on the reaction product, has a molecular weight of at least 5000 and a plurality of conjugated 1,3-diene systems incorporated into the molecular structure. A dienophile reaction with the conjugated 1,3-diene of the polymer is at least 1% by weight based on the reaction product. Examples of the polymer include polyesters, polyamides, polyethers, polysulfones and copolymers. The bisunsaturated dienophiles may include bis-maleimide, bisnadimides, bis maleic and bis tumaric esters and amides. This method for expanding the molecular weight chains of the polymers, preferably thermoplastics, is advantageous for processing or fabricating thermoplastics. A low molecular weight thermoplastic is converted to a high molecular weight plastic having improved strength and toughness for use in the completed end use article. Author

N86-25478*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SEMI-2-INTERPENETRATING NETWORKS OF HIGH TEMPERATURE SYSTEMS Patent Application
Annemarie O. Egli, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) and Terry L. St.Clair, inventor (to NASA) Filed 18 Mar. 1986 19 p
(NASA-Case-LAR-13450-1; NAS 1.71:LAR-13450-1; US-Patent-Appl-SN-840816) Avail: NTIS HC A02/MF A01 CSCL 11B

A semi-2-interpenetrating network of improved qualities which is prepared by combining a linear polymer and a cross-linkable oligomer having identical repeating units is developed. Polymers have been combined in the past into interpentrating networks in order to gain useful properties from the combination of materials. However, previous semi-interpenetrating networks have only been formed using polymers having different repeating units. This method provides a semi-2-interpenetrating network of improved characteristics which is constructed by combining a linear polymer with a cross-linkable oligomer which has the same repeating unit as the linear polymer. The resulting interpenetrating network has improved properties over prior networks because the polymer and oligomer with identical functionalities are mutually soluble and form one homogeneous phase. This eliminates the phase separation problems common to other networks. Author

N86-25479# Lawrence Livermore National Lab., Calif.
STRUCTURAL CHARACTERIZATION OF SILICA AEROGEL USING SPECIFIC SURFACE AREA MEASUREMENTS
C. W. Price, W. G. Halsey, and S. C. Sanders Oct. 1985 18 p Presented at the 13th DOE Surface Studies Conference, Dayton, Ohio, 8-10 Oct. 1985
(Contract W-7405-eng-48)
(DE86-003884; UCRL-92955; CONF-8510181-2) Avail: NTIS HC A02/MF A01

Specific surface area measurements are proving to be useful for the structural characterization of silica aerogels. Transmission electron microscopy (TEM) revealed the aerogel structure to be composed of fibrous chains of linked spherical particles. Surface area calculations based on a hard sphere approximation using the TEM data correspond reasonably well to specific surface area measurements by the BET method. The BET measurements also correspond with surface area measurements generated from low angle X-ray scattering. The reproducibility of the BET measurements was determined to be better than 5%. The confidence level of BET analysis is relatively high, although the absolute accuracy is still open to some speculation. Other techniques that are useful to supplement BET analysis of aerogels are X-ray diffraction, thermal gravimetric analysis, residual gas analysis during outgassing, and infrared spectroscopy. These techniques were used in a preliminary study of the heat treating response of aerogel. DOE

N86-25480# Xerox Palo Alto Research Center, Calif.
RESEARCH ON ELECTRONIC AND STRUCTURAL PROPERTIES OF AMORPHOUS-SILICON-BASED ALLOY MATERIALS Annual Subcontract Report, Jul. 1984 - Jun. 1985
R. A. Street Nov. 1985 41 p
(Contract DE-AC02-83CH-10093)
(DE85-016883; SERI/STR-211-2810) Avail: NTIS HC A03/MF A01

The objective of this research was to understand the electronic and structural properties of a-Si:H, focussing on properties particularly important to electronic devices and attempting to identify their origins. Measurements of metastable defect creation by prolonged illumination have shown that the internal stress that accompanies a-Si:H film growth is one of the major factors in the formation of light-induced defects. Defect creation is suppressed in compensated a-Si:H because impurity-related shallow states dominate the recombination. The annealing kinetics have also been analyzed. Dangling bond states were measured to confirm their energy levels in the gap. The measurements also show that there is little atomic relaxation at the dangling bonds. Defect states have been studied in fluorinated a-Si samples. Neutral donors have been identified for the first time by their hyperfine interaction in ESR. Interface states between a-Si:H and silicon oxide have also been studied. Transient photoconductivity on doped a-Si:H samples has been analyzed to obtain information about the density of shallow states. The photoconductivity decay is apparently dominated by contact effects rather than by bulk recombination. DOE

N86-25481# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Chemistry.
MOLTEN CARBONATES: MICROWAVE STUDIES OF THE VAPOR STATE Final Report
C. W. Gillies Aug. 1985 125 p refs
(Contract DE-AC02-81ER-10909)
(DE86-004504; DOE/ER-10909/1) Avail: NTIS HC A06/MF A01

A high temperature microwave spectrometer was developed for the analysis of the vapor above alkali carbonates in fuel cell environments. The absorption cell utilizes nickel foil and a novel support system for the Stark septum. Both Stark modulation and radiofrequency-microwave double resonance (RFMDR) were employed for the observation of the J = 1(YIELDS)2 transitions of potassium hydroxide in several vibrational states. This is the first application of RFMDR techniques at high temperature. The analysis of the hyperfine structure due to nuclear quadrupole splitting of the J=1(YIELDS)2 transitions yielded quadrupole data for the ground state and the first excitations of the K-0 stretch and the degenerate bonding modes. For the ground state the unsplit frequency (NU)0=32,834.33(5)MHz and eQq = 7.19(8) MHz. The unsplit frequencies for all states observed are consistent with rotational and distortion constants obtained from higher J transitions. Experiments with the 62 to 38 mole percent lithium-potassium carbonate eutectic in gas atmospheres which maximize the potassium hydroxide vapor concentration have failed to identify the J = 1(YIELDS)2 transition of monomeric potassium hydroxide. Sensitivity estimates of the high temperature microwave spectrometer indicate that the potassium hy droxide concentrations fall below the detection limit in typical fuel cell gas atmospheres. DOE

N86-25482# City Univ. of New York, Brooklyn.
ELECTROCHEMICAL PROPERTIES OF CONDUCTING, NITROGEN-BEARING IODINATED POLYMERS Final Report, 15 Oct. 1983 - 14 Oct. 1985
Seymour Aronson and Henry Teoh 30 Nov. 1985 13 p refs
(Contract DAAG29-83-K-0158)
(AD-A164052; ARO-20715.2-MS) Avail: NTIS HC A02/MF A01 CSCL 07/4

The primary objective of this investigation was to determine the feasibility of using conducting, iodinated polymers as cathode materials for high energy-density, high power-density electrochemical cells with lithium as the anode. The following nitrogen-bearing, conjugated polymers were either prepared or were purchased: 2-polyvinylpyridine, cyclized polyacrylonitrile, aniline black, paracyanogen, polyquinoxaline, and polybenzimidizole. Only the first three polymers exhibited high electrical conductivity when reacted with iodine. GRA

N86-25483# Emory Univ., Atlanta, Ga. Dept. of Chemistry.
SYNTHESIS AND EXAMINATION OF NEW CATALYTIC POLYMERS Final Report, 1 Sep. 1982 - 31 Aug. 1985
Frederick M. Menger 1 Dec. 1985 8 p refs
(Contract DAAG29-82-K-0131)
(AD-A164069; ARO-19285.6-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Research supported by Grant DAAG29-82-K-0131 consisted of the following four components: 1) A new turnover catalyst capable of hydrolyzing phosphate esters under mildly basic conditions has been developed. It is currently being tested in Army laboratories. 2) A polymer-bound 4-aminopyridine has been synthesized which is capable, in the solid state, of catalyzing a variety of organic reactions. 3) A new theory for the high reactivity of intramolecular and enzymatic systems. The theory postulates that the rate of reaction between functionalities A and B is proportional to the time that A and B reside within critical distances. Attempts have been made to evaluate critical distances for organic molecules. 4) Three new multi-armed amphiphiles have been synthesized. Although these materials do not form micelles by themselves, they have the property of seeding micelle formation by conventional surfactants. GRA

N86-25484# Naval Postgraduate School, Monterey, Calif.
RETAINED AMBIENT TEMPERATURE PROPERTIES OF SUPERPLASTICALLY DEFORMED Al-10%Mg-0.1%Zr, Al-10%Mg-0.5%Mn AND Al-10% Mg-0.4%Cu ALLOYS M.S. Thesis
Karl A. Klankowski Dec. 1985 90 p refs
(AD-A164493; AD-E900539) Avail: NTIS HC A05/MF A01 CSCL 11/6

The room temperature mechanical properties of three superplastic, high-Magnesium, Aluminum-Magnesium alloys (Al-10%Mg-0.1%Zr, Al-10%Mg-0.5%Mn, Al-10%Mg-0.4%Cu) were evaluated after simulated superplastic forming at warm temperature. The alloys were initially processed to produce superplastic response. They were then deformed at 300 C to stains of 100 to 200% at strain rates of 1,700 S or 170 S and samples remachined for ambient temperature testing. Results indicate yield strengths of about 276 MPa (40 KSI) are attainable with ductility varying from about 1 to 14 percent elongation at fracture. Ultimate strengths correspondingly vary up to about 517 MPa (75 KSI). Origin of the variability of the ductility is considered. GRA

N86-25485# Naval Postgraduate School, Monterey, Calif.
PLASTIC INSTABILITY OF ALUMINIDE AND PLATINUM MODIFIED DIFFUSION COATINGS DURING 1100 C CYCLIC TESTING M.S. Thesis
Thomas F. Manley, II Dec. 1985 78 p refs
(AD-A164506) Avail: NTIS HC A05/MF A01 CSCL 11/3

Platinum modified and unmodified aluminide diffusion coatings, on a nickel base superalloy (IN-738), were prepared to test the pre-aluminizing surface roughness effect on coating oxide scale adherence. A preliminary study of coating microstructure and surface structure changes during cyclic oxidation at 1100 C was begun. During this testing, significant surface deformation described as rumpling was observed and attributed to plastic instability produced during the cycling. Rumpling is found to be a function of the number and type of thermal strain cycles, thermal expansion mismatch, coating strength, and coating thickness. The role of oxide adherence observed for the Pt modified coatings cannot be determined from the data. Previous mention of this effect was not found in the literature. A similar surface rumpling phenomena, however, has been observed in overlay coating systems under similar conditions. The mechanical and protectivity impact of rumpling can only be inferred due to the limited available data. Author (GRA)

N86-25486# Cincinnati Univ., Ohio. Dept. of Materials Science and Engineering.
SAX (SMALL-ANGLE X-RAY SCATTERING) STUDY OF MICELLE FORMATION IN MIXTURES OF BUTADIENE HOMOPOLYMER AND STYRENE-BUTADIENE BLOCK COPOLYMER. PART 3: COMPARISON WITH THEORY
R. J. Roe 15 Jan. 1986 25 p
(Contract N00014-85-K-0245)
(AD-A163149; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

The theory of block copolymer micelle formation formulated by Leibler, Orland and Wheeler is compared with the experimental results of Rigby and Roe obtained with mixtures of styrene-butadiene diblock copolymer and butadiene homopolymer. To facilitate the comparison, the theoretical expressions are recast in terms of the molecular volume v and the rms end-to-end distance r, thereby avoiding the use of the concept of the segment size a and the number of segment N per molecule. The calculated radii of the micelles show excellent agreement with the observed values. The theory predicts correctly the trend of change in the critical micelle cores to consist predominantly of styrene blocks, whereas the experimental results indicate that above a certain temperature that micelle cores become increasingly swollen with polybutadiene as the temperature is raised toward the dissolution temperature. GRA

N86-25487# Department of the Navy, Washington, D. C.
BIS(PENTAFLUOROSULFUR)DIACETYLENE POLYMER THEREFROM AND PREPARATIONS THEREOF Patent
Thomas A. Kovacena, Ronald A. DeMarco, and Arthur W. Snow, inventors (to Navy) Issued 5 Nov. 1985 4 p
(AD-D012124; US-Patent-4,551,349; US-Patent-Appl-SN-562252; US-Patent Class-427-255.6) Avail: US Patent and Trademark Office CSCL 07/3

This invention pertains to a double substitution of pentafluorosulfur on diacetylene by a reaction of diacetylene with pentafluoro sulfur bromide, followed by a dehydrobromine action with potassium hydroxide. the substitutes diacetylene polymerizes in the liquid and gas phases. The polymer is useful as a coating and surface-treatment agent. GRA

N86-25488# Department of the Air Force, Washington, D.C.
PREPARATION AND POLYMERIZATION OF OXETHER-1 Patent
John M. Guimont, Gerald E. Manser, and Donald L. Ross, inventors (to Air Force) Issued 24 Dec. 1985 9 p
(AD-D012131; US-Patent-4,560,779; US-Patent-Appl-SN-400179; US-Patent-Class-549-510) Avail: US Patent and Trademark Office CSCL 07/3

The present invention provides a method for synthesizing a novel oxether-1 monomer by a two step reaction scheme which involves effecting a reaction between 3-methyl-3-hydroxymethyl oxetane and 1,1,1-trinitroethane to form an intermediate reaction product which in turn is reacted with methyl iodide to produce the oxether-1 monomer. The monomer is easily polymerized using conventional polymerization techniques to produce a poly (oxether-1) polyol useful as a binder component in smokeless propellants and explosives. GRA

N86-25489# Bell Telephone Labs., Inc., Murray Hill, N. J.
CRITICAL SCATTERING IN POLYMER MELTS
F. S. Bates, M. A. Hartney, and G. D. Wignall Oct. 1985 17 p Presented at the International Conference on Neutron Scattering, Santa Fe, N. Mex., 19 Aug. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-003093; CONF-850871-21) Avail: NTIS HC A02/MF A01

Critical phenomena in two classes of polymer melts have been examined by small-angle neutron scattering (SANS); single component block polymers which undergo an order-disorder phase transition, and binary polymer mixtures which exhibit classical liquid-liquid phase separation behavior. A model set of 1,4-polybutadiene-1,2-polybutadiene diblock copolymers containing perdeuterated 1,4-polybutadiene blocks were investigated by SANS in the disordered state. The SANS spectra exhibit a peak in the scattering intensity which diverges at the ordering transition, in close agreement with mean-field theory. Binary blends of perdeuterated and protonated 1,4-polybutadiene homopolymers have been found to form regular solutions characterized by an upper critical solution temperature (UCST). Near the critical point,

these mixtures exhibit classical critical scattering as measured by SANS. The second set of results raises serious questions regarding the widely held assumption that deuterated and protonated polymers form ideal mixtures. DOE

N86-25490# Texas Technological Univ., Lubbock. Glass Research and Testing Lab.
STRENGTH OF NEW WINDOW GLASS PLATES USING SURFACE CHARACTERISTICS Final Report
D. C. Kanabolo and H. S. Norville Jul. 1985 122 p refs
(Grant NSF CEE-81-18214)
(PB86-140100; IDR/DOC-76D) Avail: NTIS HC A06/MF A01 CSCL 11B

The strength of new window glass plates under the action of uniform lateral pressure is discussed. Nine samples of new window glass plates of different geometries were tested to failure. The strengths of the samples are reported. Further, these strengths were evaluated relative to each other by using a common window plate geometry and a theory of fracture which employs parameters m and k which describe surface strength. Direct comparisons of experimental failure data illustrate the dependency of new window glass plate strengths on load duration. GRA

N86-25491# Texas Technological Univ., Lubbock. Glass Research and Testing Lab.
STRESSES IN LAYERED GLASS UNITS AND MONOLITHIC GLASS PLATES Final Report
S. R. Nagalla, V. G. Vallabhan, J. E. Minor, and H. S. Norville Oct. 1985 58 p refs Sponsored in part by Monsanto Polymer Products Co., St. Louis, Mo.
(PB86-142015; TTU-IDR-75D) Avail: NTIS HC A04/MF A01 CSCL 11A

The report examines in detail the structural mechanics behavior of thin, layered glass units under lateral presure relative to the behavior of monolithic glass plates of equal glass thickness. The theoretical study of specific geometries of layered glass units and monolithic glass plates provides interesting insights into the relative behaviors of these plates under lateral pressures. The study shows that layered glass units do not always develop larger principal tensile stresses than those found in monolithic glass plates of the same geometry and nominal thickness. GRA

N86-25492# Coors Porcelain Co., Golden, Colo.
CERAMIC TUBE MATERIALS AND PROCESSING DEVELOPMENT Topical Report, Feb. 1982 - Dec. 1984
K. E. Green, M. I. Rivkin, and D. W. Roy Jul. 1985 51 p
(Contract GRI-5081-231-0539)
(PB86-168762; GRI-85/0143) Avail: NTIS HC A04/MF A01 CSCL 11B

A cost-effective material/process has been developed for fabrication of SiC tubes which satisfy many of the structural and operataing environment requirements for high temperature heat recovery systems. Available property data plus cost projects are presented. Accomplishments and results include: extensive search for and final selection of lowest cost starting materials commercially available at the time; development of appropriate body formulations and processes to sucessfully utilize the respective low cost raw materials selection; development of an extrusion process (including tool design) to successfully fabricate and dry tubing; development of an optimal firing (siliconizing) cycle to adequately infiltrate the extruded tubes so they would yield measured properties which would meet or exceed the agreed upon specifications set down in concert with systems designers; and a final standardized process which should yield acceptable reaction bonded SiC tubing well within the target pricing in large quantities. GRA

N86-25493# SOHIO Engineered Materials Co., Niagara Falls, N.Y. Structural Ceramics Div.
CERAMIC COMPONENT MANUFACTURING TECHNOLOGY DEVELOPMENT Final Report. Sep. 1982 - Feb. 1985
I. Ruppel and J. Halstead Dec. 1985 67 p
(Contract GRI-5082-232-0635)
(PB86-157898; GRI-85/0276) Avail: NTIS HC A04/MF A01 CSCL 11B

Plastic binder extrusion of thin wall small to medium diameter finned and unfinned tubing has been developed to the stage that large quantities of tubing can be economically manufactured. Extrusion, binder removal, and sintering conditions have been optimized. Larger diameter, thicker wall tubing has been successfully plastic extruded at a rapid rate and significant progress has been made in the binder removal and sintering steps. Both continuous and periodic sintering are options depending upon size or geometry. Additional work with a larger scale periodic furnace will be required to confirm full scale capability. GRA

N86-25494# Southern Research Inst., Birmingham, Ala.
PREDICTIVE MODELS: PERMEATION OF POLYMERIC MEMBRANES BY ORGANIC SOLVENTS
G. D. Sides, D. P. Segers, E. F. Philpot, and A. S. Bhown Jan. 1986 10 p
(Contract EPA-68-03-3113)
(PB86-148459; EPA-600/D-86-021) Avail: NTIS HC A02/MF A01 CSCL 11J

Protective clothing (for example, gloves, aprons, masks, and protective ensembles) is often constructed in the form of barrier polymeric membranes. Permeation testing, which is used frequently to screen candidate polymers for use as protective barrier materials is expensive and time consuming, particularly when working with compounds as toxic and as subject to regulation as CW agents. The literature was reviewed and an initial approach to the prediction of the diffusivities and solubilities of organic solvents in polymers was developed. A brief review of the applicable theory is presented. Predicted diffusivities and solubilities for several solvent/polymer combinations are compared to experimental data. GRA

N86-25495# Southern Research Inst., Birmingham, Ala.
PREDICTIVE TEST METHODS: PERMEATION OF POLYMERIC MEMBRANES BY ORGANIC SOLVENTS
R. B. Spafford, G. D. Sides, and D. P. Segers Jan. 1986 86 p refs
(Contract EPA-68-03-3113)
(PB86-148111; EPA-600/D-86-022) Avail: NTIS HC A02/MF A01 CSCL 11J

As the result of screening elastomeric materials that may be suitable for formulating chemical-protective clothing, a simple test method has been developed that allows the prediction of the permeation of an organic solvent through a polymeric membrane. The test method, based on liquid-immersion absorption and desorption measurements, is simple, universal, and can be carried out by technicians with minimal training. GRA

N86-25496# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
PROTECTIVE COATINGS ON METALS, VOLUME 6
G. V. Samsonov 1984 321 p refs Transl. into ENGLISH of the book "Zashchitnye Pokrytiya na Metallakh, Vyp. 6" Kiev, USSR, Naukova Dumka, 1972 Prepared for National Science Foundation, Washington, D.C.
(PB86-155249; TT-76-52021-Vol-6) Avail: NTIS HC A14/MF A01 CSCL 11C

Review articles and brief communications devoted to the theory and practice of the formation of protective diffusion coatings on metals and alloys are given. Valuable information on different processes used in powder metallurgy, such as boriding, carbidizing, nitriding, aluminizing, chromizing, nickel plating and multicomponent diffusion coating is given. GRA

N86-25497# Environmental Protection Agency, Research Triangle Park, N.C. Office of Air Quality Planning and Standards.
SURFACE COATING OF PLASTIC PARTS FOR BUSINESS MACHINES: BACKGROUND INFORMATION FOR PROPOSED STANDARDS, DRAFT REPORT
Dec. 1985 268 p refs
(PB86-151784; EPA-450/3-85/019A) Avail: NTIS HC A12/MF A01 CSCL 11C

Standards of performance for the control of VOC emissions from affected facilities that perform exterior surface coating of plastic parts for business machines are being proposed under authority of Section III of the Clean Air Act. These standards would apply to each new, modified, and reconstructed spray booth in which plastic parts for business machines are surface coated and that commence construction on or after the date of proposed of the regulation. Background information and environmental and economic impact assessments of the regulatory alternatives considered in developing the proposed standards are given. GRA

N86-25498# Bureau of Mines, Rolla, Mo. Research Center.
PLASMA-SPRAYED IRON-BASE WEAR-RESISTANT COATINGS CONTAINING TITANIUM DIBORIDE, REPORT OF INVESTIGATIONS/1985
J. F. McIlwain and L. A. Neumeier 1985 25 p refs
(PB86-150901; BM-RI-8984; LC-85-600122) Avail: NTIS HC A02/MF A01 CSCL 11C

Cobalt-base hardfacing alloys used for wear resistance consist almost entirely of metals largely imported into the United States. As part of an overall research program to help alleviate this foreign dependency, the Bureau of Mines has been investigating an iron-base alloy system as a potential replacement for cobalt-base alloys for some uses. To ascertain the melting ranges, thermal analyses were made of cast heats of alloys. Powder alloys within this range of composition, prepared by mechanical alloying, were sized and applied to mild steel test coupons by nontransferred-arc plasma spraying. Abrasive and adhesive wear test data were compared to those of a plasma-sprayed cobalt-base alloy. GRA

N86-25499# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
9 Apr. 1986 43 p refs Transl. into ENGLISH of various Japanese articles
(JPRS-JST-86-009) Avail: NTIS HC A03/MF A01

Articles from foreign newspapers, periodicals and books and news agency transmissions and broadcasts on biotechnology and fiber optics are discussed. For individual titles, see N86-25500 through N86-25500.

N86-25500# Joint Publications Research Service, Arlington, Va.
TRENDS IN INFRARED OPTICAL FIBERS DISCUSSED
Shiro Takahashi *In its* Japan Report: Science and Technology (JPRS-JST-86-009) 9 Apr. 1986 p 30-40 refs Transl. into ENGLISH from Ceramics (Tokyo, Japan), Jul. 1985 p 595-600
(For primary document see N86-25499 16-27)
Avail: NTIS HC A03/MF A01

Optical fibers are playing an important role in the industry of optical transmission of information. The properties of optical fibers lend themselves to a wide range of applicatons, from transmission mediums which are measured in microns to kilometers. Optical fiber structures are discussed in relationship to light transmission loss. Applications of infrared optical fibers are also described. B.G.

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-25501# Mechanical Technology, Inc., Latham, N. Y
EVALUATION OF ALTERNATE-FUELS PERFORMANCE IN AN EXTERNAL COMBUSTION SYSTEM Final Report
R. A. Battista and M. Connelly Dec. 1985 75 p refs
(Contract DE-AC01-84CE-50043)
(DE86-004901; DOE/CE-50043/1) Avail: NTIS HC A04/MF A01

As the economic attractiveness of many alternate fuels increases relative to gasoline, the viability of any future automotive power plant may soon depend on the ease with which these alternate fuels can be utilized. It is generally assumed that external-combustion engines are more tolerant of alternate fuels than internal-combustion engines. This study attempted to verify that assumption. The purpose of the Alternate-Fuels Performance Evaluation Program was to evaluate and compare the impact of burning six different liquids fuels in an external-combustion system. Testing was conducted in the automotive Stirling engine (ASE) combustion performance rig, which duplicates the external heat system (EHS) of a Stirling engine. The program expanded the range of fuels evaluated over previous studies conducted at Mechanical Technology Incorporated (MTI). The specific objective was to determine the optimal combustion stoichiometry considering the performance parameters of combustion efficiency, temperature profile, exhaust emissions, and burner wall temperature. DOE

N86-25502*# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mechanical Engineering.
EMISSION FTIR ANALYSES OF THIN MICROSCOPIC PATCHES OF JET FUEL RESIDUES DEPOSITED ON HEATED METAL SURFACES Final Report
James L. Lauer and Peter Vogel 30 May 1986 95 p refs
(Grant NAG3-205)
(NASA-CR-176786; NAS 1.26:176786) Avail: NTIS HC A05/MF A01 CSCL 21D

The relationship of fuel stability to fuel composition and the development of mechanisms for deposit formation were investigated. Fuel deposits reduce heat transfer efficiency and increase resistance to fuel flow and are highly detrimental to aircraft performance. Infrared emission Fourier transform spectroscopy was chosen as the primary method of analysis because it was sensitive enough to be used in-situ on tiny patches of monolayers or of only a few molecular layers of deposits which generally proved completely insoluble in any nondestructive solvents. Deposits of four base fuels were compared; dodecane, a dodecane/tetralin blend, commercial Jet A fuel, and a broadened-properties jet fuel particularly rich in polynuclear aromatics. Every fuel in turn was provided with and without small additions of such additives as thiophene, furan, pyrrole, and copper and iron naphthenates. B.G.

N86-25503# Morton Thiokol, Brigham City, Utah.
MINUTEMAN STAGE 3 OPERATIONAL SURVEILLANCE PROGRAM 7-YEAR TESTING BONDLINE AGING STUDY
Michael R. Knight Dec. 1985 133 p refs
(Contract F42600-86-C-0001)
(AD-A164288; TWR-32333) Avail: NTIS HC A07/MF A01 CSCL 21/9

The program objective is to provide material properties aging data at silo conditions (70 + or - 5 F, 50 + or - 5 percent RH) for liner bond strength, ANB-3066 propellant, SD-851-2 liner, and V-45 insulation from selected locations of three Minuteman Stage III motors. These data are to be used to relate the conditions of the dissected motors to those of operational motors (via excise samples) and to compare and adjust the age of all of these to the Stage II nominal liner degradation curve. This report contains results of the yearly material properties testing of Stage III motor segments in the 12-year bondline aging study. Also reported are the results obtained in the continued testing/monitoring of Motor TC 30024 (LRSLA Simulated Aging Test No. 3), as are the second year results of tests upon the bondline materials and propellants obtained from dissected stage III segments of Motor TC 30072. The twelve-year bondline aging study uses segments removed from three in-process reject motors which were cast in 1971 and were rejected due to apex voids. Segments maintained at silo conditions are being used to track bondline aging of Stage III motors with testing of material properties being performed at one-year intervals to 1990. GRA

N86-25504# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATION OF THE ENERGETIC CHARACTERISTICS OF TN IN COMPOSITE SOLID PROPELLANTS
Zhang Wei and Tian Deyu 23 Jan. 1986 19 p refs Transl. into ENGLISH from Yuhang Xuebao (China), no. 2, 1984 p 84-90

(AD-A164310; FTD-ID(RS)T-0961-85) Avail: NTIS HC A02/MF A01 CSCL 19/1

This paper introduces the physiochemical properties of a new organic oxidizer - 2, 3, 5,6 -tetranitrato - 1,4 Dinitropiperazine (TN). Based on White's minimization of Gibbs free energy principle, its energetic characteristics in solid propellants are investigated with the aid of a computer. The results indicate that the theoretical specific thrust of a composite solid propellant consisting of TN, aluminum powder (Al) and HTPB can reach 276 sec, approximately 10 sec. higher than the Ap, Al and HTPB series of propellants. This demonstrates that TN is indeed a high energy oxidizer. In addition, characteristics of smokeless propellants consisting of TN and HTPB are being studied preliminarily in this paper. GRA

N86-25505# Coordinating Research Council, Inc., Atlanta, Ga.
THE 1984 CRC (COORDINATING RESEARCH COUNCIL) OCTANE NUMBER REQUIREMENT SURVEY
Dec. 1985 272 p refs
(AD-A164454; CRC-544) Avail: NTIS HC A12/MF A01 CSCL 21/4

In the thirty-eighth annual statistical survey of current model vehicles conducted by the Coordinating Research Council, Inc., test data were obtained on 407 1984 model vehicles, including 345 US vehicles and 62 imported vehicles. Eighteen laboratories participated in this Survey. Maximum octane number requirements were determined by testing under part-throttle conditions, as well as at maximum-throttle. Requirements are expressed as the Research octane number, Motor octane number, and (R+M)/2 octane number of the reference fuel producing knock which was recurrent and repeatable at the lowest audible level. A new definition of borderline knock was used in this Survey; this change may have affected the 1984 Survey results relative to previous years' Surveys. Estimated octane number requirements for the US vehicles are weighted in proportion to the 1984 vehicle model production figures and, for the imported models, in proportion to import sales volume in the United States. Author (GRA)

N86-25506# Materials Research Labs., Ascot Vale (Australia).
DETERMINATION OF SHOCK INITIATION AND DETONATION CHARACTERISTICS OF PE4 IN PROOF TEST GEOMETRIES
M. C. Chick and L. A. Learmonth Nov. 1985 20 p refs
(AD-A164484; AD-E900539; MRL-R-979) Avail: NTIS HC A02/MF A01 CSCL 19/1

PE4 is a white, soft plastic explosive. It is the standard service explosive for demolition and explosive ordnance disposal. The basic ingredients are: RDX grade B (boiled and milled) - 88%; Plasticizer (PE4 grease) - 11%; Pentaerythritol di-oleate, PEDO 1%. Various shock initiation and detonation properties relevant to the detonation proof testing of PE4 are reported and used to assess the results of a survey of over 450 proof tests on production PE4 for the five year period up to 1981. Conclusions from the investigation include: high moisture content can cause failures; large variations in plasticizer content (up to double) do not cause failures; voids in the PE4 adjacent to and under the detonator do not cause failure; a void across the complete diameter of the PE4 test sample adjacent to the steel plate can cause partial failures; the L2A1 detonator has more than sufficient power to detonate the PE4; full detonation is achieved within the PE4 and the test geometry is several orders of magnitude greater than the critical diameter to support detonation. GRA

N86-25507# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Facility.
REAL-TIME QUALITY CONTROL OF ANTIMISTING KEROSENE (AMK) Final Report, Feb. 1983 - Apr. 1985
Richard J. Mannheimer Oct. 1985 67 p
(Contracts DAAK70-85-C-0007; DAAK70-82-C-0001)
(AD-A163157; BFLRF-187; FAA/CT-85/5) Avail: NTIS HC A04/MF A01 CSCL 21/4

This report discusses the results of a program to develop real-time quality-control tests for antimisting fuels. In Phase 1, die-swell and torsional balance experiments were performed to compare the shear and normal stresses developed by AMK (0.3 percent FM-9 + glycol/amine in Jet A) and 0.1 percent ARCO in Jet A. In phase 2, experiments were conducted to determine the effect of polymer concentration and methods of blending on the rheological properties of AMK. GRA

N86-25508# California Univ., Berkeley. Dept. of Chemistry.
LASER-INDUCED FREE RADICAL REACTIONS Final Report, Feb. 1982 - Jan. 1985
J. H. Clark Oct. 1985 42 p refs
(Contract GRI-5081-260-0568)
(PB86-168788; GRI-85/0241) Avail: NTIS HC A03/MF A01 CSCL 21D

The solvation dynamics of electronically excited 3-aminophthalimide and 4-aminophthalimide were investigated using picosecond, time-resolved, emission spectroscopy. The results show that: (1) the rate-limiting process for the solvation dynamics of these molecules is the dielectric relaxation of the surrounding solvent molecules; (2) the excited-state solvation dynamics can be predicted from the known longitudinal dielectric relaxation rates of the solvent; and (3) the solute molecules are static while the solvent reorganizes around them. These findings constitute the first direct measurements of solvation dynamics that can be directly compared with the predictions of the various theoretical treatments of the solvation process. GRA

N86-25509# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
METHANE FROM BIOMASS AND WASTE Annual Technical Progress Report, 1984
W. H. Smith Jan. 1985 230 p
(Contract GRI-5880-323-0423)
(PB86-156130; GRI-85/0203) Avail: NTIS HC A11/MF A01 CSCL 21D

The production of methane from biomass and waste is discussed. Growth and yield data on a wide variety of plant species and varieties in eight plant resource groups are reported on promising species selected from extensive screening trials of over 150 species. Research results are summarized from water hyacinth and Napiergrass-model species showing yields in excess of 20 dry tons/acre/year. Over 1000 samples were bioassayed for methane yields and the variables affecting conversion to methane were defined. Results emphasize the Multiphase Anaerobic Digestion System (MADS), an innovative design that employs leached/packed beds. A comprehensive information management system and an integrated methane from biomass system model (BIOMET) used for research evaluation and program management are described. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-25510# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering Div.
USING A COMPUTER-AIDED DRAFTING SYSTEM TO AID IN ENGINEERING AND FABRICATION
J. Millaud, F. Goulding, and P. Salz May 1985 10 p Presented at the 4th DOE Workshop on Computer Aided Engineering, New York, N.Y., 10-11 Oct. 1985
(Contract DE-AC03-76SF-00098)
(DE86-004097; LBL-19692; CONF-851060-2) Avail: NTIS HC A02/MF A01

The generation of schematics and artwork on CAD workstations yields a large amount of numeric data that can be used in many ways. Standard by-products are connection lists, photoplot files and drill files. Using open-ended software allows for more information to be retrieved and used for various purposes in engineering and fabrication. DOE

N86-25511# Applied Research Associates, Inc., Albuquerque, N. Mex.

FUNDAMENTAL PROPERTIES OF SOILS FOR COMPLEX DYNAMIC LOADINGS. DEVELOPMENT OF A THREE INVARIANT CONSTITUTIVE MODEL Final Report, 1 Aug. 1980 - 31 Jul. 1984
Douglas Hall Merkle and William Christopher Dass 22 Apr. 1985 104 p
(Contract F49620-80-C-0088)
(AD-A164206; Rept-5230; AFOSR-85-1232TR) Avail: NTIS HC A06/MF A01 CSCL 08/13

This study sought to develop a general soil stress-strain model which can be used to solve a wide range of soil dynamics problems. The approach used was to review existing soil constitutive models used to predict the response of soil masses to complex dynamic loads, and then formulate a new model for that purpose. Eight existing soil dynamic stress-strain models were studied. The Lade model was selected as the best point of departure for developing a new soil stress-strain model for complex dynamic loading, because of its accuracy and flexibility in representing soil stress-strain behavior, ease of parameter determination, and ease of developing intuition for parameter physical significance and accuracy. The new conic model is so called because its principal mathematical surfaces are conic sections. The computer code used to exercise all nine soil constitutive models under eleven stress and strain paths is called the Soil Element Model (SEM). It can be incorporated in large finite difference or finite element codes for analyzing the response of soil masses to complex dynamic loads. The conic model performs well over a wide range of loading conditions. The parameters are determined in a straightforward manner, and the model reflects the influence of the intermediate principal stress on shear strength through a shear failure surface involving three independent stress invariants: the first total stress invariant and the second and third deviator stress invariants. GRA

N86-25512# Applied Research Associates, Inc., Albuquerque, N. Mex.
FUNDAMENTAL PROPERTIES OF SOILS FOR COMPLEX DYNAMIC LOADINGS. DEVELOPMENT OF A THREE INVARIANT CONSTITUTIVE MODEL: APPENDICES A-W Final Report, 1 Aug. 1980 - 31 Jul. 1984
Douglas Hall Merkle and William Christopher Dass 22 Apr. 1985 609 p
(Contract F49620-80-C-0088)
(AD-A164207; Rept-5230-APP-A/W; AFOSR-85-1232-APPTR) Avail: NTIS HC A99/MF A01 CSCL 08/13

Topics in these appendices to AD-A164 206 include: stress analysis; Cayley-Hamilton invariant formulations; octahedral plane plots; basic equations of elastoplasticity; vector representation of a general stress or strain state; incremental flexibility matrix for stress control; incremental stiffness matrix for strain control; incremental deformation mode logic for stress control; incremental deformation mode logic for strain control; elastic stress-strain equations; special equations for the triaxial test; transient response of a three element viscoelastic model; Young's modulus for a hyperbolic stress-strain curve; a hyperbolic expression for Poison's ratio; hyperbolic model for cyclic simple shear; yield surface violation correction for an elastic-perfectly plastic model; AFWL engineering model incremental plastic response; drained and undrained cap models and computational algorithms; Lade model cross sections and parameter determination; conic model cross sections and parameter determination. GRA

N86-25513# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Structures Lab.
EPOXY-RESIN GROUTING OF CRACKS IN CONCRETE Final Report, Jun. 1983 - Dec. 1984
Dennis L. Bean Dec. 1985 44 p refs
(AD-A164306; WES/MP/SL-85-18) Avail: NTIS HC A03/MF A01 CSCL 11/9

Cracked concrete can be successfully repaired by epoxy-resin grouting if it is performed properly, using the correct materials. Epoxy resins can be pressure grouted in cracks of different sizes in concrete at different temperatures, even if the concrete is damp or under water. A literature search was conducted and manufacturers were contacted to obtain the latest information about materials, methodology, and equipment for epoxy-resin grouting. Author (GRA)

N86-25514# Maryland Univ., College Park. Lab. for Numerical Analysis.
UNCERTAINTIES IN ENGINEERING DESIGN. MATHEMATICAL THEORY AND NUMERICAL EXPERIENCE Final Report
Babuska, I. Aug. 1985 39 p refs
(Contract N00014-85-K-0169)
(AD-A164371; BN-1044) Avail: NTIS HC A03/MF A01 CSCL 20/11

Shape optimization in structure mechanics is the center of research and applications. Many papers and books dealing with this subject appeared and special conferences dealt with these problems. The research is directed toward theoretical questions as existence and characterization of the optimal design, bounds for the optimized values, numerical treatment of the optimal design problems, etc. This paper addresses the problem of the reliability of the conclusions based on computational analysis and their relation to the problems of the optimal design. The problem of optimal design consists--in principle--in the comparison of the solutions of states from the set S of admissible states (for example, solution of the problems from the set of admissible domains) and the selection of the optimal state (e.g. the domain) for the engineering design. It is obvious that such a selection can be successful only if the solution of every state is uniformly reliable with respect to the entire set S. This requirement creates a serious difficulty because we are used to solve in practice numerically the simplified mathemtical model formulation of the problem and have experience only with small limited set of practical problems. GRA

N86-25515# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
EQUATIONS FOR NONBONDED CONCRETE OVERLAYS Final Report
Y. T. Chou Sep. 1985 37 p refs
(AD-A163173; WES/MP/GL-85-25) Avail: NTIS HC A03/MF A01 CSCL 13/13

The nature of the design equations for the nonbonded concrete overlays currently used by the US Army Corps of Engineers was examined and the original source of the equation was also examined. Using simple mechanics, new overlay equations were developed which are suitable for different thicknesses and elastic properties in the overlay and base concrete slabs. The difference in the computed overlay thickness between the new and existing equations is not large when the overlay thickness is equal to or greater than the base slab. The difference can become excessive when the overlay thickness is much less than that of the base slab. The new equations were compared with the finite element computer program for concrete overlays with various combinations of slab thickness, elastic property, and subgrade modulus. The comparisons were very favorable, indicating that the overlay equations developed in this report are analytically correct. It was difficult to judge whether the new equations are superior to the existing equation. This conclusion was expected because for all the seven test sections analyzed, the overlay thicknesses were either equal to or greater than those of the base slabs. GRA

N86-25516# Department of the Air Force, Washington, D.C.
IMPROVED BOLT FRAME CONSTRUCTION Patent Application
D. Q. Marshall, inventor (to Air Force) Filed 14 Nov. 1985 13 p
(AD-D012087; US-Patent-Appl-SN-798042) Avail: NTIS HC A02/MF A01 CSCL 13/5

The coupling together of the ends of two sections of pipes is accomplished using a pair of externally mating flanges, a plurality of nut and bolt assemblies, and a split, u-shaped positioning ring which surrounds the mating flanges. The flanges each surround the peripheral surface adjacent to a collar at the ends of the pipe sections, and have a plurality of spaces radial notches around their perimeter. The positioning ring has pairs of inwardly protruding

tabs spaced about its circumference to align with the radial notches of the two flanges. Each pair of tabs has an orifice holding the loosely preassembled nut and bolt assemblies which are all slid into their corresponding notches in the flanges at once when the claming ring is placed over the flanges. Subsequent tightening of the nut and bolt assemblies press the mating flanges together against a seal placed between them to prevent leakage from the coupling. Author (GRA)

N86-25517# Department of the Air Force, Washington, D.C.
MOUNTING DEVICE Patent
Richard L. Long, inventor (to Air Force) Issued 17 Dec. 1985 5 p
(AD-D012110; US-Patent-4,559,101; US-Patent-Appl-SN-532862; US-Patent-Class-156-359) Avail: US Patent and Trademark Office CSCL 13/5

An apparatus for demountably mounting a device to a lightweight, brittle structure, such as high modulus structures or composite structures is discussed. The apparatus is comprised of a baseplate with means for attaching the device to the baseplate, at least one layer of heat-activatable material, an electrical heater, an optical heat sensor, terminals for applying electrical current to the heater and terminals for connecting a temperature indicator to the heat sensor. GRA

N86-25518# Department of the Air Force, Washington, D.C.
METHOD FOR VACUUM BAKING INDIUM IN-SITU Patent
Joseph A. Adamski, inventor (to Air Force) Issued 17 Dec. 1985 6 p
(AD-D012113; US-Patent-4,559,217; US-Patent-Appl-SN-547611; US-Patent-Class-423-299) Avail: US Patent and Trademark Office CSCL 20/12

This invention pertains to a method for producing highly pure indium for subsequent utilization as a reaction component in the synthesis of polycrystalline indium phosphide which includes the step of heating raw indium under vaccuum in an open ended quartz ampoule to a temperature in excess of 850 C, followed by the step of sealing the ampoule while simultaneously maintaining the vacuum in the interior of the ampoule. GRA

N86-25519# United Nations Industrial Development Organization, Vienna (Austria).
OPTICAL FIBER PRODUCTION
E. Bonek, B. Furch, and H. Otruba Jul. 1985 284 p refs
(PB86-140084; UNIDO/IS.542; V-85-29313) Avail: NTIS HC A11/MF A01 CSCL 05C

A report of the U.N. Industrial Development Organization on Optical fiber production includes the following topics: Basics of optical communication; Technology trends; Classification of fibers - fiber standards; Production of optical fibers; Production of optical cables; Testing and quality control; Requirements; Capital investment; Economics of production; Potential suppliers of equipment and technology; Fiberoptics markets - characteristics and trends; Position of developing countries; and recommendations. GRA

N86-25520# National Bureau of Standards, Gaithersburg, Md.
NATIONAL CONFERENCE ON WEIGHTS AND MEASURES (70TH), 1985 Final Report
A. D. Tholen, L. E. Barbrow, and A. P. Heffernan Nov. 1985 267 p Conference held in Washington, D.C., 14-19 Jul. 1985
(PB86-150232; NBS/SP-704; LC-26-27766) Avail: NTIS HC A12/MF A01 CSCL 14B

The proceedings of the 70th Annual Meeting of the National Conference on Weights and Measures are given. Reports by the several standing and annual committees of the Conference comprise the major portion of the publication. Included also are papers presented by Conference officials and others. Major issues discussed at the Conference included a new Scales Code to be effective January 1, 1986, method of sale of commodities, labeling of gasoline-alcohol blends, national type evaluation, and development of training materials. GRA

N86-25521# Brookhaven National Lab., Upton, N. Y.
SPRAYABLE ELECTRICALLY CONDUCTIVE POLYMER CONCRETE COATINGS Final Report, Mar. 1984 - Jun. 1985
J. J. Fontana, W. Reams, and D. Elling Aug. 1985 30 p refs
(Contract DTFH61-84-Y-30331)
(PB86-157542; FHWA/RD-85/102) Avail: NTIS HC A03/MF A01 CSCL 13C

A sprayable electrically conductive polymer concrete coating for vertical and overhead applications has been developed. The technology, in conjunction with impressed current cathodic protection, can be used to prevent corrosion of the embedded reinforcing steel in concrete girders, piers, columns, and beams. A formulation of an electrically conductive polymer concrete, which holds the conductive filler in suspension and can be sprayed in thin uniform coatings, was developed. GRA

N86-25522# Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Bridge and Roadway Technology.
COMPARISON OF METHODS TO RETARD REFLECTIVE CRACKING IN BITUMINOUS CONCRETE USING FABRICS AND FIBERS: CONSTRUCTION AND EARLY PERFORMANCE REPORT Report, Jun. 1984 - Aug. 1985
D. A. Maurer Sep. 1985 68 p refs Sponsored by Federal Highway Administration
(PB86-153087; Rept-83-8; FHWA/PA-85/015) Avail: NTIS HC A04/MF A01 CSCL 13B

The primary purpose of the project is to determine whether any of various treatments, using geotechnical fabrics and fibers, will significantly retard reflective crack formation in an asphaltic concrete overlay. Four paving fabrics, one asphalt/fiber membrane and one fiber-reinforced asphalt concrete, are the treatment alternatives being evaluated. All treatments are being compared with each other and a control section without treatment to determine relative performance, considering cost, ease of placement or adaptability to normal overaly practice, and ability to resist reflective cracking. Field montioring is being maintained for three years to determine overall and relative performance of each treatment. GRA

N86-25523# Utah Dept. of Transportation, Salt Lake City. Research and Development Unit.
CRACK SEALING METHODS AND MATERIALS FOR FLEXIBLE PAVEMENTS Final Report
M. C. Belangie and D. I. Anderson May 1985 82 p refs Sponsored by Federal Highway Administration
(PB86-152345; UDOT-MR-85-1; FHWA/UT-85/1) Avail: NTIS HC A05/MF A01 CSCL 13B

The over forty-four lane miles of test site to gather up to three years of comparative performance data on thirteen crack sealants. The data indicates that the more durable, high ductility materials when applied in a band-aid configuration can be expected to give significantly better performance than the lower ductility materials used by the Utah DOT prior to 1983. Evaluation of laboratory tests indicate that Bond, Ductility and Force Ductility Tests were useful in predicting the cold temperature performance of crack sealants. The Flow Test was found to be effective in eliminating sealants that tracked or pulled-out during hot weather. Both acceptance and lot laboratory testing are recommended. The report includes specifications for material and procedures, and makes recommendations for modifications to both equipment and sealing practice. GRA

N86-25524# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
THERMODYNAMICS AND HEAT TRANSFER IN FIRE FIGHTING
P. N. Romanenko, Y. A. Koshmarov, and M. P. Bashkirtsev 1985 483 p refs Transl. into ENGLISH of the book "Termodinemika i Teplootdacha v Pozharnom Dele" Moscow, USSR, USSR Ministry of Internal AFfairs, 1977 Prepared for National Bureau of Standards, Gaithersburg, Md.
(PB86-155181; TT-81-52193) Avail: NTIS HC A21/MF A01 CSCL 13L

The book presents the fundamental principles of thermody-

namics and heat transfer with particular reference to their application in problems related to fire prevention. Special attention is given to the study of unsteady heat transfer, radiant heat transfer (including radiation from flames to the surrounding), thermodynamic analysis of the growth of fires and theoretical modeling of fires in building. GRA

N86-25525# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ENGINEERING AND EQUIPMENT Abstracts Only
14 Mar. 1986 123 p Transl. into ENGLISH from various Russian articles
(JPRS-UEQ-86-006) Avail: NTIS HC A06/MF A01

Literature abstracts addressing topics in various areas of engineering are compiled. Specific subject categories include surface transportation, fluid dynamics, nuclear and non-nuclear energy, marine technology, optical and optoelectronic devices, turbine design, and industrial technology. For individual titles, see N86-25526 through N86-25538.

N86-25526# Joint Publications Research Service, Arlington, Va.
AUTOMATED MULTIDIMENSIONAL ANALYZER BASED ON SM-3 KAMAK Abstract Only **c19**
R. Kupchak, A. Soltan, N. K. Skobelev, M. Levitovich, A. Yankovski, and G. Baluka *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 1-2 refs Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow), no. 2, Mar.-Apr. 1985 p 203-206 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A device for rotating a detector in open space that has been developed for the scanning electrostatic analyzer carried aboard the Interkosmos-18 satellite is described. The device incorporates a moving head that holds the detector, a magnetoelectric drive consisting of a permanent magnet and stationary coils that are coupled to the head, a slotted code disc that fits in a yoke that employs six pairs of light-emitting diodes and photodiodes, electronic angle-of-revolution display circuit, and a drive control. Negative feedback is employed to stabilize and limit the amplitude. The system consumes less than 10 mW. While in operation aboard Interkosmos-18, the period of the device remained constant to within + or - 0.4%; within 20 days of continuous operation this figure dropped to 18%. The amplitude of the oscillations increased by several degrees over 20 days, apparently due to gradual reduction of the friction in the bearings. Author

N86-25527# Joint Publications Research Service, Arlington, Va.
SELECTIVE COATINGS FOR SOLAR-TO-THERMAL ENERGY CONVERTERS Abstract Only **c19**
M. I. Umarova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 20 refs Transl. into ENGLISH from Izv. Akad. Nauk Tadzhiksoy SSR Otd. Fiz.-Mat., Fiz. i Geol. Nauk (USSR), no. 2 (92), Apr. - Jun. 1984 p 61-71 Previously announced as N85-28144 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

The possibility of obtaining a two layer selective coating consisting of a ferrous oxide and a transparent conducting layer by pulverization on a foil substrate in a unified technological process was investigated. In the pulverization method, a solution containing the chemical elements needed to produce the required layer was sprayed onto a heated substrate. The characteristics of a CuO + SnO2 selective coating were investigated in field tests under high altitude conditions, and indicate that this coating is suitable for solar energy converters. The coating is easy to produce, low in cost and resistant to solar radiation. Author

N86-25528# Joint Publications Research Service, Arlington, Va.
PERIODIC OPTICAL FARADAY-EFFECT CHOPPER Abstract Only **c44**
N. I. Gavrilov, A. M. Godes, V. Kh. Krupkin, A. L. Levit, and V. M. Ovchinnikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 58 refs Transl. into ENGLISH from Optiko-Mekhanicheskay Promyshlennost (USSR), no. 1, Jan. 1985 p 17-19 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A Faraday effect optical chopper is described which controls radiation at the 1.06 micron wavelength in the periodic mode with repetition rates up to 100 Hz. The chopper includes a Faraday rotation, an air-core solenoid which produces a magnetic induction of 0.5-1 T for 45 deg. rotation of the polarization plane, and a 3.6 nF capacitor bank which discharges into the solenoid in pulses. The capacitor bank is energized from a 220/800 V - 50 Hz transformer through a diode-rectifier bridge. The rotation angle is proportional to the square root of the capacitor discharge energy and inversely proportional to the square root of the solenoid radius, but does not depend on the number of solenoid turns, with a constant coefficient equal to the magnetic permeability of the medium multiplied by the Verdet constant and with a variable coefficient which depends on the ratio of solenoid radius to solenoid length and the ratio of rotator rod length to solenoid length. The normalized rotation angle increases from zero to unity as the relative length of the rotator rod increases, reaching unity at a smaller relative rod length as the relative solenoid radius decreases. The relative radial nonuniformity of the rotation angle, referred to the rotation angle at the solenoid axis, also depends on those two ratios: increasing monotonically as the relative solonoid radius increases but increasing with a sharp peak and then decreasing to zero as the relative rotator rod length increases beyond the solenoid length. M.G.

N86-25529# Joint Publications Research Service, Arlington, Va.
ELASTOHYDRODYNAMIC PROBLEM FLUID FLOWING TOWARD CRACK IN POROUS MEDIUM Abstract Only **c74**
A. V. Baluyeva and A. F. Zazovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 74 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Tverdogo Tela (USSR), no. 5, Sep.-Oct. 1985 p 157-166 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A steady-state flow of a fluid toward a single crack in a boundless porous elastic medium is analyzed, specifically a discal crack whose hydraulic permeance depends on its opening. The corresponding problem of elastohydrodynamics is formulated in two approximations, either for a laminar flow according to Boussinesq's law or for an infinite local permeance but a reduced filtration area as a result of partial or complete closure of the crack surface with formation of overlap zones; both approximations yield a nonmonotonic pressure dependence of the flow rate. The problem is formulated in accordance with the Bio theory of consolidation in a half-space, whereupon its solution is sought with the aid of the generalized Gibson representation and the Hankel transformation. The resulting system of nonlinear integral equations can be solved by the method of successive approximations. In the case of filtration with overlap zones, the problem splits into two, one in the theory of elasticity with body forces produced by pressure gradients and one in the theory of filtration. Ignoring the finiteness of the local permeance makes it possible to solve these two problems sequentially rather than only simultaneously. They are solved by the variational-difference method. Numerical calculations have been made, assuming a unity filtration coefficient, for a horizontal crack with elliptical cross-section in the ground and a vertical crack with circular cross-section in bedrock. Author

N86-25530# Joint Publications Research Service, Arlington, Va.
STABILITY CHARACTERISTICS OF SUPERSONIC BOUNDARY LAYER AND THEIR RELATION TO TRANSITION POINT BETWEEN LAMINAR AND TURBULENT FLOW Abstract Only **c34**
V. I. Lysenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 75 refs Transl. into ENGLISH from Izv. Sibirksogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no. 4, iss. 1, Mar. 1985 p 79-86 Original language document was announced in IAA as A85-42123 (For primary

document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

The transition point between laminar and turbulent flow in a compressible boundary layer has so far been predicted by approximate methods, but neither those based on the linear theory of stability nor the e(n)-method with n= 2.7 are adequate for supersonic boundary layers. This deficiency can be remedied by calculations based on the system of three partial differential equations describing the flow of a compressible heat conducting gas in a boundary layer with a pressure gradient accompanying heat transfer, in accordance with the standard program for calculating the perturbation buildup coefficients under such conditions. These coefficients are determined from the system of four equations of stability in the Dan-Lin approximation and with the Reynolds number is defined in terms of the transverse or normal scale. Results obtained for conical surfaces in winter (300 K) and in winter (-50 C) with thermal insulation underneath by the Schubauer-Skramstead-Smith method with e(10) and e(9), respectively, agree closely with experimental data, which also involve the angle between perturbation wave and main flow as well as other relevant perturbation parameters such as the wave number at supersonic velocities with the Mach number up to N sub M =4. Author

N86-25531# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIRECTIONAL INJECTION AND SUCTION ON CHARACTERISTICS OF LAMINAR BOUNDARY LAYER WITH NEGATIVE PRESSURE GRADIENT Abstract Only c02
M. N. Kiselev, V. P. Motulevich, and E. D. Sergiyevskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 75-76 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no. 4, iss. 1, Mar. 1985 p 94-98 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

Steady laminar flow of an incompressible fluid along a semiinfinitely large plane surface with injection or suction through pores in that surface is analyzed, assuming constant thermophysical properties and a Reynolds number not far below critical. Upon introduction of the flow function in Liese-Dorodnitsyn variables and the pressure gradient, the corresponding two equations of momentum and energy for a self-similar flow are solved for the appropriate velocity and temperature boundary conditions at the outer edge of the boundary layer. From the solution to this boundary-value problem it is possible to determine the two most important integral characteristics of such a boundary layer, namely the skin friction and thermal flux. A solution has been obtained on the YeS-1022 computer by the numerical method of elimination with a constant integration step and with an 800-mesh grid. The results indicate a decrease of skin friction and an intensification of heat transfer with increasing tangential velocity component during injection or suction with a negative pressure gradient, because then both the hydrodynamic and thermal thicknesses of the boundary layer decrease less than does the velocity head. During injection or suction with a quasi-zero pressure gradient, both thicknesses of the boundary layer decrease more than does the velocity head. Author

N86-25532# Joint Publications Research Service, Arlington, Va.
WAVE DRAG OF SOLIDS OF REVOLUTION WITH FRONTAL SEPARATION ZONE IN SUPERSONIC STREAM Abstract Only c02
I. A. Belov, S. A. Isayev, A. Yu. Mitin, and V. N. Konovalov *In its* USSR Report: Engineering Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 77-78 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no. 4, iss. 1, Mar. 1985 p 47-51 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

The wave drag of bodies of revolution with a frontal separation zone, specifically a cylinder behind a disk in a parallel configuration, can be calculated on the basis of exact Navier-Stokes or Reynolds equations which include viscosity. This requires a high-speed computer with large memory capacity. It has been, instead, calculated on the basis of difference solutions to the corresponding Euler equations applicable to turbulent flow with shock waves as well as to circulation flow between bodies. The validity of this approximate model is established by comparing the numerical solution with experimental data, of particular interest being the still largely unexplored supersonic range with the Mach number of quiescent flow N sub Moo >2. The model euqations were solved numerically by the Godunov straight-through method with stabilization of the unsteady finite-difference scheme, for a wide range of geometrical dimensions and the N sub Moo = 2 to 6 range of the Mach number. Experiments were performed in a wind tunnel over the N sub Moo = 1.8 to 4.15 range of Mach number and a wide range of cylinder-disk configurations. Theoretical and experimental values of the wave drag agree rather closely, except for a small disk near the cylinder. The discrepancy in this case is attributable to inaccuracy of the mathematical model, which accounts neither for artificial diffusion nor for the hysteresis effect in flow restructurization characteristic of a body with protruding spike. Author

N86-25533# Joint Publications Research Service, Arlington, Va.
TRANSIENT AERODYNAMIC CHARACTERISTICS OF FOIL IN STREAM WITH SEPARATION FLOW NEAR WAVY WALL Abstract Only c02
L. V. Mikhaylova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 78 refs Transl. into ENGLISH from Izv. Sibirskogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk, no. 4, iss. 1, Mar. 1985 p 56-60 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

Separation flow of an ideal incompressible fluid around a thin foil with a generally curvilinear profile is considered when the foil moves broadside horizontally at a constant velocity above a horizontal wall with wavy upper surface and remains forward tilted at a constant angle. The corresponding boundary-value problem for the velocity potential with a vortex sheet originating at the leading upper edge and trailing behind the trailing lower edge is formulated in a system of nonlinear singular integral equations for the coordinates and the intensities of vortex formations. This system is first reduced to a linear one, by successive linearizations for small time intervals, and then solved numerically after it has been reduced by the method of discrete vortices to a system of algebraic equations. The aerodynamic loads on the foil are evaluated through the Cauchy-Lagrange integral. The procedure has been applied to a foil of rectilinear profile, a plate, moving from rest at a constant horizontal velocity above a wall with a sinusoidal upper surface. The vortex formation immediately above the plate becomes aperiodic when the Strohal number is still small (N sub Sh = 1.047) and then becomes altogether sparse when the Strohal number is large (N sub SH = 6.28). In the latter case the aerodynamic characteristics, particularly the lift coefficient, are determined by the shape of the surface profile underneath as long as the mean altitude of the plate above the wall surface remains much smaller than the plate width. As the altitude fluctuates while the plate moves across the surface ripple, the lift coefficient cycles with hysteresis which weakens as the Strohal number decreases. Author

N86-25534# Joint Publications Research Service, Arlington, Va.
HYPERSONIC FLOW AROUND A WING AT LARGE ANGLES OF ATTACK WITH DETACHED COMPRESSION JUMP Abstract Only c02
V. N. Golubkin and V. V. Negoda *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 87 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidosti i Gaza (USSR), no. 3, May-Jun. 1985 p 149-157 Original language document was announced in IAA as A85-44788 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A study is made of the flow around a thin delta wing with finite delta angle at large angles of attack. A theory presented in earlier works describes a conical flow with a compression jump

attached only at the apex of the delta wing. Possible conditions of flow around the wing at large angles of attack are classified. The results indicate that the asymptotic theory of the shock layer for a wing of finite span is the most general, since it describes all three qualitatively different flow conditions; with a compression jump attached to the leading edge, attached only to the apex or completely detached. A general solution is obtained which allows for nonequilibrium physicochemical processes and heat radiation of the gas at high temperatures. Author

N86-25535# Joint Publications Research Service, Arlington, Va.
CIRCULATION FLOW AT FORWARD SURFACE OF A SPHERE IN A SUPERSONIC WAKE-TYPE STREAM Abstract Only c34
Yu. P. Golovachev and N. V. Leontyeva *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 87-88 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidkosti i Gaza (USSR), no. 3, May-Jun. 1985 p 143-148 Original language document was announced in IAA as A85-44787 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A study is made of an axisymmetrical steady flow around a spherical surface by a nonuniform supersonic wake-type stream with a formed head shock wave ahead of the body and a closed area of return circulation flow. The stream in the wake is modeled by a parallel axisymmetrical stream with constant pressure and axial velocity minimum and temperature maximum. It is shown that with fixed nonuniformity of the incident stream an increase in Reynolds number and cooling of the body surface lead to formation of a secondary eddy in the vicinity of the intersection of the contour of the body with the axis of symmetry. Specifics of the change in resistance parameters and heat exchange over the forward surface of cooled and insulated spheres are studied. The possibility is discussed of numerical modeling of the flow based on the equations of Euler. Author

N86-25536# Joint Publications Research Service, Arlington, Va.
SPECIFICS OF FLOW NEAR STAGNATION POINT WITH SUPERSONIC FLOW AROUND EXPONENTIALLY SHAPED BODIES Abstract Only c02
V. N. Karlovskiy and V. A. Levin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 88 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidoti i Gaza (USSR), no. 3, May-Jun. 1985 p. 138-142 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

A study is made of flow around bodies with shapes described by exponential equations with shock waves for the case of infinite curvature at the tip and finite curvature but infinite second derivative of curvature with respect to the longitudinal coordinate. The shape of the shock wave at the bow is determined by the profile of the entire subsonic portion of the body. The results produced thus can be considered possible cases of the formation of shock waves. Author

N86-25537# Joint Publications Research Service, Arlington, Va.
STABILITY OF SUBSONIC BOUNDARY LAYER UPON HEATING OF A SURFACE OF A FLAT PLATE NEAR THE LEADING EDGE Abstract Only c02
A. V. Kazakov, M. N. Kogan, and V. A. Kuparev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 89 Transl. into ENGLISH from Izvesitya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 3, May - Jun. 1985 p 68-72 Original language document was announced in IAA as A85-44783 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

The possibility of increasing flow stability in the boundary layer by heating the surface of a body near its leading edge, and thus raising the temperature of the gas in the boundary layer, is investigated analytically. It is shown that an increase in the surface temperature near the leading edge of a plate results in increased flow stability with respect to two-dimensional perturbations, with a loss of stability occuring at higher critical Reynolds numbers. The laminar-turbulent transition point shifts further downstream. Author

N86-25538# Joint Publications Research Service, Arlington, Va.
INCREASED STABILITY OF SUBSONIC BOUNDARY LAYER DURING HEATING OF SURFACE NEAR LEADING EDGE OF BODY IMMERSED IN STREAM Abstract Only c02
A. V. Kazakov, M. N. Kogan, and V. A. Kuparev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 91 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 283, no. 2, Jul. 1985 p 333-335 Original language document was announced in IAA as A85-46029 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

Subsonic flow past a flate plate is analyzed for large values of the characteristic Reynolds number. The unperturbed flow near the plate is described by ordinary Prandtl equations for a stead-state boundary layer of a compressible heat-conducting gas; the equations are solved numerically using the finite difference method. It is shown that even when temperature distribution along the body surface is far from optimum, a forced increase in surface temperature near the leading edge of the plate leads to a noticeable decrease in the spatial growth coefficient of the Tollmien-Schlichting waves and to a downstream shift of the transition point. Author

N86-25539# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
17 Jan. 1986 105 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-001) Avail: NTIS HC A06/MF A01

The topics from foreign newspapers, periodicals and books, and news agency transmissions and broadcasts included are: research policies; patents and proprietary technology imports; research organizations; nuclear fusion research; robotics; laser applications; electromagnetic pulses; and numerical control. For individual titles, see N86-25540 through N86-25546.

N86-25540# Joint Publications Research Service, Arlington, Va
NATION'S LARGEST CONTROLLED FUSION RESEARCH FACILITY
In its China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 49 Transl. into ENGLISH from Zhejiang Ribao (Hangzhou, China), 21 Nov. 1985 p 1 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

The China HK-1 was certified as a controlled fusion experimental facility. The 5 Year Plan for nuclear fusion research is described. The China HL-1 facility will be handling experimentation using the ocean as an energy reservoir. B.G.

N86-25541# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF INDUSTRIAL ROBOTS FOR THE AVIATION INDUSTRY
Chunfen Zhang *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 60-63 Transl. into ENGLISH from Hangkong Zhizao Gongcheng (Beijing, China), no. 5, 1 May 1985 p 2-4 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

The current status of robotic research in China is described, particularly the impact on the aviation industry. Suggestions are listed which would improve development and support consumer products. B.G.

N86-25542# Joint Publications Research Service, Arlington, Va.
LASER EXERCISE REMOTE CONTROL SYSTEM DEVELOPED
Anding Li *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 71 Transl. into ENGLISH from Xinhua (Beijing, China), 27 Nov. 1985 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

After 3 years, a YAG-dye-raman wide tunable laser system was developed which passed its technical appraisal tests. Applications are in the fields of laser spectrum, nonlinear optics, materials science, separation of isotopes, pollution monitoring, biology,

genetic engineering, and defense industry. Appraisal by experts is examined. B.G.

N86-25543# Joint Publications Research Service, Arlington, Va.
ELECTRICAL EXCITING TECHNIQUES FOR SIMULATING SYSTEM-GENERATED EMP
Guixin Peng *In its* China report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 72-79 Transl. into ENGLISH from Hedianzianzixue Yu Tance Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 280-284 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

Fundamental knowledge of simulating system generated electromagnetic pulses (SGEMP) and simulating techniques are discussed in terms of basic electromagnetic response parameters. The simulating method is based on the Maxwell equation and its basic symmetry relationships. Electrical exciting techniques assume that the source term J is expressed as incident fields or current carrying conductors. Various electrical exciting methods are compared with respect to the source terms, relevant equations, and boundary conditions of each technique. B.G.

N86-25544# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER-BASED MULTIFUNCTION, MINIMULTI-CHANNEL ANALYZER c60
Jingjin Wang, Ying Chen, Yixiang Wei, Putang Zheng, Hongrei Zhang, Weitong Ji, and Xuehua Qiu *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 80-84 ref Transl. into ENGLISH from Hedianzixue yu Tance Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 297-299 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

The multichannel analyzers now produced in China are basically made up of specialized hardware, their data processing functions are inadequate, and most data processing work is done by other computers. With the development of large scale integrated circuits in recent years, microcomputer functions have constantly increased and their performance/cost ratio has favored their use in nuclear data acquisition and processing systems. To satisfy the daily increasing need in China for a new multichannel analyzer, a small computer based multifunction, multichannel analyzer was developed. The design, technology, systems, and economic reliability are described. Author

N86-25545# Joint Publications Research Service, Arlington, Va.
THE STRUCTURE OF ZSM-5 MOLECULAR SIEVES AT HIGH TEMPERATURE Abstract Only c23
Zhenyi Liu, Wanjing Zhang, Bingxiong Lin, Wei Zhu et al *In* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 86 Transl. into ENGLISH from Ranliao Huaxue Xuebao (Taiyuan, China), v. 13, no. 2, Jun. 1985 p 106-113 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

The crystal structure polycrystalline sample of ZSM-5 zeolite treated with high temperature steam was determined by X-ray diffraction at 500 C. The symmetry of the crystal changed from the space group C sup 5 (sub 2h)-P2 (sub 1/n) at room temperature to C sup 9 (sub 2v)-P2 (sub 1/n) at 500 C and the unit cell parameters were a = 20.09(3) A, b = 19.97(3) A, and C = 13.36(3) A. It is interesting that when the sample was cooled to room temperature again, it returned to C sub h-P2 (sub 1/n). At 500 C the three structural parameters related to shape selectivity (size and shape of both channel opening and bend angle of the Z-form channel) are similar to those at room temperature. Therefore, when molecules of different shapes enter the ZSM-5 channels, the steric hindrance or potential barrier does not change with temperature. It is concluded that the decrease in shape selectivity of ZSM-5 is due to an increase of active molecules in isohydrocarbons and not to the perceptible increase in the size of both channels and openings at elevated temperatures. Author

N86-25546# Joint Publications Research Service, Arlington, Va.
SPECTROSCOPIC OBSERVATIONS OF THE LINE STARK BROADENING IN THE ULTRAVIOLET VACUUM IN LASER-PRODUCED PLASMAS Abstract Only c75
Yongchang Wang, E. Jannitti, and G. Tondello *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 99 Transl. into ENGLISH from Wuli Xuebao (Beijing, China), v. 34, no. 8, Aug. 1985 p 1049-1055 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

The emission from dense plasmas produced by a Q-switched ruby laser pulse focusing on plane targets of the elements Be, C, and N were observed in an ultraviolet vacuum at various distances from the target surface. For recording the emission spectra an intensified photodiode array and an optical multichannel analyzer were implemented. Very broad lines of the type delta n = 1 of the H-like, He-like, and Li-like ions arising from the relatively high principal quantum number n appear prominent in the spectra. According to the ion quaistatic approximation theory, the electron densities of the plasmas as the function of the distances from the target were derived. Author

N86-25547# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
31 Mar. 1986 129 p refs Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-011) Avail: NTIS HC A07/MF A01

The journal presents articles from many Chinese publications. Subject areas reported on are: physical sciences, applied sciences, environmental quality, aerodynamics, lasers, and solar energy. Of particular interest are the titles: Progress in ion-beam fusion research, Visibility of transverse cracks for radiographic inspection of welds,—Dry vacuum distillation, and Acid rain, other factors studied in destruction of pine forests. For individual titles, see N86-25548 through N86-25555.

N86-25548# Joint Publications Research Service, Arlington, Va.
PROGRESS IN ION-BEAM FUSION RESEARCH REVIEWED
Naiyan Wang *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 56-65 refs Transl. into ENGLISH from He Kexue Yu Gongcheng (Beijing, China), v. 5, no. 3, Sep. 1985 p 269-276 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

Progress in particle beam fusion research and key problems still awaiting solutions are outlined. A light ion beam is a potentially ideal driver for inertial confinement fusion because the pulsed power source for producing light ions is cheap and highly efficient. Research on diodes capable of efficiently producing a high brightness ion beam is described. The stopping power for light ion beams was calculated, taking account of both electrons confined in the target and free electrons. Experimental results show that when the current density of the beam is relatively high, the stopping power is twice that for a cold target. Implosion research is under way and cylinder implosion experiments were performed. Author

N86-25549# Joint Publications Research Service, Arlington, Va.
VISIBILITY OF TRANSVERSE CRACKS FOR RADIOGRAPHIC INSPECTION OF WELDS IN SPHERICAL VESSELS c39
Jicheng Xue and Yadeng Xu *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 66-72 Transl. into ENGLISH from Wusunjiance (Shanghai, China), v. 6, no. 5, Dec. 1984 p 39-41 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

Several factors affecting radiographic inspection of transverse cracks in welds in spherical vessels are discussed and some conclusions concerning them are drawn. Because of restraining conditions and residual stress from welding, welding seams in spherical vessels can have a rather serious tendency to crack if technical procedures are not strictly adhered to during assembly and installation. The cracks cause a loss of stability and can lead to leakage in spherical vessels, causing accidents. The results of more than 10 inspections of spherical vessels that were opened indicate that transverse cracks are more numerous in spherical vessel welding seams and that they assume a pattern of radiation

toward the center. There are many methods for nondestructive testing of spherical vessel welding seams to prevent accidents, and each has its own characteristics. Factors that affect the use of radiographic methods to make cracks visible are discussed.
E.R.

N86-25550# Joint Publications Research Service, Arlington, Va.
DRY VACUUM DISTILLATION DISCUSSED **c45**
Yunfu Mei and Naibo Gou *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 78-84 refs Transl. into ENGLISH from Huaxue Shijie (Shanghai, China), v. 25, no. 9, 20 Sep. 1984 p 334-336 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

Dry vacuum distillation, which is operated at higher vacuum and without steam injection, has been developed both in China and abroad. It can be used to improve the yields of gasoline and diesel oil as well as to increase the production of petrochemical feedstocks. Replacing wet vacuum distillation with dry vacuum distillation not only improve yield but also save energy and provide good operational flexibility. It is one of the good measures for realizing the four modernizations in oil refining and the chemical industry.
E.R.

N86-25551# Joint Publications Research Service, Arlington, Va.
ACID RAIN, OTHER FACTORS STUDIED IN DESTRUCTION OF PINE FORESTS **c02**
Shuwen Yu, Ziwen Yu, Houtian Liu, Jianmin Shu, Guangjing Ma, and Xiangyan Zhu *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 92-98 refs Transl. into ENGLISH from Huanjing Kexue (Beijing, China), v. 6, no. 5, 30 Oct. 1985 p 63-66 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

There are frequent reports of mass die-off of trees all the country. In Sichuan alone, there are three serious cases. In order to investigate the causes of death, the concerned state S&T Commission instructed the China Forestry Society to assemble a provisional investigation team. Together with experts from other institutions, the team arrived at the locations in Sichuan for a two week investigation. Studied were the causes for the deforestation and the economic impact of the tree deaths. Problems are stated and some brief solutions are advanced but mainly the need for further study is suggested.
E.R.

N86-25552# Joint Publications Research Service, Arlington, Va.
NUMERICAL PREDICTION OF SUPERSONIC BOUNDARY-LAYER TRANSITION Abstract Only **c02**
Guanghua Zhang and Hui Yang *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 99 Transl. into ENGLISH from Kongqidongliuxe Xuebao (Mianyang, China), no. 4, 1985 p 9-18 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

The turbulence model developed by Wilcox and Traci for predicting boundary layer transition was improved in some aspects. A series of numerical experiments were performed on the improved model to predict the supersonic boundary layer transition on a sharp cone with zero angle of attack. The computational results are compared with the wind tunnel test data reported by van Driest and Boison. Satisfactory agreement between numerical and wind tunnel experiments is obtained in many major aspects.
Author

N86-25553# Joint Publications Research Service, Arlington, Va.
MOVEMENT OF HYDROMETEOR PARTICLE CLOUD IN BOW SHOCK LAYER Abstract Only
Guoying Zhao *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 100 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

During reentry, high speed vehicles may encounter condensed phase H2O in the form of ice particles or liquid droplets, which form so called particle clouds. These particles must traverse the shocked air layer enveloping the reentering vehicle prior to impacting the surface. The interaction between the gas and the particles in the shock layer is usually investigated by calculating the trajectory of every particle in the gas flow field with consideration of the presence of other particles (this method is called one-way coupling). A gas-(solid and liquid) particle two fluid flow model is presented, including the interaction (i.e., the mass, momentum and heat transfer) between the two phases (that is, a two way coupling is taken into account), and the dissociation and ionization of the air and the dissociation of the steam (from the particle cloud). The model is solved by using the line method. The flow field of gas and the particle cloud is obtained, and the applicable range of one way coupling is studied. Finally some interesting discussions are presented.
Author

N86-25554# Joint Publications Research Service, Arlington, Va.
KERNEL FUNCTION METHOD FOR UNSTEADY TRANSONIC FLOW PAST LOW-FREQUENCY OSCILLATING BODIES OF REVOLUTION Abstract Only **c02**
Jianyu Cheng and Lixian Zhuang *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 101 Transl. into ENGLISH from Kongqidonglixue Xuebao (Mianyang, China), no. 4, 1985 p 45-54 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

An approximate method is developed to calculate the unsteady surface pressure distributions and stability derivatives for elongated axisymmetric bodies of revolution undergoing harmonic pitching oscillations in transonic flow. The analysis is based on the time linearized transonic small disturbance equation and the concept of local linearization. An integral equation is obtained and solved numerically with the panel method. Some results of the present method are compared with those of other theoretical methods and experiments.
Author

N86-25555# Joint Publications Research Service, Arlington, Va.
NORMAL FORCE CHARACTERISTICS OF SHARP NOSED BODIES OF REVOLUTION AT HIGH ANGLES OF ATTACK IN SUBSONIC AND TRANSONIC FLOW Abstract Only
Xing Tu and Wenkang Wu *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 102 Transl. into ENGLISH from Kongqidonglixue Xuebao (Mianyang, China), no. 4, 1985 p 81-89 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

The normal force characteristics of sharp nosed bodies of revolution were investigated experimentally at high angles of attack in a Mack number range form 0.35 to 1.20. The test results were analyzed. It was shown that both the Mach number and the Reynolds number strongly influence the normal force characteristics. The calculation methods based on crossflow theory had not taken into account the effects of viscosity and compressibility, so the actual phenomenon could not be represented. The present research also investigated the effect of rolling orientation on the normal force characteristics experimentally. It was shown that the vortex pattern on the leeside surface has a considerable effect on the normal force coefficient. The difference of the normal force coefficient for different rolling orientations is approximately the same as the magnitude of the Mack number effect. For sharp nosed bodies of revolution the vortex pattern on the leeside surface cannot be predicted precisely. For the same model, at the same angle of attack, the vortex pattern is different with different rolling orientations. Therefore, we can predict that the aerodynamic characteristics of sharp nosed bodies of revolution at high angles of attack should not be unique, and they can vary within a certain range.
Author

N86-25556# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ENGINEERING AND EQUIPMENT
24 Jan. 1986 104 p Transl. into ENGLISH from various Russian articles
(JPRS-UEQ-86-001) Avail: NTIS HC A06/MF A01

Topics on engineering and equipment from foreign newspapers, periodicals and books, and news agency transmissions and broadcasts presented include: aeronautics and space; marine environments and shipbuilding; nuclear energy; non-nuclear energy;

construction; inductrial technology; turbine and engine design; navigation and guidance systems; high energy devices, optics, and photography; fluid mechanics; and mechanics of solids. For individual titles, see N86-25557 through N86-25598.

N86-25557# Joint Publications Research Service, Arlington, Va.
STABILITY OF INFINITELY WIDE TRIPLE-LAYER PANEL PROPELLED BY TRACKING FORCE Abstract Only
N. B. Grigoryan *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 1 Transl. into ENGLISH from Izvestiya Akademii Nauk Armyanskoy SSR: Mekhanika (Yerevan, USSR), v. 37, no. 6, Nov. - Dec. 1984 p 65-73 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The flight of an infinitely wide triple layer panel driven by a uniformaly distributed compressive tracking force at a constant acceleration is analyzed as flutter of a nonconservative system. For stability analysis of such a system, the equations of small transverse vibrations are derived from the balance of forces on an element of unit width and infinitesimal length. Three different boundary conditions are considered: both panel edges free; one panel edge free and the other edge constrained by by an infinitely stiff diaphragm; and each panel constrained. Stability analysis of such systems by the dynamic method of Bolotin involves determining the load dependence of the vibration frequency. The critical load under which the vibration amplitude begins to increase is determined, after the frequency equation was obtained from the characteristic equations. The algorithm was programmed for computer calculation and applied to the panels. B.G.

N86-25558# Joint Publications Research Service, Arlington, Va.
SUPERSONIC FLOW AROUND BLUNT PERFORATED SHIELDS c02
Abstract Only
S. V. Guvernyuk, K. G. Savinov, and G. S. Ulyanov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 2 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 143-149 Original language document was announced in IAA as A85-28442 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Experimental results are presented on flow past thin porous metallic disks and square plates at high angles of attack (75 to 90 deg), Mach numbers of 2.0 to 3.0 and Reynolds number of 2 to 4 million in a supersonic wind tunnel. The features characterizing flow past such screens are found to be determined by intense self sustaining gas injection into the base region. The dependence of the aerodynamic characteristics on the porosity coefficient of the screen is studied for a freestream Mach number of 3. B.J.

N86-25559# Joint Publications Research Service, Arlington, Va.
AERODYNAMIC INDUCTANCE OF SUBSONIC WIND TUNNELS WITH AXISYMMETRIC TEST ZONE Abstract Only c02
O. Yu. Starikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 150-154 Original language document was announced in IAA as A85-28443 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The axisymmetric boundary value problem concerning subsonic flow past a thin body of revolution within porous walls is solved for small velocity perturbations at the flow boundary in a subsonic wind tunnel. The boundary condition connects the tangential and normal (to the wall) components of the perturbed velocity, and has a general form for the whole boundary. The optimal wall porosity for which the distortion of the pressure coefficient on the model surface is minimal compared with unbounded flow is determined from the solution obtained. B.J.

N86-25560# Joint Publications Research Service, Arlington, Va.
FLOW AROUND DELTA WINGS WITH BROKEN-LINE LEADING EDGES Abstract Only c02
A. I. Shvets *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Zhidkosti i Gaza (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 171-175 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Two design concepts of delta wings for optimal performance at hypersonic velocities are compared on the basis of experimental data and analytic evaluation. Plain delta wings triangular in the plan view, with the dihedral angle ranging from 180 deg in a flat triangular wing to 0 deg in a completely folded one were considered. Tests were performed on such wings with 150 to 180 deg at angles of attack from -2 to +15 deg in a wind tunnel with the wind velocity varied over the Mach number 4 to 8. Tests were performed on five models of delta wing with broken line leading edges with a 70 deg sweepback angle of the nose and a 50 deg sweepback angle of the tail, all having the same 100 mm half span in the plan view but each having a different dihedral angle of 60, 100, 140, 180, and 220 deg respectively. Both the lift coefficient and the drag coefficient were measured in the wind tunnel at a wind velocity corresponding to the Mach number 3, for determining their dependence and the lift to drag ratio on the angle of attack. The aerodynamic characteristics of the wing models with the optimal dihedral angle were found to be better than those of flat wings with broken line leading edges. Author

N86-25561# Joint Publications Research Service, Arlington, Va.
APPLICATION OF AVERAGING METHOD TO PROBLEM OF CONTROL SYNTHESIS Abstract Only c09
A. P. Vyazovik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 4 Transl. into ENGLISH from Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 6-13 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A scheme for nonlinear synthesis of control of systems containing slow and fast variables is developed on the basis of the fundamental constructs of the averaging method. The proposed method is used to solve the problem of controlling the movement of an aerodynamic object. In the approach employed, it is not required that the slow movements of the initial and averaged system be close during transients, which simplifies the formalization of the separation of motions. the synthesized control is modeled by the computer for the launch of an aerodynamic object 22.5 km from the coordinate origin, with different angles between the velocity vector and the radius vector of the center of mass. The trajectories obtained behave such that the velocity vector first turns toward the coordinate origin, followed by the near rectilinear movement in the required direction. The integral curves are close to the plane defined by the initial velocity vectors and to the coordinate origin. Author

N86-25562# Joint Publications Research Service, Arlington, Va.
MOVEMENT OF FLEXIBLE WING AT SUPERSONIC VELOCITY UNDER INFLUENCE OF RANDOM GUST Abstract Only c02
B. A. Yershov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 4-5 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Matematika, Mekhanika, Astronomiya (Leningrad, USSR), no. 1, Jan. - Mar. 1985 p 59-63 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The motion of an elastic wing of infinite span in an ideal compressible fluid under the action of a turbulent stream is modeled by a random vertical gust. The unperturbed motion is the movement of a rigid wing at constant horizontal velocity greater than the speed of sound in the undisturbed stream. The perturbed motion is the deformation of the wing. The problem is reduced to an integro-differential equation in partial derivatives. The problem is one of connected aeroelasticity, such that the deformation of the elastic wing excited by the air stream changes the air stream itself. The present problem is determined by the wave equation for the excited velocity potential and the equation of oscillation of the infinite wing plate, related by the boundary condition on the wing. Author

N86-25563# Joint Publications Research Service, Arlington, Va.
OSCILLATIONS IN JET STRIKING BARRIER Abstract Only **c08**
V. Ye. Kuzmina *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 5 Transl. into ENGLISH from Vestnik Leningradskogo Universiteta: Matematika, Mekhanika, Astronomiya (Leningrad, USSR), no. 1, Jan. - Mar. 1985 p 63-69 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A numerical study is presented of self-excited oscillations in a supersonic axisymmetrical jet striking an infinite flat barrier perpendicular to the axis of the jet. Information obtained in a numerical experiment concerning the flow in the area of interaction of the jet with the barrier is used to construct a physical model of the phenomenon. The jet striking this barrier is a self excited oscillating system in which is created by the constant source of energy, the gas mass exciting from the nozzle. The major supplement to the previously suggested physical model is the introduction of additional feedback through the peripheral gas flow. Author

N86-25564# Joint Publications Research Service, Arlington, Va.
LIMITS OF HEAT TRANSFER INTENSIFICATION IN COMPACT HEAT EXCHANGERS Abstract Only **c05**
V. I. Subbotin, V. F. Gordeyev, V. V. Kharitonov, and A. A. Plakseyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 25 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 279, no. 4, Dec. 1984 p 888-891 Original language document was announced in IAA as A85-20092 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Heat transfer in a heat exchanger of the simplest design, a plane porous layer between two solid plates, is analyzed on the basis of the two dimension/two temperature models. The two dimesional temperature field in the porous layer heated by a thermal flux from the sheath plates and cooled by a fluid filtering through it, is calculated as the solution to the corresponding system of Fourier equations of steady heat conduction and convection for the appropriate boundary conditions, assuming a negligible thermal conductivity of the fluid coolant in the direction of flow. The solution reveals that volume rather than surface heat transfer is the principal intensifiable component. Accordingly, four possible methods of heat transfer intensification are evaluated and their limits are compared: increasing the dispersion of the porous layer; use of liquid metals as coolants; use of low boiling or easily vaporized liquids such as water and organic fluids as coolants; and artificial turbulization of the coolant flow. The porous layer can be designed with microchannels, holes, or slots, with sponge or brush structure, and can be made of sintered metal fibers or powder. Author

N86-25565# Joint Publications Research Service, Arlington, Va.
SEMICONDUCTOR TEMPERATURE AND STRAIN GAUGES Abstract Only **c02**
M. T. Gorbachuk, V. V. Mitin, Yu. M. Shvarts, and Yu. A. Tkhorik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 40 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 21-22 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A method is proposed which permits the same sensor to be used to measure the temperature and deforming stress (load), and which reduces the errors caused by the simultaneous influence of temperature and strain on the working element of the sensor. The findings are obtained on p-type germanium subjected to uniaxial loading, which disturbs the initial symmetry of the p-Ge. Formulas are derived which make it possible to determine the temperature and strain from the known resistance of the deformed specimen parallel and perpendicular to the axis of deformation. The method permits the strain sensing element to be made of lightly doped material; the temperature range is determined by the size of the interval in which the electrophysical properties of the material employed remain uniform. The results of experimentation using a gauge incorporating a sensing element made of a single crystal of p-type germanium with specific resistance of 41 Ohm per centimeter at room temperature are presented. Author

N86-25566# Joint Publications Research Service, Arlington, Va.
MODERN ULTRASONIC FLOWMETERS Abstract Only **c34**
V. M. Gurevich and S. G. Truman *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 41-42 Transl. into ENGLISH from Sovremennyye Ultrazvukovyye Rashodomery (Moscow, USSR), 1984 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The current status of ultrasonic flowmeters were reviewed on the basis of materials published in the Soviet Union and elsewhere. The following advantages of ultrasonic flowmeters over earlier instruments are cited. A comparative analysis is made of the design methods employed in ultrasonic flowmeters. The evolution of ultrasonic flowmetering is traced from the first generation and trends in their development are analyzed. B.G.

N86-25567# Joint Publications Research Service, Arlington, Va.
PIEZORESONANT PRESSURE SENSORS Abstract Only **c35**
L. V. Maleyko, V. V. Malov, A. P. Rudenkov, I. V. Yakovlev, T. B. Ibragimov, V. A. Maglysh, O. F. Migukina, and Pitkevich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 42 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 19-21 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Piezoresonant pressure sensors based on existing commercially produced high frequency thermostable piezoelements are described. The possibility of developing a design series of piezoresonant pressure sensors operating in the 0.1 to 600 kPa range for measuring atmospheric pressure in enclosed spaces is examined. The use of a piezoresonator in a self sustained oscillator circuit makes it possible to obtain a signal with frequency proportional to the amount of pressure applies. The maximum error obtained meteorlogical testing of a number of pressure sensor specimens at the Scientific Research Institute for Metrology imeni D. I. Mendeleyev (Leningrad) are presented. The measurement range of piezoresonant sensors can be changed by changing the effective area of the membrane and the distance from the top of the piezoresonator to the edge of the electrode and from the bottom of the piezoresonator down to the edge of the electrode. The sensitivity of the sensor can be increased by making the ratio lambda/beta smaller. The use of a type-A piezoresonator is preferred for building high precision position sensors. Author

N86-25568# Joint Publications Research Service, Arlington, Va.
SEALED REED RELAY LIMIT SWITCHES Abstract Only **c35**
I. P. Ivanov, G. P. Svintsov, M. A. Yefimova, A. V. Lebedev, and Yu. P. Samsonov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 43 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 17-19 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Sealed reed relay limit switches are described which overcome the inherent deficiencies traditionally present in these devices: high material, labor consumption, and difficult operation. Series VSG limit switches developed at the All-Union Scientific Research and Technological Planning Institute for Relay Engineering (Cheboksary) for use in buildings are described. The VSG1 has a single switching contact, the VSG2 a single normally open contact, and the VSG3 a single normally closed contact. The VSG1 employs type MKS-27103 sealed reed relays, while the VSG2 and VSG3 employ KEM-1 reed relays. The magnet system, which consists of magnets and a plate, and the sealed reed relay are contained in a nonmagnetic casing with a slit in it. The mathematical expression defining the geometric dimensions of the magnet system is given. The basic parameteres of all three types of switches are tabulated. The VSG series switches can be used to replace VBK and BVK switches, thus saving electricity, labor, and materials, including silver. Author

N86-25569# Joint Publications Research Service, Arlington, Va.
CONTACTLESS POSITION SENSOR Abstract Only c35
I. I. Popov, G. S. Pyatlina, and Ye. A. Shulyakovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 43 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 16-17 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A new contactless position sensor for switching electrical control and signalling circuits based on the Hall effect is described. The control element (a permanent magnet) is fastened securely to the moving controlled member. When the controlled member reaches some assigned position, the magnetic field of the control element acts upon the sensing element (a Hall element), which outputs a signal whose voltage depends upon the direction of the vectors of the supply current and the magnetic induction. The output signal is fed to a switching element which converts the analog output signal to discrete measurement values. The schematic diagram, timing diagram, and technical specifications of the sensor are present. Author

N86-25570# Joint Publications Research Service, Arlington, Va.
METHOD OF REDUCING VIBRATIONS IN MACHINES WITH HIGH-SPEED ROTOR ON BALL BEARINGS Abstract Only c33
V. B. Balmont *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 45 Transl. into ENGLISH from Izvestiya Vysshihk Uchebnykh Zavedeniy: Mashinostroyeniye (Moscow, USSR), no. 6, Jun. 1984 p 28-33 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Vibrations in a machine with a high speed rotor mounted on geometrically imperfect ball bearings are analyzed. Three series of frequencies were identified in the perturbation spectrum: vibrations caused by defects in the inner race; vibrations caused by defects in balls and their interaction with race defect; and vibrations caused by dimensional variance of balls. From the standpoint of a deterministic spectrum of vibration frequencies, the design of the ball bearings is analyzed for reduction of vibration amplitudes. The constraints were applied to two pairs of radial bearings: standard 4-I2010 and high precision 4-I2010T. Theoretical design calculations and experimental data indicate that, with a definite ratio of ball diameter to diameter of the center circle, the perturbation frequencies can be designed not to coincide with the natural frequencies and the amplitude of vibrations will be greatly reduced. B.G.

N86-25571# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF MANIPULATOR FOR INDUSTRIAL ROBOT WITH THREE ROTATIONAL PAIRS HAVING PARALLEL AXES Abstract Only c33
M. I. Poteyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 46 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedenii: Mashinostroyeniye (Moscow, USSR), no. 6, Jun. 1984 p 54-57 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The dynamics of a manipulator with three rotatinal kinematic pairs having parallel axes are analyzed, for application in an industrial robot. The system of Lagrange equations of the second kind, describing the motion of such a mechanism in terms of kinetic energy in generalized coordinates, is reduced to equations of motion in terms of Newton's laws. These are useful not only for either determining the moments of force couples which will produce a prescribed motion or, conversely determining the motion which given force couples will produce but also for solving optimization problems under constraints in both cases and for estimating dynamic errors. As a specific example, a manipulator with all three axes of vertical rotation is considered. The performance of this manipulator, namely the parameters of its motion as functions of time, is compared with that of a manipulator having one rotational and two translational kinematic pairs. Computer aided simulation of their motion on the basis of ideal models, with all three links represented by identical homogeneous bars, has yielded velocity time diagrams which indicate that the manipulator with three rotational pairs is 4.5 times faster. Author

N86-25572# Joint Publications Research Service, Arlington, Va.
CONTROLLING MOVEMENT OF MANIPULATOR WITH ALLOWANCE FOR ELASTIC OSCILLATIONS OF ARM Abstract Only c37
N. N. Bolotnik and A. A. Gukasyan *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 46-47 Transl. into ENGLISH from Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 38-46 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A mechanical model of a manipulator with three degrees of mobility is examined. The manipulator consists of a stationary base, a pedestal, a vertically oriented shaft, a guide, and an arm. The base, pedestal, shaft, and guide are assumed to be absolutely solid bodies; the arm is a uniform elastic round rod subjected to slight flexing. The shaft of the manipulator moves vertically and rotates about the vertical axis; the arm moves back and forth along the guide. The system is controlled by the virtue of the force with respect to the axis of revolution of the shaft, the vertical force applied to the shaft, and the force applied to the arm. An expression is derived for the kinetic energy of the mechanical system. The problem of defining the control of the system of Lagrange equations describing the movement of the system is analyzed and found to have more than one solution. An algorithm is proposed for calculating the parameters of the control mode which provides the required positioning accuracy. The problem of controlling the rotation of the arm without extension or retraction is analyzed as an example. Author

N86-25573# Joint Publications Research Service, Arlington, Va.
CONVERTER OF ROTATING-TRANSFORMER SIGNALS TO CODE OF SUCCESSIVE-APPROXIMATION ANGLE Abstract Only
V. G. Domrachev and V. A. Podolyan *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 48 Transl. into ENGLISH from Izmeritelnaya Teknika (Moscow, USSR), no. 8, Aug. 1984 p 18-20 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A cyclic converter of signals from a rotating sine-cosine resolver transformer to a binary code of the angle through successive approximation was designed with large to small scale circuit integration. Its two channels yield informative outputs of 12-bit word length. The conversion process is conventional, with mismatch signals being formed in accordance with the algorithms and then reduced to zero digit by digit by the method of successive approximations. Variable input signals are converted into constant ones with the aid of a sampler-storage device. Other converter components are a read-only memory with synchronous pulse energizing and synchronous code recording, a digital to analog converter, four sign-inverting analog switches, a comparator with summation of products at the input and a trigger transmitting the somparator output signal to a successive approximations register, as well as analog switches for channel commutation and function commutation, operational amplifier, and resistor banks. Functions are recorded in the memory without deficiency, owing to addition of a modified memory which records codes with excess. Author

N86-25574# Joint Publications Research Service, Arlington, Va.
AMPLITUDINAL ANGLE-TO-CODE CONVERTER WITH ROTATING SINE-COSINE TRANSFORMER Abstract Only
B. A. Kudryashov, Yu. S. Smirnov, and A. B. Shishkov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 49 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 8, Aug. 1984 p 20-21 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

An angle-amplitude-code converter with rotating sine-cosine-resolver transformer was developed which operates at high speed

without large dynamic error, when only the digital equivalent of the angle is required without scaling or sine and cosine codes. The output signal of the rotating resolver-transformer passes through an angle to tangent and tangent to code converter which feeds the angle code to a read-only memory. The converter consists of a code to sine/cosine converter, one octant detector, an analog commutator, and an analog to digital converter. The rotating resolver-transformer is energized from a reference voltage generator. The output signal of the octant detector is fed to the commutator and also to an exclusive OR gate which receives the angle code from the memory and to a code storage register which receives the output signal from the exclusive OR gate. That register forms and delivers the angle code. The instrument error is smaller here because code to voltage conversion was eliminated, and there is no methodological error here so that the accuracy of this device is much higher than that of conventional angle to code converters. Author

N86-25575# Joint Publications Research Service, Arlington, Va.
SELECTION OF TEST ACCELERATION FACTOR FOR BEARING ASSEMBLIES OF ELECTRICAL MACHINES Abstract Only **c37**

O. D. Goldberg, A. G. Gorbunov, and S. V. Muravyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 51 Transl. into ENGLISH from Elektroteknika (Moscow, USSR), no. 10, Oct. 1984 p 34-36 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The fundamental relation for the service life of ball bearings serves as the basis for determining the mode of service life test acceleration. The test time can be shortened by the factor K sub a = (overload/nominal load) cubed, with a correction factor which accounts for the dependence of service life under a cyclic load on the mode of lubrication and thus on temperature rise. These relations were used for acceleration service life and failure tests of high capacity high precision ball bearing with three different plastic lubricants in wound induction motors, high temperature Class H insulation of the motor coils ensuring that 90 to 95% of all failures under overload were bearing related. Data on 308 to 310 bearings in ten 55 kW motors running at 6000 rpm revealed, upon regression analysis, that degradation of the lubricant to zero electrical resistance at the critical temperature increases the vibration acceleration level from a steady mean initial 70 dB to 100 to 110 dB. Bearings should not be overloaded beyond 0.9 T sub c, T sub c being the critical temperature for a given lubricant. B.G.

N86-25576# Joint Publications Research Service, Arlington, Va.
HARDENING TREATMENT OF MACHINE PARTS WITH CO2 POWER LASERS Abstract Only **c36**

A. S. Borodachev, M. B. Gutman, G. A. Kuznetsov, L. A. Medvedovskaya, and G. K. Rubin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 52 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 10, Oct. 1984 p 51-54 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Two technological laser facilities were built at the All-Union Scientific Research Institute of Electrothermal Equipment for hardening machine parts using 1.2 and 2.5 kW CO2 lasers. Both lasers are continuous wave devices with self sustained gas discharge between flat anode and tubular cathode. Each facility includes a Fabry-Perot resonator, a beam transporting and focusing mechanism, a laser power measuring instrument with a movable beam chopping mirror, and a helium/neon simulating laser with two mirrors for precision alignment of parts. These facilities are intended not only for hardening, but also for annealing, plating, and alloying. Under consideration is also use for welding and cutting. Materials hardenable with these facilities range from perlite iron to chromium steels. Experimentally hardened parts include tool bits, gear teeth, zinc extrusion plungers, bearing races, king pins, bolts, and even diesel cylinders. Hardening is done to ensure high wear resistance of the materials and long service life for the part. B.G.

N86-25577# Joint Publications Research Service, Arlington, Va.
NEW METHOD OF SYNTHESIZING NOMINAL TRAJECTORY FOR MANIPULATOR ROBOTS WITH REDUNDANT DEGREES OF MOBILITY Abstract Only **c37**

M. Vukobratovic and M. Kircanska *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 53 Transl. into ENGLISH from Mashinovedeniye (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 21-25 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The reverse problem of control for a manipulator with redundant degrees of mobility, namely synthesis of its nominal trajectory to eliminate the attendant indeterminacy, is solved by a method which draws not only on the governing kinematic relations but also on the complete dynamic characteristics of such a mechanism. The dynamic characteristics can be evaluated by any method, from general theorems of mechanics as well as from corresponding Lagrange or Gibbs-Appel equations. Here the problem is formulated in generalized Lagrange coordinates for a manipulator with n degrees of mobility. Solution of the problem includes optimization of the vector of their first derivatives. The procedure and a numerical solution are demonstrated on synthesis of a continuous trajectory for a manipulator with four degrees of mobility. The results indicate the integration must be performed over time intervals sufficiently short to minimize the optimization error and sufficiently long to avoid numerical instability of matrix inversions. Author

N86-25578# Joint Publications Research Service, Arlington, Va.
INDUCED VIBRATIONS AND RESONANCE OF SHAFT UNDER NONSTEADY LOAD Abstract Only **c39**

A. I. Vesnitskiy, I. V. Miloserdova, and A. I. Potapov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 53-54 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 103-110 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Torsional vibrations of the rotating shaft in a slider-crank mechanism are analyzed. The corresponding equation of motion is solved for appropriate boundary conditions at both drive end and load end of the shaft. An analysis of the solution reveals anharmonic natural vibrations and resonance under a load with a frequency equal to the time derivative of their phase. The simplest special case is uniform shaft rotation. For an analysis of the mechanism with a range of parametric instability, with stringent constraints on the rate of change of the moment of inertia, the sought solution must be resolved into combination modes. Such a solution can be found exactly, and describes steady state interaction of induced and parametric vibrations, parametric amplification and attenuation of induced vibrations, and excitation of pulsations. B.G.

N86-25579# Joint Publications Research Service, Arlington, Va.
ENGINEERING DESIGN AND OPTIMIZATION OF RADIAL AEROSTATIC BEARINGS Abstract Only **c37**

V. S. Balasanyan and N. Sh. Zhapparov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 54 Transl. into ENGLISH from Mashinovedeniye (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 84-91 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The engineering method developed earlier by V. S. Balasanya for design and optimization of horizontal radial aerostatic guide bearings with discrete feed and supercharge is refined by including the dimensions of pockets and the throttling of air twice, first through an orifice and then through an annular diaphragm in the clearance upon exit from a pocket. This is in addition to including the effect of circumferential leakage on the corrections to two discreteness factors in calculation of bearing stiffness and pressure flow distribution, as well as on the supercharge lines schematic. The bearing performance parameters are evaluated first, analytically and then numerically. Results reveal that inclusion of the double throttle improves the accuracy of calculations appreciably when the areas of orifice and diaphragm are comparable. The size of

the pocket diameter affects the optimum orifice diameter and the bearing stiffness, both increasing somewhat as the diameter is increased. In the real case of a large pocket, throttling occurs principally through the orifice, however, and comparison with experimental data reveals that accounting for the double throttle does not significantly improve the accuracy of performance calculations. Author

N86-25580# Joint Publications Research Service, Arlington, Va.
DYNAMIC DESIGN OF SLIDING BEARINGS Abstract Only **c37**

I. M. Khomenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 55 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 9-12 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The design and performance of a sliding bearing under dynamic conditions are analyzed, the object being to determine the maximum allowable shaft (rotor) unbalance and the minimum thickness of lubricant film for a given minimum radial clearance. The calculations are based on the theory of motion of unbalanced bodies, unbalance being defined as the distance from geometric center to center of mass and the shaft assumed to be in equilibrium when the centers of both bearings lie on a horizontal line. Conditions of shaft oscillation with unilateral shaft wear are considered, depending on whether the inertia load is respectively smaller or larger than the static load (rotor mass), but the worst case being the critical conditions where both are equal so that breakaway and impacts can occur. Author

N86-25581# Joint Publications Research Service, Arlington, Va.
MATCHING HEAD AND CAVITATION CHARACTERISTICS OF TWIN AXIAL (WORM-TYPE) PUMP IMPELLERS Abstract Only **c37**

I. V. Shcherbatenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 56 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 12-14 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The cavitation characteristics of centrifugal pumps are improved by placing a worm impeller in front of the main one, which also raises the second critical breakaway cavitation factor from 1500 to 2500 and 4000 to 5000. A further improvement of such centrifugal worm pumps is the addition of another worm impeller in front of the other one, either on a separate shaft rotating at a lower speed or on the same shaft with a larger radial clearance. The problem is to match the cavitation factor, now in the 15,000 to 20,000 range, with the specific speed and thus with the head. The vanes of this auxiliary impeller are set at an angle which will ensure cavitational breakaway simultaneously at both worms so as to maximize the working head in both worm impellers with the critical margin of cavitation head at its minimum. The analysis can thus be reduced to conventional theory. Calculations on this basis are made for a twin-worm impeller with uniform vane pitch in a viscous incompressible fluid. The dependence of the blade setting angle on the pump capacity and the fringe losses is obtained for design purposes. Author

N86-25582# Joint Publications Research Service, Arlington, Va.
INTEGRAL METHOD OF CALCULATING LOADS ON BEARINGS IN GEAR-TYPE ROTARY PUMPS WITH LIMITED WORKING SPACE Abstract Only **c37**

E. I. Rudoy and A. G. Garkusha *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 56 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 15-17 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The performance of gear type rotary pumps, which operate under periodically varying flow rate and outlet pressure, depends largely on the loads on the gears and their bearings. These loads are determined by the corresponding varying dimensions of the high pressure zone and are calculated either exactly at only several critical points, a laborious procedure, or on the basis of only approximate empirical relations. Integral averaging of the varible quantities is proposed instead, so as to combine simplicity with infinitesimal discretization. The total load on a bearing is the sum of the hydraulic pressure by the fluid and the tooth contact pressure transmitted through the seals. The instantaneous horizontal and vertical components of hydraulic pressure are integrated with respect to the coordinate of the tooth contact point on the line of action over a full tooth pitch on the base circle, assuming a constant speed of rotation and thus a uniform motion of the contact point. For numerical data and illustration of the method, calculations were made for pumps developing a pressure head of 16 MPa. Author

N86-25583# Joint Publications Research Service, Arlington, Va.
EFFECT OF UNDERCOATING BY HEAT AND AIR BLAST TREATMENT ON TRIBOLOGICAL CHARACTERISTICS OF SOLID LUBRICANT IN STEEL FRICTION PAIRS Abstract Only **c37**

Z. S. Rubsova, L. N. Sentyurikhina, G. A. Protasov, and V. I. Lopukhin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 57 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 26-27 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The effectiveness of solid lubricants such as molybdenum disulfide coated on the mating surfaces of friction pairs can be further increased, in terms of wear reduction, by undercoating the surfaces with a layer of nickel-chromium steel or a high-chromium steel plus molybdenum composite. An experimental study of this technique was made on friction elements made of stainless steel. Solid lubricant coating was deposited after grinding and sand (corundum) blasting of the undercoated surfaces. Tests at temperatures of 20 to 150 C with rubbing velocities of 0.23 to 0.87 m/s under an initially 1290 to 1760 MPa contact pressure were performed on friction pairs with 100 to 110 micrometer thick undercoatings. These test were performed with the principal friction pair consisting of a rotating steel disk and a stationary steel ball. The results indicate that the maximum wear resistance of the mating surfaces is attained by undercoating either both surfaces or the one which will not be subsequently coated with solid lubricant, in the latter case the solid lubricant being perferable deposited on the surface with the larger working area. Author

N86-25584# Joint Publications Research Service, Arlington, Va.
SUPERSONIC FLOW ABOUT CONE WITH INJECTION OF GAS THROUGH ITS SURFACE DESCRIBED BY POWER LAW Abstract Only **c34**

A. M. Antonov and v. A. Zakrevskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) date p 56 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 8, Aug. 1984 p 31-35 Original language document was announced in IAA as A85-10465 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The influence of intensive mass transfer on the supersonic flow of gas about a cone of finite length is investigated. The mathematical model describing the interaction of the primary flow and the transverse flow formed by injection is the boundary problem for a system of equations presented with boundary conditions on the cone and on the contact discontinuity. It is found that the contact surface is nonrectilinear when the injected gas is described by a power law and that the thickness of the layer coming in contact with the cone increases as the intensity of the injection becomes higher. The distribution of the pressure coefficient along a finite cone is calculated as a function of the parameter(s) associated with the injection flow rate, and the Mach number of the oncoming stream. It is found that the pressure coefficient drops off along the generatrix of a cone for all velocities of injection and oncoming stream when the injection is distributed. As the injection intensity increases, the pressure coefficient on the surface increases. Author

N86-25585# Joint Publications Research Service, Arlington, Va.
HIGH-ENERGY DEVICES, OPTICS AND PHOTOGRAPHY c93
K. Borodio *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 76 Transl. into ENGLISH from Sotsilaisticheskaya Industriya (Moscow, USSR), 21 Nov. 1985 p 4 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Using a unit for catching high energy particles form space in an experiment called Pamir, scientists have obtained new data on interactions between these particles and nuclei of atoms of matter. According to a hypothesis of physicists, electromagnetic fields operating in space and in supernova stars which flare up from time to time accelerate particles to energies which are hundreds of thousands or even millions of times as high as those which can be obtained on Earth. Something resembling a layer cake with layers of lead and a special X-ray film in lightproof and waterproof packages was set up on a level area at an elevation of almost 5,000 meters in the Pamir Mountains. This cake covers an area of almost 1,000 square meters. A single X-ray film takes up about a hectare. Particles enter the X-ray emulsion chamber and form spots on the film. The particles energy and the character of their interaction with nuclei of atoms of matter can be judged on the basis of these spots. Author

N86-25586# Joint Publications Research Service, Arlington, Va.
TRANSIENT SCATTERING OF PLANE ACOUSTIC PRESSURE BY PIECEWISE-HOMOGENEOUS PLATE Abstract Only c34
V. A. Galazyuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 77 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 11, Nov. 1984 p 25-29 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Transient scattering of a plane acoustic pressure wave by an elastic piecewise homogeneous plate is an initial value problem for intricate mixed boundary conditions. In the case of an infinitely large plate with a perfectly rigid straight or annular inclusion of uniform width and thickness, this problem is reducible, by the apparatus of Chebyshe-Laguerre polynomials, to a sequence of Fredholm integral equations of the second kind with a regular kernel. It is solved for a plane pulse wave impinging on an infinitely long perfectly rigid inclusion of finite width which constitutes the boundary of an acoustic half-space and for a plane continuous wave impinging on an annular perfectly rigid inclusion of finite uniform width. In both cases the Chebyshev-Laguerre integral transformation yields a sequence of ordinary differential equations. Assuming that the motion of the plate follows the classical theory of flexure, the solution to the problem will depend on only two dimensionless parameters: relative half-width of the inclusion and acoustoelastic modulus of the plate. Author

N86-25587# Joint Publications Research Service, Arlington, Va.
SOLUTION TO PROBLEM OF TRANSIENT DIFFRACTION OF ACOUSTIC WAVES BY INFINITELY LONG OPEN SHELLS c71 Abstract Only
V. V. Dykhta *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 78 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 11, Nov. 1984 p 33-35 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Special methods are required for solving problems of transient diffraction of acoustic waves by open shells, to ensure that the inverse transformation will restore the original uniquely where exact inverse Fourier transformation will not necessarily succeed. A method has been proposed for this applicable to open shells of arbitrary shape but finite dimensions. The method is demonstrated on an undeformable infinitesimally thin acoustically soft or stiff shell of this class in a boundless initially quiescent acoustic medium. Solution of the corresponding boundary value problem involves a Laplace transformation of the wave equation for sought velocity potentials. The boundary conditions in orthogonal curvilinear system of coordinates are supplemented with asymptotic conditions and conditions at the edge so that the unknown variables can be sought in the form of integro-discrete series expansions in eigenfunctions of corresponding Sturm-Liouville problem. Coefficients of the expansion, for a soft shell or for a stiff shell, respectively, yield an exact solution to the problem. Discretization of the eigenvalue spectrum corresponds to a shell of finite dimensions. Author

N86-25588# Joint Publications Research Service, Arlington, Va.
SOUND ISOLATION IN WIDE CYLINDRICAL TUBE WITH ANNULAR GROOVES IN WALL Abstract Only c71
P. V. Kuznetsov and G. S. Nosko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 80 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 30, no. 3, May - Jun. 1984 p 395-396 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The acoustic field in a cylindrical tube representing a turbomachine, with a number of equidistant identical annular grooves approximately equal to the number of blades, was analyzed as a field with m-th order symmetry and with the solution to the wave equation being a harmonic function of time as for a multimode waveguide. The already established feasibility of attenuating the mO-mode in a waveguide by means of an array of axisymmetric resonators was experimentally adopted for isolating acoustic noise in a turbomachine. The experimental data on the bandwidth and the attenuation coefficient agree satisfactorily with the predicted performance of resonators optimally designed for given tube volume and groove frequency characteristics. Author

N86-25589# Joint Publications Research Service, Arlington, Va.
HYDRODYNAMIC INTERACTION OF TWO SPHERICAL PARTICLES CAUSED BY SOUND WAVE PROPAGATING ALONG CENTER-TO-CENTER LINE Abstract Only c71
A. P. Zhuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 81 Transl. into ENGLISH from Priklaknaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 111-116 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Forces in a two particle system in a fluid with an acoustic field are calculated, specifically for two identical spherical particles some distance apart in a boundless ideal fluid with a plane sound wave propagating along the center to center line. One problem here is diffraction of sound by the downstream particle, formulated as the corresponding wave equation in the potential of the reflected wave field for a given potential of the incident wave field. This problem is solved by the method of separation of variables in spherical coordinates and subsequent reduction, assuming that the particles move in accordance with Newton's second law. The solution yields the resultant force on the downstream particles as consisting of two components, the force of sound radiation pressure and the force of hydrodynamic interaction. The latter is produced by the diffraction field of this particle, without reaction of this particle on the upstream one. The expressions simplify appreciably for long waves, because higher order terms can be discarded. The relations are identical to those for a single spherical particle in a fluid with and acoustic field. Author

N86-25590# Joint Publications Research Service, Arlington, Va.
ACTION OF NONAXISYMMETRIC NORMAL LOAD ALONG SURFACE OF ELASTIC SHELL INTERACTING WITH FLUID Abstract Only c39
V. I. Pozhuyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 82 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 58-64 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A coaxial infinitely long pair of a cylindrical shell around a solid cylinder is considered with an ideal compressible fluid filling the channel and interacting with the outer cylinder. The latter is under normal pressure arbitrarily distributed in space, over the length and around the circumference, but constant in time. The problem of a load moving on the surface parallel to axis is solved

by means of integral transformation with respect to the axial coordinate and Fourier series expansion with respect to the angular coordinate. The velocity of the load is assumed to be constant, but of arbitrary magnitude relative to the acoustic velocity in the fluid. Nonaxisymmetric vibrations of the shell are described by equations of dynamics for a Timoshenko shell, with terms added which represent radial damping and reaction of the fluid, while motion of the fluid is described by the wave equation. These equations are solved by integration for boundary conditions of an impermeable inside shell surface and a rigid solid cylinder. The analytical solution of the problem is shown for a self balancing array of loads discrete concentrated around the shell and continuous exponentially decreasing along the shell. Author

N86-25591# Joint Publications Research Service, Arlington, Va.
GENERAL SOLUTION OF SPATIAL PROBLEM OF ELASTICITY THEORY FOR MULTILAYER ORTHOTROPIC CYLINDRICAL SHELL Abstract Only **c39**
A. S. Kosmodamianskiy and V. A. Galich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 85 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 8, Aug. 1984 p 46-48 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The separation of variables method is employed to find an analytical solution to the problem of the stress-strain state to an m-layer thick cylindrical shell made of cylindrically orthotropic materials. The curvilinear part of the lateral surface of the shell is assumed to be free of external forces, and the layers are in rigid contact with one another. The problem is formulated as one of finding the displacement vector. The case of normal pressure inside the shell is analyzed as an example. Author

N86-25592# Joint Publications Research Service, Arlington, Va.
NONLINEAR VIBRATIONS OF FLEXIBLE CIRCULAR PLATES UNDER BENDING AND TENSION OR COMPRESSION LOADS Abstract Only **c39**
A. S. Kosmodamianskiy and O. P. Tatarinova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 86 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 11, Nov. 1984 p 36-39 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Nonlinear flexural vibrations of a flexible circular plate are analyzed, its edge being either movable on a hinge or movable in a clamp under a uniformly distributed radial tension or compression force which varies harmonically in time. The deflection and the necessarily finite radical membrane force, both functions of the radius and of time, are determined from the corresponding system of nonlinear differential equations for boundary conditions. The problem, formulated in accordance with classical linear theory, is solved by the Bubnov-Galerkin method. The result reveals that the period of nonlinear free vibrations depends on their amplitude. Nonlinear induced vibrations, in the binomial approximation with a fundamental component and a third harmonic only, are characterized by an interdependence of amplitude and frequency (period). Author

N86-25593# Joint Publications Research Service, Arlington, Va.
DYNAMIC EDGE EFFECT IN RIGID HOMOGENEOUS VIBRATION-ABSORBER COATING Abstract Only **c39**
V. B. Stephanov and B. D. Tartakovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 87 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 30, no. 3, May - Jun. 1984 p 368-372 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The dynamic edge effect in a rigid homogeneous single layer coating of a vibration absorber material on metal was studied experimentally and is analyzed theoretically, for the purpose of determining its frequency dependence and its manifestation at higher frequencies up to 2500 Hz. First the dependence of the potential strain energy in the coating on the wave dimensions of the latter was determined from the width of resonance peaks of the input admittance and from the shift of resonance frequencies of the flexural vibration modes, after the solid coatings had been split successively into 4, 8, and 16 identical segments, respectively, 0.32, 0.16, and 0.08 m long. The edge effect was then evaluated in terms of the equivalent relative contraction, namely the ratio of the change of segment length to coating thickness. The subsequent theoretical analysis of the frequency dependence is based on an approximate model, a coating of given length, width, and thickness solidly adhering to a vibrating metal bar of given thickness. The scale factor which defines the length of the edge zone is determined from the longitudinal strain and two components of displacement. Solution of the corresponding Lagrange equation by the variational method reveals that the edge effect is maximum when the end of a coating segment coincides with a crest of the bar deformation wave and is minimum when it coincides with a node. Author

N86-25594# Joint Publications Research Service, Arlington, Va.
STABILITY OF NONCIRCULAR CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION Abstract Only **c39**
N. P. Semenyuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 43-49 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

Stability of cylindrical shells with corrugated cross section under axial compression is analyzed exactly, on the basis of Kirchhoff-Love hypotheses with variation of the thickness metrics and according to a shown variational criterion and with Fourier series expansion of the displacement components. For illustration it considered a shell on hinge supports with a generatrix in a polar system of coordinates. Calculation of the critical load and the buckling mode reveals that the number of possible buckling modes increases but the order of the system of equations does not change as the number of corrugation waves increases. The procedure was applied to shells with mean radius R sub 0 = 0.2 m and length L = 0.4 m, of a material with Youngs modulus E = 7.2 times 10.000 MPa and Poissons ratio upsilon = 0.3, having various corrugations with amplitude epsilon = (0.1-48)t/R and number of waves N = 5-48. The results indicate that such shells with N < 30 are less stable than the circular shell with radius R sub 0, the shell with N = 7 being least stable of all. Their buckling modes are also compared to those of the circular shell, and the classical theory is found to be applicable here too. Author

N86-25595# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF CYLINDRICAL SHELLS WITH VARIABLE THICKNESS FOR AXISYMMETRIC LOAD Abstract Only **c39**
N. G. Medvedev and N. P. Totskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 53-57 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The problem of the weight optimization of axisymmetrically loaded closed cylindrical shells of variable thickness is analyzed for the case where a function of the shell thickness is the control variable, with constraints imposed on the shell strength and thickness. For hinged and clamped support conditions, optimum laws of shell thickness variation are found which result in a weight advantages over shells of constant thickness. V.L.

N86-25596# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF NORMAL WAVES IN HOLLOW TRANSVERSELY ISOTROPIC CYLINDER Abstract Only **c39**
V. A. Moiseyenko, V. I. Storozhev, and N. A. Shulga *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 117-118 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

The spectrum of axisymmetric normal waves in a hollow transversely isotropic cylinder is calculated from the corresponding system of two differential equations of motion. The amplitude components of the stress tensor are related to the amplitude components of the displacement vector through Hooke's law, with both the inside and outside surfaces of the cylinder assumed to be stress free. Equating the characteristic determinant to zero yields the dispersion equation, and solution of the latter yields the relation between the dimensionless wave number and the frequency parameter for given ratio of outside radius to inside radius and the given set of five elasticity parameters (three stiffness moduli and two shear moduli). A numerical analysis for a beryllium cylinder has yielded dispersion curves characterizing modes which converge but do not intersect. Author

N86-25597# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATIONS OF SPHERICAL SHELLS REINFORCED WITH MERIDIONAL HOOPS Abstract Only **c39**
V. N. Revutskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 119-121 Original language document was announced in IAA as A85-11595 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

A method allowing for the discrete placement of ribs is used to investigate the effect of rib parameters on the natural frequencies and modes of a clamped spherical shell stiffened by periodic meridional ribs. It is found that the mass of the meridional ribs effect the lower frequencies of the natural vibration of the shell to a greater extent than does the stiffness of the ribs. Consequently, the use of meridional ribs reduces the lower frequencies of natural vibration in comparison with a smooth shell. V.L.

N86-25598# Joint Publications Research Service, Arlington, Va.
THEORY OF NONLINEARLY ELASTIC MULTILAYER SHELLS WITH TRANSVERSE SHEAR STRAIN Abstract Only **c39**
V. Ye. Verizhenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 124-127 Original language document was announced in IAA as A85-11596 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

For the case of a nonlinearly elastic layered shells, more accurate expessions are obtained for the tangential components of the displacement vector, with allowance made for deformations of transverse shear. The expressions and their particular cases make it possible to obtain vesions of a physically nonlinear nonclassical theory for calculating layered shells. These can be used for describing, with a specified accuracy, the stress-strain state of layered thin walled objects of varying complexity. V.L.

N86-25599# Joint Publications Research Service, Arlington, Va.
USSR REPORT: ENGINEERING AND EQUIPMENT
7 Feb. 1986 115 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UEQ-86-002) Avail: NTIS HC A06/MF A01

Topics on engineering and equipment from foreign newspapers, periodicals, books, and news agency transmissions and broadcasts discussed include: aeronautics, shipbuilding, nuclear energy, aerospace engineering, energy technology, industrial technology, navigation and guidance systems, and materials testing. For individual titles, see N86-25600 through N86-25649.

N86-25600# Joint Publications Research Service, Arlington, Va.
AN-124 AIRPLANE'S CARGO-HANDLING AND AUTOMATION EQUIPMENT
T. Kuznetsova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 1-2 Transl. into ENGLISH from Pravda Ukrainy (Kiev, USSR), 26 May 1985 p 1 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Development of the wide-body transport aircraft AN-124 is described. The aircraft has a large payload capacity, an airspeed of 800 to 850 kilometers an hour at an altitude of 10 to 12 kilometers, one third the fuel consumption, and the ability to use runways that are not concrete. The AN-124 is equipped with the latest navigation and piloting equipment, as well as an automated electrohydromechanical control system with quadruple redundancy, which ensures a high degree of reliability. The aircraft is also equipped with an onboard automatic monitoring complex which oversees all parameters, runs a comparison check, and warns ground services in the event of a malfunction. B.G.

N86-25601# Joint Publications Research Service, Arlington, Va.
INFORMATION ON NEW AN-124 GIANT CARGO PLANE Abstract Only **c05**
N. Dombkovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 4 Transl. into ENGLISH from Trud (Leningrad, USSR), 23 May 1985 p 1 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The dimensions and capabilities of the AN-124 cargo aircraft are described. The problems that were involved in the aircraft design are also characterized. B.G.

N86-25602# Joint Publications Research Service, Arlington, Va.
DATA ON MI-26 HELICOPTER Abstract Only **c05**
L. Chernov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 7-8 Transl. into ENGLISH from Kommunist (Moscow, USSR), 19 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The MI-26 helicopter, which has the highest payload capacity of any existing helicopter, can transport items that weigh more than 20 tons over long distances in severe climatic conditions. The helicopter is used in the construction of bridges and other structures, and in the delivery and installation of heavy equipment for industrial enterprises and drilling rigs in remote areas. The increased power of the MI-26 was achieved through the use of new materials, structural design, and two economic D-136 gas turbine engines. The design and arrangement of the MI-26 systems make ground maintenance possible without special airfield equipment. An auxiliary power unit ensures the prolonged operation of the helicopter. For mechanization of loading operations, the cargo bay is equipped with two electric winches and a hoisting mechanism which can handle cargo items up to 5 tons each. With a length of 15 meters, the cargo bay can easily hold two trucks or motor buses. B.G.

N86-25603# Joint Publications Research Service, Arlington, Va.
ROLE OF OPTIMIZATION METHODS IN IMPROVEMENT OF FLIGHT CONTROL FOR AIRPLANES Abstract Only **c08**
G. M. Kashin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 10 Transl. into ENGLISH from Standarty i Kachestvo (Moscow, USSR), no. 12, Dec. 1984 p 15-18 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

While conventional computer aided automatic flight control alone improves the static and dynamic characteristics of aircraft, active automatic control can further improve the flight mechanics by means of reduction of takeoff mass. Such a control system is capable of performing other additional functions as well, namely relaxing the constraints on natural static stability, reducing the loads involved in maneuvers, increasing the stability margin under flutter, damping elastic vibrations in a turbulent atmosphere, direct control of lift and lateral forces, improving the flight aerodynamics, prevention of dives and spins, and improving passenger comfort. The stability margin is reduced by increasing the stability level. The design of such a system is based on analysis of surges and vibrations, requires inclusion of corrective filters, and calls for optimization of the control algorithm for the special application. One approach proposed is the approach taken for optimizing the parameters of standardization objects. Author

N86-25604# Joint Publications Research Service, Arlington, Va.
TECHNICAL-ECONOMIC FEASIBILITY OF ORBITING SUN-

LIGHT REFLECTORS Abstract Only c44
Zh. Alferov and V. Minin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 26-27 Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), 19 Feb. 1985 p 6 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The use of deflectors in orbit as a means of providing artificial illumination is examined. Considerations of technical and economic feasibility are addressed. Three main areas of application are distinguished: reflecting sunlight onto the surface of the Earth; concentration of the flow of solar energy on an orbiting receiver; and retransmission of optical radiation. The advantages of the artificial Earth illumination application of the orbiting reflector scheme in terms of energy savings in lighting cities, and additional daylight time for critical periods of farming operations are discussed. B.G.

N86-25605# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED HIGH-VOLTAGE AMPLIFIER Abstract Only c33
A. N. Dyachko, V. N. Ilyushenko, and V. I. Tuyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 28 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 237-238 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A high speed amplifier of high voltage pulse signals coming from remote sources over long transmission lines is now available, specifically designed for increasing the sensitivity of 6 LOR-02 oscillographs. It includes a line attenuation compensator, besides the amplifier stage with a main output and an output for oscillograph synchronization. Each component can be used independently for any particular other application. The amplifier delivers negative voltage pulses of 300 V or higher amplitidue and 200 ns duration at a repetition rate of 10 kHz or higher to a 75 ohm load, with rise and fall times not exceeding 3 ns and with the pulse top flat within 10%. Its gain is 66 dB with manual regulation over a 40 dB range, its dynamic range is 40 dB at the input, and its amplitude characteristic is linear within 15% over the 30 to 300 V range. The amplifier stage uses a 60 V power supply and draws 0.9 A, the attenuation compensator uses a 15 V power supply and draws 0.15 A. Author

N86-25606# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL RING COMMUTATOR FOR HIGH-CURRENT ACCELERATORS Abstract Only c33
I. F. Isakov, Ye. I. Logachev, and G. Ye. Remnev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 28-29 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 21-23 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A ring commutator with parallel channels in a common gas chamber and with a switching capability of 0.4 MA under 1 MV was developed for high current accelerators. The feasibility of such a commutator was established in an experimental study of dischargers and their triggering by distortion of the electric field. The necessary distortion is achieve by inserting the auxiliary electrode asymmetrically from the side and grounding it through the discharger and a current limiting resistor. Mutual brightening illumination of parallel discharger improves the stability of the triggering; a 30 to 40% smaller variance of the delay time is quite feasible. The commutator has an inductance of 40 nH, and its working medium is an elegas+nitrogen mixture in a 1:10 ratio under a 0.5MPa pressure. It was tested in the TO-NUS-1 accelerator, where switching through a twin shaping line did not delay the triggering by more than 22 ns at a 0.9 ratio of control breakdown voltage to a self sustained breakdown voltage. Author

N86-25607# Joint Publications Research Service, Arlington, Va.
HIGH-CURRENT ELECTRON ACCELERATOR Abstract Only c33
B. V. Alekseyev, I. M. Gorelikov, V. I. Kazurov, L. V. Mashkov, A. G. Greshko, G. I. Soklakov, A. I. Fedorenko, and K. B. Yurekevich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 29 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 19-21 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A high current electron accelerator was developed and built on the basis of computer aided design calculations and electrolytic trough simulation. A 15 stage Arkadyev/Marx pulse voltage generator serves as the primary energy storing device. Each stage consists of two IK-100-0.4 capacitors connected in parallel and all immersed in transformer oil inside a metal container on electrically insulating posts. Each stage is shielded on both the positive and negative potential side. The shields, made of copper foil, not only smooth the electric field in the clearances but also constitute part of the commutating circuit and contribute to reduction of the overall generator size. The pulse voltage generator is triggered by a synchronizer through the conventional firing circuit of a TGI1-350/16 thyratron. To operate the accelerator in the nanosecond mode, the generator discharges into a diode through a twin shaping line. In this mode the accelerator can produce 0.8 MeV to 240 kA electron beams of 0.8 ns duration. To operate in the microsecond mode, the shaping line acts as storing capacitor, and the discharge gaps must be charged with polarity reversal in each stage. In this mode the accelerator can produce 0.5 MeV to 10 kA electron beams of 1 microsecond duration. Author

N86-25608# Joint Publications Research Service, Arlington, Va.
PLASMATIC ION SOURCE Abstract Only c33
A. P. Semenov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 30 Transl. into ENGLISH from Plasmatic Ion Source (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 23-24 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A plasmatic ion source was built in which the hollow cathode above the two discharge chamber cathodes is readily replaced upon depletion after 250 to 300 h. The emission outlet hole is restored to original size by replacement of the cathode insert, while gas is continuously admitted by means of a spring mechanism. The source operates in the Penning discharge mode, with argon as the working gas. The hollow cathode is 36 mm long and has an inside diameter of 4 mm. The other two cathodes serve as pole shoes of a toroidal ferrite magnet which produces a longitudinal magnet field of 0.1 T induction in the discharge chamber. All three cathodes are made of magnetic steel and are insulated from cylindrical copper anode by teflon spacers. Heat is dissipated by oil, which carries it away to a water cooled housing compartment. The source generates an ion emission current of 20 mA with a discharge current of 200 mA at a pull voltage of 20kV. Author

N86-25609# Joint Publications Research Service, Arlington, Va.
DESIGN OF PNEUMOHYDRAULIC ACCUMULATORS WITH HIGH-COMPRESSIBILITY ENERGY STORING MEDIUM Abstract Only c75
S. G. Telitsa and L. M. Vinogradov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 31 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Energetika (Minsk, USSR), no. 11, Nov. 1984 p 95-97 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A pneumohydraulic accumulator for a hydraulic drive was designed to ensure that the volume of fluid satisified the requirements of the drive without being excessively large. It is required that during discharge of the fluid from the accumulator tank its pressure does not drop below the drive operating level. The design of such operators is based on the equation of the polytropic process. A preliminary estimate of the thermodynamic indicators was necessary before the optimum mixture for maximum useful work and faster response and maximum economy of metal in the tank structure can be determined. The accumulator work cycle was treated as a 2-stage cycle of isothermal charge and polytropic discharge. The calculations, based on pressure/volume diagrams of both processes, are used to determine the volume of fluid delivered and the accumulator. Numerical data based on these

relations and typical operating conditions were obtained for optimum mixtures corresponding to various durations of the discharge process. B.G.

N86-25610# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF SOLAR CELLS WITH SCHOTTKY BARRIER AND CURRENTS THROUGH SURFACE STATES Abstract Only c37
O. S. Zinets, S. S. Kilchitskaya, and V. I. Strikha *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 32-33 Transl. into ENGLISH from Geliotekhnika (Tashkent, USSR), no. 6, Nov. - Dec. 1984 p 8-13 Original language document was announced in IAA as A85-24047 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Characteristics of Schottky barrier cells are calculated in the context of the diode theory of amplification for the case of a thin intermediate layer, with allowance made for the passage of charge carriers through the surface electron states. Particular cases of the predominant charge carrier transfer between the surface electron states and one of the semiconductor bands are examined. It is shown that the presence of surface electron states, which provide a channel for the migration of photocarriers into the metal, may increase the efficiency of Schottky barrier solar cells when the interlayer thickness is greater than the optimum thickness calculated without allowance for such transfer. V.L.(IAA)

N86-25611# Joint Publications Research Service, Arlington, Va.
ROBOT DRIVE MECHANISM USES CONVENTIONAL ELECTRIC MOTORS Abstract Only c44
I. Demchenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 44-45 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 16 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The development and use of three phase asynchronous electric motors in robot technology are presented. The mechanical arm of a robot has as many drives as it has joints. Manipulators in use in modern industry must have six to nine degrees of mobility, and experimental prototypes with 18 coordinates of movement are already developed. A simple, common, and inexpensive industrial electric motor is proposed for use in the robots. This motor was previously considered unsuitable for delicate work because of its low precision in executing commands and the difficulty in controlling it. Control methods were developed to overcome this difficulty. Integrated microcircuits and a power converter control the operation of the single motor. A cassette made up of six units controls the operation of the whole mechanical arm. This cassette is linked with the brain of the robot (a microprocessor system or microcomputer). B.G.

N86-25612# Joint Publications Research Service, Arlington, Va.
AIR-HYDROGEN ELECTROCHEMICAL GENERATOR Abstract Only c37
F. Danilovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 49 Transl. into ENGLISH from Nedelya (Moscow, USSR), 25 Apr. - 5 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Soviet scientists have developed an original air/hydrogen electrochemical generator (EKHG) which can replace storage batteries in many instruments and apparatuses. Moreover, broad employment of this device will save a large amount of scarce nonferrous metals that are needed also for the production of small electric batteries. It is based on fuel cells in which chemical energy is converted into electrical energy. Design complexity and high production cost long prevented the original idea for such cells from being embodied in experimental prototypes. A working model of a fuel cell was not developed until the 1960s. Now generators developed on the basis of such cells can be serially produced. Such a generator is dependable and simple to use, and it performs well in different kinds of field conditions. It can be carried from place to place in a backpack. The efficiency of the generator can be as high as 70 percent. This opens up broad possiblilities for employing such generators in electric motor vehicles. Author

N86-25613# Joint Publications Research Service, Arlington, Va.
FATIGUE DEFECT TRANSDUCER AND VALIDATION OF ITS USABILITY Abstract Only c33
V. T. Troshchenko and V. I. Boyko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 54-55 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 3-8 (For primary document see N86-25599 16-13)
(Rept-1) Avail: NTIS HC A06/MF A01

A technology for producing a fatigue defect transducer and a methodology for using it for reliable prediction of performance margins and available life of structures were developed on the basis of irreversible changes in the electrical resistance of metals under cyclic strain. Such a transducer actually indicates the history of cyclic loading. The transducer, featuring excellent metrological characteristics along with small size and simple design, was built with annealed constantan foil according to the technology of conventional KF4 resistive strain gauges. Its main characteristics are base size 5.0 mm, initial electrical resistance 94 to 105 ohms, operating range of resistance variation 0.5 to 6.0 ohms with 5 to 30% variance, operating temperature range 103 to 308 K, operating range of cyclic strains 0.0011 to 0.0025 with 0.0011 as the sensitivity threshold, and endurance limit 0.0013 to 0.00245 on the base of 10(7) to 10(5) cycles. In practice the lines of constant transducer resistance change do not always coincide with the fatigue curves of the monitored object. The transducer is effective only when the fatigue curves of a material lie within the operating range of the transducer. This requires extending that range, by means of a device for attenuating or amplifying the transducer strain under a given object strain. Author

N86-25614# Joint Publications Research Service, Arlington, Va.
STABILIZER OF SHAFT ROTATION ANGLE FOR D.C. COMMUTATOR MOTOR Abstract Only c35
S. N. Nizovoy, F. G. Kuliczhanov, and N. O. Yelyutin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 55 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 230-231 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A stabilizer of shaft rotation angle for d.c. commutator motors is described which suppresses speed fluctuation caused by a change in the armature current as successive commutator bars reach the leading edge of a brush. This is achieved by inserting a low series resistance into the armature circuit and feeding the voltage across it to a servo oscillograph so that the frequency of the driven sweep becomes a multiple of the shaft speed. Return-stroke sweep pulses are extracted from the sawtooth voltage wave by a shaping circuit which consists of one capacitor, one resistor, two diodes, and one trigger. After a specified number of pulses has accumulated, another trigger actuates a switch which disconnects the motor from the voltage supply. A single starting pulse at the output of another shaping circuit records a specified number in the same pulse counter, through arrays of switches, and sets the same trigger for reconnecting the motor to the voltage supply. This stabilizer was tested on a positioning table driven by an MN-250 motor with 6-bar commutator, using an S1-19B oscillograph. The motor was started in steps for rotation in 3 minute steps, and the table position was measured after each 20 steps by means of a theodolite within + or - 4 sec accuracy. The average instability of the rotation angle between measurements did not exceed + or 30 sec. Author

N86-25615# Joint Publications Research Service, Arlington, Va.
DESIGN OF VIBRATION MACHINES WITH INERTIAL EXCITATION Abstract Only c37
N. N. Bolotnik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 56 Transl. into ENGLISH from Izvestiya Akiademii Nauk SSSR: Mekhanika Tverdogo Tela

(Moscow, USSR), no. 1, Jan. - Feb. 1985 p 59-66 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A perfectly solid platform which is horizontal when at rest is mounted on a stationary foundation between two walls through two pairs of generally unequal springs; the foundation springs limit its vertical motion and the wall springs limit its horizontal motion. This platform is set in plane-parallel motion by an inertial vibration exciter mounted on it and consisting of two identical unbalanced rotors which spin in opposite directions at the same constant speed on a common shaft, this shaft being horizontal so that the platform moves in the vertical plane only. The problem is formulated in two systems of Cartesian coordinates, a movable one and inertial one with a common origin at the point at one end of the platform where one set of springs is attached. The x,y axes of the inertial system remain, respectively, horizontal and vertical, while x-axis through the point at the other end of the platform where the other set of springs is attached and the y-axis perpendicular to it move with the platform. The motion is described in terms of kinetic energy and potential energy, whereupon small vibrations of the platform are considered which allow, with sufficient accuracy, linearization of the corresponding Lagrange equations. The design problem is to find a set of values of the system parameters which will ensure stable 2-periodic vibrations of the system corresponding to translatory motion of the platform; such a motion occurs only when the orientation of the movable x-axis relative to the inertial (horizontal) x-axis remains constant. Author

N86-25616# Joint Publications Research Service, Arlington, Va.
EFFECTIVENESS OF STRUCTURAL COUNTERMEASURES FOR REDUCING BLADE VIBRATIONS EXCITED BY RANDOM FLOW FLUCTUATIONS Abstract Only c37
D. M. Bavelskiy, G. I. Bogoradovskiy, G. L. Guirskiy, and M. S. Pomanychev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 57 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 51-53 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A study of blade vibrations in the prototypes GTN-25 gas pumping set by the discrete-phase method has revealed such vibrations in the first stage of the high-pressure compressor, vibrations at frequencies not multiples of the runner speed as well as normal resonance vibrations. These anomalie occurred throughout the entire range of runner speed; their intensity increased with that speed. Readings of low-inertia pressure fluctuation transducers placed before the guide vanes on the compressor inlet side and spectral analysis of these readings, aided by visual inspection and analysis of compressor-turbine aerodynamics, indicated an absence of flow separation as the possible cause. Instead, they indicated a nearly white noise distribution of those fluctuations, with a predominance of random fluctuations in the low-frequency range and characterized by a background level comparable with or even exceeding the level of runner speed harmonics. The remedy then proposed and implemented was a buildup of the inlet tube for smoothing its surface contour along the stream and a reorientation of the channel walls to make them parallel with the stream boundary. Author

N86-25617# Joint Publications Research Service, Arlington, Va.
EXTENDING RANGE OF STABLE OPERATION OF AXIAL COMPRESSORS BY MEANS OF SELF-ROTATING INLET GUIDE VANES Abstract Only c37
V. S. Knyazev and V. L. Zhokhov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 57-58 Transl. into ENGLISH from Energomashinostroyeniye (Moscow, USSR), no. 2, Feb. 1985 p 7-9 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

An array of self-rotating guide vanes was developed for axial compressors. Its purpose was to extend the range of stable operating speeds. Its characteristic feature is that the vanes, made of steel strip, have a biconvex S-profile so that the array in effect behaves as a combination of aerodynamically matched compressor and turbine mounted on the same shaft and rotating at the same speed. Two designs were tested, and their performance was evaluated over the 750-1000 rpm range of runner speed, with the Mach number of the air stream N sub M = 0.1-0.12 and with the Reynolds number N sub R = (1.8-2.0) x 10 to the 5th power. The theoretical pressure coefficient was calculated from torque readings taken on a d.c. balancing dynamometer. The flow coefficient was calculated from readings of the air rate at the inlet. The runner speed and the speed of the vanes were measured by the contactless method with stroboscope and markers. The results reveal that, by decreasing the pressure coefficient slightly to 0.015, it has been possible to lower the cutoff air rate by 9.4-1.2% and the cutoff runner speed by 13.6-17.8%. Author

N86-25618# Joint Publications Research Service, Arlington, Va.
PERIODIC MOTION OF SATELLITE RELATIVE TO CENTER OF MASS WITH UNIAXIAL ORIENTATION IN GRAVITATIONAL FIELD Abstract Only c37
V. V. Sazonov and M. Ye. Sidoryuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 68 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 3-13 Original language document was announced in IAA as A85-28901 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The motion of a satellite relative to its center of mass due to a gravity moment in circular orbit is analyzed using an autonomous system of ordinary differential equations of the sixth order to describe the motion. The symmetric periodic solutions to this system, which are close to the periodic solutions to the corresponding generating system, are investigated analytically and numerically. Some of the solutions describe periodic oscillations or rotations of the satellite relative to the axis of the minimum moment of inertia aligned approximately along the radius-vector of the satellite center of mass relative to the center of attraction. It is suggested that these motions be used for the single-axis gravity gradient stabilization of the satellite. Author

N86-25619# Joint Publications Research Service, Arlington, Va.
MOTION OF SATELLITE RELATIVE TO CENTER OF MASS CAUSED BY MOMENTS OF LIGHT-PRESSURE FORCES Abstract Only c18
D. D. Leshchenko and A. S. Shamayev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 69 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 14-21 Original language document was announced in IAA as A85-28902 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

It has been estimated in an earlier study that at heights exceeding 35,000-40,000 km above the Earth, the force moments of light pressure have greater effect on space vehicles than any other perturbing force moments. Here, the motion of a spacecraft with a triaxial ellipsoid of inertia relative to its center of mass due to light pressure force moments is analyzed for the case where the spacecraft is a body of revolution. The analysis is based on the averaging method. Author

N86-25620# Joint Publications Research Service, Arlington, Va.
DYNAMICS OF ORIENTING AND STABILIZING SYSTEMS FOR SPACECRAFT WITH CONTROLLABLE GRAVITATIONAL STABILIZER Abstract Only c18
Ye. M. Potapenko *In its* USSR Report: Engineering and Eduction (JPRS-UEQ-86-002) 7 Feb. 1986 p 69-70 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 22-30 Original language document was announced in IAA as A85-28903 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

This paper is concerned with the dynamics of a spacecraft with a controlled gravity gradient stabilizer in the form of a long thin-walled boom having a load at its free end and mounted in a

two-degrees-of-freedom controlled suspension at the other end. The use of various auxiliary mechanisms for vibration damping, such as flywheels, gyroscopes, jet engines, and electromagnets, is discussed. Attention is also given to the effect of the elasticity and deflections of the stabilizer boom on the stability of the spacecraft motion. Expressions are obtained allowing the analysis, synthesis, and comparison of the systems under study. Author

N86-25621# Joint Publications Research Service, Arlington, Va.
CORRECTION OF SPACE TACHOMETER - STABILIZING GYRO SYSTEM Abstract Only c18
A. I. Tkachenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 70 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 31-36 Original language document was announced in IAA as A85-28904 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

In an earlier study (Tkachenko, 1983), a method was presented for the calibration and refinement of the attitude of a three-dimensional angular velocity meter, mounted on a moving object, on the basis of exact angular information on the position of a coordinate trihedron connected with the object. In the present study, the same problem is solved for the case where the angular data contain small errors of the known kind which have to be evaluated along with the error of the three-dimensional angular velocity meter. The effect of errors in reading primary information on the accuracy of calibration and correction is disscussed and ways to minimize this effect are examined. Author

N86-25622# Joint Publications Research Service, Arlington, Va.
HARMONIC VIBRATIONS OF VISCOELASTIC SHELLS OF PIEZOCERAMIC MATERIAL WITH ATTENDANT HEATING Abstract Only c19
V. G. Karnaukhov and I. F. Kirichok *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 71 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 60-67 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A thermomechanical theory on the basis of Kirchhoff-Love hypotheses is constructed for vibrations of thin ceramic shells in piezoelectric transducers, considering that the material is viscoelastic and its properties are temperature-dependent. The equations of state and of motion are derived from three-dimensional equations of electroelasticity with mechanical intensity as independent variables. The resulting system is one of coupled equations which thus takes into account the interaction of mechanical, thermal, and electric fields. Axisymmetric radial vibrations of normally polarized infinitely long cylindrical shells and closed spherical shells are typical examples for which these equations are readily solvable. Accordingly numerical results are shown for a spherical shell of PZT-4 ceramic material with vacuum inside and water outside. Author

N86-25623# Joint Publications Research Service, Arlington, Va.
APPROACH TO TACKLING PROBLEMS OF WRINKLED STATE OF SOFT SHELLS Abstract Only c39
V. S. Kalinin and A. S. Melamud *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 71-72 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 67-73 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A new approach is proposed for solving problems of the wrinkled state for soft shells, namely treating a wrinkled shell as a smooth biaxial one in the zero-moment state. This eliminates the need to first determine the directions of wrinkles. Instead, the length of an arc element of any curve on the shell surface is defined as the distance between two points in three-dimensional space, this distance being sufficiently small before deformation to allow replacing the arc with a straight line segment but also sufficiently large so as not to depend on the locations of the two points on each wrinkle. This distance is then, in a sufficiently high order of precision, proportional to the differential of the corresponding Lagrange coordinate. The relation between internal forces and global strains, the latter representing changes in the surface metrics and ignoring local effects, is established accordingly on the basis of negligible compressive stresses in the real shell after stability loss and negligible normal stresses along the wrinkles. An isotropic shell material is considered first, in which case global and local strains along the wrinkles become the same. The resulting relations between corresponding stress tensor and strain tensor components can, however, also be used as the first approximation for an only slightly deformable anisotropic shell material. Author

N86-25624# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF TRIPLE-LAYER SPHERICAL SHELLS UNDER NONUNIFORM PRESSURE Abstract Only c39
V. U. Kotelnikov and V. G. Tarasenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 72 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 117-119 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Hemispherical shells consisting of three variable-thickness layers were studied to determine their behavior under nonuniform external pressure. The two outer sheath layers were made of AMTs-M aluminum alloy, with a filler between them and with a metal flange 13.7x50 sq mm in the cross-section around the bottom base edge. Two batches of 10 shells were tested. All shells had an inside diameter of 400 mm and a 14 mm thick filler. The tests were performed in an array of six annular chambers with elastic walls, all six wrapped with a common jacket so as to prevent tangential motion and each inflatable to a different pressure. Measurements were made with PKB resistive strain gauges on a 10 mm base and readings were recorded with a TsTM-3 digital bridge instrument. The results indicate higher stresses and larger strains in the sheath directly under the pressure load. Author

N86-25625# Joint Publications Research Service, Arlington, Va.
INDUCED VIBRATIONS OF SPHERICAL SHELL IN ACOUSTIC WEDGE Abstract Only c39
M. A. Potapov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 73 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 53-60 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A spherical shell of an elastic and isotropic material with a concentric solid vibrating sphere inside is placed between two plane walls intersecting so as to form a wedge. The acoustic field in such a wedge is described by two Helmholtz equations for the regions inside and outside the shell, respectively, supplemented with three equations of motion for the shell. Boundary conditions are stipulated at the surface of the wave-emitting sphere, at the median surface of the shell as the interface between the two regions, and at the wedge walls. The media inside and outside the shell are characterized by the products of their respective density and acoustic velocity. The problem of shell vibrations is solved by the method of virtual images with the wedge angle o =-q as discrete parameter (q= 1,2,...). With the solution sought in the form of a series with spherical Bessel functions and associated Legnedre polynomials, an infinite system of linear algebraic equations is obtained which has a normal determinant and an upper bound is obtained which converges. This system of equations is quasiregular, solvable by the method of reductions, and the series can be evaluated asymptotically. Numerical results have been obtained for a steel shell with a vibrator and between perfectly rigid walls of a wedge. Author

N86-25626# Joint Publications Research Service, Arlington, Va.
CERTAIN RELATIONS FOR SYSTEMS WITH DRY FRICTION Abstract Only c39
V. I. Levitas *In its* USSR Report: Engineering and Equipment

(JPRS-UEQ-86-002) 7 Feb. 1986 p 73-74 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 52-56 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A definition of friction force is proposed, which is more precise than merely in terms of positive power and from which an associated law of friction corresponding to the orthogonality principle in the theory of plasticity will follow as corollary. This definition is based on the Lagrange equations of motion for a system with stationary holonomic couplings, with m degrees of freedom, and with dry friction. The conventional definition is accordingly supplemented with the postulate of dissipation and constraints. Author

N86-25627# Joint Publications Research Service, Arlington, Va.
ENERGY CRITERION OF DYNAMIC SNAP-OVER FOR ELASTIC SPHERICAL SHELLS Abstract Only c39
L. S. Srubshchik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 74 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 60-63 Original language document was announced in IAA as A85-24178 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The critical loads of the dynamic snap-through of spherical shells are estimated for the principal types of boundary conditions using steady-state equations. The estimates are based on the concept of the astatic critical load, i.e., the minimum load required for the transition to unstable postcritical equilibrium with a potential energy equal to the initial potential energy of the shell. For the case of thin shells with simply supported and hinged edges, asymptotic formulas for the astatic critical loads are obtained and generalized to ellipsoidal shells. For hinged shells, the possibility of a snap-through under impulsive loading is demonstrated, and critical loads are calculated. Author

N86-25628# Joint Publications Research Service, Arlington, Va.
WIDE-ANGLE INSTRUMENT FOR MEASURING DIVERGENCE OF LASER BEAM Abstract Only c39
Yu. A. Pokrovskiy, Ye. A. Makaretskiy, and Yu. S. Khurkhulu *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 75 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 240 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

An instrument for measuring the divergence of laser beams and displaying the power distribution over the beam cross-section is now available, its main features being small size and fast measurement. It consists of a goniometric resonance filter-analyzer and a deflecting mirror. The filter is made of two glass prisms separated by an air gap between their diagonal facets. The dependence of its transmission coefficient on the angle of radiation incidence is analogous to the resonance characteristics of an electric LC-circuit. The angle range, analogous to the frequency band of an electric filter, is 5 x 10 to the minus 5 power - 2 x 10 to the minus 2 power rad, with a resolution of up to 2.5 x 10 to the minus 5 power rad. The deflecting mirror serves a means of varying the incidence angle, and thus also the transmitted radiation power proportionally to its angular distribution. The latter is displaced on the screen of a cathode-ray oscillograph by a signal from the photoreceiver behind the angle filter. The instrument can handle laser beams with a diameter of up to 50 mm and a radiation power of up to 50 W. Author

N86-25629# Joint Publications Research Service, Arlington, Va.
UNIVERSAL INSTRUMENT FOR ACOUSTIC INSPECTION Abstract Only c35
Ye. G. Nashuk, V. D. Beshentsev, and A. Sh. Atayev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 75-76 Transl. into *ENGLISH from Pribory* i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 242 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

An instrument for wide-range nondestructive inspection of materials and products by measurement of either the ultrasound velocity and absorption coefficient or the acoustic emission activity is discussed. The former are measured by the echo-pulse method; high resolution is attained by conversion to a time interval relative to selected zero-crossovers and subsequent discretization of that interval. Any of the first 16 echo pulses in a pulse train can be delayed. The operating frequency range in this mode is 1 to 15 MHz, the time intervals between pulses are indicated on a 5-digit display with 100, 10, or 1 ns units of the last digit and with a resolution of up to t or - 2 ns. Acoustic emission activity is measured, and indicated on a 3-digit display, after amplification of the signal by a low-noise extension preamplifier and truncation of its frequency spectrum by a filter array. The sensitivity is 5 mu V and the passband is 60 to 400 kHz in this mode of operation. Author

N86-25630# Joint Publications Research Service, Arlington, Va.
FIVE-CHANNEL INSTRUMENT FOR ACOUSTIC FLAW DETECTION BY METHOD OF ACOUSTIC EMISSION Abstract Only c35
A. I. Alabichev, Yu. I. Tyalin, Yu. I. Golovin, A. A. Sletkov, V. I. Uskov, S. A. Gladyshev, and A. N. Bykov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 76 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 243 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A five-channel instrument for detecting and recording acoustic emission from defects which develop during welding, cooling or loading is discussed. It contains a +12, -12, +24 V power supply, a control module for automatically regulating the number of acoustic emission pulses and their intensity, and five identical measuring channels. Each channel consists of a high-pass filter, an attenuator, a linear amplifier, an intensity meter, and a piezoelectric transducer with an extension preamplifier. Each intensity meter includes two pulse counters with analog converters producing histograms of the pulse rate by alternating count and readout in successive cycles. Individual pulses can be extracted for display on the screen of an S8-9A storage oscillograph. Included are also a KSP-4 automatic recording instrument and a ChZ-34 frequency meter. The counters have capacities of 100, 1000, and 10,000 pulses with the count and storage time 3, 10, and 30 s, respectively. All components are built with semiconductor devices and integrated-circuit chips. Author

N86-25631# Joint Publications Research Service, Arlington, Va.
SYNCHRONIZATION SYSTEM FOR PULSED POWER LASER WITH OPTOELECTRONIC CONTROL Abstract Only c35
V. V. Appolonov, S. I. Ziyenko, V. V. Brytkov, S. V. Muravyev, and V. A. Yamshchikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 78 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no 5, Sep. - Oct. 1984 p 163-168 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A synchronization channel was built for pulsed power lasers with optoelectronic control. It consists of a transmitter and a receiver connected through a 5 m long fiber-optic cable, each in a separate shielded housing, and a high-voltage nanosecond pulse shaper followed by an electro-optic modulator behind the receiver. The transmitter contains a photodiode at the input on which synchronizing pulses impinge, a delay line followed by a shaper of current pulses consisting of an avalanche transistor with an emitter triggering circuit, and a semiconductor-type injection laser with reverse bias at the output. The receiver contains an input photodiode and two-stage output amplifier; the latter has negative feedback in parallel and an emitter follower behind. The shaper of high-voltage nanosecond pulses includes an autonomous power supply and a kratron output commutator. The hardware between this commutator and the electrooptic modulator includes two transformers with *toroidal ferrite cores*, two shaping coaxial lines, and two nonlinear-inductance coils. The modulator consists of two electrooptical crystals. The synchronizing channel is used

for control of a transverse-excitation atmospheric-pressure CO2-laser operating in the repeater mode. Author

N86-25632# Joint Publications Research Service, Arlington, Va.
APPARATUS WITH TRANSPARENT ANVILS-WINDOWS FOR OPTICAL AND X-RAY ANALYSIS UNDER HIGH PRESSURE c36
Abstract Only
B. A. Fursenko, O. V. Kholdeyev, Yu. A. Litvin, and V. D. Kropachev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 80-81 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 174-178 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

An apparatus for optical and X-ray analysis of minerals has been built consisting of a kinematic plunger mechanism and a force mechanism. The latter produces a force which moves the plunger with self-alignment through a long cylinder without loss of parallelism between the active surfaces. The force is produced by a power screw and is transmitted through a lever mechanism of the second kind consisting of a standing lever and a movable one. A metal gasket around a ruby-crystal pressure transducer between diamond or bromellite anvils at the tips of both levers is hinge-coupled to each. All three hinge axes being mutually orthogonal for maximum freedom of self-alignment for the force mechanism. All pressure bearing components are made of high strength steel. The apparatus was tested with diamond anvils for pressures above 30.0 GPa. Author

N86-25633# Joint Publications Research Service, Arlington, Va.
DIAMOND CHAMBER TO STUDY EFFECT OF SHEARING STRAIN ON STRUCTURES AND PROPERTIES OF SOLIDS UNDER PRESSURES UP TO 43 GPa Abstract Only c35
V. D. Blank, Yu. S. Konyayev, A. I. Kuznetsov, and E. I. Estrin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 81 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 178-180 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A test chamber was built to study solids under high pressure and shearing strain. The anvils are made of natural diamond single crystals or synthetic cabonado diamonds. A specimen is placed between the two anvils, usually without a gasket, after the latter have been adjusted by means of a ball hinge into plane parallelism. Pressure is produced by applying a force of up to 15 kN to the plunger through a lever mechanism. Shear is produced by turning one anvil 5 to 8 deg with a motor through a speed reducer, at a rate which can be varied from 0.1 to 8.8 deg/min, without significant loss of parallelism with the fixed other anvil. Optical examination and measurements as well as photographic recording are made under a MIN-8 microscope. With natural diamonds used for the anvils, the pressure could be calibrated against the luminescence spectrum of a ruby crystal. The chamber was tested on NaCl+ Al203:(1 vol.%)Cr(3+) under pressures up to 43 GPa before and after shear through a 20 deg. angle, without damaging the diamond anvils. The chamber was also used for X-ray examination of bismuth and germanium, namely for determining the pressure dependence of their electrical resistivity and for recording their phase transitions. Author

N86-25634# Joint Publications Research Service, Arlington, Va.
WIDEBAND PIEZOELECTRIC PRESSURE TRANSDUCER Abstract Only c35
V. A. Godonyuk, B. V. Zhuravlev, and I. P. Shedko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 83 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 214-217 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A piezoelectric pressure transducer for pressures of up to 100 MPa was developed, with an operating frequency range from 100 Hz to 1 MHz on the electrical side - sufficiently wide to reproduce pressure profiles of arc discharges with microsecond rise times and millisecond fall times. The sensing element is a disk of TsTS-19 piezoceramic material, 1 mm thick and 5 mm in diameter. It is thermally and electrically insulated from the arc plasma by a compound transmission rod consisting of two quartz crystals 5 mm in diameter and freely sliding inside a teflon sleeve. The 50 mm long waveguide for absorbing acoustic vibrations and thus separating the valid signal from the reflected one consists of brass wires acoustically insulated with epoxy resin and encapsulated into a textolite sleeve with epoxy resin at the other end. A copper housing shields the transducer from electromagnetic interference. The transducer output signal passes through a matching circuit and then a high-impedance voltage divider to a differential amplifier, the latter being shunted by a stabilizing low 1 Mohm resistance at the input. A special feature of this transducer is low-frequency compensation by means of a corrective RC-circuit. After calibration of oscillograms, the transducer has a sensitivity of 1 V/MPa over the 10(-2) to 10 MPa range. Its resolution corresponds to the 2 microsecond maximum rise time of its output signal, with the sensing element located at the end of a shock tube. Author

N86-25635# Joint Publications Research Service, Arlington, Va.
FURNACE FOR TESTING MATERIALS IN AIR AT TEMPERATURES UP TO 1850 DEG C Abstract Only c35
V. Ye. Sotnikov, A. M. Smirnitskiy, A. V. Satanovskiy, V. L. Balkevich, and Yu. M. Mosin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 84 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 217-218 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A tubular high-temperature air furnace with a La2(CrO3)3 heater element was developed for testing materials. The electrical resistance of this heater element is 200 ohm at 20 C room temperature and 20 to 30 ohms at the top temperature. The helical heater is surrounded by three cylindrical layers of refractory thermally insulating materials within a cylindrical metal enclusure: a layer of high-density corundum on the inside and a layer of ShLB-0.4 fireclay on the outside with a layer of KL-1.3 plain corundum in between. The heater is energized from a 220 V - 50Hz power line through a thyristor bank. The furnace temperature is controlled by a high-precision regulator around the heater extension above the lining, with a PR(Pt-Rh) 30/6 thermocouple mounted preferably inside rather than outside the heater coil for faster response and better accuracy. The test tube with a specimen is inserted inside the heater coil, where it can remain for more than 50 h at 1850 C and for short periods at 1900 C. The furnace can be cycled at least 50 times in a row by heating at a rate of 20 C/min and then cooling to 20 C. Refractory materials can be tested in this furnace also with air replaced by an oxidizing atmosphere. Author

N86-25636# Joint Publications Research Service, Arlington, Va.
DETECTION OF CHARGED-PARTICLE PLUGS IN GASEOUS TARGET BY MEANS OF SEMI-CONDUCTOR-TYPE DETECTORS Abstract Only c35
G. F. Binko, M. G. Gornov, Yu. P. Dobretsov, -Ugryumov Kirillov, V. G., A. A. Maloletnev, A. L. Mikaelyan, A. P. Pichugin, V. P. Protasov, V. I. Savelyev, A. Ya. Smakov et al *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 86 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 36-40 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A reliable method of detecting charged-particle plugs in a gaseous space is proposed which, unlike the conventional anticoincidence method using scintillation detectors, involves measuring the energy of impinging particles with two semiconductor-type detectors. Only particles with an energy so low that they will stop in the target are sampled. This method eliminates background interference caused by plugs in scintillators and is applicable to fast processes as well as slow ones. The technique was proved in an experiment with muons in a synchrocyclotron. The gaseous target was a Ne(+) 2.5% Xe mixture, the xenon forming an electron shell of muonic fluorine. A beam of muonic

atoms in Ne and Fe, formed by two magnetic lenses, was passed through a collimator between two monitoring scintillation counters and then through two graphite moderators into the gas chamber with two semiconductor-type detectors: a Si(Au) surface-barrier detector and a Si(Li) lithium-drift detector. The target together with three pairs of scintillation control detectors of an electron telescope, each pair with an aluminum filter-interlayer, were placed inside a set of Helmholtz coils producing a magnetic field. Author

N86-25637# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF FREQUENCY CHARACTERISTICS OF MULTI-LAYER CYLINDRICAL SHELLS ON BASIS OF VARIOUS THEORIES Abstract Only **c75**
Y. M. Griorenko, Ye. I. Bespalova, and T. N. Kilina *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 87 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 52-58 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Free undamped vibrations of multilayer circular cylindrical shells are analyzed according to an exact three-dimensional theory of elasticity and according to two approximate two-dimensional theories, namely the Kirchhoff-Love classical theory and the Timoshenko nonclassical theory. It is assumed that such a shell consists of an arbitrary number of layers in rigid contact with one another and each having a uniform thickness. The problem reduces to a system of partial differential equations the nontrivial solution to which yields the modes and the frequency spectrum of free vibrations as well as their dependence on the relative thickness of the load-bearing layers. The nonclassicial theory is found to agree better with the exact theory than does the classical theory. Numerical data on a typical example of an orthotropic triple-layer shell reveal mode sign reversals and low frequency dips at certain ratios of carrier thickness to filler thickness. Author

N86-25638# Joint Publications Research Service, Arlington, Va.
REPRESENTATION OF MEDIAN SHELL SURFACES BY MONGE SURFACES Abstract Only **c39**
Ya. G. Savula *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 87-88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 70-75 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Parametrization of median shell surfaces by representing them as Monge surfaces is proposed; a Monge surface is formed by a planar generatrix curve which moves along a generally spatial directrix curve while it remains fixed in the plane normal to the latter. The simple case of a smooth generatrix is considered, assuming moreover a planar directrix. Shallow surfaces are described on this basis; a typical example is a surface of revolution with a circular parallel as directrix and a meridian as generatrix. A parametrization procedure is shown which simplifies the expressions for Lame coefficients and principal curvatures. Calculations are based on the Menier theorem and use of grids of biquadratic elements. Author

N86-25639# Joint Publications Research Service, Arlington, Va.
SPECIAL REVERSE PROBLEM FOR CYLINDRICAL SHELL OF VARIABLE THICKNESS Abstract Only **c39**
N. P. Totskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 75-80 Original language document was announced in IAA A85-24022 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The reverse state-of-stress and deflection problem of optimization is considered for a cylindrical shell of variable thickness under an axisymmetric load, with the thickness distribution as the control function under geometrical constaints and with strength as the design criterion. The formulation of this problem is to determine the longitudinal thickness profile with which the deflection function will be the closest uniform approximation of the prescribed deflection curve. The problem is treated as an infinite-dimensional one and, accordingly, replaced with an approximating sequence of problems in nonlinear programming. The latter is solved by finding the thickness vector rather than the thickness function and constructing with it a piecewise-linear continuous control. This has been done for an isotropic cylindrical shell under uniform external pressure with rigidly clamped or hinge supported ends, and the thickness profile is found which minimizes the deflection function. Comparison with a shell of uniform thickness and the same weight indicates that the latter is only slightly suboptimum in this respect. Author

N86-25640# Joint Publications Research Service, Arlington, Va.
WAVE PROCESSES DURING FLEXURAL VIBRATIONS OF BEAMS UNDER DEFORMATION Abstract Only **c39**
K. P. Dynnik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 88-89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 95-100 Original language document announced in IAA as A85-24023 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The flexural vibrations of damped bars are treated as a superposition of traveling waves of deformation. The complex phase velocity of the waves is interpreted in mechanical terms, and expressions are obtained for the amplitudes of incident and reflected waves at the ends of the bar. The contribution of each wave to the general vibration mode is determined, as is the wave impedance. V.L.

N86-25641# Joint Publications Research Service, Arlington, Va.
STABILITY OF SHELLS OF REVOLUTION WITH SMALL DEVIATIONS FROM CYLINDRICAL SHAPE Abstract Only **c39**
D. V. Babich and L. A. Deriglazova *In its* USSR Report: Engineering and Equipments (JPRS-UEQ-86-002) 7 Feb. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 106-108 Original language document was announced in IAA as A85-24024 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The effect of initial geometrical imperfections on the critical buckling load is investigated by using an approach where the shell imperfections are expressed through the geometrical parameters of the middle surface, such as curvature and Lame coefficients. The stability problem for shells with an arbitrary shape of the generatrix is solved using a variational-difference method. In particular, the variational principle is combined with the method of discrete functional approximation to obtain a stable rapidly converging numerical algorithm for calculating critical loads. V.L.

N86-25642# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATION MODES OF IMPERFECT CONICAL SHELLS Abstract Only **c39**
S. Yu. Fialko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 90-91 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 109-112 Original language document was announced in IAA as A85-24025 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

The natural vibrations of a thin circular shell in the shape of a truncated cone with a slight nonaxisymmetric initial imperfection were analyzed. Linear (with respect to the perturbed state components) equations, derived from geometrically nonlinear Mushtari-Vlasov equations through linearization, are used as the resolvent equations. The problem is solved using the finite-difference method. It is shown that the initial imperfection sometimes gives rise to vibrational modes with different numbers of nodal lines near the larger and the smaller ends of the shell. V.L.

N86-25643# Joint Publications Research Service, Arlington, Va.
NONAXISYMMETRIC DEFORMATION OF FLEXIBLE TOROIDAL SHELL WITH ELLIPTIC CROSS-SECTION Abstract Only **c39**
V. S. Demyanchuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 91-92 Transl. into ENGLISH

from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1986 p 112-115 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Nonaxisymmetric deformation of a flexible thin toroidal shell with elliptic cross section by a surface load is analyzed, allowing the shell thickness to vary generally in two coordinate directions. The corresponding boundary value problem is formulated in the quadratic approximation of the geometrically nonlinear theory. The resulting system of nonlinear partial differential equations with variable coefficients and with the meridional arc length as an integration variable is solved by the method of straight lines, assuming that the resolvent functions and the variation of coefficients are sufficiently smooth around the circumference. A numerical solution is obtained by the stable method of discrete orthogonalization according to the Runge-Kutta scheme so as to avoid local instabilities, and using the algorithm of linear integration so as to operate with a constant data volume rather than with a successively doubling one. The procedure was programmed in FORTRAN for YeS computers and a BESM-6. Author

N86-25644# Joint Publications Research Service, Arlington, Va.
PARAMETRIC OPTIMIZATION OF PLASTIC CYLINDRICAL SHELLS WITH GEOMETRICAL NON-LINEARITY Abstract Only **c39**
Ya. A. Lellep *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 93 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan.-Feb. 1985 p 138-146 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Design optimization of a closed circular cylindrical shell under internal pressure is considered; its ideally triple-layer lateral wall consists of two sheaths separated by a filler and its ends are arbitrarily constrained. Both the length of the shell and its total wall thickness are fixed. The problem is to optimally space additional reinforcing hoops along the wall and to match the allowable pressure range with the thickness of both sheaths so as to minimize the functional which characterizes the optimality criterion. The shell is assumed to be a Trask-St. Venant body of rigid plastic material, which adds two other constraints in accordance with the corresponding geometrically nonlinear theory of plasticity. The analysis and calculations are based on the corresponding strain theory of plasticity, where the yield surface forms a closed polyhedron and can be described by the equation of a plane in the space of generalized stresses. The problem is formulated as a variational one of optimal control with phase constraints. Author

N86-25645# Joint Publications Research Service, Arlington, Va.
PRECESSION OF NATURAL VIBRATION MODE IN SPHERICAL SHELL DURING ROTATION Abstract Only **c39**
V. F. Zhuravlev and A. L. Popov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 94 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 147-151 Original language document announced in IAA as A85-28909 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A hemispherical shell with a free edge is considered when rotating about its axis of symmetry at a generally variable speed. The vibrations of such a shell are described by the V.V. Novozhilov system of three resolvent equations. These are reduced to two systems of ordinary differential eqautions for the amplitudes of vibrations, both containing the relative speeds of traveling natural circumferential modes and only one containing their frequencies. The quadratic characteristic equation has only one positive root, which yields the precession speed of a natural mode of plane-flexural or torsional vibrations. Calculations for the fundamental mode reveal that its speed is only slightly dependent on the Poisson ratio of the shell material. The ratio of mode speed to shell speed is completely independent of the shell speed, which means that the mode axis does not depart from its position relative to certain points on the shell equator as the shell speed varies, provided that the shell speed remains far below the critical. The analysis for the special case of constant low speed of shell rotation is extended to the general case of an arbitrarily variable speed. Author

N86-25646# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATIONS OF CYLINDRICAL SHELL UNDER INITIAL EXTERNAL PRESSURE NONUNIFORMLY DISTRIBUTED OVER CIRCUMFERENCE Abstract Only **c39**
S. N. Kukudzhanov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 95-96 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 53-59 Original language document was announced in IAA as A85-16161 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Natural radial vibrations of a cantilever cylindrical shell are analyzed, specifically a shell which is hinge-supported at one end and reinforced by a perfectly stiff ring at the free other end. The object is to determine the effect of initial external pressure, a pressure nonuniformly distributed over the circumference, on the resonance modes and frequencies. The initial external pressure is assumed to be an even function of an angular cylindrical coordinate, and the deflection is sought in the form of a double series. The problem is solved by the Bubnov-Galerkin method, with the indices of the coordinate functions sought for the optimum initial approximations not a priori fixed but forming some not a priori known sequence. M.G.

N86-25647# Joint Publications Research Service, Arlington, Va.
STABILITY OF MULTILAYER CYLINDRICAL SHELL UNDER EXTERNAL PRESSURE Abstract Only **c39**
A. N. Andreyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 96-97 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 59-64 Original language document was announced in IAA as A85-16162 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

A comparison is made between critical stresses for a layered cylindrical shell loaded by a uniform external pressure, as determined from different versions of improved stability theories allowing for transverse shear and transverse elongation. The effects of transverse shear, normal reduction, and subcritical state inhomogeneity on the critical load are examined parametrically. V.L.

N86-25648# Joint Publications Research Service, Arlington, Va.
CYLINDRICAL SHELL WITH SLIT UNDER TENSION Abstract Only **c39**
M. Sh. Dyshel *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 97 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 64-69 Original language document was announced in IAA as A85-16163 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

Thin cylindrical shells made of AMg6M aluminum alloy with a narrow circumferential slit were tested in a TsD-10/90 tensile machine, with no load acting on the edges of the 0.2 mm wide slit. Normal deflections in the vicinity of the slit were measured with pneumatic strain gauges. The stress-strain curves for shells 120 mm in diameter and 0.3 to 0.46 mm thick with slits 20 to 70 mm long reveal a typical linear dependence of deflection on applied tension over a wide initial load range. The deflection is larger when the slit is longer, and when the shell is thinner, it is larger than the shell thickness even below the yield point. The deflection is maximum at the center of the slit; the shell buckles outward along the edges of the slit, decreases toward the tips of the slit and the shell buckles inward along the unslit portion of the circumference. Loading beyond the linear range results in cracking beyond the tips of the slit in the same direction, up to complete fracture around the circle. The cracking and fracture kinetics in shells of 70 to 250 m diameters under monotonically increasing tension, monitored with photoresistors and by high-speed photogra-

phy, reveal a long phase of steady subcritical crack propagation at a constant rate after an initial noncracking range and followed by supercritical avalanche breakdown. For quantitative analysis of this process, the dependence of the length of a crack on the length of time was approximated as a piecewise-linear function.
Author

N86-25649# Joint Publications Research Service, Arlington, Va.
AXISYMMETRIC CONTACT INTERACTION OF CYLINDRICAL SHELL AND ELASTIC ON RIGID HOUSING Abstract Only
c39
W. Krzys and A. Moc *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 101 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 90-96 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

An engineering problem in the design and operation of hydraulic presses, namely axisymmetric contact interaction of a cylindrical shell and its housing, is analyzed by the method of variational inequalities with finite differences. The corresponding differential equations are formulated in accordance with the applicable small-strain Timoshenko theory of shells. The shell is in an either elastic or rigid housing longer than the shell on both sides, under a radial load continuously distributed over the middle zone and discretely concentrated but dense toward the ends. The very ends of the shell are assumed to be free of constraints. The results of the solution indicate that the maximum shell deflection and the widths of the contact zones depend on the stiffness of the housing, and that increasing the stiffness narrows the contact zones as well as decreases the maximum shell deflection. A rigid housing corresponds to one with infinite stiffness, and an elastic one is found to approach this case, a free shell without constraint in a housing with zero stiffness representing the far other extreme case.
Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-25650°# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEAR-FIELD SPILLOVER FROM A SUBREFLECTOR: THEORY AND EXPERIMENT
S. W. Lee (Illinois Univ., Urbana-Champaign), R. Acosta, A. R. Cherrette, and P. T. Lam (Lockheed Missiles and Space Co., Sunnyvale, Calif.) May 1986 32 p refs
(Grant NAG3-419)
(NASA-TM-88763; NAS 1.15:88763; ELR-86-5; UILU-ENG-86-2547) Avail: NTIS HC A03/MF A01 CSCL 20N

In a dual reflector antenna, the spillover from the subreflector is important in determining the accuracy of near-field measurements. This is especially so when some of the feed elements are placed far away from the focus. A high-frequency GTD analysis of the spillover field over a plane just behind the subreflector is presented. Special attention is given to the field near the incident shadow boundary and the role played by the slope diffraction term. Computations are in excellent agreement with experimental results.
Author

N86-25651# Sandia National Labs., Albuquerque, N. Mex.
LATERAL WAVE PROPAGATION IN THE PRESENCE OF A CONDUCTING PLATE
J. M. Dunn May 1985 52 p refs
(Contract DE-AC04-76DP-00789)
(DE86-004974; SAND-85-0373) Avail: NTIS HC A04/MF A01

Lateral waves can propagate when an antenna is placed close to an interface between two different media. A study is made of how the lateral wave is affected by a conducting plate placed parallel to the interface. This changes the type of decay of the wave along the interface from that of algebraic to exponential. A new method is used in developing the formulas. Impedance boundary conditions are used to decouple the two media at each step of an iterative procedure. Single medium techniques can then be used in each region. The formulas are seen to agree well with numerical results from the exact integral representations of the fields.
DOE

N86-25652# Royal Signals and Radar Establishment, Malvern (England).
A SYSTEM DYNAMICS MODEL FOR COMMUNICATIONS NETWORKS
A. J. Awcock and T. E. G. King Sep. 1985 26 p refs
(AD-A163748; RSRE-MEMO-3866; DRIC-BR-97971) Avail: NTIS HC A03/MF A01 CSCL 17/2

An abstract model of a communications network in system dynamics terminology is developed as implementation of this model by a FORTRAN program package developed at RSRE is discussed. The result of this work is a high-level simulation package in which the performance of adaptive routing algorithms and other network controls may be assessed for a network of arbitrary topology.
GRA

N86-25653# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DEVELOPMENT OF THE AFIT COMMUNICATIONS LABORATORY AND EXPERIMENTS FOR COMMUNICATIONS STUDENTS M.S. Thesis
Jerome B. Thompson Dec. 1985 303 p refs
(AD-A163948; AFIT/GE/ENG/85D-48) Avail: NTIS HC A14/MF A01 CSCL 05/9

This thesis was a development of a series of experiments for an electronics communications laboratory. These experiments were designed to reinforce theoretical courses offered in the Air Force Institute of Technology Electrical Engineering Core Communications Sequence in the form of demonstrations or laboratory exercises. The experiments were developed under the criteria of investigating a significant number of analog and digital communication system concepts with a minimum amount of experimentation time. Extensive use of a spectrum analyzer was included in many of the experiments. The topics covered in the experiments include: amplitude modulation; frequency modulation; balanced modulator; single sideband modulation; phase-lock loop and frequency synthesizer; pulse amplitude modulation; pulse code modulation; delta modulation; amplitude shift keying; phase shift keying; and frequency shift keying. The results of this study indicated that many more system concepts could be included in laboratory exercises, such as spread spectrum communications time and frequency division multiplexing, and computer oriented testing and analysis.
GRA

N86-25654# Drexel Univ., Philadelphia, Pa.
ELECTROMAGNETIC SCATTERING PROPERTIES OF FINITE CYLINDERS AND SPHEROIDS Contractor Report, Jun. 1981 - Aug. 1984
Leonard D. Cohen, Richard D. Haracz, and Anel Cohen Nov. 1985 33 p
(Contract DAAK11-81-K-0003; DA Proj. 1L1-61102-A-71-A)
(AD-A163034; CRDC-CR-85041) Avail: NTIS HC A03/MF A01 CSCL 20/14

The perturbation theory suggested by Shifrin is applied through the second order to the scattering of light from dielectric spheroids and finite cylinders. Double scattering events involving long cylindrical particles are discussed. Comparisons between experimental and theoretical scattering from long brass and copper cylinders are discussed also.
GRA

N86-25655# Operations Research, Inc., Rockville, Md.
SIR-B (SHUTTLE IMAGING RADAR) IMAGES
31 May 1985 8 p
(Contract N00014-84-C-0716)

(AD-A163012) Avail: NTIS HC A02/MF A01 CSCL 17/2

Space Shuttle Mission 41G was launched from Kennedy Space Center on 5 October 1984. Aboard the instrument pallet was the 1.28 GHz (L-band) Shuttle Imaging Radar (SIR-B) intended to obtain SAR images for geology, agriculture, forestry, hydrology, and ocean sciences. Data were intended to be transmitted to earth via a Ku band communication link with the Tracking and Data Relay Satellite (TDRS). Unfortunately, the shuttle's trainable Ku communication antenna failed to lock onto the TDRS, making high rate data transmission impossible. A real-time-revised observation program, of much smaller scale than the original plan, was substituted making use of an onboard tape recorder. The flight crew recorded radar data on the recorder and then reoriented the shuttle itself, with the Ku antenna fixed, to point to TDRS and transmit the data. The revised plan eliminated about 80 percent of the planned data swaths and shortened the remainder. A number of errors crept into the SIR-B experiments as a result of the sudden and complete reprogramming as well as a problem in latching the radar antenna. Finally, an electrical problem in the radar caused an 8-10 dB reduction in signal-to-noise ratio. Author (GRA)

N86-25656# Ohio State Univ., Columbus. ElectroScience Lab.
GROUND VEHICLE CLASSIFICATION USING MULTIFREQUENCY MULTIPOLARIZATION RESONANCE RADAR Progress Report
Neil Chamberlain Jul. 1985 156 p
(Contract N00014-82-K-0037)
(AD-A163026; ESL-714190-10) Avail: NTIS HC A08/MF A01 CSCL 17/9

Experiments investigating the classification of ground vehicles using processed radar returns are described. The calibrated and scaled backscatter measurements of scale-model vehicles at several azimuth angles are used to establish a catalog representing the VHF resonance region radar returns of actual vehicle targets. The performance of both the nearest neighbor algorithm, (using frequency domain data), and a correlation algorithm (using time domain data), is investigated. The effects of wave polarization, azimuth angle, and other key parameters are examined. The consequences of introducing forced errors into the estimates of aspect angle are studied. A novel feature set employing the ratio of vertically and horizontally polarized radar returns is described, and its classification performance is examined. In general, classification is found to be very much dependent on the particular algorithm, azimuth angle and polarization of interest. The Nearest Neighbor algorithm, using Radar Cross Section Amplitudes as features, was found to perform quite well, yielding classification rates of about 90%, depending on target azimuthal angle and wave polarization. Increasing the number of classification frequencies improves performance, but only to a limit. Errors in aspect angle are found to significantly degrade classification performance. GRA

N86-25657# E-Systems, Inc., Fairfax, Va.
ON ACHIEVING NETWORK LPI (LINK PARAMETER INTERACTIONS) FOR SPREAD SPECTRUM COMMUNICATIONS Final Report, May 1984 - May 1985
William J. OBrien, Jeffrey Seibert, Brian Vogel, and Patricia W. Young Oct. 1985 246 p refs
(Contract DAAG29-84-C-0008)
(AD-A163985; ARO-21611.3-EL) Avail: NTIS HC A11/MF A01 CSCL 17/2

This report investigates and recommends methods of adaptively controlling parameters of Spread Spectrum Communication links to achieve Low-Probability-of-Intercept for a network composed of many links. The results provide an informative insight into the interaction between link/network variables. The best choice of parameter values for optimization of tactical situations for the communicators and/or the interceptor may be made based on algorithms developed. Recommendations for further research are included. Author (GRA)

N86-25658# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A KNOWLEDGE BASED SYSTEM FOR THE DESIGN OF MOBILE SUBSCRIBER EQUIPMENT COMMUNICATIONS NETWORKS M.S. Thesis
Brin A. Tolliffe Dec. 1985 150 p refs
(AD-A163994; AFIT/GCS/ENG/85D-16) Avail: NTIS HC A07/MF A01 CSCL 17/2

This project designed a knowledge based system that will assist tactical communications systems planners design tactical communications networks. The system was developed to be used with a new generation of United States Army tactical communications equipment, the Mobile Subscriber Equipment (MSE) System, and was named the Mobile Subscriber Equipment Network Design System (MSENDS). MSENDS is designed to use terrain knowledge available from digital terrain databases, and knowledge specific to the MSE system to perform the network design process. The heuristic network design method of clustering is used to develop an initial terrain independent network design. The initial design is then evaluated using terrain knowledge and MSE specific knowledge for constraint satisfaction. Network redesign strategies are invoked as unsatisfied constraints are identified. The evaluation and redesign of the network is performed iteratively until a satisfactory design is achieved. A prototype of MSENDS was implemented to evaluate the proposed design. A blackboard architecture that enabled non-chronological backtracking to be used was implemented. The prototype does not use terrain knowledge in its design or redesign operations; only MSE specific knowledge is used by the prototype. It was found that the use of the design, evaluate redesign architecture coupled with MSE specific knowledge was able to design a network with a lower cost than was produced by a system employing no domain specific knowledge. These results indicate that the proposed system may be useful in the design of tactical communications networks. GRA

N86-25659# Indiana Univ., Bloomington. Dept. of Psychology.
MULTI-USER REAL-TIME SPEECH PROCESSING FACILITY Final Report, 1 Jun. 1983 - 31 Aug. 1984
David B. Pisoni 21 Mar. 1985 12 p refs
(Grant AF-AFOSR-0218-83)
(AD-A164005; AFOSR-86-0005TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

Research projects requiring the VAX 11/750 and related peripherals have all focused on speech analysis, perception and recognition. We compared perceptual confusions occurring for natural and synthetic speech syllables which showed that synthetic speech is not equivalent to noisy or degraded natural speech. We conducted a study that indicated that perception of synthetic speech is improved by training. Training with fluent synthetic sentences improves performance for both isolated words and sentences. Training with isolated words improves performance on isolated words but does not improve performance on fluent synthetic sentences. A large-scale series of experiments investigated the effects of noise in a talker's ears on speech production. Words produced in noise are longer, louder and higher in pitch than words produced in the quiet. The tilt of the power spectrum decreased and formant frequencies shifted in noise. nition, I/O, human factors, cognitive processes, and communication sciences. GRA

N86-25660# California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
APPROXIMATION TECHNIQUES FOR PLANAR PERIODIC STRUCTURES
Richard C. Compton and David B. Rutledge Oct. 1985 7 p refs
(Contract DAAG29-82-K-0165)
(AD-A164053; ARO-19483.20-EL) Avail: NTIS HC A02/MF A01 CSCL 20/3

The rigorous calculation of electromagnetic properties of periodic meshes using moment methods requires considerable algebraic work and computer resources. In this paper a number of easy to use approximation techniques for analyzing thin structures with square, rectangular and circular holes are presented. Formulas for the effective impedance of these meshes are described which can easily take into account oblique incidence

and the presence of a dielectric substrate. In addition techniques for analyzing more complex shaped apertures such as a cross are discussed. These methods are more accurate than existing approximation techniques and can be applied to a wide range of situations that could not be handled before. GRA

N86-25661# California Inst. of Tech., Pasadena.
IMAGING ANTENNA ARRAYS Final Report, 1 Aug. 1982 - 30 Sep. 1985
David Rutledge Dec. 1985 6 p refs
(Contract DAAG29-82-K-0165)
(AD-A164055; ARO-19483.21-EL) Avail: NTIS HC A02/MF A01 CSCL 17/9

The goal of the research contract has been to develop monolithic imaging antenna arrays for millimeter waves. This has required new developments in planar antennas for integrated-circuit substrates that are suitable for integration with planar Schottky diodes. In the future, this work should lead to a monolithic millimeter-wave TV camera. GRA

N86-25662# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PREDICTION OF POWER MARGINS ON SATELLITE COMMUNICATIONS LINKS AS A FUNCTION OF LOCAL RAIN RATE STATISTICS AND DESIRED AVAILABILITY M.S. Thesis
Michael J. Navas Dec. 1985 161 p refs
(AD-A164097; AFIT/GE/ENG/85D-29) Avail: NTIS HC A08/MF A01 CSCL 17/2

This thesis presents an algorithm which can be used to predict power margins needed to overcome the degrading effects of rain on satellite communication links in the 7 to 9 GHz frequency range. This algorithm employs established mathematical models which are used to characterize rain rate behavior and its effects on wave propagation. The algorithm accounts for each of the three ways in which the link can be degraded by rain; signal attenuation, signal depolarization, and increased noise power at the receiver input. This algorithm is designed to give the link designer all the tools necessary to compute a reliable power margin. The power margin is tailor-made for each individual link by considering all the relevant variables that can distinguish one link from another including the specified value of link availability, the rain rate characteristics at the location of the satellite Earth terminal, and the link configuration. Finally, the algorithm is implemented in a computer program to make it convenient to use. Author (GRA)

N86-25663# Electronic Design Associates, Costa Mesa, Calif.
AUTOMATED RECOGNITION OF HELIUM SPEECH. PHASE I: INVESTIGATION OF MICROPROCESSOR BASED ANALYSIS/SYNTHESIS SYSTEM Final Report
Howard J. Jelinek 31 Jan. 1986 33 p
(Contract N00014-85-C-0593)
(AD-A164113) Avail: NTIS HC A03/MF A01 CSCL 09/2

This is the Final Report of Electronic Design Associates on its Phase I SBIR project. The purpose of this project is to develop a method for correcting helium speech, as experienced in diver-surface communication. The goal of the Phase I study was to design, prototype, and evaluate a real time helium speech corrector system based upon digital signal processing techniques. The general approach was to develop hardware (an IBM PC board) to digitize helium speech and software (a LAMBDA computer based simulation) to translate the speech. As planned in the study proposal, this initial prototype may now be used to assess expected performance from a self contained real time system which uses an identical algorithm. The Final Report details the work carried out to produce the prototype system. Four major project tasks were: a signal processing scheme for converting helium speech to normal sounding speech was generated. The signal processing scheme was simulated on a general purpose (LAMDA) computer. Actual helium speech was supplied to the simulation and the converted speech was generated. An IBM-PC based 14 bit data Input/Output board was designed and built. A bibliography of references on speech processing was generated. GRA

N86-25664# Naval Postgraduate School, Monterey, Calif.
REDUCTION IN BANDWIDTH BY USING VARIABLE LENGTH CODES M.S. Thesis
Serdar Akinsel Dec. 1985 113 p refs
(AD-A164356) Avail: NTIS HC A06/MF A01 CSCL 09/4

A method of coding an ensemble of messages of a finite number of symbols is developed. Minimizing the average number of coding digits per message by using Huffman coding can result in a large variance. This is a problem because a large variance requires a large buffer and also creates more time delay during transmission and decoding respectively for on-line communication. This research examines modified Huffman codes for the purpose of finding a way to reduce the variance. The effective parameters which give the lower variance modified Huffman codes are obtained. The buffer requirements and the reduction of the bandwidth to forward messages in an on-line communication is investigated. A possible design for a practical system is presented for using the modified Huffman codes. GRA

N86-25665# Naval Research Lab., Washington, D. C.
THE EFFECT OF LPC (LINEAR PREDICTIVE CODING) PROCESSING ON THE RECOGNITION OF UNFAMILIAR SPEAKERS Interim Report
Astrid Schmidt-Nielsen and Karen R. Stern 20 Sep. 1985 14 p refs
(AD-A164461; NRL-8926) Avail: NTIS HC A02/MF A01 CSCL 17/2

The effect of narrowband digital processing, using a linear predictive coding (LPC) algorithm at 2400 bits/s, on the recognition of previously unfamiliar speakers was investigated. Three sets of five speakers each (two sets of males differing in rated voice distinctiveness and one set of females) were tested for speaker recognition in two separate experiments using a familiarization-test procedure. In the first experiment three groups of listeners each heard a single set of speakers in both voice processing conditions, and in the second two groups of listeners each heard all three sets of speakers in a single voice processing condition. There were significant differences among speaker sets both with and without LPC processing, with the low distinctive males generally more poorly recognized than the other groups. There was also an interaction of speaker set and voice processing condition; the low distinctive males were no less recognizable over LPC than they were unprocessed, and one speaker in particular was actually better recognized over LPC. Although it seems that on the whole LPC processing reduces speaker recognition, the reverse may be the case for some speakers in some contexts. This suggests that one should be cautious about comparing speaker recognition for different voi ce systems of the basis of a single set of speakers. It also presents a serious obstacle to the development of a reliable standardized test of speaker recognizability. GRA

N86-25666# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Science.
COLLISION RESOLUTION ALGORITHMS FOR SPREAD SPECTRUM ENVIRONMENTS
Michael Paterakis and P. Papantoni-Kazakos Jan. 1986 42 p refs
(AD-A164469; UCT/DEECS/TR-86-2) Avail: NTIS HC A03/MF A01 CSCL 17/2

In some spread spectrum environments, the low energy of the transmitted signals, in conjuction with the existence of channel noise, doesn't allow the distinction between collision and lack of transmissions. For such environments, and for the Poisson user model, the authors propose and analyze stable full feedback sensing and limited feedback sensing synchronous transmission algorithms. They assume binary SNS (success versus nonsuccess) feedback per slot, and the possibility of transmission of phony data by a central node. The highest throughput attained by both the full feedback sensing and the limited feedback sensing algorithms is 0.322, while the latter induces somewhat higher delays. This is compensated by the robustness of the limited feedback sensing algorithm in the presence of feedback errors (in

contrast to the full feedback sensing algorithm) and its modest requirements on the sensed feedback history. Author (GRA)

N86-25667# Axiomatix, Los Angeles, Calif.
ADVANCED LPI (LOW-PROBABILITY-OF-INTERCEPT) INTERCEPT DETECTOR RESEARCH Final Report
C. L. Nikias and Kai T. Woo 13 Nov. 1985 239 p refs
(Contract N00014-82-C-0585)
(AD-A164485; AD-E900539; R8511-3) Avail: NTIS HC A11/MF A01 CSCL 17/2

We examine in this report the problem of wideband detection of a spread spectrum signal from an interceptor's viewpoint; our aim is to derive, evaluate and compare various detector structures whose purpose is to intercept a spread-spectrum communication transmitter. The transmitter under surveillance employs a variety of modulation/spreading/transmission techniques which are invariably assumed to emit the message-bearing signal in deep background noise or interference. Thus, the challenging task of the intercepting detector is to reveal as best as possible any transmission of the unknown spread waveform in the presence of an obscuring noisy environment. Naturally, the degree of success achieved by the interceptor when detecting the presence of the communicator's spread signal depends on the amount of information available to him regarding the structure of that signal. At one extreme, the interceptor's most fortunate situation would be to acquire the spreading code itself (crack the code). If this is too demanding, he must settle for less, such as approximate knowledge of the signal's carrier center frequency, code rate, code epoch, spreading bandwidth, etc., or a subset thereof. At the other extreme, he might know almost nothing, in which case, he could resort to a simple energy discriminator device (i.e., radiometer) since it is, on many occasions, a low-SNR asymptotically optimal detector. GRA

N86-25668# Naval Postgraduate School, Monterey, Calif.
DESIGN, CONSTRUCTION AND TESTING OF A PROTOTYPE FIN-LINE MAGIC-TEE AND FIN-LINE MONOPULSE SYSTEM SUITABLE FOR MILLIMETER-WAVE APPLICATIONS M.S. Thesis
James W. Rowley Dec. 1985 114 p refs
(AD-A164521) Avail: NTIS HC A06/MF A01 CSCL 17/9

This thesis describes a fin-line 180 degree hybrid (magic-tee) that is suitable for use in monopulse radar antennas at microwave and millimeter-wave frequencies. The three-dimensional junction of a waveguide magic-tee is replaced with fin-line slots, coupled fin-line slots and microstrip lines mounted in a waveguide fixture. The planar geometry on the substrate provides significant reduction in size and eliminates the waveguide rat race that is associated with conventional hybrids. Ports one and two are flared into fin-line horns to produce a fin-line monopulse system. Suggestions for further development of the fin-line magic-tee and monopulse system are presented. GRA

N86-25669# Naval Postgraduate School, Monterey, Calif.
JAMMING EFFECTS ON M-ARY COHERENT AND BINARY NONCOHERENT DIGITAL RECEIVERS USING RANDOM JAMMER MODELS M.S. Thesis
Luis A. Munoz Dec. 1985 113 p refs
(AD-A164522) Avail: NTIS HC A06/MF A01 CSCL 17/4

The purpose of this work is to analyze and evaluate the effect of jamming waveforms on both coherent and noncoherent digital communications receivers. Specifically, random processes are utilized as jamming models in which it is assumed that the jamming waveforms have been produced by a shaping filter driven by white Gaussian noise. Such jamming waveforms are then assumed to be present at the input of known receiver structures (in addition to the signals and channel noise normally present), and optimum jamming waveform spectra are determined for different receiver schemes and modulation techniques. Graphical results based on numerical analyses are presented in order to demonstrate the effect of different jamming strategies on receiver performance. In order to quantify receiver performance, bit error probabilities are determined for binary modulation systems and symbol error probabilities are determined for M-ary modulation systems. In each case, the error probabilities are functions of signal-to-noise ratio (SNR) and jammer-to-signal ratio (JSR). Results show that it is generally possible to significantly degrade the performance of binary as well as M-ary modulation communication receivers by introducing suitably chosen jamming waveforms. GRA

N86-25670# Department of the Navy, Washington, D. C.
RADAR DOPPLER PROCESSOR USING A FAST ORTHOGONALIZATION NETWORK Patent Application
Karl Gulach, inventor (to Navy) Filed 11 Oct. 1985 21 p
(AD-D012158; US-Patent-Appl-SN-786982) Avail: NTIS HC A02/MF A01 CSCL 17/9

A radar doppler processor, comprising M, M = N-1, tap delay lines; N digital multipliers; a N-point fast fourier transform network; and a fast orthogonalizing network to orthogonalize each subband output signal to eliminate cross-correlations between all output signals. GRA

N86-25671# Naval Research Lab., Washington, D. C.
NARROWBAND INTEGRATED VOICE DATA SYSTEM BASED ON THE 2400-b/s LPC (LINEAR PREDICTIVE CODER) Interim Report, Oct. 1984 - Jul. 1985
George S. Kang 30 Dec. 1985 17 p refs
(AD-A163158; NRL-8942) Avail: NTIS HC A02/MF A01 CSCL 17/2

This report presents a narrowband integrated voice/data system which is achieved by modifying the Government-standard linear predictive coder (LPC) operation at 2400 bits per second (b/s) to transmit both speech and digital data simultaneously. The presence of the digital data in the speech bit-stream, however, does not cause operational incompatibility with other Government-standard LPCs which dont have this capability. Since the LPC will be widely deployed in tactical platforms to support command and control of the armed forces, the capability of transmitting simple graphics or typed messages along with continuous conversation would enhance the effectiveness of tactical voice communications. According to our experimentation, digital data up to approximately 75 b/s can be transmitted during continuous conversation without deteriorating the intelligibility of the LPC processed speech. GRA

N86-25672# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
AN OPTICAL FIBER COMMUNICATION SYSTEM BASED ON COHERENT MODULATION, PART 1 Final Technical Report, Apr. - Jul. 1985
Gunnar Jacobsen Jun. 1985 109 p refs
(Contracts DAJA37-82-C-0735; DA Proj. 1T1-61102-BH-57)
(AD-A163168) Avail: NTIS HC A06/MF A01 CSCL 17/2

Coherent optical communication systems have potential application possibilities which make them a very interesting research area. Compared to present optical communication systems operating at 1.3 micron or 1.55 micron they can operate with 20 dB's increase in receiver sensitivity which allows around 100 km increase in repeater separation for point to transmission systems. In addition, fully developed coherent systems will allow multiplexing and demultiplexing of several hundreds of information channels all transmitted via just one single mode fiber. GRA

N86-25673# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
AN OPTICAL FIBER COMMUNICATION SYSTEM BASED ON COHERENT MODULATION, PART 2 Final Technical Report, Apr. - Jul. 1985
Gunnar Jacobsen Jun. 1985 109 p
(Contracts DAJA37-82-C-0735; DA Proj. 1T1-61102-BH-57)
(AD-A163169) Avail: NTIS HC A06/MF A01 CSCL 17/2

Phase delay between intensity and frequency modulation of a semiconductor laser; spectral behavior of a directly current-modulated CSP laser; a theoretical and experimental analysis of modulated laser fields and power spectra; current/frequency-modulation characteristics for directly optical frequency-modulated injection lasers at 830 nm and 1.3 micrometers; optical phase

modulation and homodyne detection using an injection locked laser transmitter; and frequency stabilization of single mode semiconductor lasers at 830 nm and 1.3 micrometers are among the topics discussed. GRA

N86-25674# Department of the Air Force, Washington, D.C.
SIMULTANEOUS NULLING IN THE SUM AND DIFFERENCE PATTERNS OF A MONOPULSE RADAR ANTENNA Patent
Randy L. Haupt, inventor (to Air Force) Issued 26 Nov. 1985 34 p Supersedes AD-D010349
(AD-D012084; US-Patent-4,555,706; US-Patent-Appl-SN-498334; US-Patent-Class-343-379) Avail: US Patent and Trademark Office CSCL 17/9

A monopulse radar has a single set of adaptive weights shared by both sum and difference channels. The radar utilizes algorithms that effect simultaneous nulling in the sum and difference patterns of its phased array antenna. Algorithms are developed for both amplitude and phase nulling and for phase only nulling. Author (GRA)

N86-25675# Department of the Air Force, Washington, D.C.
APPARATUS FOR SCANNING AND MEASURING THE NEAR-FIELD RADIATION OF AN ANTENNA Patent Application
Poirier, inventor (to Air Force) Filed 6 Nov. 1985 23 p
(AD-D012086; US-Patent-Appl-SN-795400) Avail: NTIS HC A02/MF A01 CSCL 20/14

Apparatus for measuring the near-field radiation of an antenna such that its far-field radiation characteristics can be determined is described. The invention utilizes the principle of the Foucault pendulum. It uses a bob attached to a long pendulum arm that is free to rotate. Rotation of the Earth causes an apparent rotation of the swing plane of the pendulum with a period of T = 24/sin (latitude). By attaching a field sensing probe to the pendulum bob and mounting the antenna under the Foucault pendulum, the entire antenna aperture can be scanned without moving the antenna. The motion of the probe covers part of an external sphere centered at the pivot point of the pendulum and having a radius equal to the length of the pendulum. Appropriate transformation of the measured near-field data gives the far-field radiation pattern. GRA

N86-25676# Department of the Air Force, Washington, D.C.
AUTONOMOUS SYNCHRONIZATION OF A BISTATIC SYNTHETIC APERTURE RADAR (SAR) SYSTEM Patent Application
Norman E. Powell, inventor (to Air Force) Filed 12 Nov. 1985 55 p
(AD-D012094; US-Patent-Appl-SN-795571) Avail: NTIS HC A04/MF A01 CSCL 17/9

An airborne bistatic radar synchronization apparatus and process is presented which receives clutter point echo returns from the bistatic radar receiver on a penetrator aircraft, and determines therefrom the location of the illuminator aircraft without the need of receiving direct path signals from the radar transmitter on board the illuminator aircraft. Once the state of the illuminator aircraft (position and velocity) has been determined, the estimate of the illuminator state may be refined using direct path data. Finally, a target location algorithm is applied to bistatic target echo returns to calculate an equivalent monostatic range for a desired target, and provide an estimate of the location of the target. GRA

N86-25677# Department of the Air Force, Washington, D.C.
MULTIBEAM LENS ANTENNAS Patent
Roger E. Clapp, inventor (to Air Force) Issued 10 Dec. 1985 14 p
(AD-D012108; US-Patent-4,558,324; US-Patent-Appl-SN-511591; US-Patent-Class-343-754) Avail: US Patent and Trademark Office CSCL 09/5

Multibeam lens antennas are often circular, and utilize propagation in disk-shaped parallel-surface regions. There is phase correction through terms in theta squared, where theta is the angle of an aperture point measured from the boresight direction. In the new designs herein, the lens comprises two portions, each being two closely spaced plates with a dielectric medium between them. One portion is formed as a surface of revolution(cyclindrical or conical) with two circular ends, one end being an aperture with element feedpoints coupled to array elements. The other portion is a cap joined to the other end of the first portion. The cap may be a disk or a segment of a sphere. The dimensions and indices of refraction are selected to provide focus points for feed ports, with each focus being for a specific beam direction. The parameters may be selected so that the focus points are within the cap, at the periphery of the cap, or at the aperture. GRA

N86-25678# Department of the Air Force, Washington, D.C.
APPLIQUE RATE CONVERTER Patent
Leonard R. Novick, inventor (to Air Force) Issued 10 Dec. 1985 9 p
(AD-D012111; US-Patent-4,558,445; US-Patent-Appl-SN-601520; US-Patent-Class-370-84) Avail: US Patent and Trademark Office CSCL 17/2

The applique rate converter permits a digital multiplexer to support any data rate less than half of its input port design rate. The applique rate converter develops a composite data stream consisting of alternate data bits and data boundary bits. The data boundary bits change state at each new data bit (corresponding to a change in the data clock.) The composite bit stream is increased to the output data rate by means of a circuit called the synchronizer. At the demultiplex side of the applique, the data is separated from the composite stream by a decoding process and, if necessary, the data stream is rate smoothed. The major sections of the applique rate converter are the synchronizer at the multiplex side and the data separator and rate smoothing circuits at the demultiplex side. GRA

N86-25679# Department of the Navy, Washington, D. C.
PULSE COMPRESSION SIDELOBE SUPPRESSOR Patent
Bernard L. Lewis and Frank F. Kretschmer, Jr., inventors (to Navy) Issued 26 Mar. 1985 6 p
(AD-D012115; US-Patent-4,507,659; US-Patent-Appl-SN-506945; US-Patent-Class-343-17.2 PC) Avail: US Patent and Trademark Office CSCL 09/5

A method and apparatus for reducing the peak to peak-sidelobe ratio of the compressed pulse output signal of a symmetrical frequency derived phase coded pulse expander-compressor is described. The apparatus includes a band-width limiting device connected to the output of a symmetrical frequency derived phase coded pulse expander-compressor. GRA

N86-25680# Lawrence Livermore National Lab., Calif.
BEHAVIOR OF VERY LARGE SHORT PULSE ANTENNAS. REVISION 1
H. M. Buettner and A. J. Spero Oct. 1985 72 p
(Contract W-7405-eng-48)
(DE86-004180; UCID-20080-Rev-1) Avail: NTIS HC A04/MF A01

The electromagnetic behavior of a pulsed array of radiating elements can exhibit marked differences from standard continuous wave (CW) behavior when the physical size of the array, D, exceeds the physical pulse length, cT (speed of light times pulse duration). Herein is presented a simple analytical model and the results of computer code calculations which explain and illustrate those differences. Further elaborated is the behavior of these very large transient antennas (VLTA) using computer codes to illustrate the effects on the radiation pattern when the radiators exhibit randomness of turn-on time, phase, or amplitude. Results show that the physical space into which a linear VLTA radiates can significantly be divided into two regions by the off-axis angle THETA(sub T) identical to arcsin (cT/D). Within the near-axis region (THETA < THETA(sub T)), the behavior of a coherently radiating (pulses simultaneously initiated) array is dominated by a CW antenna pattern. That is, the lobe structure found in the energy-deposition pattern is essentially that of the CW case. In the far-axis region (THETA > THETA (sub T) the behavior of acoherently radiating array is dominated by transient effects. No CW-like pattern is seen; instead the energy-deposition pattern is roughly proportional to 1/sin (sq) THETA with only a suggestion of lobes. DOE

N86-25681# Oak Ridge National Lab., Tenn.
DESCRIPTION OF A TENTATIVE US-USSR COMMON COMMUNICATION FORMAT
N. B. Cove, A. A. Brooks, S. Salazkina, I. (State Public Library for Science and Technology, Moscow), V. V. Kapralova, I. M.. Kharina, G. D. Matiushin, M. A. Avetisov (All-Union Inst. of Scientific and Technical Information, USSR), O. V. Zhukovets, A. S. Barinov (State Committee for Science and Technology, Moscow), N. V. Turtanov et al Nov. 1985 380 p Prepared in cooperation with Gosudarstvennyj Publichnaya Nauchno-Tekhnicheskaya Biblioteka SSSR, Moscow; Vsesoyuznyj Inst. Nauchnoj i Tekhnicheskoj Informatsii, Moscow (USSR);Gosudarstvennyj Komitet So
(Contract DE-AC05-84OR-21400)
(DE86-004676; ORNL/CSD/TM-232) Avail: NTIS HC A17/MF A01

The Soviet-American Research Group for the Development of a Common Communication Format for Exchange of Bibliographic Information has prepared a draft format covering books, industrial catalogs, serials, articles, patents, and technical reports. This draft is intended to provide a possible format for exhange of bibliographic records on magnetic tape. Field definitions (tags, indicators, and subfields) are proposed for 105 bibliographic fields. International Standard ISO-2709 is used for the record structure on magnetic tape. DOE

N86-25682# Mississippi Univ., University. Dept. of Electrical Engineering.
HYBRID EQUATION APPROACH FOR THE SOLUTION OF ELECTROMAGNETIC SCATTERING PROBLEMS INVOLVING ARBITRARILY SHAPED INHOMOGENEOUS DIELECTRIC BODIES Final Report, Jul. 1982 - Sep. 1985
Z. Gong and A. W. Glisson Dec. 1985 174 p refs
(Grant NSF ECS-82-04683)
(PB86-141793) Avail: NTIS HC A08/MF A01 CSCL 20N

A numerical procedure is presented for use in the solution of electromagnetic scattering problems involving arbitrarily shaped inhomogeneous dielectric bodies. The solution procedure has been developed in such a way that fairly large scatters should be amenable to treatment via sparse matrix techniques or iteration and, in addition, so that other scatterers may be included in the vicinity of the inhomogeneous body with the usual simplicity of moment method formulations. The scattering problems are formulated via hybrid integral equation/partial differential equation approach in which the inhomogeneous region is modeled by the partial differential equations for the electric or magnetic field directly, while the radiation condition is incorporated via integral equation at the surface of the homogeneous body. The method of moments is applied so that existing surface integral equation computer codes for homogeneous bodies can be used, with only minor alterations, to generate the block of the matrix corresponding to the equivalent surface current interactions. GRA

N86-25683# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
MILLIMETER-WAVE URBAN AND SUBURBAN PROPAGATION MEASUREMENTS USING NARROW AND WIDE BANDWIDTH CHANNEL PROBES
E. J. Violette, R. H. Espeland, and G. R. Hand Nov. 1985 89 p refs
(PB86-147741; NTIA-85-184) Avail: NTIS HC A05/MF A01 CSCL 17B

Measurements reported are part of a study of propagation characteristics for millimeter-wave communication links operating in an urban-suburban environment. Absorption data were collected for signals propagated through some common building materials. At these same channel frequencies, paths at street level obstructed by office buildings and residential properties were examined in terms of received signal levels resulting from direct penetration and/or propagation by diffraction modes with terminal separation of from 0.1 to 1.2 km. Signal fading was measured for line-of-sight paths traveled down an urban street. Narrow- and wide-beam antenna patterns and both modes of linear antenna polarization were used to compare multipath fading characteristics. A unique 30.3 GHz wide bandwith channel impulse probe was used to record multipath signal amplitudes and delay times. Impulse response measurements were recorded as the transmitter traveled along the urban street. GRA

N86-25684# National Weather Service, Salt Lake City, Utah.
NWR (NATIONAL WEATHER SERVICE) VOICE SYNTHESIS PROJECT, PHASE 1
G. W. Sampson Jan. 1986 75 p
(PB86-145604; NOAA-TM-NWS-WR-192) Avail: NTIS HC A04/MF A01 CSCL 17B

The purpose of the NOAA Weather Radio (NWR) Voice Synthesis Project is to provide a demonstration of the current voice synthesis technology. Phase 1 of this project is presented, providing a complete automation of an hourly surface aviation observation for broadcast over NWR. In examining the products currently available on the market, the decision was made that synthetic voice technology does not have the high quality speech required for broadcast over the NWR. Therefore the system presented uses the phrase concatenation type of technology for a very high quality, versatile, voice synthesis system. GRA

N86-25685# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
ISDN (INTEGRATED SERVICES DIGITAL NETWORK): NUMBERING, ADDRESSING AND INTERWORKING
V. J. Pietrasiewicz, J. J. Austin, and R. F. Linfield Oct. 1985 133 p
(PB86-143617; NTIA-85/182) Avail: NTIS HC A07/MF A01 CSCL 17B

The factors that affect the design of a numbering plan for the Integrated Services Digital Network (ISDN) involved a complex interplay between existing plans, national priorities, and technical system limitations. These factors are the subject of the report. Desirable attributes of any numbering plan are explained, existing standards covering various plans are discussed and some actual plans currently in use are examined. The development of the numbering plan for ISDN by the Consultative Committee for International Telegraph and Telephone is essentially complete. GRA

N86-25686# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
POSSIBLE ESTIMATION METHODOLOGIES FOR ELECTROMAGNETIC FIELD DISTRIBUTIONS IN COMPLEX ENVIRONMENTS
M. Kanda, J. Randa, and N. S. Nahman Mar. 1985 52 p refs
(PB86-167327; NBS/TN-1081) Avail: NTIS HC A04/MF A01 CSCL 20C

The problem of measuring and characterizing complicated multiple-source, multiple-frequency electromagnetic environments is becoming more important and more difficult as electrical devices proliferate. The paper outlines three general approaches to the problem which are currently under investigation at the National Bureau of Standards. The three approaches are: (1) a statistical treatment of the spatial distribution of electromagnetic field intensities; (2) a numerical computation using a finite-difference (or lattice) form of the electromagnetic action functional; and (3) use of a directional probe to scan a volume. All three methods are still in the development stage, but each appears promising. GRA

N86-25687# RAND Corp., Santa Monica, Calif.
TELECOMMUNICATIONS ALTERNATIVES FOR FEDERAL USERS: MARKET TRENDS AND DECISIONMAKING CRITERIA
L. L. Johnson, M. A. Sirbu, and B. M. Mitchell Dec. 1985 237 p refs Sponsored by NSF
(Grant NSF PRA-84-00689)
(PB86-153764; R-3355-NSF; ISBN-0-8330-0692-4;
NSF/PRA-85023) Avail: NTIS HC A11/MF A01 CSCL 17B

The telecommunications market has been marked by growing

competition in local and long-distance transmission and in terminal equipment. In response to this, the goal of the study is to show what kinds of information government agencies should collect, and how they should use it, to improve decision making. The study considers four objectives: (1) to identify and assess options for meeting voice and data needs, taking into account technical, economic, and regulatory constraints; (2) to show how Federal agencies can evaluate their needs in light of the options for supplying them; (3) to establish criteria for evaluating the relative merits of options in light of these needs; and (4) to construct a decision making framework for choosing among options, taking into account uncertainties about costs, performance, and benefits. Author (GRA)

N86-25688# Federal Communications Commission, Washington, D. C. Office of Plans and Policy.
PROMOTING COMPETITION BETWEEN INTERNATIONAL TELECOMMUNICATION CABLES AND SATELLITES
E. R. Kwerel and J. E. McNally Jan. 1986 91 p refs
(PB86-156288; FCC/OPP/WP86-19) Avail: NTIS
HC A05/MF A01 CSCL 17B

Evidence that the services of international telecommunication facilities have not been provided in the most economically efficient way is presented. Distorted investment decisions may be the result of the Commission's policies of allocating traffic among international facilities and applying rate-of-return regulation to international businesses. Alternative policies that rely on restructuring private incentives rather than increasing the Commission's direct involvement in facility planning are suggested. GRA

N86-25689*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
SYSTEM ENGINEERING STUDY OF ELECTRODYNAMIC TETHER AS A SPACEBORNE GENERATOR AND RADIATOR OF ELECTROMAGNETIC WAVES IN THE ULF/ELF FREQUENCY BAND Semiannual Report, 1 Sep. 1985 - 28 Feb. 1986
Robert D. Estes, Mario D. Grossi, and Enrico C. Lorenzini Mar. 1986 48 p refs
(Grant NAG8-551)
(NASA-CR-176749; NAS 1.26:176749; SAR-1) Avail: NTIS
HC A03/MF A01 CSCL 20N

The transmission and generation by orbiting tethered satellite systems of information carrying electromagnetic waves in the ULF/ELF frequency band to the Earth at suitably high signal intensities was examined and the system maintaining these intensities in their orbits for long periods of time without excessive onboard power requirements was investigated. The injection quantity power into electromagnetic waves as a function of system parameters such as tether length and orbital height was estimated. The basic equations needed to evaluate alternataing current tethered systems for external energy requirements are presented. The energy equations to tethered systems with various lengths, tether resistances, and radiation resistances, operating at different current values are applied. Radiation resistance as a function of tether length and orbital height is discussed. It is found that ULF/ELF continuously radiating systems could be maintained in orbit with moderate power requirements. The effect of tether length on the power going into electromagnetic waves and whether a single or dual tether system is preferable for the self-driven mode is discussed. It is concluded that the single tether system is preferable over the dual system. E.A.K.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-25690# Lawrence Livermore National Lab., Calif.
TEST FACILITY FOR THE EVALUATION OF MICROWAVE TRANSMISSION COMPONENTS
C. G. Fong and B. R. Poole 2 Oct. 1985 8 p Presented at the 11th Symposium on Fusion Engineering, Austin, Tex., 18-22 Nov. 1983
(Contract W-7405-eng-48)
(DE86-003891; UCRL-92582; CONF-851102-23) Avail: NTIS
HC A02/MF A01

A Low Power Test Facility (LPTF) was developed to evaluate the performance of Electron Cyclotron Resonance Heating (ECRH) microwave transmission components for the Mirror Fusion Test Facility (MFTF-B). The facility generates 26 to 60 GHz in modes of TE01, TE02, or TE03 launched at power levels of 1/2 milliwatt. The propagation of the RF as it radiates from either transmitting or secondary reflecting microwave transmission components is recorded by a discriminating crystal detector mechanically manipulated at constant radius in spherical coordinates. The facility is used to test, calibrate, and verify the design of overmoded, circular waveguide components, quasi-optical reflecting elements before high power use. The test facility consists of microwave sources and metering components, such as VSWR, power and frequency meters, a rectangular TE10 to circular TE01 mode transducer, mode filter, circular TE01 to 2.5 in. diameter overmoded waveguide with mode converters for combination of TE01 to TE03 modes. This assembly then connects to a circular waveguide launcher or the waveguide component under test. DOE

N86-25691# Oak Ridge National Lab., Tenn.
TEMPERATURE DEPENDENT ELECTRON TRANSPORT STUDIES FOR DIFFUSE DISCHARGE SWITCHING APPLICATIONS
S. R. Hunter, J. G. Carter, L. G. Christophorou, and S. M. Spyrou 1985 9 p
(Contract DE-AC05-84OR-21400)
(DE86-004213; DOE/OR-21400/T213) Avail: NTIS
HC A02/MF A01

A diffuse gas discharge switch must be capable of high speed, repetitive switching without significant degradation of its electron conduction and opening characteristics if it is to be useful in pulsed power switching applications. Whenever the switch is fired, the gas temperature T within the switch is expected to rise several degrees centigrade, and operating temperatures of several hundred degrees are likely for repetitively operated switches. The electron transport and rate coefficients, such as the electron drift velocity and the electron attachment coefficient for the most promising gas mixtures under study are expected to be funcions of T, and consequently, knowledge of these parameters as a function of T is desirable for modeling the operation of the diffuse discharge switch in practical application. Measurements of these parameters in C2F6/buffer gas (Ar, Ch4, N2) mixtures have been made and are reported. The electron attachment rate constant has also been measured for C2F6 and C3F8 as a function of the mean electron energy over the temperature range 300 less than or equal to T less than or equal to 750 K. For C2F6, the electron attachment rate constant has been found to increase by 30% over this temperature range, while for C3F6, the attachment rate constant first decreases when the temperature is increased to approximately 450 K and then significantly increases with increasing T. An interpretation of these measurements and their significance in repetitively operated diffuse discharge switching gas mixtures is outlined. DOE

N86-25692# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
OPTIMIZATION OF LOW NOISE MILLIMETER-WAVE RECEIVER FRONT-ENDS Ph.D. Thesis
Gamal Mahmoud Hegazi May 1986 170 p refs
Avail: NTIS HC A08/MF A01

Mixer noise theory is modified to take into account sources of excess noise in the mixer diode which differ from the classical thermal and shot noise sources. These excess noise sources are,

for the case of a GaAs Schottky diode: hot electron, trap, and intervalley scattering noise. Taking these noise sources into account, the analysis of millimeter wave mixers at both room temperature and cryogenic temperature is carried out to study the conditions for optimum embedding circuit and diode for minimum noise temperature. A performance analysis of a quasi-optical planar mixer is presented and the calculated results are compared with experimental measured ones. Finally, a balanced quasi-optical slotring mixer is utilized as an array element in a heterodyne monopulse system and a proof of concept experiment is demonstrated at X band. Author

N86-25693*# California Inst. of Tech., Pasadena. Power Electronics Group.
INPUT-CURRENT SHAPED ac TO dc CONVERTERS Final Report
May 1986 49 p refs
(Grant NAG3-615)
(NASA-CR-176787; NAS 1.26:176787; EE116-81) Avail: NTIS HC A03/MF A01 CSCL 09A

The problem of achieving near unity power factor while supplying power to a dc load from a single phase ac source of power is examined. Power processors for this application must perform three functions: input current shaping, energy storage, and output voltage regulation. The methods available for performing each of these three functions are reviewed. Input current shaping methods are either active or passive, with the active methods divided into buck-like and boost-like techniques. In addition to large reactances, energy storage methods include resonant filters, active filters, and active storage schemes. Fast voltage regulation can be achieved by post regulation or by supplementing the current shaping topology with an extra switch. Some indications of which methods are best suited for particular applications concludes the discussion. Author

N86-25694*# Wisconsin Univ., Madison. Dept. of Electrical and Computer Engineering.
POWER CONVERSION DISTRIBUTION SYSTEM USING A RESONANT HIGH-FREQUENCY AC LINK
Pradeep K. Sood and Thomas A. Lipo 1986 6 p
(Grant NAG3-492)
(NASA-CR-176804; NAS 1.26:176804) Avail: NTIS HC A02/MF A01 CSCL 10B

Static power conversion systems based on a resonant high frequency (HF) link offers a significant reduction in the size and weight of the equipment over that achieved with conventional approaches, especially when multiple sources and loads are to be integrated. A faster system response and absence of audible noise are the other principal characteristics of such systems. A conversion configuration based on a HF link which is suitable for applications requiring distributed power is proposed. Author

N86-25695*# National Aeronautics and Space Administration, Washington, D.C.
INFLUENCE OF THE TEMPERATURE OF ELECTRODE MATERIAL ON ITS DISINTEGRATION UNDER THE ACTION OF AN ARC DISCHARGE IN HYDROGEN
A. V. Bolotov and S. A. Yukhimchuk Aug. 1985 11 p refs
Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-[illegible]006)
(NASA-TM-77893; NAS 1.15:77893) Avail: NTIS HC A02/MF A01 CSCL 09C

An analysis is made of the electrophysical processes occurring at the end surface of rod electrodes during constant and alternating arc discharge in hydrogen. Experiments are reported on the effect of surface temperature of tungsten electrodes on their erosion. The influence of activating additions of thorium oxide, the structure of the tungsten, and the gas surrounding the electrode on the specific thermal loading and the erosion of the electrodes is discussed. Author

N86-25696# Chicago Univ., Ill.
CURRENT DISTRIBUTION IN ESD (ELECTRON STIMULATED DESORPTION) DIODES. CROSS SECTION CORRECTIONS
J. C. Lin and R. Gomer Nov. 1985 33 p refs
(Contract N00014-77-C-0018)
(AD-A163646; Rept-4) Avail: NTIS HC A03/MF A01 CSCL 09/1

The electron current distribution in diodes consisting of a rectangular crystal and an electron emitting filament parallel to and in front of it, used in several electron stimulated desorption (ESD) experiments has been determined by means of a dummy crystal constructed from uniformly transparent Lektromesh and a moveable, suitably constructed fine probe. It was found that for straight filaments the distribution was uniform along the narrow, but nearly triangular along the long dimension of the crystal. GRA

N86-25697# Stanford Univ., Calif. Electronics Lab.
JOINT SERVICES ELECTRONICS PROGRAM Final Annual Progress Report, 1 May 1984 - 30 Apr.1985
J. S. Harris Nov. 1985 15 p refs
(Contract DAAG29-84-K-0047)
(AD-A163755; ARO-21317.8-EL) Avail: NTIS HC A02/MF A01 CSCL 09/3

This is the final report of the research conducted at the Stanford Electronics Laboratories under the sponsorship of the Joint Services Electronics Program from May 1, 1984 through April 30 1985. This report summarizes the areas of research, identifies the most significant results, and lists the dissertations and publications sponsored by the contract (DAAG29-84-K-0047). Submicron devices, VLSI, information systems, and feedback vector quantizers are among the topics discussed. GRA

N86-25698 Department of the Air Force, Washington, D.C.
DATA ACQUISITION CHANNEL APPARATUS Patent
Charles H. Higgins, inventor (to Air Force) and John D. Skipper, inventor (to Air Force) Issued 8 Oct. 1985 7 p
(AD-D011969; US-Patent-4,546,343; US-Patent-Appl-SN-627691; US-Patent-Class-340-347) Avail: US Patent and Trademark Office CSCL 09/5

Dicussed is a hybrid integrated circuit data acquisition channel apparatus employing an operational amplifier fed by a low current differential bipolar transistor preamplifier having separate feedback gain and signal gain determining elements and providing an amplified signal output to a sample and hold and analog-to-digital converter circuits. The disclosed apparatus operates with low energy and small space requirements and is capable of operations without the sample and hold circuit where the nature of the applied input signal permits. GRA

N86-25699# ERA Ltd., Leatherhead (England).
INVESTIGATION OF MARGINAL VOLTAGE ANALYSIS FOR DEFECT LOCATION IN INTEGRATED CIRUCITS Final Technical Report, Aug. 1983 - Jun. 1984
E. H. Maher Oct. 1985 91 p
(Contract F49620-83-C-0123)
(AD-A163033; RADC-TR-85-184) Avail: NTIS HC A05/MF A01 CSCL 09/5

Digital integrated circuits tend to be classified as either good or bad when tested by standard equipment. Standard testing techniques fail to detect a group of circuits that pass normal testing but then fail after a short time of actual use. These circuits represent a reliability hazard for systems. For high reliability applications a burn-in test is used to eliminate these devices with latent defects. Some devices though survive the burn-in test only to fail later for reasons usually associated with failure mechanisms that are not accelerated by the burn-in test. An alternate screening technique is needed to eliminate these devices. A technique for detecting these reliability rogues has been studied along with a modification to the technique that will allow a more rapid location of the physical defect sites. GRA

N86-25700# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MODELING AND SIMULATION OF A SIGNAL PROCESSOR IMPLEMENTING THE WINOGRAD FOURIER TRANSFORM

M.S. Thesis
James M. Collins Dec. 1985 191 p refs
(AD-A164049; AFIT/GE/ENG/85D-9) Avail: NTIS
HC A09/MF A01 CSCL 09/5

Continuing advances in the state of the art silicon fabriaction technology have allowed tremendous increases in the performance which may be achieved by a single integrated circuit. The natural counterpart of this increased functionality is, of course, increased design complexity. A growing problem is how to concisely and accurately communicate design information on VLSI and VHSIC class circuits. The VHSIC program office has sponsored the development of a hardware description language designed to address this problem. The VHSIC Hardware Description Language (VHDL) was applied to the problem of modeling a custom signal processor employing the Winograd Fourier Transform. A methodology was developed which decomposes the architecture into subcomponents, and then models the behavior and structure of the macrocells which comprise those subcomponents. Additionally, a custom simulator was developed to verify the timing, control, and hardware macrocells used in the implementation of the signal processor. The simulation modeled the circuit at the bit level and validated the architecture and expected numerical performance. GRA

N86-25701# Naval Postgraduate School, Monterey, Calif.
THE RADIATION EFFECTS OF HIGH ENERGY ELECTRONS UPON THERMIONIC INTEGRATED CIRCUITS M.S. Thesis
William R. Arguello Dec. 1985 74 p refs
(AD-A164124) Avail: NTIS HC A04/MF A01 CSCL 09/5

Thermionic Integrated Circuit (TIC) devices use a hybrid of vacuum tube and integrated circuit technology. The integrated circuitry is fabricated on a sapphire (Al2O3) substrate. A device was irradiated to attempt to establish a total dose (measured in rad Si) of radiation to cause the TIC device to malfunction. The TIC device was irradiated using 30 and 100 Mev electrons provided by the Naval Postgraduate School Linear Accelerator (LINAC). The device received a total dose of 1.8155 x 10 to the ninth power rad Si during the course of the experiments. It continued to function normally through the irradiation study, so it is concluded that the device is not sensitive to radiation, at least at the levels used. GRA

N86-25702# Hughes Research Labs., Malibu, Calif.
VLSI (VERY LARGE SCALE INTEGRATION) FLOATING POINT CHIP DESIGN STUDY Final Report, Sep. 1983 - Nov. 1984
J. G. Nash Nov. 1985 125 p refs
(Contract N66001-83-C-0395)
(AD-A164198; NOSC-CR-312) Avail: NTIS HC A06/MF A01 CSCL 09/5

This report describes techniques for very large scale integration (VLSI) implementation of arithmetic algorithms. The report describes an algorithm for performing area-time efficient division, on-line techniques for performing bit-serial calculations, and iterative algorithms for performing square root GRA

N86-25703# Colorado Research Development Corp., Fort Collins.
SEMICONDUCTING TRANSITION METAL SILICIDES FOR ELECTRO-OPTIC VSLI INTERCONNECTS Interim Status Report
John E. Mahan 15 Oct. 1985 6 p
(Contract N00014-85-C-0874)
(AD-A164303; ISR-1) Avail: NTIS HC A02/MF A01 CSCL 09/5

Since the start of the project on September 15, 1985, we have fabricated and partially characterized the CrSi2 thin films, and made preparations for improved optical measurement and for investigating the two other proposed materials, MnSi(1.7) and IrSi(1.75). These are detailed: Chromium Silicide Formation, X-ray Diffraction Analysis of the Films, Resistivity Measurements, Optical Measurements; and Preparations for MnSi(1.7) and IrSi(1.7r). GRA

N86-25704# Naval Postgraduate School, Monterey, Calif.
ELECTRON IRRADIATION OF N CHANNEL SILICON ON SAPPHIRE INSULATED GATE FIELD EFFECT TRANSISTORS (IGFET) M.S. Thesis
Robert A Pornaras Dec. 1985 111 p refs
(AD-A164520) Avail: NTIS HC A06/MF A01 CSCL 09/1

SOS, n-channel, insulated gate field effect transistors (IGFETs) were irradiated at room temperature wht a 30 MeV electron beam at doses from 104 to 106 Rads (Si). The effects of the irradiation on IGFET performance were evaluated by measuring threshold voltage decreased after each irradiation, up to the highest dose. The threshold voltage behavior was as expected for an n-channel IGFET undergoing gate oxide charge build-up. The total dose was not large enough to exhibit threshold voltage increases indicative of interface state generation. The IGFETs were allowed to anneal for 107 hours at room temperture. The threshold voltage recovered to approximately sixty-five percent of its pre-irradiation value within thirty hours. It then increased slowly to about seventy-five percent of its pre-irradiation value by the end of the observed annealing time. Threshold voltage rebound was not observed. GRA

N86-25705# GTE Labs., Inc., Waltham, Mass.
INVESTIGATION OF OPENING SWITCH MECHANISMS BASED ON CHEMICALLY REACTIVE PLASMAS Final Report, 15 Aug. 1982 - 30 Oct. 1985
W. P. Lapatovich, R. B. Piejak, and J. M. Proud Nov. 1985 37 p refs
(Contract N00014-82-C-0615)
(AD-A163171) Avail: NTIS HC A03/MF A01 CSCL 09/5

An investigation of discharge-induced chemical reactions resulting in high-density product vapors containing strongly attaching gases has been conducted to evaluate the feasibility and potential of such reactions in rapid opening plasma switches. This new concept of employing such reactions to limit and/or interrupt large currents on a microsecond time scale was studied in two element (electrodeless and electroded) devices and in three element (electroded) devices. Bimolecular and unimolecular reactions were considered. The plasma reaction between AlCl sub 3 and SiO sub 2 was studied. The electrical properties of one of the reaction products (SiCl sub 4) is reported. GRA

N86-25706# Department of the Navy, Washington, D. C.
MICROWAVE AND MILLIMETER WAVE PHASE SHIFTER Patent Application
Robert Neidert and Clifford Krowne, inventors (to Navy) Filed 12 Dec. 1985 27 p
(AD-D012082; US-Patent-Appl-SN-808697) Avail: NTIS
HC A03/MF A01 CSCL 09/5

The present invention is directed generally to a variable phase shifter for millimeter wave signals, and more particularly to a variable phase shifter based on the slow-wave effect. There is increased interest in millimeter wave signal propagation both for military and commercial applications. The millimeter wave region is of interest because there are certain windows in the atmosphere in the millimeter wave region that will propagate millimeter waves for great distances. Additionally, millimeter waves will propagate through chaff and rain. In view of this interest, it is highly desirable to have millimeter wave circuit components which are compatible with solid state processing mothods, require reduced real estate area, have a decreased cost per device, and an increased yield. The phase shifter is an integral component of millimeter wave receivers, as well as other key RF components such as antennas, amplifiers, transmit-receiver switches, local oscillators and filters. GRA

N86-25707# Department of the Navy, Washington, D. C.
BATTERY TESTER Patent Application
Mark D. Poljak, inventor (to Navy) Filed 12 Aug. 1985 20 p
(AD-D012083; US-Patent-Appl-SN-764687) Avail: NTIS
HC A02/MF A01 CSCL 10/3

An improved battery tester for determining the acceptability of a Lithium Sulfur Dioxide (LiSO2) storage battery at a given temperature and with one or more cells therein is discussed. The tester is generally made up of a first comparison circuit having a series of interconnected components, namely a comparator, first and second flip-flops, and an AND gate. A first resistor is parallel

connected to the first comparison circuit. A second comparison circuit is also parallel connected to the first comparison circuit and is generally made up of a series interconnected components, namely a second resistor, a capacitor, a buffer, and a second comparator. A first switch is connected to the first resistor and a second switch is parallel connected to the second comparison circuit between the capacitor and the buffer. A logic control arrangement controls the operation of both switches, both comparators, and both flip-flops for testing a battery as to its start-up voltage and performance voltage characteristics all in a relatively short time period. GRA

N86-25708# Department of the Air Force, Washington, D.C.
PI-SECTION DIGITAL PHASE SHIFTER APPARATUS Patent Application
Binboga S. Yarman, inventor (to Air Force) Filed 20 Aug. 1985 13 p
(AD-D012090; US-Patent-Appl-SN-767455) Avail: NTIS
HC A02/MF A01 CSCL 09/5

An extra high frequency pi-section digital phase shifter apparatus has a diode connected between two identical parallel shunt circuits. The parallel shunt circuits connect to the series inductor/diode circuit at both the input and output and each parallel shunt circuit has an inductor connector in parallel with a capacitor and a diode to provide balanced insertion loss at each diode switching state. When the diodes of the circuit are in the forward-biased state they act as closed short circuit switches. When the diodes are reverse-biased, the inductance in the shunt circuit resonates with the diode capacitance to provide a short circuit path to the RF signal at the center frequency of the RF signal at the desired phase. GRA

N86-25709# Department of the Air Force, Washington, D.C.
T-SECTION DIGITAL PHASE SHIFTER APPARATUS Patent Application
Binboga S. Yarman, inventor (to Air Force) Filed 20 Aug. 1985 11 p
(AD-D012091; US-Patent-Appl-SN-767454) Avail: NTIS
HC A02/MF A01 CSCL 09/5

A extra high frequency T-section digital phase shifter apparatus has a pair of back to back diodes connected between the input and output terminals with a parallel circuit connected between the common junction and ground. The shunt parallel circuit has an inductor in parallel with the series combination of a capacitor and a diode to provide a balanced insertion loss at each diode switching state. When the diodes are in the forward-biased state they act as closed short circuit switches and in the shunt circuit, the inductance resonates with the diode capacitance to provide a perfect transmission for the RF signal. GRA

N86-25710# Department of the Air Force, Washington, D.C.
LOW PASS PI SECTION DIGITAL PHASE SHIFTER APPARATUS Patent Application
Binboga S. Yarman, inventor (to Air Force) Filed 20 Aug. 1985 12 p
(AD-D012093; US-Patent-Appl-SN-767446) Avail: NTIS
HC A02/MF A01 CSCL 09/1

A low pass Pi section digital phase shifter apparatus has an inductor and a diode connected in series between two identical parallel circuits. The parallel circuits connect to the series inductor/diode circuit at both the input and output. Each circuit has an inductor connected in parallel with a capacitor and a diode to provide balanced insertion loss at each diode switching state. When the diodes of the circuit are in the forward biased state they act as closed short circuit switches. When the diodes are reversed biased, the inductance in the series circuit resonates with the diode capacitance to provide a short circuit path to the RF signal to pass the center frequency of the RF signal at the desired phase. GRA

N86-25711# Department of the Air Force, Washington, D.C.
MICROPROCESSOR CONTROLLED RF MODULATOR APPARATUS Patent Application
Filardo, inventor (to Air Force) Filed 1 Nov. 1985 36 p
(AD-D012096; US-Patent-Appl-SN-793811) Avail: NTIS
HC A03/MF A01 CSCL 17/9

The microprocessor-controlled RF modulator apparatus will provide repeatable, controlled scintillation on test bench generated low-power RF target waveforms for the purpose of providing target returns with realistic radar cross section characteristics during testing of the F-16 (or any other) fire control radar. The microprocessor-controlled RF modulator apparatus is utilized in line between an RF target signal generator and the target horn to provide a variety of target situations for testing radar hardware and software. GRA

N86-25712# Department of the Air Force, Washington, D.C.
A LOW PASS T-SECTION DIGITAL SHIFTER APPARATUS Patent Application
Binboga S. Yarman, inventor (to Air Force) Filed 20 Aug. 1985 14 p
(AD-D012097; US-Patent-Appl-SN-767578) Avail: NTIS
HC A02/MF A01 CSCL 09/5

A low pass T-section digital phase shifter apparatus has a pair of serially connected inductor-diode combinations connected in series which includes a parallel circuit connected between the common junction and ground. The parallel circuit has an inductor in parallel with a series capacitor and diode to provide a balanced insertion loss at each diode switching state. When the diodes are in the forward-biased state, they act as closed short circuit switches. When the diodes are reversed-biased, the inductance in the series circuit resonates with the diode capacitance to provide a short circuit path to the RF signal to pass the center frequency of the RF signal at the desired phase. GRA

N86-25713# Department of the Air Force, Washington, D.C.
COMPACT BROADBAND RECTANGULAR TO COAXIAL WAVEGUIDE JUNCTION Patent
Joseph C. Lee, inventor (to Air Force) Issued 10 Dec. 1985 5 p
(AD-D012117; US-Patent-4,558,290; US-Patent-Appl-SN-598949; US-Patent-Class-333-126) Avail: US Patent and Trademark Office CSCL 09/1

A compact waveguide junction is described for coupling a rectangular waveguide of one frequency band to a coaxial waveguide and a second rectangular waveguide of a second frequency band to the interior of the hollow center conductor of the coaxial waveguide. GRA

N86-25714# Department of the Air Force, Washington, D.C.
DIGITAL FREQUENCY SYNTHESIZER CIRCUIT Patent
John W. Murphy and David K. Vail, inventors (to Air Force) Issued 17 Dec. 1985 8 p
(AD-D012134; US-Patent-4,559,613; US-Patent-Appl-SN-393236; US-Patent-Class-364-703) Avail: US Patent and Trademark Office CSCL 09/5

A high-resolution digital pulse to digital pulse divider circuit directly synthesizes precise frequencies having low phase noise content and phase continuity when frequency changes occur. Author (GRA)

N86-25715# Department of the Air Force, Washington, D.C.
DUAL FREQUENCY MICROSTRIP ANTENNA Patent Application
Yuen T. Lo, inventor (to Air Force) Filed 21 Oct. 1985 29 p
(AD-D012136; US-Patent-Appl-SN-771529) Avail: NTIS
HC A03/MF A01 CSCL 09/5

A single element patch microstrip antenna for dual frequency operation is disclosed. By placing shorting pins at appropriate locations in the patch, the ratio of two band frequencies can be varied from 3 to 1.8. By also introducing slots in the patch, the ratio can be reduced from 3 to less than 1.3. A second embodiment of the antenna uses a c-shaped slot to obtain an even smaller ratio of two band frequencies. GRA

N86-25716# Lawrence Livermore National Lab., Calif.
SUB-200 PICOSECOND GaAs SAMPLE-AND-HOLD CIRCUIT

FOR A MULTI-GIGASAMPLE/SECOND INTEGRATED CIRCUIT
S. Swierkowski, K. Mayeda, G. Cooper, and C. McConaghy Sep. 1985 6 p Presented at the IEEE International Electron Devices Meeting, Washington, D.C., 1 Dec. 1985
(Contract W-7405-eng-48)
(DE86-002598; UCRL-92947; CONF-851237-2) Avail: NTIS HC A02/MF A01

Initial results are reported on a digital/analog, 1-micron gate GaAs MESFET IC whose purpose is to record with bandwidths exceeding 1 GHz nonrepetitive analog transient waveforms of a few nanoseconds duration. Specialized buffered-fet logic digital circuits with T (sub pd) as low as 70 psec generate a pulse burst that strobe a series of 20 linear gate sample-and-hold circuits. These 3-gate MESFET sampling circuits have demonstrated sampling apertures of less than 200 psec, without pretriggering required. Backgating effects on the circuit design and performance and high speed techniques are reviewed. Earlier work on this scheme has been extended from 1 nsec step inputs to 100 psec and variable biasing in the linear gate circuit has been added. DOE

N86-25717# Catholic Univ. of America, Washington, D.C. Dept. of Mechanical Engineering.
MEASUREMENT AND CONTROL OF ELECTROSTATIC CHARGES ON SOLIDS IN A GASEOUS SUSPENSION Technical Progress Report
S. Nieh and T. Nguyen Oct. 1985 36 p refs
(Contract DE-FG22-84PC-70778)
(DE86-003037; DOE/PC-70078/TS; TPR-5) Avail: NTIS HC A03/MF A01

Measurements of mean particle charges and charge distributions on Medium Volatile Bituminous (MVB) coals and Lignite A (LIGA) coals in a 51 mm ID grounded copper pipe loop have been made with the upgraded Faraday cage system. Both negative and positive charges were found for coals in all experiments. The dual polarities of charges are believed to be due to the nonuniform materials and chemical composition contained in coals. As expected, increasing velocity or decreasing air humidity has a significant effect to increase the mean particle charge and the standard deviation of distribution. Charge elimination by the addition of coal fines has been explored. Effective suppression of particle charges was achieved by adding 0.1% by mass of minus 1 micron coal dust into the pipe flow. A neutralization mechanism was proposed to interpret the measured results. The results of charge control obtained to date has been significant and encouraging. More work is needed to validate the proposed mechanism. DOE

N86-25718# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
FINLINE DIODE SIX-PORT: FUNDAMENTALS AND DESIGN INFORMATION
M. Weidman Dec. 1985 43 p refs
(PB86-166725; NBS/TN-1090) Avail: NTIS HC A03/MF A01; also available SOD HC $1.75 as SN003-003-02714-6 CSCL 14B

The preliminary design and testing of a planar circuit six-port with diode detectors is described. The planar circuit medium was chosen to be finline, and all preliminary work was done in WR-42 waveguide (18-26.5 GHz). The finline substrate was alumina, and initially commercial beam-lead diodes were bonded to the finline metalization. The goal is to design an integrated circuit which could be fabricated on one chip (with diode detectors) and used as part of a six-port network analyzer in the waveguide bands above 18 GHz. Initial designs proved to be unsatisfactory because of high losses and reflections. Most of the problems have been solved, and a usable integrated finline circuit is a good possibility for a millimeter wave six-port. Author

N86-25719# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
SITE ATTENUATION
R. G. FitzGerrell Nov. 1985 51 p refs
(PB86-169083; NBS/TN-1089) Avail: NTIS HC A04/MF A01; also available SOD HC $2.00 as SN003-003-02708-1 CSCL 09E

Site attenuation is a measure of performance of an open test site used at frequencies below about 1 GHz for antenna calibration and equipment emission and susceptibility testing. These sites typically consist of a large, obstruction-free ground plane and the hemisphere above it. Site attenuation of an ideal site is calculated and compared to data measured using the 30 m by 60 m NBS ground screen. GRA

N86-25720# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
DEVELOPMENT OF NEAR-FIELD TEST PROCEDURES FOR COMMUNICATION SATELLITE ANTENNAS, PHASE 1, PART 1
A. C. Newell and A. G. Repjar Sep. 1985 82 p refs
(PB86-164357; NBSIR-85/3031) Avail: NTIS HC A05/MF A01 CSCL 09E

The purpose of the program is to define and further develop the capabilities of near-field antenna test techniques, specifically for the requirements associated with the development and verification testing of reconfigurable, multibeam, frequency reuse, commercial satellite antennas. Phase 1, Part 1 gives a general survey definition and description of near-field and compact range measurement methods as they apply to satellite antenna systems testing. Each of these methods is evaluated to determine how well they meet the measurement requirements. Included for each technique is a summary of the measurement method, discussions on probe correction and data processing, measurement hardware considerations, a results available section, and measurement accuracy and range certification considerations. The basis for the choice of the best measurement technique is established with the planar near-field measurement method receiving the best score for the directive antennas considered. GRA

N86-25721# SRI International Corp., Menlo Park, Calif.
AUTOMATIC VISUAL INSPECTION OF PRINTED CIRCUIT BOARDS Annual Report, 1 Nov. 1982 - 30 Apr. 1984
S. T. Barnard, J. A. Herson, and R. A. Cain May 1985 55 p refs
(Grant NSF MEA-81-144761)
(PB86-154432; NSF/ENG-85048) Avail: NTIS HC A04/MF A01 CSCL 09A

The goal of the project is to develop effective and efficient methods that verify the integrity of printed circuit boards (PCBs) through the use of computer analysis of images. A system for using gray-scale and color images to detect and classify instances of part integrity defects was developed; the use of color imagery to identify color-coded resistors was investigated; and a system for verifying the identity of character-coded dual in-line package markings was developed. Current work in the area of part integrity involves the use of range data acquired with a structured light device. A prototype of a low-cost laser scanner for solder joint imaging has been designed and constructed. A graphical simulator of a much higher performance device was designed. By systematically varying parameters, the conditions under which various kinds of defects become apparent can be analyzed. GRA

N86-25570# Joint Publications Research Service, Arlington, Va.
METHOD OF REDUCING VIBRATIONS IN MACHINES WITH HIGH-SPEED ROTOR ON BALL BEARINGS Abstract Only
V. B. Balmont *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 45 Transl. into ENGLISH from Izvestiya Vysshihk Uchebnykh Zavedeniy. Mashinostroyeniye (Moscow, USSR), no. 6, Jun. 1984 p 28-33 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25571# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF MANIPULATOR FOR INDUSTRIAL ROBOT WITH THREE ROTATIONAL PAIRS HAVING PARALLEL AXES Abstract Only
M. I. Poteyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 46 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy. Mashinostroyeniye (Moscow, USSR), no. 6, Jun. 1984 p 54-57 (For primary document

see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25605# Joint Publications Research Service, Arlington, Va.
HIGH-SPEED HIGH-VOLTAGE AMPLIFIER Abstract Only
A. N. Dyachko, V. N. Ilyushenko, and V. I. Tuyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 28 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 237-238 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25606# Joint Publications Research Service, Arlington, Va.
MULTICHANNEL RING COMMUTATOR FOR HIGH-CURRENT ACCELERATORS Abstract Only
I. F. Isakov, Ye. I. Logachev, and G. Ye. Remnev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 28-29 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 21-23 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25607# Joint Publications Research Service, Arlington, Va.
HIGH-CURRENT ELECTRON ACCELERATOR Abstract Only
B. V. Alekseyev, I. M. Gorelikov, V. I. Kazurov, L. V. Mashkov, A. G. Greshko, G. I. Soklakov, A. I. Fedorenko, and K. B. Yurekevich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 29 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 19-21 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25608# Joint Publications Research Service, Arlington, Va.
PLASMATIC ION SOURCE Abstract Only
A. P. Semenov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 30 Transl. into ENGLISH from Plasmatic Ion Source (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 23-24 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25613# Joint Publications Research Service, Arlington, Va.
FATIGUE DEFECT TRANSDUCER AND VALIDATION OF ITS USABILITY Abstract Only
V. T. Troshchenko and V. I. Boyko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 54-55 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 3-8 (For primary document see N86-25599 16-13)
(Rept-1) Avail: NTIS HC A06/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N86-25722 British Library Lending Div., Boston Spa (England).
GRAVITATIONAL SEDIMENTATION OF AEROSOL IN DUCTS
T. Tomassini and G. Galluppi 1986 29 p refs Transl. into ENGLISH from Italian article
(BLL-WH-646-(9091.9F); RT/PAS/85/21) Copyright. Avail: British Library Lending Div., Boston Spa, England

The gravitational sedimentation losses are analyzed. An extremely simplified methodology for sedimentation losses calculation in every geometry is shown; this study is important in order to characterize aerosols in ducts and containment systems. Author

N86-25723 ESDU International Ltd., London (England). Engineering Sciences Data Unit.
EJECTORS AND JET PUMPS. DESIGN AND PERFORMANCE FOR INCOMPRESSIBLE LIQUID FLOW
Dec. 1985 98 p refs
(ESDU-85032; ISBN-0-85679-538-0; ISSN-0141-4011) Avail: ESDU

Two procedures are given: a method to obtain an optimum design for a required duty, and a method to predict performance of an existing ejector so as to study the effect of minor changes. The methods are based on one dimensional flow theory, supplemented by empirical correlations for the losses within the nozzles and mixing duct, and the equations are detailed. Extensive design charts are included, and flowcharts guide the user through the simple step-by-step procedures which are illustrated by three detailed practical worked examples. Guidance is provided on the use of annular or multi-nozzle arrangements, various mechanical aspects, and on the avoidance of cavitation. Author

N86-25724# Sandia National Labs., Albuquerque, N. Mex.
ELECTRIC HEATING FOR HIGH-TEMPERATURE HEAT TRANSPORT FLUIDS
J. T. Holmes Dec. 1985 17 p
(Contract DE-AC04-76DP-00789)
(DE86-004975; SAND-85-0379) Avail: NTIS HC A02/MF A01

Recent experiences with electric resistance heaters at the solar Central Receiver Test Facility are described. These heaters are used to preheat or maintain equipment used with molten nitrate salt or liquid sodium heat transfer fluids. Results of extensive testing performed to improve the reliability of similar heating systems used in the development program for the sodium-cooled liquid metal fast breeder nuclear reactor are also reviewed. Recommendations are made for increasing the reliability of trace heating systems for high-melting-point heat transfer fluids including thermal design, heating element selection, installation, insulation, and controls. DOE

N86-25725# Pacific Northwest Lab., Richland, Wash.
SUPERCRITICAL FLUID METHODS FOR THE ANALYSIS OF COMPLEX FUEL AND ENVIRONMENTAL SAMPLES
R. D. Smith, C. R. Yonker, H. T. Kalinoski, E. K. Chess, H. R. Udseth, S. L. Frye, and B. W. Wright Nov. 1985 28 p refs Presented at the Hanford Life Sciences Symposium, Richland, Wash., 21 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004868; PNL-SA-13233; CONF-8510225-4) Avail: NTIS HC A03/MF A01

The application of supercritical fluid methods can greatly improve the analysis of complex mixtures spanning wide chemical classes. In separations from complex matrices supercritical fluids can be used to improve both extraction efficiency and speed. The variable solvating powers and gas-like diffusion coefficients and viscosities can provide efficient new methods for sample enrichment, cleanup and fractionation. Supercritical fluid chromatography (SFC) is applicable to both thermally labile and less volatile materials. The use of small diameter (25- to 50-micron) fused silica capillary columns provides chromatographic efficiencies for SFC that are nearly comparable to conventional capillary gas chromatography and much greater than practical by liquid chromatography (LC). The development of practical capillary SFC-MS instrumentation, allowing both electron impact and chemical ionization mass spectrometry (MS), is expected to provide a powerful alternative to LC-MS for complex mixture analysis. Recent results will be presented on the development of methods for the analysis of fuels, labile pollutants, hazardous solid waste materials, and related complex environmental mixtures. The application of various supercritical fluids for sample extraction, SFC and SFC-MS, and the recent development of a system for automated supercritical fluid extraction-chromatography will also be described. Finally, the potential role of supercritical fluid methods in routine chemical analysis will be discussed. DOE

N86-25726# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMOMECHANICAL DESIGN CRITERIA FOR CERAMIC-

COATED SURFACES
R. L. Mullen (Case Western Reserve Univ., Cleveland, Ohio.), J. Padovan (Akron Univ., Ohio.), M. J. Braun, B. T. F. Chung, G. McDonald, and R. C. Hendricks 1986 27 p refs Proposed for presentation at the 6th CIMTEC World Congress on High Tech Ceramics, Milan, Italy, 23-28 June 1986; sponsored by the Italian Ministry for Science and Technology, ENEA and American Ceramic Society
(NASA-TM-87328; E-3002; NAS 1.15:87328) Avail: NTIS HC A03/MF A01 CSCL 20D

Some early history of ceramic applications is presented. Finite element modeling of components to determine service and fabrication loads found inelastic behavior and residual stresses to be significant to component life. Inelastic behavior mitigates peak strains but enhances residual strains. Results of furnace, Mach 0.3 burner, and engine tests are discussed and categorized into design criteria (loading, geometry, fabrication, materials, analysis, and testing). These design rules and finite element analyses are brought to bear on two test cases: turboshaft engine seals, and rocket thrust chambers. Author

N86-25727*# National Aeronautics and Space Administration, Washington, D.C.
PROPAGATION OF DETONATIONS IN HYDRAZINE VAPOR
H. J. Heinrich Sep. 1985 21 p refs Transl. into ENGLISH from Zeitschrift fuer Physikalische Chemie, Neue Folge, Vol. 42, 1964 p 149-165 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-77922; NAS 1.15:77922) Avail: NTIS HC A02/MF A01 CSCL 20D

In the range of greater hydrazine vapor pressure, detonation speed depends exclusively on the extent of the ammonia decomposition in the second reaction stage. As vapor pressure decreases, the ammonia disintegration speed becomes increasingly slower and the reaction reached in the reaction zone increasingly decreases until finally, in the vapor pressure range between 53 and 16 Torr, the contribution of the second stage to detonation propagation disappears, and only the first stage remains active. Since the disintegration speed of the hydrazine in this pressure range has decreased markedly as well, no level, but rather only spinning, detonations occur. Temporary separations of the impact front and the reaction zone in the process lead to fluctuations of the detonation speed. Author

N86-25728*# National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.
THE CONSTRUCTION AND USE OF DIVERGENCE FREE VECTOR EXPANSIONS FOR INCOMPRESSIBLE FLUID FLOW CALCULATIONS Final Report
Nessan Mac Giolla Mhuiris Apr. 1986 22 p refs Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178100; ICASE-86-20; NAS 1.26:178100) Avail: NTIS HC A02/MF A01 CSCL 20D

For incompressible fluids the law of mass conservation reduces to a constraint on the velocity vector, namely that it be divergence free. This constraint has long been a source of great difficulty to the numericist seeking to discretize the Navier-Stokes and Euler equations. A spectral method is discussed which overcomes this difficulty. Its efficacy is demonstrated on some simple problems. The velocity is approximated by a finite sum of divergence free vectors, each of which satisfies the same boundary conditions as the velocity. Projecting the governing equation onto the space of inviscid vector fields eliminates the pressure term and produces a set of ordinary differential equations that must be solved for the coefficents in the velocity. The pressure can then be recovered if it is needed. Author

N86-25729# Virginia Polytechnic Inst. and State Univ., Blacksburg.
TEMPORAL AND SPATIAL GROWTH OF SUBHARMONIC DISTURBANCES IN FALKNER-SKAN FLOWS M.S. Thesis
Fabio P. Bertolotti Jun. 1985 65 p refs
(Contracts N00014-83-K-0089; N00014-84-K-0093)
(AD-A163512) Avail: NTIS HC A04/MF A01 CSCL 20/4

Careful experiments on boundary layer transition conducted in low turbulence wind tunnels have resolved three stages in the breakdown of laminar flow into turbulence: in the first stage, two-dimensional oscillations, commonly referred to as TS waves, appear and propagate in the direction of the flow; in the second stage there appears a rapid three-dimensional deformation of the oscillatory flow; and in the brief third stage high frequency, small scale, quasi-random fluctuations appear and quickly lead the flow into turbulence. The recent analysis of the second stage based on a secondary instability mechanism arising from a parametric resonance induced by the TS wave has given results in quantitative agreement with experimental observations. Using this approach, Herbert had studied the phenomenon in plane channel flow and in a Blasius boundary layer. This thesis studies the effect of pressure gradients on the behavior of secondary instabilities, by extending Herbert's analysis to the Falkner-Skan family of profiles, and develops a spatial formulation for disturbance growth to exactly match the experimentally observed behavior. Author (GRA)

N86-25730# Wisconsin Univ., Madison.
A STATISTICAL ANALYSIS OF THE EFFECT OF FREESTREAM TURBULENCE OF THE BLASIUS BOUNDARY LAYER Technical Summary Report
Thomas J. Bridges and Philip J. Morris Oct. 1985 56 p refs
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A163606; MRC-TSR-2882) Avail: NTIS HC A04/MF A01 CSCL 20/4

This paper considers the flow past a flat plate. When the flow is uniform the Blasius boundary layer forms on the plate. Herein the usual uniform free stream is perturbed by a small amplitude field of random three-dimensional turbulence. Using a numerical technique the statistical response in the boundary layer due to the turbulence in the free stream is computed in terms of auto- and cross-correlation functions. The field variables are expended in finite Chebyshev series and the space-time correlations of these functions are found by forming correlation matrices with the vectors of random coefficients of the Chebyshev expansions. The main result of the evaluations is the fact that three dimensional random infinitesimal free stream turbulence produces a fully three dimensional response in the boundary layer. The excited field includes the presence of streamwise vorticity as well which was previously thought to be due to secondary instability. GRA

N86-25731# Wisconsin Univ., Madison. Mathematics Research Center.
DEGENERATE SYSTEMS OF CONSERVATION LAWS Technical Summary Report
Blake Temple Sep. 1985 14 p refs
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A163621; MRC-TSR-2868) Avail: NTIS HC A02/MF A01 CSCL 20/4

This document describes systems of conservation laws with the property that shock and rarefaction curves coincide. It gives new examples of such systems. These systems isolate and separate many nonlinear aspects of shock waves. The author believes that analytical techniques which handle problems of uniqueness, continuous dependence or convergence of finite difference schemes in these systems, would isolate components in a corresponding analysis required for general systems of conservation laws. GRA

N86-25732# Wisconsin Univ., Madison. Mathematics Research Center.
LP-STABILITY FOR THE STRONG SOLUTIONS OF THE NAVIER-STOKES EQUATIONS IN THE WHOLE SPACE Technical Summary Report
H. BeiraodaVeiga and P. Secchi Oct. 1985 13 p
(Contract DAAG29-80-C-0041)
(AD-A163631; MRC-TSR-2881) Avail: NTIS HC A02/MF A01 CSCL 20/4

We consider the motion of a viscous fluid filling the whole space R3, governed by the classical Navier-Stokes equations (1)

Existence of global (in time) regular solutions for that system of non-linear partial differential equations, is still an open problem. From either the mathematical and the physical point of view, an interesting property is the stability (or not) of the (eventual) global regular solutions. Here, we assume that v1(t,x) is a solution, with initial data a1(x). For small perturbations of a1, we want the solution v1(t,x) being slightly perturbed, too. Due to viscosity, it is even expected that the perturbed solution v2(t,x) approaches the unperturbed one, as time goes to + infinity. This is just the result proved in this paper. To measure the distance between v1(t,x) and v2(t,x), at each time t, suitable norms are introduced (LP-norms). For fluids filling a bounded vessel, exponential decay of the above distance, is expected. Such a strong result is not reasonable, for fluids filling the entire space. GRA

N86-25733# Wisconsin Univ., Madison. Mathematics Research Center.
NOTE ON LOSS OF REGULARITY FOR SOLUTIONS OF THE 3-D INCOMPRESSIBLE EULER AND RELATED EQUATIONS Technical Summary Report
Petre Constantin Nov. 1985 25 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-01599)
(AD-A163632; MRC-TSR-2884) Avail: NTIS HC A02/MF A01 CSCL 20/4

One of the central problems in the mathematical theory of turbulence is that of breakdown of smooth (indefinitely differentiable) solutions to the equations of motion. In 1934 Leray advanced the idea that turbulence may be related to the spontaneous appearance of singularities in solutions of the 3-D incompressible Navier-Stokes equations. The problem is still open. This report shows that breakdown of smooth solutions to the 3-D incompressible slightly viscous (i.e., corresponding to high Reynolds numbers, or highly turbulent) Navier-Stokes equations cannot occur without breakdown in the corresponding solution of the incompressible Euler (ideal fluid) equation. It is proven then that solutions of distorted Euler equations, which are equations closely related to the Euler equations for short term intervals, do breakdown. Author (GRA)

N86-25734# Wisconsin Univ., Madison. Mathematics Research Center.
FLOW OF VISCOELASTIC FLUIDS BETWEEN PLATES ROTATING ABOUT DISTINCT AXES Technical Summary Report
K. R. Rajagopal, M. Renardy, Y. Renardy, and A. S. Wineman Nov. 1985 28 p
(Contract DAAG29-80-C-0041; Grants NSF MCS-82-15064; NSF DMS-84-51761)
(AD-A163700; MRC-TSR-2887) Avail: NTIS HC A03/MF A01 CSCL 20/4

We discuss the flow of BKZ fluids in an orthogonal rheometer. Some analytical results are proven, and numerical solutions are obtained for the Currie model. These solutions show a boundary layer behavior at high Reynolds numbers and the possibility of discontinuous solutions or nonexistence at high Weissenberg numbers. GRA

N86-25735# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE SHORE SINGULARITY OF WATER WAVES. PART 1: THE LOCAL MODEL Technical Summary Report
R. E. Meyer Oct. 1985 36 p refs
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-15064)
(AD-A163707; MRC-TSR-2872) Avail: NTIS HC A03/MF A01 CSCL 20/4

The nonlinear equations governing inviscid water waves close to shore over beaches of small slope are discussed to elucidate their scope, limitations and ramifications. Their decisive feature is a singularity of the differential equations themselves, and to open the way for analysis, an associated problem is formulated in terms of singular wave equations. The emphasis is on the identification of the questions of oceanographical relevance that can be asked and the ways in which they can be posed to construct the basis for a corrrect, mathematical analysis and for its application to shoaling predictions. GRA

N86-25736# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE TWO-DIMENSIONAL PERIODIC SURFACE WAVES OCCURRING IN RECTANGULAR VESSELS: THEORY VERSUS EXPERIMENT Technical Summary Report
Thomas J. Bridges Oct. 1985 78 p refs
(Contract DAAG29-80-C-0041; Grant NSFDMS-82-10950)
(AD-A163708; MRC-TSR-2878) Avail: NTIS HC A05/MF A01 CSCL 20/4

This paper is a four part dialectic between theory and experimental observations and measurements of two dimensional periodic surface waves in a vessel of rectangular cross section. The first two parts consist of minor contributions to the existing theory and experimental measurements of elliptic (deep water) standing waves and the (shallow water) travelling hydraulic jump. A new theory is proposed in the third part which explains the transition from the elliptic standing wave to the hyperbolic traveling hydraulic jump. The result is a family of standing cnoidal waves. To lowest order the solution is composed of two non-interacting periodic progressive cnoidal waves travelling in opposite directions. At higher order the two wave trains interact but the interaction produces nothing of qualitative significance except when the cnoidal standing wave of highest amplitude is considered. This family of waves is validated by experimental observation in part four. In addition in part four observation of compound cnoidal standing waves leads to a conjecture about a sequence of continuous wave forms in parameter space leading from the linear sinusoidal wave to the travelling hydraulic jump. GRA

N86-25737# Wisconsin Univ., Madison. Mathematics Research Center.
SOME REMARKS ON THE NAVIER-STOKES EQUATIONS WITH A PRESSURE-DEPENDENT VISCOSITY Technical Summary Report
Michael Renardy Nov. 1985 16 p refs
(Contract DAAG29-80-C-0041; Grants NSF MCS-82-15064; NSF DMS-84-51761)
(AD-A163726; MRC-TSR-2886) Avail: NTIS HC A02/MF A01 CSCL 20/4

In most mathematical treatments of the Navier-Stokes equations, it is assumed that the viscosity is a constant. Viscosities of real fluids, however, depend not only on the temperature, but may also change significantly with pressure, in particular at high pressures. In this paper, the mathematical consequences of such a prssure dependence are investigated. It is found that, in contrast to the ordinary Navier-Stokes equations, ellipticity can be lost, and the equations are not necessarily well-posed. The complementing condition for traction boundary conditions is investigated, and an existence theorem for the initial boundary value problem with prescribed velocities on the wall is proved. One of the main differences to ordinary Navier-Stokes theory lies in the elimination of the pressure, which now leads to a nonlinear elliptic partial differential equation instead of Laplace's equation. GRA

N86-25738# New York Univ., New York. Inst. of Mathematical Science.
COMPUTATIONAL TECHNIQUES FOR SHOCK WAVE DIFFRACTION PROBLEMS Final Report, 1 Oct. 1982 - 30 Sep. 1985
James Glimm 2 Jan. 1986 8 p refs
(Contract DAAG29-83-K-0007)
(AD-A163776; ARO-19717.11-MA) Avail: NTIS HC A02/MF A01 CSCL 20/4

The front tracking method has been shown to be correct and useful for a range of gas dynamics problems containing shock waves, slip lines, material boundaries and detonation waves. Validation tests compared to laboratory experiment, analytic solutions and independently validated numerical computations shows this method to be correct. Several definitive successes, both theoretical and numerical, have been achieved as part of this effort. Classification of two dimensional elementary waves and

a correct formulation of the two dimensional Riemann problems were first achieved under this contract. Models for curved detonation fronts were studied, to find wave speed dependence on front curvature. This was a major open problem in the modeling of detonation waves. Computations of many elementary wave interactions were tested, including the Mach triple point, regular reflection, and the shock-contact interactions of two basic types. Detailed validation of density contours was made possible because of the high quality experimental data available. Certain interactions between tracked waves, leading to bifurcation of wave topology, were completed. GRA

N86-25739# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
TABULAR AND GRAPICAL SOLUTIONS OF REGULAR AND MACH REFLECTIONS IN PSEUDO-STATIONARY FROZEN AND VIBRATIONAL-EQUILIBRIUM FLOWS. PART 2 Interim Report
T. C. J. Hu and M. Shirouzu Jun. 1985 259 p refs
(Contract DNA001-83-C-0266; Grant AF-AFOSR-0096-82)
(AD-A164047; UTIAS-283-Pt-2; AFOSR-85-1231TR) Avail: NTIS HC A12/MF A01 CSCL 20/4

Part 2 contains additional graphics for AD-A164 046 and two appendices: actual sidewall pressure histories and numerical results; and computer-program listing for the analytical solution of regular and Mach reflections. GRA

N86-25740# Calspan Advanced Technology Center, Buffalo, N.Y.
RESEARCH ON TURBINE FLOWFIELD ANALYSIS METHODS Final Report, 1 Apr. 1983 - 30 Nov. 1984
William J. Rae Jan. 1985 112 p refs
(Contract F49620-83-C-0096)
(AD-A164070; CALSPAN-7177-A-3; AFOSR-85-1220TR) Avail: NTIS HC A06/MF A01 CSCL 20/4

This report contains a description of conformal mapping procedures that can be used to generate computational grids for turbomachinery flowfield calculations, and to determine the incompressible potential flow on such a grid. The mapping procedures represent an extension of the Ives transformation to blade rows having a high solidity. The flowfield solution takes advantage of the fact that one of the mapping steps takes the blade row into a unit circle; by writing down the classical source/sink/vortex solution in this circle, it is possible to find the incompressible potential flow in the original cascade. This solution is of interest in its own right, and provides a useful initial condition for iterative or time marching calculational method. GRA

N86-25741# Naval Postgraduate School, Monterey, Calif.
REVIEW, IMPLEMENTATION AND TEST OF THE QAZ1D COMPUTATIONAL METHOD WITH A VIEW TO WAVE ROTOR APPLICATIONS M.S. Thesis
Thomas F. Salacka Dec. 1985 118 p refs
(AD-A164125; NPS67-85-012) Avail: NTIS HC A06/MF A01 CSCL 20/4

The QAZ1D method is redeveloped in detail and implemented in a first order, one-dimensional FORTRAN program, EULER-1. The program is tested on the shock tube problem and results are presented for various computational meshes and initial conditions. Based on good results of the EULER-1 code, recommendations are made for future extensions and testing to validate the suitability of the QAZ1D method for wave rotor applications. GRA

N86-25742# Naval Postgraduate School, Monterey, Calif.
TWO-DIMENSIONAL HEAT CONDUCTION IN METAL, FLUID COMPOSITES M.S. Thesis
Michael A. Gomori Dec. 1985 89 p refs
(AD-A164127) Avail: NTIS HC A05/MF A01 CSCL 13/1

Because the size and weight of main propulsion and auxiliary systems are inversely proportional to the ease in which heat or energy is exchanged, a major thrust of the research and development program of the U.S. Navy is toward the design and development of equipment that perform at higher efficiency with a reduction in size and weight. In particular, one area of great interest is the reduction in size and weight of steam condensers. The heat-transfer effectiveness is governed by the amount of surface and the overall resistance to the flow of heat. Filmwise condensation of steam on externally-finned tubes is a very complex process. Recent experiments have shown that enhancement ratios (ratio of steam-side heat-transfer coefficient to that of a smooth tube having the same diameter) exceeded the area enhancement produced by the fins. Moreover, the enhancement ratios for fully flooded tubes exceed the values predicted by a simple, one-dimensional conduction model by a factor of 2 to 4. A new two-dimensional conduction model was developed, which showed that the one-dimensional model overpredicted the two-dimensional results for high conductivity tube-metals such as copper by as much as 13%. The two-dimensional model also showed that variations in fin thickness or spacing can result in an overprediction by the one-dimensional model of the two-dimensional results by as much as twenty-two percent. GRA

N86-25743# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DYNAMIC RESPONSE OF FLUID TRANSMISSION LINES M.S. Thesis
Stephen J. McKenna Sep. 1985 172 p refs
(AD-A164354; AFIT/GAE/AA/85S-1) Avail: NTIS HC A08/MF A01 CSCL 13/7

The theoretical predictions of the dynamic response of circular cross section pneumatic transmission lines were compared with experimental results. Tests were conducted in blocked line situations as well as in both laminar and turbulent mean flow conditions. The lines used in the study were 24 in. in length with inside diameters of 0.041, 0.119, and 0.195 in. Tests were conducted over the frequency range 20 to 1000 Hz and over a range of mean flow Reynolds number from 0 to 16000. Theoretical solutions were obtained from computer simulations using a laminar flow model and two turbulent flow models. These models were developed from the Navier-Stokes equation and include components to account for viscosity and radial heat transfer in the fluid. An examination of the turbulent models was conducted based on a nondimensional frequency and attentuation. This led to modification of one of the turbulent models to include a frequency dependent term in the conductance. The effect of flow conditions upstream of the test line and the effect of orifice design on the dynamic response were studied. Experimental results showed good agreement with results of earlier studies. The use of a bypass device upstream of the test line was found to have no effect on line response. GRA

N86-25744# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL INVESTIGATION OF A THRUST AUGMENTING EJECTOR M.S. Thesis
Wiradimadja Hidayat Dec. 1985 51 p refs
(AD-A164473) Avail: NTIS HC A04/MF A01 CSCL 20/4

An ejector is basically a jet pump in which the kinetic energy of the jet is made to impart motion to the fluid surrounding it. During this process,in a well designed system,the ejector as a whole experiences a thrust much higher than that of the jet alone. In principle, an ejector is nothing but a jet surrounded by a shroud. This investigation concerns the performance of a two-dimensional ejector with its primary jet excited by a novel method. A constant area duct was used in this experiment. The velocity of the jet at the exit was subsonic. Maximum thrust was obtained when the ejector to jet exit area ratio was about 35. Under this condition a thrust augmentation ratio of 1.65 was achieved, with the jet excited at 20 Hz, whereas without excitation it was only 1.40. The mixing characteristics of the jet under excitation was examined using flow visualization techniques. Smoke filaments illuminated by a sheet of powerful light and schlieren optics with the jet heated were used. Excitation of the jet was found to generate large vortex-like flow structures which might be responsible for enhanced mixing. These vortices extended to considerable distances on both sides of the jet. GRA

N86-25745# Army Cold Regions Test Center, APO Seattle, Wash. 98733.

CONSTITUTIVE RELATIONS FOR A PLANAR, SIMPLE SHEAR FLOW OF ROUGH DISKS
Hayley H. Shen and Mark A. Hopkins Dec. 1985 25 p refs
(AD-A163147; CRREL-85-20) Avail: NTIS HC A02/MF A01 CSCL 20/4

Stresses developed in a rapid, simple shear flow of disks are quantified. Collisional momentum transfer is considered to be the dominant stress generating mechanism. The disks are inelastic and frictional. The restitution coefficient and the coefficient of friction together determine the transfer of momentum and dissipation of energy during a collision. The frictional coefficient generates and maintains a rotational motion of disks. The total fluctuation motion of disks consists of two translational modes and one rotational mode. The rotational mode is found to depend on both the restitution and the friction coefficient. Equipartitions of energy among all modes of motion is absent. The mean rotation, however, depends only on the mean flow gradient. The analysis assumes a constant magnitude for all fluctuation modes. Comparison with a computer simulated disk flow shows good agreement. This implies that the distribution of velocity magnitude may not be crucial to the quantification of stresses. GRA

N86-25746# Mississippi State Univ., Mississippi State. Engineering Industrial Research Station.
PREDICTION OF TURBULENT SKIN FRICTION FOR TWO-DIMENSIONAL, RIB-TYPE SURFACE ROUGHNESS USING A DISCRETE ELEMENT APPROACH Final Report, May 1984 - Aug. 1985
Robert P. Taylor, B. K. Hodge, and Hugh W. Coleman Sep. 1985 35 p refs
(Contract F33615-84-K-3014)
(AD-A163165; TFD-85-1; AFWAL-TR-85-3091) Avail: NTIS HC A03/MF A01 CSCL 20/4

A discrete element model for turbulent flow over two-dimensional rib-type roughness is developed and validated. Surface roughness blockage effects and form drag are included as a constituent part of the differential equations. Separation and reattachment of the flow over rib roughness are identified as the dominant flow phenomena, and models are developed which incorporate the separated region geometry into the blockage. The form drag model is based on the pressure difference between the windward and leeward forces of the roughness. Predictions are compared with a variety of data sets. These comparisons indicate that the discrete element approach can be successfully applied for rib-type roughness. However, the model has a more narrow range of application for different surface geometries than the very broad range which has previously been demonstrated for three-dimensional, distributed roughness. GRA

N86-25747# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
FAILURE ANALYSIS OF A SODIUM, INCONEL 617 HEAT PIPE Final Report, Jun. 1984 - Mar. 1985
Dean L. Jacobson and J. H. Wang Sep. 1985 31 p
(Contract F33615-81-C-2058)
(AD-A163177; AFWAL-TR-85-2064) Avail: NTIS HC A03/MF A01 CSCL 13/11

A 4.57-meter (15-foot) sodium heat pipe, Inconel 617, was examined following failure. The sodium was exposed to the atmosphere following initial testing. Testing was resumed following attempts to reprocess the sodium by high-temperature outgassing. The pipe failed with intergranular cracks which completely penetrated the heat pipe wall leaking sodium to the atmosphere. Carbide precipitates and some grain boundary impurities were found in the cracked regions, which, along with the oxygen-contaminated sodium, embrittled the material. Thermal gradient-produced stresses during start-up coupled with embrittled grain boundaries appears to have resulted in the failure of the Inconel 617 sodium heat pipe. Author (GRA)

N86-25748# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
FAILURE ANALYSIS OF A SODIUM HEAT PIPE WITH INTEGRAL LITHIUM FLUORIDE THERMAL ENERGY STORAGE Final Report, Jun. 1984 - Mar. 1985
Dean L. Jacobson and P. Soundararajan Sep. 1985 30 p
(Contract F33615-81-C-2058)
(AD-A163184; AFWAL-TR-85-2063) Avail: NTIS HC A03/MF A01 CSCL 13/11

A sodium, 321 stainless steel heat pipe with three filled Nb-1Zr tubes for thermal energy storage with 304 S.S. screen for wicking was thermal cycled to failure and then an analysis was performed to examine the failure. It was concluded that insufficient weld depth between an end cap and tube body permitted the propagation of a crack through a possible combination of thermal/corrosion failure, creep rupture of the end cap. A number of possible scenarios for the process following a leak are discussed. GRA

N86-25749# Los Alamos National Lab., N. Mex.
LOW-TEMPERATURE HEAT TRANSFER BY CONTACT IN VACUO AND THERMAL CONDUCTIVITY OF KAPTON
S. L. Wipf 1985 5 p Presented at the 9th International Conference on Magnet Technology, Zurich, Switzerland, 9 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002393; LA-UR-85-2943; CONF-850920-8) Avail: NTIS HC A02/MF A01

Heat transfer between copper surfaces separated by insulators, especially Kapton, has been measured. At 5 K, the copper/Kapton interface conductance is C = 2.5 + or - 0.8 kWm(-2)K(-1) and the thermal conductivity is k = 10 + or - 2 mWm(-1)K(-1) being inversely proportional to temperature. For mica both C and k are larger, k at least by two orders of magnitude. DOE

N86-25750# Oak Ridge National Lab., Tenn.
RESEARCH AND DEVELOPMENT ON HEAT PUMPS FOR SPACE CONDITIONING APPLICATIONS: PROCEEDINGS OF THE DOE/ORNL HEAT PUMP CONFERENCE
V. A. Jacobs, ed. and R. H. Powell, Jr., ed. Aug. 1985 269 p Conference held in Washington, D.C., 10 Dec. 1984
(Contract DE-AC05-84OR-21400)
(DE86-002984; CONF-841231) Avail: NTIS HC A12/MF A01

This conference was planned to provide information on current activities in the US Department of Energy (DOE) and Oak Ridge National Laboratory (ORNL) Building Equipment Research (BER) Program. It was primarily for the benefit of HVAC equipment manufacturers and other interested parties, including utilities, independent research and development organizations, universities, other government groups, and research funding and management organizations. The technical presentations were grouped into two principal subject areas: electric systems and thermally activated systems. Electric-system topics included field performance studies, laboratory experiments on cycling performance, analytical estimates of the benefits of variable capacity and zone control, nonazeotropic refrigerant mixtures, ground-coupled systems, and an analysis of Stirling-cycle heat pumps. In the area of thermally activated heat pumps, presentations centered on the development of absorption systems, Stirling-engine-driven systems, and a linear, free-piston IC-engine compressor. Separate abstracts have been prepared for 27 presentations for inclusion in the Energy Data Base. DOE

N86-25751 Wisconsin Univ., Madison.
INCOMPRESSIBLE VISCOUS STEADY FLOW IN CHANNELS AND PIPES Ph.D. Thesis
Gerardo Alberto Ache 1985 179 p
Avail: Univ. Microfilms Order No. DA8519747

Several topics relating to numerical solutions of flow of an incompressible viscous fluid in channels and pipes are considered. The fundamental equations governing such flows are the steady incompressible Navier-Stokes equations. The following topics are considered. An exponential decay estimate is proved for an energy functional for perturbations of Poiseuille flow in a semi-infinite cylinder. Eigenvalues governing the decay for such perturbations are computed. A two-point boundary value approach is used to solve the resulting system of ordinary differential equations yielding efficient and accurate calculations. Boundary conditions are derived

for flows in channels and axisymmetric flows in pipes. These are demonstrated in computations for channels with a step and for pipes with a sudden enlargement of the cross section. The numerical results show the effectiveness of these boundary conditions. Finally a method is presented for treating the pressure singularity at re-entrant corners which occur in both of the test problems. The numerical method is shown to accurately model the singularity at the corner. Dissert. Abstr.

N86-25530# Joint Publications Research Service, Arlington, Va.
STABILITY CHARACTERISTICS OF SUPERSONIC BOUNDARY LAYER AND THEIR RELATION TO TRANSITION POINT BETWEEN LAMINAR AND TURBULENT FLOW Abstract Only
V. I. Lysenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 75 refs Transl. into ENGLISH from Izv. Sibirksogo Otd. Akad. Nauk SSSR: Ser. Tekh. Nauk (USSR), no. 4, iss. 1, Mar. 1985 p 79-86 Original language document was announced in IAA as A85-42123 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25535# Joint Publications Research Service, Arlington, Va.
CIRCULATION FLOW AT FORWARD SURFACE OF A SPHERE IN A SUPERSONIC WAKE-TYPE STREAM Abstract Only
Yu. P. Golovachev and N. V. Leontyeva *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 87-88 refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Zhidkosti i Gaza (USSR), no. 3, May-Jun. 1985 p 143-148 Original language document was announced in IAA as A85-44787 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25566# Joint Publications Research Service, Arlington, Va.
MODERN ULTRASONIC FLOWMETERS Abstract Only
V. M. Gurevich and S. G. Truman *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 41-42 Transl. into ENGLISH from Sovremennyye Ultrazvukovyye Rashodomery (Moscow, USSR), 1984 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25584# Joint Publications Research Service, Arlington, Va.
SUPERSONIC FLOW ABOUT CONE WITH INJECTION OF GAS THROUGH ITS SURFACE DESCRIBED BY POWER LAW Abstract Only
A. M. Antonov and v. A. Zakrevskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) date p 56 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 8, Aug. 1984 p 31-35 Original language document was announced in IAA as A85-10465 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25586# Joint Publications Research Service, Arlington, Va.
TRANSIENT SCATTERING OF PLANE ACOUSTIC PRESSURE BY PIECEWISE-HOMOGENEOUS PLATE Abstract Only
V. A. Galazyuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 77 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 11, Nov. 1984 p 25-29 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-26100# Joint Publications Research Service, Arlington, Va.
FINAL STAGE OF DEGENERACY OF TURBULENT VELOCITY FIELD IN WAKE STREAM Abstract Only
I. I. Kovalev, B. A. Kolovandin, and N. N. Luchko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 10 Transl. into ENGLISH from Inzhenerno-Fizicheskiy Zhurnal (Minsk, USSR), v. 49, no. 2, Aug. 1985 p 209-214 Original language document was announced in IAA as A85-46247 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26117# Joint Publications Research Service, Arlington, Va.
PROPAGATION OF SHOCK WAVES THROUGH PETROLEUM SUSPENSIONS Abstract Only
K. V. Mukuk, S. M. Makhkamov, and Kh. Kh. Azizov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 8 Transl. into ENGLISH from Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya Tekhnicheskikh Nauk (Tashkent, USSR), no. 4, Jul. Aug. 1985 p 50-52 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26153# Joint Publications Research Service, Arlington, Va.
TEMPERATURE DIAGNOSIS OF A MIXTURE OF MOLECULAR GASES HEATED BY CW CO-2 LASER Abstract Only
R. Aleksandresku, F. V. Bunkin, B. S. Luklyamchuk, Y. Mikhaylesku, Ye. A. Morozova, and G. A. Shafeyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 54 Transl. into ENGLISH from Preprint no. 223, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 Preprint no. 223, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation,* and *19 Spacecraft Instrumentation.*

N86-25752* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FLUID FLOW METER FOR MEASURING THE RATE OF FLUID FLOW IN A CONDUIT Patent
Paul R. White, inventor (to NASA) Issued 25 Feb. 1986 8 p Filed 4 Apr. 1985 Sponsored by NASA
(NASA-CASE-MFS-28030-1; US-Patent-4,572,004; US-Patent-Appl-SN-719799; US-Patent-Class-73-861.58) Avail: US Patent and Trademark Office CSCL 14B

A tube fluid flow rate meter consists of a reservoir divided by flexible diaphragm into two separate isolated compartments. The incoming and outgoing tubes open into the compartments. The orifice is sized to allow maximum tube fluid flow. Opposing compression springs are secured within the two compartments on opposite sides of the orifice to maintain orifice position when the tube fluid pressure is zero. A tapered element is centered in, and extends through the orifice into the compartment, leaving an annular opening between the element and the perimeter of the orifice. The size varies as the diaphragm flexes with changes in the tube fluid pressure to change the fluid flow through the opening. The light source directs light upon the element which in turn scatters the light through the opening into the compartment. The light detector in the compartment senses the scattered light to generate a signal indicating the amount of fluid. B.G.

N86-25753* National Aeronautics and Space Administration. Pasadena Office, Calif.
DISCHARGE CELL FOR OPTOGALVANIC SPECTROSCOPY HAVING ORTHOGONAL RELATIONSHIP BETWEEN THE PROBE LASER AND DISCHARGE AXIS Patent
Christopher R. Webster, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) Issued 29 Apr. 1986 12 p Filed 30 Nov. 1983 Sponsored by NASA
(NASA-CASE-NPO-16271-1; US-Patent-4,585,344; US-Patent-Appl-SN-556514; US-Patent-Class-356-311; US-Patent-Class-356-318) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus for an optogalvanic spectroscopy

system are disclosed. Orthogonal geometry exists between the axis of a laser probe beam and the axis of a discharge created by a pair of spaced apart and longituduinally aligned high voltage electrodes. The electrodes are movable to permit adjustment of the location of a point in the discharge which is to irradiated by a laser beam crossing the discharge region. The cell dimensions are selected so that the cross section of the discharge region is substantly. comparable in size to the cross section of the laser beam passing orthogonally through the discharge region.
Official Gazette of the U.S. Patent and Trademark Office

N86-25754# Lawrence Livermore National Lab., Calif.
CALIBRATION AND CHARACTERIZATION OF BAYARD-ALPERT GAUGES OPERATING IN HIGH MAGNETIC FIELDS
W. L. Pickles and A. L. Hunt Nov. 1985 17 p Presented at the 32nd National Vacuum Symposium, Houston, Tex, 19-22 Nov. 1985 Sponsored by Lawrence Livermore National Lab., Calif. Submitted for publication
(Contract W-7405-eng-48)
(DE86-003477; UCRL-93596; CONF-851174-19) Avail: NTIS HC A02/MF A01

Standard Bayard-Alpert gauges have been successfully operated for several months in the 0.3 to 0.7 T magnetic fields near the plasma edge of the Tandem Mirror Experiment-Upgrade (TMX-U). The gauges clearly measure gas pressure and maintain calibration within 10% during operation. The gauge filaments are tungsten and are heated with dc. The gauge housing allows operation in the low density plasma outside the limiter radius by thermalizing the neutral gas that enters the gauge and by preventing plasma from entering the gauge. Changing the orientation of the gauge with respect to the magnetic field changes the gauge calibration, or effective sensitivity, by as much as a factor of 100. Only some orientations of the filament collector plane with respect to the magnetic field direction allow calibrated operation as a pressure gauge. This range of angles is approximately from 20 to 50 degrees. The gauge is oriented to produce the desired sensitivity, then calibrated for the magnetic field effects for that position. The correction to sensitivity for magnet field is not strongly species dependent. The gauge species sensitivities for CH4, Xe,and Kr measured in the high magnetic fields were found to be close to the published values measured in no magnetic field. DOE

N86-25755# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
DEVELOPMENT OF AN INTERFEROMETER FOR NATURAL CONVECTION ENHANCEMENT RESEARCH, 1 JANUARY-31 DECEMBER 1984
M. Bohn, E. M. Fisher, and R. Anderson Dec. 1985 43 p
(Contract DE-AC02-83CH-10093)
(DE85-016895; SERI/PR-252-2598) Avail: NTIS HC A03/MF A01

Natural convection heat transfer from vertical storage walls and absorbing surfaces plays an important role in delivering solar energy throughout a passively heated or cooled building. In many building geometries the heat transfer at these surfaces can limit performance of the building. Insufficient heat transfer can cause overheating of attached sunspaces and oversizing of the glazed/absorber area, directly increasing cost. If the natural convection coefficient could be increased simply, overheating could be reduced and system costs could be reduced. This report describes progress in developing an instrument for investigating boundary layers on vertical heated surfaces subjected to disturbances. The instrument, a Mach-Zehnder interferometer, is a standard tool used to investigate natural flows because it is nonintrusive, gives flow visualization capabilities, and gives quantitative information on temperature distribution and heat flux. DOE

N86-25756# National Bureau of Standards, Gaithersburg, Md. Temperature and Pressure Div.
THERMOMETER CALIBRATION: A MODEL FOR STATE CALIBRATION LABORATORIES Final Report
Jacquelyn A. Wise and Robert J. Soulen, Jr. 1986 93 p refs
(NBS-MONO-174; LC-85-600636) Avail: NTIS HC A05/MF A01

The means by which a state calibration laboratory can establish a calibration service based on liquid-in-glass thermometers is described. Discussed are: ice-point baths, controlled-temperature baths, thermometer inspection, calibration techniques, and control chart procedures. Author

N86-25757*# Tennessee Univ. Space Inst., Tullahoma. Gas Dynamics Div.
DEVELOPMENT OF A NEW INSTRUMENT FOR DIRECT SKIN FRICTION MEASUREMENTS Final Report
A. D. Vakili and J. M. Wu Mar. 1986 32 p refs
(Grant NAG1-303)
(NASA-CR-176818; NAS 1.26:176818; UTSI-86-02) Avail: NTIS HC A03/MF A01 CSCL 14B

A device developed for the direct measurement of wall shear stress generated by flows is described. Simple and symmetric in design with optional small moving mass and no internal friction, the features employed in the design eliminate most of the difficulties associated with the traditional floating element balances. The device is basically small and can be made in various sizes. Vibration problems associated with the floating element skin friction balances were found to be minimized due to the design symmetry and optional damping provided. The design eliminates or reduces the errors associated with conventional floating element devices: such as errors due to gaps, pressure gradient, acceleration, heat transfer, and temperature change. The instrument is equipped with various sensing systems and the output signal is a linear function of the wall shear stress. Dynamic measurements could be made in a limited range and measurements in liquids could be performed readily. Measurement made in the three different tunnels show excellent agreement with data obtained by the floating element devices and other techniques. B.G.

N86-25758# Naval Research Lab., Washington, D. C.
CHARACTERIZATION AND CALIBRATION OF FOUR HIGH ENERGY LASER CALORIMETERS Interim Report
G. L. Hall and R. B. Brown 23 Dec. 1985 22 p refs
(AD-A163507; NRL-8933) Avail: NTIS HC A02/MF A01 CSCL 14/2

Four spherical heat sink calorimeters were built for monitoring laser power in the Navy High Energy Laser Program. An extensive study was made to characterize the transfer of energy from a 90 kW lamp to one of the calorimeters. This characterization was then used in the calibration of all four. The standard deviations of the data indicate the precision of the calorimeters is within 2%, with the probable error in the accuracy of the calibrations within 5%. Calibrations calculated from the physical properties of the materials used in the calorimeters are within 5%, indicating that this is also a valid method of calibration. Details on the character of the response of the calorimeters are given in the report, and operating instructions are included. GRA

N86-25759# Naval Postgraduate School, Monterey, Calif.
MEASUREMENTS AND DESIGNS RELATED TO ELECTRICAL SPRAY MODIFICATION IN A T-56 COMBUSTOR Contractor Report, Aug. 1984 - Sep. 1985
Zeev Shavit Dec. 1985 58 p refs
(AD-A164292; NPS67-85-012CR) Avail: NTIS HC A04/MF A01 CSCL 17/8

A new optical technique for measuring Sauter Mean Diameter changes of a fuel spray under an electrostatic field was checked, calibrated, and implemented. The optical technique is based on measuring scattered light at two angles using a variable focal length apparatus. Special attention was given to improving the electrical control loop parameters in order to minimize measurement errors. In order to measure more realistically the effects of the electrostatic probe inside a gas turbine combustor, a pressure chamber was added to the outlet of the present combustion simulation device. Hot tests were carried out with diesel fuel DF-2. Pressure chamber, combustor's temperatures, fuel, and air mass flow rates, were recorded together with the voltage applied at the electrode. Results of the cold tests with the new optical device show a Sauter Mean Diameter of 50.0 micron at fuel pressure

(DF-2) of 100 psi, 51.7 micron at 125 psi and 47.8 micron at 80 psi. The device could not resolve changes while the high voltage field was exerted. Combustion temperatures within the pressure chamber are presented. Preliminary designs for improvements of the various devices are also described. GRA

N86-25760# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A LASER FEEDBACK CONTROL DESIGN FOR PASSIVE RING LASER GYROS IN A VERY HIGH FINESSE CAVITY M.S. Thesis
Mark A. Lorenz Dec. 1985 114 p refs
(AD-A164309; AFIT/GE/ENG/85D-24) Avail: NTIS HC A06/MF A01 CSCL 20/10

The Frank J. Seiler Research Laboratory is currently developing a Passive Resonant Ring Laser Gyroscope (PRRLG) enclosing 58 sq m for proposed use in testing high precision rate sensors and for possibly validating the Theory of General Relativity. The sensitivities required for such experiments are in the 10 to the minus 7th power to 10 to the minus 10th power Earth Rate Unit (ERU) range. This high sensitivity necessitates the use of a large, high finesse cavity. In dealing with high finesse cavities new considerations arise. For example, the cavity linewidth is narrower than linewidths of commercially available stabilized He-Ne lasers. The stability of the laser then becomes the limiting factor in the performance of the PRRLG because of the increased signal-to-noise ratio that arises in this situation. In addition, high finesse cavities exhibit photon lifetimes on the order of 10 to the minus 3rd power to 10 to the minus 6th power seconds, which limits the bandwidth of practical controllers. In this research, a PRRLG was constructed in which a He-Ne laser was frequency locked to 25,000 finesse, 169 sq. cm. resonant cavity, as opposed to the more traditional technique of locking the resonant condition of the cavity to the laser frequency. GRA

N86-25761# Naval Postgraduate School, Monterey, Calif.
InP:Fe AND GaAs:Cr PICOSECOND PHOTOCONDUCTIVE RADIATION DETECTORS M.S. Thesis
Phillip J. Keipper Dec. 1985 123 p refs
(AD-A164413) Avail: NTIS HC A06/MF A01 CSCL 18/4

The dark current, impulse and square-pulse response measurements of photoconductive devices fabricated from two different types of materials, Gallium Arsenide with Chromium dopant (GaAs:r) and Indium Phosphide with Iron dopant (InP:Fe) are reported. These devices have been subjected to irradiation from the S-band Electron Linear Accelerator (LINAC) with an energy of 100 MeV at room temperature. Fluence ranged between 10 to the 13th power and 10 to the 16th power electrons/sq cm. Dark current decreases with increasing fluence for the GaAs:Cr devices whereas InP:Fe shows an increase in the dark current. Both types of materials exhibit extremely fast impulse response after the irradiation. Electron mobility, drift velocity and response speed decrease with increasing fluence. Response speeds of < 100 ps are achieved by fast carrier relaxation in the semiconductor due to the introduction of trapping and recombination centers resulting from the irradiation damage. The GaAs:Cr, unlike the InP:Fe, more closely follows the longer square-pulse exhibiting non nonlinearity. All results are consistent with previously investigated neutron irradiated devices. GRA

N86-25762# Defence Research Establishment, Ottawa. (Ontario).
THE MODIFICATION AND APPLICATION OF A TWO-COLOUR DISAPPEARING-FILAMENT PYROMETER TO PERFORM FLAME TEMPERATURE MEASUREMENTS
Frank D. Findlay Aug. 1985 30 p
(AD-A164456; DREO-TN-85-27) Avail: NTIS HC A03/MF A01 CSCL 21/2

An optical pyrometer of the disappearing-filament type was modified to allow brightness temperature measurements to be made in the green region of the spectrum. The modified instrument was re-calibrated at a wavelength of 547 nm. The manufacturer's calibration of a second pyrometer operating at lambda = 645 nm was verified. Sources of error in the calibrations are discussed. The theory and limitations of two-color pyrometry as a means of obtaining true source temperatures are presented. GRA

N86-25763# Department of the Army, Washington, D. C.
PIEZOELECTRIC RESONATORS USING LATERAL FIELD EXCITATION Patent Application
Arthur Ballato, inventor (to Army) Filed 30 Jan. 1986 38 p refs
(AD-D012165; US-Patent-Appl-SN-823975) Avail: NTIS HC A03/MF A01 CSCL 09/1

Briefly, the objects of the invention are provided in accordance with a piezoelectric crystal resonator element preferably comprised of doubly rotated cuts of piezoelectric material including quartz, aluminum phosphate, lithium tantalate or lithium niobate which uses lateral field excitation and further includes an improved body geometry having recessed electrode regions adjacent a relatively raised piezoelectric region formed on at least one, but preferably both major faces or surfaces of a piezoelectric crystal element. The basic configuration of the piezoelectric element may be either a plate-like shape (plano) or a contoured shape with a plano-convex profile or a convex-convex profile. The convex-convex and plano-convex configurations tend to enhance the energy trapping phenomenon. Single or double mesas are formed on the element with electrode regions of lesser thickness formed thereon adjacent the respective mesa or horizontal channels of a predetermined depth formed in the element with electrodes of a lesser or equal depth being fabricated there in. Additionally, curved edges at the electrode-crystal interfaces are included to reduce field gradients as well as tapered electrodes which have the effect of increasing the energy trapping produced in the area of the crystal between the electrodes. GRA

N86-25764# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Inst. Services Div.
A STATIC ANALYSIS OF ERRORS IN TRANSDUCER CALIBRATION TECHNIQUES USED FOR BLAST PHENOMENA TESTS Final Report, Nov. 1983 - Jan. 1984
Falih Ahmad Sep. 1985 100 p
(AD-A163172; WES/TR-O-85-1) Avail: NTIS HC A05/MF A01 CSCL 14/2

Strain gage transducers are commonly used in the formation of measurement circuits for recording different physical phenomena such as acceleration, displacement, pressure, etc. One method of rating used in these circuits is the shunt resistor calibration technique, which is considered both satisfactory and reliable. A mathematical model representing the static measurement circuit is used to study the effect of major parameters on the calibration procedure. Three parameters are considered: the length of the cable which connects the transducer to the rest of the measurement circuit elements, the nonlinear characteristic of the transducer, and the balanced potentiometer setting. The main advantage gained from this investigation is the improvment in measurement accuracy. Author (GRA)

N86-25765# Department of the Army, Washington, D. C.
ELECTROLYTIC PRESSURE TRANSDUCTION SYSTEM Patent
Gordon H. Bryant, inventor (to Army) Issued 31 Dec. 1985 6 p
Supersedes AD-D011847
(AD-D012102; US-Patent-4,561,450; US-Patent-Appl-SN-657438; US-Patent-Class-128-780) Avail: US Patent and Trademark Office CSCL 06/12

This invention is directed to a Wheatstone bridge circuit for measuring pressure in the distal esophageal sphincter (D.E.S.) as well as in other organs and bodily cavities. A flexible hollow tube having three spaced electrodes is lodged in the esophagus. The tube is partly filled with a saline solution to cover the electrodes, thereby producing two series connected, pressure sensitive resistors. The electrolytic resistors are coupled to two series connected fixed resistors to complete the bridge circuit. Electrical imbalances in the bridge circuit are measured in terms of the pressure corresponding to the pressure applied by the D.E.S. GRA

N86-25766# Department of the Air Force, Washington, D.C.
SURFACE TENSION SCREEN FAILURE DETECTION METHOD

AND APPARATUS Patent
James R. Fenwick, inventor (to Air Force) and Yi M. Chang, inventor (to Air Force) Issued 17 Dec. 1985 6 p
(AD-D012104; US-Patent-4,558,597; US-Patent-Appl-SN-688853; US-Patent-Class-73-600) Avail: US Patent and Trademark Office CSCL 16/4

Apparatus for detecting failure of a surface tension screen disposed between a holding chamber and a main chamber of a tank includes a fixture for supporting the tank in desired test orientations, a drive mechanism on the fixture for rotating the tank and an ultrasonic transducer was in making a measurement with respect to the position of an interface between liquid and gas contained in the holding chamber of the tank. The holding and main chambers are tandemly arranged along a longitudinal axis of the tank and are each substantially filled by a liquid propellant with respective volumes of gas contained in each chamber. The fixture supports the tank in a first orientation with a nose of the tank pointing downwardly and tank longitudinal axis extending approximately 60 deg above horizontal and to the right of vertical and in a second orientation with the tank nose pointing upwardly and tank longitudinal axis extending approximately 60 deg above horizontal and to the left of vertical. Separate measurements are made after rotation of the tank in each of these orientations. These measurements are indicative of the volumes of gas in the holding chamber at the respective orientations. Comparison of the measurements provides an assessment of the integrity of the surface tension screen. If the measurements are significantly different, then this indicates that gas leakage has taken place across the screen and that the screen has therefore failed. Author (GRA)

N86-25767# Department of the Navy, Washington, D. C.
NUCLEAR MAGNETIC RESONANCE GYROSCOPE Patent
Francis A. Karwacki, inventor (to Navy) Issued 1 Oct. 1985 11 p
(AD-D012105; US-Patent-4,544,891; US-Patent-Appl-SN-453014; US-Patent-Class-324-304) Avail: US Patent and Trademark Office CSCL 17/7

A nuclear magnetic resonance gyroscope which derives angular rotation from the phases of precessing nuclear moments utilizes a single-resonance cel situated in the center of a uniform dc magnetic field. The field is generated by current flow through a circular array of coils between parallel plates. It also utilizes a pump and readout beam and associated electronics for signal processing and control. Encapsulated in the cell for sensing rotation are odd isotopes of Mercury Hg199 and Hg201. Unpolarized intensity modulated light from a pump lamp is directed by lenses to a linear polarizer. The linearly polarized light is reflected by another mirror to the cell transverse to the field and orthogonal to the pump lamp light. The linear light after transversing the cell strikes an analyzer where it is converted to an intensity-modulated light. The modulated light is detected by a photodiode processed and utilized as feedback to control the field and pump lamp excitation and readout of angular displacement. Author (GRA)

N86-25768# Department of the Navy, Washington, D. C.
MANCHESTER DECODER CLOCK MULTIPLIER Patent
Aldan D. Gomez and Edward W. Gennetten, inventors (to Navy) Issued 23 Apr. 1985 17 p
(AD-D012127; US-Patent-4,513,329; US-Patent-Appl-SN-528386; US-Patent-Class-360-42) Avail: US Patent and Trademark Office CSCL 09/4

The circuit comprises a differentiator, two a clock decoder, a data flip-flop unit, and a multiphase and frequency logic circuit. The differentiator checks the incoming Manchester encoded signal and divides it into two trigger signals one with data associated with logic O transitions within the Manchester signal and the second trigger signal containing data associated with logic 1 transitions with the Manchester data. One trigger signal is fed to one the nonretriggerable-gated-monostable-multivibrator and the other trigger signal is transmitted to the second similar unit. Within these monostable multivibrator units the signals are a plurality of delayed signals which have waveforms built upon the occurrence of transitions within the Manchester signal associated with the logic O and logic I occurrences. Also within the monostalbe multivibrator, a set/reset latch is utilized to create appropriate signals to aid the control gates in blocking out undesired portions of the input trigger signals from the differentiator. The outputs of the set/reset latches are then fed to a clock decoder and onto a data flip-flop unit which is used to retrieve the data signals from the Manchester encoded signal. Outputs from the tapped delay lines within each monostable multivibrator which emit a plurality of delayed signals are fed to a multiphase and frequency logic unit which combines these delayed signals in a predetermined manner. GRA

N86-25769# Department of the Navy, Washington, D. C.
ACTIVE CIRCULATOR GYROTRON TRAVELING-WAVE AMPLIFIER Patent
J. Mark Baird, Larry R. Barnett, and Yue Ying Lau, inventors (to Navy) Issued 19 Nov. 1985 11 p
(AD-D012128; US-Patent-4,554,483; US-Patent-Appl-SN-537474; US-Patent-Class-315-4) Avail: US Patent and Trademark Office CSCL 09/1

An RF cyclotron maser type traveling-wave amplifier including an integral active circulator is described. It includes a tapered interaction waveguide having a cross-section which gradually increases from a small first end to a larger second end. The waveguide is capable of supporting first and second orthogonal polarization modes with approximately the same propagation characteristics for the two modes. A beam of mildly relativistic electrons having helical electron motion is directed into the small first end to axially propagate within the waveguide toward the larger second end. A tapered magnetic field is generated within the waveguide in a direction approximately parallel to the axis of the waveguide. An input electromagnetic wave in the first polarization mode is launched into the larger second end of the waveguide to propagate toward the first end. The input wave is reflected by the constriction of the tapered waveguide to propagate with the electron beam in the waveguide. The reflected input wave additionally excites energy in the second mode which also co-propagates with the electron beam. The first and second modes are amplified by the electron beam; the second polarization mode being amplified to a greater extent than the first mode. The two orthogonal modes are easily separated to provide input and output ports for the amplifier. GRA

N86-25770# Department of the Air Force, Washington, D.C.
WIDE ANGLE OPTICAL TRANSMITTER/RECEIVER Patent
Raymond C. Hedin and Fred G. Hewitt, inventors (to Air Force) Issued 17 Dec. 1985 5 p
(AD-D012133; US-Patent-4,559,445; US-Patent-Appl-SN-538879; US-Patent-Class-250-203) Avail: US Patent and Trademark Office CSCL 17/2

A novel optical transmitter/receiver device is described which comprises a source of radiation providing a collimated coherent light beam, such as a laser beam, along a first optical axis; a magneto-optic light detector device controllably deflecting the beam off the first optical axis in the direction of a target; optical beam expander and collimating lenses transmitting the expanded beam toward the target and receiving the expanded and reflected beam from the target; the reflected beam then being deflected back along the first optical axis to a scraper mirror which optically turns the reflected beam along a viewing axis toward a photo detector. GRA

N86-25771# Los Alamos National Lab., N. Mex.
DIAMOND ANVIL CELLS: A NEW TOOL FOR HIGH PRESSURE STUDIES
R. D. Taylor 1985 4 p Presented at the Raymond and Beverly Sackler Distinguished Lectures, Tel Aviv, Israel, 5 May 1985
(Contract W-7405-eng-36)
(DE86-002384; LA-UR-85-3546; CONF-8505211-2) Avail: NTIS HC A02/MF A01

Literally hundreds of papers have appeared in the last few years covering a myriad of uses of the diamond anvil cells. The cresendo shows no signs of abating. Static pressures as high as

1.8 megabar were reported. Still higher pressures appear possible. Measurements were made at dilution refrigerator temperatures (less than 50 millikelvins) and to temperatures over 1000 C in special sample ovens. Obviously these methods cannot be applied to every physics problem, but the limitations of diamond anvil cells are being challenged every day. DOE

N86-25772# National Bureau of Standards, Gaithersburg, Md. Chemical Process Metrology Div.
REPORT ON THE NBS-DOE (NATIONAL BUREAU OF STANDARDS-DEPARTMENT OF ENERGY) MAY 1984 WORKSHOP ON THERMAL METERING Final Report
G. E. Mattingly Nov. 1985 59 p refs Workshop held in Gaithersburg, Md., 21-22 May 1984 Sponsored in part by DOE (PB86-155488; NBSIR-85-3242) Avail: NTIS HC A04/MF A01 CSCL 13A

A workshop on thermal metering (i.e., the flow of steam or of hot or chilled water) was convened in Gaithersburg, MD, May 21 to 22, 1984 to discuss and prioritize flow rate measurement problems and research programs which could lead to improve energy conservation through the development, acceptance, and use of district heating and cooling systems. The workshop brought together 60 attendees whose expertise spanned a broad range of interests. Included were flowmeter manufacturers, meter users, standards personnel, academicians, and consultants. Attendees listed current problem areas and measurement needs in thermal metering, discussed appropriate responses to these needs, and prioritized these according to their perceived potential for impacting thermal metering practices. Leading this list are: paper standards with special emphasis on meter installation requirements, research on two-phase flow and its measurement, two-phase flow technology transfer and information dissemination. GRA

N86-25567# Joint Publications Research Service, Arlington, Va.
PIEZORESONANT PRESSURE SENSORS Abstract Only
L. V. Maleyko, V. V. Malov, A. P. Rudenkov, I. V. Yakovlev, T. B. Ibragimov, V. A. Maglysh, O. F. Migukina, and Pitkevich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 42 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 19-21 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25568# Joint Publications Research Service, Arlington, Va.
SEALED REED RELAY LIMIT SWITCHES Abstract Only
I. P. Ivanov, G. P. Svintsov, M. A. Yefimova, A. V. Lebedev, and Yu. P. Samsonov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 43 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 17-19 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25569# Joint Publications Research Service, Arlington, Va.
CONTACTLESS POSITION SENSOR Abstract Only
I. I. Popov, G. S. Pyatlina, and Ye. A. Shulyakovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 43 Transl. into ENGLISH from Pribory i Sistemy Upravleniya (Moscow, USSR), no. 9, Sep. 1984 p 16-17 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25614# Joint Publications Research Service, Arlington, Va.
STABILIZER OF SHAFT ROTATION ANGLE FOR D.C. COMMUTATOR MOTOR Abstract Only
S. N. Nizovoy, F. G. Kuliczhanov, and N. O. Yelyutin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 55 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 230-231 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25629# Joint Publications Research Service, Arlington, Va.
UNIVERSAL INSTRUMENT FOR ACOUSTIC INSPECTION Abstract Only
Ye. G. Nashuk, V. D. Beshentsev, and A. Sh. Atayev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 75-76 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 242 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25630# Joint Publications Research Service, Arlington, Va.
FIVE-CHANNEL INSTRUMENT FOR ACOUSTIC FLAW DETECTION BY METHOD OF ACOUSTIC EMISSION Abstract Only
A. I. Alabichev, Yu. I. Tyalin, Yu. I. Golovin, A. A. Sletkov, V. I. Uskov, S. A. Gladyshev, and A. N. Bykov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 76 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 243 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25631# Joint Publications Research Service, Arlington, Va.
SYNCHRONIZATION SYSTEM FOR PULSED POWER LASER WITH OPTOELECTRONIC CONTROL Abstract Only
V. V. Appolonov, S. I. Ziyenko, V. V. Brytkov, S. V. Muravyev, and V. A. Yamshchikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 78 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 163-168 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25633# Joint Publications Research Service, Arlington, Va.
DIAMOND CHAMBER TO STUDY EFFECT OF SHEARING STRAIN ON STRUCTURES AND PROPERTIES OF SOLIDS UNDER PRESSURES UP TO 43 GPa Abstract Only
V. D. Blank, Yu. S. Konyayev, A. I. Kuznetsov, and E. I. Estrin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 81 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 178-180 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25634# Joint Publications Research Service, Arlington, Va.
WIDEBAND PIEZOELECTRIC PRESSURE TRANSDUCER Abstract Only
V. A. Godonyuk, B. V. Zhuravlev, and I. P. Shedko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 83 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 214-217 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25635# Joint Publications Research Service, Arlington, Va.
FURNACE FOR TESTING MATERIALS IN AIR AT TEMPERATURES UP TO 1850 DEG C Abstract Only
V. Ye. Sotnikov, A. M. Smirnitskiy, A. V. Satanovskiy, V. L. Balkevich, and Yu. M. Mosin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 84 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 217-218 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25636# Joint Publications Research Service, Arlington, Va.
DETECTION OF CHARGED-PARTICLE PLUGS IN GASEOUS TARGET BY MEANS OF SEMI-CONDUCTOR-TYPE DETECTORS Abstract Only
G. F. Binko, M. G. Gornov, Yu. P. Dobretsov, -Ugryumov Kirillov, V. G., A. A. Maloletnev, A. L. Mikaelyan, A. P. Pichugin, V. P. Protasov, V. I. Savelyev, A. Ya. Smakov et al *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 86 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 36-40 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-26133# Joint Publications Research Service, Arlington, Va.
APPLICATION OF SCINTALLATION DETECTORS FOR X-RAY DIAGNOSIS OF LASER PLASMA Abstract Only
M. P. Kalashnikov, V. K. Lyapidevskiy, Yu. A. Mikhaylov, V. A. Prorvich, A. V. Rode, A. V. Sartori, G. V. Skilzkov, and S. I. Fedotov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 30 Transl. into ENGLISH from Preprint no. 26, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26146# Joint Publications Research Service, Arlington, Va.
MICROCHANNEL ANALYZER FOR RECORDING PARTICLE AND X-RAY EMISSION FROM LASER PLASMA Abstract Only
L. Z. Barabash, B. N. Bragin, A. A. Golubev, A. I. Gromov, Yu. A. Zakharenkov, V. S. Malysheva, A. I. Nikitenko, A. F. Nikitina, G. V. Ryazanov, and R. T. Khaydarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 45 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 16-20 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26147# Joint Publications Research Service, Arlington, Va.
MAGNETIC ANALYZER OF HIGH-ENERGY IONS FROM THERMONUCLEAR TARGETS COMPRESSED BY LASER BEAM Abstract Only
A. A. Yerokhin, Yu. A. Zakharenkov, G. V. Sklizkov, and A. S. Shikanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 46 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 21-24 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-25773# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE CONSTRUCTION AND CALIBRATION OF A LADAR (LASER DETECTION AND RANGING) CROSS-SECTION MEASUREMENT RANGE M.S. Thesis
James C. Higgins Dec. 1985 109 p refs
(AD-A163955; AFIT/GEP/ENP/85D-5) Avail: NTIS HC A06/MF A01 CSCL 17/5

The purpose of this thesis was to construct an experiment that can accurately determine a target's laser radar cross-section. A laser radar cross-section (LRCS) is a measure of the average amount of optical power scattered by a target, and is analogous to the term radar cross-section, which is defined for scattered power radiating at microwave wavelengths. Cross-sections, whether optical or microwave, are quantities which describe the effective area of a specific target which directly scatters an incident electromagnetic wavefront. The focus of this thesis is to investigate the nature of LRCS measurements, with particular attention paid to the measurements of spherical calibration targets. GRA

N86-25774# Sigma Tau Standards Corp., Tuscaloosa, Ala.
ADVANCED DESIGN ATOMIC HYDROGEN MASER RESEARCH AND DEVELOPMENT Final Report, 1 Dec. 1982 - 31 Dec. 1985
Harry E. Peters 31 Dec. 1985 43 p refs
(Contract N00014-83-C-2015)
(AD-A164071; STNR-F1) Avail: NTIS HC A03/MF A01 CSCL 20/5

The objectives of this contract were to develop atomic hydrogen masers based upon novel concepts of cavity stabilization and new designs of the maser physics unit to provide improved stability and environmental isolation as well as a reduction in size, weight, cost and power consumption. First, new maser designs were developed which implemented electronic cavity frequency stabilization using the cavity frequency switching technique. These new designs also incorporated a novel cavity assembly which is smaller than that used in past masers and new quadrupole state selectors based upon concepts described in the cited references. Then two representative hydrogen masers were constructed and tested and experiments were performed to optimize the electronic systems. GRA

N86-25775# Stanford Univ., Calif. Lab. of Physics.
CONSTRUCTION OF A HIGH ENERGY LINEAR ACCELERATOR FOR RESEARCH IN FREE ELECTRON LASERS, BEAM-WAVE INTERACTIONS, SPECTROSCOPY AND MICROCIRCUITRY FABRICATION Final Report, 1 Aug. 1983 - 31 Jul. 1984
J. M. J. Madey and M. R. Yearian 3 Dec. 1985 12 p refs
(Grant AF-AFOSR-0303-83)
(AD-A164250; AFOSR-85-1221TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

A long pulse, high brightness 45 MeV linear accelerator has been constructed for use as a driver for free electron laser and beam wave experiments, and as the first section of a 1 GeV injector for a high brightness electron storage ring. This contract has led to: (1) demonstration of the highest gradient and longest pulse length yet achieved in a 3 meter S-band SLAC-type travelling wave accelerator section; and (2) demonstration of the high current and high current density attainable through the use of a strong microwave field to replace the dc electric field usually used in linac electron guns. GRA

N86-25776# Naval Research Lab., Washington, D. C.
BASELINE DESIGN OF A 5-7 kJ KrF LASER FACILITY FOR DIRECT ILLUMINATION ICF EXPERIMENTS
R. H. Lehmberg, S. P. Obenschain, and A. J. Schmitt 31 Dec. 1985 46 p refs
(AD-A164280; NRL-MR-5713) Avail: NTIS HC A03/MF A01 CSCL 18/1

This report presents the baseline design for a 48 channel angularly-multiplexed KrF laser system, using amplifier modules similar to those in the AURORA laser at Los Alamos National Laboratory. With output energies of 5-7 kJ, pulsewidths approx. = 5 ns, and broadband (>20 1/cm) capabilities, the proposed system is intended primarily for laser-plasma experiments related to direct-drive inertial confinement fusion. The design incorporates the NRL induced spatial incoherence (ISI) technique into each beam in order to achieve the smoothly-varying and controllable irradiation profiles essential to the direct-drive approach. The option of using stimulated Raman scattering to improve the beam quality prior to the ISI echelons is also discussed. Author (GRA)

N86-25777# SRI International Corp., Menlo Park, Calif. Chemical Physics Lab.
PHOTODISSOCIATION AND PHOTOEXCITATION OF SIMPLE MOLECULES WITH 1576 A f2 LASER
T. G. Slanger and M. R. Taherian 1985 17 p refs
(Contract DAAG29-81-K-0001)
(AD-A164336; ARO-17561.7-CH) Avail: NTIS HC A02/MF A01 CSCL 07/5

The Fluorine laser, operating at 1576 A, is the shortest wavelength laser with which one photon photochemical experiments are currently practical. This paper studies experiments carried out on C2N2 and on NO, the former case involving photodissociation, the latter, photoexcitation. At 1576 A, photodissociation of C2N2 leads to production of CN(A 2Pi) and CN(X2 Sigma(+)), with the CN(A) being produced in a range of vibrational levels, up to the thermodynamic limit of v=5. Radiative lifetimes have been measured for each of the six levels, and the lifetimes become shorter with increasing v, which agrees with theoretical predictions, but with no previous experimental studies. Rates coefficients for quenching the CN(A) state by the parent molecule show a correlation with the size of the energy gap between the A level and the closest lower X level, although the effect is linear and not exponetial in energy. The laser radiation is resonant with a transition in the B'-X band of NO. This results, in the collision-free case, in emission in three band systems, B' and B, whereas upon

He addition, several other band systems appear. We have determined which rotational levels are involved in the initial step, and find the match to be within 0.25/cm of resonance. The branching ratio between the B'-X and B'-B systems has been found to be 155. The resonance between the laser radiation and the NO transition establishes NO as a unique monitor of the laser power. GRA

N86-25778# Naval Weapons Center, China Lake, Calif.
CHARACTERIZATION OF ALUMINUM NITRIDE/ALUMINUM OXIDE REACTIVELY SPUTTERED ANTIREFLECTION COATINGS Final Report, period ending 1984
L. G. Koshigoe, L. F. Johnson, T. M. Donovan, and C. D. Marrs Sep. 1985 40 p refs
(AD-A164494; AD-E900539; NWC-TP-6651) Avail: NTIS
HC A03/MF A01 CSCL 20/5

Aluminum nitride/aluminum oxide multilayer protective anti-reflection coatings are being developed for use on laser windows. These materials have been shown to be relatively stable and scratch resistant, thus demonstrating their applicability for this use. Both two- and three-layer coatings were designed at the wavelength of 0.500 micrometer. The design techniques utilized, as well as the resulting transmission spectra, are discussed. GRA

N86-25779# Department of the Navy, Washington, D. C.
OPTICAL INJECTION LOCKING OF LASER DIODE ARRAYS Patent Application
Lew Goldberg, Henry F. Taylor, and Joseph F. Weller, inventors (to Navy) Filed 7 Nov. 1985 19 p refs
(AD-D012164; US-Patent-Appl-SN-795796) Avail: NTIS
HC A02/MF A01 CSCL 20/5

Injection locking of a laser array by a single master laser is achieved. A single-lobe far-field pattern and a single mode emission spectrum in the output of the laser array results. GRA

N86-25780# United Technologies Research Center, East Hartford, Conn.
INVESTIGATION OF PLASMA PROCESSES IN ELECTRONIC TRANSITION LASERS Annual Report, 1 Jan. - 31 Dec. 1985
William L. Nighan 15 Dec. 1985 28 p
(Contract N00014-85-C-0259)
(AD-A163141; UTRC/R85-927162-1) Avail: NTIS
HC A03/MF A01 CSCL 20/5

This is an investigation of the fundamental processes affecting the operation, performance and application of electrically excited lasers having potential utility in a variety of areas of importance to the Navy. Particular attention is presently focused on the broadband XeF(C is then A) laser, which has the potential for efficient, tunable operation throughout the blue-green spectral region. The research at UTRC is closely coordinated with a complementary ONR-supported experimental program being conducted at Rice University. This Annual Report summarizes recent results of this investigation, and includes reprints of recently published papers in which specific results and conclusions of the research are described in detail: transient absorption in the visible region; rare gas-halide mixture synthesis; efficient XeF(C is then A) laser, tunable visible laser, tunable blue-green laser. GRA

N86-25781# Department of the Air Force, Washington, D.C.
NF(3) COMBUSTOR FOR CYLINDRICAL LASER Patent Application
Walter R. Warren, inventor (to Air Force) Filed 8 Nov. 1985 24 p
(AD-D012088; US-Patent-Appl-SN-796125) Avail: NTIS
HC A02/MF A01 CSCL 20/5

A combustor using D2/NF/He (Deuterium, Nitorgen Fluoride, Helium) is used in a laser gain generator in a cylindrical gas laser. The combustor includes a plurality of primary rings having fuel, oxidizer and diluent orifices therein. Fuel and oxidizer orifices form a triplet injector set that provides a reactant set. Two diluent orifices form a diluent injector set that provides a diluent set. These sets alternate about each primary ring and form one primary ring to the adjacent primary. Because the diluent set does not mix directly with the reactant set initially, a greater percentage of lasing products are formed because of the higher temperature in the reacting zone. Diluent is mixed as required at a later stage in the flow. GRA

N86-25782# Department of the Air Force, Washington, D.C.
FIRE CONTROL APPARATUS FOR A LASER WEAPON Patent Application
Richard H. Worsham, inventor (to Air Force) Filed 29 Oct. 1985 49 p
(AD-D012098; US-Patent-Appl-SN-792373) Avail: NTIS
HC A03/MF A01 CSCL 19/5

This patent application discloses a laser weapon fire control computer apparatus for responding in real time to the escort/threat scenario that confronts the weapon. The fire control computer apparatus compares the threat data with stored predicted scenarios to develop a firing strategy menu which takes into account the fact that the laser energy is instantaneously propagated to the target but requires a substantial amount of time to inflict damage. The fire control computer apparatus utilizes the weapon's status, dwell time, slow time and fuel limits to yield a weapon pointing sequence and weapon on-off times. GRA

N86-25783# Department of the Air Force, Washington, D.C.
TUBULAR SINGLET DELTA OXYGEN GENERATOR Patent
William E. McDermott, David E. Ellis, Nicholas R. Pchelkin, George W. Miller, and David J. Benard, inventors (to Air Force) Issued 10 Dec. 1985 7 p Supersedes AD-D010414
(AD-D012112; US-Patent-4,558,451; US-Patent-Appl-SN-399567; US-Patent-Class-372-389) Avail: US Patent and Trademark Office CSCL 20/5

This invention relates to high energy chemical lasers and to a system for generating singlet data, energizing molecular gas for use with such lasers. More particularly, this invention concerns itself with an apparatus for generating molecular oxygen in the excited singlet-delta electronic state. In accordance with this invention, it has been found that molecular oxygen in the electronically excited singlet delta state can be generated in an efficient and reliable manner by a generating device which comprises a tubular reaction chamber having a substantially circular cross-section which in turn is positioned within a vacuum chamber. The generating device is then inter-connected to a conventional atomic iodine laser for providing the laser with electronically excited oxygen as one of the reacting components. The laser itself provides the necessary vacuum to evacuate the vacuum chamber of the generating device during its operation. A source of chlorine gas is introduced into the center of one end of the reaction chamber along with liquid mixture of hydrogen peroxide and sodium hydroxide. Suitable control devices control the flow rates of the gas and liquid. GRA

N86-25784# Department of the Navy, Washington, D. C.
SEMICONDUCTOR LASER END-FACET COATINGS FOR USE IN SOLID OR LIQUID ENVIRONMENTS Patent
Graham A. Garcia and Steven J. Cowen, inventors (to Navy) Issued 9 Apr. 1985 4 p
(AD-D012125; US-Patent-4,510,607; US-Patent-Appl-SN-567594; US-Patent-Class-372-49) Avail: US Patent and Trademark Office CSCL 20/5

An improvement for a semiconductor laser allows the facet reflectivity to be modified to compensate for the presence of a liquid or transparent solid medium having an index of refraction n sub m. A first dielectric coating is disposed on an end-facet of the semiconductor laser and has an index of refraction n sub 1. A second dielectric coating is disposed on the first dielectric coating and has an index of refraction n sub 2. The materials of the dielectric coatings are selected such that the fraction (n sub 1)/(n sub 2) = square root of (n sub m). Thus the problems associated with reduction of laser facet reflectivity due to contact with a surrounding medium which optically is very different from air is overcome. GRA

N86-25785# Los Alamos National Lab., N. Mex.
OPTICAL BEAM BENDING AND FOCUSING IN FREE-ELECTRON OSCILLATORS
R. W. Warren 1985 18 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002426; LA-UR-85-3854; CONF-850956-6) Avail: NTIS HC A02/MF A01

As the bunched electron beam in the wiggler of an FEL oscillates from side to side, it generates a new optical field. This new field is coherent with the old field that entered the wiggler and bears a phase relationship to that field depending upon many variables. If the new field is in phase with the old, optical gain occurs. If it is 90 deg out of phase, the combined fields have a phase shift that represents retardation, that is,a real positive index of refraction. This phase shift generally does not occur uniformly over the cross section of the optical beam, but is concentrated in the center for an aligned system or to one side for a misaligned system. The former case leads to optical beam focusing, the latter to beam bending along with the focusing. An FEL oscillator can be a particularly sensitive arrangement for observing focusing and bending because of the abrupt termination of the macropulse of electrons. This termination triggers a transverse oscillation of the optical pulse that is trapped in the cavity around its equilibrium position. The amplitude of the oscillation can be large. During the Los Alamos oscillator experiment, the bending phenomenon was observed. In this paper we present the results of these observations, a discussion of different models that might be used to explain them, and comparison of the measurements with crude calculations using a final model. DOE

N86-25786# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
COHERENT SHORT WAVE RADIATION FROM A SOLID STATE FREE ELECTRON LASER
S. A. Bogacz, J. B. Ketterson, and G. K. Wong Sep. 1985 11 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-003055; CONF-850956-8) Avail: NTIS HC A02/MF A01

The idea of using a crystal lattice or a superlattice as an undulator for a free electron laser is explored. A purely classical treatment of relativistic positrons channeling through the proposed structure is performed in a self consistent fashion involving the wave equation for the radiating electromagnetic field and the kinetic equation for the positron distribution function. The gain coefficient for a forward radiating field is obtained in closed analytic form and is studied numerically for a (110) planar channeling in Si. This result, combined with a feedback mechanism arising from Bragg diffraction within the basic crystal lattice, may lead to an instability of the radiation inside the crystal. DOE

N86-25787# Los Alamos National Lab., N. Mex.
RECENT ADVANCES IN ULTRAVIOLET LASER TECHNOLOGY
J. F. Figueira, S. R. Foltyn, L. A. Rosocha, R. C. Sze, C. R. Tallman, J. Telle, and D. E. Watkins 1985 16 p Presented at the 2nd Bucharest International Conference on Trends in Quantum Mechanics, Bucharest, Romania, 2 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002404; LA-UR-85-3560; CONF-8509105-1) Avail: NTIS HC A02/MF A01

The science and technology of violet and ultraviolet lasers has matured rapidly in the last five years. High average power lasers have been demonstrated and several commercial product lines are now available. Single pulse devices have successfully demonstrated large output energies in well controlled beams. Some of the current laser development programs are discussed. Research in both discharge pumped lasers and E-beam pumped lasers are discussed, as well as review methods of wavelength conversion in these devices. Finally the current understanding of laser induced damage to optical components in the UV is discussed. DOE

N86-25788# California Univ., Berkeley. Lawrence Berkeley Lab.
PULSED PHOTOTHERMAL DEFLECTION SPECTROSCOPY IN FLOWING MEDIA
V. Zharov and N. M. Amer Jun. 1985 8 p Presented at the 4th International Topical Meetingon Photoacoustic, Thermal and Related Sciences, Quebec, 4 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002879; LBL-20189; CONF-850886-6) Avail: NTIS HC A02/MF A01

Pulsed photothermal deflection was used to spatially map out flow velocity profiles and to determine absolute flow velocities. DOE

N86-25556# Joint Publications Research Service, Arlington, Va.
HARDENING TREATMENT OF MACHINE PARTS WITH CO_2 POWER LASERS Abstract Only
A. S. Borodachev, M. B. Gutman, G. A. Kuznetsov, L. A. Medvedovskaya, and G. K. Rubin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 52 Transl. into ENGLISH from Elektrotekhnika (Moscow, USSR), no. 10, Oct. 1984 p 51-54 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25632# Joint Publications Research Service, Arlington, Va.
APPARATUS WITH TRANSPARENT ANVILS-WINDOWS FOR OPTICAL AND X-RAY ANALYSIS UNDER HIGH PRESSURE Abstract Only
B. A. Fursenko, O. V. Kholdeyev, Yu. A. Litvin, and V. D. Kropachev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 80-81 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 174-178 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-26101# Joint Publications Research Service, Arlington, Va.
SUBSURFACE PLASMA IN BEAM OF CONTINUOUS CO_2-LASER Abstract Only
Ye. V. Danytsikov, V. A. Dymshakov, F. V. Lebedev, V. D. Pismennyy, and A. V. Ryazanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 16 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 4, Apr. 1985 p 811-828 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26102# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATION OF PROCESSES IN SOLID-STATE LASER OSCILLATORS AND AMPLIFIERS WITH PHOTOTUBE PUMPING: LASER PUMPING SYSTEMS Abstract Only
V. M. Gradov, G. I. Kromskiy, A. A. Mak, G. V. Sklizkov, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 42-43 Transl. into ENGLISH from Preprint no. 105, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26103# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF X-RADIATION EMITTED DURING FOCUSING OF LASER BEAMS ON SOLID TARGETS: RADIATION LOSSES IN MULTICHARGE PLASMA Abstract Only
V. A. Vinogradov and V. N. Shlyaptsev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 65 Transl. into ENGLISH from Preprint no. 11, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26105# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATION OF PROCESSES IN SOLID-STATE LASER RADIATORS AND AMPLIFIERS WITH GLOW-TUBE PUMPING: ELECTRIC-DISCHARGE PUMPING SOURCES.

THERMOPHYSICAL PROCESSES IN ENVELOPE AND ELECTRODES OF PULSE PUMPS Abstract Only
V. M. Gradov, V. I. Zhiltsov, G. V. Sklizkov, Yu. I. Terentyev, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 88-89 Transl. into ENGLISH from Preprint no. 189, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26106# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATIONS OF PROCESSES IN SOLID-STATE LASER RADIATORS AND AMPLIFIERS WITH PHOTOTUBE PUMPING: ELECTRIC-DISCHARGE PUMPING SOURCES. ARC DISCHARGES Abstract Only
V. M. Gradov, A. A. Mak, G. I. Kromskiy, G. V. Sklizkov, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 89 Transl. into ENGLISH from Preprint no. 190, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

N86-26112# Joint Publications Research Service, Arlington, Va.
MICROWAVE ABSROPTION IN GLASS HEATED BY LASER RADIATION Abstract Only
N. Ye. Kask, M. A. Kovalyev, G. M. Fedorov, and D. B. Chopornyak *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 3 Transl. into ENGLISH from Fizika i Khimiya Stekla (Leningrad, USSR), v. 11, no. 1, Jan.-Feb. 1985 p 68-74 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26113# Joint Publications Research Service, Arlington, Va.
IMPURITY ABSORPTION BY CHALCOGENIDE GLASSES IN CO LASER EMISSION REGION Abstract Only
V. G. Plotnichyenko and V. K. Sysoyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 4 Transl. into ENGLISH from Fizika i Khimiya Stekla (Leningrad, USSR), v. 11, no. 1, Jan.-Feb. 1985 p 105-107 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26114# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF DEGRADATION PROCESSES IN ELECTRON-BEAM PUMPED CdS LASERS USING A TRANSMISSION ELECTRON MICROSCOPE Abstract Only
G. V. Bushuyeva, S. A. Pendor, A. N. Pechenov, A. A. Predvoditelev, V. I. Reshetov, and P. V. Shapkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 4 Transl. into ENGLISH from Preprint no. 65, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26118# Joint Publications Research Service, Arlington, Va.
LASER RADIATION IN ZnSe EXCITED BY GUNN DOMAINS IN STREAMER DISCHARGE CHANNEL Abstract Only
V. D. Dubrov, I. Ismailov, A. Z. Obidin, A. N. Pechenov, and Yu. M. Popov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 10 Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 3-5 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26119# Joint Publications Research Service, Arlington, Va.
THRESHOLD CONDITIONS FOR DAMAGE TO POTASSIUM CHLORIDE SINGLE CRYSTALS EXPOSED TO CW CO-2 LASER RADIATION Abstract Only
A. A. Blistanov, N. M. Voloshinskaya, Ye. P. Glotov, Kh. Z. Bugaidullina, I. A. Zabolotskikh, V. N. Koterov, O. M. Kugayenko, V. V. Sumerin, V. A. Ulyanov, and N. V. Cheburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 13 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2389-2396 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26120# Joint Publications Research Service, Arlington, Va
GENERATION OF FREQUENCY-TUNABLE ULTRASHORT PULSES IN A DYNAMIC DISTRIBUTED FEEDBACK LASER Abstract Only
V. I. Bezrodnyy, Ye. I. Zabello, and Ye. A. Tikhonov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 14 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2438-2442 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26121# Joint Publications Research Service, Arlington, Va.
THEORY OF SURFACE DAMAGE TO NONTRANSPARENT MATERIALS BY LASER RADIATION Abstract Only
A. A. Vedenov, O. P. Ivanov, and A. L. Chernyakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 15 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2438-2442 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26122# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE INFLUENCE OF PUMP PROFILING ALONG THE OPTICAL AXIS ON TELESCOPIC-CAVITY ELECTRO-IONIZATION LASER OUTPUT CHARACTERISTICS Abstract Only
S. S. Kozyuchenok, V. A. Rodichkin, V. P. Tomashevich, and V. F. Shanskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 16 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2461-2464 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26123# Joint Publications Research Service, Arlington, Va.
LASING CHARACTERISTICS OF A POSITIVE ELECTROOPTICAL FEEDBACK NEODYMIUM LASER Abstract Only
A. V. Agashkov and Yu. F. Morgun *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2465-2470 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26124# Joint Publications Research Service, Arlington, Va.
CHLORINE MONOFLUORIDE-HYDROGEN ELECTRIC DISCHARGE CHEMICAL LASER Abstract Only
V. B. Kolovskiy, S. A. Drobakha, G. P. Zhitneva, G. A. Abakumov, and A. P. Simonov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 17-18 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2507-2509 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26125# Joint Publications Research Service, Arlington, Va.
LASER CAVITIES WITH DIFFRACTION GRATINGS IN AUTOCOLLIMATION MODE Abstract Only
V. N. Beltyugov, V. N. Ochkin, N. N. Sobolev, Yu. V. Troitskiy, and Yu. B. Udalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 18 Transl. into ENGLISH from Preprint no. 37, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26126# Joint Publications Research Service, Arlington, Va.
POLARIZATION CHARACTERISTICS OF A SECONDARY GAMMA-RAY DURING LIGHT SCATTERING BY RELATIVISTIC ELECTRONS Abstract Only
V. A. Murashova, G. S. Pashchenko, and M. N. Yakimenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 19 Transl. into ENGLISH from Preprint no.

3078, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1983 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26127# Joint Publications Research Service, Arlington, Va.
PHYSICAL FACTORS LIMITING SERVICE LIFE OF COPPER BROMIDE LASERS Abstract Only
Nikolay Kirilov Vuchkov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 19 Transl. into ENGLISH from Akademiya Nauk SSSR Institut Obshchey Fiziki Dissertation Abstracts (Moscow, USSR) (For primary document see N86-26108 16-36)
Avail: NTIS HC A05/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-25789* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SYNCHRONOUSLY DEPLOYABLE TRUSS STRUCTURE Patent
Harold G. Bush, inventor (to NASA), M. Mikulas, Jr., inventor (to NASA), and E. Wallsom, inventor (to NASA) (Kentron International, Inc., Hampton, Va.) 1 Apr. 1986 8 p Filed 30 Nov. 1983 Sponsored by NASA
(NASA-Case-LAR-13117-1; US-Patent-4,578,920;
US-Patent-Appl-SN-556512; US-Patent-Class-52-645;
US-Patent-Class-52-111; US-Patent-Class-52 648;
US-Patent-Class-244-159; US-Patent-Class-244-173;
US-Patent-Cla s-343-881; US-Patent-Class-343-882) Avail: US Patent and Trademark Office CSCL 13I

A collapsible-expandable truss structure, including first and second spaced surface truss layers having an attached core layer is described. The surface truss layers are composed of a plurality of linear struts arranged in multiple triangular configurations. Each linear strut is hinged at the center and hinge connected at each end to a nodular joint. A passive spring serves as the expansion force to move the folded struts from a stowed collapsed position to a deployed operative final truss configuration. A damper controls the rate of spring expansion for the synchronized deployment of the truss as the folded configuration is released for deployment by the restrain belts. The truss is synchronously extended under the control of motor driven spools.
Official Gazette of the U. S. Patent and Trademark Office

N86-25790* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS Patent
Eliseo DiRusso, inventor (to NASA) Issued 8 Apr. 1986 5 p Filed 16 Nov. 1984 Sponsored by NASA
(NASA-CASE-LEW-14170-1; US-Patent-4,580-791;
US-Patent-Appl-SN-672224; US-Patent-Class-227-27;
US-Patent-Class-227-28) Avail: US Patent and Trademark Office CSCL 11A

Vibration and stability of a primary seal ring is controlled by a secondary seal system. An inflatable bladder which forms a portion of the secondary seal varies the damping applied to this seal ring. The amplitude of vibration of the primary seal ring is sensed with a proximity probe that is connected to a microprocessor in a control system. The bladder pressure is changed by the control system to mitigate any sensed instability or vibration.
Official Gazette of the U. S. Patent and Trademark Office

N86-25791* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LATCHING MECHANISM FOR DEPLOYABLE/RE-STOWABLE COLUMNS USEFUL IN SATELLITE CONSTRUCTION Patent
Elvin L. Ahl, Jr., inventor (to NASA) Issued 6 May 1986 11 p Filed 2 May 1984 Sponsored by NASA
(NASA-CASE-LAR-13169-1; US-Patent-4,587,526;
US-Patent-Appl-SN-606431; US-Patent-Class-343-883;
US-Patent-Class-343-DIG.2; US-Patent-Class-52-110) Avail: US Patent and Trademark Office CSCL 13I

A column longeron latch assembly provides the securing mechanism for the deployable, telescoping column of a hoop/column antenna. The column is an open lattice structure with three longerons disposed 120 deg apart as the principle load bearing member. The column is deployed from a pair of eleven nested bays disposed on opposite sides of a center section under the influence of a motor-cable-pulley system. The longeron latch is a four bar linkage mechanism using the over-center principle for automatically locking the longeron sections into position during deployment. The latch is unlocked when the antenna is to be restowed. A spring pack disposed in the end of each longeron serves to absorb stress forces on the deployed column through the cam head piston and abutting latch from an adjacent longeron. Official Gazette of the U. S. Patent and Trademark Office

N86-25792 Central Electricity Generating Board, London (England). Translations Section - Overseas Service.
OPERATIONAL RELIABILITY OF WELDED T-JOINTS MADE FROM CrMoV STEELS FOR USE IN STEAM LINES
I. I. Chechko, V. A. Garnyk, and V. N. Zemzin 1986 9 p refs Transl. into ENGLISH from Elektricheskie Stantsii (USSR), no. 5, 1975 p 17-19
(BLL-CE-Trans-8140-(9022.09)) Avail: British Library Lending Div., Boston Spa, England

An analysis of the susceptibility to damage of welded T-joints for high-pressure steam lines supplied from various sources shows that the measures adopted by the manufacturers (gradual transition of the seam into the tube metal and examination of the hardness of the metal after heat treatment) has permitted the susceptibility of T-joints to damage to be greatly reduced. The results of further examinations of the welds made for T-joints in steam lines (involving operating times of up to 50,000 hours), and the experience gained in making repair welds under the operating conditions encountered at power stations are given. Author

N86-25793*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GENERATION OF SPIRAL BEVEL GEARS WITH ZERO KINEMATICAL ERRORS AND COMPUTER AIDED TOOTH CONTACT ANALYSIS
Faydor L. Litvin (Illinois Univ., Chicago.), Wei-Jiung Tsung, John J. Coy, and Charles Heine (Dana Corp., Fort Wayne, Ind.) Mar. 1986 21 p refs Presented at the 2nd World Congress on Gearing, Paris, France, 2-5 Mar. 1986
(Grant NAG3-48)
(NASA-TM-87273; E-2932; NAS 1.15:87273;
USAAVSCOM-TR-86-C-2) Avail: NTIS HC A02/MF A01 CSCL 13I

Kinematic errors in spiral bevel gears are a major source of noise and vibrations in transmissions. A method for the generation of Gleason's spiral bevel gears which provides conjugated gear tooth surfaces and an improved bearing contact was developed. A computer program for the simulation of meshing, misalignment, and bearing contact was written. Author

N86-25794*# National Aeronautics and Space Administration, Washington, D.C.
PROCEEDINGS OF A WORKSHOP ON APPLICATIONS OF TETHERS IN SPACE: EXECUTIVE SUMMARY
William A. Baracat, Compiler 1986 43 p Proc. held in Venice, Italy, 15-17 Oct. 1985
(Contract NASw-3921)
(NASA-CP-2422; NAS 1.55:2422) Avail: NTIS HC A03/MF A01 CSCL 13I

During June 1985, a number of aerospace products developed in Australia were displayed at the Paris Air Show. The Department of Defense was one of the 16 exhibitors, and presented 14 products which were considered to have commercial potential

on the world market. Considerable interest was shown in the Department of Defense products presented in Paris, and subsequent visits to aerospace companies in Israel, for the demonstrated strong overseas interest in both manufacture and purchase of these products. Author

N86-25795# MSNW, Inc., San Marcos, Calif.
PLASMA JOINING OF METAL MATRIX COMPOSITES Interim Report, Oct. - Nov. 1985
G. H. Reynolds and L. Yang Dec. 1985 14 p refs
(Contract DAAG29-85-C-0027)
(AD-A164095; ARO-22817.1-MS-S) Avail: NTIS HC A02/MF A01 CSCL 13/8

Aluminum-reactive metal matrix alloys for Al-SiC composite filler metals are described. Preliminary process modeling studies on constituent vaporization effects, thermochemical stability of surface oxide films, and dissolved gas evolution in-plasma are described. GRA

N86-25796# Amorphous Materials, Inc., Garland, Tex.
LARGE PLATE CdTe SYNTHESIS BY SEALED VESSEL TRANSPORT AD-A164117 HC A03/MF A01 Final Technical Report, Nov. 1984 - Nov. 1985
G. R. Cronin and A. R. Hilton 31 Dec. 1985 38 p refs
(Contract DAAG29-85-C-0004)
(AD-A164117) Avail: NTIS HC A03/MF A01 CSCL 13/8

A crucial problem in the volume production of U. S. Government FLIR systems is the availability of mercury-cadmium-telluride (HgCdTe) detector arrays. The conventional method for preparing CdTe crystals is too slow. The purpose of this program will be to develop an alternative approach. A compounding process originally developed for the preparation of large plates of IR transmitting chalcogenide glass has been applied to cadmium telluride. A three zone furnace system is used to vaporize, condense and compound near stoichiometric quantities of 5-nines grade cadmium and tellurium. A controlled directional freeze results in circular plates up to 25 cm in diameter which are free of voids or gross inclusions and contain large areas of single crystal material. A heat treating process under cadmium and tellurium vapor has been developed which results in a 100 fold improvement in infrared transmission over non heat treated material. Absorption coefficients less than 0.002/cm have been observed from 2.5 micrometers wavelength on samples ranging up to 2 cm in thickness. The attainment of near theoretical transmission, as expected, is dependent upon the sample thickness, anneal temperature, pressure of cadmium or tellurium used in the anneal, and length of time of treatment. Details of the compounding process as well as the annealing process are included in the text. GRA

N86-25797# Carnegie-Mellon Univ., Pittsburgh, Pa. Mobile Robot Lab.
AUTONOMOUS MOBILE ROBOTS Annual Report
Hans P. Moravec 30 Jan. 1986 163 p refs
(Contract N00014-81-K-0503)
(AD-A164404; CMU-RI-MRL-86-1) Avail: NTIS HC A08/MF A01 CSCL 13/6

Since 1981 the Mobile Robot laboratory of the Robotics Institute of Carnegie-Mellon University has conducted basic research in areas crucial for autonomous robots. We have built three mobile robots as testbeds for new concepts in control, vision, planning, locomotion and manipulation. This report recounts our work in 1985. Included are two papers describing two-dimensional sonar mapping and navigation, and a proposal for a three dimensional sonar. Three papers cover recent results in stereo visual navigation - we have achieved a tenfold speedup and a tenfold increase in navigational accuracy over our first generation system, and have a much deeper understanding of some of the mathematical foundations. Three papers describe results in a road navigation task - we are now able to navigate a simple road network at walking speeds with a single color camera on a roving robot using a variety of image processing and navigation methods. Three papers describe aspects of motion control, motors, wheeled kinematics and vehicle dynamics. Two papers present our newest robots, Neptune and Uranus. A final article gives some long-term motivations and expectations for mobile robot research, and the report ends with a bibliography of our publications. Author (GRA)

N86-25798# Department of the Navy, Washington, D. C.
ADJUSTABLE SELF-RELEASING HOOK Patent
William B. Piercy, inventor (to Navy) Issued 27 Aug. 1985 4 p
(AD-D012122; US-Patent-4,537,434; US-Patent-Appl-SN-606011; US-Patent-Class-294-82.31) Avail: US Patent and Trademark Office CSCL 13/3

This patent is for a load lowering hook which is equipped with a spring biased load holding member to eject and disengage the load rigging when the load touches down and the majority of the weight is released. The spring loaded member can be adjusted to disengage the load at a preset weight depending upon the weight of the rigging that will still be pulling on the hook after the load touches down. GRA

N86-25799# Massachusetts Inst. of Tech., Cambridge. Sea Grant College Program.
WIDE BANDWIDTH POSITIONING SYSTEMS FOR SPACE AND UNDERWATER VEHICLES
H. Kazerooni and T. B. Sheridan Jun. 1985 20 p refs
(Grant NA84AA-D-00046)
(PB86-157310; MITSG-85-34) Avail: NTIS HC A02/MF A01 CSCL 13I

Presented is a method for wide bandwidth stiff position control of unmanned underwater and space vehicles. The use of feedback alone may not provide an underwater or a space vehicle sufficient bandwidth with large stiffness. With feedback alone the vehicle may not behave like a stiff platform in the presence of a wide frequency range of disturbances. It is suggested that the vehicle be connected to environmental structures by means of cables or grabbers. These connecting cables will develop dynamic and kinematic constraints on the vehicle motion. This problem led to the development of a method that allows for control of the motion of constrained underwater or space vehicles. This method is called impedance control. The frequency domain essentials of impedance control and a robust controller design method are given. GRA

N86-25800# Massachusetts Inst. of Tech., Cambridge. Marine Industry Advisory Services.
MIT (MASSACHUSETTS INSTITUTE OF TECHNOLOGY) UNDERWATER TECHNOLOGY RESEARCH: TELEMANIPULATOR DEVELOPMENTS (REVISED EDITION)
1 Aug. 1985 20 p refs
(Grant NA84AA-D-00046)
(PB86-157302; MITSG-85-27; OPPORTUNITY BRIEF-40) Avail: NTIS HC A02/MF A01 CSCL 13I

The contents of an MIT report on telemanipulator developments includes the following topics: touch sensing; parallel link manipulator; impedance control of manipulators; underwater teleoperators for space simulation; and development of a supervisory controlled telemanipulator for the ARGO/JASON vehicle system. GRA

N86-25801# Amerind Publishing Co. Pvt. Ltd., New Delhi (India).
DIFFUSION PROCESSES IN SOLID-PHASE WELDING OF MATERIALS
V. M. Falchenko, L. N. Larikov, and V. R. Ryabov 1984 205 p refs Transl. into ENGLISH of the book "Diffuzionnye Protsessy v Tverdoi Faze pri Svarke" Moscow, Mashinostroenie, 1975 Sponsored in part by National Science Foundation, Washington, D.C. Prepared for National Bureau of Standards, Gaithersburg, Md.
(PB86-155025; TT-80-52014) Avail: NTIS HC A10/MF A01 CSCL 13H

Results of experimental and theoretical investigations of the physical processes occurring in the solid phase during welding of metals and alloys are discussed. A detailed examination of the theory as well as experimental data are presented in regard to the following processes: recovery and recrystallization of metals during welding; phase transformations in the zone of the welded joint; self-diffusion and heterodiffusion; the formation and growth of intermetallic layers in welded joints of heterogeneous metals;

and the formation and decay of supersaturated solid solutions in the joint zone. Technological recommendations are offered and conditions for welding suggested. Engineers and technicians working in the fields of welding, metal physics, and physical metallurgy will find the monograph very useful. GRA

N86-25802# General Electric Co., Schenectady, N. Y.
MINOR ELEMENT EFFECTS ON GAS TUNGSTEN ARC WELD PENETRATION Interim Report, 1 Oct. 1983 - 30 Sep. 1984
R. E. Sundell, W. F. Savage, S. M. Correa, D. W. Walsh, and L. P. Harris Mar. 1985 58 p refs Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.
(Grant NSF MEA-82-08950)
(PB86-154473; Rept-85SRD008; NSF/ENG-85046) Avail: NTIS HC A04/MF A01 CSCL 13H

The interim report summarizes the work completed during the second contract year to investigate and develop a means to control the influence of minor element concentrations on gas tungsten arc (GTA) weld penetration. Full factorial experiments are in progress to systematically determine the effect of separate alloying trace elements on AISI 8630 low-alloy steel and on Iconel 718. Results, to date, show a strong correlation between sulfur content and an increase in the depth-to-width ratio in the weld head for the low-alloy steel. Author (GRA)

N86-25803# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF NOx CONTROL ON A SPARK-IGNITED LARGE BORE RECIPROCATING INTERNAL COMBUSTION ENGINE. VOLUME 2: DATA SUPPLEMENT Final Report, Apr. 1980 - Jun. 1981
C. Castaldini Jan. 1986 159 p
(Contract EPA-68-02-3188)
(PB86-156817; ACUREX/TR-81-79/EE-Vol-2;
EPA-600/7-86-002B-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 21G

A compendium of detailed emission and test data from field tests of a large-bore, spark-ignited reciprocating engine and laboratory analyses of collected samples is given. The engine was tested in two operating modes: a baseline (normal) operation, and with increased air/fuel ratio for NOx reduction to levels below the proposed new source performance standard (NSPS) of 700 ppm dry at 15 percent O2. The test data include preliminary equipment calibration, detailed engine operation, and complete exhaust gas emission measurement results. Exhaust gas emission measurements included (in addition to continuous monitoring for criteria gas pollutants) monitoring for volatile hydrocarbons (C1-C6), total organics in two boiling point ranges, organic compound category information, specific quantitation of the semivolatile organic priority pollutants, separation of organic extracts, exhaust gas concentration of trace elements, and biological assays of organic sample extracts. GRA

N86-25804# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF NOx CONTROL ON A SPARK-IGNITED LARGE BORE RECIPROCATING INTERNAL COMBUSTION ENGINE. VOLUME 1: TECHNICAL RESULTS Final Report, Apr. 1980 - Jun. 1981
C. Castaldini Jan. 1986 112 p
(Contract EPA-68-02-3188)
(PB86-156809; ACUREX/TR-81-79/EE-Vol-1;
EPA-600/7-86-002A-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 21G

Emission results for a spark-ignited, largebore, reciprocating, internal-combustion engine operating both under baseline conditions, and with combustion modification controls to reduce NOx emissions to levels below the proposed new source performance standard (NSPS) for such engines are reported. Exhaust gas measurements included total organics in two boiling point ranges, compound category information within these ranges, specific quantitation of semivolatile organic priority pollutants, flue gas concentrations of 73 trace elements, and particulates. Exhaust NOx emissions were reduced almost 50%, from a baseline level of 1,260 ng/j by increasing the operating air/fuel ratio of the engine. Accompanying the reduction was a slight increase in engine efficiency. The CO, methane, total hydrocarbon, and total semivolatile organic compound emissions were increased from 10 to 65% under low-NOx operation. However, total nonvolatile organic emissions decreased 55%. The organic emissions for both tests consisted primarily of aliphatic hydrocarbons with some carboxylic acids, phenols, and low-molecular-weight fused-ring aromatics. The POMs were detected in concentrations below 4 mg/dcsm. GRA

N86-25805# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF NOx CONTROL ON A COMPRESSION IGNITION LARGE BORE RECIPROCATING INTERNAL COMBUSTION ENGINE. VOLUME 2: DATA SUPPLEMENT Final Report, Apr. 1980 - Apr. 1981
C. Castaldini Jan. 1986 174 p
(Contract EPA-68-02-3188)
(PB86-155827; ACUREX/TR-81-81/EE-Vol-2;
EPA-600/7-86-001B-Vol-2) Avail: NTIS HC A08/MF A01 CSCL 21G

Emission and test data from field tests of a large-bore, compression-ignition reciprocating engine burning diesel fuel are reported. The engine was tested during two operating modes; at baseline, and with fuel injection retard for NOx emission reduction to levels below the proposed new source performance standard (NSPS) for such engines. The data include preliminary equipment calibration, detailed engine operation, and complete exhaust gas emission measurement results Exhaust gas emission measurements included monitoring of volatile hydrocarbons (C1-C6), particulates, sulfur oxides, total organics in two boiling point ranges, organic compounds, semivolatile organic priority pollutants, trace elements, and biological assays of organic sample extracts. GRA

N86-25806# Deere and Co., Moline, Ill.
INDUSTRIAL ROTARY ENGINE DEVELOPMENT: APPLICATION OPPORTUNITIES Final Report, Jan. - Nov. 1985
J. D. Guidry Nov. 1985 170 p refs
(Contract GRI-5084-233-1055)
(PB86-153673; GRI-85/0199) Avail: NTIS HC A08/MF A01 CSCL 21G

The study examines the economic feasibility of manufacturing natural gas rotary engines for cogeneration and industrial variable speed applications. Cogeneration and variable speed potential is evaluated by market segment and projected to the year 2000. Market penetrations possible for natural gas rotary are estimated for each market segment. The benefits of manufacturing a natural gas rotary engine for cogeneration and variable speed applications to the energy consumer, to total energy conservation, the gas industry, and the natural gas rotary engine manufacturer are also discussed. The study concludes that total benefits warrant a program to develop a natural gas rotary engine for eventual sale. GRA

N86-25807# Energy and Environmental Analysis, Inc., Arlington, Va.
DIAGNOSTICS FOR EMISSION CONTROL SYSTEM MALFUNCTION ON THREE-WAY CATALYST-EQUIPPED VEHICLES Final Report, Nov. 1983 - Nov. 1985
K. G. Duleep Nov. 1985 339 p
(Contract ARB-A2-047-32)
(PB86-148665; ARB-R-85/265) Avail: NTIS HC A15/MF A01 CSCL 21G

The report presents the results of a two part study. Current manufacturer recommended diagnostic procedures for identifying vehicular emission control malfunctions on three-way catalyst equipped gasoline fueled automobiles were reviewed. Diagnosis of malperformance was limited to the following systems: exhaust gas recirculating, secondary air, fuel, and catalyst. Generalized diagnostic procedures for malfunctioning emission control systems were developed and validated on 52 vehicles. Two mechanics alternatively disabled and repaired the vehicles using the

diagnostic and repair procedures. The report also describes inspection procedures developed for the control of smoke emissions from light-duty diesel vehicles. Two types of procedures were developed, for component testing and for inspection/maintenance programs. These procedures were validated on six light-duty vehicles. GRA

N86-25808# Massachusetts Univ., Amherst. Dept. of Mechanical Engineering.
ECONOMIC APPLICATIONS OF ASSEMBLY ROBOTS. ECONOMIC ANALYSIS AND CLASSIFICATION SYSTEMS FOR ROBOT ASSEMBLY
Y. S. Ho and G. Boothroyd Feb. 1985 149 p refs
(Grant NSF MEA-81-11917)
(PB86-154465; NSF/ENG-85044; Rept-5) Avail: NTIS HC A07/MF A01 CSCL 13I

The report concerns production costs and focuses on the importance of giving proper consideration to manufacturing and assembly during the part and product design process. Types of robots and robot assembly systems are identified. Part design rules and corresponding classification systems for products to be assembled on these systems are described. Worksheets and equations for the draft design for robot assembly techniques are presented; their use is illustrated; and the effect of product redesign is discussed. A case study is included and a comparison of assembly costs and cycle times for various types of assembly systems is given. Author (GRA)

N86-25809# Massachusetts Univ., Amherst. Dept. of Mechanical Engineering.
ECONOMIC APPLICATIONS OF ASSEMBLY ROBOTS. ECONOMICS OF PRINTED CIRCUIT BOARD ASSEMBLY
J. John and G. Boothroyd Apr. 1985 124 p refs
(Grant NSF MEA-81-11917)
(PB86-154457; NSF/ENG-85045; Rept-6) Avail: NTIS HC A06/MF A01 CSCL 13I

A typical assembly process for printed circuit boards is described. Then, an initial cost model is described with application to a sample printed circuit board to show the high proportion of manual insertion cost relative to the total insertion cost. Next, standard times from industry for manual assembly of printed circuit boards are presented and compared to times from the Design for Assembly Handbook. Factors that make the handbook not applicable to printed circuit board assembly are outlined. Lastly, manual and robotic insertion time and cost for non-standard components on a sample printed circuit board are compared to show the economic feasibility of assembly robots for non-standard component insertion. Author (GRA)

N86-25810# Massachusetts Univ., Amherst. Dept. of Mechanical Engineering.
ECONOMIC APPLICATIONS OF ASSEMBLY ROBOTS. THE DEVELOPMENT OF A PROGRAMMABLE BELT FEEDER FOR HANDLING RECTANGULAR FLAT PARTS IN A ROBOT ASSEMBLY SYSTEM
J. M. Koff and P. Dewhurst Apr. 1985 125 p refs
(Grant NSF MEA-81-11917)
(PB86-153749; NSF/ENF-85043; Rept-4) Avail: NTIS HC A06/MF A01 CSCL 13I

Reprogrammable means of feeding and orienting rectangular parts are discussed. Positioning of sensory devices to determine part orientation is discussed. The development of a feeder that is designed to take randomly oriented rectangular parts and feed them to a specific location in a predetermined orientation is discussed. GRA

N86-25572# Joint Publications Research Service, Arlington, Va.
CONTROLLING MOVEMENT OF MANIPULATOR WITH ALLOWANCE FOR ELASTIC OSCILLATIONS OF ARM Abstract Only
N. N. Bolotnik and A. A. Gukasyan *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 46-47 Transl. into ENGLISH from Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 38-46 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25575# Joint Publications Research Service, Arlington, Va.
SELECTION OF TEST ACCELERATION FACTOR FOR BEARING ASSEMBLIES OF ELECTRICAL MACHINES Abstract Only
O. D. Goldberg, A. G. Gorbunov, and S. V. Muravyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 51 Transl. into ENGLISH from Elektroteknika (Moscow, USSR), no. 10, Oct. 1984 p 34-36 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25577# Joint Publications Research Service, Arlington, Va.
NEW METHOD OF SYNTHESIZING NOMINAL TRAJECTORY FOR MANIPULATOR ROBOTS WITH REDUNDANT DEGREES OF MOBILITY Abstract Only
M. Vukobratovic and M. Kircanska *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 53 Transl. into ENGLISH from Mashinovedeniye (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 21-25 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25579# Joint Publications Research Service, Arlington, Va.
ENGINEERING DESIGN AND OPTIMIZATION OF RADIAL AEROSTATIC BEARINGS Abstract Only
V. S. Balasanyan and N. Sh. Zhapparov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 54 Transl. into ENGLISH from Mashinovedeniye (Moscow, USSR), no. 4, Jul. - Aug. 1984 p 84-91 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25580# Joint Publications Research Service, Arlington, Va.
DYNAMIC DESIGN OF SLIDING BEARINGS Abstract Only
I. M. Khomenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 55 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 9-12 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25581# Joint Publications Research Service, Arlington, Va.
MATCHING HEAD AND CAVITATION CHARACTERISTICS OF TWIN AXIAL (WORM-TYPE) PUMP IMPELLERS Abstract Only
I. V. Shcherbatenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 56 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 12-14 (For primary document see N86-25556 16-31)

N86-25582# Joint Publications Research Service, Arlington, Va.
INTEGRAL METHOD OF CALCULATING LOADS ON BEARINGS IN GEAR-TYPE ROTARY PUMPS WITH LIMITED WORKING SPACE Abstract Only
E. I. Rudoy and A. G. Garkusha *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 56 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 15-17 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25583# Joint Publications Research Service, Arlington, Va.
EFFECT OF UNDERCOATING BY HEAT AND AIR BLAST TREATMENT ON TRIBOLOGICAL CHARACTERISTICS OF SOLID LUBRICANT IN STEEL FRICTION PAIRS Abstract Only
Z. S. Rubsova, L. N. Sentyurikhina, G. A. Protasov, and V. I. Lopukhin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 57 Transl. into ENGLISH from Vestnik Mashinostroyeniya (Moscow, USSR), no. 8, Aug. 1984 p 26-27 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25610# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF SOLAR CELLS WITH SCHOTTKY BARRIER AND CURRENTS THROUGH SURFACE STATES Abstract Only
O. S. Zinets, S. S. Kilchitskaya, and V. I. Strikha *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 32-33 Transl. into ENGLISH from Geliotekhnika (Tashkent, USSR), no. 6, Nov. - Dec. 1984 p 8-13 Original language document was announced in IAA as A85-24047 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25612# Joint Publications Research Service, Arlington, Va.
AIR-HYDROGEN ELECTROCHEMICAL GENERATOR Abstract Only
F. Danilovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 49 Transl. into ENGLISH from Nedelya (Moscow, USSR), 25 Apr. - 5 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25615# Joint Publications Research Service, Arlington, Va.
DESIGN OF VIBRATION MACHINES WITH INERTIAL EXCITATION Abstract Only
N. N. Bolotnik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 56 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 59-66 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25616# Joint Publications Research Service, Arlington, Va.
EFFECTIVENESS OF STRUCTURAL COUNTERMEASURES FOR REDUCING BLADE VIBRATIONS EXCITED BY RANDOM FLOW FLUCTUATIONS Abstract Only
D. M. Bavelskiy, G. I. Bogoradovskiy, G. L. Guirskiy, and M. S. Pomanychev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 57 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 51-53 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25617# Joint Publications Research Service, Arlington, Va.
EXTENDING RANGE OF STABLE OPERATION OF AXIAL COMPRESSORS BY MEANS OF SELF-ROTATING INLET GUIDE VANES Abstract Only
V. S. Knyazev and V. L. Zhokhov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 57-58 Transl. into ENGLISH from Energomashinostroyeniye (Moscow, USSR), no. 2, Feb. 1985 p 7-9 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25618# Joint Publications Research Service, Arlington, Va.
PERIODIC MOTION OF SATELLITE RELATIVE TO CENTER OF MASS WITH UNIAXIAL ORIENTATION IN GRAVITATIONAL FIELD Abstract Only
V. V. Sazonov and M. Ye. Sidoryuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 68 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 3-13 Original language document was announced in IAA as A85-28901 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-25811# Pacific Northwest Lab., Richland, Wash.
OPERATIONAL PROCEDURES FOR THE EDDY CURRENT METAL INTEGRITY/CARTRIDGE MEASUREMENT AND EJECT SYSTEM
L. J. Kirihara, G. A. Anderson, and B. J. Burghard Dec. 1985 64 p
(Contract DE-AC06-76RL-01830)
(DE86-004491; PNL-5710) Avail: NTIS HC A04/MF A01

This Cartridge Measurement and Eject System (CMES) is intended to detect internal metal defects, such as slip plane flaws and draw-forming tears, as well as major surface defects, such as splits, dents, and heavy draw scratches, on loaded 5.56 mm cartridge lots previously rejected for split failures on test firings. The Eddy Current Metal Integrity (ECMI) system used on this CMES has the capability to detect metal forming defects that can cause such failures. The system will inspect seven zones in the cartridge case body at a rate of 425 parts per minute. The basic mechanical handler was originally designed as an online surface flaw inspection system connected to a load and assembly submodule. It has been modified into a stand-alone, bulk-fed, ECMI inspection system. For cost-effectiveness, existing designs and available hardware were used in the system where applicable. An existing Moulins roll-style cartridge feeder was adapted for CMES. The spindle assemblies, ECMI electronics, and most of the system control electronics are identical to those developed for the Cartridge Case Measurement and Eject Systems (CCMES) used on the case line submodules. A reduced data set for ECMI/CMES allowed the onboard microprocessor used on the CCMES system communication card to replace the dedicat ed minicomputer. Additional software was developed for this microprocessor to provide for CMES cartridge reject control, data handling, and data formats. This document provides the user with general procedures for operating and maintaining the ECMI/CMES. DOE

N86-25812*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONCEPTS FOR INTERRELATING ULTRASONIC ATTENUATION, MICROSTRUCTURE AND FRACTURE TOUGHNESS IN POLYCRYSTALLINE SOLIDS
Alex Vary May 1986 30 p refs Presented at the Symposium on Solid Mechanics Research of Quantitative NDE, Evanston, Ill., 18-20 Sep. 1985
(NASA-TM-87339; E-3086; NAS 1.15:87339) Avail: NTIS HC A03/MF A01 CSCL 14D

Conceptual models are advanced for explaining and predicting empirical correlations found between ultrasonic measurements and fracture toughness of polycrystalline solids. The models lead to insights concerning microstructural factors governing fracture processes and associated stress wave interactions. Analysis of the empirical correlations suggested by the models indicate that, in addition to grain size and shape, grain boundary reflections, elastic anistropy, and dislocation damping are factors that underly both fracture toughness and ultrasonic attenuation. One outcome is that ultrasonic attenuation can predict the size of crack blunting or process zones that develop in the vicinity active cracks in metals. This forms a basis for ultrasonic ranking according to variations in fracture toughness. Author

N86-25813# General Electric Co., Syracuse, N.Y.
METALLIZATION QUALIFICATION FOR VLSI (TRACE TEST) Final Technical Report, Jan. 1984 - Jun. 1985
Donald J. LaCombe and Earl L. Parks Sep. 1985 76 p
(Contract F30602-84-C-0019)
(AD-A163032; RADC-TR-85-175) Avail: NTIS HC A05/MF A01 CSCL 14/2

The objective of this work was to define a standard test procedure to qualify VLSI metallization systems for government applications. The susceptibility of the metallization to electromigration was the primary concern of this qualification. Life tests were conducted in which a large number of test lines were stressed to failure. Resistance change was monitored and the correlation between rate of change and lifetime evaluated. It was determined

that the correlation was small and therefore resistometric test methods are not suitable for predicting life. Finite element modeling of the resistance change process was used to explain some of the anomalous resistance variations which were observed. The time to failure was found to be log-normally distributed down to the 0.2% failure point. It was also found that a very long test line is statistically equivalent to many shorter lines when evaluating early failures. Therefore, a lift test in which a modest number of very long lines are tested to failure is an efficient test for evaluating early failures. GRA

N86-25814# State Univ. of New York, Stony Brook. Dept. of Mathematics and Statistics.
RELIABILITY IMPORTANCE FOR CONTINUUM STRUCTURE FUNCTIONS
Chul Kim and Laurence A. Baxter 1985 24 p refs
(Grant AF-AFOSR-0243-84)
(AD-A164006; AFOSR-86-0035TR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

A continuum structure function is a nondecreasing mapping from the unit hypercube to the unit interval. A definition of the reliability importance, R (alpha) sub i say, of component i at level alpha (0 < alpha < or = 1) is proposed. Some properties of this function are deducted, in particular conditions under which the limit as alpha approaches 0 of R (alpha) sub i = the limit as alpha approaches 1 of R (alpha) sub i = 0 and conditions under which R (alpha) sub i is positive (0 < alpha < 1). GRA

N86-25815# George Washington Univ., Washington, D.C. Inst. for Reliability and Risk Analysis.
RESEARCH IN SOME METHODOLOGICAL AND MODELLING ASPECTS OF RELIABILITY THEORY Final Report, 1 May 1983 - 31 Aug. 1984
Nozer D. Singpurealla 17 Dec. 1985 9 p refs
(AD-A164007; GWU/IRRA/TR-85/18; ARO-19960.1-MA) Avail: NTIS HC A02/MF A01 CSCL 14/4

In this report a summary of the various topics of interest in reliability and life testing research are presented. References to published literature are cited. The topics covered are described by these words: Quantile estimation; Bayesian life table; Failure rate estimation; Kalman filtering; Reliability growth; Software reliability; Nonhomogeneous poisson process; Time series analysis; Random coefficient autoregressive model; Adaptive Kalman filter. GRA

N86-25816# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
ULTRASONIC NONDESTRUCTIVE EVALUATION OF DAMAGE IN CONTINUOUS FIBER COMPOSITES Annual Technical Report, 1 Feb. 1984 - 31 Jan. 198
Vikram K. Kinra Apr. 1985 97 p refs
(Grant AF-AFOSR-0066-84)
(AD-A164056; MM-5024-85-7; AFOSR-85-1227TR) Avail: NTIS
HC A05/MF A01 CSCL 11/4

It is well known that composite materials suffer complex damage when they are subjected to either monotonic or fatigue loading. This damge affects both the velocity and attenuation of ultrasonic waves. The primary objective of this research is to correlate the damage states with the changes in the velocity and attenuation. Once this has been accomplished the pair of ultrasonic parameters becomes a measure of the damage. A very accurate computer-controlled experimental technique to measure wave-speed in a composite material has been developed. For conventional isotropic materials accuracies of two parts per 10,000 were achieved; for highly damaged graphite/epoxy composite materials accuracies of 0.2% have been achieved. GRA

N86-25817# Ohio State Univ., Columbus. Research Foundation.
EFFECTS OF ASSUMING INDEPENDENT COMPONENT FAILURE TIMES, IF THEY ARE ACTUALLY DEPENDENT, IN A SERIES SYSTEM AFOSR-85-1215TR HC A07/MF A01 Annual Report, 1 Oct. 1984 - 31 Oct. 1985
Melvin L. Moeschberger and John P. Klein Dec. 1985 133 p refs
(Grant AF-AFOSR-0307-82)
(AD-A164417; AFOSR-85-1215TR) Avail: NTIS
HC A07/MF A01 CSCL 12/1

The overall objective is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption on the error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions. GRA

N86-25818# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FLAW DETECTION OF PRESSURE VESSELS BY LASER-HOLOGRAPHIC NON-DESTRUCTIVE DETECTION (NDT) TECHNIQUE
Zhong-Zheng Zheng 10 Jan. 1986 18 p refs
(AD-A164451; FTD-ID(RS)T-1038-85) Avail: NTIS
HC A02/MF A01 CSCL 14/2

Four simulative flawed pressure vessels are subjected to hydraulic pressure for the detection by a laser holographic method. The characteristic of the fringe patterns due to the deformation of the flaws provides some valuable information which can be applied to evaluate the behavior and size of practical flaws in pressure vessels. GRA

N86-25819# Department of the Air Force, Washington, D.C.
APPARATUS FOR CONTINUOUSLY INSPECTING THE PHYSICAL CHARACTERISTICS OF PARTICULATE MATTER Patent
Robert O. Berthel, Vernon G. Plank, and Dennis L. LaGross, inventors (to Air Force) Issued 24 Dec. 1985 9 p
(AD-D012132; US-Patent-4,561,018; US-Patent-Appl-SN-442493; US-Patent-Class-358-107) Avail: US Patent and Trademark Office CSCL 08/12

This patent discloses an apparatus for continuously inspecting the physical characteristics of particulate matter having a collection and conveying system, a sampling compartment, and a camera system. The collection and conveying system transports particulate matter, in the form of snowflakes, for example, to a viewing area in the sampling compartment. The camera system monitors the viewing areas in order to provide single or multiple images of the snowflakes on single video frames at suitable magnification in order to analyze the crystalline characteristics of the snowflakes under naturally occurring conditions. GRA

N86-25371# Royal Aircraft Establishment, Farnborough (England). Propulsion Dept.
CRACK GROWTH IN NEAR-ALPHA TITANIUM ALLOYS
C. R. Gostelow *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 5 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25380# National Aerospace Lab., Amsterdam (Netherlands).
TURBISTAN: A STANDARD LOAD SEQUENCE FOR AIRCRAFT ENGINE DISCS
A. J. A. Mom, W. J. Evans (Royal Aircraft Establishment, Farnborough, England), and A. A. tenHave *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985

12 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25381# Rolls-Royce Ltd., Derby (England).
AN ANALYSIS OF RIG TEST DISC FAILURES
G. Asquith *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 10 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25383# National Research Council of Canada, Ottawa (Ontario).
PRACTICAL EXPERIENCE WITH DAMAGE TOLERANCE BASED LIFE EXTENTION OF TURBINE ENGINE COMPONENTS
A. K. Koul, R. Thamburaj (Carleton Univ., Ottawa, Ontario), M. D. Raizenne, W. Wallace, and M. C. DeMalherbe *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 9 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-25820 ESDU International Ltd., London (England).
COMPUTER PROGRAM FOR THE FLEXIBILITY OF SINGLE AND DOUBLE LAP THIN PLATE JOINTS LOADED IN TENSION
Dec. 1985 21 p refs
(ESDU-85035; ISBN-0-85679-541-0; ISSN-0141-4097) Avail: ESDU

A FORTRAN program is given to compute the bolt loads, joint extension, and joint flexibility of a multibolt, single row, single lap joint under in-plane tension. The analysis may be applied to double lap joints and multiple row joints provided the rows are identical. The program uses the flexibility of the individual bolts provided by a previous report. The details of the idealization taken are given, and a worked example illustrates the input and output formats used. The joint stiffness value will be particularly useful to represent such a joint when using a finite element analysis to determine the gross load distribution through a structure. Author

N86-25821 ESDU International Ltd., London (England).
NATURAL FREQUENCIES OF SIMPLY-SUPPORTED SANDWICH PANELS WITH LAMINATED FACE PLATES
Dec. 1985 59 p refs
(ESDU-85037; ISBN-0-85679-543-7; ISSN-0141-3961) Avail: ESDU

A computer program is given for estimating the lower natural frequencies of initially unstressed rectangular sandwich panels, and is presented for convenient use when the face plates are fiber reinforced laminates. It applies to flat, or slightly curved, panels with thin orthotropic face plates having their principal axes or orthotropy aligned with the sides. The face plates may be of different materials and thicknesses and the core is assumed to have zero flexural stiffness. Simply supported edges are assumed, but guidance is provided on the use of effective panel dimensions to allow consideration of other edge conditions. Predictions of natural frequency are compared with test results from the literature for panels with fiber reinforced plates and agree to within 10 percent. Details of input and output format are provided through a practical work example and the complete listing in FORTRAN and BASIC is included. Author

N86-25822*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CYCLIC CREEP ANALYSIS FROM ELASTIC FINITE-ELEMENT SOLUTIONS
A. Kaufman and S. Y. Hwang (South Carolina State Coll., Orangeburg) 1986 21 p refs Presented at the Southeastern Conference on Theoretical and Applied Mechanics, Columbia, S.C., 17-18 Apr. 1986
(NASA-TM-87213; E-2872; NAS 1.15:87213) Avail: NTIS HC A02/MF A01 CSCL 20K

A uniaxial approach was developed for calculating cyclic creep and stress relaxation at the critical location of a structure subjected to cyclic thermomechanical loading. This approach was incorporated into a simplified analytical procedure for predicting the stress-strain history at a crack initiation site for life prediction purposes. An elastic finite-element solution for the problem was used as input for the simplified procedure. The creep analysis includes a self-adaptive time incrementing scheme. Cumulative creep is the sum of the initial creep, the recovery from the stress relaxation and the incremental creep. The simplified analysis was exercised for four cases involving a benchmark notched plate problem. Comparisons were made with elastic-plastic-creep solutions for these cases using the MARC nonlinear finite-element computer code. Author

N86-25823*# Computer Software Management and Information Center, Athens, Ga.
FOURTEENTH NASTRAN USERS' COLLOQUIUM
May 1986 337 p refs Colloquium held in San Diego, Calif. 5-9 May 1986
(Contract NASw-3247)
(NASA-CP-2419; NAS 1.55:2419) Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

The proceedings of a colloquium are presented along with technical papers contributed during the conference. Reviewed are general applications of finite element methodology and the specific application of the NASA Structural Analysis System, NASTRAN, to a variety of static and dynamic sturctural problems. For individual titles, see N86-25824 through N86-25842.

N86-25824*# Nippon Univac Kaisha Ltd. (Japan).
ENHANCEMENTS TO SPERRY/NASTRAN
Tadashi Koga *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 1-27 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Reviewed is the enhancement to NASTRAN program performed by NUK (Nippon Univac Kaisha, Ltd.) added to Level 15.5. Features discussed include intermediate checkpoint-restart in triangular decomposition, I/O improvement, multibanked memory and new plate element. The first three improvements provide the capability to solve significantly large size problems, while the new elements release the analyst from the cumbersome work to constrain the singularities caused by the lack of stiffness of inplane rotation of old plate elements. Author

N86-25825*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPROVED ISOPARAMETRIC SOLID AND MEMBRANE ELEMENTS
William R. Case and Richard E. Vandegrift *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 28-55 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Improvements that were made to the COSMIC NASTRAN elements CIHEX1 and QDMEM1 are described. These elements are isoparametric representations of solid and membrane elastic behavior. Recent papers by the authors have shown the official COSMIC versions of these elements to be inferior to those available in the MacNeal-Schwendler Corporation (MSC) version of NASTRAN in that they are overly stiff for some loadings. Modifications were made to these elements which reduce the order of integration for shear terms and, for the eight-mode solid element, add additional strain functions. The resulting element formulations give behavior similar to that of the MSC elements. The changes made

in the element formulations are discussed and results of test problems are compared with results from the official COSMIC elements and with the MSC elements. Author

N86-25826*# Aerostructures, Inc., Arlington, Va.
DYNAMIC AND AEROELASTIC ANALYSES OF TURBOSYSTEMS IN NASTRAN
V. Elchuri and P. R. Pamidi (RPK Corp., Columbia, Md.) *In* Computer Software Management and Information Center Fourteenteh NASTRAN Users' Colloquium May 1986 p 56-60 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Several new capabilities dealing with the dynamic and aeroelastic analyses of turbosystems have been added as standard features to the April 1986 release of NASTRAN. A brief description is given of these capabilities and their implementation in NASTRAN are outlined. Author

N86-25827*# Rockwell International Corp., Pittsburgh, Pa. Space Transportation Systems Div.
NASTRAN DATA DECK GENERATION ON THE PC
Robert J. Guyan *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 61-72 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Using two commercial programs an application was developed to aid in generating a run-ready NASTRAN data deck on the PC. Macros are used to access relevant reference material and card files while editing the deck. The application can be easily customized to suit individual or group needs. Author

N86-25828*# Computer Software Management and Information Center, Athens, Ga.
PRE- AND POST-PROCESSING FOR COSMIC/NASTRAN ON PERSONAL COMPUTERS AND MAINFRAMES
H. A. Kamel, Anton V. Mobley, Ben Nagaraj, and K. W. Watkins *In its* Fourteenth NASTRAN Users' Colloquium May 1986 p 73-102 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

An interface between Cosmic/NASTRAN and GIFTS has recently been released, combining the powerful pre- and post-processing capabilities of GIFTS with Cosmic/NASTRAN's analysis capabilities The interface operates on a wide range of computers, even linking Cosmic/NASTRAN and GIFTS when the two are on different computers. GIFTS offers a wide range of elements for use in model construction, each translated by the interface into the nearest Cosmic/NASTRAN equivalent; and the options of automatic or interactive modelling and loading in GIFTS make pre-processing easy and effective. The interface itself includes the programs GFTCOS, which creates the Cosmic/NASTRAN input deck (and, if desired, control deck) from the GIFTS Unified Data Base, COSGFT, which translates the displacements from the Cosmic/NASTRAN analysis back into GIFTS; and HOSTR, which handles stress computations for a few higher-order elements available in the interface, but not supported by the GIFTS processor STRESS. Finally, the versatile display options in GIFTS post-processing allow the user to examine the analysis results through an especially wide range of capabilities, including such possibilities as creating composite loading cases, plotting in color and animating the analysis. Author

N86-25829*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASTRAN INTERFACING MODULES WITHIN THE INTEGRATED ANALYSIS CAPABILITY (IAC) PROGRAM
Harold P. Frisch *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 103-129 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

The IAC program provides the framework required for the development of an extensive multidisciplinary analysis capability. Several NASTRAN related capabilities were developed which can all be expanded in a routine manner to meet in-house unique needs. Plans are to complete the work discussed herein and to provide it to the engineering community through COSMIC. Release is to be after the current IAC Level 2 contract work on the IAC executive system is completed and meshed with the interfacing modules and analysis capabilities under development at the GSFC. Author

N86-25830*# Intergraph Corp., Huntsville, Ala.
A SYSTEM APPROACH TO DESIGN-ANALYSIS
Gil White *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 130-144 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Today, the increased use of Finite Element Analysis coupled with computer graphics interfaces presents the analyst with many alternatives. The drive toward automation has resulted in the creation of many modeling and post-processing systems that are in use today throughout the world. Many of these systems exist as islands of technology. The need for fully integrated systems is being met by many companies today. Author

N86-25831*# Naval Ship Research and Development Center, Bethesda, Md.
EXPERIENCES WITH NASTRAN IN A MULTIDISCIPLINARY OPTIMIZATION ENVIRONMENT
Myles M. Hurwitz *In its* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 145-153 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

NASTRAN and COPES/CONMIN were used in the early-stage design optimization of a propeller and shaft. The work was undertaken, in part, to assess the performance of these programs for such a task. While the optimization was successful, some drawbacks to the approach surfaced and are discussed. Author

N86-25832*# Naval Ocean Systems Center, San Diego, Calif.
STRESS CONCENTRATION INVESTIGATIONS USING NASTRAN
M. C. Gillcrist and L. A. Parnell *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 154-165 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Parametic investigations are performed using several two dimensional finite element formulations to determine their suitability for use in predicting extremum stresses in marine propellers. Comparisons are made of two NASTRAN elements (CTRIM6 and CTRAIA2) wherein elasticity properties have been modified to yield plane strain results. The accuracy of the elements is investigated by comparing finite element stress predictions with experimentally determined stresses in two classical cases: (1) tension in a flat plate with a circular hole; and (2) a filleted flat bar subjected to in-plane bending. The CTRIA2 element is found to provide good results. The displacement field from a three dimensional finite element model of a representative marine propeller is used as the boundary condition for the two dimensional plane strain investigations of stresses in the propeller blade and fillet. Stress predictions from the three dimensional analysis are compared with those from the two dimensional models. The validity of the plane strain modifications to the NASTRAN element is checked by comparing the modified CTRIA2 element stress predictions with those of the ABAQUS plane strain element, CPE4. Author

N86-25833*# Rockwell International Corp., Pittsburgh, Pa. Space Transportation Systems Div.

DIFFERENTIAL STIFFNESS EFFECTS
Ben H. Ujihara and Edward T. Tong *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 166-172 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Differential stiffness as developed in NASTRAN is a linear change in stiffness caused by applied loads. Examples of differential stiffness are the stiffening effects of gravity forces in a pendulum, centrifugal forces in rotor blades and pressure loading of shell structures. In cases wherein this stiffness caused by a load is destabilizing, the differential stiffness concept lends itself to nonlinear structural analysis. Rigid Formats 4 (static analysis with differential stiffness) and 13 (normal modes with differential stiffness) are specifically designed to account for such stiffness changes. How pressure loading may be treated in these rigid formats is clarified. This clarification results from modal correlation of Ground Vibration Test (GVT) results from the empty and pressurized Filament Wound Case (FWC) quarter-scale Space Shuttle solid rocket booster (QSSRB). A sketch of the QSSRB cantilevered to the floor by its external tank attachments is shown. Author

N86-25834*# Butler Analyses, Towson, Md.
TEST VERSUS ANALYSIS: A DISCUSSION OF METHODS
Thomas G. Butler *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 173-186 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Some techniques for comparing structural vibration data determined from test and analysis are discussed. Orthogonality is a general category of one group, correlation is a second, synthesis is a third and matrix improvement is a fourth. Advantages and short-comings of the methods are explored with suggestions as to how they can complement one another. The purpose for comparing vibration data from test and analysis for a given structure is to find out whether each is representing the dynamic properties of the structure in the same way. Specifically, whether: mode shapes are alike; the frequencies of the modes are alike; modes appear in the same frequency sequence; and if they are not alike, how to judge which to believe. Author

N86-25835*# Martin Marietta Corp., Orlando, Fla.
A COMPARISON OF NASTRAN (COSMIC) AND EXPERIMENTAL RESULTS FOR THE VIBRATION OF THICK OPEN CYLINDRICAL CANTILEVERED SHELLS
Wayne L. Mindle and Peter J. Torvik (Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.) *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 187-204 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

The natural frequencies and associated mode shapes for three thick open cantilevered cylindrical shells were determined both numerically and experimentally. The shells ranged in size from moderately to very thick with length to thickness ratios of 16, 8 and 5.6, the independent dimension being the shell thickness. The shell geometry is characterized by a circumferential angle of the 142 degrees and a ratio of length to inner radii arc length near 1.0. The finite element analysis was performed using NASTRAN's (COSMIC) triangular plate bending element CTRIA2, which includes membrane effects. The experimental results were obtained through holographic interferometry which enables one to determine the resonant frequencies as well as mode shapes from photographs of time-averaged holograms. Author

N86-25836*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
NASTRAN STRUCTURAL MODEL FOR THE LARGE GROUND ANTENNA PEDESTAL WITH APPLICATIONS TO HYDROSTATIC BEARING OF FILM
Chian T. Chian *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 205-235 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Investigations were conducted on the 64-meter antenna hydrostatic bearing oil film thickness under a variety of loads and elastic moduli. These parametric studies used a NASTRAN pedestal structural model to determine the deflections under the hydrostatic bearing pad. The deflections formed the input for a computer program to determine the hydrostratic bearing oil film thickness. For the future 64-meter to 70-meter antenna extension and for the 2.2-meter (86-in.) haunch concrete replacement cases, the program predicted safe oil film thickness (greater than 0.13 mm (0.005 in.) at the corners of the pad). The effects of varying moduli of elasticity for different sections of the pedestal and the film height under stressed runner conditions were also studied. Author

N86-25837*# Rockwell International Corp., Los Angeles, Calif.
SOLVING LARGE-SCALE DYNAMIC SYSTEMS USING BAND LANCZOS METHOD IN ROCKWELL NASTRAN ON CRAY X-MP
Viney K. Gupta, Scott D. Zillmer, and Robert E. Allison *In* Computer Software Management and Information Cener Fourteenth NASTRAN Users' Colloquium May 1986 p 236-246 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

The improved cost effectiveness using better models, more accurate and faster algorithms and large scale computing offers more representative dynamic analyses. The band Lanczos eigensolution method was implemented in Rockwell's version of 1984 COSMIC-released NASTRAN finite element structural analysis computer program to effectively solve for structural vibration modes including those of large complex systems exceeding 10,000 degrees of freedom. The Lanczos vectors were re-orthogonalized locally using the Lanczos Method and globally using the modified Gram-Schmidt method for sweeping rigid-body modes and previously generated modes and Lanczos vectors. The truncated band matrix was solved for vibration frequencies and mode shapes using Givens rotations. Numerical examples are included to demonstrate the cost effectiveness and accuracy of the method as implemented in ROCKWELL NASTRAN. The CRAY version is based on RPK's COSMIC/NASTRAN. The band Lanczos method was more reliable and accurate and converged faster than the single vector Lanczos Method. The band Lanczos method was comparable to the subspace iteration method which was a block version of the inverse power method. However, the subspace matrix tended to be fully populated in the case of subspace iteration and not as sparse as a band matrix. Author

N86-25838*# Naval Ocean Systems Center, San Diego, Calif.
FLUTTER ANALYSIS OF LOW ASPECT RATIO WINGS
L. A. Parnell *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 247-263 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

Several very low aspect ratio flat plate wing configurations are analyzed for their aerodynamic instability (flutter) characteristics. All of the wings investigated are delta planforms with clipped tips, made of aluminum alloy plate and cantilevered from the supporting vehicle body. Results of both subsonic and supersonic NASTRAN aeroelastic analyses as well as those from another version of the program implementing the supersonic linearized aerodynamic theory are presented. Results are selectively compared with the experimental data; however, supersonic predictions of the Mach Box method in NASTRAN are found to be erratic and erroneous, requiring the use of a separate program. Author

N86-25839*# Texas Instruments, Inc., Dallas.
FINITE ELEMENT MODELLING OF NON-LINEAR MAGNETIC CIRCUITS USING COSMIC NASTRAN
T. J. Sheerer *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 265-281 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

The general purpose Finite Element Program COSMIC NASTRAN currently has the ability to model magnetic circuits with constant permeablilities. An approach was developed which, through small modifications to the program, allows modelling of non-linear magnetic devices including soft magnetic materials, permanent magnets and coils. Use of the NASTRAN code resulted in output which can be used for subsequent mechanical analysis using a variation of the same computer model. Test problems were found to produce theoretically verifiable results. Author

N86-25840*# Naval Ship Research and Development Center, Bethesda, Md. Numerical Structural Mechanics Branch.
CALCULATING FAR-FIELD RADIATED SOUND PRESSURE LEVELS FROM NASTRAN OUTPUT
Robert R. Lipman *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 282-292 refs Original contains color illustrations (For primary document see N86-25823 16-71)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

FAFRAP is a computer program which calculates far field radiated sound pressure levels from quantities computed by a NASTRAN direct frequency response analysis of an arbitrarily shaped structure. Fluid loading on the structure can be computed directly by NASTRAN or an added-mass approximation to fluid loading on the structure can be used. Output from FAFRAP includes tables of radiated sound pressure levels and several types of graphic output. FAFRAP results for monopole and dipole sources compare closely with an explicit calculation of the radiated sound pressure level for those sources. Author

N86-25841*# Naval Ship Research and Development Center, Bethesda, Md. Numerical Mechanics Div.
A GENERAL LOW FREQUENCY ACOUSTIC RADIATION CAPABILITY FOR NASTRAN c71
G. C. Everstine, F. M. Henderson, E. A. Schroeder, and R. R. Lipman *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium 1986 p 293-310 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

A new capability called NASHUA is described for calculating the radiated acoustic sound pressure field exterior to a harmonically-excited arbitrary submerged 3-D elastic structure. The surface fluid pressures and velocities are first calculated by coupling a NASTRAN finite element model of the structure with a discretized form of the Helmholtz surface integral equation for the exterior fluid. After the fluid impedance is calculated, most of the required matrix operations are performed using the general matrix manipulation package (DMAP) available in NASTRAN. Far field radiated pressures are then calculated from the surface solution using the Helmholtz exterior integral equation. Other output quantities include the maximum sound pressure levels in each of the three coordinate planes, the rms and average surface pressures and normal velocities, the total radiated power and the radiation efficiency. The overall approach is illustrated and validated using known analytic solutions for submerged spherical shells subjected to both uniform and nonuniform applied loads. Author

N86-25842*# Naval Underwater Systems Center, New London, Conn.
A FINITE ELEMENT SURFACE IMPEDANCE REPRESENTATION FOR STEADY-STATE PROBLEMS
A. J. Kalinowski *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 311-330 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

A procedure for determining the scattered pressure field resulting from a monochromatic harmonic wave that is incident upon a layer energy absorbing structure is treated. The situation where the structure is modeled with finite elements and the surrounding acoustic medium (water or air) is represented with either acoustic finite elements, or some type of boundary integral formulation, is considered. Finite element modeling problems arise when the construction of the structure, at the fluid structure interface, are nonhomogeneous and in particular, when the inhomogeneities are small relative to the acoustic wave length. An approximate procedure is presented for replacing the detailed microscopic representation of the layered surface configuration with an equivalent simple surface impedance finite element, which is especially designed to work only at limited frequencies. An example problem is presented using NASTRAN. However, the procedure is general enough to adapt to practically any finite element code having a steady state option. Author

N86-25843 Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 11 Monthly Report
Judith Nagle-Eshleman, ed. Nov. 1985 91 p refs Sponsored by NRL
(AD-A163153) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Topics relative to shock and vibration are discussed. The dynamic behavior of composite and sandwich plates and damping in structural joints are discussed. For individual titles, see N86-25844 through N86-25845

N86-25844 Oklahoma Univ., Norman. School of Aerospace, Mechanical and Nuclear Engineering.
RESEARCH ON DYNAMIC BEHAVIOR OF COMPOSITE AND SANDWICH PLATES, 4
C. W. Bert *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 17, No. 11 Nov. 1985 p 3-15 refs (For primary document see N86-25843 16-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A survey of the literature concerning the dynamic behavior of plate-type structural elements of either composite material or sandwich construction is given. Papers from mid-1982 through early 1985 and several references published late in 1981 are reviewed. Enphasis is given to transverse impact and subsequent damage, environmental aspects, linear and nonlinear analysis and design (including aeroelastic tailoring). Configurations include rectangularly and cylindrically orthotropic and laminated thin plates; thick plates and sandwich plates. Author

N86-25845 Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
DAMPING IN STRUCTURAL JOINTS
C. F. Beards *In* Shock and Vibration Information Center The Shock and Vibration Digest, Vol. 17, No. 11 Nov. 1985 p 17-20 refs (For primary document see N86-25843 16-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Joint damping is the major source of inherent structural damping. Because of increasing demands for higher damping, joints must be carefully controlled to yield the maximum damping compatible with the duty of the structure. To this end, refined analyses of damping and force transfer mechanisms in joints are being developed and the range of application of joint damping is being increased. Author

N86-25846# Sandia National Labs., Albuquerque, N. Mex.
NATURAL FREQUENCIES AND MODE SHAPES OF A FREE RECTANGULAR PLATE AS A FUNCTION OF THE ASPECT RATIO

D. L. Gregory and D. O. Smallwood 1986 7 p Presented at the 4th International Modal Analysis Conference, Los Angeles, Calif., Feb. 1986
(Contract DE-AC04-76DP-00789)
(DE85-018544; SAND-85-2095C; CONF-860224-3) Avail: NTIS HC A02/MF A01

Numerous modal systems are now available, and new users are continually being introduced to these systems. A simple test structure would be useful to compare these systems on a common basis. The structure would also provide a means to help train new users. Efforts to develop such a structure led to the analysis of free rectangular plates. The natural frequencies as a function of the aspect ratio (ratio of width to length) were analyzed to find an aspect ratio which would yield a desirable distribution of modal frequencies. A desirable distribution includes both widely separated and closely coupled modes. Results for sensitivity studies of mode shapes and frequencies to plate parameters are also given. DOE

N86-25847# Rochester Univ., N. Y. Dept. of Mechanical Engineering.
FRACTURE TOUGHNESS OF MATERIALS Progress Report, Oct. 1984 - Oct. 1985
S. J. Burns 1985 18 p
(Contract DE-FG02-84ER-45051)
(DE86-004545; DOE/ER-45051/T2) Avail: NTIS HC A02/MF A01

The fracture toughness of partially stabilized zirconia has been measured, for specimens that are extremely metastable, to be approx. 30MPa (RADICAL)(PI). This is the largest fracture toughness of any known ceramic. The toughness is measured using a non-linear deformation analysis. Crack tip shielding in steels has been applied to warm pre-stressed specimens. The liquid N2 toughness is elevated by about a factor of two. Thermodynamic cycles applied to partially stabilized zirconia have measured linear expansion coefficients at selected unaxial stress states. The hysteretic volume-temperature-stress surface has been determined, including two phase transformations. DOE

N86-25848# Sandia National Labs., Albuquerque, N. Mex.
COMBINED EXPERIMENTAL/ANALYTICAL MODELING OF SHELL/PAYLOAD STRUCTURES
D. R. Martinez, A. K. Miller, and T. G. Carne Dec. 1985 47 p
(Contract DE-AC04-76DP-00789)
(DE86-004968; SAND-84-2598) Avail: NTIS HC A03/MF A01

The accuracy of computed modal frequencies obtained from a combined experimental/analytical model of a shell/payload structure is discussed. A component mode synthesis technique was used which incorporated free modes and residual effects. The total structure is physically divided into the two subsystems which are connected through stiff joints. The payload was tested to obtain its free-free modes, while a finite element model of the shell was analyzed to obtain its modal description. Both the translational and rotational components of the experimental mode shapes at the payload interface were used in the coupling. Sensitivity studies were also performed to determine the effect of neglecting the residual terms of the payload. Results from a previous study of a combined experimental/analytical model for a beam structure are also given. The beam structure was used to examine the basic procedures and difficulties in experimentally measuring, and analytically accounting for the rotational and residual quantities. DOE

N86-25849# Stanford Univ., Calif. Dept. of Mechanical Engineering.
MULTIAXIAL FATIGUE DAMAGE IN METALS Final Report
A. Rostami and D. Nelson Dec. 1985 217 p
(Contract DE-AS03-81ER-10999)
(DE86-004887; DOE/ER-10999/T1) Avail: NTIS HC A10/MF A01

This review summarizes empirical trends and discusses available life prediction approaches. An evaluation of three of the more promising approaches for predicting multiaxial fatigue life is then presented. Evaluation of the approaches is based on the literature as well as tests of A533B pressure vessel steel. In these deflection-controlled tests, specimens were subjected to combined bending and torsion, applied both in-phase and 90(0) out-of-phase, at two different fixed ratios of applied torsional shear strain range to bending strain range, and at several strain ranges to produce lives between 10(3) and 10(6) cycles. The plastic work approach was superior to the others. Differences in crack formation and growth behavior with differences in the above test parameters are presented, and their significance discussed in terms of development of improved methods for predicting multiaxial fatigue life. A new theory for predicting crack propagation rates for complex multiaxial loading is subsequently developed. A procedure for estimating the J-integral for mixed mode cracking is developed. DOE

N86-25850*# Michigan State Univ., East Lansing. Dept. of Metallurgy, Mechanics and Materials Science.
EXPERIMENTAL EVALUATION CRITERIA FOR CONSTITUTIVE MODELS OF TIME DEPENDENT CYCLIC PLASTICITY Final Report, 1 Jun. 1980 - 30 Sep. 1983
John F. Martin 1986 13 p
(Grant NAG3-51)
(NASA-CR-176821; NAS 1.26:176821) Avail: NTIS HC A02/MF A01 CSCL 20K

Notched members were tested at temperatures far above those recorded till now. Simulation of the notch root stress response was accomplished to establish notch stress-strain behavior. Cyclic stress-strain profiles across the net-section were recorded and on-line direct notch strain control was accomplished. Data are compared to three analysis techniques with good results. The objective of the study is to generate experimental data that can be used to evaluate the accuracy of constitutive models of time dependent cyclic plasticity. Author

N86-25851*# Case Western Reserve Univ., Cleveland, Ohio.
FATIGUE CRACK LAYER PROPAGATION IN SILICON-IRON Final Report
Y. Birol, G. Welsch, and A. Chudnovsky May 1986 47 p refs
(Grant NAG3-223)
(NASA-CR-175115; NAS 1.26:175115) Avail: NTIS HC A03/MF A01 CSCL 20K

Fatigue crack propagation in metal is almost always accompanied by plastic deformation unless conditions strongly favor brittle fracture. The analysis of the plastic zone is crucial to the understanding of crack propagation behavior as it governs the crack growth kinetics. This research was undertaken to study the fatigue crack propagation in a silicon iron alloy. Kinetic and plasticity aspects of fatigue crack propagation in the alloy were obtained, including the characterization of damage evolution. Author

N86-25852# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.
VOID/PORE DISTRIBUTIONS AND DUCTILE FRACTURE
E. M. Dubensky and D. A. Koss Nov. 1985 31 p refs
(Contract N00014-85-K-0427)
(AD-A163508; TR-2) Avail: NTIS HC A03/MF A01 CSCL 20/11

The effects of void or pore distributions on ductile fracture has been modeled experimentally. Pores or voids are physically modeled in two dimensions by both random and regular arrays of equi-sized holes drilled through the thickness of tensile specimens of 1100-0 Al sheet and 7075-T6 Al plate and sheet. Fracture strains as well as failure paths have been determined for different hole sizes, spacings, and area fractions. A statistical analysis of the data indicates that increasing the minimum hole spacing, which decreases the degree of hole clustering, increases both strength and ductility. Conversely, decreasing the hole size causes a minor increase in both strength and ductility. Increasing the rate of work hardening is beneficial to ductility in that a high strain hardening rate appears to increase the resistance to flow localization between holes. The results are discussed in terms of a fracture process which depends on shear localization between holes/voids and which is very sensitive to void/pore distributions. GRA

N86-25853# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE EFFECTS OF THROUGH THE THICKNESS DELAMINATIONS ON CURVED COMPOSITE PANELS M.S. Thesis
Blaise A. Horban Dec. 1985 105 p refs
(AD-A164110; AFIT/GAE/AA/85D-8) Avail: NTIS
HC A06/MF A01 CSCL 13/13

The buckling loads of 8-ply A54/3501-6 graphite/epoxy delaminated cylindrical panels were determined experimentally. The delaminations fabricated into the laminate, with mylar and teflon inserts, were indicative of low velocity projectile impact damage. The mylar and teflon inserts caused partial and total delaminations, respectively. Two types of delaminations were used; namely, eccentric, off mid-surface, and mid-surface. The eccentric delaminations were placed progressively through the thickness of the laminate. STAGSC-1 finite element computer code results for undelaminated composite panels were compared to the experimental results to obtain a percent strength degradation. The experimental testing was accomplished by the Air Force Flight Dynamics Laboratory. The test device provided boundary conditions of clamped top and bottom edges and simply supported vertical sides. Two destructive techniques, stereo X-ray and deply, were used to determine the total delaminated areas and locations. Based in part on these results, one equivalent delamination was obtained corresponding to the total area of the multiple partial delaminations. The panels with multiple delaminations were found to be approximately 5% weaker than a single delaminated area of the same total size. GRA

N86-25854# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT OF AN EXPERIMENTAL TECHNIQUE AND RELATED ANALYSES TO STUDY THE DYNAMIC TENSILE FAILURE OF CONCRETE Annual Report, 1 May 1982 - 30 Apr. 1985
James K. Gran 31 Jul. 1985 225 p refs
(Contract F49620-82-K-0021)
(AD-A164261; AFOSR-85-1240TR) Avail: NTIS
HC A10/MF A01 CSCL 13/3

The objective of this research was to develop and demonstrate experimental and analytical techniques to study the tensile failure of concrete and geologic materials at strain rates of about 10 per second. A new experimental method was developed, a set of experiments was conducted, and the experiments were interpreted with numerical calculations. In the new experiments, a 5-cm-diameter rod is first loaded in static triaxial compression, then the axial pressure is released from each end simultaneously and very rapidly. The resulting relief waves interact in the center of the rod to produce a dynamic tensile stress equal in magnitude to the original static compression. Tensile failure occurs if the tensile stress exceeds the tensile strength for these conditions. The radial pressure is held approximately constant during the experiment. Several experiments of this type were performed on concrete. In every case the rod fractured near the midpoint; in some cases a second fracture also occurred several centimeters from the midpoint. Transient measurements were made of the axial load at each end, the confining pressure, and axial and circumferential surface strains at several locations along the length of the rod. Each experiment was interpreted with a set of one-dimensional finite differ ence calculations, using an elastic-fracturing (strain-softening) representation for the material. By trial and error, material parameters were chosen for each experiment so that satisfactory agreement could be achieved. GRA

N86-25855# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPROVEMENT OF END BOUNDARY CONDITIONS FOR OFF-AXIS TENSION SPECIMEN USE M.S. Thesis
Steven M. Cron Dec. 1985 136 p refs
(AD-A164321; AFIT/GAE/AA/85D-3) Avail: NTIS
HC A07/MF A01 CSCL 20/11

Inaccuracies in using the off axis tension test are caused by the nonuniform stresses produced by the end constraints. The purpose of this thesis is to show that these nonuniformities can be virtually eliminated by adjusting the amount of tab clamping and selectively locating the point about which the clamp may rotate. A second phase of the study is to conduct a limited verification of a strain energy failure criteria that can account for the material nonlinearity found in composite materials. Determination of the ideal amount of clamping and point of rotation was carried out using a linear finite element method. The nonlinear behavior of the specimen was simulated using a nonlinear finite element method. The failure criteria was used in conjunction with the nonlinear finite element algorithm in determining failure. Experimentation was also carried out to verify the finite element solutions. The results indicate that a nearly uniform state of stress can be produced with ideal tab clamping and rotation. The results indicate that the nonlinear behavior of the specimen was accurately predicted by the nonlinear finite element method but that the failure state predicted by the failure criteria was in error. Suggestions are made for improving the accuracy of the failure criteria. Author (GRA)

N86-25856# Lawrence Livermore National Lab., Calif.
MOTION OF THIN METAL WALLS AND THE EQUATION OF STATE OF DETONATION PRODUCTS. REVISION 1
E. Lee, D. Breithaupt, C. McMillan, N. Parker, J. Kury, C. Tarver, W. Quirk, and J. Walton 21 Nov. 1985 13 p Presented at the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE86-004237; UCRL-91490-Rev-1; CONF-850706-24-Rev-1)
Avail: NTIS HC A02/MF A01

Dynamic high resolution measurements made using metal cylinders and flat plates accelerated by explosives to determine detonation product behavior are reported. By using both thin walled cylinders and plates and by utilizing both streak camera and Fabry-Perot velocimeter techniques, resolution and accuracy greater than previously attained was achieved. As an example, results for LX-14, an explosive containing 95% HMX and 5% polyurethane, are presented and compared to results of hydrodynamic calculations carried out with an accuracy equivalent to the experimental resolution. Calculations show that cylinder test measurements sample the detonation product equation of state (EOS) at expansion ratios V/VO > 1. Thin flat plates aligned in the plane of the detonation front provide detailed information on the higher compression states (V (sub CJ) < V/VO < 1.3). The results of the study confirm earlier work with respect to the pressure derivatives. The results require that (partial derivative ln P/partial derivative ln V) (sub S) first increase as the products expand from the C-J state. DOE

N86-25857# Sandia National Labs., Albuquerque, N. Mex.
MODAL ANALYSIS OF A SHELL-PAYLOAD STRUCTURE USING TEST DATA
T. G. Carne, D. R. Martinez, M. D. Tucker, and J. P. Lauffer 1985 11 p Presented at the 4th International Modal Analysis Conference, Los Angeles, Calif., 3 Feb. 1986
(Contract DE-AC04-76DP-00789)
(DE86-002588; SAND-85-1301C; CONF-860224-4) Avail: NTIS
HC A02/MF A01

The accuracy of computed modal frequencies obtained from a combined experimental/analytical model for a shell-payload structure is evaluated. The total structure is physically divided into two subsystems, the shell and the internal payload, which are connected through a stiff joint. The payload was tested to obtain its free modes, while a finite element model of the shell was analyzed to obtain its modal description. A component mode synthesis technique was investigated which incorporates free modes and residual flexibility. The experimental modal data base for the payload was directly coupled with the finite element modal model of the shell to create an experimental/analytical model of the total structure. Both the translational and rotational elements of the payload mode shapes at the interface were measured and used in the coupling. The modal frequencies, computed using the combined experimental/analytical model, were then compared to those from a modal test of the entire structure. The sensitivity of

the combined model to the residual flexibilities was also determined. Finally, recommended procedures for developing combined experimental/analytical models of shell-payload structures are given. DOE

N86-25858# Oak Ridge National Lab., Tenn.
UNLUBRICATED SLIDING WEAR OF PARTIALLY STABILIZED ZIRCONIA, TOUGHENED ALUMINA AND SILICON NITRIDE
C. S. Yust and F. J. Carignan Sep. 1985 24 p Presented at the Annual Meeting of the American Society of Lubrication Engineers, Toronto, Ontario, 12 May 1986 Prepared in cooperation with Advanced Mechanical Technology, Inc., Newton, Mass.
(Contract DE-AC05-84OR-21400)
(DE86-003016; CONF-860516-1) Avail: NTIS HC A02/MF A01

Conditions were established for a pin-on-disc sliding configuration under which unlubricated partially stabilized zirconia and toughened alumina will slide on themselves for limited periods of time without incurring extensive macroscopic surface damage. Microscopic examination, however, reveals that unlubricated sliding at the conditions resulting in minimal macroscopic surface damage is accompanied by the formation of a fine particle debris which is agglomerated and adhered to the wear path. The majority (approx.80%) of the partially stabilized zirconia specimens tested to date have experienced severe wear during unlubricated sliding under the conditions of this test program. One half of the toughened alumina specimens experienced mild wear, the remaining half severe wear. All of the silicon nitride specimens exhibited severe wear. The silicon nitride surfaces show evidence of surface chemical reaction at longer test durations, demonstrating that the chemical influence of the environment, especially on a surface under dynamic stress conditions, must be considered. The transition between mild and severe wear can take place very rapidly. These results imply transition to unacceptable wear regimes in unlubricated sliding in relatively short time periods. DOE

N86-25859# Argonne National Lab., Ill.
ELASTIC PROPERTIES OF METALLIC SUPERLATTICES
I. K. Schuller Oct. 1985 6 p Presented at the IEEE Ultrasonics Symposium, San Francisco, 16 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-003071; CONF-8510219-1) Avail: NTIS HC A02/MF A01

An overview of the elastic properties and acoustic properties of metallic superlattices is presented. In general, superlattices whose constituents form solid solutions in their binary phase diagram exhibit an enhancement of the elastic constants (supermodulus effect), whereas combinations that do not form solid solutions exhibit a softening. Very little work has been performed using ultrasonic techniques, although these types of measurements could add considerable information and clarify a variety of critical issues. DOE

N86-25860# Idaho National Engineering Lab., Idaho Falls.
RECONSTRUCTION OF THE GEOMETRY OF A SURFACE-BREAKING CRACK
D. M. Tow 1985 7 p
(Contract DE-AC07-76ID-01570)
(DE86-003229; EGG-M-09485; CONF-8506110-5) Avail: NTIS HC A02/MF A01

The crack reconstruction method presented here employs a ray tracing field code described in another session of this conference. This field code calculates the transducer response to a crack of known geometry by modeling it as a collection of point scattering elements. The model is linear in that the transducer response to a collection of point scattering elements is equal to the sum of the transducer response of the individual elements. The field code is currently only capable of modeling two-dimensional geometries. In two dimensions a crack is modeled as a linear array of scattering elements. A transducer is similarly modeled as a linear array of point sources. All results discussed in this paper are two dimensional simulated results. DOE

N86-25861# New York State Dept. of Transportation, Albany. Engineering Research and Development Bureau.
LATERAL RESTRAINT OF NON-COMPOSITE BEAMS Final Research Report
R. J. Kissane Aug. 1985 27 p refs Sponsored in part by the Federal Highway Administration, Albany, N.Y.
(PB86-143781; RR-123; FHWA/NY/RR-85/123) Avail: NTIS HC A03/MF A01 CSCL 13M

Full-scale laboratory and field testing was performed to determine the restraint to elastic buckling of a steel beam supporting a non-composite concrete deck. In the laboratory testing, a 21 ft S 12x31.8 beam was loaded to flange yield without indication of lateral instability. Loads were applied through a 6 in. thick reinforced concrete slab having neither mechanical nor chemical bond to the beam. GRA

N86-25862 Colorado Univ., Boulder.
THE DYNAMICAL EQUILIBRIUM: A MATHEMATICAL MODEL FOR THE DYNAMICAL DESCRIPTION OF THE PERMANENT DEFORMATION OF AN ELASTIC MATERIAL CAUSED BY MICROFRACTURE OR PLASTIC FLOW Ph.D. Thesis
Gary Allen Dilts 1985 238 p
Avail: Univ. Microfilms Order No. DA8528480

A material which, upon the application and subsequent removal of external stress, returns to its original configuration is said to be elastic. A material which does not return to its original configuration is said to have undergone permanent or plastic deformation. Most materials are elastic for small deformation and plastic for large ones. Such elasto-plastic deformation is herein interpreted as a change in the equilibrium configuration of an elastic material. The dynamics of such a material are specified by coupling the Newtonian equations of motion with a prescription for the rate of change of the equilibrium in terms of the displacement from, and rate of displacement from, equilibrium. Thus the equilibrium itself becomes a dynamical quantity. This basic concept is developed within the context of a single mass-spring system, a lattice of harmonically interacting masses and the continuum limit of such a lattice in one and three dimensions. Dissert. Abstr.

N86-25373# Fiat Research Center, Orbassano, Turin (Italy).
SMALL DEFECT CHARACTERIZATION IN POWDER METALLURGY MATERIALS
S. Re Fiorentin and H. Walther (Fiat Aviazione S.p.A., Turin, Italy) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 12 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25375# TRW, Inc., Cleveland, Ohio.
MULTIAXIAL AND THERMOMECHANICAL FATIGUE CONSIDERATIONS IN DAMAGE TOLERANT DESIGN
Gail E. Leese and Robert C. Bill (Army Research and Technology Labs., Cleveland, Ohio) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 17 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25377# Naval Air Development Center, Warminster, Pa.
STATISTICAL ANALYSIS OF SPIN PIT FAILURE DATA TO PREDICT INSERVICE B.1 LIVES OF GAS TURBINE DISKS
R. Mahorter, S. Fowler, and J. Salvino (Naval Air Propulsion Test Center, Trenton, N.J.) *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 15 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25382# National Aerospace Lab., Amsterdam (Netherlands).
CONTRIBUTION OF TURBINE BLADE SERVICE FAILURES TO A DAMAGE TOLERANCE APPROACH
R. J. H. Wanhill and A. J. A. Mom *In* AGARD Damage Tolerance Concepts for Critical Engine Components Oct. 1985 13 p refs (For primary document see N86-25360 16-07)
Avail: NTIS HC A13/MF A01

N86-25549# Joint Publications Research Service, Arlington, Va.
VISIBILITY OF TRANSVERSE CRACKS FOR RADIOGRAPHIC

INSPECTION OF WELDS IN SPHERICAL VESSELS
Jicheng Xue and Yadeng Xu *In its* China Report: Science and Technolcgy (JPRS-CST-86-011) 31 Mar. 1986 p 66-72 Transl. into ENGLISH from Wusunjiance (Shanghai, China), v. 6, no. 5, Dec. 1984 p 39-41 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

N86-25578# Joint Publications Research Service, Arlington, Va.
INDUCED VIBRATIONS AND RESONANCE OF SHAFT UNDER NONSTEADY LOAD Abstract Only
A. I. Vesnitskiy, I. V. Miloserdova, and A. I. Potapov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 53-54 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 103-110 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25590# Joint Publications Research Service, Arlington, Va.
ACTION OF NONAXISYMMETRIC NORMAL LOAD ALONG SURFACE OF ELASTIC SHELL INTERACTING WITH FLUID Abstract Only
V. I. Pozhuyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 82 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 58-64 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25591# Joint Publications Research Service, Arlington, Va.
GENERAL SOLUTION OF SPATIAL PROBLEM OF ELASTICITY THEORY FOR MULTILAYER ORTHOTROPIC CYLINDRICAL SHELL Abstract Only
A. S. Kosmodamianskiy and V. A. Galich *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 85 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 8, Aug. 1984 p 46-48 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25592# Joint Publications Research Service, Arlington, Va.
NONLINEAR VIBRATIONS OF FLEXIBLE CIRCULAR PLATES UNDER BENDING AND TENSION OR COMPRESSION LOADS Abstract Only
A. S. Kosmodamianskiy and O. P. Tatarinova *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 85 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Tekhnicheskiye Nauki (Kiev, USSR), no. 8, Aug. 1984 p 46-48 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25593# Joint Publications Research Service, Arlington, Va.
DYNAMIC EDGE EFFECT IN RIGID HOMOGENEOUS VIBRATION-ABSORBER COATING Abstract Only
V. B. Stephanov and B. D. Tartakovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 87 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 30, no. 3, May - Jun. 1984 p 368-372 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25594# Joint Publications Research Service, Arlington, Va.
STABILITY OF NONCIRCULAR CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION Abstract Only
N. P. Semenyuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 43-49 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25595# Joint Publications Research Service, Arlington, Va.
OPTIMIZATION OF CYLINDRICAL SHELLS WITH VARIABLE THICKNESS FOR AXISYMMETRIC LOAD Abstract Only
N. G. Medvedev and N. P. Totskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 53-57 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25596# Joint Publications Research Service, Arlington, Va.
SPECTRUM OF NORMAL WAVES IN HOLLOW TRANSVERSELY ISOTROPIC CYLINDER Abstract Only
V. A. Moiseyenko, V. I. Storozhev, and N. A. Shulga *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 117-118 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25597# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATIONS OF SPHERICAL SHELLS REINFORCED WITH MERIDIONAL HOOPS Abstract Only
V. N. Revutskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 119-121 Original language document was announced in IAA as A85-11595 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25598# Joint Publications Research Service, Arlington, Va.
THEORY OF NONLINEARLY ELASTIC MULTILAYER SHELLS WITH TRANSVERSE SHEAR STRAIN Abstract Only
V. Ye. Verizhenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 124-127 Original language document was announced in IAA as A85-11596 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25623# Joint Publications Research Service, Arlington, Va.
APPROACH TO TACKLING PROBLEMS OF WRINKLED STATE OF SOFT SHELLS Abstract Only
V. S. Kalinin and A. S. Melamud *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 71-72 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 67-73 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25624# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL STUDY OF TRIPLE-LAYER SPHERICAL SHELLS UNDER NONUNIFORM PRESSURE Abstract Only
V. U. Kotelnikov and V. G. Tarasenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 72 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 117-119 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25625# Joint Publications Research Service, Arlington, Va.
INDUCED VIBRATIONS OF SPHERICAL SHELL IN ACOUSTIC WEDGE Abstract Only
M. A. Potapov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 73 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 21, no. 2, Feb. 1985 p 53-60 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25626# Joint Publications Research Service, Arlington, Va.
CERTAIN RELATIONS FOR SYSTEMS WITH DRY FRICTION Abstract Only
V. I. Levitas *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 73-74 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 52-56 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25627# Joint Publications Research Service, Arlington, Va.
ENERGY CRITERION OF DYNAMIC SNAP-OVER FOR ELASTIC SPHERICAL SHELLS Abstract Only
L. S. Srubshchik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 74 Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 280, no. 1, Jan. 1985 p 60-63 Original language document was announced in IAA as A85-24178 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25628# Joint Publications Research Service, Arlington, Va.
WIDE-ANGLE INSTRUMENT FOR MEASURING DIVERGENCE OF LASER BEAM Abstract Only
Yu. A. Pokrovskiy, Ye. A. Makaretskiy, and Yu. S. Khurkhulu *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 75 Transl. into ENGLISH from Pribory i Tekhnika Eksperimenta (Moscow, USSR), no. 5, Sep. - Oct. 1984 p 240 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25638# Joint Publications Research Service, Arlington, Va.
REPRESENTATION OF MEDIAN SHELL SURFACES BY MONGE SURFACES Abstract Only
Ya. G. Savula *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 87-88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 70-75 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25639# Joint Publications Research Service, Arlington, Va.
SPECIAL REVERSE PROBLEM FOR CYLINDRICAL SHELL OF VARIABLE THICKNESS Abstract Only
N. P. Totskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 88 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 75-80 Original language document was announced in IAA A85-24022 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25640# Joint Publications Research Service, Arlington, Va.
WAVE PROCESSES DURING FLEXURAL VIBRATIONS OF BEAMS UNDER DEFORMATION Abstract Only
K. P. Dynnik *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 88-89 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 95-100 Original language document announced in IAA as A85-24023 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25641# Joint Publications Research Service, Arlington, Va.
STABILITY OF SHELLS OF REVOLUTION WITH SMALL DEVIATIONS FROM CYLINDRICAL SHAPE Abstract Only
D. V. Babich and L. A. Deriglazova *In its* USSR Report: Engineering and Equipments (JPRS-UEQ-86-002) 7 Feb. 1986 p 90 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 106-108 Original language document was announced in IAA as A85-24024 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25642# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATION MODES OF IMPERFECT CONICAL SHELLS Abstract Only
S. Yu. Fialko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 90-91 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 109-112 Original language document was announced in IAA as A85-24025 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25643# Joint Publications Research Service, Arlington, Va.
NONAXISYMMETRIC DEFORMATION OF FLEXIBLE TOROIDAL SHELL WITH ELLIPTIC CROSS-SECTION Abstract Only
V. S. Demyanchuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 91-92 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1986 p 112-115 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25644# Joint Publications Research Service, Arlington, Va.
PARAMETRIC OPTIMIZATION OF PLASTIC CYLINDRICAL SHELLS WITH GEOMETRICAL NON-LINEARITY Abstract Only
Ya. A. Lellep *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 93 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan.-Feb. 1985 p 138-146 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25645# Joint Publications Research Service, Arlington, Va.
PRECESSION OF NATURAL VIBRATION MODE IN SPHERICAL SHELL DURING ROTATION Abstract Only
V. F. Zhuravlev and A. L. Popov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 94 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 147-151 Original language document announced in IAA as A85-28909 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25646# Joint Publications Research Service, Arlington, Va.
NATURAL VIBRATIONS OF CYLINDRICAL SHELL UNDER INITIAL EXTERNAL PRESSURE NONUNIFORMLY DISTRIBUTED OVER CIRCUMFERENCE Abstract Only
S. N. Kukudzhanov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 95-96 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 53-59 Original language document was announced in IAA as A85-16161 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25647# Joint Publications Research Service, Arlington, Va.
STABILITY OF MULTILAYER CYLINDRICAL SHELL UNDER EXTERNAL PRESSURE Abstract Only
A. N. Anidreyev *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 96-97 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 59-64 Original language document was announced in IAA as A85-16162 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25648# Joint Publications Research Service, Arlington, Va.
CYLINDRICAL SHELL WITH SLIT UNDER TENSION Abstract Only
M. Sh. Dyshel *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 97 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 10, Oct. 1984 p 64-69 Original language document was announced in IAA as A85-16163 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25649# Joint Publications Research Service, Arlington, Va.
AXISYMMETRIC CONTACT INTERACTION OF CYLINDRICAL SHELL AND ELASTIC ON RIGID HOUSING Abstract Only
W. Krzys and A. Moc *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 101 Transl. into ENGLISH from Problemy Prochnosti (Kiev, USSR), no. 1, Jan. 1985 p 90-96 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-25863*# National Aeronautics and Space Administration. National Space Technology Labs., Bay Saint Louis, Miss.
TIMBER RESOURCES INVENTORY AND MONITORING JOINT RESEARCH PROJECT
C. L. Hill Oct. 1985 35 p refs Prepared in cooperation with International Paper Co., Tuxedo Park, N.Y. Original contains color illustrations
(NASA-TM-88754; NAS 1.15:88754; ERL-237) Avail: NTIS HC A03/MF A01 CSCL 02F

Primary objectives were to develop remote sensing analysis techniques for extracting forest related information from LANDSAT Multispectral Scanner (MMS) and Thematic Mapper data and to determine the extent to which International Paper Company information needs can be addressed with remote sensing information. The company actively manages 8.4 million acres of forest land. Traditionally, their forest inventories, updated on a three year cycle, are conducted through field surveys and aerial photography. The results reside in a digital forest data base containing 240 descriptive parameters for individual forest stands. The information in the data base is used to develop seasonal and long range management strategies. Forest stand condition assessments (species composition, age, and density stratification) and identification of silvicultural activities (site preparation, planting, thinning, and harvest) are addressed. B.G.

N86-25864# Geoexplorers International, Inc., Denver, Colo.
GEOLOGICAL EVOLUTION AND ANALYSIS OF CONFIRMED OR SUSPECTED GAS HYDRATE LOCALITIES. VOLUME 1: BLAKE-BAHAMA OUTER RIDGE, US EAST COAST
J. Krason and W. I. Ridley Jun. 1985 114 p refs
(Contract DE-AC21-84MC-21181)
(DE86-001006; DOE/MC-21181/1950-Vol-1) Avail: NTIS HC A06/MF A01

This document is Volume 1 of a series of reports entitled Geological Evolution and Analysis of Confirmed or Suspected Gas Hydrate Localities. Volume 1 is an analysis of the Blake-Bahama Outer Ridge - US East Coast. This report presents a geological description of the Blake-Bahama Outer Ridge, including regional and local structural settings, geomorphology, geological history, stratigraphy, and physical properties. It provides the necessary regional and geological background for more in-depth research of the area. Detailed discussion of bottom simulating acoustic reflectors, sediment acoustic properties, distribution of hydrates within the sediments, and the relation of hydrate distribution to other features such as salt diapirism are also included. The formation and stabilization of gas hydrates in sediments are considered in terms of phase relations, nucleation, and crystallization constraints, gas solubility, pore fluid chemistry, inorganic diagenesis, and sediment organic content. Together with a depositional analysis of the area, this report is a better understanding of the thermal evolution of the locality. It should lead to an assessment of the potential for thermogenic hydrocarbon generation. DOE

N86-25865# Geoexplorers International, Inc., Denver, Colo.
GEOLOGICAL EVOLUTION AND ANALYSIS OF CONFIRMED OR SUSPECTED GAS HYDRATE LOCALITIES. VOLUME 2: BALTIMORE CANYON TROUGH AND ENVIRONS, US EAST COAST
J. Krason and W. I. Ridley Jun. 1985 138 p refs
(Contract DE-AC21-84MC-21181)
(DE86-001028; DOE/MC-21181/1950-Vol-2) Avail: NTIS HC A07/MF A01

This document is Volume 2 of a series of reports entitled Geological Evolution and Analysis of Confirmed or Suspected Gas Hydrate Localities. Volume 2 provides an analysis of the Baltimore Canyon Trough and Environs - US East Coast. The report presents a geological description of the Baltimore Canyon Trough region, including regional and local structural settings, geomorphology, geological history, stratigraphy, and physical properties. Included also is a discussion of bottom simulating acoustic reflectors, sediment acoustic properties, distribution of hydrates within the sediments, and the relation of hydrate distribution to other features such as salt diapirism. The formation and stabilization of gas hydrates in sediments are discussed in terms of phase relations, nucleation, and crystallization constraints, gas solubility, pore fluid chemistry, inorganic diagenesis, and sediment organic content. A depositional analysis of the area is discussed in order to better understand the thermal evolution of the locality and to assess the potential for thermogenic hydrocarbon generation. DOE

N86-25866*# Lunar and Planetary Inst., Houston, Tex.
THEMATIC MAPPER STUDIES OF ANDEAN VOLCANOES Monthly Report
P. W. Francis 1986 13 p Original contains color illustrations
(Contract NAS5-28759)
(NASA-CR-176807; NAS 1.26:176807; MR-6) Avail: NTIS HC A02/MF A01 CSCL 08K

The primary objective was to identify all the active volcanoes in the Andean region of Bolivia. Morphological features of the Tata Sabaya volcano, Bolivia, were studied with the thematic mapper. Details include marginal levees on lava and pyroclastic flows, and summit crater structure. Valley glacier moraine deposits, not easily identified on the multispectral band scanner, were also unambiguous, and provide useful marker horizons on large volcanic edifices which were built up in preglacial times but which were active subsequently. With such high resolution imagery, it is not only possible to identify potentially active volcanoes, but also to use standard photogeological interpretation to outline the history of individual volcanoes. B.G.

N86-25867# Ohio State Univ., Columbus. Research Foundation.
DIGITAL TERRAIN ELEVATION MODEL ANALYSIS Final Report, 28 Sep. 1984 - 28 Oct. 1985
Joseph C. Loon and Petros G. Patias Jul. 1985 105 p refs
(Contract DAAG29-81-D-0100)
(AD-A164305; OSURF-716042; ETL-0393) Avail: NTIS HC A06/MF A01 CSCL 08/6

An effort to develop techniques to evaluate contour-to-grid interpolation algorithms. The use of synthetic surfaces as tool is explored. A set of synthetic surfaces is generated using Fourier Series to represent terrain with different degrees of ruggedness; each surface represented by an equation of the form: $Z=F(X,Y)$. The results of a contour-to-grid interpolation can then be evaluated by comparison with the true elevations, the elevations calculated from the synthetic surfaces. Author (GRA)

N86-25868# Argonne National Lab., Ill.
RESULTS FROM A HIGH POWER, HIGH FREQUENCY SODAR
R. L. Coulter and T. J. Martin Oct. 1985 21 p refs Presented at the 3rd International Symposium on Acoustic Remote Sensing of the Atmosphere and Oceans, Paris, France, 14 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-003041; CONF-8510214-2) Avail: NTIS HC A02/MF A01

The design and operation of a high power, portable minisodar operating at 3 to 7 kHz are described. Estimates of first and

second moments of vertical velocity made using this system are presented and some field applications described. DOE

N86-25869# Bureau of Land Management, Denver, Colo.
RUNOFF AND SOIL-LOSS MONITORING TECHNIQUE USING PAIRED PLOTS
W. L. Jackson, K. Knoop, J. Szalona, and S. Hudson Aug. 1985 28 p
(PB86-136694; BLM/YA/PT-85/005/4341; BLM/TN-368) Avail: NTIS HC A03/MF A01 CSCL 08H

Differences in annual runoff and soil loss caused by livestock grazing on arid rangelands can be measured directly from large plots. A low-cost monitoring technique is described which uses rectangular plots, collection tanks and cumulative mechanical stage-height counters. Annual runoff and soil loss are measured on paired grazed and ungrazed plots. The plots are replicated and the pairing provides a control. Thus the statistical validity of any differences between grazed and ungrazed plots can be assessed. The plots are easy to construct, and can be maintained with as few as one or two visits per year. The system is presently being tested at four separate locations. GRA

N86-25870# Geological Survey, Reston, Va. National Mapping Div.
US GEOLOGICAL DATA: DIGITAL LINE GRAPHS FROM 1:100, 000-SCALE MAPS. DATA USERS GUIDE 2
1985 79 p
(PB86-152261) Avail: NTIS HC A05/MF A01 CSCL 08B

The National Cartographic Information Center (NCIC) distributes digital cartographic/geographic data files produced by the U.S. Geological Survey (USGS) as part of the National Mapping Program. Digital cartographic data files may be grouped into four basic types. The first of these, called a digital line graph (DLG), is line map information in digital form. The second form, called a digital elevation model (DEM), consists of a sampled array of elevations for ground positions. The third type is land use and land cover digital data which provides information on nine major classes of land use such as urban, agricultural, or forest. The fourth type, the Geographic Names Information System, provides primary information for known places, features, and areas in the United States identified by a proper name. GRA

N86-25871# Argonne National Lab., Ill.
EXPLORATORY STUDIES ON DEEP EARTH SOURCES OF METHANE: Hg AS A DIAGNOSTIC AND PROSPECTING TOOL Annual Report, Apr. - Sep. 1985
G. W. Reed and S. Jovanovic 3 Oct. 1985 18 p refs
(Contract GRI-5084-260-1029)
(PB86-156148; Rept-2; GRI-85/0217) Avail: NTIS HC A02/MF A01 CSCL 21D

The venting of primordial volatiles to the Earth surface was determined. The proposition that the mantle is a major repository for juvenile methane was examined. Data on excess 3He, the only volatile generally accepted as being of mantle origin, are complemented. The gases (fluids) that serve as carriers for 3He might also be expected to transport volcanogenic trace volatiles such as Hg, Br, As, Sb, Se, Zn and Cu. The elements, representing a range of volatilities and geochemistries, are measured in tholeitic glass samples from different ocean ridge and ocean island mantle sources, for which 3He data are available. A number of possible significant concentration trends and interelement correlations are observed. Tholeitic magmas from diverse sources contain unfractionated Hg and Sb and covariant Zn and Cu. A primitive source is inferred for all the volatiles and their interrelation may complement the 3He mantle signature. It is suggested that Hg may accompany hydrocarbons from non-biogenic sources and may be used for prospecting. GRA

N86-25872# Bureau of Mines, Avondale, Md. Research Center.
PACIFIC MANGANESE NODULES: CHARACTERIZATION AND PROCESSING
B. W. Haynes, S. L. Law, D. C. Barron, G. W. Kramer, and R. Maeda 1985 50 p refs
(PB86-150919; BM-B-679; LC-85-600142) Avail: NTIS HC A03/MF A01 CSCL 11F

The Bureau of Mines conducted research to provide technical information needed to devise waste management plans for the processing of manganese nodules. Studies included summary description of Pacific manganese nodules, process options and flowsheets, methods for characterizing nodules and their tailings, and results of analyses of laboratory and pilot-plant generated tailings. This information is the result of a cooperative research effort of the Bureau of Mines and the National Oceanic and Atmospheric Administration (NOAA), with NOAA providing funding and the Bureau conducting the research. A summary of the extensive literature review is provided for manganese nodule mineralogy, chemistry, processing techniques, and methods of analyses. Characterizations and analyses of laboratory-generated tailings and slags are given, as well as the results of the leaching studies on these waste materials. GRA

N86-25873*# National Academy of Sciences - National Research Council, Washington, D. C.
REMOTE SENSING OF THE EARTH FROM SPACE: A PROGRAM IN CRISIS Final Report
Dec. 1985 111 p Sponsored in part by National Academy of Sciences - National Research Council, Washington, D.C. Prepared in cooperation with NOAA, Rockville, Md.
(Contracts NASw-3706; NA83DA-C-00013)
(NASA-CR-176796; NAS 1.26:176796; PB86-152923) Avail: NTIS HC A06/MF A01 CSCL 05A

The present situation in earth remote sensing, determining why certain problems exist, and trying to find out what can be done to solve these problems are discussed. The conclusion is that operational remote sensing is in disarray. The difficulties involve policy and institutional issues. Recommendations are given. Author

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-25874* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OXYGEN RECOMBINATION IN INDIVIDUAL PRESSURE VESSEL NICKEL-HYDROGEN BATTERIES Patent
John J. Smithrick, inventor (to NASA) Issued 22 Apr. 1986 6 p Filed 27 Jun. 1984 Sponsored by NASA
(NASA-CASE-LEW-13822-1; US-Patent-4,584,249;
US-Patent-Appl-SN-625077; US-Patent-Class-429-57;
US-Patent-Class-429-27; US-Patent-Class-42-101) Avail: US Patent and Trademark Office CSCL 10C

A metal-hydrogen cell is described which avoids damage and retards flooding of the hydrogen electrodes by providing for chemical recombination of oxygen and hydrogen in areas or sites remote from the hydrogen electrodes. In the metal-hydrogen cell, a plurality of electrical cell units are place in a back to back relationship. The cells may be lined with a wick, having one or more catalyzed sites on the inner surface of the cell. Separators disposed between the respective metal and hydrogen electrodes of each cell unit are provided with gas directing notches around their peripheries to facilitate the desired movement of gases within the metal-hydrogen cell. Any two metal electrodes separated by a gas screen are provided with gas tight sealing means between the electrodes at each aperature. The sealing means may be a

ring of rubber or elastomeric material which is somewhat compressible but nonreactive with other materials in the cell. B.G.

N86-25875*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
POWER SYSTEM APPLICATIONS OF FIBER OPTICS
H. Kirkham, A. Johnston, G. Lutes, T. Daud, and S. Hyland Mar. 1984 180 p refs
(Contracts NAS7-918; DE-AI01-79ET-29372)
(NASA-CR-176831; JPL-Publ-84-28; NAS 1.26:176831; DOE/ET-29372/4) Avail: NTIS HC A09/MF A01 CSCL 10A

Power system applications of optical systems, primarily using fiber optics, are reviewed. The first section reviews fibers as components of communication systems. The second section deals with fiber sensors for power systems, reviewing the many ways light sources and fibers can be combined to make measurements. Methods of measuring electric field gradient are discussed. Optical data processing is the subject of the third section, which begins by reviewing some widely different examples and concludes by outlining some potential applications in power systems: fault location in transformers, optical switching for light fired thyristors and fault detection based on the inherent symmetry of most power apparatus. The fourth and final section is concerned with using optical fibers to transmit power to electric equipment in a high voltage situation, potentially replacing expensive high voltage low power transformers. JPL has designated small photodiodes specifically for this purpose, and fabricated and tested several samples. This work is described. Author

N86-25876# General Electric Co., Syracuse, N.Y. Power Electronics Semiconductor Dept.
GaAs SOLAR CELL WITH LOW SURFACE RECOMBINATION Final Subcontract Report
J. R. Shealy, P. A. McDonald, J. L. Benjamin, and D. K. Wagner Nov. 1985 24 p
(Contract DE-AC02-83CH-10093)
(DE85-016879; SERI/STR-211-2811) Avail: NTIS HC A02/MF A01

The fabrication of large-area solar cells (0.16 sq cm) on GaAs and AlGaAs structures with a new passivating coating, pyrolytic Si3N4, is demonstrated. Results in this study illustrate a near-oxide-free interface between GaAs and the Si3N4 coatings. These coatings were applied to three solar cell structures, a heteroface AlGaAs/GaAs cell, a graded band-gap AlGaAs cell, and a diffused homojunction cell. The results indicate that the pyrolytic Si3N4 coatings improve the surface (high energy) response of homojunction cells; however, they do not perform as well as cells with AlGaAs window layers on the surface. As a result, little improvement in the heteroface solar cell high-energy response was observed in this study. The best solar cells fabricated in this study with Si3N4 coatings were heteroface structures whose 1-sun, AMO conversion efficiencies were as high as 14.6%. DOE

N86-25877*# Engelhard Corp., Edison, N.J. Specialty Chemicals Div.
DEVELOP AND TEST FUEL CELL POWERED ON-SITE INTEGRATED TOTAL ENERGY SYSTEMS Interim Report, Feb. 1981 - Jan. 1984
A. Kaufman and J. Werth Oct. 1984 236 p
(Contracts DEN3-241; DE-AI01-80ET-17088)
(NASA-CR-174951; DOE/NASA-0241-12; NAS 1.26:174951) Avail: NTIS HC A11/MF A01 CSCL 10B

Work has been performed leading toward the development of a 50kW on-site integrated energy system. A sub-scale 5kW system was constructed and tested in the steady-load (with shutdowns) and transient modes. A parallel effort has been conducted to develop the full-size sub-systems for the on-site system; these include the fuel cell stack, a methanol processor, and a d.c.-a.c. power conditioner. Stack technology development activities have been carried out to improve the performance, cost and reliability of stack components and hardware. In the fuel processing area, screening tests have been conducted for various methanol steam-reforming catalysts, and the preferred catalysts have been subjected to extended testing. Application-related work has been pursued largely under subcontracts. A study has been completed in which the applicability of on-site fuel cell cogeneration systems to various building types was analyzed and the potential economic attractiveness ascertained. The overall system was analyzed in terms of its operating characteristics at part load and its response to transients. Preferred heating, ventilating, and air conditioning approaches for various building types using fuel cell cogeneration units are determined. Author

N86-25878# Energy Research Corp., Danbury, Conn.
FUEL PROCESSING SYSTEM FOR A 5 kW METHANOL FUEL CELL POWER UNIT Final Report, 20 Sep. 1984 - 20 Sep. 1985
G. Steinfeld 27 Nov. 1985 107 p
(Contract DAAK70-84-C-0099; DA Proj. 1V4-63702-DG-11)
(AD-A163636) Avail: NTIS HC A06/MF A01 CSCL 07/1

This report documents the development and design of a 5kW heat methanol reformer for phosphoric acid fuel cell power plants. The reformer design was based on utilizing burner exhaust as the source of water required for reforming. This approach was arrived at after evaluation of several system options. A developmental unit was tested, and test data is documented indicating that all design objectives were met except for start-up time. GRA

N86-25879# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
STUDY OF BIPOLAR NICKEL-CADMIUM BATTERIES AS PULSED LOAD FILTERS M.S. Thesis
Robert W. Chedister and John M. Ulmer Nov. 1985 135 p refs
(AD-A163949; AFIT/GE/ENG/85D-6) Avail: NTIS HC A07/MF A01 CSCL 10/3

Bipolar nickel-cadmium batteries were designed, built, and tested for possible use as capacitive filter elements in pulsed power applications. Electrodes were made by electrochemically impregnating sintered sides of nickel cell walls. Four-cell batteries were constructed by compressing the electrodes together with Teflon seals. A computer controlled test circuit charged and discharged the test batteries at frequencies of 1 to 50 Hertz and at depths of discharge of less than one percent. A special test battery was constructed with a removeable cadmium electrode for scanning electron microscope study. Battery energy density, effective capacitance, and efficiency were investigated as a function of current load or depth of discharge, cycle rate, and end of discharge voltage. Energy densities of nearly 75 joules per pound were demonstrated. Current loads of up to a 100 C-rate were demonstrated and an average capacitance of 6 farads was achieved. Cadmium electrode morphology was photographed and studied as a function of the charge and discharge cycle life with no crystalline anomalies discovered. Sinter corrosion, nickel electrode overcharging, and individual cell voltages were discovered as areas for further study. Author (GRA)

N86-25880# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
EXPERIMENTAL AND THEORETICAL STUDIES ON TRANSPORT PROCESSES IN LASER WELDING Progress Report
T. DebRoy 15 Apr. 1986 44 p
(Contract DE-FG02-84EG-45158)
(DE86-002953; DOE/ER-45158/2) Avail: NTIS HC A03/MF A01

Although lasers are utilized for various materials processing applications, laser welding is not an acceptable procedure for certain alloys. If an alloy contains one or more volatile components, selective vaporization of relatively more volatile components during laser welding may lead to inadequate control of the weld composition and poor mechanical properties of the fabricated product. The loss of alloying elements and the eventual properties of the weld zone are influenced by fluid flow in the weld pool, heat transfer and the thermodynamics and the kinetics of the vaporization of various components from the molten pool. In order to understand and eventually control the alloying element loss from the laser melted pool an experimental and theoretical program of

studies was initiated at Penn State in August 1984. This report documents the progress made to date on this grant. DOE

N86-25881# Khorsand (Hossein), Eagle, Idaho.
POINT FOCUS PARABOLIC SOLAR COLLECTOR
Hossein Khorsand 29 Jan. 1985 81 p
(Contract DE-FG01-82CE-15088)
(DE86-003001; DOE/CE-15088/T2) Avail: NTIS
HC A05/MF A01

The purpose of this project was to analyze and design a point focus parabolic collector. The analysis of a 15 meters diameter dish using finite elements computer programs shows high rigidity to weight ratio. A 15 meter dish weighs 7600 lb (excluding reflective surface), and when it is supported at three equally spaced support points, maximum deflection is .070 inch under a combined self, reflector, and receiver weight of 10,500 pounds. The dish subjected to wind loads at various elevation and azimuth angles showed good rigidity. Subsequently a detailed design of the dish followed. Most of the members of the structure are prefabricated in individual trusses to be assembled at the site. The structure for tracking also was analyzed. Design of tracking structure and foundation is not complete. A programmable electronic control system was designed for controlling the drive motors. The results of this project confirms the weight and cost saving which had been anticipated. DOE

N86-25882# Los Alamos National Lab., N. Mex.
HIGH-TEMPERATURE BOREHOLE INSTRUMENTATION
B. R. Dennis, S. P. Koczan, and E. L. Stephani Oct. 1985 49 p refs
(Contract W-7405-eng-36)
(DE86-00438; LA-10558-HDR) Avail: NTIS HC A03/MF A01

A new method of extracting natural heat from the Earth's crust was invented at the Los Alamos National Laboratory in 1970. It uses fluid pressures (hydraulic fracturing) to produce cracks that connect two boreholes drilled into hot rock formations of low initial permeability. Pressurized water is then circulated through this connected underground loop to extract heat from the rock and bring it to the surface. The creation of the fracture reservior began with drilling boreholes deep within the Precambrian basement rock at the Fenton Hill Test Site. Hydraulic fracturing, flow testing, and well-completion operations required unique wellbore measurements using downhole instrumentation systems that would survive the very high borehole temperatures, 320(0)C (610(0)F). These instruments were not available in the oil and gas industrial complex, so the Los Alamos National Laboratory initiated an intense program upgrading existing technology where applicable, subcontracting materials and equipment development to industrial manufactures, and using the Laboratory resources to develop the necessary downhole instruments to meet programmatic schedules. DOE

N86-25883# Technical Planning, Inc., Bethesda, Md.
PHOTOVOLTAIC DRIVEN VAPOR COMPRESSION CYCLES Final Report
D. K. Anand 1985 57 p
(Contract DE-AC03-84SF-11997)
(DE86-001702; DOE/SF-11997/T1) Avail: NTIS
HC A04/MF A01

Since the vast majority of heat pumps, air conditioning and refrigeration equipment employs the vapor compression cycle (VCC), the use of renewable energy represents a significant opportunity. As discussed in this report, it is clear that the use of photovoltaics (PV) to drive the VCC has more potential than any other active solar cooling approach. This potential exists due to improvements in not only the PV cells but VCC machinery and control algorithms. It is estimated that the combined improvements will result in reducing the PV cell requirements by as much as one half. DOE

N86-25884# California Univ., San Diego, La Jolla.
ASSESSMENT OF RESEARCH NEEDS FOR ADVANCED FUEL CELLS
S. S. Penner Jul. 1985 237 p
(Contract DE-AC01-84ER-30060)
(DE86-002003; DOE/ER-30060/T1) Avail: NTIS
HC A11/MF A01

The DOE Advanced Fuel Cell Working Group (AFCWG) was formed and asked to perform a scientific evaluation of the current status of fuel cells, with emphasis on identification of long-range research that may have a significant impact on the practical utilization of fuel cells in a variety of applications. Surveys describing the salient features of individual fuel cell types include elaborations of long-term research needs relating to the expeditious introduction of improved fuel cells. The Introduction and Summary always represent a majority view and, occasionally, a unanimous judgment. Chapters 2 to 6 provide background information and carry the names of identified authors. The identified authors of Chapters 2 to 6, rather than AFCWG as a whole, bear full responsibility for the scientific and technical contents of these chapters. DOE

N86-25885# Department of Energy, Washington, D. C. Off. of the Dep. Asst. Sec. for Renewable Energy.
RENEWABLE ENERGY RESEARCH AND DEVELOPMENT OUTLOOK, VOLUME 2
Dec. 1985 161 p
(Contract DE-AC05-81OR-20837)
(DE86-004536; DOE/OR-20837/4-Vol-2) Avail: NTIS
HC A08/MF A01

Renewable energy technologies represent a significant opportunity to increase diversity and flexibility within the energy supply system. This report (Volumes 1 and 2) presents a recent evaluation conducted by the Department of Energy to: (1) gauge the potential payoff of numerous renewable energy technology options, (2) prioritize research and development activities meeting technology development objectives obtainable over the next five years, and (3) evaluate the Government's role in performing these activities. Volume 2 contains appendices which discuss detailed data that support the method and conclusions discussed in Volume 1. This study was performed to develop five year R and D directions for the broad family of renewable energy technologies. The study included a calculation of the energy contribution potential (ECP) of each technology, a structured evaluation of the effectiveness of potential R and D activities in meeting critical technology development objectives and an evaluation of the appropriate federal role in each detailed R and D activity. DOE

N86-25886# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
PASSIVE SOLAR/GAS TECHNOLOGY CHARACTERIZATION AND DEVELOPMENT Final Report, Dec. 1982 - Mar. 1985
P. J. Burns, A. T. Kirkpatrick, and C. B. Winn Aug. 1985 141 p
(Contract GRI-5082-243-0728)
(PB86-168796; GRI-85/0244) Avail: NTIS HC A07/MF A01
CSCL 13A

Presented is the methodology used to (1) determine annual energy usage for passive solar buildings; (2) balance the amounts of auxiliary energy, passive solar features, and conservation (levels of insulation); and (3) size zone heating radiant panel units for passive solar buildings. The methodology focuses upon the building as a system with a life cycle costing approach encompassing capital equipment costs, installation costs, and energy costs. Thus, a comparison of gas versus electric systems is possible which includes these effects. The manual includes some 50 different types of passive solar systems in 50 different locations across the continential United States. GRA

N86-25887# Columbia Gas System Service Corp., Columbus, Ohio.
DOUBLE EFFECT ABSORPTION HEAT PUMP, PHASE 2 AND 2A Final Report, Oct. 1982 - May 1984
F. B. Cook, S. P. Cremean, S. C. Jatana, R. A. Johnson, and N. D. Malcosky 30 Sep. 1984 153 p
(Contract GRI-5080-341-0344)
(PB86-163722; GRI-81/0098.1) Avail: NTIS HC A08/MF A01
CSCL 13A

The objective is research, development and demonstration of a double-effect generator cycle absorption heat pump for the residential and small commerical markets. A 3RT advanced breadboard air-to-air reverse cycle heat pump was designed, fabricated and tested and the heating and cooling targets were achieved. The parasitic power consumption targets were not demonstrated in these phases. The refrigerant generator/heat exchanger subsystem, the interface heat exchangers and prototype solution pumps based on three different pumping technologies were designed, fabricated, tested and delivered by Columbia subcontractors. Development of a packaged prototype heat pump based on components and subsystems designed in these phases is recommended. GRA

N86-25528# Joint Publications Research Service, Arlington, Va.
PERIODIC OPTICAL FARADAY-EFFECT CHOPPER Abstract Only
N. I. Gavrilov, A. M. Godes, V. Kh. Krupkin, A. L. Levit, and V. M. Ovchinnikov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 58 refs Transl. into ENGLISH from Optiko-Mekhanicheskay Promyshlennost (USSR), no. 1, Jan. 1985 p 17-19 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-25604# Joint Publications Research Service, Arlington, Va.
TECHNICAL-ECONOMIC FEASIBILITY OF ORBITING SUN-LIGHT REFLECTORS Abstract Only
Zh. Alferov and V. Minin *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 26-27 Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), 19 Feb. 1985 p 6 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25611# Joint Publications Research Service, Arlington, Va.
ROBOT DRIVE MECHANISM USES CONVENTIONAL ELECTRIC MOTORS Abstract Only
I. Demchenko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 44-45 Transl. into ENGLISH from Sotsialisticheskaya Industriya (Moscow, USSR), 16 May 1985 p 4 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-25888# Argonne National Lab., Ill.
FORECASTING TRANSPORTATION ACTIVITY AND EMISSIONS FOR THE NATIONAL ACID PRECIPITATION ASSESSMENT PROGRAM
C. L. Saricks and A. D. Vyas 1985 39 p refs Presented at the 65th Annual Meeting of the Transportation Research Board, Washington, D.C., 20 Jan. 1986
(Contract W-31-109-eng-38)
(DE85-018352; CONF-860113-1) Avail: NTIS HC A03/MF A01

Transportation sources of three acid rain precursor pollutants (oxides of nitrogen, or NO/sub x/; volatile organic compounds, or VOC, and sulfur dioxide, or SO2) contribute significantly to their atmospheric loading. The main objectives of modeling these emissions for the 1985 National Acid Precipitation Assessment Program (NAPAP) are to (1) develop state-by-state projections of these precursor pollutants and (2) incorporate in the forecasting scheme the capability to model the effects of currently programmed and planned strategies on pollutant loading. The Transportation Energy and Emissions Modeling System (TEEMS) was used to develop the desired projections from NAPAP economic driver outputs. This system is a technology-based modeling package, the activity forecasting module of which has three major components: (1) a local personal-travel model, (2) an intercity passenger travel model, and (3) a freight activity projection model. The emissions module in TEEMS uses US EPA's MOBILE3 model and AP-42 factors to estimate state level emissions from national data. Results from the NAPAP reference scenario indicate an increase in transportation activity at a rapid rate during 1985 to 2000, but at a slow rate during 2000 to 2030. Transportation VOC emissions will fall to 59% of their 19 85 level by 2000 due to government emission regulation, but will increase after 2000. Emissions of NO/sub x/ will drop slightly, to 93% of the 1995 level by 1995, and then grow to 131% of the 1985 level by 2030. This rise is due to the lack of regulation for off-highway vehicles and to greatly increased activity by heavy diesel trucks. Emissions of SO2 will continue to increase for the same reasons, augmented by the rise in sulfur content of residual fuel. DOE

N86-25889# Pacific Northwest Lab., Richland, Wash.
COMPARISON OF A MULTILAYER REGIONAL-SCALE ACID RAIN ASSESSMENT MODEL (MLRAPT) WITH A SINGLE-LAYER ASSESSMENT MODEL, RAPT
W. E. Davis and C. S. Glantz Aug. 1985 24 p refs Presented at the Muskoka Conference: International Symposium on Acidic Precipitation, Toronto, Ontario, 14-18 Sep. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004862; PNL-SA-13028; CONF-850944-4) Avail: NTIS HC A02/MF A01

Uncertainty due to treating transport processes using a single-layer model compared to a multilayer model was examined. MLRAPT uses isentropic layers to characterize advection of SO2 and SO(2-)4 in either a multilayer mode, where both horizontal and vertical transport are calculated, or a single-layer mode, where only horizontal transport is considered. Comparison between the two modes indicated that the average air concentrations were highly correlated (a correlation coefficient of 0.95). However, for wet deposition of SO(2-)4, a correlation coefficient of 0.55 between the two predicted wet deposition fields was obtained. Results of the comparison of the two modes, the observed air concentration fields, and limited comparison of observed and predicted wet deposition have implications on using a single-layer model to develop source/receptor relationships. DOE

N86-25890# Oak Ridge National Lab., Tenn.
ACIDIC DEPOSITION: EFFECTS ON AGRICULTURAL CROPS Final Report, Apr. 1980 - 31 Dec. 1984
D. S. Shriner, J. W. Johnston, Jr., G. E. Taylor, Jr., R. J. Luxmoore, R. K. McConathy, S. B. McLaughlin, A. S. Heagle, R. J. Norby, B. K. Takemoto, and D. T. Dubay May 1985 145 p
(Contract DE-AC05-84OR-21400)
(DE86-004943; ORNL/M-82) Avail: NTIS HC A07/MF A01

The report presents the results of research on soybean response to simulated wet and dry deposition, and field studies of growth, yield, and physiological response to a characterized air quality. Separate abstracts have been prepared for individual papers. DOE

N86-25891# Oak Ridge National Lab., Tenn.
COMPARATIVE EVALUATION OF THE EFFECTS OF ACID PRECIPITATION, NATURAL ACID PRODUCTION AND HARVESTING ON CATION REMOVAL FROM FORESTS
D. W. Johnson Dec. 1985 111 p
(Contract DE-AC05-84OR-21400)
(DE86-005345; ORNL/TM-9706) Avail: NTIS HC A06/MF A01

The effects of acid deposition, natural leaching, and harvesting on base cation export from coniferous forests in Maine, coniferous and deciduous forests in Tennessee, a coniferous forest in South Carolina, a deciduous forest in North Carolina, and coniferous and deciduous forests in Washington were compared. Sulfate dominated leaching in the Tennessee sites, whereas HCO3(-) dominated leaching in the Maine, North Carolina, South Carolina, and Washington sites. Nitrate leaching was negligible in all but a red alder site in Washington where nitrogen fixation resulted in net NO3(-) leaching. Total base cation export by leaching exceeded Ca(2+) + Mg(2+) + K(+) export that results from whole-tree harvesting in most sites. Leaching, however, even as augmented by acid deposition, does not appear to pose an imminent threat

to soil base cation supplies on these sites because soil base cation reserves are very large relative to leaching rates. Some sites showed a net Ca(2+) or K(+) accumulation from atmospheric deposition until they were subjected to whole-tree harvesting. It is concluded that leaching need not cause a net export of all nutrient cations, even if total base cation export is accelerated by acid deposition. DOE

N86-25892# Environmental Protection Agency, Research Triangle Park, N.C. Emission Standards and Engineering Div.
OPACITY PROVISIONS: BACKGROUND INFORMATION FOR PROMULGATED AMENDMENTS Final Report
Dec. 1985 48 p
(PB86-147899; EPA-450/3-85-013) Avail: NTIS
HC A03/MF A01 CSCL 13B

The promulgated opacity provisions require owners or operators of affected facilities that are subject to opacity standards in 40 CFR Part 60 to record and report the opacity of emissions during the initial performance test. These provisions implement Section 114 of the Clean Air Act. GRA

N86-25893# Environmental Protection Agency, Research Triangle Park, N.C. Air and Energy Engineering Research Lab.
HIGH REACTIVITY SORBENTS FOR SO2 CONTROL
D. C. Drehmel, D. A. Kirchgessner, and S. L. Rakes Jan. 1986 45 p refs
(PB86-145794; EPA-600/D-86-009) Avail: NTIS
HC A03/MF A01 CSCL 13B

Studies relating to air pollution control from coal-fired utility boilers show that the primary variable affecting sorbent reactivity at high temperature or at low temperature with water droplets is surface area. For the development of high surface area during furnace injection, some limestones appear to be superior to others and can be selected accordingly. Even more striking are the differences in surface area development and sulfur capture between classes of commercially available sorbents. Dolomitic sorbents generally outperform their calcitic counterparts, and hydrates are clearly preferable to carbonates on the basis of SO2 capture. It has been shown further that sorbents can be modified in a number of ways to enhance their performance. Limestones can be precalcined to high surface areas and injected downstream from the burner to preserve their reactivity. Calcitic materials can be pressure hydrated to increase their reactivity over atmospheric hydrates, and hydration parameters can apparently be adjusted to increase reactivity even further. GRA

N86-25894# National Center for Atmospheric Research, Boulder, Colo.
PRIMARY PHOTOCHEMICAL PROCESSES OF ACROLEIN Final Report
E. P. Gardner, P. D. Sperry, and J. G. Calvert Jan. 1986 104 p refs Sponsored in part by EPA, Research Triangle Park, N.C.
(PB86-145802; EPA-600/3-85/005) Avail: NTIS
HC A03/MF A01 CSCL 07E

Pollutants are removed from the atmosphere in a number of ways: they can react with OH and O3, they can be dry and wet deposited, photodissociate through solar radiation, or they can be biodegraded. The report presents the photodissociation processes of acrolein. Quantum yields of acrolein loss are given. The dominant reactions in the lower troposphere are the formation of C2H4 and CO. Also produced are CH2-CHCHO, H, CH2CH, and HCO radicals but at lower quantum yields. Since the OH attack on acrolein is quite large (1.9 x 10 to the -11th power cu cm/molecules) ambient levels of OH (about 10 the 6th power molecules/cu cm) will remove acrolein very rapidly usually, about 15 hours. Thus, the major loss mechanism of acrolein in the troposphere is through OH attack and the photodissociation process is of negligible importance. GRA

N86-25895# Pacific Environmental Services, Inc., Durham, N.C.
EVALUATION OF CONTROL TECHNOLOGIES FOR HAZARDOUS AIR POLLUTANTS, VOLUME 1 Final Report, Aug. 1984 - Oct. 1985
R. Y. Purcell and G. S. Shareef Feb. 1986 368 p refs Prepared in cooperation with Radian Corp., Research Triangle Park, N.C. (Contract EPA-68-02-3981)
(PB86-167020; EPA-600/7-86/009A) Avail: NTIS
HC A16/MF A01 CSCL 13B

The manual is an aid to EPA regional, state, and local air pollution control agency technical personnel in selecting, evaluating, and developing costs of air pollution control techniques for reducing or eliminating the emission of potentially hazardous air pollutants (HAPs) from industrial/commercial sources. It contains information that should be useful for reviewing permit applications or for informing interested parties as to the type, basic design, and cost of available HAP control systems. Since the definition of a HAP is very broad (encompasses potentially thousands of compounds), it is not possible for the handbook to include an all-inclusive list of HAP compounds and compound-specific control techniques. However, there are only a few available generic air pollution control techniques, and the factors affecting their cost and performance as applied to many noncriteria pollutants have been identified and discussed in the literature. GRA

N86-25896# Environmental Protection Agency, Research Triangle Park, N.C. Environmental Criteria and Assessment Office.
AIR QUALITY CRITERIA FOR OZONE AND OTHER PHOTOCHEMICAL OXIDANTS, EXTERNAL REVIEW DRAFT NO. 2, VOLUME 5
D. H. Horstman, S. M. Horvath, and J. A. Raub Nov. 1985 319 p refs
(PB86-155652; EPA-600/8-84-020B-5) Avail: NTIS
HC A14/MF A01 CSCL 13B

Scientific information is presented and evaluated relative to the health and welfare effects associated with exposure to ozone and other photochemical oxidants. Although not intended as a complete and detailed literature review, the document covers pertinent literature through early 1985. Data on health and welfare effects are emphasized, but additional information is provided for understanding the nature of the oxidant pollution problem and for evaluating the reliability of effects data as well as their relevance to potential exposures to ozone and other oxidants at concentrations occurring in ambient air, information is presented on the following exposure-related topics: nature, source, measurement, and concentrations of precursors to ozone and other photochemical oxidants; formation of ozone and other photochemical oxidants and their transport once formed; properties, chemistry, and measurement of ozone and other photochemical oxidants; and concentrations of ozone and other photochemical oxidants typically found in ambient air. GRA

N86-25897# Environmental Protection Agency, Research Triangle Park, N.C. Environmental Criteria and Assessment Office.
AIR QUALITY CRITERIA FOR OZONE AND OTHER PHOTOCHEMICAL OXIDANTS, EXTERNAL REVIEW DRAFT NO. 2, VOLUME 1
R. M. Adams, H. J. B. Garner, J. A. Graham, D. E. Gardner, and D. H. Horstman Nov. 1985 233 p refs
(PB86-155645; EPA-600/8-84-020B-1) Avail: NTIS
HC A11/MF A01 CSCL 13B

Scientific information is presented and evaluated as it relates to the health and welfare effects associated with exposure to ozone and other photochemical oxidants. Although not intended as a complete literature review, the document covers relevant literature through early 1985. Data on health and welfare effects are emphasized, but additional information is provided for understanding the nature of the oxidant pollution problem and for evaluating the reliability of effects data as well as their relevance to potential exposures to ozone and other oxidants at concentration occurring in ambient air. Information is presented on the following exposure-related topics: nature, source, measurement, and concentrations of precursors to ozone and other photochemical oxidants; formation of ozone and other photochemical oxidants and their transport once formed; properties, chemistry, and measurement of ozone and other photochemical oxidants; and

concentrations of ozone and other photochemical oxidants typically found in ambient air. GRA

N86-25898# American Association for the Advancement of Science, Washington, D.C. Office of Public Sector Programs.
RESEARCH NEEDS IN BIOTECHNOLOGY AND THE ENVIRONMENT Final Report
Nov. 1985 184 p refs Workshop held in Berkeley Springs, W. Va., 29 Apr. - 1 May 1984 Sponsored by EPA
(PB86-158979) Avail: NTIS HC A09/MF A01 CSCL 06B

The report presents the results of a workshop convened by the American Association for the Advancement of Science and the U.S. Environmental Protection Agency to examine research needs in biotechnology and the environment. The workshop was held at Coolfont Conference Center, Berkeley Springs, West Virginia, 29 April - 1 May 1984. Four draft papers prepared by EPA staff on environmental effects, health effects, monitoring and quality assurance and control technologies - served to focus discussions at the workshop. Two of these papers, revised following the workshop, are included in the report. In the two other cases, the workshop review groups, and AAAS and EPA staff determined that supplementary papers by outside individuals were warranted in order to better treat the issues considered at the workshop. The report, therefore, represents a blend of the workshop discussions and papers and work performed subsequently. GRA

N86-25899# Research Triangle Inst., Research Triangle Park, N.C.
MICROCOMPUTER PROGRAMS FOR PARTICULATE CONTROL: DOCUMENTATION Final Report, Jan. - Jun. 1985
M. K. Owen and A. S. Viner Sep. 1985 381 p refs Sponsored by EPA
(PB86-146529; EPA-600/8-85-025A; EPA/SW/DK-86/009A) Avail: NTIS HC A14/MF A01 CSCL 13B

The report describes the development of a set of programs especially for air-pollution related problems. (The phenomenal growth of the microcomputer industry has made it possible for anyone in industry to have a relatively fast and easy-to-use computer. Unfortunately, the specialized software needs of the air pollution community have not been met.) The report describes: microcomputer programs of electrostatic precipitator performance, an implementation of the GCA/EPA baghouse model; an in-stack opacity prediction program; and a plume opacity model. User benefits, hardware/software requirements, and general restrictions are given, as well as brief descriptions of the theoretical models. A sample problem, which gives detailed instructions on how to use the menu and obtain desired results, is included for each program. Author (GRA)

N86-25550# Joint Publications Research Service, Arlington, Va.
DRY VACUUM DISTILLATION DISCUSSED
Yunfu Mei and Naibo Gou *In its* China Report: Science and Technology (JPRS-CST-86-011) 31 Mar. 1986 p 78-84 refs Transl. into ENGLISH from Huaxue Shijie (Shanghai, China), v. 25, no. 9, 20 Sep. 1984 p 334-336 (For primary document see N86-25547 16-31)
Avail: NTIS HC A07/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-25900*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
COMPENDIUM OF METEOROLOGY SCIENTIFIC ISSUES OF 1950 STILL OUTSTANDING
William W. Vaughan Apr. 1986 59 p refs
(NASA-RP-1167; NAS 1.61:1167) Avail: NTIS HC A04/MF A01 CSCL 04A

The Compendium of Meteorology was published in 1951 by the American Meteorological Society. A review was made of the Compendium of Meteorology to identify the studies and future needs which the authors expressed in their papers. The needs as seen by the authors are organized into sections and papers following the format of the Compendium of Meteorology. In some cases the needs they identified are as valid today as they were in 1951. In other cases one will easily be able to identify examples where significant progress has been made. It is left to the individual scientists and scientific program managers to assess whether significant progress has been made over the past thirty-five years on these outstanding scientific issues. Author

N86-25901*# Lunar and Planetary Inst., Houston, Tex.
WORKSHOP ON THE TECTONIC EVOLUTION OF GREENSTONE BELTS (SUPPLEMENT CONTAINING ABSTRACTS OF INVITED TALKS AND LATE ABSTRACTS)
1986 38 p refs Workshop held in Houston, Tex., 16-18 Jan. 1986
(Contract NASw-4066)
(NASA-CR-176621; NAS 1.26:176621; LPI-Contrib-584-Suppl)
Avail: NTIS HC A03/MF A01 CSCL 08G

Topics addressed include: greenstone belt tectonics, thermal constaints, geological structure, rock components, crustal accretion model, geological evolution, synsedimentary deformation, Archean structures and geological faults. For individual titles, see N86-25902 through N86-25910.

N86-25902*# Cambridge Univ. (England). Dept. of Earth Sciences.
GREENSTONE BELT TECTONICS: THERMAL CONSTRAINTS
M. J. Bickle and E. G. Nisbet (Saskatchewan Univ., Saskatoon.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 1-7 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Archaean rocks provide a record of the early stages of planetary evolution. The interpretation is frustrated by the probable unrepresentative nature of the preserved crust and by the well known ambiguities of tectonic geological synthesis. Broad constraints can be placed on the tectonic processes in the early Earth from global scale modeling of thermal and chemical evolution of the Earth and its hydrosphere and atmosphere. The Archean record is the main test of such models. Available general model constraints are outlined based on the global tectonic setting within which Archaean crust evolved and on the direct evidence the Archaean record provides, particularly the thermal state of the early Earth. Author

N86-25903*# Louisiana State Univ., Baton Rouge. Dept. of Geology.
THE ROCK COMPONENTS AND STRUCTURES OF ARCHEAN GREENSTONE BELTS: AN OVERVIEW
Donald R. Lowe and Gary R. Byerly *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 9-13 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Knowledge of the character and evolution of the Earth's early crust is derived from the studies of the rocks and structures in Archean greenstone belts. Ability to resolve the petrologic, sedimentological and structural histories of greenstone belts, however, hinges first on an ability to apply the concepts and procedures of classical stratigraphy. Unfortunately, early Precambrian greenstone terrains present particular problems to stratigraphic analysis. Many current controversies of greenstone belt petrogenesis, sedimentology, tectonics and evolution arise more from an inability to develop a clear stratigraphic picture of the belts than from ambiguities in interpretation. Four particular stratigraphic problems that afflict studies of Archean greenstone belts are considered: determination of facing directions, correlation of lithologic units, identification of primary lithologies and discrimination of stratigraphic versus structural contacts. B.G.

N86-25904*# Geological Survey of Canada, Ottawa (Ontario).
GREENSTONE BELTS: THEIR BOUNDARIES, SURROUNDING ROCK TERRAINS AND INTERRELATIONSHIPS
J. A. Percival and K. D. Card *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 15-18 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Greenstone belts are an important part of the fragmented record of crustal evolution, representing samples of the magmatic activity that formed much of the Earth's crust. Most belts developed rapidly, in less than 100 Ma, leaving large gaps in the geological record. Surrounding terrains provide information on the context of greenstone belts. The effects of tectonic setting, structural geometry and evolution, associated plutonic activity and sedimentation are discussed. Author

N86-25905*# Rand Afrikaans Univ., Johannesburg (South Africa). Dept. of Geology.
GREENSTONE BELTS: THEIR COMPONENTS AND STRUCTURE
J. R. Vearncombe, J. M Barton, Jr., D. D. vanReenen, G. N. Phillips (Witwatersrand Univ., Johannesburg, South Africa), and A. H. Wilson (Natal Univ., Peitermaritzburg, South Africa) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 19-25 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Greenstone sucessions are defined as the nongranitoid component of granitoid-greenstone terrain and are linear to irregular in shape and where linear are termed belts. The chemical composition of greenstones is described. Also discussed are the continental environments of greenstone successions. The effects of contact with granitoids, geophysical properties, recumbent folds and late formation structures upon greenstones are examined. Large stratigraphy thicknesses are explained. B.G.

N86-25906*# Lunar and Planetary Inst., Houston, Tex.
GREENSTONE BELTS ARE NOT INTRACONTINENTAL RIFTS. WHAT THEN ARE THEY? Abstract Only
Kevin Burke, Celal Sengor, and Maden Fakultesi *In its* Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 27-29 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Hundreds of intracontinental rifts with ages between 3.0 and 0 Ga were recognized on Earth. Compressional features are either absent or insignificant in the vast majority of these rifts. Intense compression is the rule in greenstone belts and preservation of regional extensional structures is rare. A common fate of intracontinental rifts is to develop into oceans which are likely to close. Mountain belts mark places where oceans have closed. In contrast to intracontinental rifts both mountain belts and greenstone belts are dominated by compressional structures. It is suggested that greenstone belts are mountain belts marking the places where oceans have closed. The complicated process of ocean closing and the regional complexities recorded in greenstone belts are compared. B.G.

N86-25907*# Saskatchewan Univ., Saskatoon. Dept. of Geological Sciences.
THE WESTERN WABIGOON SUBPROVINCE, SUPERIOR PROVINCE, CANADA: ARCHEAN GREENSTONE SUCCESSION IN RIFTED BASEMENT COMPLEX
G. R. Edwards and D. W. Davis (Royal Ontario Museum, Toronto.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 31-32 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

The Wabigoon Subprovince, interposed between the predominantly metasedimentary-plutonic and gneissic English River and Quetico Subprovinces to the north and south respectively, exposed Archean greenstone and granitoid rocks for a strike length of greater than 700 km. Based on predominating rock types, the western part of the subprovince is divided into two terrains: the northern Wabigoon volcano-sedimentary and pluonic terrain (NWW) and the Wabigoon Diapiric Axis terrain (WDA). Both the NWW and WDA are described according to volcanic sequence, geological faults, chemical composition and evolutionary history. B.G.

N86-25908*# Geological Survey of Canada, Ottawa (Ontario).
A SIMPLE TECTONIC MODEL FOR CRUSTAL ACCRETION IN THE SLAVE PROVINCE: A 2.7-2.5 Ga GRANITE GREENSTONE TERRANE
P. F. Hoffman *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 33 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

A prograding (direction unspecified) trench-arc system is favored as a simple yet comprehensive model for crustal generation in a 250,000 sq km granite-greenstone terrain. The model accounts for the evolutionary sequence of volcanism, sedimentation, deformation, metamorphism and plutonism, observed throughout the Slave province. Both unconformable (trench inner slope) and subconformable (trench outer slope) relations between the volcanics and overlying turbidities; and the existence of relatively minor amounts of pre-greenstone basement (microcontinents) and syn-greenstone plutons (accreted arc roots) are explained. Predictions include: a varaiable gap between greenstone volcanism and trench turbidite sedimentation (accompanied by minor volcanism) and systematic regional variations in age span of volcanism and plutonism. Implications of the model will be illustrated with reference to a 1:1 million scale geological map of the Slave Province (and its bounding 1.0 Ga orogens). B.G.

N86-25909*# Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
GEOLOGICAL EVOLUTION OF THE PIETERSBURG GREENSTONE BELT, SOUTH AFRICA AND ASSOCIATED GOLD MINERALIZATION
M. G. Jones and M. J. deWit (Lunar and Planetary Inst., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts 1986 p 35-36 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

The polyphase history of gold mineralization seen in the Pietersburg greenstone belt is integrated with the geochemical and tectonic evolution of greenstone belts as a whole. The four distinct regional geological settings of gold mineralization are described. B.G.

N86-25910*# Victoria Univ., Wellington (New Zealand). Research School of Earth Sciences.
SYNSEDIMENTARY DEFORMATION AND THRUSTING ON THE EATERN MARGIN OF THE BARBERTON GREENSTONE BELT, SWAZILAND
S. H. Lamb *In* Lunar and Planetary Inst. Workshop on the Tectonic Evolution of Greenstone Belts date p 37-38 refs (For primary document see N86-25901 16-46)
Avail: NTIS HC A03/MF A01 CSCL 08G

Mapping on the eastern margin of the 3.6 to 3.3 Ga Barberton Greenstone Belt NW Swaziland has revealed a tectonic complex which is more than 5 km thick. The area consists of fault bound units made up of three lithological associations. Some of these were affected by four phases of deformation. Fold structures, foliations, and lineations are associated with the deformation. Sedimentation, geological structures, and evolutionary history of the area are explained. B.G.

N86-25911*# National Aeronautics and Space Administration, Washington, D.C.
PRESENT STATE OF KNOWLEDGE OF THE UPPER ATMOSPHERE: AN ASSESSMENT REPORT; PROCESSES THAT CONTROL OZONE AND OTHER CLIMATICALLY IMPORTANT TRACE GASES
R. T. Watson, M. A. Geller (National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.), R. S. Stolarski, and R. F. Hampson May 1986 149 p refs Original

doc. contains color illustrations
(NASA-RP-1162; NAS 1.61:1162) Avail: NTIS HC A07/MF A01 CSCL 04A

The state of knowledge of the upper atmosphere was assessed as of January 1986. The physical, chemical, and radiative processes which control the spatial and temporal distribution of ozone in the atmosphere; the predicted magnitude of ozone perturbations and climate changes for a variety of trace gas scenarios; and the ozone and temperature data used to detect the presence or absence of a long term trend were discussed. This assessment report was written by a small group of NASA scientists, was peer reviewed, and is based primarily on the comprehensive international assessment document entitled Atmospheric Ozone 1985: Assessment of Our Understanding of the Processes Controlling Its Present Distribution and Change, to be published as the World Meteorological Organization Global Ozone Research and Monitoring Project Report No. 16. Author

N86-25912*# Nevada Univ., Reno. Dept. of Geological Sciences.
THE NATURE AND ORIGIN OF MINERAL COATINGS ON VOLCANIC ROCKS OF THE BLACK MOUNTAIN, STONEWALL MOUNTAIN AND KANE SPRINGS WASH VOLCANIC CENTERS IN SOUTHERN NEVADA Semiannual Progress Report, Jul. 1985 - Jan. 1986
James V. Taranik, Donald D. Noble, Liang C. Hsu, and Amy Hutsinpiller Jan. 1986 23 p refs Original contains color illustrations
(Contract NAS5-28765)
(NASA-CR-176805; NAS 1.26:176805) Avail: NTIS HC A02/MF A01 CSCL 08G

Four LANDSAT thematic mapping scenes in southern Nevada were requested at two different acquisition times in order to assess the effect of vegetation on the signature of the volcanic units. The remote sensing data acquisition and analysis portion are nearly completed. The LANDSAT thematic mapping data is of good quality, and image analysis techniques are so far successful in delineating areas with distinct spectral characteristics. Spectrally distinct areas were correlated with variations in surface coating and lithologies of the volcanic rocks. Author

N86-25913*# National Aeronautics and Space Administration, Washington, D.C.
FORMATION OF THE CENTRAL UPLIFT IN METEORIC CRATERS
B. A. Ivanov, A. T. Bazilevskiy, and L. V. Sazonova May 1986 33 p refs Transl. into ENGLISH from Meteoritika, Akademiya nauk SSSR (USSR), no. 40, 1982 p 67-81 Original language document was announced in IAA as A82-47141 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88427; NAS 1.15:88427) Avail: NTIS HC A03/MF A01 CSCL 08G

Data are presented on the sizes of impact craters with central uplifts on the Earth, Moon, and terrestrial planets. It is proposed that the central uplift of the Kara crater in the USSR was formed by impact metamorphism of rocks along a crater having a depth of about 600 meters. A theoretical analysis of the mechanics of hypervelocity impact cratering is used to investigate the features of shock-wave attenuation in the depths of the target and the amount of impact melt formed during this process. An attempt is made to determine the velocity of rock motion during the formation of central uplifts in terrestrial craters. Author

N86-25914# Science Applications International Corp., Arlington, Va.
PLANNING AND CONDUCTING AN INTERNATIONAL SEISMIC DATA EXCHANGE EXPERIMENT AT THE CENTER FOR SEISMIC STUDIES Quarterly Report, 1 Jul. 1984 - 31 Mar. 1985
Carl Romney, Louis Huszar, Gerald A. Frazier, Antoinette Campanella, and Michael A. Tiberio 31 Jan. 1986 308 p refs
(Contract MDA903-84-C-0020)
(AD-A164281; SAIC-86/1025) Avail: NTIS HC A14/MF A01 CSCL 08/11

This report covers preparations for and the conduct of an international seismic data exchange experiment sponsored by the Group of Scientific Experts, U.N. Conference on Disarmament. Seismic data reports from 37 countries were transmitted over circuits of the WMO/GTS. The data were analyzed at centers in Washington, Moscow and Stockholm and epicenter lists were broadcast to participants. The experiment tested a number of aspects of a proposed nuclear test monitoring system. GRA

N86-25915# Physical Dynamics, Inc., Bellvue, Wash.
IMPLEMENTATION OF AN IONOSPHERIC-IMAGE FILE MANAGEMENT, PROCESSING, AND DISPLAY SYSTEM Final Report, 1 Sep. 1981 - 28 Feb. 1985
R. D. Lucas and Robert E. Robins 15 Apr. 1985 38 p refs
(Contract F19628-84-C-0131)
(AD-A164502; PD-NW-85-331R; AFGL-TR-85-0082) Avail: NTIS HC A03/MF A01 CSCL 04/1

This Phase 1 SBIR projet addressed the problem of processing the All-Sky Imaging Photometer (ASIP) images collected in support of ionospheric science programs at AFGL and elsewhere. Hardware and software tools are developed that efficiently transform any image of interest to suitable world coordinates, thus removing the geometric distortions introduced by the ASIP wide-angle lens. Interactive graphical tools are demonstrated for the composite display of multiple, concurrent ASIP images, in geometrically corrected form, with a variety of correlative data from other sensor systems. Such systems might include incoherent-scatter radar, the HILAT satellite, and others. Eighteen black and white photographs are presented showing examples of actual ASIP images and test patterns in both raw and geometrically corrected form. Results demonstrating the resolution requirements of the ASIP data are included. Various aspects of the geometrical transformation and image-enhancement processing are illustrated, and example composite displays with actual ASIP and HILAT data are presented. Phase 1 focused on determining (1) the resolution, sensitivity, and accuracy required to capture digitally the information present in the ASIP imagery and (2) the size of computational problem involved in the requi red image transformations. It is concluded that a properly integrated workstation involving both analog and digital video and microcomputer-based graphical components will provide a powerful and cost-effective vehicle. GRA

N86-25916# Los Alamos National Lab., N. Mex.
EXPERIMENTAL ASPECTS OF ION ACCELERATION AND TRANSPORT IN THE EARTH'S MAGNETOSPHERE
D. T. Young 1985 57 p refs Presented at the Chapman Conference on Ion Acceleration, Wellesley, Mass., 3 Jun. 1985
(Contract W-7405-eng-36)
(DE86-002409; LA-UR-85-3676; CONF-8506196-2) Avail: NTIS HC A04/MF A01

Major particle population within the Earth's magnetosphere has been studied via ion acceleration processes. Experimental advances over the past ten to fifteen years have demonstrated the complexity of the processes. A review is given here for areas where composition experiments have expanded perception on magnetospheric phenomena. DOE

N86-25917# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
VERTICAL TRANSPORT BY CUMULUS CLOUDS
J. K. S. Ching and A. J. Alkezweeny Dec. 1985 8 p refs Prepared in cooperation with Battelle Pacific Northwest Labs., Richland, Wash.
(PB86-144607; EPA-600/D-85-001) Avail: NTIS HC A02/MF A01 CSCL 04A

The exchange process between the mixed layer and the free troposphere by non precipitating cumulus convective clouds is examined based on results of two field experiments conducted in Lexington, Kentucky. The first experiment used SF6 tracer gas released from one aircraft and sampled by another at various levels in and above the mixed layer as well as on the ground.

The results suggest that the cloud convective activity forces cloud layer air back into the mixed layer and into its surface layer. Thus, the layer of turbulent mixing is deeper and more vigorous in the presence of convective clouds, and the turbulence variance statistics near the surface are apt to contain large, but episodic variability localized within the domain of cloudiness. The observation is shown to be a consequence of and a requirement for a net upward flux of pollutants at the top of the mixer layer. GRA

N86-25918# National Center for Atmospheric Research, Boulder, Colo.
ROLE OF THE OCEANS IN THE ATMOSPHERIC CYCLE OF CARBONYL SULFIDE Ph.D. Thesis
J. E. Johnson 1985 153 p refs Prepared in cooperation with Washington Univ., Seattle
(Grant NSF ATM-82-17015)
(PB86-144078; NCAR/CT-93) Avail: NTIS HC A08/MF A01 CSCL 04A

Carbonyl Sulfide (OCS) is both the dominant sulfur gas in the remote troposphere and, along with volcanoes, a major source of sulfur for the stratospheric sulfate layer. Prior to this work the ocean was regarded as a major sink for atmospheric OCS. The purpose of this study has been to assess the magnitude of the global air-sea flux of OCS. The author designed an analtyical system which was centered around a Varian-3700 gas chromatograph with a flame-photometric detector. To increase the sensitivity of the detector, the hydrogen gas for the flame was doped with sulfur hexafloride. Air samples were concentrated in a liquid nitrogen cooled freeze-out loop, then injected into the gas chromatograph. Water samples purged with sulfur-free zero-air were analyzed similarly. The author also built a permeation tube system for chemical standardization. This euipment was taken on two Pacific Ocean cruises to test air and sea-water concentrations of OCS. GRA

N86-25919# National Geophysical Data Center, Boulder, Colo.
EARTHQUAKE AND TSUNAMI DATA SERVICES AND PUBLICATIONS
Dec. 1985 15 p
(PB86-156254; KGRD-15-Rev) Avail: NTIS HC A02/MF A01 CSCL 08G

The National Environmental Satellite, Data, and Information Service (NESDIS) collects, manages, and diseminates the great mass of information produced by the scientific observation of interplanetary space and the physical world. Data activities in seismology, gravity, geomagnetism, marine geology and geophysics, geothermics, and solar-terrestrial physics are directed by the NESDIA National Geophysical Data Center (NGDC) in Boulder, CO. NGDC also provides facilities for World Data Center-A (including the disciplines of Solid Earth Geophysics, Marine Geology and Geophysics, Solar-Terrestrial Physcis, and Glaciology). The products and services in seismology are briefly described. NGDC is a focal point for disseminating historical earthquake data and information to both technical and general users. Author

N86-25920# National Ocean Service, Anchorage, Alaska. Ocean Assessments Div.
OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM. FINAL REPORTS OF PRINCIPAL INVESTIGATORS, VOLUME 34
Aug. 1985 426 p Sponsored by Minerals Management Service
(PB86-150109) Avail: NTIS HC A19/MF A01 CSCL 08G

A compilation is given of three final reports dealing with geologic processes and hazards of the Beaufort and Chukchi Sea Shell and coastal regions: Beaufort and Chukchi, seacoast permafrost studies; and the environmental geology and geomorphology of the Barrier Island-lagoon system along the Beaufort Sea coastal plain from Prudhoe Bay to the Colville River. Fifteen oversized maps are included. Author

N86-25921# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
STATISTICAL MODEL TO ESTIMATE THE REFRACTIVITY TURBULENCE STRUCTURE CONSTANT CARBON SUP 2 SUB n IN THE FREE ATMOSPHERE
J. M. Warnock and T. E. VanZandt Nov. 1985 181 p
(PB86-148749; NOAA-TM-ERL-AL-10) Avail: NTIS HC A09/MF A01 CSCL 04A

The report describes a statistical model that estimates mean values of the refractivity turbulence structure constant (C sub n, sup2) in the stable free atmosphere from standard National Weather Service balloon data or an equivalent data set. A computer program that evaluates the model is also described and listed. The model is based on a statistical turbulent model developed by VanZandt, Gage, and Warnock to interpret VHF Doppler radar echoes. Height profiles of the model (C sub n, sup 2) agree well with measured profiles with a height resolution of about 1km. The program also estimates the mean values of the turbulent energy dissipation rate epsilon but, because of the lack of observations, the computed values of epsilon have not been evaluated sufficiently to be used in routine applications. GRA

N86-25922*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 496, DECEMBER 1985. PART 1: (PROMPT REPORTS). DATA FOR NOVEMBER 1985, OCTOBER 1985 AND LATE DATA
H. E. Coffey, ed. May 1985 105 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176795; NAS 1.26:176795; PB86-156866;
SGD-496-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 03B

Data for November 1985 on IUWDS alert period; solar activity indices, solar flares, solar radio emission, VOSTOK inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field, sudden ionospheric disturbances, cosmic ray measurements, geomagnetic indices, solar radio spectral observations, and calcium plage are presented. B.G.

N86-25923*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 496, DECEMBER 1985. PART 2: (COMPREHENSIVE REPORTS). DATA FOR JUNE 1985, JANUARY-MAY 1985 AND MISCELLANEA
H. E. Coffey, ed. Dec. 1985 68 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176793; NAS 1.26:176793; PB86-156874;
SGD-496-Pt-2) Avail: NTIS HC A04/MF A01 CSCL 03B

Contents include the detailed index for 1985; data for June 1985 (solar flares, solar radio bursts at fixed frequencies, solar X-ray radiation from GOES satellite graphs, mass ejections from the sun, and active prominences and filaments); data for January to May 1985 (solar flares January 1985, solar flares February 1985, solar flares March 1985, solar flares April 1985, solar flares May 1985, and number of flares August 1966 to June 1985); and the international geophysical calendar 1986. Author

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-25924*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESCRIPTION OF DATA ON THE NIMBUS 7 LIMS MAP ARCHIVE TAPE: TEMPERATURE AND GEOPOTENTIAL HEIGHT
Kenneth V. Haggard, Ellis E. Remsberg, William L. Grose, James M. Russell, III, B. T. Marshall (SASC Technologies, Inc., Hampton, Va.), and G. Lingenfelser (Analytical Mechanics Associates, Inc., Hampton, Va.) May 1986 55 p refs
(NASA-TP-2553; L-16071; NAS 1.60:2553) Avail: NTIS HC A04/MF A01 CSCL 04B

The process by which the analysis of the Limb Infared Monitor of the Stratosphere (LIMS) experiment data were used to produce estimates of synoptic maps of temperature and geopotential height is described. In addition to a detailed description of the analysis procedure, several interesting features in the data are discussed

and these features are used to demonstrate how the analysis procedure produced the final maps and how one can estimate the uncertainties in the maps. In addition, features in the analysis are noted that would influence how one might use, or interpret, the results. These include subjects such as smoothing and the interpretation of wave components. While some suggestions are made for an improved analysis of the data, it is shown that, in general, the maps are an excellent estimation of the synoptic fields. Author

N86-25925# Lawrence Livermore National Lab., Calif.
STUDIES OF COMPLEX TERRAIN WIND FLOWS USING ACOUSTIC SOUNDER AND OPTICAL CROSS-WIND REMOTE SENSORS
W. M. Porch, W. Neff, and C. King Aug. 1985 26 p refs
(Contract W-7405-eng-48)
(DE86-002993; UCID-20519; ASCOT-85-2) Avail: NTIS HC A03/MF A01

Remote sensing instrumentation has played an important role in the Atmospheric Studies in Complex Terrain (ASCOT) field experimental program. The goal of this program is to better understand transport and diffusion processes in complex terrain with an emphasis focused on nighttime drainage wind conditions. Two aspects of the instrumentation are discussed: acoustic sounders (Doppler and monostatic) and space averaging optical crosswind sensors. Data from these two sources are discussed and compared with data from conventional tower and tethersonde instrumentation. DOE

N86-25926# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
GENERAL CIRCULATION VARIABILITY, MEDIUM TO LONG-RANGE FORECASTING AND ENERGY INDUSTRY RELATED APPLICATIONS Final Report, 1 Jan. 1983 - 31 Dec. 1985
E. R. Reiter Dec. 1985 14 p
(Contract DE-AC02-76EV-01340)
(DE86-004819; DOE/EV-01340/17) Avail: NTIS HC A02/MF A01

Progress is reported on: establishment of a data base of Sea Surface Temperatures (SST) in North Atlantic and North Pacific and of atmospheric data at constant pressure levels; diagnostic planetary wave patterns on prolonged weather and/or short-term climate anomalies; numerical modeling experiments, involving the application of a simple General Circulation Model (GCM) to an assessment of climate-controlling teleconnections; long-range forecasting tests, involving teleconnections between surface anomalies and planetary wave pattern anomalies; forecast risk assessments, estimating the confidence level to be placed on a long-range forecast; energy-industry related forecasting applications, such as estimates of electric power demands; and user-friendly forecast output design which would allow easy dissemination of forecast products. DOE

N86-25927*# Massachusetts Inst. of Tech., Cambridge. Hydrology and Water Resource Systems.
SPATIAL CHARACTERISTICS OF OBSERVED PRECIPITATION FIELDS: A CATALOG OF SUMMER STORMS IN ARIZONA, VOLUME 1
Neil M. Fennessey, Peter S. Eagleson, Wang Qinliang, and Ignacio Rodrigues-Iturbe Mar. 1986 420 p 2 Vol.
(Grants NAG5-388; NSF ATM-84-20781)
(NASA-CR-176824; NAS 1.26:176824; MIT-R-86-03-Vol-1; MIT-307-Vol-1) Avail: NTIS HC A18/MF A01 CSCL 04B

Eight years of summer raingage observations are analyzed for a dense, 93 gage, network operated by the U. S. Department of Agriculture, Agricultural Research Service, in their 150 sq km Walnut Gulch catchment near Tucson, Arizona. Storms are defined by the total depths collected at each raingage during the noon to noon period for which there was depth recorded at any of the gages. For each of the resulting 428 storms, the 93 gage depths are interpolated onto a dense grid and the resulting random field is anlyzed. Presented are: storm depth isohyets at 2 mm contour intervals, first three moments of point storm depth, spatial correlation function, spatial variance function, and the spatial distribution of total rainstorm depth. Author

N86-25928*# Massachusetts Inst. of Tech., Cambridge. Hydrology and Water Resource Systems.
SPATIAL CHARACTERISTICS OF OBSERVED PRECIPITATION FIELDS: A CATALOG OF SUMMER STORMS IN ARIZONA, VOLUME 2
Neil M. Fennessey, Peter S. Eagleson, Wang Qinliang, and Ignacio Rodriguez-Iturbe Mar. 1986 569 p 2 Vol.
(Grants NAG5-388; NSF ATM-84-20781)
(NASA-CR-176823; NAS 1.26:176823; MIT-R-86-03-Vol-2; MIT-307-Vol-2) Avail: NTIS HC A24/MF A01 CSCL 04B

The parameters of the conceptual model are evaluated from the analysis of eight years of summer rainstorm data from the dense raingage network in the Walnut Gulch catchment near Tucson, Arizona. The occurrence of measurable rain at any one of the 93 gages during a noon to noon day defined a storm. The total rainfall at each of the gages during a storm day constituted the data set for a single storm. The data are interpolated onto a fine grid and analyzed to obtain: an isohyetal plot at 2 mm intervals, the first three moments of point storm depth, the spatial correlation function, the spatial variance function, and the spatial distribution of the total storm depth. The description of the data analysis and the computer programs necessary to read the associated data tapes are presented. B.G.

N86-25929# Range Commanders Council, White Sands Missile Range, N. Mex. Inter-Range Inst. Group.
IRIG STANDARDS FOR RANGE METEOROLOGICAL DATA REDUCTION. PART 2. ROCKETSONDE
Dec. 1985 385 p
(AD-A163634; IRIG-Standard-352-85-Pt-2) Avail: NTIS HC A17/MF A01 CSCL 04/1

The Rocket Reduction Program is designed to process data acquired by standard Loki and Super Loki rocketsondes. This program accepts input data taken from the AN/TMQ-5 record and the strip chart from the MSS Tracking System, a radar and/or AN/GMD-4 Rawin Set, plus co-rawinsonde baseline data. The program processes input data and output as its final product rocketsonde data in readily usable tabular format; card decks, if desired; and rocketsonde message code (ROCOB). The MSS rocketsonde reduction procedure is designed for use with transponder sondes only, such as the PWN-10A. It consists of two programs, Pass 1 and Pass 2. This document is divided into two self-contained sections. Pass 1 of the MSS rocketsonde reduction procedure reduces the wind and temperature data recorded by the MSS realtime program. Output options and surface data are entered by the operator from the display console. This pass produces quality control data, constant altitude data, and two disk files. Pass 2 of the MSS rocketsonde reduction procedure extracts the HAMDATA levels from the intermediate scratch file and the co-rawinsonde file. This pass uses the 1,000-meter constant altitude file and the intermediate scratch file to produce the ROCOB coded message. GRA

N86-25930# Maryland Univ., College Park. Dept. of Meteorology.
RADIATION CLIMATE AND TURBULENCE STRUCTURE OF A TROPICAL DRY EVERGREEN FOREST Final Report, 25 Oct. 1979 - 15 Jun. 1985
R. T. Pinker Nov. 1985 132 p refs
(Contract DAAG29-80-C-0012)
(AD-A164079; SR-85-29; ARO-16755.9-GS) Avail: NTIS HC A07/MF A01 CSCL 04/2

The research under this grant was based on information collected during the TREND (Tropical Environmental Data) experiment conducted during 1967-70 in a tropical forest environment in Southeast Asia. Under this grant, we completed the data reduction process and conducted numerous scientific investigations which dealt with such topics as: radiation climate of the tropical forest; radiative transfer in vegetative canopies; seasonal variation in the radiation balance at canopy/air, ground/air interface;

seasonal turbidity characteristics over the tropical forest; the temporal variation and stability dependence of the turbulence structure above and below the canopy; wind direction shear in the dense, semi-flexible tall vegetation; and variability parameters within and above the canopy, which characterize the dispersion process under different stability and ambient wind conditions. In this report only selected results will be presented. A detailed list of references to publications resulting from this project can be found in Appendix A. Information about the final data products resulting from this project can be found in Appendix B.
Author (GRA)

N86-25931# Air Force Geophysics Lab., Hanscom AFB, Mass.
MODEL VERTICAL PROFILES OF EXTREME RAINFALL RATE, LIQUID WATER CONTENT AND DROP-SIZE DISTRIBUTION Final Technical Report, 1984 - 1985
Paul Tattelman and Paul T. Willis 6 Sep. 1985 43 p refs
(AD-A164424; AFGL-TR-85-0200; AFGL-ERP-928) Avail: NTIS HC A03/MF A01 CSCL 04/2

This report provides a new model of hydrometeors and associated cloud-water content from the surface to 20 km. The model profiles at altitude were developed based on five surface rainfall rates: 36, 84, 168, 432, and 1872 mm/hr. The first three rates correspond to a frequency of occurrence of 0.5 percent, 0.1 percent, and 0.01 percent of the time during the worst month in the most severe area of the world for intense rainfall. The last two are the 42- and 1-min world record rainfalls. The surface rainfall rates were extrapolated aloft using results from previous studies. A large sample of drop-size distributions from intense rainfall collected during reconnaisance of Atlantic hurricanes/tropical storms was analyzed. The data set was normalized and fit by a gamma distribution. This was used to specify the drop-size distributions and liquid water content for rainfall rates specifies at the surface and aloft. Concurrent cloud-water content was estimated. Results are presented at 2-km intervals. Author (GRA)

N86-25932# Naval Postgraduate School, Monterey, Calif.
GEOSTATIONARY SATELLITE ANALYSES OF PRECIPITATION AND CLOUD PARAMETERS M.S. Thesis
Laura A. Spray Dec. 1985 101 p refs
(AD-A164441) Avail: NTIS HC A06/MF A01 CSCL 04/2

Satellite and surface data are used to analyze mesoscale and subsynoptic cloud and precipitation patterns. Digital GOES (Geostationary Operational Environment Satellite) visible and infrared data are used to produce high resolution (4 n mi) satellite analyses of cloud amount, cloud type, cloud-top temperature and height, and precipitation intensity for an approximate 1600 x 1600 n mi area over the northeastern United States and the western North Atlantic Ocean. Conventional surface observations, the Automated Radar Summary chart and manual analysis of the imagery are used to evaluate the satellite-derived analyses for nine cases during the winger and spring 1985. The majority of cloud amount estimates for clear and overcast sky conditions are analyzed correctly; however, broken and scattered skies are underestimated. The general cloud type patterns are depicted accurately. More success occurs with uniform-textured clouds (i.e., nimbostratus, stratocumulus) and multi-layered clouds than with nonuniform-textured clouds (i.e., cirrus, cumulus). The majority of cloud-top temperature/height analyses are representative of the cloud types and patterns. Most atmospheric precipitation areas are identified correctly; however, the intensity of the precipitation is underestimated. GRA

N86-25933# National Bureau of Standards, Gaithersburg, Md.
A THREE-DIMENSIONAL MESOSCALE MODEL FOR THE SIMULATION OF CLOUDS, PRECIPITATION AND AIRFLOW Final Report, 1 Oct. 1983 - 31 Sep. 1985
Everett C. Nickerson 31 Oct. 1985 136 p refs
(AF Proj. 6670)
(AD-A164468; AFGL-TR-85-0307) Avail: NTIS HC A07/MF A01 CSCL 04/2

A simulation of a heavy rainfall event has been carried out over southern France using 2-D Neph data to initialize a meso-alpha model. That model was subsequently run for a period of three hours and the resulting meteorological fields were then interpolated to a smaller grid to provide balanced initial conditions for a meso-beta model with parameterized microphysics. The meso-beta model is shown to be capable of simulating many features of an orographically forced precipitation event, including the temporal and spatial evolution of liquid water, as well as the number concentration (and hence size distribution) of raindrops. The model is especially suited for the simulation of clouds, precipitation, and airflow over complex terrain. GRA

N86-25934# Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF HIGH AND LOW PREDICTABILITY PERIODS IN MEDIUM RANGE FORECASTS M.S. Thesis
John E. Curtis Dec. 1985 75 p refs
(AD-A164495) Avail: NTIS HC A04/MF A01 CSCL 04/2

Medium-range five-day forecasts from the U.S. Navy Operational Global Atmospheric Prediction System (NOGAPS) are investigated to study high and low predictability periods from two winter seasons. Northern hemisphere 500 mb height fields are scored using the anomaly correlation coefficient. An objective method is used to choose high and low scoring periods which are analyzed using height tendencies and wavenumber structure. Results show that it is possible to objectively determine why some high and low periods occurred. Flow characteristics leading to high scoring five-day forecasts include: long wave amplitude decay, transition from meridional to zonal flow, and more meridionally extensive flow patterns. This study revealed that persistence is not a good indicator of model performance, and no appreciable skill difference exists between good and poor five-day forecasts at the 48 hour point. However, no single measure of the flow patterns is found to be a unique indicator of high or low scoring forecasts. Author (GRA)

N86-25935# Washington Univ., St. Louis, Mo.
CLIMATIC TRENDS OVER NORTH AMERICA: POTENTIAL ROLE OF AEROSOLS
R. B. Husar and W. E. Wilson Nov. 1985 21 p refs Sponsored in part by EPA
(PB86-129533; EPA-600/D-85-282) Avail: NTIS HC A02/MF A01 CSCL 04B

The spatial pattern and the trends (1948 to 1980) of several key climatic parameters show that there has been a reduction of the surface noon temperature, over the S.E. United States. During the same time, and over the same region, there was increase of dewpoint, relative humidity, and noon cloud cover. The region over which these changes occurred coincides with the region of most significant increase in haziness (aerosol concentration). However, a cause-effect relationship is not established. GRA

N86-25936# National Oceanic and Atmospheric Administration, Rockville, Md. Fed. Coord. for Meteorol. Svcs./Supporting Res.
NATIONAL HURRICANE OPERATIONS PLAN, MAY 1985
May 1985 84 p
(PB86-148384; FCM-P12-1985) Avail: NTIS HC A05/MF A01 CSCL 04B

The Tropical Cyclone Warning Service is an interdepartmental effort to provide the United States and designated international recipients with forecasts, warnings, and assessments concerning tropical and subtropical weather systems. The National Oceanic and Atmospheric Administration (NOAA) is responsible for providing forecasts and warnings for the Atlantic, and Eastern and Central Pacific Oceans, while the Department of Defense (DOD) provides the same for the West Pacific and Indian Oceans. The procedures and agreements contained herein apply to the Atlantic, Gulf of Mexico, Caribbean, and North Pacific east of the 180th meridian. The plan is intended to define the role of the individual agencies participating in the hurricane warning service when more than one agency is involved in the delivery of service in any specific area. GRA

N86-25937# National Weather Service, Silver Spring, Md. Techniques Development Lab.

AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) - ERA FORECAST VERIFICATION, OCTOBER 1985
D. P. Ruth, R. L. Miller, and M. M. Heffernan Oct. 1985 60 p
(PB86-148319; NOAA-NWS-TDL-CP-85-3) Avail: NTIS
HC A04/MF A01 CSCL 04B

The National Weather Service (NWS) has implemented a national forecast verification system which utilizes the processing and communication capabilities of the Automation of Field Operations and Services (AFOS) system. The AFOS-era forecast verification (AEV) system is a major step in implementing the National Verification Plan (NWS, 1982a) and replaces two existing national verification programs. The software described here creates and maintains the local data base of collated forecasts and observations. It also transmits the locally collected forecasts and observations to NMC. The design of the local, long term archive and the production of local summaries can be adjusted to suit local needs. GRA

N86-25938# National Severe Storms Forecast Center, Kansas City, Mo.
SEVERE LOCAL STORM WARNING VERIFICATION: 1984
P. W. Leftwich and L. A. Grenier Dec. 1985 22 p refs
(PB86-148244; NOAA-TM-NWS-NSSFC-10) Avail: NTIS
HC A02/MF A01 CSCL 04B

Tornado and severe thunderstorm warnings are issued by the local office of the National Weather Service. Routine verification of these warnings is accomplished at the National Severe Storms Forecast Center. Verification procedures and summarized national, regional, and local verification results for the years 1984 are highlighted. Stations in the Central and Southern regions issued most of the warnings and experienced most of the severe local storm events. GRA

N86-25939# National Oceanic and Atmospheric Administration, Seattle, Wash. Marine Environmental Lab.
SEA ICE DYNAMICS AND REGIONAL METEOROLOGY FOR THE ARCTIC POLYNYA EXPERIMENT (APEX)-BERING SEA 1985
C. H. Pease, M. Reynolds, G. A. Galasso, V. L. Long, and S. A. Salo Oct. 1985 129 p
(PB86-148038; NOAA-TM-ERL-PMEL-64) Avail: NTIS
HC A07/MF A01 CSCL 04B

The purpose of the Artic Polynya Experiment (APEX) is to investigate physical processes and thermodynamics in the atmosphere, sea ice, and ocean in the vicinity of St. Lawrence Island in the northern Bering Sea. The relative importance on sea ice motion of baroclinic currents due to brine rejection during the freezing of ice in the polynya, barotropic currents due to set-up on the shelf, internal ice stress due to the presence of St. Lawrence Island, wind stress and Coriolis force are being considered through a measurement and modeling program. GRA

N86-25940# National Weather Service, Kansas City, Mo.
STATISTICAL ANALYSIS OF SHEF (STANDARD HYDROMETEOROLOGICAL EXCHANGE FORMAT) CODING ERRORS
R. S. Cox Jan. 1986 51 p refs
(PB86-145141; NOAA-TM-NWS-CR-78) Avail: NTIS
HC A04/MF A01 CSCL 04B

The Standard Hydrometeorological Exchange Format (SHEF) is used throughout the Centrl Region to facilitate the automatic communication and processing of hydrometeorlogical data essential to the automation of procedures which utilize the data. Software developed to statistically analyze the coding error in SHEF messages encountered during parsing and posting are described. GRA

N86-25941# National Weather Service, Kansas City, Mo.
CLIMATOLOGICAL SUMMARY PROGRAMS F6, CLIMATE, SUMMARY, GETCS
I. F. Schwein Dec. 1985 92 p
(PB86-143948; NOAA-NWS-CRCP-14-Rev) Avail: NTIS
HC A05/MF A01 CSCL 04B

The Climatological Summary Programs F6, Climate, Summary, and GETCS are programs that process daily climatolcgical data and prepare monthly summaries of the data. These programs are described. GRA

N86-25942# National Weather Service, Garden City, N.Y.
COMPARISON AMONG VARIOUS THERMODYNAMIC PARAMETERS FOR THE PREDICTION OF CONVECTIVE ACTIVITY, PART 2
H. M. Stone Dec. 1985 22 p refs
(PB86-142353; NOAA-TM-NWS-ER-69) Avail: NTIS
HC A02/MF A01 CSCL 04B

A multitude of stability indices and thermodynamic parameters is now available for use in forecasting convection and severe weather. The performance of the more commonly used stability indices is well known, but the behavior of some of the more recently developed parameters has not previously been tested. A statistical comparison of the effectiveness of several of these parameters for forecasting various types of convection will be presented in the report. GRA

N86-25943# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-FEBRUARY TO MID-MARCH 1986, VOLUME 40, NUMBER 4, FEBRUARY 14, 1986
14 Feb. 1986 10 p
(PB86-162229) Avail: NTIS HC A02/MF A01 CSCL 04B

The report gives temperature and precipitation probabilities for the monthly and seasonal weather for North America. GRA

N86-25944# National Weather Service, Honolulu, Hawaii.
TROPICAL CYCLONES, 1983, CENTRAL NORTH PACIFIC
W. Au, A. Chun, A. Inouye, H. Rosendal, and T. Yamashiroya Dec. 1985 41 p
(PB86-158185; NOAA-TM-NWSTM-PR-29) Avail: NTIS
HC A03/MF A01 CSCL 04B

The report describes and classifies tropical storms in the Central region of the North Pacific Ocean for 1983. GRA

N86-25945# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
HURRICANE RESEARCH DIVISION, ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY FISCAL YEAR 1985 PROGRAMS: FISCAL YEAR 1986 PROJECTIONS
Jan. 1986 52 p refs
(PB86-158755) Avail: NTIS HC A04/MF A01 CSCL 04B

The Hurricane Research Division (HRD) is NOAA's primary focus for research on hurricanes and tropical meteorology. HRD's research is directed at improved hurricane prediction through improved physical understanding of the structure and dynamics of these storms. Intensive studies of Hurricane Danny were carried out on August 14 and 15. Long-term monitoring aircraft patterns provide data to study the manner in which the hurricane's central core blends into its environment. Collected in Hurricane Elena, from August 28 through September 2, were exceptionally large quantities of valuable data for use in long-term monitoring (hurricane environmental interaction) and vortex evolution studies. GRA

N86-25946# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
FEASIBILITY STUDY ON THE USE OF FIREFINDER RADAR FOR WIND PROFILING
R. G. Strauch, A. S. Frisch, R. A. Kropfli, and B. L. Weber Dec. 1985 67 p refs
(PB86-158417; NOAA-TM-ERL-WPL-128) Avail: NTIS
HC A04/MF A01 CSCL 04B

Firefinder, a microwave battlefield radar used for weapon location, can provide wind information for artillery control in some meteorological conditions. Theoretical considerations and experimental evidence indicates that Firefinder could produce wind measurements at low altitudes in the optically clear atmosphere, in precipitation, and in many clouds, but the radar wavelength is too short for routine wind measurements in the optically clear atmosphere above the boundary layer. GRA

N86-25947# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
PROGRAM FOR REGIONAL OBSERVING AND FORECASTING SERVICES (PROFS), FISCAL YEAR 1985 Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Jan. 1985 33 p refs
(PB86-158110) Avail: NTIS HC A03/MF A01 CSCL 04B

NOAA's Program for Regional Observing and Forecasting Services annual report for fisical '85 contains the following: organizational charts; budget and funding; personnel statistics; exploratory development facility; exploratory development group; analysis and prediction; experimental forecast systems; system design and implementation; and test and evaluation. GRA

N86-25948# National Weather Service, Fort Worth, Tex.
MINIMUM TEMPERATURE FORECAST AID FOR RADIATIONAL COOLING SITUATIONS IN THE LOWER RIO GRANDE VALLEY OF TEXAS
T. M. Hicks Jan. 1986 13 p refs
(PB86-154242; NOAA-TM-NWS-SR-115) Avail: NTIS HC A02/MF A01 CSCL 04B

The Lower Rio Grande Valley of Texas is known for its relatively mild winters. But nonetheless, the area is subject to freezes that can severly damage the citrus, winter vegetable, and sugar cane crops. Freezes in the valley may be classified and advection freezes or radiation freezes-or occasionally a combination of the two. Both are associated with outbreaks of arctic air. However, advection freezes are associated with wind (often strong) and perhaps clouds, while radiation freezes are characterized by clear skies and light or calm wind. The paper offers a forecast equation that is directed toward the radiation type of freeze and other non-freezing radiational cooling situations that affect the valley each year. GRA

N86-25949# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR FEBRUARY 1986, VOLUME 40, NUMBER 3, JANUARY 30, 1986
30 Jan. 1986 10 p
(PB86-155660) Avail: NTIS HC A02/MF A01 CSCL 04B

Temperature and precipitation probabilities for the Northern Hemisphere on a periodic and seasonal basis are presented. GRA

N86-25950# National Weather Service, Silver Spring, Md. Techniques Development Lab.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) ERA FORECAST VERIFICATION
D. P. Ruth, R. L. Miller, and M. M. Heffernan Oct. 1985 52 p
(PB86-152386; NOAA-NWS-TDL-CP-85-3) Avail: NTIS HC A04/MF A01 CSCL 04B

The National Weather Service (NWS) has implemented a national forecast verification system which utilizes the processing and communication capabilities of the automation of field operations and services (AFOS) system. The AFOS-era forecast vertification (AEV) system is a major step in implementing the national verification plan (NWS, 1982a) and replaces two existing national verification programs. The software described in the report, which is implemented at Weather Service Forecast Office, creates and maintains the local database of collated forecasts and observations. It also transmits the locally collected forecasts and observations to NMC. The design of the local, long-term archive and the production of local summaries can be adjusted to suit local needs. GRA

N86-25951# National Weather Service, Silver Spring, Md. Techniques Development Lab.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) TERMINAL FORECAST DECODING
D. J. Vercelli, G. A. Norman, and M. M. Heffernan Oct. 1985 19 p
(PB86-152337; NOAA-NWS-TDL-CP-85-2) Avail: NTIS HC A02/MF A01 CSCL 04B

Terminal forecasts (FT's) are issued by Weather Service Forecast Offices (WSFO's) for approximately 500 airports nationwide. These forecasts are issued both on a scheduled and non-scheduled basis to serve the pre-flight and in-flight meteorological service requirements of domestic aviation operations by providing definitive weather information about cloud heights and amounts, visibility, weather, obstructions to visibility, and wind. This paper describes two FORmula TRANslation (FORTRAN) subroutine programs which together with their subordinate subroutines can be used to decode FT's. GRA

N86-25952# Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
CITPUFF: A GAUSSIAN PUFF MODEL FOR ESTIMATING POLLUTANT CONCENTRATION IN COMPLEX TERRAIN
D. G. Ross, D. G. Fox, D. L. Dietrich, J. E. Childs, and W. E. Marlatt Jul. 1985 30 p
(PB86-150885; FSRP-RM-261) Avail: NTIS HC A03/MF A01 CSCL 04B

CITPUFF, is a puff-type dispersion model that uses a wind field calculated from a complex-terrain wind model. It accommodates a variety of source types including point, area, and line sources; calculates plume rise where applicable; and outputs a graphic display of puff trajectories and concentrations. The model is compared against models currently used for assessing air quality impacts in complex topography. GRA

N86-25953# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORY FISCAL YEAR 1985 REPORT Annual Report
Jan. 1986 69 p
(PB86-150091) Avail: NTIS HC A04/MF A01 CSCL 04B

Presented are the major accomplishments and plans of NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) for fiscal years 1985-86. The mission of NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) is to conduct a basic and applied research program in oceanography and tropical meteorology. The program seeks to understand the physical characteristics and processes of the ocean and the atmosphere, both separately and as a coupled system. Oceanographic investigations center on the fluxes of energy, momentum, and materials through the air-sea interface; the transport and composition (thermal and chemical) of water in the ocean volume; and hydrothermal processes of mineralization at seafloor spreading centers. Meteorological research is carried out to improve the description, understanding, and prediction of hurricanes. The principal focus of these investigations is to provide the knowledge that will ultimately lead to improved prediction and forecasting of severe storms. GRA

N86-25954# National Weather Service, Silver Spring, Md. Techniques Development Lab.
AFOS (AUTOMATION OF FIELD OPERATIONS AND SERVICES) TERMINAL FORECAST DECODING
D. J. Vercelli, G. A. Norman, and M. M. Heffernan Oct. 1985 23 p
(PB86-147360; NOAA-NWS-TDL-CP-85-2) Avail: NTIS HC A02/MF A01 CSCL 04B

Terminal forecasts (FT's) are issued by Weather Service Forecast Offices (WSFO's) for approximately 500 airports nationwide. A regularly scheduled FT is valid for the 24-h period following its issuance. The FT's are prepared manually each day at WSFO's which have FT responsibilities. Once prepared, they are then stored in the local Automation of Field Operations and Services (AFOS) database and transmitted over the AFSO communications circuits. The information in the forecasts can also be used by various applications programs at the local office (e.g., Vercelli and Norman, 1985). To do this, however, the forecasts must first be decoded. The paper describes two formula translation (FORTRAN) subroutine programs which together with their subordinate subroutines can be used to decode FT's. GRA

N86-25955# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

OPTICAL SYSTEM MODEL 4 FOR SPACE-AVERAGED WIND AND C SUB n SUP 2 MEASUREMENTS
G. R. Ochs and W. D. Cartwright Oct. 1985 51 p
(PB86-144086; NOAA-TM-ERL-WPL-52-Rev) Avail: NTIS HC A04/MF A01 CSCL 04B

An optical instrument that measures the path averaged values of the refractive index structure parameter (C sub n, sup 2) and the crosswind over optical paths from 200 to 1500 m. On optimum path lengths of 900 to 1200 m, (C sub n, sup 2) can be measured over a range from 1 x 10 to the 12th power to 1 x 10 to the 16th power (m exp-2/3). Author

N86-25956*# Chicago Univ., Ill. Satellite and Mesometeorology Research Project.
DFW (DALLAS-FT. WORTH) MICROBURST ON AUGUST 2, 1985
T. T. Fujita 1986 162 p
(Grant NGR-14-001-008; Contract NA85AA-DR-064; Grant NSF ATM-81-09828)
(NASA-CR-176794; NAS 1.26:176794; PB86-131638; SMRP-RP-217; LC-85-52386) Avail: NTIS HC A08/MF A01 CSCL 04B

The features of the microburst on August 2, 1985, related to the Delta 191 accident during the approach to Runway 17L of the Dallas-Ft. Worth Airport is described. Both radar and satellite data, along with ground-based measurements, were used in determining the characteristics of the parent cloud which spawned the most complicated microburst winds ever analyzed by the author. The detailed reconstruction of the airflow and the aircraft's maneuver were made possible by a series of computer analyses of the Digital Flight Data Recorder (DFDR) readout. Both measured and computed values in color diagrams that can be evaluated readily by meteorologists, pilots, structural engineers, and other interested persons in preventing microburst-related accidents in future years are presented. Author

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-25957# Skidaway Inst. of Oceanography, Savannah, Ga.
TRACE ELEMENT GEOCHEMISTRY OF THE SOUTH ATLANTIC BIGHT Progress Report
H. L. Windom Dec. 1985 35 p
(Contract DE-AS09-76EV-00890)
(DE86-004004; DOE/EV-00890/T8) Avail: NTIS HC A03/MF A01

Sediment samples collected from over fifty cores from phase 1 have been analyzed for trace metals, carbon and nitrogen and these data have been used to identify dominant phases in which trace elements reside in the sediments. Over half of the box cores collected were also analyzed for excess (210)Pb to determine sedimentation rates which range from 0.44 to 1.44 cm . yr(-1). Particulate samples collected during the Spring Shelf Removal Experiment (SPREX) have been analyzed for trace metals, carbon and nitrogen. DOE

N86-25958# Skidaway Inst. of Oceanography, Savannah, Ga.
TRACE ELEMENT GEOCHEMISTRY OF THE SOUTH ATLANTIC BIGHT Progress Report
H. L. Windom Dec. 1985 48 p refs
(Contract DE-AS09-76EV-00890)
(DE86-004921; DOE/EV-00890/9) Avail: NTIS HC A03/MF A01

This report summarizes work accomplished since 1 December 1984. Studies of nearshore sediment geochemistry have involved the collection of over 100 box cores within the coastal boundary zone. All of the cores have been X-radiographed and peeled to determine stratigraphy and trace element analyses completed. During the past year we participated in SPREX (Spring Removal Experiment) and collected over 100 suspended sediment samples along transects perpendicular to shore in a region where coastal waters are hypothesized to be more efficiently transported across the shelf during the spring. DOE

N86-25959*# National Aeronautics and Space Administration, Washington, D.C.
MONOGRAPH ON PROSPECTIVE DEVELOPMENTS IN OCEANOLOGY
A. S. Monin Jun. 1986 9 p Transl. into ENGLISH from NTA Problemi i Resheniya (USSR), no. 5, Mar. 1986 p 8 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-87983; NAS 1.15:87983) Avail: NTIS HC A02/MF A01 CSCL 08C

Excerpts from a chapter of a monograph, Oceanology in the Year 2000, which has been prepared for publication at the USSR Academy of Sciences' Institute of Oceanology, is presented. The author of this chapter is A. S. Morin, corresponding member of the USSR Academy of Sciences and director of the oceanology institute. The monograph is said to be the collective work of a group of specialists. Monin views prospective developments of oceanology and oceanology related research and development, technology and expedition research. Author

N86-25960# Old Dominion Univ., Norfolk, Va. Dept. of Oceanography.
BIOLOGICAL ACTIVITY AT OCEANIC FRONTS Final Report
William M. Dunstan and Kimberley Davis Dec. 1985 40 p
(Contract N00014-84-K-0283)
(AD-A163006) Avail: NTIS HC A03/MF A01 CSCL 08/3

Oceanic fronts, the sharp transition regions between different water masses, exhibit enhanced biological activity which can: (1) mechanically concentrate and/or sort various plankton and particulate substances, including pollutants; (2) stimulate increased autotrophic and heterotrophic productivity, including red tide conditions; (3) affect behavioral patterns such as diurnal vertical movements of plankton and migration of Oceanic Fishes; (4) juxtapose communities that otherwise would not interact, forming new community assemblages; and (5) limit the distributions of various organisms, serving as biogeographical boundaries. Partial contents: Types of fronts; Particle accumulation; Enhancement of plankton biomass and production; Behavioral responses of nekton; Ecological importance of fronts. GRA

N86-25961# California Univ., Santa Cruz. Center for Coastal Marine Studies.
SMALL AND MESOSCALE PROCESSES IN THE MARGINAL ICE ZONE EXPERIMENT
Theodore D. Foster 1985 3 p refs
(Contract N00014-84-K-0144)
(AD-A164297) Avail: NTIS HC A02/MF A01 CSCL 08/10

The primary objective of the research program is to understand the spatial and temporal behavior of the finestructure in the upper ocean of the marginal ice zone and, in particular, to determine the role that internal waves play in determining the behavior of that finestructure. A secondary objective is to provide high quality temperature and salinity profiles from the surface to the bottom in order to supplement the general hydrography of the region and to provide calibration data for other investigators. GRA

N86-25962# Marine Research Inst., Helsinki (Finland).
INVESTIGATION OF ICE DYNAMICS IN THE MARGINAL ICE ZONE Interim Report, 16 May - 30 Sep. 1985
Matti Leppaeranta 30 Sep. 1985 11 p refs
(Contract DAJA45-83-C-0034)
(AD-A164364; IR-6) Avail: NTIS HC A02/MF A01 CSCL 08/12

MIZEX-83 was a pilot study program in the Greenland Sea where ice kinematics data could be collected for about ten days. Ocean current measurements were simultaneously made beneath the same ice floes as we had transponders for the ice kinematics at three stations. The currents were measured with Aanderaa current recorders giving the mean absolute speed and instantaneous direction at ten-minute intervals. The ice kinematics

data describe relative motion between the stations. Thus in comparing ice and current kinematics we consider the relative motion, i.e., spatial fluctuations of velocity between two stations and the rate of deformation given by the three stations. The active role of ice in the ice-ocean system has a consequence that an ocean dynamics model for the ice margin problems should have an advanced ice dynamics model coupled with it. The ice motion was also measured with Argos satellite buoys. They are very good for measuring trajectories. GRA

N86-25963# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
COASTAL SECCHI DEPTH ATLAS Final Report
Robert A. Arnone Jul. 1985 164 p refs Original contains color illustrations
(AD-A164420; NORDA-83) Avail: NTIS HC A08/MF A01 CSCL 08/10

A seasonal Secchi depth atlas has been developed for the world's coastlines. Optical data have been compiled from data gathered by the National Oceanographic Data Center and from open literature for water depths less than 500 meters. These data have been averaged by one-degree squares, sorted by season, and placed in a category of six classes of Secchi depth ranges. Four charts were used to cover the world at a scale of 1:12,233,000, and four seasons were selected to encompass 3-month intervals. Additionally, annual mean Secchi depths have been compiled in four charts. Secchi depth data were found for approximately 50% of the world's coastlines. In the areas where no optical data were available other oceanographic, meteorologic, and geomorphic data sources were used to estimate the expected Secchi depth ranges. GRA

N86-25964# Naval Postgraduate School, Monterey, Calif.
VARIATION OF FRICTION VELOCITY ACROSS THE SURFACE MARGINAL ICE ZONE IN THE EAST GREENLAND SEA M.S. Thesis
Roberta M. Runge Dec. 1985 92 p refs
(AD-A164497) Avail: NTIS HC A05/MF A01 CSCL 08/12

The Marginal Ice Zone Experiment (MIZEX) took place in the summer of 1984. All data presented are from the 15 June - 15 July time frame of the MIZEX. Of primary concern in the marginal ice zone is the surface stress, which contributes to changing the upper part of the ocean, to ocean eddy formation and dissipation and to ice movement. Investigated are the surface layer wind, temperature and, in particular, the variation of the surface stress in the open water along the marginal ice zone. The stress values were obtained using the dissipation method. These values will be compared to the Large and Pond bulk-formulated drag coefficients, which are open water values. From this comparison, a realistic estimate of atmospheric forcing in the marginal ice zone can be obtained. Author (GRA)

N86-25965# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
FIELD TESTS OF THE KINETIC FRICTION COEFFICIENT OF SEA ICE
Jean-Claude Tatinclaux and David Murdey Oct. 1985 27 p
(AD-A163170; CRREL-85-17) Avail: NTIS HC A03/MF A01 CSCL 08/12

This report presents the results of tests of the ice friction coefficient mu sub k carried out during the May 1984 expedition of the F.S. Polarstern off the coast of Labrador. The test surfaces were Inerta-160-coated steel plates and bare steel plates, hand roughened and sandblasted. The main findings of the studies were: (1) columnar and granular sea ice showed no significant differences in friction coefficient; (2) for columnar ice, mu sub k was independent of ice crystal orientation with respect to test surface; (3) mu sub k was independent of normal pressure applied on ice sample; (4) mu sub k initially decreased with increasing relative velocity between the ice sample and the test surface and reached a steady value at higher speeds; (5) mu sub k increased with increasing surface roughness; (6) a wetting surface exhibited a higher friction coefficient than a non-wetting surface of the same or even higher roughness average. GRA

N86-25966# Naval Postgraduate School, Monterey, Calif.
HYDROGRAPHIC DATA FROM THE OPTOMA PROGRAM, OPTOMA18, 31 OCTOBER AND 2 NOVEMBER 1985 Progress Report, Oct. 1985 - Jan. 1986
Paul A. Wittmann, Marie C. Colton, John J. Rendine, and Christopher N. K. Mooers 17 Dec. 1985 49 p
(AD-A163429; NPS 68-86-001) Avail: NTIS HC A03/MF A01 CSCL 08/10

The OPTOMA (Ocean Prediction Through Observation, Modeling and Analysis) Program seeks to understand the mesoscale (fronts, eddies, and jets) variability and dynamics of the California Current System and to determine the scientific limits to practical mesoscale ocean forecasting. To help carry out the aims of this project, a series of cruises and P3 flights has been planned in two subdomains, NOCAL and CENCAL. Bathythermographic data were acquired with shallow (300m) and deep (700m) AXBT's which were deployed from a Navy P3 aircraft. GRA

N86-25967# National Ocean Service, Rockville, Md.
TIDE TABLES 1986, HIGH AND LOW WATER PREDICTIONS, CENTRAL AND WESTERN PACIFIC OCEAN AND INDIAN OCEAN
Jun. 1985 393 p
(PB86-148434) Avail: NTIS HC A17/MF A01 CSCL 08C

Tide tables for the use of mariners have been published by the National Ocean Service (formerly the Coast and Geodetic Survey) since 1853. The edition of the Tide Tables, Central and Western Pacific Ocean and Indian Ocean contains full daily predictions for 74 reference stations and differences and other constants for about 1,900 stations. It also contains a table for obtaining the approximate height of the tide at any time, a table of local mean time of sunrise and sunset for every 5th day of the year for different latitudes, a table for the reduction of local mean time to standard time, a table for converting feet to meters, a table of the Greenwich mean time of the Moon's phases, apogee, perigee, greatest north and south and zero declination, and the time of the solar equinoxes and solstices, and a glossary of terms. GRA

N86-25968# National Oceanic and Atmospheric Administration, Miami, Fla. Oceanographic and Meteorological Labs.
COMPUTER CODE FOR CALCULATING ACOUSTIC RAY PATHS WITH APPLICATION TO THE STRAITS OF FLORIDA
L. M. Lawson, D. A. Seem, D. R. Palmer, and Y. H. Daneshzadeh Dec. 1985 51 p
(PB86-158391; NOAA-TM-ERL-AOML-62) Avail: NTIS HC A04/MF A01 CSCL 08C

Ocean acoustic tomography is an attractive candidate for monitoring the heat transport in the Florida Current. The feasibiligy of the application of tomography depends on the ability to identify individual ray paths. Although experience shows that paths can be identified with deep ocean propagation, the ray path structure in the Florida Straits is quite different. Here the sound speed is such that a ray path which travels modest distances necessarily experiences bottom bounces. In order to investigate the question of ray path identification, a fast, specialized ray-tracing program was developed. Using the code the authors analyzed the fluctuations in ray path geometry resulting from small perturbations in the bathymetry. The report describes the computer code, and documents the historical data and the numerous ray-tracings calculated for the Florida Straits. GRA

N86-25969# National Ocean Service, Rockville, Md. Office of Oceanography and Marine Assessment.
DIRECTORY OF SELECTED RESEARCH SUPPORTED BY NOAA'S (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION'S) OCEAN ASSESSMENTS DIVISION
M. B. Matta Jan. 1985 147 p
(PB86-150216; NOAA/SR/NOS/OMA-1) Avail: NTIS HC A07/MF A01 CSCL 08A

The purpose of the report is twofold: it is intended to provide both to the general public and to regional waste managers a summary of the research supported by the National Oceanic and Atmospheric Administration's (NOAA) primary marine pollution division, the Ocean Assessments Division (OAD). The research areas are presented alphabetically-biological effects, chemical fates, physical transport and processes, and syntheses of polluting events. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-25970*# California Univ., San Francisco. Contracts and Grants Office.
PHOTOENERGY TRANSDUCTION IN HALOBACTERIUM HALOBIUM Final Report, 1 Jul. 1975 - 31 Oct. 1985
Walther Stoeckenius and Roberto A. Bogomolni 1985 9 p refs (Grant NsG-7151)
(NASA-CR-176673; NAS 1.26:176673) Avail: NTIS
HC A02/MF A01 CSCL 06C

The structure and function of a rhodopsin-like pigment bacteriorhodopsin, discovered and isolated from the membranes of the halophile Halobacterium halobium, were studied. Intermediatesm appearing in the cyclic photoreaction that drives the proton translocation, were spectroscopically characterized. The charge translocation in membrane monolayers and mulitlayers placed between electrodes were kinetically resolved. A model was developed for the proton translocation process, in which the isomerization of the retinal Schiff base decreases its pK to drive the proton off and simultaneously changes the connectivity from the cytoplasmic surface to the external surface. The stoichiometry of proton pumping in intact cells and the effect of the light generated electrochemical potential on the kinetics of the photoreaction cycle and the synthesis of ATP were investigated. B.G.

N86-25971*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGES: INDEX TO ISSUES 1-4
Ronald Teeter and Lydia Razran Hooke Jun. 1986 78 p refs (Contract NASw-3676)
(NASA-CR-3922(06); NAS 1.26:3922(06)) Avail: NTIS
HC A05/MF A01 CSCL 06C

This document is an index to issues 1 to 4 of the USSR Space Life Sciences Digest and is arranged in three sections. In section 1, abstracts from the first four issues are grouped according to subject; please note the four letter codes in the upper right hand corner of the pages. Section 2 lists the categories according to which digest entries are grouped and cites additional entries relevant to that category by four letter code and entry number in section 1. Refer to section 1 for titles and other pertinent information. Key words are indexed in section 3. Author

N86-25972# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE FIRST CORTICAL IMPLANT OF A SEMICONDUCTOR MULTIELECTRODE ARRAY. VER (VISUAL EVOKED RESPONSES) AND PROPAGATION ANALYSIS M.S. Thesis
Philip B. Fitzjarrell and Ronald L. Small Dec. 1985 185 p refs
(AD-A164015; AFIT/GE/ENG/85D-15) Avail: NTIS
HC A09/MF A01 CSCL 05/10

This thesis reports results of the analysis of data collected from the first cortical implant of an electrode array on the primary visual cortex of a laboratory beagle. No evidence of visual evoked responses (VERs) was found in the data by summation and averaging techniques. Spatial correlation results indicate support of the hyper-column theory. Spatio-temporal correlation results indicate EEG signal propagation among the cortical columns under the array. Lack of any classic VER findings may be due to data digitization errors. Major recommendations include redigitization of the beagle data, as well as procedures for future chip implants and analyses using the Masscomp MC-500 computer. Author (GRA)

N86-25973# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHOSPHOROBACTERIN AND ITS EFFECTIVENESS
Ye. N. Mishustin 30 Jan. 1986 60 p refs Transl. into ENGLISH from Izvestiya Timiryazevskoy Sleskokhozyaystvennoy Akademii (USSR), no. 4, 1967 p 65-83
(AD-A164508; FTD-ID(RS)T-1432-84) Avail: NTIS
HC A04/MF A01 CSCL 02/1

As a result of works, carried out in institute of agricultural microbiology All-Union Academy of Agricultural Sciences proposed as bacterial fertilizing preparation, phosphorobacterin, which contains culture of spore-forming bacterium Bac. megaterium. This microorganism is capable to destroy organophosphorus compounds and to covert them into the form accessible to plants. Under field conditions phosphorobacterin, i.e., the preparation containing Bac. megaterium, slightly increases the yield of farm crops. According to the data of experimental institutions, the average increase in yield is about 10%. The available data show that phosphorobacterin is more effective on the soils where phosphotoacid fertilizers were applied. This gives rise to doubt as to the thesis that phosphorobacterin mainly improves phosphorus nutrition of plants. One may also consider it proved that Bac. megaterium has not any active propagation on the root surface and in the rhisosphere of plants. This fact makes one give up the theory of R.A. Menkina, the author of phosphorobacterin, about the nature of the relationship between higher plants and Bac megaterium. The available data makes one believe that the effect of phosphorobacterin is due to the presence in Bac. megaterium culture of a number of a biologically active substances stimulating the first stages of the development of bacterial plants. GRA

N86-25974# Department of the Navy, Washington, D. C.
BIOSENSORS FROM MEMBRANE PROTEINS RECONSTITUTED IN POLYMERIZED LIPID BILAYERS Patent Application
Paul Yager, inventor (to Navy) Filed 23 Aug. 1985 18 p
(AD-D012160; US-Patent-Appl-SN-768650) Avail: NTIS
HC A02/MF A01 CSCL 06/1

It is an object of the present invention to provide a polymerized lipid membrane which extends the longevity and durability of lipid bilayers used in bioensors. It is another object of this invention to provide a device which is portable and can be used in the field. Another object of the present invention is to provide a quick and easy method for producing rugged biochemical sensors. These and other objects are achieved by extracting membrane proteins from biological cells, reincorporating the proteins into a lipid bilayer contacting the bilayer, containing the membrane proteins with the environment containing the stimulus, and measuring the change in voltage or conductivity across the bilayer. The voltage or conductivity change indicates the presence of the stimulus and the magnitude of the voltage or conductivity change indicates the amount of the stimulus present. The polymerized lipid membrane provides a rugged support for the proteins that function to sense molecules in the external environment. The acetylcholine receptor protein is purified by affinity chromatography reincorporated into lipid vesicles of polymerized lipids, and mounted on a glass microelectrode to produce a lipid bilayer containing the reincorporated proteins. One electrode from the silver-silver chloride pair is mounted on each side of the bilayer. The electrodes can measure the change in current across the bilayer when the acetylcholine receptor protein is effected by cholinergic agonists. GRA

N86-25975# Department of the Navy, Washington, D. C.
MAGNETIC SEPARATION DEVICE Patent Application
George M. Starken, J. Cavin, Richard A. Quinnell, Charles A. Twigg, and Duncan P. Crawford, inventors (to Navy) Filed 25 Sep. 1985 28 p refs
(AD-D012163; US-Patent-Appl-SN-780123) Avail: NTIS
HC A03/MF A01 CSCL 06/12

This invention pertains to magnetic separation devices and more particularly to; magnetic separation devices used to selectively

remove magnetic bead-coated cells from tissues such as bone marrow or blood. Depletion of cell populations from boner marrow has been mainly approached using antibodies conjugated to toxins such as ricin or with antibodies complement to effect lysis of the target cells. These techniques have several disadvantages including difficulty in measuring the selective cell kill in the marrow, non-specific toxicity of either toxins or complement, and the necessity to prepare large amounts of complement. In addition, many antibodies are neither cytotoxic with complement nor toxin conjugates. Polymeric microspheres conjugated to antibodies have been used to probe the cell surface for receptor sites using scanning electron microscopy. Iron-containing polymeric microspheres tagged with fluroescent dyes conjugated to antibodies were used to separate red blood cells and lymphoid cells by binding the antibody-microsphere to selected cells and exposing the cell population to a magnetic field. Over 99% of the bound cells were attracted by the magnet. GRA

N86-25976# Ottawa Univ. (Ontario). Dept. of Electrical Engineering.
STUDIES OF THE ELECTRIC FIELD DISTRIBUTION IN BIOLOGICAL BODIES. EXPERIMENTAL DOSIMETRY AT RADIOFREQUENCIES Final Report, Dec. 1981 - Sep. 1985
Stanislaw S. Stuchly and Maria A. Stuchly 5 Dec. 1985 70 p refs
(Contract N00014-82-G-0011)
(AD-A163156) Avail: NTIS HC A04/MF A01 CSCL 06/18

The objective of the project was to develop and evaluate a computer-controlled system for measurements of the spatial distribution of the specific absorption rate (SAR) in biological bodies and to perform measurements on a model of the human body, with particular emphasis on exposures in the near-field of antennas. Far-field exposures at frequencies above 160 MHz, in spite of large gradients, local values of the SAR are only about 20 times higher than the whole-body average SAR for homogeneous models of human body. However, an additional increase by a factor of 4 to 5 can be anticipated at interfaces of high water content tissues with air (gas) pockets and low water content tissues. The existence of large gradients and high local SARs, as confirmed by our results, further supports an accepted view that biological effects at relatively low average SARs are due to thermal interactions. For humans, high SARs occur in the neck, and the ratio of the SAR in the neck to the whole-body average increases with frequency. Near-field exposures, based on the experimental findings we believe that because of the spatial pattern of energy deposition, the whole-body average SAR is not an adequate dosimetric measure for near-field exposures. GRA

N86-25977# Los Alamos National Lab., N. Mex.
DNA ANALYSIS OF EPITHELIAL CELL SUSPENSIONS
J. S. Wilson, N. F. Johnson, and L. M. Holland 1985 22 p refs
Presented at the Hanford Life Sciences Symposium, Richland, Wash., 21 Oct. 1985
(Contract W-7405-eng-36)
(DE86-002403; LA-UR-85-3568; CONF-8510225-1) Avail: NTIS HC A02/MF A01

Cell suspensions of skin were obtained by animals exposed by skin painting of several crude oils. DNA analysis of these cell suspensions labeled with mithramycin provide determination of percentages of cells in the G1, S and G2M phases of the cell cycle. Data acquired showed differences from control animals occurring as early as 7 days after treatment and persisting through 21 days afterwards. There was histological evidence of erythema and hyperplasia in shale oil-exposed skins. Flow cytometric analysis of DNA content in shale-oil-exposed skin cells showed an increased percentage of cycling cells plus evidence of aneuploidy. Similar data from simply abraded skin showed increased percentages of cycling cells, but no aneuploidy. The shale-oil-exposed group, when compared to a standard petroleum-exposed group, had significantly increased percentages of cycling cells. This early indication of differing response to different complex mixtures was also seen in long-term skin exposures to these compounds. Similar analytical techniques were applied to tracheal cell suspensions from ozone-exposed rats. DOE

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-25978*# Good Samaritan Hospital and Medical Center, Portland, Oreg. Dept. of Neuro-otology.
NORMAL AND ABNORMAL HUMAN VESTIBULAR OCULAR FUNCTION Final Technical Report
Robert J. Peterka and F. Owen Black May 1986 66 p refs
(Contract NCC9-8)
(NASA-CR-176820; NAS 1.26:176820) Avail: NTIS HC A04/MF A01 CSCL 06P

The major motivation of this research is to understand the role the vestibular system plays in sensorimotor interactions which result in spatial disorientation and motion sickness. A second goal was to explore the range of abnormality as it is reflected in quantitative measures of vestibular reflex responses. The results of a study of vestibular reflex measurements in normal subjects and preliminary results in abnormal subjects are presented in this report. Statistical methods were used to define the range of normal responses, and determine age related changes in function. Author

N86-25979# Army Research Inst. of Environmental Medicine, Natick, Mass.
AEROBIC CAPACITY AND CORONARY RISK FACTORS IN A MIDDLE-AGED ARMY POPULATION AD-A163998 HC A02/MF A01
John F. Patton, James A. Vogel, Julius L. Bednek, Jr., Donald Alexander, and Ronald Albright Jan. 1986 23 p refs
(Contract USRIEM-M-10/86)
(AD-A163998) Avail: NTIS HC A02/MF A01 CSCL 06/14

The purpose of this study was to assess the relationship between coronary risk factors (CRF) and aerobic capacity measured by the direct determination of oxygen uptake during maximal exercise testing. Subjects comprised 295 male Army personnel (40 to 53 years of age) who underwent multiple serial screening procedures to include a medical and physical evaluation, calculation of a Framingham risk factor index (RI) and a graded treadmill exercise test (GXT) with the determination of peak oxygen uptake (pVO sub 2). CRF included resting systolic (SBP) and diastolic (DBP) blood pressures, total cholesterol (TC), HDL-C, triglycerides (TRIG), fasting blood sugar (FBS), smoking history, resting ECG, and percent body fat (% BF). The results, although cross sectional, imply that a high level of aerobic capacity is associated with lower coronary risk factors. GRA

N86-25980# Army Research Inst. of Environmental Medicine, Natick, Mass.
FITNESS AND ACTIVITY ASSESSMENTS AMONG US ARMY POPULATIONS: IMPLICATIONS FOR NCHS GENERAL POPULATION SURVEYS
James A. Vogel Jan. 1986 66 p refs
(AD-A164060; USARIEM-M-11/86) Avail: NTIS HC A04/MF A01 CSCL 06/14

The military forces of this country represent the largest population for which physical fitness is routinely assessed. Field measures of aerobic power, muscle strength and muscular endurance, along with body weight, are measured twice yearly in the U.S. Army through age 60. Field measures are defined as those conducted by army units without the aid of equipment or indoor facilities. The purpose of these periodic fitness evaluations is both as an indicator of the adequacy of training to meet performance goals as well as a motivator to the individual to train and improve their fitness level. In addition to these periodic field measures, extensive population surveys of laboratory-measured fitness and activity assessment have been made in a wide variety of Army units over the past ten years by the Exercise Physiology

Division, US Army Research Institute of Environmental Medicine. These assessments have been part of an ongoing research program to study factors influencing fitness in the Army. This chapter presents a description of the survey methods and sample data from both approaches. GRA

N86-25981# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF POTENTIAL PREDICTIVE PARAMETERS OF MOTION SICKNESS USING A COMPUTERIZED BIOPHYSICAL DATA ACQUISITION SYSTEM M.S. Thesis
Norman R. Jarvis and Charles T. Uyeda, Jr. Dec. 1985 254 p refs
(AD-A164099; AFIT/GSO/ENG/85D-1) Avail: NTIS HC A12/MF A01 CSCL 06/5

A computerized biophysical data acquisition system was refined and used to collect biophysical data on human volunteer subjects to examine effects of coriolis induced motion sickness. Redesigned sensors to measure electrical cardiac activity, cardiac chest rebound, abdominal/thoracic respiration, peripheral pulse blood volume, facial pulse blood volume, skin temperature, gastric/intestinal activity, nystagmus, and brain wave activity were incorporated with commercially available sensors for galvanic skin response, heart rate, and blood pressure to thoroughly measure the subject's vital signs. Subjects were rotated in a multiaxis motion chair and data collected for later analysis. Data were collected on paper strip chart recorders in parallel with a MASSCOMP MC500 minicomputer. The MASSCOMP data acquisition system software was refined with better documentation to allow data replay. GRA

N86-25982# Kentucky Univ., Lexington. Research Lab.
ULTRASONIC QUANTIFICATION OF BLOOD VOLUME REDISTRIBUTION UNDER HYPERGRAVITY Final Report, Feb. 1981 - Sep. 1985
Pramode K. Bhagat and David R. Brown 15 Jan. 1986 67 p refs
(Contract N00014-85-K-0325)
(AD-A164379) Avail: NTIS HC A05/MF A01 CSCL 06/19

In the operation of high performance aircraft, operational crews are often subject to high sustained + or - GZ acceleration. The response of the human cardiovascular system to these acceleration forces has been the object of considerable research. Numerous techniques have been used to measure important parameters of cardiovascular function; however, plethysmographic measurements of blood volume shifts have not been possible during exposure to hypergravity because of unavoidable tissue deformation. Such measurements have added significantly to understanding of the cardiovascular response to postural shifts and to zero-g. A multi-channel instrument has been developed which employs multiple ultrasonic depth measurements to determine the volume of blood contained in the various compartments of the circulation during exposure to hypergravity on a centrifuge. These volume measurements can be used to study the time course and quantity of blood shifts produced by exposure to selected acceleration profiles and physiological manipulations, including anti-G suit inflation. The data obtained should provide improved understanding of basic cardiovascular physiology and of the relative effectiveness of various anti-G devices. GRA

N86-25983# California Univ., Irvine. Dept. of Community and Environmental Medicine.
COMPARATIVE BIOCHEMISTRY AND METABOLISM. PART 2: NAPHTHALENE LUNG TOXICITY Annual Report, Jun. - Dec. 1984
Paul R. Richieri and Alan R. Buckpitt Nov. 1985 38 p
(Contract F33615-80-C-0512)
(AD-A163144; AAMRL-TR-85-069) Avail: NTIS HC A03/MF A01 CSCL 06/20

The studies reported in this document were to quantitatively examine the diffusion of naphthalene oxide and reactive metabolites form naphthalene in suspensions of isolated mouse hepatocytes and to determine whether the efflux of these metabolites was dependent upon the depletion of intracellular glutathione. The efflux of naphthalene oxide from intact hepatocytes was monitored in incubations containing 3H-glutathione (this tripeptide will not cross the intact hepatocellular membrane) and was based on the measurement of 3H-labelled glutathione adducts. Between 17 and 35% of the total naphthalene oxide formed during the metabolism of naphthalene in the cell was trapped on the exterior of the cell with 3H-glutathione. The fraction of epoxide exiting the hepatocytes as a percentage of the total amount formed did not vary with increasing naphthalene concentrations between 0.005 and 1.5 mM. These data in conjunction with the studies showing that incubation of hepatocytes with naphthalene at concentrations of 0.05 mM or greater caused a significant depletion of intracellular glutathione, suggested that the quantity of naphthalene oxide diffusing as a percentage of the total formed was not dependent upon the intracellular glutathione status. In contrast, the ration of extracellular vs i ntracellular covalent binding was dependent on the concentration of naphthalene in the incubation. GRA

N86-25984# California Univ., Irvine, Dayton, Ohio.
ACUTE TOXICITY STUDIES ON 2 AIR FORCE HYDRAULIC FLUIDS (MLO 82-233 AND MLO 82-585) Technical Report, Apr. 1983 - Mar. 1984
E. R. Kinkead, J. R. Hotron, C. L. Gaworski, and R. A. Salomon Nov. 1985 22 p
(Contract F33615-80-C-0512)
(AD-A163174; AAMRL-TR-85-070) Avail: NTIS HC A02/MF A01 CSCL 06/20

This report describes results of investigations into the acute toxic properties of two operational Air Force hydraulic fluids, MLO 82-233 and MLO 82-585. Various routes of administration were investigated including inhalation, dermal, and oral in rats, guinea pigs, rabbits, and chickens. No acute toxicity occurred in rats with either hydraulic fluid as a results of oral or inhalation exposure at the maximum concentration tested. Dermal exposure of rabbits resulted in no mortalities with either hydraulic fluid. One hydraulic fluid, MLO 82-585, was found to be a moderate skin irritant but neither fluid caused ocular irritation nor did they produce a sensitization response in guinea pigs. Neither fluid would be considered to be a delayed neurotoxin. Author (GRA)

N86-25985# California Univ., Irvine, Dayton, Ohio.
THE EXPERIMENTAL DETERMINATION OF SAFE ATMOSPHERIC EXPOSURE CONCENTRATIONS OF JP-10 JET FUEL Final Technical Report, Jun. 1978 - Jun. 1984
C. C. Haun, E. R. Kinkead, E. H. Vernot, J. D. MacEwen, and R. H. Bruner Nov. 1985 25 p
(Contracts F33615-76-C-5005; F33615-80-C-0512)
(AD-A163179; AAMRL-TR-85-072) Avail: NTIS HC A02/MF A01 CSCL 06/20

Four animal species were exposed for 1 year to 100 ppm (556 cu mg/m) JP-10 to determine its long-term toxic and oncogenic effects. Rats, mice, and hamsters were maintained for 1 year postexposure, while dogs were held for 5 years postexposure. Mean body weights of exposed hamsters and male rats were lower than controls during exposure. Weight recovery occurred in hamsters, but not in male rats during postexposure phase of the study. Significant JP-10 exposure related effects were renal tubular nephrosis together with an increase in benign and malignant renal cell tumors in male rats. Author (GRA)

N86-25986# Los Alamos National Lab., N. Mex.
TOXICOLOGICAL STUDY OF NTO
J. E. London and D. M. Smith Sep. 1985 8 p refs
(Contract W-7405-eng-36)
(DE86-003296; LA-10533=MS) Avail: NTIS HC A02/MF A01

The acute oral LD50 values for NTO for mice and rats are greater than 5 g/kg. According to classical guidelines, the test material would be considered only slightly toxic or practically nontoxic in both species. Skin application studies with NTO in rabbits demonstrated that it was mildly irritating cutaneously. With the scoring scheme, the rabbit eye test was considered negative; however, transient conjunctival and corneal irritation did result from the NTO application in several animals and one developed a chronic

anterior uveitis. The material did not induce sensitization in the intradermal guinea pig assay. DOE

N86-25987# National Center for Health Services Research and Health Care Technology Assessment, Rockville, Md.
CARDIOKYMOGRAPHY
E. Feigenbaum 1985 9 p refs
(PB86-193790; NCHSR-85-127; Rept-10) Avail: NTIS HC A02/MF A01 CSCL 06L

Cardiokymography (CKG) is a non-invasive test to detect stress induced motion abnormalities of the anterior left ventricular wall of the heart for coronary artery disease (CAD). CKG involves translation of heart wall motion into a variable electrical signal that is recorded in graphic form. It may be affected by chest wall motion, systolic rotation of the ventricle, or patient movement. The tracing is a summation of cardio-thoracic movement in the area under the trancuducer. The utility of CKG in detecting CAD remains equivocal. Reassessment of CKG has disclosed that adequate scientific data are lacking with respect to the diagnostic effectiveness of this technology. At the present time cardiokymorgraphy continues to be considered investigational, when used as a method of diagnosing ischemic heart disease. GRA

N86-25988# National Academy of Sciences - National Research Council, Houston, Tex.
EMERGENT TECHNIQUES FOR ASSESSMENT OF VISUAL PERFORMANCE Final Report
Jun. 1985 77 p refs
(Contract N00014-80-C-0159)
(PB86-144755) Avail: NTIS HC A05/MF A01 CSCL 06P

Psychophysical research has revealed in recent years that traditional measures of visual acuity and visual field only partially characterize the information processes of the human observer. A survey of recent psychophysical research that has the potential for broadening conventional assessment of visual function is provided. Areas of practice to which such psychophysical research techniques might be applied, are identified. GRA

N86-25989# Texas Univ. Health Science Center, Houston. School of Public Health.
HEALTH EFFECTS OF AMBIENT OZONE EXPOSURE IN VIGOROUSLY EXERCISING ADULTS
B. J. Selwyn, T. H. Stock, D. E. Jenkins, D. J. Kotchmar, and R. S. Chapman Jan. 1986 21 p refs Sponsored by Health Effects Research Lab. Prepared in cooperation with Baylor College of Medicine, Houston, Tex.
(Grant EPA-CR-807108)
(PB86-156940; EPA-600/D-86-033) Avail: NTIS HC A02/MF A01 CSCL 06E

The purpose of the analysis was to examine the association of changes in ambient ozone concentrations with changes in the pulmonary function (PFT) of healty adults after exercising vigorously outdoors. During May-October, 1981, 24 community residents (men and women) ran three miles twice a week some time between 4:30 and 6:30 P.M. at a high school track near Houston, Texas. An air monitoring trailer stood beside the track and monitored environmental variables continuously. The continuously measured environmental variables in this analysis (ozone, temperature, and relative humidity) were averaged over 15 minute intervals. Standard forced expiratory maneuvers were performed before and after each run. Exercise exertion was standardized. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-25990# Minnesota Univ., Minneapolis. Computerized Adaptive Testing Lab.
PROCEEDINGS OF THE ITEM RESPONSE THEORY AND COMPUTERIZED ADAPTIVE TESTING CONFERENCE Final Report
David J. Weiss Apr. 1985 382 p Conference held at Wayazata, Minn., 27-30 Jun. 1982
(Grant N00014-82-G-0061)
(AD-A163040) Avail: NTIS HC A17/MF A01 CSCL 05/10

This report is the Proceedings of the 1982 Item Response Theory and Computerized Adaptive Testing Conference held July 27-30, 1982 at the Spring Hill Conference in Wayzata, Minnesota. These Proceedings include all papers presented at the conference and discussions of these papers by the scheduled discussants. The papers are organized into the following sessions: (1) Development in Latent Trait Theory; (2) Parameter Estimation; (3) Multidimensional Item Response Theory; (4) Estimating Parameters with the E-M Algorithm; (5) Unidimensionality and Robustness; (6) Adaptive and Sequential Testing; (7) Latent Trait Models forSpecial Applications; and (8) Applications of Computerized Adaptive Testing. GRA

N86-25991# Air Force Human Resources Lab., Brooks AFB, Tex.
THEORY-BASED COGNITIVE ASSESSMENT Interim Paper, Oct. 1984 - Sep. 1985
Patrick C. Kyllonen Jan. 1986 35 p refs
(AD-A164083; AFHRL-TP-85-30) Avail: NTIS HC A03/MF A01 CSCL 05/10

This paper reviews the theoretical foundations, current issues, and a number of recent studies in the area of cognitive ability assessment, with particular focus on personnel selection and classification applications. A brief review of the history of aptitude testing is provided, with particular emphasis on the cognitive psychology, along with the availability of modestly priced microcomputer systems, hold promise for improvements in ability assessment technology. Recent studies conducted at the Air Force Human Resources Laboratory as part of the Learning Abilities Measurement Program and similar projects are reported. The focus of these studies has been on determining (1) the utility of various cognitive tasks for providing meaningful information on individual cognitive skill levels, (2) whether such tasks tap abilities not measured by currently operational paper-and-pencil tests, and (3) how changes in processing efficiency can be analyzed. Cognitive diagnostic as well as selection-and-classification applications are discussed. GRA

N86-25992# Engineering Research Associates, Inc., Vienna, Va.
SCHEMA-BASED THEORY OF INFORMATION PRESENTATION FOR DISTRIBUTED DECISION MAKING Interim Report
David F. Noble and Joseph A. Truelove Aug. 1985 120 p refs
(Contract N00014-84-C-0484)
(AD-A163150; R-028-85) Avail: NTIS HC A06/MF A01 CSCL 05/10

The Schema-Based Theory of Information Presentation for Distributed Decision Making describes a schema structure appropriate for understanding connections between the way that information is presented and its impact on distributed decision making. The theory suggests a process for determining how information should be presented so that consensus and coordination will be improved and decision conflicts will be reduced. The theory proposes that experienced decision makers select alternatives by mental processes that match the features of the current situation to features of reference situations for which possible alternatives are known to be appropriate. These reference situations may specify particular threat activities and dispositions, own Battle Group objectives, prescribed contingency plan action, and decision behavior of other decision makers to the group. Information presented according to the principles derived from the theory will encourage each decision maker to more fully consider the impact of each action on the objectives of other decision makers. Applying the principles requires that the general schema used by decision makers be determined prior to the time when particular situation-specific information is presented. Given this prior determination, the principles sugg est what emphasis needs to be given to specific features and feature relationships in the presentation of the current situation. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-25993# School of Aerospace Medicine, Brooks AFB, Tex.
A SMALL OXYGEN CONCENTRATOR Final Report, Jun. 1983 - Jul. 1984
Clarence F. Theis, Kenneth G. Ikels, and Roland G. Dornes Dec. 1985 25 p
(AD-A163145; USAFSAM-TR-85-18) Avail: NTIS HC A02/MF A01 CSCL 06/11

Onboard oxygen generating systems (OBOGS) require large quantities of air. When toxic contaminants are present, this air volume can become a problem. A small oxygen concentrator (SOC) was developed to operate at 10% the air volume and 4% the molecular sieve weight of the OBOGS. This paper gives detailed instructions on the construction of the SOC. The SOC was tested at inlet pressures of 10, 20, 30, and 40 psig and at product flows of 0.25, 0.50, 1.00, and 1.50 lpm. The SOC beds were packed with 5A or 13X molecular sieve. Additional tests were conducted with the SOC beds at 25 C, 50 C, and 60 C and using 5A molecular sieve. The SOC performance at various inlet pressures and temperatures, as measured by the oxygen concentration in the product gas, demonstrates characteristics similar to the performance of the full-size OBOGS. GRA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-25994*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CUMULATIVE REPORTS AND PUBLICATIONS THROUGH DECEMBER 31, 1985 Final Report
Apr. 1986 45 p
(Contracts NAS1-18107; NAS1-17070; NAS1-17130; NAS1-15810; NAS1-16394; NAS1-4101; NAS1-14472)
(NASA-CR-178088; NAS 1.26:178088) Avail: NTIS HC A03/MF A01 CSCL 12A

A complete list of ICASE Reports are contained. Since ICASE Reports are intended to be preprints of articles that will appear in journals or conference proceedings, the published reference is included when it is available. Author

N86-25995*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STENCILS AND PROBLEM PARTITIONINGS: THEIR INFLUENCE ON THE PERFORMANCE OF MULTIPLE PROCESSOR SYSTEMS Final Report
Daniel A. Reed, Loyce M. Adams, and Merrell L. Patrick May 1986 48 p refs Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178102; ICASE-86-26; NAS 1.26:178102) Avail: NTIS HC A03/MF A01 CSCL 12A

Given a discretization stencil, partitioning the problem domain is an important first step for the efficient solution of partial differential equations on multiple processor systems. Partitions are derived that minimize interprocessor communication when the number of processors is known a priori and each domain partition is assigned to a different processor. This partitioning technique uses the stencil structure to select appropriate partition shapes. For square problem domains, it is shown that non-standard partitions (e.g., hexagons) are frequently preferable to the standard square partitions for a variety of commonly used stencils. This investigation is concluded with a formalization of the relationship between partition shape, stencil structure, and architecture, allowing selection of optimal partitions for a variety of parallel systems. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-25996# Hanford Engineering Development Lab., Richland, Wash.
USE OF A PERSONAL COMPUTER FOR INSTRUMENTATION TESTING AT THE FFTF
D. A. Clark 1985 7 p Presented at the International Topical Meeting on Computer Applications for Nuclear Power Plant Operation, Pasco, Wash., 9 Sep. 1985
(Contract DE-AC06-76FF-02170)
(DE85-018469; HEDL-SA-3279-FP; CONF-850903-21) Avail: NTIS HC A02/MF A01

The FFTF uses computers to assist in performance of instrumentation calibration checks for Technical Specification compliance. When the computers used for these checks are not available, backup methods must be used. A method of using a personal computer to serve as a backup is discussed, and the hardware used is described. DOE

N86-25997# Argonne National Lab., Ill.
PRELIMINARY REPORT ON THE FORMAL ANALYSIS OF THE DRAPER FTP HARDWARE AND SOFTWARE USING ITP
G. H. Chisholm, J. Kljaich, B. T. Smith, and A. S. Wojcik Sep. 1985 24 p
(Contract W-31-109-eng-38)
(DE86-003985; ANL/MCS-TM-59) Avail: NTIS HC A02/MF A01

The purpose of this project is to explore the feasibility of a total design approach to fault-tolerant digital computer systems. A fault-tolerant computer system is one which has the ability to produce correct results even in the presence of any single fault. The total design approach of this project will attempt to show that both the software and the hardware that comprise the system meet specified availability and reliability criteria. This preliminary report discusses the motivation for the project, the need for a formal technique for the verification of fault-tolerance of both hardware and software, discusses preliminary results, and presents recommendations for further work. DOE

N86-25998# Florida State Univ., Tallahassee.
SUPERCOMPUTER RESEARCH DURING 1985 Annual Report, 1984 - 1985
1985 48 p
(Contract DE-FC05-85ER-25000)
(DE86-004283; DOE/ER-25000/1) Avail: NTIS HC A03/MF A01

The Supercomputer Computations Research Institute is an interdisciplinary program in computational science. The project is organized to do research in computational science, to train research people in a variety of academic disciplines and to provide them access to a supercomputer. The program gathers together research people in various disciplines that are vitally involved users of supercomputers. The resulting interactions and exchange of ideas not only enhance output of research in the various disciplines, but also lead to the discovery and propagation of new computational techniques. Due to this close association of science and

engineering users, mathematicians, computer scientists and computer manufacturers, there are synergistic beneficial consequences to research output in various fields and in the supercomputer industry. Some of the software projects in progress or being planned include: a CYBER timesharing system (like the CTSS system at Livermore), research on vectorization techniques, vectorizer compiler development, techniques and tools for multiprocessing, vectorized and parallelized numerical methods and algorithms, fast partial differential equation solvers, and the establishment of DOE user libraries for the supercomputers that we have. Some of the research projects in progress or being planned by SCRI scientists include: lattice gauge theory, data processing for high energy experimental particle physics, accelerator design, many body problems, Monte Carlo techniques, event simulation, meteorology, oceanography, geophysical fluid dynamics, computational fluid dynamics, symbolic manipulation programs, materials by design, and molecular dynamics. DOE

N86-25999# Stanford Univ., Calif. Dept. of Statistics.
DATA BASE MANAGEMENT: PROCEEDINGS OF A CONFERENCE
31 Jul. 1985 307 p refs Conference held in Monterey, Calif., 1-2 Nov. 1984
(Contract N00014-76-C-0476; NR Proj. 042-267)
(AD-A158285) Avail: NTIS HC A14/MF A01 CSCL 09/2

Data base management systems were discussed. Topics included data base organization for statistical analysis; machine learning; information retrieval; information management; and computer architecture. For individual titles, see N86-26000 through N86-26007.

N86-26000# Stanford Univ., Calif. Dept. of Medicine and Computer Science.
DATABASES FOR STATISTICS
Cio Wiederhold *In its* Data Base Management 31 Jul. 1985 p 1-12 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

The current status of areas where statistics use and database technology interact is summarized. The fields of database and statistics are both in an advanced state of development. However, their interaction is still in a primitive stage. Databases specifically designed for managing data which are subject to statistical analysis are discussed. A number of definitions are included in the context of a discussion of basic data base concepts. Some implementation issues are presented and Specific Data Base Management Systems (DBMS) are mentioned. Author

N86-26001# Stanford Univ., Calif. Dept. of Compute Science.
DISCOVERY, CONFIRMATION, AND INCORPORATION OF CAUSAL RELATIONSHIPS FROM A LARGE TIME-ORIENTED CLINICAL DATA BASE: THE RX PROJECT c82
Robert L. Blum *In its* Data Base Management 31 Jul. 1985 p 13-55 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

The objectives of the methods and computer implementation presented are: (1) to automate the process of hypothesis generation and exploratory analysis of data in large nonrandomized, time-oriented clinical data bases; (2) to provide knowledgeable assistance in performing studies on large data bases; and (3) to increase the validity of medical knowledge derived from nonprotocol data. The RX computer program consists of a knowledge base (KB), a discovery module, a study module and a clinical data base. The KB contains medical and statistical knowledge hierarchically organized and is used to assist in the discovery and study of new hypotheses. Confirmed results from the data base are automatically encoded into the KB. The discovery module uses lagged, nonparametric correlations to generate hypotheses. These are studied by the study module which automatically determines confounding variables and methods for controlling their influence. In determining the confounders of a new hypothesis the study module uses previously 'learned' causal relationships. The study module selects a study design and statistical method based on knowledge of confounders and their distribution in the data base. Author

N86-26002# RAND Corp., Santa Monica, Calif.
CODA: A CONCEPT ORGANIZATION AND DEVELOPMENT AID FOR THE RESEARCH ENVIRONMENT
James A. Dewar and James J. Gillogly *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 57-78 Previously announced as N85-30715 (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

The hypothesis is that computers can aid the policy research process by acting as a long term memory (storage and retrieval facility) for the researcher's growing data base and changing concepts. A system called CODA (for concept organization and development aid) is discussed. The authors describe the prototype system built for testing this hypothesis, the system's capabilities and limitations, some of the details of its user interface, what they have learned both from the building and testing of the system and, finally, some thoughts on further capabilities that appear amenable to computer implementation that might aid the policy researcher. The CODA program most properly qualifies as a file management menu-driven system aimed at small data bases and a very limited number of users. It is a system designed and implemented by users (policy researchers) for testing some concepts about the users' environment. It is not particularly suited for large data bases or numerical processing. Author

N86-26003# California Univ., Berkeley. Lawrence Berkeley Lab.
SCIENTIFIC INFORMATION = DATA + META-DATA c82
John L. McCarthy *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 79-124 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

Data and metadata (data about data) management systems are described. Key concepts about data and metadata are introduced. A typology of metadata with special emphasis on scientific and technical needs is outlined. The use of different kinds of metadata at various stages of scientific research and analysis is described. Principles for representation of metadata are discussed. The application of self describing files, data management systems, statistical analysis packages and data analysis environments to integrate management of data and metadata are considered. Author

N86-26004# San Jose State Univ., Calif.
PUT THE INFORMATION IN THE DATABASE, NOT THE PROGRAM c82
James L. Dolby *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 125-139 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

A small data set and the command TOTAL are discussed. The data set is shown as it is represented in a standard relational data base system for a microcomputer. The data base system's command TOTAL can be exercised interactively. The system differentiates between character strings and numerical strings and it allows for 8-character names for variables. The system is an interactive data analysis system. It seems feasible to construct such systems which will operate on modest computers. Author

N86-26005# Pacific Northwest Lab., Richland, Wash.
MANAGING THE DATA ANALYSIS PROGRESS c82
W. L. Nicholson, P. J. Cowley, D. B. Carr, and M. A. Whiting *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 141-166 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

Advances in statistical computing allowed data analyses to handle increasingly complex problems. The complex data analyses that are required with complex problems proliferate derived data structures and create evolving analysis states. A system that helps the data analyst manage the analysis process through use of data analysis save-states was designed. The system also makes use of graphical interaction, provides organization of command logs and encourages extensive annotation. It is clear that this collaborative effort of data analysts and computer scientists is

making progress toward freeing the data analyst from much mundane, but necessary, organization bookkeeping. Author

N86-26006# Computer Horizons, Inc., Cherry Hill, N. J.
LINKING SCIENCE, TECHNOLOGY AND ECONOMICS DATA
Francis Narin *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 167-214 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

Some of the state-of-the-art of linking science, technology and economics data are summarized. The linkage between technology and science is analyzed by analyzing the citations (references). It is concluded that: (1) funds and scientific publication are tightly linked at national and institutional levels; (2) cross-national, cross-institutional, geographic and subject-to-subject science linkages are quantifiable and mappable and reveal that the spectrum of activity from funds, to pubs, to patents, to productivity is reflected in highly correlated statistics; (3) citations from patents to papers document a close day-to-day relationship between science and technology; (4) the science used by patented technology is very recent - implying little or no lag between discovery and utilization; and (5) technology, like science, may be driven by a small number of key highly cited events. Author

N86-26007# Institute for Scientific Information, Inc., Philadelphia, Pa.
THE WORLD BRAIN TODAY: SCIENTOGRAPHIC DATABASES. WHAT ARE THEY, HOW ARE THEY CREATED AND WHAT ARE THEY USED FOR?
George Vladutz *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 215-299 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

The creation of automatized intelligent systems which could contribute to increasing the overall productivity of scientific research requires knowledge representation tools of global scale. The automatic compilation from existing databases of an intermediary type of knowledge representation is proposed in the form of a detailed concept dependency diagram of global scope. The relationships are outlined between concept dependency diagrams and detailed knowledge representations based on predicate calculus language and full formalization. The efforts aimed at the representation of the structure of scientific fields, mainly on the basis of citation data, are reviewed. The prospects for the development of related methods for the computerized compilation of regional and global concept maps in the form of concept dependency diagrams are discussed. Author

N86-26008# Massachusetts Inst. of Tech., Cambridge. Center for Information Systems Research.
IMS DESIGN--ALTERNATIVES, ANALYSIS, AND STRATEGIES. REVISION
Michael J. Abraham Dec. 1985 60 p refs
(Contract N00039-80-0498)
(AD-A163505; TR-17-Rev) Avail: NTIS HC A04/MF A01 CSCL 09/2

It is expected that future high-performance Data Base Management Systems will be required to provide storage capacities and transaction rates several orders of magnitude greater than those of any current systems. To meet the requirements for increased speed, capacity, and availability the IMS Data Base Computer (INFOPLEX) employs a highly parallel, distributed control architecture. The preliminary INFOPLEX design consists of two logically and physically separate components: a physical storage hierarchy and a functional hierarchy. The general structure of an INFOPLEX data storage hierarchy has been developed and a preliminary set of control algorithms has been proposed. This report presents a refind architectural specification and outlines a set of control algorithms which take advantage of theoretical properties of INFOPLEX-like storage systems. Sect 2 discusses the overall rationale for the INFOPLEX hierarchial design concept. Sect 3 presents the details of the design issues and tradeoffs related to performance and reliability, and develops a general strategy for efficient READ/WRITE control and reliable fault handling. Finally, Sect 4 summarizes this report, and indicates the directions for further research. GRA

N86-26009# Massachusetts Inst. of Tech., Cambridge. Center for Information Systems Research.
HARDWARE FEASIBILITY OF INFOPLEX DESIGN STRATEGY. REVISION
H. D. Toong and Amar Gupta Mar. 1985 37 p refs
(Contract N00039-81-C-0663)
(AD-A163506; CISR-TR-18-Rev) Avail: NTIS HC A03/MF A01 CSCL 09/2

Among its several design objectives, the key goals of INFOPLEX are to support an extremely large size of databases and to provide an unprecedented level of speed and efficiency in making database transactions. At another level, INFOPLEX attempts to dispense with the traditional approach of using monolithic mainframes. Instead, the design envisages use of arrays of relatively inexpensive microprocessors to allow for fast retrievals and to guarantee adequate fault tolerance capabilities. These microprocessors need to be interconnected in an optimal manner to provide maximum system throughput. Concurrent multiprocessor operation represents one of the key ingredients of the hardward design strategy of INFOPLEX. GRA

N86-26010# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN AND IMPLEMENTATION OF HIGH PERFORMANCE CONTENT-ADDRESSABLE MEMORIES M.S. Thesis
Wook H. Shinn Dec. 1985 106 p refs
(AD-A163995; AFIT/GE/ENG/85D-39) Avail: NTIS HC A06/MF A01 CSCL 09/5

The content addressable memories (CAMs) have major applications in developing areas of artificial intelligence and image processing. This work involves researching, designing, and implementing a high performance, high density CAM. The design, fabrication, and test of this all-parallel AFIT CAM is discussed. The AFIT CAM stores 2K bits of information and fits in 64 pin dual-in-line package. It was fabricated using a 3 micron CMOS technology with 2-layer metals. The AFIT CAM supports four types of comparisons directly on the chip. These are equal, not-equal, greater-than-or-equal, and less-than. In addition, it has DUMP and Parallel Write operations to aid artificial intelligence and image processing applications. The AFIT CAM has a total of 78,000 devices and achieves a density of 1,073 devices per sq. mm. The memory access time for reading and writing are only 22 ns and 20 ns respectively. The CAM chip computes 800 million magnitude comparisons or 3.2 billion equality comparisons per second. The cif file has been resubmitted to the manufacturer for fabrication due to a short circuit which was caused by over bloated second metal lines. A second version of the AFIT CAM cell was redesigned and nets a 25% reduction in size. Author (GRA)

N86-26011# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT AND IMPLEMENTATION OF THE X.25 PROTOCOL FOR THE UNIVERSAL NETWORK INTERFACE DEVICE (UNID2.) VOLUME 1 M.S. Thesis
Mark W. Weber Dec. 1985 273 p refs
(AD-A164076; AFIT/GE/ENG/85D-52-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 09/2

This thesis describes the continued development of an improved Universal Network Interface Device (UNID 2). The UNID 2 architecture was based on a preliminary design project at the Air Force Institute of Technology. The UNID 2 contains two main hardware modules; an local module for the network layer software and a network module for the data link layer software and physical layer interface. Each module is an independent single board computer (SBC) residing on an Intel multibus chassis, complete with its own memory (EPROM and RAM), serial link interfaces, and multibus interface. The local module is an iSBC 544 and the network module is an iSBC 88/45. The network layer software supports the CCITT X.25, datagram option, protocol and the data

link layer software supports the CCITT X.25 LAPB (HDLC) protocol. This report documents the further implementation of the CCITT X.25 protocol in the UNID 2 design. GRA

N86-26012# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DESIGN OF THE HUMAN-COMPUTER INTERFACE FOR A COMPUTER AIDED DESIGN TOOL FOR THE NORMALIZATION OF RELATIONS M.S. Thesis
Thomas C. Mallary Dec. 1985 162 p refs
(AD-A164100; AFIT/GCS/ENG/85D-8) Avail: NTIS HC A08/MF A01 CSCL 09/2

The project involved the design and implementation of the human-computer interface of a computer aided design tool used in conjunction with a relational database. The tool gives a database administrator an interactive means of specifying functional dependencies for a given relation. It then executes a nonloss decomposition, normalizing the original relation to third normal form. Background information is provided on the fundamentals of a relational database and on the concept of functional dependencies. An understanding of the term user-friendly system is developed, together with a summary of state-of-the-art techniques and guidelines meant to help the system designer create more friendly interfaces. The program development process used in the project is described in detail. Major design issues of the project are described, with emphasis placed on areas impacting the system's human-computer interface. A tool is developed to measure and quantify the extent of user satisfaction in the software system. The measurement tool is implemented by a test group asked to evaluate the normalization tool interface. Results of the evaluation are presented. GRA

N86-26013# Cincinnati Univ., Ohio.
STRUCTURED MICROCONTROLLER DESIGN USING PLA FIRMWARE Final Report, 19 Apr. 1982 - 18 Oct. 1985
Christos A. Papachristou 12 Dec. 1985 48 p refs
(Contract DAAG29-82-K-0106)
(AD-A164255; ARO-18626.12-EL) Avail: NTIS HC A03/MF A01 CSCL 09/2

The objective of this research is to contribute a design methodology for microprogramming architectures with supporting firmware and development tools. Two PLA-based microcontrol architectures have been proposed that are suitable for modular microprogramming. The first scheme consists of a PLA sequence store, a microcode ROM and an address processor. This structure has the capability of complex microsequencing such as multiway branching, microsubroutines, nested microlooping and the like. To alleviate the pin-limitation problem, a bit-slice approach is taken in the second scheme which allows for easy microcontrol expandability and compaction of the sequence store. Firmware support for the microcontrollers is provided by such control constructs as if-then-else, while-do and the like, which are available at the microlevel. Several firmware design tools have been developed and incorporated into a software package, MMDS, a Modular Microprogram Development System. MMDS includes the following tools: a microcode assembler, a microsequencer assembler, a PLA code formatter and a functional-level simulator of modular microarchitectures. GRA

N86-26014# Air Force Human Resources Lab., Brooks AFB, Tex.
COMPUTER-BASED TRAINING: IMPLEMENTATION AND SYSTEM Final Report
Joseph Y. Yasutake Jan. 1986 18 p refs
(AD-A164283; AFHRL-TP-85-40) Avail: NTIS HC A02/MF A01 CSCL 09/2

Following a series of preliminary studies in the early 1970's, the United States Air Force embarked on a major research and development effort to design, demonstrate, and evaluate a computer-based instructional system at a major technical training center. The system, called the Advanced Instructional System (AIS), was developed to demonstrate the feasibility of managing and administering individualized instruction for up to 2,000 students daily in four technical training courses. A major state-of-the-art advancement was an integrated computer-based support capability that provided a full range of computer-based instruction functions, including course development and presentation, resource allocation and scheduling, and individual student management. A unique feature was the Adaptive Model, which produced student prescriptions based on tradeoffs among learning requirements, student characteristics, and resource availability. To support the integrated CBI system, a higher-order language called CAMIL (Computer-Assisted/Managed Instructional Language) was developed. Hardware support was provided by a CYBER 73-16 computer with 10 management terminals and 50 interactive terminals. This paper describes the background of the AIS, summarizes the evaluation data, and discusses current efforts underway as a result of lessons learned from the AIS demonstration program. GRA

N86-26015# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AUTOMATED DESIGN OF REAL-TIME, MICROPROCESSOR-BASED CONTROLLERS, VOLUME 1 M.S. Thesis
Ronald L. Heacock Sep. 1985 179 p refs
(AD-A164326; AFIT/GCS/ENG/85S-1-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 09/2

This thesis determined the conceptual and implementation limitations in the use of the Control System Design Language and its timing analysis program and realization libraries for the automated design of real-time, microprocessor-based controllers. Changes were made to the language syntax and timing analysis program to permit a more accurate analysis of the timing requirements of a controller. Conceptual and implementation errors in the primitives of the original realization volume were addressed and solutions presented. A new realization volume using the memory-mapped input/output architecture of the Motorola 6800 microprocessor was developed to determine any bias toward device oriented input/output in the existing primitive designs. A partial Intel 8088 volume was constructed to investigate the applicability of the primitive designs in a segmented memory processor. A volume builder program was developed to aid in the construction and formatting of the realization volumes. A major design effort using the Field Interface Device of an Energy Monitoring and Control System as an example was performed to thoroughly exercise the timing analysis program. Author (GRA)

N86-26016# Oklahoma State Univ., Stillwater. Electronics Lab.
LAIRTS PIXEL DATA FORMATTER
Claude M. Gwinn Aug. 1985 19 p refs
(Contract F19628-85-C-0006)
(AD-A164512; AFGL-TR-85-0192; SR-1) Avail: NTIS HC A02/MF A01 CSCL 09/2

The Oklahoma State University Electronics Laboratory designed a system to assemble the asynchronous data from a pixel array together with the required housekeeping (HSKP) data and format these data into a synchronized PCM bit stream for magnetic tape recording. This report covers in detail the design of the pixel data storage system and its entry into the bit stream. The format requires a minor frame length of 132 words and a subframe length of 128 frames. There was very little available information on the amount of HSKP data that would be required. However, very simple modifications to the formatter would accommodate extra HSKP words and they are relatively easy to format. GRA

N86-26017# Department of the Air Force, Washington, D.C.
PORTABLE MINICOMPUTER FOR TESTING MEMORIES Patent
Carleston O. Brown, inventor (to Air Force) 17 Dec. 1985 16 p
(AD-D012130; US-Patent-4,559,626; US-Patent-Appl-SN-482127; US-Patent-Class-371-21) Avail: US Patent and Trademark Office CSCL 09/2

This patent is a portable high speed minicomputer tester for isolating failures in a random access memory. The device includes a central processing unit having an address counter and means for generating a plurality of test words. Individual test words are generated automatically and stored in both an internal memory and the memory under test. At a predetermined address, a test

word is read out of the memories and compared. If there are any discrepancies, the minicomputer sets a latch corresponding to the failed test word bit and identifies the failed bit on a digital display readout. Using fault conversion tables, an operator can trace a discrepancy to the bit location of a memory chip in the memory under test. GRA

N86-25544# Joint Publications Research Service, Arlington, Va.
MICROCOMPUTER-BASED MULTIFUNCTION, MINI-MULTICHANNEL ANALYZER
Jingjin Wang, Ying Chen, Yixiang Wei, Putang Zheng, Hongrei Zhang, Weitong Ji, and Xuehua Qiu *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 80-84 ref Transl. into ENGLISH from Hedianzixue yu Tance Jishu (Beijing, China), v. 5, no. 5, Sep. 1985 p 297-299 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-26018*# TRW Defense Systems Group, Huntsville, Ala. Dept. of Mechanical Engineering and Mechanics.
GROUND SOFTWARE MAINTENANCE FACILITY (GSMF) USER'S MANUAL Final Report
V. Aquila, D. Derrig, and G. Griffith Washington NASA 26 Feb. 1986 180 p
(Contract NAS8-32350)
(NASA-CR-178805; NAS 1.26:178805; TRW-41849-G-159-025)
Avail: NTIS HC A09/MF A01 CSCL 09B

Instructions for the Ground Software Maintenance Facility (GSMF) system user is provided to operate the GSMF in all modes. The GSMF provides the resources for the Automatic Test Equipment (ATE) computer program maintenance (GCOS and GOAL). Applicable reference documents are listed. An operational overview and descriptions of the modes in terms of operator interface, options, equipment, material utilization, and operational procedures are contained. Test restart procedures are described. The GSMF documentation tree is presented including the user manual. B.G.

N86-26019# Los Alamos National Lab., N. Mex.
REVIEW OF THE LITERATURE ON BI-LEVEL MATHEMATICAL PROGRAMMING
C. D. Kolstad Oct. 1985 22 p refs
(Contract W-7405-eng-36)
(DE86-004377; LA-10284-MS) Avail: NTIS HC A02/MF A01

This paper reviews the recent literature on applications and algorithms in bi-level programming. Bi-level programming involves two mathematical programs. One math program is concerned with minimizing w(x,t) over some region by varying the vector t. The variable x is actually a function x(t) and is defined implicitly as the solution vector to the second math program, which minimizes s(x,t) over some region by varying x. The review is divided into two main sections. One section covers applied problems that have been presented in the literature as bi-level math programs. Most such applications are in economics but some are in warfare planning. Another section of the paper concerns the many diverse algorithms that have been developed to solve the bi-level programming problem. DOE

N86-26020# Oak Ridge National Lab., Tenn.
ROBOT NAVIGATION ALGORITHMS USING LEARNED SPATIAL GRAPHS
S. S. Iyengar, C. C. Jorgensen, S. V. N. Rao, and C. R. Weisbin Dec. 1985 29 p refs
(Contract DE-AC05-84OR-21400)
(DE86-004649; ORNL/TM-9782) Avail: NTIS HC A03/MF A01

Finding optimal paths for robot navigation in known terrain has been studied for some time but, in many important situations, a robot would be required to navigate in completely new or partially explored terrain. We propose a method of robot navigation which requires no pre-learned model, makes maximal use of available information, records and synthesizes information from multiple journeys, and contains concepts of learning that allow for continuous transition from local to global path optimality. The model of the terrain consists of a spatial graph and a Voronoi diagram. Using acquired sensor data, polygonal boundaries containing perceived obstacles shrink to approximate the actual obstacles' surfaces, free space for transit is correspondingly enlarged, and additional nodes and edges are recorded based on path intersections and stop points. Navigation planning is gradually accelerated with experience since improved global map information minimizes the need for further sensor data acquisition. Our method currently assumes obstacle locations are unchanging, navigation can be successfully conducted using two-dimensional projections, and sensor information is precise. DOE

N86-26021# Sandia National Labs., Albuquerque, N. Mex.
FORTRAN PROGRAM FOR MODELING STEADY LAMINAR ONE-DIMENSIONAL PREMIXED FLAMES
R. J. Kee, J. F. Grcar, M. D. Smooke, and J. A. Miller Dec. 1985 114 p refs
(Contract DE-AC04-76DR-00789)
(DE86-004485; SAND-85-8240) Avail: NTIS HC A06/MF A01

This report documents a Fortran computer program that computes species and temperature profiles in steady-state burner-stabilized and freely propagating pre-mixed laminar flames. The program accounts for finite rate chemical kinetics and molecular transport. After stating the appropriate governing equations and boundary conditions, we discuss the finite difference discretization and the Newton method for solving the boundary value problem. Global convergence of this algorithm is aided by invoking time integration procedures when the Newton method has convergence difficulties. The program runs in conjunction with preprocessors for the chemical reaction mechanism and the transport properties. Discussion of two example problems illustrates many of the program's capabilities. DOE

N86-26022# Lawrence Livermore National Lab., Calif.
LAWRENCE LIVERMORE NATIONAL LABORATORY GRANULAR FLOW PROJECT Quarterly Report, Oct. - Dec. 1985
O. R. Walton, ed. 30 Dec. 1985 10 p refs
(Contract W-7405-eng-48)
(DE86-005088; UCID-20297-85-4) Avail: NTIS HC A02/MF A01

LLNL's Granular Flow Project is developing and utilizing new discrete particle computer models to determine the rheologic characteristics of idealized granular solids under various flow conditions. During FY 1985 two-dimensional granular material models of assemblies of inelastic, frictional, circular disks were developed and utilized in various parameter studies. During the current reporting period we completed an initial parameter study of steady shearing flows of idealized granular materials consisting of assemblies of equal-sized, inelastic spheres. The results of this study have been submitted for publication in Acta Mechanica. Our three-dimensional computer model has also been extended to include frictional interactions between spherical particles. A calculational series is underway examining the effects of interparticulate friction and rotations on the stresses in steady shearing flows. New post processing routines have also been written that provide the capability of making multi-color three-dimensional perspective-projection motion pictures of the granular flow calculations. We report below the highlights of the work performed during this first quarter of FY 1986. DOE

N86-26023# Naval Research Lab., Washington, D. C.
SOFTWARE TECHNOLOGY FOR ADAPTABLE RELIABLE SYSTEMS (STARS) WORKSHOP
1985 960 p refs Workshop held at Washington, D.C., 9-12 Apr. 1985
(AD-A163463; AD-E401440) Avail: NTIS HC A99/MF E03 CSCL 09/2

The Software Technology for Adaptable Reliable Systems (STARS) Project of the Office of the Secretary of Defense seeks sources of information and expertise in the building of mission critical applications software. Component specification, building, testing, maintaining and reutilization are of interest. With the promulgation of Ada as a single High Order Language to build future applications with the three services, there exist new opportunities for reuse of software. Reuse can reduce software system development time and maintenance costs, and improve reliability. This workshop deals with these issues: (1) Parts Taxonomy/Requirements; (2) Incentives; (3) Library; (4) System/Design/Integration with Reusable Parts; and (5) Metrics. GRA

N86-26024# Naval Postgraduate School, Monterey, Calif.
THE OZDRAW USER'S MANUAL AD-A163633 NPS52-86-005 HC A05/MF A01
Steven Firth and Michael J. Zyda Jan. 1986 97 p
(AD-A163633; NPS-52-86-005) Avail: NTIS HC A05/MF A01 CSCL 09/2

OZDRAW is an interactive figure generation system designed to operate on the IRIS 2400 workstations. The aim of OZDRAW is to provide a powerful, yet friendly, general purpose figure generation system to allow untrained users to produce high quality figures that can be used for presentations, technical papers and academic thesis. OZDRAW has been designed so that the user can efficiently operate the system with little or no experience. The system uses pop-up menus to provide the user with the available instructions; menus use text rather than icons to provide an interface that is less ambiguous to the inexperienced user. The system requirements for OZDRAW are: (1) an IRIS 2400 workstation, ideally with three megabytes of memory and a floating-point accelerator, and (2) the IRIS mouse (3) a graphics printer capable of quality graphics production; a laser printer is the preferred printer. GRA

N86-26025# Mitre Corp., Bedford, Mass.
SOFTWARE REPORTING METRICS, REVISION 2 Final Report
R. J. Coles, J. A. Kasputys, K. L. Lasko, T. F. Saunders, and H. P. Schultz Nov. 1985 58 p refs
(Contract F19628-86-C-0001)
(AD-A163756; MTR-9650-Rev-2; ESD-TR-85-14-Rev-2) Avail: NTIS HC A04/MF A01 CSCL 09/2

This paper presents a set of software management metrics that have been developed by the ESD/MITRE Software Center. The metrics are designed to assist in monitoring the progress of software development by gaining better visibility into the software acquisition process. This revision reflects government and industry comments on the previous version, and includes new charts, information on application of the metrics, and appendices containing generic and sample data items. This document is intended to help Project Managers prepare software development status reports. System Program Officers (SPOs) are expected to use these metrics to augment conventional acquisition system development reports such as cost and schedule reports. Section 2 presents each metric. Section 3 discusses application of the metrics. Section 4 describes continuing work efforts in the area of software status monitoring and metrics. GRA

N86-26026# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A CONTEXTUAL POSTPROCESSING EXPERT SYSTEM FOR ENGLISH SENTENCE READING MACHINES M.S. Thesis
David V. Paciorkowski Dec. 1985 140 p refs
(AD-A163951; AFIT/GE/ENG/85D-31) Avail: NTIS HC A07/MF A01 CSCL 09/2

Knowledge-based programming techniques are used in an expert system to reduce uncertainty for optical character recognition by combing evidence from several diverse knowledge sources cooperating in an hierarchical configuration. The postprocessor development focused on a system for generic text input that is not confined to a fixed vocabulary or particular subject domain. The key element to the system's effectiveness is a spell checking algorithm that is not operationally bounded by an enumerated lexicon or biased by statistical sampling. The postprocessor system is also designed to interface almost any type OCR front-end methodology. GRA

N86-26027# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INTERACTIVE COMPUTER GRAPHICS FOR ANALYSIS AND DESIGN OF CONTROL SYSTEMS M.S. Thesis
John R. Bullard Dec. 1985 257 p refs
(AD-A163952; AFIT/GE/EE/85D-5) Avail: NTIS HC A12/MF A01 CSCL 09/2

The work of improving and adding to the iterative graphics control package called ICECAP (Interactive Control Engineering Computer Analysis Package) is continued. The main emphasis will be on providing a graphical way of entering the desired system's characteristics into ICECAP versus entering the desired system's open-looped transfer function through the keyboard. This will allow the control engineer the ability to graphically place the desired system's poles and zeros through the use of the cursor control keys of the keyboard. In addition, the option of displaying the locus solution, for the entered OLTF, will be available to the user, with the added capability to add and delete new poles and zeros without deleting the previous computed locus solution. In control engineering, one of the engineer's goals is to control a system. A system is an interconnection of components forming a system configuration which will provide a desired system response. The system to be controlled may be chemical, electrical, or mechanical. But in order to accurately determine the resulting output of a control system, it requires that the control engineer model this system in the most accurate way possible. GRA

N86-26028# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EFFECTS OF RANDOM PHASE SHIFTS AND CARRIER DRIFT ON THE RESOLUTION PROPERTIES OF LINEAR STEP FREQUENCY PULSE TRAINS M.S. Thesis
Thomas L. Griffin, Jr. Dec. 1985 169 p refs
(AD-A163953; AFIT/GE/ENG/85D-19) Avail: NTIS HC A08/MF A01 CSCL 09/4

A FORTRAN program using fast Fourier transforms has been written to calculate and plot the ambiguity function of a uniform linear step frequency pulse train with random initial phases and carrier frequency drifts. The effects of random phases and frequency drifts are studied in two stages. First, the initial phases are allowed to assume any value with equal probability in ranges of 0 to 20 degrees and 0 to 180 degrees while the frequency drifts are zero. Secondly, the phases are fixed at zero and carrier frequency drifts up to 0.1% and 1.0% are set. In each case, the ambiguity surface is shifted along the Doppler axis with the effect being more pronounced for carrier frequency drifts. The effects on the half power width of the central lobe for 10 test cases for each phase and frequency range appear negligible for a two pulse train. Author (GRA)

N86-26029# Lawrence Livermore National Lab., Calif.
INTELLIGENT GATEWAY PROCESSORS AS INTEGRATORS OF CAD/CAM NETWORKS
Viktor E. Hampel, Bruce L. Garner, and Jack R. Matthews 16 Apr. 1986 26 p
(Contract W-7405-eng-48)
(AD-A163036; UCRL-93115) Avail: NTIS HC A03/MF A01 CSCL 09/2

The integration of dissimilar CAD/CAM hardware and software on local and geographically distributed networks is the major problem faced by large organizations today. The authors begin by examining the existing system for storage, retrieval, control, and distribution of design information at Lawrence Livermore National Laboratory and describe a new prototype Engineering Information System (EIS). They then discuss the Department of Energy Neutral Data Exchange Format (DOE/DEP) for the sharing of mechanical drawings among DOE installations. Finally, they describe the potential role of the Intelligent Gateway Processor (IGP) as a transaction controller for engineering

resources among contractors of the Air Force Logistics Command. IGP capabilities include a unique interpreter driven user interface which permits the installation and modification of resources and the translation of dissimilar data formats, commands, and protocols, in a unified manner while running non-stop. GRA

N86-26030# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
DEVELOPMENT AND EVALUATION OF MATH LIBRARY ROUTINES FOR A 1750A AIRBORNE MICROCOMPUTER M.S. Thesis
Jennifer J. Fried 4 Dec. 1985 150 p refs
(AD-A164050; AFIT/GCS/MA/85D-3) Avail: NTIS HC A07/MF A01 CSCL 09/2

This project produced a run-time math library for the MIL-STD-1750A embedded computer architectures. The math library consists of the algebraic functions. In addition, the steps required for a performance analysis of the math library have been outlined. Several approximation methods were investigated. The Chebyshev Economization of Maclaurin series polynomials, and rational approximations derived from the second algorithm of Remes were determined to be the best methods available. Each function's implementation was designed to take advantage of features MIL-STD-1750A architectures. The recommended test procedures provide measures of the average and worst case generated errors within each approximation. Author (GRA)

N86-26031# Texas Univ., Austin. Dept. of Computer Sciences.
HIGH PERFORMANCE PARALLEL COMPUTING Final Report, 1 Jan. - 31 Dec. 1983
James C. Browne, G. J. Lipovski, and M. Malek Dec. 1985 59 p refs
(Contract F49620-83-C-0049)
(AD-A164059; AFOSR-85-1260TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

The accomplishments of the research project High Performance Parallel Computing' for the year 1983 span algorithm formulation, parallel programming languages, basic software for the Texas Reconfigurable Array Computer and validation of design concepts for the Texas Reconfigurable Array Computer (TRAC). Image processing, sorting and time dependent partial differential equations were subjects for algorithm formulation and analysis. Accomplishments in parallel programming include: substantial progress toward the implementation of two parallel programming environments, the Computation Structures Language, and a task level data flow programming system. The hardware prototype of TRAC made substantial progress towards stability. The state-of-the-art in reconfigurable switch based architectures has been advanced. A result of note is the demonstration of the integration of circuit switching and packet switching in a single interconnection network. GRA

N86-26032# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A PROGRAMMER'S ASSISTANT FOR A SPECIAL-PURPOSE DATAFLOW LANGUAGE M.S. Thesis
Alan J. Black Dec. 1985 175 p refs
(AD-A164122; AFIT/GCS/ENG/85D-2) Avail: NTIS HC A08/MF A01 CSCL 09/2

A programming tool, the Graph Design Assistant (GDA), for a special-purpose dataflow language was designed and implemented. The motivation for the effort was the need to construct a robot simulation facility which will assist in the development of effective algorithms to plan and control robot movements. An Evans and Sutherland PS300 graphic workstation is used to display animated robot simulations. The Graph Design Assistant was developed so that researchers could program robot simulations on the PS300 without having to learn the intricacies of the PS300's dataflow language. The Graph Design Assistant was implemented on a Lisp machine using a knowledge engineering tool. The result of the effort was a prototype system to be used as the basis for further development. GRA

N86-26033# Naval Postgraduate School, Monterey, Calif.
2-D SIGNAL GENERATION USING STATE-SPACE FORMULATION M.S. Thesis
Evangelos Theofilou Dec. 1985 171 p refs
(AD-A164128) Avail: NTIS HC A08/MF A01 CSCL 09/2

This thesis considers various approaches to modelling 2-D data fields using state-space formulations. Computer simulation of these models has been carried out to generate simulated 2-D data which could then be used for various other signal processing operations. An interesting development that has resulted from this study is that of adaptation of the 1-D SSPACK software package for simulating 2-D linear systems as well as using one of the above state-variable models. Author (GRA)

N86-26034# California Univ., Berkeley. Operations Research Center.
EXTENSIONS TO POLYCHAIN: NONSEPARABILITY TESTING AND FACTORING ALGORITHM
Lucia I. P. Resende 2 Dec. 1985 40 p refs
(Contract N00014-85-K-0384)
(AD-A164242; ORC-85-14) Avail: NTIS HC A03/MF A01 CSCL 09/2

PolyChain is a portable FORTRAN program for evaluating the reliability of a K-terminal network via polygon-to-chain reductions and the factoring algorithm. The first version of PolyChain allows the evaluation of the K-terminal reliability for series-parallel graphs. The algorithm implemented is a linear time algorithm introduced in 1982 by Satyanarayana and Wood. This report discusses the design and implementation of two features recommended in a previous document that enable PolyChain subroutines to treat a larger class of problems. The algorithm of Satyanarayana and Wood has a constraint on the topology of the input network, requiring it to be nonseparable. The original version of PolyChain does not test for this requirement. One of the features added to PolyChain discussed in this report is the implementation of a routine to check for this condition. The algorithm of Satyanarayana and Wood computes the reliability of a network with an underlying series-parallel structure. When the input network is not totally reducible an extension to the algorithm is required to obtain the reduced network. The second feature discussed in this report is the implementation of a factoring algorithm incorporated to PolyChain to insure the evaluation of the K-terminal network reliability for both series-parallel reducible and irreducible networks. GRA

N86-26035# Stanford Univ., Calif. Center for Reliable Computing.
THE MEASUREMENT AND STATISTICAL MODELING OF COMPUTER RELIABILITY Final Report, 1 Apr. 1982 - 30 Sep. 1985
Edward J. McCluskey and Dorothy M. Andrews Nov. 1985 28 p refs
(Contract DAAG29-82-K-0105)
(AD-A164249; ARO-18690.19-EL) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes the research performed during a three year study of computer reliability as affected by system activity. Data collected over an eight year period on three generations of computers was analyzed to determine what relationships exist between failures and activity. The activity included type of utilization, as well as amount of activity (or load) on the computer at time of failure. The failures included both software and hardware (transient, intermittent, and permanent). Another aspect of the research was an evaluation of the fault tolerance provided by the computer system as indicated by software error detection and recovery rates. A third major area of research was the development of a methodology for analysis of failure prediction data. GRA

N86-26036# Advanced Information and Decision Systems, Mountain View, Calif.
FORMALIZATION OF THE PROGRAM REFERENCE LANGUAGE Final Report, 15 Jul. 1984 - 14 Sep. 1985
William M. Bricken, Susan G. Rosenbaum, Michael A. Brzustowicz,

Jeffrey S. Dean, and Brian P. McCune 8 Oct. 1985 84 p refs (Contract F49620-84-C-0075)
(AD-A164265; AI/DS-TR-1066-01; AFOSR-85-1219TR) Avail: NTIS HC A05/MF A01 CSCL 09/2

The goal of the Program Reference Language (PRL) Project is to construct a representation of Ada programs that facilitates retrieval of code based on both syntactic (literal) and semantic (functional) queries. The fourth year of the project focused on the formalization of the Extended Program Model (EPM), which consists of textual, syntactic, and semantic representations. The PRL query language specifies search over these three interrelated databases. Textual items are retrieved by string-matching capabilities of standard editors; syntactic queries are directd to the syntax parse tree; queries referencing program functionality are mapped onto the LOSP semantic representation. GRA

N86-26037# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE DESIGN OF A STANDARD SOFTWARE DEVELOPMENT METHODOLOGY FOR THE BRAZILIAN AERONAUTICAL MINISTRY M.S. Thesis
Aparecido F. de Oliveira Dec. 1985 207 p refs
(AD-A164289; AFIT/GCS/ENG/85D-13) Avail: NTIS HC A10/MF A01 CSCL 09/2

The project matched the requirements of the Brazilian Aeronautical Ministry with the software life cycle models, methods, and techniques, which are currently available and most widely utilized. Based on the analysis, a waterfall model was selected and integrated with some methods, tools, and techniques, such as Gane's method, SADT, Data Dictionary, etc. All of these recommendations were included in a proposed regulation for a software development methodology. GRA

N86-26038# Autometric Corp., Inc., Rome, N.Y.
AUTOMATIC FEATURE EXTRACTION/ALGORITHM TESTING Final Evaluation Report, 28 Sep. 1984 - 30 Sep. 1985
Ned A. Ferris Nov. 1985 24 p refs
(Contract DACA72-84-C-0008)
(AD-A164325; ETL-0410) Avail: NTIS HC A02/MF A01 CSCL 14/5

Feature extraction results using an Improved Texture Clustering Algorithm were compared to photo interpreters' manual segmentation/classification results. The clustering algorithm segments digital images via texture and edge attributes. The probability of detecting a target or feature is increased if the number of segments is reduced; therefore, the algorithm merges segments via edge thresholds. Evaluation showed general agreement, but the edge attributes would apply more to target detection than to feature classification. Author (GRA)

N86-26039# Defence Research Establishment Suffield, Ralston (Alberta).
PLOT: A BASIC PLOTTING ROUTINE FOR THE TEKTRONIX 4054 TERMINAL AND 4663 PLOTTER
M. D. Gauthier-Mayer Nov. 1985 86 p refs
(AD-A164327; DRES-SP-97) Avail: NTIS HC A05/MF A01 CSCL 09/2

A BASIC plotting routine for the Tektronix 4054 terminal and 4663 plotter has been developed. It is named PLOT. The program is capable of plotting in a variety of coordinate systems Cartesian, semilog on X, semilog on Y or log-log. Two separate Y axes can be used. The user can input the axes boundaries, axes titles, the block of data to be plotted, legends for the data, and a figure caption. Model equations can be represented by dashed lines on the plot. The program will accommodate up to 70 data sets, and a total of six data columns. The data can be manipulated by changing data points or sets, adding sets and columns, deleting sets or columns, sorting data in a column, generating columns from existing data and adding two data files together. This report is a working manual for the PLOT program. Author (GRA)

N86-26040# Colorado Univ., Boulder. Dept. of Computer Science.
A STABLE AND EFFICIENT ALGORITHM FOR NONLINEAR ORTHOGONAL DISTANCE REGRESSION
Paul T. Boggs, Richard H. Byrd, and Robert B. Schnabel Dec. 1985 46 p
(Contract DAAG29-81-K-0108; Grant NSF DCR-84-03483)
(AD-A164346; CU-CS-317-85; ARO-18197.8-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

One of the most widely used methodologies in scientific and engineering research is the fitting of equations to data by least squares. In cases where significant observation errors exist in all data (independent) variables, however, the ordinary least squares approach, where all errors are attributed to the observation (dependent) variable, is often inappropriate. An alternate approach, suggested by several researchers, involves minimizing the sum of squared orthogonal distances between each data point and the curve described by the model equation. We refer to this as orthogonal distance regression (ODR). This paper describes a method for solving the orthogonal distance regression problem that is a direct analog of the trust region Levenberg-Marquardt algorithm. The number of unknowns involved is the number of model parameters plus the number of data points, often a very large number. By exploiting sparsity, however, our algorithm has a computational effort per step which is of the same order as required for the Levenberg-Marquardt method for ordinary least squares. We prove our algorithm to be globally and locally convergent, and perform computational tests that illustrate some differences between the two approaches. Author (GRA)

N86-26041# Connecticut Univ., Storrs. Dept. of Electrical Eng. and Computer Science.
A UNIFIED METHOD FOR DELAY ANALYSIS OF RANDOM MULTIPLE ACCESS ALGORITHMS
L. Georgiadis, L. Merakos, and P. Papantoni-Kazakos Jan. 1986 42 p refs
(Contract N00014-85-K-0547; Grant AF-AFOSR-0229-83)
(AD-A164407; UCT/DEECS/TR-86-1) Avail: NTIS HC A03/MF A01 CSCL 17/2

This paper presents a unified method for the delay analysis of a large class of random multiple-access algorithms. This method is based on a powerful theorem referring to regenerative processes, in conjunction with results from the theory of infinite dimensionality linear systems. The authors apply the method to analyze and compute the per packet expected delays induced by two algorithms, in the presence of the Poisson user model. The considered algorithms are: the controlled ALOHA algorithm, and the 0.487 algorithm. The same method has been previously applied, for the delay analysis of certain limited sensing random access algorithms. Author (GRA)

N86-26042# Naval Postgraduate School, Monterey, Calif.
MULTICHANNEL COLLISION RESOLUTION ALGORITHM M.S. Thesis
Joo H. Cho Dec. 1985 99 p refs
(AD-A164496) Avail: NTIS HC A05/MF A01 CSCL 17/2

A multichannel random accessed communication system was considered. Every time slotted channel is shared by a large number of transmitters. To solve a collision which occurs at a certain time slot, several collision resolution protocols were tested, analyzed, and simulated. The quantities to be investigated in this thesis include L sub N (the average number of slots required to resolve a collision involving users), linear bounding of L sub n and the maximal achievable throughput. GRA

N86-26043# Advanced Decision Systems, Mountain View, Calif.
FORMALIZATION OF THE INTELLIGENT PROGRAM EDITOR Annual Technical Report, 15 Jul. 1984 - 15 Jul. 1985
Susan G. Rosenbaum, William M. Bricken, Michael A. Brzustowicz, and Jeffrey S. Dean Dec. 1985 104 p
(Contract N00014-83-C-0444)
(AD-A163180; TR-1047-02) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report covers the work done during the second year of the Intelligent Program Editor (IPE) project. The research this past

year focused on four major areas. Two of these areas were concerned with the formalization of two aspects of the IPE: the first was the study of the internal representation needs of the Extended Program Model (EPM) database and the development of a formal structure based on predicate logic; the second was on the formalization of the Program Reference Language (PRL) Picture Language to provide a direct mapping between the Picture Language and predicate logic. Another major research area was in the study of efficient retrieval of query requests from the EPM. The final area of work was in the development of an automatic parsing of Ada programs with subsequent textual and syntactic linking and display on the Symbolics LISP machine. Author (GRA)

N86-26044# Yale Univ., New Haven, Conn. Dept. of Computer Science.
HOW TO EMBED TREES IN HYPERCUBES
Sandeep N. Bhatt and Ilse C. F. Ipsen Dec. 1985 10 p
(Contracts N00014-82-K-0184; N00014-85-K-0461)
(AD-A163186; YALEU/DCS/RR-443) Avail: NTIS
HC A02/MF A01 CSCL 09/2

Many parallel machines based on the interconnections of the boolean hypercube are now commercially available. A distinctive feature of the hypercube is its universality-computer programs written for simpler architectures, such as grids for example, can be transported onto the hypercube with minimal overhead. These simulations are typically obtained by embedding the simpler architecture within the hypercube. This paper presents efficient embeddings of binary trees in the hypercube. It provides a novel and optimal embedding of a complete binary tree in which all but one tree edges are mapped onto adjacent processors on the hypercube, and the remaining edge is routed through an unused processor. With suitably designed processors and protocols, communication through the forwarding processor should incur no extra delay. The author also presents efficient embeddings of binary trees that are not complete, and shows that any N-node binary tree can be embedded with edges of length log log N+0(1) in a hypercube with no more than 2N processors. The results extend to graphs with small separators. Author (GRA)

N86-26045# Yale Univ., New Haven, Conn. Dept. of Computer Science.
THE IMPACT OF PARALLEL ARCHITECTURES ON THE SOLUTION OF EIGENVALUE PROBLEMS
Ilse C. F. Ipsen and Youcef Saad Dec. 1985 15 p
(Contracts N00014-82-K-0184; N00014-85-K-0461)
(AD-A163187; YALEU/DCS/RR-444) Avail: NTIS
HC A02/MF A01 CSCL 12/1

The most significant impact on research in Scientific Computation, and Numerical Linear Algebra in particular, seems to have been brought about by the advent of vector and parallel computation. This paper presents a short survey of recent work on parallel implementations of Numerical Linear Algebra algorithms with emphasis on those relating to the solution of the symmetric eigenvalue problem on loosely coupled multiprocessor architectures. A simple model will be given to analyze the complexity of parallel algorithms on several representative multiprocessor systems: a linear processor array (or ring), a two-dimensional processor grid and the hypercube. The vital operations in the formulation of most eigenvalue algorithms are matrix vector multiplication, matrix transposition, and linear system solution. Their implementations on the above architectures will be described, as well as parallel implementations of the following classes of eigenvalue methods: QR, bisection, divide-and-conquer, and Lanczos algorithm. GRA

N86-26046# Naval Research Lab., Washington, D. C.
ACTIVE DESIGN REVIEWS: PRINCIPLES AND PRACTICES Interim Report, 1982 - 1985
David L. Parnas and David M. Weiss 18 Nov. 1985 14 p
(AD-A163188; NRL-8927) Avail: NTIS HC A02/MF A01 CSCL 09/2

Although many new software design techniques have emerged in the past 15 years, there have been few changes to the procedures for reviewing the designs produced using these techniques. This report describes an improved technique, based on the following ideas, for reviewing designs: The efforts of each reviewer should be focused on those aspects of the design that suit his or her experience and expertise; the characteristics of the reviewers needed should be explicitly specified before reviewers are selected; reviewers should be asked to make positive assertions about the design rather than simply allowed to point out defects; the designers pose questions to the reviewers, rather than vice versa, these questions are posed on a set of questionnaires that requires careful study of aspect of the design; and interaction between designers and reviewers occurs in small meetings involving two to four people rather than meetings of large groups. GRA

N86-26047# Illinois Univ., Urbana. Coordinated Science Lab.
HIGHLY CONCURRENT SCALAR PROCESSING Ph.D. Thesis
Peter Y. Hsu Jan. 1986 122 p
(Contracts N00014-84-C-0149; N00039-80-C-0556)
(AD-A163195; UILU-ENG-86-2203; CSG-49) Avail: NTIS
HC A06/MF A01 CSCL 09/2

High speed scalar processing is an essential characteristic of high performance general purpose computer systems. Efficient concurrent execution of scalar code is difficult due to data dependencies and conditional branches. This thesis proposes a code scheduling heuristic call the decision tree scheduling (DTS) technique for general scalar code, and an optimal code scheduling algorithm called the simple loop scheduling (SLS) algorithm for a restricted class of innermost loops. Also proposed is a highly concurrent machine architecture that takes advantage of these scheduling techniques. GRA

N86-26048# Los Alamos National Lab., N. Mex.
ALTERNATIVES TO FORTRAN IN CONTROL SYSTEMS
J. A. Howell and R. M. Wright 1985 7 p Presented at the 2nd International Workshop on Accelerator Control Systems, Los Alamos, N. Mex., 7 Oct. 1985
(Contract W-7503-eng-36)
(DE86-002390; LA-UR-85-3518; CONF-8510194-3) Avail: NTIS
HC A02/MF A01

Control system software has traditionally been written in assembly language, FORTRAN, or Basic. Today there exist several high-level languages with features that make them convenient and effective in control systems. These features include bit manipulation, user-defined data types, character manipulation, and high-level logical operations. Some of these languages are quite different from FORTRAN and yet are easy to read and use. We discuss several languages, their features that make them convenient for control systems, and give examples of their use. We focus particular attention on the language C, developed by Bell Laboratories. DOE

N86-26049# Fermi National Accelerator Lab., Batavia, Ill.
STATUS OF FASTBUS SOFTWARE IN THE COMPUTING DEPARTMENT AT FERMILAB
A. Cohen, S. Gannon, and R. Pordes Oct. 1985 5 p Presented at the CERN FASTBUS Software Workshop, Geneva, Switzerland, 23 Sep. 1985
(Contract DE-AC02-76CH-03000)
(DE86-002544; FNAL-TM-1359; CONF-8509189-1) Avail: NTIS
HC A02/MF A01

This paper presents the current status of FASTBUS software projects in the Data Acquisition Group at Fermilab. The Computing Department, which includes this group, supports software running under the PDF-11 RT-11, RSX and VAX/VMS operating systems. FORTRAN callable subroutine libraries are available to access FASTBUS through the IORFI-II, UNIBUS Processor Interface (UPI) and Lecroy 1821 Host Interface. The PASTBUS Diagnostic Language, implemented and supported at the University of Illinois, is used at Fermilab, where it has been converted to run under the VAX/VMS and RSX-11M operating systems. A first version of a FASTBUS database has been implemented with and

provides data to a program which automatically generates logical addresses. DOE

N86-26050# Fermi National Accelerator Lab., Batavia, Ill.
CDC FIELD MAPPING DEVICE: ROTOTRACK
R. Yamada, J. Hawtree, K. Kaczar, R. Leverence, K. McGuire, C. Newman-Holmes, E. E. Schmidt, and J. Shallenberger Oct. 1985 22 p
(Contract DE-AC02-76CH-03000)
(DE86-00254; FNAL-TM-1358) Avail: NTIS HC A02/MF A01

A field mapping device for the magnet of the Collider Detector at Fermilab (CDF) was constructed. The device was used for the extensive study of the CDF magnetic field distribution. The mechanical and electrical features of the device, as well as the data acquisition system and software, are described. The mechanical system was designed so that the errors on the position and angle of the problem were + or - 0.75 mm and + or - 1 mrad, respectively. DOE

N86-26051# Oak Ridge National Lab., Tenn.
EZPLOT: FORTRAN GRAPHICS ROUTINES FOR THE IBM PC
M. R. Patterson and E. C. Long Dec. 1985 28 p refs
(Contract DE-AC05-84OR-21400)
(DE86-004598; ORNL/CSD-129) Avail: NTIS HC A03/MF A01

A set of FORTRAN plotting routines called EZPLOT is described in this report. EZPLOT simulates a subset of the DISSPLA calls to make plots on the IBM PC screen and an attached printer, using terminal emulators called PCPLOT and TEK. More than thirty DISSPLA calls are simulated by the EZPLOT routines. Typical screen plots require about five minutes, including compilation and linking; hard copy of the screen image requires another minute; and high resolution hardcopy requires an additional seven minutes. These routines give the IBM PC user a stand-alone capability to make useful scientific or engineering plots using data generated in FORTRAN programs. DOE

N86-26052# California State Univ., Hayward.
NEW IDEAS FOR PARALLEL ALGORITHMS ON VECTOR- AND MULTI-PROCESSORS
E. Reiter, G. Rodrique, and D. Wolitzer Oct. 1985 17 p Presented at the Parallel Computing Conference, West Berlin, Germany, 23 Sep. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-002989; UCRL-93564; CONF-8509200-1) Avail: NTIS HC A02/MF A01

Parallel numerical algorithms are characterized by having within their overall mathematical structure certain well-defined substructures that can be executed simultaneously. These mathematical substructures can be individual arithematic operations such as the addition of two vectors, or mathematical tasks such as the inversion of sequence of matrices. Computers vary on how they carry out these mathematical substructures; however, over the past decade two distinct computer architectural trends have become popular: the vector processor and the multiprocessor. Vector processors can execute parallel mathematical tasks at the floating point operation level. Even more specifically, they can only execute identical floating point operations. Multiprocessors, on the other hand, can execute larger mathematical subtasks. The basic features of the vector and multiprocessor are reviewed. Some ideas on how parallel mathematical substructures can be produced so as to create efficient algorithms for these machines are demonstrated. Computational examples will be given in both cases. DOE

N86-26053# National Center for Atmospheric Research, Boulder, Colo.
UNIX WORD PROCESSING AT HAO (FOR USE WITH THE 4.2 BSD VERSION AND -me MACRO PACKAGE)
N. Dawson Jan. 1986 150 p
(Grant NSF ATM-82-17015)
(PB86-155801; NCAR/TN-263+IA) Avail: NTIS HC A07/MF A01 CSCL 09B

The instructions for word processing on UNIX are scattered over several manuals, and many of the manuals are difficult to understand because of the technical language. The manual is a compilation of the word processing commands you are likely to need while using UNIX at the High Altitude Observatory of the National Center for Atmospheric Research in Boulder, Colorado. The manual is written in plain English and is full of examples. The word processing commands and their printed results make up the major part of the manual, part 2. Part 3 contains sample letters and memos. Part 4 contains some tips on table and equations, the lists of mathematical and Greek characters, UNIX commands that are frequently used with word processing, a brief bibliography, and a vi crib sheet (which contains frequently used editing commands). GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-26054# Oak Ridge National Lab., Tenn.
MODELING OF COMPLEX MELTING AND SOLIDIFICATION BEHAVIOR IN LASER-IRRADIATED MATERIALS: A DESCRIPTION AND USERS GUIDE TO THE LASER8 COMPUTER PROGRAM
G. A. Geist and R. F. Wood Nov. 1985 94 p
(Contract DE-AC05-84OR-21400)
(DE86-004661; ORNL-6242) Avail: NTIS HC A05/MF A01

The conceptual foundation of a computational model and a computer program based on it have been developed for treating various aspects of the complex melting and solidification behavior observed in pulsed laser-irradiated materials. A particularly important feature of the modeling is the capability of allowing melting and solidification to occur at temperatures other than the thermodynamic phase change temperatures. As a result, interfacial undercooling and overheating can be introduced and various types of nucleation events can be simulated. Calculations on silicon with the model have shown a wide variety of behavior, including the formation and propagation of multiple phase fronts. Although originally developed as a tool for studying certain problems arising in the field of laser annealing of semiconductors, the program should be useful in treating many types of systems in which phase changes and nucleation phenomena play important roles. The underlying physical and mathematical ideas and the basic relations used in LASER8 are discussed. Enough specific and detailed information on the program to serve as a guide for its use is given. A listing of one version of the program is given. DOE

N86-26055# Argonne National Lab., Ill.
QUASI-AUTOMATIC PARALLELIZATION: A SIMPLIFIED APPROACH TO MULTIPROCESSING
B. W. Glickfeld and R. A. Overbeek Oct. 1985 103 p refs
(Contract W-31-109-eng-38)
(DE86-005120; ANL-85-70) Avail: NTIS HC A06/MF A01

As multiprocessors become commercially available, a great deal of concern is being focused on the problems involved in writing and debugging software for such machines. Earlier work described the use of monitors implemented by macro processors to attain portable code. This work formulates a general-purpose monitor which simplifies the programming of a wide class of numeric algorithms. We believe that the approach of describing a set of schedulable units of computation advocated by Brown offers a real simplification for the applications programmer. In this paper, we propose a straightforward programming paradigm for describing schedulable units of computation that allows the description of many algorithms with very little effort. DOE

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-26056*# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.

TWO TIME SCALE OUTPUT FEEDBACK REGULATION FOR ILL-CONDITIONED SYSTEMS Final Report, Jan. 1982 - Jun. 1984
Anthony J. Calise and Daniel D. Moerder Washington NASA May 1986 71 p refs
(Grant NAG1-243)
(NASA-CR-3972; NAS 1.26:3972) Avail: NTIS HC A04/MF A01 CSCL 09B

Issues pertaining to the well-posedness of a two time scale approach to the output feedback regulator design problem are examined. An approximate quadratic performance index which reflects a two time scale decomposition of the system dynamics is developed. It is shown that, under mild assumptions, minimization of this cost leads to feedback gains providing a second-order approximation of optimal full system performance. A simplified approach to two time scale feedback design is also developed, in which gains are separately calculated to stabilize the slow and fast subsystem models. By exploiting the notion of combined control and observation spillover suppression, conditions are derived assuring that these gains will stabilize the full-order system. A sequential numerical algorithm is described which obtains output feedback gains minimizing a broad class of performance indices, including the standard LQ case. It is shown that the algorithm converges to a local minimum under nonrestrictive assumptions. This procedure is adapted to and demonstrated for the two time scale design formulations. Author

N86-26057# George Washington Univ., Washington, D.C. Inst. for Reliability and Risk Analysis.
THE CALCULUS OF UNCERTAINTY IN ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS. Final Report, 1 Dec. 1984 - 30 Nov. 1985
N. D. Singpurwalla and Seymour M. Selig 15 Jan. 1986 269 p refs Proc. of conference held on 28-29 Dec. 1984
(Contracts N00014-85-K-0202; N00014-85-G-0162)
(AD-A163642; GWU/IRRA/SERIAL-TR-86/2) Avail: NTIS HC A12/MF A01 CSCL 09/2

Uncertainty in artificial intelligence and expert systems are discussed. Three different approaches were examined, namely: (1) The use of belief functions, (2) fuzzy set logic, and (3) probability. A case study example of a probabilistic approach for expert systems in medicine was presented. GRA

N86-26058# Rancho Crmel Artificial Intelligence Center, San Diego, Calif.
APPLICATION OF SOME NEW ARTIFICIAL NEURAL SYSTEM PROCESSING PRINCIPLES TO PATTERN CLASSIFICATION Interim Technical Report, 26 Aug. - 18 Nov. 1985
Robert Hecht-Nielsen and Carolyn Smith 18 Nov. 1985 12 p refs
(Contract DAAG29-85-C-0025)
(AD-A163780; ARO-22323.1-MA) Avail: NTIS HC A02/MF A01 CSCL 06/4

The overall goal of the Army Research Office (ARO) study is to provide a firm conceptual and theoretical foundation for future work in ANS by exploring the use of three information processing principles. This entails both experimental exploration and theoretical development of design laws that can quantitatively predict system behavior and performance. This interim report describes the pattern environment which will support the planned experimentation. The pattern environment is a simple version of spoken English (called Lenglish), where each letter is associated with an arbitrary sound spectrum and there is a continuous transition between the spectra of adjacent letters. The signal input to the ANS will be the Lenglish reading of selected source texts. The planned experimentation will use a model of unsupervised learning to discover feature detectors for spatiotemporal segments of the input language. GRA

N86-26059# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AUTONOMOUS VEHICLE MISSION PLANNING USING AI (ARTIFICIAL INTELLIGENCE) TECHNIQUES M.S. Thesis
Samuel E. Stockbridge Dec. 1985 211 p refs
(AD-A163956; AFIT/GE/ENG/85D-45) Avail: NTIS HC A10/MF A01 CSCL 06/4

This thesis investigates a software architecture for autonomous vehicle control. The autonomous vehicle's planning ability is divided into operating system functions and mission planning system functions. The blackboard control architecture is adopted for the operating system design with implementation using the ROSS programming language. The planning system incorporate elements of a planar land understander by declaratively encoding meta-knowledge, or knowledge about the planning process. By separating the knowledge about how to plan from the specific domain knowledge, an understander can use this knowledge about how plans are constructed, in combination with the specific domain knowledge, in the understanding process. Likewise, a planner can use this same knowledge in the planning process. Thus, a great deal of flexibility is strained by dividing the knowledge base into meta-rules and domain specific rules. The planning system constructs an agenda of scripts which directs the control flow in the operating system. The operating system is given the additional duties of goal detector and plan projector and detects any errors in the plan. The implementation demonstrates the benefits of using meta-planning concepts combined with a blackboard control architecture to provide an autonomous vehicle with a more flexible and powerful planning capability. GRA

N86-26060# California Univ., San Diego. Inst. for Congitive Science.
LEARNING INTERNAL REPRESENTATIONS BY ERROR PROPAGATION Technical Report, Mar. - Sep. 1985
David E. Rumelhart, Geoffrey E. Hinton, and Ronald J. Williams Sep. 1985 48 p refs
(Contract N00014-85-K-04507)
(AD-A164453; ICS-8506) Avail: NTIS HC A03/MF A01 CSCL 05/10

This paper presents a generalization of the perception learning procedure for learning the correct sets of connections for arbitrary networks. The rule, called the generalized delta rule, is a simple scheme for implementing a gradient descent method for finding weights that minimize the sum squared error of the system's performance. The major theoretical contribution of the work is the procedure called error propagation, whereby the gradient can be determined by individual units of the network based only on locally available information. The major empirical contribution of the work is to show that the problem of local minima not serious in this application of gradient descent. GRA

N86-26061# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SCIENCE AND TECHNOLOGY POLICY
31 Mar. 1986 74 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UST-86-011) Avail: NTIS HC A04

Progress in USSR science and technology and the implementation of policies are reported. Topics discussed include: organization, planning and coordination, research facilities and manpower and automation and information policies. For individual titles, see N86-26062 through N86-26062.

N86-26062# Joint Publications Research Service, Arlington, Va.
ROLE OF ROBOTICS IN SOLVING PRODUCTION, SOCIAL PROBLEMS
Yevgeniy Pavlovich Popov *In its* USSR Report: Science and Technology Policy (JPRS-UST-86-011) 31 Mar. 1986 p 60-71 refs (For primary document see N86-26061 16-63)
Avail: NTIS HC A04

The implementation of automation and information policies by robotic systems is discussed. The robotic systems are divided into four different groups: (1) manipulation; (2) mobility; (3) information; and (4) control. The use of industrial robots to replace people and also to solve the shortage of human resources is outlined. The use of special instrument complexes in the development of the information part of the control systems of adaptive

robots and their software is outlined. The role of information science in the development of industrial robotics, in general, and in flexible machine systems, in particular, is enumerated. E.A.K.

N86-26156# Joint Publications Research Service, Arlington, Va.
COMPUTERIZATION DEMANDS ADVANCED MATHEMATICAL MODELING Abstract Only
A. A. Samarskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 62-64 Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), no. 5, 16 Jul. - 3 Aug. 1985 p 1; 4-5 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26159# Joint Publications Research Service, Arlington, Va.
PRINCIPLES OF MULTIVARIANT DOMINATION IN OPITMUM CONTROL OF TECHNOLOGICAL PROCESSES Abstract Only
E. M. Aliyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 68 Transl. into ENGLISH from Izvestiya Akademii Nauk USSR. Seriya Tekhnicheskikh Nauk (Tashkent, USSR), no. 6, Nov. - Dec. 1984 p 6-10 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26160# Joint Publications Research Service, Arlington, Va.
SIMULATION PROBLEM OF CONTROLLING LATERAL MOVEMENT OF AIRCRAFT DURING LANDING APPROACH Abstract Only
N. D. Botkin, V. M. Keyn, and V. S. Patsko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 69-70 Transl. into ENGLISH from Prikladnaya Matematika i Mekhanika (Moscow, USSR), v. 48, no. 4, Jul. - Aug. 1984 p 560-567 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-26063# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
IMPULSE RESPONSE IDENTIFICATION WITH DETERMINISTIC INPUTS USING NON-PARAMETRIC METHODS
U. K. Bhargava, R. L. Kashyap, and D. M. Goodman 15 Oct. 1985 11 p Presented at the 23rd Annual Allerton Conference on Communication, Control and Computing, Urbana-Champaign, Ill., 3-5 Oct. 1985
(Contract W-7405-eng-48)
(DE86-002852; UCRL-93531; CONF-8510226-1) Avail: NTIS HC A02/MF A01

This paper addresses the problem of impulse response identification using nonparametric methods. Although the techniques developed herein apply to the truncated, untruncated, and the circulant models, we focus on the truncated model which is useful in certain applications. Two methods of impulse response identification are presented. The first is based on the minimization of the C/sub L/ Statistic, which is an estimate of the mean square prediction error; the second is a Bayesian approach. For both of these methods, we consider the effects of using both the identity matrix and the Laplacian matrix as weights on the energy in the impulse response. In addition, we present a method for estimating the effective length of the impulse response. Estimating the length is particularly important in the truncated case. Finally, we develop a method for estimating the noise variance at the output. Often, prior information on the noise variance is not available, and a good estimate is crucial to the success of estimating the impulse response with a nonparametric technique. DOE

N86-26064# Washington Univ., Seattle. Dept. of Applied Mathematics.
PERTURBATION TECHNIQUES FOR OSCILLATORY SYSTEMS WITH SLOWLY VARYING COEFFICIENTS
J. Kevorkian 1985 131 p refs
(Contract DE-AT06-83ER-13121)
(DE86-004299; DOE/ER-13121/5) Avail: NTIS HC A07/MF A01

This is an expository paper on perturbation techniques and results for a general system of first order equations that model various weakly nonlinear oscillatory motions with slowly varying parameters. Example problems from three application areas are derived then transformed to a standard form. Asymptotic solutions and adiabatic invariants are calculated using the method of near identity averaging transformations. Equivalent results are also derived using the method of multiple scales. When certain divisors in the solution tend to zero, one can isolate the resonant behavior in a reduced problem of lower order. The solution of this reduced problem is discussed in detail for the case of transient resonance, and qualitatively for the case of sustained resonance. DOE

N86-26065# Oak Ridge National Lab., Tenn.
ANALYTIC CONTINUATION AND GREEN'S FUNCTION CALCULATIONS
L. J. Gray and T. Kaplan Nov. 1985 25 p refs
(Contract DE-AC05-84OR-21400)
(DE86-004669; ORNL-6191) Avail: NTIS HC A02/MF A01

Hass, Velicky, and Ehrenreich have shown that Green's function values can be obtained appreciably faster by performing the calculation at complex energies with large imaginary parts and then coming back to real energies by an analytic continuation algorithm. However, analytic continuation is numerically unstable and thus an error analysis is essential if one is to have confidence in the results of the continuation. Error estimates are obtained for the power series method of Hass, et al., and also for a method based upon Cauchy's Theorem. These estimates can be used to select appropriate values for the parameters of the continuation algorithms and also to determine which of the two methods is most appropriate for a given calculation. DOE

N86-26066# Sandia National Labs., Albuquerque, N. Mex.
RDEAM: AN ADAMS ODE CODE WITH ROOT SOLVING CAPABILITY
H. A. Watts Oct. 1985 64 p refs
(Contract DE-AC04-76DP-00789)
(DE86-004971; SAND-85-1595) Avail: NTIS HC A04/MF A01

Our goal has been to develop a robust root solving ODE code; that is, one which solves differential equations and isolates roots of specified event functions in the solution variables. This work concentrated on computational and software issues aimed at enhancing the reliability of locating the roots in question. Thus the primary emphasis has been placed on providing a capability which has not previously been available, and one which is needed for handling difficult and sensitive root problems. There is no doubt that we are doing a lot of work in attempting to guarantee the finding of all roots, regardless of the problem formulation. This effort is what we have referred to as the refined or sophisticated root searching procedure. It is relatively expensive, but necessary, for some problems. A less expensive and more conventional mode of operation for the root solving is also available to the user. This approach skips the refined root searching so that root detection is based solely on looking for a sign change at the endpoints of the integration step size interval. This will work well provided there is a good correlation between the step sizes taken for the integration problem and the scale or variation of the event functions. Otherwise roots are likely to be missed. DOE

N86-26067*# Kansas Univ. Center for Research, Inc., Lawrence. Structural Engineering and Engineering Materials.
THEORETICAL AND SOFTWARE CONSIDERATIONS FOR GENERAL DYNAMIC ANALYSIS USING MULTILEVEL SUBSTRUCTURED MODELS Final Report
Richard J. Schmidt and Robert H. Dodds, Jr. Sep. 1985 189 p refs
(Grant NAG3-32)
(NASA-CR-176822; NAS 1.26:176822; KU-SM-15) Avail: NTIS

HC A09/MF A01 CSCL 12A

The dynamic analysis of complex structural systems using the finite element method and multilevel substructured models is presented. The fixed-interface method is selected for substructure reduction because of its efficiency, accuracy, and adaptability to restart and reanalysis. This method is extended to reduction of substructures which are themselves composed of reduced substructures. The implementation and performance of the method in a general purpose software system is emphasized. Solution algorithms consistent with the chosen data structures are presented. It is demonstrated that successful finite element software requires the use of software executives to supplement the algorithmic language. The complexity of the implementation of restart and reanalysis porcedures illustrates the need for executive systems to support the noncomputational aspects of the software. It is shown that significant computational efficiencies can be achieved through proper use of substructuring and reduction technbiques without sacrificing solution accuracy. The restart and reanalysis capabilities and the flexible procedures for multilevel substructured modeling gives economical yet accurate analyses of complex structural systems. Author

N86-26068*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A FOURTH ORDER ACCURATE FINITE DIFFERENCE SCHEME FOR THE COMPUTATION OF ELASTIC WAVES Final Report

A. Bayliss, K. E. Jordan, B. J. LeMesurier, and E. Turkel Apr. 1986 44 p refs Submitted for publication

(Contracts NAS1-17070; NAS1-18107)

(NASA-CR-178089; ICASE-86-21; NAS 1.26:178089) Avail: NTIS HC A03/MF A01 CSCL 12A

A finite difference for elastic waves is introduced. The model is based on the first order system of equations for the velocities and stresses. The differencing is fourth order accurate on the spatial derivatives and second order accurate in time. The model is tested on a series of examples including the Lamb problem scattering from plane interfaces and scattering from a fluid-elastic interface. The scheme is shown to be effective for these problems. The accuracy and stability is insensitive to the Poisson ratio. For the class of problems considered here it is found that the fourth order scheme requires for two-thirds to one-half the resolution of a typical second order scheme to give comparable accuracy. Author

N86-26069*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PRECONDITIONED METHODS FOR SOLVING THE INCOMPRESSIBLE AND LOW SPEED COMPRESSIBLE EQUATIONS Final Report

Eli Turkel Mar. 1986 39 p refs Submitted for publication

(Contracts NAS1-17070; NAS1-18107)

(NASA-CR-178086; ICASE-86-14; NAS 1.26:178086) Avail: NTIS HC A03/MF A01 CSCL 12A

Acceleration methods are presented for solving the steady state incompressible equations. These systems are preconditioned by introducing artificial time derivatives which allow for a faster convergence to the steady state. The compressible equations in conservation form with slow flow are also considered. Two arbitrary functions, alpha and beta, are introduced in the general preconditioning. An analysis of this system is presented and an optimal value for beta is determined given a constant, alpha. It is further shown that the resultant incompressible equations form a symmetric hyperbolic system and so are well posed. Several generalizations to the compressible equations are presented which generalize previous results. Author

N86-26070*# National Aeronautics and Space Administration, Washington, D.C.

QUASI-GENERALIZED VARIABLES

J. Baumgarten and G. P. Ostermeyer May 1986 24 p refs Transl. into ENGLISH from Zeitschrift fuer Angewandte Mathematik und Mechanik (Berlin, West Germany), v. 65, no. 10, 1985 p 471-478 Original language document was announced in IAA as A86-18713 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.

(Contract NASw-4006)

(NASA-TM-88429; NAS 1.15:88429; ISSN-0044-2267) Avail: NTIS HC A02/MF A01 CSCL 12A

The numerical solution of a system of differential and algebraic equations is difficult, due to the appearance of numerical instabilities. A method is presented here which permits numerical solutions of such a system to be obtained which satisfy the algebraic constraint equations exactly without reducing the order of the differential equations. The method is demonstrated using examples from mechanics. Author

N86-26071# Washington Univ., Seattle. Dept. of Statistics.

ORTHOGONAL REGRESSION M-ESTIMATORS Technical Report, 1 Dec. 1984 - 30 Nov. 1985

Ruben H. Zamar Dec. 1985 55 p refs

(Contract N00014-84-C-0169)

(AD-A163515; TR-62) Avail: NTIS HC A04/MF A01 CSCL 12/1

M-estimators in the orthogonal regression set-up are defined in order to produce a robust alternative to the method of classical orthogonal regression. Asymptotic qualitative robustness of some orthogonal M-estimators is proved. The influence curve of these estimators is computed and some additional asymptotic theory is presented. GRA

N86-26072# Advanced Statistical Technologies Corp., Lawrenceville, N.J.

ASYMPTOTIC PROPERTIES OF INDUCED MAXIMUM LIKELIHOOD ESTIMATES OF NONLINEAR MODELS FOR ITEM RESPONSE VARIABLES: THE FINITE-GENERIC-ITEM-POOL CASE Technical Report, 1 Oct. 1984 - 31 Jul. 1985

Douglas H. Jones Oct. 1985 38 p refs

(Contract N00014-83-C-0627)

(AD-A163518; ROB-03-85; TR-01-85-ONR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The progress of modern mental test theory depends very much on the techniques of maximum likelihood estimation, and many popular applications make use of likelihoods induced by logistic item response models. While, in reality, item responses are nonreplicate within a single examinee and the logistic models are only ideal, practitioners make inferences using the asymptotic distribution of the maximum likelihood estimator derived as if item responses were replicated and satisfied their ideal model. This article proposes a sample space acknowledging these two realities and derives the asymptotic distribution of the induced maximum likelihood estimator. This article assumes that items, while sampled from an infinite set of items, have but a finite domain of alternate response functions: this situation is the case of the finite-generic-item-pool. Using the proposed sample space, the article applies the statistical functional approach of von Mises to derive the influence curve of the maximum likelihood estimator; to discuss related robustness properties; and to derive new classes of resistent estimators. The aim is revealing the value of these methods for uncovering the relative merits of different item response functions. Proofs and mathematical derivations are minimized to increase the accessability of this complex subject. Author (GRA)

N86-26073# Wisconsin Univ., Madison. Mathematics Research Center.

MAXIMUM LIKELIHOOD RECURSION AND STOCHASTIC APPROXIMATION IN SEQUENTIAL DESIGNS Technical Summary Report

C. F. J. Wu Nov. 1985 22 p

(Contract DAAG29-80-C-0041)

(AD-A163628; MRC-TSR-2890) Avail: NTIS HC A02/MF A01 CSCL 12/1

When the saving of sample size is an important consideration, sequential design of experiments is often used. By efficiently utilizing the information in the past experiments, it determines how the next experiment should be conducted. Statistical theory for

sequential designs has been developed for normal and binomial variations. For the problem of determining the solution of an unknown nonlinear equation, we have developed a class of sequential design procedures that can handle very general variations described by the generalized linear models. In special cases it includes a new adaptive version of the Robbins-Monro stochastic approximation and a maximum likelihood recursion scheme for quantal responses. Its relation to the stochastic approximation and the role the link function plays are studied. Theoretical issues such as consistency, robustness, asymptotic normality and second-order properties are discussed. GRA

N86-26074# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Mechanical Engineering.

TIME DOMAIN DESIGN OF ROBUST CONTROLLERS FOR LQG (LINEAR QUADRATIC GAUSSIAN); APPLICATION TO LARGE SPACE STRUCTURES Final Report, May 1984 - Aug. 1985

Rama K. Yedavalli Dec. 1985 104 p

(Contract F33615-84-K-3606)

(AD-A163635; AFWAL-TR-85-3093) Avail: NTIS HC A06/MF A01 CSCL 20/11

The aspect of Robustness for linear multivariable systems in time domain is the central theme of the research under the present contract. Upper bonds on the linear, structured, time varying perturbation of an asymptotically stable linear time invariant regulator are obtained to maintain both stability and acceptable regulation, using Lyapunov approach. Improvement of the proposed measures over existing measures is illustrated with the help of examples. It is shown that by employing a scaling transformation on the nominal system, it is possible to further improve the upper bound. The proposed Perturbation Round Analysis is used to design robust controllers for Linear Quadratic Regulators with structured uncertainity. Introducing quantitative measures called Stability Robustness Index and Performance Robustness Index, design algorithms are presented by which one can achieve a trade off between nominal performance, stability robustness and performance robustness. Applications considered include aircraft control problems, large space structure control problems having uncertain modal data and mode truncation as the perturbations. GRA

N86-26075# Wisconsin Univ., Madison. Mathematics Research Center.

THE CLASSIFICATION OF SOLUTIONS OF QUADRATIC RIEMANN PROBLEMS (2) Technical Summary Report

E. Isaacson and B. Temple Dec. 1985 35 p

(Contracts DAAG29-80-C-0041; DE-AC02-76ER-03077)

(AD-A163651; MRC-TSR-2892) Avail: NTIS HC A03/MF A01 CSCL 12/1

This is one step in a program aimed at classifying solutions of the Riemann problem for 2 x 2 systems of hyperbolic quadratic conservation laws. This system consists of partial differential equations. Such conservation laws approximate a general 2 x 2 system of conservation laws in a neighborhood of a point at which strict hyperbolicity fails. The solution for the symmetric systems in Region III of the four region classification of Schaeffer and Shearer is given. The solution is based on the qualitative shape of the integral curves described by Schaeffer and Shearer and a numerical calculation of the Hugonoit loci with their shock types. Author (GRA)

N86-26076# Wisconsin Univ., Madison. Mathematics Research Center.

B-SPLINES WITHOUT DIVIDED DIFFERENCES Technical Summary Report

Carl deBoor and Klaus Hoellig Dec. 1985 12 p refs

(Contract DAAG29-80-C-0041; Grant NSF DMS-83-51187)

(AD-A163702; MRC-TSR-2896) Avail: NTIS HC A02/MF A01 CSCL 12/1

This note develops the basic B-spline theory without using divided differences. Instead, the starting point is the definition of B-splines via recurrence relations. This approach yields very simple derivations of basic properties of spline functions and algorithms. GRA

N86-26077# Wisconsin Univ., Madison. Mathematics Research Center.

THE CLASSIFICATION OF SOLUTIONS OF QUADRATIC RIEMANN PROBLEMS (1) Technical Summary Report

E. Isaacson (Wyoming Univ., Laramie), D. Marchesin (Pontifica Univ. Catolica do Rio de Janeiro, Brazil), B. Plohr, and B. Temple Dec. 1985 55 p Sponsored in part by FINEP/Brazil grant, CNPq grants and Wyoming Univ.

(Contracts DAAG29-80-C-0041; DE-AC02-76ER-03077; Grants NSF DMS-83-1229; NSF INT-84-15209; NSF DMS-82-10950; AF-AFOSR-0117-85)

(AD-A163706; MRC-TSR-2891) Avail: NTIS HC A04/MF A01 CSCL 12/1

We are interested in classifying the solutions of Riemann problems for the 2 x 2 conservation laws which have homogeneous quadratic flux functions. Such flux functions approximate an arbitrary 2 x 2 system in a neighborhood of an isolated point where strict hyperbolicity fails. This problem was motivated by Marchesin and Paes-Leme who discovered such a singularity in a system of equations arising in oil reservoir simulation. Schaeffer, Shearer, Marchesin and Paes-Leme solved the Riemann problem for this system in a neighborhood of the singular point. Isaacson and Temple outlined a program for classifying such singularities by means of locating normal forms for the equivalence classes of equations generated by linear changes in dependent variables. A 2-parameter family of such normal forms were found by Plohr. In the important work of Schaeffer and Shearer a new normal form was found which reduced the classification of integral curves to a theorem of Darboux on the classification of umbilic points for homogeneous cubic equations. The integral curves fall into four isomorphism classes, called Regions 1-4. In this paper we give the solution of the Riemann problem for the systems in Region 4 which exhibit up-down symmetry. GRA

N86-26078# California Univ., Berkeley. Operations Research Center.

THE GROUP CONSENSUS PROBLEM

Kiduck Chang Dec. 1985 49 p refs

(Contract N00014-85-K-0384; Grant AF-AFOSR-0122-81)

(AD-A164064; ORC-85-13) Avail: NTIS HC A03/MF A01 CSCL 12/1

In a group consensus problem, there is a group with K greater than or equal to 2 members who are jointly responsible for the aggregation of their opinions. The group may not have a predefined real decision problem. French called the group consensus problem with a predefined real decision problem a group decision problem and the group consensus problem without a real decision problem a text-book problem. Suppose a group with K members are interested in forecasting demands for a commodity for a given time period. Production planning for this commodity depends on demands. Each group member may have his own opinion for demands in the form of probability distribution. In this case the group has a real decision problem in which they should determine the amount of the commodity to be produced. Here the group consensus opinion is a probability distribution for demands obtained from the group members' prior opinions for demands. For example a group of meteorologists are required to give a single forecast for weather without having any real decision problem. This is an example of the text-book problem. Savage suggested that the whole of statistical theory is directly or indirectly aimed at the solution of a version of the text-book problem. The objective of this paper is to give a unified approach for these two problems. In this paper all the group members are assumed to be Bayesians. GRA

N86-26079# Florida State Univ., Tallahassee. Dept. of Statistics.

THE METHOD OF SIEVES. A SURVEY OF RECENT APPLICATIONS

Ian W. McKeague Dec. 1985 12 p refs

(Contract DAAG29-82-K-0168)

(AD-A164087; FSU-Statistics-M718; TR-D-84-ARO; ARO-19367.34-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The method of sieves is a technique of nonparametric estimation in which estimators are restricted by an increasing sequence of subsets of the parameter space with the subsets indexed by the sample size. The need for this technique arises in situations where the parameter space is too large for the existence or consistency of unconstrained maximum likelihood or least squares estimators. Grenander developed the abstract theory of the method of sieves and provided a wealth of examples illustrating its use. This article is to appear under the entry SIEVES, METHOD OF in the Encylopedia of Statistical Sciences. GRA

N86-26080# Maryland Univ., College Park. Inst. for Physical Science and Technology.
THE FACTORIZATION METHOD FOR THE NUMERICAL SOLUTION OF TWO POINT BOUNDARY VALUE PROBLEMS FOR LINEAR ODE'S (ORDINARY DIFFERENTIAL EQUATIONS) Final Note
I. Babuska and V. Majer Jan. 1986 79 p refs
(Contract N00014-85-K-0169; Grant NSF DMS-83-15216)
(AD-A164368; BN-1039) Avail: NTIS HC A05/MF A01 CSCL 12/1

The theoretical analysis and computational implementation of factorization-based methods for the numerical solution of linear boundary value problems for ordinary differential equations are presented. The methods are optimal with respect to certain clearly defined criteria. Numerical examples show the effectiveness of a general code based on the factorization method. Direct methods are characterized by the solution of global (linear) algebraic systems for the discrete solution. In this sense multi-shooting may be regarded as a hybrid method between the two classes. A sophisticated recent example of multi-shooting is the BOUNDPAC package. Indirect solution methods are characterized by the association of the boundary value problem with certain auxiliary initial value problems (IVP). The auxiliary IVP's are generally solved uni-directionally (forward), but a subclass of initial value based methods are based on bi-directional (double sweep) strategies. GRA

N86-26081# Naval Research Lab., Washington, D. C.
AN EXAMINATION OF MODELS OF RELAXATION IN COMPLEX SYSTEMS. 1. CONTINUOUS TIME RANDOM WALK (CTRW) MODELS Interim Report, Apr. - Oct. 1985
K. L. Ngai, R. W. Rendell, A. K. Rajagopal, and S. Teitler 4 Feb. 1986 39 p refs
(AD-A164462; NRL-MR-5719) Avail: NTIS HC A03/MF A01 CSCL 12/1

Models of relaxation in complex systems based on the continuous time random walk (CTRW) formalism are examined on the basis of: (1) their robustness; (2) the nature of technical procedures employed; (3) the appropriateness of assumptions when subjected to physical tests; (4) the inclusion of a description of establilshed experimental results; and (5) the consistency of predictions with experimental results. Inadequacies of the CTRW models are shown to exist for all these features. It is concluded tha CTRW models, as they exist today, must be rejected as viable decriptions of the relaxation process in complex systems. GRA

N86-26082# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.
AN EVALUATION OF J-R CURVE TESTING USING THREE POINT BEND SPECIMENS
M. T. Kirk and E. M. Hackett Jan. 1986 51 p refs
(AD-A164509; DTNSRDC/SME-85/87) Avail: NTIS HC A04/MF A01 CSCL 20/11

This investigation concerns the accuracy of load line deflection measurement techniques used in J integral-R curve testing of three point bend specimens (bendbars). Four methods of load line deflection measurement were investigated. One method employed a calibrated transducer that gave a direct reading of load line deflection. The other three methods mathematically related load line deflection to some other displacement (i.e., crack mouth opening displacement, cross head displacement) measured during testing. Photographs taken at regular intervals during loading provided an absolute measure of load line deflection. In comparison to this reference, the other methods had equal accuracy with varying degrees of precision. In no case, however, did the measurements from the laboratory techniques deviate from the photographic reference by more than 0.052 mm (0.002 in.) on average. The small differences between the load line deflections measured by the various laboratory techniques cause less scatter in the J-R curves and J sub IC values than attributable to material variability. Further, J-R curves over the first 1.75 mm of crack extension from both bendbars and compacts were shown to be coincident for the alloys tested. Author (GRA)

N86-26083# Naval Postgraduate School, Monterey, Calif.
LINEAR ALGEBRA USING PASCAL MT+ Technical Report, Oct. 1982 - Oct. 1984
Larry Williamson Jan. 1986 94 p refs
(AD-A164517; NPS53-86-0001) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis includes the documentation and source listing of a user friendly interactive computer program that (1) solves simultaneous linear equations, (2) calculates the eigensystems of a square real matrix, and (3) finds the roots of a real polynomial. It is written in PASCAL MT+, the DRI implementation of Pascal, under the CPM86 operating system for the IBM PC. With the use of nested menus and keyboard filtering, the program requires no learning on the user's part. It channels the user in the right direction. Input matrices are entered from the keyboard while the answers may be outputted to the screen and/or printer. The documentation along with the source listing describe how to develop a large, user friendly program through the use of modular techniques such as overlays. Author (GRA)

N86-26084# Yale Univ., New Haven, Conn. Dept. of Computer Science.
RAPID SOLUTION OF INTEGRAL EQUATIONS OF SCATTERING THEORY IN TWO DIMENSIONS
V. Rokhlin Nov. 1985 28 p
(Contract N00014-82-K-0184)
(AD-A163193; YALEU/DCS/RR-440) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper describes an algorithm for rapid solution of boundary value problems for the Helmholtz equation in two dimensions based on iteratively solving integral equations of acoustic scattering theory. The CPU time requirements of previously published algorithms of this type are of the order sq n, where n is the number of nodes in the discretization of the boundary of the scatterer. The CPU time requirements of the algorithm of the present paper are n raised, and can be further reduced, making it considerably more practical for large scale problems. Author (GRA)

N86-26157# Joint Publications Research Service, Arlington, Va.
SOME THEORY OF APPROXIMATION AND NUMERICAL ANALYSIS PROBLEMS Abstract Only
K. I. Babenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 65 Transl. into ENGLISH from Uspekhi Matematicheskikh Nauk (Moscow, USSR), v. 40, no. 1 (241), Jan. - Feb. 1985 p 3-28 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26158# Joint Publications Research Service, Arlington, Va.
FAST ALGORITHM FOR SOLVING A NETWORK DISTRIBUTION PROBLEM AND ITS APPLICATION Abstract Only
K. V. Kim and O. V. Ni *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 66 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR. Seriya Fiziko-Matematicheskaya (Alma Ata, USSR), no. 1 (122), Jan. - Feb. 1985 p 87-89 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-26085# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE EFFECT OF TWO-STAGE SAMPLING IN THE F STATISTIC Technical Summary Report
C. F. J. Wu, D. Holt, and D. J. Holmes Oct. 1985 32 p Sponsored in part by Wisconsin Univ., Madison, and by Economic and Social Research Council of the U.K.
(Contract DAAG29-80-C-0041; Grant NSF DMS-85-02303)
(AD-A163653; MRC-TSR-2877) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document investigates the effect of intracluster correlation in two stage samples on the ordinary F procedures in linear models. A measure is proposed as a diagnostic and basis for correction to the F statistic. A decomposition of this measure is given in terms of the contributions of the individual regressors and their cross products. For known intracluster correlation the proposed correction to F performs very well in the numerical study. For unknown intracluster correlation a simple alternative to the generalized least squares procedure is proposed and is shown to perform favorably in the simulation study. Author (GRA)

N86-26086# California Univ., Berkeley. Electronics Research Lab.
CONTINUATION OF RESEARCH ON MULTIPARAMETER STOCHASTIC PROCESSES Final Report, 1 Apr. 1982 - 31 Aug. 1985
E. Wong Nov. 1985 5 p refs
(Contract DAAG29-82-K-0091)
(AD-A163763; ARO-18894.7-MA) Avail: NTIS HC A02/MF A01 CSCL 20/1

To study Markov processes with a multidimensional parameter necessitates the introduction of generalized processes that can be localized to surfaces. A vehicle for dealing with these is stochastic cochains, processes parameterized by k-dimensional surfaces in n-dimensional surface. The principal result of this project has been the development of a theory of stochastic cochains. Author (GRA)

N86-26087# Massachusetts Inst. of Tech., Cambridge.
ESTIMATION THEORY AND STATISTICAL PHYSICS
S. K. Mitter Dec. 1985 22 p refs
(Contract DAAG29-84-K-0005; Grant AF-AFOSR-0227-85)
(AD-A164054; LIDS-P-1518; ARO-20980.38-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The construction of a nonlinear filter involves an integration over function space which is exactly analogous to the construction of a measure on path space via the Feynman-Kac-Nelson Formula. In Kalman-Bucy filtering problem the filtering of Gauss-Markov processes in the presence of additive white Gaussian noise occupies the same role as the Ornstein-Uhlenbeck process (finite or infinite-dimensional) in Quantum Mechanics or Quantum Field Theory. That this analogy is borne out by the fact that a solvable Lie algebra, the oscillator algebra which contains the Heisenberg algebra as a derived algebra is intrinsically attached to the Kalman-Bucy filtering problem. The problem of nonlinear filtering of diffusion processes was shown to admit a stochastic variational interpretation. The objective of this paper is to strengthen these analogies further with a view to showing the close relationship of estimation theory to statistical mechanics. The motivation for this comes from problems of estimation and inverse problems related to image processing. In order to carry out this program it is necessary to generalize these ideas to filtering problems for infinite-dimensional processes. There are two types of processes involved: continuous processes such as infinite-dimensional Ornstein-Uhlenbeck processes and their L2-functionals which represent intensities of images and processes of a discrete nature which will represent boundaries of images. GRA

N86-26088# Sandia National Labs., Albuquerque, N. Mex.
PROBABILISTIC RISK ASSESSMENT COURSE DOCUMENTATION. VOLUME 7: ENVIRONMENTAL TRANSPORT AND CONSEQUENCE ANALYSIS
Lynn T. Ritchie, Daniel J. Alpert, Richard P. Burke, Robert M. Ostmeyer, Geoffrey D. Kaiser, Gene E. Runkle (Raytheon Service Co., Burlington, Mass.), and Keith Woodard (Pickard, Lowe and Garrick, Inc., Washington, D.C.) Aug. 1985 399 p 7 Vol.
(Grant NRC FIN-A-1321)
(TI86-002575; NUREG/CR-4350/7; SAND85-1495/7) Avail: NTIS HC A17/MF A01

Consequence models were designed to assess health and economic risks from potential accidents at nuclear power plants. These models were applied to an ever increasing variety of problems with ever increasing demands to improve modeling capabilities and provide greater realism. The environmental transport of postulated radiological releases and the elements and purpose of accident consequence evaluation were examined. Topics addressed include: overview of health and economic consequence analysis; atmospheric transport and deposition modeling; exposure pathways; radiation dosimetry; estimating potential health effects; emergency response; economic consequences of reactor accidents; consequence modeling codes; and consequence modeling differences and issues. Author

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-26089# North Carolina Univ., Chapel Hill. Operations Research and Systems Analysis.
THE DISTRIBUTION OF MAXIMUM FLOW WITH APPLICATION TO MULTI-STATE RELIABILITY SYSTEMS
George S. Fishman Nov. 1985 44 p refs
(Grant AF-AFOSR-0140-84)
(AD-A163999; UNC/ORSA/TR-85/8; AFOSR-85-1257TR) Avail: NTIS HC A03/MF A01 CSCL 12/2

This paper describes an efficient Monte Carlo sampling plan for estimating the distribution of maximum flow in a directed network whose arcs have random capacities. Such a network can be used to represent a multistate system whose multistate components are subject to deterioration in capacity by random amounts at random points in time. The proposed sampling plan uses an easily computed a priori upper bound on the complementary distribution function to obtain an unbiased point estimator with smaller variance than crude Monte Carlo sampling allows. The paper also describes procedures for interval estimation and for assessing when the sampling experiment has achieved a specified accuracy. To facilitate sampling, the paper presents a characterization of deterioration based on cumulative processes, leading to the treatment of arc capacities as being multinormally distributed. A technique is described for checking the appropriateness of this model with regard to lower and upper bounds on capacity. A procedure is also described for deriving a confidence interval on the measure used to assess variance reduction. An example illustrates the sampling plan and a concise summary gives all steps needed to implement the plan. GRA

N86-26161# Joint Publications Research Service, Arlington, Va.
PARAMETRIC OPTIMIZATION OF ALGORITHM FOR ESTIMATING VALUES OF ONE CLASS OF UNSTEADY RANDOM PROCESSES Abstract Only
G. A. Kryzhanovskiy and V. I. Aleshin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 71 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR: Seriya Fiziko-Matematicheskaya (Alma Ata, USSR), no. 5, Sep. - Oct. 1984 p 77-81 (For primary document see N86-26108 16-70) Avail: NTIS HC A05

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-26090# Argonne National Lab., Ill.
QUASI-NEWTON METHODS WITH BOUNDS
P. H. Calamai and J. J. More Oct. 1985 13 p refs
(Contract W-31-109-eng-38)
(DE86-004966; ANL/MCS-TM-60) Avail: NTIS HC A02/MF A01

We develop a quasi-Newton method which preserves known bounds on the Jacobian matrix. We show that this update can be computed with the same amount of work as competitive methods. In particular, we prove that the number of operations required to obtain this update is proportional to the number of nonzeros in the sparsity pattern of the Jacobian matrix. The method is also shown to share the local convergence properties of Broyden's and Schubert's method. DOE

N86-26091# Wisconsin Univ., Madison. Mathematics Research Center.
THE EQUATION c(z)t = PHI(zx])x: THE FREE BOUNDARY INDUCED BY A DISCONTINUITY IN THE DERIVATIVE OF c Technical Summary Report
M. Bertsch, M. E. Gurtin, and D. Hilhorst Sep. 1985 62 p refs
(Contract DAAG29-80-C-0041; Grant NSF DMS-84-04116)
(AD-A163630; MRC-TSR-2869) Avail: NTIS HC A04/MF A01 CSCL 12/1

The equation c(z)t - phi(zx)x arises in a theory for two interacting biological species that disperse in response to population pressure. We prove existence and uniqueness for this equation with appropriate initial and boundary conditions, and use these results to establish a solution, for arbitrary segregated initial-data, in which the two species remain segregated for all time. GRA

N86-26092# Oak Ridge National Lab., Tenn.
ABSTRACT TIME-DEPENDENT TRANSPORT EQUATION
V. Protopopescu 1985 15 p refs Presented at the 1st Workshop on Operator Theory and Applications, Amsterdam, Netherlands, 1 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002450; CONF-8506210-1) Avail: NTIS HC A02/MF A01

The abstract time-dependent transport equation is considered as an evolution (initial-boundary value) problem in the Banach space L(sub p), 1 less than or equal to p < infinity. By using the trajectory method, the basic issues of existence, uniqueness, positivity, and dissipativity are settled for very general, possibly time-dependent domains, operators, and boundary conditions. DOE

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-26093# Brookhaven National Lab., Upton, N. Y.
TIME-SLICING SUBSYSTEM OF THE BIOLOGY SMALL-ANGLE X-RAY SCATTERING STATION AT THE NATIONAL SYNCHROTRON LIGHT SOURCE
F. W. Stubblefield Nov. 1985 10 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 22-25 Oct. 1985
(Contract DE-AC02-76CH-00016)
(DE86-004354; BNL-37320; CONF-851009-42) Avail: NTIS HC A02/MF A01

The time-slicing subsystem of the Biology Small-Angle X-ray Scattering divides the time period during which the data for small-angle X-ray diffraction patterns from biological samples is collected into time slices (or frames). The subsystem, being part of a multiprocessor experiment control and data acquisition system, has its own dedicated processor; it also has special-purpose front-end electronics sufficient to generate the gating and other control signals required to produce a sequence of as many as 256 time slices, measured with a basic time unit of 1 (MU)sec. The electronics also synchronizes with execution of the time slice sequence the application of stimuli to the biological sample, the measurement of voltages generated by the sample, and the application of auxiliary device trigger pulses and routes detector data and auxiliary scaler data into appropriate time-slice-indexed buffers in a large external data memory array. The structure of the entire experiment control and data acquisition system is briefly reviewed. Details of the structure and operation of the time slice subsystem are presented. DOE

N86-26094*# National Aeronautics and Space Administration, Washington, D.C.
MEASUREMENT OF PARTIAL PRESSURES IN VACUUM TECHNOLOGY AND VACUUM PHYSICS
W. K. Huber Jun. 1986 22 p refs Transl. into ENGLISH from the book "Results of High-VAcuum Technology and the Physics of Thin Films, Vol. 2" Stuttgart, West Germany, Wissenschaftliche Verlagsgesellschaft, 1971 p 321-335 Original language document was announced in IAA as A72-36836 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88438; NAS 1.15:88438) Avail: NTIS HC A02/MF A01 CSCL 20C

It is pointed out that the measurement of gaseous pressures of less than 0.0001 torr is based on the ionization of gas atoms and molecules due to collisions with electrons. The particle density is determined in place of the pressure. The ionization cross sections for molecules of various gases are discussed. It is found that the true pressure in a vacuum system cannot be determined with certainty if it is unknown which gas is present. Effects of partial pressure determination on the condition of the vacuum system are discussed together with ion sources, systems of separation, and ion detection. G.R.

N86-26095# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
CHARACTERISTIC MODES FOR A SLOT IN A CONDUCTING PLANE
Karim Y. Kabalan, Roger F. Harrington, and Joseph R. Mautz Dec. 1985 110 p refs
(Contract N00014-85-K-0082)
(AD-A163523; SYRU/DECE/TR85/6; TR-2) Avail: NTIS HC A06/MF A01 CSCL 20/3

In this report, the theory of characteristic modes for slots is used to solve the problem of an infinitely long slot in a conducting plane in an unbounded medium illuminated by either a transverse electric or a transverse magnetic uniform plane wave. The characteristic currents are defined as the eigenfunctions of a certain generalized eigenvalue equation involving the admittance operator and its real part. The theory is general, applicable to wide as well as narrow slots, and gives a modal expansion of all quantities and parameters of interest usually encountered in electromagnetic compatibility problems. This modal expansion converges rapidly when the slot is narrow. The characteristic currents and fields, the equivalent magnetic current, and the radiation pattern are computed for different slot widths. Analytic expressions for the special case of a narrow slot are also given. GRA

N86-26096# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 40, NUMBER 2 Monthly Report
Larry E. Shaffer Feb. 1986 46 p
(AD-A163008; ESN-40-2) Avail: NTIS HC A03/MF A01 CSCL 05/2

ESN is a monthly publication with brief articles on recent developments in European scientific research. Its partial contents are: Biotechnology Research at GBF, and at the Inst. of Technical Chemistry, Univ. of Hanover, West Germany; 7th European Immunology Congress; Biotechnia '85 - First International Congress for Biotechnology; Acoustic Cavitation Generated by Clinical Ultrasound; Advances in Chemical Reaction Dynamics; Geophysics

Research in Israel; Fiber Composite Research at Paisley College of Technology, Scotland; A review of International Research on the Physical Metallurgy of Welding; Silicon Metallurgy at the Helsinki Technical Univ.; A Conference on Guided Optical Structures and Their Applications; Optoelectronics Research at Oxford Univ.; and Fractal Conferences in Europe. GRA

N86-26097# California Univ., Santa Barbara. Dept. of Physics.
DISCONTINUITY OF THE EXCHANGE CORRELATION POTENTIAL FROM A DENSITY FUNCTIONAL VIEWPOINT Technical Report, Jun. - Dec. 1985
W. Kohn 10 Feb. 1986 15 p refs Prepared in cooperation with Max-Planck-Inst. fuer Festkoerperforschung, Stuttgart, West Germany
(Contract N00014-84-K-0548; Grant NSF DMR-83-10117)
(AD-A164377; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/3

The calculation of energy gaps of insulators is an important theory objective. A commonly used method is density functional theory. Recently it was shown that an unexpected difficulty (discontinuity of the exchange correlation potential) arises. This paper makes a contribution towards the understanding of this problem. The discontinuity is expressed in terms of changes of the exchange correlation energy, E sub xc, of a perfect N-particle insulator when (1) a conduction electron is introduced (2) a valence electron is removed and (3) an external perturbation is applied to the perfect insulator (without changing N) such that the density change is equal to minus the sum of the density changes in (1) and (2). GRA

N86-26098# National Bureau of Standards, Gaithersburg, Md.
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS, VOLUME 90, NUMBER 5, SEPTEMBER-OCTOBER 1985
Oct. 1985 64 p
(PB86-166782) Avail: NTIS HC A04/MF A01; also available SOD HC $3.00 as SN703-027-00006-7 CSCL 14B

The Journal of Research of the National Bureau of Standards, Volume 90, Number 5, September-October 1985, contains articles on the following topics: Note on Weighings Carried Out on the NBS-2 Balance; Thermodynamics of Solution of SO2(g) in Water of Aqueous Sulfur Dioxide Solutions; SRM 1970: Succinonitrile Triple-Point Standard-A Temperature Reference Near 58.08C; Performance Assessment of Automatic Speech Recognizers; and Chemical Kinetics-Theory and Experiment. GRA

N86-26099# Joint Publications Research Service, Arlington, Va.
USSR REPORT: PHYSICS AND MATHEMATICS Abstracts Only
14 Mar. 1986 124 p Transl. into ENGLISH from various Russian articles
(JPRS-UPM-86-006) Avail: NTIS HC A06/MF A01

Topics on physics and mathematics from foreign newspapers, periodicals and books and news agency transmissions and broadcasts presented include: acoustics; crystals, laser glasses and semiconductors; gas dynamics; fluid dynamics; high temperature physics; lasers; magnetohydrodynamics; nuclear physics; optics and spectroscopy; plasma physics; thermodynamics; numerical analysis; control theory; logic and game theory; operations research and differential equations. For individual titles, see N00-00001 through N00-00008. For individual titles, see N86-26100 through N86-26107.

N86-26100# Joint Publications Research Service, Arlington, Va.
FINAL STAGE OF DEGENERACY OF TURBULENT VELOCITY FIELD IN WAKE STREAM Abstract Only **c34**
I. I. Kovalev, B. A. Kolovandin, and N. N. Luchko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 10 Transl. into ENGLISH from Inzhenerno-Fizicheskiy Zhurnal (Minsk, USSR), v. 49, no. 2, Aug. 1985 p 209-214 Original language document was announced in IAA as A85-46247 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

A three parameter differential model is used to obtain analytical expressions describing the evolution of the characteristics of the velocity fields of axisymmetric and plane wake flows in the asymptotic case of weak turbulence for various values of the excess impulse. The exponents of the power laws of attenuation are shown to depend on the values of the empirical coefficients of the model. The results obtained are compared with the asymptotic laws proposed by Phillips (1955). V.L.

N86-26101# Joint Publications Research Service, Arlington, Va.
SUBSURFACE PLASMA IN BEAM OF CONTINUOUS CO2-LASER Abstract Only **c36**
Ye. V. Danytsikov, V. A. Dymshakov, F. V. Lebedev, V. D. Pismennyy, and A. V. Ryazanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 16 Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Seriya Fizicheskaya (Moscow, USSR), v. 49, no. 4, Apr. 1985 p 811-828 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

Experiments performed at the Institute of Atomic Energy established the conditions for formation of subsurface plasma in substances by laser radiation and its characteristics. A quasi-continuous CO2 laser emitting square pulses of 0.1 to 1.0 ms duration and 1 to 10 kW power as well as a continuous CO2 laser served as radiation sources. Radiation was focused on spots 0.1 to 0.5 mm in diameter and maintained at levels ensuring constant power density during the interaction time, while the temperature of the target surface was measured continuously. Metals, graphite and dielectric materials were tested with laser action taking place in air N2 + O2 mixtures, Ar or He atmosphere under pressures of 0.01 to 1.0 atm. Data on radiation intensity thresholds for evaporation and plasma formation were obtained. On the basis of these thresholds, combined with data on energy balance and the temperature profile in plasma layers, a universal state diagram was constructed for subsurface plasma with nonquantified surface temperature and radiation intensity coordinates. B.G.

N86-26102# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATION OF PROCESSES IN SOLID-STATE LASER OSCILLATORS AND AMPLIFIERS WITH PHOTOTUBE PUMPING: LASER PUMPING SYSTEMS Abstract Only **c36**
V. M. Gradov, G. I. Kromskiy, A. A. Mak, G. V. Sklizkov, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 42-43 Transl. into ENGLISH from Preprint no. 105, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

Optical pumping systems for solid state lasers are evaluated comparatively on the basis of a mathematical model of processes and the results of computer simulation. The principal criterion for comparison is the overall energy efficiency, assuming that two essential requirements are met: a pumping power level adequate for attainment of the emission or amplification threshold and uniform distribution of the pumping radiation density above the threshold level over the active medium. The method covers spherical and cylindrical surfaces. The general algorithm of the solution of the corresponding integral and differential equations was programmed for a self consistent calculation of the pumping system characteristics. The method is applied to two different pumping systems where discharge produces an optically dense plasma and an optically thin plasma respectively. Analysis and calculations are particularized for several known variants of these pumping systems with various modes of laser emission tuning. B.G.

N86-26103# Joint Publications Research Service, Arlington, Va.
CHARACTERISTICS OF X-RADIATION EMITTED DURING FOCUSING OF LASER BEAMS ON SOLID TARGETS: RADIATION LOSSES IN MULTICHARGE PLASMA Abstract Only **c36**
V. A. Vinogradov and V. N. Shlyaptsev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 65 Transl. into ENGLISH from Preprint no. 11, Lebedev Physical Inst.,

Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

Propeties of X-radiation in the X-ray lithographic 8 to 10 A region of the spectrum emitted by a homogeneous multicharge plasma are evaluated within the ranges of temperature and density characteristic of a laser plasma above solid targets. Based on numerical analysis, analytical relations are established for atomic and ionization constants. Ionization and photorecombination rates in a steady plasma as well as in a fast excited and recombining one are determined, taking into account the relationship between ionicity distribution of atoms and electron concentration. A steady plasma is one in a state of local ionization equilibrium, which in the extreme cases of very low density and very high density becomes the state of local corona equilibrium and the state of local thermodynamic equilibrium, respectively. The rates of radiation process are calculated next assuming a plasma optically thin for its intrinsic radiation. The radiation losses in the plasma are then calculated. The losses and spectral distribution of radiation energy are determined separately for a steady and nonsteady plasma. Author

N86-26104# Joint Publications Research Service, Arlington, Va.
IMPACT DEFORMATION OF METALS TAKING INTO ACCOUNT BULK MODULUS AND TEMPERATURE Abstract Only
V. P. Mayboroda and N. N. Kholin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 76-77 refs Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Mekhanika Tverdogo Tela (Moscow, USSR), no. 4, Jul. - Aug. 1985 p 103-110 (For primary document see N86-26099 16-26)
Avail: NTIS HC A06/MF A01

Dynamic inelastic deformation of metals under impact is analyzed on the basis of a thermodynamic model which accounts for dependence on both the temperature and the bulk modulus of the material. The thermodynamic state of a metal is accordingly determined by the elastic strain tensor, the absolute temperature and the internal state described by the corresponding equations of kinetics. Stipulating an extremal deformation process rather than any other possible process of inelastic deformation and assuming that all elasticity constants of a metal are independent of its inelastic properties, an associated law of plastic flow is formulated which yields an inelastic strain rate tensor separable into strains dependent on and strains independent of the time scale. The law also yields the corresponding dissipation function. For specificity a Mises-Schleicher kind of hardenable material is considered. Deformation of such a metal at high temperature and pressure is analyzed on the basis of the Navier-Stokes equatons of flow for a compressible medium with axial symmetry and the Mie-Grueneisen equation of state. Author

N86-26105# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATION OF PROCESSES IN SOLID-STATE LASER RADIATORS AND AMPLIFIERS WITH GLOW-TUBE PUMPING: ELECTRIC-DISCHARGE PUMPING SOURCES. THERMOPHYSICAL PROCESSES IN ENVELOPE AND ELECTRODES OF PULSE PUMPS Abstract Only c36
V. M. Gradov, V. I. Zhiltsov, G. V. Sklizkov, Yu. I. Terentyev, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 88-89 Transl. into ENGLISH from Preprint no. 189, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

Thermophysical processes in pulse pumps for solid state lasers are analyzed on the basis of the results of computer simulation according to a theoretical model which includes mechanical and thermal stresses in the pump components. The thick walled pump envelope is assumed to be in a plane state of stress and strain under axisymmetric load consisting of internal pressure and heat. The corresponding system of equations covers pressure and temperature transients as well as the steady state mechnical and thermal stresses. The mathematical model emphasizes cathodic processes at the cathode surface and in the boundary layer. The corresponding system of equations is solvable by the Runge-Kutta method. Separate consideration is given to mechanical wear of the pump envelope and electrodes for which a physico-chemical structure and processes were also constructed and programmed. Author

N86-26106# Joint Publications Research Service, Arlington, Va.
COMPUTER SIMULATIONS OF PROCESSES IN SOLID-STATE LASER RADIATORS AND AMPLIFIERS WITH PHOTOTUBE PUMPING: ELECTRIC-DISCHARGE PUMPING SOURCES. ARC DISCHARGES Abstract Only c36
V. M. Gradov, A. A. Mak, G. I. Kromskiy, G. V. Sklizkov, S. I. Fedotov, and A. A. Shcherbakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 89 Transl. into ENGLISH from Preprint no. 190, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

Problems of modeling and computer simulation are analyzed in reference to the design of solid state laser devices with glow tube pumping. Electric pulse and arc discharges are considered specifically. A model was constructed for a cylindrically symmetric column in the diffusion approximation with the correspoinding system of differential equations put in a form for most efficient and accurate simulation of the processes. For most economical use of the computer, the radiation spectrum is optimally subdivided into intervals. It is necessary to validate the assumption of a plasma in the state of local thermodynamic equilibrium by first accounting for and then discounting the various factors which disturb that equilibrium, namely emission of radiation and temperature gradients, as well as diffusion of charged particles toward the walls. In the case of arc discharge, a theory and a model are constructed for determining the electrophysical characteristics and the radiation characteristics of such discharge in inert gases and in vapors of alkali metals. Author

N86-26107# Joint Publications Research Service, Arlington, Va.
CONTROL OF MANIPULATOR IN SINGULAR POSITIONS Abstract Only
V. A. Glazunov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-009) 14 Mar. 1986 p 98 Transl. into ENGLISH from Preprint no. 189, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26099 16-70)
Avail: NTIS HC A06/MF A01

A manipulator is considered whose kinematic chain, an open one consisting of six rotationally paired, can assume singular positions where the translation vectors of the six axes cease to be independent of one another. The last link holds a tong which can assume any position in space within the range defined by the six axes of the chain and whose initial displacement can generally be infinitesimal, as in bioengineering systems with velocity/vector control. The problem is to dislodge the tong from such a position by means of a kinematic screw. Control of the manipulator involves two operations, detection of a singular position and selection of the kinematic screw which most closely approximates the required one. In the simplest case the control problem is solved on the basis of a local criterion and on testing a manipulator position for one particular singularity. In automatic contour control, the criterion is generally a global one covering the entire set of possible singular positions. B.G.

N86-26108# Joint Publications Research Service, Arlington, Va.
USSR REPORT: PHYSICS AND MATHEMATICS
21 Jan. 1986 88 p Transl. into ENGLISH from various Russian articles
(JPRS-UPM-86-001) Avail: NTIS HC A05/MF A01

Topics on physics and mathematics from foreign newspapers, periodicals and books, and news agency transmissions and broadcasts addressed include: crystals and semiconductors; gas dynamics; fluid dynamics; lasers; magnetohydrodynamics; nuclear physics; optics and spectroscopy; electro-optics; plasma physics; thermodynamics; numerical analysis and statistics;

algorithms; control theory; and differential equations. For individual titles, see N86-26109 through N86-26161.

N86-26109# Joint Publications Research Service, Arlington, Va.
FAST METHOD OF GROWING CRYSTALS FOR NONLINEAR OPTICS Abstract Only c76
In its USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 1 refs Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), 18 Jun. - 1 Jul. 1985 p 4 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

A method for rapidly growing nonlinear optical crystals from aqueous solutions was developed at the USSR Academy of Sciences Institute of Applied Physics in Gor'kiy. Such crystals are used for controlling laser beams, which makes it possible to deflect beams, and change wavelengths. Previously, the rate of growth of such crystals was about 0.5 to 1.0 millimeters per day. For example, it took more than a year to grow a crystal 15 millimeters in diameter, from which an element for multiplying the beam frequency is made. On the basis of the proposed method, equipment and a process for growing crystals at a rate of 0.5 to 1.0 millimeters per hour were developed. This shortens the time it takes to grow a crystal to several days. Author

N86-26110# Joint Publications Research Service, Arlington, Va.
SUBMILLIMETRIC-WAVE LUMINESCENCE OF CdS SINGLE CRYSTALS DURING OPTICAL PUMPING Abstract Only c76
Yu. A. Mityagin, V. N. Murzin, and S. A. Stoklitskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 2 refs Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 5, May 1985 p 28-31 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The emission of submillimetric wave radiation of CdS single crystals was studied during high intensity pumping. Specimens of CdS crystals were placed on the cold plate of a helium cryostat and excited over a spot 0.3 to 1 mm in diameter either by an N2 laser with radiation pulses of 10 ns duration and approximately 1 kW power at 337.1 nm or by a Q-switched YAG laser with third harmonic pulses of 10 ns duration and 10 kW power at 335 nm. The temperature of a specimen was varied over the 10 to 180 K range by adjustment of the pumping pulse repetition rate and was read either by the position of the green laser emission line or, within the 1.6 to 4.2 K range, by a thermometer also immersed in the liquid helium. Only thermal radiation was detected at temperature below 100 k, attributable to adiabatic heating of the surface layer. Intense submillimetric wave luminescence within the 50 to 90 micron range was recorded by a Ge(Ga) detector above the 100 K threshold, its power increasing almost linearly and reaching levels to 2 to 3 orders of magnitude above that of thermal radiation. This luminescence is attributable to 2p-1s transitions of A-excitons from excited state to ground state, at a frequency corresponding to the wavelengths. B.G.

N86-26111# Joint Publications Research Service, Arlington, Va.
STIMULATED MANDELSTAM-BRILLOUIN SCATTERING IN CRYSTALS Abstract Only c76
M. Sattikulov, V. V. Demanov, and V. A. Muminov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk UZ SSR. Seriya Fiziko-Matematicheskikh Nauk (Tashkent, USSR), no. 1, Jan. - Feb. 1985 p 74-78 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Optical and acoustic aspects of collinear stimulated Mandelstam-Brillouin scattering are investigated simultaneously in a number of crystals (SiO_2, $LiNbO_3$, and Al_2O_3) for forward and backward scattering. The stimulated emission thresholds are measured under identical experimental conditions for the same crystals, and the generation of acoustic (ultrasonic) waves during forward scattering stimulated emission is investigated. All other conditions being equal, it is found that the experimental threshold for stimulated Mandelstam-Brillouin backscattering is higher than for forward scattering. Author

N86-26112# Joint Publications Research Service, Arlington, Va.
MICROWAVE ABSROPTION IN GLASS HEATED BY LASER RADIATION Abstract Only c36
N. Ye. Kask, M. A. Kovalyev, G. M. Fedorov, and D. B. Chopornyak *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 3 Transl. into ENGLISH from Fizika i Khimiya Stekla (Leningrad, USSR), v. 11, no. 1, Jan.-Feb. 1985 p 68-74 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The possibility of investigating the conductivity of glass by using local laser heating and microwave diagnosis is demonstrated. The results of conductivity testing for ZhS 12 silicate glass are presented. The proposed microwave measurement method makes it possible to investigate the electrical properties of glasslike materials over a wider range of temperatures. Structural realignments show up during rapid laser heating at temperatures exceeding 1300 K, thus expanding the interval in which glass conductivity can be investigated in the solid state. The proposed method can be used to study glass forming matter at up to approximately 2500 K in the melted state, and in the plasma state at even higher temperatures. The solid state conductivity of ZhS 12 glass is characterized by an activation energy of 0.18 eV; that of the melted state is 0.85 eV. Author

N86-26113# Joint Publications Research Service, Arlington, Va.
IMPURITY ABSORPTION BY CHALCOGENIDE GLASSES IN CO LASER EMISSION REGION Abstract Only c36
V. G. Plotnichyenko and V. K. Sysoyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 4 Transl. into ENGLISH from Fizika i Khimiya Stekla (Leningrad, USSR), v. 11, no. 1, Jan.-Feb. 1985 p 105-107 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The mechanism governing the high optical losses in chalcogenide glasses in the region of CO laser radiation (5 to 6 microns) is determined by investigating laboratory and commercial specimens of arsenic trisulfide and arsenic triselinide glasses, as well as commercial IKS series glasses. In examining the transmission spectra of various chalcogenide glasses, high nonselective absorption is noted in the emission region of CO lasers. This absorption occurs on impurities, which can be seen in As2S3 by ordinary microscopy, and in As2Se3 and IKS-29 by infrared microscopy. Atomary carbon and silicon dioxide are felt to determine the high level of optical losses in the frequency range in question. Author

N86-26114# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF DEGRADATION PROCESSES IN ELECTRON-BEAM PUMPED CdS LASERS USING A TRANSMISSION ELECTRON MICROSCOPE Abstract Only c36
G. V. Bushuyeva, S. A. Pendor, A. N. Pechenov, A. A. Predvoditelev, V. I. Reshetov, and P. V. Shapkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 4 Transl. into ENGLISH from Preprint no. 65, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The use of transmission electron microscopy to identify structural defects occurring during the growth and irradiation of cadmium sulfide by a focused electron beam with electron energy of up to 100 keV and current density up to 300 A/sq cm is described. The influence of these defects on the radiating properties of the semiconductor is studied. A JFM-100 U electron microscope was employed. Cathode luminescence measurements and long term irradiation of CdS crystals were found to exhibit significant numbers of defects at 300 K, which can be classified as small segregations with maximum volumetric density of approximately 10 to the 14th power/cu cm. Besides segregations, individual dislocations and groups of dislocations were observed in large CdS crystals. Electron microscopic investigation of CdS

revealed both motion and multiplication of dislocations in the base plane. The segregation density is found to depend strongly upon the growth conditions. The fast stage of gradual crystal degradation in metastable crystals is strongly influenced by the process associated with the increased space taken up by segregations.
Author

N86-26115# Joint Publications Research Service, Arlington, Va.
PROCESSES OF EXCITATION AND RELAXATION BY Nd SUP 3+ IN CERTAIN SEMICONDUCTOR MATRICES Abstract Only **c76**
Arzu Ali ogly Mamedov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 5 Transl. into ENGLISH from Akademiya Nauk SSSR Institut Obshchey Fiziki Dissertation Abstracts (Moscow, USSR) (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Population mechanisms of the upper lasing level of neodymium in alpha-La2S3:Nd(3+) crystals and La2S3 * 2Ga2O3: Nd(3+) and La2S3 * 2Ga2S3:Nd(3+) glasses are established. Unsteady radiation of neodymium is detected from states above the metastable state caused by low rate of relaxation of excitation from the absorption bands into the metastable state. The intermultiplet transitions responsible for unsteady radiation are identified. The decay curves of the metastable state of neodymium in La2O2S, La2S3 * 2Ga2O3, and La2S3 * 2Ga2S3 are calculated throughout the entire time interval investigated. The minimum distances between neodymium ions in glasses are determined.
Author

N86-26116# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIFFUSION CONSTRAINTS ON COMPOSITION OF VAPOR PHASE DURING GROWTH OF CdS AND ZnSe CRYSTALS Abstract Only **c76**
Ye. I. Panasyuk, M. S. Kleybanov, A. D. Levit, and V. K. Yakushin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 6 Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 6-9 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Evolution of the vapor phase during growth of CdS and ZnSe crystals in a vertical reactor with helium by the Markov-Davydov method is analyzed on the basis of a model which takes into account mechanical and thermal diffusion of the components besides interdiffusion of each with helium. Considering that mass transfer by both diffusion mechanisms is the limiting stage of the growth process, the corresponding equations which describe the process are solved for the ratio of partial pressures P sub Cd,Zn/P sub S,Se and its profile along the growth axis in the reactor. This ratio is found to decrease or increase along the axis depending on the direction of departure from the equilibrium condition at the source, with the magnitude of decrease or increase increasing as the deviation from that equilibrium condition increases. The effect of thermal diffusion becomes more appreciable with lowering of the absolute temperature and with increasing of the temperature gradient.
Author

N86-26117# Joint Publications Research Service, Arlington, Va.
PROPAGATION OF SHOCK WAVES THROUGH PETROLEUM SUSPENSIONS Abstract Only **c34**
K. V. Mukuk, S. M. Makhkamov, and Kh. Kh. Azizov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 8 Transl. into ENGLISH from Izvestiya Akademii Nauk Uzbekskoy SSR: Seriya Tekhnicheskikh Nauk (Tashkent, USSR), no. 4, Jul. Aug. 1985 p 50-52 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Anomalous shock wave propagation through petroleum with a high paraffin content was studied in an attempt to confirm the theoretically predicted breakdown of a forward shock wave into oscillating waves and wave packets as well as individual solitons. Tests were performed in a shock tube at 10, 20, and 50 to 60 C, with pure kerosene as reference and with kerosene + 5, 10, 15, and 20% paraffin. The addition of paraffin was found to radically alter the rheodynamic characteristics of the medium and, along with it, the pattern of shock wave propagation. The integro-differential equation describing a one dimensional hydraulic shock process in viscoelastic fluids is reduced to the Burgers-Korteweg-deVries equation, which is solved numerically for given values of the system parameters. The results indicate that the theory of shock wave propagation through such an anomalous suspension must be modified.
B.G.

N86-26118# Joint Publications Research Service, Arlington, Va.
LASER RADIATION IN ZnSe EXCITED BY GUNN DOMAINS IN STREAMER DISCHARGE CHANNEL Abstract Only **c36**
V. D. Dubrov, I. Ismailov, A. Z. Obidin, A. N. Pechenov, and Yu. M. Popov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 10 Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 3-5 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Laser radiation in ZnSe was obtained experimentally by combing impact ionization in a Gunn diode with directional streamer discharge. Each method alone is capable of producing strong electric field pulses for appropriate excitation of ZnSe but each having its limitations. Specimens of 25 micron thick plane-parallel ZnSe plates were coated with dielectric mirror on both sides of a quality corresponding to an overall reflection coefficient R sub 1 x R sub 2 = 0.98 and then excited with 55 kV voltage pulses of 10 ns duration. The experimental data indicated that laser sources in ZnSe appear upon formation of Gunn strong field domains in the discharge channel, with discharge above the Gunn effect threshold and with domains moving through the crystal at a velocity of 1 to 1.5 billion cm/s. The radiation power in the emission mode was 50 W at a temperature of 300 K, but optimization of both resonator and excitation circuit should make higher power levels feasible.
Author

N86-26119# Joint Publications Research Service, Arlington, Va.
THRESHOLD CONDITIONS FOR DAMAGE TO POTASSIUM CHLORIDE SINGLE CRYSTALS EXPOSED TO CW CO-2 LASER RADIATION Abstract Only **c36**
A. A. Blistanov, N. M. Voloshinskaya, Ye. P. Glotov, Kh. Z. Bugaidullina, I. A. Zabolotskikh, V. N. Koterov, O. M. Kugayenko, V. V. Sumerin, V. A. Ulyanov, and N. V. Cheburkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 13 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2389-2396 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Criteria are derived for damage to laser output windows for potassium chloride due to the thermal effect of laser radiation. A definition for damage criterion based on solution to an unsteady problem of thermal elasticity is proposed. The damage characteristics for single potassium chloride crystals by continuous focused laser radiation are investigated experimentally. Damage begins at the forward surface of the crystal and is caused by strong tangential stresses. A phenomenological constant is derived for this damage that can be used to design output windows for continuous wave CO2 lasers. This constant is an integral characteristic for an output window with a defined working surface, and can be used to calculate the maximum radiated power that can be lased through crystal windows in high power technological lasers.
Author

N86-26120# Joint Publications Research Service, Arlington, Va.
GENERATION OF FREQUENCY-TUNABLE ULTRASHORT PULSES IN A DYNAMIC DISTRIBUTED FEEDBACK LASER Abstract Only **c36**
V. I. Bezrodnyy, Ye. I. Zabello, and Ye. A. Tikhonov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 14 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2438-2442 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The formation of a dynamic lattice and the generation of tunable

ultrashort pulses in an active medium using ultrashort pulses from a solid state laser is investigated. Dynamic distributed feedback is achieved in a Nd(3+):YAG laser by employing an interference circuit in which the pumping pulses are divided. The lengths of the ultrashort pulses are measured by means of an Agat-SF high speed camera. The optical system of a distributed feedback laser employing counter propagating pumping beams is found to be suitable for ultrashort pulse lasers exhibiting lasing efficiency of approximately 3%, divergence of approximately 1 mrad with the use of a correcting lens, and a tunable range of 20 to 30 nm.
Author

N86-26121# Joint Publications Research Service, Arlington, Va.
THEORY OF SURFACE DAMAGE TO NONTRANSPARENT MATERIALS BY LASER RADIATION Abstract Only c36
A. A. Vedenov, O. P. Ivanov, and A. L. Chernyakov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 15 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2438-2442 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The dynamics of a surface subjected to powerful laser radiation is investigated by local approximation, for which the rate of damage to the material is proportional to the density of the absorbed energy flux. An equation for the surface dynamics is derived which describes the relationship between the coefficient of absorption and the angle of incidence. The problem of determining the surface shape at different times reduces to a quadrature problem for a plane-parallel beam. The depth of the cut as a function of rate is analyzed for both polarizations. The analysis shows that the depth should be greater for longitudinal polarization. Intrinsic mode propagation in a waveguide with low attenuation is analyzed. The relationship between the radius of the waveguide close to its input and the length of the waveguide can be described by a step function initially, and then approaches steady state values asymptotically.
Author

N86-26122# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE INFLUENCE OF PUMP PROFILING ALONG THE OPTICAL AXIS ON TELESCOPIC-CAVITY ELECTRO-IONIZATION LASER OUTPUT CHARACTERISTICS Abstract Only c36
S. S. Kozyuchenok, V. A. Rodichkin, V. P. Tomashevich, and V. F. Shanskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 16 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2461-2464 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The effect of positioning the active medium in an unstable cavity and profiling the pumping power along the optical axis on the radiated energy of a CO2 laser is investigated. The laser employed contained two TIR-1m intermediate amplification stages consisting of two identical modules with independent discharge. Both modules were in a common telescopic cavity with a base of 3.2 meters and magnification of M = 2. When one of the modules was pumped, the efficiency with which the excitation energy was converted to radiation was higher than when the module next to the convex mirror was pumped. When both modules were pumped simultaneously, efficiency doubled to 11%. When pumping energy was fixed in one of the modules and increased in the other, radiated energy increased more rapidly than when pumping energy was constant in the first module. The experimental data agree qualitatively with the theoretical predictions. When several modules are employed in a common telescopic cavity, the stages with the greatest gain should be placed so that they occupy most of the volume of the amplification zone of the cavity.
Author

N86-26123# Joint Publications Research Service, Arlington, Va.
LASING CHARACTERISTICS OF A POSITIVE ELECTROOPTICAL FEEDBACK NEODYMIUM LASER Abstract Only c36
A. V. Agashkov and Yu. F. Morgun *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 17 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2465-2470 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The lasing characteristics of a positive electro-optical feedback neodymium laser were investigated. The influence of Q-switching on the dynamics of the radiation field for ordinary Q-switching, for positive electro-optical feedback and for Q-modulation using an LiF(F2) crystal shutter is studied. The experimentally observed behavior of the duration energy and repetition frequency of a giant pulse and the initial transmission of the shutter agree qualitatively with calculations based on equations for a positive electro-optical feedback laser. The use of positive electro-optical feedback makes it possible to obtain giant pulses with assigned peak power, and makes the peak power independent of the power of the pumping pulse as long as the lasing threshold is exceeded for a given T sub o. The radiation field was found to exhibit a filament structure because of a lengthy linear stage in the oscillation development. Positive electro-optical feedback expands the functional capabilities of giant pulse lasers. The relationship between output parameters and control voltages allows computer automated control of the lasers.
Author

N86-26124# Joint Publications Research Service, Arlington, Va.
CHLORINE MONOFLUORIDE-HYDROGEN ELECTRIC DISCHARGE CHEMICAL LASER Abstract Only c36
V. B. Kolovskiy, S. A. Drobakha, G. P. Zhitneva, G. A. Abakumov, and A. P. Simonov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 17-18 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2507-2509 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The lasing characteristics of a ClF-H2-M mixture with short pulsed initiation of chemical reactions in a transverse electrical gas discharge are investigated. Experiments were conducted on a setup incorporating a discharge chamber in an optical cavity, two pulse power sources, a synchronization unit, a gas injection and evaluation system, and a system to record the energy, pulse shape and spectral composition of the laser radiation, and to measure electrical energy in the discharge. The laser provided 60% efficiency, unit output of 4 J/l and pulse power of 0.4 MW with combined HF and HCl pulse energy of 0.16 J. The results demonstrate the possibility of using ClH-H2-He as the active medium in a sufficiently efficient, easy to operate electric discharge chemical laser that is discretely tunable in four regions of the near infrared band for laser chemistry and spectrascopic applications.
Author

N86-26125# Joint Publications Research Service, Arlington, Va.
LASER CAVITIES WITH DIFFRACTION GRATINGS IN AUTOCOLLIMATION MODE Abstract Only c36
V. N. Beltyugov, V. N. Ochkin, N. N. Sobolev, Yu. V. Troitskiy, and Yu. B. Udalov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 18 Transl. into ENGLISH from Preprint no. 37, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

Frequency selective losses in laser cavities with circular apertures containing diffraction gratings are investigated experimentally and theoretically. A cavity incorporating a tilted plane mirror used to compute the frequency selective loss function is described. Calculations for a wide range of cavity parameters make it possible to apply the findings to infrared lasers, for which the region of confocality and Fresnel number of parameters employed is characteristic. Carbon dioxide laser experiments confirm the findings. The influence of radial inhomogeneity of the active medium is found to consist primarily of changes in the amount of nonselective losses as compared with a hollow cavity. Selective losses remain practically unchanged. The influence of the beam spreader on the selectivity is found to be insufficient in certain cases for realizing an amplification zone above the threshold, even for comparatively low pressure lasers.
Author

N86-26126# Joint Publications Research Service, Arlington, Va.
POLARIZATION CHARACTERISTICS OF A SECONDARY GAMMA-RAY DURING LIGHT SCATTERING BY RELATIVISTIC ELECTRONS Abstract Only c36
V. A. Murashova, G. S. Pashchenko, and M. N. Yakimenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 19 Transl. into ENGLISH from Preprint no. 3078, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1983 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

The polarization characteristics of a gamma beam in near perpendicular interaction geometry are investigated as an extension of studies on ruby laser photon scattering by relativistic electrons of the internal beam on the FIAN S-60 synchrotron. A theoretical analysis of the polarization is presented. The direction and degree of polarization of gamma radiation is determined experimentally by exploiting the relationship between the scattering cross section of polarized gamma quanta on the resting electrons of the detector material and the angle betwen the scattering plane and the polarization vector. Measurement of the amplitude and energy spectra are described. The experimental findings provide good qualitative confirmation of the predicted high degree of polarization of the secondary gamma beam caused by interaction between polarized photons and unpolarized relativistic electrons in the perpendicular geometry. It is possible to create quasi-monochromatic gamma beams with the required polarization characteristics that are suitable for physical research if special steps are taken to align the interacting beams and to ensure that the laser can produce pulse energy of at least 10 J over long periods. Author

N86-26127# Joint Publications Research Service, Arlington, Va.
PHYSICAL FACTORS LIMITING SERVICE LIFE OF COPPER BROMIDE LASERS Abstract Only
Nikolay Kirilov Vuchkov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 19 Transl. into ENGLISH from Akademiya Nauk SSSR Institut Obshchey Fiziki Dissertation Abstracts (Moscow, USSR) (For primary document see N86-26108 16-36)
Avail: NTIS HC A05/MF A01

The factors determining the service life of copper bromide lasers are investigated. Six different designs of gas discharge tubes for halogen vapor lasers are developed and tested, each with different placement of the working substance, with or without discharges on limiters, and with differing electrode construction. The nature of the discharge and lasing behavior are studied, and the basic lasing characteristics are measured as a function of the laser operating conditions. Optimum working conditions for the discharge tubes are identified. The behavior of the yellow and green lines is investigated as a function of the working conditions of the copper bromide laser. The main cause for the gradual reduction in laser output power over a time is contamination of the discharge tube output windows. Author

N86-26128# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL MHD-TURBULENCE: HIERARCHICAL MODEL Abstract Only c75
P. G. Frik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 20-21 Transl. into ENGLISH from Magnitnaya Gidrodinamika (Riga, USSR), no. 3, Jul. - Sep. 1984 p 48-54 Original language document was announced in IAA as A85-11824 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

A hierarchical model of tho dimensional MHD turbulence is proposed which makes it possible to investigate cascade processes over a wide range of wave numbers. The degeneration of MHD turbulence, the behavior of weak magnetic fields under conditions of strong hyrodynamic turbulence, and the developed forced MHD turbulence with various methods of energy input are discussed. The model predictions support some earlier findings concerning the behavior of two dimensional MHD turbulence. It is shown that the established spectral distributions are strongly dependent on the initial conditions and on the method of energy input. V.L.

N86-26129# Joint Publications Research Service, Arlington, Va.
UNSTEADY MHD FLOW IN ANNULAR CHANNEL OF A RADIAL MAGNETIC FIELD Abstract Only c75
M. Ya. Antimirov and A. A. Kolyshkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 21 Transl. into ENGLISH from Magnitnaya Gidrodimanika (Riga, USSR), no. 3, Jul. - Sep. 1984 p 76-78 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The problem of an unsteady magnetohydrodynamic flow in an annular channel of a radial magnetic field is investigated. The flow of conducting liquid which is fully developed in the direction of the z-axis is investigated with an assigned constant pressure gradient. The problem is stated mathematically in dimensionless quantities (characteristic dimensions of length, time, velocity, magnetic field, and pressure), and is solved by applying the residue theorem. The velocity distribution is plotted for various values of time with different values of the Hartman number. The magnetic field is found to suppress movement and to reduce the rise time. The rise time is plotted as a function of the Hartman number, indicating that the rise time for Ha = 4 is smaller by a factor of 3 than for Ha = 0. The steady state velocity distribution is plotted for different values of the Hartman number. B.G.

N86-26130# Joint Publications Research Service, Arlington, Va.
PLASMA CONFINEMENT IN L-2 STELLARATOR WITH OHMIC HEATING Abstract Only c75
I. S. Shpigel *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 23 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 13-23 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The results of investigations of ohmic plasma heating in the L-2 stellarator were reviewed. The vacuum structure of the magnetic field ensures plasma equilibrium in the stellarator. Magnetohydrodynamic (MHD) activity occurring in the central portion of the filament has a strong influence on the energy balance in that region. The structure of the MHD oscillations of the plasma in the internal region, and its relationship with the radius of the plasma filament, are established. The primary impurity in the investigated discharges is oxygen, which determines the observed volumetric energy losses, the quantity of Z sub eff, and their radial distributions. No coronal equilibrium was observed experimentally in the plasma, apparently because of the short discharge duration and the small transverse dimension of the plasma filament. The distribution of the ion temperature along the radius, which is asymmetrical because of ion drift in the inhomogeneous magnetic field, is determined throught energy analysis of the atom stream. Author

N86-26131# Joint Publications Research Service, Arlington, Va.
SEPARATION OF U-238 AND Np-237 NUCLEI BY GAMMA-QUANTA INTERMEDIATE ENERGIES Abstract Only c73
A. A. Kazakov, G. Ya. Kezerashvili, T. Ye. Lazareva, V. G. Nedorezov, A. N. Skrinskiy, A. S. Sudov, G. M. Tumaykin, and Yu. M. Shatunov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 24 Transl. into ENGLISH from Pisma V Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 40, no. 10, 25 Nov. 1984 p 445-447 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A system employing a beam of backscattered Compton quanta based on the e(+)e(-) accumulating complex and an LTI-701 solid state laser is employed to measure the average photoseparation and separability cross sections of U234 and Np237 nuclei at energies ranging from 150 to 170 MeV. The findings contradict the predictions of existing models based on photon-meson nuclear excitation, and suggest that one of the most probable mechanisms underlying the excitation of nuclei by gamma quanta with intermediate energies, in addition to the photogeneration of pions, is the generation of e(+)e(-) pairs in the field of the

nucleus: the gamma quanta wavelength energies in this region becomes comparable to the nucleon dimension, so that collective nuclear excitations are generally suppressed. Author

N86-26132# Joint Publications Research Service, Arlington, Va.
METFOROLOGICAL CORRECTION TO REFRACTION OF OPTICAL WAVE BEAMS Abstract Only **c74**
V. P. Lukin, A. E. Melamud, and V. L. Mironov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 27-28 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Fizika (Tomsk, USSR), no. 8, Aug. 1985 p 51-56 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The main source of error in the laser reference systems is the fluctuations of the laser beam axis, due to variations of atmospheric refraction along the propagation path. An error correcting algorithm is proposed which involves calculating the axis displacements in variously stratified air on the basis of meteorological data, rather than tracking the instantaneous positions of special reference sources. Displacement of the center of gravity of the beam cross section is defined as a sum of a regular component and a random component, the latter having a zero mean value and some dispersion. Refinement of the correction algorithm is needed, especially for the intermediate range. The random component of atmospheric refraction is the main source of error. The method is basically sound and can be an aid in the design of laser reference systems for use in specific climatic regions. B.G.

N86-26133# Joint Publications Research Service, Arlington, Va.
APPLICATION OF SCINTALLATION DETECTORS FOR X-RAY DIAGNOSIS OF LASER PLASMA Abstract Only **c35**
M. P. Kalashnikov, V. K. Lyapidevskiy, Yu. A. Mikhaylov, V. A. Prorvich, A. V. Rode, A. V. Sartori, G. V. Skilzkov, and S. I. Fedotov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 30 Transl. into ENGLISH from Preprint no. 26, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Scintillation detectors designed to register laser plasma X-radiation in the 2 to 200 keV range are investigated. The filter method is employed, in which the spectral characteristics are a function of the thickness of the filters and the substances used to make them. The X-radiation energies caught by different filters are determined experimentally and used to recover the spectrum. The light yield of surface lasers 0.01 to 20 microns deep is measured. The unit light yield is determined as a function of the absorbed energy density in the 10 to the 17th power to 10 to the 21st power eV/cu cm range, and of the quantum energy for CsJ(T1) crystals (2.6 to 17.4 keV). The use of scintillation detectors for laser plasma X-radiation diagnosis is described. The unit light yield of crystals in the shift X-radiation region is investigated. Measurements of the relationship between the intensity of X-radiation and atomic number of the target in different spectral bands indicates that the distribution of hard quanta is not temperature dependent in the 10 to 100 keV region. Registration of relativistic electrons is analyzed. Because of their small number, these electrons play an insignificant role in the experiments described. Author

N86-26134# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF PERTURBATIONS OF THE SPECTRA OF POLARITON RAMAN SCATTERING OF LIGHT IN NONLINEAR CRYSTALS Abstract Only **c74**
V. S. Gorelik, L. G. Reznik, and V. S. Umarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 30 Transl. into ENGLISH from Akademiya Nauk SSSR (Moscow, USSR), Preprint no. 6, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The influence of temperature, electrical field, and impurity perturbations on the optical and dielectric parameters of nonlinear crystals was examined by polariton Raman scattering of light. The polariton spectra were photographed. The perturbations were effected in the crystals by means of devices developed especially to study crystals under equilibrium and nonequilibrium temperature variation in strong electrical fields with uniaxial pressure. The effect of internal and external perturbations on the crystals changes the nature of the polariton spectra of Raman scattered light. The perturbation effect is greatest for the shift of maximum scattering wavelength on high frequency E-polaritons. The greatest changes are caused by such perturbations as temperature variations, laser radiation and doping. Behavior at maximum wavelengths of polaritons scattering may be used to estimate the values of these parameters. Author

N86-26135# Joint Publications Research Service, Arlington, Va.
LASER RADIATION WAVEFRONT REVERSAL WITH INTERMEDIATE FREQUENCY CONVERSION TO ANOTHER BAND Abstract Only **c74**
V. I. Bespalov, M. A. Dvoretskiy, A. M. Kiselev, and G. A. Pasmanik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 31 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2505-2507 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A laser radiation wavefront reversal method is proposed and implemented experimentally in which the input signal is mixed parametrically with one or several reference wavelengths and translated to a different (intermediate) frequency band where the reversal is performed. Upon passing back through the parametric mixer, the conjugated intermediate frequency signal, together with the conjugated reference wave, produces radiation at the frequency of the input signal. In the experimental setup, light at lambda = 0.5 micron is conjugated by converting it to lambda = 1.06 microns. Neodymium laser radiation was split into two beams, one of which was directed to a KDP crystal, where its frequency was doubled and wavefront reversal performed. After passing through a cuvette containing CuSO4 and plane-parrellel plates, the light beam struck a parametric mixer where it combined with the reference wave. The reference wave or second beam was directed to the same parametric amplifier by a mirror. Parametric frequency mixers can be used effectively for wavefront comjugation of optical signals. The accuracy of the proposed method depends on the characteristics of the parametric mixer, the accuracy of the reference waves wavefront conjugation and the radiation at the intermediate frequency. Author

N86-26136# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LASER RADIATION ON INDUCED ABSORPTION SPECTRA OF PURE QUARTZ GLASS OPTICAL FIBERS Abstract Only **c74**
Ye. M. Dianov, V. N. Karpechev, L. S. Korniyenko, A. O. Rybaltovskiy, and P. V.. Chernov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 32 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2480-2486 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The influence of laser radiation on radiation color centers and their associated induced absorption in the spectra of irradiated glass optical fibers is investigated. The glass fiber specimens employed had 40 to 50 micron diameter cores made of day pure quartz glass. The optical fibers were 6 to 20 meters long, produced by chemical precipitation from the gaseous phase and clad with reflecting borosilicate glass. Spectral measurements of the induced absorption in the ultraviolet region were made using an FEU-71 photodetector and a sounding radiation source. The stimulated laser emission power in the cross section of the optical fiber was measured by a photodiode; the absorption spectra were recorded by the fragment method. Eight different types of color centers were isolated whose bands cover practically the entire observed absorption spectra. The connection found between color centers and a 340 nm absorption band, and color center with absorption in the infrared band, indicate that absorption in the ultraviolet band can have a significant influence on the amount of induced absorption in the infrared band. Author

N86-26137# Joint Publications Research Service, Arlington, Va.
ANALYSIS AND INVESTIGATION OF A COHERENT WAVEFIELD IN THE FOCAL REGION OF RADIAL-SYMMETRIC OPTICAL ELEMENTS Abstract Only **c74**
A. G. Vasin, M. A. Golyo, V. A. Danilov, N. L. Kazanskiy, S. V. Karpeyev, I. N. Sisakyan, V. A. Soyfer, and G. V. Uvarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 34 Transl. into ENGLISH from Preprint no. 304, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1983 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A method is proposed for calculating the coherent wavefield in the focal region of computer simulated radial symmetric optical elements. The problem of defining the area of applicability of geometric optics in design focusers, as well as the influence of digitization errors on the functioning of artificial optical elements were studied. Computation of the three dimensional intensity distribution of focused radiation in the focal region using wave theory is examined for the case of radial symmetric optical elements. An algorithm and program are described for calculating the light field in the focal region of the focuser. The results of computer calculations are outlined. The experimental investigation of a focuser in a thin cylinder is described. The calculated light intensity distribution in the cross sections of the focal region agree with the experimental investigation of the laser radiation focuser in a thin cylinder. The methods can be used effectively for computer modeling of the laser radiation focused by a synthetic radial symmetric optical element. Author

N86-26138# Joint Publications Research Service, Arlington, Va.
CORRELATION PROPERTIES OF OPTICAL FIELDS Abstract Only **c74**
V. P. Vykov and G. V. Shepelev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 35 Transl. into ENGLISH from Preprint no. 149, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Interference experiments in classical and quantum electrodynamics were described. Different methods are discussed for statistical processing of measurements results, as well as the relationship between statistical processing and quantum mechanical averaging. The influence of the quantum state of the electromagnetic field on the interference result is examined. Fourth order interference experiments are discussed. The results of interference experiments with independent beams depend upon the quantum mechanical state of the electromagnetic field, which allows such experiments to be used to investigate the state of the field. Experiments on fourth order coherence are found to differ qualitatively from second order experiments, and provide additional information on the quantum mechanical state of the investigated field. Author

N86-26139# Joint Publications Research Service, Arlington, Va.
PLASMA-EMISSION ENERGY CONVERSION Abstract Only **c75**
I. V. Kirsanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 37 Transl. into ENGLISH from Preprint no. 41, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A method for converting plasma thermal energy to electrical energy is investigated. A plasma heated by an external source is in contact with electrodes having different emission properties. As a result, a potential difference occurs between the electrodes, and when the circuit is closed through the load resistance current can flow. The possibility of plasma emission conversion is demonstrated by the example of a single unidimensional system. It is found analytically that maximum efficiency is achieved by reducing the emission from the collector electrode; by the same token, increasing the emission from the emitting electrode above a certain value does not improve the efficiency of the converter. Energy applied asymmetrically from the external source increases conversion efficiency if the electrons moving to the collector electrode have more energy than the electrons moving toward the emitter. The findings agree well with experimental results, and can be used to assess the possibility of forming a virtual cathode during strong emission from the electrode and calculating the current density after such a cathode is formed. Author

N86-26140# Joint Publications Research Service, Arlington, Va.
CYCLOTRON ABSORPTION OF A FAST MAGNETOSONIC WAVE IN A STELLARATOR Abstract Only **c75**
L. M. Kovriznhykh and P. Ye. Moroz *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 38-39 Transl. into ENGLISH from Preprint no. 120, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Amplification of cyclotron absorption of a fast magnetosonic wave heated at cyclotron frequency of fundamental plasma ions is investigated. It is shown that the occurrence of bounce resonance causes interference among the contributions from different resonance angles. Expressions are derived for the absorbed power that makes it possible to judge the intensification of absorption. The intensification of absorption in a stellarator is caused by the spiral nature of the confining magnetic field. An expression is derived for the plasma currents in the stellarator magnetic field, and for the average power per unit volume of plasma absorbed on a given magnetic surface. Absorption in the absence of bounce resonance is analyzed. The wavefields near the resonant angles are found using Maxwell's equations. A mechanism is presented which accounts for the intensified absorption of fast magnetosonic waves in the L-2 stellarator at the cyclotron frequency of the fundamental ions of the plasma. Author

N86-26141# Joint Publications Research Service, Arlington, Va.
SUPERRADIANCE IN AN UNDULATOR IN DUAL RESONANCE MODE Abstract Only **c75**
L. S. Bogdankevich, L. K. Gelkhviidze, V. S. Ivanov, S. I. Krementsov, M. D. Rayzer, A. A. Rukhadze, and A. V. Fedotov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 39 Transl. into ENGLISH from Preprint no. 151, Institut Obshchey Fiziki an SSSR: Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The emission of a relativistic electron beam in a linearly polarized undulator magnetic field is investigated experimentally and theoretically. The Terek-I high current accelerator was employed as the electron beam injector. A spatially periodic magnetic field was formed by a system of copper rings within the external pulse magnetic field. The resonance conditions for the longitudinal and transverse components of the magnetic field are investigated. Current transmission is found to be strongly dependent on the angle between the axis of the undulator and the axis of the solenoid. A system of equations is derived for the movement of a relativistic electron in the magnetic field of the undulator. The experimentally observed values of the resonant longitudinal magnetic field, the width of the resonant region, the transverse velocity of the electrons, and the radiation line width are explained analytically. Author

N86-26142# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL PLASMA FLOWS IN A CURRENT LAYER ACCORDING TO RESULTS OF SPECTRAL MEASUREMENTS Abstract Only **c75**
N. P. Kirty, V. S. Markov, M. M. Savchenko, and A. G. Frank *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 40 Transl. into ENGLISH from Preprint no. 193, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy

of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The average ion energies and velocities of two dimensional plasma currents are investigated at different current layer evolution stages by analyzing the profiles of spectral lines broadened due to the Doppler effect. The space-time characteristics of plasma glow in different atom and ion lines are investigated. Two dimensional plasma currents are found to occur in the vicinity of the current layer, as well as within the layer, in argon. The spatial distribution of the glow in different helium spectral lines, and its time dependence, indicate that the current layer is a region of elevated electron temperature. The effective ion temperature in the layer is found, and its dynamics over time is investigated in different modes. The ion temperature comprises 20 to 200 eV, depending upon the type of gas and other experimental conditions. Author

N86-26143# Joint Publications Research Service, Arlington, Va.
RADIATION SUPERCOOLING OF BULK-IONIZED PLASMA OF MULTIPLY CHARGED IONS Abstract Only c75
F. V. Bunkin, V. I. Derzhiyev, S. A. Mayorov, and S. I. Yakovlenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 41 Transl. into ENGLISH from Preprint no. 221, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 221, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The possibility of creating a supercooled plasma of multiply-charged ions obtained by exposing an optically thin medium to radiation from an external photon source with Planck spectrum is investigated. The plasma considered exhibits bulk losses; the ionization balance and corresponding radiation characteristics are calculated in each case for the nonequilibrium situation. The cases of stationary and expanding plasmas are analyzed. Photorecombination radiation is found to be the main cooling channel in stationary, as well as expanding, plasma. The photorecombination cooling rate is governed by the efficiency of thermal ionization of the recombined ion. Thermal ionization becomes less inefficient, and the plasma temperature increases accordingly, as the most represented ions shift from Li to He and H-like. The expansion cooling is minor in these cases, with expansion influencing the plasma temperature mainly through a shift in the charge composition which accompanies the drop in density for a given stream of ionizing particles. Significant gain, which can exist for several nanoseconds, is achieved at the 4 to 3 hydrogen-like ion transition in the forming plasma. Author

N86-26144# Joint Publications Research Service, Arlington, Va.
AMPLIFICATION OF LIGHT AT H-ION TRANSITIONS DURING FREE EXPANSION OF THIN CYLINDRICAL PLASMOIDS (ADIABATIC EXPANSION) Abstract Only c75
A. V. Borovskiy, V. V. Korobkin, and Ch. K. Mukhtarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 42 Trans. into ENGLISH from Priprint no. 157, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A new method is proposed for theoretical analysis of the dynamics of the gain at H-ion transitions during expansion in a vacuum of thin cylindrical plasmoids that have been heated to a state of total ionization. The approach is used to investigate the gains in an adiabatically expanding plasma, disregarding bremsstrahlung losses that cool the electron gas, and the release of recombination heat. The maximum gains that can be achieved during the expansion of these plasmoids are found. The best initial temperature or plasmoid density values are found for which the maximum gains are realized. Formulas describing adiabatic expansion are provided for reference. For adiabatic plasma expansion, the problem consists of investigating the gain as a function of three variables; time, and two parameters that are algebraic combinations of the radius, and the nucleus charge. If some quantities are varied and some are held constant, the gain reaches its maximum as a function of two variables. Author

N86-26145# Joint Publications Research Service, Arlington, Va.
BRANCHES OF THERMAL PHYSICS AND APPLICATIONS DISCUSSED Abstract Only c75
S. Kutateladze *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 44 Transl. into ENGLISH from NTR: Problmy i Resheniya (Moscow, USSR), 2-15 Jul. 1985 p 6 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The objects of study of thermal physics are discussed which became established as a scientific direction in the 1950s and in the 1960s. Phenomena are investigated which involve complex interactions of thermodynamic processes in all aggregate states of matter. The following branches of thermal physics are briefly discussed and their applications are characterized: transport theory, and theory of transport and caloric properties of substances; heat engineering; mechanics of gas-liquid systems; nonequilibrium thermal gas dynamics; cryohydrodynamics; dynamics of thermal plasma. E.R.

N86-26146# Joint Publications Research Service, Arlington, Va.
MICROCHANNEL ANALYZER FOR RECORDING PARTICLE AND X-RAY EMISSION FROM LASER PLASMA Abstract Only c35
L. Z. Barabash, B. N. Bragin, A. A. Golubev, A. I. Gromov, Yu. A. Zakharenkov, V. S. Malysheva, A. I. Nikitenko, A. F. Nikitina, G. V. Ryazanov, and R. T. Khaydarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 45 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 16-20 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A microchannel analyzer was developed for recording the emission of particles and X-rays from a laser plasma. It consists of several camerae obscurae facing the target, some open for recording ions and some covered by beryllium or aluminum filters for recording soft and hard X-radiation, a microchannel plate behind the cameras which converts X-radiation or ion flux into an electron flux, and a fiber optic plate behind the microchannel plate with an aluminized luminescent coating for conversion of the electron flux into visible radiation. The analyzer was calibrated against an MIR-3 X-ray microscope operating in the continuous mode for sensitivity to hard X-radiation and against a plasma pulse source generated by a CO2 laser in a solid lead target for sensitivity to soft X-radition. The calibration includes flux amplification versus plate voltage, relative flux yield versus filter thickness, absolute flux yield versus amplitude of input signal, with filter material and filter thickness, distance from target to camera obscura and distance from camera obscura to microchannel plate, voltage across microchannel plate, and voltage between microchannel plate and fiber optic plate being adjustable parameters of the instrument. Author

N86-26147# Joint Publications Research Service, Arlington, Va.
MAGNETIC ANALYZER OF HIGH-ENERGY IONS FROM THERMONUCLEAR TARGETS COMPRESSED BY LASER BEAM Abstract Only c35
A. A. Yerokhin, Yu. A. Zakharenkov, G. V. Sklizkov, and A. S. Shikanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 46 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 21-24 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A magnetic mass spectrograph was built for spectral analysis of protons produced by the D-D reaction and of high energy hydrogen ions accelerating through the rarefied corona of the laser plasma on a compressed target. Its design is based on the principle of ideal focusing, which can be maintained even with wide entrance slits. The distance from target to analyzer is 1.5 m, and the solid angle covered is of the order of .00001 sr or approximately 10 times larger than that covered by earlier built mass spectrographs. The design and the performance of this instrument are in

accordance with proton and ion ballistics and energy distributions during compression, ablation, and evaporation. The analyzer geometry and ion optical characteristics conform to structural features of and operating conditions in the Delfin experimental laser facility. The magnetic field is produced by an electromagnet with cylindrical core 225 mm in diameter and two face plates. Heterogeneity of the magnetic field below 100 mT intensity limits the resolving power of the instrument. Microchannel plates operating in the current amplifier mode can also be used as high sensitivity track detectors. Author

N86-26148# Joint Publications Research Service, Arlington, Va.
HYDRODYNAMICS OF PLASMA COMPRESSION WITH A MAGNETIC FIELD BY A THIN CYLINDRICAL WALL Abstract Only **c75**
A. L. Velikovich, S. M. Golberg, M. A. Liberman, and F. S. Felber *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 47 Transl. into ENGLISH from Zhurnal Eksperimentalnoy i Teoreticheskoy Fiziki (Moscow, USSR), v. 88, no. 2, Feb. 1985 p 445-459 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The hydrodynamic characteristics of a plasma with a magnetic field are investigated theoretically in the case of compression by a thin cylindrical wall. Solutions are obtained for a series of self similar equations which describe the compression of the plasma by the cylindrical wall, and the structure of the plasma boundary layer near the wall. It is shown that the formation of the boundary layer heat fluxes and thermomagnetic currents in the boundary layer can lead to an increase in the diagmagnetism of the plasma. Magnetic flux losses due to compression in a plasma with classical transport coefficients may increase significantly, and may reach values for a turbulent plasma. At moderate rates of compression such as those observed experimentally, magnetic flux losses are found to be small. Numerical calculations of the radial compression of a plasma by a cylinder are found to agree with the self similar solutions. Profiles of the magnetic field under compression by the cylinder are given for different equations of state for the specific heat, conductivity, and compressibility of the cylinder wall. I.H.

N86-26149# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CURRENT GENERATION BY LOWER HYBRID WAVES IN A T-7 TOKAMAK Abstract Only **c75**
V. V. Alikayev, Yu. V. Grozdkov, Y. Dyatlov, F. Zhachek, D. P. Ivanov, N. V. Ivanov, V. I. Ilin, A. M. Kakurin, A. Ya. Kislov, and R. Klima *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 48 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 53-61 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Experimental results of the generation of current in the T-7 tokamak are presented. Analysis indicates that the main cause of the loss of directional movement energy by electrons during the generation of current by lower hybrid waves is coulomb collision. In order to generate current which significantly exceeds the level predicted by quasi-linear theory, more complex nonlinear processes of interactions between lower hybrid waves and plasma must occur. The current density profile changes significantly when high frequency power is injected into a plasma. This probably also caused the increase observed in the diffusion lifetime of the plasma. Author

N86-26150# Joint Publications Research Service, Arlington, Va.
LASER-DRIVEN X-RAY EMISSION FROM A PLASMA FOCUS Abstract Only **c75**
V. A. Gribkov, S. Denus, A. V. Dubrovskiy, A. I. Isakov, N. V. Kalachev, O. N. Krokhin, V. Ya. Nikulin, S. Sledzinskiy, and S. Chekay *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 50 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 117-122 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

When the anode of a plasma focus is bombarded by an intense laser beam before the hard radiation appears, the pulse shape and spectrum of the X-rays change because of an increase in the number of particles in the cross section and an increase in the effective charge of the pinch plasma due to the injection of multiply charged copper ions into the contraction region. The pinch region and the generation of hard radiation are detected near the laser focus. Author

N86-26151# Joint Publications Research Service, Arlington, Va.
PROGRESS IN CONTROLLED FUSION RESEARCH DESCRIBED **c75**
L. Sorin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 51-52 Transl. into ENGLISH from Moskovskaya Pravda (Moscow, USSR), 24 Nov. 1985 p 2 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Some comments on controlled fusion by a Soviet scientist are presented. His thoughts on the problem of thermonuclear power engineering are: Two approaches to the solution of the problem of fusion can be seen. One of them involves the use of strong magnetic field and superconductivity. This approach is being pursued with tokamak devices by scientist of the Department of Plasma Physics and Stationary Controlled Fusion Systems. The second approach is the method of microexplosions, which is being developed at the USSR Academy of Sciences. The tokamak concept, which has now spread to laboratories throughout the world and, it is generally agreed, is the most fully studied aspect of the complex problem of controlled fusion, was formulated and advanced in the USSR. E.R.

N86-26152# Joint Publications Research Service, Arlington, Va.
MOVING SOLITONS IN SUPERCONDUCTORS AND PEYERLS SYSTEMS Abstract Only **c76**
S. V. Panyukov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 53 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 56-59 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

An exact solution to the problem of moving solitons in anisotropic supercorductors and in Peyerls systems is obtained by the method of reduction to the reverse problem of scattering, which has already yielded exact quiescent soliton solutions. Metals with almost plane segments of the Fermi surface are considered, and that surface is assumed to have the form of a parallelepiped. The equilibrium value of the order parameter is determined from the effective soliton action in terms of scattering parameters of the electronic subsystem and electron-proton interaction parameters, with the aid of quasi-classical Green functions integrated with respect to the energy variable. The order parameter for a single domain wall and a charged polaron is then calculated, assuming first a quiescent soliton, whereupon the surface energy of a domain well is found by a Legendre transformation of the soliton action. Complete integrability with respect to time makes it possible to obtain an exact moving soliton solution, in the absence of pinning by structural defects. Author

N86-26153# Joint Publications Research Service, Arlington, Va.
TEMPERATURE DIAGNOSIS OF A MIXTURE OF MOLECULAR GASES HEATED BY CW CO-2 LASER Abstract Only **c34**
R. Aleksandresku, F. V. Bunkin, B. S. Luklyamchuk, Y. Mikhaylesku, Ye. A. Morozova, and G. A. Shafeyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 54 Transl. into ENGLISH from Preprint no. 223, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 Preprint no. 223, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A method is proposed for measuring the temperature of a gas mixture heated by CW radiation from a CO2 laser, in the zone of radiation operation based on information contained in the radiation spectra of the gas mixture. The radiation spectra of heated mixtures of SF6 and molecular gases (ammonia, xenon, helium,

and air) are observed experimentally. It is demonstrated that the temperature of the gas mixture in the laser interaction region can be recovered from these thermal radiation spectra. It is also possible to determine the temperature conductivity and the heat conduction, as well as the partial pressure of each of the components of the mixture. The thermal spectra contain information on the dynamics of the nonequilibrium thermochemical processes occurring in the gaseous phase and make it possible, inter alia, to identify intermediate reaction products. Author

N86-26154# Joint Publications Research Service, Arlington, Va.
NONLINEAR PROPAGATION OF SPATIALLY BOUNDED TRANSVERSE WAVES THROUGH ISOTROPIC SOLID MEDIUM **c77**
Ye. A. Zabolotskaya *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 58-59 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 43-47 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Nonlinear propagation of spatially bounded transverse waves through an isotropic solid medium is analyzed, assuming only synchronous interaction of transverse and longitudinal waves with attendant cumulative effect. From the fundamental stress-tensor displacement vector equation describing the propagation of elastic waves through an isotropic medium with dissipation and viscosity is, accordingly, derived an equation describing the nonlinear propagation of quasiplane transverse waves through such a medium. This equation is a third order approximation, since no distortion of plane transverse waves appears in the second order approximation. After explication into a system of equations in the displacement components in a system of slow coordinates, and subsequent elimination of the longitudinal displacement component, it is reduced to a system of equations of third order smallness with respect to displacement perturbations. The quadratic mode in these equations vanishes for waves with linear, circular, or elliptic polarization so that a quadratic nonlinearity does not generate a second harmonic directly. Author

N86-26155# Joint Publications Research Service, Arlington, Va.
TWO TYPES OF NONLINEAR OPTICAL SUSCEPTIBILITY Abstract Only **c74**
An. V. Vinogradov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 60 Transl. into ENGLISH from Preprint no. 42, Lebedev Physcial Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The existence of two different types of terms in the expansion by powers of the polarization field is investigated. The concept of dynamic and kinetic nonlinear optical susceptibilities is introduced. The nonlinear optical susceptibities are obtained by expanding the density matrix of a system consisting of a substance and an electromagnetic field into a perturbation theory series with respect to the interaction between them. Dynamic susceptibilities are associated with the regular terms of such a series for the dynamic time reversible equation for the density matrix. Kinetic deceptibility, on the other hand, is associated with the diverging, secular terms of that series. An exposition of perturbation theory is given in a form that makes it possible to calculate both types of nonlinear optical susceptibilities. An example is given of the derivation of the balanced kinetic equation, which can be extended to the case in which perturbation theory includes divergences caused by the occurrence of resonance, in addition to secular divergences. The occurrence of resonance makes it possible to isolate a certain class of patterns, and thus to close the system of renormalization equations. Author

N86-26156# Joint Publications Research Service, Arlington, Va.
COMPUTERIZATION DEMANDS ADVANCED MATHEMATICAL MODELING Abstract Only **c63**
A. A. Samarskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 62-64 Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), no. 5, 16 Jul. - 3 Aug. 1985 p 1; 4-5 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The importance of advancing computer mathematics and mathematical modeling is discussed. A certain tendency to divorce questions of mathematical modeling from problems of the development of computer technology is noted. The results are that the pace of development of computer mathematics is lagging behind that of computer technology. Computer experiments, their methodology, and how they can help to solve problems in various fields of science and technology are also discussed. The state of mathematical modeling and its application is assessed, and what needs to be done to improve it is explored. It is stated that there is a need to create libraries of standard algorithms on a new methodological base, as well as packages of applied programs for various classes of problems. E.R.

N86-26157# Joint Publications Research Service, Arlington, Va.
SOME THEORY OF APPROXIMATION AND NUMERICAL ANALYSIS PROBLEMS Abstract Only **c64**
K. I. Babenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 65 Transl. into ENGLISH from Uspekhi Matematicheskikh Nauk (Moscow, USSR), v. 40, no. 1 (241), Jan. - Feb. 1985 p 3-28 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A number of approximation theory problems that are important in numerical analysis are formulated. Different methods for digitizing functional compacts are examined, and optimum methods are identified. Certain approximation theory problems for functions of finite smoothness are examined. Construction of nonsaturating numerical algorithms is investigated. Approximation of infinitely differentiable classes of functions is explained. The role of modern computer speed and memory capacity is discussed as related to general problems of digitizing functional compacts. Author

N86-26158# Joint Publications Research Service, Arlington, Va.
FAST ALGORITHM FOR SOLVING A NETWORK DISTRIBUTION PROBLEM AND ITS APPLICATION Abstract Only **c64**
K. V. Kim and O. V. Ni *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 66 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR. Seriya Fiziko-Matematicheskaya (Alma Ata, USSR), no. 1 (122), Jan - Feb. 1985 p 87-89 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

An algorithm is proposed for solving a network distribution problem based on a procedure described in a previous study. In solving the network distribution problem, a reference plane is first constructed, and potentials are computed for it, after which the optimality condition is checked and a candidate list is drawn up. The coefficients of the change in the amount of traffic are then computed for each communication from the candidate list, and a decision is made about whether to add a given communication to the basis or not. The algorithm is much faster than ordinary implementation of the generalized method of potentials, making it especially effective for models that converge to a solution for a series of distribution problems. Author

N86-26159# Joint Publications Research Service, Arlington, Va.
PRINCIPLES OF MULTIVARIANT DOMINATION IN OPTIMUM CONTROL OF TECHNOLOGICAL PROCESSES Abstract Only **c63**
E. M. Aliyev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 68 Transl. into ENGLISH from Izvestiya Akademii Nauk USSR. Seriya Tekhnicheskikh Nauk (Tashkent, USSR), no. 6, Nov. - Dec. 1984 p 6-10 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

A method is proposed for selecting optimum solutions for technological processes with predictive quality indicators. The concept of preference distribution of acceptable variants, optimiza-

tion model of multivariant domination, and multivariant domination distribution with respect to the optimization model are introduced. Four principles are cited for optimization models of multivariant domination. The definitions and principles introduced make it possible to adequately select and describe a prediction procedure and optimal control algorithm for technological processes with predictive quality indicators. Author

N86-26160# Joint Publications Research Service, Arlington, Va.
SIMULATION PROBLEM OF CONTROLLING LATERAL MOVEMENT OF AIRCRAFT DURING LANDING APPROACH Abstract Only **c63**
N. D. Botkin, V. M. Keyn, and V. S. Patsko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 69-70 Transl. into ENGLISH from Prikladnaya Matematika i Mekhanika (Moscow, USSR), v. 48, no. 4, Jul. - Aug. 1984 p 560-567 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

The problem of controlling lateral movement of an aircraft in the final phase of landing under windy condition is investigated. A vector differential equation is derived to describe the lateral movement of an aircraft in linear approximation. The problem is formalized as an antagonistic positional differential close-end game between two players with a convex payoff function. The controlling parameter of the first player is a scalar, so that a universal stable optimum strategy exists for the first player. The movements of the initial system of equations are modeled for the initial conditions of one of the parameters at the moment T sub o = 0. It is found that a linear control principle does not guarantee a successful landing approach under extreme perturbation, but that a combined method does provide such a guarantee. Linear control likewise does not guarantee a successful landing in the absence of extreme perturbations if initial deviations, which the combined control principle can handle, are large. Author

N86-26161# Joint Publications Research Service, Arlington, Va.
PARAMETRIC OPTIMIZATION OF ALGORITHM FOR ESTIMATING VALUES OF ONE CLASS OF UNSTEADY RANDOM PROCESSES Abstract Only **c66**
G. A. Kryzhanovskiy and V. I. Aleshin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 71 Transl. into ENGLISH from Izvestiya Akademii Nauk Kazakhskoy SSR: Seriya Fiziko-Matematicheskaya (Alma Ata, USSR), no. 5, Sep. - Oct. 1984 p 77-81 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

Optimization of the measurement processing algorithm employed in automated air traffic control systems is investigated with respect to such observation parameters as the number of measurements processed, the digitization interval and the weighted coefficients of the algorithm. The longitudinal and lateral components of the ground speed vector are calculated by the least squares method, using a linear approximation function. The variance of the approximating function in the region of the airport is defined as the efficiency indicator in the problem of parametric optimization of the traffic control algorithm. The approach employed makes it possible to make maximum use of the capabilities of existing automated air traffic control systems and to improve ground speed determination accuracy. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-26162*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL STUDY OF THE EFFECTS OF INSTALLATION ON SINGLE AND COUNTER-ROTATION PROPELLER NOISE
F. J. W. Block Apr. 1986 33 p refs Original contains color illustrations
(NASA-TP-2541; L-16046; NAS 1.60:2541) Avail: NTIS HC A03/MF A01 CSCL 20A

Measurements which are required to define the directivity and the level of propeller noise were studied. The noise radiation pattern for various single-rotation (SR) propeller and counter-rotation (CR) propeller installations were mapped. The measurements covered + or - 60 deg from the propeller disk plane and + or - 60 deg in the cross-stream direction. Configurations examined included SR and CR propellers at angle of attack and an SR pusher installation. The increases in noise that arise from an unsteady loading operation such as an SR pusher or a CR exceeded 15 dB in the forward axial direction. Most of the additional noise radiates in the axial directions for unsteady loading operations of both the SR pusher and the CR tractor. E.A.K.

N86-26163*# Cornell Univ., Ithaca, N.Y. School of Mechanical and Aerospace Engineering.
HELICOPTER TAIL ROTOR NOISE ANALYSES Final Technical Report, 1 Jun. 1985 - 31 Jan. 1986
Albert R. George and S.-T. Chou Jan. 1986 66 p refs
(Grant NAG1-590)
(NASA-CR-176829; NAS 1.26:176829) Avail: NTIS HC A04/MF A01 CSCL 20A

A study was made of helicopter tail rotor noise, particularly that due to interactions with the main rotor tip vortices, and with the fuselage separation mean wake. The tail rotor blade-main rotor tip vortex interaction is modelled as an airfoil of infinite span cutting through a moving vortex. The vortex and the geometry information required by the analyses are obtained through a free wake geometry analysis of the main rotor. The acoustic pressure-time histories for the tail rotor blade-vortex interactions are then calculated. These acoustic results are compared to tail rotor loading and thickness noise, and are found to be significant to the overall tail rotor noise generation. Under most helicopter operating conditions, large acoustic pressure fluctuations can be generated due to a series of skewed main rotor tip vortices passing through the tail rotor disk. The noise generation depends strongly upon the helicopter operating conditions and the location of the tail rotor relative to the main rotor. Author

N86-26164# Naval Postgraduate School, Monterey, Calif.
MEASUREMENT OF THE ACOUSTIC PRESSURE EVERYWHERE OVER A MODELED CONTINENTAL SLOPE M.S. Thesis
John A. Borchardt Dec. 1985 79 p refs
(AD-A164126) Avail: NTIS HC A05/MF A01 CSCL 20/1

An image model was used to predict the sound pressure field everywhere within isospeed water overlying a sloping absorbing bottom. All lengths scale with the dump distance, which is the distance from the apex of the wedge to the point where the depth is equal to the minimum uniform depth that can support propagation of the lowest normal mode. Measurements made in a laboratory tank with a 9.5 deg. sand bottom with density and speed of sound 2.0 and 1.1 times those of water showed qualitative agreement with the predictions of the model for receiver distances up to 10 dump distances from the apex and 50 dump distances along the shore. GRA

N86-26165# Sierra Geophysics, Inc., Redmond, Wash.
THREE-DIMENSIONAL WAVE PROPAGATION USING BOUNDARY INTEGRAL EQUATION TECHNIQUES Technical Report, May 1984 - May 1985
Randy J. Apsel, George R. Mellman, and Ping C. Wong Sep. 1985 56 p refs
(Contract N00014-84-C-0104; AF Proj. 2309)
(AD-A164498; SGI-R-85-120; AFGL-TR-85-0245; SR-1) Avail: NTIS HC A04/MF A01 CSCL 20/1

The efficient numerical propagation of waves in complex three-dimensionally varying environments has been a problem of considerable geophysical interest over the past few years, yet has proven extremely difficult even for the case of acoustic wave propagation in two dimesional structures. This is primarily due to the fact that although the differential equations of motion are linear in the field quantities of interest, they are non-linear in terms of the boundary conditions for most realistic structures. This funda-

mental nonlinearity precludes construction of the solution for complex structures by superposition of the solutions for simple structures, and forces one into computationally costly schemes. Techniques for dealing with this fundamental nonlinearity have spanned the range from the crudest classical ray tracing approach to the computational-bound finite difference type methods. However, no single technique has ever proven entirely satisfactory for reasons of accuracy, completeness of solution, generality of application, cost or combinations thereof. For example, in cases where significant diffraction and interference effects require exact solutions, finite difference techniques have received widespread use. GRA

N86-26166# Georgia Inst. of Tech., Atlanta.
APPLICATION AND EXTENSION OF AN ANALYTICAL MODEL OF THE CONFINED ACOUSTIC BEAM GENERATED BY A TRANSDUCER Final Report
Jerry H. Ginsberg Oct. 1985 251 p refs
(Contract N00014-82-K-0366)
(AD-A164514) Avail: NTIS HC A12/MF A01 CSCL 20/1

Numerous evaluations of the acoustic field radiating from a baffled transducer have appeared in the published literature. An important feature is that these theories are applicable for a wide range of parameters. Approximations, such as those describing an axisymmetric sound beam in the far field (Fraunhofer zone) can substantially reduce computational cost, but they are not necessary. Linear theory is valid when the source level is sufficiently low. Even then, diffraction effects in the near field, which lead to localized cancellations and reinforcements, complicate the task of correlating near field measurements to far field propagation properties. The primary goal of this project was to develop an analytical description of transducer radiation in which finite amplitude effects, diffraction, and spherical spreading are treated consistently, without limitation to a specific spatial domain. The technique employed singular perturbation theory in conjunction with asymptotic analysis. GRA

N86-25587# Joint Publications Research Service, Arlington, Va.
SOLUTION TO PROBLEM OF TRANSIENT DIFFRACTION OF ACOUSTIC WAVES BY INFINITELY LONG OPEN SHELLS Abstract Only
V. V. Dykhta *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 78 Transl. into ENGLISH from Doklady Akademii Nauk Ukrainskoy SSR, Seriya A: Fiziko-Matematicheskiye i Teknicheskiye Nauki (Kiev, USSR), no. 11, Nov. 1984 p 33-35 (For primary document see N86-25556 16-31)
Avail: NTIS HC A0[illegible] MF A01

N86-25588# Joint Publications Research Service, Arlington, Va.
SOUND ISOLATION IN WIDE CYLINDRICAL TUBE WITH ANNULAR GROOVES IN WALL Abstract Only
P. V. Kuznetsov and G. S. Nosko *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 80 Transl. into ENGLISH from Akusticheskiy Zhurnal (Moscow, USSR), v. 30, no. 3, May - Jun. 1984 p 395-396 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25589# Joint Publications Research Service, Arlington, Va
HYDRODYNAMIC INTERACTION OF TWO SPHERICAL PARTICLES CAUSED BY SOUND WAVE PROPAGATING ALONG CENTER-TO-CENTER LINE Abstract Only
A. F. Zhuk *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 81 Transl. into ENGLISH from Priklaknaya Mekhanika (Kiev, USSR), v. 20, no. 9, Sep. 1984 p 111-116 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

N86-25840*# Naval Ship Research and Development Center, Bethesda, Md. Numerical Structural Mechanics Branch.
CALCULATING FAR-FIELD RADIATED SOUND PRESSURE LEVELS FROM NASTRAN OUTPUT
Robert R. Lipman *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium May 1986 p 282-292 refs Original contains color illustrations (For primary document see N86-25823 16-71)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

N86-25841*# Naval Ship Research and Development Center, Bethesda, Md. Numerical Mechanics Div.
A GENERAL LOW FREQUENCY ACOUSTIC RADIATION CAPABILITY FOR NASTRAN
G. C. Everstine, F. M. Henderson, E. A. Schroeder, and R. R. Lipman *In* Computer Software Management and Information Center Fourteenth NASTRAN Users' Colloquium 1986 p 293-310 refs (For primary document see N86-25823 16-39)
Avail: NTIS HC A15/MF A01; also available from COSMIC, Athens, Ga. CSCL 20K

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-26167# Abilene Christian Univ., Tex.
MEASUREMENTS OF OBSERVABLES OF PION-NUCLEON REACTIONS Progress Report
M. E. Sadler 20 Mar. 1985 105 p
(Contract DE-AS05-81ER-40036)
(DE85-011778; DOE/ER-40036/4) Avail: NTIS HC A06/MF A01

This document reports the progress of the research of pion reactions. These include (1) a study to measure observables in the pion-nucleon system in the momentum interval 400 to 700 MeV/c, (2) differential cross section measurements at low energy for pion-nucleon charge exchange, and (3) elastic and inelastic scattering of (PI)(+-) on H-3 and He-3. Individual experiments are indexed separately. DOE

N86-26168# California Univ., Berkeley. Lawrence Berkeley Lab.
MEASUREMENT OF INTERACTION CROSS SECTIONS AND NUCLEAR RADII OF UNSTABLE P-SHELL NUCLEI
I. Tanihata Sep. 1985 17 p refs Presented at the TRIUMF Accelerated Radioactive Beams Workshop, Vancouver, British Columbia, 5-7 Sep. 1985 Prepared in cooperation with Tokyo Univ., Tanashi
(Contract DE-AC03-76SF-00098)
(DE86-002898; LBL-20245; CONF-8509148-3) Avail: NTIS HC A02/MF A01

Secondary beams of p-shell nuclei (both stable and unstable) have been produced through projectile fragmentation of high energy heavy ion collisions. Interaction cross sections (sigma/sub I/) for all the known He and Li isotopes and /sup 7, 9, 10/Be isotopes on targets Be, C, and Al have been measured at 790 MeV/nucleon. Root-mean-square radii of these isotopes were deduced from the sigma/sub I/. The differences of matter radii among isobars (He-6Li-6, He-8Li-8, and Li-9Be-9) were observed for the first time. A pair of mirror nuclei (Li-7Be-7) shows an equal radii. The radius of Li-11 was found to be considerably larger than those of neighboring nuclei. DOE

N86-26169# Argonne National Lab., Ill.
STRUCTURE FUNCTIONS OF NUCLEI IN THE PION EXCHANGE MODEL
E. L. Berger and F. Coester Sep. 1985 18 p refs Presented at the Workshop on Nuclear Chromodynamics, Santa Barbara, Calif. Submitted for publication
(Contract W-31-109-eng-38)
(DE86-003061; ANL-HEP-CP-85-103; CONF-8508127-9) Avail: NTIS HC A02/MF A01

A detailed derivation is presented of the fact that the deep inelastic structure function of a nucleus may be expressed directly in terms of the empirical structure functions of the constituent nucleons and mesons and the wave function of the nuclear bound state. The assumptions made are specified. The pion exchange model provides a unified quantitative description for all x of nuclear

effects observed in deep inelastic scattering of charged and neutral leptons from nuclei. DOE

N86-26170# Stanford Linear Accelerator Center, Calif.
EMITTANCE GROWTH FROM RADIATION FLUCTUATIONS
M. Sands Dec. 1985 9 p
(Contract DE-AC03-76SF-00515)
(DE86-005085; SLAC-AP-47) Avail: NTIS HC A02/MF A01

As an electron bunch travels through a transport system, fluctuations in the energy loss of individual electrons cause the size of the bunch to grow. A calculation is given of the quantum-induced growth of the emittance of a beam in one transverse coordinate, making the following approximations: (1) that the transport system is linear; (2) that there is no coupling between the two transverse motions; and (3) that the radiation effects can be described by their values on the central design trajectory. This last assumption means that systems are considered in which the quantum effects from bending magnets are much larger than from the focusing lenses. DOE

N86-26171# Florida Univ., Gainesville. Dept. of Chemistry.
INFRARED MULTIPHOTON AND COLLISION INDUCED DISSOCIATION STUDIES OF SOME GASEOUS ALKYLAMINE IONS Technical Report, 1 Apr. - 15 Jul. 1985
C. H. Watson, G. Baykut, M. A. Battiste, and J. R. Eyler 1 Jan. 1986 28 p refs
(Contract N00014-82-K-0509)
(AD-A163504; TR-4) Avail: NTIS HC A03/MF A01 CSCL 07/5

Collision induced dissociation and infrared multiphoton dissociation of ions formed in di- and triethylamine, di- and tri-n-propylamine, and diisopropylamine were investigated by Fourier transform ion cyclotron resonance mass spectrometry. Molecular ions of all amines except di-n-propylamine produced similar fragment ions when subjected to either dissociation technique. The initial fragmentation involved C(alpha)-C(beta) bond cleavage, loss of an alkyl radical, and formation of an immonium ion. Subsequent fragmentations of the immonium ions produced by both dissociation mechanisms involved McLafferty type rearrangements and loss of alkenes. The molecular ion of di-n-propylamine fragmented by a different mechanism when subjected to infrared irradiation. Protonated molecules of di- and tri-n-propylamine yielded C3H6 and an ammonium ion upon infrared multiphoton dissociation, while protonated molecules of the other amines did not dissociate using this technique. Collision induced dissociation, on the other hand, produced fragmentation for all protonated molecules. Explanation of the different fragmentations observed for the two dissociation techniques is given in terms of a mechanism involving a tight transition state for protonated di- and tri-n-propylamine dissociation. GRA

N86-26172# University of Southern California, Los Angeles. Dept. of Chemistry.
THE BIMOLECULAR REACTIONS OF OXIDIZING AGENTS WITH FREE RADICALS OF THE FORM PX: THE ROLE OF COMPLEX NUCLEAR MOTION Final Report, 1 May 1982 - 30 Apr. 1985
Jim-Son Chou, David Sumida, and Curt Wittig 20 Nov. 1985 43 p refs
(Contract DAAG29-82-K-0118)
(AD-A163754; ARO-19095.3-CH) Avail: NTIS HC A03/MF A01 CSCL 07/5

Experimental results are presented wherein nascent PO(X2pi) is detected following the collision-free infrared multiple photon excitation and dissociation of several volatile organosphosphorus molecules which lead to PO via a sequence of bond fission reactions. GRA

N86-26173# California Univ., Berkeley. Dept. of Chemistry.
THE DYNAMICS OF VIBRATIONALLY EXCITED MOLECULES Final Report, 25 May 1981 - 31 Dec. 1984
C. B. Moore 25 Nov. 1985 7 p refs
(Contract DAAG29-81-K-0079)
(AD-A163764; ARO-18039.18-CH) Avail: NTIS HC A02/MF A01 CSCL 07/5

This work studies the transfer of vibrational energy among molecular degrees of freedom and the chemical reactions of vibrationally excited molecules. By resolving the dependence of energy transfer and reaction processes on quantum numbers the mechanism of and forces involved in these processes are identified. GRA

N86-26174# California Univ., Santa Barbara. Dept. of Physics.
DENSITY FUNCTIONAL THEORY FOR EXCITED STATES IN A QUASI LOCAL DENSITY APPROXIMATION Technical Report, Jun. - Dec. 1985
Walter Kohn 10 Feb. 1986 22 p refs
(Contract N00014-84-K-0548; Grant NSF DMR-83-10117)
(AD-A164369; TR-8) Avail: NTIS HC A02/MF A01 CSCL 07/4

Density functional theory has been an important method for studying the ground states for systems involving interacting electrons such as atoms, molecules, and solids. This paper helps to extend this theory to excited states. The starting point of this paper is a recent extension of the Hohenberg Kohn Sham (HKS) density functional theory to ensembles of systems consisting of the M lowest eigenstates, equally weighted. As in E(M/xc)(n(r)), and potential, v(M/xc)(r;(n(r'))). The present paper provides expressions for these quantities, valid for systems of slowly varying density. Even for such systems, however, there are essential non-local effects. Nevertheless both E(M/xc) and v(M/xc) can be calculated in terms of quantities characteristic of appropriate uniform thermal ensembles. This theory is the analog of the ground state local density approximation and allows calculation of excited state energies and densities. GRA

N86-26175# Naval Postgraduate School, Monterey, Calif.
STUDY OF OFF-AXIS RADIATION EXPOSURE FROM RELATIVISTIC ELECTRONS TRAVERSING THROUGH MATTER M.S. Thesis
Richard D. Fitzpatrick Dec. 1985 144 p refs
(AD-A164523) Avail: NTIS HC A07/MF A01 CSCL 20/8

Results are presented from the study of the off-axis radiation field caused by a relativistic, mono-directional electron beam passing through water. Using the Naval Postgraduate School 100 MeV linear accelerator, off-axis radiation dose was measured with calcium fluoride thermoluminescent dosimeters placed at various path lengths out to two radiation lengths. The off-axis dose was calculated using the electron transport code CYLTRAN of the integrated TIGER series of coupled electron/photon Monte Carlo transport codes. Calculations were performed at Los Alamos National Laboratory. Comparison with the results is made and CYLTRAN is found to be in agreement with experimentally measured values. The extension of results from one medium (water) to another (air) appears to be valid. GRA

N86-26176# State Univ. of New York, Buffalo. Dept. of Chemistry.
ANALYSIS OF EXPERIMENTAL DATA FOR NEUTRALIZATION OF LOW-ENERGY IONS AT A SURFACE Interim Technical Report
Hai-Woong Lee and Thomas F. George Jan. 1986 48 p Sponsored by State Univ. of New York, Buffalo. Prepared in cooperation with Oakland Univ., Rochester, Mich.
(Contract N00014-86-K-0043)
(AD-A163205; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/4

When low energy ions are incident on a solid surface, a large fraction is neutralized via an Auger or resonance process. Some useful information on details of the neutralization process can be obtained by studying the ion fraction of backscattered particles. An accurate evaluation of the characteristic velocity is expected to be particularly useful. In this paper we give a theoretical analysis of experimental ion yield data that exist in the literature. It is shown that a successful interpretation of the ion yield data can be made by taking into account the variation of the characteristic velocity with respect to the incident ion energy. GRA

N86-26177# Los Alamos National Lab., N. Mex.
SINGLE PARTICLE FEL EQUATIONS WITH OVERTONES

C. J. Elliott and M. J. Schmitt 1985 13 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-002423; LA-UR-85-3862; CONF-850956-16) Avail: NTIS HC A02/MF A01

A generalization of the usual single-particle equations for a linear polarized wiggler is discussed. Particle simulations show the presence of harmonics under conditions of low (GAMMA) and high magnetic fields. These harmonics are introduced into the single particle equations by separate field components for each harmonic. The overtones are fed by the same phase space and all their effects on the particle motion are treated simultaneously. The coupling of the magnetic field differs from the usual bessel functions form because of the low electron energy and the high magnetic field. Longitudinal space charge fields are also discussed. The reduced equation results with a full 1D particle simulation are compared. Finding good agreement, the researchers conclude that harmonic generation has a significant impact on the waveform under these conditions. DOE

N86-26178# Sandia National Labs., Albuquerque, N. Mex.
MULTI-PHOTON EXCITATION AND IONIZATION CROSS SECTIONS IN ATOMIC OXYGEN
E. J. MCGuire 1985 12 p refs Presented at the Antigone and Delphi Workshop, Livermore, Calif., 23 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002912; SAND-85-2339C; CONF-8510191-1) Avail: NTIS HC A02/MF A01

Calculations are presented on a variety of multiphoton excitation and ionization cross sections in oxygen. The regimes of cross sections discussed are: 2-photon excitation to the bound (2p) (3) (4)S (nl) levels; 2-photon excitation to the autoionizing (2p) (3) (2)D (3p) and (2p) (3) (2)P (3p) levels; excitation of the (2p) (4) (1)D and (1)S levels by both 1-photon excitation on forbidden transitions and 2-photon excitations; 1-photon photoionization of the (2p) (3) (4)S (3s) (3)S and (2p) (3) (4)S (3p) (3)P levels; and 3-photon nonresonant ionization with the (2p) (3) (4)S (3p) (3)P level as intermediate resonance. DOE

N86-26179# National Bureau of Standards, Gaithersburg, Md. Center for Radiation Research.
ANGULAR DISTRIBUTION OF HIGH ENERGY ELECTRONS FOLLOWING RADIATION
L. C. Maximon and A. Lepretre Oct. 1985 53 p Prepared in cooperation with Commissariat a l'Energie Atomique, Gif-sur-Yvette, France
(PB86-141934; NBSIR-84-2854) Avail: NTIS HC A04/MF A01 CSCL 20H

An expression was derived for the angular distribution of high energy electrons which have undergone scattering and radiated a photon, integrated over the directions of the emitted photon, in the region of small scattering angles, for which the atomic form factor must be taken into account but the nuclear structure may be neglected. This distribution is analogous to Schiff's high energy small-angle distribution for photons, integrated over the final electron angles. It is shown that the correction to the energy-angle distribution of electrons due to atomic screening is identical in form to the correction to the energy-angle distribution of photons. The correction involves an integral over the atomic form factor, and is evaluated in closed form for the Thomas-Fermi-Moliere model. A very simple expression is obtained for the case of complete screening. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-26180# Fermi National Accelerator Lab., Batavia, Ill.
FUTURE DETECTOR NEEDS FOR HIGH ENERGY PHYSICS
D. Green Oct. 1985 7 p refs Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23-25 Oct., 1985
(Contract DE-AC02-76CH-03000)
(DE86-003032; FNAL/C-85/151; CONF-851009-22) Avail: NTIS HC A02/MF A01

High energy physics, as exemplified by the SSC, requires the analysis of increasingly complex events which occur at ever higher event rates. The SSC detectors embody an order of magnitude increase in cost and complexity. Research and development for a 500 M$ detector with 500K data channels must proceed in step with accelerator design. Up to a decade of R and D at 1% per year (5M$) invested should be expected. This implies the close involvement of industry. DOE

N86-26181# Los Alamos National Lab., N. Mex.
PREDICTING NITRIDE FUEL PERFORMANCE FOR SP-100 CONDITIONS
R. E. Baars 1986 4 p Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13-16 Jan. 1986
(Contract W-7405-eng-36)
(DE86-000796; LA-UR-85-3479; CONF-860102-1) Avail: NTIS HC A02/MF A01

This paper reports on the methods used to evaluate the performance of the nitride fuel design proposed for the SP-100 thermoelectric concept. DOE

N86-26182# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PARTICLE BEAM TRACKER FOR AN ACCELERATING TARGET M.S. Thesis
Lawrence C. Jamerson Dec. 1985 110 p refs
(AD-A163945; AFIT/GE/ENG/85D-22) Avail: NTIS HC A06/MF A01 CSCL 20/7

The purpose is to use a PI(Proportional plus INTEGRAL) controller to point the centroid of a particle beam at an intended target. Multiple Model Adaptive Estimator is used to estimate the centroid of a one-dimensional Gaussian shaped source of photoelectron events. Merge Method of filter pruning is used to limit the size of this filter. A standard Kalman filter is used to estimate the position of the target where the target is initially modelled as a first-order Gauss Markov position process and later as a first-order Gauss Markov acceleration process. A PI controller is designed using LQG methods, and true states are replaced by their best estimates by invoking the principle of assumed certainty equivalence. With a target position model within the software, a parameter sensitivity analysis is performed as well as a robustness study where unmodelled constant and sinusoidal disturbances are added to the system. With a target acceleration model within the software, a robustness study is carried out where target parameters are varied within the truth model without telling the filter. In an attempt to recover full state feedback robustness qualities, Loop Transmission Recovery tuning is attempted. GRA

N86-26183# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF VARIATION OF INDEX OF REFRACTION OF ATMOSPHERE ON CERENKOV RADIATION M.S. Thesis
Kyung Ro Joo Dec. 1985 48 p refs
(AD-A164358) Avail: NTIS HC A03/MF A01 CSCL 20/8

Cerenkov radiation is calculated for electron beams which exceed the velocity of light in a nondispersive dielectric medium. The electron beam is assumed to be bunched as emitted from a traveling wave accelerator and the emission region is assumed to be finite. The direction of emission of the Cerenkov radiation is related to the index of refraction which in turn is related to atmospheric index of refraction. The calculated index of refraction in the atmosphere predicts changes to the Cerenkov radiation pattern and the emission threshold condition. GRA

N86-26184# Mission Research Corp., Albuquerque, N. Mex.
ELECTROMAGNETIC INSTABILITY IN A QUADRUPOLE-FOCUS ACCELERATOR
Thomas P. Hughes and Brendan B. Godfrey Oct. 1985 27 p
(Contract N00014-84-C-0078)
(AD-A163206; AMRC-R-323) Avail: NTIS HC A03/MF A01 CSCL 20/7

The addition of helical focusing to a modified betatron configuration is shown to give rise to an electromagnetic instability under certain conditions. The instability arises from a three wave coupling between the helical field, a transverse mode on the beam, and a transverse-electric waveguide mode. An analytic dispersion relation is derived. Several features of the instability are confirmed using three dimensional computer simulations. GRA

N86-26185# Mission Research Corp., Albuquerque, N. Mex.
ESTIMATES OF NEGATIVE-MASS INSTABILITY GROWTH FOR THE NRL BETATRON
Thomas P. Hughes Dec. 1985 19 p
(Contract N00014-84-C-0078)
(AD-A163207; AMRC-R-327) Avail: NTIS HC A02/MF A01 CSCL 20/7

Growth rates of the negative-mass instability are calculated for parameters close to those of the NRL betatron. The results indicate that the negative-mass transition energy is at, or close to, the injection energy. In the absence of a spread in particle circulation frequencies, strong negative-mass growth is predicted to set in as the beam is accelerated. To avoid this, it may be necessary to significantly increase the beam minor radius. A stability criterion in terms of the minor radius is given. GRA

N86-26186# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Apr. 1984
T. G. George, comp. Oct. 1985 25 p
(Contract W-7405-eng-36)
(DE86-00437; LA-10526-PR) Avail: NTIS HC A02/MF A01

This technical monthly report covers studies related to the use of (238) PuO2 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Covered are: general-purpose heat source testing and recovery, and safety technology program (biaxial testing, iridium chemistry). DOE

N86-26187# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, May 1984
T. G. George, comp. Sep. 1985 30 p
(Contract W-7405-eng-36)
(DE86-004375; LA-10536-PR) Avail: NTIS HC A03/MF A01

This technical monthly report covers studies related to the use of (238) PuO2 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Covered are: general-purpose heat source testing, light-weight radioisotope heater unit, and iridium biaxial testing. DOE

N86-26188# Argonne National Lab., Ill.
TORSION AND GEOMETROSTASIS IN COVARIANT SUPER-STRINGS
C. Zachos 1985 4 p refs Presented at the Meeting of the Particles and Fields Div. of the American Physical Society, Eugene, Oreg., 12 Aug. 1985
(Contract W-31-109-eng-38)
(DE86-001793; CONF-850869-3) Avail: NTIS HC A02/MF A01

The covariant action for freely propagating heterotic super-strings consists of a metric and a torsion term with a special relative strength. It is shown that the strength for which torsion flattens the underlying 10-dimensional superspace geometry is precisely that which yields free oscillators on the light cone. This is in complete analogy with the geometrostasis of two dimensional sigma models with wess-zumino interactions. DOE

N86-26189# Department of Energy, Washington, D. C. High Energy Physics Div.
REPORT OF THE 1985 HIGH ENERGY PHYSICS ADVISORY PANEL STUDY OF THE US HIGH ENERGY PHYSICS PROGRAM, 1985 - 1995
Sep. 1985 88 p
(DE86-002484; DOE/ER-0233) Avail: NTIS HC A05/MF A01

The present study was motivated by the desire to examine the US High Energy Physics Program in depth, to reassess the Superconducting Super Collider (SSC) goal in light of recent scientific and technical developments, and to understand how this projct would affect and interact with the US High Energy Program in the period before it becomes operational. It is recommended that the SSC research and development be given the highest priority in the US High Energy Physics Program so that the project can proceed to an early construction start and rapid completion. A limited number of programs are identified as forefront programs - those which enter an experimental regime in such a way as to have clear promise for fundamental discoveries and it is recommended that these proceed with priority. Research opportunities available during the next ten years are explored, including proton-antiproton colliders, electron-proton colliders, electron-positron colliders, fixed target experiments, and nonaccelerator experiments. DOE

N86-26131# Joint Publications Research Service, Arlington, Va.
SEPARATION OF U-238 AND Np-237 NUCLEI BY GAMMA-QUANTA INTERMEDIATE ENERGIES Abstract Only
A. A. Kazakov, G. Ya. Kezerashvili, T. Ye. Lazareva, V. G. Nedorezov, A. N. Skrinskiy, A. S. Sudov, G. M. Tumaykin, and Yu. M. Shatunov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 24 Transl. into ENGLISH from Pisma V Zhurnal Eksperimentalnoy I Teoreticheskoy Fiziki (Moscow, USSR), v. 40, no. 10, 25 Nov. 1984 p 445-447 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

74 OPTICS

Includes light phenomena.

N86-26190* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTICAL MULTIPLE SAMPLE VACUUM INTEGRATING SPHERE Patent
Cyrus L. Butner, inventor (to NASA) Issued 22 Apr. 1986 6 p Filed 30 Nov. 1983 Sponsored by NASA
(NASA-CASE-GSC-12849-1; US-Patent-4,583,860; US-Patent-Appl-SN-556481; US-Patent-Class-356-446; US-Patent-Class-250-228; US-Patent-Class-56-73; US-Patent-Class-356-236; US-Patent-Class-356-244) Avail: US Patent and Trademark Office CSCL 20F

An integrating sphere comprised of a uniform difusely reflecting spherical cavity, having mutually transverse input and output ports, and a linear sample transport mechanism is described. The sample transport mechanism is secured so that the multiple samples can be brought into registration with the input port, one at a time, without having to open or disassemble the apparatus when a change of sample is desired. A vacuum tight seal is provided between the cavity and the transport mechanism. This maintains the integrity of a vacuum generated with the sphere when attached to the source of optical energy. The device is utilized to test emissive characteristics such as the relative fluorescence quantum efficiency of a dye sample placed in the path of a monochromatic optical energy source coupled to the input port while having a light detector coupled to the output port. B.G.

N86-26191# Lawrence Livermore National Lab., Calif.
SCATTERING OF LIGHT BY NONSPHERICAL PARTICLES
K. L. Coulson Dec. 1985 25 p
(Contract W-7405-eng-48)

(DE86-004666; UCID-20609) Avail: NTIS HC A02/MF A01

Methods of computing scattering by non-spherical particles are reviewed for the Mie theory, the Rayleigh-Gans approximation, the geometric optics method, the extended boundary condition method, the anomalous diffraction, the suppression of resonances, the statistical approach, the expansion of vector wave equations in spheroidal coordinates, and the semi-empirical theory of Pollack and Cuzzi. The results of computations for nonspherical particles are compared for prolate and oblate spheroids, homogeneous sphere with holes, rough particles made of stacked cylinders, irregular particles of various shapes, and particles of carbonaceous smokes. Conclusions are presented in the context of nuclear winter. DOE

N86-26192# Sandia National Labs., Albuquerque, N. Mex.
DESIGN OF A LOW-NOISE FIBER-OPTIC TRANSMITTER MODULE
R. R. LeGalley Dec. 1985 15 p
(Contract DE-AC04-76DP-00789)
(DE86-004976; SAND-85-1199) Avail: NTIS HC A02/MF A01

The design of a fiber-optic transmitter module is described. This design increases the signal-to-noise margin by reducing crosstalk between adjacent transmitters. Further improvement was obtained by reducing electromagnetic interference through the use of shielding. DOE

N86-26193# California Univ., Berkeley. Lawrence Berkeley Lab.
X-RAY DATA BOOKLET. CENTER FOR X-RAY OPTICS
D. Vaughan, ed. Oct. 1985 155 p
(Contract DE-AC03-76SF-00098)
(DE86-005122; LBL-PUB-490) Avail: NTIS HC A08/MF A01

The Center for X-Ray Optics of the Lawrence Berkeley Laboratory (CA) has published an X-Ray Data Handbook. DOE

N86-26194# Columbia Univ., New York. Radiation Lab.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM Progress Report, 1 Apr. 1984 - 30 Sep. 1985
George W. Flynn and Richard M. Osgood, Jr. 31 Dec. 1985 310 p refs
(Contracts DAAG29-85-K-0049; F49620-84-K-0022; N00014-78-C-0517; DAAG29-85 K-0210; Grants AF-AFOSR-0013-84; NSF DMR-80-06966)
(AD-A163482; PR-35) Avail: NTIS HC A14/MF A01 CSCL 20/6

The characteristics of light generated by distinctly non-Poisson processes have been studied with particular interest in sub-Poisson light (light whose photon-number fluctuations are lower than those of lasers). The use of such quiet light can be beneficial, e.g., it could possibly increase the distance between repeaters in a fiber-optic communications system. As an example of a mechanism for producing such light, a Franck-Hertz apparatus excited by a space-charge-limited electron beam has been studied. Extensive theoretical calculations of the properties of such a source of light have been carried out. Under suitable conditions this device can produce antibunced and sub-Poisson photon emissions. Initial experiments were carried out which produced a photon-counting distribution that was indeed sub-Poisson, thereby providing the first cw source of nonclassical quiet light. A quantum analog of the Burgess variance theorem has also been proven. This confirmed that the sub-Poisson nature of a light beam is conserved in the presence of absorptive media and additive (Poisson) background light. Thus the light can be used once it is generated. Two other ways of producing nonclassical light have been investigated: (1) the generation of sub-Poisson light by selective deletion from cascaded atomic emissions and (2) the generation of binomial states of the quantized radiation field and an exploration of their properties. GRA

N86-26195# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SUPERRESOLUTION USING INCOHERENT LIGHT AND THE LEAST SQUARES METHOD M.S. Thesis
Robert F. Stierwalt Dec. 1985 69 p refs
(AD-A163964; AFIT/GEO/ENP/85D-5) Avail: NTIS HC A04/MF A01 CSCL 14/5

This thesis discusses the problem of incoherent imaging in a diffraction-limited optical system. Its purpose was to prove that resolving two incoherent point sources of light is possible and achievable under certain circumstances. The effects of noise are considered when trying to super-resolve the two incoherent objects. The analysis assumes a finite object of known maximum extent with an estimation of the noise in the system. The noise is assumed to be Gaussian, white, and additive for all spatial frequencies. The superresolution process uses the standard least squares process to achieve minimum error with a smoothing or regularization procedure. The singular values of the transfer matrix are modified to attenuate the very small singular values to avoid noise amplification in the high order terms. The effect of the noise is overcome by the use of a smoothing parameter. The superresolution process works extremely well when the extent of the object is known a priori to have a certain bound or maximum. Components of the restored or processed object outside the known bounds are attenuated. Results indicate that band-pass pupils can super resolve with only limited knowledge of the object when the smoothing parameter is used. GRA

N86-26196# Hughes Research Labs., Malibu, Calif.
INVESTIGATION OF OPTICAL FIBERS FOR NONLINEAR OPTICS Annual Report, 1 Apr. 1984 - 31 Mar. 1985
Larry DeShazer, Antonio Pastor, and Stephen Rand Nov. 1985 68 p refs
(Contract F49620-84-C-0043)
(AD-A164075; AFOSR-86-0009TR) Avail: NTIS HC A04/MF A01 CSCL 20/6

The principal objective of this research program is to develop single-crystal (SC) fibers for use in nonliner optical devices. This encompasses measurement of physical and chemical properties of several candidate materials, fabrication of SC fibers, and investigation of nonlinear optical applications. This report describes the successful fabrication of several SC fibers using new growth techniques and progress with hybrid fibers which show great promise for nonlinear optical applications. GRA

N86-26197# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE APODISATION OF ABERRATED COHERENT MULTIAPERTURE OPTICAL IMAGING SYSTEMS A01 M.S. Thesis
Arley J. Hugghins Dec. 1985 125 p refs
(AD-A164123; AFIT/GEP/ENP/85D-6) Avail: NTIS HC A06/MF A01 CSCL 20/6

This investigation determined that the application of a Gaussian apodiser did not improve the imaging performance through a coherent multiaperture optical imaging system. This was the case whether the object was a point source or an edge, whether the dilution was increased or held constant, or whether aberrations were present or not present. Further, the investigation determined that the amount of spacing between the subaperture which either an aberrated or unaberrated optical system could tolerate and still obtain acceptable imaging fell dramatically. The analysis was accomplished with computer codes which made use of Fourier transform techniques to perform the imaging. The edge imaging results of this study can be applied without loss of generality to that of an imaging system with an annular exit pupil. GRA

N86-26198# Naval Postgraduate School, Monterey, Calif.
COMPUTER MODELING OF IR ENCOUNTERS AND COUNTERMEASURE EFFECTIVENESS M.S. Thesis
Jeffery W. Wilson Dec. 1985 102 p refs
(AD-A164359) Avail: NTIS HC A06/MF A01 CSCL 17/4

Two computer modeling programs, LOWTRAN6 and DMAD have been converted for use at the Naval Postgraduate School. LOWTRAN6, used to model the propagation of optical radiation through the atmosphere at low resolution, has been modified to permit interactive use on the school's IBM 3033AP computer; two additional programs have been developed to provide interactive

data acquisition and plotting. DMAD has been implemented on a VAX-11/780 computer; it is used to model the effectiveness of infrared countermeasure decoys against infrared-seeking anti-ship missiles. Work has also been conducted toward the conversion of FASCODE, an infinite resolution line-by-line transmittance/radiance code. The AFGL MAIN line parameters tape has been implemented on the IBM 3033AP. Many computer programs presently used in the mathematical modeling of weapons and combat systems ignore some critical physical parameters. Using LOWTRAN6 data, the importance of including atmospheric parameters such as transmittance in a model such as DMAD has been demonstrated. GRA

N86-26199# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
NONLINEAR NONRECIPROCITY. THEORY AND APPLICATIONS TO THE ENHANCEMENT OF THE SAGNAC EFFECT, OPTICAL BISTABILITY Final Report, 1 Sep. - 31 Oct. 1984
A. E. Kaplan 26 Nov. 1985 84 p refs
(Grant AF-AFOSR-0343-83)
(AD-A164374; AFOSR-85-1205TR) Avail: NTIS HC A05/MF A01 CSCL 20/6

Several novel implementations of optical bistability have been proposed and analyzed. Novel applications of optical nonlinearities in a ring have been proposed; particularly interesting is the use of nonlinear nonreciprocity of counterpropagating waves in a ring to enahnce the Sagnac Effect, and, thereby, increase the sensitivity of a passive ring optical gyro. The use of moderate energy electron beams traversing superlattices to generate coherent X-rays by the coherent addition of transition radiation has also been proposed and analyzed. This document is a collection of articles pertaining to such fields as: solitons; cyclotron resonance of free electrons; high energy electron beams. Author (GRA)

N86-26200# Army Communications-Electronics Command, Fort Monmouth, N.J.
PROCEEDINGS OF THE 34TH WIRE AND CABLE SYMPOSIUM HELD AT CHERRY HILL, NEW JERSEY ON 19-21 NOVEMBER 1985
21 Nov. 1985 448 p refs Symposium held in Cherry Hill, N.J., 19-21 Nov. 1985
(AD-A164384) Avail: NTIS HC A19/MF A01 CSCL 17/2

Contents: The Teleco Explosion: How Far and How Fast; Fiber Optic Cable Design I; Materials; Fiber Optic Cable Design II; Design/Testing I; Design/Testing II: Fire, Smoke, and Toxicity Technology; Splicing/Enclosures/Connectors I; Fiber Optic Application/Installation; Fiber Optic Systems/Networks; Splicing/Enclosures/Connectors II. GRA

N86-26201# San Diego State Univ., Calif. Dept. of Physics.
PHOTOCHROMIC MATERIALS STUDY Final Technical Report, Jun. 1984 - Jun. 1985
Jeffrey A. Davis and Mary Thomas Sep. 1985 41 p
(Contract F30602-84-K-0110)
(AD-A163140; RADC-TR-85-177) Avail: NTIS HC A03/MF A01 CSCL 20/6

This report describes a study conducted to determine the feasibility of using the photochromic material mercury dithizonate as a programmable spatial filter for optical processing. This material has exhibited faster sriting speed and finer resolution than conventional spatial filtering techniques. Photochromics are erasable and therefore reusable. Variations in material performance were discovered and are attributed to the presence of two photochromic species in the material. A follow-up effort will investigate the effects of varying the composition of the photochromic material upon its optical properties. GRA

N86-26202# Air Force Geophysics Lab., Hanscom AFB, Mass.
OPTICAL AND RADIATIVE PROPERTIES OF A DESERT AEROSOL MODEL Interim Report
Eric P. Shettle 3 Jan. 1986 5 p Presented at the International Radiation Symposium on Current Problems in Atmospheric Radiation, Perugia, Italy, 21-28 Aug. 1984
(AD-A163181; AFGL-TR-86-0003) Avail: NTIS HC A02/MF A01 CSCL 20/6

One of the major sources of the natural atmospheric aerosols is wind-blown dust and sand. These predominantly originate from the arid and semi-arid regions which make up one-third of the earth's land area. The aerosol models in the Standard Radiation Atmospheres (SRA) of the IAMAP Radiation Commission, do not include a model specifically representative of these regions. Several recommendations were made for developing such a separate desert aerosol model. This paper presents the optical and radiative properties of a desert aerosol model based on those recommendations. Two models are discussed representing the extremes of background conditions and a severe dust storm. GRA

N86-26203# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A MIRROR MAGNIFIER
M. N. Sokolskiy 13 Dec. 1985 7 p Transl. into ENGLISH of Russian Patent No. 312 166 (19 Aug. 1971) p 1-2
(AD-A163204; FTD-ID(RS)T-0887-85) Avail: NTIS HC A02/MF A01 CSCL 20/6

Mirror magnifiers are known that contain a light with collimator, a system of mirrors and an output registration system. The described device differs from the known types by the fact that, behind the collimator, there is a diaphragm with two openings, the orthogonal projection of the one which, onto the plane perpendicular to the principal cross section of the object, is covered by the trace of the object on this plane, while the projection of other opening lies outside this trace. GRA

N86-26204# Department of the Air Force, Washington, D.C.
HYBRID SINGLE CRYSTAL OPTIC FIBERS Patent Application
Stephen C. Rand, inventor (to Air Force) Filed 6 Nov. 1985 10 p
(AD-D012089; US-Patent-Appl-SN-795572) Avail: NTIS HC A02/MF A01 CSCL 20/6

This patent application discloses a process of fabricating a hybrid single crystal fiber having nonlinear optical properties such as frequency doubling. This process includes applying a force to a fiber core resting upon a bulk nonlinear crystal such as LiIO3 in a saturated solution of LiIO3 in water. After the core is embedded a sufficient distance into the crystal, the force is removed. GRA

N86-26205# Department of the Air Force, Washington, D.C.
SINUSOIDAL DETERMINATION OF LIMITING OPTICAL RESOLUTION Patent Application
Gilbert G. Kuperman, inventor (to Air Force) Filed 1 Nov. 1985 38 p
(AD-D012099; US-Patent-Appl-SN-793812) Avail: NTIS HC A03/MF A01 CSCL 14/5

The patent application discloses an optical system limiting resolution determination arrangement employng sinusoidal intensity modulated bar pattern input stimuli including two sequences for determining the modulation transfer function (MTF) component of limiting resolution; one of these and the disclosed aerial image modulation (AIM) curve determination are based on sinusoidal intensity modulated bar patterns, while the other MTF determination uses a Heaviside edge function stimulus and a sinusoidally determined AIM curve. The disclosed limiting resolution is especially useful in the consideration of aerial image devices such as cameras. GRA

N86-26206# Department of the Air Force, Washington, D.C.
FIBER OPTIC PYROMETRY WITH LARGE DYNAMIC RANGE Patent Application
Biswa Ganguly, inventor (to Air Force) Filed 8 Aug. 1985 37 p
(AD-D012100; US-Patent-Appl-SN-763575) Avail: NTIS HC A03/MF A01 CSCL 17/8

This patent application discloses a fiber optic probe apparatus usable for measuring temperatures with increased dynamic range and frequency domain response and desirable measurement accuracy. A black body signal source, fiber optic signal coupling, and extension of the transducer dynamic range with optical multiplexing are employed; the instrument operates in the range

of 1.6 micrometers of optical energy wavelength and preferably employs recently improved indium gallium arsenide photodiode transducer devices and transducer frequency domain compensation. Use of the instrument in measuring combustion flame transient temperatures is disclosed. GRA

N86-26207# Department of the Air Force, Washington, D.C.
ANAGLYPHIC STEREOSCOPIC IMAGE APPARATUS AND METHOD Patent
Gilbert G. Kuperman and Donald L. Wallquist, inventors (to Air Force) Issued 10 Dec. 1985 19 p refs
(AD-D012109; US-Patent-4,558,359; US-Patent-Appl-SN-547610; US-Patent Class-358-89) Avail: US Patent and Trademark Office CSCL 17/8

An image processing apparatus of aids in the analysis of images through the introduction of additional physically displaced image elements in complementary color which are generated by digital processing of original image elements. The added elements and original image are viewed stereoscopically on an electronic reconstructed image display. Author (GRA)

N86-26208# Department of the Navy, Washington, D. C.
FIBER OPTIC INTERFEROMETER USING TWO WAVELENGTHS OR VARIABLE WAVELENGTH Patent
Thomas G. Giallorenzi, Sang K. Sheem, and Henry F. Taylor, inventors (to Navy) Issued 12 Nov. 1985 12 p
(AD-D012121; US-Patent-4,552,457; US-Patent-Appl-SN-462860; US-Patent Class-356-345) Avail: US Patent and Trademark Office CSCL 20/6

This patent discloses a fiber optic interferometric physical sensor. A fiber optical Mach-Zehnder interferometer includes a sensor arm and a reference arm having different optical path lengths. A transducer coupled to the sensor arm modulates the phase of light signals passing through in response to a physical quantity. The interferometer is supplied with an input optical signal which includes light components at two different wavelengths. The detected intensity of the output of the interferometer includes two components, each of which vary in relation to the physical quantity. Each output component is related to one of the two optical input wavelengths. The two output components differ in phase by an amount proportional to the path length difference between the sensor and reference arms and proportional to the wavelength difference between the sensor and reference arms and proportional to the wavelength difference between the light components of the input optical signal. The phase difference is adjusted such that the sensitivities of the two output components to the physical quantity are never simultaneously at a minimum. GRA

N86-26209# Department of the Air Force, Washington, D.C.
MICROMIRROR SPATIAL LIGHT MODULATOR Patent Application
David Armitage, inventor (to Air Force) Filed 9 Oct. 1985 18 p
(AD-D012135; US-Patent-Appl-SN-785691) Avail: NTIS HC A02/MF A01 CSCL 09/3

This patent application discloses a micromirror spatial light modulator having an associated silicon photodiode for photoaddressing a micromirror array, and a readout system for providing intensity-to-positon encoding and for providing a color image from coded monochromatic input light. GRA

N86-26210# Los Alamos National Lab., N. Mex.
DAMAGE RESISTANCE OF COATED OPTICS
W. R. Wadt 1985 21 p Presented at the Symposium on Lasers and Particle Beams for Fusion and Strategic Defense, Rochester, N.Y., 18 Apr. 1985
(Contract W-7405-eng-36)
(DE86-002391; LA-UR-85-3471; CONF—850476-3) Avail: NTIS HC A02/MF A01

Successful application of high energy lasers to national needs in strategic defense, inertial confinement fusion and isotope separation is contingent on the development of optical coatings that can withstand very intense radiation. Significant progress has been made in the development of damage resistant coatings over the past 15 years to support the needs of the inertial confinement fusion and isotope separation programs. However, the requirements evolving from the Strategic Defense Initiative (SDI) are much more severe and demand dramatic improvements in the performance of optical coatings beyond the current state of the art. The approach taken at Los Alamos towards solving the problems of optical coatings for SDI is presented. DOE

N86-25529# Joint Publications Research Service, Arlington, Va.
ELASTOHYDRODYNAMIC PROBLEM FLUID FLOWING TOWARD CRACK IN POROUS MEDIUM Abstract Only
A. V. Baluyeva and A. F. Zazovskiy *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-006) 14 Mar. 1986 p 74 Transl. into ENGLISH from Izv. Akad. Nauk SSSR: Mekhanika Tverdogo Tela (USSR), no. 5, Sep.-Oct. 1985 p 157-166 (For primary document see N86-25525 16-31)
Avail: NTIS HC A06/MF A01

N86-26132# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL CORRECTION TO REFRACTION OF OPTICAL WAVE BEAMS Abstract Only
V. P. Lukin, A. E. Melamud, and V. L. Mironov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 27-28 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Fizika (Tomsk, USSR), no. 8, Aug. 1985 p 51-56 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26134# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF PERTURBATIONS OF THE SPECTRA OF POLARITON RAMAN SCATTERING OF LIGHT IN NONLINEAR CRYSTALS Abstract Only
V. S. Gorelik, L. G. Reznik, and V. S. Umarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 30 Transl. into ENGLISH from Akademiya Nauk SSSR (Moscow, USSR), Preprint no. 6, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26135# Joint Publications Research Service, Arlington, Va.
LASER RADIATION WAVEFRONT REVERSAL WITH INTERMEDIATE FREQUENCY CONVERSION TO ANOTHER BAND Abstract Only
V. I. Bespalov, M. A. Dvoretskiy, A. M. Kiselev, and G. A. Pasmanik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 31 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2505-2507 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26136# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF LASER RADIATION ON INDUCED ABSORPTION SPECTRA OF PURE QUARTZ GLASS OPTICAL FIBERS Abstract Only
Ye. M. Dianov, V. N. Karpechev, L. S. Korniyenko, A. O. Rybaltovskiy, and P. V. Chernov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 32 Transl. into ENGLISH from Kvantovaya Elektronika (Moscow, USSR), v. 11, no. 12, Dec. 1984 p 2480-2486 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26137# Joint Publications Research Service, Arlington, Va.
ANALYSIS AND INVESTIGATION OF A COHERENT WAVEFIELD IN THE FOCAL REGION OF RADIAL-SYMMETRIC OPTICAL ELEMENTS Abstract Only
A. G. Vasin, M. A. Golyo, V. A. Danilov, N. L. Kazanskiy, S. V. Karpeyev, I. N. Sisakyan, V. A. Soyfer, and G. V. Uvarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 34 Transl. into ENGLISH from Preprint no. 304, Lebedev Physical Inst., Academy of Sciences (USSR), Moscow, USSR, 1983 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26138# Joint Publications Research Service, Arlington, Va.
CORRELATION PROPERTIES OF OPTICAL FIELDS Abstract Only
V. P. Vykov and G. V. Shepelev *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 35 Transl. into ENGLISH from Preprint no. 149, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26155# Joint Publications Research Service, Arlington, Va.
TWO TYPES OF NONLINEAR OPTICAL SUSCEPTIBILITY Abstract Only
An. V. Vinogradov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 60 Transl. into ENGLISH from Preprint no. 42, Lebedev Physcial Inst., Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

75 PLASMA PHYSICS

- Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-26211# Nagoya Univ. (Japan). Inst. of Plasma Physics.
TRANSPORT THEORY OF AXISYMMETRIC TOROIDAL PLASMA WITH RF WAVE SOURCE IN THE PFIRSCH-SCHRUETER REGIME
Masayoshi Taguchi (Tokyo Univ. (Japan).) Feb. 1986 27 p refs (IPPJ-765) Avail: NTIS HC A03/MF A01

The neoclassical transport theory of a plasma with the radio frequency wave source is formulated in the Pfirsch-Schrueter regime. The particle and heat fluxes across the magnetic surfaces induced by the radio frequency wave injection are numerically calculated for two ion species plasma. The analytic expressions for these fluxes are also obtained when the parallel phase velocity of the wave is about 2 to 3 times as fast as the ion thermal velocity. Then the parallel phase velocity is slower than the ion thermal velocity, the radio frequency wave source is shown to be approximately considered as the momentum, the energy and the heat flow sources. Author

N86-26212# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
ANALYTIC MOMENT METHOD CALCULATIONS OF THE DRIFT WAVE SPECTRUM
D. R. Thayer and K. Molvig Nov. 1985 82 p
(Contract DE-AC02-78ET-51013)
(DE86-003750; DOE/ET-51013/165; PFC/RR-85-23) Avail: NTIS HC A05/MF A01

A derivation and approximate solution of renormalized mode coupling equations describing the turbulent drift wave spectrum is presented. Arguments are given which indicate that a weak turbulence formulation of the spectrum equations fails for a system with negative dissipation. The inadequacy of the weak turbulence theory is circumvented by utilizing a renormalized formation. An analytic moment method is developed to approximate the solution of the nonlinear spectrum integral equations. The solution method employs trial functions to reduce the integral equations to algebraic equations in basic parameters describing the spectrum. An approximate solution of the spectrum equations is first obtained for a mode dissipation with known solution, and second for an electron dissipation in the NSA. DOE

N86-26213# Oak Ridge National Lab., Tenn.
COMPARATIVE MEASUREMENT OF THE NEUTRAL DENSITY AND PARTICLE CONFINEMENT TIME IN EBT
J. C. Glowienka and R. K. Richards Nov. 1985 21 p refs
(Contract DE-AC05-84OR-21400)
(DE86-004645; ORNL/TM-9704) Avail: NTIS HC A02/MF A01

The neutral density and particle confinement time in the ELMO Bumpy Torus-Scale Experiment (EBT-S) have been determined by two different techniques. These involve a spectroscopic measurement of molecular and atomic hydrogen emissions and a time-decay measurement of a fast-ion population using a diagnostic neutral beam. The results from both diagnostics exhibit identical trends for either estimate, although the absolute values differ by a factor of 2 to 3. The observed variations with fill gas pressure and microwave power from either technique are consistent with measurements of electron density and temperature. The measurement techniques are discussed, and the results are compared in the context of consistency with independently observed plasma behavior. DOE

N86-26214# GA Technologies, Inc., San Diego, Calif.
REVIEW OF ELECTRON CYCLOTRON HEATING EXPERIMENTS IN TOROIDAL DEVICES
R. Prater Nov. 1985 31 p refs Presented at the Course and Workshop on Applications of RF Waves To Tokamak Devices, Varenna, Italy, 5-14 Sep. 1985 Submitted for publication
(Contract DE-AC03-84ER-51044)
(DE86-004851; GA-A-18149; CONF-8509192-5) Avail: NTIS HC A03/MF A01

A review of electron cyclotron heating (ECH) experiments in tokamaks and stellarators is presented. ECH has the desirable properties of easily controlled, highly localized absorption, insensitivity to plasma boundary conditions, and high power density. The behavior of electron cyclotron waves is described by well developed theory, and experimental determinations of absorption and propagation tend to support the theory. Global energy confinement scalings suggest that the confinement deterioration with increasing auxiliary power found with other heating methods is also found with ECH, with some exceptions. The application of ECH to the generation of plasmas with high poloidal beta, control of MHD activity, noninductive plasma current drive, and measurement of local electron thermal conductivity is discussed. DOE

N86-26215# GA Technologies, Inc., San Diego, Calif.
STABILITY OF ELECTRON CYCLOTRON WAVES IN THE PRESENCE OF STRONG ELECTRON CYCLOTRON HEATING
J. Y. Hsu and C. N. Lashmore-Davies Dec. 1985 11 p Presented at the 5th International Workshop Electron Cyclotron Emission and Electron, San Diego, Calif., 9-12 Nov. 1985 Submitted for publication Prepared in cooperation with United Kingdom Atomic Energy Authority, Culham
(Contract DE-AC03-84ER-53158)
(DE86-004854; GA-A-18241; CONF-8511131-3) Avail: NTIS HC A02/MF A01

This report examines the stability of the O-mode for perpendicular propagation when a certain fraction of the electrons form a hot electron ring. Also considered is the case of a sharp ring simpler to analyze and a diffuse ring which may occur under conditions of strong electron cyclotron heating. In both cases the parallel distribution of velocities is assumed to be Maxwellian. It was discovered that both distributions can be unstable to the O-mode. For the diffuse ring an estimate is made of the temperature of the background thermal plasma required to stabilize the instability. DOE

N86-26216# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
OPERATIONAL CHARACTERISTICS OF A HIGH VOLTAGE DENSE PLASMA FOCUS Final Report, 7 May 1982 - 19 Apr. 1985
David M. Woodall Nov. 1985 160 p refs
(Contract F29601-82-K-0075)
(AD-A164298; AFWL-TR-84-119) Avail: NTIS HC A08/MF A01 CSCL 20/9

A high voltage dense plasma focus powered by a single stage Marx bank was designed, built and operated. The maximum bank parameters are: voltage--120 kV, energy--20 kJ, short circuit current--600kA. The bank impedance is about 200 milohms. The

plasma focus center electrode diameter is 1.27 cm. The outer electrode diameter is 10.16 cm. Rundown length is about 10 cm, corresponding to a bank quarter period of about 900 millohms ns. Rundown L is about 50 milliohms. The context of this work is established with a review of previous plasma focus theoretical, experimental and computational work and related topics. Theoretical motivation for high voltage operation is presented. The design, construction and operation of this device are discussed in detail. Results and analysis of measurements obtained are presented. Device operation was investigated primarily at 80 kV (9 kJ), with a gas fill of about 1 torr H2, plus 3-5 percent A. The following diagnostics were used: gun voltage and current measurements; filtered, time resolved x ray PIN measurements of the pinch region; time integrated x ray pinhole photographs of the pinch region; fast frame visible light photographs of the sheath during rundown; and B probe measurements of the current sheath shortly before collapse. GRA

N86-26217# Beverly (R. E., III) and Associates, Columbus, Ohio.
INVESTIGATION OF THE PLASMA PROPERTIES OF SURFACE DISCHARGES Final Report, 1 Oct. 1984 - 30 Sep. 1985
R. E. Beverly, III 30 Sep. 1985 63 p refs
(Contract DAAG29-84-C-0027)
(AD-A164345; REB85-004; ARO-22480.3-PH-S) Avail: NTIS HC A04/MF A01 CSCL 20/3

Large-area (60-220 sq cm), short-pulse (approx. 1 microsec) planar discharges employing profiled electrodes have been produced across various polymer substrates. Parametric studies of the electrical circuit parameters and discharge dimensions demonstrate the importance of proper source driver impedance matching to short-pulse operation. The degree of spatial homogeneity depends upon the peak discharge voltage, the initial rate of voltage rise, the specific capacitance of the substrate, the gas atmosphere and pressure, and the ablation mode of the substrate. Spectroscopic studies were performed to measure the equivalent brightness temperature, electron temperature, electron density, and optical thickness of smaller-area (24 sq cm) surface discharges across perovskite ceramic substrates. Detailed measurements were conducted with the spectrometer slit image perpendicular and parallel to the substrate surface, with the latter measurements being performed at incremental heights above the surface, with the latter measurements being performed at incremental heights above the surface. The plasma is not opaque in the soft-uv and shows considerable structure due to line emission from neutral and singly-ionized species originating from the gas atmosphere and vaporized substrate material. GRA

N86-26218# Lawrence Livermore National Lab., Calif.
MECHANICAL CONFIGURATION FOR A SUPERCONDUCTING IGNITION TOKAMAK (TIBER)
W. S. Neef, Jr. and B. M. Johnston Jan. 1985 7 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-002965; UCRL-92528; CONF-851102-3) Avail: NTIS HC A02/MF A01

The Lawrence Livermore National Laboratory is evaluating the engineering feasibility and economics of a superconducting ignition tokamak. Two major operational requirements had to be satisfied: (1) the conducuve heat leak to the refrigerated structure had to be minimized, and 2) assembly and maintenance of the entire experiment had to be possible with remotely operated tools. The middle poloidal push coil must have many annular disks to transfer the TF-coil inward force to the post without crushing the superconductor. The topping moment on the TF-coil vertical legs is huge. A method of keying together the TF-coil cases has been developed. This forms an integrated structure that resists torque. The joining technique permits linear motion for simple assembly/disassembly. The topping moment on the outer vertical legs of the TF coils is very large. To react that moment and avoid great coil-case bulk, a method has been developed that allows the PF coil support structure to assist the TF case structure. Finite element techniques were used to determine the ability of the coal case and conductor to react the magnetic loads. The entire cold-coil structure is mounted on a circular plate that is suspended by several large tension rods, similar to the MFTF-B yin-yang support rods. The vacuum vessel is all at room temperature and is configured like a bell jar with sixteen side doors, one for each shield module. DOE

N86-25546# Joint Publications Research Service, Arlington, Va.
SPECTROSCOPIC OBSERVATIONS OF THE LINE STARK BROADENING IN THE ULTRAVIOLET VACUUM IN LASER-PRODUCED PLASMAS Abstract Only
Yongchang Wang, E. Jannitti, and G. Tondello *In its* China Report: Science and Technology (JPRS-CST-86-001) 17 Jan. 1986 p 99 Transl. into ENGLISH from Wuli Xuebao (Beijing, China), v. 34, no. 8, Aug. 1985 p 1049-1055 (For primary document see N86-25539 16-31)
Avail: NTIS HC A06/MF A01

N86-25609# Joint Publications Research Service, Arlington, Va.
DESIGN OF PNEUMOHYDRAULIC ACCUMULATORS WITH HIGH-COMPRESSIBILITY ENERGY STORING MEDIUM Abstract Only
S. G. Telitsa and L. M. Vinogradov *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 31 Transl. into ENGLISH from Izvestiya Vysshikh Uchebnykh Zavedeniy: Energetika (Minsk, USSR), no. 11, Nov. 1984 p 95-97 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-25637# Joint Publications Research Service, Arlington, Va.
ANALYSIS OF FREQUENCY CHARACTERISTICS OF MULTI-LAYER CYLINDRICAL SHELLS ON BASIS OF VARIOUS THEORIES Abstract Only
Y. M. Griorenko, Ye. I. Bespalova, and T. N. Kilina *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-002) 7 Feb. 1986 p 87 Transl. into ENGLISH from Prikladnaya Mekhanika (Kiev, USSR), v. 20, no. 12, Dec. 1984 p 52-58 (For primary document see N86-25599 16-31)
Avail: NTIS HC A06/MF A01

N86-26128# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL MHD-TURBULENCE: HIERARCHICAL MODEL Abstract Only
P. G. Frik *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 20-21 Transl. into ENGLISH from Magnitnaya Gidrodinamika (Riga, USSR), no. 3, Jul. - Sep. 1984 p 48-54 Original language document was announced in IAA as A85-11824 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26129# Joint Publications Research Service, Arlington, Va.
UNSTEADY MHD FLOW IN ANNULAR CHANNEL OF A RADIAL MAGNETIC FIELD Abstract Only
M. Ya. Antimirov and A. A. Kolyshkin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 21 Transl. into ENGLISH from Magnitnaya Gidrodinamika (Riga, USSR), no. 3, Jul. - Sep. 1984 p 76-78 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26130# Joint Publications Research Service, Arlington, Va.
PLASMA CONFINEMENT IN L-2 STELLARATOR WITH OHMIC HEATING Abstract Only
I. S. Shpigel *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 23 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 13-23 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26139# Joint Publications Research Service, Arlington, Va.
PLASMA-EMISSION ENERGY CONVERSION Abstract Only
I. V. Kirsanov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 37 Transl. into ENGLISH from Preprint no. 41, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For

primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26140# Joint Publications Research Service, Arlington, Va.
CYCLOTRON ABSORPTION OF A FAST MAGNETOSONIC WAVE IN A STELLARATOR Abstract Only
L. M. Kovriznhykh and P. Ye. Moroz *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 38-39 Transl. into ENGLISH from Preprint no. 120, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26141# Joint Publications Research Service, Arlington, Va.
SUPERRADIANCE IN AN UNDULATOR IN DUAL RESONANCE MODE Abstract Only
L. S. Bogdankevich, L. K. Gelkhviidze, V. S. Ivanov, S. I. Krementsov, M. D. Rayzer, A. A. Rukhadze, and A. V. Fedotov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 39 Transl. into ENGLISH from Preprint no. 151, Institut Obshchey Fiziki an SSSR: Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26142# Joint Publications Research Service, Arlington, Va.
TWO-DIMENSIONAL PLASMA FLOWS IN A CURRENT LAYER ACCORDING TO RESULTS OF SPECTRAL MEASUREMENTS Abstract Only
N. P. Kirty, V. S. Markov, M. M. Savchenko, and A. G. Frank *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 40 Transl. into ENGLISH from Preprint no. 193, Institut Obshchey Fiziki an SSSR. Fizika Plazmy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26143# Joint Publications Research Service, Arlington, Va.
RADIATION SUPERCOOLING OF BULK-IONIZED PLASMA OF MULTIPLY CHARGED IONS Abstract Only
F. V. Bunkin, V. I. Derzhiyev, S. A. Mayorov, and S. I. Yakovlenko *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 41 Transl. into ENGLISH from Preprint no. 221, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 221, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26144# Joint Publications Research Service, Arlington, Va.
AMPLIFICATION OF LIGHT AT H-ION TRANSITIONS DURING FREE EXPANSION OF THIN CYLINDRICAL PLASMOIDS (ADIABATIC EXPANSION) Abstract Only
A. V. Borovskiy, V. V. Korobkin, and Ch. K. Mukhtarov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 42 Trans. into ENGLISH from Priprint no. 157, Institut Obshchey Fiziki, Laboratoriya Volnovykh Yavleniy, Academy of Sciences (USSR), Moscow, USSR, 1984 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26145# Joint Publications Research Service, Arlington, Va.
BRANCHES OF THERMAL PHYSICS AND APPLICATIONS DISCUSSED Abstract Only
S. Kutateladze *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 44 Transl. into ENGLISH from NTR: Problmy i Resheniya (Moscow, USSR), 2-15 Jul. 1985 p 6 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26148# Joint Publications Research Service, Arlington, Va.
HYDRODYNAMICS OF PLASMA COMPRESSION WITH A MAGNETIC FIELD BY A THIN CYLINDRICAL WALL Abstract Only
A. L. Velikovich, S. M. Golberg, M. A. Liberman, and F. S. Felber *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 47 Transl. into ENGLISH from Zhurnal Eksperimentalnoy i Teoreticheskoy Fiziki (Moscow, USSR), v. 88, no. 2, Feb. 1985 p 445-459 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26149# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CURRENT GENERATION BY LOWER HYBRID WAVES IN A T-7 TOKAMAK Abstract Only
V. V. Alikayev, Yu. V. Grozdkov, Y. Dyatlov, F. Zhachek, D. P. Ivanov, N. V. Ivanov, V. I. Ilin, A. M. Kakurin, A. Ya. Kislov, and R. Klima *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 48 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 53-61 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26150# Joint Publications Research Service, Arlington, Va.
LASER-DRIVEN X-RAY EMISSION FROM A PLASMA FOCUS Abstract Only
V. A. Gribkov, S. Denus, A. V. Dubrovskiy, A. I. Isakov, N. V. Kalachev, O. N. Krokhin, V. Ya. Nikulin, S. Sledzinskiy, and S. Chekay *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 50 Transl. into ENGLISH from Fizika Plazmy (Moscow, USSR), v. 11, no. 1, Jan. 1985 p 117-122 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

N86-26151# Joint Publications Research Service, Arlington, Va.
PROGRESS IN CONTROLLED FUSION RESEARCH DESCRIBED
L. Sorin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 51-52 Transl. into ENGLISH from Moskovskaya Pravda (Moscow, USSR), 24 Nov. 1985 p 2 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N86-26219# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
SUMMARY OF RECENT RESEARCH ON MECHANICAL BEHAVIOR OF POLYCRYSTALLINE SOLIDS Progress Report, Mar. 1985 - Mar. 1986
C. Y. Li Nov. 1985 70 p
(Contract DE-FG02-84ER-45055)
(DE86-004635; DOE/ER-45055/15) Avail: NTIS HC A04/MF A01

This report covers recent research on the mechanical properties of polycrystalline solids in the following areas: load relaxation studies of solute-dislocation interactions during strain aging, a state variable approach to grain boundary sliding and related phenomena, mechanical testing at elevated strain rates, and finite element modeling of nonelastic deformation process by using state variable constitutive relations. DOE

N86-26220# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF ALUMINA FILMS BY SOL-GEL METHOD
R. Brusasco, R. Kershaw, J. Baglio (GTE Labs., Inc., Waltham, Mass.), K. Dwight, and A. Wold 29 Jan. 1986 10 p refs Submitted for publication Sponsored in part by NSF, Washington, D.C.
(Contract N00014-77-C-0387)
(AD-A163548; TR-38) Avail: NTIS HC A02/MF A01 CSCL 20/12

The method of producing a good dielectric layer such as Al_2O_3

on a III-V semiconductor such as InP is limited by the thermal stability of the substrate. Since InPis reported to be stable only up to about 360 C (1), low temperature synthetic methods must be employed to produce insulating films. A low temperature sol-gel method was used to apply a thin film of alumina on indium phosphide substrates by spin application. The resultant films were characterized by ellipsometry and electron microscopy to determine thickness and porosity. The current-voltage characteristics of the films were measured as a function of annealing temperature. GRA

N86-26221# Wisconsin Univ., Madison. Dept. of Physics.
THIN SUPERCONDUCTING FILM CHARACTERIZATION BY SURFACE ACOUSTIC WAVES Research Progress Report, 30 Sep. 1984 - 30 Sep. 1985
Moises Levy 20 Dec. 1985 16 p refs
(Grant AF-AFOSR-0350-84)
(AD-A164004; AFOSR-86-0007TR) Avail: NTIS
HC A02/MF A01 CSCL 20/3

Both the dc electrical resistivity and the attenuation of surface acoustic waves (SAW) were measured in the superconducting state of a granular lead film, as a function of a perpendicular magnetic field. At 4.2 K the film appears to have an upper critical field of about 60 K Gauss. Bulk ultrasonic measurements were made in the series Er(1-x)Ho (x)Rh4B4. At 15 MHz a broad peak in attenuation, due to a relaxation mechanism associated with the Ho ions, is observed around 10 K. It moves to lower temperatures as x is decreased. An increase in attenuation is observed in the superconducting state of those alloys which are ferromagnetic superconductors. This increase may be due to superconducting screening of crystalline field effects which inhibit spin phonon interaction in the normal state. Preliminary measurements of the acoustoelectric coupling of SAW with an Al granular film, which is held 15 micron's above the SAW, indicate that at 19 MHz the attenuation increases when the film becomes superconducting. This is an unexpected result since at this frequency the attenuation is expected to decrease when the film becomes superconducting. GRA

N86-26222# Massachusetts Inst. of Tech., Cambridge.
FEEDFORWARD CONTROL OF WAVES IN LATTICE ELEMENTS Technical Report, 1 Feb. - 1 Aug. 1985
James H. Williams, Jr., Gregory A. Norris, and Samson S. Lee 1 Aug. 1985 74 p refs
(Contract F49620-83-C-0092)
(AD-A164009; AFOSR-85-1233TR) Avail: NTIS
HC A04/MF A01 CSCL 20/11

The motion in a lattice substructural element, within which longitudinal stress waves propagate nondispersively and without attenuation, is assumed to be governed by the classical wave equation. A feedforward controller configuration is proposed to isolate a portion of the substructure from longitudinal wave disturbances. The governing equations for the propagation of incoming and controller-generated stress waves in the substructure are determined. To prevent instability, the controller must respond to incoming stress waves only, disregarding self-generated outgoing waves. The transfer function for the controlled substructure system is derived. The dependence of the transfer function magnitude on the input waveform frequency as well as on controller error parameters is demonstrated. The ranges of acceptable controller error are determined for the operational goals of disturbance cancellation and disturbance amplitude attenuation. GRA

N86-26223# Spire Corp., Bedford, Mass.
EPITAXIAL (100) GaAs THIN FILMS ON SAPPHIRE FOR SURFACE ACOUSTIC WAVE/ELECTRONIC DEVICES Final Report, 30 Sep. 1984 - 28 May 1985
Victor E. Haven, Jr. Dec. 1985 32 p refs
(Contract F49620-84-C-0108)
(AD-A164252; SPIRE-FR-60057; AFOSR-86-0006TR) Avail: NTIS
HC A03/MF A01 CSCL 20/12

In the past year it has been demonstrated that undoped <111> single crystal gallium arsenide could be grown on <0112> sapphire using the metalorganic chemical vapor deposition (MO-CVD) growth technique. An interesting and unexpected result from this work was that the GaAs films grown had a <111> orientation instead of the proposed <100> orientation. GRA

N86-26224# M/A-COM, Inc., Burlington, Mass.
X-BAND GaAs ISIS (INTEGRATED SERIES IMPATT STRUCTURES) IMPATTS Final Report
Rovindra Dat and Murthy Ayyagari Jul. 1985 72 p refs
(AD-A164380) Avail: NTIS HC A04/MF A01 CSCL 09/1

The underlying purpose of this nine month program was to demonstrate the feasibility of synergistic power in Gallium Arsenide Integrated Series IMPATT Structures (ISIS). In order to demonstrate such a feasibility, the program entailed the following: Task 1: (1) Designing of appropriate doping profiles for GaAs X-band ISIS diodes; (2) Growing Integrated Series IMPATT Structures using Vapor Phase Epitaxy (VPE); and (3) Characterizing the doping profiles of the ISIS wafers. Task 2: (1) Processing ISIS wafers grown by VPE into single mesa diodes with integral heat sinks; (2) Processing ISIS wafers grown by Molecular Beam Epitaxy (to be provided by NRL) into single mesa diodes with integral heat sinks; and (3) Assembling diodes of (1) and (2) into standard packages compatible with coaxial mounts. GRA

N86-26225# Department of the Navy, Washington, D. C.
METHOD OF FORMING THERMALLY STABLE HIGH RESISTIVITY REGIONS IN n-TYPE INDIUM PHOSPHIDE BY OXYGEN IMPLANTATION Patent Application
Phillip E. Thompson, inventor (to Navy) and Harry B. Dietrich, inventor (to Navy) Filed 12 Dec. 1985 13 p
(AD-D012159; US-Patent-Appl-SN-808699) Avail: NTIS
HC A02/MF A01 CSCL 09/1

Objects of this invention are: to form high temperature stable isolation regions in InP; to provide InP wafers which allow greater flexibility in the design and fabrication of discrete devices; to provide new and improved InP semiconductor devices in n-type InP; to provide high resisitivity isolation regions in InP; to extend the usefulness of damage-induced isolation in n-type InP by making possible processes in which the isolation implantation precedes the alloying of ohmic contacts; and to provide n-type InP substrates without unwanted conductive layers. The above and other object are realized by an InP wafer comprising a S.I. InP substrate; a n-type InP active layer disposed on the substrate; and oxygen ion implanted isolation regions disposed in the active layer. The S.I. InP dopant may comprise either Fe or Cr. GRA

N86-26226# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EXAMINATION OF MILLIMETER-WAVE PERFORMANCE POTENTIAL OF MODULATION DOPED AlGaAs/GaAs FET STRUCTURES Final Technical Report, 1 Jul. 1983 - 30 Jun. 1984
Mukunda B. Das Sep. 1985 42 p refs
(AD-A163152; AFWAL-TR-85-1082) Avail: NTIS
HC A03/MF A01 CSCL 20/12

This investigation involved a critical examination of the millimeter-wave performance requirements of the modulation-doped n-AlGaAs/GaAs FET structures. The results of this study revealed the need for a high aspect ration design for the gate structure of MODFET's for millimeter-wave performance. A detailed design procedure has also been developed for submicron gate-length MODFET's, determination of carrier saturation velocity, and power gain and noise figure performance of MODFET's. GRA

N86-26227# Universidad Autonoma de Madrid (Spain). Dept. De Fisica Del Estado Solido.
THEORETICAL CALCULATIONS SUPPORTING INVESTIGATION OF METAL CONTACTS TO ULTRA-SMALL SEMICONDUCTOR STRUCTURES
F. Flores, G. Platero, J. Sanchez-Dehesa, C. Tejedor, and J. A. Verges Oct. 1985 86 p
(Contract DAJA45-84-M-0378)
(AD-A163160) Avail: NTIS HC A05/MF A01 CSCL 20/12

Metal-ultrasmall superlattice junctions have been analyzed by using a consistent tight-binding method. Heterojunctions and

metal-semicondictor interfaces have been discussed independently by assuming that each semiconductor superlayer has more than six layers. We present results for the electronic structure of (100)-semiconductor heterojunctions; in particular, we consider the (100)-GaAs-AlAs, GaSb-InAs and InAs-GaSb interfaces. For GaAs-AlAs we have found that the valence band offset is 0.41 eV, and that there is an interface dipole of 0.13 eV (for no interface dipole, the valence band offset would be of 0.28 eV). Our results also show that the two GaSb-InAs and InAs-GaSb interfaces present different band-offset discontinuities. We have also analysed the initial stages of the Schottky-barrier formation for Al on an As-terminated GaAs-(100) face. Two cases have been analyzed: (1) we have considered a half monolayer of Al, with these atoms located in the ideal position corresponding to a Ga-atom of the ideal continued GaAs crystal; (2) we have considered a full monolayer with the Al atoms forming a (100)-face of an Al crystal. GRA

N86-26228# Department of the Army, Washington, D. C.
A NONDESTRUCTIVE NONCONTACT DEVICE TO CHARACTERIZE SEMICONDUCTOR MATERIAL Patent Application
C. G. Walker, Inventor (to Army) and G. A. Tanton, Inventor (to Army) Filed 7 Feb. 1985 7 p
(AD-D011659; US-Patent-Appl-SN-699282) Avail: NTIS HC A02/MF A01 CSCL 14/2

A semiconductor single crystal wafer is positioned in a magnetic field. A computer initializes the light level and the electronic gain of each detector reamp associated with a fiber optic link from the analyzer. The magnetic field direction would then be reversed by computer command. This would cause a localized change in intensity of light passing through the wafer, due to Faraday Rotation. The resulting change in detector output together with location and wavelength data could be used to compute a map of the wafer. Author (GRA)

N86-26229# National Bureau of Standards, Washington, D.C.
TOPOLOGY OF LOCAL ATOMIC ENVIRONMENTS: IMPLICATIONS FOR MAGNETISM AND SUPERCONDUCTIVITY
L. H. Bennet, R. E. Watson, and W. B. Perason 15 Apr. 1985 9 p Presented at the International Conference on Magnetism, San Francisco, Calif. 26 Aug. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y. and Waterloo Univ., Ontario
(Contract DE-AC02-76CH-00016)
(DE86-002933; BNL-37171; CONF-850890-25) Avail: NTIS HC A02/MF A01

Wigner-Seitz cells have been constructed, as a function of atomic size, for a number of transition-metal alloys (SmCo5 etc.) and a disclination network has been obtained from these. Magnetism in these alloys can be related to the disclination lines, much like the superexchange paths familiar in the magnetism of salts. DOE

N86-26230# Los Alamos National Lab., N. Mex.
MOSSBAUER EFFECT STUDIES AT PRESSURES TO 300 KBAR
R. D. Taylor 1985 3 p Presented at the Raymond and Beverly Sackler Distinguished Lectures, Tel Aviv, Israel, 5 May 1985
(Contract W-7405-eng-36)
(DE86-002402; LA-UR-85-3569; CONF-8505211-1) Avail: NTIS HC A02/MF A01

In a recent experiment a diamond anvil cell was used for a Mossbauer effect absorber experiment. A high-atomic-weight gasket material was developed; it served both to contain the pressure and to collimate the 27.8-keV Mossbauer effect gamma rays and nearby K X-rays emitted from the source. Elemental iodine is known to transform with pressure becoming metallic near 160 kbar. Furthermore, it has been reported that I2 becomes monatomic at about 215 kbar. The Mossbauer effect of iodine-129 was employed to check this latter supposition. The Mossbauer effect fingerprint of I2 was found to change slowly with pressure up to about 160 kbar, whereupon a new high pressure phase or site began to appear. At 300 kbar the Mossbauer spectrum shows about half of the low temperature phase (I2) is still present. This contradiction with X-ray results and or their interpretation is still under investigation. DOE

N86-26231# Oak Ridge National Lab., Tenn.
FLUX-LINE PINNING BY THE GRAIN BOUNDARY IN NIOBIUM BICRYSTALS
H. R. Kerchner, D. K. Christen, E. M. Lee, A. DasGupta, B. C. Cai, and Y. T. Chou Nov. 1985 5 p Presented at the International Symposium on Flux Pinning and Electromagnetic Properties in Superconductors, Fukuoka, Japan, 11 Nov. 1985 Prepared in cooperation with Lehigh, Univ., Bethlehem, Pa.
(Contract DE-AC05-84OR-21400)
(DE86-003090; CONF-8511126-1) Avail: NTIS HC A02/MF A01

Flux-line pinning by the grain boundary in niobium bicrystals was investigated by making four-terminal measurements of the critical current and neutron diffraction measurements of the flux-line bending. The elementary pinning interaction is estimated from the critical current data by using an approximate theory of the current distribution on the grain boundary. The data reported here are mainly for a sample in which the applied magnetic field is parallel to the [111] and the [001] crystal directions in the two grains when it is in the plane of the boundary and perpendicular to the current direction. Evidence is seen of grain boundary faceting and of a flux-flow rectification effect that peaks as a function of temperature below 3 3 K. The scale of the grain-boundary pinning is consistent with the quasiparticle-scattering theory. DOE

N86-26232# National Academy of Sciences - National Research Council, Washington, D. C.
REPORT ON ARTIFICIALLY STRUCTURED MATERIALS Final Report
1985 136 p
(Contract DE-FG02-81ER-10844; Grant NSF DMR-81-19500)
(PB86-144102) Avail: NTIS HC A07/MF A01 CSCL 20L

Advances in high-vacuum and semiconductor growth techniques have made it possible to tailor-make materials one atomic layer at a time. In this way materials not occurring in nature, with particularelectrical, magnetic optical, or mechanical properties ultimately may be designed and fabricated. The report describes the types of materials used, concentrating on GaAs and GaAlAs compounds; the structures involved, such as superlattices and heterostructures; the scientific opportunities in, for example, superconductor and semiconductor technologies; and the applications possible with ASMs. The report discusses the various fabrication, diagnostic, and characterization methods used in the production of ASMs. Finally, the report lists some of the difficulties confronting researchers, such as the need for easily-available, high-purity samples, and state-of-the-art equipment to fabricate ASMs. The report makes recommendations for federal funding support to allow the U.S. to maintain the lead in this field. GRA

N86-26233# National Bureau of Standards, Gaithersburg, Md. Reactor Radiation Div.
NBS LATTICE: A PROGRAM TO ANALYZE LATTICE RELATIONSHIPS, VERSION OF SUMMER, 1985 Final Report
V. L. Himes and A. D. Mighell Dec. 1985 84 p
(PB86-166774; NBS/TN-1214) Avail: NTIS HC A05/MF A01 CSCL 20B

A FORTRAN program to analyze lattice relationships has been written and is available for distribution by the NBS Crystal Data Center. The present version of NBS *LATTICE performs several functions including: (1) the characterization and identification of unknown materials using lattice-formula matching techniques; (2) the calculation of the reduced cell of the lattice, and the calculation and reduction of specified derivative supercells and/or subcells (i.e., this program function calculates the standard cells which are useful in the determination of metric lattice symmetry in finding a matrix relating two unit cells, etc.); (3) unit cell transformations; and (4) matrix inversions. It is planned to incorporate additional functions in forthcoming versions of this program. Among others, these functions will include a matrix method to determine

metric lattice symmetry and a technique to find a transformation matrix relating any two unit cells. GRA

N86-26109# Joint Publications Research Service, Arlington, Va.
FAST METHOD OF GROWING CRYSTALS FOR NONLINEAR OPTICS Abstract Only
In its USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 1 refs Transl. into ENGLISH from NTR: Problemy i Resheniya (Moscow, USSR), 18 Jun. - 1 Jul. 1985 p 4 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26110# Joint Publications Research Service, Arlington, Va.
SUBMILLIMETRIC-WAVE LUMINESCENCE OF CdS SINGLE CRYSTALS DURING OPTICAL PUMPING Abstract Only
Yu. A. Mityagin, V. N. Murzin, and S. A. Stoklitskiy *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 2 refs Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 5, May 1985 p 28-31 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26111# Joint Publications Research Service, Arlington, Va.
STIMULATED MANDELSTAM-BRILLOUIN SCATTERING IN CRYSTALS Abstract Only
M. Sattikulov, V. V. Demanov, and V. A. Muminov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 3 Transl. into ENGLISH from Izvestiya Akademii Nauk UZ SSR. Seriya Fiziko-Matematicheskikh Nauk (Tashkent, USSR), no. 1, Jan. - Feb. 1985 p 74-78 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26115# Joint Publications Research Service, Arlington, Va.
PROCESSES OF EXCITATION AND RELAXATION BY Nd SUP 3+ IN CERTAIN SEMICONDUCTOR MATRICES Abstract Only
Arzu Ali ogly Mamedov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 5 Transl. into ENGLISH from Akademiya Nauk SSSR Institut Obshchey Fiziki Dissertation Abstracts (Moscow, USSR) (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26116# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIFFUSION CONSTRAINTS ON COMPOSITION OF VAPOR PHASE DURING GROWTH OF CdS AND ZnSe CRYSTALS Abstract Only
Ye. I. Panasyuk, M. S. Kleybanov, A. D. Levit, and V. K. Yakushin *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 6 Transl. into ENGLISH from Kratkiye Soobshcheniya Po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 6-9 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05/MF A01

N86-26152# Joint Publications Research Service, Arlington, Va.
MOVING SOLITONS IN SUPERCONDUCTORS AND PEYERLS SYSTEMS Abstract Only
S. V. Panyukov *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 53 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 5, May 1985 p 56-59 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-26234# National Bureau of Standards, Gaithersburg, Md.
THERMODYNAMICS OF HIGH TEMPERATURE MATERIALS
Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Stanley Abramowitz 24 Dec. 1985 125 p refs
(Grant AFOSR ISSA 78-00029)
(AD-A164253; AFOSR-86-0008TR) Avail: NTIS
HC A06/MF A01 CSCL 11/2

A report on the thermodynamics of high temperature materials includes the following: Research on Thermophysical Properties; High Temperature Enthalpy Measurements; Broad Band Spectroscopy of Small Molecules in Intense Laser Fields; Growth and Decomposition of Graphitic Structure; Build Up and Irradiation of Obscuring Clouds Under Near Vacuum Conditions Application to Spacecraft Survivability; and Molecular Basis for Laser Induced Vaporization of Refractory Materials. Author (GRA)

N86-26235# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THERMAL CALCULATION OF A THERMOGENERATOR AT CHANGING TEMPERATURES ALONG THERMOCONTACT SURFACES
G. A. Varshavskiy and Rezgol, I. A. 13 Jan. 1986 16 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Energetika i Transport (USSR), v. 64, no. 6, 1964 p 735-742
(AD-A164320; FTD-ID(RS)T-1218-85) Avail: NTIS
HC A02/MF A01 CSCL 20/13

The article finds expressions for the output power of efficiency of a thermoelectric generator and temperature distribution along the heat carrier under the condition that temperatures of the thermocontact surfaces vary due to the cooling and heating of the heat carriers. Simple approximation calculation formulas are given for the particular cases examined. This work is devoted to the finding of analytical bonds, which make it possible to make the calculation of the thermogenerator at changing (as a result of heat transfer) temperatures of the solderings. The obtained expressions can be useful in the preliminary determination of the optimal parameters of the generators (maximal power and efficiency, minimal weight, etc.) and an analysis of processes of regulation. GRA

N86-26236# Stanford Linear Accelerator Center, Calif.
GAUGE INVARIANCE OF STRING FIELDS
T. Banks and M. E. Peskin Oct. 1985 6 p refs Presented at the Workshop on Unified String Theories, Santa Barbara, Calif., 29 Jul. 1985 Sponsored by Stanford Linear Accelerator Center, Calif. Prepared in cooperation with Tel-Aviv Univ., Isreal
(Contract DE-AC03-76SF-00515)
(DE86-002937; SLAC-PUB-3802; CONF-850798-3; CONF-8508151-1) Avail: NTIS HC A02/MF A01

Some work done to understand the appearance of gauge bosons and gravitons in string theories is reported. An action has been constructed for free (bosonic) string field theory which is invariant under an infinite set of gauge transformations which include Yang-Mills transformations and general coordinate transformations as special cases. DOE

N86-26154# Joint Publications Research Service, Arlington, Va.
NONLINEAR PROPAGATION OF SPATIALLY BOUNDED TRANSVERSE WAVES THROUGH ISOTROPIC SOLID MEDIUM
Ye. A. Zabolotskaya *In its* USSR Report: Physics and Mathematics (JPRS-UPM-86-001) 21 Jan. 1986 p 58-59 Transl. into ENGLISH from Kratkiye Soobshcheniya po Fizike (Moscow, USSR), no. 6, Jun. 1985 p 43-47 (For primary document see N86-26108 16-70)
Avail: NTIS HC A05

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-26237# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF QUANTITY-SPLIT AND NONRECURRING COSTS UNDER COMPETITIVE PROCUREMENT ENVIRONMENT Final Report, Jan. - Sep. 1985
Dan C. Boger and Shu S. Liao Sep. 1985 77 p
(AD-A163028; NPS54-85-08) Avail: NTIS HC A05/MF A01 CSCL 05/1

This study addresses two important issues related to establishing a second source and managing a program under dual source competition. The first relates to the issue of estimating nonrecurring costs. The second relates to the issue of dual award quantity-split in order to maintain a competitive environment. In dual sourcing decisions, it is necessary that the nature and extent of prospective second source's nonrecurring costs be fully analyzed. Nonrecurring costs are important since they represent those investment costs which must be incurred before the second source produces any output. Several nonrecurring cost estimation models, both parametric and nonparametric, are examined. Five different quantity-split models are analyzed to evaluate each model's strength and weakness in cost performance and its ability to cope with contractor gamesmanship. GRA

N86-26238# George Mason Univ., Fairfax, Va. Technology Transfer Study Center.
TECHNOLOGY TRANSFER AT THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY: A DIAGNOSTIC ANALYSIS
Ronald G. Havelock and David S. Bushnell Dec. 1985 90 p
(Contracts MDA903-84-K-0031; ARPA Order 5156)
(AD-A164457) Avail: NTIS HC A05/MF A01 CSCL 05/1

Five technology transfer issues have been identified as relevant to the DARPA mission. (1) Transfer within Programs: Intra-program transfer describes what DARPA program managers do on a day-to-day basis and typically involves seven strategies: enlisting the best talent; encouraging social interaction; encouraging interinstitutional linkages; providing adequate and sustained fiscal support; concern for downstream applications; promoting creativity; supporting innovations which strengthen the R&D system. (2) Transfer of the Military: (3) Domestic Spin-off: (4) Technical Knowledge Containment: All DARPA's contractors share a great concern for the security issue, but few if any are able to propose viable countermeasures. There is a general fear that new restrictions on communication within the DARPA network would reduce creativity and productivity and might thus have a net negative effect on the Nation's standing as a technology leader. (5) Transfer into DARPA from Other Sources: DARPA has no reliable process for acquiring new ideas from sources outside the DARPA contractor pool. Better intelligence is needed on what is going on both in the U.S. and in foreign countries including the Soviet Bloc. GRA

N86-26239# National Bureau of Standards, Gaithersburg, Md. Center for Basic Standards.
TECHNICAL ACTIVITIES 1983, CENTER FOR BASIC STANDARDS
K. G. Kessler Oct. 1985 331 p
(PB86-140043; NBSIR-85/3254) Avail: NTIS HC A15/MF A01 CSCL 14B

The research and technical activities of the Center for Basic Standards during the Fiscal Year 1985 are summarized. These activities include work in the areas of electricity, temperature and pressure, mass and length, time and frequency, quantum metrology, and quantum physics. GRA

N86-26240# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Science, Eng. and Public Policy.
RESEARCH BRIEFINGS FOR THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY, THE NATIONAL SCIENCE FOUNDATION AND SELECTED FEDERAL DEPARTMENTS AND AGENCIES, 1985 Annual Report
1985 112 p Sponsored by National Academy of Sciences - National Research Council, Washington, D. C.
(Grant NSF STI-85-01382)
(PB86-148582; ISBN-0-309-03585-6; LC-85-61729) Avail: NTIS HC A06/MF A01 CSCL 06E

In 1982 the Office of Science and Technology Policy (OSTP) asked the National Academy complex to develop a series of briefings aimed at identifying research areas of unusual scientific opportunity within specific fields of science. The first set of briefings covered seven fields, and was presented in both oral and written form to senior officials of OSTP and the National Science Foundation (NSF) in late 1982. The briefings were presented subsequently to senior officials of other interested federal departments and agencies, and published as a collection by the National Academy Press. Responsibility for developing the briefings was given to the Committee on Science, Engineering, and Public Policy (COSEPUP), a joint unit of the National Academies of Science, Engineering, and the Institute of Medicine. Thus began the program of annual research briefings that with the publication of the volume will have completed four rounds and covered 28 topics. GRA

N86-26241# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
GUIDE ON SELECTING ADP (AUTOMATIC DATA PROCESSING) BACKUP PROCESSING ALTERNATIVES Final Report
I. E. Isaac Nov. 1985 43 p refs
(PB86-154820; NBS/SP-500/134; LC-85-600618) Avail: NTIS HC A03/MF A01; also available SOD HC $1.75 as SN003-003-02701-4 CSCL 05A

The publication addresses the issue of selecting ADP backup processing support in advance of events that cause the loss of data processing capability. The document emphasizes the need for managers at all levels of the organization to support the planning, funding, and testing of an alternate processing strategy. It provides a general description of the alternatives, and recommends criteria for selecting the most suitable alternate processing method. GRA

N86-26242# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Res
PROCEEDINGS OF A RESEARCH PLANNING CONFERENCE ON ENGINEERING ECONOMICS HELD AT MOUNTAIN LAKE, VIRGINIA ON AUGUST 26-29, 1984
1985 192 p Conference held in Mountain Lake, Va., 26-29 Aug. 1984 Sponsored by NSF
(PB86-163045; NSF/ENG-85049) Avail: NTIS HC A09/MF A01 CSCL 05A

The conference was held to address the complex economic decisions facing American industry due to the rapid advance in new design and manufacturing technologies. A major objective was to produce a rank-ordered list of research projects or engineering economics. A list of conference participants, representing both academia and industry, is provided. Reports of two previous workshops-one on Economic Decision Analysis and the other on Economics in Engineering Systems-are included. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-26243*# National Aeronautics and Space Administration, Washington, D.C.
SIGNIFICANT NASA INVENTIONS AVAILABLE FOR LICENSING IN FOREIGN COUNTRIES
1986 81 p
(NASA-SP-7038(08); NAS 1.21:7038(08)) Avail: NTIS MF A01; SOD HC $5.00 as 033-000-00986-1 CSCL 05B

Abstracts of various NASA-owned inventions which are available for foreign licensing in the identified countries are listed in accordance with the NASA Patent Licensing Regulations. Instructions for requested applications are explained. B.G.

N86-26244# Los Alamos National Lab., N. Mex.
FILE STRUCTURE USE IN INGRES DATABASES AT LOS ALAMOS NATIONAL LABORATORY
S. C. Hench 1985 13 p Presented at the INGRES Users Group National Conference, San Diego, Calif., 1985
(Contract W-7405-eng-36)
(DE86-002405; LA-UR-85-3704; CONF-8510240-1) Avail: NTIS HC A02/MF A01

This paper presents an analysis of the different file structures used in over 300 INGRES databases at Los Alamos National Laboratory. It also discusses the relationships between file structures and performance. DOE

N86-26245# Oak Ridge National Lab., Tenn.
CARBON DIOXIDE INFORMATION CENTER FY 1985 Progress Report
M. P. Farrell Nov. 1985 59 p
(Contract DE-AC05-84OR-21400)
(DE86-004654; ORNL/CDIC-11) Avail: NTIS HC A04/MF A01

The Carbon Dioxide Information Center (CDIC) has eight major functions: (1) distribute DOE and CDIC publications; (2) publish a CO2 document, CDIC communications; (3) respond to information requests; (4) develop a bibliographic information system and provide searching capabilities; (5) identify the CO2 research community and policymakers and provide access to a computerized world directory; (6) evaluate and test computer codes and package the models; (7) compile and evaluate numeric data bases and package the data; and (8) provide networking facilities among other data centers. CDIC progress during FY 1985 in these functions is discussed. DOE

N86-26246*# National Aeronautics and Space Administration, Washington, D.C.
THE LIBRARY SYSTEM OF THE DFVLR: PRESENT STATUS, PLANNED REORGANIZATION, USER POSSIBILITIES
P. Sternemann Oct. 1985 16 p Transl. into ENGLISH of "Das Bibliothekswen der DFVLR derzeitiger Status, gerplante Neurdnung, Nutzungsmologlichkeiten" Rept. DGLR 79-084 Cologne-Porz, West Germany Symposium held in Neubiberg, West Germany, 14 Nov. 1979 Original language document was announced in IAA as A80-44521 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77674; NAS 1.15:77674; DGLR-79-084) Avail: NTIS HC A02/MF A01 CSCL 05B

This paper gives an overview of the present status, planned alterations, and the scope of users of the DFVLR library, as well as a survey of library related activities outside of the library department. Attention is given to the tasks of the DFVLR which include research, assistance in planning and carrying out projects, and the construction and operation of large test installations, showing how they relate to demands on the library. Author

N86-26247# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
IMPLEMENTATION OF THE AFIT/ENG FACULTY AND STUDENT DATABASE MANAGEMENT SYSTEM M.S. Thesis
David A. Gaitros Dec. 1985 272 p refs
(AD-A164051; AFIT/GCS/ENG/85D-5) Avail: NTIS HC A12/MF A01 CSCL 09/2

This study took the works of the previous AFIT/ENG Student and Faculty Database System thesis efforts and design and implemented the application software for the project. The basic purpose of the thesis was to provide a sound design for the application programs that would interface with the total Database Management System and the Forms Management System. The entire system was to be designed with the notion that it would be modified and enhanced. A series of standard interface routines were created to act as a layer between the TOTAL DBMS. The resulting routines were abstracted and used as an extension to the Pascal programming language. The education plan portion of the database was used as a prototype to develop the requirements of the human-computer interface. The program was then redesigned and implemented using the standard routines and the specifications developed from the prototype. A menu driven system was used to implement the design utilizing the Forms Management System as the screen interface. The education plan program is an example of the structured approach used in interpreting the design of the database system. The program contains examples of scrolled screens, database calls, linked list routines, and data abstraction. Additional programs were written to demonstrate the capabilitiees interfacing with the GKS graphics package, transmission of data to the registrars office, and to show the continuity of the design. GRA

N86-26248# SRI International Corp., Menlo Park, Calif. Ddn Network Information Center.
ARPANET INFORMATION BROCHURE
Stephen Dennett, Elizabeth J. Feinler, and Francine Perillo Dec. 1985 57 p refs
(Contract DCA200-83-C-0025)
(AD-A164353; NIC-50003) Avail: NTIS HC A04/MF A01 CSCL 09/2

The ARPANET is an unclassified, packet-switched data network originally built by the Defense Advanced Research Projects Agency (DARPA) and used for Department of Defense computer science and networking research. It is now one of the subnetworks of the Defense Data Network (DDN) and, as such, is managed by the Defense Data Network Program Management Office (DDN PMO). Policy for the ARPANET is established by DARPA and they also decide who may become subscribers. Subscribers are required to follow certain technical and administrative procedures to connect host computers or other equipment to the DDN. This document describes these procedures as they apply to the ARPANET, provides background and technical information on the ARPANET, and suggests sources of further information on protocol implementations and interface equipment. Author (GRA)

N86-26249# Massachusetts Inst. of Tech., Cambridge. Sea Grant Program.
MARINE-RELATED RESEARCH AT MIT (MASSACHUSETTS INSTITUTE OF TECHNOLOGY): A DIRECTORY OF RESEARCH PROJECTS, 1985-1986
S. D. Stolz Sep. 1985 104 p Sponsored by NOAA
(PB86-158102; MITSG-85-31) Avail: NTIS HC A06/MF A01 CSCL 05B

A report on marine-related research at MIT contains items in the following areas: fisheries and food and drugs from the sea; marine biology; marine mineral resources; alternative energy sources; pollution; oceanography; ocean engineering; ship design and operations; shipping and transportation systems; and marine education. GRA

N86-26250# Arizona State Univ., Tempe. Dept. of Industrial and Management Sys. Eng.
INFORMATION SYSTEMS IN ADOT (ARIZONA DEPARTMENT

OF TRANSPORTATION): ANALYSIS OF INTRA-FUNCTION FLOW, DECISION SUPPORT NEEDS, EXISTING SYSTEMS UTILITY AND USER ATTITUDES. VOLUME 2: MANUAL FOR EVALUATION OF NEEDS AND ATTITUDES OF EDP USERS Final Report
W. C. Moor, J. E. Bailey, P. A. Evans, and A. Roberts Mar. 1985 98 p Sponsored in part by Federal Highway Administration, and by Arizona Dept. of Transportation
(PB86-148699; FHWA/AZ-85/205/2) Avail: NTIS HC A05/MF A01; Also avail. in set of 3 reports HC E99 as PB86-148673 CSCL 05B

A manual is presented to assist in evaluating the needs and attitudes of groups of ISG users. An objective analysis of needs and attitudes is useful when prioritizing or tailoring new application and change requests. The analysis acts as a roadmap indicating the best way to go. This manual describes the methodology of how to interpret the study results and how to administer and compile the results. GRA

N86-26251# Arizona State Univ., Tempe. Dept. of Industrial and Management Sys. Eng.
INFORMATION SYSTEMS IN ADOT (ARIZONA DEPARTMENT OF TRANSPORTATION): ANALYSIS OF INTRA-FUNCTION FLOW, DECISION SUPPORT NEEDS, EXISTING SYSTEMS UTILITY AND USER ATTITUDES, VOLUME 1 Final Report
W. C. Moor, J. E. Bailey, P. A. Evans, and A. Roberts Mar. 1985 66 p Sponsored in part by Federal Highway Administration, Phoenix, Ariz., and by Arizona Dept. of Transportation, Phoenix
(PB86-148681; FHWA/AZ-85/205/1) Avail: NTIS HC A04/MF A01; Also Avail. in set of 3 reports HC E99 as PB86-148673 CSCL 05B

A study of the information activities within the Right-of-Way section of Arizona Dept. of Transportation (ADOT) is presented. The objectives of the study are to adapt and apply techniques to measure user-perceived needs, satisfaction, and utility of services provided right-of-way by the information systems group (ISG). A background of the four tested techniques is given along with a review of related literature. The procedure used to collect and analyze the data collected in right-of-way is discussed. A manual for ISG use of the techniques is offered. GRA

N86-26252# National Academy of Sciences - National Research Council, Washington, D. C.
NAS (NATIONAL ACADEMY OF SCIENCES) EXCHANGES WITH THE ACADEMIES OF SCIENCES OF THE USSR AND EASTERN EUROPE Annual Report, 1984
31 Jan. 1985 101 p
(Grant NSF INT-83-14550)
(PB86-141827) Avail: NTIS HC A06/MF A01 CSCL 05B

The exchange program of the National Academy of Sciences (NAS) and the Academy of Sciences of the USSR (ASUSSR) dates from 1959. Comparable interacademy programs for exchange of individuals were begun with the Poles, Yugoslavs, Romanians, and Chechoslovaks in 1966, with the Bulgarians and Hungarians in 1970, and with the East Germans (GDR) in 1978. The seven East European programs represent approximately two-thirds of total exchange visits; the Soviet program, one third. The interacademy program operated for many years at approximately 330 months of exchange visits in each direction annually. With Federal budget reductions in 1981, support for the Academy's Soviet-East European exchange program, which has come exclusively from the National Science Foundation, was reduced by nearly 50%. At that time, the quotas in all programs were proportionately reduced. GRA

N86-26253# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
31 Dec. 1985 44 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UCC-85-010) Avail: NTIS HC A03/MF A01

Reports are included from a variety of periodicals on the topics of computer hardware, software, and applications, computer networks; and theory of computations. For individual titles, see N86-26254 through N86-26258.

N86-26254# Joint Publications Research Service, Arlington, Va.
REAL-TIME ALGORITHM FOR ESTIMATING PARAMETERS OF DOCUMENT INFORMATION SYSTEM Abstract Only
V. N. Belova and V. V. Maksimov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-010) 31 Dec. 1985 p 20 Transl. into ENGLISH from Nauchno-tekhnicheskaya Informatsita Seriya 2 Informatsionyye Protsessy i Sistemy (Moscow, USSR), no. 7, Jul. 1985 p 13-16 (For primary document see N86-26253 16-82)
Avail: NTIS HC A03/MF A01

A recursive algorithm is described for estimating the parameters of a document information stream based on an optimal discrete Kalman filtering algorithm and the state vector expansion method. The Kalman filtering algorithm provides unbiased, accurate estimates of the state of a discrete dynamic system when a Gaussian Markov state sequence is observed against the background of independent Gaussian random vectors. The proposed algorithn employs prediction correction (each corrected term is added to the predicted term obtained by extrapolating the preceding estimate one step ahead). The problem of estimating the number of documents in an average stream and its rate of increase is analyzed as an example. The algorithm is found to be computationally efficient; however, it requires a priori information about the statistical characteristics of the random stream and the initial estimate of the average stress. Author

N86-26255# Joint Publications Research Service, Arlington, Va.
FORMATION OF DATA BASE FOR METROLOGICAL SERVICES OF MINPRIBOR Abstract Only
A. G. Zotov, M. A. Golovahkin, M. M. Klochkov, and H. G. Sherstyukov *In its* USSR Report: Cybernetics, Computers, and Automation Technology (JPRS-UCC-85-010) 31 Dec. 1985 p 23 Transl. into ENGLISH from Izmeritelnaya Tekhnika (Moscow, USSR), no. 6, May 1985 p 65-67 (For primary document see N86-26253 16-82)
Avail: NTIS HC A03/MF A01

A sectoral metrological service , developed by the Ministry of Instrument Making, Automation Equipment, and Control Systems (MINPRIBOR) , defines the organizational and methodological bases of metrology for design, production, and operation of goods. An automated Metrology block with its data base forms part of the automated control system. Storage consists of three centralized files: sectoral list of measurement equipment (SI); metrological data sheets; and data about test units and equipment. The data system is realized on a YeS computer with YeS 7920 and YeS 7906 terminals. The programming is compatible with the YeS 6.1 operating system (or more advanced versions) and uses the Spektr relational network data base management system. One or more terminals can operate in dialogue mode and searches can be made for required instrumentation configurations. Hard copy is available from alphanumeric printers. B.G.

N86-26256# Joint Publications Research Service, Arlington, Va.
MAN-MACHINE PROBLEMS IN DEVELOPMENT AND OPERATION OF COMPUTER-AIDED DESIGN SYSTEMS Abstract Only
B. S. Irugov and N. V. Paradizov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-010) 31 Dec. 1985 p 24 Transl. into ENGLISH from Pribory, Sredstva Avtomatizatsii i Sistemy Upravleniya: Opty Khudozhestvennogo Konstruirovaniya v Priborostroyenii (Moscow, USSR), no. 15, 8 Jan. 1985 p 19-26 (For primary document see N86-26253 16-82)
Avail: NTIS HC A03/MF A01

Human factors engineering of computer aided design systems consists in ascertaining and classifying the man machine interactions, efficiently distributing the functions among the machine and human components, and coordinating their joint operations. The ergonomic aspects of the construction of a computer aided design system for printed circuit boards are discussed. The operations performed by human operators are ranked according to the

importance of the work station components in terms of the volume of information handled, the duration of each operation, and the influence of fatigue (visual, aural, physical, and psychological) on the operator. A typical illustration (consisting of a plotter, design specifications engineer, display console graphics data input unit, printed cirsuit board designer, and a control computr) is presented. B.G.

N86-26257# Joint Publications Research Service, Arlington, Va.
SEMANTIC MODULES IN MACHINE TRANSLATION SYSTEM Abstract Only
L. N. Belyaeva, L. V.. Matorina, R. G. Piotrovskij, and T. V. Yashchenko *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-010) 31 Dec. 1985 p 25 Transl. into ENGLISH from Nauchno-tekhnicheskaya Informatsiya Seriya 2 Informatsionnyye Protsessy i Sistemy (Moscow, USSR), no. 7, Jul. 1985 p 29-34 (For primary document see N86-26253 16-82)
Avail: NTIS HC A03/MF A01

A semiotic analysis was made of the matrix frame and thesaurus network translation method for word combinations in technical text. In the matrix frame analysis method, the combination rules for lexical units that form terminological word combinations are taken from the dictionary entry for each word form and put in standard frame patterns, where one of the frames represents patterns that reflect different semantic and syntactic construction schemes for the input word combination employed in the relevant area of knowledge. The thesaurus network procedure combines the valence method, which is based on consideration of the permitted combinability of semantic features of word forms comprising a terminological word combination, and analysis of the word combinations with the help of a branch thesaurus. The matrix frame approach is advantageous in that the nomenclature of all possible elements in relationships between them are assigned, which makes it possible to recognize the value of the components of the terminological word combination fairly rapidly. The thesaurus network approach does not require a priori explicit explication of all possible elements of the word combinations and connections between them. B.G.

N86-26258# Joint Publications Research Service, Arlington, Va.
IMPROVING OPERATING EFFICIENCY OF INFORMATION SYSTEMS BY EMPLOYING RELATIONAL DATA BASE MODEL Abstract Only
F. G. Kasumov, A. M. Imranov, and B. K. Melikova *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-85-010) 31 Dec. 1985 p 26 Transl. into ENGLISH from Narodnoye Khozyaystvo Azerbaydzhana (Baku, USSR), no. 6, Jun. 1985 p 42-47 (For primary document see N86-26253 16-82)
Avail: NTIS HC A03/MF A01

A relational approach to structuring the AFIPS (computerized information retrieval system) data base is described, although it is never made clear if it was applied in practice. The AFIPS is a subsystem of the Azerbaydzhan Republic Scientific Technical Information System and is made up of four subsystems to support economic management and planning entities as well as specialists within the republic by acquiring, storing, searching, outputting information, and providing on-line user access to the data base from interactive terminals. The use of relational structuring of the data base makes it possible to avoid opening and closing subfiles frequently, to access the required data block rapidly, to avoid rigid connections between the identifying key and the address of a record in a block, and to locate the blocks of the same subfile arbitrarily in a peripheral memory. Author

N86-26001# Stanford Univ., Calif. Dept. of Compute Science.
DISCOVERY, CONFIRMATION, AND INCORPORATION OF CAUSAL RELATIONSHIPS FROM A LARGE TIME-ORIENTED CLINICAL DATA BASE: THE RX PROJECT
Robert L. Blum *In its* Data Base Management 31 Jul. 1985 p 13-55 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

N86-26003# California Univ., Berkeley. Lawrence Berkeley Lab.
SCIENTIFIC INFORMATION = DATA + META-DATA
John L. McCarthy *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 79-124 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

N86-26004# San Jose State Univ., Calif.
PUT THE INFORMATION IN THE DATABASE, NOT THE PROGRAM
James L. Dolby *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 125-139 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

N86-26005# Pacific Northwest Lab., Richland, Wash.
MANAGING THE DATA ANALYSIS PROGRESS
W. L. Nicholson, P. J. Cowley, D. B. Carr, and M. A. Whiting *In* Stanford Univ. Data Base Management 31 Jul. 1985 p 141-166 refs (For primary document see N86-25999 16-60)
Avail: NTIS HC A14/MF A01 CSCL 09/2

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-26259# Committee on Commerce, Science, and Transportation (U. S. Senate).
NOMINATIONS: OCTOBER
Washington GPO 1985 137 p Hearings before the Committee on Commerce, Science, and Trasportation, 99th Congr., 1st Sess., 3 Oct., 9 Oct., 17 Oct., 22 Oct., 23 Oct., and 24 Oct. 1985 (S-Hrg-99-561; GPO-56-017) Avail: Committee on Commerce, Science, and Transpotation

Biographical sketches, prehearing and posthearing questions, and prepared statements of candidates for the following positions are presented: deputy administrator for NASA; Marine Mammal Commission members; commissioner and chairman for the Federal Maritime Commission; administrator for the Maritime Administration; National Transportation Safety Board members; Communications Satellite Corporation board of directors; and commissioner for the Consumer Product Safety Commission. For individual titles, see N86-26260 through N86-26260.

N86-26260# Committee on Commerce, Science, and Transportation (U. S. Senate).
WILLIAM R. GRAHAM, TO BE DEPUTY ADMINISTRATOR, NASA
(For primary document see N86-26259 16-84)
Avail: Committee on Commerce, Science, and Transpotation

The biographical sketch of William Robert Graham, Jr., nominee for deputy administrator for NASA, was presented. International cooperation, commercialization, and the role of the Department of Defense in relationship to the Space Station; fifth Orbiter; Shuttle operations; space science and applications; prioritization of flight opportunities; and commercialization of space were discussed. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-26261*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERVIEW OF THE 1986 FREE-PISTON STIRLING SP-100 ACTIVITIES AT THE NASA LEWIS RESEARCH CENTER Final Report
Jack G. Slaby 1986 20 p refs Prepared for presentation at the 21st Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25-29 Aug. 1986; sponsored by ACS, SAE, ANS, ASME, IEEE, AIAA, and AIChE
(Contract DE-AI05-82OR-1005)
(NASA-TM-87305; E-3028; DOE/NASA/1005-9; NAS 1.15:87305)
Avail: NTIS HC A02/MF A01 CSCL 10B

An overview of the NASA Lewis Research Center SP-100 free-piston Stirling engine activities is presented. These activities include a free-piston Stirling space-power technology feasibility demonstration project as part of the SP-100 program being conducted in support of the Department of Defense (DOD), Department of Energy (DOE), and NASA. The space-power Stirling advanced technology effort, under SP-100, addresses the status of the 25 kWe Space Power Demonstrator Engine (SPDE) including test results. Future space-power projections are presented along with a description of a study that will investigate the feasibility of scaling a single-cylinder free-piston Stirling space-power module to the 150 kW power range. Design parameters and conceptual design features will be presented for a 25 kWe, single-cylinder free-piston Stirling space-power converter. A description of a hydrodynamic gas bearing concept is presented whereby the displacer of a 1 kWe free-piston Stirling engine is modified to demonstrate the bearing concept. And finally the goals of a conceptual design for a 25 kWe Solar Advanced Stirling Conversion System capable of delivering electric power to an electric utility grid are discussed. Author

N86-26262# Oak Ridge National Lab., Tenn.
USE OF BROKER ORGANIZATIONS IN TECHNOLOGY TRANSFER AND RESEARCH UTILIZATION FOR THE BUILDINGS INDUSTRY
E. D. Copenhaver Dec. 1985 133 p
(Contract DE-AC05-84OR-21400)
(DE86-004674; ORNL/TM-9581) Avail: NTIS HC A07/MF A01

Several broker organizations are already an active part of the technology transfer and research utilization activities of DOE's Building Systems Division. These interactions often take the form of service on broker organization or DOE task forces and review committees, joint sponsorship of meetings and workshops, subcontracts for research and/or information dissemination to brokers, publication of documents, code and standards setting activities, and congressional testimony. Recommendations for additional research on technology transfer utilizing brokers are also outlined. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-26263*# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.
A SEARCH FOR METAL LINES IN THE SPECTRA OF DA WHITE DWARFS Semiannual Report, 1 Oct. 1984 - 31 Mar. 1985
Gary A. Wegner 5 Jun. 1986 22 p refs
(Grant NAG5-287)
(NASA-CR-176825; NAS 1.26:176825) Avail: NTIS HC A02/MF A01 CSCL 03A

A theoretical analysis was carried out in order to interpret the ultraviolet spectra of DB white dwarfs obtained earlier with the International Ultraviolet Explorer (IUE) satellite. Here the results of the IUE ultraviolet spectroscopy combined with visual data and model atmospheres of DB white dwarfs are reported. In particular, a search for spectra lines due to the element carbon using the ultraviolet was made. In no case is there a positive detection of carbon and from these data, and upper limits for carbon by number relative to helium are derived in the range of C: He < 10 to the minus 5 power to 10 to the minus 7 power for the 16 DB stars with ultraviolet spectra in the temperature range 11400 K < T sub EFF < less than 2300 K. The low carbon abundances found in the atmospheres of the DB stars agree well with the hypothesis that the atmospheric carbon observed in the cooler DQ members of the helium-rich white dwarf sequence is produced by a convective dredging mechanism. Author

N86-26264# National Weather Service, Salt Lake City, Utah.
SUNRISE/SUNSET AND MOONRISE/MOONSET, REVISED
G. R. Lussky Jan. 1986 86 p
(PB86-157229; NOAA-NWS-WRCP-51-Rev) Avail: NTIS HC A04/MF A01 CSCL 03A

The two AFOS programs, called SUN and MOON, allow the user to produce annual, monthly, or daily tables of sunrise/sunset or moonrise/moonset for most latitude-longitude locations around the globe. As a result, it is possible to have sunrise/sunset or moonrise/moonset times for those locations at which these data are not readily available. The programs were developed to allow the forecasters to have sun and moon data for any number of stations around their area of interest. This should make it quite easy to rapidly disseminate accurate information to those public interests requesting such data. These are the two main benefits of the programs - speed and accuracy of information. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-26265# State Univ. of New York, Stony Brook.
RESEARCH IN NUCLEAR ASTROPHYSICS: STELLAR COLLAPSE AND SUPERNOVAE Progress Report
A. Burrows, J. M. Lattimer, and A. Yahil 1986 30 p
(Contract DE-AC02-80ER-10719)
(DE86-004411; DOE/ER-10719/3) Avail: NTIS HC A03/MF A01

The interaction between nuclear theory and some outstanding problems in astrophysics is examined. The chief emphasis of our program is on stellar collapse, supernovae and neutron star formation. Central to these topics is the parallel development of both an equation of state of hot, dense matter and a novel type of hydrodynamical code. The LLPR compressible liquid drop model is the basis of the former. We are refining it to include both curvature corrections to the surface energy nuclear force parameters which are in better agreement with recently determined experimental quantities. Our study of the equation of state has the added bonus that our results can be used to analyze intermeciate energy heavy ion collisions, which, in turn, may illuminate the nucleon-nucleon force. The hydrodynamical code

includes a fast, but accurate, approximation to the complete LLPR equation of state. We model not only the stellar collapse leading up to a supernova, but also the quasi-static deleptonization and cooling stages of the nascent neutron star. Our detailed studies of the role of neutrinos in stellar collapse and neutron star formation concentrate on their detectability and signatures. These studies are intended to shed light on the early history of the universe, in which both nuclear and elementary particle physics play a crucial role. DOE

N86-26266*# Virginia Univ., Charlottesville. Dept. of Astronomy.
HIGHLY IONIZED ATOMS IN COOLING GAS
Richard J. Edgar and Roger A. Chevalier 1986 16 p refs
(Grant NAGw-764)
(NASA-CR-176819; NAS 1.26:176819) Avail: NTIS HC A02/MF A01 CSCL 03B

The ionization of low density gas cooling from a high temperature was calculated. The evolution during the cooling is assumed to be isochoric, isobaric, or a combination of these cases. The calculations are used to predict the column densities and ultraviolet line luminosities of highly ionized atoms in cooling gas. In a model for cooling of a hot galactic corona, it is shown that the observed value of N(N V) can be produced in the cooling gas, while the predicted value of N(Si IV) falls short of the observed value by a factor of about 5. The same model predicts fluxes of ultraviolet emission lines that are a factor of 10 lower than the claimed detections of Feldman, Brune, and Henry. Predictions are made for ultraviolet lines in cooling flows in early-type galaxies and clusters of galaxies. It is shown that the column densities of interest vary over a fairly narrow range, while the emission line luminosities are simply proportional to the mass inflow rate. Author

N86-26267# Chalmers Univ. of Technology, Goeteborg (Sweden). Raaoe Rymdobservatorium.
LONG-TERM STUDY OF SiO (v=1, J=2-1) MASER EMISSION FROM EVOLVED STARS AND ORION A
L. A. Nyman and H. Olofsson 1985 25 p refs
(PB86-143070; Rept-85/33) Avail: NTIS HC A03/MF A01 CSCL 03B

The SiO (v=1, J=2-1) maser emission was observed over a period of more than four years towards eight late-type stars and Orion A. This was done in order to study the general characteristics of the maser emission and, in particular, investigate any possible correlations with the optical variations of the central star. The implications of the results on the pump mechanism, the location of the masers, and the kinematics of the inner part of the circumstellar envelope will be discussed. Long-term monitoring of SiO masers has been performed previously by others. The observations described cover a longer time interval and are except for the first case, more frequently sampled in time. Also observed H2O maser emission towards the same stars. The shapes of the SiO and H2O profiles are compared, and the relative location of the masers in the circumstellar envelope is discussed. GRA

N86-26268*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 494, OCTOBER 1985, PART 2: (COMPREHENSIVE REPORTS). DATA FOR APRIL 1985, JANUARY-JUNE 1984 AND MISCELLANEA
H. E. Coffey Oct. 1985 170 p
(Contract NASA Order-W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176676; NAS 1.26:176676; PB86-143252;
SGD-494-PT-2) Avail: NTIS HC A08/MF A01 CSCL 03B

Contents include: detailed index for 1985; data for April 1985 (Meudon carte synoptique, solar radio bursts at fixed frequencies, solar X-ray radiation form GOES satellite, mass ejections from the sun, active prominences and filaments); data for January to June 1984 (solar flares January 1984, solar flares February 1984, solar flares March 1984, solar flares April 1984, solar flares May 1984, solar flares June 1984, and number of flates August 1966 to June 1984); and miscellaneous data (interplanetary solar wind July 1984 to March 1985, errata solar X-rays event list January 1985). GRA

N86-26269*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 494, OCTOBER 1985, PART 1: (PROMPT REPORTS). DATA FOR SEPTEMBER 1985, AUGUST 1985 AND LATE DATA
H. E. Coffey, ed. Oct. 1985 88 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-176833; NAS 1.26:176833; PB86-143245;
SGD-494-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 03B

Data for August and September 1985 on IUWDS alert periods (advance and worldwide), solar activity indices, solar flares, solar radio emission, Stanford mean solar magnetic fields, solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements, geomagnetic indices, radio propagation indices, inferred interplanetary magnetic field polarity, preliminary solar proton event list, and calcium plage are presented. B.G.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

No abstracts in this category.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-26270*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
AN INVESTIGATION OF THE ENERGY BALANCE OF SOLAR ACTIVE REGIONS USING THE ACRIM IRRADIANCE DATA Final Report
Larry D. Petro Feb. 1986 82 p refs
(Contract NASw-4062)
(NASA-CR-176788; NAS 1.26:176788) Avail: NTIS HC A05/MF A01 CSCL 03B

The detection of a significant correlation between the solar irradiance, corrected for flux deficit due to sunspots, and both the 205 nm flux and a photometric facular index were examined. A detailed analysis supports facular emission as the more likely source of correlation with the corrected radiance, rather then the error in sunspot correction. A computer program which simulates two dimensional convection in a compressible, stratified medium was investigated. Subroutines to calculate ionization and other thermodynamic variables were also completed. B.G.

N86-26271# Air Force Geophysics Lab., Hanscom AFB, Mass.
AUTOMATED SYSTEM FOR RESOLVING THE POSITION OF SOLAR RADIO BURSTS Interim Scientific Report
David N. Gaunt 19 Aug 1985 16 p refs
(AD-A164425; AFGL-TR-85-0179; AFGL-IP-330) Avail: NTIS HC A02/MF A01 CSCL 03/1

A swept freqency interferometer system such as the one in operation at Sagamore Hill observatory, described in AFGL Tech report 76-0194 1976, contains in its output data, precise information which can determine, in a plane resolution, the position of a radio source on the solar disk within 1.3 min arc. This information is the frequency separation between the interference fringes within the spectrum observed. A system which could, automatically, convert this information to degrees and minutes of arc is described. GRA

N86-26272# Air Force Geophysics Lab., Hanscom AFB, Mass. Space Physics Div.
PEAK-FLUX-DENSITY SPECTRA OF LARGE SOLAR RADIO BURSTS AND PROTON EMISSION FROM FLARES Scientific Interim Report, Jul. 1981 - Jul. 1985
E. W. Cliver, L. F. McNamara, and L. C. Gentile 19 Aug. 1985 61 p refs
(AF Proj. 2311)
(AD-A164458; AFGL-TR-85-0180; ERP-924) Avail: NTIS HC A04/MF A01 CSCL 03/1

We have reexamined the relationship between U-shaped peak-flux-density microwave spectra and solar proton events for approx 200 large (Sp(> or = 2GHz) > or = 800 solar flux units (sfu) microwave burst (1965 - 1979). The radio spectra fell into two basic classes: (1) U-shaped with two maxima (> or = 800 sfu) in the range from 200 MHz to > or = 10 GHz (59 percent of all events), and (2) cutoff spectra with a maximum > or = 800 sfu at f > or = 2 GHz and So (200 MHz) < 100 sfu (18 percent). Nine percent of the events had intermediate spectra with a maximum > or = 800 sfu at f > or = 2 GHz and 100 sfu < or = Sp (200 MHz) < 800 sfu. We were unable to classify 15 percent of the events because of incomplete data. The associations of the three classes of spectra with Type II (and/or Type IV) meter wavelength bursts and > 10 MeV proton events of any size (> or = 0.01 pr per sq cm per sec per sr) are as follows: U-shaped Type II/IV (90 percent of large microwave bursts with U-shaped spectra are associated with Type II/IV events), protons (77 percent); intermediate Type II/IV (78 percent), protons (73 percent); and cutoff Type II/IV (22 percent), protons (33 percent). These statistics affirm various lines of evidence linking coronal shock waves and interplanetary proton events. They also suggest that the meter wavelength branch of the U-shaped spectrum may be attributable to second phase (vs flash phase) accelerated electrons. GRA

N86-26273# California Univ., Los Angeles.
RESEARCH IN SOLAR-TERRESTRIAL PHYSICS Final Technical Report, 1 Oct. 1981 - 30 Nov. 1983
25 Jan. 1986 15 p refs
(Contract N00014-82-K-0031)
(AD-A164460) Avail: NTIS HC A02/MF A01 CSCL 03/1

A report on research in solar-terrestrial physics includes the following: Ultra Low Frequency Waves; Magnetic Pulsations; Predicting Geomagnetic Activity Using Solar Wind Data; Auroral Electrojets; Partial Ring Current; The Symmetric Ring Current; The Role of Driven and Unloading Processes in Substorms; A Study of the Near-Earth Plasma Sheet; and Methods of Time Series Data Base Management. GRA

N86-26274# California Univ., Los Angeles.
RESEARCH IN SOLAR-TERRESTRIAL PHYSICS Final Technical Report, 1 Dec. 1983 - 31 Mar. 1985
R. L. McPherron 25 Jan. 1986 35 p refs
(Contract N00014-84-C-0158)
(AD-A164504) Avail: NTIS HC A03/MF A01 CSCL 03/1

The primary goal of the research is to understand the physical phenomena which transfer energy from the solar wind to the magnetosphere, which then transport energy within the magnetosphere, and finally which lead to its dissipation in the ionosphere and its return to the solar wind. The current research projects include three distinct topics: solar wind-magnetosphere coupling, triggering of substorm expansion onsets, and generation of ultra low frequency waves. The investigation of solar wind-magnetosphere coupling is concerned with establishing how the rate of energy transfer into the magnetosphere depends on bulk parameters of the solar wind. The second topic, triggering of substorm onsets, is concerned with understanding the mechanism whereby solar wind energy stored in the tail lobes is released into the inner magnetoshere. In the model favored, this release is caused by reconnection of lobe magnetic field at a near-earth neutral line. The present research is concerned with demonstrating that this process is highly localized, transient, and at times involves multiple neutral lines. The third topic is the study of ultra low frequency waves (ULF) (1 to 1000 mHz). GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-26275# California Univ., Berkeley. Lawrence Berkeley Lab.
SPECTRUM OF THE COSMIC BACKGROUND RADIATION: EARLY AND RECENT MEASUREMENTS FROM THE WHITE MOUNTAIN RESEARCH STATION
G. F. Smoot Sep. 1985 12 p Presented at the Conference on Research Work at the U.C. Research Station at White Mountain, Bishop, Calif., 30 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002888; LBL-20344; CONF-8508148-1) Avail: NTIS HC A02/MF A01

The White Mountain Research Station has provided a support facility at a high, dry, radio-quiet site for measurements that have established the blackbody character of the cosmic microwave background radiation. This finding has confirmed the interpretation of the radiation as a relic of the primeval fireball and helped to establish the hot Big Bang theory as the standard cosmological model. DOE

N86-25585# Joint Publications Research Service, Arlington, Va.
HIGH-ENERGY DEVICES, OPTICS AND PHOTOGRAPHY
K. Borodio *In its* USSR Report: Engineering and Equipment (JPRS-UEQ-86-001) 24 Jan. 1986 p 76 Transl. into ENGLISH from Sotsilaisticheskaya Industriya (Moscow, USSR), 21 Nov. 1985 p 4 (For primary document see N86-25556 16-31)
Avail: NTIS HC A06/MF A01

99 GENERAL

N86-26276*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LANGLEY AEROSPACE TEST HIGHLIGHTS, 1985
May 1986 100 p
(NASA-TM-87703; NAS 1.15:87703) Avail: NTIS HC A05/MF A01 CSCL 05A

The role of the Langley Research Center is to perform basic and applied research necessary for the advancement of aeronautics and space flight, to generate new and advanced concepts for the accomplishment of related national goals, and to provide research advice, technological support, and assistance to other NASA installations, other government agencies, and industry. Significant tests which were performed during calendar year 1985 in Langley test facilities, are highlighted. Both the broad range of the research and technology activities at the Langley Research Center and the contributions of this work toward maintaining United States leadership in aeronautics and space research, are illustrated. Other highlights of Langley research and technology for 1985 are described in Research and Technology-1985 Annual Report of the Langley Research Center. Author

Typical Subject Index Listing

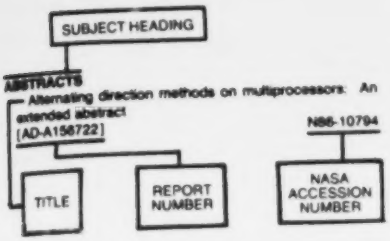

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Aircraft accident/incident summary reports: Concord, California, July 14, 1984; Atlanta, Georgia, September 24, 1984; Jasper, Alabama, December 16, 1984; Avalon, California, January 30, 1984; Charlottesville, Virginia, February 17, 1984; Kansas City, Kansas, January 9, 1985
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Aircraft accident/incident summary reports: Concord, California, July 14, 1984; Atlanta, Georgia, September 24, 1984; Jasper, Alabama, December 16, 1984; Avalon, California, January 30, 1984; Charlottesville, Virginia, February 17, 1984; Kansas City, Kansas, January 9, 1985
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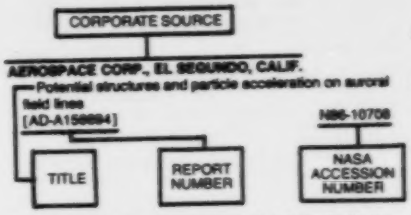

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Angular distribution of high energy electrons following radiation
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FIAT RESEARCH CENTER, ORBASSANO, TURIN (ITALY).
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Geological evolution and analysis of confirmed or suspected gas hydrate localities. Volume 2: Baltimore Canyon Trough and environs, US East Coast
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US geological data: Digital line graphs from 1:100,000-scale maps. Data users guide 2
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Damage tolerance acceptance methods in structural components of a medium carbon steel and a medium strength Al-Mg alloy N86-25367
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Proceedings of the Item Response Theory and Computerized Adaptive Testing Conference
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Emergent techniques for assessment of visual performance
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NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Remote sensing of the Earth from Space: A program in crisis
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Report on artificially structured materials
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Research briefings for the Office of Science and Technology Policy, the National Science Foundation and selected federal departments and agencies, 1985
[PB86-148582] N86-26240
NAS (National Academy of Sciences) exchanges with the academies of sciences of the USSR and Eastern Europe
[PB86-141827] N86-26252
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical Engineering: A Continuing Bibliography with Indexes (supplement 194)
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Aeronautical Engineering: A Continuing Bibliography with Indexes (supplement 200)
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Stencils and problem partitionings: Their influence on the performance of multiple processor systems
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A fourth order accurate finite difference scheme for the computation of elastic waves
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Langley aerospace test highlights, 1985
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
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Compendium of meteorology scientific issues of 1950 still outstanding
[NASA-RP-1167] N86-25900

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. NATIONAL SPACE TECHNOLOGY LABS., BAY SAINT LOUIS, MISS.
Timber Resources Inventory and Monitoring Joint Research Project
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
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Discharge cell for optogalvanic spectroscopy having orthogonal relationship between the probe laser and discharge axis
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NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Forced smolder propagation and the transition to flaming in cellulosic insulation
[PB86-166659] N86-25445
X-ray optics and microanalysis. Transactions of the International Conferency (8th) on X-Ray Optics and Micmanalysis held at Moscow-Kiev on July 9-16, 1974
[PB86-155173] N86-25446
Literature review of the chemical nature and toxicity of the decomposition products of polyethylenes
[PB86-163409] N86-25447
Metallurgy technical activities, 1985
[PB86-165032] N86-25469
Diffusion and structure of metals
[PB86-156742] N86-25470
Protective coatings on metals, volume 6
[PB86-155249] N86-25496
National Conference on Weights and Measures (70th), 1985
[PB86-150232] N86-25520
Thermometer calibration: A model for state calibration laboratories
[NBS-MONO-174] N86-25756
Report on the NBS-DOE (National Bureau of Standards-Department of Energy) May 1984 Workshop on Thermal Metering
[PB86-155486] N86-25772
Diffusion processes in solid-phase welding of materials
[PB86-155025] N86-25801
A three-dimensional mesoscale model for the simulation of clouds, precipitation and airflow
[AD-A164466] N86-25933
Journal of Research of the National Bureau of Standards, volume 90, number 5, September-October 1985
[PB86-166782] N86-26098
Angular distribution of high energy electrons following radiation
[PB86-141934] N86-26179
NBS LATTICE: A program to analyze lattice relationships, version of summer, 1985
[PB86-166774] N86-26233
Thermodynamics of high temperature materials
[AD-A164253] N86-26234
Technical activities 1983, Center for Basic Standards
[PB86-140043] N86-26239
Guide on selecting ADP (Automatic Data Processing)backup processing alternatives
[PB86-154820] N86-26241

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.
Thermodynamics and heat transfer in fire fighting
[PB86-155181] N86-25524
Topology of local atomic environments: Implications for magnetism and superconductivity
[DE86-002933] N86-26229

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Primary photochemical processes of acrolein
[PB86-145802] N86-25894
Role of the oceans in the atmospheric cycle of carbonyl sulfide
[PB86-144078] N86-25918
UNIX word processing at HAO (for use with the 4.2 BSD version and -me macro package)
[PB86-155801] N86-26053

NATIONAL CENTER FOR HEALTH SERVICES RESEARCH AND HEALTH CARE TECHNOLOGY ASSESSMENT, ROCKVILLE, MD.
Cardiokymography
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NATIOANL CENTER FOR TOXICOLOGICAL RESEARCH, JEFFERSON, ARK.
High-field NMR (Nuclear Magnetic Resonance) for structural analysis of complex polycyclic aromatic hydrocarbons
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NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, D. C.
Plan for space station polar-orbiting platform
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NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
Earthquake and tsunami data services and publications
[PB86-156254] N86-25919
Solar-geophysical data number 496, December 1985. Part 1: (Prompt reports). Data for November 1985, October 1985 and late data
[NASA-CR-176795] N86-25922
Solar-geophysical data number 496, December 1985. Part 2: (Comprehensive reports). Data for June 1985, January-May 1985 and miscellanea
[NASA-CR-176793] N86-25923
Solar-geophysical data number 494, October 1985, Part 2: (Comprehensive reports). Data for April 1985, January-June 1984 and miscellanea
[NASA-CR-176676] N86-26268
Solar-geophysical data number 494, October 1985. Part 1: (Prompt reports). Data for September 1985, August 1985 and late data
[NASA-CR-176633] N86-26269

NATIONAL MATERIALS ADVISORY BOARD, WASHINGTON, D. C.
Basic and strategic metals industries: Threats and opportunities
[PB86-154499] N86-25471

NATIONAL OCEAN SERVICE, ANCHORAGE, ALASKA.
Outer Continental Shelf Environmental Assessment Program. Final reports of principal investigators, volume 34
[PB86-150109] N86-25920

NATIONAL OCEAN SERVICE, ROCKVILLE, MD.
Tide tables 1986, high and low water predictions, central and western Pacific Ocean and Indian Ocean
[PB86-148434] N86-25967
Directory of selected research supported by NOAA's (National Oceanic and Atmospheric Administration's) Ocean Assessments Division
[PB86-150216] N86-25969

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Statistical model to estimate the refractivity turbulence structure constant carbon sup 2 sub n in the free atmosphere
[PB86-148749] N86-25921
Feasibility study on the use of firefinder radar for wind profiling
[PB86-158417] N86-25946

Program for Regional Observing and Forecasting Services (PROFS), fiscal year 1985
[PB86-158110] N86-25947
Optical System Model 4 for space-averaged wind and C sub n sup 2 measurements
[PB86-144066] N86-25955

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.
Hurricane Research Division, Atlantic Oceanographic and Meteorological Laboratory fiscal year 1985 programs: Fiscal year 1986 projections
[PB86-158755] N86-25945
Atlantic Oceanographic and Meteorological Laboratory Fiscal Year 1985 report
[PB86-150091] N86-25953
Computer code for calculating acoustic ray paths with application to the Straits of Florida
[PB86-158391] N86-25968

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.
Remote sensing of the Earth from Space: A program in crisis
[NASA-CR-176796] N86-25873
National hurricane operations plan, May 1985
[PB86-148364] N86-25936

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WASH.
Sea ice dynamics and regional meteorology for the Arctic polynya experiment (APEX)-Bering Sea 1985
[PB86-148038] N86-25939

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO).
Practical experience with damage tolerance based life extention of turbine engine components N86-25363

NATIONAL SEVERE STORMS FORECAST CENTER, KANSAS CITY, MO.
Severe local storm warning verification: 1984
[PB86-148244] N86-25938

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, BOULDER, COLO.
Technical basis for the Geostationary Satellite Orbit Analysis Program (GSOAP), version 2
[PB86-151750] N86-25391
Millimeter-wave urban and suburban propagation measurements using narrow and wide bandwidth channel probes
[PB86-147741] N86-25683
ISDN (Integrated Services Digital Network): Numbering, addressing and interworking
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report: Air Canada flgh 797, McDonnell Douglas DC-9-32, C-FTLU, Greater Cincinnati International Airport, Covington, Kentucky, June 2, 1983
[PB86-910402] N86-25332
Aircraft accident/incident summary reports: Concord, California, July 14, 1984; Atlanta, Georgia, September 24, 1984; Jasper, Alabama, December 16, 1984; Avalon, California, January 30, 1984; Charlottesville, Virginia, February 17, 1984; Kansas City, Kansas, January 9, 1985
[PB86-910410] N86-25333

NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
Minimum temperature forecast aid for radiational cooling situations in the lower Rio Grande Valley of Texas
[PB86-154242] N86-25948

NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
Comparison among various thermodynamic parameters for the prediction of convective activity, part 2
[PB86-142353] N86-25942

NATIONAL WEATHER SERVICE, HONOLULU, HAWAII.
Tropical cyclones, 1983, central North Pacific
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NATIONAL WEATHER SERVICE, KANSAS CITY, MO.
Statistical analysis of SHEF (Standard Hydrometeorological Exchange Format) coding errors
[PB86-145141] N86-25940
Climatological summary programs F6, CLIMAT, SUMMARY, GETCS
[PB86-143948] N86-25941

NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
NWR (National Weather Service) voice synthesis project, phase 1
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Sunrise/sunset and moonrise/moonset, revised
[PB86-157229] N86-26264

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
AFOS (Automation of Field Operations and Services) - era forecast verification, October 1985
[PB86-148319] N86-25937
AFOS (Automation of Field Operations and Services) era forecast verification
[PB86-152386] N86-25950
AFOS (Automation of Field Operations and Services) terminal forecast decoding
[PB86-152337] N86-25951
AFOS (Automation of Field Operations and Services) terminal forecast decoding
[PB86-147360] N86-25954

NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and seasonal weather outlook for mid-February to mid-March 1986, volume 40, number 4, February 14, 1986
[PB86-162229] N86-25943
Monthly and seasonal weather outlook for February 1986, volume 40, number 3, January 30, 1986
[PB86-155860] N86-25949

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Statistical analysis of spin pit failure data to predict inservice B.1 lives of gas turbine disks N86-25377

NAVAL AIR PROPULSION TEST CENTER, TRENTON, N.J.
Engine cyclic durability by analysis and testing: Highlights of the spring 1984 PEP Meeting N86-25362

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
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[AD-A164420] N86-25963

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NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
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Characterization of aluminum nitride/aluminum oxide reactively sputtered antireflection coatings
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The nature and origin of mineral coatings on volcanic rocks of the Black Mountain, Stonewall Mountain and Kane Springs Wash volcanic centers in southern Nevada
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NEW MEXICO STATE UNIV., LAS CRUCES.
SHARP (Stabilized High Altitude Research Platform)
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NEW MEXICO UNIV., ALBUQUERQUE.
Operational characteristics of a high voltage dense plasma focus
[AD-A164298] N86-26216

NEW YORK STATE DEPT. OF TRANSPORTATION, ALBANY.
Lateral Restraint of non-composite beams
[PB86-143781] N86-25861
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Computational techniques for shock wave diffraction problems
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NIPPON UNIVAC KAISHA LTD. (JAPAN).
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A study into the mechanism(s) for the electroplastic effect in metals and its application to metalworking
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The distribution of maximum flow with application to multi-state reliability systems
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Analysis of experimental data for neutralization of low-energy ions at a surface
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OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes, volume 40, number 2
[AD-A163008] N86-26096
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Turbulent flow over rough turbine airfoils
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Evaluation of control technologies for hazardous air pollutants, volume 1
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Comparison of methods to retard reflective cracking in bituminous concrete using fabrics and fibers: Construction and early performance report
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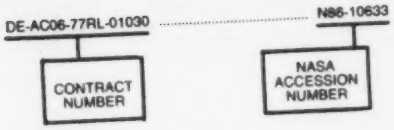

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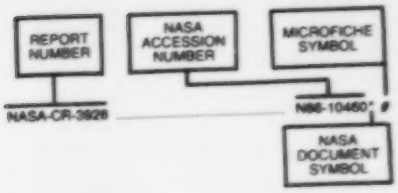

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*.

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For related information see also *34 Fluid Mechanics and Heat Transfer*

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Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

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Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE **2691**

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION **2692**

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER **2693**

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

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Includes aircraft handling qualities; piloting; flight controls; and autopilots.

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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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Includes powered and free-flight trajectories; and orbit and launching dynamics.

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20 SPACECRAFT PROPULSION AND POWER **2699**

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For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

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Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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COSATI CODE

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.
CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL
C. P. Chen Aug. 1985 22 p refs
(Contract NASw-3458)
(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS
HC A02/MF A01 CSCL 20D

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included.
Author

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-26277*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUMMARY OF RESULTS OF NASA F-15 FLIGHT RESEARCH PROGRAM
Frank W. Burcham, Jr., Gary A. Trippensee, David F. Fisher, and Terrill W. Putnam Apr. 1986 34 p ref Presented at the AIAA 3rd Flight Testing Conference, Las Vegas, Nevada, 2-4 Apr. 1986 (NASA-TM-86811; H-1341; NAS 1.15:86811; AIAA-86-9761) Avail: NTIS HC A03/MF A01 CSCL 01B

NASA conducted a multidisciplinary flight research program on the F-15 airplane. The program began in 1976 when two preproduction airplanes were obtained from the U.S. Air Force. Major projects involved stability and control, handling qualities, propulsion, aerodynamics, propulsion controls, and integrated propulsion-flight controls. Several government agencies and aerospace contractors were involved. In excess of 330 flights were flown, and over 85 papers and reports were published. This document describes the overall program, the projects, and the key results. The F-15 was demonstrated to be an excellent flight research vehicle, producing high-quality results. Author

N86-26278# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AEROSPACE KNOWLEDGE MAGAZINE (SELECTED ARTICLES)
Xin Li, Zhenwu Wang, and Xin Wu 15 Jan. 1986 19 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 6, 1985 p 17-21 (AD-A164720; FTD-ID(RS)T-1008-85) Avail: NTIS HC A02/MF A01 CSCL 01/3

This Chinese translation is of three articles from Aerospace Knowledge Magazine. The articles are Su-7 and Su-17 about the Soviet fighter bomber and the variable geometry swept-wing fighter bomber; Infrared Decoy about the scapegoat infrared countermeasure against infrared guided missiles. Smoke and flame decoys, composite decoys and fuel type decoys are also discussed in this article. The last article is entitled Distinguishing between several Soviet aircraft. GRA

N86-26279# Air Command and Staff Coll., Maxwell AFB, Ala.
WHAT USAF AIRCRAFT SHOULD BE THE WILD WEASEL OF THE 1990'S?: AN ASSESSMENT OF THE F-4G, THE F-15WW, AND F-16WW M.S. Thesis
Michael J. Neitzel 7 Jun. 1985 125 p
(AD-A164727) Avail: NTIS HC A06/MF A01 CSCL 01/3

The USAF Wild Weasel mission was born in 1965 during the Vietnam conflict. The purpose of the mission was to counter the serious radar-directed threats that were decimating the US fighter arsenal. While the current F-4G Wild Weasel aircraft has effectively met the threat into the 1980's, its capabilities reflect the aircraft's 1950's design. Meanwhile, the Soviet Union is fielding many technologically advanced radar-directed threats that bring the adequacy of the F-4G into question. This study investigated what characteristics will be required to defeat the threat of the 1990's. Next, the F-4G, F-15WW, and F-16 Wild Weasel proposal were compared against the aircraft characteristics needed (as determined by a poll of experienced officers) to survive the threats in the 1990's. This thesis concludes that the F-15WW possesses the most desirable characteristics to serve as the Wild Weasel aircraft for the 1990's. GRA

N86-26280# Army Command and General Staff Coll., Fort Leavenworth, Kansas.
THE C-17: AN ATTEMPT AT INCREASED AIRLIFT VERSATILITY M.S. Thesis
John W. Stone 7 Jun. 1985 127 p
(AD-A164822) Avail: NTIS HC A07/MF A01 CSCL 01/3

The Airlift Master Plan was developed as a guide for achieving long-term military airlift objectives. The cornerstone of the plan is the development and acquisition of the C-17. Although the C-17's direct-delivery concept is new, the quest for expanded aircraft versatility has been continually pursued in previous airlift aircraft development programs. Thus the C-17 is not the first aircraft that has attempted to combine the traditionally separate roles of intertheater and intratheater airlift. The most recent attempt at developing an aircraft capable of meeting both strategic and tactical requirements resulted in the C-5A. The C-5A failed to achieve the operational versatility predicted by its proponents and that failure has given rise to serious questions in regard to the C-17's probability of success in realizing its expanded airlift goals. A comparison of the C-5A and C-17 programs revealed the differences in concept formulation, design and acquisition strategy which will allow the C-17 to achieve its operational goals. The study further concludes that the direct-delivery concept is a valid airlift objective and current technology permits the development of an aircraft with the performance capabilities necessary to fulfill that objective. GRA

N86-26281# Air Force Academy, Colo.
AIR FORCE ACADEMY AERONAUTICS DIGEST Final Report
John H. Russell and Michael Hale Sep. 1985 85 p
(AD-A164940; USAFA-TR-85-11) Avail: NTIS HC A05/MF A01 CSCL 05/9

This Digest covers unclassified research in aeronautics by individuals assigned to or associated with the United States Air Force Academy. Partial contents: Aerodynamics - Unsteady forces acting on a flat plate airfoil undergoing chord deformation, and Unsteady surface pressure measurements on a pitching airfoil; and Engineering Education - Undergraduate airbreathing propulsion at the US Air Force Academy, and How to fairly account for an excused exam. GRA

N86-26282# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF S-3 SDLM (STANDARD DEPOT LEVEL MAINTENANCE) CORROSION DOCUMENTATION PROCEDURES M.S. Thesis
Steven L. Hanson and Mark E. Karr Dec. 1985 77 p
(AD-A165588; NPS554-85-011) Avail: NTIS HC A05/MF A01 CSCL 05/1

When senior personnel in Naval aviation are asked the question, How much time and money are we spending on corrosion prevention and correction?, fairly accurate estimates can be obtained for the organizational and intermediate levels of maintenance because they break out these costs in their maintenance data reporting systems. It is virtually impossible to quantify these same costs at the depot level since their current reporting system will not allow for the collection of such information. A second problem, caused by this rather limited reporting system, concerns the inability of the depot level engineering staff to gather sufficient accurate information about the types, extent, and locations of corrosion that occur on aircraft. This report provides a system design and implementation plan for corrosion monitoring for the Naval Air Rework Facility at Alameda, California. A computerized system for corrosion data collection and processing is needed. Research in this area led to the Depot Maintenance Data System (DMDS). GRA

N86-26283*# Notre Dame Univ., Ind. Dept. of Aerospace and Mechanical Engineering.
PROCEEDINGS OF THE CONFERENCE ON LOW REYNOLDS NUMBER AIRFOIL AERODYNAMICS
Thomas J. Mueller, ed. Jun. 1985 356 p refs
(NASA Order L-77177-B; Grant N00014-85-G-0123)
(NASA-CR-177308; NAS 1.26:177308; AD-A163609; UNDAS-CP-77B123) Avail: NTIS HC A16/MF A01 CSCL 01B

Current interest in a variety of low Reynolds number applications has focused attention on the design and evaluation of efficient airfoil sections at chord Reynolds numbers from about 100,000 to about 1,000,000. These applications include remotely piloted vehicles (RPVs) at high altitudes, sailplanes, ultra-light man-carrying/man powered aircraft, mini-RPVs at low altitudes and wind turbines/propellers. Although the design and evaluation techniques for airfoil sections above chord Reynolds numbers of 500,000 are reasonably well developed problems related to boundary layer separation and transition have made it difficult to extend these techniques to lower Reynolds numbers. Presently available design and analysis techniques require improved criteria for laminar separation transition, reattachment and turbulent separation. Mathematical models of these complex phenomena require additional very careful experimental studies. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-26284*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPUTATIONAL TRANSONIC FLUTTER BOUNDARY TRACKING PROCEDURE M.S. Thesis
J. W. Gallman, J. T. Batina, and T. Y. Yang Mar. 1986 13 p refs Presented at 27th Structures, Structural Dynamics and Materials Conference, San Antonio, Tex., 19-21 May 1986; Sponsored by AIAA Previously announced in IAA as A86-0902
(Grant NAG1-372)
(NASA-TM-87708; NAS 1.15:87708) Avail: NTIS HC A02/MF A01 CSCL 01A

An automated flutter boundary tracking procedure for the efficient calculation of transonic flutter boundaries is presented. The procedure uses aeroelastic responses to march along the boundary by taking steps in speed and Mach number, thereby reducing the number of response calculations previously required to determine a transonic flutter boundary. Flutter boundary results are presented for a typical airfoil section oscillating with pitch and plunge degrees of freedom. These transonic flutter boundaries are in good agreement with exact boundaries calculated using the conventional time-marching method. The tracking procedure is extended to include static aeroelastic twist as a simulation of the static deformation of a wing and contains all of the essential features that are required to apply it to practical three-dimensional cases. The procedure is also applied to flutter boundaries as a function of structural parameters. Author

N86-26285*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PLUME CHARACTERISTICS OF SINGLE-STREAM AND DUAL-FLOW CONVENTIONAL AND INVERTED-PROFILE NOZZLES AT EQUAL THRUST
Uwe H. vonGlahn and Jack H. Goodykoontz 1986 39 p refs Presented at the 4th Applied Aerodynamics Conference, San Diego, Calif. 9-11 Jun. 1986; sponsored by AIAA
(NASA-TM-87323; E-3060; NAS 1.15:87323; AIAA-86-1809) Avail: NTIS HC A03/MF A01 CSCL 01A

The plume velocity and temperature decay rates of single-stream, conventional dual-flow and inverted-profile dual-flow nozzles are compared at equal values of ideal thrust over a wide range of flow conditions. The comparisons are made in terms of constant velocity and temperature contour maps. The results show that both dual-flow nozzle types have much greater plume velocity and temperature decay rates than those of equivalent thrust single-stream nozzles when the respective secondary flows were at ambient temperature. With hot secondary flows, the inverted-profile dual-flow plumes decayed significantly faster than those of single-stream nozzles; however, the decay rates for the conventional dual-flow streams were about the same as those for the single-stream nozzles. Consequently, with hot secondary flows, the inverted-profile dual-flow plumes decayed much faster than the conventional dual-flow plumes at equal thrust. Author

N86-26286*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL RESULTS FOR A FLAPPED NATURAL-LAMINAR-FLOW AIRFOIL WITH HIGH LIFT/DRAG RATIO
Robert J. McGhee, Jeffrey K. Viken (Mandex, Inc., Falls Church, Va.), Werner Pfenninger (Engineering Science Consultants, Grafton, Va.), William D. Beasley, and William D. Harvey May 1984 325 p Previously announced in IAA
(NASA-TM-85788; NAS 1.15:85788) Avail: NTIS HC A14/MF A01 CSCL 01A

Experimental results have been obtained for a flapped natural-laminar-flow airfoil, NLF(1)-0414F, in the Langley Low-Turbulence Pressure Tunnel. The tests were conducted over a Mach number range from 0.05 to 0.40 and a chord Reynolds number range from about 3.0 x 10(6) to 22.0 x 10(6). The airfoil was designed for 0.70 chord laminar flow on both surfaces at a lift coefficient of 0.40, a Reynolds number of 10.0 x 10(6), and a Mach number of 0.40. A 0.125 chord simple flap was incorporated in the design to increase the low-drag, lift-coefficient range. Results were also obtained for a 0.20 chord split-flap deflected 60 deg. Author

N86-26287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNIFORMLY HIGH ORDER ACCURATE ESSENTIALLY NON-OSCILLATORY SCHEMES 3
Ami Harten (California Univ., Los Angeles), Bjorn Engquist, Stanley Osher, and Sukumar R. Chakravarthy (Rockwell International Corp., Thousand Oaks, Calif.) Apr. 1986 98 p refs
(Contracts NAS1-17070; NAS1-18107; Grants NAG1-270; NSF DMS-85-03294; DAAG29-85-K-0190)
(NASA-CR-178101; ICASE-86-22; NAS 1.26:178101) Avail: NTIS HC A05/MF A01 CSCL 01A

In this paper (a third in a series) the construction and the analysis of essentially non-oscillatory shock capturing methods for the approximation of hyperbolic conservation laws are presented. Also presented is a hierarchy of high order accurate schemes which generalizes Godunov's scheme and its second order accurate MUSCL extension to arbitrary order of accuracy. The design involves an essentially non-oscillatory piecewise polynomial reconstruction of the solution from its cell averages, time evolution through an approximate solution of the resulting initial value

problem, and averaging of this approximate solution over each cell. The reconstruction algorithm is derived from a new interpolation technique that when applied to piecewise smooth data gives high-order accuracy whenever the function is smooth but avoids a Gibbs phenomenon at discontinuities. Unlike standard finite difference methods this procedure uses an adaptive stencil of grid points and consequently the resulting schemes are highly nonlinear. Author

N86-26288*# United Technologies Research Center, East Hartford, Conn.
ANALYSIS OF TRANSITIONAL SEPARATION BUBBLES ON INFINITE SWEPT WINGS
R. L. Davis and J. E. Carter Washington Jun. 1986 39 p refs
(Contract NAS1-16585)
(NASA-CR-3956; NAS 1.26:3956) Avail: NTIS HC A03/MF A01 CSCL 01A

A previously developed two-dimensional local inviscid-viscous interaction technique for the analysis of airfoil transitional separation bubbles, ALESEP (Airfoil Leading Edge Separation), has been extended for the calculation of transitional separation bubbles over infinite swept wings. As part of this effort, Roberts' empirical correlation, which is interpreted as a separated flow empirical extension of Mack's stability theory for attached flows, has been incorporated into the ALESEP procedure for the prediction of the transition location within the separation bubble. In addition, the viscous procedure used in the ALESEP techniques has been modified to allow for wall suction. A series of two-dimensional calculations is presented as a verification of the prediction capability of the interaction techniques with the Roberts' transition model. Numerical tests have shown that this two-dimensional natural transition correlation may also be applied to transitional separation bubbles over infinite swept wings. Results of the interaction procedure are compared with Horton's detailed experimental data for separated flow over a swept plate which demonstrates the accuracy of the present technique. Wall suction has been applied to a similar interaction calculation to demonstrate its effect on the separation bubble. The principal conclusion of this paper is that the prediction of transitional separation bubbles over two-dimensional or infinite swept geometries is now possible using the present interacting boundary layer approach. Author

N86-26289*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TABLES FOR CORRECTING AIRFOIL DATA OBTAINED IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL FOR SIDEWALL BOUNDARY-LAYER EFFECTS
Renaldo V. Jenkins and Jerry B. Adcock Jun. 1986 21 p refs
(NASA-TM-87723; NAS 1.15:87723) Avail: NTIS HC A02/MF A01 CSCL 01A

Tables for correcting airfoil data taken in the Langley 0.3-meter Transonic Cryogenic Tunnel for the presence of sidewall boundary layer are presented. The corrected Mach number and the correction factor are minutely altered by a 20 percent change in the boundary layer virtual origin distance. The sidewall boundary layer displacement thicknesses measured for perforated sidewall inserts and without boundary layer removal agree with the values calculated for solid sidewalls. Author

N86-26290# Air Force Geophysics Lab., Hanscom AFB, Mass.
FACTORS AFFECTING THE VERTICAL MOTION OF A ZERO-PRESSURE, POLYETHYLENE, FREE BALLOON Environmental Research Papers, 31 Dec. 1983 - 31 Dec. 1984
James F. Dwyer 31 May 1985 108 p refs
(AD-A164596; AFGL-TR-85-0130; AFGL-ERP-921) Avail: NTIS HC A06/MF A01 CSCL 20/4

This paper discusses existing aerodynamic-thermodynamic models for predicting the vertical motion of free balloon systems. It demonstrates that: (1) the aerodynamic drag coefficient model should be based on Froude number and fractional volume as well as Reynolds number; (2) there has been a widespread error in definition of the instantaneous mass of the balloon film involved in the heat transfer process; (3) the gas bubble cannot be modelled as a sphere; (4) the gas bubble is asymmetrical except when near or at its natural ceiling altitude; and (5) the actual gas bubble shape, and most probably the added mass, is directly related to the type of gore pattern. Finally, a procedure is proposed for the analysis of actual flight data to enable the development of a practical, but also theoretically sound, model of the aerodynamic drag coefficient of a zero-pressure, free balloon- and subsequent refinement of the heat transfer models for direct and reflected solar energy. GRA

N86-26291# Woodrow Wilson International Center for Scholars, Washington, D.C. Asia Program.
THE EFFECTS ON ROTOR NONUNIFORM INFLOW HARMONIC CONTENT OF UNEVEN CIRCUMFERENTIAL DISTRIBUTION OF JET ENGINE INLET GUIDE VANES
Margaret R. Hinsman Jan. 1986 39 p refs
(Contract N00024-85-C-6041)
(AD-A164629) Avail: NTIS HC A03/MF A01 CSCL 20/4

A computative parametric study was conducted to investigate the effects of vane section geometry, vane number, and primarily, uneven circumferential vane spacing on the harmonic content of the wake field produced by a row of jet engine inlet guide vanes (IGV). As parameters were varied, the harmonic content of the resulting wake field was analyzed for its potential effect on unsteady pressures at the rotor. A semi-empirical model is presented which was used to generate the two-dimensional flow field downstream of the IGV plane. Results show that uneven angular spacing of IGV should not be employed for reducing unsteady pressures experienced by the rotor. In fact, manufacturing tolerances, relative to IGV angular location, of evenly spaced vanes should be minimized to minimize unsteady pressures. GRA

N86-26292# United Technologies Research Center, East Hartford, Conn.
VISCID/INVISCID INTERACTION ANALYSIS OF SUBSONIC TURBULENT TRAILING-EDGE FLOWS Final Report, Sep. 1983 - Jul. 1985
Mark Barnett and Joseph M. Verdon Dec. 1985 56 p
(AD-A165207; UTRC/R85-956634-6) Avail: NTIS HC A04/MF A01 CSCL 20/4

Subsonic turbulent flow past thin airfoil trailing edges is studied using a finite Reynolds number viscid/inviscid interaction model. Here, the flow in the outer or inviscid region is governed by the equations of linearized potential flow theory, while that in the inner or viscous region is governed by Prandtl's boundary-layer equations cast in terms of Levy Lees variables. The effects of turbulence are represented using an algebraic turbulence model based on the eddy viscosity concept. The flow in the vicinity of the local strong interaction is determined by iteratively matching the solutions in the inviscid and viscous regions using a quasi-simultaneous coupling procedure. Turbulent mean flow solutions have been obtained for a range of symmetric and asymmetric wedge shaped trailing edge geometries. Results illustrating the effects of airfoil thickness and loading on the detailed mean-flow behavior in the trailing edge/near wake region are presented. GRA

N86-26293# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
LAMINAR AND TURBULENT BOUNDARY-LAYER CALCULATIONS ON THE LEEWARD SURFACE OF A SLENDER DELTA WING AT INCIDENCE
A. C. deBruin 13 Apr. 1984 20 p Submitted for publication
(NLR-MP-84040-U; B8577053; ESA-86-96969) Avail: NTIS HC A02/MF A01

The boundary layer on the leeward surface of a slender delta wing at incidence was calculated for fully laminar flow and the case with artificial boundary layer tripping at the 50% semispan location. The behavior of the predicted boundary layer properties is qualitatively in good agreement with experimental observations. The rather large difference between the potential flow and experimental pressure distribution causes a discrepancy between the predicted and the experimentally observed location of secondary separation. It is expected that the potential flow pressure

distribution can be improved when the leading-edge and the secondary separation vortex sheet are correctly modeled in the potential flow calculation method. ESA

N86-26294# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
ANALYSIS OF HIGH REYNOLDS NUMBER WIND TUNNEL TESTS OF THE SEMISPAR
E. Willemsen, C. Leynse, and G. Graaf (Shell Internationale Petroleum Maatschappij B.B., Netherlands) 5 Feb. 1985 14 p Presented at the 17th Offshore Technology Conference, Houston, Tex., 6-9 May 1985
(NLR-MP-85014-U; B8577054; ESA-86-96976) Avail: NTIS HC A02/MF A01

Aerodynamic load measurements were performed on a 1:50 scale model of the semispar offshore platform concept to predict the loads exercised by the current on the full-scale structure. The test program comprised measurements with the model in even-keel and tilted conditions, in which the effects of ballast leg lengths were also investigated. All tests were carried out in uniform flow conditions, with test results corrected for wind-tunnel wall constraints. The effect of surface roughness on the measurements was investigated at various Reynolds numbers. Results obtained by applying drag calculation rules for rough, three-dimensional, circular cylinders and platform design rules concerning shielding are in good agreement with test results. Vertical forces exercise a large influence on overturning moments, in even keel and in tilted model conditions. ESA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-26295# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
A DEMONSTRATION EXPERT SYSTEM FOR IMPLEMENTING EMERGENCY PROCEDURES IN A HIGH-PERFORMANCE FIGHTER AIRCRAFT
Brenda L. Belkin Apr. 1986 14 p refs
(MAE-1749) Avail: NTIS HC A02/MF A01

A demonstration expert system was developed using a knowledge acquisition tool to simulate the operation of an electronic pilot's assistant operating on-board a high-performance fighter aircraft. The task selected for this simulation was the implementation of in-flight emergency procedures for the canopy loss scenario described in the F-16 Flight Manual. Four modes of pilot assistance operation were identified. Two modes require the Electronic Pilot's Assistant to help the pilot with routine flight tasks. The other two modes require the Electronic Pilot's Assistant to autonomously plan and execute procedures to maintain control of the aircraft in the event the pilot is incapacitated or subject to unmanageable workload. Author

N86-26296*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LIGHTNING DISCHARGE PROTECTION ROD Patent Application
Charles F. Bryan, Jr., inventor (to NASA) Filed 24 Apr. 1986 14 p Sponsored by NASA
(NASA-Case-LAR-13470-1; NAS 1.71:LAR-13470-1; US-Patent-Appl-SN-855983) Avail: NTIS HC A02/MF A01 CSCL 01C

This invention is a system for protecting an in-air vehicle from damage due to the craft sustaining a lightning strike. It is an extremely simple device consisting of a sacrificial graphite composite rod, approximately the diameter of a pencil with a length of about five inches. The sacrificial rod is constructed with the graphite fibers running axially within the rod in a manner that best provides a path of conduction axially from the trailing edge of an aircraft to the trailing end of the rod. The sacrificial rod is inserted into an attachment hole 32 machined into trailing edges of aircraft flight surfaces, such as vertical fin cap 31, and attached with adhesive in a manner not prohibiting the conduction path between the rod and aircraft. The trailing end of rod may be tapered for aerodynamic and esthetic requirements. This rod is sacrificial but has the capability to sustain several lightning strikes and still provide protection. The novelty of this invention appears to reside in a system for protecting the most vulnerable parts of an in-air vehicle when the craft is hit by lightning with an extremely simple and inexpensive device. The materials are easily procured and the sacrificial rod generally can be constructed from the same composite as the flight or control surface to be protected. The protection extends to several in-air lightning strikes and provides protection to aircraft parts manufactured from all materials including organic composites. NASA

N86-26297# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
DEVELOPMENT AND EVALUATION OF A PROTOTYPE LIFE PRESERVER
B. J. Rueschoff, E. A. Higgins, M. J. Burr, and D. M. Branson Sep. 1985 66 p
(AD-A163224; FAA-AM-85-11) Avail: NTIS HC A04/MF A01 CSCL 06/7

The purpose of this study was to develop a prototype life preserver that included provisions for: (1) increased thermal protection in the event of accidental immersion in cold water, (2) 35 pounds of buoyancy, (3) a donning time of 15 s for an adult, (4) not weighing more nor requiring more storage space than currently used life preservers, (5) fitting individuals from the 5th percentile of adult females to the 95th percentile of adult males in the U.S. adult population, and (6) self-righting the wearer in 5 s. Evaluations were made to ensure that the prototype life preserver met goals of items 2 through 6. However, the focus of the study was the assessment of thermal response characteristics. To assess the thermal response of subjects wearing the prototype life preserver and a currently used standard personal flotation device a laboratory study with 10 subjects was conducted. Two subjects, one wearing the prototype and the other a standard vest, were immersed during each experiment in 12.8 C (55 F) water in the Civil Aeromedical Institute survival tank for 2 hours. Rectal temperature, heart rate, and EKG were measured continuously. Eight of ten subjects, while wearing the prototype life preserver, showed a decrease in the rate of cooling when compared to the cooling rate when wearing the standard vest. GRA

N86-26298# Simula, Inc., Phoenix, Ariz.
CRASH-RESISTANT CREWSEAT LIMIT-LOAD OPTIMIZATION THROUGH DYNAMIC TESTING WITH CADAVERS Final Report, May 1979 - Dec. 1985
J. W. Coltman, C. Van Ingen, and F. Selker Jan. 1986 112 p
(Contract DAAK51-79-C-0016; DA Proj. 1L1-62209-AH-76)
(AD-A164828; TR-85422; USAAVSCOM-TR-85-D-11) Avail: NTIS HC A06/MF A01 CSCL 01/2

The threshold of spinal injury for seated humans subjected to +Gz loading was investigated. The +Gz loading was induced by simulating crash conditions typically found in helicopter crashes, and modified by the use of energy-absorbing mechanisms incorporated in the seat structure. Fifteen tests were conducted with unembalmed cadavers as human surrogates at various limit-load settings to attempt to identify the load threshold causing spinal injury. Bone strength analysis was used to normalize the results of the cadaver test program. Performance data and autopsy results for the 15 crash tests are presented. A correlation was derived relating the frequency of spinal injury to the energy absorber limit-load factor for use in design of crashworthy seating systems. Comparison of the incidence of spinal injury between the experimental test data developed through testing with cadavers and field performance of production energy-absorbing seats is discussed. The report also contains a discussion of the biomechanics

of trauma associated with the human spine, including mechanical properties of the spine, typical injury mechanisms for +Gz loading, and theoretical models for predicting injury. GRA

N86-26299# Coordinating Research Council, Inc., Atlanta, Ga.
FLAMMABILITY OF AIRCRAFT HYDRAULIC FLUIDS: A BIBLIOGRAPHY
Jan. 1986 46 p refs
(Contract DAAK70-86-C-0011)
(AD-A165463; CRC-546) Avail: NTIS HC A03/MF A01 CSCL 11/8

As part of an overall effort to collect flammability data on aircraft fluids, a critical survey was made of the aircraft hydraulic oil literature, with particular emphasis on flammability testing and flammability characteristics of existing and projected aircraft hydraulic fluids. Commercial aviation and military aviation fluids are treated separately, in view of their divergent development. Flammability test procedures are described. Flammability test results and other inspection tests are given for a variety of current and proposed aircraft hydraulic fluids. GRA

N86-26300# Midwest Research Inst., Kansas City, Mo.
EVALUATION OF CHARGED FOG FOR SMOKE CLEARING SHIPBOARD FIRES Final Report, Jul. 1984 - Jul. 1985
John Kinsey and Frank J. Pendleton 12 Jul. 1985 49 p
(Contract N00014-84-C-2189)
(AD-A165551; MRI-8140-L) Avail: NTIS HC A03/MF A01 CSCL 13/12

Accidental fires occurring on-board Navy surface vessels create massive quantities of dense black smoke. To increase visibility and improve firefighting capabilities, appropriate technology is needed for clearing smoke from corridors and passageways. In response to this need, midwest Research Institute has conducted research to evaluate the use of charged water droplets (fog) for clearing smoke from a test chamber under controlled laboratory conditions. As part of this effort, a new type of charged droplet generator (electrostatic fogger) has been developed which is both novel in its approach and unique in design. The results of the study indicate that smoke can be visually cleared from the test chamber within 15 to 60 sec after application of the charged fog, with similar trends observed for particle number concentration. Also, the electrostatic fogger development in the study is superior in many respects to other devices of a similar capacity and, therefore, represents an advancement in charged fog technology. GRA

N86-26301# National Transportation Safety Board, Washington, D. C. Bureau of Safety Programs.
TRANSPORTATION SAFETY RECOMMENDATIONS ADOPTED DURING THE MONTH OF DECEMBER 1985
1986 95 p
(PB85-916612; NTSB-REC-85-12) Avail: NTIS MF A01; also available on subscription, North American Continent price HC $65.00/year; all others write for quote CSCL 01B

The publication contains safety recommendations in aviation, highway and marine modes of transportation adopted by the National Transportation Safety Board during the month of December, 1985. GRA

N86-26302# National Transportation Safety Board, Washington, D. C. Bureau of Technology.
SAFETY REPORT GENERAL AVIATION CRASHWORTHINESS PROJECT. PHASE 3: ACCELERATION LOADS AND VELOCITY CHANGES OF SURVIVABLE GENERAL AVIATION ACCIDENTS Report, 1972 - 1981
4 Sep. 1985 187 p
(PB85-917016; NTSB-SR-85-02) Avail: NTIS MF A01; also available on subscription, North American Continent price HC $60.00/year; all others write for quote CSCL 01C

The report is the last in a series of three reports issued by the National Transportation Safety Board as a result of its General Aviation Crashworthiness Program. The purpose of the program is to provide information to support changes in crashworthiness design standards for seating and restraint systems in general aviation airplanes. A Phase One report presents a methodology for documenting impact severity. A Phase Two report presents specific data on survivable accidents which demonstrate that if all occupants wear shoulder harnesses, fatalities are expected to be reduced by 20 percent. Eighty-eight percent of the seriously injured persons in survivable crashes are expected to experience significantly fewer life-threatening injuries. The Phase Three report provides analytical results of actual crashes. The values of acceleration loads and velocity changes that occupants can sustain in survivable, modern aviation airplane accidents are defined. GRA

N86-26303# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 3 OF 1984 ACCIDENTS
18 Oct. 1985 421 p
(PB85-916922) Avail: NTIS HC A18/MF A01; paper copy also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

Selected aircraft accident reports in brief format occurring in the U.S. civil and foreign aviation operations during calender year 1984 are presented. Approximately 200 general aviation and air carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The brief format represent the facts, conditions, circumstances, and probable causes for each accident GRA

N86-26304# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 4 OF 1984 ACCIDENTS
14 Nov. 1985 416 p
(PB85-916923; NTSB-AAB-85-23) Avail: NTIS HC A18/MF A01; paper copy also available on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

This fourth issue contains selected aircraft accident reports in brief format occurring in U.S. civil and foreign aviation operations during calender year 1984. Approximately 200 general aviation and air carrier accidents contained in the publication are selected at random. The publication is issued approximately eighteen times each year at irregular intervals. The brief format contains the facts, conditions, circumstances, and probable cause(s) for each accident. GRA

N86-26305# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 5 OF 1984 ACCIDENTS
24 Jan. 1986 418 p
(PB86-916901; NTSB-AAB-86-01) Avail: NTIS HC A03/MF A01; paper copy also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable causes(s) for each accident. Issue 5 includes file numbers 801 through 1000. GRA

N86-26306# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 6 OF 1984 ACCIDENTS
24 Jan. 1986 418 p
(PB86-916902; NTSB-AAB-86-02) Avail: NTIS HC A18/MF A01;

paper copy also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 6 includes file numbers 1001 through 1200. GRA

N86-26307# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 7 OF 1984 ACCIDENTS
22 Nov. 1985 421 p
(PB86-916903; NTSB-AAB-86-03) Avail: NTIS HC A18/MF A01; paper copy also avail. on subscription, North America Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 7 includes file numbers 1201 through 1400. GRA

N86-26308# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 8 OF 1984 ACCIDENTS
22 Nov. 1985 421 p
(PB86-916904; NTSB-AAB-86-04) Avail: NTIS HC A18/MF A01; paper copy also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 8 includes file numbers 1401 through 1600. GRA

N86-26309# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 9 OF 1984 ACCIDENTS
29 Nov. 1985 400 p
(PB86-916905; NTSB-AAB-86-05) Avail: NTIS HC A17/MF A01; paper copy also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in brief format occurring in U.S. civil and foreign aviation operations during calendar year 1984. Approximately 200 general aviation and air carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The brief format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 9 includes file numbers 1601 through 1800. GRA

N86-26310# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 11 OF 1984 ACCIDENTS
16 Dec. 1985 418 p
(PB86-916907; NTSB-AAB-86-07) Avail: NTIS HC A18/MF A01; also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times a year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 11 includes file numbers 2001 through 2200. GRA

N86-26311# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS, BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION ISSUE NUMBER 13 OF 1984 ACCIDENTS
30 Dec. 1985 412 p
(PB86-916909; NTSB-AAB-86-09) Avail: NTIS HC A18/MF A01; also avail. on subscription, North American Continent price $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. Issue 13 includes file numbers 2401 through 2600. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-26312*# Princeton Univ., N. J. Dept. of Civil Engineering.
INTEGRATED RISK/COST PLANNING MODELS FOR THE US AIR TRAFFIC SYSTEM
John M. Mulvey and Stavros A. Zenios Dec. 1985 41 p refs
(Grants NAG1-520; NSF DCR-84-01098)
(NASA-CR-177274; NAS 1.26:177274; EES-85-9) Avail: NTIS HC A03/MF A01 CSCL 17G

A prototype network planning model for the U.S. Air Traffic control system is described. The model encompasses the dual objectives of managing collision risks and transportation costs where traffic flows can be related to these objectives. The underlying structure is a network graph with nonseparable convex costs; the model is solved efficiently by capitalizing on its intrinsic characteristics. Two specialized algorithms for solving the resulting problems are described: (1) truncated Newton, and (2) simplicial decomposition. The feasibility of the approach is demonstrated using data collected from a control center in the Midwest. Computational results with different computer systems are presented, including a vector supercomputer (CRAY-XMP). The risk/cost model has two primary uses: (1) as a strategic planning tool using aggregate flight information, and (2) as an integrated operational system for forecasting congestion and monitoring (controlling) flow throughout the U.S. In the latter case, access to a supercomputer is required due to the model's enormous size.
Author

N86-26313# Pacific Missile Test Center, Point Mugu, Calif.
NAVSTAR GPS (GLOBAL POSITIONING SYSTEM) ACCURACY WHILE SURVEYING ARRAYS OF DEEP OCEAN TRANSPONDERS
Larry A. Anderson Dec. 1985 21 p
(AD-A163364; PMTC-TP-000037) Avail: NTIS HC A02/MF A01 CSCL 17/7

The observed accuracy of the Navstar GPS Global Positioning System when used with acoustic data to geodetically locate arrays of bottom-mounted ocean transponders is presented. Two arrays were to be located, and each was surveyed on several separate occasions. In addition to GPS with dual frequency precise P-code, the arrays were located by using Argo, Syledis, Transit satellites, and by several other tracking methods. Because the array positions have been well determined, the data is now able to reveal the absolute GPS fix error while at sea. For one survey, ground truth information from the Yuma GPS facility, 263 nautical miles (487 km) away, was used to reduce measurement bias.
GRA

N86-26314# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
NAVIGATION EQUIPMENT, DOPPLER Final Report
1 Aug. 1985 31 p Supersedes MTP-6-2-206
(AD-A163408; TOP-6-2-206; MTP-6-2-206) Avail: NTIS
HC A03/MF A01 CSCL 17/7

This Test Operations Procedure describes test methods and techniques for evaluating Doppler Navigation Equipment and Systems and their Suitability for employment in the intended tactical environment. GRA

N86-26315# Federal Aviation Agency, Atlantic City, N.J.
MATH MODEL STUDY OF A PROPOSED GLIDE SLOPE FOR RUNWAY 13R, DALLAS-FORT WORTH AIRPORT, TEXAS
John Walls Jan. 1986 19 p refs
(AD-A164907; DOT/FAA/CT-TN85/80) Avail: NTIS
HC A02/MF A01 CSCL 01/5

This document describes instrument landing system (ILS) math modeling performed at the request of the Southwest Region. Data are presented showing the computed performance of a proposed glide slope for runway 13R at the Dallas-Fort Worth Airport, Texas. Model path structure and level run plots are provided for capture effect, null reference, and sideband reference systems installed at a location selected by region engineers. Results indicate that all three systems should meet category II path structure, linearity, and symmetry tolerances. The capture effect system provides the smoothest glidepath structure of the three systems modeled. Author (GRA)

N86-26316# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Guidance and Control Panel.
GUIDANCE-CONTROL-NAVIGATION AUTOMATION FOR NIGHT ALL-WEATHER TACTICAL OPERATIONS
Loughton, England Oct. 1985 136 p refs In ENGLISH and FRENCH The 40th Guidance and Control Panel Symposium was held at The Hague, Netherlands, 21-24 May 1985
(AGARD-CP-387; ISBN-92-835-0381-3) Avail: NTIS
HC A07/MF A01

The components, functions, and systems integration required to support the evolution of alternative guidance/control/navigation systems capable of enabling effective and routine night all-weather operations are discussed. Papers are organized under the following headings: operational requirements, systems concepts and integration issues, man-machine interface, terrain reference systems, and mission applications. For individual titles, see N86-26317 through N86-26327.

N86-26317# Marconi Avionics Ltd., Rochester (England).
A COST-EFFECTIVE NIGHT ATTACK SYSTEM FOR GROUND ATTACK AIRCRAFT
J. F. Fisher and G. R. Sleight *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 8 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

Current ground attack fighters have a good day visual flight rule (VFR) capability. However, they are generally ineffective at night. GEC Avionics have developed a simple integrated night vision system which allows a pilot to operate effectively at high speed and low level. The system uses a fixed forward-looking FLIR sensor to display imagery to the pilot on a raster head-up display. This allows him to terrain-follow and acquire targets. He then uses a touch-sensitive head down display to designate targets to his weapon system for subsequent attack. The pilot is also equipped with night vision goggles to permit hard maneuvering, and with a digital map to enable him to navigate flexibly. By designing the entire system as an integrated whole, cockpit workload is minimized. A series of flight trials has clearly proved the concept. The US Marine Corps AV-8B and RAF Harrier GR5 will soon be equipped with just such a system. Author

N86-26318# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
COCKPIT AUTOMATION REQUIREMENTS DERIVED FROM MISSION FUNCTIONS DATA c54
Bernadette Faulkner, R. Seifert, and K. D. Richter *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 7 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

Program activities directed towards the development of a system engineering concept for the design of the man-machine interface are summarized. The problem was approached from an operational and human task point of view. The first phase included the development of: (1) a mission task list for selected mission and weapon systems; (2) a method for rating the relative importance of each of the tasks related (a) to the frequency of occurrence, (b) to mission effectiveness, and (c) to flight safety; (3) criteria and/or categories for automation at the man-machine interface, against which the individual mission tasks could be rated; and (4) a method for rating the mission tasks in relation to the automation categories derived. Author

N86-26319# Ferranti Defence Systems Ltd., Edinburgh (Scotland).
AUTOMATION AND PILOT INTERACTIONS IN NIGHT OR ALL-WEATHER TACTICAL OPERATIONS c54
W. H. McKinlay *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 10 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

Some of the areas in which automation could be used to reduce pilot workload when operating at night or in low visibility are examined. It is shown that in navigation the pilot's task extends from the planning stage before take off to the point at which tactical decisions are taken in the air. The role of the mission planning system and the features of a system developed for this purpose are covered. The nature of the man-machine interface including its required features and the impact of the latter on the core avionic system including navigation and the MMI are addressed. Author

N86-26320# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Human Engineering Div.
SOME QUANTITATIVE METHODOLOGY FOR COCKPIT DESIGN c06
Charles Bates, Jr. and Maris M. Vikmania *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 10 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

The rapidly developing technology in sensor systems, microprocessors, artificial intelligence and communication systems has blurred the traditional lines between avionics subsystems and offers new design options for integrating the aircrew into the weapon system. These developments, together with the stressful flight regimes imposed by advanced threat systems and the night-in-weather environment required for survival in air-to-ground attack/interdiction, require new approaches to crew station design. These new design opportunities are limited only by the design tools and data bases available for their execution. A simplified cockpit design process can be summarized as conceptual design, detailed design, and design verification. With the many tools needed to pursue this process the subset involving man/machine interface must

provide a decision track quantifying and predicting the impact of design decisions on crew performance. To meet the objective of the full utilization of the weapon system crew, each technology option under consideration for incorporation in the cockpit must be judged with consideration of both mission and human performance. The cockpit design process must be embedded in an adequate human performance data base tailored for use by design personnel and must take full advantage of operational experience. The development of a family of cockpit design tools, together with the required data bases, has been one of the objectives of the Air Force Aerospace Medical Research Laboratory research program. From this program a select set of methods will be described and examples provided. Author

N86-26321# Thomson-CSF, Issy les Moulineaux (France).
SYNTHETIC REAL-TIME RELIEF DISPLAY ALL-WEATHER AIRBORNE MISSIONS **c06**
J. N. Botella *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 4 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

Within the context of all-weather airborne missions, it is necessary to provide the pilot with information on the external world, even, and particularly when information provided by radar or optronic sensors are failing. The development of altimetric digital data banks prompts investigations to examine the display of synthetic relief in a cockpit. The study of various mass storages shows that a color film has remarkable storage capacities. Altimetric data are stored on a film read by the MERCATOR reader (whose initial function is to read map images). Three-dimensional synthesis algorithms are used and they are provided with the exceptional possibilities enabled by the MERCATOR analysis. The philosophy of this study is to show how a unique product, the map reader MERCATOR, designed to display plane images, is used to perform tridimensional displays of relief. Author

N86-26322# Farrand Optical Co., Inc., Valhalla, N.Y.
THE WIDE FIELD HELMET MOUNTED DISPLAY **c06**
Joseph LaRussa *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 7 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

The wide field helmet mounted display developed by the Farrand Optical Company, Inc. is described. This display provides the pilot with an instantaneous field of view of 60 deg vertically and 135 deg horizontally. The central field of view consists of an overlap field of 25 deg within which full stereopsis is available. It would appear that a new design which the Farrand Optical Company, Inc. is now in the process of designing for Aerospace Medical Research Laboratory (AMRK) would be applicable for night all weather operations where such data as flight path control, computed weapon projectories, synthetic outside world views, expected and unexpected threats and automatic terrain following paths would be displayed. The parameters that must be considered in designing a wide field helmet mounted display are discussed. Briefly, these parameters are size, weight and balance on the head, brightness of the display and see-through ability of the display. The discussion assumes the use of a one inch, high brightness, high resolution CRT input already developed and operational. Author

N86-26323# Marconi Avionics Ltd., Rochester (England). Aircraft and Missile Systems.
A SOLID-STATE MAP DISPLAY FOR RAPID RESPONSE OPERATION **c06**
D. J. Powell and T. E. Crayford *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 13 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

A means to provide pilots with a presentation of a moving color map display on a standard color CRT is described. It uses solid-state techniques and derives the display from a digital database. The design criteria used in the development of the system are discussed and an overview of the system operation is presented. Finally, one of the many ways in which the system as a whole may be used in operation is addressed. Author

N86-26324# Harris Government Aerospace Systems Div., Melbourne, Fla. Digital Cartographic Programs.
APPLICATIONS OF DIGITAL TERRAIN DATA IN FLIGHT OPERATIONS
G. W. Cantrell *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 24 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

With the availability of a world-wide digital terrain data base becoming a reality, it is now possible to carry and display on a tactical aircraft all of the map information needed for a mission. Along with the map display on a color cathode-ray tube (CRT), current targets and mission-specific data can be shown. The limitations of today's commonly used film readers are eliminated by using a digital data base which contains elevation information; one such data base is the U.S. Defense Mapping Agency's Digital Land Mass System (DLMS). The terrain data can be digitally compressed and efficiently stored so that large area coverages may be achieved. With this information readily available, aircraft mission effectiveness and survivability can be enhanced. The system for accomplishing this task is called a digital map generator (DMG). The DMG architecture encompasses data storage, data access and reconstruction, data display processing, and data formatting for use by other aircraft subsystems. A DMG architecture was developed for application in low-level or nap-of-the-Earth tactical missions, as well as long range strategic missions. Mission capabilities are enhanced by using this DMG to support terrain following/terrain avoidance (TF/TA), autonomous navigation, threat avoidance, and weapons delivery. In addition, the same digital processing approach is usable for pre-flight mission planning. The ability to plan a flight using the actual mission data base gives the pilot the ability to see exactly where he will be at all times and to determine safe corridors for entry and departure, making maximum use of terrain shielding. Similarly, the terrain data may be used for reference during post-mission debriefing, in which the pilot can refer to in-flight annotations made through the DMG subsystem. Author

N86-26325# Theory and Applications Unlimited Corp., Los Gatos, Calif.
A NEW TECHNIQUE FOR TERRAIN FOLLOWING/TERRAIN AVOIDANCE GUIDANCE COMMAND GENERATION
Richard V. Denton, J. Edwin Jones, and Peter L. Froeberg *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 11 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

A real-time optimization technique that efficiently generates a robust, optimum terrain following/terrain avoidance (TF/TA) trajectory, and has the structural capability for adding threat avoidance is described. The TF/TA technique presented is based on definition of a performance measure that is systematically optimized in real-time. The approach uses on-board Defense Mapping Agency digital terrain elevation data extensively, as updated by real-time sensor inputs. The optimization of the performance measure embodies the real-time trade-off of flying over (TF) versus flying around terrain features (TA). The performance measure is defined to generally penalize large excursions from the nominal (globally-defined) route, while rewarding a trajectory that achieves better terrain masking than contained in the nominal, mission-planned route. Direct incorporation of limits on the flight control variables (bank angle, roll rate, normal acceleration, etc.) is included within the procedure. The TF/TA technique also addresses additional considerations that apply when combining the TF/TA flight trajectory computation with maneuvers through mission waypoints. This involves several subtleties associated with the relative importance of the turning maneuver desired versus the normally applicable TF/TA performance measure. Finally, the relevance of this work to other advances in

trajectory computation is described. This includes the relationship to global trajectory generation, and to integrated TF/TA with threat avoidance TF/(TA)2. Author

N86-26326# Societe Francaise d'Instruments de Mesure, Velizy-Villacoublay (France). Secteur Capteur Optronique.
USE OF A CO2 LASER LIDAR FOR FLIGHT AND PENETRATION AT VERY LOW ALTITUDES [UTILISATION D'UN LIDAR A LASER CO2 POUR LE VOL ET LA PENETRATION A TRES BASSE ALTITUDE] c36
Bernard Stephan *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 8 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

A CO2 laser optical sensor system which allows the acquisition of accurate land distances for a large area is described. These values are obtained in a real-time mode with the use of a UMP 7800 computer, and allow the generation of a map of the terrain to determine geographic coordinates. This map makes it possible to determine the optimal navigation trajectory at very low altitudes, with optimization based on the terrain features. This sensor was tested at Villacoublay in 1984 and is currently under testing at C.E.V. The results of the experiments and the static and dynamic analysis tests are presented. Transl. by T.R.

N86-26327# Crouzet Aerospace and Systems, Valence (France). Div. Aerospatiale.
A MISSION NAVIGATION AND CONTROL SYSTEM FOR MODERN MILITARY HELICOPTERS [UN SYSTEME DE NAVIGATION ET DE GESTION DE LA MISSION POUR LES HELICOPTERS MILITAIRES MODERNES]
J. L. Roch *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 10 p In FRENCH (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

The requirements of modern military helicopters have fostered the development of navigation systems which use position sensors as a part of a centralized mission control system. An overview of the requirements for modern operational helicopter systems is given, as well as current automatic navigation systems; this is followed by a report of the NADIR MK2 mission navigation and control system developed by the CROUZET Company. Transl. by T.R.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-26328*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
X-29A TECHNOLOGY DEMONSTRATOR FLIGHT TEST PROGRAM OVERVIEW
Walter J. Sefic and Cleo M. Maxwell May 1986 17 p refs Presented at the ISA Aerospace Industries/Test Measurement Symposium, Seattle, Wash., 5-8 May 1986
(NASA-TM-86809; H-1347; NAS 1.15:86809; ISA-504) Avail: NTIS HC A02/MF A01 CSCL 01C

An overview of the X-29A functional flight program and concept evaluation program is presented, including some of the unique and different preparations for the first flight. Included are a discussion of the many organizational responsibilities and a description of the program management structure for the test team. Also discussed are preflight ground, flight functional envelope expansion, and flight research test objectives and qualitive results to date for both a limited-envelope flight control system and an expanded-envelope system. The aircraft, including the instrumentation system and measurements, is described. In addition, a discussion is included regarding the use of major support facilities, such as ground and flight simulators, the NASA Western Aeronautical Test Range and mission control center, and the Grumman automated telemetry station. An overview of the associated real-time and postflight batch data processing software approaches is presented. The use of hardware-in-the-loop simulation for independent verification and validation and mission planning and practice is discussed. Also included is a description of the flight-readiness review, the airworthiness and flight safety review, work scheduling, technical briefings, and preflight and postflight crew briefings. The configuration control process used on the X-29A program is described, and its relationship to both simulation and aircraft operations is discussed. An X-29A schedule overview is presented with an outline of a proposed follow-on program. Author

N86-26329# Federal Aviation Administration, Washington, D.C.
FLIGHT TEST GUIDE FOR CERTIFICATION OF TRANSPORT CATEGORY AIRPLANES
9 Apr. 1986 96 p
(FAA-AC-25-7) Avail: NTIS HC A05/MF A01

These flight test requirement guidelines provide an acceptable means of demonstrating compliance with the applicable airworthiness requirements. Controllability and maneuverability; stability; stalls; ground and water handling characteristics; vibration and buffeting; high speed performance; takeoff and landing; weight and load distribution limits; and propeller speed and pitch limits are discussed. B.G.

N86-26330*# Wichita State Univ., Kans. Dept. of Aeronautical Engineering.
THEORETICAL ANALYSIS OF THE ELECTRICAL ASPECTS OF THE BASIC ELECTRO-IMPULSE PROBLEM IN AIRCRAFT DE-ICING APPLICATIONS
Robert A. Henderson and Robert L. Schrag Jun. 1986 108 p refs
(Grant NAG3-284)
(NASA-CR-176808; NAS 1.26:176808; AR-86-2) Avail: NTIS HC A06/MF A01 CSCL 01C

A summary of modeling the electrical system aspects of a coil and metal target configuration resembling a practical electro-impulse deicing (EIDI) installation, and a simple circuit for providing energy to the coil, was presented. The model was developed in sufficient theoretical detail to allow the generation of computer algorithms for the current in the coil, the magnetic induction on both surfaces of the target, the force between the coil and target, and the impulse delivered to the target. These algorithms were applied to a specific prototype EIDI test system for which the current, magnetic fields near the target surfaces, and impulse were previously measured. Author

N86-26331*# Textron Bell Helicopter, Fort Worth, Tex.
SIX DEGREE-OF-FREEDOM LIVE ISOLATION SYSTEMS, PART 1 Interim Report
Dennis R. Halwes and Colby O. Nicks Apr. 1986 79 p
(Contract NAS1-16969)
(NASA-CR-177928; NAS 1.26:177928) Avail: NTIS HC A05/MF A01 CSCL 01C

A Total Main Rotor Isolation System (TRIS) was analyzed, designed, fabricated, and bench tested for the reduction of main rotor vibration levels transmitted to the helicopter fuselage. The TRIS consists of a six degree-of-freedom passive system using six Liquid Inertia Vibration Eliminator (LIVE) units developed by Bell Helicopter Textron. The objective of the program is to develop a helicopter isolation system that will achieve 90% (or greater) isolation at minimum weight with no degradation in vehicle stability, handling qualities, alignment tolerance, and reliability or maintainability. Author

N86-26332# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AIRCRAFT NUCLEAR SURVIVABILITY METHODS Ph.D. Thesis
Halvor A. Undem Sep. 1985 279 p
(AD-A163218; AFIT/DS/PH/84-3) Avail: NTIS HC A13/MF A01

CSCL 18/3

A new approach for assessing the survivability of aircraft components in nuclear blast and thermal environments is presented in this dissertation. A nonparametric technique is developed for use in calculating the reliability interference integral. This approach eliminates the need for density function identification and parameter estimation. Furthermore, the method can be used without resorting to large-sample random Monte Carlo simulation or propagation of moments. In addition to this, the derived cumulative distribution function using such a technique exactly interpolates the true distribution function at selected points. The method is applied to the problem of aircraft survivability in nuclear blast environments using failure (strength) distributions found in the literature. It is also applied to the case of aircraft survivability in nuclear thermal environments where direct failure data is not available. Inputs to the engineering models involved are treated statistically and the method is used to rigorously determine the statistical nature of the output variables. GRA

N86-26333# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
AQUILA REMOTELY PILOTED VEHICLE: RECENT DEVELOPMENTS AND ALTERNATIVES
Jan. 1986 14 p refs
(AD-A164597; GAO/NSIAD-86-41BR) Avail: NTIS HC A02/MF A01 CSCL 01/3

This GAO report is about the Army's Aquila Remotely Piloted Vehicle (RPV), which has had numerous difficulties since it entered full-scale development in 1979. Among these have been technical performance problems and funding cuts, which have led to substantial cost growth and schedule slippage. During the past year, the emergence of critical performance problems during testing led to a major program restructuring and threatened the Aquila's future. Prior to these changes, costs to acquire the Aquila were estimated at about $2 billion. This estimate has not yet been revised to reflect the recent changes. Several RPV systems exist in addition to the Aquila. The Army considered these alternative systems in a study it made in 1984 from the standpoint of their possible availability and potential to perform in the stringent environment envisioned for Aquila's use. GAO found that although the study did not consider several factors which could have led to a more balanced comparison, the Army chose to continue the Aquila development because of its earlier availability. GRA

N86-26334# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AIRCRAFT PERFORMANCE OPTIMIZATION WITH THRUST VECTOR CONTROL M.S. Thesis
Mark S. Fellows Dec. 1985 132 p
(AD-A165388; AFIT/GAE/AA/85D-6) Avail: NTIS HC A07/MF A01 CSCL 01/2

The objective of this thesis is to determine to what extent a highly-maneuverable aircraft's overall performance capability is enhanced by thrust-vectoring nozzles. The resulting performance capabilities are compared to a baseline configuration with non-thrust-vectoring nozzles to determine the effects and advantages of thrust vectoring. The results indicate that the use of vectored thrust can significantly increase an aircraft's performance capability in turning flight. The greater the demand on the aircraft in a turning combat scenario, the more the aircraft utilizes its thrust-vectoring capability to complete the task. The results also indicate that the use of vectored thrust in other phases of flight -- such as cruise, acceleration and climb -- only slightly increases an aircraft's performance capability. GRA

N86-26320# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Human Engineering Div.
SOME QUANTITATIVE METHODOLOGY FOR COCKPIT DESIGN
Charles Bates, Jr. and Maris M. Vikmania *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 10 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-26335# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
METHOD FOR DETERMINING THE TIME DELAY OF THE PITOT-STATIC TUBING SYSTEM OF AIRCRAFT
J. H. Breeman 17 Jun. 1985 19 p
(NLR-TR-83075-U; ESA-86-96978) Avail: NTIS HC A02/MF A01

The measurement of the response of the pitot-static tubing system of aircraft is described. A small jet transport is used as an example. Results of measurements performed on the ground and at an altitude of 3000 ft are reported. ESA

N86-26321# Thomson-CSF, Issy les Moulineaux (France).
SYNTHETIC REAL-TIME RELIEF DISPLAY ALL-WEATHER AIRBORNE MISSIONS
J. N. Botella *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 4 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

N86-26322# Farrand Optical Co., Inc., Valhalla, N.Y.
THE WIDE FIELD HELMET MOUNTED DISPLAY
Joseph LaRussa *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 7 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

N86-26323# Marconi Avionics Ltd., Rochester (England). Aircraft and Missile Systems.
A SOLID-STATE MAP DISPLAY FOR RAPID RESPONSE OPERATION
D. J. Powell and T. E. Crayford *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 13 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

N86-26806# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
EVALUATION OF HELICOPTER HELMET-MOUNTED DISPLAY MOCK-UP
Guy Santucci and Claude Valot *In* AGARD Visual Protection and Enhancement Dec. 1985 14 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26809# Army Aeromedical Research Lab., Fort Rucker, Ala.
MICRO-HEADS-UP DISPLAY FOR ENHANCEMENT OF NIGHT VISION GOGGLE OPERATIONS
R. Simmons, K. Kimball, and B. Hamilton *In* AGARD Visual Protection and Enhancement Dec. 1985 9 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-26336*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUMMARY OF INVESTIGATIONS OF ENGINE RESPONSE TO DISTORTED INLET CONDITIONS
Thomas J. Biesiadny, Willis M. Braithwaite, Ronald H. Soeder, and Mahmood Abdelwahab 1986 34 p refs Proposed for presentation at the 68th Meeting of the Propulsion and Energetics Panel, Munich, West Germany, 8-9 Sep. 1986; sponsored by AGARD
(NASA-TM-87317; E-3048; NAS 1.15:87317) Avail: NTIS HC A03/MF A01 CSCL 21E

A survey is presented of experimental and analytical experience of the NASA Lewis Research Center in engine response to inlet temperature and pressure distortions. This includes a description of the hardware and techniques employed, and a summary of the highlights of experimental investigations and analytical modeling. Distortion devices successfully simulated inlet distortion, and knowledge was gained about compression system response to different types of distortion. A list of NASA research references is included. Author

N86-26337# Aeronautical Research Labs., Melbourne (Australia).
INVESTIGATION OF BLADE VIBRATION T55-L-11C COMPRESSOR STAGES 1 AND 2
N. S. Swansson 2 Jul. 1986 25 p refs
(AR-004-046; ARL-AERO-Prop-R-168) Avail: NTIS HC A02/MF A01

A vibratory survey of the first and second stage compressor blades on the T55-L-11C engine was conducted following the warning of the manufacturer that the proposed fitting of locally designed intake screens might lead to blade vibration problems. Vibration tests and a simple analysis indicated a possible resonance region. Special statistical methods for small samples were used to fully define tolerance limits for this region and establish confidence levels in the limits. Operators were initially advised to restrict operation in the potential resonance region. Subsequent intake flow tests demonstrated that the screens generated no abnormal excitation, so the restrictions could be discontinued. Author

N86-26338# Aeronautical Research Labs., Melbourne (Australia).
THE GENERAL ELECTRIC F404 - ENGINE OF THE RAAF'S NEW FIGHTER
Denis Frith Jul. 1985 55 p refs
(AD-A164562; ARL-AERO-PROP-TM-426) Avail: NTIS HC A04/MF A01 CSCL 21/5

The F404 engine in the F/A-18 is representative of a new generation of military turbofan engines. The features of the engine that govern its performance and contribute to its maintainability are discussed. The intention is to give the non-specialist an appreciation of those factors materially affecting the operation of this type of engine. The RAAF F/A-18 Hornets are powered by two General Electric F404-GE-400 augmented turbofan engines. The 3-stage fan, driven by the low-pressure turbine, compresses inlet air that subsequently divides into the bypass and core flows. Variable inlet guide vanes schedule the direction of the flow into the fan as a function of rotational speed. The core flow is further compressed for entry to the annular combustor by the compressor, driven by the high-pressure turbine. Variable inlet guide and two rows of stators adjust the flow direction as a function of corrected compressor speed. After expansion through the turbines, the high temperature gas from the combustion process is mixed with the bypass air to form the high speed jet out of the exhaust nozzle. When operating in afterburning mode, the speed of this jet is increased by additional combustion in the afterburner. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-26339*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DECOUPLING CONTROL SYNTHESIS FOR AN OBLIQUE-WING AIRCRAFT
Gurbux S. Alag (University of Western Michigan, Kalamazoo), Robert W. Kempel, and Joseph W. Pahle Jun. 1986 12 p refs Presented at the American Control Conference, Seattle, Wash., 18-20 Jun. 1986
(NASA-TM-86801; H-1339; NAS 1.15:86801) Avail: NTIS HC A02/MF A01 CSCL 01C

Interest in oblique-wing aircraft has surfaced periodically since the 1940's. This concept offers some substantial aerodynamic performance advantages but also has significant aerodynamic and inertial cross-coupling between the aircraft longitudinal and lateral-directional axes. This paper presents a technique for synthesizing a decoupling controller while providing the desired stability augmentation. The proposed synthesis procedure uses the concept of a real model-following control system. Feedforward gains are selected on the assumption that perfect model-following conditions are satisfied. The feedback gains are obtained by using eigensystem assignment, and the aircraft is stabilized by using partial state feedback. The effectiveness of the control laws developed in achieving the desired decoupling is illustrated by application to linearized equations of motion of an oblique-wing aircraft for a given flight condition. Author

N86-26340*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AEROELASTIC CONTROL OF OBLIQUE-WING AIRCRAFT
John J. Burken, Gurbux S. Alag, and Glenn B. Gilyard (University of Western Michigan, Kalamazoo) Jun. 1986 12 p refs Presented at the American Control Conference, Seattle, Wash., 18-20 Jun. 1986
(NASA-TM-86808; H-1346; NAS 1.15:86808) Avail: NTIS HC A02/MF A01 CSCL 01B

The U.S. Navy and NASA are currently involved in the design and development of an unsymmetric-skew-wing aircraft capable of 65 deg wing sweep and flight at Mach 1.6. A generic skew-wing aircraft model was developed for 45 deg wing skew at a flight condition of Mach 0.70 and 3048 m altitude. At this flight condition the aircraft has a wing flutter mode. An active implementable control law was developed using the linear quadratic Gaussian design technique. A method of modal residualization was used to reduce the order of the controller used for flutter suppression. Author

N86-26341*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VALIDATION OF A NEW FLYING QUALITY CRITERION FOR THE LANDING TASK
Donald T. Berry and Shahan K. Sarrafian 1986 10 p Presented at the AIAA Atmospheric Flight Mechanics Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88261; H-1357; NAS 1.15:88261; AIAA-86-2126-CP) Avail: NTIS HC A02/MF A01 CSCL 01C

A strong correlation has been found to exist between flight path angle peak overshoot and pilot ratings for the landing task. The use of flightpath overshoot as a flying quality metric for landing is validated by correlation with four different in-flight simulation programs and a ground simulation study. Configurations tested were primarily medium-weight generic transports. As a result of

good correlation with this extensive data base, criterion boundaries are proposed for landing based on the flight path peak overshoot metric. Author

N86-26342*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
STUDY ON USING A DIGITAL RIDE QUALITY AUGMENTATION SYSTEM TO TRIM AN ENGINE-OUT IN A CESSNA 402B
Kent E. Donaldson 1986 37 p refs
(Grant NAG1-345)
(NASA-CR-177272; NAS 1.26:177272; KU-FRL-6132-3) Avail: NTIS HC A03/MF A01 CSCL 01C

A linear model of the Cessna 402B was used to determine if the control power available to a Ride Quality Augmentation System was adequate to trim an engine-out. Two simulations were completed: one using a steady state model, and the other using a state matrix model. The amount of rudder available was not sufficient in all cases to completely trim the airplane, but it was enough to give the pilot valuable reaction time. The system would be an added measure of safety for only a relatively small amount of development. Author

N86-26343# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
FAILURES IN ADVANCED FLIGHT CONTROL SYSTEMS OF FUTURE TRANSPORT AIRCRAFT
M. F. C. vanGool and W. W. Rickard (McDonnell-Douglas Corp., Long Beach, Calif.) 12 Nov. 1984 187 p refs
(Contracts NIVR-1745; RB-RLD-84/83-1.3.1)
(NLR-TR-84108-U; ESA-86-96983) Avail: NTIS HC A09/MF A01

Failure probability and the effects of flight control system failures on handling qualities of a medium-weight transport with reduced stability equipped with a side-stick controlled fly-by-wire flight control system were studied in a flight simulator. A very simple electrical back-up system was used to reduce the pitch divergence when the primary flight control system failed. Results indicate that a large variability in pilot ratings can occur in this kind of investigation. However, analysis of the ratings and the associated commentary provides a ranking of the configurations used from good to bad. The results are compared to the existing criteria for handling qualities. It is shown that the rankings correlate well with closed-loop performance criterion, and Mil-F-8785 C criteria, whereas other criteria are either not applicable (time history criteria), or inappropriate (static stability criterion, bandwidth criterion). ESA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-26344# Dayton Univ., Ohio.
FLIGHT SIMULATOR: COMPARISON OF RESOLUTION THRESHOLDS FOR TWO LIGHT VALVE VIDEO PROJECTORS Final Report, Oct. 1984 - Aug. 1985
Peter M. Crane, Jost P. Gerlicher, and Herbert H. Bell Jan. 1986 15 p refs
(Contracts F33615-78-C-0026; F33615-84-C-0066)
(AD-A164577; AFHRL-TP-85-43) Avail: NTIS HC A02/MF A01 CSCL 14/2

The Air Force Human Resources Laboratory/Operations Training Division is developing a visual system for advanced tactical air combat simulators. As part of this work, two light valve video projectors were evaluated on their ability to display small, high-contrast images. The angular size of the smallest detail which could reliably be identified by an observer was determined for the General Electric PJ5155 and Sodern SVS-14 Video Projectors for stationary and moving targets under a variety of conditions. Several observers evaluated the projectors using variations of the stairstep procedure to determine minimum resolvable target size. For almost all conditions, observers were able to recognize smaller targets on the General Electric system than on the Sodern. With targets moving horizontally, however, minimum resolvable target size for the General Electric projector was significantly larger than for targets moving vertically or diagonally at the same speed. A hypothesis for this effect is discussed. Author (GRA)

N86-26345# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
BOMB CRATER REPAIR TECHNIQUES FOR PERMANENT AIRFIELDS. REPORT 3. SERIES 4 TESTS
Samuel J. Alford and George M. Hammitt, II Oct. 1985 66 p
(AD-A164682; WES-TR-GL-81-12-3-Rept-3) Avail: NTIS HC A04/MF A01 CSCL 19/4

This study is a continuation of Reports 1 and 2 of this series which described Series 1, 2, and 3 tests, which were performed using different field methods of repairs and restoration of bomb craters. Results from these tests showed problem areas that needed correction when the crater repairs were trafficked with full-scale loading. Series 4 tests were run to determine: (1) a way to place grout with a minimum of equipment and verify thickness requirements, (2) whether a poor-quality material could be stabilized with high early-strength cement and trafficked early, (3) whether the loose stone problem (Foreign Object Damage (FOD)) encountered with the well-graded crushed limestone could be corrected with a cap of neat grout placed over the limestone, and (4) whether an asphalt with an indefinite storage life could be used for the binder in surface treatments and to obtain additional data with surface treatments as a possible solution for the loose stone problem (FOD) encountered with the crushed limestone. Testing was by accelerated traffic using single- and multiple-wheel gear assemblies. Author (GRA)

N86-26346# Naval Postgraduate School, Monterey, Calif.
ANALYZING THE COST EFFECTIVENESS OF USING FLIGHT SIMULATORS IN THE ISRAELI AIR FORCE M.S. Thesis
Uzzi Rozen Dec. 1985 61 p
(AD-A164864) Avail: NTIS HC A04/MF A01 CSCL 05/9

During the last decade flight simulators have been increasingly used in the training of Israeli pilots. The increasing cost of a training flying hour, the shrinking training airspace over Israel since 1979, and the high performance standards required of the Israeli Air Force air crews were the accelerator factors in this process. This thesis describes a way to analyze the cost effectiveness of the present mix of flight simulators and flying hours in the training process of the I.A.F. air crews. The jet fighters, helicopters, and transportation communities are used as examples to demonstrate the implementation of the analysis. These examples give the reader a general picture of the cost effectiveness of using flight simulators in the I.A.F. Author (GRA)

N86-27150*# National Oceanic and Atmospheric Administration, Boulder, Colo.
SMALL LINEAR WIND TUNNEL SALTATION EXPERIMENTS: SOME EXPERIENCES
D. A. Gillette and P. R. Owen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p Prepared in cooperation with Imperial College of Science and Technology, London, England (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27154*# Arizona State Univ., Tempe.
DESIGN AND CALIBRATION OF THE CAROUSEL WIND TUNNEL
R. N. Leach, R. Greeley, J. Iversen (Iowa State Univ. of Science and Technology, Ames), B. White (California Univ., Davis.), and J. R. Marshall *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For

primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27165*# California Univ., Davis.
AEOLIAN PROCESSES ABOARD A SPACE STATION: SALTATION AND PARTICLE TRAJECTORY ANALYSIS
B. R. White, R. Greeley (Arizona State Univ., Tempe), J. D. Iversen (Iowa State Univ. of Science and Technology, Ames), and R. N. Leach (Santa Clara Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-26347*# Computer Sciences Corp., Beltsville, Md.
INTERNATIONAL ULTRAVIOLET EXPLORER OBSERVATORY OPERATIONS Final Report, Oct. 1982 - Oct. 1985
Nov. 1985 145 p refs
(Contract NAS5-27295)
(NASA-CR-177873; NAS 1.26:177873; CSC/TR-85/6013) Avail: NTIS HC A07/MF A01 CSCL 22A

This volume contains the final report for the International Ultraviolet Explorer IUE Observatory Operations contract. The fundamental operational objective of the International Ultraviolet Explorer (IUE) program is to translate competitively selected observing programs into IUE observations, to reduce these observations into meaningful scientific data, and then to present these data to the Guest Observer in a form amenable to the pursuit of scientific research. The IUE Observatory is the key to this objective since it is the central control and support facility for all science operations functions within the IUE Project. In carrying out the operation of this facility, a number of complex functions were provided beginning with telescope scheduling and operation, proceeding to data processing, and ending with data distribution and scientific data analysis. In support of these critical-path functions, a number of other significant activities were also provided, including scientific instrument calibration, systems analysis, and software support. Routine activities have been summarized briefly whenever possible. Author

N86-26348*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CALIBRATION OF THE ISEE PLASMA COMPOSITION EXPERIMENT
C. R. Baugher, R. C. Olsen (Alabama Univ., Huntsville), and D. L. Reasoner Mar. 1986 60 p refs Sponsored by NASA. Marshall Space Flight Center, Huntsville, Ala. Prepared in cooperation with Alabama Univ., Huntsville
(NASA-TM-86542; NAS 1.15:86542) Avail: NTIS HC A04/MF A01 CSCL 22A

The Plasma Composition experiment on the ISEE-1 satellite was designed to measure ions from 1 to 16 amu, at energies from near zero to 16 keV. The two nearly identical flight instruments were calibrated by means of preflight laboratory tests and in-flight data comparisons. This document presents most of the details of those efforts, with special emphasis on the low energy (0 to 100 eV) portion of the instrument response. The analysis of the instrument includes a ray-tracing calculation, which follows an ensemble of test particles through the detector. Author

N86-26349# Bundesministerium fuer Wissenschaft und Forschung, Vienna (Austria). Inst. fuer Extraterrestrische Physik.
SPACE RESEARCH AND SPACE TECHNOLOGY. CONTRIBUTIONS BY THE FEDERAL REPUBLIC OF GERMANY
1985 39 p Revised Original contains color illustrations
(ESA-86-96942) Avail: NTIS HC A03/MF A01

West German participation in the Galileo, Giotto, GIRL, and ROSAT missions is described. Spacelab experiments; spaceborne experiments on materials processing; biology and medicine in space; and experimental platforms are discussed. The use of LANDSAT data is summarized. Maritime and communication satellites are treated. ESA

N86-27153*# Iowa State Univ. of Science and Technology, Ames. Dept. of Aerospace Engineering.
SEDIMENT-TRANSPORT EXPERIMENTS IN ZERO-GRAVITY
James D. Iversen and Ronald Greeley (Arizona State Univ., Tempe) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27156*# Arizona State Univ., Tempe. Dept. of Geology.
ELECTROSTATIC AGGREGATION OF FINELY-COMMINUTED GEOLOGICAL MATERIALS
J. R. Marshall and R. Greeley *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27158*# National Aeronautics and Space Administration, Washington, D.C.
NUCLEATION EXPERIMENTS IN A MICROGRAVITY ENVIRONMENT
J. A. Nuth, J. E. Allen, Jr. (National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.), L. U. Lilleleht (Virginia Univ., Charlottesville), I. D. R. Mackinnon (Microbeam, Inc., Houston, Tex.), F. J. M. Rietmeijer (National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.), and J. R. J. M. Stephens (Los Alamos National Lab., N. Mex.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27162*# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
IMPACTS OF FREE-FLOATING OBJECTS: UNIQUE SPACE STATION EXPERIMENTS
P. H. Schultz and D. E. Gault (Murphys Center of Planetology, Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27164*# California Inst. of Tech., Pasadena. Div. of Physics, Mathematics and Astronomy.
GRAIN DYNAMICS IN ZERO GRAVITY
B. T. Werner and P. K. Haff *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27166*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A SYSTEM FOR CONDUCTING IGNEOUS PETROLOGY EXPERIMENTS UNDER CONTROLLED REDOX CONDITIONS IN REDUCED GRAVITY
R. J. Williams *In its* Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-27141*# California Inst. of Tech., Pasadena. Seismological Lab.
A PLANETARY ULTRA HYPERVELOCITY IMPACT MECHANICS AND SHOCK WAVE SCIENCE FACILITY
Thomas J. Ahrens *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27155*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
A MAGNETOSPHERIC SIMULATION AT THE SPACE STATION
R. E. Lopez, J. W. Freeman, and F. C. Michel *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27160*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LOW GRAVITY FACILITIES FOR SPACE STATION PLANETOLOGY EXPERIMENTS
Paul A. Penzo *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-26350# Lawrence Livermore National Lab., Calif.
BALLISTIC FLIGHT OF A PROJECTILE WITH TWO PRECESSIONAL MODES
T. Morgan 21 Nov. 1985 16 p Presented at the 24th AIAA Aerospace Science Meeting, Reno, Nev., 6-9 Jan. 1986 Original language document was announced in AIAA as A86-19923 Submitted for publication
(Contract W-7405-eng-48)
(DE86-003176; UCRL-93639; CONF-860130-3) Avail: NTIS HC A02/MF A01

Rapidly spinning projectiles with infinite rotational symmetry display a high degree of physical correspondence to a classical gyroscope. As with a gyroscope, such projectiles show two precessional modes, one of which will always be in evidence during a flight. Aeroballistic theory provides, additionally, for two simultaneously excited nutational modes, with sinusoidal frequencies close to, but not exactly coincident with, the precessional angular velocities. The combination of these two orthonormal rotations gives rise to complex pitching and yawing motion, which can be substantially different than the motion predicted by aeroballistic theory alone. Results from a numerical integration of the equations of motion in their most general form illustrate these differences.
DOE

N86-26351# Morton Thiokol, Brigham City, Utah.
MINUTEMAN 3, STAGE 3 SURVEILLANCE Semiannual Report, 1 Jun. - 30 Nov. 1985
Ralph Davis and L. C. Porter, Jr. Jan. 1986 42 p
(Contract F42600-86-C-0001)
(AD-A164840; TWR-32233) Avail: NTIS HC A03/MF A01 CSCL 21/8

The program effort during this reporting period consisted of laboratory testing of both the Morton Thiokol, Inc./ASPC Minuteman 3 Third Stage Surveillance components and material samples. In addition, bondline aging testing and analysis using samples from previously dissected motors were accomplished. In support of the program, all flight and static tests, for both First and Third Stage Minuteman motors, were reviewed and tabulated for incorporation into reliability and motor historical records.
GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-26352* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MAGNETIC SPIN REDUCTION SYSTEM FOR FREE SPINNING OBJECTS Patent
Georg F. vonTiesenhausen, inventor (to NASA) Issued 15 Apr. 1986 6 p Supersedes N85-11122 Filed 23 Aug. 1984 Sponsored by NASA
(NASA-CASE-MFS-25966-1; US-Patent-4,582,277;
US-Patent-Appl-SN-643522; US-Patent-Class-244-161) Avail: US Patent and Trademark Office CSCL 22B

A spinning Earth satellite is shown in which it is desired to reduce the rotation or spin to a level that the satellite may be secured or handled remotely from a spacecraft. This is accomplished by the spacecraft having a mast carrying an electrical current coil which encircles the satellite. The magnetic field of the coil is normal to the spin axis of the satellite which causes circular eddy current flow in the housing of the satellite. This generates magnetic force opposing the rotation. In another embodiment the magnetic field is generated by the use of an electromagnet on a remote manipulation arm.
Official Gazette of the U. S. Patent and Trademark Office

N86-26353# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
DEFINITION STUDY OF A COORDINATED GROUP OF EXPERIMENTS TO MEASURE AND MONITOR THE IN SITU PLASMA AND ELECTROMAGNETIC ENVIRONMENT OF A POLAR ORBITING SPACE SHUTTLE Final Report, 18 Feb. 1983 - 18 Feb. 1985
Herbert S. Bridge and Joseph H. Binsack Sep. 1985 105 p refs
(Contract F19628-83-K-0030)
(AD-A164561; AFGL-TR-85-0238) Avail: NTIS HC A06/MF A01 CSCL 22/1

The contents of this report include: The Environment Monitoring Payload; Radiation of Plasma Waves by a Conducting Body Moving Through a Magnetized Plasma; and Phase and Group Velocities of Waves in Cold Plasma.
GRA

N86-26354*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERACTIONS MEASUREMENT PAYLOAD FOR SHUTTLE (IMPS) DEFINITION PHASE STUDY Final Report, 23 May

1983 - 15 Dec. 1984
Gary C. Hill 15 Dec. 1984 198 p
(Contracts NAS7-918; DA Proj. 2822)
(NASA-CR-177291; NAS 1.26:177291; JPL-D-1865; AD-A165222; AFGL-TR-85-0023) Avail: NTIS HC A09/MF A01 CSCL 22B

The Interactions Measurement Payload for Shuttle (IMPS) project will study interactions between large space vehicles, such as the space shuttle, and the low altitude plasma environment over the polar caps and in the auroral zone. Studies will be conducted from the orbiter bay and from a shuttle-based subsatellite; several investigations; and an environmental monitoring package. This will be the first of a series of missions to begin in 1978. This definition phase report presents the objectives and requirements of the IMPS project and instrument system followed by the mission design they dictate. The bulk of the report is a technical discussion of the investigations and work done on the space and instrument systems, describing both their capabilities and limitations. A description of the steps for reliability/quality assurance is followed by the recommendations of the JPL engineers and scientist involved in this phase of the IMPS project. GRA

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-26355*# National Aeronautics and Space Administration, Washington, D.C.
ENVIROSAT-2000 REPORT: FEDERAL AGENCY SATELLITE REQUIREMENTS
D. Cotter, ed., I. Wolzer, ed., N. Blake, J. Jarman, D. Lichy, T. Pangburn, R. McArdle, C. Paul, L. Shaffer, G. Thorley et al NOAA Jul. 1985 156 p refs
(NASA-TM-88752; NAS 1.15:88752) Avail: NTIS HC A08/MF A01 CSCL 22B

The requirement of Federal agencies, other than NOAA, for the data and services of civil operational environmental satellites (both polar orbiting and geostationary) are summarized. Agency plans for taking advantage of proposed future Earth sensing space systems, domestic and foreign, are cited also. Current data uses and future requirements are addressed as identified by each agency. B.G.

N86-26356# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MODELLING OF A COLD GAS JET SYSTEM FOR SATELLITE ATTITUDE CONTROL
Ismael EmiliodeOliveiraFilho and Eduardo Augusto Gomes Pereira Apr. 1986 6 p refs Presented at TELECON'85, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3853-PRE/917) Avail: NTIS HC A02/MF A01

For the Earth orbiting satellite to accomplish its objectives, it is of main concern that it keep a certain attitude in relation to the planet. Among the existing attitude control actuators, the gas jet is the one with the widest application because of its large range of torque generation capability and because of its independence in relation to other kinds of systems. To be able to use a gas jet system, however, it is fundamental to know its time performance. This work proposes a mathematical modelling for the thrust of a basic gas jet system, including on-off transient times. The model considers two valves in the line: a pressure regulating one and a control one. The latter is modelled in detail and its on and off times are obtained analytically. Expressions for the thrust and mass flow with time are also obtained. Transient times and thrust are calculated numerically and considered coherents with prevision. Author

N86-26357*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC CHARACTERISTICS OF POWER-TOWER SPACE STATIONS WITH 15-FOOT TRUSS BAYS
John T. Dorsey Jul. 1986 72 p
(NASA-TM-87684; L-16094; NAS 1.15:87684) Avail: NTIS HC A04/MF A01 CSCL 22B

A power tower space station concept which generates power with photovoltaic arrays and where the truss structure has a bay size of 15 ft is described. Rigid body and flexible body dynamic characteristics are presented for a 75-kW Initial Operating Capability (IOC) and 150-kW and 300-kW growth stations. The transient response of the IOC and 300-kW growth stations to shuttle dock, orbit reboost, and mobile remote manipulator system translation loads are studied. Displacements, accelerations, and bending moments at various locations on the IOC and 300-kW growth stations are presented. Author

N86-26358*# Evansville Univ., Ind. Dept. of Physics.
THEORETICAL STUDY ON THE EFFECT OF THE DESIGN OF SMALL (MILLI-NEWTON) THRUSTER JETS ON MOLECULAR CONTAMINATION FOR THE SPACE STATION Final Report, 15 Nov. 1985 - 30 Jun. 1986
Ben R. Riley 1986 44 p refs
(Grant NAG3-674)
(NASA-CR-177263; NAS 1.26:177263) Avail: NTIS HC A03/MF A01 CSCL 22B

The self-induced molecular contamination around the space station could have adverse effects on space station components (for example solar panels) as well as scientific experiments that might be done on or near the space station. Aerospace engineers need to design a space station (SS) propulsion system that keeps the SS in a stable orbit and at the same time does not allow the propellant gases to interfere with the experiments of the user. One scenario that might accomplish the above requirements is to use an electrothermal propulsion system, resistojet, that will thrust continuously in the hundreds of milli-Newton range which will provide a constant altitude for the SS with a low g environment. As a first attempt to understand the contamination from such a propulsion system, a point source model was developed. The numerical results of the point source model are given. Number column densities for CO_2 are presented as a function of direction of observation (line of sight), temperature of the exit gas, and mean exit velocity. All the results are for a constant exhaust rate of 5,000 kg/year. In addition, a mathematical model to study the effect of nozzle design on the induced molecular environment around the space station produced by simple gas propellants is described. The mathematical model would allow one to follow the expansion of the gas from the throat of a nozzle to the nozzle exit plane and then into the space external to the nozzle. M.G.

N86-26359# SoHaR, Inc., Los Angeles, Calif.
RELIABILITY PREDICTION FOR SPACECRAFT Final Report, Mar. 1983 - Jan. 1985
Herbert Hecht and Myron Hecht Dec. 1985 152 p
(Contract F30602-83-C-0018)
(AD-A164747; RADC-TR-85-229) Avail: NTIS HC A08/MF A01

CSCL 22/2

This study provides the basis for improving the utility of Mil-Hdbk-217 for reliability prediction of spacecraft components and systems. The reliability performance histories of 300 satellite vehicles, which were launched between the early 1960's through Jan. '84, were reviewed and analyzed during the course of the study. Analysis of over 2500 reports of malfunctions indicated strong evidence of a decreasing failure rate with time in orbit. The cause for the decreasing hazard was found to be traceable primarily to design and environmental causes. In general, however, it was found that current predictions overestimate the failure rate by at least a factor of two and that the excess of predicted over observed failures increases with time in orbit. Three methods are provided for spacecraft reliability prediction. In order to account for the decreasing hazard, two of the procedures use a Weibull model with parameters based upon similar spacecraft mission types. A third method uses modifications of Mil-Hdbk-217 procedures to account for the overestimation of failure rates which result when current procedures are used. GRA

N86-26360# Aerospace Corp., El Segundo, Calif. Information Processing Div.

ANALYSIS OF ORBITAL SATELLITE STORAGE

T. L. Ferguson and T. H. Davey Nov. 1985 70 p refs

(Contract F04701-85-C-0086)

(AD-A164971; TR-0086(6417-03)-1; SD-TR-86-02) Avail: NTIS HC A04/MF A01 CSCL 22/2

This study addresses whether service of sufficient duration can be expected from a satellite that has been stored on orbit for significant periods of time. The question was approached in two ways. First, an extensive review of the research on orbital storage was conducted. While there has not been a great deal of published analysis of the subject, the records of those efforts are consistent in their conclusions that orbital storage does not appear to have any adverse impact on satellites or their redundant components. The second approach was empirical. A data set was collected, consisting of the dormant and post-dormant characteristics of redundant electronic boxes from 155 NASA, DOD and commercial satellites. Three separate investigations examined length of dormancy and subsequent length of activity of redundant units to statistically determine any relationship. GRA

N86-26361# National Aerospace Lab., Amsterdam (Netherlands). Space Div.

STUDY OF NAVSAT CONTROL SEGMENT CHARACTERISTICS. PART 1: ELEMENTS OF A CONTROL SEGMENT CONCEPT Final Report

L. J. M. Joosten, P. J. dePagter, O. B. M. Pietersen, J. J. Renes, and H. F. A. Roefs Paris, France ESA 18 Sep. 1984 129 p Prepared in cooperation with Technische Hogeschool, Delft 3 Vol.

(Contract ESA-5501/83-F-RD(SC))

(NLR-TR-84086-L-Pt-1; ESA-CR(P)-2145-Vol-1; ESA-86-96871) Avail: NTIS HC A06/MF A01

The division of tasks between Navsat Regional and Mission Center is established and intercenter communication requirements and options are discussed. Equipment for the uplink and downlink stations, particularly the antenna systems, is studied. Time synchronization between the broadcasting moments of satellite navigation signals emitted by the different satellites is addressed. The forward time correction of the uplink signals and the measurement of the interstation time differences are investigated. Measurement of ionospheric delay is addressed by introducing the dual-frequency navigation method. The impact of the dual-frequency method in the space segments, especially the Doppler properties of the navigation signal in terms of frequency stability and control, is assessed. The use of the S-band for communication is treated. ESA

N86-26362# National Aerospace Lab., Amsterdam (Netherlands). Space Div.

STUDY OF NAVSAT CONTROL SEGMENT CHARACTERISTICS. PART 2: ORBIT COMPUTATION ASPECTS Final Report

K. F. Wakker, B. A. C. Ambrosius, H. Leenman, R. Noomen, H. J. D. Piersma, T. vanderPloeg, and E. J. O. Schrama Paris, France ESA 18 Sep. 1984 169 p Prepared in cooperation with Technische Hogeschool, Delft 3 Vol.

(Contract ESA-5501/83-F-RD(SC))

(NLR-TR-84086-L-Pt-2; ESA-CR(P)-2145-Vol-2; ESA-86-96872) Avail: NTIS HC A08/MF A01

Orbit computation requirements for the 24 satellites in the Navstar global navigation network are discussed. Satellite orbits and the visibility of the satellites from the uplink stations are considered. The range tracking concept is introduced. The feasibility of compressing the ranging data is investigated. The maximum orbit prediction interval which satisfies orbit accuracy requirements is shown. The fitting of the predicted orbit by a set of polynomials is outlined. An orbit improvement scheme is presented. ESA

N86-26363# National Aerospace Lab., Amsterdam (Netherlands). Space Div.

STUDY OF NAVSAT CONTROL SEGMENT CHARACTERISTICS. PART 3: EXECUTIVE SUMMARY Final Report

L. J. M. Joosten and K. F. Wakker (Technische Hogeschool, Delft, Netherlands) Paris, France ESA 19 Apr. 1985 33 p 3 Vol.

(Contract ESA-5501/83-F-RD(SC))

(NLR-TR-84086-L-Pt-3; ESA-CR(P)-2145-Vol-3; ESA-86-96873) Avail: NTIS HC A03/MF A01

The Navsat global navigation satellite network mission and regional centers are described. Satellite orbit determination and prediction are outlined. ESA

N86-26364# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

FURTHER WORK ON POPSAT. VOLUME 1: EXECUTIVE SUMMARY Final Report

B. Schuerenburg, L. Popken, G. Thieme, and C. Clarisse (Electronique Serge Dassault, St. Cloud, France) Paris, France ESA Aug. 1985 30 p 2 Vol.

(Contract ESA-5960/84-NL-MD)

(ESA-CR(P)-2148-Vol-1; ESA-86-96874) Avail: NTIS HC A03/MF A01

Data modulation methods for the POPSAT microwave tracking system; the POPSAT time synchronization experiment; correction for nongravitational disturbances; and the POPSAT attitude and orbit control concept are discussed. For data modulation, BPSK is recommended. The time synchronization experiment requires a larger field of view than LASSO. Surface force modeling is best for correcting nongravitational disturbances. Gravity gradient stabilization enhanced by magnetic torquers is suggested for the satellite control. ESA

N86-26365# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Space Div.

FURTHER WORK ON POPSAT. VOLUME 2: TECHNICAL RESULTS Final Report

B. Schuerenburg, L. Popken, G. Thieme, D.C. Ulrich, and C. Clarisse (Electronique Serge Dassault, St. Cloud, France) Paris ESA Aug. 1985 358 p

(Contract ESA-5960/84-NL-MD)

(ESA-CR(P)-2148-Vol-2; ESA-86-96875) Avail: NTIS HC A16/MF A01

Data modulation methods for the POPSAT microwave tracking system; the POPSAT time synchronization experiment; correction for nongravitational disturbances; and the POPSAT attitude and orbit control concept are discussed. For data modulation, BPSK is recommended. The time synchronization experiment requires a larger field of view than LASSO. Surface force modeling is best for correcting nongravitational disturbances. Gravity gradient stabilization enhanced by magnetic torquers is suggested for the satellite control. ESA

N86-26366# National Aerospace Lab., Amsterdam (Netherlands). Space Div.

ATTITUDE ESTIMATION AND CONTROL OF MANEUVERING SPACECRAFT

T. Zwartbol, R. F. vandenDam, A. P. Terpstra, and P. Th. L. M. vanWoerkom 22 May 1984 19 p Revised Submitted for publication
(NLR-MP-84036-U; B8578436; ESA-86-96968) Avail: NTIS HC A02/MF A01

Application of sampled data, on board model-following, control, and estimation techniques to attitude control of high performance, maneuvering spacecraft is described. Model-following control comprises three simultaneous modes: target generation and control, disturbance accommodation control, and regulator control. The actuator is a reaction wheel. Estimation is carried out by two separate Kalman filters. One filter processes measurements from a rate-integrating gyro; output is an estimate of a three-dimensional spacecraft state vector. A second filter processes a-periodic measurements from a strapdown star sensor; output is an estimate of a three-dimensional gyro-parameter state vector. Estimation and control algorithms tests in closed-loop software simulations show very satisfactory performance. The algorithms were implemented in a 16 bit digital computer on board IRAS. In-flight estimation and control experiments produce very good results. ESA

N86-26367# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
MATHEMATICAL MODELS OF FLEXIBLE SPACECRAFT DYNAMICS: A SURVEY OF ORDER REDUCTION APPROACHES Annual Report, 1984
P. Th. L. M. vanWoerkom 21 Jan. 1985 13 p Presented at 10th IFAC Symp. on Automatic Control in Space, Toulouse, France, 25-29 Jun. 1985
(Contracts NIVR-1910)
(NLR-MP-85004-U; B8578426; ESA-86-96974) Avail: NTIS HC A02/MF A01

The usefulness of open loop model order reduction techniques for application of flexible spacecraft dynamics models was assessed. Approaches identified involve parameter optimization; aggregation; singular perturbation; modal dominance; component cost analysis; and internal balancing. The latter three approaches appear to be most meaningful, and convenient in applications. The problem of model order reduction is reviewed, and each of the six approaches is discussed. The latter three approaches are applied to the case of a long, flexible beam in space, controlled with two line torquers. ESA

N86-27147*# National Aeronautics and Space Administration, Washington, D.C.
SPACE STATION SCIENCE LAB MODULE
D. L. DeVincenzi *In* NASA. Lyndon B. Johnson Space Center Space Statiaon Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-26368* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROPULSION APPARATUS AND METHOD USING BOIL-OFF GAS FROM A CRYOGENIC LIQUID Patent
Dale H. Blount, inventor (to NASA) Issued 29 Apr. 1986 7 p Supersedes N84-15183 Filed 29 Apr. 1986 Sponsored by NASA
(NASA-CASE-MFS-25946-1; US-Patent-4,585,191;
US-Patent-Appl-SN-561432; US-Patent-Class-244-169;
US-Patent-Class-244-158.R; US-Patent-Class-60-203.1;
US-Patent-Class-60-39.465) Avail: US Patent and Trademark Office CSCL 21H

A propulsion system and method are disclosed for controlling the attitude and drag of a space vehicle. A helium dewar contains liquid helium which cools an experiment package. The helium is heated or vented to keep the temperature between 1.5 and 1.7 degrees K to maintain adequate helium boil-off gas as a propellant without adversely affecting the experiment package which is contained in the helium dewar for protection from solar heating. The apparatus includes auxiliary heater and temperature sensor for controlling the temperature of the helium. The boil-off gas propellant is delivered to thruster modules to control vehicle attutude and compensate for drag.
Official Gazette of the U. S. Patent and Trademark Office

N86-26369*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
ORBIT TRANSFER ROCKET ENGINE TECHNOLOGY PROGRAM: ADVANCED ENGINE STUDY, TASK D.1/D.3 Interim Report
A. Martinez, C. Erickson, and B. Hines Jan. 1986 237 p
(Contract NAS3-23773)
(NASA-CR-175084; NAS 1.26:175084; RI/RD86-116) Avail: NTIS HC A11/MF A01 CSCL 21H

Concepts for space maintainability of OTV engines were examined. An engine design was developed which was driven by space maintenance requirements and by a failure mode and effects (FME) analysis. Modularity within the engine was shown to offer cost benefits and improved space maintenance capabilities. Space operable disconnects were conceptualized for both engine change-out and for module replacement. Through FME mitigation the modules were conceptualized to contain the least reliable and most often replaced engine components. A preliminary space maintenance plan was developed around a controls and condition monitoring system using advanced sensors, controls, and condition monitoring concepts. A complete engine layout was prepared satisfying current vehicle requirements and utilizing projected component advanced technologies. A technology plan for developing the required technology was assembled. Author

N86-26370# Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE MUZZLE FLASH OF GUNS AND ROCKETS: A TRANSLATION Final Report
Joseph M. Heimeri Dec. 1985 28 p refs Transl. into ENGLISH of "Das Muendungesfeuer bei Geschuetzen und Raketen" Rept. 11/48 19 Jul. 1948
(AD-A164593; BRL-SP-50; Rept-11/48) Avail: NTIS HC A03/MF A01 CSCL 19/6

This is a translation of a report that summarized the experimental work done in Germany up to about the year 1945 in the field of muzzle flash suppression. The experiments used real gun systems and employed a large number of different chemical additives as potential suppressants. Negative, as well as positive, results were reported. A brief discussion on rocket afterburning suppression and smoke attenuation was also given. Author (GRA)

N86-26371# Weather Squadron (2nd), Patrick AFB, Fla. Detachment 11.
OPERATIONAL USE OF THE REEDM (ROCKET EXHAUST EFFLUENT DIFFUSION MODEL) Final Report
Billie F. Boyd 3 Jul. 1985 20 p refs
(AD-A164965; Rept-2WS/CP-85/005) Avail: NTIS

HC A02/MF A01 CSCL 20/4

This document presents operational considerations in the use of the NASA (Marshall Space Flight Center) Rocket Exhaust Effluent Diffusion code and the resultant Rocket Exhaust Effluent Diffusion Model (REEDM). It concentrates on that area outside the REEDM Code: The meteorological data that goes into the code and its significance. GRA

N86-26372# Army Materiel Test and Evaluation Directorate, White Sands Missile Range, N. Mex.

SAFETY TESTING OF MISSILE AND ROCKET SYSTEMS EMPLOYING MANNED LAUNCH STATIONS Final Report

15 Jan. 1986 76 p Supersedes TOP-5-2-619 and AD-B077876 (AD-A165395; ITOP-5-2-619; AMSTE-RP-702-104) Avail: NTIS HC A05/MF A01 CSCL 13/12

This ITOP (International Test Operating Procedure) describes the procedures for safety testing of systems listed in the title during development and production testing. It includes tests of motors, warheads, and other components which would affect stockpile-to-launch safety, as well as complete system firing tests. It specifies tests which are conducted to provide the safety release and other safety evaluation data. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-26373*# Salk Institute for Biological Studies, San Diego, Calif.

STEREOSELECTIVE FORMATION OF A 2 PRIME (3 PRIME)-AMINOACYL ESTER OF A NUCLEOTIDE

Arthur L. Weber 1986 17 p refs

(Grant NsG-7627)

(NASA-CR-176830; NAS 1.26:176830) Avail: NTIS HC A02/MF A01 CSCL 07A

Reaction of DL-series and adenosine-5-phosphorimidazolide in the presence of adenosine-5'-(0-methylphosphate) and imidazole resulted in the stereoselective synthesis of the aminoacyl nucleotide ester, 2'(3')-0-seryl-adenosine-5'-(0-methylphosphate). The enantiomeric excess of D-serine incorporated into 2'(3')-0-seryl-adenosine-5'-(0-methylphosphate) was about 9%. Adenylyl-(5-> N)-serine and an unknown product also incorporated an excess of D-serine, however, seryl-serine showed an excess of L-serine. The relationship of these results to the origin of the biological pairing of L-amino acids and nucleotides containing D-ribose is discussed. Author

24 COMPOSITE MATERIALS

Includes laminates.

N86-26374*# National Aeronautics and Space Administration, Washington, D.C.

ON THE SINTERING OF SILICON CARBIDE

E. Gugel Mar. 1986 13 p refs Transl. by the Corporate Word, Inc., Pittsburgh, Pa.

(Contract NASw-4006)

(NASA-TM-88402; NAS 1.15:88402) Avail: NTIS HC A02/MF A01 CSCL 11D

This document deals with the sintering of silicon carbide using pressureless sintering. This technique makes it possible to sinter a primarily covalent material to usable densities up to over 98% thD without having to use a high amount of sinter additives as is the case with other non-oxide ceramic materials. The process takes place rapidly, and it is also possible to produce relatively thick-walled structural parts without major problems. This sheds more light on the true characteristics of silicon carbide in one structural part, since there is no second or nearly no second phase. Heat pressing has improved stability. Author

N86-26375# Los Alamos National Lab., N. Mex.

SILICON CARBIDE WHISKERS FOR COMPOSITES: GROWTH AND PROPERTIES

G. F. Hurley and J. J. Petrovic 1985 8 p Presented at the ASM/ESD Advanced Composites Conference, Dearborn, Mich., 3-4 Dec. 1985

(Contract W-7405-eng-36)

(DE86-000798; LA-UR-85-3453; CONF-851244-1) Avail: NTIS HC A02/MF A01

Silicon carbide (SiC) whiskers have great potential as reinforcements for structural ceramic matrix composites with significantly improved fracture toughness and strength. Such whiskers, synthesized at Los Alamos by a vapor-liquid-solid (VLS) process, are single crystal fibers with diameters in the range of 0.1 to 10 (MU)m and lengths presently as long as 100 mm. They possess superb mechanical properties, with an average strength of 8.4 GPa (1,220,000 psi) and an average elastic module of 580 GPa (84,000,000 psi), as well as excellent elevated temperature stability. Future possibilities include the synthesis of long SiC whiskers for continuous fiber composites, and other types of whisker materials to extend the range of new ceramic composite systems. DOE

N86-26376*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPUTATIONAL SIMULATION OF PROGRESSIVE FRACTURE IN FIBER COMPOSITES

Christos C. Chamis 1986 12 p refs Presented at the International Conference on Computational Mechanics, Tokyo, Japan, 25-28 May 1986

(NASA-TM-87341; E-3090; NAS 1.15:87341) Avail: NTIS HC A02/MF A01 CSCL 11D

Computational methods for simulating and predicting progressive fracture in fiber composite structures are presented. These methods are integrated into a computer code of modular form. The modules include composite mechanics, finite element analysis, and fracture criteria. The code is used to computationally simulate progressive fracture in composite laminates with and without defects. The simulation tracks the fracture progression in terms of modes initiating fracture, damage growth, and imminent global (catastrophic) laminate fracture. Author

N86-26377*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.

MEASURE OF DISPLACEMENT AROUND HOLES IN COMPOSITE PLATES SUBJECTED TO QUASI-STATIC COMPRESSION

John C. Duke, Jr., Daniel Post, Robert Czarnek, and Anand Asundi Washington Jun. 1986 65 p refs

(Grant NAG1-193)

(NASA-CR-3989; NAS 1.26:3989) Avail: NTIS HC A04/MF A01 CSCL 11D

Contour maps of thickness changes were obtained for three quasi-isotropic graphite-epoxy plates with central holes, loaded in compression. Thickness changes were determined for six load increments from nearly zero to within a few percent of the failure load. The largest change of thickness occurred near the hole but not at the boundary of the hole. Below 90 percent of the failure load, the thickness changes were nearly proportional to load. Irregularities of thickness changes occurred in zones of compressive stresses and they were attributed to localized fiber buckling. A new optical technique was developed to measure thickness changes with high sensitivity. It utilizes a comparatively simple means of holographic interferometry on both sides of the specimen, followed by additive moire to obtain thickness changes as the sum of the out-of-plane displacements. Sensitivity was 12.5 x 10 to the -6 power in. per fringe order. The fringe patterns represent thickness changes uniquely, even when specimen warpage and consequent out-of-plane displacements are very large. Author

N86-26378# Aeronautical Research Labs., Melbourne (Australia).
ENVIRONMENTAL EFFECTS ON THE STATIC AND FATIGUE STRENGTH OF GRAPHITE/EPOXY STRUCTURES
R. J. Callinan Sep. 1985 34 p
(AR-004-044; ARL-STRUC-R-417) Avail: NTIS HC A03/MF A01

It is well known that moisture and temperature can degrade the properties of graphite-epoxy structures. Those laminates, loading conditions, and environments which may result in substantial reductions in static strength and fatigue life are identified. Author

N86-26379*# George Washington Univ., Washington, D.C. School of Engineering and Applied Science.
THE EFFECT OF LOW VELOCITY IMPACT ON THE STRENGTH CHARACTERISTICS OF COMPOSITE MATERIALS LAMINATES Progress Report
H. Liebowitz 7 Jan. 1986 86 p refs
(Grant NAG1-158)
(NASA-CR-176846; NAS 1.26:176846) Avail: NTIS HC A05/MF A01 CSCL 11D

The nonlinear and dynamic response of composite structures to impact loading conditions was investigated. The convergence of both finite element and finite difference solution procedures was investigated with this configuration. The response of composite beams and plates to impact were examined. Fundamental data on the indentation and flexural response of both plate and beam geometry were collected. Numerical analyses were extended to the study of circular plates subjected to impact loading. Further work was done in modeling the response to simulated impact loading through careful modeling of the momentum transfer from impactor to target. The modeling methodology and solution procedures were well tested and verified. A computer program for the solution of circular plate problems was developed and is under testing. B.G.

N86-26380*# Missouri Univ., Rolla. Dept. of Engineering Mechanics.
CRITERION FOR MIXED MODE FRACTURE IN COMPOSITE BONDED JOINTS Final Report
S. Mall and N. K. Kochhar May 1986 27 p
(Grant NAG1-425)
(NASA-CR-178112; NAS 1.26:178112) Avail: NTIS HC A03/MF A01 CSCL 11D

A study was undertaken to characterize the debond growth mechanism of adhesively bonded composite joints under mode I, mixed mode I-II, and mode II static loadings. The bonded system consisted of graphite-epoxy composite adherends bonded with a toughened epoxy adhesive. The mode I, mode II and mixed mode I-II fracture energies of the tested adhesives were found to be equal to each other. The criterion for mixed mode fracture in composite bonded joints was found. Author

N86-26381# Office of Naval Research, London (England).
THE DAMAGE TOLERANCE OF CARBON FIBER REINFORCED COMPOSITES: A WORKSHOP SUMMARY
Kenneth D. Challenger 15 Jan. 1986 20 p Workshop held in Glasgow, Scotland, 12 Sep. 1985
(AD-A163757; ONRL-C-15-85) Avail: NTIS HC A02/MF A01 CSCL 11/4

The workshop held in Glasgow, Scotland on 12 September 1985 included participants from the US, the UK, Australia, West Germany, and France. Six critical problem areas associated with damage tolerance of carbon-fiber reinforced composite materials are discussed: damage tolerant materials, testing methods, structural life prediction, damage tolerant design concepts, repair methods, and nondestructive testing. Author (GRA)

N86-26382# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ACCELERATED CORROSION TESTING OF GRAPHITE/EPOXY COMPOSITES AND ALUMINUM ALLOY MECHANICALLY-FASTENED JOINTS Final Report, 1 May 1980 - 20 Dec. 1984
S. D. Thompson, Billy L. White, and James A. Snide 20 Jun. 1985 50 p
(AD-A164772; AFWAL-TR-84-3115) Avail: NTIS HC A03/MF A01 CSCL 11/4

This program evaluates the effectiveness of a currently used finishing system to protect graphite/epoxy composites mechanically fastened to aluminum substructures with either titanium or A-286 CRES fasteners. Lap joint samples of laminated graphite/epoxy (+ or - 45/O2/9O)4/+ or - 45/O)s and aluminum alloy plates (2124-T851) were fabricated using either titanium (NAS1154V4) or A-286 CRES (MS 21140) fasteners. The unprotected baseline samples were fabricated by installing the fasteners in the uncoated graphite/epoxy aluminum alloy plates. The protected samples were exposed to humidity and salt fog for twelve weeks, tested in fatigue and exposed to the corrosive environment for twelve more weeks. The extent of corrosion was evaluated by both visual and microscopic examination. The unprotected samples experienced severe galvanic corrosion of the aluminum plate. The accelerated testing of the protected samples indicated the following problems: (1) If the area where the composite butts together in the lap joint was not properly sealed galvanic corrosion could occur in the aluminum. (2) If the composite was not painted on the edge, severe pitting of the primed aluminum alloy plate would occur on the edge of the aluminum plate. (3) The titanium fasteners performed better than the A-286 CR ES fasteners. GRA

N86-26383# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Civil Engineering.
THERMAL EXPANSION OF ELASTIC-PLASTIC COMPOSITE MATERIALS
George J. Dvorak Oct. 1985 38 p refs
(Contract N00014-85-K-0247)
(AD-A164910; CECM-1) Avail: NTIS HC A03/MF A01 CSCL 11/4

Exact relationships are derived between instantaneous overall thermal stress or strain vectors and instantaneous overall mechanical stifness or compliance, for two binary composite systems in which one of the phases may deform plastically. Also the local instantaneous thermal strain and stress concentration factors are related in an exact way to the corresponding mechanical concentration factors. The results depend on instantaneous thermoelastic constants and volume fractions of the phases. They are found for fibrous composites with two distinct elastically isotropic or transversely isotropic phases, and for any binary composite with elastically isotropic phases. The results indicate that in the plastic range the thermal and mechanical loading effects are coupled even if the phase properties do not depend on changes in temperature. The derivation is based on a novel decomposition procedure which indicates that spatially uniform elastic strain fields can be created in certain heterogeneous media by superposition of uniform phase eigen-strains with local strains caused by piecewise uniform stress fields which are in equilibrium with prescribed surface tractions. The method is extended to discretized microstructures, and also to analysis of moisture absorption and phase transformation effects on overall response and on local fields in the two composite materials. Author (GRA)

N86-26384# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EVALUATION OF THE EFFECTS OF A PLASTIC BEAD PAINT REMOVAL PROCESS ON PROPERTIES OF AIRCRAFT STRUCTURAL MATERIALS Final Report, Oct. 1984 - Aug. 1985
Sidney Childers, David C. Watson, Patricia Stumpff, and Jon Tirpak Dec. 1985 151 p
(AD-A165289; AD-F630715; AFWAL-TR-85-4138) Avail: NTIS HC A08/MF A01 CSCL 11/4

An abrasive blasting process using plastic beads has been proposed for removing organic coatings from aircraft surfaces and component parts. During the prototype development of the plastic bead blasting process for paint removal many concerns surfaced relative to the potential effects of the process on metal and composite aircraft structural materials. This evaluation of the plastic bead blasting paint removal showed that it removed

protective metal coatings such as aluminum cladding and anodize coatings from aluminum alloys and cadmium plating from steel structure. Surface roughness resulted on clad aluminum alloys. Warpage as a result of surface cold working occurred on unsupported thin skin metal materials. The bond strength of thin skin adhesive bonded structure was not affected. The process is less damaging in fatigue to 7075-T6 aluminum structure blasted at 60 psi nozzle pressure than at 38 psi nozzle pressure. Epoxy/graphite composite structure which was plastic bead blasted showed statistically significant losses in the matrix dominated properties. No significant reductions occurred in the fiber dominated mechanical properties. GRA

N86-26385# BDM Corp., Huntsville, Ala.
ADVANCED MATERIALS RESEARCH STATUS AND REQUIREMENTS. VOLUME 1: TECHNICAL SUMMARY Final Report
Jonathan A. Lee and Donald L. Mykkanen Mar. 1986 40 p
(Contract DASG60-85-C-0087)
(AD-A165338; BDM/H-86-0115-TR-Vol-1) Avail: NTIS
HC A03/MF A01 CSCL 11/6

This document describes the status and requirements of advanced composite materials which are being considered for engineering structural applications to U.S. Army Strategic Defense Command (USASDC) advanced material systems. The material examined covers the period from 1975 to mid-1984. In addition to raw material cost projection analysis, the document also presents data on the mechanical, thermal and physical properties of general interest advanced metal matrix and polymer matrix systems.
Author (GRA)

N86-26386# BDM Corp., Huntsville, Ala.
ADVANCED MATERIALS RESEARCH STATUS AND REQUIREMENTS. VOLUME 2, APPENDIX: MATERIAL PROPERTIES DATA REVIEW Final Report
Jonathan A. Lee and Donald L. Mykkanen Mar. 1986 199 p
(Contract DASG60-85-C-0087)
(AD-A165339; BDM/H-86-0115-TR-Vol-2) Avail: NTIS
HC A09/MF A01 CSCL 11/6

This document describes the status and requirements of advanced composite materials which are being considered for engineering structural applications to U.S. Army Strategic Defense Command (USASDC) advanced material systems. The material examined covers the period from 1975 to mid-1984. In addition to raw material cost projection analysis, the document also presents data on the mechanical, thermal and physical properties of general interest advanced metal matrix and polymer matrix systems.
Author (GRA)

N86-26387# New Mexico Univ., Albuquerque. Dept. of Geology.
HIGH RESOLUTION IMAGING OF BORON CARBIDE MICROSTRUCTURES
I. D. R. Mackinnon, T. Aselage (Sandia National Labs., Albuquerque, N. Mex.), and S. B. VanDeusen Aug. 1985 13 p Presented at the International Conference on the Physics and Chemistry of Boron and Boron-rich Borides Prepared in cooperation with Sandia National Labs.
(Contract DE-AC04-76DP-00789)
(DE86-001751; SAND-85-1432C; CONF-850786-9) Avail: NTIS
HC A02/MF A01

Two samples of boron carbide have been examined using high resolution transmission electron microscopy (HRTEM). A hot-pressed B13C2 sample shows a high density of variable width twins normal to (10*1). Subtle shifts or offsets of lattice fringes along the twin plane and normal to approx.(10*5) were also observed. A B4C powder showed little evidence of stacking disorder in crystalline regions. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-26388*# San Diego State Univ., Calif. Dept. of Electrical and Computer Engineering.
MEASUREMENTS OF HO2 CHEMICAL KINETICS WITH A NEW DETECTION METHOD Semiannual Status Report, 1 Dec. 1985 - 31 May 1986
Long C. Lee and Masako Suto 1986 39 p refs
(Grant NAGw-661)
(NASA-CR-176826; NAS 1.26:176826) Avail: NTIS
HC A03/MF A01 CSCL 07D

Research for the period from December 1, 1985 to May 31, 1986 is discussed, i.e., the reaction rate constant of HO2+O3 has been measured with a discharge-flow-tube apparatus. The HO2 radical was detected by the OH(A-X) photofragment emission produced from photodissociative excitation of HO2 at 147 nm. In the meantime, the optical emissions produced by the vacuum ultraviolet excitation of chemical species in the flow tube were investigated and used to examine the possibility for their interference with the HO2 detection. The research results are summarized below. Author

N86-26389# Evans (Charles) and Associates, San Mateo, Calif.
INVESTIGATION AND DEVELOPMENT OF ADVANCED SURFACE MICROANALYSIS TECHNIQUES AND METHODS Final Technical Report, 1 Apr. 1983 - 30 Sep. 1985
Robert W. Odom and Charles A. Evans, Jr. 1 Apr. 1983 125 p refs
(Contract MDA903-83-C-0099; ARPA Order 4713)
(AD-A163616) Avail: NTIS HC A06/MF A01 CSCL 07/4

The goals of this research program were two-fold: (1) Improve the sensitivity and quantitative capabilities of existing surface microanalysis techniques operating in the 1 to 150 micrometer lateral dimension regime; and (2) Investigate and evaluate techniques for obtaining trace level analyses of materials down to the 0.1 micrometer lateral dimension. This research program produced several results in the advancement of quantitation and detection limits of the two most widely used microanalytical techniques, scanning Auger microscopy (SAM) and secondary ion mass spectrometry (SIMS). This concept was developed and tested on the characterization of borophosphosilicate glass (BPSG) passivations and intermetal dielectrics. Three approaches were evaluated for the improvement of trace element detection limits. The first was to determine whether the laser enhancement concepts of resonant and nonresonant multiphonon ionization. The second approach to improved trace element detection limits was to thoroughly evaluate the analytical methodologies of specific impurity/matrix combinations relating to a particular technology. The third approach for enhanced trace component analysis was the evaluation of evolving microanalytical techniques which provide these improved quantitation or detection limits. GRA

N86-26390# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
NUMERICAL SIMULATION OF TURBULENT FLAMES USING VORTEX METHODS Annual Progress Report, 1 Sep. 1984 - 31 Aug. 1985
Ahmed F. Ghoniem 1 Oct. 1985 14 p refs
(Grant AF-AFOSR-0356-84)
(AD-A164080; AFOSR-85-1238TR; APR-1) Avail: NTIS
HC A02/MF A01 CSCL 21/2

Vortex schemes for direct numerical simulation of turbulence are developed to study the propagation and stability of turbulent flames. Attention is focused on the construction of accurate and efficient computational algorithms that are easily extendable to three dimensional reacting flow at high Reynolds numbers. A

Lagrangian vortex scheme, which incorporates stochastic simulation of diffusion, was used to obtain solutions for a recirculating flow and a mixing layer. Results showed good agreement with experimental data at intermediate Reynolds number for the first case, and was used to establish the convergence of the numerical method, the sources of errors and the appropriate scheme to improve the accuracy efficiently. For the mixing layer, the simulation predicted the average velocity and the streamwise fluctuations accurately, but overpredicted the cross-stream fluctuation, indicating that the latter are governed by the three dimensional effects. The response of the layer to harmonic modulations was analyzed revealing the nature of the flow and indicating how entrainment can be enhanced in shear flow. The relationship between the flow instability and the combustion stabilization in both cases indicated the premixed flames have a narrow range of stable existence in terms of the equivalence ratio. GRA

N86-26391# Air Force Geophysics Lab., Hanscom AFB, Mass.
THEORETICAL N2-, 02- AND AIR-BROADENED HALFWIDTHS OF OZONE CALCULATED BY QUANTUM FOURIER TRANSFORM THEORY WITH REALISTIC COLLISION DYNAMICS
Robert R. Gamache, Richard W. Davies, and Laurence S. Rothman 31 Dec. 1985 6 p
(AD-A163276; AFGL-TR-85-0340) Avail: NTIS HC A02/MF A01 CSCL 07/4

Collision broadened halfwidths of ozone are evaluated with nitrogen, oxygen, and air as the perturbing gases. It is important to consider more realistic collision dynamics in the calculations. By replacing the classical path trajectories by linear trajectories with constant velocities chosen to give the equations of motion exact to first order in time we develop the interruption function in terms of the actual distance of closest approach determined by the intermolecular potential and the velocity at this point. This improvement to the theory results in halfwidths which are in good agreement with experimental measurements. The temperature dependence of the halfwidth has been determined for 126 transactions for N2-broadening and for 10 transitions for 02-broadening. Comparison with experimental measurements is given. GRA

N86-26392# Pittsburgh Univ., Pa. Dept. of Chemistry.
DF VIBRATIONAL RELAXATION Final Report, 1 Sep. 1982 - 31 Aug. 1985
L. S. Dzelzkalns 31 Aug. 1985 28 p
(Contract N00014-82-K-0675)
(AD-A163421) Avail: NTIS HC A03/MF A01 CSCL 07/4

This report presents experimental results of the vibrational relaxation of DF(2 < or = v < or = 4) and DF(9 < or = v < or = 12). The fast flow infrared chemiluminescence method was used to determine vibrational relaxational rate constants for the processes DF(2 < or = v < or = 4) + Carbon Monoxide, Hydrogen Fluoride, Deuterium Fluoride, Nitrous Oxide, Carbon Tetrafluoride, and Sulfur Hexafluoride and DF(9 < or = v < or = 12) + Nitrogen, CO, HF, DF, Carbon Dioxide, and N2O. These are the first measurements of relaxation rate constants for the high vibrational states of DF. They are combined with low v-level data in order to gain additional insight into fundamental energy transfer questions such as the origin of the unusually strong v-dependences. GRA

N86-26393# Colorado State Univ., Fort Collins. Dept. of Chemistry.
MOLECULAR JET STUDY OF SOLVATION OF PYRAZINE BY SMALL HYDROCARBONS
J. Wanna and E. R. Bernstein 19 Mar. 1985 35 p refs
(Contract N00014-79-C-0647)
(AD-A164583) Avail: NTIS HC A03/MF A01 CSCL 07/4

Supersonic molecular jet two-color time of flight mass spectroscopy studies are reported for pyrazine solvated by methane, ethane, and propane. The results parallel those obtained for benzene and toluene solvated by these molecules. The presence of nitrogen atoms and lone pair electrons in the aromatic system has only a small effect on the cluster structure. Lennard-Jones potential calculations are presented along with the experimental data. Cluster shifts and binding energies are reported and correlated with geometries. The nucleation process for cluster formation appears to involve solvent dimers, as was found for the aromatic hydrocarbon systems. GRA

N86-26394# Colorado State Univ., Fort Collins. Dept. of Chemistry.
MOLECULAR JET STUDY OF VANDERWAALS COMPLEXES OF FLEXIBLE MOLECULES: N-PROPYL BENZENE SOLVATED BY SMALL ALKANES
K. S. Law and E. R. Bernstein 1 Apr. 1985 45 p refs
(Contract N00014-79-C-0647)
(AD-A164600; TR-18) Avail: NTIS HC A03/MF A01 CSCL 07/4

A combination of atom-atom potential calculations and experimental molecular jet spectroscopic studies is used to elucidate the geometry and binding energy of n-propul benzene/methane, ethane, and propane clusters. Two color time-of-flight mass spectroscopy data and calculations are presented for both trans and gauche configurations of n-propul benzene with up to three hydrocarbon molecules of solvation. Cluster shifts and geometry are treated in detail for the observed and calculated systems. Solvation, as observed in the clusters, seems to have little effect on the geometry of the solute in this instance. Alkyl chain motion is also discussed for the n-propyl benzene isolated molecule. GRA

N86-26395# United Technologies Research Center, East Hartford, Conn.
CARS DIAGNOSTICS OF HIGH PRESSURE COMBUSTION. 2. MEASUREMENTS OF NO, H2O AND HIGH PRESSURE FLAMES Final Report, 10 Oct. 1982 - 20 Dec. 1985
J. H. Stufflebeam and J. A. Shirley Dec. 1985 90 p refs
(Contract DAAG29-83-C-0001)
(AD-A164610; UTRC/R85-956328-F; ARO-18920.3-CH) Avail: NTIS HC A05/MF A01 CSCL 21/2

Spectroscopic investigations into the coherent anti-Stokes Raman spectroscopy (CARS) spectra of NO and H2O were conducted and the capability of CARS for diagnostics of high pressure flames examined. CARS is a remote laser diagnostic technique for temperature and species measurements in hostile combustion environments. As such it possesses considerable relevance to the Army in the general areas of ballistics and propulsion. This report describes the results of investigations conducted into the effects of high pressure, specifically the phenomenon of collisional narrowing, on CARS spectra from which temperature and density information derive. Experimental studies of CARS spectra were conducted in NO in a heated, high pressure cell over the range 300K to 800K, 1-33 atm, in H2O from 500K to 1000K, 5-30 atm and in a high pressure, premixed CO/air flame from 1-15 atm. The CARS spectra obtained were used to evaluate the CARS computer code. In addition, a new technique, termed dual broadband CARS, was developed which permits the simultaneous detection of a multiplicity of chemical species. This approach removes the nominal limitation on CARS of interrogating just a single constituent at a time. This technique should prove invaluable in the transient environments of combustion p High pressure combustion diagnostics; Collisional narrowing; Water vapor; Nitric oxide; High pressure premixed flame; and Polarization suppression. GRA

N86-26396# Colorado Univ., Boulder.
A FUNDAMENTAL MATHEMATICAL THEORY FOR THERMAL EXPLOSIONS IN RIGID SOLIDS AND IN GASES Final Report, 1 Mar. 1982 - 21 Jul. 1985
J. Bebernes and D. R. Kassoy 31 Jan. 1986 31 p refs
(Contract DAAG29-82-K-0069)
(AD-A164692; CUCOMB-2; ARO-18906.23-MA) Avail: NTIS HC A03/MF A01 CSCL 21/2

This research project has emphasized the formulation of rational mathematical models for transient and steady combustion processes. In particular, thermal explosion, shock wave initiation and high speed combustion waves have been examined. In each

case the describing mathematical system is analyzed using both formal and constructive techniques. The former are employed to consider issues of existence and uniqueness, solution bounds and general trajectory properties. Constructive solution development is based on a combination of asymptotic and numerical methods. This hybrid approach to the study of combustion problems has permitted us to develop both a rigorous and quantitative understanding of complex, initial-boundary value problems. GRA

N86-26397# Office of Naval Research, Arlington, Va.
STRUCTURAL CHEMISTRY OF ENERGETIC COMPOUNDS Annual Progress Report, 1 Oct. 1984 - 1 Oct. 1985
Richard Gilardi, Clifford George, and Judith L. Flippen-Anderson 1 Oct. 1985 93 p
(AD-A164813) Avail: NTIS HC A05/MF A01 CSCL 07/4

Structural characterization of 16 energetic materials and precursors was performed by X-ray diffraction. The trinitro and tetranitro tetraazabicyclo (3.3.0) octanes examined, compounds D and E, are significantly more dense than had been predicted. The crystal structure analysis showed that the increase in density is due to intramolecular crowding rather than extraordinary packing efficiencies which were at normal values of 0.73 and 0.75 respectively. GRA

N86-26398# Emory Univ., Atlanta, Ga. Dept. of Chemistry.
DATA ANALYSIS FOR MULTIDIMENSIONAL LUMINESCENCE Interim Technical Report
Sharon L. Neal, Gabor Patonay, Mark P. Thomas, and Isiah M. Warner 10 Feb. 1986 31 p
(Contract N00014-83-K-0026)
(AD-A164867; EMORY/DC/TR/10) Avail: NTIS HC A03/MF A01 CSCL 07/5

The application of digital analysis and reduction methods to multidimensional luminescence measurements is reviewed. The applicability and performance of linear, frequency domain and optimization methods is discussed. The range of problems being solved by these methods is also reported. Linear methods have been developed to the greatest extent. Frequency domain and optimization techniques are being used more often as the need for digital analysis methods increases. GRA

N86-26399# Emory Univ., Atlanta, Ga. Dept. of Chemistry.
BIOANALYTICAL APPLICATIONS OF FLUORESCENCE QUENCHING Interim Technical Report
Chu-Ngi Ho, Gabor Patonay, and Isiah M. Warner 10 Feb. 1986 20 p refs
(Contract N00014-83-K-0026)
(AD-A164867; EMORY/DC/TR/8) Avail: NTIS HC A02/MF A01 CSCL 06/1

Bioanalytical applications of fluorescence quenching are described. Both static and dynamic quenching processes, as applied to biochemistry, are reviewed. New developments and future trends of research in the area are discussed with regard to improved measurements. GRA

N86-26400# Ballistic Research Labs., Aberdeen Proving Ground, Md.
AIR COMPRESSION HEATING IGNITION OF HIGH EXPLOSIVES IN THE LAUNCH ENVIRONMENT
John Starkenberg, Lewis H. Ervin, and Doenee L. McFadden Feb. 1986 34 p
(AD-A164961; BRL-TR-2709) Avail: NTIS HC A03/MF A01 CSCL 19/1

Compressive heating ignition has been the subject of an extensive analytical and experimental study at the Ballistic Research Laboratory. The experimental investigation was conducted using an apparatus referred to as the activator, originally designed at Picatinny Arsenal as a laboratory-scale artillery setback simulator. Several explosives have now been tested. These are TNT, composition-B (comp-B), composition A3 (comp-A3) type II, R8151 (German formulation for the 120 mm round), LX-14, and EARK-25 (an experimental intermolecular explosive). Pressurization rate and cavity size are the principal parameters governing compressive heating ignition. Although ignition may be inhibited by limiting the peak pressure, this did not appear to occur in the activator. Studies of precompression of both cut and polished and as cast surfaces indicated that the state of the explosive surface grossly affects sensitivity to this ignition mechanism. Sensitivity is greater for surfaces which have been precompressed. Geometries which generate convergent airflow yield ignition with milder stimuli than are required with planar geometries. TNT was found to be more sensitive than comp-B when both were precompressed. Comparison of unprecompressed explosives using bubble tests showed that TNT was less sensitive that comp-B and indicated that precompression more effectively seals TNT surfaces. GRA

N86-26401# Georgia Inst. of Tech., Atlanta. School of Geophysical Sciences.
OPTICAL ABSORPTION CHARACTERISTICS OF AEROSOLS Final Report, 26 Jan. 1982 - 30 Jun. 1985
E. M. Patterson 11 Sep. 1985 35 p
(Contract F19628-82-K-0021)
(AD-A165216; AFGL-TR-85-0204) Avail: NTIS HC A03/MF A01 CSCL 07/4

The absorption of well documented, highly absorbing submicron aerosols has been measured by means of diffuse reflectance and diffuse transmission techniques. The intent of these measurements was to compare the different techniques and to provide calibration of these absorption measurements in terms of aqueous transmission measurements. These measurements indicate that there is a consistency among the absorption techniques that the differences between absorption in an aqueous and in an air suspension need to be considered in calibrations of absorption techniques, and that the diffuse transmission and diffuse reflectance measurements using the dilution technique appear to yield consistent results. GRA

N86-26402# Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
ELECTRODE PROCESSES IN POROUS ELECTRODES Final Technical Report, Sep. 1984 - Nov. 1985
T. Katan, P. J. Carlen, and J. R. Driscoll 26 Nov. 1985 11 p
(Contract N00014-80-C-0403)
(AD-A165410; LMSC-F104470) Avail: NTIS HC A02/MF A01 CSCL 07/4

This is the final technical report for an ONR contract. The scope of the effort for this period was to address novel methods of investigation of silver electrodes in order to better understand the chemical and physical processes which occur during charge and discharge. Three areas of study were covered by this effort. The first was the development of a mass spectrometric procedure to determine the distribution of silver (I) oxide and silver (II) oxide in a silver electrode at any stage of the charge-discharge process. The second was the development of a rapid analytical technique for the determination of silver (III) oxide in a silver electrode. The third was a preliminary study of the application of acoustic analysis to give a more complete understanding of the processes occurring during charge and discharge of silver electrodes. The results of these investigations are detailed in this report. GRA

N86-26403# Boston Univ., Mass. Dept. of Chemistry.
SPECTROSCOPIC INVESTIGATIONS OF ORGANIC MOLECULES ON GRAPHITE SURFACES Final Report, 1 Jul. 1982 - 31 Dec. 1985
Richard H. Clarke 26 Feb. 1986 5 p
(Contract DAAG29-82-K-0124)
(AD-A165431; ARO-19141.3-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

The research program conducted over the past three years under ARO sponsorship focused on the spectroscopic investigation of polycyclic aromatic molecules adsorbed onto the surface of graphite. The overall aim of the investigation was to characterize the structural features of the adsorbed complex and to identify the nature of the interactions which stabilize them. Our approach was to examine a series of prototypical aromatic molecules bound to highly oriented pyrolytic graphite by optical, magnetic resonance,

and Raman spectroscopy. Results in several areas of significance were obtained in the course of the research program. In summary, these were: observance of optical and ODMR spectra of photoexcited quinoline and quinoxaline on graphite; observance of resonance Raman scattering from chlorophyll on graphite; observance of ODMR from chlorophyll on graphite; determination of the chlorophyll geometry on the graphite surface; demonstration of the feasibility of Raman-detected ODMR on surfaces. GRA

N86-26404# Air Force Geophysics Lab., Hanscom AFB, Mass.
STUDIES OF NEGATIVE ION REACTIONS: SOLVATED IONS AND STRONG ACIDS
John F. Paulson, Albert A. Viggiano, Michael Henchman, and Fred Dale 7 Mar. 1986 7 p
(AD-A165484; AFGL-TR-86-0049) Avail: NTIS HC A02/MF A01 CSCL 07/4

The reactions of several negative ion species with up to three solvate molecules have been studied in a variable temperature selected ion flow tube. The reactions include association of some species of interest in the stratosphere and some proton transfer reactions of the strong and super acids. GRA

N86-26405# California Univ., Berkeley. Lawrence Berkeley Lab.
CARBON MONOXIDE INDUCED ORDERING OF ADSORBATES ON THE Rh(111) CRYSTAL SURFACE
C. M. Mate, B. E. Bent, and G. A. Somorjai Sep. 1985 9 p Presented at the 4th Conference on Vibrations at Surfaces, Bowess-on-Windermere, England, 15-19 Sep. 1985 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE86-004104; LBL-20360; CONF-8509183-2) Avail: NTIS HC A02/MF A01

It is found that the coadsorption of CO with ethylidyne, propylidyne, acetylene, fluorobenzene, benzene, and sodium on the Rh(111) surface induces ordering in the adsorbed overlayer. This phenomenon was studied using high resolution electrol energy loss spectroscopy (HREELS), low energy electron diffraction (LEED), and thermal desorption spectroscopy (TDS). The HREELS indicates that the adsorbates maintain their molecular integrity when coadsorbed with CO though a change in adsorption site sometimes occurs. In all cases, the C-O stretching frequency of coadsorbed CO is substantially reduced from that of CO adsorbed on clean Rh(111) and ranges from 1410 cm(-1) for CO coadsorbed with sodium to 1790 cm(-1) for CO coadsorbed with ethylidyne. DOE

N86-26406# Texas A&M Univ., College Station. Dept. of Chemistry.
PHOTOELECTROCHEMICAL REDUCTION OF CARBON DIOXIDE Annual Report, May 1984 - Apr. 1985
K. Chandrasekaran and J. O. Bockris Jul. 1985 68 p refs
(Contract GRI-5084-260-0982)
(PB86-157864; GRI-85/0176) Avail: NTIS HC A04/MF A01 CSCL 07D

Surface states at semiconductor-electrolyte interfaces were determined under illumination for CdTe, GaP and Si. The faradaic reaction involved was photoelectrochemical reduction of CO2 on CdTe and GaP and H2 evolution on Si. New equivalent circuits are proposed to represent the semiconductor-electrolyte interface under illumination. Surface state density is calculated per unit area at a given bias potential from integral surface state capacitance. Surface states at Si - aqueous H2SO4 interface act as recombination centers for the photogenerated electron hole pair annihilation. Surface states at CdTe-electrolyte interface act as faradaic mediators for CO2 reduction. It is proposed that adsorbed ions and radicals induce surface states. Potential of zero charge was determined for semiconductor electrolyte interfaces using Herbert pendulam and the results are discussed for several interfaces. GRA

N86-26407# Yale Univ., New Haven, Conn.
IN SITU MONITORING OF ELECTROCHEMICAL REACTIONS BY SURFACE ENHANCED RAMAN SCATTERING Annual Report, 1 Jul. 1984 - 30 Jun. 1985
R. K. Chang and V. E. Henrich Nov. 1985 23 p
(Contract GRI-5083-260-0795)
(PB86-157500; GRI-85/0262) Avail: NTIS HC A02/MF A01 CSCL 07D

Surface enhanced Raman scattering (SERS) was applied in investigating the nature of the water adsorbates and the protonation of Ag-oxides on Ag electrodes immersed in various electrolytes and undergoing oxidation-reduction cycles. The vibrational frequency of the O-D stretching mode of water adsorbates was determined for the two possible orientations (oxygen pointing away from or toward the Ag surface) and the two possible species (deuterium or hydrogen) on the other bond. Chemical reactions on Au colloids and Ag powder were also investigated as a first step toward the eventual usage of SERS for real-time monitoring of adsorbate species on industrial catalysts. To better quantify the SERS on metallic microstructures, e-beam lithography was used to produce microstructure arrays of uniform size, shape, and separation. Significant progress was made in measuring the surface enhanced inelastic scattering in the low frequency (0-250/cm) by incorporating a 12 vapor cell as a prefilter in front of the optical multichannel analyzer. GRA

N86-26408# Dow Corning Corp., Midland, Mich.
INVESTIGATION OF STRUCTURE-PERMEABILITY RELATIONSHIPS OF SILICONE POLYMER MEMBRANES Annual Interim Report, Oct. 1984 - Sep. 1985
K. Venkataraman, S. A. Stern, and J. E. Mark Oct. 1985 223 p refs Prepared in cooperation with Syracuse Univ., N.Y. and Cincinnati Univ., Ohio
(Contract GRI-5082-260-0666)
(PB86-157179; GRI-85/0246) Avail: NTIS HC A10/MF A01 CSCL 07D

An experimental apparatus was set up to determine the chemical and thermal stability of various silicone membranes to NH3, H2S and COS. Root-mean-square-end-to-end distance measurements were completed for (MePrSiO)x and (MeHxSiO)x. The electronic and conformation properties of Si-O-Si bond were studied using molecular orbitals (MO). Gas permeability and solubility data obtained indicate that the solubility and hence the permeability decreases with decreasing critical temperature of the penetrant except in the case of He and H2. The substitution of bulkier functional groups in the side-chains of a silicone polymer results in a decrease in the gas permeability of the polymer, due mainly to a decrease in the diffusivity of the penetrant in the polymer. The selectivity of the polymer is not affected by the substitution of bulkier functional groups in the side chain. A correlation was obtained for the solubility coefficient in Henry's law limit for different penetrants in a given silicone polymer. GRA

N86-26409# National Bureau of Standards, Gaithersburg, Md. Office of Standard Reference Data.
STANDARD REFERENCE DATA PUBLICATIONS, 1964-1984
J. C. Sauerwein and G. R. Dalton Dec. 1985 147 p
(PB86-155587; NBS-SP-708; LC-85-600607) Avail: NTIS HC A07/MF A01; also available SOD $5.00 as SN003-003-02705-7 CSCL 07D

The National Bureau of Standards' Office of Standard Reference Data manages a network of data centers that prepare evaluated data bases of physical and chemical properties of substances. Data bases are available in printed form, on magnetic tapes and through on-line computer networks. This document provides a comprehensive list of the products available from the National Standard Reference Data System (NSRDS) for the years 1964 to 1984, including indexes qualified by author, material, and property terms. Ordering information and current prices can be found at the end of this document. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-26410*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SURFACE FILM EFFECTS ON DROP TUBE UNDERCOOLING STUDIES Final Report
E. C. Ethridge and W. F. Kaukler (Alabama Univ., Huntsville) Apr. 1986 37 p refs
(NASA-TM-86547; NAS 1.15:86547) Avail: NTIS HC A03/MF A01 CSCL 11F

The effects of various gaseous atmospheric constituents on drop-tube solidified samples of elemental metals were examined from a microstructural standpoint. All specimens were prepared from the purest available elements, so effects of impurities should not account for the observed effects. The drop-tube gas has a definite effect on the sample microstructure. Most dramatically, the sample cooling rate is effected. Some samples receive sufficient cooling to solidify in free fall while others do not, splating at the end of the drop tube in the sample catcher. Gases are selectively absorbed into the sample. Upon solidification gas can become less soluble and as a result forms voids within the sample. The general oxidation/reduction characteristics of the gas also affect sample microstructures. In general, under the more favorable experimental conditions including reducing atmospheric conditions and superheatings, examination of sample microstructures indicates that nucleation has been suppressed. This is indicated by underlying uniform dendrite spacings throughout the sample and with a single dendrite orientation through most of the sample. The samples were annealed yielding a few large grains and single or bi-crystal samples were commonly formed. This was especially true of samples that were inadvertently greatly superheated. This is in contrast with results from a previous study in which surface oxides were stable and contained numerous sites of nucleation. The number of nucleation events depends upon the surface state of the specimen as determined by the atmosphere and is consistent with theoretical expectations based upon the thermodynamic stability of surface oxide films. Oxide-free specimens are characterized by shiny surfaces, with no observable features under the scanning electron microscope at 5000X. Author

N86-26411# Aeronautical Research Labs., Melbourne (Australia). Materials Research Lab.
SLOW STRAIN RATE TESTING OF HIGH STRENGTH LOW-ALLOY STEELS: A TECHNIQUE FOR ASSESSING THE DEGREE OF HYDROGEN EMBRITTLEMENT PRODUCED BY PLATING PROCESSES, PAINT STRIPPERS AND OTHER AIRCRAFT MAINTENANCE CHEMICALS
W. J. Pollock and C. Grey Dec. 1985 42 p
(AR-004-060; ARL-MAT-R-118) Avail: NTIS HC A03/MF A01

A slow strain rate tensile test which can be used to quantify rapidly in a statistically rigorous manner the severity of hydrogen embrittlement produced in high strength 4340 steel by paint strippers and plating processes is demonstrated. The results of multiple slow strain rate tests conducted at a crosshead displacement rate of .0002 mm/s using notched specimens in various paint strippers show that a minimum mean fracture stress and maximum standard deviation can be defined that correlates with the pass/fail criterion in standard notched C-ring tests. The advantages of using a slow strain rate test as a viable alternative to existing standard methods for hydrogen embrittlement testing are discussed. Author

N86-26412*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OXIDATION AND EMITTANCE OF SUPERALLOYS IN HEAT SHIELD APPLICATIONS
Karl E. Wiedemann (Analytical Services and Materials, Inc., Hampton, Va.), Ronald K. Clark, and Jalaiah Unnam Jun. 1986 20 p Presented at the TMS-AIME Fall Meeting, Toronto, Ontario, 13-17 Oct. 1985
(NASA-TP-2578; L-16104; NAS 1.60:2578) Avail: NTIS HC A02/MF A01 CSCL 11F

Recently developed superalloys that form alumina coatings have a high potential for heat shield applications for advanced aerospace vehicles at temperatures above 1095C. Both INCOLOY alloy MA 956 (of the Inco Alloys International, Inc.), an iron-base oxide-dispersion-strengthened alloy, and CABOT alloy No. 214 (of the Cabot Corporation), an alumina-forming nickel-chromium alloy, have good oxidation resistance and good elevated temperature strength. The oxidation resistance of both alloys has been attributed to the formation of a thin alumina layer (alpha-Al2O3) at the surface. Emittance and oxidation data were obtained for simulated Space Shuttle reentry conditions using a hypersonic arc-heated wind tunnel. The surface oxides and substrate alloys were characterized using X-ray diffraction and scanning and transmission electron microscopy with an energy-dispersive X-ray analysis unit. The mass loss and emittance characteristics of the two alloys are discussed. Author

N86-26413*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYSIS OF THE PHYSICAL ATOMIC FORCES BETWEEN NOBLE GAS ATOMS, ALKALI IONS AND HALOGEN IONS
John W. Wilson, John H. Heinbockel (Old Dominion Univ., Hampton, Va.), and R. A. Outlaw Jun. 1986 37 p
(NASA-TP-2568; L-16093; NAS 1.60:2568) Avail: NTIS HC A03/MF A01 CSCL 07D

The physical forces between atoms and molecules are important in a number of processes of practical importance, including line broadening in radiative processes, gas and crystal properties, adhesion, and thin films. The components of the physical forces between noble gas atoms, alkali ions, and halogen ions are analyzed and a data base for the dispersion forces is developed from the literature based on evaluations with the harmonic oscillator dispersion model for higher order coefficients. The Zener model of the repulsive core is used in the context of the recent asymptotic wave functions of Handler and Smith; and an effective ionization potential within the Handler and Smith wave functions is defined to analyze the two body potential data of Waldman and Gordon, the alkali-halide molecular data, and the noble gas crystal and salt crystal data. A satisfactory global fit to this molecular and crystal data is then reproduced by the model to within several percent. Surface potentials are evaluated for noble gas atoms on noble gas and salt crystal surfaces with surface tension neglected. Within this context, the noble gas surface potentials on noble gas and salt crystals are considered to be accurate to within several percent. Author

N86-26414*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HEAT TREATMENT FOR SUPERALLOY Patent Application
Fredric H. Harf, inventor (to NASA) Filed 24 Feb. 1986 11 p
(NASA-Case-LEW-14262-1; NAS 1.71:LEW-14261-1; US-Patent-Appl-SN-832296) Avail: NTIS HC A02/MF A01 CSCL 11F

A cobalt-free nickel-base superalloy composed of in weight % 15 Cr - 5 Mo - 3.5 Ti - 4 Al - 0.07 (max) C - remainder Ni is given a modified heat treatment. With this heat treatment the cobalt-free alloy achieves certain of the mechanical properties of the corresponding cobalt-containing nickel-base superalloy at 1220 F (650 C). Thus, strategic cobalt can be replaced with nickel in the superalloy. NASA

N86-26415# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FERROMAGNETIC DIELECTRIC SUBSTANCE
Yu. G. Borzyak, N. N. Oster-Volkov, A. I. Rolik, and A. I. Yakovlev 17 Dec. 1985 5 p refs Transl. into ENGLISH from Russian Patent no. 169706 (17 Mar. 1965) p 1-2
(AD-A163214; FTD-ID(RS)T-1203-85; FTD-ID(RS)T-1227-85) Avail: NTIS HC A02/MF A01 CSCL 11/6

The claim of this invention is a ferromagnetic dielectric substance on the basis of a magnetically soft iron powder and

polymer thermoreactive compound as the binder, which differs in that for the purpose of ensuring high heat resistance and mechanical strength, the compound indicated consists of a furan epoxy resin with the addition of a hardener (hexamethylene diamine or polyethylene polyamine) and a fiberglass admixture. GRA

N86-26416# Illinois Univ., Urbana. Dept. of Metallurgy and Mining Engineering.
HYDROGEN EMBRITTLEMENT OF NICKEL: MODELING OF THE EFFECT OF DIFFUSIVE SEGREGATION OF HYDROGEN ON INTERGRANULAR FRACTURE
D. H. Lassila and H. K. Birnbaum Jan. 1986 15 p
(Contract N00014-83-C-0468)
(AD-A163415) Avail: NTIS HC A02/MF A01 CSCL 11/6

Grain boundary fracture of hydrogen-charged nickel was studied under test conditions where hydrogen is essentially immobile. Prior to testing, hydrogen was allowed to diffuse during aging treatments. Experimental results show that the transition in the fracture mode from ductile rupture to intergranular is strongly dependent on aging temperature and time as well as initial bulk hydrogen concentration. Analytical modeling of these dependencies using established thermodynamic and kinetic relationships indicates that grain boundary hydrogen concentration controls the fracture mode of hydrogen-charged nickel at low temperatures. GRA

N86-26417# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Facility.
THE INHIBITION OF VAPOR-PHASE CORROSION. A REVIEW Interim Report, 1 Jul. - 30 Sep. 1985
George E. Fodor Oct. 1985 64 p
(Contract DAAK70-85-C-0007)
(AD-A163430; BFLRF-209) Avail: NTIS HC A04/MF A01 CSCL 11/6

This report documents a limited literature review on vapor phase corrosion and its inhibition. The direct cost of atmospheric corrosion of metals and alloys in the United States alone has been estimated to be between $5 billion to over $20 billion annually. This atmospheric corrosion, known by some researchers as vapor phase corrosion (VPC), is due to the individual and combined action of oxygen, moisture, and atmospheric pollutants. Additional contributors to VPC are rain, snow, dust, soot, ash, wind, and radiation (light, heat, etc.). The rate of VPC may be accelerated by both acids and bases, depending upon the metal. Rosenfeld showed that the mechanism of this attack is electrochemical, in which the electrolyte is composed of a thin film of humidity on the surface of the metal. Detrimental effects caused by photochemical reactions of sulfur dioxide and nitrogen oxides have been demonstrated. Classical methods of protecting equipment from atmospheric attack include: (1) using coating materials or paints, and (2) alloying the metal to increase its resistance to corrosion. An effective and relatively inexpensive method of controlling VPC in closed environments is through the use of vapor phase corrosion inhibitors (VCI). These materials, while having an appropriate vapor pressure, possess high passivating properties, strong tendencies toward surface adorption, and the ability to form a comparatively strong and stable bond with the metal surface. GRA

N86-26418# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials Engineering.
CRACK PROPAGATION IN POWDER METALLURGY HOT ISOSTATICALLY PRESSED NICKEL-BASED ALLOY Annual Report, 1 Jan. - 31 Dec. 1984
Richard W. Hertzberg 5 May 1985 28 p refs
(Grant AF-AFOSR-0029-83)
(AD-A164587; AFOSR-85-0672TR) Avail: NTIS HC A03/MF A01 CSCL 11/6

The room temperature threshold fatigue behavior of P/M HIP'd L.C. Astroloy has been examined. Material with grain sizes ranging from 5 micrometers to 50 micrometers has been tested to investigate the influence of grain size on the threshold response. In disc compact tension specimens grain size is observed to have little influence on the threshold values; in contrast tests conducted in four point bend specimens exhibit lower threshold values and display a dependence on grain size with larger grain sizes giving higher threshold values. Consideration has also been given to the growth of short cracks under cyclic loading at low stress intensities. The data reveal that under these conditions short cracks propagate at a consistently faster rate than long cracks subject to the same nominal stress intensity. Analytical work has been conducted which suggests that this behavior may be rationalized in terms of a more appropriate driving force for crack extension. Detailed microstructural information has been collected which identifies the major second phase particles present in the alloy. The effect of simple heat treatments on the distribution of these particles has been observed to be negligible. GRA

N86-26419# Lehigh Univ., Bethlehem, Pa. Center for Surface and Coatings Research.
CORROSION CONTROL THROUGH A BETTER UNDERSTANDING OF THE METALLIC SUBSTRATE/ORGANIC COATING/INTERFACE Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Henry Leidheiser, Jr., Egene M. Allen, Frederick M. Fowkes, Richard D. Granata, and Jack F. McIntyre 31 Jan. 1986 175 p
(Contract N00014-79-C-0731)
(AD-A164734; AR-6) Avail: NTIS HC A08/MF A01 CSCL 11/6

The contents of this report include: Sensitive Test for Water under an Organic Coating; The Effect of Temperature and Alkali Metal Cation on the Cathodic Delamination of Polybutadiene from Steel; Acid Base Effects in Glass/Bead Phenoxy Model Coating Systems; Surface Acidity of Ferric Oxides Studied by Flow Microcalorimetry; Inhibition of Iron Corrosion by Carboxylates in the Presence of Oxidants; Corrosion Behavior of Steel Pre-Treated with Silanes; Ionic Migration through Organic Coatings and Its Consequences to Corrosion; The Effect of Alkali Metal Hydroxides on the Dissolution Behavior of a Zinc Phosphate Conversion Coating on Steel and Pertinence to Cathodic Delamination; Corrosion beneath Polymeric Coatings on Thin Metal Films as Studied Using Concurrent AC Impedance and Parallel DC Resistance Measurements. GRA

N86-26420# Naval Postgraduate School, Monterey, Calif.
EFFECT OF CHROMIUM ADDITION TO THE LOW TEMPERATURE HOT CORROSION RESISTANCE OF PLATINUM MODIFIED ALUMINIDE COATINGS M.S. Thesis
Mark W. Dust Dec. 1985 77 p
(AD-A164755) Avail: NTIS HC A05/MF A01 CSCL 11/6

Marine gas turbines face many adverse conditions such as reduced fuel quality and a salt environment which present the sulfur, chloride, and sulfates required to initiate and propagate hot corrosion. A particularly severe type of hot corrosion is low temperature hot corrosion (LTHC) encountered at the low temperatures (600 to 750 C) used for low power destroyer operations. Platinum-aluminides have demonstrated great success as protective coatings which delay the onset of high temperature hot corrosion attack (800 to 1000 C). Chromium is known to provide good LTHC resistance. The effect of chromium addition to platinum aluminide coatings was investigated using two different nickel base superalloys, IN-738 (16% Cr) and IN-100 (10% Cr). GRA

N86-26421# Army Armament Research and Development Command. Watervliet, N. Y. Close Combat Armaments Center.
MATERIAL PROPERTY AND FRACTURE TESTING OF 7075-T6 EXTRUDED ALUMINUM Final Technical Report
M. A. Scavullo, J. H. Underwood, J. A. Kapp, and J. J. Zalinka Nov. 1985 27 p
(AD-A164933; AD-E440313; ARCCB-TR-85001) Avail: NTIS HC A03/MF A01 CSCL 19/1

The results of an experimental investigation into the material properties of 7075-T6 extruded aluminum used in the production of sabots for kinetic energy projectiles are presented. A comparison is made of two suppliers' materials, and a test is described that will show a difference exists in the two suppliers' materials. GRA

N86-26422# Martin Marietta Labs., Baltimore, Md.
THE DELAYED FRACTURE OF ALUMINUM ALLOYS Final

Report
Joseph R. Pickens and Timothy J. Langan Oct. 1985 82 p
(Contract N00014-83-C-0380)
(AD-A165203; MML-TR-85-64C) Avail: NTIS HC A05/MF A01
CSCL 11/6

The relationship between susceptibility to stress-corrosion cracking (SCC) and grain boundary (GB) chemistry was investigated in an attempt to elucidate the SCC mechanism in aluminum-zinc-magnesium alloys. Research was performed in two phases: (1) develop a method for inducing intergranular fracture on the actual grain boundary to enable measurement of GB composite by Auger electron spectroscopy (AES), and (2) attempt to relate changes in GB composition to changes in SCC susceptibility. The three methods of inducing intergranular fracture were evaluated: (1) fracture at near-liquid nitrogen temperatures, (2) fracture after pre-exposure to liquid gallium, and (3) fracture after pre-exposure to water vapor-saturated air (WVSA). Fracture after pre-exposure to WVSA (i.e., hydrogen pre-exposure embrittlement: H-PEE) is brittle intergranular and no reaction occurred with the fracture surface, thereby allowing composition to be measured by AES. The H-PEE fracture technique was then used to measure GB compositions for an alloy whose SCC susceptibility was varied by changing either solution heat-treatment temperature (SHT) or aging time. GRA

N86-26423# Rockwell International Corp., Golden, Colo.
CHARACTER OF SILVER LINING
1985 13 p Presented at the ASM Metals Congress - International Conference on Surface Modifications, Toronto, Ontario
(Contract DE-AC04-76DP-03533)
(DE86-001585; RFP-3662; CONF-8510160-9) Avail: NTIS HC A02/MF A01

A study has been done to characterize the structures developed in thin silver coatings deposited by the hot-hollow cathode method. The two variables examined were substrate temperature and deposition rate. Three different structural zones were seen at the different substrate temperatures. Deposition rates of 218, 374, and 684 A/sec were used to determine the effect of rate. Only the coupon coated at 218 A/sec and at 62C had any significant change in structure. DOE

N86-26424# Oak Ridge National Lab., Tenn.
EFFECTS OF RAPIDLY PULSED ION BOMBARDMENT ON MICROSTRUCTURE AND PHASE STABILITY IN A TI-MODIFIED STAINLESS STEEL
E. H. Lee, N. H. Packan, M. B. Lewis, and L. K. Mansur 1985 28 p Presented at the TMS/AIME Fall Meeting, Toronto, Ontario
(Contract DE-AC05-84OR-21400)
(DE86-004790; CONF-8510168-5) Avail: NTIS HC A03/MF A01

A low-swelling Ti-modified austenitic stainless steel has been bombarded with pulsed 4 MeV Ni(++) and in some cases simultaneously with 0.2 to 0.4 MeV He(+) ion beams at 948K over a dose range from 1 to 70 dpa. The interruption periods studied were 60, 1, 10(-3), or 10(-5) s on time with equal off time. At 1 dpa, pulsed irradiation caused interstitial dislocation loops (and subsequent MC precipitates) to be more refined with decreasing pulse periods down to the realm of the vacancy lifetime (10(-1) to 10(-3) s); still faster pulsing at 10(-5) s yielded little difference from steady irradiation. At higher doses, 40 to 70 dpa, pulsing reduced the amount of radiation-induced G phase. Long pulse periods promoted the thermally-stable MC phase, while shorter periods like 10(-3) s aided M6C and M23C6 development. In helium-implanted material bubbles were present for all pulsing conditions but bias-driven voids only developed in continuously-irradiated specimens. The results are interpreted with regard to the inherent fluctuations in point defect concentrations that result from cascade formation. DOE

N86-26425# Brookhaven National Lab., Upton, N. Y.
APPLICATIONS OF CURRENT MEASUREMENT OVER CORRODING METALLIC SURFACES
H. S. Isaacs 1985 8 p refs Presented at Ionic Currents Conf., Los Angeles, Calif., 2 Aug. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001174; BNL-36993; CONF-8508137-1) Avail: NTIS HC A02/MF A01

The scanning vibrating probe was used to study a number of different corrosion related systems: aluminum and iron pitting, metallic and organic coatings, pitting and crevice corrosion of stainless steels, and stress corrosion cracking. A few examples are presented to illustrate the technique. DOE

N86-26426# Northwestern Univ., Evanston, Ill.
EFFECTS OF QUENCHED-IN HYDROGEN ON DEFORMATION OF IRON SINGLE CRYSTALS
K. Hsashimoto and M. Meshii 1985 4 p Presented at the 7th International Conference on the Strength of Metals and Alloys, Montreal, Quebec, 12 Aug. 1985
(Contract DE-AC02-76ER-01367)
(DE86-001883; DOE/ER-01367/158; CONF-850823; COO-1367-158) Avail: NTIS HC A02/MF A01

Effects of hydrogen on mechanical properties were investigated in iron single crystals quenched from temperatures between 833 and 1133 K in a hydrogen atmosphere. The specimens were tensile-tested in a temperature range from 77 to 200 K. The specimens quenched from 1133 K deformed almost exclusively by twinning and fractured at 77 K, the reference specimens cooled slowly from 1133 K deformed plastically without twinning and failed in a ductile manner. The twinning stress was lower that the yield stress of the reference specimens. Aging at room temperature completely eliminated the effect of hydrogen-quenching, indicating that hydrogen dissolved in iron is responsible for twinning. The specimens oriented to the [110] tensile direction deformed substantially even if they were quenched from 1133 K in a hydrogen atmosphere. The flow stress of the hydrogen-quenched specimens was lower than that of the reference specimens in the temperature range from 77 to 200 K. This softening effect was smallest at 200 K. DOE

N86-26427# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
ROLE OF HYDROGEN, SULFUR AND OTHER IMPURITIES IN INTERGRANULAR FRACTURE IN IRON
K. S. Shin and M. Meshii 1985 4 p Presented at the 7th International Conference on the Strength of Metals and Alloys, Montreal, Quebec, 12 Aug. 1985
(Contract DE-AC02-76ER-01367)
(DE86-001884; DOE/ER-01367/157; CONF-850823; COO-1367-157) Avail: NTIS HC A02/MF A01

The intergranular fracture stress was investigated as a function of grain boundary concentrations of sulfur and/or H in polycrystalline MRC-VP iron specimens. The fracture energy was determined as a function of grain boundary sulfur concentration by analyzing the empirical relations with a modified Griffith equation. Two different effects of H, permanent and reversible, were identified. The permanent effect of H was caused by the formation of intergranular microcracks due to the precipitation of supersaturated H and recovered only partially after annealing at high temperatures. The size of microcracks was found to be proportional to the square of H concentration at grain boundaries. The predicted sizes of the microcracks agreed well with those determined metallographically. The present study clearly indicates that there is no synergistic effect between H and sulfur on intergranular fracture of iron regardless of whether the H effect is reversible or permanent. It was found that the primary effect of C is to displace sulfur from grain boundaries and thus to improve the grain boundary strength by reducing the embrittling effect of sulfur. The second effect of C is to increase the frictional stress to dislocation motion and thus to increase the apparent stress for intergranular fracture. DOE

N86-26428# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
COMPARISON OF HIGH TEMPERATURE STEAM OXIDATION BEHAVIOR OF ZIRCALOY-4 VERSUS AUSTENITIC AND FERRITIC STEELS UNDER LIGHT WATER REACTOR SAFETY

ASPECTS
S. Leistikow, G. Schanz, and Z. Zurek (Technical Univ. of Cracow, Poland) Dec. 1985 38 p Presented at Polish-German Seminar on Properties of High Temperature Alloys, Kracow, Poland, 3-6 Jul. 1983
(KfK-3994; ISSN-0303-4003; ESA-86-96912) Avail: NTIS HC A03/MF A01

The oxidation behavior of Zircaloy-4, ferritic-martensitic steel 1.4914, and austenitic stainless steel 1.4970 was compared. Nuclear reactor typical tube sections were exposed on both sides to superheated steam at temperatures from 600 to 1300 C for up to 6 hr. Corrosion resistance of Zircaloy-4 is between austenitic and ferritic steel. Because of the chosen wall dimensions, Zircaloy-4 and the austenitic steel behave similarly in that the faster oxidation of the thicker Zircaloy-4 cladding consumes the total wall thickness in a time equivalent to the slower oxidation of the thinner austenitic steel cladding. The ferritic steel cladding is consumed faster because of the lower oxidation resistance and the thinner wall thickness compared to the austenitic steel. Besides oxide scale formation, oxygen diffusion into the bulk of the metal, forming oxygen-containing phases was evaluated. Their influence on mechanical cladding properties and dimensional changes were studied. ESA

N86-26429# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
ENGINEERING PROPERTY COMPARISONS FOR 2324-T39 AND 2024-T351 ALUMINUM ALLOY PLATE
L. Schra and W. G. J. tHart 19 Mar. 1984 64 p
(Contracts NIVR-1906)
(NLR-TR-84021-U; B8576225; ESA-86-96979) Avail: NTIS HC A04/MF A01

Engineering properties of the plate material of aluminum alloy 2324-T39 and alloy 2024-T351 were compared. Tensile strength, fracture toughness, notched fatigue strength, and the resistance to fatigue crack propagation under constant amplitude and flight simulation loading were considered. Significantly higher strength and fracture toughness properties are found for 2324-T39, but the notched fatigue strengths of both alloys are comparable. Fatigue crack propagation resistance of 2324-T39 is slightly better than 2024-T351 under constant amplitude loading, but less resistant under flight simulation loading. The latter result indicates that replacement of 2024-T351 by 2324-T39 in fatigue critical areas is questionable. ESA

N86-26430# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
EFFECTS OF CLADDING AND ANODIZING ON FLIGHT SIMULATION FATIGUE OF 2024-T3 AND 7475-T761 ALUMINUM ALLOYS
R. J. H. Wanhill Jan. 1985 29 p refs
(Contracts NIVR-1891)
(NLR-TR-85006-U; B8578427; ESA-86-96984) Avail: NTIS HC A03/MF A01

The effects of cladding and anodizing on flight simulation (gust spectrum) fatigue of notch specimens and riveted lap joints of 2024-T3 and 7475-T761 aluminum alloy sheet were investigated. Stress levels were chosen to provide long life data (100,000 simulated flights) for bare alloy specimens. Cladding and anodizing have very large effects on the fatigue lives. Cladding and anodizing are always detrimental for notched specimens. For lap joints, cladding is detrimental only combined with anodizing. Anodizing is very beneficial for lap joints to be assembled from bare alloy sheets. With equivalent surface treatments 2024-T3 specimens always have longer average fatigue lives than 7475-T761 specimens. ESA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-26431# Kirk-Mayer, Inc., Albuquerque, N. Mex.
INFLUENCE OF DEPOSITION VARIABLES ON LPCVD TUNGSTEN FILMS DEPOSITED BY THE WF6/Si REDUCTION
M. E. Tracy 1985 16 p Presented at Workshop
(Contract DE-AC04-76DP-00789)
(DE86-003727; SAND-85-7254C; CONF-8510238-1) Avail: NTIS HC A02/MF A01

In an effort to isolate and study the Si reduction of WF6 by the reduction reaction 2 WF6 + 3 Si (YIELDS) 2 W + 3 SiF4, a systematic study of the influence of temperature, substrate doping, deposition time and variable flow rates of tungsten hexafluoride (WF6) was conducted. The effect of varying these parameters on film thickness, layer resistivity, encroachment and adhesion was investigated. A set of operating conditions has been defined that yield stable, adherent, self-limiting films of -100A thickness that are free from encroachment. Film quality was found to be relatively insensitive to moderate variations in process parameters, a favorable indication in terms of process integration and manufacturability. DOE

N86-26432# Oak Ridge National Lab., Tenn.
HARDNESS OF ION IMPLANTED CERAMICS
W. C. Oliver, C. J. McHargue, G. C. Farlow, and C. W. White 1985 11 p Presented at the Materials Research Society Meeting Prepared in cooperation with Wright State Univ., Dayton, Ohio
(Contract DE-AC05-84OR-21400)
(DE86-004771; CONF-851217-21) Avail: NTIS HC A02/MF A01

It has been established that the wear behavior of ceramic materials can be modified through ion implantation. Studies have been done to characterize the effect of implantation on the structure and composition of ceramic surfaces. To understand how these changes affect the wear properties of the ceramic, other mechanical properties must be measured. To accomplish this, a commercially available ultra low load hardness tester has been used to characterize Al2O3 with different implanted species and doses. The hardness of the base material is compared with the highly damaged crystalline state as well as the amorphous material. DOE

N86-26433# Sandia National Labs., Albuquerque, N. Mex.
FORMATION OF SURFACE LAYERS OF ICOSAHEDRAL Al(Mn)
J. A. Knapp and D. M. Follstaedt 1985 22 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-004606; SAND-85-1335C; CONF-851217-19) Avail: NTIS HC A02/MF A01

Surface layers of the icosahedral phase of Al(Mn) have been formed from thin, alternating Al/Mn layers deposited on Al or Fe surfaces by rapid electron-beam or laser melting, by ion beam mixing, and by solid-state diffusion. The electron beam and laser treatments are similar to other liquid quenching techniques used previously to form the phase, but have well defined temperature histories which place limits on the melting point of the icosahedral phase, the time needed to its nucleation from the melt, and its growth velocity. Ion beam mixing is a way of forming the icosahedral phase which is quite different from melt quenching; the phase is formed during ion beam mixing at temperatures of 100 to 200 C. For mixing at less than or equal to 60 C an amorphous phase with icosahedral short-range order is formed, and this phase can be converted to the icosahedral phase by subsequent annealing. Formation of the icosahedral phase by reacting the as-deposited layers in the solid state has not been reported elsewhere. The results presented here place new restrictions on proposed structural and thermodynamic models for the icosahedral phase. DOE

N86-26434*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

OXIDATION PROTECTING COATINGS FOR POLYMERS Patent Application
James S. Sovey, inventor (to NASA), Bruce A. Banks, inventor (to NASA), and Michael J. Mirtich, inventor (to NASA) Filed 27 Feb. 1986 12 p Sponsored by NASA
(NASA-Case-LEW-14072-3; NAS 1.71:LEW-14072-3;
US-Patent-APPL-SN-834977) Avail: NTIS HC A02/MF A01 CSCL 11B

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about four volume percent polymer to provide flexibility. NASA

N86-26435*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYETHER-POLYESTER GRAFT COPOLYMER Patent Application
Vernon L. Bell, inventor (to NASA) Filed 24 Apr. 1986 20 p Sponsored by NASA
(NASA-Case-LAR-13447-1; NAS 1.71:LAR-13447-1;
US-Patent-Appl-SN-855879) Avail: NTIS HC A02/MF A01 CSCL 11B

This invention relates to a polyether graft copolymer having improved solvent resistance and crystalline thermally reversible crosslinks. The copolymer is prepared by a novel process of anionic copolymerization. The polymers of this invention exhibit good solvent resistance and are well suited for commercial aircraft parts. Previous aromatic polyethers, also well known as polyphenylene oxides, have certain deficiencies which detract from their usefulness. These well known commercial polymers are often soluble in common solvents including the halocarbon and aromatic hydrocarbon types of paint thinners and removers. This limitation prevents the use of these polyethers in structural articles that require frequent painting. In addition, the most popular commercially available polyether is a very high melting plastic. This makes it considerably more difficult to fabricate finished parts from this material. The present invention solves these problems by providing an aromatic polyether graft copolymer with improved solvent resistance and crystalline thermally reversible crosslinks. The graft copolymer is formed by converting the carboxyl groups of a carboxylated polyphenylene oxide polymer to ionic carbonyl groups in a suitable solvent, reacting pivalolactone with the dissolved polymer, and adding acid to the solution to produce the graft copolymer. NASA

N86-26436# Department of the Air Force, Washington, D.C.
PAINT REMOVAL PROCESS Patent Application
Roberts, inventor (to Air Force) Filed 18 Dec. 1985 13 p
(AD-D012167; US-Patent-Appl-SN-810140) Avail: NTIS HC A02/MF A01 CSCL 11/11

A process of stripping paint from aluminum employs plastic particulate having sharp edges, having a hardness of about 3.5 on the mohs' scale and having a range of sizes from about 30 to 40 u.s. standard sieve. This media strips aluminum without abrasion at a pressure of about 25 to 40 pounds per square inch at the nozzle. Other substrates other than soft plastic can be stripped without damage. GRA

N86-26437# Department of the Air Force, Washington, D.C.
ETHYNYL-CONTAINING AROMATIC POLYAMIDE RESINS Patent Application
Robert C. Evers, inventor (to Air Force) 10 Dec. 1985 26 p
(AD-D012169; US-Patent-Appl-SN-807426) Avail: NTIS HC A03/MF A01 CSCL 11/9

In accordance with the present invention there is provided a novel aromatic polyamide resin having repeating units, each containing at least one o-ethynyl amido subunits. The resins of this invention which contain the above subunit can be thermally treated to undergo intramolecular cyclization, without evolution of volatiles, into polyimidines. GRA

N86-26438# Department of the Air Force, Washington, D.C.
ETHYNYL-CONTAINING AROMATIC MONOMERS Patent Application
Robert C. Evers, inventor (to Air Force) Filed 10 Dec. 1985 26 p
(AD-D012170; US-Patent-Appl-SN-807155) Avail: NTIS HC A03/MF A01 CSCL 11/9

In accordance with the present invention there are provided novel aromatic monomers, each containing at least one o-ethynyl carboxylic acid halide subunit. The monomers of this invention which contain the above subunit can be reacted with amines to form aromatic polyamide resins which can be thermally treated to undergo intramolecular cyclization, without evolution of volatiles, into polyimidines. The first of the monomers of this invention is tolane-2,4'-dicarbonyl halide. The second of the monomers of this invention is a 2,5-bis (arylethynyl) terephthaloyl halide. GRA

N86-26439# Detroit Univ., Mich. Polymer Inst.
ENERGY ABSORPTION OF POLYURETHANE-BASED POLYMER ALLOYS Interim Technical Report, 1 Jul. - 31 Dec. 1985
Bijan Sedghi, Kachorn Wongkamolsesh, Daniel Klempner, and Kurt C. Frisch 31 Jan. 1986 48 p refs
(Contract DAAG29-85-K-0129)
(AD-A164537; ARO-22361.1-MS) Avail: NTIS HC A03/MF A01 CSCL 11/9

Interpenetrating polymer networks (IPNs), elastomers, and foams composed of polyurethanes and epoxies were prepared by the simultaneous technique. The effect of platelet geometry fillers (e.g., graphite, mica, glass) and cure time on the morphology of the IPNs was investigated. Fillers were incorporated by random batch mixing and the rubber roll mill technique. It was determined that low level of filler resulted in a small increase of dynamic mechanical properties (tan delta) and as the filler level increased, tan delta decreased. Samples with low post-curing times showed higher magnitudes of tan delta than samples with longer post-curing time. IPN foams with different ratios of polyurethane and epoxy were prepared at their sound absorption properties were measured by the impudance tube method. Different PU/Epoxy ratios showed different maximum sound absorption frequency ranges. In general, the IPN foams prepared showed higher sound absorption properties than the GM polyurethane foam reference. GRA

N86-26440# Massachusetts Univ., Amherst. Polymer Research Inst.
DYNAMIC ORIENTATION STUDIES OF POLYMERS Final Report, 1 Oct. 1981 - 30 Sep. 1984
Richard S. Stein 3 Feb. 1986 8 p refs
(Contract DAAG29-82-K-0010)
(AD-A164611; ARO-18537.1-CH) Avail: NTIS HC A02/MF A01 CSCL 20/6

Static and dynamic X-ray diffraction, small angle X-ray scattering, small angle light scattering, birefringence, and infrared dichroism studies have been carried out on crystalline polymers (mostly polyethylenes) and their blends. Preliminary small angle neutron scattering studies of their orientation have been made. GRA

N86-26441# National Bureau of Standards, Gaithersburg, Md.
STUDY OF CHARGE AND POLARIZATION DISTRIBUTION IN POLYMERS Final Report, 1 Jul. 1982 - 30 Jun. 1985
Aime S. DeReggi 21 Jan. 1986 11 p refs
(Contracts MIPR-ARO-58-82; MIPR-ARO-143-83)
(AD-A164633; ARO-18712.5-PH) Avail: NTIS HC A02/MF A01 CSCL 20/3

It has been established that space charge effects are important in determining the polarization distribution of ferroelectric polymers when these are poled under conditions of significant, though still extremely small, conductivity. Asymmetric distributions are observed and these are indicative not only of space charge present during poling but also of polarity-dependent barrier effects at the metallic electrode-polymer interfaces. Among the polymers surveyed, which gave simple asymmetric polarization profiles, PVF2 and P(VF2-TE) showed a tendency to pole most strongly in the regions near the poling anode indicating accumulation of negative charge during poling, while PVF and Nulon 11 tend to pole most

strongly near the poling cathode, indicating accumulation of positive charge. The difference among samples in the sign of the change accumulated during poling suggests that a basic relation exists between charging behavior and bulk or surface polymer structure; however, additional work is required to establish the nature of such a relation. Under conditions of negligible conductivity, the observation of nonuniform sample properties are suspected to be of morphological origin or due to pre-existing polarization of unknown origin. However, it appears that under these conditions, the polarization distributions are nominally symmetric. Studies of electron-beam irradiated PVC have revealed interesting, new information-storage properties of this material. GRA

N86-26442# Rutgers - The State Univ., Piscataway, N. J. Dept. of Mechanics and Materials Science.
FIELD-INDUCED CRYSTALLIZATION IN HIGHLY PLASTICIZED POLY(VINYLIDENE FLUORIDE) FILMS
J. I. Scheinbeim, B. A. Newman, and A. Sen 27 Jan. 1986 30 p refs
(Contract N00014-80-C-0795)
(AD-A164684; TR-7) Avail: NTIS HC A03/MF A01 CSCL 20/3

Highly plasticized films of poly(vinylidene fluoride) (PCF2) containing approximately 18% by weight of tricresyl phosphate (TCP) and with initial crystallinites (phase II) of approximately 15% were poled under high vacuum. The poling temperatures were 75 C and 90 C and the poling field was 250 KV/cm. The poling time was varied from 15 minutes to 240 minutes. Weight measurements and X-ray diffraction data of poled films showed that with increasing poling time, (up to 4 hrs) that plasticizer content decreased (to a minimum of 11%) and the crystallinity of the PVF2 films increased (to a maximum of 45%). The field induced crystallization occurred as highly oriented phase I crystals. After poling for 1 hour (at 90 C), a significant percent of the crystalline material was observed to be in the polar phase I form. At longer times, a measure of the relative percent of phase I with respect to the total crystallinity decreased. As expected, the piezoelectric strain coefficient d sub 31, stress coefficient e sub 31, and pyroelectric coefficient P sub y increased with increasing phase I content, reaching maximum values after a 1 hour poling time at 90 C of d sub 31 approx. = 10 PC/N, e sub 31 approx. = 11 mc/m2 and P sub y approx. = 17 micro Cm per deg K. The dynamic mechanical modulus and d ielectric constant (measured at 3 Hz) were found to be approx. 1.3 GN/sq m and approx. 14.7 respectively under these poling conditions. GRA

N86-26443# Naval Civil Engineering Lab., Port Hueneme, Calif.
THE EFFECTS OF STEEL PROFILE AND CLEANLINESS ON COATING PERFORMANCE Technical Note, Oct. 1979 - Sep. 1984
Richard W. Drisko, Eddy S. Matsui, and Lee K. Schwab Jan. 1986 33 p
(AD-A164788; NCEL-TN-1741) Avail: NTIS HC A03/MF A01 CSCL 11/3

A 5-year study was conducted in cooperation with the Steel Structure Painting Council (SSPC) to determine surface profile and cleanliness requirements for long-term performance of generic coating systems currently used on Navy shore facilities. The experimental design included two levels of cleaning (white metal finish and commercial finish), four levels of profile height (low, medium, high, and very high), eight levels of abrasive (eight different abrasives), and six levels of generic coating system (alkyd, acrylic latex, vinyl, epoxy, coal tar epoxy, and inorganic zinc/vinyl). Replicate sets of the different variations were exposed in a salt fog chamber and at test exposure sites in a tropical marine atmospheric environment at Kwajalein Atoll in the Marshall Islands; in an industrial environment at Pittsburgh, Pa.; and in a relatively mild marine atmospheric environment at Kure Beach, N.C. After 15 months of exposure at Kwajalein, relatively little change had occurred in the overall loss in bonding strength. Significantly different variations occurred between the different coating systems, and the range of values was greatly reduced. Salt fog exposure had a much greater effect on loss of adhesion than did natural exposure for 57 months for the periods measured. Levels of statistical significance for performance at Kwajalein varied greatly with time and were much greater on scribed than unscribed specimens. Author (GRA)

N86-26444# Naval Civil Engineering Lab., Port Hueneme, Calif.
EXPERIMENTAL POLYURETHANE FOAM (PUF) ROOFING SYSTEMS. 3. NAVAL STATION, ROOSEVELT ROADS, PUERTO RICO, AND NAVAL FACILITY, CAPE HATTERAS, NORTH CAROLINA Interim Report, Sep. 1978 - Mar. 1984
Spencer R. Conklin, Daniel A. Zarate, and Robert L. Alumbaugh Jan. 1986 61 p
(AD-A164833; NCEL-TN-1742) Avail: NTIS HC A04/MF A01 CSCL 11/9

This report presents information on field investigations of experimental polyurethane foam (PUF) roofing systems installed at the Naval Station, Roosevelt Roads, P.R., and the Naval Facility, Cape Hatteras, N.C. The roof systems at Roosevelt Roads included three different foams applied at two thicknesses, five protective coating systems applied at thicknesses recommended by their manufacturer, and two different mineral roofing granules applied in the wet topcoat. The majority of the housing units was coated with acrylic and silicone coating systems, but urethane/hypalon, modified urethane, and butyl/hypalon elastomeric coating systems were also used. The roofing system installed on the Galley at Cape Hatteras was acrylic elastomer coated PUF roof applied over a modified bitumen membrane. At Roosevelt Roads, the butyl/hypalon coated system weathered the best. Energy consumption at Roosevelt Roads decreased at most only 12 to 13% after foaming the roofs. Mineral roofing granules improved weathering characteristics for the acrylic systems but not the silicones. At Cape Hatteras, one-half of the acrylic-coated roof weathered very well, while the other half showed extensive blistering. GRA

N86-26445# Naval Research Lab., Washington, D. C.
BIODEUTERATED MATERIALS: HIGH-TEMPERATURE LUBRICANTS FROM ALGAE Interim Report, Oct. 1984 - Sep. 1985
Rex A. Neihof, Mark M. Ross, and Joseph E. Campana 6 Jan. 1986 21 p refs
(AD-A164913; NRL-R-8952) Avail: NTIS HC A02/MF A01 CSCL 11/8

Substitution of deuterium for hydrogen imparts an enhanced resistance to oxidation in materials such as lubricants. The exploitation of this and other novel properties of deuterated materials in applications of Naval interest is only beginning to be realized. As an alternative to the conventional chemical methods of synthesizing deuterated compounds employing high temperature and reducing conditions, the present work explores the possible advantages of using algae grown in deuterium oxide (D2O) to provide completely deuterated precursors that are suitable for synthesizing a variety of lubricants. By proper choice of organism and growth conditions, it was possible to obtain dense cultures of algae containing 50 to 60% of their dry weight as long-chain fatty acids with different degrees of unsaturation. This report outlines strategies for synthesizing lubricant materials from these fatty acids and discusses the extension of biosynthesis to other deuterated materials such as polymers. GRA

N86-26446# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricants Research Facility.
HIGH-TEMPERATURE LUBRICATION SYSTEMS FOR RING/LINER APPLICATIONS IN ADVANCED HEAT ENGINES Interim Report, Oct. 1984 - Jul. 1985
M. D. Kanakia, E. C. Owens, and M. B. Peterson Jul. 1985 66 p
Prepared in cooperation with Wear Sciences, Inc., Arnold, Md.
(Contracts DAAK70-82-C-0001; DAAK70-85-C-0007)
(AD-A164955; BFLRF-189) Avail: NTIS HC A04/MF A01 CSCL 11/8

An assessment of tribological requirements in upper cylinder area of advanced high temperature engines was made in terms of critical components and their operating conditions. The ring-liner applications are the most severe since they have high temperature (<800 F) and large number of sliding cycles 10 to the 8th power - 10 to the 10th power. This report explores and evaluates various

high temperature tribological systems lubricants, materials and lubricant delivery or supply systems for high temperature ring-liner applications. Author (GRA)

N86-26447# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
STRUCTURE/PROPERTY STUDIES OF A HETEROCYCLIC CONDUCTIVE POLYMER Final Report
Leonard J. Buckley 1 Nov. 1985 39 p
(AD-A164959; NADC-85160-60) Avail: NTIS HC A03/MF A01 CSCL 07/4

Oxidized conductive polypyrrole/anion materials have been electrochemically synthesized under various preparation conditions to study the influence of electrode potential, current density, and anion species on the composition, structure, and properties. Elemental analysis indicates an increase in the sulfur/nitrogen ratio as the electrode potential is increased for polypyrrole/tosylate (PP(+)/OTs(-)). This implies an increase in anion concentration (or extent of oxidation of polypyrrole chains) with potential. Tensile properties of PP(+)/OTs(-) films have been measured and indicate a strong dependence on synthesis potential and current density. The ultimate tensile strength was found to decrease with an increase in these parameters. The effect of the size of the dopant anion has also been addressed by incorporating various para-substituted benzene sulfonates as the electrolyte counterion in the reaction. Tensile strength, modulus, and strain behavior was examined and has shown a transition in the tensile storage modulus (E') at approximately 25 C. This transition was not dependent on anion species. GRA

N86-26448# Army Construction Engineering Research Lab., Champaign, Ill.
DEVELOPMENT OF A PORTABLE TEST KIT FOR FIELD-SCREENING PAINTS Final Report
Alfred D. Beitelman, Stanley M. Kanarowski, and Peter J. Hearst Jan. 1986 60 p refs
(AD-A164989; CERL-TR-M-86/06) Avail: NTIS HC A04/MF A01 CSCL 11/3

Facility engineers currently have no easy way of establishing if a paint coating is of suitable quality for satisfactory application and performance. As a result, most of the paint used is not tested for specification compliance, which can lead to premature coating failure. This research was undertaken to develop a simple, portable test kit that field personnel can use to check the basic qualities of oil-based and latex paints. The kit enables 14 properties such as drying time, hiding power, appearance, gloss, adhesion, and cleanability to be tested in the field. It is to be used as an initial screening device, so that only paints which do not appear to be equal to a standard need to be sent to a laboratory for more sophisticated testing. The kit's ease of use should encourage more testing prior to application, as well as avoiding the time and expense required for laboratory testing. Development of the kit is described, and instructions for its use are provided. GRA

N86-26449# Cincinnati Univ., Ohio. Dept. of Materials Science and Engineering.
STRUCTURE AND PROPERTIES OF POLYMERS AND ORGANOSILANES ADSORBED ONTO OXIDIZED ALUMINUM AND TITANIUM Final Report, 1 Jul. 1980 - 30 Sep. 1985
F. J. Boerio 31 Jan. 1986 43 p
(Contract N00014-80-C-0733)
(AD-A165210) Avail: NTIS HC A03/MF A01 CSCL 11/1

Wettability envelopes were constructed for mechanically polished iron, titanium, and aluminum from contact angles measured for selected liquids. The results indicated that typical epoxy adhesives should wet all three substrates. The failure path of iron/epoxy and titanium/epoxy lap joints exposed to water at 60 C for varying times was determined using x-ray photoelectron spectroscopy (XPS). When iron/epoxy lap joints were prepared from adherends pretreated with aqueous solutions of Gamma-aminopropyltriethoxysilane (Gamma-APS) at pH 8.0 and tested without exposure to water, failure was mostly within the primer. Joints prepared from adherends primed with Gamma-APS at pH 10.4 failed partly within the adhesive and partly near the interface. Iron/epoxy lap joints always failed in the primer near the primer/oxide interface when tested after exposure to water for seven days but very little corrosion of the substrates was observed. When titanium/epoxy lap joints were tested without exposure to water, failure was partly within the adhesive and partly near the primer/oxide interface regardless of the pH at which the primer was applied. However, the failure path shifted to near the primer/oxide interface after the joints were immersed in water for seven days. It was concluded that failure of the joints after exposure to water was associated with hydrolysis within the primer. The effect of silane primers on the failure properties of aluminum/epoxy tapered double cantilever beams was also investigated. GRA

N86-26450# METECH, Inc., Elverson, Pa.
APPLICATION OF CONDUCTIVE POLYMER TECHNOLOGY TO THE PRODUCTION OF A NOVEL MULTILAYER CAPACITOR
David Mandelblatt and R. Selwood 14 Jan. 1986 14 p
(Contract N00014-86-C-0008)
(AD-A165212) Avail: NTIS HC A02/MF A01 CSCL 09/1

Multilayer ceramic capacitors, due to their large capacitance, reduced volume and low cost, have become one of the fastest growing technologies in electronic devices. Present technology uses barium titanate as the dielectric which requires the use of precious metal (Pd, Pt, Au) internal electrodes as a result of the high firing temperatures (1300 to 1400C). These precious metals are responsible for 50 to 60% of the total cost of the capacitor and are subject to strategic foreign disruption. It is the goal of this investigation to evaluate the feasibility of using a polymer based dielectric and a polymer thick film metal electrode to build a multilayer capacitor that would eliminate the need for precious metals. Once this is accomplished, the next phase would ultimately involve the replacement of the silver in the polymer thick film electrode with synthetic metals. The work involved an extensive literature review, discussions with researchers active in this field and the testing of prototype polymer capacitors. Evaluations were carried out based on capacitance, permittivity dissipation factor and short-term stability. The initial results were considered encouraging and a continuing effort in this direction is most feasible. GRA

N86-26451# Ballistic Research Labs., Aberdeen Proving Ground, Md.
THERMAL RESPONSE TESTS OF CANDIDATE INSULATION SYSTEMS FOR THE CHLORINE TANK CAR Final Report, Dec. 1983 - Aug. 1984
William P. Wright, Wayne A. Slack, and Willis Jackson Feb. 1986 60 p
(AD-A165293; AD-F630715; BRL-TR-2712) Avail: NTIS HC A04/MF A01 CSCL 13/6

A number of thermal tests were performed on three insulation systems. The purpose was to ascertain if an insulation system consisting of existing materials could prevent the temperature of the shell of a chlorine tank car from exceeding 252 C (493 F) while the tank car is exposed to representative fire environments which can occur in a railroad accident. The significance of the temperature criteria is that a corrosive reaction between chlorine vapor and steel begins at approximately that temperature. GRA

N86-26452# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
ACID-CATALYZED DEGRADATION OF POLY(2-BUTYL-1,3,6-TRIOXOCANE)
James C. W. Chien, C. P. Lillya, and Bao-Bei Xu 10 Jan. 1986 33 p
(Contract N00014-83-K-0083)
(AD-A165327; TR-13) Avail: NTIS HC A03/MF A01 CSCL 07/3

Polyacetals, owing to the acid sensitivity of the acetal linkage, are attractive candidates for end uses in which acid sensitivity is a desirable property, e.g., photo- or electron-resists. Acid catalyzed degradation of poly (2-butyl-1,3,6-trioxocane) (1) has been studied. With ethyl tosylate as the catalyst, the cyclic monomer 2 was the

major product. The minor products are cis and trans isomers of C3H7CH=CH-OCH2CH2OCH2CH2OH, and three stereoisomers of C3H7CH=CH-OCH2CH2OCH2CH2O-CH=CH-C3H7 elucidated by 1H and 13C NMR, IR, electron impact and chemical ionization MS, and in the case of 2 also by comparison with an authentic sample. With 98% H2SO4 as the catalyst 2 is only a minor product. The major products are diethylene glycol, valeraldehyde, and 1,4-dioxane with some 2-butyl-1,3-dioxolane. Capillary GC/Mass spectrometry led to identification of the following less abundant products: tri-n-propylbenzene, alpha, beta-unsaturated aldehydes and cyclic dimer. The products of H2SO4-catalyzed decomposition of polymer were also obtained by heating monomer 2 with H2SO4. A detailed mechanism for the formation of the 8-member ring 2 in the decomposition is proposed which involves unzipping proceeds via open carbocation intermediates. According to the principle of microscopic reversibility, the same open carbocation is the propagating species in the polymerization of 2 under similar conditions. GRA

N86-26453# Vermont Univ., Burlington. Dept. of Chemistry.
ORGANOFUNCTIONAL PHOSPHAZENES AND ORGANOFUNCTIONAL PHOSPHAZENE POLYMERS Final Report
Christopher W. Allen 19 Feb. 1986 4 p refs
(Contract N00014-77-C-0605)
(AD-A165437; AD-F250510; TR-17) Avail: NTIS HC A02/MF A01 CSCL 07/3

The report provides a brief outline of the approaches used to build traditional polymers with cyclophosphazene moieties as substituents. The physical and chemical properties, including flame retardancy, of these materials are noted. GRA

N86-26454# Stanford Univ., Calif. Petroleum Research Inst.
APPARENT VISCOSITY MEASUREMENTS OF SURFACTANT FOAM IN POROUS MEDIA
R. J. Treiner, W. E. Brigham, and L. M. Castanier Dec. 1985 37 p
(Contract DE-AC03-81SF-11564)
(DE86-000260; DOE/SF-11564/13; SU-SUPRI-TR-48) Avail: NTIS HC A03/MF A01

The apparent viscosity of surfactant foam in a sand pack model was measured at reservoir flow velocities. The effects of foam quality, surfactant concentration, and flow rate were investigated. Ottawa sand, 120 to 140-mesh, was packed into a 1 by 24 inch tube. Porosity was 38%, and permeability ranged from 5 to 8 darcies. Foam of a known quality and flow rate was continuously injected into the sand pack until a steady state condition was reached. Pressure drop was measured across three different segments of the sand pack. A system back pressure of 50 psig was applied to minimize changing foam quality caused by gas expansion. The surfactant used in this study was Suntech IV. All measurements were made at room temperature. Results show that the apparent viscosity of surfactant foam ranges from 50 to 70 centipoise at reservoir flow velocities. Increasing the foam quality corresponded to a small increase in the apparent viscosity of foam. Changes in surfactant concentration from 0.005 to 0.05 wt % caused a rapid increase in apparent viscosity. Changes in concentration above 0.05 wt % had little effect on apparent viscosity. Increasing the flow rate resulted in a reduction of the apparent viscosity of foam. This pseudo-plastic flow behavior has been widely reported in the literature. The apparent viscosity of foam in porous media was significantly effected by flow rate history. DOE

N86-26455# Brandeis Univ., Waltham, Mass.
SYNTHESIS AND PROPERTIES OF NOVEL ELECTROACTIVE ORGANOMETALLIC POLYMERS Annual Progress Report, Mar. 7 - 1 Dec. 1985
M. Rosenblum 18 Dec. 1985 6 p
(Contract DE-FG02-85ER-45193)
(DE86-004951; DOE/ER-45193/T1) Avail: NTIS HC A02/MF A01

This report describes the synthesis and crystal structure of 1,8-diruthenocenylnaphthalene and the preparation of the first oligomers based on this system. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-26456# Mueller Associates, Inc., Baltimore, Md.
ADVANCED PROPULSION SYSTEMS AND ALTERNATIVE FUELS FOR NON-HIGHWAY TRANSPORTATION. AN ASSESSMENT OF UNIQUE AND PRIORITY RESEARCH AND DEVELOPMENT OPPORTUNITIES. VOLUME 3. A COMPENDIUM OF RESEARCH AND DEVELOPMENT Final Report
Sep. 1985 166 p
(Contract DE-AC01-84ER-30063)
(DE86-002975; DOE/ER-30063/T3-Vol-3) Avail: NTIS HC A08/MF A01

This report documents the combined results of a literature search and personal communications activity designed to identify on-going R and D and suggested R and D needs for advanced propulsion systems and alternative fuels utilization technologies for non-highway transportation applications. The results are presented in the three subsequent chapters of this report. Section 3 presents the results of the literature search. Some of the information reported in Section 3 was obtained through communications with and information received from various government and private R and D funding entities. Each identified R and D program or project is summarized and various additional information deemed pertinent is noted. Section 4 presents the results of discussions and communications with various private organizations and academic institutions. These discussions and communications were designed to buttress the literature search effort and were conducted independently of the literature search. Thus, some cross-reporting of research efforts will exist. Section 5 presents the results of personal communications with selected key researchers. This latter activity was designed to elicit recommendations of R and D needs, thus providing the workshop panel with additional advance information for its considerations as well as to provide additional input for the final assessments reported in Volume 1. DOE

N86-26457# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
TNT RDX AND HMX EXPLOSIVES IN SOILS AND SEDIMENTS. ANALYSIS TECHNIQUES AND DRYING LOSSES
J. H. Cragin, D. C. Leggett, B. T. Foley, and P. W. Schumacher Oct. 1985 18 p
(AD-A163278; CRREL-85-15; AMXTH-TE-TR-85038) Avail: NTIS HC A02/MF A01 CSCL 13/2

A method for the analysis of TNT, RDX and HMX explosives in soils and sediments has been developed. It consists of methanol extraction followed by reversed-phase high performance liquid chromatography using 10% acetonitrile/40% methanol/50% water as the eluant. This method was used to study the effect of various drying techniques on the recovery of TNT, RDX, and HMX from soil and sediment samples contaminated with high (%) and low (micron g/g) levels of these explosives. For highly contaminated samples, complete recovery of TNT and RDX was obtained using freeze drying while air drying at room temperature resulted in greater than 90% recovery for both explosives. Other techniques, such as oven drying at 105 C, oven drying at 45 C, microwave oven drying, and drying under infrared lamps, all resulted in greater losses, with TNT and RDX recoveries ranging from 76 to 90%. Drying losses were not due to simple volatilization containing low levels of TNT, RDX and HMX. Recoveries of all three explosives were quantitative for all the above drying techniques. Author (GRA)

N86-26458# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATIONS OF BURNING SURFACES OF PROPELLANT GRAIN WITH EMBEDDED METAL WIRES AND OF INTERNAL BALLISTICS OF SUCH MOTOR
H. Hongquing 19 Dec. 1985 18 p
(AD-A163361; FTD-ID(RS)T-0904-85) Avail: NTIS HC A02/MF A01 CSCL 21/9

The propellant grain with embedded metal wires capable of producing two-stage thrusts, which suffers complex surface changes during the combustion process, is analyzed. Seven pertinent items of this grain are summarized which are very useful for the studies of its complex burning surfaces and the derivation of its calculation formulas about the burning surfaces. The calculation formulas of burning surfaces and that of internal ballistics are combined to form a chain of control equations. With this control chain, the burning processes of different stage and phase can be predicted very accurately if a double iteration method which satisfies optimum control conditions is used. The entire calculation process is a very good simulation of combustion, and the calculated results are in good agreement with the experimental data. GRA

N86-26459# Defence Research Establishment Suffield, Ralston (Alberta).
THE EFFECT OF AIR GAPS ON THE PROPAGATION OF DETONATION IN CHARGES CONSISTING OF STACKED BLOCKS OF CAST TNT
A. W. Gibb Dec. 1985 89 p
(AD-A163398; AD-E500738; DRES-385) Avail: NTIS HC A05/MF A01 CSCL 19/1

A series of experiments was conducted to examine the influence on the uniformity of detonation propagation of air gaps between large blocks of slow-cooled cast TNT. Donor-receptor geometries examined were: (1) two blocks with the detonation front parallel to the gap edge, and (2) four blocks with one corner in common and the (planar) detonation front at an angle of 45 deg to the block edge. Air gaps from 3 mm to 25 mm were studied. The two-block configurations produced no distortion of the shape, but the measured detonation velocity in the donor blocks and the scatter in results in the receptor blocks were observed to be influenced by the orientation of the propagation velocity vector with respect to the long axis of the TNT crystals. The four-block configuration featured channelling of detonation gases ahead of the front in the air gaps, leading to an initially complex and distorted wave structure, as well as to a delay in reinitiation, in the vertically-opposite receptor block. The shape distortion and delay effects increased as the gap width was increased. GRA

N86-26460# Southwest Research Inst., San Antonio, Tex. Fuels and Lubricant Research Facility.
UNUSUAL CONTAMINANT IN JP-4 FUEL DELIVERED TO FORT CAMPBELL, FORT KNOX, AND TENNESSEE ARMY NATIONAL GUARD Interim Report, Apr. - Jul. 1985
J. G. Barbee, R. S. McInnis, K. B. Kohl, and L. L. Stavinoha Nov. 1985 86 p
(Contract DAAK70-85-C-0007)
(AD-A163399; AD-E500738; BFLRF-201) Avail: NTIS HC A05/MF A01 CSCL 07/4

Many common types of debris were encountered during the course of a recent investigation to identify an unusual contaminant present in jet fuel (JP-4) at three Army locations. Most of the other debris were materials commonly found in fuel samples, e.g., metal flakes, rust, fibers, dirt, etc. Various analytical techniques used in this evaluation indicated that the unusual flake-like organic debris was probably a manmade (synthetic) organic component and not a fuel product. It had a high melting point (> 200 C) and was insoluble in most common solvents. The physical appearance of the flakes (thin and flat while floating in the fluid) indicated that the material was originally formed or deposited in a thin layer prior to its introduction into the fuel. The most likely source of a material with these characteristics was an unpigmented paint or protective coating from one of the epoxy or similar resin families. Such a material could be introduced into the fuel by debonding or delamination of the contaminant from any handling, storage, or transportation equipment that contains such a coating. The elements, chemical bonds, and functional groups detected by the various analytical tests were consistent with this conclusion. The use of a light box for enhanced visual (Clean and Bright) evaluation is presented in this report. GRA

N86-26461# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
CRACK PROPAGATION AND BRANCHING IN BURNING SOLID PROPELLANTS AND IGNITION OF NITRAMINE-BASED COMPOSITE PROPELLANTS Annual Report, Nov. 1984 - Dec. 1985
Kenneth K. Kuo, John A. Moreci, Jong U. Kim, Takaaki Torikai, and Mark Grubelich Jan. 1986 116 p
(Contract N00014-79-C-0762)
(AD-A164630; AR-1) Avail: NTIS HC A06/MF A01 CSCL 21/9

Three major tasks performed during the report period of investigation were: (1) crack propagation and branching in burning solid propellants, (2) ignition of nitramine-based composite propellants under rapid pressurization, and (3) ignition of nitramine-based composite propellants by CO2 laser. Propellant samples have been recovered by interrupted burning experiments. Four modes of crack propagation and/or branching were observed. The amount of surface area generated by mixed or branched modes is substantially higher than that of the single crack propagation mode, and thus could cause sufficiently severe burning in the damaged zone to result in rocket motor failure. The crack propagation problem is analyzed through the use of basic physical principles, experimental results, and Schaper's theory of crack propagation. A set of governing dimensionless parameters which control and characterize the degree of damage has been obtained. These parameters can be used to develop guidelines for safe operating conditions of rocket motors. Ignition characteristics of a series of RDX-based composite propellants were studied. The times for the onset of light emission (t sub LE) of different propellants under rapid pressurization were compared. It is also found that propellant samples with shorter t sub LE do not necessarily show higher mass consumption, this indicates that propellant vulnerability should be evaluated by both t sub LE and the fraction of mass consumed. GRA

N86-26462# Fluorochem, Inc., Azusa, Calif.
RESEARCH IN ENERGETIC COMPOUNDS Interim Summary Report, 1 Jan. - 31 Dec. 1985
T. G. Archibald, L. C. Garver, M. P. Cohen, and K. Baum Feb. 1986 63 p refs
(Contract N00014-78-C-0147)
(AD-A164901; ONR-2-8) Avail: NTIS HC A04/MF A01 CSCL 07/3

Fluoronitro polymers for use as binders in pyrotechnics applications were investigated. Isopropyl 3,3-difluroroacrylate and 2,2-difluorovinyl isopropyl ketone were synthesized from 3-chloro-3, 3-difluoropropionate and 1-chloro-1,1-difluoro-4-methyl-3-pentanone. Attempted Michael addition reactions of nitronate ions to these olefins failed to give stable adducts. The geminal difluoroazides, 2-azido-2,2-difluoroacetophenone, 1-azido-1,1-difluoro-4-methyl-3-pentanone and isopropyl 3-azido-3,3-difluoropropionate were prepared from the corresponding chlorides with sodium azide. Reaction of lithium 2-nitropropane-1,3-diol acetonide with perfluoroalkyl iodides gave the corresponding 2-perfluoroalkyl-2-nitropropane-1,3-diacetonides. Work was continued on the synthesis of polynitro derivatives of the furofuran ring system. The intermediate furans such as 5-nitro-2-methyl-3-furanmethanol acetate, 3-methyl-2-furanmethanol acetate, and 2,3-furandi-methanol were synthesized, but closure of the second ring has not yet been effected. Work was begun on the synthesis of 1,1,3,3-tetranitrocyclobutane. The model compound 1,1-dinitrocyclobutane was prepared from 1-nitrocyclobutane. Oxidation of 1,3-diaminocyclobutane gave 1,3-dinitrocyclobutane. GRA

N86-26463# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A LUMPED PARAMETER CODE FOR REGENERATIVE LIQUID PROPELLANT GUNS
Terence P. Coffee Dec. 1985 154 p
(AD-A164960; BRL-TR-2703) Avail: NTIS HC A08/MF A01 CSCL 19/6

The governing ordinary differential equations for a lumped parameter model of a regenerative liquid gun are derived. A number of different options and assumptions are implemented. The equations are solved numerically using an efficient and robust computer code. The solutions are compared to a standard code for liquid propellant guns, and the strengths and weaknesses of each method are discussed. GRA

N86-26464# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
LC-(1)H NMR CHARACTERIZATION STUDIES OF TRICYCLIC AROMATICS AND OLEFINS IN DIESEL FUELS Final Report, Sep. 1982 - 31 Dec. 1985
T. E. Blass, W. R. Bebout, K. A. Caswell, L. Allen, and H. C. Dorn 18 Feb. 1986 55 p
(Contract N00014-82-K-2057; F65-571)
(AD-A165402) Avail: NTIS HC A04/MF A01 CSCL 07/4

New analytical approaches for determination of (1) tricyclic aromatics, (2) alkenes, and weight % data in Naval diesel fuels are described. Tricyclic aromatics are detected and characterized at concentrations as low as approx. 0.25% in diesel fuels. Various analytical approaches for characterizing alkenes in diesel fuels are also explored, including: (1) chromatographic separation of the alkene fraction in diesel fuels by AgNO3 impregnated chromatographic columns, and (2) a 19F NMR tagging method characterizing alkenes. Finally, a calculative method for conversion of LC-1H NMR molar data to weight % data for each chromatographic fraction in a fuel is described. GRA

N86-26465# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
IMPINGEMENT OF LIQUID FUEL SPRAYS ON HEATED WALLS Final Report, 1 Aug. 1982 - 10 Jul. 1985
Norman Chigier, Francisco Ruiz, and James Zurlo 12 Feb. 1986 81 p
(Contract DAAG29-82-K-0162)
(AD-A165422; ARO-19485.4-EG) Avail: NTIS HC A05/MF A01 CSCL 21/4

An experimental study was made of the structure of high speed Diesel jets. A constant volume chamber was constructed into which sprays of different liquids at a controlled pressure and duration can be injected. The chamber can be pressurized to a design pressure of 900 psi and heated to 750 F. An air operated pump provides liquid injection pressures up to 10,000 psi. Microphotographs of the spray showed the formation of a train of surface waves and the presence of liquid ligaments issuing from the main liquid jet in the radial direction. Discharge coefficients decreased with increasing injection pressure, indicating presence of cavitation in the nozzle. Injection of liquid into a coaxial stream of air with velocities up to 340 m/s allowed determination of the constant A in the aerodynamic theory which represents the intensity of surface perturbations before any amplification by shear occurs. Results of an experiment conducted with liquids of different vapor pressure on 5 nozzles, indicate tha cavitation is a function of a nondimensional pressure parameter. GRA

N86-26466# Mueller Associates, Inc., Baltimore, Md.
ADVANCED PROPULSION SYSTEMS AND ALTERNATIVE FUELS FOR NON-HIGHWAY TRANSPORTATION. VOLUME 1: AN ASSESSMENT OF UNIQUE AND PRIORITY RESEARCH AND DEVELOPMENT OPPORTUNITIES Final Report
Sep. 1985 60 p
(Contract DE-AC01-84ER-30063)
(DE86-002973; DOE/ER-30063/T1-Vol-1) Avail: NTIS HC A04/MF A01

This report is Volume 1 of a three-volume set documenting an assessment of unique and priority research and development opportunities associated with advanced propulsion systems and alternative fuels utilization for non-highway transportation applications. The air, rail, marine, and pipeline modes of transportation were addressed. More specifically, the scope of the study was focused upon advanced fuel-powered prime movers which are or could be applied to aircraft, locomotives, boats/ships, and pipeline pumping/compression station applications. Of note is the fact that advanced electric powered propulsion technologies were not addressed. (This is principally an issue for the rail and pipeline modes.) This report (Volume 1) presents the assessments and recommendations resulting from the study as well as supporting information and background discussions. DOE

N86-26467# Ricardo & Co., Engineers (1927) Ltd., Shoreham-by-Sea (England).
INVESTIGATION INTO ALTERNATIVE FUEL RATING TECHNIQUES Final Report
D. M. Doyle and J. R. Needham Nov. 1985 360 p
(Contract DE-AC01-83CE-50010)
(DE86-004277; DOE/CE-50010/1) Avail: NTIS HC A16/MF A01

An extensive range of fuels have been evaluated in representative naturally aspirated IDI and DI combustion systems with cylinder sizes of 0.61 and 0. 62 liters with rated speeds of 70 and 67 rev/s respectively. Performance, gaseous and particulate emissions and detailed combustion data were obtained, with the objective of correlating combustion and performance parameters with a view towards defining an engine-based fuel rating technique. The ASTM D613 procedure was found to not predict accurately the ignition delay of vegetable oil and volatile blends of naphtha and methanol with D.2. Petroleum and synthetic derived middle-distillates and a vegetable oil ester were ranked correctly. Ignition delay was found to feature mainly in defining cold start, noise and light load HC and CO emissions. A relatively simple rating method measuring ignition delay to rank these parameters, and heat release for NOx ranking, is discussed. Several reasons are given illustrating why an overall rating method will be very complex and perhaps not possible. Recommendations are made to highlight the requirements for improvement in fuel rating methods. DOE

N86-26468# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
SMOKELESS PROPELLANTS
Loughton, England Jan. 1986 178 p In ENGLISH and FRENCH Conference held in Florence, Italy, 12-13 Sep. 1985
(AGARD-CP-391; ISBN-92-835-0387-2) Avail: NTIS HC A09/MF A01

Eleven papers are presented from the conference. The specialist meeting was arranged in the following sessions: A review of smokeless propellant technology; Prediction and measurement of signature; Chemistry of smokeless propellants; and Smoke measurements. The purpose of the meeting was to bring together specialized experts in the field of smokeless propellants in order to discuss the definitions of the various degrees of smokelessness, and provide the results of the investigations performed in the last years. The achievements were discussed in the technical evaluation report, which suggests also several subjects for future investigations. For individual titles, see N86-26469 through N86-26479.

N86-26469# Royal Ordnance PLC, Waltham Abbey (England). Research and Development Centre.
SMOKELESS PROPELLANTS OF IMPROVED PERFORMANCE
E. A. Baker *In* AGARD Smokeless Propellants Jan. 1986 p 6-1 - 6-5 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

For double base propellants the high density of nitramines compared with nitrocellulose/nitroglycerine matrices of equivalent energy levels is particularly attractive where propellant energy levels or charge volumes are restrictive. The inclusion of nitramines generally reduced plateau burning rates and impairs plateau quality, but RDX filled extruded propellants with good plateau ballistics and low temperature dependence, suitable for boost applications

were developed. No departure from conventional EDB processing is involved. Author

N86-26470# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
PROPERGOL COMBUSTION BASED ON OCTOGENESIS [COMBUSTION DES PROPERGOLS A BASE D'OCTOGENE]
Guy Lengelle and Jean Duterque *In* AGARD Smokeless Propellants Jan. 1986 p 8-1 - 8-17 In FRENCH; ENGLISH summary (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

The investigation of the combustion of solid propellants based on HMX and energetic binder was carried out through the study of HMX and the energetic binder in self-burning, as well as that of their combination in propellants. The condensed phase behavior of the components was looked into by means of thermogravimetric analysis, differential scanning calorimetry, ignition and temperature (microthermocouples) profile measurements, as well as sampling and analysis of the gases produced from the condensed phase. At very low pressure, HMX sustains a staged flame, much like that of homogeneous propellants. The behavior of the binder is close to that of homogeneous propellants. The burning rate of the propellant is a compromise between the rates of the components, without interaction between the HMX flame and that of the binder. Author

N86-26471# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
STABILITY OF NITROCELLULOSE PROPELLANTS ASSESSED VIA THERMAL DECOMPOSITION AND ALTERATION OF THE STABILIZER COMPOSITION
P. vandeMey and A. H. Heemskerk *In* AGARD Smokeless Propellants Jan. 1986 p 9-1 - 9-8 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

In the Netherlands the surveillance of propellants is performed by investigating the thermal behavior of the propellant at a temperature of 358 K. This procedure is accepted to represent a degradation equivalent to a storage period of at least ten years at ambient temperatures. To obtain additional information about the degradation of propellants thermal stability tests were performed at various temperatures and under several environmental conditions. Both the thermal behavior of the propellants and the chemical behavior of the stabilizing amine compound were determined during these experiments. The composition of the amine compounds was analyzed using HPLC techniques developed for these experiments. Author

N86-26472# Consiglio Nazionale delle Ricerche, Milan (Italy).
BURNING STABILITY OF DOUBLE BASE PROPELLANTS
L. DeLuca, C. Zanotti, G. Riva, R. Donde, A. Volpi, C. Grimaldi, and G. Colombo *In* AGARD Smokeless Propellants Jan. 1986 p 10-1 - 10-17 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

The nonsteady combustion and intrinsic burning stability of double base propellants are studied. Experimental results show that, over a large pressure range, the energetics and the dynamics of double base combustion is controlled by the fizz zone. This permits the classical quasi-steady gas phase assumption to be applied. However, a novel transient flame model is required, since the fizz zone, although thin in time, is thick in space. This novel transient flame model includes several previous models as particular cases; in addition it allows an already existing nonlinear burning stability theory to be immediately applied to double base combustion. In general, double base burning is found to be less stable than composite propellant burning, both statically and dynamically. This is due to the relatively little energy stored in the condensed phase and elongated fizz zone yielding a weak energy coupling at the burning surface. Author

N86-26473# IMI Summerfield, Kidderminster (England).
ELASTOMER MODIFIED CAST DOUBLE BASE PROPELLANTS
G. I. Evans and D. Facer *In* AGARD Smokeless Propellants Jan. 1986 p 13-1 - 13-17 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

Cast double base propellants have many attractive features for tactical missile systems, not least where plume signature transparency is at a premium. However, such propellants are limited in mechanical properties, particularly strain capability at low temperatures of -40 C or less. The development of a new class of CDB propellants is described utilizing an elastomer in the binder. The advantages, properties and performance of these EMCDB propellants are given. The field of candidate polymer systems is explored with test results and chemistry of the binder together with the criteria leading to the selection of suitable elastomer binders. Author

N86-26474# IMI Summerfield, Kidderminster (England).
THE REDUCTION OF EXHAUST SIGNATURE IN SOLID PROPELLANT ROCKET MOTORS
G. I. Evans and P. K. Smith *In* AGARD Smokeless Propellants Jan. 1986 p 16-1 - 16-16 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

An important feature of cast double base propellants is that during combustion the propellant itself produces extremely low levels of exhaust smoke. Developments in insulation material and, in particular, charge inhibitors have allowed the low smoke potential of the propellant to be fully realized in rocket motor firings. A further dramatic reduction in exhaust signature was obtained by suppressing secondary combustion in the rocket motor. This was achieved over a wide range of typical propellant charge and motor configurations using propellant additives. Flame suppressed plumes offer the desirable property of low exhaust emissions both in the visible and IR regions of the electromagnetic spectrum. Similarly missile communications both at optical and radio frequency wavelengths are improved by the absence of secondary combustion. The inhibitor and propellant developments concerned are reviewed and the reductions in exhaust signature which are obtained by the optimized use of secondary flame suppression is quantified. Author

N86-26475# Nobel's Explosives Co. Ltd., Stevenston (England). Defence and Aerospace Research.
THE CHEMICAL INTERACTION OF BALLISTIC MODIFIERS IN CDB PROPELLANT: ITS EFFECT UPON BALLISTICS AND STABILITY
J. D. M. Pearson, A. C. J. Shedden, and I. A. Duncan *In* AGARD Smokeless Propellants Jan. 1986 p 17-1 - 17-15 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

During the development of a platonized cast double base propellant it was noted that a spread of burning rates from batch to batch was obtained. Subsequently batches of the propellant presistantly showed a marked decrease in gas crack lifetime, on accelerated aging, compared with earlier satisfactory results. Extensive work showed the stability problem to be associated with a chemical reaction between the ballistic modifiers. This reaction was reproduced in the laboratory, while at the same time the ballistic variability of the propellant was under investigation. It became apparent that the chemical interaction between the modifiers affected the propellant platonized burning rate and that the by products of this reaction cause the accelerated aging problem. This understanding allowed a new ballistic modifier to be developed which helped solve the stability problem while at the same time gave much more reproducible ballistics. Author

N86-26476# Defence Research Establishment Valcartier (Quebec).
DIRECT EROSIVE BURNING MEASUREMENTS OF A REDUCED-SMOKE SOLID PROPELLANT ROCKET BY FLASH X-RAYS
T. Constantinou and D. Greatrix (Toronto Univ., Ontario) *In* AGARD Smokeless Propellants Jan. 1986 p 18-1 - 18-13 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

Despite the multitude of models available, proper erosive burning modelling continues to be a difficult task in the internal

ballistic prediction of solid propellant rockets with high volumetric loading. The majority of models are based on erosive burning measurements using small motors, window motors and with such techniques as imbedded probes or interrupted burning. Such methods, however, are not believed to exhibit the real combustion process. The flash X-ray technique using full sized motors gives a more realistic measurement of burning rates. This technique can be used to evaluate the internal ballistic code with different erosive burning models, a pressure-time record can be obtained and compared to experimental data. A comparison and evaluation of the different models, is thus possible. Data based on static firings of reduced smoke motors were analyzed by the above method and the results are presented. Author

N86-26477# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL TECHNIQUES FOR OBTAINING PARTICLE BEHAVIOR IN SOLID PROPELLANT COMBUSTION
David W. Netzer and John P. Powers *In* AGARD Smokeless Propellants Jan. 1986 p 19-1 - 19-17 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

A continuing investigation is being conducted to develop techniques to obtain quantitative data that can be used to relate solid rocket propellant composition and operating environment to the behavior of solid particulates within the grain port and exhaust nozzle. The techniques employed are high speed motion pictures of propellant strand burners and slab burners in a cross flow environment, SEM analysis of post fire residue (strand, slab, and motor), determination of D sub 32 across the exhaust nozzle using measurements of scattered laser light, and holograms of burning propellant strands, slabs and motors. In addition, techniques are being studied for automatic retrieval of particle size distributions from holograms taken of the combustion of solid propellants. Actual particle sizes of burning aluminum particles were obtained in high speed motion pictures by using high intensity rear illumination of the burning propellants to eliminate the flame envelopes surrounding the burning particles. Measurements of diffractively scattered light were made for determination of changes in D sub 32 across a solid propellant rocket motor exhaust nozzle. Two dimensional motors were employed to obtain holograms of propellant burned in a cross flow environment. Other efforts were directed at reduction of speckle in the recorded holograms and optimization of techniques for minimizing excessive smoke in the recorded scenes. A computer controlled Quantimet 720 is being used in an effort to obtain particle size distributions from reconstructed holograms. Author

N86-26478# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
GAS ANALYSIS FOR THE INVESTIGATION OF THE COMBUSTION OF DOUBLE-BASE PROPELLANTS AND HMX
Jean-Francois Trubert *In its* Smokeless Propellants (AGARD-CP-391) Jan. 1986 p 20-1 - 20-14 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

The linear pyrolysis method under vacuum by conduction and radiation, with analysis by mass spectrometry is used to obtain the composition of the gases produced by solid propellant condensed phase degradation, while minimizing the secondary reactions and under conditions close to actual burning. This method was elaborated with reference to double base propellants, and in the presence of additives. Important quantities of formaldehyde, glyoxal and carbon dioxide are obtained. The presence of low amounts of nitrogen and carbon monoxides, carbon dioxide and water indicates that the gases result mostly from the degradation. The small difference between the quantitative compositions shows that the additive does not act on the condensed phase degradation. This method was applied to HMX. The analysis shows large amounts of several nitrogen oxides (NO2, NO, N2O), formaldehyde, and cyanhydric acid, and small quantities of water, nitrogen and carbon oxides. Author

N86-26479# Brigham Young Univ., Provo, Utah. Dept. of Chemical Engineering.
MEASUREMENTS OF DISTRIBUTED COMBUSTION
M. W. Beckstead, P. C. Braithwaite, and D. L. Gordon *In* AGARD Smokeless Propellants Jan. 1986 p 21-1 - 21-12 (For primary document see N86-26468 17-28)
Avail: NTIS HC A09/MF A01

Acoustic suppressants are commonly added to low smoke and smokeless propellants to avoid the problem of combustion instability. Although some suppressants are considered to be inert, most actually react with the combustion products. If a particle reacts while traversing a relatively large portion of the system, the interchange of energy between the burning particle and the acoustic environment can result in either a driving or damping contribution to the acoustics of the system, which is referred to as distribution combustion. Instead of using actual solid propellants, and experimental technique was developed to study this mechanism utilizing a gas fired Rijke burner. Advantages of this approach allow testing an additive independent of the propellant burning surface, avoiding the use of solid propellants, and allowing for independent control of frequency, O/F ratio, temperature, and particle addition. Al and ZrC are additives commonly used in solid propellants to suppress combustion instability. Experimental results obtained using Al and ZrC in the Rijke burner indicate that both additives cause an increase in the acoustic growth rate when compared to growth rates obtained without any particles in the system. The increase caused by Al is significantly greater that that caused by ZrC, which is expected because the reaction of Al releases more than twice the energy ZrC does. The increase in the acoustic growth rate due to distributed combustion was found to be directly related to the heat of reaction. Author

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-26480# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
COMPARATIVE STUDY OF NONDESTRUCTIVE PAVEMENT TESTING, WES (WATERWAYS EXPERIMENT STATION) NDT (NONDESTRUCTIVE TESTS) METHODOLOGIES Final Report
Jim W. Hall and Don R. Alexander Sep. 1985 66 p
(AD-A163379; WES-MP-GL-85-26) Avail: NTIS HC A04/MF A01
CSCL 13/2

A demonstration of nondestructive airfield pavement evaluation procedures conducted by the US Army Engineer Waterways Experiment Station (WES) using both the WES 16-kip vibrator and a Dynatest falling weight deflectometer (FWD) is described. The nondestructive tests (NDT) were conducted at MacDill Air Force Base on five pavement test areas consisting of asphaltic concrete, portland cement concrete, and composite pavements. Two methods of data analysis were used. The dynamic stiffness modulus (DMS) method used dynamic deflection data from the WES 16-kip vibrator with a correlation analysis developed a number of years ago by WES. This method uses a correlation between the DSM (a load-deflection ratio) and the allowable load on a single wheel as derived from traditional test pit methods. The second analysis scheme used measured deflection basins at the pavement surface and layered elastic theory. Elastic moduli are computed by matching measured deflection basins with computed basins. Limiting stress/strain is then used to compute allowable aircraft loadings. This method was used with data from both the WES 16-kip vibrator and the FWD. Also demonstrated was a method of determining joint load transfer and of making appropriate adjustments to the allowable load to account for lack of load transfer. GRA

N86-26481# Ben Gurion Univ. of the Negev, Sede Boqer (Israel). Inst. for Desert Research.
OPERATIONAL SOIL MOISTURE PREDICTION MODEL Final

Report
Lev N. Gutman 20 Dec. 1985 65 p
(Contract DAJA45-84-C-0007)
(AD-A165313; AD-E301922) Avail: NTIS HC A04/MF A01 CSCL 08/13

The one dimensional problem of the diurnal variations of moisture and temperature at different depths of the thermally active, non-frozen, non-swelling soil layer is considered. It is assumed that we know: (1) Values of all meteorological elements at anemometer level at any time, (2) Moisture and temperature distribution with depths at some initial moment; and (3) Physical parameters and characteristics of the soil and vegetation cover which we shall call canopy for brevity. The model consists of: (1) Partial differential equations of the subsurface hydrology for a non-saturated vapor-liquid flow in the soil, allowing for the moisture removal by the roots of plants. (2) Algebraic empirical and ordinary differential equations for the description of the radiative and turbulent heat transfer between the atmosphere and the soil through the canopy allowing for the influence of condensation or evaporation at the foliage and also the retention of a part of the precipitation by the foliage. (3) Moisture and vapor balance equations at the surface of the soil. (4) Continuity conditions for heat and vapor fluxes at the top of the canopy. (5) Semiempirical algebraic equations of the type of surface layer equations for a thin atmospheric layer between the canopy and anemometer level. Results of computations are in agreement with experimental data. A few examples of soil moisture computations are presented together with experimental data. GRA

N86-26482# Mechanical Technology, Inc., Latham, N. Y.
IN-PROCESS CONTROL OF MACHINING. PHASE 1: MILLING
J. T. McCabe, Peter A. Albrecht, D. Locke, and Raymond A. Kirschbaum Sep. 1985 134 p
(Contract DAAA08-83-C-0052)
(AD-A165391; SARRI-EN-TR-85-01) Avail: NTIS HC A07/MF A01 CSCL 13/9

A system to control the path of a milling cutter was developed, integrated with a machining center, and demonstrated. Feedback control was based on measurements of machined edge coordinates taken behind the cutter. The demonstration consisted of milling four, parallel, identical, teardrop-shaped openings, spaced 90 degrees apart through the wall of an orifice tube. A linear diode array, sensitive to reflected light, was used to locate and record the edge profile of each opening. Real-time tool path redirection was based on a continual analysis of generated orifice area accumulation, thereby basing control of the machining process on area, the parameter which best reflected the function of the part. After the machining was completed, the optical edge sensor was used to inspect the part before it was removed from the machine. These processes resulted in significant improvements in productivity and quality. GRA

N86-26483# Ceres Corp., Waltham, Mass.
LINEAR RESONANCE COOLER
Apr. 1985 40 p
(Contract DAAK70-82-K-0222)
(AD-A165492) Avail: NTIS HC A03/MF A01 CSCL 13/1

The contract requires the incorporation of linear drive technology into a cryocooler design meeting the Specification for the US Army 1/4 Watt Common Module Cooler as closely as possible. The Resonant Cryocooler employs a concept using magnetic forces to linearly move dual opposed pistons in the compressor thus eliminating the use of rotary motors, crankshaft, greases and bearings. While not a requirement of the contract, the expander also employs a linear motor to control displacer stroking. This allows for electronic end stopping to mitigate microphonics problems. In addition, the ability to vary the waveform of the displacer motion and its phasing with respect to the compressor pressure wave form in order to optimize performance offers the potential for extending the operational life of the cooler. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-26484*# Ohio State Univ., Columbus. ElectroScience Lab.
AN E-PLANE ANALYSIS OF APERTURE-MATCHED HORN ANTENNAS USING THE MOMENT METHOD AND THE UNIFORM GEOMETRICAL THEORY OF DIFFRACTION
D. J. Heedy and W. D. Burnside Sep. 1984 114 p refs
(Grant NsG-1613)
(NASA-CR-176841; NAS 1.26:176841; OSU-TR-716148-1) Avail: NTIS HC A06/MF A01 CSCL 20N

The moment method and the uniform geometrical theory of diffraction are utilized to obtain two separate solutions for the E-plane field pattern of an aperture-matched horn antenna. This particular horn antenna consists of a standard pyramidal horn with the following modifications: a rolled edge section attached to the aperture edges and a curved throat section. The resulting geometry provides significantly better performance in terms of the pattern, impedance, and frequency characteristics than normally obtainable. The moment method is used to calculate the E-plane pattern and BSWR of the antenna. However, at higher frequencies, large amounts of computation time are required. The uniform geometrical theory of diffraction provides a quick and efficient high frequency solution for the E-plane field pattern. In fact, the uniform geometrical theory of diffraction may be used to initially design the antenna; then, the moment method may be applied to fine tune the design. This procedure has been successfully applied to a compact range feed design. Author

N86-26485*# Ohio State Univ., Columbus. ElectroScience Lab.
MOMENT METHOD ANALYSIS OF MICROSTRIP ANTENNAS OVER A WIDE FREQUENCY RANGE
B. W. Kwan and E. H. Newman Feb. 1985 61 p
(Grant NsG-1613)
(NASA-CR-176842; NAS 1.26:176842; OSU-TR-716148-4) Avail: NTIS HC A04/MF A01 CSCL 20N

Expressions for the self and mutual impedance between microstrip antenna modes on a grounded dielectric slab are presented. The mutual impedance between the microstrip modes and a vertical current filament in the dielectric is also presented. These are the quantities required in a method of moments analysis of the microstrip antenna. Entire domain expansion modes, suitable for representing the microstrip current over a broad frequency range, are used. Efficient methods for the evaluation of the mutual impedance elements are described. Author

N86-26486*# Ohio State Univ., Columbus. ElectroScience Lab.
ASYMPTOTIC HIGH FREQUENCY ANALYSIS OF THE ELECTROMAGNETIC BACKSCATTERING FROM AN INLET MODEL CONSISTING OF PIECEWISE LINEARLY TAPERED SECTIONS
A. Altintas and P. H. Pathak Nov. 1985 146 p refs
(Grant NsG-1613)
(NASA-CR-176844; NAS 1.26:176844; OSU-TR-716148-6) Avail: NTIS HC A07/MF A01 CSCL 20N

Electromagnetic backscattering from an open ended three dimensional inlet model is analyzed and computed patterns are compared with results of experimental measurements. The model is comprised of two sections. The first section consists of a linearly tapered waveguide with a rectangular opening at one end and the other end is connected to the second section which is a uniform rectangular waveguide with a planar perfectly conducting termination. The model is electrically large so that many propagating modes are excited. The method of analysis contains conventional aperture integration and modal techniques combined with high frequency techniques, which employ concepts such as modal rays, geometrical theory of diffraction and equivalent currents. For the cases considered, it is shown that only a few of the many

propagating modes contribute appreciably to the backscattered field. These modes are selected according to their modal ray angle directions. Author

N86-26487*# Ohio State Univ., Columbus. ElectroScience Lab.
SIMULATION OF AN AIRCRAFT FLYING THROUGH A GROUND STATION TO SATELLITE LINK
R. C. Rudduck, W. D. Burnside, A. K. Dominek, and T. H. Lee
Feb. 1986 52 p ref
(Grant NsG-1613)
(NASA-CR-176845; NAS 1.26:176845; OSU-TR-716148-7) Avail: NTIS HC A04/MF A01 CSCL 20N

The effect of an aircraft which flies through a ground station-to-satellite link is determined. There are two aspects to the work reported here: (1) an aperture blockage theoretical solution developed by Rudduck and Lee was used to calculate the effect of a large aircraft (C5) for various satellite ground station antenna diameters, and (2) the compact range facility at the Ohio State University was used to measure various targets, including a 737 aircraft, and to validate the theoretical solution in item 1. Author

N86-26488# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE NEGLIGIBLE EFFECT OF NON-GAUSSIAN SURFACE DEVIATIONS IN LARGE MM-LAMBDA REFLECTORS' APERTURE EFFICIENCY AND THE PERFORMANCE OF ITAPETINGA 45-FT ANTENNA AT LAMBDA = 3.3 MM
P. Kaufmann, Z. Abraham, E. Scalise, Jr., R. E. Schaal, J. L. MonteirodoVale, and J. W. S. Vilas Boas 2 Jul. 1986 18 p
Submitted for publication. Sponsored in part by FINEP
(INPE-3837-PRE/908) Avail: NTIS HC A02/MF A01

The aperture efficiency at lambda = 3.3 mm of the 45-ft Itapetinga reflector was found to be about 25 percent. This radiometric result suggests an equivalent surface accuracy of less than 0.25 mm, root-sum-square (rss), assuming a Gaussian distribution of errors, which is smaller than the actual rss estimated for the dish, and represents a 5 dB improvement in gain. This result confirms that non-Gaussian errors across a smooth surface have negligible effects on the aperture efficiency, and that antenna efficiency may be predicted from mechanical measurements when the slowly varying errors across the source are known. It is possible to predict that relatively simple mechanical readjustments of the reflector and subreflector may raise its efficiency to 30 percent. Author

N86-26489*# Operations Research, Inc., Silver Spring, Md.
SPECTRUM ORBIT UTILIZATION PROGRAM TECHNICAL MANUAL SOUP5 VERSION 3.8
J. Davidson, H. R. Ottey, P. Sawitz, and F. S. Zusman 13 Dec. 1984 77 p refs
(Contract NAS3-22885)
(NASA-CR-174944; NAS 1.26:174944; TR-2390) Avail: NTIS HC A05/MF A01 CSCL 17B

The underlying engineering and mathematical models as well as the computational methods used by the SOUP5 analysis programs, which are part of the R2BCSAT-83 Broadcast Satellite Computational System, are described. Included are the algorithms used to calculate the technical parameters and references to the relevant technical literature. The system provides the following capabilities: requirements file maintenance, data base maintenance, elliptical satellite beam fitting to service areas, plan synthesis from specified requirements, plan analysis, and report generation/query. Each of these functions are briefly described. B.G.

N86-26490# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DATA TRANSMISSION SYSTEMS
1986 4 p
(AD-A163778; FTD-ID(RS)T-0037-86) Avail: NTIS HC A02/MF A01 CSCL 17/2

This standard establishes the nominal speeds of data transmission through telegraph channels, voice-frequency channel, broadband channel, short wave radio channels, and, also, types of redundant codes for the data transmission systems through standard voice frequency channels synchronously with a narrowband feedback channel. The standard takes in to account the specifications from the recommendation made by CMEA on the standardization of PS 2344-70. GRA

N86-26491# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 1
Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 205 p refs
(Contract DCA100-85-C-0010)
(AD-A164430; NCS-TIB-85-10-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 20/14

This technical report discusses the vulnerability of equipment used by amateur/MARS radio operators in the United States to disruption or damage by transient electromagnetic effects such as lightning, voltage surges, and electromagnetic pulse (EMP) waves. It also reports the results of two test programs; one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment. Based on the test results, the report recommends procedures and a low-cost installation scheme which will significantly increase the operational survivability of amateur type communications equipment in a lightning or EMP environment. Volume 1 contains the test results and recommendations for transient protection of amateur radio equipment. B.G.

N86-26492# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 2
Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 141 p refs
(Contract DCA100-85-C-0010)
(AD-A164431; NCS-TIB-85-10-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 20/14

The vulnerability of equipment used by amateur/MARS radio operators in the United States to disruption or damage by transient electromagnetic effects such as lightning, voltage surges, and electromagnetic pulse (EMP) waves is discussed. The supporting documentation for the protective device qualification program includes: the test plan for the two EMP tests, descriptions/specifications of the tested transient suppression devices and the amateur radio equipment, and photographs of the test facilities and test set-ups. GRA

N86-26493# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 1. HIGH ENERGY PULSE-DEVICE FAILURE TEST. 50 OHMS IMPEDANCE 25,000 VOLTS-4000 AMPS, 100 JOULES
Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 217 p refs
(Contract DCA100-85-C-0010)
(AD-A164432; NCS-TIB-85-10-Vol-3-Sec-1) Avail: NTIS HC A10/MF A01 CSCL 20/14

The results of two test programs: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an electromagnetic pulse (EMP) transient environment are presented. Raw test data in the form of oscilloscope photographs for high energy pulse-device failure tests at 50 ohms impedance, 25000 volts, 400 amps, and 100 joules are presented. Analysis of the test data is being made. GRA

N86-26494# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING

OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 2. HIGH IMPEDANCE/HIGH VOLTAGE TEST 50 OHMS-4500 VOLTS

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 287 p refs
(Contract DCA100-85-C-0010)
(AD-A164433; NCS-TIB-85-10-Vol-3-Sec-2) Avail: NTIS
HC A13/MF A01 CSCL 20/14

The results of two test programs: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment are reported. Raw test data in the form of oscilloscope photographs for high impedance/high voltage tests at 50 ohms and 4500 volts are presented. GRA

N86-26495# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 3. LOW IMPEDANCE/HIGH VOLTAGE TEST, 5 OHMS-4500 VOLTS-1000 AMPS

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 200 p refs
(Contract DCA100-85-C-0010)
(AD-A164434; NCS-TIB-85-10-Vol-3-Sec-3) Avail: NTIS
HC A09/MF A01 CSCL 20/14

The results of two test programs: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment are reported. Raw test data in the form of oscilloscope photographs for low impedance/high voltage tests at 5 ohms, 4500 volts, and 1000 amps are presented. Analysis of the test data is being made. GRA

N86-26496# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 4. LOW IMPEDANCE/LOW VOLTAGE TEST, 5 OHMS-600 VOLTS-120 AMPS

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 199 p refs
(Contract DCA100-85-C-0010)
(AD-A164435; NCS-TIB-85-10-Vol-3-Sec-4) Avail: NTIS
HC A09/MF A01 CSCL 20/14

The results of two test programs are presented: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment. Raw test data in the form of oscilloscope photographs for low impedance/low voltage test at 5 ohms, 600 volts, and 120 amps are presented. Analysis of the test data is being made. GRA

N86-26497# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 5. EQUIPMENT AND DEVICES OSCILLOSCOPE PHOTOGRAPHS

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 134 p refs
(Contract DCA100-85-C-0010)
(AD-A164436; NCS-TIB-85-10-Vol-3-Sec-5) Avail: NTIS
HC A07/MF A01 CSCL 20/14

The results of two test programs are presented: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment. Oscilloscope photographs of the following equipment are presented: Mosley TA33JR antenna, rectangular sensor, ground wire antenna, Crushcraft AV-5 antenna, round H sensor, battery charger, rubber duck antenna, Fisher unit, H field sensors, and direct current power supply. Analysis of the test data is being made. GRA

N86-26498# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 6. EQUIPMENT AND DEVICES BENCH CHECK MEASUREMENT

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 176 p refs
(Contract DCA100-85-C-0010)
(AD-A164437; NCS-TIB-85-10-Vol-3-Sec-6) Avail: NTIS
HC A09/MF A01 CSCL 20/14

The results of two test programs are presented: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment. Oscilloscope photographs of the following transmitters/receivers are included: YAESU FT 726R, YAESU F7 757GX, ICOM IC-745, ICOM IC-27A, ICOM IC-02AT, ICOM IC-271A, ICOM IC-471A, Kenwood TS-4305, Kenwood TR-2600, Kenwood 7930, and Swan 250. GRA

N86-26499# Electrospace Systems, Inc., Arlington, Va.
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT. VOLUME 3. TEST DATA, ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES. SECTION 7. EQUIPMENT AND DEVICES TEST DESCRIPTIONS

Dennis Bodson, Joseph Frizzell, Thomas Higdon, and Walter Rabke
31 Oct. 1985 118 p refs
(Contract DCA100-85-C-0010)
(AD-A164438; NCS-TIB-85-10-Vol-3-Sec-7) Avail: NTIS
HC A06/MF A01 CSCL 20/14

The results of two test programs are presented: one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment. Equipment descriptions, purposes, and configurations are presented. Pulser field, power, antenna, power protection device, radio frequency protection device, and injection parameters are reported. GRA

N86-26500# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
MODEL STUDIES OF SURFACE NOISE INTERFERENCE IN GROUND-PROBING RADAR

Steven A. Arcone and Allan J. Delaney Nov. 1985 23 p
(AD-A163208; CRREL-85-19) Avail: NTIS HC A02/MF A01 CSCL 17/9

Ground-probing radar can be an effective tool for exploring the top 10 to 20 m of ground, especially in cold regions where the freezing of water decreases signal absorption. However, the large electrical variability of the surface, combined with the short wavelengths used, can often cause severe ground clutter that can mask a desired, deeper return. In this study a model facility was constructed consisting of a metallic reflector covered by sand. Troughs of saturated sand were emplaced at the surface to carry surface electrical properties and to act as a noise source to interfere with the bottom reflections. Antenna polarization and height, and signal stacking in both static (antennas stationary) and dynamic (antennas moving) modes were then investigated as methods for reducing the surface clutter. Polarization parallel to the profile direction (perpendicular to the troughs' axes) gave profiles superior to the perpendicular case because of the dimensional sensitivity of the antenna radiation. Dynamic stacking greatly improved the signal-to-noise ratio because noise sources were averaged as the antennas moved, while the desired reflector, buried at constant depth, was enhanced. Raising the antennas above the surface

also reduced noise because the surface area over which reflections were integrated increased. All three noise reduction techniques could be effective in surveys for reflectors at nearly constant depth such as groundwater tables or ice/water interfaces.
Author (GRA)

N86-26501# Human Engineering Labs., Aberdeen Proving Ground, Md.
A COMPARISON OF VOICE AND KEYBOARD DATA ENTRY FOR A HELICOPTER NAVIGATION TASK Final Report
Frank J. Malkin and Kathleen A. Christ Dec. 1985 42 p
(AD-A163245; HEL-TM-17-85) Avail: NTIS HC A03/MF A01 CSCL 17/2

The Doppler navigation set, AN/ASN 128 was used to compare manual keyboard data entry of navigation map coordinates with an isolated-word speech recognition system. Twelve male Army aviators entered data by keyboard and by voice while controlling a helicopter flight simulator. The results indicated that although the keyboard mode was faster than the voice mode of data entry, the aviators preferred using voice. Voice data entry was perceived as requiring less effort and reducing pilot workload. However, the relative slowness and low accuracy (85.5 percent) of voice data entry highlight the limitations that may exist for speech recognition systems in performing time or task critical functions. GRA

N86-26502# Massachusetts Inst. of Tech., Cambridge. Lab. for Information Decision Systems.
A SCHEDULE-BASED APPROACH FOR FLOW-CONTROL IN DATA COMMUNICATION NETWORKS Ph.D. Thesis
Utpal Mukherji Jan. 1986 120 p
(Contract N00014-84-K-0357; Grant NSF ECS-83-10698; DARPA Order 3045)
(AD-A163253; LIDS-TH-1527) Avail: NTIS HC A06/MF A01 CSCL 17/2

An approach for achieving user-session packet throughput guarantees and packet intranetwork delay limits is described. Both objectives are important for packetized voice calls. The approach permits flexible usage of link capacity by sessions, which is important for data sessions. Throughput is guaranteed to a session at links in its path by scheduling priority-slots in link frames for transmission. An extension of end-to-end windowing limits the intra-network delay for a session to the sum of, first, the product of the frame-time and the session's window-size, and, second the session's priority-slot schedule-delay. An NP-completeness result is proven, showing, for general networks, that the scheduling of priority-slots to obtain minimum sum of schedule-delays is algorithmically hard. Minimum-delay scheduling algorithms for special network classes, and a scheduling heuristic for general networks, are presented. For Poisson packet generation at session rates less than throughput guarantees, limited simulations suggest that low mean values of packet end-to-end delays, relatively insensitive to choice of window-sizes, are obtained even at small but non-zero window-sizes. GRA

N86-26503# Naval Research Lab., Washington, D. C.
THREE-DIMENSIONAL NUMERICAL SIMULATIONS OF FELs BY TRANSVERSE MODE SPECTRAL METHOD
Cha-Mei Tang and P. Sprangle 30 Dec. 1985 28 p
(AD-A163297; NRL-MR-5694) Avail: NTIS HC A03/MF A01 CSCL 20/5

A numerical method is presented for solving a three-dimensional radiation field by decomposing the radiation field into transverse modes that satisfy the free space wave equation and the boundary conditions. The formalism includes betatron oscillations in a realizable wiggler, finite emittance and energy spread in an amplifier or oscillator configuration. This formalism can be generalized to calculate sidebands resulting from the synchrotron oscillations. The transverse mode spectral method is compared with the finite difference method, spectral method and transform spectral method. Examples from a computer code using Gaussian-Hermite expansion are given. Self-focusing of the radiation beam due to gain and refraction of the Free Electron Laser is shown. GRA

N86-26504# Rome Air Development Center, Griffiss AFB, N.Y.
A COMPARATIVE ANALYSIS OF WHISPERED AND NORMALLY PHONATED SPEECH USING AN LPC-10 VOCODER
Johnny B. Wilson and James D. Mosko Dec. 1985 36 p
(AD-A163307; RADC-TR-85-264) Avail: NTIS HC A03/MF A01 CSCL 17/2

The determination of the performance of an LPC-10 vocoder in the processing of adult male and female whispered and normally phonated connected speech was the focus of this study. The LPC-10 vocoder's analysis of whispered speech compared quite favorably with similar studies which used sound spectrographic processing techniques. Shifting from phonated speech to whispered speech caused a substantial increase in the phonomic formant frequencies and formant bandwidths for both male and female speakers. The data from this study showed no evidence that the LPC-10 vocoder's ability to process voices with pitch extremes and quality extremes was limited in any significant manner. A comparison of the unprocessed natural vowel waveforms and qualities with the synthesized vowel waveforms and qualities revealed almost imperceptible differences. An LPC-10 vocoder's ability to process linguistic and dialectical suprasegmental features such as intonation, rate and stress at low bit rates should be a critical issue of concern for future research. GRA

N86-26505# Defense Communications Agency, Arlington, Va.
DEFENSE COMMUNICATIONS AGENCY COST AND PLANNING FACTORS MANUAL, CHANGE 2
23 Sep. 1985 176 p
(AD-A163319; DCA-CIRC-600-60-1-CH-2) Avail: NTIS HC A09/MF A01 CSCL 17/2

Line-of-sight (LOS) microwave systems normally use the frequency spectrum from 2 to 12 gigahertz (GHz). The LOS path lengths range from 1 to 100 miles depending upon propagation, terrain, frequency, and tower height, among other engineering considerations. The average system consists of path lengths of approximately 30 miles. The total microwave system consists of terminals, relays, and normal support functions required for any communications system, such as technical control, multiplex, utilities, land, and buildings. LOS microwave transmission is usually dual diversity, using either frequency, space, or polarization diversity. The transmission system will generally contain dual receive and transmit equipment at all locations for use as either frequency diversity systems or hot standby systems for redundancy. Two techniques may be employed for the transmission and multiplexing of communications circuits. DCS uses frequency modulation transmission and frequency division multiplex (FDM) also called analog systems. Currently DCS uses digital transmission and time division multiplex (TDM), referred to as digital systems. GRA

N86-26506# Syracuse Univ., N. Y. Dept. of Electrical and Computer Engineering.
ELECTROMAGNETIC PENETRATION THROUGH A SLOT INTO A RECTANGULAR WAVEGUIDE Interim Technical Report
Hu Zhenya and Roger F. Harrington Oct. 1985 52 p refs
(Contract DAAG29-84-K-0078)
(AD-A164590; SYRU/DECE/TR-85/4; ARO-21378.4-EL; ITR-3) Avail: NTIS HC A04/MF A01 CSCL 20/3

Electromagnetic penetration into a matched rectangular waveguide through a longitudinal slot in a conducting plane is considered. The problem is divided into two parts, one in half space and another inside the waveguide, by use of the equivalence principle. The resultant equations are the same as some previously described, the only difference being that the excitation vector is changed from an incident wave inside the waveguide to an incident plane wave in half space. The magnetic current over the slot is obtained from the solution of the matrix equations. The electromagnetic penetration into a matched rectangular waveguide and the electromagnetic reradiation into half space through a slot are computed from the equivalent magnetic current over the slot.

The computed results show that a plane wave at normal incidence and a resonated slot near the side of the waveguide broad wall allow orders of magnitude greater power to penetrate into the waveguide than when the slot is not resonated. GRA

N86-26507# Pennsylvania State Univ., University Park. Dept. of Engineering Science and Mechanics.
COMPARISON OF THE COHERENT ATTENUATION PREDICTED BY SINGLE AND MULTIPLE SCATTERING THEORIES FOR THE CASE OF SEVERAL TYPES OF HYDROMETEORS
Yushieh Ma, Vijay K. Varadan, and Vasundara V. Varadan 31 Jan. 1986 62 p
(Contract DAAG29-84-K-0187)
(AD-A164635; ARO-21825.2-GS) Avail: NTIS HC A04/MF A01 CSCL 20/14

A systematic computation has been completed in order to compare the difference in the coherent attenuation predicted using multiple and single scattering theories. This is the first study in the literature to examine quantitative results based on two different scattering theories. Therefore one is able to tell the approximate range, in both frequency and concentration regimes, where single scattering theory can be applied for different types of hydrometeors. However, the computations give exact figures up to the four decimal place and reveal that, in most cases, if interactions among scatterers are not considered, the coherent attenuation can either be over- or under-estimated. This is a serious problem in communications between distant stations. GRA

N86-26508# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
A LOOP ANTENNA FOR A VLF (VERY LOW FREQUENCY) SATELLITE TRANSMITTER
H. C. Koons, M. H. Dazey, and D. C. Pridmore-Brown 30 Sep. 1985 43 p refs
(Contract F04701-83-C-0084)
(AD-A164652; TR-0084A(5723-01)-1; SD-TR-85-49) Avail: NTIS HC A03/MF A01 CSCL 17/2

The Space Sciences Laboratory of The Aerospace Corporation is currently defining an experiment to test a loop antenna configuration as a very low frequency (VLF) transmitter in the ionosphere. The experiment is sponsored by the Naval Air Systems Command. The primary objectives of the experiment are to validate existing models for radiation by a loop antenna and to study the performance of the antenna in the ionospheric plasma. The antenna will be carried into orbit in the payload bay of the Space Shuttle. During the radiation tests it will be deployed above the payload bay by the remote manipulator system. A VLF receiver aboard a subsatellite will be used to map the radiation pattern of the antenna by measuring the field intensities at distances of 1 to 100 Km from the transmitter. Calculations predict that the antenna impedance will only be slightly modified by the plasma and that the link to the receiver can be closed at distances well beyond 100 km. A one-third scale model of the antenna has been constructed. Impedance measurements have been made on the model in a 5-m diameter space plasma simulation chamber at NASA Lewis Research Center. The measurements confirm that the reactance of the antenna in an ionospheric plasma is essentially identical to its free space self-inductance. The effective series resistance of the circuit increases with frequency. The losses are attributed to power transferred to plasma turbulence. GRA

N86-26509# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Electrical and Computer Engineering.
MIXED-ORDER FINITE ELEMENTS FOR THE SOLUTION OF THREE-DIMENSIONAL ELECTROMAGNETIC FIELDS Interim Report, Sep. 1983 - Sep. 1984
Z. J. Cendes, D. Hudak, and D. Sun Jan. 1986 33 p
(Contract F19628-83-C-0079)
(AD-A164786; RADC-TR-85-158) Avail: NTIS HC A03/MF A01 CSCL 20/4

A new method of modeling electromagnetic waves by the finite element method is presented. The method is based on a numerical formulation in which different orders of polynomials are used to approximate the three different components of either the electric or the magnetic field vectors. It provides a reliable procedure for the finite element solution of three-dimensional electromagnetic field problems. Heretofore, such solutions were plagued by the presence of spurious modes. The new method is applied to the analysis of fields in resonant electromagnetic cavities. GRA

N86-26510# Ohio State Univ., Columbus. ElectroScience Lab.
RADAR TARGET CLASSIFICATION STUDIES: SOFTWARE DEVELOPMENT AND DOCUMENTATION
A. Kamis, F. Garber, and E. Walton Sep. 1985 68 p
(Contract N00014-84-K-0705)
(AD-A164789; ESL-716559-1) Avail: NTIS HC A04/MF A01 CSCL 17/9

Three computer programs were developed to process and analyze calibrated radar returns. The first program, called DATABASE, was developed to create and manage a random accessed data base. The second program, called FTRAN DB, was developed to process horizontal and vertical polarizations radar returns into different formats (i.e., time domain, circular polarizations and polarization parameters). The third program, called RSSE, was developed to simulate a variety of radar systems and to evaluate their ability to identify radar returns. Complete computer listings are included in the appendix volumes. GRA

N86-26511# Naval Postgraduate School, Monterey, Calif.
PROCESS SYNCHRONIZATION AND DATA COMMUNICATION BETWEEN PROCESSES IN REAL TIME LOCAL AREA NETWORKS M.S. Thesis
Reinhard Haeger Dec. 1985 113 p
(AD-A164860) Avail: NTIS HC A06/MF A01 CSCL 17/2

This thesis extends the multi-computer real-time executive, MCORTEX. The multiple cluster system RTC (Real Time Cluster Star), consisting of clusters of single board computers (INTEL iSBC 86/12A), which are connected via an Ethernet Local Area Network, serves as a hardware basis for the implementation of extended MCORTEX. The extension upgrades MCORTEX to system-wide synchronization and general data communication between any processes in the system. An intercluster shared memory model is developed, that partially replicates intracluster shared memory, such that shared data replication is minimized and the system's processing speed is maximized. This implementation, by transmitting produced shared data to all consuming clusters as soon as possible after production, guarantees that only cluster local hits occur in the system. Shared memory space is used efficiently by transmitting shared data to consuming clusters only, and by the ability to store shared data contiguously in intracluster shared memory. GRA

N86-26512# Princeton Univ., N. J. Information Sciences and Systems Lab.
ROBUST AND NONPARAMETRIC DETECTION OF FADING NARROWBAND SIGNALS Technical Report, Sep. 1983 - Aug. 1985
M. Weiss and Stuart C. Schwartz Jan. 1986 240 p refs
(Contract N00014-81-K-0146)
(AD-A164924; Rept-19) Avail: NTIS HC A11/MF A01 CSCL 17/9

This thesis deals primarily with the design and analysis of algorithms for detection of narrowband slowly fading signals, embedded in noise of uncertain distribution. The signal's phase and amplitude are random, but are essentially constant over the observation interval; in addition, the Doppler frequency of the signal is unknown. This is the most common model of target echoes received by radar or sonar systems. Attention is focused on i.i.d. noise samples whose marginal distribution belongs to an epsilon-mixture family, where the scale (variance) of the nominal part of the distribution is also unknown. This is an important generalization of the model. The purpose of the derived detection algorithms is two-fold: first, to assure constant probability of false alarm, regardless of the noise distribution (DF-CFAR); and second, to

achieve optimal maximin probability of detection (Pd) performance. GRA

N86-26513# Pennsylvania State Univ., University Park. Lab. for Electromagnetic and Acoustic Research.
EXACT CALCULATIONS OF FIRST ORDER CONTRIBUTIONS TO THE INCOHERENT INTENSITY
Vasundara V. Varadan, Yushieh Ma, and Vijay K. Varadan Jan. 1986 33 p refs
(Contract DAAG29-84-K-0187)
(AD-A164927; ARO-21825.1-GS) Avail: NTIS HC A03/MF A01 CSCL 14/5

Basic studies on the effect of inhomogeneities - via their geometry, size, material properties, distribution, multiple, scattering processes and statistical correlations in position and the effect of aligned versus randomly oriented non-spherical scatterers has continued this year. Emphasis has been on studies of the second moment of the field fluctuation, namely the incoherent intensity. The effects of completely correlated (identical) scatterers versus partially correlated scatterers (distinct) has been studied as a function of observation angle, non-dimensional wavenumber, and concentration. Due to the specific form of the expressions for the incoherent intensity, the effect of correlations is to decrease the value of the incoherent intensity, the effect of correlations is to decrease the value of the incoherent intensity. Since the correlation contribution is also very much angle dependent, the effects are more in some direction than in others. In every case both vertical and horizontal polarizations are studied and the differences in the results are discussed. The multiple amplitudes of the effective field exciting each scatterer are explicitily calculated leading to more accurate values of the second moment. It may be recalled that the effective field and the effective propagation constant are calculated in the Quasi Crystalline approximation and include the effects of pair correlation and sequential multiple scattering terms. Author (GRA)

N86-26514# M/A-COM Linkabit, Inc., Vienna, Va.
UHF DAMA (DEMAND-ASSIGNED MULTIPLE ACCESS) SIMULATION ANALYSIS Final Report, 7 Aug. - 27 Nov. 1985
G. Engel 27 Nov. 1985 287 p
(Contract DCA100-84-C-0009)
(AD-A165446; Rept-155; DCA/MSO-85-109A) Avail: NTIS HC A13/MF A01 CSCL 17/2

This manual is intended to provide comprehensive instructions on the use of the IBM-PC based Demand-Assigned Multiple access (DAMA) simulation environment. It presents information on the set up and loading of the various programs in the environment, as well as details on how to use each of the programs. All packages are structured as workspaces in the STSC Inc. version of the language APL*PLUS/PC. These programs will only run on an APL*PLUS/PC system, and it is assumed that the simulation user has a license for using APL*PLUS/PC from STSC. In the following section, an overview of the APL environment is presented. Each of the five following chapters document the five delivered workspaces (MODEL, BBNOISE, TDMA4N, TDMA4N, and DAMADR). Chapter 7 presents the results of the simulation validation effort. Chapter 8 gives a description of the noise model used in the simulation, as well as a user's guide to the noise simulation functions. Complete workspace documentation, including listings, cross-references, and function call trees are included as an appendix to this report. Author (GRA)

N86-26515# Stanford Telecommunications, Inc., McLean, Va.
USE OF LAN (LOCAL AREA NETWORK) TECHNOLOGY IN DSCS (DEFENSE SATELLITE COMMUNICATION SYSTEM) EARTH TERMINALS Final Report, Oct. 1985 - Feb. 1986
Alan Jacobsen and Matthew Griffin 20 Feb. 1986 212 p
(Contract DCA100-85-C-0062)
(AD-A165496; STI/E-TR-850156) Avail: NTIS HC A10/MF A01 CSCL 17/2

The report addresses the use of local area network (LAN) technology to support intercommunications within the Defense Satellite Communications Systems (DSCS) Earth terminals. A summary of local area network capabilities and options is provided as background material. Two types of device intercommunications are identified: the intercommunication of equipment to directly provide the circuit-switched channels needed for DSCS user circuits and the intercommunication of equipment in support of control and status monitoring functions. Issues and concerns regarding the application of LAN technology to either of these objectives are discussed. Additionally, the application of digital switching technology, specifically, use of the Integrated Multiplex, Patch, and Test (IMPAT) equipment, has also been considered as a means to fulfill these intercommunication requirements. GRA

N86-26516# M/A-COM Linkabit, Inc., Vienna, Va.
COMMERCIAL SATCOM SUBARCHITECTURE ASSESSMENTS AND INITIAL CONCEPTS Final Report, 17 Jun. - 22 Nov. 1985
Kamal Chahine 22 Nov. 1985 75 p
(AD-A165549; Rept-166) Avail: NTIS HC A04/MF A01 CSCL 17/2

This document reviews existing and planned, domestic and international commercial SATCOM assets for each of the following 3 time frames: Current (1985), mid-term (1986 to 1991) and far-term (1992 to 2000). In addition, current DOD use of these assets is summarized and assessed. Summary descriptions of some major mid-term DOD systems, networks and architectures are given. Alternative far-term concepts for the use of commercial SATCOM as a complement to MILSATs in providing additional service and robust connectivity are also presented. GRA

N86-26517# Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
METHODS OF OBTAINING OFFSHORE WIND DIRECTION AND SEA-STATE DATA FROM X-BAND AIRCRAFT SAR (SYNTHETIC APERTURE RADAR) IMAGERY OF COASTAL WATERS
Gary A. Mastin, Charles A. Harlow, Oscar K. Huh, and S. A. Hsu Apr. 1985 18 p
(Contract N00014-83-C-0150)
(AD-A165552; TR-410) Avail: NTIS HC A02/MF A01 CSCL 17/9

X-band synthetic aperture radar (SAR) imagery of the Goto Islands of Japan was digitally analyzed to extract air-sea interaction parameters and to assess the potential of texture measures in analysis of SAR ocean imagery. Wind direction is extracted from wind rows, wind streaks, and random turbulence patterns observed in the SAR imagery. Sea-state parameters are either extracted directly from the imagery or estimated using the extracted information in previously established empirical formulas. A convenient method of digitally presenting imagery, local power spectra, and the extracted/estimated parameters is presented. Texture analysis based on gray-level co-occurrence (GLC) matrices is applied to SAR ocean imagery. The inertia measure is shown to extract similar information to the power spectrum. The cluster-shade measure is shown to be sensitive to image phase. GRA

N86-26518# Stuttgart Univ. (West Germany). Inst. for Navigation.
SYNTHETIC APERTURE RADAR (SAR) PRODUCT SIMULATION Final Report
G. Domik (Technische Univ., Graz, Austria), Ph. Hartl, A. Popella (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart, West Germany), and A. J. Sieber Paris ESA Jul. 1985 241 p
(ESA-CR(P)-2149; ESA-86-96876) Avail: NTIS HC A11/MF A01

Existing SAR product simulator applicability to advanced land missions was assessed. It is found that none of them are appropriate. The requested input files characterizing the topography of an area of interest are not available to the quality necessary for realistic simulations. As part of the simulation process itself, the modeling of image speckle and image texture and the coherent SAR data hologram need more research. The development of a coherent radar cross section data base, including coordinated monostatic and bistatic calibrated measurements; development of algorithms for modeling image speckle and image texture, and

verification by analysis of existing SAR data; and harmonization of the development of digital terrain models are recommended. ESA

N86-26519# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Hochfrequenzverfahren.
STATISTICAL ANALYSIS OF DIGITAL SIDE-LOOKING AIRBORNE RADAR (SLAR) DATA
Juergen Nithack Aug. 1985 54 p
(DFVLR-FB-85-59; ISSN-0171-1342; ESA-86-96879) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 18

Statistical characteristics of X-Band radar data taken with digital SLAR were analyzed. It is shown that gray value distributions of range strips (50 pixels wide) and of distributed targets are sufficiently described by a normal distribution. Errors of 1st and 2nd kind were evaluated to judge the possibilities of classification, to define the minimum characteristic area of a surface type, and to judge internal equality of different surface types and equality of surface data over range after radiometric correction. A method to derive a correction factor from the SLAR data is demonstrated. This factor comprises system characteristics and geometry parameters only. A calibration concept is described, and requirements concerning calibration normals and overall accuracy are derived from the results of the data analysis. ESA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-26520*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INDIUM PHOSPHIDE SOLAR CELLS: STATUS AND PROSPECTS FOR USE IN SPACE
Irving Weinberg and David J. Brinker 1986 11 p Presented at 21st Intersociety Energy Conversion Engineering Conference (IECEC), San Diego, Calif. 25-29 Aug. 1986; sponsored by American Ceramic Society, SAE, American Nuclear Society, IEEE, AIAA and American Institute of Chemical Engineers
(NASA-TM-87315; E-3046; NAS 1.15:87315) Avail: NTIS HC A02/MF A01 CSCL 10A

The current status of indium phosphide cell research is reviewed and state of the art efficiencies compared to those of GaAs and Si. It is shown that the radiation resistance of InP cells is superior to that of either GaAs or Si under 1 MeV electron and 10 MeV proton irradiation. Using lightweight blanket technology, a SEP array structure and projected cell efficiencies, array specific powers are obtained for all three cell types. Array performance is calculated as a function of time in orbit. The results indicate that arrays using InP cells can outperform those using GaAs or Si in orbits where radiation is a significant cell degradation factor. It is concluded that InP solar cells are excellent prospects for future use in the space radiation environment. Author

N86-26521# California Univ., Berkeley. Lawrence Berkeley Lab.
OPTICAL AND ELECTROCHEMICAL STUDY OF MODEL ZINC ELECTRODE PORES IN ALKALINE ELECTROLYTE
J. H. Flatt, F. R. McLarnon, and E. J. Cairns Sep. 1985 179 p
(Contract DE-AC03-76SF-00098)
(DE86-002967; LBL-20025) Avail: NTIS HC A09/MF A01

A computer-controlled model single-pore cell has been developed to study zinc electrode discharge behavior in alkaline electrolytes. The cell design allows for simultaneous microscopic and potential performance observations. A quartz-supported, thin-film cadmium reference microelectrode was designed, fabricated and installed in the cell. The cell was designed to create model pores of dimensions comparable to those in commercial zinc electrodes. Zinc electrode discharge behavior was studied in pores of effective radii between 14 and 20 microns at 7 mA/sq cm, 30 mA/sq cm and 1250 mA/sq cm rates of discharge in 7.7M KOH electrolyte. Results are consistent with a dissolution-precipitation discharge reaction mechanism. SEM studies showed significant variations in electrodes surface morphology with location in the pore and rate of discharge. Significant pore[OH(-)] gradients, with slow relaxation times, were found to exist within the pore at the mA/sq cm rate. Passivation was observed at the 1250 mA/sq cm rate. Zinc electrode discharge behavior in 3.5M KOH-3.4M KF showed a similar discharge reaction mechanism. However, earlier surface film formation in 3.5M KOH-3.4M KF was found to occur. Initial reaction penetration depths in 7.7M KOH and 3.5M KOH-3.4M KF electrolytes were 0.11 cm and 0.10 cm. DOE

N86-26522# Naval Research Lab., Washington, D. C.
ANALYSIS OF HELICAL WAVEGUIDE
S. Ahn and A. K. Ganguly 23 Dec. 1985 32 p
(AD-A163252; NRL-MR-5620) Avail: NTIS HC A03/MF A01 CSCL 09/1

The dispersion characteristics of the large diameter helical waveguide are calculated using Pierce's small signal theory. The backward wave oscillation poses a serious problem for the development of this circuit as a broad-band, high gain amplifier. The gain of the backward waves is in general higher than the gain of the forward waves. For the first space harmonic (m=1) mode, the forward and the backward wave gains are, respectively, 2.17 dB/cm and 2.24 dB.cm. The bandwidth is 40% for a total gain of 30 dB if the backward waves are ignored. The onset of the backward wave oscillation limits the bandwidth to 5% for such high gain. The threshold interaction length for the onset of oscillation is also calculated. If the oscillations are not suppressed, the total gain of the circuit is limited to about 12 dB. At this low gain, the bandwidth can be as high as 57%. The device performs better with the low order space harmonic modes. Not only the gain and the bandwidth are larger for the low order modes but the ratio of the backward to forward wave gains and the number of the backward waves excited are also smaller. Author (GRA)

N86-26523# Oregon Graduate Center for Study and Research, Beaverton.
MONOLITHIC CATHODES Final Report, Dec. 1983 - Apr. 1985
Paul R. Davis and Lynwood W. Swanson Nov. 1985 33 p
(Contract F19628-84-K-0026)
(AD-A163282; RADC-TR-85-211) Avail: NTIS HC A03/MF A01 CSCL 09/1

The purpose of this program was to evaluate LaB6 (210) and (310) oriented single crystal material for flat cathode applications and to deliver mounted LaB6 cathodes with (310) orientation for operation in RADC/Varian life test vehicles. To that end, the program was divided into four separate tasks, as shown in the report. This project was extended for 3 months past the initial program period so that unavoidable delays could be overcome and the project completed. The final report covers the entire period of the program, which terminated 29 March 1985. GRA

N86-26524# Dayton Univ., Ohio. School of Engineering.
NON-UNIFORM CURRENTS ON A WEDGE ILLUMINATED BY A TE (TRANSVERSE ELECTRIC) PLANE WAVE Interim Report, Sep. 1984 - Jul. 1985
P. K. Murthy and Gary A. Thiele Nov. 1985 44 p
(Contract F19628-83-K-0034)
(AD-A163323; UDR-TR-85-84; RADC-TR-85-212) Avail: NTIS HC A03/MF A01 CSCL 20/3

Closed form expressions for nonuniform currents on a perfectly conducting, infinite wedge illuminated by transverse electric plane wave are presented. These expressions are derived by requiring that they coincide with the current predicted by the asymptotic diffraction theory far from the edge and, further, that they agree with the current predicted by the eigenfunction solution at the edge. The angle of incidence is arbitrary and our expressions remain valid even for glancing angles of incidence when either

one or both faces of the wedge is in the vicinity of a geometric optic boundary. Formulas presented here are simple involving the well known modified Fresnel functions but are not uniform. Exact expressions for non-uniform currents are available for the two special cases of half plane and infinite plane. For these special cases, our solution reduces to the exact solution. Currents computed using the expressions developed here are compared with currents computed from the eigenfunction solution of the wedge. Good agreement is obtained throughout. Author (GRA)

N86-26525# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
A THREE DIMENSIONAL PLASMA SIMULATION CODE APPLIED TO PHASE VELOCITY PREDICTION IN A COUPLED CAVITY CIRCUIT Final Technical Report, Sep. 1982 - Sep. 1985
Paul E. Prince Oct. 1985 54 p
(Contract F30602-82-C-0161)
(AD-A163331; UTEC-85-049; RADC-TR-85-198) Avail: NTIS HC A04/MF A01 CSCL 20/3

The problems encountered in the design of circuits for traveling wave devices are of sufficient difficulty that analytic solutions are not usually possible. Historically, resistive networks, electrolytic tanks, and analog computers have been used to simulate devices and thereby permit direct measurement of the field variations. With the advent of large digital computers, it has become possible to solve these problems in a much more general fashion by numerically integrating the fundamental differential equations over a discrete mesh. The recent development of numerical techniques to efficiently handle the massive data storage problem necessary to self-consistently solve Maxwell's equations with sources, combined with the continuing improvement in computer price/performance ratios, has led to the development of computer codes powerful enough to perform three-dimensional numerical experiments. Codes of this type have been used for a number of years in EMP calculations and in plasma physics. This paper will present the initial results of applying a three-dimensional plasma simulation code to microwave tube design problems; specifically, the cold testing of coupled-cavity to find phase/frequency characteristics. GRA

N86-26526# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
EVALUATION OF TWT (TRAVELING WAVE TUBE) CATHODE IMPREGNANT MANUFACTURING PROCEDURES
R. A. Lipeles 27 Nov. 1985 27 p
(Contract F04701-85-C-0086)
(AD-A163360; TR-0086(6945-02)-1; SD-TR-85-84) Avail: NTIS HC A03/MF A01 CSCL 09/1

Impregnant manufacturing procedures were evaluated as part of a program to develop guidelines for producing reliable dispenser cathodes. Such procedures must be controlled in order to eliminate variations in impregnant composition that can give rise to unpredictable cathode performance. Experiments revealed that variations in impregnant composition result primarily from contamination by moisture, incomplete mixing, and incomplete reaction. Procedures developed to overcome these problems are discussed. The following recommendations are made: (1) Alumina must be dried prior to weighing to avoid inaccurate formulation due to moisture. (2) Multiple dry and wet mixing steps are nedded to thoroughly homogenize the starting materials. (3) Calcination temperatures of 1300 + or - 60 C are required to form thoroughly reacted barium calcium aluminates. (4) Thermogravimetry is useful for testing impregnants and starting materials for moisture contamination. GRA

N86-26527# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Sci.
COMPACTION WITH AUTOMATIC JOG INTRODUCTION
F. M. Maley Oct. 1985 24 p refs
(Contract N00014-80-C-0622)
(AD-A163436) Avail: NTIS HC A02/MF A01 CSCL 09/5

A novel polynomial-time algorithm for compacting a VLSI layout is presented. Compared to previous algorithms, the algorithm promises to produce higher quality output while reducing the need for designer intervention. The performance gain is realized by converting wires into constraints on the positions of the active devices. These constraints can be solved by graph-theoretic techniques to yield optimal positions for chip components. A single-layer router is then used to restore the wires to the layout, using as many as jogs as necessary. An automated compaction procedure is an effective tool for cutting production costs of a VLSI circuit at low cost to the designer, because the yield of fabricated chips is strongly dependent on the total circuit area. Sect 1 is an introduction. Sect 2 states the definitions and theoretical results that underlie the new compaction method. Sect 3 shows how the circuit layout is converted to a data structure appropriate for compaction, and Sect 4 details the body of the compaction algorithm. Sect 5 covers several improvements to the algorithm that should make it run considerably faster. Sect 6 comments on the algorithms of results, and a discussion of the practical value of the compaction algorithm. GRA

N86-26528# Department of the Army, Washington, D. C.
AMORPHOUS SILICON SPATIAL LIGHT MODULATOR Patent Application
Paul R. Ashley, inventor (to Army) Filed 23 Dec. 1985 9 p
(AD-D012168; US-Patent-Appl-SN-812603) Avail: NTIS HC A02/MF A01 CSCL 09/3

This patent application discloses an amorphous silicon spatial light modulator that includes a unique three electrode structure that is used to create a two-dimensional electric field distribution in liquid crystal material. This modulator allows for the use of very thin photoconductor layers and a middle electrode in the form of a grating structure to provide control of the field shape while also providing for high spatial resolution. GRA

N86-26529# Department of the Air Force, Washington, D.C.
POWER SENSING DEVICE Patent Application
Jaime Quiros, inventor (to Air Force) Filed 19 Jul. 1985 12 p
(AD-D012171; US-Patent-Appl-SN-756549) Avail: NTIS HC A02/MF A01 CSCL 09/5

A power sensing device is disclosed for use with an electrical alternating current (AC) power source, a primary load, and a plurality of secondary loads. The power sensing device detects when the primary load is turned on, and automatically supplies power from the electrical AC power source to the plurality of secondary loads in response thereto. The power sensing device also senses when the primary load is turned off, and removes electrical power from the plurality of secondary loads in response thereto. Author (GRA)

N86-26530# Rome Air Development Center, Griffiss AFB, N.Y.
MINIMIZING EHF WAVEGUIDE LOSSES
Edward W. Gilbertson Dec. 1985 79 p
(AD-A164726; RADC-TR-85-223) Avail: NTIS HC A05/MF A01 CSCL 09/1

To minimize RF power transmission losses at high frequencies, rectangualr waveguide has become the standard transmission medium. At EHF frequencies, rectangular waveguide attenuation rises to unacceptably high levels. To minimize waveguide loss, length is minimized. Where this is not possible, a variety of alternatives exist, each having lower attenuation than standard rectangular waveguide and each with its own advantages and limitations. Square circular (modes TE11 and TE01), oversized rectangular, oversized circular (modes TE11 and TE01), and dielectric waveguides are addressed and categorized according to bendability. By choosing the technology with the lowest attenuation which meets the installation's bendability requirements, the optimum transmission method can be determined. Attenuations are calculated for comparison at 44 GHz, but the discussion is general enough to hold throughout the EHF frequency range.GRA

N86-26531# Princeton Univ., N. J. Information Sciences and Systems Lab.
FINITE LENGTH DISCRETE MATCHED FILTERS
Andrew B. Martinez and John B. Thomas Jan. 1986 18 p

(Contract N00014-81-K-0146)
(AD-A164869; TR-20) Avail: NTIS HC A02/MF A01 CSCL 09/5

The Matched Filter (MF) is well known to be the linear detector that has the maximum output Signal-to-Noise Ratio (SNR). The problem of finding the minimum filter length in discrete time to achieve a certain level of performance is considered when there is some freedom in choosing a signal shape. Upper and lower bounds on the SNR are given in terms of the eigenvalues of the noise covariance matrix. Since these bounds are rather difficult to compute, looser, but easier to compute, bounds are given. Several examples are presented which illustrate the exact and approximate bounds. GRA

N86-26532# Ohio State Univ., Columbus. ElectroScience Lab.
JOINT SERVICES ELECTRONICS PROGRAM Annual Report, Oct. 1984 - Sep. 1985
Dec. 1985 187 p refs
(Contract N00014-78-C-0049)
(AD-A164916; ESL-710816-18; AR-8) Avail: NTIS HC A09/MF A01 CSCL 09/5

An overview of the research in electromagnetics is given. The progress in diffraction studies, which include diffraction by nonconducting surfaces, vertex diffraction, diffraction by wedges, diffraction in the paraxial regions of smooth quasicylindrical convex surfaces, and caustic field analysis, is reviewed. Hybrid techniques including diffraction by perfectly conducting surfaces, the problem of diffraction by edges formed at junctions between perfectly conducting and dielectric boundaries, analysis of microstrip antennas, and reflecting antenna synthesis are presented. Integral equation studies of material coated edges and time domain studies are also updated. E.R.

N86-26533# Illinois Univ., Urbana. Coordinated Science Lab.
QUASI-TEM ANALYSIS OF MICROWAVE TRANSMISSION LINES BY THE FINITE ELEMENT METHOD
Zorica Pantic and Raj Mittra Feb. 1986 35 p
(Contract N00014-84-C-0149)
(AD-A164943; UILU-ENG-86-2205) Avail: NTIS HC A03/MF A01 CSCL 09/3

This paper describes a finite element approach to quasi-TEM analysis of several different types of isolated and coupled microwace transmission lines. Both the first and higher-order ordinary elements, as well as singular and infinite elements are used to solve for the potential and field distribution in the cross-section of the line. Next, the cross-sectional field distribution is inserted in a variational expression to compute the capacitance per unit length of the line and the effective permittivity and characteristic impedance of the line are obtained from the capacitance value. A perturbationl approach is developed for estimating the losses due to conductor and dielectric dissipation and computing the attentuation constant. Lines treatable by this method may contain an arbitrary number of arbitrarily shaped conductors, including a system of conductors either placed above a single ground plane or between two parallel ground planes, and inhomogeneous dielectric regions that can be approximated locally by a number of homogeneous subregions. GRA

N86-26534# Naval Postgraduate School, Monterey, Calif.
DIGITALLY CONTROLLED PROGRAMMABLE ACTIVE FILTERS M.S. Thesis
Panagiotis Andresakis Dec. 1985 201 p refs
(AD-A164999) Avail: NTIS HC A10/MF A01 CSCL 09/3

In this research a general purpose digitally controlled analog filter is presented. The novel design is a cascade of second order sections that are individually programmed to achieve any filtering topologies. Two binary words are used to control the pole frequency omega p and selectivity Qp of each section independently. Each second order section is a Generalized-Immittance Converter (GIC) biquads which are known for their high stability and low active and passive sensitivity. CMOS switches are used to electronically relocate the minimum number of passive elements to achieve function programmability. Switches are also used to select the number of cascaded sections to realize higher order transfer functions. GRA

N86-26535# Rome Air Development Center, Griffiss AFB, N.Y.
CONCEPT STUDY OF A MULTIPLE BEAM LENS ANTENNA WITH AN INTERNAL PHASE SHIFT MASK
Daniel T. McGrath Aug. 1985 28 p
(AD-A165277; RADC-TR-85-159) Avail: NTIS HC A03/MF A01 CSCL 09/5

A new antenna architecture has been investigated to assess its usefulness for limited scan systems. It consists of a passive lens with a few small subarrays spaced evenly across its focal surface. Between the lens and the focal surface is a phase shift layer, or mask, comprised of oppositely-facing planar arrays interconnected by phase shifters (similiar to a phased array lens). The mask redirects a focusing wave from an arbitrary angle onto one of the subarrays. It is shown that a system with only 19 small subarrays, and a mask containing about 4500 elements could provide complete Earth coverage with as many as 19 simultaneous 0.3 deg beams. The pattern quality of those beams is good, provided that no two are steered to within a few beamwidths of each other. GRA

N86-26536# Polytechnic Inst. of New York, Brooklyn.
LUMPED-ELEMENT AND LEAKY-WAVE ANTENNAS FOR MILLIMETER WAVES Final Technical Report
A. A. Oliner Jan. 1986 193 p
(Contract F19628-81-K-0044)
(AD-A165280; RADC-TR-85-255) Avail: NTIS HC A09/MF A01 CSCL 09/5

This contract was concerned with millimeter wave antennas that cannot be scaled from their microwave frequency counterparts, and it concentrated on novel leaky wave antennas. Two such waveguides were selected: the groove guide, and nonradiative dielectric (NRD) guide. Six different leaky wave antennas were analyzed on this program, with two treated in special detail. Three different mechanisms for producing leakage were employed: asymmetry, foreshortening the structure's cross section, and using leaky higher modes. The different mechanisms also lead to different polarizations of the radiated fields. Accurate theoretical analyses were conducted for each of the antenna structures. Transverse equivalent networks were established, the elements of which were derived in closed form, so that the dispersion relations were also. Numerical values for the propagation characteristics were obtained as a function of various geometric parameters, to aid in the design of antennas based on these leaky structures. Special design considerations, including optimization procedures, were also developed when possible. GRA

N86-26537# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
ANALYSIS OF AN APERTURE COUPLED MICROSTRIP ANTENNA Interim Report, Jan. 1984 - Jul. 1985
Peter L. Sullivan and Daniel H. Schaubert Feb. 1986 68 p
(Contract F19628-84-K-0022)
(AD-A165283; RADC-TR-85-274) Avail: NTIS HC A04/MF A01 CSCL 09/5

A new feed configuration for microstrip antennas is analyzed. The antenna consists of a single rectangular microstrip patch coupled through a rectangular aperture to a microstrip line on a separate substrate. The report describes the theory which uses a moment method analysis to calculate the antenna's input impedance. The analysis was verified by comparison with measurements of patch antennas on a low-dielectric-constant substrate (2.54) and the feed line on high-dielectric-constant (10.2) substrate. Author (GRA)

N86-26538# Systems Science and Software, La Jolla, Calif.
IONIZATION INDUCED INSTABILITY IN AN ELECTRON COLLECTING SHEATH
D. L. Cooke and I. Katz Jun. 1985 30 p
(Contract F19628-82-C-0081)
(AD-A165330; SSS-R-85-7343; AFGL-TR-85-0256; SR-2) Avail:

NTIS HC A03/MF A01 CSCL 09/1

A numerical investigation of the electron collecting sheath about a positively biased probe in the ionosphere has been conducted to determine the effect of ionization within the sheath. This report is directed at the space charge limited regime appropriate to objects with characteristic size much larger than the ambient Debye length, and uniform surface potential much greater than the ambient plasma temperature. A fluid approximation is employed to model the dynamics of the secondary plasma produced within the sheath. The results indicate that when the secondary ion production exceeds a critical level, the sheath edge propagates outward in an explosive fashion, in a manner similar to the propagation of double layers. This critical level is shown to be equivalent to a mean free path for ionization by electrons lambda sub ie < (sq. rt. (m(sub i)/m(sub e))) (D(sub S)/alpha) where D sub S is the sheath thickness and alpha is a geometry dependent parameter. Usual ionosphere-probe interactions appear to be sub critical, but an enhanced neutral background might be produced by shuttle contaminants, could reach the critical level, and trigger the instability. GRA

N86-26539# Naval Postgraduate School, Monterey, Calif.
ELECTRON INDUCED CONDUCTIVITY OF AL2O3 AS PERTAINING TO THERMIONIC INTEGRATED CIRCUITS M.S. Thesis
Peter J. Peterson Dec. 1985 109 p
(AD-A165589) Avail: NTIS HC A06/MF A01 CSCL 09/5

Experiments were conducted to measure the electron induced conductivity (EIC) of single crystal sapphire (Al2O3) and polycrystalline alumina (Al2O3). The EIC is generated when the samples are bombarded with high energy electrons, utilizing the Naval Postgraduate School's S-band linear accelerator (LINAC). The EIC was measured at dose rate up to 6 x 10 to the 7th power rad (Si)/sec. The EIC for alumina was an order of magnitude smaller than the value for sapphire. The value calculated for alumina was 10,000 per ohm cm and 1,000 per ohm cm for sapphire. The response of EIC to a given dose rate did not change as the dose accumulated. Surface flashover problems during electron irradiation were observed and are discussed. GRA

N86-26540# Department of the Navy, Washington, D. C.
SELF ALIGNED NOTCH FOR InP PLANAR TRANSFERRED ELECTRON OSCILLATOR Patent Application
Steven C. Binari, inventor (to Navy) Filed 13 Jan. 1986 14 p
(AD-D012185; US-Patent-Appl-SN-818512) Avail: NTIS HC A02/MF A01 CSCL 09/5

A method of fabricating a notched indium phosphide planar transferred electron oscillator device which automatically aligns the high-resistivity notch position immediately adjacent to the cathode contact by slant evaporation of a metal coating over the edge of a masking layer followed by ion implantation. GRA

N86-26541# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/Algorithmics and Archite.
AREA PENALTY FOR SUBLINEAR SIGNAL PROPAGATION DELAY ON CHIP (PRELIMINARY VERSION)
Paul M. B. Vitanyi Aug. 1985 25 p Partly in ENGLISH and FRENCH Presented at 26th Annual IEEE Symposium on Foundations of Computer Science, Portland, Oreg., 21-23 Oct. 1985 Revised
(Contract BMFT-0101-ZA/WF/WRD-174/4)
(CWI-CS-R8514; B8575491; ESA-86-97005) Avail: NTIS HC A02/MF A01

It is shown that sublinear signal propagation delay in VLSI circuits carries a far greater penalty in wire area than is commonly realized. Therefore, the global complexity of VLSI circuits is more layout dependent than thought. This effect is pronounced in wafer scale integration technology. Lower bounds on the trade-off between sublinear signaling speed and layout area for the implementation of a complete binary tree in VLSI are established. Sublinear delay can only be realized at the cost of superlinear area. Designs with equal length wires can either not be laid out at all (for logarithmic delay) or require such long wires in the case of radical delay that the aimed for gain in speed is cancelled. For wire length distributions commonly occurring on chip, the requirements for sublinear signal propagation delay tend to cancel the gain. ESA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-26542 Royal Aircraft Establishment, Farnborough (England). Inst. of Sound and Vibration Research.
THE AIR-INJECTION METHOD OF FIXING BOUNDARY-LAYER TRANSITION AND INVESTIGATING SCALE EFFECTS
P. R. Ashill, comp., J. L. Fulker, comp., D. J. Weeks, and M. Verain 15 Mar. 1985 44 p refs
(RAE-TR-85025; RAE-AERO-3609; BR97257; ESA-85-96844)
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Experience with the air-injection method of fixing transition in wind tunnel tests on two-dimensional airfoils and a swept panel at high subsonic free-stream speeds is described. The method is shown to provide a repeatable level of disturbance which, for a given flow condition, may be generated without interrupting the test, and does not cause a significant excess drag. Examples illustrate the effectiveness of the technique in demonstrating scale-sensitive features of flows. A correlation which allows the minimum value of air-injection mass flow needed to fix transition to be estimated from a knowledge of the behavior of natural laminar flow on the wing is presented. ESA

N86-26543*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE EXISTENCE OF SOLUTIONS OF AN EQUATION ARISING IN THE THEORY OF LAMINAR FLOW IN A UNIFORMLY POROUS CHANNEL WITH INJECTION Final Report
Ke-Gang Shih Mar. 1986 27 p refs Sponsored by NASA. Langley Research Center, Hampton, Va. Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178078; ICASE-86-17; NAS 1.26:178078) Avail: NTIS HC A03/MF A01 CSCL 20D

The existence of concave solutions of Berman's equation which describes the laminar flow in channels with injection through porous walls is established. It was found that the (unique) concave solutions exist for all injection Reynolds number R < 0. Author

N86-26544*# Universities Space Research Association, Huntsville, Ala. Science and Engineering Directorate.
A COMPUTER CODE FOR THREE-DIMENSIONAL INCOMPRESSIBLE FLOWS USING NONORTHOGONAL BODY-FITTED COORDINATE SYSTEMS Final Report
Y. S. Chen Mar. 1986 86 p refs
(Contract NAS8-35918)
(NASA-CR-178818; NAS 1.26:178818) Avail: NTIS HC A05/MF A01 CSCL 20D

In this report, a numerical method for solving the equations of motion of three-dimensional incompressible flows in nonorthogonal body-fitted coordinate (BFC) systems has been developed. The equations of motion are transformed to a generalized curvilinear coordinate system from which the transformed equations are discretized using finite difference approximations in the transformed domain. The hybrid scheme is used to approximate the convection terms in the governing equations. Solutions of the finite difference equations are obtained iteratively by using a pressure-velocity correction algorithm (SIMPLE-C). Numerical examples of two- and three-dimensional, laminar and turbulent flow problems are employed to evaluate the accuracy and efficiency of the present computer code. The user's guide and computer program listing of the present code are also included. Author

N86-26545*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF A COMPUTATIONAL MODEL FOR VORTEX GENERATORS IN SUBSONIC INTERNAL FLOWS
William G. Kunik 1986 24 p refs Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE
(NASA-TM-87327; E-3072; NAS 1.15:87327; AIAA-86-1458) Avail: NTIS HC A02/MF A01 CSCL 20D

A model for the analysis of vortex generators in a fully viscous subsonic internal flow is evaluated. A vorticity source term is used in a modified form of the Parabolized Navier-Stokes equations to model the shed vortex. Computed results are compared with idealized flow vortex paths, and with experimental data for vortex generators embedded in a thick turbulent boundary layer. The analysis is also compared with experimental data for a separated diffusing S-duct and for a diffusing S-duct with vortex generators. Quantitative comparisons are shown for the latter three cases. Emphasis is placed on verifying the ability of the model to predict global distortions in the flow field. Author

N86-26546*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
THERMODYNAMIC EVALUATION OF TRANSONIC COMPRESSOR ROTORS USING THE FINITE VOLUME APPROACH Semiannual Status Report, 20 Dec. 1985 - 31 May 1986
Stephen Nicholson and John Moore 1986 81 p
(Grant NAG3-593)
(NASA-CR-176840; NAS 1.26:176840; JM/86-2) Avail: NTIS HC A05/MF A01 CSCL 20D

The finite volume explicit time marching method was refined and improved. Previously, extension had been made to the finite volume method to improve the accuracy of the calculation of total pressure in inviscid flow, extend the method to allow the calculation of laminar and turbulent boundary layers in internal flows, and improve the shock capturing properties of the method by introducing a Mach number dependent interpolation scheme for the pressure used in the calculating the density. The current work extends these developments by using the new pressure interpolation scheme in two dimensional viscous calculations, including a more complete description of the viscous stresses, introducing a criteria for the transverse upwind differencing which is a function of the ratio of transverse and streamwise mass fluxes, and allowing the calculation of internal flow where boundary layers are present on both walls of the duct. The manner in which the viscous stresses are evaluated in the nonorthogonal, nonuniform grid is detailed. The convergence is investigated and results for calculations of laminar flow in a converging duct are presented. Results for calculations of transonic flow in a converging-diverging nozzle are presented and the results are compared with Sajben's measurements and calculations by others. Author

N86-26547*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIGRID METHOD FOR A VORTEX BREAKDOWN SIMULATION
Shlomo Taasan May 1986 23 p refs
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178106; ICASE-86-29; NAS 1.26:178106) Avail: NTIS HC A02/MF A01 CSCL 20D

An inviscid model for a steady axisymmetric flow with swirl was studied. The governing equation is a nonlinear elliptic equation which has more than one solution for a certain range of the swirl parameter. The physically interesting solutions have closed streamlines that look like vortex breakdown (bubble-like solutions). A multigrid method is used to find these solutions. Using an FMG algorithm (nested iteration), the problem is solved in just a few multigrid cycles. Author

N86-26548*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON SIMILARITY SOLUTIONS OF A BOUNDARY LAYER PROBLEM WITH AN UPSTREAM MOVING WALL
M. Y. Hussaini, W. D. Lakin (Old Dominion Univ., Norfolk, Va.), and A. Nachman (Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.) May 1986 26 p refs
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178104; ICASE-86-26; NAS 1.26:178104) Avail: NTIS HC A03/MF A01 CSCL 20D

The problem of a boundary layer on a flat plate which has a constant velocity opposite in direction to that of the uniform mainstream is examined. It was previously shown that the solution of this boundary value problem is crucially dependent on the parameter which is the ratio of the velocity of the plate to the velocity of the free stream. In particular, it was proved that a solution exists only if this parameter does not exceed a certain critical value, and numerical evidence was adduced to show that this solution is nonunique. Using Crocco formulation the present work proves this nonuniqueness. Also considered are the analyticity of solutions and the derivation of upper bounds on the critical value of wall velocity parameter. Author

N86-26549*# National Aeronautics and Space Administration, Washington, D.C.
SELF-ADAPTIVE DIFFERENCE METHOD FOR THE EFFECTIVE SOLUTION OF COMPUTATIONALLY COMPLEX PROBLEMS OF BOUNDARY LAYER THEORY
W. Schoenauer, H.-G. Daeubler, G. Glotz, and J. Gruening Jun. 1986 25 p refs Transl. into ENGLISH of conf. paper "Selbststeuernde Differenzenverfahren zur Effektiven Loesung von Stark Rechenintensiven Problemen der Grenzschichttheorie" presented at DGLR 9th Annual Convention, 1976 p 1-20 Conference held in Munich, West Germany, 14-16 Sep. 1976 Original language document was announced in IAA as A77-16564 Transl. by The Corporate Word, Inc., Pittsburgh, Pa. Original doc. prep. by Karlsruhe Univ.
(Contract NASw-4006)
(NASA-TM-88440; NAS 1.15:88440; DGLR-76-185) Avail: NTIS HC A02/MF A01 CSCL 20D

An implicit difference procedure for the solution of equations for a chemically reacting hypersonic boundary layer is described. Difference forms of arbitrary error order in the x and y coordinate plane were used to derive estimates for discretization error. Computational complexity and time were minimized by the use of this difference method and the iteration of the nonlinear boundary layer equations was regulated by discretization error. Velocity and temperature profiles are presented for Mach 20.14 and Mach 18.5; variables are velocity profiles, temperature profiles, mass flow factor, Stanton number, and friction drag coefficient; three figures include numeric data. B.J.

N86-26550*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPECTRAL METHODS IN FLUID DYNAMICS Final Report
M. Y. Hussaini and T. A. Zang May 1986 63 p refs Sponsored by NASA. Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178103; ICASE-86-25; NAS 1.26:178103) Avail: NTIS HC A04/MF A01 CSCL 20D

Fundamental aspects of spectral methods are introduced. Recent developments in spectral methods are reviewed with an emphasis on collocation techniques. Their applications to both compressible and incompressible flows, to viscous as well as inviscid flows, and also to chemically reacting flows are surveyed. The key role that these methods play in the simulation of stability, transition, and turbulence is brought out. A perspective is provided on some of the obstacles that prohibit a wider use of these methods, and how these obstacles are being overcome. Author

N86-26551*# Alabama Univ., Huntsville.
MONOBALL ENERGY TRANSFER: TEST REPORT Final Report, 27 Sep. 1985 - 26 Jun. 1986
Francis C. Wessling Jun. 1986 23 p
(Grant NAG8-046)
(NASA-CR-176812; NAS 1.26:176812) Avail: NTIS HC A02/MF A01 CSCL 20D

An aluminum platform serves as a storage shelf for experiments transported on the space shuttle. This platform is attached to the shuttle storage area through several supports, each consisting of an attachment fitting, a monoball bearing, a clevis pin and a support strut. The experiments must be temperature controlled during and after launch. Consequently, heat loss through the plate, attachment fitting, monoball bearing, and strut are important. The overall conductance of the monoball bearing was determined by an experimental method of heating the outer ring with a nichrome resistance wire and cooling the inner ball with propylene glycol. Temperature differences across the bearing were measured for various heat fluxes. The overall conductance is 0.42 Watts/C (0.80 BTU/hr F), This yields a 16 watt loss for a 38 C temperature difference across the bearing. Author

N86-26552*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADVANCES IN NUMERICAL AND APPLIED MATHEMATICS
Final Report
J. C. South, Jr., ed. and M. Y. Hussaini, ed. Mar. 1986 593 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178076; ICASE-86-18; NAS 1.26:178076) Avail: NTIS HC A25/MF A01 CSCL 20D

This collection of papers covers some recent developments in numerical analysis and computational fluid dynamics. Some of these studies are of a fundamental nature. They address basic issues such as intermediate boundary conditions for approximate factorization schemes, existence and uniqueness of steady states for time dependent problems, and pitfalls of implicit time stepping. The other studies deal with modern numerical methods such as total variation diminishing schemes, higher order variants of vortex and particle methods, spectral multidomain techniques, and front tracking techniques. There is also a paper on adaptive grids. The fluid dynamics papers treat the classical problems of imcompressible flows in helically coiled pipes, vortex breakdown, and transonic flows. For individual titles, see N86-26553 through N86-26573.

N86-26553*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONVERGENCE TO STEADY STATE OF SOLUTIONS OF BURGERS' EQUATION
Gunilla Kreiss (Royal Inst. of Tech., Stockholm, Sweden) and Heinz-Otto Kreiss (California Inst. of Tech., Pasadena) *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 1-29 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0303-85)
Avail: NTIS HC A25/MF A01 CSCL 20D

Consider the initial boundary value problem for Burgers' equation. It is shown that its solutions converge, in time, to a unique steady state. The speed of the convergence depends on the boundary conditions and can be exponentially slow. Methods to speed up the rate of convergence are also discussed. Author

N86-26554*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY ANALYSIS OF INTERMEDIATE BOUNDARY CONDITIONS IN APPROXIMATE FACTORIZATION SCHEMES
Jerry C. South, Jr., Mohamed M. Hafez (California Univ., Davis), and David Gottlieb (Brown Univ., Providence, R. I.) *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 30-55 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0303-85)
Avail: NTIS HC A25/MF A01 CSCL 20D

The role of the intermediate boundary condition in the approximate factorization 2 (AF2) scheme used by Holst for simulation of the transonic full potential equation was discussed. The treatment suggested by Holst led to a restriction on the time step and ways to overcome this restriction were suggested. The discussion is based on the theory developed by Gustafsson, Kreiss, and Sundstroem and also on the von Neumann method. Author

N86-26555*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIPLE STEADY STATES FOR CHARACTERISTIC INITIAL VALUE PROBLEMS
M. D. Salas, S. Abarbanel (Tel-Aviv Univ., Israel), and David Gottlieb (Brown Univ., Providence, R. I.) *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 56-99 Previously announced as N85-14800 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0303-85)
Avail: NTIS HC A25/MF A01 CSCL 20D

The time dependent, isentropic, quasi-one-dimensional equations of gas dynamics and other model equations are considered under the constraint of characteristic boundary conditions. Analysis of the time evolution shows how different initial data may lead to different steady states and how seemingly anamolous behavior of the solution may be resolved. Numerical experimentation using time consistent explicit algorithms verifies the conclusions of the analysis. The use of implicit schemes with very large time steps leads to erroneous results. Author

N86-26556*# Tel-Aviv Univ. (Israel). School of Mathematical Sciences.
A MINIMUM ENTROPY PRINCIPLE IN THE GAS DYNAMICS EQUATIONS
Eitan Tadmor *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 100-118 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; DAAG29-85-K-0190; Grant NSF DMS-85-03294)
Avail: NTIS HC A25/MF A01 CSCL 20D

Let u(bar x,t) be a weak solution of the Euler equations, governing the inviscid polytropic gas dynamics; in addition, u(bar x,t) is assumed to respect the usual entropy conditions connected with the conservative Euler equations. It is shown that such entropy solutions of the gas dynamics equations satisfy a minimum entropy principle, namely, that the spatial minimum of the specific entropy is an increasing function of time. This principle equally applies to discrete approximations of the Euler equations such as the Godunov-type and Lax-Friedrichs schemes. The derivation of this minimum principle makes use of the fact that there is a family of generalized entropy functions connected with the conservative Euler equations. Author

N86-26557*# Florida State Univ., Tallahassee.
A SPECTRAL MULTIDOMAIN METHOD FOR THE SOLUTION OF HYPERBOLIC SYSTEMS
David A. Kopriva *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 119-164 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107)
Avail: NTIS HC A25/MF A01 CSCL 20D

A multidomain Chebyshev spectral collocation method for solving hyperbolic partial differential equations was developed. Though spectral methods are global methods, an attractive idea is to break a computational domain into several subdomains, and a way to handle the interfaces is described. The multidomain approach offers advantages over the use of a single Chebyshev grid. It allows complex geometries to be covered, and local refinement can be used to resolve important features. For steady-state problems it reduces the stiffness associated with the use of explicit time integration as a relaxation scheme. Furthermore, the proposed method remains spectrally accurate. Results showing performance of the method on one dimensional linear models and one and two dimensional nonlinear gas dynamics problems are presented. Author

N86-26558*# Carnegie-Mellon Univ., Pittsburgh, Pa.
ON SUBSTRUCTURING ALGORITHMS AND SOLUTION TECHNIQUES FOR THE NUMERICAL APPROXIMATION OF PARTIAL DIFFERENTIAL EQUATIONS
M. D. Gunzburger and R. A. Nicolaides *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 165-195 (For primary document see N86-26552 17-34)

(Contracts NAS1-18107; DAAG29-83-4-0084; Grant AF-AFOSR-0231-83)
Avail: NTIS HC A25/MF A01 CSCL 20D

Substructuring methods are in common use in structural mechanics problems where typically the associated linear systems of algebraic equations are positive definite. Here these methods are extended to problems which lead to nonpositive definite, nonsymmetric matrices. The extension is based on an algorithm which carries out the block Gauss elimination procedure without the need for interchanges even when a pivot matrix is singular. Examples are provided wherein the method is used in connection with finite element solutions of the stationary Stokes equations and the Helmholtz equation, and dual methods for second-order elliptic equations. Author

N86-26559*# California Inst. of Tech., Pasadena. Dept. of Applied Mathematics.
MULTIPLE LAMINAR FLOWS THROUGH CURVED PIPES
Zhong-hua Yang and H. B. Keller *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 196-228 (For primary document see N86-26552 17-34)
(Contracts DE-AS03-76SF-00767; DAAG29-81-K-0107)
Avail: NTIS HC A25/MF A01 CSCL 20D

The Dean problem of steady viscous flow through a coiled circular pipe is studied numerically for a large range of Dean number and for several coiling ratios. It was found that the solution family, as parameterized by Dean number, has numerous folds or limit points. Four folds and hence five branches of solutions are found. It is speculated that infinitely many solutions can exist in this family for some fixed value(s) of D. More resolution and higher accuracy would be required to justify this conjecture and to find the rule of formation of new solution branches. Author

N86-26560*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CALCULATIONS OF THE STABILITY OF SOME AXISYMMETRIC FLOWS PROPOSED AS A MODEL OF VORTEX BREAKDOWN
Nessan Mac Giolla Mhuiris *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 229-263 (For primary document see N86-26552 17-34)
Avail: NTIS HC A25/MF A01 CSCL 20D

The term vortex breakdown refers to the abrupt and drastic changes of structure that can sometimes occur in swirling flows. It was conjectured that the bubble type of breakdown can be viewed as an axisymmetric wave traveling upstream in a primarily columnar vortex flow. In this scenario the wave's upstream progress is impeded only when it reaches a critical amplitude and it loses stability to some nonaxisymmetric disturbance. The stability of some axisymmetric wavy flows to three dimensional disturbances, viewing the amplitude of the wave as a bifurcation parameter is examined. The stability of a set of related columnar vortex flows, constructed by taking the two dimensional flow at a single axial location and extending it throughout the domain without variation, is investigated. The method used will be to expand the perturbation velocity in a series of divergence free vectors which ensures that the continuity equation for the incompressible fluid is satisfied exactly by the computed velocity field. Projections of the stability equation onto the space of inviscid vector fields eliminated the pressure term from the equation and reduces the differential eigen problem to a generalized matrix eigen problem. Results are presented both for the one dimensional, columnar vortex flows and also for the wavy bubble flow. Author

N86-26561*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUMERICAL STUDY OF VORTEX BREAKDOWN
M. Hafez (Vigyan Research Associates, Inc., Hampton, Va.), G. Kuruvila, and M. D. Salas *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 264-290 Previously announced as A86-19948 (For primary document see N86-26552 17-34)
(Contract NAS1-17919)
Avail: NTIS HC A25/MF A01 CSCL 20D

The incompressible axisymmetric steady Navier-Stokes equations and the Euler equations are solved numerically to model the breakdown of a vortex. Although the solutions obtained for the Euler equations show a vortex breakdown-like structure, their behavior is very different from that of the Navier-Stokes equations. The details of the numerical algorithms used are presented, and the results obtained are compared to those in the literature. Author

N86-26562*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIGRID METHOD FOR A VORTEX BREAKDOWN SIMULATION
Shlomo Taasan *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 291-312 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107)
Avail: NTIS HC A25/MF A01 CSCL 20D

An inviscid model for a steady axisymmetric flow with swirl was studied. The governing equation is a nonlinear elliptic equation which has more than one solution for a certain range of the swirl parameter. The physically interesting solutions have closed streamlines that look like vortex breakdown (bubblelike solutions). A multigrid method is used to find these solutions. Using an FMG algorithm (nested iteration), the problem is solved in just a few multigrid cycles. Author

N86-26563*# Carnegie-Mellon Univ., Pittsburgh, Pa.
CONSTRUCTION OF HIGHER ORDER ACCURATE VORTEX AND PARTICLE METHODS
R. A. Nicolaides *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 312-330 (For primary document see N86-26552 17-34)
(Grant AF-AFOSR-0137-84)
Avail: NTIS HC A25/MF A01 CSCL 20D

The standard point vortex method was recently shown to be of high order of accuracy for problems on the whole plane, when using a uniform initial subdivision for assigning the vorticity to the points. If obstacles are present in the flow, this high order deteriorates to first or second order. Vortex methods which are of arbitrary accuracy (under regularity assumptions) regardless of the presence of bodies and the uniformity of the initial subdivision are introduced. Author

N86-26564*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PSEUDO-TIME ALGORITHMS FOR THE NAVIER-STOKES EQUATIONS
R. C. Swanson and E. Turkel (Tel-Aviv Univ., Isreal) *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 331-359 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107)
Avail: NTIS HC A25/MF A01 CSCL 20D

A pseudo-time method is introduced to integrate the compressible Navier-Stokes equations to a steady state. This method is a generalization of a method used by Crocco and also by Allen and Cheng. It is shown that for a simple heat equation that this is just a renormalization of the time. For a convection-diffusion equation the renormalization is dependent only on the viscous terms. The method for the Navier-Stokes equations was implemented using a Runge-Kutta algorithm. This enables the time step to be chosen based on the inviscid model only. The use of residual smoothing when viscous terms are present was discussed. Author

N86-26565*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
CONDITIONS FOR THE CONSTRUCTION OF MULTI-POINT TOTAL VARIATION DIMINISHING DIFFERENCE SCHEMES
Antony Jameson and Peter D. Lax (New York Univ., New York) *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 361-381 (For primary document see N86-26552 17-34)
Avail: NTIS HC A25/MF A01 CSCL 20D

Conditions are derived for the construction of total variation

diminishing difference schemes with multi-point support. These conditions, which are proved for explicit, implicit, and semi-discrete schemes, correspond in a general sense to the introduction of upwind biasing. Author

N86-26566*# California Univ., Los Angeles. Dept. of Mathematics.
SOME RESULTS ON UNIFORMLY HIGH ORDER ACCURATE ESSENTIALLY NON-OSCILLATORY SCHEMES
Ami Harten, Stanley Osher, Bjorn Engquist, and Sukumar R. Chakravarthy (Rockwell International Science Center, Thousand Oaks, Calif.) *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 383-436 (For primary document see N86-26552 17-34)
(Grants NAG1-270; NCA2-IR-390-403; NSF DMS-85-03294; DAAG29-85-K-0190)
Avail: NTIS HC A25/MF A01 CSCL 20D

The construction and the analysis of essentially nonoscillatory shock capturing methods for the approximation of hyperbolic conservation laws are continued. These schemes share many desirable properties with total variation diminishing (TVD) schemes, but TVD schemes have at most first order accuracy in the sense of truncation error, at extrema of the solution. An hierarchy of uniformly high order accurate approximations of any desired order of accuracy which are tailored to be essentially nonoscillatory are constructed. The design involves an essentially nonoscillatory piecewise polynomial reconstruction of the solution from its cell averages, time evolution through an approximate solution of the resulting initial value problem, and averaging of this approximate solution over each cell. To solve this reconstruction problem, an interpolation technique was used that when applied to piecewise smooth data gives high order accuracy whenever the function is smooth but avoids a Gibbs phenomenon at discontinuities. Author

N86-26567*# Technische Hogeschool, Delft (Netherlands).
ON NUMERICAL DISPERSION BY UPWIND DIFFERENCING
Bram vanLeer *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 437-448 (For primary document see N86-26552 17-34)
Avail: NTIS HC A25/MF A01 CSCL 20D

Upwind-biased difference schemes for the linear one-dimensional convection equation are defined. It is demonstrated that the numerical dispersion caused by such schemes changes sign in the middle of the allowed Courant-Friedrichs-Lewy (CFL) number range. This makes it possible to annihilate dispersive errors in two steps. Author

N86-26568*# Los Alamos National Lab., N. Mex. Theoretical Div.
AZTEC: A FRONT TRACKING CODE BASED ON GODUNOV'S METHOD
Blair K. Swartz and Burton Wendroff *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 449-466 (For primary document see N86-26552 17-34)
(Contract W-7405-eng-36)
Avail: NTIS HC A25/MF A01 CSCL 20D

AZTEC (Adaptive Zoom Tracking-Experiment Code) is a code to solve the one-dimensional gas dynamic equations in a variable area duct with specific implementation for plane, cylindrical, and spherical geometries. The program uses a fixed, locally and adaptively refinable grid, together with a set of moving grid points which migrate through the fixed grid. The moving points represent shocks or contact discontinuities, and can be created or destroyed, usually as the result of a collision. The basic difference scheme for both the fixed and moving grid is Godunov's method, with the Riemann solver used to compute both cell boundary fluxes and the speeds of the moving points. Tracking of rarefaction waves on the moving grid is difficult with this method since the waves must be represented as piecewise constant. In one version the polytrophic gas equation of state was replaced by one in which the pressure is a continuous piecewise linear function of specific volume at constant entropy. With this assumption the solution of each Riemann problem is piecewise constant, and the method is exact until the wave structure becomes too complicated. Some preliminary numerical results are exhibited. Author

N86-26569*# Carnegie-Mellon Univ., Pittsburgh, Pa.
LEAST SQUARES FINITE ELEMENT SIMULATION OF TRANSONIC FLOWS
T. F. Chen and G. J. Fix *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 467-493 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107; DAAG29-83-K-0084)
Avail: NTIS HC A25/MF A01 CSCL 20D

Finite difference approximation of transonic flow problems is a well developed and largely successful approach. Nevertheless, there is still a real need to develop finite element methods for applications arising from fluid-structure interactions and problems with complicated boundaries. A least squares based finite element scheme was introduced. It is shown that, if suitably formulated, such an approach can lead to physically meaningful results. Bottlenecks that arise from such schemes are also discussed. Author

N86-26570*# Brookhaven National Lab., Upton, N. Y. Dept. of Applied Mathematics.
THE WEAK ELEMENT METHOD APPLIED TO HELMHOLTZ TYPE EQUATIONS
Charles I. Goldstein *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 495-531 (For primary document see N86-26552 17-34)
(Contract DE-AC02-76CH-00016)
Avail: NTIS HC A25/MF A01 CSCL 20D

Helmholtz type boundary value problems are important in a variety of scattering and diffraction problems. Standard numerical schemes based on finite difference, finite element, or integral equation methods are generally not well suited for these problems in the intermediate frequency range since the oscillatory solution is not accurate approximated by piecewise polynomials. A version of the weak element method is employed to numerically solve these problems in two dimensions. This method consists of partitioning the domain into small elements and locally approximating the solution in each element by a sum of exponentials. These piecewise approximations are joined together at interelement boundaries by continuity conditions for certain functionals of the approximate solution. The method is analyzed using a complementary variational formulation. It is shown that the weak element method is considerably more accurate than standard discretization methods when the solution is adequately approximated locally by the exponential basis functions. These results are validated by numerical experiments. Author

N86-26571*# Columbia Univ., New York. Dept. of Applied Physics and Nuclear Engineering.
THE LOCAL REDISTRIBUTION OF POINTS ALONG CURVES FOR NUMERICAL GRID GENERATION
Peter R. Eiseman *In* NASA. Langley Research Center Advances in Numerical and Applied Mathematics Mar. 1986 p 533-556 (For primary document see N86-26552 17-34)
(Grants NAG1-479; NAG1-427; AF-AFOSR-0176B-82)
Avail: NTIS HC A25/MF A01 CSCL 20D

A methodology is established to cluster points along curves in a manner which does not change the existing pointwise distribution outside of a specific region containing the cluster. In each instance, points are pulled from the perimeters of the region towards the cluster center. The result is a smooth expansion from each end followed by a compression into the center. Altogether, this represents a local redistribution of points which can be employed either interactively or automatically. Author

N86-26572*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON SIMILARITY SOLUTIONS OF A BOUNDARY LAYER PROBLEM WITH AN UPSTREAM MOVING WALL
M. Y. Hussaini, W. D. Lakin (Old Dominion Univ., Hampton, Va.), and A. Nachman (Air Force Office of Scientific Research, Bolling

AFB, Washington, D.C.) *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 557-580 (For primary document see N86-26552 17-34)
(Contracts NAS1-17070; NAS1-18107)
Avail: NTIS HC A25/MF A01 CSCL 20D

The problem of a boundary layer on a flat plate which has a constant velocity opposite in direction to that of the uniform mainstream was examined. It was previously shown that the solution of this boundary value problem is crucially dependent on the parameter which is the ratio of the velocity of the plate to the velocity of the free stream. In particular, it was proven that a solutin exists only if this parameter does not exceed a certain critical value, and numerical evidence was adduced to show that this solution is nonunique. Using Crocco formulation the present work proves this solution is nonunique. Also considered are the analyticity of solutions and the derivation of upper bounds on the critical value of wall velocity parameter. Author

N86-26573*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE ADVANTAGES OF THE VORTICITY-VELOCITY FORMULATION OF THE EQUATIONS OF FLUID DYNAMICS
Charles G. Speziale *In its* Advances in Numerical and Applied Mathematics Mar. 1986 p 581-589 (For primary document see N86-26552 17-34)
(Contract NAS1-18107)
Avail: NTIS HC A25/MF A01 CSCL 20D

The mathematical properties of the pressure-velocity and vorticity-velocity formulations of the equations of viscous flow are compared. It is shown that a vorticity-velocity formulation exists which has the interesting property that noninertial effects only enter into the problem through the implementation of initial and boundary conditions. This valuable characteristic, along with other advantages of the vorticity-velcoity approach, are discussed in detail. Author

N86-26574# Admiralty Marine Technology Establishment, Teddington (England). Inst. of Sound and Vibration Research.
COMPARISON OF MEASURED AND COMPUTED BOUNDARY LAYERS AT THE TAIL-END OF TWO AXISYMMETRIC BODIES IN THE ARE QUIET WIND TUNNEL
G. J. Cooper, comp. Jun. 1985 28 p Presented at EC-5 Intern. Workshop on Electron Cyclotron Emission and Electron Cyclotron Heating and Gyrotron User/Developer Meeting, San Diego, Calif., 9-12 Nov. 1985 Sponsored by Admiralty Research Establishment, Teddington, England
(AMTE(N)-TM-84063; BR97645; ESA-86-96849) Avail: Issuing Activity

Velocity profiles measured at the tail end of two axisymmetric bodies are compared with velocity profiles produced by a potential flow and first order boundary layer computer model. The computer program can produce excellent agreement with measured data if the boundary layer transition position can be optimized in the computation. The program is valuable in determining the model and duct configuration most suitable for simulating a particular full scale situation. Preliminary testing of models may be necessary to establish the actual boundary layer transition position, and to change it using a boundary layer trip device, or to optimize the position selected for the computation. ESA

N86-26575*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACTIVE CONTROL OF BOUNDARY LAYER TRANSITION AND TURBULENCE Patent Application
Lucio Maestrello, inventor (to NASA) Filed 11 Mar. 1986 13 p (NASA-Case-LAR-13532-1; NAS 1.71:LAR-13532-1; US-Patent-Appl-SN-838649) Avail: NTIS HC A02/MF A01 CSCL 20D

The invention is a system and method for controlling boundary layer flow such that flow separation can be delayed and skin friction drag can be reduced. The invention consists of heater elements used to trigger turbulent flow and audio speakers used to suppress turbulent oscillations. By inducing turbulent oscillations into the flow in a region of positive pressure gradient, pressure patterns became more regular. The suppression of these patterns can be accomplished by imposing an out-of-phase suppressing wave. This wave is the audio output generated by a feedback amplifier using inputs from a hot-wire anemometer reading downstream turbulence. The novel features of the present invention are the tripping of boundary layer flow in a region of positive pressure gradient and the cooperative use of the feedback means to control turbulence. The result is a significant reduction in drag and separation problems. NASA

N86-26576# Wisconsin Univ., Madison. Mathematics Research Center.
REGULARITY FOR A SINGULAR CONSERVATION LAW Technical Summary Report
R. E. Meyer Sep. 1985 55 p refs
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-15064)
(AD-A163620; MRC-TSR-2871) Avail: NTIS HC A04/MF A01 CSCL 20/4

The main structure underlying the nonlinearity of conservation laws of gasdynamical type in two independent variables is discussed at the hand of a canonical example describing also properties of water waves near shore. The ultimately singular nature of such laws is here the central issue and calls for an unusual formulation. Attention is directed to the globally strong solutions, and an unusual regularization is employed to make them accessible, after illposedness is overcome. The usual regularity theory is not normally sufficient for singular partial differential equations, and the neccessry additional chapter on extensions to the singular locus is developed in detail for the canonical example. Criteria for the relation between regularized and strong solutions are discussed and used to characterize the class of solutions that are globally strong in the strictest sense. GRA

N86-26577# Wisconsin Univ., Madison. Mathematics Research Center.
POINTED BUBBLES RISING IN A TWO-DIMENSIONAL TUBE Technical Summary Report
Jean-Marc Vanden-Broeck Dec. 1985 12 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-80-01960)
(AD-A163624; MRC-TSR-2893) Avail: NTIS HC A02/MF A01 CSCL 20/4

This document considers a periodic array of plane bubbles rising in a gravity field. This configuration can serve as a model for an advanced stage of Rayleigh-Taylor instability. Vanden-Broeck solved the problem numerically and showed that two classes of solutions are possible. One class is characterized by a bubble profile with a continuous slope at the apex of the bubble whereas the other is characterized by the presence of a cusp at the apex. In a recent paper Garabedian and Modi conjectured that solutions with a 120 deg. angle at the apex might also exist. In this paper a scheme is presented to compute such solutions. It is found that a solution exists at a unique Froude number of 0.36. This result does not support Garabedian's conjecture that bubbles with a 120 deg. angle at the apex exist for all values of F between 0.23 and 0.36. GRA

N86-26578# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A STUDY OF THE FLUID-DYNAMIC PRESSURE FIELDS ON COMPRESSOR REED VALVES M.S. Thesis
Robert D. Hunt Dec. 1985 120 p refs
(AD-A164102; AFIT/GAE/AA/85D-09) Avail: NTIS HC A06/MF A01 CSCL 20/4

The flow induced pressure field in a reed valve arrangement was analytically predicted and experimentally measured for steady state conditions. The flow was found to be supersonic in nature with an imbedded shock for all but the lowest pressure runs. The analytic method used one-dimensional isentropic and normal shock relations. The technique provides a good first look at the nature of the flow and is compatible for use on a small computer system. The experimental data was obtained by using an idealized reed valve model. The data acquisition system was

computerized and used a scanivalve system to measure the pressure in the valve model. Circular, square, and rectangular valve plate geometries were investigated. The inlet was circular for all cases. Flow visualization oil was also used in a qualitative approach to determine the location and shape of the shock in the flow. The pressure measurements and the flow visualization showed the shock to be circular for all geometries and pressures tested. At high total pressure runs the valve plate began vibrating and the shock location became smeared suggesting the shock was also oscillating. GRA

N86-26579# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
HYDRAULIC POWER MODULATION LAMINAR PROPORTIONAL AMPLIFIER DEVELOPMENT
K. M. Lee and D. N. Wormley Nov. 1985 88 p
(Contract DAAK21-81-C-0122; DA Proj. 1L1-61102-AH-44)
(AD-A163390; HDL-CR-85-122-1) Avail: NTIS HC A05/MF A01 CSCL 20/4

A basic analytical and experimental study of the influence of geometry on laminar proportional fluidic amplifier characteristics has been conducted. Performance characteristics for current HDL C-Format amplifier designs as well as new configurations have been determined to identify the design tradeoffs among characteristics including blocked load gain, pressure recovery, flow recovery, efficiency, laminar operating range and dynamic response. The results of the study have led to the development and testing of a laminar proportional amplifier (LPA) specifically designed for power modulation applications. The power modulation amplifier has a nozzle to splitter distance which is 37.5 percent of the standard LPA design and as a result has a blocked load pressure gain which is approximately 35 percent of that of the standard LPA, but has a pressure recovery, 1.35 times and efficiency double the respective values of the standard LPA. In addition, the power modulation LPA has an increased operating range with respect to temperature variations and increased dynamic response with an increase in the frequency at which 90 degrees phase shift occurs in the frequency response by a factor of 2.6. The increased pressure recovery and efficiency can lead to reductions in fluidic system size and weight for applications in which power modulation is of prime importance. GRA

N86-26580# Woods Hole Oceanographic Institution, Mass.
SUMMER STUDY PROGRAM IN GEOPHYSICAL FLUID DYNAMICS, WOODS HOLE OCEANOGRAPHIC INSTITUTION: CHAOS
George Veronis and Linda M. Hudon Nov. 1985 280 p refs
(Contract N00014-82-G-0079; Grants NSF MSC-82-000450; NSF DMS-85-04166)
(AD-A164601; WHOI-85-36) Avail: NTIS HC A13/MF A01 CSCL 20/4

The explosive growth of dynamical system theory stems in large part from the realization that it is applicable to many natural phenomena. Indeed, much of the theoretical development has been sparked by numerical and laboratory experiments which exhibit ordered sequences of behavior that call for a general framework of interpretation. Five lectures exposed us to elementaty examples of bifurcation and chaos, to symmetry breaking, normal forms and temporal and spatial disorder, as well as to pertinent fluid mechanical and astrophysical phenomena. In addition are the development with an elegant summary of different types of intermittency; Seminars on phase instability and turbulence as an extension of the lecture series; and the fascinating correspondence between the frequencies observed in one recent fluid mechanics experiment, and results from number theory relating the Fibonacci series to the golden mean. GRA

N86-26581# Cornell Univ., Ithaca, N.Y. Dept. of Applied and Engineering Physics.
VORTICITY OPTICAL PROBE Final Technical Report, 1 Jun. 1983 - 14 Apr. 1985
14 Apr. 1985 9 p refs
(Contract N00014-83-K-0460)
(AD-A164619) Avail: NTIS HC A02/MF A01 CSCL 20/4

The design, construction, and testing of a new scale flow system is discussed. It appears from preliminary examination that this flow system generates a turbulent boundary layer suitable for wide ranging study of vorticity dynamics. Verification that the flow exhibits normal boundary layer characteristics with both flow visualization and hot-film anemometry is under way. The Vorticity Optical Probe (VOP) provides a measure of local vorticity fluctuations. Ideally, the study of boundary layer turbulence would be conducted on a smooth flat plate with uniform flow at infinity, no plate end effects, and neglegible disturbance by extended flow structures and background turbulence in the incident flow. To minimize the scale and cost of the tunnel, compromises were required. Nonetheless, it was our goal to simulate the above free boundary layer conditions, to the maximum extent that this is possible in a modest scale flow tunnel suited to application of the VOP geometry using the available technical experience, in order to confirm the precision and accuracy of the probe for study of the vorticity dynamics of both transitional and turbulent flow and to carry out precise studies on well defined flows. GRA

N86-26582# Naval Ship Research and Development Center, Bethesda, Md.
INFINITE ELEMENTS FOR TWO-DIMENSIONAL FLUID-STRUCTURE INTERACTION PROBLEMS
Erwin A. Schroeder Feb. 1986 22 p
(AD-A164749; DTNSRDC-86/001) Avail: NTIS HC A02/MF A01 CSCL 13/10

This report describes an effective method for using two-dimensional infinite elements to compute acoustic or magnetic fields in the unbounded fluid region surrounding a submerged vehicle. In this method, finite elements represent the bounded region containing the vehicle and may also be used to represent a layer of fluid surrounding the vehicle. Infinite elements are used to represent the unbounded exterior region. Since infinite elements are not bounded, their shape functions are chosen to contain decay factors to produce convergent integrals. If, from physical or other considerations, the order of decay of the solution as the radius increases is known, infinite elements should be chosen with the same order of decay. The results obtained in this study were found to be within 2% when the decay factor of infinite elements matched that of the solution. However, for other problems, the order of decay of the solution may not be known in advance, and, therefore, it may not be possible to match the two rates of decay. For such cases, the errors were found to be as large as 20%. In such situations, a layer of finite fluid elements, two elements thick around the structure, reduced the errors to less than 3.5% for the modes and decay factors tested. GRA

N86-26583# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
THREE-DIMENSIONAL SEPARATION AND VORTICAL WAKES OVER A PROLATE SPHEROID Final Report
Demetri P. Telionis and Christopher E. Costis Sep. 1985 51 p
(Contract N00167-84-C-0044)
(AD-A164781; VPI-E-86-1; DTNSRDC/ASED-CR-01-85) Avail: NTIS HC A04/MF A01 CSCL 20/4

A vortex lattice code was developed to generate potential flow solutions over three dimensional bodies. An approximate boundary layer technique is incorporated to allow the calculation of the line separation. The separated vortex sheets are modeled in terms of a vortex grid which is convected with the flow. Special conditions at separation determine the strength of nascent vorticity. Viscous inviscid interaction in three dimensions allows the accurate prediction of the line of separation and the pressure distribution over the attached flow region. GRA

N86-26584# Carnegie-Mellon Univ., Pittsburgh, Pa.
ANNUAL PROGRESS REPORT, 1 JUNE 1984-31 MAY 1985
Nicolaides Nov. 1985 6 p Submitted for publication
(Grant AF-AFOSR-0137-84)
(AD-A164853; AFOSR-86-0001TR) Avail: NTIS HC A02/MF A01 CSCL 20/4

The use of certain nonconforming schemes for solving

viscous incompressible flow problems was put on a rigorous foundation, and the resulting theory was used to construct new convergent schemes. The investigator was able to show that a certain nonconforming quadratic element actually has the same accuracy as a well known nonconforming cubic. This is of great practical significance because the costs of implementing the quadratic elements are far less than those for cubics. GRA

N86-26585# Ballistic Research Labs., Aberdeen Proving Ground, Md.
FREE GYROSCOPE EXPERIMENTS OF TWO IMMISCIBLE LIQUIDS IN A PARTIALLY FILLED CYLINDER Final Report
Lyle D. Kayser, William P. DAmico, Jr., and William I. Brannan Dec. 1985 30 p
(AD-A164937; BRL-MR-3484) Avail: NTIS HC A03/MF A01 CSCL 20/4

Gyroscope experiments have been conducted to measure the yaw growth rate in a cylinder filled with two immiscible liquids (silicone oil and water). The experimental data were obtained by measuring the yaw history was processed to obtain the yaw growth rate induced by the liquid. Yaw histories were obtained for a 90% filled cylinder (height - 25.78 cm and diameter = 8.24 cm) spinning at 50 rev/sec. The aspect ratio (height/diameter) of the cylinder was 3.126. The composition of the liquid payload was changed by varying the oil to water ratios - ratios of 100/0, 85/15, 75/25, 30/70, 15/85, and 0/100 were tested. The experimental data were found to be consistent with a recent theory by Murphy. However, a small, but consistent, bias was observed between the measured and predicted values of yaw frequency at the maximum growth rate; the experimental values were slightly larger. Author (GRA)

N86-26586# Villanova Univ., Pa. Dept. of Mechanical Engineering.
A PHYSICAL MODEL AND CONSERVATION EQUATION FOR DYNAMIC SOLID-LIQUID BEHAVIOR Progress Report, Aug. 1983 - Apr. 1985
John N. Majerus Feb. 1986 102 p
(Contract DAAK11-83-K-0009)
(AD-A165295; BRL-CR-551) Avail: NTIS HC A06/MF A01 CSCL 20/4

A self-consistent set of equations were developed for 3-D penetration problems. The set of equations includes polymorphic and thermodynamic phase changes, finite material extensions and rotations between time-steps, thermal softening, Hugioniot volumetric relationships, strain and strain-rate dependency for elastic-viscoplastic deviatoric behavior, generalized inertial forces, and conductive, convective and radiation heat fluxes. Continuous mapping between fluid and solid states were obtained by selecting velocity and temperature as the primary variables. The resulting set of mass, linear momentum and energy equations form a coupled set of differential and integral-differential equations. These equations were approximated by discretizing in both time and space via the method of weighted residuals using piecewise continuous weighting and trial functions. A quadratic time-element was assumed and a wide variety of algebraic recursion relationships were derived for the corresponding implicit solution schemes. In order to quickly evaluate any of these solution schemes, a new concept entitled creation and annihilation was introduced where geometric sub-regions are added to, and subtracted from, the geometric problem during the penetration process. GRA

N86-26587# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Chemical and Environmental Engineering.
EFFECT OF LIQUID COMPOSITION ON ENHANCED FLOW DUE TO SURFACE SHEAR IN THE CONTACT LINE REGION: CONSTANT VAPOR PRESSURE BOUNDARY CONDITION
P. C. Wayner, Jr. and C. J. Parks 1985 8 p
(Contract DAAG29-83-K-0058)
(AD-A165545; ARO-19879.17-EG) Avail: NTIS HC A02/MF A01 CSCL 07/4

The physicochemical phenomena associated with fluid flow in an evaporating ultrathin film of an ideal binary mixture in the contact line region are discussed. The effect of composition and temperature gradients on surface shear is analyzed and the results are compared with experimental trends. Although simple in concept, the constant vapor pressure boundary condition appears to be very useful in delineating the relative effects of surface tension, temperature and composition on fluid flow due to surface tension gradients in general. GRA

N86-26588# Oak Ridge National Lab., Tenn.
ENERGY DEPOSITION, HEAT FLOW AND RAPID SOLIDIFICATION DURING LASER AND ELECTRON BEAM IRRADIATION OF MATERIALS
C. W. White and M. J. Aziz Oct. 1985 57 p Presented at the ASM Metals Congress - International Conference on Surface Modifications, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002240; CONF-8510160-7) Avail: NTIS HC A04/MF A01

The fundamentals of energy deposition, heat flow, and rapid solidification during energy deposition from lasers and electron beams is reviewed. Emphasis is placed on the deposition of energy from pulsed sources (10 to 100 ns pulse duration time) in order to achieve high heating and cooling rates (10(8) to 10(10) (0)C/s) in the near surface region. The response of both metals and semiconductors to pulse energy deposition is considered. Guidelines are presented for the choice of energy source, wavelength, and pulse duration time. DOE

N86-26589# Holmes and Narvier, Inc., Mercury, Nev.
HEAT PUMP STRATEGY AT THE NEVADA TEST SITE
R. E. Davis 1985 4 p Presented at the 8th World Engineering Congress, Atlanta, Ga., 22 Oct. 1985
(Contract DE-AC08-76NV-00020)
(DE85-013669; CONF-851002-1) Avail: NTIS HC A02/MF A01

The high desert location of the Nevada Test Site (NTS) provides both high and low temperature extremes during the course of a year. The remoteness of the NTS resulted in the selection of electricity as the principal energy source for environmental conditioning systems. These two factors have led the facility designers at the NTS to select the technology of heat pumps as the principal means of providing air conditioning for new facilities. This paper discusses the installations of heat pumps at the NTS over the past five years. Air-to-air heat pumps installed at the NTS include split systems, single package systems, and through-the-wall systems. A large central plant closed cycle water-to-air heat pump system is also described. The results of a recent analysis of an open cycle water source heat pump system are also presented. DOE

N86-26590# Lawrence Livermore National Lab., Calif.
TOPAZ3D: A THREE-DIMENSIONAL FINITE ELEMENT HEAT TRANSFER CODE
A. B. Shapiro Aug. 1985 61 p
(Contract W-7405-eng-48)
(DE85-017878; UCID-20484) Avail: NTIS HC A04/MF A01

TOPAZ3D is a three dimensional implicit finite element computer code for heat transfer analysis. A user's manual for TOPAZ3D is provided as is a description of the numerical algorithms used. Sample problems with analytical solutions are presented. TOPAZ3D was implemented on the Cray and Vax computers. TOPAZ3D can be used to solve for the steady state or transient temperature field on three dimensional geometries. Material properties may be temperature dependent and either isotropic or orthotropic. A variety of time and temperature dependent boundary conditions can be specified including temperature, flux, convection, and radiation. By implementing the user subroutine feature, users can model chemical reaction kinetics and allow for any type of functional representation of boundary conditions and internal heat generation. TOPAZ3D can solve problems of diffuse and specular band radiation in an enclosure coupled with conduction in the material surround the enclosure. Additional features include thermal contact resistance across an interface, bulk fluids, phase change, and energy balances. Thermal stresses can be calculated using the solid mechanics code NIKE3D which reads

the temperature state data calculated by TOPAZ3D. TOPAZ3D is an extension of the two dimensional heat transfer code TOPAZ to three dimensions. DOE

N86-26591# Los Alamos National Lab., N. Mex.
CALCULATION OF SLIDING INTERFACES OF TWO-DIMENSIONAL UNSTEADY FLOW
H. Kao-yu and C. Kuang-i 1985 16 p Transl. into ENGLISH from Pao-cha yu ch'ung-chi, v. 3, no. 10, 1983 p 10-18
(Contract W-7405-eng-36)
(DE86-005003; LA-tr-86-1) Avail: NTIS HC A02/MF A01

A new technique is described for the numerical investigation of time-dependent elastic-plastic flow with sliding interfaces. The Lagrangian equations of sliding motion are derived analytically; detailed results for sliding interfaces are described. Numerical simulation results of a standard cylinder test are in good agreement with experimental data. In the problem of two-dimensional unsteady flow, sliding (contact interruption) is a kind of mechanical phenomenon frequently occurred. On a sliding plane, the normal-direction velocity of the sliding object is continuous while the tangential-direction velocity is interrupted. The differential equation for motion does not apply, therefore another group of sliding-motion equations should be used instead. In the paper, the following conditions are assumed: elastic-plastic flow, and frictionless (nonviscous) sliding plane. An analysis method is used to derive the sliding motion equations. In addition, a type of difference model is presented for the sliding motion equations. Finally, an example is given for numerical calculation. DOE

N86-26592# Sandia National Labs., Livermore, Calif.
TOPAZ - THE TRANSIENT ONE-DIMENSIONAL PIPE FLOW ANALYZER: EQUATIONS AND NUMERICS
W. S. Winters Dec. 1985 42 p
(Contract DE-AC04-76DR-00789)
(DE86-005063; SAND-85-8248) Avail: NTIS HC A03/MF A01

TOPAZ is a user friendly computer code for modeling the one-dimensional, transient physics of multi-species gas transfer in arbitrary arrangements of pipes, valves, vessels, and flow branches. This report, the third in a series of reports documenting TOPAZ, deals exclusively with governing equations, numerical methods, and code architecture. DOE

N86-26593# Thermo Electron Corp., Waltham, Mass.
CERAMIC HEAT PIPE WASTE HEAT RECOVERY, PHASE 1 Report, 1 Aug. 1984 - 30 Apr. 1985
May 1985 90 p
(Contract DE-AC07-84ID-12532)
(DE86-005350; DOE/ID-12532/1) Avail: NTIS HC A05/MF A01

This report describes design simplifications and mass production concepts that can achieve a heat pipe cost of $448 each. A ceramic heat pipe recuperator design is presented which addresses fouling, cleaning, sealing and maintainability. Overall dimensions including ducts, flanges and insulation are 16 x 5 1/2 x 6 1/2 feet. The weight is 12.5 tons. The simple payback for the system is 0.73 year. A plan for Phase 2 work is presented, which addresses verification of the concepts developed in the study. DOE

N86-26594# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
PRODUCTION OF TURBULENCE ACCORDING TO THE TRANSPORT EQUATIONS
B. vandenBerg 16 Apr. 1984 17 p
(NLR-MP-84030-U; B8578432; ESA-86-96967) Avail: NTIS HC A02/MF A01

The turbulence transport equations are reviewed. The role of the pressure-strain term is studied. It is shown that the pressure-strain term exactly cancels the production term when the Taylor hypothesis or frozen turbulence approximation holds. The consequences of this result for the interpretation of the turbulence transport equations are discussed. ESA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-26595* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLID SORBENT AIR SAMPLER Patent
Theodore J. Galen, inventor (to NASA) (Northrop Services, Inc., Houston, Tex.) Issued 29 Apr. 1986 7 p Supersedes N85-20301 Filed 10 Oct. 1984 Sponsored by NASA Sponsored by NASA
(NASA-CASE-MSC-20653-1; US-Patent-4,584,887;
US-Patent-Appl-SN-659474; US-Patent-Class-73-863.31;
US-Patent-Class-73-863.21; US-Patent-Class-73-864.34;
US-Patent-Class-73-863.72) Avail: US Patent and Trademark Office CSCL 14B

A fluid sampler for collecting a plurality of discrete samples over separate time intervals is described. The sampler comprises a sample assembly having an inlet and a plurality of discreet sample tubes each of which has inlet and outlet sides. A multiport dual acting valve is provided in the sampler in order to sequentially pass air from the sample inlet into the selected sample tubes. The sample tubes extend longitudinally of the housing and are located about the outer periphery thereof so that upon removal of an enclosure cover, they are readily accessible for operation of the sampler in an analysis mode.
Official Gazette of the U. S. Patent and Trademark Office

N86-26596*# Sverdrup Technology, Inc., Cleveland, Ohio.
CALIBRATION OF DROPLET SIZING AND LIQUID WATER CONTENT INSTRUMENTS: SURVEY AND ANALYSIS Interim Report
Edward C. Hovenac May 1986 30 p refs Sponsored in part by FAA, Atlantic City, N.J.
(Contract NAS3-24105)
(NASA-CR-175099; E-3025; NAS 1.26:175099; FAA-CT-86-19)
Avail: NTIS HC A03/MF A01 CSCL 14B

Results are presented for phase 1 of an effort to establish a unified calibration capability for instruments used for aircraft icing certification and aircraft icing research. Various calibration, data correction, and verification procedures are reviewed and some new techniques are developed for droplet sizing instruments and liquid water content meters. These instruments include a forward scattering spectrometer probe, an optical array probe, and hot-wire type liquid water content meters. Work planned for phase 2 of the effort is described. Author

N86-26597# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONCEPTION AND OPTIMIZATION OF AN INFRARED THERMAL SENSOR USING THE VALUE ANALYSIS METHOD
Mario Marcos QuintinodaSilva and Luis Antonio Waack Bambace Apr. 1986 6 p Presented at TELECON'85, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3854-PRE/918) Avail: NTIS HC A02/MF A01

Infrared sensors are necessary in infrared simulation of satellites. The methodology of Value Analysis is used to obtain better sensors than those available in the market at lower cost and with the same or even better performance, taking into account the restrictions on the project inside the facilities. Author

N86-26598*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PLANAR OSCILLATORY STIRRING APPARATUS Patent Application
Martin F. Wolf, inventor (to NASA) (Stanford Univ., Calif.) Filed 15 Aug. 1985 15 p

(Contract NAS8-34872)
(NASA-Case-MFS-26002-1-CU; NAS 1.71:MFS-26002-1-CU; US-Patent-Appl-SN-765991) Avail: NTIS HC A02/MF A01 CSCL 14B

The present invention is directed to an apparatus for stirring materials using planar orthogonal axes oscillations. The apparatus has a movable slide plate sandwiched between two fixed parallel support plates. Pressurized air is supplied to the movable slide plate which employs a tri-arm air bearing vent structure which allows the slide plate to float and to translate between the parallel support plates. The container having a material to be stirred is secured to the upper surface of the slide plate through an aperture in the upper support plate. A motor driven eccentric shaft loosely extends into a center hole bearing of the slide plate to cause the horizontal oscillations. Novelty lies in the combination of elements which exploits the discovery that low frequency, orthogonal oscillations applied horizontally to a Bridgman crucible provides a very rigorous stirring action, comparable with and more effective by an order of magnitude than the accelerated crucible rotation technique. NASA

N86-26599*# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mechanical Engineering, Aeronautical Eng.
POLARIZATION MODULATED ELLIPSOMETRY Final Report
James L. Lauer and Norbert Marxer 10 Jul. 1986 114 p
(Grant NAG3-222)
(NASA-CR-177264; NAS 1.26:177264) Avail: NTIS HC A06/MF A01 CSCL 14B

For the investigation of the composition and thickness of thin nonuniform films on bearing and other tribological surfaces an automated ellipsometer was built, which is extremely sensitive to relative changes in thickness and composition of surface films. These changes can be seen by scanning across the surface with 20 micrometer lateral resolution. By measuring at different angles of incidence one can determine the film thickness and identify the material of the film by its complex index of refraction. For the analysis of organic layers on top of several metallic layers it was necessary to develop mathematical procedures to increase the absolute precision of the instrument. The ellipsometer is described in detail, and the precision is discussed. The actual performance of the ellipsometer was tested on three experiments. In the first one the composition and thickness of patches of an oxide film inside a wear track were determined. In the second the thickness of a carbon overcoat sputtered on a computer disk was measured: the carbon was identified as graphitic and of random orientation. In the third thickness of silicon oxide on top of a silicon substrate was found. Important features of this apparatus are: (1) accurate settings of the polarization stages and the angle of incidence (both automated); (2) high precision in the determination of the ellipsometric parameters without calibration prior to an experiment; and (3) very accurate scanning modes with high spatial resolution. Author

N86-26600# Office of Naval Research, London (England).
STATE-OF-THE-ART SURVEY OF GYROTRON RESEARCH: AN ONRL SPONSORED WORKSHOP
Paul Roman 10 Jan. 1986 9 p Workshop held in London, Engl., 25-26 Nov. 1985
(AD-A163580; ONRL-C-14-85) Avail: NTIS HC A02/MF A01 CSCL 09/1

A thorough review of the past history and the current work on the fast-wave amplifiers performed at NRL is presented. Two current NRL research projects in the plasma physics division are on highly relativistic gyrotrons, and on the design and initial performance of cyclotron autoresonance masers. An overview of applications of gyrotrons in the area of electron cyclotron resonance plasma heating for fusion experiments is presented as is a status report on the latest design results of a 150 GHz overmoded gyrotron development project at the German Nuclear Research Institute in Karlsruhe whose purpose is to study higher modes in circular gyrotrons with increasing output power. Current and planned gyrotron development studies within the framework of the Fusion Programme of the Commission of the European Communities are discussed as is work on high peak power gyroklystron amplifiers. GRA

N86-26601# Naval Postgraduate School, Monterey, Calif.
DEVELOPMENT OF A TESTBED FOR MULTISENSOR DISTRIBUTED DECISION ALGORITHMS M.S. Thesis
Mark A. Schon Dec. 1985 85 p refs
(AD-A164487; AD-E900539) Avail: NTIS HC A05/MF A01 CSCL 09/2

Distributed decision problems arise when two or more sensors viewing the same phenomenon must work cooperatively to draw inferences about the observed situation. Typical examples are in target detection and target classification. Such problems are characterized by distributed processing of information and communication between processors over a limited bandwidth data link. This thesis presents some statistical distributed decision algorithms and describes the implementation of one of them on a set of loosely coupled multiprocessor clusters which simulate the distributed environment characterizing multisensor decision roblems. GRA

N86-26602# Stafford (J.) Associates, San Mateo, Calif.
IMPROVED DESIGNS FOR ISOCON CAMERAS IN HERTR SYSTEMS Final Report, 4 Dec. 1984 - 22 May 1985
Joseph J. Stafford 7 Jun. 1985 28 p refs
(Contract N60921-85-C-0063)
(AD-A164627; NSWC-TR-85-382) Avail: NTIS HC A03/MF A01 CSCL 17/8

The HERTR imaging systems are experiencing Isocon tube failures at a rate which is not typical of more intensely used imaging systems containing Isocon tubes. Heat is the usual cause for early Isocon tube failures. A HERTR system was visited and it was decided that, indeed, heat was the probable cause for a failure. A mechanical design was prepared which was as similar as possible to the major confining structure surrounding the HERTR camera. In subsequent tests with the duplicate structure, the thermal failure mode was duplicated without continuing the tests to completion. A design change was initiated and tested with the duplicate system. Thermal characteristics of the altered system were measured. Additional deficiencies in the HERTR imaging system were noted during the course of the visit to the HERTR site. These deficiencies are also described in this report. Recommendations are made to alter the HERTR design to include the modifications made to the duplicate camera design. In the short term these modifications are simple and inexpensive to implement. Recommendations are also included for an extensive modification to high energy imaging systems, particularly those subject to pulsed operating conditions and to those operating in photon limited situations which is usual in X-ray imaging systems. Author (GRA)

N86-26603# Calspan Advanced Technology Center, Buffalo, N.Y.
AN EVALUATION OF THE CAPABILITY OF THE SURFACE CONDITION ANALYZER (SCAN) SENSORS TO MEASURE RUNWAY WATER DEPTH Final Report, Mar. 1981 - Jan. 1986
C. W. Rogers, E. J. Mack, and B. J. Wattle Jan. 1986 58 p
(Contract N00014-81-C-0443)
(AD-A164719; CALSPAN-6857-M-1) Avail: NTIS HC A04/MF A01 CSCL 14/2

Field tests of Surface Systems, Inc.'s Surface Condition Analyzer's (SCAN) capability to measure runway water depth during rainfall events were performed at the Spirit of St. Louis Airfield, St. Louis, Mo., during March-May of 1985. These limited tests were scheduled to provide data in real rainfall events and to answer questions of sensor capability relative to true runway water depth and or sensor installation and siting protocol--i.e., should the sensor surface be horizontal or flush relative to a sloping runway surface. Field calibration checks showed that sensors installed in the runway surface can measure in-situ water depth in the range 0.030 to 0.40 inches (+ or = 0.01 inches). In real rainfall with rates ranging from 0.30 inches/hour (very light) to 6.0 inches/hour (heavy), it was found that the sensor-measured water depth correlated very well with an independently measured water depth over the range 0.03 to 0.10 inches (maximum observed).

At the lower end of this range, both sensors measured the same water depth, while at the top end, the sloping, flush-mounted sensor indicated only about 75% of the water depth measured independently and by the horizontally mounted sensor. GRA

N86-26604# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
DTNSRDC THREE COMPONENT LASER DOPPLER VELOCIMETRY: TOWING TANK SYSTEM MEASUREMENT ERRORS Final Report
David J. Fry 1 Oct. 1985 142 p
(AD-A164743; DTNSRDC/SPD-1163-03) Avail: NTIS HC A07/MF A01 CSCL 14/2

A three-component Laser Doppler Velocimetry (LDV) system is tested. Thirteen measurement errors are quantified in terms of: velocity field characteristics, LDV equipment design, and user chosen system operating parameters. Operating parameter effects on measurement error are emphasized because usually they are the only way an experimenter can control errors. Background sections and appendixes explain in considerable detail, the origin of these measurement errors. First, the operating parameter choices for the towing tank LDV system are listed with a description of how they affect measurements. Then, each of the measurement errors is discussed, and this helps establish a functional relationship to operating parameters, LDV equipment design, and flow field characteristics. GRA

N86-26605# Naval Ship Research and Development Center, Bethesda, Md. Ship Performance Dept.
DTNSRDC THREE COMPONENT LASER DOPPLER VELOCIMETRY: MEAN VELOCITY DATA ANALYSIS
David J. Fry 10 Oct. 1985 130 p
(AD-A164744; DTNSRDC/SPD-1163-02) Avail: NTIS HC A07/MF A01 CSCL 14/2

This report describes how the columinous amount of data from Laser Doppler Velocimetry (LDV) experiments can be distilled to produce useful and comprehendable results. The procedures draw heavily on the experience and development work done in implementing three component LDV systems for the towing tanks and large wind tunnels of the David Taylor Naval Ship Research and Development Center. The standard procedures and computer software described are meant to reduce the time needed to analyze and report LDV experiments. The procedures address data collection, data calibration, measurement error estimation, data display graphics, and short and long term data storage. GRA

N86-26606# Naval Postgraduate School, Monterey, Calif.
A SURVEY OF VIDEODISC TECHNOLOGY M.S. Thesis
Charles W. Davis Dec. 1985 101 p refs
(AD-A164992) Avail: NTIS HC A06/MF A01 CSCL 14/3

In today's computer-based military environment the interactive videodisc offers a means to an efficient education and training system. It allows interactive instruction capable of responding to individual needs. Interactive videodisc also has potential as a mass storage and retrieval system accommodating complete catalogs of printed material. This thesis focuses on a number of studies completed on this new technology. Author (GRA)

N86-26607# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
A STUDY OF THE OPTIMIZATION PROBLEM FOR CALIBRATING A LACOSTE AND ROMBERG G GRAVITY METER TO DETERMINE CIRCULAR ERRORS
Dingbo Chao and Edward M. Baker Sep. 1985 102 p
(Contract F19628-82-K-0017)
(AD-A165218; OSU/DGSS-364; AFGL-TR-85-0208; SR-9) Avail: NTIS HC A06/MF A01 CSCL 08/5

This report discusses how the circular errors of a gravity meter could be effectively calibrated in a laboratory. Minimization of the trace of the variance-covariance matrix of adjusted parameters, is adopted as the criterion for the optimization. The mathematical analysis of the trace is made in the case of one wavelength in order to find the best distribution of observations, as well as the worst. For several wavelengths, a number of simulative computations are carried out for finding effective distribution of observations and the best and worst weights. A set of numerical solutions for the equations over a certain range of observations is obtained. Based on the simulative studies, the concepts of phase distribution and effectiveness of observations in the periodic error calibration are presented and so a design for the most effective distribution of observations is introduced. For the calibration of periodic errors with several wavelengths, it is preferable to select two weights that can be mutually compensated in fitting them with all involved periods. An attempt is made to answer how many observations should be made for determining the periodic screw errors with reasonable accuracy. GRA

N86-26608# United Technologies Research Center, East Hartford, Conn.
CONCEPTUAL DEVELOPMENT OF STRAIN-GAGE SIGNAL INTERPRETATION SYSTEM FOR JET ENGINE APPLICATIONS Final Report, Feb. 1983 - Mar. 1985
Ray M. Chi, Deborah C. Haas, William C. McClurg, and Philip E. Zwicke Oct. 1985 157 p
(Contract F33615-82-C-2263)
(AD-A165489; UTRC/R85-956394-R1; AFWAL-TR-85-2052) Avail: NTIS HC A08/MF A01 CSCL 21/5

This study sought to define the hardware/software configurations of an expert system capable of monitoring and interpreting strain-gage signals from jet engine compressor stages and immediately taking necessary evasive actions to ensure rig safety. First, a comprehensive strain-gage data bank was generated that contains all major categories of aeromechanical phenomena and noise signals from fan and compressor stages of various engines. These data were analyzed in both time and frequency domains to identify significant signal features for various types of aeromechanical phenomena and noise. These individual signal features were combined with spatial (interblade and interstage), temporal and other syntactic features to form a complete feature set for each aeromechanical phenomenon or noise type. These feature sets were then used in a three level classifier system to determine the probability values of each possible aeromechanical phenomenon and noise type. The first classification uses only the individual strain gage feature to determine the category probability for each phenomena and noise type. The second level uses the spatial features to refine the category pseudo-probability values and yield the event probability values. The third level combines the temporal features with the ev ent probability values to yield the final probabilities based on which decisions are made on the type of actions to be taken to ensure rig safety. GRA

N86-26609# Environmental Research Inst. of Michigan, Ann Arbor.
GRATING INTERFEROMETRIC SENSORS Final Technical Report, 1 Sep. 1982 - 31 Oct. 1985
Anthony M. Tai Feb. 1986 92 p refs
(Contract DAAG29-82-K-0173)
(AD-A165593; ERIM-163700-12-F; ARO-18491.6-PH) Avail: NTIS HC A05/MF A01 CSCL 17/5

A new class of grating-based interferometric sensors is introduced for target discrimination, detection and passive synthetic aperture imaging. It is shown that the grating-based interferometric sensors provide superior system sensitivity and flexibility. Several design approaches and operating modes of the grating interferometric sensors are presented and experiments demonstrating the proposed system concepts are described. We have examined the uses of a grating interferometer for passive synthetic aperture imaging to achieve imaging resolution beyond that permitted by the collection aperture and as a moving target sensor to detect the presence of moving targets that are too small to be resolved. We have shown that the achromaticity of the grating interferometer allows the use of a wider instantaneous spectral bandwidth which in turn provides a better system sensitivity than conventional systems. In addition, the grating interferometer offers a simple means to achieve two-dimensional aperture fill and it is more tolerant to system vibration. GRA

N86-26803# Army Electronics Research and Development Command, Fort Belvoir, Va. Night Vision and Electro-Optics Lab.
IMAGE INTENSIFIERS: PAST AND PRESENT
Robert W. Verona *In* AGARD Visual Protection and Enhancement Dec. 1985 5 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-26610# Los Alamos National Lab., N. Mex.
THREE-DIMENSIONAL SIMULATIONS OF AN XUV FREE-ELECTRON LASER
J. C. Goldstein, B. D. McVey, and B. E. Newnam 1985 12 p refs Presented at the International Conference on Insertion Devices for Synchrotron Sources, Stanford, Calif., 27-30 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003654; LA-UR-85-4092; CONF-8510186-4) Avail: NTIS HC A02/MF A01

Operation of free-electron lasers (FEL) at long optical wavelengths (greater than or equal to 600 nm) has now been successfully demonstrated at several laboratories. To operate an FEL at shorter wavelengths imposes constraints on the brightness of the electron beam which are difficult to achieve. Until recently, it was perceived that only an electron storage ring could satisfy these beam requirements. However, our previous 1-D theoretical calculations revealed that modest improvements in the emittance available from rf-linear accelerators would be sufficient to allow operation of an FEL in the XUV spectral range (greater than or equal to 50 nm). We shall present new theoretical results for the design of a linac-driven XUV FEL derived from an improved simulation model. The model is fully three-dimensional in its treatment of the undulator magnetic field, the optical radiation field, and the motion of electrons in a finite-emittance beam. Furthermore, the model computes self-consistently the motion of the electrons and the amplification, diffraction, and the refraction of the light within the undulator magnet. Propagation of the optical beam and reflection at the mirrors of the optical resonator are incorporated in the model so that a complete laser oscillator solution can be generated. The computed performance parameters of a particular XUV FEL oscillator design will be compared with the output of synchrotron radiation sources. DOE

N86-26611# Allied-Signal Corp., Westlake Village, Calif. Military Laser Products Div.
ALEXANDRITE LASERS: STATE OF TECHNOLOGY AND APPLICATIONS
R. C. Sam 1985 9 p Presented at the ICALEO International Congress on the Applications of Lasers and Electro-optics, San Francisco, Calif., Nov. 1985
(Contract W-7405-eng-36)
(DE86-003666; LA-UR-85-4028; CONF-8511103-5) Avail: NTIS HC A02/MF A01

The current alexandrite laser technology will be reviewed. Established applications such as differential absorption LIDAR, nighttime illumination and laser isotope separation will be discussed. Potential new applications will be addressed. DOE

N86-26612# Los Alamos National Lab., N. Mex.
KrF LASERS AS INERTIAL FUSION DRIVERS
D. B. Harris, R. R. Berggren, N. A. Kurnit, D. D. Lowenthal, R. G. Berger, J. M. Eggleston, J. J. Ewing, and M. J. Kushner 1985 37 p Presented at the 11th Symposium on Fusion Engineering, Austin, Tex., 18-28 Nov. 1985 Prepared in cooperation with Spectra Technology, Inc., Bellevue, Wash.
(Contract W-7405-eng-36)
(DE86-003667; LA-UR-85-4019; CONF-851102-34) Avail: NTIS HC A03/MF A01

A new type of KrF laser system has been proposed that has a significantly higher efficiency than pure angular multiplexed KrF lasers. This system uses electron-beam-sustained discharge lasers to pump a high gain Raman amplifier. The discharge lasers can operate at a higher efficiency than e-beam pumped lasers, and the forward Raman scattering process has both a high gain and high quantum efficiency using the rotational transition. The Raman system cost and performance has been examined and compared to the pure angular multiplexed system. The discharge-Raman system has a higher efficiency (12.3% vs 9.1%) and a higher cost ($140/joule vs $100/joule). For an ICF power plant driver, the higher efficiency offsets the higher cost, making the discharge-Raman system appear to be an attractive alternative to the pure angular multiplexed system. DOE

N86-26613# Sandia National Labs., Albuquerque, N. Mex.
TRANSIENT CONDUCTANCE MEASUREMENTS AND HEAT-FLOW ANALYSIS OF PULSED-LASER-INDUCED MELTING OF ALUMINUM THIN FILMS
J. Y. Tsao, S. T. Picraux, P. S. Peercy, and M. O. Thompson 1985 7 p Presented at the Materials Research Society Meeting Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC04-76DP-00789)
(DE86-003928; SAND-85-1397C; CONF-851217-12) Avail: NTIS HC A02/MF A01

We report time-resolved electrical-resistance measurements during pulsed-laser melting of a metal, aluminum. The resistances are correlated with the thresholds for partial and full melting. We describe a semi-analytic solution, based on an impulse-response function, for the response, to a heating pulse, of a thin film of good thermal conductor supported by an infinite substrate. The results agree well with the resistance measurements, and confirm our interpretation of the data. In addition, time-resolved reflectance measurements establishing that, in this geometry, melting and solidification proceed via the motion of a well-defined, planar liquid/solid interface, whose position can be deduced from the resistance measurements. These measurements permit the first real-time determinations of melt-depths and quenching histories during rapid-solidification processing of metals. DOE

N86-26614# Brookhaven National Lab., Upton, N. Y. National Synchrotron Light Source.
TRANSIENT ANALYSIS OF A BUNCHED BEAM FREE ELECTRON LASER
J. M. Wang and L. H. Yu 1985 12 p Presented at the 7th International FEL Conference, Tahoe City, Calif., 8-13 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-003372; BNL-37139; CONF-850956-13) Avail: NTIS HC A02/MF A01

The problem of the bunched beam operation of a free electron laser was studied. Assuming the electron beam to be initially monoenergetic, the Maxwell-Vlasov equations describing the system reduce to a third order partial differential equation for the envelope of the emitted light. The Green's function corresponding to an arbitrary shape of the electron bunch, which describes the transient behavior of the system, is obtained. The Green's function was used to discuss the start up problem as well as the power output and the power spectrum of a self-amplified spontaneous emission. DOE

N86-26615# Lawrence Livermore National Lab., Calif.
HIGH-RESOLUTION ABSORPTION SPECTRUM OF THE 6(1)S0 (YIELDS) 6(3)P1 TRANSITION IN MERCURY WITH A Cw DYE LASER
J. K. Crane, G. V. Erbert, S. D. Mostek, R. C. Kerlin, and J. A. Paisner 13 Nov. 1985 14 p refs Presented at the 1st International Laser Conference, Dallas, Tex., 18-22 Nov. 1985 Submitted for publication
(Contract W-7405-eng-48)
(DE86-003492; UCRL-93471; CONF-851185-2) Avail: NTIS HC A02/MF A01

Using a stabilized single-frequency commercial dye laser and an external cavity doubling crystal, we have measured the isotope shifts of mercury for the 6(1)S0 (YIELDS) 6(3)P1 transition

with an accuracy of 4 MHz. We describe the method for generating single-frequency light at 2537 A and compare the results of measurements of the isotope shifts with previous work. DOE

N86-26616*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A MODEL FOR THE KINETICS OF A SOLAR-PUMPED LONG PATH LASER EXPERIMENT
Larry V. Stock (Hampton Inst., Va.), John W. Wilson, and Russell J. DeYoung May 1986 33 p refs
(Grant NAG1-411)
(NASA-TM-87668; NAS 1.26:87668) Avail: NTIS HC A03/MF A01 CSCL 20E

A kinetic model for a solar-simulator pumped iodine laser system is developed and compared to an experiment in which the solar simulator output is dispersed over a large active volume (150 cu cm) with low simulator light intensity (approx. 200 solar constants). A trace foreign gas which quenches the upper level is introduced into the model. Furthermore, a constant representing optical absorption of the stimulated emission is introduced, in addition to a constant representing the scattering at each of the mirrors, via the optical cavity time constant. The non-uniform heating of the gas is treated as well as the pressure change as a function of time within the cavity. With these new phenomena introduced into the kinetic model, a best reasonable fit to the experimental data is found by adjusting the reaction rate coefficients within the range of known uncertainty by numerical methods giving a new bound within this range of uncertainty. The experimental parameters modeled are the lasing time, laser pulse energy, and time to laser threshold. Author

N86-26617# Los Alamos National Lab., N. Mex.
ELECTRON MICROPULSE DIAGNOSTICS AND RESULTS FOR THE LOS ALAMOS FREE-ELECTRON LASER
W. E. Stein and R. L. Sheffield 1985 19 p refs Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract W-7405-eng-36)
(DE86-003690; LA-UR-85-3167; CONF-850956-14) Avail: NTIS HC A02/MF A01

The electron beam diagnostic used in the Los Alamos free-electron laser are described. These include the standard beam-current,-position and -profile monitors as well as more elaborate energy and temporal spectrometers. Emphasis is given to the latter devices, which provide three-dimensional representations of the electron beam current as a function of energy and time in the picosecond region. These results were used to determine the performance of the accelerator and the laser. Crucial accelerator parameters were the energy spread and temporal shape of the micropulse. Essential laser parameters were the extraction efficiency and the duration of lasing during an individual micropulse. DOE

N86-26618# Xerox Special Information Systems, Pasadena, Calif.
BLUE LASER Final Technical Report, Sep. 1984 - Nov. 1985
Gordon R. Griffin Dec. 1985 33 p
(Contract DACW72-84-C-0016)
(AD-A163201; ETL-0412) Avail: NTIS HC A03/MF A01 CSCL 20/5

This has been a development program to design a low noise, moderate power, blue, hollow cathode laser used for imaging on photoconductors for on-demand color printing. Descriptions of the construction, processing, and testing of experimental unit are presented with recommendations for design improvements. GRA

N86-26619# Naval Research Lab., Washington, D. C.
PROPOSAL FOR FEL EXPERIMENTS DRIVEN BY THE NATIONAL BUREAU OF STANDARDS' CW MICROTRON Memorandum Report, Oct. 1984 - Sep. 1985
Cha-Mei Tang, P. Sprangle, S. Penner, B. M. Kincaid, and R. R. Freeman 31 Dec. 1985 11 p
(AD-A163227; NRL-MR-5709) Avail: NTIS HC A02/MF A01 CSCL 20/5

Free Electron Laser experiments driven by the race-track microtron (RTM) are proposed. The design of RTM has many exceptional properties: (1) normalized transverse emittance of 10 mm mrad, comparable to a storage ring; (2) axial emittance less than 30 keV-degree, much superior to r.f. linacs; (3) electron energy tunable from 20 to approximately 200 MeV; (4) CW operation; (5) energy stability; (6) compactness; and (7) high power-conversion efficiency. Accelerator up-grades to increase the peak current and to recover a significant part of the electron beam energy are also proposed. It seems possible to obtain peak current of I sub p = 5-10A, for electron pulse length of leb greater than approx. 1.2 mm. We have made conservative estimates based on I sub p = 1.0 A in estimating the performance of the FELs to be used with the RTM. Low gain calculations indicate that the FEL can oscillate at the fundamental wavelength ranging from 0.15 to 100 micrometers. Furthermore, we will outline experiments to generate harmonics in the extreme ultraviolet radiation. GRA

N86-26620# Aerospace Corp., El Segundo, Calif.
INITIATOR DURATION EFFECT ON PULSED CHAIN REACTION CHEMICAL LASER SCALING LAWS
Harold Mirels 15 Nov. 1985 52 p
(Contract F04701-85-C-0086)
(AD-A163387; TR-0086(6930-01)-3; SD-TR-85-82) Avail: NTIS HC A04/MF A01 CSCL 20/5

The effect of initiator pulse duration on the performance of a pulsed chain reaction chemical laser is investigated using a two-level vibrational model. Analytic results are presented for a saturated laser in the limits of weak and strong initiation. The initiator is assumed to provide a uniform (e.g., electron beam), parabolic (e.g., flash lamp), or power law variation of F-atom production rate F sub B with time. Laser performance is presented as a function of t sub b/t sub e where t sub B and t sub e are initiator and laser pulse times, respectively. In the weak initiation regime, an increase of t sub B/t sub e from zero to one results in a decrement in laser output energy of 20 and 33-1/3% for a flash lamp and electron-beam initiator, respectively. In the strong initiation regime, an increase of t sub B/t sub e from zero to one results in an energy decrement of only 5 and 10% for a flash lamp and electron-beam initiator, respectively. In each case, the laser pulse time t sub e is increased by a factor of two as t sub B/t sub e increases from zero to one. GRA

N86-26621# Institute for Defense Analyses, Alexandria, Va.
APPLICATIONS OF GAMMA-RAY LASERS Final Partial Report, Apr. - Nov. 1985
Bohdan Balko, Leslie Cohen, and Francis X. Hartmann Nov. 1985 12 p refs
(Contract MDA903-84-C-0031)
(AD-A164889; AD-E500750; IDA-M-141; IDA/HQ-85-30620) Avail: NTIS HC A02/MF A01 CSCL 20/5

As a result of the IST/IDA Gamma-Ray Laser Workshop held in May 1985, a general picture of the gamma-ray laser has emerged. The characteristics of the radiation from this source are contrasted with those from other coherent sources; these include energy, bandwidth, intensity, and coherence length. Potential nonmilitary applications are listed; and two classes of military applications are suggested. Those characteristics which drive a specific application are spelled out. GRA

N86-26622# Institute for Defense Analyses, Alexandria, Va.
IST/IDA (INNOVATIVE SCIENCE AND TECHNOLOGY/ INSTITUTE FOR DEFENSE ANALYSES) GAMMA-RAY LASER WORKSHOP, 21-22 MAY 1985 Final Partial Report, Apr. - Nov. 1985
Bohdan Balko, Leslie Cohen, and Francis X. Hartmann Nov. 1985 26 p refs Workshop held 21-22 May 1985
(Contract MDA903-84-C-0031)
(AD-A164890; AD-E500749; IDA-M-122; IDA/HQ-85-30619) Avail: NTIS HC A03/MF A01 CSCL 20/5

An historical perspective of the gamma-ray laser effect is presented, beginning with the 1957 discovery of the Mossbauer Effect. A retrospective of the workshop is given, including the

principal research workers and laboratories involved. The five principal concepts that emerged and the critical issues attached to each concept are discussed. The conclusions reached as a result of the workshop and the recommendations of the IDA staff for future directions are also presented. GRA

N86-26623# Hampton Inst., Va. Dept. of Physics and Engineering Studies.
A PLASMA ULTRAVIOLET SOURCE FOR SHORT WAVELENGTH LASERS Final Report, 15 Jan. 1985 - 14 Jan. 1986
Kwang S. Han 10 Mar. 1986 28 p
(Grant DAAG29-85-G-0073)
(AD-A165430; ARO-22576.2-PH-H) Avail: NTIS
HC A03/MF A01 CSCL 20/5

A high power blue-green laser was pumped with an array of the dense plasma focus. As the result of optimizing the operating conditions of the dense plasma focus and laser system, the maximum untuned laser output exceeded 2.1mJ corresponding to the energy density 3J/cu cm which is much higher than the typical flashlamp dye laser. The optimum operating conditions of the DPF device and laser system were argon pressure 0.3 torr, dye concentration 6 x 0.0001 mol/liter and 10% output transmission mirror. In order to enhance the efficiency of a blue-green laser through spectrum conversion of the pumping light, a converter dye, BBQ, was mixed in the laser dye solutions. The laser was pumped with the hypocyloidal-pinch plasma radiation source. The maximum increase of laser output at the dye mixture of LD490+BBQ or coumarin 503+bbq was about 80%. The enhancement is mainly due to the abundance of near uv in the pumping source, the fairly good match of the fluorescence band of converter dye with the absorption band of the laser dye, and a small overlap of fluorescence band of laser dyes with triplet-triplet adsorption band of converter dye. Author (GRA)

N86-26624# Sandia National Labs., Albuquerque, N. Mex.
SIMPLE WAVEMETER FOR PULSED DYE LASERS
D. Pleasance and R. L. Schmitt Nov. 1985 15 p
(Contract DE-AC04-76DP-00789)
(DE86-004488; SAND-85-8243) Avail: NTIS HC A02/MF A01

A real-time wavemeter has been developed for monitoring the wavelength, linewidth, and pulse energy of flashlamp-pumed dye lasers. The system uses a RETICON photodiode array in the back focal plane of a spectrometer, and is controlled by a versatile, menu-driven computer program. DOE

N86-26625# Lawrence Livermore National Lab., Calif.
VIDEO GUIDEBOOK. PROCEEDINGS OF THE FIRST SYMPOSIUM ON THE APPLICATIONS OF LABORATORY X-RAY LASERS
N. M. Ceglio, ed. 1985 215 p Symposium held at Pacific Grove, Calif., 17-19 Feb. 1985
(Contract W-7405-eng-48)
(DE86-002982; CONF-850293-Absts) Avail: NTIS
HC A10/MF A01

On February 17 to 19, 1985 approximately three dozen scientists working in the areas of microbiology, surface and solid state physics, X-ray lithography, plasma physics, short wavelength lasers, and X-ray optics assembled at the Asilomar Conference Center in Pacific Grove, California. Details of microbiology, X-ray holography, and atomic physics were exchanged. There were 15 hours of formal sessions. The overall group was divided into three panels: micromechanics, microbiology, and surface and solid state physics. After a series of X-ray laser briefings given on the morning of February 18, the symposium was turned over to the panels and their chairmen. The proceedings was formed from video tapes of the formal discussions. DOE

N86-26626# Lawrence Livermore National Lab., Calif.
LASER PROGRAM Annual Report, 1984
M. L. Rufer, ed. and P. W. Murphy, ed. Jun. 1985 488 p
(Contract W-7405-eng-48)
(DE86-005297; UCRL-50021-84) Avail: NTIS HC A21/MF A01

The Laser Program Annual Report is part of the continuing series of reports documenting the progress of the unclassified Laser Fusion Program at the Lawrence Livermore National Laboratory (LLNL). As in previous years, the report is organized programmatically. The first section is an overview of the basic goals and directions of the LLNL Inertial Confinement Fusion (ICF) Program, and highlights the year's important accomplishments. Sections 2 through 7 provide the detailed information on the various program elements: Laser Systems and Operations, Target Design, Target Fabrication, Laser Experiments and Advanced Diagnostics, Advanced Laser Development, and Applications of Inertial Confinement Fusion. Individual sections will be indexed separately. DOE

N86-26326# Societe Francaise d'Instruments de Mesure, Velizy-Villacoublay (France). Secteur Capteur Optronique.
USE OF A CO2 LASER LIDAR FOR FLIGHT AND PENETRATION AT VERY LOW ALTITUDES [UTILISATION D'UN LIDAR A LASER CO2 POUR LE VOL ET LA PENETRATION A TRES BASSE ALTITUDE]
Bernard Stephan *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 8 p
(For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-26627*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SEAM TRACKING PERFORMANCE OF A COAXIAL WELD VISION SYSTEM AND PULSED WELDING Interim Report
K. J. Gangl, J. L. Weeks, and D. Todd Mar. 1986 16 p
(Contract NAS8-27980)
(NASA-CR-178816; NAS 1.26:178816) Avail: NTIS
HC A02/MF A01 CSCL 13H

This report describes a continuation of a series of tests on the Coaxial Weld Vision System at MSFC. The ability of the system to compensate for transients associated with pulsed current welding is analyzed. Using the standard image processing approach for root pass seam tracking, the system is also tested for the ability to track the toe of a previous weld bead, for tracking multiple pass weld joints. This Coaxial Weld Vision System was developed by the Ohio State University (OSU) Center for Welding Research and is a part of the Space Shuttle Main Engine Robotic Welding Development System at MSFC. Author

N86-26628*# Quest Engineering Development Corp., Crosby, Tex.
PRESSURE SYSTEMS ENERGY RELEASE PROTECTION (GAS PRESSURIZED SYSTEMS)
Samuel J. Brown, ed. May 1986 435 p refs
(Contract NAS1-17278)
(NASA-CR-178090; NAS 1.26:178090) Avail: NTIS
HC A19/MF A01 CSCL 13I

A survey of studies into hazards associated with closed or pressurized system rupture and preliminary guidelines for the performance design of primary, secondary, and protective receptors of these hazards are provided. The hazards discussed in the survey are: blast, fragments, ground motion, heat radiation, biological, and chemical. Performance guidelines for receptors are limited to pressurized systems that contain inert gas. The performance guidelines for protection against the remaining unaddressed degenerative hazards are to be covered in another study. Author

N86-26629*# Garrett Turbine Engine Co., Phoenix, Ariz.
PRELIMINARY EVALUATION OF A COMPOUND CYCLE ENGINE FOR SHIPBOARD GENSETS
Jere G. Castor and William T. Wintucky (National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.) Jun. 1986 29 p Sponsored by NASA. Prepared in cooperation with Naval Ship Research and Development Center, Annapolis, Md. Development Center, Annapolis, Md.

(Contract NAS3-24346)
(NASA-CR-179451; NAS 1.26:179451; DTNSRDC-PASD-CR-1866; Garrett-21-5869; AVSCOM-TR-86-C-20) Avail: NTIS HC A03/MF A01 CSCL 13I

The results of a thermodynamic cycle (SFC) and weight analysis performed to establish engine configuration, size, weight and performance are reported. Baseline design configuration was a 2,000 hour MTBO Compound Cycle Engine (CCE) for a helicopter application. The CCE configuration was extrapolated out to a 10,000 MTBO for a shipboard genset application. The study showed that an advanced diesel engine design (CCE) could be substantially lighter and smaller (79% and 82% respectively) than todays contemporary genset diesel engine. Although the CCE was not optimized, it had about a 7% reduction in mission fuel consumption over today's genset diesels. The CCE is a turbocharged, power-compounded, high power density, low-compression ratio diesel engine. Major technology development areas are presented. Author

N86-26630# Admiralty Marine Technology Establishment, Poole (England). Inst. of Sound and Vibration Research.
THE EXAMINATION OF THREE SCUFFING WEAR DISC SPECIMENS FROM UNIVERSITY COLLEGE, CARDIFF
J. Manson Aug. 1985 16 p
(AMTE(M)-TM-85219; BR96848; ESA-86-96848) Avail: Issuing Activity

A metallographic examination of test disk specimens suggests a simple model of scuffing wear. The surface structures and bulk microstructural changes found are consistent with the frictive welding of material at the surface, with a large heat pulse decaying into the bulk material. The results suggest that the initiation of scuffing wear cannot be found on the zone just in front of a scuffed area as the heat pulse generated in the frictive event travels through and changes the prescuffing area. A polish etch effect is the major surface difference between run specimens. ESA

N86-26631# Department of the Air Force, Washington, D.C.
CONTOURED PUNCH TOOL FOR REMOVING SEMI-TUBULAR RIVETS Patent Application
Halver V. Ross, inventor (to Air Force) Filed 10 Jun. 1985 12 p
(AD-D012172; US-Patent-Appl-SN-743326) Avail: NTIS HC A02/MF A01 CSCL 13/5

A rivet removal tool for removing semi-tubular rivets from a work piece is described. The tool has a punch head whose hemispherical tip bottoms within the rivet cavity to provide alignment therewith, and a shoulder whose edge shears the enlarged end of the aligned rivet. GRA

N86-26632# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A CENTRIFUGAL TYPE GASKET FOR BEARINGS
P. D. Kiykov, B. T. Tsoy, and V. A. Brenner 3 Feb. 1986 7 p
Transl. into ENGLISH from Russian Patent no. 214984, 29 Mar. 1968 p 1-2
(AD-A164796; FTD-ID(RS)T-0699-85) Avail: NTIS HC A02/MF A01 CSCL 11/1

There is a familiar centrifugal-type gasket for bearings, consisting of an immovable inner ring and an outer rotating ring connected to it, both secured on an axle. The described device differs from the familiar in that the outer and inner rings have joining conical surfaces, flaring in the direction of the outside of the bearing. The inner conical surface of the outer ring is smooth, while the surface of the inner ring joined to it has annular recesses. GRA

N86-26633# Technion Research and Development Foundation Ltd., Haifa (Israel).
MECHANICAL FACE SEAL DYNAMICS Final Report, Jan. 1983 - Aug. 1985
Itzhak Etsion and Itzhak Green Dec. 1985 66 p
(Contract F49620-83-C-0057)
(AD-A164978; EEC-159; AFWAL-TR-85-2082) Avail: NTIS HC A04/MF A01 CSCL 11/1

This report summarizes a three year study of noncontacting coned-face mechanical seal dynamics. Both small perturbation and full nonlinear analyses are presented. An experimental technique to measure relevant dynamic properties of elastomeric secondary seals is described. The critical speed, for the dynamic stability threshold, and the critical rotor runout are presented. It is shown that the more simple to use small perturbation analysis gives very good results for most practical cases. This document includes information on the following form areas: (1) Stiffness and Damping Characteristics of Elastomer O Rings Secondary Seals Subjected to Reciprocating Twist; (2) A Kinematic Model for Mechanical Seals with Antirotation Locks or Positive Drive Devices; (3) Stability Threshold and Steady State Response of Noncontacting Coned-Face Seals; and (4) Nonlinear Dynamic Analysis of Noncontacting Coned-Face Mechanical Seals. GRA

N86-26634# Pennsylvania State Univ., University Park. Applied Research Lab.
ADVANCED PROPULSOR DESIGN STUDIES Final Report
Walter S. Gearhart Jun. 1985 57 p refs
(Contract DTCG23-84-F-20046)
(AD-A164983; USCG-D-1-86) Avail: NTIS HC A04/MF A01 CSCL 13/10

It is the purpose of the propulsor to convert rotational shaft energy into a propulsive thrust. Ideally, this conversion is to be accomplished with the most efficient, vibration-free and inexpensive device. However, emphasis on achieving a particular performance goal such as cavitation resistance, efficiency, or propulsor weight and mechanical simplicity may limit the designer in the type of propulsor configuration to be selected. It is the intent of this document to review the propulsive characteristics of various propulsive types for application on planning hull type craft. On the basis of these studies the performance advantages and shortcomings associated with each type of propulsor will be discussed. The performance of the conventional open propeller as well as propellers employing stationary counterswirl vanes located upstream of the propeller (reaction fin propulsor) shall be reviewed. Ducted propulsors employing a stator blade located upstream of the rotor shall also be considered. GRA

N86-26635# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
THE ANALYSIS, DESIGN AND PERFORMANCE OF A 1.25 INCH DIAMETER PNEUMATIC ACTUATOR
Joe L. Byrd Apr. 1985 66 p refs
(AD-A165297; AD-E950773; AMSMI/RG-85-22-TR) Avail: NTIS HC A04/MF A01 CSCL 13/7

This report presents the detailed design and measured performance of a prototype, single axis vane actuator for potential application to small diameter hypervelocity missiles. The actuator produces over 100 inch-pounds of torque while operating on nitrogen at 1295 psi. The small signal bandwidth is approximately 40 Hz. The actuator operates 2 vanes on a common shaft for aerodynamic control in the pitch or yaw plane. Author (GRA)

N86-26636# Oak Ridge National Lab., Tenn.
DESIGN CONCEPTS AND ADVANCED MANIPULATOR DEVELOPMENT FOR NUCLEAR FUEL CYCLE FACILITIES
M. J. Feldman 1985 24 p Presented at the 1st International Seminar on Nuclear Robotics, Brussels, Belgium, 26 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE85-01771; CONF-850827-1) Avail: NTIS HC A02/MF A01

In the Fuel Recycle Division, Consolidated Fuel Reprocessing Program at ORNL, a comprehensive remote systems development program has existed for the past seven years. The new remote technology under development is expected to significantly improve remote operations by extending the range of tasks accomplished by remote means and increasing the efficiency of remote work undertaken. The application of advanced manipulation is viewed as an essential part of a series of design directions whose sum describes a somewhat unique blend of old and new technology. A design direction based upon the Teletec concept is

explained and recent progress in the development of an advanced servomanipulator-based maintenance concept is summarized to show that a new generation of remote systems is feasible through advanced technology. DOE

N86-26637# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF NOx CONTROL ON A COMPRESSION IGNITION LARGE BORE RECIPROCATING INTERNAL COMBUSTION ENGINE. VOLUME 1: TECHNICAL RESULTS Final Report, Apr. 1980 - Apr. 1981
C. Castaldini Jan. 1986 113 p
(Contract EPA-68-02-3188)
(PB86-155819; ACUREX-TR-81-81/EE; EPA-600/7-86-001A) Avail: NTIS HC A06/MF A01 CSCL 21G

Volume 1 of the report gives emission results from field tests of the exhaust gas from a large-bore, compression-ignition reciprocation engine burning diesel fuel. An objective of the tests was to evaluate the operating efficiency of the engine with combustion modification NOx control to reduce emissions to below the proposed NOx new source performance standard (NSPS) of 600 ppm at 15 percent O2 dry. Engine NOx emissions were reduced 31 percent (from 825 to 571 ppm) at 15 percent O2 with 3.5 degrees of fuel injection timing retard. The reduction was accompanied by a 1 percent loss in engine efficiency. CO emissions decreased slightly from 119 to 90 ppm). Total unburned hydrocarbons remained relatively unchanged (25 ppm), as did particulate emissions (35 ng/J) and total organic emissions (55 ng/J). Volatile organics (boiling point less than about 100 C) accounted for the largest fraction of the total organic. Naphthalene, fluoroanthene, phenanthrene/anthracene, and pyrene were the only organic priority pollutants detected in both tests at levels below 70 micrograms/dscm. GRA

N86-26638# National Center for Atmospheric Research, Boulder, Colo.
THREE-LEVEL ENERGY BALANCE CLIMATE MODEL WITH TOPOGRAPHY, EXPLICIT RADIATIVE TRANSFER, AND EXPLICIT SEA ICE AND SNOW MASS BUDGETS Ph.D. Thesis
L. D. D. Harvey 1986 347 p
(Grant NSF ATM-82-17015)
(PB86-181799; NCAR/CT-97) Avail: NTIS HC A15/MF A01 CSCL 03B

A three-level energy balance climate is presented, in which temperatures are computed for the surface, surface air, and stratosphere. The model has land-sea resolution, explicit sea ice and snow mass budgets, and uses a nested integration scheme such that shorter time steps are used for newly forming ice in leads. The sea ice model is found to be very sensitive to the value of many of the input parameters. The effect of adding individual processes can vary dramatically in magnitude from zone to zone and for different seasons. The snowpack sensitivity to changes in model parameters is much less than that of the sea ice model. The full model sensitivity to a solar constant change appears to be dependent on part on the way in which changes in ice mass are partitioned between changes in ice area and in ice thickness. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-26639*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EVALUATION OF MULTILAYER PRINTED WIRING BOARDS BY METALLOGRAPHIC TECHNIQUES: AN ILLUSTRATED GUIDE TO THE PREPARATION AND INSPECTION OF PLATED-THROUGH HOLE TEST COUPONS BASED ON THE REQUIREMENTS OF MIL-P-55110D
Jane Jellison May 1986 72 p refs
(NASA-RP-1161; Rept-86B0088; NAS 1.61:1161) Avail: NTIS HC A04/MF A01 CSCL 14D

This work is an illustrated handbook containing the rationale and procedure for the evaluation of multilayer printed wiring board construction integrity with respect to plated-through holes in accordance with the requirements of MIL-P-55110D, Printed Wiring Boards. It is intended as a practical aid for those concerned with determining the construction integrity of multilayer boards for high reliability applications. Photomicrographs of cross sectioned holes illustrate defect types, acceptable and unacceptable conditions, and methods of measurement. A procedure for specimen preparation is given, and appropriate paragraphs of the military specification are included and explained. Author

N86-26640# George Washington Univ., Washington, D.C. Inst. for Management Science and Engineering.
SEQUENTIAL TESTING AND CONFIDENCE INTERVALS FOR THE MTBF (MEANTIME BETWEEN FAILURES) OF SYSTEMS HAVING EXPONENTIAL DISTRIBUTION OF THE INTERFAILURE TIMES
S. Zacks 23 Dec. 1985 28 p
(Contract N00014-83-K-0216)
(AD-A165189; GWU/IMSE/SERIAL-T-506/85) Avail: NTIS HC A03/MF A01 CSCL 14/2

The application of the Wald SPRT to life testing of equipment, having an exponential distribution of the interfailure times, has been in practice since the 1950s. The problem discussed in the present paper is that of the exact computation of the distributions of the stopping times, and the determination of confidence limits for the mean time between failures (MTBF), theta, after stopping. Formulae are developed for the exact computation of the distribution of stopping times in sequential life testing, according to a modified SPRT. These distributions yield the fractiles of the stopping times at acceptance or at rejection, from which confidence limits for the MTBF can be obtained. GRA

N86-26641# Argonne National Lab., Ill.
EFFECTS OF CAVITATION ON HIGH-CYCLE FATIGUE LIFE
S. Majumdar Sep. 1985 11 p Presented at the Minnowbrook Conference on Life Prediction for High Temperature Gas Turbine Materials, Blue Mountain Lake, N.Y., 27 Aug. 1985
(Contract W-31-109-eng-38)
(DE86-001814; CONF-8508146-1) Avail: NTIS HC A02/MF A01

Cavitation was measured in 304 stainless steel after creep tests. Results show that cavitation is highly inhomogenous. This has a significant effect on the interaction between small amounts of creep damage and high cycle fatigue life. The low cycle creep-fatigue and the high cycle fatigue are not independent and may have large interactive effects. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-26642 ESDU International Ltd., London (England). Engineering Sciences Data Unit.
CIRCULAR-CYLINDRICAL STRUCTURES: DYNAMIC RESPONSE TO VORTEX SHEDDING. PART 3: COMPUTER PROGRAMS
Dec. 1985 25 p refs
(ESDU-85040; ISBN-0-85679-546-1; ISSN-0143-2702) Avail: ESDU

A BASIC program is given for estimating cross wind deflection of cantilever structures such as stacks, towers and process columns or of structural elements held at both ends. The program implements the full procedure developed and presented in ESDU 84038

and predicts both the maximum amplitude (at critical wind speed), and response at off-critical wind speeds. It applies to parallel sided, stepped, and tapered structures and also structures with efficient aerodynamic spoilers. The necessary input data are described and example outputs from program runs are included. A simplified calculation procedure applying to cantilever structures is also given in ESDU 85039. Author

N86-26643# Sandia National Labs., Albuquerque, N. Mex.
RECTANGULAR PLATE IS PROPOSED AS AN IES MODAL TEST STRUCTURE
D. O. Smallwood and D. L. Gregory 1985 10 p Presented at the 4th International Modal Analysis Conference, Los Angeles, Calif., Feb. 1985
(Contract DE-AC04-76DP-00789)
(DE85-018274; SAND-85-2060C; CONF-860224-1) Avail: NTIS
HC A02/MF A01

Numerous modal systems are now marketed by commercial companies and new users are continually being introduced to these systems. A simple test structure would be useful to compare these systems on a common basis. The structure would also provide new users with a means to evaluate their newly acquired experimental and analytical skills. This paper will discuss a particular proposed rectangular plate. The physical description of the plate is given, the modal properties of the plate are discussed, and experimental results are given to illustrate the plate behavior. DOE

N86-26644# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 9 Monthly Report
Judith Nagle-Eshleman, ed. Sep. 1985 110 p refs
(AD-A161143) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Changing trends in shock and vibration research are noted in this journal. Included are literature surveys, abstracts, current news and editors notes. The feature article is entitled Impactor Interaction with Concrete Structures - Local Effects. For individual titles, see N86-26645 through N86-26646.

N86-26645# Ohio State Univ., Columbus. Dept. of Civil Engineering.
IMPACTOR INTERACTION WITH CONCRETE STRUCTURES: LOCAL EFFECTS
H. Adeli and R. L. Sierakowski *In* SVIC The Shock and Vibration Digest, volume 17, no. 9 Sep. 1985 p 3-16 refs (For primary document see N86-26644 17-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The local effect of solid impactors acting on concrete structures is studied. Available formulas for predicting the penetration depth, scabbing thickness, and perforation thickness of solid impactors acting on concrete structures are reviewed and compared. Author

N86-26646# Clarkson Univ., Potsdam, N.Y. Dept. of Mechanical and Industrial Engineering.
RECENT RESEARCH IN NONLINEAR ANALYSIS OF BEAMS
M. Sathyamoorthy *In* SVIC The Shock and Vibration Digest, volume 17, no. 9 Sep. 1985 p 19-27 (For primary document see N86-26644 17-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

This literature survey deals with the static and dynamic nonlinear analysis of beams. Also included are papers about arches, cables, frames, strings, and trusses. Papers reviewed are limited to those published between 1982 and 1984. Geometric and material type nonlinearities are included. Analytical, experimental, and numerical methods are reviewed. Author

N86-26647*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
BOUNDARY FORCE METHOD FOR ANALYZING TWO-DIMENSIONAL CRACKED BODIES
P. W. Tan (Analytical Services and Materials, Inc., Hampton, Va.), I. S. Raju, and J. C. Newman, Jr. May 1986 44 p refs
(NASA-TM-87725; NAS 1.15:87725) Avail: NTIS
HC A03/MF A01 CSCL 20K

The Boundary Force Method (BFM) was formulated for the two-dimensional stress analysis of complex crack configurations. In this method, only the boundaries of the region of interest are modeled. The boundaries are divided into a finite number of straight-line segments, and at the center of each segment, concentrated forces and a moment are applied. This set of unknown forces and moments is calculated to satisfy the prescribed boundary conditions of the problem. The elasticity solution for the stress distribution due to concentrated forces and a moment applied at an arbitrary point in a cracked infinite plate are used as the fundamental solution. Thus, the crack need not be modeled as part of the boundary. The formulation of the BFM is described and the accuracy of the method is established by analyzing several crack configurations for which accepted stress-intensity factor solutions are known. The crack configurations investigated include mode I and mixed mode (mode I and II) problems. The results obtained are, in general, within + or - 0.5 percent of accurate numerical solutions. The versatility of the method is demonstrated through the analysis of complex crack configurations for which limited or no solutions are known. Author

N86-26648*# Lehigh Univ., Bethlehem, Pa.
THE CRACK PROBLEM IN A REINFORCED CYLINDRICAL SHELL
O. Selcuk Yahsi (Middle East Technical Univ., Ankara, Turkey) and F. Erdogan Mar. 1986 35 p
(Grants NGR39-007-011; NSF MEA-84-14477)
(NASA-CR-176686; NAS 1.26:176686) Avail: NTIS
HC A03/MF A01 CSCL 20K

In this paper a partially reinforced cylinder containing an axial through crack is considered. The reinforcement is assumed to be fully bonded to the main cylinder. The composite cylinder is thus modelled by a nonhomogeneous shell having a step change in the elastic properties at the $z=0$ plane, z being the axial coordinate. Using a Reissner type transverse shear theory the problem is reduced to a pair of singular integral equations. In the special case of a crack tip touching the bimaterial interface it is shown that the dominant parts of the kernels of the integral equations associated with both membrane loading and bending of the shell reduce to the generalized Cauchy kernel obtained for the corresponding plane stress case. The integral equations are solved and the stress intensity factors are given for various crack and shell dimensions. A bonded fiberglass reinforcement which may serve as a crack arrestor is used as an example. Author

N86-26649*# Lehigh Univ., Bethlehem, Pa.
LINE SPRING MODEL AND ITS APPLICATIONS TO PART-THROUGH CRACK PROBLEMS IN PLATES AND SHELLS
F. Erdogan and B. Aksel Jun. 1986 43 p refs
(Grants NGR-39-007-011; NSF MEA-84-14477)
(NASA-CR-176688; NAS 1.26:176688) Avail: NTIS
HC A03/MF A01 CSCL 20K

A general description of the line spring model is given. It is extended to cover the problem of interaction of multiple internal and surface cracks in plates and shells. The shape functions for various related crack geometries obtained from the plane strain solution and the results of some multiple crack problems are presented. The problems considered include coplanar surface cracks on the same or opposite sides of a plate, nonsymmetrically located coplanar internal elliptic cracks, and in a very limited way the surface and corner cracks in a plate of finite width and a surface crack in a cylindrical shell with fixed end Author

N86-26650*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INDEX OF AEROSPACE MECHANISMS SYMPOSIA PROCEEDINGS 1-19
A. Rinaldo (Lockheed Missiles and Space Co., Sunnyvale, Calif.)

and J. Wilson Apr. 1986 281 p
(NASA-TM-88205; A-86078; NAS 1.15:88205) Avail: NTIS HC A13/MF A01 CSCL 13I

This index, organized in five sections (by symposium, by title, by author, by subject, and by project), brings together information on the first 19 Aerospace Mechanisms symposia. Key words are included, cross-referencing all the symposia, and the eighteenth and nineteenth symposia are cross-indexed by project. The Aerospace Mechanisms symposia are devoted to discussions of design, fabrication, test, and operational use of aerospace mechanisms; this is the first index that compiles information on symposia held from 1966 through 1985. Author

N86-26651*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW-CYCLE THERMAL FATIGUE
Gary R. Halford Feb. 1986 114 p refs
(NASA-TM-87225; E-2890; NAS 1.15:87225) Avail: NTIS HC A06/MF A01 CSCL 20K

A state-of-the-art review is presented of the field of thermal fatigue. Following a brief historical review, the concept is developed that thermal fatigue can be viewed as processes of unbalanced deformation and cracking. The unbalances refer to dissimilar mechanisms occurring in opposing halves of thermal fatigue loading and unloading cycles. Extensive data summaries are presented and results are interpreted in terms of the unbalanced processes involved. Both crack initiation and crack propagation results are summarized. Testing techniques are reviewed, and considerable discussion is given to a technique for thermal fatigue simulation, known as the bithermal fatigue test. Attention is given to the use of isothermal life prediction methods for the prediction of thermal fatigue lives. Shortcomings of isothermally-based life prediction methods are pointed out. Several examples of analyses and thermal fatigue life predictions of high technology structural components are presented. Finally, numerous dos and don'ts relative to design against thermal fatigue are presented. Author

N86-26652*# Battelle Columbus Labs., Ohio.
NONLINEAR DAMAGE ANALYSIS: POSTULATE AND EVALUATION Final Report, 30 Sep. 1981 - 6 Apr. 1983
B. N. Leis and T. P. Forte 6 Apr. 1983 101 p refs
(Contract NAS3-22825)
(NASA-CR-168171; NAS 1.26:168171) Avail: NTIS HC A06/MF A01 CSCL 20K

The objective of this program is to assess the viability of a damage postulate which asserts that the fatigue resistance curve of a metal is history dependent due to inelastic action. The study focusses on OFE copper because this simple model material accentuates the inelastic action central to the damage postulate. Data relevant to damage evolution and crack initiation are developed via a study of surface topography. The effects of surface layer residual stresses are explored via comparative testing as were the effects in initial prestraining. The results of the study very clearly show the deformation history dependence of the fatigue resistance of OFE copper. Furthermore the concept of deformation history dependence is shown to qualitatively explain the fatigue resistance of all histories considered. Likewise quantitative predictions for block cycle histories are found to accurately track the observed results. In this respect the assertion that damage per cycle for a given level of the damage parameter is deformation history dependent appears to be physically justified. Author

N86-26653*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BUCKLING BEHAVIOR OF RENE 41 TUBULAR PANELS FOR A HYPERSONIC AIRCRAFT WING
William L. Ko, John L. Shideler, and Roger A. Fields May 1986 31 p refs Presented at the AIAA/ASME/ASCE/AHS 27th Structures, Structural Dynamics and Materials Conference, San Antonio, Texas, 19-21 May 1986
(NASA-TM-86798; H-1327; NAS 1.15:86798; AIAA-86-0978) Avail: NTIS HC A03/MF A01 CSCL 20K

The buckling characteristics of Rene 41 tubular panels for a hypersonic aircraft wing were investigated. The panels were repeatedly tested for buckling characteristics using a hypersonic wing test structure and a universal tension/compression testing machine. The nondestructive buckling tests were carried out under different combined load conditions and in different temperature environments. The force/stiffness technique was used to determine the buckling loads of the panel. In spite of some data scattering, resulting from large extrapolations of the data fitting curve (because of the termination of applied loads at relatively low percentages of the buckling loads), the overall test data correlate fairly well with theoretically predicted buckling interaction curves. Also, the structural efficiency of the tubular panels was found to be slighly higher than that of beaded panels. Author

N86-26654# Admiralty Marine Technology Establishment, Dunfermline (Scotland). Inst. of Sound and Vibration Research.
INTERFRAME BUCKLING OF ALUMINIUM ALLOY STIFFENED PLATING
J. D. Clarke, comp., J. W. Swan, comp., and M. Verain Oct. 1985 65 p
(AMTE(S)-R-85104; BR97439; ESA-86-96850) Avail: Issuing Activity

Compression tests on 5 stiffened N8 aluminum alloy plates covering typical full scale warship scantlings are described. The panels were manufactured using normal shipyard production methods to ensure typical initial distortion and residual stresses. Maximum loads and post-buckling load/deflection results are compared with theoretical predictions using a computer program (NI06C). Test results show significant variations in yield strength. In most cases the maximum strength of aluminum alloy structures can be calculated using NI06C with the plating behavior represented by an equivalent steel b/t value giving the same beta. The peak load for sharply varying load/deflection curves may be overestimated. The measured post-buckling strength is higher than that predicted by the simple two half frame finite element model used. This is partly due to the rotational restraint at the frame ends, but could also be due to the additional rotational restraint at the ends provided by the short sections with doubler plates. ESA

N86-26655# New Mexico Univ., Albuquerque.
PROBABILISTIC ANALYSIS OF NONLINEAR STRUCTURES SUBJECTED TO TRANSIENT LOADS. PART 1 Final Report, 15 Nov. 1983 - 30 Nov. 1984
Dennis Morrison Oct. 1985 117 p
(Contract F29601-81-C-0013)
(AD-A163235; NMERI-TA8-81-Pt-1; AFWL-TR-84-154-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 13/13

A technique for the analysis of reliability in linear and nonlinear systems that can be modeled as single-degree-of-freedom (SDF) structures is investigated and established. Transition probabilities are established using conditional probability and problems for stationary and nonstationary input are shown. Methods for computational enhancements are investigated. Multiple point failure analysis of multiple-degree-of-freedom (MDF) systems is addressed separately. Peak responses are expanded in a series involving the input and systems parameters and moments of the peak response are determined. Margins of survival are established using random failure levels and the probability of survival is computed. A second method using the equations of a numerical technique to form the joint probability density of the response measures is also presented. Author (GRA)

N86-26656# Lehigh Univ., Bethlehem, Pa. Inst. of Fracture and Solid Mechanics.
DAMAGE PREDICTION OF PROJECTILE PENETRATION PROCESS BASED ON ENERGY DISSIPATION RATE Final Report, 1 Apr. 1983 - 30 Sep. 1984
G. C. Sih and D. H. Song Aug. 1985 167 p
(Contracts DAAG46-83-K-0158; DA Proj. 8X3-63304-D-215)
(AD-A163268; AMMRC-TR-85-26) Avail: NTIS HC A08/MF A01 CSCL 19/4

The projectile penetration process covers a wide range of failure modes depending on impact velocity, configuration and

material of the projectile and target. This study overcomes previous difficulties in such mathematical descriptions by applying a concept which assumes that material damage occurs nonhomogeneously throughout the target and can be uniquely associated with the rate at which energy is dissipated in a unit volume of material. Introduced as a corollary of the strain energy density theory are the quantities dV/dA and dW/dV which represent, respectively, the rate of change of volume with surface area and the strain energy density function. Together they deterime the energy used to damage a differential area in the projectile penetration process. Orientations of the damage planes form the failure path. A numerical procedure is developed for modeling the material damage process during projectile penetration. The progressive damage pattern for each time increment is exhibited where the elements fail nonhomogeneously. For blunt projectiles impacting relatively hard targets, the conditions for plugging failure are met soon after impact with little radial flow of material. This failure mode is investigated by invoking different assumptions in the state of the failed elements. This model can also treat the phase transformation of solid where shear bands are formed in regions of highly localized energy states. GRA

N86-26657# Army Tank-Automotive Systems Development Center, Warren, Mich.
RESIDUAL STRESS MEASUREMENTS ON M1 TANK WELDMENTS Final Technical Report, 1 Apr. - 30 Sep. 1985
S. B. Catalano 30 Sep. 1985 40 p
(AD-A163330; TACOM-TR-13133) Avail: NTIS HC A03/MF A01 CSCL 19/3

Residual stress levels were measured on four weldment areas of the M1 tank--two on the hull and two on the turret. Measurements were performed on preexisting tanks as well as on current production runs. Two hulls and two turrets of preexisting tanks were measured; three hulls and two turrets of current production runs were measured. Measurements were performed on the weld nugget and heat-affected zones using portable X-ray diffraction equipment. A total of 142 measurements were performed. Only six measurements exhibited tensile residual stresses; the remainder exhibited compressive residual stresses. The highest tensile residual stress observed was 47,000 psi. Weldment areas measured were: race ring to forward glacis; turret roof plate joint; gunner primary sight to frontal slope plate; and side plate to front portion of hull. GRA

N86-26658# Dayton Univ., Ohio.
TWO COMPLIANCE EXPRESSIONS FOR ARBITRARY LOCATIONS ACROSS A CRACK IN A CT (COMPACT TYPE) SPECIMEN Interim Report, Jan. 1984 - Mar. 1985
P. R. Enderle and Noel E. Ashbaugh Jun. 1985 56 p refs
(Contracts F33615-81-C-5015; F33615-84-C-5051)
(AD-A163369; AFWAL-TR-85-4074) Avail: NTIS HC A04/MF A01 CSCL 20/11

Two empirical equations were developed that express displacement across the crack in a compact type specimen as a function of crack length and distance behind the crack tip. The coefficients in the equations were generally determined by least square error fit to crack surface displacements obtained from finite element analysis. In one expression, simple types of functions which depend on either crack length or distance from the crack tip were combined to form an equation that is similar to a series expansion in two separate variables. The second equation was developed from a combination of the far field behavior of the displacements and a near field fit which incorporates the near tip analytical displacement behavior. Both equations have application to a broad range of values of crack length and distance from the crack tip. Either equation can be used in conjunction with measurements of displacement across the crack surface to indirectly determine the crack length. GRA

N86-26659# Dayton Univ., Ohio.
HIGH STRAIN RATE MATERIAL BEHAVIOR Final Report, Aug. 1982 - Sep. 1985
A. M. Rajendran and Stephan J. Bless Dec. 1985 242 p
(Contract F33615-82-C-5126)
(AD-A165214; UDR-TR-84-138; AFWAL-TR-85-4009) Avail: NTIS HC A11/MF A01 CSCL 20/11

High strain rate material behavior of 1020, C1008, HY100 steels, OFHC copper, 7039-T64 aluminum, and BeO was characterized. Data were obtained from split Hopkinson bar (SHB) and plate impact test configurations. A high speed photographic system was used to obtain dynamic stress-strain data from necking Hopkinson bar specimens. The state variable based viscoplastic constitutive model of Bodner and Partom was considered for the material modeling. Computer programs and special purpose subroutines were developed to use the Bodner-Partom model in the STEALTH finite difference code. A unique iterative algorithm was developed to evaluate the model constants from both tensile SHB and plate impact test data. The model constants were determined for the five metals. Both tension and compression SHB and plate impact tests were successfully simulated using Bodner-Partom model constants. GRA

N86-26660# Sandia National Labs., Livermore, Calif.
CRYSTAL PLASTICITY ANALYSIS OF LARGE-STRAIN SHEAR
R. J. Asaro and T. C. Lowe Dec. 1985 26 p
(Contract DE-AC04-76DR-00789)
(DE86-005061; SAND-85-8245) Avail: NTIS HC A03/MF A01

Successful computer prediction of metal forming processes requires accurate constitutive relations to represent large-strain deformation. Crystal plasticity analyses of metal polycrystals subject to large strains are described which will help guide the formulation of such relations. The response of a polycrystalline aggregate of grains is analyzed to elucidate the effects of boundary constraint during large strain shear deformations. Deformation-induced textures are also predicted. Predictions of the Swift effect, that is, normal strains that accompany finite shear strains, are compared with experimental data. DOE

N86-26661# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
THE POSTBUCKLING BEHAVIOR OF BLADE-STIFFENED CARBON EPOXY PANELS LOADED IN COMPRESSION
J. F. M. Wiggenraad 19 Feb. 1985 20 p
(Contracts NIVR-312.2-1019)
(NLR-MP-85019-U; B8577052; ESA-86-96977-L) Avail: NTIS HC A02/MF A01

The postbuckling behavior of blade-stiffened carbon epoxy panel laminates consisting of only a few layers due to the relatively low design loads was studied in compression tests. Certain coupling terms in the stiffness matrices were thought to be no longer insignificant. The full scale panels buckle in a global mode and do not show any postbuckling strength. The short columns, buckling in a local mode, support 1.8 times the initial buckling load before failure. Comparison with calculations shows that the influence of the coupling terms on the buckling behavior of the specimens is relatively small: it decreases the buckling load slightly, does not change the end shortening curves significantly and is mainly apparent in the out-of-plane deflections. ESA

N86-26662# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
SOME TESTS TO ASSESS THE EFFECT OF CRACK STOPPERS ON THE FATIGUE LIFE OF CENTER-NOTCHED SPECIMENS
J. Schijve and F. A. Jacobs Feb. 1984 33 p refs
(NLR-TR-84051-U; B8576224; ESA-86-96981) Avail: NTIS HC A03/MF A01

Crack stoppers were evaluated in crack propagation tests on Alclad 2024-T3 sheet specimens (thickness 2 mm) provided with a central crack to assess the usefulness of very simple crack stopping elements which can be applied to macrocracks in sheet metal structures accessible from one side only. Results show that a stop hole at the crack tip should be filled to obtain a good propping of the hole. Self tapping screws and tapered pins give large crack growth retardation lives. Large retardations are obtained with hard driven rivets and with heavily tightened bolts in the stop holes, but they require accessibility from two sides. Flight-simulation

loading on specimens with tightened bolts indicates a significant retardation, but quantitatively the effects under flight-simulation loading and under constant-amplitude loading are highly different. ESA

N86-26663# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
CONSTANT AMPLITUDE AND FLIGHT SIMULATION OF FATIGUE TESTS ON ADHESIVE BONDED LAP JOINT SPECIMENS OF 2024-T3 SHEET MATERIAL
J. Schijve and F. A. Jacobs 9 Aug. 1984 47 p refs
(Contracts NIVR-1725)
(NLR-TR-84090-U; B8576223; ESA-86-96982) Avail: NTIS HC A03/MF A01

Fatigue tests were carried out on Redux and FM 123/5 bonded specimens at various stress levels, temperatures (RT to 65C) and low and high test frequencies. Type of failure (bond line failure or sheet failure) and the significance of the adhesive squeeze-out for crack nucleation were examined. Results indicate that the fatigue notch effect of a thickness increase as a result of adhesive bonding of sheet material is very small; the effect of secondary bending is more significant. If the bending effect is not excessive (depending on the design) the fatigue strength of a bonded lap joint is high. In flight-simulation tests, bond line failures do not occur even under severe test conditions. The life in flight is highly superior to results for riveted lap joint and a single shear strap joint, while it is of the same order of magnitude found for riveted double-strap joints. ESA

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-26664*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HISTORY MATCHING BY SPLINE APPROXIMATION AND REGULARIZATION IN SINGLE-PHASE AREAL RESERVOIRS Final Report
Tai-yong Lee (California Inst. of Tech., Pasadena), Costas Kravaris (Michigan Univ., Ann Arbor), and John Seinfeld (California Inst. of Tech., Pasadena) Mar. 1986 54 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178087; ICASE-86-19; NAS 1.26:178087) Avail: NTIS HC A04/MF A01 CSCL 09B

An automatic history matching algorithm is developed based on bi-cubic spline approximations of permeability and porosity distributions and on the theory of regularization to estimate permeability or porosity in a single-phase, two-dimensional real reservoir from well pressure data. The regularization feature of the algorithm is used to convert the ill-posed history matching problem into a well-posed problem. The algorithm employs the conjugate gradient method as its core minimization method. A number of numerical experiments are carried out to evaluate the performance of the algorithm. Comparisons with conventional (non-regularized) automatic history matching algorithms indicate the superiority of the new algorithm with respect to the parameter estimates obtained. A quasioptimal regularization parameter is determined without requiring a priori information on the statistical properties of the observations. Author

N86-26665*# South Carolina Univ., Columbia. Inst. for Marine Biology and Coastal Research.
APPLICATION OF LANDSAT TM IMAGES TO ASSESS CIRCULATION AND DISPERSION IN COASTAL LAGOONS Progress Report
Bjoern Kjerfve, John R. Jensen, and K. E. Magill 15 Feb. 1986 38 p refs
(Contract NAS5-28741)
(NASA-CR-177315; NAS 1.26:177315) Avail: NTIS HC A03/MF A01 CSCL 08C

The main objectives are formulated around a four pronged work approach, consisting of tasks related to: image processing and analysis of LANDSAT thematic mapping; numerical modeling of circulation and dispersion; hydrographic and spectral radiation field sampling/ground truth data collection; and special efforts to focus the investigation on turbid coastal/estuarine fronts. Author

N86-26666# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A PROPOSAL FOR A PROJECT ENTITLED ASSESSMENT OF FOREST RESOURCES IN URUGUAY SUBMITTED TO THE UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)
Rene Antonio Novaes, David Chung Liang Lee, Pedro Hernandez Filho, Armando PachecodosSantos, and Flavio Jorge Ponzoni Mar. 1986 13 p
(INPE-3828-NTE/255) Avail: NTIS HC A02/MF A01

This project proposal was submitted by request of the United Nations Industrial Development Organization (UNIDO). The main objective is to collect basis forest information for the development, promotion, and utilization of alternative sources of energy through the use of Uruguay's national resources and to define the value of LANDSAT-TM as an aid in efficient management of the country's plantations. An additional objective is to train the Uruguayan technical team. Indications are given as to how each task will be accomplished and what techniques will be employed in performing main tasks such as: forest mapping and development of map legends, map accuracy assessment and forest area correction, stand timber volume evaluation, field sampling, and mensuration procedures. Flow diagrams of the overall project, activity bar diagrams, and list of equipment required for task completion are included. The expected results of the map products and timber volumes are discussed. Author

N86-26667# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
WHEAT AREA ESTIMATION USING DIGITAL LANDSAT MSS DATA AND AERIAL PHOTOGRAPHS
Mauricio A. Moreira, Sherry C. Chen, and Getulio T. Batista Mar. 1986 28 p Submitted for publication
(INPE-3824-PRE/900) Avail: NTIS HC A03/MF A01

A procedure to estimate wheat (Triticum aestivum L) area using sampling technique based on aerial photographs and digital LANDSAT MSS data was developed. Aerial photographs covering 720 sq km were visually analyzed. Computer classification of LANDSAT MSS data acquired on Sept. 4, 1979 was done using unsupervised and supervised algorithms and classification results were spatially filtered using a post-processing technique. To estimate wheat area, a regression approach was applied using different sample sizes and various sampling units. Based on four decision criteria proposed in this study, it was concluded that: (1) as the size of sampling unit decreased, the percentage of sample area required to obtain similar estimation performance also decreased; (2) the lowest percentage of the area sampled for wheat estimation under established precision and accuracy criteria through regression estimation was 13.09% using 10 sq km as the sampling unit; and (3) wheat area estimation obtained by regression estimation was more precise and accurate than those obtained by direct expansion method. Author

N86-26668# National Environmental Satellite Service, Suitland, Md. Satellite Applications Lab.
CHARACTERISTICS OF WESTERN REGION FLASH FLOOD

EVENTS IN GOES IMAGERY AND CONVENTIONAL DATA
Eric L. Fleming and LeRoy E. Spayd, Jr. Mar. 1986 87 p refs
(NOAA-TM-NESDIS-13) Avail: NTIS HC A05/MF A01

Characteristics of western region convective and extratropical cyclone flash flood events as observed in (VIS and IR) GOES imagery and conventional surface and upper air data are presented. One hundred and thirty-seven convective heavy rainfall events from 1981 to 1983 were examined and categorized into time of year, time of day of maximum precipitation, minimum cloud top temperature at time of maximum precipitation, and type of satellite-observed convective system. Detailed analysis of conventional data for the largest flash flood producing mesoscale convective systems (MCS) yielded four distinct atmospheric patterns at the surface, 700, and 500 mb levels. Twenty-four flash flood events produced by extratropical cyclones from 1981 to 1983 were classified into three main types of satellite observed cloud patterns. These atmospheric composites and satellite observed cloud patterns were designed to aid operational meteorologists in recognizing and forecasting flash flood events in the western region of the United States. M.G.

N86-26669*# Kansas Univ. Center for Research, Inc., Lawrence. Space Technology Center.
RESEARCH ON ENHANCING THE UTILIZATION OF DIGITAL MULTISPECTRAL DATA AND GEOGRAPHIC INFORMATION SYSTEMS IN GLOBAL HABITABILITY STUDIES Final Report, 1985-1986
Edward A. Martinko and James W. Merchant Feb. 1986 60 p
Sponsored in part by the Kansas Fish and Game Commission
(Grant NGL-17-004-024)
(NASA-CR-177294; NAS 1.26:177294) Avail: NTIS HC A04/MF A01 CSCL 05B

The University of Kansas Applied Remote Sensing (KARS) program is engaged in a continuing long term research and development effort designed to reveal and facilitate new applications of remote sensing technology for decision makers in governmental agencies and private firms. Some objectives of the program follows. The development of new modes of analyzing multispectral scanner, aerial camera, thermal scanner, and radar data, singly or in concert in order to more effectively use these systems. Merge data derived from remote sensing with data derived from conventional sources in geographic information systems to facilitate better environmental planning. Stimulation of the application of the products of remote sensing systems to problems of resource management and environmental quality now being addressed in NASA's Global Habitability directive. The application of remote sensing techniques and analysis and geographic information systems technology to the solution of significant concerns of state and local officials and private industry. The guidance, assistance and stimulation of faculty, staff and students in the utilization of information from the Earth Resources Satellite (LANDSAT) and Aircraft Programs of NASA in research, education, and public service activities carried at the University of Kansas. E.R.

N86-26670*# University of South Florida, St. Petersburg. Dept. of Marine Science.
A SIMULATION ANALYSIS OF THE FATE OF PHYTOPLANKTON WITHIN THE MID-ATLANTIC BIGHT
John J. Walsh, Dwight A. Dieterle, and Mark B. Meyers 1986 82 p
(Grant NAGw-678)
(NASA-CR-177265; NAS 1.26:177265) Avail: NTIS HC A04/MF A01 CSCL 08A

A time-dependent, three-dimensional simulation model of wind-induced changes of the circulation field, of light and nutrient regulation of photosynthesis, of vertical mixing as well as algal sinking, and of herbivore grazing stress, is used to analyze the seasonal production, consumption, and transport of the spring bloom within the mid-Atlantic Bight. The particular case (c) of a 58-day period in February-April 1979, simulated primary production, based on both nitrate and recycled nitrogen, with a mean of 0.62 g C sq m/day over the whole model domain, and an export at the shelf-break off Long Island of 2.60 g ch1 sq m/day within the lower third of the water column. About 57% of the carbon fixation was removed by herbivores, with 21% lost as export, either downshelf or offshore to slope waters, after the first 58 days of the spring bloom. Extension of the model for another 22 days of case (c) increased the mean export to 27%, while variation of the model's parameters in 8 other cases led to a range in export from 8% to 38% of the average primary production. Spatial and temporal variations of the simulated algal biomass, left behind in the shelf water column, reproduced chlorophyll fields sensed by satellite, shipboard, and in situ instruments. Author

N86-26671# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
IMPULSE RADAR SOUNDING OF LEVEL FIRST-YEAR SEA ICE FROM AN ICEBREAKER
Carl R. Martinson Nov. 1985 15 p
(AD-A163229; CRREL-SR-85-21) Avail: NTIS HC A02/MF A01 CSCL 08/12

During the weeks of May 1984, a CRREL impulse radar system was used onboard the R V Polarstern to measure the thickness of level first-year sea ice. The purpose was to determine the onboard performance of the radar system and, if possible, provide ice thickness information to researchers conducting other tests. Radar data were compared with ice thickness determined by drilling, indicating that radar soundings could be a viable means of collecting ice thickness information. A lack of adequate coordination between the two measurement methods prevented a point-by-point comparison of ice thicknesses; the comparisons were based on averages for particular test runs. The differences of the averages for the two measuring methods ranged from 0.03 m to 0.22 m with a mean variation in the differences of 0.13 m for eight runs. There may have been some interference from the ship's hull during data collection because of the location of the antenna. However, an unidentified signal in some of the data does not appear to obscure a valid return from the bottom of the ice sheet. Author (GRA)

N86-26672# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
AN ISOSTATIC EARTH MODEL
Hans Suenkel Sep. 1985 59 p refs
(Contract F19628-82-K-0017)
(AD-A164608; OSU/DGSS-367; AFGL-TR-85-0239; SR-10) Avail: NTIS HC A04/MF A01 CSCL 08/5

The concept of the conventional Airy/Heiskanen isostatic model is investigated from scratch, based on the harmonic analysis of the topographic-isostatic potential. First and higher order approximations for those coefficients are discussed and rule of thumb formulas given. The estimated frequency transfer function between the power spectrum of the observed gravitational field and the power spectrum implied by the isostatic model strongly suggests a smoothing of the compensation surface according to Vening Meinesz with a smoothing operator of Gaussian bell-shaped type, and a depth of compensation of about 24 km. A proof of equivalence of using a standard Airy/Heiskanen model with a larger compensation depth and a corresponding Poisson smoothed Vening Meinesz model at a smaller depth has been given for the case of linear approximation, yielding an entirely new interpretation of recent isostatic models. An iterative least-squares process has been designed which provides parameter estimates of that isostatic model in best possible agreement with the observed gravitational potential of the earth. Based on these parameters a set of harmonic coefficients of the topographic-isostatic potential, complete up to degree and order 180 was computed. Several maps of topography-isostasy implied geoidal heights are presented for comparison. GRA

N86-26673# Louisiana State Univ., Baton Rouge. Coastal Ecology Lab.
THE ATCHAFALAYA RIVER DELTA. REPORT 7. ANALYTICAL ANALYSIS OF THE DEVELOPMENT OF THE ATCHAFALAYA RIVER DELTA

Flora C. Wang Sep. 1985 203 p refs
(Contract DACW39-81-C-0004)
(AD-A164931; WES-TR-HL-82-15; Rept-7) Avail: NTIS HC A10/MF A01 CSCL 08/8

The diversion of fresh water and sediments from the Mississippi River to the Atchafalaya River is developing a new delta on the south-central Louisiana coast. The building of this new wetland area has prompted scientific interest in predicting delta evolution. This study reports the analytical prediction of future delta growth based on the theory of turbulent jets that issue from river outlets and discharge into quiescent bays. An integrated form of the hydrodynamics equations of flow continuity and momentum balance, coupled with the advection-diffusion mass transport equation, have been formulated into a two dimensional spatial domain. Closed-form analytical solutions are obtained with the aid of similarity functions for the velocity and sediment concentration profiles. A numerical procedure for estimating the area and volume of deposition of the delta sediments is presented. The results show that the deposited sediment forms a saddle-shaped bottom. Rapid accumulatin of suspended sediment near the river outlet and an abrupt decline of sediment deposition away from the outlet observed. It is concluded that the riverine inflow has a insignificant influence of sediment deposition within a short longitudinal distance, and that beyond that distance the riverine inflow is insignificant. The analytical predictions are compared with the predictions made by other statistical and generic approaches; an agreement is found. Author (GRA)

N86-26674# Institute for Land and Water Management Research, Wageningen (Netherlands). Subfaculteit Wiskunde en Informatica.
A MULTIINDEX MULTITEMPORAL APPROACH TO MAP CROPS IN THE EARLY GROWING SEASON: AN APPLICATION TO TWO ITALIAN IRRIGATION DISTRICTS: EAST SESIA AND GRANDE BONIFIGA FERRARESE
M. Sc. Dott and S. Azzali May 1985 42 p Sponsored by European Economic Commission
(ICW-1611; ESA-86-96955) Avail: NTIS HC A03/MF A01

The feasibility of a method to determine quality, quantity, and type of crops and their water stress by LANDSAT images was tested in two irrigation districts in the Po valley, Italy. In spite of striking misestimates, results are promising, 5 out of 11 crops being detected. However, the uncertain number of yearly available images and lack of reference data to tune the method inhibit the operational development of this tool. It is emphasized that the feasibility of mapping individual crops by means of LANDSAT-MSS data is definitely proven in principle. A semioperational use of such data would provide an opportunity to iron out practical details and assess the amount of needed ancillary and ground-reference data, given the required accuracy of determination. ESA

N86-26675# Geological Survey, Reston, Va. National Mapping Div.
RESEARCH, INVESTIGATIONS AND TECHNICAL DEVELOPMENTS: NATIONAL MAPPING PROGRAM, 1983-1984
R. B. McEwen 1985 134 p
(PB86-166097; USGS-OFR-85-304) Avail: NTIS HC A07/MF A01 CSCL 08B

Subject areas covered are cartography, photogrammetry and surveying, image mapping, remote sensing, land use and land cover mapping, and geographic information systems. The influence of digital cartographic concepts is found throughout and is leading not only to the automation of map making but to the computer analysis of spatial data, the essence of modern geographic information systems. There are several activities of special interest. These include the 1:100,000-scale digital cartographic data base, the LANDSAT Thematic Mapper image map of Great Salt Lake and Vicinity, the successful testing of the Aerial Profiling of Terrain System, several applications of geographic information systems, and publication of the first chapters of the National Gazetteer of the United States. GRA

N86-27168*# Geological Survey, Flagstaff, Ariz.
MAPPING EXPERIMENT WITH SPACE STATION
Sherman S. C. Wu *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p
(For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-26676# Battelle Columbus Labs., Ohio.
PROJECT SUMMARIES: SEVENTH BATTERY AND ELECTROCHEMICAL CONTRACTORS' CONFERENCE
Nov. 1985 128 p ref Conf. held at Crystal City, Va., 18-21 Nov. 1985 Prepared in cooperation with Pacific Northwest Labs., Richland, Wash.
(Contract DE-AC06-76RL-01830)
(DE85-003020; CONF-851146-Summ) Avail: NTIS HC A07/MF A01

The overall goal of the United States' energy policy is to foster an adequate supply of energy at a reasonable cost. This policy recognizes that adequate supply requires flexibility in the energy system, with no reliance on any single source of supply. The Energy Storage Program of the Office of Energy Storage and Distribution is supporting this policy by providing the technology base and exploratory development required for the more effective use of electrochemical technologies, aimed at improved energy flexibility in transportation, electric utility, and industrial applications. This document represents a compilation of seventy-four project summaries of research supported by the US Department of Energy, Energy Storage Program. Sections included in this report are: Sodium Sulfur Research and Development, Flow Battery Research and Development, Advanced Battery Research, Systems Analysis, Performance and Testing, Metal Air Batteries, and Fuel Cells.DOE

N86-26677*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NICKEL-HYDROGEN SEPARATOR DEVELOPMENT
Olga D. Gonzalez-Sanabria 1986 8 p refs Presented at the 21st Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25-29 Aug. 1986; sponsored by the ACS, SAE, ANS, ASME, IEEE, and AICHE
(NASA-TM-87332; E-3076; NAS 1.15:87332) Avail: NTIS HC A02/MF A01 CSCL 10C

The separator technology is a critical element in the nickel-hydrogen (Ni-H2) systems. Previous research and development work carried out at NASA Lewis Research Center has determined that separators made from zirconium oxide (ZrO2) and potassium titanate (PKT) fibers will function satisfactorily in Ni-H2 cells without exhibiting the problems associated with the asbestos separators. These separators and their characteristics were previously discussed. A program was established to transfer the separator technology into a commercial production line. A detailed plan of this program will be presented and the preliminary results will be discussed. Author

N86-26678*# National Aeronautics and Space Administration, Washington, D.C.
SOLAR ENERGY AND THE AERONAUTICS INDUSTRY Thesis
L. Benedek Nov. 1985 74 p refs Transl. into ENGLISH of Argentinian Thesis, 9 Oct. 1985 p 1-82 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.

(Contract NASw-4006)
(NASA-TM-77957; NAS 1.15:77957) Avail: NTIS
HC A04/MF A01 CSCL 10B

An introduction to the physical aspects of solar energy, incidental energy and variations in solar flux is presented, along with an explanation of the physical principles of obtaining solar energy. The history of the application of solar energy to aeronautics, including the Gossamer Penguin and the Solar Challenger is given. Finally, an analysis of the possibilities of using a reaction motor with hybrid propulsion combining solar energy with traditional fuels as well as calculations of the proposed cycle and its mode of operation are given. Author

N86-26679*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE FLAT-PLATE SOLAR ARRAY PROJECT WORKSHOP ON LOW-COST POLYSILICON FOR TERRESTRIAL PHOTOVOLTAIC SOLAR-CELL APPLICATIONS
Feb. 1986 425 p Workshop held in Las Vegas, Nev., 28-30 Oct. 1985
(Contracts NAS7-918; DE-AI01-85CE-89008)
(NASA-CR-176816; JPL-5101-287; DOE/JPL-1012-122; JPL-Publ-86-11; NAS 1.26:176816) Avail: NTIS
HC A18/MF A01 CSCL 10A

Sessions conducted included: polysilicon material requirements; economics; process development in the U.S.; international process development; and polysilicon market and forecasts. Twenty-one papers were presented and discussed. For individual titles, see N86-26680 through N86-26697.

N86-26680*# Westinghouse Research and Development Center, Pittsburgh, Pa.
EFFECTS OF IMPURITIES ON SILICON SOLAR-CELL PERFORMANCE
R. H. Hopkins *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 15-34 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Model analyses indicate that sophisticated solar cell designs (back surface fields, optical reflectors, surface passivation, and double layer antireflective coatings) can produce devices with conversion efficiencies above 20%. To realize this potential, the quality of the silicon from which the cells are made must be improved; and these excellent electrical properties must be maintained during device processing. As the cell efficiency rises, the sensitivity to trace contaminants also increases. For example, the threshold Ti impurity concentraion at which cell performance degrades is more than an order of magnitude lower for an 18% cell than for a 16% cell. Similar behavior occurs for numerous other metal species which introduce deep level traps that stimulate the recombination of photogenerated carriers in silicon. Purification via crystal growth in conjunction with gettering steps to preserve the large diffusion length of the as grown material can lead to the production of devices with efficiencies above 18%, as verified experimentally. Author

N86-26681*# Illinois Univ., Urbana.
REQUIREMENTS FOR HIGH-EFFICIENCY SOLAR CELLS
C. Tang Sah *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 37-52 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Minimum recombination and low injection level are essential for high efficiency. Twenty percent AM1 efficiency requires a dark recombination current density of 2 x 10 to the minus 13th power A/sq cm and a recombination center density of less than 10 to the 10th power /cu cm. Recombination mechanisms at thirteen locations in a conventional single crystalline silicon cell design are reviewed. Three additional recombination locations are described at grain boundaries in polycrystalline cells. Material perfection and fabrication process optimization requirements for high efficiency are outlined. Innovative device designs to reduce recombination in the bulk and interfaces of single crystalline cells and in the grain boundary of polycrystalline cells are reviewed. Author

N86-26682*# Osaka Titanium Co. Ltd., Amagasaki (Japan).
ECONOMICS OF POLYSILICON PROCESS: A VIEW FROM JAPAN
Yasuhiro Shimizu *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 57-78 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

The production process of solar grade silicon (SOG-Si) through trichlorosilane (TCS) was researched in a program sponsored by New Energy Development Organization (NEDO). The NEDO process consists of the following two steps: TCS production from by-product silicon tetrachloride (STC) and SOG-Si formation from TCS using a fluidized bed reactor. Based on the data obtained during the research program, the manufacturing cost of the NEDO process and other polysilicon manufacturing processes were compared. The manufacturing cost was calculated on the basis of 1000 tons/year production. The cost estimate showed that the cost of producing silicon by all of the new processes is less than the cost by the conventional Siemens process. Using a new process, the cost of producing semiconductor grade silicon was found to be virtually the same with any to the TCS, dicloro-silane, and monosilane processes when by-products were recycled. The SOG-Si manufacturing processes using the fluidized bed reactor, which needs further development, shows a greater probability of cost reduction than the filament processes. B.G.

N86-26683*# Lamar Univ., Beaumont, Tex.
ECONOMICS OF POLYSILICON PROCESSES
Carl L. Yaws, K. Y. Li, and S. M. Chou *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 79-121 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Techniques are being developed to provide lower cost polysilicon material for solar cells. Existing technology which normally provides semiconductor industry polysilicon material is undergoing changes and also being used to provide polysilicon material for solar cells. Economics of new and existing technologies are presented for producing polysilicon. The economics are primarily based on the preliminary process design of a plant producing 1,000 metric tons/year of silicon. The polysilicon processes include: Siemen's process (hydrogen reduction of trichlorosilane); Union Carbide process (silane decomposition); and Hemlock Semiconductor process (hydrogen reduction of dichlorosilane). The economics include cost estimates of capital investment and product cost to produce polysilicon via the technology. Sensitivity analysis results are also presented to disclose the effect of major paramentes such as utilities, labor, raw materials and capital investment. Author

N86-26684*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SENSITIVITY ANALYSIS FOR SOLAR PLATES
Robert W. Aster *In its* Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 123-130 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Economic evaluation methods and analyses of emerging photovoltaic (PV) technology since 1976 was prepared. This type of analysis was applied to the silicon research portion of the PV Program in order to determine the importance of this research effort in relationship to the successful development of commercial PV systems. All four generic types of PV that use silicon were addressed: crystal ingots grown either by the Czochralski method or an ingot casting method; ribbons pulled directly from molten silicon; an amorphous silicon thin film; and use of high concentration

lenses. Three technologies were analyzed: the Union Carbide fluidized bed reactor process, the Hemlock process, and the Union Carbide Komatsu process. The major components of each process were assessed in terms of the costs of capital equipment, labor, materials, and utilities. These assessments were encoded as the probabilities assigned by experts for achieving various cost values or production rates. B.G.

N86-26685*# Union Carbide Corp., Washougal, Wash.
DEVELOPMENT OF THE SILANE PROCESS FOR THE PRODUCTION OF LOW-COST POLYSILICON
Sridhar K. Iya *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 135-145 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

It was recognized that the traditional hot rod type deposition process for decomposing silane is energy intensive, and a different approach for converting silane to silicon was chosen. A 1200 metric tons/year capacity commercial plant was constructed in Moses Lake, Washington. A fluidized bed processor was chosen as the most promising technology and several encouraging test runs were conducted. This technology continues to be very promising in producing low cost polysilicon. The Union Carbide silane process and the research development on the fluidized bed silane decomposition are discussed. B.G.

N86-26686*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FLUIDIZED-BED DEVELOPMENT AT JPL
G. Hsu *In its* Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 147-165 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Silicon deposition on silicon seed particles by silane pyrolysis in a fluidized bed reactor (FBR) was investigated as a low cost, high throughput method to produce high purity polysilicon for solar cell applications. The emphasis of the research is fundamental understanding of fluidized bed silicon deposition. The mechanisms involved were modeled as a six-path process: heterogeneous deposition; homogeneous decomposition; coalescence; coagulation; scavenging; and chemical vapor deposition growth on fines. Author

N86-26687*# Washington Univ., St. Louis, Mo.
FLUIDIZED-BED REACTOR MODELING FOR PRODUCTION OF SILICON BY SILANE PYROLYSIS
M. P. Dudukovic, P. A. Ramachandran, and S. Lai *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 167-184 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

An ideal backmixed reactor model (CSTR) and a fluidized bed bubbling reactor model (FBBR) were developed for silane pyrolysis. Silane decomposition is assumed to occur via two pathways: homogeneous decomposition and heterogeneous chemical vapor deposition (CVD). Both models account for homogeneous and heterogeneous silane decomposition, homogeneous nucleation, coagulation and growth by diffusion of fines, scavenging of fines by large particles, elutriation of fines and CVD growth of large seed particles. At present the models do not account for attrition. The preliminary comparison of the model predictions with experimental results shows reasonable agreement. The CSTR model with no adjustable parameter yields a lower bound on fines formed and upper estimate on production rates. The FBBR model overpredicts the formation of fines but could be matched to experimental data by adjusting the unkown jet emulsion exchange efficients. The models clearly indicate that in order to suppress the formation of fines (smoke) good gas-solid contacting in the grid region must be achieved and the formation of the bubbles suppressed. B.G.

N86-26688*# California Inst. of Tech., Pasadena. Engineering and Applied Science Div.
SILICON PRODUCTION IN AN AEROSOL REACTOR
Jin Jwang Wu and Richard C. Flagan *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 187-208 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

An aerosol reactor system was developed in which large particles of silicon can be grown by silane pyrolysis. To grow particles to sizes larger than one micron, vapor deposition must be used to grow a relatively small number of seed particles. Suppression of nucleation is achieved by limiting the rate of gas phase chemical reactions such that the condensible products of the gas phase chemical reactions diffuse to the surface of the seed particles as rapidly as they are produced. This prevents high degrees of supersaturation and runaway nucleation during the growth process. Particles on the order of 10 microns were grown repeatedly with the present aersol reactor. The nucleation controlled aerosol reactor is, therefore, a suitable system for the production of powders that can readily be separated from the gas by aerodynamic means. B.G.

N86-26689*# Osaka Titanium Co. Ltd., Amagasaki (Japan).
PROCESSES AND PROCESS DEVELOPMENT IN JAPAN
Toshio Noda *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 213-231 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

The commercialization of solar power generation necessitates the development of low cost manufacturing method of silicon suitable for solar cells. The manufacturing methods of semiconductor grade silicon (SEG-Si) and the development of solar grade silicon (SOG-Si) in foreign countries was investigated. It was concluded that the most efficient method of developing such materials was the hydrogen reduction process of trichlorosilane (TCS), using a fluidized bed reactor. The low cost reduction of polysilicon requires cost reductions of raw materials, energy, labor, and capital. These conditions were carefully reviewed. The overall conclusion was that a development program should be based on the TCS-FBR process and that the experimental program should be conducted in test facilities capable of producing 10 tons of silicon granules per year. B.G.

N86-26690*# National Tsing Hua Univ., Hsinchu (Taiwan). Dept. of Electrical Engineering.
PROCESSES AND PROCESS DEVELOPMENT
H. L. Hwang *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 233-248 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Silicon material research in the Republic of China (ROC) parallels its development in the electronic industry. A brief outline of the historical development in ROC silicon material research is given. Emphasis is placed on the recent Silane Project managed by the National Science Council, ROC, including project objectives, task forces, and recent accomplishments. An introduction is also given to industrialization of the key technologies developed in this project. Author

N86-26691*# Heliotronic G.m.b.H., Burghausen (West Germany).
REFINING OF METALLURGICAL-GRADE SILICON
J. Dietl *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 251-265 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

A basic requirement of large scale solar cell fabrication is to provide low cost base material. Unconventional refining of metallurical grade silicon represents one of the most promising ways of silicon meltstock processing. The refining concept is based

on an optimized combination of metallurgical treatments. Commercially available crude silicon, in this sequence, requires a first pyrometallurgical step by slagging, or, alternatively, solvent extraction by aluminum. After grinding and leaching, high purity quality is gained as an advanced stage of refinement. To reach solar grade quality a final pyrometallurgical step is needed: liquid-gas extraction. Author

N86-26692*# Siemens A.G., Munich (West Germany).
SOLAR-GRADE SILICON PREPARED BY CARBOTHERMIC REDUCTION OF SILICA
H. A. Aulich, F.-W. Schulze, H.-P. Urbach, and A. Lerchenberger *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 267-275 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

An advanced carbothermic reduction (ACR) process was developed to produce solar grade (SC) silicon from high purity silica and carbon. Preparation of starting materials and operation of the arc furnace to product high purity silicon is described. Solar cells prepared from single crystal SG-Si had efficiencies of up to 12.3% practically identical to cells made from electronic grade silicon. The ACR process is not in the pilot stage for further evaluation. Author

N86-26693*# Elkem A/S, Kristiansand (Norway).
A METALLURGICAL ROUTE TO SOLAR-GRADE SILICON
Anders Schei *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 279-295 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

The aim of the process is to produce silicon for crystallization into ingots that can be sliced to wafers for processing into photovoltaic cells. If the potential purity can be realized, the silicon will also be applicable for ribbon pulling techniques where the purification during crystallization is negligible. The process consists of several steps: selection and purification of raw materials, carbothermic reduction of silica, ladle treatment, casting, crushing, leaching, and melting. The leaching step is crucial for high purity, and the obtainable purity is determined by the solidification before leaching. The most difficult specifications to fulfill are the low contents of boron, phosphorus, and carbon. Boron and phosphorus can be excluded from the raw materials, but the carbothermic reduction will unavoidably saturate the silicon with carbon at high temperature. During cooling carbon will precipitate as silicon carbide crystals, which will be harmful in solar cells. The cost of this solar silicon will depend strongly on the scale of production. It is as yet premature to give exact figures, but with a scale of some thousand tons per year, the cost will only be a few times the cost of ordinary metallurgical silicon. Author

N86-26694*# Pragma S.p.A., Rome (Italy).
SOLAR SILICON FROM DIRECTIONAL SOLIDIFICATION OF MG SILICON PRODUCED VIA THE SILICON CARBIDE ROUTE
M. Rustioni, D. Margadonna, R. Pirazzi (Samim Abrasivi S.p.A., Domodossola, Italy), and S. Pizzini (Milan Univ., Italy) *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 297-321 Sponsored in part by ENEA (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

A process of metallurgical grade (MG) silicon production is presented which appears particularly suitable for photovoltaic (PV) applications. The MG silicon is prepared in a 240 KVA, three electrode submerged arc furnace, starting from high grade quartz and high purity silicon carbide. The silicon smelted from the arc furnace was shown to be sufficiently pure to be directionally solidified to 10 to 15 kg. After grinding and acid leaching, had a material yield larger than 90%. With a MG silicon feedstock containing 3 ppmw B, 290 ppmw Fe, 190 ppmw Ti, and 170 ppmw Al, blended with 50% of off grade electronic grade (EG) silicon to reconduct the boron content to a concentration acceptable for solar cell fabrication, the 99% of deep level impurities were concentrated in the last 5% of the ingot. Quite remarkably this material has OCV values higher than 540 mV and no appreciable shorts due to SiC particles. B.G.

N86-26695*# SRI International Corp., Menlo Park, Calif.
CHARACTERIZATION OF SOLAR-GRADE SILICON PRODUCED BY THE SiF4-Na PROCESS
A. Sanjurjo, K. M. Sancier, R. M. Emerson, S. C. Leach, and J. Minahan (Spectrolab, Inc., Sylmar, Calif.) *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 325-343 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

A process was developed for producing low cost solar grade silicon by the reaction between SiF4 gas and sodium metal. The results of the characterization of the silicon are presented. These results include impurity levels, electronic properties of the silicon after crystal growth, and the performance of solar photovoltaic cells fabricated from wafers of the single crystals. The efficiency of the solar cells fabricated from semiconductor silicon and SiF_4-Na silicon was the same. Author

N86-26696*# Eagle-Picher Industries, Inc., Miami, Okla.
A SILANE-BASED POLYSILICON PROCESS
Paul E. Grayson and James Jaffe (Allied Corp., Morristown, N.J.) *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 347-365 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

A silane based polysilicon process plant was constructed in Miami, Oklahoma. The processes included: the synthesis of crude silane gas, ultrapurification of the gas, and direct pyrolysis to product silicon. Features of the process provided for direct continuous operation from process feed to final product, without the requirement to store intermediates or even convert the silane to a liquid phase. Semiconductor product quality as analyzed internally was demonstrated by the first integrated operation of the plant. B.G.

N86-26697*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SILICON PURIFICATION USING A Cu-Si ALLOY SOURCE
R. C. Powell, P. Tejedor, and J. M. Olson *In* JPL Proceedings of the Flat-Plate Solar Array Project Workshop on Low-Cost Polysilicon for Terrestrial Photovoltaic Solar-Cell Applications Feb. 1986 p 367-377 (For primary document see N86-26679 17-44)
Avail: NTIS HC A18/MF A01 CSCL 10A

Production of 99.9999% pure silicon from 98% pure metallurgical grade (MG) silicon by a vapor transport filtration process (VTP) is described. The VTF process is a cold wall version of an HCl chemical vapor transport technique using a Si:Cu3Si alloy as the silicon source. The concentration, origin, and behavior of the various impurities involved in the process were determined by chemically analyzing alloys of different purity, the slag formed during the alloying process, and the purified silicon. Atomic absorption, emission spectrometry, inductively coupled plasma, spark source mass spectrometry, and secondary ion mass spectroscopy were used for these analyses. The influence of the Cl/H ratio and the deposition temperature on the transport rate was also investigated. Author

N86-26698# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
AN ANALYTICAL METHOD FOR THE DETERMINATION OF SOLAR CELL MODEL PARAMETERS
Ram Kishore Apr. 1986 10 p Submitted for publication (INPE-3852-PRE/916) Avail: NTIS HC A02/MF A01

A method to determine the parameters of an electrotechnical model of the current-voltage characteristics of a solar cell is presented. It is shown that all the parameters can be obtained

analytically from the experimental data by solving a single parameter transcendental equation. Author

N86-26699# Massachusetts Inst. of Tech., Lexington.
LASER-HEATED CVD PROCESS FOR DEPOSITING THIN FILMS FOR LOW-COST SOLAR CELL APPLICATIONS Annual Subcontract Progress Report, 1 Feb. 1984 - 31 May 1985
J. S. Haggerty and D. Adler Nov. 1985 18 p
(Contract DE-AC02-83CH-10093)
(DE85-016887; SERI/STR-211-2831) Avail: NTIS HC A02/MF A01

Significant progress has been made toward using laser-induced chemical vapor deposition (LICVD) of a-Si:H films in photovoltaic (PV) applications. This report describes research in which the investigators accomplished the safety and equipment changes needed for the deposition of doped films; achieved both n- and p-doping by LICVD for the first time; adapted the existing electrical conductivity measurement apparatus to the requirements of doped films; continued investigating the deposition process; characterized the properties of doped and undoped films with an emphasis on properties crucial to the success of the PV project; and fabricated the first solar cells using LICVD material as the intrinsic layer. DOE

N86-26700# Delaware Univ., Newark. Inst. of Energy Conversion.
STABLE, HIGH-EFFICIENCY, CuInSe2 BASED POLYCRYSTALLINE THIN-FILM TANDEM SOLAR CELLS Annual Subcontract Report, 16 Mar. 1984 - 15 Mar. 1985
R. W. Birkmire and J. E. Phillips Nov. 1985 46 p
(Contract DE-AC02-83CH-10093)
(DE85-016893; SERI/STR-211-2804) Avail: NTIS HC A03/MF A01

The goal of this program is a high-efficiency, thin-film tandem solar cell based on CuInSe2. The performance of the (CdZn)S/CuInSe2 component in the tandem has been brought up to an efficiency of well over 10%. Significant improvement in a CdS/CdTe thin-film cell compatible with the tandem design has also been achieved. A number of tandem devices have been made and progress continues on increasing the efficiency of the cells presently being produced. DOE

N86-26701# Ford Aerospace and Communications Corp., Newport Beach, Calif. Aeronutronic Div.
SODIUM-SULFUR BATTERY DEVELOPMENT, PHASE VB Final Report, 1 Oct. 1981 - 28 Feb. 1985
Oct. 1985 106 p
(Contract DE-AT04-79ET-25102)
(DE86-003484; DOE/ET-25102/T1) Avail: NTIS HC A06/MF A01

The program addressed the development of Na/S batteries for stationary energy storage (SES) and electric vehicle (EV) applications, although during Phase VB the EV application was emphasized. Phase VB technical achievements are summarized as follows: cell development, electrolyte development and production, and battery development. DOE

N86-26702# Argonne National Lab., Ill.
TESTING ACTIVITIES AT THE NATIONAL BATTERY TEST LABORATORY
F. Hornstra, W. H. DeLuca, and T. P. Mulcahey 1985 5 p Presented at the Annual Battery and Electrochemical Energy Storage Contractors' Meeting, Washington, D.C., 18 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-004057; CONF-851146-2) Avail: NTIS HC A02/MF A01

The National Battery Test Laboratory (NBTL) is an Argonne National Laboratory facility for testing, evaluating, and studying advanced electric storage batteries. The facility tests batteries developed under Department of Energy programs and from private industry. These include batteries intended for future electric vehicle (EV) propulsion, electric utility load leveling (LL), and solar energy storage. Since becoming operational, the NBTL has evaluated well over 1400 cells (generally in the form of three- to six-cell modules, but up to 140-cell batteries) of various technologies. Performance characterization assessments are conducted under a series of charge/discharge cycles with constant current, constant power, peak power, and computer simulated dynamic load profile conditions. Flexible charging algorithms are provided to accommodate the specific needs of each battery under test. Special studies are conducted to explore and optimize charge procedures, to investigate the impact of unique load demands on battery performance, and to analyze the thermal management requirements of battery systems. DOE

N86-26703# Sandia National Labs., Albuquerque, N. Mex.
STATUS OF ELECTRIC VEHICLE BATTERY DEVELOPMENT AND MANUFACTURING ACTIVITIES OUTSIDE OF THE UNITED STATES
J. H. Swisher Dec. 1985 70 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004215; DOE/RL-01830/T40) Avail: NTIS HC A03/MF A01

A study was conducted to summarize and analyze current activities outside of the United States in battery technology for electric vehicles. Emphasis was placed on batteries which are either commercially available now or may be fully developed within the next ten years. The battery systems of greatest interest currently are sodium/sulfur, nickel/iron, zinc/bromine, and advanced lead/acid. The countries with the largest programs are England, Japan, and the Federal Republic of Germany. Performance and cost goals for each system do not vary significantly from one country to another, with the possible exception of the Soviet Union. The number of joint ventures and consortia that have formed in recent years has increased, and international cooperation is now an important feature of current activities in battery technology. US Executive Branch policy is now very supportive of joint ventures. For this and other reasons, organizations in the United States could benefit from increased involvement in cooperative international activities. DOE

N86-26704# Sandia National Labs., Albuquerque, N. Mex.
UPDATE ON THE STRUCTURAL DESIGN OF THE SANDIA 34-M VERTICAL AXIS WIND TURBINE
D. F. Berg and T. D. Ashwill 1986 8 p Presented at the 5th ASME Wind Energy Symposium
(Contract DE-AC04-76DP-00789)
(DE86-004217; SAND-85-2534C; CONF-860218-1) Avail: NTIS HC A02/MF A01

Sandia National Laboratories, as lead Department of Energy (DOE) laboratory for Vertical Axis Wind Turbine (VWAT) technology development in the USA, has been funded by the Wind/Oceans Technologies Division of the DOE to design and build a 34-M research-oriented VAWT. The machine will incorporate step-tapered blades with natural laminar flow blade sections, and will be capable of operating as either a constant rpm or a continuously-variable rpm machine. Design changes in the last year have reduced the predicted blade flatwise mean stresses by 56% and have reduced the rotor weight by 10,400 kg (23,000 lbs.). Flutter and aeroelastic damping analyses have been completed, instrumentation defined, and initial testing plans developed. The long lead time components of the turbine have been ordered, with deliveries to start in March, 1986. First turn of the turbine is planned for October, 1986. DOE

N86-26705# Department of Energy, Morgantown, W. Va. Energy Technology Center.
PROCEEDINGS OF THE SECOND ANNUAL HEAT ENGINES CONTRACTORS MEETING
Aug. 1985 381 p Meeting held in Morgantown, W. Va., 29 Apr. - 1 May 1985
(Contract DE-AC21-85MC-21353)
(DE85-008595; DOE/METC-85-6023; CONF-850429) Avail: NTIS HC A17/MF A01

The Second Annual Heat Engines Contractors Meeting was held April 29 through May 1, 1985, at the Sheraton Lakeview

Resort and Conference Center in Morgantown, West Virginia and was sponsored and hosted by the US Department of Energy (DOE), Office of Fossil Energy, Morgantown Energy Technology Center (METC). The annual meeting provided a forum for the exchange of information between DOE contractors and interested parties, and this year's meeting was attended by 220 individuals from industry, academia, national laboratories, and other governmental agencies. The proceedings have been reproduced from camera-ready manuscripts furnished by the authors. These papers have not been extensively edited. Most of them deal with gas turbines, diesel engines, fuel slurries, and pulverized fuels for these. The latter requires special coal preparation to get low ash fuels. Twenty-eight papers have been entered individually into EDB and ERA. DOE

N86-26706# Rockwell International Corp., Canoga Park, Calif.
HIGH TEMPERATURE MOLTEN SALT STORAGE Final Subcontract Report
J. Ives, J. C. Newcomb, and A. G. Pard Oct. 1985 95 p
(Contract DE-AC02-83CH-10093)
(DE85-016874; SERI/STR-231-2836) Avail: NTIS
HC A05/MF A01

The design of a high-temperature molten salt thermal energy storage (TES) concept, including some materials testing, was developed by Rockwell International's Rocketdyne Division (RD), under contract to SERI, and is described in this document. The main features of the concept are a conical hot tank with a liner and internal insulation that allows unrestricted relative thermal expansion and the use of cathodic protection (impressed voltage) to inhibit corrosion. The RD design uses two tanks and ternary eutectic lithium-sodium-potassium carbonates for sensible heat storage. The tanks were sized for 6 h of storage at a discharge rate of 300 MW, giving 1800 MWh total usable thermal storage capacity. The molten carbonate storage medium is cycled between 425 and 900C. From the design study, no definitive statement can be made as to the cost-effectiveness of cathodic protection. Several anode design issues need to be resolved before cathodic protection can significantly reduce corrosion where the liner comes in contact with molten salts. However, where the tank is exposed to salt vapor, the large corrosion allowance required for the liner without cathodic protection results in a much thicker liner wall and shorter liner life than originally perceived, which affects system costs significantly. DOE

N86-26707# Spire Corp., Bedford, Mass.
RESEARCH ON HIGH-EFFICIENCY, STACKED, MULTIJUNCTION, AMORPHOUS SILICON ALLOY THIN-FILM SOLAR CELLS Semiannual Subcontract Progress Report, 1 Oct. 1983 - 15 May 1985
V. Dalal Nov. 1985 59 p
(Contract DE-AC02-83CH-10093)
(DE85-016875; SERI/STR-211-2845) Avail: NTIS
HC A04/MF A01

This technical progress report to the Solar Energy Research Institute covers work on high-efficiency, stacked, multijunction amorphous silicon alloy thin-film solar cells. Material growth was begun in a multisector reactor. The a-Si:H films grown in this reactor were very high quality, as shown in their high ratio of photo-to-dark conductivity and very low dark conductivity. High-band-gap a-Si:H films were achieved by using H etching of films during growth. H2 dilution in the plasma led to a sharpening of the valence band tail in both a-Si:H and a-(Si,Ge):H films. No SiH2 bonds were observed after Ge was added to the a-Si:H. Experiments were begun to develop a two-level, stable back contact to a-Si:H. Preliminary results indicate that a Cr/Pd contact may be stable and moderately reflecting, but the best reflection was obtained with Ag. Mo appears to be a suitable, stable contact to SnO2. A critical parameter in achieving 8.5% efficient a-Si:H devices was plasma-cleaning between deposition of the p- and i-layers. 6.5% efficient a-(Si,Ge):H devices were also grown. Two types of tandem cells were fabricated. DOE

N86-26708# Midwest Research Inst., Golden, Colo.
SOLAR ENERGY COMPUTER MODELS DIRECTORY
Aug. 1985 137 p
(Contract DE-AC02-83CH-10093)
(DE85-008791; SERI/SP-271-2589) Avail: NTIS
HC A07/MF A01

This directory describes models developed and available in the US for six solar and renewable energy technologies. These technologies are: biomass; solar heating, cooling, and conservation; ocean energy; photovoltaics; solar thermal; and wind. DOE

N86-26709# Sandia National Labs., Livermore, Calif.
NUMERICAL MODELING OF A SOLID PARTICLE SOLAR CENTRAL RECEIVER
G. H. Evans, W. G. Houf, R. Greif, and C. Crowe Dec. 1985 63 p Prepared in cooperation with California Univ., Berkeley and Washington State Univ., Pullman
(Contract DE-AC04-76DR-00789)
(DE86-005066; SAND-85-8249) Avail: NTIS HC A04/MF A01

The flow of air and particles and the heat transfer inside a solar heated, open cavity containing a falling cloud of 100 to 1000 micron solid particles have been studied. Two-way momentum and thermal coupling between the particles and the air is included in the analysis along with the effects of radiative transport within the particle cloud, among the cavity surfaces, and between the cloud and the surfaces. The flow field is assumed to be two dimensional with steady mean quantities. The PSI-Cell (Particle Source In cell) computer code is used to describe the gas-particle interaction. The method of discrete ordinates is used to obtain the radiative transfer within the cloud. The results include the velocity and temperature profiles of the particles and the air. In addition, the thermal performance of the solid particle solar receiver has been determined as a function of the following particle parameters: size, mass flow rate, absorptivity, and infrared scattering albedo. Other parameters which have been varied include the incident solar flux (both magnitude and distribution) and receiver size. A forced flow, applied across the cavity aperture, has also been investigated as a means of decreasing convective heat loss from the cavity. Comparison of the results from the model has been made with an experiment performed at the radiant heat facility in Albuquerque. The model has also been used to predict the entrainment of air and the decrease in particle drag which has been observed when measurements were made of particle velocity in a cloud of particles in free fall. DOE

N86-26710# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany). Inst. of Sound and Vibration Research.
ADVANCED HEATING FACILITIES. DEVELOPMENT OF DEMONSTRATION MODELS Final Report
J. Schawer, comp., O. Brost, comp. (Stuttgart Univ., West Germany), G. Biersch, S. Ranke (Leybold-Heraeus G.m.b.H., Hanau/Main, West Germany), and R. Becker (Johann-Wolfgang-Goethe-Univ., Frankfurt am Main, West Germany) Paris ESA Aug. 1985 158 p Presented at EC-5 Intern. Workshop on Electron Cyclotron Emission and Electron Cyclotron Heating and Gyrotron User/Developer Meeting, San Diego, Calif., 9-12 Nov. 1985
(ERNO-671-AHF/2; ESA-CR(P)-2156; ESA-86-96858) Avail: NTIS
HC A08/MF A01

Electron beam and heat pipe technique furnaces for space-borne microgravity experiments were assessed. Testing of demonstration model furnaces clearly shows the advantages of the heat pipe principle for an isothermal furnace. Isothermality of the whole furnace working space can be provided without additional heaters for compensation of the working space end heat losses. Temperature stability during long-time furnace operation can be achieved by using a variable conductance heat pipe (VCHP) with gas pressure feedback-control. The VCHP principle with gas pressure measurement provides a viable method to improve the temperature measurement accuracy, for absolute temperature measurement, and provides long-time accuracy of the temperature measurement. The furnace can be operated at least in a temperature range of 900 to 1500 C. ESA

N86-26711# AEG-Telefunken, Wedel (West Germany).
GROWTH CAPABILITIES OF EUROPEAN RETRACTABLE SOLAR ARRAYS Final Report
G. Behrens Paris, France ESA Jun. 1985 89 p
(Contract ESTEC-5554/83-NL-PB(SC))
(ESA-CR(P)-2141; ESA-86-96870) Avail: NTIS HC A05/MF A01

The growth capabilities of the Advanced Rigid Array, Rigid Solar Generator, L-Sat solar array, SOLA solar array, Space Telescope solar array, and the Ultralight Panel array were assessed. Capabilities of up to 18kW are needed for the NASA manned space station. The assessment shows that each of the arrays can reach the required power range, but without taking economic factors into account, and given that only the existing application was considered, it is not possible to recommend any particular concept. ESA

N86-26712# National Bureau of Standards, Gaithersburg, Md. Building Equipment Div.
MODELING OF A HEAT PUMP CHARGED WITH A NON-AZEOTROPIC REFRIGERANT MIXTURE Final Report
P. Domanski Jan. 1986 396 p Sponsored by EPRI
(PB86-168267; NBS-TN-1218) Avail: NTIS HC A17/MF A01; also available SOD HC $18.00 as SN003-003-02716-2 CSCL 13A

An analysis of the vapor compression cycle and the main components of an air-to-air heat pump charged with a binary non-azeotropic mixture has been performed for steady-state operation. The general heat pump simulation model HPBI has been formulated which is based on independent, analytical models of system components and the logic linking them together. The logic of the program requires an iterative solution of refrigerant pressure and enthalpy balances, and refrigerant mixture and individual mixture component mass inventories. The modeling effort emphasis was on the local thermodynamic phenomena which were described by fundamental heat transfer equations and equation of state relationships among material properties. In the compressor model several refrigerant locations were identified and the processes taking place between these locations accounted for all significant heat and pressure losses. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-26713# Argonne National Lab., Ill.
BIOCHEMICAL TRANSFORMATIONS IN TWO PLANT/SOIL SYSTEMS EXPOSED TO SIMULATED ACIDIC PRECIPITATION
P. M. Irving 1985 24 p Presented at the 7th International Symposium on Environmental Biochemistry, Rome, Italy
(Contract W-31-109-eng-38)
(DE86-004040; CONF-8509211-1) Avail: NTIS HC A02/MF A01

We were interested in determining how normal deposition rates of acidic rain affect the cycling of nutrients in two minimally managed perennial forage-soil systems. The objectives of our research were to quantify the impacts of acidic rain on the plant-soil system, through process-oriented studies of the soil biota, and through examination of the relationships between soil and plants. Our approach was to measure biogeochemical interactions within two sensitive model ecosystems exposed to different doses of simulated acidic rain during a two-year period. The results presented here are a summary of some of the highlights of our investigations. Although the complete picture of ecosystem reponse cannot be reported here, we include a selection of information on treatment effects ranging from chemical and biological processes to population and production dynamics. DOE

N86-26714# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
A MICROCOMPUTER POLLUTION MODEL FOR CIVILIAN AIRPORTS AND AIR FORCE BASES
H. M. Segal, J. K. Kemp, and P. L. Hamilton Dec. 1985 55 p
(AD-A163232; FAA-EE-85-4; AFESC/ESL-TR-85-41) Avail: NTIS HC A04/MF A01 CSCL 09/2

Over the past five years, the Federal Aviation Administration and the United States Air Force have developed a number of user-friendly emissions and dispersion models for air quality assessment purposes. The first, Simplex A was completed in July 1981. The second, called Emissions and Dispersion Modeling System (EDMS), has just been completed and this report constitutes its User's Guide. First, this User's Guide shows how the EDMS system evolved from the earlier, more complex AVAP and AQAM systems. Then, it identifies the hardware and software required to run the system and provides instructions on how to add, delete or change standard information. Finally, through a 125-step example problem, it instructs the user on how to input and process data to produce: (1) an emissions inventory of all sources at an airport/airbase, and (2) an estimate of the concentrations of these sources at specified locations. An inexperienced user should be able to process the example problem in less than three hours. Author (GRA)

N86-26715# Air Force Engineering and Services Center, Tyndall AFB, Fla. Engineering and Services Lab.
AIRCRAFT ENGINE EMISSIONS ESTIMATOR Final Report, Jan. 1983 - Sep. 1985
Glenn D. Seitchek Nov. 1985 101 p refs
(AD-A164552; AFESC/ESL-TR-85-14) Avail: NTIS HC A06/MF A01 CSCL 21/5

The objective of this effort is to revise the Aircraft Emission Estimation Techniques (ACEE) Handbook to reflect changes in the Air Force aircraft inventory that have occurred since 1975. A complete listing of current Air Force aircraft and their associated engines is included. Emission factors for most of these engines are provided, along with examples for calculating emissions from aircraft operations, and analyzing their impact. This report supersedes CEEDO-TR-78-33, Aircraft Emission Estimation Techniques (ACEE). Author (GRA)

N86-26716# Coast Guard, Washington, D.C.
A REVIEW OF METHODS TO TRACK OIL IN ARCTIC WATERS Final Report
Joseph W. St.Martin Jun. 1985 25 p refs
(AD-A164679; USCG-D-28-85) Avail: NTIS HC A02/MF A01 CSCL 13/2

A review of available literature on the tracking of oil in Arctic environments was conducted. The effectiveness of satellite and aircraft mounted detection devices used in locating oil-on-water, ice or in an ice/water mixture was examined. Oil spill tracking buoys and devices, both micro and macro scale, were also reviewed with their applicability to the Arctic environment detailed. Recommendations were made for the U.S. Coast Guard to use ARGOS system buoys on Arctic oil spills for long term tracking of movement. An additional recommendation was made for the future testing of the HU-25A mounted AIREYE surveillance system or an HC-130 mounted sensor package on oil spilled in an Arctic environment. Author (GRA)

N86-26717# Corps of Engineers, Davis, Calif. Hydrologic Engineering Center.
HEC-5Q: SYSTEM WATER QUALITY MODELING
R. G. Willey Jan. 1986 23 p
(AD-A164832; HEC-TP-111) Avail: NTIS HC A02/MF A01 CSCL 13/2

Several state-of-the art models are available for analyzing water quality conditions in complex reservoir systems for a given set of operational conditions. Some of these models can even make operational decisions regarding proper gate regulations to obtain a desirable water quality condition at a dam site for a given set of flow conditions. HEC-5Q, Simulation of Flood Control and Conservation Systems (including Water Quality Analysis) computer model, has the unique capabilities to accept user-specified water quantity and quality needs system-wide and to decide how to regulate the network of reservoirs. The decision criteria are programmed to consider flood control, hydropower, instream flow

(municipal, industrial, irrigation, water supply, fish habitat) and water quality requirements. The HEC-5Q program was first applied to the Sacramento River System in California and a report was published in July 1985. Two other applications are in progress in the Kanawha and Monongahela River systems, and are expected to be completed by September 1986. GRA

N86-26718# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
GAS EXCHANGE BETWEEN THE FOREST AND THE ATMOSPHERE
C. E. Murphy, Jr. 1985 36 p Presented at the Department of Energy (DOE) Meterology Workshop, Lake Placid, N.Y., 1 Oct. 1985
(Contract DE-AC09-76SR-00001)
(DE86-004624; DP-MS-85-116; CONF-8510250-1) Avail: NTIS HC A03/MF A01

Forest gas exchange is discussed in terms of the processes that control the rate of exchange with the atmosphere. Examples are presented to show how vegetative uptake control is varied for gases with different characteristics. The prediction of uptake for large areas and over long periods of time is discussed in terms of quantitative models of the gas exchange processes. Finally, remote sensing is suggested as a means of obtaining the parameters needed to make the model predictions. DOE

N86-26719# Kema N.V., Arnhem (Netherlands). Dept. of Chemical Research.
SELECTIVE CATALYTIC REMOVAL OF NO FROM STATIONARY SOURCES
F. J. J. G. Janssen, F. M. G. vandenKerkhof, and A. J. vanLoon, ed. 1985 19 p
(S/T-Rept-Vol-3-No-6; B8574251; ISBN-90-353-0029-7; ISSN-0167-8590; ESA-86-96945) Avail: NTIS HC A02/MF A01

Research on selective catalytic removal of nitric oxide with ammonia to develop catalysts for use under conditions likely to produce flue gases was surveyed. The activity and selectivity of supported vanadium, tungsten, and iron oxide catalysts were studied in a plug-flow and a mixed-flow reactor on a laboratory scale between 370 and 670 K. The effects of the NO/NH3 ratio, space-velocity and oxygen on the reduction reactions, and effects of catalysts on ammonia and sulfur dioxide oxidation were investigated. The catalysts were characterized by conventional techniques. All the catalysts showed relatively high NO conversion. Data show that the NO/NH3 reaction in the presence of oxygen below 575 K is according to the formula 4 NO + 4 NH3 + O2 yields 4N2 + 6 H2O. Selectivity decreases above 625 K because of NH3 oxidation. The rate of the NO/NH3 reaction on the catalysts under dilute gas conditions is markedly increased by the addition of 1% oxygen. ESA

N86-26720# Environmental Protection Agency, Washington, D.C. Criteria and Standards Div.
NONPOINT SOURCE POLLUTION: INFORMATION GUIDE Final Report, Jan. 1983 - Aug. 1985
P. E. Shelley Aug. 1985 245 p
(PB86-130275) Avail: NTIS HC A11/MF A01 CSCL 13B

Identified are eight Federal agencies, and several sub-units within each of them, involved in environmental impacts of nonpoint source pollution. Complete mail addresses and telephone numbers are included for each organizational unit, along with a brief description of the specific area of concern. This resource will be of value in directing specific questions on nonpoint source pollution to the appropriate agency. GRA

N86-26721# Maryland Univ., College Park. Water Resources Research Center.
MARYLAND WATER RESOURCES RESEARCH CENTER, FISCAL YEAR 1984 PROGRAM REPORT
Sep. 1985 28 p Sponsored in part by the Geological Survey, Reston, Va.
(Grant DI-14-08-0001-G-911)
(PB86-133253; USGS-G-911-01) Avail: NTIS HC A03/MF A01 CSCL 13B

Within the framework of the 1984 Program of the Maryland Water Resources Research Center, three projects were focused on questions of pollution of surface and ground water and one on acid rain. An information transfer project focused on the protection of ground water supplies. In a project to assess nitrogen and phosphorus losses via subsurface ground water flow from conventional and no-till corn watersheds, evidence was obtained that the leaching of nitrates into percolate or ground water is not enhanced by the use of no-till cultivation. No phosphate was found in percolate samples from either no-till or conventional cultivation treatments. A two-year study has been conducted to assess the accumulation of toxic metals in the sediments of Maryland's Eastern Shore rivers. In a project to determine the impact on human health of contaminants present in sludge applied as soil amendment, ground and surface water have been analyzed for mutagenic compounds. Preliminary information on acidity in rainfall indicates increased levels of H(+), SO4(2-), Pb, and Mn over a control area in Tennessee. GRA

N86-26722# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
USER-FRIENDLY SCREENING MODEL FOR POINT-SOURCE IMPACT ASSESSMENT
D. B. Turner Apr. 1986 19 p
(PB86-176369; EPA-600/D086-062) Avail: NTIS HC A02/MF A01 CSCL 04A

A user friendly air quality simulation screening model coded in FORTRAN is described and sample use is shown for point source impact assessment. The model was developed and tested on a personal computer and can be run interactively on a mainframe. Any of five dispersion techniques: (1) wind fluctuations, (2) Briggs urban, (3) Briggs rural, (4) Pasquill-Gifford, or (5) Brookhaven can be used. Plume rise can be calculated either by Briggs 1975 techniques, currently included in models used for regulatory purposes, or by techniques which calculate plume rise layer-by-layer and consider partial penetration. Maximum ground level concentration downwind or concentrations at specific locations can be estimated. Receptor locations can be specified in four ways: (1) specific downwind distance, (2) downwind and crosswind location, (3) distance and azimuth from the source, or (4) Cartesian coordinates of both source and receptor. The model provides ground level estimates for a single stack or ground level source. GRA

N86-26723 Colorado Univ., Boulder.
A STUDY OF THE UNSTEADY AERODYNAMIC FORCES GENERATED BY A DEFORMING JOUKOWSKI AIRFOIL Ph.D. Thesis
John Hugh Russell 1985 150 p
Avail: Univ. Microfilms DA8528520

An analytic study is performed in order to determine the aerodynamic forces that arise from the prescribed deformations of a Joukowski airfoil. The fluid medium is assumed to be an incompressible, potential flow and the superposition principle is used to build the entire flow field. Unsteadiness enters the analysis only through the time dependent body deformations and through the action of the trailing wake. The analysis proceeds in order of increasing difficulty through the construction of the computational model to its application on the general Joukowski airfoil. In all instances evaluated, a degree of unsteady lift enhancement or decrement was observed, depending upon the particular deformation and deformation rate. The study also makes use of a special form of the Blasius Theorem in order to facilitate determination of the aerodynamic forces in a moving reference frame. The unsteady forces are determined by means of a computer code that calculates the time history of the lift and drag arising from the airfoil deformations. The code also computes the effects that the deforming airfoil and the wake have upon each other. Dissert. Abstr.

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-26724*# Smithsonian Astrophysical Observatory, Cambridge, Mass.

DETERMINATION OF BAND OSCILLATOR STRENGTHS OF ATMOSPHERIC MOLECULES FROM HIGH RESOLUTION VACUUM ULTRAVIOLET CROSS SECTION MEASUREMENTS

Semiannual Status Report, 1 Nov. 1985 - 30 Apr. 1986

W. H. Parkinson May 1986 69 p refs

(Grant NAG5-484)

(NASA-CR-177293; NAS 1.26:177293; SASR-3) Avail: NTIS HC A04/MF A01 CSCL 04A

An account is given of progress in work on (1) the determination of band oscillator strengths of the Schumann-Runge absorption bands of (16)O2 and (18)O2 from cross section measurements conducted at 79 K; (2) the determination of the absolute absorption cross section of the Schumann-Runge bands of (16)O(18)O from optical depth measurements performed on mixtures of (16)O2, (18)O2 and (16)O(18)O at 79K; and (3) the influence of Schumann-Runge linewing contributions on the determination of the Herzberg continuum absorption cross section of (16)O2 in the wavelength region 194 to 204 nm. The experimental investigations are effected at high resolution with a 6.65 m scanning spectrometer which is, by virtue of its small instrumental width (EWHM = 0.0013 nm), uniquely suitable for cross section measurements of molecular bands with discrete rotational structure. Absolute cross sections, which are independent of the instrumental function and from which band oscillator strengths are directly determined, are measurod for the absorption bands that are most predissociated. Such measurements are needed for (1) accurate calculations of the stratospheric production of atomic oxygen and heavy ozone formed following the photopredissociation of (18)O(16)O by solar radiation penetrating between the absorption lines of (16)O2; (2) elucidation of the mechanism of predissociation of the upper state of the Schumann-Runge bands; and (3) determination of the true shape of the Herzberg continuum cross section. Author

N86-26725*# International Council of Scientific Unions, Urbana, Ill.

MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP, VOLUME 19

Richard A. Goldberg, ed. (National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.) Mar. 1986 210 p

(NASA Order W-15897)

(NASA-CR-176800; NAS 1.26:176800; MAP-HANDBOOK-19) Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

This MAP handbook is concerned with rocket techniques and instrumentation as they are currently employed in the middle atmosphere. It is composed of nine chapters, written by experts on rocket experiments. The emphasis is on measurement techniques rather than results, although results are incorporated wherever they provide examples which illustrate the measurement features. The chapters first cover techniques relating to measurements of neutral dynamics and chemistry, then measurements of the various intermittent and excessive radiation sources which effect the middle atmospheric environment, and finally measurements of the plasma environment including electric fields. The weighting toward plasma related parameters is not accidental, but reflects both the historical headstart given by early development of radio wave and probe techniques to measure electron density, and by the relatively limited number of techniques available for neutral atmospheric measurements. For individual titles, see N86-26726 through N86-26734.

N86-26726*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.

ROCKET TECHNIQUES USED TO MEASURE THE NEUTRAL ATMOSPHERE

F. J. Schmidlin *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 28 p (For primary document see N86-26725 17-46)

Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

One important facet of middle atmosphere studies is the role of direct measurements provided by rocket systems. These systems range in size from the small meteorological rocketsonde capable of providing temperature and wind data to the larger sounding rocket designed to carry much larger payloads. The more common methods of rocket meteorological measurements used today are discussed, some of which were first deployed over 25 years ago. The major emphasis is given to that system which produces the most measurements (the small meteorological rocket), the types of sensors, the role and applicability of coordinated launchings such as obtained from the Meteorological Rocket Networks, and, the data quality and uses. The large sounding rockets produce similar data but, because of the cost and complexity involved in launching these bigger vehicles, fewer data are obtained. This does not, however, detract from the value of such data. The observational virtue of rocket data is its vertical height resolution which added new information on the atmospheric structure in mesoscale and, possibly, microscale dimensions. Rocket exploration of the atmosphere has changed the popular notion that the middle and upper atmosphere is a static, quiet area, to the realization that this region is highly active and dynamic. Author

N86-26727*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ROCKET TECHNIQUES FOR MEASUREMENT OF OZONE AND RELATED NEUTRAL MINOR CONSTITUENTS

A. J. Krueger *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 27 p (For primary document see N86-26725 17-46)

Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Rockets are the only vehicles for direct measurement of the neutral composition of the stratosphere and mesosphere above balloon altitudes (35 to 40 km). Instrumentation was developed for routine measurements of ozone using either UV absorption, chemiluminescence, or airglow techniques, and for nitric oxide using chemiluminescence. Other species which were measured are nitrogen dioxide, water vapor, hydroxyl, and atomic oxygen. Ozone was measured about 400 times, nitric oxide about 10 times, and the remaining species only one or two times. Author

N86-26728*# Denver Univ., Colo. Dept. of Physics.

MEASUREMENTS OF X-RAY ENERGY DEPOSITION IN THE MIDDLE ATMOSPHERE

J. R. Barcus *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 32 p (For primary document see N86-26725 17-46)

Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Rocket techniques as applied to measurements in the middle atmosphere of X-rays in the 5 to 100 keV range are presented. Different types of detectors and payloads are compared in regard to their capabilities and limitations. Assessment of the energy deposition by X-rays is examined by methods involving in situ measurements and/or model-dependent calculations. Recent results illustrate the role of X-rays as an important source of ionization in the middle atmosphere at all latitudes, with the greatest range of effects taking place at high magnetic latitudes. Author

N86-26729*# Bergen Univ. (Norway). Dept. of Physics.
DETECTORS FOR MEASURING ENERGETIC CHARGED PARTICLES IN ROCKETS
F. Soraas *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 14 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The physical principles of electron and ion detection are discussed. A detector model is developed and different charged particle detectors are surveyed. It is shown how the energy and pitch angle distribution of the energetic particles can be measured. Examples of rocket instruments for charge particle measurement are shown. Author

N86-26730*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
REVIEW OF ROCKET-BORNE ION MASS SPECTROMETRY IN THE MIDDLE ATMOSPHERE
F. Arnold and A. A. Viggiano *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 36 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Experimental methods employed in middle atmosphere rocket-borne ion mass spectrometry are reviewed with an emphasis on recent developments. Interest is also focussed on milestones in instrumental developments and related progress in the exploration of the middle atmosphere ionized component. Attention is also drawn to interesting applications of in situ ion composition measurements in the middle atmosphere, particularly the detection of neutral trace gases and microaerosols using passive chemical ionization mass spectrometry. Finally, future trends in rocket-borne ion mass spectrometry are assessed. Author

N86-26731*# Norwegian Defence Research Establishment, Kjeller.
DC-PROBE MEASUREMENTS IN THE MIDDLE ATMOSPHERE
E. V. Thrane *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 17 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Rocket-borne dc probes were used extensively to study the weakly ionized plasma in the lower ionosphere and upper stratosphere. Although based upon the same basic principle, the probes were used in many different forms to measure both ion and electron densities, as well as electron temperature, and in some cases, ion composition. In recent years, probes have been used successfully to study turbulence in the middle atmosphere. The most important electrostatic probe techniques are reviewed and the accuracy and sensitivity of the different instruments are discussed and illustrated with sample measurements. The theory for the collection of ions or electrons by means of such probes in a collision-dominated regime is complex and not well developed. Some of the theoretical difficulties are pointed out briefly. Author

N86-26732*# Pennsylvania Transportation Inst., University Park. Communications and Space Science Lab.
ROCKET PROBE TECHNIQUES FOR MEASURING BULK ION PROPERTIES
J. D. Mitchell *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 18 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

An overview of rocket probe techniques for measuring middle atmosphere ion properties is presented. The measured parameters include conductivity, ion mobility and number density, all of which characterize the region's electrical structure. Particular consideration is given to the Gerdien condenser because of its capability to measure all three of these ion quantities. This probe was adapted for flight operation while either attached to a rocket or, more often, descending on a parachute. The use of a parachute potentially enhances the probe's measurement capabilities and also it lessens detrimental flow effects on ion collection. From the brief presentation of measurement results, it is demonstrated that a variety of presently flown probe systems, both supersonic and subsonic, show general consistency in measuring conductivity; and, in fact, they occasionally have been combined to enhance overall investigations. Also, it is observed that electrical conductivity is the most variable of the three parameters, having a strong dependence on temperature, solar conditions, and local ionization sources. Author

N86-26733*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
ELECTRON DENSITY MEASUREMENTS IN THE MIDDLE ATMOSPHERE BY RADIO PROPAGATION TECHNIQUES
L. G. Smith *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 15 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Radio propagation between a ground-based transmitter and a rocket-borne receiver provides a useful method of obtaining the electron density structure of the middle atmosphere. The basis of the experiment is contained in magnetoionic theory. The implementation of the experiment takes the form of Faraday rotation and differential absorption; the two techniques are often combined into a single system. Author

N86-26734*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MEASUREMENT TECHNIQUES FOR MIDDLE ATMOSPHERE ELECTRIC FIELDS
N. C. Maynard *In* International Council of Scientific Unions Handbook for MAP, Vol. 19 Mar. 1986 15 p (For primary document see N86-26725 17-46)
Avail: NTIS HC A10/MF A01; also available from SCOSTEP Secretariat, University of Illinois, 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Both the difficulty of access to the region and the difficulty of measurement techniques has caused the middle atmosphere to be one of the last near Earth regions to be explored electrodynamically. Recent improvements in measurement techniques spurred by the apparent discovery of large V/m electric fields have resulted in new thrusts into this previously neglected field. Both double probe techniques and field mills were adapted for middle atmosphere measurements. A brief description of each technique is given along with some of the pitfalls and difficulties associated with middle atmosphere electric field measurements. Measurement of mV/m level electric fields is now possible in the D region. The detection of V/m level fields in the lower ionosphere remains controversial; however, increasing evidence is accumulating for their existence. Author

N86-26735*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
KINEMATICS, COMPOSITION AND THERMODYNAMICS OF THE MESOPAUSE, TURBOPAUSE, REGION OF THE ATMOSPHERE (BETWEEN 80 AND 120 KM) RELATED TO THE AEROASSISTED ORBIT TRANSFER VEHICLE (AOTV) OPERATIONS
Michael Susko Apr. 1986 21 p refs
(NASA-TM-86545; NAS 1.15:86545) Avail: NTIS HC A02/MF A01 CSCL 04A

The mesopause-turbopause region (80 to 120 km) of the atmosphere which is frequently used as a boundary between the thermosphere and mesosphere for models of the atmosphere is discussed. The initialization of models is important since uncertainties may lead to significant changes in the computations of total

density at greater altitudes. In this transition region, the experimental data base for the total gas density and the constituents of smaller abundance is very limited. The turbopause height (h sub t) may vary from 90 to 120 km and no pronounced dependence of (h sub t) on season, local time, or solar activity is determined. The importance of atmospheric turbulence is discussed and its important role in the mesosphere and lower atmosphere by influencing the thermal balance of the upper atmosphere, as well as the distribution of different atmospheric constituents, is presented. The number of measurements of turbulence at these altitudes is small. Data from radio meteors, noble gas ratio analysis, and luminescent cloud analysis reveal no definite conclusion or systematic variation of the turbulence region. The heat input by gravity waves is a dominant term in the energy balance equation. Also gravity waves, either directly or through a mechanism of turbulence generation, enhance the mixing ability of the atmosphere. Internal gravity waves produce variations in the density as well as concentration of atomic oxygen. The uncertainty in the atmospheric density variation leads to control system design problems for the AOTV relative to the control authority required to deal with the unpredictable variation in density. Author

N86-26736# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EQUATORIAL F REGION VERTICAL PLASMA DRIFTS: SEASONAL AND LONGITUDINAL ASYMMETRIES IN THE AMERICAN SECTOR
I. S. Batista, M. A. Abdu, and J. A. Bittencourt Mar. 1986 29 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico. Submitted for publication
(INPE-3839-PRE/909) Avail: NTIS HC A03/MF A01

Longitudinal and seasonal asymmetries in the evening ionospheric F region plasma vertical drift (V sub z) enhancements, between two longitudinally separated stations situated along the magnetic equator, are investigated under solar maximum conditions. Results obtained from the analysis of ionosonde data acquired at the Huancayo, Peru and Fortaleza, Brazil stations are used. The two stations have markedly different magnetic declination angles. The observed asymmetries are interpreted using a detailed numerical simulation of the E and F region electrodynamic coupling process that takes into account its asymmetry about the equator arising from the finite magnetic declination angle. The results of the simulation show, in agreement with observations, that the evening F region vertical drift pre-reversal peak occurrence time and its seasonal variation at a station are controlled by the magnetic declination angle at that station, which determines the seasonal variation of the sunset times (and hence the integrated Pedersen conductivity longitudinal gradient) at its magnetic conjugate E layers. The amplitude of the pre-reversal peak, on the other hand, undergoes the influence of the magnetic declination angle as well as of the thermospheric zonal wind. Author

N86-26737# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DYNAMICS OF NON-RELATIVISTIC EQUATORIAL ELECTRONS AND PROTONS INSIDE THE PLASMASPHERE
O. Pinto, Jr., O. Mendes, Jr., and W. D. Gonzalez Mar. 1986 25 p Sponsored in part by Fundo NACIONAL DE Desenvolvimento Cientifico e Tecnologico. Submitted for publication
(INPE-3833-PRE/905) Avail: NTIS HC A02/MF A01

The dynamics of nonrelativistic equatorial electrons and protons inside the plasmasphere are studied. These particles are subjected to the combined action of the geomagnetic field and plasmaspheric electric fields, both assumed to be static, during magnetically quiet and distrubed periods. It is concluded that, during magnetically quiet periods, electrons tend to corotate with and simultaneously drift away from the Earth. On the other hand, protons show a more complex dynamical behavior, strongly depending on energy and local time, presenting open orbits similar to those of electons, except for an energy interval in which closed orbits exist within certain local time intervals. During magnetically disturbed periods, at least around L = 2, the behavior of electrons and protons remains approximately unchanged. Author

N86-26738# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THERMOSPHERIC MODELS: A SHORT REVIEW ON THE BASIC ASSUMPTIONS
Carlos Jose Zamlutti Mar. 1986 35 p refs Submitted for publication
(INPE-3823-PRE/899) Avail: NTIS HC A03/MF A01

Thermospheric models vary in a wide range of approaches: theoretical, analytical, semiempirical, numerical, etc. The models should be used only if the basic assumption, on which they are based, are valid. This paper deals with a critical review of thermospheric models keeping in view that they are designed to predict the actual behavior of the neutral atmosphere parameters above 90 km. Emphasis is put on the lower thermosphere to avoid interhemispheric transport effect, not included in most of the models. Author

N86-26739*# Iowa Univ., Iowa City.
INVESTIGATION OF THE DIFFUSE ULTRAVIOLET BACKGROUND USING SATELLITE DATA: DYNAMICS EXPLORER GUEST INVESTIGATOR PROGRAM Final Technical Report, 15 Jul. 1984-14 Jan. 1986
John D. Fix 27 Jun. 1986 10 p refs
(Grant NAG5-449)
(NASA-CR-176809; NAS 1.26:176809) Avail: NTIS HC A02/MF A01 CSCL 04A

The imaging instrumentation for the Dynamics Explorer Mission was designed primarily to obtain global auroral images. The instrument, however, was also used successfully to study marine bioluminescence, the geocorona, and the global distribution of atmospheric ozone. The imager has considerable potential for the study of astronomical sources of ultraviolet radiation as well. The data produced by the imager is used to study the brightness and isotrophy of the diffuse ultraviolet background. Author

N86-26740*# Bechtel National, Inc., San Francisco, Calif.
THEMATIC MAPPER RESEARCH IN THE EARTH SCIENCES: TECTONIC EVALUATION OF THE NUBIAN SHIELD OF NORTHEASTERN SUDAN/SOUTHEASTERN EGYPT USING THEMATIC MAPPER IMAGERY Interim Report
Feb. 1986 24 p refs Original contains color illustrations
(Contract NAS5-28757)
(NASA-CR-177311; NAS 1.26:177311) Avail: NTIS HC A02/MF A01 CSCL 08G

The tectonic evaluation of the Nubian Shield using the Thematic Mapper (TM) imagery is progressing well and shows great promise. The TM tapes for the six LANDSAT 5 scenes covering the northern portion of the Red Sea hills were received, and preliminary maps and interpretations were made for most of the area. It is apparent that faulting and shearing associated with the major suture zones such as the Sol Hamed are clearly visible and that considerable detail can be seen. An entire quadrant of scene 173,45 was examined in detail using all seven bands, and every band combination was evaluated to best display the geology. A comparison was done with color ratio combinations and color combinations of the eigen vector bands to verify if band combinations of 7-red, 4-green, and 2-blue were indeed superior. There is no single optimum enhancement which provides the greatest detail for every image and no single combination of spectral bands for all cases, although bands 7, 4, and 2 do provide the best overall display. The color combination of the eigen vector bands proved useful in distinguishing fine detailed features. B.G.

N86-26741*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Studies.
PLATE MOTIONS AND DEFORMATIONS FROM GEOLOGIC AND GEODETIC DATA Semiannual Report, 1 Aug. 1984 - 31 Dec. 1985
Thomas H. Jordan 30 Jun. 1986 53 p
(Grant NAG5-459)
(NASA-CR-177299; NAS 1.26:177299) Avail: NTIS HC A04/MF A01 CSCL 08G

Research effort on behalf of the Crustal Dynamics Project

focused on the development of methodologies suitable for the analysis of space-geodetic data sets for the estimation of crustal motions, in conjunction with results derived from land-based geodetic data, neo-tectonic studies, and other geophysical data. These methodologies were used to provide estimates of both global plate motions and intraplate deformation in the western U.S. Results from the satellite ranging experiment for the rate of change of the baseline length between San Diego and Quincy, California indicated that relative motion between the North American and Pacific plates over the course of the observing period during 1972 to 1982 were consistent with estimates calculated from geologic data averaged over the past few million years. This result, when combined with other kinematic constraints on western U.S. deformation derived from land-based geodesy, neo-tectonic studies, and other geophysical data, places limits on the possible extension of the Basin and Range province, and implies significant deformation is occurring west of the San Andreas fault. A new methodology was developed to analyze vector-position space-geodetic data to provide estimates of relative vector motions of the observing sites. The algorithm is suitable for the reduction of large, inhomogeneous data sets, and takes into account the full position covariances, errors due to poorly resolved Earth orientation parameters and vertical positions, and reduces baises due to inhomogeneous sampling of the data. This methodology was applied to the problem of estimating the rate-scaling parameter of a global plate tectonic model using satellite laser ranging observations over a five-year interval. The results indicate that the mean rate of global plate motions for that interval are consistent with those averaged over several million years, and are not consistent with quiescent or greatly accelerated plate motions. This methodology was also used to provide constraints on deformation in the western U.S. using very long baseline interferometry observations over a two-year period. M.G.

N86-26742# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
PARTICLE AND WAVE DYNAMICS DURING PLASMA INJECTIONS
H. C. Koons and J. F. Fennell 15 Jul. 1985 34 p refs
(Contract F04701-83-C-0084)
(AD-A163210; TR-0084A(5940-06)-3; SD-TR-85-51) Avail: NTIS HC A03/MF A01 CSCL 04/1

The SCATHA satellite measures particle and wave parameters as it moves outbound on the dusk side from the plasmasphere into the plasma sheet. In many cases plasma waves are not observed in the quiescent plasma sheet prior to a plasma injection. The electron distribution function prior to entry into the plasma sheet is a nearly isotropic soft spectrum J(E) approx. 1/E. Just inside the plasma sheet the spectrum begins to harden and becomes anisotropic, J perpendicular greater than J parallel. As the satellite penetrates deeper into the plasma sheet the spectrum further hardens, especially near alpha sub 0 approx. 90 deg. At the injection the electron spectrum drastically hardens and often becomes peaked in the keV energy range. The pitch angle anisotropy is further enhanced in favor of J perpendicular. The plasma wave emissions onset occurred at the time of the injection. Whistler-mode waves are observed below the electron cyclotron frequency. Electrostatic waves are detected in bands between the electron cyclotron frequency harmonics. GRA

N86-26743# Pacific-Sierra Research Corp., Los Angeles, Calif.
RADIATION OF LONG ELECTROMAGNETIC WAVES BY A MODULATED ELECTRON BEAM IN THE IONOSPHERE Final Report, Dec. 1983 - Aug. 1985
E. C. Field and L. E. Johnson Dec. 1985 45 p
(Contract F19628-84-C-0014)
(AD-A163306; PSR-1566; RADC-TR-85-233) Avail: NTIS HC A03/MF A01 CSCL 04/1

Pulsed electron beams in the ionosphere radiate electromagnetic energy and, therefore, might work as wireless virtual antennas. Such virtual antennas would be most useful at low frequencies because small or moderate-size wire antennas work well at high frequencies. Natural beams radiate energy that propagates down through the ionosphere, but no experiment has used a man-made electron beam to produce radiation at the modulation frequency or its harmonics, and detected that radiation on the ground. The present report addresses the feasibility of such an experiment, and suggests preferred configurations. Motivated by communications applications, which require good time availability, it considers only phenomena, such as the triggering plasma of instabilities or guidance in transient ionospheric ducts. GRA

N86-26744# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
WAVES AND ELECTRIC FIELDS ASSOCIATED WITH THE DECEMBER 27, 1984, ARTIFICIAL COMET Progress Report
D. A. Gurnett, T. Z. Ma, R. R. Anderson, G. Haerendel, and G. Paschmann 27 Nov. 1985 71 p
(Contracts N00014-82-K-0183; N00014-85-K-0404)
(AD-A163409; U-Of-Iowa-85-18) Avail: NTIS HC A04/MF A01 CSCL 04/1

A variety of plasma wave and electric field effects were observed during the AMPTE (Active Magnetospheric Particle Tracer Explorers) solar wind barium release. Electron plasma oscillations at the local electron plasma frequency provided measurements of the electron density during the entire event. A static electric field of about 1 to 2 mVolt/m was detected in the diamagnetic cavity. This electric field is in the same direction as the solar wind electric field, suggesting that polarization charges in the ion cloud are not effective at shielding out an external electric field. As the spacecraft passed through the boundary of the diamagnetic cavity, a region of compressed plasma and magnetic field was detected upstream of the ion cloud. This region of compressed plasma is believed to be caused by solar wind plasma and magnetic field lines draped around the noise of the ion cloud. Inside the diamagnetic cavity electrostatic emissions were observed in a narrow band centered on the barium ion plasma frequency and in another band at lower frequencies. These waves are believed to be short wavelength ion acoustic waves. Bursts of electrostatic waves were also observed at the boundaries of the diamagnetic cavity, apparently caused by an electron drift current along the boundary. GRA

N86-26745# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
THE STUDY OF GRAVITY FIELD ESTIMATION PROCEDURES Final Report, 22 Dec. 1981 - 30 Jun. 1985
Richard H. Rapp Sep. 1985 12 p refs
(Contract F19628-82-K-0022)
(AD-A164564; AFGL-TR-85-0278) Avail: NTIS HC A02/MF A01 CSCL 08/5

The research described includes the use of high degree potential coefficient expansions, vertical datum corrections, improved gravity fields from satellite altimetry, the computation of the gravity vector in space and the use of digital terrain models for gravimetric computations. GRA

N86-26746# Saint Louis Univ., Mo.
ATTENUATION OF SEISMIC WAVES AT REGIONAL DISTANCES Scientific Report, 1 Jan. - 30 Jun. 1985
Otto W. Nuttli, Brian J. Mitchell, and H. J. Hwang 15 Aug. 1985 104 p refs
(Contract F19628-85-K-0021; ARPA Order 5299)
(AD-A164617; AFGL-TR-85-0185; SR-1) Avail: NTIS HC A06/MF A01 CSCL 17/10

A report on the attenuation of seismic waves at regional distances contains the following topics: Yield estimates of Nevada Test Site explosions obtained from siesmic Lg waves; Inter-station surface wave analysis by frequency-domain Wiener deconvolution and modal isolation; New insights on crustal Q structure in stable continental regions - preliminary results. GRA

N86-26747# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
THE NEUTRAL/ION CHEMISTRY OF SODIUM IN THE STRATOSPHERE AND MESOSPHERE

Jose M. Rodriguez, Malcolm K. W. Ko, and Nien D. Sze 30 Sep. 1985 59 p
(Contract F19628-83-C-0123)
(AD-A164636; AFGL-TR-85-0237; SR-2) Avail: NTIS HC A04/MF A01 CSCL 04/1

Part A of the report presents results from our model calculation of the diurnal behavior of the neutral and ionic sodium species. It is shown that the concentration of Na(+) above 90 km exerts a direct influence on the topside scale height of the atomic sodium layer in the mesosphere. The abundance of Na(+) is controlled by the reaction rate for the clustering reaction which is the rate limiting step for the conversion of Na(+) to Na. Downward transport of Na(+) due to ion drift is also effective in reducing the sodium abundance around 90 km. The model can successfully simulate the observed topside scale height of the sodium layer by either using a slow rate for the clustering reaction or incorporating transport of Na(+). Part B assesses the possible impact of sodium species on the stratospheric chlorine cycle. Recent measurements of kinetic rates suggest that the bulk of the sodium species could be in the form of NaCl in the stratosphere. Since the sodium abundance is three orders of magnitude smaller than that of chlorine, NaCl is not likely to be an important chlorine reservoir. Photolysis of NaCl could provide a mechanism for recycling HCl to Cl in the lower stratosphere if it is as fast as 0.001/s. However, the mechanism would not be effective if there exists another more stable form of sodium compound, such as NaHC03 or polymers of NaCl. GRA

N86-26748# Schmitt (Rainer), Glashutten (West Germany).
INVESTIGATIONS OF THE MICRO-TURBULENCE IN THE BOTTOM OF THE BOUNDARY LAYER Final Report
Rainer Schmitt 31 Dec. 1985 92 p
(Contracts DAJA45-83-C-0038; DA Proj. 1T1-61102-BH-57)
(AD-A165306; AD-E301922) Avail: NTIS HC A05/MF A01 CSCL 04/1

Measurements of the microturbulence in the bottom of the atmospheric boundary layer using a two-ended scintillometer system have been performed at two sites in West Germany: more than 500 hours in a hilly area, 180 hours near the coast of the North Sea. The data are presented as figures: signal as function of time. The signal monitored corresponds to the refractive index structure parameter (Cn2) averaged over the path between an incoherent light source and a signal receiver. The reported values are proportional to the logarithm of Cn2. GRA

N86-26749# Analytic Sciences Corp., Reading, Mass.
GRAVITY GRADIOMETER SURVEY ERRORS Report, Nov. 1984 - Apr. 1985
Steven J. Brzezowski Mar. 1985 37 p
(Contract F19628-83-C-0053)
(AD-A165575; TASC-TR-4423-3; AFGL-TR-85-0066; SR-4) Avail: NTIS HC A03/MF A01 CSCL 08/5

Gradiometer system noise, sampling effects, downward continuation and limited data extent contribute to moving-base gravity gradiometer survey error. This report describes the individual effects of these error sources on a gravity gradiometer survey system currently under development. Special techniques are required to account for downward continuation and limited data extent effects which cannot be adequately modeled as measurement noise in a linear error estimation algorithm. The results reported herein indicate the survey performance improvement which could be realized if each error source were totally eliminated. The sensitivity of total survey error to small changes in the nominal value of each error source is also identified. System performance results are analyzed for several sets of airborne survey conditions. For a typical characterization of the Earth's gravity field, limited data extent generally contributes about one-half of the total error variance associated with recovery of the gravity disturbance vector at the Earth's surface; gradiometer system noise typically contributes about one-third. However, sampling effects are also very significant (and are controlled through the survey track spacing). The findings of this study indicate that a 5-km track spacing provides a reasonable tradeoff between survey cost and errors due to track spacing. Author (GRA)

N86-26750# Freiburg Univ. (West Germany). Inst. of Sound and Vibration Research.
STUDY OF IONOSPHERIC AND TROPOSPHERIC MODELS Final Report
Karl Rawer, comp. and Dieter Bilitza, comp. Paris ESA Sep. 1985 93 p
(Contract ESA-5375/83-D)
(ESA-CR(P)-2157; ESA-86-96859) Avail: NTIS HC A05/MF A01

To improve Bent's ionospheric model, the source of the NASA model applied by ESOC when computing the ionospheric refraction correction at radio location of satellites, empirical data were compared with the model and with proposed changes. The most important improvements proposed refer to the shape of the electron density profile and to the ionospheric peak parameters. A saturated relation instead of a linear one is proposed for the solar activity effect, and a provisional formula for taking account of the plasmaspheric content is given. Observations made by ESOC ground stations were used to check the models. It is found that the proposed changes are helpful and provide an overall improvement. ESA

N86-26751# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
EFFECT OF STOCHASTIC PERTURBATIONS ON A SPECTRAL MODEL OF ATMOSPHERIC CIRCULATION
H. E. deSwart and J. Grasman Nov. 1985 21 p Revised Sponsored by Netherlands Foundation for the Technical Sciences
(CWI-AM-R8515; B8578049; ESA-86-97001) Avail: NTIS HC A02/MF A01

The dynamics of a low order spectral model of the barotropic potential vorticity equation, forced by random perturbations, is studied as a function of the memory and intensity of the noise. The unperturbed deterministic system has three equilibria, and for arbitrary initial conditions trajectories in phase space always tend to one of the two stable equilibria representing preferent circulation patterns of the atmosphere. The noise forces the system to visit alternately the two attraction domains of the stable equilibria. During the transition the system remains temporarily in a neighborhood of the unstable equilibrium. Characteristic residence times in the attraction domains and in the domain near the unstable equilibrium are calculated. The alternation of preferent states is studied with a discrete state Markov model. The eigenvalues of the Markov model indicate the time scale over which the effect of the initial state is present in the system. ESA

N86-26752# South Carolina Univ., Columbia. Dept. of Civil Engineering.
INVESTIGATION OF SUBSURFACE EXPLORATION METHODS FOR PREVAILING GEOLOGIC CONDITIONS IN SOUTH CAROLINA Final Report
R. L. Baus Nov. 1985 161 p Sponsored in cooperation with the Federal Highway Administration and South Carolina Dept. of Highways and Public Transportation
(PB86-167087; RR-F85-203; FHWA/SC-85/01) Avail: NTIS HC A08/MF A01 CSCL 08G

Subsurface conditions at sites in the coastal plains region of South Carolina were investigated using standard penetration and mechanical quasi-static cone penetration tests. The penetration test results are compared with measured static axial pile capacity. The cone penetration test results are compared with stratigraphy and soil types encountered at each site. Results show that with certain limitations, cone penetration test results can be used to assess general stratigraphy and soil type and predict static axial pile capacity with reasonable accuracy. GRA

N86-26753# National Geodetic Survey, Rockville, Md.
MODEL COMPARISON IN VERTICAL CRUSTAL MOTION ESTIMATION USING LEVELING DATA
G. W. Hein Feb. 1986 49 p
(PB86-175551; NOAA-TR-NOS-117; NGS-35) Avail: NTIS

HC A03/MF A01 CSCL 08E

A new generalized linear regression model, also called mixed model, is presented for the computation of zero-epoch heights and height velocities using releveling observations. The method is compared with the single point velocity model having a multiquadric interpolator for the velocity surface. Tests based on simulated error free and noisy data show slight advantages for the mixed model. The multiquadric technique provides a good interpolation method in the deterministic sense when certain specific precautions are considered. Error statistics of multiquadrics using a stochastic approach through least squares should be interpreted with extreme care. GRA

N86-26754# National Geodetic Survey, Rockville, Md.
MEGATREND SOLUTIONS IN PHYSICAL GEODESY
A. Bjerhammar Feb. 1986 35 p
(PB86-173317; NOAA-TR-NOS-116; NGS-34) Avail: NTIS
HC A03/MF A01 CSCL 08E

A technique for renormalization of integral equations is used for obtaining very robust solutions. The number of multiplications used for inverting the integral equations can be reduced dramatically and mostly only weighted means will be needed. Theoretical proportional gain in computer time might be as much as 100,000 for the most favorable cases when using 1,000 unknowns. (Practical gains will be considerably less.) Solutions were obtained with increased accuracy compared with the classical technique of integral equations. Surface elements could be of arbitrary size, but the method is optimal for a global approach with equal area elements. The solutions were found strictly invariant with respect to the depth of the embedded sphere when using simpler models. GRA

N86-26755# National Geodetic Survey, Rockville, Md.
BLUE RIDGE GRAVIMETER CALIBRATION BASE LINE, ESTABLISHED 1985
C. W. Wessells Dec. 1985 58 p
(PB86-167475; NOAA-TM-NOS-NGS-44) Avail: NTIS
HC A04/MF A01 CSCL 08E

As with almost all scientific instrumentation, some method of calibration is necessary to achieve optimum results in a given investigation. The same holds true for gravimeters. The Blue Ridge Gravimeter Calibration Base Line provides the user with an overall 310-mgal gravity range (10-mgal intervals) for calibration of gravimeters reading to plus or minus 0.01 mgal and a 10-mgal range (1mgal interval) for the more sensitive gravimeters, reading to plus or minus 0.001 mgal. This line will enable the user to determine scale constants for each interval as well as circular error contributions for their gravimeters. GRA

N86-26851*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE PRODUCTION OF TRACE GASES BY PHOTOCHEMISTRY AND LIGHTNING IN THE EARLY ATMOSPHERE
Joel S. Levine, Geoffrey M. Tennille, Kenneth M. Towe (Smithsonian Institution, Washington, D. C.), and Raj K. Khanna (Maryland Univ., College Park.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 47 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

N86-27157*# Guelph Univ. (Ontario).
THE INITIATION OF GRAIN MOVEMENT BY WIND
W. G. Nickling *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-26756*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
GENERATION OF AVAILABLE POTENTIAL ENERGY AND THE ENERGY CYCLE DURING THE GLOBAL WEATHER EXPERIMENT Final Report
David A. Salstein and Richard D. Rosen Apr. 1986 30 p refs
(Contract NAS5-27745)
(NASA-CR-177872; NAS 1.26:177872) Avail: NTIS
HC A03/MF A01 CSCL 04B

Two major themes were pursued during this research period. The first of these involved examining the impacts of satellite-based data and the forecast model used by the Goddard Laboratory for Atmospheres (GLA) on general circulation statistics. For the other major topic, the diabatic heating fields produced by GLA were examined for one month during the FGGE First Special Observing Period. As part of that effort, the three-dimensional distribution of the four component heating fields were studied, namely those due to shortwave radiation, Q sub SW, longwave radiation, Q sub LW, sensible heating, Q sub S, and latent heating, Q sub L. These components were calculated as part of the GLA analysis/forecast system and archived every quarter day; from these archives cross products with temperature were computed to enable the direct calculation of certain terms of the large-scale atmospheric energy cycle, namely those involving the generation of available potential energy (APE). The decision to archive the diabatic heating components separately has enabled researchers to study the role of the various processes that drive the energy cycle of the atmosphere. Author

N86-26757# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPARISON OF RAINFALL CHARACTERISTICS AT FORTALEZA (CEARA) AND OTHER NEARBY LOCATIONS IN NORTHEAST BRAZIL
R. P. Kane and N. B. Trivedi Apr. 1986 63 p refs Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico. Submitted for publication
(INPE-3851-PRE/915) Avail: NTIS HC A04/MF A01

The rainfall series of Fortaleza (Ceara) is compared with similar series for several other locations in Northeast Brazil. It is shown that the correlations are good for distances up to about 600 km from Fortaleza. A Master Curve for 1912-1978, obtained by averaging rainfall data for 93 stations having good correlations with Fortaleza, shows very prominent periodicities at T = 5.6, 12.3, and 47.3 years and less prominent periodicities at T = 3.4 and 4.3 years. Predictions from both the Fortaleza series (1849-1976) and the Master Curve (1912-1978) indicated droughts during 1979-1983. This prediction seems to have been realized. In future, droughts during 1992-1994 and 2002-2006 are indicated. Author

N86-26758*# Florida State Univ., Tallahassee. Dept. of Meteorology.
AN INVESTIGATION OF THE MARINE BOUNDARY LAYER DURING COLD AIR OUTBREAK Final Report
Steven A. Stage Jul. 1986 26 p refs
(Grant NAG5-332)
(NASA-CR-177287; NAS 1.26:177287) Avail: NTIS
HC A03/MF A01 CSCL 04B

Methods for use in the remote estimation of ocean surface sensible and latent heat fluxes were developed and evaluated. Three different techniques were developed for determining these fluxes. These methods are: (1) Obtaining surface sensible and latent heat fluxes from satellite measurements; (2)Obtaining surface sensible and latent heat fluxes from an MABL model; (3) A method using horizontal transfer coefficients. These techniques are not very sensitive to errors in the data and therefore appear to hold promise of producing useful answers. Questions remain about how closely the structure of the real atmosphere agrees with the assumptions made for each of these techniques, and, therefore about how well these techniques can perform in actual use. The value of these techniques is that they promise to provide methods

for the determination of fluxes over regions where very few traditional measurement exist. E.R.

N86-26759# Naval Research Lab., Washington, D. C.
RELATIVE - HUMIDITY PARAMETERIZATION OF THE NAVY AEROSOL MODEL (NAM) Interim Report
Hermann E. Gerber 30 Dec. 1985 16 p
(AD-A163209; NRL-8956) Avail: NTIS HC A02/MF A01 CSCL 04/2

An improved relative-humidity parameterization is described for the lognormal size distributions used in the Navy aerosol model. Approximation formulas are developed for the geometric mean and standard deviation of the distributions for sea-salt, urban, and rural aerosols. The parameterization gives accurate predictions of the size dependence of the aerosol particles for a range in relative humidity from near 0% to 100%, and for dry particle sizes from 0.01 to 10 microns. By neglecting the Kelvin effect, the new formulas reduce to a form similar to the existing humidity parameterization. The range of applicability of the new formula and its reduced form for estimating extinction coefficients are established. GRA

N86-26760# National Center for Atmospheric Research, Boulder, Colo.
A STUDY OF THE METHODOLOGY OF LOW-ALTITUDE WIND SHEAR DETECTION WITH SPECIAL EMPHASIS ON THE LOW LEVEL WIND SHEAR ALERT SYSTEM CONCEPT Final Report, Oct. 1983 - Jul. 1985
F. W. Wilson, Jr. and John A. Flueck Feb. 1986 112 p
(Contract DTFA01-82-Y-10513)
(AD-A164939; JAWS-NCAR-02-85; FAA-RD-PM-86-4) Avail: NTIS HC A06/MF A01 CSCL 04/2

This basic principles study of the Low Level Wind Shear Alert System (LLWAS) addresses the question of the degree to which a change of algorithm and network geometry can improve the performance of an anemometer-based wind shear detection system to an acceptable level. The performance of the current system seems to be deficient in that it is ineffective for the detection of microburst and that it issues many alarms in situations where pilots do not experience hazardous wind shear. The theoretical basis for this investigation is simulation testing. This process involves testing each combination of algorithm and geometry against a realistic mathematicly generated weather model that includes wind shear events. The binary time series of (event/no event) and (detection/no detection) are computed and the systems that exhibit the best skill are determined. The systems that have the best skills have high probabilities of detection and low probabilities of false alarms. GRA

N86-26761# Weather Squadron (2nd), Patrick AFB, Fla. Detachment 11.
UPGRADE OF WEATHER FORECAST SUPPORT TO SHUTTLE OPERATIONS Final Status Report
Thomas M. Myers and Billie F. Boyd 11 Apr. 1985 9 p refs
(AD-A164967; Rept-2WS/CP-85/002) Avail: NTIS HC A02/MF A01 CSCL 04/2

The report details the background of a joint USAF and NASA project to upgrade the forecast inputs at the Cape Canaveral Forecast Facility (CCFF) in support of Space Shuttle and missile launch operations at the Eastern Test Range (ETR). Prior to the start of Shuttle Operations, the CCFF had been geared to support missile launches with forecast requirements slanted towards launch pad safety (lightning, high winds, toxic diffusion) and upper air wind shears. Shuttle support added the problems of forecasting safe conditions (visibility, ceilings, crosswinds, precipitation and turbulence) for Shuttle emergency landing immediately following a launch attempt or for normal end of mission landing at the Kennedy Space Center Shuttle Landing Facility. The short range and microscale forecast requirements for Shuttle could not be met with the inplace technology. To deal with this support capability shortfall, NASA and the USAF (Det 11, 2WS and the Eastern Space and Missile Center) initiated a Meteorological Systems Modernization Program (MSMP) The intent of this weather support upgrade is to minimize the impacts of the environment on the Shuttle by providing the most accurate possible forecast advice to support managers during processing, launch, and recovery operations. Shuttle weather sensitivities are presented along with the architecture of the forecast support system being assembled to meet these challenges. Author (GRA)

N86-26762# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
WEATHER RADAR STUDIES Quarterly Technical Summary Report, 1 Apr. - 30 Jun. 1985
James E. Evans 30 Jun. 1985 65 p
(Contracts DTFA01-80-Y-10546; F19628-85-C-0002)
(AD-A165221; DOT/FAA/PM-85-28) Avail: NTIS HC A04/MF A01 CSCL 04/2

FFA-funded Doppler weather radar activities during the period 1 April to 30 June 1985 are reported. The test-bed Doppler weather radar system making measurements in Olive Branch, Mississippi, was fully operational. Additionally, the University of North Dakota C-band Doppler weather radar commenced measurements. Weather measurements were conducted on a number of cold front passages with attendent prefrontal lines of showers and thunderstorms and on scattered air mass thunderstorms. Some 17 microbursts were observed during the radar operation with the bulk of the microburst occurring in late June. Thirty-one gust fronts were observed as well. The University of North Dakota Citation aircraft made airborne turbulence measurements on eight days in the period mid-May to mid-June. The Lincoln mesonet was fully operational throughout the period. The 1984 peak wind speed data from the mesonet and the Memphis International Airport LLWSAS data have been analyzed to determine ground level wind-shear characteristics in the Memphis area. Doppler weather radar data from the National Center for Atmospheric Research JAWS program and the National Severe Storms Laboratory are being analyzed to develop low-altitude wind-shear detection algorithms. Analysis continued of the data collected in the 1983 Boston area coordinated aircraft-Doppler weather radar turbulence experiment. Work continued on the development of weather radar products for the Central Weather Processor. Author (GRA)

N86-26763# Miami Univ., Fla. School of Marine and Atmospheric Science.
GENESIS OF MAJOR DUST STORMS IN WEST AFRICA DURING THE SUMMER OF 1974
M. Estoque, J. Fernandez-Partagas, D. M. Helgren, and J. M. Prospero Jan. 1986 60 p
(Contract DAAG29-83-K-0082)
(AD-A165457; ARO-19684.2-GS) Avail: NTIS HC A04/MF A01 CSCL 04/2

The occurrence of major dust clouds over the western Sahara is associated with several characteristic features of the large scale synoptic conditions, including the isalloberic pattern as well as the flow patterns at the 850 to 700 mb layer and the surface. A necessary ingredient for the occurrence of dust appears to be the existence of a well developed and intense surface cyclone along the ITF south of the dust source region. These three features are incorporated in three synoptic models for dust generation. The models are: the general model (GM), the model without a trough (NTM) and the model with a trough (TM). Conditions resembling those in the TM appear to be the ones most frequently observed during dust episodes in GATE. Author (GRA)

N86-26764# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, KUNSAN AB, SOUTH KOREA Data Summary Report, Sep. 1974 - Aug. 1984
30 Sep. 1985 296 p
(AD-A165553; USAFETAC/DS-85/055) Avail: NTIS HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Kusan AB, Korea. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E,

Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26765# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, INDIAN MOUNTAIN AFS, ALASKA Data Summary Report, Dec. 1976 - Nov. 1984
1 Nov. 1985 295 p
(AD-A165554; USAFETAC/DS-85/056) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Indian Mountain AFS, Alaska. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26766# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, KELLY AFB, TEXAS Data Summary Report, Sep. 1975 - Aug. 1985
6 Nov. 1985 303 p
(AD-A165555; USAFETAC/DS-85/057) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Kelly AFB, Texas. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26767# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, TIN CITY AFS, ALASKA Data Summary Report, Dec. 1974 - Nov. 1984
27 Dec. 1985 296 p
(AD-A165556; USAFETAC/DS-86/002) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Tin City AFS, Alaska. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26768# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, CAPE LISBURNE, ALASKA Data Summary Report, Dec. 1974 - Nov. 1984
9 Jan. 1986 296 p
(AD-A165557; USAFETAC/DS-86/003) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Cape Lisburne, Alaska. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26769# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, LANGLEY AFB, VIRGINIA Data Summary Report, Sep. 1975 - Aug. 1985
13 Jan. 1986 300 p
(AD-A165558; USAFETAC/DS-86/004) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six part statistical data summary of surface weather observations for Langley AFB, Virginia is presented. The summary consists of: PART A, Weather conditions and atmospheric phenomena; PART B, Precipitation; PART C, Surface winds; PART D, Ceiling and visibility; PART E, Psychrometric summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary Of Surface Weather Observations (RUSSWOs) for complete description of contents and instructions for use. GRA

N86-26770# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, TATALINA AFS, ALASKA Data Summary Report, Dec. 1976 - Nov. 1984
16 Jan. 1986 294 p
(AD-A165559; USAFETAC/DS-86/005) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Tatalina AFS, Alaska. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26771# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, BEALE AFB, CALIFORNIA Data Summary Report, Dec. 1975 - Nov. 1985
6 Feb. 1986 437 p
(AD-A165560; USAFETAC/DS-86/006) Avail: NTIS
HC A19/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Beale AFB, California. Summary consists of: Part A, Weather Conditions and Atmospheric Phenomena; Part B, Precipitation; Part C, Surface Winds; Part D, Ceiling an Visibility; Part E, Psychrometric Summaries; Part F, Pressure summaries. See USAFETAC/TN-83/001 (AD-A132186l, and An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for completed descriptions of contents and instructions for use. GRA

N86-26772# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, LA CROSSE MUNICIPAL AIRPORT, WISCONSIN Data Summary Report, Sep. 1975 - Aug. 1985
3 Feb. 1986 296 p
(AD-A165561; USAFETAC/DS-86/008) Avail: NTIS
HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: La Crosse Municipal Airport, WI. Summary consists of: Part A, Weather Conditions and Atmospheric Phenomena; Part B, Precipitation; Part C, Surface winds; Part D, Ceiling and Visibility; Part E, Psychrometric Summaries; Part F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the

Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-26773# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
CAMP CASEY, SOUTH KOREA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F Data Summary Report, Sep. 1975 - Aug. 1985
24 Dec. 1985 227 p
(AD-A165562; USAFETAC/DS-85/062) Avail: NTIS HC A11/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Camp Casey, South Korea. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and Part F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aide for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents of and instructions for use. GRA

N86-26774# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
WESTOVER AFB, MASSACHUSETTS LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS). PARTS A, C-F Data Summary Report, Oct. 1975 - Sep. 1985
6 Feb. 1986 372 p
(AD-A165563; USAFETAC/DS-86/007) Avail: NTIS HC A16/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Westover AFB, Massachusetts. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-26775# Air Force Geophysics Lab., Hanscom AFB, Mass.
TECHNIQUES FOR THE AUTOMATED OBSERVATION OF CLOUDS Final Scientific Report
James I. Metcalf 10 Oct. 1985 23 p refs
(AD-A165573; AFGL-TR-85-0253; AFGL-ERP-932) Avail: NTIS HC A02/MF A01 CSCL 04/2

This report surveys techniques for cloud detection to assess their suitability for meeting the requirements of the Automated Observation System (AOS). A microwave sensor is essential because of the requirements for observing cloud top heights and documenting multiple cloud layers. Wavelengths between 3 cm and 8.6 mm could be used for this application, and a detailed sensor design study is recommended to evaluate the availability, cost, performance, and reliability of components and systems. Pulsed or continuous-wave radars could meet most of the requirements, although measurements of cloud base with high accuracy at low altitude may be difficult with some pulsed systems. GRA

N86-26776# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
MODEL VALIDATION RESEARCH: COMPARISON OF SIMULATED AND OBSERVED CLIMATE PATTERNS FOR THE PAST 18,000 YEARS Progress Report, 1 Feb. 1985 - 31 Jan. 1986
T. Webb, III Dec. 1985 26 p
(Contract DE-FG02-85ER-60304)
(DE86-004631; DOE/ER-60304/1) Avail: NTIS HC A03/MF A01

Research during 1985 was organized within four major tasks with a primary objective of testing the ability of the National Center for Atmospheric Research (NCAR) Community Climate Model (CCM) to simulate past climates. Because changes in the global mean temperature during the past 18,000 years have been similar in magnitude to those predicted for carbon dioxide doubling, the comparison of the model results with paleoclimatic data provides a useful test of the NCAR CCM, which is being used in carbon dioxide research. In particular, the data/model comparisons reveal certain of the model responses to past variations in the seasonal radiation budget. Key results included: (1) a description of a series of experiments with NCAR CCM to simulate climate for 18,000 y B.P. to present, (2) descriptions of available sea-surface temperature data from the tropics and of a global paleoclimatic data base for 6000 y B.P., (3) development of polynomial regression equations to estimate pollen percentages for temperature and precipitation data, and (4) favorable comparisons between paleoclimatic data and model results for the period 18,000 y B.P. in North America and for 18,000 B.P. to present in the Northern Hemisphere tropics. DOE

N86-26777# National Center for Atmospheric Research, Boulder, Colo.
VERTICAL MODES AND ENERGETICS OF GRAVITATIONAL AND ROTATIONAL MODES IN A MULTILEVEL GLOBAL SPECTRAL MODEL Ph.D. Thesis
S. D. Ko 1985 247 p refs Prepared in cooperation with Michigan Univ., Ann Arbor
(Grant NSF ATM-82-17015)
(PB86-160165; NCAR/CT-95) Avail: NTIS HC A11/MF A01 CSCL 04B

An energetics analysis is made based on the NCAR Community Climate Model. One difficulty, which is studied hear for the first time, is that the discrete vertical structure equation is not unique. For some typical vertical profiles of temperature and pressure, the solutions of the differential and integral vertical equations are compared. The difference between these solutions is smaller for lower baroclinic modes but larger for higher modes. The distributions of available potential energy and divergent and nondivergent kinetic energy are investigated both globally and in the tropics. New concepts of the balanced energy (BE), transient energy (TE), and balanced gravitational energy (BGE) are introduced. It is more appropriate to express the energy in terms of vertical modes rather than zonal waves in order to examine whether the energy is balanced or not during the initialization. GRA

N86-26778# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
CLOUD BASE HEIGHTS FROM LIDAR, ROTATING BEAM CELLOMETER AND PILOT REPORTS COMPARED BY EXPERIMENT AND THEORY
W. L. Eberhard Jan. 1986 58 p refs
(PB86-159894; NOAA-TM-ERL-WPL-129) Avail: NTIS HC A04/MF A01 CSCL 04B

An experiment is described, wherein cloud signals from a range-corrected ruby lidar and a rotating beam ceilometer showed excellent agreement in the height at which peak signal occurred. To develop an understanding of the relationships between ceilometer signals and pilot visibility, the physical bases of these signals and of pilot's perceptions are analyzed. A relationship is derived that connects pilot optical depth with an idealized lidar's signal profile by applying reasonable approximations to the cloud structure (with or without precipitation). The view angle of the pilot, the lidar's pointing direction, and the vertical distribution of the obscuring particles control the relationship. GRA

N86-26779# National Weather Service, Silver Spring, Md. Techniques Development Lab.
MOISTURE MODEL FOR THE LOCAL AFOS MOS (AUTOMA-

TION OF FIELD OPERATIONS AND SERVICES MODEL OUTPUT STATISTICS) PROGRAM
D. A. Unger Dec. 1985 49 p
(PB86-151305; NOAA-TM-NWS-TDL-77) Avail: NTIS
HC A03/MF A01 CSCL 04B

The moisture model used for the Local AFOS MOS Program (LAMP) is described. The model predicts the degree of saturation in the single layer between 1000 and 500 mb by a moisture parameter known as the saturation deficit. Moisture is advected under the assumption that no evaporation or condensation occurs along the trajectory. The thickness and elevation of the advected air column determine the degree of saturation. Precipitation is forecast when the air column is saturated. The model forecasts for instantaneous precipitation were compared to those of persistance and advection of initial precipitation. GRA

N86-26780# National Weather Service, Garden City, N.Y.
LAWEB (LAKE WEATHER BROADCAST): DATA PROCESSING FOR THE GREAT LAKES
W. C. Randel and M. R. Peroutka Mar. 1986 96 p
(PB86-176658; NOAA-NWS-ERCP-36) Avail: NTIS
HC A05/MF A01 CSCL 04B

A program is described which gathers all of the available observations on the Great Lakes and presents them in two, unified formats. The first format is a broadcast text which is read over the Great Lakes VHF radio system every six hours during the shipping season. The text contains wind and wave reports as well as weather and visibility when the visibility is less than four miles. The second format is that of a standard AFOS plot file, complete with sea level pressure, temperature, dew point, water temperature and wave height, when available. National Weather Service (NWS) offices can produce customized graphic displays and analyses from this file using the PMOD system of programs and various mesoscale analysis routines. A great effort has been made to produce a program which will allow major revisions of the output products without altering the FORTRAN code. GRA

N86-26781# National Severe Storms Forecast Center, Kansas City, Mo.
SEVERE THUNDERSTORM CASES OF 1985
J. E. Hales and H. G. Crowther Feb. 1986 61 p
(PB86-174125; NOAA-TM-NWS-NSSFC-11) Avail: NTIS
HC A04/MF A01 CSCL 04B

Severe thunderstorms occurrences are relatively infrequent in much of the United States. Realizing the importance that experience plays and difficulty involved for a meteorologist to study past cases, a summary was compiled of all the organized severe thunderstorm episodes of June 1985. Included in each case were the times and locations of the severe weather along with specifics of the more noteworthy events. The objective was to give an overview to a forecaster as to what ingredients went into severe development with a more detailed analysis being left up to the reader. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-26782*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBJECTIVE ANALYSIS OF TIDAL FIELDS IN THE ATLANTIC AND INDIAN OCEANS
Breulio V. Sanchez, Desiraju B. Rao (National Meteorological Center, Washington, D.C.), and Stephen D. Steenrod (Applied Research Corp., Landover, Md.) Jun. 1986 25 p refs
(NASA-TM-87773; NAS 1.15:87773; Rept-86B0195) Avail: NTIS
HC A02/MF A01 CSCL 08C

An objective analysis technique has been developed to extrapolate tidal amplitudes and phases over entire ocean basins using existing gauge data and the altimetric measurements which are now beginning to be provided by satellite oceanography. The technique was previously tested in the Lake Superior basin. The method has now been developed and applied in the Atlantic-Indian ocean basins using a 6 deg x 6 deg grid to test its essential features. The functions used in the interpolation are the eigenfunctions of the velocity potential (Proudman functions) which are computed numerically from a knowledge of the basin's bottom topography, the horizontal plan form and the necessary boundary conditions. These functions are characteristic of the particular basin. The gravitational normal modes of the basin are computed as part of the investigation, they are used to obtain the theoretical forced solutions for the tidal constituents, the latter provide the simulated data for the testing of the method and serve as a guide in choosing the most energetic modes for the objective analysis. The results of the objective analysis of the M2 and K1 tidal constituents indicate the possibility of recovering the tidal signal with a degree of accuracy well within the error bounds of present day satellite techniques. Author

N86-26783*# Alaska Univ., Anchorage.
INFLUENCE OF THE YUKON RIVER ON THE BERING SEA Progress Report
K. Dean and C. P. McRoy 1986 12 p refs Original contains color illustrations
(Contract NAS5-28769)
(NASA-CR-177310; NAS 1.26:177310) Avail: NTIS
HC A02/MF A01 CSCL 10C

The relationships between the discharge of the Yukon River to the currents and biological productivity in the northern Bering Sea were studied. Specific objectives were: to develop thermal, sediment, and chlorophyll surface maps using Thematic Mapper (TM) data of the discharge of the Yukon River and the Alaskan Coastal Current during the ice free season; to develop a historical model of the distribution of the Yukon River discharge and the Alaskan Coastal Current using LANDSAT Multispectral band scanner (MSS) and NOAA satellite imagery; and to use high resolution TM data to define the surface dynamics of the front between the Alaskan Coastal Current and the Bering Shelf/Anadyr Current. LANDSAT MSS, TM, and Advanced Very High Resolution Radiometer (AVHRR) data were recorded during the 1985 ice free period. The data coincided with shipboard measurements acquired by Inner Shelf Transfer and Recycling (ISTAR) project scientists. An integrated model of the distribution of turbid water discharged from the Yukon River was compiled. A similar model is also being compiled for the Alaskan Coastal and Bering Shelf/Anadyr water masses based on their thermal expressions seen on AVHRR imagery. B.G.

N86-26784# Pacific Missile Test Center, Point Mugu, Calif.
TIDAL AND LUNAR DATA FOR POINT MUGU, SAN NICHOLAS ISLAND, AND THE BARKING SANDS AREA DURING 1986 Annual Report
Rich Dixon 31 Dec. 1985 40 p
(AD-A163249; PMTC-TP-00035) Avail: NTIS HC A03/MF A01
CSCL 08/3

Basic lunar and tidal data for Point Mugu, San Nicolas Island, and the Barking Sands Area during 1986 are provided. The data presented are (1) tidal data, (2) times of moonrise and moonset, (3) times of lunar phases, and (4) times of sunrise and sunset. GRA

N86-26785# Scripps Institution of Oceanography, La Jolla, Calif. Marine Physical Lab.
INFRASONIC AMBIENT OCEAN NOISE SPECTRA FROM FREELY DRIFTING SENSORS Summary Report
Richard L. Culver 30 Oct. 1985 51 p
(Contract N00014-82-K-0147)
(AD-A163413; MPL-U-52/85; SIO-REF-85-22) Avail: NTIS
HC A04/MF A01 CSCL 08/10

Self-contained Swallow Floats can record very low frequency (VLF) ambient ocean noise over extended periods of time. The autonomous buoys measure and record the components of particle velocity in the 1-10 Hz band. They can be ballasted to neutral buoyancy at a desired depth. The buoys generate and

receive high frequency acoustic signals which may be used to determine their relative positions. The deployment of several of these units forms a freely drifting array of sensors. Individual element time series may be combined coherently off-line using a beamformer, e.g., the MPL dynamic Beamformer. The Swallow float design minimizes self-noise which can limit accurate ambient ocean noise measurements. The floats drift freely and are not subject to flow noise or cable strumming. They measure particle velocity and are therefore insensitive to variations in local pressure. MPL has conducted Swallow float deployments annually since 1982. The 1982 deployment tested only the acoustic positioning system. Between 12 and 14 July 1983, three Swallow floats were deployed at a location approximately 50 miles west of San Diego. California and southeast of San Clemente Island (32'N, 118'W). Sea state during the deployment varied between 1 and 2. Water depth was approximately 1900 meters. Two of the floats deployed to a depth of about 1400 meters and the third deployed to the bottom. Measurements recorded by float 3 which deployed to 1400 meters have been analyzed and results are reported. GRA

N86-26786# Naval Postgraduate School, Monterey, Calif.
CHANGES IN THE OCEAN MIXED LAYER FOLLOWING EXTRAORDINARY ATMOSPHERIC FORCING M.S. Thesis
Theodore R. Mettlach Dec. 1985 95 p
(AD-A164703) Avail: NTIS HC A05/MF A01 CSCL 08/10

A one dimensional ocean planetary boundary layer model is used to predict the evolution of the thermal structure of the ocean mixed layer at six locations in the ocean following the hypothetical effects on the atmosphere of a major nuclear war. The inputs to the ocean model are the heat and momentum fluxes computed from a 3D climate model designed to simulate nuclear winter effects in the atmosphere. The experiment gives evidence that the summertime mixed layer can cool 5 C within 30 days and that the effect of increased wind along coastal regions due to sudden ocean-land temperture differences will deepen the mixed layer 20 to 30 meters. The scientific literature on the subject of nuclear winter is reviewed and interpreted to trace the evolution of the nuclear winter hypothesis and to assess the quality of the results of the mixed layer experiment. GRA

N86-26787# University of Southern Mississippi, Hattiesburg.
OCEAN FRONTAL AREAS. PHYTOPLANKTON ENUMERATION AND BIOMASS ESTIMATES -- OPERATION GUIDING LIGHT (APRIL - MAY 1985) Final Report
Gary Anderson and Daniel Gustafson Jan. 1986 76 p refs
(Contract N00014-85-K-0353)
(AD-A164985; AD-E751128) Avail: NTIS HC A05/MF A01 CSCL 06/3

During the pilot field exercise for Operation Guiding Light (April to May, 1985), 39 phytoplankton samples were collected in the continental shelf slope frontal region and 72 phytoplankton samples were collected in the Gulf Stream frontal region (both survey areas are located in the western North Atlantic Ocean). Samples were obtained using either a towed underwater pumping system (TUPS) at a depth of two meters or a rosette sampler (various depths) and were preserved for subsequent analysis. For each sample we identified (to species, where possible) enumerated and estimated biomass of the phytoplankton present. GRA

N86-26788# Science Applications International Corp., College Station, Tex.
A STUDY OF SEA ICE KINEMATICS AND THEIR RELATIONSHIP TO ARCTIC AMBIENT NOISE. PART 3, SECTION 1: AMBIENT NOISE. SECTION 2: AMBIENT NOISE Final Report, Mar. 1985 - Feb. 1986
James K. Lewis and Warren W. Denner Feb. 1986 327 p
(Contract N00014-85-C-0531)
(AD-A165304; AD-E301922; SAIC-85/1950-Pt-3;
SAIC-1-425-07-356-10-Pt-3-SEC) Avail: NTIS HC A15/MF A01 CSCL 08/12

This report details the kinematic analysis of sea ice motion data collected during the Arctic Ice Dynamics Joint Experiment (AIDJEX) in the Beaufort Sea. In addition, relationships between the ice kinematic parameters and associated ambient noise are presented. These relationships were determined by an extensive correlation process between the noise and ice motion time histories. Time scales of the various modes of ice motion were calculated by season. Also, seasonal time and space scales were calculated for ambient noise at 10 Hz, 32 Hz, and 1000 Hz. Contents of this section include: Seasonal Arctic Ambient Noise Variations, Beaufort Sea, 1975-1976; Two-Dimensional Contour Maps of Arctic Ambient Noise Variations, 8-9 August 1975 (Summer); and Two-Dimensional Contour Maps of Arctic Ambient Noise Variations, 16-17 November 1975 (Fall). GRA

N86-26789# Science Applications International Corp., College Station, Tex.
A STUDY OF SEA ICE KINEMATICS AND THEIR RELATIONSHIP TO ARCTIC AMBIENT NOISE. PART 3, SECTION 3: AMBIENT NOISE Final Report, Mar. 1985 - Feb. 1986
James K. Lewis and Warren W. Denner Feb. 1986 107 p
(Contract N00014-85-C-0531)
(AD-A165305; AD-E301922; SAIC-85/1950-Pt-3-Sec-3;
SAIC-1-425-07-356-10-pt-3-2) Avail: NTIS HC A06/MF A01 CSCL 08/12

This report details the kinetic analysis of sea ice motion data collected during the Arctic Ice Dynamics Joint Experiment (AIDJEX) in the Beaufort Sea. In addition, relationships between the ice kinematic parameters and associated ambient noise are presented. These relationships were determined by an extensive correlation process between the noise and ice motion time histories. Time scales of the various modes of ice motion were calculated by season. Also, seasonal time and space scales were calculated for ambient noise at 10 Hz, 32 Hz, and 1000 Hz. Contents of this section include: Seasonal Arctic Ambient Noise Temporal Autocorrelations, Beaufort Sea, 1975-1976; Seasonal Arctic Ambient Noise Spatial Autocorrelations, Beaufort Sea, 1975-1976; Seasonal Arctic Ambient Noise Power Spectra, Beaufort Sea, 1975-1976. GRA

N86-26790# Woods Hole Oceanographic Institution, Mass.
DATA TABULATIONS AND ANALYSIS OF DIURNAL SEA SURFACE TEMPERATURE VARIABILITY OBSERVED AT LOTUS (LONG-TERM UPPER OCEAN STUDY)
Clarke M. Bowers, James F. Price, Robert A. Weller, and Melbourne G. Briscoe Feb. 1986 55 p
(Contracts N00014-76-C-0197; N00014-84-C-0134)
(AD-A165406; WHOI-86-5) Avail: NTIS HC A04/MF A01 CSCL 08/10

Air/sea measurements from the Long-Term Upper Ocean Study (LOTUS) buoy in the Sargasso Sea are analyzed to learn how the diurnal response of sea surface temperature, delta T sub s, is related to the surface heating, H, and the wind stress, S. Data are taken from the LOTUS-3 and LOTUS-5 records which span the summers of 1982 and 1983. The basic data are shown in monthly plots, and the analyzed daily values of delta T sub s, H, and S are given in tables and in figures. Analyzed data show a clear trend of delta T sub s increasing with H and decreasing with S. A best-fit, three-parameter, empirical function can account for 90% of the variance in a screened subset of the LOTUS data (172 days) and 81% of the variance of the full data set (361 days). The analyzed data are also compared with a theoretical model function now used for ocean predictions in the Diurnal Ocean Surface Layer model (DOSL) of Fleet Numerical Oceanography Center. The DOSL model function was derived from the assumption that wind-mixing occurs by a mechanism of shear flow instability. It is fully predictive and shows a parameter dependence consistent with the LOTUS data over a wide range of H and S. THE DOSL model function can account for almost as much variance as the best-fit empirical function. GRA

N86-26791# Massachusetts Inst. of Tech., Cambridge. Marine Industry Advisory Services.
REMOTE SENSING AND OCEANOGRAPHIC EQUIPMENT TECHNOLOGY: SOME PRESENT SYSTEMS AND FUTURE NEEDS, REVISED
1 Aug. 1985 24 p Sponsored by NOAA

(Grant NA84AA-D-00046)
(PB86-156502; MITSG-85-21; OPPORTUNITY-BRIEF-41) Avail: NTIS HC A02/MF A01 CSCL 08C

Satellite sensing systems offer new capabilities for obtaining synoptic data which can be used for understanding the dynamics of the ocean. While satellites have expanded our potential for exploring the ocean, they have also increased the demand for extensive in situ measurements (footprints or 'ground truth') to calibrate the remotely observed data. Used together with computer models, in situ measurements and satellite measurements provide new insights into the dynamics of the ocean, such as the motions of warm core rings north of the Gulf Stream. Modelling, satellite imagery and in situ measurements are being combined in ways which promise very significant advances in studying natural phenomena. GRA

N86-26792# Old Dominion Univ., Norfolk, Va. Dept. of Biological Sciences.
IDENTIFICATION MANUAL FOR PHYTOPLANKTON OF THE UNITED STATES ATLANTIC COAST Final Report
H. G. Marshall Jan. 1986 144 p refs
(PB86-151222; EPA-600/4-86-003) Avail: NTIS HC A07/MF A01 CSCL 08A

The phytoplankton identification manual is designed for general usage by individuals who have not had formal training in phytoplankton systematics or access to the numerous keys and taxonomic references usually necessary to identify marine phytoplankton. The manual contains 173 species, representing 9 taxonomic groups, that the author considers among the more common species found on the United States eastern coast. The user is also provided with a list of additional identification references for the major taxonomic groups, phytoplankton studies for the United States east coast, and recommended collection and preparation techniques. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-26793# Johns Hopkins Univ., Baltimore, Md. School of Medicine.
MACROPHAGE STRUCTURE AND FUNCTION Final Report, 1 Feb. 1982 - 31 Jan. 1985
Thomas August 19 Dec. 1985 9 p
(Contract N00014-82-K-0221)
(AD-A163314) Avail: NTIS HC A02/MF A01 CSCL 06/1

Extensive progress has been made in the identification and characterization of several proteins active in the human immune response. These results are summarized as follows: Preparation of Monoclonal Antibodies; Identification of Cell Proteins; Characterization of the Human Lymphocyte Function Antigen (HLFA); The In Vitro Formation of Multinucleated Giant Cells Induced from Monocytes by Monoclonal Anti-HLA-DR; Antibodies that Inhibit the Mixed Lymphocyte Reaction (MLR). GRA

N86-26794# Office of Naval Research, London (England).
BIOTECHNICA '85 INTERNATIONAL CONGRESS FOR BIOTECHNOLOGY
Claire E. Zomzely-Neurath 27 Feb. 1986 24 p Congress held in Hannover, East Germany, 8-10 Oct. 1985
(AD-A165415; ONRL-C-13-85) Avail: NTIS HC A02/MF A01 CSCL 06/1

The First International Congress and Exhibition, Biotechnica! '85, which took place from 8 through 10 October 1985 at the Hannover Exhibition Grounds, was designed to provide an insight into the structure and growth potential of the relatively new biotechnology market. The congress, which included exhibitions, seminars, workshops, and panel discussions, focused on the commercial and industrial applications of biotechnology. The congress received support from the European Community because of its emphasis on fostering contacts between industry and academia. Over 170 companies, as well as research institutes and universities from 15 countries, disseminated information about current developments in research, laboratory equipment, and production techniques. The topics in the scientific program presented at the symposia sessions were divided into three general areas: (1) measurement of process control and development of models; (2) biocatalyst preparation, utilization, and improvement; and (3) animal and plant cell cultures. GRA

N86-26795# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
DEVELOPMENT, GROWTH AND TIME
Paul M. B. Vitanyi Aug. 1985 20 p Revised Submitted for publication
(CWI-CS-R8516; B8575498; ESA-86-97007) Avail: NTIS HC A02/MF A01

A simple mathematical model for filamentous growth and development is proposed. The model relates stereotype elemental (cellular) behavior to empirically observed overall growth curves. The sigmoidal growth curves are obtained. The separation of subjective or physiological time of the organism from objective or absolute, and the relation between them are emphasized. The underlying philosophy is related to Lindenmayer's developmental model. ESA

N86-26796 Washington Univ., Seattle.
THE ROLE OF THE OCEANS IN THE ATMOSPHERIC CYCLE OF CARBONYL SULFIDE
James Elmer Johnson 1985 111 p
Avail: Univ. Microfilms Order No. DA8529909

The magnitude of the global air-sea flux of carbonyl sulfide (OCS) was assessed. Air and seawater concentrations of OCS from the equator to the Aleutian Islands were measured. The Henry's law constant of solubility for OCS was measured in the laboratory for filtered and boiled seawater at three temperatures. These measurements show: (1) the atmospheric concentration of OCS is very constant and the latitudinal gradient, if any, is small, with a maximum gradient of 7% between 50 deg N and the equator; (2) the ocean surface layer is supersaturated with OCS and is therefore a source for the atmosphere instead of a sink; (3) there appears to be a subsurface maximum in the OCS concentration in the oceanic mixed layer in tropical waters; (4) values for the solubility of OCS in seawater are 10% lower than reported elsewhere; (5) a history of measurements of atmospheric OCS by four groups shows that any secular trend in atmospheric OCS is less than 3%/ yr; (6) the budget for atmospheric OCS is still not well understood. Dissert. Abstr.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-26797* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Jun. 1986 105 p
(NASA-SP-7011(285); NAS 1.21:7011(285)) Avail: NTIS HC A06/MF A01 CSCL 06E

This bibliography lists 319 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1986. Author

N86-26798# Naval Ocean Systems Center, San Diego, Calif.
MECHANISM OF ELECTROMAGNETIC ENERGY EFFECTS ON THE NERVOUS SYSTEM: VOLTAGE-CLAMP STUDY Final Report, Oct. 1981 - Sep. 1984
C. L. Brandt and N. L. Campbell Jul. 1985 69 p refs
(AD-A164653; NOSC/TR-1051) Avail: NTIS HC A04/MF A01 CSCL 06/18

Low-level microwave energy at a frequency of 2.45 GHz has

been previously observed to alter the firing frequency of Aplysia californica neurons. This study was undertaken to search out the mechanism of this microwave effect by examining the influences of microwave energy on specific ion currents across the cell membrane that influence the cell's firing frequency. Late outward K(+) current was examined and showed no statistically significant change during microwave exposure. The membrane current shape during voltage clamping (the summation of several different ionic currents) also showed no change during exposure except in one instance when exposure was concurrent with the application of Na(+) free artificial sea water. GRA

N86-26799# Boston Univ., Mass. School of Medicine.
FLUID-ELECTROLYTE-MINERAL INTERRELATIONS AS AFFECTING WORK PERFORMANCE Final Report, 18 Jun. 1984 - 1 Jul. 1985
Morteza Janghorbani Nov. 1985 39 p
(Grants DAMD17-84-G-4012; DA Proj. 3E1-62777-A-879)
(AD-A165325) Avail: NTIS HC A03/MF A01 CSCL 06/16

This is the Final Report dealing with development of stable isotope approaches for the study of water-electrolyte balance dynamics in relation to exercise in heat. This progress report describes the development of analytical chemistry of labeled water (H2O18) and rubidium as tracers for the measurement of body water and its dynamics and intracellular mass and its correlates. The methods used in these studies are based on Isotope Ratio Mass Spectrometry (IR/MS) and Inductively Coupled Plasma Mass Spectrometry (ICP/MS). It is shown clearly that both these methods can be used effectively for simultaneous measurement of body water and body rubidium and their correlates in human adults. Author (GRA)

N86-26800# Army Research Inst. of Environmental Medicine, Natick, Mass.
PERCEPTUAL AND PHYSIOLOGICAL RESPONSES DURING EXERCISE IN COOL AND COLD WATER
Michael M. Toner, Lawrence L. Drolet, and Kent B. Pandolf 1986 11 p
(AD-A165491) Avail: NTIS HC A02/MF A01 CSCL 06/19

This investigation examined the interaction of exposure to cold water stress with both perceived exertion and thermal sensation during exercise. Eight male volunteers performed arm, leg and combined arm and leg exercise for 45 min in water at 20 and 26 C. Exercise was performed at a low (n = 7) and a high (n = 8) intensity relative to the ergometer specific peak oxygen uptake (VO2 peak). In general, percent VO2 peak did not differ (p greater than 0.05) between type of exercise in either 20 or 26 C water. During low intensity exercise when power output was matched across water temperature (T sub w), percent VO2 peak was greater (P less than 0.05) in 20 C water (52%) compared to 26 C water (42%). Ratings of perceived exertion (RPE) did not differ (p greater than 0.05) between T sub w. During high intensity exercise when percent VO2 peak was matched across T sub w, RPE was low (P less than 0.01) during exercise in 20 C (X = 12.9) compared to 26C (X = 13.9). Multiple correlation analyses comparing both final RPE and thermal sensation (TS) with physiological and thermal measures were performed across type of exercise and T sub w. These data suggest that the change in oxygen uptake associated with exercise in cold water does not add to the overall perception of exertion. This perception appears to be related to cardiopulmo nary variables rather than thermal measures, whereas thermal sensation is related to thermal measures and not cardiopulmonary variables. GRA

N86-26801# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Thermophysiology Group.
INDIVIDUAL PARAMETERS IN THERMOREGULATORY CONTROL; A REVIEW
G. Havenith Dec. 1985 86 p Sponsored by Netherlands Central Organization TNO , Delft
(IZF-1985-26; TDCK-86-0429; ESA-86-96943) Avail: NTIS HC A05/MF A01

Variations in human thermoregulatory behavior caused by differences in sex, age, anthropometric measures, hydration state, and circadian rhythm were studied. In order of significance, factors which affect the variations are: state of acclimatization (defined by sweat characteristics); physical fitness (circulatory capacity); hydration state (plasma osmolality and volume); anthropometric measures (body surface, fat, inactive body mass); and time of day. ESA

N86-26802# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Aerospace Medical Panel.
VISUAL PROTECTION AND ENHANCEMENT
Loughton, England Dec. 1985 230 p refs In ENGLISH and FRENCH Conference held in Athens, Greece, 22-24 Apr. 1985
(AGARD-CP-379; ISBN-92-835-0384-8) Avail: NTIS HC A11/MF A01

Vision is the preeminent sensory channel through which the aviator obtains information necessary for the control of his aircraft and the execution of his operational role. Recognizing this to be important, all reasonable and practical means of enhancing and protecting vision should be adopted. The papers presented considers not only systems for visual protection and enhancement but also addressed the basic physiological and pathological mechanisms underlying existing and future solutions. For individual titles, see N86-26803 through N86-26825.

N86-26803# Army Electronics Research and Development Command, Fort Belvoir, Va. Night Vision and Electro-Optics Lab.
IMAGE INTENSIFIERS: PAST AND PRESENT c35
Robert W. Verona *In* AGARD Visual Protection and Enhancement Dec. 1985 5 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The evolution of the image intensifier is presented from the first through the third generation. Technological advancements during the past two decades, such as the microchannel plate and the gallium arsenide photocathodes, have significantly improved the image intensifier's projected life time and performance capabilities. Improved manufacturing techniques have contributed to the intensifier's extended life and expanded performance capabilities. This continued progress attests that the image intensifier continues to be a viable sensory extension helping man achieve his goal, the conquest of darkness. Author

N86-26804# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
FLIR, NVG AND HMS/D SYSTEMS FOR HELICOPTER OPERATION: REVIEW c74
H.-D. V. Boehm *In* AGARD Visual Protection and Enhancement Dec. 1985 27 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

In the last decade, electro-optical systems have been used successfully in military and civil applications. They extend the scope of operation of ground vehicles, helicopters and fixed wing aircraft from daytime into nighttime, with a 24 hour readiness covering even bad weather conditions. The visual aids fall into two physical categories: the image intensifiers, which amplify reflected residual light in the near infrared and the thermal imager, which detect the thermal radiation of all bodies mainly in the 8 to 12 micrometer atmospheric window for bodies with T approx. 20 C. During the last five years, the investigator has carried out helicopter flight trials at night using examples of all these visionic aids (FLIR, LLLTV, NVG, HMS/D and Direct View Optics) for piloting and observation tasks. The detection, recognition and identification range of nine different FLIR were tested in ground and laboratory tests. The evaluation of an optical sensor platform location in the helicopter nose-, roof- and mast-mounted versions, the comparison of thermal and intensifier images and the NVG compatible cockpit were topics of the tests. The optical sensors are described with their limitations and some results of the trials are given, with regard to the pilot's stress situation and eye safety. Author

N86-26805# German Army Aviation School, Bueckeburg (West Germany).
OPERATIONAL EXPERIENCES WITH NIGHT VISION GOGGLES IN HELICOPTER LOW-LEVEL FLIGHT AT NIGHT c54
Hermann Haidn *In* AGARD Visual Protection and Enhancement Dec. 1985 8p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The operational marginal conditions are described with regard to the threat analysis in the Central European theater. This is supplemented by a presentation of the technological and physical aspects of the available visual sensors, such as helmet mounted night vision goggles, low light level television, and forward looking infrared and their employment as pilotage aids within the helicopter cockpit. Also, a description is given of the work capabilities and limitations inherent with the employment of electro-optical vision aids. This involves a comparison of the visual capabilities of the unaided eye during low level flight with Moon illumination at night, conditions during reduced light levels, and viewing the same scene with electro-optical sensors. The requirement for glare protection within the cockpit is discussed and different solutions are represented. An exceptional and difficult problem to solve is currently presented by positive position fixing under the given circumstances. Aids and procedures to improve navigation were devised and are now successfully in use. Finally, the results of interviews with helicopter pilots, who have long term experience with the use of helmet mounted night vision goggles are discussed. Author

N86-26806# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
EVALUATION OF HELICOPTER HELMET-MOUNTED DISPLAY MOCK-UP c06
Guy Santucci and Claude Valot *In* AGARD Visual Protection and Enhancement Dec. 1985 14 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A psychophysiological investigation was conducted on a mockup to evaluate a helmet mounted FLIR display. This experiment included laboratory and inflight testing. Laboratory testing included angular visual acuity, contour perception and stereoscopic acuity. Electrooculography was used to test binocular behavior under monocular stimulation (interocular synergy, binocular rivalry, optokinetic nystagmus). Results showed decreased angular and stereoscopic acuity, and provided a better understanding of eye activity components in this situation. Inflight testing: stressful perception was evidenced during low level helicopter flight, which can be either an overestimation of distances and altitude by active pilots, or an underestimation of these parameters by passive pilots. An illusory sensation was observed under certain binocular uses of helmet mounted displays. It concerns contour vision. Hypotheses are formulated for these various sensory changes. Author

N86-26807# Naval Air Development Center, Warminster, Pa.
VISUAL AND SPECTRORADIOMETRIC PERFORMANCE CRITERIA FOR NIGHT VISION GOGGLES (NVG) COMPATIBLE AIRCRAFT INTERIOR LIGHTING c54
William A. Breitmaier and Ferdinand Reetz, III *In* AGARD Visual Protection and Enhancement Dec. 1985 11 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A draft military specification for NVG-compatible aircraft interior lighting was developed. The specification is based on the utilization of a specific type of NVG, the AN/AVS-6 Aviators Night Vision Imaging System (ANVIS). The performance requirements and testing methodology established in the specification and the rationale for developing these requirements are described. The performance requirements are affected by three factors: luminance, chromaticity, and ANVIS compatibility. Luminance requirements do not change drastically from the requirements that presently exist for interior lighting. However, the chromaticity requirements of green for primary and secondary lighting, and yellow for both master caution and warning indicators are different from those that presently exist. The reason for this change is that any lighting with a significant amount of red energy cannot be used in a cockpit that is required to be ANVIS compatible. The implications for this new color design for cockpit lighting are discussed together with the rationale for the chromaticity coordinates and limits chosen. ANVIS compatibility is defined in terms of the spectral sensitivity of the ANVIS and the combination of spectral radiance of the cockpit lighting and the outside world night radiance. Quantitative testing methodology for determining ANVIS compatibility of cockpit lighting is also discussed. A thorough description of all analytic and laboratory studies performed in support of this specification development is presented. Author

N86-26808# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
NIGHT VISION SUPPORT DEVICES: HUMAN ENGINEERING INTEGRATION c74
Louis V. Genco *In* AGARD Visual Protection and Enhancement Dec. 1985 8 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Although NVGs extend the luminance range over which vision can be used, current AN/PVS systems require special cockpit lighting to be fully effective, reduce visual depth of field and diminish the field of view. All three of these factors are extremely important to pilots performing night operations. The results of several operationally oriented efforts conducted by the U.S. Air Force to improve visual performance, cockpit lighting, and flight information transfer in conjunction with the use of NVGs are described. The efforts include an operational definition of NVG compatible lighting, a recommended approach to improving depth of focus, an attempt to expand field of view, and a description of a NVG HUD using optically injected flight data. All efforts center around using or modifying current AN/PVS NVGs used by US forces. Author

N86-26809# Army Aeromedical Research Lab., Fort Rucker, Ala.
MICRO-HEADS-UP DISPLAY FOR ENHANCEMENT OF NIGHT VISION GOGGLE OPERATIONS c06
R. Simmons, K. Kimball, and B. Hamilton *In* AGARD Visual Protection and Enhancement Dec. 1985 9 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A series of investigations which were initiated in 1976 and completed in March 1984 by the US Army addressed the utility of providing a subminiature heads-up flight instrument display for the NVG system. The research first attempted to identify critical flight information that should be provided to supplement the degraded environmental cues during NVG operations. Subsequent research explored methods of presentation (digital vs. dynamic information), in-line mounting of the display to NVG, and in-flight human factor considerations of the total system. Author

N86-26810# Army Aeromedical Research Lab., Fort Rucker, Ala.
AEROMEDICAL LESSONS LEARNED WITH NIGHT VISION DEVICES
Dudley R. Price and William E. McLean *In* AGARD Visual Protection and Enhancement Dec. 1985 10 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A review of night vision devices used in the military helicopter flight environment is presented, along with aeromedical lessons learned. Discussion revolves around experience with three U.S. Army aviation systems: the currently used second-generation night vision goggle (NVG), or AN/PVS-5; the soon-to-be-fielded AN/AVS-6 third-generation NVG; and the AH-64 Apache thermal sensor and imaging system. Performance characteristics are presented, and primary emphasis is on aeromedical research related to pilot interface with the systems to include visual acuity, contrast sensitivity, depth discrimination, dark adaptation, crew fatigue, and adaptational problems. Author

N86-26811# Marconi Avionics Ltd., Rochester (England). Airborne Display Div.
NIGHT VISION BY NVG WITH FLIR c74
G. C. Bull *In* AGARD Visual Protection and Enhancement Dec.

1985 7 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Night Vision Goggles and fixed forward looking infrared equipment both have particular operational shortcomings when used in a fixed wing aircraft for close air support at night. However, when operated together, they compensate for each others deficiencies forming a highly capable system at far less cost and complexity compared with other night vision systems. Author

N86-26812# Hamburg Univ. (West Germany). Dept. of Ophthalmology.
PARTICULAR PROBLEMS OF AIRWORTHINESS FROM AN OPHTHALMOLOGICAL VIEW
J. Draeger, K. Hanke, and H. Wirt *In* AGARD Visual Protection and Enhancement Dec. 1985 3 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Navigation of aircrafts depends on visual acuity and optical perception in the main. Therefore ophthalmological evaluation is of major importance in aviation medicine. Each country uses its own national medical standards for the three different pilot classes. But there still remain applicants not exactly meeting these standards. In West Germany, a special expert board is competent for these borderline cases in civil aviation. Some examples are given from the practice of this board showing the particular problems of appropriate decisions. Also the major differences of national regulations between West Germany and the USA are discussed, comparing civil and Air Force standards. Author

N86-26813# Letterman Army Inst. of Research, San Francisco, Calif.
COMPUTER VISUAL SIMULATION OF CONTRAST SENSITIVITY DEFICITS INDUCED BY LASER AND CHEMICAL ANTIDOTE EXPOSURE c54
H. Zwick, D. Monroe, and L. Sherman *In* AGARD Visual Protection and Enhancement Dec. 1985 4 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Training in some complex combat related tasks may produce a degree of transient visual impairment which may simulate what could be expected in combat. A method is presented for simulating visual impairment produced by potential combat conditions. The use of a computer to both digitize and store as well as produce the simulated image has provided an ideal tool for research. The degree of realism provided by such simulation offers suggestions for development of more realistic training techniques Author

N86-26814# Hamburg Univ. (West Germany). Dept. of Ophthalmology.
NEW GLASSES FOR PRESBYOPIC PILOTS
J. Draeger, H. Wirt, and K. Hanke *In* AGARD Visual Protection and Enhancement Dec. 1985 3 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Presbyopia is a physiological condition starting by an age of about 40 and increasing steadily with age until accommodation ceases around 55. This means that the naked eye is not able to read instruments and charts in near distance. In a fighter cockpit the information of the head-up display is projected on to the windscreen. Therefore, the pilot has to share his attention between infinity and the projected image of the head-up display, focussing and defocussing very quickly between both distances, always looking straight. This reaction slows down with age. In an experimental study an attempt was made to investigate this complex problem and to test certain solutions. A group of untrained presbyopic subjects were asked to perform specifically designed tasks of assembling small parts and were fitted with different multifocal glasses. In three different ranges and different levels, approximately according to the distance in a cockpit, they had to differentiate and to grasp small electronic elements and to fix them on an electronic plate. The time needed and the mistakes were noted and compared. The evaluation showed much better results for those subjects which had with their glasses the greatest visual field for each specific range and level. E.R.

N86-26815# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
CONTACT LENSES FOR PILOTS AND AIRCREW IN THE SERVICES
J. K. Cloherty *In its* Visual Protection and Enhancement Dec. 1985 12 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

After working for five years in the contact lens department of Moorsfields Eye Hospital in London and after fitting and monitoring forty volunteers in the RAF Aircrew Soft Contact Lens Trial, it is the opinion of the author that high water content soft contact lenses, or silicone lenses, used as extended wear lenses, are the only contact lenses which are suitable in an aircrew service environment. The fitting and monitoring of such lenses must be carried out by experts in the field of contact lenses. Author

N86-26816# National Aerospace Medical Centre, Soesterberg (Netherlands).
DYNAMIC BEHAVIOUR OF SPHERICAL AND ASPHERICAL CONTACT LENSES EXPOSED TO +Gz-ACCELERATION FORCES c54
H. Punt, A. C. H. vandenHeuvel, H. H. vandenBiggelaar (Royal Netherlands Air Force, The Hague.), G. J. Hoekstra, and A. J. P. Rouwen (Militair Hospitaal Dr. A. Mathijsen, Utrecht (Netherlands).) *In* AGARD Visual Protection and Enhancement Dec. 1985 5 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A study was made of the behavior of two types of hard contact lenses fitted to a young myopic pilot and exposed to +Gz-acceleration forces. The degree of dislocation of the hard lenses was studied as was the pathological phenomena of the cornea under increasing +Gz-forces. The two types of the evaluated contact lenses are a conventional spherical polymethylmethacrylate (PMMA) lens and an aspherical gas-permeable lens. In a human centrifuge a test person was exposed to +Gz-forces increasing from +1 to +9 Gz. In the gondola a videotelecamera was focussed at the head of the test person during the total test session. It could be concluded that the aspherical gas-permeable contact lenses maintained an optimal concentration under all circumstances. The conventional hard contact lenses with a spherical base curve and a smaller diameter showed downward decentration under increasing +Gz-loads from +6 Gz to a peak value of 8.6 Gz. However, the dislocation never caused the contact lens to leave the cornea. The results are discussed in relation to practical consequences for pilot flying high performance aircraft. Author

N86-26817# Letterman Army Inst. of Research, San Francisco, Calif.
EFFECTS OF BROAD-BANDED EYE PROTECTION ON DARK ADAPTATION
H. Zwick, T. A. Garcia, E. S. Beatrice, and K. R. Bloom *In* AGARD Visual Protection and Enhancement Dec. 1985 8 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Modern combat scenarios require soldiers to perform military tasks under night time conditions. While image enhancement devices are vital to such military performance, unimpaired human night vision retinal mechanisms are essential for performance success. Protection of the human biological sensor is of utmost importance. In this investigation, earlier findings indicating that sunglasses could prevent deleterious effects of bright light on dark adaptation are reexamined. It was found that the use of broad band attenuating spectacles could improve absolute visual thresholds but they had minimal effect on central retinal mechanisms. Dark adaptation functions measured with long wavelength light showed no significant sunglass effect; whereas, such functions measured with intermediate spectral light decreased in final visual thresholds. These differential effects were obtained under environmental light conditions insufficient to produce an evaluation in final visual thresholds for control group subjects not provided with

sunglasses. The results strongly support previous arguments for providing standard visible and near ultraviolet protection to personnel required to perform military tasks under extremely bright environmental light. Author

N86-26818# School of Aerospace Medicine, Brooks AFB, Tex.
EYE PROTECTION AGAINST INTENSE LIGHT SOURCES
Donald N. Farrer *In* AGARD Visual Protection and Enhancement Dec. 1985 3 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The assessment of modern techniques for the protection of the eyes against laser radiation must begin with the careful evaluation of these stimuli within the context of impairment of useful work. Occupational safety and health standards were designed to define exposure limits of laser systems to prevent damage. However, an eye hazard may not exist within some exposure conditions (e.g., glare, dazzle, or reversible scotoma) in which functional vision impairment could result in job performance failures. Additionally, eye protection devices should not induce impairment properties. It is within this context that this research program was designed. The identification of laser threats, effects on functional vision and eye protective device properties are important considerations for successful aircrew performance. The vast array of intense light sources which represent threats to functional vision, introduces significant challenges for this research area. Author

N86-26819# WWDBw ABC-Schutz, Munster (West Germany).
CALCULATIONS ON TECHNICAL REQUIREMENTS FOR PROTECTION DEVICES AGAINST A NUCLEAR LIGHT FLASH
W. Rehmann and H. Sesterhenn *In* AGARD Visual Protection and Enhancement Dec. 1985 11 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Preliminary calculations on the requirements for protective devices against permanent retinal burns caused by nuclear detonations were based on a simplified model which was also used for this study. Computations concerning the reversible flash blindness of flight crews caused by a nuclear explosion is studied as well as the resultant technical requirements to be met by antiflash eye protection systems. In the low yield nuclear range the computations led to shutter times which are technically unfeasible at the present time. Therefore, additional computations were made to determine the periods of blindness occurring when technically feasible antiflash eye protection systems are used. They were then compared with the periods of blindness to be expected under identical conditions but without antiflash eye protection systems. Author

N86-26820# WWDBw ABC-Schutz, Munster (West Germany).
GERMAN DEVELOPMENT OF A LC-FLASHBLINDNESS DEVICE c74
W. Rehmann and H. Sesterhenn *In* AGARD Visual Protection and Enhancement Dec. 1985 6 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

A research program was conducted on the feasibility of flash blindness protection by liquid crystal techniques. The result was the development of a reversible fast optical shutter basically consisting of a liquid crystal cell enclosed in 2 crossed polarizers, which provided promising data for an application for flash blindness protection. Shutter times were in the range of 50 to 80 microseconds, an open state transmittance of 0.25 to 0.30 is state of the art. The closed state transmittance amounts to .0001 to .00001. Author

N86-26821# Naval Air Development Center, Warminster, Pa. Life Sciences Research Group.
THE APPLICATION OF DIFFRACTION OPTICS TECHNIQUES TO LASER EYE PROTECTION
Gloria T. Chisum *In* AGARD Visual Protection and Enhancement Dec. 1985 4 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

Development of a method of protecting the eyes of military personnel from laser radiation has been pursued for a number of years. The devices developed have marginal acceptability, particularly for aircrew personnel. Efforts underway to develop a holographic diffraction grating protection device indicate that such a device is feasible and that the requirements of high transmittance, multiple wavelength rejection and configuration suitable for aircrew use can be met. Author

N86-26822# Letterman Army Inst. of Research, San Francisco, Calif.
FOVEAL FLASHES AND HUMAN PERFORMANCE
D. I. Randolph, E. T. Schmeisser, and E. S. Beatrice *In* AGARD Visual Protection and Enhancement Dec. 1985 6 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The role of several variables in the production of a flash which would reduce the ability of humans to detect and discriminate targets, functions which are required of both air and ground troops is determined. Four volunteers were exposed to xenon gas discharge tubes with different retinal spot sizes and flash durations. The task consisted of a reaction time experiment in which the subjects detected both the presence and orientation of a striped grating which subtended 0.57 deg at the retina. Three grating contrasts at three pattern-background contrasts were presented in a pseudo random order. Three flash conditions were used. The results showed that the larger image size and longer flash durations produced significantly poorer performance on both the detection and discrimination tasks. For the smallest retinal spot size, and the shortest flash condition, the detection but not the discrimination times were faster than the nonflash trials. This indicated that while the flash may have acted as a preparatory signal, more complex pattern processing remained sensitive to the flash. Author

N86-26823# Letterman Army Inst. of Research, San Francisco, Calif.
PERMANENT VISUAL CHANGE ASSOCIATED WITH PUNCTATE FOVEAL LESIONS
H. Zwick, K. R. Bloom, and E. S. Beatrice *In* AGARD Visual Protection and Enhancement Dec. 1985 8 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

In order to understand battlefield hazards of laser exposure under field conditions, it has been necessary to evaluate effects of small punctate foveal lesions on visual function of nonhuman primates. Previous experiments have found a correlation between functional loss and foveal damage. The present investigation showed that detecting the effects of small foveal lesions is not an easy task. From the results, the possibility that considerable foveal damage could occur before a measurable change in visual function could be detected with presently available visual function testing procedures is apparent. It is recommended that more sensitive visual function test procedures, such as clinical tests that measure both spectral and spatial resolution under threshold contrast conditions. Author

N86-26824# British Aerospace Public Ltd. Co., Kingston-upon-Thames (England). Systems Engineering Dept.
VISUAL DIFFICULTIES ASSOCIATED WITH FUTURE WINDSCREEN AND HUD INTEGRATION c74
A. J. Hulme and K. F. Shrubb *In* AGARD Visual Protection and Enhancement Dec. 1985 9 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The integration of a binocular HUD and the windscreen requires the consideration of a number of optical parameters if the HUD symbology is to be superimposed on the real world scene without giving rise to unacceptable visual difficulties. These parameters are described as are the causes of these difficulties, and a number of experiments carried out during these investigations are reported. The significance of these results for future aircraft and their operations is discussed. Author

N86-26825# British Aerospace Public Ltd. Co., Lancashire (England). Cockpit Specialist Group.
HUMAN FACTORS: THE CINDERELLA DISCIPLINE IN COCKPIT INTERFACE DESIGN **c54**
K. W. Martin and J. Laycock (Royal Aircraft Establishment, Farnborough, England) *In* AGARD Visual Protection and Enhancement Dec. 1985 10 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

The present trend in military aircraft design towards compact cockpits, multifunction controls and displays, and integrated systems within more agile and smaller airframes, has resulted in a greater need for human factors involvement in the design of the man machine interface. The cockpit of the modern military aircraft is inevitably a compromise of conflicting design disciplines, and one in which human factors fails to achieve any long term influence because the discipline lacks the absolute argument necessary for survival in the industrial environment. If human factors are to establish the degree of influence the current levels of research justify, then a new approach is necessary. This approach must recognize the practical problems associated with the design and manufacture of the integrated weapons delivery system that future aircraft represent. One possible approach may be the generation of human factors design tools, for use by engineers, which incorporate human sensory emulations and provide outputs that can be integrated into the engineering discipline. Author

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-26826 Groningen Rijksuniversiteit (Netherlands). Traffic Research Center.
DRIVING PERFORMANCE THE DAY AFTER USE OF LOPRAZOLAM, FLUNITRAZEPEM AND PLACEBO
E. R. Volkerts, G. deVries, T. Meijer, and J. F. OHanlon Jun. 1984 66 p Revised Sponsored in part by Netherlands' Ministerie van Onderwijs en Wetenschappen and Roussel-UCLAF, France
(VK-83-04; ISBN-90-6807-005-3; B8561714; ISSN-0167-8590; ESA-86-96948) Copyright. Avail: Issuing Activity

In order to determine if loprazolam, a mild hypnotic drug, has residual effects on driving performance and if a dose-effect relationship exists, 16 female subjects performed a driving test in 1 of 4 conditions. Loprazolam was administered in doses of 1 mg and 2 mg in conditions 1 and 2; flunitrazepam in a dose of 2 mg was administered as the active drug control in the third condition; and a placebo was given in the fourth condition. Nightly doses of loprazolam 1 mg and flunitrazepam 2 mg can slightly degrade driving performance the following day, but the degree of impairment seems insufficient to preclude the drugs' use by drivers. Nightly doses of loprazolam 2 mg can seriously degrade driving performance for up to 17 hours and this dose is not recommended for use by drivers. ESA

N86-26827 Groningen Rijksuniversiteit (Netherlands). Traffic Research Center.
THE EFFECTS OF THE ANTIDEPRESSANTS OXAPROTILINE, MIANSERIN, AMITRYPTILINE AND DOXEPIN UPON ACTUAL DRIVING PERFORMANCE
Jan Willem Louwerens, Karel A. Brookhuis, and James F. OHanlon Jun. 1984 77 p Sponsored in part by Netherlands' Ministerie van Onderwijs en Wetenschapsbeleid and Ciba-Geigy AG, Basle, Switzerland
(VK-83-05; ISBN-90-6807-006-1; B8561711; ISSN-0167-8590; ESA-86-96949) Copyright. Avail: Issuing Activity

The effects of antidepressants and a placebo were compared using a driving test. Five treatments were administered to 20 healthy young male volunteers on separate days, spaced at least 5 days apart. These were: oxaprotiline, amitryptiline and doxepin 75 mg (25 mg tid); mianserin 30 mg (10 mg tid); and placebo. Doses of each drug and placebo were administered 10, 6, and 2 hours before tests. Oxaprotiline is generally without adverse acute effects upon driving performance, but may produce either impairment or improvement in particular individuals. Amitryptiline, mianserin and doxepin, in that order, have adverse acute effects on driving performance. Individuals suffering impairment as a consequence of antidepressants' acute effects can recognize the implications for driving safety and cease driving, while others cannot, and continue driving with progressively deteriorating performance until their safety is seriously compromised. ESA

N86-26828# Yale Univ., New Haven, Conn. Dept. of Psychology.
COMPONENTS OF VERBAL INTELLIGENCE Final Report, 1 Oct. 1982 - 30 Sep. 1985
Robert J. Sternberg 30 Dec. 1985 47 p
(Contract N00014-83-K-0013)
(AD-A163359) Avail: NTIS HC A03/MF A01 CSCL 05/10

This project develops and tests a theory of the components of verbal intelligence. Alternative theoretical frameworks for understanding verbal intelligence are reviewed, and then a componential theory of verbal comprehension is proposed. The theory specifies the information-processing components, context cues, and mediating variables underlying acquisition of word meanings from context. A number of experiments testing and supporting the theory are described, including experiments involving both internal and external context. Instructional experiments are also described, and it is concluded that the theory is well supported by the data, and moreover, that it can serve as a useful basis for training people in how to learn meanings of words from context. The theory is extended to novel kinds of concepts as well, and it is shown that the learning of novel concepts involves an interaction between linguistic and conceptual unfamiliarity. In a series of experiments on causal inference involving verbal versus symbolic-abstract materials, it is shown that although a core of logical operations is applied to both verbal and abstract materials, special processes are involved when people reason about meaningful verbal materials. GRA

N86-26829# Xerox Palo Alto Research Center, Calif.
ACQUIRING PROCEDURAL SKILLS FROM LESSON SEQUENCES Final Report, 1 Jan. 1982 - 15 Jun. 1985
Kurt A. Vanlehn 13 Aug. 1985 53 p
(Contract N00014-82-C-0067)
(AD-A164580; ISL-9) Avail: NTIS HC A04/MF A01 CSCL 05/10

This report provides an informal overview of a theory that describes how people learn certain procedural skills, such as arithmetic and algebra, from multi-lesson curricula. The central hypothesis is that students and teachers obey conventions that cause the goal hierarchy of the acquired procedure to be a particular structural function of the sequential ordering of lessons. This learning theory is an extension of Repair Theory, which describes how people mix interpretation and a certain type of meta-level problem solving as they try to solve practice problems. The learning theory has been embedded in a program that generates detailed predictions about the products of published curricula. The predictions have been tested against data from several thousand mathematics students. GRA

N86-26830# Naval Postgraduate School, Monterey, Calif.
CHANGES IN NAVAL AVIATION BASIC INSTRUMENT FLIGHT TRAINING: AN ANALYSIS M.S. Thesis
James Y. Wallace, III Dec. 1985 108 p
(AD-A164738) Avail: NTIS HC A06/MF A01 CSCL 05/9

This thesis evaluates a modification to the Navy's Basic Instrument flight instruction, the performance of two groups of student aviators was compared. The modifications consisted of a lecture concentrating on the fundamentals of attitude instrument flight. One group of 100 students received the new training while a control group of 100 students did not. Analysis of the flight grades of the two groups revealed no significant difference in

their performance. Based on the results of this research it was concluded that the modified basic instrument training did not improve the performance of student naval aviators. However, the modified lecture and training did improve the student's understanding of basic instrument fundamentals. The study recommended that the modified lecture should be continued as part of the syllabus because the benefits from affording the student aviators with additional training exceed the small costs involved. ign, Flight skills acquisition. GRA

N86-26831# Vanderbilt Univ., Nashville, Tenn. Dept. of Psychology.
INTERACTION OF IMAGE CHARACTERISTICS OF STEREOSCOPIC FORMS DURING DEPTH PERCEPTION Final Report, 1 Oct. 1980 - 30 Jun. 1984
Robert Fox Aug. 1985 35 p refs
(Contract N00014-81-C-0001)
(AD-A164895; N14-0001-85C-0001) Avail: NTIS HC A03/MF A01 CSCL 06/16

The primary objective of this research program was to determine the degree of congruence between the apparent or perceived depth position of a stereoscopic form and the position predictable from the physical conditions of stimulation. This topic, which bears directly on the veridicality or validity of depth information presented in a stereoscopic or 3-d display, has been investigated previously under restricted laboratory conditions that yield results of limited generality. For that reason, the present inquiry was pursued under naturalistic conditions similar to those that would obtain during the routine operation of visual displays. To gain insights into potential interactions between depth position (X-axis) and stimulus configuration (X- and Y-axes), stereoscopic forms were created from dynamic random element stereograms continuously generated electronically. This approach precluded the occurrence of non-stereoscopic cues that can arise in conventional depth displays. GRA

N86-26832# School of Aerospace Medicine, Brooks AFB, Tex.
THE HEALTHY MOTIVATION TO FLY: NO PSYCHIATRIC DIAGNOSIS Final Report, 1 Jul. - 31 Aug. 1985
Robert R. Adams and David R. Jones Nov. 1985 15 p refs
(AD-A164944; USAFSAM-TR-85-77) Avail: NTIS HC A02/MF A01 CSCL 05/10

Aircrew mission effectiveness may uniquely be influenced by subtle psychological factors, not ordinarily brought to the attention of psychiatrists. Pilots tend to be bright, articulate, and anxious to resume their aviation duties when grounded. However, these patients are usually well defended, and rarely psychologically attuned or introspective. Greater insight into what constitutes the normal, healthy motivation to fly will help those who make judgements regarding the return of grounded aviators to flying duty. A review of associated birth order, personality theory, industrial and business psychology, aerospace, and psychoanalytic literature is presented. Highlighted are the difficulties inherent in examining the motivation of a healthy, well-defended population. Our conclusion: an examiner's countertransferential feelings are the best available tool for measurement of healthy motivation. GRA

N86-26833# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
THE ROLE OF ELABORATIONS IN INSTRUCTIONAL TEXTS: LEARNING TO USE THE APPROPRIATE PROCEDURE AT THE APPROPRIATE TIME Technical Report, Jan. - Oct. 1985
Davida H. Charney 14 Feb. 1986 85 p
(Contracts N00014-84-K-0063; NR Proj. RR0-4206)
(AD-A165211; TR-86-2-ONR) Avail: NTIS HC A05/MF A01 CSCL 05/9

This research investigates the kinds of information that should be included in instructional texts that teach skills (such as manuals or textbooks). It focuses on an important subcomponent of skill learning: choosing the right procedure at the right time. Learning to choose the right procedure is difficult in skills such as using a computer because the connection between real-world goals and the generic procedures described in a manual is often obscure. Furthermore, when several procedures have similar functions, it is difficult to tell which one is best for a particular situation. In order to facilitate the decision process, instructional tests may include advice about when to use particular procedures and may illustrate the advice with examples. The research reported here investigated the effect of various forms of advice on learners' strategies for choosing a procedure. Subjects read one of four versions of a manual for a computer game called Box-World. Three versions contained advice about when to use particular game procedures; the advice was either stated as a simple verbal rule or elaborated with one of two types of examples. The fourth version contained no advice. Subjects then performed three tasks: a recall task, a recognition task (i.e., discriminating between correct and incorrect applications of the advice), and a decision task (i.e., solving problems for which the advice was relevant). Author (GRA)

N86-26834# Groningen Rijksuniversiteit (Netherlands). Traffic Research Center.
FLURAZEPAM HCL'S RESIDUAL (HANGOVER) EFFECTS UPON ACTUAL DRIVING PERFORMANCE
J. F. OHanlon, E. R. Volkerts, G. deVries, A. vanArkel, M. Wiethoff, and T. Meijer Nov. 1984 58 p Revised Sponsored in part by Netherlands' Ministerie van Onderwijs en Wetenschapsbeleid and F. Hoffmann-La Roche and Co., Ltd., Basle, Switzerland
(VK-83-02; B8462753; ISBN-90-353-0030-0; ISSN-0167-8590; ESA-86-96947) Avail: NTIS HC A04/MF A01

The effects on driver performance of taking a hypnotic drug (flurazepam HCL) were assessed on 40 female subjects aged between 25 and 40. An acute experiment wherein a larger group's performance was assessed following 2 nights of drug or placebo treatment; and a subchronic experiment wherein a smaller group's performance was assessed, before, during and after 8 consecutive nights of treatment with flurazepam 30 mg were conducted. Flurazepam doses of 15 mg and 30 mg were administered in different treatment conditions of the acute experiment. Secobarbital 200 mg was administered in another condition as the active drug control, and a placebo was administered in the final condition. Flurazepam 30 mg impairs driving performance for at least 17 hours following drug intake. Flurazepam's residual effect is dose-dependent. Serious impairment can occur. ESA

N86-26835# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A MODEL AND EXPERIMENTAL ANALYSIS OF PILOT DECISION MAKING BEHAVIOR FOR VARIOUS AUTOMATIC APPROACH CONDITIONS
R. C. vandeGraaf and P. H. Wewerinke 5 Apr. 1984 48 p
(Contracts NIVR-1857; BMFT-0101-ZA/WF/WRD-174/4)
(NLR-TR-84037-U; ESA-86-96980) Avail: NTIS HC A03/MF A01

Four experienced airline pilots monitored stabilized automatic approaches in a flight simulator, to assess a failure detection model. The tasks comprised the detection of excessive longitudinal and lateral windshears, and of system failures on the glideslope and localizer indicators. Two failure probability conditions were included to investigate the effect of the subject's failure expectancy on the detection performance. Good agreement between the model predictions and the experimental results of two subjects is obtained. The failure detection times of the two other subjects are larger, especially for the windshear conditions, due to a more conservative detection strategy. Results indicate the usefulness of an analytical capability for investigating relative effects of aircraft design parameters, such as display integrity, configuration, and format on failure detection performance. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-26836*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

BASELINE EXPERIMENTS IN TELEOPERATOR CONTROL
Walter W. Hankins, III and Randolph W. Mixon Jul. 1986 65 p
(NASA-TP-2547; L-15963; NAS 1.60:2547) Avail: NTIS
HC A04/MF A01 CSCL 05H

Studies have been conducted at the NASA Langley Research Center (LaRC) to establish baseline human teleoperator interface data and to assess the influence of some of the interface parameters on human performance in teleoperation. As baseline data, the results will be used to assess future interface improvements resulting from this research in basic teleoperator human factors. In addition, the data have been used to validate LaRC's basic teleoperator hardware setup and to compare initial teleoperator study results. Four subjects controlled a modified industrial manipulator to perform a simple task involving both high and low precision. Two different schemes for controlling the manipulator were studied along with both direct and indirect viewing of the task. Performance of the task was measured as the length of time required to complete the task along with the number of errors made in the process. Analyses of variance were computed to determine the significance of the influences of each of the independent variables. Comparisons were also made between the LaRC data and data taken earlier by Grumman Aerospace Corp. at their facilities. Author

N86-26837# Cummings Solar Corp., Wilmington, Mass.
DESIGN AND PRODUCTION OF DAMAGE-RESISTANT TRAY PACK CONTAINERS Final Report, 13 Apr. 1984 - 31 Jul. 1985
Richard D. Cummings Jul. 1985 242 p refs
(Contract DAAK60-84-C-0011; DA Proj. 1L1-62724-AH-99)
(AD-A164595; NATICK-TR-86/008) Avail: NTIS
HC A11/MF A01 CSCL 06/8

The tray pack is a food container that serves the functions of food storage vessel; food heating vessel; and food serving vessel. The lid is drawn from 90-pound per base box (0.010-inch-thick) steel. The bottom or can is drawn from 90-pound per base box (0.010-inch-thick) steel. Both top and bottom have a polymeric inner linear and an outer organic coating. The cause of tray pack damage were determined to be: prestressing caused by vacuum packing and underfilling; hydrodynamic forces induced by relative fluid motion within the tray pack at the moment of impact during dropping; and denting of the thin tray body material. The inability of the tray pack shipping container to withstand stacking loads was determined to be caused by poor tolerances of the shipping containers and denting of separation pads by the tray lid sealing seam. Test results show that damage can be prevented by avoiding vacuum packing, making the tray packs from 98-pound material, using a tray pack design employing reinforcing beads, using pads that nest within the sealing seam of the tray pack, and packing the tray packs so that the lids of the bottom two face down and top two face up. Test results also show that unit loads of tray packs can be stacked four high by using a properly dimensioned telescoping shipping container, the nesting pads and the two-up, two-down packing technique. GRA

N86-26838# Anthropology Research Project, Yellow Springs, Ohio.
DEMOGRAPHIC AND ANTHROPOMETRIC ASSESSMENT OF US ARMY ANTHROPOMETRIC DATA BASE Interim Report, Sep. 1984 - Apr. 1985
Bruce Bradtmiller, Jyoti Ratnaparkhi, and Tebbetts, Ilse Aug. 1985 83 p
(Contract DAAK60-84-C-0086; DA Proj. 1L1-62723-AH-98)
(AD-A164637; NATICK-TR-86/004) Avail: NTIS
HC A05/MF A01 CSCL 05/2

It has been nearly 20 years since the last anthropometric survey of Army males was conducted and about eight years since the last survey of Army females. The purpose of this report is to assess the extent to which the Army's existing anthropometric data base is representative of the current Army active duty force, both demographically and anthropometrically. The demographic variables of age, sex, and race are compared for the Army's existing anthropometric data base, the current active duty force, and the projected force of the 1990s. The changes in these variables occurring in the Army population are also contrasted with those occurring in the U.S. population at large. The anthropometric variables of stature and weight are compared for the existing data base and current active duty officers. Other anthropometric variables that are affected by race and age are also examined. Differences in anthropometric variables between the existing data base and the current active duty force are discussed in the context of secular trends in anthropometric measures from the U.S. population at large and other military populations. The implications of using the Army's existing anthropometric data base in the design and sizing of clothing and personal equipment are examined in light of the present and projected demographic composition of the Army active duty force. GRA

N86-26839# Materials Research Labs., Ascot Vale (Australia).
A LIGHTWEIGHT IMPERMEABLE SUIT FOR CHEMICAL PROTECTION IN WARM CONDITIONS: A PRELIMINARY LOOK AT THE CONCEPT
R. I. Tilley, Jill M. Standerwick, Geoffrey J. Long, and Hugh D. Crone Aug. 1985 22 p refs
(AD-A164687; MRL-R-972) Avail: NTIS HC A02/MF A01 CSCL 15/2

A lightweight overgarment made of spun-bonded polyethylene was compared with the UK No. 1 Mk 3 NBC suit in terms of the heat burden imposed on wearers. The physiological responses of volunteers exercising in warm conditions were measured for both clothing ensembles and were found to be similar. These results suggested that the concept of a lightweight impermeable NBC suit for wear in jungle conditions was worthy of close investigation. Results also confirmed previous observations that soldiers wearing NBC clothing in warm and humid conditions could do little more than adopt a defensive position if they were not to become heat stress casualties. GRA

N86-26840# Pattern Analysis and Recognition Corp., McLean, Va.
HUMAN FACTORS IN RULE-BASED SYSTEMS Final Report
Paul E. Lehner, Debra Zirk, Richard B. Hall, and Leonard Adelman 14 Oct. 1985 30 p refs
(Contract N00014-83-C-0537)
(AD-A165309; AD-E301922; PAR-85-109) Avail: NTIS
HC A03/MF A01 CSCL 05/8

This report summarizes several experiments investigating the impact of mental models and cognitive consistency on user/expert system interaction. Results indicate that user/expert system combined problem solving performance significantly improves if the user has a good mental model of expert system processes. Furthermore, cognitive consistency between the user and system problem solving procedures only degrades performance in situations where users do not have a good mental model. Some practical implications of this research is discussed. Author (GRA)

N86-26841# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
SOLDIER-COMPUTER INTERFACE Final Report
30 Nov. 1985 215 p
(AD-A165326; TOP-1-1-059) Avail: NTIS HC A10/MF A01 CSCL 05/5

The material in this TOP is intended to be used for the Human Factors Engineering (HFE) Evaluation of the Soldier-Computer Interface (SCI) of systems tested by TECOM. It encompasses procedures for an HFE Analysis and walk-through, mission simulation, and interview guide. Included are criteria in the form of checklists. GRA

N86-26842# School of Aerospace Medicine, Brooks AFB, Tex.
METHODOLOGY FOR INTEGRATION TESTING OF AIRCREW CLOTHING AND EQUIPMENT Final Report, Aug. 1982 - Dec. 1984
Peter H. R. Gill Dec. 1985 19 p refs

(AD-A165328; USAFSAM-TR-84-19) Avail: NTIS HC A02/MF A01 CSCL 06/17

This report recommends a comprehensive range of tests for the integration and viability of an aircrew personal protective ensemble (PPE) or an item of PPE for use in an aircraft. It is emphasized that these tests are additional to any type test schedules for individual items of PPE. A test described in this report should be completed satisfactorily before the item or assembly is submitted for flight test evaluation. GRA

N86-26843# Pattern Analysis and Recognition Corp., McLean, Va.
MENTAL MODELS AND PROBLEM SOLVING WITH A KNOWLEDGE-BASED EXPERT SYSTEM
Richard B. Hall Oct. 1985 28 p
(Contract N00014-83-C-0537)
(AD-A165398; PAR-85-108) Avail: NTIS HC A03/MF A01 CSCL 09/2

Previous research in the area of user/expert system interaction has shown that the quality of problem solving with a general expert system (ES) is associated with mental model, a user's conceptual understanding of the basic principle of an ES's problem solving process. The current paper describes an experiment with MYCIN, a medical knowledge-based expert system, that lends additional support to the link between problem solving quality and mental model. GRA

N86-26318# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
COCKPIT AUTOMATION REQUIREMENTS DERIVED FROM MISSION FUNCTIONS DATA
Bernadette Faulkner, R. Seifert, and K. D. Richter *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 7 p refs (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

N86-26319# Ferranti Defence Systems Ltd., Edinburgh (Scotland).
AUTOMATION AND PILOT INTERACTIONS IN NIGHT OR ALL-WEATHER TACTICAL OPERATIONS
W. H. McKinlay *In* AGARD Guidance-Control-Navigation Automation for Night All-Weather Tactical Operations Oct. 1985 10 p (For primary document see N86-26316 17-04)
Avail: NTIS HC A07/MF A01

N86-26805# German Army Aviation School, Bueckeburg (West Germany).
OPERATIONAL EXPERIENCES WITH NIGHT VISION GOGGLES IN HELICOPTER LOW-LEVEL FLIGHT AT NIGHT
Hermann Haidn *In* AGARD Visual Protection and Enhancement Dec. 1985 8p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26807# Naval Air Development Center, Warminster, Pa.
VISUAL AND SPECTRORADIOMETRIC PERFORMANCE CRITERIA FOR NIGHT VISION GOGGLES (NVG) COMPATIBLE AIRCRAFT INTERIOR LIGHTING
William A. Breitmaier and Ferdinand Reetz, III *In* AGARD Visual Protection and Enhancement Dec. 1985 11 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26813# Letterman Army Inst. of Research, San Francisco, Calif.
COMPUTER VISUAL SIMULATION OF CONTRAST SENSITIVITY DEFICITS INDUCED BY LASER AND CHEMICAL ANTIDOTE EXPOSURE
H. Zwick, D. Monroe, and L. Sherman *In* AGARD Visual Protection and Enhancement Dec. 1985 4 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26816# National Aerospace Medical Centre, Soesterberg (Netherlands).
DYNAMIC BEHAVIOUR OF SPHERICAL AND ASPHERICAL CONTACT LENSES EXPOSED TO +Gz-ACCELERATION FORCES
H. Punt, A. C. H. vandenHeuvel, H. H. vandenBiggelaar (Royal Netherlands Air Force, The Hague.), G. J. Hoekstra, and A. J. P. Rouwen (Militair Hospitaal Dr. A. Mathijsen, Utrecht (Netherlands).) *In* AGARD Visual Protection and Enhancement Dec. 1985 5 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26825# British Aerospace Public Ltd. Co., Lancashire (England). Cockpit Specialist Group.
HUMAN FACTORS: THE CINDERELLA DISCIPLINE IN COCKPIT INTERFACE DESIGN
K. W. Martin and J. Laycock (Royal Aircraft Establishment, Farnborough, England) *In* AGARD Visual Protection and Enhancement Dec. 1985 10 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-26844*# National Aeronautics and Space Administration, Washington, D.C.
SECOND SYMPOSIUM ON CHEMICAL EVOLUTION AND THE ORIGIN OF LIFE
Donald L. DeVincenzi, ed. and Patricia A. Dufour, ed. (George Washington Univ., Washington, D.C.) May 1986 128 p refs Symposium held at Moffett Field, Calif., 23-26 Jul. 1985
(Contract NASw-3165)
(NASA-CP-2425; NAS 1.55:2425) Avail: NTIS HC A07/MF A01 CSCL 06C

Recent findings by NASA Exobiology investigators are reported. Scientific papers are presented in the following areas: cosmic evolution of biogenic compounds, prebiotic evolution (planetary and molecular), early evolution of life (biological and geochemical), evolution of advanced life, solar system exploration, and the Search for Extraterrestrial Intelligence (SETI). For individual titles, see N86-26845 through N86-26913.

N86-26845*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ORGANIC CHEMISTRY OF MURCHISON METEORITE: CARBON ISOTOPIC FRACTIONATION c90
George U. Yuen (Arizona State Univ., Tempe), Neal E. Blair (North Carolina State Univ., Raleigh), David J. DesMarais, John R. Cronin (Arizona State Univ., Tempe), and Sherwood Chang *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 40 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The carbon isotopic composition of individual organic compounds of meteoritic origin remains unknown, as most reported carbon isotopic ratios are for bulk carbon or solvent extractable fractions. The researchers managed to determine the carbon isotopic ratios for individual hydrocarbons and monocarboxylic acids isolated from a Murchison sample by a freeze-thaw-ultrasonication technique. The abundances of monocarboxylic acids and saturated hydrocarbons decreased with increasing carbon number and the acids are more abundant than the hydrocarbon with the same carbon number. For both classes of compounds, the C-13 to C-12 ratios decreased with increasing carbon number in a roughly parallel manner, and each carboxylic acid exhibits a higher isotopic number than the hydrocarbon containing the same number of carbon atoms. These trends are consistent with a kinetically controlled synthesis of higher homologues for lower ones. Author

N86-26846*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHARACTERIZATION OF BIOGENIC ELEMENTS IN INTER-

PLANETARY DUST PARTICLES
T. E. Bunch *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 41 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

Those particles that were designated cometary are aggregates of amorphous materials including carbon, iron-magnesium silicates, sulfides, metal and trace amounts of unusual phases. Most aggregates are carbon-rich with major and minor element abundances similar to a fine grained matrix of carbonaceous chondrites. Several particles were analyzed by a laser microprobe. The negative ionic species identified to date include carbon clusters, protonated carbon clusters, CN-, HCN-, CNO-, PO2-, PO3-, S-, S2- asnd OH-. These species are similar to those observed in cometary spectra and they support the assumption that organic materials are present. The occurance of phosphate ions suggests the presence of apatite or whitlockite. Cometary particle characteristics may indicate that the component grains represent primitive unaltered dust whose overall properties are extremely similar to altered primitive dust in carbonaceous chondrites. Author

N86-26847*# Massachusetts Univ., Amherst. Dept. of Physics and Astronomy.
BOUNDARY CONDITIONS FOR THE PALEOENVIRONMENT: CHEMICAL AND PHYSICAL PROCESSES IN DENSE INTERSTELLAR CLOUDS
William M. Irvine, F. Peter Schloerb, and Lucy M. Ziurys *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 42 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The present research includes searches for important new interstellar constituents; observations relevant to differentiating between different models for the chemical processes that are important in the interstellar environment; and coordinated studies of the chemistry, physics, and dynamics of molecular clouds which are the sites or possible future sites of star formation. Recent research has included the detection and study of four new interstellar molecules; searches which have placed upper limits on the abundance of several other potential constituents of interstellar clouds; quantitative studies of comparative molecular abundances in different types of interstellar clouds; investigation of reaction pathways for astrochemistry from a comparison of theory and the observed abundance of related species such as isomers and isotopic variants; studies of possible tracers of energenic events related to star formation, including silicon and sulfur containing molecules; and mapping of physical, chemical, and dynamical properties over extended regions of nearby cold molecular clouds. Author

N86-26848*# Molecular Research Inst., Palo Alto, Calif.
INTERSTELLAR ISOMERS
Doug DeFrees, Dough McLean (IBM Research Lab., San Jose, Calif.), and Eric Herbst (Duke Univ., Durham, N. C.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 43 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

Both observational and theoretical studies of molecular clouds are hindered by many difficulties. One way to partially circumvent the difficulties of characterizing the chemistry within these objects is to study the relative abundances of isomers which are synthesized from a common set of precursors. Unfortunately, only one such system has been confirmed, the HCN/HNC pair of isomers. While the basic outlines of its chemistry have been known for some years, there are still many aspects of the chemistry which are unclear. Another potential pair of isomers is HCO+/HOC+; HCO+ is an abundant instellar molecule and a tentative identification of HOC+ has been made in Sgr B2. This identification is being challenged, however, based on theoretical and laboratory evidence that HOC+ reacts with H2. Another potential pair of interstellar isomers is methyl cyanide (CH3CN, acetonitrile) and methyl isocyanide (CH3NC). The cyanide is well known, however the isocyanide has yet to be observed despite theoretical predictions that appreciable quantities should be present. Author

N86-26849*# Rensselaer Polytechnic Inst., Troy, N.Y.
PHOTOLYSIS PRODUCTS OF CO, NH3 AND H2O AND THEIR SIGNIFICANCE TO REACTIONS ON INTERSTELLAR GRAINS
James P. Ferris *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 44 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

With the increase in evidence that interstellar grains are the basic building blocks of comets and with the realization that comet collisions with the earth have probably occured at a much higher frequency than earlier assumed it may be presumed that interstellar dust chemistry played an important role in the early chemistry of the earth. As a part of the study of the photochemical processes taking place on interstellar grains the photolysis of mixtures of CO, NH3 and H2O was performed at 10 K, 77K and 298K. The reaction products were determined by GC/MS and HPLC analysis to be lactic acid, glycolic acid, hydroxyacetamide, urea, biuret, oxamic acid, oxamide, glyceric acid and glyceramide. Ethylene glycol and glycerol were also detected but is is not clear at present whether these are true photoproducts or contaminants. The mechanism of formation of these molecules are discussed as well as their possible significance to the origins of life. Author

N86-26850*# California Univ., Berkeley. Dept. of Astronomy.
OBSERVATIONAL EXOBIOLOGY
Jill Tarter *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 45 Prepared in cooperation with Search for Extraterrestrial Intelligence Inst., Los Altos, Calif. (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The Earth's atmosphere absorbs partially or completely many ultraviolet, infrared and submillimeter wavelengths. Atmospheric seeing distorts small images, imposing a limit on the achievable angular resolution at optical and infrared wavelengths that is much poorer than the intrinsic capability of telescope optics. The atomic and molecular species of the atmosphere confuse or prevent the spectral studies of similar compounds outside of the terrestrial environment. Telescopes placed in orbit above the atmosphere avoid these problems and enjoy a unique view of the universe. There are many complex questions pertaining to the origin and evolution of the biogenic elements and compounds and the existence of terrestrial types of planets elsewhere that can be only tackled from orbiting facilities. The detailed nature of the spacecraft, platforms and instrumentation most likely to be launched by the United States and Europe in the near future in an attempt to determine what observational programs would be tractable and which areas of interest to exobiology required hardware capabilities beyond those currently envisioned are considered. Author

N86-26851*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE PRODUCTION OF TRACE GASES BY PHOTOCHEMISTRY AND LIGHTNING IN THE EARLY ATMOSPHERE c46
Joel S. Levine, Geoffrey M. Tennille, Kenneth M. Towe (Smithsonian Institution, Washington, D. C.), and Raj K. Khanna (Maryland Univ., College Park.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 47 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

Recent atmospheric calculation suggest that the prebiological atmosphere was most probably composed of nitrogen, carbon dioxide, and water vapor, resulting from volatile outgassing, as opposed to the older view of a strongly reducing early atmosphere composed of methane, ammonia, and hydrogen. Photochemical calculations indicate that methane would have been readily destroyed via reaction with the hydroxyl radical produced from water vapor and that ammonia would have been readily lost via photolysis and rainout. The rapid loss of methane and ammonia, coupled with the absence of a significant source of these gases,

suggest that atmospheric methane and ammonia were very short lived, if they were present at all. An early atmosphere of N2, CO2, and H2O is stable and leads to the chemical production of a number of atmospheric species of biological significance, including oxygen, ozone, carbon monoxide, formaldehyde, and hydrogen cyanide. Using a photochemical model of the early atmosphere, the chemical productionof these species over a wide range of atmospheric parameters were investigated. These calculations indicate that early atmospheric levels of O3 were significantly below the levels needed to provide UV shielding. The fate of volcanically emitted sulfur species, e.g., sulfur dioxide and hydrogen sulfide, was investigated in the early atmosphere to assess their UV shielding properties. The photochemical calculations show that these species were of insufficient levels, due in part to their short photochemical lifetimes, to provide UV shielding. Author

N86-26852*# Cornell Univ., Ithaca, N.Y. Lab. for Planetary Studies.

THE ORGANIC AEROSOLS OF TITAN

B. N. Khare, C. Sagen, W. R. Thompson, E. T. Arakawa, F. Suits, T. A. Calcott, M. W. Williams, S. Shrader, H. Ogino, T. O. Willingham et al *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 48 Submitted for publication (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

A dark reddish organic solid, called tholin, is synthesized from simulated Titanian atmospheres by irradiation with high energy electrons in a plasma discharge. The visible reflection spectrum of this tholin is found to be similar to that of high altitude aerosols responsible for the albedo and reddish color of Titan. The real (n) and imaginary (k) parts of the complex refractive index of thin films of Titan prepared by continuous dc discharge through a 0.9 N2/0.1 CH4 gas mixture at 0.2 mb is determined from X-ray to microwave frequencies. Values of n (approx. 1.65) and k (approx. 0.004 to 0.08) in the visible are consistent with deductions made by groundbased and spaceborne observations of Titan. Many infrared absorption features are present in k(lambda), including the 4.6 micrometer nitrile band. Molecular analysis of the volatile components of this tholin was performed by sequential and nonsequential pyrolytic gas chromatography/mass spectrometry. More than one hundred organic compounds are released; tentative identifications include saturated and unsaturated aliphatic hydrocarbons, substituted polycylic aromatics, nitriles, amines, pyrroles, pyrazines, pyridines, pyrimidines, and the purine, adenine. In addition, acid hydrolysis produces a racemic mixture of biological and nonbiological amino acids. Many of these molecules are implicated in the origin of life on Earth, suggesting Titan as a contemporary laboratory environment for prebiological organic chemistry on a planetary scale. Author

N86-26853*# Harvard Univ., Cambridge, Mass.

THE D TO H RATIO ON TITAN AND THE PLANETS: IMPLICATIONS FOR ORIGIN AND EVOLUTION OF PLANETARY ATMOSPHERES

J. P. Pinto, J. I. Lunine (California Inst. of Tech., Pasadena), S.-J. Kim, and Y. L. Yung *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 49 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Measurements of deuteratad methane show that Titan's atmosphere is enriched by at least several times in deuterium compared to the major planets. Potential causative factors for this enrichment are condensation to form tropospheric methane clouds, fractionation occuring over a hypothetical CH4-C2H2 ocean and between the ocean and the clathrate crust beneath, fractionation which occurred during the formation of Titan and fractionation occuring as a result of the evolution of Titan's atmosphere. The greater part of the observed fractionation is probably derived from the formation of Titan and the subsequent evolution of Titan atmosphere driven by photochemistry. The latter process is developed here for the first time. The D/H ratio in a planetary atmosphere is one readily available measure of the origin and evolution of the hydrogen bearing volatiles on the planet. Comparison between D/H ratio in the inner solar system and the outer solar system may pose important constraints on current theories. Author

N86-26854*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MEASUREMENTS OF PHYSICAL PROPERTIES OF MODEL TITAN ATMOSPHERES c91

Thomas W. Scattergood (State Univ. of New York, Stony Brook.), Sherwood Chang, Chris McKay, Bonnie OHara and Glenn Carle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 50 (For primary document see N86-26844 17-55)

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One aspect of the study of Titan's atmosphere is the elucidation of the chemical and physical nature of the aerosols. In order to facilitate this, a program to produce laboratory synthesized model materials for Titan's aerosol and to study their chemical and physical properties is now in progress. Various processes, including electric discharge, photolysis by ultraviolet light, and irradiation by energetic particles, will be used to produce the materials. A first set of experiments where a nominal Titan mixture (97% N2, 3% CH4, 0.2% H2) was subjected to pulsed high temperature shocks yielded a reddish brown waxy solid. This material was subjected to pyrolysis/gas chromatography, a technique that has been proposed as a method for analysis of the Titan aerosols. Preliminary results show the material to consist of simple hydrocarbons but little else, at least up to temperatures of 600 C. Since the material was colored, compounds other than those mentioned above must be present. Author

N86-26855*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EXPERIMENTAL BASIS FOR A TITAN PROBE ORGANIC ANALYSIS c91

C. P. McKay, T. W. Scattergood (State Univ. of New York Stony Brook.), W. J. Borucki, J. F. Kasting, and S. L. Miller (California Univ., San Diego, La Jolla) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 52 (For primary document see N86-26844 17-55)

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The recent Voyager flyby of Titan produced evidence for at least nine organic compounds in that atmosphere that are heavier than methane. Several models of Titan's atmosphere, as well as laboratory simulations, suggest the presence of organics considerably more complex that those observed. To ensure that the in situ measurements are definitive with respect to Titan's atmosphere, experiment concepts, and the related instrumentation, must be carefully developed specifically for such a mission. To this end, the possible composition of the environment to be analyzed must be bracketed and model samples must be provided for instrumentation development studies. Laboratory studies to define the optimum flight experiment and sampling strategy for a Titan entry probe are currently being conducted. Titan mixtures are being subjected to a variety of energy sources including high voltage electron from a DC discharge, high current electric shock, and laser detonation. Gaseous and solid products are produced which are then analyzed. Samples from these experiements are also provided to candidate flight experiments as models for instrument development studies. Preliminary results show that existing theoretical models for chemistry in Titan's atmosphere cannot adequetely explain the presence and abundance of all trace gases observed in these experiments. Author

N86-26856*# National Aeronautics and Space Administration, Washington, D.C.

A GAS CHROMATOGRAPH EXPERIMENT FOR A TITAN ENTRY PROBE

Glenn C. Carle, Daniel R. Kojiro, Bonnie J. OHara, Jose R. Valentin, Verne R.s W. Oberbeck, and Thomas W. Scattergood (State Univ.

of New York, Stony Brook) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 53 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Development of a gas chromatographic technique for analysis of aerosols and volatile organics from a Titan probe is now in progress. Preliminary investigations of aerosol collectors have shown that an electrostatic device should be the most efficient for the particle sizes expected in Titan's atmosphere. Such a device particularly lends itself to development of a simple pyrolyzer which can be used to break down any collected organic conglomerate structures into volatile fragments. Those fragments can subsequently be analyzed by GC providing information about the original chemical structure of the aerosols. Studies show that as little as 1 to 5 micrograms of model aerosol can be successfully analyzed. High altitude atmospheric gas sampling will also be important on Titan due to the great depth of the atmosphere. Studies show that a GC analysis of model Titan atmospheres at pressures approximating this altitude can be made with a sensitivity of a few ten's of parts-per-billion for the trace gases of interest. Author

N86-26857*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MOLECULAR AND ELEMENTAL DUST ANALYZER (MEDA) FOR THE COMET RENDEZVOUS ASTEROID FLYBY MISSION

Bonnie J. OHara, Glenn C. Carle, and Benton C. Clark (Martin Marietta Aerospace, Denver, Colo.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 54 (For primary document see N86-26844 17-55)

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Comets are some to the most primitive bodies in the solar system and therefore should contain elemental, chemical, and isotopic records of the early history of the solar system. An opportunity to perform in situ analyses of a comet nucleus exists with the Comet Rendezvous Asteroid Flyby (CRAF) mission. An integrated gas chromatograph/X-ray fluorescence instrument (MEDA), being proposed for inclusion onboard the CRAF spacecraft, will measure the molecular and elemental constituents of collected dust grains and ices. The gas chromatograph, employing helium ionization detectors and three columns designed to separate light gases, polar gases, and hydrocarbons will measure the volatile compounds of the biogenic elements thermally released from collected dust grains. The sensitivity of the GC for compounds of interest is at the picogram level. X-ray fluorescence utilized cryogenically cooled Si(Li) solid state detectors of nominal 150 eV resolution at 5.9 keV. Based on laboratory work with carbonaceous meteorites, both the GC and XRF can perform meaningful analyses with a few micrograms of collected comet dust. Author

N86-26858*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INVESTIGATION OF POROUS POLYMER GAS CHROMATOGRAPHIC PACKINGS FOR ATMOSPHERIC ANALYSIS OF EXTRATERRESTRIAL BODIES

Glenn E. Pollock *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 55 (For primary document see N86-26844 17-55)

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Measurement of the permanent gases in the atmospheres of mission targets is a major objective. A 16 meter long Porapak N column was used on the Venus probe and required a rather high carrier gas flow rate. The researchers have, therefore, surveyed commercial porous polymer types which had some ability to resolve nitrogen, oxygen, argon and carbon monoxide gases. Porapaks N and Q appeared superior to most. Batch to batch variation, however, was quite wide, so the researchers learned how to synthesize porous polymer and investigated some of the factors affecting the separations. A polymer was synthesized which was superior to all commercial products and allowed at least a 50% reduction in length and flow rate of carrier gas. Similar studies were made concerning the separation of hydrocarbons and new porous polymers have been synthesized which represent significant improvements in time of analysis, column, and carrier gas flow rate. Author

N86-26859*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MINIATURE METASTABLE IONIZATION DETECTORS FOR EXOBIOLOGY FLIGHT EXPERIMENTS

Fritz H. Woeller *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 56 (For primary document see N86-26844 17-55)

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The Metastable Ionization Detector (MID) is three orders of magnitude more sensitive than the thermal conductivity detectors used on previous flight instruments. The miniature MID provides scientists with a much smaller and highly sensitive detector for flight gas chromatographs. A miniature MID featuring an unconventional triaxial electrode configuration was developed and used routinely in the laboratory. Although much smaller and lighter than the commercial MID, its performance characteristics parallel those of the traditional design. The detector is compatible with the modulated voltage circuitry, also developed here, and thus can perform over an expanded response range of more than 7 orders magnitude. A micro volume version of a miniature MID, with an internal volume of less than 8 microliter, was recently designed is now being tested. The micro volume MID uses carrier gas flow rates of approx. 2cc/min thus eliminating the need for makeup gas when capillary columns are used. Author

N86-26860*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MULTIPLEX GAS CHROMATOGRAPHY: A NOVEL ANALYTICAL TECHNIQUE FOR FUTURE PLANETARY STUDIES

Jose R. Valentin, Glenn C. Carle, and John B. Phillips (University of Southern Illinois, Carbondale) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 57 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Determination of molecular species comprised of the biogenic elements in the atmospheres of planets and moons of the solar system is one the foremost requirements of the exobiologist studying chemical evolution and the origin of life. Multiplex chromatography is a technique where many samples are pseudo-randomly introduced to the chromatograph without regard to elution of preceding components. The resulting data are then reduced using mathematical techniques such as cross correlation or Fourier Transforms. To demonstrate the utility of this technique for future solar system exploration, chemical modulators were developed. Several advantages were realized from this technique in combination with these modulators: improvement in detection limits of several orders of magnitude, improvement in the analysis of complex mixtures by selectively modulating some of the components present in the sample, increase in the number of analyses that can be conducted in a given period of time, and reduction in the amount of expendables needed to run an analysis. In order to apply this technique in a real application, methane in ambient air was monitored continuously over a period of one week. By using ambient air as its own carrier all expendables beyond power were eliminated. Author

N86-26861*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ION MOBILITY DRIFT SPECTROMETER (IMDS) AS A FLIGHT ANALYTICAL INSTRUMENT TECHNIQUE

Daniel R. Kojiro and Glenn C. Carle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 58 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

A detailed knowledge of the history and abundances of the biogenic elements and their compounds throughout the solar system can provide the exobiologists with a basis for understanding

the conditions necessary for chemical evolution and the origin of life. The Ion Mobility Drift Spectrometer is an ion molecule reactor coupled with an ion drift spectrometer. Sample molecules are ionized to form product ions in the reactant region. An electric field moves the ions through a drift region against the flow of a drift gas where they are separated according to their size and structure producing an ion mobility spectrum. These spectra provide the IMDS with virtually universal sample identification capability. To conform to the rigid limits of weight, volume and consumables placed on flight instrumentation, several aspects of the IMDS must be studied and redesigned for flight use. In addition to miniaturization of the instrument, a reduction in the high flow rates used for the drift gas is an obvious necessary consideration. The effect of drastically reduced drift flow rates on IMDS spectra was investigated by lowering flow rates from 500ml/min to 50ml/min. Changes in peak shape, drift time and total spectra were studied at each flow rate. Author

N86-26862*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

NEW TECHNIQUES FOR THE DETECTION AND CAPTURE OF MICROMETEOROIDS c91

John H. Wolfe (San Jose State Univ., Calif.), Theodore E. Bunch, and Glenn C. Carle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 59 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

In order to understand the origin and distribution of the biogenic elements and their compounds in the solar system, it will be necessary to study material from many classes of objects. Chemical, elemental, and isotopic measurements of returned samples of comets, asteroids, and possibly extra-solar system dust clouds would provide information on a particularly important class: the primitive objects. Extraterrestrial micron-sized particles in the vicinity of earth are one source of such materials that might otherwise be inaccessible. The Space Station appears to be an eminently suitable platform from which to collect and detect these various particles. The primary challenge, however, is to collect intact, uncontaminated particles which will be encounted at tens of kilometers per seconds. A concept for a micrometeoroid detector that could be deployed at a Space Station has been developed which uses a large area detector plate implanted with acoustic transducers. When an impact event occurs, the resulting signal is subjected to spectral analysis providing positive detection, momentum information, and angle of incidence. The primary advantage of this detector is the large area which increases the probability of measuring events. Author

N86-26863*# California Univ., San Diego, La Jolla. Dept. of Chemistry.

ENERGY YIELDS IN THE PREBIOTIC SYNTHESIS OF HYDROGEN CYANIDE AND FORMALDEHYDE

Roscoe Stribling and STanley L. Miller *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 61 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Prebiotic experiments are usually reported in terms of carbon yields, i.e., the yield of product based on the total carbon in the system. These experiments usually involve a large input of energy and are designed to maximize the yields of product. However, large inputs of energy result in multiple activation of the reactants and products. A more realistic prebiotic experiment is to remove the products of the activation step so they are not exposed a second time to the energy source. This is equivalent to transporting the products synthesized in the primitive atmosphere to the ocean, and thereby protecting them from destruction by atmospheric energy sources. Experiments of this type, using lower inputs of energy, give energy yields (moles of products/joule) which can be used to estimate the relative importance of the different energy sources on the primitive earth. Simulated prebiotic atmospheres containing either CH4, CO or CO2 with N2, H2O and variable amounts of H2 were subjected to a high frequency Tesla coil. Samples of the aqueous phase were taken at various time intervals from 1 hr to 7 days, and the energy yields were obtained by extrapolation to zero time. The samples were analyzed for HCN with the cyanide electrode and for H2CO by chromotropic acid. The spark energy was estimated by calorimetry. The temperature rise in an insulated discharge flask was compared with the temperature rise from a resistance heater in the same flask. These results will be compared with calculated production rates of HCN and H2CO from lightning and a number of photochemical processes on the primitive Earth. Author

N86-26864*# Maryland Univ., College Park. Lab. of Chemical Evolution.

SYNTHESIS AND ANALYSIS IN STUDIES OF CHEMICAL EVOLUTION

Cyril Ponnamperuma, Mitchell K. Hobish, Kensei Kobayashi, Lu-Lin Hua, and Nalinie Senaratne *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 62 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Studies of the various processes that may have given rise to life on the Earth have demonstrated the appropriateness of an approach that makes use of analysis and synthesis. Analysis of extraterrestrial samples in the form of meteorites has demonstrated the presence of several precursors of biomolecules, most notably a full suite of nucleic acid bases and nucleotides of biological significance. These species were determined after exhaustive extraction of the sample and subsequent analysis using HPLC, GC, MS, and GC-MS. Procedural blanks indicate that these molecules are likely not the result of contamination during the extraction and analysis process. Similar species were found as products of spark discharge experiments in atmospheres thought to mimic primitive Earth conditions. These results indicate that the basic chemistry underlying these syntheses is common, and that life may not be unique to the Earth. Studies underway in the laboratory make use of proton nuclear magnetic resonance spectroscopy as a probe to assess associations between selected amino acids and any of several nucleotides comprising their genetic code and genetic anticode sequences. These studies demonstrate a clear selectivity by the anticode sequences, thus confirming the hydrophobicity studies performed by Lacey et al. These studies further support the contention that life is likely a natural result of the physics and chemistry of the universe. Author

N86-26865*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ISOTOPIC CHARACTERISATION OF PREBIOTIC SYNTHESIS OF ORGANIC MATERIAL

John F. Kerridge (California Univ., Los Angeles.) and Sherwood Chang *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 63 (For primary document see N86-26844 17-55)

Avail: NTIS HC A07/MF A01 CSCL 06C

Many primitive meteorites contain an insoluble organic material, much like terrestrial kerogen, whose mode of origin is currently unknown. When sujbected to stepwise decomposition, this material, unlike its terrestrial counterpart, reveals characteristic release patterns for the stable isotopes of carbon, hydrogen and nitrogen as a function of fractional release of each element. The purpose of this study is to try to match those release patterns using organic matter synthesised in the laboratory under controlled conditions. If successful, such a study would shed light on the origin of kerogen-like organic matter in the early solar system and, by extension, on prebiotic organic synthesis in general. The range of possible syntheses, starting materials and reaction conditions to be investigated is considerable. Samples analysed to date include: a heavy oil produced by Fischer-Tropsch-type catalysis of CO + H2; a solid residue generated by a plasma discharge in CO + H2 + N2; a solid deposited on the electrodes of a Miller-Urey synthesis operating on CH4 + H2O + N2; and a solid residue formed by polymerization of light hydrocarbons procured by a Miller-Urey discharge acting on CH4. Significant structure is observed in the

release patterns for the carbon and hydrogen isotopes from the synthetic samples, though there is little evidence for isotopic fractionation during the analysis itself. Author

N86-26866*# Massachusetts Inst. of Tech., Cambridge.
ORIGIN OF LIFE AND IRON-RICH CLAYS
Hyman H. Hartman *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 pen1] 64 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The premise that life began with self-replicating iron-rich clays is explored. In association with these clays and UV light, polar organic molecules, such as oxalic acid, were synthesized. The carbonaceous chondrites have both iron-rich clays and organic molecules. It is convenient to classify meteoritic organic matter into 3 categories: insoluble polymer, hydrocarbons and polar organics (soluble in water). Recent work on the delta D, delta N-15 and delta C-13 has made it clear that these three fractions have been made by three different mechanisms. A significant fraction of the insoluble polymer has a delta-D which suggests that it was made in an interstellar medium. The hydrocarbons seem to have been made on a parent body by a Fischer-Tropsch mechanism. The polar organics were probably synthesized in a mixture of carbonate (NH4)2CO3, Fe(++) ion and liquid water by radiolysis. In a set of experiments the radiolysis of (NH4)2CO3 in the presence and absence of Fe(++) ion has been examined. The synthesis of glycine in the presence of Fe(++) ion is 3-4 times that in the absence of ferrous ion. The effects of the addition of hydrocarbons to this mixture are explored. Iron-rich clays at low temperature and pressure are synthesized. So far the results are not sufficiently crystalline to look for replication. It should be noted that organic chelating agents such as oxalic acid do increase the crystallinity of the clays but not sufficiently. The hydrothermal synthesis of iron-rich clays is being examined. Author

N86-26867*# San Jose State Univ., Calif.
CLAY ENERGETICS IN CHEMICAL EVOLUTION
Lelia M. Coyne *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 65 (For primary document see N86-26844 17-55)
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Clays have been implicated in the origin of terrestrial life since the 1950's. Originally they were considered agents which aid in selecting, concentrating and promoting oligomerization of the organic monomeric substituents of cellular life forms. However, more recently, it has been suggested that minerals, with particular emphasis on clays, may have played a yet more fundamental role. It has been suggested that clays are prototypic life forms in themselves and that they served as a template which directed the self-assembly of cellular life. If the clay-life theory is to have other than conceptual credibility, clays must be shown by experiment to execute the operations of cellular life, not only individually, but also in a sufficiently concerted manner as to produce some semblance of the functional attributes of living cells. Current studies are focussed on the ability of clays to absorb, store and transfer energy under plausible prebiotic conditions and to use this energy to drive chemistry of prebiotic relevance. Conclusions of the work are applicable to the role of clays either as substrates for organic chemistry, or in fueling their own life-mimetic processes. Author

N86-26868*# Polytechnic Inst. of New York, Brooklyn.
FURTHER WORK ON SODIUM MONTMORILLONITE AS CATALYST FOR THE POLYMERIZATION OF ACTIVATED AMINO ACIDS
Frederick R. Eirich and Mella Paecht-Horowitz (Hebrew Univ. of Jerusalem, Rehovot (Israel).) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 66 (For primary document see N86-26844 17-55)
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When the polycondensation of amino acid acylates was catalyzed with Na-montmorillonite, the polypeptides were consistently found to exhibit a distribution of discrete molecular weights, for as yet undiscovered reasons. One possible explanation was connected to the stepwise mode of monomer addition. New experiments have eliminated this possibility, so that there is the general assumption that this discreteness is the result of a preference of shorter oligomers to add to others of the same length, a feature that could be attributed to some structure of the platelet aggregates of the montmorillonite. The production of optical stereoisomers is anticipated when D,L-amino acids are polymerized on montmorillonite. Having used an optically active surface, the essence of the results lies not only in the occurrence of optically active oligomers and polymers, but also in the fact that the latter exhibit the same molecular weight characteristics as the D,L-polymers. Preparatory to work contemplated on a parallel synthesis of amino acid and nucleotide oligomers, studies were continued on the co-adsorption of amino acids, nucleotides, and amino acid-nucleotides on montmorillonite. Author

N86-26869*# San Francisco State Univ., Calif. Dept. of Chemistry.
ADSORPTION AND CONDENSATION OF AMINO ACIDS AND NUCLEOTIDES WITH SOLUBLE MINERAL SALTS
James Orenberg and Noam Lahav (Hebrew Univ. of Jerusalem, Rehovot (Israel).) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 67 (For primary document see N86-26844 17-55)
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The directed synthesis of biopolymers in an abiotic environment is presumably a cyclic sequence of steps which may be realized in a fluctuating environment such as a prebiotic pond undergoing wetting-drying cycles. Soluble mineral salts have been proposed as an essential component of this fluctuating environment. The following sequence may be considered as a most primitive mechanism of information transfer in a fluctuating environment: (1) adsorption of a biomolecule onto a soluable mineral salt surface to act as an adsorbed template; (2) specific adsorption of biomonomers onto the adsorbed template; (3) condensation of the adsorbed biomonomers; and (4) desorption of the elongated oligomer. In this investigation, the salts selected for study were CaSO4.2H2O(gypsum), SrSO4, and several other metal sulfates and chlorides. Adsorption of the monomeric species, gly, 5'AMP 5'GMP, and 5'CMP was investigated. The adsorbed template biopolymers used were Poly-A, Poly-G, Poly-C, and Poly-U. The results of studies involving these experimental participants, the first two steps of the proposed primitive information transfer mechanism, and condensation of amino acids to form oligomers in a fluctuating environment are to be reported. Author

N86-26870*# Harvard Univ., Cambridge, Mass.
PALEOSOLS AND THE CHEMICAL EVOLUTION OF THE ATMOSPHERE
H. D. Holland, E. A. Zbinden, and J. P. Pinto *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evoltuion of Life May 1986 p 68 (For primary document see N86-26844 17-55)
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The chemistry and mineralogy of soils reflects the chemistry of the atmosphere below which they develop. Today the presence of a cover of land plants can obscure the signature of a highly oxidizing atmosphere. Prior to the advent of higher land plants ca. 400 m.y. ago the obscuring effect of a biological interface should have been minor. It can be shown that under such conditions the behavior of ferrous iron during weathering depends on the relationship between the ratio of the net concentration of oxidants to the concentration of acids in rainwater, and on the ratio of the oxygen demand to the acid demand for complete weathering of the parent rock. An analysis of the behavior of iron in some 15 paleosols between 1.0 and 2.9 b.y. in age showed some time ago that iron was retained, or largely retained, in paleosols developed on rocks with a low ratio of oxidant demand to acid demand (R value) and was lost from paleosols with a high R value. The results indicate that between 1.1 and 2.9 b.y.b.p. the ratio of the net concentration of oxidants to CO2 in rainwater was less than ca. 1/600 of the present-day value. Work during the

past year has sought to extend the data base for paleosols and to define more precisely the relationships between the composition of paleosols and the chemistry of the atmosphere below which they developed. Author

N86-26871*# Santa Clara Univ., Calif. Dept. of Chemistry.
COOPERATION OF CATALYSTS AND TEMPLATES
David H. White, Anastassia Kanavarioti, CArle W. Nibley, and John W. Macklin (Washington Univ., Seattle.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 69 (For primary document see N86-26844 17-55)
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In order to understand how self-reproducing molecules could have originated on the primitive Earth or extraterrestrial bodies, it would be useful to find laboratory models of simple molecules which are able to carry out processes of catalysis and templating. Furthermore, it may be anticipated that systems in which several components are acting cooperatively to catalyze each other's synthesis will have different behavior with respect to natural selection than those of purely replicating systems. As the major focus of this work, laboratory models are devised to study the influence of short peptide catalysts on template reactions which produce oligonucleotides or additional peptides. Such catalysts could have been the earliest protoenzymes of selective advantage produced by replicating oligonucleotides. Since this is a complex problem, simpler systems are also studied which embody only one aspect at a time, such as peptide formation with and without a template, peptide catalysis of nontemplated peptide synthesis, and model reactions for replication of the type pioneered by Orgel. Author

N86-26872*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MOLECULAR MICROENVIRONMENTS: SOLVENT INTERACTIONS WITH NUCLEIC ACID BASES AND IONS
R. D. MacElroy and A. Pohorille (California Univ., Berkeley.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 70 (For primary document see N86-26844 17-55)
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The possibility of reconstructing plausible sequences of events in prebiotic molecular evolution is limited by the lack of fossil remains. However, with hindsight, one goal of molecular evolution was obvious: the development of molecular systems that became constituents of living systems. By understanding the interactions among molecules that are likely to have been present in the prebiotic environment, and that could have served as components in protobiotic molecular systems, plausible evolutionary sequences can be suggested. When stable aggregations of molecules form, a net decrease in free energy is observed in the system. Such changes occur when solvent molecules interact among themselves, as well as when they interact with organic species. A significant decrease in free energy, in systems of solvent and organic molecules, is due to entropy changes in the solvent. Entropy-driven interactions played a major role in the organization of prebiotic systems, and understanding the energetics of them is essential to understanding molecular evolution. Author

N86-26873*# Alabama Univ., Birmingham. Dept. of Biochemistry.
INTRAMOLECULAR INTERACTIONS IN AMINOACYL NUCLEOTIDES: IMPLICATIONS REGARDING THE ORIGIN OF GENETIC CODING AND PROTEIN SYNTHESIS
J. C. Lacey, Jr., D. W. Mullins, Jr., C. L. Watkins, and L. M. Hall *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 71 (For primary document see N86-26844 17-55)
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Cellular organisms store information as sequences of nucleotides in double stranded DNA. This information is useless unless it can be converted into the active molecular species, protein. This is done in contemporary creatures first by transcription of one strand to give a complementary strand of mRNA. The sequence of nucleotides is then translated into a specific sequence of amino acids in a protein. Translation is made possible by a genetic coding system in which a sequence of three nucleotides codes for a specific amino acid. The origin and evolution of any chemical system can be understood through elucidation of the properties of the chemical entities which make up the system. There is an underlying logic to the coding system revealed by a correlation of the hydrophobicities of amino acids and their anticodonic nucleotides (i.e., the complement of the codon). Its importance lies in the fact that every amino acid going into protein synthesis must first be activated. This is universally accomplished with ATP. Past studies have concentrated on the chemistry of the adenylates, but more recently we have found, through the use of NMR, that we can observe intramolecular interactions even at low concentrations, between amino acid side chains and nucleotide base rings in these adenylates. The use of this type of compound thus affords a novel way of elucidating the manner in which amino acids and nucleotides interact with each other. In aqueous solution, when a hydrophobic amino acid is attached to the most hydrophobic nucleotide, AMP, a hydrophobic interaction takes place between the amino acid side chain and the adenine ring. The studies to be reported concern these hydrophobic interactions. Author

N86-26874*# Salk Institute for Biological Studies, San Diego, Calif.
MOLECULAR REPLICATION
Leslie E. Orgel *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 72 (For primary document see N86-26844 17-55)
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The object of our research program is to understand how polynucleotide replication originated on the primitive Earth. This is a central issue in studies of the origins of life, since a process similar to modern DNA and RNA synthesis is likely to have formed the basis for the most primitive system of genetic information transfer. The major conclusion of studies so far is that a preformed polynucleotide template under many different experimental conditions will facilitate the synthesis of a new oligonucleotide with a sequence complementary to that of the template. It has been shown, for example, that poly(C) facilitates the synthesis of long oligo(G)s and that the short template CCGCC facilities the synthesis of its complement GGCGG. Very recently we have shown that template-directed synthesis is not limited to the standard oligonucleotide substrates. Nucleic acid-like molecules with a pyrophosphate group replacing the phosphate of the standard nucleic acid backbone are readily synthesized from deoxynucleotide 3'-5'-diphosphates on appropriate templates. Author

N86-26875*# Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
STEREOSELECTIVE AMINOACYLATION OF RNA
D. A. Usher, M. C. Needels, and T. Brenner *In* NASA, Washington Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 73 (For primary document see N86-26844 17-55)
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Prebiotic chemistry is faced with a major problem: how could a controlled and selective reaction occur, when there is present in the same solution a large number of alternative possible coreactants? This problem is solved in the modern cell by the presence of enzymes, which are not only highly efficient and controllable catalysts, but which also can impose on their substrates a precise structural requirement. However, enzymes are the result of billions of years of evolution, and we cannot invoke them as prebiotic catalysts. One approach to solving this problem in the prebiotic context is to make use of template-directed reactions. These reactions increase the number of structural requirements that must be simultaneously present in a molecule for it to be able to react, and thereby increase the selectivity of the reaction. They also can give a large increase in the rate of a reaction, if the template constrains two potential coreactants to lie close together. A third benefit is that information that is present in the template molecule can be passed on to the product molecules. If

the earliest organisms were based on proteins and nucleic acids, then the investigation of peptide synthesis on an oligonucleotide template is highly relevant to the study of the origin of life. Author

N86-26876*# Salk Institute for Biological Studies, San Diego, Calif.

MODELS OF GLYCOLYSIS: GLYCERALDEHYDE AS A SOURCE OF ENERGY AND MONOMERS FOR PREBIOTIC CONDENSATION REACTIONS

Arthur L. Weber *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 74 (For primary document see N86-26844 17-55)

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All organisms require energy in a chemical form for maintenance and growth. In contemporary life this chemical energy is obtained by the synthesis of the phosphoanhydride bonds of ATP. Among the biological processes that yield ATP, fermentation is generally considered primitive, because it operates under anaerobic conditions by substrate-level phosphorylation which does not require compartmentation by membranes. Fermentation by the glycolytic pathway, which is found in almost every living cell, is an especially attractive energy source for primitive life. Glycolysis not only produces useful chemical energy (ATP), but intermediates of this pathway are also involved in amino acid synthesis and photosynthetic carbon-fixation. It is believed that energy and substrates needed for the origin of life were provided by nonenzymatic chemical reactions that resemble the enzyme-mediated reactions of glycolysis. These nonenzymatic reactions would have provided a starting point for the evolutionary development of glycolysis. Author

N86-26877*# Roswell Park Memorial Inst., Buffalo, N. Y. Unit of Theoretical Biology.

A COMPARATIVE STUDY OF PREBIOTIC AND PRESENT DAY TRANSLATIONAL MODELS

R. Rein, G. Raghunathan, J. McDonald, M. Shibata, and S. Srinivasan *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 75 (For primary document see N86-26844 17-55)

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It is generally recognized that the understanding of the molecular basis of primitive translation is a fundamental step in developing a theory of the origin of life. However, even in modern molecular biology, the mechanism for the decoding of messenger RNA triplet codons into an amino acid sequence of a protein on the ribosome is understood incompletely. Most of the proposed models for prebiotic translation lack, not only experimental support, but also a careful theoretical scrutiny of their compatibility with well understood stereochemical and energetic principles of nucleic acid structure, molecular recognition principles, and the chemistry of peptide bond formation. Present studies are concerned with comparative structural modelling and mechanistic simulation of the decoding apparatus ranging from those proposed for prebiotic conditions to the ones involved in modern biology. Any primitive decoding machinery based on nucleic acids and proteins, and most likely the modern day system, has to satisfy certain geometrical constraints. The charged amino acyl and the peptidyl termini of successive adaptors have to be adjacent in space in order to satisfy the stereochemical requirements for amide bond formation. Simultaneously, the same adaptors have to recognize successive codons on the messenger. This translational complex has to be realized by components that obey nucleic acid conformational principles, stabilities, and specificities. This generalized condition greatly restricts the number of acceptable adaptor structures. Author

N86-26878*# Miami Univ., Coral Gables, Fla. Inst. for MOlecular and Cellular Evolution.

PROTOBIOLOGICAL INFORMATION, BIDIRECTIONAL RECOGNITION AND REVERSE TRANSLATION

Sidney W. Fox, Tadayoshi Nakashima, Aleksander Przybylski, and Graham Vaughan *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 76 (For primary document see N86-26844 17-55)

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Emergence of protobiological information has been suggested by experiments in which heated mixtures of alpha-amino acids order themselves into a self limited array of thermal proteins. The polymers display selective catalytic, hormonal, and other activities. Interactions of varied cationic thermal proteins with polynucleotides indicate selective recognition in both directions. Reverse translation is partly a missing link in the molecular evolution flowsheet. The self ordering of amino acids serves conceptually as a deterministic evolutionary precursor of the modern coding mechanism. The possibility for the evolution of information at an early nontemplated protein stage is supported by findings of electrical signals from proteinoid microspheres prepared with no DNA/RNA in their history. The deposition of thermal copolyamino acids on lipid membranes in the Mueller-Rudin apparatus has here been found to produce electrical behavior like that evoked by bacterial EIM polypeptide. A new procedure is to make a film of membrane on the electrode; the results provide maximal repeatability. The principle of nonrandom biomacromolecular specificity identified by these studies in molecular evolution have been extrapolated to principles of evolution of advanced organisms. Author

N86-26879*# Hawaii Univ., Honolulu. Exobiology Lab.

PHOTOCHEMICAL REACTIONS OF VARIOUS MODEL PROTOCELL SYSTEMS

Clair E. Folsome *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 77 (For primary document see N86-26844 17-55)

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Models for the emergence of cellular life on the primitive Earth, and for physical environments of that era have been studied that embody these assumptions: (1) pregenetic cellular forms were phase-bounded systems primarily photosynthetic in nature, and (2) the early Earth environment was anoxic (lacking appreciable amounts of free hydrogen). It was found that organic structures can also be formed under anoxic conditions (N_2, $CO_3^{=}$, H_2O) by protracted longwavelength UV radiation. Apparently these structures form initially as organic layers upon $CaCO_3$ crystalloids. The question remains as to whether the UV photosynthetic ability of such phase bounded structures is a curiosity, or a general property of phase bounded systems which is of direct interest to the emergence of cellular life. The question of the requirement and sailient features of a phase boundary for UV photosynthetic abilities was addressed by searching for similar general physical properties which might be manifest in a variety of other simple protocell-like structures. Since it has been shown that laboratory protocell models can effect the UV photosynthesis of low molecular weight compounds, this reaction is being used as an assay to survey other types of structures for similar UV photosynthetic reactions. Various kinds of structures surveyed are: (1) proteinoids; (2) liposomes; (3) reconstituted cell membrane spheroids; (4) coacervates; and (5) model protocells formed under anoxic conditions. M.G.

N86-26880*# Houston Univ., Tex.

THE PRINCIPLE OF COOPERATION AND LIFE'S ORIGIN AND EVOLUTION

J. Oro, Gil Armangue, and Arnulfo Mar *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 78 (For primary document see N86-26844 17-55)

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In simple terms a living entity is a negentropic system that replicates, mutates and evolves. A number of suggestions have been made, such as directed panspermia, atmospheric photosynthesis, genetic overtaking from inorganic processes, etc., as alternative models to the accepted Oparin-Haldane-Urey model of the origin of life on Earth. This has probably occurred because in spite of tremendous advances in the prebiotic synthesis of biochemical compounds, the fundamental problem of the appearance of the first life--a primordial replicating cell-ancestral to all other forms of extant life, has remained elusive. This is indeed a

reflection on the different fundamental nature of the problem involved. Regardless of which were the fundamental processes which occurred on the primitive Earth, it has to end up with the fundamental characteristics of an ancestral protocell. The problem of the emergence of the first ancestral cell was one of synergistic macromolecular cooperation, as it has been discussed by authors recently (COSPAR XXV Plenary Meeting). An analogous situation must have occurred at the time of the appearance of the first eucaryotic organism. Procaryotic life appeared probably during the first 600 million years of Earth history when the Earth was sufficiently cool and continually bombarded (in the late accretion period) by comets and minor bodies of the solar system, when the sea had not yet acquired its present form. Author

N86-26881*# Massachusetts Inst. of Tech., Cambridge. Dept. of Biology.

BASE PAIRING AND BASE MIS-PAIRING IN NUCLEIC ACIDS

Andrew H.-J. Wang and Alexander Rich *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 78 (For primary document see N86-26844 17-55)

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In recent years we have learned that DNA is conformationally active. It can exist in a number of different stable conformations including both right-handed and left-handed forms. Using single crystal X-ray diffraction analysis we are able to discover not only additional conformations of the nucleic acids but also different types of hydrogen bonded base-base interactions. Although Watson-Crick base pairings are the predominant type of interaction in double helical DNA, they are not the only types. Recently, we have been able to examine mismatching of guanine-thymine base pairs in left-handed Z-DNA at atomic resolution (1A). A minimum amount of distortion of the sugar phosphate backbone is found in the G x T pairing in which the bases are held together by two hydrogen bonds in the wobble pairing interaction. Because of the high resolution of the analysis we can visualize water molecules which fill in to accommodate the other hydrogen bonding positions in the bases which are not used in the base-base interactions. Studies on other DNA oligomers have revealed that other types of non-Watson-Crick hydrogen bonding interactions can occur. In the structure of a DNA octamer with the sequence d(GCG-TACGC) complexed to an antibiotic triostin A, it was found that the two central AT base pairs are held together by Hoogsteen rather than Watson-Crick base pairs. Similarly, the G x C base pairs at the ends are also Hoogsteen rather than Watson-Crick pairing. Hoogsteen base pairs make a modified helix which is distinct from the Watson-Crick double helix. Author

N86-26882*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CARBON EXCHANGE BETWEEN THE MANTLE AND THE CRUST AND ITS EFFECT UPON THE ATMOSPHERE: TODAY COMPARED TO ARCHEAN TIME

David DesMarais *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 81 (For primary document see N86-26844 17-55)

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Paleobiologists now recognize that the Earth's biosphere has been profoundly affected by geologic processes. One very important process is the dissipation of heat which has been generated by radioactivity and/or stored within the Earth. Heat flow is responsible for crustal movements and therefore it is the principal architect for constructing the environments (e.g. shallow marine, continental, etc.) wherein life developed and flourished. Heat flow has also influenced the movements of volatile elements (e.g. C, N, H, S, rare gases, etc.) both within the Earth's crust and between the crust and mantle. The inventory of these elements in the Earth's crust is important, not just because some of them constitute the building blocks of organic matter, but also because they influence the biosphere's climate. The purpose of this work is to evaluate how the decline of heat flow over the course of the Earth's history has influenced the carbon inventory in the Earth's crust. Such an evaluation must first consider whether the rate at which carbon is presently being exchanged between the mantle and crust is sufficient to play an important role in controlling the crustal inventory. Secondly, this exchange of carbon must be reevaluated in the context of the Precambrian Earth's environment. One very important consideration is that the upper mantle was perhaps 300 C hotter 3 b.y. ago than it is today. Author

N86-26883*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EARTH'S EARLY ATMOSPHERE AS SEEN FROM CARBON AND NITROGEN ISOTOPIC ANALYSIS OF ARCHEAN SEDIMENTS

Everett K. Gibson, Jr., L. P. Carr, I. Gilmour (Open Univ., Milton, England), and C. T. Pillinger *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 82 (For primary document see N86-26844 17-55)

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The origin and evolution of the Earth's early atmosphere has long been a topic of great interest but determination of actual compositions over geologic time is a difficult problem. However, recent systematic studies of stromatolite deposits (Precambrian Paleobiology Research Group) has extended our knowledge of Archean ecosystems. It has been shown that many stromatolite deposits have undergone negligible alteration since their time of formation. The discovery of primary fluid inclusions within unaltered 3.5 b.y. old Archean sediments and the observation that the 3.3 b.y. old Barberton cherts have remained closed to argon loss and have not been subjected to thermal metamorphism suggests that an opportunity exists for the direct measurement of the volatile constituents present at their time of formation. Of primary interest to this study was the possibility that the stromatolites and other Archean sediments might retain a vestige of the atmosphere and thus afford an indication of the variations in carbon dioxide and nitrogen isotopic compositions with time. A suite of essentially unaltered Archean stromatolites and the cherts of different ages and geologic sites have been analyzed for their trapped carbon dioxide and nitrogen compositions by the stepped combustion extraction tech nique utilizing static mass spectrometers for the isotope measurements. Author

N86-26884*# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.

USE OF LABORATORY SIMULATED PYROLYSIS IN TRACING THE HISTORY OF SEDIMENTARY ORGANIC MATTER

I. R. Kaplan, E. Tannenbaum, and B. E. Huizinga *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 82 (For primary document see N86-26844 17-55)

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Results from laboratory simulated pyrolyses experiments show that in addition to depth of burial, preservation of kerogen, and hence any morphologic structure in it, is also dependent on the mineral matrix with which it is associated. In the presence of clay minerals, and especially under dry conditions, extractable lipids released during kerogen decomposition are more rapidly destroyed than in the presence of calcite or chert matrices. The result is production of gas, polar bitumen and pyrobitumen and destruction of biomarkers. During such an early reorganization of the kerogen, the biomarker constituents can be destroyed, or unrecognizably altered. The above process of organic residues maturation appears to be inhibited in the presence of water and is significantly reduced where kerogen is hosted in limestones, dolomites or cherts. These minerals have been characteristically found to be the most reliable in yielding morphological fossils and small quantities of extractable bitumen in Archean and Proterozoic rocks. To understand the validity of chemical and morphological fossils, in the early geologic record, it will be necessary to understand the process of kerogen in sedimentary rocks. To test the role of various minerals on the preservation process, kerogen extracted from a variety of rocks has been heated together with montmorillonite, illite and calcite. The kinetics of the process has been monitored and the products quantitatively identified. M.G.

N86-26885*# Indiana Univ., Bloomington. Biogeochemical Labs.

ISOTOPIC, PETROLOGIC AND BIOGEOCHEMICAL INVESTIGATIONS OF BANDED IRON-FORMATIONS

J. M. Hayes, A. J. Kaufman, C. Klein (New Mexico Univ., Albuquerque), S. A. Studley, M. E. Baur (California Univ., Los Angeles), and M. R. Walter (Bureau of Mineral Resources, Geology and Geophysics, Canberra, Australia) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 84 (For primary document see N86-26844 17-55)

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It is recognized that the first occurrence of banded iron-formations (BIFs) clearly predates biological oxygenation of the atmosphere-hydrosphere system and that their last occurrences extend beyond plausible dates of pervasive biological oxygenation. For this reason, and because enormous quantities of oxidizing power have been sequestered in them, it is widely thought that these massive, but enigmatic, sediments must encode information about the mechanism and timing of the rise of atmospheric O2. By coupling isotopic analyses of iron-formation carbonates with biogeochemical and petrologic investigations, we are studying (1) the mechanism of initial sedimentation of iron; (2) the role of iron in microbially mediated diagenetic processes in fresh iron-formation sediments; and (3) the logical integration of mechanisms of deposition with observed levels of banding. Thus far, it has been shown that (1) carbonates in BIFs of the Hamersley Group of Western Australia are isotopically inhomogenous; (2) the nature and pattern of isotopic ordering is not consistent with a metamorphic origin for the overall depletion of C-13 observed in the carbonates; (3) if biological, the origin of the C-13 depleted carbonate could be either respiratory or fermentative; (4) iron may have been precipitate d as Fe(3+), then reduced to Fe(2+) within the sediment; and (5) sedimentary biogeochemical systems may have been at least partially closed to mass transport of carbonate species. Author

N86-26886*# Michigan Univ., Ann Arbor.

THE LUNAR NODAL TIDE AND THE DISTANCE TO TNE MOON DURING THE PRECAMBRIAN ERA

James C. G. Walker and Kevin J. Zahnle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 85 (For primary document see N86-26844 17-55)

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The origin and early evolution of life on Earth occurred under physical and chemical conditions distinctly different from those of the present day. The broad goal of this research program is to characterize these conditions. One aspect involves the dynamics of the Earth-Moon system, the distance of the Moon from the Earth, and the length of the day. These have evolved during the course of Earth history as a result of the dissipation of tidal energy. As the moon has receded the amplitude of oceanic tides has decreased while the increasing length of the day should have influenced climate and the circulation of atmosphere and ocean. A 23.3 year periodicity preserved in a 2500 million year old banded iron-formation was interpreted as reflecting the climatic influence of the lunar nodal tide. The corresponding lunar distance would then have been approx. 52 Earth radii. The influence of the lunar nodal tide is also apparent in rocks with an age of 680 million years B.P. The derived value for lunar distance 2500 million years ago is the only datum on the dynamics of the Earth-Moon system during the Precambrian era of Earth history. The implied development of Precambrian tidal friction is in accord with more recent paleontological evidence as well as the long term stability of the lunar orbit. Author

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RECENT PROGRESS IN PRECAMBRIAN PALEOBIOLOGY

J. William Schopf *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 87 (For primary document see N86-26844 17-55)

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Ongoing studies at UCLA include the following: (1) investigations in Archean and Proterozoic sequences of various locations; (2) laboratory and field studies of modern microbial biocoenoses (analogues of Precambrian microbial communities) especially those at Laguna Mormona, Baja California, Mexico; (3) development of new laboratory techniques for the separation and concentration of minute cellularly preserved fossils for isotopic and organic geochemical analyses; and (4) assembly of a computerized database for assessment of the timing and nature of major events occurring during Precambrian biotic evolution, and of the potential applicability of ancient microbiotas to problems of global biostratigraphy and biogeography. Author

N86-26888*# Illinois Univ., Urbana.

HIGHER-ORDER STRUCTURE OF rRNA

R. R. Gutell and C. R. Woese *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 88 (For primary document see N86-26844 17-55)

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A comparative search for phylogenetically covarying basepair replacements within potential helices has been the only reliable method to determine the correct secondary structure of the 3 rRNAs, 5S, 16S, and 23S. The analysis of 16S from a wide phylogenetic spectrum, that includes various branches of the eubacteria, archaebacteria, eucaryotes, in addition to the mitochondria and chloroplast, is beginning to reveal the constraints on the secondary structures of these rRNAs. Based on the success of this analysis, and the assumption that higher order structure will also be phylogenetically conserved, a comparative search was initiated for positions that show co-variation not involved in secondary structure helices. From a list of potential higher order interactions within 16S rRNA, two higher-order interactions are presented. The first of these interactions involves positions 570 and 866. Based on the extent of phylogenetic covariation between these positions while maintaining Watson-Crick pairing, this higher-order interaction is considered proven. The other interaction involves a minimum of six positions between the 1400 and 1500 regions of the 16S rRNA. Although these patterns of covariation are not as striking as the 570/866 interaction, the fact that they all exist in an anti-parallel fashion and that experimental methods previously implicated these two regions of the molecule in tRNA function suggests that these interactions be given serious consideration. Author

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THE rRNA EVOLUTION AND PROCARYOTIC PHYLOGENY

George E. Fox *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 89 (For primary document see N86-26844 17-55)

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Studies of ribosomal RNA primary structure allow reconstruction of phylogenetic trees for prokaryotic organisms. Such studies reveal major dichotomy among the bacteria that separates them into eubacteria and archaebacteria. Both groupings are further segmented into several major divisions. The results obtained from 5S rRNA sequences are essentially the same as those obtained with the 16S rRNA data. In the case of Gram negative bacteria the ribosomal RNA sequencing results can also be directly compared with hybridization studies and cytochrome c sequencing studies. There is again excellent agreement among the several methods. It seems likely then that the overall picture of microbial phylogeny that is emerging from the RNA sequence studies is a good approximation of the true history of these organisms. The RNA data allow examination of the evolutionary process in a semi-quantitative way. The secondary structures of these RNAs are largely established. As a result it is possible to recognize examples of local structural evolution. Evolutionary pathways accounting for these events can be proposed and their probability can be assessed. Author

N86-26890*# California Univ., Berkeley. Space Sciences Lab.
INVESTIGATIONS WITH METHANOBACTERIA AND WITH EVOLUTION OF THE GENETIC CODE
Thomas H. Jukes *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 90 (For primary document see N86-26844 17-55)
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Mycoplasma capricolum was found by Osawa et al. to use UGA as the code of tryptophan and to contain 75% A + T in its DNA. This change could have been from evolutionary pressure to replace C + G by A + T. Numerous studies have been reported of evolution of proteins as measured by amino acid replacements that are observed when homologus proteins, such as hemoglobins from various vertebrates, are compared. These replacements result from nucleotide substitutions in amino acid codons in the corresponding genes. Simultaneously, silent nucleotide substitutions take place that can be studied when sequences of the genes are compared. These silent evolutionary changes take place mostly in third positions of codons. Two types of nucleotide substitutions are recognized: pyrimidine-pyrimidine and purine-purine interchanges (transitions) and pyrimidine-purine interchanges (transversions). Silent transitions are favored when a corresponding transversion would produce an amino acid replacement. Conversely, silent transversions are favored by probability when transitions and transversions will both be silent. Extensive examples of these situations have been found in protein genes, and it is evident that transversions in silent positions predominate in family boxes in most of the examples studied. In associated research a streptomycete from cow manure was found to produce an extracellular enzyme capable of lysing the pseudomurein-contining methanogen Methanobacterium formicicum. Author

N86-26891*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IS THE ATPase FROM HALOBACTERIUM SACCHAROVORUM AN EVOLUTIONARY RELIC?
Lawrence I. Hochstein, Wijaya Altekar (Bhabha Research Center (India).), and Hordur Kristjansson *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 91 (For primary document see N86-26844 17-55)
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The ATP Synthase Complex present in the membranes of mitochondria, chloroplasts or bacteria is composed of 2 sectors: FO, an integral membrane protein consisting of 3 subunits mediating proton translocation across the membrane and F1, the catalytic component composed of 5 non-identical subunits. The apparent early origin of the ATP Synthase Complex, as implied by its ubiquitous distribution, seems inconsistent with its structural and functional complexity and raises the question if simpler versions of the ATP Synthase exist. Such an ATP Synthase has been searched for in various Archaebacteria. A purified halobacterial ATPase activity which possesses certain properties consistent with those of an ATP Synthase but which has a different subunit structure is described. M.G.

N86-26892*# California Univ., Irvine.
FUNCTIONAL AND EVOLUTIONARY RELATIONSHIPS BETWEEN BACTERIORHODOPSIN AND HALORHODOPSIN IN THE ARCHAEBACTERIUM, HALOBACTERIUM HALOBIUM
Janos K. Lanyi *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 92 (For primary document see N86-26844 17-55)
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The archaebacteria occupy a unique place in phylogenetic trees constructed from analyses of sequences from key informational macromolecules, and their study continues to yield interesting ideas on the early evolution and divergence of biological forms. It is now known that the halobacteria among these species contain various retinal-proteins, resembling eukaryotic rhodopsins, but with different functions. Two of these pigments, located in the cytoplasmic membranes of the bacteria, are bacteriorhodopsin (a light-driven proton pump) and halorhodopsin (a light-driven chloride pump). Comparison of these systems is expected to reveal structure/function relationships in these simple (primitive?) energy transducing membrane components and evolutionary relationships which had produced the structural features which allow the divergent functions. Findings indicate that very different primary structures are needed for these proteins to accomplish their different functions. Indeed, analysis of partial amino acid sequences from halo-opsin shows already that few if any long segments exist which are homologous to bacterio-opsin. Either these proteins diverged a very long time ago to allow for the observed differences, or the evolutionary clock in the halobacteria runs faster than usual. M.G.

N86-26893*# California Univ., Berkeley. Div. of Molecular Plant Biology.
THIOREDOXINS IN EVOLUTIONARILY PRIMITIVE ORGANISMS
Bob B. Buchanan *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 93 (For primary document see N86-26844 17-55)
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Thioredoxins are low molecular weight redox proteins, alternating between the S-S (oxidized) and SH (reduced) states, that function in a number of biochemical processes, including DNA synthesis, DNA replication, and enzyme regulation. Until recently, reduced ferredoxin was known to serve as the source of reducing power for the reduction of thioredoxins only in oxygenic photosynthetic cells. In all other organisms, the source of hydrogen (electrons) for thioredoxin reduction was considered to be NADPH. It was found that Clostridium pasteurianum, an anaerobic organism normally living in the soil unexposed to light, resembles photosynthetic cells in using ferredoxin for the reduction of thioredoxin. The results reveal the existence of a pathway in which ferredoxin, provides the reducing power for the reduction of thioredoxin via the flavoprotein enzyme, ferredoxinthioredoxin reductase. In related studies, it was found that Chromatium vinosum, an anaerobic photosynthetic purple sulfur bacterium, resembles evolutionarily more advanced micro-organisms in having an NADP-thioredoxin system composed of a single thioredoxin which is reduced by NADPH via NADP-thioredoxin reductase. The adoption of the NADP-thioredoxin system by Chromatium seems appropriate in view of evidence tha the organi sm utilizes ATP-driven reverse electron transport. Finally, results of research directed towards the identification of target enzymes of the ferredoxin/thioredoxin system in a cyanobacterium (Nostoc muscorum), show that thioredoxin-linked photosynthetic enzymes of cyanobateria are similar to those of chloroplasts. It now seems that the ferredoxin/thioredoxin system functions in regulating CO2 assimilation via the reductive pentose phosphate cycle in oxygenic but not anoxygenic photosynthetic cells. M.G.

N86-26894*# Rockefeller Univ., New York.
BIOSYNTHETIC PORPHYRINS AND THE ORIGIN OF PHOTOSYNTHESIS
David Mauzerall, Arthur Ley, and Janet A. Mercer-Smith (Los Alamos National Lab., N. Mex.) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 94 (For primary document see N86-26844 17-55)
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Since the prebiotic atmosphere was anaerobic, if not reducing, a useful function of primordial photosynthesis would have been to photooxidize reduced substrates such as Fe(+2), S(-2) or reduced organic molecules and to emit hydrogen. Experiments have shown that the early biogenic pigments uroporphyrin and coproporphyrin do photooxidize organic compounds and emit hydrogen in the presence of a platinum catalyst. These experiments were carried out in dilute aqueous solution near neutral pH under anaerobic atmosphere, and quantum yields near 10-2 were obtained. Thus relevant prebiotic conditions were maintained. Rather then to further optimize conditions, attempts were made to replace the platinum catalyst by a more prebiotically suitable catalyst. Trials with an Fe4S4(SR)4 cluster, in analogy to the present hydrogenase and

nitrogenase, were not successful. However, experiments using cobalt complexes to catalyze the formation of hydrogen are promising. In analogy with biological photosynthetic systems which group pigments, electron transfer molecules and enzymes in clusters for efficiency, it was found that binding the biogenic porphyrins to the polyvinyl alcohol used to support the platinum catalyst did increase the quantum yield of the reaction. It was also found that ultraviolet light can serve to photo-oxidize porphyrinogens to porphyrins under anaerobic conditions. Thus the formation of the colorless porphyriogens by the extraordinarily simple biosynthetic pathway would not be a problem because of the prevalence of UV light in the prebiotic, anoxic atmosphere. Author

N86-26895*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OXYGEN AND THE EVOLUTION OF METABOLIC PATHWAYS
Linda L. Jahnke *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 95 (For primary document see N86-26844 17-55)
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While a considerable amount of evidence has been accumulated about the history of oxygen on this planet, little is known about the relative amounts to which primitive cells might have been exposed. One clue may be found in the metabolic pathways of extant microorganisms. While eucaryotes are principally aerobic organisms, a number are capable of anaerobic growth by fermentation. One such eucaryotic microorganism, Saccharomyces cerevisiae, will grow in the complete absence of oxygen when supplemented with unsaturated fatty acid and sterol. Oxygen-requiring enzymes are involved in the synthesis of both of these compounds. Studies have demonstrated that the oxidative desaturation of palmitic acid and the conversion of squalene to sterols occur in the range of 10-(3) to 10(-2) PAL. Thus, if the oxygen requirements of these enzymatic processes are an indication, eucaryotes might be more primitive than anticipated from the microfossil record. Results of studies on the oxygen requirements for sterol and unsaturated fatty acid synthesis in a more primitive procaryotic system are also discussed. M.G.

N86-26896*# California Univ., San Diego, La Jolla.
EVOLUTION OF THIOL PROTECTIVE SYSTEMS IN PROKARYOTES
Robert C. Fahey and Gerald L. Newton *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 96 (For primary document see N86-26844 17-55)
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Biological thiols are essential elements in most aspects of cell function but undergo rapid oxidation to disulfides in the presence of oxygen. The evolution of systems to protect against such oxygen toxicity was essential to the emergence of aerobic life. The protection system used by eukaryotes is based upon glutathione (GSH) and GSH-dependent enzymes but many bacteria lack GSH and apparently use other mechanisms. The objective of this research is to elaborate the thiol protective mechanisms employed by prokaryotes of widely divergent evolutionary origin and to understand why GSH became the central thiol employed in essentially all higher organisms. Thiol-selective fluorescent labeling and HPLC analysis has been used to determine key monothiol components. M.G.

N86-26897*# Florida State Univ., Tallahassee. Dept. of Biological Science.
MICROFOSSILS IN THE ANTARCTIC COLD DESERT: POSSIBLE IMPLICATIONS FOR MARS
E. Imre Friedmann and Roseli Ocampo-Friedmann (Florida Agricultural and Mechanical Univ., Tallahassee) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 97 (For primary document see N86-26844 17-55)
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In the Ross Desert of Antarctica, the principal life form is the cryptoendolithic microbial community in the near-surface layers of porous sandstone rocks. Biological, geological, and climatic factors interact in a complex and precarious balance, making life possible in an otherwise hostile environment. Once this balance is tipped, fossilization sets in. In the reverse case, new colonization of the rock surface may be initiated. As a result, fossilization is contemporary with modern life and both may be simultaneously present in a mosaic pattern. Also, different stages of fossilization are present. The process of fossilization takes place in a nonaquatic environment. If primitive life ever appeared on Mars, it is possible that with increasing aridity, life withdrew into an endolithic niche similar to that in the Antarctic desert. Fossilization in a nonaquatic environment may have set in with the result that traces of past life could be preserved. If such was the case, the study of the fossilization process in Antarctica may hold useful information for the analysis of Martian samples for microfossils. Author

N86-26898*# University of Southern Illinois, Carbondale.
EVOLUTIONARY SIGNIFICANCE OF OSMOREGULATORY MECHANISMS IN CYANOBACTERIA
John H. Yopp, John H. Pavlicek, and Marion H. Sibley *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 98 (For primary document see N86-26844 17-55)
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Physiological processes of all life forms on this planet are intrinsically related to their intracellular water potential. The overall goal was the elucidation of the mechanism(s) whereby the first oxygenic photoautotrophs (the cyanobacteria) adjust their water potential to that of a changing external water potential (that is, osmoregulate). Osmoregulation is achieved by intracellular adjustment of inorganic and/or organic solutes (osmolytes) involving specific biochemical mechanisms. Structural and biochemical evolution within the cyanobacteria is believed completed (and fixed in present day forms) by the end of the Precambrain eon. Therefore, research using cyanobacteria of all three structural types (unicellular, filamentous, and branched), each grown in the photoautotrophic (PA), photoheterotrophic (PG), and chemotrophic (CH) modes of nutrition, should provide insight into the origin and evolution of the photosynthetically related osmoregulatory mechanisms of eukaryotic organisms. The chloroplasts of these organisms are phylogenetically related to the cyanobacteria. Author

N86-26899*# Boston Univ., Mass.
MICROBIAL CONTRIBUTIONS TO THE PRECAMBRIAN EARTH
Lynn Margulis, David Bermudes, and Robert Obar *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 99 (For primary document see N86-26844 17-55)
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Life has existed on Earth for approximately 3.5 billion years. For most of this time, prokaryotic communities provided the major biological forces changing the Earth. Many changes in atmospheric gas composition occurred during the Archean and Proterozoic eons as a result of microbial activity. Extant microbial communities were used to help understand the dynamics which contributed to these atmospheric changes. The microbial mat communities were characterized according to the organismic constituents. Symbiosis in microbial communities is recognized as a major force in cell evolution. Among the evolutinary enigmas investigated is the problem of the origin of the undulipodia. Undulipodial microtubules are still deployed for major cellular processes such as mitosis and meiosis. Several prokaryotes were tested for the presence of the S1-type protein, so far only spirochetes were found to possess it. The S1-type protein is being sought in cyanobacteria reported to contain microtubules. B.G.

N86-26900*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ORGANIC S13C VALUES VARY SLIGHTLY WITH SALINITY IN MICROBIAL MATS AT GUERRERO NEGRO, BAJA CALIFORNIA SUR, MEXICO: IMPLICATIONS FOR STROMATOLITE S13C

VALUES
David J. DesMarais, Etta Peterson, Emil Kwong, and Hua Bui *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 100 (For primary document see N86-26844 17-55)
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Stromatolites, layered sedimentary rock structures produced by communities of microorganisms, constitute the most abundant early evidence of life on Earth. Microbial mats, which are found most frequently in hypersaline marine or hot spring environments, serve as useful modern analogs of stromatolitic communities. Biochemical studies of mats were conducted to assist in the interpretations of stromatolites. The data suggest that salinity effects are insufficient by themselves to cause the C-13 differences observed between Precambrian stromatolites and modern microbial mats. Author

N86-26901*# Chicago Univ., Ill.
THE FOSSIL RECORD OF EVOLUTION: ANALYSIS OF EXTINCTION
David M. Raup *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 102 (For primary document see N86-26844 17-55)
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There is increasing evidence that events in space have had direct effects on Earth history and on the history of life on Earth. Nowhere is this more evident than in mass extinction. The biosphere has undergone repeated devastation caused by relatively short-lived environmental stress, with species kill rates up to 80 and 95%. For five of the mass extinctions, geochemical or other evidence was reported suggesting large body impact as the cause of the environmental stress producing the extinctions. It was argued on statistical ground that the major extinction events are uniformly periodic in geological time. If it is true that large body impact is a principal cause of mass extinctions and if the periodicity is real, than a cosmic driving mechanism is inescapable. Paleontological data sets were developed which detail the ranges in geological time of about 4,000 families and 25,000 genera of fossil marine organisms. Analyses to date have concentrated on the most recent 250 million years. Associated with these studies are analyses of other aspects of Earth history which may have signatures indicative of extraterrestrial effects. Author

N86-26902*# Chicago Univ., Ill.
THE FOSSIL RECORD OF EVOLUTION: DATA ON DIVERSIFICATION AND EXTINCTION
J. John Sepkoski, Jr. *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 102 (For primary document see N86-26844 17-55)
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Synoptic studies of the fossil record of complex life on Earth indicate increasingly that extinction, and especially mass extinction, were extremely important driving forces in the history of life. Analysis of a new compilation of geologic ranges for 25,000 genera of marine animals suggests that extinction events were much more frequent in occurrence and variable in magnitude than previously suspected. At least 30 well documented and potential mass extinctions were identified in the dataset. The most recent event, distributed over 260 to 0 ma. exhibit a stationary periodicity of 26.1 + or - 1 ma, implicating a cosmological forcing mechanism. Earlier events, especially in the 575 to 450 ma interval, are more frequent, possibly indicating either a breakdown of periodicity in the more distant past; and as yet undemonstrated diminution of the period length; or frequent aperiodic terrestrial perturbations of a less stable biota superimposed upon the cosmological periodicity. Author

N86-26903*# California Univ., Berkeley. Lawrence Berkeley Lab.
GEOCHEMICAL ANOMALIES, BOLIDE IMPACTS AND BIOLOGICAL EXTINCTIONS ON THE EARTH
Frank Asaro, Luis W. Alvarez, H. V. Michel, and W. Alvarez (California Univ., Berkeley.) *In* NASA, Washington Second Symposium in Chemical Evolution and the Origin and Evolution of Life May 1986 p 104 (For primary document see N86-26844 17-55)
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Geochemical and mineralogical techniques are used to search for evidence of extraterrestrial impacts associated with mass and lesser biological extinction peaks in the geological record. Studies of the Cretaceous-Tertiary boundary serve as a baseline for evaluating geochemical data from the extinction horizones. Other studies were generally concentrated on rock strata corresponding to the periodic extinction peaks noted by Raup and Sepkoski. A significant iridium anomaly in late Eocene marine sediments associated with extinctions of radiolaria in low latitudes and attributed to an extraterrestrial source is widely distributed in 8 to 9 sites around the world. Author

N86-26904*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CLIMATIC CONSEQUENCES OF VERY HIGH CO2 LEVELS IN EARTH'S EARLY ATMOSPHERE
James F. Katsing *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 105 (For primary document see N86-26844 17-55)
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Earth has approximately 60 bars of carbon dioxide tied up in carbonate rocks, or roughly 2/3 the amount of CO2 of the atmosphere of Venus. Two different lines of evidence, one based on thermodynamics and the other on geochemical cycles, indicate that a substantial fraction of thes CO2 may have resided in the atmosphere during the first few hundred million years of the Earth's history. A natural question which arises is whether this much CO2 would have resulted in a runaway greenhouse effect. One dimensional radiative/convective model calculations presented showed that the surface temperature of a hypothetical primitive atmosphere containing 20 bars of CO2 was less than 100 C; thus no runaway greenhouse effect would have occurred. The climatic stability of the early atmosphere is a consequence of three factors: reduced solar luminosity at that time, an increase in planetary albedo caused by Rayleigh scattering by CO2, and the stabilizing effects of a moist convection. The latter two factors are sufficient to prevent a CO2 induced runaway greenhouse effect on the present Earth as well, for CO2 levels up to 100 bars. Further studies are being undertaken to determine whether a runaway greenhouse effect could have occurred during the latter stages of the accretion process and, if so, whether it would have collapsed one the influx of material slowed down. Author

N86-26905*# Ohio State Univ., Columbus.
A DECADE OF SETI OBSERVATIONS
Robert S. Dixon *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 107 (For primary document see N86-26844 17-55)
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A full time dedicated search for extraterrestrial radio signals of intelligent origin has been in progress at the Ohio State University Radio Observatory since 1973. The radio telescope has a collecting area of 2200 square meters, which is equivalent to a circular dish 175 feet in diameter. The search concentrates on a 500 kHz bandwidth centered on the 1420 MHz hydrogen line, Doppler corrected to the galactic standard of rest. A large portion of the sky visible from Ohio was searched, with particular emphasis on the galactic center region and the M31 Andromeda galaxy. The survey is largely computer automated, and all data reduction is done in real time. Two distinct populations of signals were detected. The first is a relatively small number of signals which persist for over a minute and which are clearly extraterrestrial in origin. The second is the large number of signals which persist less than 10 seconds whose locations are anticorrelated with the galactic plane but show clumps along the galactic axis. None of these signals were observed to recur, despite repeated observations. The cause of these signals were not determined. Author

N86-26906*# California Univ., Berkeley. Space Sciences Lab.
THE BERKELEY SERENDIP PROJECT
Stuart Bowyer, Dan Werthimer, Jill Tarter, and Rachael Buhse *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 108 (For primary document see N86-26844 17-55)
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An automated system was designed to perform a real time search for narrow band radio signals in the spectra of sources in a regularly scheduled, non-SETI astronomical observing program. The system will compute the power spectrum using a 65, 536 channel fast Fourier transform processor with a real time bandwidth of 128 KHz and 2 Hz per channel resolution. After search for peaks in a 100 KHz portion of the IF band of the radio telescope, the system will move to the next 100 KHz portion using a programmable frequency synthesizer. When the whole IF band is scanned, the process will start again. Unidentified peaks in the power spectra are candidates for further study and their celestial coordinates will be recorded along with the time and power, IF and RF frequency, and bandwidth of the peak. Most of the hardware was developed and the machine software is in the process of being finalized. A number of means for identifying and rejecting power spectra peaks which have a high likelihood of being nonuseful are being investigated. Author

N86-26907*# California Univ., Berkeley. Space Sciences Lab.
AN INFRARED SEARCH FOR EXTRATERRESTRIAL LASER SIGNALS
Albert Betz *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 109 (For primary document see N86-26844 17-55)
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The focus of project SETI is on microwave frequencies, where receivers fundamentally have the best sensitivity for the detection of narrow band signals. Such receivers, when coupled to existing radio telescopes, form an optimum system for broad area searches over the sky. Detection of narrow band infrared signals is best done with a laser heterodyne reciever similar in function to a microwave spectral line receiver. A receiver was built for astrophysical observations at 30 THz (10 microns) and the spectrometer is being adapted for SETI work. The receiver uses a small CO2 laser as the local oscillator, a HgCdTe diode as the photomixer, and a multichannel intermediate frequency (IF) filterbank. An advanced multichannel IF processor is now being built to detect infrared line radiation in 1000 spectral channels each 1 MHz wide. When completed this processor will be used with a ground based telescope next year for a survey of several hundred selected stars for narrow band CO2 laser signals at 30 THz. Author

N86-26908*# Boston Univ., Mass. Dept. of Astronomy.
USING THE IRAS DATA TO SEARCH IN THE ASTEROID BELT FOR ANY POTENTIAL EVIDENCE OF GALACTIC COLONIZATION
Michael D. Papagiannis *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 110 (For primary document see N86-26844 17-55)
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The end product of the biological evolution seems to be the appearance of technological civilizations, which are characterized by superior technology that supercedes biological capabilities. The Search for Extraterrestrial Intelligence (SETI) has gained scientific recognition in recent years. The concept of galactic colonization is debated extensively, with opinions ranging from the impossible to the inevitable, but without a clear resolution. Answers can be obtained only with experimental tests and not with endless debates. A search for large space colonies in the asteroid belt, an ideal source of raw materials for a spaceborne civilization, is a test of the galactic colonization theory. The catalogue of solar system objects obtained form the Infrared Astronomy Satellite (IRAS) observations at 12, 25, 60, and 100 microns, is an ideal source for such a search. The catalog is expected to be ready at the end of 1985 and will contain more than 10,000 objects. B.G.

N86-26909*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
OVERVIEW OF THE NASA SETI PROGRAM
Bernard M. Oliver *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 111 (For primary document see N86-26844 17-55)
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The NASA Search of Extraterrestrial Intelligence (SETI) program plan is to scan the microwave window from 1 to 10 GHz with existing radio telescopes and sophisticated signal processing equipment looking for narrow band features that might represent artificial signals. A microwave spectrometer was built and is being field tested. A pattern recognition computer to search for drifting continuous wave signals and pulse trains in the output spectra is being designed. Equipment to characterize the radio frequency interference environment was also built. The plan is to complete the hardware and software by FY-88. Then, with increased funding, this equipment will be replicated in Very Large Scale Integration form. Observations, both a complete sky survey and a search fo nearby solar type stars, will begin in about 1990. The hypothesis that very powerful signals exist or that signals are being beamed at us will be tested. To detect the kinds of signals radiated at distances of 100 light years will require a collecting area kilometers in diameter. Author

N86-26910*# Stanford Univ., Calif. Radioscience Lab.
STANFORD HARDWARE DEVELOPMENT PROGRAM
Allen Peterson, Ivan Linscott, and Jim Burr *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 112 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

Architectures for high performance, digital signal processing, particularly for high resolution, wide band spectrum analysis were developed. These developments are intended to provide instrumentation for NASA's Search for Extraterrestrial Intelligence (SETI) program. The real time signal processing is both formal and experimental. The efficient organization and optimal scheduling of signal processing algorithms were investigated. The work is complemented by efforts in processor architecture design and implementation. A high resolution, multichannel spectrometer that incorporates special purpose microcoded signal processors is being tested. A general purpose signal processor for the data from the multichannel spectrometer was designed to function as the processing element in a highly concurrent machine. The processor performance required for the spectrometer is in the range of 1000 to 10,000 million instructions per second (MIPS). Multiple node processor configurations, where each node performs at 100 MIPS, are sought. The nodes are microprogrammable and are interconnected through a network with high bandwidth for neighboring nodes, and medium bandwidth for nodes at larger distance. The implementation of both the current mutlichannel spectrometer and the signal processor as Very Large Scale Integration CMOS chip sets was commenced. Author

N86-26911*# California Univ., Berkeley. Dept. of Astronomy.
GOLDSTONE FIELD TEST ACTIVITIES: TARGET SEARCH
Jill Tarter *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 113 Prepared in cooperation with Search for Extraterrestrial Intelligence Inst., Los Altos, Calif. (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

In March of this year prototype SETI equipment was installed at DSS13, the 26 meter research and development antenna at NASA's Goldstone complex of satellite tracking dishes. The SETI equipment will remain at this site at least through the end of the summer so that the hardware and software developed for signal detection and recognition can be fully tested in a dynamic observatory environment. The field tests are expected to help understand which strategies for observing and which signal recognition algorithms perform best in the presence of strong man-made interfering signals (RFI) and natural astronomical sources. Author

N86-26912*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE FIELD TEST ACTIVITIES: SKY SURVEY
Samuel Gulkis and Edward T. Olsen *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 114 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The goals are to conduct a research and development program aimed at determining the most effective way to do SETI within the constraints of current technology and estimated budgets. The general search strategy adopted is that which is recommended by the SETI Science Working Group. The strategy for an all sky survey for SETI was further developed over the last year. Scan patterns, scan rates, and signal detection algorithms were developed. Spectral power measurement instrumentation was tested at the Venus Station of the Goldstone Deep Space Communication Complex. A specially designed radio frequency interference (RFI) measurement system was built and installed at the Venus Station. A data base management system for storage and retrieval of the RFI data was partially implemented on a VAX 750 computer at the Jet Propulsion Laboratory. Author

N86-26913# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JPL'S ROLE IN THE SETI PROGRAM
Michael J. Klein *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin of Life May 1986 p 115 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

The goal of the JPL SETI Team is to develop the strategies and the instrumentation required to carry out an effective, yet affordable, SETI Microwave Observing Program. The primary responsibility for JPL is the development and implementation of the Sky Survey component of the bimodal search program recommended by the SETI Science Working Group (NASA Technical Paper 2244, 1983). JPL is also responsible for the design and implementation of microwave analog instrumentation (including antenna feed systems, low noise RF amplifiers, antenna monitor and control interfaces, etc.) to cover the microwave window for the Sky Survey and the Target Search observations. The primary site for the current SETI Field Test activity is the Venus Station of the Goldstone Deep Space Communication Complex. A SETI controller was constructed and installed so that preprogrammed and real time SETI monitor and control data can be sent to and from the station controller. This unit will be interfaced with the MCSA. A SETI Hardware Handbook was prepared to describe the various systems that will be used by the project at the Venus Station; the handbook is frequently being expanded and updated. The 65,000 channel FFT Spectrum analyzer in the RFI Surveillance System was modified to permit operation with variable resolutions (300 Hz to less than 1 Hz) and with real-time accumulation, which will enhance the capability of the system for testing Sky Survey search strategies and signal detection algorithms. Author

N86-27152*# National Aeronautics and Space Administration, Washington, D.C.
EXOBIOLOGY EXPERIMENT CONCEPTS FOR SPACE STATION
L. D. Griffiths (Management and Technical Services Co., Washington, D.C.) and D. L. DeVincenzi *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-26914*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INCREASING PROCESSOR UTILIZATION DURING PARALLEL COMPUTATION RUNDOWN
William H. Jones 1986 13 p refs Presented at the 1986 International Conference on Parallel Processing, St. Charles, Ill., 19-22 Aug. 1986; sponsored by IEEE
(NASA-TM-87349; E-3101; NAS 1.15:87349) Avail: NTIS HC A02/MF A01 CSCL 09B

Some parallel processing environments provide for asynchronous execution and completion of general purpose parallel computations from a single computational phase. When all the computations from such a phase are complete, a new parallel computational phase is begun. Depending upon the granularity of the parallel computations to be performed, there may be a shortage of available work as a particular computational phase draws to a close (computational rundown). This can result in the waste of computing resources and the delay of the overall problem. In many practical instances, strict sequential ordering of phases of parallel computation is not totally required. In such cases, the beginning of one phase can be correctly computed before the end of a previous phase is completed. This allows additional work to be generated somewhat earlier to keep computing resources busy during each computational rundown. The conditions under which this can occur are identified and the frequency of occurrence of such overlapping in an actual parallel Navier-Stokes code is reported. A language construct is suggested and possible control strategies for the management of such computational phase overlapping are discussed. Author

N86-26915*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTATIONAL METHODS FOR THE CONTROL OF DISTRIBUTED PARAMETER SYSTEMS
J. A. Burns (Virginia Polytechnic Inst. and State Univ., Blacksburg.), E. M. Cliff, and R. K. Powers May 1986 19 p refs Sponsored in part by LLNL
(Contracts NAS1-17070; NAS1-18107; Grants NSF ECS-81-09245; AF-AFOSR-0287-85)
(NASA-CR-178108; ICASE-86-32; NAS 1.26:178108) Avail: NTIS HC A02/MF A01 CSCL 12A

Finite dimensional approximation schemes that work well for distributed parameter systems are often not suitable for the analysis and implementation of feedback control systems. The relationship between approximation schemes for distributed parameter systems and their application to optimal control problems is discussed. A numerical example is given. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-26916# Los Alamos National Lab., N. Mex.
NETWORK FILE STORAGE SYSTEM
M. W. Collins 1985 12 p Presented at the 7th Symposium on Mass Storage Systems, Tucson, Ariz., 4-7 Nov. 1985
(Contract W-7405-eng-36)
(DE86-000779; LA-UR-85-3183; CONF-8511114-1) Avail: NTIS HC A02/MF A01

The CFS is a centralized file management and file storage for the Los Alamos Integrated Computing Network (ICN). The ICN is composed of over 70 computers running 5 different timesharing operating systems. CFS has been operational since June 1979 in a scientific computing environment (primarily interactive but including batch), using the latest supercomputers. CFS allows controlled data sharing between the network computers and between users, as any file stored in CFS can be retrieved on any

of the network computers provided the user has access to the file and meets security rules. The user interface to CFS is simple and flexible and was designed for optimum performance with an interactive user. The network interface is also simple and flexible. This is a better approach than a network storage system that is integrated with the operating systems of the network computers. The ICN is constantly changing, so the interfaces between the components must be simple. Most of the CFS user interface decision is placed at the user level to allow the user to retain the maximum control and flexibility. DOE

N86-26917# Los Alamos National Lab., N. Mex.
CFT COMPILER OPTIMIZATION AND CRAY X-MP VECTOR PERFORMANCE
I. Y. Bucher and M. L. Simmons 1985 9 p Presented at the Cray Users Group Meeting, Montreal, Quebec, 30 Sep. - 3 Oct. 1985
(Contract W-7405-eng-36)
(DE86-004746; LA-UR-85-4404; CONF-8509219-1) Avail: NTIS HC A02/MF A01

The motivation for this paper was the observation that Cray X-MP vector performance has not always improved. It is well known that vector performance of register-to-register vector computers is strongly compiler dependent. The compiler is responsible for properly sequencing vector load, arithmetic, and store operations, and for scheduling necessary scalar operations in such a way that they take place while vector operations are in progress and therefore do not consume any additional time. We have analyzed vector performance data for CFT compiler versions 1.10 through 1.14. In spite of the great performance improvements achieved by version 1.14 of CFR, further speedups are possible by eliminating the slowdowns introduced in version 1.11. DOE

N86-26918# Yale Univ., New Haven, Conn. Dept. of Computer Science.
FOUNDATIONS OF KNOWLEDGE FOR DISTRIBUTED SYSTEMS. REVISION
Michael J. Fisher and Neil Immerman Dec. 1985 19 p refs
(Contract N00014-82-K-0154; Grant NSF DCR-84-05478)
(AD-A163545; Yaleu/DCS/TR-450-Rev) Avail: NTIS HC A02/MF A01 CSCL 09/2

We give a simple, yet very general definition for distributed protocols. We then define notions of knowledge and common knowledge appropriate for these protocols. We study how changes in the states of knowledge relate to more standard notions of computation. We find that by restricting our formulas to certain sets of global states we can realize different, appropriate definitions of knowledge with fundamentally different properties. GRA

N86-26919# Georgia Inst. of Tech., Atlanta. School of Information and Computer Science.
PROCEEDINGS OF THE INTERNATIONAL TEST AND EVALUATION ASSOCIATION 1984 SYMPOSIUM (STEP SESSION). SUPPLEMENT
Apr. 1985 102 p
(Grant F33657-82-G-2083)
(AD-A163236; GIT-ICS-85/05-Suppl) Avail: NTIS HC A06/MF A01 CSCL 09/2

The motivation for this session of the ITEA symposium is to demonstrate some good examples of software testing in the DoD and to update the test community on some current activities of the DoD to improve the testing of software. The session is organized around three technical areas: 1) The Software T&E Policy and Guidance section is concerned with presenting policy level changes to DoDD 5000.3 that will improve the visibility and accountability of softwafe in major systems acquisitions. Included in this section is a presentation of a guidebook that will be issued to aid in implementing DoD policy. 2) The Software Test Management section presents two perspectives of the management of software testing during development test and operational test. 3) The Software Test Tools section describes the effectiveness of using software test tools on two DoD programs. In addition, it describes the to-be-issued DoD-StD-SDS and SOS, the new Joint Logistics Commanders Standards for software development and software quality assurance. GRA

N86-26920# Texas Instruments, Inc., Dallas. Central Research Labs.
CHOOSING ARCHITECTURES FOR EXPERT SYSTEMS Final Report, Jul. 1983 - Mar. 1985
Paul J. Kline and Steven B. Dolins Oct. 1985 158 p
(Contract F30602-83-C-0123)
(AD-A163343; RADC-TR-85-192) Avail: NTIS HC A08/MF A01 CSCL 09/2

Design guidelines for expert systems are developed. These guidelines relate problem characteristics to appropriate artificial intelligence (AI) implementation techniques. They were developed by (1) collecting claims about the appropriate use of techniques from the published literature on expert systems, (2) circulating these draft guidelines among experienced expert systems builders for their comments and additions, and (3) revising the draft guidelines in response to these comments. This report includes the resulting 47 guidelines along with excerpts from the published literature that justify and support each guideline. The report also contains descriptions of 44 problems readers can be expected to encounter if they decide to use some of the AI techniques that are recommended. A glossary that defines 53 of the AI techniques and an index are also included. Author (GRA)

N86-26921# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Sci.
INTERPROCESSOR COMMUNICATION ISSUES IN FAT-TREE ARCHITECTURES
Alexander Toichi Ishii Oct. 1985 43 p
(Contract N00014-80-C-0622)
(AD-A163425) Avail: NTIS HC A03/MF A01 CSCL 09/2

In recent years, it has become increasingly evident that conventional computer architectures will be unable to perform, in an acceptable time frame, many of the computational functions that we would desire of them. Consequently, much research has been devoted to the concept of constructing super-computers, which will be able to exploit the potential for parallel computation intrinsic to many large computational problems. Recently, Leiserson has proposed a multiprocessor scheme based on Leighton's tree of meshes, called a fat-tree. Conceptually, such a multiprocessor would be comprised of a set of n processing elements each situated as a leaf in a complete binary tree. Internal modes would be high speed switches which route messages being passed between processing elements, while edges between nodes would be bundles of constant bandwidth communication paths. The purpose of this document will be to address and define some of the issues which effect interprocessor communication within a fat-tree multiprocessor. Specifically, it covers the following topics: (1) Addressing in a fat-tree; (2) Generation of addresses in a fat-tree; and (3) Allocation of communication resources in a fat-tree. GRA

N86-26922# University of Southern California, Los Angeles. Computer Research Inst.
SYNTHESIS OF HIGH-SPEED DIGITAL SYSTEMS Ph.D. Thesis
Nohbyung Park 8 Nov. 1985 232 p
(Contracts DAAG29-83-K-0147; DAAG29-80-K-0083)
(AD-A164690; CRI-85-23; ARO-20637.11-EL) Avail: NTIS HC A11/MF A01 CSCL 09/2

The design of high-speed systems and the automation of the design tasks involved is the topic of this thesis. In particular, the focus is on the use of pipelining and general overlapped execution in order to speed up the systems being implemented. This thesis contains new techniques for speed-up, and describes the implementation of these techniques in a set of design automation programs. The new techniques produce designs which share resources and time in a manner which is more complex that used as common practice in working systems. The manual design of such complex hardware would be virtually impossible; thus, automated design is a key aspect of the proposed design

methodology. The specific problem the thesis addresses is the following: the determination of the point in time each operation in a set of tasks is to be performed, and the manner in which the operators which execute each operation are reused from cycle to cycle. Three topics are investigated: 1) clocking scheme synthesis; 2) synthesis of pipelined data paths; and, 3) the insertion of delays into pipelined systems to avoid resources conflicts while increasing performance. GRA

N86-26923# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMPUTERS AND DATA TRANSMISSION EQUIPMENT. ALPHA-NUMERIC CODES
4 Feb. 1986 13 p Transl. into ENGLISH from Russian State Standard GOST 13052-67, 1967 p 1-14 Supersedes FTD-ID(RS)T-0041-86
(AD-A164794; FTD-ID(RS)T-0041-86; FTD-HT-23-652-69) Avail: NTIS HC A02/MF A01 CSCL 09/2

In a translation of a Soviet document a standard is extended to a binary seven-element code (symbols and their code designations), which is intended for the representation of information at the inputs and outputs of the data transmission equipment, electronic computers, and input/output units. GRA

N86-26924# Naval Postgraduate School, Monterey, Calif.
MODERN HARDWARE TECHNOLOGIES AND SOFTWARE TECHNIQUES FOR ON-LINE DATABASE STORAGE AND ACCESS M.S. Thesis
Christopher V. Feudo Dec. 1985 297 p refs
(AD-A164993) Avail: NTIS HC A13/MF A01 CSCL 09/2

Computerized data processing applications have grown over the past thirty years to a point where they have now become a pervasive influence in our society. As the range of applications has grown, a continuing concern has been the cost and access time of data storage. A wide range of technologies have been investigated to address this problem. The purpose of this thesis is to examine high volume, on-line storage media of current and emerging technologies and software techniques for supporting these on-line, high capacity storage media. In the first part, we analyze such media as vertical magnetic recording, thin film media, optical data disks, magneto-optic disks, bubble and Bernoulli-effect disks. Then, comparisons and evaluations of products and product categories are illustrated. In the second part, we review the modern software techniques for on-line database storage and access. Author (GRA)

N86-26925# Naval Postgraduate School, Monterey, Calif.
THE FEASIBILITY OF AUTOMATIC STORAGE RECLAMATION WITH CONCURRENT PROGRAM EXECUTION IN A LISP ENVIRONMENT M.S. Thesis
Kevin G. Cassidy Dec. 1985 108 p
(AD-A165184) Avail: NTIS HC A06/MF A01 CSCL 09/2

Storage reclamation is the process of reclaiming discarded information and returning the memory space occupied by that discarded information to an available area or list in memory that is available to be utilized by programmers. This increased interest in storage reclamation is a result of the increasing use of list-processing environments. A list-processing environment is a system in which the language manipulates data structures called lists. In classical LISP implementations, program execution/computation continues until there is no more memory available (i.e., the free list of available cells has become exhausted). When this happens, user program(s) HALT and then storage reclamation, in the form of garbage collection, takes over. This halting of programs in the midst of their computation is not only frustrating to programmers and researchers but can also be of crucial importance in other applications. This thesis investigates the feasibility of allowing concurrent program execution with garbage collection. LISP has been selected because it has been estimated that typical LISP programs take 10%-30% of their processing time to perform garbage collection. GRA

N86-26926# Naval Biodynamics Lab., New Orleans, La.
DEMONSTRATION OF A STATISTICAL METHOD FOR ISOLATING TIMESHARING COMPONENTS
Alvah C. Bittner, Jr. and Diane L. Damos Jan. 1986 21 p
(AD-A165417; NBDL-86R001) Avail: NTIS HC A02/MF A01 CSCL 09/2

An objective statistical method for isolating timesharing components of performance is described and demonstrated. During the first stage of this method, partial correlation analysis is used to remove the variance attributable to the single-task measures. During the second stage, the resulting dual-task partial correlations are subjected to a form of factor analysis. Data from both Sverko (1977) and Wickens, Mountford, and Schreiner (1981) were reanalyzed and the results compared with their earlier analyses, as well as with the reanalysis of the later study by Ackerman, Schneider and Wickens (1984). The characterization of timesharing factors and the question of a general timesharing factor are also discussed. Using the proposed method, substantial evidence for multiple timesharing components was found. Author (GRA)

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-26927 Royal Signals and Radar Establishment, Malvern (England). Inst. of Sound and Vibration Research.
REGULAR EXPRESSION ANALYSIS OF PROCEDURES AND EXCEPTIONS
J. M. Foster Jun. 1985 22 p refs
(RSRE-85008; BR97966; ESA-86-96846) Copyright. Avail: Issuing Activity

An algorithm to find properties of computer programs by using algebraic methods is described. It is capable of handling subroutines and exception exits. A program scheme to find properties of microcode programs was produced. The scheme can be systematically instantiated to deal with particular properties. The algorithm works in practice, even for very complex microcode, in time proportional to the number of microcode instructions. ESA

N86-26928*# Standard Univ., Calif. Computer Systems Lab.
EXECUTAABLE ASSERTIONS AND FLIGHT SOFTWARE
Aamer Mahmood, Dorothy M. Andrews, and E. J. McCluskey Nov. 1984 35 p refs Previously announced in IAA as A85-17854
(NASA-CR-176759; NAS 1.26:176759; CSL-TR-84-258; CRC-TR-84-16) Avail: NTIS HC A03/MF A01 CSCL 09B

Executable assertions are used to test flight control software. The techniques used for testing flight software; however, are different from the techniques used to test other kinds of software. This is because of the redundant nature of flight software. An experimental setup for testing flight software using executable assertions is described. Techniques for writing and using executable assertions to test flight software are presented. The error detection capability of assertions is studied and many examples of assertions are given. The issues of placement and complexity of assertions and the language features to support efficient use of assertions are discussed. Author

N86-26929# Argonne National Lab., Ill. Mathematics and Computer Science Div.
SPECFUN - A PORTABLE SPECIAL FUNCTION PACKAGE
W. J. Cody 1985 13 p Presented at the Workshop on Microcomputers in Large Scale Scientific Computing, Newark, Del.
(Contract W-31-109-eng-38)
(DE86-004060; CONF-8505216-1) Avail: NTIS HC A02/MF A01

SPECFUN is a collection of transportable Fortran special function programs and accompanying test drivers that is currently under development. Elements of the package have been success-

fully run on machines as diverse in characteristics as a Kaypro II, an IBM PC, a VAX 11/780, an IBM 3033, and Cray-1. This is a discussion of the overall capabilities, design characteristics, and implementation details of the package. DOE

N86-26930# Lawrence Livermore National Lab., Calif.
ALGORITHMS FOR SUPERCOMPUTERS
B. J. Alder Dec. 1985 20 p Presented at Congress Submitted for publication
(Contract W-7405-eng-48)
(DE86-004480; UCRL-93705; CONF-850859-3) Avail: NTIS HC A02/MF A01

Better numerical procedures, improved computational power and additional physical insights have contributed significantly to progress in dealing with classical and quantum statistical mechanics problems. Past developments are discussed and future possibilities outlined. DOE

N86-26931# Royal Signals and Radar Establishment, Malvern (England). Inst. of Sound and Vibration Research.
EXTENDING DATA TYPING BEYOND THE BOUNDS OF PROGRAMMING LANGUAGES
M. Stanley Sep. 1985 13 p
(RSRE-MEMO-3878; BR97889; ESA-86-96847) Avail: Issuing Activity

The use of strongly typed values at the operating system and command language level in a Programming Support Environment (PSE) is discussed. The use of flexible data structures on filestore, with support for data typing from the operating system and the command language interpreter, as implemented in the Flex PSE, is outlined. ESA

N86-26932*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
A LATERAL GUIDANCE ALGORITHM TO REDUCE THE POST-AEROBRAKING BURN REQUIREMENTS FOR A LIFT-MODULATED ORBITAL TRANSFER VEHICLE M.S. Thesis
Glen Charles Herman Jun. 1986 155 p
(Contract NAS9-17560)
(NASA-CR-177295; NAS 1.26:177295; CSDL-T-912) Avail: NTIS HC A08/MF A01 CSCL 09B

A lateral guidance algorithm which controls the location of the line of intersection between the actual and desired orbital planes (the hinge line) is developed for the aerobraking phase of a lift-modulated orbital transfer vehicle. The on-board targeting algorithm associated with this lateral guidance algorithm is simple and concise which is very desirable since computation time and space are limited on an on-board flight computer. A variational equation which describes the movement of the hinge line is derived. Simple relationships between the plane error, the desired hinge line position, the position out-of-plane error, and the velocity out-of-plane error are found. A computer simulation is developed to test the lateral guidance algorithm for a variety of operating conditions. The algorithm does reduce the total burn magnitude needed to achieve the desired orbit by allowing the plane correction and perigee-raising burn to be combined in a single maneuver. The algorithm performs well under vacuum perigee dispersions, pot-hole density disturbance, and thick atmospheres. The results for many different operating conditions are presented. Author

N86-26933*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
AN ADAPTIVE GUIDANCE ALGORITHM FOR AN AERODYNAMICALLY ASSISTED ORBITAL PLANE CHANGE MANEUVER M.S. Thesis
James A. Blissit May 1986 229 p
(Contract NAS1.18061)
(NASA-CR-177296; NAS 1.26:177296; CSDL-T-902) Avail: NTIS HC A13/MF A01 CSCL 09B

Using analysis results from the post trajectory optimization program, an adaptive guidance algorithm is developed to compensate for density, aerodynamic and thrust perturbations during an atmospheric orbital plane change maneuver. The maneuver offers increased mission flexibility along with potential fuel savings for future reentry vehicles. Although designed to guide a proposed NASA Entry Research Vehicle, the algorithm is sufficiently generic for a range of future entry vehicles. The plane change analysis provides insight suggesting a straight-forward algorithm based on an optimized nominal command profile. Bank angle, angle of attack, and engine thrust level, ignition and cutoff times are modulated to adjust the vehicle's trajectory to achieve the desired end-conditions. A performance evaluation of the scheme demonstrates a capability to guide to within 0.05 degrees of the desired plane change and five nautical miles of the desired apogee altitude while maintaining heating constraints. The algorithm is tested under off-nominal conditions of + or -30% density biases, two density profile models, + or -15% aerodynamic uncertainty, and a 33% thrust loss and for various combinations of these conditions. Author

N86-26934# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
ERROR PROPERTIES OF HARTLEY TRANSFORM ALGORITHMS
Avideh Zakhor Oct. 1985 204 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285; NR Proj. 049-506)
(AD-A163217; TR-511) Avail: NTIS HC A10/MF A01 CSCL 12/1

In this thesis, the error properties of various discrete Hartley transform (DHT) algorithms are investigated theoretically and experimentally. More specifically, the author analyzes the arithmetic roundoff error characteristics of DHT algorithms proposed by Bracewell and Wang and develops and analyzes a new DHT algorithm. Statistical models for roundoff errors and linear system noise theory are employed to estimate output noise variance for these DHT algorithms. By considering the overflow constraint in conjunction with these noise analyses, output noise to signal ratios are derived for both fixed and floating-point arithmetic. Experiments are used to support the theoretical predictions obtained via the statistical models. The empirical results are found to be in excellent agreement with the predictions based on the models. Comparing Bracewell's, Wang's and the new algorithm in terms of their error properties, it is found that Bracewell's algorithm exhibits the most desirable error characteristics. These results were found to hold for both frequency and decimation-in-time and for a variety of different radices. For a given radix, the total operation count for all algorithms is found to be identical.to be identical Author (GRA)

N86-26935# Rockwell International Corp., Los Angeles, Calif.
CADS: A COMPUTER AIDED DESIGN SYSTEM. VOLUME 2. USER'S GUIDE Final Report, 1 Dec. 1981 - 30 Apr. 1985
Michael C. Less and Susan Manuel Aug. 1985 231 p
(Contract F33615-81-C-3229)
(AD-A163258; AFWAL-TR-85-3066-Vol-2) Avail: NTIS HC A11/MF A01 CSCL 09/2

A user's guide for the Computer Aided Design System, CADS. CADS is a pre and post processor for structural analysis and optimization programs based on the finite element method is presented. The system supports five functional modules controlled by an Executive Monitor. All of these modules communicate with a data base through a data manager. In addition a post output translator, CADSPP, is available which processes output from finite element programs, e.g. NASTRAN, directly into the data base. Also given is a detailed description of all user commands available in CADS and CADSPP. A sample session is provided which shows the user commands applied to a variety of sample problems. Author (GRA)

N86-26936# Institute for Defense Analyses, Alexandria, Va.
STARS (SOFTWARE TECHNOLOGY FOR ADAPTABLE AND RELIABLE SYSTEMS) METHODOLOGY AREA SUMMARY. VOLUME 1: ORGANIZATION AND PLANS Final Report
Robert Converse, Catherine W. McDonald, William Riddle, and Christine Youngblut Mar. 1985 33 p
(Contract MDA903-84-C-0031)
(AD-A163270; AD-E500743; IDA-P-1814-Vol-1; IDA/HQ-85-29621-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

Initially, the Ada Joint Program Office (AJPO) sponsored Professors Peter Freeman and Anthony Wasserman to identify requirements for software development methodologies that would allow the Department of Defense (DoD) to realize the full potential of Ada. Since that time, the work on methodologies to support Ada has been transferred to the DoD Joint Program Office for the program entitled Software Technology for Adaptable and Reliable Systems (STARS). The STARS Joint Program Office (SJPO) objective is to improve the productivity level of software system development and support as well as the resulting quality of deployed software systems. This report consists of two volumes: Volume I presents the organization and plans of the STARS Methodology Coordination Team. Volume II is a technical report concerned with the development of methodology classification, evaluation and selection technologies and a framework of characteristics that can be used to support these technologies. GRA

N86-26937# Institute for Defense Analyses, Alexandria, Va.
STARS (SOFTWARE TECHNOLOGY FOR ADAPTABLE AND RELIABLE SYSTEMS) METHODOLOGY AREA SUMMARY. VOLUME 2: PRELIMINARY VIEWS ON THE SOFTWARE LIFE CYCLE AND METHODOLOGY SELECTION Final Report
Catherine W. McDonald, William Riddle, and Christine Youngblut Mar. 1985 66 p
(Contract MDA903-84-C-0031)
(AD-A163271; AD-E500744; IDA-P-1814-Vol-2; IDA/HQ-85-29622-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 09/2

Initially, the Ada Joint Program Office (AJPO) sponsored Professors Peter Freeman and Anthony Wasserman to identify requirements for software development methodologies that would allow the Department of Defense (DoD) to realize the full potential of Ada. Since that time, the work on methodologies to support Ada has been transferred to the DoD Joint Program Office for the program entitled Software Technology for Adaptable and Reliable Systems (STARS). The STARS Joint Program Office (SJPO) objective is to improve the productivity level of software system development and support as well as the resulting quality of deployed software systems. This report consists of two volumes: Volume I presents the organization and plans of the STARS Methodology Coordination Team. Volume II is a technical report concerned with the development of methodology classification, evaluation and selection technologies and a framework of characteristics that can be used to support these technologies. GRA

N86-26938# Institute for Defense Analyses, Alexandria, Va.
USER'S MANUAL FOR THE PROTOTYPE ADA (TRADEMARK) COMPILER EVALUATION CAPABILITY (ACEC), VERSION 1 Final Report
Audrey A. Hook, Gregory A. Riccardi, Michael Vilot, and Stephen Welke Oct. 1985 69 p refs
(Contract MDA903-84-C-0031)
(AD-A163272; AD-E500741; IDA-P-1879; IDA/HQ-85-30428) Avail: NTIS HC A04/MF A01 CSCL 09/2

The purpose of the Prototype Ada Compiler Evaluation Capability (ACEC) is to provide users with 1) an organized suite of compiler performance tests, and 2) support software for executing these tests and collecting performance statistics. These performance tests were collected by the Ada Evaluation and Validation (E&V) Team from several sources. The test programs, which have been in the public domain for some time, have been organized as a test suite according to categories which are explained in Section II. The strategy for measuring test performance and obtaining differential statistics is described in Section III. Section IV describes the entire support software architecture, including machine-dependent modules. General instructions for executing the Prototype ACEC are provided in Section V. GRA

N86-26939# Institute for Defense Analyses, Alexandria, Va.
COMMERCIAL MARKET POTENTIALS FOR THE USE OF THE ADA (TRADEMARK) PROGRAMMING LANGUAGE Final Report
David Dikel, Audrey A. Hook, and Patricia L. Greene Aug. 1985 53 p
(Contract MDA903-84-C-0031)
(AD-A163273; AD-E500742; IDA-M-106; IDA/HQ-85-30205) Avail: NTIS HC A04/MF A01 CSCL 09/2

Research on the use of the ADA language in the commercial community is discussed. The formal interview process took place during a seven month period from October 1984 to April 1985. The objective of the study was to investigate and describe areas of commercial ADA use in an effort to encourage better informed investments in the development and implementation of ADA products by the commercial community. GRA

N86-26940# Defence Research Establishment Atlantic, Dartmouth (Nova Scotia).
CIRCE: A NATURAL LANGUAGE RULE TRANSLATION SYSTEM FOR INTERSENSOR
James R. Ellis and C. Ann Dent Nov. 1985 49 p
(AD-A163279; DREA-TC-85/314) Avail: NTIS HC A03/MF A01 CSCL 09/2

CIRCE is a set of functions written in LISP as an experiment in natural language processing. It was developed for knowledge acquisition by the Intersensor system, a sonar knowledge-based inference system. The main function of CIRCE inputs from either the keyboard or a file a rule written in English and converts it into a LISP-like data structure. This conversion takes place in two steps: the English text is first parsed, and then the relevant information is extracted from the resulting list and assembled into rules. These rules are then written to a file where they can be used directly by the inference mechanism of Intersensor without further processing. The paper briefly reviews prior research at DREA in this area, and contrasts the current system with its predecessors. Implementation problems are discussed, and suggestions for improvements are given. Author (GRA)

N86-26941# Naval Research Lab., Washington, D. C.
APPLICATION OF FLUX-CORRECTED TRANSPORT TO TTCP JOINT LAUNCH BLAST COMPUTATIONAL EFFORT
P. S. Kamath, S. Eidelman, M. A. Fry, J. D. Baum, and D. L. Book 31 Dec. 1985 135 p
(AD-A163332; NRL-MR-5701) Avail: NTIS HC A07/MF A01 CSCL 19/4

The method of Flux-Corrected Transport (FCT) was developed as a means for solving systems of hyperbolic equations in such a way that physically positive quantities like mass and energy density remain positive. Its principal application has been to compressible fluids, i.e., fluids in which some of the flow speeds are comparable with or greater than the local speed of propagation of waves in the medium. During the past decade the method has been extended and generalized in a number of important respects. A general-purpose FCT hydrocode was used to treat two muzzle blast test problems. Analysis of the results and comparison with data indicates that the results are physically realistic and, within the modeling assumptions, highly accurate. The FCT simulation model used runs on the Cray-1 and on smaller mainframe computers including the VAX and the multitasking array processors in our Graphical and Array Processing System. GRA

N86-26942# Softech, Inc., Fairborn, Ohio.
Ada (TRADEMARK) COMPILER VALIDATION SUMMARY REPORT. VERDIX Ada COMPILER, VADS, VERSION V03.06 FOR VAX-11/785, USING ULTRIX 1.0 Final Report, 14 Jun. 1985 - 14 Jun. 1986
14 Jun. 1985 46 p
(Contract F33600-84-D-0280)
(AD-A163345; Rept-3285-2-15.2) Avail: NTIS HC A03/MF A01 CSCL 09/2

This Validation Summary Report presents the results and conclusions of performing standardized tests on the Verdix Ada compiler (VADS). The VADS is hosted on the VAX-11/785 computer operating under ULTRIX 1.0. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.5, was used. The ACVC suite of tests is used to validate conformance of the compiler to ANSI/MIL-STD-1815A (ADA). The purpose of

the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal language constructs. The testing also identifies implementation-dependent behavior permitted by the standard. Six classes of tests are used. These tests are designed to perform checks at compile time, during execution, and at link time. GRA

N86-26943# Softech, Inc., Fairborn, Ohio.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: VERDIX ADA COMPILER, VADA-010-0101, VERSION V03.04 FOR VAX-11/750, USING UNIX 4.2 BSD Final Report, for 15 Mar. 1985 - 15 Mar. 1986
15 Mar. 1985 47 p refs
(Contract F33600-84-D-0280)
(AD-A163363) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the Verdix Ada Compiler. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.5, was used. The ACVC suite of tests is used to validate conformance of the compiler to ANSI/MIL-STD-1815A (ADA). The purpose of the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal language constructs. The testing also identifies implementation-dependent behavior permitted by the standard. Six classes of tests are used. These tests are designed to perform checks at compile time, during execution, and at link time. GRA

N86-26944# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A NONPARAMETRIC STATISTICAL APPROACH TO THE VALIDATION OF COMPUTER SIMULATION MODELS
William E. Baker and Malcolm S. Taylor Nov. 1985 38 p
(AD-A163376; BRL-TR-2696) Avail: NTIS HC A03/MF A01 CSCL 09/2

Initially the authors completed a literature search in order to identify existing methods of computer simulation validation. Nonparametric statistical techniques were subsequently adapted to both deterministic and stochastic simulations, and these procedures were applied to a computer model currently in use at the Ballistic Research Laboratory. Monte-Carlo methods provided an indication of the power of these tests, and a mention of future work concerning attempts to increase this power has been included in this report. Author (GRA)

N86-26945# Massachusetts Inst. of Tech., Cambridge.
SPACE-EFFICIENT ALGORITHMS FOR COMPUTATIONAL GEOMETRY M.S. Thesis
Cynthia A. Phillips Oct. 1985 34 p
(Contract N00014-80-C-0622)
(AD-A163426) Avail: NTIS HC A03/MF A01 CSCL 09/2

For the VLSI design to be reliably produced as a working chip, various features on the chip must be separated by minimum distances to ensure the proper operation of transistors and interconnections. The design rule checker program verifies that these and other geometric constraints are satisfied and signals an error if it finds two features that violate the design rules. For a chip composed of millions of rectangles, design rule checking is a time-consuming process which cannot be done entirely within the primary memory of many computers. This thesis presents an efficient algorithm for finding the connected components of rectangles in the plane using a machine model incorporating the secondary disk memory where the VLSI design is stored. By running this algorithm simultaneously on each layer of a VLSI chip design, a design rule checker can determine which features of a chip design are electrically equivalent, i.e., are effectively part of the same wire. The determination of electrical equivalence allows the design rule checker to avoid reporting the many aliasing errors which occur when two electrically equivalent features are mistaken for electrically distinct features. For example, two wires might be too close together, but if they are actually the same wire, it does not matter. GRA

N86-26946# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
SCHEMA: AN ARCHITECTURE FOR KNOWLEDGE BASED CAD
C. G. Clark and R. E. Zippel Oct. 1985 4 p
(Contract N00014-80-C-0622)
(AD-A163437) Avail: NTIS HC A02/MF A01 CSCL 09/2

Schema provides an integrated environment for all aspects of the synthesis and analysis of electronic designs from PC boards through circuit and mask design of VLSI devices. It simplifies the development of synthesis and analysis tools by using uniform data structures and by making available libraries of standard routines and advanced control structures appropriate for CAD tool development. Because all tools in the Schema environment utilize the same abstract data structures it is easy for tools to interchange data about a design or even pieces of the design itself. Schema also permits much of the design to be done in a technology independent fashion by allowing the designer to delay implementation decisions until the last possible moment. The information associated with a particular component of a design is organized as a module. Modules contain schematics, icons, topologies, layouts, simulation results, and other descriptive information for this component. The descriptions contained in modules are implemented as procedures which utilize other modules in a hierarchical fashion. Author (GRA)

N86-26947# Naval Postgraduate School, Monterey, Calif.
USE OF COLOR IN DIFFERENTIATING FACTOR LEVELS IN SIMULATION OUTPUT (PRELIMINARY REPORT)
Peter A. W. Lewis Jan. 1986 13 p
(AD-A164651; NPS55-86-001) Avail: NTIS HC A02/MF A01 CSCL 09/2

A simulation is essentially a multi-factor statistical sampling experiment through which approximate answers to questions about some aspect of a system or statistic are obtained. Unfortunately the multi-factor aspect of the simulation is usually downplayed because of the difficulties of organizing and displaying the output as a function of various factors. Some graphical procedures using color are suggested for assessing the effect of the factors on the output. This is done in the context of an example of a multiserver queue. Classical analysis of variance techniques are usually not appropriate for this analysis because the data is non-normal and the mean is seldom an adequate or complete characterization of the output. GRA

N86-26948# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
VERIFYING TEMPORAL PROPERTIES WITHOUT USING TEMPORAL LOGIC
Bowen Alpern and Fred B. Schneider Dec. 1985 43 p
(Contract N00014-86-K-0092; Grant NSF DCR-83-20274)
(AD-A164820; CU-CSD-TR-85-723) Avail: NTIS HC A03/MF A01 CSCL 09/2

A new approach for proving temporal properties of concurrent programs is presented. The approach does not use temporal logic. To show that a program satisfies a given temporal property, the property is first decomposed into proof obligations. These obligations are then discharged by devising suitable invariant assertions and variant functions for the program. The approach is quite general - it handles a superset of the properties that can be expressed in linear-time temporal logic. Author (GRA)

N86-26949# Naval Postgraduate School, Monterey, Calif.
TOP-DOWN PARSING SYNTAX ERROR RECOVERY M.S. Thesis
Paul E. Hallowell, Jr. Dec. 1985 179 p
(AD-A164859) Avail: NTIS HC A09/MF A01 CSCL 09/2

Compiler writers continue to search for a reliable method of syntactic error recovery. Spurious error reports and confusing diagnostics are common problems confronting the programmer.

innumerable error possibilities have made recovery design a frustrating task. This thesis implements a method of syntactic error recovery using recursive calls on the error recovery routine. Parsing is accomplished by traversing transition diagrams which are created from syntax charts. Key language symbols and dynamically generated recovery positions are used in restoring the parse. High-quality error diagnostics give a clear, accurate, and thorough description of each error, providing an excellent instuctional software tool. Approach and implementation issues are discussed, and sample output listings are included. Author (GRA)

N86-26950# Naval Postgraduate School, Monterey, Calif.
SURFACE CONSTRUCTION FROM PLANAR CONTOURS M.S, Thesis
Patrick G. Hogan Dec. 1985 62 p
(AD-A164862) Avail: NTIS HC A04/MF A01 CSCL 09/2

Many scientific and technical endeavors require the reconstruction of a three-dimensional solid from a collection of two-dimensonal contours. One method for this reconstruction involves a procedure whereby individual pairs of contours are mapped together to form triangular surface patches. This thesis presents an algorithm which not only handles mapping situations of simple, closed contours but also mappings of multiple/contours per plane and partial contour mappings. Also included is a discussion of algorithm limitations and heuristics. Author (GRA)

N86-26951# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SEMI-APPLICATIVE PROGRAMMING. EXAMPLES OF CONTEXT FREE RECOGNIZERS
N. S. Sridharan Jan. 1986 47 p refs
(Contracts N00014-77-C-0378; N00014-85-C-0079)
(AD-A164897; BBN-6135) Avail: NTIS HC A03/MF A01 CSCL 09/2

Most current parallel programming languages are designed with a sequential programming language as the base language and have added constructs that allow parallel execution. We are experimenting with an applicative base language that has implicit parallelism everywhere, and then we introduce constructs that inhibit parallelism. The base language uses pure LISP as a foundation and blends in interesting features of Prolog and FP. Proper utilization of available machine resources is a crucial concern of programmers. We advocate several techniques of controlling the behavior of functional programs without changing their meaning or functionality: program annotation with constructs that have benign side-effects, program transformation and adaptive scheduling. This combination yields us a semi-applicative programming language and an interesting programming methodology. This paper deals with context-free parsing as an illustration of semi-applicative programming. Starting with the specification of a context-free recognizer, we have been successful in deriving variants of the recognition algorithm of Cocke-Kasami-Younger. GRA

N86-26952# Army Electronic Proving Ground, Fort Huachuca, Ariz.
METHODOLOGY INVESTIGATION: MULTILINGUAL STATIC ANALYSIS TOOL (MSAT) Final Report
Edward L. Anderson Nov. 1985 81 p
(AD-A164956) Avail: NTIS HC A05/MF A01 CSCL 09/2

The Multilingual Static Analysis Tool (MSAT) investigation was conducted to develop a software tool to automate the collection and reporting of software design and quality characteristics in a multilingual milieu. The goal of MSAT is to minimize the manual effort associated with the static software assessment of a target software system's design, structure, maintainability, modifications, and conformance with documented design and development standards. MSAT consists of a flexible, language-independent data collection component which extracts and stores items of interest in a DBMS; static analysis/report generation components for calculating and presenting software metrics and reports; and an executive control component which provides a user-friendly interface. Author (GRA)

N86-26953# Georgia Inst. of Tech., Atlanta. School of Information and Computer Science.
SOFTWARE TEST AND EVALUATION MANUAL. VOLUME 1: GUIDELINES FOR THE TREATMENT OF SOFTWARE IN TEST AND EVALUATION MASTER PLANS Final Report
Oct. 1985 71 p
(Contracts DAAH01-85-D-A005; F33657-82-G-2083)
(AD-A165208; GIT-ICS-85/26-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Software Test and Evaluation Manual provides guidance to DoD components in the area of software test and evaluation for defense system acquisition. It was prepared by the Software Test and Evaluation Project (STEP) in response to tasking by the Director Defense Test and Evaluation (OSD/USDR&E). Volume I is intended to support the review of Test and Evaluation Master Plans (TEMPs) for systems that contain mission critical software components, are software intensive, or present software testing issues that significantly affect risk. It consists of a checklist or series of questions that are keyed to the major paragraphs of a TEMP, and an accompanying set of explanatory notes that are brief commentaries on the questions and the significance of the possible responses to them. The primary audience for this manual consists of those individuals who are responsible for evaluating TEMPs. However, it should also prove useful to program offices, independent test organizations, contractors, and others who review, prepare, or provide data for inclusion in TEMPs. GRA

N86-26954# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES m201 TEACHER'S WORKBOOK
1986 160 p
(Contract DAAB07-83-C-K506)
(AD-A165299; AD-E301922) Avail: NTIS HC A08/MF A01 CSCL 05/9

Each Exercise of the Ada training curriculum has the following format: (1) Overview of the method, (2) Problem statement; (3) Solution method; (4) Syntax summary; and (5) Pages for documenting the solution. GRA

N86-26955# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES m201 TEACHER'S GUIDE, VOLUME 1
1986 456 p
(Contract DAAB07-83-C-K506)
(AD-A165300; AD-E301922) Avail: NTIS HC A20/MF A01 CSCL 05/9

The contents of the Ada training curriculum are as follows: (1) introduction -- course goals; (2) software engineering (SE); (3) the software life cycle; (4) software engineering methodologies; (5) analysis introduction; (6) SADT methodology; (7) SREM methodology; (8) entity diagramming; (9) PSL/PSA; (10) structured systems analysis methods; (11) software cost reduction project (SCRP) methodology; (12) analysis wrap-up; (13) design introduction; (14) software cost reduction project(SCRP) design methods; (15) object-oriented design; (16) structured design methodology; (17) Jackson methodology; (18) Warnier-Orr methods; (19) higher order software (HOS) method; (20) architectural design metrics; (21) program design languages (PDL); (22) graphical detailed design methods; (23) design wrap-up; (24) implementation introduction; (25) structured programming; (26) program complexity management; (27) program correctness; (28) testing approaches; (29) methods of review; (30) implementation wrap-up; and (31) course wrap-up. GRA

N86-26956# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES m201 TEACHER'S GUIDE, VOLUME 2
1986 503 p
(Contract DAAB07-83-C-K506)
(AD-A165301; AD-E301922) Avail: NTIS HC A22/MF A01 CSCL

05/9

This Ada training curriculum teacher's guide on software engineering methodologies consists of the following sections: (1) software cost reduction project (SCRP) methodology; (2) analysis wrap-up; (3) design introduction; (4) software cost reduction project design methods; (5) object-oriented design; (6) structured design methodology; (7) Jackson methodology; (8) Warnier-Orr method; (9) higher order software method; and (10) architectural design metrics. GRA

N86-26957# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING METHODOLOGIES m201 TEACHER'S GUIDE, VOLUME 3
1986 393 p
(Contract DAAB07-83-C-K506)
(AD-A165302; AD-E301922) Avail: NTIS HC A17/MF A01 CSCL 05/9

This Ada training curriculum teacher's guide on Software Engineering Methodologies consists of the following sections: (1) program design languages; (2) graphical detailed design methodsHIPO tool and NSSF tool; (3) design wrap-up; (4) implementation introduction; (5) structured programming; (6) program complexity management; (7) program correctness; (8) testing approaches; (9) methods of review; (10) implementation wrap-up; and (11) instructor notes. GRA

N86-26958# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. Ada (REGISTERED TRADEMARK) FOR SOFTWARE MANAGERS, 1201: TEACHER'S GUIDE, VOLUME 1
1986 405 p
(Contract DAAB07-83-C-K506)
(AD-A165314; AD-E301922) Avail: NTIS HC A18/MF A01 CSCL 05/9

The Ada training curriculum teacher's guide for software managers consists of the following sections: (1) introduction; (2) lexical rules; (3) data types; (4) statements; (5) packages and private types; and (6) subprograms. GRA

N86-26959# Softech, Inc., Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. ADA (REGISTERED TRADEMARK) FOR SOFTWARE MANAGERS, L201. VOLUME 2: TEACHER'S GUIDE
1986 388 p Supersedes report dated May 1984, AD-A142431
(Contract DAAB07-83-C-K506)
(AD-A165315; AD-E301922) Avail: NTIS HC A17/MF A01 CSCL 05/9

This teacher's guide on Ada for Software managers consists of the following sections: (1) Tasks; (2) Generics; (3) Input/output (4) Exceptions; (5) Stubbing; (6) Visibility and scope; (7) Overloading; (8) Pragmas; and (9) Low-level features. Other sections presented are: (10) Summary of uses of Ada features; (11) Introduction to Ada design/code assessment; (12) Characteristics of good Ada designs; and (13) Ada in perspective; reusability and portability. GRA

N86-26960# Maryland Univ., College Park. Dept. of Computer Science.
CHARACTERIZATION OF AN Ada SOFTWARE DEVELOPMENT
Victor R. Basili, Elizabeth E. Katz, Nora M. Panlilio-Yap, Connie L. Ramsey, and Shih Chang Sep. 1985 13 p Previously announced in IAA as A85-48023
(Contract N00014-82-K-0225)
(AD-A165320) Avail: NTIS HC A02/MF A01 CSCL 05/9

This article examines the use of Ada in a software project developed by the General Electric Company. The project was monitored by the University of Maryland and GE to identify areas of success and difficulty in learning and using Ada as both a design and a coding language. Since production-quality Ada translators were not readily available, the study focused on training and early software development. Our study also presents the major factors to consider before using Ada in software development, particularly when training in Ada is necessary. Our study attempts to meet several goals. The first focuses on characterization of the effort, the changes, and the errors of the project. The second considers how Ada was used on the project. The third concerns evaluation of the data collection and validation process, while the fourth concentrates on the development of measures for the Ada Programming Support Environment. GRA

N86-26961# Maryland Univ., College Park.
SOFTWARE METRICS FOR Ada Final Report
Victor R. Basili 3 Feb. 1986 4 p
(Contract N00014-82-K-0225)
(AD-A165321) Avail: NTIS HC A02/MF A01 CSCL 09/2

The investigators monitored a software development project written in Ada by integrating measurement into the software development process. Their goal is to identify areas of success and difficulty in learning and using Ada as a design and coding language. The underlying process and the evolving product are measured, and the resulting information characterizes this project's successes and failures. It may be used to make recommendations about training, methodology, and metrics to the Ada users community. This experience with data collection and metrics will aid in the selection of a general set of measures and measurement procedures for any software development project. The project studied involved the redesign and reimplementation, at the General Electric Company, of a portion of a satellite ground control system originally written in FORTRAN. GRA

N86-26962# Maryland Univ., College Park. Dept. of Computer Science.
MONITORING AND Ada SOFTWARE DEVELOPMENT PROJECT
Victor Basili, John Gannon, Elizabeth Katz, Marvin Zelkowitz, and John Bailey 1986 4 p
(Contract N00014-82-K-0225)
(AD-A165324) Avail: NTIS HC A02/MF A01 CSCL 09/2

As any science matures, the role of measurement, analysis and experimentation grows. The software engineering community has seen the continued development of new software development methods and tools and their use in various environments. The evaluation of methods and tools began with subjective criteria and has been developing toward more objective data collection, measurement and controlled experiments. While this trend is encouraging, these evaluation studies have largely been on a one-shot basis. What has been missing is a systematic approach which defines a longe-range program for the study, analysis and evaluation of a specific method or tool. The emergence of Ada provides a focal point for developing such a systematic study. As a first step, research teams from the University of Maryland and General Electric have embarked upon an eighteen-month collaborative effort. The purpose of this effort is to monitor the use of Ada on a realistically large and complex software development project within industry. GRA

N86-26963# Maryland Univ., College Park. Dept. of Computer Science.
METRICS FOR Ada PACKAGES: AN INITIAL STUDY
J. D. Gannon, E. E. Katz, and V. R. Basili 1985 16 p
(Contract N00014-82-K-0225)
(AD-A165336) Avail: NTIS HC A02/MF A01 CSCL 09/2

Many novel features of Ada (e.g., packages, generics, tasking, and exception handling) were included in the language to improve readability, aid modification, or encourage reusability. Since they have not been available in other widely used languages, packages present programmers with a fairly formidable learning task. We studied four first-time Ada programmers as they developed a ground-support satellite system. Metrics are presented which characterize their use of Ada packages, indicating where program structure may make changes difficult, and suggesting how the structure may be improved. The findings suggest that a good background in the software engineering practices supported by Ada is necessary to learn to use the features of the language –

simply teaching professional programmers Ada is not enough. GRA

N86-26964# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) PRIMER
1986 381 p Supersedes AD-A148855
(Contract DAAB07-83-C-K506)
(AD-A165345) Avail: NTIS HC A17/MF A01 CSCL 09/2

Ada is a high order language (HOL) developed by the Department of Defense (DoD) to be used in programming embedded systems. It is anticipated that use of Ada will significantly reduce the costs associated with defense software by providing more maintainable code. One of the goals of this workbook is to illustrate how to use the features of the Ada language to help produce more maintainable code. Ada Primer is the first of a series of three workbooks. The other two workbooks are entitled respectively, Advanced Ada and Real-Time Ada. Ada Primer leads the novice through the fundamentals of Ada by addressing the so-called Pascal subset of Ada. This workbook may be used in conjunction with module L202, Basic Ada Programming. A student, having completed L202 in conjunction with this workbook, shall be able to use an Ada package and code Ada subprograms using the Pascal subset of Ada. With the exception of Section 1 of this workbook, each workbook is organized as a series of Ada exercises to be solved by the reader. Taken sequentially as presented in the workbook, the exercises expose the student to the features of Ada in a logical fashion. In order to gain full benefit from this workbook, it is strongly recommended that the exercises be completed in the order presented. The solution to a specific exercise is located directly following the exercise. GRA

N86-26965# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. INSTRUCTOR'S COURSE s500 MANAGEMENT MODULES
1986 129 p
(Contract DAAB07-85-C-K506)
(AD-A165347) Avail: NTIS HC A07/MF A01 CSCL 05/9

This Instructor's Course Consists of the following Sections: (1) Overview; (2) Ada orientation for managers; (3) Software engineering for managers; (4) Ada for software managers; and (5) Real time concepts. An overall picture is given, details are presented in other volumes. GRA

N86-26966# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. INSTRUCTOR'S COURSE s500 INTRODUCTORY LANGUAGE MODULES
1986 83 p
(Contract DAAB07-85-C-K506)
(AD-A165348) Avail: NTIS HC A05/MF A01 CSCL 05/9

This instructor's course consists of the following sections: (1) Overview; (2) Ada technical overview; (3) Introduction to Ada - A higher order language; and (4) Basic Ada programming. GRA

N86-26967# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. INSTRUCTOR'S COURSE s500 METHODOLOGY MODULES
1986 234 p
(Contract DAAB07-85-C-K506)
(AD-A165349) Avail: NTIS HC A11/MF A01 CSCL 05/9

This instructor's course consists of the following sections: (1) Overview; (2) Introduction to software engineering; (3) Software engineering methodologies; and (4) Programming methodology. GRA

N86-26968# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM. INSTRUCTOR'S COURSE s500 OVERVIEW
1986 108 p
(Contract DAAB07-85-C-K506)
(AD-A165350) Avail: NTIS HC A06/MF A01 CSCL 05/9

This instructor's course consists of the following sections: (1) Philosophy Behind the Curriculum; (2) Overview of the Curriculum; and (3) General considerations. GRA

N86-26969# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: Ada ORIENTATION FOR MANAGERS 1101 TEACHER'S GUIDE
1986 249 p Supersedes AD-A141846
(Contract DAAB07-83-C-K514)
(AD-A165351) Avail: NTIS HC A11/MF A01 CSCL 05/9

This teacher's guide consists of the following sections: (1) Why Ada?; (2) What Ada is Not; (3) What Ada is; (4) What are some transition issues with Ada; and (5) Where is Ada now and tomorrow. The historical motivation for Ada is set. GRA

N86-26970# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: Ada TECHNICAL OVERVIEW 1102 TEACHER'S GUIDE
1986 211 p Supersedes AD-A141862
(Contract DAAB07-83-C-K506)
(AD-A165352) Avail: NTIS HC A10/MF A01 CSCL 05/9

This teacher's guide on Ada Technical overview consists of the following sections: (1) background and rationale for Ada; (2) writing an Ada program from begin to end; (3) summary of Ada program structure; (4) Ada through example; (5) large system development; (6) summary of Ada features. Instructions are given for the student who wishes more information. GRA

N86-26971# Army Electronic Proving Ground, Fort Huachuca, Ariz.
SOFTWARE TESTING OF MULTIPROCESSOR SYSTEMS Final Methodology Investigation Report
Edward L. Anderson Oct. 1985 68 p
(AD-A165387) Avail: NTIS HC A04/MF A01 CSCL 09/2

The increasing complexity of battlefield automated systems (BAS) has dictated the need to use multiple processors to enhance system reliability and to provide timely processing in systems that process large volumes of data. One such system, Position Location Reporting System (PLRS), has completed developmental testing; several more (Remotely Piloted Vehicle (RPV), Facility Intrusion Detection System (FIDS), and All Source Analysis System (ASAS)) are in the development phase. Additionally, the trend is toward distributive processing systems which will have multiple interactive processors and common software functions. Very little has been done to establish comprehensive test procedures for evaluating these systems, particularly under full load conditions. The objective of this investigation was to establish methods and procedures for evaluation of software for systems containing multiple interactive processors. A number of multiprocessor monitors/debuggers were examined for function and design approach. The investigation resulted in the development of a hybrid monitor concept: the integration of both hardware and software monitor capabilities into a central monitor system. This phase of the investigation resulted in revision of the specification documents and continued design and implementation of the prototype hybrid monitor. GRA

N86-26972# Naval Postgraduate School, Monterey, Calif.
IMPLEMENTATION OF A NATURAL LANGUAGE PROCESSOR USING FUNCTIONAL GRAMMAR M.S. Thesis
Fred G. Orchard Dec. 1985 81 p
(AD-A165428) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis presents the design and implementation of a natural language processor using Functional Grammar. Traditionally, grammars have consisted of a set of words and a set of semantic and syntactic rules which combine the words to form sentences. Thus, the language is looked at as a syntactic structure which is used to derive meaning. Functional Grammar looks at language as a means of social interaction and applies the syntactic and semantic rules only after the meaning, based on pragmatics, of the sentence has been established. Prolog has been used to demonstrate how Functional Grammar can be used to provide that meaning. GRA

N86-26973# M/A-COM Linkabit, Inc., Vienna, Va.
SOFTWARE DOCUMENTATION ON THE URDB MODIFICATIONS TO INCORPORATE INFORMATION COLLECTED IN

POST-DSCS AND UHF STUDIES Final Report, 15 Jul. - 14 Oct. 1985
S. Keyser and D. Eversmeyer 15 Oct. 1985 10 p refs
(Contract DCA100-84-C-0009)
(AD-A165451; Rept-159; DCA/MSO-85-129) Avail: NTIS HC A02/MF A01 CSCL 09/2

This documentation has been produced to provide system managers and programmers with the information necessary to understand the URDB modifications to incorporate information collected in the Post-DSCS and UHF studies. This document is intended to be used as a supplement to the MILSATCOM User Requirements System (MURS) URDB Program Maintenance Manual (November 1984), which defines other MURS software that is used in this system. GRA

N86-26974# Analytics, Inc., Willow Grove, Pa.
DESIGN METHODOLOGY FOR EMBEDDED SYSTEMS Final Report
David Lefkovitz 15 Nov. 1985 140 p
(Contract N62269-80-D-0025)
(AD-A165497; TR-1500.21) Avail: NTIS HC A07/MF A01 CSCL 09/2

This contract has explored the multidimensional problem of the development of embedded software systems. In its reports and presentations the work has characterized these problems in various ways, but to view them as multidimensional is helpful inasmuch as the problems may be separated into different solution domains. These have been identified as: communication; principles and practices; technology, and compiler (Ada) language structure and capability. Its contents are as follows: The Domain of Solutions; Integration of the Four Solution Domains; Tools; Program Architectural Designs; The Embedded Software Design Simulator (ESDS). GRA

N86-26975# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Datenverarbeitung in der Technik.
A THEORY OF PARTIAL SYSTEMS
F. J. Polster Oct. 1985 116 p
(KfK-3982; ISSN-0303-4003; ESA-86-96911) Avail: NTIS HC A06/MF A01

The notion of fragment system is introduced as a formalization of the properties of interconnections among fragments of code used to implement parts of a computer program. It is a model for system families, where the members of a system family (the partial systems) are composed of a subset of a collection of shared system components (the fragments). An algorithm for the construction of a characteristic set CF is presented: CF is a minimal subset of fragments with the property, that it is sufficient to indicate for the fragments of CF only, whether or not they are relevant for a partial system. An explicit representation of the set of partial system is developed as a subset of (0,1) [CF], the elements of which satisfy Boolean expressions, called restrictions. Restrictions are inherent to the fragment system and can be algorithmically derived. Restrictions may also be employed to model semantics of the system interface. ESA

N86-26976# Karlsruhe Univ. (West Germany). Fakultaet fuer Informatik.
COMPUTER AIDED MANUFACTURING (CAM) DATA BASES: REQUIREMENTS AND SURVEY
Alfons Kemper Aug. 1985 18 p refs
(Rept-17/85; ESA-86-96930) Avail: NTIS HC A02/MF A01

The most common representation schemes for modeling solid geometric objects in a computer, including the constructive solid geometry model and the boundary representation model are investigated from a data structure point of view, i.e., investigating the requirements which such schemes impose on a database management system. Developments in engineering databases with regard to supporting these representation schemes are discussed. Systems considered are extensions to the relational data model. The investigation is carried out by defining the (skeleton) schemes for the representation methods in the particular data base management system. ESA

N86-26977# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
OPERATIONAL SEMANTICS OF A PARALLEL OBJECT-ORIENTED LANGUAGE
Pierre America (Philips Gloeilampenfabrieken N. V., Eindhoven, Netherlands), Jaco deBakker, Joost N. Kok, and Jan Rutten Aug. 1985 22 p Revised Sponsored by European Economic Commission Esprit Project 415
(CWI-CS-R8515; B8575492; ESA-86-97006; ISSN-0167-8590) Avail: NTIS HC A02/MF A01

The semantics of the programming language POOL is described. The language integrates the object-oriented structure of languages like Smalltalk-80 with facilities for concurrency and communication like the ones in Ada. The semantics is described in an operational way: it is based on transition systems. By using a way of representing parallel processes that is different from the traditional one, it is possible to overcome difficulties pertaining to the latter. The resulting semantics shows a close resemblance with the informal language description, and there are good prospects that it can serve as a secure guide for the implementation of the language. ESA

N86-26978# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
A CONCEPTUAL MODELING EXPERT SYSTEM
M. L. Kersten, H. Weigand (Vrije Universiteit, Amsterdam, Netherlands), F. Dignum, and J. Boom Sep. 1985 17 p Revised
(CWI-CS-R8518; B8575499; ESA-86-97009) Avail: NTIS HC A02/MF A01

The architecture of an interactive conceptual modeling expert system, called ACME is described. The input to ACME is a natural language description of the application domain, decomposed by a parser into so-called predications. From these predications a preliminary EAR model can be extracted readily, which is subsequently improved by the EAR modeling expert using structural and semantic rules stored in a knowledge base. In an iterative process the user resolves the inconsistency and ambiguity problems discovered by ACME and enhances the conceptual model. ESA

N86-26979# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/ Algorithmics and Architecture.
TAPE VERSUS QUEUE AND STACKS: THE LOWER BOUNDS
Ming Li (Cornell Univ., Ithaca, N.Y.) and Paul M. B. Vitanyi Sep. 1985 27 p refs Supersedes Rept-TR-84-591; CWI-CS-R8406 Submitted for publication
(Grant NSF DCR-83-01766)
(CWI-CS-R8519; Rept-TR-84-591; CWI-CS-R8406; B8575495; ESA-86-97010) Avail: NTIS HC A03/MF A01

Optimal or nearly optimal lower bounds on the time needed to simulate queue, stacks (stack = pushdown store) and tapes by one off-line single-head tape-unit with one-way input, both deterministic and nondeterministic are derived. The techniques rely on algorithmic information theory (Kolmogorov complexity). ESA

N86-26980# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
PROGRAM DERIVATION THROUGH TRANSFORMATIONS: THE EVOLUTION OF LIST-COPYING ALGORITHMS
N. W. P. vanDiepen and W. P. deRoever (Technische Hogeschool, Eindhoven, Netherlands) Sep. 1985 63 p Revised Submitted for publication
(CWI-CS-R8520-Rev; RUU-CS-85-3; B8575496; ESA-86-97011) Avail: NTIS HC A04/MF A01

The technique of program transformation is used to show the derivability and to prove the correctness of fast list-copying algorithms developed by Robson, Fisher and Clark. Transformation rules necessary for the correctness proofs are given. Other proof techniques used include data refinement and the use of auxiliary variables and structures. ESA

N86-26981# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
AN OPERATIONAL SEMANTICS FOR PROCESS ALGEBRA
J. C. Baeten, J. A. Bergstra (Amsterdam Univ., Netherlands), and J. W. Klop Sep. 1985 33 p Revised report of RUU-CS-85-3 Submitted for publication Sponsored in part by European Economic Commission ESPRIT Project 432
(CWI-CS-R8522; B8575497; ESA-86-97013) Avail: NTIS HC A03/MF A01

Operational rewrite rules, expressing the dynamic behavior of configurations of objects are considered. This gives an algebraic way to generalize Petri net theory. Operational rewrite rules for process algebras are described, and it is shown that in each case the operational semantics thus obtained is equivalent to the regular denotational semantics of processes. This theory can be used to describe features like true concurrency and real-time behavior for concurrent, communicating processes. ESA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-26982# Range Commanders Council, White Sands Missile Range, N. Mex. Data Reduction and Computing Group.
IRIG STANDARD DATA FORMAT FOR INTERRANGE TRANSMISSION OF TRACKING DATA FROM COMPUTER TO COMPUTER (2400 BPS SYNCHRONOUS EFG FORMAT 0)
Nov. 1985 12 p
(AD-A163251; DR/CG-161-85) Avail: NTIS HC A02/MF A01 CSCL 09/2

This document defines a standard format for interrange transmission of tracking data from a computer on one range to a computer on another range. GRA

N86-26983# Naval Postgraduate School, Monterey, Calif.
PRINTER MULTIPLEXING AMONG MULTIPLE Z-100 MICROCOMPUTERS M.S. Thesis
Kwang J. Choi and Ju K. Lee Dec. 1985 79 p
(AD-A165179) Avail: NTIS HC A05/MF A01 CSCL 09/2

This thesis describes the detailed design and implementation of a printer server in the laboratory environment of sharing resources among multiple Zenith Z-100 microcomputers. The Printer Server System is a controller box which consists of a power supply, a single board computer, and the BLC 8538 eight channel I/O expansion boards. Each Z-100 microcomputer is connected to the controller thru the RS-232C port. The Printer Server System has three software utilities: BOOT, CONTROL, and SPOOL. The BOOT process, resident in the controller, downloads the CONTROL file from any one of multiple Z-100's which is turned on. The CONTROL process allows the printer to be used by any one of multiple Z-100's at a time. The SPOOL process sends the data thru the CONTROL process to the printer or saves the data on the disk file. Author (GRA)

N86-26984# Pennsylvania State Univ., University Park.
RESEARCH IN DISTRIBUTED AND PARALLEL SYSTEMS Final Report, 1 May 1982 - 31 Dec. 1985
Joseph JaJa and Janos Simon 27 Feb. 1986 13 p
(Contract DAAG29-82-K-0110)
(AD-A165486; ARO-18896.30-EL) Avail: NTIS HC A02/MF A01 CSCL 09/2

The main research achievements in distributed and parallel systems have been in the following areas: Theory of communication complexity, lower bounds for VLSI computations, algorithms and special - purpose architectures for VLSI, theory of computation, CAD tools, parallel computation and fault-tolerant distributed computation. Author (GRA)

N86-26985# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science/ Algorithmics and Architecture.
DISTRIBUTED MATCHMAKING FOR PROCESSES IN COMPUTER NETWORKS
Sape J. Mullender and Paul M. B. Vitanyi Aug. 1985 25 p Presented at 4th ACM SIGACT-SIGOPS Symposium on Principles of Distributed Computing, Minaki, Ontario, 5-7 Aug. 1985 Revised
(CWI-CS-R8513; B8575501; ESA-86-97004) Avail: NTIS HC A02/MF A01

The problem of setting up communication when needed between processes in a multiprocessor network where processes have names but no permanent addresses is investigated. Establishing communication between a process asking for a service and a process giving that service, without centralized control in a distributed environment with mobile processes, constitutes the problem of distributed matchmaking. Logically, such a matchmaking phase precedes routing in store-and-forward computer networks of this type. Algorithms for distributed matchmaking are developed and their complexity is investigated in terms of message passes and storage needed. The theoretical limitations of distributed match-making are established and the techniques are applied to network topologies. ESA

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-26986# Massachusetts Inst. of Tech., Cambridge.
ANALYSIS OF A MULTIACCESS CONTROL SCHEME
John N. Tsitsiklis Feb. 1986 10 p
(Contracts DAAG29-84-K-0005; N00014-77-C-0532)
(AD-A165498; LIDS-P-1534; ARO-20980.42-MA) Avail: NTIS HC A02/MF A01 CSCL 17/2

The usual slotted ALOHA model, under the infinite source assumption and ternary feedback is considered. In more detail, there is an infinite number of stations and, at the beginning of any time slot, each station may have at most one packet to transmit. Any station with an available packet may decide to attempt transmission (possibly using a probabilistic rule) or to decide to defer this attempt for later. The objective is to find a probabilistic rule that lets each station decide at any given time, using only the information available to it, whether it will transmit or not (of course this rule will be used only by those stations that have an available packet.) GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-26987*# Lehigh Univ., Bethlehem, Pa.
ON THE SOLUTION OF INTEGRAL EQUATIONS WITH A GENERALIZED CAUCHY KERNEL
A. C. Kaya and F. Erdogan Mar. 1986 22 p refs
(Grants NGR-39-007-011; NSF MEA-84-14477)
(NASA-CR-176685; NAS 1.26:176685) Avail: NTIS HC A02/MF A01 CSCL 12A

In this paper a certain class of singular integral equations that may arise from the mixed boundary value problems in nonhomogeneous materials is considered. The distinguishing feature of these equations is that in addition to the Cauchy singularity, the kernels contain terms that are singular only at the end points. In the form of the singular integral equations adopted, the density function is a potential or a displacement and consequently the kernel has strong singularities of the form (t-x) sup-2, x sup n-2 (t+x) sup n, (n > or = 2, 0<x,t>b). The complex function theory is used to determine the fundamental function of the problem for the general case and a simple numerical technique is described to solve the integral equation. Two examples from the theory of elasticity are then considered to show the application of the technique. Author

N86-26988*# Lehigh Univ., Bethlehem, Pa.
ON THE SOLUTION OF INTEGRAL EQUATIONS WITH STRONGLY SINGULAR KERNELS
A. C. Kaya and F. Erdogan Sep. 1985 25 p refs
(Grants NGR-39-007-011; NSF MEA-82-09083)
(NASA-CR-176687; NAS 1.26:176687) Avail: NTIS HC A02/MF A01 CSCL 12A

In this paper some useful formulas are developed to evaluate integrals having a singularity of the form (t-x) sup-m, m> or = 1. Interpreting the integrals with strong singularities in Hadamard sense, the results are used to obtain approximate solutions of singular integral equations. A mixed boundary value problem from the theory of elasticity is considered as an example. Particularly for integral equations where the kernel contains, in addition to the dominant term (t,x) sup-m, terms which become unbounded at the end points, the present technique appears to be extremely effective to obtain rapidly converging numerical results. Author

N86-26989*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REGULARITY ESTIMATES UP TO THE BOUNDARY FOR ELLIPTIC SYSTEMS OF DIFFERENCE EQUATIONS
J. C. Strikwerda, B. A. Wade (Wisconsin Univ., Madison.), and K. P. Bube (California Univ., Los Angeles.) May 1986 66 p refs
Sponsored in part by Gulf Research and Development Co.
(Contracts NAS1-17070; NAS1-18107; Grants NsG-5034; NsG-5130; Contract DAAG29-80-C-0041; Grant NSF MCS-76-07039)
(NASA-CR-178107; ICASE-86-31; NAS 1.26:178107) Avail: NTIS HC A04/MF A01 CSCL 12A

Regularity estimates up to the boundary for solutions of elliptic systems of finite difference equations were proved. The regularity estimates, obtained for boundary fitted coordinate systems on domains with smooth boundary, involve discrete Sobolev norms and are proved using pseudo-difference operators to treat systems with variable coefficients. The elliptic systems of difference equations and the boundary conditions which are considered are very general in form. The regularity of a regular elliptic system of difference equations was proved equivalent to the nonexistence of eigensolutions. The regularity estimates obtained are analogous to those in the theory of elliptic systems of partial differential equations, and to the results of Gustafsson, Kreiss, and Sundstrom (1972) and others for hyperbolic difference equations. Author

N86-26990*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SPECTRAL MULTIDOMAIN METHOD FOR THE SOLUTION OF HYPERBOLIC SYSTEMS
David Kopriva May 1986 48 p refs
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178105; ICASE-86-28; NAS 1.26:178105) Avail: NTIS HC A03/MF A01 CSCL 12A

A multidomain Chebyshev spectral collocation method for solving hyperbolic partial differential equations were developed. Though spectral methods are global methods, an attractive idea is to break a computational domain into several domains, and a way to handle the interfaces is described. The multidomain approach offers advantages over the use of a single Chebyshev grid. It allows complex geometries to be covered, and local refinement can be used to resolve important features. For steady state problems it reduces the stiffness associated with the use of explicit time integration as a relaxation scheme. Furthermore, the proposed method remains spectrally accurate. Results showing performance of the method on one dimensional linear models and one and two dimensional nonlinear gas dynamics problems are presented. Author

N86-26991# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONTROL, STATE ESTIMATION AND PARAMETER IDENTIFICATION OF NONLINEAR DISTRIBUTED PARAMETER SYSTEMS USING FIXED POINT TECHNIQUES: A SURVEY
J. A. M. FelippedeSouza Apr. 1986 8 p refs Presented at the 4th IFAC Symposium on Control of Distributed Parameter Systems, Los Angeles, Calif. 29 Jun. - 3 Jul. 1986
(INPE-3855-PRE/919) Avail: NTIS HC A02/MF A01

Fixed point theorems have been an important tool used by mathematicians in the study of the existence of a solution of nonlinear differential equations, and nonlinear operator equations in general, since the beginning of the century. The last seven years has seen the appearance of some papers which extended the basic idea of this tool to solve problems of control, state estimation, and parameter identification of nonlinear systems, including distributed parameter systems. The present paper attempts to survey the fixed point techniques used in nonlinear distributed parameter systems in papers already published on this subject. The fact that most of these papers concentrate on theoretical results is emphasized. Though several of them bring creative ideas, they are poor in practical results or concrete examples of applications. Author

N86-26992*# Hampton Inst., Va. Dept. of Mathematics.
THE DESIGN AND IMPLEMENTATION OF COST-EFFECTIVE ALGORITHMS FOR DIRECT SOLUTION OF BANDED LINEAR SYSTEMS ON THE VECTOR PROCESSOR SYSTEM 32 SUPERCOMPUTER
Augustine S. Samba 1985 48 p
(Grant NAG1-544)
(NASA-CR-17681; NAS 1.26:176811) Avail: NTIS HC A03/MF A01 CSCL 12A

The problem of solving banded linear systems by direct (non-iterative) techniques on the Vector Processor System (VPS) 32 supercomputer is considered. Two efficient direct methods for solving banded linear systems on the VPS 32 are described. The vector cyclic reduction (VCR) algorithm is discussed in detail. The performance of the VCR on a three parameter model problem is also illustrated. The VCR is an adaptation of the conventional point cyclic reduction algorithm. The second direct method is the Customized Reduction of Augmented Triangles' (CRAT). CRAT has the dominant characteristics of an efficient VPS 32 algorithm. CRAT is tailored to the pipeline architecture of the VPS 32 and as a consequence the algorithm is implicitly vectorizable. Author

N86-26993# Los Alamos National Lab., N. Mex.
EXACT INTEGRATION ALGORITHM FOR USE WITH MODAL ANALYSIS
R. Rodeman 1985 6 p Presented at the 4th International Modal Analysis Conference, Los Angeles, Calif., 3 Feb. 1986
(Contract DE-AC04-76DP-00789)
(DE85-018533; SAND-85-2121C; CONF-860224-2) Avail: NTIS HC A02/MF A01

A modal analysis integration algorithm which is exact for a piecewise-linear excitation has been developed. Since virtually all field excitations are represented in digitized form, a piecewise-linear representation is appropriate. The integration algorithm is obtained by constructing a recursive, ramp-invariant digital filter. The recursive form is simple; only five additions and five multiplications are necessary to determine a new response point. This algorithm is compared with the Newmark-beta, central difference, trapezoidal rule, and linear-acceleration algorithms. It is shown that the new algorithm has a marked superiority. It is also shown that the classical algorithms can produce poor results. DOE

N86-26994# California Univ., Davis.
THE SOLUTION OF NONLINEAR TIME-DEPENDENT PROBLEMS USING MODAL COORDINATES Interim Report, Jan. - Sep. 1985
Kyran D. Mish, Darl M. Romstad, and Leonard R. Herrmann Dec. 1985 41 p
(Contract N62583-85-J-T168; NR Proj. Yr0-2303)
(AD-A163535; NCEL-CR-86.003) Avail: NTIS HC A03/MF A01 CSCL 12/1

An algorithm for the solution of a class of nonlinear time-dependent problems using reduced modal coordinates is proposed and implemented. Example problems in one space dimension are modeled, and comparisons made to exact solutions. The results

of these examples are used to make suggestions for further research. GRA

N86-26995# Naval Civil Engineering Lab., Port Hueneme, Calif.
A RECURSIVE BOUNDARY ELEMENT WITH INITIAL ERROR INVESTIGATION Final Report, Oct. 1984 - Sep. 1985
J. V. Cox and T. A. Shugar Dec. 1985 49 p
(AD-A163563; NCEL-TN-1730) Avail: NTIS HC A03/MF A01 CSCL 12/1

A recursive numerical integration technique is developed for the boundary element method. The initial implementation is within an indirect formulation for two-dimensional elastostatics. A numerical study investigates the error field near a single boundary element in the infinite plane using different orders of numerical integration. The difficulty of integrating the singular kernal functions with discrete integration points is eliminated with a recursive algorithm that adaptively subdivides elements that are in close proximity to the internal response point. The recursive technique allows calculation of internal responses arbitrarily close to the boundary subdivision based on boundary geometry and anticipated boundary response gradients without regard for the numerical integration accuracy of responses near the boundary. The gradient of the artificial tractions must ordinarily be considered when modeling problems with the indirect formulation. GRA

N86-26996# Wisconsin Univ., Madison. Mathematics Research Center.
THE ORDINARY LEAST SQUARES ESTIMATION FOR THE GENERAL-LINK LINEAR MODELS, WITH APPLICATIONS Technical Summary Report
Naihua Duan and Ker-Chau Li Oct. 1985 34 p refs
(Contract DAAG29-80-C-0041; Grant NSF MCS-83-01587)
(AD-A163599; MRC-TSR-2880) Avail: NTIS HC A03/MF A01 CSCL 12/1

For a general link linear model (GLLM), we show that the OLS estimate of the slope vector is strongly consistent up to a multiplicative scale, even though the model might actually be nonlinear. Furthermore, the estimated slope vector is strongly consistent for the average slope vector, the average of the pointwise slope vectors on the response surface. For a GLLM with a completely specified link function, we can solve for the multiplicative scalar and estimate the intercept and Cox and Snell's generalized residuals. We then estimate the response surface and the pointwise slopes using a generalization of the smearing estimate in Duan (1983). The results can be applied to a number of important subclasses of GLLM, including general transformation models, general scaled transformation models, dichotomous regression, and Tobit regression. GRA

N86-26997# National Bureau of Standards, Gaithersburg, Md. Center for Applied Mathematics.
MARCHING DIFFERENCE SCHEMES FOR ILL POSED INITIAL VALUE PROBLEMS Final Report, 16 Jul. 1982 - 30 Sep. 1985
Alfred S. Carasso 30 Nov. 1985 6 p refs
(Contract MIPR-ARO-63-82)
(AD-A164012; ARO-19643.4-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This final report summarizes work accomplished on the development of marching algorithms for the numerical computation of ill-posed initial value problems. Applications include nonlinear inverse heat transfer in gun barrels, and the detection of flaws in metallic plates by ultrasonic testing. A new systematic approach to pulse probing and characterization of linear time invariant systems was discovered. This theory uses tools from probability theory related to the Central Limit Theorem. Important computational experiments were successfully performed on reconstructing singular elastic Green's functions. Author (GRA)

N86-26998# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
THE RELATIVE ENTROPY OF A RANDOM VECTOR WITH RESPECT TO ANOTHER RANDOM VECTOR
M. Rosenblatt-Roth Oct. 1985 72 p refs
(Contract F49620-82-K-0001)
(AD-A164093; TR-85-35; AFOSR-86-0036TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper discusses some problems connected with the concept of entropy. GRA

N86-26999# California Univ., Santa Barbara. Dept. of Physics.
DENSITY FUNCTIONAL THEORY FOR EXCITED STATES IN A QUASI LOCAL DENSITY APPROXIMATION Technical Report, Jun. - Dec. 1985
W. Kohn 10 Feb. 1986 11 p
(Contract N00014-84-K-0548)
(AD-A164474; TR-9) Avail: NTIS HC A02/MF A01 CSCL 07/4

The starting point of this paper is a recent extension by A.K. Theophilou of the Hohenberg-Kohn-Sham(HKS) density functional theory to ensembles of systems consisting of the M lowest eigenstates, equally weighted. As in the HKS theory the key quantities are the exchange correlation energy, E(supM, sub xc) [n (r')] and potential v sup M, sub xc (r; [n (r')]). This paper provides expressions for these quantities, valid for systems of slowly varying density. Even for such systems, however, there are essential non-local effects. Nevertheless, both E (sup M, sub xc) and v (sup M, sub xc) can be calculated in terms of quantities characteristic of appropriate uniform thermal ensembles. This theory is the analog of the ground state local density approximation and allows calculation of excited state energies and densities. GRA

N86-27000# Yale Univ., New Haven, Conn. Dept. of Computer Science.
END-POINT CORRECTED TRAPEZOIDAL QUADRATURE RULES FOR SINGULAR FUNCTIONS
V. Rokhlin Nov. 1985 16 p
(Contract N00014-82-K-0184)
(AD-A163242; YALEU/DCS/RR-441) Avail: NTIS HC A02/MF A01 CSCL 12/1

A group of quadrature formulae for end-point singular functions is presented generalizing classical end-point corrected trapezoidal quadrature rules. The actual values of the end-point corrections are obtained for each singularity as a solution of a system of linear algebraic equations. The algorithm is applicable to a wide class of monotonic singularities and does not require that an analytical expression for the singularity be known; only the knowledge of its first several moments and the ability to evaluate it on the interval of integration are needed Author (GRA)

N86-27001# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
THE MATHEMATICAL STRUCTURE OF ERROR CORRECTION MODELS
Soren Johansen May 1985 40 p refs
(Contract N00014-79-C-0801)
(AD-A163344; TR-461; TR-85-10-ONR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The error correction model for a vector valued time series has been proposed and applied in the economic literature with the papers by Sargan (1964), Davidson et al. (1978), Hendry and von Ungern-Sternberg (1981) and has been given a formal mathematical treatment by Granger (1983). He introduced the notion of cointegratedness of a vector process and showed the relation between cointegration and error correction models. This paper defines a general error correction model, that encompasses the usual error correction model as well as the integral correction model by allowing a finite number of error correction terms which correspond to linear combinations of the vector process that are integrated of different order. It is shown that this structure is inherent in the model if it is given in autoregressive form or moving average form by exploiting the singularity of the matrix function that defines the model. The theory is applied to some examples discussed by Davidson (1983) and Harvey (1982). Author (GRA)

N86-27002# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.

ON DENSITY ESTIMATION FROM CENSORED DATA BY PENALIZED LIKELIHOOD METHODS
V. K. Klonias and John C. Wierman Jun. 1985 28 p
(Contract N00014-79-C-0801)
(AD-A163388; TR-418; ONR-TR-85-3) Avail: NTIS HC A03/MF A01 CSCL 12/1

Estimators for the probability density function, cumulative distribution function, and hazard function are proposed in the random censorship setting. The estimators are derived from the Kaplan-Meier product limit estimator by maximum penalized likelihood methods. The authors establish the existence and uniqueness of the estimates, which are exponential splines with knots at the uncensored observations, and provide an efficient algorithm for their numerical evaluation. They prove the consistency, in probability and almost surely, of the density estimates in the Hellinger distance, the L sub p norms for p =1, 2, infinity, and the Sobolev norm. The corresponding hazard rate estimator converges uniformly on bounded intervals. Author (GRA)

N86-27003# Stanford Univ., Calif. Dept. of Statistics.
CONVEXITY OF ELLIPTICALLY CONTOURED DISTRIBUTIONS WITH APPLICATIONS
S. Iyengar and Y. L. Tong 10 Dec. 1985 23 p
(Contract N00014-76-C-0475)
(AD-A163389; SU-TR-368) Avail: NTIS HC A02/MF A01 CSCL 12/1

The problem of evaluating multivariate probabilities arises in many areas of statistics, such as in the construction of confidence regions for the mean vector or regression parameters in a general linear model, the determination of critical regions for certain tests, multiple comparisons, reliability, etc. Because these probabilities are hard to evaluate numerically, a thorough study of the nature of, say, the distribution function is needed to suggest good approximations and inequalities. For example, tables for selected values of parameters are available, and one usually interpolates linearly to get an approximation; if we know that the tabulated function is convex or concave, we also get a bound for the quantity of interest. The cumulative and rectangular probabilities for elliptically contoured distributions are increasing functions of the correlations, but the rate of increase has not yet been studied. This paper proves some results concerning the convexity in correlations of the distribution functions of random vectors with elliptically contoured distributions, and their absolute values. Sections 2-5 describe the bivariate case, and the last section contains extensions to the multivariate case; the results here are not as strong as for the bivariate case, as the computations are much harder. GRA

N86-27004# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
A NOTE ON CONVERGENCE OF FUNCTIONS OF RANDOM ELEMENTS
Robert J. Serfling Nov. 1985 12 p
(Contract N00014-79-C-0801)
(AD-A163405; TR-459; TR-85-8-ONR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Convergence of g(xi sub n) to g (xi) is considered when xi sub n approaches limit of xi distribution or in probability, without the usual restriction that g be continuous a.s. under the distribution of xi. It is shown that the covergence g (xi sub n) approaches limit of g (xi) holds for arbitrary Borel-measurable g, if in addition to the assumed convergence xi sub n approaches limit of xi the corresponding measures (p sub N) of (xi sub) are contiguous to the measure of P of xi in a certain very weak sense. Some statistical applications are indicated. GRA

N86-27005# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
COMPUTATION OF THE STATIONARY VALUES OF THE PRODUCT OF TWO RALEIGH QUOTIENTS
C. R. Rao and C. V. Rao Sep. 1985 16 p refs
(Contract F49620-85-C-0008)
(AD-A164586; TR-85-34; AFOSR-86-0038TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A computational algorithm is developed for finding the stationary values of the function x'Cx/ square root of (x'Ax) square root of (x'Bx) where A and B are positive definite and C is a symmetric matrix. The square of the function under consideration is the product of two Raleigh coefficients x'Cx/x'Ax and x'Cx/x'Bx. The general problem occurs in multivariate analysis in the computation of homologous canonical variates in studying relationships between two sets of homologous measurements. The special case with C=I occurs in designing control systems with minimum norm feedback matrices. Author (GRA)

N86-27006# Florida State Univ., Tallahassee. Dept. of Statistics.
AN EXACT TEST FOR THE NESTING EFFECT'S VARIANCE COMPONENT IN AN UNBALANCED RANDOM TWO-FOLD NESTED MODEL
Andre I. Khuri and Ramon C. Littell Jan. 1986 16 p refs
(Contract N00014-86-K-0059)
(AD-A164607; TR-248) Avail: NTIS HC A02/MF A01 CSCL 12/1

An exact test is presented to evaluate the significance of the nesting effect's variance components in an unbalanced random two-fold nested model. The power of this test is compared to power values obtained under other approximate tests. Author (GRA)

N86-27007# Minnesota Univ., Duluth.
METASTABILITY AND COMPENSATED COMPACTNESS IN CONTINUUM THEORIES Final Report, 1 Dec. 1984 - 30 Nov. 1985
Hans Weinberger and George R. Sell 23 Jan. 1986 13 p
(Contract DAAG29-85-K-0021)
(AD-A164634; ARO-21859.1-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Historically, one of the most important problems in continuum mechanics has been the understanding of hyperbolic conservation laws. This is because such systems arise from the underlying balance laws of mass, momentum, and energy. Their nonlinearity and hyperbolicity arise from the simplest constitutive assumptions, even in an ideal gas. The goal of this workshop was to examine the implications of compensated compactness and dispersion in the analysis and numerical analysis of such equations. The influence of viscosity and fluctuation mechanisms in nature was discussed as well. A second workshop focused on metastability and incompletely posed problems. GRA

N86-27008# Florida Univ., Gainesville. Dept. of Statistics.
MEASURES OF IMBALANCE FOR UNBALANCED MODELS
Andre I. Khuri Jan. 1986 26 p
(Contract N00014-86-K-0059)
(AD-A164638; TR-255) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper presents a procedure to measure the degree of imbalance of an unbalanced data set. The procedure is based on choosing an appropriate loglinear model for the subclass frequencies of the data. A measure of imbalance is then introduced as some function of the chi-squared statistic used in the goodness-of-fit test for the loglinear model. The proposed procedure can also be used to measure departures from certain types of balance, such as proportionality of subclass frequencies, partial balance, and last-stage uniformity. Author (GRA)

N86-27009# Stanford Univ., Calif. Lab. for Computational Statistics.
ON FREQUENCY POLYGONS AND AVERAGE SHIFTED HISTOGRAMS IN HIGHER DIMENSIONS
Nils L. Hjort Feb. 1986 55 p
(Contract N00014-83-K-0472)
(AD-A164680; SU-LCS-TR-22) Avail: NTIS HC A04/MF A01 CSCL 12/1

Scott has recently studied two simple variations on the ordinary histogram, namely the frequency polygon and the average shifted

histogram, and found that they are able to compete with for example kernel density estimators in performance while retaining the advantage of being conceptually and computationally simple. The present paper proposes a way of generalizing frequency polygons to d-dimensional space that performs better than Scott's generalization. Expressions for integrated mean squared error and for integrated mean absolute deviation plus integrated absolute bias are obtained for generalized frequency polygons, for average shifted histograms, and for generalized frequency polygons of average shifted histograms. These expressions are used to give guidelines for window sizes. GRA

N86-27010# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ON THE EXISTENCE OF LI-YORKE POINTS IN THE THEORY OF CHAOS
Nam P. Bhatia and Walter O. Egerland Jan. 1986 15 p refs
(AD-A164691; BRL-TR-2702) Avail: NTIS HC A02/MF A01 CSCL 12/1

The report establishes an addendum to the Li-Yorke theorem, lists the complete set of Li-Yorke inequalities, and provides in the Equivalence theorem nonperiodic conditions equivalent to the known periodic conditions that guarantee chaos. Author (GRA)

N86-27011# Air Force Geophysics Lab., Hanscom AFB, Mass.
A REVIEW OF MAXIMUM ENTROPY SPECTRAL ANALYSIS AND APPLICATIONS TO FOURIER SPECTROSCOPY
Edmond M. Dewan 3 Apr. 1985 80 p
(AD-A164698; AFGL-TR-85-0091; AFGL-ERP-911) Avail: NTIS HC A05/MF A01 CSCL 12/1

There are many situations where a great increase in the resolution of power spectral densities, PSD's, would solve important problems. The problem areas range from radar, speech compression, seismic signal processing, to spectral analysis of optical signals. The maximum entropy method (MEM) can, under certain circumstances, provide an order of magnitude increase in resolution over conventional techniques. The fundamental concepts and mathematical background are given and, most importantly, the peculiarities and new features introduced by the MEM technique are explained. Some signals are good candidates for this technique while others are not; thus, methods are described to distinguish between the two. After the techniques to obtain the MEM-PSD are explained, an application to Fourier Spectroscopy is given to illustrate the results (as compared to conventional means). This review employs certain features to make the MEM approach accessible to those without previous knowledge about it. These features include: a short history of the PSD which describes the evolution over time of the basic concepts; a discussion of the higher principle of maximum entropy in the context of probability theory; a simple introduction to the Z-transform and how it introduces the basic spectral line shape of the MEM-PSD as well as other peculiarities of the method which distinguish it from the conventional approach; the physics behind the reflection coefficients which are introduced by MEM; and an extensive annotated bibliography. GRA

N86-27012# Naval Research Lab., Washington, D. C.
A UNIFYING APPROACH TO LINEAR AND NONLINEAR ARRAY PROCESSING: A TUTORIAL Final Report, Oct. 1984 - Sep. 1985
Charles L. Byrne 30 Dec. 1985 31 p
(AD-A164777; NRL-8959) Avail: NTIS HC A03/MF A01 CSCL 12/1

The concept of linear filtering is the focus of a unifying approach to linear and nonlinear array processing methods. A number of well-known methods (conventional, optimal, maximum likelihood) are typically discussed within the context of linear filtering, while others (maximum entropy, linear predictor, generalized eigenvector) are not usually presented in this way. Through rederivation of these methods in terms of constrained filtering, we are able to relate performance of the methods to imposed (or neglected) constraints. Each filter discussed is linearly constrained in the look direction and then optimized using quadratic forms based on noise and sidelobe structure. Each filter is more complicated than the ones preceding it, as we consider additional aims and impose additional constraints. Stability of the methods to mismatches is considered, and techniques for improving stability are presented. Appendixes on Fourier transform approximation, array gain and detection, and complex Gaussian random variables are included. Author (GRA)

N86-27013# Emory Univ., Atlanta, Ga. Dept. of Chemistry.
TIME DOMAIN FILTERING OF TWO-DIMENSIONAL FLUORESCENCE DATA Interim Technical Report
Maria Vicsek, Sharon L. Neal, and Isiah M. Warner 10 Feb. 1986 27 p Submitted for publication
(Contract N00014-83-K-0026; Grant NSF CHE-82-01886; NR Proj. 051-841)
(AD-A164954) Avail: NTIS HC A03/MF A01 CSCL 05/8

Four time domain filtering methods are applied to simulated and experimental two dimensional fluorescence data in order to evaluate their performance. The methods that were evaluated are: (1) moving average, (2) Savitsky Golay polynomial smoothing, (3) Chebyshev filtering, and (4) Bicubic spline filtering. The methods are compared using mean square error analysis and the difference in the amplitudes of the filtered noisy and ideal data. The two dimensional version of the Savitsky Golay filtering and the spline method produced the best overall results. GRA

N86-27014# Naval Postgraduate School, Monterey, Calif.
THE FRACTAL GEOMETRY OF NATURE; ITS MATHEMATICAL BASIS AND APPLICATION TO COMPUTER GRAPHICS M.S. Thesis
Michael E. Gaddis and Michael J. Zyda Jan. 1986 131 p
(AD-A165185; NPS52-86-008) Avail: NTIS HC A07/MF A01 CSCL 12/1

Fractal Geometry is a recent synthesis of old mathematical constructs. It was first popularized by complex renderings of terrain on a computer graphics medium. Fractal geometry has since spawned research in many diverse scientific disciplines. Its rapid acceptance has been achieved due to its ability to model phenomena that defy discrete computation due to roughness and discontinuities. With its quick acceptance have come problems. Fractal geometry is a misunderstood idea that is quickly becoming buried under grandiose terminology that serves no purpose. Its essence is induction using simple geometric constructs to transform initiating objects. The fractal objects that we create with this process often resemble natural phenomena. The purpose of this thesis is to present fractal geometry to the graphics programmer as a simple workable technique. We hope to demystify the concepts of fractal geometry and make it available to all who are interested. Author (GRA)

N86-27015# Texas Univ., Austin. Inst. for Fusion Studies.
SPONTANEOUS SYMMETRY BREAKING AND NEUTRAL STABILITY IN THE NONCANONICAL HAMILTONIAN FORMALISM
P. J. Morrison and S. Eliezer Oct. 1985 36 p
(Contract DE-FG05-80ET-53088)
(DE86-004562; DOE/ET-53088/212; IFSR-212) Avail: NTIS HC A03/MF A01

The noncanonical Hamiltonian formalism is based upon a generalization of the Poisson bracket, a particular form of which is possessed by continuous media fields. Associated with this generalization are special constants of motion called Casimirs. These are constants that can be viewed as being built into the phase space, for they are invariant for all Hamiltonians. Casimirs are important because when added to the Hamiltonian they yield an effective Hamiltonian that produces equilibrium states upon variation. The stability of these states can be ascertained by a second variation. Goldstone's theorem, in its usual context, determines zero eigenvalues of the mass matrix for a given vacuum state, the equilibrium with minimum energy. Here, since for fluids and plasmas the vacuum state is uninteresting, we examine symmetry breaking for general equilibria. Broken symmetries imply directions of neutral stability. Two examples are

presented: the nonlinear Alfven wave of plasma physics and the Korteweg-de Vries soliton. DOE

N86-27016# Los Alamos National Lab., N. Mex.
APPROACH TO ERROR-ESTIMATION IN THE APPLICATION OF DIMENSION ALGORITHMS
J. Holzfuss and G. Mayer-Kress 1985 12 p Presented at the International Conference on Dimensions and Entropies in Chaotic Systems, Pecos River, N.M., 11 Sep. 1985
(Contract W-7405-eng-36)
(DE86-004733; LA-UR-85-4265; CONF-8509203-3) Avail: NTIS HC A02/MF A01

Three different methods for calculating the dimension of attractors are analyzed. An approach to error-estimation is presented and is used on various datasets. It is shown that in some cases the errors can become very large. DOE

N86-27017# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
CAYLEY CAGES
P. M. vandenBroek Nov. 1984 12 p
(Memo-448; ESA-86-96965) Avail: NTIS HC A02/MF A01

A (d,g)-Cayley cage is defined to be a Cayley graph of degree d and girth g with minimum number of points. Cayley cages are determined for several values of the degree and the girth, among them a (3,5)-Cayley cage with 50 points and (d,6)-Cayley cages for those values of d for which d-1 is a prime power. Upper bounds are derived for the number of points of all Cayley cages with girth not exceeding 6. ESA

N86-27018# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
AN EFFICIENT DECISION-MAKING-FREE FILTER FOR PROCESSES WITH ABRUPT CHANGES
H. A. P. Blom 10 Sep. 1984 10 p Presented at 7th IFAC Symposium on Identification and System Parameter Estimation, York, England, 3-7 Jul. 1985
(NLR-MP-84080-U; B8578435; ESA-86-96970) Avail: NTIS HC A02/MF A01

The system of linear stochastic difference equations with Markovian coefficients was generalized to cover processes in R sup n which jump simultaneously with the coefficients. The additional modeling potential of this generalized system is illustrated. For filtering partial observations of the generalized system, the Interacting Multiple Model (IMM) algorithm is given. It consists of a bank of N interacting Kalman-like filters which cooperate with a filter for the N state Markov process and is free of any decision making mechanism. Comparisons with other algorithms for processes with abrupt changes show that the IMM algorithm performs very well at the cost of a relatively low computational load. Due to the generalization, the IMM algorithm is a serious competitor of decision directed filters for processes in R sup n with additive jumps. ESA

N86-27019# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
ON THE LIKELIHOOD RATIO TEST FOR A CHANGE POINT IN A SEQUENCE OF INDEPENDENT EXPONENTIALLY DISTRIBUTED RANDOM VARIABLES
Patsy Haccou (Leiden Univ., Netherlands), Evert Meelis, and Sara vandeGeer Aug. 1985 34 p refs
(CWI-MS-R8507; B8573005; ESA-86-96986) Avail: NTIS HC A03/MF A01

Let x1, ..., xn + 1 be independent exponentially distributed random variables, and let xi have intensity lambda 1 for i < or = tau, and intensity lambda 2 for i > tau, where tau is an unknown instant and lambda 1 and lambda 2 are also unknown. It is proved that the asymptotic null-distribution of the likelihood ratio statistic for testing lambda 1 = lambda 2 (or, equivalently, tau = 0 or n + 1) is an extreme value distribution, by application of theorems concerning the normed uniform quantile process. The rate of convergence is studied with Monte Carlo methods. Since it appears very low, simulated 5% critical values are given. It is shown that the test is optimal in the sense of Bahadur. Simulation results indicate a good power for values of n that are relevant for most applications. The likelihood ratio test is compared with a test which has the same asymptotic null-distribution. It is proved that this test has Bahadur efficiency zero. The simulation results confirm that the likelihood ratio test is superior to the latter test. ESA

N86-27020# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
RESIDUE FORMULAS FOR MEROMORPHIC MATRICES
J. M. Schumacher Sep. 1985 16 p Revised Submitted for publication
(CWI-OS-R8506; B8577117; ESA-86-96988) Avail: NTIS HC A02/MF A01

Derivation of the so-called participation matrices which govern the energy distribution over the resonance modes in vibration analyses of mechanical systems is discussed. These matrices appear as residue matrices for certain meromorphic matrix-valued functions (transfer matrices from forces to displacements), the poles of which correspond to the resonance frequencies. These poles are simple as a consequence of the law of conservation of energy. The problem comes down to the computation of the residue at a simple pole of a meromorphic matrix. A residue formula (and variants) for matrices in fractional form is given. In all versions, a normalizing matrix which is invertible if and only if the pole considered is simple is constructed, and a formula for the residue which features the inverse of the normalizing matrix is written. Proofs are based on the local Smith form for meromorphic matrices. The normalizing matrix can also be used in stability tests. ESA

N86-27021# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
WAITING-TIME APPROXIMATIONS FOR CYCLIC-SERVICE SYSTEMS WITH SWITCHOVER TIMES
O. J. Boxma and B. Meister (IBM Research Lab., Zurich, Switzerland) Sep. 1985 19 p Revised Submitted for publication
(CWI-OS-R8510; B8577110; ESA-86-96992) Avail: NTIS HC A02/MF A01

Mean waiting-time approximations are derived for a single-server multiqueue system with nonexhaustive cyclic service. Nonzero switchover times of the server between consecutive queues are assumed. A pseudo-conservation law was found by Watson (1984). The approximation is simpler and, as extensive simulations show, more accurate than existing approximations. It gives very good insight into the qualitative behavior of cyclic-service queueing systems. ESA

N86-27022# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
A DOUBLE INTEGRAL CONTAINING THE MODIFIED BESSEL FUNCTION: ASYMPTOTICS AND A DEVICE FOR COMPUTATION
N. M. Temme Apr. 1985 10 p Revised Submitted for publication
(CWI-AM-R8507; B8578041; ESA-86-96993) Avail: NTIS HC A02/MF A01

A two-dimensional integral containing exp (- xi - eta)I0(2 root xi eta) is considered; I0(z) is the modified Bessel function and the integral is taken over the rectangle 0 < or = xi < or = x, 0 < or = eta < or = y. The integral is difficult to compute when x and y are large, especially when x and y are almost equal. Computer programs based on existing series expansions are inefficient in this case. A representation in terms of the error function (normal distribution function) from which more efficient and reliable algorithms can be constructed is given. ESA

N86-27023# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
AN ABSTRACT DELAY-DIFFERENTIAL EQUATION MODELING SIZE DEPENDENT CELL GROWTH AND DIVISION
M. Gyllenberg (Helsinki Univ., Finland) and H. J. A. M. Heijmans

Apr. 1985 18 p Revised
(CWI-AM-R8508; B8578042; ESA-86-96994) Avail: NTIS
HC A02/MF A01

A two-phase model for the growth of a single cell population structured by size is formulated and analyzed. The model takes the form of a delay-differential equation in a Banach space. Using positivity arguments, the spectrum of the infinitesimal generator of the semigroup associated with solutions is described. Under a certain condition on the growth rate of individual cells the semigroup is compact after finite time. This is used to determine the ultimate behavior of solutions and prove the existence of a stable size distribution. ESA

N86-27024# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
THE SIZE AND SCAR DISTRIBUTIONS OF THE YEAST SACCHAROMYCES CEREVISIAE
Mats Gyllenberg (Helsinki Univ., Finland) May 1985 21 p Revised Submitted for publication
(CWI-AM-R8509; B8578043; ESA-86-96995) Avail: NTIS
HC A02/MF A01

A model for the growth of populations of Saccharomyces cerevisiae is formulated and analyzed. The probability of bud emergence is assumed to depend on the size of the cell. Under certain conditions on birth size the model can be reduced to a single renewal equation. Using Laplace transform techniques and renewal theory, the existence of a stable scar and size distribution under certain conditions on the growth rate of individual cells is established. The steady state values for the relative frequencies of unbudded and budded cells in the various scar classes are given. ESA

N86-27025# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
A DIFFERENTIAL-INTEGRAL EQUATION MODELING THE DYNAMICS OF POPULATIONS WITH A RANK STRUCTURE
Horst R. Thieme (Heidelberg Univ., West Germany) Jul. 1985 25 p Revised Submitted for publication Sponsored by Deutsche Forschungsgemeinschaft
(CWI-AM-R8511; B8578045; ESA-86-96997) Avail: NTIS
HC A02/MF A01

In order to illustrate the stabilizing potential of rank structures for the development of populations, a differential-integral equation (differentiation in time, integration over rank) modeling the dynamics of rank-structured (e.g., territorially or hierarchically organized) populations is proposed. After establishing existence and uniqueness of solutions, it is proved that, under biologically interpretable conditions, the population either dies out or tends towards a uniquely determined nonzero equilibrium state. Which of these alternatives actually occurs depends on the reproductive potential of the population and the permeability of the rank structure. ESA

N86-27026# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
READY TRACE SEMANTICS FOR CONCRETE PROCESS ALGEBRA WITH PRIORITY OPERATOR
J. C. M. Baeten (Amsterdam Univ., Netherlands), J. A. Bergstra (Utrecht State Univ., Netherlands), and J. W. Klop Aug. 1985 25 p Revised Submitted for publication Sponsored by European Economic Commission ESPRIT Project 432
(CWI-CS-R8517; B8575500; ESA-86-97008) Avail: NTIS
HC A02/MF A01

A process semantics intermediate between bisimulation semantics and readiness semantics, called ready trace semantics is considered. The advantage of this semantics is that, while retaining the simplicity of readiness semantics, it is possible to augment this process model with the mechanism of atomic actions with priority (theta operator). It is shown that in readiness semantics, and a fortiori in failure semantics, such an extension with theta is impossible. Ready trace semantics is considered in the setting of concrete process algebra, i.e., without abstraction (no silent moves) and for finite processes only. For such finite processes without silent moves, a complete axiomatization of ready trace semantics is given via the method of process graph transformations. ESA

N86-27027# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
GLOBAL RENAMING OPERATORS IN CONCRETE PROCESS ALGEBRA Annual Report, 1984
J. C. M. Baeten and J. A. Bergstra Sep. 1985 33 p Revised report of RUU-CS-85-3 Submitted for publication Sponsored in part by European Economic Commission ESPRIT Project 432
(CWI-CS-R8521; B8575494; ESA-86-97012) Avail: NTIS
HC A03/MF A01

Renaming operators are introduced in concrete process albegra (i.e., abstraction and silent moves are not considered). Examples of renaming operators are given: encapsulation, pre-abstraction, and localization. It is shown that renamings enhance the defining power of concrete process algebra by using the example of a queue. The trace set of a process is defined, and it is shown when equality of trace sets implies equality of processes. Trace sets are used to define the restriction of a process. Processes with actions that have a side effect on a state space are described, and how to use them for translation of computer programs into process algebra is outlined. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-27028# Stanford Univ., Calif. Dept. of Statistics.
ESTIMATES OF CIRCULAR ERROR PROBABILITIES
M. Evans, Z. Govindarajulu, and J. Barthoulot 5 Dec. 1985 25 p
(Contract N00014-76-C-0475)
(AD-A163257; SU-TR-367) Avail: NTIS HC A02/MF A01 CSCL 19/5

The general problem of the estimation of P sub theta (C) where C is some fixed event and P sub theta is unknown in some class is considered. The various available estimation procedures seem to involve the choice of some random probability measure. In particular we consider this problem when C is a disk in Sq R centered at o and P sub theta is restricted to be bivariate normal. Details concerning the implementation of the estimation procedures and a Monte Carlo study are discussed for this case. This particular problem arises when we are concerned with assessing the accuracy of a targeting procedure. Author (GRA)

N86-27029# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
A BAHADUR REPRESENTATION FOR QUANTILES OF EMPIRICAL DFs GENERALIZED U-STATISTIC STRUCTURE
Robert J. Serfling Nov. 1985 21 p
(Contract N00014-79-C-0801)
(AD-A163311; TR-453; TR-85-6-ONR) Avail: NTIS
HC A02/MF A01 CSCL 12/1

A wide class of c-sample statistics can be represented conveniently as quantiles of a nonclassical empirical df having the structure of a generalized U-statistic. A key tool in studying classical quantiles has been the Bahadur representation. This paper provides a suitable extension of that tool to the generalized setting. As auxiliary lemmas, some new results for generalized U-statistics are developed. Also, some further results for empirical df's of generalized U-statistic structure and their corresponding quantiles are provided. Author (GRA)

N86-27030# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.
ON THE LEAST-INFORMATIVE DISTRIBUTION IN A CONTAMINATION NEIGHBORHOOD
John C. Wierman and Kenneth S. Cantwell Jun. 1985 18 p
(Contract N00014-79-C-0801; Grant NSF MCS-83-03238)
(AD-A163312; TR-434; TR-85-2-ONR) Avail: NTIS

HC A02/MF A01 CSCL 12/1

For a board class of model distributions G, this document determines the distribution minimizing Fisher information for location in the epsilon-contamination neighborhood of G. The class consists of distributions G with a density g such that psi sub g = -g'/g is continuously differentiable and psi ' sub g has finitely many intervals of increase. The result is extended to the scale problem.

Author (GRA)

N86-27031# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.

GENERALIZED ORDER STATISTICS, BAHADUR REPRESENTATIONS AND SEQUENTIAL NONPARAMETRIC FIXED-WIDTH CONFIDENCE INTERVALS

J. Choudhury and R. J. Serfling Oct. 1985 29 p

(Contract N00014-79-C-0801)

(AD-A163329; TR-445; TR-85-4-ONR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper introduces confidence intervals formed by a pair of generalized order statistics, develops Bahadur-type representation theory for these order statistics, and constructs corresponding sequential fixed-width confidence interval procedures. Previous work related to the subject is sharpened and extended. GRA

N86-27032# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.

ASYMPTOTIC NORMALITY OF U-STATISTICS BASED ON TRIMMED SAMPLES

Paul Janssen, Robert Serfling, and Noel Veraverbeke Nov. 1985 20 p

(Contract N00014-79-C-0801)

(AD-A163346; TR-450; ONR-85-5) Avail: NTIS HC A02/MF A01 CSCL 12/1

For robust estimation of location, the ordinary sample mean is too sensitive to outliers. A classical and successful alternative is the trimmed mean, for which asymptotic normality was established by Bickel (1965). As discussed by Bickel and Lehmann (1975), for example, the trimmed mean remains relatively efficient with respect to the untrimmed mean even in the absence of outliers. Viewing the trimmed mean as simply the ordinary mean defined on a trimmed sample, we are motivated to consider other common statistics as well in this regard. This paper studies U-statistics in such fashion. The class of U-statistics, introduced by Hoeffding (1948), contains a wealth of statistics of interest in their own rights and also contains statistics which serve as approximations to statistics of more complicated type. A very significant broadening of the scope of robust statistical inference is achieved, therefore, by consideration of the class of U-statistics on trimmed samples.

GRA

N86-27033# Naval Postgraduate School, Monterey, Calif.

PROPERTIES OF BATCH MEANS FROM STATIONARY ARMA (AUTOREGRESSIVE MOVING AVERAGE) TIME SERIES

Keebom Kang and Bruce Schmeiser Feb. 1986 13 p

(AD-A165187; NPS55-86-004) Avail: NTIS HC A02/MF A01 CSCL 12/1

The batch means process arising from an arbitrary autoregressive moving-average (ARMA) process time series is derived. As side results, the variance and correlation structures of the batch means process as functions of the batch size and parameters of the original process are obtained. Except for the first-order ARMA process, for which a closed-form expression is obtained, the parameters of the batch-means process are determined numerically. Author (GRA)

N86-27034# Bielefeld Univ. (West Germany). Research Center.

STOCHASTIC MECHANICS AND THE KEPLER PROBLEM

P. Garbaczewski (Wroclaw Univ., Poland) 1986 16 p Sponsored by Stiftung Volkswagenwerk

(Rept-70; ESA-86-96929) Avail: NTIS HC A02/MF A01 Member States, AU, CN, NO (+20% others)

Nelson-Guerra's stochastic mechanics is formulated for the hydrogen atom. It is demonstrated that this simple quantum system can be described in terms of three independent Gaussian Markov processes, driven (controlled) by the classical Kepler problem. It reveals a manifest connection between the classical and quantized versions of the Kepler problem. ESA

N86-27035# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.

A SOLUTION METHOD FOR THE SET PACKING PROBLEM WITH POLYHEDRAL CHARACTERISTICS

Sjored M. Baas and Martin C. Bonvanie May 1984 21 p

(Memo-446; ESA-86-96964) Avail: NTIS HC A02/MF A01

The concept of solving combinatorial problems with the help of relevant information on the facetial structure of the underlying polytope is used in connection with Set Packing (SP) problems. An algorithm is presented in which a standard list of simple facet inequalities is investigated as to its efficiency to solve a general SP problem of average size (40 to 60 variables) in a limited number of iterations. Within each iteration relevant facet inequalities are derived by considering the corresponding intersection graph. Precise expressions for these inequalities can be established with the help of a specific sequential facet lifting procedure. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-27036*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

A LUMPED PARAMETER MATHEMATICAL MODEL FOR SIMULATION OF SUBSONIC WIND TUNNELS

Susan M. Krosel, Gary L. Cole, William M. Bruton, and John R. Szuch May 1986 50 p refs

(NASA-TM-87324; E-3065; NAS 1.15:87324) Avail: NTIS HC A03/MF A01 CSCL 12B

Equations for a lumped parameter mathematical model of a subsonic wind tunnel circuit are presented. The equation state variables are internal energy, density, and mass flow rate. The circuit model is structured to allow for integration and analysis of tunnel subsystem models which provide functions such as control of altitude pressure and temperature. Thus the model provides a useful tool for investigating the transient behavior of the tunnel and control requirements. The model was applied to the proposed NASA Lewis Altitude Wind Tunnel (AWT) circuit and included transfer function representations of the tunnel supply/exhaust air and refrigeration subsystems. Both steady state and frequency response data are presented for the circuit model indicating the type of results and accuracy that can be expected from the model. Transient data for closed loop control of the tunnel and its subsystems are also presented, demonstrating the model's use as a control analysis tool. Author

N86-27037# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.

STOCHASTIC REALIZATION PROBLEMS MOTIVATED BY ECONOMIC MODELING

J. H. vanSchuppen Sep. 1985 20 p Revised Submitted for publication

(CWI-OS-R8507; B8577113; ESA-86-96989) Avail: NTIS HC A02/MF A01

The econometric modeling of time series as a stochastic realization problem (Kalman's approach) is introduced and, in a nondynamic framework, generalized to multivariate stochastic realization problems. The three-variate Gaussian stochastic realization problem is investigated. In a dynamic context the stochastic realization problem of representing an observed process such that the inherent causality or dependency relation between the components is made explicit is posed. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-27038# Naval Postgraduate School, Monterey, Calif.
GAMMA PROCESSES
Peter A. W. Lewis, E. McKenzie, and D. K. Hugus Jan. 1986 37 p
(AD-A165390; NPS55-86-002) Avail: NTIS HC A03/MF A01 CSCL 12/1

The Beta Gamma transformation is described and is used to define a very simple first order autoregressive Beta Gamma process, BGAR(1). Maximum likelihood estimation is discussed for this model, as well as moment estimators. The first-order structure is extended to include moving average processes and mixed first-order autoregressive, pth-order moving average processes. It is shown that these Gamma processes are time-reversible and, therefore, too narrow for general physical modelling. A dual process to the BGAR(1) process, DBGAR(1), is introduced, as well as an iterated process which combines the Beta-Gamma process and the GAR(1) process of Gaver and Lewis (1980). Some properties of these extended autoregressive processes are derived. Several highly nonlinear extensions of these processes which produce negative correlation are given. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-27039# Los Alamos National Lab., N. Mex.
KINETIC STABILIZATION OF FIELD-REVERSED CONFIGURATIONS
J. L. Schwarzmeier, H. R. Lewis, D. C. Barnes, and C. E. Seyler 1985 5 p Presented at the 7th US-Japan Workshop on Compact Toroids, Bellevue, Wash., 12-13 Nov. 1985 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract W-7405-eng-36)
(DE86-003655; LA-UR-85-4077; CONF-8511118-3) Avail: NTIS HC A02/MF A01

The tilt instability in field-reversed configurations (FRC's) may be roughly divided into two categories, depending on the nature of the unstable eigenfunction. The internal tilt instability, which could also be called an n = 1 ballooning mode, is defined here to be an instability in which the displacement of the flux surfaces is confined to the closed region of magnetic field and the separatrix remains fixed in time. Since, for a fixed separatrix, the only destabilizing term in delta W is proportional to the pressure gradient times the parallel curvature of the magnetic field, the internal tilt could be considered a pressure driven mode. The external tilt is defined here to be an instability in which the entire closed field line FRC rotates rigidly about some axis perpendicular to the symmetry axis of the FRC. The external tilt results from magnetic interactions involving the toroidal plasma current. In spheromaks (at zero beta) the tilt instability is due to these same interactions, so in this sense the external mode might be considered current driven. However, since in FRC's the toroidal current comes solely from having finite plasma pressure, the distinction between pressure and current driven instabilities in FRC's is not meaningful (there is no parallel current). For oblate FRC's the eigenfunction of the external tilt is a rigid rotation of the closed field line FRC. For FRC's that are only moderately prolate the distinction between internal and external tilt modes is not clear, and the eigenfunction of the tilt mode may be a combination of internal and external displacements of the flux surfaces. DOE

N86-27040# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
A PARADIGM FOR RELIABLE CLOCK SYNCHRONIZATION
Interim Report
Fred B. Schneider Feb. 1986 22 p
(Contract N00014-86-K-0092; Grant NSF DCR-83-20274)
(AD-A164819; CU-CSD-TR-86-735) Avail: NTIS HC A02/MF A01 CSCL 09/2

Existing fault-tolerant clock synchronization protocols are shown to result from refining a single clock synchronization paradigm. In that paradigm, a reliable time source periodically issues messages that cause processors to resynchronize their clocks. The reliable time source is aproximated by reading all clocks in the system and using a convergence function to compute a fault-tolerant average of the values read. The performance of a clock synchronization algorithm based on the paradigm can be quantified in terms of the two parameters that characterize the behavior of the convergence function used: accuracy and precision. GRA

N86-27041# Massachusetts Inst. of Tech., Lexington.
EFFECT OF MAGNETOSTRICTION ON REMANENT MAGNETIZATION
Gerald F. Dionne 5 Dec. 1985 19 p refs
(Contract F19628-85-C-0002)
(AD-A165450; TR-737; ESD-TR-85-292) Avail: NTIS HC A02/MF A01 CSCL 20/3

Magnetostriction effects of remanent magnetization are examined in a phenomenological model that is used to design a high magnetization polycrystalline spinel ferrite with excellent square hysteresis loop properties. Isotropic magnetostriction is compensated by substituting Mn(3+) ions for 0.2 Fe(3+) ions per formula unit of Ni.65Zn.35Fe2O4 host material. As predicted by theory, the magnetostriction reduction dramatically increases the remanent magnetization and removes most of its external stress sensitivity. The resulting remanent magnetization, which approaches 4000 G, represents an increase of more than a factor of 2 over that of the host composition, with no significant deterioration in other magnetic and dielectric properties. The remanence ratio improvement is in general accord with estimates predicted by the theoretical model. GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-27042*# Michigan State Univ., East Lansing. Dept. of Mechanical Engineering.
TRANSVERSE VORTICITY MEASUREMENTS USING AN ARRAY OF FOUR HOT-WIRE PROBES
John F. Foss, Casey L. Klewicke, and Peter J. Disimile May 1986 147 p
(Grant NAG1-287)
(NASA-CR-178098; NAS 1.26:178098; FSFL-R-006) Avail: NTIS HC A07/MF A01 CSCL 20A

A comprehensive description of the technique used to obtain a time series of the quasi-instantaneous transverse vorticity from a four wire array of probes is presented. The algorithmic structure which supports the technique is described in detail and demonstration data, from a large plane shear layer, are presented to provide a specific utilization of the technique. Sensitivity calculations are provided which allow one contribution to the inherent uncertainty of the technique to be evaluated. Author

N86-27043*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRESSURE PROBE AND HOT-FILM PROBE RESPONSES TO ACOUSTIC EXCITATION IN MEAN FLOW
Tony L. Parrott and Michael G. Jones (PRC Kentron, Inc., Hampton, Va.) Jun. 1986 56 p refs
(NASA-TP-2581; L-16079; NAS 1.60:2581) Avail: NTIS HC A04/MF A01 CSCL 20A

An experiment was conducted to compare the relative responses of a hot-film probe and a pressure probe positioned in a flow duct carrying mean flow and progressive acoustic waves.

The response of each probe was compared with that of a condenser-type microphone flush mounted in the duct wall for flow Mach numbers up to about 0.5. The response of the pressure probe was less than that of the flush-mounted microphone by not more than about 2.1 dB at the highest centerline Mach number. This decreased response of the probe can likely be attributed to flow-induced impedance changes at the probe sensor orifices. The response of the hot-film probe, expressed in terms of fluctuating pressure, was greater than that of the flush-mounted microphone by as much as 6.0 dB at the two higher centerline Mach numbers. Removal of the contribution from fluctuating temperature in the hot-film analytical model greatly improved the agreement between the two transducer responses. Author

N86-27044# Texas Univ., Austin. Applied Research Lab.
EXPERIMENTS ON SOUND PROPAGATION OVER SLOPED BOTTOMS Final Report, 1 Jul. 1983 - 30 Sep. 1984
Halvor Hobaek, Chris T. Tindle, and T. G. Muir 14 Nov. 1985 23 p
(Contract N00014-83-K-0593)
(AD-A163431; ARL-TR-85-41) Avail: NTIS HC A02/MF A01 CSCL 20/1

Experiments to study sound propagation in a shallow water wedge were conducted in a tank. Results confirm the assumption of adiabatic normal mode theory that the mode shapes adjust continuously to the local water depth. Mode coupling, if it exists, is negligible. For upslope propagation, the energy of a mode traveling beyond its cutoff depth is directed into the bottom with negligible coupling to lower modes. For downslope propagation, the normal modes in a wedge propagate with curved wavefronts and not with the straight vertical wavefronts of simple adiabatic normal mode theory. In addition, normal modes not present at the source can be captured when the water depth is sufficient to support them. GRA

N86-27045# Cornell Univ., Ithaca, N.Y. Dept. of Theoretical and Applied Mechanics.
X-RAY GENERATED ULTRASOUND Summary Report, 15 Apr. 1985 - 15 Jan. 1986
Wolfgang Sachse and Kwang Y. Kim 30 Jan. 1986 64 p refs
(Contract N00014-85-K-0263)
(AD-A164581; TAM-TR86-1) Avail: NTIS HC A04/MF A01 CSCL 20/1

This report describes the mechanisms by which ultrasonic signals are generated by an intense, pulsed X-ray source interacting with a material and how the associated contrast mechanisms can be used to image and characterize material microstructures. The existence of X-ray generated acoustic signals was verified and the beam-current dependence of the X-ray generated acoustic signals was established. The amplitudes of the acoustic signals appear to be linearly related to the electron beam current of the synchrotron and hence the X-ray intensity. Thus, the X-ray/acoustic phenomenon could form the basis of an X-ray beam monitor sensor. The X-ray acoustic signals were also found to depend linearly on the beam size. The generated X-ray/acoustic signals show a directivity pattern resembling that of the thermoelastic signals generated by a pulsed thermal laser source and they appear to be independent of beam width. A newly developed double modulation measurement technique analogous to existing photo-acoustic spectroscopy (PAS) measurements is described. It was found that the X-ray/acoustic spectra are material dependent. The measured scanned fields vary spatially, with features apparently related to the effects of the transducer or elastic wave resonances in the specimen. A preliminary test was completed with a new differential X-ray/acoustic measurement technique by which transducer and specimen wave propagation effects were removed so that spatial features in a specimen could be clealy identified. GRA

N86-27046# Washington Univ., Seattle. Applied Physics Lab.
COLOSSUS REVISITED: A REVIEW AND EXTENSION OF THE MARSH-SCHULKIN SHALLOW WATER TRANSMISSION LOSS MODEL (1962) Interim Report, 1 Aug. 1984 - 31 Jul. 1985
M. Schulkin and J. A. Mercer Dec. 1985 41 p refs
(Contract N00014-84-K-0646)
(AD-A164588; APL-UW-8508) Avail: NTIS HC A03/MF A01 CSCL 20/1

This report reviews the Marsh-Schulkin (M-S), or Colossus, model of acoustic transmission loss in shallow water in light of new information and techniques that have emerged since its introduction in 1962. The M-S model, a semiempirical model based on extensive measurements taken off the Atlantic Coast, uses several concepts; (1) refractive cycle, or skip distance; (2) deflection of energy into the bottomat high angles by scattering from the sea surface; and (3) a simplified Rayleigh two-fluid model of the bottom for sand or mud sediments. With a few free parameters, including water depth, about 100,000 measurements from 100 Hz to 10 kHz were fitted within stated error bounds. The chief criticisms of the model have been that it could not be adjusted for arbitrary negative sound-speed gradients, and that it uses empirical bottom loss values. The M-S model yields good predictions when applied properly; it is not to be used for all environments. The M-S model is compared with Rogers' semiempirical model based on numerical calculations of the normal-mode solutions to the wave equation for propagation in shallow water. The M-S model is also extended to treat arbitrary negative and bilinear sound-speed gradients by using new general expressions for skip distance, near-field anomaly, and reflection coefficients. The reflection coefficients are calculated from the Morse-Mackenzie relations for loss per bounce. GRA

N86-27047# Sierra Geophysics, Inc., Redmond, Wash.
MSS EVALUATION. REVISION 1 Status Report, 13 Aug. - 13 Nov. 1985
George R. Mellman and Marilee Henry 12 Feb. 1986 11 p refs
(Contract N00014-85-C-0793)
(AD-A164589) Avail: NTIS HC A02/MF A01 CSCL 08/11

This is a Marine seismic system (MSS) progress report. It discusses the following tasks: identify events detected and phases observed in MSS data; catalog pertinent MSS information and preliminary analysis; compare MSS and OBS data and site characteristics; analyze the Wake Island hydrophone array data. Preliminary findings suggest MSS detection threshold for unfiltered teleseismic events is rather high and that 180 regional events were recorded. GRA

N86-27048# Texas Univ., Austin. Applied Research Lab.
A SYNOPSIS OF RESEARCH ON SUBBOTTOM EFFECTS ON UNDERWATER ACOUSTIC PROPAGATION Final Report, 1 Jun. 1982 - 30 Sep. 1984
Robert A. Koch, Jo B. Lindberg, and Paul J. Vidmar 14 Nov. 1985 30 p
(Contract N00014-82-K-0679)
(AD-A165420; ARL-TR-85-40) Avail: NTIS HC A03/MF A01 CSCL 20/1

This report investigates some effects of the subbottom on underwater acoustic propagation. Our major accomplishment was solving the problem of ordering and counting the normal modes of propagation in the ocean waveguide when the seafloor is described by an impedance boundary condition. The boundary condition, derived from the plane wave reflection coefficient, introduces mathematical complexities since it is a function of the separation parameter in the acoustic wave equation. As a natural extension of our theoretical approach, the relationship between mode concepts of normalization and cycle distance, and geometrical ray concepts of beam displacement and time delay were rigorously established. Additional work was also done to examine ray and normal mode approaches for predicting propagation in a sloping geometry. GRA

N86-27049# Miami Univ., Fla. School of Marine and Atmospheric Science.
ACOUSTIC NORMAL MODES USING THE PROPAGATOR MATRIX TECHNIQUE FOR A STRATIFIED OCEAN OVERLAYING AN INHOMOGENEOUS ANISOTROPIC POROUS BED Interim Report

Mohsen Badiey and Tokuo Yamamoto Jan. 1986 116 p
(Contract N00014-85-C-0020)
(AD-A165436; AD-F250510; RSMAS-TR86-002) Avail: NTIS
HC A06/MF A01 CSCL 17/1

Propogation of acoustic normal modes at excitation frequencies of 50 to 50000 Hz in a shallow stratified ocean overlaying a transverse isotropic poro-elastic sediment bed is modeled. The Biot-Willis stiffness matrix of the poro-elastic anisotropy is defined in terms of physical properties of sediments to model the bed. Propagator matrix method is used to solve the differential equations for the motion stress vectors in both layered sediment and water. The effects of sediment properties on the dispersion and attenuation of acoustic waves are examined numerically. Using the relaxation principle it is observed that the energy loss is maximum at frequency referred to as relaxation frequency of the porous media given by f sub ri = (beta)(nu)/3 pi k (sub si), where beta is the porosity, nu is the kinematic viscosity of the pore fluid and k (sub si) is the anisotropic permeability coefficient. The phase speed of compressional and shear waves in the sediment becomes highly dispersive around this frequency. The sandy bottom's relaxation frequency is the range of several hundred hertz to several kilo hertz. This report presents the derivation of the mathematical expressions used in the model and a complete description of the computer program. Four examples of numerical calculations are provided. GRA

N86-27050# Ohio State Univ., Columbus. Dept. of Welding Engineering.
INVESTIGATIONS OF ULTRASONIC WAVE INTERACTIONS AT BOUNDARIES SEPARATING ANISOTROPIC MATERIALS Progress Report
L. Adler Nov. 1985 7 p
(Contract DE-FG02-84ER-45057)
(DE86-004953; DOE/ER-45057/1) Avail: NTIS HC A02/MF A01

The studies of the interaction of waves with interfaces between generally anisotropic media were supported experimentally. Two boundary conditions on the interface were considered: rigid, and slip. The latter boundary condition describes dislocation boundaries and slip on grain boundaries. It was shown that reflection from such an interface is much stronger than from a rigid bond. A device was designed based on the diffraction of waves on periodic gratings. An anomalous phenomenon was found in the reflection of elastic waves from an interface between anisotropic crystals. It was found that the domain of permissible incident angles splits into disjoint pieces for certain crystal cuts. In this way, a new branch for the reflection coefficient was found. A sample from a Ni crystal was prepared. Another experiment was carried out on critical angles in backscattering. The general computer programs are being adapted to interactive algorithms for the PDP-11 with real time plotting of results on graphic displays. The Schlieren Visualization System was improved by adding capabilities for visualization of impulse ultrasonic signals. DOE

N86-27051# Kema N.V., Arnhem (Netherlands). Dept. of Physical Research.
CONTINUOUS ULTRASONIC WAVES TO DETECT STEAM BUBBLES IN WATER UNDER HIGH PRESSURE
H. J. M. Hulshof, F. Schurink, and A. J. vanLoon, ed. 1985 13 p
Information brochure presented at 2nd UN Conf. on the Exploration and Peaceful Uses of Outer Space (UNISPACE), Vienna, Aug. 1982 -12 Nov. 1985 Sponsored by Netherlands Central Organization TNO, Delft, Gals, Switzerland and Energy Research Laboratory
(S/T-Rept-Vol-3-No-5; B8574250; ISBN-90-353-0028-9;
ISSN-0167-8590; ESA-06-96944) Avail: NTIS HC A02/MF A01

A detector using continuous ultrasonic waves to detect bubbles in water in steel tubes is described. The variation of the transmitted wave caused by the bubbles was determined by demodulation. The results meet the objectives set for cold water with air bubbles. A clear indication of the presence of steam bubbles is found in fast-flowing hot water in a steel tube with a diameter of 60 mm. A change in the low-frequency region of the modulation is the only indication of the presence of steam bubbles in the large-diameter downcomer of the water-separator drum of a boiler in an electrical power plant. Possible causes of the differences in the results obtained are discussed on the basis of differences in bubble sizes, and in focusing and reflection of the ultrasonic waves. ESA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-27052# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Physics.
THEORY OF PHOTO- AND ELECTROPRODUCTION OF MESONS: PROBLEMS AND PROSPECTS
N. C. Mukhopadhyay, R. Davidson, M. Bourdeau, S. Nergiz, and R. Wittman 1985 27 p refs
(Contract DE-AC02-83ER-40114)
(DE86-004094; DOE/ER-40114/T2) Avail: NTIS
HC A03/MF A01

The state of theoretical understandings of the photo- and electroproduction of pions from nucleons is reviewed, with particular emphasis on the unitarity and dynamics. Understandings of these processes in the delta region are summarized, with emphasis on the hadron structure. Some problems and prospects for future studies of the high-energy photo- and electroproduction of mesons at CEBAF are discussed. DOE

N86-27053# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
QUASI-PARTICLE SPECTRUM OF THE HUBBARD MODEL
Ram Kishore Apr. 1986 24 p Submitted for publication
(INPE-3869-PRE/927) Avail: NTIS HC A02/MF A01

The quasi-particle spectrum of the Hubbard model is studied by using a projection operator formalism of the Green's function. In weak electron correlation regime, the exact results are obtained up to the second order in the intra-atomic interaction. For strong electron correlations, the quasi-particle spectrum consists of two bands. For each band, quasi-particle energy is obtained exactly up to the first order in the transfer integral. Also, a semiclassical approximation is proposed which gives the above mentioned exact results in proper limits. Author

N86-27054# Illinois Inst. of Tech., Chicago. Dept. of Physics.
THEORETICAL ELEMENTARY PARTICLE STUDIES Final Report, Sep. 1983 - Jul. 1985
J. C. Collins 1985 8 p
(Contract DE-AC02-80ER-10712)
(DE86-001165; DOE/ER-10712/5) Avail: NTIS HC A02/MF A01

The work done during the period September 1983 to July 1985 covers several areas of the theory of the strong interactions of elementary particles, mostly in the area characterized as perturbative QCD. The specific topics are: the proof of factorization for hard processes, such as the Drell-Yan process; calculation of transverse-momentum distributions for these processes; investigation of the small-x region; demonstration of the applicability of perturbative QCD (quantum chromodynamics) to the production of heavy quarks; and improved methods of calculation of the effects of heavy quarks in hard processes, and in particular of their distribution functions in hadrons (structure functions). DOE

N86-27055# National Aeronautics and Space Administration. Pasadena Office, Calif.
VARIABLE ENERGY, HIGH FLUX, GROUND-STATE ATOMIC OXYGEN SOURCE Patent Application
Ara Chutjian, Inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) and Otto J. Orient, Inventor (to NASA)
Filed 10 Apr. 1986 17 p Sponsored by NASA
(NASA-Case-NPO-16640-1-CU; NAS 1.71:NPO-16640-1-CU;
US-Patent-Appl-SN-852468) Avail: NTIS HC A02/MF A01 CSCL 20H

A variable energy, high flux atomic oxygen source is described which is comprised of a means for producing a high density beam of molecules which will emit O(-) ions when bombarded with

electrons; a means for producing a high current stream of electrons at a low energy level passing through the high density beam of molecules to produce a combined stream of electrons and O(-) ions; a means for accelerating the combined stream to a desired energy level; a means for producing an intense magnetic field to confine the electrons and O(-) ions; a means for directing a multiple pass laser beam through the combined stream to strip off the excess electrons from a plurality of the O(-) ions to produce ground-state O atoms within the combined stream; an electrostatic deflection means for deflecting the path of the O(-) ions and the electrons in the combined stream; and a means for stopping the O(-) ions and the electrons and for allowing only the ground-state O atoms to continue as the source of the atoms of interest. The method and apparatus are also adaptable for producing other ground-state atoms and/or molecules. NASA

N86-27056# State Univ. of New York, Buffalo. Dept. of Chemistry.
RESONANCE FLUORESCENCE OF A TWO-LEVEL ATOM NEAR A ROUGH METAL SURFACE Interim Technical Report
Xi-Yi Huang, Ki-Tung Lee, and Thomas F. George Jan. 1986 33 p
(Contract N00014-86-K-0043)
(AD-A163219; URochester/DC/85/TR-4) Avail: NTIS HC A03/MF A01 CSCL 07/5

Surface-dressed optical Bloch equations are solved for a two-level atom near or adsorbed on a rough surface, which is modeled as a hemispheroid protrusion on a perfectly-conducting surface. Effects of the laser bandwidth are included by means of a phase-diffusion model. The presence of the surface roughness generates a dephasing broadening mechanism on the adatomic resonance fluorescence spectrum, which can be strongly enhanced by plasma resonances depending on the shape of the hemispheroid. The dependence of the electrodynamics of the adatom on the adatom-hemispheroid distance is also evaluated. GRA

N86-27057# Yeshiva Univ., New York, N. Y.
ION TRANSPORT ACROSS SYNTHETIC AND BIOLOGICAL MEMBRANES: IONOPHORE-MEDIATED TRANSPORT Final Report, May 1982 - Sep. 1985
Lea Elau 21 Oct. 1985 19 p
(Contract N00014-82-K-0437)
(AD-A163269; AD-E500743) Avail: NTIS HC A02/MF A01 CSCL 06/16

The objectives of this study were: to set-up a research laboratory; to initiate membrane related research; to investigate ionophore-mediated transport and to involve students in research. Synthetic compounds, the lariat ethers, and a non-cyclic di-n-propyl diamide were investigated. These compounds were known to form complexes with cations in organic solvents. However, their ionophoretic activity in model membranes has not been previously demonstrated. It was shown that some lariat ethers mediate potassium transport across phosphatidylcholine bilayers, and that the diamide induced calcium movement across lipid membranes. The polyether carboxylic acids A23187 and X537A were extensively investigated. The inital rates of calcium movement across lipid bilayers were measured as a function of the ionophore and calcium concentration. It has been found that the transported complex has a stoichiometry of ionophore:calcium 2:1 and 1:1 for A23187 and X537A respectively. However, esterification of the carboxylic group of A23187 to yield the appropriate methyl ester reduced the potency more than 200 fold and the stoichiometry was changed to ionophore:calcium 1:1. GRA

N86-27058# Colorado State Univ., Fort Collins. Dept. of Chemistry.
CALCULATIONS OF THE GEOMETRY AND BINDING ENERGY OF AROMATIC DIMERS: BENZENE, TOLUENE, AND TOLUENE-BENZENE
Mark Schauer and E. R. Bernstein 15 Apr. 1985 26 p refs
(Contract N00014-79-C-0647)
(AD-A164570; TR-17) Avail: NTIS HC A03/MF A01 CSCL 20/8

Calculations of the geometries and energies of the benzene, toluene, and toluene-benzene dimers using a combination of atom-atom and multipolar potentials are presented and discussed. An exponential-six atom-atom potential plus a molecular quadrupole-quadrupole interaction term gives the reported parallel displaced C2h benzene dimer geometry. The excited state behavior of the benzene dimer can be qualitatively understood based on this calculation. The toluene-benzene dimer is well modeled by these terms in addition to a dipole-quadrupole interaction term. Both parallel displaced and perpendicular configurations are obtained in agreement with the experimental data. Using exponential-six, dipole-dipole, quadrupole-quadrupole, and dipole-quadrupole interactions the toluene dimer can be satisfactorily modeled. The calculations generally suggest that excitation of parallel displaced dimers can lead to rearrangement (and possible excimer formation) in the excited state. GRA

N86-27059# Naval Research Lab., Washington, D. C.
THE USE OF ION IMPLANTATION FOR MATERIALS PROCESSING Annual Progress Report, 1 Oct. 1983 - 30 Sep. 1984
F. A. Smidt 6 Mar. 1986 241 p
(AD-A165432; AD-F250510; NRL-MR-5716) Avail: NTIS HC A11/MF A01 CSCL 13/8

This report is the sixth in a series of Progress Reports on work conducted at the Naval Research Laboratory (NRL) to investigate the use of ion implantation for materials processing. The objective of the program is to develop the capabilities of ion implantation and ion beam activated deposition for new and improved surface treatment techniques of interest to Navy and DOD applications. Attainment of this objective requires both fundamental research to provide an understanding of the physical and metallurgical changes taking place in the implanted region of a material and applications oriented research to demonstrate the benefits of ion implantation. The purpose of this report is to make available from one source the results of all studies at NRL related to the use of ion implantation for materials processing so as to provide a more comprehensive picture of the scope and interrelationship of the research and to expedite technology transfer to the civilian industrial sector. The report consists of four sections describing the research and a cummulative bibliography of published papers and reports. This report describes the important factors in ion implantation science and technology and reports progress in the use of ion implantation to modify friction, wear, fatigue, corrosion, optical and magnetic properties of materials. GRA

N86-27060# California Univ., Berkeley. Lawrence Berkeley Lab.
REACTION DYNAMICS OF ELECTRONICALLY EXCITED ALKALI ATOMS WITH SIMPLER MOLECULES
P. S. Weiss, J. M. Mestdagh, H. Schmidt, M. F. Vernon, M. H. Covinsky, B. A. Balko, and Y. T. Lee May 1985 14 p Presented at the Conference on Recent Advances in Molecular Reaction Dynamics, Aussois, France
(Contract DE-AC03-76SF-00098)
(DE85-014538; LBL-19719; CONF-8506151-1) Avail: NTIS HC A02/MF A01

The reactions of electronically excited sodium atoms with simple molecules have been studied in crossed molecular beams experiments. Electronically excited Na(3(2)P(sub 3/2), 4(2)D(sub 5/2), and 5(2)S(sub 1/2) were produced by optical pumping using single frequency dye lasers. The effects of the symmetry, and the orientation and alignment of the excited orbital on the chemical reactivity, and detailed information on the reaction dynamics were derived from measurements of the product angular and velocity distributions. DOE

N86-27061# Brookhaven National Lab., Upton, N. Y.
FASTRUN: A HIGH PERFORMANCE COMPUTING DEVICE FOR MOLECULAR MECHANICS USING A PIPELINE ARCHITECTURE
D. G. Dimmler, R. Fine, and C. Levinthal Oct. 1985 7 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif.,

23 Oct. 1985 Prepared in cooperation with Columbia Univ., New York
(Contract DE-AC02-76CH-00016)
(DE86-004355; BNL-37221; CONF-851009-41) Avail: NTIS
HC A02/MF A01

A deep, synchronous pipeline architecture has been selected for a computing device with a power of 500 million floating point operations per second (Mflops). The device calculates the forces and energy due to pair-wise interactions of many objects in a system. Considerations relating to application specific high-performance computer architectures are addressed. In addition, topics specifically relating to very deep, synchronous unidirectional pipelines are discussed. A key element of the device, a quadratic interpolator based on a lookup table, has been developed and tested. Five of these interpolators with a total computing power of 280 Mflops will be employed in the device. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-27062# Los Alamos National Lab., N. Mex.
WAKEFIELD ACCELERATORS FOR SDI
M. E. Jones, R. Keinigs, R. J. Faehl, and B. G. DeVolder 1985 6 p refs Presented at the Compact Accelerator Workshop/Conference, Livermore, Calif., 23-24 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003673; LA-UR-85-3999; CONF-8510203-3) Avail: NTIS
HC A02/MF A01

The Wakefield accelerator concept consists of utilizing the electric field generated by the motion of one group of particles to accelerate another group of particles. Essentially, the Wakefield accelerator is a transformer which transfers the energy in a large number of relatively low energy particles to a smaller number of particles, resulting in acceleration of these particles to high energy. The basic physics of Wakefield acceleration is described, and issues relevant to SDI applications. For such applications the amount of total energy in the beam must be maximized. Specific Wakefield concepts are described - RF cavity and slow-wave structure Wakefield and the plasma Wakefield accelerator. DOE

N86-27063*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTICAL MODEL CALCULATIONS OF HEAVY-ION TARGET FRAGMENTATION
Lawrence W. Townsend, John W. Wilson, Francis A. Cucinotta (Old Dominion Univ., Norfolk, Va.), and John W. Norbury Jul. 1986 15 p refs
(NASA-TM-87692; L-16113; NAS 1.15:87692) Avail: NTIS
HC A02/MF A01 CSCL 20H

The fragmentation of target nuclei by relativistic protons and heavy ions is described within the context of a simple abrasion-ablation-final-state interaction model. Abrasion is described by a quantum mechanical formalism utilizing an optical model potential approximation. Nuclear charge distributions of the excited prefragments are calculated by both a hypergeometric distribution and a method based upon the zero-point oscillations of the giant dipole resonance. Excitation energies are estimated from the excess surface energy resulting from the abrasion process and the additional energy deposited by frictional spectator interactions of the abraded nucleons. The ablation probabilities are obtained from the EVA-3 computer program. Isotope production cross sections for the spallation of copper targets by relativistic protons and for the fragmenting of carbon targets by relativistic carbon, neon, and iron projectiles are calculated and compared with available experimental data. Author

N86-27064# Wisconsin Univ., Madison. Dept. of Nuclear Engineering.
FUSION REACTOR PHYSICS AND TECHNOLOGY STUDIES Final Report, 1 Oct. 1977 - 30 Nov. 1985
G. L. Kulcinski, G. A. Emmert, C. W. Maynard, R. W. Conn, J. F. Santarius, I. N. Sviatoslavsky, and M. E. Sawan Nov. 1985 15 p
(Contract DE-AC02-78ET-52048)
(DE86-004527; DOE/ET-52048/32) Avail: NTIS
HC A02/MF A01

A brief review of seven reactor studies is given. The studies which are listed are NUWAK, INTOR, WITAMIR-I, UWTOR-M, MARS, and MINIMARS. A list of 133 reports which were issued under Fusion Reactor Physics and Technology Studies is given for further consideration of the above studies. DOE

N86-27065# Brookhaven National Lab., Upton, N. Y.
PARTICLE DYNAMICS FOR MOTION IN A NON-PLANAR ACCELERATOR
A. Antillon and M. Month 20 Aug. 1985 28 p
(Contract DE-AC02-76CH-00016)
(DE86-005303; BNL-51927) Avail: NTIS HC A03/MF A01

The basic dynamics of a planar accelerator is extended to the non-planar case. This is done using the geometrical concept of torsion and extending the Hamiltonian formalism. A generalized non-planar reference orbit is adopted which introduces torsion in appropriately chosen drift spaces. The parameters of the reference orbit are associated with uncoupled and coupled betatron parameters currently in use. DOE

N86-27066# Kema N.V., Arnhem (Netherlands). Dept. of Reactor Physics.
MELTING NUCLEAR FUEL
C. D. Andriesse and A. J. vanLoon, ed. 1985 25 p
(S/T-Rept-Vol-3-No-7; B8575584; ISBN-90-353-0030-0; ISSN-0167-8590; ESA-86-96946) Avail: NTIS HC A02/MF A01

Transport of fission products in overheated reactor fuel is discussed. The relevance of this transport for the determination of the source term at severe accidents with a nuclear reactor is outlined. Experimental data on the release of fission products from UO2 at high temperatures are analyzed. A model explaining these data in terms of basic transport processes is applied to predict releases at accidents, and is compared to releases measured in tests with severe damage of fuel or calculated in core-melt studies. It appears that the behavior of nonvolatile fission products needs further study. Assumptions and approximations in the model are reviewed. Release is described as a result of intragranular diffusion, either in an interstitial mode (for unbound fission products) or in a substitutional mode (for bound products). A theory for the diffusion entropy of the interstitial mode is provided. ESA

N86-27067# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
ALTERNATIVE METHODS FOR DISPOSAL OF LOW-LEVEL RADIOACTIVE WASTES
R. D. Bennett Oct. 1985 102 p
(Contract NRC-FIN-D1001)
(TI81-900254; NUREG/CR-3775-Vol-5) Avail: NTIS
HC A06/MF A01

Current practice in the U. S. for disposal of commercial low level radioactive wastes (LLW) is burial in shallow trenches. Although shallow land burial in trenches may continue to be practiced, it is likely that techniques for engineered disposal will be introduced to the National Regulatory Commission or states for licensing consideration within the next few years. The shaft disposal alternative is one of several methods that may be proposed. The term shaft disposal refers to a near surface disposal alternative in which the wastes would be disposed of in shafts or boreholes augered, bored, or sunk by any other conventional method. A generic description of the features, components, and operation of a shaft disposal facility is provided. Features and components that could enhance the long term performance are also described, including site conditions for which they would be

applicable. The existing criteria developed for near surface disposal were assessed for applicability to the shaft disposal method. B.G.

74 OPTICS

Includes light phenomena.

N86-27068# Department of the Air Force, Washington, D.C.
FIBER OPTIC CABLE STORAGE DEVICE Patent Application
Gregory J. Zagar, inventor (to Air Force) Filed 18 Dec. 1985 14 p
(AD-D012166; US-Patent-Appl-SN-810432) Avail: NTIS HC A02/MF A01 CSCL 20/6

This patent application discloses a fiber optic cable storage device for securing fiber optic cable with connectors on a spool. The spool includes a drum with a flange and slot that allows for stress free routing of cable and connectors to a connector storage area. The connector storage area includes a drive plate for mechanically reeling of the cable and connector holders for holding fiber optic cable connectors. A removable cover is used to trap the cable connectors in the holders. GRA

N86-27069# Optical Society of America, Washington, D. C.
TOPICAL MEETING ON PICOSECOND ELECTRONICS AND OPTOELECTRONICS: A DIGEST OF TECHNICAL PAPERS
15 Mar. 1985 137 p refs Presented at the Topical Meeting on Picosecond Electronics and Optoelectronics, Incline Village, Nev., Mar. 13-15 1985
(AD-A164598) Avail: NTIS HC A07/MF A01 CSCL 20/6

The following subjects were discussed at a meeting on picosecond electronics and optoelectronics held at Incline Village, Nevada, March 13 to 15, 1985: Ultrafast Optics and Electronics I, Ultrafast Optics and Electronics II, High-Speed Phenomena in Semiconductors, Picosecond Diode Lasers, Poster Session, Optoelectronics, Cryoelectronics, Ultrafast Electronics, Quantum Structures, and Electronics and Optoelectronics. GRA

N86-27070# Colorado Univ., Boulder.
A BRILLOUIN LIGHT SCATTERING STUDY OF MAGNETIC EXCITATIONS Final Report, 1 Apr. 1981 - 15 Oct. 1985
Carl E. Patton 30 Jan. 1986 16 p
(Contract MIPR-ARO-119-83; Grant NSF DMR-80-13727)
(AD-A164716; ARO-17591-17-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

Of particular note are results on exchange in Li-Zn ferrite and surface magnons in thin films. Central to the research was the development of a high contrast, high resolution multipass tandem Fabry-Perot interferometer. The 4-plus-2 system has a contrast in excess of 10 to the 12th power and a background dark count below 1/3 count/second. GRA

N86-27071# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
FIELD-SEQUENTIAL COLOR STEREOSCOPY WITH LIQUID CRYSTAL SPECTACLES
P. Milgram and R. vanderHorst 8 Jun. 1984 9 p Presented at 4th International Display Research Conference (Eurodisplay) '84), Paris, France, 18-20 Sep. 1984
(NLR-MP-84081-U; B8577051; ESA-86-96971) Avail: NTIS HC A02/MF A01

A field-sequential stereoscopic display using the phase change effect with cholesteric liquid crystals is presented. Advantages, especially with respect to PLZT shutters, include minimal reduction in image brightness, full color, and reduced visual fatigue. ESA

N86-26804# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
FLIR, NVG AND HMS/D SYSTEMS FOR HELICOPTER OPERATION: REVIEW
H.-D. V. Boehm *In* AGARD Visual Protection and Enhancement Dec. 1985 27 p refs (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26808# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
NIGHT VISION SUPPORT DEVICES: HUMAN ENGINEERING INTEGRATION
Louis V. Genco *In* AGARD Visual Protection and Enhancement Dec. 1985 8 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26811# Marconi Avionics Ltd., Rochester (England). Airborne Display Div.
NIGHT VISION BY NVG WITH FLIR
G. C. Bull *In* AGARD Visual Protection and Enhancement Dec. 1985 7 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26820# WWDBw ABC-Schutz, Munster (West Germany).
GERMAN DEVELOPMENT OF A LC-FLASHBLINDNESS DEVICE
W. Rehmann and H. Sesterhenn *In* AGARD Visual Protection and Enhancement Dec. 1985 6 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

N86-26824# British Aerospace Public Ltd. Co., Kingston-upon-Thames (England). Systems Engineering Dept.
VISUAL DIFFICULTIES ASSOCIATED WITH FUTURE WINDSCREEN AND HUD INTEGRATION
A. J. Hulme and K. F. Shrubb *In* AGARD Visual Protection and Enhancement Dec. 1985 9 p (For primary document see N86-26802 17-52)
Avail: NTIS HC A11/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-27072# Lawrence Livermore National Lab., Calif.
PLASMA PHYSICS MODELING AND THE CRAY-2 MULTIPROCESSOR
J. Killeen 1985 12 p refs Presented at the 7th International Conference on Computing Methods in Applied Sciences and Engineering, Versailles, France, 9-13 Dec. 1985 Submitted for publication
(Contract W-7405-eng-48)
(DE86-004239; UCRL-93699; CONF-851251-1) Avail: NTIS HC A02/MF A01

The importance of computer modeling in the magnetic fusion energy research program is discussed. The need for the most advanced supercomputers is described. To meet the demand for more powerful scientific computers to solve larger and more complicated problems, the computer industry is developing multiprocessors. The role of the Cray-2 in plasma physics modeling is discussed with some examples. DOE

N86-27073# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
NON-THERMAL ELECTRON VELOCITY DISTRIBUTION MEASURED BY ELECTRON CYCLOTRON EMISSION IN ALCATOR C TOKAMAK
K. Kato and I. H. Hutchinson Oct. 1985 15 p refs
(Contract DE-AC02-78ET-51013)
(DE86-004402; PFC/JA-85-37) Avail: NTIS HC A02/MF A01

The non-thermal electron velocity distribution of lower hybrid RF heated plasmas in the Alcator C tokamak is deduced from measurements of electron cyclotron emission using a specialized vertical viewing optics arrangement. At a density of anti n(sub e) = 0.7 × 10 to the 29th power/cu m, the reconstructed

distribution function in the range 50keV less than or equal to E less than or equal to 230keV shows enhancement in the parallel direction with a perpendicular spread equivalent to T(sub perpendicular) approx. = 30keV. The line average energetic electron density in this energy range is approximately 7 x 10 to the 15th power/cu m during the RF. DOE

N86-27074# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ELECTRON BERNSTEIN WAVE CURRENT DRIVE IN THE START-UP PHASE OF A TOKAMAK DISCHARGE
A. Montes and G. O. Ludwig 2 Jul. 1986 20 p Submitted for publication
(INPE-3868-PRE/926) Avail: NTIS HC A02/MF A01

Current drive by electron Bernstein waves in the start-up phase of tokamak discharges is studied. A general analytical expression is derived for the figure of merit J/P sub d associated with these waves. This is coupled with a ray tracing code, allowing the calculation of the total current generated per unit incident power in realistic tokamak conditions. The results show that electron Bernstein waves can drive substantial currents even at very low electron temperature. Author

N86-27075*# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
IN SITU MEASUREMENTS OF THE PLASMA BULK VELOCITY NEAR THE IO FLUX TUBE
Alan Barnett Oct. 1985 43 p refs Sponsored by JPL, Pasadena, Calif.
(NASA-CR-176810; NAS 1.26:176810; CSR-P-85-6) Avail: NTIS HC A03/MF A01 CSCL 20I

The flow around the Io flux tube was studied by analyzing the eleven spectra taken by the Voyager 1 Plasma Science (PLS) experiment in its vicinity. The bulk plasma parameters were determined using a procedure that uses the full response function of the instrument and the data in all four PLS sensors. The mass density of the plasma in the vicinity of Io is found to be 22,500 + or - 2,500 amu/cu cm and its electron density is found to be 1500 + or - 200/cu cm. The Alfven speed was determined using three independent methods; the values obtained are consistent and taken together yield V sub A = 300 + or - 50 km/sec, corresponding to an Alfven Mach number of 0.19 + or - 0.02. For the flow pattern, good agreement was found with the model of Neubauer (1980), and it was concluded that the plasma flows around the flux tube with a pattern similar to the flow of an incompressible fluid around a long cylinder obstacle of radius 1.26 + or - 0.1 R sub Io. Author

N86-27076*# Massachusetts Inst. of Tech., Cambridge.
THE RESPONSE FUNCTION OF MODULATED GRID FARADAY CUP PLASMA INSTRUMENTS
Alan Barnett and Stanislaw Olbert 1986 37 p refs Submitted for publication
(Grant NsG-22-009-015)
(NASA-CR-177312; NAS 1.26:177312; CSR-P-85-5) Avail: NTIS HC A03/MF A01 CSCL 20I

Modulated grid Faraday cup plasma analyzers are a very useful tool for making in situ measurements of space plasmas. One of their great attributes is that their simplicity permits their angular response function to be calculated theoretically. An expression is derived for this response function by computing the trajectories of the charged particles inside the cup. The Voyager Plasma Science (PLS) experiment is used as a specific example. Two approximations to the rigorous response function useful for data analysis are discussed. The theoretical formulas were tested by multi-sensor analysis of solar wind data. The tests indicate that the formulas represent the true cup response function for all angles of incidence with a maximum error of only a few percent. Author

N86-27077# Naval Research Lab., Washington, D. C.
HIGH POWER MICROWAVE PLASMA PULSE COMPRESSION
Memorandum Report, Oct. 1984 - Oct. 1985
W. M. Manheimer and B. H. Ripin 31 Dec. 1985 35 p
(AD-A163298; NRL-MR-5589) Avail: NTIS HC A03/MF A01 CSCL 20/14

It is shown that a plasma loaded waveguide is sufficiently dispersive that very high power microwave pulse compression is possible. The input microwave pulse can be either chirped or fixed frequency, if the waveguide plasma parameters are steady or variable in time respectively. GRA

N86-27078# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
WHISTLER-MODE RADIATION FROM THE SPACELAB 2 ELECTRON BEAM Progress Report
D. A. Gurnett, W. S. Kurth, J. T. Steinberg, P. M. Banks, and R. I. Bush 27 Nov. 1985 23 p
(Contract N00014-85-K-0404)
(AD-A163367; U-Of-Iowa-85-19) Avail: NTIS HC A02/MF A01 CSCL 22/1

During the Spacelab 2 mission the Plasma Diagnostics Package (PDP) performed a fly-around of the shuttle at distances of up to 300 meters while an electron beam was being ejected from the shuttle. This paper discusses a magnetic conjunction of the shuttle and the PDP while the electron gun was operating in a steady (DC) mode. During this conjunction the PDP detected a very clear funnel-shaped emission that is believed to be caused by whistler-mode emission from the beam. Ray path calculations show that the shape of the funnel can be accounted for by whistler-mode waves propagating near the resonance cone. Since the beam and waves are propagating in the same direction, the radiation must be produced by a Landau, omega(k parallel) = V sub b, interaction with the beam. Other types of waves generated by the beam are also described. GRA

N86-27079# Lawrence Livermore National Lab., Calif.
MONTE CARLO PARTICLE SIMULATION AND FINITE-ELEMENT TECHNIQUES FOR TANDEM MIRROR TRANSPORT
T. D. Rognlien, B. I. Cohen, Y. Matsuda, and J. J. Stewart, Jr. Dec. 1985 10 p Presented at the US-Japan Workshop on Advanced Plasma Modeling, Nagoya, Japan, 24 Sep. 1985
(Contract W-7405-eng-48)
(DE86-004238; UCRL-93686; CONF-8509216-1) Avail: NTIS HC A02/MF A01

A description is given of numerical methods used in the study of axial transport in tandem mirrors owing to Coulomb collisions and RF diffusion. The methods are Monte Carlo particle simulations and direct solution to the Fokker-Planck equations by finite-element expansion. DOE

N86-27080# Oak Ridge National Lab., Tenn.
FEATURES OF SPHERICAL TORUS PLASMAS
Y. K. M. Peng and D. J. Strickler Dec. 1985 32 p
(Contract DE-AC05-84OR-21400)
(DE86-004642; ORNL/FEDC-85/6) Avail: NTIS HC A03/MF A01

The spherical torus is a very small aspect ratio (A less than 2) confinement concept obtained by retaining only the indispensable components inboard to the plasma torus. MHD equilibrium calculations show that spherical torus plasmas with safety factor q greater than 2 are characterized by high toroidal beta ((BETA)/sub t/ greater than 0.2), low poloidal beta ((BETA)/sub p/ less than 0.3), naturally large elongation (kappa greater than or equal to 2), large plasma current with I/sub p//(aB/sub t0/) up to about 7 MA/mT, strong paramagnetism (B/sub t//B/sub t0/ greater than 1.5), and strong plasma helicity (F comparable to THETA). A large near-omnigeneous region is seen at the large-major-radius, bad-curvature region of the plasma in comparison with the conventional tokamaks. These features combine to engender the spherical torus plasma in a unique physics regime which permits compact fusion at low field and modest cost. Because of its strong paramagnetism and helicity, the spherical torus plasma shares some of the desirable features of spheromak and reversed-field pinch (RFP) plasmas, but with tokamak-like confinement and safety factor q. The general class of spherical tori, which includes the spherical tokamak (q greater than 1), the spherical pinch (1 greater

than q greater than O), and the spherical RFP (q less than O), have magnetic field configurations unique in comparison with conventional tokamaks and RFPs. DOE

N86-27081# Oak Ridge National Lab., Tenn.
HIGHLIGHTS FROM THE ASSEMBLY OF THE HELICAL FIELD COILS FOR THE ADVANCED TOROIDAL FACILITY
R. D. Benson 1985 4 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-004758; CONF-851102-59) Avail: NTIS HC A02/MF A01

The helical field (HF) coils in the Advanced Toroidal Facility (ATF) device consist of a set of 24 identical segments connected to form a continuous pair of helical coils wrapped around a toroidal vacuum vessel. Each segment weighs approximately 1364 kg (3000 lb) and is composed of 14 water-cooled copper plate conductors bolted to a cast stainless steel structural support member with a T-shape cross section (known as the structural tee). The segment components are electrically insulated with Kapton adhesive tape, G-10, Tefzel, and rubber to withstand 2.5 kV. As a final insulator and structural support, the entire segment is vacuum impregnated with epoxy. This paper offers a brief overview of the processes used to assemble the component parts into a completed segment, including identification of items that required special attention. DOE

N86-27082# Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
ADVANCED TOROIDAL FACILITY
R. L. Johnson 1985 4 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-004805; CONF-851102-57) Avail: NTIS HC A02/MF A01

The Advanced Toroidal Facility (ATF) is a new magnetic confinement plasma device under construction at the Oak Ridge National Laboratory (ORNL) that will lead to improvements in toroidal magnetic fusion reactors. The ATF is a type of stellerator, known as a torsatron, which theoretically has the capability to operate at greater than or equal to 8% beta in steady state. The ATF plasma has a major radius of 2.1 m, an average minor radius of 0.3 m, and a field of 2 T for a 2 s duration or 1 T steady state. The ATF device consists of a helical field (HF) coil set, a set of poloidal field (PF) coils, an exterior shell structure to support the coils, and a thin, helically contoured vacuum vessel inside the coils. The ATF replaces the Impurities Studies Experiment (ISX-B) tokamak at ORNL and will use the ISX-B auxiliary systems including 4 MW of electron cyclotron heating. The ATF is scheduled to start operation in late 1986. An overview of the ATF device is presented, including details of the construction process envisioned. DOE

N86-27083# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
[ACTIVITIES REPORT OF THE INSTITUTE OF PLASMA RESEARCH] Annual Report, 1984
1984 24 p
(ESA-86-96920) Avail: NTIS HC A02/MF A01

Research concerning electron cyclotron heating; plasma theory (stochastic effects, numerical plasma simulation); laser diagnostics; and plasma focus is summarized. ESA

N86-27084# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
BIFURCATION, INTERMITTANCY AND CHAOS IN A DRIVEN THREE WAVE SYSTEM
E. Raeuchle Dec. 1984 30 p
(IPF-84-11; ESA-86-96921) Avail: NTIS HC A03/MF A01

A dissipative system consisting of three waves in which one wave is excited additionally from outside is considered. The amplitude of the external wave is modulated in time. This model can be considered as a general element of turbulence theory. It corresponds formally to a driven dissipative nonlinear oscillator, where subharmonics and chaos are observed, e.g., for the Duffing equation and the Helmholtz equation. For the system investigated, all these nonlinear phenomena appear similarly. The solutions of this system are characterized by bifurcations, intermittency and chaos. ESA

N86-27085# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
ASSESSMENT OF THE POSSIBLE USE OF THE KE 1 THOMSON SCATTERING COLLECTION OPTICS FOR AN ADDITIONAL LIDAR SYSTEM
K. Hirsch and H. Salzmann 10 Feb. 1985 67 p
(IPF-85-1; ESA-86-96922) Avail: NTIS HC A04/MF A01

The possibility of using parts of the KE 1 Thomson scattering system simultaneously for a lidar type backscattering plasma diagnostic is discussed. In the KE 1 system the laser beam is passed vertically through the plasma. The scattered light is collected by a large Newtonian mirror optics. This optics consists of a closely spaced array of seven mirrors collecting the scattered light through a corresponding array of windows. The modification consists in using the central window of the array as laser input window. If the lidar laser beam is reflected into the torus by a large mirror located on the backside of the small Newtonian mirror of the KE 1 system, the central mirror of the KE 1 collection system is screened. The modification produces a solid angle of collection for the unvignettedly observed plasma center 10 times larger than the unmodified lidar design. Wall material ablation, and vignetting along the spatial chord are possible. ESA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-27086# Sandia National Labs., Albuquerque, N. Mex.
ELECTRONIC TRANSPORT IN BORON CARBIDES
D. Emin 1985 22 p refs Presented at Conf.
(Contract DE-AC04-76DP-00789)
(DE86-003721; SAND-85-1340C; CONF-850786-8) Avail: NTIS HC A02/MF A01

The electronic transport of boron carbides, B/sub 1-x/C/sub x/ with 0.1 less than or equal to x less than or equal to 0.2, between 300 K and 1200 K is inconsistent with conventional models of both itinerant and hopping transport. While the thermally activated conductivities and the low weakly activated Hall mobilities suggest the hopping of a high density (approx. 10(21) cm(-3)) of small polarons, the spin densities are orders of magnitude smaller than this. Furthermore, the p-type Seebeck coefficients are both large (>100 (MU)V/K) and strongly increasing functions of temperature, rather than being small and weakly temperature dependent as expected of degenerate semiconductors. Finally, unlike standard hopping systems, the electrical conductivity decreases with applied pressure. This is due to a pressure dependent increase of the conductivity activation energy. The anomalous thermoelectric, magnetic, and pressure-dependent transport properties are attributed to the charge carriers being hole-like small singlet bipolarons which hop between inequivalent B11C icosahedra. DOE

N86-27087# Virginia Univ., Charlottesville. Dept. of Physics.
SPECTROSCOPY OF SURFACE ADSORBED MOLECULES (SCANNING TUNNELING MICROSCOPY) Progress Report, 1 May 1985 - 30 Apr. 1986
R. V. Coleman 1986 64 p refs
(Contract DE-FG05-84ER-45072)
(DE86-004508; DOE/ER-45072/18) Avail: NTIS HC A04/MF A01

A review of the scanning tunneling microscopy program is given. This article contains a description of the design and

fabrication of the microscope in addition to description of studies which use the microscope: studies of charge-density waves and studies of tunnel junctions doped with metals and semiconductors. DOE

N86-27088# Sandia National Labs., Albuquerque, N. Mex.
PRESSURE-DEPENDENT MAGNETO-OPTIC MEASUREMENTS IN STRAINED-LAYER SUPERLATTICES AT LOW TEMPERATURES
E. D. Jones, J. E. Schirber, I. J. Fritz, P. L. Gourley, R. M. Biefeld, L. R. Dawson, and T. J. Drummond 1985 6 p Presented at the Materials Research Society Meeting
(Contract DE-AC04-76DP-00789)
(DE86-004604; SAND-85-1425C; CONF-851217-20) Avail: NTIS HC A02/MF A01

Magneto-optic studies on InGaAs/GaAs and GaAs/GaPAs strained-layer superlattices are used to determine the in-plane light-hole valence-band effective masses. Also, hydrostatic pressure-dependent magneto-optic studies have been performed on these samples for magnetic fields up to 65 kG and pressures to 4 kbar in the temperature range of 1.6 to 4 K. The experimental pressure coefficients of the band-gap energy and the effective mass in the InGaAs/GaAs SLS structures were determined. DOE

N86-27089# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
FOCUSED ION BEAM FABRICATION OF GRADED CHANNEL FET'S IN GaAs AND Si Semiannual Technical Report, 1 Jul. - 31 Dec. 1985
John Melngailis 27 Jan. 1986 7 p refs
(Contract MDA903-85-C-0215)
(AD-A163475) Avail: NTIS HC A02/MF A01 CSCL 20/12

The aim of this program is to fabricate field effect transistors in Si and GaAs in which the doping in the channel is varied as a function of distance from source to drain. The focused ion beam machine is a unique tool which is capable of producing such graded implants. In achieving this goal alignment procedures of the focused ion beam to existing features on the wafer have to developed, and the focused ion beam implants must be characterized and compared to conventional implants. In addition, models of the behavior of the graded channel devices must be developed. GRA

N86-27090# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
HILLOCK FORMATION ON (100) GaAs
S. I. Boldish and P. M. Adams 27 Nov. 1985 19 p
(Contract F04701-85-C-0086)
(AD-A163308; TR-0086(6925-01)-1; SD-TR-85-81) Avail: NTIS HC A02/MF A01 CSCL 20/12

For application to the growth of gallium arsenide (GaAs) by metal-organic chemical vapor deposition, the dependence of surface morphology and hillock formation on crystal orientation, AsH3/TMG ratio, and oxide contamination was investigated. Layers of GaAs were deposited on undoped liquid-encapsulated Czochralski (LEC) GaAs substrates oriented either (100) or (100)+ 2 deg yields <110>. Substrate orientation was checked by Laue X-ray diffraction. Surface features were observed by phase contrast optical microscopy and surface profilometry. To examine the relationship of hillock formation to oxide contamination, GaAs substrate surfaces were exposed to water vapor prior to epitaxial growth. GRA

N86-27091# Minnesota Univ., Minneapolis. Dept. of Chemical Engineering and Materials Science.
EXPERIMENTAL DETERMINATION OF THE ELECTRONIC STRUCTURE OF SMALL METAL PARTICLES Interim Report
C. Caprile, A. Franciosi, D. Wielickza, and C. G. Olson 31 Dec. 1985 10 p
(Contract N00014-84-K-0545)
(AD-A163406; IR-6) Avail: NTIS HC A02/MF A01 CSCL 20/12

Low electronegativity metals such as Sm, Cs, and Na have been examined in the search for metal with strong catalytic activity in promoting the oxidation of semiconductor surfaces. A preliminary study shows that Sm overlayers appear to yield the maximum oxidation promotion observed to date on the Si(111) surface. The Sm chemisorption process, following a peculiar two-step sequence on Si(111) and GaAs (110) surfaces, is examined. At submonolayer metal coverage Sm atoms are in a mostly divalent state. At higher metal coverages trivalent Sm species dominate.At least in the case of Si the oxidation promotion effect appears related to the appearance of the trivalent state. This complex chemisorption process is still far from being completely understood. In this paper we present a simple experimental technique to study the electronic structure of metals in cluster or thin film form on ideally inert substrates. We apply this technique to Sm and we make systematic comparisons of the results for Sm chemisorption onto semiconductor surfaces and Sm adsorption onto inert substrates (solid Xe). In this first preliminary paper we give a very brief summary of the experimental technique and present selected results on cluster-size induced valence transition and on size-dependent metal screening during Sm adsorption on Xe. GRA

N86-27092# Harry Diamond Labs., Adelphi, Md.
CLASSICAL DERIVATION OF NONLINEAR SUSCEPTIBILITIES FOR THE 32 CRYSTAL CLASSES IN THE HARMONIC OSCILLATOR APPROXIMATION
Clyde A. Morrison and Mary S. Tobin Jan. 1986 85 p refs
(AD-A164536; HDL-TR-2078) Avail: NTIS HC A05/MF A01 CSCL 20/2

New applications relating to optical information processing, optical limiting, and frequency-agile laser systems have produced a resurgence of interest in nonlinear optical materials. In this work, we extend the classical anharmonic analysis to describe the nonlinear optical properties of the 32 crystal classes. We derive expressions for and relationships between the nonlinear susceptibility tensor elements in terms of the anharmonic force constants according to the crystal class symmetry. We show that all the susceptibilities thus derived (Chi (1), Chi (2), and Chi (3)) obey the Kleinman conditions. Finally, we discuss the possible application of these results, coupled with a point-charge model, for estimating the nonlinear force constants, in the prediction of potential new nonlinear materials. GRA

N86-27093# Minnesota Univ., Minneapolis.
MICROSCOPIC CONTROL OF SEMICONDUCTOR INTERFACE REACTIVITY Annual Report, 1 Aug. 1984 - 31 Jul. 1985
A. Franciosi 10 Jan. 1986 67 p refs
(Contract N00014-84-K-0545)
(AD-A164560; AR-7) Avail: NTIS HC A04/MF A01 CSCL 07/4

In recent years a number of metal overlayers on silicon have been shown to yield an increase in silicon oxidation rate when the surface is exposed to an oxidizing atmosphere. Metals as diverse as Au, AG, Cu, Pd all give rise to promotion effects, with the production of Si-oxide phases of variable stoichiometry. In the case of Au and Cr, the Si-oxide appears to nucleate on top of the metal overlayer. To the extent that the metal atoms increase the surface reaction kinetics and do not appear directly involved in the reaction product, i.e., the surface silicon oxide, they play the role of a catalyst. Since the magnitude of the effect depends on the overlayer-silicon interface morphology, in the absence of a more precise denomination we refer to such phenomena as interface catalytic effects. The main goal of our program is to investigate the microscopic mechanisms which determine these effects, characterize the electronic and structural modifications that accompany the surface reactions, determine the stoichiometry of the reaction products and/or the interface composition profile, and ultimately obtain and enhanced control of the kinetics of surface reactions with gaseous species and metals. Long term practical aplications include the synthesis of new insulating and metallic epitaxial layers on Si and GaAs and enhanced control of interdiffusion and contact stability. GRA

N86-27094# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
STABILITY AND PROPERTIES OF COMPOSITIONALLY MODU-

LATED FILMS Interim Report
R. C. Cammarata, S. M. Prokes, and F. Spaepen Nov. 1985 31 p refs
(Contract N00014-85-K-0023)
(AD-A164574; TR-28) Avail: NTIS HC A03/MF A01 CSCL 20/12

The thermodynamics and kinetics governing the stability of compositionally modulated materials are reviewed. Typical results of experiments on fcc and amorphous metals are presented to demonstrate the effects of interdiffusion. Two coarsening mechanisms are analyzed, as is the stability of orthogonal waves in phase separating systems. The interdiffusivity between amorphous Si and Ge in the temperature range 550 to 630 K is 1.07x10 to the minus 10th power exp(-1.6 ev/kT)m2 1/s, for a modulation wavelength of 5.83 nm. No crystallization occurred during the anneals. The theories for the enhancement of the elastic modulus in crystalline compositionally modulated films are reviewed. Both the Fermi sphere-Brillouin zone interaction model and the coherency stress model are found to be inadequate and insufficiently developed. Author (GRA)

N86-27095# Rutgers - The State Univ., Piscataway, N. J. Dept. of Mechanics and Materials Science.
FIELD INDUCED DIPOLE REORIENTATION AND PIEZOELECTRICITY IN HEAVILY PLASTICIZED NYLON 11 FILMS
J. I. Scheinbeim, S. C. Mathur, and B. A. Newman 6 Jan. 1986 27 p refs
(Contract N00014-80-C-0795)
(AD-A164683; TR-6) Avail: NTIS HC A03/MF A01 CSCL 09/3

Nylon 11 films with very low initial crystallinity were made by dissolving the nylon 11 in 2-Ethyl 1,3 Hexanedoil at 150 C. Films were cast from the solution and excessive plasticizer was removed in a vacuum oven. Films were then melt-pressed and quenched to yield heavily plasticized nylon 11 films containing 30% by weight of the plasticizer. These films were poled under vacuum to allow the plasticizer to evaporate in the presence of an electric field. A high piezoelectric response was observed for the films subjected to the maximum electric field while the sample contained a large fraction of plasticizer. Significant development of crystallinity was observed without apparent indication of orientation of the crystallites. These studies suggest that the observed piezoelectric response originates primarily from oriented hydrogen bonds in the amorphous regions of nylon 11. GRA

N86-27096# Columbia Univ., New York. School of Mines.
ELECTRICAL MEASUREMENTS ON ALPHA-QUARTZ CRYSTALS Final Technical Report, Nov. 1981 - Dec. 1984
A. S. Nowick Dec. 1985 53 p
(Contract F19628-82-K-0013)
(AD-A164793; RADC-TR-85-174) Avail: NTIS HC A04/MF A01 CSCL 20/2

This study was aimed at achieving a better understanding of the defects in alpha-quartz crystals that affect their frequency stability. The principal techniques used were electrical conductivity and dielectric loss measurements, both of which are largely controlled by alkalis present to compensate for substitutional Al(3+). In order to deal with just one alkali species at a time, samples studied were swept with either Li+ or Na+. The results involve considerable information about Al-Na and Al-Li bound pairs in the crystal, about alkalis freed from these pairs that give rise to the conductivity, and about the defects (which include electrons and holes) produced by X-ray irradiation of these crystals. The Al-Na pairs can exist in two configurations (alpha and beta) with the Sodium on opposite sides of the AlO4 tetrahedron, off the C2 symmetry axis. In Aluminum-Lithium, however, the Li(+) sits on the C2 axis. The alkalis freed at high temperature give rise to the conductivity and involve a higher activation energy for Li+ and for Na+. Finally, upon irradiation, liberated alkalis form new centers which produce a striking low-temperature dielectric loss peak. The use of computer simulation calculations has also been shown to be a helpful adjunct to the electrical measurements. GRA

N86-27097# Rome Air Development Center, Griffiss AFB, N.Y.
THE EFFECTS OF ARSINE PRESSURE ON THE COMPOSITIONS, CARRIER CONCENTRATIONS, MOBILITIES AND GROWTH RATES OF EPITAXIAL LAYERS OF Ga(x)In(1-x)As PREPARED BY THE VPE (VAPOR-PHASE EPITAXY)-HYDRIDE TECHNIQUE
David W. Weyburne and Kenneth P. Quinlan Nov. 1985 20 p
(AD-A165278; RADC-TR-85-238) Avail: NTIS HC A02/MF A01 CSCL 20/12

The effect of three arsine partial pressure on the preparation of the ternary, Ga(x)In(1-x)As, was investigated. Operational parameters are given for the preparation of Ga(0.47)In(0.53)As at these pressures. Increased arsine partial pressures decreased the gallium composition of the ternary. Growth rates have been determined as a function of gallium monochloride and arsine partial pressures. Increased mole fractions of arsine do not lower carrier concentrations or increase mobilities of the Ga(x)In(1-x)As layers. GRA

N86-27098# Scientific Research Associates, Inc., Glastonbury, Conn.
TRANSIENT TRANSPORT IN BINARY AND TERNARY SEMICONDUCTORS Final Report, 27 Sep. 1982 - 26 Sep. 1985
H. L. Grubin, J. P. Kreskovsky, M. Meyyappan, and B. J. Morrison 27 Feb. 1986 62 p
(Contract DAAG29-82-C-0023)
(AD-A165464; SRA-R930009-F; ARO-18480.5-EL) Avail: NTIS HC A04/MF A01 CSCL 20/12

A description of recent studies of two and three terminal band structure dependent compound semiconductors is given. GRA

N86-27099# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
SOLID-PHASE EQUILIBRIA IN THE Au-Ga-Sb, Au-In-As, AND Au-In-Sb TERNARIES
C. T. Tsai and R. S. Williams 28 Feb. 1986 36 p Prepared for publication
(Contract N00014-83-K-0612)
(AD-A165469; TR-12) Avail: NTIS HC A03/MF A01 CSCL 20/12

The Au-Ga-As, Au-Ga-Sb, Au-In-As, and Au-In-Sb ternaries were surveyed using X-ray powder diffraction to determine which metallic phases exist at equilibrium with the III-V compound semiconductors. In closed, small-volume systems (i.e., formation of gas-phase products was prevented), Au does not react with GaAs but does react with the other III-V's investigated to produce Au-Group III intermetallic compounds and another solid phase containing the group V element. However, each semiconductor formed pseudobinary systems with at least two different intermetallic compounds. The bulk phase diagrams determined in this study provide frameworks within which much of the experimental data in the literature concerning the products of reactions at Au/III-V interfaces can be understood. GRA

N86-27100# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
ENTROPY-DRIVEN LOSS OF GAS-PHASE GROUP 5 SPECIES FROM GOLD/3-5 COMPOUND SEMICONDUCTOR SYSTEMS
John H. Pugh and R. Stanley Williams Feb. 1986 36 p
(Contract N00014-83-K-0612)
(AD-A165584; TR-11) Avail: NTIS HC A03/MF A01 CSCL 07/2

Temperature dependent chemical interactions between Au and nine 3-5 compound semiconductors (3=A1, Ga, In and V=P, As, Sb) have been calculated using bulk thermodynamic properties. Enthalpic considerations alone are insufficient to predict metal/compound-semiconductor reactivities. The entropy of vaporization of the group 5 elements is shown to be an extremely important driving force for chemical reactions involving the 3-5's, since it enables several endothermic reactions to occur spontaneously under certain temperature and pressure conditions. Plots of either Gibb's free energies of reaction or equilibrium vapor pressure of the group 5 element versus temperature are used to

predict critical reaction temperatures for each of the systems studied. These plots agree extremely well with previous experimental observations of thin film reactions of Au on GaAs. GRA

N86-27101# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
AMORPHIZATION AND RECRYSTALLIZATION PROCESSES IN MONOCRYSTALLINE BETA SILICON CARBIDE THIN FILMS
J. A. Edmond, S. P. Withrow, H. S. Kong, and R. F. Davis 1985 14 p Presented at the Materials Research Society Meeting Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-004797; CONF-851217-15) Avail: NTIS HC A02/MF A01

Individual, as well as multiple doses of (27)Al(+), (31)P(+), (28)Si(+), and (28)Si(+) and (12)C(+), were implanted into (100) oriented monocrystalline (BETA)-SiC films. The critical energy of approx. =16 eV/atom required for the amorphization of (BETA)-SiC via implantation of (27)Al(+) and (31)P(+) was determined using the TRIM84 computer program for calculation of the damage-energy profiles coupled with the results of RBS/ion channeling analyses. In order to recrystallize amorphized layers created by the individual implantation of all four ion species, thermal annealing at 1600, 1700, or 1800 C was employed. Characterization of the recrystallized layers was performed using XTEM. Examples of SPE regrown layers containing precipitates and dislocation loops, highly faulted-microtwinned regions, and random crystallites were observed. DOE

N86-27102# Sandia National Labs., Albuquerque, N. Mex.
OPTICAL IMAGING OF DISLOCATIONS IN STRAINED-LAYER SUPERLATTICES AND LATTICE-MISMATCHED EPILAYERS
P. L. Gourley, R. M. Biefeld, and L. R. Dawson 1985 6 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-004620; SAND-85-2664C; CONF-851217-16) Avail: NTIS HC A02/MF A01

We have developed a convenient photoluminescence micro-imaging technique to probe misfit dislocations in epitaxially grown semiconductor alloys and multilayers. Using this technique, we have examined the microscopic optical quality of thick (approx.1 (MU)m) III-V semiconductor epitaxial layers, mismatched to their substrates. The layers include several kinds of [100] strained-layer superlattices (GaP/GaAs/sub x/P/sub 1-x/ on GaP and GaAs/GaAs/sub 1-x/P on GaAs grown by MOCVD, AND GaAs/In/sub x/Ga/sub 1-x/As on GaAs grown by MBE) and associated alloys. For each type of superlattice, we have studied a large number of samples corresponding to different compositions and layer thicknesses. The results show that misfit dislocations can be completely eliminated in the uppermost layers of the strained-layer superlattices if these structures have thin layers, less than the critical thickness for elastic accommodation, and sufficient numbers of interfaces to block threading dislocations. DOE

N86-27103# Supercon, Inc., Shrewsbury, Mass.
DEVELOPMENT OF HIGH FIELD SUPERCONDUCTORS FOR FUSION ENERGY APPLICATIONS Progress Report, 1 Aug. 1984 - 15 Jan. 1985
1985 5 p
(Contract DE-AC01-80ER-52068)
(DE86-004834; DOE/ER-52068/T10) Avail: NTIS HC A02/MF A01

Fabrication and testing of superconducting materials is discussed. Fabrication of the X-type internal bronze material to 0.016 in. (0.406 mm) diameter yields 720 A/mm(2) in the non-copper at 10 T and 4.2 K and a sensitivity of 1.5 (MJ)V/cm). Plans for the preparation of the MIT test coil are reported. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-27104# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THEORY OF THE REACTION SURFACE WITH FREEZING LEWIS NUMBER NOT EQUAL TO 1 AND ITS APPLICATION IN THE OXIDATION-SUBLIMATION COUPLING PROCESS
Jiakang Zhong 13 Dec. 1985 17 p Transl. into ENGLISH from Lixue Xuebao (China), v. 16, no. 1, Jan. 1984 p 27-35
(AD-A163213; FTD-ID(RS)T-0633-85) Avail: NTIS HC A02/MF A01 CSCL 20/13

A theoretical analysis of the reaction surface of a locally similar laminar boundary layer with addition of mass and chemical reaction is presented. Heat transfer and mass transfer correlations under the condition freezing Lewis Number not equal to 1 are derived. As an application of the theory of the reaction surface, the oxidation sublimation coupling process on the surface material is investigated. The transition mechanism and transformation condition of the oxidation and sublimation processes from rate-controlled to diffusion-controlled regimes are described. The phenomenon that the rate-sublimation is involved in diffusion-controlled oxidation regime is shown. Comparisons with the experimental data are made for the case of graphite stagnation ablation, and quantitative agreement is found. GRA

N86-27105# Texas Univ. at Dallas, Richardson. Center for Quantum Electronics.
THE DEMONSTRATION OF THE FEASIBILITY OF THE TUNING AND STIMULATION OF NUCLEAR RADIATION Annual Summary Report, 1 Jan. - 31 Dec. 1985
Carl B. Collins 31 Jan. 1986 43 p
(Contract N00014-81-K-0653)
(AD-A164530) Avail: NTIS HC A03/MF A01 CSCL 20/8

This project concerns the demonstration of the feasibility of the tuning and perhaps even stimulation of nuclear radiation. Theory has indicated that anti-Stokes Raman upconversion of intense but conventional long wavelength sources of radiation produced by scattering from isomeric states of nuclear excitation could lead to significant sources of tunable gamma-radiation characterized by the natural Mossbauer widths of the lines. This would result in lines with sub-Angstrom wavelengths and widths of a few MHz. Whether or not these processes can reach threshold depends upon the resolution of basic issues lying in an interdisciplinary region between quantum electronics and nuclear physics that have not been previously addressed. It was the purpose of this work to study these issues experimentally. GRA

N86-27106# Boston Univ., Mass. Dept. of Physics.
FIELD THEORETIC INVESTIGATIONS ON PARTICLE PHYSICS AND COSMOLOGY Annual Technical Progress Report
S. Y. Pi 1985 13 p
(Contract DE-AC02-83ER-40118)
(DE86-004516; DOE/ER-40118/1) Avail: NTIS HC A02/MF A01

Topics covered include bridging particle physics and cosmology, superconducting universe, inflationary universe, density fluctuations in the new inflationary universe, a realistic inflationary model, and the quantum mechanics of the scalar field in the new inflationary universe. DOE

N86-27107# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
ON THE QUANTIZATION OF NONCONTACT FIELD THEORIES IN MINKOWSKI SPACE
J. W. vanHolten Oct. 1985 14 p Revised report of RUU-CS-85-3
(NIKHEF-H/85-12; B8578199; ESA-86-97016) Avail: NTIS

HC A02/MF A01

The definition and regularizaton of Minkowski-space path integrals for field theories with noncompact field manifolds is examined. It is shown that a quantization procedure including constrained auxiliary field components in a positive definite Hilbert space necessarily requires nonstandard analytic continuation of Green's functions for these constrained fields. ESA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-27108* National Aeronautics and Space Administration, Washington, D.C.

MANAGEMENT: A BIBLIOGRAPHY FOR NASA MANAGERS

Apr. 1986 169 p

(NASA-SP-7500(20); NAS 1.21:7500(20)) Avail: NTIS HC A08 CSCL 05A

This bibliography lists 707 reports, articles and other documents introduced into the NASA scientific and technology information system in 1985. Items are selected and grouped according to their usefulness to the manager as manager. Citations are grouped into ten subject categories: human factors and personnel issues; management theory and techniques; industrial management and manufacturing; robotics and expert systems; computers and information management; research and development; economics, costs, and markets; logistics and operations management; reliability and quality control; and legality, legislation, and policy. Author

N86-27109# Los Alamos National Lab., N. Mex.

CREATIVITY IN SCIENCE - A SYMPOSIUM

M. R. Raju, ed., J. A. Phillips, ed., and F. Harlow, ed. Aug. 1985 143 p Presented at the Creativity in Science Symposium, Los Alamos, N. Mex., 13-14 Aug. 1984

(Contract W-7405-eng-36)

(DE86-003289; LA-10490-C; CONF-8408177) Avail: NTIS HC A07/MF A01

This conference proceeding is a collection of the talks and panel discussions for the symposium, Creativity in Science, held at Los Alamos National Laboratory August 13 and 14, 1984. Also included is a related colloquium and dialogue by J. Krishnamurti, which took place at Los Alamos National Laboratory on March 20 and 21, 1984. The symposium addressed issues concerning individual creativity and management for creativity. DOE

N86-27110# George Mason Univ., Fairfax, Va. Technology Transfer Study Center.

TECHNOLOGY TRANSFER AT DARPA: THE DEFENSE ADVANCED RESEARCH PROJECTS AGENCY. EXECUTIVE SUMMARY

Ronald G. Havelock and David S. Bushnell Dec. 1985 15 p refs

(Contract MDA903-84-K-0031; ARPA Order 5156)

(AD-A164503) Avail: NTIS HC A02/MF A01 CSCL 05/1

Five distinct transfer issues were uncovered, namely: (1) transfer within programs (intra-transfer); (2) transfer to military users (hand-off); (3) transfer to non-military users (spin-off); (4) undesired transfer or leakage (defined as the problem of knowledge containment); and (5) transfer into DARPA from other sources (in-transfer). Five specific recommendations are offered for early action to begin a more coherent and aggressive approach to transfer issues within the Agency. First, the Agency should immediately appoint a technology transfer facilitator to oversee the transition of developed technology to military use. Second, it should develop a state-of-the-art on-line retrieval system for tracking data on all projects and proposals. Third, it should develop a new system of program tracking to identify critical stages and outcomes, which we call transition analysis. Fourth, it should convene a panel on access to unclassified technical knowledge. Finally, it should establish an annual forum for the review of newly emerging technologies. A brief summary of each recommendation is given. GRA

N86-27111# Navy Personnel Research and Development Center, San Diego, Calif.

INDEPENDENT RESEARCH AND INDEPENDENT EXPLORATORY DEVELOPMENT FY 85 Annual Report, Oct. 1984 - Sep. 1985

Robert Penn and Alice Crawford Jan. 1986 63 p

(AD-A163432; NPRDC-SR-86-1) Avail: NTIS HC A04/MF A01 CSCL 05/1

This report provides summaries of FY85 Independent Research (IR) and Independent Exploratory Development (IED) efforts and the IR/IED funding profile, as well as IR/IED researchers' awards and honors for FY85 and presentations and publications based on IR/IED efforts. The following IR efforts are described: Models for calibrating multiple-choice items: Enhancing understanding of electric circuits: Cognitive and effective processing; Cognitive factors in learning and retention; Reward system design and performance; Relationships between management practices and organizational performance; Analysis of cognition in natural settings; and Expert systems for fault diagnosis. The following IED efforts are described: Multiple criterion optimization techniques; Interfaces for combat decision support; and Development of graphic design aids. GRA

N86-27112# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

CALENDAR OF SELECTED AERONAUTICAL AND SPACE MEETINGS DECEMBER 1985

Dec. 1985 146 p In ENGLISH and FRENCH

(AD-A164535; AGARD-CAL-85/2) Avail: NTIS HC A07/MF A01 CSCL 05/2

The purpose of this publication is to assist members of the Aeronautical and Space Community by: (1) informing them about many International Scientific and Technical Meetings scheduled; (2) avoiding the need for them to consult several sources in order to find out what meetings have been planned, their dates and locations. GRA

N86-27113# Colorado Univ., Boulder. Center for Research on Judgement and Policy.

A THEORETICALLY BASED REVIEW OF THEORY AND RESEARCH IN JUDGMENT AND DECISION MAKING

Kenneth R. Hammond Feb. 1986 96 p refs

(Contract N00014-81-C-0591)

(AD-A164914; CRJP-260) Avail: NTIS HC A05/MF A01 CSCL 05/10

Barriers to unification lie in the false dichotomy and rivalry between intuition and analysis, the arbitrary choice of task conditions, and the absence of a theory of successful intuition, as well as in current research practices. A theoretical framework is presented that is intended to overcome these barriers. The theory is anchored in task conditions, specifies the variety of cognitive properties they induce, and indicates subsequent behavior. GRA

N86-27114# Naval Postgraduate School, Monterey, Calif.

THE USE OF FORM, FIT, AND FUNCTION IN THE ACQUISITION OF MAJOR WEAPON SYSTEMS M.S. Thesis

Douglas M. Deets Dec. 1985 102 p refs

(AD-A165000) Avail: NTIS HC A06/MF A01 CSCL 15/5

This thesis was undertaken to analyze the use of Form, Fit, and Function as a second sourcing methodology for major weapon systems. The major objectives of the research were to

determine what the attributes of Form, Fit, and Function were and how it could best be successfully employed. The researcher found that the Form, Fit, and Function would most likely not be used for the reprocurement of entire weapon systems. The real potential of this methodology was in the procurement of components and subsystems. In this regard, it can be used successfully for simple or technically complex items, initial or follow-on buys, and as means of retrofitting existing equipments. Since there is no need to transfer technical data between sources as in the other second sourcing methodologies, Form, Fit, and Function can also be used when the transfer of technology is impossible, impractical or inappropriate. GRA

N86-27115# Naval Postgraduate School, Monterey, Calif.
AN APPLICATION OF COST RISK IN INCENTIVE CONTRACTS M.S. Thesis
Christopher M. McGrath Dec. 1985 96 p
(AD-A165177) Avail: NTIS HC A05/MF A01 CSCL 14/1

This thesis begins with an examination of the literature concerning incentive contract effectiveness and contractor motivation. Citing the most frequently supported conclusions, the researcher integrates these with a cost risk analysis methodology based upon the Beta distribution. The result is a share curve that automatically adjusts the share ratio based upon estimated cost variance. The researcher suggests that this approach is better at reflecting cost risk than the standard linear design. The share curve provides more risk sharing, especially at higher levels of cost variance, and provides both significant rewards and penalties only for significant deviations from target cost. The final conclusion is that the share curve mitigates the defense contractors' risk averse nature, thus allowing the profit motive to become operative in incentivizing the contractor to control or reduce costs. GRA

N86-27116# Bundesministerium fuer Wissenschaft und Forschung, Vienna (Austria).
REPORT OF THE WEST GERMANY FEDERAL GOVERNMENT ON RESEARCH Annual Report, 1984
1984 61 p
(ESA-86-96940) Avail: NTIS HC A04/MF A01

The West German research and technology policy is described. The freedom of science; technical progress and trends; and the promotion of research are discussed. ESA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-27117# Oak Ridge National Lab., Tenn.
QUALITY CONTROL IN RESEARCH DATA BASES: THE US ENVIRONMENTAL PROTECTION AGENCY NATIONAL SURFACE WATER SURVEY EXPERIENCE
P. Kanciruk, R. J. Olson, and R. A. McCord 1985 29 p Presented at the Research Data Management in the Ecological Sciences Symposium, Georgetown, S.C.
(Contract DE-AC05-84OR-21400)
(DE86-002249; CONF-8511112-1) Avail: NTIS HC A03/MF A01

The usefulness of a research data base is in part determined by the quality of the information it contains. The procedures involved in ensuring the production of a high quality data base are collectively termed quality assurance. To ensure that data are as accurate as possible, the research data base manager ideally should have the research and data management background to be involved from the point of project design, data verification and validation, through the documentation and dissemination of the final data. This ideal is not often realized. One exception, however, is Phase 1 of the US Environmental Protection Agency's National Surface Water Survey. Beginning in the fall of 1984, this 3-month field survey will sample 2100 lakes in the northeast, southeast, and upper midwest regions of the United States. Another 900 western lakes will be sampled in the fall of 1985. The survey uses helicopters to take water samples that are chemically analyzed at remote laboratories. The survey will synoptically define the extent of existing surface water acidification and the number of lakes potentially at risk because of acidic deposition. DOE

N86-27118# Defense Technical Information Center, Alexandria, Va.
PROCEEDINGS OF THE 1985 ANNUAL DTIC USERS CONFERENCE
Judith A. Pickeral, Compiler 1985 230 p Proceedings held in Alexandria, Va., 23-25 Oct., 1985
(AD-A166250; DTIC/TR-86/7) Avail: NTIS HC A11/MF A01 CSCL 05/2

The proceedings of the 1985 Annual DTIC Users Conference consist of transcriptions of presentations. The presentations include: status report, wrap-up, and question-and-answer sessions provided by DTIC's Directors and Program Managers; reports from the Defense RDT&E Online System (DROLS) User Council; R&D Planning Information Management initiatives; a review of DROLS Communications; a New User Orientation introducing relatively new users to DTIC's product and services; DROLS Workshops for Dedicated and Dial-up Terminals providing discussions on new system features, training tips, search problems, and questions; panel discussions on procedures and problems associated with the release of Limited Documents; an overview of four DTIC Intern Papers; sessions on How To Promote DTIC's Products and Services to Your User Community; an update on Corporate Planning at DTIC; policy and procedural aspects of Export Control; and the results of a study on Army Use of DTIC. Author

N86-27119# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
PIEZOMETER DATA BASE PACKAGE USER'S GUIDE Final Report
Earl V. Edris, Jr. and Wipawi Vanadit-Ellis Oct. 1985 163 p
(AD-A163264; WES/IR/GL-85-2) Avail: NTIS HC A08/MF A01 CSCL 05/2

A data base package for storage, retrieval, and display of piezometer data for geotechnical projects is described. Detailed instructions are given for using the package for monitoring piezometers, rapid retrieval of data, and display of piezometer locations, time history plots, and piezometer readings with embankment profiles. The package provides for easy, interactive data entry and editing with automatic data checks and error messages when data exceed user specified ranges. Data storage and retrieval are accomplished using the CE-owned SYSTEM 2000 Data Base Management System on the Corps-wide time-sharing service operated (1984) by Control Data Corporation. The data entry and retrieval programs developed for the package are designed for a low skill level and minimum training of personnel. Data entry can also be accomplished on CE District Harris computers. Author (GRA)

N86-27120# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
THE GEONAMES PROCESSING SYSTEM SYNOPSIS Final Report
Gail Langran Sep. 1985 34 p
(AD-A163366; NORDA-125) Avail: NTIS HC A03/MF A01 CSCL 14/3

The Defense Mapping Agency has recognized a need for digital procedures to store, retrieve, and edit geographic names data and to prepare names for product generation. DMA's stated goal is a 50 to 100 million name digital data base with subsystems to capture names, edit and format names data, and prepare names overlays for maps. NORDA began a geonames processing system design study late in FY82. This report summarizes NORDA's study findings. The four sections in Part One discuss geonames processing functions in turn: names data capture, data base management, editing and formatting, and map names processing.

Each subsystem is described, unresolved issues are highlighted, and recommendations are made. Part Two discusses concerns common to all four geonames processing subsystems. Section 5 defines interfaces between the subsystems. Section 6 weighs the technical possibilities for handling non-Roman alphabets and ideographs. Personnel and space requirements for a comprehensive names processing system are estimated in Section 7. Automated Alphanumeric Data Entry System (AADES); Geographic Names Data Base (GNDB); Advanced Symbol Processing (ASP); and Advanced Type Placement (ATP). GRA

N86-27121# Naval Postgraduate School, Monterey, Calif.
THE DESIGN AND ANALYSIS OF A NETWORK INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM M.S. Thesis
Clemon R. Wortherly Dec. 1985 127 p
(AD-A164756) Avail: NTIS HC A07/MF A01 CSCL 09/2

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specifications of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach affords the user the ability to access and manage a large collection of databases, via several data models and their corresponding data languages, without the aforementioned restriction. In this thesis, we present a methodology for supporting network (CODASYL) database management on the MLDS. Specifically, we design an interface which translates CODASYL-DML statements into ABDL requests. We describe the data structures, the control mechanisms, and the functions/procedures necessary to implement such a system. GRA

N86-27122# Naval Postgraduate School, Monterey, Calif.
RECENT NAVAL POSTGRADUATE SCHOOL PUBLICATIONS Summary Report, 1 Oct. 1983 - 30 Sep. 1984
Gilbert T. Howard 30 Sep. 1985 288 p
(AD-A164846; NPS-012-85-002PR) Avail: NTIS HC A13/MF A01 CSCL 05/2

This publication contains a listing for each faculty member from each department identifying conference presentations, contributions to books, published papers, and technical reports for the years 1981 to 1984. GRA

N86-27123# Naval Postgraduate School, Monterey, Calif.
THE IMPLEMENTATION OF A ENTITY-RELATIONSHIP INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM M.S. Thesis
Jacob A. Anthony, III and Alfred J. Billings Dec. 1985 156 p
(AD-A164858) Avail: NTIS HC A08/MF A01 CSCL 09/2

Traditionally, the design and implementation of a conventional database system begins with the choice of a data model followed by the specifications of a model-based data language. Thus, the database system is restricted to a single data model and a specific data language. An alternative to this traditional approach to database-system development is the multi-lingual database system (MLDS). This alternative approach enables the user to access and manage a large collection of databases via several data models and their corresponding data languages without the aforementioned restriction. This thesis presents the implementation of a entity-relationship/Daplex language interface for the MLDS. Specifically, it presents the implementation of an interface which translates Daplex language calls in to attribute-based data language requests. The authors describe the software engineering aspects of the implementation of an overview of the five modules which comprise the entity-relationship/Daplex language interface. Author (GRA)

N86-27124# Naval Postgraduate School, Monterey, Calif.
THE FORMAL SPECIFICATION OF AN ABSTRACT DATABASE: DESIGN AND IMPLEMENTATION M.S. Thesis
Klaus-Harald Zang Dec. 1985 364 p
(AD-A164865) Avail: NTIS HC A16/MF A01 CSCL 09/2

The technique of problem solving abstraction provides an appropriate tool for specifying an interface between the layers of computer hardware and software. Based on this methodology, the types of support and function calls that should be provided to application programs running on micro computers are described with respect to a database resource. The database is integrated with an abstract processor called AM, a machine which focuses on eliminating the problems with portability and reusability of software, imposed by insufficient resource abstraction. Author (GRA)

N86-27125# Naval Environmental Prediction Research Facility, Monterey, Calif.
DIRECTORY OF RESEARCH PUBLICATIONS
Jan. 1986 29 p
(AD-A164875) Avail: NTIS HC A03/MF A01 CSCL 05/2

This directory lists research publications produced by the Naval Environmental Prediction Research Facility (NEPRF) since the command was established in 1971. Abstracts of the last calendar year's publications also are provided. The following identification information is given: Report number assigned by NEPRF; Government accession (AD) number where assigned; Date of publication; The publication's title, author(s), and number of pages. Topics include such items as weather, tidal currents, data bases, and oceanic regions. GRA

N86-27126# Naval Postgraduate School, Monterey, Calif.
COMPILATION OF ABSTRACTS OF THESES SUBMITTED BY CANDIDATES FOR DEGREES Report, 1 Oct. 1983 - 30 Sep. 1984
30 Sep. 1985 558 p refs
(AD-A164988; NPS-012-85-003PR) Avail: NTIS HC A24/MF A01 CSCL 05/2

This publication contains the abstracts of theses submitted during the period 1 October 1983 to 30 September 1984 by candidates for Doctoral, Master's and Engineer's degrees at the Naval Postgraduate School, Monterey. Subject areas include: Aeronautical engineering, Electrical engineering, Mechanical engineering, Applied science, Computer science, Engineering acoustics, Hydrography, Information systems, Management, Meteorology and oceanography, Operations research, Systems technology (Antisubmarine warfare), Telecommunications systems management, and National security affairs. GRA

N86-27127# Naval Postgraduate School, Monterey, Calif.
THE IMPLEMENTATION OF A NETWORK CODASYL-DML INTERFACE FOR THE MULTI-LINGUAL DATABASE SYSTEM M.S. Thesis
Bulent Emdi 19 Dec. 1985 127 p refs
(AD-A164996) Avail: NTIS HC A07/MF A01 CSCL 09/2

Traditionally, the design and implementation of a conventional database system begins with the selection of a data model, followed by the specification of a model-based data language. An alternative to this traditional approach to database system development is the multi-lingual database system (MLDS). This alternative approach affords the user the ability to access and manage a large collection of databases via several data models and their corresponding data languages. This thesis presents the specification and implementation of an interface which translates CODASYL-DML data language calls into attribute-based data language (ABDL) requests. It describes the software engineering aspects of the implementation and an overview of the four modules which comprise our CODASYL-DML language interface. Author (GRA)

N86-27128# Naval Postgraduate School, Monterey, Calif.
RELATIONAL MODEL OF A DATA DICTIONARY M.S. Thesis
M. G. Dedeoglu Dec. 1985 85 p refs
(AD-A164998) Avail: NTIS HC A05/MF A01 CSCL 09/2

The data dictionary system is an important tool for supporting information resource management. It facilitates the management and control of data. This thesis will develop a relational model of a data dictionary and implement it on the ORACLE relational data base management system. Then, this data dictionary model will be implemented using the logic-oriented Prolog language. The Prolog model of a data dictionary will demonstrate that logic

programming can be used for relational data base applications and that it provides more powerful dictionary capabilities than the relational model. GRA

N86-27129# Decision Science Consortium, Inc., Falls Church, Va.
A PERSONALIZED AND PRESCRIPTIVE DECISION AID FOR CHOICE FROM A DATABASE OF OPTIONS Interim Technical Report, Jul. 1983 - Feb. 1986
Marvin S. Cohen, Kathryn B. Laskey, and Martin A. Tolcott 4 Mar. 1986 57 p
(Contract N00014-83-C-0485; f66-701)
(AD-A165396; TR-86-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

In many decision-making contexts there is a need for aids which cater flexibly to individual users in their preferred ways of organizing information and solving problems, but which guard against potential errors or biases inherent in common approaches to decision making. DSC has developed principles of personalized and prescriptive decision aiding which respond to this need, and which are based on experimental findings and theoretical models in cognitive psychology. In Phase I of this project, those principles were applied to the development of an aid for attack submarine approach and attack. In Phase 2, the principles have been generalized and extended to the development of a generic personalized and prescriptive evaluation system. The system incorporates five basic cognitive interface modules to customize the user's interaction with the aid and to provide prescriptive guidance, as well as a set of interactive dialogues or guides which blend all five functions in support of specific user-selected decision-making strategies. The aid will be tested and demonstrated in the context of a personnel selection application. Author (GRA)

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-27130# Congressional Research Service, Washington, D.C. Office of Senior Specialists.
PUBLIC LAWS OF THE 98TH CONGRESS RELATING TO INFORMATION POLICY
Sandra N. Milevski 14 Mar. 1986 101 p
(CRS-TK-7885-F) Avail: NTIS HC A06/MF A01

Statutes of the 98th Congress treating information related concerns are enumerated. Limited to public laws of a substantive nature, the topical overview of areas of congressional concern is divided into nine sections: Federal Information Resources Management; International Communications and Information Policy; Telecommunication, Broadcasting, and Satellite Transmission; Intellectual Property; Library and Archives Policies; Information Disclosure, Confidentiality and the Right of Privacy; Computer Security and Crime; Information Technology for Education, Innovation, and Competitiveness; and Government Information Systems, Clearinghouses, and Dissemination. Brief considerations of parallel developments in the executive branch and private sector for 1983 to 1984 are included, along with significant laws from the 95th through 97th Congresses. The appendix provides a compilation of information policy public laws, 1977 through 1984. Author

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-27131# Naval Postgraduate School, Monterey, Calif.
A SUMMARY OF THE NAVAL POSTGRADUATE SCHOOL RESEARCH PROGRAM Summary Report, 1 Oct. 1983 - 30 Sep. 1984
Gilbert T. Howard 30 Sep. 1985 404 p
(AD-A164845; NPS-012-85-001PR) Avail: NTIS HC A18/MF A01 CSCL 14/2

This report contains 232 summaries of research projects which were carried out under funding to the Naval Postgraduate School Research Program. This research was conducted under the areas of Computer Science, Mathematics, Administrative Sciences, Operations Research, National Security Affairs, Physics, Electrical and Computer Engineering, Meteorology, Aeronautics, Oceanography, and Mechanical Engineering. The table of contents identifies specific research topics. GRA

N86-27132# Naval Postgraduate School, Monterey, Calif.
EXPLOITING CAPABILITY CONSTRAINTS TO SOLVE GLOBAL, TWO DIMENSIONAL PATH PLANNING PROBLEMS
R. F. Richbourg, Neil C. Rowe, and Michael J. Zyda Jan. 1986 35 p refs
(AD-A164973; NPS52-86-006) Avail: NTIS HC A03/MF A01 CSCL 17/7

Mobile autonomous vehicles require the capability of planning routes over ranges that are too great to be characterized by local sensor systems. Completion of this task requires some form of map data. Much work has been done concerning planning paths through local areas, those which can be scanned by on-board sensor systems. However, planning paths based on long range map data is a very different problem. Extant solution techniques require the search of discrete, node and link representations which characterize continuous, two dimensional problem environments. The authors assume the availability of topographic data organized into regions of homogenous traversal cost. Given this, they present a solution technique for the long range planning problem which relies on a Snell's Law heuristic to limit a graph search for the optimal solution. GRA

N86-27133# Naval Postgraduate School, Monterey, Calif.
UNITED STATES TECHNOLOGY TRANSFER TO PERU AND VENEZUELA M.S. Thesis
Alfredo Arrisueno and Ramon Peraza Dec. 1985 134 p refs
(AD-A164995) Avail: NTIS HC A07/MF A01 CSCL 05/4

Technology has a decisive influence on the daily lives of most of the world population. Historically, technology has moved from one part of the world to another by a continuous process or transfer. However, the resultant transference has been quite uneven in its geographical impact, and there is a concern that the technology gap between the developed countries and the less developed countries is widening. Concern about the widening of the gap and the need to increase the technology transfer process, is the very essence of the economic growth and development needs of less developed countries. This Thesis will examine the gap, and an attempt will be made to determine guidelines, initiatives, and mechanisms to facilitate the transfer of U.S. technology to Latin America and specifically to Peru and Venezuela. GRA

N86-27134# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES. VOLUME 40, NUMBER 4 Monthly Report
C. J. Fox Apr. 1986 37 p

(AD-A165292; AD-F630715; ESN-40-4) Avail: NTIS HC A03/MF A01 CSCL 05/2

ESN is a monthly publication with brief articles on recent developments in European scientific research. Partial contents: Center of Molecular Biology, Canto Blanco (Madrid), Spain; Life Science Research at Trent Polytechnic, Nottingham, UK; Artificial Intelligence at Milan; Ceramic Matrix Composites; Fluid Mechanics, Combustion, and Hydroacoustics at Bertin and Co. (France); Fluid Mechanics Research at Laboratoire National d'Hydraulique (France); Lasers and Electro-Optics at CISE in Milan. GRA

N86-27135# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
ON ROADS WITH NO OVERTAKING
A. J. Koning Sep. 1985 45 p
(CWI-MS-R8508; B8577114; ESA-86-96987) Avail: NTIS HC A03/MF A01

A road which narrows at bottleneck from an infinite-lane road to a one-lane road is studied with two independent stochastic processes. At the bottleneck an equilibrium headway can be viewed as the maximum of a shifted exponential random variable and a minimum headway. After the bottleneck the situation becomes far more complicated. However, at a sufficently large distance from the bottleneck an equilibrium headway may be approximated by the maximum of a shifted exponential random variable and a minimum headway, with the parameters of the shifted exponential random variable depending on the desired speed of the car. The distance from the bottleneck only affects the location, not the scale. Results are checked by Monte Carlo experiments. ESA

88 SPACE SCIENCES (GENERAL)

N86-27136*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE STATION PLANETOLOGY EXPERIMENTS (SSPEX)
Ronald Greeley, ed. (Arizona State Univ., Tempe) and Richard J. Williams, ed. May 1986 97 p Workshop held in Flagstaff, Ariz., 20-22 Jun. 1985
(Contracts NCC9-14; NAS9-17023)
(NASA-CP-2424; S-554; NAS 1.55:2424) Avail: NTIS HC A05/MF A01 CSCL 03A

A meeting of 50 planetary scientists considered the uses of the Space Station to support experiments in their various disciplines. Abstracts (28) present concepts for impact and aeolian processes, particle formation and interaction, and other planetary science experiments. Summaries of the rationale, hardware concepts, accomodations, and recommendations are included. For individual titles, see N86-27137 through N86-27168.

N86-27137*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE STATION IMPACT EXPERIMENTS c90
Peter Schultz (Brown Univ., Providence, R. I.), Thomas Ahrens (California Inst. of Tech., Pasadena), W. M. Alexander (Baylor Univ., Waco, Tex.), Mark Cintala, Donald Gault (Murphys Center of Planetology, Calif.), Ronald Greeley (Arizona State Univ., Tempe), B. Ray Hawke (Hawaii Univ., Honolulu), Kevin Housen (Boeing Aerospace Co., Seattle, Wash.), and Robert Schmidt *In its* Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Four processes serve to illustrate potential areas of study and their implications for general problems in planetary science. First, accretional processes reflect the success of collisional aggregation over collisional destruction during the early history of the solar system. Second, both catastrophic and less severe effects of impacts on planetary bodies survivng from the time of the early solar system may be expressed by asteroid/planetary spin rates, spin orientations, asteroid size distributions, and perhaps the origin of the Moon. Third, the surfaces of planetary bodies directly record the effects of impacts in the form of craters; these records have wide-ranging implications. Fourth, regoliths evolution of asteroidal surfaces is a consequence of cumulative impacts, but the absence of a significant gravity term may profoundly affect the retention of shocked fractions and agglutinate build-up, thereby biasing the correct interpretations of spectral reflectance data. An impact facility on the Space Station would provide the controlled conditions necessary to explore such processes either through direct simulation of conditions or indirect simulation of certain parameters. B.G.

N86-27138*# Iowa State Univ. of Science and Technology, Ames.
SEDIMENT-TRANSPORT (WIND) EXPERIMENTS IN ZERO-GRAVITY c90
James Iverson, Dale Gillette (National Oceanic and Atmospheric Administration, Boulder, Colo.), Ronald Greeley (Arizona State Univ., Tempe), Jeff Lee, Ian Mackinnon (New Mexico Univ., Albuquerque), John Marshall (New Mexico Univ.), William Nickling (Guelph Univ., Ontario) 08(California Inst. of Tech., Pasadena.), Brad Werner, Bruce White, and Steve Williams (Arizona State Univ., Tempe.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 6 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The carousel wind tunnel (CWT) can be a significant tool for the determination of the nature and magnitude of interparticlar forces at threshold of motion. By altering particle and drum surface electrical properties and/or by applying electric potential difference across the inner and outer drums, it should be possible to separate electrostatic effects from other forces of cohesion. Besides particle trajectory and bedform analyses, suggestions for research include particle aggregation in zero and subgravity environments, effect of suspension-saltation ratio on soil abrasion, and the effects of shear and shearfree turbulence on particle aggregation as applied to evolution of solar nebula. B.G.

N86-27139*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PARTICLE FORMATION AND INTERACTION c92
Steven Squyres, George J. Corso (Northwestern Univ., Evanston, Ill.), Lynn Griffiths (Management and Technical Services Co., Washington, D.C.), Ian Mackinnon (New Mexico Univ., Albuquerque), John Marshall, Joseph A. Nuth, III (National Aeronautics and Space Administration, Washington, D.C.), Brad Werner (California Inst. of Tech., Pasadena), and John Wolfe (San Jose State Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 4 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

A wide variety of experiments can be conducted on the Space Station that involve the physics of small particles of planetary significance. Processes of interest include nucleation and condensation of particles from a gas, aggregation of small particles into larger ones, and low velocity collisions of particles. All of these processes could be investigated with a general purpose facility on the Space Station. The microgravity environment would be necessary to perform many experiments, as they generally require that particles be suspended for periods substantially longer than are practical at 1 g. Only experiments relevant to planetary processes will be discussed in detail here, but it is important to stress that a particle facility will be useful to a wide variety of scientific disciplines, and can be used to address many scientific problems. Author

N86-27140*# National Aeronautics and Space Administration, Washington, D.C.
REPORT ON OPPORTUNITIES AND/OR TECHNIQUES FOR HIGH-CALIBER EXPERIMENTAL RESEARCH (OTHER) PROPOSALS FOR SSPEX c90
Joseph A. Nuth, III, George Corso (Northwestern Univ., Evanston, Ill.), Donald DeVincenzi, Al Duba (Lawrence Livermore National Lab., Calif.), John Freeman (Rice Univ., Houston, Tex.), Ramon

Lopez, James Stephens (Jet Propulsion Lab., California Inst. of Tech., Pasadena), Ian Strong (Los Alamos National Lab., N. Mex.), and John Wolfe (San Jose State Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Brief discriptions of the following 13 experiments are included: ultrahigh vacuum petrology facility; artificial comet free flyer; artificial comet (tethered); cosmic dust detector; cosmic dust collector; dust collection using tethered satellites; artificial magnetosphere; microgravity petrological studies; slitless ultraviolet spectrometer; orbital determination and capture experiment (ODACE); high velocity sputtering of amorphous silicates; particle release experiments; and calibration of gamma and X-ray remote sensing-probes. B.G.

N86-27141*# California Inst. of Tech., Pasadena. Seismological Lab.
A PLANETARY ULTRA HYPERVELOCITY IMPACT MECHANICS AND SHOCK WAVE SCIENCE FACILITY c14
Thomas J. Ahrens *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Using the concept of intercepting orbits from a pair of Space Station serviced free flyers, a class of impact and shock wave experiments pertinent to planetary science can be performed. One proposed free flying vehicle is an impactor dispensor, and the second is the impact laboratory. How collision is achieved by utilizing essentially twice orbital velocity is demonstrated. The impactor dispensor contains a series of small flyer plates or other projectiles which are launched into the trajectory of the impactor laboratory at appropriate positions. The impactor laboratory is a large impact tank similar to those in terrestrial gun laboratories, except that it contains a supply of targets and instrumentation such as high speed cameras, flash X-ray apparatus and digital recorders. Shock and isentropic pressures of up to 20 Mbar are achievable with such a system which provides 15 km/sec impact velocities for precisely oriented projectiles. B.G.

N86-27142*# California Inst. of Tech., Pasadena. Seismological Lab.
PROPOSED EARTH BASED CRATERING EXPERIMENTS AT LOW G IN HARD VACUUM c91
Thomas J. Ahrens *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

In order to address the question of whether the cratering scale which was developed can be extrapolated to low velocity (of planetesimals appropriate for conditions during accretion of the planets and the impact mechanics of encounters of both asteroids and the solid objects which comprise the rings of the outer major planets), a series of experiments at low gravity and at high vacuum are proposed. Specific issues which could be addressed include: the effect of very low gravity on cratering efficiency and final crater shape; and the dynamics of impact into a strengthless spherical and ellipsoidal liquid target. Author

N86-27143*# Baylor Univ., Waco, Tex. Dept. of Physics.
MASS LOADING OF THE EARTH'S MAGNETOSPHERE BY MICRON SIZE LUNAR EJECTA. 1: EJECTA PRODUCTION AND ORBITAL DYNAMICS IN CISLUNAR SPACE c90
W. M. Alexander, W. G. Tanner, P. D. Anz, and A.-L. Chen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Particulate matter possessing lunar escape velocity sufficient to enhance the cislunar meteroid flux was investigated. While the interplanetary flux was extensively studied, lunar ejecta created by the impact of this material on the lunar surface is only now being studied. Two recently reported flux models are employed to calculate the total mass impacting the lunar surface due to sporadic meteor flux. There is ample evidence to support the contention that the sporadic interplanetary meteoroid flux enhances the meteroid flux of cislunar space through the creation of micron and submicron lunar ejecta with lunar escape velocity. B.G.

N86-27144*# Baylor Univ., Waco, Tex. Dept. of Physics.
MASS LOADING OF THE EARTH'S MAGNETOSPHERE BY MICRON SIZE LUNAR EJECTA. 2: EJECTA DYNAMICS AND ENHANCED LIFETIMES IN THE EARTH'S MAGNETOSPHERE c90
W. M. Alexander, W. G. Tanner, P. D. Anz, and A.-L. Chen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Extensive studies were conducted concerning the indivdual mass, temporal and positional distribution of micron and submicron lunar ejecta existing in the Earth-Moon gravitational sphere of influence. Initial results show a direct correlation between the position of the Moon, relative to the Earth, and the percentage of lunar ejecta leaving the Moon and intercepting the magnetosphere of the Earth at the magnetopause surface. It is seen that the Lorentz Force dominates all other forces, thus suggesting that submicron dust particles might possibly be magnetically trapped in the well known radiation zones. B.G.

N86-27145*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LOW-GRAVITY IMPACT EXPERIMENTS: PROGRESS TOWARD A FACILITY DEFINITION c91
Mark J. Cintala *In its* Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Innumerable efforts were made to understand the cratering process and its ramifications in terms of planetary observations, during which the role of gravity has often come into question. Well known facilities and experiments both were devoted in many cases to unraveling the contribution of gravitational acceleration to cratering mechanisms. Included among these are the explosion experiments in low gravity aircraft, the drop platform experiments, and the high gravity centrifuge experiments. Considerable insight into the effects of gravity was gained. Most investigations were confined to terrestrial laboratories. It is in this light that the Space Station is being examined as a vehicle with the potential to support otherwise impractical impact experiments. The results of studies performed by members of the planetary cratering community are summarized. Author

N86-27146*# Indiana Univ. Northwest, Gary.
COSMIC DUST COLLECTION WITH A SUB-SATELLITE TETHERED TO A SPACE STATION c90
G. J. Corso *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p Prepared in cooperation with Northwestern Univ., Evanston, Ill. (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The number concentration and density of 1 micron and submicron sized grains in interplanetary space, as well as their relation to the larger zodical dust particles, and the importance of the Beta meteoroid phenomenon are currently being questioned. The best approach to collecting large numbers of intact micron and submicron sized cosmic dust particles in real time while avoiding terrestrial and man made contamination would be to employ a tethered subsatellite from a space station down into the Earth's atmosphere. Such a subsatellite tied to the space shuttle by a 100 km long tether is being developed. It is also possible that a permanent space station would allow the use of a tether even longer that 100 km. It should be noted that the same tethered collectors could also be employed to study the composition and

flux of man made Earth orbiting debris in any direction within 100 km or so of the space station. B.G.

N86-27147*# National Aeronautics and Space Administration, Washington, D.C.
SPACE STATION SCIENCE LAB MODULE **c18**
D. L. DeVincenzi *In* NASA. Lyndon B. Johnson Space Center Space Statiaon Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The Science Lab Module (SLM), a key component of the proposed Space Station (SS) orbiting complex, is undergoing intensive study during the project design phase which is currently underway. The SLM is one of the two laboratory modules which, together with two habitation modules, comprise the core elements of the SS reference configurations. Current project emphasis is to configure the SLM as a national science laboratory module facility which would have four major functions: maximize life sciences research potential, support operations of attached payloads, provide shirtsleeve environment for other payload instrument servicing, and support other science requirements. The design studies are focusing on outfitting a common module basic design to accommodate the four specific functions. Although design work for outfitting the SLM for life sciences research is underway, science requirements for the other sciences and functions are not as well developed. Author

N86-27148*# Lawrence Livermore National Lab., Calif.
ELECTRICAL CONDUCTIVITY OF CARBONACEOUS CHONDRITES AND ELECTRIC HEATING OF METEORITE PARENT BODIES **c91**
Al Duba *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p refs (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The electrical conductivity of samples of the Murchison and Allende carbonaceous chondrites is 4 to 6 magnitudes greater than rock forming minerals such as Olivine up to 700 C. The remarkably high electrical conductivity of these meteorites is attributed to carbon at grain boundaries. The environment in the wake of the space station can be exploited to produce conditions which will allow pyrolysis of carbonaceous chondrites. An experimental package consisting of a one square meter shield attached to a 15 cm diameter by 40 cm long furnace and tied to a conductance bridge, furnace controller, and digital voltmeter inside the space station via umbilical cable could make the required measurements. Since heating rates as low as 0.1 C/hour are required to study kinetics of the pyrolysis reations which are the cause of the high conductivity of the carbonaceous chondrites, experimental times up to 3 months will be needed. B.G.

N86-27149*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
THE ORBIT PROPERTIES OF COLLIDING CO-ORBITING BODIES **c90**
John W. Freeman *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

It is generally assumed that an ensemble of small bodies located in similar Keplarian orbits will, because of collisions, tend to disperse into more and more dissimilar orbits. For example, it is thought that the asteroids may represent the remnants of a few larger bodies that broke up or failed to fully accrete. A proposed experiment using the space station consists of an ensemble of small bodies or particles released gently from a central location in a large chamber, much like the breaking of billiard balls. The particles would them co-orbit and occasionally collide. Their subsequent behavior could be monitored by several video recorders, their linear and angular velocities before and after collision calculated, and their general behavior studied. This experiment could yield results of fundamental importance for theories of the origin of the planets, asteroids, comets, and probably ring systems. B.G.

N86-27150*# National Oceanic and Atmospheric Administration, Boulder, Colo.
SMALL LINEAR WIND TUNNEL SALTATION EXPERIMENTS: SOME EXPERIENCES **c09**
D. A. Gillette and P. R. Owen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p Prepared in cooperation with Imperial College of Science and Technology, London, England (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Since the wind tunnels proposed to be used for the Space Station Planetology Experiments are of a rather limited size, some experience and techniques used for saltation experiments in a small linear wind tunnel may be of interest. Three experiments will be presented. The first concerns a length effect of saltation mass flux in which the size of the wind tunnel exaggerates the physical process taking place. The second experiment concerns a nonoptical technique that does not interfere with flow and by which momentum flux to the floor may be measured. The technique may also be used to calculate saltation flux (using appropriate assumptions). The third experiment concerns the use of the momentum equation to estimate momentum fluxes by difference. Author

N86-27151*# Department of Energy, Mines, and Resources, Ottawa (Ontario). Microgravity Cratering Working Group.
IMPACT EXPERIMENTATION AND THE MICROGRAVITY ENVIRONMENT: AN OVERVIEW **c90**
Richard A. F. Grieve *In* NASA. Lyndon B. Johnson Space Center Sapce Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Impact is an ubiquitous physical process in the solar system. It occurs on all solid bodies and operates over a spectrum of scales, influencing geologic processes ranging from accretion, the early evolution of planetary bodies, the petrogenetic and spatial relations of lunar samples, the surface characteristics and interpretation of spectral data of asteroidal bodies, to the nature of some meteorites. Understanding impact phenomena is therefore paramount in constraining and underpinning a large number of research efforts into fundamental planetary geology. Gravity is an important parameter in impact processes. The physical environment offered by the Space Station represents an unique opportunity to extend the experimental aspect of impact studies into the microgravity (less than 1 g) regime. Through the use of free floating targets, it may be possible to explore in detail phenomena associated with the collision of bodies. Such experiments can address questions regarding early and late accretional processes, catastrophic disruption and asteroidal evolution, as well as the effects of large impacts on the momentum and spin of the target bodies. The last question is of considerable topical interest with respect to the hypothesized origin of the moon by a Mars-sized impact on Earth. B.G.

N86-27152*# National Aeronautics and Space Administration, Washington, D.C.
EXOBIOLOGY EXPERIMENT CONCEPTS FOR SPACE STATION **c55**
L. D. Griffiths (Management and Technical Services Co., Washington, D.C.) and D. L. DeVincenzi *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The exobiology discipline uses ground based and space flight resources to conduct a multidiscipline research effort dedicated to understanding fundamental questions about the origin, evolution, and distribution of life and life related molecules throughout the universe. Achievement of this understanding requires a methodical research strategy which traces the history of the biogenic elements from their origins in stellar formation processes through the

chemical evolution of molecules essential for life to the origin and evolution of primitive and, ultimately, complex living species. Implementation of this strategy requires the collection and integration of data from solar system exploration spacecraft and ground based and orbiting observatories and laboratories. The Science Lab Module (SLM) of the Space Station orbiting complex may provide an ideal setting in which to perform certain classes of experiments which form the cornerstone of exobiology research. These experiments could demonstrate the pathways and processes by which biomolecules are synthesized under conditions that simulate the primitive Earth, planetary atmospheres, cometary ices, and interstellar dust grains. Exobiology experiments proposed for the Space Station generally fall into four classes: interactions among gases and grains (nucleation, accretion, gas-grain reactions), high energy chemistry for the production of biomolecules, physical and chemical processes occurring on an artificial comet, and tests of the theory of panspermia. Author

N86-27153*# Iowa State Univ. of Science and Technology, Ames. Dept. of Aerospace Engineering.
SEDIMENT-TRANSPORT EXPERIMENTS IN ZERO-GRAVITY **c12**
James D. Iversen and Ronald Greeley (Arizona State Univ., Tempe) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

One of the important parameters in the analysis of sediment entrainment and transport is gravitational attraction. The availability of a laboratory in Earth orbit would afford an opportunity to conduct experiments in zero and variable gravity environments. Elimination of gravitational attraction as a factor in such experiments would enable other critical parameters (such as particle cohesion and aerodynamic forces) to be evaluated much more accurately. A Carousel Wind Tunnel (CWT) is proposed for use in conducting experiments concerning sediment particle entrainment and transport in a space station. In order to test the concept of this wind tunnel design a one third scale model CWT was constructed and calibrated. Experiments were conducted in the prototype to determine the feasibility of studying various aeolian processes and the results were compared with various numerical analysis. Several types of experiments appear to be feasible utilizing the proposed apparatus. Author

N86-27154*# Arizona State Univ., Tempe.
DESIGN AND CALIBRATION OF THE CAROUSEL WIND TUNNEL **c09**
R. N. Leach, R. Greeley, J. Iversen (Iowa State Univ. of Science and Technology, Ames), B. White (California Univ., Davis.), and J. R. Marshall *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

In the study of planetary aeolian processes the effect of gravity is not readily modeled. Gravity appears in the equations of particle motion along with interparticle forces but the two terms are not separable. A wind tunnel that would permit variable gravity would allow separation of the forces and aid greatly in understanding planetary aeolian processes. The design Carousel Wind Tunnel (CWT) allows for a long flow distance in a small sized tunnel since the test section is a continuous circuit and allows for a variable pseudo gravity. A prototype design was built and calibrated to gain some understanding of the characteristics of the design and the results presented. B.G.

N86-27155*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
A MAGNETOSPHERIC SIMULATION AT THE SPACE STATION **c14**
R. E. Lopez, J. W. Freeman, and F. C. Michel *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

It is proposed that a strong magnet (terrella) be flown at or near the Space Station to create an artificial magnetosphere in a laboratory setting. The relative flow of the ionosphere past the terrella will constitute a plasma wind that will interact with the magnetic field of the terrella to produce a localized magnetosphere. This object could then be extensively studied using diagnostic probes attached to the Space Station, or with free flyers. The space and storage requirements would be minimal, since the experiment would be conducted outside the space station. The total equipment would consist of several terrella (with varying surface conductivities), approximately 3 small magnetometer/plasma diagnostic packages, and several gas canisters for upstream seeding. Power requirements would be approximately 60 watts. Several track mounted tethers, each approximately or > 200 m long in length, with track parallel to the orbital motion and 100 m long, are also needed. Astronaut time needed would be minimal in the tethered configuration (approximately 4 man hours/week). A free flying configuration, while not needing the tether track, would require much more human interaction. Author

N86-27156*# Arizona State Univ., Tempe. Dept. of Geology.
ELECTROSTATIC AGGREGATION OF FINELY-COMMINUTED GEOLOGICAL MATERIALS **c12**
J. R. Marshall and R. Greeley *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Electrostatic forces are known to have a significant effect on the behavior of finely comminuted particulate material: perhaps the most prevalent expression of this being electrostatic aggregation of particles into relatively coherent clumps. However, the precise role of electrostatic attraction and repulsion in determining the behavior of geological materials (such as volcanic ash and aeolian dust) is poorly understood. Electrostatic aggregation of fine particles is difficult to study on Earth either in the geological or laboratory environment principally because the material in an aggregated state remains airborne for such a short period of time. Experiments conducted in the NASA/JCS - KC135 aircraft are discussed. The aircraft experiments are seen as precursors to more elaborate and scientifically more comprehensive Shuttle or Space Station activities. B.G.

N86-27157*# Guelph Univ. (Ontario).
THE INITIATION OF GRAIN MOVEMENT BY WIND **c46**
W. G. Nickling *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

When air blows across the surface of dry, loose sand, a critical shear velocity must be achieved to inititate motion. Since most natural sediments consist of a range of grain sizes, fluid threshold for any sediment cannot really be defined by a finite value but should be viewed as a threshold range which is a function of the mean size, sorting, and packing of the sediment. In order to investigate the initiation of particle movement by wind, a series of wind tunnel tests were carried out on a range of screened sands and commercially available glass beads of differing sizes, sorting, and shape characteristics. In addition, individual samples of the glass beads were mixed to produce rather poorly sorted bimodal distributions. Test results suggest that when velocity is slowly increased over the sediment surface the smaller or more exposed grains are first entrained by the fluid drag of the air either in surface creep or in saltation. As velocity continues to rise, the larger more protected grains may also be moved by fluid drag. The data also indicate that predicted values based on the modified Bagnold equation fall within the range of threshold values defined by the transition section of the grain movement/shear velocity plots. Moreover, the predicted values are very similar to the threshold values derived for the point maximum inflection on the curves. Author

N86-27158*# National Aeronautics and Space Administration, Washington, D.C.
NUCLEATION EXPERIMENTS IN A MICROGRAVITY ENVIRONMENT **c12**
J. A. Nuth, J. E. Allen, Jr. (National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.), L. U. Lilleleht (Virginia Univ., Charlottesville), I. D. R. Mackinnon (Microbeam, Inc., Houston, Tex.), F. J. M. Rietmeijer (National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.), and J. R. J. M. Stephens (Los Alamos National Lab., N. Mex.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

A simple experimental apparatus is described in which a wide variety of vapor phase nucleation studies of refractory materials could be performed aboard NASA's KC-135 Research Aircraft. The chief advantage of a microgravity environment for these studies is the expected absence of thermally driven convective motions in the gas. The absence of convection leads to much more accurate knowledge of both the temperature distribution in the system and the time evolution of the refractory vapor concentration as a function of distance from the crucible. The evolution of the apparatus will be described as more experience is gained with the microgravity environment. Such experiments will be used to prepare for similar ones carried out aboard either the shuttle or Space Station where considerably longer duration experiments are possible. Author

N86-27159*# National Aeronautics and Space Administration, Washington, D.C.
ULTRAVIOLET SPECTROSCOPY OF METEORIC DEBRIS: IN SITU CALIBRATION EXPERIMENTS FROM EARTH ORBIT **c90**
Joseph A. Nuth, III, Thomas J. Wdowiak (Alabama Univ., Birmingham), and William R. Kubinec (Charleston Coll., S.C.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments May 1986 2 p Previously announced as N86-23523 (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

It is proposed to carry out slitless spectroscopy at ultraviolet wavelengths from orbit of meteoric debris associated with comets. The Eta Aquarid, Orionid/Halley, and the Persied/1962 862 Swift-Tuttle showers would be principal targets. Low light level, ultraviolet video technique will be used during night side of the orbit in a wide field, earthward viewing mode. Data will be stored in compact video cassette recorders. The experiment may be configured as a GAS package or in the HITCHHIKER mode. The latter would allow flexible pointing capability beyond that offered by shuttle orientation of the GAS package, and doubling of the data record. The 1100 to 3200 A spectral region should show emissions of atomic, ionic, and molecular species of interest on cometary and solar system studies. Author

N86-27160*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LOW GRAVITY FACILITIES FOR SPACE STATION PLANETOLOGY EXPERIMENTS **c14**
Paul A. Penzo *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

For experimentation, space offers a unique environment which is unobtainable on Earth. One characteristic is a gravity force less than 1 g, where g is the mean Earth gravity acceleration of 9.8 m/sq s. The production of uniform gravity levels above zero g in space is discussed in relationship to experimental needs. For planetology experiments, providing gravity in space will make it possible to more nearly simulate conditions on natural bodies. The g-level is but one parameter involved in the design of a specific experiment. Other requirements may be: g-level range; g-level tolerance value; Coriolis tolerance value; volume requirement; g-level duration; power and materials for the experiment; and automated or man-tended operation. These requirements, and certainly others, will dictate the type of facility which should be considered. The use of the Space Station or the Tethered Satellite System configurations is discussed. B.G.

N86-27161*# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
DEBRIS-CLOUD COLLISIONS: ACCRETION STUDIES IN THE SPACE STATION **c90**
P. H. Schultz and D. E. Gault (Murphys Center of Planetology, Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The growth of planetesimals in the Solar system reflects the success of collisional aggregation over disruption. Recent experiments performed at the NASA-Ames Vertical Gun Range are discussed using the production of debris cloud impaction to model protoplanetary accretion. The impact experiment assessed the differences between clustered and single body impacts on particulate surfaces. The preliminary results would indicate that collisions between two debris clouds might produce aggregates, thereby increasing particle sizes, whereas a single particle impacting a particle results in disruption and comminution. Such an experiment could provide new insight for early planetary growth processes and for interpreting the record of this stage. The use of the microgravity environment of the Space Station to further the research is discussed. B.G.

N86-27162*# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
IMPACTS OF FREE-FLOATING OBJECTS: UNIQUE SPACE STATION EXPERIMENTS **c12**
P. H. Schultz and D. E. Gault (Murphys Center of Planetology, Calif.) *In* NASA. Lyndon B. Johnson Space Center Space STation Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The transfer of momentum and kinetic energy between planetary bodies forms the basis for wide ranging problems in planetary science ranging from the collective long term effects of minor perturbations to the catastrophic singular effect of a major collision. Although the collisional transfer of momentum and energy was discussed over the last two decades, major issues remain that largely reflect current limitations in Earth based experimental conditions and 3-D numerical codes. Two examples with potential applications in a Space Station laboratory, are presented: asteroid spin rates and orientations, and planetary disruption/spin rates. Asteroid spin rate and orientation experiments are needed wherein free floating nonspining and spining objects of varying strength, porosity, and volatility are impacted at varying velocities and angles. A space station platform also could provide an opportunity to test important facets of planetary disruption/spin rate models by allowing freely suspended spherical targets of varying viscosities, internal density gradients, and spin rates. Author

N86-27163*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HOW TO MAKE A COMET **c90**
James Stephens, R. Stephen Saunders, and Fraser Fanale (Hawaii Univ., Honolulu) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The primary mandate of NASA is the study of the nature and origin of the solar system. The study of comets provides information about conditions and processes at the beginning of the solar system. Short period comets and their relatives, the near Earth asteroids may prove to be second only to the Sun in importance to the long term survival of civilization for two reasons: as a possible candidate for the cause of mass extinctions of life on Earth and as the material means for the expansion of civilization into the solar system and beyond. In the mean time comets are studied

by remote means. Laboratory investigations using synthetic cometary materials may add to the knowledge of these interesting objects. Dust and mantle formation are currently being studied by the use of comet sublimation experiments. Results of these experiments are discussed. B.G.

N86-27164*# California Inst. of Tech., Pasadena. Div. of Physics, Mathematics and Astronomy.
GRAIN DYNAMICS IN ZERO GRAVITY c12
B. T. Werner and P. K. Haff *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The dynamics of granular materials has proved difficult to model, primarily because of the complications arising from inelastic losses, friction, packing, and the effect of many grains being in contact simultaneously. The kinetic model of granular systems is similar to the kinetic theory of gases, except that collisional energy losses are always present in the former and must be treated explicity. Few granular materials on Earth are describable by this limiting model, since gravity tends to collapse the grains into a high density state where Coulombic friction effects are dominant. The planned Space Station offers an unusual opportunity to test the kinetic grain model and to explore its predictions. Without gravity, the regime of low interparticle velocities (where an elastic description of the collision is still valid) can be investigated. This will allow for direct interpretation by dynamical computer simulations as well as by the kinetic theory. The dynamics of spherical grains inside a clear box would be examined. Results would be compared with the predictions of the kinetic theory and computer simulations. B.G.

N86-27165*# California Univ., Davis.
AEOLIAN PROCESSES ABOARD A SPACE STATION: SALTATION AND PARTICLE TRAJECTORY ANALYSIS c09
B. R. White, R. Greeley (Arizona State Univ., Tempe), J. D. Iversen (Iowa State Univ. of Science and Technology, Ames), and R. N. Leach (Santa Clara Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The Carousel wind tunnel (CWT) proposed to study aeolian processes aboard a space station consists of two concentric rotating drums. The space between the two drums comprises the wind tunnel test section. Differential rates of rotation of the two drums would provide a wind velocity with respect to either drum surface. Preliminary results of measured velocity profiles made in a CWT prototype indicate that the wall bounded boundary layer profiles are suitable to simulate flat plate turbulent boundary layer flow. The two dimensional flat plate Cartesian coordinate equations of motion of a particle moving through the air are explained. In order to assess the suitability of CWT in the analysis of the trajectories of windblown particles, a series of calculations were conducted comparing cases for gravity with those of zero gravity. Results from the calculations demonstrate that a wind tunnel of the carousel design could be fabricted to operate in a space station environment and that experiments could be conducted which would yield significant results contributing to the understanding of the physics of particle dynamics. B.G.

N86-27166*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A SYSTEM FOR CONDUCTING IGNEOUS PETROLOGY EXPERIMENTS UNDER CONTROLLED REDOX CONDITIONS IN REDUCED GRAVITY c12
R. J. Williams *In its* Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

The Space Shuttle and the planned Space Station will permit experimentation under conditions of reduced gravitational acceleration offering experimental petrologists the opportunity to study crystal growth, element distribution, and phase chemistry. In particular the confounding effects of macro and micro scale buoyancy-induced convection and crystal settling or floatation can be greatly reduced over those observed in experiments in the terrestrial laboratory. Also, for experiments in which detailed replication of the environment is important, the access to reduced gravity will permit a more complete simulation of processes that may have occurred on asteroids or in free space. A technique that was developed to control, measure, and manipulate oxygen fugacites with small quantities of gas which are recirculated over the sample is described. This system should be adaptable to reduced gravity space experiments requiring redox control. Experiments done conventionally and those done using this technique yield identical results done in a 1-g field. B.G.

N86-27167*# San Jose State Univ., Calif.
NEW TECHNIQUES FOR THE DETECTION AND CAPTURE OF MICROMETEOROIDS c90
J. H. Wolfe *In* NASA. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

In order to understand the origin and distribution of the biogenic elements and their compounds in the solar system, it will be necessary to study material from many classes of objects. Chemical, elemental, and isotopic measurements of returned samples of comets, asteroids, and possibly extrasolar system dust clouds would provide information on a particularly important class: the primitive objects. Extraterrestrial micron-sized particles in the vicinity of Earth are one source of such materials that might otherwise be inaccessible. The Space Station appears to be an eminently suitable platform from which to collect and detect these various particles. The primary challenge, however, is to collect intact, uncontaminated particles which will be encountered at tens of kilometers per seconds. A concept for a micrometeoroid detector that could be deployed from the Space Station was developed which uses a large area detector plate implanted with acoustic transducers. A concept of a nondestructive micrometeoroid collector for the Space Station was also developed. Particles collected would then be returned to Earth for subsequent analysis. Author

N86-27168*# Geological Survey, Flagstaff, Ariz.
MAPPING EXPERIMENT WITH SPACE STATION c43
Sherman S. C. Wu *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

Mapping of the Earth from space stations can be approached in two areas. One is to collect gravity data for defining topographic datum using Earth's gravity field in terms of spherical harmonics. The other is to search and explore techniques of mapping topography using either optical or radar images with or without reference to ground central points. Without ground control points, an integrated camera system can be designed. With ground control points, the position of the space station (camera station) can be precisely determined at any instant. Therefore, terrestrial topography can be precisely mapped either by conventional photogrammetric methods or by current digital technology of image correlation. For the mapping experiment, it is proposed to establish four ground points either in North America or Africa (including the Sahara desert). If this experiment should be successfully accomplished, it may also be applied to the defense charting systems. B.G.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-27169*# Wisconsin Univ., Madison. Dept. of Physics.
SMALL SCALE H I STRUCTURE AND THE SOFT X-RAY BACKGROUND

Keith Jahoda, Dan McCammon, and Felix J. Lockman (National Radio Astronomy Observatory, Charlottesville, Va.) 22 May 1986 15 p refs Submitted for publication
(Grant NAG5-629)
(NASA-CR-176674; NAS 1.26:176674) Avail: NTIS HC A02/MF A01 CSCL 03A

The observed anticorrelation between diffuse soft X-ray flux and H I column density has been explained as absorption of soft X-rays produced in a hot galactic halo, assuming that the neutral interstellar material is sufficiently clumped to reduce the soft X-ray absorption cross section by a factor of two to three. A 21 cm emission line study of H I column density variations at intermediate and high galactic latitudes to 10' spatial resolution has been done. The results confirm conclusions from preliminary work at coarser resolution, and in combination with other data appear to rule out the hypothesis that clumping of neutral interstellar matter on any angular scale significantly reduces X-ray absorption cross sections in the 0.13 - 0.28 keV energy range. It is concluded therefore that the observed anticorrelation is not primarily a consequence of absorption of soft X-rays produced in a hot galactic halo.
Author

N86-27170# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Inst. of Sound and Vibration Research.
THE IRAS REVISITED (LESSONS LEARNED FROM IRAS OPERATIONS) Final Report
L. Karsten, comp., W. vanLeeuwen, comp., F. Teule, G. Hameetman (National Aerospace Lab., Amsterdam, Netherlands), C. Slippens, R. Ely (Science Research Council, Chilton, England), and J. Gourlay ESA ESA Jul. 1985 131 p
(Contract ESA-6018/84-NL-PP(SC))
(FOK-TR-85-63; ESA-CR(P)-2167; ESA-86-96866) Avail: NTIS HC A07/MF A01

After the nominal end of the IRAS mission, in-orbit experiments to demonstrate IRAS reconfigurability aspects and to assess long term performance were initiated. In a computer memory reconfiguration, 3 blocks of 16k 16-bits RAM memory became available for data storage. In the original configuration, 2 blocks of these belonged to the redundant 32k computer system. Since during the operational mission no back-up mode was needed, a ROM implemented back-up mode for the normal safe mode was operated. The back-up mode software in ROM was called by RAM software to provide experiment specific data storage in the extended memories. This approach was also followed for the last experiment in which the satellite recovered from a deliberately saturated reaction wheel (23 Nms). All systems (not including the telescope) operated without substantial degradation. ESA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-27171*# San Diego State Univ., Calif. Dept. of Electrical and Computer Engineering
PHOTOABSORPTION AND PHOTODISSOCIATION OF MOLECULES IMPORTANT IN THE INTERSTELLAR MEDIUM Annual Report, 15 May 1985 - 14 May 1986
Long C. Lee 2 Jun. 1986 34 p refs
(Grant NAGw-319)
(NASA-CR-176828; NAS 1.26:176828) Avail: NTIS HC A03/MF A01 CSCL 03B

In the period from May 15, 1985 to May 14, 1986, the photoabsorption and photodissociation cross sections of the interstellar radical of SO and the interstellar molecules of HCl, H2CO, and CH3CN were measured and the results were reported in scientific papers. In the meantime, a windowless apparatus is used to measure the photoabsorption and photodissociation cross sections of CO in the 90-105 nm region. The optical data obtained in this research program are needed for the determination of the formation and destruction rates of molecules and radicals in the interstellar medium. Accomplishments in this research period are summarized below.
Author

N86-26845*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ORGANIC CHEMISTRY OF MURCHISON METEORITE: CARBON ISOTOPIC FRACTIONATION
George U. Yuen (Arizona State Univ., Tempe), Neal E. Blair (North Carolina State Univ., Raleigh), David J. DesMarais, John R. Cronin (Arizona State Univ., Tempe), and Sherwood Chang *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 40 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

N86-27137*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE STATION IMPACT EXPERIMENTS
Peter Schultz (Brown Univ., Providence, R. I.), Thomas Ahrens (California Inst. of Tech., Pasadena), W. M. Alexander (Baylor Univ., Waco, Tex.), Mark Cintala, Donald Gault (Murphys Center of Planetology, Calif.), Ronald Greeley (Arizona State Univ., Tempe), B. Ray Hawke (Hawaii Univ., Honolulu), Kevin Housen (Boeing Aerospace Co., Seattle, Wash.), and Robert Schmidt *In its* Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27138*# Iowa State Univ. of Science and Technology, Ames.
SEDIMENT-TRANSPORT (WIND) EXPERIMENTS IN ZERO-GRAVITY
James Iverson, Dale Gillette (National Oceanic and Atmospheric Administration, Boulder, Colo.), Ronald Greeley (Arizona State Univ., Tempe), Jeff Lee, Ian Mackinnon (New Mexico Univ., Albuquerque), John Marshall (New Mexico Univ.), William Nickling (Guelph Univ., Ontario) 08(California Inst. of Tech., Pasadena.), Brad Werner, Bruce White, and Steve Williams (Arizona State Univ., Tempe.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 6 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27140*# National Aeronautics and Space Administration, Washington, D.C.
REPORT ON OPPORTUNITIES AND/OR TECHNIQUES FOR HIGH-CALIBER EXPERIMENTAL RESEARCH (OTHER) PROPOSALS FOR SSPEX
Joseph A. Nuth, III, George Corso (Northwestern Univ., Evanston, Ill.), Donald DeVincenzi, Al Duba (Lawrence Livermore National Lab., Calif.), John Freeman (Rice Univ., Houston, Tex.), Ramon Lopez, James Stephens (Jet Propulsion Lab., California Inst. of Tech., Pasadena), Ian Strong (Los Alamos National Lab., N. Mex.), and John Wolfe (San Jose State Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 5 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27143*# Baylor Univ., Waco, Tex. Dept. of Physics.
MASS LOADING OF THE EARTH'S MAGNETOSPHERE BY MICRON SIZE LUNAR EJECTA. 1: EJECTA PRODUCTION AND ORBITAL DYNAMICS IN CISLUNAR SPACE
W. M. Alexander, W. G. Tanner, P. D. Anz, and A.-L. Chen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27144*# Baylor Univ., Waco, Tex. Dept. of Physics.
MASS LOADING OF THE EARTH'S MAGNETOSPHERE BY MICRON SIZE LUNAR EJECTA. 2: EJECTA DYNAMICS AND ENHANCED LIFETIMES IN THE EARTH'S MAGNETOSPHERE
W. M. Alexander, W. G. Tanner, P. D. Anz, and A.-L. Chen *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology

Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27146*# Indiana Univ. Northwest, Gary.
COSMIC DUST COLLECTION WITH A SUB-SATELLITE TETHERED TO A SPACE STATION
G. J. Corso *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p Prepared in cooperation with Northwestern Univ., Evanston, Ill. (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27149*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
THE ORBIT PROPERTIES OF COLLIDING CO-ORBITING BODIES
John W. Freeman *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27151*# Department of Energy, Mines, and Resources, Ottawa (Ontario). Microgravity Cratering Working Group.
IMPACT EXPERIMENTATION AND THE MICROGRAVITY ENVIRONMENT: AN OVERVIEW
Richard A. F. Grieve *In* NASA. Lyndon B. Johnson Space Center Sapce Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27159*# National Aeronautics and Space Administration, Washington, D.C.
ULTRAVIOLET SPECTROSCOPY OF METEORIC DEBRIS: IN SITU CALIBRATION EXPERIMENTS FROM EARTH ORBIT
Joseph A. Nuth, III, Thomas J. Wdowiak (Alabama Univ., Birmingham), and William R. Kubinec (Charleston Coll., S.C.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments May 1986 2 p Previously announced as N86-23523 (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27161*# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
DEBRIS-CLOUD COLLISIONS: ACCRETION STUDIES IN THE SPACE STATION
P. H. Schultz and D. E. Gault (Murphys Center of Planetology, Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27163*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HOW TO MAKE A COMET
James Stephens, R. Stephen Saunders, and Fraser Fanale (Hawaii Univ., Honolulu) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27167*# San Jose State Univ., Calif.
NEW TECHNIQUES FOR THE DETECTION AND CAPTURE OF MICROMETEOROIDS
J. H. Wolfe *In* NASA. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 1 p (For primary document see N86 27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N86-27172*# Yale Univ., New Haven, Conn. Dept. of Geology and Geophysics.
EARLY DIFFERENTIATION OF THE MOON: EXPERIMENTAL AND MODELING STUDIES Final Report, 1 Feb. 1981 - 31 Jan. 1986
John Longhi 18 Jun. 1986 8 p
(Grant NAGw-175)
(NASA-CR-176817; NAS 1.26:176817) Avail: NTIS HC A02/MF A01 CSCL 03B

Major accomplishments include the mapping out of liquidus boundaries of lunar and meteoritic basalts at low pressure; the refinement of computer models that simulate low pressure fractional crystallization; the development of a computer model to calculate high pressure partial melting of the lunar and Martian interiors; and the proposal of a hypothesis of early lunar differentiation based upon terrestrial analogs. B.G.

N86-26854*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MEASUREMENTS OF PHYSICAL PROPERTIES OF MODEL TITAN ATMOSPHERES
Thomas W. Scattergood (State Univ. of New York, Stony Brook.), Sherwood Chang, Chris McKay, Bonnie OHara, and Glenn Carle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 50 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

N86-26855*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL BASIS FOR A TITAN PROBE ORGANIC ANALYSIS
C. P. McKay, T. W. Scattergood (State Univ. of New York Stony Brook.), W. J. Borucki, J. F. Kasting, and S. L. Miller (California Univ., San Diego, La Jolla) *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 52 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

N86-26862*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NEW TECHNIQUES FOR THE DETECTION AND CAPTURE OF MICROMETEOROIDS
John H. Wolfe (San Jose State Univ., Calif.), Theodore E. Bunch, and Glenn C. Carle *In* NASA, Washington Second Symposium on Chemical Evolution and the Origin and Evolution of Life May 1986 p 59 (For primary document see N86-26844 17-55)
Avail: NTIS HC A07/MF A01 CSCL 06C

N86-27142*# California Inst. of Tech., Pasadena. Seismological Lab.
PROPOSED EARTH BASED CRATERING EXPERIMENTS AT LOW G IN HARD VACUUM
Thomas J. Ahrens *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27145*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LOW-GRAVITY IMPACT EXPERIMENTS: PROGRESS TOWARD A FACILITY DEFINITION
Mark J. Cintala *In its* Space Station Planetology Experiments

(SSPEX) May 1986 3 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

N86-27148*# Lawrence Livermore National Lab., Calif.
ELECTRICAL CONDUCTIVITY OF CARBONACEOUS CHONDRITES AND ELECTRIC HEATING OF METEORITE PARENT BODIES
Al Duba *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 2 p refs (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-27173*# American Science and Engineering, Inc., Cambridge, Mass.
SAROS: SOLAR ACTIVE REGION OBSERVATIONS FROM SPACELAB Final Report, 11 Feb. 1980 - 11 Nov. 1985
Allen S. Krieger 30 Dec. 1985 27 p refs
(Contract NAS5-26048)
(NASA-CR-177878; NAS 1.26:177878; ASE-5066) Avail: NTIS HC A03/MF A01 CSCL 03B

A definition study of the SAROS investigation was conducted. An instrument design and mode of operation was established which was consistent with the capabilities of the Space Transportation System. Upon completion of the definition phase study the program was placed on hold for approximately five years before being terminated. Consequently, the promise which this investigation held for understanding the heating processes in coronal loops remains unfulfilled. E.R.

N86-27174# Stanford Univ., Calif. Center for Space Science and Astrophysics.
OBSERVATIONS OF LOW-DEGREE P-MODE OSCILLATIONS IN 1984. COMMENTS ON TECHNIQUES FOR SPECTRAL DECONVOLUTION
Harald M. Henning and Philip H. Scherrer Sep. 1985 26 p
(Contract N00014-76-C-0207; Grant NSF ATM-77)
(AD-A164780; CSSA-ASTRO-85-23) Avail: NTIS HC A03/MF A01 CSCL 03/2

Global convective flows in the solar convection zone have been predicted by theoretical interpretations of the global-scale ordering of magnetic fields and activity centers and by theoretical analyses of rotating convection zones. Direct evidence of these flows in the photosphere has not previously been found despite several long-term efforts. The signatures of such flows have now been detected by analyzing the daily series of low-resolution Dopplergrams obtained at the Wilcox Solar Observatory at Stanford Univ. The signatures are patterns of alternating east and west flows with amplitudes on the order of 25 m/s and longitudinal extent of about 30 degrees. The patterns move across the solar disc at approximately the solar rotation rate and have lifetimes of at least several rotations. Boundaries of the fast and slow flows are often associated with large magnetic active regions. GRA

N86-27175# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
DIRECTORY OF MESOSCALE SOLAR RADIATION INFORMATION SOURCES
Nov. 1985 44 p
(Contract DE-AC02-83CH-10093)
(DE85-016868; SERI/SP-271-2715) Avail: NTIS HC A03/MF A01

This directory contains thirty-nine US networks. A network comprises three or more mesoscale sites that concurrently measured solar radiation for at least one year. Mesoscale solar radiation information consists of solar radiation data from sites 20 to 200 km apart. Actual data from the networks are not included but information is provided on their characteristics and on how to obtain the data. The directory also identifies readily available, valuable literature on mesoscale research results. DOE

N86-27139*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PARTICLE FORMATION AND INTERACTION
Steven Squyres, George J. Corso (Northwestern Univ., Evanston, Ill.), Lynn Griffiths (Management and Technical Services Co., Washington, D.C.), Ian Mackinnon (New Mexico Univ., Albuquerque), John Marshall, Joseph A. Nuth, III (National Aeronautics and Space Administration, Washington, D.C.), Brad Werner (California Inst. of Tech., Pasadena), and John Wolfe (San Jose State Univ., Calif.) *In* NASA. Lyndon B. Johnson Space Center Space Station Planetology Experiments (SSPEX) May 1986 4 p (For primary document see N86-27136 17-88)
Avail: NTIS HC A05/MF A01 CSCL 03A

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-27176*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THEORETICAL STUDY OF THE X-RAY EMISSION FROM ASTROPHYSICAL SHOCK WAVES Semiannual Report, 1 Jun. 1985 - 31 May 1986
John Raymond Jun. 1986 9 p refs
(Grant NAGw-528)
(NASA-CR-177318; NAS 1.26:177318; SAPR-4; SAPR-5) Avail: NTIS HC A02/MF A01 CSCL 03B

Theoretical X-ray emission spectra are needed to interpret the X-ray emission observed by many low and moderate resolution X-ray instruments, and to provide diagnosis of physical conditions for high resolution spectra. Over the past decade, a set of model codes which compute the X-ray and XUV emission for a wide set of physical conditions, including high or low densities, photoionized gas, and time-dependent ionization balance was developed. In the past year, the atomic rate coefficients in the code was improved. Further capabilities were added, and applied to several astrophysical problems. Author

N86-27177# Severn Communications Corp., Severna Park, Md.
SURVEY OF ATMOSPHERIC RADIATION COMPONENTS FOR THE GAMMA AND COSMIC RAY ASTROPHYSICS BRANCH OF THE SPACE SCIENCE DIVISION OF THE NAVAL RESEARCH LABORATORY Final Report
31 May 1985 111 p
(Contract N00014-84-C-2089)
(AD-A165538) Avail: NTIS HC A06/MF A01 CSCL 03/1

A survey of atmospheric radiation components for the gamma and cosmic ray astrophysics branch of the Naval Research Laboratory has the following contents: Electron Capture Decay of Cosmic Rays; Cosmic Ray Heavy Ions at and Above 40,000 Feet; Neutron Generated Single Event Upsets in the Atmosphere; Nuclear Cross Sections, Cosmic Ray Propagation and Source Composition; Radiation Transport of Cosmic Ray Nuclei in Lunar Material and Radiation Doses; Non-Geometric Behavior of Nucleus Nucleus Total Inelastic Cross Sections; Environmental Models for Single Event Upset Estimation; Uncertainties in Cosmic Ray Source Composition; Late Stage in Acceleration of Cosmic Rays; Ultraheavy Cosmic Rays and Electron Capture; Propagation of Heavy Cosmic Ray Nuclei; On the Abundances of Ultraheavy Cosmic Rays; LET-Distributions and Doses of HZE Radiation Components at Near Earth Orbits; and Radiation Doses and LET (Linear Energy Transfer) Distributions of Cosmic Rays. GRA

99 GENERAL

No abstracts in this category.

Typical Subject Index Listing

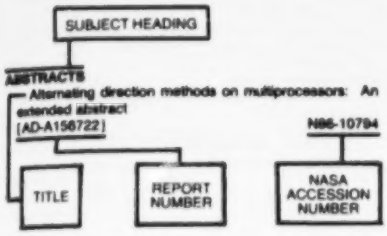

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7053).

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Aerospace Medicine and Biology: A continuing bibliography with indexes
[NASA-SP-7011(285)] N86-26797
A review of maximum entropy spectral analysis and applications to Fourier Spectroscopy
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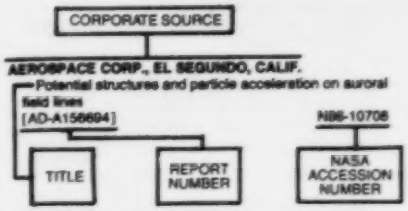

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The effect of air gaps on the propagation of detonation in charges consisting of stacked blocks of cast TNT
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Direct erosive burning measurements of a reduced-smoke solid propellant rocket by flash X-rays N86-26476
DEFENSE COMMUNICATIONS AGENCY, ARLINGTON, VA.
Defense Communications Agency cost and planning factors manual, change 2
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DEFENSE TECHNICAL INFORMATION CENTER, ALEXANDRIA, VA.
Proceedings of the 1985 Annual DTIC Users Conference
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Proceedings of the Second Annual Heat Engines Contractors Meeting
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Further work on POPSAT. Volume 1: Executive summary
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ESDU INTERNATIONAL LTD., LONDON (ENGLAND).

Circular-cylindrical structures: Dynamic response to vortex shedding. Part 3: Computer programs
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EVANSVILLE UNIV., IND.

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Aquila remotely piloted vehicle: Recent developments and alternatives
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Technology transfer at DARPA: The Defense Advanced Research Projects Agency. Executive summary
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The effect of low velocity impact on the strength characteristics of composite materials laminates
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Proceedings of the International Test and Evaluation Association 1984 Symposium (Step Session). Supplement
[AD-A163236] N86-26919

Software test and evaluation manual. Volume 1: Guidelines for the treatment of software in test and evaluation master plans
[AD-A165208] N86-26953

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Driving performance the day after use of lorpazolam, flunitrazepam and placebo
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A multiindex multitemporal approach to map crops in the early growing season: An application to two Italian irrigation districts: East Sesia and Grande Bonifica Ferrarese
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INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG (NETHERLANDS).
Individual parameters in thermoregulatory control; a review
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Modelling of a cold gas jet system for satellite attitude control
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INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, URBANA, ILL.
Middle Atmosphere Program. Handbook for MAP, volume 19
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Experimental determination of the electronic structure of small metal particles
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[PB85-916923] N86-26304
Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 5 of 1984 accidents
[PB86-916901] N86-26305
Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 6 of 1984 accidents
[PB86-916902] N86-26306
Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 7 of 1984 accidents
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Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 8 of 1984 accidents
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Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 9 of 1984 Accidents
[PB86-916905] N86-26309
Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 11 of 1984 accidents
[PB86-916907] N86-26310
Aircraft accident reports, brief format, US Civil and Foreign Aviation Issue Number 13 of 1984 accidents
[PB86-916909] N86-26311

NATIONAL TSING HUA UNIV., HSINCHU (TAIWAN).
Processes and process development N86-26690

NATIONAL WEATHER SERVICE, GARDEN CITY, N.Y.
LAWEB (Lake Weather Broadcast): Data processing for the Great Lakes
[PB86-176658] N86-26780

NATIONAL WEATHER SERVICE, SILVER SPRING, MD.
Moisture model for the local AFOS MOS (Automation of Field Operations and Services Model Output Statistics) program
[PB86-151305] N86-26779

NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Structure/property studies of a heterocyclic conductive polymer
[AD-A164959] N86-26447
Visual and spectroradiometric performance criteria for Night Vision Goggles (NVG) compatible aircraft interior lighting N86-26807
The application of diffraction optics techniques to laser eye protection N86-26821

NAVAL BIODYNAMICS LAB., NEW ORLEANS, LA.
Demonstration of a statistical method for isolating timesharing components
[AD-A165417] N86-26926

NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
The effects of steel profile and cleanliness on coating performance
[AD-A164788] N86-26443
Experimental polyurethane foam (PUF) roofing systems. 3. Naval Station, Roosevelt Roads, Puerto Rico, and Naval Facility, Cape Hatteras, North Carolina
[AD-A164833] N86-26444
A recursive boundary element with initial error investigation
[AD-A163563] N86-26995

NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY, MONTEREY, CALIF.
Directory of research publications
[AD-A164875] N86-27125

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
The geonames processing system synopsis
[AD-A163366] N86-27120

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
Mechanism of electromagnetic energy effects on the nervous system: Voltage-clamp study
[AD-A164653] N86-26798

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
An analysis of S-3 SDLM (Standard Depot Level Maintenance) corrosion documentation procedures
[AD-A165588] N86-26282
Analyzing the cost effectiveness of using flight simulators in the Israeli Air Force
[AD-A164864] N86-26348
Effect of chromium addition to the low temperature hot corrosion resistance of platinum modified aluminide coatings
[AD-A164755] N86-26420
Experimental techniques for obtaining particle behavior in solid propellant combustion N86-26477
Process synchronization and data communication between processes in real time local area networks
[AD-A164860] N86-26511
Digitally controlled programmable active filters
[AD-A164999] N86-26534
Electron induced conductivity of Al2O3 as pertaining to thermionic integrated circuits
[AD-A165589] N86-26539
Development of a testbed for multisensor distributed decision algorithms
[AD-A164487] N86-26601
A survey of videodisc technology
[AD-A164992] N86-26606
Changes in the ocean mixed layer following extraordinary atmospheric forcing
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Changes in Naval Aviation Basic Instrument flight training: An analysis
[AD-A164738] N86-26830
Modern hardware technologies and software techniques for on-line database storage and access
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The feasibility of automatic storage reclamation with concurrent program execution in a LISP environment
[AD-A165184] N86-26925
Use of color in differentiating factor levels in simulation output (preliminary report)
[AD-A164651] N86-26947
Top-down parsing syntax error recovery
[AD-A164859] N86-26949
Surface construction from planar contours
[AD-A164862] N86-26950
Implementation of a natural language processor using functional grammar
[AD-A165429] N86-26972
Printer multiplexing among multiple Z-100 microcomputers
[AD-A165179] N86-26983
The fractal geometry of nature; its mathematical basis and application to computer graphics
[AD-A165185] N86-27014
Properties of batch means from stationary ARMA (Autoregressive moving average) time series
[AD-A165187] N86-27033
Gamma processes
[AD-A165390] N86-27036
The use of form, fit, and function in the acquisition of major weapon systems
[AD-A165000] N86-27114
An application of cost risk in incentive contracts
[AD-A165177] N86-27115
The design and analysis of a network interface for the multi-lingual database system
[AD-A164756] N86-27121
Recent Naval Postgraduate School publications
[AD-A164846] N86-27122
The implementation of a entity-relationship interface for the multi-lingual database system
[AD-A164858] N86-27123
The formal specification of an abstract database: Design and implementation
[AD-A164865] N86-27124

Compilation of abstracts of theses submitted by candidates for degrees
[AD-A164986] N86-27126
The implementation of a network CODASYL-DML interface for the multi-lingual database system
[AD-A164996] N86-27127
Relational model of a data dictionary
[AD-A164998] N86-27128
A summary of the Naval Postgraduate School research program
[AD-A164845] N86-27131
Exploiting capability constraints to solve global, two dimensional path planning problems
[AD-A164973] N86-27132
United States technology transfer to Peru and Venezuela
[AD-A164995] N86-27133

NAVAL RESEARCH LAB., WASHINGTON, D. C.
Biodeterated materials: High-temperature lubricants from algae
[AD-A164913] N86-26445
Three-dimensional numerical simulations of FELs by transverse mode spectral method
[AD-A163297] N86-26503
Analysis of helical waveguide
[AD-A163252] N86-26522
Proposal for FEL experiments driven by the National Bureau of Standards' CW microtron
[AD-A163227] N86-26619
Relative - humidity parameterization of the Navy Aerosol Model (NAM)
[AD-A163209] N86-26759
Application of flux-corrected transport to TTCP joint launch blast computational effort
[AD-A163332] N86-26941
A unifying approach to linear and nonlinear array processing: A tutorial
[AD-A164777] N86-27012
The use of ion implantation for materials processing
[AD-A165432] N86-27059
High power microwave plasma pulse compression
[AD-A163298] N86-27077

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.
Preliminary evaluation of a compound cycle engine for shipboard gensets
[NASA-CR-179451] N86-26629

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Infinite elements for two-dimensional fluid-structure interaction problems
[AD-A164749] N86-26582
DTNSRDC three component laser Doppler velocimetry: Towing tank system measurement errors
[AD-A164743] N86-26604
DTNSRDC three component laser Doppler velocimetry: Mean velocity data analysis
[AD-A164744] N86-26605

NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER, SAN DIEGO, CALIF.
Independent research and independent exploratory development FY 85
[AD-A163432] N86-27111

NEW MEXICO UNIV., ALBUQUERQUE.
High resolution imaging of boron carbide microstructures
[DE86-001751] N86-26387
Probabilistic analysis of nonlinear structures subjected to transient loads. Part 1
[AD-A163235] N86-26655

NOBEL'S EXPLOSIVES CO. LTD., STEVENSTON (ENGLAND).
The chemical interaction of ballistic modifiers in CDB propellant: Its effect upon ballistics and stability N86-26475

NORTH CAROLINA STATE UNIV., RALEIGH.
Amorphization and recrystallization processes in monocrystalline beta silicon carbide thin films
[DE86-004797] N86-27101

NORTHWESTERN UNIV., EVANSTON, ILL.
Effects of quenched-in hydrogen on deformation of iron single crystals
[DE86-001883] N86-26426
Role of hydrogen, sulfur and other impurities in intergranular fracture in iron
[DE86-001884] N86-26427
Cosmic dust collection with a sub-satellite tethered to a space station N86-27146

NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT, KJELLER.
DC-probe measurements in the middle atmosphere N86-26731

NOTRE DAME UNIV., IND.
Proceedings of the Conference on Low Reynolds Number Airfoil Aerodynamics
[NASA-CR-177308] N86-26283

O

OAK RIDGE NATIONAL LAB., TENN.
Effects of rapidly pulsed ion bombardment on microstructure and phase stability in a Ti-modified stainless steel
[DE86-004790] N86-26424
Hardness of ion implanted ceramics
[DE86-004771] N86-26432
Energy deposition, heat flow and rapid solidification during laser and electron beam irradiation of materials
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Design concepts and advanced manipulator development for nuclear fuel cycle facilities
[DE85-01771] N86-26636
Features of spherical torus plasmas
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Highlights from the assembly of the helical field coils for the Advanced Toroidal Facility
[DE86-004758] N86-27081
Amorphization and recrystallization processes in monocrystalline beta silicon carbide thin films
[DE86-004797] N86-27101
Quality control in research data bases: The US Environmental Protection Agency National Surface Water Survey Experience
[DE86-002249] N86-27117

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Propergol combustion based on octogenesis N86-26470

OFFICE OF NAVAL RESEARCH, ARLINGTON, VA.
Structural chemistry of energetic compounds
[AD-A164813] N86-26397

OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
The damage tolerance of carbon fiber reinforced composites: A workshop summary
[AD-A163757] N86-26381
State-of-the-Art survey of gyrotron research: An ONRL sponsored workshop
[AD-A163560] N86-26600
Biotechnica '85 International Congress for Biotechnology
[AD-A165415] N86-26794
European science notes. Volume 40, number 4
[AD-A165292] N86-27134

OHIO STATE UNIV., COLUMBUS.
An E-plane analysis of aperture-matched horn antennas using the moment method and the uniform geometrical theory of diffraction
[NASA-CR-176841] N86-26484
Moment method analysis of microstrip antennas over a wide frequency range
[NASA-CR-176842] N86-26485
Asymptotic high frequency analysis of the electromagnetic backscattering from an inlet model consisting of piecewise linearly tapered sections
[NASA-CR-176844] N86-26486
Simulation of an aircraft flying through a ground station to satellite link
[NASA-CR-176845] N86-26487
Radar target classification studies: Software development and documentation
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Joint services electronics program
[AD-A164918] N86-26532
A study of the optimization problem for calibrating a Lacoste and Romberg G gravity meter to determine circular errors
[AD-A165218] N86-26607
Impactor interaction with concrete structures: Local effects N86-26645
An isostatic Earth model
[AD-A164608] N86-26672
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[AD-A164564] N86-26745
A decade of SETI observations N86-26905
Investigations of ultrasonic wave interactions at boundaries separating anisotropic materials
[DE86-004953] N86-27050

OLD DOMINION UNIV., NORFOLK, VA.
Identification manual for phytoplankton of the United States Atlantic coast
[PB86-151222] N86-26792

OPERATIONS RESEARCH, INC., SILVER SPRING, MD.
Spectrum orbit utilization program technical manual SOUP5 Version 3.8
[NASA-CR-174944] N86-26489

OPTICAL SOCIETY OF AMERICA, WASHINGTON, D. C.
Topical Meeting on Picosecond Electronics and Optoelectronics: A digest of technical papers
[AD-A164598] N86-27069

OREGON GRADUATE CENTER FOR STUDY AND RESEARCH, BEAVERTON.
Monolithic methodes
[AD-A163282] N86-26523

OSAKA TITANIUM CO. LTD., AMAGASAKI (JAPAN).
Economics of polysilicon process: A view from Japan N86-26682
Processes and process development in Japan N86-26689

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PACIFIC MISSILE TEST CENTER, POINT MUGU, CALIF.
Navstar GPS (Global Positioning System) accuracy while surveying arrays of deep ocean transponders
[AD-A163364] N86-26313
Tidal and lunar data for Point Mugu, San Nicholas Island, and the Barking Sands Area during 1986
[AD-A163249] N86-26784

PACIFIC NORTHWEST LAB., RICHLAND, WASH.
Project summaries: Seventh Battery and Electrochemical Contractors' Conference
[DE86-003020] N86-26676

PACIFIC-SIERRA RESEARCH CORP., LOS ANGELES, CALIF.
Radiation of long electromagnetic waves by a modulated electron beam in the ionosphere
[AD-A163306] N86-26743

PATTERN ANALYSIS AND RECOGNITION CORP., MCLEAN, VA.
Human factors in rule-based systems
[AD-A165309] N86-26840
Mental models and problem solving with a knowledge-based expert system
[AD-A165398] N86-26843

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Crack propagation and branching in burning solid propellants and ignition of nitramine-based composite propellants
[AD-A164630] N86-26481
Comparison of the coherent attenuation predicted by single and multiple scattering theories for the case of several types of hydrometeors
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PENNSYLVANIA TRANSPORTATION INST., UNIVERSITY PARK.
Rocket probe techniques for measuring bulk ion properties N86-26732

PITTSBURGH UNIV., PA.
DF vibrational relaxation
[AD-A153421] N86-26392
The relative entropy of a random vector with respect to another random vector
[AD-A164093] N86-26998
Computation of the stationary values of the product of two Raleigh quotients
[AD-A164586] N86-27005

POLYTECHNIC INST. OF NEW YORK, BROOKLYN.
Lumped-element and leaky-wave antennas for millimeter waves
[AD-A165280] N86-26536
Further work on sodium montmorillonite as catalyst for the polymerization of activated amino acids N86-26868

PRAGMA S.P.A., ROME (ITALY).
Solar silicon from directional solidification of MG silicon produced via the silicon carbide route N86-26694

PRINCETON UNIV., N. J.
A demonstration expert system for implementing emergency procedures in a high-performance fighter aircraft
[MAE-1749] N86-26295
Integrated risk/cost planning models for the US Air Traffic system
[NASA-CR-177274] N86-26312
Robust and nonparametric detection of fading narrowband signals
[AD-A164924] N86-26512
Finite length discrete matched filters
[AD-A164869] N86-26531
Conditions for the construction of multi-point total variation diminishing difference schemes N86-26585

PRINS MAURITS LAB. TNO, RIJSWIJK (NETHERLANDS).
Stability of nitrocellulose propellants assessed via thermal decomposition and alteration of the stabilizer composition N86-26471

Q

QUEST ENGINEERING DEVELOPMENT CORP., CROSBY, TEX.
Pressure systems energy release protection (gas pressurized systems)
[NASA-CR-178090] N86-26626

R

RANGE COMMANDERS COUNCIL, WHITE SANDS MISSILE RANGE, N. MEX.
IRIG standard data format for interrange transmission of tracking data from computer to computer (2400 BPS synchronous EFG format 0)
[AD-A163251] N86-26662

RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Thermal expansion of elastic-plastic composite materials
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Effect of liquid composition on enhanced flow due to surface shear in the contact line region: Constant vapor pressure boundary condition
[AD-A165545] N86-26587
Polarization modulated ellipsometry
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Photolysis products of CO, NH3 aND H2O and their significance to reactions on interstellar grains N86-26649
Theory of photo- and electroproduction of mesons: problems and prospects
[DE86-004094] N86-27052

RICARDO & CO., ENGINEERS (1927) LTD., SHOREHAM-BY-SEA (ENGLAND).
Investigation into alternative fuel rating techniques
[DE86-004277] N86-26467

RICE UNIV., HOUSTON, TEX.
The orbit properties of colliding co-orbiting bodies N86-27149
A magnetospheric simulation at the space station N86-27155

ROCKEFELLER UNIV., NEW YORK.
Biosynthetic porphyrins and the origin of photosynthesis N86-26794

ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Orbit Transfer Rocket Engine Technology Program: Advanced engine study, task D.1/D.3
[NASA-CR-175084] N86-26369
Seam tracking performance of a Coaxial Weld Vision System and pulsed welding
[NASA-CR-178816] N86-26627
High temperature molten salt storage
[DE85-018874] N86-26706

ROCKWELL INTERNATIONAL CORP., GOLDEN, COLO.
Character of silver lining
[DE86-001565] N86-26423

ROCKWELL INTERNATIONAL CORP., LOS ANGELES, CALIF.
CADS: A Computer Aided Design System. Volume 2. User's guide
[AD-A163258] N86-26035

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
A comparative analysis of whispered and normally phonated speech using an LPC-10 vocoder
[AD-A163307] N86-26504
Minimizing EHF waveguide losses
[AD-A164726] N86-26530
Concept study of a multiple beam lens antenna with an internal phase shift mask
[AD-A165277] N86-26535
The effects of arsine pressure on the compositions, carrier concentrations, mobilities and growth rates of epitaxial layers of Ga(x)In(1-x)As prepared by the VPE (Vapor-Phase Epitaxy)-hydride technique
[AD-A165278] N86-27097

ROSWELL PARK MEMORIAL INST., BUFFALO, N. Y.
A comparative study of prebiotic and present day translational models N86-26877

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
The air-injection method of fixing boundary-layer transition and investigating scale effects
[RAE-TR-85025] N86-26542

ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, SCHIPHOL-OOST.
The IRAS revisited (lessons learned from IRAS operations)
[FOK-TR-85-82] N86-27170

ROYAL ORDNANCE PLC, WALTHAM ABBEY (ENGLAND).
Smokeless propellants of improved performance N86-26489

ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Regular expression analysis of procedures and exceptions
[RSRE-85008] N86-26927
Extending data typing beyond the bounds of programming languages
[RSRE-MEMO-3879] N86-26931

RUTGERS - THE STATE UNIV., PISCATAWAY, N. J.
Field-induced crystallization in highly plasticized poly(vinylidene fluoride) films
[AD-A164884] N86-26442
Field induced dipole reorientation and piezoelectricity in heavily plasticized nylon 11 films
[AD-A164883] N86-27095

S

SAINT LOUIS UNIV., MO.
Attenuation of seismic waves at regional distances
[AD-A164617] N86-26746

SALK INSTITUTE FOR BIOLOGICAL STUDIES, SAN DIEGO, CALIF.
Stereoselective formation of a 2 prime (3 prime)-aminoacyl ester of a nucleotide
[NASA-CR-178830] N86-26373
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Models of glycolysis: Glyceraldehyde as a source of energy and monomers for prebiotic condensation N86-26876

SAN DIEGO STATE UNIV., CALIF.
Measurements of HO2 chemical kinetics with a new detection method
[NASA-CR-178826] N86-26388
Photoabsorption and photodissociation of molecules important in the interstellar medium
[NASA-CR-178828] N86-27171

SAN FRANCISCO STATE UNIV., CALIF.
Adsorption and condensation of amino acids and nucleotides with soluble mineral salts N86-26869

SAN JOSE STATE UNIV., CALIF.
Clay energetics in chemical evolution N86-26867
New techniques for the detection and capture of micrometeoroids N86-27167

SANDIA NATIONAL LABS., ALBUQUERQUE, N. MEX.
Formation of surface layers of icosahedral Al(Mn)
[DE86-004606] N86-26433
Transient conductance measurements and heat-flow analysis of pulsed-laser-induced melting of aluminum thin films
[DE86-003928] N86-26613
Simple wavemeter for pulsed dye lasers
[DE86-004488] N86-26624
Rectangular plate is proposed as an IES modal test structure
[DE85-018274] N86-26643
Status of electric vehicle battery development and manufacturing activities outside of the United States
[DE86-004215] N86-26703
Update on the structural design of the Sandia 34-M vertical axis wind turbine
[DE86-004217] N86-26704
Electronic transport in boron carbides
[DE86-003721] N86-27086
Pressure-dependent magneto-optic measurements in strained-layer superlattices at low temperatures
[DE86-004604] N86-27088
Optical imaging of dislocations in strained-layer superlattices and lattice-mismatched epilayers
[DE86-004620] N86-27102

SANDIA NATIONAL LABS., LIVERMORE, CALIF.
TOPAZ - The transient one-dimensional pipe flow analyzer: Equations and numerics
[DE86-005063] N86-26592
Crystal plasticity analysis of large-strain shear
[DE86-005061] N86-26660
Numerical modeling of a solid particle solar central receiver
[DE86-005066] N86-26709

SANTA CLARA UNIV., CALIF.
Cooperation of catalysts and templates N86-26871

SCHMITT (RAINER), GLASHUTTEN (WEST GERMANY).
Investigations of the micro-turbulence in the bottom of the boundary layer
[AD-A165306] N86-26748

SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
Eye protection against intense light sources N86-26618
The healthy motivation to fly: No psychiatric diagnosis
[AD-A164944] N86-26832
Methodology for integration testing of aircrew clothing and equipment
[AD-A165328] N86-26842

SCIENCE APPLICATIONS INTERNATIONAL CORP., COLLEGE STATION, TEX.
A study of sea ice kinematics and their relationship to arctic ambient noise. Part 3, Section 1: Ambient noise. Section 2: Ambient noise
[AD-A165304] N86-26786
A study of sea ice kinematics and their relationship to arctic ambient noise. Part 3, section 3: Ambient noise
[AD-A165305] N86-26789

SCIENTIFIC RESEARCH ASSOCIATES, INC., GLASTONBURY, CONN.
Transient transport in binary and ternary semiconductors
[AD-A165484] N86-27098

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
Infrasonic ambient ocean noise spectra from freely drifting sensors
[AD-A163413] N86-26785

SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE INST., LOS ALTOS, CALIF.
Observational exobiology N86-26850
Goldstone field test activities: Target search N86-26911

SEVERN COMMUNICATIONS CORP., SEVERNA PARK, MD.
Survey of atmospheric radiation components for the Gamma and Cosmic Ray Astrophysics Branch of the Space Science Division of the Naval Research Laboratory
[AD-A165538] N86-27177

SHOCK AND VIBRATION INFORMATION CENTER (DEFENSE), WASHINGTON, D. C.
The Shock and Vibration Digest, volume 17, no. 9
[AD-A161143] N86-26644

SIEMENS A.G., MUNICH (WEST GERMANY).
Solar-grade silicon prepared by carbothermic reduction of silica N86-26692

SIERRA GEOPHYSICS, INC., REDMOND, WASH.
MSS evaluation. Revision 1
[AD-A164589] N86-27047

SIMULA, INC., PHOENIX, ARIZ.
Crash-resistant crewseat limit-load optimization through dynamic testing with cadavers
[AD-A164828] N86-26298

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Determination of band oscillator strengths of atmospheric molecules from high resolution vacuum ultraviolet cross section measurements
[NASA-CR-177293] N86-26724
Theoretical study of the X-ray emission from astrophysical shock waves
[NASA-CR-177318] N86-27176

SOCIETE FRANCAISE D'INSTRUMENTS DE MESURE, VELIZY-VILLACOUBLAY (FRANCE).
Use of a CO2 laser lidar for flight and penetration at very low altitudes N86-26326

SOFTECH, INC., FAIRBORN, OHIO.
Ada (trademark) compiler validation summary report. Verdix Ada compiler, VADS, Version V03.08 for VAX-11/785, using ULTRIX 1.0
[AD-A163345] N86-26942
Ada (trade name) compiler validation summary report: Verdix Ada Compiler, VAda-010-0101, Version V03.04 for VAX-11/750, using UNIX 4.2 BSD
[AD-A163383] N86-26943

SOFTECH, INC., WALTHAM, MASS.
Ada (trademark) training curriculum. Software engineering methodologies m201 teacher's workbook
[AD-A165299] N86-26954
Ada (trademark) training curriculum. Software engineering methodologies m201 teacher's guide, volume 1
[AD-A165300] N86-26955
Ada (trademark) training curriculum. Software engineering methodologies m201 teacher's guide, volume 2
[AD-A165301] N86-26956
Ada (trademark) training curriculum. Software engineering methodologies m201 teacher's guide, volume 3
[AD-A165302] N86-26957
Ada (trademark) training curriculum. Ada (registered trademark) for software managers, t201: Teacher's guide, volume 1
[AD-A165314] N86-26958
Ada (Trademark) training curriculum. Ada (Registered Trademark) for software managers, t201. Volume 2: Teacher's guide
[AD-A165315] N86-26959
Ada (Trademark) primer
[AD-A165345] N86-26964
ADA (trademark) training curriculum. Instructor's course s500 management modules
[AD-A165347] N86-26965

Ada (trademark) training curriculum. Instructor's course s500 introductory language modules
[AD-A165348] N86-26966
Ada (trademark) training curriculum. Instructor's course s500 methodology modules
[AD-A165349] N86-26967
Ada (trademark) training curriculum. Instructor's course s500 overview
[AD-A165350] N86-26968
Ada (Trademark) training curriculum: Ada orientation for managers 1101 teacher's guide
[AD-A165351] N86-26969
Ada (Trademark) training curriculum: Ada technical overview 1102 teacher's guide
[AD-A165352] N86-26970

SOHAR, INC., LOS ANGELES, CALIF.
Reliability prediction for spacecraft
[AD-A164747] N86-26359

SOUTH CAROLINA UNIV., COLUMBIA.
Application of LANDSAT TM images to assess circulation and dispersion in coastal lagoons
[NASA-CR-177315] N86-26665
Investigation of subsurface exploration methods for prevailing geologic conditions in South Carolina
[PB86-167087] N86-26752

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.
The inhibition of vapor-phase corrosion. A review
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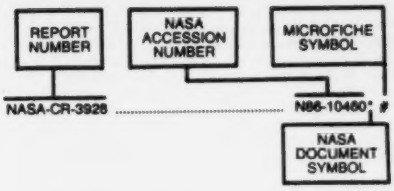

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AD-A165562 N86-26773 #
AD-A165563 N86-26774 #
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AD-A165586 N86-26292 #
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AD-A165593 N86-26608 #
AD-A166250 N86-27118 #

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AD-D012186 N86-26540 #

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AD-E500736 N86-26459 #
AD-E500739 N86-26460 #
AD-E500741 N86-26938 #
AD-E500742 N86-26939 #
AD-E500743 N86-26936 #
AD-E500743 N86-27057 #
AD-E500744 N86-26937 #
AD-E500749 N86-26622 #
AD-E500750 N86-26621 #
AD-E751128 N86-26767 #
AD-E900539 N86-26601 #
AD-E950773 N86-26635 #

AD-F250510 N86-26453 #
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AD-F250510 N86-27059 #
AD-F630715 N86-26384 #
AD-F630715 N86-26451 #
AD-F630715 N86-27134 #

AFESC/ESL-TR-85-14 N86-26715 #
AFESC/ESL-TR-85-41 N86-26714 #

AFGL-ERP-911 N86-27011 #
AFGL-ERP-921 N86-26290 #
AFGL-ERP-932 N86-26775 #

AFGL-TR-85-0023 N86-26354* #
AFGL-TR-85-0066 N86-26749 #
AFGL-TR-85-0091 N86-27011 #
AFGL-TR-85-0130 N86-26290 #
AFGL-TR-85-0185 N86-26746 #
AFGL-TR-85-0204 N86-26401 #
AFGL-TR-85-0206 N86-26607 #
AFGL-TR-85-0237 N86-26747 #
AFGL-TR-85-0238 N86-26353 #
AFGL-TR-85-0239 N86-26672 #
AFGL-TR-85-0253 N86-26775 #
AFGL-TR-85-0258 N86-26038 #
AFGL-TR-85-0279 N86-26745 #
AFGL-TR-85-0340 N86-26391 #
AFGL-TR-86-0049 N86-26404 #

AFHRL-TP-85-43 N86-26344 #

AFIT/DS/PH/84-3 N86-26332 #

AFIT/GAE/AA/85D-6 N86-26334 #
AFIT/GAE/AA/85D-09 N86-26578 #

AFOSR-85-0672TR N86-26418 #
AFOSR-85-1238TR N86-26390 #
AFOSR-86-0001TR N86-26584 #
AFOSR-86-0036TR N86-26668 #
AFOSR-86-0038TR N86-27005 #

AFWAL-TR-84-3115 N86-26382 #
AFWAL-TR-85-2052 N86-26606 #
AFWAL-TR-85-2082 N86-26633 #
AFWAL-TR-85-3066-VOL-2 N86-26635 #
AFWAL-TR-85-4009 N86-26659 #
AFWAL-TR-85-4074 N86-26658 #
AFWAL-TR-85-4136 N86-26384 #

AFWL-TR-84-154-PT-1 N86-26655 #

AGARD-CAL-85/2 N86-27112 #

AGARD-CP-379 N86-26802 #
AGARD-CP-387 N86-26316 #
AGARD-CP-391 N86-26468 #

AIAA-86-0978 N86-26653* #
AIAA-86-1458 N86-26545* #
AIAA-86-1809 N86-26285* #
AIAA-86-2126-CP N86-26341* #
AIAA-86-9761 N86-26277* #

AMMRC-TR-85-26 N86-26658 #

AMSMI/RG-85-22-TR N86-26635 #

AMSTE-RP-702-104 N86-26372 #

AMTE(M)-TM-85219 N86-26630 #

AMTE(N)-TM-84063 N86-26574 #

AMTE(S)-R-85104 N86-26654 #

AMXTH-TE-TR-85038 N86-26457 #

APL-UW-8508 N86-27046 #

APR-1 N86-26390 #

AR-1 N86-26461 #
AR-6 N86-26419 #
AR-7 N86-27093 #
AR-8 N86-26532 #
AR-86-2 N86-26330* #
AR-004-044 N86-26378 #
AR-004-046 N86-26337 #
AR-004-060 N86-26411 #

ARCCB-TR-85001 N86-26421 #

ARL-AERO-PROP-R-168 N86-26337 #

ARL-AERO-PROP-TM-426 N86-26338 #

ARL-MAT-R-118 N86-26411 #

ARL-STRUC-R-417 N86-26378 #

ARL-TR-85-40 N86-27048 #
ARL-TR-85-41 N86-27044 #

ARO-17591-17-PH N86-27070 #
ARO-18480.5-EL N86-27096 #
ARO-18491.6-PH N86-26609 #
ARO-18537.1-CH N86-26440 #
ARO-18712.5-PH N86-26441 #
ARO-18898.30-EL N86-26964 #

ARO-18906.23-MA ..... N86-26396 #
ARO-18920.3-CH ..... N86-26395 #
ARO-19141.3-CH ..... N86-26403 #
ARO-19486.4-EG ..... N86-26465 #
ARO-19643.4-MA ..... N86-26997 #
ARO-19684.2-GS ..... N86-26763 #
ARO-19879.17-EG ..... N86-26567 #
ARO-20637.11-EL ..... N86-26922 #
ARO-20960.42-MA ..... N86-26986 #
ARO-21376.4-EL ..... N86-26506 #
ARO-21825.1-GS ..... N86-26513 #
ARO-21825.2-GS ..... N86-26507 #
ARO-21859.1-MA ..... N86-27007 #
ARO-22361.1-MS ..... N86-26439 #
ARO-22576.2-PH-H ..... N86-26623 #

ASE-5066 ..... N86-27173* #

AVSCOM-TR-86-C-20 ..... N86-26629* #

BBN-6135 ..... N86-26951 #

BDM/H-86-0115-TR-VOL-1 ..... N86-26385 #
BDM/H-86-0115-TR-VOL-2 ..... N86-26386 #

BFLRF-189 ..... N86-26446 #
BFLRF-201 ..... N86-26460 #
BFLRF-209 ..... N86-26417 #

BNL-36993 ..... N86-26425 #
BNL-37139 ..... N86-26614 #
BNL-37221 ..... N86-27061 #
BNL-51927 ..... N86-27065 #

BRL-CR-551 ..... N86-26586 #

BRL-MR-3484 ..... N86-26585 #

BRL-SP-50 ..... N86-26370 #

BRL-TR-2696 ..... N86-25944 #
BRL-TR-2702 ..... N86-27010 #
BRL-TR-2703 ..... N86-26483 #
BRL-TR-2709 ..... N86-26400 #
BRL-TR-2712 ..... N86-26451 #

BR96848 ..... N86-26630 #
BR97257 ..... N86-26542
BR97439 ..... N86-26654 #
BR97645 ..... N86-26574 #
BR97869 ..... N86-26931 #
BR97966 ..... N86-26927

B8462753 ..... N86-26834 #
B8561711 ..... N86-26827
B8561714 ..... N86-26826
B8573005 ..... N86-27019 #
B8574250 ..... N86-27051 #
B8574251 ..... N86-26719 #
B8575491 ..... N86-26541 #
B8575492 ..... N86-26977 #
B8575494 ..... N86-27027 #
B8575495 ..... N86-26979 #
B8575496 ..... N86-26980 #
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B8575498 ..... N86-26795 #
B8575499 ..... N86-26978 #
B8575500 ..... N86-27026 #
B8575501 ..... N86-26985 #
B8575584 ..... N86-27066 #
B8576223 ..... N86-26663 #
B8576224 ..... N86-26662 #
B8576225 ..... N86-26429 #
B8577051 ..... N86-27071 #
B8577052 ..... N86-26661 #
B8577053 ..... N86-26293 #
B8577054 ..... N86-26294 #
B8577110 ..... N86-27021 #
B8577113 ..... N86-27037 #
B8577114 ..... N86-27135 #
B8577117 ..... N86-27020 #
B8578041 ..... N86-27022 #
B8578042 ..... N86-27023 #
B8578043 ..... N86-27024 #
B8578045 ..... N86-27025 #
B8578049 ..... N86-26751 #
B8578199 ..... N86-27107 #
B8578426 ..... N86-26367 #
B8578427 ..... N86-26430 #
B8578432 ..... N86-26594 #
B8578435 ..... N86-27016 #
B8578436 ..... N86-26366 #

CALSPAN-6857-M-1 ..... N86-26603 #

CECM-1 ..... N86-26383 #

CERL-TR-M-86/06 ..... N86-26448 #

CONF-850293-ABST ..... N86-26525 #
CONF-850429 ..... N86-26705 #
CONF-850786-8 ..... N86-27086 #
CONF-850786-9 ..... N86-26967 #
CONF-850823 ..... N86-26426 #
CONF-850823 ..... N86-26427 #
CONF-850827-1 ..... N86-26636 #
CONF-850859-3 ..... N86-26930 #
CONF-850956-13 ..... N86-26614 #
CONF-850956-14 ..... N86-26617 #
CONF-851002-1 ..... N86-26589 #
CONF-851009-41 ..... N86-27061 #
CONF-851102-34 ..... N86-26612 #
CONF-851102-57 ..... N86-27062 #
CONF-851102-59 ..... N86-27061 #
CONF-851146-SUMM ..... N86-26676 #
CONF-851146-2 ..... N86-26702 #
CONF-851165-2 ..... N86-26615 #
CONF-851217-12 ..... N86-26613 #
CONF-851217-15 ..... N86-27101 #
CONF-851217-16 ..... N86-27102 #
CONF-851217-19 ..... N86-26433 #
CONF-851217-20 ..... N86-27066 #
CONF-851217-21 ..... N86-26432 #
CONF-851244-1 ..... N86-26375 #
CONF-851251-1 ..... N86-27072 #
CONF-860130-3 ..... N86-26350 #
CONF-860218-1 ..... N86-26704 #
CONF-860224-1 ..... N86-26643 #
CONF-860224-2 ..... N86-26993 #
CONF-8406177 ..... N86-27109 #
CONF-8506216-1 ..... N86-26929 #
CONF-8506151-1 ..... N86-27060 #
CONF-8506137-1 ..... N86-26425 #
CONF-8506146-1 ..... N86-26641 #
CONF-8509183-2 ..... N86-26405 #
CONF-8509203-3 ..... N86-27016 #
CONF-8509211-1 ..... N86-26713 #
CONF-8509216-1 ..... N86-27079 #
CONF-8509219-1 ..... N86-26917 #
CONF-8510160-7 ..... N86-26588 #
CONF-8510160-9 ..... N86-26423 #
CONF-8510168-5 ..... N86-26424 #
CONF-8510186-4 ..... N86-26610 #
CONF-8510203-3 ..... N86-27062 #
CONF-8510236-1 ..... N86-26431 #
CONF-8510250-1 ..... N86-26718 #
CONF-8511103-5 ..... N86-26611 #
CONF-8511112-1 ..... N86-27117 #
CONF-8511114-1 ..... N86-26916 #
CONF-8511118-3 ..... N86-27039 #

COO-1367-157 ..... N86-26427 #
COO-1367-158 ..... N86-26426 #

CRC-TR-84-16 ..... N86-26928* #

CRC-546 ..... N86-26299 #

CRI-85-23 ..... N86-26922 #

CRUP-260 ..... N86-27113 #

CRREL-SR-85-21 ..... N86-26671 #

CRREL-85-15 ..... N86-26457 #
CRREL-85-19 ..... N86-26500 #

CRS-TK-7865-F ..... N86-27130 #

CSC/TR-85/6013 ..... N86-26347* #

CSDL-T-902 ..... N86-26933* #
CSDL-T-912 ..... N86-26932* #

CSL-TR-84-258 ..... N86-26928* #

CSR-P-85-5 ..... N86-27076* #
CSR-P-85-6 ..... N86-27075* #

CSSA-ASTRO-85-23 ..... N86-27174 #

CU-CSD-TR-85-723 ..... N86-26948 #
CU-CSD-TR-86-735 ..... N86-27040 #

CUCOMB-2 ..... N86-26396 #

CWI-AM-R8507 ..... N86-27022 #
CWI-AM-R8508 ..... N86-27023 #
CWI-AM-R8509 ..... N86-27024 #
CWI-AM-R8511 ..... N86-27025 #
CWI-AM-R8515 ..... N86-26751 #

CWI-CS-R8406 ..... N86-26979 #

CWI-CS-R8513 ..... N86-26995 #
CWI-CS-R8514 ..... N86-26541 #
CWI-CS-R8515 ..... N86-26977 #
CWI-CS-R8516 ..... N86-26795 #
CWI-CS-R8517 ..... N86-27026 #
CWI-CS-R8518 ..... N86-26978 #
CWI-CS-R8519 ..... N86-26979 #
CWI-CS-R8520-REV ..... N86-26980 #
CWI-CS-R8521 ..... N86-27027 #
CWI-CS-R8522 ..... N86-26981 #

CWI-MS-R8507 ..... N86-27019 #
CWI-MS-R8508 ..... N86-27135 #

CWI-OS-R8506 ..... N86-27020 #
CWI-OS-R8507 ..... N86-27037 #
CWI-OS-R8510 ..... N86-27021 #

DCA-CIRC-600-60-1-CH-2 ..... N86-26505 #

DCA/MSO-85-109A ..... N86-26514 #
DCA/MSO-85-129 ..... N86-26973 #

DE85-01771 ..... N86-26636 #
DE85-008595 ..... N86-26705 #
DE85-008791 ..... N86-26706 #
DE85-013669 ..... N86-26589 #
DE85-014538 ..... N86-27060 #
DE85-016668 ..... N86-27175 #
DE85-016674 ..... N86-26706 #
DE85-016675 ..... N86-26707 #
DE85-016687 ..... N86-26699 #
DE85-016693 ..... N86-26700 #
DE85-017878 ..... N86-26590 #
DE85-018274 ..... N86-26643 #
DE85-018533 ..... N86-26993 #
DE86-000260 ..... N86-26454 #
DE86-000779 ..... N86-26916 #
DE86-000798 ..... N86-26375 #
DE86-001165 ..... N86-27054 #
DE86-001174 ..... N86-26425 #
DE86-001585 ..... N86-26423 #
DE86-001751 ..... N86-26387 #
DE86-001814 ..... N86-26641 #
DE86-001863 ..... N86-26426 #
DE86-001864 ..... N86-26427 #
DE86-002240 ..... N86-26588 #
DE86-002249 ..... N86-27117 #
DE86-002967 ..... N86-26521 #
DE86-002973 ..... N86-26466 #
DE86-002975 ..... N86-26456 #
DE86-002982 ..... N86-26625 #
DE86-003020 ..... N86-26676 #
DE86-003176 ..... N86-26350 #
DE86-003289 ..... N86-27109 #
DE86-003372 ..... N86-26614 #
DE86-003484 ..... N86-26701 #
DE86-003492 ..... N86-26615 #
DE86-003654 ..... N86-26610 #
DE86-003655 ..... N86-27039 #
DE86-003666 ..... N86-26611 #
DE86-003667 ..... N86-26612 #
DE86-003673 ..... N86-27062 #
DE86-003690 ..... N86-26617 #
DE86-003721 ..... N86-27086 #
DE86-003727 ..... N86-26431 #
DE86-003926 ..... N86-26613 #
DE86-004040 ..... N86-26713 #
DE86-004057 ..... N86-26702 #
DE86-004060 ..... N86-26929 #
DE86-004094 ..... N86-27052 #
DE86-004104 ..... N86-26405 #
DE86-004215 ..... N86-26703 #
DE86-004217 ..... N86-26704 #
DE86-004238 ..... N86-27079 #
DE86-004239 ..... N86-27072 #
DE86-004277 ..... N86-26467 #
DE86-004355 ..... N86-27061 #
DE86-004402 ..... N86-27073 #
DE86-004480 ..... N86-26930 #
DE86-004488 ..... N86-26624 #
DE86-004508 ..... N86-27087 #
DE86-004516 ..... N86-27106 #
DE86-004527 ..... N86-27064 #
DE86-004562 ..... N86-27015 #
DE86-004604 ..... N86-27088 #
DE86-004606 ..... N86-26433 #
DE86-004620 ..... N86-27102 #
DE86-004624 ..... N86-26718 #
DE86-004631 ..... N86-26776 #
DE86-004642 ..... N86-27080 #
DE86-004733 ..... N86-27016 #
DE86-004746 ..... N86-26917 #
DE86-004758 ..... N86-27081 #
DE86-004771 ..... N86-26432 #
DE86-004790 ..... N86-26424 #

DE86-004797 ..... N86-27101 #
DE86-004805 ..... N86-27082 #
DE86-004834 ..... N86-27103 #
DE86-004851 ..... N86-26455 #
DE86-004853 ..... N86-27050 #
DE86-005003 ..... N86-26591 #
DE86-005061 ..... N86-26660 #
DE86-005063 ..... N86-26592 #
DE86-005096 ..... N86-26709 #
DE86-005297 ..... N86-26626 #
DE86-005309 ..... N86-27065 #
DE86-005350 ..... N86-26593 #

DFVLR-FB-85-59 ..... N86-26519 #

DGLR-78-185 ..... N86-26549* #

DOE/CE-50010/1 ..... N86-26467 #

DOE/ER-01367/157 ..... N86-26427 #
DOE/ER-01367/158 ..... N86-26426 #
DOE/ER-10712/5 ..... N86-27054 #
DOE/ER-30063/T1-VOL-1 ..... N86-26455 #
DOE/ER-30063/T3-VOL-3 ..... N86-26456 #
DOE/ER-40114/T2 ..... N86-27052 #
DOE/ER-40118/1 ..... N86-27106 #
DOE/ER-45057/1 ..... N86-27050 #
DOE/ER-45072/18 ..... N86-27067 #
DOE/ER-45193/T1 ..... N86-26455 #
DOE/ER-52068/T10 ..... N86-27103 #
DOE/ER-60304/1 ..... N86-26776 #

DOE/ET-25102/T1 ..... N86-26701 #
DOE/ET-52048/32 ..... N86-27064 #
DOE/ET-53068/212 ..... N86-27015 #

DOE/ID-12532/1 ..... N86-26593 #

DOE/JPL-1012-122 ..... N86-26679* #

DOE/METC-85-6023 ..... N86-26705 #

DOE/RL-01830/T40 ..... N86-26703 #

DOE/SF-11564/13 ..... N86-26454 #

DOT/FAA/CT-TN85/80 ..... N86-26315 #

DOT/FAA/PM-85-28 ..... N86-26762 #

DP-MS-85-116 ..... N86-26718 #

DR/CG-161-85 ..... N86-26982 #

DREA-TC-85/314 ..... N86-26940 #

DRES-365 ..... N86-26459 #

DTIC/TR-86/7 ..... N86-27118 #

DTNSRDC-PASD-CR-1886 ..... N86-26629* #

DTNSRDC-86/001 ..... N86-26582 #

DTNSRDC/ASED-CR-01-85 ..... N86-26583 #

DTNSRDC/SPD-1163-02 ..... N86-26605 #
DTNSRDC/SPD-1163-03 ..... N86-26604 #

E-2990 ..... N86-26651* #
E-3025 ..... N86-26596* #
E-3046 ..... N86-26520* #
E-3048 ..... N86-26336* #
E-3060 ..... N86-26285* #
E-3065 ..... N86-27036* #
E-3072 ..... N86-26545* #
E-3076 ..... N86-26677* #
E-3090 ..... N86-26376* #
E-3101 ..... N86-26914* #

EEC-159 ..... N86-26633 #

EES-85-9 ..... N86-26312* #

EMORY/DC/TR/8 ..... N86-26399 #
EMORY/DC/TR/10 ..... N86-26398 #

EPA-600/D086-062 ..... N86-26722 #
EPA-600/4-86-003 ..... N86-26792 #
EPA-600/7-86-001A ..... N86-26637 #

ERIM-163700-12-F ..... N86-26609 #

ERNO-671-AHF/2 ..... N86-26710 #

ESA-CR(P)-2141 ..... N86-26711 #

ESA-CR(P)-2145-VOL-1 ..... N86-26361 #
ESA-CR(P)-2145-VOL-2 ..... N86-26362 #
ESA-CR(P)-2145-VOL-3 ..... N86-26363 #
ESA-CR(P)-2148-VOL-1 ..... N86-26364 #
ESA-CR(P)-2148-VOL-2 ..... N86-26365 #
ESA-CR(P)-2149 ..... N86-26518 #
ESA-CR(P)-2156 ..... N86-26710 #
ESA-CR(P)-2157 ..... N86-26750 #
ESA-CR(P)-2167 ..... N86-27170 #

ESA-85-96844 ..... N86-26542
ESA-85-96846 ..... N86-26927
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52 AEROSPACE MEDICINE 2956
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 2960
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT N.A.
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY 2961
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 2961
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 2961
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 2964
Includes computer networks.

63 CYBERNETICS 2965
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 2965
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 2967
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS N.A.
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 2968
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 2968
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 2968
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS 2969
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 2970
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS 2970
Includes light phenomena.

75 PLASMA PHYSICS 2971
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS 2973
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS 2974
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **2974**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **2975**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **2976**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS **2976**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **2977**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **2977**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) **2977**

89 ASTRONOMY **2980**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **2981**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **2981**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **2982**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **2984**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 18 / SEPTEMBER 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-27178# Minority Services, Inc., Washington, D.C.
MICROWAVE LANDING SYSTEM (MLS) STATION INTERFACE CONTROL REPORT
Jun. 1986 182 p
(Contract DTFA01-86-Y-01010)
(DOT/FAA/PM-86/17) Avail: NTIS HC A09/MF A01

This report contains requirements which are applicable to the MLS Interfaces for the system control functions, Remote Monitoring and Maintenance System status and maintenance reporting functions, and the synchronization function. The purpose is to provide for complete interoperability of MLS ground equipments which may have a different design and/or manufacturer, serving opposite ends of the same runway. Information is provided for the communication protocol and message/data formats between the Maintenance Processor Subsystem (MPS) and the Remote Monitoring System (RMS) of an MLS. The Remote Control and Status Unit (RCSU) is the RMS focal point for the MLS. Similar information is provided for the interface/communications between the RCSU and the stations of the MLS. A Printer/Terminal (P/T) provides active interface with the MLS stations. Information on the P/T interface and the set of P/T commands is provided. The various operating/non operating states of the MLS are given. A set of data parameters is given which may be transmitted to the MPS as descriptors of the MLS operating status history, site related parameters, monitor related parameters and maintenance related parameters. Parameter information is provided for the intra-system synchronization function. Author

N86-27179# Grand Canyon National Park, Ariz. Resources Management and Planning Div.
AIRCRAFT INFORMATION PACKET (GRAND CANYON NATIONAL PARK, ARIZONA)
Sep. 1985 53 p
(PB86-159704; GCNP/AIR/INFO-85/1) Avail: NTIS HC A04/MF A01 CSCL 01B

The Aircraft Information Packet presents an overview of the aircraft overflight issue at Grand Canyon National Park which was made available for public review in September 1985. The packet consists of a task directive and pre-planning booklet distributed for public review and comment from September 17, 1985 through December 17, 1985. The task directive provides a background of the aircraft issue at Grand Canyon, the legal and policy constraints under which the management plan is being developed, a summary of research to date, and a discussion of the planning process being followed. The pre-planning booklet provides an overview of current aircraft use, a summary of public involvement to date, and an analysis of possible mitigation actions being considered to address this issue. GRA

N86-27481# Joint Publications Research Service, Arlington, Va.
NEW FIGHTER-BOMBER IN AIR FORCE
In its East Europe report (JPRS-EER-86-031) 4 Mar. 1986 p 103-104 Transl. into ENGLISH from Soldat und Technik (Frankfurt/Main, West Germany), no. 12, Dec. 1985 p 786 (For primary document see N86-27479 18-31)
Avail: NTIS HC A08/MF A01

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-27180 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, s'Gravenhage (Netherlands). Hoofdgroep Maatschappelijke Technologie.
THE WAKE OF A HORIZONTAL-AXIS WIND TURBINE MODEL; MEASUREMENTS IN UNIFORM APPROACH FLOW AND IN A SIMULATED ATMOSPHERIC BOUNDARY LAYER
A. M. Talmon Aug. 1985 65 p Revised report of RUU-CS-85-3
Original contains color illustrations
(Rept-85-010121; MT-TNO-8724-12433; ESA-86-97014)
Copyright. Avail: Issuing Activity

Wind tunnel measurements of the wake of a wind turbine model were conducted to refine calculations of wake effects in wind turbine parks. Wake effects caused by tower and nacelle were studied in uniform flow. Wake development depending on tip speed ratio was studied in a simulated atmospheric boundary layer. Wind tunnel results show that ground effects inhibit vertical growth of the lower part of the wake. Turbine drag and centerline velocity defects are strongly interrelated. The velocity defect wake profile of a wind turbine shifts slightly towards the ground. ESA

N86-27181# Old Dominion Univ., Norfolk, Va. Dept. of Engineering.
AN EVALUATION OF A TAYLOR-GALERKIN ALGORITHM FOR HIGH SPEED INVISCID FLOWS USING QUADRILATERAL AND TRIANGULAR ELEMENTS M.S. Thesis
Kim S. Bey Mar. 1986 156 p
Avail: NTIS HC A08/MF A01 CSCL 01A

The Taylor-Galerkin finite element algorithm is used to obtain solutions to the two-dimensional compressible Euler equations. The mathematical formulation of the algorithm is presented for a typical scalar equation. The derivation results in element equations which are assembled over the entire solution domain to obtain the system of equations that are solved explicitly. The algorithm has the feature that the finite element matrices can be evaluated in closed form, avoiding expensive numerical integration. Aspects of vector programming strategies and mesh generation important to an effective analysis procedure are also described. Solutions to supersonic flow problems with exact solutions are computed and compared for meshes containing all quadrilateral and triangular elements. Solutions to hypersonic flow over a blunt body are

computed for different meshes and compared with solutions from other numerical techniques. Solution to the flow in the cove formed by the junctute of the Shuttle orbiter wing and elevon is computed and compared with experimental data. Author

N86-27182*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
UNSTEADY AERODYNAMICS-FUNDAMENTALS AND APPLICATIONS TO AIRCRAFT DYNAMICS
D. G. Mabey (Royal Aircraft Establishment, Bedford, England) and J. R. Chambers 1985 18 p
(NASA-TM-88768; NAS 1.15:38768; AGARD-AR-222; ISBN-92-835-1515-3) Avail: NTIS HC A02/MF A01 CSCL 01A

From May 6 to 9, 1985, the Fluid Dynamics Panel and Flight Mechanics Panel of AGARD jointly arranged a Symposium on Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics at the Stadthall, Gottingen, West Germany. This Symposium was organized by an international program committee chaired by Dr K. J. Orlik-Ruckemann of the Fluid Dynamics Panel. The program consisted of five sessions grouped in two parts: (1) Fundamentals of Unsteady Aerodynamics; and (2) Applications to Aircraft Dynamics. The 35 papers presented at the 4 day meeting are published in AGARD CP 386 and listed in the Appendix. As the papers are already available and cover a very wide field, the evaluators have offered brief comments on every paper, followed by an overall evaluation of the meeting, together with some general conclusions and recommendations. Author

N86-27183# National Aerospace Lab., Tokyo (Japan).
AN EXPERIMENT ON SUPERSONIC TURBULENT MIXING LAYERS
Tomoyuki Komuro, Atsuo Murakami, Kenji Kudou, Nobuo Chinzei, and Goro Masuya Oct. 1985 16 p In JAPANESE; ENGLISH summary
(NAL-TR-884; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

An experimental study on single stream and two stream supersonic mixing layers was made to investigate the effect of compressibility on their mean properties. Free streams on both sides of the two stream mixing layer had Mach numbers of 2.3 and 1.35 with a velocity ratio of 0.74. One or the other of the streams was blocked for the single stream experiment. Pitot and static pressure surveys were conducted to deduce mean velocity profiles. Self-similar and linearly spreading flows were established at distances of approximately 100 and 200 times the momentum thickness of separated boundary layer from the beginning point of the mixing layer for the single and two stream cases, respectively. It was found that weak compression and expansion waves remaining in a test section have little effect on the spreading. In the single stream case, spreading rates decreased with increasing free stream Mach number. This tendency agrees not only qualitatively but also quantitatively with the tendency obtained in the majority of the previous experiments. The spreading rate of the two stream mixing layer was about half of that in the single stream layer with the same free stream Mach number as the high velocity side. This result agreed with previously obtained spreading rates for incompressible two stream mixing layers with the same value of velocity ratio. In the present two stream mixing layer, therefore, it can be concluded that there was no compressibility effect because of the small velocity difference. Author

N86-27184# National Aerospace Lab., Tokyo (Japan). Second Aerodynamics Div.
COMPUTATION OF 3-DIMENSIONAL VISCOUS TRANSONIC FLOWS USING THE LU-ADI FACTORED SCHEME
Kozo Fujii and Shigeru Obayashi Nov. 1985 20 p
(NAL-TR-889T; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The LU-ADI (lower/upper block diagonal - alternating direction implicit) factored scheme was successfully applied to solve the three-dimensional compressible thin layer Navier-Stokes equations. The computations are carried out for the slightly supersonic flow over a hemispheric cylinder at high incidence and for the transonic flow over a swept wing. To simulate these complicated flow fields, fine grid distributions of up to about 200,000 points were used on the Japanese supercomputer of 1 GFLOPS. The total cpu time for each case was less than two hours. The results for the flow over a hemispheric cylinder at high incidence revealed the existence of the shock wave and the detailed structure of the vortical flow field on the leeward side. The result for the flow over the swept wing shows that the three-dimensional shock induced separation is well captured. These results indicate the capability of the present code to make three-dimensional complicated flow field simulations; and the application of the present code to the more practical flow fields such as transonic flows over the wing or the wing-body combination of the transportation aircraft is very promising. Even simulation over the whole aircraft may soon be possible. Author

N86-27185# National Aerospace Lab., Tokyo (Japan).
WIND TUNNEL TEST AND ANALYSIS ON GUST LOAD ALLEVIATION OF A HIGH-ASPECT-RATIO WING
Nov. 1985 60 p In JAPANESE; ENGLISH summary
(NAL-TR-890; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Application of the active control technology to gust load alleviation problems was investigated both experimentally and analytically. Wind tunnel test were conducted for a high aspect ratio wing that assumes an energy efficient type of future transport. For these tests, National Aerospace Laboratory's low speed wind tunnel was equipped with a gust generator with hydraulic servo system. This generator generates turbulence by utilizing the tip vortices from the cantilevered double wings. Atmospheric turbulence was simulated in the tunnel according to the Dryden mathematical model. Control surfaces of the flexible wing model were actuated by a small dc electric motor embedded in the airfoil. A handy analog computer played the role of controller to drive control surfaces by the signals from two accelerometers and a strain gauge which was installed in the model as feedback sensors. Control laws were obtained by the optimal control theory with its performance index selected as the total energy of the system. Simple control laws based on the LQG theory demonstrated their effectiveness against realistic random gusts. At the end of the test, the flutter boundary of this model was determined for the configuration without active control. Author

N86-27186*# Kansas Univ., Lawrence. Dept. of Aerospace Engineering.
EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF A FREEZING POINT DEPRESSANT FLUID ICE PROTECTION SYSTEM M.S. Thesis. Final Report
Alan E. Albright Sep. 1984 149 p
(Grant NAG3-273)
(NASA-CR-174758; NAS 1.26:174758) Avail: NTIS HC A07/MF A01 CSCL 01A

A glycol-exuding porous leading edge ice protection system was tested in the NASA Icing Research Tunnel. Stainless steel mesh, laser drilled titanium, and composite panels were tested on two general aviation wing sections. Two different glycol-water solutions were evaluated. Minimum glycol flow rates required for anti-icing were obtained as a function of angle of attack, liquid water content, volume median drop diameter, temperature, and velocity. Ice accretions formed after five minutes of icing were shed in three minutes or less using a glycol fluid flow equal to the anti-ice flow rate. Two methods of predicting anti-ice flow rates are presented and compared with a large experimental data base of anti-ice flow rates over a wide range of icing conditions. The first method presented in the ADS-4 document typically predicts flow rates lower than the experimental flow rates. The second method, originally published in 1983, typically predicts flow rates up to 25 percent higher than the experimental flow rates. This method proved to be more consistent between wing-panel configurations. Significant correlation coefficients between the predicted flow rates and the experimental flow rates ranged from .867 to .947. Author

N86-27187# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
AIRCRAFT DRAG PREDICTION AND REDUCTION. ADDENDUM

1: COMPUTATIONAL DRAG ANALYSES AND MINIMIZATION; MISSION IMPOSSIBLE?
J. W. Slooff (National Aerospace Lab., Amsterdam, Netherlands) Apr. 1986 33 p Presented at Aircraft Drag Prediction and Reduction, Rhode Saint Genese, Belgium, 20-23 May 1985, and Hampton, Va., 5-8 Aug. 1985; sponsored by the von Karman Inst., AGARD, and NASA Langley Research Center
(AGARD-R-723-Add-1; ISBN-92-835-1524-2) Avail: NTIS HC A03/MF A01

The Special Course on Aircraft Drag Prediction was sponsored by the AGARD Fluid Dynamics Panel and the von Karman Institute and presented at the von Karman Institute, Rhode-Saint-Genese, Belgium, on 20 to 23 May 1985 and at the NASA Langley Research Center, Hampton, Virginia, USA, 5 to 6 August 1985. The course began with a general review of drag reduction technology. Then the possibility of reduction of skin friction through control of laminar flow and through modification of the structure of the turbulence in the boundary layer were discussed. Methods for predicting and reducing the drag of external stores, of nacelles, of fuselage protuberances, and of fuselage afterbodies were then presented followed by discussion of transonic drag rise. The prediction of viscous and wave drag by a method matching inviscid flow calculations and boundary layer integral calculations, and the reduction of transonic drag through boundary layer control are also discussed. This volume comprises Paper No.9 Computational Drag Analyses and Minimization: Mission Impossible? which was not included in AGARD Report 723 (main volume). Author

N86-27188*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Engineering Mechanics.
SIMULATION OF SELF-INDUCED UNSTEADY MOTION IN THE NEAR WAKE OF A JOUKOWSKI AIRFOIL Semiannual Progress Report
K. N. Ghia, G. A. Osswald, and U. Ghia 1986 14 p refs
(Grants NAG1-465; AF-AFOSR-0231-85)
(NASA-CR-177273; NAS 1.26:177273) Avail: NTIS HC A02/MF A01 CSCL 01A

The unsteady Navier-Stokes analysis is shown to be capable of analyzing the massively separated, persistently unsteady flow in the post-stall regime of a Joukowski airfoil for an angle of attack as high as 53 degrees. The analysis has provided the detailed flow structure, showing the complex vortex interaction for this configuration. The aerodynamic coefficients for lift, drag, and moment were calculated. So far only the spatial structure of the vortex interaction was computed. It is now important to potentially use the large-scale vortex interactions, an additional energy source, to improve the aerodynamic performance. B.G.

N86-27189*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TURBULENT FLOW FIELD PREDICTIONS IN SHARPLY CURVED TURN-AROUND DUCTS Final Report
L. Michael Santi Washington NASA Jun. 1986 34 p Previously announced as N86-24542
(Grant NGT-01-008-021)
(NASA-CR-3990; NAS 1.26:3990; M-529) Avail: NTIS HC A03/MF A01 CSCL 01A

Two-dimensional turbulent flow of incompressible Newtonian fluids in sharply curved 180 deg turn around ducts is studied. Results of an approximate numerical flow field analysis utilizing an orthogonal, body-fitted, curvilinear coordinate system are compared to results based on a traditional cylindrical reference frame. Qualitative induction of general streamfield characteristics as well as quantitative benchmarks for the planning of future experimentation are provided. In addition, preliminary results of an augmented kappa - epsilon turbulence model analysis, which explicitly accounts for the effects of streamline curvature and pressure strain in internal turbulent flows, are presented. Specific model difficulties are discussed and comparisons with standard kappa - epsilon model predictions are included. Author

N86-27190*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VORTEX FLOW AERODYNAMICS, VOLUME 1
James F. Campbell, ed., Russell F. Osborn, ed. (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio), and Jerome T. Foughner, Jr., ed. Jul. 1986 404 p Conference held in Hampton, Va., 8-10 Oct. 1985
(NASA-CP-2416-Vol-1; L-16117; NAS 1.55:2416-Vol-1) Avail: NTIS HC A18/MF A01 CSCL 01A

Vortex modeling techniques and experimental studies of research configurations utilizing vortex flows are discussed. Also discussed are vortex flap investigations using generic and airplane research models and vortex flap theoretical analysis and design studies. For individual titles, see N86-27191 through N86-27208.

N86-27191*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VORTEX LIFT RESEARCH: EARLY CONTRIBUTIONS AND SOME CURRENT CHALLENGES
Edward C. Polhamus *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 1-30 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The trend towards slender wing aircraft for supersonic cruise and the early chronology of research directed towards their vortex-lift characteristics are briefly reviewed. An overview of the development of vortex-lift theoretical methods is presented, and some current computational and experimental challenges related to the viscous flow aspects of this vortex flow are discussed. Author

N86-27192*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LEADING-EDGE VORTEX RESEARCH: SOME NONPLANAR CONCEPTS AND CURRENT CHALLENGES
James F. Campbell and Russell F. Osborn (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio) *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 31-63 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Some background information is provided for the Vortex Flow Aerodynamics Conference and that current slender wing airplanes do not use variable leading edge geometry to improve transonic drag polar is shown. Highlights of some of the initial studies combining wing camber, or flaps, with vortex flow are presented. Current vortex flap studies were reviewed to show that there is a large subsonic data base and that transonic and supersonic generic studies have begun. There is a need for validated flow field solvers to calculate vortex/shock interactions at transonic and supersonic speeds. Many important research opportunities exist for fundamental vortex flow investigations and for designing advanced fighter concepts. Author

N86-27193*# Kansas Univ., Lawrence. Dept. of Aerospace Engineering.
EXTENSIONS OF THE CONCEPT OF SUCTION ANALOGY TO PREDICTION OF VORTEX LIFT EFFECT
C. Edward Lan *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 65-84 (For primary document see N86-27190 18-02)
(Grant NsG-1629)
Avail: NTIS HC A18/MF A01 CSCL 01A

Flow field data for a double delta wing at low speed were used to determine the location of a vortex action point. The result was found to be consistent with what was determined for a delta wing. In supersonic flow, the action point location was determined empirically. For a wing with rounded leading edges, an assumption for initial vortex separation was shown to be equivalent to initial leading edge bubble separation for airfoils. A theoretical formulation by the section analogy to determine the delayed vortex separation on a cambered wing with rounded leading edges was presented. The method of suction analogy was further shown to be applicable to predicting the body vortex lift. Author

N86-27194*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT EXTENSIONS TO THE FREE-VORTEX-SHEET THEORY FOR EXPANDED CONVERGENCE CAPABILITY
James M. Lückring, Keith D. Hoffler (Vigyan Research Associates, Inc., Hampton, Va.), and Arthur C. Grantz (Northrop Corp., Hawthorne, Calif.) *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 85-114 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A new version of the free vortex sheet formulation is presented which has greatly improved convergence characteristics for a broad range of geometries. The enhanced convergence properties were achieved largely with extended modeling capabilities of the leading edge vortex and the near field trailing wake. Results from the new code, designated FVS-1, are presented for a variety of configurations and flow conditions with emphasis on vortex flap applications. Author

N86-27195*# North Carolina State Univ., Raleigh.
A DIRECT AND INVERSE BOUNDARY LAYER METHOD FOR SUBSONIC FLOW OVER DELTA WINGS
Shawn H. Woodson and Fred R. DeJarnette *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 115-133 (For primary document see N86-27190 18-02)
(Contract NCC1-22)
Avail: NTIS HC A18/MF A01 CSCL 01A

A new inverse boundary layer method is developed and applied to incompressible flows with laminar separation and reattachment. Test cases for two dimensional flows are computed and the results are compared with those of other inverse methods. One advantage of the present method is that the calculation of the inviscid velocities may be determined at each marching step without having to iterate. The inverse method was incorporated with the direct method to calculate the incompressible, conical flow over a slender delta wing at incidence. The location of the secondary separation line on the leeward surface of the wing is determined and compared with experiment for a unit aspect ratio wing at 20.5 deg incidence. The viscous flow in the separated region was calculated using prescribed skin friction coefficients. Author

N86-27196*# Notre Dame Univ., Ind.
AN EXPERIMENTAL INVESTIGATION OF VORTEX BREAKDOWN ON A DELTA WING
F. M. Payne and R. C. Nelson *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 135-161 (For primary document see N86-27190 18-02)
(Grant NAG2-258)
Avail: NTIS HC A18/MF A01 CSCL 01A

An experimental investigation of vortex breakdown on delta wings at high angles is presented. Thin delta wings having sweep angles of 70, 75, 80 and 85 degrees are being studied. Smoke flow visualization and the laser light sheet technique are being used to obtain cross-sectional views of the leading edge vortices as they break down. At low tunnel speeds (as low as 3 m/s) details of the flow, which are usually imperceptible or blurred at higher speeds, can be clearly seen. A combination of lateral and longitudinal cross-sectional views provides information on the three dimensional nature of the vortex structure before, during and after breakdown. Whereas details of the flow are identified in still photographs, the dynamic characteristics of the breakdown process were recorded using high speed movies. Velocity measurements were obtained using a laser Doppler anemometer with the 70 degree delta wing at 30 degrees angle of attack. The measurements show that when breakdown occurs the core flow transforms from a jet-like flow to a wake-like flow. Author

N86-27197*# Lockheed-Georgia Co., Marietta.
LASER VELOCIMETRY IN HIGHLY THREE-DIMENSIONAL AND VORTICAL FLOWS
Charles J. Novak, Charles R. Huie, and Kenneth C. Cornelius *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 163-185 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The need for experimentally determined 3-D velocity information is crucial to the understanding of highly 3-dimensional and vortical flow fields. In addition to gaining an understanding of the physics of flow fields, a correlation of velocity data is needed for advanced computational modelling. A double pass method for acquiring 3-D flow field information using a 2-D laser velocimeter (LV) is described. The design and implementation of a 3-D LV with expanded capabilities to acquire real-time 3-D flow field information are also described. Finally, the use of such an instrument in a wind tunnel study of a generic fighter configuration is described. The results of the wind tunnel study highlight the complexities of 3-D flow fields, particularly when the vortex behavior is examined over a range of angles of attack. Author

N86-27198*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IN-FLIGHT AND WIND TUNNEL LEADING-EDGE VORTEX STUDY ON THE F-106B AIRPLANE
John E. Lamar *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 187-201 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The vapor screen technique was successfully applied to an F-106B fighter aircraft during subsonic and transonic maneuvers. This system has allowed the viewing of multiple vortex systems on the wing upper surface at angles of attack less than 19 deg. In addition, similarities as well as differences were determined to exist between the vortex systems for a full scale semispan model and the flight vehicle at 20 deg incidence. Furthermore, variations in Reynolds number and Mach number were identified as to how they affect vortex system details at flight conditions. Author

N86-27199*# Vigyan Research Associates, Inc., Hampton, Va.
BASIC STUDIES ON DELTA WING FLOW MODIFICATIONS BY MEANS OF APEX FENCES
Keith D. Hoffler, Dhanvada M. Rao, and Mark C. Frassinelli (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio) *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 203-217 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The effectiveness of apex fences on a 60-deg delta wing at low speeds was experimentally investigated. Resembling highly swept spoilers in appearance, the fences are designed to fold out of the wing apex region upper surface near the leading edges, where they generate a powerful vortex pair. The intense suction of the fence vortices augments lift in the apex region, the resulting positive pitching moment being utilized to trim trailing edge flaps for lift augmentation during approach and landing at relatively low angles of attack. The fences reduce the apex lift at high angles of attack, leading to a desirable nose-down moment. The above projected functions of the apex fence device were validated and quantified through low speed tunnel tests, comprising upper surface pressure surveys on a semispan model and balance measurements on a geometrically similar fully span wing/body configuration. Fence parameters such as area, shape, hinge position and deflection angle were investigated. Typical results are presented indicating the apex fence potential in controlling the longitudinal characteristics of a tail-less delta. Author

N86-27200*# Vigyan Research Associates, Inc., Hampton, Va.
TOWARDS AN ADVANCED VORTEX FLAP SYSTEM: THE CAVITY FLAP
Dhanvada M. Rao *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 219-230 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

An extension of the vortex flap concept was explored with the aim of providing high-alpha flight control capability coupled with maneuver drag reduction for highly swept wing configurations. A retractable lower surface flap mounted on a translating hinge is proposed, allowing chordwise extension as well as deflection, the

two movements being independently controlled. The frontal cavity formed by the partially extended and deflected flap captures a vortex above a certain angle of attack. The cavity vortex downwash alleviates the effective incidence of the wing leading edge, thus modulating vortex lift; at the same time, the induced suction in the cavity generates thrust. These postulated aerodynamic features of the cavity flap were validated through low speed tunnel pressure and visualization tests on a 65 deg swept oblique wing model, which also provided initial trends of the leading edge vortex alleviation and cavity suction with respect to flap extension, deflection and angle of attack. Force tests on a 60 deg delta model further showed the cavity flap L/D performance to compare favorably with the conventional vortex flap. A two segment flap arrangement with independently control led segments was envisaged for exploiting the vortex modulation capability of the cavity flap for pitch, roll and yaw control, in addition to drag reduction at high angles of attack. Author

N86-27201*# General Dynamics Corp., Fort Worth, Tex.
VORTEX FLOW HYSTERESIS
Atlee M. Cunningham, Jr. *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 231-248 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

An experimental study was conducted to quantify the hysteresis associated with various vortex flow transition points and to determine the effect of planform geometry. The transition points observed consisted of the appearance (or disappearance) of trailing edge vortex burst and the transition to (or from) flat plate or totally separated flows. Flow visualization with smoke injected into the vortices was used to identify the transitions on a series of semi-span models tested in a low speed tunnel. The planforms tested included simple deltas (55 deg to 80 deg sweep), cranked wings with varying tip panel sweep and dihedral, and a straked wing. High speed movies at 1000 frames per second were made of the vortex flow visualization in order to better understand the dynamics of vortex flow, burst and transition. Author

N86-27202*# Boeing Military Airplane Development, Seattle, Wash.
VISCOUS VORTICAL FLOW CALCULATIONS OVER DELTA WINGS
G. Blom, J. C. Wai, and H. Yoshihara *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 249-261 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Two approaches to calculate turbulent vortical flows over delta wing configurations are illustrated. The first is for a simple delta wing at low speeds using the boundary layer approximation to treat the effects of the secondary separation. The second is for the supersonic case of a generic fighter using the NASA Ames parabolized Navier/Stokes method. Test/theory comparisons are given in both cases. Author

N86-27203*# Lockheed-California Co., Burbank.
AN EULER AERODYNAMIC METHOD FOR LEADING-EDGE VORTEX FLOW SIMULATION
Pradeep Raj and Lyle N. Long (Lockheed-Advanced Aeronautics Co., Valencia, Calif.) *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 263-281 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The current capabilities and the future plans for a three dimensional Euler Aerodynamic Method are described. The basic solution algorithm is based on the finite volume, Runge-Kutta pseudo-time-stepping scheme of FLO-57. Several modifications to improve accuracy and computational efficiency were incorporated and others are being investigated. The computer code is used to analyze a cropped delta wing at 0.6 Mach number and an arrow wing at 0.85 Mach number. Computed aerodynamic parameters are compared with experimental data. In all cases, the configuration is impulsively started and no Kutta condition is applied at sharp edges. The results indicate that with additional development and validation, the present method will be a useful tool for engineering analysis of high speed aircraft. Author

N86-27204*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EULER ANALYSIS OF AN ELLIPTIC MISSILE BODY
James R. Sirbaugh *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 283-301 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The Euler code FL057 was applied to a blunt nose smooth surface missile body shape. A range of angle of attacks was analyzed at Mach numbers of 0.55 and 2.0. A Mach number sweep from 0.55 to 2.0 was run for 12 degrees angle of attack. Experimental force and moment data were compared at Mach 2.0. The Euler code agreed with the experimental data over the linear portion of the Mach 0.55 data and over the entire angle-of-attack range at Mach 2.0. Author

N86-27205*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPUTATION OF LEADING-EDGE VORTEX FLOWS
Richard W. Newsome (Air Force Wright Aeronautical Labs., Hampton, Va.) and James L. Thomas *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 305-330 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

The simulation of the leading edge vortex flow about a series of conical delta wings through solution of the Navier-Stokes and Euler equations is studied. The occurrence, the validity, and the usefulness of separated flow solutions to the Euler equations of particular interest. Central and upwind difference solutions to the governing equations are compared for a series of cross sectional shapes, including both rounded and sharp tip geometries. For the rounded leading edge and the flight condition considered, viscous solutions obtained with either central or upwind difference methods predict the classic structure of vortical flow over a highly swept delta wing. Predicted features include the primary vortex due to leading edge separation and the secondary vortex due to crossflow separation. Central difference solutions to the Euler equations show a marked sensitivity to grid refinement. On a coarse grid, the flow separates due to numerical error and a primary vortex which resembles that of the viscous solution is predicted. In contrast, the upwind difference solutions to the Euler equations predict attached flow even for first-order solutions on coarse grids. On a sufficiently fine grid, both methods agree closely and correctly predict a shock-curvature-induced inviscid separation near the leeward plane of symmetry. Upwind difference solutions to the Navier-Stokes and Euler equations are presented for two sharp leading edge geometries. The viscous solutions are quite similar to the rounded leading edge results with vortices of similar shape and size. The upwind Euler solutions predict attached flow with no separation for both geometries. However, with sufficient grid refinement near the tip or through the use of more accurate spatial differencing, leading edge separation results. Once the leading edge separation is established, the upwind solution agrees with recently published central difference solutions to the Euler equations. Author

N86-27206*# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
STEADY SUPERSONIC NAVIER-STOKES SOLUTIONS OF A 75 DEG DELTA WING
Thomas A. Buter and Donald P. Rizzetta *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 331-347 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

Steady solutions about a slender sharp edged delta wing in a supersonic freestream for moderate and high angles of attack are obtained numerically by time integration of the unsteady compressible three dimensional laminar Navier-Stokes equations. The main features of the flow, including primary and secondary separation, and vortex position and strength, are adequately

simulated in the numerical solutions. Improved resolution of the computational grid in the leading edge region from a previous solution had considerable effect on the accuracy of the solutions. Good agreement between numerical solutions and experimental data was obtained for two cases. A local timestepping procedure is used to speed convergence by approximately a factor of two.
Author

N86-27207*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN OVERVIEW OF THE FUNDAMENTAL AERODYNAMICS BRANCH'S RESEARCH ACTIVITIES IN WING LEADING-EDGE VORTEX FLOWS AT SUPERSONIC SPEEDS
David S. Miller, Richard M. Wood, and Peter F. Covell *In its* Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 349-377 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

For the past 3 years, a research program pertaining to the study of wing leading edge vortices at supersonic speeds has been conducted in the Fundamental Aerodynamics Branch of the High-Speed Aerodynamics Division at the Langley Research Center. The purpose of the research is to provide an understanding of the factors governing the formation and the control of wing leading-edge vortices and to evaluate the use of these vortices for improving supersonic aerodynamic performance. The studies include both experimental and theoretical investigations and focus primarily on planform, thickness and camber effects for delta wings. An overview of this research activity is presented. Author

N86-27208*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WATER TUNNEL RESULTS OF LEADING-EDGE VORTEX FLAP TESTS ON A DELTA WING VEHICLE
John H. DelFrate *In* NASA. Langley Research Center Vortex Flow Aerodynamics, Vol. 1 Jul. 1986 p 379-389 (For primary document see N86-27190 18-02)
Avail: NTIS HC A18/MF A01 CSCL 01A

A water tunnel flow visualization test on leading edge vortex flaps was conducted at the flow visualization facility of the NASA Ames Research Center's Dryden Flight Research Facility. The purpose of the test was to visually examine the vortex structures caused by various leading edge vortex flaps on the delta wing of an F-106 model. The vortex flaps tested were designed analytically and empirically at the NASA Langley Research Center. The three flap designs were designated as full-span gothic flap, full-span untapered flap, and part-span flap. The test was conducted at a Reynolds number of 76,000/m (25,000/ft). This low Reynolds number was used because of the 0.076-m/s (0.25-ft/s) test section flow speed necessary for high quality flow visualization. However, this low Reynolds number may have influenced the results. Of the three vortex flaps tested, the part-span flap produced what appeared to be the strongest vortex structure over the flap area. The full-span gothic flap provided the next best performance.
Author

N86-27209*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF 3 NUMERICAL METHODS FOR PROPULSION INTEGRATION STUDIES ON TRANSONIC TRANSPORT CONFIGURATIONS
Steven F. Yaros, John R. Carlson, and Balasubramanyan Chandrasekaran (Vigyan Research Associates, Inc., Hampton, Va.) Jun. 1986 23 p Presented at the 4th AIAA Applied Aerodynamics Conference, San Diego, Calif., 9-11 Jun. 1986
(NASA-TM-87727; NAS 1.15:87727; AIAA-86-1814) Avail: NTIS HC A02/MF A01 CSCL 01A

An effort has been undertaken at the NASA Langley Research Center to assess the capabilities of available computational methods for use in propulsion integration design studies of transonic transport aircraft, particularly of pylon/nacelle combinations which exhibit essentially no interference drag. The three computer codes selected represent state-of-the-art computational methods for analyzing complex configurations at subsonic and transonic flight conditions. These are: EULER, a finitie volume solution of the Euler equation; VSAERO, a panel solution of the Laplace equation; and PPW, a finite difference solution of the small disturbance transonic equations. In general, all three codes have certain capabilities that allow them to be of some value in predicting the flows about transport configurations, but all have limitations. Until more accurate methods are available, careful application and interpretation of the results of these codes are needed.
Author

N86-27210# National Aeronautical Lab., Bangalore (India). Director's Unit.
THE LIFT ON AN AIRFOIL IN A TURBULENT BOUNDARY LAYER
S. Kishore Kumar and R. Barasimha Mar. 1986 42 p
(NAL-TM-DU-8601) Avail: NTIS HC A03/MF A01

Following a general formulation of the problem, detailed results are presented when the mean velocity in the turbulent boundary layer is given by the one-seventh power law. The lift on the airfoil is computed as the sum of contributions from shear and incidence, taking into account the presence of the wall. It is found that for an airfoil with a chord equal to the boundary layer thickness delta, the shear effect is generally dominant over all other factors. Furthermore, the lift coefficient, based on either the velocity at the position of the airfoil or that at the edge of the boundary layer, decreases monotonically as the height above the wall increases.
Author

N86-27211# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
AN INTERFEROMETRIC INVESTIGATION OF THE REGULAR TO MACH REFLECTION TRANSITION BOUNDARY IN PSEUDOSTATIONARY FLOW IN AIR
John Wheeler Apr. 1986 152 p Sponsored in cooperation with the Natural Sciences and Engineering Research Council of Canada
(Contract DNA-001-85-C-0368; Grant AF-AFOSR-82-0096)
(UTIAS-TN-256; ISSN-0082-5263) Avail: NTIS HC A08/MF A01

The regular (RR) to Mach reflection (MR) transition boundary in pseudostationary flow in air was investigated, with emphasis on the influence of shock-induced boundary layer. Nearly 100 experiments were conducted in the region of the RR/MR transition line over a range of incident-shock-wave Mach number 1.1 < M sub s > 6.5 by conducting experiments in the UTIAS 10 x 18 cm Hypervelocity Shock Tube. The wedge angles used were 42 deg, 45 deg, 47 deg, and 48 deg. Initial pressures were kept as low as possible to maximize viscous effects and ranged from 0.4 kPa to 100 kPa. A comparison was made between the boundary-layer thickness, and the deviation of the transition boundary from inviscid theory. This difference is often called the von Neumann paradox. It was found that the von Neumann paradox was due to viscous effects. The deviation of the RR/MR transition line from the detachment criterion boundary was found to increase with a drop in initial pressure, in a manner consistent with boundary-layer theory. The effect of the endwall boundary layer on the RR/MR transition line was more pronounced at low Mach number (M sub s s < 2), and a model is proposed to explain this behavior. Initial pressure was also found to influence the height of the Mach stem in MR. Lower initial pressure (and hence greater viscous effects) reduced the height of the Mach stem, which was found to be smaller than the inviscid prediction in all MR experiments.
Author

N86-27212# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
ANALYSIS OF WINGS WITH LEADING EDGE AND/OR TRAILING EDGE SEGMENTED (SPANWISE) FLAPS USING PLANAR HORSE SHOE VORTEX LATTICE METHOD
B. Rajeswari and H. N. V. Dutt Nov. 1985 74 p
(NAL-TM-AE-8507) Avail: NTIS HC A04/MF A01

A method and a computer program in FORTRAN have been developed for the analysis of wings with segmented leading edge and trailing edge flaps using planar horse-shoe vortices. This

computer program can be used to estimate overall aerodynamic characteristics like C sub L, C sub D and C sub M and the detailed local loads for a given wing flap geometry at specified incidence and Mach number. The method has no limitations on aspect ratio, taper ratio and sweep angles. The code has been validated for a number of cases for which experimental data is available. The program is working on UNIVAC 1100-60 computer and takes about 2 minutes to analyze a typical wing-flap configuration (with approximately 120 panels) for a given incidence and Mach number. Author

N86-27213*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRELIMINARY RESULTS OF UNSTEADY BLADE SURFACE PRESSURE MEASUREMENTS FOR THE SR-3 PROPELLER
Laurence J. Heidelberg and Bruce J. Clark 1986 26 p Presented at the 10th Aeroacoustics Conference, Seattle, Wash., 9-11 Jul. 1986
(NASA-TM-87352; E-3106; NAS 1.15:87352; AIAA-86-1893) Avail: NTIS HC A03/MF A01 CSCL 01A

Unsteady blade surface pressures were measured on an advanced, highly swept propeller known as SR-3. These measurements were obtained because the unsteady aerodynamics of these highly loaded transonic blades is important to noise generation and aeroelastic response. Specifically, the response to periodic angle-of-attack change was measured for both two- and eight-bladed configurations over a range of flight Mach numbers from 0.4 to 0.85. The periodic angle-of-attack change was obtained by placing the propeller axis at angles up to 4 deg to the flow. Most of the results are presented in terms of the unsteady pressure coefficient variation with Mach number. Both cascade and Mach number effects were largest on the suction surface near the leading edge. The results of a three-dimensional Euler code applied in a quasi-steady fashion were compared to measured data at the reduced frequency of 0.1 and showed relatively poor agreement. Pressure waveforms are shown that suggest shock phenomena may play an important part in the unsteady pressure response at some blade locations. Author

N86-27214*# Joint Inst. for Advancement of Flight Sciences, Hampton, Va.
INCOMPRESSIBLE BOUNDARY-LAYER STABILITY ANALYSIS OF LFC EXPERIMENTAL DATA FOR SUB-CRITICAL MACH NUMBERS M.S. Thesis
Scott A. Berry Jul. 1986 80 p
(Contract NCC1-24)
(NASA-CR-3999; NAS 1.26:3999) Avail: NTIS HC A05/MF A01 CSCL 01A

An incompressible boundary-layer stability analysis of Laminar Flow Control (LFC) experimental data was completed and the results are presented. This analysis was undertaken for three reasons: to study laminar boundary-layer stability on a modern swept LFC airfoil; to calculate incompressible design limits of linear stability theory as applied to a modern airfoil at high subsonic speeds; and to verify the use of linear stability theory as a design tool. The experimental data were taken from the slotted LFC experiment recently completed in the NASA Langley 8-Foot Transonic Pressure Tunnel. Linear stability theory was applied and the results were compared with transition data to arrive at correlated n-factors. Results of the analysis showed that for the configuration and cases studied, Tollmien-Schlichting (TS) amplification was the dominating disturbance influencing transition. For these cases, incompressible linear stability theory correlated with an n-factor for TS waves of approximately 10 at transition. The n-factor method correlated rather consistently to this value despite a number of non-ideal conditions which indicates the method is useful as a design tool for advanced laminar flow airfoils. Author

N86-27215# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
BLOWING MODEL FOR TURBULENT BOUNDARY-LAYER DUST INGESTION
Harold Mirels 10 Feb. 1986 38 p
(Contract F04701-85-C-0086)
(AD-A165074; TR-0086(6785)-1; SD-TR-85-97) Avail: NTIS HC A03/MF A01 CSCL 20/4

The rate at which dust is ingested into a turbulent boundary layer is deduced for the case of a semi-infinite flat plate and for the boundary layer behind a moving shock wave. Conventional turbulent boundary-layer theory is used. It is assumed that the local dust-ingestion rate corresponds to the blowing rate at which the local unblown surface shear C(f,0) is reduced to a value C(f,t) that is just sufficient to maintain surface particles in a mobile state. It is further assumed that the particle-velocity equilibration distance is small compared with the local boundary-layer thickness. It is found that erosion rate and boundary-layer thickness parameters are weakly (logarithmically) dependent on C(f,O)/C(f,t) and the maximum dust loading within the boundary layer is approximately equal to one. The theoretical predictions for local erosion rate, boundary thickness, and dust density are compared with the limited experimental results of Hartenbaum and Ausherman for the semi-infinite flat plate and moving-shock cases, respectively. Agreement within about a factor of two is obtained. Further comparison with experiment is recommended. GRA

N86-27216# Oak Ridge National Lab., Tenn.
THEORETICAL MODEL OF AERODYNAMIC FORCES AT HIGH SPEEDS AND ANGLE OF ATTACK IN A STRATIFIED FLOW-FIELD OF UF
G. J. Harloff Sep. 1985 39 p
(Contract DE-AC05-84OR-21400)
(DE86-005650; K/TS-11-732) Avail: NTIS HC A03/MF A01

A theoretical aerodynamic model of lift and drag forces on a flat plate at angle of attack and at hypersonic speeds is presented. Real gas effects and friction drag are accounted for. Theoretical results are presented as a function of the viscous interaction parameter. The performance for two geometries is presented. DOE

N86-27217# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE. BIMONTHLY BULLETIN, NO. 1984-6, NOVEMBER - DECEMBER 1984
Claude Sevestre, ed. Paris ESA May 1985 59 p Transl. into ENGLISH of La Recherche Aerospatiale. Bulletin Bimensuel (Paris, France), no. 1984-6, Nov. - Dec. 1984 Original language document was announced in IAA as A84-37528
(ESA-TT-907; ESA-85-95383) Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

Turbulence models for a separated three dimensional turbulent boundary layer; a vortex point method for calculation of inviscid incompressible flows around rotary wings; effect of Reynolds number on the aerodynamic characteristics of an ogive-cylinder at high angle of attack; a hybrid finite difference-spectral method for computing compressible fluid flows; modeling the dynamic stall of the NACA 0012 profile; and helicopter noise are discussed. For individual titles, see N86-27218 through N86-27223.

N86-27218# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CRITICAL EXAMINATION OF TURBULENCE MODELS FOR A SEPARATED THREE DIMENSIONAL TURBULENT BOUNDARY LAYER **c34**
R. Abid and R. Schmitt *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 11 p (For primary document see N86-27217 18-02) Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

We propose to examine the behavior of several turbulence models in a 3 D turbulent boundary layer approaching separation. The incompressible test flow of Van den Berg et Elsenaar, which simulates a 3 D boundary layer under infinite swept wing conditions, was chosen to evaluate these models. An inverse calculation method is used to avoid singularities near the separation and thus permit a reliable critical examination of turbulence modeling. One algebraic turbulence model and three transport equation

models are evaluated in this study. The anisotropic eddy viscosity hypothesis introduced by Rotta is discussed in each case. Author

N86-27219# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A VORTEX POINT METHOD FOR CALCULATING INVISCID INCOMPRESSIBLE FLOWS AROUND ROTARY WINGS c34
B. Canatloube and S. Huberson *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 13 p Previously announced in IAA as A86-12021 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

An integral method is presented for calculating incompressible inviscid unsteady flow around thin bodies in arbitrary motion, i.e., rotor blades in motion with respect to one another. Because an integral method is used, discretization is limited to the solid boundaries and the vortices. Boundary conditions are treated in terms of equation for the slipstream on the walls, the vorticity vector, a volume integral for the vorticity and a first-order Fredholm integral. The Helmholtz equation governs the evolution of vorticity, which forms a sheet of doublets. The pressure jumps on the blades are covered by the unsteady Bernoulli equation. Applications of the method to helicopter rotors, medium- and high-aspect ratio propellers and low-aspect ratio nautical propellers are demonstrated. M.S.K. (IAA)

N86-27220# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
EFFECT OF THE REYNOLDS NUMBER ON THE AERODYNAMIC CHARACTERISTICS OF AN OGIVE-CYLINDER AT HIGH ANGLE OF ATTACK
P. Champigny *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 9 p Previously announced in IAA as A86-12022 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

Low-speed wind tunnel data for an ogive model at high Angles Of Attack (AOA) are analyzed in terms of the flow separation regimes. The flows covered the Re range of 280,000-2 million, AOAs up to 80 deg and a Mach 0.35 flow velocity. The sting-mounted model was instrumented with 354 pressure taps. The data were used to calculate the normal and side forces. The drag coefficient was found to be dependent on the Re and the AOA. Both laminar and turbulent flows produced large side forces, which had cyclic distributions. Finally, the separations that occurred produced four types of flows for separate Re regimes. M.S.K. (IAA)

N86-27221# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A HYBRID SPECTRAL-FINITE DIFFERENCE METHOD FOR COMPUTING COMPRESSIBLE FLUID FLOWS
P. Loisel *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 11 p Previously announced in IAA as A86-12023 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

A spectral method is described for solving the two-dimensional Navier-Stokes equations for viscous compressible flows with discontinuities. Momentum, mass and energy conservation equations are defined and applied in both one- and two-dimensional calculations. Comparisons are made between the efficacy of the spectral model in high gradient regions, using a Chebyshev collocation technique, and a finite difference method, involving a total variation diminishing scheme. The comparisons cover modeling of flows in a one-dimensional shock tube, a two-dimensional shock reflection and two-dimensional shock propagation. The spectral method contains Gibb oscillations and captures the shocks, and is more accurate where unsteady states border discontinuities. M.S.K. (IAA)

N86-27222# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DYNAMIC STALL MODELING OF THE NACA 0012 PROFILE
D. Petot *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 4 p Previously announced in IAA as A86-12024 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

Correlations obtained by ONERA researchers in studies of large amplitude oscillations in airfoils are discussed. The correlation values were generated with a dynamic model for helicopter rotor blades experiencing nonlinear oscillations in the lift/angle of attack or moment/angle of attack hysteresis loops. Comparisons were made between the model predictions and data from NASA experiments with NACA 0012 airfoils at varying angles of attack, amplitudes and frequencies. The model proved adequate for predicting the hysteresis loops and in identifying stall behavior. M.S.K. (IAA)

N86-27223# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
HELICOPTER NOISE
R. Legendre *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 3 p Previously announced in IAA as A86-12025 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

The state of the art in predicting and modeling helicopter noise, its sources, components, magnitudes and dynamic characteristics, is assessed. Noise is not emitted by steady flow, and can be decomposed into noise and pseudo-noise. Account must be taken of pseudo-noise in considerations of passenger comfort. The evolution of vortices in the turbulent boundary layer, the turbulent wake and at the blade tips produces noise. The difficulty in predicting noise arises from the complex behavior of vortices, atmospheric processes which affect the noise during flight and interactions among noise effects of separate blades and the fuselage noise. Various experiments are suggested for deriving quantitative laws to improve noise prediction efforts. M.S.K. (IAA)

N86-27224# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics and Flight Mechanics Panel.
UNSTEADY AERODYNAMICS-FUNDAMENTALS AND APPLICATIONS TO AIRCRAFT DYNAMICS
Loughton, England Nov. 1985 620 p In ENGLISH and FRENCH Symposium held in Goettingen, West Germany 6-9 May 1985 (AGARD-CP-386; ISBN-92-835-0382-1) Avail: NTIS HC A99/MF A01

Recent advances in the methods for experimentation and computational prediction of nonlinear flow phenomena in unsteady aerodynamics and of stability parameters required to describe adequately the dynamic behavior of aircraft with special emphasis on high angle-of-attack were examined. Topics addressed include: unsteady boundary layers; unsteady separation and stall; buffeting; unsteady airloads; wind tunnel and flight test techniques, with emphasis on the measurement of nonlinearities, aerodynamic cross-coupling, hysteresis, and time dependent effects; mathematical modeling; bifurcation theory; prediction of wing rock; and advanced control systems. For individual titles, see N86-27225 through N86-27266.

N86-27225# Technische Univ., Brunswick (West Germany). Inst. fuer Stroemungsmechanik.
UNSTEADY FLOWS: FUNDAMENTALS AND APPLICATIONS
B. Laschka *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 21 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

An introductory overview about the fundamental equations describing the special features of unsteady flows is presented.

Starting with the full Navier-Stokes equations different stages of reductions down to linear potential theory are evaluated. Their scope of validity is discussed. For viscous flows attention is given to the incompressible case whereas for inviscid flows compressibility was retained. Author

N86-27226# United Technologies Research Center, East Hartford, Conn.
DYNAMIC STALL OF SWEPT AND UNSWEPT OSCILLATING WINGS
Franklin O. Carta *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 15 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Recent unsteady tests on oscillating tunnel-spanning wings (representative of full scale helicopter blades) have shown that the dynamic stall phenomena for a swept wing model is significantly different from that for an unswept wing. Several critical measurements and calculations relative to the behavior of the surface flow were made, including chordwise wave speed of the stalling vortex, the degree of pitch rate dependence of the vortex inception angle, and the ability of the cosine law for sweep to normalize unsteady poststall behavior, even after reattachment occurs. Finally, an examination of hot-film response data shows that the stagnation flow along the swept wing leading edge significantly alters the unsteady surface flow behavior in a narrow region along the leading edge when compared with data from the unswept wing. However, from approximately 15 percent chord and aft there appears to be no sweep effect, and the results from both wings are nearly indistinguishable. Author

N86-27227# Centre National de la Recherche Scientifique, Orsay (France).
UNSTEADY VISCOUS FLOW OF AN INCOMPRESSIBLE FLUID AROUND A PROFILE: A COMPARISON OF THEORY AND PRACTICE [ECOULEMENT INSTATIONNAIRE DECOLLE D'UN FLUIDE INCOMPRESSIBLE AUTOUR D'UN PROFIL: UNE COMPARISON THEORIE-EXPERIENCE]
O. Daube, Ta Phuoc Loc, P. Monnet (Poitiers Univ., France), and M. Coutanceau *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The results of numerical and experimental studies of the unsteady flow of a viscous incompressible fluid around a profile of high incidence were presented. Numerical simulation and experimental tests were used to analyze the correlation of the Navier-Stokes equation and Reynolds number at the transition phase. Transl. by T.R.

N86-27228# Vrije Universiteit, Brussels (Belgium). Dept. of Fluid Mechanics.
VELOCITY AND TURBULENCE MEASUREMENTS IN DYNAMICALLY STALLED BOUNDARY LAYERS ON AN OSCILLATING AIRFOIL
J. deRuyck and Ch. Hirsch *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 13 p Sponsored in part by Belgian National Research Funds (NFWO) (For primary document see N86-27224 18-02)
(Contract DAJA45-83-C-0021)
Avail: NTIS HC A99/MF A01

Detailed velocity and turbulence properties in the dynamically stalled boundary layer of an oscillating NACA 0012 airfoil were measured. The airfoil oscillated around an axis at 25% distance from the leading edge with a sinusoidal motion. Measurements are performed at eight chordwise positions, in non-stalled, stall onset, and deep stalled flow conditions. Instantaneous detailed flow and turbulence patterns of the periodic separation vortex are presented and discussed. Corresponding terms of the turbulent energy balance are derived and compared with flat plate boundary layer data. In particular, negative turbulent energy production is observed during vortex development. Author

N86-27229# Centre National de la Recherche Scientifique, Marseilles (France). Inst. de Mecanique des Fluides.
WING PROFILE IN STALLED POSITION SUBJECT TO A FLOW OF ALTERNATING POTENTIAL AND STRONG VORTEX [PROFIL D'AILE EN DECROCHAGE SOUMIS A UN ECOULEMENT ALTERNATIVEMENT POTENTIEL ET A FORT VORTICITE]
C. Maresca and D. Favier *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 15 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The aerodynamic behavior of a wing profile subject to a flow of alternating potential and strong vortex is examined. The simulation experiment consisted of placing a fixed wing profile in the wake of a profile that oscillated at stalling incidence parallel to the flow. The results show that the effects on the fixed profile may be theoretically approximated by considering the profile as isolated in the flow while the amplitude of the speed and the incidence are simultaneously variable with the pre-established values. Transl. by T.R.

N86-27230# Lockheed Missiles and Space Co., Sunnyvale, Calif.
A CRITICAL LOOK AT DYNAMIC SIMULATION OF VISCOUS FLOW
L. E. Ericsson *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 11 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A critical examination is made of the classic role of the wind tunnel as a tool for simulation of the free flight aerodynamics. That the equivalence concept established for steady flow is not valid for unsteady flow is no great surprise. More surprising, probably, is the fact that simulation of the relative velocity time history, which assures simulation of the inviscid unsteady aerodynamics, will in many cases not assure simulation of the unsteady viscous flow. In the case of flow separation and associated hysteresis the lack of simulation of the transient viscous flow can sometimes even generate the incorrect final steady state flow condition. Only close attention to the simulation of the unsteady boundary condition at the vehicle surface can assure the utility of experimental and numerical results for prediction of full scale unsteady viscous flow characteristics. Author

N86-27231# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
UNSTEADY BOUNDARY-LAYER SEPARATION ON AIRFOILS PERFORMING LARGE-AMPLITUDE OSCILLATIONS: DYNAMIC STALL
W. Geissler *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 12 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Experimental investigations have exposed a strong dependency of unsteady separation characteristics in the regime of dynamic stall on airfoil shape, Reynolds and Mach number, and frequency and time dependence incidence. A suitable prediction method should be able to account for these various parameters. Coupling procedures between two-dimensional unsteady boundary layers and inviscid surface singularity methods (panel methods) were developed for analytical investigation of unsteady turbulent separation. The influence of various parameters on unsteady separation is discussed in detail and comparison with experimental data is made. The results show that, even for weak coupling between boundary layer and inviscid boundary condition, good correspondence exists between theory and experiment with respect to the development of unsteady separation. Author

N86-27232*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
COMPUTATIONAL ASPECTS OF UNSTEADY FLOWS
Tuncer Cebeci (Douglas Aircraft Co., Inc., Long Beach, Calif.), L. W. Carr, A. A. Khattab, and S. M. Schimke *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics

Nov. 1985 25 p (For primary document see N86-27224 18-02) (Contract F496720-82-C-0055)
Avail: NTIS HC A99/MF A01 CSCL 01A

The calculation of unsteady flows and the development of numerical methods for solving unsteady boundary layer equations and their application to the flows around important configurations such as oscillating airfoils are presented. A brief review of recent work is provided with emphasis on the need for numerical methods which can overcome possible problems associated with flow reversal and separation. The zig-zag and characteristic box schemes are described in this context, and when embodied in a method which permits interaction between solutions of inviscid and viscous equations, the characteristic box scheme is shown to avoid the singularity associated with boundary layer equations and prescribed pressure gradient. Calculations were performed for a cylinder started impulsively from rest and oscillating airfoils. The results are presented and discussed. It is conlcuded that turbulence models based on an algebraic specification of eddy viscosity can be adequate, that location of translation is important to the calculation of the location of flow separation and, therefore, to the overall lift of an oscillating airfoil. Author

N86-27233*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
UNSTEADY TURBULENT BOUNDARY-LAYER EXPERIMENTS WITH RAPIDLY CHANGING FREE-STREAM CONDITIONS
G. J. Brereton (Stanford Univ., Calif.), L. W. Carr, and W. C. Reynolds *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 9 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

Selected data sets produced by the Stanford Unsteady Turbulent Boundary Layer Program are compared to analytic solutions of the Stokes equations for different kinds of imposed, organized unsteadiness. Good agreement is found, qualifying the facility as one that faithfully produces flows of different prescribed unsteady conditions. Data sets from the facility are therefore considered especially suitable for comparison with predictions of turbulence models for unsteady flows. New data describing the development of an unsteady separation bubble are presented. Author

N86-27234# Centre National de la Recherche Scientifique, Grenoble (France). Inst. de Mecanique.
EXPERIMENTAL STUDY OF UNSTEADY TURBULENT BOUNDARY LAYERS SUBJECT TO MEAN PRESSURE GRADIENTS OF ZERO OR POSITIVE [ETUDE EXPERIMENTALE DE COUCHES LIMITES TURBULENTES INSTATIONNAIRES SOUMISES A DES GRADIENTS DE PRESSION MOYENS NULS OU POSITIFS]
G. Binder, S. Tardu, R. Blackwelder, and J. L. Kueny *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 13 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The results of tests on turbulent flows in a fluid cycle, at the frequency and amplitude of the audible frequency range were presented. The results include velocity measurements using laser velocimeter equipment, as well as friction measurements using the hot film method. Transl. by T. R.

N86-27235# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et Recherches en Aerothermodyn.
UNSTEADY TURBULENT BOUNDARY LAYERS: EXPERIMENTAL AND NUMERICAL INVESTIGATIONS [COUCHE LIMITE TURBULENTE INSTATIONNAIRE: INVESTIGATIONS EXPERIMENTALE ET NUMERIQUE]
J. Cousteix and R. Houdeville *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 12 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The results of an experimental study of turbulent boundary layers subject to periodic external fluctuations of the flow are presented. Two cases are studied, one a flat plate and the other a pipe with a positive pressure gradient viscous flow. The unsteady boundary layer equations and their relationship with viscous flow is analyzed using integral equations. Transl. by T. R.

N86-27236# Mykytow (Walter J.), Weymouth, Mass.
REVIEW OF SMP 1984 SYMPOSIUM ON TRANSONIC UNSTEADY AERODYNAMICS AND ITS AEROELASTIC APPLICATIONS
Walter J. Mykytow *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 45 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The latest methods of predicting transonic unsteady airloads for oscillating surfaces and flutter were discussed. Also considered were aeroelastic applications, many of which were made to standard AGARD configurations. The 16 papers and the round table discussion were summarized for coordination with the Fluid Dynamics Panel and the Fluid Mechanics Panel. B.G.

N86-27237*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSONIC AERODYNAMIC AND AEROELASTIC CHARACTERISTICS OF A VARIABLE SWEEP WING
P. M. Goorjian, G. P. Guruswamy (Informatics, Inc., Palo Alto, Calif.), H. Ide (Rockwell International Corp., Los Angeles, Calif.), and G. Miller *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 15 p Previously announced as N85-25203 (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

The flow over the B-1 wing is studied computationally, including the aeroelastic response of the wing. Computed results are compared with results from wind tunnel and flight tests for both low-sweep and high-sweep cases, at 25.0 and 67.5 deg., respectively, for selected transonic Mach numbers. The aerodynamic and aeroelastic computations are made by using the transonic unsteady code ATRAN3S. Steady aerodynamic computations compare well with wind tunnel results for the 25.0 deg sweep case and also for small angles of attack at the 67.5 deg sweep case. The aeroelastic response results show that the wing is stable at the low sweep angle for the calculation at the Mach number at which there is a shock wave. In the higher sweep case, for the higher angle of attack at which oscillations were observed in the flight and wind tunnel tests, the calculations do not show any shock waves. Their absence lends support to the hypothesis that the observed oscillations are due to the presence of leading edge separation vortices and are not due to shock wave motion as was previously proposed. Author

N86-27238# National Aerospace Lab., Amsterdam (Netherlands).
UNSTEADY AIRLOAD COMPUTATIONS FOR AIRFOIL OSCILLATING IN ATTACHED AND SEPARATED COMPRESSIBLE FLOW
R. Houwink *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 8 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Recent developments in coupled inviscid flow-boundary layer computations are discussed for airfoils in unsteady motion in attached and separated subsonic and transonic flow. The applicability of quasi-simultaneous strong interaction coupling procedures for transonic small perturbation theory and boundary layer integral methods is illustrated for oscillating airfoils with shock-induced separation. The relevance of the predicted airloads for aeroelastic applications is illustrated using the analysis of an aeroelastic instability of a supercritical wing wind tunnel model. Author

N86-27239# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
WIND TUNNEL AND FLIGHT TEST ANALYSIS AND EVALUATION OF THE BUFFET PHENOMENA FOR THE ALPHA JET

TRANSONIC WING
H. Buers and V. Schmitt (Office National d'Etudes et de Recherches Aeronautiques, Paris, France) *In* AGARD Unsteady Aerodynamics-Fundamentals and Application to Aircraft Dynamics Nov. 1985 11 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

In addition to previous presentations of wind tunnel and flight test data of the Dornier Transsonischer Tragfluegel (TST) program, results of local flow surveys on the wing in the buffeting region are presented. The vibration levels on the wing and at the pilot's seat are also shown. The separated effects of the slats in use both with and without trailing edge flaps as maneuver flaps up to the transonic flight regime are presented. Author

N86-27240# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
UNSTEADY VORTEX AIRFOIL INTERACTION
G. E. A. Meier and R. Timm *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 10 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The unsteady flow in the vicinity of an airfoil in a subsonic flow with strong vortices is investigated for a two-dimensional problem. Emphasis was placed on the interaction of the passing vortex flow field with the steady flow field of the airfoil. Unsteady flow separation and generation of new vortices of the airfoil occurs depending on vortex strength and core path. Inviscid calculations of vortex paths and sound generation are compared with the experimental results. The associated pressure waves have a strong directivity. The vortices used for the interaction experiments are generated by different vortex shedding cylinders in a stationary duct flow or by airfoils in the starting flow of a shock-tube. High speed interferometric flow recording and wall pressure measurement are the main experimental techniques. Author

N86-27241# Westland Helicopters Ltd., Yeovil (England).
UNSTEADY AERODYNAMICS APPLICATION TO HELICOPTER NOISE AND VIBRATION SOURCES
T. S. Beddoes *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 10 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The feasibility of producing aerodynamic loads of sufficient fidelity to enable a realistic acoustic signal to be derived was studied. The need arises from the excessive blade/slap noise which results from blade/vortex interaction. A tool is required to investigate the influence of design and operational parameters as a routine procedure. For this purpose a simplified two dimensional model was developed and validated against a more sophisticated analysis. The model is extended to the rotor application where the complex wake geometry is the determining factor in the character of the loading. From the distributed transient loading an acoustic signal was derived which was compared with experimental data. A comprehensive correlation was not yet performed but the preliminary results are encouraging. Author

N86-27242*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
RECENT DEVELOPMENTS IN ROTARY-BALANCE TESTING OF FIGHTER AIRCRAFT CONFIGURATIONS AT NASA AMES RESEARCH CENTER
Gerald N. Malcolm and Lewis B. Schiff *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 25 p Previously announced as N85-32090 (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

Two rotary balance apparatuses were developed for testing airplane models in a coning motion. A large scale apparatus, developed for use in the 12-foot Pressure Wind Tunnel primarily to permit testing at high Reynolds numbers, was recently used to investigate the aerodynamics of 0.05-scale model of the F-15 fighter aircraft. Effects of Reynolds number, spin rate parameter, model attitude, presence of a nose boom, and model/sting mounting angle were investigated. A smaller apparatus, which investigates the aerodynamics of bodies of revolution in a coning motion, was used in the 6-by-6 foot Supersonic Wind Tunnel to investigate the aerodynamic behavior of a simple representation of a modern fighter, the Standard Dynamic Model (SDM). Effects of spin rate parameter and model attitude were investigated. A description of the two rigs and a discussion of some of the results obtained in the respective tests are presented. Author

N86-27243# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.
NEW ROTARY RIG AT RAE AND EXPERIMENTS ON HIRM
C. O. OLeary and E. N. Rowthorn *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A rig for measurement of forces and moments due to continuous rate of roll was commissioned at Royal Aircraft Establishment, Bedford. Tests were made on a High Incidence Research Model (HIRM) in two wind tunnels at M = 0.2, 0.4, and 0.7. At present models can be tested up to 40 deg angle of attack at rotational speeds up to 350 rpm. Tests on HIRM included an investigation of configuration and Reynolds number effects. Results are compared with similar data from tests with another rolling rig and from small amplitude oscillatory tests. Author

N86-27244# Aeronautical Research Inst. of Sweden, Bromma.
NEW DYNAMIC TESTING TECHNIQUES AND RELATED RESULTS AT FFA
Torulf Jansson and Lars Torngren *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Extraction of dynamic derivatives from wind tunnel testing was emphasized in recent years. This is shown from the number of different rigs developed and in use, both in the subsonic and transonic wind tunnels. Brief descriptions of the different rigs, testing procedures and data handling were given. A wide survey of the different rigs used for dynamic derivative testing and the corresponding testing capability are presented. B.G.

N86-27245# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
STANDARD DYNAMICS MODEL EXPERIMENTS WITH THE DFVLR/AVA TRANSONIC DERIVATIVE BALANCE
E. Schmidt *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 16 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A slender high-load forced-oscillation measuring system for dynamic derivatives of aircraft and missile models in a transonic wind tunnel is presented together with typical test results of the significant aerodynamic coefficients and stability derivatives of the Standard Dynamics Model, a simplified fighter aircraft model with a wing span of 0.345 m. The measurements in the rotational modes pitch, yaw, and roll encompass Mach numbers from 0.6 to 1.2, angles of attack from 0 to 30 degrees, and excitation frequencies from 2 to 20 Hz at a constant Reynolds number of 7.8 Mio/m. Most of the stiffness and damping derivatives gathered show substantial nonlinear dependence on Mach number and angle of attack, whereas the influence of reduced frequency is less prominent. The results are closely related to published measurements on Standard Dynamic Models performed in other NATO countries. Author

N86-27246# Institut de Mecanique des Fluides de Lille (France).
RECENT DEVELOPMENTS IN TECHNIQUES FOR DYNAMIC SIMULATION FOR THE IDENTIFICATION OF STABILITY PARAMETERS [RECENTS DEVELOPPEMENTS DES TECHNIQUES DE SIMULATION DYNAMIQUE APPLIQUEES A L'IDENTIFICATION DES PARAMETRES DE STABILITE]
D. Tristrant and O. Renier *In* AGARD Unsteady Aerodynamics-

Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

In the aircraft dynamic behavior prediction context, experimental methods and analytical procedures which allow mathematical linear modeling parameters to be identified, using a test apparatus located at the Institut de Mecanique des Fluides de Lille is presented. The rig characteristics, the experimental procedures, the identification methods, and results from different aircraft models will be described. Emphasis is put on the interest of a specifc lambda degree of freedom angle formed by the rotational vector and velocity vector. Effectively, it is shown that rotational tests with a non zero value of lambda offer interesting possibilities for identification and allow the estimation of linear model parameters in the case of a quasi-linear path. A different degree of freedom, called gyration radius, was obtained by fixing a special mechanism onto the test apparatus. By carrying out a carefully selected test program, this degree of freedom allows the whole set of stability parameters to be identified, given the structure of the linear mathematical model. Finally, dynamic measures obtained during oscillatory coning using a complete aircraft model produced in evidence the large amplitude of unsteady aerodynamic phenomena at high angles of attack, which could not be ignored if prediction of post stall evolutions is sought. Author

N86-27247# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
GENERATION OF TWO-DIMENSIONAL GUST FIELDS IN SUBSONIC WIND-TUNNELS
B. Krag and W. Wegner (Technische Univ., Brunswick, West Germany) *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 12 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

For a variety of flight vehicles, problems during flight in turbulence at subsonic speeds are expected: mainly slow flying helicopters, tilt rotorcraft, aircraft maneuvering at high angles of attack, wing in ground effect vehicles, and aircraft with active controlled wings. The investigation of these problems posses large difficulties. The analyst rapidly enters domains where computational methods fail and where wind tunnel experiments are necessary. This raises the problem of stimulating atmospheric turbulence in a wind tunnel. Until now, no fundamental investigations of the problem of gust generation in wind tunnels were undertaken. Investigations of gust generations were started in a model subsonic wind tunnel. In order to recognize the influence of the main parameters, like number of lift generating wings, chord length, trailing edge-flap or jet-flap, constant chord wing or side-wall mounted winglets, four different types of gust generators were investigated. The gust field was harmonically oscillating. Frequency response measurements of the gust angle of attack were made, covering the complete volume of the test section. Additionally the flow field in the wind tunnel behind harmonically oscillating gust generator flaps was calculated. The results were compared with the measurements. Author

N86-27248*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
EXTRACTION OF AERODYNAMIC PARAMETERS FOR AIRCRAFT AT EXTREME FLIGHT CONDITIONS
Kenneth W. Iliff *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 21 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

The maximum likelihood estimator was used to extract stability and control derivatives from flight data for many years. Most of the literature on aircraft estimation concentrates on new development and applications, assuming familiarity with basic concepts. The maximum likelihood estimator and the aircraft equations of motion that the estimator uses are discussed. The current strength and limitations associated with obtaining flight-determined aerodynamic coefficients in extreme flight conditions are assessed. The importance of the careful combining of wind tunnel results (or calculations) and flight results and the thorough evaluation of the mathematical model is emphasized. The basic concepts of minimization and estimation are examined for a simple computed aircraft example, and the cost functions that are to be minimized during estimation are defined and discussed. Graphic representations of the cost functions are given to help illustrate the minimization process. Finally, the basic concepts are generalized, and estimation of stability and control derivatives from flight data is discussed. Author

N86-27249*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NONLINEAR PROBLEMS IN FLIGHT DYNAMICS INVOLVING AERODYNAMIC BIFURCATIONS
Murray Tobak and Gary T. Chapman *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 15 p Previously announced as N85-25206 (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

Aerodynamic bifurcation is defined as the replacement of an unstable equilibrium flow by a new stable equilibrium flow at a critical value of a parameter. A mathematical model of the aerodynamic contribution to the aircraft's equations of motion is amended to accommodate aerodynamic bifurcations. Important bifurcations such as, the onset of large-scale vortex shedding are defined. The amended mathematical model is capable of incorporating various forms of aerodynamic responses, including those associated with dynamic stall of airfoils. E.A.K.

N86-27250*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIFURCATION THEORY APPLIED TO AIRCRAFT MOTIONS
W. H. Hui (Waterloo Univ., Ontario) and Murray Tobak *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p Previously announced as N85-23705 (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 01A

The bifurcation theory is used to analyze the nonlinear dynamic stability characteristics of single-degree-of-freedom motions of an aircraft or a flap about a trim position. The bifurcation theory analysis reveals that when the bifurcation parameter, e.g., the angle of attack, is increased beyond a critical value at which the aerodynamic damping vanishes, a new solution representing finite-amplitude periodic motion bifurcates from the previously stable steady motion. The sign of a simple criterion, cast in terms of aerodynamic properties, determines whether the bifurcating solution is stable (supercritical) or unstable (critical). For the pitching motion of a flap-plate airfoil flying at supersonic/hypersonic speed, and for oscillation of a flap at transonic speed, the bifurcation is subcritical, implying either that exchanges of stability between steady and periodic motion are accompanied by hysteresis phenomena, or that potentially large aperiodic departures from steady motion may develop. On the other hand, for the rolling oscillation of a slender delta wing in subsonic flight (wing rock), the bifurcation is found to be supercritical. This and the predicted amplitude of the bifurcation periodic motion are in good agreement with the experiments. Author

N86-27251# National Research Council of Canada, Ottawa (Ontario).
DYNAMIC NONLINEAR AIRLOADS: REPRESENTATION AND MEASUREMENT
E. S. Hanff *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 14 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A new representation of aerodynamic reactions (in terms of the motion variables), which does not rely on assumptions of linearity, is proposed. This representation is, therefore, indicated for extreme flight conditions where a locally linearized model is usually of questionable value. The significance within the present context of stability derivatives is discussed with the intention of

pointing out their range of applicability. A wind tunnel technique, capable of efficiently obtaining the bulk of the data required for the effective use of the representation is briefly described. Author

N86-27252*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT EXPERIENCES OF UNSTEADY AERODYNAMIC EFFECTS ON AIRCRAFT FLIGHT DYNAMICS AT HIGH ANGLE OF ATTACK
Luat T. Nguyen, Raymond D. Whipple, and Jay M. Brandon *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 25 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Recent research is highlighted which was conducted at the NASA Langley Research Center on two high angle-of-attack flight dynamic phenomena which are dominated by unsteady aerodynamic effects: wing rock and tumbling. Studies of wing rock induced by strong vortical flows and tumbling characteristics observed on an advanced configuration are reviewed. Results of wind tunnel experiments are summarized and the aerodynamic mechanisms involved in the phenomena were discussed. Author

N86-27253# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Avionics Lab.
UNSTEADY AERODYNAMICS AND DYNAMIC AIRCRAFT MANEUVERABILITY
James D. Lang and Michael S. Francis (Air Force Space Div., Los Angeles, Calif.) *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 19 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A forecast of future aerial combat predicated on anticipated technological advances and weapons developments suggests a need for supermaneuverable aircraft possessing greatly enhanced turning and virtually instantaneous point-and-shoot capabilities. The potential advantage of exploiting this unique flight environment was discussed along with a detailed description of expected vehicle dynamic behavior. An emerging picture of the unsteady aerodynamic behavior which will be experienced during these violent maneuvers dictates a need for greater vehicle and flow field control capabilities far in excess of any previously employed in application. However, the successful implementation of advanced control techniques may well beneficially exploit the unusual flow phenomena associated with this nonclassical method of flight. The research discoveries and developmental ideas generated during the next decade will likely alter the concept of maneuvering flight as it is known and lead to a new generation of aircraft with vastly improved combat capabilities. Author

N86-27254# London Univ. (England). Dept. of Aeronautical Engineering.
ON THE INTERFACE BETWEEN UNSTEADY AERODYNAMICS, DYNAMICS AND CONTROL
G. J. Hancock and R. Vepa *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 12 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The problems of interfacing the mathematical representation of linearized unsteady aerodynamics with dynamic response such that the eigenvalue of the dynamic response are correctly obtained. These eigenvalues are then used in control synthesis. Particular attention is paid to C sub M2 (lag effect between the main wing and tail) in the context of aircraft dynamics. The concept of quasi-steady aerodynamics is clarified. Author

N86-27255# Royal Aircraft Establishment, Farnborough (England).
CORRELATION OF PREDICTED AND FREE-FLIGHT RESPONSES NEAR DEPARTURE CONDITIONS OF A HIGH INCIDENCE RESEARCH MODEL
A. Jean Ross and Geraldine F. Edwards *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 13 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The mathematical model of aerodynamic forces and moments is described, based on results from various wind tunnel experiments with the Royal Airforce Establishment High Incidence Research Model (HIRM). Simulations of the responses due to longitudinal and lateral control inputs at high angles of attack are compared with the responses measured on free-flight models of the configuration. The main features of the flight behavior are reproduced, in particular such phenomena as roll-off, wing rock, and nose slice. Author

N86-27256# Kansas Univ., Lawrence. Dept. of Aerospace Engineering.
THEORETICAL PREDICTION OF WING ROCKING
C. Edward Lan *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 13 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Wing rock is primarily a rolling oscillation about the longitudinal body axis at high angles of attack. It involves nonlinear interaction between flight dynamics and aerodynamics. A nonlinear aerodynamic model was proposed earlier to predict the wing rock frequency and amplitude of low aspect-ratio configurations with good accuracy. The theory is applied to a twin-jet fighter aircraft of moderate aspect ratio and to a low-speed configuration of high aspect ratio. For the purpose of predicting necessary aerodynamic derivatives, a lifting surface method coupled with nonlinear airfoil section data is developed. The results show that wing rock can be predicted with the present wing-rock and aerodynamic theories. It is also found that for configurations of high aspect ratio, the one degree of freedom dynamic model in the present wing rock theory should be used. For other configurations, the three degrees of freedom model is more appropriate. Author

N86-27257# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
EFFECTS OF AERODYNAMIC LAGS ON AIRCRAFT RESPONSES
J. C. vanderVaart *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 11 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Results of a theoretical study on the effects of unsteady aerodynamics on symmetric aircraft responses due to elevator and vertical turbulence imputs, are presented. Several linear models were developed to describe unsteady lift and downwash and delays due to horizontal tail length. Results for three example aircraft types show that calculated normal acceleration levels due to turbulence are very little affected by including unsteady wing lift and downwash. However, there appears to be a noticeable influence on plunging acceleration and pitch rate response to elevator or vertical turbulence inputs. Author

N86-27258# Smith Associates Consulting System Engineers Ltd., Cobham (England).
A SELF-ORGANISING CONTROL SYSTEM FOR NON-LINEAR AIRCRAFT DYNAMICS
C. Evans *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 12 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

At high angles of attack (AOA) flow separations can produce nonlinear and time varying aerodynamic loads, which cannot be predicted with great certainty. Such loads make control system development extremely difficult. A control system was developed which can accomplish on-line reduction of the a priori uncertainties pertaining to the effective control of the aircraft. The self-organizing control system was developed to suppress unacceptable pitch-up tendencies of an aircraft at high AOA, without the use of AOA measurement. The final control system demonstrated good performance for a variety of inputs although performance was not as good in turbulence. Author

N86-27259# Messerschmitt-Boelkow G.m.b.H., Munich (West Germany). Hubschrauber und Flugzeuge.
GUST ALLEVIATION ON A TRANSPORT AIRPLANE
J. Becker, F. Weiss, E. Cavatorta (Aeritalia S.p.A., Naples, Italy), and C. Caldarelli *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 9 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A Gust Alleviation System on a preliminary configuration of a commuter aircraft was analyzed. The analysis takes into account the influence of the elasticity of the aircraft, unsteady aerodynamic effect, and mechanical nonlinearities such as backlash-deadzone, control surface rate, and deflection limitations. A relatively simple model shows that ride comfort can be improved by at least 50%. Author

N86-27260# Waterloo Univ. (Ontario). Dept. of Applied Mathematics and Mechanical Engineering.
UNSTEADY THREE-DIMENSIONAL FLOW THEORY VIA MATERIAL FUNCTIONS
W. H. Hui and H. J. VanRoessel *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 3 p (For primary document see N86-27224 18-02)
(Grant NAGw-575)
Avail: NTIS HC A99/MF A01

A new Lagrangian formulation for unsteady three dimensional supersonic inviscid flow over rigid bodies is developed. The continuity equation is eliminated by the use of material functions, a generalization of the stream functions for steady flow. This is followed by a transformation to new independent variables, three of which are these material functions. The fourth variable is a Lagrangian time distinct from the Eulerian time. This simultaneous use of both Langrangian and Eulerian time allows the problem of flow with shock wave to be reduced to a fixed boundary one. In the Newtonian limit it is found possible to obtain analytic solutions for various body shapes. Author

N86-27261*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
UNSTEADY INTERACTIONS OF TRANSONIC AIRFOILS WITH GUSTS AND CONCENTRATED VORTICES
W. J. McCroskey and G. R. Srinivasan (JAI Associates, Mountain View, Calif.) *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 13 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

Unsteady interactions of strong concentrated vortices, distributed gusts, and sharp-edged gusts with stationary airfoils were analyzed in two-dimensional transonic flow. A simple and efficient method for introducing such vortical disturbances was implemented in numerical codes that range from inviscid, transonic small-disturbance to thin-layer Navier Stokes. The numerical results demonstrate the large distortions in the overall flow field and in the surface air loads that are produced by various vortical interactions. The results of the different codes are in excellent qualitative agreement, but, as might be expected, the transonic small-disturbance calculations are deficient in the important region near the leading edge. Author

N86-27262# Hellenic Air Force Technology Research Center, Athens (Greece).
MODELLING OF THE VORTEX-AIRFOIL INTERACTION
Argyris G. Panaras *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 16 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

A modeling of the vortex-airfoil interaction is presented in which the finite-area of the real vortices is taken into consideration. Two vortex models are used. In the first, a disturbed piece of vorticity layer is simulated by four rows of discrete vortices of small strength. In the second, a number of discrete vortices is arranged within a circle. The first model may simulate a shear layer or a wake, while the second, a well-formed vortex. The method was applied to the calculation of the pressure induced on the surface of the airfoil by the interacting vortex. Both models give similar results. It was found that for large distances of the vortex from the surface of the airfoil, the consideration or not of the finite-area of the vortex is not a significant factor in determining the induced pressure field. However, when the distance of the vortex from the surface is reduced, its shape is distorted and the induced pressure pulses have lower amplitude than the ones induced by an equivalent point vortex. In the limit, where the vortex impinges on the leading edge of the airfoil, it is split into two and the time dependent pressure coefficient takes even negative values at some time intervals. Author

N86-27263# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
IDENTIFICATION OF AIRCRAFT CHARACTERISTICS INCLUDING GUST INDUCED DYNAMIC EFFECTS
D. Rohlf *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 8 p (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

For the investigation of unsteady aerodynamic effects at low Mach numbers, dynamic tests using controllable models of a light transport aircraft were performed in wind tunnels in the Dynamic Simulation Facility (Germany) and the Free Flight Catapult Facility (France). These model test techniques have the advantage of laboratory conditions with the possibility of generating reproducible gusts. The achieved flight test data were analyzed in detail applying method of system identification. This included the determination of the discrete gust disturbance from onboard measured signals. An approach was presented which used the measured angle of attack and additional calculated dynamic terms, which become essential in the presence of fast flow changes due to short-wave gusts or high-frequency control deflection. Measured time histories of model flight tests with excitation by control inputs and gusts are presented and compared with identification results obtained from the multi-run evaluation. Author

N86-27264# Sherbrooke Univ. (Quebec). Dept. de Genie Mecanique.
EXPERIMENTAL STUDY OF THE EFFECT OF TURBULENCE ON DYNAMIC STALLING [ETUDE EXPERIMENTALE DE L'EFFET DE LA TURBULENCE SUR LE DECROCHAGE DYNAMIQUE]
A. Laneville, P. Vittecoq, and J. Cote *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 7 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The results of a study of dynamic stalling for different intensities of turbulence in the flow of a wind tunnel are presented. The test was conducted on a NACA 0018 profile with sinusoidal oscillation. The results show that turbulence modifies both static and dynamic stall phenomena. It is shown that turbulence stabilizes the boundary layer at the leading edge, while allowing the profile to attain larger angles of incidence before stalling. In addition, turbulence alters the formation of vortices at the leading edge. Transl. by T. R.

N86-27265*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
APPLICATION OF CFD TECHNIQUES TOWARD THE VALIDATION OF NONLINEAR AERODYNAMIC MODELS
Lewis B. Schiff and Joseph Katz *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 15 p Previously announced as N85-26671 (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01 CSCL 14B

Applications of computational fluid dynamics (CFD) methods to determine the regimes of applicability of nonlinear models describing the unsteady aerodynamic responses to aircraft flight motions are described. The potential advantages of computational methods over experimental methods are discussed and the

concepts underlying mathematical modeling are reviewed. The economic and conceptual advantages of the modeling procedure over coupled, simultaneous solutions of the gas dynamic equations and the vehicle's kinematic equations of motion are discussed. The modeling approach, when valid, eliminates the need for costly repetitive computation of flow field solutions. For the test cases considered, the aerodynamic modeling approach is shown to be valid. Author

N86-27266# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
STUDY OF THE TRANSITION BEHAVIOR OF AN AIRPLANE IN THE VICINITY OF BIFURCATION POINTS [ETUDE DU COMPORTEMENT TRANSITOIRE D'UN AVION AU VOISINAGE DE POINTS DE BIFURCATION]
P. Guicheteau *In* AGARD Unsteady Aerodynamics-Fundamentals and Applications to Aircraft Dynamics Nov. 1985 7 p In FRENCH (For primary document see N86-27224 18-02)
Avail: NTIS HC A99/MF A01

The transition behavior of an aircraft in the vicinity of bifurcation points, using a differential system method to analytically determine nonlinearities is discussed. The method proposed does not require the reduction of the differential system. Primary applications for this method include studies on fighter aircraft. Transl. by T. R.

N86-27652*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TETHERED AEROTHERMODYNAMICS RESEARCH FACILTY (STARFAC) INSTRUMENTATION REQUIREMENTS
George M. Wood, Paul M. Siemers, Giovanni M. Carlomagno (Naples Univ. (Italy).), and John Hoffman (Texas Univ., Dallas.) *In* NASA, Washington Applications of Tethers in Space. Workshop Proceedings, Vol. 2 Jun. 1986 p 251-263 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27653*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TETHERED AEROTHERMODYNAMICS RESEARCH FACILITY (STARFAC)
Paul M. Siemers, George M. Wood, and Henry Wolf *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 265-285 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-27267# National Transportation Safety Board, Washington, D. C.
NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATION
4 Mar. 1986 6 p
(NTSB-4102C/300A) Avail: NTIS HC A02/MF A01

Vibrations caused by open air start access doors on Lockheed Electras were discussed. Proposed safety measures include: issuance of an Airworthiness Directive to all Electra operators to modify the air start access door; until modification of the door occurs, Principle Operations Inspectors should inform the operators of the potential hazards; establish procedures to ensure adequate surveillance is maintained; verification that supplemental operators are fulfilling their responsibility to see that competent personnel are available to maintain and service the aircraft; evaluate information needed by the crash/fire rescue agencies; and provide guidance on topics and training in cockpit resource management to flightcrew members. B.G.

N86-27268*# Wichita State Univ., Kans. Coll. of Engineering.
ANALYSES AND TESTS FOR DESIGN OF AN ELECTRO-IMPULSE DE-ICING SYSTEM Interim Report
G. W. Zumwalt, R. L. Schrag, W. D. Bernhart, and R. A. Friedberg May 1985 198 p
(Grant NAG3-284)
(NASA-CR-174919; AR-85-1; NAS 1.26:174919) Avail: NTIS HC A09/MF A01 CSCL 01C

De-icing of aircraft by using the electro-magnetic impulse phenomenon was proposed and demonstrated in several European countries. However, it is not available as a developed system due to lack of research on the basic physical mechanisms and necessary design parameters. The de-icing is accomplished by rapidly discharging high voltage capacitors into a wire coil rigidly supported just inside the aircraft skin. Induced eddy currents in the skin create a repulsive force resulting in a hammer-like force which cracks, de-bonds, and expels ice on the skin surface. The promised advantages are very low energy, high reliability of de-icing, and low maintenance. Three years of Electo-Impulse De-icing (EIDI) research is summarized and the analytical studies and results of testing done in the laboratory, in the NASA Icing Research Tunnel, and in flight are presented. If properly designed, EIDI was demonstrated to be an effective and practical ice protection system for small aircraft, turbojet engine inlets, elements of transport aircraft, and shows promise for use on helicopter rotor blades. Included are practical techniques of fabrication of impulse coils and their mountings. The use of EIDI with nonmetallic surface materials is also described. Author

N86-27269# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 17 OF 1983 ACCIDENTS
12 Jul. 1985 337 p
(PB85-916918; NTSB/AAB-85/18) Avail: NTIS HC A15/MF A01; also available on subscription, North American Continent HC $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1983. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-27270* National Aeronautics and Space Administration. Pasadena Office, Calif.
HIGH DYNAMIC GLOBAL POSITIONING SYSTEM RECEIVER Patent
William J. Hurd, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) Issued 25 Mar. 1986 13 p Filed 14 Nov. 1983 Supersedes N84-12151 (22 - 03, p 330) Sponsored by NASA, Pasadena Office
(NASA-Case-NPO-16171-1CU; US-Patent-4,578,678; US-Patent-Appl-SN-551536; US-Patent-Class-343-357; US-Patent-Class-343-418) Avail: US Patent and Trademark Office CSCL 17G

A Global Positioning System (GPS) receiver having a number of channels, receives an aggregate of pseudorange code time

division modulated signals. The aggregate is converted to baseband and then to digital form for separate processing in the separate channels. A fast fourier transform processor computes the signal energy as a function of Doppler frequency for each correlation lag, and a range and frequency estimator computes estimates of pseudorange, and frequency. Raw estimates from all channels are used to estimate receiver position, velocity, clock offset and clock rate offset in a conventional navigation and control unit, and based on the unit that computes smoothed estimates for the next measurement interval. NASA

N86-27271*# Princeton Univ., N. J. School of Engineering and Applied Science.
AN OPTIMIZATION MODEL FOR THE US AIR-TRAFFIC SYSTEM Final Report
John M. Mulvey Apr. 1986 27 p
(Grant NAG1-520)
(NASA-CR-177277; NAS 1.26:177277) Avail: NTIS HC A03/MF A01 CSCL 17G

A systematic approach for monitoring U.S. air traffic was developed in the context of system-wide planning and control. Towards this end, a network optimization model with nonlinear objectives was chosen as the central element in the planning/control system. The network representation was selected because: (1) it provides a comprehensive structure for depicting essential aspects of the air traffic system, (2) it can be solved efficiently for large scale problems, and (3) the design can be easily communicated to non-technical users through computer graphics. Briefly, the network planning models consider the flow of traffic through a graph as the basic structure. Nodes depict locations and time periods for either individual planes or for aggregated groups of airplanes. Arcs define variables as actual airplanes flying through space or as delays across time periods. As such, a special case of the network can be used to model the so called flow control problem. Due to the large number of interacting variables and the difficulty in subdividing the problem into relatively independent subproblems, an integrated model was designed which will depict the entire high level (above 29000 feet) jet route system for the 48 contiguous states in the U.S. As a first step in demonstrating the concept's feasibility a nonlinear risk/cost model was developed for the Indianapolis Airspace. The nonlinear network program --NLPNETG-- was employed in solving the resulting test cases. This optimization program uses the Truncated-Newton method (quadratic approximation) for determining the search direction at each iteration in the nonlinear algorithm. It was shown that aircraft could be re-routed in an optimal fashion whenever traffic congestion increased beyond an acceptable level, as measured by the nonlinear risk function. B.W.

N86-27272# Massachusetts Inst. of Tech., Lexington.
TCAS EXPERIMENTAL UNIT (TEU) HARDWARE DESCRIPTION
David A. Spencer, Raymond R. LaFrey, Joseph DiBartolo, and William H. Harman 6 Jun. 1986 129 p
(Contracts F19628-85-C-0002; DOT-FA77WAI-817)
(FAA/PM-85/2; PR-ATC-133) Avail: NTIS HC A07/MF A01

The hardware design of the TCAS Experimental Units (TEU's) constructed by Lincoln Laboratory to support the design and validation of the Traffic Alert and Collision Avoidance System (TCAS) for the FAA is described. Section 1.0 presents an overview of the operation of the TEU's in order to give some context for the hardware design. References are given to more extensive descriptions of the TCAS system operation and software design. Section 2.0 constitutes the bulk of the report, and is a detailed description of the TEU hardware design. The purpose of this description is to document the design details of the equipment which was used to develop and validate the signal processing techniques and algorithms which appear in the TCAS II Minimum Operational Performance Standard, the TCAS National Standard and various technique reports listed in the references. A second purpose is to provide design guidance to potential TCAS II manufacturers, in the form of a detailed description of a feasible design with documented performance. Finally, this document is a manual for future use and maintenance of the TEU's. Author

N86-27273# Federal Aviation Agency, Atlantic City, N.J.
TECHNICAL SUPPORT OF THE WALL STREET/BATTERY PARK CITY HELIPORT MLS (MICROWAVE LANDING SYSTEM) PROJECT Technical Note, Jan. - Jun. 1985
Barry R. Billmann, James H. Enias, and Michael Webb Dec. 1985 78 p
(AD-A165073; DOT/FAA/CT-TN85/58) Avail: NTIS HC A05/MF A01 CSCL 17/7

During the winter and spring of 1985, the Federal Aviation Administration (FAA) Eastern Region in conjunction with the Guidance and Airborne Systems Branch at the FAA Technical Center conducted a demonstration of a Microwave Landing System (MLS) located at a downtown heliport. This report describes both the industry/user and FAA Technical Center activities during the evaluation period. It describes the evaluation methodology and addresses topics concerning both technical and operational issues. It also describes the helicopter procedures flown during this evaluation and provides an analysis of signal coverage and the user's subjective opinions concerning the acceptability and perceived workload associated with these procedures. It was concluded that MLS to heliports is a viable asset to the helicopter Instrument Flight Rules (IFR) community; however, its full benefits may not be realized in the Battery Park/Wall Street area without revisiting the necessity and demand for the New York Terminal Control Area (TCA) Visual Flight Rules (VFR) operating exclusion area. Author (GRA)

N86-27274# Oak Ridge National Lab., Tenn.
LEARNED NAVIGATION PATHS FOR A ROBOT IN UNEXPLORED TERRAIN
S. S. Iyengar, C. C. Jorgensen, S. V. N. Rao, and C. R. Weisbin 1985 9 p Presented at the 2nd Conference on Artificial Intelligence Applications, Miami Beach, Fla., 11 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001358; CONF-851245-1) Avail: NTIS HC A02/MF A01

Finding optimal paths for robot navigation in known terrain has been studied for some time but, in many important situations, a robot would be required to navigate in completely new or partially explored terrain. We propose a method of robot navigation which requires no pre-learned model, makes maximal use of available information, records and synthesizes information from multiple journeys, and contains concepts of learning that allow for continuous transition from local to global path optimality. The model of the terrain consists of a spatial graph and a Voronoi diagram. Using acquired sensor data, polygonal boundaries containing perceived obstacles shrink to approximate the actual obstacle surfaces, free space for transit is correspondingly enlarged, and additional nodes and edges are recorded based on path intersections and stop points. Navigation planning is gradually accelerated with experience since improved global map information minimizes the need for further sensor data acquisition. Our method currently assumes obstacle locations are unchanging, navigation can be successfully conducted using two-dimensional projections, and sensor information is precise. DOE

N86-27275# Litton Technische Werke, Freiburg (West Germany).
IMPROVEMENT OF STRAPDOWN SYSTEM PERFORMANCE BY MEANS OF NUMERICAL METHODS Final Report, Dec. 1984
Hermann Buitkamp, Klaus Enderlein, Glynn Everett, Uwe Kirchhoff, Michael Kleinschmidt, Demir Ozdes, and Peter Steiert Bonn Bundesministerium fuer Forschung und Technologie Nov. 1985 130 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-011; ISSN-0170-1339; LITEF-105-793) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27.50

Software methods to improve the performance of strapdown systems, and the simulation tools used in the analysis of system mechanisms are presented. Models of the inertial and external sensors to compensate for systematic errors; correct timing of

the data flow of the sensors; multiposition alignment to eliminate the day-to-day repeatability of gyro biases; design control loops with optimal/suboptimal filters for special tasks of a strapdown unit (e.g., helicopter mission, initial alignment) are described. Kalman filters are used to reduce the influence of stochastic errors and for cross calibration of the sensors. ESA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-27276# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
COMBAT LOADS ON MODERN FIGHTERS
Feb. 1986 21 p
(AGARD-R-730; ISBN-92-835-1518-8) Avail: NTIS HC A02/MF A01

A number of factors which influence the selection of design cases are examined in the light of modern fighter usage and modern technologies that are available, or will soon be available. It was found that pilots fly fighters very differently than was the norm for the period of time when most design criteria specifications were written, largely because the environment created by today's detection systems and weapons is very different than it was then. It was found that as technology advances, such advanced composite construction and fly-by-wire control systems make it possible to tailor the configuration to achieve a maneuvering capability previously unattainable. It is concluded that the method of selecting design cases need to be updated. Available methods for predicting loads for new, more complex design cases are discussed. No firm recommendations can be made, but a number of suggestions are made which, it is hoped, will contribute to fruitful future consideration of the problems discussed. Author

N86-27277# National Aerospace Lab., Tokyo (Japan).
AN ANALYSIS OF THE LIMIT CYCLE OBSERVED IN THE FUNCTIONAL MOCKUP TEST OF THE NAL QSTOL RESEARCH AIRCRAFT
Hiroyuki Yamato, Tadao Uchida, Noriaki Okada, Toshio Ogawa, and Akira Tada Dec. 1985 56 p In JAPANESE; ENGLISH summary
(NAL-TR-893; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

The quiet STOL research aircraft under development at the National Aerospace Laboratory is equipped with the Stability and Control Augmentation System (SCAS). When the SCAS Pitch CWS mode is engaged in flight simulation tests using the control system functional mockup, a small limit cycle is observed. The method of describing functions is used to analyze this problem, because nonlinearities in the mechanical linkages and the power actuator play an important role in sustaining the limit cycle. To construct a mathematical model of the control system, nonlinear elements are employed so that the model response may accord with functional mockup test results including the frequency response. Through both the test and the analysis, it is shown that the present method is an effective tool for analyzing the limit cycle. And it is also clarified that the limit cycle observed is not so annoying to the pilot and is within the limits of the MIL specifications for sustained oscillations. Author

N86-27278*# PRC Kentron, Inc., Hampton, Va.
EFFECT OF EMERGING TECHNOLOGY ON A CONVERTIBLE, BUSINESS/INTERCEPTOR, SUPERSONIC-CRUISE JET
F. L. Beissner, Jr., W. A. Lovell, A. Warner Robins, and E. E. Swanson May 1986 60 p
(Contract NAS1-18000)
(NASA-CR-178097; NAS 1.26:178097) Avail: NTIS HC A04/MF A01 CSCL 01C

This study was initiated to assess the feasibility of an eight-passenger, supersonic-cruise long range business jet aircraft that could be converted into a military missile carrying interceptor. The baseline passenger version has a flight crew of two with cabin space for four rows of two passenger seats plus baggage and lavatory room in the aft cabin. The ramp weight is 61,600 pounds with an internal fuel capacity of 30,904 pounds. Utilizing an improved version of a current technology low-bypass ratio turbofan engine, range is 3,622 nautical miles at Mach 2.0 cruise and standard day operating conditions. Balanced field takeoff distance is 6,600 feet and landing distance is 5,170 feet at 44,737 pounds. The passenger section from aft of the flight crew station to the aft pressure bulkhead in the cabin was modified for the interceptor version. Bomb bay type doors were added and volume is sufficient for four advanced air-to-air missiles mounted on a rotary launcher. Missile volume was based on a Phoenix type missile with a weight of 910 pounds per missile for a total payload weight of 3,640 pounds. Structural and equipment weights were adjusted and result in a ramp weight of 63,246 pounds with a fuel load of 30,938 pounds. Based on a typical intercept mission flight profile, the resulting radius is 1,609 nautical miles at a cruise Mach number of 2.0. Author

N86-27279*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIVERGENCE STUDY OF A HIGH-ASPECT RATIO, FORWARD-SWEPT WING
Stanley R. Cole Jun. 1986 10 p Presented at the AIAA 24th Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986 Previously announced in IAA as A86-19632
(NASA-TM-87682; NAS 1.26:87682) Avail: NTIS HC A02/MF A01 CSCL 01C

An experimental wind-tunnel study to determine the divergence characteristics of a high-aspect ratio, forward-swept wing has been conducted in the NASA Langley Research Center (LaRC) Transonic Dynamics Tunnel (TDT). The rectangular wing used for this study had a panel aspect ratio of 9.16 (lambda = 0 deg.) and the sweep angle could be set at lambda = 0 deg., -15 deg., -30 deg., -45 deg., or -60 deg. A rectangular wing tip shape was tested at each of these sweep angles. In addition, a tip shape parallel to the freestream flow was tested for a wing sweep angle of lambda = -45 deg. The root of the wing was cantilever mounted to the wall of the wind tunnel. Divergence conditions were measured at M = 0.4 for each sweep angle and tip configuration tested. Subcritical response techniques were used to extrapolate to the divergence conditions during the wind-tunnel test. The primary objective of this test was to obtain data which could be used to verify for this configuration the divergence prediction capability of an aeroelastic analysis code. Subsonic lifting surface theory (kernel function) aerodynamics are utilized by this particular code. The analytical predictions of divergence were found to be significantly conservative at all forward sweep angles. At lambda = -45 deg., the analysis was 14 percent conservative. The effect of the two tip shapes on the divergence dynamic pressure was predicted accurately by the analysis. The divergence condition for the tip shape parallel to the flow occurred at a dynamic pressure 14 percent higher than the divergence condition with a rectangular tip shape. Author

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-27280* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRCRAFT LIFTMETER Patent
Ernest W. Millen, inventor (to NASA) Issued 29 Apr. 1986 10 p Filed 8 Feb. 1984 Supersedes N84-32383 (22 - 22, p 3535) Sponsored by NASA. Langley Research Center

(NASA-Case-LAR-12518-1; US-Patent-4,586,140; US-Patent-Appl-SN-578388; US-Patent-Class-364-433; US-Patent-Class-364-435; US-Patent-Class-244-181; US-Patent-Class-73-178T; US-Patent-Class-340-968) Avail: US Patent and Trademark Office CSCL 01D

A display for aiding the pilot of an aircraft in anomalous wind environments is described. Wind velocity components are measured by an instrument, processed by a computer and a vector generator, and then displayed as a vector. The display utilizes the measurements of ground speed and of wind velocity in three mutually perpendicular directions. This display will also show changes in lift of an aircraft. B.W.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-27281# National Aerospace Lab., Tokyo (Japan).
A STUDY ON CONTROL SYSTEM OF HIGH EFFICIENCY GAS TURBINE AGTJ100(1); CONTROL SYSTEM DEVELOPMENT FACILITIES AND ITS CHARACTERISTICS
Nanahisa Sugiyama, Takeshi Koshinuma, and Kenji Nishio Dec. 1985 48 p In JAPANESE; ENGLISH summary
(NAL-TR-895; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

A national research and development program on High Efficiency Gas Turbines is under way. The target of the program is to develop an intercool/reheat type gas turbine engine for 100 MW class power generation with very high thermal efficiency, resulting in energy conservation. The requirement for engine control is severe due to the complexity of the engine cycle and geometry. Therefore, development of an engine controller, an inherently sophisticated multivariate controller, is considered to be one of the most important items for the success of the program. The basic plan, fabrication, and characteristics of the control system development facilities are described. The facilities consist of a high speed digital simulator (AD10) for real time gas turbine simulation, a peripheral array processor (MAP300) for matrix operation and time series analysis, and a general purpose super minicomputer (VAX11/750). These can be utilized effectively in various stages of development of a control system, such as design, evaluation, and hardware test. Author

N86-27282*# Hamilton Standard, Windsor Locks, Conn.
LARGE-SCALE ADVANCED PROP-FAN (LAP) PITCH CHANGE ACTUATOR AND CONTROL DESIGN REPORT
Robert A. Schwartz, Paul Carvalho, and Mark J. Cutler 31 Jan. 1986 187 p Original document contains color illustrations
(Contract NAS3-23051)
(NASA-CR-174788; NAS 1.26:174788) Avail: NTIS HC A09/MF A01 CSCL 01A

In recent years, considerable attention has been directed toward improving aircraft fuel consumption. Studies have shown that the high inherent efficiency previously demonstrated by low speed turboprop propulsion systems may now be extended to today's higher speed aircraft if advanced high-speed propeller blades having thin airfoils and aerodynamic sweep are utilized. Hamilton Standard has designed a 9-foot diameter single-rotation Large-Scale Advanced Prop-Fan (LAP) which will be tested on a static test stand, in a high speed wind tunnel and on a research aircraft. The major objective of this testing is to establish the structural integrity of large-scale Prop-Fans of advanced construction in addition to the evaluation of aerodynamic performance and aeroacoustic design. This report describes the operation, design features and actual hardware of the (LAP) Prop-Fan pitch control system. The pitch control system which controls blade angle and propeller speed consists of two separate assemblies. The first is the control unit which provides the hydraulic supply, speed governing and feather function for the system. The second unit is the hydro-mechanical pitch change actuator which directly changes blade angle (pitch) as scheduled by the control. Author

N86-27283*# Pratt and Whitney Aircraft, East Hartford, Conn. Commercial Products Div.
STRUCTURAL TAILORING OF ENGINE BLADES (STAEBL) THEORETICAL MANUAL
K. W. Brown Mar. 1985 51 p
(Contract NAS3-22525)
(NASA-CR-175112; NAS 1.26:175112; PWA-5774-40) Avail: NTIS HC A04/MF A01 CSCL 21E

This Theoretical Manual includes the theories included in the Structural Tailoring of Engine Blades (STAEBL) computer program which was developed to perform engine fan and compressor blade numerical optimizations. These blade optimizations seek a minimum weight or cost design that satisfies practical blade design constraints, by controlling one to twenty design variables. The STAEBL constraint analyses include blade stresses, vibratory response, flutter, and foreign object damage. Blade design variables include airfoil thickness at several locations, blade chord, and construction variables: hole size for hollow blades, and composite material layup for composite blades. Author

N86-27284*# Pratt and Whitney Aircraft, East Hartford, Conn. Commercial Products Div.
STRUCTURAL TAILORING OF ENGINE BLADES (STAEBL) USER'S MANUAL
K. W. Brown Mar. 1985 106 p
(Contract NAS3-22525)
(NASA-CR-175113; NAS 1.26:175113; PWA-5774-39) Avail: NTIS HC A06/MF A01 CSCL 21E

This User's Manual contains instructions and demonstration case to prepare input data, run, and modify the Structural Tailoring of Engine Blades (STAEBL) computer code. STAEBL was developed to perform engine fan and compressor blade numerical optimizations. This blade optimization seeks a minimum weight or cost design that satisfies realistic blade design constraints, by tuning one to twenty design variables. The STAEBL constraint analyses include blade stresses, vibratory response, flutter, and foreign object damage. Blade design variables include airfoil thickness at several locations, blade chord, and construction variables: hole size for hollow blades, and composite material layup for composite blades. Author

N86-27285*# Massachusetts Inst. of Tech., Cambridge. Gas Turbine and Plasma Dynamics Lab.
CHANNEL FLOW MODELING OF IMPINGEMENT COOLING OF A ROTATING TURBINE BLADE
JaHye Jenny Koo Dec. 1984 94 p
(Grant NAG3-335)
(NASA-CR-177206; NAS 1.26:177206; GTPDL-181) Avail: NTIS HC A05/MF A01 CSCL 21E

Local heat transfer distributions in impingement cooling have been measured by Kreatsoulas and Prieser for a range of conditions which model those in actual turbine blades, including the effects of rotation. These data were reported as local Nusselt numbers, but referred to coolant supply conditions. By means of a channel flow modeling of the flow in the supply and impingement passages, the same data are here presented in terms of local Nusselt number distributions such as are used in design. The results in this form are compared to the nonrotating impingement results of Chupp and to the rotating but nonimpingement results of Morris. Rotation reduces the mean Nusselt numbers from these found by Chupp by about 30 percent, and introduces important radial variations which are sensitive to rotation and to leading edge stagger angle. Author

N86-27286# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
A MICROCOMPUTER BASED SCANNING PRESSURE MEA-

SUREMENT SYSTEM Final Report, Jan. - Aug. 1985
Stephen F. Foley Jan. 1986 48 p
(AD-A165051; AFWAL-TR-85-2075) Avail: NTIS HC A03/MF A01 CSCL 21/5

There is a requirement in the Air Force Wright Aeronautical Laboratory's Compressor Research Facility (CRF) for a multichannel pressure measurement system which can easily integrate into its present data acquisition system. The requirement for this system is based on a need for measurement of a large number of steady state pressures emanating from gas turbine engine compressor test vehicles. Implementation of such a system would greatly expand the data gathering capability of the CRF while vacating presently available channels for use in higher response pressure measurement applications. This report describes in detail the design and implementation of a scanning pressure measurement system which uses a personal computer as the controlling and data processing element. GRA

N86-27287# Naval Academy, Annapolis, Md. Div. of Engineering and Weapons.
NUMERICAL HEAT TRANSFER MODEL FOR A HEAT-BARRIER-PISTON ENGINE WITH HYPERGOLIC COMBUSTION Progress Report, 1982 - 1986
David A. Blank Feb. 1986 193 p
(AD-A165083; USNA-EW-8-86) Avail: NTIS HC A09/MF A01 CSCL 21/7

Axisymmetric turbulent combustion flow with heat transfer has been modeled for a four-stroke engine exhibiting hypergolic combustion and containing a heat barrier within the piston. The boundaries of the solution scheme extend fixed distances into the piston and cylinder lining. In the model, a valve was simulated which has thickness for the purpose of heat transfer calculations and is infinitely thin for the purpose of fluid field calculations. A fuel injector was numerically modeled which gave good simulation of the type of injector used in current hypergolic combustion research. The implicit finite-difference solution of the governing equations for the primitive variables was conducted in three regions, one fixed in space with time, one utilizing a stretching and compressing computational mesh and one which moved with time without stretching and compressing. An accuracy check of the computational code for the five primitive variables representing the non-combustion case was conducted by specifying an analytic expression for each of these variables and changing the source terms of the corresponding governing equations to make these analytic expressions into the solution computed solution with the specified analytic solution for the resultant set of modified equations. Comparis on of the numerically computed solution with the specified analytic solution gave excellent agreement. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-27288* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THUMB-ACTUATED TWO-AXIS CONTROLLER Patent
Richard H. Hollow, inventor (to NASA) (Computer Sciences Corp., Mountain View, Calif.) Issued 22 Apr. 1986 11 p Filed 8 Sep. 1982 Supersedes N83-12098 (21 - 03, p 328) Sponsored by NASA. Ames Research Center
(NASA-Case-ARC-11372-1; US-Patent-4,584,510;
US-Patent-Appl-SN-415878; US-Patent-Class-318-584;
US-Patent-Class-318-640; US-Patent-Class-250-211K;
US-Patent-Class-200-157; US-Patent-Class-244-234) Avail: US Patent and Trademark Office CSCL 01C

A two axis joystick controller is described. It produces at least one output signal in relation to pivotal displacement of a member with respect to an intersection of the two axes. The member is pivotally movable on a support with respect to the two axes. The support has a centrally disposed aperture. A light source is mounted on the pivotally movable member above the aperture to direct light through the aperture. A light sensor is mounted below the aperture in the support at the intersection of the two axes to receive the light from the light source directed through the aperture. The light sensor produces at least one output signal related to a location on the sensor at which the light from the light source strikes the sensor. NASA

N86-27289# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
A COMPUTER PROGRAMME FOR DATCOM METHODS OF ESTIMATION OF LATERAL STABILITY AND CONTROL DERIVATIVES
S. Ramabhadran and H. Sundaramurthy Mar. 1986 46 p
(NAL-TM-AE-8601) Avail: NTIS HC A03/MF A01

A computer code has been developed to estimate the lateral stability and control derivatives of aircraft configuration. The code, in general, is based on USAF DATCOM methods; in the case of a few derivatives, some approximate relations are used. The code estimates nine important lateral derivatives and five control derivatives. A brief review of the methods along with the limitations of DATCOM are presented. A comparison between the results of the code with those of the working examples of DATCOM are given for some cases. Application of the code for typical configurations is discussed. Author

N86-27290*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HIGHLY MANEUVERABLE AIRCRAFT TECHNOLOGY (HIMAT) FLIGHT-FLUTTER TEST PROGRAM
Michael W. Kehoe May 1984 20 p
(NASA-TM-84907; H-1183; NAS 1.15:84907) Avail: NTIS HC A02/MF A01 CSCL 01C

The highly maneuverable aircraft technology (HiMAT) vehicle was evaluated in a joint NASA and Air Force flight test program. The HiMAT vehicle is a remotely piloted research vehicle. Its design incorporates the use of advanced composite materials in the wings, and canards for aeroelastic tailoring. A flight-flutter test program was conducted to clear a sufficient flight envelope to allow for performance, stability and control, and loads testing. Testing was accomplished with and without flight control-surface dampers. Flutter clearance of the vehicle indicated satisfactory damping and damping trends for the structural modes of the HiMAT vehicle. The data presented include frequency and damping plotted as a function of Mach number. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-27291*# Wichita State Univ., Kans. Dept. of Aeronautical Engineering.
DE-ICING OF THE ALTITUDE WIND TUNNEL TURNING VANES BY ELECTRO-MAGNETIC IMPULSE Final Report
Glen W. Zumwalt and Richard Ross Mar. 1986 79 p
(Grant NAG3-607)
(NASA-CR-177260; NAS 1.26:177260) Avail: NTIS HC A05/MF A01 CSCL 14B

The Altitude Wind Tunnel at the NASA-Lewis facility is being proposed for a refurbishment and moderization. Two major changes are: (1) the increasing of the test section Mach number to 0.90, and (2) the addition of spray nozzles to provide simulation of flight in icing clouds. Features to be retained are the simulation of atmospheric temperature and pressure to 50,000 foot altitude and provision for full-scale aircraft engine operation by the

exhausting of the aircraft combustion gases and ingestion of air to replace that used in combustion. The first change required a re-design of the turning vanes in the two corners downstream of the test section due to the higher Mach number at the corners. The second change threatens the operation of the turning vanes by the expected ice build-up, particulary on the first-corner vanes. De-icing by heat has two drawbacks: (1) an extremely large amount of heat is required, and (2) the melted ice would tend to collect as ice on some other surfaces in the tunnel, namely, the tunnel propellers and the cooling coils. An alternate de-icing method had been under development for three years under NASA-Lewis grants to the Wichita State University. This report describes the electro-impulse de-icing (EIDI) method and the testing work done to assess its applicability to wind tunnel turning vane de-icing. Tests were conducted in the structural dynamics laboratory and in the NASA Icing Research Tunnel. Good ice protection was achieved at lower power consumption and at a wide range of tunnel operations conditions. Recommendations for design and construction of the system for this application of the EIDI method are given. Author

N86-27292*# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
PERFORMANCE TESTS FOR THE NASA AMES RESEARCH CENTER 20 cm X 40 cm OSCILLATING FLOW WIND TUNNEL Progress Report, 1 Jun. - 31 Dec. 1984
William J. Cook and Tim A. Giddings 31 Dec. 1984 46 p
(Grant NCC2-200)
(NASA-CR-176385; NAS 1.26:176385; ISU-ERI-Ames-85436)
Avail: NTIS HC A03/MF A01 CSCL 14B

An evaluation is presented of initial tests conducted to assess the performance of the NASA Ames 20 cm x 40 cm oscillating flow wind tunnel. The features of the tunnel are described and two aspects of tunnel operation are discussed. The first is an assessment of the steady mainstream and boundary layer flows and the second deals with oscillating mainstream and boundary layer flows. Experimental results indicate that in steady flow the test section mainstream velocity is uniform in the flow direction and in cross section. The freestream turbulence intensity is about 0.2 percent. With minor exceptions the steady turbulent boundary layer generated on the top wall of the test section exhibits the characteristics of a zero pressure gradient turbulent boundary layer generated on a flat plate. The tunnel was designed to generate sinusoidal oscillating mainstream flows. Experiments confirm that the tunnel produces sinusoidal mainstream velocity variations for the range of frequencies (up to 15 Hz). The results of this study demonstrate that the tunnel essentially produces the flows that it was designed to produce. Author

N86-27293# Washington Univ., Seattle. Transportation Center.
USE OF NDE TO EVALUATE REFLECTION CRACKING IN AIRFIELD PAVEMENTS Final Report, Feb. - Aug. 1984
David E. Newcomb, Joe P. Mahoney, and Jatinder Sharma Nov. 1985 129 p
(Contract F08635-84-K-0145)
(AD-A164880; AFESC/ESL-TR-84-42) Avail: NTIS HC A07/MF A01 CSCL 14/2

This study reports on the possible use of nondestructive testing equipment to evaluate the potential of reflection cracking in airfield pavements. It also summarizes the state of the art of reflection cracking analysis and methods for controlling reflection cracking. The proposed method of analysis consists of testing portland cement concrete slabs in a curled-up condition at slab centers and slab corners. Increased tensile strains at the bottom of the overlays at slab corners are related to the number of traffic repetitions to predict reflection cracking life. Although the method appears promising, further study is recommended to extend the limited data base presented here and gain added insight into the nature of mechanisms which cause reflection cracking. GRA

N86-27294# Illinois Univ., Urbana. Civil Engineering Lab.
CONCEPTS FOR THE DEVELOPMENT OF A NONDESTRUCTIVE TESTING AND EVALUATION SYSTEM FOR RIGID AIRFIELD PAVEMENTS Final Report, Jan. 1983 - May 1985
P. T. Foxworthy Nov. 1985 274 p Previously announced as N86-15324
(Contract F08637-84-M-1743)
(AD-A165055; AFESC/ESL-TR-85-46) Avail: NTIS HC A12/MF A01 CSCL 14/2

This technical report develops a complete system for nondestructive testing and evaluation of rigid airfield pavements. An extensvie review of present destructive and nondestructive equipment and methodologies is made to form the basis for selection of the equipment and analytical model used in this research. A brief description of the selected Dynatest Model 8000 Falling Weight Deflectometer (FWD) and the ILLISLAB finite element computer model is presented. Three Air Force installations were chosen for in-depth study of pavement response to FWD loads under a variety of environmental and geological conditions. Techniques are presented to determine the location of maximum damage to rigid pavement slabs for one or any combination of aircraft, and the validity of the calculated stresses is established through comparisons of measured and predicted deflections at joints. Major study findings include: (1) new designations for pavement features based on actual loading conditions, (2) guidelines for planning and conducting large-scale evaluations of major airfield systems, (3) a computer-based determination of E and K, (4) joint behavior prediction under fluctuating temperatures and their effect on generated slab stresses, (5) procedures to account for the annual distribution of traffic over the range of temperatures normally experienced at any facility, and (6) a simplistic means of estimating total past damage from aircraft operations. Author (GRA)

N86-27295# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
VERIFICATION AND AERODYNAMIC CALIBRATION OF THE TUNNEL 16T CAPTIVE TRAJECTORY SUPPORT (CTS) SYSTEM Final Report, 21 Jul. - 26 Jul. 1985
E. G. Allee, Jr. and M. L. Mills Mar. 1986 60 p Prepared in cooperation with Calspan Field Services, Inc., Arnold AFS, Tenn.
(AD-A165235; AEDC-TR-86-4) Avail: NTIS HC A04/MF A01 CSCL 14/2

An air-on demonstration of the Captive Trajectory Support (CTS) system was conducted in the Propulsion Wind Tunnel (16T) on July 21 through July 26, 1985. The test objectives were: (1) to demonstrate the structural integrity of the CTS system; (2) to demonstrate the ability of the CTS system to satisfactorily obtain grid and trajectory generation data for a typical shore model in free stream and relative to a simulated (flat plate) aircraft in a dynamic wind tunnel environment; and (3) to obtain a Mach number calibration for the Tunnel 16T Cart 2 (Multi-Purpose Cart) with the CTS system installed. The 1/4-scale Maximum Volume Bomb (MVB) was used to represent a typical store. Data were obtained at free-stream Mach numbers from 0.3 to 1.6 at stagnation pressures from 400 to 1600 psfa. GRA

N86-27296# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany). Unternehmensbereich UT.
DEVELOPMENT, CONSTRUCTION, AND MANUFACTURING OF WIND TUNNEL MODELS FOR AERODYNAMIC INVESTIGATIONS Final Report, Mar. 1984
Karl Kaszemeik Bonn (West Germany) Bundesministerium fuer Forschung und Technologie Nov. 1985 50 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-012; ISSN-0170-1339; ESA-86-96887; TE-2-1363) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11

Models and model components for aerodynamic research in the European airbus project A-320 were manufactured with a numerical control milling machine and prepared for testing: Three high speed wings IFAS 5, 6, and 6.1; a low speed halfmodel with IFAS 6; a low speed complete model with IFAS 6; a halfmodel as test setup for high and low speed; an A-310 research model for the active tail-section design; and a propulsion simulator were produced. ESA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-27297*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE 1985 GET AWAY SPECIAL EXPERIMENTER'S SYMPOSIUM
Lawrence R. Thomas, ed. and Frances L. Mosier, ed. May 1986 295 p Symposium held in Greenbelt, Md., 8-9 Oct. 1985
(NASA-CP-2401; Rept-86B0015; NAS 1.55:2401) Avail: NTIS HC A13/MF A01 CSCL 22A

The 1985 Get Away Special (GAS) Experimenter's Symposium provided a formal opportunity for GAS experimenters to share the results of their projects. The focus is on payloads that have been flown on Shuttle missions, and on GAS payloads that will be flown in the near future. For individual titles, see N86-27298 through N86-27329.

N86-27298*# Medical Univ. of South Carolina, Charleston. Dept. of Family Medicine.
TO CATCH A COMET: TECHNICAL OVERVIEW OF CAN DO G-324
Thomas J. OBrien, ed. *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 1-9 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The primary objective of the C. E. Williams Middle School Get Away Special CAN DO is the photographing of Comet Halley. The project will involve middle school students, grades 6 through 8, in the study and interpretation of astronomical photographs and techniques. G-324 is contained in a 5 cubic foot GAS Canister with an opening door and pyrex window for photography. It will be pressurized with one atmosphere of dry nitrogen. Three 35mm still cameras with 250 exposure film backs and different focal length lenses will be fired by a combination of automatic timer and an active comet detector. A lightweight 35mm movie camera will shoot single exposures at about 1/2 minute intervals to give an overlapping skymap of the mission. The fifth camera is a solid state television camera specially constructed for detection of the comet by microprocessor. Author

N86-27299*# Medical Univ. of South Carolina, Charleston. Pathology Image Analysis Lab.
TO CATCH A CHILDS'S IMAGINATION: EDUCATIONAL OVERVIEW OF CAN DO G-324
James H. Nicholson *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 11-17 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The experience has shown that a GAS experiment can be a valuable education tool. It can return results far in excess of the resources invested. The best estimate on the financial investment per student indicates that it is somewhat less than the cost of a school lunch. That's a bargain in a time when educational bargains are hard to come by. To reach this goal means reaching far beyond the students who could possibly design or fly experiments in a single canister. The greatest value of CAN DO is that it serves as a catalyst and inspiration for other activities. To not reach out would have turned it into an overblown, expensive science fair project for a few exceptional students. To fully exploit the benefit of a GAS canister, you should build on a well established science enrichment program. As part of a comprehensive plan, a GAS can be one of the most motivating educational tools available. Author

N86-27300*# Ohio State Univ., Columbus. Dept. of Aeronautical and Astronautical Eng.
SPACE MANUFACTURING UTILIZING THE DIRECTIONAL ELECTROSTATIC ACCRETION PROCESS
Alan Mortensen *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 19-24 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Directional Electrostatic Accretion Process (DEAP) is described with respect to both the physical process and its application to manufacturing in space. This high precision portable manufacturing method will revolutionize current practices in manufacturing and repair of spacecraft and space structures. The cost effectiveness of this process will be invaluable to future space manufacturing projects. Author

N86-27301*# Computer Sciences Corp., El Segundo, Calif.
THE NORTHERN UTAH SATELLITE (NUSAT) COMMUNICATIONS LINK c32
Lee Barrett *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 25-32 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

During the planning stages of the NUSAT satellite, an obvious issue to be discussed was the method of communications to be used. The frequencies would have to be high enough to pass through the atmosphere relatively unattenuated but low enough that antennas and transmission lines would not be so critical in length and properties that unexperienced students would have difficulty with handling them. The frequencies of 450.000 MHz and 137.900 MHz were decided upon and applied for licensing. Representatives of the amateur radio satellite organization, AMSAT, were contacted for ideas. This organization seems to favor AM types of emissions such as CW to control their OSCAR series of satellites and also the current Phase 3 unit. NUSAT personnel felt, however, that there would be merit in the improved signal to noise ratio usually obtained in an FM mode. Doppler shift of the transmitted information on the NUSAT also had to be considered. The final decision was to use Audio Frequency Shift Keying (ASKF) modulated on an FM carrier. In this mode audio tones used would not shift frequency with Doppler. Author

N86-27302*# Worcester Polytechnic Inst., Mass.
FLUID BEHAVIOR IN MICROGRAVITY c34
William W. Durgin and James W. Matthews *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 33-40 refs (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

An experiment designed to study some fundamental aspects of microgravity fluid dynamics has been built and is scheduled for flight. The purpose of the experiment is to investigate differences in behavior of wetting and nonwetting fluid systems at low Bond numbers. Methods were developed to determine liquid quantity, estimate vapor contact area and measure liquid layer thickness. Both the responses of the fluid systems to external perturbations and the transfer of liquid through a connection between two containers can be studied. Author

N86-27303*# National Electric Co. of Venezuela, Caracas.
THE CASTING OF SEMI-PERMEABLE MEMBRANES IN A MICROGRAVITY ENVIRONMENT
Ivan Vera *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 41-44 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The experiment is to study polymeric membranes. Presently, semipermeable membranes are being manufactured from several different kinds of polymers all over the world and specific applications have been identified in fluid separation processes such as reverse osmosis, ultrafiltration and electrodialysis. Although, the ultrastructure of asymmetric and composite membranes have been under intensive study, still there are many questions about the factors affecting this structure and their degree of correlation. Nevertheless, there is indication that the entire morphological structure of polymeric membranes could be affected by the difference in specific gravity between the cast solution and the coagulation liquid normally used in the membranes preparation process. The casting of semipermeable membranes in space might

help to identify the effect of gravity upon the structure of these membranes. It is important to recognize that the casting process involves changes of state and that in a microgravity environment, there will be a reduction on buoyancy-driven natural convection and density gradients. Author

N86-27304*# Colorado Univ., Boulder.
CU IN SPACE: THE UNIVERSITY OF COLORADO GET AWAY SPECIAL PAYLOAD G-285
Kent Tobiska *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 49-56 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

There are four separate experiments integrated into the single payload of G-285 which are supported by internal payload power, thermal environment control, command and data handling facilities and structural subsystems. The four experiments contained in this payload are: a single spectrometer performing two experiments - one to study night time shuttle glow phenomena in the ultraviolet and the other to observe NO2 concentrations over equatorial latitudes in the day; a fluids management experiment using centrifugation for particle/liquid/vapor separation; and an experiment using Phycomyces fungi to study the gravireceptor mechanism theory. The experiments are supported by a microprocessor, data storage devices, power and thermal control subsystems. Author

N86-27305*# Purdue Univ., West Lafayette, Ind.
DESIGN OF AN EXPERIMENT FOR THE PRODUCTION OF A FOAMED TIN SAMPLE **c26**
Eric Wernimont *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 57-63 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

One of the major experiments in the GAS container is concerned with the experimental production of a foamed metal. A foamed metal is one that contains a significant amount of gas bubbles suspended in its solid volume. Purdue's GAS team proposes to do this with the help of a solid zinc carbonate that gives off carbon dioxide at high temperatures. Because of low energy requirements, the metal used for this experiment is tin. It is hoped that the use of near zero environment will keep the suspended bubbles more uniform than in an Earth based process, hence not depleting the physical strength of the material as greatly as is observed on Earth. Author

N86-27306*# San Jose State Univ., Calif. Space Research and Development Organization.
THE DEVELOPMENT OF A PROJECT PLAN FOR THE GET AWAY SPECIAL PROGRAM
Steven J. Butow *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 65-72 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Trying to get a project started? Well, since the introduction of the Get Away Special Program, there have been 451 reservations placed by people who, just like yourself, are eager to send a small payload into space; and yet only 33 of them have actually succeeded. Even more staggering, many of those who have flown have done so more than once; meaning that less than 10% of all GAS users have actually sent something into space. Some of the problems that face GAS users are approached and it is hoped that they will be helpful, especially to those new to the program. Some of the subject areas include selecting a project, and payload management. Author

N86-27307*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROJECT EXPLORER GAS #007: MARSHALL AMATEUR RADIO CLUB EXPERIMENT (MARCE)
Edward F. Stluka *In its* The 1985 Get Away Special Experimenter's Symposium May 1986 p 73-80 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Polls were taken at the Project Explorer meetings regarding flying without the radio experiment transmitting. The radio downlinks require extra coordination and are sensitive to certain payloads. The poll results were unanimous. The radio downlinks are vital in providing data on the health and status of the total experiments package, in real time, during the flight. The amateur radio operators, prepared to receive the downlinks and OSCAR-10 relays, revealed that there was enormous interest throughout the world, to participate. This sets the stage for the reflight opportunities which the GAS program has provided. Major activities, pertinent to the STS-41G flight preparations by the GAS #007 team and support group, are listed. Author

N86-27308*# Asahi National Broadcasting Co., Tokyo (Japan).
WATER BALL COLLISION **c34**
Kazuo Fujimoto *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 81-84 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

What happens if a stainless steel ball hits a water ball in the weightless space ot the Universe? In other words, it was the objective of our experiments in the Space to observe the surface tension of liquid by means of making a solid collide with a liquid. Place a small volume of water between 2 glass sheets to make a thin water membrane: the 2 glass sheets cannot be separated unless an enormous force is applied. It is obvious from this phenomenom that the surface tension of water is far greater than presumed. On Earth, however, it is impossible in most cases to observe only the surface tension of liquid, because gravity always acts on the surface tension. Water and stainless steel balls were chosen the liquid and solids for the experiments. Because water is the liquid most familiar to us, its properties are well known. And it is also of great interest to compare its properties on the Earth with those in the weightless space. Author

N86-27309*# Air Force Academy, Colo. Dept. of Engineering Mechanics.
UNITED STATES AIR FORCE ACADEMY'S MICRO-GRAVITY RESEARCH USING G-0307
Glon D. Turner *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 85-86 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The current materials research being done in microgravity solidification and the future experimentation planned onboard a space shuttle mission is reported. The Department of Engineering Mechanics at the USAF Academy is developing a microgravity furnace to be used on board the space shuttle. The microgravity furnace will be used to conduct materials research dealing with such topics as immiscible alloy solidification. The purpose behind this research project is three-fold: to develop a simple, inexpensive, and easy to use furnace to conduct space materials research, to conduct a solidification experiment on a lead-zinc alloy in space that macrosegregates due to gravity, and to provide a research mechanism for students to get involved with space materials research. Author

N86-27310*# Federal Aviation Administration, Salt Lake City, Utah.
NUSAT 1: THE FIRST EJECTABLE GETAWAY SPECIAL
Charles A. Bonsall and R. Gilbert Moore (Morton Thiokol, Brigham City, Utah) *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 87-99 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Four hours, fourteen minutes and forty-two seconds after the space shuttle, Challenger, was launched on mission 51B, a small satellite was ejected into independent orbit from a Getaway Special canister. This event was an exciting milestone in a project conceived over seven years ago. It is hoped that the story of NUSAT (Northern Utah SATellite) will be an inspiration for other experimentors to exploit this new service of the Getaway Special program. The purpose and history of the project, the NUSAT

spacecraft, the ground station and its operation, and some future directions envisioned by the participants are described. Author

N86-27311*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
MATERIAL SCIENCES EXPERIMENTS UNDER MICROGRAVITY CONDITIONS WITH MAUS
G. H. Otto and D. Baum *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 101-108 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Project MAUS is a part of the German material sciences program and provides autonomous payloads for the Space Shuttle. These payloads are housed in canisters which are identical with those of NASA's Get Away Special program. The main components of the hardware are: a standard system consisting of power supply, experiment control, data acquisition and the experiment modules containing experiment specific hardware. So far, three MAUS modules with experiments from the area of material sciences have been flown as GAS payloads. They deal with the effects of reduced sedimentation, convection phenomena caused by temperature gradients and the behavior of dispersed particles ahead of a solid/liquid interface. Author

N86-27312*# Worcester Polytechnic Inst., Mass. Dept. of Electrical Engineering.
THE DESIGN OF FLIGHT HARDWARE: ORGANIZATIONAL AND TECHNICAL IDEAS FROM THE MITRE/WPI SHUTTLE PROGRAM
F. J. Looft *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 109-116 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Mitre Corporation of Bedford Mass. and the Worcester Polytechnic Institute are developing several experiments for a future Shuttle flight. Several design practices for the development of the electrical equipment for the flight hardware have been standardized. Some of the ideas are presented, not as hard and fast rules but rather in the interest of stimulating discussions for sharing such ideas. Author

N86-27313*# Purdue Univ., West Lafayette, Ind. Getaway Special Group.
DESIGN CONSIDERATIONS FOR A GAS MICROCONTROLLER c35
Douglas A. Ritter *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 117-124 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Some of the design problems that are now being addressed in consideration of a microcontroller for the upcoming GAS payload are discussed. Microcontrollers will be used to run the experiments and to collect and store the data from those experiments. Some of the requirements for a microcontroller are to be small, lightweight, have low power consumption, and high reliability. Some of the solutions that were developed to meet these design requirements are discussed. At present, the experiment is still in the design stage and the final design may change from what is presented here. The search for new integrated circuits which will do all that is needed all in one package continues. Author

N86-27314*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROJECT EXPLORER'S UNIQUE EXPERIMENTS: GET AWAY SPECIAL #007
Arthur J. Henderson, Jr. *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 125-131 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Project Explorer payload represents the first attempt at broadcasting digitized voice signals via a Space Shuttle flight on amateur radio frequencies. These amateur ham-radio frequencies will be transmitting real time data while the experiments are operating. Experiments 1, 2, and 3 represent the work of students ranging from materials processing to the science of biology. Experiment 1 will study the solidification of two hypereutectic alloys, lead-antimony and aluminum-copper. Experiment 2 will investigate the examination and growth of radish seeds in space. Experiment 3 will examine the electrochemical growth process of potassium tetrocyonoplatinate hydrate crystals and Experiment 4 involves amateur radio transmissions, monitoring and support of the entire Get Away Special (GAS) 007 payload. Author

N86-27315*# Worcester Polytechnic Inst., Mass. Chemical Engineering Dept.
GROWTH OF ZEOLITE CRYSTALS IN THE MICROGRAVITY ENVIRONMENT OF SPACE
A. Sacco, Jr., L. B. Sand, D. Collette, K. Dieselman, J. Crowley, and A. Feitelberg *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 133-140 Sponsored in part by the Mitre Corp. (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Zeolites are hydrated, crystalline aluminosilicates with alkali and alkaling earth metals substituted into cation vacancies. Typically zeolite crystals are 3 to 8 microns. Larger cyrstals are desirable. Large zeolite crystals were produced (100 to 200 microns); however, they have taken restrictively long times to grow. It was proposed if the rate of nucleation or in some other way the number of nuclei can be lowered, fewer, larger crystals will be formed. The microgravity environment of space may provide an ideal condition to achieve rapid growth of large zeolite crystals. The objective of the project is to establish if large zeolite crystals can be formed rapidly in space. B.G.

N86-27316*# Kayser Threde G.m.b.H., Munich (West Germany).
HALOGEN LAMP EXPERIMENT, HALEX c35
Gunter Schmitt and Jurgen Stapelmann (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 141-149 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The main purpose of the Halogen Lamp Experiment (HALEX) was to investigate the operation of a halogen lamp during an extended period in a microgravity environment and to prove its behavior in space. The Mirror Heating Facilities for Crystal Growth and Material Science Experiments in space relies on one or two halogen lamps as a furnace to melt the specimens. The HALEX aim is to verify: full power operation of a halogen lamp for a period of about 60 hours; achievement of about 10% of its terrestrial life span; and operation of the halogen lamp under conditions similar to furnace operation. B.G.

N86-27317*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RESPONSE OF GAS PAYLOAD (G345 AND G347) TEMPERATURES TO VARIOUS ORBITER FLIGHT ATTITUDES
Werner M. Neupert *In its* The 1985 Get Away Special Experimenter's Symposium May 1986 p 151-164 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

At the beginning of the Get-Away Special (GAS) flight program, the GAS Project flew a Flight Verification Payload on STS-3 to make measurements of the vibrations, acoustic and magnetic environments of the canister, and to obtain thermal profiles of internal and external components of the GAS system. Two types of GAS canister end caps (insulated end cap and silverized teflon covered end cap) were used on the two flights (STS-7 and STS-8) so that a direct comparison of the thermal performance was obtained. These observations were compared with a simple thermal model of the instrument in the GAS canister in order to assess whether such simple models can be useful to experimenters in predicting the thermal response of their payloads. B.G.

N86-27318*# Messerschmitt-Boelkow-Blohm/Entwicklungspring Nord, Bremen (West Germany).
GAS PAYLOAD NO. G-025: STUDY OF LIQUID SLOSHING BEHAVIOUR IN MICROGRAVITY **c34**
C. R. Gilbert *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 165-176 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Get Away Special (GAS) G-025, which flew on shuttle Mission 51-G, examined the behavior of a liquid in a tank under microgravity conditions. The experiment is representative of phenomena occurring in satellite tanks with liquid propellants. A reference fluid in a hemispherical model tank will be subjected to linear acceleration inputs of known levels and frequencies, and the dynamic response of the tank liquid system was recorded. Preliminary analysis of the flight data indicates that the experiment functioned perfectly. The results will validate and refine mathematical models describing the dynamic characteristics of tank-fluid systems. This will in turn support the development of future spacecraft tanks, in particular the design of propellant management devices for surface tension tanks. Author

N86-27319*# North Carolina Agricultural and Technical State Univ., Greensboro. Student Space Shuttle Program.
MEASUREMENT OF THE HEAT PRODUCED INTERNALLY DURING DISCHARGE BY THE 6V EVEREADY ENERGIZER BATTERY, NO. 528 **c44**
F. D. Hooker, K. R. Brooks, B. K. Burnette, J. D. Hampton, F. W. Crigler, and S. T. Ahrens *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 177-184 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

When a 6V Eveready Energizer Battery, 528, is discharged, heat is produced internally within the battery itself. Detailed measurements of this battery heat were made for a five day discharge period using a load resistance of 20 ohms and an ambient temperature of 10 C. The battery heat produced per quarter day varied considerably, ranging from 1.08 watt-hrs to 2.63 watt-hrs. The total battery heat produced, using a 3.0 volt cutoff, is significant (37 watt-hrs) when compared to the total load heat produced (70 watt-hrs). Author

N86-27320*# Thermo-Systems, Inc., Minneapolis, Minn.
GAS EJECTION SYSTEM OVERVIEW AND DESIGN ENHANCEMENTS **c18**
Pat Miller *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 185-190 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The structural design of the Get Away Special (GAS) ejection system is described. Equipment specifications and modifications are illustrated. Future goals are listed. Author

N86-27321*# Swedish Space Corp., Stockholm.
AN ADVANCED MATERIAL SCIENCE PAYLOAD FOR GAS **c23**
R. Joensson, S. Wallin, and K. Loeth *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 191-217 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The aim of the experiment is to study solidification of different compositions of lead-tin. The weight of the material is quite high: 8 kilograms. Nearly 10% of the payload is sample weight. The dendritic growth and the effect of the absence of natural convection are of particular interest. The results from the flight processed samples will be compared with results from Earth processed samples in order to investigate the influence of the natural convection on the solidification process. The power systems, heat storage and rejection, and mechanical support are discussed in relationship to the scientific requirements. B.G.

N86-27322*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
AN UPDATE OF UTAH STATE UNIVERSITY'S GAS ACTIVITIES
L. R. Megill *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 219-230 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The highlights of the Utah State University's participation in the space program are listed. Proposed experiments include: a study of the velocity of a bubble in water under the influence of a temperature gradient; reflight of an experiment on surface tension driven convective flow; surface waves in zero-G; crystallization in zero-G (vapor phase and liquid phase); bio gas generation; and penicillum growth; study of undamped oscillations in a vacuum and zero-G. The effect that spinoffs have had on the Utah State University were discussed. B.G.

N86-27323*# Thermo-Systems, Inc., Minneapolis, Minn.
STRUCTURAL INTEGRITY OF GAS EJECTION SYSTEM **c18**
Mark Cascia *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 231-236 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The following Get Away Special (GAS) ejection system components were analyzed: full diameter motorized door assembly (FDMDA); actuating assembly; gas ejection system; lower end plate; and the battery boxes. Special considerations and experiment constraints are also discussed. B.G.

N86-27324*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE CAPILLARY PUMPED LOOP (CPL) GAS EXPERIMENT G-471 **c34**
Dan Butler *In its* The 1985 Get Away Special Experimenter's Symposium May 1986 p 237-253 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Capillary Pumped Loop (CPL) experiment, G-471 is a thermal control system with high density heat acquisition and transport capability. The CPL consists of two capillary pumped evaporators with integral heaters, a fluid loop charged with ammonia (NH3), a condenser plate (heat sink), and various control electronics. The purpose of the experiment is to demonstrate the capability of a capillary pumped system under zero gravity conditions for use in the thermal control of large scientific instruments, advanced orbiting spacecraft, and space station components. Author

N86-27325*# Messerschmitt-Boelkow-Blohm/Entwicklungspring Nord, Bremen (West Germany).
LESSONS LEARNT FROM 11 GAS PAYLOADS FLOWN ON 5 SHUTTLE MISSIONS
H. Stolze and P. Vits *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 255-265 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Selected hints derived from 5 years experience in experiment hardware design, hardware qualification, safety provisions, experiment testing, payload integration, flight preparation, battery transport, and postmission checkout are presented. B.G.

N86-27326*# Marshall-McShane, Prescott, Ariz.
G-38, G-39 AND G-40: ART IN SPACE, A DIVERGENT EXPLORATION
Joseph W. McShane *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 267-273 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The results of the Get Away Special (GAS) Arts-Science payload G-38, processed in orbit on board the Space Shuttle Challenger during mission 41-G STS 17, October 5 to 13, 1984 are explained. The payload G-38 was created as a unified Arts-Science payload that simultaneously explored the process of

vapor deposition in the vacuum and weightlessness of the shuttle environment and created a series of space sculptures utilizing this process. The purpose of the experiment was to test the sputter deposition process in space and to create five subtle spherical sculptures with metallic coatings of gold, silver, platinum and chrome. B.G.

N86-27327*# Bristol Aerospace, Ltd., Winnipeg (Manitoba).
DESIGN AND DEVELOPMENT OF A WINDOW ASSEMBLY FOR A GAS PAYLOAD
Bev Christie and Bob Tough *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 275-284 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

A sealed window assembly for the Get Away Special (GAS) payloads was developed from a synthetic fused silica. The details of the design and development of this window assembley are given. Author

N86-27328*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GLOMR SATELLITE PAYLOAD G-308 c18
In its The 1985 Get Away Special Experimenter's Symposium May 1986 p 285-291 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

The Global Low Orbiting Message Relay (GLOMR) Satellite and its participation in the pioneering development of a Get Away Special (GAS) satellite launch capability is described. The GLOMR is a data relay communication satellite. Experiment objectives are to demonstrate the store-forward relay of data/messages and the communication to ground user equipment. The 150 pound brass satellite, powered by lead acid batteries and solar cells, includes processing, control and radio frequency electronics for data message handling and storage. The GLOMR is mounted through a Marman clamp ejection/retention pedestal to a five cubic foot GAS canister bottom plate. The GAS canister includes a Full Diameter Motorized Door Assembly lid which is opened remotely by astronauts for satellite launch. Author

N86-27329*# Utah State Univ., Logan. Center for Atmospheric and Space Science.
THERMOCAPILLARY FLOW AND GASEOUS CONVECTION IN MICROGRAVITY: RESULTS FROM GAS PAYLOAD G-0518 c34
Scott Thomas *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 293-301 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

Thermocapillary flow and gaseous convection in microgravity were investigated in GAS payload G-0518 during Space Shuttle Mission 41-D. A cylinder of paraffin was supported and heated differentially from its ends to induce a melt from solid to liquid and drive thermocapillary flow in the resulting liquid phase. Laminar thermocapillary flow was observed in the liquid paraffin and found to show a transition to time-dependent oscillatory motion at a Marangoni number of about Ma = 34000 with a period of approximately T = 8 seconds. In addition, free convection in a gas in microgravity was observed for the first time. The gaseous convection was caused by the thermal and/or velocity boundary layers present at the heater-liquid interface. Oscillation occurred in the gaseous convection simultaneously with those in the liquid, implying the two are strongly coupled. The gaseous convection may be driven by coupled thermocapillary flow/thermal expansion convection or microgravity bouyancy convection. Author

N86-27330# European Space Agency, Paris (France).
FUTURE MISSIONS IN SOLAR, HELIOSPHERIC AND SPACE PLASMA PHYSICS
Erica Rolfe and Bruce Battrick Jun. 1985 266 p Conference held in Garmisch-Partenkirschen, West Germany, 30 Apr. - 3 May 1985
(ESA-SP-235; ISSN-0379-6566; ESA-85-95665) Avail: NTIS HC A12/MF A01

The origin of the solar wind, solar-planetary plasma interaction, and small scale plasma structures are some areas of discussion. Other areas are the internal structure of the Sun, the solar and heliospheric observatory, and cluster (space plasma physics. All are projects of ESA. For individual titles, see N86-27331 through N86-27348.

N86-27331# Tromsoe Univ. (Norway). Auroral Observatory.
SOLAR WIND AND CORONAL HOLES c92
Egil Leer and Thomas E. Holzer (National Center for Atmospheric Research, Boulder, Colo.) *In* ESA Future Missions in Solar Heliospheric and Space Plasma Physics Jun. 1985 p 3-9 Sponsored by NSF (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The genesis of high speed solar wind streams, causing recurrent geomagnetic storms, in coronal holes, i.e., low density, low temperature regions in the corona, where the large scale magnetic field opens up into interplanetary space is reviewed. The basic physics of the solar wind emanating from coronal holes are discussed. It is shown that thermally driven solar wind models cannot explain the high flow speeds. The effect of MHD waves on the solar wind and wind from late-type giants and supergiants is also discussed. Author (ESA)

N86-27332# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
ENERGY INPUT INTO THE SOLAR WIND c92
E. Marsch *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 11-21 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The energy input into the solar wind is discussed in terms of observation and fluid theory. Solar wind microphysics and transport are reviewed. In situ observations beyond 0.3 AU and the consequent constraints on solar wind expansion and energetics are treated. Energy and mass flux obtained by indirect means and remote optical sensing of the corona are considered. The need to revise the classical Coulomb collision model of transport is emphasized. Slow and fast mode wave damping, and nonlinear processes leading to damping of Alfven waves, used to explain ion heating in the corona and solar wind, are assessed. Author (ESA)

N86-27333# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
THE CORONA AND INTERPLANETARY MEDIUM DURING THE SOLAR CYCLE c92
D. G. Sime *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 23-36 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

Long term variations of the solar corona, including observations of the morphology, the brightness, and the rotation characteristics are described. Cyclic changes in the electron corona are interpreted as reflecting changes in the large scale magnetic field over the cycle. The ability to link the coronal magnetic structure and the organization of solar wind speed is extended to develop expectations about the variation of properties of the interplanetary medium (IPM) with the solar cycle. The gross features of the velocity structure are present, and the IPM appears to rotate with a character similar to that of the corona. However, the relationship of the magnetic field in interplanetary space to that in the corona is obscure. The short time scale phenomena which comprise the active component of the corona and interplanetary medium only vary in as much as the global organization of the coronal and interplanetary field varies, so rather than showing a variation in properties as individuals, the active features of the corona and IPM change only in their distribution. Author (ESA)

N86-27334# Bern Univ. (Switzerland). Inst. fuer Physik.
DIAGNOSTICS OF CORONA BY IN-SITU COMPOSITION MEASUREMENTS AT 1 AU c92

J. Geiss *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 37-50 Sponsored by Swiss National Science Foundation (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

Measurements of abundances of elements and isotopes in the solar wind and their charge state distributions were used to study the corona and chromosphere. The composition and time variations of the solar wind indicate that two mechanisms are responsible for the observed differences between solar wind abundances and the composition in the outer convective zone of the Sun. The first mechanism is an atom-ion separation process, leading to an overabundance of elements with low first ionization potential in corona and solar wind. The second mechanism operates in the corona. Ions that are not well coupled to the protons and electrons by collisions or waves are not sufficiently accelerated to enter the solar wind with their full abundance. The anomalous abundances in the driver gas that follows flare driven interplanetary shocks imply that the corona (before perturbation) is compositionally stratified. Author (ESA)

N86-27335# Dartmouth Coll., Hanover, N.H.
SOLAR WIND INTERACTION WITH PLANETARY MAGNETIC FIELDS c92
B. U. O. Sonnerup *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 53-64 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The interaction between the solar wind and a strongly magnetized planet is reviewed. Processes which lead to the transport of flux, mass, momentum and energy from the solar wind across the magnetopause into the planetary magnetosphere are discussed. Magnetospheric geometry, flow without reconnection, and reconnection at the magnetopause are considered. Author (ESA)

N86-27336# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
SOLAR WIND INTERACTION WITH NEUTRAL ATMOSPHERES c92
W.-H. Ip *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 65-82 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

Direct interaction between the solar wind plasma and the neutral atmospheres of comets, Venus, Titan, and Mars is discussed. Space observations of the corresponding plasma processes and structures are reviewed. Prospects of research are considered. Author (ESA)

N86-27337# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio INterplanetario.
COLLISIONLESS SHOCK WAVES IN SPACE AND IN ASTROPHYSICS c75
V. Formisano *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 83-100 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The state of knowledge on collisionless shock waves in space plasma since the ISEE missions is reviewed. The dissipation mechanism, areas where progress is scarce, and the possibility of transferring knowledge to astrophysical shocks are discussed. For the laminar quasiperpendicular dispersive shock, the dissipation mechanism is the modified two stream instability which heats the electrons and the ions. For other shock structures, the mechanism is unclear. Astrophysical shocks have extreme values for the characteristic parameters, therefore it is necessary to explore in the solar system (in space) shocks which extend, in parameter space, the region explored until now. Coronal shocks could be the link between space observations and astrophysical shocks. Author (ESA)

N86-27338# Ruhr Univ., Bochum (West Germany).
PLASMOIDS IN PLANETARY MAGNETIC FIELDS AND THE SOLAR CORONA c90
Karl Schindler *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 101-105 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The formation and acceleration of plasmoids, observed in the laboratory, in the magnetosphere, and in the solar atmosphere are discussed. Results suggest that the formation and ejection of plasmoids is a dominant loss process for mass and energy accumulated in closed flux regions in the magnetic field of planets and stars, under nearly ideal MHD conditions. Formation occurs via an instability if, during energy storage, nonideal plasma effects become important. The instability is based on the attraction of parallel electric current. This phenomenon is a (partial) collapse of a portion of the plasma sheet. The accelerating forces arise from the change of topology of the magnetic field by spontaneous magnetic reconnection. Observationally, the separation of space and time dependence is essential to study plasmoid magnetic topology, the three dimensional plasma structure including superthermal population and ionic composition, and the basic dissipation mechanism. Author (ESA)

N86-27339# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
MAGNETOSPHERE-IONOSPHERIC COUPLING c46
C.-G. Faelthammar *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 107-133 Original language document was announced as N86-24071 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

Magnetosphere-ionosphere coupling, and the role of Birkeland currents, magnetic field aligned electric fields, and Alfven waves are discussed. In addition to transporting energy and momentum between the magnetosphere and the ionosphere, the Birkeland current cause a redistribution of matter within and between these regions. They do so directly via exchange of charge carriers, and indirectly via instabilities and acceleration processes that they excite in the plasmas. The spatial distribution of magnetic field aligned electric fields, and the way they are supported are unclear. Changes in electric fields and plasma convection are communicated between the magnetosphere and the ionsophere by Alfven waves. Observations of high power low frequency noise, which fits an Alfven wave discription, and which has a net downward Poynting flux of 100 million W integrated over the auroral regions are reported. Individual Alfven waves, upward and downward propagating, are observed. Oblique Alfven waves are a key feature of a model for auroral arc formation. Author (ESA)

N86-27340# Saint Andrews Univ. (Scotland). Dept. of Applied Mathematics.
SMALL-SCALE RECONNECTION c75
E. R. Priest *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 137-149 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

The theory, and examples of magnetic reconnection of cosmic plasma are discussed. The theory of reconnection consists of two branches: linear tearing modes and the fast nonlinear state of Petschek-Sonnerup reconnection. Developments linked them and reveal two fast unsteady regimes: the flux pile-up and the impulsive bursty regime. Applications include: mini flux transfer events discovered by the AMPTE satellite at the magnetopause; cancelling magnetic features in photospheric magnetograms form Big Bear Solar Cbservatory; and the heating of the solar corona by tearing turbulence at many small curent sheets. Author (ESA)

N86-27341# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
GENERATION OF FIELD-ALIGNED CURRENT STRUCTURES AT SUBSTORM ONSETS c46
A. Roux *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 151-159 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

The sharp transition between tail and dipole-like magnetic configurations which develops prior to the onset of magnetospheric substorms is discussed. It is shown that this boundary is unstable to westward traveling waves which are fed at the expense of azimuthaly drifting energetic ions in the restored dipolar configuration. Evidence that the surges observed simultaneoulsy on the ground are the projection along geomagnetic field lines of this distorted (unstable) boundary is given. Medium scale field aligned current structures are shown to develop as a result of this instability process and to tend to cascade towards smaller scale structures. Electron acceleration correlates very well with these small scale structures. Author (ESA)

N86-27342# Oxford Univ. (England). Dept. of Theoretical Physics.

HIGH RESOLUTION OBSERVATIONS OF MAGNETIC STRUCTURES **c92**

C. Jordan *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 161-167 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

High resolution observations in the ultraviolet spectral region to study the structure and energy balance of the solar atmosphere are discussed. Observations with high spatial and spectral resolution show structure in the quiet and active atmosphere on the 1 arcsec scale. In addition to the all pervasive nonthermal line broadening, such observations show small regions where unusally large line widths and line shifts exist. Their relation to heating processes and mass flux deserves further study. Observations required to investigate the existence of wave heating modes are discussed, emphasizing the importance of simultaneous measurements of line fluxes, electron densities, and line profiles. The SOHO mission provides an excellent opportunity to resolve the issue of coronal heating. Author (ESA)

N86-27343# Observatoire de Paris-Meudon (France).

SOLAR FINE STRUCTURES: THEIR IMPORTANCE IN THE SUN'S PHYSICS AND THEIR OBSERVATION **c92**

J. Heyvaerts *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 169-174 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

Structures in the Sun's atmosphere are reviewed. The essential role of these structures in the physics of the Sun's convective zone and atmosphere is stressed, and it is emphasized that the same physics is crucial in a number of other systems of planetological or astrophysical interest. The problem of solar coronal heating is considered, and its relation to the solar wind acceleration problem is discussed. The diagnosing of nonthermal heating phenomena is shown to involve elaborate observations with high spectral, spatial and temporal resolution. It is concluded that the SOHO project appears to be the best step to take. Author (ESA)

N86-27344# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.

CHARACTERISTIC PHENOMENA OF MAGNETOHYDRODYNAMIC TURBULENCE **c75**

D. Montgomery *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 175-179 (For primary document see N86-27330 18-12)

(Grant NAGw-719; Contract DE-FG02-85ER-53194)

Avail: NTIS HC A12/MF A01

Magnetohydrodynamic (MHD) turbulence theory is reviewed. Mangetic X points, vorticity quadropoles, concentrated current filaments, highly anisotropic spectra, selective decay and dynamic alignment phenomena (charaterized by highly unequal dissipation rates for global ideal invariants), and kinking turbulence for plasmas which carry strong currents are reviewed. The most useful tool for obtaining accurate information about turbulent dynamics is numerical solution of the MHD equations. Author (ESA)

N86-27345# Cambridge Univ. (England). Inst. of Astronomy.

THEORY OF SOLAR OSCILLATIONS **c92**

D. O. Gough *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 183-197 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

Analyses of helioseismological data, and the theoretical issues they raise are discussed to illustrate how measurements influence concepts of the solar interior, and to suggest avenues of enquiry. The properties of resonant modes of oscillation are reviewed, to illustrate which aspects of the solar structure can be measured from their frequencies. A determination of the variation of sound speed through much of the interior of the Sun is described. The measurement reveals at least one error in a theoretical solar model, and suggests the presence of macroscopic motion in the solar core. More sophisticated analyses of the data should provide important diagnostics of the outer layers of the Sun, to improve understanding of the dynamics of the convetions zone. Author (ESA)

N86-27346# National Optical Astronomy Lab. Tucson, Ariz. National Solar Observatory.

HIGH-RESOLUTION HELIOSEISMOLOGY **c92**

J. Harvey *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 199-208 Sponsored by NSF (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

The basic method of helioseismology, considerations important in designing an instrument to obtain the required observations, the status of observational techniques, and results and advantages of space observations are reviewed. High resolution of solar interior conditions in radius, latitude, longitude, and time requires observations of as many different modes of oscillation as possible. Such observations can be made by measuring oscillations of brightness or the Doppler shift of suitable spectrum lines. To observe the maximum number of different modes requires angular resolution of 2 arc sec over the entire disk and time resolution of 100 sec for a duration of months. However, much can be learned with less highly resolved images. Ground based observations are limited by atmospheric blurring and by diurnal sampling distortions. By avoiding these problems the SOHO mission offers an excellent opportunity for a major advance in understanding of the solar interior. Author (ESA)

N86-27347# Observatoire du Mont-Gros, Nice (France).

GLOBAL OSCILLATIONS **c92**

E. Fossat *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 209-217 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

The use of pressure modes to probe the deepest layers of the Sun's internal structure is discussed. It is noted that models featuring diffusion in the core satisfying neutrino flux are incompatible with helioseismological data. The contribution expected from gravity mode observations is assessed. The levels of solar and atmospheric noise encountered in Doppler and irradiance measurements are considered. Improvements in observational accuracy possible with SOHO project are reviewed. Author (ESA)

N86-27348# Observatoire de Paris-Meudon (France).

SOLAR/SPECTRA CONNECTIONS **c92**

F. Praderie *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 219-228 (For primary document see N86-27330 18-12)

Avail: NTIS HC A12/MF A01

The hydrodynamics of stellar interiors are discussed. For the diagnostics of phenomena at the stellar surface whose seat is deep below, variability studies play an increasingly important role. Stars are analyzed as magnetic variables, to gain information on the dynamo-generated surface magnetic field, and pulsating variables in as much as nonradial oscillations probe the structure and dynamical state of the interior. The need for a long term spaceborne monitoring project consisting of a photometric channel

(for stellar seismology) and a spectroscopic one (for stellar magnetometry) via activity studies at various altitudes and with time is stressed. Author (ESA)

N86-27649*# Naples Univ. (Italy). Istituto Aerodinamica U. Nobile.
TETHERED ELEVATOR: A UNIQUE OPPORTUNITY FOR SPACE PROCESSING
Rodolfo Monti *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 137-147 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-27349# Optimization, Inc., Blacksburg, Va.
ORBITAL-MANEUVER-SEQUENCE OPTIMIZATION Final Report, 1 Jun. 1984 - 31 Aug. 1985
H. J. Kelley, E. M. Cliff, and F. H. Lutze Dec. 1985 146 p
(Contract F04611-84-C-0014)
(AD-A165138; K505-1; AFRPL-TR-85-090) Avail: NTIS HC A07/MF A01 CSCL 22/1

This 15 month effort developed an orbital maneuver sequence optimization computer program and applied it to the generation of optimal co-orbital attack maneuver sequences and to the generation of optimal evasion and return maneuver sequences. Rocket burns were modeled as impulse and coasts as conic arcs, or as near circular orbit approximations thereto. Parameters consisting of impulse components and coast lengths are adjusted iteratively by a variable metric (BFGS) gradient process with projection treatment of constraints. A minimum radius component, not ordinarily included in orbit transfer optimization studies, proved to be important for co-orbital attack maneuver sequences. Families of such sequences are explored and the effects of various operational constraints investigated. Optimal in plane evasive maneuvering is studied subject to return-to-orbit and return-to-position in orbit constraints. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-27391# European Space Tribology Lab., Risley (England).
THERMAL VACUUM INCLINOMETRY: A TEST FACILITY FOR ANTENNA POINTING MECHANISMS
E. W. Roberts *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 261-265 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-27350# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). FMP Working Group WG-12.
VALIDATION OF MISSILE SYSTEM SIMULATION Final Report
Nov. 1985 114 p
(AGARD-AR-206; ISBN-92-835-1514-5) Avail: NTIS HC A06/MF A01

A survey of missile simulation facilities in 1982 indicated that very little was devoted to the validation of missile system simulations. The validation techniques that are used are not standardized, often ill defined, and generally undocumented. In an attempt to rectify this situation, missile simulation procedures were examined and techniques for the validation and universalization of the results were recommended. A simulation terminology that, if adopted, should simplify the validation process is recommended. A hierarchical model representation called, Confidence Level in Model Behavior (CLIMB), is also recommended to organize the simulation process. A standardized documentation procedure is emphasized which both simplifies the orderly use of simulation and insures confidence in the final simulation results. Examples of using CLIMB are included. Computer languages and how they can benefit the simulation process are discussed. Software verification, validation, and assessment methods are exemined. Recommendations were made to enhance the validation of the simulation. Author

N86-27395# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
ARIANE RELEASE GEAR SYSTEM
P. McMahon *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 289-296 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27396# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
ARIANE 3RD STAGE PRESSURE CONTROL VALVES
C. B. Taylor *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 297-303 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-27351*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PARTICULATE CONTAMINANT RELOCATION DURING SHUTTLE ASCENT
John J. Scialdone Jun. 1986 17 p
(NASA-TM-87794; NAS 1.15:87794; Rept-86B0432) Avail: NTIS HC A02/MF A01 CSCL 22B

The dislodgement, venting, and redeposition of particles on a surface in the shuttle bay by the vibroacoustic, gravitational, and aerodynamic forces present during shuttle ascent have been investigated. The particles of different sizes which are displaced, vented, and redistributed have been calculated; and an estimate of the increased number of particles on certain surfaces and the decrease on others has been indicated. The average sizes, velocities, and length of time for certain particles to leave the bay following initial shuttle doors opening and thermal tests have been calculated based on indirect data obtained during several shuttle flights. Suggestions for future measurements and observations to characterize the particulate environment and the techniques to limit the in-orbit particulate contamination of surfaces and environment have been offered. Author

N86-27352*# National Aeronautics and Space Administration, Washington, D.C.
ACTIONS TO IMPLEMENT THE RECOMMENDATIONS OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT. REPORT TO THE PRESIDENT
14 Jul. 1986 52 p
Avail: NTIS HC A04/MF A01 CSCL 05A

The status of the implementation of the recommendations of the Presidential Commission on the Space Shuttle Challenger Accident is reported. The implementation of recommendations in the following areas is detailed: (1) solid rocket motor design; (2) shuttle management structure, including the shuttle safety panel and astronauts in management; (3) critical item review and hazard analysis; (4) safety organization; (5) improved communication; (6) landing safety; (7) launch abort and crew escape; (8) flight rate; and (9) maintenance safeguards. Supporting memoranda and communications from NASA are appended. J.P.B.

N86-27656*# British Columbia Univ., Vancouver.
EFFECTS OF DAMPING ON THE CONTROL DYNAMICS OF THE SPACE SHUTTLE BASED ON TETHERED SYSTEMS
V. J. Modi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 357-382 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-27353# European Space Agency, Paris (France).
SECOND EUROPEAN SPACE MECHANISMS AND TRIBOLOGY SYMPOSIUM
T. D. Guyenne, comp. and J. Hunt, comp. Dec. 1985 327 p In ENGLISH and FRENCH Symposium held in Schloss Meersburg, West Germany, 9-11 Oct. 1985; sponsored by ESA, Dornier-Werke GmbH, and DFVLR
(ESA-SP-231; ESA-86-96851) Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Spacecraft mechanisms; motors and actuators; tribology; space stations; and mechanism analysis and testing were discussed. For individual titles, see N86-27354 through N86-27397.

N86-27354# Rockwell International Corp., Downey, Calif.
OPERATIONAL FLIGHT EXPERIENCE AND DISASSEMBLY/INSPECTION RESULTS OF SPACE SHUTTLE ORBITER ACTUATORS
D. Woolhouse *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 3-8 (For primary document see N86-27353 18-18)
(Contract NAS9-14000)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

After completion of the first six flights of Space Shuttle Columbia, the four rudder/speedbrake rotary actuators were removed so that a complete disassembly and inspection could be accomplished to evaluate the condition of all internal components. The flight loads experienced by the actuators are compared to those used in designing them. The combination of materials employed for the gear train and lubrication system of the Space Shuttle rudder/speedbrake rotary actuators successfully withstands all stresses and loads encountered during six orbital flights and six years of environmental exposure. Care should be exercised when choosing off-the-shelf or catalog parts (e.g., bearings, rollers, and spacers) to ensure that the same attention to surface protection is exercised as is typically given to custom designed parts. The requirement imposed on this design for operation during 100 missions over a 10 year period can be met as demonstrated by the excellent condition of these units after their flight exposure. ESA

N86-27355# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
THE SUCCESSFUL MAIDEN FLIGHT OF THE INSTRUMENT POINTING SYSTEM
K. Suttner *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 9-12 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Operation on flight STS-51 F of the Intrument Pointing System (IPS), a facility for pointing and stabilizing payloads of up to 3000 kg in the arcsec range, is summarized. After initial problems due to software and optics deficiencies were corrected, the mechanism behaved absolutely normally throughout the flight, as shown when such downlink data as actuator currents, run time, end switch timing, and temperatures are compared with those from ground tests. ESA

N86-27356# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
FEATURES OF THE SOLAR ARRAY DRIVE MECHANISM FOR THE SPACE TELESCOPE
R. G. Hostemkamp *In* ESA Second European and Space Mechanisms and Tribology Symposium Dec. 1985 p 13-17 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Spacecraft mechanisms; motors and actuators; tribology; space stations; and mechanism analysis and testing were discussed. The Solar Array Drive Mechanism for the Space Telescope is described. Power and signal transfer is achieved by a flexible wire harness for which the chosen solution, consisting of 168 standard wires, is described. The torque performance data of the harness over its temperature range is presented. The off load system which protects the bearings from the launch loads is released by a trigger made from Nitinol, a memory alloy. The benefits of memory alloy and the caveats for the design are discussed. The design of the off load is outlined and test experience reported. ESA

N86-27357# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
HISTORICAL DEVELOPMENT OF SOLAR ARRAY DRIVE MECHANISMS BY BRITISH AEROSPACE c37
I. D. Henderson *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 19-24 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Solar array drive mechanisms are described. Design and technical features of the Bearing and Power Transfer Assembly and the solar array drive mechanisms for Olympus and Eurostar

satellites are outlined. Arrays for large space platforms are considered. ESA

N86-27358# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ANALYSIS OF IN-ORBIT PERFORMANCE OF MECHANISMS WITHIN LARGE STRUCTURES
H. Baier *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 29-34 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Simulating and predicting the behavior of spacecraft mechanisms especially within larger structures are discussed. Deployment kinematic analysis is outlined. Actuators and their transfer functions within an active isolation or damping system as well as investigations of the static behavior of a refocus mechanism and the dynamic behavior of a bearing and power transfer assembly are treated. For the latter case, the effects of nonlinearities and of static preloads are emphasized. Ways to verify mechanism behavior in flexible structures are summarized. ESA

N86-27359# Technische Univ., Brunswick (West Germany). Inst. fuer Angewandte Mechanik.
CONTROL OF FLEXIBLE STRUCTURES WITH RESPECT TO INFINITY
P. Ruge *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 35-39 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The transfer matrix method is recommended for studying the stability of linear feedback controlled systems continuous in space and time. The system matrix can be assembled as it is used from finite element methods separately for each continuous member and each joint including control elements. Distributed transfer matrices for the continuous members which contain information up to infinity without poles and truncation errors are used. The calculation of as many eigenvalues as wanted is carried out by trace theorems. ESA

N86-27360# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. des Systemes Balistiques et Spatiaux.
SOLAR ARRAY DEPLOYMENT SIMULATION USING ADAMS SOFTWARE c44
C. Roux and P. Flament *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 41-46 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The use of ADAMS program to predict dynamic phenomena during deployment of satellite solar arrays is reviewed. The program increases understanding of influences of constituent flexibility during deployment. The program contributes to optimization of the mechanism as to mechanical strength under deployment loads and latching shocks; motorization factor; and layout on the solar array. Prediction of all in orbit deployment cases (including possible failure cases) in order to be sure that no unexpected phenomenon perturb the space flight is also improved. The improved accuracy using ADAMS is verified by test prediction correlation. ESA

N86-27361# Societe Europeenne de Propulsion, Vernon (France).
GIOTTO DESPIN MECHANISM SUBSYSTEM: GENERAL LOOP DESIGN AND POINTING ASPECTS
G. Turin *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 47-52 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The Giotto spacecraft despin antenna subsystem used to orient the high gain antenna towards the far Earth, while the satellite is spin stabilized at 15 rpm is described. The despin antenna subsystem control loop behavior in environmental tests and in flight is summarized. The subsystem was launched, unlocked, and put in rotation succesfully. The precision is within the deadband, better than +/- 0.022 degrees (better than half specification). This shows that the concept of a stepper motor in open loop is safe, although an alternative is to increase the damping ratio; simulations show that 1% is sufficient. Strong control on the potential perturbation is also necessary. For example, the least correction must be lower than calculated for a normal linear system. The results from calculation assuming a linear system are optimistic. ESA

N86-27362# Technische Univ., Munich (West Germany).
TRAJECTORY PLANNING FOR MANIPULATOR SYSTEMS c37
F. Pfeiffer *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 53-58 (For primary document see N86-27353 18-18)
(Contract SV-I/61-288)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

For the combination of an arbitrary manipulator and a given trajectory, a method which allows a simple evaluation of time optimal trajectory motion and the consideration of any other performance criterion is presented. The idea that path tracking of a manipulator may be regarded as approximately a one degree of freedom motion leads to a set of nonlinear differential equations which can be used to determine the state space constraints caused by geometric constraints and torque/force limitations in the joints. The equations of motion and their formal quadrature are used to construct a field of extremals in the state-plane, which defines in a transparent way the time-minimum solution. More general performance criteria are considered by the application of a dynamic programming approach. ESA

N86-27363# Technische Univ., Munich (West Germany). Lehrstuhl B fuer Mechanik.
MODELING AND CONTROL OF A LIGHTWEIGHT ROBOT c37
B. Gebler *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 59-64 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

For a lightweight industrial robot the influence of elasticity of the structural parts is studied. The system is modeled as a hybrid multibody system. It is shown that using the static deflection bending lines as shape functions yields, with only a few degrees of freedom, very good results. For control of the system, consideration of nominal deflections is proposed. This concept takes into account the elastic properties of robot arms when computing feedforward control torques. ESA

N86-27364# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
THE EXTENDABLE AND RETRACTABLE MAST (ERM)
M. Schmid and M. Aguirre *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 69-74 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The Extendable and Retractable Mast (ERM) used to deploy and retract large foldable structures such as solar arrays and furlable spacecraft antennas is presented. The design is based on a telescopic carbon-fiber structure with high stiffness, strength, and pointing accuracy. To verify the chosen design a breadboard model of an ERM was built and tested under TV conditions. ESA

N86-27365# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE COLLAPSIBLE TUBE MAST (CTM)
M. Aguirre, A. Bureo, M. Fuentes, and J. Rivacoba *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 75-81 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member

States, AU, CN, NO (+20% others)

A biconvex tube mast that can be flattened and rolled around a drum into a small volume package is described. A drive system pulls the tube by the edges to deploy it, and rotates the stowing drum to retract it. The mast can be manufactured in metal or composite; in both cases a continuous manufacturing method is used, providing a mast of unlimited length. An engineering model with tubes in copper beryllium and carbon fiber reinforced epoxy and thermoplastic is planned. ESA

N86-27366# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.

BRITISH AEROSPACE MECHANICS FOR INTELSAT 6

G. J. Sturtivant *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 83-88 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Mechanisms for the INTELSAT 6 program to clamp, release, stabilize, and deploy the satellite assembly from an STS Orbiter launch are described. They can be refurbished and reused for a minimum of 16 flights, while the single operation spring ejector mechanism also provides the separation of the perigee stage from the satellite. The design of the mechanisms achieves simplicity, low mass, high load capability, and reliable functional capability mechanisms. ESA

N86-27367# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.

THERMAL CUTTING HOLDDOWN AND RELEASE MECHANISM c37

G. J. A. N. Kester *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 89-93 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A restraint and release mechanism was invented and tested in the Advanced Rigid Array program. The invention degrades the mechanical properties of a restraining element like an aramid cable by means of a heat source. The performance specifications and test results are listed. The benefits of using this mechanism instead of pyrotechnic systems include higher reliability, low cost and mass, long term storage, and the possibility of prelaunch testing. ESA

N86-27368# Sener, S.A., Madrid (Spain).

THE ULYSSES MECHANISMS

F. Abarrategui, M. Fuentes, S. Ugaldea, and M. Aguirre *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 95-104 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The Ulysses (ex ISPM) radial boom, two wire booms, and a rigid axial boom are described. The radial boom is used to deploy five experiment sensors away from the spacecraft body. It is constructed with nonmagnetic materials, and consists of two articulated arms. The wire boom antennas when deployed form a 72 m tip-to-tip dipole for the radio and plasma wave experiment. The antenna element is a tape of 5 x 0.04 mm section in CuBe2 material. The axial boom antenna, located at the spinning axis, is used as a monopole antenna by the radio and plasma wave experiment. The antenna consists of a tube of lenticular section. The section shape permits the tube to be pressed flat and rolled into a drum. ESA

N86-27369# Societe Nationale Industrielle Aerospatiale, Cannes (France).

SPEED REGULATORS FOR SPACE APPENDAGES DEPLOYMENT

J. M. Leblanc *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 105-111 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The requirements, design, test program, and performances of a centrifugal brake speed regulator for the deployment of spaceborne appendages are described. The regulator is qualified for the SPOT solar array, the TVSAT/TDF reflectors, and TELE-X reflectors. ESA

N86-27370# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).

SEMI-ACTIVE MAGNETIC BEARINGS FOR SPACE APPLICATIONS c37

M. Gauthier and C. Rouyer *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 115-120 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Magnetic and ball bearings for satellite inertia wheels are compared. For momentum wheels magnetic bearings have the advantage over ball bearings for high kinetic momentum (150 Nms and over). For smaller kinetic momentum, this advantage still exists given that no redundancy of the mechanical part is required. For reaction wheels, the advantage of the magnetic bearing is chiefly related to the low friction and stiction torques, and the choice is dictated by the mission requirements. The same conclusions apply to optical systems. For kinetic energy storage, magnetic bearings are mandatory to reach competitive performance. The flight qualification obtained with the SPOT satellite and the development of high speed rotors for kinetic energy storage are discussed. ESA

N86-27371# Technische Univ., Brunswick (West Germany). Inst. fuer Elekt. Maschinen, Antriebe, und Bahnen.

DIRECTLY-DRIVEN SERVOMOTOR WITH VERY HIGH TORQUE c33

H. Weh, P.-Chr. Leymann, and W. Niemann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 121-126 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A direct drive for robot applications is described. The motor operates as a permanently excited synchronous machine, whereby the proportion of magnetic material can be minimized owing to the rotor construction. It develops a continual torque of 827 Nm for an outer diameter of 386 mm and can be directly incorporated into the articulated arm. A microcomputer assumes the position and rotation speed regulation as well as the control of the multiphase pulse converter, which supplies the stator with square-wave current pulses. ESA

N86-27372# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).

TORQUE IRREGULARITIES IN REACTION WHEELS

R. Stapf, Th. Lange, and H. Holzach *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 127-131 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Experimental investigations on torque irregularities in reaction wheels revealed two classes of unexpected effects: Frictional effects, which can be interpreted with Dahl's model of solid friction; and effects due to electromagnetic interactions in the dc motor. An extreme dependency of the wheel start-up current on the rotor's angular position is emphasized. Equidistant current spikes exceeding the nominal start current up to one order of magnitude are found, producing an exceptionally high start-up torque. ESA

N86-27373# Societe Europeenne de Propulsion, Vernon (France).

ELECTRIC MOTOR WITH SUPERCONDUCTING WINDINGS FOR ACTUATION MECHANISM IN THE FOCAL PLANE OF A SPACE CRYOSTAT c33

J. P. Bugeat, R. Petit, D. Valentian, M. Junca, and M. Verain *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 133-138 (For primary document see N86-27353 18-18)

(Contract ESA-5609/83)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

An electric motor for the Infrared Space Observatory was tested. This stepper motor derived from a space qualified component is able to run under vacuum at liquid helium temperatures. Its superconducting winding allows it to run with an electrical heat dissipation of less than 1 mW. Themotor test program included endurance tests at cryogenic temperatures (10K) and vibration tests at liquid nitrogen temperature. The motor torque was measured down to 8K. ESA

N86-27374# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PYROTECHNIC VALVES, MINIATURE PYROMECHANISMS, AND PYROTECHNIC NUTS **c28**
J. C. Slama *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 139-143 In FRENCH (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Pyrotechnic valves for isolating two parts of launch vehicle fluid circuits before activation and for shutting off a feed circuit are described. Miniature pyrotechnic actuators for deployment, retraction, and cutting mechanisms for payloads on manned vehicles are presented. A reusable pyrotechnic release nut for rocket payloads (e.g., a complete satellite or an antenna) is presented. ESA

N86-27375# Centre National d'Etudes Spatiales, Toulouse (France).
DEFINITION AND TESTING OF GEARS FOR SPACE ROBOTICS **c37**
L. Petitjean and A. Borrien *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 149-154 In FRENCH; ENGLISH summary (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

An automatic manipulator arm for the capture of a three-axis stabilized satellite by another satellite on the same orbit was investigated. A general design study highlighted critical technological problems, such as the design and manufacturing of the joint gear-boxes, as the joints must transmit high forces and torques (60 Nm holding torque) which induce high contact stresses on the gear teeth. The research in lubrication processes, the experimental program to prove the feasibility of the concept, and the test results under atmosphere are summarized. ESA

N86-27376# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Technische Physik.
THE PERFORMANCE OF UNBONDED MoS2 FOR SPACE APPLICATIONS **c27**
V. Buck *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 155-159 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The performance of MoS2 as a dry lubricant in general is outlined and the advantages and disadvantages for space applications are reviewed. Knowledge in sputtering of MoS2 is discussed and the influence of preparation conditions on impurities or disorder of the films is assessed. Results showing correlations between H2O impurities in the plasma and structural parameters of the layers are given, and the importance of these effects is outlined. Considerations relating structural properties to tribological behavior are presented. ESA

N86-27377# Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel. Dept. de Recherche et Developpement.
COATINGS AGAINST FRETTING **c27**
M. Maillat and H. E. Hintermann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 161-166 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Coatings and lubricants to protect aerospace mechanisms from wear and microweldings caused by fretting or reciprocal sliding were investigated. From the 144 tests performed, TiC, Tiodize and Adhesoil coatings show the best results under a high specific load; the best results are obtained with Rh + MoS2 coatings under low contact pressure against Be. ESA

N86-27378# European Space Tribology Lab., Risley (England).
SURFACE-TREATED TITANIUM ALLOY GEARS FOR SPACE MECHANISMS **c37**
R. A. Rowntree *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 167-171 Sponsored by ESTEC (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The performance of surface treatments against adhesive wear (galling) on the alloy IMI 318 (Ti-6Al-4V) was tested using gears unlubricated in vacuum, in a four square rig. Gear performance was determined by life or number of tooth encounters before failure of the surface treatment rather than by wear depth. Conventional treatments such as nitriding or oxidation are found to offer limited improved gear life, above that of the untreated alloy. Boronizing gives the longest gear life but causes, during treatment, dimensional growth of the gears. Sputter-deposited coatings of TiN are poorly adherent to the substrate and give short lives. Arc-evaporated coatings of TiN give improved performance until coating fracture and subsequent galling of the titanium alloy occurs. ESA

N86-27379# Societe Nationale Industrielle Aerospatiale, Cannes (France).
USE OF MoS2 APPLIED BY PHYSICAL VAPOR DEPOSITION (PVD) ON SPACE MECHANISMS **c27**
J. F. Patin, M. Maillat (Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel.), and H. E. Hintermann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 173-176 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Satellite mechanisms using a solid lubricant film of MoS2 applied by physical vapor deposition or RF sputtering are described. This process satisfies space requirements because MoS2 has excellent friction properties in vacuum; nevertheless it is necessary to take into account moisture effects during ground tests. Parameters likely to influence the performances of lubricated mechanisms were studied on a pin on disk tribological test rig. Sputter coated MoS2 films are successfully used in the telecommunication satellite Arabsat, the observation satellite SPOT, and the television satellite TDF. Examples of lubricated mechanisms are antennas, rigid solar array deployment mechanisms, and flexible solar array box opening mechanisms. ESA

N86-27380# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DESIGN AND TEST OF A LINEAR THERMAL ACTUATOR **c33**
G. Bush, D. Osborne, and V. A. Wehrle *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 181-185 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A linear thermal actuator (LTA) to serve as the actuating element of a shape control system which compensates actively for deployment inaccuracies or thermal distortions of large antennas or other space structures requiring high dimensional stability was developed. The LTA was subjected to spacecraft-level vibration and thermal vacuum tests. Results and effect on ambient performance are presented. A follow-on development effort in which it is proposed to incorporate a network of distributed

LTAs into a shape control system for a phased-array planar antenna of a hypothetical ice surveillance satellite is outlined. ESA

N86-27381# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelberg (West Germany).
A COARSE POINTING MECHANISM FOR AN INTERSATELLITE LASER LINK (ISL2) SYSTEM c37
R. Kern and K. Kierschke *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 187-192 (For primary document see N86-27353 18-18)
(ESA-86-96851; ESA-SP-231) Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The basic structure and principle of operation of a Pointing, Acquisition, and Tracking Subsystem (PATS) for intersatellite laser links, especially by using CO2 lasers, are described. The Coarse Pointing Assembly features the largest dimensions and requires thorough design considerations to keep its mass at a minimum. In spite of a possibly lightweight construction, the high accuracy requirements for the CPA have to be met. A trade-off of potential CPA mechanisms was made and the resulting design is presented. The gear design, the pick-off approach, the bearings arrangement, and the motor are discussed. The control law and its realization in connection with the complete PATS are considered. ESA

N86-27382# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DEVELOPMENT AND TESTING OF A DUAL-WOUND dc MOTOR GEARHEAD c37
B. W. Henson and J. C. Anderson (European Space Tribology Lab., Ridley (England).) *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 193-200 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The development and testing of a dual-wound dc motor and integral gearhead are described. Extensive testing proves its ability to operate in vacuum over the temperature range -45 to +85C with a life greater than 250 hours. The unit has a rated torque output of 1.5 Nm with a nominal output speed of 30 rpm and could be used as a prime mover in many medium speed space applications. Its high overall efficiency means that it can be backdriven. ESA

N86-27383# Indian Space Research Organization, Trivandrum. Vikram Sarabhai Space Center.
DESIGN AND DEVELOPMENT OF A BRUSHLESS dc MOTOR FOR SPACE APPLICATIONS c33
N. Kannan, A. Bose, and N. Vedachalam *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 201-206 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A brushless dc motor for momentum/reaction wheel applications was developed. Ironless armature is adopted and trapezoidal torque function is achieved, making effective use of a high coercive rare earth cobalt permanent magnet for the field system. The magnet rotor position sensing for electronic commutation is accomplished with high resolution optical reflective sensors. The performance tests for characterization of the motor parameters are presented. ESA

N86-27384# Moore Reed and Co. Ltd., Walworth (England).
A SPACE-COMPATIBLE ANGULAR CONTACT ENCODER c33
A. R. Flew *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 207-212 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

An electromechanical digital position encoder, based on existing commercial technology, for spacecraft applications is described. The device contains electrical wiping contacts, a gear mechanism, and plain and rolling-element bearings all operating without wet lubrication. Designed to function continuously for 10 years, certain contacts will perform in excess of 20 million cycles. To investigate the performance of these contacts, automatic test equipment was designed to monitor the accuracy of 8192 separate output conditions on a regular basis throughout an accelerated-life thermal vacuum test. The equipment also checks for missing bits and edge noise and logs any errors that are found. ESA

N86-27385# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
INTEGRATED SENSOR AND ACTUATOR SYSTEM FOR FLEXIBLE SPACE STRUCTURE EXPERIMENTS c19
Th. Lange and H. Holzach *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 217-220 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A high accuracy sensor and actuator system for laboratory experiments on flexible structure control, comprising an optical sensor and a magnetic actuator, is presented. It features high linearity and large bandwidth. A special wiring profile was realized for the actuator coil to generate a constant magnetic driving field in a defined working space. This design prevents force variations as a result of relative displacement. The performance is confirmed by tests and experiments. ESA

N86-27386# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
EXPERIMENT MANIPULATORS FOR AUTOMATIC SAMPLE HANDLING c37
N. Cable *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 221-226 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The application of robotics to small scale manipulator systems for materials handling in microgravity was studied, using the single core payload of EURECA. A skeleton and an advanced concept were studied. Modularity; size and mass; joint design; sensors; reliability, safety and redundancy; orbit and ground operation; computer aided design; end effectors; grapple fixtures; storage and process interfaces; processors; software; and the use of commercially available manipulators were investigated. ESA

N86-27387# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
A DORNIER LATCH DESIGN FOR A DOCKING MECHANISM c37
K. Priesett, F. Gampe, R. H. Bentall, and N. Cable *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 227-232 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Within a technology study of a spacecraft docking mechanism subsystem, it is shown that based on the selection of a very low impact docking concept, a simple latching and connecting interface can be applied to the coupling of two spacecraft. Structural joining is accomplished by three or four equispaced capture latches. A capture latch mechanism for this docking technique is described. Latching requirements, the standard docking interface, the latch mechanism design and analysis, and results of a predevelopment model latch test are outlined. ESA

N86-27388# Sener, S.A., Madrid (Spain).
A SENER LATCH DESIGN FOR DOCKING MECHANISMS c37
F. Abarrategui, M. Fuentes, J. Rivacoba, and J. A. Ros *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 233-238 (For primary document see N86-27353 18-18)
(Contract ESA-5195/82-NL-BI)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Latch mechanisms were designed for the docking of two spacecrafts at relatively short distances and with small relative

velocity between them. The mechanism mounted on one of the spacecrafts has to receive the passive element of the other, guide it, dissipate as much as possible the small relative kinetic energy, stop it, bring it to the final rest position, and rigidize the interface between both spacecraft. The mechanism elements necessary to carry out this task and the operation of the latch in the process of docking and undocking are explained. A model of the latch was built and tested in a bidimensional air bearing set-up. ESA

N86-27389# Royal Netherlands Aircraft Factories Fokker, Amsterdam. Space Div.
A DEPLOYABLE AND RETRACTABLE STRONGBACK STRUCTURE
R. Zwanenburg *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 239-245 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

A deployable/retractable structure whose parts deploy or retract simultaneously was developed for spacecraft antennas, solar arrays, heat rejection systems, sensors, concentrators, and platforms. Its advantages include simplicity and high reliability; excellent strength and stiffness in deployed condition; high design flexibility without the need for complete redesign; low production cost due to large number of identical elements; low development effort; and simple ground testing. ESA

N86-27390# European Space Tribology Lab., Risley (England).
SOME RECENT EXPERIENCES OF MECHANISM PERFORMANCE AND COMPONENT ASSESSMENT IN THERMAL VACUUM TESTS AT ESTL
J. A. Duvall and K. Parker *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 251-260 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The spacecraft mechanism test facilities at the European Space Tribology Laboratory (ESTL) are described. Test results are reviewed on three mechanisms where, in a variety of thermal conditions, the measurement of the reaction torque which would be experienced by the spacecraft was important. Valuable performance data is obtained when it is possible to dismantle mechanisms and examine the condition of all components after the tests. This was particularly important for two ESA mechanisms subjected to seven-year real life tests, one having lead-lubricated bearings and the other oil-lubricated bearings. The ESTL experience in component examination and failure analysis, with advice on how to improve mechanism reliability, is reviewed. ESA

N86-27391# European Space Tribology Lab., Risley (England).
THERMAL VACUUM INCLINOMETRY: A TEST FACILITY FOR ANTENNA POINTING MECHANISMS c14
E. W. Roberts *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 261-265 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The development of a measurement and test facility for space antenna pointing mechanisms is described. The system allows measurements of high accuracy and resolution to be made on mechanisms operating under ambient or thermal vacuum conditions (-40 C to +80 C). The basis of the facility is a high precision tilt sensor which can be used in high vacuum. Data acquisition from such sensors is by means of an LSI/11-23 based computer which also allows data processing and programmed control over mechanism movements. In static measurements the system displays high accuracy (+ or - 0.001 deg) high resolution (0.0004 deg) and good repeatability (0.0005 deg). Examples of tests made possible by this measuring system are presented. ESA

N86-27392# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
THE OLYMPUS ANTENNA DEPLOYMENT SUBSYSTEM DESIGN AND TESTING
M. D. Death *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 267-272 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Satellite Antenna Deployment Subsystem design and engineering model testing is presented. The design, test philosophies, and their implications for the hardware are discussed. Functional, vibration and thermal vacuum test results are summarized and the hardware implications considered. The consequences of the engineering model test program and its implications for qualification and flight model testing are treated. ESA

N86-27393# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
RESULTS OF A 10 Nms REACTION WHEEL TEST PROGRAMME, INCLUDING TESTS ON A NYLON PORE LUBRICATION SYSTEM
G. J. Sturtivant *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 273-278 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The Olympus satellite 10 Nms reaction wheel test program philosophy and results are presented. The test program is designed to fully characterize the reaction wheel assembly and to verify that the unit is capable of surviving the launch and operating environments. The lubrication system theory and test program are discussed. A history of the testing and difficulties is also included, and the resulting design modifications are detailed. ESA

N86-27394# Centre National d'Etudes Spatiales, Toulouse (France).
MECHANISMS DEVELOPED IN THE FRENCH SPACE INDUSTRY c37
R. Salome and L. Petitjean *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 283-288 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Mechanisms developed for satellite projects such as SPOT, Giotto, TV.SAT, and TELEX-X are described. Solar Array Drives, antenna pointing mechanisms, and hinges for robot arms are presented. ESA

N86-27395# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
ARIANE RELEASE GEAR SYSTEM c15
P. McMahon *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 289-296 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

The Ariane release gear system consists of four arms used to support the vehicle during assembly and integration. Contained within each arm is a release mechanism used to restrain the vehicle during engine ignition and then, on command of a signal from the launch site computer, release the vehicle in a controlled manner over 200 ms so that its acceleration increases in a linear fashion. Once the vehicle rises 150 mm a retraction system is employed to withdraw the arms away from the flight path of the rising vehicle. The four release and four retraction mechanisms are operated hydraulically from a common power source. Similar pipe lengths are employed between the power unit and the release arms to ensure simultaneous operation of the mechanisms. ESA

N86-27396# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
ARIANE 3RD STAGE PRESSURE CONTROL VALVES c15
C. B. Taylor *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 297-303 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Cryogenic pressure control valves were designed, developed, and qualified for the third stage of the Ariane launch vehicle. Design drivers include accurate pressure control and operation under conditions of vibration, acceleration, and +30 to -223 deg C temperatures. The methods by which the required performance was achieved are presented together with typical test data. The development and qualification programs are reviewed. ESA

N86-27397# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).

SPACE MECHANISMS DEVELOPMENT IN THE ESA TECHNOLOGICAL RESEARCH PROGRAM c37

D. Wyn-Roberts *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 305-310 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

Spacecraft components, control actuators, space operation mechanisms, instrument mechanisms, deployment mechanisms, and solar array mechanisms are described. Motors, wheels (including energy storage), docking and robotics mechanisms, and masts are discussed. ESA

N86-27398*# General Electric Co., Philadelphia, Pa. Space Systems Div.

SPACE STATION AUTOMATION STUDY: AUTOMATION REQUIREMENTS DERIVED FROM SPACE MANUFACTURING CONCEPTS,VOLUME 2 Final Report

27 Nov. 1984 125 p

(Contract NAS5-25182)

(NASA-CR-177862-Vol-2; NAS 1.26:177862-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 22B

Automation reuirements were developed for two manufacturing concepts: (1) Gallium Arsenide Electroepitaxial Crystal Production and Wafer Manufacturing Facility, and (2) Gallium Arsenide VLSI Microelectronics Chip Processing Facility. A functional overview of the ultimate design concept incoporating the two manufacturing facilities on the space station are provided. The concepts were selected to facilitate an in-depth analysis of manufacturing automation requirements in the form of process mechanization, teleoperation and robotics, sensors, and artificial intelligence. While the cost-effectiveness of these facilities was not analyzed, both appear entirely feasible for the year 2000 timeframe. B.G.

N86-27399*# General Electric Co., Philadelphia, Pa. Space Systems Div.

SPACE STATION AUTOMATION STUDY: AUTOMATION REQUIREMENTS DERIVED FROM SPACE MANUFACTURING CONCEPTS. VOLUME 1: EXECUTIVE SUMMARY Final Report

9 Jul. 1984 34 p

(Contract NAS5-25182)

(NASA-CR-177862-Vol-1; NAS 1.26:177862-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 22B

The electroepitaxial process and the Very Large Scale Integration (VLSI) circuits (chips) facilities were chosen because each requires a very high degree of automation, and therefore involved extensive use of teleoperators, robotics, process mechanization, and artificial intelligence. Both cover a raw materials process and a sophisticated multi-step process and are therfore highly representative of the kinds of difficult operation, maintenance, and repair challenges which can be expected for any type of space manufacturing facility. Generic areas were identified which will require significant further study. The initial design will be based on terrestrial state-of-the-art hard automation. One hundred candidate missions were evaluated on the basis of automation portential and availability of meaning ful knowldege. The design requirements and unconstrained design concepts developed for the two missions are presented. B.G.

N86-27400*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.

DEVELOPMENT OF AN EMULATION-SIMULATION THERMAL CONTROL MODEL FOR SPACE STATION APPLICATION Semiannual Status Report

Gene T. Colwell and James G. Hartley 5 Jan. 1986 46 p

(Grant NAG1-551)

(NASA-CR-177298; NAS 1.26:177298) Avail: NTIS HC A03/MF A01 CSCL 22B

Analysis techniques to evaluate the effects of changing thermal loads and the methods utilized to control temperature distributions in the orbital space station are essential. Analysis techniques including a user-friendly computer program, were developed which should prove useful in thermal design and system analysis of the the space station. The program uses a data base and user input to compute costs, sizes, and power requirements for individual components and complete systems. User input consists of selecting mission parameters, selecting thermal acquisition configurations, transport systems and distances, and thermal rejection configurations. B.G.

N86-27401*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.

ADAPTIVE CONTROL OF LARGE SPACE STRUCTURES USING RECURSIVE LATTICE FILTERS Final Report

N. Sundararajan and Gene L. Goglia Dec. 1985 80 p

(Grant NAG1-429)

(NASA-CR-177270; NAS 1.26:177270) Avail: NTIS HC A05/MF A01 CSCL 22B

The use of recursive lattice filters for identification and adaptive control of large space structures is studied. Lattice filters were used to identify the structural dynamics model of the flexible structures. This identification model is then used for adaptive control. Before the identified model and control laws are integrated, the identified model is passed through a series of validation procedures and only when the model passes these validation procedures is control engaged. This type of validation scheme prevents instability when the overall loop is closed. Another important area of research, namely that of robust controller synthesis, was investigated using frequency domain multivariable controller synthesis methods. The method uses the Linear Quadratic Guassian/Loop Transfer Recovery (LQG/LTR) approach to ensure stability against unmodeled higher frequency modes and achieves the desired performance. E.R.

N86-27402*# RCA Astro-Electronics Div., Princeton, N. J.

COMMUNICATIONS PLATFORM PAYLOAD DEFINITION STUDY

H. W. Clopp, T. A. Hawkes, C. R. Bertles, B. A. Pontano (Communications Satellite Corp., Clarksburg, Md.), and T. Kao Washington, D.C. NASA Jul. 1986 245 p

(Contract NAS3-24236)

(NASA-CR-174986; NAS 1.26:174986) Avail: NTIS HC A11/MF A01 CSCL 22B

Large geostationary communications platforms were investigated in a number of studies since 1974 as a possible means to more effectively utilize the geostationary arc and electromagnetic spectrum and to reduce overall satellite communications system costs. The commercial feasibility of various communications platform payload concepts circa 1998 was addressed. Promising payload concepts were defined, recurring costs were estimated, and critical technologies needed to enable eventual commercialization were identified. Ten communications service aggregation scenarios describing potential groupings of service were developed for a range of conditions. Payload concepts were defined for four of these scenarios: (1) Land Mobile Satellite Service (LMSS) meets 100% of Contiguous United States (CONUS) plus Canada demand with a single platform; (2) Fixed Satellite Service (FSS) (trunking + Customer Premises Service (CPS)), meet 20% of CONUS demand;(3) FSS (trunking + CPS + video distribution), 10 to 13% of CONUS demand; and (4) FSS (20% of demand) + Inter Satellite Links (ISL) + Tracking and Data Relay Satellite System

(TDRSS)/Tracking and Data Acquisition System (TDAS) Data Distribution. Author

N86-27403*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
COMMUNICATION PLATFORM PAYLOAD DEFINITION (CPPD) STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report, Jun. 1984 - Jul. 1985
E. M. Hunter Mar. 1986 40 p
(Contract NAS3-24235)
(NASA-CR-174928; NAS 1.26:174928; WDL-TR-10631-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 22B

This is Volume 1 (Executive Summary) of the Ford Aerospace & Communications Corporation Final Report for the Communication Platform Payload Definition (CPPD) Study program conducted for NASA Lewis Research Center under contract No. NAS3-24235. This report presents the results of the study effort leading to five potential platform payloads to service CONUS and WARC Region 2 traffic demand as projected to the year 2008. The report addresses establishing the data bases, developing service aggregation scenarios, selecting and developing 5 payload concepts, performing detailed definition of the 5 payloads, costing them, identifying critical technology, and finally comparing the payloads with each other and also with non-aggregated equivalent services. Author

N86-27404*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
COMMUNICATION PLATFORM PAYLOAD DEFINITION (CPPD) STUDY. VOLUME 2: TECHNICAL REPORT Final Report, Jun. 1984 - Jul. 1985
E. M. Hunter, T. Driggers, and R. Jorasch Mar. 1986 598 p
(Contract NAS3-24235)
(NASA-CR-174929; NAS 1.26:174929; WDL-TR-10632-Vol-2) Avail: NTIS HC A25/MF A01 CSCL 22B

This is Volume 2 (Technical Report) of the Ford Aerospace & Communications Corporation Final Report for the Communication Platform Payload Definition (CPPD) Study program conducted for NASA Lewis Research Center under contract No. NAS3-24235. This report presents the results of the study effort leading to five potential platform payloads to service CONUS and WARC Region 2 traffic demand as projected to the year 2008. The report addresses establishing the data bases, developing service aggregation scenarios, selecting and developing 5 payload concepts, performing detailed definition of the 5 payloads, costing them, identifying critical technology, and finally comparing the payloads with each other and also with non-aggregated equivalent services. Author

N86-27405*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
COMMUNICATION PLATFORM PAYLOAD DEFINITION (CPPD) STUDY. VOLUME 3: ADDENDUM Final Report, Jun. 1984 - Jul. 1985
E. M. Hunter, T. Driggers, and R. Jorasch Mar. 1986 424 p
(Contract NAS3-24235)
(NASA-CR-174930; NAS 1.26:174930; WDL-TR-10633-Vol-3) Avail: NTIS HC A18/MF A01 CSCL 22B

This is Volume 3 (Addendum) of the Ford Aerospace & Communications Corporation Final Report for the Communication Platform Payload Definition (CPPD) Study Program conducted for NASA Lewis Research Center under contract No. NAS3-24235. This report presents the results of the study effort leading to five potential platform payloads to service CONUS and WARC Region 2 traffic demand as projected to the year 2008. The report addresses establishing the data bases, developing service aggregation scenarios, selecting and developing 5 payload concepts, performing detailed definition of the 5 payloads, costing them, identifying critical technology, and finally comparing the payloads with each other and also with non-aggregated equivalent services. Author

N86-27406*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
USERS GUIDE: STEADY-STATE AERODYNAMIC-LOADS PROGRAM FOR SHUTTLE TPS TILES
Patricia A. Kerr and Dennis H. Petley Jul. 1984 112 p
(NASA-TM-85724; NAS 1.15:85724) Avail: NTIS HC A06/MF A01 CSCL 22B

A user's guide for the computer program that calculates the steady-state aerodynamic loads on the Shuttle thermal-protection tiles is presented. The main element in the program is the MITAS-II, Martin Marietta Interactive Thermal Analysis System. The MITAS-II is used to calculate the mass flow in a nine-tile model designed to simulate conditions duing a Shuttle flight. The procedures used to execute the program using the MITAS-II software are described. A list of the necessry software and data files along with a brief description of their functions is given. The format of the data file containing the surface pressure data is specified. The interpolation techniques used to calculate the pressure profile over the tile matrix are briefly described. In addition, the output from a sample run is explained. The actual output and the procedure file used to execute the program at NASA Langley Research Center on a CDC CYBER-175 are provided in the appendices. Author

N86-27407*# RCA Astro-Electronics Div., Princeton, N. J.
COMMUNICATIONS PLATFORM PAYLOAD DEFINITION STUDY, EXECUTIVE SUMMARY
H. W. Clopp, T. A. Hawkes, C. R. Bertles, B. A. Pontano (Communications Satellite Corp., Washington, D.C.), and T. Kao Jul. 1986 34 p
(Contract NAS3-24236)
(NASA-CR-174985; NAS 1.26:174985) Avail: NTIS HC A03/MF A01 CSCL 22B

Large geostationary communications platforms have been investigated in a number of studies since 1974 as a possible means to more effectively utilize the geostationary orbital arc and electromagnetic spectrum and to reduce overall satellite communications system costs. This NASA Lewis sponsored study addresses the commercial feasibility of various communications platform payload concepts circa 1998. It defines promising payload concepts, estimates recurring costs and identifies critical technologies needed to permit eventual commercialization. Ten communications service aggregation scenarios describing potential groupings of services were developed for a range of conditions. Payload concepts were defined for four of these scenarios: (1) Land Mobile Satellite Service (LMSS), meet 100% of CONUS plus Canada demand with a single platform; (2) Fixed Satellite Service (FSS) (Trunking + Customer Premises Service (CPS), meet 20% of CONUS demands; (3) FSS (Trunking + video distribution), 10 to 13% of CONUS demand; and (4) FSS (20% of demand) + Inter Satellite Links (ISL) + TDRSS/TDAS Data Distribution. Author

N86-27408*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ADVANCING AUTOMATION AND ROBOTICS TECHNOLOGY FOR THE SPACE STATION AND FOR THE US ECONOMY Progress Report, Oct. 1985 - Mar. 1986
Mar. 1986 57 p
(NASA-TM-88785; NAS 1.15:88785; ATAC-PR-2) Avail: NTIS HC A04/MF A01 CSCL 22B

In April 1985, as required by Public Law 98-371, the NASA Advanced Technology Advisory Committee (ATAC) reported to Congress the results of its studies on advanced automation and robotics technology for use on the Space Station. This material was documented in the initial report (NASA Technical Memorandum 87566). A further requirement of the Law was that ATAC follow NASA's progress in this area and report to Congress semiannually. This report is the second in a series of progress updates and covers the period between October 4, 1985, and March 31, 1986. NASA has accepted the basic recommendations of ATAC for its Space Station efforts. ATAC and NASA agree that thrust of Congress is to build an advanced automation and robotics technology base that will support an evolutionary Space Station Program and serve as a highly visible stimulator effecting

the U.S. long-term economy. The progress report identifies the work of NASA and the Space Station study contractors, research in progress, and issues connected with the advancement of automation and robotics technology on the Space Station. Author

N86-27409*# National Aeronautics and Space Administration, Washington, D.C.
THE SUITABILITY OF VARIOUS SPACECRAFT FOR FUTURE SPACE APPLICATIONS MISSIONS
Charles W. Mathews, Ralph Bernstein (International Business Machines Corp., Palo Alto, Calif.), and Donald C. MacLellan (Massachusetts Inst. of Tech., Cambridge.) Jul. 1986 18 p
(NASA-TM-88986; NAS 1.15:88986) Avail: NTIS HC A02/MF A01 CSCL 22B

The Space Applications Advisory Committee (SAAC) of NASA's Advisory Council was asked by the Associate Administrator for Space Science and Applications to consider the most suitable future means for accomplishing space application missions. To comply with this request, SAAC formed a Task Force whose report is contained in this document. In their considerations, the Task Force looked into the suitability of likely future spacecraft options for supporting various types of application mission payloads. These options encompass a permanent manned space station, the Space Shuttle operating in a sortie mode, unmanned platforms that integrate a wide variety of instruments or other devices, and smaller free fliers that accommodate at most a few functions. The Task Force also recognized that the various elements could be combined to form a larger space infrastructure. This report summarizes the results obtained by the Task Force. It describes the approach utilized, the findings and their analysis, and the conclusions. Author

N86-27410# National Oceanic and Atmospheric Administration, Washington, D. C. Natl. Environ. Satellite Data and Inform. Service.
FEDERAL AGENCY SATELLITE REQUIREMENTS Final Report
D. Cotter and I. Wolzer Jul. 1985 160 p
(AD-A165071) Avail: NTIS HC A08/MF A01 CSCL 04/2

This report summarizes the requirements of Federal agencies for the data and services of NOAA's civil operational environmental satellites--both polar-orbiting and geostationary. The Federal agencies contributing to this document have described their current and planned use of the data and services provided by NOAA's environmental satellite and Landsat systems, as well as those provided by the systems of others. Agency plans for taking advantage of proposed future Earth-sensing space systems, domestic and foreign, are cited also. The report emphasizes requirements for direct and indirect support from NOAA's environmental satellite systems. In the direct case, the agencies process, interpret, or use NOAA's satellite data, products, or services as inputs to in-house activities. In the indirect case, NOAA provides the agencies with support products, such as weather forecasts, that depend on satellite operations to various degrees. This report focuses on the direct requirements served by the National Environmental Satellite Data, and Information Service (NESDIS). Described here are the satellite needs of the Department of Agriculture, the Army Corps of Engineers, the Department of Transportation (which includes the Federal Aviation Administration and the Coast Guard), the Agency for International Development, the Department of Defense, the Department of the Interior, and the National Aeronautics and Space Administration. Current data uses and future requirements are addressed. GRA

N86-27411# National Oceanic and Atmospheric Administration, Washington, D. C. Natl. Environ. Satellite Data and Inform. Service.
GOES (GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE)-NEXT OVERVIEW Final Report
A. Schwalb, D. Cotter, and J. Hussey Sep. 1985 76 p
(AD-A165080) Avail: NTIS HC A05/MF A01 CSCL 22/2

This report describes, in summary form, the current National Oceanic and Atmospheric Administration (NOAA) Geostationary Operational Environmental Satellite (GOES) system and the scientific rationale used to develop specifications for the next generation of satellites of this series. The payload instruments of the current satellites are reviewed in conjunction with the products prepared from their data outputs. The rationale used by the National Weather Service (NWS) in developing top-level requirements for GOES-Next stresses the projected use of data within the restructured NWS organization expected in the 1990's. NOAA-certified requirements used by the National Aeronautics and Space Administration (NASA) to develop the Request for Proposal, issued to industry in June 1984, are also provided. Finally, a brief description of the satellite system that will be built for launch in the 1990's is provided. This final section has been abstracted from the winning proposal submitted by Ford Aerospace and Communications Corporation and is a glimpse at what the future has in store for GOES. Author (GRA)

N86-27412# National Oceanic and Atmospheric Administration, Washington, D. C. Natl. Environ. Satellite Data and Inform. Service.
OPERATIONAL SATELLITE SUPPORT TO SCIENTIFIC PROGRAMS Final Report
H. W. Yates, D. J. Cotter, and G. Ohring Mar. 1985 57 p
(AD-A165081) Avail: NTIS HC A04/MF A01 CSCL 22/2

The role of operational environmental satellites in science programs undertaken to study the Earth system is examined. It centers on the satellite systems operated by the National Oceanic and Atmospheric Administration (NOAA). Other satellite systems are referenced as appropriate. NOAA's operational satellites are serving the research community extensively. Research programs such as climate studies, ocean dynamics investigations, and global vegetation surveys benefit from the special characteristics of operational satellites. Among these characteristics are routine global coverage in many spectral intervals; reliability, resulting from a commitment to continue the service; speed in data access because of real-time applications; repeatability of measurements because of matched, calibrated instruments; and data handling methods that provide output products in conventional, usable formats and with traceable histories. Author (GRA)

N86-27413# National Oceanic and Atmospheric Administration, Washington, D. C.
COMPARISON OF THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP) AND THE NOAA POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE (POES) PROGRAM
D. Cotter, A. Ramsey, E. Heacock, J. Bailey, and Q. Wilkes Oct. 1985 416 p
(AD-A165118) Avail: NTIS HC A18/MF A01 CSCL 22/2

This report offers technical comparison of the two United States operational space programs that are based on the capabilities of polar-orbiting environmental satellites. The U.S. Air Force manages and conducts the operations of the Defense Meteorological Satellite Program (DMSP); the National Oceanic and Atmospheric Administration has the same responsibilities with respect to the NOAA Polar-orbiting Operational Environmental Satellite (POES) program. The report examines the major missions and goals of the two programs, the management and operational procedures that they follow, and the support they extend to each other and to other Federal agencies. Detailed discussions are provided about the specifications and performance characteristics of the spacecraft, sensors, onboard systems, command and control systems, and communications systems employed by the two programs. An extensive relative analysis of the operation and uses of the DMSP and POES imaging and atmospheric sounding instruments is provided. Other sensors and systems are discussed, as is the joint agreement between DOD and NOAA for sharing their satellite data and data processing load. Nonmeteorological users of DMSP and POES data are described. The organization and content of the satellite data archive are presented. Near-future system improvements and longer-term mission requirements are also discussed. Author (GRA)

N86-27414# National Oceanic and Atmospheric Administration, Washington, D. C.
NOAA SATELLITE REQUIREMENTS FORECAST Final Report
D. Cotter, L. Fisher, D. Montgomery, T. Pyle, and F. Zbar May 1985 119 p
(AD-A165244) Avail: NTIS HC A06/MF A01 CSCL 22/2

Environmental satellites have been an essential component of NOAA's global observing system for 25 years. This report offers a projection of NOAA's requirements for satellite data and services covering the next 15 years. These requirements derive from the mission responsibilities of NOAA's public service and research agencies; the National Weather Service, the National Ocean Service, the National Marine Fisheries Service, and the Office of Oceanic and Atmospheric Research. The National Environmental Satellite, Data, and Information Service operates the Polar-orbiting Operational Environmental Satellite (POES) and Geostationary Operational Environmental Satellite (GOES) systems and provides data archive and distribution services to the public and private sectors. The satellite support needed to help meet their mission goals through the end of this century are presented as they have been identified by each agency. The requirements specified in this report will be a major factor in the long-range planning for NOAA's future satellite programs.
Author (GRA)

N86-27415# Kayser Threde G.m.b.H., Munich (West Germany). Inst. fuer Plasmaforschung.
ANTHRORACK PHASE A STUDY. VOLUME 3: EXECUTIVE SUMMARY Final Report
P. Rank, comp. and W. Bangert, comp. Paris ESA 1 Feb. 1985 192 p Prepared in cooperation with SNIAS, St. Medard-en-Jalles, France, Compagnie Industrielle Radioelectrique, Gals, Switzerland and Energy Research Laboratory
(Contract ESA-5916/84-F-FL(SC))
(AN-RP-0000-01B-KT-Vol-3; ESA-CR(P)-2111-Vol-3; ESA-86-96646) Avail: NTIS HC A09/MF A01

Technical concepts, mission scenarios, project planning, and mission assurance of Anthrorack, a Spacelab human physiology facility, are summarized.
ESA

N86-27320*# Thermo-Systems, Inc., Minneapolis, Minn.
GAS EJECTION SYSTEM OVERVIEW AND DESIGN ENHANCEMENTS
Pat Miller *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 185-190 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27323*# Thermo-Systems, Inc., Minneapolis, Minn.
STRUCTURAL INTEGRITY OF GAS EJECTION SYSTEM
Mark Cascia *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 231-236 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27328*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GLOMR SATELLITE PAYLOAD G-308
In its The 1985 Get Away Special Experimenter's Symposium May 1986 p 285-291 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27645*# Naples Univ. (Italy).
TETHERED CONSTELLATIONS, THEIR UTILIZATION AS MICROGRAVITY PLATFORMS AND RELEVANT FEATURES
Luigi G. Napolitano and Franco Bevilacqua (Aeritalia S.p.A., Torino (Italy).) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 2 Jun. 1986 p 65-77 Previously announced in IAA as A85-13279 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27646*# Alabama Univ., Huntsville.
ARTIFICIAL OR VARIABLE GRAVITY ATTAINED BY TETHER SYSTEMS
Charles A. Lundquist *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 79-86 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27647*# Martin Marietta Corp., Denver, Colo.
TETHERED ORBITAL REFUELING STUDY
Dale A. Fester *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 89-123 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27648*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TETHERS AND GRAVITY IN SPACE
Paul A. Penzo *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 125-135 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27658*# Contraves Italiana, Rome.
COMLINK PROPOSAL FOR FUTURE MISSIONS OF TETHERED SATELLITE
Filippo Sciarrino *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 387-398 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27659*# Aeritalia S.p.A., Torino (Italy). Gruppo Sistemi Spaziali.
TETHERED ELEVATOR AND PLATFORMS AS SPACE STATION FACILITIES: SYSTEMS STUDIES AND DEMONSTRATIVE EXPERIMENTS
In NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 413-455 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

N86-27660*# California Univ., La Jolla. Space Inst.
ROLES FOR TETHERS ON AN EVOLVING SPACE STATION
Joseph A. CArroll *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 457-472 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-27385# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
INTEGRATED SENSOR AND ACTUATOR SYSTEM FOR FLEXIBLE SPACE STRUCTURE EXPERIMENTS
Th. Lange and H. Holzach *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 217-220 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-27416*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.

ADVANCED ELECTRIC PROPULSION AND SPACE PLASMA CONTACTOR RESEARCH Annual Report, 1 Oct. 1984 - 1 Jan. 1986
Paul J. Wilbur Jan. 1986 151 p
(Grant NGR-06-002-112)
(NASA-CR-175119; NAS 1.26:175119) Avail: NTIS
HC A08/MF A01 CSCL 21C

A series of experiments performed on an 8 cm dia. ring cusp magnetic field ion thruster are described. The results show the effects of anode and cathode position and size, ring cusp axial location and discharge chamber length on plasma ion energy cost and extracted ion fraction. Thruster performance is shown to be improved substantially when optimum values of these parameters are used. Investigations into the basic plasma phenomena associated with the process of plasma contacting are described. The results show the process of electron collection from a background plasma to a hollow cathode plasma contactor exhibits a higher impedance than the process of electron emission from the hollow cathode. The importance of having cold ions present to facilitate the plasma contacting process is shown. Results of experiments into the behavior of hollow cathodes operating at high interelectrode pressures (up to approx. 100 Torr) on nitrogen and ammonia are presented. They suggest that diffuse emission from the insert of a hollow cathode can be sustained at high interelectrode pressures if the cathode is made of non-conducting material and the cathode internal pressure is reduced by evacuating the cathode interior. A theoretical model of discharge chamber operation developed for inert gas thrusters is extended so it can be used to evaluste the performance of mercury ion thrusters. Predictions of the model are compared to experimental results obtained on two 30 cm dia. thrusters. Author

N86-27417*# Wyle Labs., Inc., Huntsville, Ala.
SIGNAL DETECTION TECHNIQUES FOR DIAGNOSTIC MONITORING OF SPACE SHUTTLE MAIN ENGINE TURBOMACHINERY Final Report
Thomas Coffin and Jen-Yi Jong Feb. 1986 178 p
(Contract NAS8-34961)
(NASA-CR-178851; NAS 1.26:178851; TR-66938-01) Avail: NTIS
HC A09/MF A01 CSCL 21H

An investigation to develop, implement, and evaluate signal analysis techniques for the detection and classification of incipient mechanical failures in turbomachinery is reviewed. A brief description of the Space Shuttle Main Engine (SSME) test/measurement program is presented. Signal analysis techniques available to describe dynamic measurement characteristics are reviewed. Time domain and spectral methods are described, and statistical classification in terms of moments is discussed. Several of these waveform analysis techniques have been implemented on a computer and applied to dynamc signals. A laboratory evaluation of the methods with respect to signal detection capability is described. A unique coherence function (the hyper-coherence) was developed through the course of this investigation, which appears promising as a diagnostic tool. This technique and several other non-linear methods of signal analysis are presented and illustrated by application. Software for application of these techniques has been installed on the signal processing system at the NASA/MSFC Systems Dynamics Laboratory. Author

N86-27418*# Sverdrup Technology, Inc., Cleveland, Ohio.
CHARACTERIZATION OF REAL GAS PROPERTIES FOR SPACE SHUTTLE MAIN ENGINE FUEL TURBINE AND PERFORMANCE CALCULATIONS Final Report
Gary J. Harloff Jun. 1986 97 p
(Contract NAS3-24105)
(NASA-CR-175066; E-2938; NAS 1.26:175066) Avail: NTIS
HC A05/MF A01 CSCL 21H

Real thermodynamic and transport properties of hydrogen, steam, the SSME mixture, and air are developed. The SSME mixture properties are needed for the analysis of the space shuttle main engine fuel turbine. The mixture conditions for the gases, except air, are presented graphically over a temperature range from 800 to 1200 K, and a pressure range from 1 to 500 atm. Air properties are given over a temperature range of 320 to 500 K, which are within the bounds of the thermodynamics programs used, in order to provide mixture data which is more easily checked (than H2/H2O). The real gas property variation of the SSME mixture is quantified. Polynomial expressions, needed for future computer analysis, for viscosity, Prandtl number, and thermal conductivity are given for the H2/H2O SSME fuel turbine mixture at a pressure of 305 atm over a range of temperatures from 950 to 1140 K. These conditions are representative of the SSME turbine operation. Performance calculations are presented for the space shuttle main engine (SSME) fuel turbine. The calculations use the air equivalent concept. Progress towards obtaining the capability to evaluate the performance of the SSME fuel turbine, with the H2/H2O mixture, is described. Author

N86-27419*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
IMPROVEMENT OF ION THRUSTER DESIGN Final Report
Raymon T. Carpenter 1986 139 p
(Grant NAG3-206)
(NASA-CR-177223; NAS 1.26:177223) Avail: NTIS
HC A07/MF A01 CSCL 21C

Two types of measurements were performed on ion thrustors equipped with SmCo magnets in either ring cusp or line cusp arrangements. Langmuir probes were used to measure plasma potential, electron density, and electron temperture in all regions inside the thruster. Loss fluxes to various surfaces were determined by measuring the currents to foils attached to or imbedded in the surface. Data were obtained for several sets of discharge voltages and currents. The loss currents were determined from current vs voltage characteristics observed on a transistor curve tracer oscilloscope. Both ion and electron currents were measured to all parts of the walls and to all parts of the cathode assembly using collecting plates. These measurement were also made for various parameter sets. In line cusp configuration the plasma density is essentially as predicted by existing calculations. In the ring cusp arrangement the interior of the plasma contains an inhomogeneous and relatively large magnetic field so the geometry is decidely two-dimensional and the models of Self (1967) and of Kino and Sham (1966) do not agree. B.G.

N86-27420# Weather Squadron (2nc), Patrick AFB, Fla. Detachment 11.
THE ROCKET EXHAUST EFFLUENT DIFFUSION MODEL Final Report
Clint Bowan 3 Jul. 1985 19 p
(AD-A164963; Rept-2WS/CP-85/006) Avail: NTIS
HC A02/MF A01 CSCL 20/4

Described are the purpose, historical development, program components, and output of NASA's Rocket Exhaust Effluent Diffusion Model (REEDM). GRA

N86-27421# Naval Postgraduate School, Monterey, Calif.
PARTICLE SIZING IN A SOLID-PROPELLANT ROCKET MOTOR USING SCATTERED LIGHT MEASUREMENTS M.S. Thesis
John S. Rosa Dec. 1985 90 p
(AD-A165017) Avail: NTIS HC A05/MF A01 CSCL 21/8

An experimental investigation was performed to determine, in situ, the change in mean particle size across the exhaust nozzle of a small metallized solid-propellant rocket motor. Light scattering profiles were recorded at both the exhaust and the entrance of the nozzle. The experiment method used provided excellent results within the exhaust. However, combustion light at the wavelength of the transmitted light hampered light scattering measurements within the motor. Particle size measurements were consistent with the sizes found in the collected exhaust products. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-27422# Naval Research Lab., Washington. D. C.
SECONDARY FREE RADIAL INTERMEDIATES IN THE SYNTHESIS OF 2-METHYL-6-NITROINDAZOLE Interim Report, Nov. 1984 - Nov. 1985
J. H. Boyer, M. D. Pace, P. Pagoria, T. P. Pillai, and D. Stec 10 Mar. 1986 14 p
(AD-A165042; NRL-MR-5736) Avail: NTIS HC A02/MF A01 CSCL 07/3

Four distinct free radical intermediates were detected by electron spin resonance (e.s.r) spectroscopy during the spontaneous conversion of an isomeric mixture of 2,4 and 3,4-dinitro-N,N-dimethylbenzylamine to 2-methyl-6-nitroindazole. These spectra include an iminoxyl radical, R-N=N-O. (not reproducible); a dimethylnitroxyl radical, (CH3)2NO. (reproducible); and two structurally unidentified radicals (also reproducible). Free radical intermediates were detected only when the reaction was started by nitrating 4-nitro-N,N-dimethylbenzylamine. No free radicals were detected when the reaction was started by mixing separately prepared 2,4 and 3,4-dinitro-N,N-dimethyl-benzylamine. (3,4-dinitro-N,N-dimethylbenzylamine alone does not convert to 2-methyl-6-nitroindazole). GRA

N86-27423# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PHYSICOCHEMICAL MECHANICS OF MATERIALS (SELECTED ARTICLES)
V. F. Sarabeyev, S. M. Perlin, G. K. Shreyber, V. N. Kestelman, and L. N. Magazinova 5 Mar. 1986 12 p Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (USSR), no. 4, Jul. - Aug. 1971 p 88-90
(AD-A165518; FTD-ID(RS)T-1273-85) Avail: NTIS HC A02/MF A01 CSCL 11/9

This report includes the following articles: (1) The problem of the Classification of Stresses in Reinforced Plastics - No clearly-defined classification of stresses arising in the area of reinforced plastics exists at the present time. These stresses have the most diverse types of names: internal, residual, initial, intrinsic, thermo-structural, structural, optical. When becoming familiar with the research done by investigator of different schools, it is difficult to know precisely which stresses they are addressing. It is expedient to make use of only two terms: transient and residual stresses. Stresses disappearing in a material, stock, or structure after elimination of the causes of their arising must be called transient stresses. Residual stresses are those which are maintained after the removal of the causes of their appearance. (2) Investigation of the Creep of a Polycarbonate in Corrosive Environments - The polycarbonate is one of the new polymeric materials promising for industry, but its physical and mechanical properties and its exploitation properties have not been sufficiently studied. Macrolon (West Germany) and Diflon K (USSR) polycarbonates are used in Soviet industry. We raised the problem of investigating the creep an the long-term stability of makrolon and Diflon k in corrosive environments. GRA

N86-27424# Lawrence Livermore National Lab., Calif.
SOME APPLICATIONS OF MICROANALYTICAL ELECTRON MICROSCOPY IN MATERIALS RESEARCH
G. Thomas Oct. 1985 36 p Presented at the 1st Conference and Exhibition on Instrumental Analysis, Beijing, China, 18 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE86-005214; LBL-20224; CONF-8511149-1) Avail: NTIS HC A03/MF A01

Electron microscopy has made extraordinary progress over the past 30 years and has become an indispensible tool for research in materials science. In this paper a review is given of some applications of microdiffraction and microanalysis in our current materials science research projects at the University of California, Berkeley. The following topics were discussed. (1) The problem of solute atom partitioning in steels; this includes the difficulties of measuring carbon contents and methods of utilizing diffraction, lattice imaging, energy dispersive X-ray (EDXS) and electron energy loss (EELS) spectroscopies and atom probe analysis will be illustrated. (2) Utilization of CBED and EDXS techniques in zirconia ceramics research (3) Applications of CBED to the study of gamma Fe2O3 particles used in magnetic recording systems. (4) Applications of CBED and EDXS to rare earth permanent magnets. (5) Channelling enhanced microanalysis.DOE

N86-27321*# Swedish Space Corp., Stockholm.
AN ADVANCED MATERIAL SCIENCE PAYLOAD FOR GAS
R. Joensson, S. Wallin, and K. Loeth *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 191-217 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

24 COMPOSITE MATERIALS

Includes laminates.

N86-27425# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.
IMPACT DAMAGE TO COMPOSITE STRUCTURES
Feb. 1986 40 p
(AGARD-R-729; ISBN-92-835-1517-X) Avail: NTIS HC A03/MF A01

The impact of ballistic penetrators in fuel filled tanks generates high dynamic pressure loading. This damage process is generally referred to as hydraulic ram. Hydraulic ram in aircraft fuel tanks results in large damage of structural components, which in turn can lead to fuel loss or ingestion into the engines, fire and explosion. To determine the effect of hydraulic ram to an integral fuselage fuel tank with carbon/epoxy skin, a firing program was established. Plane carbon/epoxy plates, bolted to an impact box, were impacted with single cuboid fragments. Different shock-absorbing materials used to reduce hydraulic ram pressures on the impact plate, were investigated to prevent propagation of the shock wave. Multiple fragments were projected against the simulated fuel tank sections with carbon/epoxy skins and sandwich design at a hit density of 25 fragments per square meter. Author

N86-27426*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE CORRELATION OF LOW-VELOCITY IMPACT RESISTANCE OF GRAPHITE-FIBER-REINFORCED COMPOSITES WITH MATRIX PROPERTIES
Kenneth J. Bowles 1986 24 p Presented at the 8th Symposium on Composite Materials Testing and Design, Charleston, S. Car., 29 Apr. - 1 May 1986; sponsored by the American Society for Testing and Materials
(NASA-TM-87337; E-3084; NAS 1.15:87337) Avail: NTIS HC A02/MF A01 CSCL 11D

Summarized are basic studies that were conducted to correlate the impact resistance of graphite-fiber-reinforced composites with polymer matrix properties. Three crosslinked epoxy resins and a linear polysulfone were selected as composite matrices. As a group, these resins possess a significantly large range of mechanical properties. The mechanical properties of the resins and their respective composites were measured. Neat resin specimens and unidirectional and crossply composite specimens were impact tested with an instrumented dropweight tester. Impact resistances of the specimens were assessed on the basis of loading capability, energy absorption, and extent of damage. Author

N86-27427*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
FRACTURE SURFACE ANALYSIS IN COMPOSITE AND TITA-

NIUM BONDING Annual Report
T. A. DeVilbiss and J. P. Wightman Apr. 1986 14 p refs
(Grant NAG1-343)
(NASA-CR-177271; NAS 1.26:177271) Avail: NTIS
HC A02/MF A01 CSCL 11D

Carbon fibers were obtained from several manufacturers. Surface treatments were performed on these fibers by anodization. The surfaces of these fibers were analyzed by X-ray photoelectron spectroscopy and wetting force measurement. The breaking strength of these fibers was measured at 2.5 cm length. It was seen that the surface treatments reduces the strength of the fibers. It was also seen that the Hercules fibers had a higher breaking strength than the Union Carbide fibers. Fiber critical length measurements showed no difference in critical lengths between AS-4 and AU-4 fibers embedded in polysulfone. However, the fiber lengths were much shorter for the surface treated fibers. This effect could be related to increased adhesion between fiber and matrix, or it could be due to the lower breaking strength of the surface treated fiber. Author

N86-27428*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF PARTIAL INTERLAMINAR BONDING ON IMPACT RESISTANCE AND LOADED-HOLE BEHAVIOR OF GRAPHITE/EPOXY QUASI-ISOTROPIC LAMINATES
Walter Illg Jul. 1986 48 p refs
(NASA-TM-87678; L-16088; NAS 1.15:87678) Avail: NTIS
HC A03/MF A01 CSCL 11D

A partial-bonding interlaminar toughening concept was evaluated for resistance to impact and for behavior of a loaded hole. Perforated Mylar sheets were interleaved between all 24 plies of a graphite/epoxy quasi-isotropic lay-up. Specimens were impacted by aluminum spheres while under tensile or compressive loads. Impact-failure thresholds and residual strengths were obtained. Loaded-hole specimens were tested in three configurations that were critical in bearing, shear, or tension. Partial bonding reduced the tensile and compressive strengths of undamaged specimens by about one-third. For impact, partial bonding did not change the threshold for impact failure under tensile preload. However, under compressive preload, partial bonding caused serious degradation of impact resistance. Partial bonding reduced the maximum load-carrying capacity of all three types of loaded-hole specimens. Overall, partial bonding degraded both impact resistance and bearing strength of holes. Author

N86-27429*# Missouri Univ., Rolla. Dept. of Engineering Mechanics.
FINITE ELEMENT ANALYSIS OF END NOTCH FLEXURE SPECIMEN Final Report
S. Mall and N. K. Kochhar May 1986 21 p
(Grant NAG1-425)
(NASA-CR-178113; NAS 1.26:178113) Avail: NTIS
HC A02/MF A01 CSCL 11D

A finite element analysis of the end notch flexure specimen for mode II interlaminar fracture toughness measurement was conducted. The effect of friction between the crack faces and large deflection on the evaluation of G sub IIc from this specimen were investigated. Results of this study are presented in this paper. Author

N86-27430# Army Materials and Mechanics Research Center, Watertown, Mass.
CAUSES OF DELAMINATION FAILURES OF KEVLAR/EPOXY LAMINATES USED IN HARDENED ARMY TACTICAL SHELTERS Final Report
William W. Houghton and Margaret E. Roylance Dec. 1985 28 p
(AD-A165507; MTL-TR-85-36) Avail: NTIS HC A03/MF A01
CSCL 13/13

A series of chemical, mechanical, and physical tests were performed on Kevlar/epoxy laminates to determine the cause of failure in a structure which had undergone extensive delamination during a simulated solar load test. The results of these tests indicated that improper fabrication procedures caused microcracking at the fiber matrix interface which made the material particularly susceptible to invasion by environmental moisture and subsequent delamination at elevated temperatures. The material was also found to have been undercured by approximately 30%. Acting on recommendations resulting from this study, the fabricator was able to eliminate the microcracking and significantly increase the degree of cure in the laminates. Preliminary measurements of the effect of moisture on the mechanical properties of the laminate suggested that design properties of the material should be determined at elevated temperature and humidity. Author (GRA)

N86-27500# Joint Publications Research Service, Arlington, Va.
ALUMINUM-GRAPHITE COMPOSITE MATERIALS STUDIED
Lida Liang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 194-199 Transl. into ENGLISH from Dalian Gongxueyuan Xuebao (Dalian, China), v. 24, no. 3, Sep. 1985 p 109-112 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography, combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-27431* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPILLAGE DETECTOR FOR LIQUID CHROMATOGRAPHY SYSTEMS Patent
Michael J. Jarvis (Illinois Univ., Urbana) and Donald S. Fulton, inventors (to NASA) Issued 27 May 1986 12 p Filed 23 Mar. 1983 Supersedes N83-29325 (21 - 18, p 2890) Sponsored by NASA. Johnson Space Center
(NASA-Case-MSC-20206-1; US-Patent-4,591,838;
US-Patent-Appl-SN-478129; US-Patent-Class-340-605;
US-Patent-Class-200-61.05; US-Patent-Class-141-198) Avail: US Patent and Trademark Office CSCL 07D

A spillage detector device for use in conjunction with fractionation of liquid chromatography systems which includes a spillage recieving enclosure beneath the fractionation area is described. A sensing device having a plurality of electrodes of alternating polarity is mounted within the spillage recieving enclosure. Detection circuitry, responsive to conductivity between electrodes, is operatively connected to the sensing device. The detection circuitry feeds into the output circuitry. The output circuit has relaying and switching circuitry directed to a solenoid, an alarm system and a pump. The solenoid is connected to the pliable conduit of the chromatography system. The alarm system comprises an audio alarm and a visual signal. A 115-volt power system interconnected with the pump, the solenoid, the sensing device, and the detection and output circuitry. NASA

N86-27432*# Alabama Univ., Huntsville. Dept. of Chemistry.
OSTWALD RIPENING THEORY. Final Report, 3 Oct. 1984 - 1 Jun. 1986
James K. Baird 1 Jun. 1986 84 p
(Contract NAS8-35986)
(NASA-CR-178860; NAS 1.26:178860; UAH-RR-514) Avail: NTIS
HC A05/MF A01 CSCL 07D

The Ostwald-ripening theory is deduced and discussed starting from the fundamental principles such as Ising model concept, Mayer cluster expansion, Langer condensation point theory, Ginzburg-Landau free energy, Stillinger cutoff-pair potential, LSW-theory and MLSW-theory. Mathematical intricacies are reduced to an understanding version. Comparison of selected works, from 1949 to 1984, on solution of diffusion equation with and without sink/sources term(s) is presented. Kahlweit's 1980 work and Marqusee-Ross' 1954 work are more emphasized. Odijk and Lekkerkerker's

1985 work on rodlike macromolecules is introduced in order to simulate interested investigators. Author

N86-27433*# Alabama Univ., Huntsville. Dept. of Chemistry.
OSTWALD RIPENING THEORY Quarterly Report, 1 Apr. - 30 Jun. 1985
James K. Baird 1985 10 p
(Contract NAS8-35986)
(NASA-CR-178862; NAS 1.26:178862) Avail: NTIS HC A02/MF A01 CSCL 07D

An approximate analytical technique for extracting the concentration dependence of the interdiffusion coefficient was derived from diffusion measurements carried out with the diaphragm cell. The systematic error incurred in using the technique was estimated and found to be no greater than the random error ordinarily encountered in these experiments. Author

N86-27434*# California Univ., San Diego.
FLAME PROPAGATION AND EXTINCTION IN PARTICLE CLOUDS Final Technical Report, 2 Jan 1984 - 31 Aug. 1985
A. L. Berlad and N. D. Joshi Jan. 1986 7 p
(Grant NAG3-473)
(NASA-CR-177304; NAS 1.26:177304) Avail: NTIS HC A02/MF A01 CSCL 21B

Two phase flame propagation and extinction theory required to support the corresponding experiments planned for the space shuttle is being developed. Also being planned are specialized collaborative, experimental and theoretical NASA UCSD studies needed to support the ongoing definition of needed experimental hardware, experimental procedures, data acquisition philosophy, and other ground based support activities required to assure the success of space shuttle based experiments concerned with combustion of clouds of particulates at reduced gravitational conditions. The further development of relations delineating premixed particle cloud and premixed gaseous systems as well as burner stabilized and freely propagating flame systems is considered. E.R.

N86-27435# National Aeronautical Lab., Bangalore (India). Materials Science Div.
ELECTRONIC PROPERTIES OF CERIUM AND THE KINDO VOLUME-COLLAPSE MODEL
T. G. Ramesh and V. Shubha Mar. 1986 21 p
(NAL-TM-MT-8604) Avail: NTIS HC A02/MF A01

New data on the thermoelectric and resistivity behaviour of cerium across the isostructural gamma-alpha phase transition is reported. These high resolution data provide a more precise location of the critical point in the P-T plane. The recently developed Kondo volume collapse model has been highly successful in providing a semiquantitative description of the gamma-alpha transition. It is shown here that the anomalies in the transport properties can be explained within the same framework. Author

N86-27436# Naval Surface Weapons Center, Silver Spring, Md.
DYNAMIC COMPACTION OF POROUS BEDS Progress Report, May 1981 - Dec. 1984
H. W. Sandusky and T. P. Liddiard 26 Dec. 1985 53 p
(AD-A164883; NSWC/TR-83-246) Avail: NTIS HC A04/MF A01 CSCL 08/13

During the build-up of deflagration-to-detonation transition (DDT) in porous energetic materials, there is increasing dynamic compaction of the porous bed, which in turn affects the DDT build-up. To simulate the various pressures and pressurization rates that occur during DDT, a study of dynamic compaction was conducted with several different experimental arrangements, each designed to avoid direct ignition of the porous material by hot combustion products as in DDT. From those experiments, unreactive Hugoniot data were obtained for porous beds of three inert materials and a variety of energetic materials. GRA

N86-27437# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
SUMMARY ABSTRACT: ANALYSIS OF CHEMICAL BONDING IN TiC, TiN, AND TiO USING SECOND-PRINCIPLES BAND STRUCTURES FROM PHOTOEMISSION DATA
Sehun Kim and R. S. Williams 28 Feb. 1986 3 p
(Contract N00014-83-K-0612)
(AD-A165053; TR-10) Avail: NTIS HC A02/MF A01 CSCL 20/8

This investigation was motivated in part by the observation that the empirical pseudopotential calculations of the TiC electronic structure produced valence electron densities that disagree severely with those obtained from first-principles calculations. The intent of this study was to see if the mixed-basis band structure interpolation scheme (MBBSIS) could be used to obtain reliable band structures and charge densities for more complex systems, such as TiC, TiN, and TiO. GRA

N86-27438# Battelle Columbus Labs., Ohio.
RETENTION KINETICS OF SOLID PARTICULATES ON SOLID SURFACES Special Publication, Jun. 1983 - Feb. 1984
Barton E. Dahneke Jan. 1986 42 p
(Contract DAAG29-81-D-0100; DA Proj. 1L1-62706-A-553)
(AD-A165130; CRDC-SP-84021) Avail: NTIS HC A03/MF A01 CSCL 13/11

When fiber filters are used in the aerosol filtration process, aerosol particles collide with the fibers and are captured on their surfaces. For the filtration process to be effective, the particles must be retained on the surface of the fiber. Although particle retention is recognized as an important aspect of filtration, the process has not been adequately addressed by theory and experiment, and no model of the process has been adequately incorporated into the principles of filter design. This report surveys the presently available information in the area of retention kinetics, which deals with particle/surface interactions and describes the conditions required for the retention or rebound of particles on or from surfaces. Knowledge gaps are identified in the areas of adhesion energy and force models, dynamic particle/surface interaction models, and experimental data. Recommendations are made for dynamic model development, coordinated experimental testing, and improvements in filter design. GRA

N86-27439# Sandia National Labs., Albuquerque, N. Mex.
FLOW AND MIXING STRUCTURES IN BLUFF-BODY STABILIZED GAS FLAMES
M. Namazian (Acurex Corp., Mountain View, Calif.), J. Kelly, R. W. Schefer, S. C. Johnston, and M. B. Long (Yale Univ., New Haven, Conn.) Jan. 1986 17 p Presented at the International Gas Research Conference, Toronto, Canada, 8 Sep. 1985 Prepared in cooperation with Sandia National Labs., Livermore, Calif.; Yale Univ., New Haven, Conn.
(Contract DE-AC04-76DR-00789)
(DE86-005648; SAND-85-8864; CONF-8509229-1) Avail: NTIS HC A02/MF A01

The mixing and combustion process has been studied in a bluff-body stabilized, nonpremixed flame using direct flame photography and planar flow visualization. The burner consisted of a central jet of CH4 and an outer coflowing air stream. Direct flame photography was used to study the effects of fuel and air flowrate on the global characteristics of the flame. Planar flow visualization techniques using Mie scattering from seed particles added to the fuel jet and Raman scattering from CH4 provided information on the interaction between turbulent mixing and combustion chemistry. The results show that the flow is highly three dimensional. Roll-up structures, which form randomly, are evident on the fuel and combustion air boundaries. Stabilization of the flame is dominated by large-scale turbulent mixing structures which are irregular and time-varying. DOE

N86-27440# Battelle Pacific Northwest Labs., Richland, Wash.
SUPERCRITICAL FLUID EXTRACTION OF PARTICULATE AND ADSORBENT MATERIALS Report, Feb. 1984 - Jan. 1985
B. W. Wright and R. D. Smith Mar. 1986 79 p Sponsored by EPA and DOE
(PB86-175999; EPA/600/4-86/017) Avail: NTIS HC A05/MF A01 CSCL 13B

A summary is presented of work on the extraction of semivolatiel organic materials (SVOCs), for example, polynuclear aromatic compounds, from various adsorbents and environmental matrices, using supercritical fluids (SCFs) as extractants. The results show that supercritical fluids are effective extractants for many SVOCs, and are often competitive with conventional Soxhlet extraction. Advantages of SCFs over conventional methods include higher extraction efficiency, more rapid extraction, and reduced decomposition of thermally labile compounds. GRA

N86-27441# Case Western Reserve Univ., Cleveland, Ohio.
RATE CONSTANTS FOR POLYMETHYLETACRYLATE DIFFUSION FLAME USING A SEMI-GLOBAL REACTION MODEL Final Report
N. A. Messaoudene and J. S. Tien Feb. 1986 59 p Sponsored by NSB, Gaithersburg, Md.
(PB86-171089; NBS/GCR-86/508) Avail: NTIS HC A04/MF A01 CSCL 21B

A numerical study of the combustion and extinction in the stagnation point boundary layer of a condensed fuel (PMMA) has been performed using a three-step semi-global reactions model. In the first step considered, fuel is oxidized to form carbon monoxide and water vapor. In the second, carbon monoxide is oxidized to form carbon dioxide, and in the reaction, carbon dioxide decomposes into carbon monoxide and oxygen, which is the reverse of the second reaction. The governing equations were transformed into a set of ordinary differential equations through a similarity variable. Fictitious unsteady terms were added to the ordinary differential equations and the resulting equations were solved numerically using an explicit scheme for the fictitious unsteady terms. Use has been made of Howard, et. al., kinetics constants for the forward reaction of CO (second reaction), and constants calculated from equilibrium considerations for the backward reaction (third reaction). Comparing the extinction results with experimental data, good agreement was found for B sub F = 4.43 x 10 to the 13th power cu ml/gmole.sec. and E sub F = 32000 cal/mole, which are respectively the preexponential factor and the activation energy for the rate of the first reaction. Author (GRA)

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-27442 British Library Lending Div., Boston Spa (England).
DEVELOPMENTS AND TRENDS IN THE USE OF HIGH-TENSILE AND HIGH-STRENGTH MATERIALS
K. Kussmaul (Stuttgart Univ., West Germany) Jun. 1986 71 p Transl. into ENGLISH from "Fortschritte und Entwicklungstendenzen Beim Einsatz Hochzaeher und Hochfester Werkstoffe" Stuttgart, West Germany
(BLL-Risley-TR-5288-(9091.9F)) Avail: British Library Lending Div., Boston Spa, Engl.

Yield point is used to determine strength calculations in applied design principles in nuclear engineering. It was suggested that other toughness characteristics be used to determine strength calculations. Especially cracked components of non-austenitic steels with a predominately static load were examined. A calculation factor W can be introduced into the equations in the design code, which enables the wall thickness to be determined as a function of toughness if sufficient precise information is available on the mechanical, thermal, and corrosive loadings as well as the weldability. This is best done using a nomogram, in which the wall thickness factor is plotted as a function of impact toughness. Fractomechanical characteristics can be determined by means of crack resistance curves for crack initiation and resistance against further tearing and possibly even for load-controlled instability. B.G.

N86-27443# National Aeronautical Lab., Bangalore (India). Materials Science Div.
STUDIES ON ELECTROLESS NICKEL BATHS
K. S. Rajam and S. R. Rajagopalan Jan. 1986 50 p
(NAL-TM-MT-8601) Avail: NTIS HC A03/MF A01

The feasibility of substituting ammonia in alkaline electroless nickel bath has been investigated. It is shown that ethylene diamine can be used in place of ammonia. However, such a bath has a narrow operating range. It is found that ethanolamines in general and triethanolamine in particular are useful substitutes for ammonia in citrate based alkaline electroless baths. Author

N86-27444*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
THE EVOLUTION AND GROWTH OF Al2O3 SCALES ON BETA-NiAl Ph.D. Thesis. Final Report
Joseph K. Doychak May 1986 242 p
(Grant NAG3-498)
(NASA-CR-175097; NAS 1.26:175097) Avail: NTIS HC A11/MF A01 CSCL 11F

The formation and growth of Al2O3 scales on (beta)-NiAl were studied using electron microscopy and other analytical techniques to gain an understanding of the oxidation properties of (beta)-NiAl and of alumina-forming alloys, in general. The transient and mature stages of oxidation were studied as well as the transformation stage during which the oxide scale transforms from metastable Al2O3 phases to the thermodynamically stable alpha-Al2O3 phase. The transient oxidation stages were studied at 800 deg C and for short times at 1100C. At 800C, the scales consist predominantly of delta-Al2O3 which forms by cation vacancy ordering in the defective spinel lattice of gamma-Al2O3. At 1100C, a fast-growth morphology of theta-Al2O3 forms as a surface layer over delta-Al2O3. For both oxidation temperatures, the scales are often epitaxially oriented with respect to the metal. The transient scales grow by outward cation diffusion as evidenced by surface growth morphologies. The transformation to alpha-Al2O3 occurs within 1 hour at 1100C by a nucleation and radial growth process. The large volume decrease associated with the transformation results in a highly strained alpha-Al2O3 microstructure. A change in scale growth mechanism from outward cation to inward anion diffusion allows transient surface morphologies to be smoothed by surface diffusion. The mature stage of oxidation involves the growth of an alpha-Al2O3 scale having the lacey morphology formed as a result of the gamma yields alpha transformation. Growth of the scale occurs by counterdiffusion along grain boundaries resulting in ridges formed by impingement of alpha-Al2O3 nuclei during the transformation stage. Also scale growth occurs by inward oxygen diffusion through healed cracks; the cracks result from transformation stresses. The measured growth rates of scales having the lacey morphology are an order of magnitude less than fine-grained alpha-Al2O3 scales. Metal orientations were found to have a large effect on oxide morpholoies during all stages of oxidation. Author

N86-27445# Argonne National Lab., Ill.
THIRD ANNUAL REVIEW OF MATERIALS RESEARCH CONFERENCE. CHICAGO SECION OF TMS-AIME, ASBTRACTS
1985 35 p Conference held at Argonne, Ill., 12 Sep. 1985
(Contract W-31-109-eng-38)
(DE86-001407; CONF-850935-Absts) Avail: NTIS HC A03/MF A01

Abstracts of 27 papers presented in five sessions are given. Among the topics covered are the following: high-temperature high strength alloys, phase tranformations in metallic systems, electronic materials, oxide ceramics, and a poster session. DOE

N86-27446# Oak Ridge National Lab., Tenn.
HOT CORROSION OF CHROMIUM IN (LI/SUB 0.62/K/SUB 0.38) SUB 2 CO SUB 3 AT 650 DEG C
H. S. Hsu 1985 28 p Presented at the Corrosion 86, Houston, Tex., 17 Mar. 1986
(Contract DE-AC05-84OR-21400)
(DE86-003091; CONF-860304-2) Avail: NTIS HC A03/MF A01

The hot corrosion of metallic chromium was studied in (Li(sub 0.62)K(sub 0.38))CO carbonate salt at 650 C under prototypical molten carbonate fuel cell environments. With the aid of phase stability diagrams of the Cr-Li-K-C-O system, the corrosion kinetics and scale morphologies were examined. The corrosion process in oxidizing atmospheres was divided into three distinct phases: (1) the formation of liquid corrosion product, chromate, from the reaction of carbonate and chromium, (2) the formation of nonprotective Cr O scale under the liquid corrosion product, and (3) localized hot corrosion in the Cr O scale due to the dry-out of the liquid corrosion product. The corrosion behavior in the oxidizing environment is primarily dependent on the oxygen concentration. Thus, the catastrophic corrosion of chromium with carbonate deposit can be alleviated by lowering the oxygen partial pressure in the gas phase. Very little corrosion was observed when chromium with a carbonate deposit was reached under reducing gas environments. This low corrosion rate of chromium was the result of the scarcity of oxygen in the reducing gas atmosphere. DOE

N86-27447# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
CORROSION OF SELECTED ALLOYS IN EUTECTIC LITHIUM-SODIUM-POTASSIUM CARBONATE AT 900C
R. T. Coyle, T. M. Thomas, and P. Schissel Jan. 1986 26 p
(Contract DE-AC02-83CH-10093)
(DE86-004417; SERI/PR-255-2561) Avail: NTIS HC A03/MF A01

There is an ongoing interest at the US Department of Energy in using molten salts as high temperature sensible heat storage media in advanced solar thermal systems. In this report, the compatibility of selected alloys in eutectic lithium-sodium-potassium carbonate, the salt to be used in the near-term engineering experiments, has been evaluated at 900C. Several combinations of oxidation potential and acidity in the salt were used in the experiments. It was found that the extent of corrosion was dramatically lower for experiments conducted at high oxygen potential compared to experiments at low oxygen potential. For Inconel 600, Hastelloy N, and nickel the results indicated that corrosion rates substantially below 1 mm/year/side might reasonably be expected and that a reevaluation of alloys exhibiting poor corrosion resistance under low oxygen potential would be advisable. DOE

N86-27448# Sandia National Labs., Albuquerque, N. Mex.
CONVECTION SIMULATION IN METAL SOLIDIFICATION
L. A. Bertram and F. J. Zanner 1985 10 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-004605; SAND-85-0702C; CONF-851125-19) Avail: NTIS HC A02/MF A01

In casting and welding of metal alloys, segregation of alloy components on a macroscale can defeat the purposes for which the alloy was chosen and prevent correction by heat treatment. Convection is, of course, a very powerful transporter of molten metal over finite distances during solidification. Mechanisms by which convection can be driven include shrinkage induced pressure gradients, thermal buoyancy, magnetohydrodynamic pumping by electrical currents, and buoyancy due to compositional differences imposed by the alloy's equilibrium phase diagram. The experimental and numerical techniques by which these issues have been studied, including high-speed movies and computer animation, will be described, primarily in the context of the vacuum consumable arc remelting process. DOE

N86-27449# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
ENVIRONMENTAL FACTORS AFFECTING THE CORROSION OF GALVANIZED STEEL
F. H. Haynie Apr. 1986 19 p
(PB86-174075; EPA-600/D-86-061) Avail: NTIS HC A02/MF A01 CSCL 11F

Galvanized steel samples were exposed for periods of up to 30 months at nine air monitoring sites in the St. Louis, Missouri area. Climatic and air quality data were recorded during the exposure periods and were subjected to a rigorous evaluation to eliminate recording errors and to estimate missing values. Weight loss was used as the measure of zinc corrosion on the galvanized steel. Corrosion rate was evaluated with respect to fluxes of pollutants (sulfur oxides, nitrogen oxides, oxidants, and particles) to the galvanized steel during both wet and dry periods, temperature, and amount of rainfall at Lambert field (airport). Different definitions of when the galvanized steel was wet were evaluated to determine the most likely critical relative humidity. A theoretical model of film buildup and dissolution was developed to explain how factors affect corrosion rates. Nonlinear and linear multiple regression techniques were used to determine the statistical significance of each factor. GRA

N86-27305*# Purdue Univ., West Lafayette, Ind.
DESIGN OF AN EXPERIMENT FOR THE PRODUCTION OF A FOAMED TIN SAMPLE
Eric Wernimont *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 57-63
(For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-27450* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SULFONE-ESTER POLYMERS CONTAINING PENDENT ETHYNL GROUPS Patent
Paul M. Hergenrother and Brian J. Jensen, inventors (to NASA) Issued 6 May 1986 8 p Filed 23 May 1984 Supersedes N84-28987 (22 - 19, p 2996) Sponsored by NASA. Langley Research Center
(NASA-Case-LAR-13316-1; US-Patent-4,587,312;
US-Patent-Appl-SN-613139; US-Patent-Class-525-535;
US-Patent-Class-260-544P; US-Patent-Class-525-534;
US-Patent-Class-526-285; US-Patent-Class-528-171;
US-Patent-Class-528-174; US-Patent-Class-528-176) Avail: US Patent and Trademark Office CSCL 11B

Sulfone ester polymers containing pendent ethnyl groups and a direct and multistep process for their preparation are disclosed. The process involves the conversion of a pendent bromo group to the ethynyl group while the direct route involves reacting hydroxy-terminated sulfone oligomer or polymers with a stoichiometric amount of 5(4-ethynyl phenoxy)isophthaloyl chloride. The 5(4-ethynyl phenoxy)isophthaloyl chloride synthesis procedures are also disclosed.

Official Gazette of the U.S. Patent and Trademark Office

N86-27451* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TOUGHENING REINFORCED EPOXY COMPOSITES WITH BROMINATED POLYMERIC ADDITIVES Patent
Zohar Nir, Inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.) and William J. Gilwee, Jr., Inventor (to NASA) Issued 15 Aug. 1985 13 p
(NASA-Case-ARC-11427-2; US-Patent-4,588,778;
US-Patent-Appl-SN-765-980; US-Patent-Class-525-115;
US-Patent-Class-525-119; US-Patent-Class-525-122;
US-Patent-Class-525-108; US-Patent-Class-523-434;
US-Patent-Class-523-445; US-Patent-Class-523-461) Avail: US Patent and Trademark Office CSCL 11B

Cured polyfunctional epoxy resins including tris(hydroxyphenyl) methane triglycidyl ether are toughened by addition of polybrominated polymeric additives having an EE below 1500 to the pre-cure composition. Carboxy-terminated butadiene-acrylonitrile rubber is

optionally present in the pre-cure mixture as such or as a pre-formed copolymer with other reactants. Reinforced composites, particularly carbon-reinforced composites, of these resins are disclosed and shown to have improved toughness.
Official Gazette of the U.S. Patent and Trademark Office

N86-27452*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CHARACTERIZATION OF THE TRIBOLOGICAL COATING COMPOSITION 77 wt % CaF2 - 23 wt % Li F FUSED TO IN-750 ALLOY
Daniel L. Deadmore and Harold E. Sliney Jun. 1986 13 p
(NASA-TM-87342; E-3091; NAS 1.15:87342) Avail: NTIS
HC A02/MF A01 CSCL 11B

A coating composed of 77 wt % CaF2 - 23 wt % LiF fused on IN-750 nickel-based alloy was studied using SEM, XRD, EDX, and optical microscopic methods. The surfaces examined were the as-fused coating with no subsequent treatment, the coating after ultrasonic cleaning in water, and the uncoated polished and etched metal. It was found that the coating reacts during fusion with Ti and Nb rich inclusions in the alloy. Numerous small rectangular crystallites of Ca(Ti,Nb) oxide are formed beneath an overlay of fused fluoride composition. These crystallines are stubby and appear to be embedded in the metal substrate surface. It is known from previous studies that this coating-alloy system has good tribological properties in extreme conditions, such as liquid fluorine. It has been concluded from the present study that the short firmly embedded crystalline protuberances contribute to the coating adherence and thereby to enhanced coating wear life.
Author

N86-27453*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADHESIVE EVALUATION OF THIN FILMS OF LARC-TPI AND LARC-TPI WITH 5 MOL % ODA
Donald J. Progar Jun. 1986 30 p
(NASA-TM-87738; NAS 1.15:87738) Avail: NTIS
HC A03/MF A01 CSCL 11A

A commercially available LARC-TPI film and an experimentally prepared film of LARC-TPI with 5 mol % of 4,4'-oxydianiline (ODA), designated as LARC-TPI/ODA in the report, supplied by Mitsui Toatsu Chemicals, Incorporated (MTCI), Japan, were evaluated as thermoplastic adhesive films for bonding Ti-6Al-4V. The LARC-TPI/ODA had been shown by MTCI to possess more flow than thermoplastic LARC-TPI and was, therefore, evaluated and compared to the LARC-TPI. Lap shear strength was used to evaluate the materials as adhesives. They were characterized after fracture by determining the glass transition temperature, Tg. The mode of failure was also reported. Thermal exposure at 204C for 500 and 1000 hrs and a 72-hour water-boil were conducted on lap shear specimens prepared with the two adhesive films. Lap shear tests were conducted at RT, 177C, 204C, and 232C before and after exposures.
Author

N86-27454# Cornell Univ., Ithaca, N.Y.
METHACRYLAMIDE COPOLYMER RESISTS FOR ELECTRON BEAM LITHOGRAPHY
Y. M. N. Namaste, S. K. Obendorf, and R. Rodriguez 28 Feb. 1986 12 p
(Contract N00014-85-K-0474)
(AD-A165023; TR-2) Avail: NTIS HC A02/MF A01 CSCL 11/9

Polymethacrylamide (PMAAm) and copolymers of MAAm with methyl methacrylate were synthesized and evaluated for their applicability to electron beam lithography. The sensitivity of PMAAm has previously been reported as less than 1 microcurie/sq cm, with thermal stability at temperatures up to 330 C. Despite these claims, further lithographic evaluation of this resist system is apparently absent from the literature. This research was conducted to further investigate the lithographic performance of these resists and to determine their sensitivity using current definitions. Using PMAAm homopolymer with a 15 minute prebake at 200 C, the lithographic results were much poorer than expected. Patterns exposed to doses of 10 microcuries/sq cm or lower could not be developed using water was the developing solvent. Forced developing with Na2SiO3 solution (pH = 10) developed lower doses than water, but much greater thinning as observed. An unexposed thinning of 10% occurred when developing exposures of 15 microcuries/sq cm with water, and 40 microcuires/sq cm with Na2SiO3 solution (20 KV). Swelling of the unexposed polymer and some adhesion problems were observed. Because of the problems encountered with the PMAAm homopolymer during lithography, a series of MMA-MAAm copolymers were synthesized and evaluated as potential resists. These copolymers eliminated the problems of swelling and poor solubility of the homopolymer, but sensitivity enhancement over that of PMMA was minimal. GRA

N86-27455# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CREEP OF THERMOPLASTICS IN AIR AND PHYSIOLOGICAL SOLUTION
G. I. Roitberg, V. N. Kestelman, and R. Z. Rakhimov 14 Feb. 1986 9 p Transl. into ENGLISH from Fiziko-Khimicheskaya Mekhanika Materialov (USSR), no. 5, 1972 p 81-84
(AD-A165030; FTD-ID(RS)T-1272-85) Avail: NTIS
HC A02/MF A01 CSCL 11/9

Creep of polymeric materials has been studied mainly under conditions of static monoaxial tension. We have now established the existence of elastic, resilient-elastic (nonsteady-state) and viscous (steady-state) components of total creep. In this case, the full deformation under constant tensile load and at constant temperature, as well as the duration of load, are interrelated. We studied the creep of polymers under normal conditions in air and in a liquid medium - a physiological solution (0.9% NaCl solution in distilled water) under static bending and pressure. The subjects of the study were polyamide - 12 (P-12), a copolymer of trioxane with dioxalene (STD), fluorinated polymethyl methacrylate (PM-MAF), and molding polyethylene terephtalate (PETF). GRA

N86-27456# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
THE AXIAL COMPRESSIVE STRENGTH OF HIGH PERFORMANCE POLYMER FIBERS Interim Report, Mar. 1982 - Dec. 1984
S. J. DeTeresa Mar. 1985 212 p
(Contract F33615-82-C-5068)
(AD-A165065; AFWAL-TR-85-4013) Avail: NTIS
HC A10/MF A01 CSCL 11/9

An experimental and theoretical study of the axial compressive strengths of high performance polymer fibers is undertaken. Compressive failure of these fibers manifests itself as kink band formation. Techniques permitting the application of small, measurable axial compressive strains to initiate kink banding in fine fibers are introduced. Tensile tests of compressively kinked poly(p-phenylene terephthalamide) (PPTA) fibers reveal only a 10% loss in tensile strength after application of compressive strains much greater than the critical strain required for kink band initiation. The concepts of compressive failure due to elastic microbuckling instabilities in axially compressed extended-chain polymers is proposed. Highly oriented polymer fibers are treated as a laterally interacting collection of fully extended chains. The critical stress required to buckle this collection of chains is calculated to be equal to the minimum longitudinal shear modulus of the fiber. This critical compressive strength is used as a prediction of the limiting value of fiber compressive strength. An excellent linear correlation between axial compressive strength and torsion modulus is measured for four extended-chain polymer fibers and for a graphite fiber. These fibers exhibit compressive strengths equal to approximately one-third of their respective torsion moduli. The relationship between torsion strains and axial normal strains in high performance polymer fibers is also investigated. GRA

N86-27457# Department of the Navy, Washington, D. C.
NONSKID COATING FORMULATIONS Patent Application
Larry W. Kraft and Robert F. Brady, inventors (to Navy) Filed 22 Jan. 1986 15 p
(AD-D012186; US-Patent-Appl-SN-621308) Avail: NTIS

HC A02/MF A01 CSCL 01/5

It is an object of the present invention to provide improved nonskid coating formulations having enhanced impact resistance and resistance to sliding movement thereon by aircraft or other equipment. It is a further object of the invention to provide nonskid coatings which will maintain their adhesion to primed steel after severe impact and thus eliminate the hazards caused by dislodged fragments. Yet another object of the invention is to provide nonskid coatings which are resistant to wear and which provide resistance to sliding throughout their service life by virtue of their coarse textured surface. The nonskid coating formulations of the present invention are comprised of two or more components that contain specified ingredients in specified amounts. The nonskid coating formulation is comprised of the following ingredients, by weight, 3 to 8% amine resins, 7 to 13% epoxy resins, 17 to 22% pigments, fillers, and thickeners, 10 to 20% solvents and 39 to 56% aggregates. GRA

N86-27458# Sandia National Labs., Albuquerque, N. Mex.
MECHANISTIC STUDIES OF POLYSILANE SYNTHESIS BY REDUCTIVE COUPLING OF DICHLOROSILANES
J. M. Zeigler 1985 12 p Presented at the Symposium on Novem Polymerization Mechanisms and Methods, New York, N.Y., 13 Apr. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003716; SAND-85-2538C; CONF-8504190-1) Avail: NTIS HC A02/MF A01

For most applications, the oligomer fraction is of little or no value, so it is desirable to shift the course of the reaction to production of as much linear polymer as possible at the expense of the oligomers. For many applications, these low molecular weight polymers are adequate, but for high precision applications, particularly microlithographic ones, low polydispersity materials with molecular weights above the critical molecular weight for chain entanglement at about 30,000 daltons are needed. Studies of the mechanism of the Na-mediated coupling of dichlorosilanes were carried out. These studies provide a greater understanding of the reaction and lead to improvements in methods which give polysilanes in higher yields, higher molecular weights, and lower polydispersities than previously obtainable. DOE

N86-27459# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
SHIELDING EFFECTIVENESS MEASUREMENTS OF PLASTICS
J. W. Adams and E. J. Vanzura Jan. 1986 33 p
(PB86-183605; NBSIR-85/3035) Avail: NTIS HC A03/MF A01 CSCL 11I

Measurement of shielding effectiveness (SE) of plastic materials may give serious problems due to the insulating nature of many plastics. A method of making these measurements using a flanged coaxial holder overcomes these limitations. GRA

N86-27376# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Technische Physik.
THE PERFORMANCE OF UNBONDED MoS2 FOR SPACE APPLICATIONS
V. Buck *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 155-159 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27377# Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel. Dept. de Recherche et Developpement.
COATINGS AGAINST FRETTING
M. Maillat and H. E. Hintermann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 161-166 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27379# Societe Nationale Industrielle Aerospatiale, Cannes (France).
USE OF MoS2 APPLIED BY PHYSICAL VAPOR DEPOSITION (PVD) ON SPACE MECHANISMS
J. F. Patin, M. Maillat (Centre Suisse de Documentation dans le Domaine de la Microtechnique, Neuchatel.), and H. E. Hintermann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 173-176 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27469# General Dynamics Corp., Groton, Conn. Electric Boat Div.
BEHAVIOR OF ELASTOMERIC MATERIALS UNDER DYNAMIC LOADS, PART 4 Monthly Report
C. A. Caseiro *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 18, No. 1 Jan. 1986 p 3-6 (For primary document see N86-27468 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-27460*# Santa Clara Univ., Calif. Dept. of Mechanical Engineering Research.
RESEARCH AND DEVELOPMENT OF NEAT ALCOHOL FUEL USAGE IN AUTOMOBILES
R. K. Pefley, L. Browning, S. Espanola, B. Pullman, R. Gururangan, and N. Saito Jun. 1984 147 p
(Grant NAG3-143)
(NASA-CR-174813; DOE/NASA/0143-1; NAS 1.26:174813; DOE/NBB-0067; ME84-1) Avail: NTIS HC A07/MF A01 CSCL 21D

The study is an extension of previous work. Its topical coverage ranges from research in the forms of experimental operation of engines in cold chambers and a photochemical smog chamber with allied computer modeling of the thermofluid mechanics of cold engine starting and photochemical smog through engine corrosion and wear studies, to vehicle operation, which includes a description of the engineering development of after-market conversion kits to change Ford Pinto vehicles from gasoline to alcohol. Although further research is recommended, evidence presented contributes positively to the view that it is feasible to operate neat alcohol fleets in the range of 1000-10,000 vehicles, without major operational difficulties and without exacerbating the environmental, health and safety risks associated with petroleum fuels. Author

N86-27461# Monsanto Co., Dayton, Ohio.
PROPERTIES OF AIRCRAFT FUELS AND RELATED MATERIALS Final Report, 15 Feb. 1982 - 31 Jan. 1985
D. S. Duvall, A. D. Snyder, J. Henry, D. J. Lewis, and F. N. Hodgson Aug. 1985 162 p
(Contract F33615-81-C-2035)
(AD-A164532; AFWAL-TR-85-2049) Avail: NTIS HC A08/MF A01 CSCL 21/4

Fuel tests, analyses, and analytical method development were conducted on a number of fuels of an experimental nature in conjuction with ongoing Air Force programs for studying fuel combustion behavior, turbine engine design, and other fuel related technologies. Fuels from conventional and alternate sources were studied, as were fuels of the high density missile propellant type. A wide variety of both physical and chemical properties of the

fuels were measured and are tabulated. Studies conducted to aid in the solution of operational problems are also reported. GRA

N86-27462# University of Southeastern Massachusetts, North Dartmouth.
QUANTITATIVE DETERMINATION OF CORROSION INHIBITOR LEVELS IN JET FUELS BY HPLC Final Report, 18 Jan. - 30 Sep. 1985
Margaret A. Wechter 6 Jan. 1986 31 p
(Contract N00014-85-M-0248)
(AD-A165220) Avail: NTIS HC A03/MF A01 CSCL 21/4

Corrosion inhibitors are mandatory additives which are added to Navy Jet fuels to reduce corrosion of transfer lines and storage tanks. In addition, they are known to enhance lubricity properties of hydro-treated fuels. It is known that, as fuels pass through transfer lines or are stored, the level of corrosion inhibitor present decreases and with this decrease there is a corresponding decrease in both the corrosion protection and the lubricity characteristics of the fuel. Since there are potentially deleterious effects resulting from a decrease in corrosion inhibitor concentrations, a method of quantifying their concentrations was desired in order to be able to make appropriate after market adjustments to fuels. Thus, the ultimate goal of this project was to develop an analytical method to quantitaively determine the amount of corrosion inhibitor present in fuel samples. A secondary goal was to gain more specific experimental evidence regarding the fate of the inhibitors. A method which efficiently extracts nine of the military approved commercial corrosion inhibitors from aircraft turbine fuels and qualitatively and quantitatively determines them by gel permeation chromatography is described. Additive concentration for quantitation ranges between 1 and 35 ppm (V/V). In addition the fate of the corrosion inhibitors at these concentrations in fuel was examined in the presence of steel surfaces, fresh water and sea water. GRA

N86-27463# Brookhaven National Lab., Upton, N. Y.
OVERVIEW OF US CONTRIBUTIONS TO IEA HYDROGEN TECHNOLOGY TASK 4 ELECTROLYTIC HYDROGEN PRODUCTION
A. Mezzina Jun. 1985 6 p Presented at the 4th IEA Task Workshop on Electrolytic Hydrogen Production, Julich, West Germany, 14 Jul. 1985
(Contract DE-AC02-76CH-00016)
(DE86-000026; BNL-36755; CONF-850799-3) Avail: NTIS HC A02/MF A01

US contributions to electrolytic hydrogen production technology research derive largely from the US Department of Energy Chemical/Hydrogen Energy Storage Systems Program. The programmatic rationale, goals and focus, which reflect current US R and D policy and perceptions, are discussed as they influence the substance and pace of the R and D program in Hydrogen Technology. Contributions and future prospects are discussed briefly. DOE

N86-27464# Lawrence Livermore National Lab., Calif.
PEX ENERGETIC LIQUID CARRIERS: ATTEMPTS TO CRYSTALLIZE
K. Scribner and P. Crawford Jun. 1985 17 p
(Contract W-7405-eng-48)
(DE86-003539; UCID-20469) Avail: NTIS HC A02/MF A01

We are developing a Paste Extrudable Explosive (PEX) that can be transferred from a storage location to the point of use by pressure extrusion. We must be capable of making the transfer under all stockpile to target sequence (STS) conditions. The requirements put severe constraints on the liquid carrier portion of the PEX: it must be compatible with the crystalline explosive, it must be an energy source so that the total PEX energy/density is useful, and it must not freeze. The effective low temperature requirement is -35C. We will use a mixture of liquids, all completely soluble in the mixture through the temperature range of interest. With negligible driving force to organize groups of molecules of a particular type, crystallization does not appear. We are thoroughly convinced that we have two such liquid mixtures. This report describes the thermal testing of various liquid and PEX mixtures that convinced us crystallization would not occur. DOE

N86-27465# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
MULTISTAGE METAL HYDRIDE COMPRESSOR
L. K. Heung 1986 14 p Presented at the Solid Storage Science and Engineering Meeting, Los Alamos, N. Mex., 12 Mar. 1986
(Contract DE-AC09-76SR-00001)
(DE86-001965; DP-MS-85-83; CONF-860345-1) Avail: NTIS HC A02/MF A01

Metal hydride compressors can compress hydrogen to high pressures without using mechanical moving parts. They are particularly suited for tritium applications because they require minimal maintenance. A three-stage metal hydride compressor which can compress hydrogen from 14.7 to 20,000 psia has been demonstrated. The design principle and experimental results are presented. DOE

N86-27466# Oak Ridge National Lab., Tenn.
STABILITY AND COMPOSITION OF PALM, COCONUT AND SOY OIL FATTY ACID MICROEMULSION DIESEL FUELS
A. L. Compere, W. L. Griffith, and J. M. Googin 1985 8 p Presented at the 7th Miami International Conference on Alternative Energy Sources, Miami Beach., Fla., 9 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-005017; CONF-851201-10) Avail: NTIS HC A02/MF A01

Microemulsions fuels containing fully and partially coconut, palm, and soy fatty acids; varying amounts of C1 to C4 alcohols varying amounts of water; and four fuel bases were evaluated between O and 60 C for stability as a single phase system. In general, ability to form a stable single phase system rose with increasing alcohol chain length, decreasing water, and increasing dispersed phase content. It was possible to form O to 60 C stable single phase systems in all four fuels tested using 30 to 50% v/v dispersed phase containing 1-butanol and either palm or soy fatty acids. DOE

N86-27374# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PYROTECHNIC VALVES, MINIATURE PYROMECHANISMS, AND PYROTECHNIC NUTS
J. C. Slama *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1935 p 139-143 In FRENCH (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27480# Joint Publications Research Service, Arlington, Va.
ALTERNATIVES TO GASOLINE EXPLORED
I. Irmscher *In its* East Europe Report (JPRS-EER-86-031) 4 Mar. 1986 p 54-63 Transl. into ENGLISH from KFT-Kraftfahrzeugtechnik (East Berlin, East Germany), no. 11, Nov. 1985 p 328-330 (For primary document see N86-27479 18-31)
Avail: NTIS HC A08/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-27467*# National Aeronautics and Space Administration. Pasadena Office, Calif.
OXYGEN CHEMISORPTION CRYOGENIC REFRIGERATOR Patent Application
Jack A. Jones, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena) Filed 24 Apr. 1986 15 p Sponsored by NASA
(NASA-Case-NPO-16734-1-CU; NAS 1.71:NPO-16734-1-CU; US-Patent-Appl-SN-855982) Avail: NTIS HC A02/MF A01 CSCL 13I

The present invention relates to a chemisorption compressor

cryogenic refrigerator which employs oxygen to provide cooling at 60 K to 100 K. The invention includes dual vessels containing an oxygen absorbent material, alternately heated and cooled to provide a continuous flow of high pressure oxygen, multiple heat exchangers for precooling the oxygen, a Joule-Thomson expansion valve system for expanding the oxygen to partially liquefy it and a liquid oxygen collection vessel. The primary novelty of the present invention lies in the provision of a refrigeration system which makes use of reversible chemical reactions with oxygen to provide cooling at 60 K to 100 K. NASA

N86-27468# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 18, NO. 1 Monthly Report
Judith Nagle-Eshleman, ed. Jan. 1986 116 p
(AD-A165726) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Topics addressed include: mechanical systems, analysis and design, structural systems, vehicle systems, biological systems, mechanical components, structural components, electric components, dynamic environment, mechanical properties, and experimentation. Literature review of the behavior of elastomeric material under dynamic loads and rotor instability in centrifugal pumps is also presented. For individual titles, see N86-27469 through N86-27470.

N86-27469# General Dynamics Corp., Groton, Conn. Electric Boat Div.
BEHAVIOR OF ELASTOMERIC MATERIALS UNDER DYNAMIC LOADS, PART 4 Monthly Report c27
C. A. Caseiro *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 18, No. 1 Jan. 1986 p 3-6 (For primary document see N86-27468 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Literature published since 1982 on the behavior of rubber material under sinusoidal forces is reviewed. The most significant advances concern the correlation of dynamic properties and molecular structure. Author

N86-27470# Weir Pumps Ltd., Glasgow (Scotland).
ROTOR INSTABILITY IN CENTRIFUGAL PUMPS Monthly Report c37
D. France *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 18, No. 1 Jan. 1986 p 3-6 (For primary document see N86-27468 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

The literature describing rotor instability phenomena in centrifugal pumps is reviewed. Discussion is confined to subsynchronous instabilities classified according to origin and in terms of the fractional frequency ratio of occurrence. When possible, the underlying mechanisms of the instabilities are described. Author

N86-27471# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 8 Monthly Report
Judith Nagle-Eshleman, ed. Aug. 1985 117 p
(AD-A165115) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Topics adressed include mechanical systems, structural systems, vehicle systems, biological systems, mechanical components, electric components, structural components, analysis and design, dynamic environment, mechanical properties, and experimentation. Literature on noise transmission into propeller aircraft is reviewed. Computer automated failure predictions in mechanical systems are discussed. For individual titles, see N86-27472 through N86-27473.

N86-27472# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
COMPUTER-AUTOMATED FAILURE PREDICTION IN MECHANICAL SYSTEMS UNDER DYNAMIC LOADING Monthly Report c38
C. W. deSilva *In* Shock and Vibration Information Center(Defense), The Shock and Vibration Digest, Volume 17, No. 8, Aug. 1985 p 3-12 (For primary document see N86-27471 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

A computer-automated system for failure prediction in mechanical systems having many components that are functionally and physically interconnected is described. This system consists of three subsystem modules: component failure models developed from available data and procedures; reliability model for the overall mechanical system, developed using functional interrelations and failure models of individual components; and failure diagnostic and model-parameter updating system. The general structures of these three modules and their role in obtaining accurate predictions for time and mode of next failure are discussed. Pertinent background information is provided. Author

N86-27473# Columbia Univ., New York. Dept. of Civil Engineering.
NOISE TRANSMISSION INTO PROPELLER AIRCRAFT Monthly Report c71
R. Vaicaitis *In* Shock and Vibration Information Center(Defense), The Shock and Vibration Digest, Volume 17, No. 8 , Aug. 1985 p 15-20 (For primary document see N86-27471 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Papers and reports, most of which were written since 1981, that are concerned with airborne and structure-borne noise transmission into a propeller-driven aircraft are surveyed. Special attention is given to a new propfan aircraft. Author

N86-27474# MMR Technologies, Inc., Mountain View, Calif.
DEVELOPMENT OF A LOW NOISE 10K JT. REFRIGERATION SYSTEM Final Technical Report
Feb. 1986 12 p
(Contract N00014-85-C-0428)
(AD-A165154) Avail: NTIS HC A02/MF A01 CSCL 13/1

This report summarizes the results of an engineering design program to develop a low noise, closed cycle, Joule-Thomson, microminiature refrigeration system for 10K operation. During this period the effort has been focused on the fabrication of the argon and hydrogen stages of the three stage cooler. A test facility was designed and built which allows one to mount each refrigerator on a separate removable base and to test each in turn. Key to the successful fabrication of the refrigerator is the determination of the proper firing profile for sealing the refrigerator components. Three batches of refrigerators have been built to date, and reasonable yields are now being obtained for the fabrication of these stages. The helium stage has been designed and laid out, and the photomasks prepared. Work has continued on the hydraulically actuated compressor. GRA

N86-27475# Oak Ridge National Lab., Tenn.
DESIGN AND FABRICATION OF THE VACUUM VESSEL FOR THE ADVANCED TOROIDAL FACILITY
K. K. Chipley and G. N. Frey 1985 4 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov., 1985 Prepared in cooperation with Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
(Contract DE-AC05-84OR-21400)
(DE86-003273; CONF-851102-51) Avail: NTIS HC A02/MF A01

The vacuum vessel for the Advanced Toroidal Facility (ATF) is a heavily contoured and very complex formed vessel that is specifically designed to allow for maximum plasma volume in a pure stellarator arrangement. The design of the facility incorporates an internal vessel that is closely fitted to the two helical field coils following the winding law theta = 1/6phi. Metallic seals have been incorporated throughout the system to minimize impurities. The vessel has been fabricated utilizing a comprehensive set of tooling fixtures specifically designed for the task of forming

6-mm stainless steel plate to the complex shape. Computer programs were used to develop a series of ribs that essentially form an internal mold of the vessel. Plates were press-formed with multiple compound curves, fitted to the fixture, and joined with full-penetration welds. DOE

N86-27476# Lawrence Livermore National Lab., Calif.
DESIGN, CONSTRUCTION, AND TESTING OF THE VACUUM VESSEL FOR THE TANDEM MIRROR FUSION TEST FACILITY
J. W. Gerich Nov. 1985 27 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-7405-eng-48)
(DE86-003476; UCRL-92732; CONF-851174-18) Avail: NTIS HC A03/MF A01

In 1980, the US Department of Energy gave the Lawrence Livermore National Laboratory approval to design and build a tandem Mirror Fusion Test Facility (MFTF-B) to support the goals of the National Mirror Program. We designed the MFTF-B vacuum vessel both to maintain the required ultrahigh vacuum environment and to structurally support the 42 superconducting magnets plus auxiliary internal and external equipment. During our design work, we made extensive use of both simple and complex computer models to arrive at a cost-effective final configuration. As part of this work, we conducted a unique dynamic analysis to study the interaction of the 32,000-ton concrete-shielding vault with the 2850-ton vacuum vessel system. To maintain a vacuum of 2 x 10 to the -8 Torr during the physics experiments inside the vessel, we designed a vacuum pumping system of enormous capacity. The vacuum vessel (4200 cu m) has been fabricated, erected, and acceptance tests have been completed at the Livermore site. The rest of the machine has been assembled, and individual systems have been successfully checked. On October 1, 1985, we began a series of integrated engineering tests to verify the operation of all components as a complete system. DOE

N86-27477# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
NALED ICE GROWTH
G. Schohl and R. Ettema Feb. 1986 205 p
(Grant NSF CEE-81-09252)
(PB86-168200; IIHR-297) Avail: NTIS HC A10/MF A01 CSCL 13B

Based on theoretical formulation and dimensional analysis, supported by the results of laboratory experiments, a theory and a detailed description of naled ice growth are presented. The theory, concepts, and data should be of interest to engineers concerned with the effects of naleds (also referred to as aufeis or icings) on engineering works. The growth of a two dimensional, or laterally confined (flume), naled is shown to depend primarily on seven, independent, dimensionless parameters. The early, two dimensional, phase of growth, a naled consists of a mixture of ice and water, or ice-water slush, forming on a frigid base. The influence of two of the three remaining parameters is not felt until after a transition time has passed. The continuing, cyclic process by which slush layers form and eventually freeze results in the ice laminations that are a feature of naled ice. GRS

N86-27478# National Bureau of Standards, Gaithersburg, Md.
THERMOMETRY Final Report
J. F. Schooley Mar. 1986 30 p
(PB86-181369; NBSIR-85/3133) Avail: NTIS HC A99/MF A01 CSCL 13H

The manuscript develops the concept of thermometry, including historical experiments and thermodynamics; the Kelvin thermodynamic temperature scale; international practical temperature scales; the thermodynamic methods used to realize the Kelvin scale; and modern types of thermometers. Nearly 400 bibliographic references are included. GRA

N86-27479# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT
4 Mar. 1986 174 p Transl. into ENGLISH from various East European articles
(JPRS-EER-86-031) Avail: NTIS HC A08/MF A01

East Europe Reports (JPRS-EER-86-031), 4 March 1986, contains reports on the agriculture, economy, military forces, politics, science and technology, and sociology of the countries of Eastern Europe. Of special interest in this issue are articles on gasoline fuel alternatives, and a new fighter-bomber (the Su-22) assigned to the East German Air Force. For individual titles, see N86-27480 through N86-27481.

N86-27480# Joint Publications Research Service, Arlington, Va.
ALTERNATIVES TO GASOLINE EXPLORED **c28**
I. Irmscher *In its* East Europe Report (JPRS-EER-86-031) 4 Mar. 1986 p 54-63 Transl. into ENGLISH from KFT-Kraftfahrzeugtechnik (East Berlin, East Germany), no. 11, Nov. 1985 p 328-330 (For primary document see N86-27479 18-31)
Avail: NTIS HC A08/MF A01

At the Berlin-Wartenberg Engineering College, a study was made of the possibilities for using nonfossil energy sources as alternative fuels in consideration of the specific agricultural conditions of the GDR. The point of departure was the requirement for the economic use of diesel fuel, the search for possibilities for replacing diesel fuel with domestic energy sources, especially biogas, and agriculture's very important share--about one-fifth--of the national economy's overall requirement for diesel fuel. Author

N86-27481# Joint Publications Research Service, Arlington, Va.
NEW FIGHTER-BOMBER IN AIR FORCE **c01**
In its East Europe report (JPRS-EER-86-031) 4 Mar. 1986 p 103-104 Transl. into ENGLISH from Soldat und Technik (Frankfurt/Main, West Germany), no. 12, Dec. 1985 p 786 (For primary document see N86-27479 18-31)
Avail: NTIS HC A08/MF A01

FITTER K, currently the latest version of the FITTER fighter-bomber series from Sukhoi, along with other East German Air/Air Defense Force [EGAF/AD] aircraft of Soviet and Czechoslovak manufacture, was displayed on the ground and in the air during a troop review in August of this year. The appearance of this aircraft in the East German Army--deliveries allegedly began already in 1981--is indicative of the continuing modernization and strengthening of air attack forces in East Germany. Derived from the Su-22BM (M = modified) FITTER H, FITTER K is likewise equipped with the afterburner turbojet engine AL-21F of A. Lyulka, but differs externally from it in having a square-shaped supplementary air intake in the dorsal bulge in the ascending vertical fin. It is assumed that a parallel series was built having the higher-output Tumanskv engine R-29B. This version can be recognized by the somewhat larger fuselage cross-section in the area of the engine. The bomb and missile armament can be distributed among eight weapons stations (pylons), three each beneath the rigid wing center sections and two beneath the fuselage. The relatively short, adjustable outer wing sections are not loadable in any of the FITTER swing-wing versions. Author

N86-27482# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
1 Mar. 1986 235 p Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-008) Avail: NTIS HC A11/MF A01

Topics addressed include: national developments, physical sciences, applied sciences, environmental quality, analytical chemistry, electronics, nuclear power engineering, and organic chemistry. For individual titles, see N86-27483 through N86-27500.

N86-27483# Joint Publications Research Service, Arlington, Va.
INSTABILITY IN LOWER IONOSPHERE AT LOW LATITUDE **c46**
Xuanmou Liu, Genghou Liu, Tao Gu, and Rong Cui *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 63-71 Transl. into ENGLISH from Wuhan Daxue Xuebao (Ziran Kexue Ban) (Wuhan, China), no. 2, Jun. 1984 p 39-44 (For primary

document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

In the lower ionosphere, a dc electric field is induced by the collision between charged and neutral particles. In addition, there is a vertical electron density gradient due to the presence of the Hall current induced by the Earth magnetic field and the partially ionized plasma in the ionosphere. Under these conditions, their combined effects will cause instabilities in this region. Based on the two-fluid plasma equation, the growth rate of these instabilities is derived. Numerical simulation of this instability shows some fluctuation in electron density in the lower ionosphere 150 seconds after the disturbance. The spatial scale of the undulation is of the order of several hundred meters to several kilometers. In addition, it has a tendency to move in the vertical and horizontal directions. Furthermore, the observation made during the solar eclipse in Yunnan of 16 February 1980 is also discussed. Author

N86-27484# Joint Publications Research Service, Arlington, Va.
CRYOGENICS OF CHINA'S NIOBIUM MATERIAL (Nb2-1) c76
Jiasu Wang and Suyu Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 72-74 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 5, Sep. 1985 p 119-120 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The experimental research of the superconducting microwave surface resistance with China's niobium material at the liquid helium temperature is described. The measurement is made on X-band TE sub 011 mode cavity. Unloaded Q sub 0 value of 4.3x10 is achieved at a temperature of 4.2K. The equivalent residual surface resistance is .00018 omega. In superconducting material at very low frequencies, the superfluid current is dominant while the resistance effect is very tiny. Yet surface resistance exists in superconducting material in the microwave frequency band. The superconducting microwave surface resistance measured on X wave band highly pure niobium at a temperature of 1.3K was 1.5x10 to the - 9th power. The superconducting microwave surface resistance of X wave band measured highly pure niobium at 1.87K as .0000078 omega. The results are given of experimental research on a superconducting microwave resonator made of Chinese manufactured industrially pure cast niobium ingot and at 4.2K and 9984MHz the superconducting microwave surface resistance was measured at 0.00018 omega. Author

N86-27485# Joint Publications Research Service, Arlington, Va.
CONFOCAL LASER RESONATOR CHARACTERISTICS ANALYZED c36
Deyun Jin *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 75-80 Transl. into ENGLISH from Guangxue Xuebao (Acta Optica Sinica) (Shanghai, China), v. 5, no. 11, Nov. 1985 p 992-996 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The dynamic oscillation characteristics of a special confocal resonator with G sub 1=0 and G sub 2=0 were analyzed. This resonator shows oscillation characteristics of a Gaussian standing-wave resonator, a critical resonator, and a traveling wave resonator, respectively, when the direction of the rectilinear motion equation for the resonator is changed. The method for designing the resonator is proposed. Experimental results are in agreement with theoretical analysis. Author

N86-27486# Joint Publications Research Service, Arlington, Va.
CHINESE ACADEMY OF SCIENCES STUDIES DH LASER c36
Qiming Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 81-92 Transl. into ENGLISH from Tongxin Xuebao (Beijing, China), v. 6, no. 1, Jan. 1985 p 65-70 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

An investigation of Co-Cavity Two-Section (CCTS) AlGaAs/GaAs, InGaAsP/InP DH lasers is reported. It is shown that CCTS DH lasers have multiaction characteristics both in steady states and in transient states. As a three terminal device, the lasing state may be controlled by selecting the operating mode such as on or off and by controlling the pulse sequence. It is interesting that bistable behavior in the output can be obtained in these lasers under appropriate experimental conditions. Author

N86-27487# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SECTIONAL CONSTRICTED PLANAR CO-CAVITY DH LASERS c36
Guotong Du, Deling Yang, and Dingsan Gao *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 93-96 Transl. into ENGLISH from Bandaoti Xuebao (Beijing, China), v. 6, no. 4, Jul. 1985 p 442-445 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The development of sectional constructed planar cocavity DH lasers is reported. At present, lasers with a cavity length of 135 micrometers and dc threshold values of 30mA (27 C) were manufactured. Initial hypotheses for analyzing the mode characteristics for equivalent values over the whole cavity are suggested. Author

N86-27488# Joint Publications Research Service, Arlington, Va.
OUTPUT POWER EQUATION AND NUMERICAL INTEGRATING METHOD OF POSITIVE-BRANCH UNSTABLE CONFOCAL RESONATOR c74
Zuhai Cheng, Zaiguang Li, and Xuhui He *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 97-104 Transl. into ENGLISH from Guangxue Xuebao (Acta Optica Sinica) (Shanghai, China), v. 5, no. 11, Nov. 1985 p 986-991 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The output power equation of a positive-branch unstable confocal resonator was deduced by using the numerical integrating method and dividing the resonator to two regions. The numerical results of this equation are in good agreement with experimental data. Author

N86-27489# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC OF VANE-LOADED HELIX SLOW-WAVE STRUCTURE c33
Qingyou Chen *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 105-116 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 11, no. 5, Sep. 1983 p 23-32 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

Based on the existing vane loaded helix slow wave structure, a theoretical analytic model is proposed, in which the space between the helix and metallic barrel is fully filled up with dielectric, and vanes, infinite in number and infinitely thin in thickness, are set along all over the inner wall of the barrel. By utilizing the matching method of regional electromagnetic field for individual regions, the electromagnetic field distribution in the space of three respective regions is found. And the dispersion equation, couple impedance and attenuation constant are then obtained. The propagation system of electromagnetic wave is also discussed, with S being the cross section of any shape. A principle of stored energy equilization is derived. Author

N86-27490# Joint Publications Research Service, Arlington, Va.
IMPROVEMENT OF LARGE SIGNAL INTERACTION MODEL FOR TWT c32
Wenmiao Song, Yongquan Liu, and Jingxian Wu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 117-126 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 136-143 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

Because of the nonconservation of energy in Rowe's model for large signal interaction in traveling wave tubes (TWT), Rowe's model produces considerable error in TWT design, especially for a velocity-tapered one. A modified model which is based on energy conservation is suggested to improve the accuracy of the

design of TWT. By the new model, when the loss and space charge in TWT are neglected, the energy received by the circuit is exactly equal to that given by the electron beam. All the results obtained with the new model are in better agreement with the actual cases than those obtained with Rowe's model. Author

N86-27491# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL EXPERT SYSTEM, BLOCK, FOR USE IN CIRCUIT DESIGN **c33**
Yongsui Fang, Jiren Lu, Zongxuan Hu, and Zhaoming Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 127-135 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 92-97 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

A practical expert system called block is created for analog circuit design, the goal being to use this research to implement ways and means of high level circuit expert systems. Block system only requires the output and input signal demands of the given circuit to complete the block design of the circuit automatically and rapidly while these these tasks ordinarily must be done by the circuit designer. Author

N86-27492# Joint Publications Research Service, Arlington, Va.
VERTICAL POLARIZED ANTENNA FOR SYNTHETIC APERTURE RADAR **c32**
Ruxian Wang and Guanhong Shen *In its* China Report: Science and Technology (JPRS-CST-98-008) 1 Mar. 1986 p 136-140 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 158-160 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

A simple design model of a vertical polarized antenna operated in the X-Band is described. This antenna consists of longitudinal shunt slottery array at the broad side of rectangular waveguide and metallic horned plates. A full size model was fabricated. The computed results are in agreement with measured ones approximately. Although this method is preliminary, it has practical value in antenna design. Author

N86-27493# Joint Publications Research Service, Arlington, Va.
CY SERIES INTEGRATED PRESSURE TRANSDUCER **c35**
Minhang Bao and Jishen Jiang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 141-147 Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), no. 12, 10 Dec. 1984 p 25-26, 28 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The CY series integrated pressure transducer is a new third generation semiconductor pressure sensing element whose primary performance indicators have reached or surpassed the advanced levels for similar products abroad. In order to make the transducer have ideal performance parameters, the CY series pressure transducer integrates on one chip a pressure sensitive bridge, signal amplification circuit, and temperature compensation circuit. Since silicon material <100> crystal orientation has a mature etching process and at the same time is more ideal for integrated circuit process, therefore P-type <100> crystal orientation silicon chips were chosen for the CY series products, and pressure-sensitive resistance lines follow <011> and <011> crystal orientation. Author

N86-27494# Joint Publications Research Service, Arlington, Va.
NEW DT(SUP)2L SYSTEM OF LARGE-SCALE INTEGRATED CIRCUIT DESCRIBED **c33**
Yanhong Li *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 148-157 Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), no. 12, 10 Dec. 1984 p 8-11, 18 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

A simplified gate circuit and trigger is presented based on existing transistor-transistor logic (TTL) circuits to create a new series. It is not only suited to China's existing technological level and package cooling technology, but also improves integration and speed and provides experimental proposals for developing China's own medium and large scale integrated circuit series. Author

N86-27495# Joint Publications Research Service, Arlington, Va.
ADMITTANCE OF RECTANGULAR WAVEGUIDE OF SLOT ARRAY MEASURED **c32**
Zhixin Li *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 158-163 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 3, May 1983 p 227-231 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The serial feed waveguide H-plane slot array antenna is a widely used antenna type. The relationship between the waveguide slot conductance and the geometrical dimensions of the slot is the foundation for designing this type of antenna and the frequency characteristics of the slot admittance is an indispensable basis for analyzing the antenna's frequency characteristics. Although the formulas for theoretical analysis can be applied in designing a waveguide slot array antenna, there are some irregularities between the results obtained and the actual situation; therefore, before design, the conductance of the waveguide antenna is measured. Because the conductance of a single slot is rather small, it is difficult to measure accurately and in addition, there is coupling between slots, thus people generally measure the slot conductance of many slots in the array. To analyze and predict the frequency characteristics of a serial feed waveguide H-plane slot array antenna and improve the antenna's broad-band performance, an easy, computer-aided method of measuring the admittance frequency characteristics in a slotted array is proposed the results of measurement are presented. From the results it can be seen that the frequency characteristics of slot admittance are regular. Author

N86-27496# Joint Publications Research Service, Arlington, Va.
DESIGN OF OPTICAL DETECTOR, RECEIVER DISCUSSED **c74**
Guoxiang Li and Jingde Xu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 164-168 Transl. into ENGLISH from Dalian Gongxueyuan Xuebao (Dalian, China), v. 24, no. 3, Sep. 1985 p 121-124 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

An optical band signal receiving unit is, in many aspects, similar to a radio receiver system. It is composed of a photodetector, receiver, and terminal. A radio receiver unit includes an antenna, receiver, and terminal. They are also similar in major technical areas such as sensitivity, frequency response (including selectivity), non-linear distortion, signal to noise ratio and miscode ratio. Based on these facts, the duality of an optical band signal receiver unit and a radio receiver unit is presented. The following dualities exist: photodetector versus receiving antenna, receiver versus receiver, and terminal versus terminal. Based on these dualities, a photodetector is considered as a receiving antenna. Then, an optical band signal receiving device can be modelled as a radio receiving device. Thus the design theory for radio receiving equipment can be used for optical frequency band signal receiving equipment. Author

N86-27497# Joint Publications Research Service, Arlington, Va.
DESIGN SCHEME OF 8mm HIGH-POWER COAXIAL MAGNETRON DESCRIBED **c33**
Mingye Chen *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 169-173 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 6, no. 3, May 1984 p 259-281 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

There are two opinions on the feasibility of coaxial structure for magnetrons at 8mm wave band. One opinion is that when approaching the 8mm wave band, only an anti-coaxial structure can be used, while another opinion is that a coaxial structure can still be realized at 8mm wave band provided that high magnetic

conduction material is employed for the terminal boot, and high strength oxygen-free copper is used for the internal resonant chamber, as well as employing line cutting method to process. Currently, there is still difficulty in obtaining high magnetic conduction material for use in vacuum and air tight environments. The processing method of line cutting is still primarily employed in scientific research, and there is a certain degree of difficulty for batch production plants. A new design scheme is proposed and tested with positive results. Author

N86-27498# Joint Publications Research Service, Arlington, Va.
ENGINEERING STANDARD OF MOS MEMORY MODULE c60
Jingdong Chen, Zucai Zhu, and Zhongquan Xu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 174-179 Transl. into ENGLISH from Jisuanji Yanjiu Yu Fazhan (Beijing, China), v. 21, no. 11, Nov. 1984 p 30-36 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

Mankind has entered the information society, and information storage is an important technology of the information age. Not only is it needed in computer design, but it is also indispensable in many kinds of electronic control equipment. The MOS RAM is already widely used in many different fields. At present, domestic research and manufacture of computers is flourishing. In order to speed up the lead-time cycle of these machines and to enhance their performance reliability so as to promote the development of information storage technology, in February of 1984 the China Computer Society's storage technology group invited experts from concerned units throughout the country to Jiangsu Shazhou (Computer) Storage Plant to hold a meeting to examine and approve an MOS memory module standard, and a draft of the standard was approved. It combines the achievements of the past few years of experience in the research and manufacture of MOS memory; the data contained in the standard are derived from articles from two conferences on information storage technology and from the practical experience of the units represented by the participating experts. This standard lists the testing standards and engineering design principles for the research and manufacture of MOS RAM devices; it does not go into the details of the production process. Author

N86-27499# Joint Publications Research Service, Arlington, Va.
CZOCHRALSKI GROWTH OF TUNABLE LASER CRYSTAL BeAl(SUB)2O(SUB)4:Cr(SUP)3+ c76
Xiaoshan Ma, Yinchun Hou, Siting Wang, Yafang Shen, and Zongru Jin *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 186-193 Transl. into ENGLISH from Guisuanyan Xuebao (Beijing, China), v. 12, no. 2, Jun. 1984 p 131-136 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

Optically homogeneous alexandrite blanks, 100 mm in length and 20 mm in diameter, were grown by Czochralski technique using RF heating. These blanks were fabricated into 90 mm long 5 mm diameter c-axis laser rods. Tunable laser output was obtained experimentally. Spectroscopic characteristics of the crystal were presented. Problems such as prevention of BeO contamination, chrysoberyl formation kinetics and melt aging are also discussed. Author

N86-27500# Joint Publications Research Service, Arlington, Va.
ALUMINUM-GRAPHITE COMPOSITE MATERIALS STUDIED c24
Lida Liang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 194-199 Transl. into ENGLISH from Dalian Gongxueyuan Xuebao (Dalian, China), v. 24, no. 3, Sep. 1985 p 109-112 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

The wear reduction, damping capacity and technical properties of rheocast aluminum-graphite composite materials were tested. The effect of graphite content on various properties was determined to serve as a technical basis for this type of materials. Author

N86-27501# Joint Publications Research Service, Arlington, Va.
CHINA REPORT: SCIENCE AND TECHNOLOGY
13 Mar. 1986 161 p Transl. into ENGLISH from various Chinese articles
(JPRS-CST-86-009) Avail: NTIS HC A08/MF A01

China Report - Science and Technology (JPRS-CST-86-009), 13 March 1986, contains articles on National Developments, Physical Sciences, and Applied Science. Of special interest in this issue are articles on ultrasonic holography, slotted antennas, end-fed array antennas, coupled-cavity TWT's, a dynamic balance test facility, free-electron lasers, optical disk media, laser pulse compression, standing wave wigglers, carbon dioxide isotope lasers, and X-ray lasers. For individual titles, see N86-27502 through N86-27512.

N86-27502# Joint Publications Research Service, Arlington, Va.
IMAGING EQUATION, OPTIMUM ESTIMATION, ALGORITHM OF ULTRASONIC HOLOGRAPHY c35
Zaiming Li and Junti Wu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 43-51 Transl. into ENGLISH FROM Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 3, May 1985 p 71-76 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

The imaging equation, optimum estimation model and computer algorithm of ultrasonic Fourier holography are discussed. The effect of background interference and its elimination are analyzed. Good results were obtained using this model and algorithm. To facilitate computer processing of multi-dimensional information, an information estimation and functional analysis method was employed to discuss ultrasonic Fourier holography. This method has advantages such as clear concept and well-defined capabilities. Furthermore, it can facilitate software design. The resulting imaging effect is better than that reported in the literature. Author

N86-27503# Joint Publications Research Service, Arlington, Va.
COUPLING PROPERTIES OF SLOTTED ANTENNA STUDIED c32
Shanwei Lu, Jishi Ren, and Yin Fang *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 54-70 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 5, Sep. 1985 p 92-101 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

Coupling properties of any two longitudinal slots in the wider walls of a rectangular waveguide are analyzed. The theoretical results are in good agreement with the experimental results and with the data previously obtained (for single slot and half-wavelength slots). Based on the calculated and the experimental results, the electric field distribution at the aperture surface, the admittance, the resonant conductance, and the resonant length of the slots are discussed, taking into account both the effects of external and internal mutual coupling between the slots. The effects of the waveguide wall thickness and narrow-side width are also discussed. Author

N86-27504# Joint Publications Research Service, Arlington, Va.
RADAR ANTENNA TRANSIENT EFFECTS STUDIED c32
Hannan Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 71-81 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 11, no. 6, Nov. 1983 p 80-87 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

The problem of transient effect of one-dimensional end-fed array antennas is discussed. It is shown that the transient effect of end-fed array antennas will deteriorate the angular resolution performance in radar systems, and that such influence is more serious to radars sensitive to the amplitudes of very short pulses. Author

N86-27505# Joint Publications Research Service, Arlington, Va.
LARGE SIGNAL THEORY, COMPUTATION OF COUPLED-

CAVITY TWT'S c33
Wenmiao Song and Zhenhuai Li *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 82-93 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 12, no. 3, May 1984 p 25-32 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

The physical model and numerical method for CCTWT's large-signal interaction are given. In this model, the electrical field distribution in the gap (both modulus and phase angle) as well as the backward wave influence and the relativistic effect are considered. The mechanism of the electron beamwave interaction is discussed in great detail. Since the model uses the energy conservation law as a rule for the interaction, the computational results conform with the law accurately. The computation for an X-band CCTWT shows good agreement with the experiment values. Author

N86-27506# Joint Publications Research Service, Arlington, Va.
FIRST FREE-ELECTRON LASER OPERATIONAL c36
Cheng Zhu, Zaitong Lu, Ruigen Shi, Zhijiang Wang, Jinchuan Shi, and Yu Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 95 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, p 767 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

Output from China's first free-electron laser has been obtained. This free-electron laser is based on stimulated Raman scattering. Author

N86-27507# Joint Publications Research Service, Arlington, Va.
OPTICAL DISK MEDIA RESEARCH DISCUSSED c35
Jinchun Hou and Fuxi Gan *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 96-110 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, p 705-712 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

A review of the current status of the research and development on various optical disk media is presented. It is noted that research around the world on the media for the nonerasable optical disk is almost over, and that the nonerasable optical disk has been successfully used for CD, LD player and DRAW devices. On the other hand, great efforts are now being made to search the more suitable media for erasable optical disks. Extensive experiments on various material systems including optical characteristic change, phase transition and magneto-optical recording media are under way. It is expected that fruitful results will appear in the next 2 or 3 years. Author

N86-27508# Joint Publications Research Service, Arlington, Va.
LASER PULSE COMPRESSOR AND PHASE-COMPENSATOR DESCRIBED c36
Cunkai Wu, Guang Lan, Jie Xu, and Guozheng He *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 115-117 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, 20 Dec. 1985 p 750-751 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

In the development of nonlinear phase conjugate optics, a number of phase conjugate cavity and phase conjugate mirrors have been proposed for the phase anomaly in the laser amplifier. A composite laser system with a stimulated Brillouin scattering (SBS) conjugate mirror was studied and 200 mJ of output was obtained using a polarization isolation technique. Pulse compression was observed using the usual capillary Brillouin cell and using a ruby laser as a pump. Higher order pulse compression was achieved with a long conical capillary Brillouin cell. In this work, the composite laser system and the conical capillary Brillouin scattering conjugate mirror were combined. Using a polarization isolation method, the compressed laser pulse is completely coupled out. Using a 670 mm tapered capillary Brillouin cell containing CS2 liquid, the pulse width of the Q-switched Nd:YAG laser amplifier in the composite system is compressed by a factor of 3. The laser pulse energy is more than 240 mJ. The degree of compression depends on the length of the capillary; by changing the length of the Brillouin cell, it is possible that a variable pulse width laser can be made. Author

N86-27509# Joint Publications Research Service, Arlington, Va.
STANDING WAVE WIGGLERS USED IN FREE-ELECTRON LASER c36
Shizhan Lei *In its* China Report: Science and technology (JPRS-CST-86-009) 13 Mar. 1986 p 118-123 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), v. 4, no. 5, Oct. 1985 p 374-378 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

Operating conditions for free-electron lasers with a standing wave for wigglers are analyzed and the laser gains are calculated. A unique feature of free electron lasers is that the output wavelength can be tuned continuously by changing the energy of the relativistic electrons and the spatial period of the wiggler. In principle, output can be obtained in the infrared, ultraviolet, and even the X-ray range. A high energy relativistic electron beam is required to produce a short wavelength laser. Recently attempts have been made to obtain laser oscillation in the X-ray wavelength using free electron laser but great technical difficulties were encountered. Author

N86-27510# Joint Publications Research Service, Arlington, Va.
THE (SUP)14 CO (SUB)2 ISOTOPE LASER DESCRIBED c36
Lin Fei, Kejun Wang, and Zuhui Zhu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 124-130 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, 20 Sep. 1985 p 524-527 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

A (14)CO2 - (12)CO2 isotope laser has been developed and 80 laser lines were measured. Forty lines originated from lasing transition of the I band of (14)CO2 and the strongest line output power was over 4.0 W. The competition effect between isotopes were experimentally observed and domination of lasing radiation of (14)CO2 was found even when the content of (14)CO2 was less than (12)CO2. Author

N86-27511# Joint Publications Research Service, Arlington, Va.
AUTO-ALIGNMENT DEVELOPED FOR LARGE LASER SYSTEM c36
Wucheng Wang, Jianxiong Wang, Hengxian Wu, Ruoju Guo, Jingxin Yang, and Shiyuan Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 131-139 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, Sep. 1985 p 542, 543-546 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

A principle of optical path adjustment by servo-control mechanism is proposed. A computer program based on this principle has been successfully used in the auto-alignment of a laser system. A large laser system usually consists of an oscillator, a number of amplifiers and extensive optics. While in operation it is difficult to keep the laser beam from drifting. For example, the optical path of the pulsed solid state laser system used in nuclear fusion relies on an alignment control system so that the axial and angular drifts of the beams remain within a tolerable range. In this article we report our research results in this area. Author

N86-27512# Joint Publications Research Service, Arlington, Va.
TIME-RESOLVED X-RAY SPECTRA STUDIED c74
Chengming Pan, Guangyu Yin, Shicheng Zhao, and Daqing Zhu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 140-145 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, Sep. 1985 p 570-572 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

The interaction of laser light with plasma is described which offers X-rays directly or indirectly. The specifications as well as the calibration of the X-ray streak camera are presented. Its physical

application in laser produced plasma is indicated. X-ray emitted by the laser plasma plays a direct or indirect role in the interaction of laser and plasma. The characteristic length is several micrometers to several hundred micrometers and the characteristic time is several picoseconds to several hundred picoseconds. A device for diagnosing the time resolved X-ray must therefore have a time resolution of several picoseconds to several hundred picoseconds. An X-ray streak camera is designed for this specific purpose. Before an X-ray streak camera is put in use, it must be calibrated for time resolution, dynamic range, scanning linearity, and trigger jittering. Its intensity and linear output range must be quantified together with its spectral resolution devices such as reflecting mirrors and filters. Author

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-27513* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

METHOD AND APPARATUS FOR OPERATING ON COMPANDED PCM VOICE DATA Patent

Frank Byrne, inventor (to NASA) Issued 13 May 1986 8 p Filed 28 Sep. 1984 Supersedes N85-29120 (23 - 18, p 3089) Sponsored by NASA. Kennedy Space Center

(NASA-Case-KSC-11285-1; US-Patent-4,588,986; US-Patent-Appl-SN-655601; US-Patent-Class-340-347DD; US-Patent-Class-365-768; US-Patent-Class-179-18BC) Avail: US Patent and Trademark Office CSCL 17B

The method and apparatus constructed in accordance with this invention permits a plurality of parties to speak to each other on a conference line with a minimum of interference. The apparatus digitizes audio signals. Each of the parties has an audio transmitter and receiver provided for transmitting and receiving audio signals. The audio signals are converted to a PCM companded eight-bit parallel signal followed by a conversion to a serial signal for transmitting to a remote location and then reconverting each of the companded signals to a first-eight-bit parallel signal. The eight-bit parallel signal is fed to one input of a pre-programmed ROM. This eight-bit signal provides one-half of a sixteen-bit address of a lookup ROM. The other half of the sixteen-bit ROM address is supplied by another suscriber over an identical circuit. NASA

N86-27514 British Broadcasting Corp., Kingswood (England). Engineering Div.

SATELLITE SOUND BROADCASTING TO FIXED, PORTABLE AND MOBILE RADIO RECEIVERS

J. H. Stott Dec. 1985 14 p

(BBC-RD-1985/19) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

Direct broadcasting by satellite (DBS) of television signals to the home has received much attention recently; less attention has been paid to sound-only (i.e., radio) broadcasting from satellites. This Report reviews the present range of terrestrial sound broadcasting and explores the possible scope and technical feasibility of using satellites. Satellite broadcasting of sound programs to receivers of all types, including portable and mobile, situated in national or regional areas appears technically practicable, but there are problems to be overcome. The most significant are regulatory in nature, in particular there is no appropriate frequency allocation. A new system possibility is presented using digital modulation which has a number of advantages, including potential for good spectrum utilization. Various technical details require further study to produce a system of optimum performance, flexibility and spectrum efficiency. Author

N86-27515*# North Carolina State Univ., Raleigh. Dept. of Electrical and Computer Engineering.

ON THE ELECTROMAGNETIC SCATTERING FROM INFINITE RECTANGULAR CONDUCTING GRIDS

Christos Christodoulou May 1985 171 p

(Grant NsG-1588)

(NASA-CR-177236; NAS 1.26:177236) Avail: NTIS HC A08/MF A01 CSCL 20N

The study and development of two numerical techniques for the analysis of electromagnetic scattering from a rectangular wire mesh are described. Both techniques follow from one basic formulation and they are both solved in the spectral domain. These techniques were developed as a result of an investigation towards more efficient numerical computation for mesh scattering. These techniques are efficient for the following reasons: (a1) make use of the Fast Fourier Transform; (b2) they avoid any convolution problems by converting integrodifferential equations into algebraic equations; and (c3) they do not require inversions of any matrices. The first method, the SIT or Spectral Iteration Technique, is applied for regions where the spacing between wires is not less than two wavelengths. The second method, the SDCG or Spectral Domain Conjugate Gradient approach, can be used for any spacing between adjacent wires. A study of electromagnetic wave properties, such as reflection coefficient, induced currents and aperture fields, as functions of frequency, angle of incidence, polarization and thickness of wires is presented. Examples and comparisons or results with other methods are also included to support the validity of the new algorithms. Author

N86-27516*# North Carolina State Univ., Raleigh. Dept. of Electrical and Computer Engineering.

ON THE CONVERGENCE OF AN ITERATIVE FORMULATION OF THE ELECTROMAGNETIC SCATTERING FROM AN INFINITE GRATING OF THIN WIRES

Jerry C. Brand May 1985 99 p Previously announced as N85-35319

(Grant NsG-1588)

(NASA-CR-177235; NAS 1.26:177235) Avail: NTIS HC A05/MF A01 CSCL 20N

Contraction theory is applied to an iterative formulation of electromagnetic scattering from periodic structures and a computational method for insuring convergence is developed. A short history of spectral (or k-space) formulation is presented with an emphasis on application to periodic surfaces. The mathematical background for formulating an iterative equation is covered using straightforward single variable examples including an extension to vector spaces. To insure a convergent solution of the iterative equation, a process called the contraction corrector method is developed. Convergence properties of previously presented iterative solutions to one-dimensional problems are examined utilizing contraction theory and the general conditions for achieving a convergent solution are explored. The contraction corrector method is then applied to several scattering problems including an infinite grating of thin wires with the solution data compared to previous works. Author

N86-27517*# Notre Dame Univ., Ind. Dept. of Electrical and Computer Engineering.

ERROR CONTROL TECHNIQUES FOR SATELLITE AND SPACE COMMUNICATIONS Annual Status Report, 1 Jun. 1985 - 31 May 1987

Daniel J. Costello, Jr. Jul 1986 76 p

(Grant NAG5-557)

(NASA-CR-177224; NAS 1.26:177224) Avail: NTIS HC A09/MF A01 CSCL 17B

High rate concatenated coding systems with trellis inner codes and Reed-Solomon (RS) outer codes for application in satellite communication systems are considered. Two types of inner codes are studied: high rate punctured binary convolutional codes which result in overall effective information rates between 1/2 and 1 bit per channel use; and bandwidth efficient signal space trellis codes which can achieve overall effective information rates greater than 1 bit per channel use. Channel capacity calculations with and without side information performed for the concatenated coding

system. Concatenated coding schemes are investigated. In Scheme 1, the inner code is decoded with the Viterbi algorithm and the outer RS code performs error-correction only (decoding without side information). In scheme 2, the inner code is decoded with a modified Viterbi algorithm which produces reliability information along with the decoded output. In this algorithm, path metrics are used to estimate the entire information sequence, while branch metrics are used to provide the reliability information on the decoded sequence. This information is used to erase unreliable bits in the decoded output. An errors-and-erasures RS decoder is then used for the outer code. These two schemes are proposed for use on NASA satellite channels. Results indicate that high system reliability can be achieved with little or no bandwidth expansion. Author

N86-27518# Mnemoics, Inc., Saline, Mich.
ROAD DETECTION ON RADAR IMAGERY Final Report, Mar. 1984 - Jun. 1985
Jungwhan J. Kim and Robert M. Haralick Sep. 1985 73 p
(Contract DACA76-84-C-0003)
(AD-A164730; ETL-0403) Avail: NTIS HC A04/MF A01 CSCL 17/9

Detecting a road network on radar imagery is becoming a new area in remote sensing. This report is an attempt to build a facet-based road network detection procedure for radar imagery. This procedure includes the line detection part and the road detection and connection part. The first part analytically detects linear features using a facet valley-finding technique which looks for the first directional derivative zero-crossing of a bicubic facet model. The second part statistically screens the linear features on a component-by-component base and then optimally connects the screened linear features using a dynamic programming algorithm. GRA

N86-27519# Mnemoics, Inc., Saline, Mich.
NOISE REMOVAL ON RADAR IMAGERY USING LOCAL GRADIENT AND STATISTICS Final Technical Report, Mar. - Jul. 1984
Jugwhan Kim and Robert M. Haralick Sep. 1985 52 p
(Contract DACA76-84-C-0003)
(AD-A164888; ETL-0402) Avail: NTIS HC A04/MF A01 CSCL 17/9

This report shows that the noise-removal algorithm using local gradient and statistics is most favorable to filter a noisy radar image without contrast loss. This report includes the summary of this algorithm with a suggestion of a practical method of estimating a local noise variance. Various noise-removal algorithms are compared with this algorithm based on a visual examination of their filtering results on a set of radar images. The final results of noise removal of the images are displayed along with the originals in the last section. A set of twenty-eight SAR (Synthetic Aperture Radar) images, of size 512x512 pixels, for experimentation. Author (GRA)

N86-27520# Mnemoics, Inc., Saline, Mich.
DISCRIMINATION OF WATER FROM SHADOW REGIONS ON RADAR IMAGERY USING COMPUTER VISION TECHNIQUES Final Report, Mar. 1984 - Jul. 1985
Jianzhong Qian and Robert M. Haralick Sep. 1985 139 p
(Contract DACA76-84-C-0003)
(AD-A164912; ETL-0404) Avail: NTIS HC A07/MF A01 CSCL 17/9

Unlike MSS LANDSAT imagery and other photography, the specific characteristics of the intensity of water and shadow reflectivity in SAR imagery make the task of discriminating between them extremely difficult. In this report, we analyze the mechanism of reflectivity of water and shadow on radar imagery and describe a scene-analysis system which consists of a texture-preserving noise-removal procedure as the preprocessing step, a probabilistic relaxation algorithm to do the low-level labeling, and a spatial reasoning procedure based on a relational model to perform the high-level interpretation. The experimental results obtained from the SAR images are presented to illustrate the performance of this system. GRA

N86-27521# Haskins Labs., Inc., New Haven, Conn.
STATUS REPORT ON SPEECH RESEARCH. A REPORT ON THE STATUS AND PROGRESS OF STUDIES ON THE NATURE OF SPEECH, INSTRUMENTATION FOR ITS INVESTIGATION, AND PRACTICAL APPLICATIONS Interim Scientific Report, Apr. - Sep. 1985
Alvin M. Liberman Oct. 1985 298 p
(Contracts N00014-83-K-0083; PHS-N01-HD-5-2910; Grants HD-01994; HD-16591; RR-05596; NSF BNS-81-11470; NS-13870; NS-13617; NS-18010)
(AD-A165084; SR-82/83(1985)) Avail: NTIS HC A13/MF A01 CSCL 05/7

This interim status report on speech research discusses the following topics: On Vagueness and Fictions as Cornerstones of a Theory of Perceiving and Acting: A Comment on Walter (1983); The Informational Support for Upright Stance; Determining the Extent of Coarticulation-effects of Experimental Design; The Roles of Phoneme Frequency, Similarity, and Availability in the Experimental Elicitation of Speech Errors; On Learning to Speak; The Motor Theory of Speech Perception Revised; Linguistic and Acoustic Correlates of the Perceptual Structure Found in an Individual Differences Scaling Study of Vowels; Perceptual Coherence of Speech: Stability of Silence-cued Stop Consonants; Development of the Speech Perceptuomotor System; Dependence of Reading on Orthography-Investigations in Serbo-Croatian; The Relationship between Knowledge of Derivational Morphology and Spelling Ability in Fourth, Sixth, and Eighth Graders; Relations among Regular and Irregular, Morphologically-Related Words in the Lexicon as Revealed by Repetition Priming; Grammatical Priming of Inflected Nouns by the Gender of Possessive Adjectives; Grammatical Priming of Inflected Nouns by Inflected Adjectives; Deaf Signers and Serial Recall in the Visual Modality-Memory for Signs, Fingerspelling, and Print; Did Orthographies Evolve?; The Development of Children's Sensitivity to Factors Influencing Vowel Reading. GRA

N86-27522# Naval Research Lab., Washington, D. C.
APPLICATIONS OF SPECTRAL ESTIMATION TECHNIQUES TO RADAR DOPPLER PROCESSING: SIMULATION AND ANALYSIS OF HF (HIGH-FREQUENCY) SKYWAVE RADAR DATA Interim Report
D. B. Trizna and G. D. McNeal 31 Dec. 1985 29 p
(AD-A165153; NRL-8950) Avail: NTIS HC A03/MF A01 CSCL 17/9

This work is the second paper in a series of studies of the application of spectral estimations techniques to Doppler processing of coherent radar signals. In this work, simulated high-frequency (HF) radar sea scatter time series are generated and processed by use of three different spectral estimation algorithms and the fast Fourier transform (FFT). The sea clutter is simulated by narrowband filtering a wideband Gaussian noise spectrum in the frequency domain, with filter widths appropriate to describe first-order Bragg lines and second-order continuum. Targets are introduced as sinusoids, stepped by 5 dB for eight different echo power values, and stepped in Doppler frequency for four different values relative to the clutter. These simulations identify problems that appear unique to Doppler processing of coherent radar data in the presence of broadband clutter, and are in distinction to the application of spectral estimation to processing in the spatial domain. In the latter case, the spectral contributions are generally narrowly confined in the angular power spectral estimate, and the aim is to separate these contributions in the presence of noise. The HF radar application is concerned with separation of weak targets in the presence of stronger clutter returns, which are relatively broad compared to the target return. It appears that the Burg maximum entropy method allows the detection of targets in clutter under conditions which the FFT is incapable of detection with any degree of accuracy. Author (GRA)

N86-27523# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
EXPERIMENTAL VERIFICATION OF THE FAR FIELD CRITERIA FOR AFWAL'S COMPACT RANGE IN THE QUIET ZONE REGION
Interim Report, Jun. 1983 - Jul. 1984
Hirsch M. Chizever and Brian M. Kent Oct. 1985 127 p
(AD-A165275; AFWAL-TR-85-1080) Avail: NTIS HC A07/MF A01 CSCL 20/14

In past years the radiation and scattering properties of aerospace components have been tested on large outdoor measurement ranges. The distance between the transmitting and receiving antenna (for radiation measurements) or target (for scattering measurements) is normally dictated by the far field criteria. Recent interest in the millimeter wavelength region and the need to measure larger targets requires longer distances between source and target to satisfy the far field condition. This report documents an alternative method of creating a space limited far field environment for radiation and scattering measurements using the compact range approach. However, some questions concerning the planarity of the aperture field have been raised by the scientific community. Field probe data is presented here which unquestionably verifies the planarity of the aperture field. GRA

N86-27524# Mitre Corp., McLean, Va.
PRELIMINARY DESIGN CONCEPTS FOR COMMAND AND CONTROL MODELING USING TIME WARP/HYPERCUBE
S. J. Laskowski, R. O. Nugent, and L. M. Sokol 14 Aug. 1985 61 p
(Contract F19628-84-C-0001)
(AD-A165511; MTR-84W00535) Avail: NTIS HC A04/MF A01 CSCL 15/3

The objective of this task was to develop and evaluate preliminary design concepts for modeling command and control (C2) on the hypercube parallel processing computer architecture using the associated Time Warp operating system. MITRE performed this task in support of the Army Model Improvement Program (AMIP) Management Office (AMMO) systems research and planning efforts required as part of the development of a new family of Army models. Command and control can be thought of as large complex system of facilities, equipment, communications, procedures, and personnel through which command and control of forces and resources is exercised in performing the missions and functions assigned to them. Modeling C2 provides a means of analyzing the process and the effects of alternative doctrine, tactics, and C2 systems. The size and complexity of the command and control decision process make it difficult to model; simulation is one means of making the modeling problem tractable. The objective of this effort was to develop and evaluate design concepts for modeling command and control on the hypercube parallel processing computer architecture using the associated Time Warp operating system. In particular, the evaluation was to be responsive to two basic questions: Can Time Warp on a hypercub e architecture be used in conjunction with object-oriented techniques to significantly speed up the processing time associated with command and control modeling? GRA

N86-27525# Rome Air Development Center, Griffiss AFB, N.Y.
PROCEEDINGS OF THE 1985 ANTENNA APPLICATIONS SYMPOSIUM, VOLUME 2
Dec. 1985 372 p Conference held in Monticello, Ill., 18-20 Sept. 1985
(AD-A165535; RADC-TR-85-242-Vol-2) Avail: NTIS HC A16/MF A01 CSCL 09/5

The Proceedings of the 1985 Antenna Applications Symposium is a collection of state-of-the-art papers relating to phased array antennas, multibeam antennas, satellite antennas, microstrip antennas, reflector antennas, HF, VHF, UHF, and various other antennas. GRA

N86-27526# Department of the Navy, Washington, D. C.
A PARTIALLY ADAPTIVE ARRAY USING BOOTLACE LENS
Patent Application
William F. Gabriel and James K. Hsiao, inventors (to Navy) Filed 11 Oct. 1985 17 p
(AD-D012183; US-Patent-Appl-SN-786569) Avail: NTIS HC A02/MF A01 CSCL 17/4

A partially adaptive array compensates for jamming. The array is comprised of more than 1000 elements and uses a bootlace lens to form a family of beams from which an adaptive array chooses at least one beam of the family of beams that most closely represent the jamming, and subtracts the beam from a main beam. In this way jamming of the main beam is compensated for. Author (GRA)

N86-27527# Lawrence Livermore National Lab., Calif.
RADAR CROSS SECTION REDUCTION BY LUMPED, LINEAR, PASSIVE LOADING
R. M. Bevensee Oct. 1985 6 p Presented at the IEEE National Radar Conference, Los Angeles, Calif., 12 Mar. 1986
(Contract W-7405-eng-48)
(DE86-002855; UCRL-93545; CONF-860347-1) Avail: NTIS HC A02/MF A01

A general analysis describing total power scattered from lossy, electrically linear bodies of arbitrary shape, excited by single-frequency plane waves, is modified to treat bistatic scattered power, p(sub sc), in a specified solid angle. Formulas are given for the passive load at a selected port to minimize p(sub sc) in terms of four real radiation field parameters and the input impedance. The analysis is illustrated for a thin-wire aircraft model, lambda/2 long. p(sub sc) in a 60 deg. cone is first minimized for nose-on incidence of a circularly-polarized wave, and then reduced for many incident waves by lumped loading at two ports. An iterative scheme was employed to converge on the loads. Even the simple loading scheme employed reduced p(sub sc) by at least 12.8 dB for each of the 56 directions of incidence within the 60 deg. scatter cone. DOE

N86-27528# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
MILLIMETER-WAVE BEHAVIOR OF RAIN ATTENUATION BASED ON RECENT EXPERIMENTAL DATA
E. J. Dutton Jan. 1986 42 p
(PB86-166907; NTIA-86-189) Avail: NTIS HC A03/MF A01 CSCL 20N

The report describes analysis of millimeter-wave data taken over the last year or so (1984-1985) by the Institute for Telecommunication Sciences. The first part of the report reviews multiple-frequency analysis and discusses problems encountered in applying these techniques to the 28.8, 57.6, and 96.1 GHz frequency specific rain attenuation data taken in the ITS experiment. The report then examines two alternative ways of using the ITS experimental data to predict specific rain attenuation and its annual occurrence. First, power-law fitting techniques to the data are discussed and compared. Next, a model for the prediction of annual worst-case specific rain attenuation is evolved to more directly aid in engineering design. This model is derived from a sample of daily specific rain attenuation distributions at Gasquet and is referred to as the standard sample. The worst-case results obtained from the standard sample are then compared with some more-recent data from Gasquet, California. GRA

N86-27529# Institute for Telecommunication Sciences, Boulder, Colo.
RAIN ATTENUATION MEASUREMENTS AT 28.8, 57.6, AND 96.1 GHz ON A 1-km PATH
R. H. Esperland, E. J. Violette, and K. C. Allen Feb. 1986 42 p
(PB86-175569; NTIA-86-190) Avail: NTIS HC A03/MF A01 CSCL 20N

An experimental millimeter-wave propagation link was installed on a 1-km path in the northern California area (Gasquet) to compare rain rate and attenuation at 28.8,57.6, and 96.1 GHz. During the monitoring period (January 26 through April 14), rain occurred on 27 days with an accumulation of 514 mm (20.25 in). For periods when the rain rate exceeded 5 mm/h, both VV (vertical polarization at the transmitter and vertical polarization at the receiver) and VH

(vertical polarization at the transmitter and horizontal polarization at the receiver) signals were recorded. Maximum rain rates exceeded 50mm/h and maximum attenuations of 4, 10, and 17 dB were observed on the 28.8, 57.6, and 96.1 GHz channels, respectively. GRA

N86-27530# Federal Communications Commission, Washington, D. C. Office of Engineering and Technology.
MODERN METHODS FOR CALCULATING GROUND-WAVE FIELD STRENGTH OVER A SMOOTH SPHERICAL EARTH
R. P. Eckert Feb. 1986 48 p
(PB86-173457; FCC/OET/R86-1) Avail: NTIS HC A03/MF A01 CSCL 20N

The report makes available the computer program that produces the proposed new FCC ground-wave propagation prediction curves for the new band of standard broadcast frequencies between 1605 and 1705 kHz. The curves are included in recommendations to the U.S. Department of State in preparation for an International Telecommunication Union Radio Conference. The history of the FCC curves is traced from the early 1930's, when the Federal Radio Commission and later the FFC faced an intensifying need for technical information concerning interference distances. A family of curves satisfactorily meeting this need was published in 1940. The FCC reexamined the matter recently in connection with the planned expansion of the AM broadcast band, and the resulting new curves are a precise representation of the mathematical theory. Mathematical background is furnished so that the computer program can be critically evaluated. This will be particularly valuable to persons implementing the program on other computers or adapting it for special applications. Technical references are identified for each of the formulas used by the program, and the history of the development of mathematical methods is outlined. Author

N86-27531# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Electromagnetic Wave Propagation Panel.
PROPAGATION EFFECTS ON MILITARY SYSTEMS IN THE HIGH LATITUDE REGION
Haim Soicher, ed. (Army Communications-Electronics Command, Fort Monmouth, N.J.) Loughton, England Nov. 1985 577 p Proceedings of the 36th Symposium of the Electromagnetic Wave Propagation Panel, Fairbanks, Alaska, 3-7 Jun. 1985
(AGARD-CP-382; ISBN-92-835-0383-X) Avail: NTIS HC A25/MF A01

Various topics relative to propagation effects on military systems at high latitudes are discussed. Ionospheric propagation, propagation aspects of high frequency communication, high altitude probes, scattering, measurement techniques, and meteor scatter radio communication are among the topics covered. For individual titles, see N86-27532 through N86-27565.

N86-27532# Alaska Univ., Fairbanks. Geophysical Inst.
SOLAR-TERRESTRIAL RELATIONSHIPS IN THE HIGH LATITUDE REGION c46
S.-I. Akasofu *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 17 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

It is shown how the magnetosphere responds to the three components (B sub x, B sub y, B sub z) of the interplanetary magnetic field (IMF) and to the power sigma of the solar wind magnetosphere dynamo. In particular, it is shown that the geometry of the auroral oval and the polar cap depends greatly on the magnitude and signs of the IMF three components. Geomagnetic storms result when the dynamo power sigma exceeds approx. 1 million Mwatts. Once such knowledge is available, it is possible to predict the geometry of the auroral oval and the intensity of a geomagnetic storm as a function of time, if one can predict time variations of the solar wind speed and the IMF three components. We demonstrate such a possibility by a computer model study, namely by the first generation numerical forecasting scheme. Author

N86-27533# Norwegian Defence Research Establishment, Kjeller.
MEDIA EFFECTS ON SYSTEMS IN THE HIGH LATITUDE REGION
E. V. Thrane *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 16 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

The effects of the transmission medium on radio systems in the high latitude regions are reviewed. First, some general properties of propagation media are discussed, followed by brief descriptions of the effects on radio waves of the Earth's surface, the troposphere and the ionosphere in high latitudes. General principles are illustrated by examples from observations and model calculations. Author

N86-27534# Physical Dynamics Northwest, Bellevue, Wash.
RECENT HILAT RESULTS
E. J. Fremouw *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 14 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

The Defense Nuclear Agency (DNA) HiLat Satellite was launched on 27 June 1983 for the purpose of studying the development and dynamics of F-layer irregularities between the plasmapause and the pole. In a circular 800-km orbit at 82 inclination, it carries (1) a coherent radio beacon for measuring complex-signal scintillation and TEC, (2) a three-instrument thermal-plasma experiment consisting of a Langmuiare probe (debilitated on launch), a retarding-potential analyzer (RPA), and an ion drift meter; (3) an energetic-electron spectrometer operating between 20 ev and 20 kev, (4) a three-axis fluxgate magnetometer, and (5) an optical package consisting of a vacuum-ultraviolet (vuv) imaging spectrophometer (failed after collecting forty orbits of data) and two visible-wavelength telephotometers. All instruments other than the Langmuire probe and the vuv imager continue to operate reliably. To date, HiLat has returned the following three specific observations of note: first auroral image in full daylight, most intense field-aligned current flowing into the ionsophere, and energy-dispersed electron precipitation impulses with about a one-second periodicity. These observations and on-going analyses of HiLat's bulk data base are summarized. Author

N86-27535# Air Force Geophysics Lab., Hanscom AFB, Mass. Ionospheric Physics Div.
TOTAL ELECTRON CONTENT AND L-BAND AMPLITUDE AND PHASE SCINTILLATION MEASUREMENTS IN THE POLAR CAP IONOSPHERE
J. A. Klobuchar, G. J. Bishop, and P. H. Doherty (Emmanuel Coll., Boston, Mass.) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 8 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

The first measurements of absolute Total Electron Content (TEC) and L-band amplitude and phase scintillation were made from Thule, Greenland, a polar cap station, in early 1984. These measurements were made using signals transmitted from the Global Positioning System (GPS) satellites. The variability of the TEC, especially during the afternoon to pre-midnight hours, is large, with increases in TEC above the background values of greater than 100 percent not uncommon. During one disturbed time quasi-periodic TEC enhancements having periods as short as ten minutes and amplitudes equal to the background TEC were observed for over two hours. The TEC during some of the disturbed periods in the dark Thule ionosphere exceeded mid-latitude daytime values. Amplitude scintillations were small, not exceeding 3 dB peak to peak during the entire observing period, but they were associated with the times of TEC enhancements, with some evidence for stronger scintillation occurring during the negative gradients of the TEC enhancements. Phase scintillations were highest during some of the times of enhanced TEC, and depend critically upon the phase detrend interval used. Author

N86-27536# Army Communications-Electronics Command, Fort Monmouth, N.J. Center for Communications Systems.
VARIABILITY OF TRANSIONOSPHERIC SIGNAL TIME DELAY AT HIGH LATITUDES NEAR SOLAR MINIMUM
Haim Soicher *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 9 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Faraday observations were conducted at Anchorage, Alaska (61.04 degrees N, 149.75 degrees W) utilizing beacon transmissions from a geostationary satellite during the period just following the minimum phase of solar cycle 21. Average maximum monthly values of total electron content (TEC), which is proportional to transionospheric signal time delay, were below 15 x 10 to the 16th power el m-2, while individual daily maximum values never exceeded 20 x 10 to the 16th power m-2. Seasonal and day-to-day variabilities were observed. Unique representation of the data has permitted the study of day-to-day variability of TEC. For example, during all seasons the TEC structure appears uniform from day to day during the buildup and decay phase of the local ionosphere. During the maximum and minimum of the diurnal phase, the TEC structure variability is seasonally dependent. During periods of magnetic sudden commencements, which rarely occurred in the observations period, significant positive phase response of TEC did not materialize. Author

N86-27537# Boston Univ., Mass. Dept. of Astronomy.
F LAYER IRREGULARITIES AT PLASMAPAUSE AND AURORAL LATITUDES **c46**
Jules Aarons *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 16 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Distinctive effects of two irregularity regions, one at plasmapause latitudes and the second in the auroral region, were explored using primarily radio scintillation data. Using scintillation measurements at the times numbering seven to nine sensors within a relatively confined area, it is possible to document the morphology of development of irregularities in the plasmapause and in the auroral region over a period of time, a technique difficult with only low altitude satellite scintillation observations. Two cases of irregularity storms one in the plasmapause and the second in the auroral oval are reported. During the stable auroral red arc of March 5 to 6, 1981, intense irregularities were centered at plasmapause latitudes but levels tapered off in the same longitude sector at auroral latitudes. Reported Synthetic Aperture Radar (SAR) measurements indicated no visible aurora until areas 4 L shells polewards. Low energy (approx. 8ev) electron precipitation has been reported within the region covered by the SAR arcs. Higher temperatures have also been reported within the SAR arc, perhaps indicating a need to invoke the temperature gradient drift instability as the source for the generation of irregularities. Scintillation of moderate level is not uncommon for the plasmapause region. In March 1981 approximately 60% of the nights had scintillation levels approx. 6 dB at 137 MHz lasting over one hour. Author

N86-27538# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Avionics Lab.
INFLUENCE OF IONOSPHERIC IRREGULARITY SHAPE AND VELOCITY ON THE DESIGN OF AIRBORNE SATELLITE COMMUNICATIONS SYSTEMS
Allen L. Johnson *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Extensive ground and airborne UHF ionospheric scintillation measurements were conducted in the polar region during the peak of the current solar cycle. Using three spaced antennas the speed and direction of the irregularity drift was obtained from cross-correlation plots. Measurements taken during 1980 at Thule, Greenland; Sonderstrom, Greenland, and Goosebay, Labrador showed velocities of up to s1000 meters per second. A diurnal pattern of rapid direction changes provided information on the two cell polar circulation of the irregularities from the noon sector of the auroral oval over the polar cap to the midnight section and back around the oval to the noon section. Airborne ionospheric scintillation fading measurements conducted near Goosebay were compared with simultaneous ground measurements to investigate the ionospheric irregularity shape. Polar ionospheric scintillation fading measurement indicates that special care is required in the design of airborne satellite communications systems intended for polar operation. Applicable coding techniques, interleaving length, modulation schemes, and message length to provide an airborne satellite communication system protection against polar ionospheric scintillation fading are discussed. Author

N86-27539# SRI International Corp., Menlo Park, Calif.
PROPAGATION EFFECTS ON SATELLITE-BORNE SYNTHETIC APERTURE RADARS Abstract Only
Charles L. Rino and Jacqueline Owen *In* AGARD Propagation Effects on Military Systems in the High Latitutde Region Nov. 1985 1 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

A numerical Synthetic Aperture Radar (SAR) simulator is discussed. The simulator can generate and process image segments with full or partial corrections for range walk and quadratic phase-error correction. The simulations also include the effects of coherent target speckle, which is important in assessing SAR image quality. Results show that moderate auroral-zone scintillation will degrade an image to about the same level as any undisturbed image processed with only partial range-walk compensation. Thus, propagation effects are undoubtedly present in many of the SEASAT-A high-latitude images, but the degradation is comparable to other distortions introduced in the processing itself. Phase error compensation is effective, but amplitude scintillation is also important for larger disturbances. Ramifications of SAR imaging are discussed. Author

N86-27540# University Coll. of Wales, Aberystwyth.
HIGH-LATITUTDE SCINTILLATIONS USING NNSS SATELLITES
L. Kersley *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 7 p (For primary document see N86-27531 18-32)
(Grant AF-AFOSR-0037-84)
Avail: NTIS HC A25/MF A01

An experiment is described which has been established in Northern Sweden since September 1984 to monitor scintillations using transmissions from NNSS satellites. Designed for long-term nearly-unattended operation, with control and data handling based around a PDP 11/23 minicomputer, the equipment records and processes data from more than 20 NNSS passes per day. Stored on magnetic tape for further study for each 20s segment of received signal after suitable detrending, are S4-indices for both frequencies, the r.m.s. differential phase fluctuations, the differential phase rotation (differential doppler), together with statistics of signal fading below selected thresholds and durations of individual fades. Determination of satellite position in nearly-real time from the transmitted ephemeris parameters enables estimates of effective ionospheric irregularity height to be made for high-elevation passes by means of the cross correlation of signals received on two separated antennas. A second mode of operation allows the raw data to be stored for subsequent analysis. This has been used successfully for coordinated special program experiments in conjunction with the EISCAT ionospheric radar facility in the study of the physical processes reponsible for the scintillation-producing irregularities. Author

N86-27541# Mitre Corp., Bedford, Mass.
SHF/EHF RAY BENDING
D. L. Zimmerman, G. F. Providakes, D. L. Post, and S. H. Talbot (Rome Air Development Center, Griffiss AFB, N.Y.) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 6 p Sponsored in part by AF (For primary document see N86-27531 18-32)

Avail: NTIS HC A25/MF A01

Ray bending expected for narrow-beam satellite links in the atmosphere are discussed. Satellite communications terminals in the upper latitudes frequently operate at low elevation angles with high gain antennas. These antennas produce narrow beams that pass through the atmosphere at low terminal-to-satellite evaluation angles for communication with geostationary equatorial satellites. The propagation paths experience ray bending caused by earth curvature and a decrease in atmospheric refractivity with altitude. Unless these effects are properly accounted for, acquisition and tracking problems can occur. Ray bending was found to vary from about 0.1 degrees for 10 degrees elevation angles to about 0.75 degrees for 0 degrees elevation angles under standard atmospheric conditions. Bending was found to be nearly independent of frequency in the SHF/EHF (20 GHz to 50 GHz) region. Warm high-humidity areas tended to produce more bending. Potential problem areas, including tracking and spatial acquisition, are discussed for satellite systems. The authors propose using elliptic reflectors and analytic prediction of ray bending to minimize adverse effects of ray bending. Author

N86-27542# Communications Research Centre, Ottawa (Ontario).
E.H.F. PROPAGATION MEASUREMENTS ALONG SATELLITE-EARTH PATHS IN THE CANADIAN HIGH ARCTIC
I. Lam and J. I. Strickland *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 8 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Observations of the signal received from an EHF satellite beacon were made during June, August and December 1984 from a location in the Canadian arctic north of 80 deg N. The satellite follows an inclined orbit and as a result is visible for about eleven hours per day. During this period the elevation angle to the satellite varies between zero and approximately 21 degrees. The pointing of the receive antenna towards the satellite was achieved through computer-controlled tracking with a resolution better than 5% of the antenna beamwidth. Throughout the experimental period the changes in atmospheric conditions were mainly due to movement of air masses rather than diurnal variations in ground heating. Also, even though fog from the nearly ocean occurred frequently, there were no significant amounts of precipitation during the experiment. The results of the experiment indicate that signal fading occurs almost entirely at elevation angles less than approximately 5 degrees. Variations in the median signal level are presented as a function of the elevation angle. Also included are cumulative distributions of received signal level computed for various elevation angles. In general, the experimental results correlate well with the atmospheric conditions. The fading was found to be less severe in the winter than either spring or summer. Author

N86-27543# GEC-Marconi Electronics Ltd., Chelmsford (England).
IONOSPHERIC MODELLING AND HF RADIO SYSTEMS AT HIGH LATITUDES
S. Quegan, J. D. Milsom, and R. N. Herring *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 8 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Successful planning of HF radio systems to operate at high latitudes requires some means of predicting ionospheric morphology, both as regards ambient electron density and ionospheric irregularities causing backscatter. Because of the presence of several physical processes, and the sparsity of data, reliable statistical models are not easily constructed. However, increasing knowledge of the processes operating, and the availability of powerful computers, makes the construction of physically-based numerical models of ionospheric structure a viable proposition. Such a model at a fairly advanced stage of development is described. Examples of calculated electron densities are given. The ingredients and shortcomings of the model are be described, together with the steps to be taken to account for ionospheric irregularities, and to allow us to predict HF system performance using ray-tracing. Author

N86-27544# Rome Air Development Center, Hanscom AFB, Mass. Electromagnetic Sciences Div.
HIGH LATITUDE SPATIALLY ADAPTIVE PROPAGATION EXPERIMENT
Gary S. Sales, Raymond J. Cormier, Raymond A. Greenwald (Johns Hopkins Univ., Laurel, Md.), and Kile B. Baker *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 7 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

A special HF phased array was used to obtain high latitude HF propagation data. The antenna located at Goose Bay, Labrador, Canada, received HF transmission (8 to 20 MHz) from Thule, Greenland. The receiving antenna at Goose Bay consisted of two parallel linear arrays each with 16 horizontal log-periodic antennas. This system was used to measure both the azimuth and elevation angle of arrival of the propagated radio wave. Comparisons are made with model calculations and the received modes are analyzed to determine the presence of ionospheric tilts. Author

N86-27545# York Univ. (England). Dept. of Electronics.
TECHNIQUES FOR IMPROVING THE RELIABILITY OF MOBILE HF COMMUNICATIONS OVER HIGH-ABSORPTION PATHS
M. Darnell *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 15 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

System design aspects of the mobile HF communications problem in high-latitude regions are discussed. An attempt is made to identify the various techniques available for enhanced reliability of reception under high-absorption conditions and to indicate how these can be coalesced into an improved HF system design. The basic problem associated with excess absorption is that received signal-to-noise ratios (SNR's) are lower than those which might be expected for say mid-latitude paths. Specific methods by which the value of the SNR required at the receiver can be reduced, either directly or effectively are discussed. Techniques discussed include: (1) the use of various forms of diversity processing, emphasising the value of path/geographical diversity combining; (2) relaying out of the disturbed region with a view to avoiding the perturbed ionosphere and operating the transmitting antenna system more efficiently at a high frequency; (3) the use of meteor-burst and ionospheric scatter communication to complement normal HF communication; (4) the use of modulation and coding schemes requiring a relatively low SNR at the receiver; and (5) system control procedures. Author

N86-27546# Alaska Univ., Fairbanks. Geophysical Inst.
PROPAGATION CHARACTERISTICS OF MEDIUM FREQUENCY SKYWAVE SIGNALS FROM THE CONTINENTAL US AND CANADA RECEIVED AT FAIRBANKS, ALASKA
Robert D. Hunsucker, Brett S. Delana, and John C. H. Wang *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 14 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Since September 1981, an F.C.C.-sponsored medium-frequency (MF) skywave monitoring program has been in continuous operation at the Geophysical Institute of the University of Alaska. The receiver frequency is automatically stepped through 16 channels every five minutes by the system programmer. Recordings are continuously made of ten or more standard broadcast stations on digital tape cassettes, which are then transferred on a weekly basis to form a data base on a VAX 11/780-785 computer. A noise source has also been provided for system calibration. Three antennas have been utilized during the program to date, a 32-meter top-loaded vertical with ground screen being the primary antenna. Measurements of the electrical characteristics and computer modeling of the antenna systems have been made, and selected results are presented, as well as daily, seasonal and sunspot variation effects on measured MF skywave signal strengths. The summer/winter and magnetic activity effects are profound on medium and long-distance paths to

Fairbanks. Present plans are to continue this monitoring program until Fall 1987 at least half of a sunspot cycle. Author

N86-27547# Paris-Sud Univ., Cachan (France). Lab. d'Etude des Transmissions Ionospheriques.
OPTIMISATION DES SYSTEMS OF TRANSMISSION NUMERIQUE TRANSAURORAUX EN ONDES DECAMETRIQUES OPTIMIZATION OF H.F. DIGITAL RADIO SYSTEMS AT HIGH LATITUDES
C. Goutelard, J. Caratori, and A. Nehme *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 18 p In FRENCH; ENGLISH summary (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

High latitudes are inevitably encountered in telecommunications, especially in long distance transmissions. At high latitudes the following phenomena appear: auroral and polar absorptions, spread F, perturbations aligned with the magnetic field, sporadic E... which make long distance transmission characteristics special. Researchers were able to establish a channel model from experimental observations of transmissions travelling through high latitudinal regions. The parameters of the model must include the perturbations found at high latitudes, the length of the transmission, and its position relative to the magnetic pole and the auroral zone. From these models, which point out the spectral modifications of the signal, the fading, the duration of coherence, researchers determined the classes of signals which can be needed for H.F. digital telecommunications with the aim of diverse techniques: serial or parallel transmissions, autoadaptative systems, coded transmission systems. Author

N86-27548# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
OBSERVATIONS WITH AN IONOSONDE IN NORTHERN GERMANY NEAR THE MID-LATITUDE TROUGH c46
Thomas Damboldt *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 5 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

A new-vertical incidence ionosonde was installed more than two years ago near Hamburg, in order to improve HF propagation predictions and frequency management. HF propagation in the North-Sea and Baltic-Sea areas - close to the auroral zone, near the mid-latitude trough - is highly variable. This manifests itself also on the ionograms. Many of them show peculiarities normally not seen farther south. The day-to-day variation of measured ionospheric characteristics is compared with those obtained by the CCIR method (Report 340). In addition statistics of ionospherically disturbed days in the years 1983 and 1984 are given and compared with measurements of the variations of the geomagnetic field at the near-by observatory Wingst. Although the ionosonde is used mainly as a tool for up-to-date HF propagation predictions, the collected data can be of considerable use also for the design of new HF radio systems in the area under consideration. Author

N86-27549# Rutherford High Energy Lab., Chilton (England).
IONOSPHERIC FACTORS AFFECTING THE PERFORMANCE OF HF SKY-WAVE SEA-STATE RADARS AT HIGH LATITUDES
P. A. Bradley, A. J. Gibson, J. C. Schlobohm (SRI International Corp., Menlo Park, Calif.), and D. E. Westover *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 14 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Sky-wave radars provide a means of ocean surveillance beyond line of sight and beyond the ranges achievable with a ground-wave radar. However, the ionosphere introduces a number of important propagation limitations. Firstly, it is necessary to provide illumination of the areas of interest, which may place restrictions on radar sitting and periods of operation. Then, backscattered signals must have sufficient amplitude to provide adequate discrimination above the naturally occurring and interference backgrounds. A radar measures time-of-flight and such information needs transforming to equivalent ground range in terms of the prevailing ionospheric path. Finally, ionospheric motions create Doppler shifts and spreads of the returned signals which prevent spectral resolution of Bragg scattered components. The high-latitude ionosphere is characterised by features which exhibit marked spatial and temporal variability. Specific problems are discussed and possible ways of alleviating some of these considered. Author

N86-27550# Paris VI Univ. (France).
SPECTRAL CHARACTERISTICS OF HIGH FREQUENCY WAVES BACKSCATTERED BY SMALL SCALE F REGION IRREGULARITIES: EVIDENCE OF STRONG SUB-AURORAL ION FLOW
A. Bourdillon *In* AGARD Propagation Effects on Military Systems in the High Latitude Regin Nov. 1985 16 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

The spectra of H.F. waves backscattered at night by small scale (10 to 20 m) sub-auroral F region irregularities often exhibit large Doppler shifts and widths in the local time sector 2000 to 2400. After local midnight the Doppler shifts and the widths of the spectra decrease rapidly. Examples of experimental data obtained with the two coherent backscatter radars of the EDIA experiment, showing the spectral characteristics just mentioned are given. From the Doppler shift measured at the two sites researchers deduced the perpendicular velocity of the irregularities, which can reach values as high as 2000 m/s. These observations are interpreted using results of theoretical models which predict strong sub-auroral ion flow in the trough region. Author

N86-27551# Toulon Univ. (France). Lab. de Sondages Electromagnetiques de l'Environment.
SMALL-SCALE IRREGULARITIES IN THE HIGH-LATITUDE F REGION c46
C. Hanuise, J. P. Villain, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), and G. Caudal (Centre National de la Recherche Scientifique, Saint-Maur-des-Fosses, France) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 12 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Coordinated observations performed at high and very high latitudes in the European sector with the ISOPROBE experiment on board the AUREOL 3 satellite, the EISCAT incoherent scatter radar and the SAFARI HF coherent radar system are reported. The latitudinal profiles of electron density measured by the incoherent scatter radar are used to determine the influence of the propagation of the HF radio wave on the detectability of the density variations deduced from in-situ measurements. The physical processes leading to the formation of the fluctuations are studied at several wavelengths from in-situ and radar data. The phase velocity vector constructed from the radial velocities measured by two HF radars are compared to the plasma drift measured with the EISCAT facility under various geophysical conditions. The excellent agreement between the estimates confirms, as predicted theoretically, that the F-region small-scale irregularities are drifting with the bulk plasma. Their motion can therefore can therefore be used to derive the two-dimensional flow pattern of plasma convection in the auroral and polar ionosphere. Author

N86-27552# SRI International Corp., Menlo Park, Calif. Radio Physics Lab.
ON THE RELATIONSHIP OF F-REGION STRUCTURE IN THE DAYSIDE AURORAL OVAL TO HF BACKSCATTER SIGNATURES ATTRIBUTED TO THE POLAR CUSP c46
J. D. Kelly, R. T. Tsunoda, J. K. Olesen (Danish Meteorological Inst., Copenhagen.), and P. Stauning *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Ionosonde measurements in the vicinity of the dayside auroral oval are characterized by complex signal returns. These are thought to be associated with the structure of the electron density in the F-region attributed to processes associated with the polar cusp.

The results of a comparison of simultaneous, incherent-scatter radar measurements and ionosonde measurements of the dayside auroral-zone ionization are given. This experiment takes advantage of the unique geometry of the Sondrestrom radar operated by SRI International at Sondre Stromfjord, Greenland, and the ionosondes operated by the Danish Meteorological Institute at Godhavn and Sondre Stromfjord, Greenland. The radar was operated while the antenna scanned in the magnetic meridian. The locations of the ionosondes are in that meridian. The radar data greatly assist in the interpretation of the complex ionograms. The F-region structure in electron density is closely associated with specific features in the plasma convection patterns. The F-region structure associated with the plasma convection reversal (polar-cap boundary) in the postnoon sector and its ionogram signature were studied. The ionograms are charact erized by oblique echoes when the convection reversal is either poleward or equatorward of the ionosonde. The radar data indicate that the gradient in the electron density enhancement is similar on the poleward and equatorward edges, and that the enhancement is extended along the convection reversal for many hours. Author

N86-27553# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.

OBSERVATIONS OF VERY HIGH LATITUTDE IONOSPHERIC IRREGULARITIES WITH THE GOOD BAY HF RADAR c46

R. A. Greenwald and K. B. Baker *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 17 p (For primary document see N86-27531 18-32)

Avail: NTIS HC A25/MF A01

The Goose Bay HF radar is a sophisticated instrument capableof providing detailed information on very high latitude E and F region ionospheric electron density irregularities which act as a source of clutter on OTH radar systems. Through the use of two parallel phased array antennas, this instrument is able to image the ocation of these irregularities within a three-dimensional volume covering much of northeastern Canada and Greenland. It is also capable of following the temporal variability of these irregularities as well as determining unambiguously the Doppler shift and broadening of radar signals scattered by them. Initial results with a single phased array antenna which represent typical examples of the spatial intensity distribution of these irregularities at different local times are presented. Examples of Doppler spectra of the irregularities at different local times are given. Data of this type are of appreciable value in ascertaining the techniques that must be utilized to improve clutter mitigation on high latitude radar systems. Author

N86-27554# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.

OBSERVATIONS OF THE MID-LATITUDE IONOSPHERIC TROUGH FROM ANTARCTICA c46

F. T. Berkey and M. J. Jarvis (British Antarctic Survey, Cambridge (England).) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 25 p (For primary document see N86-27531 18-32)

(Grants NSF DPP-81-00220; NSF DPP-83-08044)

Avail: NTIS HC A25/MF A01

Measurements of the ionosphere using two identical digitally controlled high frequency radar systems have been conducted in the Antarctic from the Halley and Siple Stations. These stations are uniquely sited, both having essentially identical coordinates of geographic and geomagnetic latitude. Furthermore, due to the large offset of the geographic and magnetic poles in Antarctica, the difference in magnetic local time is less than half the separation in local solar time. The locations of the minimum and poleward edge of the trough have been found for magnetically quiet intervals and mapped into invariant latitude. Simultaneous measurements of the trough location from Siple and Halley have been compared using magnetic, local and universal time coordinates. For geomagnetically quiet conditions, this analysis suggests that the invariant latitude of the poleward edge has a Universal Time dependence prior to local midnight. The presence of the ionospheric trough introduces a further degree of complexity to the subauroral ionosphere which, in turn, complicates automatic realtime processing of digital ionograms. Several examples of a technique termed elevation angle filtering are presented and the effect of the presence of the ionospheric trough on this process is examined. Author

N86-27555# British Antarctic Survey, Cambridge (England).

THE VARIABILITY AND PREDICTABILITY OF THE MAIN F-REGION TROUGH DETERMINED USING DIGITAL IONOSPHERIC SOUNDER DATA c46

Alan S. Rodger and John R. Dudeney *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 11 p (For primary document see N86-27531 18-32)

Avail: NTIS HC A25/MF A01

The main F-region (or mid-latitude) electron density trough occurs near lambda = 60 degrees and is associated with significant meridional gradients in electron concentration. Despite many satellite studies of the trough, the causes of the variability of its shape as a function of time, geomagnetic and solar activity is still poorly understood. This is illustrated by the large discrepancies between the various empirical formulae tht have been developed to estimate the trough latitude for specified geomagnetic conditions. These problems arise partly because satellite data cannot be used to differentiate adequately between spatial and temporal variations. In 1981, a new and powerful research tool for trough studies has become available. The observations from this equipment have significantly improved our understanding of several features of trough morphology and in particular the causes of some of the variability. The four aspects of this variability that are discussed here are the orientation of the poleward edge of the trough with respect to Halley; the variation of the maximum plasma frequency of the poleward edge; the signature of the Harang discontinuity in the poleward edge and the latitudinal movement of the poleward edge as a function of time and geomagnetic activity. A framework is described for incorporating these aspects of trough morphology into a realistic model for predicting the location and maximum plasma density of the poleward edge as a function of time and the prevailing geomagnetic conditions. Author

N86-27556# Alaska Univ., Fairbanks. Geophysical Inst.

PROGRESS IN MODELLING THE POLAR IONOSPHERE FROM SOLAR AND MAGNETOSPHERE PARAMETERS c46

B. J. Watkins, S.-I. Akasofu, and C. D. Fry *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 5 p (For primary document see N86-27531 18-32)

Avail: NTIS HC A25/MF A01

Solar and magnetospheric parameters have been used as inputs to a three dimensional ionospheric model covering the polar cap and auroral zone latitudes for heights 120 to 500 km. The development of this model is reported. Using solar and magnetosphere parameters, the solar radiation and convective electric field structure are defined. Solutions to the momentum and continuity equations for ionization densities are obtained vertically along magnetic field lines as they move under the influence of convective electric fields. The critical measurements that are needed to use such a model to predict ionospheric conditions at polar regions are discussed. Author

N86-27557# Lancaster Univ. (England). Dept. of Environmental Science.

STATISTICS OF AURORAL RADIO ABSORPTION IN RELATION TO PREDICTION MODELS

J. K. Hargreaves, M. T. Feeney, and C. J. Burns *In* AGARD Propagation Effects on Military System in the High Latitude Region Nov. 1985 10 p Sponsored in part by Royal Aircraft Establishment, Farnborough, England, and by the Science and Engineering Research Council (For primary document see N86-27531 18-32)

Avail: NTIS HC A25/MF A01

The prediction of HF propagation conditions at high latitude requires a knowledge of the statistics of radio absorption in the auroral ionosphere, a highly variable phenomenon depending on local time, magnetic latitude, season and solar activity. Data from riometer stations may be compiled to provide statistics on the

auroral radio absorption. Questions regarding the probability distribution and variations with latitude, solar and geomagnetic activity, and longitude are considered. Difficulties concerning the smallest absorption values are pointed out. Author

N86-27558*# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Scien
FORMATION AND DETECTION OF HIGH LATITUDE IONOSPHERIC IRREGULARITIES **c46**
M. C. Lee, J. Buchau (Air Force Geophysics Lab., Hanscom AFB, Mass.), H. C. Carlson, Jr., J. A. Klobuchar, and E. J. Weber *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 14 p (For primary document see N86-27531 18-32)
(Grant NAG5-270; Contract F19628-83-K-0024)
Avail: NTIS HC A25/MF A01

Measurements of Total Electron Content (TEC) and airglow variations show that large scale plasma patches appearing in the high-latitude ionsophere have irregular structures evidenced by the satellite phase and amplitude scintillations. Whistler waves, intense quasi-DC electric field, and atmospheric gravity waves can become potential sources of various plamsa instabilities. The role of thermal effects in generating ionospheric irregularities by these sources is discussed. Meter-scale irregularities in the ionospheric E and F regions can be excited parametrically with lower hybrid waves by intense whistler waves. Ohmic dissipation of Pedersen current in the electron gas is able to create ionospheric F region irregularities in plasma blobs or plasma patches (i.e., high ambient plasma density environment) with broad scale lengths ranging from tens of meters to a few kilometers. Through the neutral-charged particle collisions, gravity waves can excite large-scale (less than tens of kilometers) ionospheric irregularities simultaneously with forced ion acoustic modes in the E region. The large-scale ionospheric density fluctuations produced in the E region can extend subsequently alogn the earth's magnetic field to the F region and the topside ionospheric regions. These mechanisms characterized by various thermal effects can contribute additively with other processes to the formation of ionospheric irregularities in the high latitude region. Author

N86-27559# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
DIRECT, IN-SITU MEASUREMENTS OF IRREGULARITIES IN THE MESOSPHERE (85 - 50 km) AT 69 DEG N (ANDENES, NORWAY) **c46**
Hans-Ulrich Widdel *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

One of the problems of the physics of the mesosphere which is apparently not yet completely solved is which hydrodynamic mechanisms can cause transient vertical and horizontal gradients of electron density and neutral air density. Such gradients give rise to scattered signals of radio waves at different frequencies. Well-known are the 'partial echoes' observed on short wave frequencies below about 100 km down to about 60 km. They seem to occur at certain 'preferred' heights which seem to change with season and latitude. Because the distribution of ionization at such low altitudes, once produced, is primarily controlled by the neutral atmosphere. Investigations of the dynamics of the neutral atmosphere combined with simultaneous radio wave measurements promise some advance of knowledge. It was shown that small foil clouds, together with proper techniques of observation can be used to study in detail a number of dynamic effects in the neutral atmosphere with high spatial resolution. This high spatial resolution revealed that some atmospheric structures seem to be very local. Further, the radar range gate echo records showed that the radar tracking data do not always tell the full story. To obtain a better picture, more than one chaff target, separated in space, should be tracked simultaneously. This calls for a 3D-multiacquisition-multitarget radar for tracking. Author

N86-27560# Rome Air Development Center, Hanscom AFB, Mass.
CONDUCTIVITY PROFILES OF THE DISTURBED POLAR IONOSPHERE FROM VLF REFLECTION DATA
P. A. Kossey, J. E. Rasmussen, E. C. Field (Pacifica-Sierra Research Corp., Los Angeles, Calif.), and C. R. Warber *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 11 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Two independent techniques are used to determine conductivity profiles of the lower polar ionosphere during a strong solar proton event (SPE). The first method inverts reflection coefficients measured with a groundbased VLF sounder; the second uses proton fluxes measured on board satellites to calculate ion-pair production rates, which, in turn, are input to lumped-parameter de-ionization equations. Conductivities determined by the two methods exceed ambient by two or more orders of magnitude, but disagree by up to an order of magnitude at altitudes between fifty and sixty kilometers. Full-wave calculations are used to predict the effect of the SPE-disturbed profiles on long range VLF propagation in the earth-ionosphere waveguide. The SPE is found to suppress the geomagnetically converted transverse electric field radiated by a groundbased vertical electric dipole. Author

N86-27561# Bonn Univ. (West Germany). Radioastronomical Inst.
A STUDY OF ULF PROPAGATION AT HIGH SOUTHERN LATITUDES USING SFERICS
H. Volland, M. Schmolders, G. Proelss, and H. Kroeninger (National Electrical Engineering Research Inst., Pretoria (South Africa).) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Sferics are electromagnetic pulses generated by lightning events. Their maximum spectrum energy is in the frequency range below 15 kHz. These powerful natural VLF transmitters can be used to determine the propagation characteristics of the atmospheric wave guide between earth and ionospheric D layer along virtually every propagation path. A VLF-sferics-analyzer was operating at the German antarctic Von Neumayer station from January to July 1983. This analyzer records sferics from distant lightning events in the frequency range between 5 and 9 kHz. The method of measurement is described. The data of June 1983 are evaluated, and the distances of the sources are determined by a comparison with rainfall records during the same month and, in addition, with sferics recordings from a station in Pretoria, South Africa. The data evaluation of the propagation conditions is compared with theoretical calculations. The main result is that the virtual reflection height of the ionospheric D layer is between about 78 km at noon and about 84 km during midnight in reasonable agreement with the theory. The difference between west-to-east and east-to-west propagation is smaller than the theory predicts indicating that the ionospheric D layer at high souther latitudes behaves more isotropic with respect to VLF propagation than at mid-latitudes. Author

N86-27562# Pacifica-Sierra Research Corp., Los Angeles, Calif.
EFFECTS OF THE IONOSPHERE ON ELF SIGNALS DURING POLAR CAP ABSORPTION EVENTS: COMPARISON OF THEORY AND EXPERIMENTS
E. C. Field, C. R. Warber, and R. G. Joiner (Office of Naval Research, Arlington, Va.) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

In order to calculate extremely low frequency (ELF) propagation when the earth-ionosphere waveguide is not stratified, a hybrid method is developed that uses full-wave theory to determine local parameters of the TEM mode, but uses ray theory to describe the field's horizontal variations. The method is applied to several model solar proton events (SPEs), including one based on the weak 23 November 1982 event. Calculations predict diminished fields near the Gulf of Alaska, where a submarine-borne receiver measured

an unusually severe signal reduction. That behavior is caused by lateral refraction, which bends the signal away from the polar cap boundary and into the central cap where, during an SPE, the phase velocity of the TEM mode is slowest. The theory also predicts an enhanced field just inside the polar cap boundary, but no data are available to test that result. Author

N86-27563# Norwegian Telecommunications Administration, Oslo.
WORLD ATLAS OF GROUND CONDUCTIVITIES WITH PARTICULAR EMPHASIS ON THE HIGH LATITUDE REGION
Knut N. Stokke *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 12 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Methods of predicting the phase and amplitude of ground waves are discussed. An important feature concerning transmission of ground waves is the ground conductivity. Information about the ground conductivity has been, and is, important for the planning work in the International Telecommunication Union (ITU). Therefore very early in the work of IWP 5/1 the necessity of a ground conductivity atlas was recognized, and in 1978 the IWP 5/1 was formally given the task to produce a world atlas (CCIR Decision 3). Information about the ground conductivity has been received from about 50 countries, but there are some problems concerning the way in which the informations are presented. However, measuring campaigns will give better data and will also give better informations from other areas. The first edition of the Atlas is planned before the CCIR Final Studygroup Meetings September - November 1985. Author

N86-27564# Royal Aircraft Establishment, Farnborough (England).
METEOR SCATTER RADIO COMMUNICATION AT HIGH LATITUDES
P. S. Cannon, A. H. Dickson, and M. H. Armstrong *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 18 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

A brief historical and physical description of the meteor burst communications (MBC) technique is given together with a discussion of the advantages of very high frequency MBC, with respect to conventional high frequency communication, when used at high latitudes. A recently deployed high latitude MBC propagation experiment, between Bodo in Norway and Wick in Scotland (UK) is described and some of the early data gathered at frequencies close to 40 MHz and 70 MHz is presented. A theoretical description of the effects of Polarisation Rotation in a linearly polarised MBC system is developed and it is shown that at 40 MHz Polarisation Rotation, due to excess D-region ionization may cause the system performance to differ from its ambient level. Corroborative experimental results, over a temperature latitude path, are presented. Based upon the early high latitude experimental results and on the theoretical calculations, it is suggested that frequencies close to 40 MHz, in common use in atemperate latitude linearly polarised MBC systems, are too low for high latitude operation. Author

N86-27565# Danish Research Center for Applied Electronics, Hoersholm.
CHARACTERISTICS OF HIGH LATITUDE METEOR SCATTER PROPAGATION PARAMETERS OVER THE 45 - 104 MHz BAND
J. C. Ostergaard, J. E. Rasmussen, M. J. Sowa, J. M. Quinn, and P. A. Kossey *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 15 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

Data being acquired on a high latitude test-bed, to assess the performance of meteor scatter propagation over the 45 to 104 MHz band, are described. Emphasis is on data obtained over a 1200 km path in northern Greenland, which includes initial estimates of the availability of usable meteor trails, the potential performance of meteor scatter systems, and the application of adaptive data rates to improve system performance. The use of the data to validate and expand propagation prediction techniques for the polar region is also discussed. Author

N86-27566# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Electromagnetic Wave Propagation Panel.
PROPAGATION IMPACT ON MODERN HF COMMUNICATIONS SYSTEM DESIGN
Loughton, England Mar. 1986 187 p Lecture series held in Brussels, Belgium, 21-22 Apr. 1986; in Issy-les-Moulineaux, France, 24-25 Apr. 1986; and in Copenhagen, Denmark, 28-29 Apr. 1986 (AGARD-LS-145; ISBN-92-835-1521-8) Avail: NTIS HC A09/MF A01

AGARD Lecture Series 145 is concerned with high frequency communications and is sponsored by the Electromagnetic Wave Propagation Panel of AGARD and implemented by the Consultant and Exchange Program. The aim of these lectures is to survey problems in the field of HF Communications. The lectures cover needs of both the civil and military communities for high frequency communications. They discuss concepts of real time channel evaluation, system design, as well as advances in equipment, in propagation, and in coding and modulation techniques. The lectures are aimed to bring non-specialists in the field up to date so that HF communications can be considered as a viable technique at this time. The problems, difficulties and limitations of HF are also outlined. For individual titles, see N86-27567 through N86-27576.

N86-27567# Hull Univ. (England). Dept. of Electronic Engineering.
THE DESIGN OF STATIC AND MOBILE HF COMMUNICATION SYSTEMS
M. Darnell *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 25 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The lecture deals with more specific aspects of HF communication system design arising from a previous lecture entitled HF system design principles presented as part of AGARD Lecture Series 127 in 1983. The major topics considered are: (1) the design of point-to-point systems; (2) the design of systems involving mobile terminals; (3) system control and frequency management; (4) resistance to interception and disruption. The lecture is intended to provide a technical framework for later lectures covering the more detailed aspects of HF communication system design. Author

N86-27568# Norwegian Defence Research Establishment, Kjeller.
PROPAGATION 1: STATE OF THE ACT OF MODELLING AND PREDICTION IN HF PROPAGATION
E. V. Thrane *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 21 p Previously announced as N83-30864 (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The lecture reviews the state of the art in HF propagation modelling and describes the principles of radio frequency predictions. As a basis for the discussions, a brief introduction is given to the ionospheric parameters of importance to HF-propagation. Current methods for frequency prediction are semi-empirical, that is they depend upon a large data base of ionospheric physical models of the ionosphere and of radio wave propagation through the medium. In addition models of the noise and interference environment must be included. The lecture discusses the principles on which the methods are based, as well as their limitations. Examples are given of the use of predictions in system planning and communications. The relative importance of skywave and ground wave communications in the HF-band is discussed. Author

N86-27569# Hull Univ. (England). Dept. of Electronic Engineering.
EMBEDDED REAL-TIME CHANNEL EVALUATION TECHNIQUES

M. Darnell *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 16 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The requirement for real-time channel evaluation (RTCE) in HF systems is identified and discussed in detail. Various scenarios in which RTCE is applicable are examined and classified. Specific RTCE techniques and systems are then described including: Pulse/modulated pulse sounding, chirp sounding, limited channel monitoring, interference characterization, and in-band RTCE. The application of RTCE to practical HF systems is discussed and the benefits accruing from its use quantified. Author

N86-27570# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
AN INTRODUCTION TO ERROR-CONTROL CODING WITH APPLICATION TO HF COMMUNICATIONS
Mario D. Grossi *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 16 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The increasing demand for reliable, low error-rate, high-speed digital data transmission at HF has created the need for the adopting of coding schemes. As it is well appreciated by the practicing communicator, a problem in high-speed data transmission is the occurrence of errors. Codes provide an effective approach for the reduction of the error rate. Linear block codes (of which cyclic codes are a subclass) and convolutional codes are the main categories of codes of interest to HF communications. They are capable of correcting random errors due to white Gaussian noise, as well as burst errors due to impulse noise. In block codes, a block of information bits is followed immediately by a group of check bits. The latter verify the presence of errors in the former. In convolutional codes, check bits are continuously interleaved with information bits, and they check the presence of errors not only in the block immediately preceeding them, but in other blocks as well. For the various coding schemes reviewed in the lecture, several numerical examples are given, to help in the quantitative appraisal of the merits of a code, versus required equipment complexity. Author

N86-27571# Signatron, Inc., Lexington, Mass.
MODERN HF COMMUNICATIONS, MODULATION AND CODING
P. Monsen *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 13 p Previously announced as N83-30867 (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

Digital communications over High Frequency radio channels are limited by the effects of time varying multipath signals and an impulsive noise characteristic. Modulation techniques which utilize adaptive receiver structures in conjunction with advanced error correction coding concepts can provide quality communication at both low data rates around 10 bps and high data rates around 2400 bps. The multipath channel is examined and two basic constraints are introduced. When the learning constraint is satisfied, it is possible to estimate the channel multipath gain and phase components. The diversity constraint establishes the necessary condition for implicit diversity. For low data rate applications where Intersymbol Interference (ISI) is negligible, adaptive receivers are discussed when both learning and diversity constraints are satisfied. An incoherent adaptive receiver is discussed for applications where the learning constraint is not satisfied. For high data rate applications, both constraints are satisfied in an HF application but ISI effects are severe. Adaptive techniques including equalizers and maximum likelihood sequence estimators are discussed. Experimental results from HF channel simulator tests are presented in a comparison of nonadaptive and adaptive high speed modems. We discuss the use of error correction coding to protect against impulsive noise and show that multipath fading reduces the theoretical performance capability by only 1 to 3 dB when proper coding and interleaving are employed. Performance of practical coding schemes using channel state information are used to show the potential performance on an HF channel. Author

N86-27572# Petrie Telecommunications, Nepean (Ontario).
EQUIPMENT: ANTENNA SYSTEMS
L. E. Petrie *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 5 p Previously announced as N83-30868 (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

Some antenna fundamentals as well as definitions of the principal terms used in antenna engineering are described. Methods are presented for determining the desired antenna radiation patterns for HF communication circuit or service area. Sources for obtaining or computing radiation pattern information are outlined. Comparisons are presented between the measured and computed radiation patterns. The effect of the properties of the ground on the antenna gain and the pattern are illustrated for several types of antennas. Numerous examples are given of the radiation patterns for typical antennas used on short, intermediate and long distance circuits for both mobile and fixed service operations. The application of adaptive antenna arrays and active antennas in modern HF communication systems are briefly reviewed. Author

N86-27573# Mitre Corp., Bedford, Mass.
DEVELOPMENTS IN HF EQUIPMENT AND SYSTEMS MOBILE AND PORTABLE TERMINALS
Q. C. Wilson *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 19 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

Before the advent of satellite platforms, sophisticated high frequency (HF) propagation and system research promised improved capability during disturbed ionospheric propagation conditions. However, satellite relays captured the imaginations and pocketbooks of the communications community in the mid-1960s. Consequently, extant HF systems aged while satellite systems were implemented. During peacetime, satellite systems transmit quality low data rate communications and navigation aids to mobile users, but there is now renewed interest in the low cost and survivability attributes of HF radio. At this time, when old HF prime systems need replacement for logistical reasons, the need for low cost communications that can survive jamming, nuclear effects, and space warfare is not satisfied. The HF renaissance is the response to this challenge. Logistical replacement procurements that provide new capabilities are redressing the attrition of vacuum-tube radio equipment over the last decade. Procuring organizations typically compile specifications comprising state-of-the-art and new capabilities offered by competing vendors. Integrated circuits, which include microprocessors, synthesizer elements, and other evolving components, have led to new circuit architectures. The first of the following three sections describes: Receivers; Transceivers and Antenna Couplers; Antenna Kits; and Audio Channel Peripherals. Author

N86-27574# Norwegian Defence Research Establishment, Kjeller.
PROPAGATION 2: PROBLEMS IN HF PROPAGATION
E. V. Thrane *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 17 p Previously announced as N83-30870 (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The ionosphere is not a perfect reflector for HF-waves, and the lecture will review some of the resulting propagation problems. Some of these are encountered during undisturbed ionospheric conditions, such as multipath reflections, but most problems are associated with geophysical disturbances. Solar flares and associated magnetic storms cause absorption, low MUF (Maximum Useable Frequency), scatter due to irregularities, etc., The ionosphere is particularly variable in high latitudes where auroral phenomena influence the reflecting properties of the ionospheric layers. The lecture discussed the presently available short term forecasting techniques, and it also deals with possible ways of

minimizing the effects of ionospheric disturbances, such as path and time diversity, the use of early warnings, and back-up systems. Author

N86-27575# Harvard-Smithsonian Center for Astrophysics, Cambridge, Mass.
MEASUREMENTS OF HF PROPAGATION PARAMETERS FOR REAL-TIME CHANNEL EVALUATION (RTCE) SYSTEMS
Mario D. Grossi *In* AGARD Propagation Impact on Modern HF Communications System Desing Mar. 1986 14 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

HF propagation paths are time-spread and frequency-spread channels, and are characterized by severe variability in the time domain of all their properties, inclusive of path losses. In addition, even when path conditions would be affordable,the link may be severely interfered with by other transmitters. Improvements over present-day link's performance in terms of circuit reliability, data rate and error rate can be achieved through the use of adaptive schemes capable of coping with the variability of the channel. Recent advances in microprocessor technology, in frequency-agile HF equipment and in the understanding of the propagation medium, make it feasible and practical to use adaptive schemes at HF. The simplest approach is to make the link adaptive to a selected channel parameter such as the Signal-to-Noise ratio. At the other extreme, the adaptive links can be designed to respond to all relevant channel functions, such as Signal-to-Noise ratio, multipath spread, Doppler spread, etc. In all cases, a necessary prerequisite for link's adaptivity is Real-Time Channel Evaluation (RTCE). The RTCE data gathering must match in scope and complexity the adaptivity scheme that is meant to serve. For instance, if the link's data rate is adjusted only to the Signal-to-Noise ratio, the RTCE must be kept very simple and must be reduced to the sole measurement of the signal intensity and to the level of the noise, inclusive of interference. Measurement of pertinent link's parameters by the RTCE must be performed at several spot frequencies in the band of interest, in order to identify automatically the most suitable carriers for the transmission of the information. RTCE is at present in the R&D phase, and the related activities consist almost solely of the measurement of signal amplitude and noise levels, inclusive of interference, at several frequencies in specific HF paths of interest, with only a few instances of inclusion of multipath spread measurements. At the successful completion of the R&D activity, it is expected that in a form or another, RTCE and the related adaptive schemes will enter the practice of modernized HF communications. Author

N86-27576# Petrie Telecommunications, Nepean (Ontario).
ADAPTIVE SYSTEMS IN OPERATION
L. E. Petrie *In* AGARD Propagation Impact on Modern HF Communications System Design Mar. 1986 10 p (For primary document see N86-27566 18-32)
Avail: NTIS HC A09/MF A01

The development and evolution of channel evaluation techniques is described. A recently developed fully automatic HF radio telephone system is discussed which automatically selects the suitable channel and also provides a telephone inter-connects. Also described is a HF message terminal which automatically requests, repeats and confirms message status for sender and receiver. Author

N86-27301*# Computer Sciences Corp., El Segundo, Calif.
THE NORTHERN UTAH SATELLITE (NUSAT) COMMUNICATIONS LINK
Lee Barrett *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 25-32 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27490# Joint Publications Research Service, Arlington, Va.
IMPROVEMENT OF LARGE SIGNAL INTERACTION MODEL FOR TWT
Wenmiao Song, Yongquan Liu, and Jingxian Wu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 117-126 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 136-143 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27492# Joint Publications Research Service, Arlington, Va.
VERTICAL POLARIZED ANTENNA FOR SYNTHETIC APERTURE RADAR
Ruxian Wang and Guanhong Shen *In its* China Report: Science and Technology (JPRS-CST-98-008) 1 Mar. 1986 p 136-140 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 158-160 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27495# Joint Publications Research Service, Arlington, Va.
ADMITTANCE OF RECTANGULAR WAVEGUIDE OF SLOT ARRAY MEASURED
Zhixin Li *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 158-163 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 3, May 1983 p 227-231 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27503# Joint Publications Research Service, Arlington, Va.
COUPLING PROPERTIES OF SLOTTED ANTENNA STUDIED
Shanwei Lu, Jishi Ren, and Yin Fang *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 —p 54-70 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 5, Sep. 1985 p 92-101 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27504# Joint Publications Research Service, Arlington, Va.
RADAR ANTENNA TRANSIENT EFFECTS STUDIED
Hannan Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 —p 71-81 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 11, no. 6, Nov. 1983 p 80-87 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27763*# Kyoto Univ. (Japan). Radio Atmospheric Science Center.
THE MU RADAR: CURRENT STATUS AND FIRST RESULTS
Susumu Kato, Shoichiro Fukao, Toshitaka Tsuda, and Toru Sato *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-27577*# National Aeronautics and Space Administration, Washington, D.C.
DESIGN REQUIREMENTS FOR RIGID PRINTED WIRING BOARDS AND ASSEMBLIES
Jan. 1986 98 p
(NHB-5300.4(3K); NAS 1.18:5300.4(3K)) Avail: NTIS HC A05/MF A01; also available SOD HC $5 as 033-000-

00982-8 CSCL 09A

The NASA requirements for assuring reliable rigid printed wiring board design are prescribed. Basic considerations necessary to assure reliable rigid printed wiring board design are described and incorporated. B.G.

N86-27578# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NEAR-FIELD TESTING OF THE 30 GHz TRW PROOF-OF-CONCEPT MULTIBEAM ANTENNA

Richard R. Kunath, Jr. and Robert J. Zakrajsek 1986 11 p

Proposed for presentation at the Antenna Measurements Techniques Association 8th Annual Meeting and Symposium, Ottawa, Ontario, 23-25 Sep. 1986; sponsored by the National Research Council of Canada and the AMTA

(NASA-TM-87357; E-3115; NAS 1.15:87357) Avail: NTIS HC A02/MF A01 CSCL 09C

Near-field testing was conducted on the 30 GHz TRW proof-of-concept (POC) Multibeam Antenna (MBA). The TRW POC MBA is a dual offset Cassegrain reflector system using a 2.7 m main reflector. This configuration was selected to assess the ability to create both multiple fixed and scanned spot beams. The POC configuration investigated frequency reuse via spatial separation of beams, polarization selectivity and time division multiple access scanning at 30 GHz. Measurements of directivity, sidelobe level, and pattern were made at NASA Lewis Research Center's Near-Field Antenna Test Facility. Presented in this paper are complete results of these measurements. Included is a detailed discussion of all testing procedures and parameters. Results of additional testing used to evaluate diffraction effects of the subreflector and distortions of the main reflector are also presented. Author

N86-27579# ITT Advanced Technology Center, Shelton, Conn.

QUALITY PROCEDURES FOR VLSI/VHSIC (VERY LARGE SCALE INTEGRATED AND VERY HIGH SPEED INTEGRATED CIRCUITS) TYPE DEVICES Final Report, Sep. 1983 - Sep. 1985

Seymour Cohen Nov. 1985 135 p

(Contract F30602-83-C-0083)

(AD-A164885; RADC-TR-85-219) Avail: NTIS HC A07/MF A01 CSCL 09/5

Procedures for microcircuit screening and qualification to ensure the reliability and uniformity of VLSI/VHSIC devices were prepared. The use of Process Control Monitors (PCM) and Reliability Evaluation Modules (REM) were incorporated in the procedures. In addition, recommended guidelines for the evaluation of Computer-Aided-Manufacturing (CAM) facilities were generated in this study. A proposed replacement was provided for existing Method 5007 to MIL-STD-883, Wafer Acceptance Procedure which incorporates reliability screening, process quality evaluation, and electrical parameter testing of each wafer in a lot. GRA

N86-27580# Illinois Univ., Urbana. Coordinated Science Lab.

ASYMMETRICAL COUPLED COPLANAR-TYPE TRANSMISSION LINES WITH ANISOTROPIC SUBSTRATES

Toshihide Kitazawa, Yoshio Hayashi, and Raj Mittra Feb. 1986 33 p

(Contract N00014-84-C-0149)

(AD-A165007; UILU-ENG-86-2206) Avail: NTIS HC A03/MF A01 CSCL 09/5

Various types of transmission lines with anisotropic substrates have been investigated for use in microwave- and millimeter-wave integrated circuits. These include single and coupled striplines, slot lines, and coplanar-type transmission lines. The coplanar-type transmission lines (CTLs) are promising because of their easy adaptation to shunt element connections. The application of coupled coplanar-type transmission lines. (C-CTL) have been studied based on the quasistatic and hybrid-mode formulations and accurate numerical values are available for the cases with isotropic and/or anisotropic substrates. However, most of them assume the structural symmetry. The theoretical approach for the asymmetrical version is available only for the propagation constant of the case with a single isotropic substrate. This paper presents the analytical method for the general structure of asymmetrical coupled coplanar-type transmission lines with an anisotropic substrate. This method includes both the hybrid-mode and the quasistatic formulations and is useful for accurately computing the characteristics impedances as well as propagation constants of various types of asymmetrical coupled coplanar-type transmission lines. GRA

N86-27581# Polytechnic Inst. of New York, Farmingdale.

WORKSHOP ON NEW DIRECTIONS IN SOLID STATE POWER SWITCHES HELD AT FARMINGDALE, NEW YORK ON 28-30 AUGUST 1985 Final Report, 1 Jul. - 31 Dec. 1985

Benjamin Senitzky 24 Dec. 1985 481 p Workshop held at Farmingdale, N.Y., 28-30 Aug. 1985

(Contract N00014-85-G-0236)

(AD-A165039) Avail: NTIS HC A21/MF A01 CSCL 09/5

The Workshop on New Directions in Solid State Power Switching was conducted on August 28 to 30, 1985, by the Weber Research Institute of the Polytechnic Institute of New York. The workshop invited people from different areas to discuss the relevant properties of solid state power switches. Four groups were formed to identify research directions in the following areas: (1) Potential Materials for Solid State Switches, (2) Relaxation Mechanisms, (3) Volume and Surface Breakdown, and (4) Solid State Plasma Transport. GRA

N86-27582# Army Electronic Proving Ground, Fort Huachuca, Ariz.

AUTOMATED AIDS TO TEST DATA GENERATION Final Methodology Investigation Report

William H. Kukes Nov. 1985 47 p

(AD-A165047) Avail: NTIS HC A03/MF A01 CSCL 09/3

The Automated Aids to Test Data Generation investigation was initiated to provide a method for automating the composition and validation of scenarios used in the developmental testing of message-driven systems. Existing scenario development software and procedures were examined to identify processes amenable to automation. From those identified, specific processes were selected for further study. Functional requirements were then developed and an Automated Message Generation (AMG) tool was designed. Subsequent project effort focused on the implementation of this tool. The application of the AMG tool to Test Item Stimulator (TIS) scenario development processes would serve to validate the AMG design. In addition, the application of this tool to the development of tactically significant scenarios would result in the refinement of the AMG design and the identification of additional processes amenable to automation. GRA

N86-27583# Harry Diamond Labs., Adelphi, Md.

DEVELOPMENT AND OPERATING CHARACTERISTICS OF THE PS132 THERMAL BATTERY

Frank C. Krieger Jan. 1986 48 p

(AD-A165149; HDL-TR-2075) Avail: NTIS HC A03/MF A01 CSCL 11/6

The development and operating characterisitics of the PS132 thermal battery are described. The PS132 uses the electrochemical system Ca/LiCl-KCl eutectic-SiO2CACRO4, and it is one of the smallest batteries of its type ever built that can meet its electrical and envronmental requirements. A development program that included construction of approximately 400 PS132-like batteries showed that obtaining acceptable DEB electrolyte-cathode powders was a major problem. Most commercial DEB powders caused excessive amounts of CaLi2 molten metal to form in the operating thermal cells of the PS132. This molten metal then flowed from the cells and caused electrical short circuits. GRA

N86-27584# Department of the Army, Washington, D. C.

METHOD OF MONITORING ELECTROCHEMICAL CELLS Patent Application

Gregory J. Malinowski and Deborah M. Chaskin, inventors (to Army) Filed 13 Mar. 1986 11 p

(AD-D012175; US-Patent-Appl-SN-831027) Avail: NTIS HC A02/MF A01 CSCL 01/3

The physical and electrical condition of electrochemical cells of a battery is monitored on a continuous basis so that corrective action can be taken before explosion and/or venting occurs by a method including the steps of: (A) coating the electrically conductive shell of each cell of the battery with a thin nonelectrically conductive layer; (B) applying a sensor stripe over the nonelectrically conductive layer so that the sensor stripe does not make electrical contact to the shell of the cell; (C) connecting leads to the sensor and then coating the sensor with a protective layer; and (D) connecting the sensor leads of individual cells of the battery into an electrical series circuit, the remaining leads of the series sensor circuit being connected to an alarm/control network that monitors the conductivity of the series electrical path. GRA

N86-27585# Argonne National Lab., Ill.
FIRST INTERNATIONAL WORKSHOP ON BATTERY TESTING. WORKBOOK AND EXTENDED ABSTRACTS: SUMMARIES
E. Estand, (comp.) Sep. 1985 197 p Presented at the International Battery Testing Workshop, Heidelberg, West Germany, 29 Sep. 1985
(Contract W-31-109-eng-38)
(DE86-001615; CONF-8509154-Summs) Avail: NTIS HC A09/MF A01

Thirty-nine papers are presented under the following session headings: international overview; general testing procedures; testing of special battery systems; accelerated life cycle tests; instrumentation, hardware, equipment; post-test analyses, thermal management; and field testing and correlating laboratory tests with on-board EV tests. DOE

N86-27586# Argonne National Lab., Ill.
LITHIUM-ALLOY/IRON SULFIDE BATTERIES
P. A. Nelson and H. Shimotake (Amoco Oil Co., Naperville, Ill.) 1986 7 p Presented at the International Symposium on Fuel Cell and Advanced Battery, Tokyo, Japan, 22 Jan. 1986 Prepared in cooperation with Amoco Research Center, Naperville, Ill.
(Contract W-31-109-eng-38)
(DE86-005529; CONF-860138-2) Avail: NTIS HC A02/MF A01

Lithium-alloy/FeS cells with a theoretical capacity of 200 to 400 Ah have been developed. These cells have achieved high specific energy (100 Wh/kg), high power (150 Wh/kg), and long life (1000 cycles). Electrode experiments and design studies indicate the possibility of improving specific energy and power by 50 to 100% and, perhaps, retaining cycle life. DOE

N86-27587# Brookhaven National Lab., Upton, N. Y.
CABLE INSULATION DEVELOPMENT. PART 2: SUPERCONDUCTING POWER TRANSMISSION SYSTEM DEVELOPMENT Semiannual Report, 1 Oct. 1984 - 31 Mar. 1985
19 Jul. 1985 58 p
(Contract DE-AC02-76CH-00016)
(DE86-005653; BNL-51920) Avail: NTIS HC A04/MF A01

Objectives are to develop a superconducting power transmission system and cable insulation using polymeric tapes. This report is divided into: ambient temperature high stress power cable development; and 1000-MVA test facility. DOE

N86-27588# National Bureau of Standards, Boulder, Colo. Electromagnetic Fields Div.
EFFICIENT AND ACCURATE METHOD FOR CALCULATING AND REPRESENTING POWER DENSITY IN THE NEAR-ZONE OF MICROWAVE ANTENNAS
R. L. Lewis and A. C. Newell Dec. 1985 44 p
(PB86-181963; NBSIR-85/3036) Avail: NTIS HC A03/MF A01 CSCL 09E

An algorithm is presented for calculating near-zone and Fresnel-region fields in front of microwave antennas from discrete numerical values of the radiated plane-wave spectrum (complex far-field pattern). That is, the near fields are calculated by numerically integrating the plane-wave spectrum representation of the field. The crux of the analysis consists of handing a numerical instability which arises from integrating discrete data. A criterion is developed for limiting the integration domain in order to exclude highly oscillatory regions of the integrand. In turn, this leads to restricting the applicable output range over which the field can be computed. With the numerical instability problem thus resolved, fast Fourier transform techniques are used to assure efficient numerical integration over a large (but restricted) output range. GRA

N86-27589# Saad Publications, Karachi (Pakistan). Translation Div.
THE 2ND NATIONAL SYMPOSIUM IN RADIO SCIENCE, GDANSK
Mar. 1986 287 p Transl. into ENGLISH from Polska Akademie Nauk for Union Radio-Scientifique Internationale (Gdansk, Poland), 1978 287 p Sponsored by NSF Prepared in cooperation with Smithsonian Inst. Libraries, Washington, D.C.
(PB86-174224; TT-81-53726) Avail: NTIS HC A15/MF A01 CSCL 09C

The subject matter of the symposium is divided into four sections: electronic elments, circuits and systems; signals and systems; field theory, electromagnetic waves; and electromagnetic metrology and radioastronomy. Author

N86-27371# Technische Univ., Brunswick (West Germany). Inst. fuer Elekt. Maschinen, Antriebe, und Bahnen.
DIRECTLY-DRIVEN SERVOMOTOR WITH VERY HIGH TORQUE
H. Weh, P.-Chr. Leymann, and W. Niemann *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 121-126 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27373# Societe Europeenne de Propulsion, Vernon (France).
ELECTRIC MOTOR WITH SUPERCONDUCTING WINDINGS FOR ACTUATION MECHANISM IN THE FOCAL PLANE OF A SPACE CRYOSTAT
J. P. Bugeat, R. Petit, D. Valentian, M. Junca, and M. Verain *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 133-138 (For primary document see N86-27353 18-18)
(Contract ESA-5609/83)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27380# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DESIGN AND TEST OF A LINEAR THERMAL ACTUATOR
G. Bush, D. Osborne, and V. A. Wehrle *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 181-185 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27383# Indian Space Research Organization, Trivandrum. Vikram Sarabhai Space Center.
DESIGN AND DEVELOPMENT OF A BRUSHLESS dc MOTOR FOR SPACE APPLICATIONS
N. Kannan, A. Bose, and N. Vedachalam *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 201-206 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27384# Moore Reed and Co. Ltd., Walworth (England).
A SPACE-COMPATIBLE ANGULAR CONTACT ENCODER
A. R. Flew *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 207-212 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27489# Joint Publications Research Service, Arlington, Va.
CHARACTERISTIC OF VANE-LOADED HELIX SLOW-WAVE STRUCTURE
Qingyou Chen *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 105-116 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 11, no. 5, Sep. 1983 p 23-32 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27491# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL EXPERT SYSTEM, BLOCK, FOR USE IN CIRCUIT DESIGN
Yongsui Fang, Jiren Lu, Zongxuan Hu, and Zhaoming Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 127-135 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 7, no. 2, Mar. 1985 p 92-97 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27494# Joint Publications Research Service, Arlington, Va.
NEW DT(SUP)2L SYSTEM OF LARGE-SCALE INTEGRATED CIRCUIT DESCRIBED
Yanhong Li *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 148-157 Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), no. 12, 10 Dec. 1984 p 8-11, 18 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27497# Joint Publications Research Service, Arlington, Va.
DESIGN SCHEME OF 8mm HIGH-POWER COAXIAL MAGNETRON DESCRIBED
Mingye Chen *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 169-173 Transl. into ENGLISH from Dianzi Kexue Xuekan (Beijing, China), v. 6, no. 3, May 1984 p 259-281 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27505# Joint Publications Research Service, Arlington, Va.
LARGE SIGNAL THEORY, COMPUTATION OF COUPLED-CAVITY TWT'S
Wenmiao Song and Zhenhuai Li *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 —p 82-93 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 12, no. 3, May 1984 p 25-32 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-27590 ESDU International Ltd., London (England).
BOILING INSIDE TUBES: GENERAL ASPECTS AND ESTIMATED WET-WALL HEAT TRANSFER
Dec. 1985 42 p
(ESDU-85041; ISBN-0-85679-547-X; ISSN-0141-402X) Avail: ESDU

Data item ESDU 85041, a part of the Heat Transfer Sub-series, discusses the problems met in thermal rating a vaporizer in terms of the flow patterns in boiling flow, the conditions for nucleate boiling, considerations of burnout and dryout, the use of mixtures, and the flow instabilities that can occur. Nine correlations for wet-wall boiling of a pure liquid are evaluated against over 3000 experimental points taken from the literature and the results tabulated. The most reliable prediction method was chosen and a graph shows its performance against experimental data for water, ethylene glycol, and a number of refrigerants. A calculation procedure based on that correlation is provided, including checks on whether nucleate boiling or statified flow exists. The calculation of the surface area required to reach a selected flow quality is also given. A practical worked example illustrates the use of the method. It applies to steam generators and to vaporizers for process fluids. Large water tube boilers used in power generation are outside the scope, however. ESDU

N86-27591 ESDU International Ltd., London (England).
EFFECTIVENESS-N SUB TU RELATIONSHIPS FOR THE DESIGN AND PERFORMANCE EVALUATION OF TWO-STREAM HEAT EXCHANGERS
Dec. 1985 57 p
(ESDU-85042; ISBN-0-85679-548-8; ISSN-0141-402X) Avail: ESDU

Data item ESDU 85042, Heat Transfer Sub-Series, gives equations and a large number of curves derived from them to allow design or performance evaluation of shell-and-tube heat exchangers. The curves cover co-current and countercurrent flow and various numbers of shells and of tube side passes. Also shown on the curves are the locus of designs for which a temperature cross may occur and the locus or 95 percent heat transfer effectiveness which indicates the region of uneconomic design. The method assumes a linear temperature/enthalpy relationship (constant specific heat capacity) for both streams. It applies to boiling or condensing flow of a single component with no temperature change, or boiling and condensing flow of a mixture that is always two phase. It excludes conditions in which transition from single to two-phase flow occurs. Worked examples show the application of the method. ESDU

N86-27592 Engineering Sciences Data Unit, London (England).
FLUID TRANSIENTS IN PIPES. PRESSURE SURGE FOLLOWING BOOSTER PUMP TRIP. SUPPRESSION USING PUMP BYPASS
1985 67 p
(ESDU-85044; ISBN-0-85679-550-X; ISSN-0141-4011) Avail: ESDU

Data item ESDU 85044, Fluid Mechanics Sub-Series, gives a graphical method of estimating the magnitudes of the surge pressures following power failures to a booster pump that is protected by a one-way valve preventing reverse flow through the pump. The system may also be protected by a bypass which itself includes a one-way valve that closes when flow through the bypass falls to zero. The graphical methods allow the head and flow conditions to be found at the suction and discharge sides of the pump with or without the bypass circuit. The effect of pipe friction may be taken into account. A computer program in BASIC is included that also allow the pump run-down characteristics to be modeled and provides results for the pressure changes over the whole line. The use of the information is illustrated in a practical worked example. ESDU

N86-27593* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MULTI-LEG HEAT PIPE EVAPORATOR Patent
Joseph P. Alario (Grumman Aerospace Corp., Bethpage, N.Y.) and Robert A. Haslett, inventors (to NASA) Issued 22 Apr. 1986 7 p Filed 31 May 1984 Supersedes N84-32748 (22 - 22, p 3592) Sponsored by NASA. Johnson Space Center
(NASA-Case-MSC-20812-1; US-Patent-4,583,587; US-Patent-Appl-SN-616002; US-Patent-Class-165-104.26; US-Patent-Class-122-366; US-Patnet-Class-165-41, US-Patent-Class-165-104.14) Avail: US Patent and Trademark Office CSCL 20D

A multileg heat pipe evaporator facilitates the use and application of a monogroove heat pipe by providing an evaporation section which is compact in area and structurally more compatible with certain heat exchangers or heat input apparatus. The evaporation section of a monogroove heat pipe is formed by a series of parallel legs having a liquid and a vapor channel and a communicating capillary slot therebetween. The liquid and vapor channels and interconnecting capillary slots of the evapora-

ting section are connected to the condensing section of the heat pipe by a manifold connecting liquid and vapor channels of the parallel evaporation section legs with the corresponding liquid and vapor channels of the condensing section. NASA

N86-27594# National Aerospace Lab., Tokyo (Japan).
NUMERICAL SIMULATION OF THE RETURN TO ISOTROPY OF HOMOGENEOUS TURBULENCE
Kiyoshi Yamamoto Oct. 1985 15 p In JAPANESE; ENGLISH summary
(NAL-TR-885; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

Direct numerical simulation of the return to isotropy of homogeneous turbulence is carried out for the various initial anisotropic turbulent fields. Navier-Stokes equation is calculated with the spectral method using 32 to the 3rd Fourier components of velocity. The numerical results show that the two rotational invariants 2 and 3 of the anisotropy tensor which describes the departure of the Reynolds stress from isotrophy characterize well the process of the return to isotrophy of homogeneous turbulence. The values of the constant in the Rotta's turbulence model are calculated for the tensor components of the pressure-strain correlation and the mean Rotta's constant is evaluated from the least squares mean of these tensor components for each anisotropic turbulence. The mean Rotta's constants of the various anisotropic turbulence show a nearly identical variation in time in the range from 0.5 to 4.0, which roughly coincides with the dispersive range of the experimental results. The variation of the Rotta's constant implies its dependence on variants 2, 3, and Reynolds number. Author

N86-27595# National Aerospace Lab., Tokyo (Japan).
PNEUMATIC ATOMISATION WITH COAXIAL INJECTORS: MEASUREMENTS OF DROP SIZES BY THE DIFFRACTION METHOD AND LIQUID PHASE FRACTION BY THE ATTENUATION METHOD OF LIGHT
Hiromi Gomi Nov. 1985 55 p
(NAL-TR-888T; ISSN-0389-4010) Avail: NTIS HC A04/MF A01

Sprays, formed by coaxial injectors with water/air and water/helium to model liquid oxygen/hydrogen atomization in a rocket engine, were measured by a particle size meter. A criterion that the transmittance of light be more than 50% for a reliable measurement restricted water injection flow rates to less than 10 g/s. Bimodal distribution of diffracted light energy also impeded measurements at high injection mass ratios of liquid to gas. The drop sizes increased with the distance from the injectors and spray axis. The drop sizes on the spray axis had their local maximum with a high injection gas celocity and their minimum with a low injection gas velocity. The minimum drop of D sub p,min = 5.8 microns used in the drop size distribution gave ratios of the Sauter mean diameter to the mass median diameter consistant with other studies. Regimes of atomization are proposed. Author

N86-27596# National Aerospace Lab., Tokyo (Japan).
TURBULENCE PROPERTIES OF JET AND PLUME
Hiroshi Ishigaki and Munekazu Mochizuki Dec. 1985 11 p In JAPANESE; ENGLISH summary
(NAL-TR-894; ISSN-0389-4010) Avail: NTIS HC A02/MF A01

The plane and round turbulent buoyant jets issuing vertically into quiescent fluid are analyzed. As the flow travels farther from the exit, it changes from a jet into a plume. Formulae on turbulent shear stress and heat flux are derived for jet and plume, and compared with the available experimental data. In addition, profiles of turbulent eddy viscosity and turbulent prandtl number are given. Author

N86-27597# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS
1985 534 p Lecture held in Rhode-Saint-Genese, Belgium, 21-25 Jan. 1985 Sponsored in part by AGARD
(VKI-LS-1985-01; ESA-85-95396) Avail: NTIS HC A23/MF A01

The Von Karman Insitute for Fluid Mechanics sponsored a lecture series entitled 'Introduction to Computational Fluid Dynamics,' which took place in Rhode Saint Genese, Belgium, on 21-25 January, 1985. Among the topics discussed were the following: a solution technique for compressible boundary layers; turbulent boundary layer turbulence models; implicit time dependent methods for inviscid andviscous compressible flows; finite difference approximations of the Navier-Stokes equations for incompressible flows; and numerical analysis of vortex breakdown. For individual titles, see N86-27598 through N86-27603.

N86-27598# Maryland Univ., College Park. Dept. of Aerospace Engineering.
INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS
John D. Anderson *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1985 269 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

The basic philosophy of computational fluid dynamics; the governing equations of fluid dynamics; mathematical properties of fluid dynamic equations; discretization of partial differential equations; transformations and grids; source and panel vortex methods for incompressible inviscid flows; and applications of explicit finite difference methods to inviscid and viscous flows are introduced. Author (ESA)

N86-27599# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
COMPRESSIBLE BOUNDARY LAYERS: AN EXAMPLE OF AN EFFICIENT SOLUTION TECHNIQUE
R. Arina, C. Benocci, and J.-A. Essers *In its* Introduction to Computational Fluid Dynamics 1985 61 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

The solution of two dimensional and axisymmetric boundary layers by finite difference schemes is introduced. A method based on a combination of the generalized Crank-Nicholson and box schemes is presented and applied to boundary layer flows. The technique can be extended to the computation of wakes and jets. Laminar flows are treated, but the conclusions can be applied to the turbulent case, providing the equations are written formally in laminar form. The boundary layer equations are presented in tensorial notation to take into account curvature effects. The general equations are specialized for steady two dimensional and axisymmetric flows. A method for the solution of compressible two dimensional and axisymmetric boundary layer flows on a wall with modest curvature is outlined. Information concerning three dimensional boundary layers is presented. Author (ESA)

N86-27600# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
TURBULENT BOUNDARY LAYERS: EXAMPLES OF TURBULENCE MODELS
R. Arina and C. Benocci *In its* Introduction to Computational Fluid Dynamics 1985 45 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

Turbulence models for boundary layer flows and the principles to be followed for their implementation in the frame of an existing boundary layer solver are presented. The selection of the appropriate model and the optimization of the numerical solution are illustrated with examples for compressible and incompressible regimes. Author (ESA)

N86-27601# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
IMPLICIT TIME DEPENDENT METHODS FOR INVISCID AND VISCOUS COMPRESSIBLE FLOWS
G. Degrez *In its* Introduction to Computational Fluid Dynamics 1985 61 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

Linear multistep methods; predictor-corrector methods; centered implicit dissipation schemes; and characteristic modeling schemes for compressible flows are introduced. The multistep

algorithm is unconditionally stable and the error on the converged steady solution does not depend on the time step used, but the short wavelengths are not damped and therefore the scheme is not dissipative in the sense of Kreiss. Dissipation is provided by appending explicit and implicit artificial viscosity. The predictor-corrector scheme is centered in space for a linear equation intrinsically dissipative without artificial viscosity and requires the solution of two block bidiagonal systems for each space variable. The implicit schemes are single step schemes with centered differencing in space. The time differencing produces the appropriate dissipation. For Euler equations, characteristic schemes produce the dissipation by noncentered discretization in space.
Author (ESA)

N86-27602# Technische Hochschule, Aachen (West Germany). Inst. fuer Aerodynamik.
FINITE-DIFFERENCE APPROXIMATIONS OF THE NAVIER-STOKES EQUATIONS FOR INCOMPRESSIBLE FLOWS
Egon Krause *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1985 47 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

Numerical solutions of the Navier-Stokes equations for incompressible unsteady two and three dimensional viscous flows are introduced. The differential formulations of the continuity equation and of the momentum equations are derived from the integral relations for mass conservation and momentum balance. The energy fluxes and the energy equation are described. The vorticity transport equation with the Poisson equation for the stream function and the pressure; the Poisson equations for the velocity components for two dimensional flow related to the gradients of the vorticity component; the fourth order equation for the stream function of two dimensional flow; and the divergence form of the equations of motion are obtained. Author (ESA)

N86-27603# Technische Hochschule, Aachen (West Germany). Inst. fuer Aerodynamik.
NUMERICAL ANALYSIS OF VORTEX BREAKDOWN
Egon Krause *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1985 23 p (For primary document see N86-27597 18-34)
Avail: NTIS HC A23/MF A01

Spiral, bubble, and double helix type vortex breakdowns are discussed. Hall's conjecture (that when an adverse pressure gradient is increased, less swirl is required to maintain breakdown, or if the same level of swirl is maintained, the breakdown is moved upstream) is proved. Estimation of the axial pressure gradient; computation of breakdown point for slender vortices; initial and boundary conditions; and determination of the pressure are considered. Author(ESA)

N86-27604# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
QUICK REPRODUCTION OF BLAST-WAVE FLOW-FIELD PROPERTIES OF NUCLEAR, TNT, AND ANFO EXPLOSIONS
Clinton P. T. Groth Apr. 1986 93 p Sponsored in cooperation with Science, Systems and Software and Defense Research Establishment
(UTIAS-TN-259; ISSN-0082-5263) Avail: NTIS HC A05/MF A01

In many instances, extensive blast-wave flow-field properties are required in gasdynamics research studies of blast-wave loading and structure response, and in evaluating the effects of explosions on their environment. This report provides a very useful computer code, which can be used in conjunction with the DNA Nuclear Blast Standard subroutines and code, to quickly reconstruct complete and fairly accurate blast-wave data for almost any free-air (spherical) and surface-burst (hemispherical) nuclear, trinitrotoluene (TNT), or ammonium nitrate-fuel oil (ANFO) explosion. This code is capable of computing all of the main flow properties as functions of radius and time, as well as providing additional information regarding air viscosity, reflected shock-wave properties, and the initial decay of the flow properties just behind the shock front. Both spatial and temporal distributions of the major blast-wave flow properties are also made readily available. Finally, provisions are also included in the code to provide additional information regarding the peak or shock-front flow properties over a range of radii, for a specific explosion of interest. Author

N86-27605# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
LASER DOPPLER VELOCIMETRY MEASUREMENTS IN COAXIAL, CO- AND COUNTER-SWIRLING, ISOTHERMAL JETS
P. A. Robinson, R. A. Cusworth, and J. P. Sislian May 1986 81 p Sponsored by the Natural Sciences and Engineering Research Council of Canada
(UTIAS-308; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

Measured values of the three components of mean velocity and the six components of the turbulent stress tensor are reported in free, co-axial, isothermal, co- and counter-swirling jet flows representative of combustor flows. The effects of specific radial distributions of mean swirl velocity, and co- and counter-swirling annular flows on the flow field are investigated. A one-dimensional laser Doppler velocimeter is used to obtain the measurements. It consists of a 15mW He-Ne laser, DISA 55x modular optics with a Bragg cell and electronic frequency shifting to handle high turbulence intensities and reverse flow regions, and a TSI model 1980A counter processor. Measured values are presented for two tangential velocity profiles in co- and counter-swirling annular flows, in all, for four different cases. A central recirculation zone occurs in each case. Streamlines are calculated from the measured velocity distribution, and contours of turbulent kinetic energy are presented. The former show the structure of the CRZ, and the latter indicate the zones of high turbulence intensity. Experimental data indicate that the flows are more affected by the direction of rotation of the annular flow than by altering the radial distribution of mean swirl velocity Counter-swirl tends to increase the turbulent stresses with the maxima occuring near the boundary of the CRZ. Author

N86-27606# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
SIMULATION OF A BLAST WAVE3 IN A SHOCK TUBE BY USING PERFORATED PLATES IN THE DRIVER
K. Y. Zhang and J. J. Gottlieb Mar. 1986 234 p Sponsored in cooperation with Defence Research Establishment, BRL, and the Natural Sciences and Engineering Research Council of Canada
(UTIAS-304; ISSN-0082-5255) Avail: NTIS HC A11/MF A01

The simulation of a blast wave in a conventional air-driven shock tube by means of judiciously positioning perforated plates in the driver with porosities judiciously selected is investigated both numerically and experimentally. For the numerical study the random-choice method is used in a much improved and extended form. Most notable in terms of the anaysis, which is presented and explained in detail, is the incorporation of perforated plates with area changes and head losses, head losses from poor diaphragm breakage, friction and heat transfer at the walls, mass loss by jets out of perforations in the walls, sudden changes in grid node spacing, and duct ends that are open to the atmosphere and may or may not include a reflection eliminator. The analysis is also developed to make the computer code efficient, and a factor of at least two is gained in computational time over earlier UTIAS programs. The validity of the analysis and computer code is demonstrated by presenting a number of comparisons of numerical and experimental data. Finally, in terms of numerical predictions, they are made for three different blast-wave simulators. The first has a constant area driver and channel 2.44 m in diameter and an 83-m-long driver with six perforated plates. The last two have a channel 1.22 m in diameter and a constant-area driver 15.2 m long and 2.13 m in diameter, but one driver has six perforated plates and the other only three. For all three simulators the extensive sets of numerical predictions include blast-wave peak overpressures of 1/6, 1/3, 2/3, 1, 3/2, 2, 5/2, and 3 atm, and predictions are also given for the important companion cases of driver-air heating which eliminates density and temperature discontinuities across the contact surface. Author

N86-27607*# Pennsylvania State Univ., State College. Applied Research Lab.
THE BOUNDARY LAYER ON COMPRESSOR CASCADE BLADES Semiannual Progress Report, 1 Dec. 1985 - 1 Jun. 1986
STeven Deutsch and William C. Zierke 1986 20 p
(Grant NsG-3264)
(NASA-CR-177279; NAS 1.26:177279) Avail: NTIS HC A02/MF A01 CSCL 20D

The purpose of NASA Research Grant NSG-3264 is to characterize the flowfield about an airfoil in a cascade at chord Reynolds number(R sub C)near 5 x 10 to the 5th power. The program is experimental and combines laser Doppler velocimeter (LDV) measurements with flow visualization techniques in order to obtain detailed flow data, e.g., boundary layer profiles, points of separation and the transition zone, on a cascade of highly-loaded compressor blades. The information provided by this study is to serve as benchmark data for the evaluation of current and future compressor cascade predictive models, in this way aiding in the compressor design process. Summarized is the research activity for the period 1 December 1985 through 1 June 1986. Progress made from 1 June 1979 through 1 December 1985 is presented. Detailed measurements have been completed at the initial cascade angle of 53 deg. (incidence angle 5 degrees). A three part study, based on that data, has been accepted as part of the 1986 Gas Turbine Conference and will be submitted for subsequent journal publication. Also presented are data for a second cascade angle of 45 deg (an incidence angle of 3 degrees). Author

N86-27608# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
BUOYANCY DRIVEN FLOW AS THE FORCING FUNCTION OF SMOKE TRANSPORT MODELS Final Report
Walter W. Jones and Xavier Bodart May 1986 26 p
(NBSIR-86-3329) Avail: NTIS HC A03/MF A01

Flow at vents is the major driving force in smoke transport models. The precision with which we can calculate these flows determines to a great extent how accurately we can model buoyant flow and the inherent speed of the models. This report describes some of the problems encountered in calculating these flows, and gives a general algorithm for their calculation. Author

N86-27609# Cornell Univ., Ithaca, N.Y. School of Mechanical and Aerospace Engineering.
FRONTIERS IN FLUID MECHANICS: A COLLECTION OF RESEARCH PAPERS WRITTEN IN COMMEMORATION OF THE 65TH BIRTHDAY OF STANLEY CORRSIN Final Report, 1 Aug. 1984 - 30 Apr. 1985
Stephen H. Davis, ed. (Northwestern Univ., Evanston, Ill.) and John L. Lumley, ed. Berlin, West Germany Springer-Verlag 30 Apr. 1985 298 p
(Contract N00014-84-G-0127)
(AD-A165139; ISBN-3-540-15361-6; ISBN-0-387-15361) Avail: NTIS HC A13/MF A01 CSCL 20/4

A collection of research papers on fluid dynamics dedicated to the 65th birthday of Stanley Corrsin includes the following topics: On the Approach to Isotropy of Homogeneous Turbulence: Effect of the Partition of Kinetic Energy Among the Velocity Components; Random Incompressible Motion on Two and Three-Dimensional Lattices and its Application to the Walk on a Random Field: Transition and Turbulence in Fluid Flows and Low-Dimensional Chaos; Some Contributions of Two-Point Closure to Turbulence; Intermittent Turbulent Flow; The Spectra of Single Reactants in Homogeneous Turbulence; The Dynamics of Turbulent Spots; Spectral and Statistical Characteristics of Breaking Waves; How Do Drops Spread on Solids?; Effects of Steamline Curvature on Turbulence; Limitations of Second Order Modeling of Passive Scalar Diffusion; and Acoustic Wave Propagation in Fluids. GRA

N86-27610# Naval Research Lab., Washington, D. C.
DIRECT NUMERICAL SIMULATION OF AXISYMMETRIC JETS
F. F. Grinstein, Elaine S. Oran, and J. P. Boris 25 Mar. 1986 16 p
(AD-A165536; NRL-MR-5732) Avail: NTIS HC A02/MF A01 CSCL 20/4

Results are presented from numerical calculations of the evolution of the Kelvin-Helmholtz instability for an unforced, subsonic, compressible axisymmetric, spatially-evolving shear layer. In addition, the effect of small, random pressure fluctuations at the nozzle orifice on the growth of the mixing layers is studied. These fluctuations model inflow perturbations in experimental flows arising from turbulence and boundary layers in the nozzle. The finite-difference numerical model used to perform the simulations solves the two-dimensional time-dependent conservation equations for an ideal fluid using the Flux-Corrected Transport algorithm and timestep-splitting techniques. No subgrid turbulence model has been included. In the absence of perturbations, the calculations indicate that the large scale development of the unforced jet shear layer has an underlying degree of organization. This is the result of a feedback mechanism in which the shear layer ahead of nozzle edge is modulated by the far field induced by the mergings on downstream, near the end of the potential core of the jet. The studies with random high frequency perturbations on the inflow velocity show that they effectively tend to break the temporal correlations between the structures. GRA

N86-27611# Los Alamos National Lab., N. Mex.
MEASUREMENT AND MODELING OF INTERFACE HEAT TRANSFER COEFFICIENTS
A. D. Rollett, H. D. Lewis, and P. S. Dunn 1985 12 p Presented at the Modeling and Control of Casting and Welding Processes Conference, Santa Barbara, Calif., 12 Jan. 1986
(Contract W-7405-eng-36)
(DE86-004744; LA-UR-85-4367; CONF-860132-1) Avail: NTIS HC A02/MF A01

The results of preliminary work on the modeling and measurement of the heat transfer coefficients of metal/mold interfaces is reported. The system investigated is the casting of uranium in graphite molds. The motivation for the work is primarily to improve the accuracy of process modeling of prototype mold designs at the Los Alamos Foundry. The evolution in design of a suitable mold for unidirectional solidification is described, illustrating the value of simulating mold designs prior to use. Experimentation indicated a heat transfer coefficient of 2 kW/sq m /K both with and without superheat. It was possible to distinguish between solidification due to the mold and that due to radiative heat loss. This permitted an experimental estimate of the emissivity, epsilon = 0.2, of the solidified metal. DOE

N86-27218# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
CRITICAL EXAMINATION OF TURBULENCE MODELS FOR A SEPARATED THREE DIMENSIONAL TURBULENT BOUNDARY LAYER
R. Abid and R. Schmitt *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 11 p (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

N86-27219# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
A VORTEX POINT METHOD FOR CALCULATING INVISCID INCOMPRESSIBLE FLOWS AROUND ROTARY WINGS
B. Canatloube and S. Huberson *In its* La Recherche Aerospatiale. Bimonthly Bulletin, no. 1984-6, November - December 1984 (ESA-TT-907) May 1985 13 p Previously announced in IAA as A86-12021 (For primary document see N86-27217 18-02)
Avail: NTIS HC A04/MF A01; HC also available in English and French from ONERA, Paris FF 70

N86-27302*# Worcester Polytechnic Inst., Mass.
FLUID BEHAVIOR IN MICROGRAVITY
William W. Durgin and James W. Matthews *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 33-40 refs (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27308*# Asahi National Broadcasting Co., Tokyo (Japan).
WATER BALL COLLISION
Kazuo Fujimoto *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 81-84 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27318*# Messerschmitt-Boelkow-Blohm/Entwicklungspring Nord, Bremen (West Germany).
GAS PAYLOAD NO. G-025: STUDY OF LIQUID SLOSHING BEHAVIOUR IN MICROGRAVITY
C. R. Gilbert *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 165-176 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27324*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE CAPILLARY PUMPED LOOP (CPL) GAS EXPERIMENT G-471
Dan Butler *In its* The 1985 Get Away Special Experimenter's Symposium May 1986 p 237-253 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27329*# Utah State Univ., Logan. Center for Atmospheric and Space Science.
THERMOCAPILLARY FLOW AND GASEOUS CONVECTION IN MICROGRAVITY: RESULTS FROM GAS PAYLOAD G-0518
Scott Thomas *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 293-301 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27635# Ecole Royale Militaire, Brussels (Belgium).
MEASUREMENTS IN TWO-PHASE FLOWS
R. Decuypere *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 92 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

N86-27636# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
SHORT DURATION HEAT TRANSFER MEASUREMENTS
Tony Arts and Cengiz Camci *In its* Measurements Techniques in Turbomachines, Volume 2 1985 50 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

N86-27637# Nottingham Univ. (England).
HEAT TRANSFER MEASUREMENTS IN STEADY STATE FACILITIES
Nessim Hay *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 40 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

N86-27638# Nottingham Univ. (England).
THE SWOLLEN POLYMER TECHNIQUE
Nessim Hay *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 52 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

N86-27651*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE CONTINUOUS OPEN WIND TUNNEL (SCOWT)
Giovanni M. Carlomagno (Naples Univ. (Italy).), Luigi deLuca, Paul M. Siemers, and George M. Wood *In* NASA, Washington Applications of Tethers in Space. Workshop Proceedings, Vol. 2 Jun. 1986 p 225-249 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-27612*# Harvard Coll. Observatory, Cambridge, Mass. Center for Astrophysics.
PRELIMINARY EXPERIMENT REQUIREMENTS DOCUMENT FOR SOLAR AND TERRESTRIAL ATMOSPHERES SPECTROMETER (STAS)
May 1986 58 p Prepared in cooperation with Ball Aerospace Systems Div., Boulder, Colo.
(Contract NASw-3940)
(NASA-CR-177301; NAS 1.26:177301) Avail: NTIS HC A04/MF A01 CSCL 14B

The principal scientific objective of the Solar and Terrestrial Atmospheres Spectrometer (STAS) project is the measurement of the absolute ultraviolet solar spectral irradiance with: (1) resolution of better than 15 mA, and (2) absolute irradiance uncertainty at the state of the art (less than or equal to 3%). High measurement accuracy coupled with high spectral resolution are necessary to identify the nature of the radiation, its variability, and to identify solar processes which may cause the changes. Solar radiation between 1200 and 3600 A dominates the photochemistry of the mesosphere and stratosphere. Some important minor species, such as NO, show very complex and fundamentally narrow structure in their photodestruction cross sections, especially in the region of the Schumann-Runge bands of O2. Understanding the photochemical processes in the terrestrial atmosphere requires knowledge of both the cross sections and of the solar spectrum with the highest possible resolution and accuracy. Author

N86-27613# National Aeronautical Lab., Bangalore (India). Materials Science Div.
TEMPERATURE PROGRAMMER FOR THE TEFLON-CELL ARRANGEMENT IN HIGH PRESSURE STUDIES
V. Shubha and T. G. Ramesh Mar. 1986 16 p
(NAL-TM-MT-8602) Avail: NTIS HC A02/MF A01

A precision analog temperature programmer is presented for use with the teflon cell technique which is extensively used in high pressure studies. The stability of temperature control is within + or - 0. 1 deg. C of the set point value. Linear temperature versus time ramps selectable from 1 deg. C/minute to 20 deg. C/minute is also possible in this system. This instrument facilitates automatic data acquisition of electronic transport properties under high pressure conditions. Author

N86-27614# Electrotechnical Lab., Ibaraki (Japan).
RESEARCH ON TESTING METHODS OF SOUND LEVEL METERS
Moriyasu Minakawa, Hajime Tomioka, Kihachi Mutoh, and Hajime Miura Dec. 1985 66 p In JAPANESE; ENGLISH summary
(EL-862; ISSN-0366-9106; UDC-534.322:53.089.6) Avail: NTIS HC A04/MF A01

Testing and calibrating methods for sound level meters were described according to the Measurement Law as well as the Japanese Industrial Standards. Testing methods developed for the establishment of the inspection system of sound level meters were based on high technologies, such as digitalized signal sources f and automated testing systems using minicomputers and microcomputers. Two types of sound level meters were examined: JIS C1502-1977 and JIS C1505-1977. B.G.

N86-27615# National Aeronautical Lab., Bangalore (India). Materials Science Div
ANALOG LINEARISING CIRCUITRY FOR THERMOCOUPLES
V. Shubha and T. G. Ramesh May 1986 12 p

(NAL-TM-MT-8608) Avail: NTIS HC A02/MF A01

An analog fourth order polynomial curve fitting circuit was designed to linearize the thermocouple voltages of standard thermocouples. Typical design data and performance of the circuit is illustrated for the Type K thermocouple. This circuit can also be used to linearize the outputs of other types of transducers and simulate nonlinear variations with temperature of the physical quantities like absolute thermoelectric power of chromel and alumel. Author

N86-27616°# Arizona Univ., Tucson. Lunar and Planetary Lab.
DEISGN STUDY OF AN ENTRY PROBE SPECTRO-REFLECTOMETER Final Report, Sep. 1982 - Sep. 1983
Godfrey T. Sill and Uwe Fink 14 Jul. 1986 11 p
(Grant NAGw-248)
(NASA-CR-177278; NAS 1.26:177278) Avail: NTIS HC A02/MF A01 CSCL 14B

A wind tunnel was built to simulate the rapid movement of an entry probe through the Jupiter atmosphere. Wind speeds range from 1 to 50 meters per second in a closed system. Wind velocity and temperature probes as well as a cryogenically cooled cold finger can be placed in the 6 inch diameter viewing section. The initial testing of the wind tunnel involved running sectional profiles through the observation port of air currents of 0.1 to 3.0 atmosphere. The velocity profile was very uniform throughout the cross section of the experimental port, with the exception of the wall effects. The deposition of cooled volatiles using the wind tunnel was not performed. However, measurements of the deposition of H2O ice on a cryogenically cooled thickness modulator were made under ambient conditions, namely room temperature and pressure. In the Frost Depositon Test Facility, ice deposition was measured at thicknesses of about a half millimeter and frost was produced whose thickness reflectivity could easily be measured by reflectance spectroscopy. B.G.

N86-27617°# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IDENTIFICATION OF DIFFERENCES BETWEEN FINITE ELEMENT ANALYSIS AND EXPERIMENTAL VIBRATION DATA
Charles Lawrence Jun. 1986 33 p
(NASA-TM-87336; E-3082; NAS 1.15:87336) Avail: NTIS HC A03/MF A01 CSCL 14B

An important problem that has emerged from combined analytical/experimental investigations is the task of identifying and quantifying the differences between results predicted by F.E. analysis and results obtained from experiment. The objective of this study is to extend and evaluate the procedure developed by Sidhu for correlation of linear F.E. and modal test data to include structures with viscous damping. The desirability of developing this procedure is that the differences are identified in terms of physical mass, damping, and stiffness parameters instead of in terms of frequencies and modes shapes. Since the differences are computed in terms of physical parameters, locations of modeling problems can be directly identified in the F.E. model. From simulated data it was determined that the accuracy of the computed differences increases as the number of experimentally measured modes included in the calculations is increased. When the number of experimental modes is at least equal to the number of translational degrees of freedom in the F.E. model both the location and magnitude of the differences can be computed very accurately. When the number of modes is less than this amount the location of the differences may be determined even though their magnitudes will be under estimated. Author

N86-27618°# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CRYOGENIC STRAIN GAGE TECHNIQUES USED IN FORCE BALANCE DESIGN FOR THE NATIONAL TRANSONIC FACILITY
Alice T. Ferris May 1986 15 p
(NASA-TM-87712; NAS 1.15:87712) Avail: NTIS HC A02/MF A01 CSCL 14B

A force balance is a strain gage transducer used in wind tunnels to measure the forces and moments on aerodynamic models. Techniques have been established for temperature-compensation of force balances to allow their use over the operating temperature range of a cryogenic wind tunnel (-190C to 60C) without thermal control. This was accomplished by using a patented strain gage matching process to minimize inherent thermal differences, and a thermal compensation procedure to reduce the remaining thermally-induced outputs to acceptable levels. A method of compensating for mechanical movement of the axial force measuring beam caused by thermally-induced stresses under transient temperatures was also included. Author

N86-27619# Army Research Inst. of Environmental Medicine, Natick, Mass.
AUTOMATED DATA COLLECTION AND PROCESSING FOR A CONCENTRIC/ECCENTRIC CYCLE ERGOMETER
Everett Harman, Howard G. Knuttgen, and Peter Frykman Feb. 1986 28 p
(AD-A165025; USARIEM-M-16/86) Avail: NTIS HC A03/MF A01 CSCL 14/2

A system for collection and processing of data from a concentric/eccentric high intensity cycle ergometer is described. Each cycle pedal is fitted with transducers to measure pedal angle relative to the crank and foot forces both perpendicular and parallel to the pedal surface. An additional transducer monitors crank position. Output signals are conditioned, amplified, digitized by a 12 bit A/D converter, fed into a computer at 100 Hz per channel, and mathematically smoothed to attenuate noise. For each sample interval, foot force components perpendicular and parallel to the crank arm are calculated. Power generated by subjects on each crank revolution is determined from transducer information. Computer graphics display pedalling parameters vs. crank angle in both rectangular and circular format. Data files containing variables descriptive of pedalling parameter curves are produced to enable computerized statistical analysis of cycling performance. Author (GRA)

N86-27620# Department of the Navy, Washington, D. C.
HIGH FREQUENCY RESPONSE MULTILAYER HEAT FLUX GAUGE Patent Application
Alan H. Epstein, Gerald R. Guenette, and Robert J. Norton, inventors (to Navy) Filed 28 May 1985 46 p
(AD-D012181; US-Patent-Appl-SN-738217) Avail: NTIS HC A03/MF A01 CSCL 14/2

This patent application discloses a double sided, high frequency response heat flux gauge for use on metal turbine blading consisting of a metal film resistance thermometer sputtered on both sides of a thin (25 micrometer) polyimide sheet. The temperature difference across the polyimide is a direct measure of the heat flux at low frequencies, while a quasi-ID analysis is used to infer the high frequency heat flux from the upper surface history. GRA

N86-27621# Varian Associates, Palo Alto, Calif.
RECENT OPERATING EXPERIENCE WITH VARIAN 70 GHz AND 140 GHz GYROTRONS
K. Felch, R. Bier, L. Fox, H. Huey, L. Ives, H. Jory, N. Lopez, J. Shively, and S. Spang 1985 7 p Presented at the Course and Workshop on Applications of RF Waves To Tokamak Devices, Varenna, Italy, 5 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003099; CONF-8509192-3) Avail: NTIS HC A02/MF A01

The design features and initial test results of Varian 70 GHz and 140 GHz CW gyrotrons are presented. The first experimental 140 GHz tube has achieved an output power of 102 kW at 24% efficiency under pulsed conditions in the desired TE sup o sub 031 cavity mode. Further tests aimed at achieving the design goal of 100 kW CW are currently under way. The 70 GHz tube has achieved an output power of 200 kW under pulsed conditions and possesses a wide dynamic range for output power variations. DOE

N86-27622# Lawrence Livermore National Lab., Calif.
OPERATION OF COLD-CATHODE GAUGES IN HIGH MAGNETIC FIELDS

S. R. Thomas, Jr., D. A. Goerz, and W. L. Pickles 11 Nov. 1985 6 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract W-7405-eng-48)
(DE86-003489; UCRL-92741; CONF-851174-22) Avail: NTIS HC A02/MF A01

The Mirror Fusion Test Facility (MFTF-B), under construction at LLNL, requires measurement of the neutral gas density in high magnetic fields near the plasma at several axial regions. This Background Gas Pressure (BGP) diagnostic will help us understand the role of background neutrals in particle and power balance, particularly in the maintenance of the cold halo plasma that shields the hot core plasma from the returning neutrals. It consists of several cold-cathode, magnetron-type gauges stripped of their permanent magnets, and utilizes the MFTF-B ambient B-field in strengths of 5 to 25 kG. Similar gauges have operated in TMX-U in B-fields up to 3 kG. To determine how well the gauges will perform, we assembled a test stand which operated magnetron gauges in an external, uniform magnetic field of up to 30 kG, over a pressure range of 1E-8 T to 1E-5 T, at several cathode voltages. This paper describes the test stand and presents the results of the tests. DOE

N86-27623# Sandia National Labs., Albuquerque, N. Mex.
MINIMIZATION OF OPERATOR-BALANCE INTERACTIVE WARMUP BY USE OF AN ALTER EGO HEAT SOURCE
D. W. Braudaway 1986 13 p Presented at the IEEE Conference on Instrumentation and Measurements, Boulder, Colo., 25 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004221; SAND-85-1983C; CONF-860354-1) Avail: NTIS HC A02/MF A01

Operator-equipment interaction is a well-known but frustrating part of many high precision measurements. Deterioration in performance of a high-precision balance required testing to identify the cause of the problem and to establish effectiveness of the solution. An unexpected result of the tests was a clear characterization of a significant operator-balance thermal interaction and verification of the empirically determined warmup requirement. The repeatability of the interactive effect inspired development of a replacement for the operator using an alter ego heat source. DOE

N86-27624# Royal Netherlands Aircraft Factories Fokker, Amsterdam.
PRINCIPLES AND APPLICATIONS OF THE FOKKER BOND TESTER
Jos J. C. Caarls, Rolf J. Querido, and Alan G. Julier 1985 21 p Presented at Air Transport Association of America Nondestructive Testing Forum, Miami, Fla., 17-20 Sep. 1985
(Contract BMFT-0101-ZA/WF/WRD-174/4)
(ESA-86-96960) Avail: NTIS HC A02/MF A01

An instrument for testing adhesive bonding of aircraft structures is described. Factors determining bond strength; principle of operation; and the use of correlation charts are discussed. Automation and improvements to the instrument since its introduction are outlined. ESA

N86-27625# National Physical Lab., Teddington (England). Div. of Material Applications.
BACKGROUND DISCUSSION PAPER FOR THE DEVELOPMENT OF R AND D STRATEGY IN THE AREA OF JOINING TECHNOLOGY
L. N. McCartney 1985 634 p
(PB86-178399; NPL-DMA(A)-110) Avail: NTIS HC A04/MF A01 CSCL 14B

In response to a request from the Non-Metallic Materials and Chemicals Committee (NMMCC) of the Materials, Chemicals and Vehicles Requirements Board of the DTI, the NPL have prepared a background paper on joining technology which reviews progress to date and highlights some of the challenges for the future. The uses of composite materials, ceramics, plastics and adhesives in manufacturing industry are reviewed and the importance of joining technology to their application is emphasized. GRA

N86-27313*# Purdue Univ., West Lafayette, Ind. Getaway Special Group.
DESIGN CONSIDERATIONS FOR A GAS MICROCONTROLLER
Douglas A. Ritter *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 117-124 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27316*# Kayser Threde G.m.b.H., Munich (West Germany).
HALOGEN LAMP EXPERIMENT, HALEX
Gunter Schmitt and Jurgen Stapelmann (Dornier-Werke G.m.b.H., Friedrichshafen, West Germany) *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 141-149 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27493# Joint Publications Research Service, Arlington, Va.
CY SERIES INTEGRATED PRESSURE TRANSDUCER
Minhang Bao and Jishen Jiang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 141-147 Transl. into ENGLISH from Dianzi Kexue Jishu (Beijing, China), no. 12, 10 Dec. 1984 p 25-26, 28 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27502# Joint Publications Research Service, Arlington, Va.
IMAGING EQUATION, OPTIMUM ESTIMATION, ALGORITHM OF ULTRASONIC HOLOGRAPHY
Zaiming Li and Junti Wu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 —p 43-51 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 3, May 1985 p 71-76 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27507# Joint Publications Research Service, Arlington, Va.
OPTICAL DISK MEDIA RESEARCH DISCUSSED
Jinchun Hou and Fuxi Gan *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 96-110 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, p 705-712 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-27626# Impulse Engineering, Inc., New Haven, Conn.
LONG-LIFE, REPETITIVE-PULSE SWITCH FOR LASERS Final Report, Sep. 1982 - Jun. 1985
D. Turnquist Dec. 1985 48 p
(Contract F33615-82-C-2243)
(AD-A164879; AFWAL-TR-85-2084) Avail: NTIS HC A03/MF A01 CSCL 09/1

This program is the first phase of the development of a scalable, long life, high pressure, closing switch for use in repetitively pulsed high voltage systems. The objectives were to develop a conceptual switch design and to perform experiments to establish the feasibility of the switch for varying voltage/pulse life. To fulfill the requirements a switch was conceived with the features of: a high pressure gas fill, for high voltage holdoff and fast current rise; a discharge formation control scheme to generate a uniform discharge that will minimize filamentation and arcing; a linear (50 to 100 cm length) geometry compatible with transverse-discharge lasers. The first part of this program was directed toward delineation of the important switch design parameters and toward the design of the experimental switch. Areas reviewed for the first part were uniform discharge growth at high pressure, basic data for the gases under consideration, and preionization ion density requirements. For the second part of the program an experimental device was built and

experiments were run to determine the switch characteristics.
GRA

N86-27627# Lawrence Livermore National Lab., Calif.
ECONOMIC REQUIREMENTS FOR COMPETITIVE LASER FUSION POWER PRODUCTION
W. J. Hogan and W. R. Meier 15 Nov. 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-003480; UCRL-92559; CONF-851102-47) Avail: NTIS HC A02/MF A01

An economic model of a laser fusion commercial power plant is used to identify the design and operating regimes of the driver, target and reaction chamber that will result in economic competitiveness with future fission and coal plants. We find that, for a plant with a net power of 1 GW(sub e), the cost of the driver must be less than $0.4 to 0.6 B, and the recirculating power fraction must be less than 25%. Target gain improvements at low driver energy are the most beneficial but also the most difficult to achieve. The optimal driver energy decreases with increasing target technology. The sensitivity of the cost of electricity to variations in cost and performance parameters decreases with increasing target technology. If chamber pulse rates of a few Hz can be achieved, then gains of 80 to 100 will be sufficient, and higher pulse rates do not help much. Economic competitiveness becomes more difficult with decreasing plant size. Finally, decreasing the cost of the balance of plant has the greatest beneficial effect on economic competitiveness.
DOE

N86-27628# Sandia National Labs., Albuquerque, N. Mex.
RECENT RESULTS FROM NUCLEAR PUMPED LASER STUDIES: GAIN MEASUREMENTS IN XeF
G. N. Hays, D. A. McArthur, D. A. Neal, and J. K. Rice 1985 10 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-004557; SAND-85-2214C; CONF-851185-3) Avail: NTIS HC A02/MF A01

Nuclear pumped lasers are the subjects studied. Gain measurements on the XeF(B-X) transition near 351 mm in He/Xe/NF gas mixtures pumped by fission fragments originating from thermal neutron impact of He are presented.
DOE

N86-27485# Joint Publications Research Service, Arlington, Va.
CONFOCAL LASER RESONATOR CHARACTERISTICS ANALYZED
Deyun Jin *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 75-80 Transl. into ENGLISH from Guangxue Xuebao (Acta Optica Sinica) (Shanghai, China), v. 5, no. 11, Nov. 1985 p 992-996 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27486# Joint Publications Research Service, Arlington, Va.
CHINESE ACADEMY OF SCIENCES STUDIES DH LASER
Qiming Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 81-92 Transl. into ENGLISH from Tongxin Xuebao (Beijing, China), v. 6, no. 1, Jan. 1985 p 65-70 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27487# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF SECTIONAL CONSTRICTED PLANAR CO-CAVITY DH LASERS
Guotong Du, Deling Yang, and Dingsan Gao *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 93-96 Transl. into ENGLISH from Bandaoti Xuebao (Beijing, China), v. 6, no. 4, Jul. 1985 p 442-445 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27506# Joint Publications Research Service, Arlington, Va.
FIRST FREE-ELECTRON LASER OPERATIONAL
Cheng-Zhu, Zaitong Lu, Ruigen Shi, Zhijiang Wang, Jinchuan Shi, and Yu Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 —p 95 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, p 767 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27508# Joint Publications Research Service, Arlington, Va.
LASER PULSE COMPRESSOR AND PHASE-COMPENSATOR DESCRIBED
Cunkai Wu, Guang Lan, Jie Xu, and Guozheng He *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 115-117 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 12, 20 Dec. 1985 p 750-751 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27509# Joint Publications Research Service, Arlington, Va.
STANDING WAVE WIGGLERS USED IN FREE-ELECTRON LASER
Shizhan Lei *In its* China Report: Science and technology (JPRS-CST-86-009) 13 Mar. 1986 p 118-123 Transl. into ENGLISH from Hongwai Yanjiu (Shanghai, China), v. 4, no. 5, Oct. 1985 p 374-378 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27510# Joint Publications Research Service, Arlington, Va.
THE (SUP)14 CO (SUB)2 ISOTOPE LASER DESCRIBED
Lin Fei, Kejun Wang, and Zuhui Zhu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 124-130 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, 20 Sep. 1985 p 524-527 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

N86-27511# Joint Publications Research Service, Arlington, Va.
AUTO-ALIGNMENT DEVELOPED FOR LARGE LASER SYSTEM
Wucheng Wang, Jianxiong Wang, Hengxian Wu, Ruoju Guo, Jingxin Yang, and Shiyuan Hu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 131-139 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, Sep. 1985 p 542, 543-546 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-27629* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOAD POSITIONING SYSTEM WITH GRAVITY COMPENSATION
Richard H. Hollow 12 Dec. 1984 9 p
(NASA-Case-ARC-11525-1; US-Patent-4,591,772;
US-Patent-Appl-SN-681041; US-Patent-Class-318-632;
US-Patent-Class-318-8; US-Patent-Class-318-48;
US-Patent-Class-318-663) Avail: US Patent and Trademark Office CSCL 13I

A load positioning system with gravity compensation has a servomotor, position sensing feedback potentiometer and velocity sensing tachometer in a conventional closed loop servo arrangement to cause a lead screw and a ball nut to vertically position a load. Gravity compensating components comprise the DC motor, gears, which couple torque from the motor to the lead screw, and constant current power supply. The constant weight of the load applied to the lead screw via the ball nut tend to cause the lead screw to rotate, the constant torque of which is opposed by the constant torque produced by the motor when fed from the constant current source. The constant current is preset as required by the potentiometer to effect equilibration of the load which thereby

enables the positioning servomotor to see the load as weightless under both static and dynamic conditions. Positioning acceleration and velocity performance are therefore symmetrical. NASA

N86-27630* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTIMIZED BOLTED JOINT Patent
Leonard J. Hart-Smith (McDonnell-Douglas Corp., Long Beach, Calif.), Bruce L. Bunin, and Donald J. Watts, inventors (to NASA) Issued 1 Apr. 1986 9 p Filed 23 Jan. 1984 Supersedes N84-20859 (22 - 11, p 1664) Sponsored by NASA. Langley Research Center (NASA-Case-LAR-13250-1; US-Patent-4,579,475; US-Patent-Appl-SN-573162; US-Patent-Class-403-312; US-Patent-Class-403-388; US-Patent-Class-403-408.1) Avail: US Patent and Trademark Office CSCL 13I

A method is disclosed for joining segments of the skin of an aircraft. The ends of the skin are positioned in close proximity or abutt each other. The skin is of constant thickness throughout the joint and is sandwiched between splice plates, which taper in thickness from the last to the first bolt rows in order to reduce the stiffness of the splice plate and thereby reduce the load transfer at the location where bypass loads are the highest.
Official Gazette of the U.S. Patent and Trademark Office

N86-27631# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
MEASUREMENTS TECHNIQUES IN TURBOMACHINES, VOLUME 2
1985 385 p Lecture series held in Rhode-Saint-Genese, Belgium, 25 Feb. - 1 Mar. 1985
(VKI-LS-1985-03-Vol-2; ESA-85-95398) Avail: NTIS HC A17/MF A01

Design, development and operation of a high simultaneous capacity digital telemetry system for gas turbine studies; hot-wire anemometry in turbomachinery components (measurements with stationary hot-wire probes, application of hot-wires in the relative frame of reference); measurements in two-phase flows; short duration heat transfer measurements; and heat transfer measurements in steady state facilities were discussed. For individual titles, see N86-27632 through N86-27638.

N86-27632# Rolls-Royce Ltd., Derby (England).
DESIGN, DEVELOPMENT AND OPERATION OF A HIGH SIMULTANEOUS CAPACITY DIGITAL TELEMETRY SYSTEM
K. Bradley *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 32 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

A digital telemetry system for measuring pressures in interblade passages on large fan engines and model fan rigs was developed. The telemetry system replaces the slip-rings used in previous tests, and incorporates on rotor digitization and hybrid circuit techniques. Simultaneous cpacity is 48 measurements, in the dc to 3 kHz bandwidth. Measurement accuracy is + or - 0.5% fsd (dc) to 1.0% fsd (ac). Dynamic range is 60 dB. Input sensitivity is 0 to 80 mV for 0 to 25 psia. Applications are to an RB 211 development engine and a model scale fan rig. Engine shaft speed is 3900 rpm, rig speed is 10,000 to 11,000 rpm. Author (ESA)

N86-27633# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
HOT-WIRE ANEMOMETRY IN TURBOMACHINERY COMPONENTS
K. Mathioudakis and F. A. E. Breugelmans *In its* Measurements Techniques in Turbomachines, Volume 2 1985 50 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

Techniques for measurements in turbomachinery employing stationary hot-wire probes are presented. Single slanted hot-wires can measure the three dimensional mean and turbulent flow fields. Their use can become tedious if large amounts of data have to be taken. They cannot provide instantaneous signals of velocity magnitude and direction. Use of crossed hot-wires should be restricted to two dimensional flow conditions and particularly to mean flow measurements. The combination of three wires to form triple sensor probes is the most powerful instrument for three dimensional mean velocity and turbulence measurements. Methods employing such probes are described. Author (ESA)

N86-27634# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
APPLICATION OF HOT WIRES IN THE RELATIVE FRAME OF REFERENCE
F. A. E. Breugelmans *In its* Measurements Techniques in Turbomachines, Volume 2 1985 68 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

Hot-wire techniques for studying flow phenoma in the rotating channel and near the blade surfaces of turbomachines are reviewed. Instruments for flow reversal investigations (i.e., sensors based on the thermal tuft technique); sensors for flow direction measurements on the blade surface; and probes for channel flow exploration are discussed. The rotor boundary layer longitudinal and crossflow profiles; the three dimensional structure of the wake; tip leakage flow; flow separation; stall; and surge are discussed.
Author (ESA)

N86-27635# Ecole Royale Militaire, Brussels (Belgium).
MEASUREMENTS IN TWO-PHASE FLOWS c34
R. Decuypere *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 92 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

Laser transit velocimetry (LTC) measurements of turbomachine flows are introduced. Droplet size and wetness measurements are described. With the backscattering LTV, no seeding is required to study two phase flows. It is less sensitive than laser doppler anemometers to dirty windows, although dirt reduces signal quality for measurements within 3 mm of the window. For flows with high angular turbulence levels the laser doppler velocimeter must be used. Author (ESA)

N86-27636# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
SHORT DURATION HEAT TRANSFER MEASUREMENTS c34
Tony Arts and Cengiz Camci *In its* Measurements Techniques in Turbomachines, Volume 2 1985 50 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

Shock tunnels, blowdown cascades, and isentropic light piston compression tubes used to study heat transfer and aerodynamic phenomena in turbine components are described. Thin film heat transfer gages, calorimeter gages, and optical measurements methods are presented. Compression tube investigations of convective heat transfer on a flat plate, with and without film cooling; and convective heat transfer on a high pressure rotor blade with and without film cooling are summarized. Results show that along the suction side, laminar to turbulent transition is strongly influenced by the presence of the leading edge cooling holes, even when no coolant flow is ejected. Along the pressure side, the boundary layer behavior is dominated by the free stream pressure gradient rather than by the existence of the cooling holes. Significant coolant temperature effects are also observed. At low blowing rate this effect is mainly observed up to 35 to 40 hole diameters downstream of the suction side ejection rows when the coolant temperature is lowered from wall temperature to half of the mainstream level. At high blowing rate, the influence of the coolant temperature is felt much further downstream.
Author (ESA)

N86-27637# Nottingham Univ. (England).
HEAT TRANSFER MEASUREMENTS IN STEADY STATE FACILITIES c34
Nessim Hay *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 40 p (For primary document see N86-27631 18-37)

Avail: NTIS HC A17/MF A01

Heat transfer measurement techniques used to study gas turbines, particularly blade cooling, are reviewed. Surface temperature methods; transient methods; pulse methods; and mass transfer analogy methods are covered. Promising techniques for steady state facilities include infrared camera system for low and high temperature tests; pulse methods for full scale tests; and the swollen polymer technique for fundamental investigations under ambient conditions. Author (ESA)

N86-27638# Nottingham Univ. (England).
THE SWOLLEN POLYMER TECHNIQUE c34
Nessim Hay *In* Von Karman Inst. for Fluid Dynamics Measurements Techniques in Turbomachines, Volume 2 1985 52 p (For primary document see N86-27631 18-37)
Avail: NTIS HC A17/MF A01

The swollen polymer technique for measuring heat transfer in gas turbine steady state facilities is described. It is a combination of the swollen polymer approach to mass transfer and laser holographic interferometry. The former is used in place of the sublimating naphthalene surface and the latter replaces the associated mechanical profilometric measurements with optical measurements. Application to the measurement of adiabatic wall effectiveness on film cooled surfaces is outlined. Author (ESA)

N86-27639# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
MEASUREMENT TECHNIQUES IN TURBOMACHINES, VOLUME 1
1985 402 p Lecture series held in Rhode-Saint-Genese, Belgium, 25 Feb. - 1 Mar. 1985
(VKI-LS-1985-03-Vol-1; ESA-85-95397) Avail: NTIS HC A18/MF A01

The Von Karman Institute for Fluid Mechanics sponsored a lecture series on Techniques in Turbomachines, which took place in Rhode Saint Genese, Belguim, on 25 February - 1 March 1985. Among the topics discussed were the following: the application of laser anemometry to turbomachinery flow field measurements; high frequency response measurement in turbomachinery; and optical techniques in turbomachinery. For individual titles, see N86-27640 through N86-27642.

N86-27640*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF LASER ANEMOMETRY TO TURBOMACHINERY FLOW FIELD MEASUREMENTS
Anthony J. Strazisar *In* Von Karman Inst. for Fluid Dynamics Measurement Techniques in Turbomachines, Volume 1 1985 122 p (For primary document see N86-27639 18-37)
Avail: NTIS HC A18/MF A01

The application of laser anemometry to the measurement of turbomachinery flow fields is reviewed. Choices of optical configuration, seed particle generation, and seed injection techniques are discussed. The modification of experimental facilities to gain optical access is considered. The efficiency of data acquisition schemes is analyzed and issues related to data integrity and error estimation are addressed. Data reduction and analysis techniques for extracting and understanding the flow physics from laser anemometer measurements are presented. Author (ESA)

N86-27641# Massachusetts Inst. of Tech., Cambridge. Gas Turbine Lab.
HIGH FREQUENCY RESPONSE MEASUREMENTS IN TURBOMACHINERY
Alan H. Epstein *In* Von Karman Inst. for Fluid Dynamics Measurement Techniques in Turbomachines, Volume 1 1985 104 p (For primary document see N86-27639 18-37)
Avail: NTIS HC A18/MF A01

The design, construction, and use of multitransducer probes for the measurement of total and static pressures and flow angles in turbomachinery are discussed. Physical constraints on probe frequency response and tradeoffs in spatial resolution are presented. Probe use and calibration are illustrated in a conventional steady state compressor test rig. The determination of fluctuating temperature in a high speed flow field by hot wire anemometry is reviewed. A technique using a multisensor aspirating probe to simultaneously measure time resolved total pressure and temperature is presented. The calibration techniques for the aspirating probe are compared to those for multisensor pressure probes. Use of the aspirating probe in transonic turbomachinery is illustrated. Author (ESA)

N86-27642# TopExpress Ltd., Cambridge (England).
OPTICAL TECHNIQUES IN TURBOMACHINERY
P. J. Bryanston-Cross *In* Von Karman Inst. for Fluid Dynamics Measurement techniques in Turbomachines, Volume 1 1985 161 p (For primary document see N86-27639 18-37)
Avail: NTIS HC A18/MF A01

Turbomachine flow analysis using shadowgraphy; Schlieren photography; moire interferometry; holography; smoke visualization; particle seeding; Mie scattering; pulse laser velocimetry (PLV); speckle interferometry; heat mass transfer analogies; fluorescence; and photography is illustrated. Author (ESA)

N86-27643*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SSME LONG-LIFE BEARINGS Final Report, Jan. 1982 - July 1986
Myles F. Butner and Brian T. Murphy Jul. 1986 163 p
(Contract NAS3-23623)
(NASA-CR-179455; NAS 1.26:179455; RI/RD86-168) Avail: NTIS HC A08/MF A01 CSCL 13I

Hybrid hydrostatic/ball bearings for LH2 and LO2 service in turbopumps were studied as a means of improving speed and life capabilities. Four hybrid bearing configurations were designed with emphasis on achieving maximum stiffness and damping. Parallel load bearings were tested at steady-state and transient conditions with LH2 (externally fed) and LN2 (internally fed). The hydrostatic elements were tested with Freon 113 for empirical determination of dynamic characteristics. Tests using an eccentric journal for loading showed the externally and internally fed hydrostatic bearings to have significant separated coefficients of direct stiffness and damping. For the internally fed bearing, the strongly speed-dependent cross-coupling stiffness arising from fluid swirl, along with significant cross-coupling damping, resulted in low net effective stiffness and damping. The test method used can produce separated coefficients with a sufficiently elliptic journal orbit; otherwise, only net effective coefficients combining direct and cross-coupling terms can be determined. Testing with nonsynchronous excitation is recommended to avoid this restriction. Investigation of hard materials, including ceramics, is recommended as a means of eliminating the need for the rolling bearing for startup and shutdown support. The testing was performed in 1984 (LH2), 1985 (LN2) and 1985-86 (Freon). Author

N86-27644*# National Aeronautics and Space Administration, Washington, D.C.
APPLICATIONS OF TETHERS IN SPACE: WORKSHOP PROCEEDINGS, VOLUME 2
William A. Baracat, comp. (General Research Corp., McLean, Va.) Jun. 1986 502 p Workshop held in Venice, Italy, 15-17 Oct. 1985; sponsored by NASA, the Italian National Space Plan and CNR
(Contract NASw-3921)
(NASA-CP-2422-Vol-2; NAS 1.55:2422-Vol-2) Avail: NTIS HC A23/MF A01 CSCL 13I

Topics addressed include: tethered orbital transfer vehicle operations, Centaur and Shuttle tether technology; tethered constellations, gravitational effects; Shuttle continuous open wind tunnel; optimal control laws, electrodynamic tether technology; and space station facilities. For individual titles, see N86-27645 through N86-27660.

N86-27645*# Naples Univ. (Italy).
TETHERED CONSTELLATIONS, THEIR UTILIZATION AS MICROGRAVITY PLATFORMS AND RELEVANT FEATURES c18

Luigi G. Napolitano and Franco Bevilacqua (Aeritalia S.p.A., Torino (Italy).) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 2 Jun. 1986 p 65-77 Previously announced in IAA as A85-13279 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The gravitational, thermal, and dynamic docking effects on tethered platforms were studied. The near-earth environment has gravitational effects such a g-jitters and intermittencies, g-noise, and frequency and amplitude features which may influence life science, materials processing, and fluid processes research and commercial activities. Artificial gravity is produced by minute accelerations imparted by tethers. The magnitudes of gravitational forces produced by tethers 100 and 100,000 m long at various altitudes from 463 to 35,786 km are calculated. Thermal analyses were performed for stainless steel and Kevlar tethers, showing the steel tether could vary 300 m in length and the polyamide 25 m during one orbit. Finally, consideration given to docking with a tethered platform revealed that the center of mass could change, which would produce, however, negligible changes in orbit and therefore gravity. M.S.K. (IAA)

N86-27646*# Alabama Univ., Huntsville.
ARTIFICIAL OR VARIABLE GRAVITY ATTAINED BY TETHER SYSTEMS **c18**
Charles A. Lundquist *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 79-86 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The simplest orbiting tethered system demands for stability that the mass centers of two end bodies be displaced above and below the position of zero acceleration. Therefore, the contents of the end bodies are subjected necessarily to acceleration fields or artificial gravity whose magnitudes depend on the dimensions and masses of the system. If the length of the tether changes, so do the fields. Even for a fixed tether length, the acceleration field at a location in the system may be somewhat variable unless special means are employed to maintain a constant value. These fundamental properties of a tethered system can be used to advantage if small or variable acceleration fields are desired for experimental or operational reasons. This potential use involves a few expressions from a formulation of tether system dynamics. Some of these formulae were collected for convenient use. Two and three body tethered equilibrium equations are explained. A special application of acceleration field control using a tether system is attainment of near-zero gravity. In this applicaition, even small variations about zero become a critical matter. Author

N86-27647*# Martin Marietta Corp., Denver, Colo.
TETHERED ORBITAL REFUELING STUDY **c18**
Dale A. Fester *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 89-123 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

Objectives are to evaluate the feasibility and limitations of fluid acquisition and transfer under an accleration induced in a tethered orbital refueling facility and to provide conceptual designs. Program tasks consist of recommendation of fluid transfer method and parameters; evaluation of disturbances, fluid motion, and damping; selection of passive devices to augment inherent fluid damping and determination of the resultant envelope of operation; assessment of the effect of tether lengths on hazards; and identification of ground and flight tests necessary to prove the tethered orbital refueling concepts. B.G.

N86-27648*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TETHERS AND GRAVITY IN SPACE **c18**
Paul A. Penzo *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 125-135 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The life science objectives concerning gravitational effects in space are summarized. The use of rotation, centrifuge, and tether techniques to produce variable gravity in space are presented. The station and tether platform concept are presented for the Gravlab design. B.G.

N86-27649*# Naples Univ. (Italy). Istituto Aerodinamica U. Nobile.
TETHERED ELEVATOR: A UNIQUE OPPORTUNITY FOR SPACE PROCESSING **c12**
Rodolfo Monti *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 137-147 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The latest fluid dynamic and material science experiments in the microgravity environment have emphasized the importance of the residual gravity level and of the g-jitter on fluid physics phenomena. The tethered elevator presents the possibility of providing variable g-levels (both steady and g-jitter) around a very low steady g-level (that can be realized when the elevator is near the center of mass of the space station-tether complex). When positioning a variable periodic oscillation to the payload a clean g-jitter disturbance can be obtained that would not be otherwise obtainable by other systems. These two possibilities make the elevator a facility to help resolve a number of still open questions that are preventing wider utilization of the space environment in the microgravity area. B.G.

N86-27650*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT
Enrico Lorenzini *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 167-203 (For primary document see N86-27644 18-37)
(Contracts NAS8-35497; NAS8-36606; RH4-394019)
Avail: NTIS HC A23/MF A01 CSCL 13I

Topics covered include station keeping of single-axis and two-axis constellations; single-axis vertical constellations with low-g platform; single-axis vertical constellations with three masses; deployment strategy; and damping of vibrational modes. B.G.

N86-27651*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE CONTINUOUS OPEN WIND TUNNEL (SCOWT) **c34**
Giovanni M. Carlomagno (Naples Univ. (Italy).), Luigi deLuca, Paul M. Siemers, and George M. Wood *In* NASA, Washington Applications of Tethers in Space. Workshop Proceedings, Vol. 2 Jun. 1986 p 225-249 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The aerodynamic and heat transfer coefficients are studied within the range of thermo-fluid-dynamic conditions experienced by a satellite during Tethered Satellite System (TSS) atmospheric flights. The gasdynamic processes occuring downstream of the bow wave standing in front of the satellite are also studied. The knowledge of the chemistry and physics of the upper atmosphere related to satellite aerothermodynamics is furthered. The existence of an overshooting of the air drag coefficient of the sphere in the transition regime is validated. A complete set of measurements is performed in order to provide the data base to develop and validate theoretical models of free molecule transition flow fields. E.R.

N86-27652*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TETHERED AEROTHERMODYNAMICS RESEARCH FACILTY (STARFAC) INSTRUMENTATION REQUIREMENTS **c02**
George M. Wood, Paul M. Siemers, Giovanni M. Carlomagno (Naples Univ. (Italy).), and John Hoffman (Texas Univ., Dallas.) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 251-263 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The instrumentation requirements for the Shuttle Tethered

Aerothermodynamic Research Facility (STARFAC) are presented. The typical physical properties of the terrestrial atmosphere are given along with representative atmospheric daytime ion concentrations and the equilibrium and nonequilibrium gas property comparison from a point away from a wall. STARFAC science and engineering measurements are given as are the TSS free stream gas analysis. The potential nonintrusive measurement techniques for hypersonic boundary layer research are outlined along with the quantitative physical measurement methods for aerothermodynamic studies. E.R.

N86-27653*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SHUTTLE TETHERED AEROTHERMODYNAMICS RESEARCH FACILITY (STARFAC) **c02**
Paul M. Siemers, George M. Wood, and Henry Wolf *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 265-285 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The Earth's atmosphere from 90 km to 200 km provides the last aerothermodynamics frontier. Present NASA programs which require but also can provide an understanding of the aerodynamics and aerothermodynamics of the free molecule and transition flows that exist at these altitudes are the Aeroassisted OTV, Entry Research Vehicle and the Tethered Satellite. Each of these programs provides a unique opportunity to do flight research in the rarefied upper atmosphere. However, the Tethered Satellite Program provides, because of its capability to obtain global, in-situ, steady state data, the greatest potential to: (1)define the performance of aerodynamic shapes as a function of environmental characteristics (free molecule, transition, slip flow regimes); (2)define the characteristics of the upper atmosphere and the global variability of properties such as composition temperature, pressure and density. Such data are required to accomplish the systematic development and verification of analytical prediction techniques required to support advance configuration designs. Author

N86-27654*# Aeritalia S.p.A., Torino (Italy).
TETHER POINTING PLATFORM AND SPACE ELEVATOR MECHANISMS ANALYSIS OF THE KEY CONCEPTS FOR SATP AND SCALED SATP
E. Turci *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 287-324 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The key concepts for a scaled and full model Science and Applications Tethered Platform (SATP) are analysized. This includes a tether pointing platform and a space elevator. The mechanism concepts and technological solutions are given. The idea of the tether pointing platform mechanism is to control and stabilize the attitude of a platform by means of a movable tether. The idea of the space elevator mechanism for a scaled SATP is to drag the tether gripping it between two rotating wheels. E.R.

N86-27655*# Howard Univ., Washington, D. C. Dept. of Mechanical Engineering.
THE DEVELOPMENT OF OPTIMAL CONTROL LAWS FOR ORBITING TETHERED PLATFORM SYSTEMS
Peter M. Bainum *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 325-355 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

A mathematical model of the open and closed loop in orbit plane dynamics of a space platform-tethered-subsatellite system is developed. The system consists of a rigid platform from which an (assumed massless) tether is deploying (retrieving) a subsatellite from an attachment point which is, in general, offset from the platform's mass center. A Langrangian formulation yields equations describing platform pitch, subsatellite tetherline swing, and varying tether length motions. These equations are linearized about the nominal station keeping motion. Control can be provided by both modulation of the tether tension level and by a momentum type platform-mounted device; system controllability depends on the presence of both control inputs. Stability criteria are developed in terms of the control law gains, the platform inertia ratio, and tether offset parameter. Control law gains are obtained based on linear quadratic regulator techniques. Typical transient responses of both the state and required control effort are presented. Author

N86-27656*# British Columbia Univ., Vancouver.
EFFECTS OF DAMPING ON THE CONTROL DYNAMICS OF THE SPACE SHUTTLE BASED ON TETHERED SYSTEMS **c16**
V. J. Modi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 357-382 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The analysis of the effects of damping on the control dynamics of the space shuttle based on tethered systems suggest that a relatively simple point mass model can provide useful information concering librational dynamics during development and retrieval of the tethered satellites. The results show that a nonlinear tension control strategy in conjunction with a suitable choice of gains and realistic damping can lead to stable retrieval maneuver with amplitudes in pitch and roll limited to acceptable values. Longitudinal and lateral vibrations of the tether are strongly coupled and can lead to the slackening of the tether. Tether vibrations can be controlled quite effectively by speeding up the retrieval at smaller tether length and/or using thruster. E.R.

N86-27657*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTRODYNAMIC TETHER TECHNOLOGY CONSIDERATIONS
Joseph C. Kolecki *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 383-386 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The electrodynamic tether operation was studied. Plasma contactors, power management and conditioning, and exposure of materials were considered. Multikilowatt electrodynamic tether systems need a variety of supporting technologies in order to be viable. The area of interface between the high voltage end of the electrodynamic tether and the user was not addressed, however, it must be in order for the successful and safe operation of the system. E.R.

N86-27658*# Contraves Italiana, Rome.
COMLINK PROPOSAL FOR FUTURE MISSIONS OF TETHERED SATELLITE **c18**
Filippo Sciarrino *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 387-398 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

The quality of the communications links between satellites was tested. The interaction between the VLF and ELF waves, generated by the conducting tether, and the SHF and YHF electromagnetic waves, generated by the 20/30 GHz transmitters were investigated. The ionspheric electron density irregularities was measured by means of phase-coherent RF transmission between the two vehicles. The motion of the tethered satellite was observed through the Doppler link established between the shuttle and the satellite. The technology and deployment of spaceborne antennas of large diameter was tested. E.R.

N86-27659*# Aeritalia S.p.A., Torino (Italy). Gruppo Sistemi Spaziali.
TETHERED ELEVATOR AND PLATFORMS AS SPACE STATION FACILITIES: SYSTEMS STUDIES AND DEMONSTRATIVE EXPERIMENTS **c18**
In NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 413-455 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

Several key concepts of the science and applications tethered platforms were studied. Some conclusions reached are herein

listed. Tether elevator and platform could improve the space station scientific and applicative capabilities. The space elevator presents unique characteristics as microgravity facility and as a tethered platform servicing vehicle. Pointing platforms could represent a new kind of observation facility for large class of payloads. The dynamical, control and technological complexity of these concepts advised demonstrative experiments. The on-going tethered satellite system offers the opportunity to perform such experiments. And feasibility studies are in progress. E.R.

N86-27660*# California Univ., La Jolla. Space Inst.
ROLES FOR TETHERS ON AN EVOLVING SPACE STATION
c18
Joseph A. Carroll *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Vol. 2 Jun. 1986 p 457-472 (For primary document see N86-27644 18-37)
Avail: NTIS HC A23/MF A01 CSCL 13I

A scenario was developed for evolution of space station tether capabilities. As tether imposed constaints on station developments and operations were minimized, maximum benefits were derived from a mutually compatible combination of: (1)electrodynamic tethers for power, thrust, and libration control; (2)momentum transfer operations involving the STS or upper stages; (3)aeroma-neuvering devices for space station orbital plan change: and (4)tethered constellations and tether/free-flyer combinations. Some concepts determined for advance tether facilities orbiting the moon: (1)stationkeeping deltaVs to stay in precise equatorial or polar orbits; (2)ratio of facility mass to maximum payload mass (surface-orbit-escape); (3)electric-thruster power requirements and maximum rendezvous frequencies; and (4)overall capabilities and major constraints on such facilities. E.R.

N86-27661*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEW METHODOLOGY FOR SHAFT DESIGN BASED ON LIFE EXPECTANCY
Stuart H. Loewenthal 1986 20 p Presented at the International Original Equipment Manufacturers Design Conference, New York, N.Y., 9-11 Dec. 1986
(NASA-TM-87354; E-3109; NAS 1.15:87354) Avail: NTIS HC A02/MF A01 CSCL 13I

The design of power transmission shafting for reliabilty has not historically received a great deal of attention. However, weight sensitive aerospace and vehicle applications and those where the penalties of shaft failure are great, require greater confidence in shaft design than earlier methods provided. This report summarizes a fatigue strength-based, design method for sizing shafts under variable amplitude loading histories for limited or nonlimitedservice life. Moreover, applications factors such as press-fitted collars, shaft size, residual stresses from shot peening or plating, corrosive environments can be readily accommodated into the framework of the analysis. Examples are given which illustrate the use of the method, pointing out the large life penalties due to occasional cyclic overloads. Author

N86-27662# Southampton Univ. (England). Inst. of Sound and Vibration Research.
POWER TRANSMISSION OF AN IDEALISED GEARBOX
R. C. N. Leung Nov. 1985 47 p Sponsored by Admiralty Research Establishment, Teddington, England
(ISVR-TR-131; ISSN-0347-6405; ESA-86-96843) Avail: NTIS HC A03/MF A01

The power transmission of a gearbox due to the inolane vibration was studied. Results show that a journal bearing with a high eccentricity ratio has a smaller effect on the power transmission process than a journal bearing with a low eccentricity ratio. A journal bearing with a low eccentricity ratio acts as a dash pot at the low frequency range to dissipate the vibrational power. In the high frequency region, the dissipation process becomes less effective. Findings based on the results of the calculated power transmitted to the housing per unit excitation force at the rim are the same as those based on the power transmissibility of an idealized gearbox. The responses at the point of excitation for a rotating disk with a stationary excitation force were derived. ESA

N86-27663# Commerce Dept., Washington, D.C.
ROBOT END EFFECTOR Patent Application
A. Slocom, (inventors to Commerce) and P. Jurgens, (inventors to Commerce) Filed 13 Feb. 1986 19 p
(PB86-166042; US-Patent-Appl-SN-6-829052) Avail: NTIS HC A02/MF A01 CSCL 13I

The invention relates to manipulating devices, and in particular relates to an end effector or gripper attachable to a robot for mechanically grasping and orienting objects. GRA

N86-27664# Battelle Columbus Labs., Ohio.
TECHNOLOGY DEVELOPMENT FOR CORROSION-RESISTANT CONDENSING HEAT EXCHANGERS Final Report, Sep. 1984 - Oct. 1985
G. H. Stickford, B. Hindin, S. G. Talbert, A. K. Agrawal, and M. J. Murphy Oct. 1985 194 p
(PB86-172038; GRI-85/0282) Avail: NTIS HC A09/MF A01 CSCL 13A

The results of a study to develop technology to support gas appliance manufacturers in the selection of corrosion resistant materials for high efficiency, gas fired residential space heating equipment is presented. Condensate sampling during the 1984 to 1985 heating season has indicated that condensate chloride levels from indoor air combustion normally vary by 200 or 300 percent from week to week due to normal homeowner activities. Several homes, however, had chloride levels greater that the benchmark level (26 ppm) nearly every week. These results support the hypothesis that high indoor chloride levels are more likely caused by on going homeowner activities than by a rare chloride producing event. The mean chloride level found in outdoor air condensate samples was five to eight times lower than the mean of the indoor data. The chloride level corresponding to the 99.5 percentile for the outdoor samples could not be estimated because of the limited amount of outdoor data. GRA

N86-27357# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
HISTORICAL DEVELOPMENT OF SOLAR ARRAY DRIVE MECHANISMS BY BRITISH AEROSPACE
I. D. Henderson *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 19-24 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27362# Technische Univ., Munich (West Germany).
TRAJECTORY PLANNING FOR MANIPULATOR SYSTEMS
F. Pfeiffer *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 53-58 (For primary document see N86-27353 18-18)
(Contract SV-I/61-288)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27363# Technische Univ., Munich (West Germany). Lehrstuhl B fuer Mechanik.
MODELING AND CONTROL OF A LIGHTWEIGHT ROBOT
B. Gebler *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 59-64 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27367# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
THERMAL CUTTING HOLDDOWN AND RELEASE MECHANISM
G.J. A. N. Kester *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 89-93 (For primary document see N86-27353 18-18)

Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27370# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
SEMI-ACTIVE MAGNETIC BEARINGS FOR SPACE APPLICATIONS
M. Gauthier and C. Rouyer *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 115-120 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27375# Centre National d'Etudes Spatiales, Toulouse (France).
DEFINITION AND TESTING OF GEARS FOR SPACE ROBOTICS
L. Petitjean and A. Borrien *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 149-154 In FRENCH; ENGLISH summary (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27378# European Space Tribology Lab., Risley (England).
SURFACE-TREATED TITANIUM ALLOY GEARS FOR SPACE MECHANISMS
R. A. Rowntree *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 167-171 Sponsored by ESTEC (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27381# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelberg (West Germany).
A COARSE POINTING MECHANISM FOR AN INTERSATELLITE LASER LINK (ISL2) SYSTEM
R. Kern and K. Kierschke *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 187-192 (For primary document see N86-27353 18-18)
(ESA-86-96851; ESA-SP-231) Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27382# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DEVELOPMENT AND TESTING OF A DUAL-WOUND dc MOTOR GEARHEAD
B. W. Henson and J. C. Anderson (European Space Tribology Lab., Risley (England).) *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 193-200 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27386# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
EXPERIMENT MANIPULATORS FOR AUTOMATIC SAMPLE HANDLING
N. Cable *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 221-226 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27387# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
A DORNIER LATCH DESIGN FOR A DOCKING MECHANISM
K. Priesett, F. Gampe, R. H. Bentall, and N. Cable *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 227-232 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27388# Sener, S.A., Madrid (Spain).
A SENER LATCH DESIGN FOR DOCKING MECHANISMS
F. Abarrategui, M. Fuentes, J. Rivacoba, and J. A. Ros *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 233-238 (For primary document see N86-27353 18-18)
(Contract ESA-5195/82-NL-BI)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27394# Centre National d'Etudes Spatiales, Toulouse (France).
MECHANISMS DEVELOPED IN THE FRENCH SPACE INDUSTRY
R. Salome and L. Petitjean *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 283-288 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27397# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SPACE MECHANISMS DEVELOPMENT IN THE ESA TECHNOLOGICAL RESEARCH PROGRAM
D. Wyn-Roberts *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 305-310 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

N86-27470# Weir Pumps Ltd., Glasgow (Scotland).
ROTOR INSTABILITY IN CENTRIFUGAL PUMPS Monthly Report
D. France *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 18, No. 1 Jan. 1986 p 3-6 (For primary document see N86-27468 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-27665*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
ULTRASONIC STRESS WAVE CHARACTERIZATION OF COMPOSITE MATERIALS Final Report
John C. Duke, Jr., Edmung G. Henneke, II, and Wayne W. Stinchcomb Washington NASA May 1986 161 p
(Grant NAG3-323)
(NASA-CR-3976; E-2948; NAS 1.26:3976) Avail: NTIS HC A08/MF A01 CSCL 14D

The work reported covers three simultaneous projects. The first project was concerned with: (1) establishing the sensitivity of the acousto-ultrasonic method for evaluating subtle forms of damage development in cyclically loaded composite materials, (2) establishing the ability of the acousto-ultrasonic method for detecting initial material imperfections that lead to localized damage growth and final specimen failure, and (3) characteristics of the NBS/Proctor sensor/receiver for acousto-ultrasonic evaluation of laminated composite materials. The second project was concerned with examining the nature of the wave propagation that occurs during acoustic-ultrasonic evaluation of composite laminates and demonstrating the role of Lamb or plate wave modes and their utilization for characterizing composite laminates. The third project was concerned with the replacement of contact-type receiving piezotransducers with noncontacting laser-optical sensors for acousto-ultrasonic signal acquisition. Author

N86-27666*# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
WAVE PROPAGATION IN ANISOTROPIC MEDIUM DUE TO AN OSCILLATORY POINT SOURCE WITH APPLICATION TO UNIDIRECTIONAL COMPOSITES Final Report
James H. Williams, Jr., Elizabeth R. C. Marques, and Samson S. Lee Washington NASA Jul. 1986 59 p
(Grant NAG3-328)
(NASA-CR-4001; E-3093; NAS 1.26:4001) Avail: NTIS HC A04/MF A01 CSCL 14D

The far-field displacements in an infinite transversely isotropic elastic medium subjected to an oscillatory concentrated force are derived. The concepts of velocity surface, slowness surface and wave surface are used to describe the geometry of the wave propagation process. It is shown that the decay of the wave amplitudes depends not only on the distance from the source (as in isotropic media) but also depends on the direction of the point of interest from the source. As an example, the displacement field is computed for a laboratory fabricated unidirectional fiberglass epoxy composite. The solution for the displacements is expressed as an amplitude distribution and is presented in polar diagrams. This analysis has potential usefulness in the acoustic emission (AE) and ultrasonic nondestructive evaluation of composite materials. For example, the transient localized disturbances which are generally associated with AE sources can be modeled via this analysis. In which case, knowledge of the displacement field which arrives at a receiving transducer allows inferences regarding the strength and orientation of the source, and consequently perhaps the degree of damage within the composite. Author

N86-27667# Martin Marietta Aerospace, Orlando, Fla.
IMPACT OF HARDWARE/SOFTWARE FAULTS ON SYSTEM RELIABILITY. VOLUME 1. STUDY RESULTS Final Technical Report, Mar. 1983 - Jan. 1985
Edward C. Soistman and Katherine B. Ragsdale Dec. 1985 195 p
(Contract F30602-83-C-0050)
(AD-A165231; OR-18173-Vol-1; RADC-TR-85-228-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 09/2

The objective of this study was to develop techniques for predicting total system reliability, which include the combined effects of software and hardware. Since hardware reliability techniques are much further developed, the study emphasized methods of characterizing software reliability. The software reliability prediction methodology contained in the report is compatible with hardware reliability techniques and definitions and is applicable during early development so that the predictions can influence the design and development process. The software reliability prediction techniques use both software product and development process characteristics to develop estimates of the reliability of the various software components which comprise the system. The software component reliabilities are combined via a Markov model to obtain estimates of software system reliability. Estimates of the execution frequencies of the various software components, as a function of the mission profile, are required by the methodology. Procedures for application of the techniques are provided and are intended for use by a reliability engineer having a basic knowledge of software engineering practices. The techniques offer a rudimentary framework for predicting total system reliability. Validation and refinement of the techniques using software development and field reliability performance data remains to be accomplished.
Author (GRA)

N86-27668# Martin Marietta Aerospace, Orlando, Fla.
IMPACT OF HARDWARE/SOFTWARE FAULTS ON SYSTEM RELIABILITY. VOLUME 2. PROCEDURES FOR USE OF METHODOLOGY Final Technical Report, Mar. 1983 - Jan. 1985
Edward C. Soistman and Katherine B. Ragsdale Dec. 1985 93 p
(Contract F30602-83-C-0050)
(AD-A165232; OR-18173-1-Vol-2; RADC-TR-85-228-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 09/2

The objective of this study was to develop techniques for predicting total system reliability, which include the combined effects of software and hardware. Since hardware reliability techniques are much further developed, the study emphasized methods of characterizing software reliability. The software reliability prediction methodology contained in the report is compatible with hardware reliability techniques and definitions and is applicable during early development so that the predictions can influence the design and development process. The software reliability prediction techniques use both software product and development process characteristics to develop estimates of the reliability of the various software components which comprise the system. The software component reliabilities are combined via a Markov model to obtain estimates of software system reliability. Estimates of the execution frequencies of the various software components, as a function of the mission profile, are required by the methodology. Procedures for application of the techniques are provided and are intended for use by a reliability engineer having a basic knowledge of software engineering practice. The techniques offer a rudimentary framework for predicting total system reliability. Validation and refinement of the techniques using software development and field reliability performance data remains to be accomplished.
Author (GRA)

N86-27669# University of Southern California, Los Angeles.
COGNITIVE WORKLOAD IN FAULT DIAGNOSIS Interim Report, Sep. 1983 - Dec. 1985
Douglas M. Towne Dec. 1985 65 p
(Contract N00014-80-C-0493)
(AD-A165263; TR-107) Avail: NTIS HC A04/MF A01 CSCL 05/10

Prior research has produced a capability to project with reasonable accuracy the manual activities required to accomplish diagnosis and repair of particular faults within a specified system. When applied to a substantial sample of faults, the technique, termed PROFILE, provides an assessment of the manual workload expected to maintain the system. Obtaining usable projections of total repair times, however, requires the estimation of the cognitive portion of fault diagnosis time as well. It is necessary to explore the variations in cognitive times in relation to those characteristics of the diagnostic situation which can be quantified. Three such characteristics are analyzed in detail: (1) the number of tests required to isolate a fault, (2) the total manual time expended in fault diagnosis, and (3) the times of the individual tests in a diagnostic sequence. The most reliable predictor of actual cognitive time for a particular fault was obtained by computing an estimated cognitive time prior to each test based upon the manual time required to perform that test. Since the PROFILE troubleshooting model produces good projections of the particular tests performed to accomplish diagnosis and repair, and their time durations, it can now also compute the estimated cognitive time preceding each test. The sum of the projected cognitive and manual times correspond well with the experimentally observed total diagnosis and repair times. GRA

N86-27670# Hernandez Engineering, Inc., Houston, Tex. Inst. of Sound and Vibration Research.
ESA SAFETY OPTIMIZATION STUDY
James Wiggins, comp., W. vanLeeuwen, comp., F. Teule, G. Hameetman, C. Slippens, R. Ely, and J. Gourlay Paris ESA 1 Aug. 1985 398 p In FRENCH; ENGLISH summary
(Contract ESTEC-6233/85-NL-AB)
(HEI-685/1026; ESA-CR(P)-2140; ESA-86-96869) Avail. NTIS HC A17/MF A01

To help determine the optimum system safety effort, space programs and projects for NASA, DOD, and commercial groups were reviewed to determine what efforts were performed and why these efforts were accomplished. Projects included the Space Shuttle, Inertial Upper Stage, Payload Assist Module, deployable fixed payloads of the Shuttle, and Expendable Launch Vehicle Payloads. Based upon the review and the assessment of the results, recommendations for ESA implementation are included.
ESA

N86-27671# Battelle Columbus Labs., Ohio.
QUALITY ASSURANCE OF HEAT-FUSED POLYETHYLENE PLASTIC PIPE JOINTS, PHASE 3 Final Report, Nov. 1983 - Jan. 1986
L. J. House, J. F. Mank, T. A. Pettenski, and W. J. Williams Jan. 1986 376 p
(Contract GRI-5083-271-0921)
(PB86-174414; GRI-85/0284) Avail: NTIS HC A17/MF A01 CSCL 13B

A prototype of an automated ultrasonic inspection system was developed for field testing of butt fusion joints in polyethylene gas distribution pipe. The inspection system accommodates a range of pipe sizes and a variety of pipe materials. The ultrasonic technique implemented by the inspection devices was demonstrated to detect all known types of flaws that can occur in heat fused pipe joints. The acceptability of the pipe joint is determined by a data processing method developed specifically for the application to account for different pipe sizes, different pipe materials, and the proximity of the flaws to the inner and outer surfaces of the pipe. The inspection system design and the ultrasonic method implemented to detect flaws in polyethylene butt fusion joints are described. GRA

N86-27472# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
COMPUTER-AUTOMATED FAILURE PREDICTION IN MECHANICAL SYSTEMS UNDER DYNAMIC LOADING Monthly Report
C. W. deSilva *In* Shock and Vibration Information Center(Defense), The Shock and Vibration Digest, Volume 17, No. 8, Aug. 1985 p 3-12 (For primary document see N86-27471 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-27672 Engineering Sciences Data Unit, London (England).
STRESS CONCENTRATIONS: INTERACTION AND DECAY FOR SELECTED CASES
Dec. 1985 20 p
(ESDU-85045; ISBN-0-85679-551-8; ISSN-0141-4089; ISSN-0141-3996) Avail: ESDU

Data item ESDU 85045, Stress and Strength Sub-Series, discusses the decay of stress from stress concentration and explains how knowledge of the decay from an individual stress raiser can be used to determine the likely interaction between two similar features. Data are presented on the decay of stress from an elliptical hole in a flat plate loaded either uniaxially or biaxially. Stress concentration factors are also presented for a pair of equal circular holes in a finite width plate loaded uniaxially transverse to the axis of the holes; the data relate to points on the edges of the holes on either end of the diameters transverse to the load. Stress concentration factors are also given for a series of notches in the edge of a plate parallel to the notched edge. ESDU

N86-27673 Engineering Sciences Data Unit, London (England).
CRACK RESISTANCE CURVES
Dec. 1985 46 p Supersedes ESDU-FAT-R.06.01
(ESDU-85031; ISBN-0-85679-537-2; ISSN-0141-3996; ESDU-Fat-R.06.01) Avail: ESDU

Data item ESDU 85031, Fatigue-Fracture Mechanics Sub-Series, provides R-curves for several aerospace sheet materials in SI (International System of Units) and English (lbf, in) units on transparencies for overlaying on plots of stress intensity factor against crack length appropriate to the user's structure (matching blank grids are provided to draw those curves). The co-ordinates of the curves in both sets of units are also tabulated for storing in a computer data base. The curves are indexed by alloy specification, details of which are given together with relevant test conditions. The use of the data is explained, together with the advantages and limitations of the presentation, and two fully worked practical examples illustrate their use to determine the onset of fast fracture. As new data becomes available, they are revised and added to this first issue of ESDU 85031; the first issue date given here does not, therefore, reflect the age of the data or the date of latest revision. ESDU

N86-27674 GKSS-Forschungszentrum Geesthacht (West Germany).
MEASUREMENT OF STABLE CRACK GROWTH INCLUDING DETECTION OF INITIATION OF GROWTH USING THE dc POTENTIAL DROP AND THE PARTIAL UNLOADING METHODS
Karl Heinz Schwalbe, Dieter Hellmann, Juergen Heerens, Juergen Knaack, and Jens Mueller-Roos 1985 30 p Repr. from American Society for Testing and Materials Special Technical Testing Publication 856, 1985 p 338-362
(GKSS-85/E/44; ISSN-0344-9629; ESA-86-96899) Copyright. Avail: Issuing Activity

The ability of the dc potential drop method and the partial unloading technique to measure crack growth and to detect initiation of crack growth was investigated using steels and aluminum alloys. It is found that within the range of parameters investigated, both of the methods can be recommended for the determination of the R curve; however, at small amounts of crack growth, the dc potential drop method gives more consistent results. The initiation values of J integral determined by fractography were compared with Jic as obtained by current practice. It is found that ductile fracture toughness Jic is poorly related to initiation or to a specific amount of crack growth. A modification of the Jic procedure is proposed. Two contacting arrangements of the dc potential drop method were checked for initiation detection: one indicates initiation by a potential minimum (related to a J value Jmin), the other by the intersection of the R curve with the blunting line (related to a J value Jint). ESA

N86-27675 GKSS-Forschungszentrum Geesthacht (West Germany).
SUGGESTIONS FOR A MODIFICATION OF ASTM E 813
Karl-Heinz Schwalbe and Juergen Heerens 1985 10 p Repr. from American Society for Testing and Materials Special Technical Testing Publication 856, 1985 p 411-416
(GKSS-85/E/45; ISSN-0344-9629; ESA-86-96900) Copyright. Avail: Issuing Activity

Modifications of the present procedure for the determination of fracture toughness (Jic) are proposed to ensure better consistency of data. A blunting line which takes advantage of theoretical work concerning the crack-tip behavior and which shows good agreement with fractographical data is proposed. The Jic value is that point on the initial part of the R curve that is determined by the intersection of the R curve with an intercept line parallel to and by an amount delta a off the blunting line. ESA

N86-27676 United Kingdom Atomic Energy Authority, Risley (England).
DETERMINATION OF CRACK ARREST CHARACTERISTICS BY MEANS OF ROTATING DISCS
E. Roos and H. Griesinger 5 Jun. 1986 22 p Transl. into ENGLISH of conference paper "Rissstopuntersuchungen an Rotierenden Scheiben" presented at the 11th MPA Seminar, 1985 Conference held in Stuttgart, West Germany, 10-11 Oct. 1985
(BLL-Risley-Tr-5281-(9091.9F)) Copyright. Avail: NTIS HC A02/MF A01

A complete analytical description of the behavior of pressure vessels would contain information on whether a vessel fails by leaking or by large-scale fracture. To decide this one needs to know various material parameters which describe the crack initiation and crack arrest behavior of cracked vessels. Experimental and

theoretical examinations have shown that crack initiation values determined statically on laboratory specimens are directly applicable to vessels. With the usual test specimens and test methods this has not been the case, however, for the crack arrest parameters. This report describes a method with which it should be possible to determine crack arrest parameters applicable to pressure vessels. Author

N86-27677 Stanford Univ., Calif.
THERMAL AND ELECTROMAGNETIC DAMPING ANALYSIS AND ITS APPLICATION Ph.D. Thesis
Lee Usik 1985 308 p
Avail: Univ. Microfilms Order No. DA8511326

Passive damping techniques, as a part of vibration control, have been researched extensively during the past decade to gain successful performance of vibrating systems by reducing undesirable vibrations. Most of the research has been focussed on artificially furnished damping which is relatively larger than material damping. Large space structures require light-weight construction with extremely accurate positioning requirements. Even a tiny amount of material damping has been recognized as essential for meeting such requirements of large space structures such as telescopes and attennas in space. The purpose of this research is to estimate analytically the thermal damping due to thermal currents and the electromagnetic damping due to electric conduction currents based on coupled thermoelasticity and coupled magnetoelasticity. Also, the influence of thermal damping on the aeroelastic stabilities is investigated based on the theory of two-dimensional aerodynamics. In this research the study of effects of structural and geometrical constraints on damping loss factors are investigated. Optimum conditions for the maximum damping, which may be useful on the stage of system design, are investigated. Dissert. Abstr.

N86-27678# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
STATIC AEROELASTICITY IN COMBAT AIRCRAFT
Jan. 1986 42 p
(AGARD-R-725; ISBN-92-835-1516-1) Avail: NTIS HC A03/MF A01

A review of fighter aircraft development programs over the past three decades indicates a trend of increasing emphasis on the consideration of static aeroelastic effects. While early concerns addressed only the impact on air vehicle structural integrity, current design philosophy recognizes and addresses aeroelasticity as a primary design parameter affecting structural optimization, vehicle aerodynamic stability, control effectiveness, and overall performance. Examples from wind tunnel testing, analytical studies, and operational applications are presented to justify this emphasis, illustrate current methodology and analysis techniques, and make a case for an integrated approach to the consideration of static aeroelastic effects at all stages of the design process. Author

N86-27679# National Aerospace Lab., Tokyo (Japan).
AXISYMMETRIC AND BEAM-LIKE BENDING DEFORMATIONS IN THIN ELASTIC CIRCULAR CYLINDRICAL SHELLS DUE TO THERMAL LOADS
Shuji Endo Nov. 1985 44 p In JAPANESE; ENGLISH summary
(NAL-TR-891; ISSN-0389-4010) Avail: NTIS HC A03/MF A01

The problems of axisymmetric and beam-like bending deformations in a thin circular cylindrical shell due to thermal loads are analyzed utilizing the Fluegge, the Naghdi, the Koiter-Sanders, the Novozhilov, and the Love-Reissner theories for the case where both edges of the shell are simply supported. The first approximate expressions based on the Kirchoff-Love hypothesis are obtained in closed form for the displacements, stress resultants, and stress couples. It is then shown that the various theories provide the same results within engineering accuracy except when the shell is extremely long. Also, for the case when the temperature rise is uniform in the axial direction, the extremum values of stress resultant and couples occurring in the edge-zone are calculated. From the calculations, it is shown that, except for a very short shell, the extrema are independent of the length of the cylindrical shell. Author

N86-27680*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RE-EXAMINATION OF CUMULATIVE FATIGUE DAMAGE ANALYSIS: AN ENGINEERING PERSPECTIVE
S. S. Manson and G. R. Halford 1986 71 p Presented at the Symposium on Mechanics of Damage and Fatigue, Haifa-Tel Aviv, Israel, 1-5 Jul. 1985; sponsored by the International Union of Theoretical and Applied Mechanics
(NASA-TM-87325; E-3066; NAS 1.15:87325) Avail: NTIS HC A04/MF A01 CSCL 20K

A method which has evolved in our laboratories for the past 20 yr is re-examined with the intent of improving its accuracy and simplicity of application to engineering problems. Several modifications are introduced both to the analytical formulation of the Damage Curve Approach, and to the procedure for modifying this approach to achieve a Double Linear Damage Rule formulation which immensely simplifies the calculation. Improvements are also introduced in the treatment of mean stress for determining fatigue life of the individual events that enter into a complex loading history. While the procedure is completely consistent with the results of numerous two level tests that have been conducted on many materials, it is still necessary to verify applicability to complex loading histories. Caution is expressed that certain phenomena can also influence the applicability - for example, unusual deformation and fracture modes inherent in complex loading - especially if stresses are multiaxial. Residual stresses at crack tips, and metallurgical factors are also important in creating departures from the cumulative damage theories; examples of departures are provided. Author

N86-27681# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
DYNAMICS OF VISCOELASTIC STRUCTURES
Kerman Jamshed Buhariwala Jun. 1986 208 p Sponsored by the National Sciences and Engineering Research Council of Canada
(UTIAS-309; ISSN-0082-5255) Avail: NTIS HC A10/MF A01

A general method for modelling energy dissipation in dynamical systems is presented. The work is primarily concerned with a damping model based on viscoelastic assumptions motivated by the concern for analyzing structures composed of fiber reinforced polymeric composite materials. A brief review of linear viscoelasticity is presented. Motion equations are formulated in operator form for an aribrary viscoelastic structure of generation anisotropy. The mass, damping, and stiffness operators are developed consistently in the formation. Basic operator properties are discussed and orthonormality conditions are derived for the viscoelastic system. Modal identities are derived for a constrained viscoelastic structure. These identities are a helpful guide in checking the accuracy of the numerical solution. The modal identities of viscoelastic systems are shown to reduce to those of the elastic systems for light damping. An extension to the classical lamination theory based on viscoelastic constitutive equations is presented. The motion equations of a viscoelastic laminate are shown to be of the same form as the motion equations of the classical elastic laminate plate. The inplane membrane, coupling, and bending stiffness coefficients for the viscoelastic plate problem are time dependent operators. Next the consistent, discretized motion equations are developed using the finite element method. The equations of motion are integro-differential and so, the resulting eigenproblem cannot be handled by standard numerical routines. The eigenvalues and eigenmodes are solved by Jacobi root perturbation method. Eigenvalues and eigenmodes using Jacobi root perturbation method are calculated for a cantilevered viscoelastic beam. Author

N86-27682# National Aeronautical Lab., Bangalore (India). Structures Div.
STRESS OSCILLATIONS IN PLANE STRESS MODELLING OF FLEXURE: A FIELD-CONSISTENCY INTERPRETATION

G. Prathap, G. Subramanian, and C. Ramesh Babu Jun. 1985 35 p
(TM-ST-8507) Avail: NTIS HC 03/MF A01

Exactly integrated isoparametric plane stress elements behave poorly in flexure. The 4-noded element locks, with errors that progress indefinitely as the element aspect ratio increases. Reduced integration of the shear strain energy eliminates this locking entirely. The 8-noded element does not lock, but improves in performance with reduced integration of shear strain energy. Both elements, with their original shape functions show severe shear stress oscillations in flexure. These oscillations are attributed to the lack of consistency of shear strain fields derived directly from independent field-variable interpolations. Error models were derived for specific tractable examples which can confirm the accuracy of this conceptual scheme through digital computation using the finite element models. A field-consistent redistribution strategy for the shear strain-field is offered as an elegant procedure to free the elements of spurious oscillations and give a lock free performance. Author

N86-27683# National Aeronautical Lab., Bangalore (India).
ON THE FICTION OF THE KIRCHHOFF EFFECTIVE SHEAR REACTIONS
G. Prathap and C. Ramesh Babu Jan. 1986 29 p
(NAL-TM-ST-8601) Avail: NTIS HC A03/MF A01

The development of accurate and reliable plate bending elements based on the shear flexible Mindlin plate theory has resulted in attempts to accurately evaluate bending moments and shear forces in transversely loaded plates. It appears from such studies that the interpretation of the classical Kirchhoff-Love theory in terms of only two boundary conditions at an edge and the related merging of the actual shear force and twisting moments on an edge into an effective Kirchhoff shear reaction is ambiguous in physical terms and must be revised. An improved interpretation is offered that brings Kirchhoff theory into line with Mindlin theory, and leads to the conclusion that the use of three boundary conditions on an edge as offered by Poisson is correct from the physical point of view, especially for unsupported edges, and that there is no need to define a Kirchhoff effective shear reaction at all. Author

N86-27684# National Aeronautical Lab., Bangalore (India). Materials Science Div.
RESEARCH AND DEVELOPMENT IN THE FIELD OF FATIGUE AND FRACTURE MECHANICS AT NAL
Kn Raju and R. Sunder Dec. 1985 64 p
(NAL-SR-8501) Avail: NTIS HC A04/MF A01

Research and development in the area of fatigue and fracture mechanics at the National Aeronautical Laboratory is described, highlighting some of the interesting and useful results obtained. The beginning of research and development activities at NAL dates back to the late sixties. Thus, what is related in this paper covers work over a period of more than a decade. Author

N86-27685# National Aeronautical Lab., Bangalore (India). Materials Science Div.
CLOSURE OF PART THROUGH CRACKS AT THE NOTCH ROOT
K. Anandan and R. Sunder Apr. 1986 54 p
(NAL-PD-MT-8625) Avail: NTIS HC A04/MF A01

A study of fatigue closure of part through cracks in notched 5mm thick Al-Cu alloy sheet specimens is described. The study used a specially designed electron fractography technique which permits accurate assessment of closure, its development with crack extension as well as its variation across the crack front. The effect of prior overloads on notch root crack closure was also investigated. Author

N86-27686# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 6 Monthly Report
Judith Nagle-Eshleman, ed. Jun. 1985 97 p
(AD-A165500) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Topics addressed include mechanical systems, structural systems, vehicle systems, biological systems, mechanical components, structural components, electric components, dynamic environment, analysis and design, mechanical properties, and experimentation. A literature review on flexural rigidity of stranded cables is provided. Frequency domain modal analysis techniques are also reviewed. For individual titles, see N86-27687 through N86-27688.

N86-27687# Polytechnic Inst. of Bucharest (Rumania).
FREQUENCY DOMAIN EXPERIMENTAL MODAL ANALYSIS TECHNIQUES Monthly Report
M. Rades *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 17, No. 6 Jun. 1985 p 3-16 (For primary document see N86-27686 18-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington. D.C. 20375 CSCL 20/11

Recent advances in the development of structural modal identification procedures are reviewed. Only methods concerned with frequency response data in the frequency domain are considered. Emphasis is on the theoretical background of analytical modal characterization techniques. Testing philosophy is also considered. Author

N86-27688# Central Power Research Inst., Bangalore (India).
FLEXURAL RIGIDITY OF STRANDED CABLES Monthly Report
T. V. Gopalan and G. R. Nagabhushana (Indian Inst. of Science, Bangalore) *In* Shock and Vibration Information Center The Shock and Vibration Digest, Volume 17, No. 6 Jun. 1985 p 17-20 (For primary document see N86-27686 18-39)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

Flexural rigidity and maximum fiber distance are important in the dynamics of the multi-stranded cables used in overhead power lines. A satisfactory solution based on experimental results for obtaining these parameters is discussed. Author

N86-27689*# Argonne National Lab., Ill.
EFFECTS OF A HIGH MEAN STRESS ON THE HIGH CYCLE FATIGUE LIFE OF PWA 1480 AND CORRELATION OF DATA BY LINEAR ELASTIC FRACTURE MECHANICS
S. Majumdar and R. Kwasny Nov. 1985 28 p
(NASA Order C-91113-D; Contract W-31-109-eng-38)
(NASA-CR-175057; NAS 1.26:175057; ANL-85-74) Avail: NTIS HC A03/MF A01 CSCL 20K

High-cycle fatigue tests using 5-mm-diameter smooth specimens were performed on the single crystal alloy PWA 1480 (001 axis) at 70F (room temperature) in air and at 100F (538C) in vacuum (10 to the -6 power torr). Tests were conducted at zero mean stress as well as at high tensile mean stress. The results indicate that, although a tensile mean stress, in general, reduces life, the reduction in fatigue strength, for a given mean stress at a life of one million cycles, is much less than what is predicted by the usual linear Goodman plot. Further, the material appears to be significantly more resistant to mean stress effects at 1000F than at 70F. Metallographic examinations of failed specimens indicate that failures in all cases are initiated from micropores of sizes of the order of 30 to 40 microns. Since the macroscopic stress-strain response in all cases was observed to be linear elastic, linear elastic fracture mechanics (LEFM) analyses were carried out to determine the crack growth curves of the material assuming that crack initiation from a micropore (a sub o = 40 microns) occurs very early in life. The results indicate that the calculated crack growth rates at an R (defined as the ratio between minimum stress to maximum stress) value of zero are approximately the same at 70F as at 1000F. However, the calculated crack growth rates at other R ratios, both positive and negative, tend to be higher at 70F than at 1000F. Calculated threshold effects at large R values tend to be independent of temperature in the temperature regime studied. They are relatively constant with increasing R ratio

up to a value of about 0.6, beyond which the calculated threshold stress intensity factor range decreases rapidly with increasing R ratios. Author

N86-27690# Virginia Univ., Charlottesville. Dept. of Mechanical and Aerospace Engineering.
NONLINEAR ELASTIC AND INELASTIC ANALYSIS OF STRUCTURAL MEMBERS IN THE PRESENCE OF HIGH TEMPERATURE AND CREEP Final Report, 10 Jan. 1984 - 30 Sep. 1985
Walter D. Pilkey 20 Dec. 1985 12 p
(Contract N00014-83-K-0392)
(AD-A165140; UVA/5-25387/MAE86/101) Avail: NTIS HC A02/MF A01 CSCL 20/11

This research began with a mixed principle based creep analysis and was later redirected to a study of limiting performance methodology, including a formulation for the limiting performance analysis of large systems. The formulations for dynamic systems apply to problems for which such variables as maximum displacements or stresses, relative displacements, peak velocities or accelerations are of concern. GRA

N86-27691# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
NATURAL FREQUENCIES AND MODE SHAPES OF CURVED RECTANGULAR COMPOSITE PANELS WITH INTERIOR CUTOUTS M.S. Thesis
Richard A. Walley Dec. 1985 101 p
(AD-A165269; AFIT/GAE/AA/85D-16) Avail: NTIS HC A06/MF A01 CSCL 13/13

A finite element computer code, STAGSC-1 and holographic interferometry were used to determine the effects of interior cutouts on the first five natural frequencies and mode shapes of curved Graphite Expoxy panels. The panels are a quasi-isotropic layup with a 12 inch chord and height. Both the finite element and holographic analysis were conducted using clamped-clamped boundary conditions. The vibration branch of STAGSC-1 is an energy technique based on small displacements and linear elastic stress-strain relationships. When compared with the time averaged holograms of the experimentally determined natural frequencies and mode shapes, the two techniques show a close correlation of both frequency and shape. It was found that for the 2 x 2 inch cutout, the mode shapes change very little while the natural frequencies displayed a small decrease for the higher modes. The 2 x 4 inch cutout retained the general mode shape of the solid panel for the first two modes. The third through the fifth mode shapes were changed by this cutout and the loss of panel stiffness was visible. The 4 x 4 inch cutout exhibit both a switch in symmetry of the first two modes and a general decrease in natural frequencies. GRA

N86-27692# Brookhaven National Lab., Upton, N. Y.
MODELING EFFECTS OF THIN FILM FORMATION AT CRACK TIPS ON FRACTURE
K. Sieradzki 15 Apr. 1986 18 p Presented at the TMS/AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC02-76CH-00016)
(DE86-001180; BNL-37094; CONF-8510168-1) Avail: NTIS HC A02/MF A01

This paper discusses the manner in which thin films surrounding cracks can induce deformational mode transitions in materials; that is, cracks which normally deform by dislocation emission can be made to cleave (and vice versa) by coating the crack surfaces with films of appropriate properties. Such films actually form on metallic crack surfaces in certain environments and lead to the phenomenon known as stress-corrosion cracking. Analytical calculations are presented and the results indicate that the important parameters influencing deformational mode transitions include elastic modulus, film-substrate lattice parameter mismatch, film thickness, and interfacial bond strength. DOE

N86-27693# Materials Engineering Associates, Inc., Lanham, Md.
A REVIEW OF THE MODELS AND MECHANISMS FOR ENVIRONMENTALLY-ASSISTED CRACK GROWTH OF PRESSURE VESSEL AND PIPING STEELS IN PWR ENVIRONMENTS
W. Cullen, G. Gabetta (Centro Informazioni Studi Esperienze, Milan Italy), and H. Hanninen (Technical Research Centre of Finland, Espoo) Dec. 1985 115 p
(TI86-900460; NUREG-CR-4422) Avail: NTIS HC A06/MF A01

The crack-tip micromechanisms and the computational models for environmentally-assisted cracking in pressure vessel and piping steels in high-temperature, low-oxygen (PWR), reactor-grade water are described and evaluated. The report begins with a brief description of the critical variables which are known to affect environmentally-assisted subcritical cracking in these metal/environment systems. The micromechanistic models are discussed in some detail, with anodic dissolution and hydrogen assistance being the prime candidates for the successful explanation of the observed phenomena. A variety of calculational models are in various stages of development; all of them are far from use as a predictive tool. Crack-tip strain rate models have received the most attention, and the approach to their use has been to partition the environmentally-assisted growth rates into a mechanically-driven component, with the environmental enhancement superposed. The environment component is then correlated with a calculated crack-tip strain rate. At the present time, these models predict monotonically increasing growth rates with increases in the cyclic period, which is incorrect, although for cases in which the environment assistance is significant, the strain rate models, with a suitable choice of fitting parameters, correlate with the data reasonably well. Author

42 GEOSCIENCES (GENERAL)

N86-27694# Meteorological Satellite Center, Tokyo (Japan).
METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE, NO. 13, 1986
Mar. 1986 73 p In ENGLISH and JAPANESE
(ISSN-0388-9653) Avail: NTIS HC A04/MF A01

Two articles are presented, one addressing the land-sea contrast in the Earth radiation budget and the other discussing the Cb cloud vortical pattern apart from a typhoon pressure center. In addition, a bibliography of references dealing with the use of satellite data in practical work and research is given. For individual titles, see N86-27695 through N86-27696.

N86-27695# Meteorological Satellite Center, Tokyo (Japan).
ON LAND-SEA CONTRAST IN THE EARTH RADIATION BUDGET c46
Isao Kubota and Hiroko Imai *In its* Meteorological Satellite Center Technical Note, no. 13, 1986 (ISSN-0388-9653) Mar. 1986 p 1-31 In JAPANESE; ENGLISH summary (For primary document see N86-27694 18-42)
Avail: NTIS HC A04/MF A01

In order to make clear the difference between the Earth's radiation budget over land and over sea, three components of the budget; absorbed solar radiation, emitted terrestrial radiation, and net total radiation N on the Earth-atmosphere system measured by the wide field of view sensor aboard NIMBUS 7 were analyzed for the period during November 1978 to October 1979. The resultant zonal averages over each land and sea showed following facts. Both S and N in the latitudinal range 40 degrees around the solar declination are above 40 W/sq m larger over the sea than over land. The excess of S over sea beyond land stems mainly from differences of both clear-sky albedo and cloud amount between over land and over sea. In the latitudinal range 30 degrees centered 60N or 60S, S over land in summer is above 15 W/sq m greater then over sea contrary to the low latitudes. Finally, examination of latitudinal variation of T all the year round shows that there are a minimum zone near the equator corresponding to ITCZ, and a maximum zone in the subtropical area of each hemisphere corresponding to the subtropical high pressures

or the downward stream branches of the direct circulation. The minimum in the zonal monthly average over land tends to be lower than over sea and the both maximums over land tend to be greater than over sea. These facts show that the direct circulation over land looks more active than over sea. Author

N86-27696# Meteorological Satellite Center, Tokyo (Japan).
ON THE Cb CLOUD VORTICAL PATTERN APART FROM TYPHOON PRESSURE CENTER c47
Shuhei Akashi, Hiroyuki Koba, and Michio Hitsuma *In its* Meteorological Satellite Center Technical Note, no. 13, 1986 (ISSN-0388-9653) Mar. 1986 p 33-56 IN JAPANESE; ENGLISH summary (For primary document see N86-27694 18-42)
Avail: NTIS HC A04/MF A01

In several tropical cyclones, it was observed that vortex of cumulonimbus (Cb) cloud located apart from the pressure center of the tropical cyclone in stage of movement into the Westery belt and transformation to an extratropical cyclone. By the study of two cases, typhoon 8506 and 8124, findings are follows: (1) pressure center of the cyclone coincides with the vortex of the low-level cloud rather than with the Cb-vortex; (2) the separation between Cb-vortex has begun 12 to 36 hours before the transformation from a tropical cyclone to an extratropical cyclone; (3) the distance of separation between each vortex increased according to the cyclone's movement and finally has extended to 200 km; (4) Cb-vortex located eastward from the low-level cloud's vortex and the relative position of them rotated counterclockwise with the lapse of time; and (5) the low-level cloud's vortex is not always distinct, and generally, there are little upper cloud in this region. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-27697 GKSS-Forschungszentrum Geesthacht (West Germany).
ON THE INFORMATION CONTENT OF MULTISPECTRAL RADIANCE MEASUREMENTS OVER AN OCEAN
Juergen Fischer 1985 16 p Repr. from International Journal of Remote Sensing, v. 6, no. 5, 1985 p 773-786 In GERMAN
(GKSS-85/E/43; ISSN-0344-9629; ESA-86-96898) Avail: Issuing Activity

An eigenvalue analysis and a multivariate significance test are applied to the problem of measuring suspended matter, phytoplankton, and yellow substance from ship, aircraft, or satellite. The number of linearly independent pieces of information is inferred from multispectral radiance measurements at six wavelengths within the visible part of the spectrum. The radiances analyzed are calculated with a radiative transfer model (matrix operator method) for an atmosphere-ocean system and realistic variations of scattering and absorption by hydrosols in ocean waters, as well as maritime atmospheric aerosols. Instrumental errors and errors in atmospheric correction strongly determine the information content. The wavelength dependence of both errors is taken into account. Depending on atmospheric and oceanic turbidity, at most 2 independent optical parameters of water substances can be derived with an accuracy of a factor of 2 from multispectral radiance measurements made at a height of 10 km. ESA

N86-27698*# Maryland Univ., College Park. Office of Sponsored Programs.
DEPARTMENT OF GEOLOGY/NASA-GSFC GEOBOTANICAL INVESTIGATION Summary Report
26 May 1986 10 p refs
(Grant NsG-5423)
(NASA-CR-177300; NAS 1.26:177300) Avail: NTIS
HC A02/MF A01 CSCL 02F

Geobotanical mapping in the southern Appalachians and soil metal associated changes in vegatation spectral responses in the reflective and emissive portions of the electromagnetic spectrum (EMS) is studied. It is determined whether deciduous forest vegetation reflection and emission characteristics show detectable changes that can be related to residual soil characteristics. Analyses of such related characteristics enhances the ability to discriminate underlying lithologies as well as variances within lithologies associated with natural heavy metal occurences. An understanding is developed of the factors which contribute to the differing spectral signatures of various lithology/soil types. A combination of field data and remote spectral analysis is studied. E.R.

N86-27699*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SATELLITE DETECTION OF PHYTOPLANKTON EXPORT FROM THE MID-ATLANTIC BIGHT DURING THE 1979 SPRING BLOOM
John J. Walsh (University of South Florida, St. Petersburg.), Dwight A. Dieterle, and Wayne E. Esaias Feb. 1986 53 p Sponsored in part by DOE and NOAA
(NASA-TM-88782; NAS 1.15:88782) Avail: NTIS
HC A04/MF A01 CSCL 08A

Analysis of Coastal Zone Color Scanner (CZCS) imagery confirms shipboard and in situ moored fluorometer observations of resuspension of near-bottom chlorophyll within surface waters (1 to 10 m) by northwesterly wind events in the mid-Atlantic Bight. As much as 8 to 16 micrograms chl/l are found during these wind events from March to May, with a seasonal increase of algal biomass until onset of stratification of the water column. Rapid sinking or downwelling apparently occurs after subsequent wind events, however, such that the predominant surface chlorophyll pattern is approx. 0.5 to 1.5 micrograms/l over the continental shelf during most of the spring bloom. Perhaps half of the chlorophyll increase observed by satellite during a wind resuspension event represents in-situ production during the 4 to 5 day interval, with the remainder attributed to accumulation of algal biomass previously produced and temporarily stored within near-bottom water. Present calculations suggest that about 10% of the primary production of the spring bloom may be exported as ungrazed phytoplankton carbon from mid-Atlantic shelf waters to those of the continental slope. Author

N86-27700*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
HIGH FREQUENCY SAMPLING OF THE 1984 SPRING BLOOM WITHIN THE MID-ATLANTIC BIGHT: SYNOPTIC SHIPBOARD, AIRCRAFT, AND IN SITU PERSPECTIVES OF THE SEEP-I EXPERIMENT
John J. Walsh (University of South Florida, St. Petersburg), Creighton D. Wirick (Brookhaven National Lab., Upton, N. Y.), Leonard J. Pietrafesa (North Carolina State Univ., Raleigh.), Terry E. Whitledge (Texas Univ., Port Aransas), Frank E. Hoge, and Robert N. Swift (EG and G Washington Analytical Services Center, Inc., Pocomoke City, Md.) 1986 56 p
(NASA-TM-88765; NAS 1.15:88765) Avail: NTIS
HC A04/MF A01 CSCL 08A

Moorings of current meters, thermistors, transmissometers, and fluorometers on the mid-Atlantic shelf, south of Long Island, suggest a cumulative seaward export of perhaps 0.35 g C/sq m/day between the 80 and 120 m isobaths during February-April 1984. Such a horizontal loss of algal carbon over the lower third of the water column would be 23 to 78% of the March-April 1984 primary production. This physical carbon loss is similar to daily grazing losses from zooplankton of 32-40% of the algal fixation of carbon. Metabolic demands of the benthos could be met by just the estimated fecal pellet flux, without direct consumption of algal carbon, while bacterioplankton needs could be served by excretory release of dissolved organic matter during photosynthesis. Sediment traps tethered 10 m off the bottom at the 120 m isobath and 50 m above the 500 m isobath caught as much as 0.16 to 0.26 g C /sq m/day during March-April 1984, in

reasonable agreement with the flux estimated from the other moored instruments. Author

N86-27701*# Connecticut Univ., Storrs. School of Engineering.
A SENSTITIVITY STUDY OF THE GROUND HYDROLOGIC MODEL USING DATA GENERATED BY AN ATMOSPHERIC GENERAL CIRCULATION MODEL Ph.D. Thesis
Shu Fen Sun 1985 245 p
(Grant NsG-5075)
(NASA-CR-177285; NAS 1.26:177285) Avail: NTIS
HC A11/MF A01 CSCL 08H

The Ground Hydrologic Model (GHM) developed for use in an atmospheric general circulation model (GCM) has been refined. A series of sensitivity studies of the new version of the GHM were conducted for the purpose of understanding the role played by various physical parameters in the GHM. The following refinements have been made: (1) the GHM is coupled directly with the planetary boundary layer (PBL); (2) a bulk vegetation layer is added with a more realistic large-scale parameterization; and (3) the infiltration rate is modified. This version GHM has been tested using input data derived from a GCM simulation run for eight North America regions for 45 days. The results are compared with those of the resident GHM in the GCM. The daily average of grid surface temperatures from both models agree reasonably well in phase and magnitude. However, large difference exists in one or two regions on some days. The daily average evapotranspiration is in general 10 to 30% less than the corresponding value given by the resident GHM. Author

N86-27702*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Geological Sciences.
RELATIONSHIP BETWEEN HIGH- AND LOW-GRADE ARCHEAN TERRANES: IMPLICATIONS FOR EARLY EARTH PALEOGEOGRAPHY Final Technical Report, 1 Mar. 1985 - 31 Aug. 1986
Kenneth A. Eriksson 1986 60 p
(Grant NAG9-95)
(NASA-CR-177202; NAS 1.26:177202) Avail: NTIS
HC A04/MF A01 CSCL 08E

The Western Gneiss Terrain (WGT) of the Yilgarn Block, Western Australia was studied. The WGT forms an arcuate belt of Archean gneisses that flank the western margin of the Yilgarn Block. In general the WGT is composed of high-grade orthogneisses and paragneisses which contain supracrustal belts composed largely of siliciclastic metasediments and subordinate iron formation. The platformal nature of the metasedimentary belts and lack of obvious metavolcanic lithologies contrasts with the composition of typical Yilgarn greenstones to the east. Radiometric data from WGT rocks indicates that these rocks are significantly older than Yilgarn rocks to the east (less than 3.3 Ga) and this has led to the suggestion that the WGT represents sialic basement to Yilgarn granite-greenstone belts. The Mount Narryer region exposes the northernmost occurrence of high-grade metasediments within the WGT and consists of quartz-rich clastic metasediments at upper amphibolite to granulite grade. Most occurrences of supracrustal rocks in this region comprise isolated lenses within the gneissic basement. However, at Mount Narryer a unique sequence of metaclastics with preserved bedding provide an unusual window into the parentage of similar supracrustal bodies in this region. M.G.

N86-27703# National Oceanic and Atmospheric Administration, Washington, D. C.
SATELLITE-DERIVED MOISTURE PROFILES
Andrew Tinchalk Apr. 1986 70 p
(NOAA-NESDIS-24) Avail: NTIS HC A04/MF A01

An evaluation of relative humidity and mixing ratio profiles determined by two different satellite methods is presented. One method (bogus), which is used operationally, uses GOES cloud imagery to prescribe vertical moisture profiles. The second method (TOVS) uses a 15-channel algorithm with polar orbiting satellite data. The accuracies of both methods, although inferior to moisture profiles obtained from rawinsondes, show sufficient accuracy to be useful as input into forecast models whose domain includes large oceanic areas. TOVS moisture profiles were more accurate in clear and partly cloudy areas, whereas the bogus profiles were more accurate in the broken cloud cover areas. An advantage of the TOVS method is that it is fully automated and can be applied globally; however, some accompanying disadvantages are that the retrievals are asynoptic and that they are made only in clear and partly cloudy areas. The major advantage of the bogus method is that profiles are available at synoptic times and over areas where no TOVS moisture values are retrieved. The disadvantage of the bogus method is that the moisture values are less accurate than the TOVS values in clear and partly cloudy areas. Furthermore, the method is only partially automated and requires subjective interpretation of cloud imagery. Author

N86-27704*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
PRELIMINARY ASSESSMENT OF SOIL MOISTURE OVER VEGETATION Final Report, 1 Mar. 1985 - 28 Feb. 1986
Toby N. Carlson Jul. 1986 40 p
(Grant NAG5-184)
(NASA-CR-177226; NAS 1.26:177226) Avail: NTIS
HC A03/MF A01 CSCL 08M

Modeling of surface energy fluxes was combined with in-situ measurement of surface parameters, specifically the surface sensible heat flux and the substrate soil moisture. A vegetation component was incorporated in the atmospheric/substrate model and subsequently showed that fluxes over vegetation can be very much different than those over bare soil for a given surface-air temperature difference. The temperature signatures measured by a satellite or airborne radiometer should be interpreted in conjunction with surface measurements of modeled parameters. Paradoxically, analyses of the large-scale distribution of soil moisture availability shows that there is a very high correlation between antecedent precipitation and inferred surface moisture availability, even when no specific vegetation parameterization is used in the boundary layer model. Preparatory work was begun in streamlining the present boundary layer model, developing better algorithms for relating surface temperatures to substrate moisture, preparing for participation in the French HAPEX experiment, and analyzing aircraft microwave and radiometric surface temperature data for the 1983 French Beauce experiments. B.G.

N86-27705*# Arizona Univ., Tucson. Optical Sciences Center.
SPECTRORADIOMETRIC CONSIDERATIONS FOR ADVANCED LAND OBSERVING SYSTEMS Final Report
Philip N. Slater Jul. 1986 101 p
(Grant NAG5-196)
(NASA-CR-177205; NAS 1.26:177205) Avail: NTIS
HC A06/MF A01 CSCL 08B

Research aimed at improving the inflight absolute radiometric calibration of advanced land observing systems was initiated. Emphasis was on the satellite sensor calibration program at White Sands. Topics addressed include: absolute radiometric calibration of advanced remote sensing; atmospheric effects on reflected radiation; inflight radiometric calibration; field radiometric methods for reflectance and atmospheric measurement; and calibration of field relectance radiometers. B.G.

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-27706* National Aeronautics and Space Administration. Pasadena Office, Calif.

PROTECTIVE TELESCOPING SHIELD FOR SOLAR CONCENTRATOR Patent
Maurice J. Argoud (Jet Propulsion Lab., California Inst. of Tech., Pasadena), Walter L. Walker, and Lloyd V. Butler, inventors (to NASA) Issued 6 May 1986 7 p Filed 22 Feb. 1984 Supersedes N84-25164 (22 - 15, p 2361) Sponsored by NASA. Pasadena Office
(NASA-Case-NPO-16236-1; US-Patent-4,586,487;
US-Patent-Appl-SN-582495; US-Patent-Class-126-418;
US-Patent-Class-126-419; US-Patent-Class-126-438) Avail: US Patent and Trademark Office CSCL 10A

An apparatus is described for use with a solar concentrator such as a parabolic dish which concentrates sunlight onto a small opening of a solar receiver, for protecting the receiver in the event of a system failure that could cause concentrated sunlight to damage the receiver. The protective apparatus includes a structure which can be moved to a stowed position where it does not block sunlight, to a deployed position. In this position, the structure forms a tube which substantially completely surrounds an axis connecting the receiver opening to the center of the concentrator at locations between the receiver and the concentrator. NASA

N86-27707# EG and G Washington Analytical Services Center, inc., Berkeley, Calif.
OTEC (OCEAN THERMAL ENERGY CONVERSION) COLD WATER PIPE AT-SEA TEST PROGRAM DATA ANALYSIS PROJECT. COMPARISONS BETWEEN MEASURED AND PREDICTED BARGE AND PIPE RESPONSE: EVALUATION OF THE NOAA/ROTECF AND NOAA/TRW COMPUTER MODELS
L. A. Vega and G. C. Nihous Oct. 1985 64 p
(Contract DGNC-5-00093)
(PB86-177599) Avail: NTIS HC A04/MF A01 CSCL 10B

The simulation of the at-sea test conditions with computer models is considered. The NOAA/ROTECF model simulates a coupled barge/pipe system driven by waves and currents in the frequency domain (standard-deviation parameters are considered). The NOAA/TRW model simulates a pipe driven by user-specified barge motions, waves, and currents in the time domain (parameters as a function of time are considered). GRA

N86-27708*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.
MOD-5A WIND TURBINE GENERATOR PROGRAM DESIGN REPORT: VOLUME 1: EXECUTIVE SUMMARY Final Report
Aug. 1984 63 p
(Contracts DEN3-153; DE0AI01-79ET-20305)
(NASA-CR-174734; DOE/NASA-0153/1; NAS 1.26:174734) Avail: NTIS HC A04/MF A01 CSCL 10A

The design, development and analysis of the 7.3 MW MOD-5A wind turbine generator covering work performed between July 1980 and June 1984 is discussed. The report is divided into four volumes: Volume 1 summarizes the entire MOD-5A program, Volume 2 discusses the conceptual and preliminary design phases, Volume 3 describes the final design of the MOD-5A, and Volume 4 contains the drawings and specifications developed for the final design. Volume 1, the Executive Summary, summarizes all phases of the MOD-5A program. The performance and cost of energy generated by the MOD-5A are presented. Each subsystem - the rotor, drivetrain, nacelle, tower and foundation, power generation, and control and instrumentation subsystems - is described briefly. The early phases of the MOD 5A program, during which the design was analyzed and optimized, and new technologies and materials were developed, are discussed. Manufacturing, quality assurance, and safety plans are presented. The volume concludes with an index of volumes 2 and 3. Author

N86-27709# National Aeronautical Lab., Bangalore (India). Materials Science Div.
A SYSTEM FOR THE MEASUREMENT OF ABSOLUTE THERMOELECTRIC POWER
V. Shubha and T. G. Ramesh Mar. 1986 17 p
(NAL-TM-MT-8603) Avail: NTIS HC A02/MF A01

A precision system for the continuous and rapid measurement of absolute thermoelectric power (TEP) under controlled conditions of temperature and pressure has been developed. The design is centered around a fourth order polynomial curve fitting circuit which enables: (1) linearization of thermocouple-temperature characteristic, and (2) simulation of the variation with temperature of the relative TEP of the thermocouple and the absolute TEP of either of the constituents. Some typical data on the absolute TEP of cerium across the gamma-alpha transition is presented to demonstrate the performance of this system. Author

N86-27710# National Aeronautical Lab., Bangalore (India). Wind Energy Programme.
A CASE STUDY OF FIELD TESTING OF WINDPUMPS IN INDIA
Ar Venkatanarayana Feb. 1985 20 p
(NAL-TM-WE-8502) Avail: NTIS HC A02/MF A01

A tentative methodology for the testing of appropriate technology design windpumps and some early experience in operation of a relatively simple field test are described. This testing serves three purposes. One is comparative assessment under identical conditions. Second is keeping an impartial record of maintenance requirements. Third is to generate performance data to permit prediction of the quantity of water likely to be lifted on a gross, monthly basis at different places. The 10 minutes data generated intermittently can be utilized where velocity distribution profiles are known. This is the case at 37 places in India. But at another 317 places only monthly mean wind speeds are known. At these places 24-hourly performance data can be used in making first approximation of expected monthly outputs. Author

N86-27711# Research Triangle Inst., Research Triangle Park, N.C.
AN AlGaAs-GaAs PATTERNED Ge TUNNEL JUNCTION CASCADE CONCENTRATOR SOLAR CELL Annual Subcontract Report, 15 Oct. 1984 - 14 Oct. 1985
Jun. 1985 72 p
(Contract DE-AC02-83CH-10093)
(DE86-010699; SERI/STR-211-2932) Avail: NTIS HC A04/MF A01

The long-term goal of this research was to demonstrate a two-junction cascade solar cell (0.5 sq cm) composed of AlGaAs-GaAs having an AM2 conversion efficiency of more than 30%. As part of this work, Si has been selected as the best n-type dopant to date, and Mg, the best p-type dopant. B-doped, p(+)-Ge epilayers have been grown with mirror-like surface morphologies and hole concentrations above 10 to the 20 power/cu cm. Intercell ohmic connections have been fabricated using n(+)-GaAs/p(+)-Ge/p(+)-GaAs sandwiched structures. GaAs bottom cells having mirror-like surface morphologies have been grown with efficiencies of 8-12%. Al sub x Ga sub 1-x As top cells have also been obtained, but no satisfactory photovoltaic action has yet been measured. A complete Al sub x Ga sub 1-x/GaAs cascade cell using the patterned n(+)-GaAs p(+)-Ge/p(+)-GaAs sandwiched IOC has also been fabricated. Author

N86-27712# Army Engineer Div., Huntsville, Ala.
INTRODUCTION TO DIGITAL LOGIC SYSTEMS FOR ENERGY MONITORING AND CONTROL SYSTEMS
May 1985 84 p
(AD-A165540; HNDSP-85-ED-ME) Avail: NTIS HC A05/MF A01 CSCL 10/3

Recent advances in the state-of-the-art of digital electronic technology have made feasible the concept of distributed data processing in energy monitoring and control systems (EMCS). These advances were brought about largely due to the advent of micro-miniaturization of electronic integrated circuit components and the development of the microprocessor, a discrete semiconductor device with many of the capabilities of the central processing unit of the familiar mainframes of minicomputers, but vastly reduced in size and cost. It is now possible to design a reliable EMCS

consisting of a central computer control system and remote microcomputers which can perform many functions independent of the central system. When properly applied, these EMCS installations can aid significantly in conserving our dwindling sources of energy. GRA

N86-27713# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SYSTEM PERFORMANCE AND COST SENSITIVITY COMPARISONS OF STRETCHED MEMBRANE HELIOSTAT REFLECTORS WITH CURRENT GENERATION GLASS/METAL CONCEPTS
L. M. Murphy, J. V. Anderson, W. Short, and T. Wendelin Dec. 1985 94 p
(Contract DE-AC02-83CH-10093)
(DE85-016892; SERI/TR-253-2694) Avail: NTIS HC A05/MF A01

Heliostat costs have long been recognized as a major factor in the cost of solar central receiver plants. Research on stretched membrane heliostats has been emphasized because of their potential as a cost-effective alternative to current glass/metal designs. However, the cost and performance potential of stretched membrane heliostats from a system perspective has not been studied until this time. The optical performance of individual heliostats is predicted here using results established in previous structural studies. These performance predictions are used to compare both focused and unfocused stretched membrane heliostats with state-of-the-art glass/metal heliostats from a systems perspective. We investigated the sensitivity of the relative cost and performance of fields of heliostats to a large number of parameter variations, including system size, delivery temperature, heliostat module size, surface specularity, hemispherical reflectance, and macroscopic surface quality. The results indicate that focused stretched membrane systems should have comparable performance levels to those of current glass/metal heliostat systems. Further, because of their relatively lower cost, stretched membrane heliostats should provide an economically attractive alternative to current glass/metal heliostats over essentially the entire range of design parameters studied. Unfocused stretched membrane heliostats may also be attractive for a somewhat more limited range of applications, including the larger plant sizes and lower delivery temperatures. DOE

N86-27714# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente und Zentrale Techn.
BASIC MATERIALS FOR SOLAR SILICON Final Report, Sep. 1983
Hubert Aulich, Wolfgang Dietze, Christa Grabmaier, Josef Grabmaier, and Werner Grimm Bonn Bundesministerium fuer Forschung und Technologie Nov. 1985 220 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-119; ISSN-0340-7608; ESA-86-96888) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38.50

High purity silicon dioxide and carbon were prepared using inexpensive raw materials to reduce solar cell costs, and reacted in an arc furnace under pure conditions to produce solar grade silicon. From pure natural quartz and purified carbon pellets, solar grade silicon was obtained which after two Czochralski pulls (crucible pulling) was converted into solar cells with an 11% efficiency. Silicon sheets (6 X 100 cm) were obtained by pulling a carbon fiber net through liquid silicon; this led to solar cells with 7% efficiency. Using finely powdered silicon as starting material, green foils were prepared, from which large grained silicon sheets (4 X 10 X 0.2 cm) were obtained by employing a sintering method. Using the roller-quenching technique, silicon ribbons (20 X 200 cm) were obtained, exhibiting suitable surface structure and grain size. ESA

N86-27715# Technischer Beratungsdienst der Steinbeis Stiftung, Mannheim (West Germany).
DEVELOPMENT OF A SIMPLE RADIATION SYSTEM BASED ON SYNTHETIC MATS Final Report, Jul. 1984
Konrad Abel, Armin Hampel, Walter Kerber, Damir Percornik, and Klaus Sattler Bonn Bundesministerium fuer Forschung und Technologie Nov. 1985 229 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-124; ISSN-0340-7608; ESA-86-96891) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 39.50

Possibilities to use the physical effect of passive radiation cooling economically for space cooling in arid areas were investigated. Development of emitter layer configurations (coatings); computer models for optimization of the heat exchangers; and determination of design features for practical realization were studied. Practical tests prove that an economically feasible approach is possible with simple components. ESA

N86-27319*# North Carolina Agricultural and Technical State Univ., Greensboro. Student Space Shuttle Program.
MEASUREMENT OF THE HEAT PRODUCED INTERNALLY DURING DISCHARGE BY THE 6V EVEREADY ENERGIZER BATTERY, NO. 528
F. D. Hooker, K. R. Brooks, B. K. Burnette, J. D. Hampton, F. W. Crigler, and S. T. Ahrens *In* NASA. Goddard Space Flight Center The 1985 Get Away Special Experimenter's Symposium May 1986 p 177-184 (For primary document see N86-27297 18-12)
Avail: NTIS HC A13/MF A01 CSCL 22A

N86-27360# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. des Systemes Balistiques et Spatiaux.
SOLAR ARRAY DEPLOYMENT SIMULATION USING ADAMS SOFTWARE
C. Roux and P. Flament *In* ESA Second European Space Mechanisms and Tribology Symposium Dec. 1985 p 41-46 (For primary document see N86-27353 18-18)
Avail: NTIS HC A15/MF A01; ESA, Paris FF 150 or $18 Member States, AU, CN, NO (+20% others)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-27716# San Diego State Univ., Calif. Systems Ecology Research Group.
RESPONSE OF ARCTIC ECOSYSTEMS TO ELEVATED CARBON DIOXIDE REGIMES Progress Report, 1 Jul. 1984 - 30 Jun. 1986
W. C. Oechel 1986 122 p
(Contract DE-AC03-82ER-60079)
(DE84-015237; DOE/ER-60079/T5) Avail: NTIS HC A06/MF A01

The goal of the project is to establish the effects of medium- and long-term field manipulations of CO2 in northern ecosystems so that total system interactions can be evaluated and the effect of elevated CO2 levels on carbon accumulation and species composition determined. DOE

N86-27717# Deutsche Babcock Anlagen A.G., Krefeld (West Germany). Produktbereich Gasreinigungsanlagen.
REDUCTION OF NOXIOUS GAS AND FINES EMISSION BY DRY SORPTION AND FILTERING DUST COLLECTORS INSTALLED BEHIND COMBUSTION PLANTS Final Report, Sep. 1982
Ulrich Glinka Bonn Bundesministerium fuer Forschung und Technologie Oct. 1985 144 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-121; ISSN-0340-7608; ESA-86-96889) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 30

A process for simultaneous removal of noxious gas and fines from flue gas dispensing with wet separation was developed. Two process variants were studied: Atomizing of an alkaline suspension

in the flue gas flow and drying of neutral salts by water evaporation, with salts removed in a fabric filter where they act as an additional fines filter and subsequent fixed-bed reactor; and injection of a dry alkaline sorbant into an evaporation cooler following flue gas conditioning by water injection. Dust is collected in a fabric filter. Maximum sorbant utilization is achieved by building up a filtering layer (fixed bed) and recirculating the dust collected. ESA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-27718 Engineering Sciences Data Unit, London (England).
QUADRATURE METHODS FOR THE EVALUATION OF DEFINITE INTEGRALS
Dec. 1985* 46 p
(ESDU-85046; ISBN-0-85679-552-6; ISSN-0141-3988) Avail: ESDU

Data item ESDU 85046, Dynamics Sub-Series, considers the Newton-Cotes formulae, both open and closed types, in which the abscissae are equally spaced across the integration interval, and Gauss-Legendre formulae, in which the abscissae are unequally spaced and are determined from the roots of the Legendre polynomials. General expressions are given, and abscissae and weights for formulae are discussed. An adaptive integration scheme is also given that can distinguish regions in which the function varies rapidly and adapts the abscissa step lengths to meet a specified tolerance. It is shown how the methods can be modified to treat multiple integrals, and that the inner integration limits may be functions of the variable of the outer integral. Guidance is given on use for integration up to or across a singularity of the integrand. Computer program listings in FORTRAN are included for approximation of both a single and a double definite integral where the integration region may be rectangular or nonrectangular. An adaptive quadrature method based on Simpson's rule and its use is illustrated by practical worked examples. ESDU

N86-27719*# International Council of Scientific Unions, Urbana, Ill.
MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP. VOLUME 18: EXTENDED ABSTRACTS
S. Kato, ed. Dec. 1985 536 p Presented at MAP Symposium, Kyoto, Japan, 26-30 Nov. 1984 Sponsored in cooperation with UNESCO
(NASA Order W-15897)
(MAP-HANDBOOK-18) Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Various topics related to middle atmosphere research are discussed. Variability of the middle atmosphere during winter, climatology, gravity waves, atmospheric turbulence, transport processes of trace species and aerosols, and research in the Antarctic are among the topics covered. For individual titles, see N86-27720 through N86-27832.

N86-27720*# Freie Univ., Berlin (West Germany). Institut fuer Meteorologie.
ON THE INTERANNUAL VARIABILITY OF THE MIDDLE ATMOSPHERE DURING WINTER
K. Labitzke *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 9 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Reference atmospheres such as the new CIRA (COSPAR International Reference Atmosphere), which will be based on global satellite data form a very useful basis for climatological studies. When using such climatologies it is important to be aware of the interannual variability which in the middle atmosphere is particularly large during the northern winters and southern springs. For a comparison of the two polar regions, the monthly mean temperature data for 90 deg N and 90 deg S are shown in the form of frequency distributions. The main features to be noted are: (1) in the middle stratosphere the variability during the northern midwinters is much larger than during the southern midwinters due to the major midwinter warmings which take place only during the northern winters (the largest variations over Antarctics are observed during late spring, i.e., October and November when very intense final warmings bring about the transition into summer); (2) the variability in the middle stratosphere is very small in summer when the planetary waves of the troposphere cannot propagate upwards into the stratosphere due to the prevailing easterly winds (this is true for both polar regions); and (3) the annual temperature range is larger over the South Pole, because winters are colder and summers warmer than over the North Pole. In addition, the Canadian, midwinter, and final warmings occurring during northern winters are characterized and the recent cooling trend in the arctic is discussed. Author

N86-27721*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MIDDLE ATMOSPHERE GENERAL CIRCULATION STATISTICS
Marvin A. Geller *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

With the increased availability of remote sensing data for the middle atmosphere from satellites, more analyses of the middle atmosphere circulation are being published. Some of these are process studies for limited periods, and some are statistical analyses of middle atmosphere general circulation statistics. Results from the latter class of studies will be reviewed. These include analysis of the zonally averaged middle atmosphere structure, temperature, and zonal winds; analysis of planetary wave structures, analysis of heat and momentum fluxes; and analysis of Eliassen-and-Palm flux vectors and flux divergences. Emphasis is on the annual march of these quantities; Northern and Southern Hemisphere asymmetries; and interannual variability in these statistics. Statistics involving the global ozone distribution and transports of ozone are also discussed. Author

N86-27722*# Kyoto Univ. (Japan). Geophysical Inst.
SEASONAL VARIATION OF THE STRATOSPHERIC CIRCULATION
I. Hirota and M. Shiotani *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

An extensive analysis is made of the extratropical stratospheric circulation in terms of the seasonal variation of large-scale motion fields, with the aid of height and temperature data obtained from the TIROS satellite. Special attention is paid to a comparison of climatological aspects between the Northern Hemisphere (NH) and the Southern Hemisphere (SH). In order to see the general picture of the annual mach of the upper stratosphere, the zonal mean values of geopotential height of the 1 mb level at 70 deg N and 70 deg S were plotted on the daily basis throughout a year. It is observed that, during the winter, the zonal mean 1 mb height in the NH is much more variable than that in the SH. It is also notable that the SH height is rather oscillatory throughout the longer period from midwinter to early summer. Since the zonal mean height in the polar latitude is a rough measure of the mean zonal flow in extratropical latitudes, the difference of the seasonal variation between the two hemispheres mentioned above is considered to be due mainly to the planetary wave-mean flow

interaction in the middle atmosphere. The wave activity in the middle atmosphere is represented more rigorously by the Eliassen-Palm flux associated with vertically propagating planetary waves forced from below. The day-to-day variation of the EP flux in the upper stratosphere shows that the wave activity varies intermittently with a characteristic time scale of about two weeks. Author

N86-27723*# Meteorological Office, Bracknell (England).
ASPECTS OF THE STRATOSPHERIC CIRCULATION AS DERIVED FROM SSU DATA
V. Michaelis and A. ONeill *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Five years of global data are available for the stratosphere up to 1 mb from Stratospheric Sounding Units (SSUs) on board NOAA satellites. These data form the basis for a climatological study which concentrates on the seasonal and inter-annual variability of the stratosphere and the connection between the stratospheric circulation and that of the troposphere. Particular emphasis is on the structure of the Southern Hemisphere and how it compares with that of the Northern Hemisphere. The characteristic difference in the vertical structure and propagation of disturbances in the two hemispheres is related to differences in the tropospheric flow and the long-term variation of the basic state of the stratosphere. Disturbances in both hemispheres occur in preferred geographical locations. The final warming, marking the transition from westerly to easterly winds, is an example. These occur asymmetrically with respect to the pole as warm air moves over the pole, usually from the same region. M.G.

N86-27724*# Ministry of Posts and Telecommunications, Ibaraki (Japan). Radio Research Labs.
THE SEASONAL VARIATION OF THE D REGION AS INFERRED FROM PROPAGATION CHARACTERISTICS OF LF RADIO WAVES
T. Ishimine, T. Ishii, and Y. Echizenya (Ministry of Posts and Telecommunications, Akita (Japan).) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 15-18 (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The propagation data of JG2AS 40 kHz (Japanese Standard Frequency), Loran C 100 kHz radio waves, and meteorological data were analyzed to study the association of propagation characteristics of LF radio waves with the atmospheric circulation in the mesosphere. The monthly averaged electric fields were depicted on the complex plane for typical summer and winter months, June and November. The locus traced out by the electric field vector during daytime is nearly circular. This is because during daytime the amplitude of the sky wave remains nearly constant while its phase changes in accord with the height change of the reflection layer, and thus the electric field vector traces out a circular locus with its center at the tip of the supposed ground wave vector. The locus has a loop during the sunrise or sunset period, which seems to arise from interference of two waves reflected by two different layers. In June the amplitude of the sky wave decreases rapidly before the dawn or increases after the dusk. In November such rapid change is not observed. During nighttime, the sky wave phase changes in such a way as to suggest that the reflection height moves upwards with time before midnight or lowers after midnight in November. In June it changes similarly before midnight, but after midnight it varies erratically. These characteristics are closely related to the structure of the D region, which is clearly shown by simulating the loci traced out by electric fields. Author

N86-27725*# Saskatchewan Univ., Saskatoon.
MEAN WINDS OF THE UPPER MIDDLE ATMOSPHERE (60-110 km): A GLOBAL DISTRIBUTION FROM RADAR SYSTEMS (M.F., METEOR, VHF)
A. H. Manson, C. E. Meek, M. Massebeuf (Centre National de la Recherche Scientifique, Paris (France).), J. L. Fellous, W. G. Elford (Adelaide Univ. (Australia).), R. A. Vincent, R. L. Craig, R. G. Roper (Georgia Inst. of Tech., Atlanta.), S. Avery (Colorado Univ., Boulder.), B. B. Balsley et al *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Since the development of the last CIRA in 1972, the number of radars providing winds in the upper middle atmosphere has increased significantly. These systems fill the data gap between 60 km and 110 km. The radars include medium frequency (MF) radars or partial reflection systems giving data from 60/70 to 100/110 km; meteor radars, 80 to 110 km, and M.S.T. radars operating as meteor radars. Data from 12 locations are shown, which represent a good Northern Hemispheric (NH) North American chain, an Oceanian chain which is mainly in the Southern Hemisphere (SH), and some Western Europe data. Generally tidal oscillations have been removed from days or groups of days, and the remaining mean winds and longer period oscillations plotted as height-time contours. Composite cross sections from the years 1978 to 1982 were formed where possible so that only the major temporal features remain. Author

N86-27726*# National Oceanic and Atmospheric Administration, Washington, D. C. Climate Analysis Center.
TRENDS IN UPPER STRATOSPHERIC TEMPERATURES AS OBSERVED BY ROCKETSONDES (1965-1983)
K. W. Johnson and M. E. Gelman *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Recent interest in possible anthropogenically induced changes in stratospheric ozone has led to a number of modeling studies. These studies indicate that stratospheric temperature changes would be related to stratospheric ozone changes. Therefore, this study was motivated by a concern to find out whether or not any significant trend in upper stratospheric temperatures could be ascertained from available observational data. June monthly mean values for 40 to 45 km layer were calculated for all Western Hemisphere rocketsonde stations for which data was available. Mean temperatures for each June were then used to calculate linear least squares regression coefficients with latitude of the stations as the independent variable. The resulting coefficients were used to calculate area-weighted mean temperatures for 25 deg N to 55 deg N. A two-to-three degree temperature drop in the early 1970s is indicated. It was noted, however, that this temperature decline coincides with a change in the principal observing system from the Arcasconde system to the Datasonde system. In order to study this temperature decrease more closely, similar mean temperatures were calculated for the 25 to 30 km layer using both rocketsondes and support radiosondes. Author

N86-27727*# Air Force Geophysics Lab., Hanscom AFB, Mass.
PROFILES OF TEMPERATURE AND DENSITY BASED ON EXTREMES AT 5, 10, 20, 30 AND 40 km
Arthur J. Kantor, Paul Tattelmann, and Frank A. Marcos *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Information on the vertical distribution of expected extremes of temperature and density are required for the design and operation of systems traversing the atmosphere. Such data are particularly important at altitudes from the surface to approximately 80 km for developing all types of airborne vehicles ranging from

helicopters and airplanes to sophisticated aerospace systems. Vertical profiles of temperature and density have been developed based on 1- and 10-percent hot and cold temperatures and 1- and 10- percent high and low densities occurring during the most severe month at the worst locations for which reliable upper-air data are available. The model profiles, from the surface to 80 km, are based on extremes that occur at 5, 10, 20, 30, and 40 km. There are 20 profiles for extreme temperatures (5 levels by 4 percentiles) that include associated densities, and 20 analogous profiles for extreme densities including associated temperatures. Consequently, a set of realistic profiles (rather than envelopes) of temperature and density, associated with extremes at each of 5 specified levels in the troposphere and stratosphere, are now available for altitudes up to 80 km. Author

N86-27728*# Indian Inst. of Tropical Meteorology, Poona.
INTERANNUAL VARIABILITY OF MIDDLE ATMOSPHERE DURING NORTHERN WINTER
B. K. Mukherjee, K. Indira, and Bh. V. Ramana Murty *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N36-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

An investigation was undertaken to examine the characteristics of the interannual variability of the zonal wind and the temperature of the middle atmosphere of the Northern Hemisphere during winter and to search for a relationship of the variability of the middle atmosphere with the activity of the following Indian summer monsoon. For this purpose, the rocketsonde temperature and wind data for 8 stations for a 6-year period for the month of January were collected. It is clear from the results that the interannual variability noticed in the zonal wind of the high latitude middle atmosphere was caused by the differential activity of the long-period planetary waves. In order to examine whether the stability of the polar night jet in the high latitude middle atmosphere has any influence on the spectacular tropospheric weather phenomenon such as the Indian summer monsoon, the rainfall activity for India has been studied. The study revealed that: (1) the strong and stable polar night jet with weak equator to pole temperature gradient at the stratopause in January was linked with the forthcoming weak monsoon activity; and (2) the weak and distorted polar night jet with strong equator-to-pole temperature gradient at the stratopause in January was linked with the forthcoming strong monsoon activity. M.G.

N86-27729*# Institut fuer Astrophysik und Extraterrestrische Forschung, Bonn (West Germany).
CONNECTION BETWEEN MESOPAUSE TEMPERATURE, CIRCULATION AND NOCTILUCENT CLOUDS
Volker Gartner and Michael Memmesheimer *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

To investigate the connection between mesopause temperature in summer and the induced circulation upon possible formation of the observed polar mesospheric (noctilucent) cloud layer (PMC), a two-dimensional semiempirical model is used to calculate the zonally averaged diabatic circulation. On the basis of the calculations, one may draw the following conclusions: (1) if the large departures from radiative equilibrium which occur at the summer mesopause at high latitudes should be balanced by adiabatic processes of the mean circulation alone, a vigorous circulation is needed (there is some evidence that such a vigorous circulation has been observed); (2) the vertical velocities of some cm/s at the polar summertime mesopause will support the formation of polar mesospheric clouds, because those large wind speeds support larger ice particles against gravitational sedimentation; and (3) a region of mild subsidence in the summertime midlatitude mesosphere due to the effect of nonlinear temperature advection would tend to limit the occurrence of ice particles to latitudes poleward of about 55 deg. M.G.

N86-27730*# Delhi Univ. (India). Dept. of Physics.
SOME STUDIES OF ZONAL AND MERIDIONAL WIND CHARACTERISTICS AT LOW LATITUDE INDIAN STATIONS
O. P. Nagpal and Somesh Kumar *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

At the beginning of the Indian Middle Atmosphere Programme (IMAP), it was decided that the preparation of consolidation reports of already available parameters for the middle atmosphere would be useful. Atmospheric wind data obtained by rockets and balloons constituted one such parameter which had to be consolidated. The present paper summaries the results of this consolidation study. Both zonal and meridional components of winds at four low latitude Indian stations namely Thumba, Shar, Hyderabad, and Balasore, have been analyzed to yield reference wind profiles for each month. The montly mean values have been used to bring out the amplitudes and phases of the annual, semiannual and quasi-biennial oscillations. Author

N86-27731*# Indian Space Research Organization, Trivandrum. Space Physics Lab.
TEMPORAL VARIATIONS OF THE TROPICAL TROPOPAUSE CHARACTERISTICS
B. V. Krishna Murthy, K. Parameswaran, and K. O. Rose *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 46-49 (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Results of a detailed study of tropopause characteristics at eleven Indian stations spread over a latitude range of 8.4 deg N to 28.6 deg N, using the data obtained during the period 1969 to 1978, are presented and discussed. This study reveals that the semiannual component in TP(T) (the tropopause potential temperature) can mainly be accounted by the corresponding variation on the solar insolation, whereas the annual component is greatly affected by the monsoon phenomenon, which is a large-scale annual one. During this period, the large-scale cloud cover would reduce the convective activity. Again, the annual components of TP(T) and lower stratospheric (18 km) potential temperature show a phase difference of about 6 months, except at the extratropical stations and about 2 to 3 months in the case of semiannual component. At extratropical stations the phase difference is much less, indicating the influence of convective process in the lower stratosphere. M.G.

N86-27732*# Boston Univ., Mass. Dept. of Elec., Computer and Systems Engineering.
MIDDLE ATMOSPHERE TIDES
Jeffery M. Forbes *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The recent direction of theoretical and observational research in middle atmosphere tides is reviewed. The diurnal tide has received considerable emphasis, including observations of evanescent components at high latitudes, numerical simulations of nonmigrating propagating components due to longitudinally varying water vapor insolation absorption in the troposphere, and implications and origins of unsteadiness in tidal oscillations over periods of days. Recent analyses of Nimbus 7 LIMS temperatures and partial reflection drift measurements of neutral winds in the tropical mesosphere have also emphasized the diurnal propagating tide. A description of the Atmospheric Tides Middle Atmosphere

Program (ATMAP) and an overview of ATMAP campaign results are also presented. M.G.

N86-27733*# Kyoto Univ. (Japan). Radio Atmospheric Science Center.

DIURNAL NONMIGRATING TIDES DUE TO LAND-SEA DISTRIBUTION

Toshitaka Tsuda and Susumu Kato *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)

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This paper is concerned with thermal excitation of diurnal nonmigrating tides by differential heating between land and sea. The nonmigrating tide is defined as a wave with a period corresponding to a subharmonic of a solar day. It is excited when heat sources of atmospheric tides have zonal asymmetries, and does not necessarily propagate westward with the Sun. Author

N86-27734*# Saskatchewan Univ., Saskatoon. Institute of Space and Atmospheric Studies.

MIDDLE ATMOSPHERE (60-110 km) TIDAL OSCILLATIONS AT SASKATOON, CANADA (52 DEG N, 107 DEG W) DURING 1983/84

A. H. Manson and C. E. Meek *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)

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Since mid-1978, the medium frequency (2.2 MHz; M.F.) radar at Saskatoon has run continuously, measuring winds by the spaced antenna method in the upper middle atmosphere. As there is so much dynamics activity during the years of MAP it seems very important to establish the features of the tidal field at Saskatoon during 1983 to 1984, and compare these with the climatology from the four years 1978 to 1979 and 1981 to 1982. Wind profiles with 60 to 110 km (80 to 110 km at night) with 3 km resolution are obtained every 5 minutes by means of a full-correlation analysis. Hourly means are formed and harmonic analysis applied to sets of data to obtain the mean winds and tidal oscillation amplitudes and phases. The zonal wind field at Saskatoon is structurally similar to CIRA-72; however, the wind eastward cell is weaker and much more structured, and the summer eastward cell above 85 km is also weaker. For the semidiurnal tide, a strong seasonal change exists, with larger amplitudes and shorter wavelengths, in winter-like months and the reverse in summer-like months. A summary of the tidal parameters at 90 km is given, where mean values from 1978 to 1982 are also shown. This seasonal variation of tides is a midlatitude climatology, as comparisons with Monpazier, France and Christchurch, New Zealand show very similar behavior, as does Durham; and requires antisymmetric tidal modes such as 2,3 and 2,5. Considering the diurnal tide, for most months centered on summer there are long wavelength modes, or superposition of several models. However, some winter months show a short wavelength mode. A summary of the 90 km characteristics is presented. Author

N86-27735*# Kyoto Univ. (Japan). Radio Atmospheric Science Center.

MESOSPHERIC WINDS OBSERVED BY THE KYOTO METEOR RADAR

Toshitaka Tsuda and Susumu Kato *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)

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The Kyoto meteor radar has been operated almost continuously from May 1983. By using a large amount of radar data, seasonal variations of mean winds, planetary waves and atmospheric tides can be delinated. Seasonal and latitudinal variation of tidally corrected mean winds including Kyoto observations have been examined in comparison with the CIRA 1972 model. A power spectral density of the zonal wind field for 60 days of data is formed from an autocorrelation function with a maximum time lag of 30 days. A quasi-2-day oscillation was evident in the period from June to September, and seems to be repeated in 1983 and 1983. It had large amplitudes in June and July and became weak in August; then it was again amplified in September. In summer months, the period of the wave was indicated as 2.2 days, and it became shorter in September. At Kyoto (35 deg N), the diurnal tide is the main component of atmospheric tides. The monthly mean amplitude of the eastward component of diurnal tide is plotted for the period from May 1983 to September 1984. It was clearly amplified in summer months at around 92 to 96 km altitudes. This feature was repeated in two successive years except for the maximum amplitude which exceeded 40 m/sec and 30 m/sec in 1983 and 1984, respectively. M.G.

N86-27736*# Calcutta Univ. (India).

SEMIDIURNAL TEMPERATURE OSCILLATION AND E-REGION ABSORPTION OVER HARINGHATA

N. N. Purkait *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 69-71 (For primary document see N86-27719 18-46)

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An attempt has been made to explain the observed asymmetry in the diurnal curves on absorption for the E region at 2.2 MHz for the field station at Haringhata (22 deg 56'N, 88 deg 36'E). A comparison between the computed and observed diurnal curves on absorption revealed that a part of the asymmetry was a manifestation of the effect of semidiurnal temperature oscillation present in the E layer. It was further noted that the degree of the asymmetry of the observed diurnal curves depends profoundly on the rate of downwards phase progression of the temperature oscillation. M.G.

N86-27737*# Kyoto Univ. (Japan). Geophysical Inst.

NORMAL MODE ROSSBY WAVES OBSERVED IN THE UPPER STRATOSPHERE

Toshihiko Hirooka and Isamu Hirota *In* International Council of Scientific Unions Handbook for MAP Dec. 1985 4 p (For primary document see N86-27719 18-46)

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In recent years, observational evidence has been obtained for westward traveling planetary waves in the middle atmosphere with the aid of global data from satellites. There is no doubt that the fair portion of the observed traveling waves can be understood as the manifestation of the normal mode Rossby waves which are theoretically derived from the tidal theory. Some observational aspects of the structure and behavior of the normal model Rossby waves in the upper stratosphere are reported. The data used are the global stratospheric geopotential thickness and height analyses which are derived mainly from the Stratospheric Sounding Units (SSUs) on board TIROS-N and NOAA satellites. A clear example of the influence of the normal mode Rossby wave on the mean flow is reported. The mechanism considered is interference between the normal mode Rossby wave and the quasi-stationary wave. M.G.

N86-27738*# Adelaide Univ. (Australia). Dept. of Physics.

ON THE INTERACTION BETWEEN THE QUASI-2-DAY WAVE AND THE MEAN FLOW

R. L. Craig, R. A. Vincent, and R. A. Plumb (Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia).) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)

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Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Studies of the quasi-2-day wave show that it is a summertime phenomenon. Long-term measurement of the winds in the 60 to 100 km height range at Adelaide show that the wave appears in the late December but that the peak amplitudes are not reached until mid-January. In the summer of 1983 to 1984 the main phase of the wave appeared as a pulse in mid-January which lasted about 7 cycles (14 days). Little or no amplification with height was observed; peak amplitudes were about 60 m/s for the meridional and 20 m/s for the zonal component. Coincident with the onset of the pulse, a temporary but substantial change occurred throughout a deep layer of the upper mesosphere over a period of about 3 days. A change of more than 10 m/s occurred in the northward flow while the change in the zonal flow (about 30 m/s westward) actually caused a reversal of the prevailing zonal circulation. Author

N86-27739*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.

PLANETARY WAVES-MEAN FLOW INTERACTION IN THE MIDDLE ATMOSPHERE: LIDAR OBSERVATIONS AND MODELISATION

A. Hauchecorne *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 9 p (For primary document see N86-27719 18-46)

Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Lidar observations of the temperature from 30 to 80 km have been made at the Observatory of Haute-Provence on an operational basis since 1981. Data obtained during the four last winters indicate the quasi-systematic presence of traveling Rossby waves with periods ranging from 5 to 20 days and a vacillation of the zonal mean circulation leading to a succession of upper stratospheric warmings and associated mesospheric coolings spaced by 25 to 50 days. A semi-spectral model of the wave one-mean flow interaction has been used to interpret these results. When a stationary wave forcing is imposed at the lower boundary of the model, a vacillation of the zonal flow is obtained as soon as the amplitude of this wave reaches a critical value of about 140 m. When an 18-day westward traveling wave is imposed in supplement to this forcing, the date of occurrence of the upper stratospheric warmings is imposed by the coincidence of the phases of the two waves that enhanced the forcing. M.G.

N86-27740*# National Oceanic and Atmospheric Administration, Washington, D. C. Climate Analysis Center.

DISCRIMINATION OF A MAJOR STRATOSPHERIC WARMING EVENT IN FEBRUARY-MARCH 1984 FROM EARLIER MINOR WARMINGS

K. W. Johnson, R. S. Quiroz, and M. E. Gelman *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)

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As part of its responsibility for stratospheric monitoring, the Climate Analysis Center derives time trends of various dynamic parameters from NMC stratospheric analyses. Selected figures from this stratospheric monitoring data base are published in Climate Diagnostics Bulletin in March and October, after each hemispheric winter. During the Northern Hemisphere winter of December 1983-February 1984 several warming events may be seen in the plot of 60 deg. N zonal mean temperatures for 10 mb. Minor warmings may be noted in early December, late December, mid January and early February. A major warming with the 60 deg. N zonal mean temperatures reaching -40C is observed in late February, associated with a circulation reversal. In all of the minor warming episodes, there is a polarward movement of the Aleutian anticyclone; however, at 10 mb the North Pole remains in the cyclonic circulation of the stratospheric vortex which is not displaced far from its usual position. In the case of the later February major warming, the 10 mb circulation pattern over the North Pole is anticyclonic, and the cyclonic circulation has moved to the south and east with a considerable elongation. Cross sections of heat transport and momentum transport are not dramatically different for the minor and major warming episodes. Author

N86-27741*# Indian Inst. of Tropical Meteorology, Poona.

THE 4-5 DAY MODE OSCILLATION IN ZONAL WINDS OF INDIAN MIDDLE ATMOSPHERE DURING MONEX-79

R. S. Reddy, B. K. Mukherjee, K. Indira, and Bh. V. Ramana Murty *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)

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In the early studies based on time series of balloon observations, the existence of 4 to 5 day period waves and 10 to 20 day wind fluctuations were found in the tropical lower stratosphere, and they are identified theoretically as the mixed Rossby-gravity wave and the Kelvin wave, respectively. On the basis of these studies, it was established that the vertically propagating equatorial waves play an important role in producing the QBO (quasi-biennial oscillation) in the mean zonal wind through the mechanism of wave-zonal interaction. These studies are mainly concentrated over the equatorial Pacific and Atlantic Oceans. Similar prominent wave disturbances have been observed over the region east of the Indian Ocean during a quasi-biennial oscillation. Zonal winds in upper troposphere and lower stratosphere (10 to 20) km of the middle atmosphere over the Indian subcontinent may bear association with the activity of summer monsoon (June-September). Monsoon Experiment (MONEX-79) has provided upper air observations at Balasore (21 deg. 30 min.N; 85 deg. 56 min.E), during the peak of monsoon months July and August. A unique opportunity has, therefore, been provided to study the normal oscillations present in the zonal winds of lower middle atmosphere over India, which may have implication on large scale wave dynamics. This aspect is examined in the present study. Author

N86-27742*# Meteorological Office, Bracknell (England).

THE EVOLUTION OF ERTEL'S POTENTIAL VORTICITY DURING STRATOSPHERIC SUDDEN WARMINGS

T. D. A. Fairlie and A. ONeill *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)

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In the winter stratosphere of the Northern Hemisphere, the disruption of the westerly vortex and associated warming of polar latitudes is a well known phenomenon. It has become apparent that some important dynamical processes in the stratosphere are highly nonlinear and are best thought of locally rather than in terms of the interaction between the zonal-mean flow and harmonic waves around latitude circles. The importance of nonlinear processes was suggested by McIntyre and Palmer (1983, 1984) who used isentropic maps of Ertel's Potential Vorticity to show that during disturbed episodes material lines may become strongly and irreversibly deformed in certain places. They adopted the term planetary wave breaking to describe this process. Isentropic maps of Q are used to follow the evolution of a Canadian warming in November - December 1981 and a particularly strong warming in January 1982. The advection of Q over large distances on isentropic surfaces was a striking feature of the flow during each event. This could be identified because of our ability to follow the movement of material lines due to the approximate conservation of Q over several days. The advection of Q was a nonlinear process because its changing distribution affected the advecting wind field. The Canadian warming did not lead to a permanent change in the structure of the westerly vortex, as defined by the coarse-grain field of Q, whereas the January event was accompanied by a substantial loss of resolved Q which was never fully recovered. Author

N86-27743*# Meteorological Office, Bracknell (England).
SEASONAL CHANGES IN THE STRUCTURE OF THE STRATOSPHERIC CIRCULATION
A. ONeill and V. D. Pope *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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The seasonal evolution of the stratospheric circulation in both hemispheres is studied using a coordinate independent diagnostic tied to the vortex, wherever it lies, rather than to latitude circles. Zonally averaged quantities are highly variable in the winter stratosphere, as the vortex moves on and off the pole, masking systematic changes in the structure of the vortex. The quantities shown here are the areas A(Q), where Ertel's potential vorticity is greater than a specified value Q, for various Q. In these calculations, Q is evaluated on the 850K isentropic surface which lies near 10 mb in the middle of the stratosphere. The advantage of using contours of Q (rather than contours of geopotential height, say) is that an area enclosed by such contours is approximately constant for quasi nondivergent, adiabatic, inviscid motion. Changes in area will occur if any of the above restrictions on the motion are invalid, and also if scales of motions are generated below those that can be adequately resolved. The evolution of area shows the systematic change in the average structure of the vortex. At a given time the rate of change of Q with A(Q) gives a measure of the average gradient of Q. The gradient of Q is relevant for the propagation of large-scale disturbances into the stratosphere. Experience has also shown that winds tend to be strong (weak) when the gradient of Q is strong (weak). Author

N86-27744*# Freie Univ., Berlin (West Germany). Institut fuer Meteorologie.
ON THE USE OF POTENTIAL VORTICITY FOR THE DIAGNOSIS OF STRATOSPHERIC SYNOPTICS
K. Rose, K. Labitzke, and U. Kummel *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

According to quasi-geostrophic approximation, regions of strong cross flow gradient of geopotential vortivity support Rossby wave propagation. Using potential vorticity as a dynamical tracer, the polar vortex can be considered as a material entity. In addition to synoptic charts of geopotential heights and temperatures, maps of potential vorticity are used to describe some distinct features of the circulation of the winter stratosphere. Author

N86-27745*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE INTEGRATED ENSTROPHY BUDGET OF THE WINTER STRATOSPHERE DIAGNOSED FROM LIMS DATA
Mark R. Schoeberl and Anne K. Smith (National Center for Atmospheric Research, Boulder, Colo.) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The quasi-geostrophic integrated enstrophy budget for the 1978 to 1979 winter has been analyzed from 10-0.1 mb using LIMS data. During January and late February periods a significant imbalance in the budget appears at 10mb. This imbalance is attributed to Rossby wave breaking. It is produced by the irreversible transfer of enstrophy to smaller scales not resolved by LIMS. The imbalance episodes correspond well to the appearance of Ertel vorticity filaments shown by McIntyre and Palmer (1984). From a seasonal viewpoint, the integrated enstrophy shows an average (although irregular) transfer from a zonal mean reservoir to waves which are then dissipated. On a shorter time scale the integrated enstrophy sloshes back and forth between the waves and mean flow in early winter; then, beginning with the January sudden warming, the total enstrophy is reduced more rapidly. Between 10 mb and 1 mb this reduction is more or less continuous until the end of February. However, in the mesosphere the total enstrophy decrease is very short lived, being quickly restored after the January warming. Even though the zonal mean integrated enstrophy is large, only about 10% can be utilized by the waves. The available integrated potential enstrophy is introduced, which is a better measure of how close the flow is to saturation by Rossby waves. The largest amount of available potential enstrophy in early January is at 1 mb with decreasing amounts above and below. Saturation of the flow by Rossby waves occurs below 1 mb only coincident with sudden warmings; however, at mesospheric heights the flow appears to be nearly saturated throughout the winter. Author

N86-27746*# Kyoto Univ. (Japan). Geophysical Inst.
PLANETARY WAVE-MEAN FLOW INTERACTION IN THE STRATOSPHERE: A COMPARISON BETWEEN THE NORTHERN AND SOUTHERN HEMISPHERES
M. Shiotani and I. Hirota *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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Based on satellite-derived data supplied by the National Meteorological Center (NMC), the dynamical interaction between planetary waves and mean zonal winds in the stratosphere is investigated. Special attention is paid to the differences between the Northern Hemisphere (NH) and the Southern Hemisphere (SH). An analysis is made using Eliassen-Palm (E-P) flux diagnostics for the period from June 1981 to May 1982. In a climatological sense, different seasonal evolutions of large-scale motions between the NH and the SH in the stratosphere are demonstrated. Vertical cross-section analysis is presented to show the day-to-day variation in the mean zonal wind and wave activity, in particular, the following phenomena: (1) the poleward shifting of the westerly jet, and (2) episodes after the shifting of the westerly jet. Author

N86-27747*# Meteorological Research Inst., Tsukuba (Japan). Forecast Research Div.
WAVE-MEAN FLOW INTERACTION DURING THE WINTER TO SUMMER TRANSITION IN THE SOUTHERN HEMISPHERE STRATOSPHERE
K. Yamazaki *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The evolution of the flow and wave-mean flow interactions in the Southern Hemisphere during the period when the final stratospheric warming and the associated reversal of the flow in the upper stratosphere occurred is described. The spring is the most interesting season as far as the wave mean flow interaction in the Southern Hemisphere is concerned. The data for this study are NMC analysis of temperature and geopotential fields between 1000 and 0.45 mb for the period August 31 to November 10, 1979. Author

N86-27748*# Washington Univ., Seattle.
A NEW MODEL OF RESONANCE IN THE WINTER STRATOSPHERE
Peter H. Haynes *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

It is generally accepted that the planetary waves observed in the winter stratosphere are primarily a response to dynamical forcing from the troposphere. Nevertheless, the mechanism by

which wave amplitudes sometimes become larger remains uncertain. It is possible that anomalously large waves in the stratosphere might simply be the result of anomalously large tropospheric forcing. However, it has also been suggested that they are a response to a stratospheric-tropospheric cavity being in a near-resonant configuration. It has been suggested that nonlinear self-tuning effects could play an important role in the behavior of such a cavity. Self-tuning may occur when a system starts to one side of resonance, such that the mean-state change induced by growing waves brings the system closer to resonance. A new model of the stratospheric cavity is introduced and is then used to re-examine the possibility of wave growth in the real atmosphere and in atmospheric models due to self-tuning effects. The new model is based on the picture of the winter-time stratosphere which has been revealed by the observations of Ertel's potential vorticity, Q. Isentropic maps of Q show two rather distinct regions, the first containing the circumpolar vortex, where gradients of Q are large and Rossby waves may propagate easily. Surrounding this is a second, low-latitude region where the gradients are generally weak and where, because the Eulerian-mean flow is comparable with their phase speed, Rossby waves must be continually breaking. As the waves are observed to grow the relative sizes of these two regions change in time. This leads to the interesting possibility that self-tuning, mainly due to irreversible changes in the size of the polar vortex, is taking place. Author

N86-27749*# Colorado Univ., Boulder. Dept. of Astrophysics, Planentary and Atmospheric Science.

TRANSIENT RESPONSE TO LOCALIZED EPISODIC HEATING IN THE TROPICS

Murry L. Salby and Rolando R. Garcia (National Center for Atmospheric Research, Boulder, Colo.) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 8 p (For primary document see N86-27719 18-46)

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It is generally recognized that equatorial disturbances in the lower stratosphere are excited by convective latent heat release associated with the Internal Tropical Convergence Zone (ITCZ). Recently, attention has also focused on tropical convection with regard to extratropical teleconnection patterns. Unlike equatorial waves which are trapped about the equator but propagate vertically, the latter extend well out of the tropics but are barotropic. They have been most widely discussed in connection with long-term climatological features. Both types of disturbances have been examined largely from the standpoint of steady monochromatic forcing, in the latter case zero frequency or time-mean heating. However, tropical convection as revealed by recent geostationary satellite imagery is anything but regular, surely not steady. Much of the heating variance is concentrated spatially within three localized convective centers: Indonesia, the Amazon, and the Congo. Convective activity within these regions undergoes an irregular evolution over the span of a couple of days. It involves a rather broad spectrum of spatial and temporal scales. The analysis of cloud brightness over the Eastern Atlantic and Africa suggests a characteristic time scale of 3-4 days and correlations scales in latitude and longitude of approximately 30 deg. Author

N86-27750*# Oxford Univ. (England). Dept. of Atmospheric Physics.

ROSSBY WAVETRAINS IN THE STRATOSPHERE FORCED BY LOCALISED DISTURBANCES IN THE TROPOSPHERE

C. J. Marks, A. ONeill (Meteorological Office, Bracknell, England), and V. D. Pope *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)

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Studies have linked elements of the stratospheric circulation with particular localized features in the tropospheric circulation. This suggests a study of the response of the stratosphere to forcing by localized disturbances in the troposphere. A multilevel, primitive equation model is used of the stratosphere and mesosphere the height of whose lower boundary at 300 mb can be prescribed. Localized height disturbances which grow to steady amplitude are applied at this lower boundary, and the response of the initially axially symmetric stratosphere is studied. The perturbation, centered at 45 deg N, has a Gaussian distribution with a half width of 15 deg., corresponding roughly to the size of persistent troughs and blocking ridges in the troposphere. The forcing is nearly at fully amplitude 10 days after being switched on, and thereafter remains steady. Two types of experiments are conducted: in one the forcing is of small amplitude (100 gpm) and in the other it is of large amplitude (600 gpm). These pairs of experiments are compared to determine how nonlinear processes affect the perturbation fields. This is done locally by defining the perturbation response to the forcing as an anomaly, i.e., as a departure from the response in a controlled experiment in which no asymmetric forcing was applied at the lower boundary of the model. Experiments have been conducted for a number of atmospheric states obtained as zonal means of observations made by a stratospheric sounding unit (SSU). In this summary, results for the zonal mean flow on January 19, 1982 are outlined. Author

N86-27751*# Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.

LOW-FREQUENCY DYNAMICS OF QUASI-GEOSTROPHIC WAVES IN A MIDLATITUDE CHANNEL AND THE EFFECTS OF TROPICAL INFLUENCE

K. K. Tung and A. J. Rosenthal *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 145-154 (For primary document see N86-27719 18-46)

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Both zonal mean flow and stationary waves in the stratosphere have large variabilities from month to month and from year to year. One plausible mechanism that can account for these variabilities is the interaction between the forced stationary waves and the mean zonal flow. Given the large energy source contained in the stationary waves which are forced in the lower atmosphere, they are probably responsible for inducing the bulk of the variability in the mean flow in the stratosphere. Variability in the mean flow can in turn produce variability in the stationary wave amplitudes due to the possible sensitivity of wave response in the stratosphere to the configuration of the wave guide determined by the mean flow. The likely causes for the low-frequency variability of the stationary waves-mean flow system in extratropical latitudes are assessed. The causes of variability are divided into internal and external ones. Internal mechanisms include transition between equilibria and vacillation cycles, while mechanisms external to the midlatitude system include eddy heat and momentum fluxes from the tropics and the Hadley circulation forced in the tropics. Author

N86-27752*# Princeton Univ., N. J. Geophysical Fluid Dynamics Program.

SUPPRESSION OF STATIONARY PLANETARY WAVES BY INTERNAL GRAVITY WAVES IN THE MESOPHERE

Saburo Miyahara *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 154-156 Prepared in cooperation with Kyushu Univ., Fukuoka, Japan (For primary document see N86-27719 18-46)

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The supression of stationary planetary waves by internal gravity waves in the mesosphere is treated using a quasi-geostrophic model on a midlatitude beta-plane. The drag forces due to internal gravity waves are parameterized based on the wave-breaking assumption proposed by Lindzen (1981). In the present model the vertical propagation of internal gravity waves is affected not only by mean zonal wind distribution but also by eastward and northward velocity perturbations associated with stationary plane-

tary waves, viz. the total local velocity. Only two stationary upward propagating internal gravity waves with the same horizontal wavelength 57 km, but whose wave number vectors are different are considered. One component has a wave number vector which is directed towards northeast, and the other is directed southeast. Planetary waves with zonal wave number 1 are considered, and the amplitudes of the geopotential height at the bottom (z=20km) are specified to be 50 m. Author

N86-27753*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.

MEAN ZONAL WINDS AND PLANETARY WAVES INDUCED BY INTERNAL GRAVITY WAVE PACKETS

M. Takahashi and M. Uryu *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)

Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The generation of mean zonal winds and planetary waves induced by internal gravity wave packets are investigated by numerical experiments. The numerical model is a 3-dimensional primitive equation model on the equatorial beta-plane with boundaries at the equator and North Pole. Because of equatorial boundary conditions, equatorial symmetric modes only are included in the model. Internal gravity wave packets are produced by thermal heating at the bottom boundary. Because of restriction of grid size, convective instability is parameterized by time-independent vertical and horizontal eddy viscosity. Other dissipation mechanisms (e.g., Newtonian cooling, ion drag, molecular viscosity etc.) are also included in the model. Author

N86-27754*# National Center for Atmospheric Research, Boulder, Colo.

WAVE-MEAN FLOW INTERACTION IN THE NCAR STRATOSPHERIC GENERAL CIRCULATION MODEL

Byron A. Boville *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 161-168 (For primary document see N86-27719 18-46)

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A version of the NCAR General Circulation Model has been developed which extends from the surface into the mesosphere. The model was forced by climatological January sea surface temperatures and insolation and gives a fairly reasonable simulation of the troposphere and stratosphere. The transformed Eulerian formation is used to examine the interaction of the eddies with the mean flow in the winter hemisphere. The essence of the transformed Eulerian formation is an attempt to distinguish between the mean meridional circulation driven by diabatic heating and that driven by eddies. The net effect of eddies can then be determined, and is given by the Eliassen-Palm (EP) flux divergence. In practice, this method works reasonably well but is far from perfect. For instance, in the absence of eddy forcing, the winter stratosphere would go to radiative equilibrium and there would be no diabatic heating to drive a mean meridional circulation. Author

N86-27755*# National Center for Atmospheric Research, Boulder, Colo.

EQUATORIAL WAVES IN THE NCAR STRATOSPHERIC GENERAL CIRCULATION MODEL

Byron A. Boville *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)

Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Equatorially trapped wave modes are very important in the tropical stratospheric momentum balance. Kelvin waves and mixed Rossby-gravity waves are believed to be responsible for the quasi-biennial oscillation of the zonal winds in the equatorial lower stratosphere. Both Kelvin and mixed Rossby-gravity waves have been identified in observations and in numerical models. Kelvin and mixed Rossby-gravity waves are identified in a general circulation model extending from the surface into the mesosphere and looks at the effect on the waves of lowering the top of the model. Author

N86-27756*# Colorado Univ., Boulder. Dept. of Astrophys., Planetary and Atmosph. Sci.

VACILLATIONS INDUCED BY INTERFERENCE OF STATIONARY AND TRAVELING WAVES

Murry L. Salby and Rolando R. Garcia (National Center for Atmospheric Research, Boulder, Colo.) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)

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It was shown that there exists a correspondence between interference of the 16-day wave with the stationary planetary wave and vacillations in eddy heat and momentum fluxes. There has been speculation on the role such interference may play in stratospheric warmings. The appearance of higher-order normal modes, e.g., the 16-day wave, prior to disturbances in the stratospheric vortex has also been noted. Since amplitudes of the 16-day wave are compared to those of the stationary component, it can significantly alter the instantaneous total wave field. The behavior of the wave number 1 height field at 60 deg N during January 1979 is shown when a large amplitude disturbance retrogressed barotropically around the globe over much of the troposphere and stratosphere. This transient disturbance has been identified with the 16-day wave. More generally, the presence of fluctuating planetary wave activity can, through combined interference, alter the instantaneous planetary wave field as well as the transports it produces. The implications of such interference in a quasi-geostrophic framework has been explored, using the Eliassen-Palm (EP) flux as a diagnostic. Author

N86-27757*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.

OVER-REFLECTION OF BAROTROPIC ROSSBY WAVE PACKET

K. Takano and M. Uryu *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)

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Interference of stationary and traveling waves of sufficiently large amplitude can cause vacillations in the instantaneous EP-flux and its divergence. Such fluctuations may provide an explanation for some of the vacillations in transport and in the mean flow observed in the stratosphere. While there has been a focus on a simple two-component system, in reality several spectral components are likely to be present. For sufficiently large mean flow deceleration, the local wave field and the quasi-linear description developed here would presumably break down. Author

N86-27758*# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.

EFFECTS OF RAYLEIGH AND NEWTONIAN DAMPING ON WAVE-MEAN FLOW INTERACTION

Yoshikazu Hayashi *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)

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A theoretical study is made of the effects of mean damping on wave-mean flow interactions. A condition is derived for the Eliassen-Palm flux divergence to balance the steady-state residual circulations induced by eddies in the presence of mean damping. It is shown by a simple analytical model that this balance holds for stratospheric planetary waves when the Rayleigh friction

coefficient is one order smaller than the Newtonian cooling coefficient, although the tall mean flow condition is not violated. In this case, the Eliassen-Palm flux divergence can be interpreted as approximating the steady residual circulation (approximately equal to Lagrangian-mean circulations) induced by eddies as well as the net mean acceleration in the absence of mean damping. This balance is consistent with the stratospheric circulations of a dynamical model. Author

N86-27759*# Kyoto Univ. (Japan). Data Analysis Center Geomagnetism and Spacemagnetism.
VARIATION OF TIDAL WINDS IN THE IONOSPHERE INFERRED FROM GEOMAGNETIC SQ FIELD
M. Takeda and T. Araki *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 182-185 (For primary document see N86-27719 18-46)
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The geomagnetic Sq field is mainly generated by the dynamo action of tidal winds in the ionosphere, and therefore some information can be derived from the variation of the Sq field. The geomagnetic Sq field was analyzed during March 1 to 18, 1980, when the geomagnetic activity was exceptionally low, and the equivalent Sq currents calculated every 2 hours by using the spherical harmonics method. Then additional Sq currents were extracted by subtracting the currents averaged through all days in the period from the original currents at each UT. The change of the instantaneous Sq current system by the above-mentioned method is discussed. Author

N86-27760*# Meteorological Research Inst., Yatabe (Japan).
INFLUENCE OF GEOMAGNETIC DISTURBANCE ON ATMOSPHERIC CIRCULATION
Kunihiko Kodera *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 186-189 (For primary document see N86-27719 18-46)
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The influence of geomagnetic disturbance or passage of the solar sector boundary on the atmospheric circulation was reported. Unfortunately little is known about the general morphology of Sun weather relationships. In order to know the general characteristics, pressure height variations on an isobaric surface over the Northern Hemisphere were analyzed. Although it may be suitable to use some index, or some integrated value for statistical purposes, weather prediction data were used to verify whether the obtained tropospheric response is caused externally or not. Author

N86-27761*# Indian Inst. of Tropical Meteorology, Poona.
BEHAVIOR OF NEUTRAL WIND GRADIENTS AT METEOR HEIGHTS OVER MIDLATITUDE STATIONS
P. C. S. Devara, G. Chandrasekhar (Andhra Univ., Waltair, India), and M. I. Ahmed *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
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The variation of wind gradients in the altitude range of 80 to 100 km, which contributes information on propagational characteristics of wave phenomena prevailing at those altitudes, was studied. Diurnal and semidiurnal components of the zonal (EW) and meridional (NS) neutral wind data collected over Atlanta using the Georgia Tech Meteor Wind Radar Facility during the period of August 1974 through March of 1978 over the height range of 80 to 100 km are analyzed in detail to obtain information on height gradients in amplitude and phase of neutral wind components over height intervals of 80 to 90 and 90 to 100 km. The details of the data analysis, major results, and conclusions are presented. Author

N86-27762*# Adelaide Univ. (Australia). Dept. of Physics.
RADAR OBSERVATIONS OF MESOSPHERIC GRAVITY WAVES AND TURBULENCE AT ADELAIDE
R. A. Vincent *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
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Recent studies made at Adelaide (35 deg S, 138 deg E), of gravity waves and turbulence in the 60 to 100 km altitude range are reviewed. The observations were made with a radar operating at 2 MHz and both the spaced antenna (SA) and Doppler techniques were used. The SA observations were made on a continuous real time basis from November 1983 to December 1984 with a time resolution of 10 min and a 2 km height resolution. The Doppler observations were made on a campaign basis and were used to study gravity wave momentum fluxes with the dual-beam technique of Vincent and Reid (1983) and also turbulence dissipation rates. Author

N86-27763*# Kyoto Univ. (Japan). Radio Atmospheric Science Center.
THE MU RADAR: CURRENT STATUS AND FIRST RESULTS c32
Susumu Kato, Shoichiro Fukao, Toshitaka Tsuda, and Toru Sato *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
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The MU (Middle and Upper Atmosphere) radar is a 46.5 MHz pulse modulated monostatic Doppler radar with an active phased array system. The nominal beam width is 3.6 deg, and the peak radiation power is 1 MW with maximum average power of 50 kW. A brief description of the system and the initial observational results are presented. Author

N86-27764*# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
POWER SPECTRA OF MESOSPHERIC VELOCITIES IN POLAR REGIONS
P. Czechowsky and R. Ruster *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
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The mobile SOUSY radar was operated on Andoya in Northern Norway during the MAP/WINE campaign from November 1983 to February 1984 and for about two weeks in June 1984 to study the seasonal dependence of mesospheric structures and dynamics at polar latitudes. During the winter period, measurements were carried out on 57 days, primarily in coordination with the schedule of the rocket experiments. Echoes were detected in the troposphere and stratosphere up to 30 km and at mesospheric heights from about 50 to 90 km with a distinct maximum around noon. In summer, the radar system was operated continuously from 19th to the 28th of June 1984. Echoes occurred almost for 24 hours in the height range from 70 to 95 km showing no recognizable diurnal variation. Similar observations in polar latitudes were carried out for several years with the Poker Flat Radar in Alaska. Author

N86-27765*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
GRAVITY WAVE SPECTRA OBSERVED BY DOPPLER RADAR: COMPARISON OF A MODEL WITH MESOSPHERIC OBSERVATIONS
T. E. VanZandt, S. A. Smith (Alaska Univ., Fairbanks), and D. C. Fritts *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719

18-46)
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It was proposed that mesoscale fluctuations of wind and temperature in the free atmosphere are due to gravity waves. Critical tests of this hypothesis must involve the comparison of models based on the theory of buoyancy waves with suitable measurements. The MST (mesosphere-stratosphere-troposphere) radar technique is particularly attractive for this purpose, because it can measure several independent power spectra simultaneously. Observed spectra are derived from mesospheric data taken by the Poker Flat MST radar during June 1983. The spectra were compared with the model spectra for three days when suitable data were available. It was concluded that the mesoscale fluctuations were dominated by gravity waves, and the contribution of two-dimensional turbulence was small. B.G.

N86-27766*# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
INSTABILITIES AND TURBULENCE AT MESOSPHERIC HEIGHTS AS OBSERVED BY VHF RADAR
R. Ruster and J. Klostermeyer *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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Very High Frequency (VHF) radar operating at frequencies near 50 MHz can simultaneously measure mean winds, waves, and turbulence at scales equal to half the radar wavelength. Harper and Woodman (1977) pointed out that short-period evanescent gravity waves act as a direct energy source for turbulence at mesospheric heights. A few examples of observational results of strong mesospheric turbulance bursts are presented and compared with recently observed turbulence bursts in a tropospheric jet stream to gain insight into the generation mechanism. Author

N86-27767*# Academia Sinica, Beijing (China). Institute of Atmospheric Physics.
OBSERVATION AND ANALYSIS OF THUNDERSTORM-GENERATED GRAVITY WAVES IN THE LOWER STRATOSPHERE
Daren Lu, T. E. VanZandt (National Oceanic and Atmospheric Administration, Boulder, Colo.), and W. L. Clark, Jr. *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The relation between internal gravity waves and thunderstorms may be important in at least two respects. First, thunderstorm cells could be excited or initiated by propagating gravity waves in the troposphere. Second, thunderstorms may contribute to the energy of the atmospheric gravity wave field. Observations of gravity waves associated with thunderstorms are analyzed. The analysis will emphasize the difference of thunderstorm-generated gravity waves in the troposphere and lower stratosphere. B.G.

N86-27768*# Saskatchewan Univ., Saskatoon.
GRAVITY WAVES OBSERVED WITH GRAVNET: SASKATOON (52 DEG N, 107 DEG W) 1983/84
C. E. Meek, A. H. Manson, and I. M. Reid *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
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The GRAVNET system is based on a medium frequency (MF) radar (2.22 MGz) with one site consisting of a transmitting and spaced receiving antenna; and two remote receiving sites (approximately 40 km distance, forming an approximately equalateral triangle), also spaced receiving antennas. The winds of the upper middle atmosphere (60 to 110 km) are measured at each of the three sites in real time, using the Spaced Antenna method. Up to 12 profiles per hour were obtained. Spectral analysis was performed separately on northward and eastward velocity components for each site at the same height. Cross spectra are then found between sites. Data selection criteria included the Normalized Phase Discrepancy (NDP). B.G.

N86-27769*# International Council of Scientific Unions, Urbana, Ill. Water Research Inst.
HIERARCHICAL STRUCTURE OF STRATOSPHERIC WIND FLUCTUATIONS
M. D. Yamanaka and H. Tanaka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 50-46 (For primary document see N86-27719 18-46)
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In order to verify the gravity-wave-breaking theories, high resolution observations of middle-stratospheric winds were carried out by balloon-borne anemometers. The observed features were summarized, the parameters of waves generating the turbulence were estimated, and the effect on the general circulation and the transport process were discussed. Author

N86-27770*# University of Electro-Communications, Tokyo (Japan). Dept. of Applied Electronic Engineering.
TWO CLASSES OF MEDIUM-SCALE TRAVELING IONOSPHERIC DISTURBANCES OBSERVED WITH AN ARRAY ON HF-DOPPLER SOUNDERS
T. Shibata and T. Okuzawa *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The importance of the quasi-evanescent mode of acoustic-gravity waves (AGW) was recently stressed to elaborate on the daytime dispersion characteristics of horizontal velocity of medium-scale traveling ionospheric disturbances (MS-TID) which were observed by a high frequency Doppler (HFD) sounder array in central Japan. Observed MS-TIDs were classified into two categories: the internal mode and the quasi-evanescent mode as regards physical implication. Nonlinear wave-wave interaction is proposed in an attempt to explain salient features of the latter-class TID. Author

N86-27771*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
FINITE AMPLITUDE GRAVITY WAVES: HARMONICS, ADVECTIVE STEEPENING, BREAKING AND SATURATION
J. Weinstock *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A simple theory is presented which determines details of the breaking and saturation of a gravity wave as it propagates upward in the atmosphere. Breaking and saturation are here due to nonlinear advection analogous to the breaching of a surface wave and to the breaking of a planetary wave. Much simplification is obtained by the assumption that in a wave packet consisting of a primary wave and its harmonics, the primary wave remains dominant. This assumption, referred to a quasi-monochromatic approximation, is suggested by observations. Determined by this approximate theory are: a detailed picture of the waveform as it steepens and breaks; harmonics of the wave; the turbulence generation; and an underlying relationship between superadiabatic lapse rate and saturation by wave-wave interactions. Author

N86-27772*# Adelaide Univ. (Australia). Institute for Antarctic Research.

GRAVITY WAVE VERTICAL ENERGY FLUX AT 95 km
P. G. Jacob and F. Jacka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A three-field photometer (3FP) located at Mt. Torrens near Adelaide, is capable of monitoring different airglow emissions from three spaced fields in the sky. A wheel containing up to six different narrow bandpass interference filters can be rotated, allowing each of the filters to be sequentially placed into each of the three fields. The airglow emission of interest is the 557.7 nm line which has an intensity maximum at 95 km. Each circular field of view is located at the apexes of an equilateral triangle centered on zenith with diameters of 5 km and field separations of 13 km when projected to the 95-km level. The sampling period was 30 seconds and typical data lengths were between 7 and 8 hours. The analysis and results from the interaction of gravity waves on the 557.7 nm emission layer are derived using an atmospheric model similar to that proposed by Hines (1960) where the atmosphere is assumed isothermal and perturbations caused by gravity waves are small and adiabatic, therefore, resulting in linearized equations of motion. In the absence of waves, the atmosphere is also considered stationary. Thirteen nights of quality data from January 1983 to October 1984, covering all seasons, are used in this analysis.
Author

N86-27773*# Tokyo Univ. (Japan). Upper Atmosphere and Space Research Lab.
WAVE MOTIONS IN THE UPPER ATMOSPHERIC SODIUM LAYER OBSERVED WITH A LIDAR TECHNIQUE
Hiroshi Kamiyama and Fumihiko Tomita (Ministry of Posts and Telecommunications, Tokyo, Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Since the middle of 1980, the vertical profile of the atmospheric sodium layer was observed with a tunable laser radar at Mt. Zao Observatory in northern Japan. The principal characteristics of the lidar system are summarized. The output wavelength is continuously monitored by using a sodium resonance cell, a spectrometer, and a Fabry-Perot interferometer provided with the reference spectrum of the sodium lamp. Owing to the strict temperature control of the filters, the tuning is sufficiently stable throughout the night. The calibration of the absolute sodium density was carried out by adopting the method established by previous works.
Author

N86-27774*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
TROPOSPHERIC GRAVITY WAVES OBSERVED BY THREE CLOSELY-SPACED ST RADARS
D. A. Carter, B. B. Balsley, W. L. Ecklund, M. Crochet (Toulon Univ., La Garde, France), A. C. Riddle (Colorado Univ., Boulder), and R. Garello *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

During a 6 week period in 1982, 3 ST (Stratosphere-Troposphere) radars measured horizontal and vertical wavelengths of small scale tropospheric gravity waves. These 50 MHz, vertically-directed radars were located in a trianglar network with approximately 5 km spacing on the southern coast of France at the mouth of the Rhone River during the ALPEX (Alpine Experiment) program.
Author

N86-27775*# Wuhan Univ. (China). Dept. of Space Physics.
THE ACOUSTIC GRAVITY WAVE INDUCED BY A POINT SOURCE IN THE MIDDLE ATMOSPHERE
Xun Jie Zhang and Nian Lu Xiong *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 9 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Acoustic gravity wave (AGW) results computed for a stationary impulsive point source and a moving point source in the middle atmosphere are presented. For a stationary impulsive point Row's far field formula of the AGW was extended into the near field one, which comprises the Zeroth order Bessel function and its derivative terms. When (t-t sub o) is not large, the contribution of the derivative terms is important. The computed results agree with the experimental ones. For a moving point source with supersonic velocity, AGW is calculated using the moving point theory. Two solar eclipses that occurred in the lower latitude and over the ocean on Feb. 16, 1980, and June 11, 1983, were compared. The results show that the theoretical curve of AGW is fairly consistent with the observed ones.
Author

N86-27776*# Meteorological Research Inst., Yatabe (Japan).
A NUMERICAL STUDY OF NONLINEAR INTERACTIONS BETWEEN MEAN FLOW AND BREAKING INTERNAL GRAVITY WAVES
Hideji Kida *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 273-280 (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Internal gravity waves are one of the important phenomena in understanding the general circulation as well as eddy motions in the atmosphere, particularly in the mesosphere and lower thermosphere. Therefore, in order to reproduce the middle atmospheric general circulation, it is necessary to incorporate vertically propagating internal gravity waves into general circulation models (GCMs). Results from numerical simulations on nonlinear interactions between mean flow and internal gravity waves are briefly presented.
Author

N86-27777*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
EFFECTS OF BREAKING GRAVITY WAVES ON THE CHEMICAL COMPOSITION OF THE MESOSPHERE AND LOWER THERMOSPHERE
S. Solomon and R. Garcia (National Center for Atmospheric Research, Boulder, Colo.) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Eddy diffusion and momentum forcing in the mesosphere and lower thermosphere arise principally from the effects of breaking gravity and waves. The propagation and dissipation of gravity waves depend strongly on season and latitude because of its relationship to the background zonal wind. These processes have significant effects on the transport of chemical species in that region, so that observations of variations in chemical constituents provide useful tracers for dynamical theory. A parameterization of gravity wave propagation and dissipation was incorporated in the coupled dynamical-chemical model to study these effects. Several easily observable airglow features of the mesosphere-thermosphere region are shown to provide sensitive indications of gravity wave influence. In particular, theoretical predictions of large seasonal and latitudinal variations in the atomic oxygen green line, the Meinal bands of excited OH, and the O3 densities inferred from O2 (delta supra 1 sub g) emission at altitudes from 75 to 90 km are shown to be in remarkably good agreement with observations. Implications of these sensitive chemical tracers for the dynamics of the mesosphere-lower thermosphere region and its relationship to gravity waves are discussed.
Author

N86-27778*# Alaska Univ., Fairbanks. Geophysical Inst.
LOCAL EFFECTS OF GRAVITY WAVE PROPAGATION AND SATURATION
David C. Fritts *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

In recent years, gravity waves were recognized to play a major role in the dynamics of the middle atmosphere. Perhaps the major effect of such motions are the reversal of the vertical shear of the mean zonal wind and the occurrence of a large turbulent diffusivity in the mesosphere due to gravity wave saturation. Yet, despite the importance of these gravity wave effects, the processes and the consequences of gravity wave propagation and saturation are only beginning to be understood in detail. The linear saturation theory predicts drag and turbulent diffusion due to saturating wave motion. This theory, however, fails to address a number of issues that are certain to be important for gravity wave propagation and saturation in the middle atmosphere. These issues, including wave transience, wave superposition, local convective adjustment, and nonlinearity, are discussed. Author

N86-27779*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.
THE SPEED OF WAVE-WAVE INTERACTIONS IN THE ATMOSPHERE
K. C. Yeh and C. H. Liu *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
(Grant NSF ATM-83-12175)
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Resonant wave-wave interactions are considered. Studies of the interaction coefficient show that rapid transfer of wave action can take place in the disjoined parts of the spectrum for three processes, namely: elastic scattering, parametric subharmonic instability and induced diffusion. Of the three processes, the vertical shear plays a role in two. The vertical shear of a moderate scale interacts through elastic scattering to make the spectrum vertically symmetric. On the other hand, the vertical shear of a large scale interacts through induced diffusion and is responsible for diffusion in k sub z space. When interacting with a vertical shear, it is known that the vertical shear acts as a catalyst and is not involved in energy transfer. Consequently, in both elastic scattering and induced diffusion, the vertical shear does not gain or lose energy. Through parametric subharmonic instability the more energetic large-scale waves are feeding energy into moderate and small scale waves of an elevation angle of 60 deg or larger. E.R.

N86-27780*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A RAY TRACING MODEL OF GRAVITY WAVE PROPAGATION AND BREAKDOWN IN THE MIDDLE ATMOSPHERE
Mark R. Schoeberl *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Gravity wave ray tracing and wave packet theory is used to parameterize wave breaking in the mesosphere. Rays are tracked by solving the group velocity equations, and the interaction with the basic state is determined by considering the evolution of the packet wave action density. The ray tracing approach has a number of advantages over the steady state parameterization as the effects of gravity wave focussing and refraction, local dissipation, and wave response to rapid changes in the mean flow are more realistically considered; however, if steady state conditions prevail, the method gives identical results. The ray tracing algorithm is tested using both interactive and noninteractive models of the basic state. In the interactive model, gravity wave interaction with the polar night jet on a beta-plane is considered. The algorithm produces realistic polar night jet closure for weak topographic forcing of gravity waves. Planetary scale waves forced by local transfer of wave action into the basic flow in turn transfer their wave action into the zonal mean flow. Highly refracted rays are also found not to contribute greatly to the climatology of the mesosphere, as their wave action is severely reduced by dissipation during their lateral travel. Author

N86-27781*# Adelaide Univ. (Australia). Dept. of Physics.
GRAVITY WAVE MOTIONS AND MOMENTUM FLUXES IN THE MIDDLE ATMOSPHERE AT ADELAIDE, AUSTRALIA
R. A. Vincent and D. C. Fritts (Alaska Univ., Fairbanks) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A study was made of gravity wave momentum fluxes in the middle atmosphere using data collected during June 1984 at Adelaide, Australia (35 deg S). The primary objectives were to identify that portion of the gravity wave spectrum that contributes most of the momentum transport and flux divergence and to examine the temporal variability of wave energies and momentum fluxes. The data were obtained with an HF (2 MHz) radar operated in a Doppler configuration with two coplanar off-vertical beams. This technique provides a direct measure of the vertical flux of horizontal momentum due to an arbitrary spectrum of gravity wave and other motions in the plane of the radar beams. Author

N86-27782*# Academia Sinica, Beijing (China). Institute of Atmospheric Physics.
MAP-ORIENTED RESEARCH IN THE PEOPLE'S REPUBLIC OF CHINA
Daren Lu *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A brief accounting of MAP oriented research in the Republic of China is given. A stratosphere balloon launching facility and its capabilities are reviewed. Observations of the stratospheric aerosols with a balloon-borne aerosol computer were made. Long term monitoring of stratospheric aerosols induced by volcanic eruptions are made with a ruby lidar. The main parameters of an ST radar system are given. The ionospheric D region is investigated with the method of ionospheric absorption. And photochemical modeling and radiation parameterization of the middle atmosphere are made. E.R.

N86-27783*# Kyoto Univ. (Japan). Radio Atmospheric Science Center.
QUANTITATIVE STUDY ON DISPERSION RELATIONS OF TIDs OBSERVED BY AN HF DOPPLER ARRAY
M. Tsutsui and T. Ogawa *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A quantitative study on the dispersion relation of traveling ionospheric disturbances (TIDs) was performed by using data obtained by an HF Doppler array. Observed data at three stations are digitized continuously with a sampling period of 10 sec. A schematic illustration of a running analysis method is given. Fourier components omega's and their wave vectors k's of the TIDs are calculated from these subset data from three stations by means of the cross-spectrum analysis. Diagrams of horizontal trace velocity V sub ph versus wave period T were also obtained. From these diagrams one can see clear cutoff periods of the internal mode

of the atmospheric gravity waves. A morphological classification of the mode of the omega - k and V sub ph - T obtained through one year was performed. The estimation of the horizontal velocity vectors of the thermospheric wind form their dispersion relations was performed also. A key point of the method of obtaining the vectors is to estimate the tilt, in azimuthally different omega - k diagrams, of a resonant branch ascribed to the Brunt oscillations. Author

N86-27784*# Doshisha Univ., Kyoto (Japan). Dept. of Electronics.

HF DOPPLER OBSERVATIONS OF ACOUSTIC WAVES EXCITED BY THE EARTHQUAKE

T. Ichinose, K. Takagi, T. Tanaka (Toshiba Electric Co., Nagoya (Japan), T. Okuzawa (University of Electro-Communications, Tokyo (Japan), T. Shibata, Y. Sato (Tohoku Univ., Sendai (Japan), C. Nagasawa (Tokyo Metropolitan Univ. (Japan).), and T. Ogawa (Kyoto Univ. (Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 310-318 (For primary document see N86-27719 18-46)

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Ionospheric disturbances caused by the earthquake of a relatively small and large epicentral distance have been detected by a network of HF-Doppler sounders in central Japan and Kyoto station, respectively. The HF-Doppler data of a small epicentral distance, together with the seismic data, have been used to formulate a mechanism whereby ionospheric disturbances are produced by the Urakawa-Oki earthquake in Japan. Comparison of the dynamic spectra of these data has revealed experimentally that the atmosphere acts as a low-pass filter for upward-propagating acoustic waves. By surveying the earthquakes for which the magnitude M is larger than 6.0, researchers found the ionospheric effect in 16 cases of 82 seismic events. As almost all these effects have occurred in the daytime, it is considered that it may result from the filtering effect of the upward-propagating acoustic waves. Author

N86-27785*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.

ESTIMATION OF NEUTRAL WIND VELOCITY IN THE IONOSPHERIC HEIGHTS BY HF-DOPPLER TECHNIQUE

T. Kitamura, M. Takefu, and N. Hiroshige *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)

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Three net stations located about 100 kilometers apart were set up around the station of the standard frequency and time signals (JJY) in central Japan and measurements of atmospheric gravity waves in the ionospheric heights (F-region, 200 to 400 km) were made by means of the HF-Doppler technique during the period of February 1983 to December 1983. The frequencies of the signals received are 5.0, 8.0 and 10.0 MHz, but only the 8.0 MHz signals are used for the present study, because no ambiguities due to the interference among other stations such as BPM, BSF, etc. exist by the use of 8.0 MHz. Two main results concerning the horizontal phase velocity of the atmospheric gravity waves with periods of 40 to 70 min may be summarized as follows: (1) the value of the phase velocity ranges from 50 m/s to 300 m/s; (2) the direction of the gravity wave propagation shows a definite seasonal variation. The prevailing direction of the gravity waves in winter is from north to south, which is consistent with the results obtained from other investigations. On the other hand, the two directions, from northeast to southwest and from southeast to northeast, dominate in summer. Author

N86-27786*# Calgary Univ. (Alberta). Dept. of Physics.

SATELLITE OBSERVATIONS OF 557.7 NM AIRGLOW AS A DIAGNOSTIC TECHNIQUE TO STUDY THE DYNAMICS OF THE LOWER THERMOSPHERE

L. L. Cogger, R. Elphinstone, and J. S. Murphree *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)

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Photometric observations of the airglow limb at 557.7 nm have been made from the ISIS 2 satellite since 1971. From an analysis of 32,000 airglow limb observations obtained during the first two years of operation, the major temporal and spatial characteristics of the night airglow have been identified. Maxima occur in mid-October and mid-April at all latitudes. There is a marked variation with latitude during the equinox periods, with peak intensities near 35 degrees in autumn and near 25 degrees in spring. It is possible to gain considerable insight into the behavior of the lower thermosphere by combining the airglow observations with a simple model of the photochemical and dynamical processes. In this way a pattern of the latitude and temporal variation of atomic oxygen concentration at the peak of the layer as well as the eddy diffusion in this altitude region have been inferred. The concentration of atomic oxygen shows midlatitude peaks near equinox, and minima about one month after solstice. Average values at midlatitudes are about 1.3 times those at the equator. The amplitude of the semiannual component is about 20% of the mean value at 35 degrees as compared to 10% at the equator, and the amplitude of 12-month component is about 12% at 35 deg and 5% at the equator. The semiannual component has a minimum that occurs approximately 3 weeks (plus or minus) after solstice at all latitudes, while the 12-month component peaks in the summer hemisphere at solstice (plus or minus 2 months). Author

N86-27787*# Radio Research Labs., Tokyo (Japan).

LOCAL TIME DISTRIBUTION OF THE SSC-ASSOCIATED HF-DOPPLER FREQUENCY SHIFTS

T. Kikuchi, H. Sugiuchi, and T. Ishimine *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)

Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The HF-Doppler frequency shift observed at the storm's sudden commencement is composed of a frequency increase (+) and decrease (-), and classified into four types, SCF(+ -), SCF(- +), SCF(+) and SCF(-). Since the latter two types are special cases of the former two types, two different kinds of electrical field exist in the F region and cause the ExB drift motion of plasma. HUANG (1976) interpreted the frequency increase of SCF(+ -) as due to the westward induction electric field proportional to delta H/ delta t and the succeeding frequency decrease due to the eastward conduction electric field which produces ionospheric currents responsible for the magnetic increase on the ground. In spite of his success in interpreting the SCF(+ -), some other interpretations are needed for the explanation of the whole set of SCF's, particularly SCF(- +). Local time distributions of the SCF's are derived from 41 SCF's which are observed on the HF standard signal (JJY) as received in Okinawa (path length =1600 km) and Kokubunji (60 km). It is shown that the SCF(+ -) appears mainly during the day, whereas the SCF(- +) is observed during the night. The results indicate that the preliminary frequency shift (+) of SCF(+ -) and (-) of SCF(- +) is caused by a westward electric field in the dayside hemisphere, while by an eastward electric field in the nightside hemisphere. The main frequency shift [(-) of SCF(+ -) and (+) of SCF(- +)] is caused by the reversed electric field. Consequently, the preliminary frequency shift is caused by the dusk-to-dawn electric field, while the main frequency shift by the dawn-to-dusk electric field. Author

N86-27788*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TRANSPORT PROCESSES AS MANIFESTED IN SATELLITE AND LIDAR AEROSOL MEASUREMENTS

M. P. McCormick *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document

see N86-27719 18-46)
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A large increase in stratospheric aerosol data has become available recently from the SAM II and SAGE satellite sensors and the impetus from increased volcanic perturbations. Six years of SAM II and nearly 3 years of SAGE measurements have been accumulated. The increase in large volcanic eruptions since 1979 has caused an acceleration of new data sets from worldwide lidars and airborne lidar campaigns and from various airborne in situ measurements. The SAM II and SAGE data sets show the tropical stratosphere as a source for background stratospheric aerosols, and midlatitudes as a possible sink. Analyses of SAM II data show that the aerosol within the northern wintertime polar vortex becomes isolated from the outside. Subsidence occurs within the vortex, changing the vertical aerosol distribution over the winter period. SAM II and SAGE data show that the aerosol is transported in the stratosphere from low to high latitudes in wintertime. Entry regions of tropospheric air in the Tropics are also evident in the SAGE data as shown by stratospheric cirrus clouds being formed well above the local tropopause. Nature has provided over the past 5 years a number of large volcanic eruptions which spewed tons of new aerosol into the stratosphere. These eruptions have occurred at various latitudes which allow transport differences to be studied. Satellite and lidar aerosol data will be used to describe the stratospheric motions of aerosols produced after these violet volcanic eruptions. Author

N86-27789*# Meteorological Research Inst., Tsukuba (Japan).
RUBY LIDAR OBSERVATIONS AND TRAJECTORY ANALYSIS OF STRATOSPHERIC AEROSOLS INJECTED BY THE VOLCANIC ERUPTIONS OF EL CHICHON
O. Uchino, T. Tabata, I. Akita, Y. Okada, and K. Naito *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Large amounts of aerosol particles and gases were injected into the lower stratosphere by the violet volcanic eruptions of El Chichon on March 28, and April 3 and 4, 1982. Observational results obtained by a ruby lidar at Tsukuba (36.1 deg N, 140.1 deg E) are shown, and some points of latitude dispersion processes of aerosols are discussed. Author

N86-27790*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.
LIDAR OBSERVATIONS OF THE EL CHICHON CLOUD IN THE STRATOSPHERE OVER FUKUOKA
M. Fujiwara, T. Shibata, and M. Hirono *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A volcanic cloud in the stratosphere, originating from the March to April 1982 eruptions of El Chichon, has been observed for about 2.5 years at Fukuoka (33.5 degrees N, 130.4 degrees E) with two wavelengths of Nd-YAG lidar, 1.06 and 0.53 microns. Time and height variabilities of the cloud are described, using the 1.06 microns data, and some results of the two-wavelength measurements are presented. A sudden enormous increase in the total aerosol backscattering from the stratosphere (backscattering coefficient for 1.06 microns integrated over 13.5 to 28.5 km range) was followed by a decrease from late spring to summer with large fluctuations. The cloud initially appeared stratified into two layers: the upper one with fine structure and sharp edges in the easterly wind region and the lower dumpy one in the westerly wind region. Most of the aerosols were contained in the upper layer. The two layers merged into a broad, single-peaked layer as the easterly prevailed in the whole region in fall, when the total aerosol backscattering began to increase. The layer then decreased its peak height as it broadened. The difference in shape of both layers and the increase of total backscattering from fall can be interpreted by the difference in velocity of material transport in the easterly and the westerly wind region. Author

N86-27791*# Nagoya Univ. (Japan). Water Research Inst.
ON THE LONG TERM VARIATION OF STRATOSPHERIC AEROSOL CONTENT AFTER THE ERUPTION OF VOLCANO EL CHICHON: LASER RADAR MEASUREMENTS
S. Hayashida and Y. Iwasaka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The results of measurements of the stratospheric aerosol layer by a ruby lidar (lambda = 0.6943 microns) for two years after the eruption of El Chichon (March 29, April 4, 1982, Mexico) are given. The results show the sudden increase in the stratospheric aerosol content after the eruption and its subsequent decline. Author

N86-27792*# Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.
BEHAVIOR OF DECAYING EL CHICHON CLOUD OVER TOYOKAWA, JAPAN (35 DEG N) OBSERVED BY 532-NM LIDAR
M. Takagi, A. Iwata, and Y. Kondo *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The stratospheric aerosol state in 1982 and 1983 was in a violet excitation due to the eruption of Mt. El Chichon. A number of direct and indirect soundings of the stratosphere confirmed that the aftereffect of it covered almost the entire Northern Hemisphere by the end of 1982 (e.g., POLLACK et al., 1983). The lidar system constructed at Toyokawa (34.8 deg N, 137.4 deg E) have entered routine base observations since December 1982 (IWATA et al., 1983). The state of observations was 8 months after the eruption, and researchers missed monitoring the drastic variations in the stratosphere just following the event. However, the El Chichon cloud over Japan was reported to have reached the second maximum concentration in November or December 1982 according to the lidar observations at Tsukuba, Nagoya and Fukuoka, so the researchers' observations corresponded to the decaying phase of it. Presented are some characteristics of the aerosol profile over Toyokawa during a period of 20 months from December 1982 to July 1984. Author

N86-27793*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.
COMPARATIVE STUDY OF AEROSOLS OBSERVED BY YAG LIDAR AND AIRBORNE DETECTORS
M. Hirono, M. Fujiwara, and T. Shibata *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The causal relationships of very large (tropical) volcanic eruptions and El Nino Southern Oscillations (ENSO) based on the unequal atmospheric heating by aerosols observed by lidar and airborne detectors are discussed. Author

N86-27794*# Kyushu Univ., Fukuoka (Japan). Dept. of Electrical Engineering.
EXICIMER LIDAR MEASUREMENTS OF OZONE
T. Shibata, O. Uchino (Meteorological Research Inst., Tsukuba (Japan), and M. Maeda *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
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Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The observation of the atmospheric ozone profile in an altitude range of 3 to 28 km by means of differential absorption lidar in combination with an XeCl laser (308 nm) and SRS pumped by a KrF laser (249 nm) is discussed. Author

N86-27795*# Department of Energy, New York. Environmental Measurements Lab.

MEASUREMENTS OF CCl3F, CCl2F2, CCl4, N2O AND SF6 IN THE NORTHERN HEMISPHERE STRATOSPHERE

Robert Leifer and Russell Juzdan *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)

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An overview of the Department of Energy's High Altitude Sampling Program and some recent trace gas measurement results are presented. Analysis of whole air samples, collected in pressurized bottles, provides information on stratospheric inventories and distributions for CCl3F, CCl2F2, CCl4, N2O and SF6 in the Northern Hemisphere. Based on a linear regression analysis of the data the estimated mean Northern Hemisphere stratospheric concentration of each gas increased as follows: CCl3F changed from 54 to 142 p1/1 (4/74-11/83); CCl2F2 changed from 133 to 268 p1/1 (4/76-11/83); SF6 changed from 160 to 480 f1/1 (4/74-11/83); CC1, changed from 58 to 91 p1/1 (4/75-11/83); N2O changed from 246 to 261 n1/1 (4/76-11/83). The calculated mean Northern Hemisphere stratospheric concentrations of N2O, CCl3F, CCl2F2, and CCl4 after 1980 show larger than expected fluctuations with time. Recent volcanic activity may be a partial cause for these fluctuations through induced changes in stratospheric dynamical processes. Author

N86-27796*# National Center for Atmospheric Research, Boulder, Colo.

TRANSPORT OF TRACE SPECIES DEDUCED FROM LIMS OBSERVATIONS

J. C. Gille, L. V. Lyjak, A. K. Smith, P. L. Bailey, S. T. Massie, and C. M. Smythe *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)

(NASA Order L-9469-B; NASA Order W-15439)

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One of the critical problems in the middle atmosphere at this time is understanding the interaction between atmospheric motions and photochemistry, and the way in which these two processes maintain the distributions of photochemically active species such as ozone. Recent work has shown that a great deal can be learned by considering the zonally averaged distributions and transports, i.e., working in the latitude-altitude plane. This 2-dimensional approach has been used in the past in Eulerian formation. Recent work (DUNKERTON, 1978) has shown that formulating the transport problems in terms of the residual mean circulation, which has similarity to the Lagrangian mean motion, results in a more physical picture of the way in which the transport takes place. Here, data from the Limb Infrared Monitor of the Stratosphere (LIMB) experiment are used to investigate how well the residual mean formulation works with real data, in the sense of asking how well the predicted ozone changes match those in regions of the lower stratosphere in which chemical changes may be neglected. This allows a test of the approximations that are made, and of the strengths and weaknesses of this approach to transport calculation. Author

N86-27797*# Tokyo Univ. (Japan). Institute of Space and Astronautical Science.

LIMB-ATMOSPHERIC INFRARED SPECTRUM OBSERVED ON THE SATELLITE OHZORA

A. Matsuzaki, Y. Nakamura, and T. Itoh *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)

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The Institute of Space and Astronautical Science (ISAS) launched the 9th scientific satellite Ohzora at 17:00 JST on February 14, 1984. This satellite bears the spectrometer, which measures the infrared spectrum of the solar radiation passing the limb atmosphere in the wavelength region of 2 to 10 m. The spectrometer is based on multichannel spectroscopy by using image sensors. Since the wavelength is scanned electronically, it can measure the spectrum unaffected by the satellite motion. A definite axis, i.e., the Z-axis of the satellite, which coincides to the optical axis of the spectrometer, is controlled to the direction of the Sun, and the finer control to introduce the solar light into the spectrometer is made with a 2-axes-controlled mirror. This solar tracking equipment is derived fast enough to measure the spectra in a moment after sunrise. The solar light introduced into the spectrometer is focused on the slits of the monochromators (f=100mm). For better altitude resolution, the horizontal slit is also used with the vertical slit, which is used for the separation of the dispersion. The dispersion light is detected with the pyroelectric array sensors. To obtain maximum dynamic range and spectral resolution, the three-stage polychromator is used. Author

N86-27798*# Tokyo Univ. (Japan). Dept. of Chemistry.

ATMOSPHERIC CONCENTRATIONS AND BEHAVIOR OF HALOCARBONS AND METHANE

Y. Makide, A. Yokohata, and T. Tominaga *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 1 p (For primary document see N86-27719 18-46)

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The atmospheric concentrations of halocarbons and methane in the troposphere and stratosphere were precisely measured by grab-sampling followed by gas-chromatographic analysis in the laboratory. Chlorofluorocarbons such as CCl2F2 and CCl3F have received a great deal of attention due to their probable impact on the stratospheric ozone: the chlorofluorocarbons accumulated in the troposphere are eventually decomposed by photolysis in the stratosphere releasing Cl radicals which in turn participate in the ClO sub x-catalytic chain destroying the ozone, especially in the upper stratosphere. Methane reacts with Cl in the stratosphere reducing the ozone depletion, while its source and future trend of concentration in the troposphere are uncertain. The study of their distribution and behavior in the atmosphere are therefore very important. After the extensive survey of the locations for collection of atmospheriic samples representing the midlatitudes Northern Hemisphere (N.H.) without local contamination, we have measured the concentrations of CCl2F2, CCl3F, CH3CCl3, CC1, CHCl=CCl2 and CCl2=CCl2 with plus or minus 1 pptv precision in samples collected in Hokkaido and west coast Tohoku area (the northern part of Japan, 40 deg to 45 deg N) every summer and winter since 1979. The observed concentrations of CCl2F2 and CCl3F are now above 360 and 200 pptv, respectively, and have been steadily increasing by approx. 15 and approx. 8 pptv/year during the last several years. Author

N86-27799*# Meteorological Research Inst., Tsukuba (Japan).

TRANSPORT CHARACTERISTICS IN THE MIDDLE ATMOSPHERE AND TWO-DIMENSIONAL MODELING

Hideji Kida *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 8 p (For primary document see N86-27719 18-46)

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Transport mechanisms of tracers in the atmosphere are briefly discussed from a viewpoint of Lagrangian motions of air parcels. The tracers are retained by air parcels themselves. In this regard, both momentum and energy are quite different from chemical

tracers. The present problem is what interpretation is best for understanding transport mechanisms of tracers. A method is reviewed and proposed, although conceptually. The numerical model used was a whole hemispheric global climate model. Annual- and zonal-mean diabatic forcing was assumed to drive the general circulation. Time integrations were carried out for about 100 days. The model quasi-equilibrium states were analyzed.
Author

N86-27800*# Commonwealth Scientific and Industrial Research Organization, Mordialoc (Australia). Div. of Atmospheric Research.
THE ZONALLY AVERAGED TRANSPORT CHARACTERISTICS OF THE ATMOSPHERE AS DETERMINED BY A GENERAL CIRCULATION MODEL
R. Alan Plumb *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 2 p (For primary document see N86-27719 18-46)
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Two dimensional modeling has become an established technique for the simulation of the global structure of trace constituents. Such models are simpler to formulate and cheaper to operate than three dimensional general circulation models, while avoiding some of the gross simplifications of one dimensional models. Nevertheless, the parameterization of eddy fluxes required in a 2-D model is not a trivial problem. This fact has apparently led some to interpret the shortcomings of existing 2-D models as indicating that the parameterization procedure is wrong in principle. There are grounds to believe that these shortcomings result primarily from incorrect implementations of the predictions of eddy transport theory and that a properly based parameterization may provide a good basis for atmospheric modeling. The existence of these GCM-derived coefficients affords an unprecedented opportunity to test the validity of the flux-gradient parameterization. To this end, a zonally averaged (2-D) model was developed, using these coefficients in the transport parameterization. Results from this model for a number of contrived tracer experiments were compared with the parent GCM. The generally good agreement substantially validates the flus-gradient parameterization, and thus the basic principle of 2-D modeling.
Author

N86-27801*# Kyoto Univ. (Japan). Geophysical Inst.
DYNAMICAL ROLES OF PLANETARY WAVES ON THE WINTER ANOMALY IN THE MIDDLE AND LOWER LATITUDES
Kohji Kawahira *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
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The winter anomaly of radio wave absorption in the ionospheric D region (65 to 90 km), caused by a factor of about ten increase in electron density, has been considered to be due to a factor of about ten increase of the nitric oxide concentration and/or a few tens of degrees Kelvin temperature rise due to a strong temperature dependency of the conversion rate of molecular ions to cluster ions. In order to investigate the mechanism of the winter anomaly, the processes that brought about these changes are identified. It is well known that stratospheric warmings sometimes accompany the winter anomaly in middle latitudes. The present study concentrates on the winter anomaly which occurred simultaneously during a sudden warming of the 1967 to 1968 winter, from middle December 1967 to middle January 1968. Variations of geophysical and ionospheric parameters are shown.
Author

N86-27802*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRANSPORT PROCESSES IN THE STRATOSPHERE: MODEL SIMULATIONS AND COMPARISONS WITH SATELLITE OBSERVATIONS
W. L. Grose, R. E. Turner, and J. E. Nealy *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A three dimensional atmospheric model was used to study transport processes and to simulate the distribution of chemically active species in the stratosphere. The present results are part of a long term simulation of the seasonally varying structure of stratospheric trace constituents. The occurrence of a midwinter stratospheric warming and the associated transport of O3 and HNO3 during the simulation are described. Comparison of the simulated distributions of O3 and HNO3 are made with data from the Limb Infrared Monitor of the Stratosphere (LIMS) experiment. In addition, distributions of Ertel's potential vorticity on isentropic surfaces (IPV) are evaluated as a diagnostic for interpreting transport processes. Comparisons are made with IPV distributions inferred from LIMS temperature data.
Author

N86-27803*# Freie Univ., Berlin (West Germany). Institut fuer Meteorologie.
OZONE DURING SUDDEN STRATOSPHERIC WARMING: A THREE-DIMENSIONAL SIMULATION
K. Rose and G. Brasseur (Institut d'Aeronomie Spatiale de Belgique, Brussels.) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Sudden warmings which are currently observed in the winter stratosphere are believed to be due to the upward propagation of planetary waves originating in the troposphere. Major warmings are characterized by local increases of the temperature in a deep layer beyond the stratopause, with values of the order of 50 K at 10 mbar appearing over a short period of time and leading to significant changes in the rate constant of several chemical reactions. During such events, the dynamical fields in the stratosphere are completely altered, so that dramatic changes in the transport of trace constituents are expected. Preliminary results of a 3-D model simulation of the ozone behavior during winter in connection with the appearance of stratospheric warmings are reported. The middle stratosphere (12 mbar or approximately 32 km) where the chemical lifetime of odd oxygen is quite long, and consequently, transport plays a major role is emphasized.
Author

N86-27804*# Meteorological Research Inst., Tsukuba (Japan).
INTRUSION PROCESS OF STRATOSPHERIC OZONE INTO THE TROPOSPHERE OVER JAPAN
H. Muramatsu, Y. Makino, M. Hirota, and T. Sasaki *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The stratospheric-tropospheric exchanges play an important role in determining the distribution and residence time of ozone, aerosol and other substances in the stratosphere and troposphere. The ozone transport is estimated from the stratosphere into the troposphere by so-called tropopause folding event associated with the polar front jet stream. It is shown that in winter ozone transport occurs mainly in the region to the north of Japan in Asia. The ozone transport rate is estimated. Vertical velocity was estimated by marking the air parcel of an observation aircraft and tracking is on the isentropic surface.
Author

N86-27805*# Kyoto Univ. (Japan). Lab. for Climatic Change Research.
AN INTERPRETATION FOR THE INTERANNUAL VARIATIONS OF THE GLOBAL DISTRIBUTION OF TOTAL OZONE
Fumio Hasebe *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document

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The quasibiennial oscillation (QBO) and the four year oscillation (FYO) in total ozone are discussed. In order to understand these oscillations, a comprehensive view of the ozone and the stratospheric temperature is attempted. The standpoint here is to examine if these oscillations could be understood as a reflection of the general circulation changes in the stratosphere. The description of the circulation is based on the Lagrangian-mean point of view, although only a rough estimate is obtained. For the sake of simplicity, the ozone is assumed to be an inert tracer following the atmospheric motion. Author

N86-27806*# Calcutta Univ. (India). Inst. of Radiophysics and Electronics.
EMISSION, ABSORPTION AND GROUP DELAY OF MICROWAVES IN THE ATMOSPHERE IN RELATION TO WATER VAPOUR CONTENT OVER THE INDIAN SUBCONTINENT
A. K. Sen, A. K. Dev Gupta (Scottish Church Coll., Calcutta, India), P. K. Karmakar (Saint Andrew's High School, Calcutta, India), S. Dev Barman (Bajkul Milani Coll., West Bengal, India), A. B. Bhattacharya (Serampore Coll., West Bengal, India), N. Purkait, M. K. Das Gupta, and J. S. Sehra (Department of Electronics, New Delhi, India) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 399-404 (For primary document see N86-27719 18-46)
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The advent of satellite communication for global coverage has apparently indicated a renewed interest in the studies of radio wave propagation through the atmosphere, in the VHF, UHF and microwave bands. The extensive measurements of atmosphere constituents, dynamics and radio meterological parameters during the Middle Atmosphere Program (MAP) have opened up further the possibilities of studying tropospheric radio wave propagation parameters, relevant to Earth/space link design. The three basic parameters of significance to radio propagation are thermal emission, absorption and group delay of the atmosphere, all of which are controlled largely by the water vapor content in the atmosphere, particular at microwave bands. As good emitters are also good absorbers, the atmospheric emission as well as the absorption attains a maximum at the frequency of 22.235 GHz, which is the peak of the water vapor line. The group delay is practically independent of frequency in the VHF, UHF and microwave bands. However, all three parameters exhibit a similar seasonal dependence originating presumably from the seasonal dependence of the water vapor content. Some of the interesting results obtained from analyses of radiosonde data over the Indian subcontinent collected by the India Meteorological Department is presented. Author

N86-27807*# Kyushu Univ., Fukuoka (Japan). Dept. of Electrical Engineering.
NUMERICAL SIMULATION OF EL CHICHON VOLCANIC CLOUD
T. Shibata, M. Fujiwara, and M. Hirono *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 2 p (For primary document see N86-27719 18-46)
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The stratospheric volcanic cloud from the eruption of El Chichon, Mexico, on April 4, 1982 was observed routinely by a Nd:YAG lidar system from April 18, 1982 at Kyushu University. There were two phenomena detected by lidar observation of the El Chichon volcanic cloud: (1) The main enhanced layer was formed in the summer easterly wind region over Fukuoka (33.5 deg N, 130.4 deg E). The layer had two high gradient top and bottom boundaries. The layer width slowly broadened until September 1982, when the easterly wind changed to the westerly wind. A similar phenomenon was observed after the eruption of Mt. St. Helens in May 1980. (2) The stratospheric integrated backscattering coefficient (IBC) reached a peak value on May 3, 1982. It then gradually decreased until August, but reincreased significantly from September to December 1982. After January 1983, IBC decreased slowly. This remarkable reincrease had not been seen in past increases which had been observed by lidar at Kyushu University. These phenomena are briefly discussed. Author

N86-27808*# Kyoto Univ. (Japan). Geophysical Inst.
A NEGATIVE ION MODEL IN THE LOWER STRATOSPHERE
Hiroto Kawamoto and Toshio Ogawa *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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There are a number of problems in the electricity of the stratosphere at middle latitudes; e.g., the positive relation between the seasonal variations of negative polar conductivity and that of ozone density, the observed dependence of the daytime variation of conductivity on the solar zenith angle, and the interaction between the ions and aerosols, particularly the processes of the conversion from negative ions to the sulfate aerosols; e.g., ion-nucleation and the growth through multi-ion complexes. As a basic tool for investigating these problems, a negative ion chemical model was constructed in the altitude region of 15 to 30 km. Recently, the success of in situ mass analysis of stratospheric ions has revealed the nature of the most abundant ions in the stratosphere. Further, the height variations of negative ion composition between 15 and 34 km were obtained with the balloon-borne mass spectrometer by another researcher. A comparison of the calculated result with the observed result is given. Author

N86-27809*# Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.
AIRCRAFT MEASUREMENTS OF AEROSOLS IN THE UPPER TROPOSPHERE AT MIDLATITUDES
Y. Morita, M. Takagi, and Y. Kondo *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
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Aircraft measurements of aerosols were made during the years 1982 to 1984 in the upper troposphere. In some cases, the influence of the local atmospheric pollution originating from the land surface was observed. The background concentration of the Mie particle was about 0.1/cu. cm. at an altitude of 6 to 8 km. An air mass of stratospheric origin was observed over the Japan sea in the winters of 1983 and 1984. The Mie particle concentration increased and the count ratio of two size ranges was found to be a large value in 1983, the value decreased to that of a background level in the stratosphere in 1984. The volcanic eruption of Mt. El Chichon seems to be responsible for the large aerosol count ratio of the measurements of 1983. Author

N86-27810*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.
LIDAR OBSERVATIONS OF THE NIGHTTIME SODIUM LAYER AT 33 DEG N
Michihiro Uchiumi, Motokazu Hirono, and Motowo Fujiwara *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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Measurements of the nighttime atmospheric sodium layer have been performed since 1977, using a dye lidar at Fukuoka (33.4 deg N, 130.2 deg E.). The Kyushu lidar uses a flashlamp pumped dye laser tuned to the sodium D sub 2 line (589.0 nm)

as a transmitter. The dye laser used in the Kyushu lidar system has been described elsewhere. Sporadic enhancements of the total column abundance of the layer during the Perseids meteor shower were observed on the nights of August 12 and 13, 1978, 1979, 1981, and 1983. Degrading weather conditions prevented observation on the nights during 1980 and 1983. A contour plot of the sodium layer for the period of 8 hours from 21:00 to 5:00 JST on the night of August 12 to 13 1983, is shown. The predominant feature visible is the increase in the height of peak density from 21:00 to 2:00 JST, and the slight decrease in the height of peak density from 2:00 to 5:00 JST. The average abundance had a maximum of about 7 x 10 to the 13th power/sq m on August 13. A plot is presented of the nightly average abundance for available data. The sodium layer abundance increased on the night of August 12 to 13, 1983, during the peak of the Perseids meteor shower, and the following night, August 13 to 14, almost went back to the monthly mean. Author

N86-27811*# Mysore Univ. (India). Dept. of Physics.
ION LOSS PROCESSES IN THE STRATOSPHERE
B. S. N. Prasad and S. Chandramma *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
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Small ions consisting of aggregates of a few molecules determine th stratospheric electrical parameters such as conductivity, mobility, etc. The small ion density is controlled by the ionizing mechanisms for the production of ions and electrons and the loss processes for these charged particles. Ion production in stratosphere is chiefly due to galactic cosmic rays, and the loss processes due to recombination and attachment. Free electrons do not exist at stratospheric heights. The primary positive ion O2+ and the electrons are converted into complex clusters of positive and negative ions. The equilibrium ion density is governed by the equation of continuity for the production and loss of these ions. In the generalized equation of continuity, the gain or loss of ions due to transport is neglected. When aerosols or particulates are not present in the atmosphere, ions are loss due to ion-ion recombination. In the presence of aerosols, small ions can also be lost by attachment to the aerosols, and thus aerosols are likely to cause perturbations in the stratosphere electrification. A simplified model approach is adopted to study the effect of aerosols on the equilibrium ion density. The results of the analysis for the equatorial station Thumba (8.5 deg N) are presented. Author

N86-27812*# Institut d'Aeronomie Spatiale de Belgique, Brussels.
VERTICAL DISTRIBUTION OF ACETONITRILE IN THE ATMOSPHERE
J. Ingels, D. Nevejans, and E. Arijs *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p Original language document was announced as N86-22021 (For primary document see N86-27719 18-46)
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The presence of acetonitrile in the atmosphere was confirmed by results of surface and stratospheric investigations. Stratospheric measurements give mixing ratios typically decreasing with height from 3 ppt at 25 km to 0.5 ppt at 40 km. Measurements at the Earth's surface are less unanimous, although a ground level background mixing ratio of a few times 10 ppt seems realistic. Measurements are compatible with a small global surface source of acetonitrile and a small tropospheric loss. The vertical distribution of acetonitrile presented in consistent with general knowledge of its atmospheric chemistry. Author (ESA)

N86-27813*# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
MEASUREMENTS OF CONCENTRATIONS OF CHLOROFLUOROMETHANES (CFMs) CARBON DIOXIDE AND CARBON ISOTOPE RATIO IN STRATOSPHERIC AND TROPOSPHERIC AIR BY GRAB-SAMPLING SYSTEMS
T. Itoh, H. Kubo, H. Honda, T. Tominaga, Y. Makide, A. Yakohata, and H. Sakai *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Measurements of concentrations of chlorofluoromethanes (CFMs), carbon dioxide and carbon isotope ratio in stratospheric and tropospheric air by grab-sampling systems are reported. The balloon-borne grab-sampling system has been launched from Sanriku Balloon Center three times since 1981. It consists of: (1) six sampling cylinders, (2) eight motor driven values, (3) control and monitor circuits, and (4) pressurized housing. Particular consideration is paid to the problem of contamination. Strict requirements are placed on the choice of materials and components, construction methods, cleaning techniques, vacuum integrity, and sampling procedures. An aluminum pressurized housing and a 4-m long inlet line are employed to prevent the sampling air from contamination by outgassing of sampling and control devices. The sampling is performed during the descent of the system. Vertical profiles of mixing ratios of CF2Cl2, CFCl3 and CH4 are given. Mixing ratios of CF2Cl2 and CFCl3 in the stratosphere do not show the discernible effect of the increase of those in the ground level background, and decrease with altitude. Decreasing rate of CFCl3 is larger than that of CF2Cl2. CH4 mixing ratio, on the other hand, shows diffusive equilibrium, as the photodissociation cross section of CH4 is small and concentrations of OH radical and 0(sup I D) are low. Author

N86-27814*# Meteorological Research Inst., Tsukuba (Japan).
UV LIDAR MEASUREMENTS OF THE STRATOSPHERIC AEROSOL LAYER AND COMPARISON WITH OTHER OPTICAL DATA
O. Uchino *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
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After the violent volcanic eruptions of El Chichon in Mexico (17.33 deg. N, 93.20 deg. W) in late March and early April 1982, enhanced stratospheric aerosols have been monitored by ruby (lasing wavelength lambda=694.3 nm) or Nd:YAG lidars (lambda=1064 or 532 nm). By these lidars, visible or near-infrared optical informations of stratospheric aerosols and their space-time variations can be obtained. It is usually difficult to measure the background level of stratospheric aerosols by an ultraviolet (UV) lidar, since Rayleigh scattering prevails over Mie scattering in the stratosphere. However, after the large volcanic eruptions, UV lidar measurements of stratospheric aerosols are possible. In order to obtain UV optical properties of stratospheric aerosols, measurements have been made at Fukuoka (33.65 deg. N, 130.35 deg. E) by a p-terphenyl dye laser at a wavelength of 340.5 nm. Observational results during October 1982, through May 1983, are shown and are compared with the results obtained by a ruby lidar at Tsukuba (36.05 deg. N, 140.13 deg. E). Author

N86-27815*# Wyoming Univ., Laramie. Dept. of Physics and Astronomy.
BALLOON-BORNE OBSERVATIONS OF STRATOSPHERIC AEROSOL IN ANTARCTICA FROM 1972 TO 1984
D. J. Hofmann *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 7 p (For primary document see N86-27719 18-46)
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Stratospheric levels of particles with r > or = 0.15 microns were monitored with optical particle counters in approximately monthly balloon soundings at Laramie, Wyoming (41 deg N) since 1971. These measurements were used to characterize the

background stratospheric aerosol layer and the disturbed layer following major volcanic eruptions. Levels of particles with r > or = 0.01 microns have also been measured with balloon-borne counters since 1973. The latter are collectively called condensation nuclei (CN) as they are characteristic of aerosol in the early stages of growth. While they dominate the size distribution in the tropsophere, they are a trace species in the undisturbed stratosphere. From 1972 until 1980, annual balloon soundings from McMurdo Station (78 deg S) and/or Amundsen-Scott Station (90 deg S), in Antarctica, have also been conducted to crudely monitor Southern Hemisphere aerosol levels. These measurements were continued in 1983 and 1984. Profiles of r > 0.15 microns aerosol concentrations as measured during January at the south pole from 1972 to 1975 and in 1980 are given. The former are typical of undisturbed conditions and indicate the small degree of variability under these conditions. The latter indicates the effect of minor volcanic activity, visible in the 10 to 15 km region. Author

N86-27816*# Nagoya Univ. (Japan). Water Research Inst.
LASER RADAR OBSERVATION OF THE POLAR STRATOSPHERIC AEROSOL LAYER
Y. Iwasaka, T. Hirasawa (National Inst. of Polar Research, Tokyo, Japan), H. Fukunishi, M. Fujiwara (Kyushu Univ., Fukuoka, Japan), R. Fujii (National Inst. of Polar Research, Tokyo, Japan), and H. Miyaoka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The polar stratosphere has been speculated to be an active sink region of various stratospheric materials; ozone, water vapor, NOX, aerosol particles and so on, but this process is not theoretically and/or observationally made clear. The observation of the polar stratospheric aerosol layer using laser radar certainly contributes to the study of the global transport of these stratospheric minor constituents. In addition to this, from the viewpoint of aerosol science, there may be many interesting phenomena which cannot be found in the stratosphere at mid and low latitudes; the effect of precipitation of high energy molecules and atoms, of very cold winter stratosphere, of very cold mesopause in summer. Laser radar observation is one of the main activities of the Antarctic Middle Atmosphere (AMA) project at Syowa Station (69.00 deg S, 39.35 deg E), Antarctica since May 1983. Laser radar measurement at Syowa Station is discussed in detail. Author

N86-27817*# Meteorological Research Inst., Tsukuba (Japan).
A SPECIAL OZONE OBSERVATION AT SYOWA STATION, ANTARCTICA FROM FEBRUARY 1982 TO JANUARY 1983
Shigeru Chubachi *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The behavior of stratospheric ozone at high latitudes is especially interesting, since the stratospheric ozone at high latitudes is thought to be transported from low latitudes through dynamical processes. However, only limited information has so far been obtained, because ozone observations at high latitudes are sparse. There are only two ozone observation stations operating in Antarctica: Syowa Station and Amundsen-Scott, where the total ozone has been observed in sunlit months only. To make up for this deficiency, extensive observations were carried out at Syowa Station as part of MAP. Some preliminary results of these observations are described. Author

N86-27818*# Meteorological Research Inst., Tsukuba (Japan).
OBSERVATION OF ATMOSPHERIC MINOR CONSTITUENTS BY FTIR AT SYOWA STATION, ANTARCTICA
Y. Makino, H. Muramatsu, S. Kawaguchi (National Inst. of Polar Research, Tokyo, Japan), T. Yamanouchi, M. Tanaka (Tohoku Univ., Sendai, Japan), and T. Ogawa (Tokyo Univ., Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

As a part of the Antarctic MAP activity, a ground-based spectroscopic observation of atmospheric infrared transmission was started at Syowa station (69 deg 00'S, 39 deg 35'E) in March 24, 1983. Observations of sunlight as a radiation source were made with a Fourier transform infrared spectrometer having a maximum path difference of 80 mm and an apodized FWHM resolution of approx. 0.12/cm. In routine operation through the year, the resolution of approx. 0.8/cm was applied for economy of data-processing time. The 408 spectra for 72 days were obtained in about 10 months until January 23, 1984. From the absorption features revealed in the spectra over the wave number range of 500 to 7500/cm, a preliminary estimate of N202 gamma sub 1 band absorption was attempted. An apparent transmittance was defined at the wave number 2576/cm, where the absorption by N20 molecules affected the observed intensity strongly. A ray-tracing technique and a line-by-line calculation with a model atmosphere and the AFGL atmospheric absorption line parameters compilation were applied to the calculation of the synthetic spectra. Author

N86-27819*# Tokyo Univ. (Japan). Geophysics Research Lab.
MEASUREMENT OF POLAR STRATOSPHERIC NO2 FROM THE 23RD AND 24TH JAPANESE ANTARCTIC RESEARCH EXPEDITION (JARE) BALLOON EXPERIMENTS
K. Shibasaki, N. Iwagami, and T. Ogawa *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

As a part of the Japanese activities of MAP in the Antarctica, balloon-borne measurements of the stratospheric NO2 profile were planned and carried out by the JARE 23rd and 24th wintering parties. Few results have been reported so far as the stratospheric NO2 profile at high latitude. There were no reported balloon measurements carried out in the Southern Hemisphere. Profiles are presented for the first balloon-borne measurement of the stratospheric NO2 in the Antarctica. Three balloons named JA21, JA25 and JA26 were launched from Syowa Station (69 deg S, 35.6 deg E) using 5000 cu. cm plastic balloons. JA21 balloon was launched on November 24, 1982, and JA25 and JA26 balloons on November 12 and 20, 1983, respectively. Author

N86-27820*# Tokyo Science Univ. (Japan).
DECOMPOSITION OF CO2 MOLECULES DUE TO AURORAL X-RAYS
K. Sekihara *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 p 466-470 (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

It has been reported by SEKIHARA (1981), that the circumpolar measurement from a commercial airliner reported by PRATT and FALCONER (1979) was subjected to a strong influence of a geomagnetic storm, specifically at the beginning stage through the North Pole. The main point of interest was the increase of CO concentration by the order of 10 ppb that took place simultaneously with a temperature decrease of several degrees, which was regarded as a result of enhanced cooling to space due to CO2 decomposition. Later inspection of the original magnetogram of eleven auroral zone stations revealed that the observation started 13 hours after the main phase of a geomagnetic storm, which lasted for 22 hours. A quantitative estimation is made of CO2 decomposition due to auroral X-rays that should take place during the degradation of photoelectrons injected into the lower stratospheres. Author

N86-27821*# Radio Research Labs., Tokyo (Japan).
VHF RADAR OBSERVATION OF THE MIDDLE ATMOSPHERE AT SYOWA STATION, ANTARCTICA
K. Igarashi, T. Ogawa, T. Tanaka, Y. Kuratani, R. Fujii (National Inst. of Polar Research, Tokyo, Japan), and T. Hirasawa *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 6 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The newly developed pulsed Doppler radars with 50 and 112 MHz were installed at Syowa Station (69 deg 00'S, 39 deg 35'E geographic; 70.0 deg S, 80.2 deg E geomagnetic) in 1982 and 1983, respectively. They have the nominal peak power of 15 kW; the narrow antenna beams (4 deg in the horizontal plane) in two different directions (approximately geomagnetic south and geographic south with a crossing angle of about 33 deg), the three operation modes (spectrum, double-pulse and meteor mode). The radars were designed to measure the intensity and Doppler velocity of auroral radar echoes due to the 3- and 1.34-m irregularities appearing often in the disturbed E region and also to detect the meteor echoes in the 80 to 100 km altitudes, thereby to clarify how the middle atmosphere in the polar region behaves in response to the energy input from the magnetosphere, especially during a substorm. Some initial results obtained through the radar operation during 1982 to 1983 are presented to show that this system is useful for continuous monitoring of the lower auroral ionosphere. Author

N86-27822*# Adelaide Univ. (Australia). Institute for Antarctic Research.
WINDS IN THE LOWER THERMOSPHERE OVER MAWSON, ANTARCTICA
N. P. Jones and F. Jacka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Measurements are presented of the neutral wind field in the lower thermosphere over Mawson, Antarctica, made during the austral Spring of 1981. The Mawson Institute's Fabry-Perot spectrometer was used to study the OI lambda 588 nm emission in the night airglow and aurora. Wind velocities were inferred from Doppler shifts of this emission. Author

N86-27823*# Nagoya Univ. (Japan). Research Inst. of Atmospherics.
BALLOON MEASUREMENTS OF AEROSOL IN THE ANTARCTIC STRATOSPHERE
Y. Morita, M. Takagi, Y. Iwasaka, and A. Ono *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Three balloon soundings of aerosol were conducted from Syowa Station, Antarctica in April, June and October 1983. Number concentration and the size distribution of aerosol particles with diameter greater than 0.3 microns were measured by using a light scattering aerosol particle counter. The influence of the eruption of Mt. El Chichon on the aerosol concentration in the stratosphere was observed on October 16. Very high aerosol concentration at stratospheric heights was obtained from the first successful aerosol sounding in winter Antarctic stratosphere. The result gives direct evidence of winter enhancement in the Antarctic stratosphere. Author

N86-27824*# Meteorological Research Inst., Tsukuba (Japan).
BALLOON-BORNE OBSERVATION OF AITKEN NUCLEI IN THE ANTARCTIC STRATOSPHERE AND TROPOSPHERE
Tomoyuki Itc, Miwako Ikegami, Izuo Kanazawa, and Yasunobu Iwasaka (Nagoya Univ., Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 5 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Aitken nuclei (0.002 < or = r < or = 0.1 microns in the atmosphere are produced through gas-to-particle conversion processes, and they grow in size by heterogeneous nucleation processes and others to produce larger aerosol particles. In the study of global background aerosol pollution, full knowledge of such aerosol processes in the clean atmosphere is essentially required. In this sense, it is important to examine the behavior of aerosols in a clean atmosphere which is not contaminated directly by aerosols and gases emitted from the Earth's surface. The Antarctic atmosphere is thought to be such a clean atmosphere. From an extensive surface observation of aerosols carried out at Syowa Station (69 deg 00'S, 39 deg 35'E) Antarctica, it has been revealed that various phenomena relating to long-range transport of trace constituents and/or photochemical processes resulting in production or growth of aerosol particles are clearly observed in Antarctica. This paper gives a preliminary report of observations made by balloon-borne Aitken nuclei sonde in 1983, at Syowa Station. Author

N86-27825*# Meteorological Research Inst., Tsukuba (Japan).
GAS-CHROMATOGRAPHIC MEASUREMENTS OF ATMOSPHERIC CF2Cl2, CFCl3 AND N2O IN ANTARCTICA
H. Hirota, Y. Makino, S. Chubachi, H. Muramatsu, and M. Shiobara (Tohoku Univ., Sendai, Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Stratospheric ozone is produced photochemically and destroyed by reactions with such minor constituents as O, NOx, HOx, and ClOx. Chlorofluoromethanes (CF2Cl2 and CFCl3) and dinitrogen oxide (NwO) are considered as major sources of the stratospheric ClOx and NOx, respectively. It is well known that CF2Cl2 and CFCl3 are released only by man's activities, and are being accumulated in the troposphere. In order to assess the influence of these compounds on the natural ozone balance these gases have been measured over Japan since 1978. Measurements of Antarctic air samples are also indispensable to understanding the global distributions of these gases, because most CF2Cl2 and CFCl3 have been released in the Northern Hemisphere. Antarctic air samples were obtained by the 23rd, 24th and 25th Japanese Antarctic Research Expeditions, and analyzed by a gas-chromatographic method using an electron capture detector. Three experimental results were obtained: (1) latitudinal distribution of these gases from Tokyo to Syowa Station (69.0 deg S, 39.6 deg E), (2) time trends at Syowa Station, and (3) vertical distributions over Syowa Station. Results are reported. Author

N86-27826*# Radio Research Labs., Tokyo (Japan).
THE 50-MHz METEOR RADAR OBSERVATION AT SYOWA STATION, ANTARCTICA
T. Tanaka, T. Ogawa, K. Igarashi, and R. Fujii (National Inst. of Polar Research, Tokyo, Japan) *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The 50-MHz Doppler radar installed at Syowa Station (69 deg 00'S, 39 deg 35'E), Antarctica, in 1982 can detect continuously a meteor echo if an operator assigns the meteor mode operation to the radar. The radar has two narrow antenna beams (4 deg in the horizontal plane), one toward geomagnetic south and the other toward approximately geographic south, with a crossing angle of about 33 deg. The minicomputer annexed to the radar controls

the transmission and reception of a 50-MHz wave. If the receiver detects a meteor echo, the flag signal is sent to the computer. Then the computer begins to determine the echo range with a time resolution of 1 micro s and to sample every 200 microns/s for 1 s the Doppler signal and echo intensity at the particular range (R). The line-of-sight velocity (V sub D) of the echo trail is calculated from the output from the Doppler signal detection circuit having an offset frequency by using the so-called zero-crossing method. The echo amplitude decay time calculated by a least-mean square method is used to obtain the ambipolar diffusion coefficient (D) and then to calculate the echo height (H). About 120 day observations were made during 1982-1983. Some early results are presented. magnetic tapes together with V sub D, D, H and R for later analysis in Japan. About 120 day observation were made during 1982-1983. Some early results are presented. Author

N86-27827*# National Inst. of Polar Research, Tokyo (Japan).
RESEARCH ACTIVITIES ON ANTARCTIC MIDDLE ATMOSPHERE BY JARE 25TH TEAM
T. Hirasawa, H. Fukunishi, M. Ayukawa, M. Ejiri, Y. Iwasaka (Nagoya Univ., Japan), M. Tanaka (Tohoku Univ., Sendai, Japan), and R. Fujii *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The Antarctic Middle Atmosphere (AMA)-Japan research project was set about by the JARE (Japan Antarctic Research Expedition) 23rd team in 1982, and since then the JARE-24th and JARE-25th teams have been continuing reseach on the Antarctic Middle Atmosphere. Results gained by JARE-25th team members who are now working at Syowa Station (69.99 deg S, 39.35 deg E), Antarctica are presented. In their activities satellite measurements (Exos-C) and rocket soundings are used. Three rockets of the S310 type were launched at Syowa Station (Geomagnetic Latitude = 69.9 deg S) for the purpose of directly observing the electron density, ionospheric temperature, auroral patterns and luminosity in situ. Vertical profiles of electron density and auroral emission 4278A measured by three rockets are compared. Author

N86-27828*# National Inst. of Polar Research, Tokyo (Japan).
OBSERVATION OF TOTAL OZONE FIELDS IN THE ANTARCTIC ATMOSPHERE FROM TOVS OF TIROS-N/NOAA
T. Yamanouchi, Sadao Kawaguchi, I. Iwashina (University of Electro-Communications, Tokyo, Japan), and K. Suzuki *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Total ozone amounts in the Antarctic atmosphere are derived from infrared nadir scanning data of TIROS Operational Vertical Sounder (TOVS) of NOAA-6 and 7. HRPT data of the TIROS-N NOAA series of meteorological satellites have been received at Syowa Station (69 deg 00'S, 39 deg 35'E), Antarctica, about once a day since February 1980, by the Japanese Antarctic Research Expedition. HIRS/2 data of TOVS were extracted from HRPT data after being converted into CCT at the home institute. Total ozone amounts were derived for the northeastern part of the Antarctic, for about 100 orbits in 1981 and 1982. Author

N86-27829*# Tokyo Univ. (Japan). Geophysics Research Lab.
SEASONAL AND DIURNAL VARIATION OF THE ATMOSPHERIC NO2 AT SYOWA STATION, ANTARCTICA
K. Shibasaki *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 4 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Extensive attention has been directed to nitrogen dioxide (NO2) since its important role in the atmospheric chemistry relating to the stratospheric ozone (e.g., WMO, 1982) has been pointed out. However, the behavior of NO2 in the atmosphere has still not been fully confirmed, although ground-based, balloon and satellite measurements of NO2 have been reported by many scientists. Especially, only a few measurements made at high latitude in the Southern Hemisphere have been reported. The total atmospheric NO2 by ground-based visible absorption spectroscopy at Syowa Station (69 deg S, 39.6 deg E), Antarctica. The observation continued from March 1983, to January 1984. The principles of measurement, instrumentation and the method of data analysis are described in detail. Author

N86-27830*# Nagoya Univ. (Japan). Water Research Inst.
THE CHANGE OF DEPOLARIZATION OF BACKSCATTERING LIGHT FROM THE POLAR STRATOSPHERIC AEROSOL LAYER
Y. Iwasaka *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The change of polarization properties of scattered light strongly depends on the non-sphericity of target particles. It should be helpful information for the study of stratospheric aerosols to know the non-sphericity of stratospheric aerosol particles. The change of the total backscatter depolarization ratio of the stratospheric aerosol layer measured at Syowa Station (69.00 deg S, 39.35 deg E), Antarctica is described. Author

N86-27831*# Nagoya Univ. (Japan). Water Research Inst.
THE STRATOSPHERIC AEROSOL PARTICLE MEASUREMENT BY BALLOON AT SYOWA STATION (69.00 DEG S, 39.35 DEG E): OUTLINE OF SPECIAL SONDE (RUBBER) CAMPAIGN JARE 24
Y. Iwasaka, T. Morita, T. Itoh (Meteorological Research Inst., Tsukuba, Japan), K. Shibazaki (Tokyo Univ., Japan), Y. Makino (Meteorological Research Inst., Tsukuba, Japan), T. Tanaka (Radio Research Labs., Tokyo, Japan), K. Tsukamura (Japan Meteorological Agency, Tokyo), T. Yano, K. Kondoh, and G. Iwashita *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

During the period of AMA (Antarctic Middle Atmosphere), various style balloons were used to measure atmospheric parameters at Syowa Station (69.00 deg S, 39.35 deg E), Antarctica. The measurements which were made using balloons specially designed to monitor stratospheric aerosol particles are discussed. This type balloon was first used by JARE (Japan Antarctic Research Expedition) 24th Team in 1983. Until that time, the Japan Antarctic Research Expedition Team had been using only a large plastic balloon to monitor various minor constituents in the stratosphere. The plastic balloon was very useful, but it took a long time to arrange a balloon launching. Additionally, launching time strongly depended on weather conditions. A timely launching of the balloon was carried out with this specially designed sonde. Author

N86-27832*# Nagoya Univ. (Japan). Water Research Inst.
WATER VAPOR CONTENT IN THE POLAR ATMOSPHERE MEASURED BY LYMAN-ALPHA/OH FLUORESCENCE METHOD
Y. Iwasaka, S. Saitoh, and A. Ono *In* International Council of Scientific Unions Handbook for MAP, Vol. 18 Dec. 1985 3 p (For primary document see N86-27719 18-46)
Avail: NTIS HC A23/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The water vapor of the polar stratosphere possibly plays an important role in various aeronomical processes: for example, OH radical formation through photodissociation of H2O, formation of

water cluster ions, radiative energy transfer in the lower stratosphere, condensation onto particulate matter, and so on. In addition to these, it has been speculated, from the viewpoint of global transport and/or budget of water vapor, that the polar stratosphere functions as an active sink. STANFORD (1973) emphasized the existence of the stratospheric Cist cloud in the polar stratosphere which brought a large loss rate of stratospheric water vapor through a so-called freeze-out of cloud particles from the stratosphere into the troposphere. However, these geophysically interesting problems unfortunately remain to be solved, owing to the lack of measurements on water vapor distribution and its temporal variation in the polar stratosphere. The water vapor content measured at Syowa Station (69.00 deg S, 39.35 deg E), Antarctica using a balloon-borne hygrometer (Lyman - alpha/OH fluorescence type) is discussed. Author

N86-27833*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
PLATE MOTIONS AND DEFORMATIONS FROM GEOLOGIC AND GEODETIC DATA Semiannual Report, 1 Aug. 1983 - 31 Dec. 1985
Thomas H. Jordan 1986 53 p
(Grant NAG5-459)
(NASA-CR-177313; NAS 1.26:177313) Avail: NTIS
HC A04/MF A01 CSCL 08E

A satellite laser ranging experiment conducted by NASA since 1972 has measured the relative motion between the North America and Pacific plates in California. Based on these measurements, the 896-km distance between San Diego and Quincy, California, is shortening at 62 + or - 9 mm/yr. This geodetic estimate is consistent with the rate of motion between the two plates, calculated from geological data to be 53 + or - 3 mm/yr averaged over the past few million years. Author

N86-27834*# California Univ., Los Angeles. Dept. of Atmospheric Sciences.
INVESTIGATION OF THE DAYSIDE BOUNDARY REGION OF THE MAGNETOSPHERE Final Technical Report, 1 May 1979 - 31 Mar. 1985
Nancy Crooker Jun. 1985 7 p
(Grant NsG-5351)
(NASA-CR-177275; NAS 1.26:177275) Avail: NTIS
HC A02/MF A01 CSCL 04A

The region near the dayside boundary of the magnetosphere is of particular interest mainly because it is the most likely site for solar wind energy transfer. Exactly where and how this transfer occurs is one of the basic problems of magnetospheric physics. The global nature of the energy transfer is addressed in this research. In order to test whether energy transfer affects the large scale plasma flow in the magnetosheath, global properties of the magnetosheath were analyzed and compared to models with no energy transfer. Also, global models of merging sites on the magnetopause were modeled with the aid of the magnetosheath models. Since energy transfer and intrinsic magnetosheath properties depend upon the orientation of the interplanetary magnetic field (IMF), it was essential to have an IMF monitor for these studies. In the course of using ISEE 3 in this role, statistical studies were performed to test the accuracy of using data from an orbit so far upstream. Global properties of the magnetosheath energetic ion population, magnetic field strength and orientation, and flow pattern, determined with ISEE data are summarized.B.W.

N86-27835*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRBORNE LIDAR MEASUREMENTS OF EL CHICHON STRATOSHPERIC AEROSOLS
M. Patrick McCormick and M. T. Osborn (SASC Technologies, Inc., Hampton, Va.) Jul. 1982 49 p Supersedes NASA-RP-1136; NASA-RP-1148
(NASA-RP-1166; L-16107; NAS 1.61:1166) Avail: NTIS
HC A03/MF A01 CSCL 04A

A NASA Electra airplane outfitted with a lidar system was flown in July 1982 between the latitudes of 42 deg. N and 12 deg. N. The primary purpose of this mission was to determine the spatial distribution and aerosol characteristics of the El Chichon-produced stratospheric material. This report presents the lidar data from that flight mission. Representative profiles of lidar backscatter ratio, plots of the integrated backscattering function versus latitude, and contours of backscatter mixing ratio versus altitude and latitude are given. In addition, tables containing numerical values of the backscatter ratio and backscattering functions versus altitude are supplied for each profile. The largest amount of material produced by the El Chichon eruptions of late March-early April 1982 which was measured by this flight resided south of 30 deg. N and was concentrated above 21 km in a layer that peaked at 24 to 27 km. In this latitude region, peak backscatter ratios at a wavelength of 0.6943 microns were approximately 50, and peak optical depths were calculated to be 0.2. This report presents the results of this mission in a ready-to-use format for atmospheric and climatic studies. Author

N86-27836*# Florida State Univ., Gainesville. Dept. of Meteorology.
SENSTITIVITY ANALYSIS OF HORIZONTAL HEAT AND VAPOR TRANSFER COEFFICIENTS FOR A CLOUD-TOPPED MARINE BOUNDARY LAYER DURING COLD-AIR OUTBREAKS M.S. Thesis
Yuwen Vaughn Chang Apr. 1986 332 p
(Grant NAG5-332)
(NASA-CR-177282; NAS 1.26:177282) Avail: NTIS
HC A06/MF A01 CSCL 04A

The effects of external parameters on the surface heat and vapor fluxes into the marine atmospheric boundary layer (MABL) during cold-air outbreaks are investigated using the numerical model of Stage and Businger (1981a). These fluxes are nondimensionalized using the horizontal heat (g1) and vapor (g2) transfer coefficient method first suggested by Chou and Atlas (1982) and further formulated by Stage (1983a). In order to simplify the problem, the boundary layer is assumed to be well mixed and horizontally homogeneous, and to have linear shoreline soundings of equivalent potential temperature and mixing ratio. Modifications of initial surface flux estimates, time step limitation, and termination conditions are made to the MABL model to obtain accurate computations. The dependence of g1 and g2 in the cloud topped boundary layer on the external parameters (wind speed, divergence, sea surface temperature, radiative sky temperature, cloud top radiation cooling, and initial shoreline soundings of temperature, and mixing ratio) is studied by a sensitivity analysis, which shows that the uncertainties of horizontal transfer coefficients caused by changes in the parameters are reasonably small. Author

N86-27837*# Florida State Univ., Gainesville. Dept. of Meteorology.
A MODEL FOR THE ESTIMATION OF THE SURFACE FLUXES OF MOMENTUM, HEAT AND MOISTURE OF THE CLOUD TOPPED MARINE ATMOSPHERIC BOUNDARY LAYER FROM SATELLITE MEASURABLE PARAMETERS M.S. Thesis
Donald Eugene Allison Aug. 1984 73 p
(Grant NAG5-332)
(NASA-CR-177283; NAS 1.26:177283) Avail: NTIS
HC A04/MF A01 CSCL 04A

A model is developed for the estimation of the surface fluxes of momentum, heat, and moisture of the cloud topped marine atmospheric boundary layer by use of satellite remotely sensed parameters. The parameters chosen for the problem are the integrated liquid water content, q sub li, the integrated water vapor content, q sub vi, the cloud top temperature, and either a measure of the 10 meter neutral wind speed or the friction velocity at the surface. Under the assumption of a horizontally homogeneous, well-mixed boundary layer, the model calculates the equivalent potential temperature and total water profiles of the boundary layer along with the boundary layer height from inputs of q sub li, q sub vi, and cloud top temperature. These values, along with the 10m neutral wind speed or friction velocity and the sea surface temperature are then used to estimate the surface fluxes. The development of a scheme to parameterize the integrated water

vapor outside of the boundary layer for the cases of cold air outbreak and California coastal stratus is presented. Author

N86-27838*# Florida State Univ., Tallahassee. Dept. of Meteorology.
AN INVESTIGATION OF THE MARINE BOUNDARY LAYER DURING COLD AIR OUTBREAK Final Report
Steven A. Stage Jul. 1986 26 p
(Grant NAG5-332)
(NASA-CR-177249; NAS 1.26:177249) Avail: NTIS HC A03/MF A01 CSCL 04A

Three techniques were developed and tested for use in the remote estimation of ocean surface heat and vapor fluxes. Methods for measurement of surface sensible and latent heat fluxes discussed include: satellite measurement, marine atmospheric boundary layer (MABL) model, and horizontal transfer coefficients. The accuracy and applicability of the methods are examined. Publications and papers are listed. B.G.

N86-27839*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTRODUCTION TO THE THEORY OF ATMOSPHERIC RADIATIVE TRANSFER
James J. Buglia Jul. 1986 171 p
(NASA-RP-1156; L16068; NAS 1.61:1156) Avail: NTIS HC A08/MF A01 CSCL 04A

The fundamental physical and mathematical principles governing the transmission of radiation through the atmosphere are presented, with emphasis on the scattering of visible and near-IR radiation. The classical two-stream, thin-atmosphere, and Eddington approximations, along with some of their offspring, are developed in detail, along with the discrete ordinates method of Chandrasekhar. The adding and doubling methods are discussed from basic principles, and references for further reading are suggested. Author

N86-27840*# Texas Univ., Dallas.
STUDIES OF DYNAMO FIELD STRUCTURE AND RELATED EFFECTS: DE SATELLITE PROJECT GUEST INVESTIGATOR PROGRAM Final Report
W. R. Coley Jul. 1986 28 p
(Grant NAG5-450)
(NASA-CR-177222; NAS 1.26:177222) Avail: NTIS HC A03/MF A01 CSCL 04A

The establishment of the latitudinal and longitudinal structure of the low latitude dynamo electric field was initiated using data primarily from the Unified Abstract (UA) files of the Atmosphere Explorer E (AE-E) satellite. Mass plots of the vertical ion drift values were made for 1977, 1978, and 1979. The average diurnal variation of V sub v within 20 degrees of the dip equator is remarkably similar to that obtained at Jicamarca in the same years. The average meridional ion drift velocity vectors, obtained as a function of latitude by combining the average vertical and horizontal (nearly north-south) ion drift values from the AE-E, showed the expected variations with local time and season based on the well known equatorial fountain effect theory. The average diurnal variation of the vertical drift was found for four different ranges of dip latitude for a northern solstice season. The effect of the transequatorial neutral winds was as evident in this plotting format as in the meridional or fountain effect format. Finally, the average vertical drift velocity V sub v, not the east-west electric field E sub ew, was found to be approximately independent of longitude, as expected from the dynamo theory. B.G.

N86-27841# Science Applications International Corp., San Diego, Calif.
HIGH FREQUENCY P WAVE ATTENUATION AND DEGRADATION OF DETECTION CAPABILITY BY LARGE EARTHQUAKES Semiannual Technical Report, Dec. 1984 - Jun. 1985
Thomas C. Bache and Steven R. Bratt 5 Sep. 1985 64 p
(Contract F19628-85-C-0021)
(AD-A164733; SAIC-85/1820; AFGL-TR-85-0211; SATR-1) Avail: NTIS HC A04/MF A01 CSCL 08/11

This report describes two distinct seismological studies. The first is High Frequency P Wave Attenuation Along Five Teleseismic Paths from Central Asia. P Wave spectra from E. Kazakhstan explosions recorded at five arrays are computed for all five paths using an absorption band model. The Q exhibits strong frequency dependence in the band from 0.5 to 3 Hz, and is nearly the same for all five paths. The second study is, An Investigation of the Degradation of Teleseismic Detection Capability Caused by Large Earthquakes. A ten year global seismicity bulletin is searched to determine the extent to which large earthquakes inhibit the detection of small earthquakes occurring a short time thereafter. Significant degradation of the detection capability of the 115 station global network contributing to the bulletin is seen for periods up to an hour for earthquakes of M sub b 5.8 and larger. GRA

N86-27842# Alberta Univ., Edmonton. Dept. of Physics.
DEVELOPMENT OF COMPUTER PROGRAMS AND RELATED SOFTWARE FOR THE DETECTION AND ANALYSIS OF PI2 PULSATIONS RECORDED AT GROUND BASED STATIONS Final Report, 2 Mar. 1982 - 2 Sep. 1985
J. C. Samson 2 Sep. 1985 33 p
(Contract F19628-82-K-0032)
(AD-A165224; AFGL-TR-85-0146) Avail: NTIS HC A03/MF A01 CSCL 04/1

The major objectives of the study were to develop algorithms for the estimation of the polarization states of Pi 2 geomagnetic pulsations, to code these algorithms in FORTRAN, and to develop models for the prediction of the polarization states of Pi 2's. The Pi 2 models are based on the magnetic fields associated with transient field-aligned currents, on geomagnetic field lines threading the auroral ionosphere. These models have proven to be extremely successful in predicting the polarization states of high and mid latitude Pi 2's. The computer programs are based on algorithms for detecting pure states, and estimating the parameter of pure states or polarized waves in multiple time series. All the software for these algorithms has been written in FORTRAN, and the programs have been used with considerable success in the parameterization of the polarization states of Pi 2's. GRA

N86-27843# Massachusetts Univ., Amherst. Astronomy Research Facility.
PROCESSING OF SCRIBE DATA Final Report, Oct. 1983 - Sep. 1985
Hajime Sakai Sep. 1985 83 p
(Contract F19628-84-K-0009)
(AD-A165226; UMASS-ARF-85-001; AFGL-TR-85-0279) Avail: NTIS HC A05/MF A01 CSCL 04/1

The SCRIBE experiments were conducted for the purpose of observing the atmospheric infrared emission by using a cryogenic interferometer spectrometer mounted on a balloon-borne platform. The data collected during the flight by the spectrometer were transmitted through the radio telemetry link and were received at the ground station of Holloman AFB where these flights were monitored. They were recorded on analog 1/2 in magnetic tapes running at 60 ips. By playing back these tapes, the telemetry signal transmitted from the balloon-borne package was reproduced at our site for processing efforts to retrieve the interferogram data out of the played-back telemetry signal, and to recover the spectral data corresponding to radiation emitted by the atmosphere were the main objective of this work. In addition to the Holloman tapes, a mobile telemetry signal-receiving unit of AFGL was used to record the flight data on similar analog tapes for the Jul-05-1984 flight launched from Roswell, New Mexico. GRA

N86-27844# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth Atmospheric and Planetary Sciences.
INVESTIGATION OF EURASIAN SEISMIC SOURCES AND UPPER MANTLE STRUCTURE Semiannual Report, No. 1, 6 Dec. 1984 - 30 Jun. 1985
Thomas H. Jordon 30 Jun. 1985 40 p
(Contract F19628-85-K-0024)
(AD-A165228; AFGL-TR-85-0206) Avail: NTIS HC A03/MF A01

CSCL 08/11

Complex P-SV wavegroups are successfully fit on vertical component seismograms for paths crossing northern Eurasia with a model having a 39 km crust and no asthenospheric low-velocity zone. Between the Moho and the 400 km discontinuity, the shear velocities found from the P-SV waveform analysis are consistently lower than those inferred from the SH waveform modeling of Grand and Helmberger. We suggest that this discrepancy is diagnostic of a polarization anisotropy associated with the olivine rich mineralogy of the thick, basalt depleted chemical boundary layer that characterizes the upper mantle beneath stable continents. The vertical resolving power of source and receiver array are investigated in determining Eurasian crustal and upper mantle structure using waveform inversion technique of Lerner-Lam and Jordan (1983). The results show that good resolution of upper mantle structure can be obtained with this method from sparse arrays of sources and/or receivers. Source arrays are particularly effective in enhancing resolution, provided that the source depths are well distributed and the source centroids and moment tensors are well determined, while receiver arrays contribute to the reduction of the variance of the model estimates. GRA

N86-27845# Royal Norwegian Council for Scientific and Industrial Research, Kjeller.
THE NORWEGIAN SEISMIC ARRAY (NORSAR) Final Technical Summary, 1 Apr. - 30 Sep. 1985 on
L. B. Loughran, ed. Dec. 1985 137 p
(Contract F08606-84-C-0002)
(AD-A165243; NORSAR-Contrib-362; NORSAR-Scientific-1/85/86) Avail: NTIS HC A07/MF A01 CSCL 08/11

Using a data base of about 170 NORSAR-recorded seismic events at regional distances during the past 15 years, a detailed map of propagation characteristics of short period regional seismic phases has been compiled. Lg shows efficient propagation out to about 20 deg at 1 Hz and 10 deg at 4 Hz over continental shield paths (e.g., to the east of the array), whereas Sn is the dominant secondary phase for paths tha cross significant tectonic features like graben structures and continental margins. The NORESS on-line detection and location performance have been evaluated both for regional and teleseismic events. A case study of 132 Western Norwar/North Sea events has indicated a detection threshold of M sub L 1.5-2.0 for NORESS. The NORESS epicentral solutions are in most cases consistent with those provided by the Western Norway seismic network. For one site where a large number of known explosions (36) were processed, the average NORESS location error was 10 km. A statistical study of NORESS detections during Apr-Sep 1985 has shown an average of about 100 detections per day, of which about 20% are teleseismic P phases, about 25% regional p phases and the remaining 55% have slow phase velocities (< 6 km/s) correspo nding to secondary phases or possibly noise detections. GRA

N86-27846# Utah State Univ., Logan. Space Dynamics Labs.
ANALYSIS OF FIELD-WIDENED INTERFEROMETER DATA BY LEAST-SQUARES AND SPECTRAL DECONVOLUTION METHODS
A. S. Zachor, R. D. Sharma, J. R. Winick, and R. H. Picard 31 May 1985 72 p Prepared in cooperation with Atmospheric Radiation Consultants, Acton, Mass.
(Contract F19628-83-C-0056)
(AD-A165253; SDL/85-033; AFGL-TR-85-0132; SR-8) Avail: NTIS HC A04/MF A01 CSCL 04/1

Linear least-squares methods and the Jansson method of constrained nonlinear spectral deconvolution were used to analyze atomspheric emission spectra obtained in the Field-Widened Interferometer (FWI) experiment. The analysis provides estimates of line intensities and spectra of enhanced resolution. A conclusion of the study is that NO+ was not present in the auroral event observed by the FWI. GRA

N86-27847# Air Force Geophysics Lab., Hanscom AFB, Mass.
A SURVEY OF KNOWN INDICATORS OF AURORAL SUBSTORM ONSET Research Report, 1 Jan. - 9 May 1985
John O. Wise 29 Aug. 1985 50 p
(AD-A165276; AFGL-TR-85-0197; AFGL-ERP-926) Avail: NTIS HC A03/MF A01 CSCL 04/1

This report summarizes current research in the area of auroral substorm prediction. Long term indicators are investigated; in particular the solar cycle solar flares coronal holes, and the tendency for these phenomena to recur. Short term indicators are also reviewed: recurrence probability in Defense Meteorological Satellite Program images, the solar winds and the interplanetary magnetic field, the equatorward boundary of the auroral oval, electron density dropouts at geosynchronous orbit, visual observations from the ground, magnetometer measurements, auroral radar and riometer measurements. GRA

N86-27848# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
MICROCRACKS AND ENERGY Progress Report, 1 Mar. 1984 - 15 Mar. 1985
G. Simmons 17 Feb. 1986 69 p
(Contract DE-AC02-78ER-04972)
(DE86-000217; DOE/ER-04972/T4) Avail: NTIS HC A04/MF A01

Progress is reported on a study of the role of microcracks in the transport of uranium in crystalline rocks. The focus is on the conditions under which the migration or fixation occurs. DOE

N86-27849# Kiruna Geophysical Inst. (Sweden).
ON THE GENERATION OF AURORAL ARCS AND INVERTED-V STRUCTURES Thesis
K. Stasiewicz Oct. 1985 61 p
(KGI-191; ISSN-0347-6405; ESA-86-96739) Avail: NTIS HC A04/MF A01

The origin of the auroral inverted-V electron spectra; the influence of a turbulent region on the flux of auroral electrons; a statistical study of precipitating electrons; the formation of auroral arcs; and generation of magnetic-field aligned currents, parallel electric fields and inverted-V structures by plasma pressure inhomogeneities in the magnetosphere are discussed. ESA

N86-27850# National Oceanic and Atmospheric Administration, Boulder, Colo.
AERONOMY LABORATORY Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Oct. 1985 103 p
(PB86-182912) Avail: NTIS HC A06/MF A01 CSCL 04A

The Aeronomy Laboratory (NOAA) Annual Report for Fiscal Year 1985 covers the following topics: Atmospheric sampling; Optical aeronomy; Theoretical aeronomy; Atmospheric chemical kinetics; Atmospheric dynamics; Tropical dynamics and climate; Theoretical wave and turbulence. GRA

N86-27339# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
MAGNETOSPHERE-IONOSPHERIC COUPLING
C.-G. Faelthammar *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 107-133 Original language document was announced as N86-24071 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27341# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
GENERATION OF FIELD-ALIGNED CURRENT STRUCTURES AT SUBSTORM ONSETS
A. Roux *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 151-159 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27483# Joint Publications Research Service, Arlington, Va.
INSTABILITY IN LOWER IONOSPHERE AT LOW LATITUDE
Xuanmou Liu, Genghou Liu, Tao Gu, and Rong Cui *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986

p 63-71 Transl. into ENGLISH from Wuhan Daxue Xuebao (Ziran Kexue Ban) (Wuhan, China), no. 2, Jun. 1984 p 39-44 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27532# Alaska Univ., Fairbanks. Geophysical Inst.
SOLAR-TERRESTRIAL RELATIONSHIPS IN THE HIGH LATITUDE REGION
S.-I. Akasofu *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 17 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27537# Boston Univ., Mass. Dept. of Astronomy.
F LAYER IRREGULARITIES AT PLASMAPAUSE AND AURORAL LATITUDES
Jules Aarons *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 16 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27548# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
OBSERVATIONS WITH AN IONOSONDE IN NORTHERN GERMANY NEAR THE MID-LATITUDE TROUGH
Thomas Damboldt *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 5 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27551# Toulon Univ. (France). Lab. de Sondages Electromagnetiques de l'Environment.
SMALL-SCALE IRREGULARITIES IN THE HIGH-LATITUDE F REGION
C. Hanuise, J. P. Villain, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), and G. Caudal (Centre National de la Recherche Scientifique, Saint-Maur-des-Fosses, France) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 12 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27552# SRI International Corp., Menlo Park, Calif. Radio Physics Lab.
ON THE RELATIONSHIP OF F-REGION STRUCTURE IN THE DAYSIDE AURORAL OVAL TO HF BACKSCATTER SIGNATURES ATTRIBUTED TO THE POLAR CUSP
J. D. Kelly, R. T. Tsunoda, J. K. Olesen (Danish Meteorological Inst., Copenhagen.), and P. Stauning *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27553# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
OBSERVATIONS OF VERY HIGH LATITUTDE IONOSPHERIC IRREGULARITIES WITH THE GOOD BAY HF RADAR
R. A. Greenwald and K. B. Baker *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 17 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27554# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
OBSERVATIONS OF THE MID-LATITUDE IONOSPHERIC TROUGH FROM ANTARCTICA
F. T. Berkey and M. J. Jarvis (British Antarctic Survey, Cambridge (England).) *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 25 p (For primary document see N86-27531 18-32)
(Grants NSF DPP-81-00220; NSF DPP-83-08044)
Avail: NTIS HC A25/MF A01

N86-27555# British Antarctic Survey, Cambridge (England).
THE VARIABILITY AND PREDICTABILITY OF THE MAIN F-REGION TROUGH DETERMINED USING DIGITAL IONOSPHERIC SOUNDER DATA
Alan S. Rodger and John R. Dudeney *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 11 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27556# Alaska Univ., Fairbanks. Geophysical Inst.
PROGRESS IN MODELLING THE POLAR IONOSPHERE FROM SOLAR AND MAGNETOSPHERE PARAMETERS
B. J. Watkins, S.-I. Akasofu, and C. D. Fry *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 5 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27558*# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Scien
FORMATION AND DETECTION OF HIGH LATITUDE IONOSPHERIC IRREGULARITIES
M. C. Lee, J. Buchau (Air Force Geophysics Lab., Hanscom AFB, Mass.), H. C. Carlson, Jr., J. A. Klobuchar, and E. J. Weber *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 14 p (For primary document see N86-27531 18-32)
(Grant NAG5-270; Contract F19628-83-K-0024)
Avail: NTIS HC A25/MF A01

N86-27559# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
DIRECT, IN-SITU MEASUREMENTS OF IRREGULARITIES IN THE MESOSPHERE (85 - 50 km) AT 69 DEG N (ANDENES, NORWAY)
Hans-Ulrich Widdel *In* AGARD Propagation Effects on Military Systems in the High Latitude Region Nov. 1985 10 p (For primary document see N86-27531 18-32)
Avail: NTIS HC A25/MF A01

N86-27695# Meteorological Satellite Center, Tokyo (Japan).
ON LAND-SEA CONTRAST IN THE EARTH RADIATION BUDGET
Isao Kubota and Hiroko Imai *In its* Meteorological Satellite Center Technical Note, no. 13, 1986 (ISSN-0388-9653) Mar. 1986 p 1-31 In JAPANESE; ENGLISH summary (For primary document see N86-27694 18-42)
Avail: NTIS HC A04/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-27851# Radio Technical Commission for Aeronautics, Washington, D. C.
MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRBORNE THUNDERSTORM DETECTION EQUIPMENT
May 1986 75 p
(RTCA/DO-191) Avail: NTIS HC A04/MF A01

Minimum operational performance standards for non-radar airborne thunderstorm detection equipment are explained in this document. These standards specify system characteristics that should be useful to designers, manufacturers, installers and users of the equipment. Information needed to understand the rationale for equipment characteristics and requirements is given. Typical equipment applications and operational goals as envisioned by Special Committee 154 are discussed. The minimum performance standards for the equipment are given. These standards specify the required performance under standard and environmental conditions. Also included are recommended bench test procedures necessary to demonstrate equipment compliance with the stated minimum requirements. Tests for the installed equipment are included when performance cannot be adequately determined through bench testing. The operational performance characteristics for equipment installations are described and conditions that will

assure the equipment is used properly in the expected operational environment are defined. B.W.

N86-27852*# Florida State Univ., Tallahassee. Coll. of Arts and Sciences.
SENSITIVITY ANALYSIS OF HORIZONTAL HEAT AND VAPOR TRANSFER COEFFICIENTS FOR A CLOUD-TOPPED MARINE BOUNDARY LAYER DURING COLD-AIR OUTBREAKS M.S. Thesis
Yuwen Vaughn Chang Apr. 1986 113 p refs
(Grant NAG5-332)
(NASA-CR-177292; NAS 1.26:177292) Avail: NTIS HC A06/MF A01 CSCL 04B

The effects of external parameters on the surface heat and vapor fluxes into the marine atmospheric boundary layer (MABL) during cold-air outbreaks are investigated using the numerical model of Stage and Businger (1981a). These fluxes are nondimensionalized using the horizontal heat (g1) and vapor (g2) transfer coefficient method first suggested by Chou and Atlas (1982) and further formulated by Stage (1983a). In order to simplify the problem, the boundary layer is assumed to be well mixed and horizontally homogeneous, and to have linear shoreline soundings of equivalent potential temperature and mixing ratio. Modifications of initial surface flux estimates, time step limitation, and termination conditions are made to the MABL model to obtain accurate computations. The dependence of g1 and g2 in the cloud topped boundary layer on the external parameters (wind speed, divergence, sea surface temperature, radiative sky temperature, clould top radiation cooling, and initial shoreline soundings of temperature) studied by a sensitivity analysis, which shows the uncertainties of horizontal transfer coefficients caused by changes in the parameters are reasonably small. Therefore, the surface heat and vapor fluxes are also weakly dependent on the external parameters, and can be well estimated by the horizontal transfer coefficient method even from rather poor measurements. M.G.

N86-27853*# Florida State Univ., Tallahassee. Coll. of Arts and Sciences.
A MODEL FOR THE ESTIMATION OF THE SURFACE FLUXES OF MOMENTUM, HEAT, AND MOISTURE OF THE CLOUD-TOPPED MARINE ATMOSPHERIC BOUNDARY LAYER FROM SATELLITE MEASURABLE PARAMETERS M.S. Thesis
Donald Eugene Allison Aug. 1984 74 p
(Grant NAG5-332)
(NASA-CR-177290; NAS 1.26:177290) Avail: NTIS HC A04/MF A01 CSCL 04B

A model for the estimation of the surface fluxes of momentum, heat, and moisture of the cloud topped marine atmospheric boundary layer was developed by use of satellite remotely sensed prarameters. The parameters chosen for the problem were the integrated liquid water content, the integrated water vapor content, the cloud top temperature, the sea surface temperature, and either a measure of the 10 meter neutral wind spread or the friction velocity at the surface. Under the assumptions of a horizontally homogeneous, well-mixed boundary layer, the model calculates the equivalent potential temperature and total water profiles of the boundary layer along with the boundary layer height. The development of a scheme to parameterize the integrated water vapor outside of the boundary layer for the cases of cold air outbreak and California coastal stratus is presented. Sensitivity studies are presented showing the potential accuracy of this technique. With improvements of current technology, the model will provide reasonable estimates of the surface fluxes. Author

N86-27854# National Aeronautical Lab., Bangalore (India).
THE WIND ENVIRONMENT IN INDIA
Roddam Narasimha Dec. 1985 53 p
(TM-DU-8501) Avail: NTIS HC A04/MF A01

A major issue of wind engineering is the formulation of a rational method of estimating wind loads in different parts of the country. The building code in current use is not consistent with published estimates of extremes, which in turn are only in broad qualitative agreement with each other. A thorough re-examination is needed. The mean winds appear well understood, and are dominated by the monsooons and the remnants of the Findlater jet that blows across the Arabian Sea. The country is generally characterized by a relatively high extreme/mean ratio, posing difficult problems for the windmill designer. Statistical data needed for wind energy applications is now available, but a need for micro-surveys still exists. The variation of monthly means over the year can be compactly described in terms of two empirically defined orthogonal modes, corresponding roughly to the south-west and north-east monsoons. The meager data available on gust frequencies required in aeronautical applications show them to be relatively high. A variety of other phenomena important in aviation, from mountain waves to microbursts, still need to be investigated. B.G.

N86-27855*# LuTech, Inc., Hayward, Calif.
ANALYSIS OF DIRECT AND NEARBY LIGHTNING STRIKE DATA FOR AIRCRAFT Final Report
D. V. Giri, R. S. Noss, D. B. Phuoc, and F. M. Tesche Jun. 1983 205 p
(Contract NAS1-16893)
(NASA-CR-172127; NAS 1.26:172127) Avail: NTIS HC A10/MF A01 CSCL 04B

A method for interpreting direct strike and nearby strike lightning data on aircraft is discussed. The theoretical basis for the interpretation involves a transmission line model for the aircraft, and is discussed. Results of applying this model to the F-106 aircraft are presented and in the natural resonances are computed for several different electrical representations of the aircraft. The signal processing techniques useful for extracting pole (resonance) information from experimental data are discussed, and the use of these techniques on the measured lightning data is illustrated. Finally, the results of a related ground-based lightning experiment are discussed and data are presented. The purpose of this test was to gain additional understanding of the resonance properties of the F-106 aircraft. Author

N86-27856# Naval Postgraduate School, Monterey, Calif.
SYNOPTIC/MESOSCALE METEOROLOGICAL FEATURES IN THE MARGINAL ICE ZONE M.S. Thesis
Larry D. Phegley Dec. 1985 93 p
(AD-A165016) Avail: NTIS HC A05/MF A01 CSCL 04/2

This thesis summarizes meteorological conditions occurring in the Marginal Ice Zone Experiment (MIZEX-84), conducted in the East Greenland Sea during the summer of 1984. It includes a discussion of the synoptic and mesoscale conditions. The three cases discussed are: a weak storm which filled over the marginal ice zone (MIZ); an intense storm which transited the MIZ and entered the polar basin; and an undisturbed case. The MIZEX-84 period can be divided into three synoptic time periods. The first and the last were situations when the storms passed to the south and east of the Fram Striates. During the middle period the storms passed through the straits in response to the development of a closed upper-level low over the north coast of Greenland. Three of the four storms which moved into the straits were moving north-northwest and filled or slowed significantly in the MIZ. The fourth was moving parallel to the MIZ. This would seem to show that the MIZ does not dominate but may affect storm movement. GRA

N86-27857# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite Data and Information Service.
THE US WEATHER WATCH: A COMPOSITE SYSTEM Final Report
R. Koffler, E. Friday, Jr., F. Zbar, and J. Hussey Jul. 1985 24 p
(AD-A165072) Avail: NTIS HC A02/MF A01 CSCL 04/2

The U.S. Weather Watch observing system is a key element in monitoring local and global weather, and is essential to the provision of forecasts and services to the Nation. It has changed greatly over the past century, and its evolution over the next 15 years is expected to be even more rapid. This paper reviews those expected changes and other key NOAA programs. GRA

N86-27858# National Oceanic and Atmospheric Administration, Washington, D. C.
NUMERICAL WEATHER PREDICTION AND SATELLITE OBSERVATIONS Final Report
Frederick G. Shuman Aug. 1985 25 p
(AD-A165141) Avail: NTIS HC A02/MF A01 CSCL 04/2

The history of the scientific approach to weather forecasting is traced through the 20th century, including a projection to the year 2000. It is felt that such a review may foster a better understanding of the problems we face and will face in the future. During the first half of the century, little could be done, even on an experimental basis, because of the overwhelming need for tools that did not appear until midcentury. It is remarkable, however, that there were scientists who thought about weather forecasting in optimistic terms. There was a consistency throughout this preliminary period in determining exactly what was required for a successful beginning. It could not have been otherwise, because the natural laws dictate rather clearly these three requirements: (1) Sufficient observations of the atmosphere; (2) Sufficient knowledge of atmospheric mechanisms; (3) Sufficiently powerful means of computation. Solutions to these problems were adequately advanced by midcentury to allow the use of the scientific approach, but future advances must continue to be made to improve weather forecasting. Since 1960, observational weather satellites have played a large role in improving our ability to determine the initial state of the atmosphere, and they promise to play an ever larger role in the future. Author (GRA)

N86-27859# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY SEASONAL WEATHER OUTLOOK FOR APRIL, 1986, VOLUME 40, NUMBER 7, MARCH 29, 1986
29 Mar. 1986 10 p
(PB86-178266) Avail: NTIS HC A02/MF A01 CSCL 04B

Temperature and precipitation probabilities for the monthly and seasonal weather for North America are reported. GRA

N86-27860# National Weather Service, Salt Lake City, Utah.
WEATHER EXTREMES (7TH REVISION)
R. J. Schmidli Mar. 1986 26 p
(PB86-177672; NOAA-TM-NWS-WR-28) Avail: NTIS HC A03/MF A01 CSCL 04B

The purpose of the publication is to provide National Weather Service personnel with a ready reference of information that may be useful when preparing weather stories and radio scripts, when talking to mass-media reporters, and when answering questions from the general public. The memorandum is organized into fifteen categories covering the elements of temperature, precipitation, snowfall, atmospheric pressure, and wind. The fourteen western cities, thirteen western states, United States, North America, and world are each listed in the various categories. GRA

N86-27861# National Weather Service, Kansas City, Mo.
SEVERE THUNDERSTORM OUTBREAK OF JULY 6, 1983 IN SOUTHEAST IDAHO, WESTERN WYOMING AND SOUTHWEST MONTANA
G. L. Cox Apr. 1986 34 p
(PB86-184322; NOAA-TM-NWS-CR-81) Avail: NTIS HC A03/MF A01 CSCL 04B

Late in the afternoon on July 6, 1983, a squall line developed in southeast Idaho, the southwest corner of Montana, and northern Utah. The line of thunderstorms accelerated northeast through southwest Montana and into western Wyoming the rest of the afternoon and early evening before dissipating east of the Continental Divide. The thunderstorms generated wind gusts estimated up to 100 mph, did up to 1.5 million dollars of damage, and left one person dead and two injured. The following is a case study of that event, written from the point of view needed to forecast it. GRA

N86-27696# Meteorological Satellite Center, Tokyo (Japan).
ON THE Cb CLOUD VORTICAL PATTERN APART FROM TYPHOON PRESSURE CENTER
Shuhei Akashi, Hiroyuki Koba, and Michio Hitsuma *In its* Meteorological Satellite Center Technical Note, no. 13, 1986 (ISSN-0388-9653) Mar. 1986 p 33-56 IN JAPANESE; ENGLISH summary (For primary document see N86-27694 18-42)
Avail: NTIS HC A04/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-27862*# Woods Hole Oceanographic Institution, Mass.
HYDROGRAPHIC DATA FROM R/V ENDEAVOR CRUISE #90
M. D. Stalcup, T. M. Joyce, R. L. Barbour, and J. A. Dunworth Mar. 1986 82 p Sponsored in part by NSF
(Grants NAGw-272; NSF OCE-80-16983)
(NASA-CR-177234; NAS 1.26:177234; WHOI-86-15) Avail: NTIS HC A05/MF A01 CSCL 08C

The final cruise of the NSF sponsored Warm Core Rings Program studied a Warm Core Ring (WCR) in the Fall of 1982 as it formed from a large northward meander of the Gulf Stream. This ring, known as 82-H or the eighth ring identified in 1982, formed over the New England Seamounts near 39.5 deg N, 65 deg W. Surveys using Expendable Bathythermographs, Conductivity-Temperature-Depth-Oxygen stations and Doppler Current Profiling provide a look at the genesis of a WCR. These measurements reveal that WCR 82-H separated from the Gulf Stream sometime between October 2-5. This ring was a typical WCR with a diameter of about 200 km and speeds in the high velocity core of the 175 cm/sec. Satellite imagery of 82-H following the cruise showed that it drifted WSW in the Slope Water region at almost 9 km/day, had at least one interaction with the Gulf Stream and was last observed on February 8, 1983 at 39 deg N, 72 deg W. Author

N86-27863# Flow Research, Inc., Kent, Wash.
A HIGH-RESOLUTION CLUSTER OF OCEANOGRAPHIC INSTRUMENTS FOR BOUNDARY LAYER MEASUREMENTS UNDER ICE Final Report, 26 Sep. 1983 - 30 Nov. 1985
H.-T. Liu, J. J. Kolle, and P. D. Bondurant Nov. 1985 101 p
(Contract N00014-83-C-0764)
(AD-A165250; TR-352/11-85) Avail: NTIS HC A06/MF A01 CSCL 08/10

Three high-resolution clusters (HRCs) of oceanographic instruments, each consisting of three diode laser Doppler velocimeters (DLDVs), a high-frequency thermistor probe and a dual-electrode conductivity probe, have been developed for measurements of turbulent momentum, heat and mass fluxes in the oceanic boundary layer under ice. The spatial resolution was designed to be 2 cm or better. The DLDVs, which are the essential components of the HRCs, were first developed and successfully tested in the laboratory, then they were deployed during two field experiments. Two experimental units were deployed during the 1984 Marginal Ice Zone Experiment (MIZEX 84), and two prototype velocity-temperature-conductivity clusters were deployed during the 1985 Arctic Internal Wave Experiment (AIWEX 85). During MIZEX 84, velocity components were measured simultaneously with the DLDV and ducted current meters. Good agreement was generally observed. The AIWEX 85 results also included temperature and conductivity measurements. Variations in temperature and conductivity at depths of 2 and 4 m were only observed with one sensor to exceed 0.01 C and 10 micromho/cm, respectively for a time scale up to one hour. This indicate that the boundary layer under the ice flow was essentially well-mixed, which is consistent with other observations during the same time period (April and May 1985). Both field experiments showed adequacy of scattering particles for use with the DLDV. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-27864*# Management and Technical Services Co., Washington, D.C.

USSR SPACE LIFE SCIENCES DIGEST, ISSUE 6
Lyida Razran Hooke, ed., Mike Radtke, ed., Ronald Teeter, ed., and Joseph E. Rowe, ed. Washington NASA Jun. 1986 131 p
(Contract NASw-3676)
(NASA-CR-3922(07); NAS 1.26:3922(07)) Avail: NTIS HC A07/MF A01 CSCL 06C

This is the sixth issue of NASA's USSR Space Life Sciences Digest. It contains abstracts of 54 papers recently published in Russian language periodicals and bound collections and of 10 new Soviet monographs. Selected abstracts are illustrated with figures and tables from the original. Additional features include a table of Soviet EVAs and information about English translations of Soviet materials available to readers. The topics covered in this issue have been identified as relevant to 26 areas of aerospace medicine and space biology. These areas are adaptation, biospherics, body fluids, botany, cardiovascular and respiratory systems, developmental biology, endocrinology, enzymology, exobiology, genetics, habitability and environment effects, health and medical treatment, hematology, human performance, immunology, life support systems, mathematical modeling, metabolism., microbiology, morphology and cytology, musculoskeletal system, neurophysiology, nutrition, perception, personnel selection, psychology, radiobiology, reproductive biology, and space medicine. Author

N86-27865# Electrotechnical Lab., Ibaraki (Japan).
STUDIES ON INFORMATION PROCESSING MECHANISMS IN THE CENTRAL VISUAL SYSTEM OF THE CAT
Shinji Kaji Dec. 1985 42 p
(EL-861; ISSN-0366-9106; UDC-572.788.916.3) Avail: NTIS HC A03/MF A01

The characteristics of information processing of visual neurons were investigated, including nonlinear summation and contour enhancement effects of concentric receptive fields, and neural interactions between detectors for the same or different stimulus domains. A model was proposed to explain the results of antagonistic actions between the center and surrounding regions in the concentric receptive field of lateral geniculate neurons. The response of lateral geniculate neurons with concentric receptive fields to large two-dimensional figures was investigated. The interactions between the different orientation detecting processes were investigated in the orientation sensitive neurons of the visual cortex. The neural interactions between two direction-selective processes as well as between direction and selective process were investigated in the complex type neurons, using a non-oriented textured stimulus (two-dimensional random noise pattern) and an oriented grating. B.G.

N86-27866# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
INHALATION TOXICOLOGY. 5: EVALUATION OF RELATIVE TOXICITY TO RATS OF THERMAL DECOMPOSITION PRODUCTS FROM TWO AIRCRAFT SEAT FIRE-BLOCKING MATERIALS Report, Oct. 1983 - Sep. 1984
Donald C. Sanders, Charles R. Crane, and Boyd R. Endecott Nov. 1985 16 p
(AD-A165034; DOT-FAA-AM-86-1) Avail: NTIS HC A02/MF A01 CSCL 06/20

Two fire-blocking layer (FBL) materials, designed to delay the thermal decomposition of polyurethane foam seat cushions during an aircraft cabin fire, were evaluated for the relative toxicity of their gaseous combustion products. Each materials was thermally decomposed under five distinct thermal environments: two contact temperatures (600 and 750 c) in a horizontal hot tube furnace and three flux levels (2.5, 5.0, and 7.5 w/cm) in a radiant heat furnace. The measured toxicological endpoint was time-to-incapacitation (+ sub i) in the albino rat; this endpoint is believed to be the most relevant one for assessing smoke hazard in a fire environment. In three of the five test environments, norfab, an aluminized synthetic fabric, produced shorter + sub i--and was thus toxic--than vonar, a neoprene foam. However, at 2.5 w/cm in the radiant furnace system, the norfab test specimen lost only 13 percent of the sample weight and did not incapacitate any of the test animals during the exposure period and, at 750c (flaming) in the combustion tube assembly, norfab produced longer and more variable + sub i than did vonar. Hydrogen cyanide (hcn) was detected in the combustion products from norfab under all test conditions except the 2.4 w/cm radiant flux level; no HCN was dtected in the test c onditions except the 2.5 w/+ sub i radiant flux level; no HCN was detected in the combustion products from any of the vonar tests. GRA

N86-27867# George Washington Univ., Washington, D.C.
MICROWAVE EFFECTS ON CNS: A HISTOPATHOLOGIC, ULTRASTRUCTURAL AND AUTORADIOGRAPHIC STUDY Final Report
Ernest N. Albert 20 Feb. 1986 69 p
(Contract N00014-78-C-0527)
(AD-A165040) Avail: NTIS HC A04/MF A01 CSCL 06/18

The objectives of this investigation were to: (1) investigate the effects of electromagnetic fields on the release of calcium ions from nervous tissue, (2) examine for histological changes, if any, of young rat brains after 2.45 GHz microwave exposure, and (3) study the rat brain metabolism during 2.45 GHz microwave exposure using 2-Deoxyglucose. In conclusion, the data presented here demonstrates that the specific radiofrequency radiation used does not perturb Ca ions efflux from avian brain tissue under in vitro conditions. Comparison of this data with that gathered by Blackman's group, however, suggests that appropriate radiofrequency radiation in conjunction with certain other physical factors may indeed perturb Ca ions efflux. GRA

N86-27868# Brookhaven National Lab., Upton, N. Y.
LATE BIOLOGICAL EFFECTS FROM INTERNAL AND EXTERNAL EXPOSURE
W. H. Adams 1985 12 p Presented at the Health Physics Society Symposium Hammond, La., 28 May 1985
(Contract DE-AC02-76CH-00016)
(DE86-001181; BNL-37087; CONF-8505213-1) Avail: NTIS HC A02/MF A01

Information on late biological effects of radiation was obtained from the long-term medical followup of a small population of Marshallese accidentally exposed to radioactive fallout from a thermonuclear test in 1954. Endocrine data are compatible with a sequence of nonstochastic radiation effects. The ingestion of radioisotopes of iodine produced clinical thyroid hypofunction in children, biochemical evidence of thyroid dysfunction in some adults, thyroid adenomatous module formation, and, as a possible indirect effect of thyroid damage, at least two cases of pituitary adenoma. In contrast, the only evidence of a stochastic effect has been a real increase in thyroid cancers among the more highly exposed people of Rongelap, none of whom have evidence of residual disease. While three nonthyroidal cancers which are known to be inducible in humans by external irradiation have been documented in the exposed population, three similar cancers have occurred in an unexposed comparison population of Marshallese. Nonstochastic effects of radiation exposure may be common but subtle. In the Marshallese experience the morbidity of delayed nonstochastic effects far exceeds that of the stochastic. DOE

N86-27869# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
9 May 1986 143 p Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-008) Avail: NTIS HC A07/MF A01

Topics on life sciences addressed include: aerospace medicine, agrotechnology, biochemistry, biophysics, biotechnology, epidemiology, food technology, genetics, human factors engineering, immunology, clinical medicine, microbiology, physiology, public health, psychology, radiation biology, and virology. For individual titles, see N86-27870 through N86-27877.

N86-27870# Joint Publications Research Service, Arlington, Va.
LACTOBACTERIA AND PROPHYLAXIS IN SPACE **c52**
I. Ivanov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 1 Transl. into ENGLISH from Tass (Tartu, USSR), 11 Mar. 1986 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

Cosmonauts on long duration space flights face health hazards in the form of pathogenic bacteria. Lactobacteria increase the resistance of the body to disease and kill agents responsible for many diseases. The lactobacteria have the capacity to stick to the cell of the human body and thus make them invulnerable to pathogenic microbes. The lactobacteria preparation replenishes the loss of the bacteria in the human body and stimulates the immune system. The use of these microorganisms institutes an ecological barrier protecting man. B.G.

N86-27871# Joint Publications Research Service, Arlington, Va.
COMMENTARY ON RESULTS OF BIOLOGICAL SATELLITE PROGRAM
Yu. Fabbishenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 2 Transl. into ENGLISH from Meditsinskaya Gazeta (Moscow, USSR), 15 Jan. 1986 p 4 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

The Kosmos-1667 satellite carried two monkeys and other biological specimens. The experimental animals were employed to gather scientific data which is difficult or impossible to obtain from human subjects. The monkeys were monitored with 20 sensors and provided data on the mechanism of changes in an organism during the period of acute change. B.G.

N86-27872# Joint Publications Research Service, Arlington, Va.
SWEATING REFLEX IN COMPLEX OF METHODS FOR EVALUATING OPERATOR EFFICIENCY **c52**
P. P. Slynko, L. I. Bukvareva, S. V. Zaporozhets, and P. M. Onishchenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 46 Transl. into ENGLISH from Fiziologicheskiy Zhurnal (Kiev, USSR), v. 31, no. 6, Nov. - Dec. 1985 p 678-682 Original language document was announced as A86-21453 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

A method for measuring the electrodermal characteristics associated with the stress induced diaphoretic reflex was developed. The method is intended for use in evaluating the functional conditions of a human operator in monotonous work conditions. A general description of the diaphoretic skin sensor is give, and experimental results are presented concerning the accuracy of the method in comparison to conventional electrodermal sensing methods. It is shown that, in contrast to conventional methods, the present sensing method offers a highly reliable measure of skin response over extended periods of monotonous work. I.H.(IAA)

N86-27873# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF SHIPBOARD ENVIRONMENTAL FACTORS ON CONDITIONED REFLEX ACTIVITY OF EXPERIMENTAL ANIMALS DURING A LONG VOYAGE
O. Yu. Netudykhatka, A. P. Stoyanov, and V. N. Yevstafyev *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 98 Transl. into ENGLISH from Fiziologicheskiy Zhurnal (Kiev, USSR), v. 31, no. 6, Nov. - Dec. 1985 p 688-691 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

The influence of environmental factors encountered on board a ship, with predominance of the noise vibration component, was studied with the conditioned reflex activity of experimental animals. Experiments were performed on 120 male Wistar white rats during a 90-day voyage of a freighter. The influence of specific shipboard environmental factors was evaluated on the basis of studies on conditioned motor reflexes involving response to a sound signal which preceded application of a mild electric shock by 5 seconds. The changes in the conditioned reflex activity varied with intensity and duration of training. Differences in the avoidance reaction were observed in all groups of animals, indicating an increase in the degree of inhibitory processes in the central nervous system as a result of the influence of the unfavorable sanitary-hygienic factors characteristic for the working spaces in ships. Author

N86-27874# Joint Publications Research Service, Arlington, Va.
EFFECTS OF COLD EXPOSURE ON THERMAL STATUS OF MEN AND WOMEN **c52**
R. F. Afanasyeva and R. O. Oganyan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 100 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 1, Jan. 1986 p 24-28 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

Sex differences in thermal confort perception and objective changes in skin temperature and heat loss on exposure to different environmental temperatures were assessed in 8 men and 9 women between the ages of 20 and 35 years. In conjecture with the objective data that thermoregulation in women relies essentially on physical factors (decreased skin temperature and diminished body heat loss), women were quicker to perceive thermal discomfort. In men, thermal homeostasis relied preferentially on chemical thermoregulation reflected in greater heat loss. B.G.

N86-27875# Joint Publications Research Service, Arlington, Va.
STUDY OF BRAIN BIOCHEMISTRY DURING HYPOTHERMIA **c52**
E. E. Emirbekov and S. P. Lvova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 101 Transl. into ENGLISH from Kriobiologiya (Kiev, USSR), no. 1, 1985 p 44-49 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

Aspects of cerebral metabolism in hibernating and non-hibernating animals during hypothermia are discussed and analyzed on the basis of literature survey. Existing factual materials on neurochemical changes in the brain due to hypothermia cannot support formulation of a fully developed theory of the effect of cooling on cerebral metabolism. There are many gaps in the area of neuro-specific components and their role in hypothermia. A specific concept of the effect of hypothermia on molecular processes in the brain is described briefly. Existence of reserve possibilities of regulatory processes in the central nervous system during hypothermia is indicated and prospects are presented for extending resistance of warm blooded animals to hypothermia by use of adaptive functions at low body temperatures. Author

N86-27876# Joint Publications Research Service, Arlington, Va.
SOMATOSENSORY AND AUDITORY PERCEPTION ACCORDING TO STUDY USING FOCUSED ULTRASOUND **c52**
Ye. M. Tsirulnikov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 102 Transl. into ENGLISH from Zhurnal Evolyutsionnoy Biokhimii i Fiziologii (Leningrad, USSR), v. 21, no. 6, Nov. - Dec. 1985 p 591-596 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

Materials from literature are used in discussion of aspects of the interpenetration of physiology and psychology in the area of sensory preception with emphasis on the contribution of somatosensory and auditory systems with the aid of focused ultrasound. Characteristics of distribution of sensitivity in the skin surface and in deep tissues are described and discussed. Specific feature of sensitivity in biologically active points are considered. The advisability of isolating elementary sensation and considering its role in formation of a sensory image was indicated. Artificial formation of samples, especially single-model samples such as tactile, temperature or auditory modes was found to be helpful since such a model can be controlled to a great degree with the aid of focused ultrasound and other artificial stimuli. Author

N86-27877# Joint Publications Research Service, Arlington, Va.
CHANGE OF RNA AND PROTEIN LEVEL IN NEURONS-GLIA

SYSTEM UNDER EFFECTS OF HYPERTHERMIA AND HYPOXIA
L. M. Mamalyga *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 103 Transl. into ENGLISH from Izvestiya Akademii Nauk Moldavskoy SSR. Seriya Bioilogicheskikh i Khimicheskikh Nauk (Kishinev, USSR), no. 5, Sep. Oct. 1985 p 42-47 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

Functional and metabolic possibilities of different brain structures, under the effects of hyperthermia, hypoxia, and combinations of both, were studied by cytochemical and morphological methods in experiments performed on Wistar male white rats (weight 160 to 180 g) (age 5 to 6 months). Rats were subjected to simulated altitude of 8200 m, to hyperthermia at 40 C for 75 minutes, or to combined hyperthermia and hypoxia at 8200 m and 40 C for 75 minutes. After the experiment, rats were decapitated without use of anesthesia and RNA level and total and basic proteins in various neuron-glia systems were studied. Separate and combined effects of hyperthermia and hypoxia in the organism produced metabolic and morpholocigal changes in the brain structures studied. Reduction of RNA level and proteins in the neurons under combined effect of hyperthermia and hypoxia decreased their cytoplasm volume; overheating dehydrated the organism, reduced the volume of circulating blood, increased its viscosity, and reduced the hemoglobin level in the erythrocytes. The combined effect of hyperthermia and hypoxia, increasing at different rates, decreased the resistance of the animal to altitude considerably. Author

N86-27878# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 1, JANUARY - FEBRUARY 1986
17 Apr. 1986 161 p Transl. into ENGLISH of Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), no. 1, Jan.-Feb. 1986 94 p
(JPRS-USB-86-003) Avail: NTIS HC A08

Presented is the translation of a journal on space biology and aerospace medicine published in the USSR. The journal is divided into areas of surveys, experimental and general theoretical research, methods, and brief reports. Some representative topics are: Prospects for using ultraviolet radiation in long term spaceflights; Some human reactions during seven-day antiorthostatic hypokinesia; Effect of diphosphonates on bones of hypokinetic rats; Effect of different doses of ultraviolet radiation on vitamin levels in man; Reproductive capacity of microflora on polymers used in sealed environments; and amino acid spectrum of human blood in the presence of emotional stress. For individual titles, see N86-27879 through N86-27904.

N86-27879# Joint Publications Research Service, Arlington, Va.
PROSPECTS FOR USING ULTRAVIOLET RADIATION IN LONG-TERM SPACEFLIGHTS c52
N. Ye. Panferova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 1-13 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 4-12 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The data concerning UV-effects on the human body and the environment are reviewed as applied to long term flights. It is concluded that UV-radiation can be used in long term spaceflights in view of its vitamin forming, desensitizing, bactericidal and supporting properties to improve the environment and to prevent adverse effects of spaceflight factors. Author

N86-27880# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL AND GENERAL THEORETICAL RESEARCH: NATURE OF CIRCULATORY REGULATION IN PILOTS c52
V. G. Doroshev, Z. A. Kirillova, and A. P. Vanarshenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 14-18 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 12-15 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Dynamic observations over a group of pilots within a working week during three months have shown that blood pressure increases to meet the requirements via higher cardiac output. When stresses grow and fatigue sets in, the pattern of circulation regulation changes so that elevated blood pressure is maintained due to an increased peripheral resistance. Differential approach to the pattern of blood pressure regulation makes it possible to assess the degree of circulation adaptation to various work loads. Author

N86-27881# Joint Publications Research Service, Arlington, Va.
PSYCHOEMOTIONAL PILOT STRESS PRIOR TO EJECTION AND ITS ROLE IN APPROPRIATE PERFORMANCE c53
A. P. Kozlovskiy and A. F. Kovalenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 19-24 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 16-19 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

It was demonstrated that with respect to the psychoemotional state real and simulated catapulting events were similar. The time-course variations in the latent period of the motor reaction were obtained. The time interval between the command Go and the catapulting event was found to increase significantly in relation to the latent period. This was correlated with the level of psychoemotional strain. Author

N86-27882# Joint Publications Research Service, Arlington, Va.
EFFECT OF INTENSIVE OPERATOR WORK ON LIPID PEROXIDATION PROCESSES IN MAN c52
S. M. Ivanova, O. N. Orlov, S. S. Brantova, O. I. Labetskaya, N. A. Davydova, A. Ye. Zezerov, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 25-28 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 20-22 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

It was demonstrated that the stress associated with an active mental work for 2 hours leads to a high rate of lipid peroxidation which results in a greater amount of products of lipid peroxidation in blood and pentane in exhaled air. Simultaneous measurements of blood catecholamines have shown their significant increase immediately after exposure to the stress effect. It can therefore be concluded that a stress situation enhances lipid peroxidation in the human body. Author

N86-27883# Joint Publications Research Service, Arlington, Va.
EFFECT OF RHYTHMIC PHOTIC INTERFERENCE ON WORKING ELECTROENCEPHALOGRAM AND EFFICIENCY OF HUMAN MOVEMENTS c53
Ye. T. Petrenko and L. A. Yermukhametova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 29-33 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 22-25 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The effect of rhythmic light flashes on the space-time pattern of brain biopotentials during motor functions and biomechanical efficiency of man's actions was investigated. As the motor model, the ability to maintain equilibrium when standing on the toes of one foot was used. Electroencephalography (EEG) from 12 neocortical areas and oscillations of the body mass center (stabilography) were recorded in 20 men who performed the exercise under normal conditions and during light flashes of 12 Hz. The resultant EEG and stabilograms were exposed to correlations-spectral and coherent analysis with the aid of an EC-1035 computer. Light flashes induced a change in the EEG peaks and

flicker fusion frequency, a significant increase of the density of biopotentials corresponding to the light stimulation frequency, and a redistribution of the number of high intercentral correlations between neocoretical motor centers. When the light flashes were presented, 75 to 85% of the test subjects showed a 0.19 to 0.26 increase in the biopotential coherence of the premotor, motor and sensomotor areas. They also exhibited a significant decrease in the body stability and an increase in the stabilographic amplitude and frequency. It is suggested that the decline of biomechanical efficiency is associated with the disorders of the space-time integration between neocortical centers involved in the motor control system that are responsible for the execution of motor acts. Author

N86-27884# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS IN HUMORAL CONTROL OF METABOLISM WITH SIMULATION OF SPACEFLIGHT FACTORS **c52**
S. Kalandarov, V. P. Bychkov, I. D. Frenkel, and G. I. Proskurova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 34-38 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 25-28 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Hormonal regulation of metabolism was investigated in test subjects of three age groups: group 1 included test subjects of 41 to 50 years old, group 2 test subjects of 50 to 57 years old, and group 3 test subjects of 26 to 33 years old. Test subjects from groups 1 and 2 were exposed to head down tilt as well as linear acceleration of 3 Gz for 1 min and exercises of 450 to 1050 kgm before and after the tilt test. Group 3 test subjects were exposed to neuroemotional stress before, during and after the head down test. Exposure to head down tilt, acceleration and exercises caused adaptive changes in humoral regulation of metabolism in the test subjects of groups 1 and 2. Food supplements given to group 3 test subjects produced a normalizing effect on humoral regulation of metabolism. Author

N86-27885# Joint Publications Research Service, Arlington, Va.
SOME HUMAN REACTIONS DURING 7-DAY ANTIORTHOSTATIC HYPOKINESIA **c52**
B. F. Asyamolov, V. S. Panchenko, V. A. Karpusheva, R. A. Bondarenko, O. A. Vorobyev, V. V. Zaritskiy, V. P. Stupnitskiy, I. G. Popov, P. A. Lozinskiy, and S. M. Ledovskoy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 39-44 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 29-32 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Time-course variations in the cardiovascular parameters, vestibulo-autonomic stability, work capacity and nutritional status were measured in 20 male test subjects, aged 19 to 22, who were exposed for 7 days to head down tilt. Beginning with days 3 or 4, new hemodynamic ratios developed that indicated a new level of circulation regulation and adaptation to head down tilt. It appears that blood redistribution towards the head led to an enhanced vestibulo-autonomic stability. Renal excretion of nitrogen increased, reaching the highest level on days 6 to 7. The investigations allow the conclusion that 7-day head down tilt may cause changes in almost every physiological system. Author

N86-27886# Joint Publications Research Service, Arlington, Va.
COLLAGEN, LIPID AND GLYCOGEN CONTENT OF RAT SKELETAL MUSCLES IN RECOVERY PERIOD AFTER 15- AND 30-DAY HYPOKINESIA
P. P. Potapov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 45-48 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 33-35 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

On the 15th hypokinetic day, carcass mass, glycogen and lipid content in skeletal muscles decreased while collagen content increased. The content of collagen returned to the norm by the 7th day of the recovery period. By that time the glycogen content increased significantly and a week later decreased noticeably. The content of total lipids and triglycerides was higher than the baseline level on the 15th and 30th days of the recovery period. On hypokinesia day 30 carcass mass and glycogen content decreased while collagencontent increased. After 30-day hypokinesia, glycogen significantly increased on the 7th day and returned to the norm by the 60th day of the recovery period. Lipid content was elevated only on the 7th day of the recovery period, and collagen content returned to the norm on the 15th day of the recovery period. Following 15- and 30-day hypokinesia, carcass mass returned to the baseline level by the 30th day of the recovery period. Author

N86-27887# Joint Publications Research Service, Arlington, Va.
HUMAN CENTRAL HEMODYNAMICS DURING LOWER LIMB DECOMPRESSION **c52**
V. V. Rumyantsev and V. Ye. Katkov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 49-52 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 35-37 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Experiments were performed to study the effect of leg decompression in the head down position at -15 deg. The method of chronic catheterization was used, pressure was measured in different areas of the cardiovascular system, blood was withdrawn for biochemical analysis. The effect of leg decompression was compared with that of lower body negative pressure. Decompression produced changes in Pressure in Pulmonary (PAP) and Central Venous Pressure (CVP) that were similar in sign but different in magnitude. The decompression induced changes in PAP and CVP were primarily determined by the area of exposure. Using previous data, a nomograph was constructed to evaluate PAP and CVP variations as a function of the decompression mode and site. Author

N86-27888# Joint Publications Research Service, Arlington, Va.
PHASIC PROCESSES IN KINETICS OF FORMED BLOOD ELEMENTS **c52**
V. V. Verigo and F. Gauser *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 53-58 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 38-41 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

When quantitating blood shifts in response to environmental effects, it is important to take into account the phasic pattern of certain processes. Theoretical considerations and experimental data on the fluctuations of the counts of formed elements have been published. Since the fluctuations cannot be easily detected by experimental methods, they can be investigated using mathematical modeling. A model describing the counts of red blood cells and their precursors in relation to the age structure of the population was developed. Depending on the oxygen requirements and physiological parameters, humoral regulation controls cell proliferation and release into the functioning pool. The model allows for incidental hemolysis as well as for lifetime of red blood cells. Simulation of various processes in the blood system when exposed to unusual environmental effects has shown that some of the processes can be phasic in character. Author

N86-27889# Joint Publications Research Service, Arlington, Va.
MORPHOLOGICAL AND BIOCHEMICAL INVESTIGATION OF RAT ADRENOCORTICAL FUNCTION DURING LONG-TERM HYPOKINESIA
Ye. V. Vorotnikova and Ye. A. Zagorskaya *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February

1986 (JPRS-USB-86-003) 17 Apr. 1986 p 59-65 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 41-45 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Female rats exposed to 3-month hypokinesia were used to study adrenal morphology and plasma corticosterone. Prolonged hypokinesia (60 to 90 days) led to a dissociation between adrenal hypertrophy and lower corticosterone content in plasma. During hypokinesia, rats were also exposed to an additional stress effect, i.e., 5-hour immobilization. This approach showed that in the course of 90-day hypokinesia the adrenal cortex retained its ability to react to an acute stress by an enhanced corticosteroid secretion. Moreover, in response to stress effects of identical strength and duration the experimental adrenals produced more corticosterone than the controls with no structural rearrangement or delipoidization. Author

N86-27890# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIPHOSPHONATES ON BONES OF HYPOKINETIC RATS
V. N. Shvets, A. S. Pankova, O. Ye. Kabitskaya, Z. Ye. Vnukova, and B. V. Morukov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 66-72 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 45-49 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The diphosphonate effect on bones was studied in Wistar male rats weighing about 200 g. The rats were kept for 60 days in small size cages where their motor activity was diminished. Every day the rats were given 0.3% solution of 1-hydroxy-ethylene-1,1-diphosphonate (HEDP) containing 9 mg/kg phosphorus. In the course of hypokinetic exposure the rats developed generalized osteoporosis. Histomorphometric measurements demonstrated that the drug did not prevent mineral losses from the tubular bones (humerus, femur). However, the drug led to a complete bone mass recovery in the pelvix and a partial recovery in the sternum. The drug also produced a preventive effect on the population of cells-precursors of osteogenesis, the number of which decreases significantly during hypokinesia. Author

N86-27891# Joint Publications Research Service, Arlington, Va.
EXPERIMENTS WITH DEVELOPING PLANTS ABOARD SALYUT-5, SALYUT-6 AND SALYUT-7 ORIBITAL STATIONS
L. N. Kostina, I. D. Anikeyeva, and E. N. Vaulina *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 73-78 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 53-56 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The experiments with air dry Crepis capillaris seeds flown on the spacecraft Soyuz-16 and orbital stations Salyut-5, Salyut-6 and Salyut-7 showed that the number of aberrant cells in the seedlings grown during flight (experimental) and after flight (flight control) was higher than in the ground based control. This number was greater in the experimental seedlings than in the flight controls. The plants Arabidopsis thaliana grew from cotyledons to flowers during flight. The seeds developed postflight exhibited a lower fertility and a higher frequency of recessive mutants. The greater number of mutants persisted in the progeny of plants that completed their developmental cycle. Inhibited viability of germs manifested as a reduced germination rate of flown seeds and a premature death of seedlings. In the first postflight generation the lesions produced by large chromosome aberrations were eliminated and the lesions caused by gene mutations and microaberrations were retained. Author

N86-27892# Joint Publications Research Service, Arlington, Va.
T AND B COMPONENTS OF IMMUNITY IN THE PRESENCE OF ACUTE MOUNTAIN SICKNESS c52
M. M. Mirrakhimov, M. I. Kitayev, R. O. Khamzamulin, A. G. Tokhtabayev, and S. M. Pogrebitskiy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 79-84 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 53-56 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Immunological aspects of the adaptation process were investigated in 57 male test subjects that stayed for 30 days at an altitude of 3600 m above sea level. The uneventful development of adaptation was accompanied by a short term decrease in the number and activity of T-lymphocytes. An acute mountain disease led to a distinct deficiency of T-cell immunity which still persisted on test day 30. Besides, the content of zero cells in circulating blood was increased and the blast-transformation reaction of lymphocytes to concavalin A was inhibited. Prior to the ascent the test subjects who were susceptible to the acute mountain disease showed a lower content of T-lymphocytes and a higher content of zero cells in circulating blood. Author

N86-27893# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIFFERENT DOSES OF ULTRAVIOLET RADIATION ON VITAMIN LEVELS IN MAN c52
M. S. Belakovskiy, M. G. Yuzhanskaya, N. Ye. Panferova, L. Kh. Pastushkova, O. G. Pereverzeva, A. N. Smirnova, I. N. Sergeyev, and V. B. Spirichev *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 85-91 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 56-61 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Exposure of healthy adults to prophylactic doses of UV radiation in the medium and long wavelength spectrum improved metabolism of vitamins A, E and D and increased their content in the body. UV irradiation even in prophylactic doses increased ascorbic acid requirements. Excessive UV radiation produced an adverse effect on the vitamin content. However, the vitamin concentration in blood was not significantly decreased. This can be explained by the adaptation of the human body to UV-irradiation upon a continuous increase of its dosage. Author

N86-27894# Joint Publications Research Service, Arlington, Va.
PHYSICAL ENDURANCE OF RATS DURING INTENSIVE AND REPEATED EXPOSURE TO STATIONARY MAGNETIC FIELD
L. V. Kokoreva *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 92-94 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 61-63 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Variations in physical endurance of rats exposed to a constant magnetic field of 1.6 T for 3 hours a day during 30 days were investigated. The parameter was measured as the time of swimming with a load making 10% of body weight until complete arrest. The rats exposed once, 5 or 15 times showed a longer time of swimming than the controls. On the 30th day of exposure there was no difference between the experimental and control animals. The data obtained suggest that exposure to a constant magnetic field produces a stimulating effect on physical work capacity during the first 15 days. Author

N86-27895# Joint Publications Research Service, Arlington, Va.
RADIOBIOLOGICAL VALIDATION OF QUALITY FACTOR OF PROTONS AND HELIUM IONS c52
N. I. Ryzhov and B. S. Fedorenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 95-99 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 63-66 (For primary document see N86-27878 18-51)

Avail: NTIS HC A08

Reported data and experimental results of measuring the relative biological effectiveness of protons of different energies and helium ions of 4 GeV/nuclon were analyzed to determine quality factors of the major components of cosmic radiations. It is recommended to use quality factors equal to 1.30 to 1.45 for 100 to 730 MeV protons and equal to 1.75 for 9 GeV protons and 4 GeV/nuclon helium ions. It is also suggested to employ them as standards for solving practical problems of radiation safety in spaceflights.

Author

N86-27896# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIBASOL AND SOME OF ITS IMIDAZO ANALOGUES ON ANIMAL TOLERANCE TO GRAVITATIONAL ACCELERATIONS AND DYNAMICS OF DEVELOPMENT OF POSTISCHEMIC CEREBROVASCULAR PHENOMENA
V. K. Vereshchagin and M. D. Gayevyy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 100-105 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 67-70 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Anesthetized and nonanesthetized animals were used to study the effect of dibazolum and its new imidazo analogs (designated AKS-67 and AKS-87) on animal tolerance to gravitational effects and cerebral ischemia (ligation of both carotid arteries), as well as on systemic arterial pressure and tone of cerebral and peripheral vessels (resistographically) in the postischemic period. The drugs were administered 30 to 90 min before exposure. It was found that in nonanesthetized rats dibazolum and AKS-87 increased tolerance to cranio-caudal acceleration and decreased it to caudo-cranial acceleration, whereas AKS-67 produced a distinct protective effect regardless of the vector. In anesthetized rats (bilateral carotid ligation) AKS-67 and AKS-87 increased acceleration tolerance and dibazolum produced no protective effect. Dibazolum enhanced postischemic hypotension while AKS-67 and AKS-87 delayed or completely arrested it. For aerospace medicine the drug AKS-67 is of particular importance because it increases significantly animal tolerance to acceleration and stabilizes arterial pressure in the postischemic period. Author

N86-27897# Joint Publications Research Service, Arlington, Va.
REPRODUCTIVE CAPACITY OF MICROFLORA ON POLYMERS USED IN SEALED ENVIRONMENTS
N. D. Novikova, M. I. Orlova, and M. B. Dyachenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 106-109 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 71-73 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The main representatives of human automicroflora were examined to identify the microorganisms that can grow and develop on various polymers used in an enclosed interior. Bacteria of the genera Pseudomonas, Proteus and Bacillus were found to be most proliferative. Microbial growth was strongly influenced by environmental parameters of the enclosure and by the chemical structure of the polymer. Author

N86-27898# Joint Publications Research Service, Arlington, Va.
RESTRAINT SYSTEM FOR WAKING MACACA MULATTA MONKEYS DURING POSTURAL TESTS
V. P. Melnichenko, M. D. Goldovskaya, V. P. Kotov, A. G. Popov, I. S. Kondakova, and N. V. Gorbatenkova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 110-112 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 73-74 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Postural tests are a convenient model for investigation of the distinctions in physiological functions with changes in body position in relation to the vector of Earth's gravity. Postural tests are difficult to perform on waking Macaca mulatta monkeys because of their general motor activity, the level of which depends largely on how the animals are immobilized on the turntable. A restraint system involving the use of a special suit is known. The results of the observations revealed that the system of immobilization must meet the following requirements: it should not cause any pain to the animal and must reduce to a minimum the effect of factors that elicit discomfort; it must provide for a standard position of the monkey on the turntable platform; it must prevent passive displacement of the monkey under the effect of gravity when the turntable is tilted. For this reason, a restraint system was developed, the principal elements of which are an immobilization suit, a device that restricts head movements, a device that restricts the monkey's body movements in orthostatic position. The above system was used in postural tests on monkeys weight 3.5 to 6 kg. The system provided reliable, sparing immobilization of monkeys on the turntable and was convenient to work with. E.R.

N86-27899# Joint Publications Research Service, Arlington, Va.
METHOD OF DEMONSTRATING CALCIUM IN HUMAN FOOT BY NEUTRON ACTIVATION OF (ALPHA, N)-SOURCES c52
V. Ye. Zaychik, A. Ye. Kondrashov, and B. V. Morukov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 113-119 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 75-78 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Bone demineralization during long term exposure to weightlessness and hypokinesia is presently a universally recognized fact. However, it should be noted that quantitatively incomparable results were obtained with use of different methods (X-ray densitometry, photon absorptiometry, X-ray tomography) to determine mineralization of bone. Evidently, this is attributable to the fact that they yield only an indirect estimate of the state of the mineral matrix of bone, since they characterize a parameter inherent in bone tissue as a whole, namely, the degree of absorption of photons of X-ray and gamma ranges of energy. Availability of this information alone does not allow one to draw a strictly quantitative conclusion about one of the important features of the mineral matrix, the concentration of calcium. Recording mesoroentgen radiation during exposure of some parts of the skeleton, for example, the calcaneus, to mu-mesons is a promising procedure for development of a method of direct measurement of the main mineral constituents of bone. However, there is still much to be done in this direction, and it is difficult to execute such a measuring method, as well as to make a quantitative interpretation of the obtained results. A description of the in vivo NAA method for Ca level in the human foot is presented. Special investigations had to be conducted to optimize irradiation conditions and spectrometry, as well as develop special equipment, in order to reach the goal of no more than 0.05 relative total error of each individual measurement with an equivalent dose or no more than 3 rem. E.R.

N86-27900# Joint Publications Research Service, Arlington, Va.
DIRECT SPECTROPHOTOMETRIC METHOD OF ASSAYING AMMONIA CONCENTRATION IN GAS ENVIRONMENT OF SEEDING CHAMBERS
A. A. Polovinkin and A. N. Kravchuk *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 120-122 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 78-80 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Toxicologists have been traditionally using colorimetry methods to measure ammonia concentration in the air environment. Colorimetric methods are simple to use, they have rather high sensivity and accuracy. However, they also have a number of flaws. Use of a spectrophotometric method of assaying ammonia in an air environment eliminates these flaws. A combined unit was developed and used for measurement of ammonia concentra-

tion in the range of 1 to 150 mg/cu m in the atmosphere of seeding chambers in toxicological experiments. The method is based on using the absorption maximum of ammonia at a wavelength of 204.3 mm. Introduction of the device to practical toxicological studies makes it possible to effect continuous monitoring, recording and correction of ammonia content of seeding chambers. E.R.

N86-27901# Joint Publications Research Service, Arlington, Va.
AMINO ACID SPECTRUM OF HUMAN BLOOD IN THE PRESENCE OF EMOTIONAL STRESS **c52**
T. F. Vlasova, A. S. Ushakov, V. P. Bychkov, and Ye. B. Miroshnikova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 123-125 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 80-82 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

The results of assaying the amino acid spectrum of human blood with simulation of stress situations similar to the professional activities of cosmonauts are presented. Methods and results are discussed. Author

N86-27902# Joint Publications Research Service, Arlington, Va.
BLOOD SERUM ENZYMES DURING 7-DAY WATER IMMERSION **c52**
T. Ye. Drozdova and Ye. G. Vetrova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 126-128 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 82-83 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

During submersion in water the body is exposed to a number of factors, among which redistribution of blood and lack of load on the locomotor system are rather important. This could affect metabolism of skeletomuscular tissue and parenchymatous organs, analogous to the effect of weightlessness. Investigation of changes in blood serum enzyme spectrum enables the demonstration, with some degree of certainty, the direction of metabolic transformations in different tissues and organs in weightlessness. Author

N86-27903# Joint Publications Research Service, Arlington, Va.
INTENSITY OF PHOTOSYNTHESIS IN CLOSTERIOPSIS ACICULAR VAR. AFRICANA HIND AS A FUNCTION OF OXYGEN CONCENTRATION IN THE ATMOSPHERE
M. A. Levinskikh *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 129-131 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 83-84 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

When unicellular algae are included in the photoautotrophic link of closed ecological systems, it is important to know their attitude toward different concentrations of oxygen in the atmosphere. The adverse influence of high concentrations of oxygen on photosynthesis is known as the Warburg effect. The inhibitory effect of high oxygen content on photosynthetic productivity of algae referable to different taxonomic groups has been repeatedly confirmed by many authors. In particular for a number of Chlorella strains it was shown that intensity of photosynthesis, in the case of both cumulative and continuous long term cultivation, is directly related to concentration of oxygen in the gas phase. At the same time, there is information to the effect that some algae can retain productivity when partial oxygen pressure is raised both in the range of 3 to 5 to 21% and up to 40 to 80%. Finally, it was established that the photosynthetic process in Chlorella sorokiniana ORS is resistant to oxygen concentrations in the atmosphere of up to 95%. The intensity of photosynthesis in Closteriopsis acicularis var. africana Hind., family Ankistrodesmaceae, as a function of oxygen concentration in the reactor's gas phase was investigated. Author

N86-27904# Joint Publications Research Service, Arlington, Va.
RADIOPROTECTIVE AND THERAPEUTIC EFFICACY OF CARRAGEENAN AGAINST PROTON RADIATION **c52**
K. S. Chertkov, N. I. Gvozdeva, B. S. Fedorenko, and Yu. Yu. Preobrazhenskiy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 132-135 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 84-86 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

Assurance of radiation safety of long term spaceflights is one of the important tasks put to space biology and medicine. In this regard, importance is attributed to refinement of technical equipment, search and development of effective drugs. It is known that the danger of irradiation, mainly from high energy protons, is higher in long term spaceflights. It was deemed desirable to investigate the radioprotective properties of some previously tested radioprotective agents, for example, carrageenan, during exposure to protons. E.R.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-27905* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Dec. 1985 81 p
(NASA-SP-7011(278); NAS 1.21:7011(278)) Avail: NTIS HC A05 CSCL 06E

This bibliography lists 237 reports, articles, and other documents introduced into the NASA scientific and technical information system in November 1985. Author

N86-27906# Electrotechnical Lab., Ibaraki (Japan).
STUDIES ON VISUAL INFORMATION PROCESSING IN RETINAL NEURONS
Masahiro Yamada Oct. 1985 78 p In JAPANESE; ENGLISH summary
(EL-859; ISSN-0366-9106; UDC-612.843:681.3) Avail: NTIS HC A05/MF A01

In the retina a great deal of information is processed. A negative feedback hypothesis in synaptic mechanisms explaining color information processes in retinal neurons was not proved physiologically in spite of being supported by histological findings. In order to know the characteristics of visual information processing, the relationship between photostimulus and electric response of cells, particularly, the response dynamics was investigated. A linear response analysis method was applied to the neural network in a retina. The effects of light adaptation on the waveforms of oscillatory potentials found in photoresponses of rods were examined. The relationship between rod and cone neural pathways was studied. The responses of second neurons to photostimulus at receptor cells was also examined. B.G.

N86-27907# Electrotechnical Lab., Ibaraki (Japan).
STUDIES ON ACCURATE MEASUREMENTS AND ANALYSES OF HUMAN OLFACTORY EVOKED POTENTIALS
Mitsuo Tonoike Jan. 1986 86 p In JAPANESE; ENGLISH summary
(EL-863; ISSN-0366-9106; UDC-612.86:6512.825.5:159.933) Avail: NTIS HC A05/MF A01

Several techniques were developed to measure human olfactory evoked potentials (OEPs). Waveforms of the OEPs were recorded when perceived. Techniques for rejecting the contaminants and preventing various kinds of noise are described. The

saturation phenomenon is discussed with respect to the amplitude of OEPs for repeated pulse stimuli. Psychological studies on the scaling structure of odors were performed to compare the waveforms of OEPs with the psychological data of olfaction. Waveform of OEPs for various odorants were measured. The singuair value decomposition (SVD) method is applied to analyze the waveforms. The correlation of the response peak of OEPs at 300 milliseconds with the P300 response of the event related potential was discussed. B.G.

N86-27908# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
ELEMENTS OF RADIATION PROTECTION
M. Belli, S. Frullani, F. V. Orestano, and G. Campurra 15 Nov. 1985 101 p In ITALIAN; ENGLISH summary Seminar held in Rome, Italy, 21-23 Nov. 1983
(ISS-L-84/7; ISSN-0390-6493; ESA-86-97079) Avail: NTIS HC A06/MF A01

The biological effects of radiation, health effects of radiation, and the physical and medical aspects of radiation protection are discussed. For individual titles, see N86-27909 through N86-27912.

N86-27909# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
BIOLOGICAL EFFECTS OF IONIZING RADIATION [EFFETTI BIOLOGICI DELLE RADIAZIONI IONIZZANTI]
M. Belli *In its* Elements of Radiation Protection 15 Nov. 1985 28 p In ITALIAN (For primary document see N86-27908 18-52)
Avail: NTIS HC A06/MF A01

The processes leading to damage of living cells by ionizing radiation are reviewed. The discussion includes the definitions of relative biological effectiveness and linear energy transfer; a description of the primary processes and the effects on lipids, proteins and DNA; the DNA self-repairing processes; and theories of damaging mechanisms. It is concluded that DNA is the main target for permanent biological damage, which is a function of initial damage and recovery capacity. It is shown that mutation mechanisms where the effect-dose ratios do not show a threshold are relevant to genetic and cancerogenic effects. ESA

N86-27910# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
EFFECTS OF RADIATION HEALTH [EFFETTI SANITARI DELLE RADIAZIONI]
S. Frullani *In its* Elements of Radiation Protection 15 Nov. 1985 45 p In ITALIAN (For primary document see N86-27908 18-52)
Avail: NTIS HC A06/MF A01

The measurement of radiation parameters such as relative biological effectiveness and linear energy transfer, and the clinical effects of radiation as dependent of dose and type are reviewed in order to assess criteria for a radiation health policy. Stochastic and threshold effects are discussed. The protective regulations existing in the European Community are examined. It is shown that the dose limits are chosen to give a risk limit of one per thousand per year, that is ten times the amount corresponding to low risk professions. ESA

N86-27911# Calabria Univ., Cosenza (Italy).
OPERATING RADIATION PROTECTION: PHYSICAL ASPECTS [RADIOPROTEZIONE OPERATIVA: ASPETTI FISICI]
F. V. Orestano *In* Istituto Superiore di Sanita Elements of Radiation Protection 15 Nov. 1985 10 p In ITALIAN (For primary document see N86-27908 18-52)
Avail: NTIS HC A06/MF A01

The categories of radiation distinguished by Italian law and the function of the radiation expert required by Italian legislation to check working areas with a radiation hazard potential are examined. The details of the regulations are discussed and the full text of several norms is presented. ESA

N86-27912# European Nuclear Energy Agency, Frascati (Italy).
OPERATING RADIATION PROTECTION: MEDICAL ASPECTS [RADIOPROTEZIONE OPERATIVE: ASPETTI MEDICI]
G. Campurra *In* Istituto Superiore di Sanita Elements of Radiation Protection 15 Nov. 1985 12 p In ITALIAN (For primary document see N86-27908 18-52)
Avail: NTIS HC A06/MF A01

The duties of medical personnel working with radiation exposed workers are described. The nature of preliminary medical evaluations are explained, showing that the main goal is to determine workers' ability to support radiation risk and to identify as early as possible any pathological condition due to radiation or implying a physiological reduction of radiation resistance. Clinical examinations to be performed are classified and discussed. Italian regulations are included. ESA

N86-27913*# Arizona Water Resources Research Center, Tucson. Dept. of Physiology.
EFFECTS OF MUSCLE ATROPHY ON MOTOR CONTROL Final Technical Report, 1 Jun. 1982 - 31 May 1985
Douglas G. Stuart 1985 22 p
(Grant NAGw-338)
(NASA-CR-177201; NAS 1.26:177201) Avail: NTIS HC A02/MF A01 CSCL 06P

As a biological tissue, muscle adapts to the demands of usage. One traditional way of assessing the extent of this adaptation has been to examine the effects of an altered-activity protocol on the physiological properties of muscles. However, in order to accurately interpret the changes associated with an activity pattern, it is necessary to employ an appropriate control model. A substantial literature exists which reports altered-use effects by comparing experimental observations with those from animals raised in small laboratory cages. Some evidence suggests that small-cage-reared animals actually represent a model of reduced use. For example, laboratory animals subjected to limited physical activity have shown resistance to insulin-induced glucose uptake which can be altered by exercise training. This project concerned itself with the basic mechanisms underlying muscle atrophy. Specifically, the project addressed the issue of the appropriateness of rats raised in conventional-sized cages as experimental models to examine this phenomenon. The project hypothesis was that rats raised in small cages are inappropriate models for the study of muscle atrophy. The experimental protocol involved: 1) raising two populations of rats, one group in conventional (small)-sized cages and the other group in a much larger (133x) cage, from weanling age (21 days) through to young adulthood (125 days); 2) comparison of size- and force related characteristics of selected test muscles in an acute terminal paradigm. Author

N86-27914# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CONCERNING BAROTRAUMA OF THE LUNGS-TRANSLATION
G. Khristov 5 Feb. 1986 20 p Transl. into ENGLISH from Khirurgiya (Bulgaria), v. 22, no. 6, 1969 p 589-597
(AD-A165006; FTD-ID(RS)T-1143-85) Avail: NTIS HC A02/MF A01 CSCL 06/5

The popularization and development of skin diving has led to the appearance of a new type of trauma of the lungs, caused by rapid change in air pressure in the lungs during sudden ascent of the diver with the breath held. Barotrauma of the lungs may be occasionally observed in anesthesiological practice as well. The paper discusses the etiopathogenesis, clinical manifestations and treatment of the complaint. The author has observed and described three cases of barotrauma of the lungs, one of which ended in death. It is emphasized that effective treatment of pulmonary barotrauma is feasible only when a barochamber is available, large enough to accommodate the performance of resuscitation and, if necessary, surgical interventions. GRA

N86-27915# School of Aerospace Medicine, Brooks AFB, Tex.
SOFT CONTACT LENS WEAR DURING +G(Z) ACCELERATION Final Report, Oct. 1982 - Jun. 1985
William J. Flynn, Michael G. Block, Wayne F. Provines, Thomas J. Tredici, and Robert D. Kullman Dec. 1985 23 p
(AD-A165013; USAFSAM-TR-85-84) Avail: NTIS

HC A02/MF A01 CSCL 17/8

The effects of +G sub z on soft contact lens wear are reported here. Human centrifuge rides up to +8G sub z were accomplished on 11 subjects. Six myopic subjects were tested with low-, medium-, and high-water-content spherical soft lenses. Two astigmatic subjects were tested with various designs of toric soft lenses. In addition, the contact lens subjects were tested with spectacles for comparison. Three emetropic subjects served as controls. Video photography was used to monitor lens position during the centrifuge rides; and visual acuity was checked at +1, +2, +4, +6 and +8 G sub z with a reduced Snellen eye chart. Each lens type and control run was evaluated in straight-ahead, lateral, and vertical gaze. No significant decentration was noted for any of the lens types tested up to the maximum level of +8 G sub z. Visual acuity was reduced at the higher +G sub z levels for contact lenses, and spectacle trials, and with the emmetropic controls--all to similar levels. Contact lens did not produce any corneal insult due to the +G sub z exposure. Author (GRA)

N86-27916# Army Research Inst. of Environmental Medicine, Natick, Mass.

INFLUENCE OF ERYTHROCYTHEMIA ON BLOOD VOLUME AND THERMOREGULATION DURING EXERCISE-HEAT STRESS

Michael N. Sawka, Richard C. Dennis, Richard R. Gonzalez, Andrew J. Young, and Stephen R. Muza 1986 31 p

(AD-A165014; USARIEM-M-13/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

We studied the effects of autologous erythrocyte infusion on blood volume and thermoregulation during exercise in the heat. Using a double blind design, nine unacclimated male subjects were infused with either 700 ml of a NaCl glucose-phosphate solution containing approx. 60% hematocrit (n=6, reinfusion) or 700 ml of this solution only (n=3, saline). A heat stress test (HST) was attempted approximately 2 wk pre-and 48 h post-infusion during the late spring months. After 30 min of rest in a 20 C antechamber, the HST consisted of a 120-min exposure (two repeats of 15-min rest and 45-min treadmill walking) in a hot (35c, 45% rh) environment while euhydrated. Red cell volume (RCV, 51 CR) and plasma volume (PV, 125I) were measured 24-h before each HST, and maximal oxygen uptake (VO2 max) was measured 24-h after each HST. Generally, no significant effects were found for the saline group. For the reinfusion group, RCV (11%, $P<0.01$) and V02 max (11%, $P<0.05$) increased after infusion, and the following observations were made: (1) the increased RCV was associated with a reduction in PV to maintain the same blood volume as during the preinfusion measurements; (2) erythrocythemia reduced total circulating protein, but did not alter F-cell ratio, plasma osmolality, plasma protein content, or plasma lactate at rest or during exercise-heat stress; (3) erythrocythemia did not change the volume of fluid entering the intravascular space from rest to exercise-heat stress. GRA

N86-27917# Army Research Inst. of Environmental Medicine, Natick, Mass.

URINARY AND HEMATOLOGICAL INDICES OF HYPOHYDRATION

R. P. Francesconi, R. W. Hubbard, P. C. Szlyk, D. Schnakenberg, and D. Carlson 1986 22 p

(AD-A165015; USARIEM-M-15/86) Avail: NTIS HC A02/MF A01 CSCL 06/19

As part of a large scale field feeding system test we had the unique opportunity to collect and study hundreds of overnight urine aliquots which were obtained immediately prior to a fasting blood sample on days 1, 20, and 44 of the field test. To evaluate the hydrational status of test subjects and criteria of hypohydration, urine aliquots were categorized by specific gravity > or = 1.03 (n=124) or < 1.03 (n=540). Creatinine levels were elevated ($p<.001$) in the concentrated urine samples, but a decreased trend in Na(+)/K(+) ratios in these samples failed to achieve statistical significance ($p=0.1$). However, when individuals with high specific gravity urine were further subclassified by a criterion of weight loss > 3% from original body weight, then creatinine concentrations were elevated ($p=.05$) while Na(+)/K(+) ratios were decreased ($p=.05$) when compared with levels in subjects also with high specific gravity but weight loss < 3%. Serum urea nitrogen/creatinine ratios were significantly increased (days 1 and 44, $p=.02$) in test subjects whose urine samples exceeded 1.03 in specific gravity. The results of this study indicated that prodromal hypohydration, indicated by concomitant elevations in urinary specific gravity and creatinine, was not reflected in the common indices of circulatory hypohydration- hematocrit and osmolality. Alternatively, urea nitrogen/creatinine ratio may be a sensitive circulatory index of imminent hypohydration. GRA

N86-27918# Health Effects Research Lab., Research Triangle Park, N. C.

FACTORS INFLUENCING CARBOXYHEMOGLOBIN STABILITY Final Report, 1983 - 1984

George M. Goldstein, Louis Raggio, and Dennis House 26 Mar. 1985 39 p Prepared in cooperation with Rockwell International Corp., Chapel Hill, N.C.

(AD-A165032; TR-1811) Avail: NTIS HC A03/MF A01 CSCL 06/1

Carbon monoxide (CO) is a byproduct of the incomplete combustion of hydrocarbons. Because of its high affinity for oxygen binding sites on hemoglobin and displacing oxygen, the presence of CO in the atmosphere has been shown to produce adverse health effects, affecting the cardiovascular system as well as causing behavioral changes. These changes have been reported at concentrations of carboxyhemoglobin (COHB) in the range of 4 to 6%. The Department of Defense (DOD) is concerned about the production of CO in fixed and mobile weapon systems and the relationship between behavior and health effects in military personnel associated with this exposure. The source of CO in a combat situation is exhaust gases from motorized vehicles and propellant gases from weapon systems. Studies were conducted to determine the stability of carboxyhemoglobin (COHb) in evacuated blood containers using the IL-282 co-oximeter as the measurement instrument. This study has shown that COHb levels decrease by 5 to 10% of the original value after three days of storage and remain stable for 14 days at 4 C or 21 C in vacutainers containing heparin or EDTA. The storage temperature, 4 C or 21 C had no appreciable affect on COHb levels. Blood samples that contained the anticoagulant heparin had higher initia l values of COHb than samples with EDTA. In this study ambient room light levels did not affect the measured levels of COHb at 4C for 5 days. GRA

N86-27919# Texas Univ., Arlington. Dept. of Psychology.

EFFECTS OF ATROPINE SULFATE ON AIRCREW PERFORMANCE Final Report, Mar. 1983 - Apr. 1985

Michael L. Lobb, James D. Phillips, Jr., and A. S. Winter Dec. 1985 16 p

(Contract F33615-83-K-0611)

(AD-A165063; USAFSAM-TR-85-48) Avail: NTIS HC A02/MF A01 CSCL 06/15

The human/animal literature on performance effects of atropine sulfate is reviewed and extrapolated to aircrew requirements. Subjective reports and physiological dose-response curves are used to estimate effective dosage levels for performance; ED50 is the dose at which 50% of an aircrew experiences a detectable performance change. Based on this review and extrapolation, the ED40 level for atropine sulfate is 2 mg IM/person for performance effects on near vision, alertness, equilibrium, response-force discrimination, and enunciation: the ED5 level is estimated at 1.35 mg IM/person. Although the published literature on simultaneously administered acetylcholinesterase inhibitors and blockers is insufficient to warrant even a tentative conclusion, the initial results suggest a combined mode of action in the visual system; if confirmed, such action would limit the use of atropine to counteract chemical-warfare performance decrements. Thus although atropine may be lifesaving, it does not prevent aircrew performance losses due to chemical-warfare agents and may impose additional decrements. GRA

N86-27870# Joint Publications Research Service, Arlington, Va.
LACTOBACTERIA AND PROPHYLAXIS IN SPACE
I. Ivanov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 1 Transl. into ENGLISH from Tass (Tartu, USSR), 11 Mar. 1986 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

N86-27872# Joint Publications Research Service, Arlington, Va.
SWEATING REFLEX IN COMPLEX OF METHODS FOR EVALUATING OPERATOR EFFICIENCY
P. P. Slynko, L. I. Bukvareva, S. V. Zaporozhets, and P. M. Onishchenko *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 46 Transl. into ENGLISH from Fiziologicheskiy Zhurnal (Kiev, USSR), v. 31, no. 6, Nov. - Dec. 1985 p 678-682 Original language document was announced as A86-21453 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

N86-27874# Joint Publications Research Service, Arlington, Va.
EFFECTS OF COLD EXPOSURE ON THERMAL STATUS OF MEN AND WOMEN
R. F. Afanasyeva and R. O. Oganyan *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 100 Transl. into ENGLISH from Gigiyena Truda i Professionalnyye Zabolevaniya (Moscow, USSR), no. 1, Jan. 1986 p 24-28 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

N86-27875# Joint Publications Research Service, Arlington, Va.
STUDY OF BRAIN BIOCHEMISTRY DURING HYPOTHERMIA
E. E. Emirbekov and S. P. Lvova *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 101 Transl. into ENGLISH from Kriobiologiya (Kiev, USSR), no. 1, 1985 p 44-49 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

N86-27876# Joint Publications Research Service, Arlington, Va.
SOMATOSENSORY AND AUDITORY PERCEPTION ACCORDING TO STUDY USING FOCUSED ULTRASOUND
Ye. M. Tsirulnikov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-008) 9 May 1986 p 102 Transl. into ENGLISH from Zhurnal Evolyutsionnoy Biokhimii i Fiziologii (Leningrad, USSR), v. 21, no. 6, Nov. - Dec. 1985 p 591-596 (For primary document see N86-27869 18-51)
Avail: NTIS HC A07/MF A01

N86-27879# Joint Publications Research Service, Arlington, Va.
PROSPECTS FOR USING ULTRAVIOLET RADIATION IN LONG-TERM SPACEFLIGHTS
N. Ye. Panferova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 1-13 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 4-12 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27880# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL AND GENERAL THEORETICAL RESEARCH: NATURE OF CIRCULATORY REGULATION IN PILOTS
V. G. Doroshev, Z. A. Kirillova, and A. P. Vanarshenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 14-18 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 12-15 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27882# Joint Publications Research Service, Arlington, Va.
EFFECT OF INTENSIVE OPERATOR WORK ON LIPID PEROXIDATION PROCESSES IN MAN
S. M. Ivanova, O. N. Orlov, S. S. Brantova, O. I. Labetskaya, N. A. Davydova, A. Ye. Zezerov, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 25-28 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 20-22 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27884# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS IN HUMORAL CONTROL OF METABOLISM WITH SIMULATION OF SPACEFLIGHT FACTORS
S. Kalandarov, V. P. Bychkov, I. D. Frenkel, and G. I. Proskurova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 34-38 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 25-28 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27885# Joint Publications Research Service, Arlington, Va.
SOME HUMAN REACTIONS DURING 7-DAY ANTIORTHOSTATIC HYPOKINESIA
B. F. Asyamolov, V. S. Panchenko, V. A. Karpusheva, R. A. Bondarenko, O. A. Vorobyev, V. V. Zaritskiy, V. P. Stupnitskiy, I. G. Popov, P. A. Lozinskiy, and S. M. Ledovskoy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 39-44 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 29-32 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27887# Joint Publications Research Service, Arlington, Va.
HUMAN CENTRAL HEMODYNAMICS DURING LOWER LIMB DECOMPRESSION
V. V. Rumyantsev and V. Ye. Katkov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 49-52 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 35-37 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27888# Joint Publications Research Service, Arlington, Va.
PHASIC PROCESSES IN KINETICS OF FORMED BLOOD ELEMENTS
V. V. Verigo and F. Gauser *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 53-58 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 38-41 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27892# Joint Publications Research Service, Arlington, Va.
T AND B COMPONENTS OF IMMUNITY IN THE PRESENCE OF ACUTE MOUNTAIN SICKNESS
M. M. Mirrakhimov, M. I. Kitayev, R. O. Khamzamulin, A. G. Tokhtabayev, and S. M. Pogrebitskiy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 79-84 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 53-56 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27893# Joint Publications Research Service, Arlington, Va.
EFFECT OF DIFFERENT DOSES OF ULTRAVIOLET RADIATION ON VITAMIN LEVELS IN MAN
M. S. Belakovskiy, M. G. Yuzhanskaya, N. Ye. Panferova, L. Kh. Pastushkova, O. G. Pereverzeva, A. N. Smirnova, I. N. Sergeyev, and V. B. Spirichev *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 85-91 Transl. into ENGLISH from

Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 56-61 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27895# Joint Publications Research Service, Arlington, Va.
RADIOBIOLOGICAL VALIDATION OF QUALITY FACTOR OF PROTONS AND HELIUM IONS
N. I. Ryzhov and B. S. Fedorenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 95-99 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 63-66 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27899# Joint Publications Research Service, Arlington, Va.
METHOD OF DEMONSTRATING CALCIUM IN HUMAN FOOT BY NEUTRON ACTIVATION OF (ALPHA, N)-SOURCES
V. Ye. Zaychik, A. Ye. Kondrashov, and B. V. Morukov *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 113-119 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, Jan. - Feb. 1986 p 75-78 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27901# Joint Publications Research Service, Arlington, Va.
AMINO ACID SPECTRUM OF HUMAN BLOOD IN THE PRESENCE OF EMOTIONAL STRESS
T. F. Vlasova, A. S. Ushakov, V. P. Bychkov, and Ye. B. Miroshnikova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 123-125 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 80-82 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27902# Joint Publications Research Service, Arlington, Va.
BLOOD SERUM ENZYMES DURING 7-DAY WATER IMMERSION
T. Ye. Drozdova and Ye. G. Vetrova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 126-128 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 82-83 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27904# Joint Publications Research Service, Arlington, Va.
RADIOPROTECTIVE AND THERAPEUTIC EFFICACY OF CARRAGEENAN AGAINST PROTON RADIATION
K. S. Chertkov, N. I. Gvozdeva, B. S. Fedorenko, and Yu. Yu. Preobrazhenskiy *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 132-135 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 84-86 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-27920*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYTICAL TECHNIQUES OF PILOT SCANNING BEHAVIOR AND THEIR APPLICATION
Randall L. Harris, Sr., Bobby J. Glover (PRC Kentron, Inc., Hampton, Va.), and Amos A. Spady, Jr. Jul. 1986 46 p refs
(NASA-TP-2525; L-15995; NAS 1.60:2525) Avail: NTIS HC A03/MF A01 CSCL 05I

The state of the art of oculometric data analysis techniques and their applications in certain research areas such as pilot workload, information transfer provided by various display formats, crew role in automated systems, and pilot training are documented. These analytical techniques produce the following data: real-time viewing of the pilot's scanning behavior, average dwell times, dwell percentages, instrument transition paths, dwell histograms, and entropy rate measures. These types of data are discussed, and overviews of the experimental setup, data analysis techniques, and software are presented. A glossary of terms frequently used in pilot scanning behavior and a bibliography of reports on related research sponsored by NASA Langley Research Center are also presented. Author

N86-27921# School of Aerospace Medicine, Brooks AFB, Tex.
US AIR FORCE COMBAT PSYCHIATRY Final Report, Jan. 1979 - Jun. 1985
David R. Jones Jan. 1986 44 p
(AD-A165011; USAFSAM-TR-85-83) Avail: NTIS HC A03/MF A01 CSCL 05/10

The U.S. Air Force faces the distinct possibility that its bases may be vulnerable to enemy attack. Combat fatigue may thus affect nonfliers, whereas in past conflicts fliers have been the ones affected. This report reviews the literature on the effects of combat: first on fliers, then on nonfliers. The report suggests that flight surgeons use 2 main agents of therapy, rest and the force of their personality, to delay or prevent combat fatigue in fliers. The report also discusses the relevant signs and symptoms, both in fliers and in nonfliers, and ends with a presentation of the principles of Brevity, Immediacy, Centrality, Expectancy, Proximity, and Similicity in dealing with combat fatigue in nonfliers. GRA

N86-27922# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
INITIAL SKILL LEARNING: AN ANALYSIS OF HOW ELABORATIONS FACILITATE THE THREE COMPONENTS Technical Report, Oct. 1984 - Feb. 1986
Davida H. Charney and Lynne M. Reder 14 Feb. 1986 57 p
(Contract N00014-84-K-0063)
(AD-A165137; TR-86-1-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/10

This paper is concerned with the issue of how verbal instructions influence skill learning. In particular, our goal is to outline the components of initial cognitive skill acquisition and analyze what features of elaborations in the instructional materials can facilitate each component. We identify three basic components of skill learning: learning novel concepts and the functionality of novel concepts and procedures; learning how to execute the procedures; and learning the conditions under which the procedures can and should be applied. Each of these components can be learned independently and each component can be a bottleneck to acquiring a skill. Situation examples are the most useful type of elaboration for skill learning because each example can contribute to learning in all three components. On the other hand, while analogies can be constructed to illustrate each component, they are more likely to help people learn the functionality of a procedure than how to execute it or when to select it. However, since learners tend to rely on examples as models, it is very important to choose examples with great care and to provide enough examples to illustrate the range of application of a rule or procedure. Otherwise, learners may interpret a rule incorrectly or make spurious assumptions about the conditions under which it applies. GRA

N86-27881# Joint Publications Research Service, Arlington, Va.
PSYCHOEMOTIONAL PILOT STRESS PRIOR TO EJECTION AND ITS ROLE IN APPROPRIATE PERFORMANCE
A. P. Kozlovskiy and A. F. Kovalenko *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 19-24 Transl. into ENGLISH

from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 16-19 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

N86-27883# Joint Publications Research Service, Arlington, Va.
EFFECT OF RHYTHMIC PHOTIC INTERFERENCE ON WORKING ELECTROENCEPHALOGRAM AND EFFICIENCY OF HUMAN MOVEMENTS
Ye. T. Petrenko and L. A. Yermukhametova *In its* USSR Report: Space Biology and Aerospace Medicine, No. 1, January - February 1986 (JPRS-USB-86-003) 17 Apr. 1986 p 29-33 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 1, Jan. Feb. 1986 p 22-25 (For primary document see N86-27878 18-51)
Avail: NTIS HC A08

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

No abstracts in this category.

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-27923# Southwest Research Inst., San Antonio, Tex. Dept. of Bioengineering.
EFFECTS OF 60 Hz ELECTRIC FIELDS ON OPERANT AND SOCIAL STRESS BEHAVIORS OF NONHUMAN PRIMATES
W. R. Rogers, J. H. Lucas, G. T. Moore, and J. L. Orr 1985 18 p Presented at the DOE Contractors Conference, Alexandria, Va., 5 Nov. 1985
(Contract DE-AC02-80RA-50219)
(DE86-003748; CONF-8511143-1) Avail: NTIS HC A02/MF A01

An overall description of this research program is presented. The objectives are to investigate the use of nonhuman primates to investigate possible behavioral effects associated with exposure to high-intensity, 60 Hz, electric fields. DOE

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-27924# Virginia Polytechnic Inst. and State Univ., Blacksburg. Coll. of Engineering.
ENGINEERING SCIENCE AND MECHANICS COMPUTER LABORATORY USER'S GUIDE
C. Thompson and C. Hawley Feb. 1986 13 p
(PB86-166022; VPI-E-86-4) Avail: NTIS HC A02/MF A01 CSCL 09B

The User's Guide introduces the services and resources provided by the Engineering Science and Mechanics Computer Laboratory. Topics include general information regarding the hours of operation, accounting procedures, and methods of communicating with other computers on campus. GRA

N86-27498# Joint Publications Research Service, Arlington, Va.
ENGINEERING STANDARD OF MOS MEMORY MODULE
Jingdong Chen, Zucai Zhu, and Zhongquan Xu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 174-179 Transl. into ENGLISH from Jisuanji Yanjiu Yu Fazhan (Beijing, China), v. 21, no. 11, Nov. 1984 p 30-36 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-27925*# National Aeronautics and Space Administration, Washington, D.C.
COMPUTER-ASSISTED DESIGN OF ORGANIC SYNTHESIS
Hiroshi Kaminaka Apr. 1986 20 p Transl. into ENGLISH from Kagaku to Kogyo (Osaka, Japan), v. 59, no. 7, 1985 p 263-268 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88401; NAS 1.15:88401) Avail: NTIS HC A02/MF A01 CSCL 09B

The computer programs to design synthetic pathways of organic compounds have been utilized throughout the world since the first system was reported by Corey in 1969, and the LHASA was reported in1972 to become the predominant system. Many programs have been reported mainly in the United States and Europe, and groups of corporations, especially chemical companies, have been trying to improve programs and increase the efficiency of research. In Japan, unfortunately, no concrete movement in this area has been seen. Of course, it goes without saying that these kinds of programs are effective for efficient research, but the remarkable aspect is that these can present unexpected data to the researchers to stimulate them to develop new ideas. Author

N86-27926# Lockheed-California Co., Burbank.
KRASH85 USER'S GUIDE: INPUT/OUTPUT FORMAT Final Report, Jan. 1984 - Sep. 1984
M. A. Gamon, G. Wittlin, and W. L. LaBarge Jul. 1985 235 p
(DOT/FAA/CT-85/10-Rev; LR-30777-Rev) Avail: NTIS HC A11/MF A01 CSCL 09B

Program KRASH as modified under Contract DTFA03-84-C-00004 is described. The updated version is denoted KRASH85. This document is a User's Guide and defines the input and output formats appropriate for KRASH85. Features that are incorporated into KRASH85 include: an improved plastic hinge moment algorithm; gear-oleo metering pin coding; load-interaction curves; an expanded initial conditions subroutine (combined with NASTRAN); a comprehensive energy balance; center of gravity (c.g.) displacement, velocity, acceleration and force time histories; revised vertical beam orientation coding; provision to save data for post-processing i.e., acceleration, mass location and forces; provisions to input preprocessed data; a corrected uncoupled KR curve unloading/reloading algorithm; provisions to define a tire spring (remains normal to ground plane); provisions to number the masses to an arbitrary sequence; and an option to compute section shear and moment distributions. Author

N86-27927*# Operations Research, Inc., Rockville, Md.
SPECTRUM ORBIT UTILIZATION PROGRAM DOCUMENTA-

TION: SOUP5 VERSION 3.8 USER'S MANUAL, VOLUME 1, CHAPTERS 1 THROUGH 5 Final Report
J. Davidson, H. R. Ottey, P. Sawitz, and F. S. Zusman 10 Jun. 1985 194 p
(Contract NAS3-22885)
(NASA-CR-174889; NAS 1.26:174889; TR-2273-Vol-1) Avail: NTIS HC A09/MF A01 CSCL 09B

The underlying engineering and mathematical models as well as the computational methods used by the Spectrum Orbit Utilization Program 5 (SOUP5) analysis programs are described. Included are the algorithms used to calculate the technical parameters, and references to the technical literature. The organization, capabilities, processing sequences, and processing and data options of the SOUP5 system are described. The details of the geometric calculations are given. Also discussed are the various antenna gain algorithms; rain attenuation and depolarization calculations; calculations of transmitter power and received power flux density; channelization options, interference categories, and protection ratio calculation; generation of aggregate interference and margins; equivalent gain calculations; and how to enter a protection ratio template. B.G.

N86-27928*# Operations Research, Inc., Rockville, Md.
SPECTRUM ORBIT UTILIZATION PROGRAM DOCUMENTATION: SOUP5 VERSION 3.8 USER'S MANUAL, VOLUME 2, APPENDICES A THROUGH G Final Report
J. Davidson, H. R. Ottey, P. Sawitz, and F. S. Zusman 10 Jun. 1985 124 p
(Contract NAS3-22885)
(NASA-CR-174890; NAS 1.26:174890; TR-2273-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 09B

The appendixes of the user manual are presented. Input forms which may be used to prepare data for the SOUP5V3.4 of the R2BCSAT-83 data base are given. The IBM job control language which can be used to run the SOUP5 system from a magnetic tape is described. Copies of a run using the delivered tape and IBM OS/MVS Job Control Language card deck are illustrated. Numerical limits on scenario data requests are listed. Error handling, error messages and editing procedures are also listed. Instructions as to how to enter a protection ratio template are given. And relation between PARC prameter, channelization, channel families, and interference categories are also listed. E.R.

N86-27929# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
FLIGHT SIMULATION MOTION-BASE DRIVE ALGORITHMS. PART 2: SELECTING THE SYSTEM PARAMETERS
L. D. Reid and M. A. Nahon May 1986 231 p Sponsored by tyhe Canadian Transportation Development Centre
(UTIAS-307; ISSN-0082-5255) Avail: NTIS HC A11/MF A01

A project aimed at developing and testing flight simulator motion-base drive algorithms suited for commercial jet transports is discussed. Full six degrees-of-freedom motion of a synergistic motion-base is being studied. Three forms for these algorithms are being considered: (1) classical linear washout, (2) optimal control, and (3) coordinated adaptive washout. It is felt that the latter two techniques may provide some advantages over the classical, which is currently employed in most commercial flight simulators. A filter parameter selection process using typical jet transport maneuvers as input signals is discussed. The filter parameters were adjusted to produce a range of washout characteristics. The pilot's motion sensations produced by these tests were estimated through the use of linear models of the human vestibular system. Nine sets of washout filters were generated for future evaluation by a group of pilots. Computer listings of the real-time software are presented along with numerous test results. Author

N86-27930*# College of William and Mary, Williamsburg, Va. Dept. of Computer Science.
A HIGH-ORDER LANGUAGE DOR A SYSTEM OF CLOSELY COUPLED PROCESSING ELEMENTS Final Report
Stefan Feyock and W. Robert Collins Jul. 1986 67 p
(Grant NAG3-232)
(NASA-CR-177280; NAS 1.26:177280) Avail: NTIS HC A04/MF A01 CSCL 09B

The research reported in this paper was occasioned by the requirements on part of the Real-Time Digital Simulator (RTDS) project under way at NASA Lewis Research Center. The RTDS simulation scheme employs a network of CPUs running lock-step cycles in the parallel computations of jet airplane simulations. Their need for a high order language (HOL) that would allow non-experts to write simulation applications and that could be implemented on a possibly varying network can best be fulfilled by using the programming language Ada. We describe how the simulation problems can be modeled in Ada, how to map a single, multi-processing Ada program into code for individual processors, regardless of network reconfiguration, and why some Ada language features are particulary well-suited to network simulations. Author

N86-27931*# Research and Data Systems, Inc., Lanham, Md.
NIMBUS-7 ERB DELMAT OPERATORS GUIDE AND MAINTENANCE MANUAL
Lanning M. Penn and Philip E. Ardanuy Mar. 1986 67 p
(Contract NAS5-27728)
(NASA-CR-17874; NAS 1.26:17874; RDS-TR-82-08-04) Avail: NTIS HC A04/MF A01 CSCL 09B

Described in detail are the ERB DELMAT algorithms used to correct the wide field-of-view channels (11, 12, 13 and 14) radiometer data. The computer software and the required operational environment are also delineated. The information and procedures required to maintain the DELMAT program are also described. Author

N86-27932*# Houston Univ., Tex. Dept. of Computer Science.
DATABASE INTERFACES ON NASA'S HETEROGENEOUS DISTRIBUTED DATABASE SYSTEM Semiannual Report
Shou-Hsuan Stephen Huang 14 Jul. 1986 34 p
(Grant NAG5-739)
(NASA-CR-177248; NAS 1.26:177248) Avail: NTIS HC A03/MF A01 CSCL 09B

The purpose of the ORACLE interface is to enable the DAVID program to submit queries and transactions to databases running under the ORACLE DBMS. The interface package is made up of several modules. The progress of these modules is described below. The two approaches used in implementing the interface are also discussed. Detailed discussion of the design of the templates is shown and concluding remarks are presented. Author

N86-27933*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
A GENERAL NUMERICAL ANALYSIS PROGRAM FOR THE SUPERCONDUCTING QUASIPARTICLE MIXER
Ross G. Hicks, Marc J. Feldman, and Anthony R. Kerr Jul. 1986 117 p
(NASA-TM-86145; NAS 1.15:86145) Avail: NTIS HC A05/MF A01 CSCL 09B

A user-oriented computer program SISCAP (SIS Computer Analysis Program) for analyzing SIS mixers is described. The program allows arbitrary impedance terminations to be specified at all LO harmonics and sideband frequencies. It is therefore able to treat a much more general class of SIS mixers than the widely used three-frequency analysis, for which the harmonics are assumed to be short-circuited. An additional program, GETCHI, provides the necessary input data to program SISCAP. The SISCAP program performs a nonlinear analysis to determine the SIS junction voltage waveform produced by the local oscillator. The quantum theory of mixing is used in its most general form, treating the large signal properties of the mixer in the time domain. A small signal linear analysis is then used to find the conversion loss and port impedances. The noise analysis includes thermal noise from the termination resistances and shot noise from the periodic LO current. Quantum noise is not considered. Many aspects of the program have been adequately verified and found accurate. Author

N86-27934# Naval Research Lab., Washington, D. C.
EXECUTING TRACE SPECIFICATIONS USING PROLOG Interim Report, Jan. 1984 - Jun. 1985
John D. McLean, David M. Weiss, and Carl E. Landwehr 21 Jan. 1986 13 p
(AD-A164877; NRL-8940) Avail: NTIS HC A02/MF A01 CSCL 09/2

Trace specifications have some desirable properties that most specifications lack: they are abstract, so they need not impose unnecessary constraints on the implementor; and they are formal, so they can be understood unambiguously and can be rigorously tested for consistency, totalness, and correctness of implementation. Nevertheless, understanding trace specifications and translating them to computer programs are significant tasks. This report documents experiments in translating trace specifications to Prolog so that they can be executed directly. The selection of Prolog over other possible languages is discussed, and several example specifications and their translations are presented. Some generally useful Prolog predicates are gleaned from these examples, and difficulties encountered in performing the translations are described. On the way, an implementation-free semantics for a subset of Prolog is given. The report concludes with a discussion of possibilities for mechanically translating trace specifications to Prolog. Author (GRA)

N86-27935# Naval Postgraduate School, Monterey, Calif.
OZDRAW: A REAL-TIME INTERACTIVE FIGURE GENERATION SYSTEM M.S. Thesis
Steven J. Firth Dec. 1985 60 p
(AD-A165020) Avail: NTIS HC A04/MF A01 CSCL 09/2

The capability to produce and reproduce quality technical figures, such as those found in official reports and academic papers is invaluable in a business, administrative or academic environment. Ideally, the user should have the ability to produce a figure quickly and with a minimum of effort. Further, if the user is using an automated or semi-automated process he should not be encumbered by the requirement to learn, and hence remember, complex operating procedures; the system should be simple, self-documenting, powerful and yet be able to be used by an untrained person. Numerous automated systems have been devised to aid the author in the figure generation process. Few of these systems have used visual feedback during figure production. These non-visual systems tend to be based upon operating system-like command interfaces. The main reason for this limitation was the prohibitive expense of computer-graphics terminals and workstations with sufficient capabilities to provide real-time, interactive feedback. With the advances in display technology has come a significant drop in price such that this has become less of a problem. Consequently, this thesis re-opens the issue of computer-assisted technical figure generation. It does this in terms of a real-time, interactive figure gen eration. Author (GRA)

N86-27936# Army Electronic Proving Ground, Fort Huachuca, Ariz.
METHODOLOGY INVESTIGATION, PROGRAM FLOW ANALYZER, VOLUME 2 Final Report
Edward L. Anderson Sep. 1985 108 p
(AD-A165029) Avail: NTIS HC A06/MF A01 CSCL 09/2

The table-driven Assembly Code Analysis Program (ACAP) is one component in a family of automated software assessment tools. These tools extract information about software quality features of the target software being examined. ACAP provides a translator which can be modified to tailor it to the specific assembly language of the target software. Provision is also made in the ACAP system for generating reports from information collected by other language translators. The ACAP system has been developed on the Digital Equipment VAX series of computers utilizing VMS. The ACAP is written entirely in VAX/DCL and FORTRAN. The table driven ACAP system accepts input defining the mnemonics of the assembler language to be analyzed. Depending on the particular language, the statement parser may need modification and subsequent linkage within the code translation section of ACAP. ACAP determines information about the structure, complexity, use of instructions and variables, and selected quality parameters. A general purpose report writer interfaces with ACAP and other code analysis programs. Data generated by these programs are provided via files to the Report Writer. These files supply the data that creates the software assessment reports, and in addition, are concatenated into a single maste r file. The ACAP system also provides the capability to create a paginated, sequenced listing to assist in software assessment activities. GRA

N86-27937# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: ADVANCED Ada TOPICS L305 TEACHER'S GUIDE, VOLUME 1
1986 389 p
(Contract DAAB07-83-C-K506)
(AD-A165075) Avail: NTIS HC A17/MF A01 CSCL 09/2

This teacher's guide on advanced Ada topics consists of the following sections: (1) Basic structuring features; (2) Recursive subprograms; (3) Sets using Boolean arrays; (4) Linear lists; (5) Linked lists and recursive types; (6) Data type encapsulation; (7) Private types; (8) Limited private types; and (9) use of exceptions. GRA

N86-27938# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: ADVANCED Ada L305 TEACHER'S GUIDE, VOLUME 2
1986 616 p
(Contract DAAB07-83-C-K506)
(AD-A165076) Avail: NTIS HC A99/MF A01 CSCL 09/2

This teachers' guide on advanced Ada topics consist of the following sections: (10) Overloading; (11) Generic units; (12) Derived types; (13) Unchecked deallocation; (14) Generic packages for stacks; (15) Trees; (16) Searching; (17) Sorting; (18) Linked list implementation of sets; (19) Mergeable sets; and (20) Graphs. GRA

N86-27939# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: ADVANCED Ada TOPICS L305 TEACHER'S GUIDE, VOLUME 3
1986 184 p
(Contract DAAB07-83-C-K506)
(AD-A165077) Avail: NTIS HC A09/MF A01 CSCL 09/2

This teachers' guide on advanced Ada topics consist of the following sections: (21) Low level and implementation - dependent features; (22) Example of low level programming; and, (23) Overview of Ada task language. GRA

N86-27940# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: INTRODUCTION TO SOFTWARE ENGINEERING M102 TEACHER'S GUIDE
1986 548 p
(Contract DAAB07-83-C-K506)
(AD-A165122) Avail: NTIS HC A23/MF A01 CSCL 05/9

The Ada training curriculum: Introduction to software engineering M102 teacher's guide contains the following program: Day 1 - (1) Introduction - Background and Motivation; (2) Software Engineering and its Goals - Goals, and Software Engineering Principles; (3) How These Goals are Achieved - The Life-Cycle Model to Develop Systems, MIL-STDS and Documentation, Introduction to Methods and Tools, Requirements Analysis: Introduction, and Analysis Method Overview; Day 2 - (4) How These Goals are Achieved (Continued) - Design Overview, Design Method Overview, Detailed Design Techniques, Implementation Overview, Structured Programming, Testing Approaches, and Software Management; Summary-Relationship of Software Engineering Techniques to Ada. GRA

N86-27941# Softech, Inc., Waltham, Mass.
Ada (TRADEMARK) TRAINING CURRICULUM: SOFTWARE ENGINEERING FOR MANAGERS M101 TEACHER'S GUIDE
1986 359 p
(Contract DAAB07-83-C-K506)
(AD-A165123) Avail: NTIS HC A16/MF A01 CSCL 05/9

The Ada training curriculum: Software engineering for managers M101 teacher's guide contains the following: (1) Background and Motivation - Definition of Software Engineering, and Motivation for Software Engineering (Software Crisis); (2) Software Engineering and its Goals - Software Engineering Goals, and Software Engineering Principles; (3) Achieving Software Engineering Goals - Software Life-Cycle, Methods and Tools for each phase of Life-Cycle, Testing, and Software Management: (4) Software Engineering and Ada - Relationship of Software Engineering to Ada. GRA

N86-27942# Army Electronic Proving Ground, Fort Huachuca, Ariz.
PROGRAM FLOW ANALYZER. VOLUME 1 Final Methodology Investigation Report
Edward L. Anderson Sep. 1985 31 p
(AD-A165152) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Program Flow Analyzer (PFA) methodology investigation developed an automated tool for software analysis in such a manner as to simplify the effort required to develop new front-end encoders. While the PFA design has allowed a significant reduction in development time for new front-end encoders,there is a need for a more flexible multi-lingual capability. It is recommended that the Multi-lingual Static Analysis Tool be developed to satisfy this need. GRA

N86-27943# Oklahoma State Univ., Stillwater. Electronics Lab.
IRIG FORMAT B DECODER
John Pearson and Jerry Grayson Jun. 1985 21 p
(Contract F19628-81-C-0079)
(AD-A165225; AFGL-TR-85-0193; SR-4) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report describes a special application of a microprocessor for decoding a serial bit stream of data from an IRIG B time code generator. The report covers theory of operation, suggestions for improvement and modification and a listing of the system software. GRA

N86-27944# Naval Postgraduate School, Monterey, Calif.
THE DESIGN AND ANALYSIS OF A COMPLETE ENTITY-RELATIONSHIP INTERFACE FOR THE MULTI-BACKEND DATABASE SYSTEM M.S. Thesis
Philip L. Goisman 19 Dec. 1985 93 p
(AD-A165255) Avail: NTIS HC A05/MF A01 CSCL 09/2

Interest in increasing programmer productivity has spawned new software tools. Some of these tools are statistical packages, program generators, and database management systems (DBMS). One area of DBMS research designed to improve the efficiency of DBMS is the multi-lingual database system (MLDS). MLDS combines software and hardware technology to gain efficiency and versatility in DBMS. The MLDS design goals overcome the conventional limitation to develope a database system that supports a single data model and a corresponding model-based data languages are SQL, DL/I, CODASYL, and Daplex. These models and their data languages are supported conventionally by separate DBMS. Instead, MLDS as a single DBMS is capable of supporting multiple models and their respective database languages. This thesis presents a methodology for supporting entity-relationship database management on an attribute-based database system, since the heart of MLDS is the attribute-base system. Specifically, it provides the design specifications for transforming Daplex requests into equivalent attribute-based data language requests. During this design process, we describe the data structures, control structures, and the functions required to implement this transformation. GRA

N86-27945# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) TRANING CURRICULUM. ADVANCED ADA TOPICS L305 TEACHER'S GUIDE
1986 79 p
(Contract DAAB07-83-C-K506)
(AD-A165288; AD-F630715) Avail: NTIS HC A05/MF A01 CSCL 05/9

There are far more exercises in this booklet than can be solved during one presentation of L305. The instructors should select specific exercises for the class based on the class's mathematical background and programming ability, the pace of the course, and the degree of success solving previous exercises. The purpose of this Guide is to help instructors make this selection. Each exercise is designed for a certain point in the course. An accompanying diagram shows the point at which each exercise can be assigned. In most cases the exercise makes use of information presented as part of the indicated topic, and should be assigned after that topic has been presented. Because L305 emphasizes data abstraction and the construction of software out of components, solutions to most of the exercises are packages rather than subprograms. Thus they are not executable by themselves. GRA

N86-27946*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE ISEE-3 ULEWAT: FLUX TAPE DESCRIPTION AND HEAVY ION FLUXES 1978-1984
G. M. Mason (Maryland Univ., College Park.) and B. Klecker Dec. 1985 325 p Partly in ENGLISH and FRENCH
(Contracts NAS5-26739; BMFT-RV-14-B8/74;
BMFT-0101-ZA/WF/WRD-174/4)
(NASA-CR-177269; NAS 1.26:177269; MPE-IN-Rept-46;
ISSN-0340-8922; EPA-86-96935) Avail: NTIS HC A14/MF A01

The ISEE ULEWAT FLUX tapes contain ULEWAT and ISEE pool tape data summarized over relatively long time intervals (1hr) in order to compact the data set into an easily usable size. (Roughly 3 years of data fit onto one 1600 BPI 9-track magnetic tape). In making the tapes, corrections were made to the ULEWAT basic data tapes in order to, remove rate spikes and account for changes in instrument response so that to a large extent instrument fluxes can be calculated easily from the FLUX tapes without further consideration of instrument performance. ESA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-27947*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HYBRID ROUTING TECHNIQUE FOR A FAULT-TOLERANT, INTEGRATED INFORMATION NETWORK
Barry D. Meredith Jul. 1986 20 p
(NASA-TP-2605; L-16034; NAS 1.60:2605) Avail: NTIS HC A02/MF A01 CSCL 09B

The evolutionary growth of the space station and the diverse activities onboard are expected to require a hierarchy of integrated, local area networks capable of supporting data, voice, and video communications. In addition, fault-tolerant network operation is necessary to protect communications between critical systems attached to the net and to relieve the valuable human resources onboard the space station of time-critical data system repair tasks. A key issue for the design of the fault-tolerant, integrated network is the development of a robust routing algorithm which dynamically selects the optimum communication paths through the net. A routing technique is described that adapts to topological changes in the network to support fault-tolerant operation and system evolvability. Author

N86-27948# Sistemi di Teleinformatica ed Automazione, Rome (Italy).
ADVANCED DATA SYSTEM INTERCONNECTION STUDY Final Report
Paris, France ESA 8 Jun. 1985 82 p Revised Prepared in cooperation with MATRA Espace, Toulouse, France
(Contracts ESTEC-6017/84-NL-BI; SESA-2065-S)
(IS-23-003-Rev; ESA-CR(P)-2121-Rev) Avail: NTIS HC A05/MF A01

Onboard data management system requirements were re-

viewed. The study includes the identification of the services to be provided to the end users, the analysis of the data communication network architectures, and the design of the data system specification according to space environment constraints. The logical approach and the three axis matrix analysis prove to be well suited with regard to result validation processes. The results include the distribution of communication services into architectural layers, a definition of interfaces with the physical supports, and a mapping of architectural layers into physical equipment. The study is considered a basic step for the functional specifications toward the implementation of the communication architecture.

Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-27949# Pattern Analysis and Recognition Corp., McLean, Va.

COGNITIVE FACTORS IN USER/EXPERT SYSTEM INTERACTION

Paul E. Lehner and Deborah A. Zirk Oct. 1985 39 p

(Contract N00014-83-C-0537)

(AD-A165270; PAR-85-107) Avail: NTIS HC A03/MF A01 CSCL 06/4

A cognitive theory of user/expert system interaction is proposed that relates the quality of cooperative problem solving with an expert system to: (1) cognitive consistency, the degree of consistency between the rule-based system and the user's problem solving processes; and (2) mental model, the user's conceptual understanding of the basic principle of the system's problem solving processes. An experimental study is described that strongly supports the theoretical prediction. In particular, the results support the prediction that for users with an accurate mental model, increasing cognitive consistency significantly decreases user/expert system problem solving performance. Users not possessing an accurate mental model reach higher performance when utilizing cognitive consistent procedures. The practical implications of this theory are briefly discussed.

GRA

N86-27950# Dynamic Systems, Inc., Urbana, Ill.

LEADER-FOLLOWER STRATEGIES UNDER MODELING AND INFORMATION UNCERTAINTIES Final Technical Report

26 Apr. 1986 260 p

(Contract DE-AC01-81RA-50658)

(DE86-000203; DOE/RA-50658/T1) Avail: NTIS HC A12/MF A01

Focus of the research is the characterization and formulation of control strategies for large-scale systems which have two or more decision making authorities. The actions of each decision maker contribute to the total behavior of the system. Furthermore, the information on which each decision maker is based is affected by the action of the other decision makers. Thus the role of multiple decision making in the theory and methodology pertaining to the analysis, planning, and control of large-scale systems is very significant. This research addressed the central influence of hierarchical organizational forms in developing control strategies in large-scale systems when the decision makers do not have identical capabilities, priorities, and information structures. This report is divided into five parts corresponding to the five tasks for the project: global feedback, adaptive control concepts, multiparameter singularly perturbed systems with multiple decision makers, multitime scales induced by the information pattern, and problems of control organizations where the organizational center is the leader and the agents are followers.

DOE

N86-27951# Idaho National Engineering Lab., Idaho Falls.

EXPERT SYSTEM INTERACTION WITH EXISTING ANALYSIS CODES

V. H. Ransom, R. K. Fink, W. J. Bertch, and R. A. Callow 1986 7 p Presented at the Phoenix Conference on Computers and Communications, Phoenix, Ariz., 26 Mar. 1986

(Contract DE-AC07-76ID-01570)

(DE86-002357; EGG-M-17685; CONF-860346-1) Avail: NTIS HC A02/MF A01

Coupling expert systems with existing engineering analysis codes is a promising area in the field of artificial intelligence. The added intelligence can provide for easier and less costly use of the code and also reduce the potential for code misuse. This paper will discuss the methods available to allow interaction between an expert system and a large analysis code running on a mainframe. Concluding remarks will identify potential areas of expert system application with specific areas that are being considered in a current research program. The difficulty of interaction between an analysis code and an expert system is due to the incompatibility between the FORTRAN environment used for the analysis code and the AI environment used for the expert system. Three methods, excluding file transfer techniques, are discussed to help overcome this incompatibility. The first method is to link the FORTRAN routines to the LISP environment on the same computer. Various LISP dialects available on mainframes and their interlanguage communication capabilities are discussed. The second method involve s network interaction between a LISP machine and a mainframe computer. Comparisons between the linking method and networking are noted. The third method involves the use of an expert system tool that is campatible with a FORTRAN environment. Several available tools are discussed. With the interaction methods identified, several potential application areas are considered. Selection of the specific areas that will be developed for the pilot project and applied to a thermal-hydraulic energy analysis code are noted.

DOE

N86-27952# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.

THE NONINTERACTING CONTROL PROBLEM FOR NONLINEAR CONTROL SYSTEMS

H. Nijmeijer and J. M. Schumacher (Erasmus Univ., Rotterdam (Netherlands).) Mar. 1984 25 p

(Contract BMFT-0101-ZA/WF/WRD-174/4)

(Memo-427; ESA-86-96962) Avail: NTIS HC A02/MF A01

The noninteracting control problem for affine nonlinear control systems is studied, assuming that the number of scalar inputs equals the number of vector outputs, in order to find a static state feedback law for the system which achieves noninteraction. By using the differential geometric approach to nonlinear systems theory, necessary and sufficient conditions for the solution of this problem are given. In this way the approach fits in the systematic generalization of the geometric approach to linear systems theory.

ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-27953*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MODIFIED DENAVIT-HARTENBERG PARAMETERS FOR BETTER LOCATION OF JOINT AXIS SYSTEMS IN ROBOT ARMS

L. Keith Barker Washington Jul. 1986 30 p

(NASA-TP-2585; L-16092; NAS 1.60:2585) Avail: NTIS HC A03/MF A01 CSCL 12A

The Denavit-Hartenberg parameters define the relative location of successive joint axis systems in a robot arm. A recent justifiable criticism is that one of these parameters becomes extremely large when two successive joints have near-parallel rotational axes. Geometrically, this parameter then locates a joint axis system at an excessive distance from the robot arm and, computationally, leads to an ill-conditioned transformation matrix. In this paper, a

simple modification (which results from constraining a transverse vector between successive joint rotational axes to be normal to one of the rotational axes, instead of both) overcomes this criticism and favorably locates the joint axis system. An example is given for near-parallel rotational axes of the elbow and shoulder joints in a robot arm. The regular and modified parameters are extracted by an algebraic method with simulated measurement data. Unlike the modified parameters, extracted values of the regular parameters are very sensitive to measurement accuracy. Author

N86-27954# Suomalainen Tiedeakatemia, Helsinki (Finland).
ON THE DEGREE THEORY FOR NONLINEAR MAPPINGS OF MONOTONE TYPE Thesis
Juha Berkovits and Olli Lehto 1986 62 p
(ISSN-0355-0087; ISBN-951-41-0520-6) Avail: NTIS HC A04/MF A01

Many problems in mathematics and mathematical physics can be reduced to a study of the set of solutions for an equation f(x) = y, where f is a map between appropriate spaces X and Y, and y is an element of Y. Useful information about the solution set is obtained by means of a topological degree theory. One use of degree theory is to provide a natural technique for proving the so-called mapping theorems which include results concerning the invarience of domain and generalization of the Jordan curve theorem. This paper focuses on how the degree theory can be used to deduce existence and surjectivity results for equations involving nonlinear mappings of monotone type. The degree of a composition of mappings is studied and a generalization of the multiplication theorem of the Leray-Schauder theory is achieved. Finally, the connectedness of the solution set and the existence of multiple solutions are examined. M.G.

N86-27955# Naval Postgraduate School, Monterey, Calif.
A MATHEMATICAL MODEL FOR CALCULATING NON-DETECTION PROBABILITY OF A RANDOM TOUR TARGET M.S. Thesis
Salah I. AbdEl-Fadeel Dec. 1985 71 p
(AD-A165019) Avail: NTIS HC A04/MF A01 CSCL 12/1

The primary objective of this thesis was to build a mathematical model to predict the probability of a target moving according to a two-dimensional random tour model avoiding detection (i.e., surviving) to some specified time, t. This model assumes that there is a stationary searcher having a 'cookie-cutter' sensor located in the center of the search area. A Monte-Carlo simulation computer program was used to generate the non-detection probabilities. The output of this program was used to construct the required mathematical model. The model predicts, and simulation supports, that as the mean segment length of the random tour becomes small with respect to the square root of the area size, the probability of non-detection approaches that previously obtained for a diffusing target. In the opposite extreme, the probability of non-detection approaches the general form of Koopman's random search formula. Author (GRA)

N86-27956# Dayton Univ., Ohio.
A HYBRID-ITERATIVE TECHNIQUE FOR COMPLEX SCATTERING PROBLEMS Interim Report, May 1984 - May 1985
P. K. Murthy, Kuei-Chien C. Shill, and Gary A. Thiele Jan. 1986 59 p
(Contract F19628-83-K-0034)
(AD-A165233; UDR-TR-85-56; RADC-TR-85-160) Avail: NTIS HC A04/MF A01 CSCL 12/1

A new technique, named a hybrid-iterative technique, is presented which computes the induced currents on an arbitrary, perfectly conducting scatterer. The technique is an evolution from two previous techniques developed earlier. The first of the previous techniques used the moment method to compute correction currents to an optics-type current. The second of the previous techniques, which was developed on this contract, effected a significant improvement by eliminating the use of the moment method to obtain the correction currents, using iteration to obtain them. The technique described here incorporates the edge diffraction theory and the Fock theory into the ansatz of the iterative scheme. This procedure speeds up the algorithm as well as extending the range of problems that can be solved by the iterative scheme. Furthermore, the technique described in this report incorporates the correction currents into the optics currents thereby substantially reducing the computation time. For intermediate size and larger bodies, the CPU time is significantly less than that of the moment method. Results are presented for a variety of curved and edged two-dimensional cylinders. Author (GRA)

N86-27957# California Univ., Berkeley. Lawrence Berkeley Lab. School of Education.
INTERPRETATION OF SCIENTIFIC OR MATHEMATICAL CONCEPTS: COGNITIVE ISSUES AND INSTRUCTIONAL IMPLICATIONS Technical Report, Aug. 1983 - Feb. 1986
Frederick Reif Feb. 1986 45 p
(Contract N00014-83-K-0598; Grant NSF MDR-85-50332)
(AD-A165245) Avail: NTIS HC A03/MF A01 CSCL 05/10

Scientific and mathematical concepts are significantly different from every day concepts and are notoriously difficult to learn. It is shown that particular instances of such concepts can be identified or generated by different possible modes of concept interpretation. Some of these modes use formally explicit knowledge and thought processes, others rely on various kinds of compiled knowledge. Each mode has distinctive consequences in terms of attainable precision, likely errors, and ease of use. A combination of such modes can be exploited to formulate an ideal model for interpreting scientific concepts so as to achieve both reliable scientific effectiveness and cognitive processing efficiency. This model can be compared with the actual concept interpretations of expert scientists or novice students. All the preceding remarks are illustrated in the specific case of the physics concept acceleration. The discussion elucidates both cognitive and metacognitive reasons why the learning of scientific or mathematical concepts is difficult. It also suggests instructional methods for teaching such concepts more effectively. Author (GRA)

N86-27958# Sandia National Labs., Albuquerque, N. Mex.
ETBFCT: A SOLVER FOR 1-DIMENSIONAL TRANSPORT EQUATIONS
R. J. Gross and M. R. Baer Oct. 1985 48 p
(Contract DE-AC04-76DP-00789)
(DE86-002016; SAND-85-1273) Avail: NTIS HC A03/MF A01

A robust numerical technique for solving a wide class of one-dimensional transport-dominated problems is presented. The method is a finite-difference technique called flux-corrected transport (FCT) that preserves stability without sacrificing accuracy by exploiting the property of positivity. The specific algorithm, ETBFCT, developed at the Naval Research Laboratory, has been vectorized for execution on the Cray Computer. A single call to ETBFCT solving a transport equation on a 100 node mesh typically takes less than 0.001 cpu second on the Cray. ETBFCT has been modularized to be used as a library routine. The methodology and theory of FCT is discussed, enabling the potential user to make an informed judgment as to the usefulness of the method. The routines comprising the FCT algorithm and the mechanics for their use are then described. Finally, two example transport problems are solved to illustrate the use of ETBFCT. FORTRAN listings of the algorithm are included. DOE

N86-27959# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
APPROXIMATIONS TO TOROIDAL HARMONICS
P. A. Pribyl Oct. 1985 81 p
(Contract DE-AC02-78ET-51013)
(DE86-003358; DOE/ET-51013/161; PFC/RR-85-21) Avail: NTIS HC A05/MF A01

Toroidal harmonics P sup 1 sub n-1/2 (cosh mu) and Q sup 1 sub n-1/2 (cosh mu) are useful in solutions to Maxwell's equations in toroidal coordinates. In order to speed their computation, a set of approximations has been developed that is valid over the range 0 < mu < infinity. The functional form used for these approximations is dictated by their behavior as mu yields 0 and as mu yields infinity, and is similar to that used by Hastings in his

approximations to the elliptic integrals K and E. This report lists approximations of several mathematical forms with varying numbers of terms; approximations to the above Legendre functions are given for n = 0 through 6. Coefficients of each expansion have been adjusted to distribute the relative error in equi-amplitude peaks over some range, typically .05 < mu< 5, and in the best cases these peaks are less than 10 to the -10 power. The simple method used to determine the approximations is described. Relative error curves are also presented, obtained by comparing approximations to the more accurate values computed by direct summation of the hypergeometric series. DOE

N86-27960# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
TWISTOR GEOMETRY
P. M. vandenBroek Jul. 1984 54 p
(Contract BMFT-0101-ZA/WF/WRD-174/4)
(Memo-410; ESA-86-96961) Avail: NTIS HC A04/MF A01

The relation between the geometry of twistor space and the geometry of Minkowski space is exposed. The concepts of Minkowski space, Lorentz group, SL(2,C), spinors, and the interrelations between them are recalled. Null twistors are interpreted as null lines in compactified Minkowski space. General twistors are interpreted as Robinson congruences in compactified Minkowski space and as null planes in compactified complexified Minkowski space. It is shown how these interpretations are related. Ways in which the conformal group acts on twistor space are discussed. ESA

N86-27961# National Oceanic and Atmospheric Administration, Seattle, Wash. Marine Environmental Lab.
SIMULATION DATA SETS FOR TESTING MOS (MODEL OUTPUT STATISTICS) PREDICTION METHODS
R. W. Preisendorfer Oct. 1985 60 p
(PB86-173911; NOAA-TM-ERL-PMEL-65) Avail: NTIS HC A04/MF A01 CSCL 12A

It is shown how to construct a set of time series with prescribed autocorrelations and cross correlations which will serve as simulators of real fields drawn from nature for use in testing methods of prediction. These constructions are applied in particular to the problem of evaluating the skill of prediction methods in the context of a model output statistics (MOS) framework. In an MOS framework there are three main ingredients: (1) a model that produces a set of predictor time series called the model predictors; (2) an observer that produces the observed predictand, and (3) a prediction method that forecasts the predictand given the predictors. The distinguishing feature of an MOS framework is that the observed predictands are not in the list of outputs of the model. It therefore falls upon the prediction method to link the model predictors and the observed predictand during a training period for the method. Then, when fresh realizations of the predictors are produced by the model, the prediction method will produce its forecasts of the predictand. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-27962# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Sci.
TARGET PARAMETER ESTIMATION IN THE NEAR-FIELD WITH TWO SENSORS Annual Report, 1984 - 1985
H. Shertukde and Y. Bar-Shalom Jan. 1986 47 p
(Contract N00014-84-K-0492)
(AD-A165237; TR-86-2) Avail: NTIS HC A03/MF A01 CSCL 17/7

A performance prediction procedure is developed for the evaluation of a passive tracking technique for the localization of targets in the near-field of the sensors. The target moves in a three-dimensional space with a constant velocity at a constant depth. The parameter vector is thus five-dimensional. Target localization parameter identifiability is established with the aid of the Fisher Information Matrix (FIM). The FIM is evaluated for various combinations of the following sequences of measurements: time difference of arrival (TDOA) between the two sensors, depression angles measured at the two sensors, and frequency measurements obtained separately with the two sensors. The FIM is used to determine bounds on localization performance, and the corresponding uncertainty ellipses associated with the target position are evaluated for various tracking scenarios. The theoretical results are corroborated by applying a maximum likelihood estimation algorithm to simulated data and observing the results for a series of Monte Carlo simulations. Author (GRA)

N86-27963# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
THE USE OF CONVERSATIONAL PACKAGES IN STATISTICAL COMPUTING
H. J. Ader (Vrije Universiteit, Amsterdam (Netherlands).), D. J. Kuik, E. Opperdoes (Central Bureau of Statistics, Voorburg (Netherlands).), and B. F. Schriever (Vrije Universiteit, Amsterdam (Netherlands).) Sep. 1985 37 p Partly in ENGLISH and FRENCH Submitted for publication
(Contract BMFT-0101-ZA/WF/WRD-174/4)
(CWI-MS-R8506; ESA-86-96985) Avail: NTIS HC A03/MF A01

Problems which arise when applying statistical techniques repeatedly on the same dataset are outlined. Protection of inexperienced users against this kind of improper use of a conversational statistical package is discussed. Formal aspects of conversational communication are listed. User objectives in the use of the package are considered and consequences for the user interface formulated. ESA

N86-27964# Research Triangle Inst., Research Triangle Park, N.C.
DETERMINING UNCERTAINTY IN PHYSICAL PARAMETER MEASUREMENTS BY MONTE CARLO SIMULATION
D. W. Coy, G. A. Kew, M. E. Mullins, and P. V. Piserchia Mar. 1986 30 p
(Contract EPA-68-03-3149)
(PB86-164902; EPA/600/D-86/052) Avail: NTIS HC A03/MF A01 CSCL 13B

A statistical approach, often called Monte Carlo Simulation, was used to examine propagation of error with measurement of several parameters important in predicting environmental transport of chemicals. These parameters are vapor pressure, water solubility, octanol-water partition coefficient, and volatilization from water. Column chromatographic and high pressure liquid chromatographic methods tend to under predict aqueous solubility and vapor pressure and overpredict octanol-water partition coefficient. Measurement error proves not to be normally distributed, with differing bias for each parameter. For volatilization from water, determination of the ratio of rate constants for compounds whose Henry's Law constant equals or exceeds 1,000 torr/mole/liter typically report 95% confidence limits equal to 5 to 10 percent of the ratio. Analysis of a regression approach often used to determine the ratio suggests underestimation of both the ratio and its variance. Monte Carlo Simulation did not confirm underestimation of the ratio but suggests variances may be underestimated by a factor of 2.3. Using the statistical approach in other cases might allow an investigator to choose levels of a parameter knowing the uncertainly associated with the choice, or the converse. GRA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-27965# Florida Univ., Gainesville. Dept. of Statistics.
THE SEQUENTIAL GENERATION OF MULTIRESPONSE D-OPTIMAL DESIGN WHEN THE VARIANCE-COVARIANCE MATRIX IS NOT KNOWN
Manel C. Wijesinha and Andre I. Khuri Feb. 1986 25 p
(Contract N00014-86-K-0059)
(AD-A164731; TR-258) Avail: NTIS HC A02/MF A01 CSCL 12/1

The construction of D-optimal designs for multiresponse experiments was previously considered. This algorithm required that the variance covariance matrix, Sigma, of the responses be known. This is rarely the case in practice. The primary objective of this paper is to develop a sequential procedure for the construction of multiresponse designs when Sigma is not known. Several numerical examples are given to illustrate this procedure. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-27966# Polish Academy of Sciences, Warsaw. Instytut Podstawowych Problemow Techniki.
THE 1/2 SUBHARMONIC RESONANCE AND ITS TRANSITION TO CHAOTIC MOTION IN A NONLINEAR OSCILLATOR
Wanda Szemplinska-Stupnicka, Josef Bajkowski, and Zaklad Ukladow Meohanioznych Apr. 1986 37 p
(ISSN-0208-5658) Avail: Issuing Activity

An equation of motion representing steady-state vibrations of physical systems with nonsymmetric elastic characteristics and single equilibrium conditions is considered. The results of theoretical, first approximate solution and computer simulation are presented and the following conclusions are drawn: (1) the system can exhibit chaotic motion in a narrow zone of frequency in the neighbourhood of nu(D sub 1), where the theoretical loss of stability of the 1/2 subharmonic resonance is predicted; (2) although the chaotic motion is preceded by a cascade of period doubling bifurcations, the three harmonic components assumed in the first approximate solution predominate in the response as long as the motion is a regular, periodic one; (3) the region of chaotic motion replaces the classical 'jump phenomenon' and forms a transition zone between the subharmonic and resonant harmonic solution; and (4) the chaotic motion exhibited by the system can be roughly interpreted as random fluctuation of the 1/2 nu harmonic component. M.G.

N86-27967# Academy of Sciences (USSR), Moscow. Space Research Inst.
SATURATE COMPTONIZATION IN THE STRONG MAGNETIC FIELD
Yu. E. Lyubarsky 1986 20 p
(Rept-1086) Avail: NTIS HC A02/MF A01

The radiation transfer in a hot optically thick plasma with a strong magnetic field (gamma sub g >> gamma) is considered assuming the scattering to dominate the absorption. The conditions of saturated Comptonization imply the characteristic time for energy gain by photon, due to multiple Compton scatterings, to be much less than escape time. Then the Wien spectrum forms with chemical potential depending on the depth according to the rates of photon production and escape. The analytical expressions for the radiation flux emitted by the semi-infinite isothermal medium, and the spectrum and angular distribution of outcoming radiation are obtained. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-27968 ESDU International Ltd., London (England).
COMPUTER-BASED ESTIMATION PROCEDURE FOR CO-AXIAL JET NOISE, INCLUDING FAR-FIELD SUBSONIC JET MIXING NOISE DATABASE FOR STATIONARY, CO-PLANAR CONICAL NOZZLES
Dec. 1985 76 p
(ESDU-85043; ISBN-0-85679-549-6; ISSN-0307-0115) Avail: ESDU

Data item ESDU 85043, Noise Sub-Series, provides a program lisiting for interpolating within or extrapolating a data base. The variables considered make it particularly applicable in estimating noise from coaxial jets. A comprehensive data base is provided for jet mixing noise of static engines with conical nozzles, but the user may provide an alternative data base that could include installation and flight effects as well as other noise components (such as combustion and shock noise) or may supplement the provided data base with additional data. The interpolation/extrapolation routine uses a least squares fitting procedure in which two or three independent variables may be involved. Two of the variables are the primary jet velocity and the velocity ratio of the two streams but the third may be chosen by the user. Appropriate weighting of the data is included. The program is listed in both BASIC and FORTRAN. ESDU

N86-27969# Federal Aviation Administration, Washington, D.C.
ADVISORY CIRCULAR: ESTIMATED AIRPLANE NOISE LEVELS IN A-WEIGHTED DECIBELS
27 Mar. 1986 38 p
(AC-36-3D) Avail: NTIS HC A03/MF A01

Federal Aviation Regulation (FAR) Part 36 requires the reporting of turbojet and large transport category aircraft certificated noise levels in units of Effective Perceived Noise Level in decibels. Many airport and other community noise analyses utilize a noise rating scale that is based upon A-weighted decibels. For this reason, A-weighted noise levels for aircraft under FAR Part 36 conditions were estimated to provide a reference source for aircraft noise levels that is consistent with the many noise rating scales having A-weighted noise level as the basic measurement. Listings of estimated aircraft noise levels in units of A-weighted sound level in decibels, ranked in descending order are presented. This information is provided both for aircraft that were noise type certificated under FAR Part 36 and for aircraft for which no such requirement currently exists. Author

N86-27970*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPECTRA OF NOISE AND AMPLIFIED TURBULENCE EMANATING FROM SHOCK-TURBULENCE INTERACTION: TWO SCENARIOS
Herbert S. Ribner Mar. 1986 40 p Sponsored by the Natural Sciences and Engineering Research Council of Canada Prepared in cooperation with Toronto Univ. (Ontario)
(NASA-TM-88766; NAS 1.15:88766; UTIAS-TN-260;
ISSN-0082-5263) Avail: NTIS HC A03/MF A01 CSCL 20A

This work is a small extension of NACA studies of the early fifties that predicted amplification of turbulence on passing through a shock wave (observed for turbulent boundary layers), as well as the generation of intense noise (observed for supersonic jets). The first solved the basic gasdynamics problem of the interaction of an infinite planar shock with a single three-dimensional spectrum component of turbulence (an oblique sinusoidal shear wave). The second developed the comprehensive 3D spectrum analysis necessary to generalize the scenario to the interaction of a shock wave with convected homogeneous turbulence. Numerical calculations were carried out to yield curves (vs. Mach number) of rms sound pressure, temperature fluctuation, and two components of turbulent velocity downstream of the shock, for two cases of preshock turbulence. The present numerical study reproduces

these for one case and provides in addition their one-dimensional power spectra (vs. wavenumber or frequency). Ratios of the several postshock spectra to the longitudinal preshock turbulence spectrum (1D) have been computed for a wide range of Mach numbers; curves vs. wavenumber are presented for two scenarios of preshock turbulence: isotropy and axisymmetry, both based on the von Karman 3D spectrum. Author

N86-27971# Princeton Univ., N. J. Information Sciences and Systems Lab.
SIGNAL DETECTION AND NORMALIZATION IN UNDERWATER NOISES MODELED AS A GAUSSIAN-GAUSSIAN MIXTURE Technical Report, Sep. 1984 - Aug. 1985
Michel Bouvet and Stuart C. Schwartz Jan. 1986 61 p
(Contract N00014-81-K-0146)
(AD-A164876; TR-18) Avail: NTIS HC A04/MF A01 CSCL 09/4

Knowledge of the noise probability density function is central in signal detection problems, not only for optimum receiver structures but also for processing procedures such as power normalization. The statistical knowledge must be acquired since the classical assumption of a Gaussian noise PDF is often not valid in underwater acoustics. This report studies statistical modeling by a Gaussian-Gaussian mixture for three different underwater noise samples. One of them can adequately be described by a Gaussian-Gaussian mixture, one is very close to a Gaussian model and is described by a mixture with a very small perturbating term, whereas the third one seems closer to the Middleton class A model but is non-stationary. The first noise is studied with emphasis on the normalization needed in the receiver in order to achieve a constant false alarm probability and also on the optimal receiver structure for the detection of a deterministic signal. It is shown that the classical noise power estimate, calculating the norm L-squared of the observation vector, is a good approximation to the square of the maximum likelihood estimator of the noise amplitude for the Gaussian-Gaussian mixture. GRA

N86-27972# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
ANALYSIS OF HELICOPTER NOISE DATA USING INTERNATIONAL HELICOPTER NOISE CERTIFICATION PROCEDURES
J. S. Newman, E. J. Rickley, D. A. Levanduski, and S. B. Woolridge Mar. 1986 282 p Prepared in cooperation with Operations Research, Inc., Rockville, Md.
(PB86-186533; FAA-EE-86-01) Avail: NTIS HC A13/MF A01 CSCL 20A

The results of a Federal Aviation Administration (FAA) noise measurement flight test program involving seven helicopters are documented. Noise levels were established using the basic testing, reduction and analysis techniques specified by the International Civil Aviation Organization (ICAO) for helicopter noise certification, supplemented with some procedural refinements contained in ICAO Working Group II recommendations for incorporation into the standard. GRA

N86-27473# Columbia Univ., New York. Dept. of Civil Engineering.
NOISE TRANSMISSION INTO PROPELLER AIRCRAFT Monthly Report
R. Vaicaitis *In* Shock and Vibration Information Center(Defense), The Shock and Vibration Digest, Volume 17, No. 8 , Aug. 1985 p 15-20 (For primary document see N86-27471 18-31)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/11

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-27973# Texas Univ., Austin.
RESEARCH IN EXPERIMENTAL NUCLEAR PHYSICS Progress Report, 1 Apr. 1985 - 31 Mar. 1986
Nov. 1985 10 p
(Contract DE-AS05-76ER-05224)
(DE86-000864; DOE/ER-05224/9) Avail: NTIS HC A02/MF A01

An overview of experiments performed at LAMPF on the Energetic Pion Channel and Spectrometer (EPICS) or at the High Resolution Spectrometer (HRS) is presented. A list of abstracts of papers reported at scientific meetings and a list of published papers is given. DOE

N86-27974# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Nuclear Physics Section.
[NUCLEAR REACTIONS]
1985 47 p Presented at Workshop on Perspectives in Nucl. Phys. at Intermediate Energies, Miramare-Trieste, Italy, 25-29 Mar. 1985
(EMIN-85-04; B8574262; ESA-86-97017) Avail: NTIS HC A03/MF A01

Delta excitation in nuclei by pions and photons; a nuclear structure research program; and high resolution (e, e', p) experiments are discussed. For individual titles, see N86-27975 through N86-27977.

N86-27975# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-K.
DELTA-EXCITATION IN NUCLEI BY PIONS AND PHOTONS
Justus H. Koch *In its* Nuclear Reactions 1985 14 p Sponsored by Foundation for Fundamental Research on Matter and Netherlands Organization for the Advancement of Pure Research (For primary document see N86-27974 18-72)
Avail: NTIS HC A03/MF A01

The delta-hole approach was used to study pion and photon-induced nuclear reactions at intermediate energies. It is shown that the many body aspects of delta-propagation in nuclei play a very important role in photonuclear reactions, including nuclear photoabsorption, elastic Compton scattering, and pion photoproduction. There are discrepancies in the peak height and position between the calculated and measured photoabsorption cross sections for light targets. For elastic nuclear Comptom scattering in the resonance region, which provides another probe of the delta-nucleus dynamics, no data exist. Nuclear pion photoproduction measurements are quite well described in the delta-hole approach, which includes important medium modifications of the production process. ESA

N86-27976# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
FUTURE DEVELOPMENTS AT NATIONAL INSTITUT VOOR KERNFYSICA EN HOGE-ENERGIEFYSICA (NIKHEF)-K, AMSTERDAM
C. deVries *In its* Nuclear Reactions 1985 13 p Sponsored by Foundation for Fundamental Research on Matter and Netherlands Organization for the Advancement of Pure Research (For primary document see N86-27974 18-72)
Avail: NTIS HC A03/MF A01

A nuclear-structure research program with electron and photon beams is described. High-resolution single-arm electron scattering experiments investigate properties of nuclear ground states and discrete energy levels. High missing-mass resolution (150 keV) coincidence experiments involving quasi elastic knockout processes, such as (e,e'p) and (e,e'd), investigate wave functions of individual nucleons and nucleon clusters in the nucleus. Photopion production experiments study pion-nucleus delta resonance effects. Electron scattering experiments at 180 deg study ground state magnetic moment distributions and magnetic and transverse-electric transitions. ESA

N86-27977# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
HIGH RESOLUTION (E, E', P) EXPERIMENTS
P. K. A. deWittHuberts *In its* Nuclear Reactions 1985 18 p (For primary document see N86-27974 18-72)
Avail: NTIS HC A03/MF A01

Deep proton-hole states were studied using electromagnetic probes, in the quasi elastic knockout process (e, e', p). The relative lack of two-step processes in the (e,e'p) reaction is demonstrated for the case of C12; based on this observation, information on small wave function components was obtained from the one-step dominated (e,e'p) reaction. The coupling of the virtual photon with correlated (p-n) pairs was investigated with the (e,e'd) reaction on He3. Coupling is found to be appreciable and to agree with a diagrammatic expansion of the scattering amplitude, including initial and final state correlations. The treatment of the final state interaction in an optical model framework is schematic and leads to a non-negligible uncertainty in the absolute spectroscopic factors. ESA

N86-27978# Rome Air Development Center, Griffiss AFB, N.Y.
THE DE BROGLIE RELATIONS: LORENTZ INVARIANCE AND PHOTONS Report, Jan. - Jun. 1985
Ronald G. Newburgh Aug. 1985 22 p
(AD-A165234; RADC-TR-85-144) Avail: NTIS HC A02/MF A01 CSCL 20/10

A simple covariant derivation of the de Broglie relations breaks down when one considers propagation of light in an anisotropic medium. This breakdown results in two disappointing conclusions. The first is that the de Broglie relations are not completely universal and their covariance is restricted. The second is that wave-particle duality is not universal. In this paper a resolution of these problems is suggested, a resolution which is an extrapolation of ideas of de Broglie and Andrade e Silva. The relations are generalized for propagation in anisotropic media by defining a new phase wave with wave vector l in the direction of energy transport and distinct from the conventional electromagnetic wave. The introduction of l follows the method by which de Broglie associated a wave with an electron. The magnitude of l is omega u/c-squared where omega is the angular frequency and u the velocity of energy transport. The physical meaning of l and the covariance of physical laws in the presence of matter are discussed. An experiment is described which would test the existence of the phase wave associated with the new wave vector l. This experiment is essentially a Young two-slit experiment carried out within an anisotropic crystal. GRA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-27979# Lawrence Livermore National Lab., Calif.
NUMERICAL SIMULATION OF SECONDARY ELECTRON ORBITS NEAR AN ELECTRON BEAM PROPAGATING IN A LOW PRESSURE GAS
M. R. Teague and S. S. Yu 14 Aug. 1985 10 p Presented at the Particle Accelerator Conference, Vancouver, British Columbia, 13 May 1985
(Contract W-7405 eng-48)
(DE86-001651; UCRL-91956; CONF-850504-296) Avail: NTIS HC A02/MF A01

A numerical simulation has been constructed to obtain a detailed, quantitative estimate of the electromagnetic fields generated in a recently-proposed collective accelerator scheme for electrons. The code treats the secondary electrons by particle simulation and the beam dynamics by a time-dependent envelope model. The simulation gives a fully relativistic description of secondary electrons moving in selfconsistent electromagnetic fields. The calculations are made using coordinates t, x, y, z for the electrons and t, ct-z, r for the axisymmetric electromagnetic fields and currents. Code results showing the axial electric field dependence on the configuration of the ultrashort U.V. laser pulse will be given. DOE

N86-27980# Sandia National Labs., Albuquerque, N. Mex.
NINTH INTERNATIONAL NEA SEABED WORKING GROUP MEETING
D. R. Anderson Aug. 1985 162 p Meeting held in Berlin, West Germany, 27-29 Mar. 1984
(Contract DE-AC04-76DP-00789)
(DE85-017595; SAND-84-1451; CONF-8403207) Avail: NTIS HC A08/MF A01

This report is an account of work sponsored by the Governments of Canada, France, the Federal Republic of Germany, Japan, the Netherlands, Switzerland, United Kingdom, and the United States, and by the Commission of the European Communities, in the framework of a coordinate program on seabed disposal of radioactive waste. The objective of the coordinated program is to provide an international assessment of the technical feasibility and long-term safety of seabed disposal of high-level radioactive waste as a multi-media concept with marine sediments as the primary isolation barrier. DOE

74 OPTICS

Includes light phenomena.

N86-27981# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
COUPLING PROBLEMS WITH HIGH BIREFRINGENCE FIBERS Final Report
Chin-Lin Chen Sep. 1985 60 p
(Contract N00014-83-K-2029)
(AD-A165150) Avail: NTIS HC A04/MF A01 CSCL 20/6

A program to investigate the coupling problems of high birefringence fibers was initiated. A fiber is birefringent if it has a non-circular core and/or cladding, or is subjected to anisotropic stress. Currently, the loss of fibers with embedded anisotropic stress is much lower than that with non-circular core or cladding and therefore these fibers are of interest. Central to any coupling problem is the distribution of fields in the fibers. To date, very little is known relative to the fields of polarization modes in biaxial fibers. This is the main thrust of our study. We have used a perturbation method to study the fields and dispersion of polarization modes in biaxial fibers. In our approach, the inclusion or exclusion of a term is determined by the differential equation, the boundary conditions and the symmetry of the problem, and does not rely on the prior knowledge of the fields in the fibers. The dependence of the fiber birefringence on the index differential and index anisotropy has been studied. Now that the fields in high birefringent fiber are known, the excitation of high birefringent fibers can be analyzed. Methods for studying these excitation problems are indicated and some of the results are presented. GRA

N86-27982# Sandia National Labs., Albuquerque, N. Mex.
ACCURATE DETERMINATION OF Hg OSCILLATOR STRENGTHS BY NONLINEAR-OPTICAL MIXING
A. V. Smith and W. J. Alford 1985 3 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-005440; SAND-85-1678C; CONF-851185-5) Avail: NTIS HC A02/MF A01

We have developed new techniques based on four-wave mixing for accurate determination of oscillator strengths. Using index-matching conditions of the mixing process, we have obtained oscillator strengths of 15 VUV transitions in Hg. DOE

N86-27983# Gesellschaft fuer Informationsverarbeitung, Kommunikationstechnik und Prozessautomatisierung m.b.H., Stuttgart (West Germany).
OPTICAL BUS SYSTEM LIBSY Final Report, Sep. 1982
Thomas Wagner Bonn Bundesministerium fuer Forschung und Technologie Nov. 1985 50 p In GERMAN; ENGLISH summary

Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-123; ISSN-0340-7608; ESA-86-96890) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10.50

The local area network LIBSY, a protocol transparent ring with controlled access consisting of users, computers, and peripherical devices all connected to an optical bus by the intelligent interface device LICOM is presented. The LICOM contains the interface electronics for a bus compatible adaption to the user computer. The battery-buffered coupling optronics connects the optical fiber and the computer which drives and supervises the decentralized democratically organized data flow in the network. Up to 64 computers or 255 users can be connected to the ring. The levels 1 to 4 of the ISO model for system architecture were implemented by the system. ESA

N86-27488# Joint Publications Research Service, Arlington, Va.
OUTPUT POWER EQUATION AND NUMERICAL INTEGRATING METHOD OF POSITIVE-BRANCH UNSTABLE CONFOCAL RESONATOR
Zuhai Cheng, Zaiguang Li, and Xuhui He *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 97-104 Transl. into ENGLISH from Guangxue Xuebao (Acta Optica Sinica) (Shanghai, China), v. 5, no. 11, Nov. 1985 p 986-991 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27496# Joint Publications Research Service, Arlington, Va.
DESIGN OF OPTICAL DETECTOR, RECEIVER DISCUSSED
Guoxiang Li and Jingde Xu *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 164-168 Transl. into ENGLISH from Dalian Gongxueyuan Xuebao (Dalian, China), v. 24, no. 3, Sep. 1985 p 121-124 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27512# Joint Publications Research Service, Arlington, Va.
TIME-RESOLVED X-RAY SPECTRA STUDIED
Chengming Pan, Guangyu Yin, Shicheng Zhao, and Daqing Zhu *In its* China Report: Science and Technology (JPRS-CST-86-009) 13 Mar. 1986 p 140-145 Transl. into ENGLISH from Zhongguo Jiguang (Shanghai, China), v. 12, no. 9, Sep. 1985 p 570-572 (For primary document see N86-27501 18-31)
Avail: NTIS HC A08/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-27984# Los Alamos National Lab., N. Mex.
FISSION POWER: A SEARCH FOR A SECOND-GENERATION REACTOR
J. Hovingh Jul. 1985 112 p
(Contract W-7405-eng-48)
(DE85-0174142; UCID-20015) Avail: NTIS HC A06/MF A01

This report touches on the history of US fission reactors and explores the current technical status of such reactors around the world, including experimental reactors. Its purpose is to identify, evaluate, and rank the most promising concepts among existing reactors, proposed but unadopted designs, and what can be described as new concepts. Also discussed are such related concerns as utility requirements and design considerations. The report concludes with some recommendations for possible future LLNL involvement. DOE

N86-27985# Lawrence Livermore National Lab., Calif.
PROGRESS IN INERTIAL FUSION
W. Hogan and E. Storm Oct. 1985 13 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif. 28 Oct. 1985
(Contract W-7405-eng-48)
(DE86-003473; UCRL-92434; CONF-851053-7) Avail: NTIS HC A02/MF A01

The requirements for high gain in inertial confinement are given in terms of target implosion requirements. Results of experimental studies of the laser/target interaction and of the dynamics of laser implosion. A report of the progress of advanced laser development is also presented. DOE

N86-27986# Lawrence Livermore National Lab., Calif.
TIBER: TOKAMAK IGNITION/BURN EXPERIMENTAL RESEARCH
C. D. Henning, B. G. Logan, W. L. Barr, R. H. Bulmer, J. N. Doggett, B. M. Johnston, R. W. Hoard, J. D. Lee, J. R. Miller, D. S. Slack et al Nov. 1985 8 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge
(Contract W-7405-eng-48)
(DE86-003475; UCRL-93497; CONF-851102-40) Avail: NTIS HC A02/MF A01

As part of a continuing effort by the Office of Fusion Energy to define an ignition experiment, a superconducting tokamak has been designed with thin neutron shielding and aggressive magnet and plasma parameters. By so minimizing the inner radial dimensions of the tokamak center post, coil, and shielding region, the plasma major radius is reduced, with a corresponding reduction in device costs. The peak nuclear-heating rate in the superconducting TF coils is 22 mW/cm^3, which results in a steady heat load of 50 kW to the cryogenic system. Fast-wave, lower-hybrid heating would be used to induce a 10-MA current in a moderate density plasma. Then pellet fueling would raise the density to achieve ignition as the current decays in a few hundred seconds. Steady-state current drive in subignited conditions permits a 0.8 MW/m^2 average wall loading to study plasma and nuclear engineering effects. DOE

N86-27987# Lawrence Livermore National Lab., Calif.
MINIMARS: AN ATTRACTIVE SMALL TANDEM MIRROR FUSION REACTOR
L. J. Perkins, B. G. Logan, J. N. Doggett, R. S. Devoto, W. D. Nelson (Oak Ridge National Lab., Tenn.), D. C. Lousteau, G. L. Kulcinski (Wisconsin Univ., Madison.), J. F. Santarius, J. D. Gordon (TRW Defense and Space Systems Group, Redondo Beach, Calif.), and R. B. Campbell 13 Nov. 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985 Prepared in cooperation with Oak Ridge National Lab., TN.;Wisconsin Univ., Madison.;TRW Energy Development Group, Redondo Beach, CA.;General Dynamics Corp., Fort Worth, TX.;Argonne National Lab., IL.
(Contract W-7405-eng-48)
(DE86-003479; UCRL-92631; CONF-851102-44) Avail: NTIS HC A02/MF A01

Through the innovative design of a novel end plug scheme employing octopole MHD stabilization, we present the conceptual design of MINIMARS, a small commercial fusion reactor based on the tandem mirror principle. The current baseline for MINIMARS has a net electric output of 600 MWe and we have configured the design for short construction times, factory-built modules, inherently safe blanket systems, and multiplexing in station sizes of approx. 600 to 2400 MWe. We demonstrate that the compact octopole end cell provides a number of advantages over the more conventional quadrupole (yin-yang) end cell encountered in the MARS tandem mirror reactor study, and permits ignition to be achieved with much shorter central cell lengths. Accordingly, being economic in small sizes, MINIMARS provides an attractive alternative to the more conventional larger conceptual fusion reactors encountered to date, and would contribute significantly to the lowering of utility financial risk in a developing fusion economy. DOE

N86-27988# Sandia National Labs., Albuquerque, N. Mex.
FLASHOVER LITHIUM ION SOURCE DEVELOPMENT FOR LARGE PULSED POWER ACCELERATORS
K. W. Bieg, E. J. T. Burns, R. A. Gerber, J. N. Olsen, and K. P. Lamppa 1985 16 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003499; SAND-85-2529C; CONF-851174-16) Avail: NTIS HC A02/MF A01

PBFA II, a light-ion pulsed power accelerator intended for inertial confinement fusion (ICF) applications, is currently under construction at Sandia National Laboratories. The accelerator will deliver a 30 MV, 5 MA lithium beam from an Applied-B diode to drive an ICF target. The ion source for this diode will require a thin (approx. 1 mm), dense (10.cm) anode plasma layer of singly-ionized lithium over an anode area of 10 cm. One type of source being investigated is the flashover ion source, which generates the anode plasma via vacuum flashover of a lithium-bearing dielectric material. Experiments with a LiF flashover source on the 0.03 TW Nereus accelerator have shown that contaminant ions account for as much as 70% of the extracted ion beam current. To overcome this, we have explored in-diode cleaning of the externally-prepared anode surface by flow discharge cleaning and vacuum baking as well as in-diode preparation of the anode surface by vacuum evaporation of the lithium dielectric. Lithium-bearing dielectric materials which have been investigated include LiF, LiI, LiNO, and Li N. These techniques have resulted in a two-to three-fold improvement in the extracted lithium ion purity. As a result, a glow-discharge cleaned LiF flashover source will be used for initial pulsed-power testing on PBFA II. DOE

N86-27989# Los Alamos National Lab., N. Mex.
BLANKET ACTIVATION AND AFTERHEAT FOR THE COMPACT REVERSED-FIELD PINCH REACTOR
J. W. Davidson and M. E. Battat 1985 8 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-003669; LA-UR-85-4017; CONF-851102-36) Avail: NTIS HC A02/MF A01

A detailed assessment has been made of the activation and afterheat for a Compact Reversed-Field Pinch Reactor (CRFPR) blanket using a two-dimensional model that included the limiter, the vacuum ducts, and the manifolds and headers for cooling the limiter and the first and second walls. Region-averaged, multigroup fluxes and prompt gamma-ray/neutron heating rates were calculated using the two-dimensional, discrete-ordinates code TRISM. Activation and depletion calculations were performed with the code FORIG using one-group cross sections generated with the TRISM region-averaged fluxes. Afterheat calculations were performed for regions near the plasma, i.e., the limiter, first wall, etc. assuming a 10-day irradiation. Decay heats were computed for decay periods up to 100 minutes. For the activation calculations, the irradiation period was taken to be one year and blanket activity inventories were computed for decay times to 4 x 10 years. These activities were also calculated as the toxicity-weighted biological hazard potential (BHP). DOE

N86-27990# Los Alamos National Lab., N. Mex.
PROSPECTS FOR FUSION APPLICATIONS OF REVERSED-FIELD PINCHES
C. G. Bathke, R. A. Krakowski, and R. L. Hagenson 1985 7 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-003677; LA-UR-85-3984; CONF-851102-45) Avail: NTIS HC A02/MF A01

The applicability of the Reversed-Field Pinch (RFP) as a source of fusion neutrons for use in developing key fusion nuclear technologies is examined. This Fusion Test Facility (FTF) would emphasize high neutron wall loading, small plasma volume, low fusion and driver powers, and steady-state operation. Both parametric tradeoffs based on present-day physics understanding and a conceptual design based on an approx. 1-MW/m (neutron) driven operation are reported. DOE

N86-27991# Rochester Univ., N. Y. Lab. for Laser Energetics.
ABSOLUTE STIMULATED RAMAN SCATTERING INSTABILITY IN A FINITE COLLISIONAL PLASMA
C. J. McKinstrie and A. Simon 1985 17 p Presented at the 29th Annual Anomalous Absorption Conference, Banff, Alberta, 23 Jun. 1985
(Contract DE-FC08-85DP-40200)
(DE86-003778; DOE/DP-40200/14; CONF-8506221-2) Avail: NTIS HC A02/MF A01

The nonlinear saturation of the absolute stimulated Raman scattering (SRS) instability is considered in a finite homogeneous plasma. The amplitude of the incident wave exceeds the absolute instability threshold by the fractional amount ($<<1$). A single backscattered wave and a single plasma wave grow until time-asymptotic saturation occurs. The reflected light intensity is determined analytically. The spatial variation of the saturated wave amplitudes is also determined. The reflected intensity is compared to the values predicted for the convective instability, for the same incident intensity. In short plasmas, i.e., ones which extend over only a few convective gain lengths, the reflected intensity is much higher when the absolute instability threshold is exceeded. A reflection coefficient for the SRS instability is discussed for the case when both spatial and temporal effects are important. The paper consists of 15 viewgraphs. DOE

N86-27992# Rochester Univ., N. Y. Lab. for Laser Energetics.
NUMERICAL SIMULATION AND TARGET DESIGN FOR LASER-IMPLODED CYLINDRICAL PLASMAS
R. Epstein, J. Delettrez, M. C. Richardson, and B. Yaakobi 1985 19 p Presented at the 29th Annual Anomalous Absorption Conference, Banff, Alberta, 23 Jun. 1985
(Contract DE-FC08-85DP-40200)
(DE86-003780; DOE/DP-40200/15; CONF-8506221-3) Avail: NTIS HC A02/MF A01

The characteristics of plasmas formed from laser-driven implosions of cylindrical targets are studied using one-dimensional hydrocode simulations. The implosive motion of the heated target material and the axial symmetry of the plasma are properties not shared by exploding-foil plasmas. These properties can be exploited to control the plasma lifetime and transverse scale lengths which, in addition to optimum average ionization states, are important characteristics of plasmas used as X-ray laser media. The analysis includes atomic rate-equation calculations of the relevant ionization species populations within these plasmas. The paper consists of 10 viewgraphs. DOE

N86-27993# Rochester Univ., N. Y. Lab. for Laser Energetics.
RAMAN SCATTERING IN INHOMOGENEOUS LASER PRODUCED PLASMA
A. Simon, W. Seka, L. M. Goldman, and R. W. Short Sep. 1985 59 p
(Contract DE-FC08-85DP-40200)
(DE86-003782; DOE/DP-40200/T3) Avail: NTIS HC A04/MF A01

A model of Raman scattering in inhomogeneous laser produced plasma is described, which invokes enhanced Thomson scattering. The enhancement is due to pulses of hot electrons arising from laser-plasma interactions at the critical or quarter-critical surfaces. A simple model predicts the locations of two enhanced frequency bands, one between omega sub o and omega sub o/2, and the other between 2 omega sub o and omega sub o. The model is shown to fit the results of eight experiments, including a new experiment using the 6-beam Omega laser facility, converted to 351 nm. In this latter experiment, simultaneous measurement of the upscattered and downscattered bands is carried out, and good agreement is found with the enhanced Thomson model. DOE

N86-27994# Rochester Univ., N. Y. Lab. for Laser Energetics.
ENHANCED THOMSON SCATTERING THEORY APPLIED TO EIGHT EXPERIMENTS
A. Simon, R. W. Short, W. Seka, and L. M. Goldman 1985 15 p Presented at the 29th Annual Anomalous Absorption Conference, Banff, Alberta, 23 Jun. 1985
(Contract DE-FC08-85DP-40200)
(DE86-004927; DOE/DP-40200/17; CONF-8506221-4) Avail: NTIS HC A02/MF A01

The onset of an instability, such as the 2 omega (sub p) at the n(sub c)/4 surface, usually leads to wave breaking and the emission of hot electron pulses which can profoundly influence instability thresholds and scattering behavior elsewhere in the plasma. In particular, enhanced Thomson scattering (via the plasma line) can occur, and this has been used to explain the observation of the SRS instability well below the theoretical threshold. A simple model of the hot electron pulses based on measured values of the hot and cold electron temperatures T (sub h) and T(sub c), has yielded good agreement with experimental observation of the Raman spectral frequency bands. The agreement has continued, even for experiments which are clearly above the SRS threshold, with the enhanced noise likely acting as a seed for the SRS growth. We will show details of the successful comparison of this theory with six experiments carried out on SHIVA, ARGUS, NoVETTE(2), and GDL(2), and also with an upscattering feature seen at Garching. In addition, a recent experiment using 6 beams of OMEGA (at 0.35 microns) will be discussed, and compared with the theory. The report is comprised of viewgraphs of the talks. DOE

N86-27995 Texas Univ., Austin.
THE LINEAR INSTABILITY AND NONLINEAR MOTION OF ROTATING PLASMA Ph.D. Thesis
Jixing Liu 1985 212 p
Avail: Univ. Microfilms Order No. DA8529881

Two coupled nonlinear equations describing the flute dynamics of the magnetically confined low beta collisionless rotating plasma are derived. The linear instability and nonlinear dynamics of the rotating column are analyzed theoretically. From the exact solution of eigenvalue equation for Gaussian density profile and uniform rotation of the plasma, the stability of the system strongly depends on the direction of plasma rotation, FLR effect, and the location of the conduction wall. An analytic expression showing the finite wall effect on different normal modes is obtained. The sheared rotation drive instability is investigated by using three model equilibrium profiles and the analytic expressions of eigenvalues which includes the wall effect are obtained. The analogy between shear rotation driven instability and the instability driven by sheared plane parallel flow in the inviscid fluid is analyzed.
Dissert. Abstr.

N86-27337# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio INterplanetario.
COLLISIONLESS SHOCK WAVES IN SPACE AND IN ASTROPHYSICS
V. Formisano *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 83-100 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27340# Saint Andrews Univ. (Scotland). Dept. of Applied Mathematics.
SMALL-SCALE RECONNECTION
E. R. Priest *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 137-149 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27344# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.
CHARACTERISTIC PHENOMENA OF MAGNETOHYDRODYNAMIC TURBULENCE
D. Montgomery *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 175-179 (For primary document see N86-27330 18-12)
(Grant NAGw-719; Contract DE-FG02-85ER-53194)
Avail: NTIS HC A12/MF A01

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-27996*# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
CRYSTAL GROWTH OF DEVICE QUALITY GaAs IN SPACE Annual Report, 1 Apr. 1985 - 31 Mar. 1986
Harry C. Gatos and Jacek Lagowski 1986 36 p
(Grant NsG-7331)
(NASA-CR-177268; NAS 1.26:177268) Avail: NTIS HC A03/MF A01 CSCL 20L

It was established that the findings on elemental semiconductors Ge and Si regarding crystal growth, segregation, chemical composition, defect interactions, and materials properties-electronic properties relationships are not necessarily applicable to GaAs (and to other semiconductor compounds). In many instances totally unexpected relationships were found to prevail. It was further established that in compound semiconductors with a volatile constituent, control of stoichiometry is far more critical than any other crystal growth parameter. It was also shown that, due to suppression of nonstoichiometric fluctuations, the advantages of space for growth of semiconductor compounds extend far beyond those observed in elemental semiconductors. A novel configuration was discovered for partial confinement of GaAs melt in space which overcomes the two major problems associated with growth of semiconductors in total confinement. They are volume expansion during solidification and control of pressure of the volatile constituent. These problems are discussed in detail. E.R.

N86-27997# Electrotechnical Lab., Ibaraki (Japan).
A STUDY ON CARRIERS IN THE INSULATOR AND AT THE SEMICONDUCTOR-INSULATOR INTERFACE OF AN MIS STRUCTURE
Kiyoko Nagai Dec. 1985 51 p In JAPANESE; ENGLISH summary
(EL-860; ISSN-0366-9106; UDC-621.382) Avail: NTIS HC A04/MF A01

Effects of carriers in the metal-insulator-semicondustor (MIS) structure and on the electrical erasibility in the floating gate type nonvolatile memory are studied. Avalanche breakdown characteristics of an metal-oxide-semiconductor (MOS) diode driven by a linear ramp voltage are discussed. Avalanche breakdown characteristics between the channel and the substrate of an MOS field effect transistor (MOSFET) are discussed for efficient carrier injection. Carrier injection is shown by both theoretical analysis and measurement. Oxide trap and interface trap creation by injected carrier are examined. The effects of interface trapped charge on the static characteristics of the MOSFET are investigated. Also discussed are the theoretical effects of fixed oxide charge and interface trap charge on the low and high frequency capacitance-voltage curves of a semiconductor-insulator-semiconductor structure. Several types of EEPROM (electrically erasable read only memory) are proposed, two of which were fabricated to demonstrate the write and erase characteristics. Analog memory using the floating gate type EEPROM is discussed. B.G.

N86-27998# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
OBSERVATION OF MECHANISM FOR HIGHER OPERATING TEMPERATURE EXTRINSIC DETECTORS Interim Report, Mar. 1981 - Aug. 1983
Gail J. Brown, Melvin C. Ohmer, David Fischer, Steve Smith, and Frank Szmulowicz May 1985 56 p

(AD-A165274; AFWAL-TR-85-4012) Avail: NTIS HC A04/MF A01 CSCL 17/8

Spectral photoconductivity, detectivity, infrared absorption and Hall effect transport measurements were used to study the electrical and optical properties of Si:In that had been irradiated with 1 MeV electrons. The Hall effect and infrared absorption measurements showed no unusual behavior before or after irradiation. The photoconductivity and detectivity measurements showed a large improvement in the operating temperature range of the Si:In material after electron irradiation. Before irradiation, the detector signal became swamped by noise at 22K. After irradiation, the signal was maintained up to 80K. The magnitude of the photoresponse versus temperature remained constant up to 65K at which temperature detector noise began to set in. A constant D* peak value of 2.2 x 10 to the 10th power (cm-sq rt. Hz/Watt) was measured up to 60K. GRA

N86-27999# Evans (Charles) and Associates, San Mateo, Calif.
THE DEVELOPMENT OF SPUTTERED NEUTRAL MASS SPECTROMETRY FOR THE QUANTITATIVE DEPTH PROFILING OF COMPOUND SEMICONDUCTOR MATERIALS Technical Progress Report, 1 Nov. - 15 Dec. 1985
David A. Reed 15 Dec. 1985 17 p
(Contracts N00014-85-C-0858; ARPA Order 4941)
(AD-A165516) Avail: NTIS HC A02/MF A01 CSCL 20/12

This report evaluates the applications potential of sputtered neutral mass spectrometry (SNMS) as implemented in the INA-3 for advanced materials characterization. The report will detail initial hands-on experiences with SNMS via the prototype version of the INA-3. The key functional components and parameters are: 1) The rf plasma uniquely established by pressure, rf power and external DC magnetic field, 2) Ion extraction optics consisting of an extraction electrode, focusing lens, 30 deg electrostatic analyzer (ESA) and transfer elements required to transport the energy filtered ion beam into a quadrupole mass spectrometer. 3) A conventional quadrupole mass filter with electron multiplier detector, and 4) The target bias supply. In the latter case, the Kaiserslautern instrument references the target potential to the plasma potential via a Langmuir probe, whereas the INA-3 presently references the target power supply to ground potential (i.e., no Langmuir probe). Studies to date have indicated that a Langmuir reference might make a significant improvement. GRA

N86-28000# Department of the Navy, Washington, D. C.
PREPARATION OF REFRACTORY TUNNEL BARRIERS OF SPUTTERED BORON NITRIDE Patent Application
Randy W. Simon, Kenneth E. Kihlstrom, and John H. Claassen, inventors (to Navy) Filed 23 Dec. 1985 10 p
(AD-D012184; US-Patent-Appl-SN-811974) Avail: NTIS HC A02/MF A01 CSCL 20/12

The present invention relates to Josephson Junctions. More specifically the present invention relates to high quality artificial tunnel barriers found in a Josephson junction. A Josephson Junction is a weak connection between two superconducting layers through which the Josephson effect is realized. The Josephson effect is where the passage of paired electrons (Cooper pairs) through a weak connection forms a current (supercurrent) in addition to the usual current that results from the passage or tunneling of single electrons. Objects of the present invention are to provide a tunnel barrier that has a sharp even interface with the superconducting metal; to provide a tunnel barrier that is amorphous; and to provide a tunnel barrier that does not breakdown under high temperature conditions. These, and other objects of the present invention are achieved with a Josephson junction comprising: a first superconducting layer; a second superconducting layer; and a tunnel barrier of boron nitride located between the first and second superconducting layers and in contact therewith. GRA

N86-27484# Joint Publications Research Service, Arlington, Va.
CRYOGENICS OF CHINA'S NIOBIUM MATERIAL (Nb2-1)
Jiasu Wang and Suyu Wang *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 72-74 Transl. into ENGLISH from Dianzi Xuebao (Acta Electronica Sinica) (Beijing, China), v. 13, no. 5, Sep. 1985 p 119-120 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

N86-27499# Joint Publications Research Service, Arlington, Va.
CZOCHRALSKI GROWTH OF TUNABLE LASER CRYSTAL BeAl(SUB)2O(SUB)4:Cr(SUP)3+
Xiaoshan Ma, Yinchun Hou, Siting Wang, Yafang Shen, and Zongru Jin *In its* China Report: Science and Technology (JPRS-CST-86-008) 1 Mar. 1986 p 186-193 Transl. into ENGLISH from Guisuanyan Xuebao (Beijing, China), v. 12, no. 2, Jun. 1984 p 131-136 (For primary document see N86-27482 18-31)
Avail: NTIS HC A11/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-28001# Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science.
ANOMALIES AND TOPOLOGY
R. Jackiw Aug. 1985 24 p Proceedings of Theoretical Advanced Study Inst. in Elementary Particle Physics, New Haven, Conn., Jun. - Jul. 1985 Submitted for publication
(Contract DE-AC02-76ER-03069)
(DE86-000569; DOE/ER-03069/T5) Avail: NTIS HC A02/MF A01

The lectures given cover the topological effects in gauge field theories, fermionic chiral anomalies, and some relationships between the two. Gauge field theories in three and four space-time dimensions are considered. Topological terms as external U(1) functional gauge potential connections in field space are discussed. Both the structure and physical impact of anomalies are described. DOE

N86-28002# California Univ., Berkeley. Dept. of Chemical Engineering.
CONTINUOUS THERMODYNAMICS FOR PHASE EQUILIBRIA AND ENTHAIPY CALCULATIONS Annual Report, Sep. - 1984 - Aug. 1985
G. F. Chou, R. L. Cotterman, and J. M. jPrausnitz Oct. 1985 32 p
(Contract GRI-5083-260-0953)
(PB86-178985; GRI-85/0242) Avail: NTIS HC A03/MF A01 CSCL 20M

A numerical procedure has been developed for performing adiabatic flash calculations for continuous and semicontinuous mixtures using the Soave equation of state; the procedure uses Gaussian quadrature method to solve phase-equilibrium and enthalpy equations containing integrals of continuous distribution functions. To perform adiabatic flash calculations within continuous-thermodynamic framework, equation-of-state parameters and ideal-gas heat capacities are correlated with molecular weight for hydrocarbon homologous series. The flash-calculation results compare favorably to those obtained using the discrete method; continuous thermodynamics give better results than does the pseudocomponent method and the difference in results depends on the arbitrary selection of Pseudocomponents. Author (GRA)

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-28003*# National Academy of Sciences - National Research Council, Washington, D. C. Office of Scientific and Engineering Personnel.

POSTDOCTORAL AND SENIOR POSTDOCTORAL RESIDENT RESEARCH ASSOCIATESHIP PROGRAM AND RESEARCH MANAGEMENT ASSOCIATESHIP PROGRAM FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Status Report, 1 Mar. - 31 May 1986
1986 137 p
(Contract NASw-3458)
(NASA-CR-177203; NAS 1.26:177203; SR-87) Avail: NTIS HC A07/MF A01 CSCL 05I

Information on the status of all Resident Research Associated and Research Management Associates is provided. All Associated whose tenure continued as of June 1, 1985 are listed alphabetically by laboratory. Also included are their countries of citizenship and dates of tenure. The status of reporting obligations are summarized. A list of progress reports received during this reporting period is also provided. All Associates who terminated during the reporting period are listed. B.G.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-28004*# Texas A&M Univ., College Station. Industrial Engineering Div.
CREATION OF THE SELECTION LIST FOR THE EXPERIMENT SCHEDULING PROGRAM (ESP) Final Report
Bryan L. Deuermeyer, Robert E. Shannon, and Alvin J. Underbrink, Jr. 15 May 1986 74 p
(Contract NAS8-35972)
(NASA-CR-178861; NAS 1.26:178861) Avail: NTIS HC A04/MF A01 CSCL 05A

The efforts to develop a procedure to construct selection groups to augment the Experiment Scheduling Program (ESP) are summarized. Included is a User's Guide and a sample scenario to guide in the use of the software system that implements the developed procedures. Author

N86-28005# Naval Postgraduate School, Monterey, Calif.
TECHNICAL DATA PACKAGE: A SECOND SOURCING METHODOLOGY M.S. Thesis
Robert E. Hale Dec. 1985 138 p
(AD-A165028) Avail: NTIS HC A07/MF A01 CSCL 15/5

The purpose of this thesis was to analyze the Technical Data Package as a second sourcing methodology to create production competition. Two second sourcing models and two major weapon system programs were presented for this analysis. Issues analyzed include technology transfer, Technical Data Package validation, technical data rights, initial investment costs, and maintenance considerations. As a results of this analysis it is concluded that there is no significant guidance for the application of the Technical Data Package second sourcing methodology, there are circumstances that are particularly inappropriate for the use of this methodology, and that the two programs that used this methodology appeared to have met their acquisition goals. This study recommends that one second sourcing model be employed under actual program conditions and that the program manager perform a comprehensive data package validation prior to using this second sourcing methodology. GRA

N86-28006# Department of the Air Force, Andrews AFB, Md. Directorate of Cost and Management Analysis.
EXAMINING THE AFSC (AIR FORCE SYSTEMS COMMAND) PRODUCTION RATE MODEL
Thurman D. Gardner 20 Sep. 1985 19 p Presented at the Annual Department of Defense Cost Analysis Symposium, Leesburg, Va., 17-20 Sep. 1985
(AD-A165033) Avail: NTIS HC A02/MF A01 CSCL 13/8

A problem facing the cost estimator and the program manager is the need to assess program cost impacts resulting from changes in production rate. The Air Force Systems Command (AFSC) has developed the Production Rate Model for providing quick same day responses. The model is based on the assumption that the influence an increasing production rate has on decreasing the unit cost is limited. This idea follows the minimum cost point found on the long run average cost curve in economic theory. In the model's case the point is determined by the manufacturer prior to production. This point is based on plant capacity, capital investment and manpower requirements, anticipated quantities and production rate, and requirements specified by the government. The AFSC model modifies the learning curve equation by including a variable representing production rate. This equation is used to estimate recurring cost. There is an internal data base of historical programs containing first unit cost, learning curve slope, and production rate slope generated with a nonlinear regression technique. The nonlinear regression technique was used to reduce the effects of multicollinearity and bias associated with ordinary least squares regression. AFSC knows about and accepts the statistical limitation because the model was developed to provide a good approximation of the change in cost that result from a production rate change. GRA

N86-28007# National Oceanic and Atmospheric Administration, Washington, D. C.
OPTIMUM MANAGEMENT STRATEGIES FOR THE NOAA (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION) POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITES, 1985-2000. VOLUME 1 Final Report
W. H. Eskite and W. P. Bishop Apr. 1985 70 p
(AD-A165143) Avail: NTIS HC A04/MF A01 CSCL 05/1

The experience of the past 15 years was used as a basis to establish the best management principles to apply to the POES for the next 15 years. This was done for both a two-satellite configuration and a one-satellite configuration. The principles include always having a spare available, a 4-month call-up capability, taking advantage of satellites that live longer than their design life, and taking advantage of early indications of imminent failure. These principles must be applied in different ways to the two configurations. Applying these principles to several scenarios for the future leads to the conclusion that we should plan for 12 satellites for the next 15 years for either the one-satellite or the two-satellite system. Author (GRA)

N86-28008# Naval Postgraduate School, Monterey, Calif.
AN ASSESSMENT OF THE LIFE CYCLE CONTRACTING MODEL FOR USE BY MAJOR AEROSPACE WEAPON SYSTEM ACQUISITION MANAGERS M.S. Thesis
Kimberly J. Annunziata Dec. 1985 144 p
(AD-A165238) Avail: NTIS HC A07/MF A01 CSCL 15/5

The utility of using the Life Cycle Contracting Model in major weapon systems acquisition is assessed. The conclusions are based on an analysis of LCC model simulated real world follow-on production contracting scenarios. What if changes are made to the contracting scenario parameters to understand how the LCC model might be used by major weapon system acquisition and contract managers. An analysis shows that the LCC model can be used to interpret the results of trade-off decisions and to assist the contract manager in developing sound negotiating strategy alternatives. Total contract cost to the government cannot be predicted with the model but the effects on total cost of decisions made can be inferred and compared. The LCC model should be used to justify deviations from full and open competition and to demonstrate the predicted results of viable, lower cost alternatives to firm fixed price contracting. GRA

N86-28009# Naval Postgraduate School, Monterey, Calif.
COST INFORMATION REQUIREMENTS FOR MANAGING AIRCRAFT REWORK M.S. Thesis
David P. Faust and John W. Highsmith Dec. 1985 56 p
(AD-A165262) Avail: NTIS HC A04/MF A01 CSCL 05/1

Managing the diverse aspects of a Naval Air Rework Facility (NARF) is a complex and demanding task. This thesis provides fresh input into two of the areas that are of concern to NARF management on a daily basis. First is the management of cost data to provide meaningful information for managers at all levels of the organization. Included is a brief explanation of the economic rationalization that supports the Life Cycle Cost concept. A discussion of the types of financial information needed by managers and deficiencies in the NIF accounting system follows. The next section centers on the basis behind the Reliability Centered Maintenance concept and how the deficiencies in the information collection system at NARF Alameda fail to support the demands of this concept. Recommendations are provided to alleviate both short and long run deficiencies. GRA

N86-28010# Naval Postgraduate School, Monterey, Calif.
GOVERNMENT MANAGEMENT OF CONTRACTOR SUBMISSION OF VALUE ENGINEERING CHANGE PROPOSALS M.S. Thesis
Gary G. Given Dec. 1985 65 p
(AD-A165271) Avail: NTIS HC A04/MF A01 CSCL 05/1

The purpose of this thesis is to determine how the Department of Defense value engineering policies and processing procedures affect a contractor's motivation to submit value engineering change proposals. A comparative analysis of the DOD Value Engineering Program with private industry's value analysis program and also an examination of how the Hughes Aircraft Company has used the DOD Value Engineering Program, resulted in three conclusions. The first conclusion is that the incentives offered by the DOD Value Engineering Program have been found by private industry to be ineffective in attracting supplier participation in value analysis. The second conclusion is that delays in incorporating the VECP in the end-item significantly reduces a contractor's motivation to submit future VECPs. The third conclusion is that the contractor's perception of the government buying activity's willingness to fairly evaluate VECPS is the most significant influence on a contractor's motivation to submit VECPs. Author (GRA)

N86-28011# Naval Postgraduate School, Monterey, Calif.
CONTROLLING LIFE-CYCLE COST: A MANAGEMENT PERSPECTIVE M.S. Thesis
David L. Porter Dec. 1985 148 p
(AD-A165520) Avail: NTIS HC A07/MF A01 CSCL 05/1

The objective of this thesis is to examine the obstacles which are preventing the Navy from realizing the full economic advantage of a total cost management program for aviation support equipment. The research has shown that Navy program managers are not fully committed to managing life-cycle cost nor is it considered early enough in the procurement process to influence design. To improve the life-cycle cost management effort, existing policies and provisions included in DoD Directives should be applied to aviation support equipment. More emphasis should be placed on the RFP as a means of communicating the Navy's concerns about controlling cost and adequate information should be provided to the contractor to be used in developing realistic cost estimates. Finally, life-cycle cost should be elevated to the level of unit-production cost, schedule and performance and made a mandatory source selection criterion. GRA

N86-28012# Department of Energy, Washington, D. C. Office of Civilian Radioactive Waste Management.
PROGRAM MANAGEMENT SYSTEM MANUAL
Jan 1986 95 p
(DE86-005396; DOE/RW-0043) Avail: NTIS HC A05/MF A01

The Program Management System (PMS), as detailed in this manual, consists of all the plans, policies, procedure, systems, and processes that, taken together, serve as a mechanism for managing the various subprograms and program elements in a cohesive, cost effective manner. The PMS is consistent with the requirements of the Nuclear Waste Policy Act of 1982 and the Mission Plan for the Civilian Radioactive Waste Management Program (DOE/RW-0005). It is based on, but goes beyond, the DOE management policies and procedures applicable to all DOE programs by adapting these directives to the specific needs of the Civilian Radioactive Waste Management program. This PMS Manual describes the hierarchy of plans required to develop and maintain the cost, schedule, and technical baselines at the various organizational levels of the Civilian Radioactive Management Program. It also established the management policies and procedures used in the implementation of the program. These include requirements for internal reports, data, and other information; systems engineering management; regulatory compliance; safety; quality assurance; and institutional affairs. Although expanded versions of many of these plans, policies, and procedures are found in separate documents, they are an integral part of this manual. The PMS provides the basis for the effective management that is needed to ensure that the Civilian Radioactive Waste Management Program fulfills the mandate of the Nuclear Waste Policy Act of 1982. DOE

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-28013# Naval Postgraduate School, Monterey, Calif.
A RELATIONAL DATA DICTIONARY COMPATIBLE WITH THE NATIONAL BUREAU OF STANDARDS INFORMATION RESOURCE DICTIONARY SYSTEM M.S. Thesis
Robert A. Kirsch, II Dec. 1985 254 p
(AD-A165022) Avail: NTIS HC A12/MF A01 CSCL 05/2

Data is a very valuable corporate asset. How it is managed and controlled can often determine the success or failure of a corporate venture. With this fact in mind many organizations are taking a close look at what tools are available to help them in this effort. This thesis takes a look at two types of data management tools available today, the Relational Data Base Base Management System (DBMS) and the Data Dictionary (DD). It discusses desirable DBMS and DD characteristics with particular attention being paid to the shortcomings of DDs. It also describes the effort of the National Bureau of Standards (NBS) to develop a DD standard and examines in detail the NBS Information Resource Dictionary System (IRDS) and how the standard was implemented in a prototype IRDS. Author (GRA)

N86-28014# Department of Defense, Washington, D. C. Directorate for Information Operations and Repts.
LIST OF APPROVED RECURRING INFORMATION REQUIREMENTS. VOLUME 1
31 Jan. 1986 90 p
(AD-A165078; DIOR/DOD-5000.19-L-Vol-1; DOD-5000.19-L-Vol-1)
Avail: NTIS HC A05/MF A01 CSCL 05/1

The purpose of the volume is to identify DOD internal information requirements approved by OSD, interagency reporting requirements approved by the General Services Administration, and DOD public-use reports approved by the Office of Management and Budget (OMB). GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-28015# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
PROCUREMENT: AN ASSESSMENT OF THE AIR FORCE'S F-16 AIRCRAFT MULTIYEAR CONTRACT
Feb. 1986 26 p
(PB86-168026; GAO/NSIAD-86-38; B-215825; AD-A165720) Avail: NTIS HC A03/MF A01 CSCL 15E

The authors reviewed the Air Force's F-16 multiyear contract

for fiscal years 1982 to 1985. They assessed potential savings from using a multiyear contract instead of a series of annual contracts, the effect of foreign military sales on multiyear contract prices, the effect of aircraft the Congress added to the fiscal year 1984 budget on multiyear contract prices, and other benefits of using multiyear contracting. The substance of the report was provided in a briefing on the preliminary findings of the review. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-28016# National Oceanic and Atmospheric Administration, Washington, D. C.
INTERNATIONAL COORDINATION OF AND CONTRIBUTIONS TO ENVIRONMENTAL SATELLITE PROGRAMS Final Report
P. Uhlir and L. Shaffer Jun. 1985 65 p
(AD-A165142) Avail: NTIS HC A04/MF A01 CSCL 22/2

The paper begins with an overview of U.S. policy on remote sensing. Next, the extensive international cooperation in U.S. Polar-orbiting Operational Environmental Satellites (POES) is described. This includes participation in the POES direct readout services program, and existing instrument contributions and commitments to the POES system. The opportunities and mechanisms for future contributions to POES, or to the polar platform component of the U.S. Space Station, are also examined. Geostationary environmental satellites are operated by the United States, the European Space Agency, Japan, and India. These systems are described, and the Coordination on Geostationary Meteorological Satellites is discussed. Other international organizations used for cooperation and coordination in remote-sensing activities are outlined. These include the World Meteorological Organization, the Intergovernmental Oceanographic Commission, the International Council of Scientific Unions, and the Committee on Earth Observations Satellites. Contributions by the United States to planned foreign remote-sensing programs are addressed as well. Finally, the report identifies and discusses three trends in remote sensing, and makes some concluding observations about the future of international remote-sensing ac tivities. Appendix A lists the dates of all relevant documents, such as Memoranda of Understanding, Terms of Reference for international committees, and Minutes of Meetings. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-28017*# Mechanical Technology, Inc., Latham, N. Y.
AUTOMOTIVE STIRLING ENGINE DEVELOPMENT PROGRAM Semiannual Technical Progress Report, 1 Jan. - 30 Jun. 1984
N. Nightingale, A. Richey, R. Farrell, G. Riecke, W. Ernst, R. Howarth, M. Cronin, M. Simetkosky, and G. Smith Dec. 1984 103 p
(Contracts DEN3-32; DE-AI01-77CS-51040)
(NASA-CR-174749; DOE/NASA/0032-80/7; NAS 1.26:174749) Avail: NTIS HC A06/MF A01 CSCL 13F

This is the sixth Semiannual Progress Report prepared under the Automative Stirling Engine Development Program. It covers the twenty-fourth and twenty-fifth quarters of activity after award of the contract. Quarterly Technical Progress Reports related program activities from the first through the thirteenth quarters; thereafter, reporting was changed to a semiannual format. This report summarizes activities performed on Mod I engine characterization and analyses, Mod I Transient Test Bed fuel economy, upgraded Mod I performance and testing, Stirling engine reference engine manufacturing and reduced size studies, components and subsystems, and the study and test of low cost casting alloys. The overall program philosophy is outlined, and data and results are presented. Author

N86-28018# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
THE COORDINATION OF COMMUNITY TRANSPORT RESOURCES: A CASE STUDY OF SHARED TRANSPORT SERVICE, BIRMINGHAM
A. Warrington 1986 114 p
(TT-8603) Avail: NTIS HC A06/MF A01

The last decade has been characterized by a substantial growth in the number of community organizations purchasing minibuses in attempts to meet their specific clients' mobility needs. Recently these groups have been faced with severe economic constraints, with many government grants being cut back. The overarching aim of the project was to examine the management and co-ordination of community transport from the perspective of participants in such schemes, with particular reference to their views about is applicability. One of the objectives set to meet this aim involved undertaking three case studies of co-ordinated transport schemes in Britain. The information presented in this work is from one of the three individual case studies undertaken. The findings are presented from the case study of Shared Transport Service (STS), the community transport co-ordination scheme in Birmingham. The planning of the STS brokeage scheme is dicussed. An appraisal of the day to day operation of STS is given. The barriers to and problems of vehicle sharing are discussed. Finally, an evaluation of the STS project and benefits arising from the use of the brokeage service is presented. presented. B.W.

88 SPACE SCIENCES (GENERAL)

N86-28019*# Lunar and Planetary Inst., Houston, Tex.
WORKSHOP ON PAST AND PRESENT SOLAR RADIATION: THE RECORD IN METEORITIC AND LUNAR REGOLITH MATERIAL
R. O. Pepin, comp. and D. S. McKay, comp. 1986 41 p Workshop held in Mainz, West Germany, 3-4 Sep. 1983
(Contract NASw-4066)
(NASA-CR-177305; NAS 1.26:177305; LPI-TR-86-02) Avail: NTIS HC A03/MF A01 CSCL 03B

The principal question addressed in the workshop was the extent to which asteroidal and lunar regoliths have collected and preserved, in meteoritic regolith breccias and in lunar soils and regolith breccias, a record of the flux, energy, and compositional history of the solar wind and solar flares. Six central discussion topics were identified. They are: (1)Trapped solar wind and flare gases, tracks, and micrometeorite pits in regolith components; (2)Comparison between lunar regolith breccias, meteoritic regolith breccias, and the lunar soil; (3)The special role of regolith breccias and the challenge of dating their times of compaction; (4)Implications of the data for the flux and compositional history of solar particle emission, composition, and physical mechanisms in the solar source regions, and the composition of the early nebula; (5)How and to what extent have records of incident radiation been altered in various types of grains; (6)Future research directions For individual titles, see N86-28020 through N86-28035.

N86-28020*# California Univ., San Diego. Dept. of Chemistry.
SOLAR PARTICLE HISTORY: 1983 VERSION c92
J. R. Arnold, R. C. Reedy (Los Alamos National Lab., N. Mex.), and K. Nishiizumi *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 11 (For primary document see N86-28019

18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

It has long been known that the great majority of nuclear active solar particles are emitted in a few large storms in each 11 year cycle. A single storm in August 1972 dominated the fluence of particles of energy >10 MeV. Such storms can occur, it seems, at any time within the more active half of the cycle. On a time scale long compared to 11 years, the knowledge comes from two sources. Terrestrial C-14 sets limits on the largest proton bursts that can have taken place in the 8000 years. Lunar surface samples have yielded data on mean fluxes on a time scale from the C-14 to the Mn-53 mean life. A mean flux was found of 70 protons >10 MeV and a rigidity constant R sub o = 100 MV to be robust on the 1,000,000 to 10,000,000 year time scale. Over the shorter periods represented by C-14 and Kr-81 the fluxes seem to have been higher by a factor of roughly three. Some examples of dating are discussed. Author

N86-28021*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
SOLAR WIND HELIUM, NEON AND ARGON RELEASED BY OXIDATION OF METAL GRAINS FROM THE WESTON CHONDRITE c92
R. H. Becker, R. S. Rajan (Jet Propulsion Lab., California Inst. of Tech., Pasadena.), and E. R. Rambaldi *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 12-13 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

A set of experiments were carried out to test the feasibility of determining unfractionated elemental and isotopic ratios for the noble gases in the presumably ancient solar wind present in the gas rich meteorites. The problems of diffusive loss was avoided by analyzing metal rather than the usual silicates. In order to avoid chemical, and even harsh physical, treatment of the sample, which might have affected the surfaces of metal grains, a means of analyzing the metal in the presence of residual silicate not removed by gentle crushing and magnetic separation was devised. Preliminary results given were obtained by taking advantage of the differing properties of metal and silicates with regard to diffusion. The results suggests that, with some modifications in the choice of pyrolysis and combustion temperatures and in the amount of O2 used, it should be possible, by oxidizing the surfaces of metal grains from gas rich meteorites, to obtain data on solar wind that has not been fractionated by diffusive loss. E.R.

N86-28022*# Houston Univ., Clear Lake, Tex.
PARTICLE TRACK MEASUREMENTS IN LUNAR REGOLITH BRECCIAS c91
George E. Blanford *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 14-16 Previously announced as A85-17791 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

Particle track measurements have been reported for 25 (5 percent) of the regolith breccias in the collection; they have been reported for 16 breccias (30%) in the reference suite. The most frequently reported measurement for these 25 breccias is the maximum surface exposure age of the compacted rock (48% of the published breccia measurements). Information on the nature of the precompaction regolith is given for 9 rocks (36%) and on the nature of the compaction event for 6 rocks (24%). Most of the breccias appear to have simple post compaction surface exposure histories (89%). From the few track density frequency distributions (7) that are available and inferring from the low exposure ages of these rocks (75% were younger than 10 to the 6th years), it appears that most of these breccias are amenable to studies which separate the contemporary surface exposure age from information about the precompaction regolith. If the number of immature submature precompaction soils (6 out of 10 of the breccias for which appropriate data are available) represents many regolith breccias, then it is inferred that regolith breccias may sample the deeper, less reworked materials in the lunar soil and compliment the samples available from the returned cores. Author

N86-28023*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
SCR AND GCR EXPOSURE AGES OF PLAGIOCLASE GRAINS FROM LUNAR SOIL c91
Ph. Etique, H. Baur, P. Signer, and R. Wieler *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 18-19 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

The concentrations of solar wind implanted Ar-36 in mineral grains extracted from lunar soils show that they were exposed to the solar wind on the lunar surface for an integrated time of 10E4 to 10E5 years. From the bulk soil 61501 plagioclase separates of 8 grain size ranges was prepared. The depletion of the implanted gases was achieved by etching aliquot samples of 4 grain sizes to various degrees. The experimental results pertinent to the present discussion are: The spallogenic Ne is, as in most plagioclases from lunar soils, affected by diffusive losses and of no use. The Ar-36 of solar wind origin amounts to (2030 + or - 100) x 10E-8 ccSTP/g in the 150 to 200 mm size fraction and shows that these grains were exposed to the solar wind for at least 10,000 years. The Ne-21/Ne-22 ratio of the spallogenic Ne is 0.75 + or - 0.01 and in very good agreement with the value of this ratio in a plagioclase separate from rock 76535. This rock has had a simple exposure history and its plagioclases have a chemical composition quite similar to those studied. In addition to the noble gases, the heavy particle tracks in an aliquot of the 150 to 200 mm plagioclase separate were investigated and found 92% of the grains to contain more than 10E8 tracks/sq cm. This corresponds to a mean track density of (5 + or - 1) x 10E8 tracks/sq cm. The exploration of the exposure history of the plagioclase separates from the soil 61501 do not contradict the model for the regolith dynamics but also fail to prove it. Author

N86-28024*# Bern Univ. (Switzerland). Physikalisches Inst.
THE COMPOSITION OF LUNAR NOBLE GASES TRAPED 2.5 AE AND 3.5 AE AGO c91
O. Eugster *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Materials 1986 p 20 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

The times when the soils 74001 and 73261 were exposed on the lunar surface were determined by the U-235 - Xe-136 dating method. The isotopic composition of the trapped noble gases in these two soils is compared with that of the surface correlated noble gases in the young soils 12001 and in the present day solar wind. The surface correlated trapped gases are a mixture of implanted solar wind particles and retrapped lunar atmospheric gases. The observed changes are interpreted as a result of decreasing outgassing of radiogenic Ar-40 and perhaps He-4 and of fissiogenic Xe from the lunar crust. The old soils probably also contain surface correlated Kr-80 and Kr-82 produced by secondary cosmic ray neutron capture of adsorbed or retrapped bromine. To some extent the isotopic composition of the trapped gases in old lunar soil may also have been altered due to diffusion loss from material of low retentivity. Author

N86-28025*# Bern Univ. (Switzerland). Physikalisches Inst.
THE DATING OF PRE-EXPOSURE TIMES OF LUNAR ROCKS AND SOILS c91
O. Eugster *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 21 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

Xenon produced by fission of uranium, thorium and plutonium has repeatedly been observed in lunar rocks and soils. In two basaltic rocks and in two soils Xe was found originating from fission of U-235 induced by neutrons which are due to the

interactions of cosmic ray particles with lunar matter. Two facts lead to this conclusion: (1) fission Xe is present in excess of that expected for the U, Th, and Pu concentrations and for the gas retention age of the samples; and (2) the Xe-134/Xe-136 ratio of excess fission Xe is close to 1.25 as expected for neutron induced fission of U-235. Information on the duration of the exposure to cosmic rays was obtained from the Kr-81-Kr systematics whereas the effective shielding conditions were derived from the depth sensitive cosmogenic ratio Xe-131/Xe-126. For the four samples the exposure to cosmic rays in the lunar regolith is described by a two stage exposure model. The history of the four samples was derived in terms of duration and shielding depth of the two stages. Author

N86-28026*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.

RELEASE OF NOBLE GASES AND NITROGEN FROM GRAIN-SURFACE SITES IN LUNAR ILMENITE BY CLOSED-SYSTEM OXIDATION c91

Urs Frick, Richard H. Becker, and R. O. Pepin *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 22-23 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

Noble gases and nitrogen were extracted from a 100 to 150 microns ilmenite separate from lunar soil 71501 by closed system stepped heating in approx. 10 torr O2 at 300 C, 400 C, 500 C, 600 C and 630 C, followed by stepped pyrolysis at ten temperatures between 680 C and approx. 1500 C. The five oxidation steps together liberated approx. 65% of the total He-4, 45% of the Ne-20, 23% of the N-14 and Ar-36, 12% of the Kr-84 and 8% of the Xe-132 in the sample; Ne-20/Ar-36 and Ne-20/Ne-22 ratios agree with the solar wind composition experiment, and Kr-84/Ar-36 and Xe-132/Ar-36 are within approx. 10% of Cameron's estimates for the sun and solar wind. The remaining gases, released above 630 C by pyrolysis, are strongly fractionated with respect to the SWC-Cameron solar wind elemental composition. Large concentrations of fractionated noble gases in grain interiors, their virtual absence in the relatively unfractionated surface gas reservoir, and the high N/noble gas ratio all imply that most of the solar wind noble gases initially implanted in grain surfaces are eventually lost by diffusion. Loss limits can be estimated by considering two given scenarios. It is concluded tat approx. 70 to 97% or more of the Ar implanted in 71501 ilmenite grains has diffusively escaped. Author

N86-28027*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.

BOUNDARY CONDITIONS ON THE EARLY SUN FROM ANCIENT COSMOGENIC NEON IN METEORITES c92

C. M. Hohenberg, M. W. Caffee, T. D Swindle, and J. Goswami (Physical Research Lab., Ahmedabad (India).) *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 24 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

Isotopic analysis of neon from individual grains of the meteorites Murchison (CM) and Kapoeta (howardite) shows large enrichments of cosmogenic neon in grains with solar flare tracks. The quantity of this component is incompatible with galactic cosmic ray or solar cosmic ray irradiation under present conditions and is attributed to irradiation by energetic flares from an early active Sun. Handpicked grains from each meteorite were grouped according to the presence or absence of solar flare heavy ion tracks, and these four samples were analyzed with an ion counting noble gas mass spectrometer. Author

N86-28028*# California Univ., Los Angeles. Inst. of Geophysics.

THE REALITY OF THE SECULAR CHANGE IN SOLAR WIND NITROGEN ISOTOPES c92

J. F. Kerridge *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 25 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

Evidence concerning the isotopic composition of N in the early solar system currently seems to favor a picture of isotopic inhomogeneity rather than of a unique primordial composition modified by local processes. Certainly the range of N-15/N-14 ratios found in meteorites points to the existence of more than one nucleogenetic N component, though mass dependent modification of them explain the isotopic variation observed for N in the lunar regolith. The observational evidence is addressed which can be used to discriminate between such a model and one invoking a secular change in the composition of the solar wind. Three tests of this model were considered, starting with a search for light planetary N surviving in lunar rocks. Results so far are negative. The results of these tests may not eliminate the two component model for regolith N but they seriously weaken it. The alternate view, involving a secular change in solar wind N composition, has its problems but continues to survive by default. Author

N86-28029*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).

DISTRIBUTION OF SOLAR WIND IMPLANTED NOBLE GASES IN LUNAR SAMPLES c92

J. Kiko and T. Kirsten *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 26-27 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

The distribution of solar wind implanted noble gases in lunar samples depends on implantation energy, fluence, diffusion, radiation damage and erosion. It is known that at least the lighter rare gases are fractionated after implantation, but the redistribution processes, which mainly drive the losses, are not well understood. Some information about this one can get by looking at the concentration profiles of solar wind implanted He-4 measured by the Gas Ion Probe in single lunar grains. The observed profiles were divided in three groups. These groups are illustrated and briefly discussed. Author

N86-28030*# Missouri Univ., Rolla. Dept. of Chemistry.

THE NEED FOR ISOTOPIC DATA ON REFRACTORY ELEMENTS IN THE SOLAR WIND c92

O. K. Manuel *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 28 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

The Sun accounts for the bulk of material in the solar system. Information on the isotopic composition of elements in the solar wind is therefore essential for an understanding of the contribution made by each nucleogenetic component that has been identified in meteorites. Recent work suggests that isotopic data on the solar wind may also help us to understand the physical process that is concentrating light elements at the solar surface. Refractory and volatile elements would behave alike under the conditions of solar fractionation. Prolonged exposure of foils at 1AU from the sun would be a relatively inexpensively way to collect the quantity of solar wind implanted refractory elements needed to test this hypothesis. Author

N86-28031*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

PETROGRAPHIC SURVEY OF LUNAR REGOLITH BRECCIAS c91

D. S. McKay and Sue Wentworth (Lockheed Electronics Co., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 29-30 (For primary document see N86-28019 18-88)

Avail: NTIS HC A03/MF A01 CSCL 03B

Regolith breccias from the Moon and from parent bodies of some meteorites may provide samples of ancient regoliths which

have been frozen in time. If these rocks were essentially closed at some earlier time and that time can be determined, then these rocks provide a record of conditions in the solar system at that point in time. A survey of regolith breccias in the Apollo collection was conducted concentrating initially on Apollo 15 and 16. All available thin sections for 32 regolith breccias from Apollo 15 and 19 breccias from Apollo 16 were surveyed. These are most of the returned regolith breccias larger than 1 cm from these two mission. For comparison several fragmental matrix breccias which do not strictly qualify as regolith breccias were investigated. The criteria for classification as a regolith breccia is the presence of identifiable soil components such as glass spheres or agglutinates. The breccias are classified according to their intergranular porosity. In addition the fracture porosity is noted, and the relative abundance of agglutinates and spheres. Several petrographic trends are also noted. Identifiable regolith material decreases with decreasing intergranular porosity while fracture porosity increases. This relative lack of maturity of regolith breccias mayreflect their generally earlier formation age an the maturity of the regolith at that earlier time. Author

N86-28032*# Physical Research Lab., Ahmedabad (India).
SOLAR FLARE NEON AND SOLAR COSMIC RAY FLUXES IN THE PAST USING GAS-RICH METEORITES **c92**
C. M. Nautiyal and M. N. Rao *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 31 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

Methods were developed earlier to deduce the composition of solar flare neon and to determine the solar cosmic ray proton fluxes in the past using etched lunar samples and at present, these techniques are extended to gas rich meteorites. By considering high temperature Ne data points for Pantar, Fayetteville and other gas rich meteorites and by applying the three component Ne-decomposition methods, the solar cosmic ray and galactic cosmic ray produced spallation Ne components from the trapped SF-Ne was resolved. Using appropiate SCR and GCR production rates, in the case of Pantar, for example, a GCR exposure age of 2 m.y. was estimated for Pantar-Dark while Pantar-Light yielded a GCR age of approx. 3 m.y. However the SCR exposure age of Pantar-Dark is two orders of magnitude higher than the average surface exposure ages of lunar soils. The possibility of higher proton fluxes in the past is discussed. Author

N86-28033*# Cambridge Univ. (England).
LUNAR NITROGEN: SECULAR VARIATION OR MIXING? **c91**
S. J. Norris, I. P. Wright, and C. T. Pillinger *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 32-33 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

The two current models to explain the nearly 40% variation of the lunar nitrogen isotopic composition are: (1) secular variation of solar wind nitrogen; and (2) a two component mixing model having a constant, heavy solar wind admixed with varying amounts of indigenous light lunar N (LLN). Both models are needed to explain the step pyrolysis extraction profile. The secular variation model proposes that the low temperature release is modern day solar wind implanted into grain surfaces, the 900 C to 1100 C release is from grain surfaces which were once exposed to the ancient solar wind but which are now trapped inside agglutinates, and the >1100 C release as spallogenic N produced by cosmic rays. The mixing model ascribes the components to solar wind, indigenous lunar N and spallogenic N respectively. An extension of either interpretation is that the light N seen in lunar breccias or deep drill cores represent conditions when more N-14 was available to the lunar surface. Author

N86-28034*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
NITROGEN AND NOBLE GASES IN THE 71501 BULK SOIL AND ILMENITE AS RECORDS OF THE SOLAR WIND EXPOSURE: WHICH IS CORRECT? **c91**
P. Signer, H. Baur, Ph. Etique, and R. Wieler *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 34-35 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

The N determination in mg sized mineral separates from lunar soils by static mass spectrometry is an experimental break-through likely to contribute to the deciphering of the records left in the mineral grains by the exposure to the solar wind. In this discussion some comparisons of the results of N and noble gas analyses of the 71501 bulk soil and an ilmenite separate thereof are focussed on. Conclusions from noble gas data obtained on mineral separates from some 20 soils are summarized in a companion paper and are also discussed herein. Author

N86-28035*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
STUDIES OF LIGHT NOBLE GASES IN MINERAL GRAINS FROM LUNAR SOILS: A STATUS REPORT **c91**
R. Wieler, Ph. Etique, and P. Signer *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 36-37 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

Among the lunar soil constituents, monomineralic grains deserve special attention. Noble gases of carefully prepared mineral separates from lunar bulk soils were studied. The major results and conclusions of these investigations are summarized, in the context of both the regolith evolution and the history of the solar corpuscular radiation. With regard to the most abundant noble gas component in the regolith samples (the solar gases) the mineral grains have mainly two properties giving these particles among all soil constituents the best characteristics as sensors for solar gases, despite the fact, that the noble gas concentrations in a mineral separate are 10 to 60 times lower that those in a bulk sample of the same grain size. The first of these properties is the mineral dependent retentivity of the light gases He and Ne, the second property concerns the relatively short time during which a mineral grain acquires it solar gases. These two points are briefly discussed. Author

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-28036# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
OBSERVATIONS OF 3C273 WITH HIGH NORTH-SOUTH RESOLUTION
M. Cohen (California Inst. of Tech., Pasadena.), J. Biretta, R. E. Schaal, G. Comoretto (Instituto di Radioastronomia, Bologna (Italy)), L. Baath (Onsala Space Observatory (Sweden).), and G. Nicholson (National Inst. for Telecommunications Research, Johannesburg (South Africa).) Mar. 1986 3 p Submitted for publication
(INPE-3841-PRE/910) Avail: NTIS HC A02/MF A01

The first very long base interferometry (VLBI) results using high north-south resolution are presented for the quasar 3C273. A major result is that the VLBI jet does not have a simple monotonic curvature. The 11-GHz maps show new superluminal components about 1 milliarcsecond from the core at position angles between -140 and -120 deg. Comparison of these positions with those of components farther from the core shows that the VLBI jet first curves north and then south, and ultimately points to the optical jet. M.G.

N86-28037*# Massachusetts Inst. of Tech., Cambridge.
COORDINATED OBSERVATIONS OF X-RAY BRIGHT BL LACERTAE OBJECTS Semiannual Status Report, 15 Mar. -

15 Sep. 1985
C. Megan Urry 1985 50 p refs
(Grants NAG5-495; NSF AST-83-01234)
(NASA-CR-177297; NAS 1.26:177297; SASR-1) Avail: NTIS HC A03/MF A01 CSCL 03A

Simultaneous multifrequency observations of the BL Lac object Mkn421 covering radio through X-ray wavelengths were performed. Composite multifrequency spectra of the central nonthermal component were obtained at the two epochs after subtracting the optical and infrared light of the underlying galaxy. Physical parameters of Mkn421 are discussed in terms of the synchrotron self-Compton model. Taking the spectral turnover between infrared and radio for synchrotrom self absorption, the radio emmision originates in a more extended region than the infrared to X-ray emission, the source size of which should be less than .01 milliarcseconds. Relativistic beaming is required if the angular size is smaller than a few times .001 milliarcseconds. A possible explanation of the spectral change during the two epochs is also discussed. B.G.

N86-28038*# Dartmouth Coll., Hanover, N.H. Dept. of Physics and Astronomy.
A STUDY OF THE ULTRAVIOLET ABSORPTIONS IN THE SPECTRA OF DA WHITE DWARFS Semiannual Report, 1 Apr. - 30 Sep. 1985
Gary A. Wegner 10 Jun. 1986 14 p
(Grant NAG5-287)
(NASA-CR-177276; NAS 1.26:177276) Avail: NTIS HC A02/MF A01 CSCL 03A

Systematic investigations of the ultraviolet spectra of the hydrogen-rich white dwarfs were conducted with the International Ultraviolet Explorer satellite (IUE). This is to follow up on the work reported in Nelan and Wegner (1985) that the strong absorptions found earlier near lambda lambda 1600 and 1400 (cf. Greenstein 1980; Wegner 1982 and 1984, b) in the spectra of the cooler DA are absorptions produced by the H2 and H2(+) quasi-molecules. Observations of new DA white dwarfs obtained with the IUE are summarized. B.W.

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-28039*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
MOLECULAR CLOUDS IN ORION AND MONOCEROS Ph.D. Thesis
Ronald J. Maddalena Jun. 1986 210 p
(NASA-TM-87786; NAS 1.15:87786) Avail: NTIS HC A10/MF A01 CSCL 03B

About one-eighth of a well-sampled 850 deg. sq. region of Orion and Monoceros shows CO emission coming from either local clouds (d < 1 kpc) lying as much as 25 deg. from the galactic plane or from more distant objects located within a few degrees of the plane. Local giant clouds associated with Orion A and B have enhanced temperatures and densities near their western edges possibly due to compression by a high pressure region created by approx.10 supernovae that occurred in the Orion OB association. Another giant cloud associated with Mon R2 may be related to the Orion clouds. Two filamentary clouds (one possibly 300 pc long but 10 pc wide) may represent a new class of object. An expanding ring of clouds concentric with the H II region ionized by lambda Ori probably constitute fragments of the original cloud from which lambda Ori formed; the gas pressure of the H II region and the rocket effect probably disrupted the original cloud. At a distance of 3 kpc, a large (250 x 100 pc) and massive (7-11x10 to the 5th power solar mass) cloud was found with the unusual combination of low temperatures (T sub R < 2.7 K) and wide spectral lines (approx. 7 km /sec). Most of the signs of star formation expected for such a massive cloud being absent, this may be a young cloud that has not yet started to form stars. The approx. 15 large clouds found in the outer galaxy (1 approx. 206 deg. - 220 deg.) probably lie in two spiral arms. The distribution of outer galaxy clouds and a comparison of the properties of these clouds and those of local clouds are given. Author

N86-27338# Ruhr Univ., Bochum (West Germany).
PLASMOIDS IN PLANETARY MAGNETIC FIELDS AND THE SOLAR CORONA
Karl Schindler *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 101-105 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-28040*# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
LABORATORY EVALUATION AND APPLICATION OF MICROWAVE ABSORPTION PROPERTIES UNDER SIMULATED CONDITIONS FOR PLANETARY ATMOSPHERES Semiannual Status Report, 1 Feb. - 31 Jul. 1986
Paul G. Steffes 1986 20 p refs
(Grant NAGw-533)
(NASA-CR-177267; NAS 1.26:177267; SASR-5) Avail: NTIS HC A02/MF A01 CSCL 03B

The recognition of the need to make laboratory measurements of simulated planetary atmospheres over a range of temperatures and pressure which correspond to the altitudes probed by radio occultation experiments, and over a range of frequencies which correspond to both radio occultation experiments and radio astronomical observations, has led to the development of a facility at Georgia Tech which is capable of making such measurements. Construction was completed of the outer planets simulator and measurements were conducted of the microwave absorption and refraction from nitrogen under simulated Titan conditions. The results of these and previous laboratory measurements were applied to a wide range of microwave opacity measurements, in order to derive constituent densities and distributions in planetary atmospheres such as Venus. E.R.

N86-28041*# National Aeronautics and Space Administration, Washington, D.C.
ADVANCES IN PLANETARY GEOLOGY, VOLUME 1
Jul. 1986 579 p
(NASA-TM-88784-Vol-1; NAS 1.15:88784-Vol-1) Avail: NTIS HC A25/MF A01 CSCL 03B

This publication is a compilation of reports focusing on research into the origin and evolution of the solar system with emphasis on planetary geology. Author

N86-28042*# National Aeronautics and Space Administration, Washington, D.C.
ADVANCES IN PLANETARY GEOLOGY, VOLUME 2
Jul. 1986 475 p
(NASA-TM-88784-Vol-2; NAS 1.15:88784-Vol-2) Avail: NTIS HC A20/MF A01 CSCL 03B

This publication is a continuation of volume 1; it is a compilation of reports focusing on research into the origin and evolution of the solar system with emphasis on planetary geology. Specific reports include a multispectral and geomorphic investigation of the surface of Europa and a geologic interpretation of remote sensing data for the Martian volcano Ascreaus Mons. Author

N86-28022*# Houston Univ., Clear Lake, Tex.
PARTICLE TRACK MEASUREMENTS IN LUNAR REGOLITH BRECCIAS
George E. Blanford *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 14-16 Previously announced as A85-17791 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28023*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
SCR AND GCR EXPOSURE AGES OF PLAGIOCLASE GRAINS FROM LUNAR SOIL
Ph. Etique, H. Baur, P. Signer, and R. Wieler *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 18-19 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28024*# Bern Univ. (Switzerland). Physikalisches Inst.
THE COMPOSITION OF LUNAR NOBLE GASES TRAPED 2.5 AE AND 3.5 AE AGO
O. Eugster *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Materials 1986 p 20 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28025*# Bern Univ. (Switzerland). Physikalisches Inst.
THE DATING OF PRE-EXPOSURE TIMES OF LUNAR ROCKS AND SOILS
O. Eugster *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 21 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28026*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
RELEASE OF NOBLE GASES AND NITROGEN FROM GRAIN-SURFACE SITES IN LUNAR ILMENITE BY CLOSED-SYSTEM OXIDATION
Urs Frick, Richard H. Becker, and R. O. Pepin *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 22-23 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28031*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PETROGRAPHIC SURVEY OF LUNAR REGOLITH BRECCIAS
D. S. McKay and Sue Wentworth (Lockheed Electronics Co., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 29-30 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28033*# Cambridge Univ. (England).
LUNAR NITROGEN: SECULAR VARIATION OR MIXING?
S. J. Norris, I. P. Wright, and C. T. Pillinger *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 32-33 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28034*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
NITROGEN AND NOBLE GASES IN THE 71501 BULK SOIL AND ILMENITE AS RECORDS OF THE SOLAR WIND EXPOSURE: WHICH IS CORRECT?
P. Signer, H. Baur, Ph. Etique, and R. Wieler *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 34-35 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28035*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
STUDIES OF LIGHT NOBLE GASES IN MINERAL GRAINS FROM LUNAR SOILS: A STATUS REPORT
R. Wieler, Ph. Etique, and P. Signer *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 36-37 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-28043# Stanford Univ., Calif. Center for Space Science and Astrophysics.
GEOMAGNETIC DISTURBANCES Final Report, 1 Sep. 1975 - 30 Sep. 1985
Philip H. Scherrer Jan. 1986 44 p
(Contract N00014-76-C-0207)
(AD-A165131) Avail: NTIS HC A03/MF A01 CSCL 03/2

Recent efforts include the study of the solar dynamics by directly observing the surface manifestations of giant scale convective motions. A knowledge of the structure of the convective zone is crucial to the eventual understanding of the solar magnetic cycle. The origin and structure of coronal magnetic fields and the origin of solar wind variability are studied. The static structure of the corona is governed by the large scale organization of photospheric fields. During times of low activity, these fields can be used to infer the coronal structure with reasonable accuracy. Our synoptic series of high accuracy low resolution magnetic observations continues to provide a useful source for a number of investigations conducted at Stanford and elsewhere. The relation between the effects of transient events and the large scale ambient structure is investigated. Flare accelerated material that does not cross the heliospheric current sheet has a larger impact on the terrestrial environment than material from flares that must cross the current sheet to arrive at the Earth. GRA

N86-28044*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 496, FEBRUARY 1986. PART 1: (PROMPT REPORTS). DATA FOR JANUARY 1986, DECEMBER 1985 AND LATE DATA
H. E. Coffey Feb. 1986 94 p
(Contract NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-177319; NAS 1.26:177319; PB86-181336;
SGD-498-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 03B

Solar-Geophysical Data Number 498, February 1986, Part 1 (Prompt Reports), Data for January 1986, December 1985 and Late Data contains the following:detailed index for 1985-86; data for January 1986--(IUWDS alert periods (advanced and world-wide), Solar activity indices, Solar flares, Solar radio emission, Vostok inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field); data for December 1985--(Solar active regions, Sudden ionospheric disturbances, Solar radio spectral observations, Cosmic ray measurements by neutron monitor, Geomagnetic indices, Radio propagation indices); late data--(Solar radio emission Nancay interferometric chart December 1985, Solar radio spectral observations Culgoora May 1985, Geomagnetic indices sudden commencements November 1985, Calcium plage data). GRA

N86-28045*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 498, FEBRUARY 1986. PART 2: (COMPREHENSIVE REPORTS). DATA FOR AUGUST 1985, AND MISCELLANEA
H. E. Coffey Feb. 1986 31 p
(Contract NASA Order W-15519; Grant NSF ATM-83-18491)

(NASA-CR-177320; NAS 1.26:177320; PB86-181344; SGD-498-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Solar-Geophysical Data Number 498, February 1986, Part 2 (Comprehensive Reports), Data for August 1985, and Miscellenea contains the following: detailed index for 1985-86; data for August 1985--(Solar flares, Solar radio bursts at fixed frequencies, Solar X-ray radiation from GOES satellite, Mass ejections from the Sun, Active prominences and filaments); miscellaneous data--Meudon carte synoptique 13 May - 7 July 1985. Author (GRA)

N86-27331# Tromsoe Univ. (Norway). Auroral Observatory.
SOLAR WIND AND CORONAL HOLES
Egil Leer and Thomas E. Holzer (National Center for Atmospheric Research, Boulder, Colo.) *In* ESA Future Missions in Solar Heliospheric and Space Plasma Physics Jun. 1985 p 3-9 Sponsored by NSF (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27332# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
ENERGY INPUT INTO THE SOLAR WIND
E. Marsch *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 11-21 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27333# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
THE CORONA AND INTERPLANETARY MEDIUM DURING THE SOLAR CYCLE
D. G. Sime *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 23-36 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27334# Bern Univ. (Switzerland). Inst. fuer Physik.
DIAGNOSTICS OF CORONA BY IN-SITU COMPOSITION MEASUREMENTS AT 1 AU
J. Geiss *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 37-50 Sponsored by Swiss National Science Foundation (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27335# Dartmouth Coll., Hanover, N.H.
SOLAR WIND INTERACTION WITH PLANETARY MAGNETIC FIELDS
B. U. O. Sonnerup *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 53-64 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27336# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
SOLAR WIND INTERACTION WITH NEUTRAL ATMOSPHERES
W.-H. Ip *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 65-82 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27342# Oxford Univ. (England). Dept. of Theoretical Physics.
HIGH RESOLUTION OBSERVATIONS OF MAGNETIC STRUCTURES
C. Jordan *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 161-167 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27343# Observatoire de Paris-Meudon (France).
SOLAR FINE STRUCTURES: THEIR IMPORTANCE IN THE SUN'S PHYSICS AND THEIR OBSERVATION
J. Heyvaerts *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 169-174 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27345# Cambridge Univ. (England). Inst. of Astronomy.
THEORY OF SOLAR OSCILLATIONS
D. O. Gough *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 183-197 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27346# National Optical Astronomy Lab. Tucson, Ariz. National Solar Observatory.
HIGH-RESOLUTION HELIOSEISMOLOGY
J. Harvey *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 199-208 Sponsored by NSF (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27347# Observatoire du Mont-Gros, Nice (France).
GLOBAL OSCILLATIONS
E. Fossat *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 209-217 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-27348# Observatoire de Paris-Meudon (France).
SOLAR/SPECTRA CONNECTIONS
F. Praderie *In* ESA Future Missions in Solar, Heliospheric and Space Plasma Physics Jun. 1985 p 219-228 (For primary document see N86-27330 18-12)
Avail: NTIS HC A12/MF A01

N86-28020*# California Univ., San Diego. Dept. of Chemistry.
SOLAR PARTICLE HISTORY: 1983 VERSION
J. R. Arnold, R. C. Reedy (Los Alamos National Lab., N. Mex.), and K. Nishiizumi *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 11 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28021*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
SOLAR WIND HELIUM, NEON AND ARGON RELEASED BY OXIDATION OF METAL GRAINS FROM THE WESTON CHONDRITE
R. H. Becker, R. S. Rajan (Jet Propulsion Lab., California Inst. of Tech., Pasadena.), and E. R. Rambaldi *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 12-13 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28027*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
BOUNDARY CONDITIONS ON THE EARLY SUN FROM ANCIENT COSMOGENIC NEON IN METEORITES
C. M. Hohenberg, M. W. Caffee, T. D Swindle, and J. Goswami (Physical Research Lab., Ahmedabad (India).) *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 24 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28026*# California Univ., Los Angeles. Inst. of Geophysics.
THE REALITY OF THE SECULAR CHANGE IN SOLAR WIND NITROGEN ISOTOPES
J. F. Kerridge *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 25 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28029*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
DISTRIBUTION OF SOLAR WIND IMPLANTED NOBLE GASES IN LUNAR SAMPLES
J. Kiko and T. Kirsten *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 26-27 (For primary document see N86-28019 18-88)
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N86-28030*# Missouri Univ., Rolla. Dept. of Chemistry.
THE NEED FOR ISOTOPIC DATA ON REFRACTORY ELEMENTS IN THE SOLAR WIND
O. K. Manuel *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 28 (For primary document see N86-28019 18-88)
Avail: NTIS HC A03/MF A01 CSCL 03B

N86-28032*# Physical Research Lab., Ahmedabad (India).
SOLAR FLARE NEON AND SOLAR COSMIC RAY FLUXES IN THE PAST USING GAS-RICH METEORITES
C. M. Nautiyal and M. N. Rao *In* Lunar and Planetary Inst. Workshop on Past and Present Solar Radiation: The Record in Meteoritic and Lunar Regolith Material 1986 p 31 (For primary document see N86-28019 18-88)
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93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-28046# Texas Univ., Austin.
THE IMPACT OF THE LOCAL ENVIRONMENT ON THE PROPERTIES OF RADIO GALAXIES: A STUDY OF GALAXIES IDENTIFIED FROM THE TEXAS SURVEY
Elizabeth Pike Bozyan 1985 514 p
Avail: Univ. Microfilms Order No. DA8527527

A sample of 3196 radio sources, with greater than or = 20 deg. from the +36 deg. strip of the 365 MHz Texas Survey, searched for optical counterparts, forms a large homogeneous data base used to investigate the incidence of and importance of, as a class of radio sources, optically first ranked galaxies occurring in small groups. The optical identification rate, for this sample, is 27%, with the identifications equally divided into red (galaxies) and blue ((QSO and QSO-like) objects. Statistical tests show that the galaxies and QSO plus QSO-like objects come from different radio populations and that their distribution of number as a function of apparent magnitude is different. Detailed optical and radio observations of a subset of twenty of the radio galaxies shows that the vast majority, probably all, are in interacting systems and that local environment plays a definite role. Divided by optical morphology, the combined optical luminosity of an interacting system is correlated with its radio luminosity. Examples taken from the literature confirm and extend these correlations to cluster radio galaxies. Using the sample of twenty to calibrate the entire sample of identified radio galaxies (405), a bivariate radioluminosity function has been constructed. By constructing a radio luminosity function covering three magnitudes in absolute optical magnitude, it is possible to explain the observed number of radio galaxies as a function of apparent magnitude without invoking luminosity or density evolution. The counts are explained by including a much larger number of intrinsically optically faint galaxies with large radio to optical luminosity ratios. Dissert. Abstr.

N86-28047*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
AN INVESTIGATION OF THE ENERGY BALANCE OF SOLAR ACTIVE REGIONS USING THE ACRIM IRRADIANCE DATA Semiannual Progress Report, May - Oct. 1985
Larry D. Petro 1986 10 p
(Contract NASw-4062)
(NASA-CR-176797; NAS 1.26:176797) Avail: NTIS HC A02/MF A01 CSCL 03B

The correlation between the irradiance (as measured by the Active Cavity Radiometer Irradiance Monitor and the Earth Radiation Budget) as corrected for sunspot flux deficit (which is responsible for most of the variance of the uncorrected signal) and both the 205 nm flux (as measured by Nimbus 7) and a photometric facular index is discussed. The computer program which simulates two-dimensional convection in a compressible, stratified medium is described. Equipment which was acquired to perform high precision, white-light observations of sunspot areas, and procedures were tested. Analysis of observations of large scale convective heat inhomogeneities which were obtained in May 1985 was begun. B.G.

99 GENERAL

No abstracts in this category.

Typical Subject Index Listing

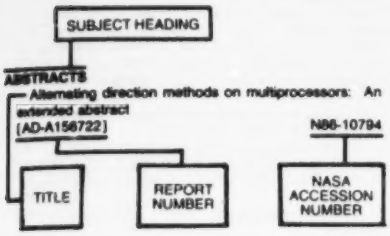

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Proceedings of the 1985 Antenna Applications Symposium, Volume 2
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Modern methods for calculating ground-wave field strength over a smooth spherical Earth
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Spectrum Orbit Utilization Program documentation: SOUP5 version 3.8 user's manual, volume 1, chapters 1 through 5
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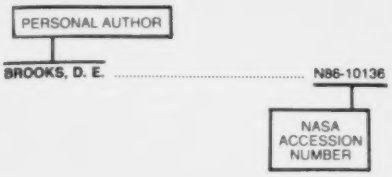

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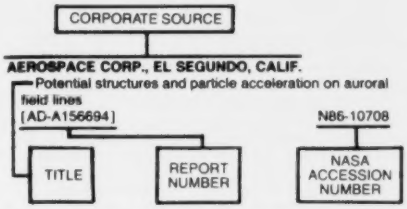

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ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Environmental factors affecting the corrosion of galvanized steel
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EUROPEAN NUCLEAR ENERGY AGENCY, FRASCATI (ITALY).
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Sensitivity analysis of horizontal heat and vapor transfer coefficients for a cloud-topped marine boundary layer during cold-air outbreaks
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FLORIDA STATE UNIV., TALLAHASSEE.
An investigation of the marine boundary layer during cold air outbreak
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FLOW RESEARCH, INC., KENT, WASH.
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FORD AEROSPACE AND COMMUNICATIONS CORP., PALO ALTO, CALIF.
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FORSCHUNGSINSTITUT DER DEUTSCHEN BUNDESPOST, DARMSTADT (WEST GERMANY).
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OBSERVATOIRE DU MONT-GROS, NICE (FRANCE).
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
La recherche aerospatiale. Bimonthly bulletin, no. 1984-6, November - December 1984
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POLYTECHNIC INST. OF NEW YORK, FARMINGDALE.
Workshop on New Directions in Solid State Power Switches held at Farmingdale, New York on 28-30 August 1985
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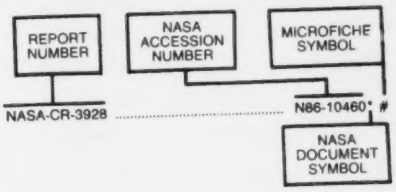

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) **2985**

02 AERODYNAMICS **2985**

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

03 AIR TRANSPORTATION AND SAFETY **2988**

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION **2988**

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE **2989**

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION **N.A.**

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER **2991**

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL **2992**

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) **2993**

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

12 ASTRONAUTICS (GENERAL) **2994**

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

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14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) **N.A.**

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES **2995**

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION **N.A.**

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING **2996**

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE **2996**

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION **2998**

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER **2998**

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **3000**

Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **3000**

Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY **3001**

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For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS **3006**

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **3011**

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **3014**

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

For related information see also *Physics*.

31 ENGINEERING (GENERAL) **3023**

Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **3024**

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING **3032**

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER **3041**

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For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY **3043**

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

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38 QUALITY ASSURANCE AND RELIABILITY **3051**

Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **3053**

Includes structural element design and weight analysis; fatigue; and thermal stress.

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GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) **3058**

43 EARTH RESOURCES **3060**

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION **3062**

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION **3065**

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 3066
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 3072
Includes weather forecasting and modification.

48 OCEANOGRAPHY 3076
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 3077
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52 AEROSPACE MEDICINE 3078
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53 BEHAVIORAL SCIENCES 3078
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54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 3079
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY 3080
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) 3080

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61 COMPUTER PROGRAMMING AND SOFTWARE 3081
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Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

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Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 3088
Includes mathematical modeling; network analysis; and operations research.

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Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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77 THERMODYNAMICS AND STATISTICAL PHYSICS 3101
Includes quantum mechanics; and Bose and Fermi statistics.
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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **3102**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **3102**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **3103**
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS **3106**
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84 LAW AND POLITICAL SCIENCE **3106**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3106**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **3107**

89 ASTRONOMY **3117**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3118**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3121**
Includes planetology; and manned and unmanned flights.
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Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **3122**
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GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.
CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL
C. P. Chen Aug. 1985 22 p refs
(Contract NASw-3458)
(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS
HC A02/MF A01 CSCL 20D

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-28048* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 201)
Jun. 1986 126 p
(NASA-SP-7037(201); NAS 1.21:7037(201)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 438 reports, articles, and other documents introduced into the NASA scientific and technical information system in May 1986. Author

N86-28049*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A TIME-BASED CONCEPT FOR TERMINAL-AREA TRAFFIC MANAGEMENT
Heinz Erzberger and Leonard Tobias Apr. 1986 17 p Presented at the 42nd AGARD Guidance and Control Panel Symposium, Brussels, Belgium, 6-9 May, 1985
(NASA-TM-88243; NAS 1.15:88243) Avail: NTIS HC A02/MF A01 CSCL 01B

An automated air-traffic-management concept that has the potential for significantly increasing the efficiency of traffic flows in high-density terminal areas is discussed. The concept's implementation depends on the techniques for controlling the landing time of all aircraft entering the terminal area, both those that are equipped with on-board four dimensional guidance systems as well as those aircraft types that are conventionally equipped. The two major ground-based elements of the system are a scheduler which assigns conflict-free landing times and a profile descent advisor. Landing times provided by the scheduler are uplinked to equipped aircraft and translated into the appropriate four dimensional trajectory by the on-board flight-management system. The controller issues descent advisories to unequipped aircraft to help them achieve the assigned landing times. Air traffic control simulations have established that the concept provides an efficient method for controlling various mixes of four dimensional-equipped and unequipped, as well as low-and high-performance, aircraft. Author

N86-28050*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
GEOMETRY DEFINITION AND GRID GENERATION FOR A COMPLETE FIGHTER AIRCRAFT
Thomas A. Edwards Apr. 1986 15 p Presented at the AGARD Symposium on Applications of CED in Aeronautics, Aix en Provence, France, 7-10 Apr. 1986
(NASA-TM-88242; A-86208; NAS 1.15:88242) Avail: NTIS HC A02/MF A01 CSCL 01B

Recent advances in computing power and numerical solution procedures have enabled computational fluid dynamicists to attempt increasingly difficult problems. In particular, efforts are focusing on computations of complex three-dimensional flow fields about realistic aerodynamic bodies. To perform such computations, a very accurate and detailed description of the surface geometry must be provided, and a three-dimensional grid must be generated in the space around the body. The geometry must be supplied in a format compatible with the grid generation requirements, and must be verified to be free of inconsistencies. This paper presents a procedure for performing the geometry definition of a fighter aircraft that makes use of a commercial computer-aided design/computer-aided manufacturing system. Furthermore, visual representations of the geometry are generated using a computer graphics system for verification of the body definition. Finally, the three-dimensional grids for fighter-like aircraft are generated by means of an efficient new parabolic grid generation method. This method exhibits good control of grid quality. Author

N86-28051*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT AND VALIDATION OF THE CREW-STATION SYSTEM-INTEGRATION RESEARCH FACILITY
Bill Nedell, Gordon Hardy, Ted Lichtenstein, Gary Leong, and David Thompson May 1986 24 p
(NASA-TM-86841; A-85410; NAS 1.15:86841) Avail: NTIS HC A02/MF A01 CSCL 01B

The various issues associated with the use of integrated flight management systems in aircraft were discussed. To address these issues a fixed base integrated flight research (IFR) simulation of a helicopter was developed to support experiments that contribute to the understanding of design criteria for rotorcraft cockpits incorporating advanced integrated flight management systems. A validation experiment was conducted that demonstrates the main features of the facility and the capability to conduct crew/system integration research. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-28052*# National Aeronautics and Space Administration, Washington, D.C.
FORMATION OF ASYMMETRIC SEPARATED FLOW PAST SLENDER BODIES OF REVOLUTION AT LARGE ANGLES OF ATTACK
M. G. Goman and A. N. Khrabrov Jun. 1986 17 p Transl. into ENGLISH from Uchenye Zapiski TsAGI (USSR), vol. 15, no. 6, 1984 p 1-9 Previously announced as A86-13429 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NAS2-4005)
(NASA-TM-88441; NAS 1.15:88441; ISSN-0321-3249) Avail: NTIS HC A02/MF A01 CSCL 01A

The paper examines the problem of determining stationary positions of pairs of vortices of unequal intensity in the flow behind a cylinder modeling the axisymmetric separated flow past a slender body at large angles of attack. The possible asymmetric stationary positions of two vortices are calculated, and their stability with respect to small perturbations is determined. Bifurcations of the flow field with changes in vortex intensity are analyzed. Author

N86-28053*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LASER FRINGE ANEMOMETRY FOR AERO ENGINE COMPONENTS
Anthony J. Strazisar 1986 54 p Presented at the 67th Symposium of the AGARD Propulsion and Energetics Panel on Advanced Instrumentation for Aero Engine Components, Philadelphia, Pa., 19-23 May 1986
(NASA-TM-88798; E-3135; NAS 1.15:88798) Avail: NTIS HC A02/MF A01 CSCL 01A

Advances in flow measurement techniques in turbomachinery continue to be paced by the need to obtain detailed data for use in validating numerical predictions of the flowfield and for use in the development of empirical models for those flow features which cannot be readily modelled numerically. The use of laser anemometry in turbomachinery research has grown over the last 14 years in response to these needs. Based on past applications and current developments, this paper reviews the key issues which are involved when considering the application of laser anemometry to the measurement of turbomachinery flowfields. Aspects of laser fringe anemometer optical design which are applicable to turbomachinery research are briefly reviewed. Application problems which are common to both laser fringe anemometry (LFA) and laser transit anemometry (LTA) such as seed particle injection, optical access to the flowfield, and measurement of rotor rotational position are covered. The efficiency of various data acquisition schemes is analyzed and issues related to data integrity and error estimation are addressed. Real-time data analysis techniques aimed at capturing flow physics in real time are discussed. Finally, data reduction and analysis techniques are discussed and illustrated using examples taken from several LFA turbomachinery applications. Author

N86-28054*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIAXIS AIRCRAFT CONTROL POWER FROM THRUST VECTORING AT HIGH ANGLES OF ATTACK
Francis J. Capone and Mary L. Mason Jun. 1986 51 p Presented at the AIAA 4th Applied Aerodynamics Conference, San Diego, Calif., 9-11 Jun. 1986
(NASA-TM-87741; NAS 1.15:87741; AIAA-86-1779) Avail: NTIS HC A03/MF A01 CSCL 01A

Extensive research programs conducted at the Langley Research Center have shown that thrust vectoring can be provided by multifunction (nonaxisymmetric) nozzles. Most of this research has been conducted on pitch vectoring at both static and forward flight conditions. Recent efforts have been aimed at evaluating yaw vectoring concepts at static (wind off) conditions. This paper summarizes results for three different twin-engine fighter configurations tested over a Mach number range of 0.15 to 2.47 at angles of attack up to 35 deg. The objective of these investigations was to determine the multiaxis control power characteristics provided by thrust vectoring. All three configurations employed two-dimensional convergent-divergent nozzles which provided pitch vectoring by differential deflection of the upper and lower nozzle divergent flaps. Three different means of yaw vectoring were tested: (1) a translating nozzle sidewall; (2) yaw flaps located in the nozzle sidewalls; and (3) canted nozzles. These investigations were conducted in the Langley 16-Foot Transonic Tunnel and the Lewis 10x10-Foot Supersonic Tunnel. Longitudinal and direction control power from thrust vectoring was greater than that provided by aerodynamic control effectors at low speed or at high angles of attack. Author

N86-28055*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROTOR WAKE CHARACTERISTICS OF A TRANSONIC AXIAL FLOW FAN
M. D. Hathaway (Army Aviation Research and Technology Activity, Cleveland, Ohio), J. Gertz (Massachusetts Inst. of Tech., Cambridge), A. Epstein, and A. J. Strazisar 1985 13 p Presented at the 21st Joint Propulsion Conference, Monterey, Calif., 8-10 Jul. 1985; sponsored by AIAA, SAE, ASME and ASEE Previously announced in IAA as A85-43974
(NASA-TM-87073; E-2644; USAAVSCOM-TR-85-C-8; AIAA-85-1133; NAS 1.15:87073) Avail: NTIS HC A02/MF A01 CSCL 01A

State of the art turbomachinery flow analysis codes are not capable of predicting the viscous flow features within turbomachinery blade wakes. Until efficient 3D viscous flow analysis codes become a reality there is therefore a need for models which can describe the generation and transport of blade wakes and the mixing process within the wake. To address the need for experimental data to support the development of such models, high response pressure measurements and laser anemometer velocity measurements were obtained in the wake of a transonic axial flow fan rotor. Author

N86-28056*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HOVER IN-GROUND-EFFECT TESTING OF A FULL-SCALE, TILT-NACELLE V/STOL MODEL
James E. Eshleman, Michael R. Dudley, and Charles J. Schell (Grumman Aerospace Corp., Bethpage, N.Y.) Feb. 1986 18 p Presented at the 14th AIAA Aerodynamic Testing Conference, West Palm Beach, Fla., 5-7 Mar. 1986
(NASA-TM-88218; A-86127; NAS 1.15:88218) Avail: NTIS HC A02/MF A01 CSCL 01A

A full-scale, tilt-nacelle V/STOL aircraft model was tested in hover at the National Full Scale Aerodynamics Complex (NFAC), NASA Ames Research Center. The model was powered by two TF-34 turbofan engines. It was tested at several ground heights and control deflections. Test technique and test setup were documented. Limited results show that: (1) a small change in control power with ground height was measured, and control power was found to be good over + or - 20 deg of horizontal vane deflection; (2) integrated fuselage undersurface pressures, when compared with the total model loads and measured thrust, defined the effect of the fountain and its related flow field on model forces and moments; and (3) there was no indication of hot gas ingestion during simulated takeoff in calm winds from wheels on deck ground height. Author

N86-28057*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A PERSPECTIVE OF COMPUTATIONAL FLUID DYNAMICS
Paul Kutler May 1986 22 p Presented at the National Aerospace Lab., Tokyo, Japan, 20 Jun. 1986
(NASA-TM-88246; A-86224; NAS 1.15:88246) Avail: NTIS HC A02/MF A01 CSCL 01A

Computational fluid dynamics (CFD) is maturing, and is at a stage in its technological life cycle in which it is now routinely applied to some rather complicated problems; it is starting to create an impact on the design cycle of aerospace flight vehicles and their components. CFD is also being used to better understand the fluid physics of flows heretofore not understood, such as three-dimensional separation. CFD is also being used to complement and is being complemented by experiments. In this paper, the primary and secondary pacing items that govern CFD in the past are reviewed and updated. The future prospects of CFD are explored which will offer people working in the discipline challenges that should extend the technological life cycle to further increase the capabilities of a proven demonstrated technology. Author

N86-28058*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VORTEX SIMULATION OF FORCED MIXING LAYERS

Osamu Inoue and Anthony Leonard Jun. 1986 71 p
(NASA-TM-88235; A-86191; NAS 1.15:88235) Avail: NTIS
HC A04/MF A01 CSCL 01A

Two-dimensional, spatially growing, turbulent mixing layers are simulated numerically by a vortex method and the results are compared with those determined experimentally. The effects of artificial forcing on flow development are also studied. Many of the flow features which have been observed experimentally are reproduced, and good quantitative agreements between experiments and computations are obtained. Author

N86-28059*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL STUDY OF FLOW DEFLECTORS DESIGNED TO ALLEVIATE GROUND WINDS INDUCED BY EXHAUST OF 80-BY 120-FOOT WIND TUNNEL
Vernon J. Rossow, Gene I. Schmidt, Michael S. Reinath, Johannes M. VanAken (Kansas Univ., Lawrence), Cynthia L. Parrish, and Raymond F. Schuler Jan. 1986 43 p
(NASA-TM-88195; A-86055; NAS 1.15:88195) Avail: NTIS
HC A03/MF A01 CSCL 01A

An experimental study directed at finding a deflector ramp that will reduce to an acceptable level the ground winds under the exhaust jet of the 80 by 120 Foot Wind Tunnel at NASA Ames Center is described. A one-fifieth scale model of the full-scale facility was used to investigate how the jet flow field was modified by the various design parameters of the ramp. It was concluded that the ground winds were alleviated sufficiently by a ramp with end plates located next to the wind tunnel building along the ground edge of the exhaust opening. At full scale, the ramp should have a slant length of 7.62 m (25 ft) or more, and would be elevated at about 45 degrees to the ground plane. The material should have holes less than 15.2 (6 in) in diameter distributed uniformly over its surface to produce a porosity of about 30%. Author

N86-28060*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ROTOR/WING AERODYNAMIC INTERACTIONS IN HOVER
Fort F. Felker and Jeffrey S. Light May 1986 27 p Presented at the 42nd Annual Forum of the American Helicopter Society, 2-4 Jun. 1986
(NASA-TM-88255; A-86246; NAS 1.15:88255) Avail: NTIS
HC A03/MF A01 CSCL 01A

An experimental and theoretical investigation of rotor/wing aerodynamic interactions in hover is described. The experimental investigation consisted of both a large-scale and small-scale test. A 0.658-scale, V-22 rotor and wing was used in the large-scale test. Wind download, wing surface pressure, rotor performance, and rotor downwash data from the large-scale test are presented. A small-scale experiment was conducted to determine how changes in the rotor/wing geometry affected the aerodynamic interactions. These geometry variations included the distance between the rotor and wing, wing incidence angle, and configurations both with the rotor axis at the tip of the wing (tilt rotor configuration) and with the rotor axis at the center of the wing (compound helicopter configuration). A wing with boundary-layer control was also tested to evaluate the effect of leading and trailing edge upper surface blowing on the wing download. A computationally efficient, semi-empirical theory was developed to predict the download on the wing. Finally, correlations between the theoretical predictions and test data are presented. Author

N86-28061*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
USING THE BOUNDARY-LAYER EQUATION IN 3-DIMENSIONAL VISCOUS FLOW SIMULATION
William R. VanDalsem and Joseph L. Steger Mar. 1986 15 p Presented at the AGARD Symposium on Applications of CFD in Aeronautics, Aix en Provence, France, 7-10 Apr. 1985
(NASA-TM-88241; A-86203; NAS 1.15:88241) Avail: NTIS
HC A02/MF A01 CSCL 01A

A simple and computationally efficient algorithm for solving the unsteady three dimensional boundary layer equations in a time accurate or relaxation mode is presented. The algorithm is used to compute the separated flow over a 6:1 ellipsoid at angle of attack and the transonic flow over a finite wing with shock induced separation. These results are compared to available experimental data. A method of using the boundary layer algorithm to accelerate a Navier-Stokes computation is also presented. Example comoutations indicate that a boundary layer algorithm can be used to improve both the accuracy and efficiency of a Navier-Stokes algorithm. Author

N86-28062*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PATCHED-GRID CALCULATIONS WITH THE EULER AND NAVIER-STOKES EQUATIONS: THEORY AND APPLICATIONS
M. M. Rai Feb. 1986 105 p Presented at the Lecture Series on CFD, Rhode-St-Genese, Belgium, 3-7 Mar. 1986
(NASA-TM-88228; Rept-86112; NAS 1.15:88228) Avail: NTIS
HC A06/MF A01 CSCL 01A

A patched-grid approach is one in which the flow region of interest is divided into subregions which are then discretized independently using existing grid generator. The equations of motion are integrated in each subregion in conjunction with patch-boundary schemes which allow proper information transfer across interfaces that separate subregions. The patched-grid approach greatly simplifies the treatment of complex geometries and also the addition of grid points to selected regions of the flow. A conservative patch-boundary condition that can be used with explicit, implicit factored and implicit relaxation schemes is described. Several example calculations that demonstrate the capabilities of the patched-grid scheme are also included. Author

N86-28063*# United Technologies Research Center, East Hartford, Conn.
MEASUREMENTS OF A TURBULENT HORSESHOE VORTEX FORMED AROUND A CYLINDER Final Report
W. A. Eckerle and L. S. Langston (Connecticut Univ., Storrs) Washington NASA Jun. 1986 206 p
(Grant NsG-3238)
(NASA-CR-3986; E-3027; NAS 1.26:3986) Avail: NTIS
HC A10/MF A01 CSCL 01A

An experimental investigation was conducted to characterize a symmetrical horseshoe vortex system in front of and around a single large-diameter right cylinder centered between the sidewalls of a wind tunnel. Surface flow visualization and surface static pressure measurements as well as extensive mean velocity and pressure measurements in and around the vortex system were acquired. The results lend new insight into the formation and development of the vortex system. Contrary to what has been assumed previously, a strong vortex was not identified in the streamwise plane of symmetry, but started a significant angular distance away from it. Rather than the multiple vortex systems reported by others, only a single primary vortex and saddle point were found. The scale of the separation process at the saddle point was much smaller than the scale of the approaching boundary layer thickness. Results of the present study not only shed light on such phenomena as the nonsymmetrical endwall flow in axial turbomachinery but can also be used as a test case for three-dimensional computational fluid mechanics computer codes. Author

N86-28064*# Old Dominion Coll., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
AN INVESTIGATION OF THE FEASIBILITY OF ACTIVE BOUNDARY LAYER THICKENING FOR AIRCRAFT DRAG REDUCTION Final Report, period ending 3 Mar. 1986
Robert L. Ash and C. Koodalattupuram Apr. 1986 15 p
(Grant NAG1-121)
(NASA-CR-177133; NAS 1.26:177133) Avail: NTIS
HC A02/MF A01 CSCL 01A

The feasibility of using a forward mounted windmilling propeller to extract momentum from the flow around an axisymmetric body to reduce total drag has been studied. Numerical calculations

indicate that a net drag reduction is possible when the energy extracted is returned to an aft mounted pusher propeller. However, net drag reduction requires very high device efficiencies. Results of an experimental program to study the coupling between a propeller wake and a turbulent boundary layer are also reported. The experiments showed that a complex coupling exists and simple modes for the flow field are not sufficiently accurate to predict total drag. Author

N86-28065# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Hochgeschwindigkeitsstroemungen.
DIRECT CALCULATION OF WALL INTERFERENCES AND WALL ADAPTATION FOR TWO-DIMENSIONAL FLOW IN WIND TUNNELS WITH CLOSED WALLS
Juergen Amecke Nov. 1985 106 p In GERMAN; ENGLISH summary
(DFVLR-FB-85-62; ISSN-0171-1342; ESA-86-96882) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 29

A method for the direct calculation of the wall induced interference velocity in two dimensional flow based on Cauchy's integral formula was derived. This one-step method allows the calculation of the residual corrections and the required wall adaptation for interference-free flow starting from the wall pressure distribution without any model representation. Demonstrated applications are given. ESA

N86-28066# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
TRANSONIC AND SUPERSONIC WIND TUNNEL TESTS ON SCHEMATIC MISSILE CONFIGURATIONS WITH TWO DIFFERENT NOSE LENGTHS
Sven Erik Gudmundson and Lars Torngren Sep. 1985 93 p
(Contracts FMV-F-K-82223-75-007-07-001; FMV-F-K-82223-76-001-21-001)
(FFA-TN-1984-62; ESA-86-97051) Avail: NTIS HC A05/MF A01

A wind tunnel investigation at transonic and supersonic speeds for schematic missile models including body alone, body-tail, body-wing, and body-wing-tail configurations was performed. The test gives symmetric force and moment coefficients for an angle of attack range of 0 to 24 deg at Mach numbers from 0.7 to 2.99. Two different ogival noses with length/diameter ratio 3.5 and 1.5 were used. The influence of the nose length on normal force, pitching moment and axial force was studied. Examples of effects on asymmetric coefficients are given. ESA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-28067# Mitre Corp., McLean, Va.
PROCEDURES FOR CAUSE ORIENTED ANALYSIS AND CONSEQUENCE ORIENTED ANALYSIS
Alvin L. McFarland, Yan-Shek Hoh, and Gerald A. Dorfman Jun. 1986 26 p
(Contract DTFA01-84-C-0001)
(DOT/FAA/PM-86/21) Avail: NTIS HC A03/MF A01

Cause and consequence oriented analyses are techniques for safety analysis of software. They are particularly important for analyzing software whose inadequate performance could result in hazard to life or property. This report presents procedures for performing these analyses. Author

N86-28068*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TIME-BASED AIR TRAFFIC MANAGEMENT USING EXPERT SYSTEMS
L. Tobias and J. L. Scoggins Apr. 1986 59 p
(NASA-TM-88234; A-86188; NAS 1.15:88234) Avail: NTIS HC A04/MF A01 CSCL 07G

A prototype expert system was developed for the time scheduling of aircraft into the terminal area. The three functions of the air traffic control schedule advisor are as follows: first, for each new arrival, it develops an admissible flight plan for that aircraft. Second, as the aircraft progresses through the terminal area, it monitors deviations from the flight plan and provides advisories to return the aircraft to its assigned schedule. Third, if major disruptions such as missed approaches occur, it develops a revised plan. The advisor is operational on a Symbolics 3600, and is programed in MRS (a logic programming language), Lisp, and FORTRAN. Author

N86-28069# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
AIRCRAFT ACCIDENT REPORT: CHINA AIRLINES BOEING 747-SP, N4522V 300 NAUTICAL MILES NORTHWEST OF SAN FRANCISCO, CALIFORNIA, FEBRUARY 19, 1985
29 Mar. 1986 48 p
(PB86-910403; NTSB-AAR-86-03) Avail: NTIS HC A03/MF A01; also available on subscription, North American continent HC $60.00/year; all others write for quote CSCL 01B

About 1016 Pacific standard time February 19, 1985, China Airlines Flight 006, a Boeing 747 SP-09, enroute to Los Angeles, California from Taipei, Taiwan, suffered an inflight upset. The flight from Taipei to about 300 nmi northwest of San Francisco was uneventful and the airplane was flying at about 41,000 feet mean sea level when the No. 4 engine lost power. The National Transportation Safety Board determines that the probable cause of the accident was the captain's preoccupation with an inflight malfunction and his failuare to monitor properly the airplane's flight instruments which resulted in his losing control of the airplane. Contributing to the accident was the captain's over-reliance on the autopilot after the loss of thrust on the No. 4 engine. GRA

N86-28070# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 10 OF 1984 ACCIDENTS
16 Dec. 1985 406 p
(PB86-916906; NTSB-AAB-86-06) Avail: NTIS HC A18/MF A01; also available on subscription, North American continent HC $185.00/year; all others write for quote CSCL 01B

Selected aircraft accident reports in brief format occurring in U.S. civil and foreign aviation operations during Calendar Year 1984 are given. Approximately 200 general aviation and air carrier accidents represent a random selection. The facts, conditions, circumstances and probable cause(s) for each accident are given. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-28071# Birmingham Univ. (England). Dept. of Electronic and Electrical Engineering.
A STUDY OF DOPPLER LOGS FOR USE AS A SHIP'S NAVIGATIONAL AID
P. N. Denbigh 1978 48 p
(ACO-TR-4211; BR96381; ESA-86-97108) Avail: Issuing Activity

The use of acoustic Doppler logs to provide an instantaneous readout of ship's velocity and thus a dead reckoning technique to give the distance travelled is considered. Principles and limitations of the Doppler technique, and causes of inaccuracies are discussed.

The problem of Doppler log transmissions being detected by enemy sonars is examined. It is shown that, in spite of the high operating frequency where sound attenuation is very considerable in water, there are nonlinear effects in the water which can cause low frequency signals to be generated and propagated. These are shown to be of a magnitude likely to be detected. However, fairly simple modifications can be made to the Doppler log which greatly reduce the magnitude of these low frequency signals. ESA

N86-28072 Technische Hogeschool, Delft (Netherlands). Afdel. der Elektrotechniek.
LECTURE NOTES: ELECTRONIC NAVIGATION 2 (RADAR) [ELEKTRONISCHE NAVIGATIE 2]
E. Goldbohm 1986 191 p in DUTCH
(ESA-86-96951) Avail: Issuing Activity

The radar equation, related magnitudes such as signal detection, scanning and collapsing loss, and scattering cross section are introduced. Resolution, exactitude, and forms of clutter (e.g., ground, sea, and rain) are analyzed using the ambiguity function. Different types of radar (e.g., tracking, side looking, Doppler, and pulse radar) and their application possibilities and limitations, are discussed. ESA

N86-28073# Ohio Univ., Athens. Dept. of Electrical and Computer Engineering.
SITING CRITERIA FOR MICROWAVE LANDING SYSTEMS (MLS) Final Report
Roger Radcliff and Michael F. DiBenedetto Jun. 1986 83 p
(Contract DTRS57-83-C-00097)
(FAA/PM-86/18; OU-AEC-81-1) Avail: NTIS HC A05/MF A01

Current siting criteria for the Microwave Landing System (MLS) are described. These criteria were obtained throught flight testing, mathematical and computer modeling, and publications from other sources. A description of MLS principles and a technical description of each of the systems components are provided. General principles germane to siting, such as critical areas and propagation effects are introduced. The criteria for siting in the MLS in an ideal airport are described. Solutions to difficult siting problems such as MLS/ILS collocation, multipath and shadowing effects, and collocation with approach lighting systems are given. Author

N86-28074*# Boeing Commercial Airplane Co., Seattle, Wash.
LOCAL FLOW MANAGEMENT/PROFILE DESCENT ALGORITHM. FUEL-EFFICIENT, TIME-CONTROLLED PROFILES FOR THE NASA TSRV AIRPLANE
J. L. Groce, K. H. Izumi, C. H. Markham, R. W. Schwab, and J. L. Thompson May 1986 126 p
(Contract NAS1-14880)
(NASA-CR-172593; NAS 1.26:172593) Avail: NTIS HC A07/MF A01 CSCL 17G

The Local Flow Management/Profile Descent (LFM/PD) algorithm designed for the NASA Transport System Research Vehicle program is described. The algorithm provides fuel-efficient altitude and airspeed profiles consistent with ATC restrictions in a time-based metering environment over a fixed ground track. The model design constraints include accommodation of both published profile descent procedures and unpublished profile descents, incorporation of fuel efficiency as a flight profile criterion, operation within the performance capabilities of the Boeing 737-100 airplane with JT8D-7 engines, and conformity to standard air traffic navigation and control procedures. Holding and path stretching capabilities are included for long delay situations. Author

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-28075*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOADS CALIBRATIONS OF STRAIN GAGE BRIDGES ON THE DAST PROJECT AEROELASTIC RESEARCH WING (ARW-2)
Clinton V. Eckstrom Mar. 1986 118 p
(NASA-TM-87677; NAS 1.15:87677) Avail: NTIS HC A06/MF A01 CSCL 01C

Results from and details of the procedure used to calibrate strain gage bridges for measurements of wing structural loads, shear (V), bending moment (M), and torque (T), at three semi-span stations on both the left and right semispans of the ARW-2 wing are presented. The ARW-2 wing has a reference area of 35 square feet, a span of 19 feet, an aspect ratio of 10.3, a midchord line sweepback angle of 25 degrees, and a taper ratio of 0.4. The ARW-2 wing was fabricated using aluminum spars and ribs covered with a fiberglass/honeycomb sandwich skin material. All strain gage bridges are mounted along with an estimate of their accuracy by means of a comparison of computed loads versus actual loads for three simulated flight conditions. Author

N86-28076*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASTRAN/FLEXSTAB PROCEDURE FOR STATIC AEROELASTIC ANALYSIS
Lawrence S. Schuster Sep. 1984 21 p
(NASA-TM-84897; NAS 1.15:84897) Avail: NTIS HC A02/MF A01 CSCL 01C

Presented is a procedure for using the FLEXSTAB External Structural Influence Coefficients (ESIC) computer program to produce the structural data necessary for the FLEXSTAB Stability Derivatives and Static Stability (SD&SS) program. The SD&SS program computes trim state, stability derivatives, and pressure and deflection data for a flexible airplane having a plane of symmetry. The procedure used a NASTRAN finite-element structural model as the source of structural data in the form of flexibility matrices. Selection of a set of degrees of freedom, definition of structural nodes and panels, reordering and reformatting of the flexibility matrix, and redistribution of existing point mass data are among the topics discussed. Also discussed are boundary conditions and the NASTRAN substructuring technique. Author

N86-28077*# McDonnell-Douglas Corp., Long Beach, Calif.
EVALUATION OF LAMINAR FLOW CONTROL SYSTEMS CONCEPTS FOR SUBSONIC COMMERCIAL TRANSPORT AIRCRAFT Final Report
W. E. Pearce Jun. 1983 504 p
(Contract NAS1-14632)
(NASA-CR-159251; NAS 1.26:159251; ACEE-01-FR-3132) Avail: NTIS HC A22/MF A01 CSCL 01C

An evaluation was made of laminar flow control (LFC) system concepts for subsonic commercial transport aircraft. Configuration design studies, performance analyses, fabrication development, structural testing, wind tunnel testing, and contamination-avoidance techniques were included. As a result of trade studies, a configuration with LFC on the upper wing surface only, utilizing an electron beam-perforated suction surface, and employing a retractable high-lift shield for contamination avoidance, was selected as the most practical LFC system. The LFC aircraft was then compared with an advanced turbulent aircraft designed for the same mission. This comparison indicated significant fuel savings and reduced direct operating cost benefits would result from using LFC. Author

N86-28078*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
APPLICATION OF PARAMETER ESTIMATION TO HIGHLY UNSTABLE AIRCRAFT
Richard E. Maine and James E. Murray Aug. 1986 14 p Proposed for presentation at the AIAA Atmospheric Flight Mechanics Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88266; H-1365; NAS 1.15:88266; AIAA-86-2020-CP) Avail: NTIS HC A02/MF A01 CSCL 01C

The application of parameter estimation to highly unstable aircraft is discussed. Included are a discussion of the problems in applying the output error method to such aircraft and demonstrates that the filter error method eliminates these problems. The paper shows that the maximum likelihood estimator with no process noise does not reduce to the output error method when the system is unstable. It also proposes and demonstrates an ad hoc method that is similar in form to the filter error method, but applicable to nonlinear problems. Flight data from the X-29 forward-swept-wing demonstrator is used to illustrate the problems and methods discussed. Author

N86-28079*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF BLADE-TO-BLADE DISSIMILARITIES ON ROTOR-BODY LEAD-LAG DYNAMICS
Michael J. McNulty Mar. 1986 31 p
(Contract K-1053)
(NASA-TM-86828; A-85393; NAS 1.15:86828; USAAVSCOM-TM-86-A-3) Avail: NTIS HC A03/MF A01 CSCL 01C

Small blade-to-blade property differences are investigated to determine their effects on the behavior of a simple rotor-body system. An analytical approach is used which emphasizes the significance of these effects from the experimental point of view. It is found that the primary effect of blade-to-blade dissimilarities is the appearance of additional peaks in the frequency spectrum which are separated from the convention response modes by multiples of the rotor speed. These additional responses are potential experimental problems because when they occur near a mode of interest they act as contaminant frequencies which can make damping measurements difficult. The effects of increased rotor-body coupling and a rotor shaft degree of freedom act to improve the situation by altering the frequency separation of the modes. Author

N86-28080# Aeronautical Research Labs., Melbourne (Australia).
MIRAGE A3-002 STRAIN RESPONSES TO GROUND CALIBRATION LOADINGS BETWEEN 1978 AND 1985
M. G. J. Higgs Dec. 1985 116 p
(AD-A165846; ARL-STRUC-TM-425) Avail: NTIS HC A06/MF A01 CSCL 01/3

Prior to flight trials in 1978, a calibration of strain gauges fitted to Mirage A3-002 was carried out by measuring responses to ground loads applied at several locations on the Mirage wing. Since 1978, further ground calibrations have been made on the same aircraft. The loading procedure used was similar to that for earlier ground calibrations of other Mirage aircraft. This technical memorandum provides a record of the output of strain gauges fitted to A3-002, and identifies some trends in these outputs. For some gauges, data is given for a seven-year period. Two loading cases are presented: (1) loading at the main external store attachment point, and (2) loading at the Sidewinder attachment point. The discussion is restricted to strain gauges fitted to wings and to fuselage frame 26. In general, consistent results were obtained over the measurement period. GRA

N86-28081# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
PROBABILISTIC DAMAGE TOLERANCE ANALYSIS OF AIRCRAFT STRUCTURES
Bjoern Palmberg, Anders F. Blom, and Sigge Eggwertz Nov. 1985 136 p Submitted for publication
(Contract STU-84-4563)
(FFA-TN-1985-68; ESA-86-97055) Avail: NTIS HC A07/MF A01

The state of the art in probabilistic damage tolerance analysis was reviewed. A probabilistic model for fatigue life prediction based on existing models for probabilistic characterization of initial flaw sizes, fatigue crack growth and failure was developed. The effect of periodic inspections is taken into account. A numerical example which shows practical difficulties involved in the analysis, but also the advantage of inspections from a safety point of view is included. ESA

N86-28082# Societe Nationale Industrielle Aerospatiale, Toulouse (France). Div. Avions.
THE DESIGN OF COMPOSITE STRUCTURES [LA CONCEPTION DES STRUCTURES COMPOSITES]
G. Hellard 13 Feb. 1985 22 p In FRENCH Presented at 1st Bonded Aircraft Struct. Tech. Appl. and Repairs Tech. Congr., Seeheim, West Ger., 23 Jan. 1985
(SNIAS-861-111-103; GCO/GH/CL-442.026/85; ESA-86-97140) Avail: NTIS HC A02/MF A01

The principles of aircraft element design using composite materials are outlined. Glass carbon and Kevlar composites are discussed. Sandwich and monolothic structures are described and application criteria are detailed. Drawings detailing the composite elements of the A-310 to A-330 and ATR-42 aircrafts and the particular design of those elements are presented. ESA

N86-28083# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
THE SIGMA CADCAM SOFTWARE [SIGMA, LOGICIEL DE CFAO]
R. Gandou and P. Jubert 16 Dec. 1985 14 p In FRENCH Presented at Congr. on Le Calcul Demain, Grenoble, France, 6 Dec. 1985 Submitted for publication
(SNIAS-861-111-110; ESA-86-97146) Avail: NTIS HC A02/MF A01

A software system for designing and handling complex three-dimensional shapes based on a polynomial representation of curves and surfaces derived from Bezier-Berstein functions is described. Applications include aviation (designing wings, forward fuselages, wing-fuselage joints, engine pods and pylons) ship building (designing hulls) the automobile industry (bodywork), and all industries for which the design of shapes raises complex problems, requiring considerable interactivity, extremely good computation accuracy, and manipulation of surfaces by blending, cutting out, etc. The man machine dialog; the creation of shapes; the exploitation of shapes; and manufacture are discussed. ESA

N86-28084# Societe Nationale Industrielle Aerospatiale, Marignane (France). Structures Dept.
COMPUTING CODES FOR DEVELOPMENT OF HELICOPTER CRASHWORTHY STRUCTURES AND TEST SUBSTANTIATION
J. Mens and J. C. Bianchini (Engineering System International, Rungis, France) 1986 14 p Presented at AHS/NAI Intern. Seminar, Nanjing, China, 6-8 Jan. 1985 Sponsored by Direction des Recherches Etudes et Techniques
(SNIAS-861-210-106; ESA-86-97154) Avail: NTIS HC A02/MF A01

Computing tools used in designing crashworthy helicopters are described. The dynamic behavior of components during impact on ground is computed by the KRASH program. The buckling load of panels stiffened by angles, Z-sections, or honeycomb panels, is computed by a purely analytic computer code. The complete buckling and post-buckling behavior of the structure components can be successfully described by the PAM CRASH computer program system, taking account of specific support and contact conditions as well as possible interaction between fluid and structure; the programs use the finite element method in large deformations and the nonlinear behavior of materials. In static or slightly dynamic analyses, an implicit integration scheme is used. For higher velocity impact, an explicit scheme is more effective. Hybridization of the analytical model within an implicit numerical code gives results which are very comparable with a purely numerical calculation, but at lower cost. ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-28085*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

UNIFORM ENGINE TESTING PROGRAM PHASE 7: NASA LEWIS RESEARCH CENTER SECOND ENTRY

T. J. Biesiadny, L. A. Burkardt, M. Abdelwahab, W. M. Braithwaite, T. A. Kirchgessner, and D. Silver Jul. 1986 69 p

(NASA-TM-87272; E-2971; NAS 1.15:87272) Avail: NTIS HC A04/MF A01 CSCL 21E

The propulsion and Energetics Panel, Working Group 15, of the Advisory Group for Aerospace Research and Development (AGARD) is sponsoring a Uniform Engine Testing Program (UETP). In this program, two jet engines were tested under identical conditions in certain NATO altitude and ground-level facilities as a means of correlating these facilities. With this second entry, NASA documented engine deterioration that may have occurred since inception of the UETP. Additionally, NASA investigated anomalies discovered during review of data from the five facilities which had participated in the program between the two NASA entries. Author

N86-28086*# Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.

LATERAL JET INJECTION INTO TYPICAL COMBUSTOR FLOW-FIELDS

David G. Lilley Washington NASA Jul. 1986 97 p

(Grant NAG3-549)

(NASA-CR-3997; NAS 1.26:3997) Avail: NTIS HC A05/MF A01 CSCL 21E

The experimental problem of lateral jet injection into typical flow fields in the absence of combustion was studied. All flow fields being investigated have no expansion of the crossflow (the test section to swirler diameter ratio D/d = 1), after its passage through an optional swirler (with swirl vane angle phi = 0 (swirler removed), 45, and 70 degree). The lateral jet(s) is(are) located one test-section diameter downstream of the test-section inlet (x/D = 1). The lateral jets have round-sectioned nozzles, each of which has an area of 1/100th of the cross sectional area of the crossflow (A sub j/A sub c = 1/100). Jet-to-crossflow velocity ratios of R = v sub j/u sub o = 2, 4, and 6 were investigated. Helium-bubble low visualization, five-hole pitot probe time-mean velocity measurements, and single-wire time-mean velocity and normal and shear stress turbulence data were obtained in the research program. Author

N86-28087*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.

EFFECTS OF SURFACE CHEMISTRY ON HOT CORROSION LIFE Final Report

R. E. Fryxell and G. E. Leese (TRW, Inc., Cleveland, Ohio.) Jun. 1986 113 p

(Contract NAS3-23926)

(NASA-CR-179471; NAS 1.26:179471; R86AEB361) Avail: NTIS HC A06/MF A01 CSCL 21E

Burner rig tests were conducted under the following conditions: 900 C, hourly thermal cycling, 0.5 ppm sodium as NaCl in the gas stream, and Mach 0.3 velocity. The alloys tested were Udimet 700 (U700) and Rene 80, uncoated and with RT21, Codep, or NiCoCrAlY coatings. The tests, up to 1000 hours, included specimens in the as-processed condition and after aging at 1100 C in oxidizing or inert environments for up to 600 hours. Coil-inductance changes were measured for periodic nondestructive inspection of speciments and found useful in the following course of corrosion. Typical sulfidation observed in all cases was similar to that observed in service-run turbine components. Aging at 1100 C caused severe decrease in the hot corrosion life of RT21 and Codep coatings and a significant but lesser decrease in the life of NiCoCrAlY coatings. The extent of these decreases was much greater for all three coatings on U700 than on Rene substrates. A coating hot corrosion life-predicitin model was proposed. The model requires time/temperature information for a turbine component at takeoff conditions as well as environmental contaminant information. Author

N86-28088*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.

TEST AND EVALUATION OF THE HIDEC ENGINE UPTRIM ALGORITHM

Ronald J. Ray and Lawrence P. Myers Jul. 1986 13 p Presented at the AIAA/ASME/SAE/ASEE 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986

(NASA-TM-88262; H-1363; NAS 1.15:88262) Avail: NTIS HC A02/MF A01 CSCL 21E

The highly integrated digital electronic control (HIDEC) program will demonstrate and evaluate the improvements in performance and mission effectiveness that result from integrated engine-airframe control systems. Performance improvements will result from an adaptive engine stall margin mode, a highly integrated mode that uses the airplane flight conditions and the resulting inlet distortion to continuously compute engine stall margin. When there is excessive stall margin, the engine is uptrimmed for more thrust by increasing engine pressure ratio (EPR). The EPR uptrim logic has been evaluated and implemented into computer simulations. Thrust improvements over 10 percent are predicted for subsonic flight conditions. The EPR uptrim was successfully demonstrated during engine ground tests. Test results verify model predictions at the conditions tested. Author

N86-28089*# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.

ON THE MODELING OF LOW-REYNOLDS-NUMBER TURBULENCE Final Report

Ronald M. C. So and G. J. Yoo Washington NASA Jul. 1986 143 p

(Grant NAG3-167; Contract NG0530-85-C-0191)

(NASA-CR-3994; E-3059; NAS 1.26:3994; CR-R85033) Avail: NTIS HC A07/MF A01 CSCL 21E

A full Reynolds-stress closure that is capable of describing the flow all the way to the wall was formulated for turbulent flow through circular pipe. Since viscosity does not appear explicitly in the pressure redistribution terms, conventional high-number models for these terms are found to be applicable. However, the models for turbulent diffusion and viscous dissipation have to be modified to account for viscous diffusion near a wall. Two redistribution and two diffusion models are investigated for their effects on the model calculations. Wall correction to pressure redistribution modeling is also examined. Diffusion effects on calculated turbulent properties are further investigated by simplifying the transport equations to algebraic equations for Reynolds stress. Two approximations are explored. These are the equilibrium and nonequilibrium turbulence assumptions. Finally, the two-equation closure is also used to calculate the flow in question and the results compared with all the other model calculations. Fully

developed pipe flows at two moderate Reynolds numbers are used to validate these model calculations. Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-28090*# Alphatech, Inc., Burlington, Mass.
INITIAL DESIGN AND EVALUATION OF AUTOMATIC RESTRUCTURABLE FLIGHT CONTROL SYSTEM CONCEPTS
Jerold L. Weiss, Douglas P. Looze, John S. Eterno, and Daniel B. Grunberg Jun. 1986 163 p
(Contract NAS1-17411)
(NASA-CR-178064; NAS 1.26:178064; AI-TR-269) Avail: NTIS HC A08/MF A01 CSCL 01C

Results of efforts to develop automatic control design procedures for restructurable aircraft control systems is presented. The restructurable aircraft control problem involves designing a fault tolerance control system which can accomodate a wide variety of unanticipated aircraft failure. Under NASA sponsorship, many of the technologies which make such a system possible were developed and tested. Future work will focus on developing a methodology for integrating these technologies and demonstration of a complete system. Author

N86-28091*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
SIMULATION STUDIES OF ALTERNATE LONGITUDINAL CONTROL SYSTEMS FOR THE SPACE SHUTTLE ORBITER IN THE LANDING REGIME
Bruce G. Powers and Shahan K. Sarrafian 1986 14 p Proposed for presentation at the AIAA Atmospheric Flight Mechanics Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-86815; H-1356; NAS 1.15:86815) Avail: NTIS HC A02/MF A01 CSCL 01C

Simulations of the space shuttle orbiter in the landing task were conducted by the NASA Ames-Dryden Flight Research Facility using the Ames Research Center vertical motion simulator (VMS) and the total in-flight simulator (TIFS) variable-stability aircraft. Several new control systems designed to improve the orbiter longitudinal response characteristics were investigated. These systems improved the flightpath response by increasing the amount of pitch-rate overshoot. Reduction in the overall time delay was also investigated. During these evaluations, different preferences were noted for the baseline or the new systems depending on the pilot background. The trained astronauts were quite proficient with the baseline system and found the new systems to be less desirable than the baseline. On the other hand, the pilots without extensive flight training with the orbiter had a strong preference for the new systems. This paper presents the results of the VMS and TIFS simulations. A hypothesis is presented regarding the control strategies of the two pilot groups and how this influenced their control systems preferences. Interpretations of these control strategies are made in terms of open-loop aircraft response characteristics as well as pilot-vehicle closed-loop characteristics. Author

N86-28092*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
EFFECT OF TIME DELAY ON FLYING QUALITIES: AN UPDATE
Rogers E. Smith and Shahan K. Sarrafian Aug. 1986 13 p Proposed for presentation at the AIAA Guidance, Navigation and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88264; H-1351; NAS 1.15:88264) Avail: NTIS HC A02/MF A01 CSCL 01C

Flying qualities problems of modern, full-authority electronic flight control systems are most often related to the introduction of additional time delay in aircraft response to a pilot input. These delays can have a significant effect on the flying qualities of the aircraft. Time delay effects are reexamined in light of recent flight test experience with aircraft incorporating new technology. Data from the X-29A forward-swept-wing demonstrator, a related preliminary in-flight experiment, and other flight observations are presented. These data suggest that the present MIL-F-8785C allowable-control system time delay specifications are inadequate or, at least, incomplete. Allowable time delay appears to be a function of the shape of the aircraft response following the initial delay. The cockpit feel system is discussed as a dynamic element in the flight control system. Data presented indicate that the time delay associated with a significant low-frequency feel system does not result in the predicted degradation in aircraft flying qualities. The impact of the feel system is discussed from two viewpoints: as a filter in the control system which can alter the initial response shape and, therefore, the allowable time delay, and as a unique dynamic element whose delay contribution can potentially be discounted by special pilot loop closures. Author

N86-28093*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPLEMENTATION AND FLIGHT TESTS FOR THE DIGITAL INTEGRATED AUTOMATIC LANDING SYSTEM (DIALS). PART 2: COMPLETE SET OF FLIGHT DATA
Richard M. Hueschen Jul. 1986 330 p
(NASA-TM-87632-Pt-2; NAS 1.15:87632-Pt-2) Avail: NTIS HC A15/MF A01 CSCL 17G

Five flight tests of the Digital Automated Landing System (DIALS) were conducted on the Advanced Transport Operating System (ATOPS) Transportation Research Vehicle (TSRV)--a modified Boeing 737 Aircraft for advanced controls and displays research. These flight tests were conducted at NASA's Wallops Flight Center using the Microwave Landing System (MLS) installation on Runway 22. This report is primarily a collection of data plots of all performance variables recorded for the entire five flight tests. A description and source of the performance variables is included. Performance variables include inertial data, air data, automatic control commands, control servo positions, sensor data, DIALS guidance and control parameters, and Kalman filter data. This data illustrates low overshoot captures of the localizer for intercept angles of 20 deg, 30 deg, 40 deg, and 50 deg intercept angles, and low overshoot captures of the glideslope slope for 3 deg, 4.5 deg, and 5 deg glideslopes. Flare maneuvers were successfully performed from the various glideslope angles and good decrab maneuvers were performed in crosswinds of 6 knots. In 18 to 20 knot crosswind conditions rudder limiting occurred which caused lateral drifting although heading alignment was achieved. Author

N86-28094# Deutsche Lufthansa Aktiengesellschaft, Cologne (West Germany).
CONTROL SYSTEMS FOR THE AIRBUS DESIGN AND FUNCTIONAL EXPERIENCE [LEITSYSTEME FUER DEN AIRBUS. AUFBAU UND BETRIEBSERFAHRUNG]
Peter H. Heldt 1985 21 p In GERMAN Presented at Fachgespraechs der Gesellschaft fuer Reaktorsicherheit, Munich, West Germany, 8 Nov. 1985
(ESA-86-96936) Avail: NTIS HC A02/MF A01

The design of cockpits of modern passenger aircraft is illustrated by the Airbus 310. Basic rules of aircraft design are given. Important control systems are presented. The status of functional experience is outlined. The crew is taken into account as an integral part in order to correctly understand the global cockpit system. It is shown how the two tasks of pilots (flying and controlling) are integrated in the global concept of cockpit design, and the pilot qualifications required for these tasks are outlined. ESA

N86-28095# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
EIGENVALUES ASSIGNMENT METHOD: AN APPLICATION TO DESIGNING AN AUTOPILOT
A. Bucharles (Departement d'Etudes et de Recherches en

Technologie Spatiale, Toulouse, France), J. F. Magni, and O. Herail 1986 15 p In FRENCH; ENGLISH summary Presented at AFCET Salon Intern. des Tech. et Energies du Futur (SITEF 85), Toulouse, 24-25 Oct. 1985 Submitted for publication
(Contracts STPA-83-95024; STPA-84-95016)
(SNIAS-861-111-106; ESA-86-97143) Avail: NTIS HC A02/MF A01

Eigenstructure assignment methods are shown to be a useful tool for computing control laws of multivariable systems. In a first step closed loop eigenvalues are to be assigned. The second step uses the degrees of freedom available on the eigenvectors for optimizing criteria relative to control objectives as output shaping, insensitivity, or disturbance decoupling The degrees of freedom of eigenvectors are defined and it is shown how to obtain control objectives. The design of an autopilot is detailed to demonstrate the method's efficiency. ESA

N86-28096# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
MAIN FLIGHT CONTROLS [COMMANDES DE VOL PRINCIPALES]
Michel Durandeau 1986 30 p In FRENCH Presented at Ecole Nationale de l'Aviation Civile Conf., Toulouse, 22 May 1985
(SNIAS-861-111-111; ESA-86-97147) Avail: NTIS HC A03/MF A01

The A-320 aircraft flight control and avionics systems are illustrated. Safety, maintenance, and systems engineering aspects are listed. ESA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-28097*# National Aeronautics and Space Administration, Washington, D.C.
WALL EFFECTS IN WIND TUNNELS
J. P. Chevallier and X. Vaucheret Jul. 1986 40 p Transl. into ENGLISH of conference paper "Effets de Parois en Soufflerie" rept. ONERA TP-1983-143 ONERA, Toulouse, France, presented at the 20th Colloquium on Applied Aerodynamics of the AAAF. 1983 p 1-31 Colloquium held in Toulouse, France, 8-10 Nov. 1983 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88447; NAS 1.15:88447) Avail: NTIS HC A03/MF A01 CSCL 14B

A synthesis of current trends in the reduction and computation of wall effects is presented. Some of the points discussed include: (1) for the two-dimensional, transonic tests, various control techniques of boundary conditions are used with adaptive walls offering high precision in determining reference conditions and residual corrections. A reduction in the boundary layer effects of the lateral walls is obtained at T2; (2) for the three-dimensional tests, the methods for the reduction of wall effects are still seldom applied due to a lesser need and to their complexity; (3) the supports holding the model of the probes have to be taken into account in the estimation of perturbatory effects. Author

N86-28098*# National Aeronautics and Space Administration, Washington, D.C.
INITIAL ADAPTATION TESTING OF THE BIDIMENSIONALLY SELF-ADAPTING WALL OF THE FRENCH T2 WIND TUNNEL, AROUND A THREE-DIMENSIONAL OBJECT
J. P. Archambaud, J. B. Dor, A. Mignosi, and L. Lamarche Jun. 1986 52 p Transl. into ENGLISH of "Premiers Essais d'Adaptation des Parois Auto-Adaptables Bidimensionnelles de la Soufflerie T2 Autour d'Obstacles Tridimensionnels" rept. OA-33/3075, DERAT-11/5015-DN ONERA, Toulouse, France, Sep. 1985 p 1-49 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88444; NAS 1.15:88444; OA-33/3075; DERAT-11/5015-DN) Avail: NTIS HC A04/MF A01 CSCL 14B

The test series was carried out at ONERA/CERT at the T2 wind tunnel in September 1984. The objective of this series was to minimize wall interference through a bidimensional adaptation around the models, inducing tridimensional flows. For this, three different models were used, measuring either the pressures or the forces and moment of pitch (balance). The adaptation was derived from a correction computation in the compressible axisymmetric tridimensional. Author

N86-28099*# National Aeronautics and Space Administration, Washington, D.C.
CRYOGENIC WIND TUNNELS: PROBLEMS OF CONTINUOUS OPERATION AT LOW TEMPERATURES
D. Faulmann Jun. 1986 52 p Transl. into ENGLISH of "Soufflerie Cryogeniques Problemses Lies au Fonctionnement Continue en Basse Temperature" rept. OA-9/5007-AYD, DERAT-9/5007-DY ONERA, Toulouse, France, Jun. 1980 p 1-18 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88446; NAS 1.15:88446; OA-9/5007-AYD; DERAT-9/5007-DY) Avail: NTIS HC A03/MF A01 CSCL 14B

The design of a cryogenic wind tunnel which operates continuously, and is capable of attaining transonic speeds at generating pressures of about 3 bars is described. Its stainless steel construction with inside insulation allows for very rapid temperature variations promoted by rapid changes in the liquid nitrogen flow. A comparative study of temperature measuring probes shows a good reliability of thin sheet thermocouples. To measure fluctuations, only a cold wire makes it possible to record frequencies of about 300 Hz. The use of an integral computer method makes it possible to determine the impact of the wall temperature ratio to the adiabatic wall temperature for the various parameters characterizing the boundary layer. These cases are processed with positive and negative pressure gradients. Author

N86-28100*# National Aeronautics and Space Administration, Washington, D.C.
PROBLEMS ASSOCIATED WITH OPERATIONS AND MEASUREMENT IN CRYOGENIC WIND TUNNELS
A. Blanchard, V. Delcourt, and M. Plazanet Jun. 1986 75 p Transl. into ENGLISH of "Problemes Lies au Fonctionnement et aux Mesures en Soufflerie Cryogenique" rept. OA-13/5007-AYD, DERAT-13/5007-DY ONERA, Toulouse France, Jul. 1981 p 1-30 Transl. by Scientifc Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88443; NAS 1.15:88443; OA-13/5007-AYD; DERAT-13/5007-DY) Avail: NTIS HC A04/MF A01 CSCL 14B

Cryogenic wind tunnel T'3 under continuous blower operation has been the object of improvements and the installation of auxiliary equipment, dealing in particular with the enlargement of the liquid nitrogen injection reservoir and the hook-up to a fast data acquisition system. Following a brief description of the installation and its functioning, we present the main experimental techniques and the instrumentation used in the cryogenic environment. Author

N86-28101*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF TWO TURNING VANE DESIGNS FOR HIGH-SPEED CORNER OF 0.1-SCALE MODEL OF NASA LEWIS RESEARCH CENTER'S PROPOSED ALTITUDE WIND TUNNEL
Royce D. Moore, Donald R. Boldman, and Rickey J. Shyne Apr. 1986 130 p
(NASA-TP-2570; E-2831; NAS 1.60:2570) Avail: NTIS HC A07/MF A01 CSCL 14B

Two turning vane designs were experimentally evaluated for corner 1 (downstream of the test section) of a 0.1-scale model of the NASA Lewis Research Center's proposed Altitude Wind

Tunnel (AWT). Vane A was a controlled-diffusion airfoil shape; vane B was a circular-arc airfoil shape. The vane designs were tested over corner inlet Mach numbers from 0.16 to 0.465. Several modifications in vane setting angle and vane spacing were also evaluated for vane A. The overall performance obtained from total pressure rakes indicated that vane B had a slightly lower loss coefficient than vane A. At Mach 0.35 (the design Mach number without the engine exhaust removal scoop), the loss coefficients were 0.150 and 0.178 for vanes B and A, respectively. Resetting the vane A angle by -5 deg. (vane A10) to turn the flow toward the outside corner reduced the loss coefficient to 0.119. The best configuration (vane A10) was also tested with a simulated engine exhaust removal scoop. The loss coefficient for that configuration was 0.164 at Mach 0.41 (the approximate design Mach number with the scoop). Author

N86-28102# Department of the Navy, Washington, D. C.
AIRCRAFT BARRICADE Patent
Perry R. DiGiovanniantonio, inventor (to Navy) and William J. Zimmer, inventor (to Navy) Issued 28 Jan. 1986 4 p Supersedes AD-D011316
(AD-D012194; US-Patent-4,566,658; US-Patent-Appl-SN-519421; US-Patent-Class-244-110) Avail: US Patent and Trademark Office CSCL 01/5

A webbing system is disclosed for use as an aircraft barricade wherein a plurality of rectangularly-shaped engaging loops are arranged in an alternating, multi-planar array and suspended across a landing area in the path of an approaching aircraft upon an assembly of support loops stretched between a pair of stanchions and connected on either side to an energy absorbing device. Slidably connected along upper and lower horizontal components of the support loops, the engaging loops are free to move laterally along the support loops toward the longitudinal axis of the aircraft when penetrated by the fuselage so that the aircraft is ensnared about its wings by the loops with equalized loading and its forward motion arrested. GRA

N86-28103# Aeronautical Research Labs., Melbourne (Australia).
RIGID BODY STABILITY AUGMENTATION STUDIES FOR A WIND TUNNEL FLUTTER MODEL
C. J. Ludowyk Nov. 1985 47 p
(AD-A165847; ARL-STRUC-TM-426) Avail: NTIS HC A03/MF A01 CSCL 14/2

The report describes a simulation study undertaken in preparation for wind tunnel trials of flutter suppression control laws at DFVLR, Goettingen, West Germany. GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-28104* National Aeronautics and Space Administration, Washington, D.C.
TECHNOLOGY FOR LARGE SPACE SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 14)
Jul. 1986 172 p
(NASA-SP-7046(14); NAS 1.21:7046(14)) Avail: NTIS HC A07 CSCL 22A

This bibliography lists 645 reports, articles and other documents introduced into the NASA scientific and technical information system between July 1, 1985 and December 31, 1985. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. Author

N86-28105* National Aeronautics and Space Administration, Washington, D.C.
SPACE STATION SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 2)
Jul. 1986 232 p
(NASA-SP-7056(02); NAS 1.21:7056(02)) Avail: NTIS HC A10 CSCL 22A

This bibliography lists 904 reports, articles and other documents introduced into the NASA scientific and technical information system between July 1, 1985 and December 31, 1985. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. The coverage includes documents that define major systems and subsystems, servicing and support requirements, procedures and operations, and missions for the current and future space station. Author

N86-28106*# National Aeronautics and Space Administration, Washington, D.C.
AN OVERVIEW OF DUTCH PARTICIPATION IN THE SPACELAB D1 MISSION AND THE COLUMBUS SPACE STATION PROJECT
Jun. 1986 12 p Transl. into ENGLISH from Ruimtevaart (Netherlands), no. 6, May 1986 p 22-37 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-87986; NAS 1.15:87986) Avail: NTIS HC A02/MF A01 CSCL 22A

Articles and a few short descriptions of recent developments in the field of space travel are discussed. Information on research and technology in space to facilitate contact between these two fields is provided. A description is given of the successful Spacelab D-1 flight and the standard instrument package. The Netherlands experiments in the D-1 mission, the next Spacelab flights, and the Columbus program are discussed. Author

N86-28107# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
WORKING IN SPACE. SPACELAB, MATERIALS RESEARCH AND ENGINEERING UNDER WEIGHTLESSNESS [DAS LABOR IM WELTRAUM: MATERIALFORSCHUNG UND VERFAHRENSTECHNIK UNTER SCHWERELOSIGKEIT]
Nov. 1985 58 p In GERMAN Original contains color illustrations
(ESA-86-96941) Avail: NTIS HC A04/MF A01

Materials research performed in the framework of the Spacelab programs is reviewed. Scientific and technical preparation, experimental programs in space, demonstration missions, and pilot projects are presented. The access of users to flight possibilities is explained. Research activities are listed. ESA

N86-28108# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
COMPARISON OF ALTERNATIVE STRATEGIES OF RETURN-TO-THE-MOON CASTOR
Uwe Apel, Bernd Johenning, H. Hermann Koelle, Buelent Alkan, Peter Koziol, Andreas Lindenthal, Udo Merk, Hinrich Rodatz, Bilhan Tuerkmen, Thomas Eckardt et al 20 Aug. 1985 111 p
(ILR-Mitt-154; ESA-86-96809) Avail: NTIS HC A06/MF A01

Strategies of constructing and supporting a permanent lunar base for 25 operational years with a crew of 6, 30, or 120 respectively were assessed. If initial development funding is available in 1991, beneficial occupancy of such lunar bases could occur in the 2001 to 2004 time bracket. The cost is estimated to be on the order of 56, 65, and 106 billion dollars (1985) respectively leading to a cost-effectiveness of 338, 83, and 33 million dollars (1985) per lunar man-year for these three alternatives. ESA

N86-28412*# Rome Univ. (Italy). Dipt. Fisica.
SCIENCE APPLICATIONS
Franco Mariani *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 117-126

(For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28413*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
APPLICATIONS OF TETHERS FOR PLANETARY MISSIONS
Paul Penzo *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 127-151 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28415*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ELECTRODYNAMIC INTERACTIONS
James McCoy *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 161-184 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28418*# Martin Marietta Aerospace, Denver, Colo.
TETHER APPLICATIONS FOR SPACE STATION
William Nobles *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 239-267 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28419*# Aeritalia S.p.A., Torino (Italy). Space Systems Group.
THE SCIENCE AND APPLICATIONS TETHERED PLATFORM (SATP) PROJECT
Pietro Merlina *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 269-278 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY AND TEST
Paul Siemers *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 279-283 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28421*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
TETHERED CONSTELLATIONS
Enrico Lorenzini *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 285-308 Pergammon Press Ltd. (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28423*# Los Alamos National Lab., N. Mex.
BISTATIC LIDAR EXPERIMENT PROPOSED FOR THE SHUTTLE/TETHERED SATELLITE SYSTEM MISSIONS
David J. McComas, Harlan E. Spense (California Univ., Los Angeles), Robert R. Karl, Henry G. Horak, and Thomas D. Wilkerson (Maryland Univ., College Park) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 329-347 American Inst. of Physics Repr. from Review of Scientific Instruments, v. 56, no. 5, May 1985 p 670-673 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28876*# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE CASSINI MISSION TO SATURN AND TITAN. AN OVERVIEW
Jean-Pierre Lebreton *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 225-232 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28877*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE TOUR DESIGN FOR THE CASSINI MISSION
Roger E. Diehl *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 233-243 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28879*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CASSINI: THE IMAGING EXPERIMENT
Torrence V. Johnson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 261-265 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-28109# Bonn Univ. (West Germany). Geodaetischen Inst.
INVESTIGATIONS FOR THE IMPROVEMENT OF BROWNIAN MOON RANGES BASED ON THE VARIATIONS OF THE INTEGRATION CONSTANTS AND OTHER PARAMETERS Ph.D. Thesis [UNTERSUCHUNGEN ZUR VERBESSERUNG BROWNSCHER MONDENTFERNUNGEN AUFGRUND VON VARIATIONEN DER INTEGRATIONSKONSTANTEN UND ANDERER PARAMETER]
Klaus-Peter Stoffels 1985 134 p In GERMAN
(Rept-66; ISSN-0723-4325; ESA-86-96933) Avail: NTIS HC A07/MF A01

Possibilities to improve Moon theories to determine translational Moon motion were investigated, using Brown's Moon theory and later improvements (e.g., Eckert). After a comparison between Brownian ephemerides and more recent precise Moon ephemerides, parameter estimates were performed for interpolation and extrapolation of Moon ranges. The integration procedure allows deeper insight into the time dependent changes of the variable constants and in the mechanical model. The extrapolation procedure is not suited for precise predictions. The results of the test calculation, based on the supposition of supplements which are constant in time, are not suited for predictions with a better precision than 100 to 200 m. The variations resulting from the parameter suppositions have generally a periodic effect on the Moon ranges. ESA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-28110# Societe Nationale Industrielle Aerospatiale, Paris (France).

THE EVOLUTION OF TACTICAL MISSILES SINCE 1945 [L'EVOLUTION DES MISSILES TACTIQUES DE 1945 A NOS JOURS]
Allier 1986 20 p In FRENCH
(SNIAS-861-320-101; ESA-86-97155) Avail: NTIS HC A02/MF A01

The development of tactical missiles in Europe, and particularly in France, is reviewed. The discussion includes target missiles, air-surface missiles, air-air missiles, antitank missiles, antimissile missiles and antiship missiles. It is shown that most of the missiles discussed are adopted by many different nations and several weapon systems are built under licence in several countries. ESA

N86-28111# Societe Nationale Industrielle Aerospatiale, Paris (France).
INNOVATION AND TACTICAL MISSILES [INNOVATION ET MISSILES TACTIQUES]
J. P. Comon 1986 7 p In FRENCH
(SNIAS-861-320-102; ESA-86-97156) Avail: NTIS HC A02/MF A01

Examples of design developments of tactical missiles are given to illustrate the contribution of new ideas to the improvement of military missiles. These developments include placing forward the propulsion section of antitank missiles to improve efficiency by automatically providing a standoff distance; the modification of the Exocet antiship missile to a Mach 2 velocity; an improved guiding system and a main propulsion assured by ramjet engine; and an antimissile missile with a very short reaction time combining rocket engine and aerodynamic forces to provide a high precision guiding system. The design and test facilities required are also discussed. ESA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-28112# Fondazione Ugo Bordoni, Rome (Italy).
WAVE PROPAGATION EXPERIMENTS USING THE ECS SATELLITE TELEMETRY BEACON [SPERIMENTAZIONE DI PROPAGAZIONE CON IL BEACON DI TELEMTRIA DEI SATELLITI ECS]
Ermanno Fionda, Paolo Lombardi, Piergiorgio Migliorini, and Salvatore Piazzolla Sep. 1985 20 p In ITALIAN
(FUB-17-1985; ESA-86-97084) Avail: NTIS HC A02/MF A01

An experiment to utilize the 11.45 GHz telemetry beacon and the tracking facilities of the ECS satellite is described. The adaptation of two receiving stations is mentioned. Space diversity and distribution of the rain attenuation were studied. The data acquisition system, based on a HP-1000 computer and the receiving and measuring systems are discussed. The error analysis shows that the attenuation measurement error is 1 dB rms. ESA

N86-28284*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PARKES-CDSCC TELEMETRY ARRAY: EQUIPMENT DESIGN
D. W. Brown, H. W. Cooper, J. W. Armstrong, and S. S. Kent *In its* The Telecommunications and Data Acquisition Report 15 May 1986 26 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09F

N86-28288*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK TRACKING SYSTEM, MARK 4-A, 1986
J. A. Wackley *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09D

N86-28293*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE VENUS BALLOON PROJECT TELEMETRY PROCESSING
J. M. Urech, A. Chamarro, J. L. Morales, and M. A. Urech *In its* The Telecommunications and Data Acquisition Report 15 May 1986 13 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09D

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-28113*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONTROL/STRUCTURES INTERACTION STUDY OF TWO 300 KW DUAL-KEEL SPACE STATION CONCEPTS
John W. Young, Frederick J. Lallman, Paul A. Cooper, and Daniel P. Giesy (PRC Kentron, Inc., Hampton, Va.) May 1986 61 p
(NASA-TM-87679; NAS 1.15:87679) Avail: NTIS HC A04/MF A01 CSCL 22B

The results of an investigation of the influence of structural stiffness of the space station framework on the controllability of two 300 kw class, solar dynamic powered, dual-keel space station designs are presented. The two design concepts differed only in the truss bay dimensions of the structural framework of the stations. Two control studies were made: (1) A study of the interaction of the framework structural response with the reaction control system used for attitude control during an orbital reboost maneuver; and (2) A study of the stability of the space station attitude control system with sensors influenced by the elastic deformations of the station framework. Although both configurations had acceptable control characteristics, the configuration with the larger truss bay dimension and its increased structural stiffness had more attractive characteristics for pointing control of the solar dynamic system during reboost and for attitude control during normal in-orbit operations. Author

N86-28114*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL INVESTIGATION OF THE DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT, PHASE 2 Quarterly Report, 22 Dec. 1985 - 21 Mar. 1986
Enrico C. Lorenzini, David A. Arnold, Mario D. Grossi, and Gordon E. Gullahorn Mar. 1986 29 p
(Contract NAS8-36606)
(NASA-CR-178846; NAS 1.26:178846; QR-4) Avail: NTIS HC A03/MF A01 CSCL 22B

The g-tuning maneuvers of a 3-mass, vertical tethered system

are considered. In particular, the case of reaching a zero-g acceleration level on board the middle mass from a non-zero initial condition is analyzed. A control law that provides a satisfactory transient response is derived. The constellation dynamics in the case of the middle mass travelling from one tether tip to the other is also investigated. Instabilities that take place at the end of the maneuver are analyzed and accommodated by devising suitable damping algorithms. M.G.

N86-28115*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPLICATIONS OF TETHERS IN SPACE: A REVIEW OF WORKSHOP RECOMMENDATIONS
Georg vonTiesenhausen, ed. May 1986 24 p
(NASA-TM-86549; NAS 1.15:86549) Avail: NTIS HC A02/MF A01 CSCL 22B

Well-organized and structured efforts of considerable magnitude involving NASA, industry, and academia have explored and defined the engineering and technological requirements of the use of tethers in space and have discovered their broad range of operational and economic benefits. The results of these efforts have produced a family of extremely promising candidate applications. The extensive efforts now in progress are gaining momentum and a series of flight demonstrations are being planned and can be expected to take place in a few years. This report provides an analysis and a review of NASA's second major workshop on Applications of Tethers in Space held in October 15 to 17, 1985, in Venice, Italy. It provides a summary of an up-to-date assessment and recommendations by the NASA Tether Applications in Space Program Planning Group, consisting of representatives of seven NASA Centers and responsible for tether applications program planning implementation as recommended by the workshop panels. Author

N86-28116# Consulenze Generali Roma (Italy).
NUMERICAL EXPERIMENTS ON A CONTROLLED FLEXIBLE STRUCTURE USING DCAF Final Report
F. Graziani and C. Arduini Nov. 1984 264 p
(ESA-CR(P)-2159; ESA-86-96861) Avail: NTIS HC A12/MF A01

The Deficiency Corrective Action Program (DCAP) code was used to simulate analog and digital control of a flexible spacecraft for the case of only in-plane motion, without spinning. For analog control, a simple PD scheme with sensors and actuators on the main rigidbody, with control relying on separation between control bandwidth and the lowest elastic frequency, and fully flexible modal control based on LQG programs are studied. For digital control, a problem for sampled sensor signal (at constant sample interval) digital logic and actuation is formulated by a zero order sample and hold device (at constant sample rate). ESA

N86-28117# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COMPUTATION OF TETHERED SATELLITE POTENTIAL, CURRENT, AND AMBIENT MAGNETIC FIELD
M. Candidi Aug. 1985 18 p
(IFSI-85-8; ESA-86-97092) Avail: NTIS HC A02/MF A01

A tethered satellite magnetic field, tether current timeline, and induced potential timeline were calculated. The total magnetic field is modulated between 21,000 nT and 48,000 nT: the minimum in the total field is due to the South Atlantic anomaly. In upward deployment of the tethered satellite (for a westward motion of the system) the natural polarity is such that the satellite is positively charged with respect to the ambient plasma (while the Shuttle termination of the tether tends to go negative with respect to the plasma); vice versa for a downward deployment. Tether current is 20 to 70 times above the undisturbed plasma thermal current, i.e., 30 mA for a satellite with a radius of 80 cm, for an applied voltage of 4 kV. ESA

N86-28118# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Lab. des Materiaux.
DESIGN OF BONDED STRUCTURAL JOINTS FOR SPACECRAFT [CALCUL DES LIASONS COLLEES STRUCTURALES DANS LES VEHICULES SPATIAUX]
Jean-Pierre Maigret and Michel Martin 1986 20 p In FRENCH Presented at Colloq. sur les Tendances en Calcul des Struct., Bastia, France, 6-8 Nov. 1985
(SNIAS-861-430-105; ESA-86-97167) Avail: NTIS HC A02/MF A01

It is shown that for designing bonded joints, computer programs must include joint geometry, stress, environment, tolerances, and adhesive characteristics. The results of the experimental evaluation of characterization methods are presented and the most important unsolved problems are indicated. ESA

N86-28119# Swedish Space Corp., Solna.
STUDY ON SOUNDING ROCKET PAYLOAD ALTERNATIVES, WORK PACKAGE 1 Final Report
Rolf Joensson Paris ESA 28 Mar. 1983 24 p
(Contract ESA-4951/81-F-FC(SC))
(M5/1-11-Vol-1; ESA-CR(P)-2154-Vol-1; ESA-86-96856) Avail: NTIS HC A02/MF A01

Nine proposals accepted for flight on Swedish modules in the TEXUS 7/8 campaign are summarized. They concern soldering; floating zone; diffusion; heat conduction; preparation of single crystals of rare earth-magnesium compounds; immiscible alloy systems; retention of a fine precipitate dispersion; formation of metal foam; and precipitation and collision of small crystals during cooling. ESA

N86-28120# Swedish Space Corp., Solna.
STUDY ON SOUNDING ROCKET PAYLOAD ALTERNATIVES, WORK PACKAGE 2 Final Report
Rolf Joensson Paris ESA 28 Mar. 1983 105 p
(Contract ESA-4951/81-F-FC(SC))
(M5/1/11-Vol-2; ESA-CR(P)-2154-Vol-2; ESA-86-96857) Avail: NTIS HC A06/MF A01

A concept for a small multimirror furnace is investigated. Theoretical models for important design parameters, such as maximum sample temperature, heating rate, and crucible temperature distribution are made. Practical tests with a breadboard model verify the theoretical calculations and indicate that the concept is correct. The importance of selecting the proper crucible material is investigated. The crucible must have acceptable thermoshock qualities and also be nonreactive with the sample. The possibility of integrating the furnace into existing Swedish sounding rocket modules is discussed. ESA

N86-28408*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TETHERED SATELLITE SYSTEM
James Sisson *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 37-61 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28409*# Consiglio Nazionale delle Ricerche, Rome (Italy). Programma Spaziale Nazionale.
TETHERED SATELLITE DESIGN
Gianfranco Manarini *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 63-79Vol-1) ?ILLEGAL DATE? (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28878*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CASSINI-TITAN PROBE CONCEPT
G. E. N. Scoon *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 245-260 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-28121*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HALOGEN OCCULTATION EXPERIMENT (HALOE) PERFORMANCE VERIFICATION TEST PROCEDURE
Lemuel E. Mauldin, III Jul. 1986 138 p
(NASA-TM-87748; NAS 1.15:87748) Avail: NTIS
HC A07/MF A01 CSCL 14B

The Performance Verification Test Procedure is given for the Halogen Occultation Experiment (HALOE) instrument, which is being developed in house at the Langley Research Center for the Upper Atmosphere Research Satellite (UARS). This procedure is used for comprehensive performance testing of the HALOE instrument which occurs before, during, and after flight environmental tests. The radiometric performance tests include noise, drift, linearity, instantaneous field-of-view, cal wheel gas cell characterization, and self thermal emissions. Pointer/tracker performance tests include sun sensor performance, gimbal performance, control system performance, and boresight alignment. In addition, the instrument is tested functionally in simulated orbit sequences and all command operating modes are exercised. The data analysis required for each test is specified and pass/fail criteria are given where applicable. This test will fully demonstrate the HALOE instrument's ability to achieve science mission requirements. The HALOE instrument is a gas correlation radiometer that measures vertical distribution of eight upper atmospheric constituents: O3, HCl, HF, NO, CH4, H2O, NO2, and CO2. Author

N86-28882# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
AN AEROSOL COLLECTOR PYROLYSER FOR THE CASSINI TITAN PROBE
Guy Israel *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 281-286 Sponsored by SNIAS (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-28122*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A 20 KILOHERTZ SPACE STATION POWER SYSTEM
Irving G. Hansen and Fredrick J. Wolff 1986 10 p Proposed for presentation at the 19th Annual Electronics and Aerospace Conference, Washington, D.C., 9 Sep. 1986; sponsored by IEEE
(NASA-TM-88801; E-3140; NAS 1.15:88801) Avail: NTIS
HC A02/MF A01 CSCL 10B

The space station represents the next major U.S. commitment in space. The efficient delivery of power to multiple user loads is key to that success. In 1969, NASA Lewis Research Center began a series of studies with component and circuit developments that led to the high frequency, bi-directional, four quadrant resonant driven converter. Additional studies and subsequent developments into the early 1980's have shown how the high frequency ac power system could provide overall advantages to many aerospace power systems. Because of its wide versatility, it also has outstanding advantages for the Space Station Program and its wide range of users. High frequency ac power provides higher efficiency, lower cost, and improved safety. The 20 kHz power system has exceptional flexibility, is inherently user friendly, and is compatible with all types of energy sources - photovoltaic, solar dynamic, rotating machines or nuclear. Lewis has recently completed development under contract a 25 kW, 20 kHz ac power distribution system testbed. The testbed demonstrates flexibility, versatility, and transparency to user technology as well as high efficiency, low mass, and reduced volume. Author

N86-28123*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RAIL ACCELERATORS FOR SPACE TRANSPORTATION: AN EXPERIMENTAL INVESTIGATION
Lynnette M. Zana, William R. Kerslake, and John L. Sturman May 1986 37 p
(NASA-TP-2571; E-2754; NAS 1.60:2571) Avail: NTIS
HC A03/MF A01 CSCL 09C

An experimental program was conducted at the Lewis Research Center with the objective of investigating the technical feasibility of rail accelerators for propulsion applications. Single-stage, plasma driven rail accelerators of small (4 by 6 mm) and medium (12.5 by 12.5 mm) bores were tested at peak accelerating currents of 50 to 450 kA. Streak-camera photography was used to provide a qualitative description of plasma armature acceleration. The effects of plasma blowby and varying bore pressure on the behavior of plasma armatures were studied. Author

N86-28124*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CURRENT EVALUATION OF THE TRIPROPELLANT CONCEPT
Robert L. Zurawski Jun. 1986 30 p Presented at the AIAA/SAI/ASME/ASEE 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986
(NASA-TP-2602; E-2863; NAS 1.60:2602) Avail: NTIS
HC A03/MF A01 CSCL 21I

An analytical study was conducted to determine the specific-impulse advantages of adding metals to conventional liquid-bipropellant systems. These tripropellant systems theoretically offer higher specific impulse and increased propellant density compared with bipropellant systems. Metals considered were Be, Li, and Al. Bipropellant systems were H2/O2, N2H4/N2O4, RP-1/O2, and H2/F2. Thermochemical calculations were performed for sea-level expansion from 6.895-MN/sq. m. (1000-psia) chamber pressure over a wide range of mixture ratios and propellant compositions. Three-dimensional plots characterize the specific impulse of each tripropellant system. Technology issues pertinent to metallized propellant systems are discussed. Author

N86-28125*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE VOLTAGE THRESHOLD FOR ARCING FOR SOLAR CELLS IN LEO: FLIGHT AND GROUND TEST RESULTS
Dale C. Ferguson Mar. 1986 22 p Presented at the 24th AIAA Aerospace Sciences Meeting, Reno, Nev., 6-9 Jan. 1986
(NASA-TM-87259; E-2951; NAS 1.15:87259; AIAA-Paper-86-0362)
Avail: NTIS HC A02/MF A01 CSCL 10B

Ground and flight results of solar cell arcing in low Earth orbit (LEO) conditions are compared and interpreted. It is shown that an apparent voltage threshold for arcing may be produced by a strong power law dependence of arc rate on voltage, combined with a limited observation time. The change in this apparent threshold with plasma density is a reflection of the density dependence of the arc rate. A nearly linear dependence of arc rate on density is inferred from the data. A real voltage threshold for arcing for 2 by 2 cm solar cells may exist however, independent of plasma density, near -230 V relative to the plasma. Here, arc rates may change by more than an order of magnitude for a change of only 30 V in array potential. For 5.9 by 5.9 solar cells, the voltage dependence of the arc rate is steeper, and the data are insufficient to indicate the existence of an arcing increased by an atomic oxygen plasma, as is found in LEO, and by arcing from the backs of welded-through substrates. Author

N86-28126# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
A STUDY OF SOLID FUEL RAMJET (SOFRAM) POWERED BALLISTIC PROJECTILES FOR LONG RANGES
Ralf Eliasson Jan. 1986 48 p In SWEDISH; ENGLISH summary Sponsored by Swedish Material Administration of the Armed Forces
(FOA-C-20594-D3; ISSN-0347-3694; ESA-86-97035) Avail: NTIS HC A03/MF A01

A quasidynamic trajectory computer program was implemented with a routine for the study of ballistic projectiles powered with Solid Fuel Ramjet (SOFRAM) engines. The routine is described and the results from calculations are discussed. A range of some 70 km is possible with a 155 mm caliber SOFRAM projectile, when initiation occurs the earliest possible after firing and when the motor impulse remains the highest possible up to the maximum functional level. Base pressure is of great importance. ESA

N86-28214# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
LASER-INDUCED FLUORESCENCE IMAGING OF SOLID PROPELLANT FLAMES
T. Edwards, D. P. Weaver, S. Hulsizer (Dayton Univ. Research Inst., Edwards AFB, Calif.), and D. H. Campbell *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 13-20 Previously announced in IAA as A86-19800 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28215# Dayton Univ., Ohio. UDRI Fluid Mechanics.
OPTICAL CONSIDERATIONS IN OBTAINING A STATISTICAL DATA BASE ON PROPELLANT DEFLAGRATION
R. J. Becker and J. L. Laird *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 21-28 (For primary document see N86-28212 19-28)
(Contract F04611-83-K-0023)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28223# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
DRIVING OF AXIAL OSCILLATIONS BY SIMULATED SOLID PROPELLANT FLAMES
S. V. Sankar, J. I. Jagoda, B. R. Daniel, and B. T. Zinn *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 113-121 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0082-84)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28225# Naval Weapons Center, China Lake, Calif.
ANALYSIS OF LONGITUDINAL CHAMBER PRESSURE OSCILLATIONS IN SHUTTLE SRB'S DURING FLIGHT
H. B. Mathes and C. J. Bicker *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 133-138 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28226# Georgia Inst. of Tech., Atlanta.
ENERGY BALANCE ANALYSIS OF VORTEX DRIVEN OSCILLATIONS
G. A. Flandro *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 139-149 (For primary document see N86-28212 19-28)
(Contract F04611-83-C-0003)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28234# Army Research and Development Command, Dover, N.J.
A STUDY OF DIFFUSION IN PROPELLANT GASES USING MOLECULAR DYNAMICS
T. Vladimiroff *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 257-262 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28239# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
FLAME DRIVING OF LONGITUDINAL INSTABILITIES IN DUMP TYPE RAMJET COMBUSTORS
U. G. Hedge, D. Reuter, B. R. Daniel, and B. T. Zinn *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 307-316 Previously announced in IAA as A86-19839 (For primary document see N86-28212 19-28)
(Contract N00014-84-K-0470)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28240# California Inst. of Tech., Pasadena.
NONLINEAR ANALYSIS OF PRESSURE OSCILLATIONS IN RAMJET ENGINES
Vigor Yang and Fred E. C. Culick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 317-329 (For primary document see N86-28212 19-28)
(Contract N00014-84-K-0434)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28241# Flow Research, Inc., Kent, Wash.
LARGE EDDY SIMULATIONS OF FLOW IN A RAMJET COMBUSTOR
Wen-Huei Jou and Suresh Menon *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 331-339 (For primary document see N86-28212 19-28)
(Contract N00014-84-C-0359)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28242# Naval Research Lab., Washington, D. C. Lab. for Computational Physics.
ACOUSTIC-VORTEX INTERACTIONS IN AN IDEALIZED RAMJET COMBUSTOR
K. Kailasanath, J. Gardner, J. Boris, and E. Oran *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 341-350 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28243# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
FLOW VISUALIZATION STUDIES OF A SOLID FUEL RAMJET COMBUSTOR USING A NEW MATERIAL-POLYAPHRONS
J. A. Schetz, F. Sebba, and R. H. Thomas *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 351-359 (For primary document see N86-28212 19-28)
(Contract F33615-84-C-2468)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28244# Atlantic Research Corp., Alexandria, Va.
PREDICTION OF BORON DUST CLOUD FLAME SPEEDS
Merrill K. King *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 361-376 (For primary document see N86-28212 19-28)
(Contract F49260-81-C-0035)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28252# Pratt and Whitney Aircraft, West Palm Beach, Fla. Engineering Div.
PERFORMANCE COMPARISON OF THE CURRENT SSME AND A NEW MAIN INJECTOR-MAIN COMBUSTION CHAMBER CONFIGURATION USING THE JANNAF METHODOLOGY
R. G. Carroll, D. R. Connell, and C. D. Limerick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 453-462 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28254*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SSME FUEL PREBURNER PHASE 1/PHASE 2+ COMPARISON
R. J. Jensen, P. Y. Liang, and S. M. Pinkowski *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985

p 473-476 (For primary document see N86-28212 19-28)
(Contract NAS8-27980)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-28127 Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
COMPOUNDS, BETWEEN WISHES AND REALITY [VERBUND-WERKSTOFFE ZWISCHEN WUNSCH UND WIRKLICHKEIT]
Gerhard Ondracek Nov. 1985 8 p Reprint from Umschau 7/85, Broenner, Frankfurt am Main, 1985 In GERMAN
(KfK-4003; ESA-86-96914) Avail: Issuing Activity

Compound materials and their applications are reviewed. The three main groups of materials are presented: metallic materials, ceramics (nonmetallic inorganic materials), and nonmetallic (nonmetallic-organic) materials. It is explained in what sense compounds have to be technologically and economically feasible. The research and development status of compound materials is discussed. Utilization domains of compound materials are given. ESA

N86-28128*# Salk Institute for Biological Studies, San Diego, Calif.
OLIGOGLYCERIC ACID SYNTHESIS BY AUTOCONDENSATION OF GLYCEROYL THIOESTER
Arthur L. Weber Aug. 1986 22 p
(Grant NsG-7627)
(NASA-CR-177130; NAS 1.26:177130) Avail: NTIS
HC A02/MF A01 CSCL 07A

The autocondensation of the glyceroyl thioester, S-glyceroyl-ethane-thiol, yielded oligoglyceric acid. The rates of autocondensation and hydrolysis of the thioester increased from pH 6.5 to pH 7.5 in 2,6-lutidine and imidazole buffers. Autocondensation and hydrolysis were much more rapid in imidazole buffers as compared to 2,6-lutidine and phosphate buffers. The efficiency of ester bond synthesis was about 20% for 40 mM S-glyceroyl-ethane-thiol in 2,6-lutidine and imidazole buffers near neutral pH. The size and yield of the oligoglyceric acid products increased when the concentration of the thioester was increased. The relationship of these results to prebiotic polymer synthesis is discussed. Author

N86-28869# Paris-Val de Marne Univ., Creteil (France). Lab. de Physicochimie de l'Environnement.
ORGANIC CHEMISTRY ON TITAN: LABORATORY SIMULATIONS AND SPECULATION [CHIMIE ORGANIQUE DANS TITAN: EXPERIENCES DE SIMULATION EN LABORATOIRE ET SPECULATIONS]
F. Raulin *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 161-173 In FRENCH (For primary document see N86-28849 19-88)
(Contract CNES-85-1251)
Avail: NTIS HC A14/MF A01

24 COMPOSITE MATERIALS

Includes laminates.

N86-28129*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF ANNEALING HISTORY ON FREE VOLUME IN THERMOPLASTICS
Jag J. Singh and Terry L. St.Clair Jul. 1986 11 p
(NASA-TM-87734; NAS 1.15:87734) Avail: NTIS
HC A02/MF A01 CSCL 11D

Two different types of thermoplastic glassy polymers have been investigated for the effects of thermal annealing on their free volumes. It has been observed that free volumes in glassy polymers decrease asymptotically to a steady level after about four thermal anneals lasting for 24 hours at a temperature about 50 C below their glass transition temperatures. These results indicate that composites incorporating properly annealed thermoplastic matrices may not experience any additional internal stresses due to subsequent thermal excursions experienced while in service. Author

N86-28130*# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
SUBLAMINATE ANALYSIS OF INTERLAMINAR FRACTURE IN COMPOSITES Final Technical Report
Erian A. Armanios and Lawrence W. Rehfield 1986 89 p
(Grant NAS1-558)
(NASA-CR-177228; NAS 1.26:177228) Avail: NTIS
HC A05/MF A01 CSCL 11D

A simple analysis method based upon a transverse shear deformation theory and a sublaminate approach is utilized to analyze a mixed-mode edge delamination specimen. The analysis provides closed form expressions for the interlaminar shear stresses ahead of the crack, the total energy release rate, and the energy release rate components. The parameters controlling the behavior are identified. The effect of specimen stacking sequence and delamination interface on the strain energy release rate components is investigated. Results are compared with a finite element simulation for reference. The simple nature of the method makes it suitable for preliminary design analyses which require a large number of configurations to be evaluated quickly and economically. Author

N86-28131* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIGHT WEIGHT FIRE RESISTANT GRAPHITE COMPOSITES Patent
Demetrius A. Kourtides, John A. Parker, and Ming-Ta S. Hsu Issued 1 Jul. 1986 12 p Filed 28 Feb. 1985 Supersedes N85-28976 (23 - 18, p 3068)
(NASA-Class-ARC-11615-1SB; US-Patent-4,598,007; US-Patent-Appl-SN-706682; US-Patent-Class-428-116; US-Patent-Class-428-408; US-Patent-Class-428-921; US-Patent-Class-526-265) Avail: US Patent and Trademark Office CSCL 11D

Composite structures with a honeycomb core and characterized by lightweight and excellent fire resistance are provided. These sandwich structures employ facesheets made up of bismaleimide-vinyl styrylpyridine copolymers with fiber reinforcement such as carbon fiber reinforcement. In preferred embodiments the facesheets are over layered with a decorative film. The properties of these composites make them attractive materials of construction aircraft and spacecraft. NASA

N86-28132# General Dynamics Corp., Fort Worth, Tex.
CUMULATIVE DAMAGE MODEL FOR ADVANCED COMPOSITE MATERIALS Final Report, Oct. 1983 - Jan. 1985
H. R. Miller, K. L. Reifsnider, W. W. Stinchcomb, D. A. Ulman, and R. D. Bruner Jun. 1985 168 p
(Contract F33615-81-C-5049)
(AD-A165688; AFWAL-TR-85-4069) Avail: NTIS
HC A08/MF A01 CSCL 11/4

This report details the model verification activity of Phase 3 of this program and summarizes the modeling effort conducted over the entire program duration. In the Phase 3 effort, the model was used to predict the specimen response using four previously unstudied parameter variations. The variations consisted of introduction of a different specimen width than that used in Phase 1 and 2, a new stacking sequence, new loading conditions applied to previously studied stacking sequence, and a different material system (T300/V378A as opposed to AS/3501 used throughout Phases 1 and 2). In each case the model predictions were obtained prior to the specimen testing; in fact, the model was used to determine the load conditions used in the test program. In all

cases, predicted lifetimes were within the same decade-- indicating good agreement between the theory and experiment for fatigue analysis. Also discussed are the methodologies associated with applying the model in tension-tension, tension-compression, compression-compression, and mixed block loading situations. Sensitivity of the model to various parameters in these loading conditions is demonstrated. GRA

N86-28133# Construcciones Aeronauticas S.A., Madrid (Spain).
CHEMICAL CONTROL FOR AIRBUS COMPOSITES. HPLC STANDARDIZATION
J. Sanchez and E. Garate 20 Dec. 1984 141 p
(I-104/84; ESA-86-97060) Avail: NTIS HC A07/MF A01

Liquid chromatography with a UV detector to assess resins used in the Airbus was tested on two resins. Results show that the chromatographic method permits an adequate separation of the different components of both resins, though the fact of having to perform a gradient limits the integration accuracy of the different peaks and therefore supposes a limitation of the method. None of the two wavelengths used (220 and 230 nm) seems to have any influence on the accuracy of the results obtained. ESA

N86-28134# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Lab. Materiaux et Procedes.
COMPOSITES REVIEW [DOSSIER COMPOSITES]
Alain Hordonneau 11 Jan. 1986 19 p In FRENCH
(SNIAS-861-430-108; ESA-86-97170) Avail: NTIS HC A02/MF A01

The properties and applications of composite materials are reviewed. Glass, carbon, Kevlar, ceramic, whisker, and metal fibers, and polyester, epoxy, polyimide, Peek, carbon, ceramic, and metal matrices are discussed. The quantitative distribution of high technology fibers in various applications is given. The role of aerospace industry in the development and promotion of composite utilization is discussed. Consumption trends indicate a rapid development of the composite market. ESA

N86-28135# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
WEAR-RESISTANT MATERIALS BASED ON BORON CARBIDE Thesis - Karlsruhe Univ., West Germany
Dietrich Lange Dec. 1985 204 p In GERMAN; ENGLISH summary
(KfK-4009; ISSN-0303-4003; ESA-86-96915) Avail: NTIS HC A10/MF A01

Characteristics, wear behavior, and applications of boron carbide are discussed. The extraordinary property of boron carbide is its high hardness even at high temperatures; it is considerably less expensive than the harder materials diamond and cubic boron nitride. The disadvantage of boron carbide is its brittleness. Applications in wear resistant materials therefore require an increased strength and a reduced brittleness. Because of the reactivity of boron carbide, only the formation of numerous phase and grain boundaries is a successful possibility. Investigations of phase relations show that there is no coexistence between boron carbide and binder materials such as Fe, Co, or Ni. Silicon wets boron carbide very well. Transformation strengthening of boron carbide seems to be impossible. Boron carbide is coexistant with several refractory materials and borides of the transition metals; a special method of hot pressing was developed for densification of these materials. Toughness and strength of tools containing boron carbide is sufficient for cutting applications. Materials based on boron carbide exhibit an outstanding resistance against abrasive wear. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-28136*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Physics.
A STUDY OF KAPTON DEGRADATION UNDER SIMULATED SHUTTLE ENVIRONMENT Final Report, 1 May 1983 - 30 Apr. 1986
T. G. Eck and H. W. Hoffman Jul. 1986 9 p
(Grant NAG3-426)
(NASA-CR-176850; NAS 1.26:176850) Avail: NTIS HC A02/MF A01 CSCL 07D

A system was developed which employs a source of low energy oxygen ion to simulate the shuttle low Earth orbit environment. This source, together with diagnostic tools including surface analysis ans mass spectroscopic capability, was used to measure the dependence of ion energy of the oxygen induced CO signals from pyrolytic graphite and Kapton. For graphite the CO signal was examined at energies ranging form 4.5 to 465 eV and for Kapton from 4.5 to 188 eV. While the relative quantum yields inferred from the data are reasonably precise, there are large uncertainties in the absolute yields because of the assumptions necessary to covert the measured signal strengths to quantum yields. These assumptions are discussed in detail. B.G.

N86-28137*# National Aeronautics and Space Administration, Washington, D.C.
CATALYSTS FOR THE DECOMPOSITION OF HYDRAZINE AND ITS DERIVATIVES AND A METHOD FOR ITS PRODUCTION
R. Sasse Jun. 1986 8 p Transl. into ENGLISH of West German Patent no. 1916247 (20 Nov. 1970) p 1-7 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88462; NAS 1.15:88462) Avail: NTIS HC A02/MF A01 CSCL 07D

Catalysts of various types are used to decompose hydrazine and its derivatives. One type of catalyst is made as follows: the aluminum is dissolved out of an alloy of cobalt or nickel/aluminum so that a structure is produced that is chemically active for the monergol and that has a large active surface. The objective was to avoid difficulties and to create a catalyst that not only has a short start time but that can also be manufactured easily and relatively inexpensively. The solution to this task is to coat the base structure of the catalyst with oxides of copper, cobalt and cerium or oxides of copper, cobalt and cerite earth. Author

N86-28138*# National Aeronautics and Space Administration, Washington, D.C.
CATALYSTS FOR THE DECOMPOSITION OF HYDRAZINE, HYDRAZINE DERIVATIVES AND MIXTURES OF BOTH
R. Sasse Jun. 1986 7 p Transl. into ENGLISH of West German Patent no. 2036958 (27 Jan. 1972) p 1-6 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88463; NAS 1.15:88463) Avail: NTIS HC A02/MF A01 CSCL 07D

This invention concerns a catalyst designed for the decomposition of hydrazine, hydrazine derivatives and mixtures of the two. The objective is to develop a catalyst of the type described that is cheap and easy to produce and is also characterized by extremely short response times. Author

N86-28139*# Illinois Univ., Urbana. Dept. of Aeronautical and Astronautical Engrg.
THE BEHAVIOR OF FUEL-LEAN PREMIXED FLAMES IN A STANDARD FLAMMABILITY LIMIT TUBE UNDER CONTROLLED GRAVITY CONDITIONS Final Report, Jan. - Dec.

1985
Brian L. Wherley and Roger A. Strehlow Jul. 1986 143 p
(Contract NCC3-35)
(NASA-CR-177132; NAS 1.26:177132; AAE-86-3;
UILU-ENG-86-0503) Avail: NTIS HC A07/MF A01 CSCL 21B

Fuel-lean flames in methane-air mixtures from 4.90 to 6.20 volume percent fuel and propane-air mixtures from 1.90 to 3.00 volume percent fuel were studied in the vicinity of the limit for a variety of gravity conditions. The limits were determined and the behavior of the flames studied for one g upward, one g downward, and zero g propagation. Photographic records of all flammability tube firings were obtained. The structure and behavior of these flames were detailed including the variations of the curvature of the flame front, the skirt length, and the occurrence of cellular instabilities with varying gravity conditions. The effect of ignition was also discussed. A survey of flame speeds as a function of mixture strength was made over a range of lean mixture compositions for each of the fuels studied. The results were presented graphically with those obtained by other researchers. The flame speed for constant fractional gravity loadings were plotted as a function of gravity loadings from 0.0 up to 2.0 g's against flame speeds extracted from the transient gravity flame histories for corresponding gravity loadings. The effects of varying gravity conditions on the extinguishment process for upward and downward propagating flames were investigated. Author

N86-28140# Evans (Charles) and Associates, San Mateo, Calif.
DEVELOPMENT AND APPLICATION OF SIMS (SECONDARY ION MASS SPECTROMETRY) CHARACTERIZATION TECHNIQUES FOR THE STUDY OF IMPURITIES AND IMPURITY MOTION IN HgCd) Te AND CdTe Final Report, 1 Nov. 1983 - 30 Sep. 1985
Oct. 1985 77 p
(Contract MDA903-82-C-0427; ARPA Order 4606)
(AD-A163047) Avail: NTIS HC A05/MF A01 CSCL 07/4

The tasks in the statement of work for this contract were to develop quantitative methods of secondary ion mass spectrometry (SIMS) analysis and to study the incorporation and redistribution of impurities in (HgCd)Te and CdTe. The second task included investigation of MeV ion implantation into (HgCd)Te and development of an image processing techniques for a quantitative investigation of laterally distributed impurities. The mechanisms and protocols developed were applied to various kinds of (HgCd) Te and its homologs in the characterization of a variety of dopants and impurities of interest to DARPA and its subcontractors. These applications elucidated the mechanism of boron incorporation during the LEC growth of CdTe. GRA

N86-28141# Wisconsin Univ., Madison.
CHARACTERIZATION OF SPUTTER DEPOSITED Al-NITRIDE AND Al-OXIDE BY X-RAY PHOTOELECTRON LOSS SPECTROSCOPY
Charlene J. G. Kubiak, Carolyn R. Aita, Ngoc C. Tran, and Tery L. Barr 1986 10 p
(Contract DAAG29-84-K-0126)
(AD-A165737; ARO-21334.5-MS) Avail: NTIS HC A02/MF A01 CSCL 07/4

The results of an X-ray photoelectron loss spectroscopy (XPLS) study of several wide band gap aluminum compounds are presented here. XPLS is a new application of X-ray photoelectron spectroscopy involving the determination of the energy separation, Delta E, between a particular core photoelectron peak and its principal loss peak. The materials investigated here are sputter deposited thin film Al-nitride and oxide, and bulk single crystal alpha-alumina. It is not possible to distinguish between these materials on the basis of the chemical shift in the binding energy of the Al2p and Al2s photoelectrons (Siegbahn shift). The results show that XPLS can be used to distinguish between these materials. Delta E in Al-oxides and nitride differs by several eV and is independent of sample charging. Comparison with Delta E calculated using a free electron gas model is made and related to the plasmon nature of Delta E. GRA

N86-28142# Princeton Univ., N. J.
THE DETERMINATION OF INTERFACIAL TENSION BY VIDEO IMAGE PROCESSING OF PENDANT FLUID DROPS
S. H. Anastasiadis, J. K. Chen, J. T. Koberstein, A. F. Siegel, and J. E. Sohn 7 Mar. 1986 28 p
(Contract DAAG29-85-K-0245)
(AD-A165745; ARO-22886.1-MS) Avail: NTIS HC A03/MF A01 CSCL 07/4

A novel method for the analysis of interfacial tension from the shape of pendant fluid drops is presented. The experimental apparatus employs digital video image processing techniques to record drop images and to segment the fluid drop profile. An associated drop profile shape analysis algorithm is developed based upon robust shape comparison methods that utilize repeated median concepts. The complete algorithm is designed specifically to be executable on a microcomputer. The performance of the algorithm is illustrated for simulated pendant fluid drop profiles and pendant drops of glycerin. In the latter case, the experimental precision in the resultant surface tension is found to be of the order of 0.5%. GRA

N86-28143# Ministry of Defence, London (England). Directorate of Quality Assurance/Technical Support.
SOME APPLICATIONS OF FAST ATOM BOMBARDMENT MASS SPECTROMETRY
J. Hodson and A. J. Pidduck Aug. 1985 26 p
(AD-A165757; MATERIALS-TP-905; DRIC-BR-98163) Avail: NTIS HC A03/MF A01 CSCL 07/1

The fast bombardment (FAB) ionization source for mass spectrometry (MS) is introduced, and the advantages over other ionization techniques are discussed. Experimental factors are fully described. In initial work, FABMS is applied to the direct analysis of lubricant additives, thermally labile or involatile organic compounds such as macromolecules and ionic dyestuffs, and inorganic compounds. Applications published in the literature are reviewed. Attention is drawn to the high specificity of FABMS for surfactant species since these are often difficult to analyze by other methods. GRA

N86-28144# California Univ., Berkeley. Lawrence Berkeley Lab.
STUDIES OF MOLECULAR MONOLAYERS AT AIR-LIQUID INTERFACES BY SECOND HARMONIC GENERATION: QUESTION OF ORIENTATIONAL PHASE TRANSITION
T. Rasing, Y. R. Shen, M. W. Kim, S. Grubb, and J. Bock Jun. 1985 6 p Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with Exxon Research and Engineering Co., Annandale, N. J.
(Contract DE-AC03-76SF-00098)
(DE86-002871; LBL-20067; CONF-850605-8) Avail: NTIS HC A02/MF A01

Insoluble molecular monolayers at gas-liquid interfaces provide an insight to the understanding of surfactants, wetting, microemulsions and membrane structures and offer a possibility to study the rich world of 2-dimensional phase transitions. In the interpretation of the observed properties of these systems various assumptions about the molecular orientation are often made, but so far few clear experimental data exist. In this paper we will show how optical second harmonic generation (SHG) can be used to measure the molecular orientation of monolayers of surfactant molecules at water-air interfaces. By simultaneously measuring the surface pressure versus surface molecular area we can show for the first time that the observed liquid condensed-liquid expanded transition is an orientational phase transition. DOE

N86-28145# California Univ., Berkeley. Dept. of Physics.
SECOND-HARMONIC GENERATION FROM SUB-MONOLAYER MOLECULAR ADSORBATES USING A c-w DIODE LASER: MAUI SURFACE EXPERIMENT
G. T. Boyd, Y. R. Shen, and T. W. Hansch Jun. 1985 4 p Presented at the 7th International Conference on Laser Spectroscopy, Maui, Hawaii, 24 Jun. 1985 Prepared in cooperation with California Univ., Berkeley, Lawrence Berkeley Lab. and Stanford

Univ.
(Contract DE-AC03-76SF-00098)
(DE86-002885; LBL-20068; CONF-850605-7) Avail: NTIS HC A02/MF A01

Optical second-harmonic generation (SHG) can be an extremely sensitive tool for surface studies. The technique is capable of probing adsorbed molecules at various interfaces. It is based on the idea that SHG is forbidden in a medium with inversion symmetry, but necessarily allowed at a surface. To see such a surface nonlinear optical effect, high laser intensity is often needed. Thus, in the experiments reported so far, pulsed lasers were used exclusively. From the consideration for practical applications, however, the technique would look much more attractive if the bulky pulsed laser can be replaced by a simple inexpensive c-w diode laser. This paper describes the first demonstration of surface SHG with a c-w laser. DOE

N86-28146# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Chemical and Environmental Engineering.
KINETIC MEASUREMENTS ON ELEMENTARY FOSSIL FUEL COMBUSTION REACTIONS OVER WIDE TEMPERATURE RANGES Progress Report, 1 Dec. 1984 - 30 Nov. 1985
A. Fontijn and K. Mahmud Dec. 1985 14 p
(Contract DE-FG02-84ER-13224)
(DE86-005502; DOE/ER-13224/2) Avail: NTIS HC A02/MF A01

The use of an HTP (high-temperature photochemistry) facility for experimental measurements on the O + C2H4 reaction is described. Rate coefficient measurements have been obtained from 295 to 1430 K and an extension to higher temperatures is in progress. No previous measurements in the 1050 to 1430 K temperature regime exist. Our data show excellent agreement with earlier measurements over the 295 to 1050 K regime, but suggest deviations from extrapolated expressions based on data from T < 1050 K and T > 1600 K measurements. DOE

N86-28147# SRI International Corp., Menlo Park, Calif.
SEMICONDUCTOR ELECTROCHEMISTRY APPROACH TO THE STUDY OF OXIDE FILMS ON NICKEL AND ZINC Final Report
M. J. Madou, S. Wing, and M. C. H. McKubre Sep. 1985 44 p
(Contract DE-AC03-76SF-00098)
(DE86-005844; LBL-20305) Avail: NTIS HC A03/MF A01

On nickel electrodes, we discovered the mechanisms that explain lithium and cobalt ion contribution to improved nickel electrode performance, and the cobalt might be more effective in the plate from solution rather than in the active material beforehand. The reported capacity improvement can only be confirmed on unrealistically thin battery plates. Fluoride has a negative effect on nickel electrodes (greatly reduces oxygen overpotential), and it offsets the positive effect of lithium. The negative effect of zincate on the oxygen evolution can be offset by LiOH, and the positive effect of cobalt on nickel electrodes is similar to that of lithium. For a beneficial effect, the ions should be small (about 0.6 A), preferably nonelectroactive, and able to act as acceptors in the NiO lattice, and they should poison the oxygen evolution on nickel. PbO is a potentially beneficial additive for the nickel electrode. Mg has a surface catalytic effect to decrease the oxygen overpotential, which reduces the nickel electrode charge capacity. On zinc electrodes, Fe decreases the hydrogen overpotential and should be avoided. Fluoride reduces the charge-discharge current peaks by over a factor of ten. Zincate will always be present when zinc is used, reduces the hydrogen overpotential at low concentrations and tends to increase it at high concentrations. PbO has a beneficial effect on the zinc electrode as well, and seems like a good additive for Ni/Zn batteries. Photocurrent experiments on the passive zinc electrode reveal the presence of an n-type semiconductor (possibly two separate phases), and impedance measurements indicate the higher resistance of the passive film on zinc in a fluoride-containing alkaline solution, compared to the alkaline solution without the fluoride. DOE

N86-28148# Pittsburgh Univ., Pa. Dept. of Chemical and Petroleum Engineering.
CHEMICAL TRAPPING AND IR STUDIES CO/H SURFACE SPECIES Quarterly Report, Sep. - Nov. 1985
D. G. Blackmond and I. Wender Dec. 1985 6 p
(Contract DE-FG22-85PC-80526)
(DE86-004847; DOE/PC-80526/T1; QR-1) Avail: NTIS HC A02/MF A01

CO hydrogenation reactions over supported metals can produce a wide spectrum of hydrocarbon and oxygenated compounds depending to a large extent on the type of metal used. Elucidating the nature of the intermediate species formed on metal surfaces may provide the key to understanding the pathways through which these reactions proceed on different metals. Research is proposed to investigate intermediate species formed during CO hydrogenation reactions on silica-supported Pd, Rh, Ru, and Ni catalysts. A novel chemical trapping technique will be used to identify adsorbed intermediates. Coupled with in-situ IR spectroscopic investigations of adsorption and reaction on the catalysts, these trapping studies should provide a framework for understanding differences in CO hydrogenation reaction pathways over different metals. In addition, chemical trapping studies using selected transition metal complexes of known structure will be carried out to help evaluate the techniques as well as to help establish relationships between homogeneous and heterogeneous catalytic reactions of CO and H. During the first quarter of the project, a research team has been assembled, the high pressure reaction system has been designed and reaction parts and supplies have been ordered. Preliminary IR investigations of CO adsorption on Rh/Al O have been performed. Preparation methods of model transition metal complexes has been investigated. DOE

N86-28149# New Mexico Univ., Albuquerque. Dept. of Chemistry.
RESONANCE RAMAN INVESTIGATION OF TRANSIENT PHOTO-INDUCED LIGATION CHANGES IN NICKEL PORPHYRINS
E. W. Findsen, J. A. Shelnutt, J. M. Friedman, and M. R. Ondrias 1985 20 p Presented at the International Conference on Exited States and Dynamics of Porphyrins, Little Rock, Ark., 17 Nov. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N.M. and Bell Telephone Labs., Murray Hill, N.J.
(Contract DE-AC04-76DP-00789)
(DE86-005433; SAND-85-2842C; CONF-8511135-2) Avail: NTIS HC A02/MF A01

The first picosecond and nanosecond time-resolved Raman spectra of photo-excited metalloporphyrins in coordinating and noncoordinating solvents are presented. Our data demonstrate that resonance Raman spectra can be obtained from transient nickel porphyrin species and confirm the existence of photo-induced ligation changes in nickel proto and octaethyl porphyrin species on a sub-nanosecond timescale. DOE

N86-28150# Massachusetts Univ., Amherst. Dept. of Chemical Engineering.
MULTIVARIABLE AND DISTRIBUTED CONTROL OF NONLINEAR CHEMICAL PROCESSES USING ADAPTIVE METHODS Progress Report, 1 Jan. 1985 - 31 Dec. 1988
B. E. Ydstie Nov. 1985 38 p
(Contract DE-FG02-85ER-13318)
(DE86-005505; DOE/ER-13318/1) Avail: NTIS HC A03/MF A01

This report summarizes work aimed towards the development of multivariable adaptive controllers. The emphasis in this research has been placed on robustness issues. The research has involved theoretical development of new control strategies as well as the testing of the algorithms in simulation studies of a variety of distillation columns. The main result to date is a global stability result for the Extended Horizon Controller (EHC) in the multivariable, deterministic case. This result is valid for linear, open loop stable systems only and we are currently in the process of extending it to cover the nonlinear compensation technique described in the main proposal, and open loop unstable systems. Current theoretical studies center around the development of automatic tuning strategies. Preliminary simulation studies for single-input single-output systems show great promise. Our algorithms have been modified so that they use the incremental rather than the standard backward shift operators. This offers

substantial numerical advantages. A novel technique for weighing coefficient selection is also being investigated. DOE

N86-28151# Lawrence Livermore National Lab., Calif.
RAMAN SCATTERING METHOD FOR HIGH PRECISION COMPARATIVE MEASUREMENTS OF THE OXYGEN CONCENTRATION IN AIR
P. P. Tans and D. A. Lashof May 1985 115 p
(Contract DE-AC03-76SF-00098)
(DE86-005872; LBL-19977) Avail: NTIS HC A06/MF A01

We describe a method designed to determine relative concentrations of oxygen in air to a few parts per million. The method is based on the comparison of Raman scattering intensities from air in two cells, both of which are placed inside the cavity of an Ar ion laser. The scattered light is channeled through fiber optic light guides into the detectors which consist of dielectric interference filters and photomultiplier tubes. The systematic errors effecting the long-term stability of the intensity comparison are analyzed and our efforts to overcome these errors are described. DOE

N86-28152# Texas Southern Univ., Houston. Dept. of Chemistry.
STUDY OF SOME TRANSITION METAL COMPLEXES AS PROCESS CATALYSTS Quarterly Report, Sep. 1 - 31 Nov. 1985
B. L. Wilson 1985 21 p
(Contract DE-FG22-84PC-70753)
(DE86-005975; DOE/PC-70753/T5) Avail: NTIS HC A02/MF A01

The main objectives of this project are: (1) preparation and characterization of transition metal complexes with nitrogen, oxygen, and sulfur donor ligands, expecially the poly(pyrazolyl) borate ligands; (2) preparation of bimetallic complexes of molybdenum and other metals such as nickel, cobalt, and iron; (3) determination of the ability of the above complexes to catalytically reduce polycyclic aromatic or hererocyclic compounds; (4) evaluation of these complexes as coal liquefaction catalysts; (5) evaluation of these complexes as desulfurization and denitrogenation catalysts; and (6) training of students in transition metal complex preparation and characterization and in the evaluation of metal complexes as process catalysts. Potassium dihydrobis (pyrazolyl)borate was prepared and reacted with cobalt chloride and zirconium halides to produce cobalt and zirconium complexes. The structures and physical properties of the two ligands, potassium dihydrobis(pyrazolyl)borate and potassium hydrobis(pyrazolyl) borate were investigated. Titanium and zirconium complexes are being characterized. The 300 ml autoclave reactor was tested. Three direct coal liquefaction runs were made on Illinois No. 6 River King coal. A typical loading consisted of 35.7 g of coal that had been ground to pass 60 mesh, 70.0 g of SRC II, a distillate cut, and 2000 to 16,000 ppM by weight of metal on dry/ashless coal. Results are presented for the catalytic and noncatalytic liquefaction runs. DOE

N86-28153# A/G Technology Corp., Needham, Mass.
RESEARCH INTO AN ASYMMETRIC MEMBRANE HOLLOW FIBER DEVICE FOR OXYGEN ENRICHED AIR PRODUCTION, PHASE 2 Final Report
A. Z. Gollan and M. H. Kleper Dec. 1985 74 p
(Contract DE-AC07-83ID-12429)
(DE86-006429; DOE/ID-12429/1) Avail: NTIS HC A04/MF A01

Oxygen enriched air (OEA) combustion is a major potential energy conservation measure for American Industry. Enrichment of oxygen content in air to the range of 30% to 35% during combustion benefits energy conservation in two ways. First, it leads to higher flame temperatures which in turn result in higher heat transfer rates with a concomitant reduction in process time requirements. Second, the parasitic nitrogen volume to be heated and subsequently vented at elevated temperatures is lowered. Implementation of oxygen enriched air process modifications in the combustion area will require an economical method of increasing the oxygen concentration in the intake air. Membrane processes are characteristically simple, continuous in operation and potentially highly economical to operate. Due to their modular nature, membrane systems can meet the needs of both the small and the large scale user of oxygen enriched air. In this program a semi-permeable polymeric membrane system which overcomes the limitations of prior membrane technology has been developed for oxygen enrichment. In Phase 1 of this program, laboratory-scale hollow fiber membrane cartridges were developed and an economic analysis model was formulated. In this second phase of the program the hollow fiber membranes were optimized and full-scale cartridges capable of producing about 2 SCFM of 35% oxygen (25 C, compression ratio of 5, 25% conversion) have been fabricated. Actual performance data have been used to update the capital and operating costs model. This report presents the objectives and results of the second phase of this program, including the updated economic analysis. DOE

N86-28154# Massachusetts Univ., Boston. Dept. of Chemistry.
INVESTIGATION OF THE STRUCTURE OF PHOTOSYNTHETIC REACTION CENTERS Progress Report, 1 Jun. 1985 - 31 Jan. 1986
H. vanWilligen Jan. 1986 7 p
(Contract DE-FG02-84ER-13242)
(DE86-006508; DOE/ER-13242/2) Avail: NTIS HC A02/MF A01

Research performed during the period covered by this report addresses the effect of dimerization on the photo-excited triplet state characteristics of a number of porphyrins and metalloporphyrins, the determination of the structure of a tetraphenylporphyrin (TPP) dimer with the aid of ENDOR measurements, and the photooxidation of porphyrin monomers and dimers. DOE

N86-28155# National Bureau of Standards, Gaithersburg, Md. Polymer Science and Standards Div.
POLYMERS: TECHNICAL ACTIVITIES 1985 Annual Report, 1 Oct. 1984 - 30 Sep. 1985
L. E. Smith and B. M. Fanconi Nov. 1985 104 p
(PB86-165024) Avail: NTIS HC A06/MF A01 CSCL 07D

Technical activities of the Polymers Division for FY-85 are reviewed. Included are descriptions of the 6 tasks of the division, project reports, publications, and other technical activities. GRA

N86-28156# National Marine Fisheries Service, Seattle, Wash.
STANDARD ANALYTICAL PROCEDURES OF THE NOAA (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION) NATIONAL ANALYTICAL FACILITY, 1985-1986: EXTRACTABLE TOXIC ORGANIC COMPOUNDS, SECOND EDITION
W. D. MacLeod, D. W. Brown, A. J. Friedman, D. G. Burrows, and O. Maynes Oct. 1985 113 p refs
(PB86-147873; NOAA-TM-NMFS-F/NWC-92) Avail: NTIS HC A06/MF A01 CSCL 07D

Numerous recent studies demonstrate associations between organic chemical contamination of the aquatic environment and impacts on environmental health and, potentially, on human health. If the results of the one study are compared with those of another, uniform analytical methods for the chemicals will be required. To meet this need, NOAA's National Analytical Facility (NAF) prepared this Technical Memorandum as a methods manual for extractable organic chemicals in marine sediments and tissues. It applies specifically to organic analytes selected for documentation by NOAA's National Statue and Trends (S&T) Program. GRA

N86-28157# Ohio State Univ., Columbus. Research Foundation.
LIMITATIONS ON THE EFFICIENCY OF THE SOLAR PHOTOREDUCTION OF CARBON Final Report, Jun. 1982 - May 1985
R. T. Ross Mar. 1986 30 p
(Contract GRI-5082-260-0642)
(PB86-179074; GRI-86/0035) Avail: NTIS HC A03/MF A01 CSCL 07D

The purpose of the project was to clarify the thermodynamic and kinetic limits on the efficiency of solar photochemistry in general, and the solar photoeducation of carbon in particular. A thought experiment was devised which provides a nonmathematical proof of the generality of the Carnot limitation on the efficiency of converting light energy into work. Proof was

obtained that a simple hybrid solar energy converter can have both very high theoretical efficiency (66%) and properties which are compatible with construction of a practical device. This kind of converter combines the electron-transfer aspect of photoelectrical and photochemical cells with the high-temperature aspect of thermal solar conversion. Losses due to the finite width of the electronic spectral bands of photochemical systems were found to be approximately proportional to the square of this width and to cause a significant loss in achievable conversion efficiency. Bilinear analysis of fluorescence from photosynthetic systems permitted determination of the fluorescence spectra of photosystems I and II. GRA

N86-28158# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
STOICHIOMETRIC CO REDUCTION BY SUPPORTED METAL CARBONYLS Annual Report, Dec. 1984 - Nov. 1985
D. F. Shriver and C. Woodcock Jan. 1986 11 p
(Contract GRI-5082-260-0693)
(PB86-174455; GRI-86/0015) Avail: NTIS HC A02/MF A01 CSCL 07D

Three basic organometallic compounds, Fe(phen)2(CN)2, Cp4Fe4(CO)4, and CpFe(CO)2CN, have been studied in the AlCl3/n-butylpyridinium chloride, (BPC) molten salt system. IR and UV-VIS spectroscopy show that the ligands of all three complexes interact with Lewis acids contained in the melts. Comparison of spectral shifts for these compounds in the various melts with shifts previously reported for isolated Lewis acid adducts of the same compounds provides insight into the relative electron pair acceptor ability of the various melts. Cyclic voltammetry of Fe(phen)2(CN)2 in the molten salts demonstrates a very large shift in the oxidation potential with increasing acidity whereas the oxidation potential of Cp4Fe4(CO)4 is unchanged. This behavior is consonant with simple molecular orbital calculations. GRA

N86-28159# Stanford Univ., Calif. Dept. of Chemistry.
ELECTROCHEMICAL ACTIVATION OF CARBON DIOXIDE Annual Report, 15 Oct. 1984 - 14 Oct. 1985
N. S. Lewis Jan. 1986 47 p
(Contract GRI-5094-260-1015)
(PB86-174380; GRI-85/0274) Avail: NTIS HC A03/MF A01 CSCL 07D

The authors are attempting to bind a variety of cobalt-based macrocycles to electrode surfaces, and to assess their activity towards CO2 reduction. Cobalt-based systems are being pursued at present because they are known to possess the necessary oxidation states, hydride and proton binding sites, and reactivity patterns which are required to effect multi-electron transformations on inorganic fuel precursors. In parallel with the study, the authors are also pursuing work designed to elucidate changes in fundamental reactivity patterns as a result of immobilization of molecules on electrode surfaces. The authors have developed techniques which allow, for the first time, an investigation of the intrinsic reactivity of simple transition metal ions, such as Ru(NH3)5 (H2O)2+ in polymer films. Kinetic and spectroscopic methods have been used to probe reactivity variations in this system. Also, thermodynamic information regarding the local solvent sphere of these ions and the factors which control binding of these charged species into ionophores have been performed. GRA

N86-28160# National Bureau of Standards, Gaithersburg, Md. Molecular Spectroscopy Div.
TECHNICAL ACTIVITIES 1985, MOLECULAR SPECTROSCOPY DIVISION
A. Weber Jan. 1986 110 p
(PB86-164381; NBSIR-86/3313) Avail: NTIS HC A06/MF A01 CSCL 07D

The technical activities of the National Bureau of Standards (NBS) Molecular Spectroscopy Division during the Fiscal Year 1985 are summarized. The activities span experimental and theoretical research in high resolution molecular spectroscopy, quantum chemistry and laser photochemistry, and include the development of frequency standards, critically evaluated spectral data, applications of spectroscopy to important scientific and technological problems, as well as advancement of spectroscopic measurement methods and techniques. GRA

N86-28161# National Bureau of Standards, Gaithersburg, Md.
INTRODUCTION TO FOURIER TRANSFORM SPECTROSCOPY
J. Cohen Mar. 1986 102 p
(PB86-182300; NBSIR-86-3339) Avail: NTIS HC A06/MF A01 CSCL 07D

Presented is a simplified, concise introduction to Fourier Transform spectroscopy. The emphasis is on concepts and comprehension, and abundant diagrams are provided as an aid. The work is organized into three parts: first, a selective, but adequate review of Fourier transform mathematics, next, a treatment of the physics of a simple Michelson interferometer, and last, salient topics in Fourier transform spectroscopy. GRA

N86-28162# Sandia National Labs., Albuquerque, N. Mex.
HECTR ANALYSES OF LARGE-SCALE PREMIXED HYDROGEN COMBUSTION EXPERIMENTS
C. Channy Wong 1986 9 p Presented at the International ANS/ENS Topical Meeting on Thermal Reactor Safety, San Diego, Calif., 2-6 Feb. 1986
(Contract DE-AC04-76DP-00789)
(TI86-004611; SAND-85-1652C; CONF-860204-18) Avail: NTIS HC A02/MF A01

The HECTR (Hydrogen Event: Containment Transient Response) computer code is a reactor accident analysis tool designed to calculate the transport and combustion of hydrogen and the transient response of the containment. As part of the assessment effort, HECTR was used to analyze the Nevada Test Site (NTS) large-scale premixed hydrogen combustion experiments. The results of these analyses and the critical review of the combustion modle in HECTR is presented. Author

N86-28213# Atlantic Research Corp., Alexandria, Va.
EFFECTS OF OXIDIZER DEPLETION ON BORON CLOUD COMBUSTION TIME
Merrill K. King *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 1-11 (For primary document see N86-28212 19-28)
(Contract F49260-81-C-0035)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28216*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EROSIVE BURNING RESEARCH
L. Strand, L. Yang, R. Ray, and J. Barry *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 29-40 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28218# Army Armament Munitions and Chemical Command, Dover, N.J.
SINGLE-SHOT H2 CARS SPECTROMETRY OF PROPELLANT IGNITION AND COMBUSTION, UNDER PRESSURE
T. E. Haw (Geo-Centers, Inc., Newton, Mass.), S. Darrah, and L. E. Harris *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 55-64 (For primary document see N86-28212 19-28)
(Contracts DAAK10-81-C-0265; DAAA21-85-C-0139)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28219# Morton Thiokol, Brigham City, Utah.
ROCKET PROPELLANT IGNITION: A WORKSHOP REPORT
M. Salita *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 65-86 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28220# Atlantic Research Corp., Gainesville, Va. Ignition Tech. Internal Research and Development.
A ROCKET MOTOR IGNITION MODEL UTILIZING IGNITION DELAY VERSUS PRESSURIZATION RATE DATA

J. E. Wills *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 87-96 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28221# Cohen (Norman S.) Professional Services, Inc., Redlands, Calif.
ANALYTICAL MODELS OF COMBUSTION RESPONSE FUNCTIONS
Norman S. Cohen *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 97-102 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28222# Georgia Inst. of Tech., Atlanta.
NONLINEAR COMBUSTION INSTABILITY
G. A. Flandro *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 103-112 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28224# Brigham Young Univ., Provo, Utah. Dept. of Chemical Engineering.
A NUMERICAL MODEL FOR THE RIJKE BURNER
R. L. Raun and M. W. Beckstead *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 123-131 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0157-83)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28227# United Technologies Corp., San Jose, Calif.
COUPLING BETWEEN VELOCITY OSCILLATIONS AND SOLID PROPELLANT COMBUSTION
R. S. Brown, A. M. Blackner, P. G. Willoughby, and R. Dunlap *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 151-160 Previously announced in IAA as A86-19933 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28233# Applied Combustion Technology, Inc., Orlando, Fla.
ANALYSIS OF TWO-PHASE IGNITER FLOW THROUGH A GRANULAR BED
A. Michael Varney, John Martino, Saeed Ghandeharioun, Bryan Steury, and Charles Irish (Naval Ordnance Station, Indian Head, Md.) *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 209-221 (For primary document see N86-28212 19-28)
(Contract N00174-83-C-0254)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28236# University of Southern California, Los Angeles.
A NOVEL FEEDBACK CONCEPT FOR COMBUSTION INSTABILITY IN RAMJETS
P. Roy Choudhury, Melvin Gerstein, and Reza Mojaradi *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 279-287 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0222-82)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28238*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CARS SYSTEM FOR SIMULTANEOUS MEASUREMENT OF TEMPERATURE, NITROGEN AND OXYGEN DENSITIES IN A TURBULENT FLAME
Olin Jarrett, Jr., Richard R. Antcliff (Systems Research Labs., Inc., Dayton, Ohio), and R. Clayton Rogers *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 295-306 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28246# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
IGNITION AND COMBUSTION OF ALUMINUM AND ALUMINUM/CARBON SLURRY DROPLETS
S. R. Turns and S.-C. Wong *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 383-398 (For primary document see N86-28212 19-28)
(Contract F33615-84-C-2410)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28247*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMBUSTION IN SUPERSONIC FLOW
G. Burton Northam *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 399-410 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28248# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERSONIC COMBUSTION OF A SILANE/METHANE MIXTURE
G. Burton Northam and Allen G. McLain *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 411-416 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28249# United Technologies Research Center, East Hartford, Conn.
CARS FEASIBILITY DEMONSTRATION IN SUPERSONIC COMBUSTING FLOWS
Torger J. Anderson, Ira W. Kay, and William T. Peschke *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 417-428 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28251# Colorado State Univ., Fort Collins.
IMPROVEMENT OF AN INTEGRAL STABILITY MODEL
C. E. Mitchell *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 443-452 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28257# Naval Weapons Center, China Lake, Calif.
A SIMULTANEOUS MATHEMATICAL TREATMENT OF DEFLAGRATION AND IGNITION PHENOMENA
C. F. Price and T. L. Boggs *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 505-513 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28258# Naval Research Lab., Washington, D. C. Chemistry Div.
KINETIC MODELING OF DIMETHYLNITRAMINE THERMAL DECOMPOSITION: A MECHANISTIC EXTRAPOLATION TO RDX DECOMPOSITION IN THE GAS PHASE
M. E. Umstead, S. A. Lloyd, and M. C. Lin *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 515-521 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-28163*# National Aeronautics and Space Administration, Washington, D.C.
METHOD FOR THE PRODUCTION OF STRONGLY ADHESIVE FILMS ON TITANIUM AND TITANIUM ALLOYS WITH A METALLIZATION PROCESS
H.-J. Hahn Jun. 1986 9 p Transl. into ENGLISH of West Germany Patent no. 2442742 (3 Jul. 1975) p 1-4 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)
(NASA-TM-88461; NAS 1.15:88461) Avail: NTIS HC A02/MF A01 CSCL 11F

A process for the spray-application of a strongly adhesive, thick antifriction layer on titanium and titanium alloys is proposed. The titanium/titanium alloy component to be coated is first subjected to cleaning in a pickling bath with reducing additives and sand-blasting, then coated with an intermediate layer of nickel, after which the final layer is applied. The formation of TiNi at the interface ensures strong bonding of the antifriction layer. Author

N86-28164*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MICROMECHANISMS OF THERMOMECHANICAL FATIGUE: A COMPARISON WITH ISOTHERMAL FATIGUE
Robert C. Bill 1986 21 p Presented at the International Spring Conference Fatigue at High Temperatures, Paris, France, 9-11 Jun. 1986; sponsored by the Societe Francaise de Metallurgie Prepared in cooperation with Army Aviation Research and Technology Activity, Cleveland, Ohio
(NASA-TM-87331; E-3075; NAS 1.15:87331; USAAVSCOM-TR-86-C-7) Avail: NTIS HC A02/MF A01 CSCL 11F

Thermomechanical Fatigue (TMF) experiments were conducted on Mar-M 200, B-1900, and PWA-1480 (single crystals) over temperature ranges representative of gas turbine airfoil environments. The results were examined from both a phenomenological basis and a micromechanical basis. Depending on constituents present in the superalloy system, certain micromechanisms dominated the crack initiation process and significantly influenced the TMF lives as well as sensitivity of the material to the type TMF cycle imposed. For instance, high temperature cracking around grain boundary carbides in Mar-M 200 resulted in short in-phase TMF lives compared to either out-of-phase or isothermal lives. In single crystal PWA-1480, the type of coating applied was seen to be the controlling factor in determining sensitivity to the type of TMF cycle imposed. Micromechanisms of deformation were observed over the temperature range of interest to the TMF cycles, and provided some insight as to the differences between TMF damage mechanisms and isothermal damage mechanisms. Finally, the applicability of various life prediction models to TMF results was reviewed. Current life prediction models based on isothermal data must be modified before being generally applied to TMF. Author

N86-28165*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPRESSIVE CREEP BEHAVIOR OF ALLOYS BASED ON B2 FeAl
N. Mantravadi (Case Western Reserve Univ., Cleveland, Ohio), K. Vedula, D. Gaydosh, and R. H. Titran 1986 16 p Presented at the IMS-AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986 (Grant NsG3-387)
(NASA-TM-87293; E-3000; NAS 1.15:87293) Avail: NTIS HC A02/MF A01 CSCL 11F

Alloys based on FeAl are attractive alternate materials for environmental resistance at intermediate temperatures. Addition of small amounts of Nb, Hf, Ta, Mo, Zr, and B were shown to improve the compressive creep of this alloy at 1100 K. Boron, in particular, was found to have a synergistic effect along with Zr in providing properties substantially better than the binary alloy. This improvement seems to be related to the higher activation energy found for this alloy, suggesting a modification in the diffusion behavior due to the alloying additions. Author

N86-28166*# Battelle Columbus Labs., Ohio.
THE INFLUENCE OF DEFECTS OF THE FATIGUE RESISTANCE OF BUTT AND GIRTH WELDS IN A106B STEEL Final Report
B. N. Leis, D. P. Goetz, and P. M. Scott Jul. 1986 108 p
(Contract NAS1-17404)
(NASA-CR-178114; NAS 1.26:178114) Avail: NTIS HC A06/MF A01 CSCL 11F

This three-phase study was directed at developing a fitness for service defect acceptance criteria for welds with defect indications. The study focussed on A106 Gr. B steel pipe. The first phase involved a literature search and critical review to develop the preliminary acceptance criteria to the extent permitted by the data. The second phase developed data for flat plate, wall segment, and vessel specimens containing artificial or natural planar or volumetric defects. The final phase developed acceptance criteria from the test data. Author

N86-28167# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
NEUTRON DIFFRACTION CHARACTERIZATION OF TUNGSTEN-NICKEL-IRON ALLOYS Preliminary Technical Report, 1984 - 1985
H. J. Prask and C. S. Choi Feb. 1986 26 p
(AD-A165796; AD-E401461; ARAED-TR-85015) Avail: NTIS HC A03/MF A01 CSCL 07/4

Neutron diffraction and small-angle scattering have been employed to elucidate the effect of strain aging on macroscopic properties of tungsten-nickel-iron (W-.07Ni-.03Fe) alloys. The neutron measurements indicate that strain aging causes reduction and redistribution of residual stresses induced by swaging, accompanied by void/precipitate evolution. GRA

N86-28168# Avco-Everett Research Lab., Mass.
LASER METALWORKING TECHNOLOGY TRANSFER Final Report
Ole A. Sandven 1986 84 p
(Contract N00014-82-C-2373)
(AD-A165808) Avail: NTIS HC A05/MF A01 CSCL 11/6

The Technology Transfer program assists in the utilization and integration of the laser facility in the manufacturing of naval ordnance components and systems. This assistance consists of targeting workpieces and production steps suitable for laser processing in terms of cost effectiveness and quality enhancement, the development of techniques and procedures for such processing and the establishment of processing parameters and other pertinent data. The work is related to laser surface transformation hardening of steels. The response of a number of frequently used steels to such laser processing has been determined over a wide range of processing parameters. Models and calculator programs for the prediction of laser hardening have been developed and tested, and the necessary thermophysical constants of the various materials determined by statistical and empirical means. In addition to the transformation hardening survey, process development work relating to the laser hardfacing of aircraft carrier catapult rails has been performed, and preliminary techniques and processing data established for different combinations of hardfacing alloys/substrate materials. GRA

N86-28169# Materials Research Labs., Ascot Vale (Australia).
CONTROLLING CORROSION IN DEFENCE EQUIPMENT TECHNICAL MEETING
D. A. Wright Oct. 1985 71 p Meeting held in Maribyrnong, Australia, 27 Mar. 1985
(AD-A165834; MRL-R-964) Avail: NTIS HC A04/MF A01 CSCL 11/6

Presentations at this Technical Meeting covered a wide range of corrosion theory and practical control measures. Topics range from protective measures such as electroplating, painting and surface modification, through ways of minimizing corrosion by suitable equipment design, to overviews of stress corrrosion cracking and the monitoring of corrosion. Case histories of corrosion-induced failures in material that are typically representative of control problems, and estimates of the cost of corrosion to Defence are given in some detail. The meeting sought to expand and update the long established, and productive, liaison between MRL corrosion scientists and the Armed Services and Defence Factories in this important and costly area. Corrosion expertise immediately available to Defence personnel was highlighted, as were current developments in corrosion control areas in which MRL research and development is either presently active or could be deployed should Defence requirements so dictate. It was hoped,

therefore, to show MRL's customers how to obtain advice on corrosion more effectively from present scientific resources, on to developments in corrosion technology that might have future application in their work. Author (GRA)

N86-28170# Technical Research Centre of Finland, Espoo.
EFFECT OF DECONTAMINATION ON OXIDATION OF AUSTENITIC STAINLESS STEEL IN REACTOR CONDITIONS
T. Starkman Jul. 1984 120 p In FINNISH; In FINNISH
(DE86-700116; VTT-TUTK-289) Avail: NTIS (US Sales Only) HC A06/MF A01

Austenitic stainless steels were oxidized in static autoclaves in light water reactor conditions. After the autoclave treatments the specimens were decontaminated with the aid of alkaline potassium permanganate (AP) and oxalic acid and citric acid (CITROX) as well as electrochemically in H3PO4. Alternating oxidation and decomtamination tests were performed. An elemental analysis of the surfaces of the specimens was carried out by electron spectroscopy. Changes in structure and thicknesses of the oxide layers were observed. Author

N86-28171# Minnesota Univ., Minneapolis. Corrosion Research Center.
CORROSION RESEARCH CENTER OF THE UNIVERSITY OF MINNESOTA Progress Report, Jan. 1 - 31 Dec. 1985
R. A. Oriani Dec. 1985 209 p
(Contract DE-FG02-84ER-45173)
(DE86-004404; DOE/ER-45173/1-1985) Avail: NTIS HC A10/MF A01

The following topics in aqueous and high-temperature corrosion were studied: passivation on GaAs, adsorption on electrode surfaces, passive films on Ti, corrosion protection by conductive polymers, interfaces, scaling and molten carbonates. DOE

N86-28172# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
INVESTIGATION OF MICROSTRUCTURAL CHANGES IN FERRITIC STAINLESS STEELS CAUSED BY HIGH TEMPERATURE DEFORMATION Final Report, 15 Sep. 1981 - 30 Nov. 1985
J. R. Weertman Nov. 1985 33 p
(Contract DE-AC02-81ER-10960)
(DE86-004509; DOE/ER-10960/10) Avail: NTIS HC A03/MF A01

The low cycle fatigue behavior of several ferritic stainless steels (primarily Fe9Cr1Mo + V,Nb) was studied under total strain control at elevated temperatures. The effects of strain range, temperature, environment, and prior heat treatment were evaluated. The accompanying microstructural changes were observed by conventional and high voltage TEM and carbide coarsening was followed by small-angle neutron scattering (SANS). Substantial softening was observed in all fatigue tests. The introduction of hold times at maximum strain decreases cycle life but extends time to failure. The stress relaxes markedly during these hold times. Fatigue life is much shorter in air than in vacuum, especially at low strain ranges. The presence of air appears to increase softening. Prior aging or raising the temperature decreases the stress range but, in the case of continuous cycling under vacuum, cycle life is determined primarily by the plastic strain amplitude. Microstructural changes responsible for the observed softening include: change from the original lath dislocation structure to cells or subgrains; large decrease in the originally high dislocation density; carbide coarsening. Information obtained from SANS measurements on carbide coarsening during high temperature deformation or aging is in good agreement with HVEM observations and mechanical behavior. DOE

N86-28173# Argonne National Lab., Ill.
TRANSPORT MECHANISMS IN BETA-LITHIUM/ALUMINUM: AN OVERVIEW
S. Susman, T. O. Brun, and K. J. Volin Oct. 1985 4 p Presented at the International Workshop on High Temperature Molten Salt Batteries, Argonne, Ill., 5 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-004036; CONF-851192-2) Avail: NTIS HC A02/MF A01

There is a critical composition within the phase domain corresponding to 50.7 at. % Li. This composition partitions the Li conduction mechanism problem into four regions: room temperature (RT) for x V 0.507, RT for x 0.507, high temperature (HT) for x V 0.507, and HT for x > 0.507. The point defects and dimeric defects necessary to account for observed variations in Li diffusion have been determined for the first 3 regions; the fourth region is still being investigated. DOE

N86-28174# Oak Ridge National Lab., Tenn.
MECHANICAL PROPERTIES OF METALLIC FILMS ON SAPPHIRE
F. A. List and R. A. McKee 1985 5 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-005159; CONF-851217-29) Avail: NTIS HC A02/MF A01

A knowledge of interfacial mechanical properties is of considerable importance to the areas of oxidation, corrosion, metallization, and composite materials. We have developed an experimental apparatus capable of simultaneous measurements of elastic and anelastic properties of materials in controlled atmospheres (10 to 10 Pa) from 25 to 1000 C. The apparatus employs the technique of dynamic resonance in which a material's mechanical resonance spectrum can be determined over a range 10 to 10 Hz with resolution + or - 0.001 Hz. This resolution has enabled us to determine the mechanical properties of films as thin as approximately 10 nm. We present resonance results for thin films (approx. 100 nm) of nickel and gold on sapphire substrates. Results suggest that nickel films on sapphire are adherent, i.e., cyclic strain is continuous at the film-substrate interface, over a range of temperature about the film growth temperature; whereas gold films show nonadherent behavior at all temperatures studied. DOE

N86-28175# Argonne National Lab., Ill.
ION BEAM MIXING IN BINARY AMORPHOUS METALLIC ALLOYS
H. Hahn, R. S. Averback, T. Diazde la Rubia, and P. R. Okamoto Dec. 1985 8 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with New York State Univ., Albany
(Contract W-31-109-eng-38)
(DE86-005526; CONF-851217-36) Avail: NTIS HC A02/MF A01

Ion beam mixing (IM) was measured in homogeneous amorphous metallic alloys of Cu-Er and Ni-Ti as a function of temperature using tracer impurities, i.e., the so-called marker geometry. In Cu-Er, a strong temperature dependence in IM was observed between 80 and 373°K, indicating that radiation-enhanced diffusion mechanisms are operative in this metallic glass. Phase separation of the Cu-Er alloy was also observed under irradiation as Er segregated to the vacuum and SiO interfaces of the specimen. At low-temperatures, the amount of mixing in amorphous Ni-Ti is similar to that in pure Ni or Ti, but it is much greater in Cu-Er than in either Cu or Er. DOE

N86-28176# Argonne National Lab., Ill.
CORROSION OF ALLOYS IN MIXED GASES
K. Natesan Dec. 1985 17 p Presented at the 168th Meeting of the Electrochemical Society, Las Vegas, Nev., 13 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-005541; CONF-851048-12) Avail: NTIS HC A02/MF A01

Corrosion of materials at elevated temperatures is a potential problem in many systems within the chemical, petroleum, and power-generation industries. Multicomponent gas environments are generally prevalent in a number of these systems; the interactions between the complex gas atmospheres and materials of construction can lead to wastage and can alter the structural integrity of the materials. Thermodynamic and kinetic aspects of corrosion processes occurring in complex gas mixtures are discussed. Further, possible mechanisms are enumerated to evaluate the long-term performance of materials in complex gas environments. DOE

N86-28177# Argonne National Lab., Ill.
EVOLUTION OF PHASE MICROSTRUCTURE DURING IRRADIATION
H. Wiedersich Nov. 1985 33 p Presented at the Workshop on the Relation Between Mechanical Properties and Micro-structure Under Fusion Irradiation Conditions, Ebeltoft, Denmark, 27 Jun. 1985
(Contract W-31-109-eng-38)
(DE86-005544; CONF-8506165-5) Avail: NTIS HC A03/MF A01

The phase microstructure of alloys is frequently severely altered during irradiation. Sluggish precipitation reactions including precipitation coarsening are accelerated by irradiation-enhanced diffusion. Radiation-induced segregation redistributes existing precipitate phases within the microstructure, induces precipitation of nonequilibrium phases and affects the composition of phases in multicomponent alloys. The displacement process causes disordering of ordered alloys and frequently amorphization, especially in intermetallic compounds, at low temperature. Although a good qualitative understanding of the basic process involved, i.e., displacement mixing, radiation-enhanced diffusion and radiation-induced segregation exists, methods for detailed quantitative modeling of the evolution of the microstructure of alloys remain to be developed. DOE

N86-28178# Wayne State Univ., Detroit, Mich. Dept. of Chemistry.
SURFACE COMPOSITION-REACTIVITY RELATIONSHIPS IN HETEROGENEOUS CATALYSIS Progress Report
A. Brenner Jan. 1986 7 p
(Contract DE-AC02-79ER-10381)
(DE86-005907; DOE/ER-10381/7) Avail: NTIS HC A02/MF A01

Temperature programmed reduction/oxidation has been carried out up to 1200 C on 2% metal on alumina supports. H-D exchange was studied over Mo on alumina and silica supports. Decomposition of Mo(CO) was studied. Benzene hydrogenation over carbonyls of many transition metals was studied in detail. DOE

N86-28179# California Univ., Berkeley. Lawrence Berkeley Lab.
LOW CARBON DUAL PHASE STEELS FOR HIGH STRENGTH WIRE
G. Thomas and J. H. Ahn Aug. 1985 32 p Presented at the 55th Annual Convention: Interwire '85, Atlanta, Ga., 3 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE86-001481; LBL-20141; CONF-8511125-1) Avail: NTIS HC A03/MF A01

This paper shows that dual phase steels can be designed and processed as new, economical low carbon steels for cold drawing into high tensile strength steel wires. Current work indicates wires of tensile strengths up to 400,000 psi can be obtained. Potential applications for dual phase steel wire include bead wire, tire cord, wire rope and prestressed concrete. It should be possible to produce wire rods in existing rod mills by adapting the controlled rolling and quenching procedures outlined in this paper. DOE

N86-28180# Vereinigte Aluminium-Werke A.G., Bonn (West Germany). Technische Beratung und Entwicklung.
WARP-FREE REFINEMENT OF ALUMINUM STRIP Final Report, Sep. 1984
Hans-Heinrich Plath Bundesministerium fuer Forschung und Technologie Nov. 1985 78 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-125; ISSN-0340-7608; ESA-86-96892) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16.50

An aluminum strip heat treatment process, whereby heat transfer is achieved by contact with internal cooled rolls to avoid warp deformation, was developed. Stresses arising in a strip during the quench procedure were predetermined by data processing. Fundamental relations between important parameters were thus obtained, and conditions for practical try-out of the process were determined. The experimental concept included solution annealing of coiled test strips in a closed chamber and quenching with two cooling rolls operating in series. Theoretical calculations according to which stresses resulting from quenching can be reduced to a noncritical level are confirmed by laboratory tests. ESA

N86-28181# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Angewandte Physik.
METAL PROCESSING WITH UV LASERS Final Report, Oct. 1983
Reinhart Poprawe Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 46 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-140; ISSN-0340-7608; ESA-86-96894) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.50

A medium power transversely excited excimer laser system (p = 25 W) was developed. The system is suited for metal processing in the submicrometer range. Special attention was paid to homogenization of the KrF-gas discharge to optimize beam quality. For material ablation with ultraviolet pulsed lasers, the reciprocal processes between beam, workpiece and material vapor, as well as the impact of the processes on quality and the operation degree, were examined. Matching the laser parameters to the interaction phenomena results in high quality and efficient ablation. ESA

N86-28182# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
FATIGUE CRACK GROWTH DATA FOR STEEL N-A-XTRA 56. PART 2: WELD METAL AND HEAT AFFECTED ZONE
Anders F. Blom Jul. 1985 23 p
(Contracts STEV-506-101-7; STEV-506-101-8)
(FFA-TN-1985-44-Pt-2; ESA-86-97052) Avail: NTIS HC A02/MF A01

Fatigue crack growth data were obtained for the weld metal and for the heat affected zone at three different R-values (R = 0.2, 0.5 and 0.8) of wind turbine rotor steels. It is found that although at higher crack growth rates cracks may grow faster in weld metal and heat affected zone than in base material, the near-threshold crack growth rates are slower in weld metal and heat affected zone than in base material. This is beneficial for the overall lifetime of the wind turbine since cracks are likely to initiate at welds and the near-threshold regime largely determines the fatigue behavior, due to the large number of load cycles the turbine blades are designed to sustain during their required safe service life of 30 Yr. ESA

N86-28183# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
SHORT FATIGUE CRACK GROWTH IN Al 2024 AND Al 7475
A. F. Blom, A. Hedlund, W. Zhao, A. Fathulla, B. Weiss, and R. Stickler Nov. 1985 47 p Presented at Symposium on Behavior of Short Fatigue Cracks, Sheffield, England, 25-28 Sep. 1985 Submitted for publication Sponsored by Fonds zur Foerderung der Wissenschaftlichen Forschung und Hochschuljubilaeumsstiftung der Stadt Wien
(Contract STU-84-4563)
(FFA-TN-1985-67; ESA-86-97054) Avail: NTIS HC A03/MF A01

Fatigue crack initiation and growth in two high strength technical Al-alloys differing in mechanical properties and microstructure were investigated at low load amplitudes slightly below and above the high-cycle fatigue limit (0.9 to 1.4 times the fatigue limit, 0.2 to 0.9 times the yield strength). The effect of stress ratios (-1 to 0.7) and short and long crack growth properties for identical specimen material, orientation, and test conditions were studied. For the determination of closure stresses a dynamic compliance technique was developed and the crack opening phenomena followed by microscopic methods. Initiation and growth of fatigue cracks strongly depend on microstructural features (second phase particles, grain boundaries). A comparison of the growth behavior of microstructurally-short and physically-short cracks with that of

long cracks shows that the peculiarities of short crack growth can be partly related to crack closure phenomena. ESA

N86-28184# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Lab. Soete for Strength of Materials and Welding Technology.
INFLUENCE OF A POST WELD HEAT TREATMENT ON THE TOUGHNESS OF WELDMENTS IN LOW TEMPERATURE STEEL GRADES T St E 460 AND ASTM A 537 Cl 1
W. Provost Dec. 1985 40 p Sponsored by Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture and Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques
(CRIF-MT-163; ESA-86-97061) Avail: NTIS HC A03/MF A01

The influence of post weld heat treatment (PWHT) on the toughness of welded joints in three low temperature steel grades was investigated. Results show that PWHT produces a significant drop in HAZ and WMC toughness for the two T ST E 460 steels A and B. Stress relieving of this steel grade should be omitted. Fracture toughness tests, including wide plate testing, show evidence of an acceptable toughness level of the welds in steel A in the as welded condition. In contrast with the satisfactory Charpy V toughness, rather low CTOD values are observed in the HAZ of steel B in the as welded condition. A significant improvement in Charpy V and CTOD toughness by PWHT is demonstrated for steel C. However, acceptable toughness levels are also obtained in the as welded condition. This is reflected by the wide plate test results, implying that PWHT is superfluous, at least up to the tested plate thickness. ESA

N86-28185# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
RESULTS OF CHEMICAL CORROSION TESTING OF ELECTROSLAG-REMELTED CrNi STAINLESS STEEL AISI 340 L (MATERIAL NO. 1.4306) IN NITRIC ACID
R. Kraft, S. Leistikow, and E. Pott Nov. 1985 68 p In GERMAN; ENGLISH summary
(KfK-3878; ISSN-0303-4003; PWA-20/85; ESA-86-96910) Avail: NTIS HC A04/MF A01

The extra-low-carbon quality of the CrNi stainless steel AISI 304, additionally purified by the electroslag-remelting process, was tested as forged and rolled (sheet) material in nitric acid of different concentrations and temperatures for application in nuclear fuel reprocessing plants. All tests of solution-annealed materials in boiling 65% nitric acid show a very low constant of uniform metal dissolution. The specimens exposed in the vapor phase of the boiling aceotropic nitric acid show a corrosion attack comparable in quality and quantity to that in the liquid phase. No impairment of corrosion resistance is observed after annealing at 550 and 600 C; solution-annealing at 950, 1050, and 1100 C; and cold deformation (10% to 80%) by rolling of the material. Parameter studies show a slight dependence of corrosion of forged and rolled materials on the bulk structure after 1hr heat treatment at 650 to 750 C. A decrease of temperature and nitric acid concentration minimizes the metal dissolution rate while addition of Cr-6 ions to the aceotropic acid strongly increases it. ESA

N86-28186# National Bureau of Standards, Gaithersburg, Md.
MATERIALS TECHNOLOGY FOR ELECTRICAL APPLIANCES: MAGNETIC AND ELECTRICAL PROPERTIES OF METALS AND ALLOYS
G. N. Dubinin and Y. S. Avraamov 1985 277 p Transl. into ENGLISH of the mono. "Konstruktsionnye, Provodnikove i Magnitnye Materialy (Elektromaterialovedenie)" Moscow, USSR, Mashinostroenie, 1973 p 1-268 Sponsored by NSF
(PB86-184314; TT-79-52021) Avail: NTIS HC A13/MF A01 CSCL 11F

Described are the theoretical principles of the materials technology for electrical appliances used in aviation instrumentation. Major attention has been paid to the structure and properties of metals and alloys used in modern aviation instrumentation. The authors have elaborated the relationship between the structure and physiochemical properties of alloys. Various methods of developing special properties in alloys have been described. A considerable part of the book has been devoted to the study of special-purpose alloys such as soft and hard magnetic materials, ferrites, alloys with special thermal and electrical properties, and semiconductors. Students in aviation institutes will find the book very useful. Aviation, electrical and mechanical engineers engaged in the development of electrical appliances will also benefit from the bor GRA

N86-28187 United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
EFFECTIVE CORROSION MONITORING
C. F. Britton and B. C. Tofield Nov. 1985 14 p
(AERE-R-12007) Copyright. Avail: Issuing Activity

Results of two surveys (carried out in 1981 and 1984), of users of corrosion monitoring equipment are described. The benefits to be obtained from a well designed corrosion monitoring system, especially if a corrosion control program is utilized, are outlined together with the difficulties and barriers that can obstruct successful application. Developing methods such as ac impedance, electrochemical noise and TLA (thin layer activation) are discussed in view of the comments received from the surveys. Author

N86-28188 Newcastle-upon-Tyne Univ. (England). Materials Development Div.
AN ASSESSMENT OF THE RISK OF EMBRITTLEMENT OF A STEEL CONTAINER BY HYDROGEN PICKED UP FROM THE OPEN BED
D. Hardie Sep. 1985 72 p
(AERE-G3587) Copyright. Avail: NTIS HC A04/MF A01

A realistic assessment of the likelihood of embrittlement of a plain carbon steel container for nuclear waste has been made by estimating the hydrogen levels that might be expected to develop in the steel as a consequence of the slow corrosion of the container and the possible effect that such a hydrogen concentration would have on its mechanical behavior. By consideration of various possible models for the generation of hydrogen and its subsequent uptake into the steel or dissemination in the environment, it is concluded that the most pessimistic assessment of the concentration of hydrogen that could build-up in the container walls during 1000 years burial would not significantly affect the resistance to failure of even relatively high strength steels. Author

N86-28189# Brookhaven National Lab., Upton, N. Y.
DETECTION OF DEFECTS IN ION VAPOUR DEPOSITED ALUMINUM ON STEEL
Hugh S. Isaacs 1986 8 p
(TI86-006884; BNL-37598) Avail: NTIS HC A02/MF A01

Defects in ion vapor deposited aluminum coatings on steel exposed to a 0.3M H3BO4 solution adjusted to pH 3 with NaOH were detected in-situ. The nonaggressive borate solution was chosen to prevent any significant damage to the coating during defect location. The defects were located using a scanning vibrating probe electrode which measured the distribution of current density above the surface of the coated steel. The vibrating probe technique enabled polarization measurements of specific areas of the surface to be made. The polarization measurements of the defect sites showed that they were not a result of exposed steel but were caused by the presence of inclusions. Author

N86-28190# Ames Lab., Iowa.
STEEL CONTAINMENT RESISTANCE UNDER GENERAL DYNAMIC PRESSURES
L. Greimann, F. Fanous, and D. Bluhm Feb. 1986 150 p
(Contract NRC-FIN-A4134)
(TI86-006950; NUREG-CR-4223) Avail: NTIS HC A07/MF A01

Severe accident loadings on containments can include combinations of uniform internal pressure, dynamic pressure and seismic loadings. The objective of this work is to develop a methodology for calculating the ultimate capacity of steel containments under very general global or local, uniform or spatially varying dynamic loadings. An axisymmetric geometric model is used and the

circumferential variation of the loads is expressed in terms of Fourier series components. The solution, i.e., displacement and stress resultants at any point of time, are obtained and also represented by Fourier series components. Values of these components at discrete locations are evaluated using modal superposition. Failure, i.e., leakage of the containment, is defined to occur when either the membrane strain in the shell reaches twice the shell material yield strain or a bifurcation point occurs. A computer program called LOADS was written to evaluate the point-in-time displacements and stress resultants. This program uses the results obtained from a modified BOSOR4 modal analysis program. The results of the LOADS program are input into a modified BOSOR5 computer code to evaluate the containment resistance which considers large deformation and material nonlinear behavior. A user's manual for the BOSOR4/LOADS/BOSOR5 program set is presented. Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-28191 National Physical Lab., Teddington (England). Div. of Materials Applications.
ON STANDARD PROCEDURES FOR THE PRESENTATION OF MULTIPOINT DATA ON POLYMERS Interim Report
G. Dean Dec. 1985 20 p
(NPL-DMA(A)111; ISSN-0143-7313; ESA-86-97130) Copyright.
Avail: Issuing Activity

Recommended tests and test conditions for the presentation of multipoint data on polymers are listed. ESA

N86-28192 National Physical Lab., Teddington (England). Div. of Materials Applications.
THE APPLICATION OF ACOUSTIC SURFACE WAVES TO THE CHARACTERISATION OF POLYMERS
G. D. Dean Dec. 1985 27 p
(NPL-DMA(A)112; ISSN-0143-7313; ESA-86-97131) Copyright.
Avail: Issuing Activity

Apparatus for launching and receiving acoustic surface waves in polymers is described. The influences on wave velocity of internal stress, molecular orientation, physical aging, and absorbed water in polymethylmethacrylate were investigated. Although high accuracy can be achieved in the determination of changes in wave velocity, very small changes are caused by realistic variations in the parameters investigated, except of water content. The sensitivity of wave velocity to anisotropy is revealed by theoretical analysis for the case of hexagonal symmetry and by measurements on a fiber reinforced plastic and an oriented liquid crystal polymer. The velocity along symmetry directions is close to that of the appropriate bulk shear wave in the material, the proximity depending on the degree of anisotropy. ESA

N86-28193 National Physical Lab., Teddington (England). Div. of Materials Applications.
CHARACTERISATION AND INFLUENCE OF ORIENTATION AND INTERNAL STRESS IN ACRYLIC AIRCRAFT MATERIALS Final Report
B. E. Read, G. D. Dean, and J. C. Duncan Dec. 1985 79 p
(Contract MOD-RAE(F)MT-69/2/10)
(NPL-DMA(A)113; ISSN-0143-7313; ESA-86-97132) Copyright.
Avail: Issuing Activity

A photoelastic method for characterizing the internal stresses in crosslinked PMMA acrylic aircraft materials and windows was developed. The time-dependence of optical birefringence during creep or relaxation tests at different temperatures suggests that three nonequilibrium internal stress components operate: stress characteristic of the molecular orientation produced by stretching at high temperature; a glasslike distortional stress; and a stress arising from molecular conformational changes generated by the beta relaxation process in PMMA. A light-scattering technique was used to characterize internal stresses from temperature-dependent birefringence measurements in biaxially oriented materials. Levels of molecular orientation in biaxially stretched sheets and windows correspond to an orientational stress of 2 + or - 0.2 MPa along each of the stretching directions. Internal stresses in the crosslinked acrylic materials can be assessed from surface acoustic wave velocity. ESA

N86-28194*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MICROGRAVITY POLYMERS
Jun. 1986 22 p Proceedings of a Workshop held in Cleveland, Ohio, 9 May 1985
(NASA-CP-2392; E-2707; NAS 1.55:2392) Avail: NTIS
HC A02/MF A01 CSCL 11B

A one-day, interactive workshop considering the effects of gravity on polymer materials science was held in Cleveland, Ohio, on May 9, 1985. Selected programmatic and technical issues were reviewed to introduce the field to workshop participants. Parallel discussions were conducted in three disciplinary working groups: polymer chemistry, polymer physics, and polymer engineering. This proceedings presents summaries of the workshop discussions and conclusions. Author

N86-28195*# College of William and Mary, Williamsburg, Va.
RADIATION EFFECTS ON HIGH PERFORMANCE POLYMERS Final Technical Report, 1 Jun. 1985 - 28 Feb. 1986
Robert A. Orwoll 1986 10 p
(Grant NAG1-593)
(NASA-CR-177191; NAS 1.26:177191) Avail: NTIS
HC A02/MF A01 CSCL 11B

Polymer matrix materials are candidates for use in large space antennas and space platforms that may be deployed in geosynchronous orbit 22,500 miles above the Earth. A principal concern is the long term effects of an environment that is hostile to organic polymers, including high energy electromagnetic radiation, bombardment by charged particles, and large abrupt changes in temperature. Two polyarylene ethers which might be utilized as models for polymers in space applications were subjected to dosages of 70 keV electrons up to 3.4 x 10 to the 10th power rad. The irradiated films were then examined to determine the effects of the high-energy electrons. Author

N86-28196*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE EFFECTS OF ENERGETIC PROTON BOMBARDMENT ON POLYMERIC MATERIALS: EXPERIMENTAL STUDIES AND DEGRADATION MODELS
Daniel R. Coulter, Amitava Gupta, Mark V. Smith, and R. E. Fornes
1 Jun. 1986 84 p
(Contract NAS7-918)
(NASA-CR-177161; JPL-PUB-85-101; NAS 1.26:177161) Avail: NTIS HC A04/MF A01 CSCL 11C

This report describes 3 MeV proton bombardment experiments on several polymeric materials of interest to NASA carried out on the Tandem Van De Graff Accelerator at the California Institute of Technology's Kellogg Radiation Laboratory. Model aromatic and aliphatic polymers such as poly(1-vinyl naphthalene) and poly(methyl methacrylate), as well as polymers for near term space applications such as Kapton, Epoxy and Polysulfone, have been included in this study. Chemical and physical characterization of the damage products have been carried out in order to develop a model of the interaction of these polymers with the incident proton beam. The proton bombardment methodology developed at the Jet Propulsion Laboratory and reported here is part of an ongoing study on the effects of space radiation on polymeric materials. The report is intended to provide an overview of the mechanistic, as well as the technical and experimental, issues involved in such work rather than to serve as an exhaustive description of all the results. Author

N86-28197# Vermont Univ., Burlington. Dept. of Chemistry.
ORGANOPHOSPHAZENES. 19. COPOLYMERIZATION OF 2-(2-ETHOXYVINYL) PENTAFLUORO CYCLOTRIPHOSPHAZENE WITH STYRENE AND METHYL METHACRYLATE Technical Report
Christopher W. Allen and Randall P. Bright 14 Mar. 1986 17 p
(Contract N00014-85-K-0558)
(AD-A165716; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/3

The novel cyclophosphazene, 2-(2-ethoxyvinyl) pantafluorocyclotri phosphazene (N3P3F5C(OC2H5)=CH2) undergoes radical copolymerization with styrene and methyl methacrylate. The styrene system was examined in detail with flame retardant copolymers having up to 43.7% phosphazene content being obtained. Reactivity ratios for the styrene-ethoxyvinyl phosphazene copolymerization have been calculated by several methods. An examination of the Alfrey-Price parameters for the phosphazene indicates that the major perturbation of the olefinic center is through the sigma electron withdrawing effect of the phosphazene. The copolymer molecular weights decrease with increasing phosphazene content. The thermal decomposition of the copolymers is a two step process with the phosphazene being involved in the first step. GRA

N86-28198# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
A MICROMECHANICS MODEL FOR NONLINEAR VISCOELASTIC BEHAVIOR OF PARTICLE-REINFORCED RUBBER WITH DISTRIBUTED DAMAGE
R. A. Schapery Jan. 1986 51 p
(Contract N00014-83-K-0211)
(AD-A165728; MM-4867-86-1) Avail: NTIS HC A04/MF A01 CSCL 11/10

A mathematical model based on micromechanics for predicting effective viscoelastic stress-strain equations and microcrack growth in particle-reinforced rubber (or other relatively soft viscoelastic matrix) is described. Geometric idealization of the microstructure follows that of the composite spheres assemblage and generalized self-consistent scheme originally used for linear elastic composites without damage. The approach combines a perturbation analysis of the matrix, which becomes more accurate as the particle volume fraction is increased, with the Rayleigh-Ritz energy method for predicting mechanical response of the composite. Results for linear elastic and nonlinear viscoelastic behavior are discussed. It is shown that the elasticity theory may be easily extended to predict mechanical response of a viscoelastic composite, and that an approximate equation governing microcrack growth is analogous to one for an aging elastic material. Finally, a limited assessment of the theory is made through comparison with some existing effective modulus results and experimental data on a particle-filled rubber. Author (GRA)

N86-28199# Case Western Reserve Univ., Cleveland, Ohio.
STRESS CRACKING OF POLYETHYLENE IN ORGANIC LIQUIDS Final Report, 1 Sep. 1982 - 31 Dec. 1985
C. E. Rogers 24 Feb. 1986 6 p
(Contract DAAG29-82-K-0174)
(AD-A165733; ARO-19329.3-MS) Avail: NTIS HC A02/MF A01 CSCL 11/9

The following results have been obtained in a study of the stress cracking of polyethylene in organic liquids: Fracture mechanics is applicable to both high and low density polyethylene at low and intermediate stress intensity factors. Constant crack speed was found to increase with detergent concentration up to 25% Igepal C0-630. William's flow model was found to be inadequate to describe crack propagation. An aggressive environment, which has micellar solution structure, was found to be effective in cracking compared to the one having nonmicellar structure. GRA

N86-28200# Oklahoma State Univ., Stillwater.
MACROPOROUS POLYMER SUPPORTS FOR ORGANIC SYNTHESIS Final Report, 1 Sep. 1982 - 30 Nov. 1985
Warren T. Ford 28 Feb. 1986 9 p
(Contract DAAG29-82-K-0133)
(AD-A165749; ARO-19156.9-CH) Avail: NTIS HC A02/MF A01 CSCL 11/9

Highly cross-linked macroporous polystyrenes and microporous polystyrenes have been used as supports for Wittig reagents and for ester precursors to medium and large ring lactones and Beta-keto esters. Functionalization of the polymer with the bulky lithium dipehnylphosphide allows subsequent high yield Wittig reactions even with large aldehydes to form vitamin A derivatives and with large ketones such as a 3-keto steroid on a 20% cross-linked macroporous support. Reduced mobility of the polymer-supported reagent compared with a soluble analog enabled cyclization of 12-hydroxydodecanoic thiol ester in higher yield in the polymer than in solution at similarly high concentration. C-13 NMR spectral analysis was developed into a routine tool for analysis of insoluble polymer-supported reagents. The glass-to-gel transition temperatures of polymer-supported reagents were shown to be much lower than the temperatures at which useful syntheses are carried out. A new, safe, low-cost method for preparation of chloromethylated polystyrenes by phase transfer catalyzed chlorination of poly(p-methylstyrene) was discovered. GRA

N86-28201# Case Western Reserve Univ., Cleveland, Ohio.
THE EFFECTS OF MECHANICAL DEFORMATION ON SORPTION AND DIFFUSION IN POLYMERS Final Report, 1 Sep. 1982 - 31 Dec. 1985
C. E. Rogers 24 Feb. 1986 8 p
(Contract DAAG29-82-K-0172)
(AD-A165762; ARO-19240.2-MS) Avail: NTIS HC A02/MF A01 CSCL 11/9

This research was concerned with determination of the effects of static tensile and cyclic tensile (fatigue) mechanical deformations on the sorption, diffusion, and permeation of selected gases, vapors, and liquids in representative elastometers, glassy polymers, and semicrystalline polymers. The project also considered apparent effects of the sorbed and diffusing penetrant on polymer structure in so far as those effects lead to concurrent changes in sorption and transport behavior. The polymers chosen for this study were: blends of different modulus silicone rubber, synthetic natural rubber, biaxially oriented polystyrene, bisphenol-A-polycarbonate, polyethylene, polypropylene and polybutene-1. The penetrant gases, vapors, or liquids were: helium, nitrogen, argon, carbon dioxide, methanol, acetone, benzene, and dichloropentane. Not all penetrants were used with all polymer samples; the penetrant was selected for each experiment on the basis of the information desired. GRA

N86-28202# Northwestern Univ., Evanston, Ill. Dept. of Materials Science.
RESIDUAL STRESS MEASUREMENTS OF A PLASMA SPRAYED COATING SYSTEM USING SYNCHROTRON X-RAY RADIATION
P. Georgiopoulos, J. B. Cohen, and H. Herman Feb. 1986 11 p
(Contract N00014-80-C-0116)
(AD-A165785; AD-E900554; TR-23) Avail: NTIS HC A02/MF A01 CSCL 11/3

Residual stresses have been measured for the first time in the substrate below a plasma coating of ceramic. The effect of the heating by the coating during application was detected. GRA

N86-28203# Brookhaven National Lab., Upton, N. Y.
NEUTRON SCATTERING STUDIES OF MAGNETIC CORRELATIONS IN REENTRANT SPIN GLASSES
S. M. Shapiro, G. Aeppli (Bell Telephone Labs., Inc., Murray Hill, N. J.), H. Maletta (Kernforschungsanlage, Juelich, West Germany), and K. Motoya (Sala Magnetics, Inc., Cambridge, Mass.) 1985 27 p Presented at the Cliff Shull Ceremonial Conference, Cambridge, Mass., 24 Sep. 1985
(Contract DE-AC02-76CH-00016)
(DE86-005244; BNL-37352; CONF-8509185-2) Avail: NTIS HC A03/MF A01

We review neutron scattering measurements performed on

two disparate reentrant spin glass systems: the magnetic insulator Eu(sub x)Sr(sub 1-x)S and the metallic alloy Fe(sub 1-x)Al(sub x). We show that the magnetic behavior in the two is very similar and can be explained in terms of random field effects which arise when ferromagnetic and spin glass order parameters are coupled together. DOE

N86-28204# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.
MECHANISM OF MECHANICAL FATIGUE OF FUSED SILICA
Progress Report, Jul. 1 - 31 Dec. 1985
M. Tomozawa Jan. 1986 16 p
(Contract DE-FG02-85ER-45217)
(DE86-005503; DOE/ER-45217/1) Avail: NTIS HC A02/MF A01

The mechanical strength of glass is strongly influenced by crack geometry. In particular, the mechanism of mechanical fatigue of glasses is closely related to crack tip geometry and a different mechanism has to be invoked depending upon whether the crack tip is sharp or blunt; a sharp tip crack can simply propagate, but a blunt tip crack has to be sharpened before it can propagate. In order to investigate the possibility of a blunt crack tip, the following two experiments were conducted: (1) strengthening upon annealing of glasses with extended crack; and (2) kinetics of strength increase upon annealing in various atmospheres. From the results of these experiments, it was shown that the crack tip of glass becomes blunt upon annealing. The results suggest that the mechanical fatigue of some glasses involves crack initiation as well as crack growth. DOE

N86-28205# Lehigh Univ., Bethlehem, Pa.
ANALYTICAL ELECTRON MICROSCOPY STUDIES OF PRECIPITATION IN CERAMIC SYSTEMS
1986 57 p
(Contract DE-FG02-84ER-45150)
(DE86-005511; DOE/ER-45150/1) Avail: NTIS HC A04/MF A01

The purpose of the proposed research is to gain an understanding of precipitation and solid state phase transformations in ceramic systems with potential for improvement in properties through transformation toughening. AEM (analytical electron microscopy), CBED (convergent beam electron diffraction), and HREM (high resolution electron microscopy) are used as the major research techniques. During the next grant period it is proposed to continue investigation on the ZrO2-TiO2-MgO ternary system, and to perform research concerning interfacial structure and microchemistry in zirconia-based eutectic systems. In addition, work performed during the present research year (1985 to 1986) is described, including completed research on precipitation in the Y2O3-La2O3 system. DOE

N86-28206# Argonne National Lab., Ill.
MIXED ALKALI EFFECT IN SODIUM RUBIDIUM GERMANATE GLASSES
J. N. Mundy and G. L. Jin 1985 11 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract W-31-109-eng-38)
(DE86-005553; CONF-851217-34) Avail: NTIS HC A02/MF A01

The lack of general applicability of the many theoretical models for the mixed alkali effect (MAE) in glasses is briefly reviewed. Although the MAE appears to be related to the bonding affinity of alkali ions to charge compensating centers in the glass network, experimental scatter and the difficulty of comparing different glass networks have prevented systematic tests of this relationship. The present paper discussed why the mixed alkali germanate glasses should provide a glass system where the concentration and strength of charge-compensating centers can be systematically varied and the relationship to the MAE tested. Such tests are only possible if the ionic conductivity of a series of mixed alkali germanate glasses can be measured in a reproducible manner. The measurements of the ionic conductivity of two series of X(Na,Rb) O:(1-X)GeO glasses, with X = 0.19 and X = 0.29, respectively, suggest the necessary reproducibility can be attained. DOE

N86-28207# Stanford Linear Accelerator Center, Calif.
PROPERTIES OF THIN ANTI-MULTIPACTOR COATINGS FOR KLYSTRON WINDOWS
A. R. Nyaiesh, E. L. Garwin, F. K. King, and R. E. Kirby Aug. 1985 18 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC03-76SF-00515)
(DE86-005661; SLAC-PUB-3760; CONF-851174-28) Avail: NTIS HC A02/MF A01

Low secondary electron emission yield (1 to 1.3), low RF-loss films are of interest as coatings for alumina ceramic high power klystron windows. Air-oxidized Cr films offer an alternative to TiN. This work shows that they have the required resistivity for low RF-loss, combined with stability in the secondary electron emission (SEE) yield under bakeout and electron bombardment. SEE, AES, XPS, ELS, oxidation, bakeout and electron bombardment results are presented for Cr and TiN layers deposited by sputtering onto high density alumina substrates. The surface of TiN oxidized to a 9A thick TiO2 layer which, under bakeout to 550C in vacuum, thinned to 6A. This extreme layer-thinness resulted in a significant drop in the SEE yield which, unfortunately, was reversible upon re-oxidation. The oxidized layer on Cr was 17A of Cr2O3 which thinned to 13A upon bakeout. This thicker oxide layer produced a stable SEE yield which, although not as low as oxidized TiN, is sufficient to prevent electron multipactor. Windows covered by air-oxidized Cr films are at least as good, under tube processing conditions as the best TiN coated windows. DOE

N86-28208# Los Alamos National Lab., N. Mex.
LOAD-RATE CHARACTERISTICS OF CERTAIN POLYURETHANE FOAMS
E. G. Endebrock Nov. 1985 20 p
(Contract W-7405-eng-36)
(DE86-005863; LA-10567-MS) Avail: NTIS HC A02/MF A01

Three urethane foams were subjected to quasistatic and drop tests to evaluate their mechanical properties under various loading rates. The foam formulations, tests, and data reduction procedures are described and test results are presented and discussed. All of the foams are load-rate sensitive and have large energy absorbing capacities when loaded beyond their yield stresses. DOE

N86-28209# Sandia National Labs., Albuquerque, N. Mex.
TFTR LIMITER STUDY: COATING ADHESION TESTING AND GRAPHITE SURFACE PREPARATION
A. W. Mullendore and J. F. Smatana Nov. 1985 13 p
(Contract DE-AC04-76DP-00789)
(DE86-004186; SAND-85-1514) Avail: NTIS HC A02/MF A01

A pull-rod adhesion test was used to evaluate the bonding of chemical vapor deposited coatings of TiC and TiB on POCO AXF5Q graphite. The samples were from two different coating suppliers. They were tested in the as-deposited, 2000 C annealed and electron beam thermally cycled conditions. All of the substrates were ultrasonically cleaned before coating. All samples (except the tests where the pull-rod adhesive failed) exhibited fracture in the graphite substrate, while no coating/substrate separations were observed. Since proper substrate preparation appears to assure good bonding, a detailed study of an ultrasonic cleaning sequence was made, with characterization of the surface after each step. The quality of the preparation is clearly revealed by visual appearance, an adhesive tape stripping test, and by SEM micrographs of the surface. DOE

N86-28210# Societe Nationale Industrielle Aerospatiale, Paris (France).
CERAMIC-CERAMIC COMPOSITES
Hordonneau and Capdepuy 1986 8 p In FRENCH; ENGLISH summary Presented at 1st European Conf. on Composite Materiaux, Bordeaux, France, 24-27 Sep. 1985
(SNIAS-861-430-102; ESA-86-97164) Avail: NTIS HC A02/MF A01

Ceramic-ceramic composites were manufactured to verify theoretical conclusions and to confirm their potential interest in

the aerospace industry. The tested materials include silica matrix composites with short (SIC) or long fibers (SIC and Nextel). The matrix is obtained by successive drying-firing cycles of silica sol layers. Unidirectional alumina-alumina composites were used to test the effect of a reduced fiber-matrix adherence. The results confirm the interest in these materials and show the need to control the fiber-matrix interface and to increase the fiber's thermal stability. ESA

N86-28211# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
ELECTROACTIVE POLYMERS
Anders Wirsen Jan. 1986 80 p Partly in ENGLISH and SWEDISH
(FOA-C-20596-F9; ISSN-0347-3694; ESA-86-97036) Avail: NTIS HC A05/MF A01

Polymer electromagnetic interference (EMI) shielding, batteries for vehicles, and hydrophones are discussed. As filling material for EMI shielding polymers, iron and carbon are used. Polymeric batteries can be charged in a much shorter time than lead batteries. Documentation on EMI shielding, signature material, doping, organic electroconduction material, covalent conductive polymers, and piezoelectric polymers for hydrophone applications is given. ESA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-28212# Johns Hopkins Univ., Laurel, Md. Chemical Propulsion Information Agency.
THE 22ND JANNAF COMBUSTION MEETING, VOLUME 1
Debra Sue Eggleston, ed. Oct. 1985 561 p Meeting held in Pasadena, Calif., 7-10 Oct. 1985
(Contract N00024-85-C-5301)
(AD-A165503; CPIA-Publ-432-Vol-1) Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Several topics related to rocket and gun propellants, rocket motors and engines, and combustion processes are discussed. Metal combustion|steady state combustion, ignition and temperature sensitivity, combustion stability, ramjet combustion, supersonic combustion, and nitramine combustion are among the topics covered. For individual titles, see N86-28213 through N86-28258.

N86-28213# Atlantic Research Corp., Alexandria, Va.
EFFECTS OF OXIDIZER DEPLETION ON BORON CLOUD COMBUSTION TIME c25
Merrill K. King *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 1-11 (For primary document see N86-28212 19-28)
(Contract F49260-81-C-0035)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

An examination of the effects of oxidizer depletion on boron particle burn times in dust clouds has been carried out. A detailed boron combustion model allowing for finite-rate kinetics of surface reactions has been used to develop an expression for the burning rate of boron particles as a function of such parameters as pressure, particle size, temperature, and instantaneous concentration of oxidants in the gases around the particle. This expression has then been coupled with mass conservation equations for boron and the oxidants in the dust cloud, and the resulting set of differential equations describing the time rates of change of particle size and oxidant concentration has been integrated to particle burnout to determine the particle burn time for given initial particle size, pressure, and initial cloud oxidation index. As expected, combinations of large particle size and high pressure lead to curves duplicating those calculated using a diffusion-limited closed-form expression from the literature, while combinations of small size and low pressure result in curves duplicating those calculated using a kinetics-limited closed-form expression. Intermediate curves are presented for various pressure and initial particle sizes, and effects of these parameters on the location of these curves relative to the two limiting-case curves are discussed. Author

N86-28214# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
LASER-INDUCED FLUORESCENCE IMAGING OF SOLID PROPELLANT FLAMES c20
T. Edwards, D. P. Weaver, S. Hulsizer (Dayton Univ. Research Inst., Edwards AFB, Calif.), and D. H. Campbell *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 13-20 Previously announced in IAA as A86-19800 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The application of several systems to detect and analyze laser-induced fluorescence (LIF) in solid propellant flames is described. Propellant flames are a difficult diagnostic environment for LIF because of the large amount of light scattered from particulates in the flame. This scattering must be separated from the fluorescence to obtain meaningful results, a separation that is best accomplished with a multiple stage spectrometer. The influence on fluorescent intensity of propellant type, pressure, and position in the flame have been studied, with the increasing optical density of the propellant flame with increasing pressure looming as one of the major difficulties with high pressure propellant diagnostics. 2-D imaging of the fluorescence is difficult because the filtering necessary to separate the fluorescence from the scattered light destroys the two-dimensional nature of the flame image. Author

N86-28215# Dayton Univ., Ohio. UDRI Fluid Mechanics.
OPTICAL CONSIDERATIONS IN OBTAINING A STATISTICAL DATA BASE ON PROPELLANT DEFLAGRATION c20
R. J. Becker and J. L. Laird *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 21-28 (For primary document see N86-28212 19-28)
(Contract F04611-83-K-0023)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The utility of copper-vapor laser illumination for high-resolution, high-speed cinephotography of solid-propellant deflagration was demonstrated. Movies can be made with a ratio of the field dimension to the smallest resolvable size of greater than 300. These movies are unimpaired by flame brightness, motion blur, or laser speckle. At pressures below 250 psi, particles appear in a size range (50 to 200 microns) that does not occur in the original formulation. The performance of the experiment is critically dependent on the combined Modulation Transfer Function of the camera lens and film. Since the depth-of-field and resolution are coupled, high resolution exacts a penalty of a severely limited depth-of-field. The use of white-light illumination has placed severe constraints on the depth-of-field and field-of-view that can be obtained from such films at high resolution. The use of an intense pulsed laser for illumination relaxes these constraints. Consequently, it is now possible to survey an entire strand surface in detail. In this manner, meaningful statistical information can be obtained about particular behavior in the flame. In particular, analyses of interactions between particles and cooperative behavior, if any, can be made. Author

N86-28216*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EROSIVE BURNING RESEARCH c25
L. Strand, L. Yang, R. Ray, and J. Barry *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 29-40 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The preliminary results are presented for the completed tests in a series of motor firings being carried out to measure the transition length threshold conditions (axial position at which deviation from non-erosive burning rate begins) while attempting

to systematically vary the parameters that are considered to control the phenomenon. The erosive-burning predictions determined from a supporting ballistics analysis are also presented. Author

N86-28217# Georgia Inst. of Tech., Atlanta.
FURTHER RESULTS ON THE COMBUSTION BEHAVIOR OF AP/POLYMER SANDWICHES WITH ADDITIVES
E. W. Price, J. K. Sambamurthi, and R. K. Sigman *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 41-54 Sponsored in part by Office of Naval Research and Air Force Office of Scientific Research (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Results are reported on the combustion behavior of AP-PBAN binder sandwiches in which various additives are included in the binder lamina. A screening study reports results with 10% additive in 50 m thick binder lamina tested at 3.5 MPa (500 psi). Fe_2O_3 was chosen for more detailed study using a range of thicknesses of binder lamina, additive loading and test pressure. The screening study included both burning rate enhancers and burning rate depressants. In the case of Fe_2O_3, the combined results indicate that concentration of the catalyst on the binder surface leads to near-surface breakdown of heavy fuel molecules, which leads to closer approach to the O-F flame to the surface and corresponding increase in burning rate. The results indicate that condensed phase or surface reactions of the AP are not catalyzed and that condensed phase AP-binder interaction is not catalyzed. However, closer proximity of the O-F flame does increase the AP self deflagration rate, thereby increasing sample buring rate. Copper chromite seems to act in the same manner as Fe_2O_3. The other additives appear to act in a variety of ways, which need further study to clarify. Surface concentration on the binder laminae was conspicuous with Fe_2O_3 copper chromite, and iron blue (catalysts), and with aluminum hydroxide (suppressant). Surface concentration was minimal with copper oxide (catalyst) and antimony oxide (suppressant). Author

N86-28218# Army Armament Munitions and Chemical Command, Dover, N.J.
SINGLE-SHOT H2 CARS SPECTROMETRY OF PROPELLANT IGNITION AND COMBUSTION, UNDER PRESSURE c25
T. E. Haw (Geo-Centers, Inc., Newton, Mass.), S. Darrah, and L. E. Harris *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 55-64 (For primary document see N86-28212 19-28)
(Contracts DAAK10-81-C-0265; DAAA21-85-C-0139)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A single-shot H2 coherent anti-stokes Raman spectroscopy (CARS) spectrometer has been developed and experimental considerations for accurate thermometry examined. The spectrometer is capable of synchronization with external events such as laser-initiated propellant ignition or ballistic compression, given an inherent delay time of 250 microseconds and a predetermined diagnostic time window approaching 1 second. Additional capability to operate in a double Q-switched mode (two diagnostic probes 60 to 90 microseconds apart) has been demonstrated, with inherent delay time of 190 microseconds. Application to static samples of H2 and to H2/O2 flame reveal unreferenced errors approaching 10% or more in temperature determination, and indicate the necessity for simultaneous standardization in accurate thermometry. Concentration determination in an unreferenced fashion reveals errors of 30%, with contributions from YAG and dye laser intensity and phase fluctuations. Q-branch lines from the first vibrational state of hydrogen have been observed for the first time in the H2/O2 flame using this apparatus. These observations have been incorporated into more accurate spectroscopic constants for use in computer modeling, and concur with ab initio results and recent spectral determination in hydrogen discharge. A parallel reference system has been implemented in the apparatus, and performance evaluation begun in single-pulse extraction experiments with the laser running at 10 Hz. Author

N86-28219# Morton Thiokol, Brigham City, Utah.
ROCKET PROPELLANT IGNITION: A WORKSHOP REPORT c25
M. Salita *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 65-86 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

An all-day workshop on rocket propellant ignition was held October 2, 1984 at the 21st JANNAF Combustion Meeting, with thirty-one attendees representing numerous government facilities, industrial corporations, and universities. The morning session consisted of prepared viewgraph presentations, while the afternoon consisted of discussion and an attempt to develop a consensus about the required elements of ignition modeling. The main goal of the workshop was to aid modelers in choosing the best techniques for motor ignition prediction. Although general modeling criteria were established by consensus, time was insufficient to identify optimum specific models. The purpose is to document the consensus criteria, and to summarize the many useful overviews of ignition modeling presented by the experts in the field. Author

N86-28220# Atlantic Research Corp., Gainesville, Va. Ignition Tech. Internal Research and Development.
A ROCKET MOTOR IGNITION MODEL UTILIZING IGNITION DELAY VERSUS PRESSURIZATION RATE DATA c25
J. E. Wills *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 87-96 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A lumped-parameter, dual-chamber rocket motor ignition model used to predict the ignition transient of end burners, space motors, or low port length to port diameter ratio (L/D) motor configurations is presented. The analysis models the ignition transient in a pyrogen type igniter and motor combustion chamber independently using the isentropic nozzle flow equations to couple the two solutions. The model is also applicable to bag type igniters by setting the igniter pressure and temperature equal to the combustion chamber pressure and temperature. The computer solution continuously monitors ignition delay versus pressurization rate data obtained from actual rocket motor firings to determine the point of motor ignition based on the calculated average pressurization rate. The model correctly predicts the chamber pressurization rate and, thus, the motor ignition delay given thermochemistry, geometry, and burning rate data for the igniter charge and rocket motor grain. Author

N86-28221# Cohen (Norman S.) Professional Services, Inc., Redlands, Calif.
ANALYTICAL MODELS OF COMBUSTION RESPONSE FUNCTIONS c25
Norman S. Cohen *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 97-102 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The objective was to relate analytical models of combustion response functions to available information about the combustion process of composite solid propellants. It has been acknowledged that ignorance about the combustion response to pressure and flow perturbations is the most limiting aspect of efforts to deal with solid rocket motor combustion instability. Analytical models have been developed to calculate combustion response, but they have proven to be deficient in a number of respects. It was considered that information about the structure of the combustion zone has become available which are not embraced by the current models, and there is concern about continued model developments which do not account for them. There needs to be more interchange and coordination between the modeling work and the generation of phenomenological information in order to identify the limitations of the models and the most important direction for future efforts. Author

N86-28222# Georgia Inst. of Tech., Atlanta.
NONLINEAR COMBUSTION INSTABILITY c25

G. A. Flandro *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 103-112 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The Nonlinear Combustion Instability Workshop was held in conjunction with the 21st JANNAF Combustion Meeting at the Johns Hopkins Applied Physics Laboratory from 30 September to 1 October 1984. The areas of discussion were selected from a list of issues left unresolved by the 1974 Nonlinear Instability Workshop. The discussions covered: (1) nonlinear behavior from the perspective of recent experimental programs and motor development experience, (2) basic nomenclature and definitions pertaining to nonlinear phenomena, (3) status of analytical models and their limits of applicability, and (4) current understanding of the physical mechanisms of nonlinear instability. Author

N86-28223# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
DRIVING OF AXIAL OSCILLATIONS BY SIMULATED SOLID PROPELLANT FLAMES c20
S. V. Sankar, J. I. Jagoda, B. R. Daniel, and B. T. Zinn *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 113-121 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0082-84)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

An experimental setup has been developed to simulate oscillatory solid propellant flames. High speed Schlieren/shadowgraph cine photography capabilities have been developed and used to study the experimental flames under different oscillatory flow conditions. These showed that away from a pressure minimum the flat flame oscillates undistorted relative to the side wall surface while at a pressure minimum the flame is distorted by flamelets which form near its center and grow as they are convected along its surface. Also, capabilities for measuring C-H and C-C radiation from the oscillatory flame have been developed and used. The phase differences between radiation and pressure oscillations have been determined and are reported. These phase differences are such that Rayleigh's criterion for driving acoustic waves is satisfied in regions away from acoustic pressure minima. Author

N86-28224# Brigham Young Univ., Provo, Utah. Dept. of Chemical Engineering.
A NUMERICAL MODEL FOR THE RIJKE BURNER c25
R. L. Raun and M. W. Beckstead *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 123-131 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0157-83)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Combustion instability often adversely effects the performance of solid propellant rocket motors. Various particulate suppressants have been added to rocket propellants to damp acoustic oscillations, but results are unpredictable and often unsatisfactory. A basic theory of how particulate suppressants function needs to be developed. The effects of particle combustion on acoustic oscillations have been studied by Braithewaite, et. al. in a Rijke burner. Past mathematical models for the Rijke tube did not consider heat loss or particle effects, both important in the Rijke burner. As a result, past Rijke tube models are inadequate for modelling the Rijke burner. A new numerical model for the Rijke burner has been developed to account for the effects of varying temperature (heat loss) and particles. The objective of this model is prediction of characteristic frequencies and growth rates for oscillations in a Rijke burner. The model has been compared to several analytical test cases and gives good results, typically within 1% for frequency and 6% for growth rate. Past flame response models of Bailey and Merk have been tested with the model and are found to fit experimental data reasonably well (within 7% for frequency and 25% for growth rate) when heat loss is taken into account. A modification of Bailey's model which includes a time lag can be used to fit experimental data exactly. Preliminary results with particle combustion indicate qualitative agreement with experiment and that more work is required to obtain quantitative agreement. Author

N86-28225# Naval Weapons Center, China Lake, Calif.
ANALYSIS OF LONGITUDINAL CHAMBER PRESSURE OSCILLATIONS IN SHUTTLE SRB'S DURING FLIGHT c20
H. B. Mathes and C. J. Bicker *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 133-138 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Magnetic tapes containing digitized chamber pressure data from four Space Shuttle Solid Rocket Booster Motors (SRB's) were received from Shuttle flights STS-9, -11, and -41D. Analysis of the flight data indicates presence of mild longitudinal chamber pressure oscillations similar to those found in static tests of SRB's. Details of data from flight motors are presented and a comparison of amplitudes between flight motors and statistically tested motors is made. With one exception, chamber pressure amplitudes in flight motors are lower than those found in statistically tested motors. Author

N86-28226# Georgia Inst. of Tech., Atlanta.
ENERGY BALANCE ANALYSIS OF VORTEX DRIVEN OSCILLATIONS c20
G. A. Flandro *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 139-149 (For primary document see N86-28212 19-28)
(Contract F04611-83-C-0003)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Several mechanisms by which hydrodynamic instability of sheared regions of flow in a rocket chamber drive acoustical oscillations are integrated in this analysis into a comprehensive model of the vortex shedding phenomenon. The energy method is utilized to enable extension of the linear theory evaluated herein to finite amplitude problems in which nonlinear effects are likely to be dominant. A detailed model of the feedback effect which links the acoustical and vortical fields in the vicinity of the shear layer origin is presented. This is a vital element in the modeling since it provides the phasing and also the strength of the vortical waves relative to the superposed acoustic field. The most important mechanism involved in the transfer of vortical energy into the acoustic field is shown to be the interaction of the vortices with a solid surface of impingement at a suitable distance and location downstream from the shear layer origin. The energy transfer in this case is equivalent to a dipole sound source; a far more efficient mechanism than the volume quadrapole effects that have previously been evaluated. Two useful motor design tools emerge. The first is a simple rule by which designers can make the changes in internal ballistics necessary to eliminate or reduce vortex driven oscillations. The second is a growth rate model that allows a quantitative assessment of vortical interactions which is compatible with the standard stability assessment procedures in wide-spread use. Author

N86-28227# United Technologies Corp., San Jose, Calif.
COUPLING BETWEEN VELOCITY OSCILLATIONS AND SOLID PROPELLANT COMBUSTION c25
R. S. Brown, A. M. Blackner, P. G. Willoughby, and R. Dunlap *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 151-160 Previously announced in IAA as A86-19933 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Cold flow studies are being conducted to define and characterize the basic flow field and heat transfer mechanisms controlling the coupling between the acoustic velocity and the solid propellant combustion zone. This coupling produces a substantial effect on the overall acoustic energy balance in the combustion chamber, yet significant deficiencies exist in the current basic knowledge regarding this coupling. Previously reported measurements of the oscillatory heat transfer have demonstrated that the current heuristic for velocity coupling, which is incorporated in the Standard Stability Prediction Program, has series deficiencies. These data also suggest the acoustic velocity behaves much

differently than the classical longitudinal acoustic waves assumed in the model. Therefore, current studies are focusing on measuring the characteristics of the acoustic environment in more detail. Split film anemometer measurements have been made to determine the acoustic velocity vector under several flow and acoustic conditions. The results show that regions of highly oscillatory rotational flows are generated near the wall and are responsible for the large variations in the magnitude of the acoustic velocity with radius. Modifications to the multidimensional combustion stability analysis have been derived to account for these vorticity contributions. Author

N86-28228# California Inst. of Tech., Pasadena.
COUPLED VORTEX SHEDDING AND ACOUSTIC RESONANCES IN A DUCT c71
K. M. Aaron and F. E. C. Culick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting Oct. 1985 p 161-171 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0286-84)
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Undesirable sound generation in the combustion chambers of solid propellant rocket motors previously has been attributed to vortex shedding from obstructions that are uncovered as the propellant burns back. An experimental investigation of the phenomenon has re-confirmed this observation and extended the understanding of the mechanism by which the process is self-sustaining. A pair of aluminum baffles within a lucite duct through which air is drawn models the important aspects which enable the sound generation mechanism to operate. The baffles form an edgetone system which interacts with longitudinal acoustic modes of the chamber. Pure acoustic tones occur spontaneously, at frequencies equal to the acoustic resonances, when the spacing between the baffles satisfies certain criteria. Flow visualization using smoke and a strobe light triggered by the pressure oscillation indicates that vortex shedding occurs at the upstream baffle in phase with the acoustic velocity oscillation there. Based on the results of the present experiments and others reported in the literature, a mechanism is postulated which explains the observed behavior. It is suggested that pressures induced on the downstream baffle by the vortices convected past by the freestream drive the acoustic resonance. In turn, the acoustic velocity at the upstream baffle serves as the perturbation triggering the formation of vortices in the shear layer growing from the separation point at that location. Author

N86-28229# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ANALYSIS OF HAN-BASED LIQUID MONOPROPELLANTS BY TITRATION
Madelyn M. Decker and Eli Freedman *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 173-176 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Stability studies of liquid monopropellants require analytical methods to determine the purity of each component and the composition of the whole mixture after formulation. The composition of hydroxylammonium nitrate (HAN)-based monopropellants can be determined by acid-base titrations, using either visual or potentiometric methods for the end-point determination. Titrations of mixtures of HAN and triethanolammonium nitrate (TEAN) with alcoholic potassium hydroxide or tetrabutylammonium hydroxide are feasible. This method may also be used to determine the purity of HAN. Analysis of HAN in the presence of TEAN is also possible by oxidation-reduction titration. However, the environment must be carefully controlled to ensure that the desired redox reaction is the only one occurring. Data on permanganate titrations are presented. Both methods are compared and other titrants and oxidation-reduction reactions considered. Author

N86-28230# Ballistic Research Labs., Aberdeen Proving Ground, Md.
TRANSITION METAL REACTIONS IN HAN-BASED MONOPROPELLANTS
Madelyn M. Decker, Eli Freedman, J. Richard Ward (Army Armament, Munitions and Chemical Command, Aberdeen Proving Ground, Md.), Pascal A. Tarantino, and Paul M. Davis *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 177-184 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Tests have shown that the stability of Hydroxylammonium Nitrate (HAN) based liquid monopropellants is adversely affected by the presence of transition metal ions. Atomic absorption spectroscopy, UV/visible spectroscopy and polarography are used to detect trace quantities of these metals in hydroxylammonium nitrate. Compatability studies involving HAN and selected transition metals are monitored by atomic absorption spectroscopy. Data are presented on the removal of copper and iron from concentrated hydroxylammonium nitrate solutions. Complexing agents cupferron, EDTA, DCTA, 2,2'-dipyridyl and tributylphosphate were evaluated and the effectiveness of ion exchange and adsorption resins was investigated. The stability of the iron complex formed with 2,2'depyridyl in HAN was examined. Author

N86-28231# Princeton Combustion Research Labs., Inc., Monmouth Junction, N.J.
THERMAL DECOMPOSITION STUDIES OF HAN-BASED LIQUID MONOPROPELLANTS
Neale A. Messina and Nathan Klein (Ballistic Research Labs., Aberdeen Proving Ground, Md.) *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 185-192 (For primary document see N86-28212 19-28)
(Contract DAAD05-84-M-Q118)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Thermal initiation and combustion experiments were conducted on the liquid gun propellant LGP 1845 to determine the effects, if any, of various additives. Ions of the transition metals, iron and copper, known to adversely affect storage stability of the propellant, have no effect on either reaction initiation or on gas evolution. The copper complexing agent, cupferron, in moderate concentration (approx. less than 3000 ppm) has no effect on propellant performance other than to form a pale, yellow-orange precipitate. The complexing agent 2,2'-bipyridine (dipy) tends to raise reaction initiation temperature without adversely affecting gas evolution rates, a desirable feature. Since dipy also disrupts the ability of Fe 3 to catalyze propellant decomposition, it should seriously be considered as an additive that improves propellant properties. Finally, the effect of carbon monoxide on LGP 1845 initiation and combustion was studied. The effects observed will aid in development of a more complete reaction mechanism for this material. Author

N86-28232# Ballistic Research Labs., Aberdeen Proving Ground, Md.
MECHANISM OF THE PLASMA IGNITION PROCESS IN LIQUID PROPELLANTS
Nathan Klein, F. B. Carleton (Imperial Coll. of Science and Technology, London, England), G. Cheriyan, and F. J. Weinberg *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 201-207 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

In the course of investigating the ignition of liquid propellants by electrically initiated plasma discharges, it became clear that a number of complex and important processes were taking place within the reaction chamber, commonly called a plasma plug. The development of transparent plugs that permit optical access to the reaction chamber is described. The optical and electronic systems for high speed cine schlieren, shadow, and direct photography of events taking place within the cavity are also described. Observations are presented and briefly discussed that demonstrate the power and versatility of the equipment developed. Author

N86-28233# Applied Combustion Technology, Inc., Orlando, Fla.
ANALYSIS OF TWO-PHASE IGNITER FLOW THROUGH A GRANULAR BED c25
A. Michael Varney, John Martino, Saeed Ghandeharioun, Bryan Steury, and Charles Irish (Naval Ordnance Station, Indian Head, Md.) *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 209-221 (For primary document see N86-28212 19-28)
(Contract N00174-83-C-0254)
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A model to characterize a pyrotechnic igniter stream flowing through a stationary packed bed of inert propellant simulant has been developed. Unsteady grain heating resulting from a convectively driven igniter stream is predicted, including the effects of vapor phase condensation and condensed phase depletion from the primary stream. Using an assumed ignition threshold criterion of an integrated energy deposition of 5 J/cm2, the model was shown to provide predictions which are in good agreement with experimental ignition effectiveness data. Theoretical results for BP, BKNO3, and MTV are presented and compared with experimental data. Author

N86-28234# Army Research and Development Command, Dover, N.J.
A STUDY OF DIFFUSION IN PROPELLANT GASES USING MOLECULAR DYNAMICS c20
T. Vladimiroff *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 257-262 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Sophisticated models of interior ballistics and combustion must take into account the transport properties of propellant gases. In diffusion controlled flames it is the rate of diffusion which regulates the combustion process. For interior ballistics calculations, the viscosity of the propellant gases influences the flow properties in the gun barrel. Thermal conductivity determines the heat flow to the barrel and the amount of heat conducted back to the propellant surface. Since experimental methods of measuring transport properties are difficult to perform at gun temperature and pressures, molecular dynamics was investigated as a means of calculating diffusion coefficients for propellant gases. Molecular dynamics assumes that the motion of propellant gas molecules is governed by the laws of classical mechanics. A Lennard-Jones potential is used to describe the forces between molecules. Newton's equations of motion are solved using a predictor-corrector type of algorithm for 256 particles in conjunction with a periodic boundary condition. The basic computation method is the same as in previous work; only the computer program has been modified to keep track of the distance each particle diffuses as a function of time. Diffusion coefficients for nitrogen gas are reported at temperatures of 1000 K, 2000 K and 3000 K and a density range of 0.1 to 0.9 g/cubic centimeters. Author

N86-28235# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
OBSERVATIONS OF THE COMBUSTION AND FRACTURE PHENOMENA OF SINGLE UNSLOTTED STICK PROPELLANTS
M. M. Athavale, K. C. Hsieh, W. H. Hsieh, J. M. Char, and K. K. Kuo *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 263-278 (For primary document see N86-28212 19-28)
(Contract DAAG29-83-K-0081)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Single-perforated long-stick propellants have been used in large-caliber gun systems. Flame spreading and combustion inside the perforation of a stick propellant involve many complicated processes. Pressure differential across the web causes grain deformation, which further interacts with the fluid dynamic processes inside the perforation. The propellant grain may rupture at some stage during flame spreading and combustion. It is important to determine the effect of pressurization rate, initial temperature, grain geometry, and pressure outside the slick propellant on grain fracture. In this research, theoretical analysis was performed using a coupled finite-difference and finite-element code which solves: (1) one dimensional transient flow of the gas phase, (2) transient flame spreading over the propellant surface, and (3) dynamic deformation of the axisymmetric propellant grain. Experimental investigations were conducted using a windowed test chamber. A single stick propellant was mounted in the test chamber, and the internal perforation was rapidly pressurized using either compressed nitrogen gas or combustion product gases from a driving motor. Test results indicate that the critical pressure differential for grain rupture increases monotonically with the internal pressurization rate, and under extremely rapid pressurization (approx. -70,000 MPa/sec or 10.15 x 1 million psi/sec), it could be substantially higher than that for the steady-state conditions. Recovered propellant samples showed that at low pressurization rates, longitudinal slits were formed, while at rapid pressurization (>35 MPa/sec or 5.08 x 1,000 psi/sec), the grains shattered into many small pieces. This implies that at high pressurization rates, propellant mass burning rate and chamber pressure could be affected substantially by grain fracture. Author

N86-28236# University of Southern California, Los Angeles.
A NOVEL FEEDBACK CONCEPT FOR COMBUSTION INSTABILITY IN RAMJETS c25
P. Roy Choudhury, Melvin Gerstein, and Reza Mojaradi *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 279-287 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0222-82)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Many dump combustors exhibit low frequency longitudinal combustion instability in the frequency range of 80 to 300 Hz. Although the exact causes of combustion instability are not known precisely, it is generally accepted that the interaction of the shock induced pressure pulsation and the coherent vortex shedding at the dump plane induces combustion instability. When the coherence of the shear layer at the dump plane is disrupted either by gasjets or by upstream protrusions the effect of combustion instability is found to be minimized. The control system suggested here is based upon the idea of disrupting the shear layer at the dump plane by means of pulsing gasjets. The control system senses the critical combination of frequency, amplitude and phase angle upstream of the combustor and actuates the gasjets at the dump plane at an appropriate combination of frequency, amplitude and phase angle to partially negate the effect of upstream pressure pulsation. Experiments in two laboratory scale two-dimensional (6.4 cm x 3.8 cm and 7.6 cm x 2.54 cm) dump combustors using premixed propane-air mixtures show the feasibility of reducing chamber pressure amplitude by such a technique. Author

N86-28237# San Diego State Univ., Calif. Dept. of Aerospace Engineering.
THE FLOWFIELD OF A SIDE-DUMP COMBUSTOR c34
Nagy Nosseir and Shabtay Behar *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 289-294 (For primary document see N86-28212 19-28)
(Contract N0014-84-K-0373)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Flow visualization is used to study the characteristics of the flowfield of a side-dump combustor. A two-dimensional combustor simulator, with water as the working fluid, is used in this experiment. In this configuration, two jets are introduced into the combustor through rectangular ports in the combustor's sides. The two jets impinge on each other at the plane of symmetry of the combustor. Counter-rotating vortex-pairs are generated near this plane. The axes of the vortices are parallel to the plane of symmetry of the combustor. The strength of the vortices changes periodically as they stretch along the downstream direction. The effects of changing the combustor dimensions on the generation of these vortices are investigated. Author

N86-28238*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CARS SYSTEM FOR SIMULTANEOUS MEASUREMENT OF TEMPERATURE, NITROGEN AND OXYGEN DENSITIES IN A TURBULENT FLAME c25

Olin Jarrett, Jr., Richard R. Antcliff (Systems Research Labs., Inc., Dayton, Ohio), and R. Clayton Rogers *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 295-306 (For primary document see N86-28212 19-28)

Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Simultaneous nitrogen number density, oxygen number density, and nitrogen rotational-vibrational temperature (static temperature) were measured in a flame with a Coherent Anti-Stokes Raman Scattering (CARS) instrument. The fuel jet of the subsonic coaxial diffusion burner was diluted with nitrogen (20 percent by volume) to allow temperature measurements to be made across the entire jet mixing region. The CARS system incorporated a Neodymium YAG laser, an intensified silicon photodiode array detector for nitrogen temperature and density measurements and a photomultiplier-digitizer combination for oxygen density measurements. Unequal beamsplitting was used to enhance the dynamic range of the detectors. Calculations based on a parabolized Navier-Stokes computer code were compared to the CARS measurements to assess CFD model validity. Author

N86-28239# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.

FLAME DRIVING OF LONGITUDINAL INSTABILITIES IN DUMP TYPE RAMJET COMBUSTORS c20

U. G. Hedge, D. Reuter, B. R. Daniel, and B. T. Zinn *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 307-316 Previously announced in IAA as A86-19839 (For primary document see N86-28212 19-28)

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Coaxial, dump type ramjet combustors are often prone to combustion instability problems that can seriously affect their performance. Low frequency instabilities which represent one of the most common types of instabilities encountered are discussed. In particular, the coupling between cone-like flames often encountered in dump type combustors and longitudinal acoustic fields is studied. A variety of experimental techniques, including high speed Schlieren and shadow photography, CH radiation emission and acoustic pressure measurements are used. A strong coupling between the flame response and certain acoustic natural frequencies of the experimental set up is observed. These observations shed new light on flame/acoustic mode interactions in a ramjet combustor-like environment and the limitations of current state of the art theoretical models of this phenomenon. Author

N86-28240# California Inst. of Tech., Pasadena.

NONLINEAR ANALYSIS OF PRESSURE OSCILLATIONS IN RAMJET ENGINES c20

Vigor Yang and Fred E. C. Culick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 317-329 (For primary document see N86-28212 19-28)

(Contract N00014-84-K-0434)

Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Pressure oscillations in ramjet engines have been studied using an approximate method which treats the flow fields in the inlet and the combustor separately. The acoustic fields in the combustor are expressed as syntheses of coupled nonlinear oscillators corresponding to the acoustic modes of the chamber. The influences of the inlet flow appear in the admittance function at the inlet/combustor interface, providing the necessary boundary condition for calculation of the combustor flow. A general framework dealing with nonlinear multi-degree-of-freedom system has also been constructed to study the time evolution of each mode. Both linear and nonlinear stabilities are treated. The results obtained serve as a basis for investigating the existence and stabilites of limit cycles for acoustic modes. As a specific example, the analysis is applied to a problem of nonlinear transverse oscillations in ramjet engines. Author

N86-28241# Flow Research, Inc., Kent, Wash.

LARGE EDDY SIMULATIONS OF FLOW IN A RAMJET COMBUSTOR c20

Wen-Huei Jou and Suresh Menon *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 331-339 (For primary document see N86-28212 19-28)

(Contract N00014-84-C-0359)

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Cold flow simulations are performed for the flow inside a ramjet combustor with dump. The objective is to develop a numerical simulation code that can be used to study the complex interaction between acoustic waves and large vortex structures in such a device. The compressible Navier-Stokes equations are solved using a MacCormack semi-implicit scheme. Beginning with a flow at rest, the flow seems to reach a state of stationary variation ten longitudinal acoustic cycles after the exit pressure is lowered to a prescribed value. Vorticity contour plots reveal that the shear layer behind the backward-facing step rolls up into large vortices. These vortices go through two pairings before being convected into the wall layer. The frequency of the vortex after the second pairing is near the range of the jet preferred mode. The unsteady component of the dilation field is chosen as a quantity that characterizes the acoustic component of the motion. Contour plots of the dilation field show that it is dominated by the quadrupole sources associated with rolled up vortices. The long-wavelength standing waves cannot be detected using this method. Examination of the two-point, two-time correlation of the pressure variations at several points in the flow field gives evidence that the long-wavelength acoustic waves close to the jet preferred mode frequency have been excited. Author

N86-28242# Naval Research Lab., Washington, D. C. Lab. for Computational Physics.

ACOUSTIC-VORTEX INTERACTIONS IN AN IDEALIZED RAMJET COMBUSTOR c20

K. Kailasanath, J. Gardner, J. Boris, and E. Oran *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 341-350 (For primary document see N86-28212 19-28)

Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Results are presented of numerical simulations performed to isolate and study the interaction between acoustic waves and large scale coherent vortex structures in an idealized ramjet combustor. A strong coupling between the acoustic modes of the chamber and large scale vortical structures is observed. The results in the early part of the calculations are indicative of an unforced natural vortex growth at a frequency close to the acoustic frequency. With time, the acoustic modes shift the frequency of the most amplified mode into resonance with the acoustic mode. The location in space where the modes grow can also be shifted by acoustic forcing. An interesting new feature that is observed is a low frequency mode corresponding to the passage of the vortex structures through the choked exit. This results in a major alteration of the merging pattern of the vortices. Author

N86-28243# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.

FLOW VISUALIZATION STUDIES OF A SOLID FUEL RAMJET COMBUSTOR USING A NEW MATERIAL-POLYAPHRONS c20

J. A. Schetz, F. Sebba, and R. H. Thomas *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 351-359 (For primary document see N86-28212 19-28)

(Contract F33615-84-C-2468)

Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A new material for water flow visualization of combustor models was developed. They are small globules of one liquid encapsulated in a thin film of another liquid and are called polyaphrons. Their size, shape, color and density can all be adjusted. Several useful formulations were developed. One of the best of these was used with success in a series of tests with a Solid Fuel Ramjet Combustor mode. This is an axial flow highly confined dump combustor. The vaned swirler has flat blades set at 35 deg producing a swirl number of 0.47. The burning of the SFRJ was simulated in three stages. A 3.5 in. diameter combustor simulated the beginning of a

burn. Remarkably, a strong recirculation region was preduced under these highly confined low swirling conditions. Next, injection was added through the wall of the 3.5 in. can to simulate gaseous products of the solid fuel combustion. This strengthened somewhat the recirculation but produced a tighter vortex downstream. Temperature measurements across the exit plane gave an indication that mixing between the main and injected flows was poor. Finally, a 5.0 in. can simulated the SFRJ at the end of the burn. The greater expansion of this configuration produced a larger central recirculation zone and a peripheral zone also. Author

N86-28244# Atlantic Research Corp., Alexandria, Va.
PREDICTION OF BORON DUST CLOUD FLAME SPEEDS c20
Merrill K. King *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 361-376 (For primary document see N86-28212 19-28)
(Contract F49260-81-C-0035)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A detailed model of flame propagation in boron dust clouds including oxygen, water gas, and carbon dioxide as oxidizers has been developed. Included in this model are a detailed submodel of the ignition of boron particles involving removal of an inhibiting boric oxide coating from the particles (with competitive exothermic oxide deposition processes and endothermic removal processes occurring simultaneously) and a burning rate correlation for clean-particle combustion of the particles (subsequent to removal of the oxide coating) based on a detailed particle combustion model which includes the effects of finite-rate surface reaction kinetics. Reasonably good agreement between predictions of the model and measured flame speed has been obtained although uncertainties regarding details of the experimental work (particularly as regards radiative characteristics of the products, to which predicted flame speeds are sensitive) render this agreement somewhat inconclusive. The model has been used to examine the dependency of predicted flame speed on initial cloud temperature, initial oxygen, carbon dioxide, and water gas levels, pressure, weight fraction particles, initial particle size, initial oxide coating percentage, emissivity for radiative feedback from the post-flame zone, and Nusselt Number for transport processes between particles and surrounding gas. Author

N86-28245# University of Southern California, Los Angeles.
THE USE OF ADDITIVES TO PROMOTE THE ATOMIZATION AND COMBUSTION OF SLURRY FUELS
Melvin Gerstein and P. Roy Choudhury *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 377-382 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The evaporation and combustion of slurry fuels is inhibited by the fact that the volatile carrier evaporates leaving a large agglomerate of solid particles which burn very slowly or not at all. Previous work by the authors has shown that time controlled explosion of additives in liquid sprays can be achieved. This concept is applied to the shattering of liquid drops including those containing slurries of boron and carbon particles. Experiments are reported using benzoyl peroxide and carbamide peroxide along with theoretical calculations using these additives. The time between the ignition of the drop and the onset of disruptive burning or shattering was measured and compared with theory. Good agreement was obtained using benzoyl peroxide in cumene which was chosen to illustrate the technique. It was also shown that slurry fuels could be shattered and, in particular, that boron slurries could be shattered and that the typical green flame of burning boron could be observed. Author

N86-28246# Pennsylvania State Univ., University Park. Dept. of Mechanical Engineering.
IGNITION AND COMBUSTION OF ALUMINUM AND ALUMINUM/CARBON SLURRY DROPLETS c25
S. R. Turns and S.-C. Wong *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 383-398 (For primary document see N86-28212 19-28)
(Contract F33615-84-C-2410)
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The ignition and combustion of aluminum and aluminum/carbon slurry fuel droplets were studied in the post-flame region of a flat-flame burner. Individual droplets having initial diameters ranging from 500 to 1100 microns were supported on silicon carbide filaments and rapidly exposed to the hot gas environment. Burner operating conditions were varied to provide oxygen mole fractions ranging from 0.10 to 0.25, and gas temperatures from 1250 to 1810 K at atmospheric pressure. Flame environments both with and without water vapor were considered. Using motion picture photography, ignition and burning times were measured, and low temperature ignition limits were determined. Both the ignition and burning processes were modeled analytically, and theoretical predictions were compared with the experimental results. Composition and morphology of the residual combustion products were determined using X-ray diffraction techniques and scanning electron microscopy, respectively. Author

N86-28247*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMBUSTION IN SUPERSONIC FLOW c25
G. Burton Northam *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 399-410 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A workshop on combustion in supersonic flow was held in conjunction with the 21st JANNAF Combustion Meeting at Laurel, Maryland on October 3 to 4 1984. The objective of the workshop was to establish the level of current understanding of supersonic combustion. The workshop was attended by approximately fifty representatives from government laboratories, engine companies, and universities. Twenty different speakers made presentations in their area of expertise during the first day of the workshop. On the second day, the presentations were discussed, deficiencies in the current understanding defined, and a list of recommended programs generated to address these deficiencies. The agenda for the workshop is given. Author

N86-28248# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERSONIC COMBUSTION OF A SILANE/METHANE MIXTURE c25
G. Burton Northam and Allen G. McLain *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 411-416 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

A test program was conducted to evaluate the ignition and combustion characteristics of a 20 volume percent silane/methane mixture using a model scramjet combustor with Mach 2 combustor entrance conditions. The test gas total temperature was varied from 1200 to 3900 R. The mixture autoignited at a total temperature of 1650 R. This autoignition temperature can be contrasted with 2330 R for hydrogen and 1350 R for a 20 percent silane/hydrogen mixture in similar hardware. Methane without the silane additive did not autoignite in this configuration at temperatures as high as 3900 R. Author

N86-28249# United Technologies Research Center, East Hartford, Conn.
CARS FEASIBILITY DEMONSTRATION IN SUPERSONIC COMBUSTING FLOWS c25
Torger J. Anderson, Ira W. Kay, and William T. Peschke *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 417-428 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The feasibility of coherent anti-Stokes Raman spectroscopy (CARS) as a diagnostic for measuring temperature and species concentrations in supersonic combusting flows has been demonstrated. The data required to determine the combustion efficiency of the flow include the fuel/air equivalance ratio of the propane/air mixture and the stagnation temperatures of the propane/air flow and the pilot product stream. The results obtained by the CARS

system were a series of single shot, instantaneous static temperature measurements made at a centerline point during the combustion process. These data, combined with static and stagnation pressure measurements can provide the total temperatures required to compute the combustion efficiency. By plotting the CARS temperature data as histograms for each point, the temperature spread can be observed, providing insight into the turbulent nature of the flow. Author

N86-28250*# Aerojet Technical Systems Co., Sacramento, Calif.
LONGITUDINAL MODE COMBUSTION INSTABILITIES OF A HIGH-PRESSURE FUEL-RICH LOX/RP-1 PREBURNER c38
J. J. Fang *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 429-441 (For primary document see N86-28212 19-28)
(Contract NAS3-22647)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

During the hot-fire testing of a high-pressure fuel-rich LOX/RP-1 preburner, longitudinal mode combustion instabilities were observed. The experimental data showing how the instability varied with the chamber pressure, mixture ratio, chamber length and turbulence ring are given. Technical rationales are given for the test-to-test hardware configuration changes that eventually led to the stable result. Author

N86-28251# Colorado State Univ., Fort Collins.
IMPROVEMENT OF AN INTEGRAL STABILITY MODEL c25
C. E. Mitchell *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 443-452 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Research directed at extending and improving on an integral, iterative predictive model for combustion instability in liquid propellant rocket engines is described. Theoretical extensions of the model to include sources of combustion distributed along the axis of the combustion chamber are presented. Modifications made to the existing computer code which are necessary for inclusion of these theoretical improvements are discussed. Finally, results of calculations made using the improved model are presented and features of its predictive capability are described. Author

N86-28252# Pratt and Whitney Aircraft, West Palm Beach, Fla. Engineering Div.
PERFORMANCE COMPARISON OF THE CURRENT SSME AND A NEW MAIN INJECTOR-MAIN COMBUSTION CHAMBER CONFIGURATION USING THE JANNAF METHODOLOGY c20
R. G. Carroll, D. R. Connell, and C. D. Limerick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 453-462 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Increasing the specific impulse of the Space Shuttle Main Engine (SSME) by one second will increase the payload capability by approximately 1100 pounds. The specific impulse of the current SSME and a new improved SSME configuration are compared at full power level (FPL), using the rigorous JANNAF methodology. The calculated value for specific impulse for the current SSME is 450.7 seconds which compares with the accepted value of 452.8 seconds obtained from flight data. The calculated specific impulse for the improved configuration is 456.0 seconds. An improved powerhead configuration has been proposed for the SSME to increase specific impulse as well as life, maintainability and operability. The rigorous JANNAF methodology was used to calculate the specific impulse of the current SSME and the improved configuration at FPL. The JANNAF methodology is given. The improved configuration main injector has 2466 tangential entry, coaxial injection elements equally spaced along radial spraybars which extend from the outer periphery of the injector toward the centerline, like the spokes in a wheel. 52.0 cm (20.5 in.) at the injector end, and a contraction ratio of 3.58. Author

N86-28253*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
MODELING OF DENSE SPRAYS FROM LOX/H2 COAXIAL INJECTORS UNDER SUPERCRITICAL CONDITIONS c34
P. Y. Liang and R. J. Jensen *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 463-471 (For primary document see N86-28212 19-28)
(Contract NAS8-27980)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Assumptions commonly employed in the analytical description of a thin spray become unacceptable as the droplet density and droplet volume displacement become large. Changes in the semiempirical models describing drop-drop or drop-gas interactions as well as in the basic modeling approach itself may be necessary. A number of efforts undertaken to improve such models of the atomization-evaporation process to render them applicable in the dense-spray, supercritical regime are described. The improvements include those for variable drop density, supercritical properties, stripping evaporation and drop reincorporation into the liquid stream. The models are developed for use with the ARICC three-phase finite difference combustion code. Selected results from a sample calculation are presented, demonstrating the enhanced realism achievable with the upgraded models. Author

N86-28254*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SSME FUEL PREBURNER PHASE 1/PHASE 2+ COMPARISON c20
R. J. Jensen, P. Y. Liang, and S. M. Pinkowski *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 473-476 (For primary document see N86-28212 19-28)
(Contract NAS8-27980)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

An analytical comparison of the predicted combustion flowfields for the Phase 1 and Phase 2+ fuel preburner configurations using an advanced CFD combustion code is currently underway at Rocketdyne. The Phase 2+ injector has a modified element design. The redesigned element provides for improved atomization through a shift in the injector element/face bleed flow split while maintaining an acceptable pressure drop. Cold-flow tests of the new design have been encouraging. As a complement to those tests, the Advanced Rocket Injector Combustor Code (ARICC) was selected to conduct a detailed combustion flowfield simulation. ARICC models two-dimensional (or axisymmetric), transient, turbulent, two-phase mixing and combustion flowfields. It is derived from a member of the Los Alamos ICEd-ALE family of codes. Unique features of ARICC include explicit representation of the coaxial LOX jet and hydrogen gas flows, distributed atomization processes, droplet breakup, and supercritical vaporation processes. Predictions of temperature and OH concentration profiles for the Phase 1 and Phase 2+ injector flowfields indicate a trend toward more uniform temperature distributions and shorter flame lengths with the Phase 2+ design. Author

N86-28255# Remtech, Inc., Huntsville, Ala.
BOUNDARY LAYER SIMULATOR (BLIMPJ) IMPROVEMENT c34
S. C. Praharaj *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 477-493 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Improvements made to the existing Boundary Layer Integral Matrix Procedure, Version J (BLIMPJ) are discussed. These improvements have application to high area ratio nozzle design such as those being considered on future Orbit Transfer Vehicle (OTV) engines. The heat transfer to the nozzle wall, which is affected by such variables as wall roughness, relaminarization, and the presence of particles in the flow, was investigated. The existing motor performance loss calculation for these nozzles with thick boundary layers, which is inaccurate using the JANNAF procedure coded in BLIMPJ, was modified. The wall roughness effect was modeled successfully by modification of the turbulence model, and compared against two other engineering models

giving good comparison. The relaminarization effects were modeled using the ideas of Nash-Webber, and an approximation was given to modify the turbulence model. The results were compared against the available data of Back and Cuffel giving approximate correlation between theory and measured data. The boundary layer particle effects were accounted for by an engineering approach, but no nozzle data was available for comparison. The accuracy of the nozzle performance loss calculation from thick boundary layers was improved by determining the edge of the boundary layer through an iteration procedure. The iteration used RAMP for the inviscid flowfield and BLIMPJ for the viscous flowfield. An example of the iteration procedure is given for a typical OTV nozzle with an area ratio of 1293. Author

N86-28256*# Software and Engineering Associates, Inc., Carson City, Nev.

TWO-DIMENSIONAL KINETICS COMPUTER PROGRAM FOR ORBIT TRANSFER VEHICLES c61

G. R. Nickerson and L. D. Dang *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 495-503 (For primary document see N86-28212 19-28)
(Contract NAS8-35931)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Future Orbit Transfer Vehicles (OTV) presently under consideration require rocket engines delivering a high specific impulse. This high performance can be obtained with large area ratio thrust chambers using oxygen with either hydrogen or hydrocarbon fuels. In the projected nozzles, the combustion products are expanded to low pressure and temperature levels at high Mach number, a domain which has not been experienced with existing rocket engines. In order to assist in the design and evaluation of OTV engines, modifications have recently been incorporated in the Two-Dimensional-Kinetics (TDK) computer program. These modifications include the treatment of shock waves induced by the wall curvature, and shocks which are attached to the wall. The reflection of a shock wave at the flow axis is also treated in an appropriate manner and multiple shock reflections are allowed. A Boundary Layer Module (BLM) has also been incorporated into the TDK computer program in order to provide an automated treatment of the rigorous JANNAF rocket engine performance prediction procedure. Author

N86-28257# Naval Weapons Center, China Lake, Calif.

A SIMULTANEOUS MATHEMATICAL TREATMENT OF DEFLAGRATION AND IGNITION PHENOMENA c25

C. F. Price and T. L. Boggs *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 505-513 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

Recent emphasis on the study of transient combustion and the role of gas phase kinetics in that process has refocussed efforts to better our understanding and formulation of the ignition process. Historically, the laboratory investigation of material ignitability has been correlated in terms of either the time to first detectable event (light, pyrolysis) or the time at which self-sustaining combustion is achieved (go/no-go). In the utilization of such correlations, first-event times have been expressed as a surface temperature criterion, and self-sustaining times as a minimum-energy criterion. Variously in transient pressure prediction models the material is considered totally ignited when one or the other of the criteria has been met. The former requires calculation of a transient surface temperature, while the latter involves calculation of a transient bulk temperature. Neither is adequate for all materials in all environments, and the inadequacy is most noticeable with nitramine-based materials at high heating rates and low ambient pressures. The partial differential equations describing the condensed and gas phase reactions occurring during ignition show that inert thermal conduction, as well as reactions in both phases, may all be of significance to the process. Author

N86-28258# Naval Research Lab., Washington, D. C. Chemistry Div.

KINETIC MODELING OF DIMETHYLNITRAMINE THERMAL DECOMPOSITION: A MECHANISTIC EXTRAPOLATION TO RDX DECOMPOSITION IN THE GAS PHASE c25

M. E. Umstead, S. A. Lloyd, and M. C. Lin *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 515-521 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

The kinetics and mechanism of the thermal decomposition of dimethylnitramine have been investigated at low temperatures (466 to 524 K) in a static system and at high temperatures (800 to 1200 K) in a shock tube with IR laser and UV diagnostics. The unimolecular rate constant at the high-pressure limit was found to be K = 10 to the 15.9 power exp(-44.1/RT) s(-1). Detailed kinetic modeling has shown that the key initiation step is the dissociation of DMNA into NO2 and the dimethylamino radical, and that NO formation results mainly from the reaction of the dimethylamino radical with NO2. The more energetic steps leading to CO were found to be a series of chain reactions starting from methyl radicals. A parallel reaction scheme for the gaseous thermal decomposition of RDX is proposed. Author

N86-28259*# National Aeronautics and Space Administration, Washington, D.C.

EXPLICIT EXPRESSION TO PREDICT THE EROSIVE BURNING RATE OF SOLID PROPELLANTS

Shoufan Wang Jul. 1986 9 p Transl. into ENGLISH from Journal of Engineering Thermophysics (Beijing, China), v. 6, no. 1, Feb. 1985 p 84-86 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88465; NAS 1.15:88465) Avail: NTIS HC A02/MF A01 CSCL 21H

Using the theory of gas dynamics and heat transfer from a turbulent gas flow to the burning surface of propellant along a permeable wall, an explicit expression is derived to predict the burning rate of the solid propellant with crossflow. Results of the calculation have been compared with experimental data and proved to be correct. Author

N86-28260*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

EFFECT OF NON-NEWTONIAN ANTIMISTING KEROSENE ON JET PUMP PERFORMANCE

L. P. Bernal and V. Sarohia May 1986 48 p
(Contracts NAS7-918; DTFA03-8000215)
(NASA-CR-177192; NAS 1.26:177192; FAA/CT-85-30) Avail: NTIS HC A03/MF A01

The effect of antimisting kerosene (AMK) on jet pump performance was determined experimentally. It is shown that the performance of the jet pump is reduced by AMK as much as 50% as compared to Jet A under identical operating condition. Tests with the boost pump driven motive flow showed an improved performance. Low temperature AMK fuel resulted in an additional improvement on performance. Flow visualization and surface pressure measurements indicate suppression of turbulent mixing within the pump to be the cause for the reduced performance. In order to improve the efficiency of jet pumps with AMK, the length of the mixing chamber was increased. With increased mixing chamber length, an improvement in mass transferred rate of 15% at a 2 psi pressure head was observed. Alternatively, larger size pumps designed to operate with Jet A are also proposed. Scaling parameters are given to dimension the pump using Jet A data. Water ingestion tests showed no precipitate formation prior to the entrance to the pump. As the flow moved through the pump, large amounts of precipitate were formed. The precipitate did not impair the operation of the pump. Author

N86-28261*# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.

DETERMINATION OF SOLID MASS FRACTION IN PARTIALLY FROZEN HYDROCARBON FUELS Final Report

E. M. Cotterell, R. Mossadegh, A. J. Bruce, and C. T. Moynihan Jul. 1986 90 p
(Grant NAG3-213)

(NASA-CR-179472; NAS 1.26:179472) Avail: NTIS HC A05/MF A01 CSCL 07D

Filtration procedures alone are insufficient to determine the amounts of crystalline solid in a partially frozen hydrocarbon distillate fraction. This is due to the nature of the solidification process by which a large amount of liquid becomes entrapped within an interconnected crystalline structure. A technique has been developed to supplement filtration methods with an independent determination of the amount of liquid in the precipitate thereby revealing the actual value of mass percent crystalline solid, %S. A non-crystallizing dye is injected into the fuel and used as a tracer during the filtration. The relative concentrations of the dye in the filtrate and precipitate fractions is subsequently detected by a spectrophotometric comparison. The filtration apparatus was assembled so that the temperature of the sample is recorded immediately above the filter. Also, a second method of calculation has been established which allows significant reduction in test time while retaining acceptable accuracy of results. Data have been obtained for eight different kerosene range hydrocarbon fuels. Author

N86-28262# Mound Lab., Miamisburg, Ohio.
STUDY OF EXPLOSIVES BY DIFFUSE REFLECTANCE FT-IR SPECTROSCOPY
G. E. Hapner and A. B. Nease 1985 4 p Presented at the Joint DOD/DOE Explosives Surveillance Meeting, Albuquerque, N. Mex., 3 Dec. 1985
(Contract DE-AC04-76DP-00053)
(DE86-006111; MLM-3326(OP); CONF-851256-1) Avail: NTIS HC A02/MF A01

The infrared spectra of a number of explosives have been recorded using diffuse reflectance spectroscopy. This technique is explained. The spectra of a series of penetaerethritol tetranitrate (PETN) samples stored at elevated temperatures are used to demonstrate the usefulness of this technique. Because diffuse reflectance is surface sensitive, this technique is more sensitive to measuring changes on the surface of powered materials than transmission techniques. This advantage of diffuse reflectance spectroscopy was important in detecting spectroscopic changes in the infrared spectrum of triamino trinitrobenzene exposed to visible light. DOE

N86-28263# Lawrence Livermore National Lab., Calif.
RELATIONSHIP BETWEEN THE SHOCK SENSITIVITY AND THE SOLID PORE SIZES OF TATB POWDERS PRESSED TO VARIOUS DENSITIES
R. Lee, G. Bloom, W. VonHolle, W. Weingart, L. Erickson, S. Sanders, C. Slettevold, and R. McGuire 31 Jul. 1985 12 p Presented at the 8th International Symposium on Detonation, Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE85-017266; UCRL-91827-Rev-1; CONF-850706-33-Rev-1) Avail: NTIS HC A02/MF A01

Mercury intrusion porosimetry measurements have been made on samples pressed from three different types of triaminotrinitrobenzene (TATB) powders having quite different particle size distributions. The samples had densities ranging from 74 to 99% of theoretical maximum density. Results of the porosimetry measurements are compared with shock initiation thresholds measured on the same materials. The growth of reaction in sustained pressure experiments is also compared for two of the TATB types. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-28264*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GSFC PREFERRED PARTS LISTS PPL-17
Bruno P. Baldini, ed. Sep. 1984 94 p
(NASA-TM-88769; NAS 1.15:88769) Avail: NTIS HC A05/MF A01 CSCL 13B

A listing of preferred parts, part upgrading procedures, part derating guidelines, and part screening procedures to be used in the selection, procurement, and application of parts for Goddard Space Flight Center (GSFC) space systems and ground support equipment is contained. Author

N86-28265# Department of the Navy, Washington, D. C.
METHOD OF PREPARING SINGLE CRYSTALLINE CUBIC SILICON CARBIDE LAYERS Patent
Arrigo Addamiano, inventor (to Navy) Issued 3 Dec. 1985 6 p Supersedes AD-D011305
(AD-D012191; US-Patent-4,556,436; US-Patent-Appl-SN-643327; US-Patent-Class-148-175) Avail: US Patent and Trademark Office CSCL 07/2

This invention pertains to a method of making very pure cubic silicon carbide, SiC, comprising the steps of: loading a first inner graphite cup of a Lely type furnace while cold with a large number of crystals of SiC that are used as substrates; sealing the first cup with a graphite lid; inserting the first cup into a second graphite cup and inserting them into the furnace; filling the area between the first cup and the second cup with SiC; heating the first cup to between 2300 C and 2700 C until an atmosphere saturated with Si, C, SiC2 and Si2C is created; and cooling the furnace quickly to a temperature less than 1800 C. GRA

N86-28266# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
APPARATUS FOR THE PREPARATION OF AIR
N. S. Nikolayev, Y. M. Itskovich, A. V. Shcherbakov, T. V. Stoyanova, and V. V. Golovin 12 Mar. 1986 10 p Transl. into ENGLISH of Russian Patent 302 279, 28 Apr. 1971 p 1-3
(AD-A165603; FTD-ID(RS)T-0134-86) Avail: NTIS HC A02/MF A01 CSCL 13/7

The invention deals with equipment for ensuring the maximal reliable operation of devices that pneumatically control air conditioning systems. It can be used, in particular, in an apparatus for preparing air for devices of pneumatic control, for example, air conditioning on aircraft. GRA

N86-28267# Army Construction Engineering Research Lab., Champaign, Ill.
INITIAL INVESTIGATION OF THREE UNCURED ELASTOMERIC ROOFING MEMBRANE MATERIALS FOR USE IN MILITARY CONSTRUCTION Final Report
Myer J. Rosenfield Feb. 1986 35 p
(AD-A165620; CERL-IR-M-86/03) Avail: NTIS HC A03/MF A01 CSCL 13/13

Three uncured elastomeric membranes were investigated as part of ongoing research into alternative roofing systems for military construction. Literature, manufacturers' data, and field applications were investigated to identify the properties and characteristics of chlorinated polyethylene (CPE), chlorosulfonated polyethylene (CSPE), and polyisobutylene (PIB), and the advantages and disadvantages associated with their use. It was concluded that Corps of Engineers use of these three materials should not be considered until an industry-wide standard for their manufacture is developed. In addition, results of future work which will test actual roofing applications should be considered before a final decision is made. Author (GRA)

N86-28268# Naval Weapons Center, China Lake, Calif.
PROCEEDINGS OF THE 10TH ANNUAL SOLDERING-MANUFACTURING SEMINAR Annual Report, Mar. 1985 - Feb. 1986
19 Feb. 1986 197 p Proceedings held at China Lake, Calif., 19-20 Feb., 1986
(AD-A165786; AD-E900554; NWC-TP-6707) Avail: NTIS HC A09/MF A01 CSCL 13/8

Presented are the proceedings of the 10th Annual Soldering/Manufacturing Seminar, held on 19 and 20 February 1986 at the Naval Weapons Center, China Lake, Calif. The proceedings include

the papers or abstracts of papers presented at the Seminar and cover all aspects of soldering technology and electronics manufacturing. GRA

N86-28269# Sandia National Labs., Albuquerque, N. Mex.
THETA GUN, A MULTISTAGE, COAXIAL, MAGNETIC INDUCTION PROJECTILE ACCELERATOR
T. J. Burgess, B. W. Duggin, and M. Cowan, Jr. Nov. 1985 80 p
(Contract DE-AC04-76DP-00789)
(DE86-004185; SAND-85-1881) Avail: NTIS HC A05/MF A01

We experimentally and theoretically studied a multistage coaxial magnetic induction projectile accelerator. We call this system a theta gun to differentiate it from other coaxial accelerator concepts such as the mass driver. We conclude that this system can theoretically attain railgun performance only for large caliber or very high injection velocity and, even then, only for long coil geometry. Our experiments with a three-stage, capacitor bank-driven accelerator are described. The experiments are modeled with a 1-1/2 dimensional equivalent circuit-hydrodynamics code which is also described. We derive an expression for the conditions of coaxial accelerator-railgun velocity breakeven in the absence of ohmic and hydrodynamic effects. This, in conjunction with an expression for the magnetic coupling coefficient, defines a set of geometric relations which the coaxial system must simultaneously satisfy. Conclusions concerning both the existence and configuration of a breakeven coaxial system follow from this requirement. The relative advantages and disadvantages of the coaxial induction projectile accelerator, previously cited in the literature, are critiqued from the viewpoint of our analysis and experimental results. We find that the advantages vis-a-vis the railgun have been overstated. DOE

N86-28270# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Dept. des Systemes Plasma Industriels.
PLASMA TORCHES
Maxime Labrot 1986 7 p In FRENCH; ENGLISH summary
Presented at Congr. on Elec. et Tech. Avancees, Bordeaux, 9-12 Oct. 1985
(SNIAS-861-430-107; ESA-86-97169) Avail: NTIS HC A02/MF A01

The characteristics and applications of high power plasma torches are described. The average enthalpy is usually < 10 MJ per kg of gas to limit electrode wear. The energy supply is normally rectified current and a series inductance is used to filter out tension fluctuations and harmonics. A high furnace process implemented with a 2 Megawatt plasma torch is detailed. ESA

N86-28271 United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
CONTROLLED REMOVAL BY ION BEAM ETCHING OF SURFACE CONTAMINANT LAYERS ON TRANSMISSION ELECTRON MICROSCOPE SPECIMENS
A. W. James Oct. 1985 17 p
(AERE-R-11796) Copyright. Avail: NTIS HC A02/MF A01

The basic principles of transmission electron microscope (TEM) specimen preparation by ion beam thinning are described. The rate of material removal from stainless steel specimens has been assessed and this information has been used to demonstrate the controlled thinning of TEM specimen. Three examples where ion beam wiping can be used to remove contaminated surface layers of TEM specimens are given: (1) chlorine - enriched surface regions on stainless steel; (2) Cu-S rich films on ferritic steels; and (3) oxide films on sintered aluminum. These examples make it clear that ion beam wiping is an essential step in the preparation of some TEM specimens where accurate chemical analysis is required. Author

N86-28290*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HVAC MODIFICATIONS AND COMPUTERIZED ENERGY ANALYSIS FOR THE OPERATIONS SUPPORT BUILDING AT THE MARS DEEP SPACE STATION AT GOLDSTONE
A. Halperin and P. Stelzmuller *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 13B

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-28272 British Broadcasting Corp., Kingswood (England). Engineering Div.
DIGITAL VIDEO: ASSESSMENT OF COMB-FILTER DESIGN FOR SUB-NYQUIST PAL CODECS
N. D. Wells Dec. 1985 21 p
(BBC-RD-1985/18) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

One very effective technique for the bit-rate reduction of digital PAL signals is sub-Nyquist sampling. This technique requires the use of comb filters which attenuate unwanted alias components produced by the sub-sampling process and also reconstruct the color signal to standard form at the decoder. Variations are possible in the design of comb filter; in particular, the configuration can be based on line, field or picture delays. This Report outlines the theory of comb filter operation and describes the results of subjective tests which compare the performance of the different possible sub-Nyquist systems. Certain design features are also described which are required in order that sub-Nyquist codecs may be cascaded without introducing further filtering impairment after the first such codec. Author

N86-28273# Royal Signals and Radar Establishment, Malvern (England).
THE IMPLICATIONS OF BOLTZMANN-TYPE MACHINES FOR SAR DATA PROCESSING: A PRELIMINARY SURVEY
S. P. Luttrell Jun. 1985 39 p
(AD-A163749; RSRE-MEMO-3815; BR98262; ESA-86-97113)
Avail: Issuing Activity

It is proposed that Markov random field models (MRFs) be used as a framework within which to construct models of synthetic aperture radar (SAR) images. The relationship between this class of models and the Boltzmann machine (BM) of artificial intelligence is clarified. The BM training procedure is generalized and used to train MRF models. This technique is used to investigate the ability of a simple MRF texture model to learn a texture by maximizing a relative entropy objective function. The marriage of MRF models with the BM training procedure is fruitful. ESA

N86-28274# Royal Signals and Radar Establishment, Malvern (England).
THE DESIGN AND CONSTRUCTION OF A MODULE TO DEMONSTRATE A METHOD FOR TRANSMISSION OF DATA FROM A MEDICAL IMPLANT
I. Morgan and J. D. Benjamin Aug. 1985 30 p
(AD-A163750; RSRE-MEMO-3872; BR98206; ESA-86-97117)
Avail: Issuing Activity

Methods of powering devices to which only ac contact can be made and receiving data transmitted back from them are described. Such devices include medical implants which communicate with the external environment via ultrasound or rf links. Two breadboard systems were built to demonstrate the techniques. In both the device is powered by picking up an ac input and rectifying it. A signal voltage detected by the device is encoded as a frequency, transmitted and decoded. In one case this is performed on a separate channel from that used to power the device. In the other only one channel is used for both signals, and data is transmitted by modulating the impedance presented by the

device. The resulting modulation of the input signal is picked up by the external circuit and decoded. ESA

N86-28275*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT Progress Report, Jan. - Mar. 1986
E. C. Posner, ed. 15 May 1986 222 p
(Contract NAS7-918)
(NASA-CR-177229; JPL-TDA-PR-42-85; NAS 1.26:177229) Avail: NTIS HC A10/MF A01 CSCL 17B

This publication, one of a series formerly titled The Deep Space Network (DSN) Progress Report, documents DSN progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations. In addition, developments in Earth-based radio technology as applied to geodynamics, astrophysics, and the radio search for extraterrestrial intelligence are reported. For individual titles, see N86-28276 through N86-28294.

N86-28276*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TOTAL IONOSPHERIC ELECTRON CONTENT CALIBRATION USING SERIES GPS SATELLITE DATA **c46**
G. Lanyi *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 04A

The current status of the Deep Space Network advanced systems research into ionospheric calibration techniques, based on Global Positioning System (GPS) data is described. A GPS-based calibration system is planned to replace the currently used Faraday rotation method by 1989. The SERIES receiver system determines the differential group delay of signals transmitted at two different carrier frequencies. This differential delay includes an ionospheric component and a GPS transmitter offset. The transmitter offsets are different for each GPS satellite. Tests were conducted to assess the effect of the offsets on the ionospheric calibration accuracy. From the obtained data, the total electron content and GPS transmitter offsets are calculated by a least squares estimation method employing a local model of total ionospheric electron content. The end product is an estimation of the total ionospheric content for an arbitrary line-of-sight direction. For the presented polynomial fitting technique, the systematic error due to mismodeling is estimated to be approximately 6 x 10 to the 16th power el/sq m, while the formal error is approximately 2 x 10 to the 16th power el/sq m. The final goal is an error of 3 x 10 to the 16th power el/sq m (approximately 0.7 ns at 2.3 GHz). Author

N86-28277*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETS AS BACKGROUND NOISE SOURCES IN FREE SPACE OPTICAL COMMUNICATIONS
J. Katz *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

Background noise generated by planets is the dominant noise source in most deep space direct detection optical communications systems. Earlier approximate analyses of this problem are based on simplified blackbody calculations and can yield results that may be inaccurate by up to an order of magnitude. Various other factors that need to be taken into consideration, such as the phase angle and the actual spectral dependence of the planet albedo, in order to obtain a more accurate estimate of the noise magnitude are examined. Author

N86-28278*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SIMPLE METHOD FOR DESIGNING OR ANALYZING AN OPTICAL COMMUNICATION LINK
J. R. Lesh, W. K. Marshall, and J. Katz *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

A simple method is described for determining the performance of a free space optical communication link. The method can be used either in the system design (synthesis) mode or in the performance evaluation (analysis) mode. Although restricted to photo counting based detection of pulse position modulated signals, the method is still sufficiently general to accommodate space-based, as well as ground-based, reception. Author

N86-28279*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MAXIMUM LIKELIHOOD ESTIMATION OF SIGNAL-TO-NOISE RATIO AND COMBINER WEIGHT
S. Kalson and S. J. Dolinar *In its* The Telecommunications and Data Acquisition Report 15 May 1986 10 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

An algorithm for estimating signal to noise ratio and combiner weight parameters for a discrete time series is presented. The algorithm is based upon the joint maximum likelihood estimate of the signal and noise power. The discrete-time series are the sufficient statistics obtained after matched filtering of a biphase modulated signal in additive white Gaussian noise, before maximum likelihood decoding is performed. Author

N86-28280*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A VLSI PIPELINE DESIGN OF A FAST PRIME FACTOR DFT ON A FINITE FIELD
T. K. Truong, I. S. Hsu, H. M. Shao, I. S. Reed (University of Southern California, Los Angeles), and H. C. Shyu *In its* The Telecommunications and Data Acquisition Report 15 May 1986 11 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

A conventional prime factor discrete Fourier transform (DFT) algorithm is used to realize a discrete Fourier-like transform on the finite field, GF(q sub n). A pipeline structure is used to implement this prime factor DFT over GF(q sub n). This algorithm is developed to compute cyclic convolutions of complex numbers and to decode Reed-Solomon codes. Such a pipeline fast prime factor DFT algorithm over GF(q sub n) is regular, simple, expandable, and naturally suitable for VLSI implementation. An example illustrating the pipeline aspect of a 30-point transform over GF(q sub n) is presented. Author

N86-28281*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FAST FREQUENCY ACQUISITION VIA ADAPTIVE LEAST SQUARES ALGORITHM
R. Kumar *In its* The Telecommunications and Data Acquisition Report 15 May 1986 9 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

A new least squares algorithm is proposed and investigated for fast frequency and phase acquisition of sinusoids in the presence of noise. This algorithm is a special case of more general, adaptive parameter-estimation techniques. The advantages of the algorithms are their conceptual simplicity, flexibility and applicability to general situations. For example, the frequency to be acquired can be time varying, and the noise can be nonGaussian, nonstationary and colored. As the proposed algorithm can be made recursive in the number of observations, it is not necessary to have a priori knowledge of the received signal-to-noise ratio or to specify the measurement time. This would be required for batch processing techniques, such as the fast Fourier transform (FFT). The proposed algorithm improves the frequency estimate on a recursive basis as more and more observations are obtained. When the algorithm is applied in real time, it has the extra advantage that the observations need not be stored. The algorithm also yields a real time confidence measure as to the accuracy of the estimator. Author

N86-28282*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SYSTOLIC ARCHITECTURE FOR THE CORRELATION AND ACCUMULATION OF DIGITAL SEQUENCES c33
L. J. Deutsch and C. R. Lahmeyer *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09C

A fully systolic architecture for the implementation of digital sequence correlator/accumulators is described. These devices consist of a two-dimensional array of processing elements that are conceived for efficient fabrication in Very Large Scale Integrated (VLSI) circuits. A custom VLSI chip that was implemented using these concepts is described. The chip, which contains a four-lag three-level sequence correlator and four bits of accumulation with overflow detection, was designed using the Integrated UNIX-Based Computer Aided Design (CAD) System. Applications of such devices include the synchronization of coded telemetry data, alignment of both real time and non-real time Very Large Baseline Interferometry (VLBI) signals, and the implementation of digital filters and processes of many types. Author

N86-28283*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VLBI OBSERVATIONS OF 416 EXTRAGALACTIC RADIO SOURCES c93
D. D. Morabito, A. E. Niell, R. A. Preston, R. P. Linfield, A. E. Wehrle, and J. Faulkner *In its* The Telecommunications and Data Acquisition Report 15 May 1986 16 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 03B

The Deep Space Network is establishing a high-accuracy Very Long Base Interferometry (VLBI) celestial reference frame. Presented are the VLBI results of observations of 416 radio sources with declination north of -45 degrees which were conducted at frequencies of 2.3 GHz and 8.4 GHz. At 2.3 GHz 323 of 391 radio sources observed were detected with a fringe spacing of 3 milliarcsec and a detection limit of approximately 0.1 Jy. At 8.4 GHz, 278 of 416 radio sources were detected with a fringe spacing of 1 milliarcsec and a detection limit of approximately 0.1 Jy. This survey was conducted primarily to determine the strength of compact components at 8.4 GHz for radio sources previously detected with VLBI at 2.3 GHz. Compact extragalactic radio sources with strong correlated flux densities at both frequencies are used to form a high-accuracy reference frame. Author

N86-28284*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PARKES-CDSCC TELEMETRY ARRAY: EQUIPMENT DESIGN c17
D. W. Brown, H. W. Cooper, J. W. Armstrong, and S. S. Kent *In its* The Telecommunications and Data Acquisition Report 15 May 1986 26 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09F

A unique combination of Deep Space Network (DSN) and non-DSN facilities in Australia provided enhanced data return from the Voyager spacecraft as it encountered the planet Uranus. Many of the key elements are duplicated from Voyager's encounters with Jupiter and Saturn. Some are unique extensions of that technology. Author

N86-28285*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DSA'S SUBCARRIER DEMODULATION LOSSES
M. Simon and A. Mileant *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

The degradation in bit error rate performance due to imperfect subcarrier tracking by the Demodulation Synchronization Assembly (DSA) is investigated. Results apply to any type of digital loop and received signal dynamics. A type four loop causes the least amount of loss, because it tracks phase jerk with zero steady-state error. However, when frequency rate and frequency acceleration are as large as in the extended Magellan mission, it will be necessary to decrease the loop update time in order to minimize the losses. Author

N86-28286*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SNR ESTIMATION FOR THE BASEBAND ASSEMBLY
M. K. Simon and A. Mileant *In its* The Telecommunications and Data Acquisition Report 15 May 1986 9 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

The expected value and the variance of the Baseband Assembly symbol signal-to-noise ratio (SNR) estimation algorithm are derived. The SNR algorithm treated here is designated as the Split Symbol Moments Estimator (SSME). It consists of averaging the first two moments of the integrated half symbols. The SSME is a biased, consistent estimator. The SNR degradation factor due to the jitter in the subcarrier demodulation and symbol synchronization loops is taken into account. Curves of the expected value of the SNR estimator versus the actual SNR are presented. Author

N86-28287*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE NEW 34-METER ANTENNA
M. F. Pompa *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

The new 34-m high efficiency Azimuth - Elevation antenna configuration, including its features, dynamic characteristics and performance at 8.4-GHz frequencies is described. The current-technology features of this antenna produce a highly reliable configuration by incorporation of a main wheel and track azimuth support, central pintle pivot bearing, close tolerance surface panels and all-welded construction. Also described are basic drive controls that, as slaved to three automatic microprocessors, provide accurate and safe control of the antenna's steering tasks. At this time antenna installations are completed at Goldstone and Canberra and have operationally supported the Voyager - Uranus encounter. A third installation is being constructed currently in Madrid and is scheduled for completion in late 1986. Author

N86-28288*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK TRACKING SYSTEM, MARK 4-A, 1986 c17
J. A. Wackley *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09D

The Deep Space Network (DSN) Tracking System provides highly precise measurements of spacecraft Doppler and range. It was recently extensively modified as part of the Mark 4-A implementation. The DSN Tracking System as currently implemented, its performance in support of Voyager 2, and plans for new implementation are described. Author

N86-28289*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MARK 4A DSN RECEIVER-EXCITER AND TRANSMITTER SUBSYSTEMS
M. R. Wick *In its* The Telecommunications and Data Acquisition Report 15 May 1986 10 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 17B

The present configuration of the Mark 4A DSN Receiver-Exciter and Transmitter Subsystems is described. Functional requirements and key characteristics are given to show the differences in the capabilities required by the Networks Consolidation task for combined High Earth Orbiter and Deep Space Network tracking support. Author

N86-28290*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HVAC MODIFICATIONS AND COMPUTERIZED ENERGY ANALYSIS FOR THE OPERATIONS SUPPORT BUILDING AT THE MARS DEEP SPACE STATION AT GOLDSTONE c31
A. Halperin and P. Stelzmuller *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 13B

The key heating, ventilation, and air-conditioning (HVAC) modifications implemented at the Mars Deep Space Station's Operation Support Building at Jet Propulsion Laboratories (JPL) in order to reduce energy consumption and decrease operating costs are described. An energy analysis comparison between the computer simulated model for the building and the actual meter data was presented. The measurement performance data showed that the cumulative energy savings was about 21% for the period 1979 to 1981. The deviation from simulated data to measurement performance data was only about 3%. Author

N86-28291*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REVERSE OSMOSIS WATER PURIFICATION SYSTEM c54
H. G. Ahlstrom, P. S. Hames, and F. J. Menninger *In its* The Telecommunications and Data Acquisition Report 15 May 1986 10 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 06K

A reverse osmosis water purification system, which uses a programmable controller (PC) as the control system, was designed and built to maintain the cleanliness and level of water for various systems of a 64-m antenna. The installation operates with other equipment of the antenna at the Goldstone Deep Space Communication Complex. The reverse osmosis system was designed to be fully automatic; with the PC, many complex sequential and timed logic networks were easily implemented and are modified. The PC monitors water levels, pressures, flows, control panel requests, and set points on analog meters; with this information various processes are initiated, monitored, modified, halted, or eliminated as required by the equipment being supplied pure water. Author

N86-28292*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE VENUS BALLOON PROJECT c91
C. T. Stelzried, R. A. Preston, C. E. Hildebrand, J. H. Wilcher, and J. Ellis *In its* The Telecommunications and Data Acquisition Report 15 May 1986 8 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 03B

On June 11 and 15, 1985, two instrumental balloons were released from the Soviet VEGA 1 and VEGA 2 spacecraft and deployed in the atmosphere of Venus. The VEGA probes flew by the planet on their way to a rendezvous with comet Halley in March 1986. Drifting with the wind at altitudes of 54 km, the balloons traveled one-third of the way around the planet during their 46-hour lifetimes. Sensors on-board the gondolas made periodic measurements of pressure, temperature, vertical wind velocity, cloud particle density, ambient light level, and frequency of lightning. The data were transmitted to Earth and received at the Deep Space Network (DSN) 64-m stations and at several large antennas in the USSR. Approximately 95 percent of the telemetry data were successfully decoded at the DSN complexes and in the Soviet Union, and were provided to the international science team for analysis. Very Long Baseline Interferometry (VLBI) data were acquired by 20 radio observatories around the world for the purpose of monitoring the Venus winds. The DSN 64-m subnet was part of a 15-station VLBI network organized by the Centre National d'Etudes Spatiales (CNES) of France. In addition, five antennas of the Soviet network participated. VLBI data from the CNES network are currently being processed at the Jet Propulsion Laboratory. Author

N86-28293*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE VENUS BALLOON PROJECT TELEMETRY PROCESSING c17
J. M. Urech, A. Chamarro, J. L. Morales, and M. A. Urech *In its* The Telecommunications and Data Acquisition Report 15 May 1986 13 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09D

The peculiarities of the Venus Balloon telemetry system required the development of a new methodology for the telemetry processing, since the capabilities of the Deep Space Network (DSN) telemetry system do not include burst processing of short frames with two different bit rates and first bit acquisition. A software package was produced for the non-real time detection, demodulation, and decoding of the telemetry streams obtained from an open loop recording utilizing the DSN spectrum processing subsystem-radio science (DSP-RS). A general description of the resulting software package (DMO-5539-SP) and its adaptability to the real mission's variations is contained. Author

N86-28294*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE MARCH 1985 DEMONSTRATION OF THE FIDUCIAL NETWORK CONCEPT FOR GPS GEODESY: A PRELIMINARY REPORT c43
J. M. Davidson, C. L. Thornton, T. H. Dixon, C. J. Vegos, L. E. Young, and T. P. Yunck *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 08E

The first field tests in preparation for the NASA Global Positioning System (GPS) Caribbean Initiative were conducted in late March and Early April of 1985. The GPS receivers were located at the POLARIS Very Long Base Interferometry (VLBI) stations at Westford, Massachusetts; Richmond, Florida; and Ft. Davis, Texas; and at the Mojave, Owens Valley, and Hat Creek VLBI stations in California. Other mobile receivers were placed near Mammoth Lakes, California; Pt. Mugu, California; Austin, Texas; and Dahlgren, Virginia. These sites were equipped with a combination of GPS receiver types, including SERIES-X, TI-4100 and AFGL dual frequency receivers. The principal objectives of these tests were the demonstration of the fiducial network concept for precise GPS geodesy, the performance assessment of the participating GPS receiver types, and to conduct the first in a series of experiments to monitor ground deformation in the Mammoth Lakes-Long Valley caldera region in California. Other objectives included the testing of the water vapor radiometers for the calibration of GPS data, the development of efficient procedures for planning and coordinating GPS field exercise, the establishment of institutional interfaces for future cooperating ventures, the testing of the GPS Data Analysis Software (GIPSY, for GPS Inferred Positioning SYstem), and the establishment of a set of calibration baselines in California. Preliminary reports of the success of the field tests, including receiver performance and data quality, and on the status of the data analysis software are given. Author

N86-28295*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TRELLIS CODED MODULATION FOR 4800-9600 BPS TRANSMISSION OVER A FADING MOBILE SATELLITE CHANNEL
Dariush Divsalar and M. K. Simon 1 Jan. 1986 46 p
(Contract NAS7-918)
(NASA-CR-177159; JPL-PUB-86-8; NAS 1.26:177159) Avail: NTIS HC A03/MF A01 CSCL 17B

The combination of trellis coding and multiple phase-shift-keyed (MPSK) signalling with the addition of asymmetry to the signal set is discussed with regard to its suitability as a modulation/coding scheme for the fading mobile satellite channel. For MPSK, introducing nonuniformity (asymmetry) into the spacing between signal points in the constellation buys a further improvement in performance over that achievable with trellis coded symmetric MPSK, all this without increasing average or peak power, or changing the bandwidth constraints imposed on the system. Whereas previous contributions have considered the performance of trellis coded modulation transmitted over an additive white

Gaussian noise (AWGN) channel, the emphasis in the paper is on the performance of trellis coded MPSK in the fading environment. The results will be obtained by using a combination of analysis and simulation. It will be assumed that the effect of the fading on the phase of the received signal is fully compensated for either by tracking it with some form of phase-locked loop or with pilot tone calibration techniques. Thus, results will reflect only the degradation due to the effect of the fading on the amplitude of the received signal. Also, we shall consider only the case where interleaving/deinterleaving is employed to further combat the fading. This allows for considerable simplification of the analysis and is of great practical interest. Finally, the impact of the availability of channel state information on average bit error probability performance is assessed. Author

N86-28296*# Texas A&M Univ., College Station. Dept. of Electrical Engineering.
TWO HYBRID ARQ ERROR CONTROL SCHEMES FOR NEAR EARTH SATELLITE COMMUNICATIONS
Shu Lin 4 Aug. 1986 16 p
(Grant NAG5-778)
(NASA-CR-177179; NAS 1.26:177179; TR-1) Avail: NTIS HC A02/MF A01 CSCL 17B

Two hybrid Automatic Repeat Request (ARQ) error control schemes are proposed for NASA near Earth satellite communications. Both schemes are adaptive in nature, and employ cascaded codes to achieve both high reliability and throughput efficiency for high data rate file transfer. Author

N86-28297# Defense Communications Engineering Center, Reston, Va.
PERFORMANCE ANALYSIS OF DIGITAL LOS LINK MORMOND HILL-LATHERON, UK (M0672)
Nicholas J. Sorovacu Sep. 1985 24 p
(AD-A165635; DCEC-TR-7-83) Avail: NTIS HC A02/MF A01 CSCL 17/2

The U.S. Navy has been tasked to upgrade link M0672, Mormond Hill-Latheron, UK for digital operations. Technical guidance was requested from the Defense Communications Engineering Center (DCEC) to analyze link performance expected of the digital configuration and to assess the potential of using DIDICOM units in conjunction with quad diversity. GRA

N86-28298# Mitre Corp., Bedford, Mass.
EXPERT SYSTEMS FOR C3I. VOLUME 1. A USER'S INTRODUCTION Final Report
J. A. Clapp, S. M. Hockett, M. J. Prelle, A. M. Tallant, and D. D. Triant Oct. 1985 60 p
(Contract F19628-84-C-0001)
(AD-A165693; ESD-TR-85-125) Avail: NTIS HC A04/MF A01 CSCL 17/2

There has been a tremendous burgeoning of interest in artificial intelligence (AI) over the last few years. Investments of commercial and government sponsors reflect a widespread belief that AI is now ready for practical applications. The area of AI currently receiving the greatest attention and investment is expert system technology. Most major high tech corporations have begun to develop expert systems, and many software houses specializing in expert system tools and applications have recently appeared. The defense community is one of the heaviest investors in expert system technology, and within this community one of the application areas receiving greatest attention is C3I. Many ESD programs are now beginning to ask whether expert system applications for C3I are ready for incorporation into ESD-developed systems, and, if so, what are the potential benefits and risks of doing so. This report was prepared to help ESD and MITRE personnel working on acquisition programs to address these issues and to gain a better understanding of what expert systems are all about. The primary intention of this report is to investigate what expert systems are and the advances that are being made in expert system technology for C3I applications. The report begins with a brief tutorial on expert systems, emphasizing how they differ from conventional software systems and what they are best at doing. GRA

N86-28299# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
BEST APPROXIMATION OF SIGNAL AMPLITUDE AND DELAY IN A NARROWBAND RADAR
Richard C. Raup 22 Jan. 1986 48 p
(Contract F19628-85-C-0002)
(AD-A165700; TR-723; ESD-TR-85-311) Avail: NTIS HC A03/MF A01 CSCL 17/9

The range estimation problem is generally solved by assuming a low order target mass center motion description (such as constant velocity or constant acceleration) or by postulating a well defined manuever. Assumptions are often made that require the receiver signal associated with a well tracked target to have a narrow bandwidth. These assumptions are unreasonable for certain range estimation problems. An approach general enough for use with virtually any pulsed narrowband transmitter waveform and a variety of finite parameter descriptions of time varying target range and cross section is developed. The associated best approximation problem is nonlinear but has a special structure which permits a computable solution in applications of interest involving thousands of unknowns. An Appendix provides an example of estimating a polynomial propagation delay from observations of the radar receiver signal. GRA

N86-28300# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
RESTRUCTURABLE VLSI PROGRAM Semiannual Technical Summary Report, 1 Apr. - 30 Sep. 1985
Gerald C. OLeary 30 Sep. 1985 22 p
(Contracts F19628-85-C-0002; ARPA Order 3797; DA Proj. 3D3-0)
(AD-A165718; ESD-TR-85-293) Avail: NTIS HC A02/MF A01 CSCL 17/2

This report describes work performed on the Restructurable VLSI Program sponsored by the Information Processing Techniques Office of the Defense Advanced Research Projects Agency during the period 1 April through 30 September 1985. GRA

N86-28301# Naval Research Lab., Washington, D. C.
ESTIMATING THE SCATTERING COEFFICIENT OF THE OCEAN SURFACE FOR HIGH-FREQUENCY OVER-THE-HORIZON RADAR
R. O. Pilon and J. M. Headrick 28 Mar. 1986 23 p
(AD-A165722; NRL-MR-5741) Avail: NTIS HC A02/MF A01 CSCL 17/9

Several methods for determining the radar scattering coefficient of the ocean surface, sigma (o), all based on the technique developed by Trizna, have been applied to two sets of High-Frequency Over-the-Horizon (HF OTH) data. One specific method is found to yield the best results. A method of operation of an HF OTH system to allow the estimation of sigma (o) is recommended. GRA

N86-28302# Range Commanders Council, White Sands Missile Range, N. Mex. Inter-range Inst. Group.
COHERENT c-BAND TRANSPONDER STANDARDS
Feb. 1986 27 p
(AD-A165811; IRIG-STANDARD-257-86) Avail: NTIS HC A03/MF A01 CSCL 17/7

The objective of this document is to define minimum transponder parameters in such a manner that any C-band instrumentation radar on any test range may use the transponder. It is not the goal of these standards to require all transponders to use the same pulse code spacing or the same spot frequencies. Rather, it is to establish an envelope of frequencies and codes within which all test ranges may operate. In this way, the goals can be met and yet the interference-free traffic capacity will be larger than if only one system of codes and spot frequencies was used. Many of the parameters can and will undoubtedly be improved. There are three basic designs of a coherent pulse radar transponder; however, only two are in use for trajectory measurement

application. Both employ superheterodyne receivers, delay at the intermediate frequency, and heterodyne the signal back to the carrier frequency through the use of a common local oscillator. If the transponder has good stability, the phase of the reply will bear a fixed relationship to the interrogation signal. The difference between the two transponder types occur in the transmitter section. One design achieves power gain by cascading injection locked oscillators. GRA

N86-28303# Westinghouse Electric Corp., Pittsburgh, Pa. Power System Engineering Dept.
ELECTROMAGNETIC TRANSIENTS PROGRAM (EMTP) PRIMER Final Report
S. F. Mauser and T. E. McDermott Sep. 1985 265 p Sponsored by EPRI
(EPRI Proj. 2149-1)
(DE86-000060; EPRI-EL-4202) Avail: NTIS HC A12/MF A01

This document is an outgrowth of a survey and analysis of Electromagnetic Transients Program (EMTP) user needs, in which improved user's documentation was determined to be the single most important enhancement to the EMTP. The Primer is an EMTP training manual for new users. It includes introductory material and eleven sample studies so that the reader can learn by the case study method. The Primer is part of a series of new EMTP user manuals which covers program operation, theory, and application guide lines. DOE

N86-28304# Centre National d'Etudes Spatiales, Toulouse (France). Div. Trans., Instr. et Traitement de Bord.
STAR HIGH BIT RATE LINK MODEL: THE CARRIER REGENERATION [MAQUETTE DE LIAISON HAUTE CADENCE STAR: LA REGENERATION DE PORTEUSE]
M. Grondin 29 Oct. 1984 50 p In FRENCH; ENGLISH summary
(CNES-84/331-T-CT/DRT/TIT/TR; ESA-86-97181) Avail: NTIS HC A03/MF A01

A simulation breadboard Star model was designed and implemented to work at up to 200 Mbps through a data relay satellite. The carrier regenerator module design and performance are discussed. The 46 Hz receiver, treating 4 phase shift keyed signals, is based on a remodulation-demodulation concept, which has the advantage of giving demodulated signals in phase and quadrature. The choice of a voltage controlled oscillator with better thermal stability; the problems caused by poor knowledge of circuit delays and transit times; and the unavoidable Doppler effect are discussed. The utilization of dedicated integrated circuits would improve the overall performance. ESA

N86-28305# Centre National d'Etudes Spatiales, Toulouse (France).
STAR HIGH RATE LINK MODEL: CLOCK REGENERATION [MAQUETTE DE LIAISON HAUTE CADENCE STAR: LA REGENERATION D'HORLOGE]
J. P. Soldermann and M. Grondin 29 Nov. 1984 30 p In FRENCH; ENGLISH summary
(CNES-CT/DRT/TIT/TR-84/349-T; ESA-86-97184) Avail: NTIS HC A03/MF A01

The receiving part of this module, used in spacecraft transmission through a relay satellite, requires a very accurate clock reference in the extraction of data from a QPSK modulated signal at a bit rate of 100 MHz. The results achieved to improve this accuracy working on the nonlinear treatment and the narrow band filtering are described. The chosen clock detector is based on a delay line and a multiplier. The multiplication is assured in ECL logic by an exclusive or. The filter is based on a narrow band phase loop. It is shown that the performance degradation introduced by the clock regenerator is 0.2 dB if the static phase error is kept within 5 deg. ESA

N86-28306# Ekonomisk Foretagsledning, Stockholm (Sweden).
THE BENEFITS OF MOBILE COMMUNICATIONS
Paris ESA Apr. 1985 40 p
(Contract ESA-5982/84-F-RD(SC))
(ESA-CR(P)-2160; ESA-86-96862) Avail: NTIS HC A03/MF A01

The benefits offered by mobile communications facilities are compared to conventionally priced networks. Sweden, the UK and Eire were taken as examples of markets that are respectively leading, growing and restrictive. The three major benefits identified are higher profits for commercial organizations from cost savings and improved productivity, the prevention and minimization of damage to life and property, and better social contacts for people isolated from communities. Case studies provide examples of the benefits different occupational and social groups acquire from mobile communications in each country. The studies were also used to project future growth in the uptake and range of mobile communications facilities offered in each country. ESA

N86-28307# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung HF-Systeme.
DEVELOPMENT OF A LINEAR BACKFIRE ANTENNA FOR AN AIRBORNE L-BAND SCATTEROMETER
Helmut Haerter and Bernd Mayr Oct. 1985 20 p In GERMAN; ENGLISH summary
(DFVLR-Mitt-85-15; ISSN-0176-7739; ESA-86-96884) Avail: NTIS HC A02/MF A01; DFVLR, Cologne DM 9.50

A short backfire antenna with four feeding elements was developed for airborne applications. The specifications and the design of the antenna are presented. The technical performance and the sizing of the antenna are described. ESA

N86-28308# Bundesministerium fuer Wissenschaft und Forschung, Vienna (Austria).
SATELLITE COMMUNICATION TECHNIQUES. FUNDAMENTALS, SYSTEMS, AND PROJECTS [SATELLITENNACHRICHTENTECHNIK GRUNDLAGEN, SYSTEME UND PROJEKTE]
W. Lothaller May 1985 285 p In GERMAN Sponsored by Bundesministerium fuer Wissenschaft und Forschung, Austrian Post- und Telegraphenverwaltung, Bundeskammer der gewerblichen Wirtschaft, Vereinigung Oesterreichischer Industrieller, Austria Metall AG, Elin Union AG, Oesterreichische Raumfa
(ESA-86-96937) Avail: NTIS HC A13/MF A01

Worldwide projects involving communication satellites are reviewed, emphasizing technical aspects, tasks, and realization. Satellite communication fundamentals, and boundary conditions in space and their consequences for systems design and satellite construction are explained. European projects and international systems of interest to Austria are presented. The historical development of European communication satellites is depicted. ESA

N86-28309# Rijksluchtvaartdienst, The Hague (Netherlands).
FUTURE AERONAUTICAL COMMUNICATION SYSTEM (FACS): REPORT
H. J. Hof Jun. 1985 102 p In DUTCH
(ESA-86-96959) Avail: NTIS HC A06/MF A01

The feasibility of a FACS design, particularly with regard to application possibilities of satellites, was investigated. It was assumed that communication between airborne stations and air traffic control centers is exclusively possible via satellites using mainly voice communication (possibly completed by data communication). It is concluded that integration possibilities of satellites are mainly limited by the airborne antenna chosen. As a solution, phase steered microstrip antenna arrays are presented. However, the use of these antennas is limited to large (long-distance) aircraft. For operational feasibility, it is concluded that communication should take place in the high frequency band. ESA

N86-28310# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
ELECTROMAGNETIC COMPATIBILITY ON PRINTED CIRCUIT BOARDS
L. J. M. Joosten 6 Sep. 1984 19 p In DUTCH; ENGLISH summary Presented at PATO Course on Electromagnetic Compatibility, 14-23 Nov. 1984

(NLR-MP-84087-U; B8578428; ESA-86-96972) Avail: NTIS HC A02/MF A01

Guidelines concerning the design and layout of the wiring on a printed circuit board are outlined. Applications in the digital and analog field for frequencies up to the microwave band are shown. ESA

N86-28311# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

METHODS FOR THE GENERATION OF SIGNALS FOR SUSCEPTIBILITY MEASUREMENTS

O. B. M. Pietersen 4 Sep. 1984 25 p In DUTCH; ENGLISH summary Presented at PATO Course on Electromagnetic Compatibility, 14-23 Nov. 1984

(NLR-MP-84088-U; B8578429; ESA-86-96973) Avail: NTIS HC A02/MF A01

Means to generate interference fields, currents, and tensions in electronic apparatus for the quantitative determination of their susceptibility are presented. Transducers such as magnetic loop antennas, coaxial and microstrip structures to generate high field strength, and specialized electromagnetic interference antennas are discussed. ESA

N86-28312# Uppsala Ionospheric Observatory (Sweden).

STANDING WAVE PATTERN OF HF RADIO WAVES IN THE IONOSPHERIC REFLECTION REGION. PART 2: APPLICATIONS

Bengt Lundborg and Bo Thide 29 Oct. 1985 47 p Sponsored by Swedish Natural Science Research Council

(UIO-SR-85-05-Pt-2; ISSN-0349-2699; ESA-86-97029) Avail: NTIS HC A03/MF A01

General analytical formulas derived within a uniform approximation are utilized for determining the wave pattern of a vertically propagating HF wave totally or partially reflected from the ionosphere. The full three-dimensional wave is calculated accurately, also at the reflection point. Parameter values are typical of ionospheric modification experiments as two sites are chosen. The influence of the geomagnetic field and collisions are properly taken into account but nonlinear and coupling effects are excluded. It is shown that the geomagnetic field affects the wave pattern strongly and leads to a very high swelling in the first wave maximum below the reflection point. ESA

N86-28313# Uppsala Ionospheric Observatory (Sweden).

STRUCTURE OF HF PUMP IN IONOSPHERIC MODIFICATION EXPERIMENTS. LINEAR TREATMENT

Bo Thide and Bengt Lundborg 21 Nov. 1985 21 p Submitted for publication Sponsored by Swedish Natural Science Research Council

(UIO-SR-86-06; ISSN-0349-2699; ESA-86-97030) Avail: NTIS HC A02/MF A01

In order to demonstrate the versatility and flexibility of the uniform approximation technique for solving the problem of propagation of radio waves in an inhomogeneous, collisional, and magnetized plasma, the standing wave pattern of an O-mode radio wave reflected from an ionospheric Chapman layer is calculated. Comparisons with results obtained from standard formulas show the superiority of the uniform approximation method. The derivation of the accurate analytic uniform approximation formulas is motivated by the need for a detailed analysis of nonlinear wave phenomena induced by the electromagnetic pump in ionospheric modification experiments. ESA

N86-28314# Research Inst. of National Defence, Linkoeping (Sweden).

ADAPTIVE ANTENNAS: MEASUREMENTS ON A TWO-ELEMENT FIX-FREQUENCY SYSTEM IN REAL TERRAIN

Boerje Asp Dec. 1985 49 p Sponsored by Swedish Material Administration of Armed Forces Air Material Department

(FOA-C-30404-E2; ISSN-0347-3708; ESA-86-97037) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, Sweden KR 50

Field measurements on a two-element fix-frequency adaptive system, PV2413A, for 30 to 88 MHz are described. In open fields the system acts very well. In woodland there are cases with impaired cancellation as a result of the multipath environment, but the PV2413A sometimes works better in woodland relative to the open field case. Cancellation depths of 30 to 60 dB are obtained. The measurements were made with a two-element system on a vehicle with three antenna elements. Comparing results from the various combinations shows that an adaptive system with three antenna elements is better suited to manage heavy multipath fading. ESA

N86-28315# Research Inst. of National Defence, Linkoeping (Sweden).

AN INVERSE METHOD FOR THE PROCESSING OF SYNTHETIC APERTURE RADAR DATA

Hans Hellsten and Lars Erik Andersson Jan. 1986 22 p

(FOA-C-30413-E1; ISSN-0347-3708; ESA-86-97040) Avail: NTIS HC A02/MF A01; Research Institute for National Defence, Stockholm, Sweden KR 50

An inverse method for SAR signal processing which is independent of the relative bandwidth of the radar signal is presented. It works when the frequency of the emitted radiation is of the same order as the bandwidth, i.e., in low frequency, high resolution applications. It is shown that the obtained relations reduce to the correlation integrals of conventional SAR image processing in the case that the relative bandwidth of the signal is small. Range attenuation and antenna illumination effects may be fully compensated for. ESA

N86-28316# Fondazione Ugo Bordoni, Rome (Italy).

PERFORMANCE ANALYSIS OF THE FRAME STRUCTURE PROPOSED FOR THE HYBRID DIGITAL HIERARCHY

Odoardo Brugia, Emilio Montolivo, and William Wolfowicz Feb. 1985 12 p

(FUB-2-1985; ESA-86-97081) Avail: NTIS HC A02/MF A01

Frame structures and frame alignment criteria proposed for a mixed digital hierarchy employed for international interworking between networks using different multiplexing standards are analyzed. The average alignment holding time (i.e., the average time interval between of frame alignment for a transmission error ratio) the false alignment probability (i.e., the probability of alignment simulation) and the maximum realignment time with 99.7% probability of its not being exceeded are given. ESA

N86-28317# Fondazione Ugo Bordoni, Rome (Italy).

A PUBLIC-KEY CRYPTOSYSTEM BASED ON A GENERALIZATION OF THE KNAPSACK PROBLEM

Adina DiPorto Apr. 1985 9 p Presented at Eurocrypt, Linz, Austria 9-11 Apr. 1985

(FUB-18-1985; ESA-86-97085) Avail: NTIS HC A02/MF A01

A cryptographic algorithm, based on a generalization of the knapsack problem, which allows encryption of multilevel digit sequences and provides attractive performances from the point of view of secrecy is proposed. A modified algorithm which is much harder to break is presented. The modified algorithm increases security owing to the necessity of factoring large numbers. Both algorithms require generation of large numbers to get a good level of security. ESA

N86-28318# European Space Agency, Paris (France).

INVESTIGATION OF SIGNAL DEGRADATION BY SCATTERING AND ITS SUPPRESSION IN NEAR-GROUND RADAR CROSS SECTION MEASUREMENTS

Karl-Heinz Bethke Jan. 1986 76 p Transl. into ENGLISH from "Untersuchungen zur Stoerstreuung und Methoden zu deren Unterdrueckung bei Bodennahen Radarrueckstrahlmessungen" Oberfaffenhofen, West Germany Original report in GERMAN previously announced as N86-15539

(ESA-TT-967; DFVLR-FB-85-42; ESA-86-96855) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 22

Radar scattering on level ground and edge diffraction in near-ground measurements are discussed. The suppression of

ground reflections by screening fences is considerably improved by mounting additional diffracting metal strips parallel to the top of the fences. Starting with the Fresnel diffraction, a dimensioning procedure for an optimum design for these strip grids with respect to the required homogeneity of the field at the location of the object to be measured is developed. The practical improvement obtained by using strip grids is demonstrated by taking radar cross section measurements on a metal target with pronounced anisotropic backscatter characteristics. ESA

N86-28319# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
OPTIMIZED TE01-TO-TM11 MODE CONVERSION IN HIGHLY OVERMODED CIRCULAR WAVEGUIDE AT 70 AND 140 GHz
H. Sturm Jun. 1985 66 p In GERMAN; ENGLISH summary
(IPF-85-5; ESA-86-96923) Avail: NTIS HC A04/MF A01

Mode coupling in bent, oversized, smoothly walled circular waveguides was studied by numerical integration of coupled-mode equations, to optimize high power TE01-to-TM11 mode transducers at 70 and 140 GHZ. Such transducers are used in the mode conversion sequence TE on to TE01 to TM11 to HE11 to generate the linearly polarized HE11 (Gaussianlike) mode from the circular electric TE on gyrotron mode. The balanced HE11 hydrid mode is ideal for electron cyclotron plasma heating in thermonuclear fusion research and for other technical applications. The lowest level of unwanted spurious modes is achieved with sinusoidal curvature distribution instead of constant curvature. The calculated efficiencies of 98.0% at 70 GHZ and 95.2% at 140 GHZ (inner diameter 27.79 mm, ohmic attenuation included) are in excellent agreement with the measured values (97.6% and 95%) respectively. ESA

N86-28320# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany). Fachgebiete: Meteorologie, Ozeanographie, Physik des Erdkoerpers.
RADAR BACKSCATTERING EXPERIMENTS IN A WIND-WAVE TUNNEL ON CLEAN SURFACES ON SURFACES COVERED WITH A SURFACE FILM, IN THE X BAND (9.8 GHz) [RADAR RUECKSTREUEXPERIMENTE AM WIND-WELLEN-KANAL BEI SAUBERER UND FILMBEDECKTER WASSEROBERFLAECHE IM X-BAND (9.8 GHZ)]
Folkart Feindt Hamburg University 1985 238 p In GERMAN
(Rept-75; ESA-86-96926) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38

The average radar backscattering cross section for several conditions and the radar signal modulation due to long waves on clean and film-covered water surfaces were measured. The spectral energy of the Bragg waves was calculated from the measured wave spectra. The damping due to three monomolecular surface films with different physical properties was determined. The degree and phase of the wave-radar modulation transfer function were measured for several wind velocities, incidence angles, polarizations, and antenna viewing directions. ESA

N86-28321# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
REPORT FROM THE SYMPOSIA ON ANTENNAS AND PROPAGATION
Stefan Mattsson Dec. 1985 90 p Partly in ENGLISH and SWEDISH Proceedings of ISAP, Kyoto, Japan, 20-22 Aug. 1985 and ISAE, Beijing, China, 26-28 Aug. 1985
(FOA-C-30409-E2; ISSN-0347-3708; ESA-86-97038) Avail: NTIS HC A05/MF A01; Research Institute of National Defence, Stockholm, KR 50

Communications including shortwave; mobile radio; radiolink; satellite networks; and array, microstrip, adaptive, and reflector type antennas; surface and underground antennas; and waves were treated. Rain attenuation was discussed. Multipath propagation on radiolinks, and the interference between terrestrial links and satellite links were considered. ESA

N86-28350# Kaiserslautern Univ. (West Germany). Lehrstuhl fuer Grundlagen der Elektrotechnik.
DIGITAL CORRELATION PROCESSORS FOR SPREAD-SPECTRUM-COMMUNICATION-SYSTEMS
Hans-Joachim Fischer and A. Baier *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28353# Physics and Electronics Lab. TNO, The Hague (Netherlands).
REAL-TIME DIGITAL MATCHED FILTER FOR RADAR PULSE COMPRESSION
J. Wiltschut and G. A. Breems *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 8 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28355# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
HIGH SPEED DIGITAL IMAGE PROCESSING FUNCTIONS FOR A REALTIME SYNTHETIC APERTURE RADAR PROCESSOR
Roland Schotter and Horst Froelich *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28356# Standard Telecommunication Labs. Ltd., Harlow (England).
A SYSTOLIC ARRAY FOR HIGH PERFORMANCE ADAPTIVE BEAMFORMING
C. R. Ward and P. J. Hargrave *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28357# Communications Research Centre, Ottawa (Ontario).
PROCESSING REQUIREMENTS FOR RADAR DIGITAL BEAMFORMING
J. Litva *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 16 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28368# Royal Signals and Radar Establishment, Malvern (England).
ADVANCED SIGNAL PROCESSING TECHNOLOGY FOR FUTURE RADAR SYSTEMS
C. Pell, A. C. Fairhead, and M. B. Thomas *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 15 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28426*# Genoa Univ. (Italy).
NATURAL ELF NOISE EVALUATION FOR TSS EMISSIONS DETECTION ON THE EARTH'S SURFACE. THE ELECTRIC FIELD COMPONENT APPROACH
Giorgio Tacconi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 421-430 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28427*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. Fisica Spazio Interplanetario.
SPONTANEOUS RADIATION EMITTED BY MOVING TETHERED SYSTEMS
Marino Dobrowolny *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 431-439 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28429*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
PLASMA CONTACTOR PERFORMANCE CHARACTERIZATION
Paul Wilbur *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 483-498 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28496# Technische Univ., Graz (Austria). Inst. for Image Processing and Computer Graphics.
RADARGRAMMETRIC ASPECTS OF SAR DATA EVALUATION
J. Raggam, G. Triebnig, M. F. Buchroithner, G. Domik (Vexcell Corp., Boulder, Colo.), and F. W. Leberl *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 57-64 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

N86-28497# Technische Univ., Graz (Austria). Inst. for Navigation.
SYNTHETIC APERTURE RADAR (SAR) PRODUCT SIMULATION
Ph. Hartl, A. Popella (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), and A. J. Sieber *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 65-72 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-28322*# Novar Electronics Corp., Barberton, Ohio.
NEAR FIELD TO FAR FIELD TRANSFORMATIONS AND MULTIPLE BEAM FORMING AND STEERING Final Report
19 Nov. 1984 72 p
(Contract NAS9-16985)
(NASA-CR-171935; NAS 1.26:171935) Avail: NTIS HC A04/MF A01 CSCL 09C

The feasibility of acoustic verification of microwave near field to far field transformation algorithms using the Phased Array Sonic Simulation System was studied. Existing electromagnetic near field measurement techniques and transformation algorithms (equations) were investigated. It was analytically determined that acoustic verification is valid. Acoustic simulation of electromagnetic near field to far field transformations is emphasized. The acoustic simulation of electromagnetic near field to far field transformation is verified for the modal expansion method. In the modal expansion method, data from antenna near field measurements are converted to a summation or spectrum of modes corresponding to wave numbers in the measurement coordinate system. Fourier transformation of those measurements preserves the far field information in a spectral form that is then readily extractable. E.R.

N86-28323*# SRI International Corp., Menlo Park, Calif.
THERMIONIC NOISE MEASUREMENTS FOR ON-LINE DISPENSER CATHODE DIAGNOSTICS FOR LINEAR BEAM MICROWAVE TUBES Final Report, Feb. 1984 - Aug. 1985
Christopher Holland and Ivor Brodie Aug. 1985 48 p
(Contract NAS3-23777; SRI Proj-6923)
(NASA-CR-175105; NAS 1.26:175105) Avail: NTIS HC A03/MF A01 CSCL 09C

A test stand has been set up to measure the current fluctuation noise properties of B- and M-type dispenser cathodes in a typical TWT gun structure. Noise techniques were used to determine the work function distribution on the cathode surfaces. Significant differences between the B and M types and significant changes in the work function distribution during activation and life are found. In turn, knowledge of the expected work function can be used to accurately determine the cathode-operating temperatures in a TWT structure. Noise measurements also demonstrate more sensitivity to space charge effects than the Miram method. Full automation of the measurements and computations is now required to speed up data acquisition and reduction. The complete set of equations for the space charge limited diode were programmed so that given four of the five measurable variables (J, J sub O, T, D, and V) the fifth could be computed. Using this program, we estimated that an rms fluctuation in the diode spacing d in the frequency range of 145 Hz about 20 kHz of only about 10 to the -5 power A would account for the observed noise in a space charge limited diode with 1 mm spacing. Author

N86-28324# Boeing Aerospace Co., Seattle, Wash.
HIGH VOLTAGE PULSE TESTING SURVEY Final Report, 1 Oct. 1984 - 31 Jul. 1985
William G. Dunbar Oct. 1985 60 p
(Contract F33615-81-C-2013)
(AD-A165666; AFWAL-TR-85-2079) Avail: NTIS HC A05/MF A01 CSCL 10/2

The purpose of this work was to lay the technical groundwork necessary to establish new guidelines for high voltage pulse testing waveform parameters, test requirements, test procedures and test limits with respect to insulation characteristics in advanced, high power airborne components. This work has been initiated via this survey which reviews government, industrial and technical society literature concerning impulse and/or pulse testing of military, commercial, and experimental equipment. The survey details the test pulse rise time, dwell time, fall time, and peak voltage applied to evaluate the insulation systems typically found in electrical/electronic aerospace components. Based on the survey findings, a complete specification for a suitable pulse testing apparatus to accomplish such tests is provided. GRA

N86-28325# Royal Signals and Radar Establishment, Malvern (England).
FORMAL PROOF OF CORRESPONDENCE BETWEEN THE SPECIFICATION OF A HARDWARE MODULE AND ITS GATE LEVEL IMPLEMENTATION
C. H. Pygott Nov. 1985 68 p
(AD-A165696; RSRE-85012) Avail: NTIS HC A04/MF A01 CSCL 09/5

The growing use of digital circuits in safety critical environments and the cost of correcting mistakes in large scale integrated circuits, both lead to a requirement for a high level of confidence in the correctness of the design of micro-electronic elements. This paper describes a novel application of a general hardware description language that enables the implementation of a synchronous circuit to be checked exhaustively against a high level, implementation independent, specification of its functionality (originally written in a formalism such as first order predicate calculus). The technique avoids the cost, in simulation time, usually associated with exhaustive checking. The method is illustrated by examples written in the design and description language ELLA: no prior knowledge of ELLA is assumed. Included in the annexes to this paper are a library of ELLA functions that provide those facilities required for the validation of circuits, and the translation of specifications written in the first order predicate calculus language LCF-LSM into ELLA. GRA

N86-28326# Naval Ocean Systems Center, San Diego, Calif.
SUGGESTIONS FOR DESIGNERS OF NAVY ELECTRONIC EQUIPMENT. REVISION A. 1985 EDITION
May 1985 158 p
(AD-A165697; NOSC/TD-250-REV-A) Avail: NTIS HC A08/MF A01 CSCL 09/5

The engineer is provided with common sense recommendations which will increase the reliability of a system in military environments and provides suggestions which will make operation

and maintenance of these equipments easier for Navy personnel. GRA

N86-28327# Washington Univ., Seattle. Dept. of Computer Science.
UW/NW (UNIVERSITY OF WASHINGTON/NORTHWEST) VLSI CONSORTIUM Semiannual Technical Report, 1 Oct. 1985 - 17 Mar. 1986
Lawrence Snyder 17 Mar. 1986 43 p
(Contracts MDA903-85-K-0072; ARPA Order 4563)
(AD-A165748; TR-86-23-02; SATR-2) Avail: NTIS HC A03/MF A01 CSCL 09/5

This document reports on the research activities of the UW/NW VLSI Consortium. During this period, the Consortium staff refined a number of the design generators reported on in the last Technical Report. Two substantial design efforts, a 32 bit microprocessor and a digital filter, utilized several of the generators. Ongoing work focuses on development of interfaces to verification tools such as the DRC and switch level simulators, as well as a functional simulator currently under development. Such interfaces allow the verification tools to make use of the correctness of instances created by generators. A preliminary model for generator construction has been proposed. The intent of the model is to provide a concise specification of the circuit from which a number of output descriptions such as the layout, schematic and transistor netlist may be derived. The model has been applied to both a decoder and a multiplier generator. Work is progressing on a simulation system intended to provide a broad range of capability - from high level behavioral modeling to low level transistor modeling. The system is intended to be used to simulate assemblies of circuits produced by the design generators as well as hand crafted circuits. GRA

N86-28328# New Mexico Univ., Albuquerque.
PREPROCESSING TECHNIQUES FOR THE ESTIMATION OF PARAMETERS FROM NOISY TRANSIENT DATA Final Report, Jul. 1984 - Jul. 1985
Sung-won Park Jan. 1986 77 p
(Contract F29601-84-K-0045)
(AD-A165764; AFWL-TR-85-102) Avail: NTIS HC A05/MF A01 CSCL 09/3

Two kinds of pole estimators for given noisy transient data are presented. One is a SVD-based method and the other is the iterative preprocessing algorithm (IPA). The SVD method estimates the characteristic equation coefficients from the weakest eigenvectors when the system order is overdetermined. The IPA is shown to converge to the maximum-likelihood estimator for some range of SNR. It not only reduces the computational burden of the currently existing iterative algorithms but also improves stability. The approximate IPA (AIPA), which further reduces the computational burden, is described. The Cramer-Rao lower bound for the system characteristic equation coefficients is calculated. The IPA is extended to pole estimation for given multiple data sets. This technique is applied to estimating the natural frequencies of an electromagnetic scatter. An iterative scheme is described for estimating other parameters of the singularity expansion method (SEM) formalism. GRA

N86-28329# Battelle Columbus Labs., Ohio.
EXTENDED ABSTRACTS: SEVENTH BATTERY AND ELECTROCHEMICAL CONTRACTORS' CONFERENCE
D. Sheppard, comp. and J. Hurwitch, comp. Nov. 1985 329 p
Presented at the Annual Battery and Electrochemical Energy Storage Contractors' Meeting, Washington, D.C., 18 Nov. 1985
Prepared in cooperation with Pacific Northwest Labs., Richland, Wash.
(Contract DE-AC06-76RL-01830)
(DE86-003019; CONF-851146-Absts) Avail: NTIS HC A15/MF A01

Seventy-two papers presented at the Seventh Battery and Electrochemical Contractors' Conference are arranged under the following session headings: EPRI storage program, review of key program activities, sodium/sulfur battery development, advanced battery research (two sessions), flow battery development, sodium/sulfur battery research, systems analysis and technology transfer, performance and testing (two sessions), flow battery research, metal/air batteries, and fuel cells. DOE

N86-28330# Lawrence Livermore National Lab., Calif.
ALUMINUM-AIR POWER CELL: THE M4-CELL ASSEMBLY AND INITIAL TESTS
A. Maimoni, S. A. Muelder, and W. C. Hui 3 Oct. 1985 46 p
(Contract W-7405-eng-48)
(DE86-003182; UCID-20495) Avail: NTIS HC A03/MF A01

We fabricated, assembled, and tested the modular, wedge-shaped M4 Aluminum-Air Power Cell in a system with a fluidized-bed crystallizer and hydrocyclone separator. Two M4-cell experiments validated the design premises and indicated predictable performance. The combined duration of the M4-1 and M4-2 experiments was almost 9 h. Conductive epoxy bonds are inadequate for bonding the air-cathode metal screen to current collectors; soldered joints using low melting (93°C) Indium solder performed satisfactorily. Both experiments were terminated because of problems directly traceable to metallic tin deposited by the stannate corrosion inhibitor. Apart from problems caused by metallic tin, the M4-2 test system performed very satisfactorily. Individual cell pods are readily assembled into single or multicell stacks; it is easy to disassemble the cells after a run to determine cell condition. Air-cathode assembly is the most cumbersome aspect of the M4 cell. We obtained valuable information regarding the evolution of particle-size distribution. We did not observe substantial agglomeration of the smaller crystals. A simple model of secondary nucleation gave a reasonably good fit to the secondary nucleation observed in the M3-3 experiment. DOE

N86-28331# Sandia National Labs., Albuquerque, N. Mex.
EXPLORATORY BATTERY TECHNOLOGY DEVELOPMENT AND TESTING REPORT FOR 1984
N. J. Magnani, R. P. Clark, D. M. Bush, P. C. Butler, J. L. Chamberlin, J. M. Freese, K. R. Grothaus, K. D. Murphy, and P. E. Shoemaker Oct. 1985 97 p
(Contract DE-AC04-76DP-00789)
(DE86-003188; SAND-85-1446) Avail: NTIS HC A05/MF A01

Sandia National Laboratories, Albuquerque, has been designated as Lead Center for the Exploratory Battery Technology Development and Testing Project, which is sponsored by the US Department of Energy's Office of Energy Storage and Distribution. In this capacity, Sandia is responsible for the engineering development of advanced rechargeable batteries for both mobile and stationary energy storage applications. This report details the technical achievements realized in pursuit of the Lead Center's goals during calendar year 1984. DOE

N86-28332# Argonne National Lab., Ill.
TESTING AND DEVELOPMENT OF ELECTRIC VEHICLE BATTERIES FOR EPRI ELECTRIC TRANSPORTATION PROGRAM Technical Report, Nov. 1982 - Dec. 1984
Nov. 1985 106 p
(Contract W-31-109-eng-38)
(DE86-004178; ANL/OEPM-85-4) Avail: NTIS HC A06/MF A01

Argonne National Laboratory conducted an electric-vehicle battery testing and development program for the Electric Power Research Institute. As part of this program, eighteen battery modules previously developed by Johnson Controls, Inc. were tested. This type of battery (EV-2300 - an improved state-of-the-art lead-acid battery) was designed specifically for improved performance, range, and life in electric vehicles. In order to obtain necessary performance data, the batteries were tested under various duty cycles typical of normal service. This program, supported by the Electric Power Research Institute, consisted of three tasks: determination of the effect of cycle life vs peak power and rest period, determination of the impact of charge method on cycle life, and evaluation of the EV-2300 battery system. Two supporting studies were also carried out: one on thermal management of electric-vehicle batteries and one on enhanced utilization of active material in lead-acid batteries. DOE

N86-28333# Oak Ridge National Lab., Tenn.
IFSMTF EXPERIENCES AND CONCLUSIONS REGARDING THE USE OF KAPTON INSULATED, HIGH-VOLTAGE CABLE IN A VACUUM/CRYOGENIC ENVIRONMENT
C. T. Wilson, Jr., J. N. Luton, Jr., and S. S. Shen 1985 3 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003808; CONF-851102-46) Avail: NTIS HC A02/MF A01

This paper describes the experiences of the International Fusion Superconducting Magnet Test Facility (IFSMTF), formerly called the Large Coil Test Facility, with regard to the use of Kapton insulated cable for high-voltage instrumentation within the IFSMTF vacuum vessel. Initial high-performance tests performed on the General Dynamics electrical system were disappointing and led to the philosophy and technology associated with the use of Kapton insulated cable. DOE

N86-28334# Zeiss (Carl), Oberkochen (West Germany). Instrumentenbererich Entwicklung elektronenoptisch
ELECTRON GUN Final Report, Mar. 1983
Dieter Kurz Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 46 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-144; ISSN-0340-7608; ESA-86-96896) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.50

A 100 kV electron gun with field emission electrode for analytical electron microscopy was improved. A tetrode concept was used to obtain brightness values of 100 million to 1 billion A/sq cm. Using a ceramic insulator, safe control of the accelerating voltage without misdischarges is assured. The basis for routine and automated operation of the gun is provided by the use of integrated electronics at high voltage; safe protection of these modules in the case of discharges; and protective measures for the sensitive field emission tungsten cathode tip. Results show a brightness of three orders of magnitude higher than that of thermal systems. ESA

N86-28335# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
HOW TO PROTECT HARDENED FACILITIES FROM VERY HIGH LEVEL TRANSIENTS INDUCED ON POWER LINES BY LIGHTNING OR EMP
G. Perroton 1986 5 p Presented at Intern. Symp. on Electromagnetic Compatibility, Wakefield, Mass., 20-22 Aug. 1985
(SNIAS-861-422-105; ESA-86-97162) Avail: NTIS HC A02/MF A01

It is shown that in very severe environments due to lightning or EMP, classical protection devices with arresters may not be sufficient. Three systems are described: an insulating shaft system; a hydraulic system; and a fast circuit shorter. The first two systems are relatively independent of the specification of the threat and do not need to calculate the precise characteristics of the transients. The last device has the advantage of giving significant improvement of an existing protection. ESA

N86-28336# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
DESCRIPTION OF AN ELECTRONIC EQUIPMENT FOR THE BOFORS JOYSTICK [BESKRIVNING AV ELEKTRONIK TILL BOFORS STYRSPAK]
Lars A. Lekzen Jan. 1986 16 p In SWEDISH; ENGLISH summary
(FOA-C-20593-E3; ISSN-0347-3694; ESA-86-97034) Avail: NTIS HC A02/MF A01

The electronic unit supplies power to the joystick which has two detection (N-S and E-W) axes, and also handles the output signals from the joystick and transforms them to analog signals suitable for an A/D converter for further computerized treatment. An effect oscillator was built, giving a maximum voltage of 8 V. As the Bofors stick requires a feeding at 24 V, 400 Hz, a transformer must be used. The differential voltages from the stick are brought to the phase demodulators, one for each detection axe. ESA

N86-28337# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Avionics Panel.
THE IMPACT OF VERY HIGH PERFORMANCE INTEGRATED CIRCUITS ON RADAR, GUIDANCE AND AVIONICS SYSTEMS
Loughton, England Aug. 1985 396 p In ENGLISH and FRENCH Symposium held in Lisbon, Portugal, 20-25 May 1985
(AGARD-CP-380; ISBN-92-835-0379-1) Avail: NTIS HC A17/MF A01

Advances with silicon integrated circuit technology have demonstrated the feasibility of very large scale integration with gate densities of 10 to the 5th power/sq cm and with functional throughput rates in excess of 10 to the 12th power gate Hz/sq cm. These advances offer the prospect of compact, low power consumption, high throughput processors in a wide variety of roles throughout military electronic systems. This symposium aimed to involve integrated circuit experts who reviewed ththeir current and projected capabilities, circuit and subsystems designers who are exploiting the technology in implementing sophisted processing and data manipulation techniques and who reported on their progress, and system designers who described applications addressed by the advancing technology. For individual titles, see N86-28338 through N86-28374.

N86-28338# Naval Research Lab., Washington, D. C.
VHSIC TODAY AND TOMORROW
David O. Patterson and E. D. Maynard, Jr. (Office of the Under Secretary of Defense for Research and Engineering, Washington, D. C.) *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 4 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The origin and objectives of the U.S. Department of Defense Very High Speed Integrated Circuits (VHSIC) Program are discussed. This document describes the several phases of the program schedule and give the status of each. The phase 1 contractors, their approaches, and highlights of the Phase 1 chip sets are given. Supporting programs ranging from design and fabrication to implementation are presented. The contractors of the Phases 2 submicron technology effort are listed with their projected results. Finally the technology insertion effort is discussed, listing some systems being implemented and the payoffs of the VHSIC program. Author

N86-28339# Department of Trade and Industry, London (England). Alvey Directorate.
VHPIC AND THE UK ALVEY PROGRAMME
W. Fawcett *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Very high performance silicon integrated circuits (VHPIC) will be vital to future defense systems. In the UK, the required technology is being developed in the Alvey program and will be exploited in a Ministry of Defense VHPIC application demonstrator program. The organization and objectives of these programs are described in this paper. Author

N86-28340# Ferranti Electronics Ltd., Oldham (England).
BIPOLAR VLSI TECHNOLOGY
D. L. Grundy *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 14 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The fundamental aspects of speed, power dissipation, linear capability, nuclear radiation tolerance and manufacturability are discussed for bipolar VLSI technology. Ultimate speed limits for VLSI technology are considered. It is suggested that bipolar technology may ultimately prove to offer the lowest power dissipation for a given speed. Of increasing interest to users of VLSI chips is linear capability and the fundamental factors

influencing linear performance. The performance of bipolar technology in the nuclear environment is discussed. MOST and bipolar technologies are compared. Finally, the practical ultimate limits of complexity for VLSI chips are discussed and the problems associated with achieving acceptable manufacturing yields are explored. Author

N86-28341# TRW Electronics and Defense Sector, Redondo Beach, Calif. Microelectronics Center.
THE FUTURE OF BIPOLAR TECHNOLOGY FOR AVIONICS
Barry Dunbridge *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

In the past 25 years, silicon integrated circuit (IC) device technology has been heavily utilized in military and avionics systems due to primary advantages in availability, versatility, environmental ruggedness/reliability, and speed/frequency performance. Silicon n-channel metal oxide semiconductor (NMOS) technology has also rapidly developed and has been dominant for commercial applications due to its previous advantages of cost and density in modest environments, especially for standard memory and microprocessor functions. Complementary metal oxide semiconductor (CMOS) LSI/VLSI has more recently rapidly emerged as the dominant MOS device technology of the future. The long held speed performance advantage of silicon bipolar ICS is also being challenged by the superior switching speed of GaAs field-effect transistor (FET) ICs. The question arises as to the future competitiveness and role of silicon bipolar. The question is further examined in this paper, especially for future avionics systems applications having heavy realtime digital signal processing requirements. B.W.

N86-28342# Ruhr Univ., Bochum (West Germany). Inst. fuer Elektronik.
MONOLITHIC SILICON BIPOLAR CIRCUITS FOR GIGABIT APPLICATIONS
U. Langmann *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 4 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

This contribution presents examples of Si gigabit circuits for application in wide-band communication systems. Circuits recently implemented in a relatively conventional Si bipolar technology are reported and guidelines for the design of high-speed bipolar ICs are given. Performance data are compared to those of bipolar ICs using self-aligned process technologies. Author

N86-28343# Hughes Aircraft Co., El Segundo, Calif. Technology Dept.
HIGH LEVERAGE GaAs INTEGRATED CIRCUITS FOR MILITARY SYSTEMS
John T. Mendel *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 15 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

During the past fifteen years a substantial amount of funding has been devoted to the research and development of GaAs devices and circuits primarily by the space and military sectors of the U.S. Government. The remarkable characteristics of this compound semiconductor in terms of speed, radiation hardness, and the potential for low power consumption has caused many investigators to regard GaAS as a successor to silicon in high performance circuits for military applications. In spite of this promise there exists today very little usage of GaAs in military systems with the exception of discrete microwave FETs and IMPATT diodes. Fundamental problems of material growth and processing technologies have created formidable barriers to the rapid exploitation of the III-V compounds except at levels of small scale integration. However, for very demanding military applications GaAs still remains the basic hope for the future. Particularly in the area of preprocessing for radar and EW systems the speed requirements are well beyond the capabilities of silicon. The unique capabilities of GaAs devices are discussed and their continued use in military applications is highlighted. Author

N86-28344# Sandia National Labs., Albuquerque, N. Mex.
A COMPARISON OF THE RADIATION HARDNESS OF VARIOUS VLSI TECHNOLOGIES FOR DEFENSE APPLICATIONS
C. F. Gibbon *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 8 p Previously announced as N85-30236 (For primary document see N86-28337 19-33)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A17/MF A01

In this review the radiation hardness of various potential very large scale (VLSI) IC technologies is evaluated. IC scaling produces several countervailing trends. Reducing vertical dimensions tends to increase total dose hardness, while reducing lateral feature sizes may increase susceptibility to transient radiation effects. It is concluded that during the next decade at least, silicon complimentary MOS (CMOS), perhaps on an insulating substrate (SOI) will be the technology of choice for VLSI in defense systems. Author

N86-28345# Rome Air Development Center, Hanscom AFB, Mass. Solid State Sciences Div.
THE IMPACT OF VLSI ON INTEGRATED CIRCUIT RADIATION HARDNESS
Bobby L. Buchanan *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The important constituents of energetic radiation and the effects of the radiation on semiconductor devices and integrated circuits are briefly summarized. The basic silicon material and device parameters which are sensitive to energetic radiation and can be controlled by the IC designer are delineated. The trends of the variation of hardness with the level of integration for commercial MOS and bipolar integrated circuits are examined. It is shown theoretically how the hardness will vary as a function of device size for total ionizing dose, ionizing dose rate, and single particle (cosmic ray) environments. Contrary to what the trends had been indicating, it is shown that the basic component devices theoretically and actually become more radiation resistant as the devices are scaled down in size for implementing higher levels of integration. However, the parasitic MOS and bipolar devices created in implementing VLSI designs may cause the overall hardness to decrease. The reasons for the radiation hardness of the GaAs integrated circuits are discussed and put into perspective with the silicon technology. Author

N86-28346# Plessey Co. Ltd., Romsey (England).
HARDWARE AND ARCHITECTURE DESIGN OF VLSI SYSTEMS
Brian G. Marchent and David F. Burrows *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 11 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

An outline of a design methodology is presented. This methodology enables the system designer to capitalize upon the opportunities offered by advances in digital semiconductor technology without being overwhelmed by the VLSI complexity management problem. The paper commences with a brief description of a typical enabling technology, in this case Plessey Megacell. Then the areas to which this technology can be applied are suggested and illustrated by reference to a Radar System. A large gap is shown to exist in terms of complexity between the basic building blocks of a VLSI device and the sub systems into which a Radar is typically decomposed in the first attempt at design partitioning. In order to be able to put the Radar system onto VLSI, a structured, hierarchical approach is shown to be necessary. The building blocks of each stage in the design process are proposed and finally the design task itself is described which,

at the lower level in the sub system design process, will consist of the structured instantation, parameterization and interconnection of the hierarchical building blocks. Author

N86-28347# Rome Air Development Center, Griffiss AFB, N.Y. Reliability and Compatibility Div.
THE USE OF FAULT TOLERANT AND TESTABLE HIGH PERFORMANCE INTEGRATED CIRCUITS FOR IMPROVED MILITARY ELECTRONIC SYSTEM AVAILABILITY
John J. Bart *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 4 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The rapid evolution of high performance Very Large Scale Integrated Circuits (VLSICs) has resulted in accelerated opportunities for improving the operational performance of military electronic systems. In addition, the microelectronics technology base also holds the promise of providing improvements in the operational availability, survivability and logistics supportability of these complex systems. The basics for these advances lies in the ability to design microelectronics based systems which are much more fault tolerant and more easily testable than those which have been developed to date. The current activities in the design of testable/fault tolerant integrated circuits are reviewed and areas for future emphasis are suggested. Author

N86-28348# Electronique Serge Dassault, St. Cloud (France).
VLSI CONTROL STRUCTURES [STRUCTURES DE CONTROLE DANS LES V.L.S.I.]
G. Vallas *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p In FRENCH; ENGLISH summary (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

After some illustrated examples of the technological progress made in the past 30 years, this report shows the objectives for VLSI technology in the future, particularly for military applications (radar and homing devices) as well as the control of these circuits. The objectives for VLSI technology research are shown to include: satisfying the needs for the 90's; using suitable technology to reduce the cost; and increasing the efficiency by using appropriate system architecture. Author

N86-28349# Rensselaer Polytechnic Inst., Troy, N.Y. Center for Integrated Electronics.
GALLIUM ARSENIDE WAFER SCALE INTEGRATION
J. F. McDonald, G. Taylor, R. Steinvorth, B. Donlan, and A. S. Bergendahl *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 14 p Sponsored in part by the Fannie and John Hertz Foundation, and by IBM VLSI Fellowship (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Gallium Arsenide (GaAs) digital MESFET technology has recently begun to appear in the semiconductor marketplace. The initial commercial offerings are at the small to medium scale integration levels. The high speed of these parts would seem to be very attractive for designers of high performance signal processing equipment. Persistent yield problems, however, have prevented the appearance of large scale integrated circuits. As a result, intrapackage and interpackage signal propagation problems such as coupling, parasitics and delay are likely to negate much of the benefits of the fast MESFET logic devices for large systems constructed with such small scale building blocks. An early packaging concept, Wafer Scale Integration (WSI), which could possibly be used to address some of these limitations is reexamined. Author

N86-28350# Kaiserslautern Univ. (West Germany). Lehrstuhl fuer Grundlagen der Elektrotechnik.
DIGITAL CORRELATION PROCESSORS FOR SPREAD-SPECTRUM-COMMUNICATION-SYSTEMS c32
Hans-Joachim Fischer and A. Baier *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Some important correlators are presented and examined with respect to their applicability in spread-spectrum systems. The most suitable correlators are SAW TDL Filters, SAW Convolvers and Digital Matched Filters. The SAW devices have good performance and need only little space. Digital devices are easy to handle but hitherto suffer from a compromise between signal width, signal length and correlation rate. Nevertheless digital correlators are of great interest considering the advances in semiconductor technology. Two compact Digital Matched Filters for binary reference signals are presented, which show the possibilities of quantized recieved signals. The first DMF, called 4-phase DMF, is used for binarily quantized recieved signals. The second DMF can process received signals, which are quantized much finer. Author

N86-28351# Defence Research Establishment, Ottawa. (Ontario).
A HIGH PERFORMANCE CHIP SET IMPLEMENTATION OF A FINITE IMPULSE RESPONSE FILTER
R. J. Inkol, K. D. Symons, and P. D. Clarke *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The systolic properties of digital signal processing algorithms can most easily be exploited by specialized processors with simple architectures providing considerable parallelism and freedom from bottlenecks in the control and flow of data. The realization of such processors is facilitated by the availability of advanced IC process technologies, coupled with Computer Aided Design (CAD) techniques. A design example for a Finite Impulse Response (FIR) filter is presented. It consists of a small chip set; a multiplier-accumulator, a coefficient memory (consisting of Read Only Memory (ROM) or Random Access Memory (RAM) devices) and a Data Memory/Control Unit (DMCU). The latter, implemented with standard cell techniques, includes a 128 word x 16-bit data memory, generates all system control signals from a few simple external signals, and provides a simple asynchronous interface. The basis design concept is well suited for implementation using advanced technologies. Sub-micron silicon technology would provide improved performance and facilitate a single chip implementation, while gallium arsenide technology offers potential for real-time video signal processing. y would provide improved performance and facilitate a single chip implementation, while gallium arsenide technology offers potential for real-time video signal processing. Author

N86-28352# AEG-Telefunken, Ulm (West Germany). Radar Div.
RADAR SIGNAL PROCESSING WITH HIGH SPEED LSI DEVICES
P. K. Schmitt *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The basic structures of digital processing architectures using fast dedicated VLSI components are shown for two typical coherent signal processing operations: pulse compression and Doppler filtering. It is shown how these can be realized using currently available VLSI components and how future, more highly integrated components could be derived. A key role here is played by chips which perform fast multiplication of complex number pairs. Author

N86-28353# Physics and Electronics Lab. TNO, The Hague (Netherlands).
REAL-TIME DIGITAL MATCHED FILTER FOR RADAR PULSE COMPRESSION c32
J. Wiltschut and G. A. Breems *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 8 p (For primary document see

N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Digital processing of radar signals becomes more feasible by the advances in integrated circuit technology. A programmable matched filter for real-time compression of frequency modulated radar pulses, implemented with high speed LSI/MSI circuits is described. This matched filter, denoted as pulse compressor, forms part of an experimental radar system. The input signal consists of complex samples (2*12 bits) at a 10 MHz rate. The maximum pulse duration is 25 micro-seconds, which results in a time-bandwidth product of 250. The pulse compression is achieved through application of fast convolution with a transform size of 512 and a 50 percent overlap. The pulse compressor has a pipelined structure consisting of similar modules. The data is in 12 bit fixed point format and processing is done by integer arithmetic with block floating point scaling to avoid overflow. The internal data throughput rate is 20 MHz and more than 720 million multiplications per second are executed. Author

N86-28354# AEG-Telefunken, Ulm (West Germany).
MONOLITHIC 6 BIT SUBCONVERTER FOR HIGH SPEED, HIGH RESOLUTION A/D CONVERSION SYSTEMS
F. Beck and G. Bergmann *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 5 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The design of a subconverter for sequential flash A/D converters is presented. The subconverter consists of a 6 bit flash ADC, 64 pipeline latches, a 6 bit (64 current sources) D/A converter and 6 bit data register. It was integrated on a single die utilizing a high speed bipolar process with double layer metallization. Circuit details, simulation results, and chip design are described. Author

N86-28355# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
HIGH SPEED DIGITAL IMAGE PROCESSING FUNCTIONS FOR A REALTIME SYNTHETIC APERTURE RADAR PROCESSOR **c32**
Roland Schotter and Horst Froelich *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Realtime Synthetic Aperture Radar Processing requires high speed implementation of basic image processing functions such as Lowpass/Bandpass Filtering, Correlation/Convolution, Fourier Transformation, Imaging Memories, Interpolation/Resampling, Complex Multiplication/Accummulation and Processing Control. The hardware concept is based on modular processing units which allow the construction of different algorithms by simply combining the appropriate modules of the processing family in a pipeline structure. Each module is designed by taking advantage of the most advanced integrated digital circuits like fast multiplier/accummulators, ALS TTL and High speed CMOS control logic, 64 K/256 K dynamic memories, fast CMOS memories and integrated signal processors. The basic architecture of some of the processing modules (FIR-Filter, Image Memory, FFT/IFFT) will be presented together with the practical results in terms of operational speed, work length, power consumption and board sizes. Additionally, the structure of the realtime SAR Processor based on these processing functions are discussed in detail showing the flexibility of the hardware approach. Author

N86-28356# Standard Telecommunication Labs. Ltd., Harlow (England).
A SYSTOLIC ARRAY FOR HIGH PERFORMANCE ADAPTIVE BEAMFORMING **c32**
C. R. Ward and P. J. Hargrave *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

A new technique for adaptive antenna beamforming is described which provides very rapid adaptation. The technique avoids the explicit computation of the covariance matrix estimate and this results in a reduced sensitivity to limited arithmetic precision. The proposed algorithm may be implemented in an efficient pipeline architecture using a triangular systolic array. Author

N86-28357# Communications Research Centre, Ottawa (Ontario).
PROCESSING REQUIREMENTS FOR RADAR DIGITAL BEAM-FORMING **c32**
J. Litva *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 16 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

An overview is given of the signal processing capabilities of radar DBF systems. Also, a description is given of advances required in existing hardware for implementing real-time signal processing on radar DBF systems. These include antenna elements, monolithic microwave integrated circuits and VLSI. A discussion is given of the advantages of novel architectures, such as systolic arrays or hypercubes using up to 10,000 processing elements. It is shown that the processing for a DBF system follows naturally from a set of basic matrix operations, running from matrix-vector multiplications to singular value decomposition of matrices and that these functions are best implemented using systolic-array type architectures. Finally, results will be presented from an existing near real-time DBF system which is capable of carrying out a 16-point complex FFT in 250 nanoseconds and produces 64 independent radar-beams in 4 microseconds. Author

N86-28358# Norwegian Defence Research Establishment, Kjeller.
TWO-LEVEL DATA-FLOW ARCHITECTURE FOR PROGRAMMABLE SIGNAL PROCESSING **c60**
Yngvar Lundh and Oddvar Sorasen *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Signal processing tasks such as those encountered in radar systems can be highly demanding in terms of computer instructions per second. A multiprocessor architecture called Martinus is described, exploiting complexity to achieve high performance. Complex VLSI circuits are being specially designed for Martinus machines. A reconfigurable network consists of programmable processors, interconnected by buses of very high capacity. The processors may be of different types and can be of more or less task oriented design. One such class of types, Svop, is itself a multiprocessor, comprising a systolic array of programmable processing elements. Martinus-machines can be configured for high capacity. A 120 MIPS machine is in operation. Further developments aim to make capacities beyond 1 GFLOPS practical. The development comprises several application-specific integrated circuits including a bus circuit offering data transmission rates up to 2.5 Gbits/second. The article commences with a discussion of basic limiting factors of high performance computing. Author

N86-28359# Royal Signals and Radar Establishment, Malvern (England).
MIL-DAP: ITS ARCHITECTURE AND ROLE AS A REAL TIME AIRBORNE DIGITAL SIGNAL PROCESSOR **c60**
P. Simpson, J. B. G. Roberts, and B. C. Merrifield *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 18 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Prototypes of a highly programmable digital processor, Mil-DAP, operating in excess of 300 MOPS and occupying less than a cubic foot will be available in 1985. Its architecture consisting of a large array of processing elements, controlled by a single control unit operating in a Single Instruction Muliple Data (SIMD) mode is described in some detail, including the provision of fast data input-output (up to 40 MBytes/sec), data buffering and programmable data reformation such as corner turning. Two programming

languages exist; an assembler language for high efficiency and a higher level parallel form of FORTRAN. The ease of use of both these parallel languages is demonstrated with reference to simple examples. Mil-DAP's performance, size, weight and power consumption suit it well to the wide range of applications encountered in an avionics environment. For example, multimode, radar signal processing incorporating spectral analysis, constant false alarm rate processing and ambiguity resolution; speech recognition as in a voice driven cockpit; electronic support measures where very high speed association and recognition of received pulse information is needed; and reconnaissance image processing, are all potential real time applications. Benchmarks for these are given.
Author

N86-28360# Tridex Systems, Inc., Nepean (Ontario).
A DISTRIBUTED ARRAY SIGNAL PROCESSOR WITH FAULT-TOLERANCE ATTRIBUTES **c60**
E. T. Fathi, C. V. W. Armstrong, K. Q. T. Nguyen, and A. W. Bridgewater (Department of Communications, Ottawa, Ontario) *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 15 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

A fault-tolerant distributed array signal processor designed as a research tool to investigate fault-tolerance in the area of space-based radar signal processing is described here. Such applications require high reliability due to the closed system environment and high performance in order to reduce the bandwidth in data communication. These requirements exceed those required by commercial systems. The system described here is a multiple microprocessor-based system configured as a 3*3 array of identical processing modules. Each module consists of a data and communication subsystem and a signal processing subsystem, employing off-the-shelf state-of-the-art VLSI technology. Each subsystem has its own microprocessor, local program and data memory and operates independently to each other. The two subsystems operate asynchronously and also perform confidence tests on each other's performance. Communication between the processing modules is parallel at high data rates using dedicated DMA channels. A powerful virtual token-passing mechanism manages the arbitration for the parallel busses. The operating system is fully distributed and provides dynamic load sharing.
Author

N86-28361# Mitre Corp., Bedford, Mass.
A REVOLUTIONARY DESIGN METHOD FOR VLSI SIGNAL PROCESSORS
Ronald D. Haggarty, Bruce L. Johnson, and Edward A. Palo *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p Sponsored in part by Mitre Corp., Bedford, Mass. (For primary document see N86-28337 19-33)
(Contract F19628-84-C-0001)
Avail: NTIS HC A17/MF A01

This paper presents a new method of designing digital signal processors for very large scale integrated (VLSI) circuit implementation with residue number systems (RNS), as opposed to the binary number systems traditionally used. In an RNS, a number is represented by its residues, modulo a set of relatively prime integers. The basic operations of modulo addition and multiplication are simpler in RNS because they can be executed independently in each residue class. Consequently, a desired linear function can be executed in a set of parallel channels on a chip, where each channel performs the same calculation modulo the integer used in theat channel. Complexity is thus reduced by two mechanisms. Interconnections between parallel channels are eliminated and all operations are performed modulo the small integer used in each parallel channel of the RNS structure. The square law of circuit complexity applied to this set of small integers results in small, simple circuits. Speed of computation is increased because carry propagation delays are avoided. Further, the RNS design is combined with systolic arrays in such a way that the desired function becomes a parallel set of nearest neighbor--connected identical cells, each of which is minimally complex. The regularity minimizes interconnections and design time--only one master VLSI macrocell that can be optimized and replicated under computer-aided design (CAD) control is needed. In addition, two levels of redundancy can readily be incorporated to achieve concurrent test and fault tolerance: (1) redundant parallel residue channels can be used, and (2) error detection techniques can be efficiently incorporated into each of the systolic array cells that compose the parallel RNS channels.
Author

N86-28362# Hughes Aircraft Co., Canoga Park, Calif.
POTENTIAL IMPACT OF VLSI TECHNOLOGIES ON GUIDED MISSILE DESIGN
Hans A. Maurer and Knut S. Kongelbeck *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 6 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Some aspects of the anticipated impact of emerging VLSI technologies on tactical missiles, present and future generations are discussed. VLSI evolution represents a unique example of a very dynamic and pervasive trend in commercial and military applications. It is our opinion, however, that the characteristics of this trend are quite different in tactical missiles, not only compared to commercial electronics but even to strategic or space missiles. Considering the particular objectives and constraints as they seem common to most tactical guided missiles and smart munitions, the VLSI technologies should be almost tailored to this application. However, there are some perequisites to be considered to make the introduction of VLSIs successful. Here are some examples: careful planning to be in step with the maturity of the VLSI technology, sensible selection of targets for insertion or new designs and - quite importantly - consideration of program stability in terms of volume, rates, and changes. From a technical viewpoint alone, the current trend to light and small, 4- to 8-inch-diameter configuration whether ground or air-launched encourages an early insertion of VLSIs. Electronic packaging with unusual form factors, e.g., having a central hole for warhead effectiveness, high density and low weight, and low power dissipation, poses conflicting requirements to the missile designer. With very few exceptions, such as in magnetics or battery chemistry, the electronics sections cannot benefit from other technological breakthroughs. It is the evolution of monolithic large scale integration of circuits on Silicon and to a lesser degree on Gallium Arsenide which bears the main load to meeting these criteria of processing density at minimum power dissipation, and of providing an ever-increasing functional throughput. Those VLSI embodiments which appear to be most likely to influence missile electronics are defined. They may be divided into four categories, with some ranking indicated regarding their maturity and avaliability, as well as nonrecurring cost weight: (1) Memories (RAM and ROM); (2) Catalog special devices (ADC, DAC, (CP); (3) Semicustom (CGAs); and (4) Full custom. Author

N86-28363# AEG-Telefunken, Ulm (West Germany). Design Center for Integrated Circuits.
CHARGE PROCESSING IN INFRARED CCD-SENSOR-ARRAYS
G. Kohlbacher and P. Nothaft *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 7 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Caused by the rapid progress in solid state technologies, especially in the field of VLSI components, infrared thermal imaging is more and more attractive for a lot of military applications. Tactical missile systems, target aquisition, fire control, airborne threat warning, airborne reconnaissance and spaceborne surveillance besides tank-mounted or man-portable night-vision cameras are important examples for military systems with infrared sensor-arrays. The physical principles of infrared detectors witha sufficient sensitivity and resolution demand an operating temperature in the range of liquid nitrogen, i.e., about 77 K. Due to the low operating temperatures MOS technologies are the best choice for the multiplexer circuits. The system designers need together with the

multiplexer function the ability to integrate the individual detector signals during one frame period. These two functions may be easily combined in Charge Coupled Devices (CCD) and therefore for the most IR sensor-arrays described in the literature CCDs had been used. A CCD is an analog delay line where signals are handles as charge packets, which will be clocked through an arrangement of MOS capacitors. Two methods packets, which will be clocked through an arrangement of MOS capacitors. Two methods of detector-CCD coupling are described. A novel design of a monocithic 32x32 element array with Si:In detectors sensitive in the 3-5 micron range at an operating temperature of 55 k is described. Author

N86-28364# British Aerospace Dynamics Group, Hatfield (England). Software Engineer.

THE IMPLEMENTATION OF IMAGE PROCESSING ALGORITHMS **c60**

D. A. Pellatt *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 8 p (For primary document see N86-28337 19-33)

Avail: NTIS HC A17/MF A01

The purpose of this paper is to describe a specific set of image processing problems, different classes of algorithms applicable to those problems and the efficient implementation of such algorithms using advanced processor architectures. The first section of the paper contains a brief description of the requirements of a typical image processing system operating in a particular scenario. The second section contains descriptions of various algorithms applicable to such a system; the techniques described having been selected in order to demonstrate the contrasting hardware requirements of different types of algorithms. The third, and final, section suggests ways in which the various algorithms may be implemented in Emerging Technology hardware. The applicability of systolic processors, reduction machines and data - flow architectures are discussed. Author

N86-28365# Texas Instruments, Inc., Lewisville.

MISSION BENEFITS OF A VERY HIGH THROUGHPUT IMAGE TRACKER SYSTEM **c61**

Joel K. McWilliams and Jack H. Pridgen *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 9 p (For primary document see N86-28337 19-33)

Avail: NTIS HC A17/MF A01

The launch and leave, air-to-ground, autonomous class of weapons with imaging sensors is considered. Processor throughput is coupled very closely to many areas of system design for this class of weapon. A typical weapon requires midcourse guidance and must search a relatively large uncertainity area by the time it is close enough to the target for reliable detection. The detection processing time is proportional to the number of pixels in the search area. One can alleviate the detection processing time by allowing the imager to have coarse resoltuion, but that is done at the expense of detection range. If the detection range is inadequate, the terminal accuracy will be degraded due to insufficient time for guidance. The situation is that processor throughput limits resolution for searching the uncertainty area, and resolution limits detection range. While increasing the number of resolution elements in a given search area is one way to use additional processor throughput, this paper considers a less obvious way to make use of higher throughput, which is reducting the size of the search area for the mission. This reduction is accomplished by using an imaging tracker system at the st art of midcourse to significantly reduce two of the contributors to the size of the uncertainty area. By using an image tracking system to track the ground immediately after launch, the actual attitude of the boresight with respect to horizontal and vertical can be determined with more precision than it could be by using airframe attitude and gimbal angle measurements. The better boresight reference effectively reduces the uncertainty in both the airframe attitude reference and the measurement of the platform position with respect to the airframe. The equations necessarv to infer true horizontal and vertical from the ground tracking subimage motions are shown. A throughput analysis shows the level of throughput required to solve the equations. The accuracies to which the boresight angle can be measured by this method are shown. The method offers a double benefit, as the reduced search area allows more latitude in other system design trades concerning the use of increase throughput. Author

N86-28366# MATRA Espace, Paris-Velizy (France). Div. Equipements.

A FLOATING POINT PROCESSOR FOR MISSILE GUIDANCE

Francois Plisson and Alain Dantee *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p (For primary document see N86-28337 19-33)

Avail: NTIS HC A17/MF A01

The results of the study for the definition of a new missile guidance, highly integrated processing unit are analysed. An overview of advanced algorithms and software architectures required is given, available technologies are reviewed and the rationale for building a dedicated processor is discussed. The design methodology using the standard cells approach is explained. Data processing needs for missile guidance have increased significantly over past years. These trends are confirmed for the new development, with the introduction of high speed, highly integrated digital circuits. Author

N86-28367# British Aerospace Dynamics Group, Hatfield (England). Dynamics Group.

NEW SYSTEM DESIGN METHODOLOGIES IN THE DESIGN OF MODERN IMAGING MISSILE SYSTEMS STIMULATED BY THE INTRODUCTION OF VLSI DEVELOPMENT TOOLS

A. Dent and G. Briant *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 16 p (For primary document see N86-28337 19-33)

Avail: NTIS HC A17/MF A01

There is a trend towards increasing complexity of modern missile systems, particularly with regard to the guidance algorithms that will be used in future imaging systems. In some applications the use of general purpose computing elements is prohibited because of performance requirements. In these cases dedicated hardware designs are necessary. Increasingly these designs are implemented in semi-custom LSI/VLSI technology. As the use of this type of approach increases there are consequences that propagate into the total missile system design philosophy. Some of the advantages and disadvantages of using these newer design techniques, based on experience gained in the design of advanced imaging guidance systems, are discussed, in particular the architectures associated with image processing. The major advantages of a LSI/VLSI solution, whether a general purpose computing element or a dedicated hardware element are: (1) increased computational performance; (2) Reduced size; (3) Lower cost; (4) Reduced power consumption; and (5) greater reliability. For a one off type development system, and small scale production quantities, the cost of VLSI is always thought to be prohibitive. However, because of the computational performance required when implementing the complex algorithms associated with imaging guidance systems, the architectural advantages associated with VLSI become the dominant factor. For designs of this complexity it is argued that the cost and timescales involved for the LSI approach have significant advantages at the end of the development cycle provided that the appropriate design procedures are adopted. The requirements for a design procedure will be discussed for both the total missile system and the electronic subsystems. Author

N86-28368# Royal Signals and Radar Establishment, Malvern (England).

ADVANCED SIGNAL PROCESSING TECHNOLOGY FOR FUTURE RADAR SYSTEMS **c32**

C. Pell, A. C. Fairhead, and M. B. Thomas *In* AGARD The Impact of Very High Performance integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 15 p (For primary document

see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

This paper reviews and discusses the likely technology requirements of the signal processing functions of future radar systems. The technology considerations are largely confined to digital functions, starting at the analogue-to-digital interface. In order to focus the technology discussion, some of the candidate modes of operation of future radars are stated together with the key processing functions that need to be supported. The processing functions include adaptive array antenna processing and programmable digital pulse compression. Using these functions as examples, assessments have been made of the technology requirements and it is shown that both digital beamforming and digital pulse compression are particularly demanding of fast arithmetic operations such as complex multiplication. The advanced VLSI technology functions that are considered to be most important for future radar processing are discussed. Author

N86-28369# Thomson-CSF, Montrouge (France). Div. Equipements Avioniques.
THE APPLICATION OF HIGH-PERFORMANCE INTEGRATED CIRCUITS FOR AIRPORT FIRE CONTROL RADARS [INTERET DES CIRCUITS INTEGRES DE HAUTES PERFORMANCES POUR LES RADARS AEROPORTES DE CONDUITS DE TIR]
Jean-Claude Marchais *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 4 p In FRENCH; ENGLISH summary (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The number of functional modes needed for airport fire control radars, together with the need for high-performance characteristics, indicates that high-performance integrated circuits will have significant applications in such radar. It is shown that multi-function and multi-mode radars which combine air-to-air combat, air-to-ground and air-to-sea modes will comprise the basis for the next generation of fire control radars. Other applications for such radars are shown to include anti-collision, air navigation and air-to-air pursuit modes. Author

N86-28370# Elektronik-System G.m.b.H., Munich (West Germany).
AN INTEGRATED APPROACH TOWARD RECOGNIZING, LOCATING AND COMBATING TARGETS FROM A MODERN INTERCEPTOR AIRCRAFT
E. G. Meyhoff and H. W. Kloeckner *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 16 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Interceptor aircraft of the future will find themselves in an environment which will not only be significantly more hostile than today but also far more difficult to assess. On the one hand the requirement will be to reduce the detectability of the own aircraft and on the other to enhance the capability of destroying enemy targets. Reduction of detectability can be achieved through a variety of measures such as lowering the radar cross section, the IR emission or the RF emission. Enhancement of the capability to destroy enemy target requires, next to better weapons, longer detection and identification ranges as well as quicker reaction times. Faster reaction times are not only required to gain advantages in combating the designated enemy targets but also to respond to threat situations which may emanate from sources other than the targets. The requirement will exist for an avionic system capable of correlating all relevant data and either reaching decisions itself or presenting the pilot with information in such a way that they support his own making process. This paper describes a typical set of aircraft equipments which would be involved in the data acquisition and decision making processes; it quantifies data volumes and rates and, based on these figures, attempts to define processing and correlation requirements. It then proposes a system architecture which might be suitable for the tasks at hand. The emphasis of the paper will be on assessing the impact of LSI/VHSIC technology on those portions of the avionics system which are utilized in the processes described above. Author

N86-28371# Aeritalia S.p.A., Caselle Torinese (Italy). Gruppo Sistemi Avionici ed Equipaggiamenti.
POSSIBLE IMPACTS OF VHSIC ON MIL-STD-1553B DATA TRANSMISSION MANAGEMENT
L. Berardi and M. Merlano *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 12 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

High performance integrated circuit technologies allow for dramatic improvement in speed and reduction in size of the integrated circuits. This fact results in the possibility to pack in a denser way the computing and decision making functions of the avionics systems. Nevertheless it is still necessary to connect together the various sytem components, spread through the airframe, by means of an interfunction data transmission system. For these reasons the application of the new technologies to a MIL-STD-1553B data transmission system is considered. In particular the data management task allocated to the Bus Controller is described in four increasing levels of complexity, ranging from the minimum requirement to an 'expert' function including an high degree of configurability. The performance obtainable by implementing the functions in the current or new technologies, and with two different architectural solutions, are measured or estimated. The comparison among the obtained results shows that the new technologies not only improve the performances of the data transmission system, but also allow to include an higher degree of intelligence in the function, extending in this way the application of MIL-STD-1553B to future advanced avionic systems. Author

N86-28372# Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.
THE IMPACT OF VHPIC ON AVIONIC SYSTEM ARCHITECTURE, PACKAGING AND MAINTAINABILITY
L. T. J. Salmon and D. E. Oldfield *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 5 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

The advent of high performance integrated circuit technology will have a far reaching effect on avionic systems. Currently, the impact is being mainly felt at a high bandwidth, signal processing level where the benefits are self-evident, however, unless the effect of the technology is considered across the whole of the avionic system then there is little doubt that much of the improved mission effectiveness promised by the new, high bandwidth systems will not accrue. A wider, system level approach is therefore needed which not only encompasses the technical aspects of individual sensors but also considers the remainder of the airborne data processing system and more traditional topics such as maintainability, packaging and architecture. This paper highlights some of the areas in which very high performance integrated circuits (VHPIC) could have a major impact on avionics systems and indicates some of the factors that will need to be considered during the design of future systems. Author

N86-28373# Westinghouse Electric Corp., Baltimore, Md. Advanced Technology Div.
THE IMPACT OF VERY HIGH PERFORMANCE INTEGRATED CIRCUITS ON AVIONICS SYSTEM READINESS
Gene Struil *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 2 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Very high performance integrated circuits (VHPIC) represent more than an integrated circuit technology advance- VHPIC really represents a new systems/technology culture. With a philosophy of top-down design and bottom-up build, a vehicle is provided to avoid rapid obsolescence so prevalent in the fast moving integrated circuit industry. However, to successfully and effectively design advanced systems in this manner, a design methodology is required that adequately addresses the challenge. Since everything from chip definition through application analysis is interactive with

everything else, the challenge is to adequately keep track of all the perimeters and their relationship. The methodology by which design and analysis are accomplished is discussed. The starting point is the systems architecture and its application software. From the architecture and application software the partitioning of the system into appropriate modules can be derived. From this an idea of the integrated circuits needed can be determined. The elements of system readiness are described. They are design, implementation, insertion, maintenance, and (Preplanned Product Improvement). Author

N86-28374# British Aerospace Aircraft Group, Woodford (England). Aircraft Group.
THE IMPACT OF ARTIFICIAL INTELLIGENCE ON AIRBORNE MARITIME RECONNAISSANCE
J. Shepard and R. J. Scott-Wilson *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 14 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

Some of the problems arising out of the introduction of VHPIC to the sensor and data processing systems of Maritime Reconnaissance aircraft are susceptible to solution by conventional computing techniques within mission time constraints. Some may be more susceptible to the use of artificial intelligence techniques. This paper identifies those aspects of artificial intelligence relevant to the Airborne Maritime Reconnaissance task and the areas of the current task where artificial intelligence can be usefully applied. It reviews the current state of the art in the relevant aspects of artificial intelligence and indicates how they might be employed in the near, medium and long term. It indicates some future applications and concludes that, artificial intelligence will play an important role in the future Maritime Reconnaissance aircraft. Author

N86-28282*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SYSTOLIC ARCHITECTURE FOR THE CORRELATION AND ACCUMULATION OF DIGITAL SEQUENCES
L. J. Deutsch and C. R. Lahmeyer *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 09C

N86-28430*# Systems Science and Software, La Jolla, Calif.
THEORY OF PLASMA CONTRACTORS FOR ELECTRODYNAMIC TETHERED SATELLITE SYSTEMS
Donald E. Parks and I. Katz *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings Volume 1 Jun. 1986 p 499-546 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-28375*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FEASIBILITY STUDY OF OPTICAL BOUNDARY LAYER TRANSITION DETECTION METHOD Final Report, 22 Feb. 1983 - 15 Nov. 1985
M. Azzazy, D. Modarress, and J. D. Trolinger Jun. 1986 179 p (Contract NAS1-17293)
(NASA-CR-178109; NAS 1.26:178109; SLD-85-2285-47F) Avail: NTIS HC A09/MF A01 CSCL 20D

A high sensitivity differential interferometer was developed to locate the region where the boundary layer flow undergoes transition from laminar to turbulent. Two laboratory experimental configurations were used to evaluate the performance of the interferometer: open shear layer, and low speed wind tunnel turbulent spot configuration. In each experiment, small temperature fluctuations were introduced as the signal source. Simultaneous cold wire measurements were compared with the interferometer data. The comparison shows that the interferometer is sensitive to very weak phase variations in the order of 0.001 the laser wavelength. An attempt to detect boundary layer transition over a flat plate at NASA-Langley Unitary Supersonic Wind Tunnel using the interferometer system was performed. The phase variations during boundary layer transition in the supersonic wind tunnel were beyond the minimum signal-to-noise level of the instrument. Author

N86-28376*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL SIMULATION OF BOUNDARY LAYERS. PART 1: WEAK FORMULATION AND NUMERICAL METHOD
Philippe R. Spalart Feb. 1986 21 p
(NASA-TM-88222; A-86029; NAS 1.15:88222) Avail: NTIS HC A02/MF A01 CSCL 20D

A numerical method designed to solve the time-dependent, three-dimensional, incompressible Navier-Stokes equations in boundary layers is presented. The fluid domain is the half-space over a flat plate, and periodic conditions are applied in the horizontal directions. The discretization is spectral. The basis functions are divergence-free and a weak formulation of the momentum equation is used, which eliminates the pressure term. An exponential mapping and Jacobi polynomials are used in the semi-infinite direction, with the irrotational component receiving special treatment. Issues related to the accuracy, stability and efficiency of the method are discussed. Very fast convergence is demonstrated on some model problems with smooth solutions. The method has also been shown to accurately resolve the fine scales of transitional and turbulent boundary layers. Author

N86-28377*# Flow Research, Inc., Kent, Wash.
FEASIBILITY OF GENERATING AN ARTIFICIAL BURST IN A TURBULENT BOUNDARY LAYER
Mohamed Gad-el-Hak Washington NASA Aug. 1986 53 p (Contract NAS1-17951)
(NASA-CR-4003; NAS 1.26:4003; Rept-332) Avail: NTIS HC A04/MF A01 CSCL 20D

Artificial bursts were generated in laminar and turbulent boundary layers. The burst-like events were produced by withdrawing near-wall fluid from two minute holes separated in the spanwise direction or by pitching a miniature delta wing that was flush-mounted to the wall. Either of these actions generated streamwise vorticity and a low-speed streak that resembled a naturally occurring one. The resulting sequence of events occurred at a given location and at controlled times, allowing detailed examination and comparison with natural, random bursts by means of flow visualization and fast-response probe measurement techniques. Author

N86-28378*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DIFFUSION FLAME EXTINCTION IN SLOW CONVENCTIVE FLOW UNDER MICROGRAVITY ENVIRONMENT
Chiun-Hsun Chen 1986 16 p Proposed for presentation at the Microgravity Fluid Mechanics Symposium, Anaheim, Calif., 10-11 Dec. 1986; sponsored by ASME
(NASA-TM-88799; E-3137; NAS 1.15:88799) Avail: NTIS HC A02/MF A01 CSCL 20D

A theoretical analysis is presented to study the extinction characteristics of a diffusion flame near the leading edge of a thin fuel plate in slow, forced convective flows in a microgravity environment. The mathematical model includes two-dimensional Navier-Stokes momentum, energy and species equations with one-step overall chemical reaction using second-order finite rate Arrhenius kinetics. Radiant heat loss on the fuel plate is applied in the model as it is the dominant mechanism for flame extinguishment in the small convective flow regime. A parametric study based on the variation of convective flow velocity, which varies

the Damkohler number (Da), and the surface radiant heat loss parameter (S) simultaneously, is given. An extinction limit is found in the regime of slow convective flow when the rate of radiant heat loss from fuel surface outweighs the rate of heat generation due to combustion. The transition from existent envelope flame to extinguishment consists of gradual flame contraction in the opposed flow direction together with flame temperature reduction as the convective flow velocity decreases continuously until the extinction limit is reached. A case of flame structure subjected to surface radiant heat loss is also presented and discussed. Author

N86-28379# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE SHORE SINGULARITY OF WATER-WAVE THEORY. PART 2. SMALL WAVES DON'T BREAK ON GENTLE BEACHES
Technical Summary Report
R. E. Meyer Oct. 1985 27 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-15064)
(AD-A163652; MRC-TSR-2873) Avail: NTIS HC A03/MF A01 CSCL 20/4

The model of gravitational surface waves on beaches of small slope formulated in and its mathematical theory are used to show how an incident-wave amplitude can be defined so that a bound on it guarantees solutions which respect the assumptions of the model everywhere and forever. The structure of those solutions far from shore is then compared with that predicted near shore by the classical, linear theory to remove the indeterminacies of both theories: Shore reflection is determined for the classical theory, and it is shown how the critical length scale and amplitude of the beach theory are related to the familiar wavelength and amplitude in deep water. These results indicate that the beach theory captures and elucidates the basic singularity structure underlying the shore behavior of gravitational surface waves. Author (GRA)

N86-28380# Oak Ridge National Lab., Tenn.
PREDICTION OF FLOW RATES THROUGH AN ORIFICE AT PRESSURES CORRESPONDING TO THE TRANSITION BETWEEN MOLECULAR AND ISENTROPIC FLOW
S. F. DeMuth and J. S. Watson 1985 15 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985 Prepared in cooperation with Tennessee Univ., Knoxville
(Contract DE-AC05-84OR-21400)
(DE86-004682; CONF-851174-24) Avail: NTIS HC A02/MF A01

A model of compressible flow through an orifice, in the region of transition from free molecular to isentropic expansion flow, has been developed and tested for accuracy. The transitional or slip regime is defined as the conditions where molecular interactions are too many for free molecular flow modeling, yet not great enough for isentropic expansion flow modeling. Due to a lack of literature establishing a well-accepted model for predicting transitional flow, it was felt such work would be beneficial. The model is nonlinear and cannot be satisfactorily linearized for a linear regression analysis. Consequently, a computer routine was developed which minimized the sum of the squares of the residual flow for the nonlinear model. The results indicate an average accuracy within 15% of the measured flow throughout the range of test conditions. Furthermore, the results of the regression analysis indicate that the transitional regime lies between Knudsen numbers of approximately 2 and 45. DOE

N86-28381# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
THREE-DIMENSIONAL ROTATIONAL INVISCID FLOW CALCULATION IN AXIAL TURBINE BLADE ROWS
Tony Arts Sep. 1985 98 p
(VKI-TN-154; TUT-8502/TA/NT; ESA-86-97063) Avail: NTIS HC A05/MF A01

A method to compute three dimensional, rotational, adiabatic, inviscid flow of a perfect gas in an axial turbine blade row or an axial turbine stage (subsonic, transonic, or supersonic) is presented. In low subsonic, rotational flow calculations in isolated cascades, the method reveals the main secondary effects. Inside the passage, agreement between computed and measured static pressure and angle distributions is fairly good. For transonic flow calculations in axial turbine stages, the method uses a time-averaged blade row interaction model. The mass flow and the overall aerodynamic characteristics of both blade rows are well predicted. Real three dimensional effects, such as lack of stream surface axial symmetry, are clearly seen from the calculated results. Contrary to over an isolated blade row calculation, the interrow boundary conditions adapt themselves automatically to the flow pattern, no experimental data being built in to the calculation. ESA

N86-28382# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
CRITERIA FOR SEPARATION IN TWO-DIMENSIONAL STEADY AND UNSTEADY COMPRESSIBLE FLOW
Fuqing Zhang and Hans Foersching Sep. 1985 45 p In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-985)
(DFVLR-FB-85-60; ISSN-0171-1342; ESA-86-96880) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 16

Separation criteria for two-dimensional flows were deduced. The most important technical flow separation phenomena are reviewed, and the governing physical influence parameters are outlined. The starting points were the theory of viscous flow and Prandtl's boundary layer concept. The most important existing flow separation criteria are discussed. From a study of the streamline behavior near a separation point, generalized criteria for separation in two-dimensional steady and unsteady compressible flow are derived. It is shown that the existing criteria are special cases of the generalized criteria. ESA

N86-28383 Central Electricity Generating Board, London (England).
LOCAL CHARACTERISTICS OF HEAT TRANSFER AND FLOW DYNAMICS OF STAGGERED BANKS OF FINNED TUBES
A. Zhukauskas, R. Ulinskas, and F. Zinevicius 1985 18 p Transl. into ENGLISH from Trudy AN LitSSR (USSR), v. 2, no. 141, series B, 1984 p 40-45
(TI86-910130; BLL-CE-Trans-8152-(9022.09)) Copyright. Avail: Issuing Activity

Transverse flow around banks of finned tubes involving separation of the flow comes under the category of complex flows. In order to make an analytical study of such flows, for the purpose of optimizing the finning arrangement, it is necessary to carry out structure investigations in the spaces between both the ribs and fins, and also have data on the local heat exchange on the surface of a finned tube in the bank. Results obtained from the investigations into variation in local velocity, flow turbulence, temperature and local heat transfer coefficients of a finned tube are presented. Author

N86-28384# Argonne National Lab., Ill. Reactor Analysis and Safety Div.
MODELING OF VAPOR GENERATION IN FLASHING FLOW
J. Riznic and M. Ishii Dec. 1985 38 p
(Contract NRC-FIN-A-2026)
(TI86-006062; NUREG/CR-4501; ANL-86-1) Avail: NTIS HC A03/MF A01

A phenomenon of flashing related to discharging of an initially subcooled liquid from a high pressure condition into a low pressure environment is very important in several industrial systems such as nuclear reactors and chemical reactors. A model for the flashing process is proposed based on the wall nucleation theory, bubble growth model, and drift-flux bubble transport model. In order to calculate the bubble number density, the bubble number transport equation with a distributed source from the wall nucleation sites is used. The model predictions in terms of the void fraction are compared to the experimental data of Reocreux. It shows that satisfactory agreements could be obtained from the present model without any floating parameter to be adjusted with data. The result indicates that, at least for the experimental conditions considered here, the mechanistic prediction of the flashing phenomenon is

possible based on the present wall nucleation based model.
Author

N86-28237# San Diego State Univ., Calif. Dept. of Aerospace Engineering.
THE FLOWFIELD OF A SIDE-DUMP COMBUSTOR
Nagy Nosseir and Shabtay Behar *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 289-294 (For primary document see N86-28212 19-28)
(Contract N0014-84-K-0373)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28253*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
MODELING OF DENSE SPRAYS FROM LOX/H2 COAXIAL INJECTORS UNDER SUPERCRITICAL CONDITIONS
P. Y. Liang and R. J. Jensen *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 463-471 (For primary document see N86-28212 19-28)
(Contract NAS8-27980)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28255# Remtech, Inc., Huntsville, Ala.
BOUNDARY LAYER SIMULATOR (BLIMPJ) IMPROVEMENT
S. C. Praharaj *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 477-493 (For primary document see N86-28212 19-28)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-28385*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FEASIBILITY OF A NUCLEAR GAUGE FOR FUEL QUANTITY MEASUREMENT ABOARD AIRCRAFT
Jag J. Signh, Gerald H. Mall (Computer Sciences Corp., Hampton, Va.), Danny R. Sprinkle, and Hoshang Chegini (Old Dominion Univ., Norfolk, Va.) Aug. 1986 25 p
(NASA-TM-87706; L-16132; NAS 1.15:87706) Avail: NTIS HC A02/MF A01 CSCL 14B

Capacitance fuel gauges have served as the basis for fuel quantity indicating systems in aircraft for several decades. However, there have been persistent reports by the airlines that these gauges often give faulty indications due to microbial growth and other contaminants in the fuel tanks. This report describes the results of a feasibility study of using gamma ray attenuation as the basis for measuring fuel quantity in the tanks. Studies with a weak Am-241 59.5-keV radiation source indicate that it is possible to continuously monitor the fuel quantity in the tanks to an accuracy of better than 1 percent. These measurements also indicate that there are easily measurable differences in the physical properties and resultant attenuation characteristics of JP-4, JP-5, and Jet A fuels. The experimental results, along with a suggested source-detector geometrical configuration are described. Author

N86-28386*# California Inst. of Tech., Pasadena.
[THE HXII GAS SYSTEM] Final Report
1986 24 p
(Grant NAG5-175)
(NASA-CR-177882; NAS 1.26:177882) Avail: NTIS HC A02/MF A01 CSCL 14B

Two gas proportional counters were designed: one detector was patterned after the HEAO-1 design which possesses a proven low background capability at atmospheric pressure, and the other was a parallel planar geometry detector with an extensive drift region. The actual performance of the detectors was evaluated with emphasis on background rejection efficiency and position resolution. B.G.

N86-28387*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
CONCEPT STUDY OF A UV CORONAGRAPH SPECTROMETER FOR THE PINHOLE-OCCULTER FACILITY Final Report, 1 Oct. - 30 Nov. 1985
John L. Kohl Jul. 1986 28 p
(Grant NAG8-554)
(NASA-CR-177122; NAS 1.26:177122) Avail: NTIS HC A03/MF A01 CSCL 14B

The results of a very short study to define an Ultraviolet Coronagraph-Spectrometer (UVCS) for the Pinhole/Occulter Facility (P/OF) are summarized. The P/OF instrument was based on documentation from the Definition Phase of the Spacelab Coronographs Program which was effectively completed in August 1980. The primary differences between the P/OF instrument and the Spacelab experiment are the remote occulter mask, the telescope size , and the deployable structure to accommodate P/OF's length restrictions. Requirement for P/OF that are associated with these features are briefly considered, but further study is need to more fully consider the unusual implications, particularly in the interplay between the instrument pointing and the P/OF boom control. Author

N86-28388*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPROVED SKIN FRICTION INTERFEROMETER
R. V. Westphal, W. D. Bachalo, and M. H. Houser (Aerometrics, Inc., Mountain View, Calif.) Mar. 1986 48 p
(NASA-TM-88216; A-86138; NAS 1.15:88216) Avail: NTIS HC A03/MF A01 CSCL 14B

An improved system for measuring aerodynamic skin friction which uses a dual-laser-beam oil-film interferometer was developed. Improvements in the optical hardware provided equal signal characteristics for each beam and reduced the cost and complexity of the system by replacing polarization rotation by a mirrored prism for separation of the two signals. An automated, objective, data-reduction procedure was implemented to eliminate tedious manual manipulation of the interferometry data records. The present system was intended for use in two-dimensional, incompressible flows over a smooth, level surface without pressure gradient, but the improvements discussed are not limited to this application. Author

N86-28389*# National Aeronautics and Space Administration. Langley Research Center. Hampton, Va.
IMPROVEMENT IN THE QUALITY OF FLOW VISUALIZATION IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
Walter L. Snow, Alpheus W. Burner, and William K. Goad 1986 24 p
(NASA-TM-87730; L-16108; NAS 1.15:87730) Avail: NTIS HC A02/MF A01 CSCL 14B

Optical diagnostic techniques have not been as successful in the 0.3-Meter Transonic Cryogenic Tunnel as in conventional wind tunnels. This paper describes a simple shadowgraph experiment which allowed evacuation of the optical paths outside the test section. The results show that refractive index variations induced by temperature gradients outside the test section account for most of the image degradation. Earlier reports had erroneously attributed this degradation to inhomogeneities in the test section. Evacuation of the paths leading to and from the test section significantly improves the quality of flow visualization.
Author

N86-28390# Department of the Navy, Washington, D. C.
COMPLEX CAVITY GYROTRON Patent
Michael E. Read, Yuval Carmel, Kwo R. Chu, and Achintya K.

Ganguly, inventors (to Navy) Issued 19 Nov. 1985 7 p Supersedes AD-D010591
(AD-D012139; US-Patent-4,554,484; US-Patent-Appl-SN-527626; US-Patent-Class-315-4) Avail: US Patent and Trademark Office CSCL 09/1

A complex gravity gyrotron designed for stable operation at high order modes is described. The device comprises circuitry for generating an annular electron beam, a coupled cavity disposed coaxially with the electron beam and having a first and second adjacent coaxial sections with the dimensions of these coaxial sections adjusted so that different modes with the same azimuthal eigen number but different radial eigen numbers are simultaneously resonant at approximately the same frequency in the two sections, and circuit for generating an axial magnetic field within the cavity. Few, if any, combinations of modes other than the combination chosen will simultaneously resonate in the cavity thereby effecting higher order mode suppression. The present design has a low susceptibility to beam velocity spread and its effective for any combination of modes with identical azimuthal eigen numbers. GRA

N86-28391# Department of the Navy, Washington, D. C.
QUASI-OPTICAL HARMONIC GYROTRON AND GYROKLYSTRON Patent
Wallace Manheimer, inventor (to Navy) and Baruch Levush, inventor (to Navy) Issued 17 Dec. 1985 10 p Supersedes AD-D011308
(AD-D012199; US-Patent-4,559,475; US-Patent-Appl-SN-630049; US-Patent-Class-315-4) Avail: US Patent and Trademark Office CSCL 09/1

This patent discloses a method and apparatus for suppressing lower order cyclotron harmonics in order to permit resonance within a quasi-optical gyrotron/gyroklystron configuration of a desired high order harmonic. In the gyrotron/gyroklystron configuration at least one open resonator defined by at least two mirrors is positioned downstream from an electron beam source for receiving therethrough the beam of electrons and for exchanging energy therewith. This method includes the steps for choosing a mirror radius size large enough relative to the spot size of a desired radiation cyclotron harmonic so that the harmonic oscillates within the at least one resonator, but small enough so that the spot size for the next lower cyclotron harmonic is larger than the mirror so that harmonic does not oscillate due to diffraction losses. This method further includes the step of generating an electron beam bias the electron beam source with a beam current which is greater than or equal to the starting current for the desired nth cyclotron harmonic, but less than the starting current for the nth cyclotron harmonic. GRA

N86-28392# Los Alamos National Lab., N. Mex.
MULTICHANNEL ANALOG TEMPERATURE SENSING SYSTEM
R. Gribble Aug. 1985 5 p
(Contract W-7405-eng-36)
(DE86-004371; LA-10475-MS) Avail: NTIS HC A02/MF A01

A multichannel system that protects the numerous and costly water-cooled magnet coils on the translation section of the FRX-C/T magnetic fusion experiment is described. The system comprises a thermistor for each coil, a constant current circuit for each thermistor, and a multichannel analog-to-digital converter interfaced to the computer. DOE

N86-28393# Lawrence Livermore National Lab., Calif.
EXPERIENCES IN CONTROL SYSTEM DESIGN AIDED BY INTERACTIVE COMPUTER PROGRAMS: TEMPERATURE CONTROL OF THE LASER ISOTOPE SEPARATION VESSEL
D. T. Gavel, L. C. Pittenger, J. S. McDonald, P. G. Cramer, and C. J. Herget 1985 10 p Presented at the 24. IEEE Conference on Decision and Control, Ft. Lauderdale, FL., 11 Dec. 1985
(Contract W-7405-eng-48)
(DE86-004481; UCRL-93713; CONF-851209-7) Avail: NTIS HC A02/MF A01

A robust control system has been designed to regulate temperature in a vacuum vessel. The thermodynamic process is modeled by a set of nonlinear, implicit differential equations. The control design and analysis task exercised many of the computer-aided control systems design software packages, including MATLAB, DELIGHT, AND LSAP. The working environment is a VAX computer. Advantages and limitations of the software and environment, and the impact on final controller design is discussed. DOE

N86-28394# Technische Hochschule, Aachen (West Germany). Inst. fuer Theroretische Elektrotechnik.
DIRECT WRITING ELECTRON BEAM LITHOGRAPHY Final Report, Jun. 1984
Walter L. Engl, Dirk Beets, and Hans-Rainer Schulte Bonn Bundesministerium fuer Forschung und Technologie Nov. 1985 215 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T 85-132; ISSN-0340-7608; ESA-86-96893) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38

A quasi-shaped-beam method to enhance the throughput of a vector scan electron-beam lithography system using a circular spot with Gaussian shaped current density distribution was developed. Spot diameter is switched by varying the condenser currents. Exposure spot movements caused by mean size switching are prevented using an adapted control of the electron source alignment coils. An ultrahigh vacuum sealed anode chamber was built to use LaB6 cathodes. A part of its emitted light is reflected to a specially developed quotient pyrometer to measure the cathode tip temperature. A modified correlation method enables use of process induced topographical markers for wafer alignment. Necessary short detection time is achieved by pipelining and parallel processing techniques using microprocesser controlled signal processing hardware. The underetching of the marker generating process is measured with the position detection. ESA

N86-28395# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
ASSESSMENT OF THE PIEZO-ELECTRIC FOIL AS A MEANS OF MONITORING WALL TURBULENCE
Joergen Olsson, A. K. Lewkowicz, and S. C. Cheah 6 Nov. 1985 32 p
(FFA-TN-1985-60; ESA-86-97053) Avail: NTIS HC A03/MF A01

The feasibility of a commercial piezo-film as a transducer for monitoring turbulent properties of wall shear flows was assessed. A fully developed turbulent pipe flow with variable Reynolds number along with a separated and reattaching flow were used. Probe design, manufacture, and signal processing are outlined. It is concluded that the concept is promising for practical applications and could compete successfully with other turbulence sensors. ESA

N86-28396# Institute of Oceanographic Sciences, Birkenhead (England).
PERFORMANCE OF THE LOW PRESSURE DIFFERENTIAL AND ABSOLUTE DIGIQUARTZ PRESSURE TRANSDUCERS
A. D. Banaszek 1985 34 p
(IOS-215; ESA-86-97122) Avail: NTIS HC A03/MF A01

Long term performance of pressure transducers used for sea level measurements was assessed. The differential and low pressure absolute digiquartz instruments exhibit extremely good long term stability but suffer from short term instability which leads to initial drift and is caused by the mechanics of the bellows. Differences in calibrations over several years can mostly be accounted for in terms of common mode line pressure effects, whereas changes in the zero pressure output are a result of the mechanical instability of the bellows. The exponential drift that can occur is shown to be reversible and has a time constant of 40 hr. Thus, datum shifts occur when the transducer is deployed, the magnitude of which depends on the particular transducer and the differential pressure. ESA

N86-28397 United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
THE EFFECTS OF TEMPERATURE AND IRRADIATION ON

PIEZOELECTRIC ACOUSTIC TRANSDUCERS AND MATERIALS
G. H. Broomfield Dec. 1985 37 p
(AERE-R-11942) Copyright. Avail: Issuing Activity
The testing, selection and application of materials for piezoelectric acoustic transducers are discussed. The construction of high frequency transducers and the effects of irradiation and temperature on types designed for arduous service are described. The criteria for assessing piezoelectric materials are given as a preamble to a brief discussion of the effects on them of temperature and irradiation. These materials include the powder-route ceramics, lead metaniobate and lead-zirconate-titanate and the single crystal materials, quartz, tourmaline, lithium niobate and strontium niobate. Conclusions on the materials are concerned with the probable future temperature ranges for their applications. Author

N86-28398 British Gas Corp., London (England).
THE APPLICATION OF VIBRATING WIRE STRAIN GAUGE IN EXERCISE OF INSTALLATION AT POTENTIALLY UNSTABLE SITES
C. Gramola and S. Venzi Jan. 1985 15 p Transl. into ENGLISH of conference paper presented at the National Convention of the Italian Association for the Analysis of Stress, 1872 Convention held in Calabria, Italy, 22-25 Sep. 1982
(TI86-910153; BLL-BG-Trans-700A-(9022.048);
T700A/BG/ERS/BS-71/05792) Copyright. Avail: Issuing Activity
The analysis in the time of stresses, induced in pipes placed in areas liable to landslides, was solved by the adoption of a suitable appliance of vibrating wire strain gauges. This was possible when the stress condition in a cross section was transferred to monoaxial deformation measurement only by an instrument of high sensitivity as the vibrating wire strain gauge. Author

N86-28695# Joint Publications Research Service, Arlington, Va.
A NEW WAY OF HOLOGRAPHIC RECORDING OF INFORMATION
A. A. Vasilyev, P. V. Vashurin, V. A. Yelkhov, I. N. Kompanyets, A. V. Prafenov, and P. M. Semochkin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-004) 25 Apr. 1986 p 10 Transl. into ENGLISH from Priroda (Moscow, USSR), no. 12, Dec. 1985 p 104 (For primary document see N86-28694 19-70)
Avail: NTIS HC A04/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-28399*# Hampton Inst., Va. Dept. of Physics and Engineering.
DIRECT SOLAR-PUMPED IODINE LASER AMPLIFIER Semiannual Progress Report, 1 Oct. 1985-30 Mar. 1986
Kwang S. Han Mar. 1986 61 p
(Grant NAG1-441)
(NASA-CR-177238; NAS 1.26:177238) Avail: NTIS HC A04/MF A01 CSCL 20E
During this period the parametric studies of the iodine laser oscillator pumped by a Vortek simulator were carried out before amplifier studies. The amplifier studies are postponed to the extended period after completing the parametric studies. In addition, the kinetic modeling of a solar-pumped iodine laser amplifier, and the experimental work for a solar pumped dye laser amplifier are in progress. This report contains three parts: (1) a 10 W CW iodine laser pumped by a Vortek solar simulator; (2) kinetic modeling to predict the time to lasing threshold, lasing time, and energy output of solar-pumped iodine laser; and (3) the study of the dye laser amplifier pumped by a Tamarack solar simulator. Author

N86-28400# Connecticut Univ., Storrs. Dept. of Physics.
RADIATIONLESS DEACTIVATION OF LOW-FIELD CHROMIUM COMPLEXES IN SOLIDS Final Technical Report, 31 Aug. 1982 - 31 Dec. 198
Ralph H. Bartram 20 Feb. 1986 27 p
(Contract DAAG29-82-K-0158)
(AD-A165734; ARO-18764.7-PH) Avail: NTIS HC A03/MF A01 CSCL 20/5
Thermal quenching of fluorescence is a major loss mechanism which may impede the performance of tunable solid-state lasers, but whose impact is difficult to assess a-priori. The object of the reported investigation was to achieve a quantitative understanding of the factors which control this process, with the ultimate goal of formulating design criteria for tunable solid-state laser materials. The temperature dependence of chromium photoluminescence spectra and lifetimes has been measured in ordered-perovskite (Cs2NaYC16, K2NaScF6 and K2NaGaF6) low-crystal-field host crystals. After the failure of linear-coupling models was demonstrated, a successful theoretical model was proposed in which fluorescence quenching is mediated by quadratic coupling to assymetric modes of vibration. Parameters of the model are constrained by empirical spectral information, and radiationless transition rates are calculated by numerical line-shape simulation. Both semi-empirical (INDO) and ab-initio molecular-orbital cluster calculations have been performed in conjunction with lattica-statics calculations in a continuing effort to refine this quenching model. Photoluminescence spectra and lifetimes, measured as functions of temperature and pressure in a diamond-anvil cell, revealed a pressure-induced transition from broad-band fluorescence to narrow-band phosphorescence; i.e., from low-crystal-field to high-crystal-field behavior. GRA

N86-28401# Williams Coll., Williamstown, Mass. Dept. of Physics and Astronomy.
ATOMIC HYDROGEN MASER INVESTIGATIONS OF HYDROGEN ATOM INTERACTIONS FROM 4 K TO 12 K Final Report, 1 Mar. 1980 - 28 Feb. 1985
Stuart B. Crampton 24 Mar. 1986 18 p
(Contract N00014-80-C-0240; RR0-1103)
(AD-A165807) Avail: NTIS HC A02/MF A01 CSCL 20/5
Techniques developed during previous studies of the ground state hyperfine resonance of hydrogen atoms intermittently adsorbed on molecular hydrogen surfaces were used to develop a cryogenic atomic hydrogen maser using a 5 K state-selected H atom beam and solid neon storage surfaces near 10 K temperature. The physical parameters affecting the use of such a device for frequency metrology and precision measurements of atomic parameters were determined. GRA

N86-28402# Los Alamos National Lab., N. Mex.
INVESTIGATION OF METAL COATINGS FOR THE FREE ELECTRON LASER
Marion L. Scott, Paul N. Arendt, Robert W. Springer, Richard C. Cordi, and William J. McCreary 1985 12 p Presented at the 17th Annual Symposium on Optical Materials for High Power Lasers, Boulder, Colo., 28-30 Oct. 1985
(Contract W-7405-eng-36)
(DE86-006008; LA-UR-86-100; CONF-851052-3) Avail: NTIS HC A02/MF A01
The deposition and characteristics of metal coatings for use in environments such as the Free Electron Laser where the radiation resistance of metal coatings could prove to be of great benefit were studied. Initial efforts concentrated on silver laminate coatings due to the high reflectance of silver at 1 micron wavelength. The initial laminate coatings utilized thin layers of titanium oxide to break up the columnar structure of the silver during electron-beam deposition on fused silica substrates. Initial results on equal coating thickness samples indicate an improvement in damage threshold that ranges from 1.07 to 1.71 at 351 nm. Author

N86-28403# Los Alamos National Lab., N. Mex.
AURORA PROJECT: OPTICAL DESIGN FOR A KILOJOULE CLASS KrF LASER
J. Hanlon, J. McLeod, J. E. Sollid, W. Horn, III, R. Carmichael, B. Kortegaard, G. Woodfin, and L. Rosocha 1985 7 p Presented at the Southwest Conference on Optics, Albuquerque, N. Mex., 4

Apr. 1985
(Contract W-7405-eng-36)
(DE85-014078; LA-UR-85-2245; CONF-850345-26) Avail: NTIS
Avail: NTIS HC A02/MF A01

Aurora is a 248-nm, 10-kilojoule laser system being built at Los Alamos National Laboratory to demonstrate the feasibility of large KrF laser systems for laser fusion. It was designed as a test bed to demonstrate: (1) efficient energy extraction at 248 nm; (2) an angularly multiplexed optical system that is scaleable to large system designs; (3) the control of parasitics and ASE (amplified spontaneous emission); (4) long path pulse propagation at UV wavelengths; (5) alignment systems for multibeam systems; and (6) new or novel approaches to optical hardware that can lead to cost reduction on large systems. In this paper only issues pertinent to the optical system are addressed. First, a description of the entire system is given. The design constraints on the optical system are explained, concurrent with a discussion of the final design. This is followed by a very brief discussion of coatings; in particular, the use of sol-gels for antireflection coatings is presented. DOE

N86-28404# Lawrence Livermore National Lab., Calif.
PERFORMANCE DEGRADATION IN LASER WEAPON SYSTEMS DUE TO PERTURBATION OF OPTICAL MIRRORS
J. SooHoo 16 Dec. 1985 45 p
(Contract W-7405-eng-48)
(DE86-005761; UCID-20640) Avail: NTIS HC A03/MF A01

In terms of maximizing the laser intensity at the target, we calculate and evaluate the performance of a generic laser weapon system in the presence of induced perturbations. Such perturbations include mirror tilts and mirror displacements, which may result from structure vibration and coolant flow. We also consider the effect on the beam quality due to blockage by the secondary mirror and nonuniformity in the laser amplitude. Additionally, we show the relationship between the far-field characteristics and the near-field ray angle and phase functions across the aperture plane, which is useful for beam control purposes. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-28405 National Physical Lab., Teddington (England). Div. of Materials Applications.
THE TECHNICAL BACKGROUND TO THE REVISION OF BS 4429: 1969 SPECIFICATION FOR RIGGING SCREWS AND TURNBUCKLES
T. A. E. Gorley Dec. 1985 39 p
(NPL-DMA(A)108; ISSN-0143-7313; ESA-86-97128) Copyright.
Avail: Issuing Activity

The design criteria and the methods of design for component specified in standard BS 4429 are described: rigging screw bodies; turnbuckles and pipe hangers; and accessories (screw threads, screwed elongated eyes, screwed forks, screwed trapezoidal hooks, and locknuts). ESA

N86-28406 National Physical Lab., Teddington (England). Div. of Materials Applications.
BACKGROUND DISCUSSION PAPER FOR THE DEVELOPMENT OF R AND D STRATEGY IN THE AREA OF JOINING TECHNOLOGY
L. N. McCartney Nov. 1985 27 p
(NPL-DMA(A)110; ISSN-0143-7313; ESA-86-97129) Copyright.
Avail: Issuing Activity

The uses of composite materials, ceramics, plastics and adhesives in manufacturing industry are reviewed and the importance of joining technology to their application is emphasized. Adhesive bonding; welding thermoplastics; and joining ceramics to metals are discussed. ESA

N86-28407*# National Aeronautics and Space Administration, Washington, D.C.
APPLICATIONS OF TETHERS IN SPACE: WORKSHOP PROCEEDINGS, VOLUME 1
William A. Baracat, comp. (General Research Corp., McLean, Va.) Jun. 1986 585 p Workshop held in Venice, Italy, 15-17 Oct. 1985; sponsored by NASA, the Italian National Space Plan and CNR
(Contract NASw-3921)
(NASA-CP-2422-Vol-1; NAS 1.55:2422-Vol-1) Avail: NTIS
HC A25/MF A01 CSCL 13I

The complete documentation of the workshop including all addresses, panel reports, charts, and summaries are presented. This volume presents all the reports on the fundamentals of applications of tethers in space. These applications include electrodynamic interactions, transportation, gravity utilization, constellations, technology and test, and science applications. For individual titles, see N86-28408 through N86-28431.

N86-28408*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TETHERED SATELLITE SYSTEM c18
James Sisson *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 37-61 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

A reusable system is to be developed to enable a variety of scientific investigations to be accomplished from the shuttle, considering the use of a tethered system with manual or automated control, deployment of a satellite toward or away from the Earth, up to 100 km, and conducting or nonconducting tether. Experiments and scientific investigations are to be performed using the tether system for applications such as magnetometry, electrodynamics, atmospheric science, and chemical release. A program is being implemented as a cooperative U.S./Italian activity. The proposed systems, investigations, and the program are charted and briefly discussed. E.R.

N86-28409*# Consiglio Nazionale delle Ricerche, Rome (Italy). Programma Spaziale Nazionale.
TETHERED SATELLITE DESIGN c18
Gianfranco Manarini *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 63-79 Vol-1) (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The capability of the satellite to perform a variety of space operations to be accomplished from the shuttle is reviewed considering use of the satellite with man-in-loop and closed loop modes and deployment (toward or away from Earth, up to 100 km), stationkeeping, retrieval and control of the satellite. Scientific payloads are to be used to perform experiments and scientific investigation for applications such as magnetometry, electrodynamics, atmospheric science, chemical release, communications, plasmaphysics, dynamic environment, and power and thrust generation. The TSS-S will be reused for at least 3 missions after reconfiguration and refurbishment by changing the peculiar mission items such as thermal control, fixed boom for experiments, aerodynamic tail for yaw attitude control, external skin, experiments, and any other feature. The TSS-S is to be composed of three modules in order to allow independent integration of a single module and to facilitate the refurbishment and reconfiguration between flights. The three modules are service, auxiliary propulsion, and payload modules. E.R.

N86-28410*# Energy Science Labs., Inc., San Diego, Calif.
TETHER FUNDAMENTALS
Joseph A. Carroll *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 81-101 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Some fundamental aspects of tethers are presented and briefly discussed. The effects of gravity gradients, dumbbell libration in

circular orbits, tether control strategies and impact hazards for tethers are among those fundamentals. Also considered are aerodynamic drag, constraints in momentum transfer applications and constraints with permanently deployed tethers. The theoretical feasibility of these concepts are reviewed. E.R.

N86-28411*# Padua Univ. (Italy). Inst. of Applied Mechanics.
A REVIEW OF TETHER INDUCED DYNAMICAL FEATURES
Silvio Bergamaschi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 103-116 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The simplest mathematical model used for the simulation of TSS motion is considered in order to review the dynamics of tethers. This model is discussed. Also reviewed are elasticity effects, perturbation sources, orbit eccentricity and natural frequencies. Tethered systems provide a unique opportunity for skilled measurement activities in space. Some of the experiments envisaged require the measurement of very small mechanical quantities. This implies that the level of dynamical noise on instruments output be low or that system response to excitation, either external or internal, be sufficiently known. In this respect, the first TSS flights will be very useful, but much work will be needed in order to have reliable estimates of structural damping in different future systems. E.R.

N86-28412*# Rome Univ. (Italy). Dipt. Fisica.
SCIENCE APPLICATIONS c12
Franco Mariani *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 117-126 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Possible scientific applications in the field of the neutral ionized atmosphere and of the solid Earth in terms of the TSS are summarized. Studies of the vertical, zonal, and meridional neutral winds and temperature, whose extensive variations suggest the importance of energy transfer mechanism in modifying the structural properties of the region are reviewed. Layers below the F region of high plasma density that propagate to lower altitudes with drift velocities will be studied for their electron and ion composition and motion. These are to be measured by the TSS in conjunction with ground based radar observations. Basic fluid dynamics problems will be studied onboard tethered satellites. Studies will be conducted on the structure of the equatorial electrojet, in particular its longitudinal and meridional extent. Magnetic measurements will also be used to probe the tether current distribution in the plasma sheath. E.R.

N86-28413*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
APPLICATIONS OF TETHERS FOR PLANETARY MISSIONS c12
Paul Penzo *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 127-151 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Ideas of deep space exploration are considered. The role of tethers in deep space is of most concern. A proposal of a tethered instrument package in orbit about the Moon is explored. The idea of a sling on the surface of the Moon which would take solar energy and build up momentum of the sling is studied. The NASA idea of a Mars Aeronomy Orbiter which would use a tether to enhance the planned Mars Orbiter is reviewed. It is also proposed that a tether can be attached to an asteroid during a spacecraft flyby. The possibility of using tethers to provide a transportation system for payloads which are coming to the surface from escape, and which are leaving Mars and escaping from Mars itself is also studied. A proposal from the Jet Propulsion Lab. on collecting comet or asteroid samples and returning them to Earth is reviewed. A tethered penetrator which could collect core samples is the proposed way. Also considered is the area of electrodynamic tethers at Jupiter. E.R.

N86-28414*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. Fisica Spazio Interplanetario.
ELECTRODYNAMIC INTERACTIONS
Marino Dobrowolny *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 153-160 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The electrodynamic interaction of long metallic tethers with the ionosphere is introduced. Due to the tether's motion across the Earth's field, a polarization electric field is generated along the tether. In a system like the Tethered Satellite System (TSS) where the tether is coated with dielectric and the electrical contact is between its two terminations and the ionosphere, the upper end termination will collect electrons and, in a passive system, the lower end termination will collect ions. Space charge regions will develop around the two terminations of the system, which can be at considerable potential with respect to the unperturbed ionospheric plasma and the current in the tether will be most significantly determined by local processes in such space charge regions. A qualitative view of the global perturbation induced by TSS in the ionosphere is outlined. One of the applications of electrodynamic tethers is that of using them as low frequency wave generators to communicate to the Earth. This application is briefly discussed. An equivalent circuit of the tether system is described. The basic equation of the circuit is given. E.R.

N86-28415*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ELECTRODYNAMIC INTERACTIONS c12
James McCoy *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 161-184 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Power and thrust applications of the electrodynamic tether are considered. The induced voltage in the tether wire is in the same direction in the case of a power generator and a spacecraft motor, and the difference involves whether one allows that voltage to drive a current to generate power. Or, if one uses an onboard power supply with a higher voltage to drive a current in the opposite direction, which then provides thrust. Return circuit currents must be spread out through the ionosphere sufficiently so that ionosphere conductivities are very high and so that anomalous resistance is not produced in the ionosphere which would prevent the current from flowing. This is largely a function of the plasma contactors that are used. Three have been most frequently considered. It is concluded that, for the primary power and thrust applications, the hollow cathode seems to be far superior to the electron gun for producing high current contact to the ionosphere. This has led to a study of the Plasma Motor Generator (PMG) because it is capable of being reversed. The PMG theory is explored along with other power and thrust applications of the electrodynamic tether. E.R.

N86-28416*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TRANSPORTATION
Georg vonTiesenhausen *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 185-219 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

A summary of tether transportation is given. Four steps were used over a period of time. First, theoretical engineering feasibility and technology requirements were determined. Then the survivors of that effort went into step two in the analysis of promising candidates. Those survivors went into the third phase which is engineering design and cost benefits. Survivors entered into the demonstration mission definition phase. Transportation studies have covered two kinds of deployments. First, steady state deployment was studied. Like the TSS, it's nearly vertical. It takes a long time to deploy and involves relatively high tether tension. Secondly, dynamic deployment was studied. Deployment started in an almost horizontal direction under a very shallow angle which allows a high deployment rate under very low tension. Momentum transfer here occurs by libration. Specific payloads were used to

study tethered transportation benefits. Four transportation concepts were studied with regard to cost benefits. A tethered orbiter deboost from the space station, an OTV boost up from the Space Station, a science platform on a tether with a possible micro-g lab moving in between platform and station, and a tethered boost of payloads fromthe orbiter are the four concepts. These benefits are examined in detail. E.R.

N86-28417*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
US GRAVITY UTILIZATION OF TETHERS ACTIVITY
Kenneth Kroll *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 223-238 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The feasibility, requirements, and limitations of fluid transfer on a tethered system is evaluated. The study is conducted to simplify fluid transfer and to improve safety. The effects of gravity on these factors is also noted. Tether orbital refueling is used to settle fluid and to overcome the surface tension forces that are in space with the gravity level. It also allows a separation, when on the space station, from contamination and also from explosion hazards. Once the cryogenic propellant is settled the most important thing is the fluid slosh. Future plans of a gravity laboratory and a demonstration of gravity utilization using a TSS type of deployer are considered. E.R.

N86-28418*# Martin Marietta Aerospace, Denver, Colo.
TETHER APPLICATIONS FOR SPACE STATION c12
William Nobles *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 239-267 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

A wide variety of space station applications for tethers were reviewed. Many will affect the operation of the station itself while others are in the category of research or scientific platforms. One of the most expensive aspects of operating the space station will be the continuing shuttle traffic to transport logistic supplies and payloads to the space station. If a means can be found to use tethers to improve the efficiency of that transportation operation, it will increase the operating efficiency of the system and reduce the overall cost of the space station. The concept studied consists of using a tether to lower the shuttle from the space station. This results in a transfer of angular momentum and energy from the orbiter to the space station. The consequences of this transfer is studied and how beneficial use can be made of it. E.R.

N86-28419*# Aeritalia S.p.A., Torino (Italy). Space Systems Group.
THE SCIENCE AND APPLICATIONS TETHERED PLATFORM (SATP) PROJECT c12
Pietro Merlina *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 269-278 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The capabilities of tether systems in orbit are going to be demonstrated by the first planned flights of the Tethered Satellite System (TSS). These test flights will investigate the properties of tether systems as low altitude atmospheric research facilities and as electric power generators. Studies are being conducted with the purpose of testing a variety of concepts and approaches. A comparative analysis of results will allow the choosing of the most promising ideas for further development. The broad range of applications presently under study include applications in electrodynamics, transportation, microgravity in addition to basic research. The SATP project definition study is now about midway through its first phase. The analyses conducted have led to an appraisal of users interest in the project and to a deeper understanding of the problems associated with large, long-lived tether systems in space. In addition, two specialized platform designs, devoted to microgravity and precise pointing applications, are being studied because of their potential usefulness and the promise of technical feasibility. E.R.

N86-28420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY AND TEST c12
Paul Siemers *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 279-283 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The chairman of the Technology Applications in Space Working Group summarizes the technology issues for each of the disciplines in Tethered Satellite Systems. The disciplines are Tether Materials and Configurations, Tether System Dynamic Simulation Capability, Tether System Instrumentation, TAS Program Related Science Instrumentation, Atmospheric/Aerothermodynamic tethered system research, and TAS Discipline Program Accomplishment. To enable these tether applications, design and development programs have been recommended and are presently underway relative to the demonstration of the hollow cathode concept which is an enabling electrodynamic tether mission technology. E.R.

N86-28421*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
TETHERED CONSTELLATIONS c12
Enrico Lorenzini *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 285-306 Pergammon Press Ltd. (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The studies that have been carried out on Tethered Constellations are briefly addressed. A definition of a tethered constellation is any number of masses/platforms greater that two connected by tethers in a stable configuration. Configurations and stability constraints are reviewed. Conclusions reached are: (1) The 1-D, horizontal, passively stabilized constellations have been ruled out; (2) Fishbone constellations have been also ruled out; (3) Alternative stable 2-D configurations have been devised such as the quadrangular configuration stabilized by electrodynamic forces (ESC), the quadrangular configuration stabilized by differential air drag (DSC), and the pseudo elliptical configuration stabilized by electrodynamic forces (PEC). Typical dimensions for these constellations are 10 km (horizontal) by 20 km (vertical) with balloon diameters around 100 m in the case of a DSC and a power consumption around 7 KW for an ESC or PEC. E.R.

N86-28422*# Science Research Council, Chilton (England). Rutherford Appleton Lab.
LOWER THERMOSPHERE DENSITIES OF N2, O AND Ar UNDER HIGH LATITUDE WINTER CONDITIONS c46
Paul H. G. Dickinson, U. vonZahn (Bonn Univ., West Germany), K. D. Baker (Utah State Univ., Logan), and D. B. Jenkins (University Coll. of Wales, Aberystwyth) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 321-328 Pergamon Press Ltd. Repr. from Journal of Atmospheric and Terrestrial Physics (England), v. 47, no. 1-3, 1985 p 283-290 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Measurements of the neutral thermosphere were conducted in northern Scandinavia during the Energy Budget Campaign. These measurements included determinations of N2, O, and Ar densities using rocket-borne experiments. The results obtained in the experiments are presented, taking into account also details regarding the employed experimental methods, and an evaluation of the significance of the data. It is found that there are striking differences in thermospheric distributions of the neutral constituents under different geomagnetic conditions. Under quiet geomagnetic conditions there was reasonable agreement with the United States Standard Atmosphere. The concentrations of N2 and Ar were about 70 percent of the predicted values, while the O concentration was about 2.5 times greater. E.R.

N86-28423*# Los Alamos National Lab., N. Mex.
BISTATIC LIDAR EXPERIMENT PROPOSED FOR THE SHUTTLE/TETHERED SATELLITE SYSTEM MISSIONS c12
David J. McComas, Harlan E. Spense (California Univ., Los

Angeles), Robert R. Karl, Henry G. Horak, and Thomas D. Wilkerson (Maryland Univ., College Park) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 329-347 American Inst. of Physics Repr. from Review of Scientific Instruments, v. 56, no. 5, May 1985 p 670-673 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

A new experiment concept has been proposed for the shuttle/tethered satellite system missions, which can provide high resolution, global density mappings of certain ionospheric species. The technique utilizes bistatic LIDAR to take advantage of the unique dual platform configuration offered by these missions. A tuned, shuttle-based laser is used to excite a column of the atmosphere adjacent to the tethered satellite, while triangulating photometic detectors on the satellite are employed to measure the fluorescence from sections of the column. The fluorescent intensity at the detectors is increased about six decades over both ground-based and monostatic shuttle-based LIDAR sounding of the same region. In addition, the orbital motion of the Shuttle provides for quasi-global mapping unattainable with ground-based observations. Since this technique provides such vastly improved resolution on a synoptic scale, many important middle atmospheric studies, heretofore untenable, may soon be addressed. Author

N86-28424*# Naples Univ. (Italy). Inst. of Gasdynamics.
HIGH RESOLUTION REMOTE SENSING MISSIONS OF A TETHERED SATELLITE **c43**
Sergio Vetrella and A. Moccia *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 349-363 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The application of the Tethered Satellite (TS) as an operational remote sensing platform is studied. It represents a new platform capable of covering the altitudes between airplanes and free flying satellites, offering an adequate lifetime, high geometric and radiometric resolution and improved cartographic accuracy. Two operational remote sensing missions are proposed: one using two linear array systems for along track stereoscopic observation and one using a synthetic aperture radar combined with an interferometric technique. These missions are able to improve significantly the accuracy of future real time cartographic systems from space, also allowing, in the case of active microwave systems, the Earth's observation both in adverse weather and at any time, day or night. Furthermore, a simulation program is described in which, in order to examine carefully the potentiality of the TS as a new remote sensing platform, the orbital and attitude dynamics description of the TSS is integrated with the sensor viewing geometry, the Earth's ellipsoid, the atmospheric effects, the Sun illumination and the digital elevation model. A preliminary experiment has been proposed which consist of a metric camera to be deployed downwards during the second Shuttle demonstration flight. Author

N86-28425*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
LABORATORY SIMULATION OF THE ELECTRODYNAMIC INTERACTIONS OF A TETHERED SATELLITE WITH AN IONOSPHERIC PLASMA
Carlo Bonifazi, Jean Pierre Lebreton (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands), G. Vannaroni, Cristiano Cosmovici, R. Debrie (Centre National de la Recherche Scientifique, Orleans, France), M. Hamelin, L. Pomathiod, and H. Arends (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 401-420 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

An improved experimental set-up in the Orleans Plasma Chamber allowed investigations of the I-V characteristics of a conductive spherical body (10 cm diameter) in a plasma environment. Moreover, the influence of a transversal magnetic field at 0.6 and 1.2 G was investigated, for the first time, both on the sheath potential profile and current collection. Floating potential profiles were measured at 16 different radial distances from the test body up to 9 body radii in 8 different angular positions. The test body potential could be increased in the range from -200 V up to +100 V. Preliminary results are shown and discussed. Author

N86-28426*# Genoa Univ. (Italy).
NATURAL ELF NOISE EVALUATION FOR TSS EMISSIONS DETECTION ON THE EARTH'S SURFACE. THE ELECTRIC FIELD COMPONENT APPROACH **c32**
Giorgio Tacconi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 421-430 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The preliminary estimate of the local noise structure in the proximity of a receiver is essential to establishing the detectability of a given signal in presence of such noise. The possibility of detecting the Electric Field Component of the background noise by means of electric dipoles horizontally placed on the sea bed in shallow water is outlined, in order to find its spectral and statistical characteristics for the definition of the optimal receiving system. Author

N86-28427*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. Fisica Spazio Interplanetario.
SPONTANEOUS RADIATION EMITTED BY MOVING TETHERED SYSTEMS **c32**
Marino Dobrowolny *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 431-439 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Some concepts related to radiation emitted by a large conductor moving through a magnetoplasma are outlined and referred to the case of long tethers. Some recent results of a theoretical calculation of Alfven wings, their structure and the power associated with are shown. How the problem of radiation from TSS or for any large conductor moving through a magnetoplasma should be approached is presented. The approach is that of the theory of antennas in plasmas. E.R.

N86-28428*# Consiglio Nazionale delle Ricerche, Frascati (Italy). Piano Spaziale Nazionale.
TETHERED SATELLITE SYSTEM (TSS) CORE EQUIPMENT
Carlo Bonifazi *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 441-469 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

To date, three Tethered Satellite System (TSS) missions of the Italian provided scientific satellite orbiting in the ionosphere connected to U.S. Space Shuttle is foreseen. The first mission will use an electrically conductive tether of 20 km deployed upward from the orbiter flying at 300 km altitude. This mission will allow investigation of the TSS electrodynamic interaction with the ionosphere due to the high voltage induced across the two terminators of the system during its motion throughout the geomagnetic field. The second mission will use a dielectric tether of 100 km deployed downward from the Orbiter flying at 230 km altitude. Tethered-vehicle access to altitude as low as 120 to 150 km from the Orbiter would permit direct long term observation of phenomena in the lower thermosphere and determination of other dynamical physical processes. The third mission would use the same configuration of the first electrodynamic mission with the complete Core Equipment. Study of power generation by tethered systems would be possible by operating the Core Equipment in the inverted current mode. This mode of operation would allow ion current collection upon the TSS satellite by controlling its potential with respect to the ambient ionospheric plasma. The main requirements of the Core Equipment configuration to date foreseen for the first TSS electrodynamic mission is described. Besides the Core Equipment purposes, its hardware and operational sub-modes of operation are described. E.R.

N86-28429*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
PLASMA CONTACTOR PERFORMANCE CHARACTERIZATION c32
Paul Wilbur *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 483-498 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The plasma contactor performance is outlined. Some performance objectives are given including expellant compatibility, high electron production capability, high ion production capability, high reliability for starting and operation, passive emission control, switchover capability between ion/electron emission, low ion and electron energies, low system mass, and low expellant consumption rate. The basic elements of the hollow cathode are shown along with key features of the plasma source. E.R.

N86-28430*# Systems Science and Software, La Jolla, Calif.
THEORY OF PLASMA CONTRACTORS FOR ELECTRODYNAMIC TETHERED SATELLITE SYSTEMS c33
Donald E. Parks and I. Katz *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings Volume 1 Jun. 1986 p 499-546 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

Recent data from ground and space experiments indicate that plasma releases from an object dramatically reduce the sheath impedance between the object and the ambient plasma surrounding it. Available data is in qualitative accord with the theory developed to quantify the flow of current in the sheath. Electron transport in the theory is based on a fluid model of a collisionless plasma with an effective collision frequency comparable to frequencies of plasma oscillations. The theory leads to low effective impedances varying inversely with the square root of the injected plasma density. To support such a low impedance mode of operation using an argon plasma source for example requires that only one argon ion be injected for each thirty electrons extracted from the ambient plasma. The required plasma flow rates are quite low; to extract one ampere of electron current requires a mass flow rate of about one gram of argon per day. Author

N86-28431*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ELECTRODYNAMICS PANEL PRESENTATION
James McCoy *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 547-594 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

The Plasma Motor Generator (PMG) concept is explained in detail. The PMG tether systems being used to calculate the estimated performance data is described. The voltage drops and current contact geometries involved in the operation of an electrodynamic tether are displayed illustrating the comparative behavior of hollow cathodes, electron guns, and passive collectors for current coupling into the ionosphere. The basic PMG design involving the massive tether cable with little or no satellite mass at the far end(s) are also described. The Jupiter mission and its use of electrodynamic tethers are given. The need for demonstration experiments is stressed. E.R.

N86-28432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BEARING DEVELOPMENT PROGRAM FOR A 25 kWe SOLAR-POWERED ORGANIC RANKINE-CYCLE ENGINE
B. Nesmith 15 Sep. 1985 67 p
(Contract NAS7-918; JPL Proj. 5105-146; Contract DE-AM04-80A1-13137)
(NASA-CR-177156; JPL-PUB-85-81; DOE/JPL-1060-92; NAS 1.26:177156) Avail: NTIS HC A04/MF A01 CSCL 13I

The bearing development program is summarized for a 25-kWe power conversion subsystem (PCS) consisting of an organic Rankine-cycle engine, and permanent magnetic alternator (PMA) and rectifier to be used in a 100-kWe point-focusing distributed receiver solar power plant. The engine and alternator were hermetically sealed and used toluene as the working fluid. The turbine, alternator, and feed pump (TAP) were mounted on a single shaft operating at speeds up to 60,000 rev/min. Net thermal-to-electric efficiencies in the range of 21 to 23% were demonstrated at the maximum working fluid temperature of 400 C (750 F). A chronological summary of the bearing development program is presented. The primary causes of bearing wear problems were traced to a combination of rotordynamic instability and electrodynamic discharge across the bearing surfaces caused by recirculating currents from the PMA. These problems were resolved by implementing an externally supplied, flooded-bearing lubrication system and by electrically insulating all bearings from the TAP housing. This program resulted in the successful development of a stable, high-speed, toluene-lubricated five-pad tilting-pad journal bearing and Rayleigh step thrust bearing system capable of operating at all inclinations between horizontal and vertical. Author

N86-28433*# Cincinnati Univ., Ohio. Dept. of Mechanical and Industrial Engineering.
DYNAMIC LOADING ON PARALLEL SHAFT GEARS Final Report
Hsiang-Hsi (Edward) Lin (Memphis State Univ., Tenn.) and Ronald L. Huston Jul. 1986 80 p
(Grant NsG-3188)
(NASA-CR-179473; NAS 1.26:179473; UC-MIE-051586-19) Avail: NTIS HC A05/MF A01 CSCL 13I

A computer-based analysis of the dynamic effects of spur gear systems is presented. The method of analysis with its associated computer code is capable of determining the dynamic response of spur gear systems having involute tooth profiles and standard contact ratios. Various parameters affecting the system dynamic behavior are examined. Numerical results of the analysis are compared with semi-empirical formulae, AGMA (American Gear Manufacturers Association) formulae, and experimental data. A close correlation with the experimental data is obtained. Author

N86-28434*# Clemson Univ., S.C. Dept. of Electrical and Computer Engineering.
SOFTWARE DEVELOPMENT TO SUPPORT SENSOR CONTROL OF ROBOT ARC WELDING Final Report, 16 Apr. 1985 - 8 May 1986
Fred R. Silas, Jr. 8 May 1986 173 p
(Contract NAS8-36460)
(NASA-178865; NAS 1.26:178865; CAM-TR-86-120) Avail: NTIS HC A08/MF A01 CSCL 13H

The development of software for a Digital Equipment Corporation MINC-23 Laboratory Computer to provide functions of a workcell host computer for Space Shuttle Main Engine (SSME) robotic welding is documented. Routines were written to transfer robot programs between the MINC and an Advanced Robotic Cyro 750 welding robot. Other routines provide advanced program editing features while additional software allows communicatin with a remote computer aided design system. Access to special robot functions were provided to allow advanced control of weld seam tracking and process control for future development programs. Author

N86-28435# Army Construction Engineering Research Lab., Champaign, Ill.
RECOMMENDED STAINLESS STEEL WELDING PROCEDURES FOR CORPS OF ENGINEERS CONSTRUCTION Final Report
Robert A. Weber, Steve Hanson, and Marie Bottoms Feb. 1986 21 p
(AD-A165668; CERL-TR-M-86/05) Avail. NTIS HC A02/MF A01 CSCL 13/8

Two stainless steel welding methods are investigated for potential use in Corps of Engineers construction. The methods, gas tungsten-arc welding (GTAW) and shielded metal-arc welding (SMAW), are tested with varying current levels for two stainless steels (types 304 and 316). Comparative analyses are made between test results and standard specifications for the weld's mechanical properties. Test samples also are examined using

metallography and electron microscopy. Results show that GTAW and SMAW provide sound welds in the two stainless steels tested. Moreover, using low-carbon electrodes and filler metal and low currents in the welding process results in low precipitate levels in the heat-affected zone, thus reducing the risk of knifeline corrosion attack. The objective of this work is to investigate current limitations and welding positions that will refine stainless steel pipe welding for field construction and to use this information as a basis for recommending guidance for CE stainless steel welding procedures. GRA

N86-28436# Army Research and Development Command, Dover, N.J. Fire Support Armament Center.
COPPERHEAD CONTAINER LATCH
Paul J. LaCarrubba Feb. 1986 36 p
(AD-A165787; AD-E401458; ARFSD-TR-85004) Avail: NTIS HC A03/MF A01 CSCL 13/4

An improved version of the container latch for the Copperhead M712 projectile is now available. It can be grasped with more comfort, provides the tightest seal possible, and has good shock resistance. Detailed illustrations describe its development. Computer graphics show competing latches under shock load. GRA

N86-28437# Air Force Packaging Evaluation Agency, Wright-Patterson AFB, Ohio.
DESIGN AND DEVELOPMENT OF e3 ANTENNA CONTAINER
Farley T. Hinds 3 Sep. 1985 45 p
(AD-A165804) Avail: NTIS HC A03/MF A01 CSCL 01/3

Warner-Robins ALC/DSTD, Robins AFB GA 31098, requested the Air Force Packaging Evaluation Agency, Wright-Patterson AFB Ohio 45433, to participate as a consultant in the design, development, and testing of a new container for shipping and storage of the E3 Antenna used on the airborne warning and control system (AWACS) aircraft. Evaluation of previous efforts to provide a qualified container revealed a need for substantial changes in the containerization process. The new container must provide not only environmental protection for the E3 Antenna but also shall be transportable by C-5, C-130, or C-141 aircraft. The purpose of this project was to: (1) Design a sealable container for the E3 Antenna; (2) Ensure that the container design was compatible with the C-5, C-130 and C-141 aircraft as well as truck, rail and ship; (3) Establish test plan parameters; (4) Develop reprocurement drawings (level 3); (5) Evaluate the container design and determine any deficiencies; and (6) Deliver a qualified container in nine months. GRA

N86-28438# Oak Ridge National Lab., Tenn.
MANUAL GAS TUNGSTEN ARC (dc) AND SEMIAUTOMATIC GAS METAL ARC WELDING OF 6XXX ALUMINUM. WELDING PROCEDURE SPECIFICATION
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 8 p
(Contract DE-AC05-84OR-21400)
(DE86-001512; ORNL/M-26) Avail: NTIS HC A02/MF A01

Procedure WPS-1009 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for manual gas tungsten arc (dc) and semiautomatic gas metal arc (dc) welding of aluminum alloys 6061 and 6063 (P-23), in thickness range 0.187 to 2 in.; filler metal is ER4043 (F-23); shielding gases are helium (GTAW) and argon (GMAW). DOE

N86-28439# SKF Industries, Inc., King of Prussia, Pa.
MECHANICAL INTERACTIONS OF ROUGH SURFACES Quarterly Progress Report, 30 Sep. - 31 Dec. 1985
J. I. McCool Jan. 1986 13 p
(Contract DE-AC02-84ER-13163)
(DE86-005778; DOE/ER-13163/9) Avail: NTIS HC A02/MF A01

Measurements of spinning torque as a function of spinning velocity were predicted using an elastic-plastic traction model computer program TRIBOS. Differences are noted depending upon whether the shear stress components in the plastic zone follow the elastically or viscously computed directions. It is found that at high load the viscous version affords a good fit while at low load the elastic version is superior. The behavior of lubricated concentrated contacts involving microscopically rough surfaces is explored under conditions of combined rolling, sliding and spinning with and without the presense of contaminating particles. Processing principles and techniques are being developed for the analysis of digitized rough surface profiles to yield surface descriptors that are predictive of functional performance and which have acceptable systematic and random error. DOE

N86-28440# European Space Tribology Lab., Risley (England).
PERFORMANCE AND LIFE TESTING OF MOTOR GEARHEADS
J. C. Anderson Paris ESA Jan. 1985 45 p Revised
(Contract ESTEC-5615/83-NL-PP)
(ESA-ESTL-68; ESA-CR(P)-2158; ESA-86-96860) Avail: NTIS HC A03/MF A01

A size 11 permanent magnet motor, and 2 size 18 precision gearheads were subjected to air and vacuum performance tests and accelerated life testing. Each gearhead was lubricated with a different perfluoropolyether-based grease, namely Braycote 3L-38-RP and Fomblin Y VAC 3. The gearheads and the motor perform satisfactorily in air, and in vacuum over a range of temperatures from +85C to -45C, except that the gearhead lubricated with Y VAC 3 exhibits a higher current consumption for the same ouptut torque at -45C compared with the Braycote-lubricated unit. The Braycote-lubricated gearhead accumulated 61 hr of operation in air and 15 hr 10 min in vacuum. The motor, fitted with graphite-based brushes, accumulated 61 hr 20 min running in air and 33 hr 50 min in vacuum, but the brushes were severely worn. ESA

N86-28441# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF A RECIPROCATING ENGINE RETROFITTED WITH SELECTIVE CATALYTIC REDUCTION. VOLUME 2: DATA SUPPLEMENT Final Report, Mar. - Dec. 1984
C. Castaldini and L. R. Waterland Apr. 1986 72 p
(Contract EPA-68-02-3188)
(PB86-183787; EPA/600/7-86/014B) Avail: NTIS HC A04/MF A01 CSCL 21G

Results of comprehensive emission measurements and 15-day continuous emission monitoring for a 1,500 kW (2000 hp) gas-fired, four-stroke turbocharged reciprocating engine equipped with an ammonia-based selective catalytic reduction system for NOx control are given. A data supplement is included. GRA

N86-28442# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
ENVIRONMENTAL ASSESSMENT OF A RECIPROCATING ENGINE RETROFITTED WITH SELECTIVE CATALYTIC REDUCTION. VOLUME 1: TECHNICAL RESULTS Final Report, Mar. - Dec. 1984
C. Castaldini and L. R. Waterland Apr. 1986 71 p
(Contract EPA-68-02-3188)
(PB86-183779; EPA/600/7-86/014A) Avail: NTIS HC A04/MF A01 CSCL 21G

Results of comprehensive emission measurements and 15-day continuous emission monitoring for a 1,500 kW (2000 hp) gas-fired, four-stroke turbocharged reciprocating engine equipped with an ammonia-based selective catalytic reduction system for NOx control are given. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-28443 Kema N.V., Arnhem (Netherlands).
NONDESTRUCTIVE TESTING (NDT) IN THE NETHERLANDS 1982-85

M. G. vanDijk Oct. 1985 52 p
(WSK/98001-38; ESA-86-96663) Copyright. Avail: Issuing Activity

Nondestructive testing (NDT) in the Dutch aerospace, oil, process, and power generation industries is reviewed. Test facilities and institutes involved in NDT are described. ESA

N86-28444# Royal Armament Research and Development Establishment, Fort Halstead (England). Mathematics and Assessment Group.
RELIABILITY. PART 1: ATTRIBUTES DATA
J. Bendall 1984 46 p
(Rept-20/84-Pt-1; BR93984; ESA-86-97112) Avail: NTIS

An approach to the assessment of system reliability, based on attributes data, is described. Techniques for handling general multicomponent systems are presented. ESA

N86-28445*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
A STUDY OF THE STRESS WAVE FACTOR TECHNIQUE FOR NONDESTRUCTIVE EVALUATION OF COMPOSITE MATERIALS Final Report
A. Sarrafzadeh-Khoee, M. T. Kiernan, J. C. Duke, Jr., and E. G. Henneke, II Washington NASA Jul. 1986 33 p
(Grant NAG3-172)
(NASA-CR-4002; E-3081; NAS 1.26:4002) Avail: NTIS HC A03/MF A01 CSCL 14D

The acousto-ultrasonic method of nondestructive evaluation is an extremely sensitive means of assessing material response. Efforts continue to complete the understanding of this method. In order to achieve the full sensitivity of the technique, extreme care must be taken in its performance. This report provides an update of the efforts to advance the understanding of this method and to increase its application to the nondestructive evaluation of composite materials. Included are descriptions of a novel optical system that is capable of measuring in-plane and out-of-plane displacements, an IBM PC-based data acquisition system, an extensive data analysis software package, the azimuthal variation of acousto-ultrasonic behavior in graphite/epoxy laminates, and preliminary examination of processing variation in graphite-aluminum tubes. Author

N86-28446# NDT Technologies, Inc., South Windsor, Conn.
ELECTROMAGNETIC INSPECTION OF WIRE ROPES USING SENSOR ARRAYS Final Report, 16 Jun. 1983 - 15 Jun. 1985
Herbert R. Weischedel 20 Dec. 1985 93 p
(Contract N00014-83-C-0484)
(AD-A165681) Avail: NTIS HC A05/MF A01 CSCL 14/2

The Program Objective was to develop a technique and apparatus for a reliable inspection of wire ropes in service. In particular, the objective was to develop advanced methods and apparatus for an accurate quantitative in-service identification and characterization of wire rope defects using electromagnetic NDE methods. A line of electromagnetic instruments was developed. These instruments can reliably test wire ropes in service, and they can remedy the shortcomings of previous wire rope inspection methods. The new instruments allow a quantitative determination of loss of metallic cross-sectional area (LMA) caused by localized flaws (e.g., broken wires) and by distributed flaws (e.g., corrosion or abrasion) with a quantitative resolution of 50 mm. (Here, quantitative resolution is defined as the required minimum flaw length for which the sensor provides a quantitative measure of LMA directly, without additional signal processing).The qualitative identification of flaws shorter than 50 mm is possible without further signal processing. GRA

N86-28447# Karlsruhe Univ. (West Germany). Inst. Fuer Zuverlaessigkeit und Schadenskunde in M
FRACTURE MECHANIC EVALUATION OF NONDESTRUCTIVELY DETECTED FLAWS IN CERAMIC MATERIALS Final Report, Oct. 1984
Ottmar Rosenfelder and Dietrich Munz Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 76 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-148; ISSN-0340-7608; ESA-86-96897) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

The effect of flaws such as pores, inclusions, and cracks on the failure of ceramic materials is discussed. Flaw assessment was based on nondestructive and fractographic evaluation. It is shown that all flaws > 360 micron diameter can be detected nondestructively. For smaller flaws, the detection probability is < 1. For the prediction of failure strength the stress intensity factor for different flaw configuration was calculated. Pores, approximately described by spheres, were described by two-dimensional cracks; this is not possible for elongated pores. If the pores are described by spheres or hemispheres with circumferential cracks, a crack length much larger than the grain size has to be assumed. The behavior of inclusion depends on the thermal expansion coefficent of inclusion and matrix. ESA

N86-28448# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. des Systemes Balistiques et Spatiaux.
THE QUALITY OF AEROSPACE MATERIALS ENVIRONMENTAL TESTS [LA QUALITE DES ESSAIS EN ENVIRONNEMENT POUR LES MATERIES AEROSPATIAUX (RECOMMANDATION RG AERO 00011 ELABOREE PAR LE BNAE)]
Bertrand Rosenau 1986 21 p In FRENCH
(SNIAS-861-422-103; ESA-86-97160) Avail: NTIS HC A02/MF A01

The test quality in mechanical, climate, electrical, and radioelectrical environments is discussed. The evaluation of the test quality and the interactions between the user and the control laboratory to establish an efficient test system are examined for the different phases of the system implementation, including design, experimental set-up, execution and formulation of the test results. ESA

N86-28449# Food and Drug Administration, Rockville, Md. Center for Devices and Radiological Health.
COMPUTER TOMOGRAPHY TECHNIQUES AND QUALITY ASSURANCE PROGRAMS IN THE MID-1980's Final Report
J. L. McCrohan, J. F. Patterson, R. L. Burkhart, H. A. Goldstein, and F. G. Shuman Mar. 1986 74 p
(PB86-182508; HHS/PUB-FDA-86-8258; FDA/CDRH-86/113) Avail: NTIS HC A04/MF A01 CSCL 06L

The Center for Devices and Radiological Health (CDRH) has been concerned for some time about a variety of issues related to the practice of computed tomography (CT). To obtain information on two of those issues, how CT systems are used in practice and the extent and nature of quality assurance activities, CDRH negotiated contracts for the collection of data with 21 States during Fiscal Years '83 and '84. In 421 surveys, data were gathered on 40 different CT system models manufactured by 11 different firms. The report presents an analysis of the data collected. The general conclusions drawn from the data are also presented in the report. GRA

N86-28450# Battelle Columbus Labs., Ohio.
EVALUATIONS AND UTILIZATIONS OF RISK IMPORTANCES
W. E. Vesely and T. C. Davis Aug. 1986 130 p
(Contract NRC-FIN-D-1106)
(TI85-902167; NUREG/CR-4377; BMI-2129) Avail: NTIS HC A07/MF A01

Approaches for utilizing Probabilistic Risk Analyses (PRA's) to determine risk importances are discussed. Risk importances are determined for design features, plant operations, and other factors that can affect risk. PRA's can be used to identify the importances of risk contributors or proposed changes to designs or operations. The objective here is to provide guidance in evaluating and applying risk importances. The utilization of both qualitative risk importances and quantitative risk importances is described. Qualitative risk importances are based on the logic models in the PRA, while quantitative risk importances are based on the quantitative results of the PRA. Both types of importances are among the most robust

and meaningful information a PRA can provide. A wide variety of risk importance evaluations are described including evaluations of the importances of design changes, testing, maintenance, degrading environments, and aging. Specific utilizations are described in inspection and in reliability assurance programs. However, the general approaches have widespread applicability. The role of personal computers and decision support programs in applying risk importance evaluations are also described. Author

N86-28451 United Kingdom Atomic Energy Authority, Harwell (England). Materials Development Div.
THE DEVELOPMENT AND USE OF ELECTROCHEMICAL POTENTIAL MONITORING IN ENVIRONMENT ASSISTED CRACKING TESTS IN HIGH TEMPERATURE, HIGH PRESSURE, AQUEOUS ENVIRONMENTS
P. M. Scott and W. H. Bamford Oct. 1985 21 p
(AERE-R-11741) Copyright. Avail: NTIS HC A02/MF A01

The results of corrosion fatigue and stress corrosion studies of pressure boundary steels in LWR type environments have often exhibited significant interlaboratory variability. One measurement that has proved essential in helping to resolve these differences has been the corrosion potential of the test specimens achieved in various test rigs. The International Co-operative Group on Cyclic Crack Growth Rate Testing and Evaluation (the ICCGR Group), as part of its activities, has collated measurements of corrosion potentials and has been able to monitor the reliability and longevity of various reference electrodes thought to be suitable for high temperature (up to 290 deg C) aqueous environments. These measurements are reviewed. Recommendations are given for the most suitable reference electrode designs for BWR and PWR primary water environments. Author

N86-28452# Institute of Gas Technology, Chicago, Ill.
FIELD-TESTING RESULTS ON THE SONIC LEAK PINPOINTER
James E. Huebler, Christopher J. Ziolkowski, Stuart B. Eynon, and L. L. Altpeter, Jr. 1985 25 p Presented at the American Gas Association Distribution Conference Operating Section, Boston, Mass., 20-22 May 1985
(TI86-900902; CONF-8505237-3) Avail: NTIS HC A02/MF A01

The field testing results on the sonic leak pinpointer for medium and high pressure gas distribution systems are discussed. The sonic leak pinpointer is a supplement to conventional leak pinpointers by means of which false excavations can be eliminated. During the field testing, currently available pinpointing techniques (including the combustible gas indicator) accurately pinpointed leaks at 74% of the sites. The addition of the sonic leak pinpointer to these techniques increased the accurate pinpointing to 97% of the sites, an improvement of 23%. Accurate pinpointing is defined as + or - 2 feet, ensuring that the leak is in the first bell hole excavated. Uses for the pinpointer and the general procedure for using the instrument are also discussed. The current results demonstrate that the sonic leak pinpointer has a payback period of less than two months. Author

N86-28250*# Aerojet Technical Systems Co., Sacramento, Calif.
LONGITUDINAL MODE COMBUSTION INSTABILITIES OF A HIGH-PRESSURE FUEL-RICH LOX/RP-1 PREBURNER
J. J. Fang *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 429-441 (For primary document see N86-28212 19-28)
(Contract NAS3-22647)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-28453 ESDU International Ltd., London (England).
CIRCULAR-CYLINDRICAL STRUCTURES: DYNAMIC RESPONSE TO VORTEX SHEDDING. PART 2: SIMPLIFIED CALCULATION PROCEDURES
Dec. 1985 36 p
(ESDU85039; ISBN-0-85679-545-3; ISSN-0143-2702) Avail: ESDU

Simplified procedures with charts for estimating across-wind deflection of cantilever structures such as stacks, towers, and process columns are given (ESDU Report 85039).The methods are derived from the full procedure in a previous report (ESDU 85038) but are simplified by using pre-determined values of the across-wind force coefficient and Strouhal number. They apply to parallel-sided, tapered and stepped structures and structures with efficient aerodynamic spoilers, and only require knowledge of the mass, natural frequency and dimensions of the structure. The procedures, for which calculation sheets are included, predict maximum amplitude (at critical wind speed), and response at off-critical wind speeds. The loss of accuracy resulting from the simplifications compared with the full procedure is within the overall uncertainty of the method and gives predictions that are certainly adequate for most engineering calculations. Worked examples illustrate the use of the methods. A subsequent report (ESDU 85040) gives a computer program for the calculation of response using the full method of the previous report (ESDU 85038). Author

N86-28454# Royal Aircraft Establishment, Farnborough (England).
PREDICTION OF STRESS DISTRIBUTIONS IN FATIGUE SPECIMENS BY FINITE ELEMENT ANALYSIS
C. G. Burton, T. J. W. Ward, and S. R. Cockrem 26 Apr. 1985 18 p
(RAE-TM-P-1054; BR96735; ESA-86-97106) Avail: Issuing Activity

An elastoplastic finite element code was used to analyze the stress fields in a notch bend fatigue specimen and a model gas turbine disk. A range of solution algorithms was employed. The quickest is the initial stiffness algorithm in which the structural stiffness matrix remains constant throughout the analysis. Attempts to improve the convergence rate of the iterative solution procedure by using Crisfield's acceleration technique were unsuccessful. The model disk results show good correlations between the observed crack initiation sites and the predicted location of maximum principal stress thus improving confidence in the accuracy of the analysis. The predicted stresses for the model disk and notch bend specimen were used successfully to correlate experimental crack initiation and growth data. ESA

N86-28455*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
INTEGRATED RESEARCH IN CONSTITUTIVE MODELLING AT ELEVATED TEMPERATURES, PART 2 Final Report
W. E. Haisler and D. H. Allen Jun. 1986 224 p
(Grant NAG3-491)
(NASA-CR-177233; NAS 1.26:177233; MM-4998-86-13-Pt-2) Avail: NTIS HC A10/MF A01 CSCL 20K

Four current viscoplastic models are compared experimentally with Inconel 718 at 1100 F. A series of tests were performed to create a sufficient data base from which to evaluate material constants. The models used include Bodner's anisotropic model; Krieg, Swearengen, and Rhode's model; Schmidt and Miller's model; and Walker's exponential model. For individual titles, see N86-28456 through N86-28460.

N86-28456*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
OVERVIEW OF MODELS
In its Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 2 Jun. 1986 p 16-125 (For primary document see N86-28455 19-39)
Avail: NTIS HC A10/MF A01 CSCL 20K

The thermodynamic framework of internal state variables are briefly described. The general form of viscoplastic models is

discussed. Tests used as input to calculate material constants for viscoplastic models are covered. The standard tests included creep tests, stress relaxation tests, monotonic strain rate tests, fully reversed cyclic tests, transient tests during monotonic loading, and transient tests during cyclic loading. The test equipment is also described. B.G.

N86-28457*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
DATA SET
In its Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 2 Jun. 1986 p 126-135 (For primary document see N86-28455 19-39)
Avail: NTIS HC A10/MF A01 CSCL 20K

The calculations used in the viscoplasticity models were repeated and upgrades to the methods used were developed. The data are presented in tabular form. B.G.

N86-28458*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
PROPOSED INITIAL CALCULATION METHODS
In its Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 2 Jun. 1986 p 136-148 (For primary document see N86-28455 19-39)
Avail: NTIS HC A10/MF A01 CSCL 20K

The proposed methods are summarized using a generic viscoplastic model. The following initial assumptions were made: back stress was assumed responsible for hardening in monotonic tension; drag stress was assumed responsible for cyclic softening; thermal recovery effects were small and masked by solute strengthening effects; and solute strengthening or strain aging masked the basic positive strain rate sensitivity of the material. Each of the four models used is then explained. B.G.

N86-28459*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
AUXILIARY MODEL RESULTS
In its Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 2 Jun. 1986 p 149-174 (For primary document see N86-28455 19-39)
Avail: NTIS HC A10/MF A01 CSCL 20K

The experimental results for the first half cycle of the cyclic tests and the long term tension tests are presented. The model predictions for these results are provided and the numerical instabilities are examined. B.G.

N86-28460*# Texas A&M Univ., College Station.
EXPERIMENTAL COMPUTER PROGRAMS
In its Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 2 Jun. 1986 p 175-215 (For primary document see N86-28455 19-39)
Avail: NTIS HC A10/MF A01 CSCL 20K

The test software developed for the viscoplasticity modeling is presented. All programs are written in MTS Basic. Program VCYC6 allows the user to run cyclic tests, monotonic tension test, and cyclic tests with creep hold times. Program CRP3 performs creep tests and creep stress drop tests. Program BACK2 allows the user to analyze cyclic creep hold time data on creep stress drop data. The program does a linear regression curve fit through the data. The number of points used for the curve is chosen for each step. Program GMPLT8 analyzes each test with the gamma plot. The stress inelastic strain history is calculated and a stress-inelastic strain polynomical curve fit performed. Program WALK2 performs the same function with the theta plot. B.G.

N86-28461*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRUCTURAL ANALYSIS OF TURBINE BLADES USING UNIFIED CONSTITUTIVE MODELS
A. Kaufman, M. Tong, J. F. Saltsman, and G. R. Halford 1986 12 p Proposed for presentation at the International Conference on Computers in Engine Technology, Cambridge, England, 24-27 Mar. 1987; sponsored by the Institution of Mechanical Engineers
(NASA-TM-88807; E-3155; NAS 1.15:88807) Avail: NTIS HC A02/MF A01 CSCL 20K

The utility of advanced constitutive models and structural analysis methods in predicting the cyclic life of an air-cooled turbine blade is assessed. Five structural analysis methods were exercised in calculating the cyclic stress-strain response at the airfoil critical location. The methods studied were a cyclic elastic finite-element analysis, nonlinear finite-element analyses based on classical inelastic models and the unified models of Bodner and Walker, and a simplified inelastic procedure. These analyses were compared in terms of computing times and of predicted crack initiation lives using the Strainrange Partitioning method. Author

N86-28462*# Georgia Inst. of Tech., Atlanta. School of Engineering Science and Mechanics.
FORMULATION OF THE NONLINEAR ANALYSIS OF SHELL-LIKE STRUCTURES, SUBJECTED TO TIME-DEPENDENT MECHANICAL AND THERMAL LOADING Interim Technical Report, 15 Apr. 1984 - 14 Apr. 1986
George J. Simitses, Robert L. Carlson, and Richard Riff 28 Jul. 1986 178 p
(Grant NAG3-534)
(NASA-CR-177194; NAS 1.26:177194) Avail: NTIS HC A09/MF A01 CSCL 20K

A general mathematical model and solution methodologies for analyzing the structural response of thin, metallic shell structures under large transient, cyclic, or static thermomechanical loads was sought. Among the system responses associated with these loads and conditions are thermal buckling, creep buckling, and ratcheting. Thus geometric and material nonlinearities (of high order) can be anticipated and must be considered in developing the mathematical model. A complete, true ab-initio rate theory of kinematics and kinetics for continuum ad curved thin structures, without any restriction on the magnitude of the strains or the deformations, was formulated. The time dependence and large strain behavior are incorporated through the introduction of the time rates of metric and curvature in two coordinate systems: fixed (spatial) and convected (material). The relations between the time derivative and the covariant derivative (gradient) was developed for curved space and motion, so the velocity components supply the connection between the equations of motion and the time rates of change of the metric and curvature tensors. A time and temperature dependent viscoplasticity model was formulated to account for finite strains and rotations. Author

N86-28463*# Aerostructures, Inc., Arlington, Va.
NASTRAN SUPPLEMENTAL DOCUMENTATION FOR MODAL FORCED VIBRATION ANALYSIS OF AERODYNAMICALLY EXCITED TURBOSYSTEMS
V. Elchuri and P. R. Pamidi (RPK Corp., Columbia, Md.) Jul. 1985 133 p
(Contract NAS3-24387)
(NASA-CR-174967; NAS 1.26:174967) Avail: NTIS HC A07/MF A01 CSCL 20K

This report is a supplemental NASTRAN document for a new capability to determine the vibratory response of turbosystems subjected to aerodynamic excitation. Supplements to NASTRAN Theoretical, User's, Programmer's, and Demonstration Manuals are included. Turbosystems such as advanced turbopropellers with highly swept blades, and axial-flow compressors and turbines can be analyzed using this capability, which has been developed and implemented in the April 1984 release of the general purpose finite element program NASTRAN. The dynamic response problem is addressed in terms of the normal modal coordinates of these tuned rotating cyclic structures. Both rigid and flexible hubs/disks are considered. Coriolis and centripetal accelerations, as well as differential stiffness effects are included. Generally non-uniform steady inflow fields and uniform flow fields arbitrarily inclined at small angles with respect to the axis of rotation of the turbosystem are considered as the sources of aerodynamic excitation. The spatial non-uniformities are considered to be small deviations from a principally uniform inflow. Subsonic and

supersonic relative inflows are addressed, with provision for linearly interpolating transonic airloads. Author

N86-28464*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL-FATIGUE AND OXIDATION RESISTANCE OF COBALT-MODIFIED UDIMET 700 ALLOY
Peter T. Bizon and Betty J. Barrow Apr. 1986 15 p
(NASA-TP-2591; E-2704; NAS 1.60:2591) Avail: NTIS
HC A02/MF A01 CSCL 20K

Comparative thermal-fatigue and oxidation resistances of cobalt-modified wrought Udimet 700 alloy (obtained by reducing the cobalt level by direct substitution of nickel) were determined from fluidized-bed tests. Bed temperatures were 1010 and 288 C (1850 and 550 C) for the first 5500 symmetrical 6-min cycles. From cycle 5501 to the 14000-cycle limit of testing, the heating bed temperature was increased to 1050 C (1922 F). Cobalt levels between 0 and 17 wt% were studied in both the bare and NiCrAlY overlay coated conditions. A cobalt level of about 8 wt% gave the best thermal-fatigue life. The conventional alloy specification is for 18.5% cobalt, and hence, a factor of 2 in savings of cobalt could be achieved by using the modified alloy. After 13500 cycles, all bare cobalt-modified alloys lost 10 to 13 percent of their initial weight. Application of the NiCrAlY overlay coating resulted in weight losses of 1/20 to 1/100 of that of the corresponding bare alloy. Author

N86-28465*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIGRID METHODS IN STRUCTURAL MECHANICS
I. S. Raju (Analytical Services and Materials, Inc., Hampton, Va.), C. A. Bigelow, S. Taasan, and M. Y. Hussaini Jul. 1986 60 p
(Contracts NAS1-17808; NAS1-17070)
(NASA-TM-87761; NAS 1.15:87761) Avail: NTIS
HC A04/MF A01 CSCL 20K

Although the application of multigrid methods to the equations of elasticity has been suggested, few such applications have been reported in the literature. In the present work, multigrid techniques are applied to the finite element analysis of a simply supported Bernoulli-Euler beam, and various aspects of the multigrid algorithm are studied and explained in detail. In this study, six grid levels were used to model half the beam. With linear prolongation and sequential ordering, the multigrid algorithm yielded results which were of machine accuracy with work equivalent to 200 standard Gauss-Seidel iterations on the fine grid. Also with linear prolongation and sequential ordering, the V(1,n) cycle with n greater than 2 yielded better convergence rates than the V(n,1) cycle. The restriction and prolongation operators were derived based on energy principles. Conserving energy during the inter-grid transfers required that the prolongation operator be the transpose of the restriction operator, and led to improved convergence rates. With energy-conserving prolongation and sequential ordering, the multigrid algorithm yielded results of machine accuracy with a work equivalent to 45 Gauss-Seidel iterations on the fine grid. The red-black ordering of relaxations yielded solutions of machine accuracy in a single V(1,1) cycle, which required work equivalent to about 4 iterations on the finest grid level. Author

N86-28466*# Lehigh Univ., Bethlehem, Pa.
THE CRACK PROBLEM IN A REINFORCED CYLINDRICAL SHELL
O. Selcuk Yahsi and F. Erdogan Jun. 1986 36 p
(Grant NGR-39-007-011)
(NASA-CR-178140; NAS 1.26:178140) Avail: NTIS
HC A03/MF A01 CSCL 20K

A partially reinforced cylinder containing an axial through crack is considered. The reinforcement is assumed to be fully bonded to the main cylinder. The composite cylinder is thus modelled by a nonhomogeneous shell having a step change in the elastic properties at the $z = 0$ plane, z being the axial coordinate. Using a Reissner type transverse shear theory the problem is reduced to a pair of singular integral equations. In the special case of a crack tip touching the bimaterial interface it is shown that the dominant parts of the kernels of the integral equations associated with both membrane loading and bending of the shell reduce to the generalized Cauchy kernel obtained for the corresponding plane stress case. The integral equations are solved and the stress intensity factors are given for various crack and shell dimensions. A bonded fiberglass reinforcement which may serve as a crack arrestor is used as an example. M.G.

N86-28467*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
J-INTEGRAL ESTIMATES FOR CRACKS IN INFINITE BODIES Final Report
N. E. Dowling Jul. 1986 42 p
(Grant NAG3-438)
(NASA-CR-179474; NAS 1.26:179474) Avail: NTIS
HC A03/MF A01 CSCL 20K

An analysis and discussion is presented of existing estimates of the J-integral for cracks in infinite bodies. Equations are presented which provide convenient estimates for Ramberg-Osgood type elastoplastic materials containing cracks and subjected to multiaxial loading. The relationship between J and the strain normal to the crack is noted to be only weakly dependent on state of stress. But the relationship between J and the stress normal to the crack is strongly dependent on state of stress. A plastic zone correction term often employed is found to be arbitrary, and its magnitude is seldom significant. Author

N86-28468*# Lehigh Univ., Bethlehem, Pa.
LINE SPRING MODEL AND ITS A-PPLICATIONS TO PART-THROUGH CRACK PROBLEMS IN PLATES AND SHELLS
F. Erdogan and B. Aksel Jun. 1986 44 p SPONSORED BY Lehigh Univ.,Bethlehem, Pa.
(Grant NGR-39-007-011)
(NASA-CR-178141; NAS 1.26:178141) Avail: NTIS
HC A03/MF A01 CSCL 20K

The line spring model is described and extended to cover the problem of interaction of multiple internal and surface cracks in plates and shells. The shape functions for various related crack geometries obtained from the plane strain solution and the results of some multiple crack problems are presented. The problems considered include coplanar surface cracks on the same or opposite sides of a plate, nonsymmetrically located coplanar internal elliptic cracks, and in a very limited way the surface and corner cracks in a plate of finite width and a surface crack in a cylindrical shell with fixed end. M.G.

N86-28469# California Univ., Los Angeles. School of Engineering and Applied Science.
SHEAR STRESS-STRAIN RELATION OBTAINED FROM TORQUE-TWIST DATA Interim Report
S. B. Batdorf and Robert W. C. Ko 1 Jan. 1986 11 p
(Contract N00014-85-K-0667)
(AD-A165598; UCLA-ENG-86-41) Avail: NTIS HC A02/MF A01
CSCL 20/11

One method of establishing the shear stress-strain relation of a material involves applying torsion to a circular cylinder. This approach has the advantage of experimental simplicity, but the disadvantage that the specimen is nonuniformly loaded, thus requiring a somewhat sophisticated data analysis. Fortunately the required analysis has already been worked out for the case of solid cylinders made of an isotropic elastic material. Such an analysis was furnished by Nadai. Unfortunately, sometimes only an approximate analysis is performed, and results are only reported as the resulting approximate shear stress-strain relation. Fortunately however, as we shall show, this type of approximate result can be easily corrected to get the proper result without having to go back to the original torque-twist data, which may no longer be available. A second contribution of the paper is to extend the analysis to the case of hollow cylinders. A third is to call attention to the fact that some cases of combined loads can also be analyzed in essentially the same manner. oblem, and serves as the basis of the extension to hollow cylinders. GRA

N86-28470# Kansas State Univ., Manhattan. Dept. of Civil Engineering.
APPLICABILITY OF FRACTURE MECHANICS METHODOLOGY TO CRACKING AND FRACTURE OF CONCRETE Interim Report, Oct. 1984 - Sep. 1985
Stuart E. Swartz Feb. 1986 212 p
(Contract N62583-85-M-T239; NR Proj. ZR0-2303)
(AD-A165639; NCEL-CR-86.006) Avail: NTIS HC A10/MF A01 CSCL 13/2

This report contains a state-of-the-art summary of past and current research activities in the application of fracture mechanics methodologies to cracking and fracture of concrete. A fracture model to determine the fracture process in concrete is discussed. Despite known problems, it is recommended that linear elastic fracture mechanics provides a suitable model. A detailed testing procedure and data evaluation are given using a three-point-loaded cracked beam specimen. GRA

N86-28471# Texas A&M Univ., College Station. Mechanics and Materials Research Center.
THE DYNAMIC ENERGY RELEASE RATE FOR A STEADILY PROPAGATING ANTI-PLANE SHEAR CRACK IN A LINEARLY VISCOELASTIC BODY
Jay R. Walton Jan. 1986 26 p
(Contract N00014-83-K-0211)
(AD-A165654; MM-4867-86-3) Avail: NTIS HC A03/MF A01 CSCL 20/11

The steady-state propagation of a semi-infinte, anti-plane shear crack is reconsidered for a general, infinite, homogeneous and isotropic linearly viscoelastic body. As with an earlier study, the inertial term in the equation of motion is retained and the shear modulus is only assumed to be positive, continuous, decreasing and convex. A Barenblatt type failure zone is introduced in order to cancel the singular stress, and a numerically convenient expansion for the dynamic Energy Release Rate (ERR) is derived for a rather general class of crack face loadings. The ERR is shown to have a complicated dependence on crack speed material properties with significant qualitative differences between viscoelastic and elastic material. The results are illustrated with numerical calculations for both power-law material and a standard linear solid. GRA

N86-28472# Texas A&M Univ., College Station. Mechanics and Materials Center.
THE QUASI-STATIC PROPAGATION OF A PLANE STRAIN CRACK IN A POWER-LAW INHOMOGENEOUS LINEARLY VISOELASTIC BODY
Lawrence Schovanec and Jay R. Walton Jan. 1986 28 p
(Contract N00014-83-K-0211)
(AD-A165714; MM-4867-86-4) Avail: NTIS HC A03/MF A01 CSCL 20/11

An analysis is presented of the steady-state propagation of a semi-infinite mode I crack for an infinite inhomogeneous, linearly viscoelastic body. The shear modulus is assumed to have a power-law dependence on depth from the plane of the crack. Moreover, both a general and a power-law behavior in time for the shear modulus are considered. A simple closed form expression for the normal component of stress in front of the propagating crack is derived which exhibits explicitly the form of the stress singularity and its material dependency. The crack profile is examined and its dependence on the spatial and time behavior of the shear modulus is determined. GRA

N86-28473# Aeronautical Research Labs., Melbourne (Australia).
NUMERICAL COMPLIANCE AND STRESS INTENSITY FACTOR CALIBRATIONS OF MRL (MATERIALS RESEARCH LABORATORIES) COMPACT SPECIMENS
M. Heller and J. Paul Nov. 1985 26 p
(AD-A165833; ARL/STRUC-TM-421) Avail: NTIS HC A03/MF A01 CSCL 20/11

The fracture mechanics parameters K sub IC (the plane strain fracture toughness) and J sub IC (the critical value of the J integral) characterise the resistance of a material to cracking for elastic and elastic-plastic conditions at the crack tip respectively. Standard specimen configurations are available for K sub IC and J sub IC testing, and these are given in ASTM standards E-399 and E-813 respectively. At Materials Research Laboratories, Melbourne, a compact specimen design has been developed which has been found to be suitable for both K sub IC and J sub IC testing. For determining K sub IC, a stress intensity factor (K) calibration is required for the specimen, and for determining J sub IC using the single specimen technique, a compliance calibration is needed. This memorandum describes these calibrations, which were obtained using finite element analyses, and gives equations which have been fitted to the results for convenience. GRA

N86-28474# Science Applications International Corp., McLean, Va.
MOVING FINITE ELEMENT CODES IN ONE AND TWO DIMENSIONS Final Report
Adam Drobot, Martin Fritts, Curtis Menyuk, Robert Gelinas, and Said Doss 1 Oct. 1985 103 p
(Contract DE-AC05-81ER-10858)
(DE86-006185; SAIC-85/1845) Avail: NTIS HC A06/MF A01

Many problems in physics necessitate the solution of equations which develop sharp gradients, such as shocks. To deal with this situation, methods are needed which place a high density of nodes in the neighborhoods of the steep gradients. One of the most promising of these methods is the moving finite element method. This approach, in which the nodes are moved so as to minimize the residual error was used successfully to study several different one dimensional problems and show great promise as well in dealing with two dimensions. The principal two dimensional problems which were examined include: a gas dynamic problem with a reflecting planar shock, Burger's equation in two dimensions, the Stefan problem, and a gas dynamics problem with a shock incident on a wedge boundary. B.G.

N86-28475# Technical Research Centre of Finland, Espoo.
ELASTIC-PLASTIC ANALYSIS OF FRACTURE MECHANICS TEST SPECIMENS, PART 2
H. Talja and K. Wallin Dec. 1984 110 p In FINNISH
(DE86-700156; VTT-TUTK-329) Avail: NTIS (US Sales Only) HC A06/MF A01

This is the second part of the report of the research program Comparisons between computational and experimental elastic-plastic results. The first part was reported earlier and contained a two dimensional linear elastic finite element analysis of four specimen geometries and testing and elastic-plastic analyses of the specimen. The second part of the program containing the testing and 2-D elastic-plastic analyses of five specimens is described. The four specimen geometries mentioned above and two different materials (stainless steel AISI 304 and ferrite pressure vessel steel A533B) are considered. The following comparisons are presented: load vs. load displacement curves, J-integral, crack opening displacement (COD), J vs. COD and the size of the plastic zone. The agreement between the computational and experimental results is quite good. Complete agreement can be achieved only with 3 dimensional calculation models. Author

N86-28476# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
VARIATIONAL APPROACH FOR PREDICTING THE LOAD DEFORMATION RESPONSE OF A DOUBLE STRETCHED MEMBRANE REFLECTOR MODULE
L. M. Murphy Oct. 1985 60 p
(DE85-016873; SERI/TR-253-2626) Avail: NTIS HC A04/MF A01

A report presents an analytical model useful for design and sizing purposes to describe the load deformation response of a stretched membrane reflector module structural system. The major problem addressed is that of a double membrane module which is uniformly loaded normal to the membrane surface. The membranes are attached to a frame which is held fixed by periodic simple supports. The current model predicts the coupled membrane/frame response and considers the in-plane stiffness effect

of the membrane and nonuniform tension states in the membrane; the effect of different attachment schemes; and the impact of double-membrane designs. The tension increments in the membrane are assumed to be small compared to the initial membrane pre-tension. The model developed in this report is based on an incremental variational approach where large deformation, small strain theories are assumed. The Rayleigh Ritz procedure and a formalism similar to that used in finite element analyses are employed in describing the system stiffness. Increased system structural stiffness is shown to accrue with the coupled double membrane frame system by virtue of the roll restraint and frame bending rigidity enhancements (analogous to the due to due to a flange section) offered to the frame by the membrane. Results are compared with predictions using detailed finite element analyses. DOE

N86-28477# Los Alamos National Lab., N. Mex.
DISCUSSION OF MATERIAL ROTATION AND STRESS RATE
J. K. Dienes Oct. 1985 17 p
(Contract W-7405-eng-36)
(DE86-005865; LA-10530-MS) Avail: NTIS HC A02/MF A01

Characterization of material behavior can be divided into two parts, the analysis of deformation and the underlying physics, though these are intimately related. A significant advance in the analysis of deformation was made when the polar decomposition theorem was introduced, making it possible to separate large deformations into a stretch and a rotation. Consequences of the theorem affect the way rate processes should be characterized. In particular, rate of material rotation is different from vorticity, and the stress rate for finite strains is different from the usual stress rate of Zaremba, Jaumann, and Noll. It is convenient to define a strain rate that is different from the stretching that is the symmetric part of the velocity gradient. These concepts are described in detail in a 1979 paper. Various criticisms of that paper have appeared in the Journal of Applied Mechanics, which are discussed herein. To illustrate the distinction, it is shown that the rate of rotation in a classical vortex does not vanish, though the vorticity is zero. It is also shown that the rate of material rotation recently computed by Nemat-Nasser, which involves an eigenvalue expansion, is equivalent to the one given in the 1979 paper, which makes use of matrix inversion, and it asseverated that the matrix inversion approach is computationally more efficient. DOE

N86-28478# Technische Hogeschool, Delft (Netherlands). Dept. of Civil Engineering.
IMPLEMENTATION OF AXISYMMETRIC FINITE ELEMENTS IN STRUDL V2 M8
C. F. Vrijman Nov. 1983 56 p
(ICES-STRUDL-83-15; B8575351; ESA-86-96671) Avail: NTIS HC A04/MF A01

A computer program for stress analysis in bodies of revolution under axisymmetric loading is listed. ESA

N86-28479# Technische Hogeschool, Delft (Netherlands). Transportkunde.
PULSATION TESTS ON A SOCKET FAST CASTED MOLD SOCKET [PULSATIEPROEVEN OP EEN MET SOCKET FAST INGEGOTEN FIETSOK]
G. C. Meeuse 1986 6 p In DUTCH
(Rept-1014; ESA-86-96950) Avail: NTIS HC A02/MF A01

An 18 mm steel core cable of length 4 m and a minimal fracture strength of 217 kN was subjected to pulsating dynamic loads to test synthetic sockets. Using an 800 cc pulsator and a 40 ton universal test cylinder, pulsating pull loads with upper and lower limits of 51.5 and 6.5 kN were carried out. After 127,500 load variations (frequency 100 var/min) at 50 cm from the sockets, 7 fiber cracks are observed at the cylinder side; a 10.5 mm length increase is observed. After 268,680 variations values are 89 and 11.5 mm. The frequency was raised to 160 var/min giving a final crack after 452,830 variations; the last measured value of length is 16.5 mm. Tested sockets show good performance compared with other materials. ESA

N86-28480# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Lab. Soete for Strength of Materials and Welding T
REINFORCEMENT OF OPENINGS IN FLAT HEADS
Joris Decock Dec. 1985 54 p Sponsored by Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture
(CRIF-MT-164; ESA-86-97062) Avail: NTIS HC A04/MF A01

The results of a parametric study by the finite element method on flat heads with or without a central nozzle submitted to internal pressure and an axial nozzle load are presented. A design method which takes into account the stresses at different critical locations is derived. When obtained loadings are present the value of the maximum stresses can be derived. ESA

N86-28481# Societe Nationale Industrielle Aerospatiale, Toulouse (France). Div. Avions.
STRESS INTENSITY FACTOR IN AN INTEGRAL OR BONDED STIFFENED PANEL USING AN ANALYTICAL METHOD
J. M. Thomas and B. Lachaud 1986 20 p In FRENCH; ENGLISH summary Presented at Colloq. sur les Tendances en Calcul de Struct., Bastia, France, 6-8 Nov. 1985 Submitted for publication
(SNIAS-861-111-104; ESA-86-97141) Avail: NTIS HC A02/MF A01

A mathematical model of a stiffened panel is described. The element is decomposed in a set of subelements for which analytical solutions exist. The results are then superposed respecting the compatibility constraints. The method leads to an economical computation technique to evaluate, for instance, damage tolerance. It is also shown that it could be used for fundamental parametric studies associated with the design of an aircraft. ESA

N86-28482# Societe Nationale Industrielle Aerospatiale, Toulouse (France). Aircraft Div.
DESIGN OF BOLTED JOINTS IN CFRP STRUCTURES UNDER TENSION
Pierre Lafon 1986 7 p Presented at AGARD Struct. and Mater. Panel, Toulouse, 6 Sep. 1984
(SNIAS-861-111-112; ESA-86-97148) Avail: NTIS HC A02/MF A01

For the design of bolted joints in CFRP, it is shown that the empiric rule provides suitable results in most cases. In limited cases, when the empiric rule is inapplicable, local finite element analysis, which is longer and more expensive, is used. But the two methods are not fully satisfactory since they ignore parameters such as stacking sequence, bending of joint components, and bearing stress variation with thickness. ESA

N86-28483# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
CRITERIA FOR UNSTABLE CRACK EXTENSION UNDER DISPLACEMENT CONTROL
D. Munz and A. Brueckner Dec. 1985 43 p In GERMAN; ENGLISH summary
(KIF-4015; ISSN-0303-4003; ESA-86-96916) Avail: NTIS HC A03/MF A01

Criteria for the relation between compliance and crack size under displacement control were developed. Under displacement control, cracks in components usually extend first stably under decreasing load, and afterwards unstably. The critical load for the onset of unstable crack extension depends on the material, crack geometry, the component, and on the compliance of the loading system. The relation between compliance and crack size is worked out. The relations for linear-elastic fracture mechanics for flat and rising crack growth resistance curves, the plastic instability criterion, and the J-integral methods are discussed. ESA

N86-28484# Oak Ridge National Lab., Tenn.
ORVIRT.PC: A 2-D FINITE-ELEMENT FRACTURE ANALYSIS PROGRAM FOR A MICROCOMPUTER
J. W. Bryson Oct. 1985 55 p
(Contract NRC-FIN-B-0119; DE-AC05-84OR-21400)
(TI86-001867; NUREG/CR-4367; ORNL-6208) Avail: NTIS

HC A04/MF A01

The Oak Ridge virtual crack extension personal computer (ORVIRT.PC) is a two dimensional (2-D) finite-element fracture analysis program for an IBM PC/AT or PC/XT microcomputer. The code is based primarily on the techniques used in the ORMGENADINA-ORVIRT fracture analysis system. ORVIRT.PC is a stand-alone program capable of performing 2-D linear-elastic stress and fracture-mechanics analyses. Thermal loadings may be analyzed in addition to mechanical loadings. Crack-face tractions may also be considered. Eight-noded isoparametric elements that combine both performance and ease of modeling are employed in the program. Special crack-tip elements that allow for an inverse square root variation in the near tip stress and strain fields may be used at the crack tip. Detailed user instructions describe both preparation of input data and program operation. Sample problems are presented that demonstrate good agreement with known solutions. Author

N86-28485# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. National Engineering Lab.

STRUCTURAL DAMPING CALCULATIONS OF A LABORATORY PIPING SYSTEM USING MODAL ANALYSIS

J. G. Arendts and A. G. Ware 1986 7 p Presented at conference

(TI86-003223; EGG-M-09685; CONF-860224-6) Avail: NTIS HC A02/MF A01

The United States Nuclear Regulatory Commission and the Electric Power Research Institute have jointly sponsored construction of two laboratory piping systems for a variety of vibration research projects. EGSG Idaho used the responses of these systems to obtain piping system damping data considering different supports, methods of excitation, and calculational techniques. The 6-in., carbon steel systems were approximately fifty feet in length and were excited via impulse, simulated earthquake, and random and swept sine types of input motion. Data were reduced for the modes in the seismic range 0 to 33 Hz. The system damping deceased as response frequency increased and generally consistent values were computed from the different types of tests conducted. Author

N86-28486 United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.

THE INFLUENCE OF STRENGTH AND PHOSPHORUS SEGREGATION ON THE DUCTILE FRACTURE MECHANISM IN A Ni-Cr STEEL

C. A. Hippsley and S. G. Druce Oct. 1985 30 p

(AERE-R-11964) Copyright. Avail: Issuing Activity

Upper-shelf toughness and its degradation through ageing at 500 deg C have been investigated in quenched-and-tempered 300M steel as a function of tempering treatment at 650 deg C. Material having a 0 2% proof stress in the range 550 to 1000 MPa was examined. Toughness was assessed and was related to the ductile fracture mechanism through measurements of the strain required for void nucleation and void growth to coalescence. Changes in matrix rheology, void-nucleating precipitate morphology, bulk chemistry and interfacial chemistry were monitored during tempering and ageing, and the associated fractography was quantitatively assessed. The ductile fracture process in unaged material was dominated by the strain required for void nucleation on carbide precipitates. Nucleation strain increased with tempering time at 650 deg C causing a rise in ductility. Ageing at 500 deg C produced a loss of ductility for all temper conditions, and the sole cause of this effect was the segregation of phosphorus to carbide/matrix interfaces, identified by high resolution Auger spectroscopy. Both the strain required for void nucleation at carbides and that for void growth to coalescence were suppressed by ageing, through a reduction in interfacial cohesion consistent with the embrittling effect of segregated phosphorus. Author

N86-28487# Naval Academy, Annapolis, Md.

DEVELOPMENT AND VERIFICATION OF CONDITIONS FOR DUCTILE TEARING INSTABILITY AND ARREST

J. A. Joyce Feb. 1986 31 p

(Contract NRC-FIN-B7026)

(TI86-900891; NUREG/CR-4528) Avail: NTIS HC A03/MF A01

The objective of this work was to take an in-depth look at the process of ductile tearing instability and especially to evaluate experimentally the conditions for arrest of a ductile tearing instability. Major conclusions are that the ductile tearing instability initiates slowly, but in a mechanical spring apparatus it approaches drop tower crack growth rate conditions and hence the phenomena is effected by the material rate sensitivity. The conditions necessary for arrest are completely stated and demonstrated by experimental data on a 3 percent Ni structural steel. Author

42 GEOSCIENCES (GENERAL)

N86-28488# European Space Agency, Paris (France).

PROCEEDINGS OF A WORKSHOP ON THEMATIC APPLICATIONS OF SAR DATA

Duc Guyenne, comp. and Olga Melita, comp. Dec. 1985 106 p Workshop held in Frascati, Italy, 9-11 Sep. 1985

(ESA-SP-257; ISSN-0379-6566; ESA-86-96853) Avail: NTIS HC A06/MF A01

Applications of SAR data to agriculture, forestry, ice reporting, snow monitoring, and geological surveys were discussed. For individual titles, see N86-28489 through N86-28498. ESA

N86-28489# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).

SELECTED APPROACHES TO THEMATIC SAR STUDIES c43

J. P. Guignard *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 5-6 (For primary document see N86-28488 19-42)

Avail: NTIS HC A06/MF A01

Studies aimed at establishing what SAR system parameters (e.g., frequency, angle of incidence, polarization) are most suited to thematic applications are introduced. Studies aimed at defining optimal information extraction schemes by assessing the statistical properties of required parameters and developing decision tools (e.g., Bayes estimators, maximum likelihood estimators) for automatic derivation of quantitative values related to geophysical phenomena, from SAR images are outlined. Studies of analysis tools of interest for any application, such as radargrammetry (correction of the geometry of the SAR images) and extraction of land features (e.g., roads, buildings) are discussed. ESA

N86-28490# GEC-Marconi Electronics Ltd., Chelmsford (England). Research Labs.

SAR FOR AGRICULTURE AND FORESTRY c43

S. Quegan, P. N. Churchill (Hunting Surveys Ltd., Boreham Wood, England), A. Wright, J. Lamont, A. J. Rye, and J. W. Trevett *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 7-14 (For primary document see N86-28488 19-42)

Avail: NTIS HC A06/MF A01

The data handling, system engineering and information extraction necessary for a land-use SAR are discussed. Data handling requires techniques for change detection and interpretation; in both areas present knowledge is inadequate. The lack of multitemporal SAR data and coordinated plant parameter data are a severe hindrance to the development of techniques and physical understanding. The present state of knowledge does not permit clear definition of the parameters for a land use SAR sensor, nor the requirement for ancillary data. Image interpretation is argued to be best carried out on a land-unit rather than pixel-by-pixel basis. Texture is shown to be a potential source of information independent of mean backscatter for land-cover. Human and machine measures of texture can be shown to correspond. ESA

N86-28491# National Aerospace Lab., Amsterdam (Netherlands).

USE OF A SAR IN AGRICULTURE AND FORESTRY c43

G. J. L. Nooren, J. C. A. vanderLubbe, E. P. W. Attema (Technische

Hogeschool, Delft, Netherlands), L. Krul, tj068073, and G. P. deLoor (Physics Lab. RVO-TNO, The Hague, Netherlands) *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 15-20 (For primary document see N86-28488 19-42)
(Contract ESA-5777/83-NL-MS)
Avail: NTIS HC A06/MF A01

Applications of SAR in agriculture and forestry were assessed, and classification and segmentation algorithms for SAR imagery were derived. Analysis suggests that for most of the applications, SAR imagery is inadequate. The segmentation algorithm is a bad estimator for field size, gives satisfactory results for field identification, and leads to accurate determination of field averaged pixel value. The performance improves when the number of looks is increased. The use of multitemporal data gives more improvement. The classifier is based on segments rather than pixels. For crop rotation detection, it gives a good result with a smaller training set than is usually required. The area determination is better than in the case of segmentation only. ESA

N86-28492# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
SEA ICE PARAMETER RETRIEVAL FROM SAR DATA c48
H. Skriver and P. Gudmandsen *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 21-28 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

A pixel-by-pixel classification scheme for sea ice type determination, and a spatial segmentation scheme for studies of sea ice dynamics were investigated. Before these schemes may be applied, the inherent speckle must be reduced, and noncoherent averaging and adaptive filtering (Frost and Lee filters) were applied. The Lee filter seems to give the best results. The performance of the classification method is surprisingly good, with mean classification accuracies of 80%. Three segmentation algorithms were investigated: pyramid segmentation, edge-based segmentation, and region growing, with the second scheme considered to be the best. ESA

N86-28493# Innsbruck Univ. (Austria). Inst. fuer Meteorologie und Geophysik.
TOWARDS A SAR SYSTEM FOR SNOW AND LAND ICE APPLICATIONS c43
H. Rott, G. Domik (Vexcell Corp., Boulder, Colo.), C. Maetzler (Bern Univ. Switzerland), and H. Miller (Alfred-Wegener-Inst. for Polar Research, Bremerhaven, West Germany) *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 29-39 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

The characteristics of a SAR system for snow and land ice monitoring and possible applications are considered. Characteristics of backscattering from snow and ice are discussed. Examples for radar image simulations which provide information on required antenna look angle and spatial resolution for snow cover monitoring are given. Preliminary specifications for a SAR system for snow and land ice monitoring are outlined. ESA

N86-28494# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE USE OF SAR SYSTEMS FOR GEOLOGICAL APPLICATIONS c46
F. Jaskolla (Ludwig-Maximilians-Universitaet, Munich, West Germany), M. Rast, and J. Bodechtel *In its* Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 41-50 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

Radar imagery was used for gelogical mapping in Southern Iceland, Bavaria, Italy, and Egypt. Radar data enables an improved identification of lithological units and structural features. Experiments on the information content of simultaneously collected X, C, and L-band data are needed. The application of radargrammetric correction is of great importance. ESA

N86-28495# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
LAND FEATURE EXTRACTION FROM SAR IMAGES c43
P. N. Churchill, S. Quegan (Marconi Co. Ltd., Chelmsford, England), N. Veck, and J. W. Trevett *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 51-55 Sponsored by ESA and British Government (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

The reliability and precision with which land features can be extracted from airborne and satellite borne SAR's are reviewed. The study demonstrates the benefits of combining optical with microwave sensors. The combination of different bands along the electromagnetic spectrum permits a greater depth of information to be analyzed. The combination of different ways of interacting with the vegetative canopy permits a wider analysis to be undertaken. Optical sensors tend to represent the reflection from the surface of the canopy, while active microwave sensors react with the structure of the canopy. ESA

N86-28496# Technische Univ., Graz (Austria). Inst. for Image Processing and Computer Graphics.
RADARGRAMMETRIC ASPECTS OF SAR DATA EVALUATION c32
J. Raggam, G. Triebnig, M. F. Buchroithner, G. Domik (Vexcell Corp., Boulder, Colo.), and F. W. Leberl *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 57-64 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

Radargrammetric image analysis is discussed, emphasizing applicability for geology and land snow and ice mapping. The results of these application studies lead to conclusions for radar satellite missions. A method to create digital elevation models from radar stereo-images is outlined. Radar stereo viewability is considered. ESA

N86-28497# Technische Univ., Graz (Austria). Inst. for Navigation.
SYNTHETIC APERTURE RADAR (SAR) PRODUCT SIMULATION c32
Ph. Hartl, A. Popella (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), and A. J. Sieber *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 65-72 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

Existing SAR product simulator applicability to advanced land missions was assessed. It is found that none of them are appropriate. The requested input files characterizing the topography of an area of interest are not available to the quality necessary for realistic simulations. As part of the simulation itself, the modeling of image speckle and image texture and the coherent SAR data hologram need more research. The development of a coherent radar cross section data base, including coordinated monostatic and bistatic calibrated measurements; development of algorithms for modeling image speckle and image texture, and verification by analysis of existing SAR data; and harmonization of the development of digital terrain models are recommended. ESA

N86-28498# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
STUDY OF THE POTENTIAL OF SAR FOR CROP IDENTIFICATION AND MONITORING c43
Thuy LeToan, C. Kerr, H. Laur, A. Lopes, R. Touzi, A. K. Fung (Texas Univ., Arlington.), J. M. Durand (Centre National d'Etudes Spatiales, Toulouse, France), Y. Kerr, and J. Perbos *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 73-85 (For primary document see N86-28488 19-42)
(Contract ESA-6153/NL-MS)
Avail: NTIS HC A06/MF A01

It is shown that classification of vegetation covers with SAR data is possible using spectral and, to a lesser extent, textural

information. To fully demonstrate this potential for a wide range of crop and climatic conditions adapted SAR data sets must be available. They should be mainly multitemporal, multipolarisation (HH and VV) and/or multifrequency SAR images associated with detailed ground data. Progress in processing techniques must be made, in particular in filtering and segmentation methods. Extraction of vegetation parameters is possible. ESA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-28499*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SHUTTLE IMAGING RADAR VIEWS THE EARTH FROM CHALLENGER: THE SIR-B EXPERIMENT
J. P. Ford, J. B. Cimino, B. Holt, and M. R. Ruzek 15 Mar. 1986 146 p
(Contract NAS7-918)
(NASA-CR-177158; JPL-PUB-86-10; NAS 1.26:177158) Avail: NTIS HC A07/MF A01 CSCL 08B

In October 1984, SIR-B obtained digital image data of about 6.5 million km2 of the Earth's surface. The coverage is mostly of selected experimental test sites located between latitudes 60 deg north and 60 deg south. Programmed adjustments made to the look angle of the steerable radar antenna and to the flight attitude of the shuttle during the mission permitted collection of multiple-incidence-angle coverage or extended mapping coverage as required for the experiments. The SIR-B images included here are representative of the coverage obtained for scientific studies in geology, cartography, hydrology, vegetation cover, and oceanography. The relations between radar backscatter and incidence angle for discriminating various types of surfaces, and the use of multiple-incidence-angle SIR-B images for stereo measurement and viewing, are illustrated with examples. Interpretation of the images is facilitated by corresponding images or photographs obtained by different sensors or by sketch maps or diagrams. Author

N86-28500# Department of the Navy, Washington, D. C.
ENVIRONMENTAL MAPPING SYSTEM Patent
Ben H. Cantrell, inventor (to Navy) Issued 26 Nov. 1985 16 p Supersedes AD-D007413
(AD-D012146; US-Patent-4,555,703; US-Patent-Appl-SN-160877; US-Patent-Class-343-5SA) Avail: US Patent and Trademark Office CSCL 17/9

A circuit is described which detects environmental sources of echos received by a pulse-echo system such as radar and classifies the sources of the echo at each range resolution cell as either short pulse interference, ran clutter or jamming, distributed land clutter, an isolated target or thermal noise. The circuit implements on the screen of a cathode ray tube a digital map of a selected echo source type by modulating the electron beam intensity with a binary digit (o or 1) at each increment of the sweep corresponding to a range resolution cell. The circuit utilizes a pulse-to-pulse noncoherent subtraction to remove correlated echoes, leaving only uncorrelated type echos. Short pulse interference is then detected and the uncorrelated echo component is compared to thermal noise to determine if land clutter is determined from the uncorrelated echo component, and all correlatsd targets and land clutter and isolated targets by the following procedure: the isolated targets are required to have uncorrelated echoes on each side of them in range. Finally, if no detection of any of these types is made, thermal noise is declared. GRA

N86-28501# Consiglio Nazionale delle Ricerche, Rome (Italy). International Inst. for Geothermal Research.
CALCULATION OF GEOTHERMAL RESERVOIR TEMPERATURES AND STEAM FRACTIONS FROM GAS COMPOSITIONS
Franco DAmore and Alfred N. Truesdell (Geological Survey, Menlo Park, Calif.) 1985 7 p
(Contract DE-AI01-79RA-50294)
(DE86-005739; DOE/RA-50294/T2) Avail: NTIS HC A02/MF A01

The chemical equilibrium and physical characteristics of a fluid in a reservoir (temperature, steam fraction with respect to total water, gas/steam ratio, redox conditions), which seem to be responsible for the observed concentrations of some reactive species found in the geothermal fluids (CO_2, H_2, H_2S, and CH_4) are addressed. Gas geochemistry is of particular interest in vapor dominated fields where the fluid discharged consists of almost pure steam containing a limited number of volatile chemical species. Considering several geothermal systems, a good correlation was obtained among the temperatures calculated from the gas geothermometers and the temperatures measured in the reservoir or evaluated by other physical or chemical methods. Author

N86-28502# Innsbruck Univ. (Austria). Inst. fuer Meteorologie und Geophysik.
STUDY ON USE AND CHARACTERISTICS OF SAR FOR LAND SNOW AND ICE APPLICATIONS Final Report
H. Rott, G. Domik, C. Maetzler, H. Miller, and K. G. Lenhart Paris ESA May 1985 164 p
(Contract ESA-5441/83-D-IM(SC))
(Rept-1(1985); ESA-CR(P)-2168; ESA-86-96867) Avail: NTIS HC A08/MF A01

Synthetic aperture radar systems for snow and land ice monitoring were investigated to define a land observation satellite mission. Applications and requirements for remote sensing of land cryosphere parameters are discussed. The physical background on scattering from snow and ice is discussed and results of backscattering measurements are compared with other investigations. Examples for spaceborne and airborne SAR data on snow and glaciers are provided and information for the interpretation of the radar image data is given. Synthetic radar images were generated for two test areas with different topography to define the optimum antenna look angle. Simulations based on real SAR data provided information on spatial resolution and signal to noise ratio. Promising applications and preliminary specifications for a SAR system on land cryosphere monitoring are presented. ESA

N86-28503# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
AEROSOL REMOTE SENSING USING THE MEASUREMENT OF THE STOKES VECTOR OF SCATTERED SOLAR RADIATION [AEROSOL-FERNSONDIERUNG MITTELS MESSUNG DES STOKES-VEKTORS GESTREUTER SOLARSTRAHLUNG]
Detlef Hennings, A. Ebel, ed., F. M. Neubauer, ed., E. Raschke, ed., and P. Speth, ed. 1985 89 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(Mitt-44; ISSN-0069-5882; ESA-86-96918) Avail: NTIS HC A05/MF A01

The optical characteristics of atmospheric aerosols were studied for application in passive remote sensing. Models and measured optical data were used. The effect of different aerosol scattering matrices on the solar radiation field was calculated using a radiation transfer code including reflection matrices of a rough water surface. Calculations indicate that the inverse of the degree of polarization as well as the radiance depend linearly on aerosol optical thickness, if observational conditions are properly selected, and that both measuring quantities are suited to measure optical thickness, due to their sensitivity. However, remote sensing of optical thickness by the components of the Stokes vector requires a more precise knowledge of the scattering matrices of atmospheric aerosols. Airborne measurements of the Stokes vector components were compared with model results; they agree within their measuring accuracy. ESA

N86-28504# Louisiana State Univ., Baton Rouge. Water Resources Research Inst.
DISCRETE KERNEL MODEL FOR SIMULATION OF MULTI-

LAYERED AQUIFERS
T. H. Illangasekare 1985 83 p Sponsored by Geological Survey (Grant DI-14-08-0001-G-909)
(PB86-170453; USGS/G-909-03) Avail: NTIS HC A05/MF A01 CSCL 08H

The design and development of a special management oriented groundwater model for the simulation of multilayered aquifers are presented. Multilayered aquifers consist of water bearing aquifer layers separated by permeable confining layers which permit significant leakage flow. The discrete kernel approach for groundwater modeling was used as the basic technique. The approach is based on the classical solution of partial differential equations using Green's function method. The three dimensional flow in the multilayered aquifer is simulated using a quasi-three dimensional flow model. The flow in each aquifer layer is modelled as two dimensional flow in the horizontal direction. The flow in the confining aquitard layers is assumed vertical. The model has the capability to compute the head with a higher resolution in any specified sub-regions of a large regional aquifer system. GRA

N86-28505# Louisiana State Univ., Baton Rouge. Water Resources Research Inst.
APPLICATION OF THE PRINCIPLE OF MAXIMUM ENTROPY (POME) TO HYDROLOGIC FREQUENCY ANALYSIS
V. P. Singh, K. Singh, and A. K. Rajagopal 1985 155 p Sponsored by Geological Survey
(Grant DI-14-08-0001-G-909)
(PB86-170420; USGS/G-909-05) Avail: NTIS HC A08/MF A01 CSCL 08H

The principle of maximum entropy (POME) was employed to develop a procedure for deviation of a number of frequency distributions used in hydrology for performing flood frequency and risk analysis. The procedure required specification of constraints and maximization of entropy, and was thus a solution of the classical optimization problem. Data on four rainfall-runoff events from a large outdood rainfall-runoff experimental facility were used for fitting the IUH by five different methods. For six selected river gaging stations, parameters of the gamma distribution, fitted to annual maximum discharges, were evaluated by POME and compared with those obtained by using the methods of moments (MOM) and maximum likelihood estimation. GRA

N86-28506# Mississippi State Univ., Mississippi State. Center for Computational Hydroscience and Engineer
MATHEMATICAL MODELS OF SEDIMENT EFFECTS ON WATER RESOURCES SYSTEMS Interim Report
S. S. Y. Wang Sep. 1985 36 p Sponsored by Geological Survey
(PB86-164241; USGS/G-915-05) Avail: NTIS HC A03/MF A01 CSCL 08H

Sediment is not only a major water pollutant itself but also a carrier and storage agent of other pollution. The project studied its effects on water resources by the application of the most cost-effective research methodology, numerical-empirical modeling. The most recently developed computational techniques were integrated with the most reliable empirical functions so that the complex sediment transport phenomena can be simulated on digital computers. It can be used both in hydraulic engineering project designs and in environmental engineering impact studies, especially the longterm environmental impact prediction. GRA

N86-28507# Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
COASTAL: A DISTRIBUTED HYDROLOGIC SIMULATION MODEL FOR LOWER COASTAL PLAIN WATERSHEDS IN GEORGA
C. H. Sin and G. A. Brook Aug. 1985 110 p Sponsored by Geological Survey Prepared in cooperation with Georgia Univ., Athens
(Grant DI-14-08-0001-G-900)
(PB86-134209; ERC-06-85; USGS/G-900-03) Avail: NTIS HC A06/MF A01 CSCL 08H

Overland flow to streams is rare in the Lower Coastal Plain watersheds of Georgia. As a result, commonly-used watershed hydrologic simulation models can not be used to predict streamflow accurately. Therefore, a distributed watershed hydrologic simulation model, named COASTAL, has been developed specifically for the Lower Coastal Plain regions of Georgia, Florida, and South Carolina. A basic assumption of the model, which can be run on a personal computer, is that all streamflow results from ground water discharge into stream channels. COASTAL was developed by combining surface and ground water simulation models. GRA

N86-28508# Georgia Inst. of Tech., Atlanta. Environmental Resources Center.
SIMPLIFIED APPROACH TO REGIONAL MULTILAYERED AQUIFER ANALYSIS
M. M. Aral Aug. 1985 77 p Sponsored by Geological Survey (Grant DI-14-08-0001-G-900)
(PB86-164167; USGS/G-900-02) Avail: NTIS HC A05/MF A01 CSCL 08H

In order to effectively monitor and manage aquifers subjected to artificial recharge as well as increased pumping demands, it is necessary to analyze their hydrodynamic response. Several mathematical numerical models were developed to accomplish this purpose on regional scale for single layer aquifiers. A regional two-dimensional flow analysis was formulated using finite element techniques for multilayer aquifiers. The advantages of using finite element analysis for aquifer analysis become evident when attempting to model irregular boundaries and variable inputs such as recharge, pumping and field properties in multilayer systems. GRA

N86-28509# Westinghouse Electric Corp., Pittsburgh, Pa. Nuclear Energy Systems.
FLECHT SEASET PROGRAM Final Report
L. E. Hochreiter Nov. 1985 351 p Sponsored by EPRI
(Contract NRC-FIN-B-6204; EPRI Proj. 959-1)
(TI86-900422; NUREG/CR-4167; EPRI-NP-4112; WCAP-10926; NRC/EPRI/WESTINGHOUSE-16) Avail: NTIS HC A16/MF A01

The highlights and main findings of the United States Nuclear Regulatory Commission (USNRC), the Electric Power Research Inst., Westinghouse cooperative full-length emergency cooling heat transfer seperate effects and systems effects tests (FLECHT SEASET) program are given. Areas in which the results of the program can contribute to revising the current licensing requirements for Loss of Coolant (LOCA) safety analysis for water cooled reactors are indicated. Also identified are several technical areas in which the new FLECHT SEASET data and analysis can lead to improved safety analysis modeling, and thereby to predicted pressurized water reactor (PWR) response for postulated accident scenarios. Significant progress has been made in the modeling areas of nonequlibrium dispersed two-phase flow during reflood. Improved models and understanding of this rod bundle cooling regime are summarized in this report. Another important result of the FLECHT SEASET program arises from the natural circulation test series, which investigated single-phase, two-phase, and reflux condensation cooling modes of a scaled PWR under small-break LOCA conditions. The tests and subsequent analysis consitute one of few complete sets of data for these cooling modes in which full-height, multitube steam generators with sufficient instrumentation were used to examine primary-to-secondary heat transfer in the generators. It is believed that the natural circulation test data will be extremely useful to benchmark the improved post-TMI small-break LOCA computer codes. Author

N86-28294*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE MARCH 1985 DEMONSTRATION OF THE FIDUCIAL NETWORK CONCEPT FOR GPS GEODESY: A PRELIMINARY REPORT
J. M. Davidson, C. L. Thornton, T. H. Dixon, C. J. Vegos, L. E. Young, and T. P. Yunck *In its* The Telecommunications and Data Acquisition Report 15 May 1986 7 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 08E

N86-28424*# Naples Univ. (Italy). Inst. of Gasdynamics.
HIGH RESOLUTION REMOTE SENSING MISSIONS OF A TETHERED SATELLITE
Sergio Vetrella and A. Moccia *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 349-363 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28489# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SELECTED APPROACHES TO THEMATIC SAR STUDIES
J. P. Guignard *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 5-6 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

N86-28490# GEC-Marconi Electronics Ltd., Chelmsford (England). Research Labs.
SAR FOR AGRICULTURE AND FORESTRY
S. Quegan, P. N. Churchill (Hunting Surveys Ltd., Boreham Wood, England), A. Wright, J. Lamont, A. J. Rye, and J. W. Trevett *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 7-14 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

N86-28491# National Aerospace Lab., Amsterdam (Netherlands).
USE OF A SAR IN AGRICULTURE AND FORESTRY
G. J. L. Nooren, J. C. A. vanderLubbe, E. P. W. Attema (Technische Hogeschool, Delft, Netherlands), L. Krul, tj068073, and G. P. deLoor (Physics Lab. RVO-TNO, The Hague, Netherlands) *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 15-20 (For primary document see N86-28488 19-42)
(Contract ESA-5777/83-NL-MS)
Avail: NTIS HC A06/MF A01

N86-28493# Innsbruck Univ. (Austria). Inst. fuer Meteorologie und Geophysik.
TOWARDS A SAR SYSTEM FOR SNOW AND LAND ICE APPLICATIONS
H. Rott, G. Domik (Vexcell Corp., Boulder, Colo.), C. Maetzler (Bern Univ. Switzerland), and H. Miller (Alfred-Wegener-Inst. for Polar Research, Bremerhaven, West Germany) *In* ESA Proceedings of a Workshop on Thematic Applications of SAR DATA Dec. 1985 p 29-39 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

N86-28495# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
LAND FEATURE EXTRACTION FROM SAR IMAGES
P. N. Churchill, S. Quegan (Marconi Co. Ltd., Chelmsford, England), N. Veck, and J. W. Trevett *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 51-55 Sponsored by ESA and British Government (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

N86-28498# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
STUDY OF THE POTENTIAL OF SAR FOR CROP IDENTIFICATION AND MONITORING
Thuy LeToan, C. Kerr, H. Laur, A. Lopes, R. Touzi, A. K. Fung (Texas Univ., Arlington.), J. M. Durand (Centre National d'Etudes Spatiales, Toulouse, France), Y. Kerr, and J. Perbos *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 73-85 (For primary document see N86-28488 19-42)
(Contract ESA-6153/NL-MS)
Avail: NTIS HC A06/MF A01

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-28510 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, s'Gravenhage (Netherlands). Hoofdgroep Maatschappelijke Technologie.
DESIGN CRITERIA FOR SMALL WIND TURBINES. PART 2: WIND CHARACTERIZING
G. L. H. Beugeling and P. E. J. Vermeulen Aug. 1985 126 p In DUTCH Sponsored by NLR and Stichting Projectbeheerbureau Energie Onderzoek
(Rept-85-010880-Pt-2; MT-TNO-8724-11344; ESA-86-97015) Copyright. Avail: Issuing Activity

A calculation model to determine turbulent wind velocity and Wind Direction Fluctuations (WDFs) on a rotating wind turbine rotor was developed to draw up simply applicable and rotor type differentiated design criteria. Using statistical methods, fatiguing and extreme wind gusts as well as turbulent WDFs were constructed and determined as dependent upon criteria chosen (exceed chances). Interstationary (mesoscale) WDFs expected were estimated using literature about squalls and front systems. A second model to determine wind shear for fatigue calculation was also developed. Design gusts (for different classes of hourly average wind velocity at axis height) turbulent WDFs, and wind shear are given for a small wind turbine. ESA

N86-28511*# Toledo Univ., Ohio.
APPLICATION OF A PERSONAL COMPUTER FOR THE UNCOUPLED VIBRATION ANALYSIS OF WIND TURBINE BLADE AND COUNTERWEIGHT ASSEMBLIES Final Report
Phillip R. White and Ronald R. Little Dec. 1985 144 p
(Contracts NCC3-5; DE-AI01-76ET-20320)
(NASA-CR-175090; DOE/NASA/0005-3; NAS 1.26:175090) Avail: NTIS HC A07/MF A01 CSCL 10A

A research effort was undertaken to develop personal computer based software for vibrational analysis. The software was developed to analytically determine the natural frequencies and mode shapes for the uncoupled lateral vibrations of the blade and counterweight assemblies used in a single bladed wind turbine. The uncoupled vibration analysis was performed in both the flapwise and chordwise directions for static rotor conditions. The effects of rotation on the uncoupled flapwise vibration of the blade and counterweight assemblies were evaluated for various rotor speeds up to 90 rpm. The theory, used in the vibration analysis codes, is based on a lumped mass formulation for the blade and counterweight assemblies. The codes are general so that other designs can be readily analyzed. The input for the codes is generally interactive to facilitate usage. The output of the codes is both tabular and graphical. Listings of the codes are provided. Predicted natural frequencies of the first several modes show reasonable agreement with experimental results. The analysis codes were originally developed on a DEC PDP 11/34 minicomputer and then downloaded and modified to run on an ITT XTRA personal computer. Studies conducted to evaluate the efficiency of running the programs on a personal computer as compared with the minicomputer indicated that, with the proper combination of hardware and software options, the efficiency of using a personal computer exceeds that of a minicomputer. Author

N86-28512*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SOLAR STIRLING RECEIVER ALTERNATIVES FOR THE TERRESTRIAL SOLAR APPLICATION

J. Stearns 30 Apr. 1986 36 p
(Contract NAS7-918; JPL Proj. 5105-165; Contract DE-AM^4-80AL-13137)
(NASA-CR-177155; JPL-PUB-86-13; DOE/JPL-1060-96; NAS 1.26:177155) Avail: NTIS HC A03/MF A01 CSCL 10A

Concept studies have been completed for four dish-Stirling receivers, i.e., solar only and thermal storage receiver, each of which is either directly coupled or indirectly (heat pipe) coupled to the Stirling engine. The results of these studies are to be applied to systems benefit/cost analysis to determine the most desirable development approach. Author

N86-28513# Eagle-Picher Industries, Inc., Joplin, Mo. Electronics Div.
CALCIUM/THIONYL CHLORIDE BATTERY TECHNOLOGY Final Report, Feb. 1982 - Jun. 1985
T. Counts Dec. 1985 359 p
(Contract F33615-81-C-2076)
(AD-A165657; AFWAL-TR-85-2081) Avail: NTIS HC A16/MF A01 CSCL 10/3

This final report documents the development efforts conducted by the Lithium Batteries Group of the Couples Department of Eagle-Picher Industries. The objective of the project was to develop calcium-thionyl chloride cell technology. The original project was divided into two main tasks. Task One was to consist of component optimization and stability studies. Once sufficiently advanced, the ongoing results of Task One were to be integrated with Task Two. Task Two was to consist of demonstration of an optimized primary cell. In July, 1983, the program was redirected. Task Two was split, with effort to be directed toward both the original primary cell and toward a high discharge rate reserve configuration cell. Additional electrolyte salts were to be evaluated as a means of improving the storability of the active calcium-thionyl chloride cell. GRA

N86-28514# Naval Civil Engineering Lab., Port Hueneme, Calif.
COMPUTER PROGRAM TO SIMULATE THE THERMAL CHARACTERISTICS OF HEAT RECOVERY INCINERATORS Final Report, Oct. 1981 - Sep. 1984
C. A. Kodres Feb. 1986 119 p
(AD-A165672; NCEL-1745) Avail: NTIS HC A06/MF A01 CSCL 13/1

The computer program, HRI, is described. This model simulates the thermal characteristics of energy (heat) recovery incinerators. The program takes descriptions of the fuel and of the incinerator as inputs then predicts system temperatures, steam generation rate, and energy recovery efficiency. There are options to include primary or secondary waterwalls, a water/firetube boiler, or combinations of these heat exchangers. Both starved and excess air operations are considered. Author (GRA)

N86-28515# New Energy Development Organization, Tokyo (Japan).
RESEARCH AND DEVELOPMENT OF FUEL CELL GENERATION TECHNOLOGY Annual Report, FY 1984
Apr. 1985 33 p
(DE86-900205; NP-6900205) Avail: NTIS (US Sales Only) HC A03/MF A01

Low-temperature, low-pressure phosporic-acid fuel-cell power generation systems are being developed, as are matrix and paste electrolyte type molten-carbonate fuel-cell pilots plants. System analyses are also reported. DOE

N86-28516# Bechtel Corp., San Francisco, Calif.
FEASIBLE UTILITY SCALE SUPERCONDUCTING MAGNETIC ENERGY STORAGE SYSTEM
R. J. Loyd, S. M. Schoenung, T. Nakamura, D. W. Lieurance, M. A. Hilal, J. D. Rogers, J. R. Purcell, and W. V. Hassenzahl 1986 7 p Presented at the IEEE Power Engineering Society Winter Meeting, New York, N.Y., 2 Feb. 1986 Prepared in cooperation with General Dynamics Corp., San Diego, Calif., Los Alamos National Lab., N. Mex., GA Technologies, Inc., San Diego, Calif. and California Univ., Berkeley, Lawrence Berkeley Lab.
(Contract W-7405-eng-36)
(DE86-000812; LA-UR-85-3342; CONF-860210-1) Avail: NTIS HC A02/MF A01

This paper presents the latest design features and estimated costs of a 5000 MWh/1000 MW Superconducting Magnetic Energy Storage (SMES) plant. SMES is proposed as a commercially viable technology for electric utility load leveling. The primary advantage of SMES over other electrical energy storage technologies is its high net roundtrip efficiency. Other features include rapid availability and low maintenance and operating costs. Economic comparisons are made with other energy storage options and with gas turbines. In a diurnal load leveling application, a superconducting coil can be charged from the utility grid during off-peak hours. The ac grid is connected to the dc magnetic coil through a power conversion system that includes an inverter/rectifier. Once charged, the superconducting coil conducts current, which supports an electromagnetic field, with virtually no losses. During hours of peak load, the stored energy is discharged to the grid by reversing the charging process. The principle of operation of a SMES unit is shown. For operation in the superconducting mode, the coil is maintained at extremely low temperature by immersion in a bath of liquid helium. DOE

N86-28517# Pacific Northwest Lab., Richland, Wash.
ENERGY STORAGE TECHNICAL AND ECONOMIC ANALYSIS PROGRAM Annual Report
Nov. 1985 32 p
(Contract DE-AC06-76RL-01830)
(DE86-004182; PNL-5678) Avail: NTIS HC A03/MF A01

The DOE Energy Storage program over the last several years has evaluated a large number of energy storage technologies, developed promising technologies, and successfully transferred new technologies to the private sector. In FY-1985 specific tasks involved in this area included: battery systems requirements analysis, statistical analysis of battery failures, and research needs for corrosion control and prevention in energy conservation systems. Battery cost analysis, R and D planning, and technology transfer/market analysis are also reported. DOE

N86-28518# Pacific Northwest Lab., Richland, Wash.
CALCULATION OF WAKE POWER LOSSES IN A TWO-LEVEL ARRAY: A SIMPLE CASE STUDY
J. C. Barnard Dec. 1985 20 p
(Contract DE-AC06-76RL-01830)
(DE86-005671; PNL-5721) Avail: NTIS HC A02/MF A01

One method of adding capacity is to install another array of turbines whose hub height is above the existing array. This report estimates the wake interference that could be expected in a two-level array. Interference is estimated for a typical situation that may be encountered by a wind farm developer. A modified Lissaman array model is used to make the wake interference calculations. The model calculations show that the wake interference between the two levels is small for the turbine characteristics and turbine layouts considered. (The windwise spacings are about 5.4 and 10.8D for the lower and upper levels of turbines, respectively.) Power losses are about 5% or less at rated speed. Thus, two-level arrays may be a viable way of increasing the generating capacity of existing wind farms. DOE

N86-28519# Varigas Research, Inc., Timonium, Md.
COMPRESSED AIR SYSTEMS: A GUIDEBOOK ON ENERGY AND COST SAVINGS
E. M. Talbott 1986 197 p
(DE86-005723; DOE/NBM-6005723) Avail: NTIS HC A09/MF A01

This guidebook seeks to increase the awareness of the compressed air equipment designers, system engineers and air users to the opportunities for conserving energy. By suggesting methodology and offering approaches to energy and cost analysis, it is expected to motivate conservation through better system design and management. It has been the intention that the book be factual and understandable to working level engineers and supervisors, and that the results be seen on the factory floor.

Therefore, a style somewhat less formal than that of the most technical reports has been adopted. Significant data and methodology are still covered. DOE

N86-28520# Advanced Mechanical Technology, Inc., Newton, Mass.
ANALYTICAL STUDY OF LIQUID-PISTON HEAT PUMP TECHNOLOGY
J. Gerstmann and K. Hules Dec. 1985 122 p
(Contract W-31-109-eng-38)
(DE86-005755; ANL-CT-85-2) Avail: NTIS HC A06/MF A01

While the evaluation of the feasibility of the liquid-piston heat pump (LPHP) concept is not yet complete, several preliminary conclusions may be stated based upon the initial results: (1) Simulation of an isothermal LPHP using the second order computer model indicates that the LPHP can self-start and achieve stable oscillations. (2) Examination of the principal loss mechanisms has identified no losses that are peculiar to the LPHP, and indicates that the magnitudes of the losses are similar to those of conventional Stirling engines and heat pumps. (3) The cooling COP of an LPHP operated from a 400C heat source is estimated to lie between 0.3 for an adiabatic high pressure-ratio heat pump, up to about 1.2 for an isothermal heat pump or an adiabatic, low pressure-ratio heat pump. (4) Examination of liquid piston frictional effects and other practical considerations suggest that it will not be feasible to achieve isothermal expansion/compression in practice. Therefore, prediction of LPHP performance should be based on an adiabatic model. (5) Although a true optimization has not yet been performed, preliminary indications are that the favorable operating frequency of an LPHP will be in the range of 1 to 10 Hz. In order to achieve high specific power (e.g., of the order of 10 kW/liter of displacement), a mean pressure of the order of 7 MPa (1000 psia) is required. (6) Taylor instability of the liquid piston interface will occur at all frequencies of interest unless some means of stabilizing the interface is employed. DOE

N86-28521# Sandia National Labs., Albuquerque, N. Mex.
BATTERIES IN ELECTRIC VEHICLE AND SOLAR CONVERSION APPLICATIONS
K. D. Murphy and R. P. Clark 1986 14 p Presented at the Conference on Applications and Advances in Battery Technology, Long Beach, Calif., 14 Jan. 1986
(Contract DE-AC04-76DP-00789)
(DE86-005887; SAND-85-2565C; CONF-860112-1) Avail: NTIS HC A02/MF A01

This paper reviews sodium-sulfur, zinc-bromine, sealed lead-acid, hydrogen-nickel oxide, and other advanced battery systems. At this time, there is not a clear winner in the race for the ultimate battery. Each system demonstrates particular advantages, such as performance, cost, or durability, but these are often offset by weaknesses that require focused developmental efforts. However, based on projected characteristics, several advanced batteries have great promise for satisfying future energy storage needs. DOE

N86-28522# Stuttgart Univ. (West Germany). Inst. fuer Thermodynamik.
HEAT PUMP WITH EXTERNAL COMBUSTION Final Report, Sep. 1984
Bernhard Bauer and Anton Mantel Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 88 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-142; ISSN-0340-7608; ESA-86-96895) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18.50

A heat pump unit, in which the pump cycle and a Clausius-Rankine vapor power unit are connected by a common condenser and a Combined Expansion-Compression Machine (CECM) with heat as propulsive energy is discussed. A CECM according to the Free Piston (FP) principle, with air as the working fluid, was developed. The FP machine was tested. A CECM according to the FP principle, with R 114 as the working fluid, was constructed. A heat pump test facility was designed and built. A test rig to show the thermal stability of refrigerants was developed. ESA

N86-28523# Netherlands Energy Research Foundation, Petten.
LOAD FLUCTUATIONS AND RESPONSE OF ROTOR SYSTEMS IN TURBULENT WIND FIELDS
J. B. Dragt Oct. 1985 33 p Presented at Windpower Conf., San Francisco, Calif., Aug. 1985
(ECN-172; B8577047; ESA-86-97019) Avail: NTIS HC A03/MF A01

A frequency domain model was developed to take time and space dependence of incoming wind turbulence into account, to determine the apparent wind speed fluctuations for a rotating wind turbine blade, and the consequent load fluctuations. Wind speed and load fluctuations are described in frequency spectra, expanded in rotational modes centered around the harmonics of the rotation frequency. Similar expansions apply to flexible rotor systems, where frequency filters appear due to flapping blade motions. This is demonstrated for a hinged blade rotor. The filters are characterized by physical blade parameters like mechanical, centrifugal and aerodynamic stiffness, and aerodynamic damping. Calculated spectra, and fatigue damage rate estimations are presented. Applications and limitations of the model are discussed. ESA

N86-28524# Netherlands Energy Research Foundation, Petten. Bureau Energie Onderzoek Projecten.
INTEGRAL TIP VANE DEVELOPMENT PROGRAM: PROPOSAL FOR THE FIRST PART [INTEGRAAL TIPVANE ONTWIKKELINGSPROGRAMMA: VOORSTEL VOOR HET EERSTE DEEL]
Apr. 1984 40 p In DUTCH Prepared in cooperation with Technische Hogeschool, Delft, NLR, and Energieonderzoek Centrum Nederland
(BEOP-CR-9; ESA-86-96958) Avail: NTIS HC A03/MF A01

The development, construction, and testing of a high speed 25 m diameter tip vane rotor to prove the feasibility of a high speed concept (the low speed concept shows good performance), and to carry out preliminary studies on behalf of optimization and upscaling is proposed. Financial/organizational aspects and the distribution of the activities per project-participant are elucidated. ESA

N86-28525# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
WINDPOWERED STATION WITH VARIABLE SPEED: A PRELIMINARY SPEED
Eskil Ulen Nov. 1985 127 p In SWEDISH; ENGLISH summary
(FOA-C-20591-E3; ISSN-0347-3694; ESA-86-97033) Avail: NTIS HC A07/MF A01

Control problems when changing to variable speed are discussed for the series version of WTS-3 units. This study can be used for planning, development, analysis, and simulation. A simplified blade control in combination with electric control of the generator is assumed. Detailed study of this electric control is emphasized, while the total system is more superficially treated. Simulation facilities are mentioned. ESA

N86-28526# EG and G Washington Analytical Services Center, Inc., Berkeley, Calif.
OTEC (OCEAN THERMAL ENERGY CONVERSION) COLD WATER PIPE AT-SEA TEST PROGRAM DATA ANALYSIS PROJECT: PIPE, PLATFORM AND ENVIRONMENTAL PARAMETERS DATA REDUCTION AND ANALYSIS
L. A. Vega and G. C. Nilhous Aug. 1985 152 p Sponsored by National Ocean Service
(Contract DGNC-5-00093)
(PB86-177607) Avail: NTIS HC A08/MF A01 CSCL 10B

An assessment of computer models developed to analyze the structural response of cold water pipes (CWPs) is discussed. The principal aim of the data interpretation phase of the study was to determine the causal relationship between the environment and the barge/CWP response to provide the information required to assess the CWP computer models. GRA

N86-28527# EG and G Washington Analytical Services Center, Inc., Berkeley, Calif.
OTEC (OCEAN THERMAL ENERGY CONVERSION) COLD WATER PIPE AT-SEA TEST PROGRAM DATA ANALYSIS PROJECT: USERS GUIDE FOR THE NOAA/ROTECF AND NOAA/TRW COMPUTER MODELS
L. A. Vega and G. C. Nihous Jun. 1985 152 p Sponsored by National Ocean Service
(Contract DGNC-5-00093)
(PB86-177615) Avail: NTIS HC A08/MF A01 CSCL 10B

Additional guidelines for the use of the Cold-Water-Pipe computer models NOAA/TRW and NOAA/ROTECF are provided. The primary intent is to correct and upgrade the user manuals with errata sheets and to provide an updated listing of the source codes. It is recommended that users be familiar with the hydrodynamic and structural aspects of floating vessels and the representation of ocean thermal energy conversion pipes as beams of equivalent structural properties. GRA

N86-28528# Institute of Gas Technology, Chicago, Ill.
MOLTEN CARBONATE FUEL CELL STACK DESIGN OPTIONS
Thomas G. Benjamin and Randy J. Petri 1986 12 p Presented at the 13th Energy Technology Conference and Exposition, Washington, D.C., 17-19 Mar. 1986
(TI86-900893; CONF-860303-4) Avail: NTIS HC A02/MF A01

Significant strides in molten carbonate fuel cell (MCFC) life and performance were made duing the last 20 years. Results include single cell performance improvement from 10 watts/sq ft to 120 watts/sq ft, testing of several subscale stacks, and significant reductions in cost. In the 1980s, attention has turned toward stack related issues including component dimensional and structural stability, cathode dissolution, sulfur poisoning, hardware design, electrolyte management, carbon dioxide conservation, internal reforming, and systems considerations. The MCFC stack hardware design options are discussed and a brief introduction to MCFC technology is presented. Author

N86-28529*# Purdue Univ., West Lafayette, Ind.
INK JET PRINTING OF SILVER METALLIZATION FOR PHOTOVOLTAICS Quarterly Technical Report, Jul. 1 - 30 Sep. 1985
R. W. Vest 21 Oct. 1985 34 p
(Contracts NAS7-100; JPL-957031)
(NASA-CR-177190; DOE/JPL-957031/85/4; NAS 1.26:177190; DE86-002807) Avail: NTIS HC A03/MF A01

Work performed on the development of ink jet printing of silver metallization for solar cells concentrated primarily on evaluating the effects of various cell processing techniques and on ink studies. Studies were done to determine how cleaning the cells in a dilute HF solution (or not cleaning them) might be affecting the cell's series resistance. A standardized test procedure was developed to obtain I-V curves for the cells. A method of edge grinding the cells was developed in order to minimize shunt conductance. An attempt was made to find an additive that would change the surface tension of inks without significantly altering the viscosity. Studies in the use of a 0.5 mil hole in the print head array plate were done. New power supplies were installed on a temporary basis. Computer aided design capabilities will, when implemented, allow for rapid transitions from conceptual designs on the computer to actual printing with the ink jet system. DOE

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-28530# Texas A&M Univ., College Station. Dept. of Oceanography.
GEOLOGICAL AND GEOCHEMICAL IMPLICATIONS OF GAS HYDRATES IN THE GULF OF MEXICO Final Report
J. M. Brooks and W. R. Bryant Sep. 1985 137 p
(Contract DE-FG21-84MC-21088)
(DE86-001011; DOE/MC-21088/1964) Avail: NTIS HC A07/MF A01

This document presents the results of a study of the geological and geochemical implications of gas hydrates in the Gulf of Mexico. The report is based primarily on data obtained from available seismic surveys of the Green Canyon, Garden Banks, Mississippi Canyon, and Orca Basins areas of the northern continental margin of the Gulf of Mexico. The study also includes the data and analysis obtained from several gas hydrate cores recovered in these areas. The report provides new data relevant to gas hydrate research for more in-depth research of the Gulf of Mexico gas hydrates and provides significant information which advances the knowledge and understanding of gas hydrate formations in the natural environment. The report contains several high resolution seismic surveys. In the four hydrate sites studied in detail, the seismic wipeout zones were all associated with collapsed structures, fault scarps, and/or salt piercement structures. These features provide conduits for the upward migration of either biogenic or thermogenic gas from depth. DOE

N86-28531# Mitre Corp., McLean, Va.
ACID DEPOSITION
J. Chamberlain, H. Foley, D. Hammer, G. MacDonald, S. Matarazza, O. Rothaus, and M. Ruderman Jul. 1985 100 p
(Contract DE-AC01-82ER-30029)
(DE86-001596; DOE/ER-30029/T2) Avail: NTIS HC A25/MF A01

Presented is an overview of the acid rain phenomena with unanswered questions and research recommendations. Arguments to support the following hypothesis are offered: In the northeastern United States (unlike in western and central Europe) during the winter half of the year and perhaps even during summer, the total amount of SO2 converted to sulfate and then deposited as sulfuric acid in rain may be determined more by the availability of oxidants than by the amount of SO2 emitted. When, and if, the availability of oxidants limits SO2 oxidation, any reduction of SO2 emissions would not lead to a proportional reduction in the amount of sulfuric acid deposited by wet precipitation. Although the amount of sulfuric acid in rain is widely measured, its probable dependence on oxidants makes it an unsuitable indicator of the presently unmeasured total deposition of sulfates and sulfuric acid precursors. A possible oxidant limitation to sulfuric acid in rain and snow may be much less important when considering total sulfur deposition; this includes dry deposition, which may be larger in magnitude and no less environmentally important than wet acid precipitation. One might expect there to be the so-called linearity between total SO2 emissions and sulfur deposition only when considering the total acid deposition due to SO2 emissions. DOE

N86-28532# Stockholm Univ. (Sweden). Dept. of Meteorology.
NITRATE IN PRECIPITATION: A PRESENTATION OF DATA FROM THE EUROPEAN AIR CHEMISTRY NETWORK (EACN)
Rolf Soederlund, Lennart Granat, and Henning Rodhe 26 Sep. 1985 72 p
(Grants G-GU-3922-105; SWED-EPB-641-3308-82-Fp)
(CM-69; ISSN-0280-445X; ESA-86-97057) Avail: NTIS HC A04/MF A01

Data on the nitrate content of monthly precipitation samples during the period 1955 to 1979 are presented. Employing a median two-way table statistical analysis a seasonal variation of the nitrate concentration with high concentration in January through April and low concentration in June through October is found. All stations but one exhibit an increase in concentration during the period. The annual increase in nitrate concentration between the late 1950's and early 1970's is in the range 3% to 6% at 75% of the stations. Sampling artifacts caused by microbiological transformations in the sampled water after collection may have a certain, probably not substantial, influence on results. ESA

N86-28533# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
ACID RAIN: FEDERAL RESEARCH INTO EFFECTS ON WATERS AND FORESTS

Dec. 1985 56 p
(PB86-170685; GAORCED-86-7; B-220896) Avail: NTIS
HC A04/MF A01 CSCL 06H

The status and future direction of the national Acid Precipitation Assessment Program's research to determine acid deposition's effects on our lakes, streams, and forests are given. Information on the funding supporting the national program's research effort is provided. GRA

N86-28870# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Chimie 1.
HOT ATOM CHEMISTRY AND RADIOLYSIS OF GASEOUS AND SOLID COMPONENTS OF PLANETARY ATMOSPHERES
K. Roessler *In* ESA The aTmospheres of Saturn and Titan Dec. 1985 p 175-188 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-28534*# Texas Univ., Austin. Center for Space Research.
SIMULATION AND ANALYSIS OF A GEOPOTENTIAL RESEARCH MISSION Semiannual Status Report
B. E. Schutz Jun. 1986 37 p
(Grant NAG5-528)
(NASA-CR-176789; NAS 1.26:176789) Avail: NTIS
HC A03/MF A01 CSCL 08N

A computer simulation was performed for a Geopotential Research Mission (GRM) to enable study of the gravitational sensitivity of the range/rate measurement between two satellites and to provide a set of simulated measurements to assist in the evaluation of techniques developed for the determination of the gravity field. The simulation, identified as SGRM 8511, was conducted with two satellites in near circular, frozen orbits at 160 km altitude and separated by 300 km. High precision numerical integration of the polar orbits was used with a gravitational field complete to degree and order 180 coefficients and to degree 300 in orders 0 to 10. The set of simulated data for a mission duration of about 32 days was generated on a Cray X-MP computer. The characteristics of the simulation and the nature of the results are described. Author

N86-28535*# Lunar and Planetary Inst., Houston, Tex.
WORKSHOP ON EARLY CRUSTAL GENESIS: THE WORLD'S OLDEST ROCKS
L. D. Ashwal, ed. 1986 187 p Workshop held in Godthab, Greenland, 21-30 Jul. 1985; sponsored by NASA, LPI, NSF, Gronlands Geologiske Undersogelse and the Commission for Scientific Research in Greenland
(Contract NASw-4066)
(NASA-CR-177306; NAS 1.26:177306; LPI-TR-86-04) Avail: NTIS
HC A09/MF A01 CSCL 08G

Topics addressed include: a general review of Precambrain crustal evolution; geology and geochemistry of the Archean Craton in Greenland and Labrador; Precambrian crustal evolution in North and South America; and the field excursion to the Ameralik Fjord. For individual titles, see N86-28536 through N86-28560.

N86-28536*# Lunar and Planetary Inst., Houston, Tex.
SPECULATIONS ON NATURE AND EXTENT OF ARCHEAN BASEMENT IN LABRADOR AS INDICATED BY SR, ND AND PB ISOTOPIC SYSTEMATICS OF PROTEROZOIC INTRUSIVES
L. D. Ashwal, J. L. Wooden (Geological Survey, Menlo Park, Calif.), and R. F. Emslie (Geological Survey of Canada, Ottawa, Ontario) *In its* Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 17-21 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The Sm-Nd and Rb-Sr isotopic compositions of mid to late Proterozoic (approximately 1.6 to 1.1 Ga) massit-type anorthosites and mafic intrusives in the eastern Canadian shield are correlated with geographic location. Complexes in the Grenville province have positive epsilon sub Nd values and initial Sr-87/Sr-86 (I sub Sr) generally less than 0.703, suggesting derivation from depleted mantle. In Labrador, similar complexes close to or northwest of a line roughly corresponding to the Grenville Front have negative epsilon sub Nd values and I sub Sr > 0.703. This contrast was intrepreted as reflecting either enriched mantle under the Nain Province, or contamination of the Nain intrusives with older crustal components. Lead isotopic compositions, however, favor the latter. The possibility of using these Proterozoic intrusives as tracers to characterize the nature and extent of older basement types in Labrador is discussed. Author

N86-28537*# Geological Survey, Anchorage, Alaska.
PARTIAL MELTING OF AMPHIBOLITE TO TRONDHJEMITE NEAR YKUTAT, ALASKA
Fred Barker *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 22 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

At Nunatak Fiord, 55 km NE of Yakutat, Alaska, a uniform layer of Cretaceous metabasalt approximately 3 km thick was metamorphosed to amphibolite facies and locally partially melted to trondhjemite pegmatite. Results of the rare earth element analysis performed on the amphibolite and the trondhjemite pegmatite are discussed. B.G.

N86-28538*# Geological Survey of Canada, Toronto (Ontario).
GEOCHEMISTRY OF GRANITOID ROCKS FROM THE WESTERN SUPERIOR PROVINCE: EVIDENCE FOR 2- AND 3-STAGE CRUSTAL EVOLUTION MODELS
G. P. Beakhouse and R. H. McNutt (McMaster Univ., Hamilton, Ontario) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 23-26 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The Superior Province is divisible into subprovinces that can be classified as greenstone-tonalite, paragneiss, or batholitic terranes and are distinguished by differences in lithologic proportions, metamorphic grade, and structural style. The origin and significance of contrasting geochemical characteristics of plutonic rocks from the Winnipeg River subprovince (a batholithic terrane) and the Wabigoon subprovince (a greenstone-tonalite terrane) are discussed. Author

N86-28539*# Geological Survey of Canada, Ottawa (Ontario).
GEOLOGY AND TECTONICS OF THE ARCHEAN SUPERIOR PROVINCE, CANADIAN SHIELD
K. D. Card *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 27-29 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Superior Province consists mainly of Late Archean rocks with Middle Archean gneisses in the south, and possibly in the north. The Late Archean supracrustal sequences are of island arc and interarc affinity and are cut by abundant plutonic rocks, including early arc-related intrusions, late synorogenic intrusions, and post-orogenic plutons that are possibly the product of crustal melting caused by thermal blanketing of newly-thickened continental crust combined with high mantle heat flux. The contemporaneity of magmatic and deformational events along the lengths of the belts is consistent with a subduction-dominated tectonic regime for assembly of the Kenoran Orogen. Successive addition of volcanic arcs accompanied and followed by voluminous plutonism resulted in crustal thickening and stabilization of the Superior craton prior to uplift of Kapuskasing granulites, emplacement of the Matachewan diabase dykes, and Early Proterozoic marginal rifting. Author

N86-28540*# Australian National Univ., Canberra. Research School of Earth Sciences.
STRONTIUM AND NEODYMIUM ISOTOPIC VARIATIONS IN EARLY ARCHEAN GNEISSES AFFECTED BY MIDDLE TO LATE ARCHEAN HIGH-GRADE METAMORPHIC PROCESSES: WEST GREENLAND AND LABRADOR
K. D. Collerson, M. T. McCulloch, D. Bridgwater (Geological Museum, Copenhagen, Denmark), V. R. McGregor (Atammik, Sukkertoppen, Greenland), and A. P. Nutman (Geological Survey of Greenland, Copenhagen, Denmark) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 30-36 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Relicts of continental crust formed more than 3400 Ma ago are preserved fortuitously in most cratons. The cratons provide the most direct information about crust and mantle evolutionary processes during the first billion years of Earth history. In view of their polymetamorphic character, these terrains are commonly affected by subsequent tectonothermal events. Hence, their isotope systematics may be severely disturbed as a result of bulk chemical change or local isotopic homogenization. This leads to equivocal age and source information for different components within these terrains. The Sr and Nd isotopic data are presented for early Archean gneisses from the North Atlantic Craton in west Greenland and northern Labrador which were affected by younger metamorphic events. Author

N86-28541*# Oxford Polytechnic (England). Dept. of Geology and Physical Sciences.
VARYING ROCK RESPONSES AS AN INDICATOR OF CHANGES IN CO2-H2O FLUID COMPOSITION
C. R. L. Friend *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 37-39 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The formation of the late Archean charnockite zone of southern India was ascribed to dehydration recrystallization due to an influx of CO2. Pressure temperature conditions for the metamorphism were calculated at about 750 C and 7.5 Kbar. The composition of the volatile species presently contained in fluid inclusions in the rocks changes across the transition zone. The transition zone was studied at Kabbaldurga and the paths taken by the fluids were identified. B.G.

N86-28542*# Wyoming Univ., Laramie.
DEVELOPMENT OF ARCHEAN CRUST IN THE WIND RIVER MOUNTAINS, WYOMING
C. D. Frost, B. R. Frost, M. E. Koesterer, T. P. Hulsebosch, and D. Bridgwater (Copenhagen Univ., Denmark) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 41-45 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The Wind River Mountains are a NW-SE trending range composed almost entirely of high-grade Archean gneiss and granites which were thrust to the west over Phanerozoic sediments during the Laramide orogeny. Late Archean granites make up over 50% of the exposed crust and dominates the southern half of the range, while older orthogneisses and magnatites form most of the northen half of the range. Locally these gneisses contain enclaves of supracrustal rocks, which appear to be the oldest preserved rocks in the range. Detailed work in the Medina Mountain area of the central Wind River Mountains and reconnaissance work throughout much of the northern part of the range has allowed definition of the sequence of events which marked crustal development in this area. The sequence of events are described. Author

N86-28543*# Cornell Univ., Ithaca, N.Y. Dept. of Geological Sciences.
ORIGIN AND EVOLUTION OF THE AMAZONIAN CRATON
A. K. Gibbs and K. R. Wirth *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 46-50 Sponsored in part by Guyana Geological Survey, Utah International, DOCEGEO, ICOMI and B.R.G.M., Direction Guyane (For primary document see N86-28535 19-46)
(Grants NSF EAR-76-17026; NSF EAR-82-07422; NSF EAR-84-10379)
Avail: NTIS HC A09/MF A01 CSCL 08G

The Amazonian craton appears to be formed and modifed by processes much like those of the better-known Precambrian cratons, but the major events did not always follow conventional sequences nor did they occur synchronously with those of other cratons. Much of the craton's Archean style continental crust formation, recorded in granite-greenstone and high-grade terranes, occurred in the Early Proterozoic: a period of relative quiescence in many other Precambrian regions. The common Archean to Proterozoic transition in geological style did not occur here, but an analogous change from abundant marine volcanism to dominantly continental sedimentary and eruptive styles occurred later. Amazonian geology is summarized, explaining the evolution of the craton. B.G.

N86-28544*# Toronto Univ. (Ontario). Dept. of Geology.
CYCLIC GROWTH IN ATLANTIC REGION CONTINENTAL CRUST
A. M. Goodwin *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 51-54 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Atlantic region continental crust evolved in successive stages under the influence of regular, approximately 400 Ma-long tectonic cycles. Data point to a variety of operative tectonic processes ranging from widespread ocean floor consumption (Wilson cycle) to entirely ensialic (Ampferer-style subduction or simple crustal attenuation-compression). Different processes may have operated concurrently in some or different belts. Resolving this remains the major challenge. Author

N86-28545*# Rennes Univ. (France). Inst. de Geologie.
SIGNIFICANCE OF THE Sm-Nd ISOTOPIC SYSTEMATICS OF THE AKILIA ASSOCIATION
G. Gruau, A. Nutman (Geological Survey of Greenland, Copenhagen, Denmark), and B. M. Jahn *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 55-58 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Samarium-Neodymium analyses were carried out on fourteen samples of basic to ultrabasic metavolcanics from several enclaves of the Amitsoq gneisses (T = to or approximately 3,700 Ma). Field observations suggest that all the analyzed rocks belong to the pre-Amitsoq Akilia Association. Consequently, a minimum age of 3,700 Ma is postulated for the emplacement of their protoliths. When all the data points are put together in a conventional isochron diagram, no clear isochron relationship can be discerned. However, the points seem to fall within a band broadly corresponding to an age of 3,600 Ma. The isotopic results are difficult to interpret satisfactorily. Two contrasting interpretations are offered and summarized: (1) data scatter as a result of open system behavior; and (2) data scatter due to a melange of data sets defining two distinct isochrons. Author

N86-28546*# Oxford Univ. (England). Dept. of Earth Sciences.
AGE AND ORIGIN OF GNEISSES SOUTH OF AMERALIK, BETWEEN KANGIMUT-SANGMISSOQ AND QASIGIANGUIT
N. W. Jones, S. Moorbath, and P. N. Taylor *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 59-61 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Gneisses which crop out along the southern coast of Ameralik between Kangimut-sangmissoq and Qasigianguit (K-s-Q) are the subject of long-standing controversy concerning their relationship to the early Archean Amitsoq gneisses of the Godthaab district. On the basis of field observations, it was argued that gneisses at Kangimut-sangmissoq and Qasigianguit are correlatives of the early Archean Amitsoq gneisses. The data were reexamined

and it is concluded that the K-s-Q gneisses represent an addition of substantially juvenile mantle-derived material to the Archean craton of West Greenland during the late Archean times. Some of the parent magmas have undergone interaction with older crust, as indicated by Pb isotope evidence for contamination with Amitsoq-derived Pb. However, the positive epsilon Nd(I) value for the K-s-Q gneisses firmly rules out any significant material contribution from the Amitsoq gneisses to the K-s-Q gneisses. B.G.

N86-28547*# Oregon Univ., Eugene. Dept. of Geology.
ARCHEAN METAMORPHIC SEQUENCE AND SURFACES, KANGERDLUGSSUAQ FJORD, EAST GREENLAND
M. A. Kays *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 63-67 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The characteristics of Archean metamorphic surfaces and fabrics of a mapped sequence of rocks older than about 3000 Ma provide information basic to an understanding of the structural evolution and metamorphic history in Kangerdlugssuaq Fjord, east Greenland. This information and the additional results of petrologic and geochemical studies have culminated in an extended chronology of Archean plutonic, metamorphic, and tectonic events. The basis for the chronology is considered, especially the nature of the metamorphic fabrics and surfaces in the Archean sequence. The surfaces, which are planar mineral parageneses, may prove to be mappable outside Kangerdlugssuaq Fjord, and if so, will be helpful in extending the events that they represent to other Archean sequences in east Greenland. The surfaces will become especially important reference planes if the absolute ages of their metamorphic assemblages can be determined in at least one location where strain was low subsequent to their recrystallization. Once an isochron is obtained, the dynamothermal age of the regionally identifiable metamorphic surface is determined everywhere it can be mapped. Author

N86-28548*# Oregon Univ., Eugene. Dept. of Geology.
METAMORPHOSED ULTRAMAFIC ROCKS IN EAST GREENLAND
M. A. Kays and M. J. Dorais (Georgia Univ., Athens) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 68-70 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The compositional and mineralogical characteristics of Archean ultramafic rocks in Kangerdlugssuaq Fjord are summarized: the first provides information important to understanding the primary character of the rock suite, whereas the latter provides data necessary to determine the conditions of their equilibrium during the latest metamorphism. This information will be of value in determining the affinity of the suite to similar Archean rocks in other areas of the North Atlantic craton. Author

N86-28549*# Wisconsin Univ., Oskosh. Dept. of Geology.
A MODEL FOR THE BIOLOGICAL PRECIPITATION OF PRECAMBRIAN IRON-FORMATION
Gene L. LaBerge *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 71-75 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

A biological model for the precipitation of Precambrian iron formations is presented. Assuming an oxygen deficient atmosphere and water column to allow sufficient Fe solubility, it is proposed that local oxidizing environments, produced biologically, led to precipitation of iron formations. It is further suggested that spheroidal structures about 30 mm in diameter, which are widespread in low grade cherty rion formations, are relict forms of the organic walled microfossil Eosphaera tylerii. The presence of these structures suggests that the organism may have had a siliceous test, which allowed sufficient rigidity for accumulation and preservation. The model involves precipitation of ferric hydrates by oxidation of iron in the photic zone by a variety of photosynthetic organisms. Silica may have formed in the frustules of silica secreting organisms, including Eosphaera tylerii. Iron formates formed, therefore, by a sediment rain of biologically produced ferric hydrates and silica and other organic material. Siderite and hematite formed diagenetically on basin floors, and subsequent metamorphism produced magnetite and iron silicates. Author

N86-28550*# Louisiana State Univ., Baton Rouge. Dept. of Geology.
ARCHEAN SEDIMENTARY STYLES AND EARLY CRUSTAL EVOLUTION
Donald R. Lowe *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 76-77 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The distinctions between and implications of early and late Archean sedimentary styles are presented. Early Archean greenstone belts, such as the Barberton of South Africa and those in the eastern Pilbar Block of Australia are characterized by fresh or slightly reworked pyroclastic debris, orthochemical sediments such as carbonates, evaporites, and silica, and biogenic deposits including cherts and stromatolitic units. Terrigenous deposits are rare, and it is suggested that early Archean sediments were deposited on shallow simatic platforms, with little or no components derived from sialic sources. In contrast, late Archean greenstone belts in the Canadian Shield and the Yilgarn Block of Australia contain coarse terrigenous clastic rocks including conglomerate, sandstone, and shale derived largely from sialic basement. Deposition appears to have taken place in deepwater, tectonically unstable environments. These observations are interpreted to indicate that the early Archean greenstone belts formed as anorogenic, shallow water, simatic platforms, with little or no underlying or adjacent continental crust, an environment similar to modern oceanic islands formed over hot spots. Author

N86-28551*# Memorial Univ. of Newfoundland, St. Johns. Dept. of Earth Sciences.
REGIONAL VARIATION IN THE AMITSOQ GNEISSES RELATED TO CRUSTAL LEVELS DURING LATE ARCHEAN GRANULITE FACIES METAMORPHISM: SOUTHERN WEST GREENLAND
A. P. Nutman, D. Bridgwater (Geological Museum, Copenhagen, Denmark), and V. R. McGregor (Atammik, Sukkertoppen, Greenland) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 78-83 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The dominant lithology at Kangimut sangmissoq is described as nebulitic tonalitic gneiss containing highly distended plagioclase phyric amphibolites. The gneiss amphibolite complex was intruded by Nuk gneiss between 3.05 and 2.90 Ga and later (2.6 to 2.7 Ga) by post granulite facies granitoid sheets. The amphibolites are though to be Ameralik dikes and the older gray gneiss are then Amitsoq by definition. The problem arises when the isotopic data are considered, none of which indicate rocks older that about 3.0 Ga. Author

N86-28552*# Geological Survey of Canada, Ottawa (Ontario).
METAMORPHISM AND PLUTONISM IN THE QUETICO BELT, SUPERIOR PROVINCE, N.W. ONTARIO
J. A. Percival *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 84-85 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The Quetico Belt lies between the metavolcanic Wawa-Shebandowan and Wabigoon Belts. It consists of marginal metasedimentary rocks and central pelitic, gneissic and plutonic rocks. Metamorphism is Barrovian, at depths less than 10 km, and grade increases from margins to core of the belt: the outermost pelites are at chlorite-muscovite grade; inward a garnet-andalusite zone formed throughout the inner margin; and the central zone ranges form garnet-andalusite in the west and garnet-sillimanite-muscovite to garnet-sillimanite-cordierite and rare kyanite 6 to 150 km to the east. This increase is correlated with

granitic intrusives. Migmatites in the core have intrusive leucosomes in the west and locally derived ones in the east. Isograd surfaces are steep where the belt is narrow and dip gently where it is wide. The Quetico Park intrusive complex of the central region of the Quetico Belt shows a zonation across it 20 to 50 km width from older, medium grained biotite composition to younger, coarse to pegmatitic granitic composition. Sediment of the Quetico basin had its source in the bordering metavolcanic belts and was deposited ca. 2.75 to 2.70 Ga ago. Boundaries of the belt dip inward, so it essentially is a graben of inter-arc or back-arc type.
Author

N86-28553*# Geological Survey, Denver, Colo.
EARLY ARCHEAN TONALITE GNEISS IN THE UPPER PENINSULA OF MICHIGAN
Zell E. Peterman, R. E. Zartman, and P. K. Sims *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 86-89 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Geochronological results on tonalite gneiss of northern Michigan that is 3.56 Ga or slightly older is presented. Tonalitic augen gneiss and structurally overlying biotite gneiss and schist are exposed in a dome near Watersmeet. They are part of an extensive gneiss terrane of southern Minnesota, Wisconsin and Michigan that includes rocks of early to late Archean ages and lies south of the Wawa volcanic subprovince. Two samples of the augen gneiss and one of the biotite gneiss show zircon grains of similar shape, zoning, color, and development of crystal faces. These zircons give Pb/U isotopic ratios that plot on a chord of 3,560 + or - 40 m.y. upper intersect and of 1,250 + or m.y. lower intersect. The 3,560 m.y. number is believed to be a minimum age because analysis of one of the least discordant zircon fractions by ion microprobe that gave a nearly concordant age of 3,650 m.y. The 1,250 m.y. lower intersect is without geological significance: it is interpreted to be a result of multiple lead loss at 2.7, 1.8, and 0.5 Ga by U/Pb in zircon. Archean rocks 10 to 25 km northwest of the Watersmeet dome give a 2.75 Ga age on zircons. Quartz monzonite here is dated at 2.65 Ga.
Author

N86-28554*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PETROGENESIS OF CALCIC PLAGIOCLASE MEGACRYSTS IN ARCHEAN ROCKS
W. C. Phinney and D. A. Morrison (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 90-91 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Anorthositic complexes with large equidimensional plagioclase grains of highly calcic composition occur in nearly all Archean cratons. Similar plagioclase occur as megacrysts in many Archean sills, dikes, and volcanic flows. In the Canadian Shield these units occur throughout the Archean portions of the entire shield and are particularly common as dikes over an area of a few 100,000 sq km in Ontario and Manitoba during a period of at least 100 m.y. in many different rock types and metamorphic grades. The plagioclase generally occurs in three modes: as inclusions in mafic intrusions at various stages of fractionation, as crystal segregations in anorthosite complexes, or as megacrysts in fractionated sills, dikes, and flows. Most occurrences suggest that the plagioclase was formed elsewhere before being transported to its present location. The evidence seems to be quite clear that occurrences of these types of calcic plagioclase require: (1) ponding of a relatively undifferentiated Archean tholeiitic melt at some depth; (2) isothermal crystallization of large, equidimensional homogeneous plagioclase crystals; (3) separation of the plagioclase crystals from any other crystalline phases; (4) further fractionation of melt; (5)transport of various combinations of individual plagioclase crystals and clusters of crystals by variously fractionated melts; and (6) emplacement as various types of igneous intrusions or flows.
Author

N86-28555*# Geological Museum, Copenhagen (Denmark).
INTRUSIONS OF MIXED ORIGIN MIGMATISING EARLY ACHAEAN CRUST IN NORTHERN LABRADOR, CANADA
L. Schiotte and D. Bridgwater *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 93-97 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Migmatization of Early Archean Uivak gneisses by Late Archean granitic and trondhjemitic injections are described. The rare earth element, major element, and isotopic geochemistry of the felsic sheets is interpreted to indicate both mantle and crustal components, and the sheets with associated fluids were the vehicle for element transport in the crustal column with attendant isotopic modification of the older gneisses.
Author

N86-28556*# Wyoming Univ., Laramie. Program for Crustal Studies.
SOME EXAMPLES OF DEEP STRUCTURE OF THE ARCHEAN FROM GEOPHYSICS
S. B. Smithson, R. A. Johnson, and W. R. Pierson *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 98-102 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The development of Archean crust remains as one of the significant problems in earth science, and a major unknown concerning Archean terrains is the nature of the deep crust. The character of crust beneath granulite terrains is especially fascinating because granulites are generally interpreted to represent a deep crustal section. Magnetic data from this area can be best modeled with a magnetized wedge of older Archean rocks (granulitic gneisses) underlying the younger Archean greenstone terrain. The dip of the boundary based on magnetic modeling is the same as the dip of the postulated thrust-fault reflection. Thus several lines of evidence indicate that the younger Archean greenstone belt terrain is thrust above the ancient Minnesota Valley gneiss terrain, presumably as the greenstone belt was accreted to the gneiss terrain, so that the dipping reflection represents a suture zone. Seismic data from underneath the granulite-facies Minnesota gneiss terrain shows abundant reflections between 3 and 6 s, or about 9 to 20 km. These are arcuate or dipping multicyclic events indicative of layering.
Author

N86-28557*# Oxford Univ. (England). Dept. of Earth Sciences.
Pb ISOTOPIC EVIDENCE FOR EARLY ARCHAEAN CRUST IN SOUTH GREENLAND
Paul N. Taylor and Feiko Kalsbeek (Geological Survey of Greenland, Copenhagen, Denmark) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 103-106 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The results of an isotopic remote sensing study focussed on delineating the extent of Early Archean crust north and south of the Nuuk area and in south Greenland is presented. Contamination of the Late Archean Nuk gneisses and equivalents by unradiogenic Pb uniquely characteristic of Amitsoq gneiss was detected as far south as Sermilik about 70 km south of Nuuk and only as far north as the mouth of Godthabsfjord. This study was extended to the southern part of the Archean craton and the adjoining Early Proterozoic Ketilidian orogenic belt where the Pb isotopes suggest several episodes of reworking of older uranium depleted continental crust. The technique of using the Pb isotope character of younger felsic rocks, in this case Late Archean and Early Proterozoic gneisses and granites to sense the age and isotopic character of older components, is a particularly powerful tool for reconstructing the evolutionary growth and development of continental crust.
Author

N86-28558*# Wisconsin Univ., Madison. Dept. of Geology and Geophysics.
FLUID-ABSENT METAMORPHISM IN THE ADIRONDACKS
John W. Valley *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 107-111

(For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

Results on late Proterozoic metamorphism of granulite in the Adirondacks are presented. There more than 20,000 sq km of rock are at granulite facies. Low water fugacites are implied by orthopyroxene bearing assemblages and by stability of k'spar-plag-quartz assemblages. After mentioning the popular concept of infiltration of carbon dioxide into Precambrian rocks and attendent generation of granulite facies assemblages, several features of Adirondack rocks pertinent to carbon dioxide and water during their metamorphism are summarized: wollastonite occurs in the western lowlands; contact metamorphism by anorthosite preceeding granulite metamorphism is indicated by oxygen isotopes. Oxygen fugacity lies below that of the QFM buffer; total P sub water + P sub carbon dioxide determined from monticellite bearing assemblages are much less than P sub total (7 to 7.6 kb). These and other features indicate close spatial association of high- and low-P sub carbon dioxide assemblages and that a vapor phase was not present during metamorphism. Thus Adirondack rocks were not infiltrated by carbon dioxide vapor. Their metamorphism, at 625 to 775 C, occurred either when the protoliths were relatively dry or after dessication occurred by removal of a partial melt phase. Author

N86-28559*# Atammik, Sukkertoppen (Greenland).
THE ARCHEAN GEOLOGY OF THE GODTHABSFJORD REGION, SOUTHERN WEST GREENLAND (INCLUDES EXCURSION GUIDE)
V. R. McGregor, A. P. Nutman (Memorial Univ. of Newfoundland, St. Johns), and C. R. L. Friend (Oxford Polytechnic, England) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 113-169 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

The part of the West Greenland Archean gneiss complex centered around Godthabsfjord and extending from Isukasia in the north to south Faeringehavn is studied. Extensive outcrops of 3800 to 3400 Ma rocks can provide some direct evidence of conditions and processes that operated on the Earth in the early Archean. However, the ways in which primary characteristics have been modified by later deformation, metamorphism, and chemical changes are first taken into account. The rocks exposed are the products of two major phases of accretion of continental crust, at 3800 to 3700 Ma and 3100 to 29 Ma. The main features of these two accretion phases are similar, but careful study of the least modified rocks may reveal differences related to changes in the Earth in the intervening period. The combination of excellent exposure over an extensive area, relatively detailed geological mapping of much of the region, and a considerable volume of isotopic and other geochemical data gives special insights into processes that operated at moderately deep levels of the crust in the Archean. Of particular interest is the effect of late Archean granulite facies metamorphism on early Archean rocks, especially the extent to which isotope systems were disturbed. Similar processes may well have partly or wholly destroyed evidence of more ancient components of other high grade terrains. This account does not attempt to be an exhaustive review of all work carried out on the geology of the region. Rather, it attempts to summarize aspects of the geology and some interest in the context of early crustal genesis. Author

N86-28560*# Memorial Univ. of Newfoundland, St. Johns. Dept. of Earth Sciences.
ISUKASIA AREA: REGIONAL GEOLOGICAL SETTING (INCLUDES EXCURSION GUIDE)
A. P. Nutman and M. Rosing (Geological Museum, Copenhagen, Denmark) *In* Lunar and Planetary Inst. Workshop on Early Crustal Genesis: The World's Oldest Rocks 1986 p 171-184 (For primary document see N86-28535 19-46)
Avail: NTIS HC A09/MF A01 CSCL 08G

A brief account of the geology of the Isukasis area is given and is biased toward the main theme of the itinerary for the area: What has been established about the protoliths of the early Archean rocks of the area - the Isua supracrustal belt and the Amitsoq gneisses? The area's long and complex tectonometamorphic history of events can be divided into episodes using a combination of dike chronology, isotopic, and petrological studies. The earliest dikes, the ca 3700 Ma Inaluk dikes, intrude the earliest (tonalitic) components of the Amitsoq gneisses but are themselves cut up by the injection of the younger (granitic and pegmatitic) phases of the Amitsoq gneisses of the area. The areas of low late Archean deformation, strongly deformed early Archean mafic rocks have coarse grained metamorphic segregations and are cut by virtually undeformed mid-Archean Tarssartoq (Ameralik) dikes devoid of metamorphic segregations. The shows that the area was affected by regional amphibolite facies metamorphism in the early Archean. Late Archean and Proterozoic metamorphic imprints are marked to very strong in the area. Much of the early Archean gneiss complex was already highly deformed when the mid-Archean Tarssartoq dikes were intruded. Author

N86-28561*# National Aeronautics and Space Administration, Washington, D.C.
EVOLUTION OF A METEORITE CRATER AS A PROCESS OF RANDOM DISPLACEMENTS
I. T. Zotkin and A. I. Dabizha Jun. 1986 18 p Transl. into ENGLISH from Meteoritika, Adademiya Nauk SSSR (USSR), no. 40, 1982 p 82-90 Transl. by The Corporate Word, Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88428; NAS 1.15:88428) Avail: NTIS HC A02/MF A01 CSCL 08G

An examination of the ages and sizes of 114 terrestrial impact craters shows that their aging kinetics can be described by the diffusion laws. The macrodiffusion coefficient which determines random displacements of mineral masses on the Earth has a mean value of 0.02 sq m/year. The amount of matter in a crater that contains information about the impact event decreases with time according to the 1/T law. The basic characteristic parameter of a crater is its initial area, inasmuch as sufficiently large craters are nearly surficial formations. The relaxation time of a crater is proportional to its initial area. Author

N86-28562*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SAM 2 MEASUREMENTS OF THE POLAR STRATOSPHERIC AEROSOL, VOLUME 2 Report, Oct. 1981 - Apr. 1982
M. Patrick McCormick and David Brandl (SASC Technologies, Inc., Hampton, Va.) Aug. 1986 78 p
(NASA-RP-1164; L-16105; NAS 1.61:1164) Avail: NTIS HC A05/MF A01 CSCL 04A

The Stratospheric Aerosol Measurement (SAM) 2 sensor aboard Nimbus 7 is providing extinction measurements of Antarctic and Arctic stratospheric aerosols with a vertical resolution of 1 km. Representative examples and weekly averages including corresponding temperature profiles provided by NOAA for the time and place of each SAM 2 measurement (Oct. 1981 - Apr. 1982) are presented. Contours of aerosol extinction as a function of altitude and longitude or time are plotted, and aerosol optical depths are calculated for each week. Typical values of aerosol extinction at 1.0 micron in the main lower stratospheric aerosol layer for this time period are 2 to 4 times 10 to the -4 power/km. for the Antarctic region and 0.5 to 1 times 10 to the -3 power/km. for the Arctic region. Stratospheric optical depths are about 0.001 to 0.004 for the Antarctic region and 0.003 to 0.004 at the beginning to about 0.006 at the end of the time period for the Arctic region. Polar stratospheric clouds (PSC's) were observed during the Arctic winter, as expected. This report provides, in a ready-to-use format, a representative sample of the seventh semester of data to be used in atmospheric and climatic studies. Author

N86-28563# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
THE ESTIMATION OF GEOPOTENTIALS BY WAY OF GEOPHYSICAL INVERSE THEORY
Mark T. Lane and Edward M. Gaposchkin 27 Jan. 1986 33 p

(Contract F19628-85-C-0002)
(AD-A165691; TR-735; ESD-TR-85-279) Avail: NTIS HC A03/MF A01 CSCL 08/5

Satellite to satellite tracking data (SST) can be used to measure the geopotential at the satellite altitude. This measurement can be used to estimate the Earth's gravity field at the Earth's surface, the so-called inverse problem. Geophysical inverse theory is applied to this inverse problem, and numerical methods are developed and tested. Geophysical inverse theory is used to map the geopotential from the satellite altitude to a lower surface. Two configurations are explored and the geopotential in a local network is recovered with less than 4% error. GRA

N86-28564# Geological Survey, Menlo Park, Calif.
THREE-DIMENSIONAL P-VELOCITY STRUCTURE OF THE SUMMIT CALDERA OF NEWBERRY VOLCANO, OREGON
Douglas A. Stauber, N. M. Iyer, Walter D. Mooney, and Phillip B. Dawson 1985 5 p
(Contract DE-AI01-79RA-50294)
(DE86-005740; DOE/RA-50294/T4) Avail: NTIS HC A02/MF A01

A three-dimensional high-resolution seismic study of the summit caldera of Newberry Volcano, Oregon, was conducted by the U. S. Geological Survey using an adaptation of the method applied by Mercessian (1984). Preliminary interpretation of the traveltime residuals reveals a ring of high P-velocity material coinciding with the inner ring fault system of the caldera in the upper 2 km. A zone of lower P-velocities extends deeper than 2 km in the center of the caldera. Author

N86-28565# Stockholm Univ. (Sweden). Dept. of Meteorology.
THEORY AND OBSERVATIONS OF GRAVITY WAVES IN AN INVERSION LAYER
Ingemar Carlsson 30 Oct. 1985 52 p
(DM-46; ISSN-0349-0467; ESA-86-97058) Avail: NTIS HC A04/MF A01

In order to study how gravity wave oscillations in an inversion are modified by conditions in the surrounding atmosphere, a three layer model was derived. If the waves induced in the atmosphere have a horizontal wavelength of the same order or shorter than the thickness of the inversion, the resulting resonance frequency is very close to the Brunt-Vaisala frequency of the inversion which varies with the stability. The measured frequency of the oscillations in the integrated amount of precipitable water vapor are used to determine the lapse rate in the inversion. All this information can be used as complementary conditions for the retrieval of temperature and humidity profiles from radiometer data to increase height resolution. ESA

N86-28566# Stockholm Univ. (Sweden). Dept. of Meteorology.
A FEASIBILITY STUDY ON SELECTIVE IONIZATION MASS SPECTROMETRY OF NITRIC OXIDE AND ITS APPLICATION IN THE UPPER ATMOSPHERE
Ronny Carlsson and Andre Zuber 28 Nov. 1985 43 p Sponsored by Swedish Board for Space Activities
(AP-26; ISSN-0280-4441; ESA-86-97056) Avail: NTIS HC A03/MF A01

A laboratory model of a photoionization mass spectrometer was built by modifying a commercial quadrupole mass intensity Kr low pressure lamp to selectively ionize NO. The characteristics of the photoionization mass spectrometer were determinated with respect to mass resolution, ion energy, and focusing potential. The sensitivity of the model instrument was determined to be 1.5 times 10 to the minus 9th power A/Torr for NO at a mass resolution of 1 AMU. This result shows that the present instrument is not sensitive enough for measuring mesospheric and thermospheric abundances of NO from a rocket. ESA

N86-28567# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
IONOSPHERIC STREAMS AT ALTITUDES BELOW 14RE
S. Orsini and M. Candidi Sep. 1985 29 p
(IFSI-85-10; ESA-86-97094) Avail: NTIS HC A03/MF A01

The properties of ionospheric ion streams flowing away from Earth into the magnetotail between 2 Re and 14 Re are studied from ISEE-2 data. General agreement between these observations and those at lower and larger distances is found, indicating that the plasma sheet is enriched with ionospheric ions at all distances. ESA

N86-28568# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
THE TEMAG EXPERIMENT FOR THE TETHERED SATELLITE SYSTEM (TSS)
E. Mariani (Rome Univ, Italy), M. Candidi, and R. Terenzi Oct. 1985 41 p
(IFSI-85-14; ESA-86-97098) Avail: NTIS HC A03/MF A01

An experiment to provide rapid (up to 20 vector/sec), and accurate vector measurements of the magnetic field at ionospheric altitudes is introduced. Although the engineering nature of the mission limits the scientific performance of the onboard instrumentation, scientific objectives can be pursued. Electrodynamic and atmospheric mission objectives include study of the ionospheric currents and the anomalies of the Earth's magnetic field. The electrodynamic mission also studies the magnetic signature of the tether current. Secondary objectives, for all missions, include the use of magnetic data in the understanding of the dynamical behavior of the satellite and as auxiliary data for particule data interpretation. The basic instrument is a fluxgate triaxial magnetometer mounted on an equatorial fixed boom, with the possibility of adding a second similar instrument closer to the satellite to help in determing the residual contaminating fields. ESA

N86-28569# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
DETERMINATION OF THE RADIATION BUDGET AT THE TOP OF THE ATMOSPHERE OVER THE SAHARA USING SATELLITE MEASUREMENTS [BESTIMMUNG DER STRAHLUNGSBILANZ AM OBERRAND DER ATMOSPHAERE UEBER DER SAHARA AUS SATELLITENMESSUNGEN]
M. Wiegner, A. Ebel, ed., F. M. Neubauer, ed., E. Raschke, ed., and P. Speth, ed. 1985 80 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(Mitt-43; ISSN-0069-5882; ESA-86-96917) Avail: NTIS HC A05/MF A01

A method based on satellite systems was developed in order to study one aspect of the energy balance of the system Earth-atmosphere, namely the radiation bucget at the top of the atmosphere. The anisotropy of the radiation field and the spectral sampling of the instrument are taken into account. Measuring data from the NIMBUS-7-ERB radiometer and the visible and IR-channel of METEOSAT during the period from June 16 to June 31, 1979 were taken. The measurements of the geostationary satellite were calibrated and used for spatial and temporal integration of the NIMBUS-7 data; they are also needed for scene identification. Results show a negative net flux over most parts of the Sahara, in particular over the eastern regions. ESA

N86-28570# Natural Environmental Research Council, Edinburgh (Scotland). Geomagnetism Research Group.
MAGNETIC RESULTS, 1983, 1984: ESKDALEMUIR, HARTLAND AND LERWICK OBSERVATORIES
1985 136 p
(GEOMAGNETIC-BULL-16; ISBN-0-85272-083-1; ESA-86-97123) Avail: NTIS HC A07/MF A01

The results of the standard observations carried out at the magnetic laboratories during 1983-84 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given. ESA

N86-28571# National Center for Atmospheric Research, Boulder, Colo.
PRELIMINARY EVALUATION STUDIES WITH THE REGIONAL

ACID DEPOSITION MODEL (RADM) Interim Report, 1 Jan. - 31 Dec. 1985
Mar. 1986 207 p Sponsored by EPA and NSF
(PB86-175692; EPA-600/3-86-024) Avail: NTIS
HC A10/MF A01 CSCL 04A

The findings of preliminary evaluation studies of the NCAR Regional Acid Deposition Modeling System (RADM) are discussed. Current efforts in evaluating the gas-phase chemistry submodel have met with significant success. An understanding of the smog chamber databases has also been developed. RADM forecasts of sulfate and nitrate wet deposition for the first day of OSCAR IV are quite good. The RADM-simulated three-dimensional chemical species distributions are very consistent with preliminary data measured by National Center for Atmospheric Research (NCAR) under a separate program. The first test of RADM's ability to analyze what if studies with hypothetical reductions in sulfur emissions is demonstrated. The findings confirm the complexity of directly observing potential benefit from emissions reductions. Author

N86-28572# Kanner (Leo) Associates, Redwood City, Calif.
EXCITATION OF ELECTROSTATIC WAVE TURBULENCE IN IONOSPHERE AS ONE EFFECT OF SEISMIC ACTIVITY
M. B. Gokhberg, I. L. Gufeld, A. V. Kustov, V. A. Liperovskii, A. M. Buloshnikov, V. A. Pilipenko, O. A. Pokhotelov, and S. L. Shalimov 1985 41 p Transl. into ENGLISH of "Vozbuzhdenie Elektrostaticheskoi Volnovoi Turbulentnosti v Ionosfere Kak Odin iz Effektov Seismicheskoi Aktivnosti" Preprint no. 16 Moscow, USSR, 1983
(Contract W-7405-eng-36)
(TI86-025135; LA-TR-85-62) Avail: NTIS HC A03/MF A01

A possible scenario of the buildup of a chain of geophysical phenomena is proposed associating processes in terra firma in the concluding stage of earthquake presaging and bursts of wave turbulence in the ionosphere observed on satellites. Author

N86-28276*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TOTAL IONOSPHERIC ELECTRON CONTENT CALIBRATION USING SERIES GPS SATELLITE DATA
G. Lanyi *In its* The Telecommunications and Data Acquisition Report 15 May 1986 12 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 04A

N86-28422*# Science Research Council, Chilton (England). Rutherford Appleton Lab.
LOWER THERMOSPHERE DENSITIES OF N2, O AND Ar UNDER HIGH LATITUDE WINTER CONDITIONS
Paul H. G. Dickinson, U. vonZahn (Bonn Univ., West Germany), K. D. Baker (Utah State Univ., Logan), and D. B. Jenkins (University Coll. of Wales, Aberystwyth) *In* NASA, Washington Applications of Tethers in Space: Workshop Proceedings, Volume 1 Jun. 1986 p 321-328 Pergamon Press Ltd. Repr. from Journal of Atmospheric and Terrestrial Physics (England), v. 47, no. 1-3, 1985 p 283-290 (For primary document see N86-28407 19-37)
Avail: NTIS HC A25/MF A01 CSCL 13I

N86-28494# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
THE USE OF SAR SYSTEMS FOR GEOLOGICAL APPLICATIONS
F. Jaskolla (Ludwig-Maximilians-Universitaet, Munich, West Germany), M. Rast, and J. Bodechtel *In its* Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 41-50 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-28573# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
PERFORMANCE EVALUATION OF THE NEXRAD (NEXT GENERATION WEATHER RADAR) HALL ALGORITHM APPLIED TO COLORADO THUNDERSTORMS
J. R. Smart Sep. 1985 37 p
(PB86-168374; NOAA-TM-ERL-ESG-18) Avail: NTIS
HC A03/MF A01 CSCL 04B

The relationship between the NEXRAD (next generation weather radar) storm identification algorithms and the Hail Algorithm is described. Skill scores are used to evaluate the performance of the Hail Algorithm when applied to radar reflectivity data for Colorado thunderstorms whose precipitation phenomena were verified by field observers. The Hail Algorithm successfully diagnoses the multiple pulse (long-lived) severe hailstorms while having no skill for diagnosing single pulse (short-lived) severe hailstorms. The best hail indicators far distinguishing between severe hailstorms and non-hail thunderstorms are the storm maximum reflectivity greater than or equal to 55 cBz and mid-level (5 to 12 kilometers) reflectivity greater than 50 dBZ. GRA

N86-28574*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SURFACE RADIATION BUDGET FOR CLIMATE APPLICATIONS
J. T. Suttles, ed. and G. Ohring, ed. (National Oceanic and Atmospheric Administration, Washington, D. C.) Aug. 1986 123 p
(NASA-RP-1169; L-16133; NAS 1.61:1169) Avail: NTIS
HC A07/MF A01 CSCL 04B

The Surface Radiation Budget (SRB) consists of the upwelling and downwelling radiation fluxes at the surface, separately determined for the broadband shortwave (SW) (0 to 5 micron) and longwave (LW) (greater than 5 microns) spectral regions plus certain key parameters that control these fluxes, specifically, SW albedo, LW emissivity, and surface temperature. The uses and requirements for SRB data, critical assessment of current capabilities for producing these data, and directions for future research are presented. B.G.

N86-28575*# Illinois Univ., Champaign. Climate and Meteorology Section.
A VARIATIONAL ASSIMILATION METHOD FOR SATELLITE AND CONVENTIONAL DATA: DEVELOPMENT OF BASIC MODEL FOR DIAGNOSIS OF CYCLONE SYSTEMS Final Report
G. L. Achtemeier, H. T. Ochs, III, S. Q. Kidder, R. W. Scott, J. Chen, D. Isard, and B. Chance May 1986 227 p
(Contract NAS8-34902)
(NASA-CR-3981; NAS 1.26:3981) Avail: NTIS HC A11/MF A01
CSCL 04B

A three-dimensional diagnostic model for the assimilation of satellite and conventional meteorological data is developed with the variational method of undetermined multipliers. Gridded fields of data from different type, quality, location, and measurement source are weighted according to measurement accuracy and merged using least squares criteria so that the two nonlinear horizontal momentum equations, the hydrostatic equation, and an integrated continuity equation are satisfied. The model is used to compare multivariate variational objective analyses with and without satellite data with initial analyses and the observations through criteria that were determined by the dynamical constraints, the observations, and pattern recognition. It is also shown that the diagnoses of local tendencies of the horizontal velocity components are in good comparison with the observed patterns and tendencies calculated with unadjusted data. In addition, it is found that the day-night difference in TOVS biases are statistically different (95% confidence) at most levels. Also developed is a hybrid nonlinear sigma vertical coordinate that eliminates hydrostatic truncation error in the middle and upper troposphere and reduces truncation error in the lower troposphere. Finally, it is found that the technique used to grid the initial data causes boundary effects to intrude

into the interior of the analysis a distance equal to the average separation between observations. Author

N86-28576# Miami Univ., Fla. School of Marine and Atmospheric Science.
ENVIRONMENTAL CONDITIONS ASSOCIATED WITH THE OCCURRENCE OF LARGE SCALE DUST STORMS IN ARID REGIONS OF NORTH AFRICA Final Report, 1 Jun. 1983 - 30 Nov. 1985
J. M. Prospero, D. M. Helgren, M. Estoque, and J. Fernandez-Partagas 28 Feb. 1986 23 p
(Contract DAAG29-83-K-0082)
(AD-A165662; ARO-19684.1-GS) Avail: NTIS HC A02/MF A01 CSCL 04/2

Dust storms are complex phenomena that are dependent on many meteorological and environmental factors. Because they normally occur in remote and inhospitable regions, they have been studied relatively little. Such studies are further hampered by the dearth of meteorological, climatological and geological data for such regions. In particular, the occurrence of the major storms seems to be related to identifiable meteorological conditions. Such storms should be predictable with a fair degree of confidence. Likewise, it is clear that there are a wide variety of terrains that can serve as dust sources given the right meteorological conditions. However, the truly great storms appear to occur in a relatively well-defined region of the western Sahara, west and southwest of the Ahaggar masif. There are many terrains in this region that can serve as dust sources. The dimensions of the storm appear to be controlled by the wind field. Sources in these areas are clearly very important and could control the aerosol characteristics over a large area of West Africa and the tropical and subtropical North Atlantic. , Remote sensing, Haze, Deflation. GRA

N86-28577# Miami Univ., Fla. School of Marine and Atmospheric Science.
THRESHOLD WIND VOLOCITIES FOR RAISING DUST IN THE WESTERN SAHARA
J. Fernandez-Partagas, D. M. Helgren, and J. M. Prospero Jan. 1986 19 p
(Contract DAAG29-83-K-0082)
(AD-A165761; ARO-19684.3-GS) Avail: NTIS HC A02/MF A01 CSCL 04/2

Data from eight meteorological stations in the western Sahara for the period July 1 - August 15, 1974 indicate an average threshold wind velocity of about 8 m/s for raising dust. Station-to-Station variations in the threshold wind velocity are relatively large and range from 5 m/s to 12.5 m/s. However, at most stations the threshold velocity appears to be a reproducible characteristic of the environment. Threshold velocity variations appear to be attributable in part to differences in soil and terrain characteristics at the stations. Author (GRA)

N86-28578# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.
ATMOSPHERIC CONDITIONS IN THE MIDDLE EAST
Dorathy A. Stewart, Oskar M. Essenwanger, and Larry J. Levitt Jun. 1985 71 p
(AD-A165795; AD-E950800; AMSMI/RR-85-3-TR) Avail: NTIS HC A04/MF A01 CSCL 04/2

This report describes atmospheric conditions in the Middle East. This area is defined here as Iran, Iraq, the Arabian Peninsula, Syria, Lebanon, Jordan, Israel, and Egypt. A detailed discussion of the extreme variability of precipitation in both space and time is given. Available information about temperature, humidity, fog, dust storms, and solar energy is summarized. Tables of three-hourly seasonal data for Tel Aviv, Jerusalem, Dhahran, Baghdad, and Tehran are included. These tables list means and standard deviations of temperature, dew point, absolute humidity, and wind speed. Maximum and minimum absolute humidities are also included. Visibility and cloud cover are described by frequency distributions. Author (GRA)

N86-28579# Nevada Univ., Las Vegas. Water Resources Center.
ADDITIONAL INTENSITY DURATION ANALYSES AND DESIGN HYETOGRAPH PARAMETERS FOR VARIOUS PRECIPITATION STATIONS OF THE NEVADA TEST SITE, NEVADA
R. H. French Aug. 1985 34 p
(Contract DE-AC08-85NV-10384)
(DE86-002799; DOE/NV-10384/02) Avail: NTIS HC A03/MF A01

The report presents the most current results for intensity-duration-frequency and dimensionless hyetograph parameter estimation on the Nevada Test Site. Specifically the precipitation stations for which data are presented in this report are: (1) Rock Valley; (2) Desert Rock; (3) Mercury; (4) Mid Valley; (5) Yucca; (6) 40MN; and (7) BJY. DOE

N86-28580# Massachusetts Univ., Amherst.
STUDIES OF CLIMATIC VARIABILITY DURING THE PERIOD OF INSTRUMENTAL RECORDS
R. S. Bradley, P. M. Kelly (East Anglia Univ., Norwich, England.), P. D. Jones, and H. Diaz (National Oceanic and Atmospheric Administration, Boulder, Colo.) Dec. 1985 29 p
(Contract DE-FG02-85ER-60316)
(DE86-005506; DOE/ER-60316/1) Avail: NTIS HC A03/MF A01

The report discusses progress in: (1) gridding and analysis of long-term precipitation data for northern hemisphere land areas; (2) homogeneity testing of long-term temperature data for northern hemisphere land areas and assessment of the importance of urbanization and changing spatial data coverage on the record; (3) evaluation of the influence of various forcing factors on the temperature record of the last 130 years; and (4) evaluation of the Comprehensive Ocean-Atmosphere Data Set (COADS) in preparation for merging with the DOE land data set. DOE

N86-28581# Designwrights Collaborative, Santa Fe, N. Mex.
NEW MEXICO CLIMATE MANUAL: SOLAR AND WEATHER DATA Final Report
W. S. Morris and K. Haggard Nov. 1985 608 p
(DE86-900338; NMERDI-2-72-4523) Avail: NTIS HC A99/MF A01

This manual contains extensive solar and weather data for the state of New Mexico in tabular, map, and graphic formats. It is particularly relevant to design of energy efficient buildings and renewable energy systems, but is also broad enough to provide useful information to many other disciplines. Maps of the state show monthly values of insolation for horizontal, south-facing latitude-tilted and vertical surfaces, as well as mean temperatures. Climatic summaries given for 63 sites include monthly temperature and precipitation data as well as heating/cooling degree-days and design temperatures. For nine locations (Albuquerque, Clayton, Farmington, Los Alamos, Roswell, T or C, Tucumcari, Zuni, and El Paso, Texas) most of the following comprehensive data sets are also presented: design temperatures with mean coincident wet bulb and wind values; HDD/CDD values to 12 base temperatures; day/night wind data; typical and clear-day values of incident and transmitted solar radiation for 97 orientations and tilts; and temperature distribution data in 2°F bins for six daily time periods. Extensive explanatory text with referencing to the data is provided. DOE

N86-28582# Ifremer, Paris (France).
STUDY OF THE ALGORITHM TO ESTIMATE FRICTION VELOCITY AT THE SEA SURFACE [ETUDE DE LALGORITHME DESTIMATION DE LA VITESSE DE FROTTENMENT A LA SURFACE DE LA MER]
Robert Ezraty Paris ESA 1986 57 p In FRENCH
(Contracts ESTEC-6155/85-NL-BI; IFREMER-85.2.42.5000)
(ESA-CR(P)-2169; ESA-86-96868) Avail: NTIS HC A04/MF A01

The theoretical and experimental basis to model the atmospheric boundary layer over the ocean from velocity and temperature measurements of air and water is presented. A computer program derived from these notions is used to study the variations of velocity profiles for different roughness levels. Several formula-

tions of the roughness magnitude are compared and their influence on the determination of friction velocity and the 10 m neutral equivalent velocity is estimated. It is deduced that the 10 m neutral velocity is practically independant of the model choice. ESA

N86-28583# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Wolkenphysik.
DETERMINATION OF ATMOSPHERIC PARAMETERS BY AN AIRBORNE BACKSCATTER PROBE
Hans-Eberhard Hoffmann Oct. 1985 69 p In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-990)
(DFVLR-FB-85-61; ISSN-0171-1342; ESA-86-96881) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 23

Measurements performed with a backscatter probe on an icing research aircraft are discussed. This probe transmits the white light of a flashlight. The backscattered light is received in three different wavelength ranges. The backscattered signals were calibrated for measuring standard visibilities outside clouds by an integrating nephelometer, and for measuring standard visibilities in clouds by contrast measurements. Information on particle size distributions is obtained from the values of the backscattered signal if the liquid water content is measured synchronously. Solid particles differ from fluid particles by amplitude and type of backscattered signal. Examples of measurement results are shown. ESA

N86-28584# Royal Netherlands Meteorological Inst., De Bilt. Afdel. Fysisch Meteorologisch Onderzoek.
DESCRIPTION OF THE IJMUIDEN (NETHERLANDS) WIND OBSERVATION STATION FOR THE PERIOD 1919-1980 [STATIONSBESCHRIJVING WINDWAARNEMING IJMUIDEN PERIODE 1919-1980]
B. Oemraw 1985 60 p In DUTCH; ENGLISH summary
(KNMI-TR-73; B8576433; ISSN-0169-1708; ESA-86-96957) Avail: NTIS HC A04/MF A01

At Ijmuiden (Netherlands) wind was observed from 1919 to 1968 above land and 1968 to 1980 above the North Sea, 1km from the shore. Locations of anemometers are described. Specifications of wind meter types and recorders used are given. The wind data obtained are (after objective correction for sheltering effects from the surroundings) reasonably dependable and homogenous from April 1952 to 1980. Corrected wind data summaries for 1953 to 1967 (above open terrain) and during 1969 to 1980 (above open water) are given. The tables cover the diurnal and annual course, frequency distributions, and for each two month period the maximum values of the hourly-average wind speed per 30 deg azimuth sector. ESA

N86-28585# Stockholm Univ. (Sweden). Dept. of Meteorology.
A CONSISTENT SCHEME FOR TREATMENT OF STRATIFORM AND CONVECTIVE CONDENSATION AND CLOUDINESS IN NUMERICAL WEATHER PREDICTION MODELS
Ulla Hammarstrand and Hilding Sundqvist (Bergen Univ., Norway) 13 Jan. 1986 31 p
(Grants G-GU-8494-100; G-GU-8494-101)
(DM-47; ISSN-0349-0467; ESA-86-97059) Avail: NTIS HC A03/MF A01

A parameterization scheme for stratiform and convective condensation with cloud water content and cloud cover as dependent variables is implemented in a limited area model for weather prediction. The parameterization comprises microphysical processes and subgrid scale features. The scheme for stratiform clouds is based on Sundqvist (1981). The scheme for the convective clouds is based on Kuo (1974) and Hammarstrand (1982). Aspects regarding the necessary combination of the schemes in connection with transition between the two stability regimes are discussed. Results from two 36 hr predictions started 12 hr apart are evaluated with regard to sensitivity to initial data. ESA

N86-28586# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COSMIC RAY NM-64 NEUTRON MONITOR DATA 12, JANUARY-DECEMBER 1983
N. Iucci, F. Re, F. Signoretti, C. Signorini, G. Villoresi, and N. L. Zangrilli May 1985 55 p Prepared in cooperation with Rome Univ. (Italy)
(IFSI-85-6; ESA-86-97090) Avail: NTIS HC A04/MF A01

Pressure corrected data from the Rome neutron monitor and barometric pressure data for the year 1983, and graphs of the corrected intensity are given. Details on the devices employed, operational mode, and data handling are presented. ESA

N86-28587# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COSMIC RAY NM-64 NEUTRON MONITOR DATA 12, JANUARY-DECEMBER 1984
N. Iucci, R. Beccellato, F. Re, F. Signoretti, C. Signorini, G. Villoresi, and N. L. Zangrilli Oct. 1985 55 p
(IFSI-85-13; ESA-86-97097) Avail: NTIS HC A04/MF A01

Pressure corrected data from the Rome neutron monitor and barometric pressure data, for the year 1984, and graphs of the corrected intensity are given. Details on the devices employed, operational mode, and data handling are presented. ESA

N86-28588# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
PROCESSING AND METEOROLOGICAL EVALUATION OF RESEARCH FLIGHTS WITH DFVLR MOTOR GLIDERS USING THE SOFTWARE PACKAGE RAMF
Joerg M. Hacker Jan. 1985 69 p In GERMAN; ENGLISH summary
(DFVLR-FB-85-57; ISSN-0171-1342; ESA-86-96877) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 19

The procedures developed for the processing and simple meteorological reduction of data from measuring flights are summarized. Philosophy, construction, and utilization of the software package RAM (routines for the evaluation of meteorological research flights) are described. The routines and the methods for data evaluation are presented and clarified by examples. The accuracy of the derived variables is estimated. ESA

N86-28589# Bureau of Reclamation, Denver, Colo. Div. of Atmospheric Resources Research.
PHYSICS OF WINTER OROGRAPHIC PRECIPITATION AND ITS MODIFICATION: SUMMARY OF WORKSHOP PRESENTATIONS
A. B. Super Jan. 1986 99 p Workshop held at Denver, Colorado, 1-3 Oct. 1985
(PB86-174299) Avail: NTIS HC A05/MF A01 CSCL 04B

Recent findings from the Sierra cooperative pilot project are discussed. The physics of dispersion and transport; ice multiplication; recent results of an orographic seeding experiment; recent findings from the Colorado River augmentation demonstration program; recent findings from the Bridger Range, Montana; and recent findings from the State of Utah are discussed. Winter weather modification research at Utah State University; and microphysical characteristics of winter clouds in Alberta are also discussed. GRA

N86-28590# National Weather Service, Kansas City, Mo.
SOME CHARACTERISTICS OF NORTHEAST KANSAS SEVERE WEATHER 1963-1984
L. W. Schultz Mar. 1985 17 p
(PB86-173952; NOAA-TM-NWS-CR-80) Avail: NTIS HC A02/MF A01 CSCL 04B

Severe weather events occurring in northeast Kansas were examined for the period 1963 through 1984. From these reports, general characteristics of severe weather in northeast Kansas have been determined. Because of its geographical location, the state of Kansas is frequently subject to severe convective weather in the spring and summer. One of these was the June 8, 1966 tornado which cut a swath of destruction from southwest to

northeast across the heart of Topeka and killed 17 persons. Though much smaller in size and intensity, another storm occurred the evening of June 17, 1978. Because of the frequency of severe convective weather in Kansas, the paper will focus on severe convective weather in northeast Kansas. Author

N86-28591# National Weather Service, Salt Lake City, Utah.
SOARING FORECAST PROGRAM (REVISED)
D. S. Toronto and G. R. Lussky Mar. 1986 13 p
(PB86-173523; NOAA-NWS-WRCP-36-Rev) Avail: NTIS
HC A02/MF A01 CSCL 04B

Soaring is becoming an increasingly popular sport in many regions of the United States, particularly in the Western Region where the atmospheric conditions tend to be very favorable for soaring during much of the warm season. Because of the importance of the vertical temperature structure and wind conditions with regard to soaring, program SR was written as an aid for the participant. The program has been made universal so that any location may run it without requiring program changes and recompilation. The program is written in Data General FORTRAN IV. GRA

N86-28592# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
REVIEW OF THE VAS (VISIBLE AND INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER) ASSESSMENT DURING THE 1985 PROFS (PROGRAM FOR REGIONAL AND OBSERVING FORECASTING SERVICES) SUMMER EXERCISE
D. Birkenheuer and J. Snook Oct. 1985 86 p
(PB86-173309; NOAA-TM-ERL-ESG-19) Avail: NTIS
HC A05/MF A01 CSCL 04B

An operational Visible and Infrared Spin-Scan Radiometer Atmospheric Sounder (VAS) assessment was conducted as part of the Program for Regional and Observing Forecasting Services (PROFS) 1985 summer forecasting exercise from 15 May through 23 August. The exercise focused on nowcasting severe weather, specifically the issuance of watches and warnings for a 150 km area surrounding Boulder, Colorado. GRA

N86-28593# National Weather Service, Salt Lake City, Utah.
MCC (MESOSCALE CONVECTIVE COMPLEXES): AN OVERVIEW AND CASE STUDY ON ITS IMPACT IN THE WESTERN UNITED STATES
G. R. Lussky Mar. 1986 55 p
(PB86-170651; NOAA-TM-NWS-WR-193) Avail: NTIS
HC A04/MF A01 CSCL 04B

Severe weather - as defined by tornadoes, large hail and strong thunderstorm winds - is more uncommon in the Western Region than it is in the other National Weather Service regions. While thunderstorms do occur throughout much of the region from time to time, they are generally less intense in nature than many of those that occur over the central United States. This has recently been demonstrated by Schaefer, et al. (1985) using tornado statistics which show that the areal frequency of all tornadoes drops, in general, from one to three orders of magnitude from the central U.S. to the western U.S. The biggest difference in the tornado statistics, however, is in the magnitude of the storm (i.e., it's width and path length). The areal frequency of severe weather over the West drops off sharply when only the intense storms are included; the dropoff is less dramatic over the central states. This suggests that not only are there more tornadic storms over the central U.S., but they are also more intense. Author

N86-28594# National Bureau of Standards, Gaithersburg, Md. Center for Building Technology.
DIRECTIONAL HURRICANE WIND SPEEDS Final Report
E. M. Hendrickson and E. Simiu Feb. 1986 34 p
(PB86-169026; NBSIR-86/3317) Avail: NTIS HC A03/MF A01
CSCL 04B

A simple procedure for estimating coastline hurricane wind speeds corresponding to any specified set of wind directions and to any specified mean recurrence interval is presented. The procedure uses simulated directional hurricane wind speed data as described in the report, Hurrican Wind Speeds in the United States (NBS BSS 124). These data are encoded on magnetic tape for 56 mileposts located along the U.S. Gulf and Atlantic coasts. GRA

N86-28595# National Center for Atmospheric Research, Boulder, Colo.
USER GUIDE TO A PARTICLE-GROWTH AND TRAJECTORY MODEL (USING ONE-DIMENSIONAL AND THREE-DIMENSIONAL WIND FIELDS)
J. L. Parrish and A. J. Heymsfield Oct. 1985 88 p
(Grant NSF ATM-82-17015)
(PB86-168010; NCAR/TN-259+1A) Avail: NTIS
HC A05/MF A01 CSCL 04B

In the process of studying the growth of hail and other precipitation forms within wind fields derived from Doppler radar analyses, the authors have developed GROW, a particle growth model. Forms of ice precipitation are diverse, and the schemes for the detailed growth calculations are lengthy and complex. The attempt has been to be as complete and up-to-date as possible with regard to ice growth processes by accretion and diffusion, with special attention to the complex temperature dependencies and the difficult specification of density, terminal velocity, melting and shedding, and collection efficiency. Less elaborate treatments of aggregation and liquid coalescence are included. The growth model is combined with either a one-dimensional dynamic and thermodynamic model, with conventional lateral entrainment (1D), or a three-dimensional wind field, as may be obtained from a Doppler radar field study or a dynamical model. GRA

N86-28596# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
COMPARISON OF DOPPLER LIDAR, RAWINSONDE AND 915-MHz UHF WIND PROFILER MEASUREMENTS OF TROPOSPHERIC WINDS
T. R. Lawrence, B. F. Weber, M. J. Post, R. M. Hardesty, and R. A. Richter Jan. 1986 89 p
(PB86-166220; NOAA-TM-ERL-WPL-130) Avail: NTIS
HC A05/MF A01 CSCL 04B

Tropospheric wind-field measurements obtained using a Doppler lidar are compared against rawinsonde observations and the measurements of a 915-MHz UHF wind Profiler. Height-averaged values of lidar-minus-rawinsonde mean (median) difference, and root-mean-square difference between lidar and rawinsonde horizontal wind-field measurements are respectively -1.79 (-1.46), 3.31 m/s for wind speed and -0.09 degrees (-0.54 degrees), 12.13 degrees for wind direction. These estimates are based on 429 data pairs. Author

N86-28597# Electronic Techniques, Inc., Fort Collins, Colo.
SCPP (SIERRA COOPERATIVE PILOT PROJECT) METEOROLOGICAL AND STATISTICAL SUPPORT, VOLUME 1 Interim Progress Report, 1 Sep. 1984 - 31 Aug. 1985
A. W. Huggins, J. O. Rhea, G. L. Hemmer, A. P. Kuciauskas, and C. J. Wilcox Oct. 1985 250 p Sponsored by Bureau of Reclamation
(PB86-189404) Avail: NTIS HC A11/MF A01 CSCL 04B

Field operations and data collection procedures for the Sierra Cooperative Pilot Project (SCPP) forecast office, radar and rawinsondes are described. A series of analyses by ETI and NAWC scientists is presented. Seeding effects in radar data are described for convective clouds seeded with CO2 and AgI. The passage of certain radar echoes was found to be associated with lowering cloud top and an increase in supercooled liquid water (SLW) at Kingvale. In conjunction with satellite data such correspondence may be used to help predict the occurrence of clouds suitable for seeding experiments. GRA

N86-28598# Electronic Techniques, Inc., Fort Collins, Colo.
SCPP (SIERRA COOPERATIVE PILOT PROJECT) METEOROLOGICAL AND STATISTICAL SUPPORT, VOLUME 2 Interim Progress Report, 1 Sep. 1984 - 31 Aug. 1985
G. L. Hemmer, A. W. Huggins, A. P. Kuciauskas, and C. J. Wilcox

Oct. 1985 212 p Sponsored by Bureau of Reclamation
(PB86-189412) Avail: NTIS HC A10/MF A01 CSCL 04B

Field operations and data collection procedures for the Sierra Cooperative Pilot Project (SCPP) forecast office, radar and rawinsondes are described. A series of analyses by ETI and NAWC scientists is presented. Seeding effects in radar data are described for convective clouds seeded with CO2 and AgI. The passage of certain radar echoes was found to be associated with lowering cloud top and an increase in supercooled liquid water (SLW) at Kingvale. In conjunction with satellite data such correspondence may be used to help predict the occurrence of clouds suitable for seeding experiments. One detailed case study revealed a situation where SLW was plentiful in a region upwind of the crest, but was negligible near the crest because of depletion by secondary ice crystal production. GRA

N86-28599# Sonoma Technology, Inc., Santa Rosa, Calif.
FOG SAMPLER INTERCOMPARISON STUDY Final Report
S. V. Hering and D. L. Blumenthal Oct. 1985 172 p Sponsored by Coordinating Research Council
(PB86-186616; STI-11-90063-308-FR;
CRC-APRAC-CAPA-21-80-05) Avail: NTIS HC A08/MF A01 CSCL 04B

Fog samplers of five different designs were operated simultaneously to assess differences, if any, in acidity, and to analyze concentrations and liquid water collection efficiencies. Measurements were made at Henninger Flats, a mountainous site at 777 m msl overlooking the Los Angeles, California, basin. Sampling was conducted in June 1983 when status clous intercepted the measurements sites. Five different types of fog samplers were operated by the groups which designed them. GRA

N86-28600# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-APRIL TO MID-MAY 1986, VOLUME 40, NUMBER 8. APRIL 15, 1986
15 Apr. 1986 10 p
(PB86-185501) Avail: NTIS HC A02/MF A01 CSCL 04B

Temperature and precipitation probabilities for the monthly and seasonal weather for North America are given. GRA

N86-28601# National Weather Service, Salt Lake City, Utah.
HEMISPHERIC SPECTRAL ANALYSIS PROGRAM
C. C. Peterson Apr. 1986 35 p
(PB86-183662; NOAA-NWS-WRCP-54) Avail: NTIS HC A03/MF A01 CSCL 04B

The hemispheric atmospheric kinetic energy spectrum can often give clues to the present large scale state of the atmosphere as well as to future states. The program HEMI calculates this spectrum. Much research has been done recently on the relationship between tropical and subtropical forcings and global circulaton anomalies. Of significant interest to forecasters, the northern hemisphere mid-latitudes often exhibit an organized response to the forcings, in the form of wave train anomalies in the geopotential height field (Weickmann, et al. 1985). The program HEMI calculates the kinetic energy spectrum for wavenumbers 1 through 7. GRA

N86-28602# National Weather Service, Salt Lake City, Utah.
RADID (RADAR DISPLAY DEVICE) INTERPRETATION GUIDELINES
R. G. Pappas Mar. 1986 35 p
(PB86-177680; NOAA-TM-NWS-WR-195) Avail: NTIS HC A03/MF A01 CSCL 04B

Interpretative guidelines for users of radar remoting systems are given. The focus is upon the benefits and inherent limitations of this approach to weather radar data communication and display, and radar interpretation, particularly unique problems in the Western United States. This set of guidelines applies principally to Radar Display Device (RADID) displays but will also be useful for Radar Remote Weather Display System (RRWDS) and commercial color radar remote users. RRWDS consists of two primary components - a digitizer on a radar for generating VIP-level data and a display system which includes a separate processor. RADID is a display device only. RADID can access data from RRWDS and commercial digitizers. RRWDS displays can only access data from RRWDS digitizers. GRA

N86-28853# Imperial Coll. of Science and Technology, London (England). Center for Remote Sensing and Atmospheric Physics
THE METEOROLOGY OF SATURN
Garry E. Hunt *In* ESA The Atmospheres of Saturn and Tital Dec. 1985 p 33-40 Sponsored by UK Science and Engineering Research Council (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28857# Arizona Univ., Tucson. Lunar and Planetary Lab.
LIGHTNING ON SATURN
Donald M. Hunten *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 69-71 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-28603# Defence Research Information Centre, Orpington (England).
ON THE RECOGNITION OF OCEANIC MOTION IN SATELLITE INFRARED AND RADAR ALTIMETER DATA
Paul Gerhard Hardtke Oct. 1985 18 p Transl. into ENGLISH of Z. fuer Flugwiss. u. Weltraumforsch., v. 98, no. 5, 1984 p 359-364
(DRIC-T-7597; BR97665; ESA-86-97135) Avail: Issuing Activity

Data from NOAA 6 and 7 showing variation of sea surface temperature in the North Atlantic are presented. These, together with radar altimeter measurements, are used to determine ocean surface currents. ESA

N86-28604# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
MEASUREMENTS OF INTERNAL WAVES IN THE STRAIT OF GIBRALTAR USING A SHORE-BASED RADAR Final Report
Paul E. LaViolette, Thomas H. Kinder, and Dove W. Green, III Jan. 1986 15 p
(AD-A165715; NORDA-118) Avail: NTIS HC A02/MF A01 CSCL 17/9

During the period 22 to 24 October 1983, a feasibility study was made on the use of standard shore radars to monitor the temporal and spatial distribution of internal waves. A radar (150 m elevation) situated at Gibraltar was used to monitor the surface manifestations of internal waves in the Strait of Gibraltar during three semidiurnal tidal periods. The eastward progression of internal waves within an arc approximately 19 km from the radar was observed. These observations fill a gap in the evolution of the surface signatures of internal waves between the small-scale view of ship radars and the large-scale view afforded by satellites and the Space Shuttle. Author (GRA)

N86-28605# European Space Agency, Paris (France).
LASER DOPPLER WIND PROFILE MEASUREMENTS OVER SEA SURFACES
Christian Werner, Friedrich Koepp, Eugen Biselli, and Elfriede Biselli Jan. 1986 57 p Transl. into ENGLISH from "Laser-Doppler-Windprofil-Messungen ueber See" Oberpfaffenhofen, West Germany Original report in GERMAN previously announced as ESA-96606
(ESA-TT-971; DFVLR-FB-85-48; ESA-86-95748) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne DM 18

A laser Doppler anemometer on a research platform determined the wind profile above the surface of the North Sea. The measured profiles show nearly constant wind velocities between the sea surface and 100 m height. No logarithmic wind profile was measured. The influence of the platform on the measurements

was determined. The influence of the tidal movement was corrected. The laser Doppler anemometer is the only measuring system which allows the simultaneous measurement of wind and water surface velocity. The turbulence was also measured. ESA

N86-28492# Technical Univ. of Denmark, Lyngby. Inst. of Electromagnetics.
SEA ICE PARAMETER RETRIEVAL FROM SAR DATA
H. Skriver and P. Gudmandsen *In* ESA Proceedings of a Workshop on Thematic Applications of SAR Data Dec. 1985 p 21-28 (For primary document see N86-28488 19-42)
Avail: NTIS HC A06/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-28606*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
US MONKEY AND RAT EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 1514
Richard C. Mains, ed. and Edward W. Gomersall, ed. May 1986 284 p
(NASA-TM-88223; A-86147; NAS 1.15:88223) Avail: NTIS HC A13/MF A01 CSCL 06C

On December 14, 1983, the U.S.S.R. launched Cosmos 1514, an unmanned spacecraft carrying biological and radiation physics experiments from nine countries, including five from the United States. This was the fourth flight with U.S. experiments aboard one of the Soviet unmanned spacecraft. The Cosmos 1514 flight was limited to five days duration because it was the first non-human primate flight. Cosmos 1514 marked a significant departure from earlier flights both in terms of Soviet goals and the degree of cooperation between the U.S.S.R. and the United States. This flight included more than 60 experiments on fish, crawfish eggs, plants and seeds, 10 Wistar pregnant rats, and 2 young adult rhesus monkeys as human surrogates. United States specialist participated in postflight data transfer and specimen transfer, and conducted rat neonatal behavioral studies. An overview of the mission is presented focusing on preflight, on-orbit, and postflight activites pertinent to the five U.S. experiments aboard Cosmos. Author

N86-28607# Pittsburgh Univ., Pa.
ENZYME COFACTOR MODIFIED ELECTRODES Final Report, 8 Feb. 1982 - 31 Dec. 1985
Lemuel B. Wingard, Jr. 19 Feb. 1986 6 p
(Contract DAAG29-82-K-0064)
(AD-A165604; ARO-18310.16-CH) Avail: NTIS HC A02/MF A01 CSCL 07/4

This work was focused on the study of flavin cofactor enzymes for the development of improved oxidation-reduction enzyme electrodes for eventual use in biosensors or other electrochemical systems. Flavin adenine dinucleotide or glucose oxidase were immobilized on different types of carbon electrodes and tested for electrochemical and enzymatic activity. Diffusional studies also were carried out to determine the diffusional resistance of the immobilization matrix. GRA

N86-28608# Letterman Army Inst. of Research, San Francisco, Calif.
ACUTE ORAL TOXICITY (LD50) OF GUANIDINE HYDROCHLORIDE IN RATS Final Report, 19 Jan. - 14 Feb. 1984
Earl W. Morgan, Steven K. Sano, and Don W. Korte, Jr. Aug. 1985 105 p
(AD-A165747; LAIR-204; TOXICOLOGY-SER-77) Avail: NTIS HC A06/MF A01 CSCL 06/20

Nitroguanidine is being evaluated by the US Army as a replacement for the nitrocellulose component of certain propellants/munitions. One of the by-products to be tested is guanidine. The hydrochloride salt was used in this evaluation of the acute toxicity of guanidine. The acute oral toxicity of guanidine hydrochloride was determined in male and female Sprague-Dawley rats by using the oral gavage single-dose method. The LD50 + or - S.E. for male rats was 556.5 + or - 29.7 mg(base)/kg and 474.6 + or - 35.3 mg(base)/kg for female rats. Clinical signs were observed in both the gastrointestinal (GI) tract and the central nervous system-neuromuscular junction (CNS-NM). Symptoms referrable to the GI tract included increased salivation, hunched posture, and diarrhea. CNS-NM signs included disorientation, increased startle reflex, hyperactivity, jumping behavior, presence of tremors/twitching and depression of grasping and righting reflexes. These results place guanidine hydrochloride in slightly toxic and moderately toxic ranges respectively. GRA

N86-28609# California Inst. of Tech., Pasadena. Div. of Biology.
INFORMATION PROCESSING IN MAMMALIAN VISUAL CORTEX Interim Report, 1 Dec. 1984 - 30 Nov. 1985
David C. VanEssen 26 Feb. 1986 26 p
(Contract N00014-85-K-0068)
(AD-A165832) Avail: NTIS HC A03/MF A01 CSCL 06/16

This report used a combination of physiological and anatomical approaches to elucidate the functional organization of the visual cortex in the macaque monkey. One project was a single cell analysis of texture vision, using texture patterns of the type developed by Julesz for human psychophysical studies. Many cells tested in area V2 responded to static or moving texture gradients in ways which were not predictable on the basis of responses to individual texture elements and which correlated with the preattentive discriminability of these texture patterns to human observers. A second project involved the development of a computerized technique for generating two-dimensional maps of cerebral cortex. An algorithm based on simulated annealing procedures was used to construct a complete map of primary visual cortex, thereby demonstrating its suitability for dealing with anatomical data from highly convoluted regions of cortex. A third project involved the use of voltage-sensitive dyes to monitor activity patterns in visual cortex. This technique offers great promise for analyzing the organization of large neural ensembles with high spatial and temporal resolution. GRA

N86-28610# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES
19 May 1986 106 p Transl. into ENGLISH from various Russian articles
(JPRS-UBB-86-009) Avail: NTIS HC A06/MF A01

Progress is reported in U.S.S.R. biomedical and behavioral sciences. Topics discussed include: agrotechnology; biophysics; biotechnology; ecology; environment; epidemiology; food technology; genetics; immunology; laser effects; marine mammals; medicine; microbiology; molecular biology; niemr; pharmacology and toxicology; physiology; public health; and psychiatry. For individual titles, see N86-28611 through N86-28611.

N86-28611# Joint Publications Research Service, Arlington, Va.
RESISTANCE, EXCHANGE, AND CAPACITANCE FUNCTIONS OF SKELETAL MUSCLE VESSELS IN ACUTE HYPOXIC HYPOXIA **c52**
B. I. Tkachenko and Yu. I. Ibragimov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-009) 19 May 1986 p 71-72 Transl. into ENGLISH from Fiziologicheskiy Zhurnal SSSR (Leningrad, USSR), v. 81, no. 10, Oct. 1985 p 1229-1237 (For primary document see N86-28610 19-51)
Avail: NTIS HC A06/MF A01

It is shown that acute hypoxia (10 percent O2 in nitrogen) increases precapillary resistance of skeletal muscle vessels in hemodynamically isolated cats. Postcapillary resistance was reduced by about 30 percent together with capillary hydrostatic pressure and the capillary filtration coefficient (CFC). Similar changes were observed in the denervated vascular bed under cross circulation. B.W.

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-28612* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 286)
Jul. 1986 77 p
(NASA-SP-7011(286); NAS 1.21:7011(286)) Avail: NTIS HC A05 CSCL 06E

This bibliography lists 213 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1986. Author

N86-28613*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CREW FACTORS IN FLIGHT OPERATIONS. PART 4: SLEEP AND WAKEFULNESS IN INTERNATIONAL AIRCREWS
R. Curtis Graeber Feb. 1986 113 p
(Contract NCC2-302)
(NASA-TM-88231; A-86182; NAS 1.15:88231) Avail: NTIS HC A06/MF A01 CSCL 06P

Physiological recordings of sleep and wakefulness in operating international (B-747) flight crews were obtained. Crews spent their first layover (48 h) of a trip in a sleep laboratory where standardized EEG, electro-oculograph (EOC), and electromyograph (EMG) sleep recordings were carried out whenever volunteers chose to sleep. During periods of wakefulness they underwent multiple sleep latency tests every 2 h in order to assess daytime drowsiness. The same standardized recordings were carried out at a home-based laboratory before departure. Approximately four crews each participated in flights over 7 to 9 time zones on five routes. All participants were encouraged to use whatever sleep-wake strategies they thought would provide them with the most satisfactory crew rest. Overall, layover sleep quality was not seriously disturbed, but eastward flights produced greater sleep disruption. The contributors of individual factors and the usefulness of various sleep strategies are discussed in the individual laboratory reports and in an operational summary. Author

N86-28614# Armed Forces Radiobiology Research Inst., Bethesda, Md.
AFRRI (ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE) Annual Research Report, 1 Oct. 1984 - 30 Sep. 1985
30 Sep. 1985 101 p
(AD-A165810; AFRRI-ARR-19) Avail: NTIS HC A06/MF A01 CSCL 06/18

The Armed Forces Radiobiology Research Inst.(AFRRI) is the primary DOD facility for scientific research in the field of radiobiology and related matters. It conducts applied and basic research that is essential for the operational and medical support of the DOD. The work carried out by its five scientific departments is noted. Operation, maintenance, and quality control of all AFFRI radiation sources, radiation dosimetry and estimation of tissue doses at various depths in different kinds if tissues; development and use of nuclear medicine and magnetic spectroscopic techniques for determining radiation damage in animals and model systems. GRA

N86-28615# Health Effects Research Lab., Research Triangle Park, N. C.
APPLICATION OF PORTABLE MICROPROCESSOR-BASED SYSTEM FOR ELECTROPHYSIOLOGICAL FIELD TESTING OF NEUROTOXICITY
D. Otto, S. Baumann, and G. Robinson Jan. 1986 19 p refs
Prepared in cooperation with Illinois Univ., Urbana-Champaign and North Carolina Univ., Chapel Hill
(PB86-145471; EPA-600/D-86-008) Avail: NTIS HC A02/MF A01 CSCL 06T

A portable microprocessor based system designated PEARL II was developed for neurotoxicity testing in human populations. PEARL II provides a flexible and powerful data acquisition capability to record sensory evoked potentials (auditory, visual, and somatosensory), event related slow potentials (CNV, P300), and behavioral measures. PEARL II was mounted in a mobile laboratory to facilitate field testing. Data obtained in pediatric lead studies are provided for illustration. GRA

N86-28611# Joint Publications Research Service, Arlington, Va.
RESISTANCE, EXCHANGE, AND CAPACITANCE FUNCTIONS OF SKELETAL MUSCLE VESSELS IN ACUTE HYPOXIC HYPOXIA
B. I. Tkachenko and Yu. I. Ibragimov *In its* USSR Report: Life Sciences. Biomedical and Behavioral Sciences (JPRS-UBB-86-009) 19 May 1986 p 71-72 Transl. into ENGLISH from Fiziologicheskiy Zhurnal SSSR (Leningrad, USSR), v. 81, no. 10, Oct. 1985 p 1229-1237 (For primary document see N86-28610 19-51)
Avail: NTIS HC A06/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-28616# California Univ., Santa Barbara.
COMPONENTS OF SPATIAL ABILITY Final Report, Jun. 1981 - Sep. 1984
James W. Pellegrino, David L. Alderton, and J. W. Regian 24 Mar. 1986 68 p
(Contracts N00014-81-C-0616; NR Proj. RR0-4204)
(AD-A165694) Avail: NTIS HC A04/MF A01 CSCL 05/10

The goal of this project was to identify information processing components of spatial ability. A summary paper is presented that reviews major psychometric analyses of spatial ability as they relate to theories of information processing. The primary emphasis in the review is of studies isolating individual differences in components of spatial information processing. Research is also reviewed on the acquisition of spatial processing skills. The final section considers implications of this line of research for issues of assessment, particularly as it relates to modern technologies for testing. GRA

N86-28617# Wisconsin Univ., Madison. Center for Education Research.
INEXPERT CALIBRATION OF COMPREHENSION Technical Report, Sep. - Dec. 1985
Arthur M. Glenberg and William Epstein 1 Mar. 1986 48 p
(Contracts N00014-85-K-0644; NR Proj. RR0-4206)
(AD-A165701; WCER-86-3) Avail: NTIS HC A03/MF A01 CSCL 05/10

Students with a wide range of coursework in physics or music theory read expositions in both domains. After reading, for each text students provided a judgment of confidence in ability to verify inferences based the central principle of the text. The primary dependent variable was calibration of comprehension, the degree of association between confidence and performance in the inference test. Two results of most interest were expertise in a domain was inversely related to calibration and subjects were well-calibrated across domains. Both of these results can be accommodated by a self-classification strategy: Confidence judgments are based on self-classification as expert or non-expert in the domain of the text, rather than an assessment of the degree to which the text was comprehended. Because self-classifications are not well differentiated within a domain, application of the strategy by experts produces poor calibration within a domain. Nonetheless, because self-classification is generally consistent with performance across domains, application of the strategy produces calibration across domains. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-28618* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent
Hubert C. Vykukal Issued 10 Jun. 1986 9 p Filed 20 Dec. 1984 Supersedes N85-21987 (23 - 12, p 1910)
(NASA-Case-ARC-11616-1; US-Patent-4,593,415; US-Patent-Appl-SN-684193; US-Patent-Class-2-2.1A; US-Patent-Class-2-2.1R; US-Patent-Class-128-202.11; US-Patent-Class-414-1; US-Patent-Class-414-5; US-Patent-Class-414-7; US-Patent-Class-414-8) Avail: US Patent and Trademark Office CSCL 06Q

A hard suit for use in space or diving applications having an adjustable length torso covering that will fit a large variety of wearers is described. The torso covering comprises an upper section and a lower section which interconnect so that the covering will fit wearers with short torsos. One or more sizing rings may be inserted between the upper and lower sections to accomodate larger torso sizes as required. Since access of the astronaut to the torso covering is preferably through an opening in the back of the upper section (which is closed off by the backpack), the rings slant upward-forward from the lower edge of the opening. The lower edge of the upper covering section has a coupler which slants upward-forward from the lower edge of the back opening. The lower torso section has a similarly slanted coupler which may interfit with the upper section coupler to accomodate the smallest torso size. One or more sizing rings may be inserted between the coupler sections of the upper and lower torso sections to accomodate larger torsos. Each ring has an upper coupler which may interfit with the upper section coupler and a lower coupler which may interfit with the lower section coupler. NASA

N86-28619* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ELBOW AND KNEE JOINT FOR HARD SPACE SUITS Patent
Hubert C. Vykukal Issued 8 Jul. 1986 13 p Filed 30 Dec. 1984 Supersedes N85-20666 (23 - 11, p 1697)
(NASA-Case-ARC-11610-1; US-Patent-4,598,427; US-Patent-Appl-SN-684190; US-Patent-Class-2-2.1A; US-Patent-Class-2-2.1R; US-Patent-Class-285-168; US-Patent-Class-138-120) Avail: US Patent and Trademark Office CSCL 06Q

An elbow or knee joint for a hard space suit or similar usage is formed of three serially connected rigid sections which have truncated spherical configurations. The ends of each section form solid geometric angles, and the sections are interconnected by hermetically sealed ball bearings. The outer two sections are fixed together for rotation in a direction opposite to rotation of the center section. A preferred means to make the outer sections track each other in rotation comprises a rotatable continuous bead chain which engages sockets circumferentially spaced on the facing sides of the outer races of the bearings. The joint has a single pivot point and the bearing axes are always contained in a single plane for any articulation of the joint. Thus flexure of the joint simulates the coplanar flexure of the knee or elbow and is not susceptible to lockup. NASA

N86-28620* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOULDER AND HIP JOINT FOR HARD SPACE SUITS Patent
Hubert C. Vykukal Issued 17 Jun. 1986 11 p Filed 20 Dec. 1984 Supersedes N85-21986 (23 - 12, p 1910)
(NASA-Case-ARC-11543-1; US-Patent-4,594,734; US-Patent-Appl-SN-684192; US-Patent-Class-2-2.1A; US-Patent-Class-414-7; US-Patent-Class-285-168; US-Patent-Class-138-120) Avail: US Patent and Trademark Office CSCL 06Q

Shoulder and hip joints for hard space suits are disclosed which are comprised of three serially connected truncated spherical sections, the ends of which converge. Ball bearings between the sections permit relative rotation. The proximal end of the first section is connected to the torso covering by a ball bearing and the distal end of the outermost section is connected to the elbow or thigh covering by a ball bearing. The sections are equi-angular and this alleviates lockup, the condition where the distal end of the joint leaves the plane in which the user is attempting to flex. The axes of rotation of the bearings and the bearing mid planes are arranged to intersect in a particular manner that provides the joint with a minimum envelope. In one embodiment, the races of the bearing between the innermost section and the second section is partially within the inner race of the bearing between the torso and the innermost spherical section further to reduce bulk. NASA

N86-28621# Army Belvoir Research and Development Center, Fort Belvoir, Va.
DEVELOPMENT OF U.S. ARMY REVERSE OSMOSIS WATER PURIFICATION EQUIPMENT Final Report, 1950 - 1985
Don C. Lindsten Jan. 1986 76 p
(AD-A165667; BRDC-2418) Avail: NTIS HC A05/MF A01 CSCL 13/2

The United States Army has developed and field-tested a 600-gal/h Reverse Osmosis Water Purification Unit (ROWPU). In addition, it has procured a 150,000-gal/d ROWPU, and has under development a 3000-gal/h ROWPU. These units are capable of purifying raw water, seawater, brackish water, and water contaminated with nuclear, biological, and chemical (NBC) warfare agents. GRA

N86-28622# Armed Forces Food Science Establishment, Scottsdale (Australia).
EVALUATION OF WATER STERILIZING TABLETS
G. F. Thomson, K. W. James, G. E. Driver, and A. T. Hancock Aug. 1985 22 p
(AD-A165806; AFFSE-2/85) Avail: NTIS HC A02/MF A01 CSCL 13/2

Water sterilizing tablets were evaluated for their efficiency in killing micro-organisms. The effect of inhibitors and palatability were investigated. The effect of long term use is discussed. The water sterilizing tablet recommended for disinfection of personal drinking water is the Potable Aqua tablet. The Afses is not recommended because of its need for a quiescent period. The Puritabs is not recommended because of its inability to achieve the required 99.9% kill in heavily contaminated water, especially at alkaline pH values. Fortified beverage powders, which are effective detasting agents, will inactivate the disinfecting agent if added before completion of the recommended contact period. GRA

N86-28623# Lawrence Livermore National Lab., Calif.
SUIT PENETRATION STUDY: PRELIMINARY ANALYSIS OF FLOW ABOUT A CIRCULAR CYLINDER
R. C. McCallen and S. B. Sutton 27 Nov. 1985 28 p
(Contract W-7405-eng-48)
(DE86-005760; UCID-20636) Avail: NTIS HC A03/MF A01

The flow of atomized droplets around a circular cylinder (representing a human torso) is modeled. Two different computer codes have been used to generate solutions for the flow field: a finite difference code and a vertex method code. The finite difference code, CONCHAS-SPRAY (C-S), handles unsteady, viscous, compressible flow. The second code, KPD3, simulates unsteady, high Reynolds number, incompressible separated flow with an inviscid outer flow. The specific flow problem considered is described, followed by the results of a literature search for experimental data. DOE

N86-28291*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REVERSE OSMOSIS WATER PURIFICATION SYSTEM
H. G. Ahlstrom, P. S. Hames, and F. J. Menninger *In its* The Telecommunications and Data Acquisition Report 15 May 1986

10 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 06K

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-28624*# National Aeronautics and Space Administration, Washington, D.C.
MODIFICATION OF CYTOGENETIC AND PHYSIOLOGICAL EFFECTS OF SPACE FLIGHT FACTORS BY BIOLOGICALLY ACTIVE COMPOUNDS
A. A. Aliyev, E. R. Mekhti-zade, A. L. Mashinskiy, and U. K. Alekperov Jul. 1986 14 p Transl. into ENGLISH from Zhurnal Obshchey Biologii (USSR), v. 47, no. 2, Mar. - Apr. 1986 p 246-251 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-87987; NAS 1.15:87987) Avail: NTIS HC A02/MF A01 CSCL 06C

Physiological and cytogenetic changes in the Welsh onion plants induced by a short (82 days) and long term (522 days) space flight are expressed in decrease of seed germination, inhibition of stem growth, depression of cell division in root meristem, and increase in the number of structural chromosome rearrangements. The treatment of such plants with solutions of a-tocopherol, auxin, and kinetin decreased the level of chromosome aberrations to the control one and normalized cell divisions and growth partly or completely. Author

N86-28625*# National Aeronautics and Space Administration, Washington, D.C.
MONKEYS AS A SOURCE OF VIRAL DISEASES IN MAN
E. R. Pille May 1986 14 p Transl. into ENGLISH from Voprosy Virusologii (USSR), v. 30, issue 2, Mar. - Apr. 1985 p 138-144 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-78017; NAS 1.15:78017) Avail: NTIS HC A02/MF A01 CSCL 06C

Under institutional scientific-research conditions, during contact with monkeys or their tissues, there is a danger of infection of the associates by simian viruses which are pathogenic to man. Presented in this paper is information on these stimulants. Author

N86-28626# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
APPLIED BIOLOGY AND BIOTECHNOLOGY, THE PROGRAM OF THE FEDERAL GOVERNMENT, 1985-1988 [ANGEWANDTE BIOLOGIE UND BIOTECHNOLOGIE PROGRAMM DER BUNDESREGIERUNG 1985-1988]
Oct. 1985 82 p In GERMAN Original contains color illustrations
(ESA-86-96938) Avail: NTIS HC A05/MF A01

The program of the German Federal Government in the fields of applied biology is outlined. The measures taken by the government to intensify biotechnology basic research, and to provide research and economic conditions for an improved application of biotechnology are discussed. International cooperation in the domain is presented. The financial planning of the government for the stimulation of research in the fields of applied biology and biotechnology is presented. ESA

N86-28868# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.
EXOBIOLOGICAL ASPECTS IN VIEW OF TITAN
G. Horneck *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 157-159 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28871# Centre National de la Recherche Scientifique, Orleans (France). Centre de Biophysique Moleculaire.
SEARCH FOR CHIRAL MOLECULES AND OPTICAL ACTIVITY IN EXTRATERRESTRIAL SYSTEMS. THE CASSINI MISSION OPPORTUNITY
Andre Brack and Gerard Spach (Rouen Univ. France) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 189-191 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-28627*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AUTOMATIC PROBABILISTIC KNOWLEDGE ACQUISITION FROM DATA
William B. Gevarter Apr. 1986 30 p
(NASA-TM-88224; A-85154; NAS 1.15:88224) Avail: NTIS HC A03/MF A01 CSCL 12A

A computer program for extracting significant correlations of attributes from masses of data is outlined. This information can then be used to develop a knowledge base for a probabilistic expert system. The method determines the best estimate of joint probabilities of attributes from data put into contingency table form. A major output from the program is a general formula for calculating any probability relation associated with the data. These probability relations can be utilized to form IF-THEN rules with associated probability, useful for expert systems. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-28628*# National Aeronautics and Space Administration, Washington, D.C.
NASA SUPERCOMPUTER SYSTEM TO BECOME AVAILABLE NATIONALLY
Debra J. Rahn and Peter W. Walter (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.) 21 Jul. 1986 2 p
(NASA-News-Release-86-92; P86-10152) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8752, B.W.I. Airport, Md. 21240 CSCL 09B

The most powerful supercomputer facility in the world, the Numerical Aerodynamic Simulation (NAS) system, will go on-line to scientists and engineers throughout the country on July 21, 1986. The NAS supercomputer complex will be linked with 27 remote locations across the country through a combination of high-speed terrestrail and satellite links. The Cray-2 supercomputer was installed as the main computational engine. The NAS CRAY-2 has a 256 million word memory (largest yet available) and can perform 250 million computations a second. The next generation superfast computer currently referred to as the HSP-2 (High Speed Processor-2) is expected to perform a billion computation a second. This will bring the NAS system closer to its near-term goal of having computer with a billion word memory and computational power of 4 billion calculations a second. The NAS system will be relocated to a new computational facility in late 1986 and will be fully operational in March 1987. B.G.

N86-28358# Norwegian Defence Research Establishment, Kjeller.
TWO-LEVEL DATA-FLOW ARCHITECTURE FOR PROGRAMMABLE SIGNAL PROCESSING
Yngvar Lundh and Oddvar Sorasen *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 10 p (For primary document

see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28359# Royal Signals and Radar Establishment, Malvern (England).
MIL-DAP: ITS ARCHITECTURE AND ROLE AS A REAL TIME AIRBORNE DIGITAL SIGNAL PROCESSOR
P. Simpson, J. B. G. Roberts, and B. C. Merrifield *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 18 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28360# Tridex Systems, Inc., Nepean (Ontario).
A DISTRIBUTED ARRAY SIGNAL PROCESSOR WITH FAULT-TOLERANCE ATTRIBUTES
E. T. Fathi, C. V. W. Armstrong, K. Q. T. Nguyen, and A. W. Bridgewater (Department of Communications, Ottawa, Ontario) *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 15 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

N86-28364# British Aerospace Dynamics Group, Hatfield (England). Software Engineer.
THE IMPLEMENTATION OF IMAGE PROCESSING ALGORITHMS
D. A. Pellatt *In* AGARD The Impace of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 8 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-28629 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A SURVEY OF EXTENSIONS IN PASCAL IMPLEMENTATIONS
D. A. Joslin and B. A. Wichmann Jan. 1986 22 p
(NPL-DITC-69/86; ISSN-0262-5369; ESA-86-97126) Copyright. Avail: Issuing Activity

Thirty-seven implementations of the Pascal programming language and their extensions considered for inclusion in an ISO standard are listed. ESA

N86-28630# Royal Signals and Radar Establishment, Malvern (England).
A PROCEDURAL IMPLEMENTATION OF PASCAL FILES ON FLEX
P. D. Hammond Jul. 1985 17 p
(AD-A163744; RSRE-MEMO-3883; BR98207; ESA-86-97118) Avail: Issuing Activity

Implementation of Pascal files in an object-oriented manner using procedure values is described. A Pascal compiler was written to the ISO standard for the Flex computer using these methods. Each file is represented by a package of procedures and every basic operation on the file is a call of one of these procedures. Such an implementation is only possible on a machine which supports true procedure values. These procedure values must be able to exist in the filestore as well as in the mainstore of the machine. ESA

N86-28631*# Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
IMPROVED 2-DIMENSIONAL-KINETICS COMPUTER PROGRAM
Quarterly Progress Report, 1 Apr. - 30 Jun. 1984
Gary R. Nickerson Jul. 1984 36 p
(Contract NAS8-35931)
(NASA-CR-177243; NAS 1.26:177243; QPR-2) Avail: NTIS HC A03/MF A01 CSCL 09B

The analytical capability of the existing Two-Dimensional Kinetics (TDK)/Boundary Layer Module (BLM) computer program for performance of Orbit Transfer Vehicle (OTV) thrust chambers was examined. Areas which need further examination and improvement are the thick boundary layer inviscid core flow interaction and the related thrust loss calculation. To warrant highly accurate results the provision of the best available program input data is mandatory, as well as, the use of sophisticated modeling techniques to reduce computation time with advanced error control criteria. The simulation of wall shocks, Mach-shocks, and shocks induced by large concave wall curvature is essential since this interaction with each other produces flow field changes which in turn affect the nozzle performance. Author

N86-28632*# Maryland Univ., College Park. Dept. of Civil Engineering.
COMPARATIVE EFFICIENCY OF FINITE, BOUNDARY AND HYBRID ELEMENT METHODS IN ELASTOSTATICS
C. W. Schwartz and C. W. Lee Jun. 1986 33 p
(NASA-CR-177204; NAS 1.26:177204) Avail: NTIS HC A03/MF A01 CSCL 09B

The comparative computational efficiencies of the finite element (FEM), boundary element (BEM), and hybrid boundary element-finite element (HBFEM) analysis techniques are evaluated for representative bounded domain interior and unbounded domain exterior problems in elastostatics. Computational efficiency is carefully defined in this study as the computer time required to attain a specified level of solution accuracy. The study found the FEM superior to the BEM for the interior problem, while the reverse was true for the exterior problem. The hybrid analysis technique was found to be comparable or superior to both the FEM and BEM for both the interior and exterior problems. Author

N86-28633 Societe Nationale Industrielle Aerospatiale, Paris (France).
IMPACT OF AUTOMATION ON THE DESIGN OF CARBON FIBER OMEGA RIBS
Clariou, Perez, and Plagne 1986 16 p Presented at 3rd Intern. Conf. on Composite Structures, Paisley, Scotland, 9-11 Sep. 1985
(SNIAS-861-422-101; ESA-86-97158) Avail: NTIS HC A02

A method to reduce production costs and improve quality of solar array carbon fiber omega ribs was developed. An automatic laying process was designed, but the definition had to be modified, as the thickness was not constant throughout the section, and the laying was nonsymmetric. Steps decided to change the definition, meet the specifications with the same margins, requalify the new omegas at minimal cost, be sure of reproductibility and quality of the product, and sell it to the customer are outlined. The impact of industrial constraints on the definition and qualification process, and difficulties entailed by such a performance are discussed. ESA

N86-28634*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SIMULATOR FOR MULTILEVEL OPTIMIZATION RESEARCH
S. L. Padula and K. C. Young Jun. 1986 35 p
(NASA-TM-87751; NAS 1.15:87751) Avail: NTIS HC A03/MF A01 CSCL 09B

A computer program designed to simulate and improve multilevel optimization techniques is described. By using simple analytic functions to represent complex engineering analyses, the simulator can generate and test a large variety of multilevel decomposition strategies in a relatively short time. This type of research is an essential step toward routine optimization of large aerospace systems. The paper discusses the types of optimization problems handled by the simulator and gives input and output listings and plots for a sample problem. It also describes multilevel implementation techniques which have value beyond the present computer program. Thus, this document serves as a user's manual for the simulator and as a guide for building future multilevel optimization applications. Author

N86-28635*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STAR (SIMPLE TOOL FOR AUTOMATED REASONING): TUTORIAL GUIDE AND REFERENCE MANUAL
Gary C. Borchardt 15 Dec. 1985 198 p
(Contract NAS7-918)
(NASA-CR-177157; JPL-PUB-85-59; NAS 1.26:177157) Avail: NTIS HC A09/MF A01 CSCL 09B

STAR is an interactive, interpreted programming language for the development and operation of Artificial Intelligence application systems. The language is intended for use primarily in the development of software application systems which rely on a combination of symbolic processing, central to the vast majority of AI algorithms, with routines and data structures defined in compiled languages such as C, FORTRAN and PASCAL. References to routines and data structures defined in compiled languages are intermixed with symbolic structures in STAR, resulting in a hybrid operating environment in which symbolic and non-symbolic processing and organization of data may interact to a high degree within the execution of particular application systems. The STAR language was developed in the course of a project involving AI techniques in the interpretation of imaging spectrometer data and is derived in part from a previous language called CLIP. The interpreter for STAR is implemented as a program defined in the language C and has been made available for distribution in source code form through NASA's Computer Software Management and Information Center (COSMIC). Contained within this report are the STAR Tutorial Guide, which introduces the language in a step-by-step manner, and the STAR Reference Manual, which provides a detailed summary of the features of STAR. Author

N86-28636*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
COMPUTER-AIDED MODELING AND ANALYSIS OF POWER PROCESSING SYSTEMS (CAMAPPS), PHASE 1 Final Report
S. Kim, J. Lee, B. H. Cho, and F. C. Lee 1986 211 p
(Grant NAG5-518)
(NASA-CR-177163; NAS 1.26:177163) Avail: NTIS HC A10/MF A01 CSCL 09B

The large-signal behaviors of a regulator depend largely on the type of power circuit topology and control. Thus, for maximum flexibility, it is best to develop models for each functional block a independent modules. A regulator can then be configured by collecting appropriate pre-defined modules for each functional block. In order to complete the component model generation for a comprehensive spacecraft power system, the following modules were developed: solar array switching unit and control; shunt regulators; and battery discharger. The capability of each module is demonstrated using a simplified Direct Energy Transfer (DET) system. Large-signal behaviors of solar array power systems were analyzed. Stability of the solar array system operating points with a nonlinear load is analyzed. The state-plane analysis illustrates trajectories of the system operating point under various conditions. Stability and transient responses of the system operating near the solar array's maximum power point are also analyzed. The solar array system mode of operation is described using the DET spacecraft power system. The DET system is simulated for various operating conditions. Transfer of the software program CAMAPPS (Computer Aided Modeling and Analysis of Power Processing Systems) to NASA/GSFC (Goddard Space Flight Center) was accomplished. B.G.

N86-28637*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.
COMPUTER-AIDED MODELING AND ANALYSIS OF POWER PROCESSING SYSTEMS (CAMAPPS). PHASE 1: USERS HANDBOOK
S. Kim, J. Lee, B. H. Cho, and F. C. Lee 15 Mar. 1986 82 p
(Grant NAG5-518)
(NASA-CR-177123; NAS 1.26:177123) Avail: NTIS HC A05/MF A01 CSCL 09B

The EASY5 macro component models developed for the spacecraft power system simulation are described. A brief explanation about how to use the macro components with the EASY5 Standard Components to build a specific system is given through an example. The macro components are ordered according to the following functional group: converter power stage models, compensator models, current-feedback models, constant frequency control models, load models, solar array models, and shunt regulator models. Major equations, a circuit model, and a program listing are provided for each macro component. B.G.

N86-28638# National Bureau of Standards, Gaithersburg, Md.
CSFIT: A FORTRAN PROGRAM FOR CHARGE-SHEET MODEL FITTING OF MOSFET DATA
L. C. Witte Nov. 1985 38 p
(AD-A165708; NBSIR-85-3145) Avail: NTIS HC A03/MF A01 CSCL 09/1

A FORTRAN program, CSFIT, has been developed for fitting an expression for the current-voltage (I-V) characteristics of a long-channel MOSFET to experimental I-V curves. The one-dimensional charge-sheet model developed by Brews provides the basis for the I-V characteristics. The I-V characteristics given by this model are optimized with respect to a set of experimental data using the flatband voltage and the mobility as the only adjustable parameters. The program is written so that multiple sets of I-V data can be fit simultaneously if desired. The user must supply, in specified formats, a current-voltage data file, a device parameter file, and a starting value file. Author (GRA)

N86-28639# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CONTACT SURFACE EROSION FOR HYPERVELOCITY PROBLEMS Final Report
Kent D. Kimsey and Jonas A. Zukas Feb. 1986 33 p
(AD-A165723; BRL-MR-3495) Avail: NTIS HC A03/MF A01 CSCL 19/4

This paper presents a technique for extending the capability of Lagrangian wave propagation codes to treatment of deep penetration and spaced plate perforation problems. Lagrangian codes as originally developed required that the sliding interfaces specified at the beginning of a problem remain unchanged throughout the computation. This requirement was imposed not from physical considerations but to simplify the programming of the interface logic. Its effect was to prohibit total failure of material dictated by the physical problem (i.e., front-face spall), resulting in either unrealistic distortions of the computational grid leading to large truncation errors or minuscule temporal integration increments resulting in uneconomical computations. The contact surface erosion algorithm outlined in this paper permits sliding interfaces to be dynamically relocated as materials exceed their load-bearing capability without a prior specification of the damage region. Results obtained with EPIC-2 into which this algorithm has been incorporated show good agreement with experimental data for deep penetration situations as well as for finite plate perforations at striking velocities of 1.1 - 3.75 km/s. GRA

N86-28640# Vrije Universiteit, Amsterdam (Netherlands). Subfaculteit Wiskunde en Informatica.
TRANSITION SYSTEMS, INFINITARY LANGUAGES AND THE SEMANTICS OF UNIFORM CONCURRENCY
J. W. deBakker, J.-J. Ch. Meyer, E.-R. Olderog (Kiel Univ., West Germany), and J. I. Zucker (State Univ. of New York, Buffalo) Feb. 1985 11 p Presented at STOC 1985, Providence, R.I., 6-8 May 1985 Revised Sponsored in part by ESPRIT project 415
(IR-96; B8563329; ESA-86-96954) Avail: NTIS HC A02/MF A01

Shuffle and synchronization merge, local and global nondeterminacy, and deadlocks are analyzed by confronting, for three sample languages, semantic techniques proposing an operational approach, a denotational one, and an intermediate role. The operational semantics is based on transition systems. The definitions include the use of a model involving languages with finite and infinite words; the use of full recursion (based on the copy rule) rather than just iteration; a simple treatment of synchronization; distinction between local and global nondeterminacy; and the restriction to uniform concurrency. ESA

N86-28641# Stockholm Univ. (Sweden). Inst. of Physics.
DATA ACQUISITION CONTROLLER REFERENCE MANUALS
Christian Bohm Sep. 1985 39 p
(USIP-85-19; ESA-86-97048) Avail: NTIS HC A03/MF A01

Hardware and software reference manuals describing a data acquisition controller are presented. The unit controls small to medium sized nuclear physics experiments. It connects via a RS-232 link to a host computer (VAX), which stores measuring data and provides ultimate control of the experiment. The controller can autonomously log in and log out from the host. The system, which is equipped with a eurobus backplane, uses a standard CPU, memory, and digital analog interface boards. Two single board multichannel analyzers were designed for multiscaling and for pulse height analysis. ESA

N86-28642# Stockholm Univ. (Sweden). Inst. of Physics.
MONTE CARLO DATA, THEORY AND COMPUTER PROGRAMS INTENDED FOR DATA ANALYSIS AND SIMULATION IN Fe-57 DEPTH-SELECTIVE CONVERSION ELECTRON MOSSBAUER SPECTROSCOPY (DCEMS)
D. Liljequist Oct. 1985 92 p
(USIP-85-20; ESA-86-97049) Avail: NTIS HC A05/MF A01

A program description and user's manual for computer programs and simulated weight function data for Fe-57 depth-selective Mossbauer spectroscopy are given. Calibration of and convolution with the electron spectrometer profile, phase signal theory, the simulation or analysis of phase signals and spectra, a method to correct for the attenuation of incident radiation in the absorber, and the construction and handling of absorber models are covered. ESA

N86-28643# Centre National d'Etudes Spatiales, Toulouse (France).
HIGH BIT RATE STAR MODEL: MEASUREMENT OF THE SAMPLER PERFORMANCE IN THE 2 X 100 Mb/SEC STAR MODEL [MAQUETTE DE LIAISON HAUTE CADENCE STAR: MESURE DES PERFORMANCES DE L'ECHANTILLONEUR 2 X 100 MB/S DE LA MAQUETTE STAR]
J. P. Soldermann 22 Oct. 1984 24 p In FRENCH; ENGLISH summary
(CNES-844/322-T-CT/DRT/TIT/TR; ESA-86-97183) Avail: NTIS HC A02/MF A01

The effect of the different parameters on the bit error rate is measured as a function of the signal to noise ratios. The input filter is designed as a three pole Butterworth filter with a cut-off frequency at twice the bit rate. The phase shift introduced by the 100 MHz reference oscillator error is estimated as 0.67 deg rms and the bit error caused by different time and phase errors are given. It is shown that filter losses are 0.6 dB and regenerator losses are 0.2 dB for 1 per million bit error rate. ESA

N86-28644# Salford Univ. (England). Computer Simulation Center.
CONSOLIDATION AND EXTENSION OF ESL
J. L. Hay, J. G. Pearce, and L. Turnbull Paris ESA Jun. 1985 43 p
(Contract ESA-5663/83-NL-PP)
(CSC-1026/00-FIN3; ESA-CR(P)-2164; ESA-86-96864) Avail: NTIS HC A03/MF A01

The ESA Simulation Language (ESL) was consolidated by programming 10 applications from aerospace engineering. The results demonstrate the ability of ESL to tackle a wide range of problems, many of which contained discontinuous elements. A comprehensive library of common submodels was derived. Minor problems were corrected. Parallel segmentation facilities were added to allow separate partitions, or segments, of a physical system to be simulated on an individual processor of a multiprocessor computer. Thus ESL, which runs on a conventional computer, emulates the multiprocessor system. ESA

N86-28645# Technische Hogeschool, Delft (Netherlands). Lab. voor Informatietheorie.
LECTURE NOTES: CODING [COLLEGEDICTAAT: CODEREN]
D. E. Boekee 28 Jan. 1986 99 p In DUTCH
(ESA-86-96952) Avail: NTIS HC A05/MF A01

Four aspects of variable length codes, i.e., if such a code can be decoded uniquely, the optimal code, the Huffman code, and its practical realization are discussed. Linear channel coding for error detection and correction is considered. Block-type (e.g., polynomial codes and concatenated codes) and convolution codes (e.g., rate-1/2 codes, and rate k/n convolution codes) are distinguished. ESA

N86-28646# Fondazione Ugo Bordoni, Rome (Italy).
IDENTIFICATION OF STABLE NONSTATIONARY LATTICE PREDICTORS BY LINEAR PROGRAMMING
Giuseppe Martinelli, Gianni Orlandi, Lucio PrinaRicotti, and Susanna Ragazzini Sep. 1985 8 p
(FUB-19-1985; ESA-86-97086) Avail: NTIS HC A02/MF A01

A method for constraining the lattice predictor to have coefficients less than a suitable magnitude of the reflection coefficients is presented. The method is based on a linear programming extension of the least mean square criterion, in order to incorporate the constraints. The efficiency of the resulting algorithm is illustrated. ESA

N86-28647# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
OPTIMUM DESIGN USING A PARALLEL ALGORITHM FOR NONLINEAR PROGRAMMING PROBLEMS
Philippe Berger (Ecole Nationale Superieure d'Electronique d'Informatique et d'Hydraulique, Toulouse, France), Michel Dayde, and Jean-Claude Dunyach 1986 8 p In FRENCH Presented at Conf., Berlin, 23-25 Sep. 1985 Submitted for publication
(SNIAS-861-111-105; ESA-86-97142) Avail: NTIS HC A02/MF A01

An algorithm based on a penalty function approach is applied to optimizing the mass of a structure described by finite elements which has given geometric and material properties. The solution is made parallel by adapting a variable metrics algorithm which is intended to solve problems with no constraints. The method was tested on a sequential computer and on a CRAY 1M computer. The simulation indicates a satisfactory performance. It is shown that the method can be used on a large number of nonlinear mathematical programming problems. ESA

N86-28648# Societe Nationale Industrielle Aerospatiale, Paris (France).
DIALOG ABOUT COMPUTER PROGRAMS [DIALOGUE POUR UN LOGICIEL]
Michel Bertaux, Marie-France Murphy, and Pascal Delumeau 1986 5 p In FRENCH
(SNIAS-861-422-106; ESA-86-97163) Avail: NTIS HC A02/MF A01

An imaginary dialog between an engineer and lawyer illustrates the theoretical and practical aspects of the legal protection of computer program intellectual property in France. Recommendations are given in order to assure an effective protection. The extension of the protection to other countries is discussed. ESA

N86-28649# National Bureau of Standards, Gaithersburg, Md. Center for Computer Systems Engineering.
PERFORMANCE MEASUREMENT TECHNIQUES FOR MULTIPROCESSOR COMPUTERS Interim Report
J. W. Roberts Feb. 1986 59 p Sponsored by DARPA
(PB86-186855; NBSIR-85-3296) Avail: NTIS HC A04/MF A01 CSCL 09B

A wide range of possible measures for multiprocessor computers is discussed, along with the realizability of each class of measurement technique and the applicability of the results. GRA

N86-28256*# Software and Engineering Associates, Inc., Carson City, Nev.
TWO-DIMENSIONAL KINETICS COMPUTER PROGRAM FOR ORBIT TRANSFER VEHICLES
G. R. Nickerson and L. D. Dang *In* Johns Hopkins Univ. The

22nd JANNAF Combustion Meeting, Vol. 1 Oct. 1985 p 495-503 (For primary document see N86-28212 19-28)
(Contract NAS8-35931)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

N86-28365# Texas Instruments, Inc., Lewisville.
MISSION BENEFITS OF A VERY HIGH THROUGHPUT IMAGE TRACKER SYSTEM
Joel K. McWilliams and Jack H. Pridgen *In* AGARD The Impact of Very High Performance Integrated Circuits on Radar, Guidance and Avionics Systems Aug. 1985 9 p (For primary document see N86-28337 19-33)
Avail: NTIS HC A17/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N86-28650 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
IMPLEMENTATION ASSESSMENT OF A NETWORK SERVICE. SPECIFICATION OF A CONFORMANCE TEST SUITE
G. W. Cowin and S. E. Hambly Dec. 1985 36 p
(NPL-DITC-67/85; ISSN-0262-5369; ESA-86-97124) Copyright. Avail: Issuing Activity

Systems for testing the conformance of protocol implementations to the protocol specifications were developed. A system to test the implementation of an interim protocol, known as the Yellow Book, which provides a network service over X.25 is presented. The conformance test suite for use with that testing system is described. The relevance of this to work on testing implementations of standard Open Systems Interconnection protocols is in the structure of the test suite and the nature of the purpose of individual tests. ESA

N86-28651*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HARDWARE CONFIGURATION FOR A REAL-TIME MULTIPROCESSOR SIMULATOR
Richard A. Blech and Anthony D. Williams Jul. 1986 21 p
(NASA-TM-88802; E-3141; NAS 1.15:88802) Avail: NTIS HC A02/MF A01 CSCL 09B

The Real-Time Multiprocessor Simulator (RTMPS) is a multiple microcomputer system used to investigate the application of parallel-processing concepts to real-time simulation. This users manual describes the set-up and installation considerations for the RTMPS hardware. Any modifications or further improvements to the RTMPS hardware will be documented in an addendum to this manual. Author

N86-28652# Allied Bendix Aerospace, Kansas City, Mo.
APPLYING PARALLEL DATA PROCESSING TO AUTOMATED TEST EQUIPMENT
E. J. Rolfe and M. D. Boswell Oct. 1985 24 p Presented at the MAECON Conference, Kansas City, Mo., 6 Nov. 1985
(Contract DE-AC04-76DP-00613)
(DE86-002065; BDX-613-3344; CONF-8511116-1) Avail: NTIS HC A02/MF A01

Parallel processing techniques make possible simultaneous acquisitions of product test data through the use of multiple microprocessors. Dedicating one processor with its own memory, analog to digital converter, programmable level detectors, and event timer to each product test point provides flexibility and avoids contentions for measurement resources. Significant increases in speed and reliability over single-processor testers have been achieved. DOE

N86-28653# Argonne National Lab., Ill.
ANL STATEMENT OF SITE STRATEGY FOR AUTOMATED OFFICE SUPPORT SYSTEMS
L. M. Boxberger Nov. 1985 88 p
(Contract W-31-109-eng-38)
(DE86-005673; ANL/TM-432) Avail: NTIS HC A05/MF A01

The Statement of Site Strategy consists primarily of eighteen chapters that together explain the overall Argonne strategy for defining, acquiring, using, and evaluating computing workstations and other automated office support systems. The seven appendices clarify Argonne's responsibilities in managing microprocessors and word processors and in acquiring computing workstation components. DOE

N86-28654# Stockholm Univ. (Sweden). Inst. of Physics.
A MICROPROCESSOR BASED RS-232 EXCHANGE UNIT
C. Bohm, B. Hovander, and H. Haakansson Sep. 1985 14 p
(USIP-85-18; ESA-86-97047) Avail: NTIS HC A02/MF A01

An RS-232 exchange unit, which can accommodate up to 64 ports is described. Any combination of terminals, devices, and computers are allowed, since all ports are physically identical. All standard nonsplit speeds between 110 bauds and 19,200 bauds are supported semiautomatically. The exchange unit is driven by the Data Terminal Ready signal (DTR) in the RS-232 protocol. Assertion of DTR activates the microprocessor controller of the exchange unit, which then assists in establishing the desired connection or providing the specified service. Negating or disconnecting DTR disconnects the channel. ESA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-28655# Massachusetts Univ., Amherst. Dept. of Chemical Engineering.
NONLINEAR MODEL CONTROL
S. A. Chesna, M. P. Golden, and B. E. Ydstie 1985 26 p Presented at the American Institute of Chemical Engineers Annual Winter Meeting, Chicago, Ill., 10 Nov. 1985
(Contract DE-FG02-85ER-13318)
(DE86-005699; CONF-851123-9) Avail: NTIS HC A03/MF A01

Significant improvements in control system performance can be obtained if the major process nonlinearities are included in the control system design. Nonlinear model control achieves this through the use of simple parallel and series compensation. The use of this method is explained. New theoretical results on controller robustness are presented; it is in particular shown how series nonlinear model compensation can be used to improve control system performance using steady state design models. The theoretical results are supported by simulation and pilot plant experiments using a self tuning-adaptive regulator and nonlinear model compensation. DOE

N86-28656# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
A POLYNOMIAL APPROACH TO MINIMAX FREQUENCY DOMAIN OPTIMIZATION OF MULTIVARIABLE FEEDBACK SYSTEMS
Huibert Kwakernaak Aug. 1985 35 p
(Memo-529; ISSN-0169-2690; ESA-86-96966) Avail: NTIS HC A03/MF A01

The polynomial matrix approach to the minimax frequency domain optimization of multivariate linear feedback systems is considered. The properties of a feedback system represented by rational transfer matrices for the plant and the compensator are discussed. The fact that good disturbance, robustness, limited bandwidth, and compensator roll-off may be obtained by minimizing a criterion over the norm of a matrix depending on suitable weighting matrices, is reported. Numerical solutions of the polynomial equations are discussed. The choice of weighting matrices to ensure required feedback system properties is considered. ESA

N86-28657# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and

System Theory.

A NOTE ON THE STRUCTURE OF TWO SUBSETS OF THE PARAMETERS SPACE IN ADAPTIVE CONTROL PROBLEMS

J. W. Polderman Sep. 1985 13 p Submitted for publication
(CWI-OS-R8509; B8577111; ESA-86-96991) Avail: NTIS HC A02/MF A01

Two subsets (state space and cost criterion) of the parameter space in adaptive control problems for the discrete and continuous cases are studied. The geometric, algebraic and topological properties of these subsets are reported. The fact that the results for these two cases (discrete and continuous) are identical geometrically, but algebraically and topologically different, is reported. ESA

N86-28658# Sheffield Univ. (England). Dept. of Control Engineering.

STABILIZABILITY OF FINITE AND INFINITE DIMENSIONAL BILINEAR SYSTEMS

S. P. Banks 1985 27 p
(RR-283; ESA-86-97136) Avail: NTIS HC A03/MF A01

The stabilizability of a general bilinear system in finite and infinite-dimensional spaces is considered. The stabilizing feedback controller is defined in such a way that the resulting system is of the variable-structure type with a stable sliding mode on a subspace of a state space. This leads to unbounded controls in the neighborhood of the set, but in many cases a simple perturbation of the switching manifolds leads to a bounded controller. In the finite-dimensional case, nonlinear control is discussed. The existence of switching manifolds defined by the solutions of polynomial equations is shown. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-28659 National Physical Lab., Teddington (England). Div. of Informatics Technology and Computing.

SHAPE-PRESERVING SPLINE APPROXIMATION IN THE l1-NORM

Maurice G. Cox and Helen M. Jones Dec. 1985 18 p
(NPL-DITC-68/85; ISSN-0262-5369; ESA-86-97125) Copyright. Avail: Issuing Activity

Approximating a set of discrete data by a function of one independent variable is considered. This function is required to satisfy certain properties relating to its shape. The approximating function used is a polynomial spline expressed as a linear combination of B-spline basis functions. The algorithm for solving this problem minimizes the departure of the approximating spline from the data in the l1-norm. ESA

N86-28660*# Virginia Univ., Charlottesville. Dept. of Mathematics.

MULTI-COLOR INCOMPLETE CHOLESKY CONJUGATE GRADIENT METHODS FOR VECTOR COMPUTERS Ph.D. Thesis

Eugene L. Poole May 1986 125 p
(Grant NAG1-242)
(NASA-CR-178117; NAS 1.26:178117) Avail: NTIS HC A06/MF A01 CSCL 12A

In this research, we are concerned with the solution on vector computers of linear systems of equations, $Ax = b$, where A is a larger, sparse symmetric positive definite matrix. We solve the system using an iterative method, the incomplete Cholesky conjugate gradient method (ICCG). We apply a multi-color strategy to obtain p-color matrices for which a block-oriented ICCG method is implemented on the CYBER 205. (A p-colored matrix is a matrix which can be partitioned into a pXp block matrix where the diagonal blocks are diagonal matrices). This algorithm, which is based on a no-fill strategy, achieves O(N/p) length vector operations in both the decomposition of A and in the forward and back solves necessary at each iteration of the method. We discuss the natural ordering of the unknowns as an ordering that minimizes the number of diagonals in the matrix and define multi-color orderings in terms of disjoint sets of the unknowns. We give necessary and sufficient conditions to determine which multi-color orderings of the unknowns correpond to p-color matrices. A performance model is given which is used both to predict execution time for ICCG methods and also to compare an ICCG method to conjugate gradient without preconditioning or another ICCG method. Results are given from runs on the CYBER 205 at NASA's Langley Research Center for four model problems. Author

N86-28661*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SOLUTION OF ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS BY FAST POISSON SOLVERS USING A LOCAL RELAXATION FACTOR. 1: ONE-STEP METHOD

Sin-Chung Chang May 1986 22 p Presented at the Ninth International Conference on Numerical Methods in Fluid Dynamics, Saclay, France, 25-29 Jun. 1984
(NASA-TP-2529; E-2461-1; NAS 1.60:2529) Avail: NTIS HC A02/MF A01 CSCL 12A

An algorithm for solving a large class of two- and three-dimensional nonseparable elliptic partial differential equations (PDE's) is developed and tested. It uses a modified D'Yakanov-Gunn iterative procedure in which the relaxation factor is grid-point dependent. It is easy to implement and applicable to a variety of boundary conditions. It is also computationally efficient, as indicated by the results of numerical comparisons with other established methods. Furthermore, the current algorithm has the advantage of possessing two important properties which the traditional iterative methods lack; that is: (1) the convergence rate is relatively insensitive to grid-cell size and aspect ratio, and (2) the convergence rate can be easily estimated by using the coefficient of the PDE being solved. Author

N86-28662*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PHYSICAL AND NUMERICAL SOURCES OF COMPUTATIONAL INEFFICIENCY IN INTEGRATION OF CHEMICAL KINETIC RATE EQUATIONS: ETIOLOGY, TREATMENT AND PROGNOSIS

David T. Pratt (Washington Univ., Seattle) and Krishnan Radhakrishnan May 1986 12 p
(Grant NAG3-147)
(NASA-TP-2590; E-2587; NAS 1.60:2590) Avail: NTIS HC A02/MF A01 CSCL 12A

The design of a very fast, automatic black-box code for homogeneous, gas-phase chemical kinetics problems requires an understanding of the physical and numerical sources of computational inefficiency. Some major sources reviewed in this report are stiffness of the governing ordinary differential equations (ODE's) and its detection, choice of appropriate method (i.e., integration algorithm plus step-size control strategy), nonphysical initial conditions, and too frequent evaluation of thermochemical and kinetic properties. Specific techniques are recommended (and some advised against) for improving or overcoming the identified problem areas. It is argued that, because reactive species increase exponentially with time during induction, and all species exhibit asymptotic, exponential decay with time during equilibration, exponential-fitted integration algorithms are inherently more accurate for kinetics modeling than classical, polynomial-interpolant methods for the same computational work. But current codes using the exponential-fitted method lack the sophisticated stepsize-control logic of existing black-box ODE solver codes, such as EPISODE and LSODE. The ultimate chemical kinetics code does not exist yet, but the general characteristics of such a code are becoming apparent. Author

N86-28663# Systems Control Technology, Inc., Palo Alto, Calif.

PARAMETRIC TECHNIQUES FOR MULTICHANNEL SIGNAL PROCESSING Final Report, 1 Sep. 1983 - 30 Oct. 1985

Benjamin Friedlander Oct. 1985 398 p

(Contract DAAG29-83-C-0027)
(AD-A165649; Rept-5498-07; ARO-19707.19-EL) Avail: NTIS HC A17/MF A01 CSCL 12/1

This final report summarizes results on the development of parametric techniques for multichannel signal processing. Results include the development of accurate ARMA spectrum estimation techniques with modest computational complexity, and the development of asymptotic performance bounds for the evaluation of the accuracy of these techniques. GRA

N86-28664# Royal Signals and Radar Establishment, Malvern (England).
ON EXTENSIONS TO FISHER'S LINEAR DISCRIMINANT FUNCTION
I. D. Longstaff Nov. 1985 16 p
(AD-A165661; RSRE-MEMO-3897; DRIC-BR-98722) Avail: NTIS HC A02/MF A01 CSCL 12/1

This Memorandum describes how Fisher's Linear Discriminant can be combined with the Fukunaga-Koontz transform to give a useful technique for reduction of feature space from many to two or three dimensions. Performance is seen to be superior in general to the Foley-Sammon extension to fisher's method. The technique is then extended to show how a new radius vector (or pair of radius vectors) can be combined with fisher's vector to produce a classifier with even more power of discrimination. Illustrations of the technique show that good discrimination can be obtained even if there is considerable overlap of classes in any single projection. GRA

N86-28665# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
PROGRESS ON H (AT INFINITY) OPTIMAL SENSITIVITY FOR DELAY SYSTEMS. PART 1: MINIMUM PHASE PLANT WITH INPUT DELAY. 1 POLE/ZERO WEIGHTING FUNCTION
David S. Flamm and Sanjoy K. Mitter 22 Nov. 1985 34 p
(Contracts DAAG29-84-K-0005; Grant AF-AFOSR-82-0135B)
(AD-A165766; LIDS-P-1513-Pt-1; ARO-20980.43-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this report we derive the solution of the minimal weighted sensitivity problem with 1 pole/1 zero sensitivity weighting functions for stable minimum phase rational plants with an input delay. We calculate the explicit feedback compensator and analyze its stability. Although we have a technique for approximating these compensators with proper compensators, the full description of this, along with an analysis of stability robustness will appear in a future report. Another report will also cover generalizations of this work to plants which are unstable, to plants which have right half plane zeros, and to the case of a more general sensitivity weighting function. GRA

N86-28666# Sandia National Labs., Albuquerque, N. Mex.
OVERVIEW OF PRECONDITIONED CONJUGATE GRADIENT (PCG) METHODS IN CONCURRENT FINITE ELEMENT ANALYSIS
R. E. Benner and G. R. Montry 13 Jan. 1986 15 p
(Contract DE-AC04-76DP-00789)
(DE86-006659; SAND-85-2727) Avail: NTIS HC A02/MF A01

The theory of preconditioned conjugate gradient (PCG) methods is discussed, with emphasis on the features of this class of iterative methods that make them amenable to, or pose problems for, finite element analysis in a parallel processing environment. The discussion focuses on symmetric, positive definite (SPD) matrix equations (which, for example, are commonplace in solid mechanics), with mention of the state-of-the-art of PCG methods generalized for non-SPD problems (which often arise in fluid mechanics). A new class of preconditioners is proposed (and is now being tested), based on experience with both direct and iterative methods for concurrent solution of finite element equations. Results of research with both conventional and novel PCG algorithms will appear in subsequent reports. DOE

N86-28667# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
ERROR ESTIMATES AND AUTOMATIC TIME STEP CONTROL FOR NONLINEAR PARABOLIC PROBLEMS, PART 1
Kenneth Eriksson and Claes Johnson 1985 24 p
(CTH-Math-1985-20-Pt-1; ISSN-0347-2809; ESA-86-97021) Avail: NTIS HC A02/MF A01

Results on time discretization error estimates and related automatic time step control for stiff ordinary differential equations are extended to the case of a nonlinear parabolic problem. The method for time discretization is the discontinuous Galerkin method based on using piecewise polynomials of degree $q >$ or $= 0$. The case $q = 0$, corresponding to a variant of the backward Euler method is treated. An almost optimal error estimate is proved, and a related algorithm for automatic time step control which is very simple but is efficient and gives control of the global error is presented. ESA

N86-28668# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
AN A POSTERIORI ERROR ESTIMATE AND AUTOMATIC TIME STEP CONTROL FOR A BACKWARD EULER DISCRETIZATION OF A PARABOLIC EQUATION
Claes Johnson, Yi-Yong Nie, and Vidar Thomee 1985 27 p
(CTH-Math-1985-23; ISSN-0347-2809; ESA-86-97024) Avail: NTIS HC A03/MF A01

A simple algorithm for automatic time step control for a backward Euler discretization of a linear parabolic problem is presented. The algorithm is based on an a posteriori error estimate involving the computed approximate solution. It is proved that, with only very rough a priori information of the exact solution, the algorithm chooses the correct sequence of time steps, except possibly for a few initial steps, to guarantee global error control to a certain given tolerance. ESA

N86-28669# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
CONVERGENCE ANALYSIS FOR A NONSYMMETRIC GALERKIN METHOD FOR A CLASS OF SINGULAR BOUNDARY VALUE PROBLEMS IN ONE SPACE DIMENSION
Kenneth Eriksson and Yi-Yong Nie 1985 31 p
(CTH-Math-1985-24; ISSN-0347-2809; ESA-86-97025) Avail: NTIS HC A03/MF A01

A nonsymmetric Galerkin type piecewise polynomial approximation procedure for a class of singular boundary value problems in one space dimension is extended to the case of mildly nonlinear problems with the same type of singularity. The discretization of the stationary problem is analyzed with respect to super convergence properties at the nodal points. To obtain full superconvergence at all nodal points local mesh refinements must be introduced, even though the exact solution is smooth for the given class of problems. ESA

N86-28670# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
CONVERGENCE OF A FINITE ELEMENT METHOD FOR A NONLINEAR HYPERBOLIC CONSERVATION LAW
Claes Johnson and Anders Szepessy 1985 15 p
(CTH-Math-1985-25; ISSN-0347-2809; ESA-86-97026) Avail: NTIS HC A02/MF A01

A finite element method for a time dependent nonlinear hyperbolic conservation law in one space dimension (Burger's equation) is considered. The finite element method is higher order accurate and is a Petrov-Galerkin method based on the so-called streamline diffusion modification of the test functions giving added stability. Assuming uniform boundedness of the finite element solutions, it is proved, using a compensated compactness result by Murat-Tartar, convergence to the entropy solution of the conservation law as the mesh parameter tends to zero. ESA

N86-28671# Leiden Univ. (Netherlands).
A DENSITY DEPENDENT DIFFUSION EQUATION IN POPULATION DYNAMICS: STABILIZATION TO EQUILIBRIUM
M. Bertsch and D. Hilhorst 1986 43 p
(ESA-86-96956) Avail: NTIS HC A03/MF A01

A problem (P) of the theory of population dynamics over a finite habitat composed by two different age groups when the boundary conditions are supposed that no individuals can leave or enter the habitat, is considered. This problem is studied as a nonlinear evolution problem. The large time behavior of the solutions of P is discussed and the results of existence, uniqueness, and regularity of solutions of P are reported. The construction of a Lyapunov functional for the contraction property for solutions of P and for the relations between P and the Dirichlet problem is discussed. ESA

N86-28672# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
SYMMETRY TRANSFORMATIONS IN INDEFINITE METRIC SPACES
P. M. vandenBroek Aug. 1984 19 p
(Memo-428; ESA-86-96963) Avail: NTIS HC A02/MF A01

Three properties between whose relations there exists symmetry transformations and semilinear operators over a n-dimensional complex vector space with a indefinite metric, are proved. Wigner's theorems for indefinite metric spaces are generalized. ESA

N86-28673# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THE USE OF MATHEMATICAL OPTIMIZATION TECHNIQUES BY THE DESIGNER
R. F. vandenDam 25 Jan. 1985 46 p In DUTCH; ENGLISH summary Presented at Congress on Computer Applications in Production and Engineering (CAPE) Nederland '85, Amsterdam, Netherlands, May 1985
(NLR-MP-85005-U; B8578430; ESA-86-96975) Avail: NTIS HC A03/MF A01

Mathematical optimization techniques in the design process and their use by designers are discussed. The principles underlying these techniques and the requirements for a flexible optimization system having a broad applicability are considered. Optimization techniques used in aeronautical engineering are reviewed and illustrated with the examples of the System for the Analysis and Constrainted Minimization of Induced Drag and Computational Aerodynamic Design-by-Optimization System. ESA

N86-28674# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
UNIFORM ASYMPTOTIC EXPANSION FOR A CLASS OF POLYNOMIALS BIORTHOGONAL ON THE UNIT CIRCLE
N. M. Temme Sep. 1985 9 p Submitted for publication
(CWI-AM-R8512; B8578046; ESA-86-96998) Avail: NTIS HC A02/MF A01

A family of orthogonal polynomials on the disk unit with respect to the classical weight function is considered. The fact that the zeros of the weight functions can explain the asymptotic behavior of orthogonal or biorthogonal polynomials is studied. A uniform asymptotic expansion for this family of polynomials biorthogonal on the unit circle is given. The result is valid for the parameter over compact subsets of complex numbers without zero. This result is not valid for all hypergeometric functions. ESA

N86-28675# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ON THE COMPUTATION OF THE INCOMPLETE GAMMA FUNCTIONS FOR LARGE VALUES OF THE PARAMETERS
N. M. Temme Sep. 1985 10 p Submitted for publication
(CWI-AM-R8513; B8578047; ESA-86-96999) Avail: NTIS HC A02/MF A01

The incomplete gamma function, as a function of two variables that are supposed to be non-negative, is considered. A method for the asymptotic representation for the incomplete gamma function is given. A series expansion of the coefficients generated by simple recursion is used. An algorithm for the computation of the incomplete gamma function for large values of the parameters is constructed. Legendre's continued fractions method and the Taylor series are used. The algorithm gives a remarkable reduction in computational effort compared with other methods. ESA

N86-28676# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
INCOMPLETE LAPLACE INTEGRALS: UNIFORM ASYMPTOTIC EXPANSIONS WITH APPLICATION TO THE INCOMPLETE BETA FUNCTION
N. M. Temme Oct. 1985 29 p Submitted for publication
(CWI-AM-R8514; B8578048; ESA-86-97000) Avail: NTIS HC A03/MF A01

The properties of the asymptotic expansion of one incomplete Laplace integral (quotient of the Laplace transformation and the gamma function) are studied. The representation of the remainders, the asymptotic nature of the expansion, and the construction of error bounds are given. This method answers an open problem for incomplete Beta function. Application over expansions for the incomplete Beta function are reported. ESA

N86-28677# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Applied Mathematics.
HOPF BIFURCATION IN HOST-PARASITOID MODELS
H. A. Lauwerier Nov. 1985 21 p
(CWI-AM-R8516; B8578050; ESA-86-97002) Avail: NTIS HC A02/MF A01

A host-parasitoid model of generation n with explicit Arnold normal form is studied. The fact that the Hopf bifurcation, the shape, and size of the elliptic limit curve can be derived in terms of the parameter of the model is proved. The fact that models have a rich bifurcation behavior with both forward and backward Hopf bifurcations and with a transition zone in the parameter for which there exists a pair of limit curves, one stable and one unstable, is revealed by numerical experiments. ESA

N86-28678# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
INFINITE STREAMS AND FINITE OBSERVATIONS IN THE SEMANTICS OF UNIFORM CONCURRENCY
J. W. deBakker, J.-J. Ch. Meyer, and E.-R. Olderog Sep. 1985 26 p Submitted for publication Sponsored by European Economic Commission ESPRIT Project 415
(CWI-CS-R8512; B8575493; ESA-86-97003) Avail: NTIS HC A03/MF A01

Two ways of assigning meaning to a language with uniform concurrency are compared. The language has uninterpreted elementary actions from which statements are composed using sequential composition, nondeterministic choice, parallel composition with communication, and recursion. The first semantics uses infinite streams in the sense which is a refinement of the linear time semantics of De Bakker et al. The second semantics uses the finite observations of Hoare et al., situated in between the divergence and readiness semantics of Olderog & Hoare. It is shown that the two models are isomorphic and that this isomorphism induces an equivalence result between the two semantics. The hiding operation inspired by the infinite streams approach is defined. The continuity of this operation is proved in the framework of finite observations. ESA

N86-28679# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
RIEMANN-ROCH THEOREM FOR LOCALLY PRINCIPAL ORDERS
Juliusz Brzezinski 1985 15 p
(CTH-Math-1985-27; ISSN-0347-2809; ESA-86-97028) Avail: NTIS HC A02/MF A01

A smooth integral projective curve C over the field k, and algebraically closed field in the function field K of C, is considered. The fact that Witt's version of Riemann-Roch theorem can be extended to a class of C-order lambda in arbitrary finitely dimensional semisimple separable algebras is reported. The fact that the maximal orders are locally principal but not always hereditary is shown. Properties for orders in quaternion algebras are given. ESA

N86-28680# Fondazione Ugo Bordoni, Rome (Italy).
THE REPRESENTATION OF CERTAIN INTEGERS AS A SUM OF DISTINCT FIBONACCI NUMBERS
Piero Filipponi Mar. 1985 24 p
(FUB-3-1985; ESA-86-97082) Avail: NTIS HC A02/MF A01

Classes of integers for which the number of F-addends (distinct nonconsecutive Fibonacci numbers) can be expressed in a closed form are studied. The F-addend representation of several classes of the set (Kn) of Fibonacci and Lucas related integers is established. On the basis of the uniqueness of this representation, the value of f(Kn) is found by simply enumerating the addends. The algebraic sum of Fibonacci and lucas numbers; product of Fibonacci and Lucas numbers; ratio of particular Fibonacci and Lucas numbers; and generalized Fibonacci numbers having particular initial values are considered. ESA

N86-28681# Sheffield Univ. (England). Dept. of Control Engineering.
ON THE GLOBAL BILINEARIZATION OF NONLINEAR SYSTEMS AND THE EXISTENCE OF VOLTERRA SERIES
S. P. Banks 1985 17 p
(RR-286; ESA-86-97138) Avail: NTIS HC A02/MF A01

A global Volterra series for an analytic system defined on an analytic manifold M is developed. Local bilinearizations are pieced together using the theory of fiber bundles, giving twisted bilinear systems defined globally on M. ESA

N86-28682# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics.
GAUSSIAN ELIMINATION ALGORITHMS ON A VECTOR COMPUTER
W. Hoffmann Jun. 1985 19 p
(Rept-85-10; ESA-86-96332) Avail: NTIS HC A02/MF A01

Algorithms for the triangular factorization of square matrices are classified. These factorizations are used for the solution of a linear system. Criteria for optimal algorithms on vector computers are given and comparative experiments in FORTRAN 77 with FORTRAN 200 extensions for the Cyber 205 are reported. The FORTRAN 200 application is quicker. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-28683*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STEADY-STATE PROBABILITY DENSITY FUNCTION OF THE PHASE ERROR FOR A DPLL WITH AN INTEGRATE-AND-DUMP DEVICE
M. Simon and A. Mileant 15 Apr. 1986 26 p
(Contract NAS7-918)
(NASA-CR-177160; JPL-PUB-86-3; NAS 1.26:177160) Avail: NTIS HC A03/MF A01 CSCL 12A

The steady-state behavior of a particular type of digital phase-locked loop (DPLL) with an integrate-and-dump circuit following the phase detector is characterized in terms of the probability density function (pdf) of the phase error in the loop. Although the loop is entirely digital from an implementation standpoint, it operates at two extremely different sampling rates. In particular, the combination of a phase detector and an integrate-and-dump circuit operates at a very high rate whereas the loop update rate is very slow by comparison. Because of this dichotomy, the loop can be analyzed by hybrid analog/digital (s/z domain) techniques. The loop is modeled in such a general fashion that previous analyses of the Real-Time Combiner (RTC), Subcarrier Demodulator Assembly (SDA), and Symbol Synchronization Assembly (SSA) fall out as special cases. Author

N86-28684# Los Alamos National Lab., N. Mex.
FRONTIERS OF QUANTUM MONTE CARLO WORKSHOP: PREFACE
J. E. Gubernatis 1985 13 p Presented at the Frontiers of Quantum Monte Carlo Conference, Los Alamos, N. Mex., 3 Sep. 1985
(Contract W-7405-eng-36)
(DE86-006021; LA-UR-86-209; CONF-8509213-5) Avail: NTIS HC A02/MF A01

The introductory remarks, table of contents, and list of attendees are presented from the proceedings of the conference. The conference covered a wide range of topics using the Monte Carlo method and computerized simulation. The sessions were divided into areas covering computers and science, condensed matter physics, chemistry, atomic molecular and nuclear physics, high energy physics, and advanced computer designs. E.R.

N86-28685# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
GAMES WITH DISASTER (D) AND T EVENTS
Lennart Raade 1985 27 p
(CTH-Math-1985-21; ISSN-0347-2809; ESA-86-97022) Avail: NTIS HC A03/MF A01

The duration of various games is studied. At each round of the game a disaster event can occur, which implies that the game is started afresh. There is also the possibility for a T-event which leads to the termination of the game. This is extended to continuous time. Applications including one from reliability theory are discussed. Additional event method (collective marks method) is used. ESA

N86-28686# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
R-CENSORING AND THE EXPONENTIAL DISTRIBUTION
Lennart Raade 1985 39 p
(CTH-Math-1985-22; ISSN-0347-2809; ESA-86-97023) Avail: NTIS HC A03/MF A01

A censoring method, R-censoring, in life testing experiments is studied for the case of exponentially distributed life times. The R-censoring method means that instead of observing the life time xi, min(xi, eta) where eta is a random variable independent of xi is observed. The case where only some of the tested units are R-censored (partial R-censoring) is treated. A combination of R-censoring and type 2 censoring is investigated. ESA

N86-28687# Sheffield Univ. (England). Dept. of Control Engineering.
CORRELATION BASED MODEL VALIDITY TESTS FOR NONLINEAR MODELS
S. A. Billings and W. S. F. Voon Oct. 1985 19 p Sponsored by UK Science and Engineering Research Council
(RR-285; ESA-86-97137) Avail: NTIS HC A02/MF A01

Model validity tests for nonlinear systems were developed. It is shown that covariance tests developed for linear systems provide incorrect information when applied to nonlinear systems and tests based on higher order correlation functions were derived. The application and interpretation of these tests to simulated and real data is demonstrated. The tests detect omitted linear and nonlinear dynamic terms in estimated models. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-28688*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DESIGN OF ADAPTIVE CONTROL SYSTEMS BY MEANS OF SELF-ADJUSTING TRANSVERSAL FILTERS
S. J. Morhav Feb. 1986 69 p
(NASA-TM-86843; A-85418; NAS 1.15:86843) Avail: NTIS HC A04/MF A01 CSCL 12B

The design of closed-loop adaptive control systems based on nonparametric identification was addressed. Implementation is by self-adjusting Least Mean Square (LMS) transversal filters. The

design concept is Model Reference Adaptive Control (MRAC). Major issues are to preserve the linearity of the error equations of each LMS filter, and to prevent estimation bias that is due to process or measurement noise, thus providing necessary conditions for the convergence and stability of the control system. The controlled element is assumed to be asymptotically stable and minimum phase. Because of the nonparametric Finite Impulse Response (FIR) estimates provided by the LMS filters, a-priori information on the plant model is needed only in broad terms. Following a survey of control system configurations and filter design considerations, system implementation is shown here in Single Input Single Output (SISO) format which is readily extendable to multivariable forms. In extensive computer simulation studies the controlled element is represented by a second-order system with widely varying damping, natural frequency, and relative degree.
Author

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-28689# Joint Inst. for Nuclear Research, Dubna (USSR).
SOME PROPERTIES OF CONTRAINTS IN THEORIES WITH DEGENERATE LAGRANGIANS
A. M. Chervyakov and V. V. Nesterneko 1984 14 p Presented at the 7th International Seminar on High Energy Physics Problems, Mutliquark Interactions and Quantum Chromodynamics, Dubna, USSR, 19 Jun. 1984 Submitted for publication
(DE86-700235; JINR-E-2-84-470; CONF-8406221-5) Avail: NTIS (US Sales Only) HC A02/MF A01

By means of the second Noether theorem it is shown that the action invariance under the transformations with arbitrary functions of time results in primary constraints, which are in involution between themselves at least in a weak sense. The Lagrangian constraints were proved to be invariant relations for the Euler equations. In the framework of the Lagrangian formalism a criterion of the appearance in the degenerate theory of the second class constraints is proposed. The Poisson brackets of the primary constraints with the canonical Hamiltonian are determined.
Author

N86-28690# Chalmers Univ. of Technology, Goeteborg (Sweden). Dept. of Mathematics.
ON THE ENSKOG EQUATION IN TWO SPACE VARIABLES
Leif Arkeryd 1985 16 p
(CTH-Math-1985-26; ISSN-0347-2809; ESA-86-97027) Avail: NTIS HC A02/MF A01

The existence problem for the weak Enskog equation in two space-variables far from equilibrium is studied. As a corollary, an existence result for the Boltzmann equation for inverse jth power forces and angular cutt-ff when 2< j< or = 3 is obtained. ESA

N86-28691# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.
AN EXTENDED FORMULATION OF MAXWELL'S EQUATIONS
B. Lehnert Oct. 1985 16 p
(TRITA-EPP-85-05; ISSN-0348-7539; ESA-86-97031) Avail: NTIS HC A02/MF A01

An extended Lorentz invariant formulation of Maxwell's equations which includes time dependent and steady state solutions is presented. The charge and current densities are treated as intrinsic properties of the electromagnetic field itself, in vacuo. A longitudinal electric wave is predicted to propagate in vacuo. An axially symmetric steady state in which self-confined electromagnetic radiation circulates in closed orbits around the axis of symmetry can be outlined. For this state values of the charge, the spin, and the product between magnetic moment and mass which are of the same order of magnitude as those observed for elementary particles such as the proton and electron are obtained. ESA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-28692*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GATING CHARACTERISTICS OF PHOTOMULTIPLIER TUBES FOR LIDAR APPLICATIONS
John D. W. Barrick Aug. 1986 25 p
(NASA-TM-87699; L-16112; NAS 1.15:87699) Avail: NTIS HC A02/MF A01 CSCL 20C

A detector test facility was developed and applied in the evaluation and characterization of lidar detectors in support of the multipurpose airborne differential absorption lidar (DIAL) system based at the Langley Research Center (LaRC). A performance data base of various detector configurations available to the DIAL system was obtained for optimum lidar detector selection. Photomultiplier tubes (PMT's) with multialkaline and bialkaline photocathodes were evaluated in voltage-divider networks (bases) by using either the focusing electrode or dynodes as a gating mechanism. Characteristics used for detector evaluation included gain stability, signal rise time, and the ability to block unwanted high light levels.
Author

N86-28693# Brookhaven National Lab., Upton, N. Y.
COOLING HIGH INTENSITY ATOMIC HYDROGEN BEAMS TO LIQUID HELIUM TEMPERATURES
A. Hershcovitch, A. Kponou, and T. O. Niinihoski 1986 13 p Presented at the International Workshop on Polarized Sources and Targets, Montana, Switzerland, 13 Jan. 1986
(Contract DE-AC02-76CH-00016)
(DE86-005814; BNL-37537; CONF-860126-1) Avail: NTIS HC A02/MF A01

An atomic hydrogen source, designed to operate in the laminar flow range, has been built at BNL. A unique feature of this source is a miniature gap between a teflon tube which guides the beam and an accommodator which cools it. Across this gap a step-function in temperature, with the teflon temperature exceeding 100°K and the accommodator temperature as low as 3°K, was successfully maintained. This configuration collimates the beam enough to prevent significant diffusive losses without subjecting it to the temperature range of high recombination. Record H^0 beam flux of 3.32 x 10^{18} H^0/sr-sec was obtained at an accommodation temperature of 5.5°K.
DOE

N86-28694# Joint Publications Research Service, Arlington, Va.
USSR REPORT: CYBERNETICS, COMPUTERS AND AUTOMATION TECHNOLOGY
25 Apr. 1986 62 p Transl. into ENGLISH from various Russian articles
(JPRS-UCC-86-004) Avail: NTIS HC A04/MF A01

Topics on cybernetics, computers, and automation technology include: hardware, software, applications, and education. For individual titles, see N86-28695 through N86-28697.

N86-28695# Joint Publications Research Service, Arlington, Va.
A NEW WAY OF HOLOGRAPHIC RECORDING OF INFORMATION c35
A. A. Vasilyev, P. V. Vashurin, V. A. Yelkhov, I. N. Kompanyets, A. V. Prafenov, and P. M. Semochkin *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-004) 25 Apr. 1986 p 10 Transl. into ENGLISH from Priroda (Moscow, USSR), no. 12, Dec. 1985 p 104 (For primary document see N86-28694 19-70)
Avail: NTIS HC A04/MF A01

A system of holographic paged recording of information was developed. The system is characterized by a higher recording density and protection from interference. Basically, these advantages become apparent with the recording of large files of information (pages of text, sketches, and pictures). The output of such files is highly effective with the help of space-time light modulators, from which liquid-crystal models obtained the greatest

diffusion. The method of recording of holograms is characterized both by a heightened contrast of a picture, and by considerable reduction of requirements of uniformity of the thickness of the liquid-crystal layer. This is connected to the fact that in it is used phased bunch modulation, which (in contrast to amplitude) is much less sensitive to the nonuniform thickness 1 to 2 microns it manages to obtain a contrast of 30:1. B.G.

N86-28696# Joint Publications Research Service, Arlington, Va.
DISCOVERY IN LOW-TEMPERATURE PHYSICS
Ivan Ivanov *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-004) 25 Apr. 1986 p 12 Transl. into ENGLISH from Tass (Moscow, USSR), 14 Jan. 1986 (For primary document see N86-28694 19-70)
Avail: NTIS HC A04/MF A01

The properties of the helium-3 isotope, liquefied and cooled to 0.0004 degree Kelvin were studied. The liquid helium isotope is placed in a honeycomb-like cell and excited with an electromagnetic pulse. Part of the liquid acquires magnetic properties while the rest of the liquid loses them, which indicates the transfer of magnetism. Given such unusual properties under temperatures close to absolute zero, the helium-3 isotope can be used in computers to improve capacity and increase speed. B.G.

N86-28697# Joint Publications Research Service, Arlington, Va.
INFORMATION SYSTEMS FOR LIBRARY DATABASES ORGANIZED c82
Toomas Etverk *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-004) 25 Apr. 1986 p 27-30 Transl. into ENGLISH from Rahva Haal (Tallinn, Estonia), 31 Jul. 1985 p 2 (For primary document see N86-28694 19-70)
Avail: NTIS HC A04/MF A01

One of the important resources for speeding up progress in science and technology is the Automated Remote Inquiry System of Scientific Information (TAKS), which is described. In the Soviet Union, an Automated System of the State Science and Technology Information (VINTI) is being established which comprises a system of large information centers. The effective use of the bibliographical retrospective data bases is discussed. B.G.

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-28698 National Physical Lab., Teddington (England). Div. of Materials Applications.
AN FFT MICROCOMPUTER PROGRAM FOR DETERMINING THE VELOCITY OF ULTRASONIC WAVES
A. Woolf Nov. 1985 16 p
(NPL-DMA(A)106; ISSN-0143-7313; ESA-86-97127) Copyright.
Avail: Issuing Activity

A fast Fourier transform subroutine was written for the BBC microcomputer and applied to the determination of the velocity of ultrasonic Lamb wave pulses. Results show that the BBC micro is powerful enough to transform a pulse of 1024 points in 2.4 min; for 512 points the transform time is 1.1 min. There are problems associated with recording only part of the Lamb wave pulse. If only part of the pulse is recorded then an uncertain error is introduced into the velocity determinations. For the application of fast Fourier transform techniques to Lamb wave velocity measurements to be successful, it is necessary to work with shorter pulses than those studied. ESA

N86-28699# Admiralty Research Establishment, Portland (England).
THE OPTIMIZATION OF GAIN FOR CHEBYSCHEV SHADED LINEAR ARRAYS
G. J. Kirby Aug. 1985 51 p
(ARE(PORTLAND)TN-743/85; BR97269; ESA-86-97109) Avail: NTIS HC A04/MF A01

The theory of oversteered shaded arrays is used to predict that Chebyschev arrays should have array gains significantly greater than unshaded arrays in isotropic noise. For arrays with up to 10 hydrophones, Chebyschev arrays can achieve an array gain close to N squared where N is the number of hydrophones. ESA

N86-28700# Imperial Coll. of Science and Technology, London (England). Tribology Section.
RESEARCH INTO AN ON-LINE DEVICE FOR MONITORING CONTAMINATION IN FLUIDS USING ULTRASONIC TECHNIQUES Final Report
C. J. Harries, R. S. Sayles, and P. B. Macpherson Dec. 1984 107 p
(Contract MOD(RAE)-A12/1584)
(TS011/84; BR96168; ESA-86-97120) Avail: Issuing Activity

A prototype ultrasonic device for on-line monitoring of particles within lubricant and hydraulic systems was developed. The technique is shown to operate successfully with small hard particles in the range 30 to 1000 microns suspended in a lubricant and in a range of concentrations typical of lubricant and hydraulic systems. The device is shown to offer continuous information on particle size, concentration, and possibly material. Research needed to realize the full potential of the device, and in particular, overcoming the problems posed by entrained air, is detailed. ESA

N86-28701*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL ACOUSTIC RESULTS OF TWO ROTOR MODELS WITH SEVERAL TIP DESIGNS
R. M. Martin and Andrew B. Connor Jul. 1986 191 p
(NASA-TM-87698; L-16081; NAS 1.15:87698) Avail: NTIS HC A09/MF A01 CSCL 20F

A three-phase research program has been undertaken to study the acoustic signals due to the aerodynamic interaction of rotorcraft main rotors and tail rotors. During the first phase, two different rotor models with several interchangeable tips were tested in the Langley 4- by 7-Meter Tunnel on the U.S. Army rotor model system. An extensive acoustic data base was acquired, with special emphasis on blade-vortex interaction (BVI) noise. The details of the experimental procedure, acoustic data acquisition, and reduction are documented. The overall sound pressure level (OASPL) of the high-twist rotor systems is relatively insensitive to flight speed but generally increases with rotor tip-path-plane angle. The OASPL of the high-twist rotors is dominated by acoustic energy in the low-frequency harmonics. The OASPL of the low-twist rotor systems shows more dependence on flight speed than the high-twist rotors, in addition to being quite sensitive to tip-path-plane angle. An integrated band-limited sound pressure level, limited by 500 to 3000 Hz, is a useful metric to quantify the occurrence of BVI noise. The OASPL of the low-twist rotors is strongly influenced by the band-limited sound levels, indicating that the blade-vortex impulsive noise is a dominant noise source for this rotor design. The midfrequency acoustic levels for both rotors show a very strong dependence on rotor tip-path-plane angle. The tip-path-plane angle at which the maximum midfrequency sound level occurs consistently decreases with increasing flight speed. The maximum midfrequency sound level measured at a given location is constant regardless of the flight speed. Author

N86-28702*# Pennsylvania State Univ., University Park. Dept. of Physics.
EXPERIMENTAL STUDY USING NEARFIELD ACOUSTIC HOLOGRAPHY OF SOUND TRANSMISSION THROUGH FUSELAGE SIDEWALL STRUCTURES Final Report
J. D. Maynard 1986 70 p
(Grant NAG1-216)
(NASA-CR-177162; NAS 1.26:177162) Avail: NTIS HC A04/MF A01 CSCL 20A

The reduction of cabin noise in lightweight, propeller-driven aircraft is an especially difficult problem in noise control. Nearfield Acoustic Holography (NAH) was used to determine the mode of vibration and acoustic intensity for panels which differed in: construction (number of stiffening ribs, size of stifening ribs, construction material, and panel surface curvature); boundary

support condition (free edge condition or clamped edge condition); and mode of excitation (structural-borne forces or airborne forces). The different samples of aircraft panels are described and the measurement of the natural response frequencies was discussed under various boundary support and excitation conditions. The results of the NAH measurements are presented. B.G.

N86-28703# Colorado School of Mines, Golden. Center for Wave Phenomena.
ON THE IMAGING OF REFLECTORS IN THE EARTH
Norman Bleistein 15 Jan. 1986 78 p
(Contract N00014-84-K-0049)
(AD-A165638; CWP-038) Avail: NTIS HC A05/MF A01 CSCL 20/1

This paper is based on a paper by Beylkin in which a leading order asymptotic theory for inversion of acoustic data is presented. The method is based on earlier work by Beylkin in the theory of pseudo-differential operators and generalized back projections or Radon transforms. The back projection or inversion is carried out with respect to a general C(x,y,z) background sound speed. GRA

N86-28704# European Space Agency, Paris (France).
SCATTERING OF AN ACOUSTIC FIELD BY A NONHOMOGENEOUS, NONUNIFORM FLOW
Alain Guedel Nov. 1985 225 p Transl. into ENGLISH from "Diffusion dun Champ Acoustique par un Ecoulement Inhomogene et Non Uniforme" Chatillon, France Original language document was announced as N86-181127
(ESA-TT-935; ONERA-P-1985-1; ESA-86-96854) Avail: NTIS HC A10/MF A01

Scattering effects in an acoustic field propagated through the mixing region of an open jet were analyzed. For a monochromatic incident wave, the main effects are a broadening of the line at the emission frequency, with a modulation of the wave amplitude and phase. These processes were studied with a parametric analysis in wind tunnels having diameters of 2 and 3 m, and with models using Born and Rytov approximations. The experimental data are compared quantitatively with predictions from the theoretical analysis associated with an experimental model of the turbulence of the propagation medium. The study is applied to acoustic measurements carried out in an anechoic open-jet wind tunnel. ESA

N86-28705# Hochschule der Bundeswehr, Munich (West Germany). Inst. fuer Mechanik.
THE ACOUSTIC POWER OF CIRCULAR MEMBRANES [DIE AKUSTISCHE LEISTUNG KREISFOERMIGER MEMBRANEN]
Helmut Fleischer 1984 35 p In GERMAN
(Rept-4/84; ESA-86-96931) Avail: NTIS HC A03/MF A01

The acoustic power radiated by built-in circular membranes in a half space was calculated by numerical evaluation of the Huygens-Rayleigh integral for points on the surface. Approximation formulas for ka much smaller and much larger than one (k = wavenumber; a = outer radius) are given as well as diagrams in which the reactive and active power as a function of ka are shown for 20 natural shapes of vibration. As a possible application, from the natural shape - natural frequency spectra of given membranes, the accompanying acoustic power - frequency spectra can be determined from which auditory sensations such as loudness and pitch of tone can be obtained. ESA

N86-28706 United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
ACOUSTIC EMISSION-MICROSTRUCTURAL RELATIONSHIPS IN FERRITIC STEELS. PART 1: THE EFFECT OF COOLING RATE
H. N. G. Wadley and C. B. Scruby Jun. 1985 36 p
(AERE-R-11312) Copyright. Avail: Issuing Activity

Acoustic emission is controlled during deformation and fracture by the dynamics of dislocation motion and crack advance. The nature of the relationship between defect dynamics and acoustic emission in tensile samples of specially prepared low alloy steels containing 3.25 wt.% Ni, 1 wt.% Mn and a variable carbon content from 0.06 to 0.49 wt.% is studied. The most energetic signals are from microstructures with an initially low dislocation density and a ferrite dimension of approx. > 10 microns, indicating the propagation of high velocity dislocations in ferrite to be the origin of acoustic emission during deformation. This is consistent with a model in which the product of glide distance and velocity (which are both controlled by microstructure) determines the amplitude of the acoustic emission. During subcritical micro-fracture, intergranular and alternating shear modes of microcracking in high strength conditions generate detectable signals. Both involve the rapid growth of cracks over distances of 10 to 100 micron. The ductile dimple mode of fracture is found to generate no detectable signals despite wide variations in dimple spacing and fracture stress. This is consistent with the recognized view that such fracture occurs under essentially static conditions. Author

N86-28707 United Kingdom Atomic Energy Authority, Harwell (England). Materials Physics and Metallurgy Div.
ACOUSTIC EMISSION-MICROSTRUCTURAL RELATIONSHIPS IN FERRITIC STEELS. PART 2: THE EFFECT OF TEMPERING
C. B. Scruby and H. N. G. Wadley Jul. 1985 38 p
(AERE-R-11556-Pt-2) Copyright. Avail: Issuing Activity

Tempering of Fe-3.25 wt%Ni alloys with carbon contents of between 0.057 and 0.49 wt% leads to a pronounced acoustic emission activity during ambient temperature tensile testing. The maximum emission occurs from samples tempered approx. 250 deg C and appears only weakly influenced by carbon content. Mechanical property determinations link the maximum to a precipitation hardening effect. A model involving the cooperative motion of dislocations over distances corresponding to the lath-packet dimension is proposed. The mechanism responsible for cooperative motion is believed to be a precipitate shearing process, the first time such a process has been proposed for quenched and tempered ferritic steels. A second, much weaker source of emission has been identified in material subjected to prolonged tempering at 625 deg C. The mechanism responsible for this emission is believed to be the sudden multiplication and propagation of dislocations during microyield events. No evidence has been found to support the view that carbide fracture in quenched and tempered steels is a direct source of acoustic emission. The microstructural states in which most quenched and tempered steels are used in practice, generate very little detectable acoustic emission either during deformation or fracture, irrespective of carbon content. Author

N86-28228# California Inst. of Tech., Pasadena.
COUPLED VORTEX SHEDDING AND ACOUSTIC RESONANCES IN A DUCT
K. M. Aaron and F. E. C. Culick *In* Johns Hopkins Univ. The 22nd JANNAF Combustion Meeting Oct. 1985 p 161-171 (For primary document see N86-28212 19-28)
(Grant AF-AFOSR-0286-84)
Avail: CPIA, Laurel, Md. 20707 HC $70.00 CSCL 21/2

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-28708# Materials Quality Assurance Directorate, London (England). Materials Center.
SOME APPLICATIONS OF FAST ATOM BOMBARDMENT MASS SPECTROMETRY
J. Hodson and A. J. Pidduck Aug. 1985 26 p
(MQAD-TP-905; BR98163; ESA-86-97107) Avail: NTIS HC A03/MF A01

The fast atom bombardment (FAB) ionization source for mass spectrometry (MS) is introduced, and the advantages over other ionization techniques are discussed. Experimental factors are described. Applications of FABMS to the direct analysis of lubricant additives, thermally labile or involatile organic compounds such as

macromolecules and tonic dyestuffs, and inorganic compounds are outlined. The high specificity of FABMS for surfactant species difficult to analyze by other methods is emphasized. ESA

N86-28709*# National Aeronautics and Space Administration, Washington, D.C.
THE ROLE OF SPINNING ELECTRONS IN PARAMAGNETIC PHENOMENA
D. M. Bose Jun. 1986 27 p Transl. into ENGLISH from Zeitschrift fuer Physik (West Germany), v. 43, no. 8, 1927 p 864-882 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NAS2-4005)
(NASA-TM-88439; NAS 1.15:88439) Avail: NTIS HC A02/MF A01 CSCL 20H

An attempt is made to explain paramagnetic phenomena without assuming the orientation of a molecule or ion in a magnetic field. Only the spin angular momentum is assumed to be responsible. A derivative of the Gurie-Langevin law and the magnetic moments of ions are given as a function of the number of electrons in an inner, incomplete shell. An explanation of Gerlach's experiments with iron and nickel vapors is attempted. An explanation of magnetomechanical experiments with ferromagne elements is given. Author

N86-28710# California Univ., Berkeley. Dept. of Chemistry.
THE INFRARED MULTIPHOTON DISSOCIATION OF THREE NITROLKANES
A. M. Wodtke, E. J. Hintsa, and Y. T. Lee 24 Jan. 1986 61 p
(Contract N00014-83-K-0069)
(AD-A165605) Avail: NTIS HC A04/MF A01 CSCL 07/4

Infrared multiphoton dissociation in a molecular beam has been studied in order to elucidate the collision free, 'thermal' chemistry and dynamics of nitromethane, nitroethane and 2-nitropropane. The isomerization of CH3NO2 to CH3ONO was observed by detecting the CH3O and NO products from the dissociation of the very internally hot, isomerized nitromethane. A novel application of RRKM theory was used to estimate the barrier height to isomerization at 55.5 kcal/mol. The barrier height determination method was tested and found to give excellent results by applying it to the determintaion of the barrier height to HONO elimination from nitroethane, a value which is well known from activation energy measurements. The method was then applied to the case of HONO elimination from 2-nitropropane and it appears that there is good to believe that the barrier height is 3-5 kcal/mol lower in 2-nitropropane than in nitroethane. The success of this method for determining barrier heights shows how a microscopic molecular beam experiment, using infrared multiphoton dissociation where the concept of temperature has no place, can be quantitatively related to pyrolysis experiments which are conducted under collisional, thermal conditions and measure phenomenological quantities such as activation energies. GRA

N86-28711# Louisiana State Univ., Baton Rouge.
SEARCH FOR THE FORMATION OF THE QUARK-GLUON PLASMA BY MEASUREMENT OF CROSS SECTIONS FOR DIRECT PHOTONS AND LEPTONS Annual Progress Report, 1 Apr. 1985 - 31 Mar. 1986
P. N. Kirk Dec. 1985 12 p
(Contract DE-AS05-76ER-04699)
(DE86-004471; DOE/ER-04699/9) Avail: NTIS HC A02/MF A01

The VAX 11/750 computer system for data analysis is described. The design and construction details of multiwire proportional counters are given. DOE

N86-28712# Pacific Northwest Lab., Richland, Wash.
PROCEEDINGS OF THE WORKSHOP ON RADIATION SURVEY INSTRUMENTS AND CALIBRATIONS
J. M. Selby, K. L. Swinth, E. J. Vallario, and B. L. Murphy Nov. 1985 474 p Workshop held in Gaithersburg, Md., 10 Jul. 1984
(Contract DE-AC06-76RL-01830)
(DE86-005525; PNL-SA-13346; CONF-840774) Avail: NTIS HC A20/MF A01

The workshop was held to discuss two topics: (1) a performance standard for radiation survey instruments and the potential for a testing program based on that standard; and (2) a system of secondary standards laboratories to provide instrument calibrations and related services. Separate abstracts have been prepared for the individual presentations. DOE

N86-28713# Purdue Univ., West Lafayette, Ind. Dept. of Physics.
STUDY OF NUCLEAR CHARGE DISTRIBUTIONS BY MUONIC X-RAYS Final Report, 1 Jun. 1974 - 28 Feb. 1985
R. M. Steffen Nov. 1985 43 p
(Contract DE-AC02-76ER-02875)
(DE86-005127; DOE/ER-02875/20; COO-2875-20) Avail: NTIS HC A03/MF A01

Determination of the electric monopole and quadrupole properties (isomer shifts, quadrupole moments, B(E2) moments, etc.) of the low-lying state of nuclei in the transition regions is reported. In regions of nuclear shape transitions, measurements of the quadrupole moments of the first excited nuclear states of even-even nuclei through dynamic hyperfine interactions with muonic states are reported. Investigations on isotope and isomic shifts in the mass region from A = 40 to A= 150 are reported. Observation of static nuclear hexadecopole moments through hyperfine splittings in muonic d (5/2), f and g states in the uranium region are given. Investigation of anomalous widths in pionic 4f-3d transitions in the mass region around A = 170 are reported for Na, Ta, Pb and Bi. DOE

N86-28714# Virginia Univ., Charlottesville.
GLOW DISCHARGE AS AN ATOMIZATION AND IONIZATION SOURCE Progress Report
1986 7 p
(Contract DE-AS05-80ER-10635)
(DE86-005421; DOE/ER-10635/5) Avail: NTIS HC A02/MF A01

This progress report will summarize the activities in our laboratory over the past 12 months. Included are what we feel are the most important developments. Three separate, although complementary, projects form the foundation of our research at Virginia: (1) the hollow cathode plume; (2) resonance ionization mass spectrometry; and (3) glow discharge mass spectrometry. DOE

N86-28715# Argonne National Lab., Ill.
PROCEEDINGS OF THE WORKSHOP ON SOME ASPECTS OF AUTOIONIZATION IN ATOMS AND SMALL MOLECULES
J. Berkowitz, ed., H. G. Berry, ed., and R. S. Berry, ed. Nov. 1985 280 p Presented at the Workshop on Autoionization of Atoms and Small Molecules, Argonne, Ill., 2 May 1985 Prepared in cooperation with Chicago Univ., Ill.
(Contract W-31-109-eng-38)
(DE86-005521; ANL-PHY-85-3; CONF-850560) Avail: NTIS HC A13/MF A01

Do we really understand the phenomenon of autoionization in atoms sufficiently well to consider it a mature topic? Can we generalize our understanding to predict behavior in systems not yet studied? Can we extract physical understanding from the encouraging results of the many-body calculations? Or must we still try to understand one atom at a time? Molecular autoionization is clearly more difficult. Not only must we contend with vibrational autoionization as well as electronic autoionization, but the competing process of predissociation must also be taken into account. In this molecular domain, we have many experiments and many phenomena. The extant theories only deal with some cases, and are not yet able to explain some prominent observations. A group consisting of theorists and experimentalists active in the field of autoionization assembled at Argonne National Laboratory for a two-day Workshop on May 2 to 3, 1985, to try to provide some consensus of our present understanding and to point out the most promising direction for progress in the near future. Individual items from the workshop were prepared separately for the data base. DOE

N86-28716# Brookhaven National Lab., Upton, N. Y.
METHOD OF GENERATING INTENSE NUCLEAR POLARIZED BEAMS BY SELECTIVE PHOTODETACHMENT OF NEGATIVE IONS
A. Hershcovitch 1986 8 p Presented at the International Workshop on Polarized Sources and Targets, Montana, Switzerland, 13 Jan. 1986
(Contract DE-AC02-76CH-00016)
(DE86-005815; BNL-37519; CONF-860126-2) Avail: NTIS HC A02/MF A01

A novel method for production of nuclear polarized negative hydrogen ions by selective neutralization with a laser of negative hydrogen ions in a magnetic field is described. This selectivity is possible since a final state of the neutralized atom, and hence the neutralization energy, depends on its nuclear polarization. The main advantages of this scheme are the availability of multi-ampere negative ion sources and the possibility of neutralizing negative ions with very high efficiency. An assessment of the required laser power indicates that this method is in principle feasible with today's technology. DOE

N86-28717# Brown Univ., Providence, R. I. Dept. of Chemistry.
INTERACTIONS OF MOLECULES WITH SURFACES Progress Report, 1 Feb. 1985 - 31 Jan. 1986
E. F. Greene Jan. 1986 10 p
(Contract DE-FG02-85ER-13441)
(DE86-006512; DOE/ER-13441/1; COO-4974-8) Avail: NTIS HC A02/MF A01

The angular distributions of beams of Ne and Ar atoms scattered nearly elastically from LiF (100) at 294 K show structure that is obscured by inelastic scattering when the whole range of velocities leaving the crystal is recorded. Increased fluxes of neutral species in beams from an effusive source of alkali halide vapor observed when a beam of electrons is coaxial with the neutral beam are shown to be well accounted for by a model involving electron stimulated desorption of alkali atoms. A simple model is proposed for the compensation observed for changes of the preexponential factor and activation energy in rate coefficients for the desorption of molecules from surfaces undergoing surface phase transitions. The isomerization of perfluoroDewarbenzene to perfluorobenzene can be produced in yields of 10% after single energetic collisions with a surface of polytetrafluoroethylene. The yield of ions produced when a beam of Na atoms strikes a Si(111) surface is increased over the equilibrium value observed for thermal beams by a factor of 10 or more when the kinetic energy of the incomin g atoms is increased to 14 eV. The yield is sensitive to the dynamics of electron exchange between the surface and the ion. DOE

N86-28718# Stockholm Univ. (Sweden). Inst. of Physics.
FROM TRACKS ON FILM TO CORRECTED MULTIPLICITY DISTRIBUTIONS
Barbro Aasman Aug. 1985 67 p
(USIP-85-17; ESA-86-97046) Avail: NTIS HC A04/MF A01

Charged multiplicity distributions for the inelastic, non single-diffractive component of p bar p reactions at 540 GeV are given in full phase space and also in limited parts of phase space with cuts made in pseudorapidity. The method used to get the corrected multiplicity distribution is described. The data were obtained in streamer chambers. ESA

N86-28719# Stockholm Univ. (Sweden). Inst. of Physics.
MAXIMUM LIKELIHOOD FIT OF HADRONIC BACKGROUND IN THE 1982 BIG EUROPEAN BUBBLE CHAMBER (BEBC) BEAM DUMP EXPERIMENTER
K. Hultquist Oct. 1985 18 p
(USIP-85-21; ESA-86-97050) Avail: NTIS HC A02/MF A01

Neutrino-copper target interactions were studied. A method which estimates the neutrino signal in the neutral current (NC) sample with errors that agree with the Poisson error for high energies where the background is small is presented. Comparing the fit to data with fits to Monte Carlo samples generated using the fitted model gives a goodness-of-fit of 0.45. The Monte-Carlo fit results for the neutrino signal compared with the true signal generated show that there is no appreciable systematic shift, and that the errors are correctly determined. Correction to the raw NC sample is (2 + or - 4)% above 10 GeV hadronic energy. ESA

N86-28720# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
REVIEW OF THE CONVERSION COEFFICIENTS BETWEEN DOSIMETRIC QUANTITIES AND THOSE ESTABLISHED BY INTERNATIONAL COMMISSION ON RADIATION UNITS (ICRU)
A. Bartolotta 30 Sep. 1985 26 p In ITALIAN; ENGLISH summary Presented at ICRU Study Day on Determination of Dose Equivalents Resulting from External Radiation Sources, Rome, Italy, 21 Jun. 1985
(ISS-L-85/3; ISSN-0390-6493; ICRU-39; ESA-86-97080) Avail: NTIS HC A03/MF A01

Methods used to calculate radiation quantities are reviewed. Analysis of the conversion coefficients given by the methods shows that the errors are small enough to allow the application to radiation protection procedures. The remaining problems such as obtaining reference dosimetric values and the choice of adequate instrumentation to determine the new parameters are discussed. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-28721*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRANSPORT MODEL OF NUCLEON-NUCLEUS REACTION
John W. Wilson, Lawrence W. Townsend, and Francis A. Cucinott Jul. 1986 17 p
(NASA-TM-87724; NAS 1.15:87724) Avail: NTIS HC A02/MF A01 CSCL 20H

A simplified model of nucleon-nucleus reaction is developed and some of its properties are examined. Comparisons with proton production measured for targets of Al-27, Ni-58, Zr-90, and Bi-209 show some hope for developing an accurate model for these complex reactions. It is suggested that binding effects are the next step required for further development. Author

N86-28722# Clemson Univ., S.C.
ATF NEUTRAL BEAM INJECTION: OPTIMIZATION OF BEAM ALIGNMENT AND APERTURING
R. N. Morris, R. H. Fowler, J. A. Rome, and T. J. Schlagel Dec. 1985 35 p
(Contract DE-AC05-84OR-21400)
(DE86-004638; ORNL/TM-9689) Avail: NTIS HC A03/MF A01

The application of the existing Impurity Study Experiment (ISX-B) neutral beam injectors for the Advanced Toroidal Facility (ATF) is studied. It is determined that with the practical considerations of beam aperturing, ATF vacuum vessel complexity, and realistic beam modeling, the power absorbed by the plasma will be approximately 57% of the extracted neutral beam power, which corresponds to an injected power of about 1.5 MW. By reducing the beam divergence to a 1° Gaussian distribution, the absorbed power could be increased to 93%. The power delivered to the plasma is found to be a strong function of the beam divergence but only a weak function of the beam focal length. Shinethrough can be a serious problem if very low density startups are necessary. Preliminary calculations indicate that there will be no excessive fast-ion losses. DOE

N86-28723# Pittsburgh Univ., Pa. Graduate School of Public Health.
INVESTIGATION OF SITING PARAMETERS FOR NEAR SURFACE DISPOSAL OF LOW-LEVEL NUCLEAR WASTE Final Report

W. R. Schell, A. L. Sanchez, and E. D. Thomas 15 Dec. 1985 84 p
(Contract DE-FG07-84ID-12509)
(DE86-005498; DOE/ID-12509/1) Avail: NTIS HC A05/MF A01

A study was initiated in April 1984 to evaluate actual problems associated with and to recommend improvements for near surface disposal of low-level radioactive wastes in the State of Pennsylvania and the humid Northeast. The results of field measurements showed some vertical transport of Cs and other fallout radionuclides in Pb dated peat cores from the unsaturated zone. Under the natural acid rain conditions (pH 4.0), the most mobile radionuclide, Cs, gave diffusion coefficients of 10 to 10 cm-/sec in the different organic rich soils. Both the upward and downward migration of radionuclides resulted from the hydrological cycle of evapotranspiration and precipitation which gave diffusive mixing of mobile radionuclides. The distribution coefficient, K sub d values, for several radionuclides in the organic rich soils were found to be equal to or greater than those measured previously for inorganic clay and sediment matrices. To insure that radionuclides do not enter water supplies in the humid Northeast where pH 4.0 rain is encountered, a peat liner should be considered i n the multibarrier design of repositories. DOE

N86-28724# Netherlands Energy Research Foundation, Petten.
FUSION TECHNOLOGY PROGRAM Semi-Annual Progress Report, Jan.-Jun. 1984
J. D. Elen, comp. Oct. 1985 63 p
(ECN-171; B8577048; ESA-86-97018) Avail: NTIS HC A04/MF A01

System and safety studies for fusion reactors; nuclear data bases for fusion reactors; neutronic calculations for the Joint European Torus and B-2 fusion reactors; radiation damage of vanadium alloys and stainless steel; a facility for in-pile crack growth measurement; a niobium-tin magnet for the SULTAN stage 2; a NET conductor; ceramic breeder materials; and system studies for NET-TF coils are discussed. ESA

N86-28725# Netherlands Energy Research Foundation, Petten.
FUSION TECHNOLOGY PROGRAM Semi-Annual Progress Report, Jul.-Dec. 1984
J. D. Elen, comp. Nov. 1985 78 p
(ECN-177; B8578302; ESA-86-97020) Avail: NTIS HC A05/MF A01

System and safety studies for fusion reactors; nuclear data bases for fusion reactors; neutronic calculations for the Joint European Torus and B-2 fusion reactors; radiation damage of vanadium alloys and stainless steel; a facility for in-pile crack growth measurement; a niobium-tin magnet for the SULTAN stage 2; a Net conductor; ceramic breeder materials; and system studies for NET-TF coils are discussed. ESA

N86-28726# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorentwicklung.
THE COSIMA EXPERIMENTS AND THEIR VERIFICATION, A DATA BASE FOR THE VALIDATION OF TWO PHASE FLOW COMPUTER CODES
G. Class, R Meyder, and E. Stratmanns Dec. 1985 205 p In GERMAN; ENGLISH summary
(KfK-4002; ISSN-0303-4003; ESA-86-96913) Avail: NTIS HC A10/MF A01

The large data base for validation and development of computer codes for two-phase flow, generated at the COSIMA facility, is reviewed. The aim of COSIMA is to simulate the hydraulic, thermal, and mechanical conditions in the subchannel and the cladding of fuel rods in pressurized water reactors during the blowout phase of a loss of coolant accident. In terms of fuel rod behavior, it is found that during blowout under realistic conditions only small strains are reached. For cladding rupture extremely high rod internal pressures are necessary. The behavior of fuel rod simulators and the effect of thermocouples attached to the cladding outer surface are clarified. Calculations performed with the codes RELAP and DRUFAN show satisfactory agreement with experiments. This can be improved by updating the phase separation models in the codes. ESA

N86-28727# Brookhaven National Lab., Upton, N. Y.
EXTENDED STORAGE OF LOW-LEVEL RADIOACTIVE WASTE: POTENTIAL PROBLEM AREAS
B. Siskind, D. R. Dougherty, and D. R. MacKenzie Dec. 1985 145 p
(Contract NRC-FIN-A-3171)
(TI86-004888; NUREG/CR-4062) Avail: NTIS HC A07/MF A01

If a state or state compact does not have adequate disposal capacity for low-level radioactive waste (LLRW) by 1986 as required by the Low-Level Waste Policy Act, then extended storage of certain LLRW may be necessary. Extended storage of LLRW is considered in order to determine for the Nuclear Regulatory Commission areas of concern and actions recommneded to resolve these concerns. The focus is on the properties and performance of the waste form and waste container. Storage alternatives are considered in order to characterize the likely storage environments for these wastes. The areas of concern about extended storage of LLRW are grouped into two categories: (1) performance of the waste form and/or container during storage, e.g., radiolytic gas generation, radiation-enhanced degradation of polymeric materials, and corrosion; and the (2) effects of extended storage on the properties of the waste form and/or container that are important after storage (e.g., radiation-induced embrittlement of high-density polyethylene and the weakening of steel containers resulting from corrosion). A discussion is given of additional information and actions required to address these concerns. Author

74 OPTICS

Includes light phenomena.

N86-28728*# National Aeronautics and Space Administration, Washington, D.C.
DYNAMIC METHOD FOR MEASURING THE NON-LINEARITIES OF PHOTOELECTRIC DETECTORS
H. J. Jung Jun. 1986 16 p Transl. into ENGLISH from Zeitschrift fuer Angewandte Physik (West Germany), v. 30, no. 5, 1970 p 338-341 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88464; NAS 1.15:88464) Avail: NTIS HC A02/MF A01 CSCL 20F

The photocurrent of a nonlinear radiation detector contains a signal with the frequency omega sub 1-omega sub 2 when exposed to two chopped light beams with the chopper frequencies omega sub 1 and omega sub 2. The amplitude of the intermodulation signal is proportional to the non-linearity. So it is possible to measure nonlinearities in a direct way without evaluating small differences of large quantities. The method shown requires less stability of light sources than classical methods. A dependence of the intermodulation signal on the chopper frequencies gives additional information about time dependent nonlinearities. Author

N86-28729*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
1700 DEG C OPTICAL TEMPERATURE SENSOR Final Report
P. W. Mossey, W. M. Shaffernocker, and A. R. Mulukutla Jul. 1986 168 p
(Contract NAS3-24085)
(NASA-CR-175108; NAS 1.26:175108; R86AEB267) Avail: NTIS HC A08/MF A01 CSCL 20F

A new gas temperature sensor was developed that shows promise of sufficient ruggedness to be useful as a gas turbine temperature sensor. The sensor is in the form of a single-crystal aluminum oxide ceramic, ground to a cone shape and given an emissive coating. A lens and an optical fiber conduct the thermally emitted light to a remote and near-infrared photodetector assembly.

Being optically coupled and passive, the sensor is highly immune to all types of electrical interference. Candidate sensors were analyzed for optical sensor performance, heat transfer characteristics, stress from gas loading. This led to the selection of the conical shape as the most promising for the gas turbine environment. One uncoated and two coated sensing elements were prepared for testing. Testing was conducted to an indicated 1750 C in a propane-air flame. Comparison with the referee optical pyrometer shows an accuracy of + or - 25 C at 1700 C for this initial development. One hundred cycles from room temperature to 1700 C left the sapphire cone intact, but some loss of the platinum, 6% rhodium coating was observed. Several areas for improving the overall performance and durability are identified.

Author

N86-28730*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A SIMPLE ANTIREFLECTION OVERCOAT FOR OPAQUE COATINGS IN THE SUBMILLIMETER REGION

Sheldon M. Smith Apr. 1986 23 p Prepared for presentation at the SPIE Annual Meeting, 17-23 Aug. 1986

(NASA-TM-88219; A-86074; NAS 1.15:88219) Avail: NTIS HC A02/MF A01 CSCL 20F

An antireflection overcoat for opaque baffle coatings in the far infrared (FIR)/submillimeter region was made from a simple Teflon spray-on lubricant. The Teflon overcoat reduced the specular reflectance of four different opaque coatings by nearly a factor of two. Analysis, based on the interference term of a reflecting-layer model, indicates that in the submillimeter region the reduced reflectance depends primarily on the refractive index of the overcoat and very little on its thickness.

Author

N86-28731*# Howard Univ., Washington, D. C. Dept. of Electrical Engineering.

A CLASS OF OPTICALLY CONTROLLED MILLIMETER WAVE DEVICES Final Report, 1 Feb. 1985 - 30 Jun. 1986

Raj Chowdhary Jul. 1986 36 p

(Grant NAG5-390)

(NASA-CR-177178; NAS 1.26:177178) Avail: NTIS HC A03/MF A01 CSCL 20F

Three specific devices were investigated: the sheet resistance device, the Schottky-barrier diode and the PIN diode. Several sheet resistance devices were fabricated and tested. Based on the encouraging results from these devices, a mask was designed and sent to a vendor and is expected to be received very soon. A set of masks for fabricating transparent cathode Schottky-barrier diodes was designed. These masks were given to NASA Goddard Space Flight Center for fabrication of the diodes. A mask set was designed to fabricate PIN diodes with transparent electrodes. With slight modifications, the same mask set also can be used to fabricate other devices, such as MESFET and the IMPATT diode.

Author

N86-28732* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

WIDE-ANGLE FLAT FIELD TELESCOPE Patent

Kenneth L. Hallam, Barton J. Howell, and Mark E. Wilson Issued 8 Jul. 1986 7 p Filed 5 Feb 1985 Supersedes N85-20868 (23 - 11, p 1728)

(NASA-Case-GSC-12825-1; US-Patent-4,598,981; US-Patent-Appl-SN-698641; US-Patent-Class-350-505; US-Patent-Class-350-276R; US-Patent-Class-354-479; US-Patent-Class-358-222) Avail: US Patent and Trademark Office CSCL 20F

Described is an unobscured three mirror wide angle telescopic imaging system comprised of an input baffle which provides a 20 deg (Y axis) x 30 deg (X axis) field of view, a primary mirror having a convex spherical surface, a secondary mirror having a concave ellipsoidal reflecting surface, a tertiary mirror having a concave spherical reflecting surface. The mirrors comprise mirror elements which are offset segments of parent mirrors whose axes and vertices commonly lie on the system's optical axis. An iris diaphragm forming an aperture stop is located between the secondary and tertiary mirror with its center also being coincident with the optical axis and being further located at the beam waist of input light beams reflected from the primary and secondary mirror surfaces. At the system focus following the tertiary mirror is located a flat detector which may be, for example, a TV imaging tube or a photographic film. When desirable, a spectral transmission filter is placed in front of the detector in close proximity thereto.

Official Gazette of the U.S. Patent and Trademark Office

N86-28733# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.

DEVELOPMENT OF FIBER OPTIC SYSTEMS FOR RECORDING AND TRANSMITTING HOLOGRAPHIC INFORMATION Final Report, 1 Sep. 1984 - 1 Dec. 1985

John A. Gilbert 1 Feb. 1986 18 p

(Contract DAAG29-84-K-0183)

(AD-A165710; ARO-21671.5-EG) Avail: NTIS HC A02/MF A01 CSCL 17/2

The overall aim of the work was to design and test self-contained, automated, fiber-based optical systems to measure displacement in production-related or dynamic testing applications. To this end, stability requirements imposed on fibers and optical elements required for remote holographic interferometric analysis have been evaluated for continuous wave laser systems, and techniques were developed to record interferograms on non-isolated and submerged test objects. Thermoplastics have been incorporated into fiber-based systems to record time-average and real-time holograms, and holographic/fiber-optic systems have been practically applied to evaluate the thermal deformation response of microcircuit modules.

GRA

N86-28734# New Mexico Univ., Albuquerque. Inst. for Modern Optics.

SOLITONS IN STIMULATED RAMAN SCATTERING: GENERATION AND CONTROL OF ULTRASHORT OPTICAL PULSES Final Report

Kai J. Druhl Feb. 1986 25 p

(Contract DAAG29-85-K-0031)

(AD-A165744; ARO-21497.2-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

A numerical and analytical study of soliton propagation and generation in a Raman amplifier is performed. Parameters are amplitude and temporal profile of input optical fields, Raman line width and detuning. Soliton excitations will develop, if a phase shift of nearly 180 degrees is introduced into the Stokes seed beam. In the absence of detuning and for an instantaneous phase shift of exactly 180 degrees the solitons will be stable. In the presence of detuning and for non instantaneous phase shifts of less than 180 degrees the solitons will be unstable and decay for sufficiently large gain. Limiting values are about 10% detuning relative to the Raman line width, and a fractional, unshifted Stokes intensity of about 1%. Stable solitons will show temporal narrowing with a width inversely proportional to the square root of the total gain. For large gain the final width is independent of the initial width. Unstable solitons will reach minimal width at a relative amplitude of .5, and begin to broaden on further propagation. The minimal width is proportional to the initial width and the initial relative amplitude.

GRA

N86-28735# Oak Ridge National Lab., Tenn.

TRANSMISSION MEASUREMENTS OF SELECTED LIQUIDS IN THE FAR INFRARED

M. A. Walker, R. K. Richards, and D. P. Hutchinson Nov. 1985 12 p

(Contract DE-AC05-84OR-21400)

(DE86-004641; ORNL/TM-9772) Avail: NTIS HC A02/MF A01

Measurements were taken of the transmission of 0.119 mm radiation through 22 liquids using a variable length absorption cell. Seven of these liquids were then selected to be tested at wavelengths of 0.185 mm, 0.307 mm, and 0.447 mm. It was found that a light grade of mineral oil proved to have excellent transmission in the far-infrared (FIR) spectrum. We were able,

from the data collected, to estimate the index of refraction of these liquids at wavelengths longer than 0.3 mm. DOE

N86-28736# Sandia National Labs., Albuquerque, N. Mex.
AUTOMATED LENS TESTING SYSTEM
R. O. Woods Dec. 1985 36 p
(Contract DE-AC04-76DP-00789)
(DE86-005783; SAND-85-2438) Avail: NTIS HC A03/MF A01

An autonomous, computer controlled system has been implemented to examine the optical field of non-imaging radiometer lenses. This report documents the software and also constitutes an operators's manual. DOE

N86-28737# Chicago Univ., Ill. Enrico Fermi Inst.
FUNDAMENTALS AND TECHNIQUES OF NONIMAGING OPTICS Progress Report
R. Winston Nov. 1985 20 p
(Contract DE-FG02-84ER-13178)
(DE86-005801; DOE/ER-13178/2) Avail: NTIS HC A02/MF A01

Work reported includes: generalized radiance and practical radiometry, construction of a conserved flux from plane waves, and formulation of a version of Liouville's theorem which is well suited for discussing the performace of optical systems in geometry. DOE

N86-28738# Connecticut Univ., Storrs.
ENERGY TRANSFER AND NON-LINEAR OPTICAL PROPERTIES AT NEAR ULTRAVIOLET WAVELENGTHS: RARE EARTH 4f->5d TRANSITIONS IN CRYSTALS AND GLASSES Progress Report, 1 Jun. 1985 - 31 May 1986
D. S. Hamilton Jan. 1986 43 p
(Contract DE-FG02-84ER-45056)
(DE86-006229; DOE/ER-45056/2) Avail: NTIS HC A03/MF A01

The project has considered several aspects of how high-fluence, near-ultraviolet laser light modifies the optical properties of cerium-doped crystals. Illumination of Ce^{3+}:CaF at 308 nm leads to a two-photon photoionization and the subsequent creation of photochromic color centers. A one-photon photobleaching of these centers and the finite electron acceptor density leads to a complex but solvable rate equation. The electron acceptors are trivalent cerium ions at quasi-cubic sites, which become divalent following the electron capture. The photo-bleaching involves the photoionization of the divalent cerium ions, with the electron returning to the original tetragonal symmetry site. Thermoluminescence measurements are used to study the thermally activated recombination radiation. Measurements of optical gain and loss in Ce^{3+}:LiYF are presented. DOE

N86-28739# Plessey Research (Caswell) Ltd., Towcester (England). Allan Clark Research Center.
SUB-MILLIMETER (FAR I-R) HETERODYNE SPECTROMETER (DEMONSTRATION MODEL). PART 2: EXTENSION OF SPECTRAL ANALYSIS CAPABILITIES Final Report, Dec. 1983 - Jan. 1985
C. J. Groves-Kirby 1985 75 p
(Contract ESA-5557/83-NL-PR)
(CD-6501735-Pt-2; ESA-CR(P)-2161; ESA-86-96863) Avail: NTIS HC A04/MF A01

The spectrum analysis capabilities of a Bragg Cell Spectrum Analyzer were extended. In order to increase bandwidth to 1.0GHz (from 500MHz), increases in RF system bandwidth, and optical system bandwidth were necessary. The bulky, power consuming 2 mW He-Ne laser was replaced by a more compact, efficient semiconductor laser, and the optical assembly redesigned. A surface acoustic wave compressive receiver was used as high resolution processor to extend resolution to 50 kHz over 50 MHz bandwidth. Light scattering onto the photodiode array remains a problem. ESA

N86-28740# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Technische Thermodynamik.
MICROPROCESSOR CONTROLLED OPTICAL MEASURING SYSTEM FOR LARGE MIRROR MODULES
Rainer Koehne, Erich Rach, and Franz Reich Oct. 1985 60 p In GERMAN; ENGLISH summary Report wil also be announced as translation (ESA-TT-984)
(DFVLR-FB-85-58; ISSN-0171-1342; ESA-86-96878) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 21.50

A microprocessor controlled contactless measuring system was developed in order to determine how the beam quality of mirrors influences the performance of solar plants with focusing collectors. The system was installed to investigate large flat and curved mirror surfaces (< or = 10 sq m). An algorithm to evaluate the measured data was derived. The very accurate method is based on laser ray tracing to determine the ripple and the deviations from the ideal contour which can be expressed as a root mean square value. Measurements on parabolic trough mirrors and heliostat segments yield rms values of 10 and 3.7 mrad, respectively. ESA

N86-28741# Societe Nationale Industrielle Aerospatiale, Paris (France).
MEASUREMENT TRANSMISSION BY MEANS OF OPTICAL FILTERS [TRANSMISSION DE MESURES PAR FILTRES OPTIQUES]
Claude Prevost 1986 24 p In FRENCH Submitted for publication
(SNIAS-861-430-104; ESA-86-97166) Avail: NTIS HC A02/MF A01

The modulation procedures for transmitting measurement results using an optical fiber are examined. The advantages of an optical transmission channel are pointed out. Direct intensity base band modulation, pulse frequency modulation, pulse width modulation, and frequency modulation are discussed. It is shown that frequency modulation is better regarding signal to noise ratios, linearity and differential gain, while base band modulation is poorest in all these concepts. But as it is also the least complex, base band modulation is interesting for average quality applications. ESA

N86-28742# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Meteorologische Fernerkundung.
VISIBILITY OF SIGNAL LIGHTS UNDER ATMOSPHERIC INFLUENCES
Gerhard H. Ruppersberg Oct. 1985 61 p In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-987)
(DFVLR-FB-85-63; ISSN-0171-1342; ESA-86-96883) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 19.50

The influence of atmospheric parameters on the transmission of light was studied. Visual ranges calculated from illuminance thresholds using Allard's law are only valid up to viewing angles of 0.116 mrad. At larger viewing angles neglecting an additional path radiance term results in considerably higher required intensities and much smaller visual ranges.Chromatical thresholds of luminance and illuminance must contain the path luminance in front of the signal light instead of background luminance. A background stop at small distances considerably reduces the required luminance of a signal light which can also have a neglibible influence depending on the dominant type to threshold. ESA

N86-28743# Bonn Univ. (West Germany). Inst. fuer Physik.
A MOBILE RECEPTION TELESCOPE FOR LIDAR MEASUREMENTS Thesis [EIN MOBILES EMPFANGSTELESKOP FUER LIDAR-MESSUNGEN]
Lothar Pfeifer Jul. 1984 42 p In GERMAN
(IR-84-27; ISSN-0172-8741; ESA-86-96932) Avail: NTIS HC A03/MF A01

The tasks of the receiver optics in sodium lidar experiments, and requirements for a measuring campaign instrument are discussed. The optical components are presented. The control system of the primary mirror of the telescope is described. For this control, the adjusting laser system was analyzed and optimized. A systematic measuring procedure for the primary mirror was

developed. The adjustment of the telescope using the preliminary adjustment of the secondary mirror is described. It is shown that mirror errors require a modification of the setup. The receiver lobe in measuring situations was calculated. Experience with the telescope during the campaign is summarized. The efficiency of the global receiver was calculated. Possibilities to improve the experiment are discussed. ESA

N86-28744# Berkeley Scientific Translation Service, Calif.
OPTICAL GLASS
T. S. Izumitani Oct. 1985 204 p Transl. into ENGLISH of unidentified Japanese report
(TI86-025776; UCRL-Trans-12065) Avail: NTIS HC A10/MF A01

Topics addressed include: physical and chemical properties of optical glass; manufacturing methods; cold working; polishing; coatings; laser glass; acousto-optic glass; delay-line glass; transparent crystallized glass; phase separation; glass transition; and vitreous state. B.G.

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-28745# Argonne National Lab., Ill.
COMPARISON OF TOKAMAK BURN CYCLE OPTIONS
D. A. Ehst, J. N. Brooks, Y. Cha, K. Evans, Jr., A. M. Hassanein, S. Kim, S. Majumdar, B. Misra, and H. C. Stevens 1985 22 p Presented at the Workshop on Tokamak Start-UP: Problems and Scenarios Related To the Transient Phases of Long-Burn Operations, Erice, Italy, 14 Jul. 1985
(Contract W-31-109-eng-38)
(DE85-018393; CONF-850708-4) Avail: NTIS HC A02/MF A01

Experimental confirmation of noninductive current drive has spawned a number of suggestions as to how this technique can be used to extend the fusion burn period and improve the reactor prospects of tokamaks. Several distinct burn cycles, which employ various combinations of Ohmic and noninductive current generation, are possible, and we will study their relative costs and benefits for both a commercial reactor as well as an INTOR-class device. We begin with a review of the burn cycle options. DOE

N86-28746# Missouri Univ., Rolla. Dept. of Physics.
COLLISIONAL PROCESSES OF INTEREST IN MFE PLASMA RESEARCH Annual Report, 1 Oct. 1984 - 30 Sep. 1985
R. E. Olson 25 Oct. 1985 13 p
(Contract DE-FG02-84ER-53175)
(DE86-004412; DOE/ER-53175/2) Avail: NTIS HC A02/MF A01

Research on this grant can be divided into three general topics: (1) determination of electron capture cross sections between impurity ions and hydrogen atoms needed for diagnostic studies of magnetic fusion plasmas; (2) studies into reactions important in neutral beam ion source work; and (3) calculation of cross sections relevant to alpha particle transport. For topic (1) during last year, we completed cross section calculations for Al^{3+}, Al^{3+}, B^{3+}, Be^{2+}, Cr^{6+}, Sc^{3+} and V^{5+} on H using the molecular state approach for energies between 50 eV/u and 10 keV/u. For ion source work, collisional studies were completed for nuclear spin exchange of hydrogen in collision with the alkali atoms and for H^- negative ion formation in collision of H^0 with sodium and cesium. During the same period, we began to develop theoretical methods to handle collisions of impurity ions with neutral helium. Studies of Ar^{6+}, C^{6+}, C^{6+}, H^+ and O^{8+} colliding with He were completed. DOE

N86-28747# Texas Univ., Austin.
EXISTENCE AND CALCULATION OF SHARP BOUNDARY MHD EQUILIBRIUM IN THREE-DIMENSIONAL TOROIDAL GEOMETRY
H. L. Berk, J. P. Freidberg, X. Llobet, P. J. Morrison, and J. A. Tataronis Nov. 1985 28 p
(Contract DE-FG05-80ET-53088)
(DE86-004563; DOE/ET-53088/216; IFSR-216) Avail: NTIS HC A03/MF A01

The problem of sharp boundary, ideal magnetohydrodynamic equilibria in three-dimensional toroidal geometry is addressed. The sharp boundary, which separates a uniform pressure, current-free plasma from a vacuum, is determined by a magnetic surface of a given vacuum magnetic field. The pressure balance equation has the form of a Hamilton-Jacobi equation with a Hamiltonian that is quadratic in the momentum variables, which are the two covariant components of the magnetic field on the outer surface of the plasma. The condition of finding a unique solution on the outer surface is identical with finding phase space tori in nonlinear dynamics problems and the KAM theorem guarantees that such solutions exist. When tori exist, renormalized perturbation theory is used to calculate the properties of the magnetic field just outside the plasma. DOE

N86-28748# Oak Ridge National Lab., Tenn.
EFFECTS OF AN ALPHA PARTICLE SLOWING-DOWN DISTRIBUTION ON TOKAMAK BALLOONING MODES
D. A. Spong, D. E. Hastings, D. J. Sigmar, and W. A. Cooper Dec. 1985 32 p
(Contract DE-AC05-84OR-21400)
(DE86-004647; ORNL/TM-9688) Avail: NTIS HC A03/MF A01

Energetic trapped alpha particles interact through their precessional drift with high-mode-number ballooning modes in tokamaks. Due to the energy dependence of the precessional drift, the consequences of this interaction depend on the form of the alpha distribution function. Results are compared here for two forms of alpha distribution: a Maxwellian and a slowing-down distribution. The latter has a significantly greater influence on ballooning stability because of the larger fraction of particles in the energy range of the drift resonance. Also, due to the dependence on the critical velocity (- T sub e sup 1/2), the stability boundaries and growth rates now are strong functions of the background electron temperature T sub e . Parameters typical of tokamak breakeven experiments such as the Tokamak Fusion Test Reactor (TFTR) are considered. DOE

N86-28749# Texas Univ., Austin. Inst. for Fusion Studies.
ELECTROMAGNETIC SOLITARY VORTICES IN ROTATING PLASMA
J. Liu and W. Horton Dec. 1985 36 p
(Contract DE-FG05-80ET-53088)
(DE86-005400; DOE/ET-53088/214; IFSR-214) Avail: NTIS HC A03/MF A01

The nonlinear equations describing drift-Alfven solitary vortices in a low , rotating plasma are derived. Two types of solitary vortex solutions along with their corresponding nonlinear dispersion relations are obtained. Both solutions have the localized coherent dilopar structure. The first type of solution belongs to the family of the usual Rossby or drift wave vortex, while the second type of solution is intrinsic to the electromagnetic perturbation in a magnetized plasma and is a complicated structure. While the first type of vortex is a solution to a second order differential equation the second one is the solution of a fourth order differential equation intrinsic to the electromagnetic problem. The fourth order vortex solution has two intrinsic space scales in contrast to the single space scale of the previous drift vortex solution. With the second short scale length the parallel current density at the vortex interface becomes continuous. As special cases the rotational electron drift vortex and the rotational ballooning vortex also are given. DOE

N86-28750# Oak Ridge National Lab., Tenn.
PHYSICS EVALUATION OF COMPACT TOKAMAK IGNITION EXPERIMENTS
N. A. Uckan, W. A. Houlberg, and J. Sheffield 1985 9 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003806; CONF-851102-49) Avail: NTIS HC A02/MF A01

At present, several approaches for compact, high-field tokamak

ignition experiments are being considered. A comprehensive method for analyzing the potential physics operating regimes and plasma performance characteristics of such ignition experiments with O-D (analytic) and 1-1/2-D (WHIST) transport models is presented. The results from both calculations are in agreement and show that there are regimes in parameter space in which a class of small (R(sub o) approx. 1-2 m), high-field (B(sub o) approx. 8-13 T) tokamaks with aB(sub o sup 2/q sub *approx. 25 + or - 5 and kappa = b/a approx. 1.6-2.0 appears ignitable for a reasonable range of transport assumptions. Considering both the density and beta limits, an evaluation of the performance is presented for various forms of chi(sub e) and chi(sub i), including degradation at high power and sawtooth activity. The prospects of ohmic ignition are also examined. DOE

N86-28751# GA Technologies, Inc., San Diego, Calif.
SURVEY OF ECH MICROWAVE TECHNOLOGY
C. P. Moeller Nov. 1985 18 p Presented at the Course and Workshop on Applications of RF Waves to Tokamak Devices, Varenna, Italy, 5 Sep. 1985
(Contract DE-AC03-84ER-51044)
(DE86-004265; GA-A-18150; CONF-8509192-4) Avail: NTIS HC A02/MF A01

A survey is presented of the microwave transmission system and antenna technology that has been developed for electron cyclotron heating (ECH) experiments using gyrotron sources. It is concerned particularly with techniques that have been applied or are applicable to the heating of tokamak plasmas. DOE

N86-28752# Argonne National Lab., Ill.
LIFETIME ANALYSIS OF PLASMA SIDE COMPONENTS
R. F. Mattas Nov. 1985 15 p Presented at the Technical Committee on Lifetime Predictions for the First Wall and Blanket Structure of Fusion Reactors, Karlsruhe, West Germany, 5 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-005566; CONF-851183-1) Avail: NTIS HC A02/MF A01

A one-dimensional computer code (FLIP, Fusion Lifetime Prediction) has been developed to examine the lifetime of first wall and impurity control components. The code incorporates the operating and design parameters, the material characteristics, and the appropriate failure criteria for the individual components. The major emphasis of the modelling effort has been to calculate the temperature-stress-strain-radiation effects history of a component so that the synergistic effects between sputtering erosion, swelling, creep, fatigue, and crack growth can be examined. The general forms of the property equations are the same for all materials in order to provide the greatest flexibility for materials selection in the code. The code is capable of determining the behavior of a plate, composed of either a single or dual material structure, that is either totally constrained, or constrained from bending but not from expansion. The code has been utilized to analyze plasma side components for INTOR. DOE

N86-28753# Sandia National Labs., Albuquerque, N. Mex.
ADVANCES IN LIGHT ION BEAMS FOR INERTIAL CONFINEMENT FUSION
D. L. Cook, J. E. Maenchen, T. A. Mehlhorn, J. N. Olsen, T. J. Renk, C. L. Ruiz, R. Woodworth, J. P. Quintenz, S. A. Slutz, and R. J. Leeper 1985 20 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract DE-AC04-76DP-00789)
(DE86-005634; SAND-85-1851C; CONF-851053-8) Avail: NTIS HC A02/MF A01

The development of the Particle Beam Fusion Accelerator (PBFA I) is discussed. Key issues in intense beam generation and focusing are stated to be: (1) accelerator symmetry; (2) ion source initiation; (3) ion source purity and species control; (4) diode impedance behavior and control; (5) beam neutralization and transport; (6) beam diagnostics; and (7) predictive theoretical tools. Discussions of these topics are included. DOE

N86-28754# Lawrence Livermore National Lab., Calif.
COMPUTATIONAL PHYSICS PROGRAM OF THE NATIONAL MFE COMPUTER CENTER
A. A. Mirin Dec. 1985 48 p
(Contract W-7405-eng-48)
(DE86-005762; UCID-17530-85) Avail: NTIS HC A03/MF A01

The development of numerical models for plasma phenomena and magnetic confinement devices is discussed. The multidimensional Fokker-Planck and transport codes are applied to toroidal mirror and compact toroid devices. Linear and nonlinear resistive magnetohydrodynamics in two and three dimensions are used in the investigation of various fusion devices. DOE

N86-28755# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
WEAK DOUBLE LAYERS IN A CURRENT CARRYING PLASMA
Staffan Torven Nov. 1985 17 p Presented at Nordic Symposium on Nonlinear Plasma Waves, Riso, Sweden, Aug. 1985 Submitted for publication
(TRITA-EPP-85-08; ISSN-0348-7539; ESA-86-97032) Avail: NTIS HC A02/MF A01

The existence of weak electric double layers in a current carrying low density plasma is investigated for an electron distribution function of interest in triple plasma devices and Q-machines in double ended operation. In these devices the electron distribution function in the central plasma may be discontinuous since it is made up of contributions from two independent plasma sources. A time evolution equation for a weak double layer for the case of cold ions and a discontinuous electron distribution function is derived. The existence of stationary solutions describing a propagating double layer is demonstrated, and the amplitude of the double layer is found to be proportional to the jump in the electron distribution function at the point of discontinuity. ESA

N86-28756# Kiruna Geophysical Inst. (Sweden).
WAVES WITH FREQUENCIES BELOW THE PROTON GYROFREQUENCY IN A MULTICOMPONENT PLASMA
Tord Oscarsson and Mats Andre May 1985 26 p Prepared in cooperation with Umeaa Univ., Sweden
(KGI-Preprint-080; ISSN-0349-2656; ESA-86-97045) Avail: NTIS HC A03/MF A01

Waves below the proton gyrofrequency in a homogeneous, nonrelativistic multicomponent plasma in a uniform magnetic field are investigated. It is found that the introduction of a heavier ion species into a proton-electron plasma can make the plasma become absolutely unstable more easily. It is shown that the effects of warm plasma on the propagation properties of the waves are neglected in a standard approximation and hence it gives erroneous results in absolutely unstable plasmas. The effects of warm plasma on the mode structure are examined. Most often the large scale structure is not affected, but there are cases where left-hand polarized waves are found in frequency ranges above a heavy ion gyrofrequency, where there is a stop band in the corresponding cool plasma. ESA

N86-28757# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
THE MHD POWER RADIATED BY A LARGE CONDUCTOR IN MOTION THROUGH A MAGNETOPLASMA
M. Dobrowolny Apr. 1985 24 p
(IFSI-85-4; ESA-86-97088) Avail: NTIS HC A02/MF A01

The theory of radiation from a conductor of finite dimensions in motion through a magnetoplasma is developed. The theory, as applied to magnetohydrodynamic frequencies, produces quantitatively the concept of Alfven wings. Estimates of power radiated in Alfven waves are revised, and a physical interpretation of the formal result is given. Results are applied to the case of long conducting tethers in motion through the ionosphere. For tethered satellites, low powers (1W) radiated into the ionosphere are predicted. ESA

N86-28758# Oak Ridge National Lab., Tenn.
DESIGN FEATURES OF THE ELMO BUMPY SQUARE
W. E. Bryan 1985 5 p Presented at conference
(Contract DE-AS05-84OR-21400)
(TI86-003811; CONF-851102-39) Avail: NTIS HC A02/MF A01

The ELMO Bumpy Square (EBS) is an improved version of a bumpy torus. The purposes of the experiment are: to improve the physics of confinement in toroidal systems by developing the concepts of stabilization of instabilities using the effects of energetic electron populations and reduction of thermal losses using magnetic and electric fields to control particle drifts, and to develop bumpy toroid devices as fusion reactor candidates attractive in their own right. Several advanced bumpy torus configurations were studied in detail to identify concepts that offer potential for enchanced performance over the ELMO BUMPY Torus (EBT) configuration and offer favorable reactor extrapolations. The bumpy square is the most suitable configuration to test in that it is a rebuilding, into a square geometry, of the existing EBT device and the only configuration that has attractive behavior both at the scale of EBT and at the reactor scale. The EBT is formed by four linear arrays of simple magnetic mirrors linked by the four high-field toroidal solenoid (corners). The configuration is such that the straight sides of the square are constructed from the existing EBT mirror coils (four coils per side), and each corner is formed by eight new half-size EBT coils that generate high fields with negligible field ripple in the corners. Author

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-28759*# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.
THEORETICAL STUDY OF THE TRANSVERSE DIELECTRIC CONSTANT OF SUPERLATTICES AND THEIR ALLOYS Ph.D Thesis
Keith Brian Kahan Aug. 1986 95 p
(Grant NAG3-507)
(NASA-CR-177198; NAS 1.26:177198; UILU-ENG-86-2221) Avail: NTIS HC A05/MF A01 CSCL 20L

The optical properties of III to V binary and ternary compounds and GaAs-Al(x)Ga(1-x)As superlattices are determined by calculating the real and imaginary parts of the transverse dielectric constant. Emphasis is given to determining the influence of different material and superlattice parameters on the values of the index of refraction and absorption coefficient. In order to calculate the optical properties of a material, it is necessary to compute its electronic band structure. This was accomplished by introducing a partition band structure approach based on a combination of the vector k x vector p and nonlocal pseudopotential techniques. The advantages of this approach are that it is accurate, computationally fast, analytical, and flexible. These last two properties enable incorporation of additional effects into the model, such as disorder scattering, which occurs for alloy materials and excitons. Furthermore, the model is easily extended to more complex structures, for example multiple quantum wells and superlattices. The results for the transverse dielectric constant and absorption coefficient of bulk III to V compounds compare well with other one-electron band structure models and the calculations show that for small frequencies, the index of refraction is determined mainly by the contibution of the outer regions of the Brillouin zone. Author

N86-28760* National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD OF MAKING MACROCRYSTALLINE OR SINGLE CRYSTAL SEMICONDUCTOR MATERIAL Patent
Paul J. Shlichta, inventor (to NASA) and R. James Holliday, inventor (to NASA) Issued 24 Jun. 1986 4 p Filed 10 Feb. 1983
Supersedes N83-21993 (21 - 11, p 1796)
(NASA-Case-NPO-15904-1; US-Patent-4,596,626; US-Patent-Appl-SN-465369; US-Patent-Class-156-610; US-Patent-Class-156-DIG.88; US-Patent-Class-156-624) Avail: US Patent and Trademark Office CSCL 20L

A macrocrystalline or single crystal semiconductive material is formed from a primary substrate including a single crystal or several very large crystals of a relatively low melting material. This primary substrate is deposited on a base such as steel or ceramic, and it may be formed from such metals as zinc, cadmium, germanium, aluminum, tin, lead, copper, brass, magnesium silicide, or magnesium stannide. These materials generally have a melting point below about 1000 C and form on the base crystals the size of fingernails or greater. The primary substrate has an epitaxial relationship with a subsequently applied layer of material, and because of this epitaxial relationship, the material deposited on the primary substrate will have essentially the same crystal size as the crystals in the primary substrate. If required, successive layers are formed, each of a material which has an epitaxial relationship with the previously deposited layer, until a layer is formed which has an epitaxial relationship with the semiconductive material. This layer is referred to as the epitaxial substrate, and its crystals serve as sites for the growth of large crystals of semiconductive material. The primary substrate is passivated to remove or otherwise convert it into a stable or nonreactive state prior to deposition of the seconductive material.

Official Gazette of the U.S. Patent and Trademark Office

N86-28761# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
THERMODYNAMICALLY STABLE METAL/III-V COMPOUND-SEMICONDUCTOR INTERFACES
R. S. Williams, Jeffrey R. Lince, C. T. Tsai, and John H. Pugh 28 Feb. 1986 8 p
(Contract N00014-83-K-0612)
(AD-A165597; TR-13) Avail: NTIS HC A02/MF A01 CSCL 07/4

Chemical reactions that occur at a metal/III-V compound-semiconductor interface should be minimized if the change in Gibbs free energy of the bulk materials with respect to any possible reaction products is positive. However, the large positive change in entropy caused by vaporization of the highly volatile group V elements is a very important contribution to the Gibbs free energy of these systems, especially at higher temperatures. Thus, a particular metal/III-V compound-semiconductor interface may be thermodynamically stable at one temperature, but unstable with respect to sublimation of elemental group V species at a higher temperature if the enthalpy change for the reaction is positive. Examination of bulk phase diagrams makes it possible to rationalize the reaction products observed and to predict which will be the most stable interface for any particular metal/III-V system. GRA

N86-28762# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
SOLID STATE RESEARCH Quarterly Technical Report, 1 Feb. - 30 Apr. 1985
Alan L. McWhorter 15 May 1985 69 p
(Contract F19628-85-C-0002)
(AD-A165692; Rept-1985:; Rept-2; ESD-TR-85-214) Avail: NTIS HC A04/MF A01 CSCL 20/12

The topics covered are solid state device research, quantum electronics, materials research, microelectronics, and analog device technology. GRA

N86-28763# Massachusetts Inst. of Tech., Lexington.
InP MATERIALS Annual Technical Summary Report, 1 Oct. 1984 - 30 Sep. 1985
Gerald W. Iseler 30 Sep. 1985 31 p
(Contract F19628-85-C-0002)
(AD-A165706; ESD-TR-85-316) Avail: NTIS HC A03/MF A01 CSCL 20/12

This report covers the work on InP materials carried out with the support of the Department of the Air Force during the period 1 October 1984 through 30 September 1985. A part of this support

was provided by the Rome Air Development Center. The probability of twinning in LEC growth of InP was found to be much higher for the <100> orientation that for the <111>. An optical absorption technique is being developed for estimating the residual impurity concentration in semi-insulating Fedoped InP. It has been shown that V in InP behaves as a deep donor located approx. 0.2 eV above the valence band. GRA

N86-28764# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
DIFFUSION AND DEFECT CHARACTERIZATION STUDIES OF MERCURY CADMIUM TELLURIDE Semiannual Progress Report, 1 Aug. 1985 - 31 Jan.
D. A. Stevenson 31 Jan. 1986 4 p
(Contract N00014-84-K-0423; ARPA Order 5019)
(AD-A165813) Avail: NTIS HC A02/MF A01 CSCL 20/2

During the last six month period, progress has continued on the two major areas of this program: diffusion studies in Mercury Cadmium Telluride (MCT); and growth studies in MCT. The diffusion studies have emphasized the question of multiple and distinct Hg profiles in self-diffusion and the Kirkendall effect for interdiffusion. The growth studies have concerned the relation between the surface morphology of epitaxial layers and the substrate orientation, the development of new Hg rich liquid phase epitaxial growth method, and a continuation of an electrochemical of thermodynamic properties of MCT and related binary compounds. GRA

N86-28765# Modena Univ. (Italy).
MONTE CARLO ANALYSIS OF QUANTUM TRANSPORT AND FLUCTUATIONS IN SEMICONDUCTORS Final Technical Report, Apr. 1983 - Jul. 1985
Carlo Jacoboni 18 Feb. 1986 146 p
(Contracts DAJA45-83-C-0039; DA Proj. 1T1-61102-BH-57)
(AD-A165843; R/D-4260-EE) Avail: NTIS HC A07/MF A01 CSCL 20/12

Technical matter related to research performed on two different subjects is presented. The first part concerns quantum transport in semiconductors. A unified review of the work already published in the literature is given together with some attempts to generalize Monte Carlo methods relating to quantum transport within the Liouville formulation. The second part concerns fluctuations of carrier velocities and energies both in stationary and transient regime, described by means of the correlation-function method. An analysis of the results, obtained through a Monte Carlo procedure, for covalent and polar materials yields a deep physical picture of the effect of the scattering mechanisms (phonon and carrier-carrier interactions) on transport properties. GRA

N86-28766# Los Alamos National Lab., N. Mex.
EFFECTIVE-CLUSTER SIMULATIONS OF POLYCRYSTAL PLASTICITY
U. F. Kocks, C. Tome, and G. R. Canova 1985 9 p Presented at the International Conference on Physical Basis and Modelling of Finite Deformation of Aggregates, Paris, France, 30 Sep. - 2 Oct. 1985
(Contract W-7405-eng-36)
(DE85-014081; LA-UR-85-2221; CONF-8509112-1) Avail: NTIS HC A02/MF A01

A model is proposed in which each grain, representative of a certain orientation and strength, is embedded in a thin shell of plastic effective medium; this assembly is called an effective cluster. For each grain the plastic strain increment is chosen such that the yield surface of the effective cluster gives the macroscopic stress. The results differ from uniform-strain theories only in some cases, such as in the compression of f. c. c. polycrystals, where grain curling occurs. DOE

N86-28767# California Univ., Berkeley. Lawrence Berkeley Lab.
GROWTH OF (110) GaAs/GaAs BY MOLECULAR BEAM EPITAXY
L. T. Parechanian, E. R. Weber, and T. L. Hierl Apr. 1985 9 p Presented at the Materials Research Society Spring Conference, San Francisco, Calif., 15-18 Apr. 1985
(Contract DE-AC03-76SF-00098)
(DE86-005215; LBL-19743) Avail: NTIS HC A02/MF A01

The simultaneous molecular beam epitaxy (MBE) growth of (100) and (110) GaAs/GaAs intentionally doped with Si(-1E16/cu cm) was studied as a function of substrate temperature, arsenic overpressure, and epitaxial growth rate. The films were analyzed by scanning electron and optical microscopy, liquid helium photoluminescence (PL), and electronic characterization. For the (110) epitaxial layers, an increase in morphological defect density and degradation of PL signal was observed with a lowering of the substrate temperature from 570 C. Capacitance-voltage (CV) and Hall effect measurements yield room temperature donor concentrations for the (100) films of n-7E15/ cu cm while the (110) layers exhibit electron concentrations of n-2E17/cu cm. Hall measurements at 77k on the (100) films show the expected mobility enhancement of Si donors, whereas the (110) epi layers become insulating or greatly compensated. This behavior suggests that room temperature conduction in the (110) films is due to a deeper donor partially compensated by an acceptor level whose concentration is of the smae order of magnitude as that of any electrically active Si. Temperature dependent Hall effect indicates that the activation energy of the deeper donor level lies -145 meV from the conduction band. Author

N86-28768# Argonne National Lab., Ill.
ION IMPLANTATION AT ELEVATED TEMPERATURES
N. Q. Lam and G. K. Leaf Nov. 1985 8 p Presented at the Materials Research Society Meeting. Boston, Mass., 2 Dec. 1985
(Contract W-31-109-eng-38)
(DE86-005537; CONF-851217-31) Avail: NTIS HC A02/MF A01

A kinetic model has been developed to investigate the synergistic effects of radiation-enhanced diffusion, radiation-induced segregation and preferential sputtering on the spatial redistribution of implanted solutes during implantation at elevated temperatures. Sample calculations were performed for Al(+) and Si(+) ions implanted into Ni. With the present model, the influence of various implantation parameters on the evolution of implant concentration profiles could be examined in detail. DOE

N86-28769# Argonne National Lab., Ill.
ELECTRICAL RESISTIVITY OF Au-Cr SUPERLATTICES
M. B. Brodsky, C. H. Sowers, and L. R. Sill Dec. 1985 6 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract W-31-109-eng-38)
(DE86-005539; CONF-851217-28) Avail: NTIS HC A02/MF A01

Superlattices of Au-Cr with Au:Cr = 2:1 have been prepared. Their electrical resistivities have been measured between 0.3 to 300 K. Whereas simple rho-T behavior was found for lambda = 30, 51, 90 and 150 A, complicated behavior similar to magnetic ordering is found for lambda = 45 A. No correlation is observed with the extremum wavelength for phonon velocities - a maximum occurs at 75 A - unlike that found for most metallic superlattices. DOE

N86-28770# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
IN-SITU STUDY OF CASCADE DEFECTS IN SILVER BY SIMULTANEOUS TRANSMISSION ELECTRON MICROSCOPY AND ELECTRICAL RESISTIVITY MEASUREMENTS AT LOW TEMPERATURES
K. Haga, W. E. King (Argonne National Lab., Ill.), K. L. Merkle, and M. Meshii Dec. 1985 32 p Presented at the TMS/AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-005561; CONF-8510168-7) Avail: NTIS HC A03/MF A01

A helium-cooled double-tilt specimen stage for transmission electron microscopy (TEM) with the capability of simultaneous electrical resistivity measurements was constructed and used to study defect-production, migration, clustering and recovery processes in ion-irradiated silver. Vacuum-evaporated thin film

specimens were irradiated with 1 MeV Kr (+) -ions up to a dose of 4.0 x 10^{16} ions/cm^2, at T = 10^0K in the microscope, using the HVEM-tandem accelerator ion beam interface system in the Argonne National Laboratory Electron Microscopy Center. Cascade defect formation during ion bombardment at the low temperature was directly observed both by TEM and electrical resistivity measurements. Ion bombardment created groups of defect clusters with strong strain fields which gave rise to TEM contrast. The specimen resistivity was increased by 16% during the irradiation. Subsequent microstructural changes and resistivity recovery during isochronal annealing were monitored up to room temperature. 58.3% of the irradiation induced resistivity was recovered, while significant reduction in the size of black spot defect clusters was observed by TEM. A small fraction of clusters disappeared, while no nucleation of new defect clusters was observed. DOE

N86-28771# Northwestern Univ., Evanston, Ill.
ELECTRONIC AND STRUCTURAL PROPERTIES OF SEMICONDUCTOR HETEROJUNCTIONS Technical Progress Report, 1 Jul. - 15 Dec. 1985
Y. W. Chung Dec. 1985 13 p
(Contract DE-FG02-85ER-45216)
(DE86-005707; DOE/ER-45216/T1) Avail: NTIS HC A02/MF A01

We successfully developed a procedure for preparation of clean, ordered and stoichiometric CdTe(110) single crystal surfaces. The stoichiometry was verified by polar-angle-resolved X-ray photoemission. Two evaporators were constructed permitting sequential metal (Sn, Ag or Al) and CdTe deposition in the same ultrahigh vacuum chamber. A preliminary run was performed on the deposition of 10 A gray Sn on CdTe. Angle-resolved photoemission showed that the Sn/CdTe interface is close to atomically abrupt. A simplex optimization algorithm was implemented in Pascal so that it is now possible to extract detailed profile information non-destructively from angle-resolved XPS data. Theoretical calculations showed the excellent sensitivity of this technique to composition profile changes. DOE

N86-28772# Los Alamos National Lab., N. Mex.
SPACE-TIME COMPLEXITY IN SOLID STATE MODELS
A. R. Bishop 1985 12 p Presented at the 9th Gwatt Meeting of the Swiss National Science Foundation, Gwatt, Switzerland, 17 Oct. 1985
(Contract W-7405-eng-36)
(DE86-006032; LA-UR-86-269; CONF-8510267-1) Avail: NTIS HC A02/MF A01

In this workshop on symmetry breaking it is appropriate to include the evolving fields of nonlinear-nonequilibrium systems in which transitions to and between various degrees of complexity (including chaos) occur in time or space or both. These notions naturally bring together phenomena of pattern formation and chaos and therefore have ramifications for a huge array of natural sciences: astrophysics, plasmas and lasers, hydrodynamics, field theory, materials, and solid state theory, optics and electronics, biology, pattern recognition and evolution, etc. The particular concern here are with examples from solid state and condensed matter. DOE

N86-28773# United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
EFFECTS OF SPACE RADIATION ON ADVANCED SEMICONDUCTOR DEVICES. PART 4: A STUDY OF THE LET OF FISSION PARTICLES EMITTED BY Cf252 Final Report
T. K. Sanderson, D. Mapper, J. H. Stephen, and J. Farren Jul. 1985 45 p
(Contract ESTEC-4963/81-NL-MS)
(AERE-R-11709-Pt-4; ESA-CR(P)-2165; ESA-86-96865) Avail: NTIS HC A03/MF A01

It is demonstrated that Cf 252 fission particles have a high linear energy transfer (LET) in aluminum. Investigations of the behavior of the LET with decreasing energy show that the Northcliffe and Schilling (1970) data is the most suitable for predicting the behavior of fission particles in light, solid absorber. It is confirmed that the mean masses, energies, and atomic numbers adopted for the representative ions of the two fission fragment groups can be used to predict their overall behavior. It is shown that the mean LET of Cf 252 fission particles can be reduced to 20 MeV/mg sq cm and so possibly provide a wider application of the Cf 252 source for single event testing. However, a further reduction of the LET is presents practical problems. The limited range of the ions and the presence of passivation and dead layers would restrict the use of absorbers in single event upset testing with fission particles. ESA

N86-28774# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
ABSOLUTE PHOTOYIELD MEASUREMENTS ON METAL-SEMICONDUCTOR DETECTORS
Birgitta Larsson Jan. 1986 31 p In SWEDISH; ENGLISH summary
(FOA-C-30412-E1,E3; ISSN-0347-3708; ESA-86-97039) Avail: NTIS HC A03/MF A01; Research Institute of National Defence, Stockholm, KR 50

Measurements were performed on semiconductor structures with palladium, palladium silicide, platinum, and gold as metal layers on p-type silicon. The best photoyield is measured for 500 A palladium on p-type silicon: 0.09% at a wavelength of 2 micrometers. The platinum detector does not show such a linear relation as the Pd detector: different barrier heights are noted. The gold detector shows an impedance which was practically a capacitance. ESA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-28775*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
UNIVERSALITY IN THE COMPRESSIVE BEHAVIOR OF SOLIDS
Pascal Vinet, John Ferrante, John R. Smith (General Motors Research Labs., Warren, Mich.), and James H. Rose (Iowa State Univ. of Science and Technology, Ames.) Apr. 1986 11 p
(NASA-TM-87303; E-2702-1; NAS 1.15:87303) Avail: NTIS HC A02/MF A01 CSCL 08M

It was discovered that the isothermal equation of state for solids in compression is a simple, universal form. This single form accurately describes the pressure and bulk modulus as a function of volume for tonic, metallic, covalent, and rare gas solids. Author

N86-28776*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEMPERATURE EFFECTS ON THE UNIVERSAL EQUATION OF STATE OF SOLIDS
Pascal Vinet, John Ferrante, John R. Smith (General Motors Research Labs., Warren, Mich.), and James H. Rose (Iowa State Univ. of Science and Technology, Ames.) Apr. 1986 29 p
(NASA-TM-87321; E-3001; NAS 1.15:87321) Avail: NTIS HC A03/MF A01 CSCL 08M

Recently it has been argued based on theoretical calculations and experimental data that there is a universal form for the equation of state of solids. This observation was restricted to the range of temperatures and pressures such that there are no phase transitions. The use of this universal relation to estimate pressure-volume relations (i.e., isotherms) required three input parameters at each fixed temperature. It is shown that for many solids the input data needed to predict high temperature thermodynamical properties can be dramatically reduced. In particular, only four numbers are needed: (1) the zero pressure (P=0) isothermal bulk

modulus; (2)it P=0 pressure derivative; (3) the P=0 volume; and (4) the P=0 thermal expansion; all evaluated at a single (reference) temperature. Explicit predictions are made for the high temperature isotherms, the thermal expansion as a function of temperature, and the temperature variation of the isothermal bulk modulus and its pressure derivative. These predictions are tested using experimental data for three representative solids: gold, sodium chloride, and xenon. Good agreement between theory and experiment is found. Author

N86-28777# Johns Hopkins Univ., Baltimore, Md. Dept. of Physics and Astronomy.
RESEARCH IN THEORETICAL PHYSICS Annual Progress Report, 1 Apr. 1985 - 31 Mar. 1986
G. Domokos and S. Koevesi-Domokos Nov. 1985 12 p
(Contract DE-FG02-85ER-40211)
(DE86-005504; DOE/ER-40211/1) Avail: NTIS HC A02/MF A01

Research on dynamical symmetry breaking shows a definite pattern of breakdown: a strong version of Michel's conjecture is valid. Signatures of high energy structures can be searched for in e^+e^- annihilation: formulae are given in order to analyze experiments for existence of heavy vector mesons or anomalous interactions. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-28778# National Academy of Sciences - National Research Council, Washington, D. C.
MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION: A RESEARCH AGENDA Final Report
1985 100 p Sponsored by National Inst. of Education
(Contract NIE-400-83-0059)
(PB86-160942) Avail: NTIS HC A05/MF A01 CSCL 05A

An agenda for research in mathematics, science, and technology education that will contribute to understanding the causes of and ameliorating current deficiencies in these areas is presented. Recommendations are made in four broad categories: research on the development of reasoning skills; research that facilitates increasing the amount of quality learning time through better instruction; research that facilitates increasing quality learning time through better settings for learning; and research that facilitates increasing quality learning time through the development of new learning systems. GRA

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-28779# Defense Technical Information Center, Alexandria, Va.
HOW EBENEZER SCROOGE AND PETER DRUCKER ARE HELPING SHAPE DOD'S SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM
Richard D. Douglas 1985 5 p
(AD-A165640) Avail: NTIS HC A02/MF A01 CSCL 05/1

This paper is about developing a long range plan for the Defense Technical Information Center (DTIC). That plan, DTIC 2000 - A Corporate Plan for the Future, was published in July 1984. This paper highlights the methodology used to develop the plan. It also outlines an anticipated future information environment in which the Center will operate. Additionally, it displays the long range Scientific and Technical Information Program (STIP) goals which were developed for DTIC in the planning process. Before developing the plan, the group researched many planning and management reference sources. Two of these were particularly helpful in determining the planning methodology used to develop DTIC 2000. One key reference was written by Peter Drucker (Management: Tasks, Responsibilites, Practices), a recognized authority in the field of planning and management. The other key reference was from an unexpected source and author A Christmas Carol by Charles Dickens. Drucker's advice to long range planners closely parallels insights presented by Dickens in his Christmas story. GRA

N86-28780# Applied Science Associates, Inc., Valencia, Pa.
COST AND INFORMATION EFFECTIVENESS ANALYSIS. VOLUME 1: IMPROVED METHODOLOGY Final Report, Feb. 1981 - Jun. 1982
John K. Hawley, Bryan E. Brett, and William A. Chapman Jan. 1986 209 p
(Contracts MDA903-80-C-0212; DA Proj. 2Q2-63743-A-794)
(AD-A165844; ARI-RN-86-04) Avail: NTIS HC A10/MF A01 CSCL 14/1

Presented are the results of an effort to develop an improved methodology for the conduct of Cost and Information Effectiveness Analysis (CIEA). CIEA is a methodology for the evaluation of training device performance assessment capabilities (D-PACs). It is directed at the problem of determining when the worth of performance status information available from a D-PAC offsets the costs required to develop, operate, and maintain the capability. Such a determination may be needed in order to specify requirements for a D-PAC, or as a basis for deciding between two or more D-PAC design options intended to satisfy prespecified requirements. Following the introductory section, a review of objective procedures for the assessment of information worth is presented. An objective method for information worth evaluation based upon the use of Combat Simulation Models (CSMs) is then explored in detail. The results of this evaluation indicated that a CSM-based CIEA procedure, while technically feasible, is not practical. The report presents results from a series of formative tryouts of alternative multiattribute utility measurement (MAUM) procedures for the conduct of CIEA. Based upon these empirical results, recommendations for an improved MAUM-based CIEA methodology are made. GRA

N86-28781# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. des Systemes Balistiques et Spatiaux.
BASIC RULES TO DEVELOP AND IMPLEMENT COMPLEX SYSTEMS [REGLES ESSENTIELLES DE LA CONDUITE DU DEVELOPPEMENT ET DE LA REALISATION DE SYSTEMES COMPLEXES]
P. Merian 1986 10 p In FRENCH Presented at ESTORIL, Portugal, 17-21 Jun. 1985
(SNIAS-861-422-102; ESA-86-97159) Avail: NTIS HC A02/MF A01

Rules concerning the overall management of large ballistic or space projects characterized by the participation of many industrial partners or subcontractors are discussed. Product requirements; technical specifications; the design phase; material and software constituents; quality, reliability, safety, and maintenance; and cost requirements are considered. ESA

N86-28782# National Bureau of Standards, Gaithersburg, Md. Center for Chemical Physics.
TECHNICAL ACTIVITIES 1985, CENTER FOR CHEMICAL PHYSICS
P. Ausloos Dec. 1985 357 p
(PB86-147336; NBSIR-85/3257) Avail: NTIS HC A16/MF A01 CSCL 07D

Research projects, measurement method development, testing and data evaluation activities carried out during FY-85 in the National Bureau of Standards Center for Chemical Physics are summarized. These activities fall in the areas of surface science, chemical kinetics, chemical thermodynamics, and molecular spectroscopy. GRA

N86-28783# Mohawk Research Corp., Lake Forest, Ill.
FINANCING APPLIED R AND D IN SMALLER COMPANIES
M. L. Rorke, H. C. Livesay, H. Kierulff, and A. Ramseur Oct.

1985 14 p
(PB86-196987) Avail: NTIS HC $11.50/MF A01 CSCL 05A

The authors have been interested in the issues surrounding financing for small firms since 1977. This series of research projects conducted in the U.S. and abroad included a series of workshops held in the period 1982 to 84. These workshops involved a broad spectrum of financiers ranging from passive investors of small amounts of money to professional venture capital firms investing millions of dollars in syndication with other venture capital firms. GRA

N86-28784# National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
PROJECT SUMMARIES, FY 1985
Sep. 1985 80 p
(PB86-183589; NSF-85-324) Avail: NTIS HC A05/MF A01 CSCL 05A

Included are summaries of over 75 projects that were in work during FY 1985 in the National Science Foundation's Division of Science Resources Studies. These projects concern the collection, interpretation, and analysis of data on characteristics, education, and employment of human resources (scientists, engineers, and techicians); on government, industry, and university funding of science and technology; on outputs and impacts of science and technology resources; and on international science and technology. Summaries include information on objectives, findings, methodology, authorship, and availability of resulting publications. The Project Summaries report is published annually. GRA

N86-28785# Farrell Lines, Inc., N.Y.
MICROCOMPUTER-BASED COST ANALYSIS SYSTEM. VOLUME 2: TRAINING TUTORIAL Report, Oct. 1982 - Jan. 1985
L. Smith and N. F. Kondas Nov. 1985 64 p Sponsored by Maritime Administration Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, Mass.
(PB86-181948; MA-RD-770-85041-Vol-2) Avail: NTIS HC A04/MF A01; also available in set of 3 reports HC E99 as PB86-181922 CSCL 05A

A project to develop an overall corporate cost accounting and planning system having four main objectives is discussed. The objectives are: to create productivity standards and cost accountability at the local level by implementing an automated weekly cost reporting system; to capture detailed intermodal transportation cost and summarize cost and recovery to help tariff making and cost control; to use the automated cost reporting system data base to improve accuracy and timeliness of preparation of corporate financial statements; and to create matrices of intermodal through unit costs for flexible freight solicitation decision making. GRA

N86-28786# Farrell Lines, Inc., N.Y.
MICROCOMPUTER-BASED COST ANALYSIS SYSTEM. VOLUME 3: USERS GUIDE Report, Oct. 1982 - Jan. 1985
L. Smith and N. F. Kondas Nov. 1985 107 p Sponsored by Maritime Administration Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, Mass.
(PB86-181955; MA-RD-770-85042-Vol-3) Avail: NTIS HC A06/MF A01; also available in set of 3 reports HC E99 as PB86-181922 CSCL 05A

A project to develop an overall corporate cost accounting and planning system is discussed. It has four main objectives: to create productivity standards and cost accountability at the local level by implementing and automated weekly cost reporting system; and to capture detailed intermodal transportation cost and summarize cost and recovery to help tariff making and cost control; to use the automated cost reporting system data base to improve accuracy and timeliness of preparation of corporate financial statement; and to create matrices of intermodal through unit costs for flexible freight solicitation decision making. A user's guide is provided. GRA

N86-28787# National Technical Information Service, Springfield, Va. Office of International Affairs.
TECHNICAL INFORMATION APPROPRIATE FOR DEVELOPING COUNTRIES: SELECTED ABSTRACTS FROM THE NTIS (NATIONAL TECHNICAL INFORMATION SERVICE) DATABASE, 1982-1984 SUPPLEMENT, JANUARY 1986
S. D. Tenney and E. Carroll Jan. 1986 341 p Sponsored by Agency for International Development
(PB86-122058) Avail: NTIS HC A04/MF A01 CSCL 05A

Documentation was created to support the transfer of technology to developing countries. NTIS performed a search of its database for reports placed into the system between 1982 to 1984 which were determined to be useful in the developing world. The 1986 edition lists over 2500 citations with abstracts and should be read in conjunction with the 1983 edition of the Bibliography of Appropriate Technology Information for Developing Countries (PB83-113852). Citations were selected for their applicability to local development problems in the Third World. The technology chosen can be adapted and applied to help solve development problems and foster self-reliance among low income groups. Categories cover low and intermediate technologies, labor-intensive technologies, social and management technologies and selected modern technologies. A number of management planning reports are included to assist planning in the countries involved. It was developed for use by business and industry, extension centers, research and educational institutions and consultants and policy planners. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N86-28788* National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS
Jul. 1986 52 p
(NASA-SP-7039(29)-Sect-1; NAS 1.21:7039(29)-Sect-1) Avail: NTIS HC A04 CSCL 05B

Abstracts are provided for 115 patents and patent applications entered into the NASA scientific and technical information system during the period January 1986 through June 1986. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent application. Author

N86-28789* National Aeronautics and Space Administration, Washington, D.C.
NASA PATENT ABSTRACTS BIBLIOGRAPHY. A CONTINUING BIBLIOGRAPHY. SECTION 2: INDEXES (SUPPLEMENT 29)
Jul. 1986 483 p
(NASA-SP-7039(29)-Sect-2; NAS 1.21:7039(29)-Sect-2) Avail: NTIS HC A21 CSCL 05B

Entries for over 4400 patents and patent applications citations for the period May 1969 through June 1986 are listed. Subject, invention, source, number, and accession number indexes are included. B.G.

N86-28790# Fondazione Ugo Bordoni, Rome (Italy).
A FIRST APPROACH TO THE IMPLEMENTATION OF DATA BASE INTERROGATION BY NATURAL LANGUAGE [UN PRIMO APPROCCIO ALLA REALIZZAZIONE DI UN SISTEMA PER LINTERROGAZIONE DI UNA BASE DI DATI MEDIANTE LINGUAGGIO NATURALE]
Andrea DiCarlo Aug. 1985 44 p In ITALIAN
(FUB-16-1985; ESA-86-97083) Avail: NTIS HC A03/MF A01

A telephone directory automatic voice answering system is studied using flexible parsing techniques. The syntax and semantics of language phrases in which words do not follow a fixed order are analyzed. A semantic grammar is developed and a nondetermi-

nistic processor is used for the recognition of the interrogation. The principles of an answer generator based on a template grammar are described. The resulting system has applications in the study of problems in man-machine interactions. ESA

N86-28791# Societe Nationale Industrielle Aerospatiale, Paris (France).
TECHNICAL DOCUMENTS [LA DOCUMENTATION TECHNIQUE]
V. Ploix 1986 17 p In FRENCH
(SNIAS-861-320-103; ESA-86-97157) Avail: NTIS HC A02/MF A01

The technical documents that go along with a product are discussed in order to emphasize their importance in personnel development and training. ESA

N86-28792# Institute of Gas Technology, Chicago, Ill.
ON-LINE INTERACTIVE DATABASE FOR THE STORAGE AND RAPID INFORMATION RETRIEVAL OF GAS INDUSTRY DATA
Judson J. Kruse, Carl D. Landahl, and Donald L. Klass 1985 12 p Presented at the Personal Computer Applications in the Gas Industry Conference, Rosemont, Ill., 15-17 Jul. 1985
(TI86-900895; CONF-8507111-1) Avail: NTIS HC A02/MF A01

GasLine is an on-line interactive database for the storage and rapid information retrieval of archival-type gas industry data. It is the first database of its kind dedicated to serving the gas industry with archival information. Several years of Gas Abstracts are already on-line and Energy Statistics will be available shortly. One of the features of gasLine is the availability of both textual and numerical data. Overall, a broad scope of information, much of which is not given wide distribution, will be made readily available on gasLine. GasLine will be available via TYMNET telecommunications. Benefits to the gas industry are far-ranging and can have a major impact in the areas of marketing, operations, finance, research, engineering, legal, regulatory, and policy functions. GasLine will be available for direct access by information specialists as well as other end users. Usage of gasLine is expected to result in higher individual productivity and greater efficiency of information and data manipulation and analysis. The best benefits are the combination of retrieval of need information almost instantaneously, and its strategic application. This is the essence of the time value of information which is likened to the time value of money or capital. Author

N86-28793# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Technical Information Panel.
THE VALUE OF INFORMATION AS AN INTEGRAL PART OF AEROSPACE AND DEFENCE R AND D PROGRAMMES
Loughton, England Jan. 1986 96 p Meeting held in Cheltenham, England, 4-5 Sep. 1985
(AGARD-CP-385; ISBN-92-835-0389-9) Avail: NTIS HC A05/MF A01

The management and use of scientific and technical information in the R and D process is examined from the perspective of policy makers, program managers, and researchers. Aspects considered at the meeting included the need to incorporate information as an integral part of the R and D process, the value of information in reducing the cost and preventing the duplication of research, improvements in the sharing of information resources among the NATO countries, and requirements for the future. For individual titles, see N86-28794 through N86-28803.

N86-28794# British Aerospace Public Ltd. Co., Weybridge (England). Divisional Technical Directorate.
THE POLICY MAKER LOOKS AT INFORMATION
J. B. Scott-Wilson and J. P. Hasinski *In its* The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 9 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

The policy making heirarchy within British Aerospace is described and the information routes to and from an intermediate level policy maker (Divisional Technical Director) are examined. The information paths for two typical research projects are considered as examples: the use of aluminum/lithium alloys as structural materials and the initiation and development of a new aircraft project. Information quality and the use of automated techniques by policy makers are also discussed. M.G.

N86-28795# NATO Integrated Communications System Management Agency, Brussels (Belgium).
A PROGRAMME MANAGER'S NEEDS FOR INFORMATION
I. Mason-Smith *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 8 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

The underlying basis for the information need of the program manager within the NATO Integrated Communications System Agency (NICSMA) is examined in some detail, in terms of the role of that agency as exemplified by its current charter. The various specific needs of the program planner working within this framework are then identified and critically reviewed. Finally, the paper notes the expanding role of the remodelled agency (NACISA) to include the development of both communications and information systems for NATO; in this context, the urgent need to re-examine the basic information requirements of the Agency is encouraged and proposals sought. Author

N86-28796# Raitt (D. I.), Den Haag (Netherlands).
THE INFORMATION NEEDS OF SCIENTISTS AND ENGINEERS IN AEROSPACE
D. I. Raitt *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 5 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

A brief description of a recent research project to ascertain the communication and information-seeking and use habits of scientists and engineers working in aerospace research establishments and other organizations is given. Relevant organizations studied include DFVLR, NLR, CNES and ESA. Following an overview of the basic characteristics of scientists and engineers, a review of the project's major findings as they relate to the type of information required by scientists and engineers, its availability, the sources - both oral and written - from which the information is obtained and the scientists and engineers awareness of them, how they keep up-to-date, the time spent seeking information, the use made of the library and the communication patterns of scientists and engineers, is then given. Some general suggestions for improving the communication and information flow within organizations to the satisfaction of practicing scientists and engineers are made. Author

N86-28797# Office of the Under Secretary of Defense for Research and Engineering, Washington, D. C. Research and Laboratory Management.
INFORMATION SERVICES: PROS AND CONS
Leo Young *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 8 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

A strong science and technology base is a national necessity in a competitive world, and adequate communication is a prerequisite for it. An individual, be it a policy maker, program manager, a bench scientist or engineer resorts to the information system if he believes it will save him or her time to first consult the written record rather than to undertake a repetitious experiment or investigation. The three components to an effective information service are the sources (those who provide or produce information), the users (those who need the information) and the professional information specialists (those who bind the whole system together). The cooperation toward information exchange of all those connected with research and development must be enlisted in support of the system of which they are a part. Author

N86-28798# Engineering Sciences Data Unit, London (England).
THE COSTS OF NOT HAVING REFINED INFORMATION

Anthony J. Barrett *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 9 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

The adequacy of the information resources, which are called upon for support at decision points in the research-design-production-marketing process, can in part be measured by their scope, the presence or absence of information within that scope and, increasingly, by the extent to which they offer refinement in terms of the timeliness and quality of the information which can be retrieved. Timeliness in the present context relates not so much to the response time of the information system as to the extent to which that system is tuned to the volatility of the information which it contains. Likewise, the quality of information is not to be judged only by its relevance and authenticity but also by the convenience of its form of presentation in the view of the decision maker who has need of it. The main focal points of the paper are the costs, disruption and other losses which arise from a lack of knowledge of previous work, the use of out-of-date technical information and, in particular, the extent to which the use of insufficiently refined numerical data leads to the under-, or over-, design of hardware. These are illustrated by a number of quantified examples. The transition from an industrially based to an information or service based society highlights the growing needs of the R&D decision maker and others for systems which will provide high quality numerical and factual data. However, substantiation of these needs may never be available in terms of evidence of direct future benefits as distinct from evidence of historic losses. More dynamic means of demonstrating the impact of information quality upon the interests of the decision maker must be devised and guidelines for two such projects are suggested. Author

N86-28799# King Research, Inc., Rockville, Md.
MEASURING THE VALUE OF INFORMATION AND INFORMATION SYSTEMS, SERVICES AND PRODUCTS
Donald W. King and Jose-Marie Griffiths *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 15 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

An approach for measuring the value of information and information systems, services and products is presented. Results of four research projects that have measured value of recorded information used by professional such as scientists, engineers, managers, etc. are also discussed. Furthermore, data are given on the value of such systems and services as a bibliographic database of international publications, online search systems and libraries. The approach used to measure value includes several perspectives. The first perspective is what users are willing to pay for information in terms of money (if exchanged) and the price paid by users in terms of their time and effort to get and read the information. Once information is read and assimilated, there are many purposes for which it might be used such as in one's work, to educate oneself or others, to satisfy one's curiosity, etc. The consequential value resulting from information use is partially measured by the savings that are derived from information use. Higher order values are how the consequential value affects the user's organization and, in turn, society. Author

N86-28800# National Defence Headquarters, Ottawa (Ontario). Directorate of Industry and Univ. Programs.
INTERNATIONAL INFORMATION EXCHANGE PROGRAMMES ARE NECESSARY
A. S. Reeves *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 5 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

The economic and cultural ties between Canada, the U.S. and European nations are enhanced by various means of information exchange between and among countries. The benefits of two different but interconnected processes of technology transfer are discussed: the alerting of allies to information available and the exchange of document literature. Since concern about national security and proprietary information may preclude defence research and development programs from publishing; as do other disciplines, in the open literature, special exchange agreements are necessary. The programs which have existed for some years among various NATO countries usually limit the subject areas of common interest to be discussed, and the organizations to be included. This process is illustrated using the Canadian situation. Some of the existing Canadian exchange agreements are examined, showing how they operate, the types of information which are included, the routes by which information is passed from one country to another. The ways in which information passes through the documentation centers to become a valuable service to the end users and thus enhance research and development productivity are detailed. Specific examples of the use of international information exchange programs to some major defence projects are shown. The release of information is beneficial to the releasing country as well as to the receiving country because of the increased visibility of the information and the resulting reciprocal transfer of related data. M.G.

N86-28801# Royal Library of Belgium, Brussels.
THE IDEAL INFORMATION SYSTEM? WHAT DOES THE USER REALLY WANT?
Guy M. Vanautryve *In* AGARD The Value of Information as as Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 4 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

In planning future information systems, it is of utmost importance to take into account the user who finally decides on the success of the systems. So far, system improvements have mainly been implemented with the experienced user in mind. Therefore, if the information systems want to get a better penetration, they will have to implement interfaces faciliting the accessibility of the information by the non-experienced user. Also, access to those idealized information systems could be improved through better cooperation between telecommunication authorities. Author

N86-28802# BULL, Louveciennes (France).
NEW TECHNOLOGIES FOR IMPROVED INFORMATION SYSTEMS AND SERVICES
Gilles Gauthier-Villars *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 12 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

Information data bases are growing exponentially both because of the number of records and because of the type of data. The number of occurrences encompassed by a data base has an evident influence on its volume, but as one moves from coded data to textual data and to images the need for space grows as well. Data is dear to the user. It is expensive to capture and it is important that it reaches all applications which needs it. So to keep the whole problem of data management under control storage, processing and transfer techniques evolve rapidly. This paper is focused on three important technological breakthroughs in each of these domains: a new storage technique, the optical disc; a new way to process data, the expert systems; and a new way to exchange data, with query languages. Author

N86-28803# Fachinformationszentrum fuer Energie, Physik, Mathematik G.m.b.H., Eggenstein-Leopoldshafen (West Germany). Energy and Technology Div.
INFORMATION RESOURCES MANAGEMENT IN THE R AND D ENVIRONMENT
K. Buerk *In* AGARD The Value of Information as an Integral Part of Aerospace and Defence R and D Programmes Jan. 1986 4 p (For primary document see N86-28793 19-82)
Avail: NTIS HC A05/MF A01

Efficient management of highly specialized information is a permanent task of optimization, whereby framework conditions may constantly change on account of various influencing factors. Owing to their special significance, the following has to be

considered in particular: user needs, available resources, and information techniques. The task of optimization, due to its complexity, cannot be solved model-like, but only approximately and pragmatically. Illustrated by the example of the Federal Republic of Germany and the Fachinformationszentrum Energie Physik Mathematik (FIZ) the attempt to find a practical solution is demonstrated. In this context it is shown which role a National Information Center plays within international and national cooperation including worksharing, and how information supply and dissemination of information works in the case of central information services by FIZ, and decentral dissemination of information in research centers. Illustrated by the examples of database production, online services of bibliographic, numeric and full-text databases and the concept of the International Information Network for Science and Technology (STN International), the importance of the use of the most modern information techiques is demonstrated. Author

N86-28697# Joint Publications Research Service, Arlington, Va.
INFORMATION SYSTEMS FOR LIBRARY DATABASES ORGANIZED
Toomas Etverk *In its* USSR Report: Cybernetics, Computers and Automation Technology (JPRS-UCC-86-004) 25 Apr. 1986 p 27-30 Transl. into ENGLISH from Rahva Haal (Tallinn, Estonia), 31 Jul. 1985 p 2 (For primary document see N86-28694 19-70)
Avail: NTIS HC A04/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N86-28804# Army Engineer Div., Huntsville, Ala.
PAX ECONPACK ECONOMIC ANALYSIS PACKAGE Final Report
Hugh W. Mason Jan. 1986 7 p
(AD-A165660; HNDSP-86-116-ED-ES' Avail: NTIS HC A02/MF A01 CSCL 14/1

The Economic analysis Package (ECONPACK) Program is an interactive computer system which assists the Department of Defense in the preparation of life cycle costs analysis reports, in support of funding requests for construction programs as well as many other types of programs in accordance with AR 11-28 Economic Analysis and Program Evaluation for Resource Management. GRA

N86-28805# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
A PROFILE OF SELECTED FIRMS AWARDED SMALL BUSINESS INNOVATION RESEARCH FUNDS
Mar. 1986 15 p
(AD-A165664; GAO/RCED-86-113FS) Avail: NTIS HC A02/MF A01 CSCL 05/3

The General Accounting Office conducted interviews and developed a profile of the 19 firms, obtained a description of their research work and experiences with the SBIR (Small Business Innovative Research) program, and identified efforts these firms were making to commercialize products or services developed with SBIR funding. The information collected was from firms receiving awards in fiscal years 1983 and 1984. To obtain additional information about commercialization of products developed with SBIR funding, we interviewed officials at eight venture capital firms and three experts on small business innovation. GRA

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-28806# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
UNIVERSITY FUNDING. ASSESSING FEDERAL FUNDING MECHANISMS FOR UNIVERSITY RESEARCH
Feb. 1986 37 p
(AD-A165721; GAO/RCED-86-75) Avail: NTIS HC A03/MF A01 CSCL 05/1

Over 60 percent of university research funding comes from federal agencies. this research is a key element in the United States' international competitiveness and technology advancement. Others sources for research funding include industry, foundations, and state governments. Approximately 71 percent of the federal research funds are provided through one funding mechanism or category of federal financial support for scientific research -- individual project grants. Some scientists and policymakers have questioned the consequences of such heavy reliance on individual project grants. For example, does this mechanism discourage the performance of innovative, high-risk, and interdisciplinary research? In response to the House Committee on Science and Technology's request that GAO assess the effects of; different funding mechanisms on the productivity and performance of research, GAO looked at: Whether particular funding mechanisms played a role in helping universities improve program quality. Whether two funding mechanisms -- individual project grants and center grants -- had different effects on the performance of research. GAO looked at five universities that, according to surveys of the scientific community carried out by two education and research organizations, had reputed improvement in program quality. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-28807# Office of Naval Research Liason Office, Far East, APO, San Francisco, Calif.
ONR FAR EAST SCIENTIFIC BULLETIN. VOLUME 10, NUMBER 3, JULY-SEPTEMBER 1985
George B. Wright and Mary Lou Moore Sep. 1985 137 p
(AD-A165601) Avail: NTIS HC A07/MF A01 CSCL 09/1

Recent developments in Far Eastern (particularly Japanese) scientific research are discussed. Computers, computer techniques, integrated circuits, gallium arsenides, and telecommunication technology are among the topics covered. GRA

N86-28808# Catholic Univ. of America, Washington, D.C.
REGIONAL DEVELOPMENT IMPACTS AND THEIR MEASUREMENTS
Ung S. Kim Nov. 1985 66 p
(Contract DACW72-83-C-0010)
(AD-A165687; IWR-CR-85-C-6) Avail: NTIS HC A04/MF A01 CSCL 05/3

This report reviews several analytical models which can be used for estimating the regional economic development impacts of water resource projects. A review of the history of Corps of Engineers efforts to introduce a working concept of economic development in various regions of the United States is also included. The final section of the report presents the theory, techniques and data sources for three analytical models and evaluates each model. GRA

N86-28809# Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
MATERIALS RESEARCH: THE PROGRAM OF THE FEDERAL

MINISTRY FOR RESEARCH AND TECHNOLOGY [MATERIALFORSCHUNG: PROGRAMM DES BUNDEMINISTERS FUER FORSCHUNG UND TECHNOLOGIE]
1985 63 p In GERMAN
(ESA-86-96939) Avail: NTIS HC A04/MF A01

The program of the German Federal Ministry of Research and Technology in the field of materials research is presented. The significance of materials for technical and economic efficiency is discussed. The international status of materials science is depicted. The political concept for materials research is explained. The emphasis of the program is on structural materials (construction materials) of inorganic nature (metals, non-metals, ceramics, glasses), and on structural and functional materials of organic-chemical nature (polymers). ESA

N86-28810# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jallos (France). Div. Systemes Balistiques et Spatiaux.
LEGAL FRAMEWORK AND NATIONAL INDUSTRIAL DEVELOPMENT:BAD CAPS LANGUAGE[ny] THE IMPACT ON TECHNOLOGY TRANSFERS [CADRE JURIDIQUE ET DEGRE DE DEVELOPPEMENT INDUSTRIEL. IMPACTS SUR LES TRANSFERTS DE TECHNOLOGIE]
M. F. Murphy 1986 6 p In FRENCH Presented at AFCET Salon Intern. des Tech.. et Energies du Futur, Toulouse, France, 24-25 Oct. 1985
(SNIAS-861-422-104; ESA-86-97161) Avail: NTIS HC A02/MF A01

Technology transfer given the limitations imposed by French regulations is discussed. The problems related to customs, currency control, insurance, and producer warranties are examined. The complexity of the regulations is pointed out. It is shown that considerable efforts are required to overcome these obstacles.The particular problems of the aerospace industry are mentioned. ESA

88 SPACE SCIENCES (GENERAL)

N86-28811*# Lunar and Planetary Inst., Houston, Tex.
INTERNATIONAL WORKSHOP ON ANTARCTIC METEORITES
J. O. Annexstad, L. Schultz, and H. Waenke 1986 122 p Workshop held in Mainz, West Germany, 10-12 Jul. 1985; sponsored by the International Association of Geometry and Cosmochemistry, LPI and the Max-Planck-Society
(Contract NASw-4066)
(NASA-CR-177309; NAS 1.26:177309; LPI-TR-86-01) Avail: NTIS HC A06/MF A01 CSCL 03B

Topics addressed include: meteorite concentration mechanisms; meteorites and the Antarctic ice sheet; iron meteorites; iodine overabundance in meteorites; entrainment, transport, and concentration of meteorites in polar ice sheets; weathering of stony meteorites; cosmic ray records; radiocarbon dating; element distribution and noble gas isotopic abundances in lunar meteorites; thermoanalytical characterization; trace elements; thermoluminescence; parent sources; and meteorite ablation and fusion spherules in Antarctic ice. For individual titles, see N86-28812 through N86-28833.

N86-28812*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METEORITE CONCENTRATION MECHANISMS IN ANTARCTICA c90
John O. Annexstad *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 23-25 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The location of most Antarctic meteorite finds is on stagnant, highly ablative surfaces known as blue ice. The role of blue ice as transporter, concentrator, and preserver of specimens from the time of fall until find is discussed. B.G.

N86-28813*# Pittsburgh Univ., Pa. Dept. of Geology and Planetary Science.
METEORITES AND THE ANTARCTIC ICE SHEET c90
W. A. Cassidy *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 26-27 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The majority of the meteorite finds were located in the Allan Hills site. All the expected goals involving the recovery of rare or previously unknown types of meteorites, and even the recovery of lunar ejecta, were realized. The relationship between these remarkable concentrations of meteorites and the Antarctic ice sheet itself were less well documented. Ice flow vector studies were made and concentration models were proposed. Earlier estimates of the abundances of meteorite types were based on the number of falls in the world collections. The accumulated data and the future collected data will allow more reliable estimates of the source region of most meteorites. B.G.

N86-28814*# Smithsonian Institution, Washington, D. C. Div. of Meteorites.
ANTARCTIC IRON METEORITES: AN UNEXPECTEDLY HIGH PROPORTION OF FALLS OF UNUSUAL INTEREST c90
Roy S. Clarke, Jr. *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 28-29 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The inhabited and explored areas of Earth have contributed 725 iron meteorites, accounting for 28% of the 2611 authenticated meteorites known of all types. Observed fall statistics give a much different view of relative abundance. The 42 historic iron meteorite falls spanning 230 years suggests a frequency of one fall per 5.6 years and represents only 4.9% of the total 853 known falls. Antarctic iron meteorite recoveries offer promise of providing a new perspective on the influx problem. At least 42 iron meteorite specimens were found during the last 25 years by various field teams working in Antarctica. Most of these specimens were not described in detail, but the available data indicates that 21 separate falls are represented, 50% of the number of recovered specimens. Twelve of the 21 falls were both structurally classified and placed into chemical groups. They are listed in order of increasing structural complexity and/or Ni content. B.G.

N86-28815*# Federal Inst. for Geosciences and Natural Resources, Hannover (West Germany).
DISCOVERY OF METEORITES ON A BLUE-ICE FIELD NEAR THE FRONTIER MOUNTAINS, NORTH VICTORIA LAND, ANTARCTICA c90
G. Delisle, H.-C. Hoefle, R. Thierbach, and L. Schultz (Max-Planck-Inst. fuer Chemie, Main, West Germany) *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 30-33 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

A high concentration of meteorites were discovered on a blue ice field northeast of the Frontier Mountains. As a result of a systematic search, a total of 42 meteorites were recovered. The current glacial situation has evolved through various stages, which are discussed in relationship to the concentration of meteorites. Ice flow patterns are summarized. The chemical composition and terrestrial ages of the meteorites are discussed. B.G.

N86-28816*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
MYSTERIOUS IODINE-OVERABUNDANCE IN ANTARCTIC METEORITES c90
G. Dreibus, H. Waenke, and L. Schultz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 34-36 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Halogen as well as other trace element concentrations in meteorite finds can be influenced by alteration processes on the Earth's surface. The discovery of Antarctic meteorites offered the opportunity to study meteorites which were kept in one of the

most sterile environment of the Earth. Halogen determination in Antartic meteorites was compared with non-Antarctic meteorites. No correlation was found between iodine concentration and the weathering index, or terrestrial age. The halogen measurements indicate a contaminating phase rich in iodine and also containing chlorine. Possible sources for this contamination are discussed. B.G.

N86-28817*# Cambridge Univ. (England). Polar Research Inst.
ENTRAINMENT, TRANSPORT AND CONCENTRATION OF METEORITES IN POLAR ICE SHEETS c90
D. J. Drewry *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 37-47 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Glaciers and ice sheets act as slow-moving conveyancing systems for material added to both their upper and lower surfaces. Because the transit time for most materials is extremely long the ice acts as a major global storage facility. The effects of horizontal and vertical motions on the flow patterns of Antarctic ice sheets are summarized. The determination of the source areas of meteorites and their transport paths is a problem of central importance since it relates not only directly to concentration mechanisms but also to the wider issues in glaciology and meteorites. The ice and snow into which a meteorite falls, and which moves with it to the concentration area, encodes information about the infall area. The principle environmental conditions being former elevation, temperature (also related to elevation), and age of the ice. This encoded information could be used to identify the infall area. B.G.

N86-28818*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
WEATHERING OF STONY METEORITES IN ANTARCTICA c90
J. L. Gooding *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 48-54 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Weathering produces undesirable physical, chemical, and isotopic changes that might disturb the records of cosmochemical evolution that are sought in meteorites. Meteorites are physically disintegrated by crack propagation phenomena, including ice riving and secondary mineral riving, and are probably abraded by wind that is laden with ice crystals or dust particles. Chemical weathering proceeds by oxidation, hydration, carbonation, and solution and produces a variety of secondary minerals and mineraloids. Differential weathering under freezing conditions is discussed, as well as, the mineralogy of weathering products. Furthermore, the use of Antarctic alteration of meteorites could be used as an excellent analog for weathering on Mars or on cometary bodies. B.G.

N86-28819*# Cologne Univ. (West Germany). Abteilung Nuklearchemie.
COSMIC RAY RECORDS IN ANTARCTIC METEORITES c93
S. Vogt, U. Herpers, R. Sarafin, P. Signer (Eidgenoessische Technische Hochschule, Zurich, Switzerland), R. Wieler, M. Suter, and W. Woelfli *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 55-57 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The cosmogenic radionuclides Be(10), Al(26), and Mn(53) and noble gases were determined in more than 28 meteorites from Antarctica by nuclear analytical techniques and static mass spectrometry, respectively. The summarized results are listed. The concentrations of Al(26) and Mn(53) are normalized to the repective main target elements and given in dpm/kg Si sub eq and dpm/kg Fe. Tha errors stated include statistical as well as systematical errors. For noble gas concentrations estimated errors are 5% and for isotopic ratios 1.5%. Cosmic ray exposure ages T sub 21 were calculated by the noble gas concentrations and the terrestrial residence time (T) on the basis of the spallogenic nuclide Al(26). The suggested pairing of the LL6 chondrite RKPA 80238 and RKPA 80248 and the eucrites ALHA 76005 and ALHA 79017 is confirmed not only by the noble gas data but also by the concentrations of the spallation produced radionuclides. Futhermore, ALHA 80122, clasified as an H6 chondrite, has a noble gas pattern which suggest that this meteorite belongs to the ALHA 80111 shower. Author

N86-28820*# Gakushuin Univ., Tokyo (Japan). Dept. of Chemistry.
RADIOCARBON DATINGS OF YAMATO METEORITES c90
K. Kigoshi and E. Matsuda *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 58-60 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The terrestrial ages of five Yamato Meteorites were measured by the content of cosmic-ray-produced carbon-14. Three Yamato Meteorites Y-74013, Y-74097, and Y-74136, which are all diogenites, were found at sites from one to two kilometers apart from each other. Evidence is presented for these three meteorites being a single meteorite. Also presented is a method adopted in the experimental procedure which includes a check for modern carbon contamination in the meteorites. B.G.

N86-28821*# Bern Univ. (Switzerland). Lab. fuer Radiochemie.
ELEMENT DISTRIBUTION AND NOBLE GAS ISOTOPIC ABUNDANCES IN LUNAR METEORITE ALLAN HILLS A81005 c90
U. Kraehenbuehl, O. Eugster, and S. Niedermann *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 61-64 Sponsored in part by Swiss National Science Foundation (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Antarctic meteorite ALLAN HILLS A81005, an anorthositic breccia, is recognized to be of lunar origin. The noble gases in this meteorite were analyzed and found to be solar-wind implanted gases, whose absolute and relative concentrations are quite similar to those in lunar regolith samples. A sample of this meteorite was obtained for the analysis of the noble gas isotopes, including Kr(81), and for the determination of the elemental abundances. In order to better determine the volume derived from the surface correlated gases, grain size fractions were prepared. The results of the instrumental measurements of the gamma radiation are listed. From the amounts of cosmic ray produced noble gases and respective production rates, the lunar surface residence times were calculated. It was concluded that the lunar surface time is about half a billion years. B.G.

N86-28822*# Warsaw Univ. (Poland). Dept. of Chemistry.
THERMOANALYTICAL CHARACTERIZATION OF SEVERAL ANTARCTIC METEORITES c90
B. Lang, A. Grodzinski, and L. Stoch (Academy of Mining and Metallurgy, Cracow, Poland) *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 65-67 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Thermodynamic data for several meteorites from Antarctica (5 achondrites, 2 chondrites, and 1 iron) were derived. The thermochemical response to heating in air was examined. The effects of oxidation processes can often be better identified by comparing the differential thermal analysis (DTA)-curves for heating in air with those obtained for heating in an oxidation-suppressed argon atmosphere. The thermoanalytical method can be helpful in determining the degree of weathering of meteoritic material. B.G.

N86-28823*# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
TRACE ELEMENTS IN ANTARCTIC METEORITES: WEATHERING AND GENETIC INFORMATION c90
M. E. Lipschutz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 68-70 (For primary document see N86-28811 19-88)
(Grants NAG9-48; NSF DPP-81-11513; DEFG-0280-ER-10725)
Avail: NTIS HC A06/MF A01 CSCL 03B

Antarctic meteorite discoveries have created great scientific interest due to the large number of specimens recovered (approximately 7000) and because included are representatives of hitherto rare or unknown types. Antarctic meteorites are abundant because they have fallen over long periods and were preserved, transported, and concentrated by the ice sheets. The weathering effects on the Antarctic meteorites are described. Weathering effects of trace element contents of H5 chondrites were studied in detail. The results are examined. The properties of Antarctic finds and non-Antarctic falls are discussed. B.G.

N86-28824*# California Univ., San Diego, La Jolla. Dept. of Chemistry.
TERRESTRIAL AND EXPOSURE HISTORIES OF ANTARCTIC METEORITES **c90**
K. Nishiizumi *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 71-73 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Records of cosmogenic effects were studied in a large suite of Antarctic meteorites. The cosmogenic nuclide measurements together with cosmic ray track measurements on Antartic meteorites provide information such as exposure age, terrestrial age, size and depth in meteoroid or parent body, influx rate in the past, and pairing. The terrestrail age is the time period between the fall of the meteorite on the Earth and the present. To define terrestrial age, two or more nuclides with different half-lives and possibly noble gases are required. The cosmogenic radionuclides used are C-14, Kr-81, Cl-36, Al-26, Be-10, Mn-53, and K-40. B.G.

N86-28825*# Physical Research Lab., Ahmedabad (India).
WEATHERING EFFECTS AND SOLAR COMPONENTS IN TWO ALLEN HILLS CHONDRITES **c91**
J. T. Padia and M. N. Rao *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 74-75 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Two Allen Hills chondrites, ALHA 77252 and ALHA 77215 belonging to the L-group were studied by stepwise heating mass spectrometric methods for elemental and isotopic composition of noble gases. The results are discussed. B.G.

N86-28826*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
RARE AND UNIQUE METEORITES FROM ANTARCTICA **c90**
H. Palme *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 77-79 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The detection of Antarctic meteorites of Lunar and perhaps Martian origin, belongs to the most important discoveries in planetology during the last years. There is such a wealth of new information on differentiated and undifferentiated planetary bodies deduced from Antarctic meteorites that it is at present not possible to even qualitatively foresee the impact that these meteorites will have on the understanding of the formation and differentiation of large and small planets in the solar system. Martian meteorites, Lunar meteorites, meteorites from the parent body of basaltic achondrites, and chrondritic meteorites are discussed. B.G.

N86-28827*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
TERRESTRIAL AGES OF ANTARCTIC METEORITES: IMPLICATIONS FOR CONCENTRATION MECHANISMS **c90**
Ludolf Schultz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 80-82 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Antarctic meteorites differ from meteorites fallen in other places in their mean terrestrial ages. Boeckl estimated the terrestrial half-life for the disintegration of stone meteorites by weathering under the climatic conditions of the Western United States to be about 3600 years. Antarctic meteorites, however, have terrestrial ages up to 70000 years, indicating larger weathering half-lives. The terrestrial ages of meteorites are determined by their concentration of cosmic-ray-produced radionuclides with suitable half-lives (C-14, Al-26, and Cl-36). These radionuclides have yielded reliable ages for the Antarctic meteorites. The distribution of terrestrial ages of Allan Hills and Yamato meteorites are examined. B.G.

N86-28828*# Arkansas Univ., Fayetteville. Dept. of Chemistry and Biochemistry.
THERMOLUMINESCENCE AND ANTARCTIC METEORITES **c90**
Derek W. G. Sears and Fouad A. Hasan *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 83-100 (For primary document see N86-28811 19-88)
(Grant NAG9-81)
Avail: NTIS HC A06/MF A01 CSCL 03B

The level of natural thermoluminescence (TL) in meteorites is the result of competition between build-up, due to exposure to cosmic radiation, and thermal decay. Antarctic meteorites tend to have lower natural TL than non-Antarctic meteorites because of their generally larger terrestrial ages. However, since a few observed falls have low TL due to a recent heating event, such as passage within approximately 0.7 astronomical units of the Sun, this could also be the case for some Antarctic meteorites. Dose rate variations due to shielding, heating during atmospheric passage, and anomalous fading also cause natural TL variations, but the effects are either relatively small, occur infrequently, or can be experimentally circumvented. The TL sensitivity of meteorites reflects the abundance and nature of the feldspar. Thus intense shock, which destroys feldspar, causes the TL sensitivity to decrease by 1 to 2 orders of magnitude, while metamorphism, which generates feldspar through the devitrification of glass, causes TL sensitivity to increase by a factor of approximately 10000. The TL-metamorphism relationship is particularly strong for the lowest levels of metamorphism. The order-disorder transformation in feldspar also affect the TL emission characteristics and thus TL provides a means of paleothermometry. Author

N86-28829*# Otago Univ., Dunedin (New Zealand). Dept. of Geology.
A PRELIMINARY REPORT ON A POSSIBLE STROMATOLITE FIND FROM THE ELEPHANT MORAINE, ANTARCTICA: A POTENTIAL DIRECTIONAL INDICATOR FOR ICE MOVEMENT **c90**
P. P. Sipiera and C. A. Landis *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 101-103 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

During the 1983 to 1984 Antarctic Search for Meteorites field season, numerous specimens of a shiny black rock were collected from among the glacial debris at the Elephant Moraine. From a distance these black rocks gave the appearance of meteorites, but upon closer inspection, distinct layering and radial crystal growth patterns became clearly visible. Laboratory investigations showed that these unusual specimens are primarily composed of carbonate minerals. Petrographically, microscopic examination of twelve randomly collected specimens revealed a variety in the habits of the carbonates, but the overall trend tends to be one of radiating acicular crystals that have the appearance of a pseudo-cellular structure reminiscent of stromatolites. It is not possible at this time to specifically identify this possible stromatolite material or its source locality. B.G.

N86-28830*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
THERMOLUMINESCENCE OF ANTARCTIC METEORITES: A RAPID SCREENING TECHNIQUE FOR TERRESTRIAL AGE ESTIMATION, PAIRING STUDIES AND IDENTIFICATION OF SPECIMENS WITH UNUSUAL PREFALL HISTORIES **c90**
S. R. Sutton and R. M. Walker *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 104-106 (For primary document see N86-28811 19-88)

Avail: NTIS HC A06/MF A01 CSCL 03B

Thermoluminescence (TL) is a promising technique for rapid screening of the large numbers of Antarctic meteorites, permitting identification of interesting specimens that can then be studied in detail by other, more definite techniques. Specifically, TL permits determination of rough terrestrial age, identification of potential paired groups and location of specimens with unusual pre-fall histories. Meteorites with long terrestrial ages are particularly valuable for studying transport and weathering mechanisms. Pairing studies are possible because TL variations among meteorites are large compared to variations within individual objects, especially for natural TL. Available TL data for several L3 fragments, three of which were paired by other techniques, are presented as an example of the use of TL parameters in pairing studies. Additional TL measurements, specifically a blind test, are recommended to satisfactorily establish the reliability of this pairing property. The TL measurements also identify fragments with unusual pre-fall histories, such an near-Sun orbits. Author

N86-28831*# Tokyo Univ. (Japan). Mineralogical Inst.
PARENT SOURCES OF ANTARCTIC METEORITES AS INFERRED FROM PAIRING OF THE SPECIMENS c90
Hiroshi Takeda *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 107-109 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Antarctic meteorites may be derived from regions different than those from which comtemporary falls derive. If so, they are useful in reconstruction of their parent bodies or masses. To obtain a better understanding of the parent sources and their relation to asteroids, several Antarctic achondrites and unique chondrites were reinvestigated with electron microprobe and single crystal X-ray diffraction. Synthesis of their parent body was performed for three classes of meteorites on the basis of pairing of the specimens. The results are discussed for HED (Howardites, Eucrites, Diogenites) Parent Bodies, Ureilite Parent Bodies, and LL Chondrite Parent Bodies. B.G.

N86-28832*# Cologne Univ. (West Germany). Dept. of Nuclear Chemistry.
METEORITIC ABLATION AND FUSION SPHERULES IN ANTARCTIC ICE c90
K. Thiel, J. Peters, G. M. Raisbeck (Centre National de la Recherche Scientifique, Orsay, France), and F. Yiou *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 110-112 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

In the course of two Antarctic expeditions in 1980/1981 and 1982/1983 approximately 4 metric tons of documented ice samples were collected from the Atka Bay Ice Shelf, Antarctica, and subsequently shipped for cosmic dust studies. After filtration of the melt water, approximately 700 Antarctic spherules (AAS) in the size range of 5 to 500 microns were handpicked from the filter residue under optical microscopes. For the chemical investigation of single dust grains the following techniques were applied: scanning electron microscopy (SEM), X-ray analysis (EDAX), instrumental neutron activation analysis (INAA), laser microprobe mass analysis (LAMMA), and accelerator mass spectroscopy (AMS). For more than 95% of the total mass the bulk and trace elements were determined in single grain analyses using EDAX, INAA, and LAMMA. The element pattern of the dust particles was compared with that of typical terrestrial material and meteoritic matter. The majority of the spherules exhibited elemental compositions compatible with meteoritic element patterns. B.G.

N86-28833*# National Inst. of Polar Research, Tokyo (Japan).
OVER 5,600 JAPANESE COLLECTION OF ANTARCTIC METEORITES: RECOVERIES, CURATION AND DISTRIBUTION c90
K. Yanai and H. Kojima *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 113-116 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The history of recovery of meteorite fragments in the Yamato Mountains, Allan Hills, and Victoria Land, Antarctica is reviewed. The Japanese collection of Antarctic meteorites were numbered, weighed, photographed, identified, and classified. Sample distribution of the Japanese Antarctic meteorites is described. B.G.

N86-28834# Osmania Univ., Hyderabad (India). Centre of Advanced Study in Astronomy.
PROCEEDINGS OF THE PLATINUM JUBILEE SYMPOSIUM OF NIZAMIAH OBSERVATORY ON BINARY AND MULTIPLE SYSTEMS
K. D. Abhyankar, ed. and G. M. Ballabh, ed. 1984 163 p Symposium held in Hyderabad, India, 22-24 Nov. 1983; sponsored by Osmania Univ., Univ. Grants Commission, Dept. of Science and Technology, Indian Space Research Organisation and Astronomical Society of India
Avail: NTIS HC A08/MF A01

Topics addressed include: binary eclipsing stars, multiple galaxies, galactic clustering, gravitational lenses and multiple quasars, radio and X-ray emission in radio-loud quasars, minor planets and planetary rings, comets, and interstellar medium. For individual titles, see N86-28835 through N86-28848.

N86-28835# Osmania Univ., Hyderabad (India). Centre of Advanced Study in Astronomy.
MULTIPLICITY AMONG ECLIPSING BINARIES c89
K. D. Abhyankar *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 4 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Light time effect can be used for detecting additional components in eclipsing binaries. One way to test their existence would be to consider the stability of such hierarchical systems. It is found that the triple systems are stable, but higher order multiple systems are not. Hence the three body model of AK Her proposed by Barker and Herczeg (1979) is more plausible than the four body model suggested by Abhyankar and Panchatsaram (1982). Author

N86-28836# Uttar Pradesh State Observatory, Naini Tal (India).
RS CVn BINARIES c89
J. B. Srivastava *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 15 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The observational properties of RS CVn binaries which are known to eclipse are discussed. Thirty-five RS CVn type binaries are listed with their references. The references were collected from 1978 until September 1983. B.G.

N86-28837# Osmania Univ., Hyderabad (India). Centre for Advanced Study in Astronomy.
MODELS FOR RS CVn BINARIES c89
P. Vivekananda Rao and M. B. K. Sarma *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 6 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Photometric studies of RS CVn binaries during the last two to three decades have revealed interesting results which indicate that most of these stars exhibit a sinusoidal wave-like distortion in their light curves with amplitudes of up to 0.3 m and periods which are in general equal to the orbital period. Three models which explain this phenomena are discussed: extinction of the light by the hotter component by circumstellar material (Catalano and Rodona); pulsation of one of the components with the same period as that of the orbit; and the spot hypothesis (Hall 1972, Oliver 1974). B.G.

N86-28838# Indian Inst. of Astrophysics, Bangalore.
REFLECTION EFFECT IN CLOSE BINARIES c89
A. Peraiah *In* Osmania Univ. Proceedings of the Platinum Jubilee

Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 20 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Binary stars occupy an important place in the study of structure and evolution of stars. Changes in the total light during the eclipsing of close pairs was noted. The total light is the sum of the light of the individual components and the mutually reflected light. If the components are very close, the reflected light will be a considerable fraction of the total light and therefore will have to be estimated very carefully. The calculation of the radiation field from the irradiated surface of the components in a binary system is explained. The problem is considered both from incidence from a point source and incidence from an extended source. B.G.

N86-28839# Osmania Univ., Hyderabad (India). Centre of Advanced Study in Astronomy.
BINARY AND MULTIPLE GALAXIES **c89**
G. M. Ballabh *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Galaxies commonly occur as members of pairs, triplets, and groups of higher order. Among the systems of galaxies, binary galaxies have attracted more attention due to their significant number and also due to the simplicity involved in their geometry, dynamics, and observations. The study of binary galaxies forms an important subject in extragalactic astronomy. Statistical analyses (masses, mass to luminosity ratios, and morphological type relationships) are discussed. The dynamical aspects of the galaxies are also discussed. B.G.

N86-28840# Cambridge Univ. (England). Inst. of Astronomy.
GALAXY CLUSTERING **c90**
William C. Saslaw *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p Prepared in cooperation with Virginia Univ., Charlottesville and National Radio Astronomy Observatory, Charlottesville, Va. (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Starting in the late 1960s, galaxy counting and analysis became a major astronomical industry. Two developments stimulated this rebirth: high speed computers which made correlation analysis easy and fast measuring machines which can automatically identify galaxies on plates and measure their coordinates accurately. The two point correlation function is discussed. Galaxy formation and clustering is explained using both the pancake picture and hierarchical clustering models. B.G.

N86-28841# Tata Inst. of Fundamental Research, Bombay (India).
GRAVITATIONAL LENSES AND MULTIPLE QUASARS **c89**
S. M. Chitre *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 6 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The Very Long Base Interferometry features observed in the quasar Q0957+561 A,B are incorporated in a gravitational lens model. The observed quasar configuration was modeled by prescribing the core-radii, ellipticities, major axis, position angles of the lens galaxy and the background cluster, and also specifying the position of image A and its core-jet structure. The observed position and intensity of image B and its core-jet for a given choice of the position of the cluster center was fitted into the model. The effective time delay between components A and B is shown to be of the order of one year and the observed intensity variation in B is demonstrated to arise from the action of minilensing by a low-mass star. B.G.

N86-28842# Tata Inst. of Fundamental Research, Bangalore (India). Radio Astronomy Centre.
JETS IN QUASARS **c89**
D. J. Saikia *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 16 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Powerful extended extragalactic radio sources usually contain two lobes of radio emission on either side of the parent optical galaxy or quasar. Often a compact radio core coincident with the optical object is also detected. The consensus of opinion states that energy is transported to the outer lobes by collimated beams of fluid squirting from active galactic nuclei. The detection of radio jets in a large number of sources has provided the most direct evidence in support of such a scenario. The properties of jets from quasars are reviewed and their apparent one-sideness is described in some detail. B.G.

N86-28843# Tata Inst. of Fundamental Research, Bombay (India).
RADIO AND X-RAY EMISSION IN RADIO-LOUD QUASARS **c90**
Ajit Kembhavi *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 10 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The launch of the Einstein X-ray Observatory has led to a tremendous increase in the knowledge of the X-ray properties of quasars. Prior to the new data, only 3 quasars were known to be X-ray emitters. The number of quasars on which X-ray observations are now available is about 400. Of these, about 200 were observed by Einstein in the pointing mode and the rest were observed serendipitously in the X-ray fields of other targets of interest. The observations from the Einstein X-ray Observatory are used to explain the behavior of quasars and active galactic nuclei models. B.G.

N86-28844# Indian Inst. of Astrophysics, Bangalore.
MINOR PLANETS AND PLANETARY RINGS **c91**
J. C. Bhattacharyya *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 10 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

Circumstances of the discovery of the first asteroid and the characteristics of various asteroid orbits are discussed. The shapes, compositions, and evolutionary histories were also described. The present status of knowledge about the rings surrounding the three giant planets are reviewed. Author

N86-28845# Tata Inst. of Fundamental Research, Bombay (India).
NATURE OF COMETS **c90**
K. S. Krishna Swamy *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 14 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The present status of understanding about the origin, nature, and composition of comets was discussed in terms of the nucleus, coma, abundance analysis, isotopic ratios, parent molecules, cometary dust, and ionic composition of the tail. B.G.

N86-28846# Raman Research Inst., Bangalore (India).
NON-LTE PROCESS IN THE INTERSTELLAR MEDIUM **c90**
K. R. Anantharamaiah *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

An understanding of the thermodynamic processes occurring in the interstellar medium is necessary for the interpretation of many observed phenomena. The basic concepts of thermodynamic equilibrium are discussed. Local thermodynamic equilibrium (LTE) and departures from it, generally referred to as non-LTE, are described with a few examples of their occurrence in the interstellar medium. The importance of non-LTE processes in formation of low frequency radio recombination lines such as those

observed recently using the Ooty radio telescope are examined. B.G.

N86-28847# Tata Inst. of Fundamental Research, Bombay (India).
IMPLICATIONS OF X-RAY AND UV RADIATION ON INTERSTELLAR MEDIUM **c93**
K. P. Singh *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 15 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The hot interstellar medium (HISM) was observed by ultraviolet absorption lines of highly ionized ions such Si-IV, C-IV, N-V, and O-VI and by the diffuse component of soft X-rays. The excess soft X-ray component is examined to understand its origin, and how it relates to the observation of the interstellar medium in other wavebands. B.G.

N86-28848# Indian Inst. of Astrophysics, Bangalore.
ABUNDANCE GRADIENT IN INTERSTELLAR MEDIUM **c90**
Sunetra Giridhar *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 13 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

The implications of observed abundance gradient in the interstellar medium on the chemical evolution of the Galax is reviewed. The gradients that are required to develop enrichment models are described and also the predictions of different models on the variation of metallicity in the galactic disk. The observed gradient, derived using different kinds of objects, is summarized. A few observations that are relevant to the problem of chemical evolution (like the G dwarf problem and the abundance ratios of the elements formed by primary and secondary processes of nucleosynthesis) are also briefly discussed. Some of the advanced models of chemical evolution that are able to account for all these observations are explained. It is necessary to extend the metallicity surveys to the outer most parts of the galactic disk since there is evidence that the chemical evolution of these parts was radically different from that of the solar neighborhood. The addition constraint imposed by such observations would lead to a more comprehensive theory of the chemical evolution of the galactic disk. Author

N86-28849# European Space Agency, Paris (France).
THE ATMOSPHERES OF SATURN AND TITAN
Erica Rolfe, ed. and Bruce Battrick, ed. Dec. 1985 319 p Partly in ENGLISH and FRENCH Workshop held in Alpabach, Austria, 16-19 Sep. 1985; sponsored by ESA and Austrian Solar and Space Agency
(ESA-SP-241; ISSN-0379-6566; ESA-86-96852) Avail: NTIS HC A14/MF A01

Sounding of the Saturn and Titan atmospheres by the Cassini probe was discussed. The chemistry and physics of their upper atmospheres, and the organic chemistry of Titan were considered. Complementary observations from Earth were treated. For individual titles, see N86-28850 through N86-28885. ESA

N86-28850# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIOR OF SATURN **c91**
Jonathan I. Lunine *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 11 p Sponsored by Arizona Univ., Tuscon (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Observational and theoretical constraints used to model giant planet interiors are reviewed. The vertical distribution of elements heavier than helium (Z-elements) and the abundance and rainout of helium in the interiors of Jupiter and Saturn are considered. Models of the interior of Saturn are limited by the low accuracy of data on the gravitational moments of the planet and large uncertainties in atmospheric composition. This is in contrast to Jupiter, for which the gravitational moments are better known and thus the behavior of hydrogen and helium at high pressure is a driving uncertainty. The Galileo probe will provide highly accurate data on the abundances of helium and minor constituents in Jupiter's troposphere. Cassini will accurately determine the tropospheric helium abundance and improve the precision of the gravitational moment data, and hence permit interior models of Saturn of the same resolution as those of Jupiter. ESA

N86-28851# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
THE COMPOSITION OF SATURN'S ATMOSPHERE **c91**
R. Courtin *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 13-20 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The abundance determinations for the gaseous constituents of Saturn's atmosphere are reviewed. They show that helium is significantly depleted in the outer atmosphere, an important finding for Saturn's interior and heat balance. Saturn's atmosphere is enriched in volatiles CH4, NH3, and PH3, although rather large uncertainties remain on the CH4 and NH3 mixing ratios. Except for PH3, little information is available on species considered to be diagnostic of disequilibrium processes (GeH4, HCN, CO). Determinations of C2H2 and C2H6 mixing ratios and of their variations with latitude/altitude yield constraints for the modeling of photochemical (or other) processes in the stratosphere. The deuterium abundance derived from CH3D lines is close to the value obtained for the protosolar nebula. Implications of Saturn's composition for the origin and evolution of the planet are outlined. ESA

N86-28852# Observatoire de Paris-Meudon (France).
THERMAL STRUCTURE OF SATURN'S ATMOSPHERE **c91**
B. Bezard *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 21-31 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Knowledge of the thermal structure of Saturn is surveyed. At midlatitudes, the radiative-convective boundary is located around 700 mbar. At the top of the convective zone, the temperature lapse rate indicates incomplete equilibration of ortho and para H2. Seasonal radiative models give a good representation of the stratospheric part of the temperature profiles and of the large-scale hemispheric asymmetry observed at tropopause levels at the Voyager encounter. Small-scale meridional gradients imply a decrease of the zonal winds with height above the 300 mbar level. Observational prospects with the Cassini mission are discussed. ESA

N86-28853# Imperial Coll. of Science and Technology, London (England). Center for Remote Sensing and Atmospheric Physics
THE METEOROLOGY OF SATURN **c47**
Garry E. Hunt *In* ESA The Atmospheres of Saturn and Tital Dec. 1985 p 33-40 Sponsored by UK Science and Engineering Research Council (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The meteorology of Saturn and related Jovian properties which provide insight into the generation and maintenance of the complex motions which occur in these major planetary atmospheres are reviewed. Interior structure, atmospheric structure, large scale motions, atmospheric circulation, and the maintenance of dynamical systems are considered. The impact of the Cassini mission and other spaceborne astronomy missions is discussed. ESA

N86-28854*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
THEORIES FOR THE GENERAL CIRCULATION OF SATURN'S ATMOSPHERE **c91**
Michael Allison *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 43-52 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The circulation of Saturn's cloud-top winds is discussed. According to one class of theories, the multiple jet streams are confined to a shallow geostrophic wind layer supported by horizontal gradients in temperature and composition. According to an alternate view the jets extend all the way through the molecular fluid envelope on convectively driven cylinders of motion concentric

with the planetary spin axis. Both types of theories require as a starting point assumptions about the buoyancy contrast and eddy fluxes at levels thus far inaccessible to observation. The questions confronted by current theories suggest important reconnaissance objectives for the proposed Cassini mission to Saturn. ESA

N86-28855# Arizona Univ., Tucson. Lunar and Planetary Lab.
CLOUDS AND AEROSOLS ON SATURN **c91**
M. G. Tomasko and L. R. Doose *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 53-61 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Information on the distribution and optical properties of cloud and aerosol particles in Saturn's atmosphere is summarized. Small particles, possibly produced by photochemical reactions or energetic particle bombardment, are present between the 30 and 70mb levels at low latitudes, and above the 20mb level at latitudes > 60 deg. Several optical depths of larger, negatively polarizing particles are present over much of the planet between the 50mb level and the radiative-convective boundary near 400mb. Evidence suggests a relative cloud clearing between this level and an expected relatively dense ammonia cloud near the 1.4 bar level. The presence of a relative clearing between the 500mb level and the 1 bar level suggests that the particles found above the 400mb level are photochemical products rather than ammonia crystals. ESA

N86-28856*# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
UPPER ATMOSPHERE AND IONOSPHERE OF SATURN **c91**
S. K. Atreya (Michigan Univ., Ann Arbor.) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 63-68 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Physical and chemical processes and measurements of the upper atmosphere and ionosphere of Saturn are reviewed. The discrepancies between ionospheric models and measurements are underlined. Issues to be addressed by the Cassini mission to Saturn are listed. ESA

N86-28857# Arizona Univ., Tucson. Lunar and Planetary Lab.
LIGHTNING ON SATURN **c47**
Donald M. Hunten *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 69-71 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Observational evidence and theories on lightning on Saturn are reviewed. The expected water and ice cloud layer in the 15 to 20 bar region is a suitable medium, especially by analogy with Jupiter where lightning is unequivocally observed. Saturn electrostatic discharges observed by Voyager are most naturally explained as due to lightning, although there are difficulties with the radio frequency spectrum and the required behavior of the ionosphere. The corresponding optical flashes and whistlers found at Jupiter are absent. ESA

N86-28858# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
THE COMPOSITION OF THE TITAN ATMOSPHERE **c91**
Daniel Gautier *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 75-81 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Abundances of major components of the Titan atmosphere as well as vertical and horizontal distributions of stratospheric compounds are discussed. Implications of the presence of oxygen compounds are considered. Monodeuterated methane is the only detected isotope. The possibility, based on laboratory simulations, of the formation of complex organics in the stratosphere is mentioned. ESA

N86-28859# Arizona Univ., Tucson. Lunar and Planetary Lab.
TITAN'S SURFACE: NATURE AND IMPLICATIONS FOR CASSINI **c91**
Jonathan I. Lunine *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 83-88 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

A model for a mixed ethane-methane-molecular nitrogen surface ocean is proposed to reconcile Voyager data on the lower atmosphere of Titan with understanding of the photolytic destruction of methane in the stratosphere. Such a reservoir would strongly affect the atmosphere and underlying water ice bedrock of Titan, and has profound implications for the evolution of Saturn's giant moon. Understanding of the interior and atmosphere of Titan depends upon the capability of Cassini spacecraft to determine the nature of the surface on a global scale. ESA

N86-28860*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THERMAL STRUCTURE AND METEOROLOGY OF TITAN **c91**
Barney J. Conrath *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 89-94 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Knowledge of the thermal structure and meteorology of Titan are reviewed. Atmospheric temperature determinations, from Voyager radio occultation and infrared spectroscopy measurements, provide the principal observational constraints on the atmospheric dynamic regime. Titan is the second known example, along with Venus, of cyclostrophic zonal wind balance with upper stratospheric winds a factor of 10 greater than the equatorial surface velocity. Possible contributions of the Cassini Mission to understanding of Titan's meteorology are discussed. ESA

N86-28861*# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
ZONAL WIND IN THE STRATOSPHERE OF TITAN **c91**
C. B. Leovy (Washington Univ., Seattle.) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 95-98 Sponsored by NASA (For primary document see N86-28849 19-88)
(Grant NSG-7085)
Avail: NTIS HC A14/MF A01

Analogies between the zonal wind systems in the stratospheres of Venus and Titan are examined. Venus' super-rotation wind speed is close to the value that maximizes zonal momentum pumping by the semidiurnal thermal tide. If Titan's zonal wind also maximizes pumping by this tide, the maximum equatorial super-rotation wind speed is 100 m/sec. On Venus a zonal jet structure is superimposed on the background super-rotation. It is shown that a simple scaling relation describes well the speed and latitude of low latitude jets on planets from Venus to Saturn. Applied to Titan, this scaling predicts a jet speed of 10 to 20 m/sec in the latitude belt 30 to 40 deg superimposed on the background super-rotation. ESA

N86-28862*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CLOUDS AND AEROSOLS OF TITAN'S ATMOSPHERE **c91**
Robert E. Samuelson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 99-107 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Voyager and Pioneer data on Titan's atmosphere are reviewed. Titan's cloud structure appears to consist of three basic components: a photochemical aerosol pervading the stratosphere between altitudes of 40 and 350 km; a mixture of condensed hydrocarbons and nitriles in the lower stratosphere, probably thickest between 50 and 80 km; and methane clouds between 10 and 35 km. Polarimetry, photometry, and infrared spectroscopy provide the basic data for inferring aerosol particle sizes and vertical structure. Properties of the condensates are inferred from infrared spectroscopy and radio occultation data. ESA

N86-28863*# Cornell Univ., Ithaca, N.Y. Lab. for Planetary Studies.
PHASE EQUILIBRIA IN N2-HYDROCARBON SYSTEMS: APPLICATIONS TO TITAN **c91**
W. Reid Thompson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 109-119 Sponsored by NASA (For primary document see N86-28849 19-88)

(Grants NGR-33-010-220; NGR-33-010-082)
Avail: NTIS HC A14/MF A01

Phase equilibria in the N2-CH4-C2H6-C3H8 system are modeled using an expression for activity coefficients in multicomponent systems. An accurate quantitative model of the behavior of this system is important to considerations of the ocean-atmosphere, atmosphere-cloud, and thermal equilibria in the troposphere of Titan. In the model, the interrelationship between the tropospheric gas phase CH4 abundance, the ocean composition, and temperature is well defined. Given two of these three (and the total pressure), the third variable is fixed. Given a surface inventory of any one component, the total ocean depth is also fixed. A Titan ocean seems likely, is of a single liquid phase, and is involved in a strong feedback couple with the tropospheric temperature through the thermal opacity of CH4. A large part of this opacity is contributed by the clouds, which are a liquid solution of 15 to 25 mol% N2 in CH4 below 16 km, a solid solution of 13 to 26 mol% N2 in CH4 above, and are present at a column density 0.7 gm sqcm. ESA

N86-28864# Graz Univ. (Austria). Space Research Inst.
THE UPPER ATMOSPHERE OF TITAN **c91**
S. J. Bauer *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 125-128 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Voyager 1 observations determined the predominance of N2 in Titan's upper atmosphere, its exospheric temperature, and its minor species. Electron impact on N2 within Saturn's magnetosphere appears to be the main source of the airglow emissions and of an undetected ionosphere. Escape of hydrogen from Titan seems to supply the hydrogen torus in the Saturn system, while nonthermal escape of nitrogen can account (partially) for mass loss of Titan's atmosphere since the origin of the solar system. ESA

N86-28865# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
TITAN'S HYDROGEN TORUS **c91**
W.-H. Ip *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 129-141 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Observational results and theoretical models concerning the configuration and dynamics of the Titan hydrogen torus are reviewed. The formation of other neutral gas clouds (H2, O, and N) and their physical interrelations are emphasized. The exosphere of Titan as an interface between the hydrogen torus and the ionosphere/upper atmosphere driving the synthesis of complex nitriles important to prebiotic chemistry is outlined. A combination of the orbiter measurements in the Saturnian system at large and during close encounters with Titan (with a comprehensive package of aeronomic and magnetospheric instruments) is well suited for detailed investigation of this wide range of interlocking issues. ESA

N86-28866*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
PHOTOCHEMISTRY OF TITAN **c91**
Darrell F. Strobel *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 145-148 Sponsored by NASA (For primary document see N86-28849 19-88)
(Grant NAGW-646)
Avail: NTIS HC A14/MF A01

The photochemistry of Titan's atmosphere is reviewed in the light of the Voyager Mission. The escape rate of hydrogen from Titan is controlled by photochemical production from hydrocarbons. Methane is irreversibly converted to less saturated, complex hydrocarbons which accumulate over geologic time on the surface to form an C2H6 ocean with dissolved CH4, N2, and trace organic molecules and solid C2H2 residing at the bottom of the ocean. Scientific problems which the Cassini Mission can address are discussed. ESA

N86-28867*# Hawaii Univ., Honolulu. Inst. for Astronomy.
TELESCOPIC STUDIES OF THE SATELLITES OF SATURN **c89**
Dale P. Cruikshank *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 14-156 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 (For primary document see N86-28849 19-88)
(Grant NGL-12-001-057)
Avail: NTIS HC A14/MF A01

Surface composition of Saturn's satellites (except Titan) as revealed by Earth based telescopes is discussed. Most of the satellites are icy objects with nearly pure frozen water on their surfaces. Notable exceptions are the dark hemisphere of Iapetus and the captured object Phoebe. Small amounts of nonwater contaminants may occur in the surface ices of several of the larger satellites, and Hyperion may contain a large amount of contaminant. Many unresolved questions about the nature of the Saturn satellite system remain for in situ studies by an orbiting spacecraft. ESA

N86-28868# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.
EXOBIOLOGICAL ASPECTS IN VIEW OF TITAN **c55**
G. Horneck *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 157-159 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Contributions of Cassini mission data on Titan's atmosphere to exobiology are discussed. Cassini can study the nature, abundance and degree of complexity of organic molecules including the occurrence of chirality in the clouds, on the surface of Titan, or submerged in its ocean; the transient stages and the mechanisms of organic molecule formation; and the similarities of organic compounds and of their formation processes from different cosmic sources. ESA

N86-28869# Paris-Val de Marne Univ., Creteil (France). Lab. de Physicochimie de l'Environnement.
ORGANIC CHEMISTRY ON TITAN: LABORATORY SIMULATIONS AND SPECULATION [CHIMIE ORGANIQUE DANS TITAN: EXPERIENCES DE SIMULATION EN LABORATOIRE ET SPECULATIONS] **c23**
F. Raulin *In* ESA The Atmospheres of Saturn and Tital Dec. 1985 p 161-173 In FRENCH (For primary document see N86-28849 19-88)
(Contract CNES-85-1251)
Avail: NTIS HC A14/MF A01

Laboratory simulations were used to list volatile organic composites likely to be present in Titan's atmosphere in considerable quantities. Minimum mass volumes were established for products solid at 94K, and saturation concentrations (Cm) in a variable ethane-methane solution at 94K were calculated. Results show that all the simple organic composites solidified on the surface of Titan, if it is made of such a solvent, form sediment at the bottom of the ocean. The Cm values indicate that saturation should be attained for most of the concentrations in the range 1 to 10-5 M. Ocean composition as a function of the binary mixture ethane-methane is discussed. ESA

N86-28870# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Chimie 1.
HOT ATOM CHEMISTRY AND RADIOLYSIS OF GASEOUS AND SOLID COMPONENTS OF PLANETARY ATMOSPHERES **c45**
K. Roessler *In* ESA The aTmospheres of Saturn and Titan Dec. 1985 p 175-188 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Particles with kinetic energies exceeding a few eV found in space are discussed. They induce chemical reactions different from those considered in cosmic chemistry hitherto and include endothermic reactions with high activation energies and atom-molecule interactions. This hot atom chemistry leads to the formation of molecules in rings and icy surfaces as well as in the upper atmosphere of planets and satellites. An important contribu-

tion comes from secondary particles generated by cosmic rays in the deeper layers of the atmospheres and the oceans. Laboratory simulation is performed by ion implantation and optical spectroscopy, chemical sputtering, mass spectroscopy, nuclear recoil techniques, and radiochromatography. The variation of the chemical products with the radiation dose gives information on radiation chemistry in space. ESA

N86-28871# Centre National de la Recherche Scientifique, Orleans (France). Centre de Biophysique Moleculaire.
SEARCH FOR CHIRAL MOLECULES AND OPTICAL ACTIVITY IN EXTRATERRESTRIAL SYSTEMS. THE CASSINI MISSION OPPORTUNITY **c55**
Andre Brack and Gerard Spach (Rouen Univ. France) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 189-191 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The genesis of homochiral systems and the conditions which dictate the choice of a given set of enantiomers rather than the antipode are discussed. Examination of extraterrestrial organic molecules may give clues if life based on carbon chemistry is sought. Where life is expected to exist (Mars), the detection of optical activity may be a good indication of its presence. The situation is different on Titan which is still in its phase of chemical evolution. The most simple possible derivatives devoid of oxygen atoms are listed. Search for optical activity on Titan raises difficult technical problems which, once solved, may be helpful for further exploration of other planets. ESA

N86-28872# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
GROUND-BASED HIGH RESOLUTION SPECTROSCOPY OF SATURN AND TITAN **c89**
Catherine deBergh *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 195-202 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Ground based spectroscopic studies of Saturn determined the C/H ratio and D/H ratio in methane, the C12/C13 ratio, and the D/H ratio in hydrogen. The characteristics and location of the upper cloud layers were studied. Methane absorptions were used to interpret Titan spectra. Millimetric studies of PH3 vertical distribution and signatures of species such as HCP were unsuccessful. Carbon monoxide is detected on Titan at 1.6 microns. The D/H ratio in methane was measured, also at 1.6 microns, contributing to knowledge of the origin of deuterium in the Solar System. ESA

N86-28873# California Univ., Berkeley. Dept. of Astronomy.
VLA-OBSERVATIONS OF SATURN: CAN WE DO BETTER FROM SPACE **c89**
Imke dePater *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 203-208 (For primary document see N86-28849 19-88) (Grant NSF AST-84-05358)
Avail: NTIS HC A14/MF A01

High resolution radio observations of Saturn obtained with the VLA at different wavelengths and different viewing aspects of the ring plane are discussed. Deficiencies of ground based observations in general and interferometric (VLA) observations in particular are emphasized. Two major problems are identified: the uncertainties of the absolute flux calibration, and the relatively low dynamic range obtained in ground-based planetary maps. Observations from space with a much smaller telescope (1 m) in orbit around Saturn can alleviate these problems and aid studies of Saturn's atmosphere and rings. ESA

N86-28874# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
THE CASSINI MISSION: COMPLEMENTARY OBSERVATIONS WITH THE SPACE TELESCOPE **c89**
Renee Prange *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 209-217 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The Space Telescope and its five focal instruments are presented and their characteristics ar summarized. Choice of an instrument for a given observation is discussed. Observations of the Saturn and Titan atmospheres, including Saturn's photochemistry, atmospheric circulation, center-to-limb variations, D/H ratio, H2 emissions, auroras, rings, icy satellites, and spokes by the Space Telescope are suggested. For Titan, observations of the nitrogen atmosphere, prebiotic molecules, and the hydrogen torus are proposed. ESA

N86-28875# State Univ. of New York, Stony Brook. Earth and Space Science Dept.
EARTH-ORBITING TELESCOPES IN THE CASSINI ERA **c89**
John Caldwell *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 219-222 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Two satellites expected to provide important observational capability for planetary studies before and during the operational phase of the Cassini project are described: the Hubble Space Telescope, and the Far Ultraviolet Spectroscopic Explorer. For the former, initial complement of instruments; initial observing plans; and prospects for second generation instruments are discussed. For the latter telescope, desired features are listed. ESA

N86-28876*# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE CASSINI MISSION TO SATURN AND TITAN. AN OVERVIEW **c12**
Jean-Pierre Lebreton *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 225-232 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The Cassini mission to Saturn and Titan scientific and technical aspects are summarized. The mission will study Saturn's atmosphere, rings, icy satellites, and magnetosphere. It will study Titan's atmosphere (abundances, gas distributions, winds and temperature, upper atmosphere) and surface composition. Cassini is planned for launch in May 1994 by the Space Shuttle. The combined Orbiter and Probe will be delivered to Saturn via a delta-Vega trajectory which requires a flight time of 7.7 yr. Opportunities for asteroid flybys occur twice during the interplanetary cruise to Saturn. Upon arrival at Saturn in January 2002, the Orbiter and Probe combination will be placed into an initial 3 months orbit. Near the end of this first orbit, the Orbiter will target the Probe for delivery to Titan. During the Probe mission, the Orbiter will act as a data relay station, transmitting the Probe data to the Earth. ESA

N86-28877*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE TOUR DESIGN FOR THE CASSINI MISSION **c12**
Roger E. Diehl *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 233-243 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The mission design for the Cassini satellite tour of Saturn is described. The use of Titan encounters for gravity-assisted trajectory shaping to satisfy atmosphere, magnetosphere, and satellite science requirements is discussed. Three candidate satellite tours that illustrate the tradeoffs between different strategies to satisfy the science objectives are presented. Tour characteristics for a 4yr mission include at least 30 Titan encounters to provide a minimum of 90 deg orbit rotation for either a magnetotail petal orbit or noon petal orbit; evenly distributed Titan ground tracks for radar mapping coverage; at least 2 Iapetus and 1 Enceladus close flybys; inclined orbits during the first 3 yr to provide Earth and Sun occultations by Saturn and its rings; and Polar orbits during the fourth year. ESA

N86-28878*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CASSINI-TITAN PROBE CONCEPT **c18**
G. E. N. Scoon *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 245-260 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The Cassini mission Titan Probe is modular in design, provides the necessary accommodation for the scientific instruments, and has the dynamic performance needed to withstand the environmental loads associated with a targeted entry into Titan's atmosphere. Cassini target launch date is in May 1994 using the Space Shuttle/Centaur G Prime launch vehicle. The combined Orbiter and Probe spacecraft is delivered to the Saturn system via a delta-Vega trajectory, which requires a flight time of 7.7 yr. Opportunities for asteroid flybys will occur as the spacecraft traverses the asteroid belt, which happens twice during the interplanetary cruise to Saturn. Arrival at Saturn is predicted for January 2002, when the Orbiter and Probe combination will be placed into an initial 3 month orbit. Near the end of this first orbit, the Orbiter targets the Probe for separation and delivery to Titan. ESA

N86-28879*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CASSINI: THE IMAGING EXPERIMENT **c12**
Torrence V. Johnson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 261-265 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Imaging techniques for Cassini mission objectives in Saturn atmosphere, Titan atmosphere, satellites and rings, and magnetosphere are discussed. The Cassini strawman payload suggests at least two imaging systems, a long focal length, narrow angle camera and a shorter focal length, wide angle camera. The sensors will be CCD chips with large dynamic range, linear response, and infrared sensitivity (to 1.0 micrometers). The Galileo 1500 mm focal length system with an 800x800 CCD forms the basis of at least one design which could meet the high resolution requirements of Cassini. However, since the Cassini orbiter is planned to be the second Mariner Mark 2 spacecraft, the final camera design will be influenced by the facility imaging system planned for the CRAF mission, the first Mariner Mark 2. As planned, this is a combination of a narrow and a wide angle camera designed for improved performance and lower weight compared to the Galileo system. ESA

N86-28880# California Inst. of Tech., Pasadena.
MICROWAVE SPECTROSCOPY AND RADIOMETRY OF SATURN AND TITAN **c89**
Duane O. Muhleman *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 267-279 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Experiments using microwave emission techniques for the investigation of the deep atmosphere of Saturn, the ring system, and the entire atmosphere of Titan and its surface are described. A microwave spectrometer and radiometer system is being designed for the Cassini mission. It would sound the atmosphere of Saturn in the 0.5 to 15 bar pressure range at wavelenghts of 2 and 13 cm. It would map Saturn's ring in thermal emission at wavelengths of 3 mm and 2 cm and measure the polarization of the scattered radiation at 2 cm. A system consisting of 1 or 2 receivers to sound the atmosphere of Titan from the cold trap to 500 km altitude to determine temperature, pressure of the atmosphere as a function of altitude and mixing ratio profiles of certain species is discussed. Surface emission of Titan at 2 cm is considered. ESA

N86-28881*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NEUTRAL MASS SPECTROMETRY AND GAS CHROMATOGRAPHY **c89**
Hasso B. Niemann *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 271-279 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Astronomical uses of mass spectrometers and gas chromatographs are reviewed. Mass spectrometers were employed to measure the chemical composition of the atmospheres of Mars and Venus, and a mass spectrometer is part of the Galileo mission to Jupiter. Gas chromatographs were used successfully on the Pioneer Venus mission and on the Venera 11 and 12 missions. The only gas chromatograph-mass spectrometer combination ever flown in a planetary mission was on the Viking Lander. A gas chromatograph-mass spectrometer system which alternatively takes atmospheric gas samples directly into the mass spectrometer, or indirectly through a chromatographic column, or an aerosol pyrolyzer, is proposed for the analysis of the atmosphere of Titan using an entry probe. ESA

N86-28882# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
AN AEROSOL COLLECTOR PYROLYSER FOR THE CASSINI TITAN PROBE **c19**
Guy Israel *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 281-286 Sponsored by SNIAS (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Aerosol sampling during the descent of a Titan probe, as proposed in the Cassini mission, is recommended. The preferred analytical method is pyrolysis in which the gas products can be identified by the mass spectrometer and/or mass spectrometer-gas chromatograph instruments which will be part of the probe payload. Sampling aerosols in the region 60 to 30 km seems the best way to determine the nature and importance of the organic polymers incorporated in the aerosols of the condensed clouds. Another region for sampling is envisaged in the upper part of the atmosphere (200 to 70 km). Studies on the collecting plates, and the pneumatic and mechanical systems are described. ESA

N86-28883# Arizona Univ., Tucson. Lunar and Planetary Lab.
AERONOMICAL MEASUREMENTS BY CASSINI **c91**
Donald M. Hunten *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 287-288 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

The capability of the instruments on the proposed Cassini payload to make in-situ and remote measurements of Titan's upper atmosphere is discussed. The multiple fly-throughs of the Orbiter at heights well below the ionospheric peak offer an opportunity for detailed aeronomical studies of this atmosphere. They will be supplemented by solar and stellar occultations and measurements of airglow and aurora on Titan and Saturn. ESA

N86-28884# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
THE DISCOVERY OF THE SATURN SYSTEM: CASSINI'S LIFE AND ACTIVITY **c99**
Marcello Fulchignoni *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 289-294 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Cassini's life and activity are reviewed. His discovery of Iapetus, Rhea, Thetys, and Dione, and his description of the gap in the Saturn ring (Cassini division) are described. ESA

N86-28885# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
INFRARED SPECTROSCOPY ABOARD CASSINI **c89**
Daniel Gautier *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 297-305 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Information on thermal structures and compositions of Saturn

and Titan atmospheres which can be retrieved from spectroscopy of the far infrared, submillimeter, and microwave spectra emitted by these objects is analyzed. The corresponding instrumentation proposed aboard the Orbiter of the Cassini mission is described. ESA

N86-28886# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
[ACTIVITIES REPORT OF THE ISTITUTE OF INTERPLANETARY SPACE PHYSICS] Annual Report, 1984 [RELAZIONE SULLATTIVITA SVOLTA NELLANNO 1984]
Mar. 1985 57 p In ITALIAN
(IFSI-85-3; ESA-86-97087) Avail: NTIS HC A04/MF A01
A cosmic ray detection station; a high altitude solar neutron detector; cosmic ray data analysis; tethered satellite systems; gravitational waves; Giotto satellite system; and infrared astronomy are discussed. ESA

N86-28887# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
PARTICIPATION OF THE INSTITUTE OF INTERPLANETARY SPACE PHYSICS (IFSI) IN THE STUDY OF HALLEY'S COMET [PARTECIPAZIONE DELL IFSI ALLO STUDIO DELLA COMETA DI HALLEY]
Jun. 1985 16 p In ITALIAN Original contains color illustrations
(IFSI-85-7; ESA-86-97091) Avail: NTIS HC A02/MF A01
The design of the Giotto satellite is discussed. The corresponding experiments include measurement of the energy and mass distribution of positive ions near the comet, high temporal resolution measurement of the magnetic field, observation of gas and particles in 10 different wavelengths by a dedicated design camera, ultraviolet measurements in the vicinity of the comet, and visible spectrum observations from Earth using a charged coupled device camera. ESA

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-28888# Royal Observatory, Edinburgh (Scotland).
OCCASIONAL REPORTS OF THE ROYAL OBSERVATORY, EDINBURGH
1985 22 p
(ISSN-0309-099X; ESA-85-96548) Avail: NTIS HC A02/MF A01
A multiobject fiber-optics coupler for the 1.2 m UK Schmidt Telescope (UKST); the UKST plate scale;and a design for a large altazimuth Schmidt telescope are discussed. For individual titles, see N86-28889 through N86-28891.

N86-28889# Royal Observatory, Edinburgh (Scotland).
A MULTIPLE-OBJECT FIBRE-OPTICS COUPLER FOR THE 1.2 MICRON UK SCHMIDT TELESCOPE
F. G. Watson and J. A. Dawe *In its* Occasional Reports of the Royal Observatory, Edinburgh 1985 p 1-7 (For primary document see N86-28888 19-89)
Avail: NTIS HC A02/MF A01
The rationale for and design of a spectrograph coupler for a wide-field Schmidt astronomical telescope are presented. System performance is estimated as 0.14 overall transmission, compared to 0.23 for a Cassegrain reflector. ESA

N86-28890# Royal Observatory, Edinburgh (Scotland).
THE PLATE SCALE OF THE UK SCHMIDT TELESCOPE
R. W. Argyle and P. R. Standen *In its* Occasional Reports of the Royal Observatory, Edinburgh 1985 p 9-13 (For primary document see N86-28888 19-89)
Avail: NTIS HC A02/MF A01
Plate scales for 137 plates of the South Galactic Pole were derived. The effect on expansion coefficients of using dome temperatures or invar rod temperatures is discussed. ESA

N86-28891# Royal Observatory, Edinburgh (Scotland).
DESIGN FOR A LARGE ALTAZIMUTH SCHMIDT TELESCOPE
J. A. Dawe and F. G. Watson *In its* Occasional Reports of the Royal Observatory, Edinburgh 1985 p 15-18 (For primary document see N86-28888 19-89)
Avail: NTIS HC A02/MF A01
A case for the construction of a large altazimuth Schmidt telescope for ground-based optical astronomy is presented. The statistical nature of most astronomical research suggests that the use of a single, medium-sized optical train to look at many objects simultaneously is effective and cheap. ESA

N86-28892*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A COMPARISON OF STAR FORMATION CHARACTERISTICS IN DIFFERENT TYPES OF IRREGULAR GALAXIES Final Technical Report
S. S. Lamb, D. A. Hunter (Carnegie Institution of Washington, D. C.), and J. S. III Gallagher (Kitt Peak National Observatory, Tucson, Ariz.) 8 Jul. 1986 5 p
(Grant NAG5-404)
(NASA-TM-88779; NAS 1.15:88779) Avail: NTIS HC A02/MF A01 CSCL 03A
Two regions of recent star formation in blue irregular galaxies were observed with the IUE in the short wavelength, low dispersion mode. The spectra indicates that the massive star content is similar in these regions and is best fit by massive stars formed in a burst and now are approximately 2.5 to 3.0 million years old. Author

N86-28893# Cambridge Univ. (England). Inst. of Astronomy.
[ACTIVITIES REPORT OF THE INSTITUTE OF ASTRONOMY] Annual Report, 1984-1985
1985 46 p
(ESA-86-97103) Avail: NTIS HC A03/MF A01
Research on the Sun and stars; star clusters; galaxies; galactic clusters; quasars; cosmology; relativity and fluid mechanics; and astrometry is summarized. ESA

N86-28894# Royal Greenwich Observatory, Herstmonceux (England).
CARLSBERG MERIDIAN CATALOG. LA PALMA NUMBER 1: OBSERVATIONS OF POSITIONS OF STARS AND PLANETS MADE IN THE YEAR 1984
1985 129 p Sponsored by Carlsberg Foundation, Danish Natural Science Research Council, and UK Science and Engineering Research Council Prepared in cooperation with Copenhagen University and Instituto y Observatorio Astronomico de Marina
(ESA-86-97121) Avail: NTIS HC A07/MF A01
The positions in the FK4 system for the equinox J2000.0, proper motions, and magnitudes of 5292 stars north of -45 deg declination are given. The stars include 2369 AGK3R, 1296 SRS, 227 PZT, and 838 faint reference stars around benchmark radio sources with a limiting magnitude of 13.5. The zenith mean errors are sigma alpha cos delta = 0'.193, sigma delta = 0'.184, and sigma m = 0m.054. The proper motion mean errors are typically 0'.003 per year. The catalog also contains 857 observations of solar system objects. Cross-references are given to DM, AGK3, SAO, HD, GC, and the double star catalogs ADS and IDS. ESA

N86-28895# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
OBSERVATION OF CENTAURUS A IN THE MeV GAMMA RANGE [BEOBACHTUNG VON CENTAURUS A IM MeV-GAMMABEREICH]
Peter vonBallmoos Dec. 1985 119 p In GERMAN
(MPE-193; ISSN-0178-0719; ESA-86-96934) Avail: NTIS HC A06/MF A01
The active galactic nucleus of Cen A was observed in the range of low energy (0.7 to 20 MeV) gamma radiation. The measurements were conducted in a balloon campaign using a Compton telescope. The identification of the source used an imaging technique called the pi-method. In order to simplify the source identification in the pi-charts, these are compared with

model charts resulting from Monte Carlo calculations. A thorough understanding of the telescope characteristics (especially the point image function) was decisive for the development of the pi-method. The determined spectral index and the magnitude of the excess agree very well with measurement in the hard X-ray range. The measurement, however, surprises by the significant photon flux in the high energy part of the spectrum, confirming that the luminosity of Cén A in the MeV gamma range is larger than in any other part of the electromagnetic spectrum. Three models to explain the measured spectrum are discussed. ESA

N86-28835# Osmania Univ., Hyderabad (India). Centre of Advanced Study in Astronomy.
MULTIPLICITY AMONG ECLIPSING BINARIES
K. D. Abhyankar *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 4 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28836# Uttar Pradesh State Observatory, Naini Tal (India).
RS CVn BINARIES
J. B. Srivastava *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 15 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28837# Osmania Univ., Hyderabad (India). Centre for Advanced Study in Astronomy.
MODELS FOR RS CVn BINARIES
P. Vivekananda Rao and M. B. K. Sarma *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 6 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28838# Indian Inst. of Astrophysics, Bangalore.
REFLECTION EFFECT IN CLOSE BINARIES
A. Peraiah *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 20 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28839# Osmania Univ., Hyderabad (India). Centre of Advanced Study in Astronomy.
BINARY AND MULTIPLE GALAXIES
G. M. Ballabh *In its* Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28841# Tata Inst. of Fundamental Research, Bombay (India).
GRAVITATIONAL LENSES AND MULTIPLE QUASARS
S. M. Chitre *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 6 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28842# Tata Inst. of Fundamental Research, Bangalore (India). Radio Astronomy Centre.
JETS IN QUASARS
D. J. Saikia *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 16 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28867*# Hawaii Univ., Honolulu. Inst. for Astronomy.
TELESCOPIC STUDIES OF THE SATELLITES OF SATURN
Dale P. Cruikshank *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 14-156 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 (For primary document see N86-28849 19-88)
(Grant NGL-12-001-057)
Avail: NTIS HC A14/MF A01

N86-28872# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
GROUND-BASED HIGH RESOLUTION SPECTROSCOPY OF SATURN AND TITAN
Catherine deBergh *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 195-202 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28873# California Univ., Berkeley. Dept. of Astronomy.
VLA-OBSERVATIONS OF SATURN: CAN WE DO BETTER FROM SPACE
Imke dePater *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 203-208 (For primary document see N86-28849 19-88)
(Grant NSF AST-84-05358)
Avail: NTIS HC A14/MF A01

N86-28874# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
THE CASSINI MISSION: COMPLEMENTARY OBSERVATIONS WITH THE SPACE TELESCOPE
Renee Prange *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 209-217 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28875# State Univ. of New York, Stony Brook. Earth and Space Science Dept.
EARTH-ORBITING TELESCOPES IN THE CASSINI ERA
John Caldwell *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 219-222 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28880# California Inst. of Tech., Pasadena.
MICROWAVE SPECTROSCOPY AND RADIOMETRY OF SATURN AND TITAN
Duane O. Muhleman *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 267-279 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28881*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NEUTRAL MASS SPECTROMETRY AND GAS CHROMATOGRAPHY
Hasso B. Niemann *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 271-279 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28885# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
INFRARED SPECTROSCOPY ABOARD CASSINI
Daniel Gautier *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 297-305 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-28896*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex. Solar System Exploration Dept.
METASTABLE CARBON IN TWO CHONDRITIC POROUS INTERPLANETARY DUST PARTICLES
Frans J. M. Rietmeijer and Ian D. R. Mackinnon (New Mexico

Univ., Albuquerque.) 1986 15 p Submitted for publication
(Contract NAS9-15800)
(NASA-CR-177200; NAS 1.26:177200; LEMSCO-22925) Avail: NTIS HC A02/MF A01 CSCL 03B

An understanding of carbonaceous matter in primitive extraterrestrial materials is an essential component of studies on dust evolution in the interstellar medium and the early history of the Solar System. Analytical Electron Microscopy (AEM) on carbonaceous material in two Chondritic Porous (CP) aggregrates is presented. The study suggests that a record of hydrocarbon carbonization may also be preserved in these materials. B.G.

N86-28897*# Wisconsin Univ., Madison. Dept. of Physics.
LIMITS ON CORONAL MATERIAL IN NORMAL GALAXIES Final Technical Report, 1 May 1982 - 30 Apr. 1986
Dan McCammon Jul. 1986 38 p
(Grant NAG8-431)
(NASA-CR-177195; NAS 1.26:177195) Avail: NTIS HC A03/MF A01 CSCL 03B

Measurements of the X-ray surface brightness of a face on disk galaxy M101, have previously been used to place upper limits on the power radiated by a hot corona. Such analysis contrains the effective density of the disk; either it must be so low that the remnants drive a fast hot wind (low radiated power) or so high that the remnant temperature at overlap is low (low X-ray power). These X-ray measurements are here used to constrain the properties of the population of supernova remnants evolving in the disk. This adds a further constraint since young remnants evolving in higher density radiate more of their energy in X-rays, whether or not they eventually overlap to generate a hot corona. The strength of this second limit depends strongly on the density history of the remnants and on the assumed supernova rate. For evaporative evolution the analysis rules out McKee and Ostriker ISM model in particular and evaporative evolution in general unless the supernova rate is at least several times lower than current expectations. For standard Sedov evolutions, the density limit marginally admits evolution in 0.2 cu m, a popular alternative to the McKee and Ostriker model. Author

N86-28898*# Texas Univ., Austin. Dept. of Astronomy.
MOLECULAR CLOUDS IN THE OUTER GALAXY 1: FAR INFRARED OBSERVATIONS
Kathryn N. Mead, Marc L. Kutner, Neal J. Evans, II, Paul M. Harvey, and Bruce A. Wilking 1986 17 p Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.
(Grant NAG2-198)
(NASA-CR-177127; NAS 1.26:177127) Avail: NTIS HC A02/MF A01 CSCL 03B

From the Kuiper Airborne Observatory, far infrared emission were detected from 4 molecular clouds in the outer galaxy. Eleven areas in 6 clouds were observed at 50 and 100 microns. The far-infrared luminosities indicate the presence of stars with spectral types ranging from B3 to O7. Therefore, despite the fact that these clouds have lower CO line temperatures than comparable clouds in the inner galaxy, they are giving birth to massive stars. Author

N86-28899# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
DUST PARTICLES DETECTED NEAR GIACOBINI-ZINNER BY THE ICE PLASMA WAVE INSTRUMENT Progress Report
D. A. Gurnett, T. F. Averkamp, F. L. Scarf, and E. Gruen 24 Jan. 1986 24 p
(Contract N00014-85-K-0404)
(AD-A165633; U-OF-IOWA-86-6) Avail: NTIS HC A02/MF A01 CSCL 03/1

During the International Cometary Explorer (ICE) flyby of Giacobini-Zinner the plasma wave instrument detected numerous impulsive signals caused by dust impacts on the spacecraft. Most of the impacts occurred within 30,000 km of the comet. The impact rate averaged over the inbound and outbound legs varies approximately as 1/r-square, as would be expected for an isotropic constant velocity radial outflow. Small differences between the inbound and outbound legs exist which may be indicative of azimuthal variations in the dust production rate. A simple model of the impact ionization and charge collection by the antenna indicates that the particles have a mass on the order of 10 to the -12th power to 10 to the -10th power gm, corresponding to particles with radii of a few microns. GRA

N86-28812*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METEORITE CONCENTRATION MECHANISMS IN ANTARCTICA
John O. Annexstad *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 23-25 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28813*# Pittsburgh Univ., Pa. Dept. of Geology and Planetary Science.
METEORITES AND THE ANTARCTIC ICE SHEET
W. A. Cassidy *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 26-27 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28814*# Smithsonian Institution, Washington, D. C. Div. of Meteorites.
ANTARCTIC IRON METEORITES: AN UNEXPECTEDLY HIGH PROPORTION OF FALLS OF UNUSUAL INTEREST
Roy S. Clarke, Jr. *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 28-29 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28815*# Federal Inst. for Geosciences and Natural Resources, Hannover (West Germany).
DISCOVERY OF METEORITES ON A BLUE-ICE FIELD NEAR THE FRONTIER MOUNTAINS, NORTH VICTORIA LAND, ANTARCTICA
G. Delisle, H.-C. Hoefle, R. Thierbach, and L. Schultz (Max-Planck-Inst. fuer Chemie, Main, West Germany) *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 30-33 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28816*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
MYSTERIOUS IODINE-OVERABUNDANCE IN ANTARCTIC METEORITES
G. Dreibus, H. Waenke, and L. Schultz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 34-36 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28817*# Cambridge Univ. (England). Polar Research Inst.
ENTRAINMENT, TRANSPORT AND CONCENTRATION OF METEORITES IN POLAR ICE SHEETS
D. J. Drewry *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 37-47 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28818*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
WEATHERING OF STONY METEORITES IN ANTARCTICA
J. L. Gooding *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 48-54 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28820*# Gakushuin Univ., Tokyo (Japan). Dept. of Chemistry.
RADIOCARBON DATINGS OF YAMATO METEORITES
K. Kigoshi and E. Matsuda *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 58-60 (For primary

document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28821*# Bern Univ. (Switzerland). Lab. fuer Radiochemie.
ELEMENT DISTRIBUTION AND NOBLE GAS ISOTOPIC ABUNDANCES IN LUNAR METEORITE ALLAN HILLS A81005
U. Kraehenbuehl, O. Eugster, and S. Niedermann *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 61-64 Sponsored in part by Swiss National Science Foundation (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28822*# Warsaw Univ. (Poland). Dept. of Chemistry.
THERMOANALYTICAL CHARACTERIZATION OF SEVERAL ANTARCTIC METEORITES
B. Lang, A. Grodzinski, and L. Stoch (Academy of Mining and Metallurgy, Cracow, Poland) *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 65-67 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28823*# Purdue Univ., West Lafayette, Ind. Dept. of Chemistry.
TRACE ELEMENTS IN ANTARCTIC METEORITES: WEATHERING AND GENETIC INFORMATION
M. E. Lipschutz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 68-70 (For primary document see N86-28811 19-88)
(Grants NAG9-48; NSF DPP-81-11513; DEFG-0280-ER-10725)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28824*# California Univ., San Diego, La Jolla. Dept. of Chemistry.
TERRESTRIAL AND EXPOSURE HISTORIES OF ANTARCTIC METEORITES
K. Nishiizumi *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 71-73 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28826*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
RARE AND UNIQUE METEORITES FROM ANTARCTICA
H. Palme *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 77-79 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28827*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
TERRESTRIAL AGES OF ANTARCTIC METEORITES: IMPLICATIONS FOR CONCENTRATION MECHANISMS
Ludolf Schultz *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 80-82 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28828*# Arkansas Univ., Fayetteville. Dept. of Chemistry and Biochemistry.
THERMOLUMINESCENCE AND ANTARCTIC METEORITES
Derek W. G. Sears and Fouad A. Hasan *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 83-100 (For primary document see N86-28811 19-88)
(Grant NAG9-81)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28829*# Otago Univ., Dunedin (New Zealand). Dept. of Geology.
A PRELIMINARY REPORT ON A POSSIBLE STROMATOLITE FIND FROM THE ELEPHANT MORAINE, ANTARCTICA: A POTENTIAL DIRECTIONAL INDICATOR FOR ICE MOVEMENT
P. P. Sipiera and C. A. Landis *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 101-103 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28830*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
THERMOLUMINESCENCE OF ANTARCTIC METEORITES: A RAPID SCREENING TECHNIQUE FOR TERRESTRIAL AGE ESTIMATION, PAIRING STUDIES AND IDENTIFICATION OF SPECIMENS WITH UNUSUAL PREFALL HISTORIES
S. R. Sutton and R. M. Walker *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 104-106 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28831*# Tokyo Univ. (Japan). Mineralogical Inst.
PARENT SOURCES OF ANTARCTIC METEORITES AS INFERRED FROM PAIRING OF THE SPECIMENS
Hiroshi Takeda *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 107-109 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28832*# Cologne Univ. (West Germany). Dept. of Nuclear Chemistry.
METEORITIC ABLATION AND FUSION SPHERULES IN ANTARCTIC ICE
K. Thiel, J. Peters, G. M. Raisbeck (Centre National de la Recherche Scientifique, Orsay, France), and F. Yiou *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 110-112 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28833*# National Inst. of Polar Research, Tokyo (Japan).
OVER 5,600 JAPANESE COLLECTION OF ANTARCTIC METEORITES: RECOVERIES, CURATION AND DISTRIBUTION
K. Yanai and H. Kojima *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 113-116 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28840# Cambridge Univ. (England). Inst. of Astronomy.
GALAXY CLUSTERING
William C. Saslaw *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p Prepared in cooperation with Virginia Univ., Charlottesville and National Radio Astronomy Observatory, Charlottesville, Va. (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28843# Tata Inst. of Fundamental Research, Bombay (India).
RADIO AND X-RAY EMISSION IN RADIO-LOUD QUASARS
Ajit Kembhavi *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 10 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28845# Tata Inst. of Fundamental Research, Bombay (India).
NATURE OF COMETS
K. S. Krishna Swamy *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 14 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28846# Raman Research Inst., Bangalore (India).
NON-LTE PROCESS IN THE INTERSTELLAR MEDIUM
K. R. Anantharamaiah *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 7 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28848# Indian Inst. of Astrophysics, Bangalore.
ABUNDANCE GRADIENT IN INTERSTELLAR MEDIUM
Sunetra Giridhar *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 13 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N86-28900*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC PROPERTIES OF JUPITER'S TAIL AT DISTANCES FROM 80-7500 JOVIAN RADII
M. L. Goldstein, R. P. Lepping, and E. C. Sittler, Jr. Sep. 1984 64 p
(NASA-TM-86159; NAS 1.15:86159) Avail: NTIS HC A04/MF A01 CSCL 03B

A detailed study of the magnetic field data from both Voyagers 1 and 2 has revealed several interesting properties of the near and distant Jovian magnetotail. During the first encounter, as Voyager 1 passed between 80 and 140 R sub J from Jupiter in the near tail, the spacecraft was almost entirely in the northerm lobe magnetic field. The frequency spectrum of magnetic fluctuation in this region cannot be characterized by a power law and does not appear to be turbulent. The distant tail spectra from Voyager 2 are compared with similar spectra obtained from Voyager 1 when it was in near radial alignment with Voyager 2. Although the gross properties of the tail and solar wind fields in most respects differ considerably, the shape and power levels of the spectra of the magnetic fluctuations are very similar, especially between .0001 and .001 Hz. At lower frequencies (.00001 to .0001 Hz) the spectra of magnetic helicity do differ. Author

N86-28901# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
A THREE-DIMENSIONAL SELF CONSISTENT MODEL OF THE PLASMA INTERACTION BETWEEN IO AND THE MAGNETOSPHERE OF JUPITER [EIN DREIDIMENSIONALES SELBSTKONSISTENTES MODELL DER PLASMAWECHSELWIRKUNG ZWISCHEN IO UND DER JUPITERMAGNETOSPHAERE]
D. Wolf-Gladrow, A. Ebel, ed., F. M. Neubauer, ed., E. Raschke, ed., and P. Speth, ed. 1985 103 p In GERMAN
(Mitt-45; ISSN-0069-5882; ESA-86-96919) Avail: NTIS HC A06/MF A01

A model of the interaction between Io and the Jupiter magnetosphere was developed, complementary to the model of Luzemann. The three dimensional model allows the self consistent calculation of the electric field, current distribution, and magnetic field in the neighborhood of Io, as well as in the Alfven wave tubes if the conductivities in the ionosphere are given. The electric and magnetic fields are important for the calculation of particle orbits. The current of 2.8 million A deduced from Voyager measurement in the southern Alfven wave tube can be explained by the model. The magnetic field perturbations can reach values above 200 nT. Investigations which can be performed without major changes of the programs are proposed. ESA

N86-28292*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE VENUS BALLOON PROJECT
C. T. Stelzried, R. A. Preston, C. E. Hildebrand, J. H. Wilcher, and J. Ellis *In its* The Telecommunications and Data Acquisition Report 15 May 1986 8 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 03B

N86-28825*# Physical Research Lab., Ahmedabad (India).
WEATHERING EFFECTS AND SOLAR COMPONENTS IN TWO ALLEN HILLS CHONDRITES
J. T. Padia and M. N. Rao *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 74-75 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28844# Indian Inst. of Astrophysics, Bangalore.
MINOR PLANETS AND PLANETARY RINGS
J. C. Bhattacharyya *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 10 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

N86-28850# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIOR OF SATURN
Jonathan I. Lunine *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 11 p Sponsored by Arizona Univ., Tuscon (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28851# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
THE COMPOSITION OF SATURN'S ATMOSPHERE
R. Courtin *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 13-20 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28852# Observatoire de Paris-Meudon (France).
THERMAL STRUCTURE OF SATURN'S ATMOSPHERE
B. Bezard *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 21-31 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28854*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
THEORIES FOR THE GENERAL CIRCULATION OF SATURN'S ATMOSPHERE
Michael Allison *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 43-52 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28855# Arizona Univ., Tucson. Lunar and Planetary Lab.
CLOUDS AND AEROSOLS ON SATURN
M. G. Tomasko and L. R. Doose *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 53-61 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28856*# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
UPPER ATMOSPHERE AND IONOSPHERE OF SATURN
S. K. Atreya (Michigan Univ., Ann Arbor.) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 63-68 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28858# Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
THE COMPOSITION OF THE TITAN ATMOSPHERE
Daniel Gautier *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 75-81 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28859# Arizona Univ., Tucson. Lunar and Planetary Lab.
TITAN'S SURFACE: NATURE AND IMPLICATIONS FOR CASSINI
Jonathan I. Lunine *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 83-88 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28860*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THERMAL STRUCTURE AND METEOROLOGY OF TITAN
Barney J. Conrath *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 89-94 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28861*# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
ZONAL WIND IN THE STRATOSPHERE OF TITAN
C. B. Leovy (Washington Univ., Seattle.) *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 95-98 Sponsored by NASA (For primary document see N86-28849 19-88)
(Grant NSG-7085)
Avail: NTIS HC A14/MF A01

N86-28862*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CLOUDS AND AEROSOLS OF TITAN'S ATMOSPHERE
Robert E. Samuelson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 99-107 Sponsored by NASA (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28863*# Cornell Univ., Ithaca, N.Y. Lab. for Planetary Studies.
PHASE EQUILIBRIA IN N2-HYDROCARBON SYSTEMS: APPLICATIONS TO TITAN
W. Reid Thompson *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 109-119 Sponsored by NASA (For primary document see N86-28849 19-88)
(Grants NGR-33-010-220; NGR-33-010-082)
Avail: NTIS HC A14/MF A01

N86-28864# Graz Univ. (Austria). Space Research Inst.
THE UPPER ATMOSPHERE OF TITAN
S. J. Bauer *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 125-128 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28865# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
TITAN'S HYDROGEN TORUS
W.-H. Ip *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 129-141 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

N86-28866*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
PHOTOCHEMISTRY OF TITAN
Darrell F. Strobel *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 145-148 Sponsored by NASA (For primary document see N86-28849 19-88)
(Grant NAGW-646)
Avail: NTIS HC A14/MF A01

N86-28883# Arizona Univ., Tucson. Lunar and Planetary Lab.
AERONOMICAL MEASUREMENTS BY CASSINI
Donald M. Hunten *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 287-288 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-28902# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
LATITUDINAL GRADIENTS OF THE SOLAR WIND PARAMETERS DURING 1976 AND 1977: HELIOS 1, 2 AND IMP IN-SITU OBSERVATIONS
R. Bruno, V. Villante, B. Bavassano, and R. Schwenn (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).) Apr. 1985 26 p
(IFSI-85-5; ESA-86-97089) Avail: NTIS HC A03/MF A01

Interplanetary observations from Helios 1, Helios 2 and IMP spacecraft during the early portion of solar cycle 21 were used to investigate the latitudinal gradients of solar wind parameters with respect to the angular displacement from the current sheet inferred from synoptic white-light maps of the solar corona at 1.75 solar radii. Large latitudinal gradients for solar wind flow speed, proton density, and temperature are found. All these gradients become smoother towards the solar cycle maximum. Neither latitudinal nor temporal variations for magnetic flow and thermal energy density are identified. ESA

N86-28903# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COMPOSITION AND PROPERTIES OF IONS STREAMING IN THE PLASMA MANTLE AND IN THE LOBE
S. Orsini, M. Candidi, and H. Balsiger (Bern Univ., Switzerland) Jan. 1986 28 p
(IFSI-86-1; ESA-86-97100) Avail: NTIS HC A03/MF A01

The ISEE-1 Ion Composition Experiment detects ionospheric and solar wind ions streaming tailward with the same parallel velocity in the open magnetic field lines regions of the geomagnetotail, at distances from 10 Re to 20 Re. This is an effect of the so called magnetospheric mass spectrometer which organizes these streams, allowing those ion having a certain flow velocity to get at a certain point down the tail. This effect mixes solar wind and ionospheric particles, thus filling the plasma mantle and the lobe region with a multicomponent plasma, cold, collimated, flowing with several energies, one for every ion species involved in this process. ESA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-28904*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NINETEENTH INTERNATIONAL COSMIC RAY CONFERENCE PAPERS. GENERAL INDEX, VOLUME 10
Frank C. Jones, comp. Jul. 1986 104 p Conference held in La Jolla, Calif., 11-23 Aug. 1985
(NASA-CP-2376-Vol-10; NAS 1.55:2376-Vol-10) Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

These volumes contain papers submitted for presentation at the 19th International Cosmic Ray Conference held on the campus of the University of California, San Diego, in La Jolla, CA, Aug. 11-23, 1985. The present volume contains a complete author index for volumes 1 through 9 and a list of the names and addresses of all those who attended the conference. Author

N86-28905*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
A MULTIDISCIPLINARY STUDY OF PLANETARY, SOLAR AND ASTROPHYSICAL RADIO EMISSIONS Final Technical Report
Donald A. Gurnett, W. Calvert, R. Fielder, C. Goertz, C. Grabbe, W. Kurth, R. Mutel, J. Sheerin, M. Mellott, and S. Spangler Jul. 1986 39 p
(Grant NAGw-386)
(NASA-CR-177166; NAS 1.26:177166) Avail: NTIS HC A03/MF A01 CSCL 03B

Combination of the related fields of planetary, solar, and astrophysical radio emissions was attempted in order to more fully understand the radio emission processes. Topics addressed

include: remote sensing of astrophysical plasma turbulence; Alfven waves; astrophysical shock waves; surface waves; very long base interferometry results; very large array observations; solar magnetic flux; and magnetohydrodynamic waves as a tool for solar corona diagnostics.
B.G.

N86-28283*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VLBI OBSERVATIONS OF 416 EXTRAGALACTIC RADIO SOURCES
D. D. Morabito, A. E. Niell, R. A. Preston, R. P. Linfield, A. E. Wehrle, and J. Faulkner *In its* The Telecommunications and Data Acquisition Report 15 May 1986 16 p (For primary document see N86-28275 19-32)
Avail: NTIS HC A10/MF A01 CSCL 03B

N86-28819*# Cologne Univ. (West Germany). Abteilung Nuklearchemie.
COSMIC RAY RECORDS IN ANTARCTIC METEORITES
S. Vogt, U. Herpers, R. Sarafin, P. Signer (Eidgenoessische Technische Hochschule, Zurich, Switzerland), R. Wieler, M. Suter, and W. Woelfli *In* Lunar and Planetary Inst. International Workshop on Antarctic Meteorites 1986 p 55-57 (For primary document see N86-28811 19-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-28847# Tata Inst. of Fundamental Research, Bombay (India).
IMPLICATIONS OF X-RAY AND UV RADIATION ON INTERSTELLAR MEDIUM
K. P. Singh *In* Osmania Univ. Proceedings of the Platinum Jubilee Symposium of Nizamiah Observatory on Binary and Multiple Systems 1984 15 p (For primary document see N86-28834 19-88)
Avail: NTIS HC A08/MF A01

99 GENERAL

N86-28884# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Astrofisica Spaziale.
THE DISCOVERY OF THE SATURN SYSTEM: CASSINI'S LIFE AND ACTIVITY
Marcello Fulchignoni *In* ESA The Atmospheres of Saturn and Titan Dec. 1985 p 289-294 Presented at Workshop on Solid Bodies of the Outer Solar System, Vulcano, Italy, 9-13 Sep. 1985 (For primary document see N86-28849 19-88)
Avail: NTIS HC A14/MF A01

Typical Subject Index Listing

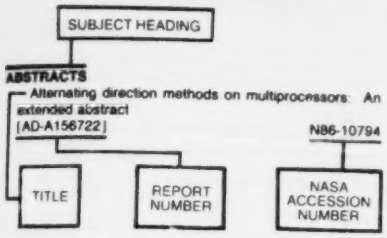

The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7053).

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[AD-A165810] N86-28614
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USSR report: Life sciences. Biomedical and behavioral sciences
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Technical activities 1985, Center for Chemical Physics
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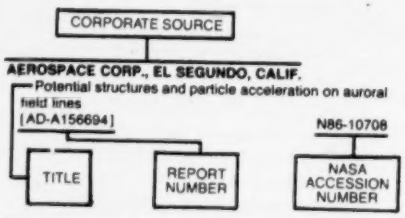

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Analytical study of liquid-piston heat pump technology
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Mirage A3-002 strain responses to ground calibration loadings between 1978 and 1985
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Cost and information effectiveness analysis. Volume 1: Improved methodology
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Transport mechanisms in beta-lithium/aluminum: An overview
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Thermoluminescence and Antarctic meteorites N86-28826
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Evaluation of water sterilizing tablets
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AFRRI (Armed Forces Radiobiology Research Institute)
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Micromechanisms of thermomechanical fatigue: A comparison with isothermal fatigue
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Effects of blade-to-blade dissimilarities on rotor-body lead-lag dynamics
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Atmospheric conditions in the middle east
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A study of diffusion in propellant gases using molecular dynamics N86-28214
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SOURCE

ATAMMIK, SUKKERTOPPEN (GREENLAND).
The Archean geology of the Godthabsfjord Region, southern west Greenland (includes excursion guide) N86-28559
ATLANTIC RESEARCH CORP., ALEXANDRIA, VA.
Effects of oxidizer depletion on boron cloud combustion time N86-28213
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ATLANTIC RESEARCH CORP., GAINESVILLE, VA.
A rocket motor ignition model utilizing ignition delay versus pressurization rate data N86-28220
AUSTRALIAN NATIONAL UNIV., CANBERRA.
Strontium and neodymium isotopic variations in early Archean gneisses affected by middle to late Archean high-grade metamorphic processes: West Greenland and Labrador N86-28540
AVCO-EVERETT RESEARCH LAB., MASS.
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Contact surface erosion for hypervelocity problems
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The influence of defects of the fatigue resistance of butt and girth welds in A106B steel
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Extended abstracts: Seventh Battery and Electrochemical Contractors' Conference
[DE86-003019] N86-28329
Evaluations and utilizations of risk importances
[TI85-902167] N86-28450
BECHTEL CORP., SAN FRANCISCO, CALIF.
Feasible utility scale superconducting magnetic energy storage system
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BELL TELEPHONE LABS., INC., MURRAY HILL, N. J.
Resonance Raman investigation of transient photo-induced ligation changes in nickel porphyrins
[DE86-005433] N86-28149
BERKELEY SCIENTIFIC TRANSLATION SERVICE, CALIF.
Optical glass
[TI86-025776] N86-28744
BERN UNIV. (SWITZERLAND).
Element distribution and noble gas isotopic abundances in lunar meteorite Allan Hills A81005 N86-28821
BIRMINGHAM UNIV. (ENGLAND).
A study of Doppler logs for use as a ship's navigational aid
[ACO-TR-4211] N86-28071
BOEING AEROSPACE CO., SEATTLE, WASH.
High voltage pulse testing survey
[AD-A165666] N86-28324
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Local flow management/profile descent algorithm. Fuel-efficient, time-controlled profiles for the NASA TSRV airplane
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BONN UNIV. (WEST GERMANY).
Investigations for the improvement of Brownian Moon ranges based on the variations of the integration constants and other parameters
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A mobile reception telescope for LIDAR measurements
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BRIGHAM YOUNG UNIV., PROVO, UTAH.
A numerical model for the Rijke burner N86-28224
BRITISH AEROSPACE AIRCRAFT GROUP, WOODFORD (ENGLAND).
The impact of artificial intelligence on airborne maritime reconnaissance N86-28374
BRITISH AEROSPACE DYNAMICS GROUP, HATFIELD (ENGLAND).
The implementation of image processing algorithms N86-28364
New system design methodologies in the design of modern imaging missile systems stimulated by the introduction of VLSI development tools N86-28367
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The policy maker looks at information N86-28794
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Digital video: Assessment of comb-filter design for sub-Nyquist PAL codecs
[BBC-RD-1985/18] N86-28272
BRITISH GAS CORP., LONDON (ENGLAND).
The application of vibrating wire strain gauge in exercise of installation at potentially unstable sites
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Detection of defects in ion vapour deposited aluminum on steel
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[TI86-004888] N86-28727
BROWN UNIV., PROVIDENCE, R. I.
Interactions of molecules with surfaces
[DE86-006512] N86-28717
BULL, LOUVECIENNES (FRANCE).
New technologies for improved information systems and services N86-28802
BUNDESMINISTERIUM FUER FORSCHUNG UND TECHNOLOGIE, BONN (WEST GERMANY).
Working in space. Spacelab, materials research and engineering under weightlessness
[ESA-86-96941] N86-28107
Applied biology and biotechnology, the program of the Federal government, 1985-1988
[ESA-86-96938] N86-28626
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[ESA-86-96939] N86-28809
BUNDESMINISTERIUM FUER WISSENSCHAFT UND FORSCHUNG, VIENNA (AUSTRIA).
Satellite communication techniques. Fundamentals, systems, and projects
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BUREAU OF RECLAMATION, DENVER, COLO.
Physics of Winter Orographic Precipitation and its Modification: Summary of workshop presentations
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Local characteristics of heat transfer and flow dynamics of staggered banks of finned tubes
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CENTRE DE RECHERCHES SCIENTIFIQUES ET TECHNIQUES DE L'INDUSTRIE DES FABRICATIONS METALLIQUES, BRUSSELS (BELGIUM).
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CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).
Star high bit rate link model: The carrier regeneration
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CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, ORLEANS (FRANCE).
Search for chiral molecules and optical activity in extraterrestrial systems. The Cassini mission opportunity N86-28871
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, VERRIERES-LE BUISSON (FRANCE).
The Cassini mission: Complementary observations with the Space Telescope N86-28874
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CHALMERS UNIV. OF TECHNOLOGY, GOETEBORG (SWEDEN).
Error estimates and automatic time step control for nonlinear parabolic problems, part 1
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An a posteriori error estimate and automatic time step control for a backward Euler discretization of a parabolic equation
[CTH-MATH-1985-23] N86-28668
Convergence analysis for a nonsymmetric Galerkin method for a class of singular boundary value problems in one space dimension
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On the Enskog equation in two space variables
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CHICAGO UNIV., ILL.
Proceedings of the workshop on some aspects of autoionization in atoms and small molecules
[DE86-005521] N86-28715
Fundamentals and techniques of nonimaging optics
[DE86-005801] N86-28737

CINCINNATI UNIV., OHIO.
Dynamic loading on parallel shaft gears
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CLEMSON UNIV., S.C.
Software development to support sensor control of robot arc welding
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ATF neutral beam injection: Optimization of beam alignment and aperturing
[DE86-004638] N86-28722

COHEN (NORMAN S.) PROFESSIONAL SERVICES, INC., REDLANDS, CALIF.
Analytical models of combustion response functions
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COLLEGE OF WILLIAM AND MARY, WILLIAMSBURG, VA.
Radiation effects on high performance polymers
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COLOGNE UNIV. (WEST GERMANY).
Aerosol remote sensing using the measurement of the Stokes vector of scattered solar radiation
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Determination of the radiation budget at the top of the atmosphere over the Sahara using satellite measurements
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A three-dimensional self consistent model of the plasma interaction between Io and the magnetosphere of Jupiter
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COLORADO SCHOOL OF MINES, GOLDEN.
On the imaging of reflectors in the Earth
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COLORADO STATE UNIV., FORT COLLINS.
Improvement of an integral stability model
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Plasma contactor performance characterization
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COMMUNICATIONS RESEARCH CENTRE, OTTAWA (ONTARIO).
Processing requirements for radar digital beamforming
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CONNECTICUT UNIV., STORRS.
Radiationless deactivation of low-field chromium complexes in solids
[AD-A165734] N86-28400
Energy transfer and non-linear optical properties at near ultraviolet wavelengths: Rare earth 4f-5d transitions in crystals and glasses
[DE86-006229] N86-28738

CONSIGLIO NAZIONALE DELLE RICERCHE, FRASCATI (ITALY).
Computation of tethered satellite potential, current, and ambient magnetic field
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Chemical control for Airbus composites. HPLC standardization
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CONSULENZE GENERALI ROMA (ITALY).
Numerical experiments on a controlled flexible structure using DCAF
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COPENHAGEN UNIV. (DENMARK).
Carlsberg meridian catalog. La Palma Number 1: Observations of positions of stars and planets made in the year 1984
[ESA-86-97121] N86-28894

CORNELL UNIV., ITHACA, N.Y.
Origin and evolution of the Amazonian craton
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DAYTON UNIV., OHIO.
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DEFENCE RESEARCH ESTABLISHMENT, OTTAWA. (ONTARIO).
A high performance chip set implementation of a finite impulse response filter N86-28351

DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON (ENGLAND).
On the recognition of oceanic motion in satellite infrared and radar altimeter data
[DRIC-T-7597] N86-28603

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Performance analysis of digital LOS link Mormond Hill-Latheron, UK (M0672)
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DEFENSE TECHNICAL INFORMATION CENTER, ALEXANDRIA, VA.
How Ebenezer Scrooge and Peter Drucker are helping shape DoD's Scientific and Technical Information Program
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Method of preparing single crystalline cubic silicon carbide layers
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DESIGNWRIGHTS COLLABORATIVE, SANTA FE, N. MEX.
New Mexico climate manual: Solar and weather data
[DE86-900338] N86-28581

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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Direct calculation of wall interferences and wall adaptation for two-dimensional flow in wind tunnels with closed walls
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Criteria for separation in two-dimensional steady and unsteady compressible flow
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Microprocessor controlled optical measuring system for large mirror modules
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DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT, COLOGNE (WEST GERMANY).
Control systems for the Airbus design and functional experience
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DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
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Calcium/thionyl chloride battery technology
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EDGERTON, GERMESHAUSEN AND GRIER, INC., IDAHO FALLS, IDAHO.
Structural damping calculations of a laboratory piping system using modal analysis
[TI86-003223] N86-28485

EG AND G WASHINGTON ANALYTICAL SERVICES CENTER, INC., BERKELEY, CALIF.
OTEC (Ocean Thermal Energy Conversion) Cold Water Pipe At-Sea Test Program Data Analysis Project: Pipe, platform and environmental parameters data reduction and analysis
[PB86-177607] N86-28526
OTEC (Ocean Thermal Energy Conversion) Cold Water Pipe At-Sea Test Program Data Analysis Project: Users guide for the NOAA/ROTECF and NOAA/TRW computer models
[PB86-177615] N86-28527

EKONOMISK FORETAGSLEDNING, STOCKHOLM (SWEDEN).
The benefits of mobile communications
[ESA-CR(P)-2160] N86-28306

ELECTRONIC TECHNIQUES, INC., FORT COLLINS, COLO.
SCPP (Sierra Cooperative Pilot Project) meterological and statistical support, volume 1
[PB86-189404] N86-28597
SCPP (Sierra Cooperative Pilot Project) meteorological and statistical support, volume 2
[PB86-189412] N86-28598

ELECTRONIQUE SERGE DASSAULT, ST. CLOUD (FRANCE).
VLSI control structures N86-28348

ELEKTRONIK-SYSTEM G.M.B.H., MUNICH (WEST GERMANY).
An integrated approach toward recognizing, locating and combating targets from a modern interceptor aircraft
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ENERGY SCIENCE LABS., INC., SAN DIEGO CALIF.
Tether fundamentals N86-28410

ENGINEERING SCIENCES DATA UNIT, LONDON (ENGLAND).
The costs of not having refined information
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ESDU INTERNATIONAL LTD., LONDON (ENGLAND).
Circular-cylindrical structures: Dynamic response to vortex shedding. Part 2: Simplified calculation procedures
[ESDU85039] N86-28453
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Investigation of signal degradation by scattering and its suppression in near-ground radar cross section measurements
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Proceedings of a Workshop on Thematic Applications of SAR Data
[ESA-SP-257] N86-28488
Laser Doppler wind profile measurements over sea surfaces
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EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
Selected approaches to thematic SAR studies N86-28489
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Performance and life testing of motor gearheads
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EVANS (CHARLES) AND ASSOCIATES, SAN MATEO, CALIF.
Development and application of SIMS (Secondary Ion Mass Spectrometry) characterization techniques for the study of impurities and impurity motion in HgCd) Te and CdTe
[AD-A163047] N86-28140

F

FACHINFORMATIONSZENTRUM FUER ENERGIE, PHYSIK, MATHEMATIK G.M.B.H., EGGENSTEIN-LEOPOLDSHAFEN (WEST GERMANY).
Information resources management in the R and D environment N86-28803
FARRELL LINES, INC., N.Y.
Microcomputer-based cost analysis system. Volume 2: Training tutorial
[PB86-181948] N86-28785
Microcomputer-based cost analysis system. Volume 3: Users guide
[PB86-181955] N86-28786
FEDERAL INST. FOR GEOSCIENCES AND NATURAL RESOURCES, HANNOVER (WEST GERMANY).
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Wave propagation experiments using the ECS satellite telemetry beacon
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Performance analysis of the frame structure proposed for the hybrid digital hierarchy
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A public-key cryptosystem based on a generalization of the knapsack problem
[FUB-18-1985] N86-28317
Identification of stable nonstationary lattice predictors by linear programming
[FUB-19-1985] N86-28846
The representation of certain integers as a sum of distinct Fibonacci numbers
[FUB-3-1985] N86-28880
A first approach to the implementation of data base interrogation by natural language
[FUB-16-1985] N86-28790
FOOD AND DRUG ADMINISTRATION, ROCKVILLE, MD.
Computer tomography techniques and quality assurance programs in the mid-1980's
[PB86-182508] N86-28449

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Feasible utility scale superconducting magnetic energy storage system
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Radiocarbon datings of Yamato meteorites N86-28820
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GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
Acid rain: Federal research into effects on waters and forests
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Feasible utility scale superconducting magnetic energy storage system
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Effects of surface chemistry on hot corrosion life
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GENOA UNIV. (ITALY).
Natural ELF noise evaluation for TSS emissions detection on the Earth's surface. The electric field component approach N86-28426
GEOLOGICAL MUSEUM, COPENHAGEN (DENMARK).
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GEOLOGICAL SURVEY OF CANADA, OTTAWA (ONTARIO).
Geology and tectonics of the Archean Superior Province, Canadian Shield N86-28539
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Sublaminate analysis of interlaminar fracture in composites
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GEORGIA UNIV., ATHENS.
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GRAZ UNIV. (AUSTRIA).
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Application of portable microprocessor-based system for electrophysiological field testing of neurotoxicity
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The acoustic power of circular membranes
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HOWARD UNIV., WASHINGTON, D. C.
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Study of the algorithm to estimate friction velocity at the sea surface
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ILLINOIS UNIV., CHAMPAIGN.
A variational assimilation method for satellite and conventional data: Development of basic model for diagnosis of cyclone systems
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The behavior of fuel-lean premixed flames in a standard flammability limit tube under controlled gravity conditions
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Application of portable microprocessor-based system for electrophysiological field testing of neurotoxicity
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IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Research into an on-line device for monitoring contamination in fluids using ultrasonic techniques
[TS011/84] N86-28700
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INDIAN INST. OF ASTROPHYSICS, BANGALORE.
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INNSBRUCK UNIV. (AUSTRIA).
Towards a SAR system for snow and land ice applications N86-28493
Study on use and characteristics of SAR for land snow and ice applications
[REPT-1(1985)] N86-28502
INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Field-testing results on the sonic leak pinpointer
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Molten carbonate fuel cell stack design options
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On-line interactive database for the storage and rapid information retrieval of gas industry data
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INSTITUTE OF OCEANOGRAPHIC SCIENCES, BIRKENHEAD (ENGLAND).
Performance of the low pressure differential and absolute digiquartz pressure transducers
[IOS-215] N86-28398
INSTITUTO Y OBSERVATORIO ASTRONOMICO DE MARINA, SAN FERNANDO (SPAIN).
Carlsberg meridian catalog. La Palma Number 1: Observations of positions of stars and planets made in the year 1984
[ESA-86-97121] N86-28894
IOWA UNIV., IOWA CITY.
Dust particles detected near Giacobini-Zinner by the ice plasma wave instrument
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A multidisciplinary study of planetary, solar and astrophysical radio emissions
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ISTITUTO SUPERIORE DI SANITA, ROME (ITALY).
Review of the conversion coefficients between dosimetric quantities and those established by International Commission on Radiation Units (ICRU)
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JOHNS HOPKINS UNIV., LAUREL, MD.
The 22nd JANNAF Combustion Meeting, volume 1
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JOINT INST. FOR NUCLEAR RESEARCH, DUBNA (USSR).
Some properties of contraints in theories with degenerate Lagrangians
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR report: Life sciences. Biomedical and behavioral sciences
[JPRS-UBB-86-009] N86-28610
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USSR report: Cybernetics, computers and automation technology
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KAISERSLAUTERN UNIV. (WEST GERMANY).
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KANNER (LEO) ASSOCIATES, REDWOOD CITY, CALIF.
Excitation of electrostatic wave turbulence in ionosphere as one effect of seismic activity
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KANSAS STATE UNIV., MANHATTAN.
Applicability of fracture mechanics methodology to cracking and fracture of concrete
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KARLSRUHE UNIV. (WEST GERMANY).
Fracture mechanic evaluation of nondestructively detected flaws in ceramic materials
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KEMA N.V., ARNHEM (NETHERLANDS).
Nondestructive testing (NDT) in the Netherlands 1982-85
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Variational approach for predicting the load deformation response of a double stretched membrane reflector module
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MINISTRY OF DEFENCE, LONDON (ENGLAND).
Some applications of fast atom bombardment mass spectrometry
[AD-A165757] N86-28143

MINNESOTA UNIV., MINNEAPOLIS.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD INST. FOR SPACE STUDIES, NEW YORK.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
Method of making macrocrystalline or single crystal semiconductor material
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NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Polymers: Technical activities 1985
[PB86-165024] N86-28155
Technical activities 1985, Molecular Spectroscopy Division
[PB86-164381] N86-28160
Introduction to Fourier transform spectroscopy
[PB86-182300] N86-28161
Materials technology for electrical appliances: Magnetic and electrical properties of metals and alloys
[PB86-184314] N86-28186
Directional hurricane wind speeds
[PB86-169026] N86-28594
CSFIT: A FORTRAN program for charge-sheet model fitting of MOSFET data
[AD-A165708] N86-28638
Performance measurement techniques for multiprocessor computers
[PB86-180855] N86-28649
Technical activities 1985, Center for Chemical Physics
[PB86-147336] N86-28782

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
Preliminary evaluation studies with the Regional Acid Deposition Model (RADM)
[PB86-175692] N86-28571
User guide to a particle-growth and trajectory model (using one-dimensional and three-dimensional wind fields)
[PB86-168010] N86-28595

NATIONAL DEFENCE HEADQUARTERS, OTTAWA (ONTARIO).
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NATIONAL INST. OF POLAR RESEARCH, TOKYO (JAPAN).
Over 5,600 Japanese collection of Antarctic meteorites: Recoveries, curation and distribution N86-28833

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WASH.
Standard analytical procedures of the NOAA (National Oceanic and Atmospheric Administration) National Analytical Facility, 1985-1986: Extractable toxic organic compounds, second edition
[PB86-147873] N86-28156

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Performance evaluation of the NEXRAD (next generation weather radar) Hail algorithm applied to Colorado thunderstorms
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Comparison of Doppler lidar, rawinsonde and 915-MHz UHF wind profiler measurements of tropospheric winds
[PB86-166220] N86-28596

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).
On standard procedures for the presentation of multipoint data on polymers
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NATIONAL RADIO ASTRONOMY OBSERVATORY, CHARLOTTESVILLE, VA.
Galaxy clustering N86-28840

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Project summaries, FY 1985
[PB86-183589] N86-28784

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Technical information appropriate for developing countries: Selected abstracts from the NTIS (National Technical Information Service) database, 1982-1984 supplement, January 1986
[PB86-122058] N86-28787

NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report: China Airlines Boeing 747-SP, N4522V 300 nautical miles northwest of San Francisco, California, February 19, 1985
[PB86-910403] N86-28069
Aircraft accident reports: Brief format US Civil and Foreign Aviation, issue number 10 of 1984 accidents
[PB86-916906] N86-28070
NATIONAL WEATHER SERVICE, KANSAS CITY, MO.
Some characteristics of northeast Kansas severe weather 1963-1984
[PB86-173952] N86-28590
NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
Soaring Forecast Program (revised)
[PB86-173523] N86-28591
MCC (Mesoscale Convective Complexes): An overview and case study on its impact in the western United States
[PB86-170651] N86-28593
Hemispheric Spectral Analysis Program
[PB86-183662] N86-28601
RADID (radar display device) interpretation guidelines
[PB86-177680] N86-28602
NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and seasonal weather outlook for mid-April to mid-May 1986, volume 40, number 8, April 15, 1986
[PB86-165501] N86-28600
NATO INTEGRATED COMMUNICATIONS SYSTEM MANAGEMENT AGENCY, BRUSSELS (BELGIUM).
A programme manager's needs for information
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NATURAL ENVIRONMENTAL RESEARCH COUNCIL, EDINBURGH (SCOTLAND).
Magnetic results, 1983, 1984: Eskdalemuir, Hartland and Lerwick observatories
[GEOMAGNETIC-BULL-16] N86-28570
NAVAL ACADEMY, ANNAPOLIS, MD.
Development and verification of conditions for ductile tearing instability and arrest
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NAVAL CIVIL ENGINEERING LAB., PORT HUENEME, CALIF.
Computer program to simulate the thermal characteristics of heat recovery incinerators
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NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.
Measurements of internal waves in the Strait of Gibraltar using a shore-based radar
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NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
Suggestions for designers of navy electronic equipment. Revision A. 1985 edition
[AD-A165397] N86-28326
NAVAL RESEARCH LAB., WASHINGTON, D. C.
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ONR Far East Scientific Bulletin. Volume 10, number 3, July-September 1985
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OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING, WASHINGTON, D. C.
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Reliability. Part 1: Attributes data
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Carlsberg meridian catalog. La Palma Number 1: Observations of positions of stars and planets made in the year 1984
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Description of the IJmuiden (Netherlands) wind observation station for the period 1919-1980
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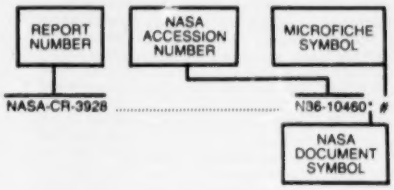

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VOLUME 24 NUMBER 20 / OCTOBER 23, 1986

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) **3125**

02 AERODYNAMICS **3125**

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY **3128**

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION **3129**

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE **3129**

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For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION **3131**

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For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER **3131**

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL **3132**

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09 RESEARCH AND SUPPORT FACILITIES (AIR) **3134**

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) **3135**

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For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE **3137**

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19 SPACECRAFT INSTRUMENTATION **3138**

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20 SPACECRAFT PROPULSION AND POWER **3138**

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For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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32 COMMUNICATIONS 3154
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34 FLUID MECHANICS AND HEAT TRANSFER 3163
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For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 3168
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LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man system technology and life support; and planetary biology.

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MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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For related information see also *54 Man System Technology and Life Support*.

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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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Includes quantum mechanics; and Bose and Fermi statistics.
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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
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For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **3255**
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90 ASTROPHYSICS **3256**
Includes cosmology; and interstellar and interplanetary gases and dust.

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For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

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Note: N.A. means that no abstracts were assigned to this category for this issue.

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N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

C. P. Chen Aug. 1985 22 p refs

(Contract NASw-3458)

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

HC A02/MF A01 CSCL 20D

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included.

Author

VOLUME 24 NUMBER 20 / OCTOBER 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-28906# Perkin-Elmer Corp., Pomona, Calif. Applied Science Div.
DEVELOPMENT OF A PORTABLE WEAR METAL ANALYZER FOR FIELD USE Final Report, Aug. 1982 - Aug. 1985
William Niu Aug. 1985 115 p
(Contract F33615-81-C-2080)
(AD-A166013; AFWAL-TR-85-2043) Avail: NTIS HC A06/MF A01 CSCL 07/4

The portable wear metal analyzer (PWMA) was developed to perform engine oil analysis when aircraft are deployed away from their home bases. The analyzer can detect nine wear metals in the parts per million concentration ranges. The analyzer uses the graphite furnace atomic absorption technology with a specially developed multi-element analysis scheme. The overall system is packaged into two militarized suitcases, including a nine-channel spectrometer, an air or water-cooled graphite furnace, a miniaturized graphite furnace power supply, a unique sample introduction device, a pneumatic supply system, and microprocessor controlled electronics. The analyzer is simple to set up and use. The operator only needs to introduce an undiluted oil sample, push a start button and wait for the results to be printed out. A brassboard system was first developed followed by six prototypes. Analytical performance as well as environmental compatibility were thoroughly evaluated on the first prototype. Consequently, design improvements were made and incorporated into five subsequent prototypes. Test results of the prototypes indicated that the instruments can meet the oil analysis need in both laboratory and rugged environments. Field tests are under way and the results will further verify the validity of the instruments. GRA

N86-28907# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
[ACTIVITIES REPORT IN AEROSPACE RESEARCH] Annual Report, 1984
24 Apr. 1985 195 p
(ESA-86-97190) Avail: NTIS HC A09/MF A01

Research in aerodynamics; test facilities; spacecraft and aircraft construction materials; spacecraft and aircraft structures; computer science; fluid mechanics; energetics; physics; and aerospace systems is summarized. ESA

N86-28908# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION
1 May 1986 61 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-86-007) Avail: NTIS HC A04/MF A01

General articles from various periodicals are reprinted on transportation in the USSR. Transportation areas are divided generally into civil aviation, motor vehicles and highways, marine and river fleets, and experimental systems. The majority of the articles are on civil aviation. For individual titles, see N86-28909 through N86-28910.

N86-28909# Joint Publications Research Service, Arlington, Va.
AEROFLOT OFFICIALS ROUNDTABLE ON SECTION'S TECHNICAL PROGRESS
S. Sokolov and I. Kazanskiy *In its* USSR Report: Transportation (JPRS-UTR-86-007) 1 May 1986 p 1-9 Transl. into ENGLISH from Grazhdanskaya Aviatsiya (Moscow, USSR), no. 2, Feb. 1986 p 30-33 (For primary document see N86-28908 20-01)
Avail: NTIS HC A04/MF A01

A roundtable discussion is presented on the resolution of the key task of the 12th five-year plan which is the utmost acceleration of scientific and technical progress and an increase in the role of science and technology in transferring the industry onto the rails of the all around intensification and raising to the efficiency and quality of air transportation. A list and affiliation of the participant in the discussion is given. A verbatim script of the discussion is given. E.R.

N86-28910# Joint Publications Research Service, Arlington, Va.
GENERAL DESIGNER BALABUYEV ON AN-124 RUSLAN FEATURES
Petr Vailyevich Balabuyev and Viktor Ilich Tolmachev *In its* USSR Report: Transportation (JPRS-UTR-86-007) 1 May 1986 p 14-21 Transl. into ENGLISH from Tekhnika-Molodezhi (Moscow, USSR), no. 2, Feb. 1986 p 30-35 (For primary document see N86-28908 20-01)
Avail: NTIS HC A04/MF A01

An interview is presented with the designers of a new cargo aircraft. They state that the appearance of the An-22 (Antey) winged heavyweight, capable of carrying 80 tons of different cargo, became a sensation 20 years ago. Created on the same drawing board as the Antey, the Ruslan has a cargo capacity which is almost double that of its older brother 5. It has already scored 21 world records, including carrying a load of 171.2 tons to an altitude of 10, 700 meters. The designers are further questioned about the basic features, advantages, weight reduction, engine type, maintenance, and flight safety. E.R.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-28911*# New York Univ., New York. Courant Mathematics and Computing Lab.
COMPUTATION OF THE TRANSONIC FLOW ABOUT A SWEPT WING IN THE PRESENCE OF AN ENGINE NACELLE Research and Development Report
D. Eoss Dec. 1985 191 p

(Grant NAG2-345; Contract DE-AC02-76ER-03077; Grant NSF DMS-83-20430)
(NASA-CR-177113; NAS 1.26:177113; DOE/ER-03077/267) Avail: NTIS CSCL 01A

A method was developed to model the effects of an engine nacelle on the transonic flow about a swept wing. The nacelle is modeled by adding an inhomogeneous term, which represents a source distribution, to the potential equation, which is solved by relaxation. The method is an extension of the design code FL22INV of Bauer, Garabedian, and McFadden, which was based on Caughy and Jameson's FLO22 and on the oblique wing code FLO16. In order to obtain a sharply defined obstacle using a source distribution on a finite difference grid, a small grid size near the source was used. This was accomplished through a mapping of the flow domain to the computational domain. Once the flow is computed, the size and position of the nacelle are found by tracing streamlines. The effect of the presence of an engine nacelle on the shock waves which form about a swept wing in transonic flight. Author

N86-28912*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
AN ANALYSIS OF BLADE VORTEX INTERACTION AERODYNAMICS AND ACOUSTICS
Duck Joo Lee Sep. 1985 173 p
(Contract NCC2-149)
(NASA-CR-177016; NAS 1.26:177016; SU-JIAA-TR-67) Avail: NTIS HC A08/MF A01 CSCL 01A

The impulsive noise associated with helicopter flight due to Blade-Vortex Interaction, sometimes called blade slap is analyzed especially for the case of a close encounter of the blade-tip vortex with a following blade. Three parts of the phenomena are considered: the tip-vortex structure generated by the rotating blade, the unsteady pressure produced on the following blade during the interaction, and the acoustic radiation due to the unsteady pressure field. To simplify the problem, the analysis was confined to the situation where the vortex is aligned parallel to the blade span in which case the maximum acoustic pressure results. Acoustic radiation due to the interaction is analyzed in space-fixed coordinates and in the time domain with the unsteady pressure on the blade surface as the source of chordwise compact, but spanwise non-compact radiation. Maximum acoustic pressure is related to the vortex core size and Reynolds number which are in turn functions of the blade-tip aerodynamic parameters. Finally noise reduction and performance are considered. Author

N86-28913*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
ANALYTICAL OBSERVATIONS ON THE AERODYNAMICS OF A DELTA WING WITH LEADING EDGE FLAPS
Sejong Oh and Domingo Tavella Mar. 1986 69 p
(Contract NCC2-74)
(NASA-CR-177022; NAS 1.26:177022; SU-JIAA-TR-74) Avail: NTIS HC A04/MF A01 CSCL 01A

The effect of a leading edge flap on the aerodynamics of a low aspect ratio delta wing is studied analytically. The separated flow field about the wing is represented by a simple vortex model composed of a conical straight vortex sheet and a concentrated vortex. The analysis is carried out in the cross flow plane by mapping the wing trace, by means of the Schwarz-Christoffel transformation into the real axis of the transformed plane. Particular attention is given to the influence of the angle of attack and flap deflection angle on lift and drag forces. Both lift and drag decrease with flap deflection, while the lift-to-drag ratioe increases. A simple coordinate transformation is used to obtain a closed form expression for the lift-to-drag ratio as a function of flap deflection. The main effect of leading edge flap deflection is a partial suppression of the separated flow on the leeside of the wing. Qualitative comparison with experiments is presented, showing agreement in the general trends. Author

N86-28914*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
A STUDY OF THE FACTORS AFFECTING BOUNDARY LAYER TWO-DIMENSIONALITY IN WIND TUNNELS
R. D. Mehta and P. H. Hoffmann May 1986 29 p
(Contract NCC2-294)
(NASA-CR-177023; NAS 1.26:177023; SU-JIAA-TR-66) Avail: NTIS HC A03/MF A01 CSCL 01A

The effect of screens, honeycombs, and centrifugal blowers on the two-dimensionality of a boundary layer on the test section floors of low-speed blower tunnels is studied. Surveys of the spanwise variation in surface shear stress in three blower tunnels revealed that the main component responsible for altering the spanwise properties of the test section boundary layer was the last screen, thus confirming previous findings. It was further confirmed that a screen with varying open-area ratio, produced an unstable flow. However, contrary to popular belief, it was also found that for given incoming conditions and a screen free of imperfections, its open-area ratio alone was not enough to describe its performance. The effect of other geometric parameters such as the type of screen, honeycomb, and blower were investigated. In addition, the effect of the order of components in the settling chamber, and of wire Reynolds number were also studied. Author

N86-28915*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
THE LIFT OF SHARP-LEADING-EDGED DELTA WINGS WITH BLOWING
Domingo A. Tavella Dec. 1985 22 p
(Contract NCC2-341)
(NASA-CR-176967; NAS 1.26:176967; JIAA-TR-68) Avail: NTIS HC A02/MF A01 CSCL 01A

An analysis of the lift augmentation due to a thin jet of air issuing from a slot along the leading edge of a delta wing is presented. The problem is treated with an extension of the method of Brown and Michael, representing the separated flow on the lee side of the wing by a pair of concentrated vortices and corresponding feeding sheets. It is assumed that the jet is not affected by Coanda forces. The analysis produces qualitative agreement with experiments. Author

N86-28916*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
THE USE OF A PANEL CODE ON HIGH LIFT CONFIGURATIONS OF A SWEPT FORWARD WING Final Report, 31 Sep. 1983 - 31 Mar. 1985
James Scott Scheib and Doral R. Sandlin 31 Mar. 1985 70 p
(Contract NCC2-255)
(NASA-CR-176968; NAS 1.26:176968) Avail: NTIS HC A04/MF A01 CSCL 01A

A study was done on high lift configurations of a generic swept forward wing using a panel code prediction method. A survey was done of existing codes available at Ames, frow which the program VSAERO was chosen. The results of VSAERO were compared with data obtained from the Ames 7- by 10-foot wind tunnel. The results of the comparison in lift were good (within 3.5%). The comparison of the pressure coefficients was also good. The pitching moment coefficients obtained by VSAERO were not in good agreement with experiment. VSAERO's ability to predict drag is questionable and cannot be counted on for accurate trends. Further studies were done on the effects of a leading edge glove, canards, leading edge sweeps and various wing twists on spanwise loading and trim lift with encouraging results. An unsuccessful attempt was made to model spanwise blowing and boundary layer control on the trailing edge flap. The potential results of VSAERO were compared with experimental data of flap deflections with boundary layer control to check the first order effects. Author

N86-28917*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
IDENTIFICATION OF LINEARIZED EQUATIONS OF MOTION FOR THE FIXED WING CONFIGURATION OF THE ROTOR SYSTEMS RESEARCH AIRCRAFT Final Report, 19 Mar. 1985 - 19 Mar. 1986
Dwight L. Balough and Doral R. Sandlin Mar. 1986 98 p
(Contract NCC2-258)

(NASA-CR-176977; NAS 1.26:176977) Avail: NTIS HC A05/MF A01 CSCL 01A

The purpose of this report is to establish linear, decoupled models of rigid body motion for the fixed wing configuration of the Rotor Systems Research Aircraft (RSRA). Longitudinal and lateral control surface fixed linear models were created from aircraft time histories using current system identification techniques. Models were obtained from computer simulation at 160 KCAS and 200 KCAS, and from flight data at 160 KCAS. Comparisons were performed to examine modeling accuracy, variation of dynamics with airspeed and correlation of simulation and flight data results. The results showed that the longitudinal and lateral linear models accurately predicted RSRA dynamics. The flight data results showed that no significant handling qualities problems were present in the RSRA fixed wing aircraft at the flight speed tested. Author

N86-28918*# Kansas Univ. Center for Research, Inc., Lawrence.
WAKE SHAPE AND ITS EFFECTS ON AERODYNAMIC CHARACTERISTICS
Homayoun Emdad and C. Edward Lan Hampton, Va. NASA Jul. 1986 116 p
(Grant NAG1-134)
(NASA-CR-178118; NAS 1.26:178118) Avail: NTIS HC A06/MF A01 CSCL 01A

The wake shape under symmetrical flight conditions and its effects on aerodynamic characteristics are examined. In addition, the effect of wake shape in sideslip and discrete vortices such as strake or forebody vortex on lateral characteristics is presented. The present numerical method for airplane configurations, which is based on discretization of the vortex sheet into vortex segments, verified the symmetrical and asymmetrical roll-up process of the trailing vortices. Also, the effect of wing wake on tail planes is calculated. It is concluded that at high lift the assumption of flat wake for longitudinal and lateral-directional characteristics should be reexamined. Author

N86-28919*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
A COMPARISON OF COMPUTER-GENERATED LIFT AND DRAG POLARS FOR A WORTMANN AIRFOIL TO FLIGHT AND WIND TUNNEL RESULTS Final Report
Albion Hideto Bowers and Doral R. Sandlin Jun. 1984 46 p
(NASA-CR-176963; NAS 1.26:176963) Avail: NTIS HC A03/MF A01 CSCL 01A

Computations of drag polars for a low-speed Wortmann sailplane airfoil are compared to both wind tunnel and flight results. Excellent correlation is shown to exist between computations and flight results except when separated flow regimes were encountered. Wind tunnel transition locations are shown to agree with computed predictions. Smoothness of the input coordinates to the PROFILE airfoil analysis computer program was found to be essential to obtain accurate comparisons of drag polars or transition location to either the flight or wind tunnel results. Author

N86-28920*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
COMPARISON OF THEORETICAL AND FLIGHT-MEASURED LOCAL FLOW AERODYNAMICS FOR A LOW-ASPECT-RATIO FIN Final Report, 31 Oct. 1980 - 31 Oct. 1984
J. Blair Johnson and Doral R. Sandlin Oct. 1984 30 p
(Contract NCC4-1)
(NASA-CR-176995; NAS 1.26:176995) Avail: NTIS HC A03/MF A01 CSCL 01A

Flight test and theoretical aerodynamic data were obtained for a flight test fixture mounted on the underside of an F-104G aircraft. The theoretical data were generated using two codes, a two dimensional transonic code called Code H, and a three dimensional subsonic and supersonic code call wing-body. Pressure distributions generated by the codes for the flight test fixture as well as boundary layer displacement thickness generated by the two dimensional code were compared to the flight test data. The two dimensional code pressure distributions compared well except at the minimum pressure point and trailing edge. Shock locations compared well except at high transonic speeds. The three dimensional code pressure distributions compared well except at the trailing edge of the flight test fixture. The two dimensional code does not predict displacement thickness of the flight test fixture well. Author

N86-28921*# Ohio State Univ., Columbus. Dept. of Aeronautical and Astronautical Engineering.
EXPERIMENTAL ANALYSES OF TRAILING EDGE FLOWS Final Technical Report
S. L. Petrie and D. S. Emmer Jun. 1984 96 p
(Grant NsG-2298)
(NASA-CR-176904; NAS 1.26:176904) Avail: NTIS HC A05/MF A01 CSCL 01A

An experimental study of several of the trailing edge and wake turbulence properties for a NACA 64A010 airfoil section was completed. The experiment was conducted at the Ohio State University Aeronautical and Astronautical Research Laboratory in the 6 inch X 22 inch transonic wind tunnel facility. The data were obtained at a free stream Mach number of 0.80 and a flow Reynolds number (based on chord length) of 5 million. The principle diagnostic tool was a dual-component laser Doppler velocimeter. The experimental data included surface static pressures, chordwise and vertical mean velocities, RMS turbulence intensities, local flow angles, and a determination of turbulence kinetic energy in the wake. Two angles of attack (0 and 2 degrees) were investigated. At these incidence angles, four flow field surveys were obtained ranging in position from the surface of the airfoil, between the transonic shock and the trailing edge, to the far-wake. At both angles of attack, the turbulence intensities and turbulence kinetic energy were observed to decay in the streamwise direction. In the far wake, for the non-lifting case, the turbulence intensities were nearly isotropic. For the two degree case, the horizontal component of the turbulence intensity was observed to be substantially higher than the vertical component. Author

N86-28922*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
MEASUREMENTS ON WING-TIP BLOWING
D. Tavella, N. Wood, and P. Harrits Jun. 1985 41 p
(Contract NCC2-271)
(NASA-CR-176930; NAS 1.26:176930; JIAA-TR-64) Avail: NTIS HC A03/MF A01 CSCL 01A

The aerodynamics of a rectangular wing with a jet exhausting in the spanwise direction from the tips has been explored experimentally. By effectively changing the span of the wing as well as outwardly displacing the tip vortices, such jets can induce aerodynamic forces that could be used for roll and lateral control of aircraft. The concept has been investigated for a variety of jet intensities, angles of attack, and aspect ratios. The results appear to confirm theoretically predicted scaling laws for lift gain and moment generation due to blowing. Author

N86-28923*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
A THEORY FOR LATERAL WING-TIP BLOWING
D. Tavella and L. Roberts Jun. 1985 40 p
(Contract NCC2-271)
(NASA-CR-176931; NAS 1.26:176931; JIAA-TR-60) Avail: NTIS HC A03/MF A01 CSCL 01A

The concept of lateral blowing consists in utilizing thin jets of air, which are ejected in the spanwise direction from slots at the tips of straight and swept wings, or along the leading edges of delta wings, to generate aerodynamic forces without the assistance of deflecting solid surfaces. For weak intensities of blowing the so-generated forces could be used for roll and lateral control of aircraft. In this work a theory for this concept as applied to straight wings is presented, revealing the analytical relationship between blowing and aerodynamic forces. The approach is based on perturbing the span of an elliptically loaded wing. Scaling laws involving blowing intensity, aspect ratio, and angle of attack are derived and compared with experiments. It is concluded that this

concept has potential as a novel roll and lateral control device. Author

N86-28924*# Waterloo Univ. (Ontario). Dept. of Applied Mathematics.
CRITICAL EVALUATION OF THE UNSTEADY AERODYNAMICS APPROACH TO DYNAMIC STABILITY AT HIGH ANGLES OF ATTACK Final Report
W. H. Hui Feb. 1985 46 p
(Grant NAGw-575)
(NASA-CR-177104; NAS 1.26:177104; WRI-Pro-308-07) Avail: NTIS HC A03/MF A01 CSCL 01A

Bifurcation theory is used to analyze the nonlinear dynamic stability characteristics of an aircraft subject to single-degree-of-freedom. The requisite moment of the aerodynamic forces in the equations of motion is shown to be representable in a form equivalent to the response to finite amplitude oscillations. It is shown how this information can be deduced from the case of infinitesimal-amplitude oscillations. The bifurcation theory analysis reveals that when the bifurcation parameter is increased beyond a critical value at which the aerodynamic damping vanishes, new solutions representing finite amplitude periodic motions bifurcate from the previously stable steady motion. The sign of a simple criterion, cast in terms of aerodynamic properties, determines whether the bifurcating solutions are stable or unstable. For the pitching motion of flat-plate airfoils flying at supersonic/hypersonic speed and for oscillation of flaps at transonic speed, the bifurcation is subcritical, implying either the exchanges of stability between steady and periodic motion are accompanied by hysteresis phenomena, or that potentially large aperiodic departures from steady motion may develop. Author

N86-28925*# National Aeronautics and Space Administration, Washington, D.C.
AERODYNAMICS OF THE VIGGEN 37 AIRCRAFT. PART 1: GENERAL CHARACTERISTICS AT LOW SPEED
Krister Karling Jun. 1986 145 p Transl. into ENGLISH of the book "Flygplan 37:s Aerodynamik - Part 1: Allmaent egenskaper vid Laaga Farter" Linkoeping, Sweden, SAAB-Scania, 1975 96 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88403; NAS 1.15:88403) Avail: NTIS HC A07/MF A01 CSCL 01A

A description of the aerodynamics of the Viggen 37 and its performances, especially at low speeds is presented. The aerodynamic requirements for the design of the Viggen 37 aircraft are given, including the basic design, performance requirement, and aerodynamic characteristics, static and dynamic load test results and flight test results. The Viggen 37 aircraft is designed to be used for air attack, surveillance, pursuit, and training applications. It is shown that this aircraft is suitable for short runways, and has good maneuvering, acceleration, and climbing characteristics. The design objectives for this aircraft were met by utilizing the effect produced by the interference between two triangular wings, positioned in tandem. Author

N86-28926# Oregon State Univ., Corvallis. Dept. of Mechanical Engineering.
FIRST ORDER ANALYSIS OF THE EFFECT OF PITCHING ON THE DRAG COEFFICIENT
R. E. Wilson and J. A. Neff Nov. 1985 39 p
(Contract DF-AC04-76DP-00789)
(DE86-006324; SAND-85-7003) Avail: NTIS HC A03/MF A01

A first order analysis was made for the drag coefficient of a pitching NACA 0015 airfoil below stall. The inviscid velocity ditribution for a translating NACA 0015 airfoil was superimposed with the additional circulation velocity for a pitching ellipse. The resulting velocity distribution was used to numerically integrate a momentum/boundary layer formulation to obtain the drag coefficient. For both laminar and turbulent boundary layers it was found that the effect of pitching on the drag coefficient can be approximated by a shift in angle of attack. The shift angle was found to be a linear function of the pitching velocity and to be less than the induced angle of attack caused by the pitching. DOE

N86-28927# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Dir. Scientifique de la Resistance des Structures.
EXTENSION OF A TRANSONIC THREE-DIMENSIONAL UNSTEADY SMALL PERTURBATION COMPUTING METHOD Final Report [DEVELOPPEMENT DU CODE DE CALCUL DE PETITES PERTURBATIONS TRANSSONIQUES INSTATIONNAIRES EN TRIDIMENSIONNEL]
P. Mulak Aug. 1985 37 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RTS-23/3064-RY-048-R; ESA-86-97199) Avail: NTIS HC A03/MF A01

A method used for rigid models in unsteady flow is extended to a flexible model to compute the vibration modes. A flexible supercritical wing profile model, that of the A-310 aircraft, was tested in a wind tunnel and the results were compared to computation. The results are in good agreement, but differences with other computing methods for the first four symmetric vibration modes are discussed. ESA

N86-28928# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics and Informatics Div.
DESIGN OF TRANSONIC AIRFOILS WITH GIVEN PRESSURE, SUBJECT TO GEOMETRIC CONSTRAINTS
J. M. J. Fray, J. W. Slooff, J. W. Boerstoel, and A. Kassies 13 Jul. 1984 36 p
(NLR-TR-84064-U; B8660349; ESA-86-97504) Avail: NTIS HC A03/MF A01

An iterative method for the design of airfoils having a prescribed pressure distribution in subsonic or transonic flow is described. In each iteration step, the difference between the current and a target pressure distributions (residual) is determined by a multigrid finite volume full-potential code. Corrections to the geometry driving the pressure residual to zero are determined by a global, inverse, thin-airfoil theory for the subsonic part of the flow field, and by a local, inverse, wavy-wall theory for the supersonic part. The geometry correction is formulated as a minimization problem in the sense that pressure distribution and geometry requirements may be balanced in a weighted least squares sense. ESA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-28929# National Transportation Safety Board, Washington, D. C.
ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA. US AIR CARRIER OPERATIONS: CALENDAR YEAR 1982
1982 111 p
(PB86-212529; NTSB-ARC-86-01) Avail: NTIS HC A06/MF A01

The record of aviation accidents involving revenue operations of U.S. Air Carriers are presented, including Commuter Air Carriers and On Demand Air Taxis for calender year 1982. In 1979 and prior years, accidents involving the smaller aircraft used by Commuters and On Demand Air Taxis were reported in annual reviews of general aviation accidents. Three major sections are presented according to the federal regulations under which the flight was conducted: 14 CFR 121, 125, 127, Scheduled 14 CFR 135. In each section, tables are presented to describe the losses and characteristics of 1982 accidents to enable comparison with pior years. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-28930# IIT Research Inst., Annapolis, Md.
A COMPARISON OF THE EFFECTS OF TWO TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEMS (TCAS 3 AND TCAS 2) ON THE PERFORMANCE OF THE AIR TRAFFIC CONTROL RADAR BEACON SYSTEM Final Report, May 1984 - Mar. 1986
T. OGrady, D. Katz, and C. Corse Apr. 1986 44 p
(Contract F19628-85-C-0071)
(DOT/FAA/PM-86/8; ECAC-CR-86-027) Avail: NTIS HC A04/MF A01

An analysis was performed to predict the effects of the Traffic Alert and Collision Avoidance System (TCAS 3) on the performance of the Air Traffic Control Radar Beacon System (ATCRBS) in the Los Angeles Basin. This was accomplished by comparing the effects of TCAS 3 and TCAS 2 operations on airborne transponder and ground-based ATCRBS interrogator performance in the same hypothetical peak Los Angeles Basin aircraft deployment. Author

N86-28931*# Analytical Mechanics Associates, Inc., Mountain View, Calif.
EVALUATION OF THE USEFULNESS OF VARIOUS SIMULATION TECHNOLOGY OPTIONS FOR TERPS ENHANCEMENT
A. V. Phatak and J. A. Sorensen May 1986 33 p
(Contract NAS2-11973)
(NASA-CR-177408; NAS 1.26:177408; FAA/PM-86/15; AMA-86-2-II) Avail: NTIS HC A03/MF A01 CSCL 17G

Current approved terminal instrument procedures (TERPS) do not permit the full exploitation of the helicopter's unique flying characteristics. Enhanced TERPS need to be developed for a host of non-standard landing sites and navigation aids. Precision navigation systems such as microwave landing systems (MLS) and the Global Positioning System (GPS) open the possibility of curved paths, steep glide slopes, and decelerating helicopter approaches. This study evaluated the feasibility, benefits, and liabilities of using helicopter cockpit simulators in place of flight testing to develop enhanced TERPS criteria for non-standard flight profiles and navigation equipment. Near-term (2 to 5 year) requirements for conducting simulator studies to verify that they produce suitable data comparable to that obtained from previous flight tests are discussed. The long-term (5 to 10 year) research and development requirements to provide necessary modeling for continued simulator-based testing to develop enhanced TERPS criteria are also outlined. Author

N86-28932# Ohio Univ., Athens. Dept. of Electrical and Computer Engineering.
INVESTIGATIONS FOR IMPROVING OPERATIONAL RELIABILITY AND MAINTAINABILITY OF ILS COMPONENTS. VOLUME 2: FIGURES AND ILLUSTRATIONS Final Report, Feb. 1983 - Feb. 1986
R. H. McFarland, W. D. Phipps, L. D. Brady, Jeff Dennis, and J. D. Longworth Feb. 1986 376 p
(Contract DTFA01-83-C-20025)
(FAA/PM-86/7.11-Vol-2; OU/AEC/EER-79-1-Vol-2) Avail: NTIS HC A17/MF A01

Evaluations and performance analysis of the Instrument Landing System (ILS) are presented for Dallas-Fort Worth, Tex.; Wheeling, W.V.; Bristol, Tenn.; Parkersburg, W.V.; Pontiac, Mich.; and DeKalb-Peachtree, Ga. An investigation of anomalous performance of the glide slope at Lambert-St. Louis is reported. An analysis of Instrument Landing System (ILS) Reference Datum Heights (RDH) is reported, as well as the results of an investigation of glide slope critical areas. A study into the feasibility of developing ground-based checking techniques for validating the Sideband Reference (SBR) glide slope is presented, as well as an assessment of the current standards and tolerances used to qualify glide slope structures. In addition, a proposed methodology for mathematical model validation is discussed. Author

N86-28933*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN CONSIDERATIONS FOR FLIGHT TEST OF A FAULT INFERRING NONLINEAR DETECTION SYSTEM ALGORITHM FOR AVIONICS SENSORS
A. K. Caglayan (Charles River Analytics, Inc., Cambridge, Mass.), P. M. Godiwala, and F. R. Morrell Aug. 1986 11 p Presented at the Guidance, Navigation, and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88998; NAS 1.15:88998) Avail: NTIS HC A02/MF A01 CSCL 01D

The modifications to the design of a fault inferring nonlinear detection system (FINDS) algorithm to accommodate flight computer constraints and the resulting impact on the algorithm performance are summarized. An overview of the flight data-driven FINDS algorithm is presented. This is followed by a brief analysis of the effects of modifications to the algorithm on program size and execution speed. Significant improvements in estimation performance for the aircraft states and normal operating sensor biases, which have resulted from improved noise design parameters and a new steady-state wind model, are documented. The aircraft state and sensor bias estimation performances of the algorithm's extended Kalman filter are presented as a function of update frequency of the piecewise constant filter gains. The results of a new detection system strategy and failure detection performance, as a function of gain update frequency, are also presented. Author

N86-28934# Oak Ridge National Lab., Tenn.
CONCURRENT ALGORITHMS FOR AUTONOMOUS ROBOT NAVIGATION IN AN UNEXPLORED TERRAIN
S. V. N. Rao, S. S. Iyengar, C. C. Jorgensen, and C. R. Weisbin 1986 23 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986 Prepared in cooperation with Louisiana State Univ., Baton Rouge
(Contract DE-AC05-84OR-21400)
(DE86-006089; CONF-860434-5) Avail: NTIS HC A02/MF A01

Navigation planning is one of the vital aspects of any autonomous mobile robot. In this paper, we present concurrent algorithms for an autonomous robot navigation system that does not require a pre-learned obstacle terrain model. The terrain model is gradually built by integrating the information from multiple journeys. The available information is used to the maximum extent in navigation planning, and global optimality is gradually achieved. It is shown that these concurrent algorithms are free from deadlocks and starvation. The performance of the concurrent algorithms is analyzed in terms of the planning time, travel time, scanning time, and update time. A modified adjacency list is proposed as the data structure for the spatial graph that represents an obstacle terrain. The time complexities of various algorithms that access, maintain, and update the spatial graph are estimated, and the effectiveness of the implementation is illustrated. DOE

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-28935*# Massachusetts Inst. of Tech., Cambridge.
FORMAL OPTIMIZATION OF HOVERING PERFORMANCE USING FREE WAKE LIFTING SURFACE THEORY
Song-Young Chung Feb. 1986 260 p
(Grant NAG2-275)

(NASA-CR-177103; NAS 1.26:177103) Avail: NTIS HC A12/MF A01 CSCL 01C

Free wake techniques for performance prediction and optimization of hovering rotor are discussed. The influence functions due to vortex ring, vortex cylinder, and source or vortex sheets are presented. The vortex core sizes of rotor wake vortices are calculated and their importance is discussed. Lifting body theory for finite thickness body is developed for pressure calculation, and hence performance prediction of hovering rotors. Numerical optimization technique based on free wake lifting line theory is presented and discussed. It is demonstrated that normal optimization can be used with the implicit and nonlinear objective or cost function such as the performance of hovering rotors as used in this report. Author

N86-28936*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronatuical Engineering.
DEVELOPMENT OF FLIGHT TESTING TECHNIQUES Final Report, 31 Oct. 1979 - 31 Oct. 1984
Doral R. Sandlin Oct. 1984 9 p
(Contract NCC4-1)
(NASA-CR-176996; NAS 1.26:176996) Avail: NTIS HC A02/MF A01 CSCL 01C

A list of students involved in research on flight analysis and development is given along with abstracts of their work. The following is a listing of the titles of each work: Longitudinal stability and control derivatives obtained from flight data of a PA-30 aircraft; Aerodynamic drag reduction tests on a box shaped vehicle; A microprocessor based anti-aliasing filter for a PCM system; Flutter prediction of a wing with active aileron control; Comparison of theoretical and flight measured local flow aerodynamics for a low aspect ratio fin; In flight thrust determination on a real time basis; A comparison of computer generated lift and drag polars for a Wortmann airfoil to flight and wind tunnel results; and Deep stall flight testing of the NASA SGS 1-36. E.R.

N86-28937*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronatuical Engineering.
IN-FLIGHT THRUST DETERMINATION ON A REAL-TIME BASIS Final Report
Ronald J. Ray, Tom Carpenter, and Tom Sandlin Apr. 1984 39 p
(Contract NCC4-1)
(NASA-CR-176997; NAS 1.26:176997) Avail: NTIS HC A03/MF A01 CSCL 01C

A real time computer program was implemented on a F-15 jet fighter to monitor in-flight engine performance of a Digital Electronic Engine Controlled (DEES) F-100 engine. The application of two gas generator methods to calculate in-flight thrust real time is described. A comparison was made between the actual results and those predicted by an engine model simulation. The percent difference between the two methods was compared to the predicted uncertainty based on instrumentation and model uncertainty and agreed closely with the results found during altitude facility testing. Data was obtained from acceleration runs of various altitudes at maximum power settings with and without afterburner. Real time in-flight thrust measurement was a major advancement to flight test productivity and was accomplished with no loss in accuracy over previous post flight methods. Author

N86-28938*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
A ZONAL COMPUTATIONAL PROCEDURE ADAPTED TO THE OPTIMIZATION OF TWO-DIMENSIONAL THRUST AUGMENTOR INLETS
T. S. Lund, D. A. Tavella, and L. Roberts Jul. 1985 148 p
(Contract NCC2-150)
(NASA-CR-176934; NAS 1.26:176934; JIAA-TR-65) Avail: NTIS HC A07/MF A01 CSCL 01C

A viscous-inviscid interaction methodology based on a zonal description of the flowfield is developed as a mean of predicting the performance of two-dimensional thrust augmenting ejectors. An inviscid zone comprising the irrotational flow about the device is patched together with a viscous zone containing the turbulent mixing flow. The inviscid region is computed by a higher order panel method, while an integral method is used for the description of the viscous part. A non-linear, constrained optimization study is undertaken for the design of the inlet region. In this study, the viscous-inviscid analysis is complemented with a boundary layer calculation to account for flow separation from the walls of the inlet region. The thrust-based Reynolds number as well as the free stream velocity are shown to be important parameters in the design of a thrust augmentor inlet. Author

N86-28939*# Boeing Commercial Airplane Co., Seattle, Wash.
DESIGN REQUIREMENTS AND DEVELOPMENT OF AN AIRBORNE DESCENT PATH DEFINITION ALGORITHM FOR TIME NAVIGATION Final Report
K. H. Izumi, J. L. Thompson, J. L. Groce, and R. W. Schwab May 1986 67 p
(Contract NAS1-16300)
(NASA-CR-178037; NAS 1.26:178037) Avail: NTIS HC A04/MF A01 CSCL 17G

The design requirements for a 4D path definition algorithm are described. These requirements were developed for the NASA ATOPS as an extension of the Local Flow Management/Profile Descent algorithm. They specify the processing flow, functional and data architectures, and system input requirements, and recommended the addition of a broad path revision (reinitialization) function capability. The document also summarizes algorithm design enhancements and the implementation status of the algorithm on an in-house PDP-11/70 computer. Finally, the requirements for the pilot-computer interfaces, the lateral path processor, and guidance and steering function are described. Author

N86-28940*# Boeing Commercial Airplane Co., Seattle, Wash.
AN INVESTIGATION OF TNAV EQUIPPED AIRCRAFT IN A SIMULATED EN ROUTE METERING ENVIRONMENT Final Report
J. L. Groce, K. H. Izumi, C. H. Markham, R. W. Schwab, and J. A. Taylor 5 May 1986 98 p
(Contract NAS1-16300)
(NASA-CR-178031; NAS 1.26:178031; D6-52321) Avail: NTIS HC A05/MF A01 CSCL 01C

This document presents the results of an effort to estimate how often a TNAV (Time Navigation) equipped aircraft could be given a TNAV clearance in the En Route Metering (ERM) system as a function of the percentage of arriving traffic which is TNAV equipped. A fast-time simulation of Denver Stapleton international arrival traffic in the Denver Air Route Traffic Control Center route structure, including en route metering operations, was used to develop data on estimated conflicts, clearance communications and fuel usage for traffic mixes of 25, 50, 75 and 100% TNAV equipped. This study supports an overall effort by NASA to assess the benefits and required technology for using TNAV-equipped aircraft in the ERM environment. Author

N86-28941# Societe Nationale des Poudres et Explosifs, Vert-Le-Petit (France).
NEW TRANSPARENT SOLID MATERIAL FOR HELICOPTER WINDSHIELDS Final Report [NOUVEAU MATERIAU MASSIF TRANSPARENT POUR VITRAGE D'HELICOPTERE]
Jacky Pattein 22 Apr. 1985 37 p In FRENCH
(Contract DRET-83-129)
(SNPE-NT-37/85/CRB/NP; ESA-86-97197) Avail: NTIS HC A03/MF A01

Polyurethanes and acrylic-urethane copolymers were studied by experimental casting of large plates. Better properties are obtained by comparison to currently used acrylics, including shock resistance, crazing resistance, thermal behavior, and surface properties. Large problems remain due to mold extraction difficulties, resulting in poor surface appearance. ESA

N86-28942# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Dir. Scientifique de la Resistance des

Structures.

AEROELASTIC TESTS OF OA 206 AND OA 207 PROFILES [ESSAIS AEROELASTIQUES DES PROFILES OA 206 ET OA 207]

B. Peleau May 1985 73 p In FRENCH
(Contract STPA-83-95-013)
(ONERA-RT-22/1841-RY-310-R; ONERA-RT-22/1841-RY-311-G; ESA-86-97201) Avail: NTIS HC A04/MF A01

Helicopter rotor wings were tested in a wind tunnel in order to verify a semiempirical unsteady separation model. Static tests and small amplitude sine vibration tests were carried out. The OA 207 profile was also studied using large amplitude oscillations. The detailed numerical results are presented. The small amplitude data are used to establish the model while the large amplitude data are useful for its validation. ESA

N86-28943# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.

AN INTRODUCTORY COURSE ON AIRCRAFT LOADING

J. B. deJonge 1984 105 p Presented at Summer Course, Bandung, Indonesia, 1984
(NLR-MP-84090-U; B8660423; ESA-86-97506) Avail: NTIS HC A06/MF A01

Flight loads on aircraft; the effects of flexibility; and loads in continuous turbulence are introduced. Loads in steady horizontal flight; maneuver loads; gust loads; ground loads; landing loads; taxiing and handling loads; pressurization loads; and acoustic loads are discussed. ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-28944# RJO Enterprises, Inc., Lanham, Md.

AIRCRAFT AVIONICS SUITABLE FOR ADVANCED APPROACH APPLICATIONS. VOLUME 1: AIRCRAFT FLEET EQUIPAGE

Stanley Kowalski and Thomas H. Croswell Jul. 1986 111 p
(Contract DTFA01-84-Y-01051)
(DOT/FAA/PM-86/25,1) Avail: NTIS HC A06/MF A01

This report catalogs the aircraft avionics suitable for advanced approach applications. The configuration and model numbers of avionics used in navigation and approaches for landing are provided for 79 different types of aircraft. Aircraft are grouped into five user communities which cover Major Air Carriers, Regional Air Carriers, Executive Jets, General Aviation Aircraft, and IFR Helicopters. Avionics evaluation includes VOR NAVs, ADFs, DMEs, RNAVs, AFCS, weather radar and the associated display instruments. These navigation systems are the most popular units for navigation and landing in todays aircraft. ILS glideslope receivers, marker beacon systems, navigation management systems, vertical navigation systems, and long range navigation systems are not covered. Author

N86-28945*# University of Southern Colorado, Pueblo. School of Applied Science and Engineering Technology.

INVESTIGATION OF AN ADVANCED FAULT TOLERANT INTEGRATED AVIONICS SYSTEM Final Technical Report, Nov. 1983 - Mar. 1986

W. R. Dunn, D. Cottrell, Joel Flanders, Alan Javornik, and Michael Rusovick Mar. 1986 76 p
(Contract NCC2-277)
(NASA-CR-176980; NAS 1.26.176980) Avail: NTIS HC A05/MF A01 CSCL 01D

Presented is an advanced, fault-tolerant multiprocessor avionics architecture as could be employed in an advanced rotorcraft such as LHX. The processor structure is designed to interface with existing digital avionics systems and concepts including the Army Digital Avionics System (ADAS) cockpit/display system, navaid and communications suites, integrated sensing suite, and the Advanced Digital Optical Control System (ADOCS). The report defines mission, maintenance and safety-of-flight reliability goals as might be expected for an operational LHX aircraft. Based on use of a modular, compact (16-bit) microprocessor card family, results of a preliminary study examining simplex, dual and standby-sparing architectures is presented. Given the stated constraints, it is shown that the dual architecture is best suited to meet reliability goals with minimum hardware and software overhead. The report presents hardware and software design considerations for realizing the architecture including redundancy management requirements and techniques as well as verification and validation needs and methods. Author

N86-29080# Joint Publications Research Service, Arlington, Va.

AERITALIA: AVIONICS, OPTOELECTRONICS RESEARCH, ATR 42

Alberto Mondini *In its* Europe Report: Science and Technology (JPRS-EST-86-008) 18 Jun. 1986 p 2-5 Transl. into ENGLISH from Science Duemila (Rome, Italy), no. 4, Apr. 1986 p 30-33
(For primary document see N86-29079 20-31)
Avail: NTIS HC A06/MF A01

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-28946*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.

A SUPERSONIC FAN EQUIPPED VARIABLE CYCLE ENGINE FOR A MACH 2.7 SUPERSONIC TRANSPORT Final Report

T. S. Tavares 22 Aug. 1985 107 p
(Grant NAG3-697)
(NASA-CR-177141; NAS 1.26:177141) Avail: NTIS HC A06/MF A01 CSCL 21E

The concept of a variable cycle turbofan engine with an axially supersonic fan stage as powerplant for a Mach 2.7 supersonic transport was evaluated. Quantitative cycle analysis was used to assess the effects of the fan inlet and blading efficiencies on engine performance. Thrust levels predicted by cycle analysis are shown to match the thrust requirements of a representative aircraft. Fan inlet geometry is discussed and it is shown that a fixed geometry conical spike will provide sufficient airflow throughout the operating regime. The supersonic fan considered consists of a single stage comprising a rotor and stator. The concept is similar in principle to a supersonic compressor, but differs by having a stator which removes swirl from the flow without producing a net rise in static pressure. Operating conditions peculiar to the axially supersonic fan are discussed. Geometry of rotor and stator cascades are presented which utilize a supersonic vortex flow distribution. Results of a 2-D CFD flow analysis of these cascades are presented. A simple estimate of passage losses was made using empirical methods. Author

N86-28947*# Teledyne CAE, Toledo, Ohio.

VARIABLE AREA RADIAL TURBINE FABRICATION AND TEST PROGRAM

Casimir Rogo Aug. 1986 91 p
(Contract NAS3-23173; DA Proj. 1L1-61101-AH-45)
(NASA-CR-175091; NAS 1.26:175091; AVSCOM-TR-86-C-13)
Avail: NTIS HC A05/MF A01 CSCL 21E

A variable area radial turbine with a moveable nozzle sidewall was experimentally evaluated. The turbine was designed for an advanced variable capacity gas turbine rotorcraft engine. The turbine has a mass flow rate of 2.27 kg/sec (5.0 lbs/sec), and a

rotor inlet temperature of 1477K (2200 F). Testing was conducted at a reduced inlet temperature, but the aerodynamic parameters and Reynolds numbers were duplicated. Overall performance was obtained for a range of nozzle areas from 50% to 100% of the maximum area. The test program determined the effect on performance of: (1) Moving the hub or shroud sidewall; (2) Sidewall-vane clearance leakage; (3) Vaneless space geometry change; and (4) Nozzle cooling flows. Data were obtained for a range of pressure ratios and speeds and are presented in a number of performance maps. Author

N86-28948# Turbomeca S. A. - Brevets Szydlowski, Bordes (France).
COMPRESSORS STUDY: IMPROVING THE EFFICIENCY OF A HIGH PERFORMANCE MULTISTAGE COMPRESSOR Final Report [ETUDE SUR LES COMPRESSORS: AMELIORATION DES RENDEMENTS DE COMPRESSEURS MULTIETAGES A HAUTES PERFORMANCES]
D. Dehondt Jun. 1985 27 p In FRENCH
(Contract DRET-82-342)
(ESA-86-97192) Avail: NTIS HC A03/MF A01

The effect of prerotation at the inlet of each stage was tested on a two stage axial compressor. The technical specifications are 45000 turns/min, 3.35 Kg of air/sec, and a compression rate of 12. A mechanical and aerodynamic study was performed in order to reduce the Mach number at the inlet of the rotating blades. The results confirm that the introduction of prerotation in the design improves overall compressor efficiency. ESA

N86-28949# Societe Nationale d'Etude et de Construction de Moteurs d'Aviation, Paris (France).
PREDICTION OF THE STABILITY PERFORMANCE OF A TURBOREACTOR COMBUSTION CHAMBER Final Report [PREDICTION DES PERFORMANCES DE STABILITE D'UNE CHAMBRE DE TURBOREACTEURS]
C. Favreau, Y. Chauveau, and M. Desaulty 1985 41 p In FRENCH
(Contract DRET-83-34-502)
(SNECMA-YKC-3269/85; ESA-86-97196) Avail: NTIS HC A03/MF A01

A theoretical prediction method based on the decomposition of the actual combustion chamber in elementary reaction volumes which are described by a model is investigated. Aerodynamic characterization of the chamber, combustion chemistry models, and carburant distribution in the combustion chamber were studied. An algorithm was developed and experimentally verified. The proposed method leads to prediction models which describe CO pollution, efficiency, and combustion stability for a reasonably low computing cost. ESA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-28950*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPLEMENTATION AND FLIGHT TESTS FOR THE DIGITAL INTEGRATED AUTOMATIC LANDING SYSTEM (DIALS). PART 1: FLIGHT SOFTWARE EQUATIONS, FLIGHT TEST DESCRIPTION AND SELECTED FLIGHT TEST DATA
Richard M. Hueschen Jul. 1986 135 p
(NASA-TM-87632-Pt-1; NAS 1.15:87632-Pt-1) Avail: NTIS HC A07/MF A01 CSCL 01C

Five flight tests of the Digital Automated Landing System (DIALS) were conducted on the Advanced Transport Operating Systems (ATOPS) Transportation Research Vehicle (TSRV) -- a modified Boeing 737 aircraft for advanced controls and displays research. These flight tests were conducted at NASA's Wallops Flight Center using the microwave landing system (MLS) installation on runway 22. This report describes the flight software equations of the DIALS which was designed using modern control theory direct-digital design methods and employed a constant gain Kalman filter. Selected flight test performance data is presented for localizer (runway centerline) capture and track at various intercept angles, for glideslope capture and track of 3, 4.5, and 5 degree glideslopes, for the decrab maneuver, and for the flare maneuver. Data is also presented to illustrate the system performance in the presence of cross, gust, and shear winds. The mean and standard deviation of the peak position errors for localizer capture were, respectively, 24 feet and 26 feet. For mild wind conditions, glideslope and localizer tracking position errors did not exceed, respectively, 5 and 20 feet. For gusty wind conditions (8 to 10 knots), these errors were, respectively, 10 and 30 feet. Ten hands off automatic lands were performed. The standard deviation of the touchdown position and velocity errors from the mean values were, respectively, 244 feet and 0.7 feet/sec. Author

N86-28951*# Kansas Univ. Center for Research, Inc., Lawrence.
INVESTIGATION OF EMPENNAGE BUFFETING
C. Edward Lan, I. G. Lee, and William H. Wentz (Wichita State Univ., Kans.) Jul. 1986 81 p
(Grant NAG2-371)
(NASA-CR-177164; NAS 1.26:177164; CRINC-FRL-714-1) Avail: NTIS HC A05/MF A01 CSCL 01C

Theoretical methods of predicting aircraft buffeting are reviewed. For the buffeting due to leading edge vortex breakdown, a method is developed to convert test data of mean square values of fluctuating normal force to buffeting vortex strength through an unsteady lifting-surface theory and unsteady suction analogy. The resulting buffeting vortex from the leading edge extension of an F-18 configuration is used to generate a fluctuating flow field which produces unsteady pressure distribution on the vertical tails. The root mean square values of root bending moment on the vertical tails are calculated for a rigid configuration. Author

N86-28952*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
THE INTEGRATED MANUAL AND AUTOMATIC CONTROL OF COMPLEX FLIGHT SYSTEMS Status Report, Apr. 1985 - Jun. 1986
David K. Schmidt 7 Jul. 1986 27 p
(Grant NAG4-1)
(NASA-CR-177086; NAS 1.26:177086) Avail: NTIS HC A03/MF A01 CSCL 01C

The topics of research in this program include pilot/vehicle analysis techniques, identification of pilot dynamics, and control and display synthesis techniques for optimizing aircraft handling qualities. The project activities are discussed. The current technical activity is directed at extending and validating the active display synthesis procedure, and the pilot/vehicle analysis of the NLR rate-command flight configurations in the landing task. Two papers published by the researchers are attached as appendices. E.R.

N86-28953*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MULTIVARIABLE CONTROL OF A FORWARD SWEPT WING AIRCRAFT M.S. Thesis
Wilma W. Quinn Jan. 1986 137 p
(Grant NAG2-297)
(NASA-CR-177112; NAS 1.26:177112; LIDS-TH-1530) Avail: NTIS HC A07/MF A01 CSCL 01C

The impact of independent canard and flaperon control of the longitudinal axis of a generic forward swept wing aircraft is examined. The Linear Quadratic Gaussian (LQG)/Loop Transfer Recovery (LTR) method is used to design three compensators: two single-input-single-output (SISO) systems, one with angle of attack as output and canard as control, the other with pitch attitude as output and canard as control, and a two-input-two-output system with both canard and flaperon controlling both the pitch attitude and angle of attack. The performances of the three systems are compared showing the addition of flaperon control allows the

aircraft to perform in the precision control modes with very little loss of command following accuracy. Author

N86-28954*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
INDIVIDUAL-BLADE-CONTROL RESEARCH IN THE MIT VTOL TECHNOLOGY LABORATORY 1977-1985 Final Report, Nov. 1977 - Nov. 1985
Norman D. Ham Jun. 1986 40 p
(Grant NsG-2266)
(NASA-CR-177121; NAS 1.26:177121; VTL-TR-196-8) Avail: NTIS HC A03/MF A01 CSCL 01C

A new, advanced system for active control of helicopters and its application to the solution of rotor aerodynamic and aeroelastic problems is described. Each blade is individually controlled in the rotating frame over a wide range of frequencies. Application of the system to gust alleviation, attitude stabilization, vibration alleviation, blade lag damping augmentation, stall flutter suppression, blade flapping stabilization, stall alleviation, and performance enhancement is outlined. The effectiveness of the system in achieving most of these applications is demonstrated by experimental results from wind tunnel tests of a model helicopter rotor with individual blade control. The feasibility of achieving many or all of the applications of individual blade control using the conventional helicopter swash plate is demonstrated, and the necessary control laws are presented. Author

N86-28955*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
MULTI-INPUT, MULTI-OUTPUT SYSTEM CONTROL FOR EXPERIMENTAL AIRCRAFT Progress Report
David K. Schmidt and E. L. Duke 13 Dec. 1985 57 p
(Contract NCC2-288)
(NASA-CR-177017; NAS 1.26:177017) Avail: NTIS HC A04/MF A01 CSCL 01C

Two techniques, direct eigenspace assignment (DEA) and explicit model following (EMF), are used initially to synthesize control laws for the longitudinal dynamics model of a Short Takeoff and Landing (STOL) vehicle in the landing configuration. The vehicle model and the flight control design are presented. The two synthesis techniques are briefly discussed and the handling qualities specifications mapped into the algorithm formulations. The control laws resulting from exercising the algorithms are evaluated in terms of achieved performance and robustness. Since the synthesized control laws involve full state feedback, methodologies were implemented for the control laws using output feedback without adversely affecting performance and robustness. Finally, the salient features of the two design techniques are summarized and the areas that require further investigation are suggested. B.G.

N86-28956*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MULTIVARIABLE CONTROL OF A TWIN LIFT HELICOPTER SYSTEM USING THE LQG/LTR DESIGN METHODOLOGY
Armando A. Rodriguez and Michael Athans 1986 8 p
(Grant NAG2-297)
(NASA-CR-177025; NAS 1.26:177025; LIDS-P-1551) Avail: NTIS HC A02/MF A01 CSCL 01C

Guidelines for developing a multivariable centralized automatic flight control system (AFCS) for a twin lift helicopter system (TLHS) are presented. Singular value ideas are used to formulate performance and stability robustness specifications. A linear Quadratic Gaussian with Loop Transfer Recovery (LQG/LTR) design is obtained and evaluated. Author

N86-28957*# Florida Atlantic Univ., Boca Raton. Dept. of Mechanical Engineering.
AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF ISOLATED ROTOR FLAP-LAG STABILITY IN FORWARD FLIGHT
Gopal H. Gaonker, Michael J. McNulty (Army Research and Technology Labs., Moffett Field, Calif.), and J. Nagabhushan (Indian Inst. of Science, Bangalore) Sep. 1985 31 p Presented at the 11th European Rotorcraft Forum, London, England, 10-13 Sep. 1985
(Contract NCC2-361)
(NASA-CR-177028; NAS 1.26:177028; Paper-66) Avail: NTIS HC A03/MF A01 CSCL 01C

For flap-lag stability of isolated rotors, experimental and analytical investigations are conducted in hover and forward flight on the adequacy of a linear quasisteady aerodynamics theory with dynamic inflow. Forward flight effects on lag regressing mode are emphasized. A soft inplane hingeless rotor with three blades is tested at advance ratios as high as 0.55 and at shaft angles as high as 20 degrees. In combination with lag natural frequencies, collective pitch settings and flap-lag coupling parameters, the data base comprises nearly 1200 test points (damping and frequency) in forward flight and 200 test points in hover. By computerized symbolic manipulations, an analytic model is developed in substall to predict stability margins with mode identification. It also predicts substall and stall regions to help explain the correlation between theory and data. Author

N86-28958*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NONLINEAR CONTROL OF AIRCRAFT
L. R. Hunt (Texas Technological Univ., Lubbock), G. Meyer, and R. Su 1984 10 p
(Grants NAG2-189; NAG2-203; Contract N00014-76-C-1136)
(NASA-TM-89225; NAS 1.15:89225) Avail: NTIS HC A02/MF A01 CSCL 01C

Transformations of nonlinear systems were used to design automatic flight controllers for vertical and short takeoff aircraft. Under the assumption that a nonlinear system can be mapped to a controllable linear system, a method using partial differential equations was constructed to approximate transformations in cases where exact ones cannot be found. An application of the design theory to a rotorcraft, the UH-1H helicopter, was presented. Author

N86-28959*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
FLUTTER PREDICTION FOR A WING WITH ACTIVE AILERON CONTROL Final Report
Kevin Penning and Doral R. Sandlin Jun. 1983 112 p
(Contract NCC4-1)
(NASA-CR-176994; NAS 1.26:176994) Avail: NTIS HC A06/MF A01 CSCL 01C

A method for predicting the vibrational stability of an aircraft with an analog active aileron flutter suppression system (FSS) is expained. Active aileron refers to the use of an active control system connected to the aileron to damp vibrations. Wing vibrations are sensed by accelerometers and the information is used to deflect the aileron. Aerodynamic force caused by the aileron deflection oppose wing vibrations and effectively add additional damping to the system. Author

N86-28960*# National Aeronautics and Space Administration, Washington, D.C.
OPTICAL TECHNOLOGY FOR FLIGHT CONTROL SYSTEMS
Mitsuyoshi Mayanagi Mar. 1986 29 p Transl. into ENGLISH from Japan Society for Aeronautical and Space Sciences Journal (Japan), v. 32, no. 369, Oct. 1984 p 583-593 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88400; NAS 1.15:88400; ISSN-0021-4663) Avail: NTIS HC A03/MF A01 CSCL 01C

Optical applications to the flight control system including optical data bus, sensors, and transducers are analyzed. Examples of optical data bus include airborne light optical fiber technology (ALOFT), F-5E, YA-7D, MIL-STD-1553 fiber optic data bus and NAL-optic data bus. This NAL-optic data bus is applied to STOL, and its characteristics are stressed. Principles and advantages of optical pulse-digital transducers are discussed. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-28961*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERFACE OF THE TRANSPORT SYSTEMS RESEARCH VEHICLE MONOCHROME DISPLAY SYSTEM TO THE DIGITAL AUTONOMOUS TERMINAL ACCESS COMMUNICATION DATA BUS
Wesley C. Easley and John S. Tanguy (PRC Kentron, Inc., Hampton, Va.) May 1986 34 p refs
(NASA-TM-87728; NAS 1.15:87728) Avail: NTIS HC A03/MF A01 CSCL 14B

An upgrade of the transport systems research vehicle (TSRV) experimental flight system retained the original monochrome display system. The original host computer was replaced with a Norden 11/70, a new digital autonomous terminal access communication (DATAC) data bus was installed for data transfer between display system and host, while a new data interface method was required. The new display data interface uses four split phase bipolar (SPBP) serial busses. The DATAC bus uses a shared interface ram (SIR) for intermediate storage of its data transfer. A display interface unit (DIU) was designed and configured to read from and write to the SIR to properly convert the data from parallel to SPBP serial and vice versa. It is found that separation of data for use by each SPBP bus and synchronization of data tranfer throughout the entire experimental flight system are major problems which require solution in DIU design. The techniques used to accomplish these new data interface requirements are described. Author

N86-28962# Royal Aircraft Establishment, Farnborough (England).
A NUMERICAL STUDY OF THE AERODYNAMIC INTERFERENCE OF A MODEL SUPPORT SYSTEM USED IN THE RAE 5 METRE WIND TUNNEL
B. C. Hardy 5 Sep. 1985 30 p
(AD-A165671; RAE-TM-AERO-2046; BR97527; ESA-86-97105) Avail: NTIS HC A03/MF A01

Lift interference effects of under-wing strut guards were studied using panel methods. Unexpected reduction in interference with increase in lift beyond a certain value is accounted for by a sweep dependent, nonlinear lift contribution. The level of agreement between theory and experiment shows that the mutual lift and the displacement effects need to be considered. Further comparisons between the calculation method and experiment are necessary to establish how much of the remaining discrepancy in calculations is due to the shortcomings of the method and how much to uncertainties in the experimental data. ESA

N86-28963# Resource International, Inc., Columbus, Ohio.
MECHANISTIC METHODOLOGY FOR AIRPORT PAVEMENT DESIGN WITH ENGINEERING FABRICS. VOLUME 2: ADVANCED CONCEPTS, VALIDATION AND CRITERIA Final Report
Kamran Majidzadeh, George J. Ilves, and V. R. Kumar 7 May 1986 95 p
(Contract DTFA01-81-C-10043)
(DOT/FAA/PM-84/9,II-Vol-2) Avail: NTIS HC A05/MF A01

This report is Volume 2 of a two volume set dealing with the application of non-woven fabrics to rigid airport pavements to control and/or retard the development of reflection cracking of flexible overlays due to both thermal stresses and load-associated fatigue. This volume describes the development of a new viscoelastic analysis model for the analysis of thermal cracking that utilizes fundamental material properties and does not rely on phenomenological distress functions. The methods developed in this work as well as those presented in Phase 1 (Volume 1), have been validated on one airport and four highway projects. The validation is described in this report and shows that the developed analysis models predict the reflection cracking phenomenon for all projects very well. This report also describes the laboratory evaluation of a fiber-asphalt SAMI layer that shows promise for use in reflection cracking control. Finally, specifications for material properties, testing procedures, and construction methods are presented. Author

N86-28964*# National Aeronautics and Space Administration, Washington, D.C.
TESTS WITH THREE-DIMENSIONAL ADJUSTMENTS IN THE RECTANGULAR WORKING SECTION OF THE FRENCH T2 WIND TUNNEL WITH AN AS 07-TYPE SWEPT-BACK WING MODEL
A. Blanchard, M. J. Payry, and J. F. Breil Jul. 1986 161 p Transl. into ENGLISH of "Essais d'Adaptation Tridimensionnelle de la Veine Rectangulaire de la Soufflerie T2 en Presence d'une Maquette d'Aile en Fleche du Type AS 07" rept. OA-34/3075, DERAT-12/5015-DN ONERA, France, Nov. 1985 p 1-24 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88442; NAS 1.15:88442; OA-34/3075; DERAT-12/5015-DN) Avail: NTIS HC A08/MF A01 CSCL 14B

The results obtained on the AS 07 wing and the working section walls for three types of configurations are reported. The first, called non-adapted, corresponds to the divergent upper and lower rectilinear walls which compensate for limit layer thickening. It can serve as a basis for complete flow calculations. The second configuration corresponds to wall shapes determined from calculations which tend to minimize interference at the level of the fuselage. Finally, the third configuration, called two-dimensional adaptation, uses the standard method for T2 profile tests. This case was tested to determine the influence of wall shape and error magnitude. These results are not sufficient to validate the three-dimensional adaptation; they must be coordinated with calculations or with unlimited atmosphere tests. Author

N86-28965*# National Aeronautics and Space Administration, Washington, D.C.
PERFORMANCE OF THE HIGH SPEED ANECHOIC WIND TUNNEL AT LYON UNIVERSITY
M. Sunyach, B. Brunel, and G. Comte-Bellot Mar. 1986 23 p Transl. into ENGLISH from Revue d'Acoustique (France), v. 18, no. 73, 1985 15 p Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88388; NAS 1.15:88388) Avail: NTIS HC A02/MF A01 CSCL 14B

The characteristics of the feed duct, the wind tunnel, and the experiments run in the convergent-divergent anechoic wind tunnel at Lyon University are described. The wind tunnel was designed to eliminate noise from the entrance of air or from flow interactions with the tunnel walls so that noise caused by the flow-test structure interactions can be studied. The channel contains 1 x 1 x 0.2 m glass and metal foil baffles spaced 0.2 m apart. The flow is forced by a 350 kW fan in the primary circuit, and a 110 kW blower in the secondary circuit. The primary circuit features a factor of four throat reductions, followed by a 1.6 reduction before the test section. Upstream and downstream sensors permit monitoring of the anechoic effectiveness of the channel. Other sensors allow modeling of the flow structures in the tunnel. The tunnel was used to examine turbulent boundary layers in flows up to 140 m/sec, tubulence-excited vibrations in walls, and the effects of laminar and turbulent flows on the appearance and locations of noise sources. Author

N86-28966*# National Aeronautics and Space Administration, Washington, D.C.
INSTRUMENTATION IN WIND TUNNELS
K. Takashima Jul. 1986 30 p Transl. into ENGLISH from Journal of the Japan Society for Aeronautical and Space Sciences (Japan), v. 32, no. 363, Apr. 1984 p 194-202 Original language document was announced in IAA as A85-40976 Transl. by The Corporate

Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-78012; NAS 1.15:78012; ISSN-0021-4663) Avail: NTIS HC A03/MF A01 CSCL 14B

Requirements in designing instrumentation systems and measurements of various physical quantities in wind tunnels are surveyed. Emphasis is given to sensors used for measuring pressure, temperature, and angle, and the measurements of air turbulence and boundary layers. Instrumentation in wind tunnels require accuracy, fast response, diversity and operational simplicity. Measurements of force, pressure, attitude angle, free flow, pressure distribution, and temperature are illustrated by a table, and a block diagram. The LDV (laser Doppler velocimeter) method for measuring air turbulence and flow velocity and measurement of skin friction and flow fields using laser holograms are discussed. The future potential of these techniques is studied. E.R.

N86-28967*# National Aeronautics and Space Administration, Washington, D.C.
ITERATIVE ADAPTION OF THE BIDIMENSIONAL WALL OF THE FRENCH T2 WIND TUNNEL AROUND A C5 AXISYMMETRICAL MODEL: INFINITE VARIATION OF THE MACH NUMBER AT ZERO INCIDENCE AND A TEST AT INCREASED INCIDENCE
J. P. Archambaud, J. B. Dor, M. J. Payry, and L. Lamarche Jun. 1986 48 p Transl. into ENGLISH of rept. OA-35/3075, DERAT-13/5015-DNO ONERA, Toulouse, France, Mar. 1986 p 1-16 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88445; NAS 1.15:88445; OA-35/3075; DERAT-13/5015-DNO) Avail: NTIS HC A03/MF A01 CSCL 14B

The top and bottom two-dimensional walls of the T2 wind tunnel are adapted through an iterative process. The adaptation calculation takes into account the flow three-dimensionally. This method makes it possible to start with any shape of walls. The tests were performed with a C5 axisymmetric model at ambient temperature. Comparisons are made with the results of a true three-dimensional adaptation. Author

N86-28968# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Aerodynamique.
WALL SELF ADAPTATION PROCESS AT MACH 1.2 Final Report [PROCESSUS D'AUTOADAPTATION DE PAROIS A.M.=1,2]
Y. Lesant Apr. 1985 32 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RTS-31/3075-AY-402; ESA-86-97198) Avail: NTIS HC A03/MF A01

A wall adaptation algorithm is described and its performance is verified by numerical simulation. The proposed technique aims to reproduce unbounded velocity field conditions in the vicinity of a model during supersonic wind tunnel tests. A Mach one boundary condition is imposed on the subsonic points of the backward limit of the computation domain. The experimental work leading to the choice of an adaptation process is detailed. Flow deviation near the wall was selected to test convergence. The results of the simulation show that three wall geometries are necessary to obtain complete agreement of confined and unbounded flow. ESA

N86-28969# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
THE EFFECT OF A SPLITTER PLATE AS BOUNDARY LAYER REMOVAL SYSTEM IN HALF-MODEL TESTING
Hans Bippes Sep. 1985 29 p
(DFVLR-FB-85-64; ISSN-0171-1342; ESA-86-97454) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany, DM 10.50

The effect of a splitter plate as boundary layer removal system in half-model testing is investigated. The experiments are performed on a rectangular wing in the range of maximum lift in subsonic flow. Oil flow patterns display the footprints of a complicated three-dimensional secondary flow in the neighborhood of the model to wall junction. This secondary flow leads to a considerable increase of local lift. The data analysis reveals that its intensity depends on the vorticity of the free shear layer separating from the suction side of the wing and the spanwise variation of the circulation, but only slightly on the thickness of the boundary layer on the splitter plate. Comparison with tests without splitter plate shows that under the test conditions investigated the use of the splitter plate is not an effective means for improving the mirror conditions in half-model testing. ESA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-28970*# National Aeronautics and Space Administration, Washington, D.C.
PLANETARY EXPLORATION THROUGH YEAR 2000: AN AUGMENTED PROGRAM. PART TWO OF A REPORT BY THE SOLAR SYSTEM EXPLORATION COMMITTEE OF THE NASA ADVISORY COUNCIL
1986 240 p Original contains color illustrations
(NASA-TM-89235; NAS 1.15:89235) Avail: SOD HC $12.00 as 033-000-00987-9; NTIS MF A01 CSCL 22A

In 1982, the NASA Solar System Exploration Committee (SSEC) published a report on a Core Program of planetary missions, representing the minimum-level program that could be carried out in a cost effective manner, and would yield a continuing return of basic scientific results. This is the second part of the SSEC report, describing missions of the highest scientific merit that lie outside the scope of the previously recommended Core Program because of their cost and technical challenge. These missions include the autonomous operation of a mobile scientific rover on the surface of Mars, the automated collection and return of samples from that planet, the return to Earth of samples from asteroids and comets, projects needed to lay the groundwork for the eventual utilization of near-Earth resources, outer planet missions, observation programs for extra-solar planets, and technological developments essential to make these missions possible. M.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-28971# Range Commanders Council, White Sands Missile Range, N. Mex. Optical Systems Group.
VIDEO STANDARDS AND FORMATS
Feb. 1986 52 p Supersedes TCG-452-77, AD-A042387
(AD-A165934; RCC/OSG-452-86; TCG-452-77) Avail: NTIS HC A04/MF A01 CSCL 17/2

This standard is intended to clarify or augment existing standards where range applications are unique. Electrical performance standards for standard and high resolution monochrome and for color closed circuit television equipment are referred to in this document. These standards are those adopted by industry

and associated professional groups which are applicable to test range use and are consistent with the rapidly developing state of the art. In addition, engineering considerations and practices used for automatic insertion of data into the video format and consequent retrieval for use are outlined. The purpose of this document is to provide users of standard and high resolution monochrome and standard color closed circuit television equipment with the criteria essential for interchange and compatibility of equipment, tape recordings and live signals. These criteria are intended to apply not only to locally generated signals (that is, signals generated by the camera itself or at a nearby point where control can be exercised over picture quality), but also to ensure compatibility for metric video application, where video tape recorders, video disc recorders and data insertion equipment are used. GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-28972*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE PROCESSING APPLICATIONS ROCKET (SPAR) PROJECT: SPAR 10
R. Poorman, comp. Jun. 1986 92 p
(NASA-TM-86548; NAS 1.15:86548) Avail: NTIS HC A05/MF A01 CSCL 20H

The Space Processing Applications Rocket Project (SPAR) X Final Report contains the compilation of the post-flight reports from each of the Principal Investigators (PIs) on the four selected science payloads, in addition to the engineering report as documented by the Marshall Space Flight Center (MSFC). This combined effort also describes pertinent portions of ground-based research leading to the ultimate selection of the flight sample composition, including design, fabrication and testing, all of which are expected to contribute to an improved comprehension of materials processing in space. The SPAR project was coordinated and managed by MSFC as part of the Microgravity Science and Applications (MSA) program of the Office of Space Science and Applications (OSSA) of NASA Headquarters. This technical memorandum is directed entirely to the payload manifest flown in the tenth of a series of SPAR flights conducted at the White Sands Missile Range (WSMR) and includes the experiments entitled, Containerless Processing Technology, SPAR Experiment 76-20/3; Directional Solidification of Magnetic Composites, SPAR Experiment 76-22/3; Comparative Alloy Solidification, SPAR Experiment 76-36/3; and Foam Copper, SPAR Experiment 77-9/1R. Author

N86-28973*# Martin Marietta Corp., Denver, Colo.
NEAR-FIELD TESTING OF THE 15-METER MODEL OF THE HOOP COLUMN ANTENNA. VOLUME 3: NEAR- AND FAR-FIELD PLOTS FOR THE JPL FEED
John Hoover, Neill Kefauver, Tom Cencich, and Jim Osborn Mar. 1986 147 p
(Contract NAS1-18016)
(NASA-CR-178061; NAS 1.26:178061; MCR-85-640-Vol-3) Avail: NTIS HC A07/MF A01 CSCL 09C

Technical results from near-field testing of the 15-meter model of the hoop column antenna at the Martin Marietta Denver Aerospace facility are discussed. The antenna consists of a deployable central column and a 15 meter hoop, stiffened by cables into a structure with a high tolerance repeatable surface and offset feed location. The surface has been configured to have four offset parabolic apertures, each about 6 meters in diameter, and is made of gold plated molybdenum wire mesh. Pattern measurements were made with feed system radiating at frequencies of 7.73, 11.60, 2.27, 2.225, and 4.26 (all in GHz). This report (Volume 3) gives the detailed patterns measured with the JPL feed (2.225 GHz). Volume 1 covers the testing from an overall viewpoint and contains information of generalized interest for testing large antennas, including the deployment of the antenna in the Martin Facility and the measurements to determine mechanical stability and trueness of the reflector surface, the test program outline, and a synopsis of antenna electromagnetic performance. A detailed listing of the antenna patterns for the LaRC feeds (7.3, 11.60, 2.27, and 4.26 GHz) are given in Volume 2 of this report. Author

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-28974# Presidential Commission on the Space Shuttle Challenger Accident, Washington, D.C.
REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, VOLUME 2
1986 485 p
Avail: SOD HC $40.00 as 040-000-00503-0 in set with volume 3; NTIS MF A01

Volume 2 continues with the findings of the commission regarding the circumstances surrounding the Challenger accident. The report of an independent test team appointed to determine if the tests and analyses being performed by the Marshall Center and Morton Thiokol were adequate to provide the information needed by the panel is given. Some personal observations on the reliability of the shuttle is given by R. P. Feynman. The work schedules of NASA and contractor personnel involved in the launch processing at Kennedy and Marshall Centers are reviewed in terms of human factors analysis. In the flight readiness review treatment of O-ring problems case to case field joint and nozzle to case joint O-ring anomalies experiences in flight and documents are described. NASA's Prelaunch Activities Team, Mission Planning and Operations Team, Development and Production Team, and Accident Analysis Team reports are given. Finally, comments by Morton Thiokol on the NASA reports are presented. E.R.

N86-28975# Presidential Commission on the Space Shuttle Challenger Accident, Washington, D.C.
REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, VOLUME 3
1986 534 p
Avail: SOD HC $40.00 as 040-000-00503-0 in set with volume 2; NTIS MF A01

The report of the NASA Photo and TV Support Team is given. It describes the significant observed anomalies and related events of the STS 51-L accident and includes image enhancement results which were used to identify, locate, and determine time related characteristics of the events. The NASA Search, Recovery, and Reconstruction Task Force Team report is also given. It includes summaries of the surface search, sonar mapping, recovery, structural reconstruction and evaluations and conclusions drawn. E.R.

N86-28976# Presidential Commission on the Space Shuttle Challenger Accident, Washington, D.C.
REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, VOLUME 4
1986 828 p
Avail: SOD HC $47.00 as 040-000-00504-8 in set with volume 5; NTIS MF A01

This volume contains all the hearings of the Presidential Commission on the Space Shuttle Challenger accident from 6 February to 25 February 1986. Among others, the testimony of NASA's acting administrator William R. Graham is included. E.R.

N86-28977# Presidential Commission on the Space Shuttle Challenger Accident, Washington, D.C.
REPORT OF THE PRESIDENTIAL COMMISSION ON THE SPACE SHUTTLE CHALLENGER ACCIDENT, VOLUME 5
1986 884 p
Avail: SOD HC $47.00 as 040-000-00504-8 in set with volume 4; NTIS MF A01

This volume contains all the hearings of the Presidential

Commission on the Space Shuttle Challenger accident from 26 February to 2 May 1986. Among others is the testimony of L. Mulloy, Manager, Space Shuttle Solid Rocket Booster Program, Marshall Space Flight Center and G. Hardy, Deputy Director, Science and Engineering, Marshall Space Flight Center. E.R.

N86-28978# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
12 Jul. 1985 60 p Transl. into ENGLISH from various West European articles
(JPRS-WST-85-021) Avail: NTIS HC A04/MF A01

Topics addressed include: aerospace industry; biotechnology; civil aviation; computers; microelectronics; scientific and industrial policy; and technology transfer. For individual titles, see N86-28979 through N86-28980.

N86-28979# Joint Publications Research Service, Arlington, Va.
EUROPE LOOKS TO TWENTY-FIRST CENTURY WITH HERMES
In its West Europe report: Science and Technology (JPRS-WST-85-021) 12 Jul. 1985 4 p Transl. into ENGLISH from Revue Aerospatiale (Paris, France), Jun. 1985 p 9; 11; 15 (For primary document see N86-28978 20-16)
Avail: NTIS HC A04/MF A01

Hermes, a manned spacecraft launched by Ariane 5, is described. Requirements for composite materials are discussed for use in the structural design. The docking mechanism is designed to be compatible with the US space station, with Columbus, and with the Soviet station. The reentry, approach, and landing are also discussed. B.G.

N86-28980# Joint Publications Research Service, Arlington, Va.
PHILIPS DEVELOPS A NEW KIND OF SEMICONDUCTOR IMAGE SENSOR **c76**
In its West Europe report: Science and Technology (JPSR-WST-85-021) 12 Jul. 1985 2 p Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtschaft (Frankfurt-Main, West Germany), 8 May 1985 p 5 (For primary document see N86-28978 20-16)
Avail: NTIS HC A04/MF A01

A semiconductor image sensor which contains twice as many light sensitive elements per surface unit as the sensors currently known is described. The improvement in performance is due to a different method of applying voltages to the electrodes. The distribution and performance of the electrodes are described. The charge transport process is described using a two electrode per cell scheme. B.G.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-28981*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NONLINEAR DYNAMIC ANALYSIS OF DEPLOYING FLEXIBLE SPACE BOOMS
Paul E. McGowan and Jerrold M. Housner Sep. 1985 34 p
(NASA-TM-87617; NAS 1.15:87617) Avail: NTIS HC A03/MF A01 CSCL 22B

A fundamental investigation of the planar deployment and lock-up of two flexible boom type appendages which have attached tip masses and are connected to a central rigid body through a rotational spring is presented. Nondimensional parameters are identified and it is shown that, in general, the solution depends only on two mass ratios and one nondimensional stiffness parameter. Results are presented for boom tip deflections, deployment time and root moments at lock-up. A threshold value of the nondimensional stiffness parameter is identified beyond which boom deflections become large. Also, a thorough examination of the effect of nonlinear terms in the equations governing the deployment phase is performed. Nonlinear terms in the deployment equations due to kinematics and structural deformation are required to predict more accurately boom deflections, but retention of an inconsistent set of nonlinear terms leads to erroneous results. In particular, retaining nonlinear kinematic terms while neglecting nonlinear structural terms can produce inaccurate results even below the threshold stiffness value. Author

N86-28982*# California Univ., Davis. Dept. of Psychology.
IMPLICATIONS OF PRIVACY NEEDS AND INTERPERSONAL DISTANCING MECHANISMS FOR SPACE STATION DESIGN Final Report, 1 Jun. - 31 Dec. 1985
Albert A. Harrison, Robert Sommer, Nancy Struthers, and Kathleen Hoyt 3 Jan. 1986 51 p
(Grant NAG2-357)
(NASA-CR-177097; NAS 1.26:177097) Avail: NTIS HC A04/MF A01 CSCL 22B

The literature on privacy needs, personal space, interpersonal distancing, and crowding is reveiwed with special reference to spaceflight and spaceflight analogous conditions. A quantitative model is proposed for understanding privacy, interpersonal distancing, and performance. The implications for space station design is described. Author

N86-28983*# North Carolina Univ., Charlotte. Dept. of Electrical Engineering.
DYNAMICS AND CONTROL OF FLEXIBLE SPACECRAFT DURING AND AFTER SLEWING MANEUVERS Semiannual Progress Report, 1 Nov. 1985 - 30 Apr. 1986
Yogendra P. Kakad 30 Apr. 1986 25 p
(Grant NAG1-535)
(NASA-CR-177027; NAS 1.26:177027) Avail: NTIS HC A02/MF A01 CSCL 22B

The dynamics and control of slewing maneuvers of a large flexible spacecraft, namely, NASA Spacecraft Control Laboratory Experiment (SCOLE) test article are studied. The dynamical equations obtained for slewing maneuvers are highly nonlinear and coupled. The maneuver is expressed in terms of four Euler parameters and is specified as the angular displacement about an arbitrary axis. The slew maneuver control problem is developed in terms of rigid-body slewing and suppression of two elastic modes is analyzed using the method of nonlinear decoupling. Author

N86-28984*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTEGRATED THERMAL-STRUCTURAL-ELECTROMAGNETIC DESIGN OPTIMIZATION OF LARGE SPACE ANTENNA REFLECTORS
Howard M. Adelman and Sharon L. Padula Jun. 1986 18 p
Presented at the 27th AIAA/ASME/ASCE/AHS Structures, Structural Dynamics and Materials Conference, San Antonio, Tex., 19-21 May 1986
(NASA-TM-87713; NAS 1.15:87713) Avail: NTIS

HC A02/MF A01 CSCL 22B

The requirements for low mass and high electromagnetic (EM) performance in large, flexible space antenna structures in motivating the development of a systematic procedure for antenna design. In contrast to previous work which concentrated on reducing rms distortions of the reflector surface, thereby indirectly increasing antenna performance, the current work involves a direct approach to increasing electromagnetic performance using mathematical optimization. The thermal, structural, and EM analyses are fully integrated in the context of an optimization procedure, and consequently, the interaction of the various responses is accounted for directly and automatically. Preliminary results are presented for sizing cross-sectional areas of a tetrahedral truss reflector. The results indicate potential for this integrated procedure from the standpoint of mass reduction, performance increase, and efficiency of the design process. Author

N86-28985# Control Dynamics Co., Huntsville, Ala.
ASCOT (ADVANCED STRUCTURAL CONTROL TECHNIQUES) Final Report, Nov. 1983 - Jan. 1985
Sherman M. Seltzer, Danny K. Tollison, Thomas G. Howsman, Richard D. Irwin, and William P. Maggard Sep. 1985 164 p
(Contracts F30602-84-C-0012; ARPA Order 4828; DA Proj. D82-8)
(AD-A165917; CDC-223-1284-FR-ASC; RADC-TR-85-166) Avail: NTIS HC A08/MF A01 CSCL 09/2

This is the Control Dynamics Company final technical report on Advanced Structural Control Techniques (ASCOT). Included is the description and application of a novel technique for the design of low order digital controllers for very high order system models. Also included is an investigation of a digital prefiltering technique which incorporates non-uniform rate sampling. GRA

N86-28986# Kayser Threde G.m.b.H., Munich (West Germany). Inst. fuer Plasmaforschung.
ANTHRORACK PHASE A STUDY. VOLUME 1: SYSTEM SPECIFICATION Final Report
W. Bangert, comp. Paris ESA 1 Feb. 1985 71 p Prepared in cooperation with SNIAS, St. Medard-en-Jalles, France, Compagnie Industrielle Radioelectrique, Gals, Switzerland, and Energy Research Laboratory
(Contract ESA-5916/84-F-FL(SC))
(AN-RP-0000-01B-KT-Vol-1; ESA-CR(P)-2111-Vol-1;
ESA-86-96644) Avail: NTIS HC A04/MF A01

Specifications of a Spacelab facility to study human physiology in microgravity are given. Technical risks and uncertainties are summarized. ESA

N86-28987# Kayser Threde G.m.b.H., Munich (West Germany). Inst. fuer Plasmaforschung.
ANTHRORACK PHASE A STUDY. VOLUME 2: PROGRAM PLANNING Final Report
P. Rank, comp. Paris ESA 1 Feb. 1985 175 p Prepared in cooperation with SNIAS, St. Medard-en-Jalles, France, Compagnie Industrielle Radioelectrique, Gals, Switzerland, and Energy Research Laboratory
(Contract ESA-5916/84-F-FL(SC))
(AN-RP-0000-01B-KT-Vol-2; ESA-CR(P)-2111-Vol-2;
ESA-86-96645) Avail: NTIS HC A08/MF A01

A low cost approach to developing a Spacelab facility to study human physiology in microgravity is outlined. ESA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-28988# Centre National d'Etudes Spatiales, Toulouse (France). Div. Transmissions, Instrumentation et Traitement.
THEORETICAL AND EXPERIMENTAL STUDY OF POSEIDON ALTIMETER ACQUISITION PHASE
Pierre Leducq 6 Nov. 1984 49 p In FRENCH; ENGLISH summary
(CNES-337-84/CT/DRT/TIT/RL; ESA-86-97179) Avail: NTIS HC A03/MF A01

The altimeter system is based on a 900 MHz frequency ramp at 13.65 GHz band, the ramp length being 10 micro sec. Heterodyning the signal and the echo gives a frequency proportional to the distance. Pursuit algorithms are used to estimate the altitude. A breadboard model of the hardware was used in the performance tests. The results are in agreement with the theory and the simulations. Acceptable values are obtained at signal to noise ratios of 3 dB. ESA

N86-28989# Centre National d'Etudes Spatiales, Toulouse (France).
TOPEX - POSEIDON CNES SENSORS Final Report
N. Lannelongue, J. P. Aguttes, and P. Raizonville 17 Sep. 1984 25 p
(CNES-CT/DRT/TIT/RL-294-T; ESA-86-97180) Avail: NTIS HC A02/MF A01

A solid state altimeter and a DORIS precision tracking system receiver for the TOPEX satellite were designed. A solid state altimeter sharing the TOPEX antenna was chosen instead of a solid state amplifier for the NASA altimeter. The altimeter will be ON only when the NASA altimeter is OFF and vice-versa. The DORIS receiver will be ON full time during the mission. Attitude specifications; orbit control; altimeter antenna sharing; DORIS TRANET compatibility; interference studies; radiation studies; and definition of the sensor interface are discussed. ESA

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-28990# Naval Postgraduate School, Monterey, Calif.
DIFFUSION ESTIMATES HANDBOOK (APPLICATION TO THE SPACE SHUTTLE HC1 EXHAUST CLOUD) Report, Oct. 1985 - Feb. 1986
G. E. Schacher, S. Larsen, and T. Mikkelsen Feb. 1986 44 p
(Contract MIPR-FY7616-84-00424)
(AD-A165878; NPS-61-86-009) Avail: NTIS HC A03/MF A01 CSCL 04/1

A simplified method is presented for making atmospheric diffusion estimates. The method is applied to the Space Shuttle HC1 exhaust hazard at Vandenberg Air Force Base. A set of standard parameters and results are developed and applications to specific areas are included. GRA

N86-28991# Stuttgart Univ. (West Germany).
PLASMA THRUSTER DEVELOPMENT: MAGNETOPLASMADYNAMIC PROPULSION, STATUS AND BASIC PROBLEMS Interim Report, Oct. 1984 - Sep. 1985
Rolf D. Buehler Feb. 1986 108 p Prepared in cooperation with AF Rocket Propulsion Lab., Edwards AFB, Calif.
(Grant AF-AFOSR-0394-84)
(AD-A165945; IRA-85-P6; AFRPL-TR-86-013) Avail: NTIS HC A06/MF A01 CSCL 21/3

This report provides an overview of the present state and the problem areas of magnetoplasmadynamic (MPD) space propulsion devices and systems potentially suitable for orbit raising and maneuvering of large space structures, i.e., thrust and power levels of presently most promising steady (or quasisteady pulsed) thruster types, self field, axial applied field arcjets and Hall ion thrusters are reviewed in terms of performance trends, present understanding, uncertainties and ground testing problems, with the conclusion that there is as yet no reliable basis for choosing one type for final development. Typical efficiency vs. specific impulse curves for all MPD thrusters show the dominant role of the

propellant on the thrust to input power ratio (as for ion engines), and the necessity of achieving relatively high specific impulse values for each propellant for acceptable efficiencies. The specific impulse (or onset) limit of self-field thrusters using a variety of propellants is discussed, together with predicted trends from several theoretical models. Considering system complexity and development cost as well as performance, the advantages and disadvantages if pulsed (quasisteady) vs. continuous thruster operation and the propellant selection criteria are reviewed. Electrode erosion, especially on cathodes, losses and limits imposed by radiation cooling are emphasized as critical problem areas for larger MPD thrusters. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-28992*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ALGORITHMS VERSUS ARCHITECTURES FOR COMPUTATIONAL CHEMISTRY
Harry Partridge and Charles W. Bauschlicher, Jr. Jan. 1986 24 p
(NASA-TM-89395; RIACS-TR-86.3; NAS 1.15:89395) Avail: NTIS HC A02/MF A01 CSCL 07A

The algorithms employed are computationally intensive and, as a result, increased performance (both algorithmic and architectural) is required to improve accuracy and to treat larger molecular systems. Several benchmark quantum chemistry codes are examined on a variety of architectures. While these codes are only a small portion of a typical quantum chemistry library, they illustrate many of the computationally intensive kernels and data manipulation requirements of some applications. Furthermore, understanding the performance of the existing algorithm on present and proposed supercomputers serves as a guide for future programs and algorithm development. The algorithms investigated are: (1) a sparse symmetric matrix vector product; (2) a four index integral transformation; and (3) the calculation of diatomic two electron Slater integrals. The vectorization strategies are examined for these algorithms for both the Cyber 205 and Cray XMP. In addition, multiprocessor implementations of the algorithms are looked at on the Cray XMP and on the MIT static data flow machine proposed by DENNIS. Author

N86-28993# Lawrence Livermore National Lab., Calif.
CHEMISTRY RESEARCH RESOURCE Progress Report, Dec. 1985
Jan. 1986 83 p
(Contract W-7405-eng-48)
(DE86-008163; UCID-20622-85-12) Avail: NTIS HC A05/MF A01

Research is reported into the following fields: synthesis of new materials, analytical techniques, chemical kinetics and transport processes, artificial intelligence, materials characterization techniques, materials modeling analysis, mechanical properties of polymers, physical metallurgy (mechanical properties, phase transformations), surface modification and surface studies, and new materials development and properties. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-28994*# Santa Clara Univ., Calif.
AN INVESTIGATION OF THE ADSORPTION CHARACTERISTICS OF 5'ATP AND 5'AMP ONTO THE SURFACE OF CaSO4 X 2H2O Final Technical Report
John Calderon and M. A. Sweeney 1984 13 p
(Contract NCC2-170)
(NASA-CR-177005; NAS 1.26:177005) Avail: NTIS HC A02/MF A01 CSCL 07D

A model has been proposed in which solid surfaces can act as a site for cataletic activity of condensation reactions for certain biomolecules. From this model, the adsorption characteristics of 5'ATP and 5'AMP onto the surface of CaSO4.2H2O was chosen for study. It has been proven that 5'ATP and 5'AMP do adsorb onto the surface of CaSO4. Studies were then made to determine the dependence of absorption versus time, concentration, ionic strength and pH. It was found that the adsorption of the nucleotides is highly pH dependent, primarily determined by the phosphate acid groups of the nucleic acid molecule. From this investigation, the data obtained is discussed in relation to the model for the prebiotic earth. Author

N86-28995*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYSIS OF DELAMINATION GROWTH FROM MATRIX CRACKS IN LAMINATES SUBJECTED TO BENDING LOADS
Gretchen Bostaph Murri and E. Gail Guynn Jul. 1986 39 p
Prepared in cooperation with Army Aviation Systems Command, St. Louis, Mo.
(DA Proj. 1L1-61102-AH-45)
(NASA-TM-87754; NAS 1.15:87754; USAAVSCOM-TM-86-B-2) Avail: NTIS HC A03/MF A01 CSCL 11D

A major source of delamination damage in laminated composite materials is from low-velocity impact. In thin composite laminates under point loads, matrix cracks develop first in the plies, and delaminations then grow from these cracks at the ply interfaces. The purpose of this study was to quantify the combined effects of bending and transverse shear loads on delamination initiation from matrix cracks. Graphite-epoxy laminates with 90 deg. plies on the outside were used to provide a two-dimensional simulation of the damage due to low-velocity impact. Three plate bending problems were considered: a 4-point bending, 3-point bending, and an end-clamped center-loaded plate. Under bending, a matrix crack will form on the tension side of the laminate, through the outer 90 deg. plies and parallel to the fibers. Delaminations will then grow in the interface between the cracked 90 deg. ply and the next adjacent ply. Laminate plate theory was used to derive simple equations relating the total strain energy release rate, G, associated with the delamination growth from a 90 deg. ply crack to the applied bending load and laminate stiffness properties. Three different lay-ups were tested and results compared. Test results verified that the delamination always formed at the interface between the cracked 90 deg. ply and the next adjacent ply. Calculated values for total G sub c from the analysis showed good agreement for all configurations. The analysis was able to predict the delamination onset load for the cases considered. The result indicated that the opening mode component (Mode I) for delamination growth from a matrix crack may be much larger than the component due to interlaminar shear (Mode II). Author

N86-28996*# National Aeronautics and Space Administration, Washington, D.C.
DAMPING CHARACTERISTICS OF DAMAGED FIBER COMPOSITE COMPONENTS
K. Eberle Jul. 1986 18 p Transl. into ENGLISH of conference paper "Daempfungsverhalten Geschaedigter Faserverbundbauteile" presented at the DGLR Symposium ueber Entwicklung und Anwendung von CFk-Strukturen, 1984 p 1-12 Symposium held in Berlin, West Germany, 8-9 Nov. 1984 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88449; NAS 1.15:88449; DGLR-84-159) Avail: NTIS HC A02/MF A01 CSCL 11D

Defects in fiber composite components produce changes with respect to the vibrational characteristics of the material. These changes can be recognized in the form of a frequency shift or an alteration of the damping process. The present investigation is concerned with questions regarding the possibility of a utilization of the changes in suitable defect-detecting inspection procedures. A description is given of a method for measuring the damping

characteristics of a specimen. This method provides a spectrum of the damping coefficients of the sample as a basis for a comprehensive evaluation of the damping behavior. The correlation between defects and change in the damping characteristics is demonstrated with the aid of results obtained in measurements involving specimens of carbon-fiber composites and a component consisting of glass-fiber-reinforced plastics. Author

N86-28997*# National Aeronautics and Space Administration, Washington, D.C.
SINTERING AND PROPERTIES OF Si3N4 WITH AND WITHOUT ADDITIVES BY HIP TREATMENT
S. Kuratani, M. Shimada, and M. Koizumi Mar. 1986 19 p Transl. into ENGLISH from Japan Society of Materials Science Journal (Japan), v. 33, no. 374, NOv. 1984 p 1372-1377 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88386; NAS 1.26:88386; ISSN-0514-5163) Avail: NTIS HC A02/MF A01 CSCL 11D

Hot Isostatic Pressing (HIP) of Si3N4 powders with and without additives was performed using a glass container, and various kinds of pressureless-sintered Si3N4 were HIP'ed without a container. The effects of HIP treatment on density, microstructure, flexural strength, microhardness, and fracture toughness on Si3N4 ceramics were studied. Using a glass container it was difficult to reach theoretical density. The microhardness of HIP'ed Si3N4 without additives was low, and the fracture toughness of HIP'ed Si3N4 with and without additives was 22 to 25 W/m-K, and it decreased with increasing the amount of additives. The density and flexural strength, and hardness of pressureless-sintered Si3N4 which contained Al2O and Y2O3 as oxide additives were remarkably improved by HIP treatment using nitrogen as a pressure transmitting gas. It is very important to select the sintering conditions for fabricating the presintered body of Si3N4 in order to improve the mechanical properties of Si3N4 by HIP treatment. Author

N86-28998*# National Aeronautics and Space Administration, Washington, D.C.
LEAF SPRING MADE OF FIBER-REINFORCED RESIN
Junichi Hori Apr. 1986 9 p Transl. into ENGLISH of Japanese Patent no. 58-77941 (Appl. no. 56-17499, 31 Oct. 1981) p 217-219 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88415; NAS 1.15:88415) Avail: NTIS HC A02/MF A01 CSCL 11D

A leaf spring made of a matrix reinforced by at least two types of reinforcing fibers with different Young's modulus is described in this Japanese patent. At least two layers of reinforcing fibers are formed by partially arranging the reinforcing fibers toward the direction of the thickness of the leaf spring. A mixture of different types of reinforced fibers is used at the area of boundary between the two layers of reinforced fibers. The ratio of blending of each type of reinforced fiber is frequently changed to eliminate the parts where discontinuous stress may be applied to the leaf spring The objective of this invention is to prevent the rapid change in Young's modulus at the boundary area between each layer of reinforced fibers in the leaf spring. Author

N86-28999*# National Aeronautics and Space Administration, Washington, D.C.
THERMODYNAMIC METHOD OF CALCULATING THE EFFECT OF ALLOYING ADDITIVES ON INTERPHASE INTERACTION IN COMPOSITE MATERIALS
L. I. Tuchinsky Mar. 1986 14 p Transl. into ENGLISH from Fiz. Khim. Obrab. Mater. (USSR), no. 1, 1979 p 121-126 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88391; NAS 1.15:88391) Avail: NTIS HC A02/MF A01 CSCL 11D

The effect of alloying additives to the matrix of a composite on the high temperature solubility rate of a single component fiber was analyzed thermodynamically. With an example of binary Ni alloys, with Group IV-VI transition metals reinforced with W fibers, agreement between the calculated and experimental data was demonstrated. Author

N86-29000# Argonne National Lab., Ill.
COMPOSITE MATERIALS FOR HIGH HEAT AND PARTICLE FLUX COMPONENTS IN FUSION DEVICES
A. R. Krauss, D. M. Gruen, J. N. Brooks, and A. B. DeWald 1985 19 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985 Prepared in cooperation with Georgia Inst. of Tech., Atlanta
(Contract W-31-109-eng-38)
(DE86-004072; CONF-851174-21) Avail: NTIS HC A02/MF A01

We discuss the use of composite materials based on the use of self-sustaining coatings to reduce sputtering-induced erosion in magnetic confinement fusion devices while providing enhanced high-heat flux properties. One material, a copper-lithium alloy has been described previously. A second group of materials consists of porous tungsten, tungsten carbide, or tantalum, impregnated with an alkali metal alumino-silicate. These materials form an alkali metal overlayer similar to that found on the Cu-Li alloy. A third group of materials is obtained by infiltrating the porous high-Z refractory metal with an alkali metal-bearing alloy such as Cu-Li or Al-Li. These materials combine the high thermal conductivity of the infiltrate material with the high-temperature strength and melt layer stability of tungsten or tantalum. Calculations of the sputtering properties indicate that it may be possible to use a tungsten composite limiter at plasma edge temperatures up to approx. 300 eV. DOE

N86-29001# Idaho Univ., Moscow. Dept. of Mechanical Engineering.
DAMPING CAPACITY MEASUREMENTS FOR CHARACTERIZATION OF DEGRADATION IN ADVANCED MATERIALS
R. Mantena, R. F. Gibson, and T. A. Place 1986 16 p Presented at the 31st National Symposium and Exhibition of the Society for the Advancement of Material and Process Engineering, Las Vegas, Nev., 8 Apr. 1986
(Contract DE-AC07-76ID-01570)
(DE86-007656; EGG-M-30485; CONF-860438-2) Avail: NTIS HC A02/MF A01

This paper describes the application of damping capacity measurements for characterization of degradation in advanced materials. A recently developed impulse-frequency response technique was used to obtain damping capacity measurements on crossplied E-glass/epoxy laminates which had been subjected to four-point bending and cantilever bending to produce matrix cracking in the transverse plies. The size and location of the damage zone were correlated with changes in damping. With the expected introduction of Rapidly Solidified Alloys (RSA) as effective alternatives to conventional materials, the applicability of damping capacity measurements as a nondestructive means of evaluating degradation in these materials was also studied. A conventional A710 structural steel having three different microstructures was used for developing the methodology to be used later on RSA specimens. It is shown that damping is more sensitive to matrix cracking than stiffness is in E-glass/epoxy composite specimens. In the case of A710 steel, the damping changes at low strain, though significant, do not correlate with the mechanical property data. Damping data at high strains does correlate with the mechanical property data, however. DOE

N86-29002# Oak Ridge National Lab., Tenn.
ALUMINA-SiC WHISKER COMPOSITES
T. N. Tiegs and P. F. Becher 1985 6 p Presented at the Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Mich., 20 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-004791; CONF-8510103-5) Avail: NTIS HC A02/MF A01

Previous results have shown that alumina reinforced with SiC whiskers is an attractive material for application in advanced heat engines. This composite exhibits excellent strength and toughness up to temperatures of approx. 1000 C and is very resistant to slow crack growth. Reinforcement of a mullite matrix by the SiC

whiskers has also been demonstrated. Recent experiments have investigated other aspects of applying the SiC whisker-reinforced alumina to heat engines. The results have shown the whisker reinforced alumina to have excellent thermal shock resistance, and a good Weibull modulus (indicating good reliability). Fabrication of high toughness composites by pressureless sintering was found to be a viable process for alumina with whisker contents < 20 vol%. In addition, whisker reinforcement may be combined with transformation toughening in the alumina and mullite matrix system for improved mechanical properties. Isothermal heating tests indicated that oxidation of the SiC whiskers in an alumina matrix caused degradation of mechanical properties in currently developed materials. DOE

N86-29003# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). New Materials and Processes Lab.
ACOUSTIC EMISSION APPLIED TO OBSERVE DAMAGE IN COMPOSITE MATERIAL HIGH-PRESSURE FLUID STORAGE TANKS
Christian LeFloch 1986 17 p Sponsored by French Ministry of Research and Technology
(SNIAS-861-430-111; ESA-86-97173) Avail: NTIS HC A02/MF A01

Acoustic emission analysis was used on composite material high-pressure fluid storage tanks made by winding resin-impregnated glass fiber around a light alloy liner. The method's advantages and limitations concerning nondestructive testing are shown. Studying acoustic activity in stages of force associated with a damaged model makes it possible to differentiate between several kinds of damage and their levels of importance. Acoustic activity rate data makes it possible to examine the metallic liner's plastic deformation. ESA

N86-29004# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes Materiaux non Metalliques.
ELEMENTARY CHARACTERIZATION OF THE BORON 696 EPOXY UNIDIRECTIONAL PREIMPREGNATED FIBERS [CARACTERISATION ELEMENTAIRE DU PREIMPREGNE TISSUE UNIDIRECTIONNEL BORE 696/ARG 12 (FIBRE SNPE)]
M. Laparliere 1984 72 p In FRENCH
(PV-M3-427200; ESA-86-97194) Avail: NTIS HC A04/MF A01

The performance of boron fibers produced by a pilot plant was tested, establishing the physical chemical characteristics of the preimpregnated product as well as the mechanical properties of the finished composite. The preimpregnation was done using CIBA Arg 12 epoxy. The mechanical properties are slightly inferior to a reference commercial product. The analysis of the Arg 12 resin shows the same basic constituents as the BSL 914 resin, but in different proportions. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-29005*# Santa Clara Univ., Calif. Sponsored Projects Office.
AN INVESTIGATION OF THE ADSORPTION CHARACTERISTICS OF 5 PRIME ATP AND 5 PRIME AMP ONTO THE SURFACE OF CaSO SUB 4 X 2H SUB 2 O Final Technical Report
John Calderon and M. A. Sweeney 1986 13 p
(Contract NCC2-170)
(NASA-CR-177101; NAS 1.26:177101) Avail: NTIS HC A02/MF A01 CSCL 07D

A model has been proposed (Lahev and Chans, 1982) in which solid surfaces can act as a site for catalytic activity of condensation reactions for certain biomolecules. From this model, the adsorption characteristics of 5'ATP and 5'AMP onto the surface of CaSO4 2H2O was chosen for study. It has been proven that 5'ATP and 5'AMP do adsorb onto the surface of CaSO4. Studies were then made to determine the dependence of adsorption versus time, concentration, ionic strength and pH. It was found that the adsorption of the nucleotides is highly pH dependent, primarily determined by the phosphate acid groups of the nucleic acid molecule. From this investigation, the data obtained are discussed in relation to the model for the prebiotic earth. Author

N86-29006*# Eloret Corp., Sunnyvale, Calif.
STRUCTURAL CHARACTERIZATION AND GAS REACTIONS OF SMALL METAL PARTICLES BY HIGH RESOLUTION IN-SITU TEM AND TED Semiannual Technical Report, 1 Jul. - 30 Sep. 1985
Klaus Heinemann 30 Sep. 1985 35 p
(Contract NCC2-283)
(NASA-CR-177031; NAS 1.26:177031) Avail: NTIS HC A03/MF A01 CSCL 07D

A commercial electron microscope with flat-plate upper pole piece configuration of the objective lens and top entry specimen introduction was modified to obtain 5 x 10 to the minus 10th power mbar pressure at the site of the specimen while maintaining the convenience of a specimen airlock system that allows operation in the 10 to the 10th power mbar range within 15 minutes after specimen change. The specimen chamber contains three wire evaporation sources, a specimen heater, and facilities for oxygen or hydrogen plasma treatment to clean as-introduced specimens. Evacuation is achieved by dural differential pumping, with fine entrance and exit apertures for the electron beam. With the microscope operating at .000001 mbar, the first differential pumping stage features a high-speed cryopump operating in a stainless steel chamber that can be mildly baked and reaches 1 x 10 to the minus 8th power mbar. The second stage, containing the evaporation sources and a custom ionization gauge within 10 cm from the specimen, is a rigorously uncompromised all-metal uhv-system that is bakable to above 200 C throughout and is pumped with an 80-liter ion pump. Design operating pressures and image quality (resolution of metal particles smaller than 1 nm in size) was achieved. Author

N86-29007*# National Aeronautics and Space Administration, Washington, D.C.
DEVELOPMENT OF A POTENTIOMETRIC EDTA METHOD FOR DETERMINATION OF MOLYBDENUM. USE OF THE ANALYSIS FOR MOLYBDENITE CONCENTRATES
R. Khristova and Mac VanMen Jun. 1986 13 p Transl. into ENGLISH from Khim. Fak. (Sofia, Bulgaria), 1976 p 243-251 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88460; NAS 1.15:88460) Avail: NTIS HC A02/MF A01 CSCL 07D

Based on considerations of principles and experimental data, the interference of sulfate ions in poteniometric titration of EDTA with FeCl3 was confirmed. The method of back complexometric titration of molybdenum of Nonova and Gasheva was improved by replacing hydrazine sulfate with hydrazine hydrochloride for reduction of Mo(VI) to Mo(V). The method can be used for one to tenths of mg of molybdenum with 0.04 mg standard deviation. The specific method of determination of molybdenum in molybdenite concentrates is presented. Author

N86-29008*# National Aeronautics and Space Administration, Washington, D.C.
ELECTROLYSIS CELL FOR THE MANUFACTURE OF PERSULFATES
J. M. Cueto Jul. 1986 10 p Transl. into ENGLISH of German Patent no. 19-08-872 (18 Jun. 1970) p 1-7 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88466; NAS 1.15:88466) Avail: NTIS HC A02/MF A01 CSCL 07D

A cell for the electrolytic generation of persulfates, characterized by the fact that a housing acts as cathode, is made of

metal, and consists of a lower electrolytically active section and an upper electrolytically inactive section. It is designed so that there is produced the greatest possible current density suited to produce the desired electrolysis effect. This invention, compared to the devices used until now, exhibits considerable advantages whereby it is particularly suited for the production of potassium persulfate. Author

N86-29009*# National Aeronautics and Space Administration, Washington, D.C.
OPTIMIZATION OF THE GEOMETRIC DIMENSIONS OF VERTICAL ELECTROLYZERS WITH GAS-GENERATING ELECTRODES
Wolfgang Thiele and Martin Schleiff Jul. 1986 8 p Transl. into ENGLISH from Chemische Technik (Leipzig, East Germany), v. 31, no. 12, Dec. 1979 p 623-624 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88468; NAS 1.15:88468) Avail: NTIS HC A02/MF A01 CSCL 07D

A study is made to determine whether, under the conditions of electrolyte circulation induced by evolved gases, it is possible to increase the vertical scale without a great increase in cell voltage. The mathematical modeling used is discussed, and a comparison is made with experimental results and conclusions. It is found that it is possible to increase the vertical scale without producing a cell voltage increase. Author

N86-29010*# National Aeronautics and Space Administration, Washington, D.C.
CONCERNING THE ELECTROSYNTHESIS OF HYDROGEN PEROXIDE AND PEROXODISULFATES. SECTION 2: OPTIMIZATION OF ELECTROLYSIS CELLS USING AN ELECTROLYZER FOR PEROXODISULFURIC ACID AS AN EXAMPLE
Martin Schleiff, Wolfgang Thiele, and Hermann Matschiner Jul. 1986 17 p Transl. into ENGLISH from Chemische Technik (Leipzig, East Germany), v. 29, no. 12, Dec. 1977 p 679-683 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88467; NAS 1.15:88467) Avail: NTIS HC A02/MF A01 CSCL 07D

The model is presented of an electrolyzer for peroxodisulfuric acid, and it is analyzed mathematically. Its application for engineering and economic optimization is investigated in detail. The mathematical analysis leads to conclusions concerning the change in position of the optimum with respect to the various target functions due to changes of the individual design-caused and economic parameters. Author

N86-29011*# National Aeronautics and Space Administration, Washington, D.C.
COMBUSTION THEORY FOR LIQUIDS WITH A FREE SURFACE. 3: SPECIAL PROBLEMS
S. N. Milkov, G. S. Sukhov, and L. P. Yarin Jun. 1986 15 p Transl. into ENGLISH from Fizika Goreniya i Vzryva (USSR), no. 3, 1985 p 3-8 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88459; NAS 1.15:88459) Avail: NTIS HC A02/MF A01 CSCL 21B

Two special problems concerning the combustion of liquids with a free surface, i.e., flame quenching during the mixing of a burning liquid inside a container and liquid burnout from a porous layer, are analyzed using a quasi-one-dimensional model. The critical parameters corresponding to the quenching of a burning fluid with a free surface are determined. Determinations are also made of the limiting pressure gradients corresponding to the transition from the combustion mode where the liquid evaporates from the surface of a porous layer to the mode where the phase transition surface lies inside the porous layer. Author

N86-29012# Catholic Univ. of America, Washington, D.C. Dept. of Chemistry.
REACTION INTERMEDIATES IN AROMATIC FUEL COMBUSTION Final Report, 18 Jul. 1984 - 17 Jul. 1985
William A. Sanders 17 Jul. 1985 36 p
(Contract N00014-84-C-2295)
(AD-A165998) Avail: NTIS HC A03/MF A01 CSCL 07/3

There is increasing tendency in future fuels to have higher aromatic contents because partly of the change in fuel sources (such as coals and shale oils) and partly of the greater use of aromatic compounds as additives due to their high octane values. The chemistry of the oxidation of aromatic compound at combustion temperatures (T > 1500 K) is very complex and poorly understood. This study is part of a series of experiments being carried out to elucidate the oxidation mechanism of C6H6, the most important benchmark system for the aromatic compounds. The unimolecular decomposition of methylphenyl ether (anisole) was studied in incident shock waves covering the temperature range from 1000 to 1580 K and the pressure range from 0.4 to 0.9 atm. The carbon monoxide formed in the reaction, monitored by resonance absorption using a stabilized cw CO laser, could be satisfactorily accounted for by a four-reaction mechanism: C6H-5OCH3 yields C6H5O + CH3; C6H5O yields CO + C5H5; CH3 + C6H5O yields o- and p-CH3C6H4OH; and CH3 + CH3 yields C2H6. GRA

N86-29013# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.
HIGH-RESOLUTION TUNABLE DIODE LASER SPECTROSCOPY OF METHANE Final Report, 1 Oct. 1981 - 30 Sep. 1983
H. C. Walker, Jr. and W. J. Phillips AEDC Mar. 1986 45 p Prepared in cooperation with AEDC, Arnold AFS, Tenn.
(AD-A166000; AEDC-TR-85-37) Avail: NTIS HC A03/MF A01 CSCL 07/4

The feasibility of using tunable diode laser spectroscopy for measurement of methane concentration in turbine engine exhausts was investigated. An experimental program was accomplished in which the foreign gas broadening parameters of the methane R(O)A line of the v3 fundamental band were measured for nitrogen and carbon dioxide broadening. The temperature range was extended from the room temperature data available in the literature to 1000K, typical of turbine engine exhausts. The range of concentrations and path lengths over which the technique is feasible was established. A literature survey on typical turbine engine emissions was conducted from which it was determined that the technique may be applicable at augmented power settings, but methane concentrations are too small for idle and intermediate power settings. GRA

N86-29014# Sandia National Labs., Albuquerque, N. Mex.
OXIDATION OF SOCl ELECTROLYTE ON Mo, Ta, W AND Pt ELECTRODES
F. M. Delnick and W. R. Cieslak Nov. 1985 15 p
(Contract DE-AC04-76DP-00789)
(DE86-003987; SAND-85-0015) Avail: NTIS HC A02/MF A01

The oxidation of 1.5 M LiAlCl4/SOCl2 electrolyte on Mo, Ta, W, and Pt electrodes is evaluated using complex impedance and steady-state polarizations. All four metals behave as inert, film-free electrodes in the SOCl2 electrolyte with the same differential double-layer capacitance of 11 to 12 microF/sq cm at E greater than or equal to 4.7 V vs. Li/LiCl. DOE

N86-29015# Pacific Northwest Lab., Richland, Wash.
TECHNIQUE FOR COMPARING AES SIGNALS FROM DIFFERENT SPECTROMETERS USING COMMON MATERIALS
D. R. Baer and M. T. Thomas Oct. 1985 17 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004857; PNL-SA-13275; CONF-851174-26) Avail: NTIS HC A02/MF A01

A simple procedure is outlined to obtain relative sensitivity curves that allow data collected on one Auger electron spectrometer to be related to data collected on a different spectrometer or to a standard data set. Data collected on three single pass cylindrical mirror analyzer (CMA) systems demonstrate that dN/dE

peak to peak amplitude ratios for pure elements can vary considerably but in a systematic manner for different systems. Such differences can be produced by variations in system design, by specimen or electron gun alignment, spectrometer contamination or other problems. However, if the differences in relative sensitivity are considered in the data analysis, data sets from different systems can be interrelated with reasonable accuracy. DOE

N86-29016# Yale Univ., New Haven, Conn.
SIMULTANEOUS MULTIPOINT MEASUREMENTS OF DENSITY GRADIENTS AND TEMPERATURE IN A FLAME Final Report, 1 Jul. 1981 - 31 Jul. 1985
R. K. Chang, B. T. Chu, and M. B. Long Nov. 1985 19 p
(Contract DE-AC02-81ER-10969)
(DE86-005124; DOE/ER-10969/T1) Avail: NTIS HC A02/MF A01

A summary is given of research directed toward the study of turbulent reacting and nonreacting flows by nonintrusive in situ optical techniques. New diagnostic techniques were developed for the instantaneous mapping of species concentration and temperature in turbulent flames in one or two dimensions. A number of different light scattering mechanisms were utilized including Rayleigh scattering, spontaneous Raman scattering, and coherent anti-Stokes Raman scattering (CARS). Progress was also made on the use of newly-available, high-speed imaging devices which allow the two-dimensional mapping of the flows at rates high enough to follow their temporal evolution. DOE

N86-29017# Department of Energy, Washington, D. C.
FOURTH SYMPOSIUM ON SEPARATION SCIENCE AND TECHNOLOGY FOR ENERGY APPLICATIONS: ABSTRACTS
1985 74 p Presented at the 4th Symposium on Separation Science and Technology for Energy Applications, Knoxville, Tenn., 20 Oct. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.; American Chemical Society, Washington, D.C.; National Research Council, Washington, D.C.
(Contract DE-AC05-84OR-21400)
(DE86-005173; CONF-851011-Absts) Avail: NTIS HC A04/MF A01

This report contains a collection of abstracts from the conference. There were 7 sessions covering: solvent extraction, sorption processes, posters, supercritical and solid-fluid systems, solvent extraction, membrane separations, and separations in dilute solutions. DOE

N86-29018# Catholic Univ. of America, Washington, D.C. Dept. of Chemistry.
KINETICS AND MECHANISMS OF KEY ELEMENTARY PROCESSES OF IMPORTANCE OF HIGH TEMPERATURE COMBUSTION CHEMISTRY Technical Progress Report, May 1 - 12 Dec. 1985
M. C. Lin 1985 8 p
(Contract DE-FG05-85ER-13373)
(DE86-005419; DOE/ER-13373/1) Avail: NTIS HC A02/MF A01

Activities summarized in this report include: improvements to the shock tube data system; kinetics and mechanism of the reaction system CH + C H O; high temperature rate constants for CH + N HCN + NH; kinetics of the methylidyne radical; modelling of the system OH + C H; and high temperature kinetics of the system C H + NO. DOE

N86-29019# Sandia National Labs., Albuquerque, N. Mex.
THE EFFECT OF SHOCK PRESSURE AND TEMPERATURE ON THE DEFORMATION MICROSTRUCTURE OF RUTILE
Martin J. Carr and Robert A. Graham 1985 21 p
(Contract DE-AC04-76DP-00789)
(DE85-016577; SAND-85-1661C) Avail: NTIS HC A02/MF A01

Annealed high purity rutile powders were shock loaded to peak pressures between 5 and 22 GPa and peak temperatures between 80 and 500 C, and then examined by transition electron microscopy. Unusually large concentrations of dislocations were observed even at the lowest pressure. They increased in density rapidly with peak pressure, exceeding 10 to the 11th power square cm above 8 GPa. Twinning was present at all pressures, but was more difficult to discern amid the dense substructure at higher pressures. Cleavage was common at 5 to 8 GPa, but rare at higher pressures. Recrystallized grains were observed at 16 GPa and 500 C. The occurrence of slip or twinning was affected by crystal orientation. Particle size and grain size were not significantly altered by shock compression. Slip on (100) planes was observed for the first time for this material. Crystallographic shear defects were not observed. DOE

N86-29020# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEN FLUORIDE: PART 1: SPECIFIC HEAT, STEAM PRESSURE AND DENSITY UP TO 300 DEG C AND 300at
E. U. Franck (Goettingen Univ., West Germany) and W. Spalthoff 1986 21 p Prepared in cooperation with Goettingen Univ. (Germany, F.R.). Inst. fuer Physikalische Chemie.
(Contract DE-AC05-84OT-21400)
(DE86-008133; K-Trans-86/5) Avail: NTIS HC A02/MF A01

Specific heat c sub v , pressure p and density rho of pure hydrogen fluoride were first measured at temperatures of up to 300C and 300 at. pressure. For this purpose, a tight and corrosion proof high pressure calorimeter with a capacity of 0.5 liter and 120 cal/degree of heat capacity was designed. The contents were heated by an integral heating element. Details of the equipment and the measuring process will be described. The densities of the liquid and gaseous HF were between 0.96 and 0.04 g/cm(3). The results for c sub r (T, rho) and p (T, rho) have been tabulated. Noticeable are the high c sub r values up to 2 cal/g degree, or the 40 cal mol degree for subcritical densities. The isotherms of the specific heat between 190 and 259C between 190 and 250C show definite maximum values between rho = 0.04 and rho = 0.2 g/cm(3). The measurements showed also the pressures and the equilibrium densities and steam and liquid. The critical HF data at f sub kr = 3C, P sub kr = 66.2 +- 3.5 kg/cm(2) and rho sub kr = 0.29 +- 0.03 g/cm(3). The vaporization rate increases from 89.5 cal/g at 19.4C to a maximum of 146 cal/g at 130C, shows still 101 cal/g at 170C and then drops rapidly. DOE

N86-29021# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
PRELIMINARY STUDY OF FLAME STRUCTURE IN AN INTERNAL COMBUSTION ENGINE USING 2-D FLOW VISUALIZATION
A. O. zurLoye, F. V. Bracco, and D. A. Santavicca (Pennsylvania State Univ., University Park) 1985 10 p Presented at the International Symposium on Diagnostics and Modeling of Combustion in Reciprocating Engines, Tokyo, Japan, 4 Sep. 1985 Prepared in cooperation with Pennsylvania State Univ., University Park
(Contract DE-AC04-81AL-16338)
(DE86-008172; CONF-850915-2) Avail: NTIS HC A02/MF A01

The structure of the turbulent flame in a premixed charge internal combustion engine was investigated at engine speeds of 300, 600, 1200, and 1800 rpm. A laser sheet, 200 microns thick and 1 cm wide, was passed through the turbulent flame front and the intensity of the light scattered by seeding particles was measured, thus obtaining two-dimensional (2-D) cross-sections of the flame front. At the lower engine speeds the flame fronts were mostly continuous with some apparent pockets of unburned gas. As the engine speed was increased the flame fronts were more strongly distorted and the frequency of what appeared to be multiply connected flame sheets increased. The measured flame thicknesses varied from 300 microns to 1000 microns with the larger values more common at higher speeds. At least some of the variation was due to the flame being tilted with respect to the laser sheet but uncertainties persist as to the accuracy of the measured thicknesses. DOE

N86-29022# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
COMPARISON OF CLAY-WATER SYSTEMS AND OF ALUMINUM HYDROXIDE GELS IN ACIDIC MEDIUM
A. C. Pierre and D. R. Uhlmann 1986 16 p
(SNIAS-861-430-109; ESA-86-97171) Avail: NTIS

HC A02/MF A01

The properties of alumina sols and gels made by hydrolysis of aluminum sec-butoxide in an acidic medium, and clay-water systems are compared. A gelation mechanism of boehmite by electrostatic linking between the negatively charged edges and the positively charged faces of platlet particles is proposed. The negative charges on the edges could be due to several possible mechanisms, such as the attraction of the anions such as NO3 by the edge Al cations. The mechanism proposed explains the high gelation volume in highly acidic conditions, and the existence of a minimum in the volume at gel point in the low acidic concentration range. It also explains the aging behavior by a cleavage of the boehmite platlets. ESA

N86-29023# Max-Planck-Inst. fuer Plasmaphysik, Garching (West Germany).

DEPENDENCE OF SURFACE TENSION ON VAPOR PRESSURE AND FLUID DENSITY. NUMERICAL TREATMENT OF MEASURING DATA AND DESCRIPTION OF THE PHASE TRANSITION IN SIMPLE FLUIDS [ABHAENGIGKEIT DER OBERFLAECHENSPANNUNG VON DAMPFDRUCK UND FLUIDDICHTE. NUMERISCHE BEHANDLUNG DER MESSDATEN UND BESCHREIBUNG DES PHASENUEBERGANGS BEI EINFACHEN FLUIDEN]

Albrecht Elsner May 1985 81 p In GERMAN

(IPP-2/261; ESA-86-96928) Avail: NTIS HC A05/MF A01

The relation g between surface tension, vapor pressure, and density of fluid and vapor was investigated for 26 fluids. The function of state g for a two-phase system with free phase surface describes the phase transition following the principle of corresponding state of real gases. The knowledge of g allows the calculation of the surface tension of a fluid from the data of vapor pressure and density only. The scaling of the surface tension in the critical point and the absolute zero point was theoretically determined using a correlation function formulating the phase transition in the domain of critical fluctuations. The critical exponent for the surface tension, and the exponent for fluids are determined. ESA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-29024*# Eloret Corp., Sunnyvale, Calif.

THE CORRELATION OF STRUCTURAL, CHEMICAL, AND ELECTRONIC PROPERTIES OF SMALL METAL PARTICLES AND THEIR ALLOYS Final Technical Report, 20 May 1982 - 31 Jul. 1983

31 Jul. 1983 25 p

(Contract NCC2-193)

(NASA-CR-177116; NAS 1.26:177116; EI-84-0408) Avail: NTIS HC A02/MF A01 CSCL 11F

The low pressure interaction of CO with small Ru particles supported on ultrahigh vacuum (UHV) cleaved mica was studied using flash thermal desorption, Auger electron microscopy, transmission electron microscopy, and transmission electron diffraction. Average particle sizes for these experiments varied between 1.2 and 16 nm. A careful search for CO decomposition on the Ru particles revealed no evidence of dissociation over a temperature range and pressure range of 300 to 550 C and 10 to the minus 11th power to 10 to the minus 6th millibar, respectively. Gas and heat treatments caused significant morphological changes and dispersion in the Ru particles, which affected CO desorption. These effects were dependent on the particle size. Author

N86-29025*# Eloret Corp., Sunnyvale, Calif.

HIGH-RESOLUTION SURFACE ANALYSIS BY MICROAREA AUGER SPECTROSCOPY: COMPUTERIZATION AND CHARACTERIZATION Final Technical Report, 15 Aug. 1982 - 15 Feb. 1985

Raymond Browning Apr. 1986 20 p

(Contract NCC2-203)

(NASA-CR-177033; NAS 1.26:177033) Avail: NTIS HC A02/MF A01 CSCL 11F

A custom scanning Auger electron microscope (SAM) capable of introducing a 3-5 keV electron beam of several nA into a 30 nm diameter sample area was fitted with a sample introduction system and was fully computerized to be used for materials science research. The method of multispectral Auger imaging was devised and implemented. The instrument was applied to various problems in materials science, including the study of the fiber/matrix interface in a SiC reinforced titanium alloy, the study of SiC whiskers in Al alloy 2124 (in cooperation with NASA-Langley), the study of NiCrAl superalloys (in collaboration with NASA-Lewis), the study of zircalloy specimens (in collaboration with Stanford University), and the microstructure of sintered SiC specimens (in collaboration with NASA-Lewis). The report contains a number of manuscripts submitted for publication on these subjects. Author

N86-29026*# National Aeronautics and Space Administration, Washington, D.C.

BORON DETERMINATION IN STEELS BY INDUCTIVELY-COUPLED PLASMA SPECTOMETRY (ICP)

A. Gomez Coedo and M. T. Dorado Lopez Jun. 1986 14 p

Transl. into ENGLISH from Rev. Metal. (Madrid, Spain), v. 21, no. 2, Mar. - Apr. 1985 p 87-90 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-4004)

(NASA-TM-88434; NAS 1.15:88434) Avail: NTIS HC A02/MF A01 CSCL 11F

The sample is treated with 5N H2SO4 followed by concentrated HNO3 and the diluted mixture is filtered. Soluble B is determined in the filtrate by Inductively-Coupled Plasma (ICP) spectrometry after addition HCl and extraction of Fe with ethyl-ether. The residue is fused with Na2CO3 and, after treatment with HCl, the insoluble B is determined by ICP spectrometry as before. The method permits determination of ppm amounts of B in steel. Author

N86-29027# Army Armament Research and Development Command, Watervliet, N. Y. Close Combat Armaments Center.

YOUNG'S MODULUS AND POISSON'S RATIO OF STEEL AS STRESS DEPENDENT QUANTITIES Final Technical Report

W. Scholz and J. Frankel Jan. 1986 14 p

(AD-A166415; AD-E440319; ARCCB-TR-86004) Avail: NTIS HC A02/MF A01 CSCL 11/6

Second and third-order elastic constants of 4340 steel obtained from ultrasonic measurements of specimens under zero and moderate uniaxial stresses are used under a continuum mechanics analysis of finite deformation to predict Young's modulus and Poisson's ratio, not only in the stress range of the measurement, but at stresses near the yield point (150,000 psi), where Young's modulus changes by about 2.5 percent, Poisson's ratio by 5 percent (both decrease in tension and increase in comparison). GRA

N86-29028# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. Mechanical Behavior of Materials Lab.

CRACK GROWTH IN TITANIUM ALLOYS UNDER THE CONJOINT ACTION OF HIGH AND LOW CYCLE FATIGUE Final Report, 15 Jun. 1983 - 14 Jun. 1985

B. E. Powell and I. Henderson Feb. 1986 77 p

(Contract F49620-83-C-0116)

(AD-A166429; AFWAL-TR-85-4093) Avail: NTIS HC A05/MF A01 CSCL 11/6

Fatigue crack propagation rates have been measured for two titanium-based aeroengine disc alloys using compact tension test pieces. The loading block employed simulates two features of the engine flight pattern. A major stress cycle represents the start-stop operation which leads to low cycle fatigue. In-flight vibrations, which may give rise to high cycle fatigue, are represented by superimposed minor cycles of high frequency. With a lifting policy of retirement for cause the useful lives of blades and discs are limited by the onset of minor cycle crack growth. The threshold values

associated with the minor cycles have been used to predict this event. Similarly the method of linear summation has been used to predict the subsequent fatigue crack growth rates. These predictions are successful for Ti-6Al-4V, whilst for Ti-5331S they are found to be either accurate or safe. Although Ti-5331S displays a marginally greater resistance to the onset of minor cycle crack growth, of greater significance is its reduced crack growth rates prior to this event. As a consequence components fabricated from Ti-5331S will exhibit longer fatigue crack propagation lives when subjected to the conjoint action of high and low cycle fatigue. GRA

N86-29029# Oak Ridge National Lab., Tenn.
EFFECTS OF HELIUM CONTENT OF MICROSTRUCTURAL DEVELOPMENT IN TYPE 316 STAINLESS STEEL UNDER NEUTRON IRRADIATION
P. J. Maziasz Nov. 1985 229 p
(Contract DE-AC05-84OR-21400)
(DE86-005342; ORNL-6121) Avail: NTIS HC A11/MF A01

This work investigated the sensitivity of microstructural evolution, particularly precipitate development, to increased helium content during thermal aging and during neutron irradiation. Helium (110 at. ppM) was cold preinjected into solution annealed (SA) DO-heat type 316 stainess steel (316) via cyclotron irradiation. These specimens were then exposed side by side with uninjected samples. Continuous helium generation was increased considerably relative to EBR-2 irradiation by irradiation in high frequency infrared radiation. Data were obtained from quantitative analytical electron microscopy (AEM) in thin foils and on extraction replicas. DOE

N86-29030# Sandia National Labs., Albuquerque, N. Mex.
FORMATION OF ICOSAHEDRAL Al(Mn) BY PULSED SURFACE MELTING
D. M. Follstaedt and J. A. Knapp 1985 5 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-005442; SAND-85-1277C; CONF-851217-32) Avail: NTIS HC A02/MF A01

Surface melting of alternating Al/Mn layers on Al and Fe substrates by pulsed electron beams and lasers is found by transition electron microscopy (TEM) to produce icosahedral Al(Mn). Interpreting the observed microstructures in terms of the calculated temperature histories places limits on the melting point of the phase (660 C < T sub m < 960 C), the time needed for its nucleation from the melt at 660 C (t sub n < 20 ns), and the rate of quenching from the liquid needed to suppress formation of the competing T phase (-T > approx. 1 x 10 K/s). DOE

N86-29031# Kanner (Leo) Associates, Redwood City, Calif.
CALCULATED AND EXPERIMENTAL OPTIMIZING OF BINARY AND TERNARY SYSTEMS OF Ag, Bi, Pb, AND Tl Ph.D. Thesis
B. Zimmermann (Stuttgart Univ., West Germany) 1986 143 p Transl. into ENGLISH from Rechnerische und Experimentelle Optimierung von Binaren und Ternaren Systemen Aus Ag, Bi, Ph, und Tl (Stuttgart, West Germany) Prepared for Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-005962; LA-tr-86-4) Avail: NTIS HC A07/MF A01

A method was developed for the calculation of binary and higher-component diagrams of state and of the thermodynamic functions in these systems. The calculation optimizes the functions of state of the binary systems through simultaneous use of different thermodynamic measured values and of the diagram of state. The calculation of ternary systems takes place through extrapolation of the functions of state of the binary boundary systems. The five binary systems Ag-Bi, Ag-Pb, Ag-Tl, Bi-Pb, and Bi-Tl and the two ternary systems Ag-Bi-Pb and Ag-Bi-Tl are computed. The diagrams of state and the functions of state exhibit good agreement with the measured values. For computed ternary systems, the extrapolation of the functions of state from the boundary systems is only approximate. But with a few measurements, a ternary correction function is obtained which describes the ternary system quite well. Supplemental measurements of liquidus temperatures with DTA was performed in the systems Ag-Tl, Bi-Pb, Ag-Bi-Pb and Ag-Bi-Tl. Mixing enthalpies of the melts, or solution enthalpies in the melts, were measured calorimetrically in the systems Ag-Bi, Ag-Tl, Bi-Tl, Ag-Bi-Pb and Ag-Bi-Tl, and melt enthalpies were measured in the Bi-Tl system. DOE

N86-29032# Allied Bendix Corp., Kansas City, Mo.
QUANTITATIVE METALLOGRAPHIC METHOD FOR DETERMINING DELTA FERRITE CONTENT IN AUSTENITIC STAINLESS STEELS Final Report
G. A. Pressly Jan. 1986 60 p
(Contract DE-AC04-76DP-00613)
(DE86-006311; BDX-613-3350) Avail: NTIS HC A04/MF A01

Delta ferrite is a magnetic form of iron and has a body centered cubic crystal structure. It is often present as a nonequilibrium phase in austenitic stainless steel welds, castings, and wrought materials. The ferrite content of austenitic stainless steel can directly affect its properties, especially weldability and formability. Therefore, it is highly desirable to be able to predict and/or measure the ferrite content accurately. Current magnetic ferrite measuring methods are not applicable when test materials are geometrically small (less than 2.54 mm thick and 6.35 mm wide). Therefore, a standard metallographic test method STM 00107-A was established to determine delta ferrite content in small weldments and base metals of austenitic stainless steel. This standard test method (STM 00107-A) was then performed on several exemplary metallographic specimens to illustrate its capabilities and applications. The results from the exemplary tests were compared and contrasted to metallographic manual point count measurements, Ferritescope measurements, and predicted values calculated from chemical analyses. By utilizing the manual metallographic point count data, an accuracy of + or - 16% and a precision of + or 0.77% were determined for the standard test method. The comparison of Ferritescope data to standard test method revealed that the results obtained by the two methods are close at low (0 to 3%) ferrite contents and Ferritescope results are substantially greater at higher (6 to 10%) ferrite contents. The standard test method data compiled from the exemplary weld specimens was noted to be very similar to the predicted values calculated from chemical analyses. It was also shown that because the standard test method utilizes optics the morphology of the delta ferrite particles can be determined. This type of determination is possible only with metallographic methods. DOE

N86-29033# Lawrence Livermore National Lab., Calif.
EFFECT OF PARTIAL REVERSIBILITY OF DISLOCATION MOTION
A. W. Sleeswyk (Groningen Rijksuniversiteit, Netherlands), M. E. Kassner, and G. J. Kemerink 17 Jan. 1986 18 p Presented at the Symposium on Sur Les Deformations Finies Des Agregats: Bases Physiques Et Modelisations, Paris, France, 30 Oct. 1985 Prepared in cooperation with Rijksuniversiteit Groningen (Netherlands)
(Contract W-7405-eng-48)
(DE86-008015; UCRL-94188; CONF-8510292-1) Avail: NTIS HC A02/MF A01

The partial reversibility of dislocation motion and strain hardening is studied by three different types of experiment. (1) It is shown that the Bauschinger effect in tension/compression tests must be explained by a lost strain and an initial decrease in dislocation density when the mobile dislocations move between barriers after reversal. The model is confirmed by electron microscopy on the change of dislocation density after reversal. (2) Dislocations are made to move back and forth in a thin foil in the HVEM to which mutually perpendicular forces are applied alternatingly (x-y tests). (3) Mechanical analysis predicts that a large fraction of the mobile dislocations does not move when the tensile direction is changed over 90(0). Macroscopic x-y tests on Al and Cu show that the strain hardening coefficient decreases after each change. DOE

N86-29034# Sandia National Labs., Albuquerque, N. Mex.
SOLUTE TRAPPING IN ION-IMPLANTED METALS
S. M. Myers, D. M. Follstaedt, and F. Besenbacher 1985 80 p Presented at the ASM Metals Congress/TMS-AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985 Prepared in cooperation with Aarhus Univ., Denmark
(Contract DE-AC04-76DP-00789)
(DE86-003722; SAND-85-1808C; CONF-8510160-11) Avail: NTIS HC A05/MF A01

Solutes in metals undergo trapping reactions with numerous entities that range from irradiation defects to the boundaries of precipitates. Such trapping is especially prevalent in ion-implanted alloys because of the high defect densities, refine microstructures, relatively low formation temperatures and frequent use of interstitial solutes that typify these systems. Solute concentrations as high as several atomic percent may be involved; consequently, the effects upon microstructure and macroscopic properties are often substantial. This review begins with a general and qualitative discussion of trapping behavior, and then moves to a more detailed consideration of the theoretical methods used to treat these effects. With this backgound, selected experimental studies are presented to develop general trends and to illustrate the experimental and theoretical procedures. The discussion concludes by considering implications of solute trapping for the microstructures and properties of ion-implanted alloys. DOE

N86-29035# Los Alamos National Lab., N. Mex.
DEVELOPMENT OF A MOLYBDENUM-RHENIUM ALLOY FOR SPACE NUCLEAR REACTORS
L. B. Lundberg 1986 30 p Presented at the 115th American Institute of Mining, Metallurgical and Petroleum Engineers Annual Meeting, New Orleans, La., 2 Mar. 1986
(Contract W-7405-eng-36)
(DE86-006034; LA-UR-86-304; CONF-860340-2) Avail: NTIS HC A03/MF A01

Information is presented on the fabrication, properties, and use of molybdenum-rhenium alloys for space nuclear reactors. DOE

N86-29036# Argonne National Lab., Ill.
LABORATORY STUDY OF CORROSION OF HIGH-TEMPERATURE ALLOYS/COATINGS IN SIMULATED MEDIUM Btu GAS ATMOSPHERES Final Report
K. Natesan Feb. 1986 58 p
(Contract W-31-109-eng-38)
(DE86-007948; EPRI-AP-4452) Avail: NTIS HC A04/MF A01

Laboratory experiments have been conducted to evaluate the relative corrosion resistance of several metallic materials and coated alloys after exposure to high-temperature gaseous atmospheres typical of those in a medium-Btu gasification process. Based on the results from 1000-h exposures with and without simulated condensate formation during downtime, it was concluded that low-alloy ferritic steel will exhibit metal recession rates up to 1.2 mmy(-1) at a metal temperature of 420(0)C. Under similar conditions, high-chromium austenitic alloys had recession rates up to 0.11 mmy(-1), while the coated alloys exhibited negligible attack over the time span of the present investigation. DOE

N86-29037# Societe Nationale Industrielle Aerospatiale, Paris (France).
THE FUTURE OF SURFACE TREATMENTS IN AERONAUTICAL CONSTRUCTION [L'AVENIR DES TRAITEMENTS DE SURFACE EN CONSTRUCTION AERONAUTIQUE]
G. Sertour 29 Oct. 1985 8 p In FRENCH
(SNIAS-861-551-101; DCQ-1/85; ESA-86-97176) Avail: NTIS HC A02/MF A01

Surface treatments employed in the aeronautical industry and their evolution trends are presented. Aluminum or titanium alloy protection by electrolytic deposits, anodization, and vacuum or plasma deposits; the surface treatment of composite materials by paint or metallization; and the corrosion protection of refractory alloys by vapor phase diffusion of aluminum or chrome are considered. Fretting corrosion is shown to remain an unsolved problem related to several degradation and fatigue phenomena. ESA

N86-29038# Pacific Northwest Lab., Richland, Wash.
MEASUREMENT AND PREDICTION OF SENSITIZATION DEVELOPMENT IN AUSTENITIC STAINLESS STEELS
S. M. Bruemmer, L. A. Charlot, and D. G. Atteridge Oct. 1985 27 p Presented at the 13th Water Reactor Safety Meeting, Washington, D.C., 24 Oct. 1985
(Contract DE-AC06-76RL-01830)
(TI86-002819; PNL-SA-13423; CONF-8510173-35) Avail: NTIS HC A03/MF A01

The effects of thermal and thermomechanical treatments on sensitization development in Type 304 and 316 stainless steels have been measured and compared to model predictions. Sensitization development resulting from isthermal, continuous cooling and pipe welding treatments has been evaluated. An empirically-modified, theoretically-based model is shown to accurately predict material degree of sensitization (DOS) as expressed by the electrochemical potentiokinetic reactivation (EPR) test after both simple and complex treatments. Material DOS is also examined using analytical electron microscopy to document grain boundary chromium depletion and is compared to EPR test results. Author

N86-29245# Army Materials and Mechanics Research Center, Watertown, Mass. Physical Metallurgy Branch.
DIRECTION OF R AND D AND CURRENT STATUS OF UNDERSTANDING OF ADVANCED GEAR STEELS
P. J. Fopiano, J. E. Krzanowski, and G. M. Crawford *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 15 p (For primary document see N86-29236 20-37)
Avail NTIS HC A11/MF A01

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-29039* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR PREPARING ESSENTIALLY COLORLESS POLYIMIDE FILM CONTAINING PHENOXY-LINKED DIAMINES Patent
Anne K. StClair and Terry L. StClair Issued 17 Jun. 1986 8 p Filed 23 Aug. 1984 Supersedes N85-20128 (23 - 11, p 1611)
(NASA-Case-LAR-13353-1; US-Patent-4,595,548;
US-Patent-Appl-SN-643524; US-Patent-Class-264-236;
US-Patent-Class-264-204; US-Patent-Class-264-216;
US-Patent-Class-264-347; US-Patent-Class-528-222;
US-Patent-Class-528-341; US-Patent-Class-528-183) Avail: US Patent and Trademark Office CSCL 11C

A polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and solar cells, and the processes for preparing the same by thermal and chemical conversion are disclosed. An essential feature for achieving maximum optical transparency films requires utilizing recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and introducing phenoxy or thiophenyl separator groups and isomeric m,m' or o,p'-oriented diamines into the polymer molecular structure. The incorporation of these groups in the polymer structure serves to separate the chromaphoric centers and reduce the formation of inter-chain and intra-chain charge transfer complexes which normally cause absorptions in the UV-visible range. The films may be obtained by hand, brushing, casting, or spraying a layer of polyamic acid solutions onto a surface and thermally converting the applied layer to the polyimide, or the polyamic acid solution can be chemically converted to the polyimide, subsequentially dissolved in an organic solvent, and applied as a polyimide film layer with the solvent therein thermally removed. Author

N86-29040*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NUMERICAL MODELING OF PHYSICAL VAPOR TRANSPORT IN A VERTICAL CYLINDRICAL AMPOULE, WITH AND WITHOUT GRAVITY
Timothy L. Miller Jul. 1986 21 p
(NASA-TP-2620; NAS 1.60:2620) Avail: NTIS HC A02/MF A01 CSCL 20D

Numerical modeling has been performed of the fluid dynamics in a prototypical physical vapor transport crystal growing situation. Cases with and without gravity have been computed. Dependence of the flows upon the dimensionless parameters aspect ratio and Peclet, Rayleigh, and Schmidt numbers is demonstrated to a greater extent than in previous works. Most notably, it is shown that the effects of thermally-induced buoyant convection upon the mass flux on the growth interface crucially depend upon the temperature boundary conditions on the sidewall (e.g., whether adiabatic or of a fixed profile, and in the latter case the results depend upon the shape of the profile assumed). Author

N86-29041*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRUCTURE-TO-PROPERTY RELATIONSHIPS IN ADDITION CURED POLYMERS 2: RESIN Tg COMPOSITE INITIAL MECHANICAL PROPERTIES OF NORBORNENYL CURED POLYIMIDE RESINS
William B. Alston 1986 13 p To be presented at the 18th National SAMPE Technical Conference, Seattle, Washington, 7-9 Oct. 1986
(NASA-TM-88794; E-2979; NAS 1.15:88794; USAAVSCOM-TR-86-C-22) Avail: NTIS HC A02/MF A01 CSCL 11C

PRM (polymerization of monomeric reactants) methodology was used to prepare thirty different polyimide oligomeric resins. Monomeric composition as well as chain length between sites of crosslinks were varied to examine their effects on glass transition temperature (Tg) of the cured/postcured resins. An almost linear correlation of Tg versus molecular distance between the crosslinks was observed. An attempt was made to correlate Tg with initial mechanical properties (flexural strength and interlaminar shear strength) of unidirectional graphite fiber composites prepared with these resins. However, the scatter in mechanical strength data prevented obtaining as clear a correlation as was observed for the structural modification/crosslink distance versus Tg. Instead, only a range of composite mechanical properties was obtained at the test temperatures studied (room temperature, 288 and 316 C). Perhaps more importantly, what did become apparent during the attempted correlation study was: (1) that PMR methodology could be used to prepare composites from resins that contain a wide variety of monomer modifications, and (2) that these composites almost invariably provided satisfactory initial mechanical properties as long as the resins selected were melt processable. Author

N86-29042*# Southwest Research Inst., San Antonio, Tex
SLIDING SEAL MATERIALS FOR ADIABATIC ENGINES, PHASE 2 Interim Report, Feb. 1985 - Feb. 1986
James Lankford and William Wei Apr. 1986 54 p
(Contracts DEN3-352; DE-AI01-86CE-50162)
(NASA-CR-179475; DOE/NASA/0352-2; NAS 1.26:179475; Rept-06-7963) Avail: NTIS HC A04/MF A01 CSCL 11B

An essential task in the development of the heavy-duty adiabatic diesel engine is identification and improvements of reliable, low-friction piston seal materials. In the present study, the sliding friction coefficients and wear rates of promising carbide, oxide, and nitride materials were measured under temperature, environmental, velocity, and loading conditions that are representative of the adiabatic engine environment. In addition, silicon nitride and partially stabilized zirconia disks were ion implanted with TiNi, Ni, Co, and Cr, and subsequently run against carbide pins, with the objective of producing reduced friction via solid lubrication at elevated temperature. In order to provide guidance needed to improve materials for this application, the program stressed fundamental understanding of the mechanisms involved in friction and wear. Electron microscopy was used to elucidate the micromechanisms of wear following wear testing, and Auger electron spectroscopy was used to evaluate interface/environment interactions which seemed to be important in the friction and wear process. Unmodified ceramic sliding couples were characterized at all temperatures by friction coefficients of 0.24 and above. The coefficient at 800 C in an oxidizing environment was reduced to below 0.1, for certain material combinations, by the ion implanation of TiNi or Co. This beneficial effect was found to derive from lubricious Ti, Ni, and Co oxides. Author

N86-29043# University of Southern California, Los Angeles. Dept. of Chemistry.
THE INFLUENCE OF SUB Tg ANNEALING ON THE PROPERTIES OF POLYMERS ABOVE AND BELOW Tg Final Report, 1 Mar. 1983 - 28 Feb. 1985
John J. Aklonis 10 Dec. 1985 134 p
(Contract DAAG29-83-K-0034)
(AD-A165899; ARO-19566.1-CH) Avail: NTIS HC A07/MF A01 CSCL 11/2

One of the fundamental tenets of all kinetic treatments of the glass transitions is that changes in viscosity occur as glasses age or anneal below the glass transition temperature even under isothermal conditions. To explain these experimental results it is necessary to assume that these changes are large, i.e, orders of magnitude under ordinarily employed experimental conditions. However, since the viscosity of glasses is always so high, (these materials are solids) even such large changes in the viscosity can go undetected. To probe these predicted large viscosity variations, we investigated changes in the effective local or micro viscosity of polymeric glasses doped with fluorescent dye molecules at very low concentrations. We reasoned that changes in viscosity of the glass will influence the local environment of the dye molecules and will be reflected as changes in rotational relaxation times or tumbling rates of the dye. These can be measured by monitoring the polarization of fluorescence emission of the dye molecules. We have investigated changes in fluorescence depolarization associated with thermal aging of several polymer glasses. Our results are much different than what has been observed earlier where the optical experiments were done at room temperature. We have concluded that, in the previous work, macroscopic orientation of the samples was induced via the severe quenching conditions and that the unexpected extremes of time and temperature necessary to erase the influence of sub Tg annealing, were, in fact, associated with relaxation of this microscopic ordering. GRA

N86-29044# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Ceramics.
LOCAL STRUCTURE OF METAL ATOMS IN SILICA AND SILICATES Progress Report, May 15 - 1 Dec. 1985
S. H. Garofalini Dec. 1985 7 p
(Contract DE-FG05-84ER-45078)
(DE86-004998; DOE/ER-45078/1-1985) Avail: NTIS HC A02/MF A01

This research is aimed at developing a better understanding of the structural and dynamic properties of metal atoms in vitreous silica and at the vitreous silica surface. The major avenues of research have addressed: the structure of the vitreous silica surface and the effect of that structure on the adsorption behavior, structure, and mobility of atoms adsorbed onto the vitreous silica surface, and the local structure around zinc ions in zinc silicate glasses and sodium zinc silicate glasses and the effect of that structure on diffusion. DOE

N86-29045# Technical Research Centre of Finland, Espoo.
EFFECT OF FUEL OIL ADDITIVES. A LITERATURE AND QUERY STUDY
M. Jantunen May 1985 41 p In FINNISH
(DE86-750279; VTT-TIED-451) Avail: NTIS (US Sales Only) HC A03/MF A01

An abundance of different additives is available for boosting the use of light and heavy fuel oils. This literature review

concentrates on the additives that affect the combustion and phenomena following it. Additives that affect the processability and storability of fuel oil are not discussed. Certain alkaline, alkali earth and transition elemental metals have proved to be effective combustion boosters. Differences in efficiency are great and depend on the metal concentration and on the compound, in which the material is mixed with oil. Part of compounds are water-soluble, part oil-soluble, and sometimes the material is sprayed as a powder direct into the flame. The particulate amount developed in the combustion of heavy oils can usually be reduced with the aid of additives. As regards light oils, the procedure is not as clear: the particulate emissions are usually not reduced, rather the contrary: they may even be increased as a consequence of the additive application. A query was also sent to 300 power plants fired with heavy fuel oil to collect experience from the use of additives. The results were in conformity with those obtained in Sweden and in the United States. Of the 222 plants that answered, 94 informed to have tested or to use some additive. In 58 cases the additive was still in use. Reduction in sooting, improved combustion and facilitation of cleaning were the most general reasons for the use of additives. This aim was considered to have been achieved in a third of the experiments, but only in a few cases were there measuring results to confirm this opinion. The economy of the additive application is often based on availability and service factors, and so it is difficult to carry out generally tenable calculations. The evaluation of the economy of combustion boosters is based on the possibility of reducing flue gas losses. DOE

N86-29046# Brookhaven National Lab., Upton, N. Y.
USE OF POLYACRYLIC ACID MACROMOLECULES TO IMPROVE STIFFNESS AND ADHESIVE BOND DURABILITY OF ZINC PHOSPHATE CONVERSION PRECOATINGS
T. Sugama and L. E. Kukacka Nov. 1985 16 p Presented at the Tri-service Corrosion Conference, Orlando, Fla., 5 Dec. 1985 (Contract DE-AC02-76CH-00016)
(DE86-006237; BNL-37381; CONF-851263-1) Avail: NTIS HC A02/MF A01

The electrostatic internal diffusion and segmental chemisorption of polyelectrolyte macromolecules, either on newly precipitated crystal nuclei or on crystal growth sites during primary zinc phosphate (Zn.Ph) conversion processes applied to cold-rolled steel surfaces, contribute significantly to the controllability of the Zn.Ph crystal dimensions. This results in an improvement in the stiffness and ductility of the normally brittle Zn.Ph layers. The polymer-polymer chemical bonding, produced at the polymer topcoat-to-polyelectrolyte-Zn.Ph precoat interfacial joints, plays a key role in achieving a long-term bond durability of the metal-adhesive joints upon exposure to chemically corrosive environments. DOE

N86-29047# Sandia National Labs., Albuquerque, N. Mex.
EFFECTS OF ION BOMBARDMENT IN PLASMA POLYMERIZATION
R. J. Buss 1986 10 p Presented at the Materials Research Society Spring Meeting, Palo Alto, Calif., 15 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007702; SAND-85-2350C; CONF-860445-1) Avail: NTIS HC A02/MF A01

A molecular beam probe technique has been used to investigate the role of ion bombardment of the film surface during the plasma polymerication process. Thin films have been deposited in a vacuum chamber from a molecular beam containing all the plasma species and these were compared with similar deposits from a beam with the charged particles deflected away. A comparison was made of deposition rates, vis/UV and IR absorption spectra of the films. It was found that the deposition rate was increased 20% with the elimination of ion bombardment. Ions incident on the film surface during deposition cause a net ablation of the film. The ion bombardment also causes an increased absorption of UV and near-UV light by the film resulting in a noticeable yellowing. No change was observed in the IR spectra of the films with ion deflection. DOE

N86-29048# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
WINDING OF CONTINUOUS FILAMENTS IMPREGNATED WITH THERMOPLASTIC RESINS [BOBINAGE DE FIBRES CONTINUES IMPREGNEES DE RESINE THERMOPLASTIQUE]
J. L. Tisne 4 Jan. 1986 26 p In FRENCH Presented at Journees Europeennes des Composites, Paris, France, 4 Mar. 1986
(SNIAS-861-430-110; ESA-86-97172) Avail: NTIS HC A03/MF A01

The development status, manufacturing procedures and properties of thermoplastic matrix composites are described. The evaluation is based on experimental tests of commercial materials intended for aerospace applications. The materials tested include polyester, polyamide, polyimide, and polyether matrices. The commercial products are glass, kevlar or carbon filaments presented as ribbons impregnated with the resin. It is shown that many applications are already in development. The advantages and problems are discussed. ESA

N86-29049# Centre d'Essais Aeronautique Toulouse (France). Lab. d'Etudes Materiaux non Metalliques.
EVALUATION OF PHYSICAL AND PHYSICAL CHEMICAL METHODS FOR THE CHARACTERIZATION OF CARBON FIBERS [EVALUATION DE METHODES DE CARACTERISATION PHYSIQUE ET PHYSICO-CHIMIQUE DES FIBRES DE CARBONE]
1985 38 p In FRENCH
(PV-M2-697500; ESA-86-97193) Avail: NTIS HC A03/MF A01

X-ray diffraction, chemical analysis, and electronic microscopy methods were studied in order to improve acceptance inspection procedures of preimpregnated carbon fibers. The chemical analysis is carried out after combustion of the washed fibers in an oxygen atmosphere. It is shown that the nitrogen content varies with the fiber origin. Values of 3.5% to 6% are found. Electron microscope photographs show differences related to the fiber manufacturing process. The X-ray diffraction experiments show broadening of the OO2 interference peak which characterizes each type of fiber. The statistical dispersion of this parameter is sufficiently low to promote the test as a fast quality control procedure. ESA

N86-29242# Boeing Vertol Co., Philadelphia, Pa.
A STUDY OF THE POTENTIAL BENEFITS ASSOCIATED WITH THE DEVELOPMENT OF A DEDICATED HELICOPTER TRANSMISSION LUBRICANT
Raymond J. Drago, Pasquale J. Mangione (Naval Air Propulsion Test Center, Trenton, N.J.), and Raymond D. Wendrzycki *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 11 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

N86-29244# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
REQUIREMENTS ON LUBRICATIN OIL FROM THE VIEW OF A HELICOPTER MANUFACTURER
Joachim Hartmann and Wolfgang Jonda *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 6 p (For primary document see N86-29236 20-37)
Avail NTIS HC A11/MF A01

N86-29249# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
MILITARY AIRCRAFT PROPULSION LUBRICANTS: CURRENT AND FUTURE TRENDS
G. A. Beane, IV, Lois J. Gschwender, Carl E. Snyder, Jr., and John T. Shimski (Naval Air Propulsion Test Center, Trenton, N.J.) *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 16 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

N86-29250# Imperial Coll. of Science and Technology, London (England).
FUTURE TRENDS IN HELICOPTER TRANSMISSION LUBRI-

CANTS
H. A. Spikes *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 10 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

N86-29251# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
AIRCRAFT ENGINE OILS AND THEIR BEHAVIOUR AT HIGH TEMPERATURES
K. Maier *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 12 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

N86-29252# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
PERFORMANCE MODELLING: A TOOL FOR LUBRICANT DEVELOPMENT
Howard E. Bandow *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 11 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

N86-29253# Technische Univ., Munich (West Germany).
SCORING TESTS OF AIRCRAFT TRANSMISSION LUBRICANTS AT HIGH SPEEDS AND HIGH TEMPERATURES
H. Winter and K. Michaelis *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 9 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-29050# Texas A&M Univ., College Station. Mechanics and Materials Center.
DYNAMIC FRACTURE AND DEFORMATION OF SOLID PROPELLANT Final Report, Feb. 1983 - Mar. 1986
R. A. Schapery and J. R. Walton Mar. 1986 7 p
(Contract N00014-83-K-0211)
(AD-A166424; MM-4867-86-10) Avail: NTIS HC A02/MF A01 CSCL 21/9

Contributions to two distinct but related topics have been made: (1) high speed crack growth in linear viscoelastic media, and (2) nonlinear viscoelastic constitutive equations for particle-filled rubber with microcracks. Both are relevant to the dynamic mechanical response of solid propellant. Work was completed and published on the dynamic steady-state propagation of an antiplane shear crack in a general linear viscoelastic layer. An infinite series representation for the stress intensity factor was derived, each term of which can be calculated recursively in closed-form. A simple, universal dependence upon crack speed and basic material properties was found. These results represent a significant step in understanding the influence of a physical dimenson (the layer thickness) on dynamic stresses in the neighborhood of crack tips in rate-dependent materials. Another paper is partly a summary of principal results in 1 and 3 and contains new material not published elsewhere. Specifically, the analysis of 3 was extended to derive the full stress field in the body. A much simpler form than was presented in 3 for the entire stress field ahead of and in the plane of the crack was exhibited and the angular dependence of the local stress field at the crack tip was calculated. GRA

N86-29051# Brobeck (William M.) and Associates, Berkeley, Calif.
ENGINEERING SUPPORT FOR LLNL CHEMISTRY'S HIGH EXPLOSIVE TECHNOLOGY GROUP Final Report
A. M. Weston and E. James Dec. 1985 22 p
(Contract W-7405-eng-48)
(DE86-006722; UCRL-15761) Avail: NTIS HC A02/MF A01

Support for the Lawrence Livermore National Laboratory (LLNL) High Explosive Technology (HET), part of the Chemistry Division is described. Brief progress reports are presented for the following six tasks: (1) assess mechanical and explosive response of proposed extreme environmental weapon systems; (2) perform a hazard study relating to Trident D-5 motor response; (3) continue development and application of the deflagration to detonation (DDT) computer model (code RDUCT) for the hazard assessment for rocket propellants (HARP) program; (4) perform rocket motor vulnerability calculations for a proposed new air force mobile missile; (5) perform additional analyses relating to radioisotope thermo-electric generator PuO2 containment with possible NASA space shuttle accident scenarios; and (6) develop a relational data base for information pertinent to the hazard studies relating to the Trident D-5 motor response and the associated HARP program. DOE

N86-29052# Mueller Associates, Inc., Baltimore, Md.
ADVANCED PROPULSION SYSTEMS AND ALTERNATIVE FUELS FOR NON-HIGHWAY TRANSPORTATION. VOLUME 1: AN ASSESSMENT OF UNIQUE AND PRIORITY RESEARCH AND DEVELOPMENT OPPORTUNITIES Final Report
Jan. 1986 12 p
(Contract DE-AC01-84ER-30063)
(DE86-006115; DOE/ER-30063/T4) Avail: NTIS HC A02/MF A01

Based upon earlier prioritization and assessment analyses, a selection of R and D needs were identified for non-highway transportation. The Department of Energy's Office of Program Analysis (DOE-OPA) in recognizing the likelihood of only limited federal government monetary support of non-highway R and D, requested that these R and D needs be further prioritized to a limited number (four to six) of recommendations. This paper presents the logic and rationale for arriving at this much smaller set of R and D priorities and re-summarizes the specific R and D needs and their potential benefits and/or utility. DOE

N86-29053# Mound Lab., Miamisburg, Ohio.
MOUND CALORIMETRY FOR EXPLOSIVE SURVEILLANCE
G. C. Shockey and W. W. Rodenburg 1985 12 p Presented at the Joint DOD-DOE Explosives Surveillance Meeting, Albuquerque, N. Mex., 3 Dec. 1985
(Contract DE-AC04-76DP-00053)
(DE86-006143; MLM-3327(OP); CONF-851256-6) Avail: NTIS HC A02/MF A01

Heat of reaction determinations of pyrotechnics and explosives is made at MRC-Mound by bomb calorimetry. Energy releases from ten calories to 94 kilocalories have been measured accurately using four different calorimeter systems. Each system is described and some heat of reaction results are given. DOE

N86-29054# Oak Ridge National Lab., Tenn.
APPLICATION OF MINIMAL QUALITY COAL LIQUIDS TO DIESEL ENGINES
R. L. Graves and E. C. Fox 1986 13 p Presented at the DOE New Fuel Forms Workshop, Washington, D.C., 25 Feb. 1986
(Contract DE-AC05-84OR-21400)
(DE86-007864; CONF-860271-1) Avail: NTIS HC A02/MF A01

Experiments and studies of low-temperature coal pyrolysis were performed by ORNL to evaluate the quality of the raw coal liquids and the economic advantages of a simple process capable of producing usable liquid and solid products. Raw oils generated by low-temperature coal pyrolysis were chemically characterized, blended with No. 2 diesel (20 to 25% by volume), and tested in three diesel engines of different configurations. Determination of physical and chemical properties of the pyrolysis liquids indicated a higher hydrogen/carbon ratio and lower aromatic content than typical SRC II and EDS middle distillates. The combustion tests, which were performed in both direct and indirect-injection engines, had variable results. In some cases there was no effect on emissions and performance; in others, emissions were reduced in one engine, and increased in another. The results of these tests

are brought into perspective with a general discussion of diesel engine design considerations and the results of coal liquid test by other. DOE

N86-29064# Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIQUID PROPELLANT GUN TECHNOLOGY
W. F. Morrison, J. D. Knapton, and P. G. Baer *In* AGARD Interior Ballistics of Guns Jan. 1986 16 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29065# Royal Armament Research and Development Establishment, Fort Halstead (England).
INGNITION, COMBUSTION, AND PHYSICAL PROPERTIES OF LIQUID PROPELLANTS AT GUN PRESSURES
G. G. Cook and T. O. Andrews *In* AGARD Interior Ballistics of Guns Jan. 1986 13 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29066# Fraunhofer-Inst. fuer Kurzzeitdynamik, Weil am Rhein (West Germany). Abteilung fuer Ballistik.
MECHANICAL BEHAVIOUR OF PROPELLANT GRAINS UNDER HEAVY DYNAMIC LOAD
Gerd Zimmerman *In* AGARD Interior Ballistics of Guns Jan. 1986 15 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29067# Bombrini Parodi-Delfino S.p.A., Rome (Italy).
FIELD ARTILLERY GUN PERFORMANCES RELATED TO TRIPLE-BASE POWDER QUALITY
B. DAndrea, M. Petrucci, and M. DiLorenzo *In* AGARD Interior Ballistics of Guns Jan. 1986 15 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29073# Etablissement Technique de Bourges (France).
EXPERIMENTAL STUDY OF THE IGNITION OF EXPLOSIVE CHARGES USING VISUALIZATION OF THE PHENOMENA [ETUDE EXPERIMENTALE DE LALLUMAGE DUNE CHARGE PROPULSIVE PAR VISUALISATION DU PHENOMENE]
Claude Berthommier *In* AGARD Interior Ballistics of Guns Jan. 1986 7 p In FRENCH (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29077# Dynamit Nobel A.G., Fuerth (West Germany). Dept. of Research and Development-Ammunition.
IGNITION OF HIGH-PERFORMANCE GUN AMMUNITION
Horst Penner *In* AGARD Interior Ballistics of Guns Jan. 1986 7 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-29055* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANGULAR MEASUREMENT SYSTEM Patent
James R. Currie and Ralph R. Kissel Issued 10 Jun. 1986 6 p Filed 3 Oct. 1984 Supersedes N85-20298 (23 - 11, p 1635)
(NASA-Case-MFS-25825-1; US-Patent-4,594,540;
US-Patent-Appl-SN-657309; US-Patent-Class-318-661;
US-Patent-Class-340-347SY; US-Patent-Class-340-347CC;
US-Patent-Class-318-636; US-Patent-Class-318-605) Avail: US Patent and Trademark Office CSCL 13B

A system for the measurement of shaft angles is disclosed wherein a synchro resolver is sequentially pulsed, and alternately, a sine and then a cosine representative voltage output of it are sampled. Two like type, sine or cosine, succeeding outputs (V sub S1, V sub S2) are averaged and algebraically related to the opposite type output pulse (V sub c) occurring between the averaged pulses to provide a precise indication of the angle of a shaft coupled to the resolver at the instant of the occurrence of the intermediately occurring pulse (V sub c). Author

N86-29056# Factory Mutual Research Corp., Norwood, Mass.
SPRAY COOLING IN ROOM FIRES
Hong-Zeng You, Hsiang-Cheng Kung, and Zhanxian Han Jul. 1986 45 p
(Grant NB83NADA4054)
(NBS-GCR-86-515) Avail: NTIS HC A03/MF A01

A series of 25 fire tests was conducted to investigate cooling in room fires by sprinkler spray. The tests were conducted in a 3.66 m x 7.32 m x 2.44 m high test room, which had a 1.22 m x 2.44 m high opening centered in one of the 3.66 m walls. The fire source was a spray fire with constant heptane flow rate, located opposite the room opening. In each test only one sprinkler was installed at the ceiling. Three geometrically similar sprinklers with nozzle diameters of 11.1 mm, 8.36 mm, and 6.94 mm were tested. Convective heat loss rate through the room opening was measured with a large fire products collector. The total heat release rate of the fire was derived from the fire products collector measurements using a carbon balance method. Heat loss rate to the ceiling and walls was measured, as well as radiative loss through the opening. Empirical correlations for the heat absorption rate of the spray and the convective heat loss rate through the room opening were established in terms of: (1) total heat release rate of the fire; (2) heat loss rate to the ceiling, walls, and floor, and radiative heat loss rate through the room opening; (3) room opening area and height; (4) sprinkler discharge rate; (5) water pressure; and (6) sprinkler orifice diameter. These correlations accounted for the effects of room geometry and opening size. Experimental results obtained for a different room geometry also followed these correlations. Author

N86-29057# Massachusetts Inst. of Tech., Lexington.
DISTANCE DETERMINATION VIA TRIANGULATION
Laurence G. Taff 11 Feb. 1986 27 p
(Contract F19628-85-C-0002)
(AD-A165932; TR-741; ESD-TR-85-303) Avail: NTIS HC A03/MF A01 CSCL 08/5

This report investigates the feasibility of distance determination by triangulation for artificial satellites, rockets, and so forth. The two-observer case is solved analytically and investigated in detail with respect to the propagation of errors. For objects distant compared to the observer to observer distance Delta rho, the variance of the observer-to-object distance R is given by Sigma sub R approx = (Sigma(R-squared))((csc theta)-squared)/Delta rho. Sigma is the standard deviation of the angular measurements, and theta is the angle between the observer-to-observer baseline and the direction to the object. The next topic discussed is the use of multiple, simultaneous, direction determinations for triangulation. A novel method is proposed to deal with this problem. It is extended to include observations with different measurement precision, and generalized to take into account the expanding conical nature of angular errors. Finally, some data acquired at the Experimental Test System of the GEODSS network and the Millstone Hill Radar are analyzed within this context. It is clear that there now exists a powerful observational tool to aid in initial orbit determination utilizing coordinated angles-only sensors. GRA

N86-29058# Argonne National Lab., Ill.
PROCEEDINGS OF THE 3RD SYMPOSIUM ON ENERGY ENGINEERING SCIENCES. THERMOFLUIDS AND SOLID MECHANICS
1985 277 p Symposium held at University Park, Pa., 8 Oct. 1985
(Contract W-31-109-eng-38)
(DE86-005973; CONF-8510176) Avail: NTIS HC A13/MF A01

The symposium reported on offered sessions on turbulence, solid mechanics and structures, turbulent heat transfer, combustion,

heterogeneous fluids and fluid mixtures, fracture mechanics and damage, transport phenomena in solids, tribology, jets and external flows. Separate abstracts were prepared for 32 papers in these symposium proceedings. DOE

N86-29059# Argonne National Lab., Ill.
FLUID FLOW AND HEAT TRANSFER MODELING FOR CASTINGS
H. M. Domanus, Y. Y. Liu, and W. T. Sha 1986 16 p Presented at the Modeling and Control of Casting and Welding Processes Conference, Santa Barbara, Calif., 12 Jan. 1986
(Contract W-31-109-eng-38)
(DE86-007999; CONF-860132-2) Avail: NTIS HC A02/MF A01

Casting is fundamental to manufacturing many types of equipment and products. Although casting is a very old technology that has been in existence for hundreds of years, it remains a highly empirical technology, and production of new castings requires an expensive and time-consuming trial-and-error approach. In recent years, mathematical modeling of casting has received increasing attention; however, a majority of the modeling work has been in the area of heat transfer and solidification. Very little work has been done in modeling fluid flow of the liquid melt. This paper presents a model of fluid flow coupled with heat transfer of a liquid melt for casting processes. The model to be described in this paper is an extension of the COMMIX code and is capable of handling castings with any shape, size, and material. A feature of this model is the ability to track the liquid/gas interface and liquid/solid interface. The flow of liquid melt through the sprue and runners and into the mold cavity is calculated as well as three-dimensional temperature and velocity distributions of the liquid melt throughout the casting process. DOE

N86-29060# Kernforschungszentrum, Karlsruhe (West Germany).
GERMAN-FRENCH STRATEGY FORUM. INFORMATION TECHNOLOGY. REPORT OF THE GERMAN WORKING GROUP PRODUCTION ENGINEERING 1984/1985 [DEUTSCH-FRANZOESISCHES STRATEGISCHES FORUM INFORMATIONSTECHNIK. BERICHT DER DEUTSCHEN ARBEITSGRUPPE FERTIGUNGSTECHNIK]
D. Stams Nov. 1985 315 p Partly in ENGLISH, GERMAN, and FRENCH Sponsored by Bundesministerium fuer Forschung und Technologie
(KfK-PFT-113; ESA-86-96908) Avail: NTIS HC A14/MF A01

Production engineering activities in Germany and France, and the possibilities of cooperation are reported on. Robotics, CAD, and local area networks are discussed. Proposals for the European advanced technology program EUREKA are given. ESA

N86-29061# Office of Technology Assessment, Washington, D.C.
BALLISTIC MISSILE DEFENSE TECHNOLOGIES
Sep. 1985 334 p
(PB86-182961; OTA-ISC-254; LC-85-600586) Avail: NTIS HC A15/MF A01 CSCL 15C

A report on Ballistic Missile Technologies includes the following: Executive summary; Introduction; Ballistic missiles then and now; Deterrence, U.S. nuclear strategy, and BMD; BMD capabilities and the strategic balance; Crisis stability, arms race stability, and arms control issues; Ballistic missile defense technologies; Feasibility; Alternative future scenarios; Alternative R&D programs. GRA

N86-29062# Office of Technology Assessment, Washington, D.C.
STRATEGIC MATERIALS: TECHNOLOGIES TO REDUCE US IMPORT VULNERABILITY
May 1985 413 p
(TI86-900760; OTA-ITE-248) Avail: NTIS HC A18/MF A01

Three nations, South Africa, Zaire, and the U.S.S.R., account for over half of the world's production of chromium, cobalt, manganese, and platinum group metals. These metals are essential in the production of high-temperature alloys, steel and stainless steel, industrial and automotive catalysts, electronics, and other applications that are critical to the U.S. economy and the national defense. With minor exceptions, there is no domestic mine production of any of the four metals. Government actions to assure secure supplies of metals critical to the United States have been limited largely to reliance on the national defense stockpile to ensure the availability of materials required for national defense in time of war, leaving it to the free market to provide a diversity of suppliers for the industrial economy. An overall strategy to reduce U.S. reliance on uncertain sources of supply of strategic materials should be based on a combination of three technical approaches: increase the diversity of the world supply of strategic metals through the development of promising deposits; decrease demand for strategic metals through the implementation of improved manufacturing processes and recycling of strategic materials from scrap and waste; and identify and test substitute materials for current applications and develop new materials with reduced strategic material content for future applications. Author

N86-29063# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
INTERIOR BALLISTICS OF GUNS
Loughton, England Jan. 1986 220 p Meeting held in Florence, Italy, 9-11 Sep. 1985; sponsored by the Propulsion and Energetics Panel
(AGARD-CP-392; ISBN-92-835-0388-0) Avail: NTIS HC A10/MF A01

Topics addressed include: liquid propellant guns; characteristics of solid gun propellants; gun barrel erosion; low vulnerability propellants for guns; experimental and test techniques in interior ballistics; gun ignition systems; new problems in guns; and traveling charge gun theory. For individual titles, see N86-29064 through N86-29078.

N86-29064# Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIQUID PROPELLANT GUN TECHNOLOGY c28
W. F. Morrison, J. D. Knapton, and P. G. Baer *In* AGARD Interior Ballistics of Guns Jan. 1986 16 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Research and development efforts on liquid propellant guns have increased steadily in the United States over the past five years as a result of progress in both liquid propellant and propulsion technology. The research program is directed toward the use of hydroxyl ammonium nitrate (HAN) based liquid monopropellants in a regenerative liquid propellant gun. The HAN-based liquid monopropellants offer a number of advantages over both solid propellants and other liquid propellant formulations. The regenerative process is based on the injection of propellant into the combustion chamber during the ballistic cycle. The interior ballistic process is summarized to provide a basis for the discussion of experimental gun firing data. A simple inline piston with multiple cylindrical injectors is used as an example. Regenerative investigation in the United States have focused on annular injection configurations, in which the propellant enters the chamber in the form of an annular sheet. A simple version of the configuration was built and tests in 25, 30, and 105 mm. Ballistic data are presented, along with discussions of ballistic repeatability and efficiency. Four computer models of the regenerative interior ballistic process are compared. Author

N86-29065# Royal Armament Research and Development Establishment, Fort Halstead (England).
INGNITION, COMBUSTION, AND PHYSICAL PROPERTIES OF LIQUID PROPELLANTS AT GUN PRESSURES c28
G. G. Cook and T. O. Andrews *In* AGARD Interior Ballistics of Guns Jan. 1986 13 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

The internal ballistics of a regenerative injection liquid propellant gun depend on the rate of injection of the liquid propellant rather than on the burning rate, owing to the small size of the droplets produced. The rate of injection is determined by the effect of the compressibility of the liquid on the motion of the piston and by its flow characteristics through the injector. The force constant of

the propellant is important as it determines the combustion pressure resulting from any given flow rate. A standard closed vessel was modified and used with a specially developed igniter to investigate the combustion of Otto Fuel II at gun pressure. It was also used to investigate the compressibility of inert liquid at pressures up to 600 MPa. A liquid propellant test vessel was constructed for use in the investigation of the compressibility of live liquids and the flow of liquids at high pressure. Author

N86-29066# Fraunhofer-Inst. fuer Kurzzeitdynamik, Weil am Rhein (West Germany). Abteilung fuer Ballistik.
MECHANICAL BEHAVIOUR OF PROPELLANT GRAINS UNDER HEAVY DYNAMIC LOAD **c28**
Gerd Zimmerman *In* AGARD Interior Ballistics of Guns Jan. 1986 15 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Special test devices were constructed to simulate the dynamic forces on gun propellant grains during shots at ambient and low temperatures (-40 C). With these devices the dynamic stress at failure, the fragmentation type (pasty, brittle), and other correlated physical characteristics of several propellant types were measured. Conclusions are drawn for the propellant behavior under real gun conditions. Author

N86-29067# Bombrini Parodi-Delfino S.p.A., Rome (Italy).
FIELD ARTILLERY GUN PERFORMANCES RELATED TO TRIPLE-BASE POWDER QUALITY **c28**
B. DAndrea, M. Petrucci, and M. DiLorenzo *In* AGARD Interior Ballistics of Guns Jan. 1986 15 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

In order to achieve the best results in the 155-39 mm field field artillary gun, several parameters affecting the triple-base powder quality were investigated. Mainly nitro-cellulose molecular weights (MW) and molecular weight distributions (MWD), determined by means of gel-permeation chromatography (GPC) related to the powder rheological properties are reported. In addition theoretical interior ballistic evaluations, tailored on powders manufactured with different nitrocellulose samples, based on computer program calculation, are compared with the firing test results. Author

N86-29068# Royal Military Coll. of Science, Shrivenham (England). School of Management and Mathematics.
PRESSURE WAVE: GUN BARREL INTERACTIONS **c34**
A. B. Crowley and W. P. C. King *In* AGARD Interior Ballistics of Guns Jan. 1986 11 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

The interaction of pressure waves generated during the internal ballistics cycle with the vibrations of a tank barrel, and the possible effects on accuracy, are described. The investigation is based on codes simulating the complete internal ballistics cycle, including the venting of gases after shot exit, and the longitudinal and flexural vibration modes of the barrel, both of which were developed at the Royal Military College of Science. The computative effects of pressure waves on both accuracy and structural integrity are discussed for a number of different charge and barrel configurations. Author

N86-29069# Royal Military Coll. of Science, Shrivenham (England).
BORE TEMPERATURE AND HEAT FLUX IN A 40 mm GUN BARREL
B. Lawton *In* AGARD Interior Ballistics of Guns Jan. 1986 12 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

A method of measuring the bore srface temperature fluctuation in a 40 mm gun is described. Fast response, 1 microsecond, eroding type, surface thermocouples are used and a feature is that they can tolerate up to 3 mm wear and pressures up to 2000 bar. The bore temperature is measured at three positions along the barrel and the pressure is measured at the breech. All three signals are captured using digital oscilloscopes and are transferred to a digital computer. The signals are processed to give instantaneous heat flux, shot velocity, shot travel, and total heat transfer. Gas leakage past the shot is found to be significant. A simple theory is proposed for calculating the maximum bore temperatures and the total heat transfer and this theory is confirmed by measurements on fourteen different rounds made up using three propellants and various charge masses and grain formulations. Author

N86-29070# Prins Maurits Lab. TNO, Rijswijk (Netherlands).
ON THE THERMAL BEHAVIOUR OF THE BARREL DURING THE INTERIOR BALLISTIC CYCLE OF PROPELLANT GUNS
W. J. Kolkert, M. Waas, and N. G. The *In* AGARD Interior Ballistics of Guns Jan. 1986 13 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Thermal stress cycling during firing constitutes a major mechanism for erosion, wear, and fatigue in gun barrels and cannon tubes. In order to predict spatial and temporal temperature distributions at the inner envelope of and through the barrel and in the gas dynamic flow accompanying the interior ballistic cycle, a two-dimensional, quasi two-phase flow (turbulent, viscous, and compressible) model, was developed. A one-dimensional model treating radial heat conduction in the barrel was coupled to this flow model. Input parameters for these models were calculated with a one-dimensional, two-phase flow, burning routine, describing propellant deflagration. Besides a description of these models, results of a prediction got heat loss, projectile travel and pressure, temperature and flow velocity distributions in the gas dynamic flow, and temperature-time histories in the barrel wall are given for the interior ballistic cycle of a caliber .50in gun. Although predicted results for heat flow into and through the barrel and predicted temperature-time histories in the barrel cannot be compared with experimental results in a reliable way at this time, predicted results for pressure-time distributions and projectile-travel fit the experimental results in a promising way. Author

N86-29071# Ecole Royale Militaire, Brussels (Belgium). Dept. of Applied Chemistry.
INTERIOR BALLISTICS OF SMALL ARMS: PARTICULAR PROBLEMS. PART 1: HEAT TRANSFER AND COOK-OFF PHENOMEN IN A SMALL CALIBER WEAPON **c34**
R. Meysmans *In* AGARD Interior Ballistics of Guns Jan. 1986 10 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

The first results obtained since beginning in 1983 are summarized. Induction periods and critical temperature, measured during salvo-firing in a small caliber weapon are compared with the values theoretically predicted by means of a mathematical model, describing as correct as possible what happens in the combustion chamber. The determination of some physico-chemical parameters, to be used in the mathematical model, is discussed. Author

N86-29072# Ecole Royale Militaire, Brussels (Belgium). Dept. of Armament and Ballistics.
INTERNAL BALLISTICS OF SMALL ARMS: PARTICULAR PROBLEMS. PART 2: THERMODYNAMIC MODEL, POWDER PARAMETERS, INITIATION **c34**
E. Celens *In* AGARD Interior Ballistics of Guns Jan. 1986 23 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

The applicability of the thermodynamic model was studied in small caliber weapons. The use of appropriate computer algorithms for optimal exploitation of closed vessel trials was examined. To better understand the initiation phase, the working of primary high explosive compounds was studied by visualizing the ignition phenomenon in a transparent chamber. The results obtained in these studies are summarized. B.G.

N86-29073# Etablissement Technique de Bourges (France).
EXPERIMENTAL STUDY OF THE IGNITION OF EXPLOSIVE CHARGES USING VISUALIZATION OF THE PHENOMENA

[ETUDE EXPERIMENTALE DE LALLUMAGE DUNE CHARGE PROPULSIVE PAR VISUALISATION DU PHENOMENE] c28
Claude Berthommier *In* AGARD Interior Ballistics of Guns Jan. 1986 7 p In FRENCH (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

A three point visualization process was used to study the ignition and combustion phenomena of propulsive charges for large caliber ammunition. The visualization process was made possible by using a translucent sleeve as the barrel. The phenomena studied included the pressure, displacement and the speed of the flame front. The procedure studied made possible an examination of the ignition and combustion processes of various charge configurations. Two examples were studied; the first study pertained to a comparison of two igniter, and the second to a pre-programmed igniter. B.G.

N86-29074# Fraunhofer-Inst. fuer Kurzzeitdynamik, Weil am Rhein (West Germany). Abteilung fuer Ballistik.
MEASUREMENT OF IMPORTANT BALLISTIC FLOW PROPERTIES BY SPECTROSCOPIC TECHNIQUES c34
Guenter Klingenberg *In* AGARD Interior Ballistics of Guns Jan. 1986 18 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Considerable progress was made in recent years in probing the gun interior ballistics cycle and the subsequent muzzle flow dynamics. With the amount of experimental research done, more detailed information was obtained to describe the many complexities of the flow phenomena which are associated with the discharge of a weapon. A survey of some of the experimental research is reviewed, pointing out the capabilities as well as the limitations and constraints encountered in ballistic environments. The experimental diagnostics described includes spectroscopic techniques for measuring the temperature and gas velocity in reacting two-phase flows produced by the combustion of both solid and liquid propellants. These techniques are the emission and/or absorption methods, reversal and Abel inversion methods, and laser Doppler spectrometry. In particular, an intrusive emission gauge technique is described which permitted the thermometric probing of optically thick propellant gases in highly pressurized combustion chambers. Sample results of these measurement will be presented. In addition, efforts directed towards the adequate simulation of reacting ballistic flows by mean of a gas gun simulator are described. Author

N86-29075# Concentration Heat and Momentum, Ltd., London (England).
MODELLING THE BEHAVIOUR OF ADDITIVES IN GUN BARRELS c34
N. Rhodes and J. C. Ludwig *In* AGARD Interior Ballistics of Guns Jan. 1986 11 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

A mathematical model which predicts the flow and heat transfer in a gun barrel is described. The model is transient, two-dimensional and equations are solved for velocities and enthalpies of a gas phase, which arises from the combustion of propellant and cartridge case, for particle additives which are released from the case; volume fractions of the gas and particles. Closure of the equations is obtained using a two-equation turbulence model. Preliminary calculations are described in which the proportions of particle additives in the cartridge case was altered. The model gives a good prediction of the ballistic performance and the gas to wall heat transfer. However, the expected magnitude of reduction in heat transfer when particles are present is not predicted. The predictions of gas flow invalidate some of the assumptions made regarding case and propellant behavior during combustion and further work is required to investigate these effects and other possible interactions, both chemical and physical, between gas and particles. Author

N86-29076# Royal Armament Research and Development Establishment, Fort Halstead (England).
NOVEL IGNITION SYSTEMS FOR HEAVY CALIBRE GUNS
C. N. Bowden, G. G. Cook, and P. S. Henning *In* AGARD Interior Ballistics of Guns Jan. 1986 11 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

In recent years there was a trend towards steadily rising gun pressures, especially in direct fire weapons and this has caused many functional problems to arise with conventional vent tube ignition systems. To overcome these problems and to allow the process of gun development to continue, the United Kingdom is performing a program of research into a number of ignition systems for heavy caliber guns. These include: spark ignition, laser ignition, and electrical impulse ignition. A number of different spark plug configurations were evaluated. Extensive trials were performed on the ignition characteristics of black powders and black powder substitutes using an experimental 4 J neodymium laser. Work was also performed on the development of high pressure sapphire windows. A study into methods of charge ignition by electrical impulse techniques was also performed. Author

N86-29077# Dynamit Nobel A.G., Fuerth (West Germany). Dept. of Research and Development-Ammunition.
IGNITION OF HIGH-PERFORMANCE GUN AMMUNITION c28
Horst Penner *In* AGARD Interior Ballistics of Guns Jan. 1986 7 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Modern high performance cartridges are designed for high loading densities of propelling charges. Sometimes they exceed the normal filling density of the propellant grains. The conditions for fast and complete ignition are discussed and a group of primers for 105 mm-rounds which will ignite the propelling charge in an optimum manner is presented. Author

N86-29078# Institut Franco-Allemand de Recherches, St. Louis (France).
HIGH-PRESSURE COMBUSTION: COMPARISON OF THEORETICAL AND ACTUAL RESULTS [COMBUSTION SOUS HAUTES PRESSIONS CONFRONTATION THEORIE EXPERIENCE]
D. Grune and M. Samirant *In* AGARD Interior Ballistics of Guns Jan. 1986 7 p In FRENCH (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

Following the observation of important variances (30 to 50%) between the theoretical and actual values obtained during a study of the combustion pressure of powders of approximately 1,500 MPa, the differences for several tests were compared. The composition of the combustion gases were analyzed. In addition, the deformation of a manometer explosive device was studied during the ignition stage. Data was obtained concerning the deformation resulting from the high pressure. B.G.

N86-29079# Joint Publications Research Service, Arlington, Va.
EUROPE REPORT: SCIENCE AND TECHNOLOGY
18 Jun. 1986 109 p Transl. into ENGLISH from various European articles
(JPRS-EST-86-008) Avail: NTIS HC A06/MF A01

Topics addressed include: biotechnology, civil aviation, computers, defense industries, microelectronics, scientific and industrial policy, factory automation, lasers, sensors, optics, and technology transfer. For individual titles, see N86-29080 through N86-29082.

N86-29080# Joint Publications Research Service, Arlington, Va.
AERITALIA: AVIONICS, OPTOELECTRONICS RESEARCH, ATR 42 c06
Alberto Mondini *In its* Europe Report: Science and Technology (JPRS-EST-86-008) 18 Jun. 1986 p 2-5 Transl. into ENGLISH from Science Duemila (Rome, Italy), no. 4, Apr. 1986 p 30-33 (For primary document see N86-29079 20-31)
Avail: NTIS HC A06/MF A01

The avionic systems on aircraft being designed by Aeritalia are discussed. The installation of the first European optical fiber system on board a G-22 aircraft of the Italian Air Force is planned. This experiment will be the start of a new phase of study for the

installation of a complete optical fiber system on board an advanced aircraft. The Automatic Test Equipment (ATE) is explained. Also discussed is the telematic laser targeting equipment for armored vehicles. Propfan technology is examined. B.G.

N86-29081# Joint Publications Research Service, Arlington, Va.
DIEHL WEAPONS LAB WORKS ON SENSORS, LASERS, FLIGHT CONTROL
Wolfgang Flume *In its* Europe Report: Science and Technology (JPRS-EST-86-008) 18 Jun. 1986 p 25-28 Transl. into ENGLISH from Wehrtechnik (Bonn, West Germany), Apr. 1986 p 103, 104 (For primary document see N86-29079 20-31)
Avail: NTIS HC A06/MF A01

The Diehl Weapons Laboratory activities include: warheads, ballistics, sensor technology, mensuration technology, and simulation. The facilities at the laboratory are described. Research projects are summarized. B.G.

N86-29082# Joint Publications Research Service, Arlington, Va.
PROPERTIES, APPLICATIONS, FUTURE OF EUROPEAN GYRO SENSORS **c35**
Werner Hansli *In its* Europe Report: Science and Technology (JPRS-EST-86-008) 18 Jun. 1986 p 29-32 Transl. into ENGLISH from Wehrtechnik (Bonn, West Germany), Apr. 1986 p 62, 65-66 (For primary document see N86-29079 20-31)
Avail: NTIS HC A06/MF A01

The mechanical gyroscope was used since the time of World War I as a sensor for measuring angular velocities for the purpose of navigation and flight control. The characteristic configuration was the fixed-in-space mount (cardan mount). With the appearance of the microprocessor, it is now possible to mount gyro devices fixed to the airframe (strapdown mount). Various gyro types are discussed as well as their specific suitability and areas of applications. Future prospects are also examined. B.G.

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-29083 Royal Signals and Radar Establishment, Malvern (England).
RSRE RESEARCH REVIEW, 1985 Annual Report
A. J. Grant, ed., E. Jakeman, ed., and J. Clarke, ed. 1985 196 p
(AD-A163899; BR98221; ESA-86-97111) Avail: NTIS HC A09/MF A01

Research concerning radar and microwaves; communications and computing; signal and data processing; infrared imagery and lasers; and solid state physics and displays is discussed. For individual titles, see N86-29084 through N86-29113.

N86-29084 Royal Signals and Radar Establishment, Malvern (England).
THE UK RADAR SCENE TODAY
J. Clarke *In its* RSRE Research Review, 1985 1985 p 1-15 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Primary radar systems in the United Kingdom that recently entered service or are at an advanced stage of development are presented. Naval, airborne, and land-based types and civil and military radars, especially airborne equipment, are discussed. ESA

N86-29085 Royal Signals and Radar Establishment, Malvern (England).
AN EXPERIMENTAL PHASE-CODED RADAR FOR THE MILLIMETER BAND
P. A. Jefford, D. E. Lloyd, and J. C. Parker *In its* RSRE Research Review, 1985 1985 p 16-22 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

A phase coded radar was used to demonstrate techniques relevant to the need for low-cost integrated microwave and millimeter wave systems. The technique is particularly useful in solid-state systems for tracking and guidance applications where sufficient transmitter power is not available from pulsed devices. The design exploits the simplicity and low cost of a single device IMPATT oscillator as a transmitter together with repeatable implementation of the RF hardware, while providing adequate performance for many applications. Angle tracking is provided by a monopulse receive antenna, and range discrimination is achieved using maximal length or pseudorandom code sequences which are modulated onto the transmitted CW carrier by a phase reversal switch. ESA

N86-29086 Royal Signals and Radar Establishment, Malvern (England).
BISTATIC RADAR FOR LONG RANGE APPLICATIONS
Chris Pell *In its* RSRE Research Review, 1985 1985 p 23-27 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The main characteristics and properties of bistatic radar as applied to long range air target detection are summarized. System functions are highlighted and processing tasks required are indicated. An example of a bistatic system is used to illustrate the likely detection performance and surveillance coverage that could be achieved. ESA

N86-29087 Royal Signals and Radar Establishment, Malvern (England).
NEW ANTENNAS FOR SECONDARY SURVEILLANCE RADAR
J. M. Shaw *In its* RSRE Research Review, 1985 1985 p 28-30 Sponsored by UK Civil Aviation Aurthority (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Large vertical aperture antenna (LVA) radars in monopulse and sliding window modes were compared with hogtrough antennas. Track quality and vertical lobing were assessed. Results confirm the greatly superior performance of the LVA design. ESA

N86-29088 Royal Signals and Radar Establishment, Malvern (England).
COHERENT AND NONCOHERENT PROPERTIES OF K DISTRIBUTED SEA CLUTTER
Chris J. Baker and Keith D. Ward *In its* RSRE Research Review, 1985 1985 p 31-33 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

A model based on the compound K-distribution is described and related to coherent as well as noncoherent processing of sea clutter. The model's main advantage is in its treatment of the correlation properties, through the separation into two multiplicative components. It is demonstrated that the application of this model provides much more realistic prediction and optimization of signal processing. ESA

N86-29089 Royal Signals and Radar Establishment, Malvern (England).
SYNTHETIC APERTURE RADAR
T. M. Mason *In its* RSRE Research Review, 1985 1985 p 34-38 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The development of digital SAR is reviewed. Coherence and motion compensation requirements are discussed. Self focusing, terrain classification, and resolution enhancement are considered. ESA

N86-29090 Royal Signals and Radar Establishment, Malvern (England).
TRANSIENT FIELD GENERATION AND MEASUREMENT
David M. Parkes and Paul D. Smith *In its* RSRE Research Review, 1985 1985 p 39-44 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The mathematical modeling and numerical computation of the electromagnetic field radiated by a biconic antenna excited by a transient waveform such as a pulse are outlined. Very good agreement between the model and experiment is achieved for the time history of the radiated pulse. Amplitudes of calculated field strengths are within engineering tolerances. The type of field and its amplitude which result when any variant of biconic antenna is excited by a given input pulse can be predicted, since the time marching method of solving integral equations is shown to be successfully implemented on a computer. Because the system is not limited to single shot events, measurement of induced currents inside target equipments when illuminated by the radiation field is simplified, since sampling technology can be employed. Current waveforms which occur in antennas can also be predicted. ESA

N86-29091 Royal Signals and Radar Establishment, Malvern (England).
SLOW SCAN TELEVISION VIA TACTICAL SATCOMS
Paul Wells *In its* RSRE Research Review, 1985 1985 p 45-47 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

A system which enables near real time moving picture information in redundant scenes to be transmitted over a low data rate tactical satellite communication link is described. The prototype equipment was designed to operate from automobile based satcom terminals using 16 kbit/sec tactical voice links. With the advent of more powerful satellites (SKYNET 4) the equipment should be usable with manpack type satcom terminals. The video codec operates at a constant 16 kbit/sec data rate and is therefore compatible with any 16 kbit/sec digital communications link. The system has two modes of operation: conventional slow scan television to build up the television frame, and conditional replenishment to send the moving picture information. The majority of information in a moving picture scene is stationary and is therefore redundant information. ESA

N86-29092 Royal Signals and Radar Establishment, Malvern (England).
DEMAND ASSIGNED MULTIPLE ACCESS CONTROL FOR TACTICAL SATELLITE COMMUNICATIONS TERMINALS
P. Wayne Braddock, Alan C. Smith, and Steve J. Perkins *In its* RSRE Research Review, 1985 1985 p 48-50 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Demand assigned multiple access implementations in which a central control station monitors traffic and allocates resources, and a distributed scheme whereby all terminals are of equal importance are compared. The distributed approach gives no overall authority to one station and has no connection to any fixed ground stations where land lines can be accessed. The central control system has the advantage that the central station has overall authority and can use land lines. However, by routing links through the center more satellite accesses are used than in the distributed case by a factor of two. The central control system is also heavily reliant on the control station remaining operational. ESA

N86-29093 Royal Signals and Radar Establishment, Malvern (England).
MALVERN'S PROGRAM ANALYSERS
B. D. Bramson *In its* RSRE Research Review, 1985 1985 p 51-52 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The Malvern Program Analysis Suite for the automatic, static analysis of safety critical software is described. Prior to analysis, a given text is translated into a standard Intermediate Language (IL), thus obviating the need for a new set of analyzers for each programming language. The IL is a strongly typed language with deliberately primitive control constructs so that high and low-level languages may be modeled. Many types are in-built, but new types, functions and procedures may also be declared without elaboration. For each procedure, including the outermost program, six types of analysis are performed: control flow; data use; information flow; partial program; semantics; and threat (matching with specifications). ESA

N86-29094 Royal Signals and Radar Establishment, Malvern (England).
FLEX: RSRE'S CAPABILITY COMPUTER
J. M. Foster *In its* RSRE Research Review, 1985 1985 p 53-55 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The Flex capability based computer architecture is described. It supports a multilanguage environment, and compilers for ALGOL 168 and PASCAL exist; an Ada compiler is being completed. The idea of capabilities is used on backing store as well as main store, so that all kinds of structured object which can be held in main store can also be held on any of the packing stores with the same degree of protection. Capabilities are used across a network of Flex computers, so that capabilities for data in one machine may be passed to and held in another. Flex uses true procedure values in the sense of Landin (1964). ESA

N86-29095 Royal Signals and Radar Establishment, Malvern (England).
AN OVERVIEW OF OPTICAL SIGNAL PROCESSING TECHNIQUES
Meirion F. Lewis *In its* RSRE Research Review, 1985 1985 p 57-65 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Optics applications in signal processing, principally fiber optics for low loss data transmission, and acousto-optics in spectrum analysis are reviewed. In each case the performance of the optical device greatly surpasses that of alternative technologies. The principal limitations of most other applications of optics concern their accuracy and dynamic range, and the problem of interfacing with electronics. The most obvious and important problem concerns the nonavailability of a cheap, reliable, reproducible spatial light modulator. This precludes the exploitation of many two-dimensional optical processors. The attraction of all-optical computing is boosted by the problems encountered in VLSI, although it is likely to be many years before such devices seriously compete with digital electronics. ESA

N86-29096 Royal Signals and Radar Establishment, Malvern (England).
ANDIE
M. Barraclough *In its* RSRE Research Review, 1985 1985 p 66-68 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

A data handling rig to assist the development of an Airborne Early Warning (AEW) radar is described. The rig assesses AEW performance as a self-contained entity, studies the interoperability of the AEW with other components of the air defense system, and assesses system enhancements. ESA

N86-29097 Royal Signals and Radar Establishment, Malvern (England).
APPLICATION OF SEMI-MARKOV MODELS TO AUTOMATIC SPEECH RECOGNITION
M. J. Russell and R. K. Moore *In its* RSRE Research Review, 1985 1985 p 69-72 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Automatic speech recognition using a statistical pattern recognition technique called hidden Markov modeling is introduced. With this technique each word in a vocabulary is represented as a probabilistic function of a Markov process, or hidden Markov model. A hidden Markov model consists of an underlying Markov chain, plus a set of multivariate probability density functions, one for each node of the Markov chain, called the states of the model. Intuitively the states describe variations in the pronunciation of different regions of a word while the underlying Markov chain describes the temporal structure of that word. Thus in hidden Markov modeling a speech signal is treated as the output of a sequence of stationary stochastic processes. ESA

N86-29098 Royal Signals and Radar Establishment, Malvern (England).
PRIOR KNOWLEDGE IN SYNTHETIC APERTURE RADAR (SAR) PROCESSING
S. P. Luttrell and C. J. Oliver *In its* RSRE Research Review, 1985 1985 p 73-77 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Application of information theory concepts of the relation between model and data interpretation to SAR processing is discussed. A model with correlated gamma-distributed cross section fluctuations fits the clutter which is observed in SAR data. Such a model can be augmented by the inclusion of collateral map data of the scene which the SAR is surveying. Thus the map may be used to determine the clutter model parameters in advance of receiving the SAR image data. Regions of the SAR image inconsistent with this clutter model (targets) require a different model. A general method of interpreting such target data is provided by superresolution. Thus prior knowledge of the general properties of targets is introduced to extract the maximum amount of target structural detail from the image. The effect of such processing is to enhance the resolution of the target image. ESA

N86-29099 Royal Signals and Radar Establishment, Malvern (England).
THE INFRARED APPLICATIONS OF CHALCOGENIDE GLASSES
Jim Savage *In its* RSRE Research Review, 1985 1985 p 79-94 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The optical and general properties of bulk chalcogenide glasses are summarized. Loss mechanisms in infrared materials; intrinsic absorption mechanisms; intrinsic scatter mechanisms; and extrinsic loss mechanisms are discussed. Sulfide glasses; selenide glasses; selenide-telluride glasses; and telluride glasses are covered. ESA

N86-29100 Royal Signals and Radar Establishment, Malvern (England).
CADMIUM MERCURY TELLURIDE INFRARED DETECTORS
C. T. Elliott *In its* RSRE Research Review, 1985 1985 p 95-103 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Signal Processing In The Element (SPITE) detectors used in high performance thermal imaging systems are discussed. Developments to improve spatial and temperature resolution are outlined. Focal plane arrays of electronically scanned two-dimensional arrays of CMT detectors are treated. Use of photovoltaic CMT detectors hybridized with silicon addressing circuits is reported. Research to raise the operating temperature of infrared detectors is summarized. ESA

N86-29101 Royal Signals and Radar Establishment, Malvern (England).
NON-GAUSSIAN LIGHT SCATTERING EXPERIMENTS
Eric Jakeman *In its* RSRE Research Review, 1985 1985 p 104-112 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Data acquired in light scattering experiments to investigate non-Gaussian fluctuations are given. Dynamic scattering in liquid crystals, laboratory generated thermal plumes, mixing layers, rippled liquid surfaces, and specially prepared solid diffusers were studied. At a qualitative level, the visual appearance of a scattered intensity pattern can be used to distinguish between smoothly varying and fractal scatterers. Solutions of Maxwell's equations for the appropriate model can then in principle be used to make quantitative comparisons with experimental data and obtain estimates of significant parameters characterizing the scatterer. In practice, anomalies remain, for example the observed strong geometrical optics features generated when waves are scattered by turbulent media which are usually considered to be describable in terms of the (fractal) Kolmogorov spectrum. ESA

N86-29102 Royal Signals and Radar Establishment, Malvern (England).
TUNABLE LASERS
M. J. P. Payne, R. C. Hollins, D. L. Jordan, H. W. Evans, and N. A. Lowde *In its* RSRE Research Review, 1985 1985 p 113-115 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Research on tunable carbon dioxide lasers for the 10 micron spectral region, vibronic solid state lasers for the visible and near infrared, dye lasers, and tunable excimer lasers is summarized. ESA

N86-29103 Royal Signals and Radar Establishment, Malvern (England).
A PYROELECTRIC LINEAR ARRAY INFRARED IMAGER
Douglas E. Burgess, P. A. Manning, and Rex Watton *In its* RSRE Research Review, 1985 1985 p 116-117 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

A linear pyroelectric infrared detector array featuring room temperature operation and low cost was demonstrated in a prototype imager. The use of uncommitted logic arrays and hybrid techniques to miniaturize the sensor head electronics is mentioned. ESA

N86-29104 Royal Signals and Radar Establishment, Malvern (England).
HIGH POWER FIBER OPTIC LASER ANEMOMETRY
Robert G. W. Brown, D. A. Jackson, J. D. C. Jones, and R. K. Y. Chan *In its* RSRE Research Review, 1985 1985 p 118-120 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Power transmission measurements in monomode optical fibers are reviewed. Hazards influencing the design and construction of high power fiber laser anemoneters are listed. It is predicted that monomode optical fibers capable of delivering hundreds of milliwatts of CW laser light over tens of meters to laser anemometer measuring regions will be developed in the near future. These will form the basis of multiplexable, miniaturized and relatively inexpensive laser anemometer optics. ESA

N86-29105 Royal Signals and Radar Establishment, Malvern (England).
HIGH SPATIAL RESOLUTION THERMAL IMAGERS
Ann P. Campbell *In its* RSRE Research Review, 1985 1985 p 121-123 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

The effect of anamorphic detector optics on Signal Processing In The Element (SPITE) detectors is discussed. Anamorphic optics enable a substantial improvement in horizontal detector modulation transfer function to be realized without requiring any detector geometry changes, and with a minimal loss in thermal sensitivity. Anamorphic detector optics were designed for thermal imaging common modules, as a form, fit and function retrofit to existing imagers. The only adjustment required is an increase in bias current, and this can be accomplished with the present bias supply circuits. The consequent increase in power dissipation is easily accomodated with the current detector and dewar combination. Comparison of images taken using an imager with standard optics and an imager with anamorphic optics demonstrates substantially improved spatial resolution. ESA

N86-29106 Royal Signals and Radar Establishment, Malvern (England).
IDENTIFICATION OF IMPURITIES AND DEFECTS IN SEMICONDUCTORS BY OPTICAL SPECTROSCOPY
M. S. Skolnick *In its* RSRE Research Review, 1985 1985 p 125-135 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01

Information that can be obtained on defect centers in semiconductors by optical spectroscopy is reviewed. Donor and acceptor identification, and symmetry determination of transition metal and axial defect-complex centers are considered. The information that can be obtained from isotope doping effects is discussed. ESA

N86-29107 Royal Signals and Radar Establishment, Malvern (England).
LOW DIMENSIONAL STRUCTURES
David A. Anderson and Colin R. Whitehouse *In its* RSRE Research Review, 1985 1985 p 136-141 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
The growth of quantum wells and techniques to probe the electronic properties of material only a few atomic layers thick are discussed. Molecular beam epitaxy is introduced. The electronic and optical properties of the structures produced are summarized, and utilization prospects are considered. ESA

N86-29108 Royal Signals and Radar Establishment, Malvern (England).
PYROELECTRIC ACTIVITY IN NON-CENTROSYMMETRIC LANGMUIR-BLODGETT FILMS
Mervyn Daniel and Gilbert W. Smith *In its* RSRE Research Review, 1985 1985 p 142-145 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
A mechanism to deposit noncentrosymmetric Langmuir-Blodgett (LB) films is described. The device can produce noncentrosymmetric organic films with useful properties such as pyroelectric and optically nonlinear behavior. Pyroelectric activity was observed and quantified in an acid/amine alternating layer LB film. As materials with custom-designed properties become available, these synthetic low-dimensional solids can produce a variety of effects with device potential. ESA

N86-29109 Royal Signals and Radar Establishment, Malvern (England).
FUNDAMENTAL STUDIES OF ION-SURFACE INTERACTIONS IN DRY ETCHING
Timothy I. Cox and Vasant G. I. Deshmukh *In its* RSRE Research Review, 1985 1985 p 146-149 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
Reactive ion beam etching of silicon using fluorocarbon gases with different C/F ratios in the parent molecule is described. Surface composition was studied via induced light emission. The relative amounts of the ionic species are a sensitive function of the gas pressure and source conditions, and are used to study ion surface interactions pertinent to dry etching for a wide range of beam compositions and ion energies. At low bombardment energies, neither a bombardment-induced silicon optical emission signal nor a signal at m/e = 28 (Si+) in the ion spectrum is observed. A threshold energy for the appearance of these signals is found. Mass spectrometric results confirm that the incident fluorocarbon beam is highly fragmented on impact with a silicon surface. Carbon so generated has a high probability of sticking to silicon and can act as a surface passivant, but may be removed by physical sputtering or by chemical combination with fluorine to form CF4 (gas). As ion energy increases the physical and chemical removal rates of carbon per incident fluorine atom increase and the fraction of the surface covered by carbon decreases. ESA

N86-29110 Royal Signals and Radar Establishment, Malvern (England).
A LIQUID CRYSTAL RADAR DISPLAY
John L. Glasper and Charles J. T. Smith *In its* RSRE Research Review, 1985 1985 p 150-154 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
A liquid crystal display for the MISER experimental radar for the evaluation of millimetric surveillance techniques was developed. The display consists of 2 large area matrix addressed displays and 12 direct drive numeric displays for axes designation and target parameters. The circular display plots data using polar coordinates to produce a PPI type presentation with the square display plotting data using rectangular coordinates to show a magnified area of the PPI display. The axes designators define the position and extent of the enlarged region and the target parameter displays track a selected target. The display unit is a combination of LCD modes; the large area displays are dyed phase change driven by waveform identity addressing, whereas the numeric displays are direct drive twisted nematic. ESA

N86-29111 Royal Signals and Radar Establishment, Malvern (England).
ULTRA HIGH SPEED MICRO-OPTICAL MODULATIONS IN GaAs: THE TEAM AND THE LEAM
David R. Wight, Phil C. Allen, John W. A. Trussler, Don P. Cooper, Dan J. Esdale, and Peter E. Oliver *In its* RSRE Research Review, 1985 1985 p 155-158 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
The design and performance of two types of optical modulators utilizing the bulk electroabsorption effect are described. Both types are of micron active dimensions and produce modulation depths of up to 50% without being optimized. The simpler transverse structure was tested to high frequency operation and is shown to have a flat response from dc to at least 14 GHz. The small size and high frequency performance of the devices offer a significant capability in fast signal transmission and processing electronics. ESA

N86-29112 Royal Signals and Radar Establishment, Malvern (England).
PHOTOLUMINESCENCE STUDIES OF SILICON GROWTH BY MBE
D. J. Robbins, D. B. Gasson, R. W. Hardeman, and A. D. Pitt *In its* RSRE Research Review, 1985 1985 p 159-163 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
Photoluminescence was used to study defects introduced during silicon wafer cleaning and subsequent growth. Dislocations in epilayers nucleated by residual substrate surface oxide; residual crystallographic damage introduced by sputter-cleaning of the substrate; and carbon incorporated during growth were examined. ESA

N86-29113 Royal Signals and Radar Establishment, Malvern (England).
HISTORY OF THE RSRE
Ernest H. Putley *In its* RSRE Research Review, 1985 1985 p 165-174 (For primary document see N86-29083 20-32)
Avail: NTIS HC A09/MF A01
The history of the United Kingdom Royal Signal and Radar Establishment is summarized. Its development of radar was an indirect result of investigations of so-called death rays in the 1930s. Other contributions include work on solid state detectors, infrared imagery, and the discovery of molecular gas lasers. Author (ESA)

N86-29114*# General Electric Co., Philadelphia, Pa. Space Systems Div.
THE 60 GHz ANTENNA SYSTEM ANALYSES FOR INTERSATELLITE LINKS, PHASE B Final and Summary Report
Sep. 1984 146 p
(Contract NAS5-27791)
(NASA-CR-175267; NAS 1.26:175267; GE-84SD54262) Avail: NTIS HC A07/MF A01 CSCL 17B
The purpose of this study is first to investigate, classify, and compare applicable antenna systems capable of establishing and maintaining intersatellite links at 60 GHz and secondly to select the most applicable system for a detailed conceptual design. The results are to be applicable to the development of intersatellite links at 60 GHz for future programs. Design goals are listed. Author

N86-29115*# Martin Marietta Corp., Denver, Colo.
NEAR-FIELD TESTING OF THE 15-METER MODEL OF THE HOOP COLUMN ANTENNA Final Report
John Hoover, Neill Kefauver, Tom Cencich, Jim Osborn, and Joe Osmanski Mar. 1986 123 p
(Contract NAS1-18016)

(NASA-CR-178059; NAS 1.26:178059; MCR-85-640) Avail: NTIS HC A06/MF A01 CSCL 20N

The technical results from near-field testing of the 15-meter model of the hoop column antenna at the Martin Marietta Denver Aerospace facility are documented. The antenna consists of a deployable central column and a 15 meter hoop, stiffened by cables into a structure with a high tolerance repeatable surface and offset feed location. The surface has been configured to have four offset parabolic apertures, each about 6 meters in diameter, and is made of gold plated molybdenum wire mesh. Pattern measurements were made with feed systems radiating at frequencies of 7.73, 11.60, 2.27, 2.225, and 4.26 (all in GHz). This report (Volume 1) covers the testing from an overall viewpoint and contains information of generalized interest for testing large antennas. This volume discusses the deployment of the antenna in the Martin Facility and the measurements to determine mechanical stability and trueness of the reflector surface, gives the test program outline, and gives a synopsis of antenna electromagnetic performance. Three techniques for measuring surface mechanical tolerances were used (theodolites, metric cameras, and near-field phase), but only the near-field phase approach is included. The report also includes an error analysis. A detailed listing of the antenna patterns are provided for the 2.225 Ghz feed in Volume 3 of this report, and for all other feeds in Volume 2. Author

N86-29116*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

WORKLOAD CHARACTERIZATION FOR THE SPACE STATION DATA COMMUNICATIONS SYSTEM

Kenneth C. Sevcik Jan. 1986 15 p

(NASA-TM-89396; RIACS-TR-86.4; NAS 1.15:89396) Avail: NTIS HC A02/MF A01 CSCL 17B

NASA plans to launch a permanent manned space station in the early 1990's. The station will be used to support a wide variety of activities involving Earth and space observation, satellite maintenance, scientific experimentation, and commercial manufacturing. The control and monitoring of many of these activities will require extensive computer and communications system support. In order to identify an appropriate computer and communication system for supporting the space station, an attempt to characterize the space station's data communications subsystem workload is currently underway. Some of the special aspects of the workload characterization problem are discussed in connection with the space station, and some possible approaches are presented. Author

N86-29117*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.

A MICROPROCESSOR BASED ANTI-ALIASING FILTER FOR A PCM SYSTEM Final Report, 31 Oct. 1980 - 31 Oct. 1984

Daniel Creighton Morrow and Doral R. Sandlin Oct. 1984 160 p

(Contract NCC4-1)

(NASA-CR-177000; NAS 1.26:177000) Avail: NTIS HC A08/MF A01 CSCL 17B

Described is the design and evaluation of a microprocessor based digital filter. The filter was made to investigate the feasibility of a digital replacement for the analog pre-sampling filters used in telemetry systems at the NASA Ames-Dryden Flight Research Facility (DFRF). The digital filter will utilize an Intel 2920 Analog Signal Processor (ASP) chip. Testing includes measurements of: (1) the filter frequency response and, (2) the filter signal resolution. The evaluation of the digital filter was made on the basis of circuit size, projected environmental stability and filter resolution. The 2920 based digital filter was found to meet or exceed the pre-sampling filter specifications for limited signal resolution applications. Author

N86-29118*# California Univ., Los Angeles. Dept. of Electrical Engineering.

A SURVEY OF THE STATE-OF-THE-ART AND FOCUSED RESEARCH IN RANGE SYSTEMS, TASK 1 Final Report

Jim K. Omura Jul. 1986 43 p

(Grant NAG2-304)

(NASA-CR-176900; NAS 1.26:176900) Avail: NTIS HC A03/MF A01 CSCL 17B

This final report presents the latest research activity in voice compression. We have designed a non-real time simulation system that is implemented around the IBM-PC where the IBM-PC is used as a speech work station for data acquisition and analysis of voice samples. A real-time implementation is also proposed. This real-time Voice Compression Board (VCB) is built around the Texas Instruments TMS-3220. The voice compression algorithm investigated here was described in an earlier report titled, Low Cost Voice Compression for Mobile Digital Radios, by the author. We will assume the reader is familiar with the voice compression algorithm discussed in this report. The VCB compresses speech waveforms at data rates ranging from 4.8 K bps to 16 K bps. This board interfaces to the IBM-PC 8-bit bus, and plugs into a single expansion slot on the mother board. Author

N86-29119# Army Aviation Systems Command, St. Louis, Mo.

VHF-FM COMMUNICATIONS ANTENNAS FOR PROJECT SINCGARS (UH-1 TAIL WHIP ANTENNA EVALUATION)

Joseph Caralyus, Joseph Miller, and Frank Cansler Feb. 1986 129 p

(AD-A165897; AVSCOM-TR-85-E-2) Avail: NTIS HC A07/MF A01 CSCL 17/2

A full-scale study was conducted by the Naval Air Development Center, Warminster, Penn. (NADC), for the C3 Division of the U.S. Army Avionics Research and Development Activity (AVRADA), Fort Monmouth, N.J., to test and evaluate production prototype antenna systems that essentially met the requirement for SINCGARS operation when installed on an Army UH-1 helicopter. The results of these tests determined a suitable tail whip antenna to be used on the UH-1 to satisfy the SINCGARS requirement between 30 and 88 MHz. This technical report describes the results of tests conducted on antennas manufactured by three major Airborne Antenna manufacturers, each of whom attempted to provide an antenna system that would directly replace the standard Army CU-942B antenna, and satisfy the more stringent requirements of project SINCGARS. The information in this report provides, in part, the technical data for the production data package of an adequate VHF-FM Communications antenna for the UH-1 aircraft. GRA

N86-29120# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

EXPLOITING SEQUENTIAL PHONETIC CONSTRAINTS IN RECOGNIZING SPOKEN WORDS

Daniel P. Huttenlocher Oct. 1985 28 p

(Contract N00014-80-C-0505)

(AD-A165913; AI-M-867) Avail: NTIS HC A03/MF A01 CSCL 05/8

Machine recognition of spoken language requires developing more robust recognition algorithms. A recent study by Shipman and Zue suggest using partial descriptions of speech sounds to eliminate all but a handful of word candidates from a large lexicon. The current paper extends their work by investigating the power of partial phonetic descriptions for developing recognition algorithms. First, we demonstrate that sequences of manner of articulation classes are more reliable and provide more constraint than certain other classes. Alone these results are of limited utility, due to the high degree of variability in natural speech. This variability is not uniform however, as most modifications and deletions occur in unstressed syllables. Comparing the relative constraint provided by sounds in stressed versus unstressed syllables, we discover that the stressed syllables provide substantially more constraint. This indicates that recognition algorithms can be made more robust by exploiting the manner of articulation information in stressed syllables. GRA

N86-29121# Connecticut Univ., Storrs. Dept. of Electrical Engrg. and Computer Science.

A RANDOM ACCESS ALGORITHM FOR FREQUENCY HOPPED SPREAD SPECTRUM PACKET RADIO NETWORKS

Michael Georgiopoulos and P. Papantoni-Kazakos Mar. 1986

24 p
(Contract N00014-85-K-0547)
(AD-A165935; EECS-TR-86-4) Avail: NTIS HC A02/MF A01
CSCL 17/2

The authors consider packet radio multi-user spread-spectrum environments, where frequency hopping spread spectrum techniques are deployed for protection against intelligent adversaries. When the users in such environments are mobile and bursty, random access frequency hopping transmission algorithms should be adopted, for efficiency in throughput and delay control. This paper proposes and analyzes such an algorithm, named Collision Resolution Algorithm for Frequency Hopping (CRAFH). The CRAFH is a limited sensing random access algorithm utilizing receiver oriented frequency hopping patterns. In its design, the experience from random access algorithms for non spread spectrum multi-user channels is utilized. Utilizing the regenerative character of the induced by the algorithm transmission process, the authors compute throughputs and expected per packet delays. In the presence of interferences between transmissions to different receivers, we compute throughputs, subject to an upper bound on the probability of erroneous data decoding. The CRAFH induces uniformly good delays within its stability region, and is particularly appropriate for environments where the users are highly mobile. GRA

N86-29122# Naval Surface Weapons Center, Silver Spring, Md.
DISPERSION CHARACTERISTICS OF A HELIX LOADED WAVEGUIDE
H. Crosby, J. Choe, and A. Krall 1 Sep. 1985 43 p
(AD-A166444; NSWC/TR-85-402) Avail: NTIS HC A03/MF A01
CSCL 09/1

The dispersion characteristics of a helix loaded waveguide have been experimentally investigated. Helix loaded waveguides are of interest as a slow wave structure that can be employed to increase the bandwidth of gyroton amplifiers. The structure consists of helical wires contained concentrially in a cylindrical conductor. The helical wires are close enough together to form a helical sheath justifying the assumption of azimuthal symmetry. The relevant physical parameters are the pitch angle (phi) and the ratio of the helix radius (Rh) to the conductor radius (Rc). The dispersion relations for the general azimuthal mode number are obtained for both the fast hybrid and the helix modes. GRA

N86-29123# Lawrence Livermore National Lab., Calif.
SCALE MODEL EVALUATION OF A REFLECTING ANTENNA DESIGN FOR AN INDOOR EMP SIMULATOR
H. G. Hudson and S. T. Pennock Dec. 1985 30 p
(Contract W-7405-eng-48)
(DE86-008146; UCID-20685) Avail: NTIS HC A03/MF A01

The purpose of this effort was to construct a scale model of a cusp antenna and evaluate its performance. Measurements were taken to describe the distortion the presence of the cusp introduced into a free space incident field. Measurements of the hangar were also taken to serve as a reference point to gauge how much the cusp was able to reflect energy. As will be described in detail later, the measured performance of the scale model cusp antenna does not agree with the predicted computer solutions from EMA. DOE

N86-29124# Research Inst. of National Defence, Linkoeping (Sweden).
THE CARABAS METHOD TO OBTAIN HIGH RESOLUTION PENETRATING RADAR RECORDINGS OF THE GROUND
Hans Hellsten, Jan Kjellgren, and Svante Oedman Jan. 1986
22 p In SWEDISH; ENGLISH summary
(FOA-C-30414-E1; ISSN-0347-3708; ESA-86-97041) Avail: NTIS HC A02/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

Information content in recordings of the ground surface readings obtained by SAR is analyzed. The speckle ambiguity characteristic of conventional SAR, a consequence of the small relative bandwidth, restrains interpretability. In CARABAS the maximum broadband signal is used: typically 10 to 100 MHz. The high angular resolution of the SAR technique combined with large absolute bandwidth provides unchanged high resolution, compared to microwave SAR, but the information content of recorded data is different. In the wavelength interval 3 to 30 m, vegetation is transparent and radiation penetrates the ground to a depth of 10 m. ESA

N86-29125# Centre National d'Etudes Spatiales, Toulouse (France).
METEOSAT OPERATIONAL INTRODUCTION OF NEW CARRIERS IN A2 METEOROLOGICAL DATA DISSEMINATION (MDD)
M. Grondin 29 Mar. 1985 20 p
(CNES-CT/DRT/TIT/TR-67-T; ESA-86-97182) Avail: NTIS HC A02/MF A01

The possibility of replacing several Meteosat meteorological data dissemination (MDD) carriers by a higher bit rate carrier, and replacing one MDD carrier by a lower bit rate carrier was studied. The power sharing between the carriers and the intermodulation products (C/I ratios) are evaluated. It is concluded that replacing 5 MDD carriers by the high bit rate carrier (at 2.4 kbs) does not degrade the reception of the remaining MDD carriers, and that the reception of the new carrier with a bit error rate of 0.000001 is possible, assuming that a suitable frequency plan is chosen. For the reception of the low bit rate carrier the result is similar, but the C/I ratio obtained must be used with care because of the limits of the simulation. ESA

N86-29126# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France). Dept. RPE/ETP.
RADIO PROPAGATION AT 900 MHz IN URBAN AREAS: MODELS WITH A FIXED FREQUENCY AND EXPERIMENTAL RESULTS [PROPAGATION RADIOELECTRIQUE A 900 MHLCZ EN MILIEU URBAIN: MODELISATION A FREQUENCE FIXE ET RESULTATS EXPERIMENTAUX]
P. Olivier and J. Tiffon Sep. 1984 65 p In FRENCH
(CRPE-NT-136; ESA-86-97189) Avail: NTIS HC A04/MF A01

Models which describe multipath propagation are examined in order to design a 900 MHz mobile communication system adapted to urban areas. A justification of the experimental data treatment is derived from this analysis. The measurements were made at a fixed 855 MHz frequency, transmitting from three locations. The fast fluctuations of the received signals are well represented by a Rayleigh process, which means that there are practically no paths of direct transmission. The coherence length is < 1 m. The statistical distribution of the average field is Gaussian and the normal deviation decreases with the distance emitter-receiver. The empiric Okumura-Hata prediction model agrees well with the experimental results, giving an average cell field decreasing with distance with a logarithmic law. ESA

N86-29127# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
MULTISENSOR MULTIPULSE LINEAR PREDICTIVE CODING (LPC) ANALYSIS IN NOISE FOR MEDIUM RATE SPEECH TRANSMISSION Final Report
Robert D. Preuss 30 Dec. 1985 36 p Sponsored by Ecole Nationale des Telecommunications, Centre National d'Etudes des Telecommunications, Lannion, France, and CNRS, Ivry sur Seine, France
(ENST-85D005; ISSN-0751-1345; ESA-86-97211) Avail: NTIS HC A03/MF A01

The theory of multipulse linear predictive coding (LPC) analysis is extended to include the possible presence of acoustic noise, as for a telephone near a busy road. Models are developed assuming two signals are provided: the primary signal is the output of a microphone which samples the combined acoustic fields of the noise and the speech, while the secondary signal is the output of a microphone which samples the acoustic field of the noise alone. Analysis techniques to extract the multipulse LPC parameters from these two signals are developed; these techniques are developed as approximations to maximum likelihood analysis for the given model. ESA

N86-29128# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
IMPLEMENTATION OF A SOFT-DECISION VITERBI CODEC
W. J. W. M. Nouwens Dec. 1984 75 p
(ESA-86-97542) Avail: NTIS HC A04/MF A01

The effects of the threshold spacing and the number of quantization levels (Q) on the bit error probability of a soft-decision decoder are investigated. An upper bound on the bit error probability is computed as a function of the threshold spacing and Es/No for Q=4 and Q=8. Threshold spacing normalized to the noise-power density, and normalized to the signal energy per code symbol are considered. Degradation of bit error probability performance is not significant even if the threshold spacings differ considerably from the optimum values. A parallel realization of the decoder with eight quantization levels is chosen. The theoretical minimum decoding data rate is at least 4 Mbs. The bit error rate performance of the decoder is measured with a polar baseband channel. The code gain of the decoder is 3.4 dB for Q=8 and 3.1 dB for Q=4. ESA

N86-29129# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
EXPRESSION OF COOPERATION, COMPETITION, COMMUNICATION IN SPECIFICATIONS BY ABSTRACT ALGEBRAIC TYPES Ph.D. Thesis [EXPRESSION DE C3 (COOPERATION, CONCURRENCE, COMMUNICATION) DANS LES SPECIFICATIONS PAR LES TYPES ABSTRAITS ALGEBRIQUES]
Hayri Sayi Jul. 1984 141 p In FRENCH and ENGLISH
(ENST-84E019; ISSN-0751-1353; ESA-86-97207) Avail: NTIS HC A07/MF A01

Examples to illustrate a specification describing a system composed of cooperating autonomous units, written in the form of algebraic abstract types, are given. The use of the OASIS computer program, designed to aid interactive specification of structural systems, is emphasized. The analysis of cooperative subsystems, and competing subsystems are discussed. The models describing competing systems separately specified, once intercommunication and the changes induced by that communication are established, are analyzed. The usefulness of this type of specification in describing communication or computer systems is shown. ESA

N86-29130# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
PARAMETER TIME-FREQUENCY REPRESENTATIONS [REPRESENTATIONS TEMPS-FREQUENCE PARAMETRIQUES]
Yves Grenier Sep. 1985 69 p In FRENCH Presented at Summer School Session on Physique Theorique de Houches, NATO ASI on Signal Processing, France, 12 Aug. - 6 Sep. 1985
(ENST-85C006; ISSN-0751-1337; ESA-86-97209) Avail: NTIS HC A04/MF A01

The definition and representation of time varying spectra are discussed. The definitions of Priestley (1965), Tjostheim (1976) and Grenier (1984) are examined. It is shown that the adjusted average autoregressive models may be globally unstable in spite of the stability of their limit models. The analysis finds that the Tjostheim definition and the observable state definition are equivalent in the sense that the first respects the signal variance and the second the instantaneous local conditions. ESA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-29131# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
IMPROVED MODE CONVERTERS FOR GENERATING THE HE11 (NEAR-GAUSSIAN) MODE FROM GYROTRON TEOn MODES AT 70 GHz AND 140 GHz
M. Thumm, G. A. Mueller, H. Sturm, R. Wilhelm, and M. Verain Nov. 1985 18 p Presented at EC-5 International Workshop on Electron Cyclotron Emission and Electron Cyclotron Heating and Gyrotron User/Developer Meeting, San Diego, Calif., 9-12 Nov. 1985
(IPF-85-6; ESA-86-96924) Avail: NTIS HC A02/MF A01

Mode converters for generating the He11 (near Gaussian) mode from gyrotron TEOn modes at 70 and 140 GHz and optimization of wall perturbations in rippled mode converters for overmoded circular waveguides are discussed. For individual titles, see N86-29132 through N86-29133.

N86-29132# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
MODE CONVERTERS FOR GENERATING THE HE11 (NEAR-GAUSSIAN) MODE FROM GYROTRON TEOn MODES AT 140 GHz
Manfred Thumm and Helga Sturm *In its* Improved Mode Converters for Generating the HE11 (Near-Gaussian) Mode from Gyrotron TEOn Modes at 70 GHz and 140 GHz Nov. 1985 p 2-9 (For primary document see N86-29131 20-33)
Avail: NTIS HC A02/MF A01

The structure of wall perturbations (superposition of 2 or 3 different periods) in rippled wall mode converters and the curvature distribution in bent smooth-walled TEO1-to-TM11 mode transducers were optimized by numerically solving the corresponding coupled-mode differential equations. Computer-aided optimization of circumferentially corrugated mode converters was achieved with a scattering matrix code employing the modal field expansion technique. In all cases the predicted overall efficiency of the complete mode converter system from Sigma TEOn (predominantly TEO3) to HE11 in the desired mode is 90% to 92% (ohmic attenuation is included). Low-power measurements on the efficiency of a 140 GHz TEO1-to-TM11 mode transducer (ao = 13.9 mm) are in excellent agreement with the predicted value of 95.2% (including ohmic attenuation). ESA

N86-29133# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
OPTIMIZATION OF WALL PERTURBATIONS IN RIPPLED WALL MODE CONVERTERS FOR OVERMODED CIRCULAR WAVEGUIDE
M. Thumm, G. A. Mueller, and R. Wilhelm *In its* Improved Mode Converters for Generating the HE11 (Near-Gaussian) Mode from Gyrotron TEOn Modes at 70 GHz and 140 GHz Nov. 1985 p 10-17 (For primary document see N86-29131 20-33)
Avail: NTIS HC A02/MF A01

Considerable improvement (higher efficiency, shorter length) of periodic-perturbation mode converters for overmoded circular high-power waveguides was accomplished by changing the perturbation period of the wall slightly from the beat wavelength between the input and the desired output mode, combined with superimposing additional, phase-matched, small perturbations, whose periods correspond to the beat wavelengths between the input and output mode and their related, strongest coupled unwanted modes, respectively. Numerical calculations and measurements on optimization of wall perturbations in TEOn-to-TEO,n-1 mode converters and TEO1-to-TE11 transducers for the 1 MW-ECRH system (five 200 kW/70 GHz-transmission lines with CW capability) at a stellerator are reported. For TEO1-to-TE11 mode conversion in transducers with constant diameter and periodically perturbed curvature (in one plane) multimode calculations show that the efficiency = 86.2% of a simple 8-period 70 GHz transducer can be raised to 97.4%. ESA

N86-29134*# California State Univ., Northridge. Dept. of Engineering.
ANALOG SIMULATION OF FLUX-SUMMING SERVO-MODEL, PHASES 1 AND 2 Final Report, 1 Dec. 1982 - 30 Sep. 1984
Edward J. Hriber Sep. 1984 48 p

(Contract NCA7-OR554-301)
(NASA-CR-176951; NAS 1.26:176951) Avail: NTIS HC A03/MF A01 CSCL 09A

The analog simulation was developed for a closed-loop system having an electrohydraulic flux-summing servo valve and actuator with associated inertial load. One-fourth of the system's total forward gain is carried by each of four channels. The present study successfully applied failure mode management techniques to the problem of channel failure. Digital logic circuitry was developed to maintain the overall forward gain of the system at a constant value, in the presence of channel failure. Finally, the stability of the system was verified, and performance characteristics were determined through the use of frequency response methods. Author

N86-29135*# National Aeronautics and Space Administration, Washington, D.C.
IMPROVEMENT OF THE PROCESS FOR ELECTROCHEMICAL IMPREGNATION OF NICKEL HYDROXIDE ELECTRODES
M. Comtat, B. Lafage, and J. Leonardi Jul. 1986 12 p Transl. into ENGLISH of "Amelioration du Procede d'Impregnation Electrochimique d'Electrodes d'Hydroxyde de Nickel" rept. ESA-SP-230 presented at the ESA Session of the 16th IEEE Annual Power Electronics Specialists Conference, 1985 p 129-133 Conference held in Toulouse, France, 24-28 Jun. 1985 Original language document was announced as N86-17447 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88469; NAS 1.15:88469; ESA-SP-230) Avail: NTIS HC A02/MF A01 CSCL 09C

Nickel hydroxide electrodes containing 11g/dsqm hydroxide, with capacities of 3.6 to 3.8 Ah/dsqm were prepared at 353 K by electrochemical impregnation. The reproducibility of the results is obtained by readjusting the pH before each preparation. The control of each electrode is done during two cycles of charge and discharge following the manufacture by a potential relaxation method. Author (ESA)

N86-29136*# National Aeronautics and Space Administration, Washington, D.C.
ELECTRODES WITH FIBER STRUCTURE
G. Benczur-Uermoessy, G. Berger, and F. Haschka Jul. 1986 15 p Transl. into ENGLISH from Elektrotechnische Zeitschrift (West Germany), v. 21, no. 104, 1983 p 1098-1101 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88470; NAS 1.15:88470) Avail: NTIS HC A02/MF A01 CSCL 09C

An electrode framework with a fiber structure, universally applicable in alkaline storage battery systems, was developed and readied for production. Storage batteries with these electrodes present higher energy and power densities and are economical to produce. The design is applicable to all rechargable storage batteries and might replace the previous variety of designs. Author

N86-29137# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
MINIATURE FLAT PANEL DISPLAY FEASIBILITY MODEL Final Technical Report, 1 Jul. 1978 - 30 Sep. 1981
R. D. Ketchpel Nov. 1985 66 p
(Contract DAAK70-78-C-0123)
(AD-A166458; AD-E301928; MRDC41011.60-FR) Avail: NTIS HC A04/MF A01 CSCL 14/2

Development efforts toward producing a matchbox-size miniature TV system using a thin film electroluminescence (TFEL) display are summarized. Potential applications include thermal weapons viewing sight and low mass head-mounted display systems. Results of the program include high density TFEL display surface (692 X 540 pixels at 500 lines/inch density), high density interconnect to display surface, and techniques for fabricating high density polyimide/copper hybrid circuits to provide an integrated miniature display system package. Procurement of high voltage driver ICs was a major hurdle. Upon receipt of these ICs TV imagery was demonstrated on a compact breadboard system using a 320 x 250 pixel TFEL display with 250 lines/inch resolution. Breadboard power measurements indicate a power requirement of 2.4 watts using existing components or 1.7 watts with improvement in the IC driver chip. Author (GRA)

N86-29138# Brookhaven National Lab., Upton, N. Y.
PHOTOVOLTAIC-POWERED SOLID POLYMER ELECTROLYTE (SPE) ELECTROLYZER SYSTEM EVALUATION Final Report
P. D. Metz and M. Piraino Jul. 1985 57 p
(Contract DE-AC02-76CH-00016)
(DE86-005300; BNL-51940) Avail: NTIS HC A04/MF A01

The final results of the evaluation of a photovoltaic-powered solid polymer electrolyte (SPE) electrolyzer system at the Brookhaven National Laboratory (BNL) Hydrogen Technology Evaluation Center (HTEC) are presented. The HTEC facility and the SPE electrolyzer system are described. Electrolyzer test results are then presented. A technoeconomic analysis of hydrogen production via PV-powered electrolysis and other options is reported. The use of grid versus photovoltaic electricity is evaluated parametrically. PV-electrolyzer system transient computer results are presented. The economic model on which the technoeconomic analysis is based is appended, as well as fitting equations and coefficients of some of the test results. DOE

N86-29139# Sandia National Labs., Albuquerque, N. Mex.
RELIABILITY ASSESSMENT OF POLYCARBONATE FILM CAPACITORS
R. V. Baron and D. H. Weingarten 1986 5 p Presented at the Capacitor and Resistor Technology Symposium, New Orleans, La., 11 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004554; SAND-85-1982C; CONF-860355-1) Avail: NTIS HC A02/MF A01

To assess the reliability of an 18 microfarad, 50-volt rated, metallized-film, polycarbonate capacitor under operating conditions, an experiment was devised and executed which put an array of 500 capacitors into a voltage and temperature matrix for test. This paper describes the capacitor, the experiment and results. DOE

N86-29140# Argonne National Lab., Ill.
DEVELOPMENT AND TEST EVALUATION OF ADVANCED LEAD-ACID BATTERIES FOR LOAD-LEVELING APPLICATIONS
N. P. Yao and J. F. Miller 1986 6 p Presented at the International Symposium on Fuel Cell and Advanced Battery, Tokyo, Japan, 22 Jan. 1986
(Contract W-31-109-eng-38)
(DE86-005565; CONF-860138-3) Avail: NTIS HC A02/MF A01

The Exide load-leveling modules have operated reliably to date in all testing at the NBTL, with stable performance exceeding design goals. Much important information on operation and maintenance requirements has been accumulated in over 3 1/2 years of testing to date. It is concluded that these batteries can perform load-leveling applications for electric utilities or utility customers. DOE

N86-29141# Sandia National Labs., Albuquerque, N. Mex.
INVERTED RELATIVISTIC MAGNETRON WITH A SINGLE AXIAL OUTPUT
W. P. Ballard, L. M. Earley, and C. B. Wharton (Cornell Univ., Ithaca, N.Y.) Jan. 1986 70 p Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC04-76DP-00789)
(DE86-005853; SAND-85-1952) Avail: NTIS HC A04/MF A01

A twelve vane, 1 MV, S-band magnetron has been designed and tested. An inverted design was selected to minimize the parasitic axial electron losses. The stainless steel anode is approximately one wavelength long. One end is partially short-circuited to RF, while the other end has a mode transformer to couple the 3.16 GHz (PI)-mode out into a TM sub 01 circular

waveguide. The magnetron has a loaded output Q of about 100. Operation at 1 MV, 0.31 T, 5 kA routinely produces approx. 150 MW peak rms and 100 MW average rms with pulse lengths adjustable from 5 to 70 ns. The microwave power pulse has a rise time of approx. 2 ns. The output power is diagnosed using four methods: calorimetry, two circular-waveguide directional couplers installed on the magnetron, two transmitting-receiving systems, and gaseous breakdown. Operation at other voltages and magnetic fields shows that the oscillation frequency is somewhat dependent on the magnetron current. Frequency changes of approx. 20 MHz/kA occur as the operating conditions are varied. A series of experiments varying the anode conductivity, the electron emission profile, and the output coupling transformer design showed that none of these significantly increased the output power. Therefore, we have concluded that this magnetron operates in saturation. Because of the anode lifetime and repeatability, this magnetron has the potential to be repetitively pulsed. DOE

N86-29142# Allied Bendix Corp., Kansas City, Mo.
DEVELOPMENT OF FABRICATION TECHNIQUES FOR A 32-IN. DIAMETER EXPLOSIVE-DRIVEN GENERATOR
R. L. Finney Jan. 1986 24 p
(Contract DE-AC04-76DP-00613)
(DE86-006157; BDX-613-3340) Avail: NTIS HC A02/MF A01

Tooling and fabrication techniques for helical-wound generator coils as large as 31 inches in diameter have been demonstrated. The coil conductors were 0.125 in. at the input and increased to 0.500 in. at the output of the generator. The coil was encapsulated with a filled epoxy system. DOE

N86-29143# Los Alamos National Lab., N. Mex.
DESIGN OF PULSE TRANSFORMERS FOR ISOLATION PROTECTION AND HIGHER SPEEDS IN THE REMOTE FIRING OF BRIDGE WIRES
W. H. Bostick, B. L. Freeman, J. C. King, and A. R. Martinez Jan. 1986 15 p
(Contract W-7405-eng-36)
(DE86-007581; LA-10586-MS) Avail: NTIS HC A02/MF A01

The continued development of high-performance explosive pulsed power supplies has necessitated the development of high-voltage isolated x-unit systems. We have developed a circuit involving an x-unit, a step-up transformer, a pulse-forming network, a step-down transformer, and a bridge wire. With this circuit, the time to burst a single bridge wire was reduced from 0.6 (MU)s for a direct, short x-unit connection to 0.21 (MU)s while obtaining an x-unit-to-bridge wire isolation of greater than or equal to 180 kV. DOE

N86-29144# Sandia National Labs., Albuquerque, N. Mex.
FIBER-OPTIC DIAGNOSTIC FOR ENERGY MEASUREMENTS
G. L. Lockwood, D. J. Muron, L. E. Ruggles, J. Chang, D. D. Bloomquist, and S. R. Babcock 1986 13 p Presented at the Conference on Measurement of Electrical Quantities in Pulse Power Systems-2, Gaithersburg, Md., 5 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007834; SAND-85-1482C; CONF-860384-2) Avail: NTIS HC A02/MF A01

A fiber-optic diagnostic system based on calorimetry to measure the total energy deposited in a liquid-filled load resistor is developed. Thermodynamic calculations show the fluid temperature to come to equilibrium in about two seconds and to remain there for several tens of seconds. Thus fluid temperature can determine the energy deposited. Using a fluoroptic thermometer, the change in temperature of a copper sulfate solution load resistor was measured as a function of the energy stored in a capacitor bank. A comparison of these results with the calculated temperature rise shows agreement to + or - 3% over the energy range from 1.4 kJ to 5.9 kJ. Measurements were then made of the energy deposited in a sodium chloride solution load resistor on the Ripple accelerator. These were made as a function of energy stored in the Marx generator from 7.4 kJ to 21.2 kJ. Electrical measurements of the energy deposited were made at the same time. These were high on the average by 8%. DOE

N86-29145# Lawrence Livermore National Lab., Calif.
LASER FABRICATION OF INTERCONNECT STRUCTURES FOR CMOS GATE ARRAYS
J. C. Whitehead, F. Mitlitsky, D. J. Ashkenas, A. F. Bernhardt, S. E. Farmwald, J. L. Kaschmitter, and B. M. McWilliams 1986 11 p Presented at the Symposium and Exhibition on Optical and Electro-optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-008143; UCRL-94057; CONF-860117-7) Avail: NTIS HC A02/MF A01

Maskless, automated, five minute interconnection of a 1000 gate CMOS array die has been accomplished using discretionary laser-induced chemical vapor deposition. Eight 125-stage ring oscillators written on single CMOS gate array dies were shown to have the device-limited performance of similar patterns manufactured with a photolithographically patterned aluminum-silicon alloy. These results suggest the feasibility of using this method, Laser Pantography (LP), for rapid implementation of prototype and limited volume semi-custom VLSI circuits immediately after their design is completed. DOE

N86-29146# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
MANUFACTURING OF HARDENED ELECTRICAL WIRING [REALISATION DE LIAISONS ELECTRIQUES DURCIES IEM]
Hublet, Meytrueix, Deve, Degelle, and Raveu 11 Dec. 1985 57 p In FRENCH
(SNIAS-861-430-112; ESA-86-97174) Avail: NTIS HC A04/MF A01

The quality control and manufacturing procedures required to assure the high reliability of electrical wiring systems for aerospace or weapon applications are discussed. The means of increased protection from electromagnetic interference include interference filters, peak absorption devices, and improved grounded shields. The use of magnetostriction devices in cable assembly is recommended. Shield manufacturing technology is discussed. Quality control facilities are detailed. It is shown that the wiring hardening techniques must be a part of the design stage to avoid later problems. ESA

N86-29147# Commerce Dept., Washington, D.C.
AMPLIFICATION BY A PHASE LOCKED ARRAY OF JOSEPHSON JUNCTIONS Patent Application
D. G. McDonald, (inventor to Commerce Dept.) Filed 26 Nov. 1985 23 p
(US-Patent-Appl-SN-801972) Avail: NTIS HC A02/MF A01 CSCL 09E

The object of the invention is to provide a general purpose amplifier, using Josephson junctions, which has a wide bandwidth and sufficiently high impedance to allow connection to a large variety of signal sources and which requires only a dc power source. GRA

N86-29258*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONTACT-RESISTANCE PROCESS CLIFF
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

N86-29259*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ADDRESSABLE INVERTER MATRIX FOR PROCESS AND DEVICE CHARACTERIZATION
Martin G. Buehler and Hoshyar R. Sayah *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p Repr. from Solid State Technology, May 1985 p 185-191 Previously announced in IAA as A86-16549 (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

N86-29261*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JMOSFET: A MOSFET PARAMETER EXTRACTOR WITH GEOMETRY-DEPENDENT TERMS
Martin G. Buehler and B. T. Moore *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 42 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09A

N86-29262*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE 1.2 MICRON CMOS TECHNOLOGY
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 10 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

N86-29263*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST CHIP ASSEMBLER AND TEST PROGRAM GENERATOR
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 6 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

N86-29264*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FAULT MODELS
Hoshyar R. Sayah and Martin G. Buehler *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 p 6 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

N86-29265*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MOS INTEGRATED CIRCUIT FAULT MODELING
M. Sievers *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 15 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-29148*# California Univ., Los Angeles.
THE NON-NEWTONIAN HEAT AND MASS TRANSPORT OF He 2 IN POROUS MEDIA USED FOR VAPOR-LIQUID PHASE SEPARATION Ph.D. Thesis
Sidney W. K. Yuan 1985 222 p
(Contract NCC2-305)
(NASA-CR-177075; NAS 1.26:177075) Avail: NTIS HC A10/MF A01 CSCL 20D

This investigation of vapor-liquid phase separation (VLPS) of He 2 is related to long-term storage of cryogenic liquid. The VLPS system utilizes porous plugs in order to generate thermomechanical (thermo-osmotic) force which in turn prevents liquid from flowing out of the cryo-vessel (e.g., Infrared Astronomical Satellite). An apparatus was built and VLPS data were collected for a 2 and a 10 micrometer sintered stainless steel plug and a 5 to 15 micrometer sintered bronze plug. The VLPS data obtained at high temperature were in the nonlinear turbulent regime. At low temperature, the Stokes regime was approached. A turbulent flow model was developed, which provides a phenomenological description of the VLPS data. According to the model, most of the phase separation data are in the turbulent regime. The model is based on concepts of the Gorter-Mellink transport involving the mutual friction known from the zero net mass flow (ZNMF) studies. The latter had to be modified to obtain agreement with the present experimental VLPS evidence. In contrast to the well-known ZNMF mode, the VLPS results require a geometry dependent constant (Gorter-Mellink constant). A theoretical interpretation of the phenomenological equation for the VLPS data obtained, is based on modelling of the dynamics of quantized vortices proposed by Vinen. In extending Vinen's model to the VLPS transport of He 2 in porous media, a correlation between the K*(GM) and K(p) was obtained which permits an interpretation of the present findings. As K(p) is crucial, various methods were introduced to measure the permeability of the porous media at low temperatures. Good agreement was found between the room temperature and the low temperature K(p)-value of the plugs. M.G.

N86-29149*# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
TURBULENT BOUNDARY LAYERS IN OSCILLATING FLOWS. PART 1: AN EXPERIMENTAL AND COMPUTATIONAL STUDY Final Technical Report, 1 Jun. 1982 - 31 Aug. 1985
William J. Cook 10 Feb. 1986 61 p
(Contract NCC2-200)
(NASA-CR-177109; NAS 1.26:177109; ISU-ERI-Ames-86434-Pt-1)
Avail: NTIS HC A04/MF A01 CSCL 20D

An experimental-computational study of the behavior of turbulent boundary layers for oscillating air flows over a plane surface with a small favorable mean pressure gradient is described. Experimental studies were conducted for boundary layers generated on the test section wall of a facility that produces a flow with a mean free stream velocity and a superposed nearly-pure sinusoidal component over a wide range of frequency. Flow at a nominal mean free stream velocity of 50 m/s were studied at atmospheric pressure and temperature at selected axial positions over a 2 m test length for frequencies ranging from 4 to 29 Hz. Quantitative experimental results are presented for unsteady velocity profiles and longitudinal turbulence levels obtained from hot wire anemometer measurements at three axial positions. Mean velocity profiles for oscillating flows were found to exhibit only small deviations from corresponding steady flow profiles, while amplitudes and phase relationships exhibited a strong dependence on axial position and frequency. Since sinusoidal flows could be generated over a wide range of frequency, studies at fixed values of reduced frequency at different axial positions were studied. Results show that there is some utility in the use of reduced frequency to correlate unsteady velocity results. The turbulence level u' sub rms was observed to vary essentially sinusoidally around values close to those measured in steady flow. However, the amplitude of oscillation and phase relations for turbulence level were found to be strongly frequency dependent. Numerical predictions were obtained using an unsteady boundary layer computational code and the Cebeci-Smith and Glushko turbulence models. Predicted quantities related to unsteady velocity profiles exhibit fair agreement with experiment when the Cebeci-Smith turbulence model is used. Author

N86-29150*# Waterloo Univ. (Ontario). Dept. of Applied Mathematics.
ON THE LAGRANGIAN METHOD FOR STEADY AND UNSTEADY FLOW
W. H. Hui and H. J. VanRoessel Feb. 1986 17 p
(Grant NAGw-575)
(NASA-CR-177079; NAS 1.26:177079; WRI-411-29) Avail: NTIS HC A02/MF A01 CSCL 20D

A new and general Lagrangian formulation of fluid motion is given in which the independent variables are three material functions and a Lagrangian time, which differs for different fluid particles and is distinct from the Eulerian time. For steady flow it requires only three independent variables - the Lagrangian time and two stream functions - in contrast with the conventional Lagrangian formulation which apparently still requires four independent variables for describing a steady flow. This places the Lagrangian formulation for steady flow on the same footing as the Eulerian. For unsteady flow, the new formulation includes the

conventional formulation as a special case when the Lagrangian time is identified with the Eulerian time and when the material functions are taken to be the fluid particle's position at some given time. The distinction between the Lagrangian and Eulerian time, however, is found useful in applications, e.g., to problems involving a free boundary. Author

N86-29151*# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
RESPONSE OF HOT ELEMENT FLUSH WALL GAUGES IN OSCILLATING LAMINAR FLOW Final Technical Report, 1 Jun. - 31 Aug. 1986
Timothy A. Giddings and William J. Cook Feb. 1986 129 p
(Grant NCC2-200)
(NASA-CR-177083; NAS 1.26:177083) Avail: NTIS
HC A07/MF A01 CSCL 20D

The time dependent response characteristics of flush-mounted hot element gauges used as instruments to measure wall shear stress in unsteady periodic air flows were investigated. The study was initiated because anomalous results were obtained from the gauges in oscillating turbulent flows for the phase relation of the wall shear stress variation, indicating possible gauge response problems. Flat plate laminar oscillating turbulent flows characterized by a mean free stream velocity with a superposed sinusoidal variation were performed. Laminar rather than turbulent flows were studied, because a numerical solution for the phase angle between the free stream velocity and the wall shear stress variation that is known to be correct can be obtained. The focus is on comparing the phase angle indicated by the hot element gauges with corresponding numerical prediction for the phase angle, since agreement would indicate that the hot element gauges faithfully follow the true wall shear stress variation. Author

N86-29152*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
FLOW DIRECTION MEASUREMENT CRITERIA AND TECHNIQUES PLANNED FOR THE 40- BY 80-/80- X 120-FOOT WIND TUNNEL INTEGRATED SYSTEMS TESTS Final Report, 1 Jan. 1984 - 31 Jul. 1985
Peter Tore Zell, Jon Hoffmann, and Doral R. Sandlin Jul. 1985 71 p
(Contract GNCC2-278)
(NASA-CR-176969; NAS 1.26:176969) Avail: NTIS
HC A04/MF A01 CSCL 20D

A study was performed in order to develop the criteria for the selection of flow direction indicators for use in the Integrated Systems Tests (ISTs) of the 40 by 80/80 by 120 Foot Wind Tunnel System. The problems, requirements, and limitations of flow direction measurement in the wind tunnel were investigated. The locations and types of flow direction measurements planned in the facility were discussed. A review of current methods of flow direction measurement was made and the most suitable technique for each location was chosen. A flow direction vane for each location was chosen. A flow direction vane that employs a Hall Effect Transducer was then developed and evaluated for application during the ISTs. Author

N86-29153*# San Diego State Univ., Calif. Dept. of Electrical and Computer Engineering.
MEASUREMENT OF TEMPERATURE AND DENSITY FLUCTUATIONS IN TURBULENCE USING AN ULTRAVIOLET LASER Final Report, Mar. 1981 - Sep. 1984
G. A. Massey Sep. 1984 30 p
(Grant NAG2-104)
(NASA-CR-176972; NAS 1.26:176972) Avail: NTIS
HC A03/MF A01 CSCL 20D

Noninvasive measurement of density and temperature fluctuations in turbulent air flow was examined. The approach used fluorescence of oxygen molecules which are selectively excited by a tunable vacuum ultraviolet laser beam. The strength of the fluorescence signal and its dependence on laser wavelength vary with the density and temperature of the air in the laser beam. Because fluorescence can be detected at 90 degrees from the beam propagation direction, spatial resolution in three dimensions, rather than path-integrated measurements can be achieved. With spatial resolutions of the order of a millimeter and at supersonic air velocities it is necessary to perform each measurement in a time of the order of a microsecond; this is possible by using laser pulses of ten nanosecond duration. In this method atmospheric O2 is excited by the emission of a tunable ArF excimer laser, and the fluorescence, which spans the 210 to 420 range, is detected by an ultraviolet phototube. B.G.

N86-29154# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
TRANSIENT COOLING OF A HOT SURFACE BY DROPLETS EVAPORATION
M. diMarzo and A. K. Trehan Jul. 1986 132 p
(Grant NBS-70-NAN-85-H-5025)
(NBS-GCR-86-516) Avail: NTIS HC A07/MF A01

The thermal behavior of a hot aluminum surface subjected to cold water droplet impingement is investigated. Evaporation phenomena of a single droplet of pure water is studied for initial surface temperature ranging from 75 to 100 C (implying full suppression of nucleate boiling). The effect of droplet release height, initial surface temperature and, droplet volume on the geometrical configuration of the droplet is investigated. A computer model is developed to predict the cooling effect (volume of influence) induced by a single droplet in contact with the hot surface, using finite difference techniques. A model to predict the evaporation of water droplets deposited on a hot non-porous solid surface is derived. The water-vapor molar fraction in the air at the exposed surface of the water droplet is deduced from the coupled heat and mass transfer energy balance. Spatial and temporal integration of the overall droplet energy equation is used to predict the droplet evaporation time and the instantaneous evaporation rate. Model predictions agree well with experiments. The model is used to quantify spatial and temporal heat fluxes distribution at the exposed surface of the water droplet. The volume of influence is found to correlate linearly with the evaporation time. This finding is particular important in light of the modelling of multi-droplets cooling effects. Author

N86-29155*# National Bureau of Standards, Gaithersburg, Md. Temperature and Pressure Div.
STABILITY OF SOME EPOXY-ENCAPSULATED DIODE THERMOMETERS
B. W. Mangum and G. A. Evans, Jr. Feb. 1986 99 p
(Contract NASA Order-L-83949B)
(NASA-CR-178137; NAS 1.26:178137; NBSIR-86-3337) Avail: NTIS
HC A05/MF A01 CSCL 20D

The stability upon thermal cycling and handling of ten small, epoxy-encapsulated silicon diode thermometers at six temperatures in the range from liquid nitrogen temperatures to about 60 C. The nominal temperatures of measurement were -196, -78, 0, 20, 40, and 60 C, as measured on the International Practical Temperature Scale of 1968. Diodes were to be thermally cycled 15 to 20 times. Since NASA anticipates that the uncertainty in their temperature measurements will be + or - 50 mK, uncertainties as large as + or - 10 mK in the measurements of the evaluaton can be accommodated without deleteriously affecting the value of the results of the investigation. Author

N86-29156*# Imperial Coll. of Science and Technology, London (England). Dept. of Fluids Section and Mechanical Engrg.
FLOW IN OUT-OF-PLANE DOUBLE S-BONDS
M. C. Schmidt, J. H. Whitelaw, and M. Yianneskis (Kings Coll., London, England) Jun. 1986 67 p
(Grant NAGw-747)
(NASA-CR-176981; NAS 1.26:176981; FS/86/30) Avail: NTIS
HC A04/MF A01 CSCL 20D

Developing flows in two out-of-plane double S-bend configurations have been measured by laser-Doppler anemometry. The first duct had a rectangular cross-section 40mmx40mm at the inlet and consisted of a uniform area 22.5 deg. - 22.5 deg. S-duct

upstream with a 22.5 deg.- 22.5 deg. S- diffuser downstream. The second duct had a circular cross-section and consisted of a 45 deg. - 45 deg. uniform area S-duct upstream with a 22.5 deg. -22.5 deg. S-diffuser downstream. In both configurations the ratio of the mean radius of curvature to the inlet hydraulic diameter was 7.0, the exit-to-inlet area ratio of the diffusers was 1.5 and the ducts were connected so that the centerline of the S-duct lay in a plane normal to that of the S-diffuser. Streamwise and cross-stream velocity components were measured in laminar flow for the rectangular duct and in turbulent flow for both configurations; measurements of the turbulence levels, cross-correlations and wall static pressures were also made in the turbulent flow cases. Secondary flows of the first kind are present in the first S-duct and they are complemented or counteracted by the secondary flows generated by the area expansion and by the curvature of the S-diffusers downstream. Cross-stream velocities with magnitudes up to 0.19 and 0.11 of the bulk velocity were measured in the laminar and turbulent flows respectively in the rectangular duct and six cross-flow vortices were evident at the exit of the duct in both flow cases. The turbulent flow in the circular duct was qualitatively similar to that in the rectangular configuration, but the cross-stream velocities measured at the exit plane were smaller in the circular geometry. The results are presented in sufficient detail and accuracy for the assessment of numerical calculation methods and are listed in tabular form for this purpose. Author

N86-29157# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

CALIBRATION AND DATA REDUCTION FOR A FIVE-HOLE PROBE

C. S. Lee and N. J. Wood Jun. 1986 40 p

(JIAA-TR-73) Avail: NTIS HC A03/MF A01 CSCL 20D

An experimental investigation was conducted to study a five-hole probe in low speed flow. The probe was a 0.125-in diameter tube with a hemisphere tip, the central hole was located at the tip of the probe, the four side holes were symmetrically located at 30 deg. with respect to the probe axes. Calibrations were conducted in the Stanford low speed wind tunnel at two typical speeds. The data reduction was performed by double interpolations using spline curve fitting. The calibration and data reduction schemes are discussed and analyzed. Results of the five-hole probe measurements in typical three-dimensional vortical flows, including velocity vectors in cross plane, pressure and vorticity contours are presented. Good repeatability is observed. The spatial resolution of the probe is found to be better than 0.05 inches. Author

N86-29158*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

REPORT ON THE FEASIBILITY OF HYPERCUBE CONCURRENT PROCESSING SYSTEMS IN COMPUTATIONAL FLUID DYNAMICS

John Bruno 18 Mar. 1986 72 p

(Contract NCC2-387)

(NASA-TM-89398; RIACS-TR-86.7; NAS 1.15:89398) Avail: NTIS HC A04/MF A01 CSCL 20D

The feasibility of using hypercube-connected concurrent processor systems for problems in computational fluid dynamics is studied. Both explicit and implicit numerical methods are considered and several alternative implementations of these methods are evaluated on concurrent processor systems. A Lax-Wendroff explicit method was designed and implemented for the Navier-Stokes equations. The code runs on the Intel iPSC concurrent processor system. Tests of this code show that it is reasonably efficient. The Beam and Warming implicit factored method was designed and implemented for Berger's equation. Preliminary tests show that the efficiency of code is poor. Author

N86-29159*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

FLOW PAST A FLAT PLATE WITH A VORTEX/SINK COMBINATION

Nikos J. Mourtos Sep. 1984 51 p Previously announced as N85-25215

(Contract NCC2-149)

(NASA-CR-176908; NAS 1.26:176908; JIAA-TR-58) Avail: NTIS HC A04/MF A01 CSCL 20D

An attempt was made to model the so called leading edge vortex which forms over the leading edge of delta wings at high angles of attack. A simplified model was considered, namely that of a two-dimensional, inviscid, incompressible steady flow around a flat plate at an angle of attack with a stationary vortex detached on top, as well as a sink to simulate the strong spanwise flow. The results appear to agree qualitatively with experiments. A comparison was also made between the lift and the drag of this model and the corresponding results for two classical solutions: (1) that of totally attached flow over the plate with the Kutta condition satisfied at the trailing edge only: and (2) the Helmholtz solution of totally separated flow over the plate. M.G.

N86-29160# Rockwell International Corp., Richland, Wash.

PORFLO: A CONTINUUM MODEL FOR FLUID FLOW, HEAT TRANSFER AND MASS TRANSPORT IN POROUS MEDIA. MODEL THEORY, NUMERICAL METHODS AND COMPUTATIONAL TESTS

A. K. Runchal, B. Sagar, R. G. Baca, and N. W. Kline Sep. 1985 104 p

(Contract DE-AC06-77RL-01030)

(DE86-005779; RHO-BW-CR-150-P) Avail: NTIS HC A06/MF A01

Postclosure performance assessment of the proposed high-level nuclear waste repository in flood basalts at Hanford requires that the processes of fluid flow, heat transfer, and mass transport be numerically modeled at appropriate space and time scales. A suite of computer models has been developed to meet this objective. The theory of one of these models, named PORFLO, is described in this report. Also presented are a discussion of the numerical techniques in the PORFLO computer code and a few computational test cases. Three two-dimensional equations, one each for fluid flow, heat transfer, and mass transport, are numerically solved in PORFLO. The governing equations are derived from the principle of conservation of mass, momentum, and energy in a stationary control volume that is assumed to contain a heterogeneous, anisotropic porous medium. Broad discrete features can be accommodated by specifying zones with distinct properties, or these can be included by defining an equivalent porous medium. The governing equations are parabolic differential equations that are coupled through time-varying parameters. Computational tests of the model are done by comparisons of simulation results with analytic solutions, with results from other independently developed numerical models, and with available laboratory and/or field data. In this report, in addition to the theory of the model, results from three test cases are discussed. A users' manual for the computer code resulting from this model has been prepared and is available as a separate document. DOE

N86-29161# Lawrence Livermore National Lab., Calif.

EFFECT OF ROTATION ON RAYLEIGH-TAYLOR INSTABILITY

J. A. Viecelli 15 Jan. 1986 16 p

(Contract W-7405-eng-48)

(DE86-006313; UCID-20638) Avail: NTIS HC A02/MF A01

The effects of viscosity, surface tension, density gradient, and magnetic fields on the growth of the Rayleigh-Taylor instability have been covered in the literature. Rotation has not received as much study, although the case where the rotation axis is perpendicular to the unstable interface has also been analyzed. The combination of rotation with Rayleigh-Taylor instability is an unusual situation, but it may have some interest. Here, the case where the rotation axis is parallel to the interface is analyzed. This case corresponds to fluids contained in a radially expanding or contracting cylindrical shell. The first section gives a derivation for the stability condition for the interface between two thin cylindrical fluid shells under radial acceleration, and the second gives an

example of where rotational effects might be significant in the case of a cylindrical implosion. DOE

N86-29162# Indiana Univ., Bloomington.
CRITERIA FOR THE RELIABILITY OF NUMERICAL APPROXIMATIONS TO THE SOLUTION OF FLUID FLOW PROBLEMS
C. Foias 1986 23 p
(Contract DE-AC02-82ER-12049)
(DE86-007017; DOE/ER-12049/1) Avail: NTIS HC A02/MF A01

The numerical approximation of the solutions of fluid flows models is a difficult problem in many cases of energy research. In all numerical methods implementable on digital computers, a basic question is if the number (N) of elements (Galerkin modes, finite-difference cells, finite-elements, etc.) is sufficient to describe the long time behavior of the exact solutions. It was shown using several approaches that some of the estimates based on physical intuition of N are rigorously valid under very general conditions and follow directly from the mathematical theory of the Navier-Stokes equations. Among the mathematical approaches to these estimates, the most promising (which can be and was already applied to many other dissipative partial differential systems) consists in giving upper estimates to the fractal dimension of the attractor associated to one (or all) solution(s) of the respective partial differential equations. DOE

N86-29163# Sandia National Labs., Albuquerque, N. Mex.
FINITE ELEMENT METHODS IN HEAT TRANSFER
D. K. Gartling Jan. 1986 117 p
(Contract DE-AC04-76DP-00789)
(DE86-007405; SAND-85-1703) Avail: NTIS HC A06/MF A01

The application of the finite element method to problems in conduction and convection heat transfer is described. The formulation of the basic equations is presented and typical solution algorithms for both transient and steady-state problems are described. Example analyses are included for problems in heat conduction, forced convection and free convection. DOE

N86-29164# Sandia National Labs., Albuquerque, N. Mex.
FINITE ELEMENT METHODS FOR NON-NEWTONIAN FLOWS
D. K. Gartling Jan. 1986 97 p
(Contract DE-AC04-76DP-00789)
(DE86-007410; SAND-85-1704) Avail: NTIS HC A05/MF A01

The application of the finite element method to problems in non-Newtonian fluid mechanics is described. The formulation of the basic equations is presented for both inelastic and viscoelastic constitutive models. Solution algorithms for treating the material nonlinearities associated with inealstic fluids are described; typical solution procedures for the implicit stress-rate equations of viscoelastic fluids are also presented. Simple example analyses are included for both types of fluid models. DOE

N86-29165# Nevada Univ., Boulder City. Energy Systems Center.
DEVELOPMENT OF DUAL TEMPERATURE AMMINES FOR HEAT PUMP LATENT HEAT STORAGE APPLICATION Final Report
U. Rockenfeller Mar. 1986 347 p
(Contract DE-AC05-84OR-21400)
(DE86-007887; ORNL/Sub-84-47999/1) Avail: NTIS HC A15/MF A01

Ammoniated Complex Compounds can be used as working fluids in space heating and cooling heat pumps and storage systems. This report describes the theoretical and experimental development of complex compound working fluids for a heat pump-storage system. A computerized data base was developed for the preliminary selection of candidate working fluids. The selected substances were experimentally investigated. Several concepts using two ammoniated complex compounds or one complex compound and the plain ligand were developed. A subscale prototype was built using the NaBr-n NH3 complex and NH3 as the ligand. Two heat exchanger designs were tested and compared in terms of optimum reaction rates. A computer simulation was written to predict the performance of a complex compound heat pump-storage system. The results were compared with a simulation of a conventional R22 heat pump cycle. The influence of additives in the NaBr-n NH3 complex was investigated with respect to the adsorption and desorption rates. DOE

N86-29166# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna.
A METHOD FOR MEASURING TWO-PHASE MASS FLOW USING A TURBINE AND A VENTURIMETER ONLY
Gerald Sonneck, Rudolf Steiner, Peter Windberg, and Laszlo Maroti Sep. 1985 14 p Presented at Specialists Meeting on Small Break LOCA Analasis in LWRs, Pisa, Italy, 23-27 Jun. 1985
(OEFZS-4334; RS-265/85; ESA-86-97069) Avail: NTIS HC A02/MF A01

An air-water loop for steady-state investigations was built. Experiments using a spool piece including a full flow turbine and a venturimeter are described. It is shown that in the given configuration and within the investigated mass flows a turbine and a venturimeter only are sufficient to measure the total mass flow by determining simultaneously gas and liquid mass flows. However, the analysis can only justify qualitatively the measured values so that no extrapolation over a bigger range is possible. The instruments must be calibrated for each desired condition. ESA

N86-29167# Institut de Mecanique des Fluides de Lille (France).
STUDY OF A LOW REYNOLDS FLOW AROUND A CYLINDER: EXPERIMENTAL SET-UP [ETUDE DE L'ECOULEMENT A BAS REYNOLDS AUTOUR D'UN CYLINDRE: MISE EN OEUVRE DE L'EXPERIENCE]
F. Beluche 19 Dec. 1984 30 p In FRENCH
(Contract DRET-83-250)
(Rept-84/70; IMFL-3115; ESA-86-97191) Avail: NTIS HC A03/MF A01

A hydrodynamic tunnel, a flow visualization system, a holographic device, and a laser-Doppler velocimeter provided with a photon correlation system are described. The elements were tested and prove adequate for experiments at 2.5 to 8 cm/sec velocities. ESA

N86-29168# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Aerodynamique.
EXPERIMENTAL STUDY OF TURBULENT THREE-DIMENSIONAL SEPARATION IN FLAT ELLIPSOIDAL CYLINDRICAL MODELS. RESULTS OF THE SECOND WIND TUNNEL TEST CAMPAIGN [ETUDE EXPERIMENTALE DU DECOLLEMENT TRIDIMENSIONNEL TURBULENT SUR MAQUETTES ELLIPSOIDE CYLINDRE APLATI. RESULTATS DE LA SECONDE CAMPAGNE D'ESSAIS A S2CH]
B. Chanetz and C. Quelin Jun. 1985 77 p In FRENCH
(ONERA-RT-11/7252-AN-060-A; ESA-86-97204) Avail: NTIS HC A05/MF A01

Wall flow visualizations and wall pressure distributions for several values of incidence and velocity are presented. The flow distribution was measured using anemometers and a three axes laser velocimeter. The average velocity and the Reynolds tensor were measured at 5000 points around the model. The analysis shows the start and development of vortices. ESA

N86-29169# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A NONLINEAR LIFTING LINE METHOD FOR THE CALCULATION OF THE FLOW AROUND A ROTATING SYSTEM. PART 1: THE CONVENTIONAL WIND TURBINE
W. J. Piers Mar. 1985 48 p Sponsored by National Development Program on Wind Energy (NOW II) Project Management Bureau for Energy Research
(NLR-TR-85052-L-Pt-1; ESA-86-97404) Avail: NTIS HC A03/MF A01

A nonlinear lifting line method for the calculation of the flow around a wind turbine is presented. The rotor blade is represented by a bound vortex and the vortex wake by isolated vortex filaments of helical form. The influence coefficients of the vortex filaments are computed numerically. The deformation of the vortex wake, in

particular the effect of variation of pitch of the helical vortices and the expansion of the wake, is modeled in an approximate way. Computational results compare reasonably well with experimental data. ESA

N86-29170# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A NONLINEAR LIFTING LINE METHOD FOR THE CALCULATION OF THE FLOW AROUND A ROTATING SYSTEM. PART 2: THE TIP VANE TURBINE
W. J. Piers Mar. 1985 17 p Sponsored by National Development Program on Wind Energy (NOW II) Project Management Bureau for Energy Research
(NLR-TR-85052-L-Pt-2; ESA-86-97405) Avail: NTIS HC A02/MF A01

A nonlinear lifting line method for the calculation of the flow around a tip vane turbine is presented. The rotor blade is represented by a bound vortex and the vortex wake by isolated vortex filaments of helical form. The tipvane is modeled similarly to the rotor blade. The wake is represented by isolated vortex filaments of helical form, and the vane by a bound vortex. From the perturbation velocities, resulting from this vortex system several contributions to the power coefficient are distinguished. In case of oversynchronization, a method which assures that the vortex filaments fulfil a numerical synchronization condition is introduced. The possibilities of the code for tip vanes comprise the calculation of the aerodynamic characteristics for a given load distribution as well as the corresponding geometry. ESA

N86-29171# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
SECOND ORDER ACCURATE UPWIND SOLUTIONS OF THE TWO-DIMENSIONAL STEADY EULER EQUATIONS BY THE USE OF A DEFECT CORRECTION METHOD
S. P. Spekreijse Sep. 1985 19 p Submitted for publication
(CWI-NM-R8520; B8660188; ESA-86-97508) Avail: NTIS HC A02/MF A01

Finite volume discretization of the steady Euler equations by the finite volume technique is discussed. On an irregular mesh it is shown how to apply Van Leers projection-evolution stages in the discretization. The rotational invariance of the Euler equations is used. For a general numerical flux function, consistent with the physical flux, a proof of the order of accuracy for a first and second order upwind scheme is given. Results hold for all well known approximate Riemann-solvers. Second order accurate approximations are obtained by a defect correction (DeC) method. A limiter, used in the DeC method, is constructed to maintain monotone solutions. For two typical model problems (an oblique shock and a contact discontinuity), only a few (3 or 4) DeC iteration steps are sufficient to steepen discontinuities effectively. This makes the method cheap to apply. The quality of the results seems comparable with results obtained by TVD schemes. ESA

N86-29172# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
DEFECT CORRECTION AND HIGHER ORDER SCHEMES FOR THE MULTIGRID SOLUTION OF THE STEADY EULER EQUATIONS
P. W. Hemker Nov. 1985 20 p Submitted for publication
(CWI-NM-R8523; B8660185; ESA-86-97511) Avail: NTIS HC A02/MF A01

First and second order finite volume schemes for the solution of the steady Euler equations of inviscid flow are described. The solution for the first order scheme can be efficiently computed by a FAS multigrid procedure. Second order accurate approximations are obtained by linear interpolation in the flux or the state space. The corresponding discrete system is solved (up to truncation error) by defect correction iteration. An initial estimate for the second order solution is computed by Richardson extrapolation. Examples of computed approximations are given, emphasizing the effect for the different possible discontinuities in the solution. ESA

N86-29173# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Fluid Dynamics Panel.
SHOCK-WAVE BOUNDARY LAYER INTERACTIONS
J. Delery (Office National d'Etudes et de Recherches Aeronautiques, Paris, France), J. G. Marvin (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.), and E. Reshotko (Case Western Reserve Univ., Cleveland, Ohio) Feb. 1986 223 p
(AGARD-AG-280; ISBN-92-835-1519-6) Avail: NTIS HC A10/MF A01

Presented is a comprehensive, up-to-date review of the shock-wave boundary-layer interaction problem. A detailed physical description of the phenomena for transonic and supersonic speed regimes is given based on experimental observations, correlations, and theoretical concepts. Approaches for solving the problem are then reviewed in depth. Specifically, these include: global methods developed to predict sudden changes in boundary-layer properties; integral or finite-difference methods developed to predict the continuous evolution of a boundary-layer encountering a pressure field induced by a shock wave; coupling methods to predict entire flow fields; analytical methods such as multi-deck techniques; and finite-difference methods for solving the time-dependent Reynolds-averaged Navier-Stokes equations used to predict the development of entire flow fields. Examples are presented to illustrate the status of the various methods and some discussion is devoted to delineating their advantages and shortcomings. Reference citations for the wide variety of subject material are provided for readers interested in further study. Author

N86-29068# Royal Military Coll. of Science, Shrivenham (England). School of Management and Mathematics.
PRESSURE WAVE: GUN BARREL INTERACTIONS
A. B. Crowley and W. P. C. King *In* AGARD Interior Ballistics of Guns Jan. 1986 11 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29071# Ecole Royale Militaire, Brussels (Belgium). Dept. of Applied Chemistry.
INTERIOR BALLISTICS OF SMALL ARMS: PARTICULAR PROBLEMS. PART 1: HEAT TRANSFER AND COOK-OFF PHENOMEN IN A SMALL CALIBER WEAPON
R. Meysmans *In* AGARD Interior Ballistics of Guns Jan. 1986 10 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29072# Ecole Royale Militaire, Brussels (Belgium). Dept. of Armament and Ballistics.
INTERNAL BALLISTICS OF SMALL ARMS: PARTICULAR PROBLEMS. PART 2: THERMODYNAMIC MODEL, POWDER PARAMETERS, INITIATION
E. Celens *In* AGARD Interior Ballistics of Guns Jan. 1986 23 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29074# Fraunhofer-Inst. fuer Kurzzeitdynamik, Weil am Rhein (West Germany). Abteilung fuer Ballistik.
MEASUREMENT OF IMPORTANT BALLISTIC FLOW PROPERTIES BY SPECTROSCOPIC TECHNIQUES
Guenter Klingenberg *In* AGARD Interior Ballistics of Guns Jan. 1986 18 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

N86-29075# Concentration Heat and Momentum, Ltd., London (England).
MODELLING THE BEHAVIOUR OF ADDITIVES IN GUN BARRELS
N. Rhodes and J. C. Ludwig *In* AGARD Interior Ballistics of Guns Jan. 1986 11 p (For primary document see N86-29063 20-31)
Avail: NTIS HC A10/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-29174* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NEBULIZATION REFLUX CONCENTRATOR Patent
Vernon G. Collins and Wesley R. Cofer, III (College of William and Mary, Newport News, Va.) Issued 17 Jun. 1986 6 p Filed 5 Nov. 1984 Supersedes N85-20154 (23 - 11, p 1615)
(NASA-Case-LAR-13254-1CU; US-Patent-4,595,399; US-Patent-Appl-SN-668432; US-Patent-Class-55-255; US-Patent-Class-55-259; US-Patent-Class-55-521; US-Patent-Class-55-528; US-Patent-Class-261-78A) Avail: US Patent and Trademark Office CSCL 14B

A nebulization reflux concentrator for removing trace gas contaminants from a sample gas is described. Sample gas from a gas supply is drawn by a suction source into a vessel. The gas enters the vessel through an atomizing nozzle, thereby atomizing and entraining a scrubbing liquid solvent drawn through a siphon tube from a scrubbing liquid reservoir. The gas and entrained liquid rise through a concentrator and impinge upon a solvent phobic filter, whereby purified gas exits through the filter housing and contaminated liquid coalesces on the solvent phobic filter and falls into the reservoir. NASA

N86-29175 Deutsche Geodaetische Kommission, Munich (West Germany).
CAMERA CALIBRATION IN PHOTOGRAMMETRIC PRACTICE [KAMMERKALIBRIERUNG IN DER PHOTOGRAMMETRISCHEN PRAXIS]
Guenther Kupfer, ed. and Wilfried Wester-Ebbinghaus, ed. 1985 181 p In GERMAN Conf. held in Bonn, 21-22 Feb. 1985
(Ser-B-275; ISBN-3-7696-8562-8; ISSN-0065-5317; ESA-86-96925) Copyright. Avail: Issuing Activity

Research on calibration of air cameras for precision photogrammetry is reviewed. Laboratory and field calibrations are compared. Applications of photogrammetric systems are presented (in coal mining, car industry robots, monitoring of churches in subsidence areas). For individual titles, see N86-29176 through N86-29196. ESA

N86-29176 Bonn Univ. (West Germany).
CAMERA CALIBRATION IN PHOTOGRAMMETRIC PRACTICE, INTRODUCTION [KAMMER-KALIBRIERUNG IN DER PHOTOGRAMMETRISCHEN PRAXIS - EINE EINFUEHRUNG]
G. Kupfer *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 7-10 In GERMAN
(For primary document see N86-29175 20-35)
Avail: Issuing Activity

Laboratory, stellar and ground calibrations are developed to assess accuracy and reliability of photographic systems and their components. Calibration of photographic systems is based on analytic assessment systems and software and calibration of aerial images in close-range photogrammetry. Algorithms to obtain simultaneous calibration of photographic systems and aerial images are developed. System reproduction, film printing plate flatness, filter glass plane parallelism, and definition of image plane or image coordinate system are calibrated in laboratory with a visual procedure using goniometers, theodolites and lens/mirror systems. Stellar calibration with or without filters is influenced by emulsion sensitivity. Ground calibration is based on image measurement and geodetic observations. Economical application of the different procedures is assessed. ESA

N86-29177 Zeiss (Carl), Oberkochen (West Germany).
ON ACCURACY OF LABORATORY CALIBRATIONS AND ON AERIAL CAMERA STABILITY WITH THE EXAMPLE OF SPACELAB RMK A 30/23 [UEBER DIE GENAUIGKEIT VON LABORKALIBRIERUNGEN UND DIE STABILITAET VON LUFTBILDKAMMERN AM BEISPIEL DER SPACELAB-RMK A 30/23]
H.-K. Meier *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 11-14 In GERMAN
(For primary document see N86-29175 20-35)
Avail: Issuing Activity

The RMK A 30/23 camera was selected for the Metric Camera experiment on the first Spacelab mission devised to determine laboratory calibration accuracy and RMK stability, based on 1000 high resolution color and black and white measurement images and to determine the applicability of photogrammetric snap shots in 1:100,000 or 1:50,000-scale mapping. Comparison of the calibrations performed in various laboratories with different calibration procedures and instruments shows good homogeneity. Calibrations of RMK A 30/23 before and after Spacelab mission show good geometric quality. The RMK A 30/23 is further improved with forward motion compensation to attain 2x to 10x basic resolution with equal geometric quality. ESA

N86-29178 Joensuu Univ. (Finland).
RADIAL DISTORTION AND COMPONENTS OF DECENTERING DISTORTION IN MODERN AERIAL CAMERAS [RADIALE VERZEICHNUNG UND DIE KOMPONENTEN DER DEZENTRIERUNGSVERZEICHNUNG IN MODERNEN LUFTBILDKAMERAS]
J. Hakkarainen *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 15-24 In GERMAN
(For primary document see N86-29175 20-35)
Avail: Issuing Activity

Radial distortion and decentering distortion of wide-angle cameras were studied. Radial asymmetry is calculated with the calibration results if the reference point is in principal point of autocollimation. Symmetric tangential distortion is determined with a goniometer. Cameras show little distortion (+ or - 2 microns) with a tangential distortion between 1 and 2 mm, good color correction and high geometrical stability. Calibration procedures should be developed to correct very fine distortion values lower than 2 microns with respect to light and standardization, optimization of the calibrating instrument grid, angle measuring system, autocollimation system and observation accuracy for optimal grid intersection. The effects of phase deflection due to energy field on measurement accuracy should be studied. ESA

N86-29179 National Research Council of Canada, Ottawa (Ontario). Photogrammetric Research Section.
ASSESSMENT OF SYSTEM CALIBRATION AND SELF-CALIBRATING PROCEDURE FOR HORIZONTAL IMAGES ABOVE A FLAT AREA BY EXCLUSIVE APPLICATION OF GIVEN CONTROL POINTS [BEWERTUNG VON SYSTEMKALIBRIERUNG UND SELBSTKALIBRIERUNGSVERFAHREN FUER SENKRECHTBILDER UEBER FLACHEM GELAENDE BEI AUSSCHLIESSLICHER VERWENDUNG GEGEBENER PASSPUNKTE]
H. Ziemann *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 25-47 In GERMAN
(For primary document see N86-29175 20-35)
Avail: Issuing Activity

A mathematical model for definition of lens distortion, geometrical and optical parameters, and on iteration procedure was developed to study camera calibration with horizontal images above a flat test field. The procedure is applied to calibrate small photogrammetric blocks. The image coordinates are applied in bundle adjustment with self-calibration. A comparison between self-calibration procedures and a system calibration based on image coordinates corrected against image distortion shows the inability of self-calibration models to detect the effects of noncorrected image errors. A model of the rotation-symmetrical distortion through components of a power series is necessary and a procedure for a more efficient correction of image distortion should be developed. Results confirm that with larger blocks fewer control points are necessary. ESA

N86-29180 Ecole Polytechnique Federale de Lausanne (Switzerland).
COMPARATIVE ANALYSIS OF CAMERAS [VERGLEICHENDE ANALYSE VON AUFNAMEKAMMERN]
O. Koelbl *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 48-64 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Image quality and metric precision for Zeiss Jena LMK with automatic forward motion compensation, Wild Heerbrugg RC 10A, and Zeiss Oberbrocken RMK are analyzed. Image quality is analyzed using modulation transmission function under flight conditions and metric precision with aerotriangulation of a photogrammetric block (6 lines: 7 images). The test field and the photographic mission are described. Field measurements show better image quality than laboratory measurements. Comparison of the results on Panatomic-X Film and Plus-X Film show little enhancement of measurement accuracy with increased resolution capacity. ESA

N86-29181 Technische Univ., Hanover (West Germany).
INVESTIGATIONS OF SYSTEMATIC IMAGE DEFECTS NOT TAKEN INTO ACCOUNT IN AEROTRIANGULATION [UNTERSUCHUNG NICHT BERUECKSICHTIGTER SYSTEMATISCHER BILDFEHLER BEI AEROTRIANGULATIONEN] **c43**
K. Jacobsen *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 65-71 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

The procedures for investigation of residual systematic image defects in calculation of the residue mean values and in covariance analysis of block adjustment with or without self-calibration are described. The investigations are performed on a computer system with programs for bundle block adjustment. The differences between the mathematical model of central perspective and film geometry are due to self-calibration of additional parameters in a bundle block adjustment. ESA

N86-29182 Bonn Univ. (West Germany).
PRACTICAL SYSTEM CALIBRATION IN THE FIELD [PRAKTISCHE SYSTEMKALIBRIERUNG IM FELD]
G. Kupfer, S. Zinndorf, W. Schaefer, and H. Roessmann *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 72-82 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Field calibration of camera systems for aerial image measurements based on a refined functional and/or stochastic model of photogrammetry to check possible and economical application of full or partial calibration according to the ground conditions is introduced. The camera is secured in a fixed position on an aircraft. Simulation calculations give satisfactory calibration results in flight for a wide-angle camera. Systems can be fully and economically calibrated in adequate field configuration. Introduction of weighted laboratory calibration values can improve the result and the numerical resolution of equation systems. In high mountains, conditions for full calibration are more favorable. Ideal perequisites for automatic calibration are given. ESA

N86-29183 Technische Univ., Hanover (West Germany).
COMBINED ADJUSTMENT WITH VARIANCE COMPONENT ASSESSMENT AND SIMULTANEOUS CALIBRATION [KOMBINIERTE AUSGLEICHUNG MIT VARIANZKOMPONENTENSCHAETZUNG UND SIMULTANKALIBRIERUNG]
E. Kruck *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 83-94 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Combined adjustment and simultaneous calibration of geodetic observations based on test calibrations and on comparison between theoretical results from a photogrammetric geodetic adjustment program and the test results are studied. The program Bundle Adjustment for Engineering Purposes is used to assess functional closeness of the program to reality, to compare geodetic and photogrammetric observations, and adjust object point coordinates on images. A network adjustment program based on eignevalues is used to analyze networks with geodetic network observations. Simultaneous calibration is recommended for image curvatures. Combined adjustment is more efficient to control the total network through a flawless functional model than a bundle adjustment taking into account that covariance of control points for variance components cannot be assessed from total network. Relationships between radial weigting function and camera type should be investigated. ESA

N86-29184 Bonn Univ. (West Germany).
PARAMETER ASSESSMENT IN HYBRID OBSERVATIONS INCLUDING SYSTEM CALIBRATION [PARAMETERSCHAETZUNG BEI HYBRIDEN BEOBACHTUNGEN UNTER EINSCHLUSS DER SYSTEMKALIBRIERUNG]
S. Zinndorf *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 95-99 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

The internal orientation parameters of a camera during a flight over an opencast mining area for close range photogrammetry were calibrated using bundle adjustment program PAT-B and adjustment program MOR-S. The distance network including control points is compared with MOR-S. Distance measurements and photogrammetric data are compared in a hybrid total block and the camera system is calibrated for accuracy. Comparison shows worse defect mean values in X-axis and Y-axis for the total block than for the opencast mining block. ESA

N86-29185 Joensuu Univ. (Finland).
GONIOMETER TO CALIBRATE SYSTEM CAMERAS OR AMATEUR CAMERAS [GONIOMETER FUER DIE KALIBRIERUNG VON SYSTEM- UND ANDEREN AMATEUR-KAMERAS]
J. Hakkarainen *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 100-105 In GERMAN Sponsored by Finnish Akademie der Wissenschaften and Joensuu Univ. (For primary document see N86-29175 20-35)
Avail: Issuing Activity

An accurate and rapid horizontal goniometer was developed to determine the optical properties of film cameras. Radial and decentering distortion, color defects, optical resolution, and small object transmission factors are measured according to light wavelengths and symmetry. The goniometer can be used to calibrate cameras for photogrammetry, to determine the effects of remoteness on image geometry, distortion symmetry, efficiency of lens lighting film systems, to develop quality criteria for lenses, and to test camera lens and camera defects after an incident. ESA

N86-29186 Technische Univ., Hanover (West Germany).
METHODS FOR FIELD CALIBRATION OF CLOSE-RANGE PHOTOGRAMMETRIC CAMERAS [VERFAHREN ZUR FELDKALIBRIERUNG VON PHOTOGRAMMETRISCHEN AUFNAHMEKAMMERN IM NAHBEREICH]
W. Wester-Ebbinghaus *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 106-114 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Field calibration methods in close range photogrammetry are studied with respect to internal camera orientation and simultaneous system calibration. Configurations for calibration determination of the projection center location in the image, of the camera constant, and image main point through orientation of a single image; image variant internal orientation with additional scale; expanded object with spatial single control point; convergent shots; calibration over a plain control point field; and four-plate shots are illustrated. The methods can be improved with data on directions and distances. ESA

N86-29187 Bonn Univ. (West Germany).
RADIAL DISTORTION IN THE REPRODUCTION OF THREE-

DIMENSIONAL TARGETS AT CLOSE RANGE [RADIALSYMMETRISCHE VERZEICHNUNG BEI ABBILDUNG DREIDIMENSIONALER OBJEKTE IM NAHBEREICH]
G. Kupfer *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 115-120 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Radial distortion in the reproduction of 3D targets in close range photogrammetry is studied based on Seidel series where distortion is a function of radial distance. Radial distortion depends on object remoteness and camera focusing. Distortion is programmed for MOR-S program (and adjustment program). Test field photographs are used to determine the test field coordinates. ESA

N86-29188 Technische Univ., Hanover (West Germany).
OPERATIONAL TEST FIELD CALIBRATIONS AT THE INSTITUTE OF PHOTOGRAMMETRY AND SURVEYING, HANOVER [OPERATIONELLE TESTFELDKALIBRIERUNGEN AM INSTITUT FUER PHOTOGRAMMETRIE UND INGENIEURVERMESSUNGEN IN HANNOVER]
H. Heier *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 121-124 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Cameras for medium and small size image formats were studied for accuracy of test field calibration with respect to camera internal orientation (camera constant, coordinates of the image main point and radial-symmetrical distortion parameters). The calibration images are assessed on a Planicomp C-100 with an HP computer. The program concentrates on automatic rough positioning of the points to be measured so that the operator can concentrate on point research, selection or identification. Image points are transformed with a correction function. The calibration values are calculated through bundle adjustment with the multi-image orientation adjustment program MOR. Good accuracy is obtained. ESA

N86-29189 Bonn Univ. (West Germany).
THE MOR-S PHOTOGRAMMETRIC GEODETIC ADJUSTMENT PROGRAM IN SPARSE MATRIX TECHNIQUE [MOR-S, EIN PHOTOGRAMMETRISCH-GEODAETISCHES PROGRAMM IN SPARSE-TECNIK]
L. Hinsken *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 125-133 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

The MOR-S (multi-image orientation) a bundle adjustment program, used in geodesy networks, based on sparse matrix technique for resolution of normal equation systems with multi-unknown parameters is applied to assess Gauss-Markov model parameters (external and internal orientation parameters and error parameters). Operation of MOR-S through envelopes or profile storage techniques is described. Numerical examples with multiple unknowns, envelope, bandwith and reordering are presented to show storage reduction due to unknown factor ordering in normal equation systems. The system computing time is reduced upon reduction, resolution, and inversion. ESA

N86-29190 Bonn Univ. (West Germany).
BASILICA DI SAN FRANCISCO: AN EXAMPLE FOR SIMULTANEOUS FIELD CALIBRATION OF SEVERAL CAMERA SYSTEMS [BASILIKA DI SAN FRANCISCO - EIN BEISPIEL ZUR SIMULTANEN FELDKALIBRIERUNG MEHRERER AUFNAHMESYSTEME]
R. Kotowski *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 134-141 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Photographs of a church taken with various lenses were used to study bundle adjustment with simultaneous field calibration of camera systems. Simultaneous field calibration allows the introduction of internal orientation parameters in adjustment procedures. Point coordinate deviation from adjustment with simultaneous calibration of a 350mm lens is 1.5 cm. Simultaneous calibration can be applied to avoid inaccuracy in image point coordinates. The interactions between image and object space geometry and target coordinate accuracy are studied. An economical and practical photogrammetric procedure based on simultaneous calibration and application of the partial measuring camera principles can be developed. ESA

N86-29191 Bonn Univ. (West Germany).
CALIBRATION OF A TERRESTRIAL MEASURING CAMERA SYSTEM BASED ON THE EXAMPLE OF A CHURCH IN A MOUNTAINOUS SUBSIDENCE AREA [KALIBRIERUNG EINES TERRESTRISCHEN MESSKAMMER-SYSTEMS AM BEISPIEL DER AUFNAME EINER KIRCHE IM BERGSENKUNGSGEBIET]
S. Zinndorf *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 142-146 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Calibration of the Jenoptik universal measuring camera 10/1318 is based on parameters of the camera internal orientation, distortion in X and Z-directions and rotation about Y-axis. Photographs of a church in a mountainous subsidence area are used to determine a 3D point field on the front of the building and to calculate the camera constants with accuracy based on matrices of the free network bundle adjustment. Calibration of the camera system can be done by network adjustment. The camera constants are determined with convergent photographs at two periods or with control point data (coordinates, distances). The main point location is determined with a photograph turning at 200 Gon about the optical axis or with target points. ESA

N86-29192 Technische Univ., Hanover (West Germany).
PRECISION POINT DETERMINATION FOR DISTORTION INVESTIGATION ON MICHAELIS CHURCH IN LUNEBURG (WEST GERMANY) WITH SIMULTANEOUS CALIBRATION OF THE PHOTOGRAMMETRIC SYSTEM [PRAEZISIONSPUNKTBESTIMMUNG ZUR DEFORMATIONSUNTERSUCHUNG AN DER MICHAELISKIRCHE IN LUENEBURG MIT SIMULTANER KALIBRIERUNG DES PHOTOGRAMMETRISCHEN SYSTEMS]
E. Kruck *In* Deutsche Geodaetische Kommission Camera calibration in Photogrammetric Practice 1985 p 147-151 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Simultaneous calibration of a photogrammetric system including a camera, photographic layer carrier, a developing device and a measuring system to attain a 1 mm accuracy for point determination is applied to measure quantitatively and qualitatively the subsidence movements leading to distortion and damage to a church. The church interior is photogrammetrically represented with points. Photogrammetric observations and conditions and geodetic measurements are compared with the computer system BINGO. A 5mm deviation in eccentricity is noted. All camera unknowns can be accurately determined. Simultaneous calibration of the camera can be performed with high precision with a photogrammetric photograph. Measurements should be performed to determine later damage and actions to be taken to stabilize the church. ESA

N86-29193 Hochschule der Bundeswehr, Munich (West Germany).
SIMULTANEOUS CALIBRATION OF A PARTS MEASURING CAMERA: EXAMPLE OF AN APPLICATION FROM THE CAR INDUSTRY [SIMULTANKALIBRIERUNG EINER TEILMESSKAMMER - EIN ANWENDUNGSBEISPIEL AUS DEM FAHRZEUGAU]
J. Peipe *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 152-158 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

A reflex camera was used for parts measuring in car production lines to determine the bending behavior of the car frame during assembly. Four work stations in the line are represented with spatial point fields through bundle adjustment with simultaneous calibration of the camera. Each image is assessed monoscopically

and the measured points are transformed to correct the systematic image errors. Image triangulation is performed on a computer with a bundle adjustment program. Calibration configurations with photogrammetric data are presented. ESA

N86-29194 Bonn Univ. (West Germany).
CALIBRATION OF A MEASURING CAMERA SYSTEM FOR PRECISE ASSESSMENT OF A NINE SHAFT SEGMENT IN COAL MINING [KALIBRIERUNG EINES MESSKAMMERSYSTEMS ZUR PRAEZISIONSVERMESSUNG EINES SCHACHTSEGMENTS IM STEINKOHLENBERGBAU]
P. Hartfiel *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 159-164 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

A measuring camera was calibrated through bundle triangulation for photogrammetric measurement of sections of a 3.2 m radius, 4.5 m long mine shaft, with an accuracy of 0.2 mm for individual coordinates. The measuring camera is protected against weather. External factors (temperature) influence the components of the camera internal orientation. The interactions between the camera constants and radial-symmetrical distortion are shown. Laboratory and field calibrations are compared. Simultaneous field calibration is required for precision. ESA

N86-29195 Technische Univ., Hanover (West Germany).
CALIBRATION OF A DIGITAL CAMERA SYSTEM [KALIBRIERUNG EINES DIGITALEN AUFNAHMESYSTEMS]
T. Luhmann *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 165-173 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Calibration of a CCD surface sensor and of a photogrammetric reproduction system is presented A digital system including a camera with an 80 mm lens, a 120 mm lens for reproduction in the sensor surface, and a CCD camera without lens is calibrated. Analog-to-digital conversion, coordinate measurement, and data transfer are performed. Images are subjected to simultaneous calibration to determine the 3-D target point coordinates of the test field and the internal and external orientation parameters after bundle adjustment. Without previous image processing, accuracy is 10 to 20 micron. The CCD surface sensors can be applied in photogrammetric systems and as sensors for large-scale analog-to-digital conversion of measuring images. Digital image production and processing can be applied in photogrammetric point determination. ESA

N86-29196 Technische Hochschule, Darmstadt (West Germany).
PHOTOGRAMMETRIC PROPERTIES OF FILM CAMERA LINHOF AERO TECHNICA 45 AFTER SIMPLE TRANSFORMATIONS [PHOTOGRAMMETRISCHE EIGNESCHAFTEN DER FILMKAMERA LINHOF AERO TECHNIKA 45 NACH EINFACHEN UMBAUTEN]
G. Berg, A. Bergmann, and B. Wrobel *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 174-181 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

Photogrammetric properties and utility for aerial surveys of a 9 x 12 camera were assessed. Flatness of the image surface and camera internal orientation are studied. The camera was modified to meet photogrammetric requirements. Images are processed using bundle adjustment for field calibration of the camera. The maximum deviation is 2 mm for the spatial coordinates. According to the price-to-performance ratio, the camera is a feasible alternative to other cameras. Further investigations to obtain more accuracy through better image flatness are recommended. ESA

N86-29197*# *University of the Pacific, Stockton, Calif.* Dept. of Physics.
ANALYSIS OF HOLOGRAPHIC INTERFEROGRAMS OF AERODYNAMIC MODELS IN A WIND TUNNEL Final Report, 1 May 1984 - 31 Dec. 1985
Richard L. Perry 31 Dec. 1985 41 p
(Contract NCC2-298)
(NASA-CR-177006; NAS 1.26:177006) Avail: NTIS HC A03/MF A01 CSCL 14E

Holographic interferometry provides a non-invasive technique for estimating variations in the air density distribution around aerodynamic models in wind tunnels. The testing of this technique has been underway for some time and has been reported previously for a two dimensional aerodynamic model. Results obtained from tests using three dimensional aerodynamic models are summarized. Holograms were made of aerodynamic models in a wind tunnel. Interferograms were made from these holograms. The interference fringes in these holographic interferograms were digitized and this information was entered into the HOLOFT program. The HOLOFT program successfully calculated the known stagnation air density at the nose of a model and the known air density distribution across the cross section passing through the stagnation point for the axisymmetrical case of this model at a Mach number of 0.8. Thus the technique of holographic interferometry does work.The HOLOFT program stands for HOLOgraphic Inversion by 2-D Fourier Transform. Author

N86-29198*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF A QUARTZ BOURDON PRESSURE GAGE OF WIND TUNNEL MACH NUMBER CONTROL SYSTEM APPLICATION
William G. Chapin Jul. 1986 19 p
(NASA-TM-88991; NAS 1.15:88991) Avail: NTIS HC A02/MF A01 CSCL 14B

A theoretical and experimental study was undertaken to determine the feasibility of using the National Transonic Facility's high accuracy Mach number measurement system as part of a closed loop Mach number control system. The theoretical and experimental procedures described are applicable to the engineering design of pressure control systems. The results show that the dynamic response characteristics of the NTF Mach number gage (a Ruska DDR-6000 quartz absolute pressure gage) coupled to a typical length of pressure tubing were only marginally acceptable within a limited range of the facility's total pressure envelope and could not be used in the Mach number control system. Author

N86-29199# Argonne National Lab., Ill.
ANL DOPPLER FLOWMETER
H. B. Karplus, A. C. Raptis, S. Lee, and T. Simpson Oct. 1985 87 p
(Contract W-31-109-eng-38)
(DE86-006158; ANL/FE-85-14) Avail: NTIS HC A05/MF A01

A flowmeter has been developed for measuring flow velocity in hot slurries. The flowmeter works on an ultrasonic Doppler principle in which ultrasound is injected into the flowing fluid through the solid pipe wall. Isolating waveguides separate the hot pipe from conventional ultrasonic transducers. Special clamp-on high-temperature transducers also can be adapted to work well in this application. Typical flows in pilot plants were found to be laminar, giving rise to broad-band Doppler spectra. A special circuit based on a servomechanism sensor was devised to determine the frequency average of such a broad spectrum. The device was tested at different pilot plants. Slurries with particulates greater than 70 microns (0.003 in.) yielded good signals, but slurries with extremely fine particulates were unpredictable. Small bubbles can replace the coarse particles to provide a good signal if there are not too many. Successful operation with very fine particulate slurries may have been enhanced by the presence of microbubbles. DOE

N86-29200# Sandia National Labs., Albuquerque, N. Mex.
METHOD FOR YAWSONDE CALIBRATION AND FLIGHT-TEST DATA REDUCTION
W. H. Curry Jan. 1986 59 p
(Contract DE-AC04-76DP-00789)
(DE86-005972; SAND-85-1410) Avail: NTIS HC A04/MF A01

Yawsondes (sun sensors) are used in the flight-testing of rapidly spinning projectiles to determine spin rate and angular orientation

in space. Important to their application is an accurate and reliable method for timing the pulses emitted by their photo cells. By using a digital multiprocessor, timing accuracy within 10 microsecs was achieved in the calibration and data reduction processes. DOE

N86-29201# National Technical Systems, Los Angeles, Calif. Research Div.
EXPLORATION OF HOLOGRAPHIC WINDOW FILM AS AN ANGLE SELECTIVE SOLAR CONTROL FILM Final Report
May 1985 275 p
(Contract DE-AC03-84SF-15294)
(DE86-007811; DOE/SF-15294/T1) Avail: NTIS HC A12/MF A01

The problem of conserving energy by appropriate window design created a strong need for the development of solar control films. This need, as yet, has not been satisfied by existing technologies. The objective of this project is to develop a new technology of IR rejection films which is derived from the rapidly emerging field of optical holography. The concept of windows utilizes Lippmann-Bragg reflection holograms to obtain wide-band filters reflecting IR radiation with very high efficiency. This new technique will provide marked improvement over the performance of existing solar control films. Not only will it allow full transmission of visible light, but it will also have the capability of reflecting nearly all of solar radiation falling in the near IR region. Additionally, because of the optical degrees of freedom which holograms provide, the opportunity for angular selective films and even regionally specific holowindows appears possible. DOE

N86-29202# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
IMAGE DATA COMPRESSION WITH SPLINE APPROXIMATION AND SEGMENTATION
J. J. Renes and P. J. dePagter 24 Apr. 1984 12 p Presented at Benelux Information Theory Conference, Aalten, Netherlands, 24-25 May 1985
(Contract NIVR-1874)
(NLR-MP-84043-U; B8660422; ESA-86-97505) Avail: NTIS HC A02/MF A01

An image data compression algorithm based on spline approximation and image segmentation is described. Coding of segmented images is outlined. An image produced by a CDC Cyber 170-855 system is shown. ESA

N86-29203 United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
ZIPSCAN: A STATE OF THE ART IN ULTRASONICS
B. J. Smith May 1985 46 p
(AERE-R-11756) Copyright. Avail: Issuing Activity

Many of the data collection, display, analysis and storage functions of ZIPSCAN are discussed. Differences between this type of instrument and conventional ultrasonic instruments are highlighted. There is also a detailed discussion of important features in the specification of the instrument. Author

N86-29062# Joint Publications Research Service, Arlington, Va.
PROPERTIES, APPLICATIONS, FUTURE OF EUROPEAN GYRO SENSORS
Werner Hansli *In its* Europe Report: Science and Technology (JPRS-EST-86-008) 18 Jun. 1986 p 29-32 Transl. into ENGLISH from Wehrtechnik (Bonn, West Germany), Apr. 1986 p 62, 65-66 (For primary document see N86-29079 20-31)
Avail: NTIS HC A06/MF A01

N86-29257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PINHOLE ARRAY CAPACITOR FOR OXIDE INTEGRITY ANALYSIS
Martin G. Buehler, Brent R. Blaes, Cesar A. Pina, and Thomas W. Griswold *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p Repr. from Solid State Technology, v. 26, no. 11, Nov. 1983 p 131-137 Previously announced in IAA as A84-35500 Sponsored in cooperation with DARPA and NSA (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

N86-29299*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTICAL DISKS
Brian Lopez-Swafford *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 9 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-29204* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LONG GAIN LENGTH SOLAR PUMPED BOX LASER Patent
Russell J. DeYoung Issued 10 Jun. 1986 4 p Filed 18 Jun. 1985 Supersedes N86-19596 (24 - 10, p 1581)
(NASA-Case-LAR-13256-1; US-Patent-4,594,720; US-Patent-Appl-SN-745973; US-Patent-Class-372-79) Avail: US Patent and Trademark Office CSCL 20E

A solar pumped laser has its lasing path lengthened by forming a square loop in the lasing path by means of bending mirrors. Solar radiation is collected and concentrated into a donut shaped intensity pattern. This intensity pattern is directed onto the lasing path such that there is a maximum fit of the solar intensity pattern to the square loop laser cavity. NASA

N86-29205# Aerospace Corp., El Segundo, Calif.
THE DEACTIVATION OF HF(V = 3) BY WATER
J. F. Bott 31 Dec. 1985 13 p
(Contract F04701-85-C-0086)
(AD-A165709; TR-0086(6603)-1; SD-TR-85-98) Avail: NTIS HC A02/MF A01 CSCL 20/5

Water is often present as an impurity in HF chemical laser systems and can affect laser performance because of the large HF(1) - H2O deactivation rate coefficient. Diatomic molecules have been found to deactivate the higher vibrational levels of HF(v) with rate coefficients that scale with v as v superscript n where n = 2.7 when the deactivation process is exothermic. This scaling does not hold for HF(v) - H2 collisions in which the primary deactivation process is an endothermic V-V transfer with the endothermicity increasing with v. The room temperature (T = 295 K) deactivation rate of HF (v = 3) by H2O has been measured to be faster than the deactivation rate of HF(v = 1) by H2O by a factor of 3.9. On the basis of a previously reported measurement of the HF(v = 1) - H2O rate coefficient, the deactivation rate coefficient of HF(v = 3) by H2O is estimated to be 16 microseconds/Torr, which is a factor of 3 faster than the hard sphere collision rate. The theoretical implication of this fast-rate coefficient are reviewed. GRA

N86-29206# Texas Univ., Austin. Dept. of Physics.
KINETIC STUDIES FOLLOWING STATE SELECTIVE LASER EXCITATION Progress Report, 15 Mar. 1985 - 14 Mar. 1986
J. W. Keto 1985 22 p
(Contract DE-FG05-84ER-13191)
(DE86-004996; DOE/ER-13191/2) Avail: NTIS HC A02/MF A01

Energy transfer studies using two-photon laser-induced fluorescence are reported. The study includes measurements of radiative life-times and state-to-state deactivation rate constants for the xenon 5 p 6p configuration in collisions with xenon atoms. DOE

N86-29207# Oak Ridge National Lab., Tenn.
OVERHEATING IN SILICON DURING PULSED-LASER IRRADIATION
B. C. Larson, J. Z Tischler, and D. M. Mills Dec. 1985 7 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Cornell Univ.,

Ithaca, N.Y.
(Contract DE-AC05-84OR-21400)
(DE86-005016; CONF-851217-24) Avail: NTIS HC A02/MF A01

Nanosecond resolution time-resolved X-ray diffraction measurements of thermal strain have been used to measure the interface temperatures in silicon during pulsed-laser irradiation. The pulsed-time-structure of the Cornell High Energy Synchrotron Source (CHESS) was used to measure the temperature of the liquid-solid interface of <111> silicon during melting with an interface velocity of 11 m/s, at a time of near zero velocity, and at a regrowth velocity of 6 m/s. The results of these measurements indicate 110 K difference between the temperature of the interface during melting and regrowth, and the measurement at zero velocity shows that most of the difference is associated with undercooling during the regrowth phase. DOE

N86-29208# Lawrence Livermore National Lab., Calif.
PHYSICS AND DESIGN ISSUES OF A HIGH GAIN FEL
D. Prosnitz 2 Oct. 1985 44 p
(Contract W-7405-eng-48)
(DE86-005445; UCID-20606) Avail: NTIS HC A03/MF A01

A series of viewgraphs is provided that summarize and illustrate some of the physics aspects and design issues of free electron lasers. Physics aspects include the coupling between electrons and light, electron beam properties that affect the free electron laser, and tapering of the wiggler. Design issues include focusing and mismatched electron orbit, as well as diffraction. Modelling of the free electron laser and scaling are also mentioned. DOE

N86-29209# Los Alamos National Lab., N. Mex.
SURFACES IN THE INTERACTION OF INTENSE LONG WAVELENGTH LASER LIGHT WITH PLASMAS
R. D. Jones 1985 15 p Presented at the 2nd International Conference on Surface Waves in Plasmas and Solids, Ohrid, Yugoslavia, 5 Sep. 1985
(Contract W-7405-eng-36)
(DE86-004738; LA-UR-85-4318; CONF-850930-1) Avail: NTIS HC A02/MF A01

The role of surface in the interaction of intense CO2 laser light with plasmas is reviewed. The collisionless absorption of long wavelength light is discussed. Specific comments on the role of ponderomotive forces and profile steepening on resonant absorption are made. It is shown that at intensities above 10 to the 15th power W/sq cm the absorption is determined by ion acoustic-like surface modes. It is demonstrated experimentally that harmonics up to the forty-sixth can be generated in steep density profiles. Computer simulations and theoretical mechanisms for this phenomena are presented. The self generation of magnetic fields on surfaces is discussed. The role these fields play in the lateral transport of energy, the insulation of the target from hot electrons, and the acceleration of fast ions is discussed. DOE

N86-29210# Los Alamos National Lab., N. Mex.
PHOTOFRAGMENT FLUORESCENCE AS AN ANALYTICAL TECHNIQUE: APPLICATION TO GAS-PHASE ALKALI COMPOUNDS
R. C. Oldenborg and S. L. Baughcum 1985 3 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-006030; LA-UR-86-264; CONF-851185-13) Avail: NTIS HC A02/MF A01

Photodissociation of gas-phase compounds using a laser at suitably short ultraviolet wavelengths can produce electronically excited photofragments. Detection of fluorescence from these excited fragments, particularly atomic fragments, allows sensitive and quantitative density measurements while signal strength as a function of dissociation laser wavelength allows differentiation between compounds that yield the same photofragment. Application of the technique to the detection of gas-phase alkali compounds is discussed and the results of experiments to detect sodium and potassium chlorides are presented. DOE

N86-29211# Lawrence Livermore National Lab., Calif.
NEW FREQUENCY CONVERSION MATERIALS FOR HIGH POWER LASERS
S. Velsko and D. Eimerl 18 Dec. 1985 9 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-Optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-006301; UCRL-93810; CONF-860117-2) Avail: NTIS HC A02/MF A01

Material properties relevant for high power harmonic conversion and present information about the linear and nonlinear optical characteristics of some new classes of materials are discussed. An assessment of the possible usefulness of 1-arginine phosphate monohydrate (LAP) as a harmonic generator for high power lasers is given. DOE

N86-29212# Lawrence Livermore National Lab., Calif.
THRESHOLDS MEASURED WITH 350-nm PULSES AT 25 TO 100 Hz FOR BARE POLISHED CRYSTALS OF CaF2 AND FOR SILICA SOL-GEL AR COATINGS ON SILICA SUBSTRATES
M. C. Staggs, D. Milam, I. M. Thomas, and J. G. Wilder 3 Feb. 1986 19 p Presented at the Boulder Damage Symposium, Boulder, Colo., 15 Oct. 1985
(Contract W-7405-eng-48)
(DE86-007117; UCRL-93250; CONF-8510101-7) Avail: NTIS HC A02/MF A01

An XeF laser-damage experiment was used to measure damage thresholds for bare polished crystals of CaF2 and porous silica antireflection coatings on fused silica substrates. Damage was induced by applying 1000 350-nm, 25-ns pulses at repetition rates of 25 to 100 Hz to small (typically 0.12 x .03 cm) sites on the surfaces of the sample. Eight samples of fluorescence-free CaF2 exhibited both surface and bulk damage at fluences as low as 10 J/cm(2). Three samples of UV-grade CaF2 also had surface damage thresholds of 10 J/cm(2), and bulk damage was not observed in this material. Thresholds for the porous silica coatings were 17 to 23 J/cm(2). DOE

N86-29213# Lawrence Livermore National Lab., Calif.
HIGH GAIN AND HIGH EXTRACTION EFFICIENCY FROM A FREE ELECTRON LASER AMPLIFIER OPERATING IN THE MILLIMETER WAVE REGIME
T. J. Orzechowski, B. R. Anderson, W. M. Fawley, D. Prosnitz, E. T. Scharlemann, S. M. Yarema, A. M. Sessler (California Univ., Berkeley. Lawrence Berkeley Lab.), D. B. Hopkins, A. C. Paul, and J. S. Wurtele 1 Oct. 1985 21 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985 Prepared in cooperation with Lawrence Berkeley Lab., Calif.
(Contracts DE-AC03-76SF00098; W-7405-eng-48; MPIR-W3-RPD-53-A127)
(DE86-007154; UCRL-93262; CONF-850956-23) Avail: NTIS HC A02/MF A01

Experiments at the Electron Laser Facility have generated peak microwave power of 180 MW at 35 GHz. The facility is operated as a single pass amplifier. Gain in excess of 30 dB/m has been observed up to saturation of the amplifier. For the 3 MeV, 850 Amp electron beam, the radiation corresponds to 7% energy extraction from the electron beam. Beyond saturation, the electron beam output power exhibits oscillations corresponding to the synchrotron motion of the trapped electrons in the ponderomotive well. In addition, the TE21 and TM21 modes have been studied and have power levels comparable to the fundamental. Third harmonic (105 GHz) radiation has been measured at power levels on the order of a few percent of the peak fundamental power. DOE

N86-29214# Alabama A & M Univ., Normal.
LASER PHOTO ACOUSTIC SPECTROSCOPY **Interim Report**
P. Venkateswarlu 1986 13 p
(Contract DE-FG05-84ER-13206)
(DE86-008209; DOE/ER-13206/2; IR-2) Avail: NTIS HC A02/MF A01

The entire photoacoustic spectrometer has been designed

and fabricated. Specifications are given for the spectrometer and related equipment. Improvements for the photoacoustic spectrometer are listed. Testing of this entire system is scheduled to be completed by the end of February 1986. DOE

N86-29215# New Mexico State Univ., Las Cruces. Dept. of Physics.
HYDRODYNAMICS OF EVAPORATING AEROSOLS IRRADIATED BY INTENSE LASER BEAMS
R. L. Armstrong, A. Zardecki, and S. A. W. Gerstl 1985 16 p Presented at the 8th International Conference on Lasers, Las Vegas, Nev., 2 Dec. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-006016; LA-UR-86-148; CONF-851208-1) Avail: NTIS HC A02/MF A01

An analysis is presented describing the interactions of atmospheric aerosols with a high-intensity laser beam propagating along an atmospheric path. For the case of moderate beam irradiances, diffusive mass transport and conductive energy transport dominate the aerosol-beam interactions. In this regime, the coupled aerosol-beam equations are solved numerically to obtain the spatic-temporal behavior of the propagating beam, and of the irradiated aerosols. For higher beam irradiances, convective transport of mass, energy and momentum away from the irradiated aerosols must be considered. The hydrodynamic equations are solved in the surrounding medium for this regime subject to appropriate jump conditions at the surface of the irradiate aerosol. Numerical examples illustrative of both regimes are given for the case of irradiated water aerosol droplets. DOE

N86-29216# Lawrence Livermore National Lab., Calif.
ACTIVITIES AT LLNL RELEVANT TO GAMMA-RAY LASER CONCEPTS
F. S. Dietrich Feb. 1986 3 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-008153; UCRL-93386; CONF-851185-17) Avail: NTIS HC A02/MF A01

Current and planned gamma-ray laser activities at LLNL include both theoretical and experimental studies of spin and shape isomers, construction of a new accelerator laboratory that will include an optimal facility for gamma-ray laser candidate searches, evaluation of the prospects for developing ultrahigh resolution detectors, and the study of a positron-annihilation laser scheme. Identifying gamma-ray laser candidates will require major advances in both theoretical and experimental techniques for nuclear spectroscopy. We have recently completed a state-of-the art gamma spectrometer that includes a Compton polarimeter and an intrinsic germanium detector with an anticoincidence shield. Shape isomers, which have long lifetimes because they have much larger quadrupole deformations than the ground state, are imbedded in a sea of closely-spaced levels with normal deformation. An experimental facility tailored for gamma-ray laser studies requires beams suitable for producing nuclei near the valley of stability, a flexible beam-chopping system useful for studying lifetimes in the nanosecon d to second range, state-of-the art gamma and conversion-electron spectrometry, and the ability to handle difficult targets that are radioactive or chemically unstable. DOE

N86-29217# National Academy of Sciences - National Research Council, Washington, D. C.
VUV (VACUUM ULTRAVIOLET) AND X-RAY SOURCES FOR ATOMIC AND MOLECULAR SCIENCE Final Report
1986 84 p Report of Workshop held in Washington, D.C., 8-9 Nov. 1984
(Contract DE-FG05-85ER-13326; Grant NSF PHY-84-15232)
(PB86-179520) Avail: NTIS HC A05/MF A01 CSCL 20E

The National Research Council's Committee on Atomic and Molecular Sciences (CAMS) convened a workshop on November 8 to 9, 1984, to review the current status of short-wavelength light sources of interest to the atomic, molecular, and optical (AMO) physics community. The general intent of the Committee was to: (1) review advantages and disadvantages of existing technologies in the ultraviolet (UV) and X-ray spectral range, and (2) determine which of these technologies, if any, is best suited for particular problems in AMO physics. Workshop Papers titles are the following: Atomic and molecular physics with VUV and X-ray photons; Properties of synchrotron radiation from bending magnets, wigglers, and undulators; Partially coherent X-rays from modern storage rings; Lasers in the vacuum ultraviolet and X-ray region; Laser produced plasma light sources; Free electron lasers for the XUV spectral region. GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-29218# Lockheed-California Co., Burbank.
DEVELOPMENT OF AN OPERATING PROFILE FOR AIRCRAFT TIRES Final Report
Paul Durup, Max Gamon, Stephen Bobo (Transportation Systems Center, Cambridge, Mass.), and S. K. Clark (Michigan Univ., Ann Arbor.) Jun. 1986 103 p
(Contract DTRS57-80-C-00190)
(FAA/CT-85-32) Avail: NTIS HC A06/MF A01

The procedures of analysis and dynamometer testing that were used to develop data and supporting technology for improving the maintenance and continued airworthiness of civil aircraft tires are described. As related to the inspection, retread and repair of aircraft tires under Advisory Circular AC 145-41, improved criteria which characterize typical tire operating environments and operating scenarios (associated with long range, medium range, and short haul transport airplanes) are defined. Based upon these criteria and scenarios which include tire loading, temperature, and roll distances, means to assess tire fatigue life were developed. Results of this effort may be used for the identification of in-service acceptance criteria and prescribed retread limits. Author

N86-29219# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE SYNTHESIS OF STABLE GRASPS IN THE PLANE
Van-Duc Nguyen Oct. 1985 25 p
(Contracts N00014-80-C-0505; N00014-82-K-0334)
(AD-A165903; AD-E750983; AI-M-862) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper addresses the problem of synthesizing stable grasps on arbitrary planar polygons. Each finger is a virtual spring whose stiffness and compression can be programmed. The contacts between the finger tips and the object are point contacts without friction. It is proven that all force-closure grasps can be made stable, and it costs O(n) time to synthesize a set of n virtual springs such that a given force-closure grasp is stable. We can also choose the compliance center and the stiffness matrix of the grasp, and so choose the compliant behavior of the grasped object about its equilibrium. The planning and execution of grasps and assembly operations become easier and less sensitive to errors. GRA

N86-29220# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
SENSING STRATEGIES FOR DISAMBIGUATING AMONG MULTIPLE OBJECTS IN KNOWN POSES
W. E. L. Grimson Aug. 1985 38 p
(Contracts N00014-80-C-0505; N00014-82-K-0334)
(AD-A165912; AI-M-855) Avail: NTIS HC A03/MF A01 CSCL 12/1

The need for intelligent interactions of a robot with its environment frequently requires sensing of the environment. Further, the need for rapid execution requires that the interaction between sensing and action take place using as little sensory data as possible, while still being reliable. Previous work has developed a technique for rapidly determining the feasible poses

of an object from sparse, noisy, occluded sensory data. This paper examines techniques for acquiring position and surface orientation data about points on the surface of objects, with the intent of selecting sensory points that will force a unique interpretation of the pose of the object with as few data points as possible. Under some simple assumptions about the sensing geometry a technique for predicting optimal sensing positions is derived. The technique has been implemented and tested. To fully specify the algorithm, needed are estimates of the error in estimating the position and orientation of the object, and derived are analytic expressions for such error for the case of one particular approach to object recognition. Author (GRA)

N86-29221# North Carolina State Univ., Raleigh. Precision Engineering Lab.
PRECISION ENGINEERING - SRO 154 Final Report
Thomas A. Dow, Michael D. Bryant, Richard F. Keltie, Clarence J. Maday, and Ronald O. Scattergood Jan. 1986 305 p
(Contract N00014-83-K-0064)
(AD-A166084) Avail: NTIS HC A14/MF A01 CSCL 13/8

For mechanical systems, the basic principles of precision motion have long been clearly enunciated. What is new is the potential for interactive computer use in real-time feedback control, involving: (1) structural stabilization of the instrument or machine; (2) movement and location of its parts; (3) processing of metrology information; and (4) positioning and stabilization of the tool/workpiece interactions in a machine tool. This can lead to a distributed, multivariable, multiloop control problem, with significant computation required in the feedback algorithm. Although the advantages of real-time control have been clear for some time, no complete machine tool or metrology system exploits this with the control of the major variables. At present open loop control is being applied, with corrections for calculated (or previously measured) estimates of systematic errors. Closed loop control automatically corrects for unpredictable errors from factors such as mechanical deflections, thermal deformation, and wear. Once in place, a system for precision manufacture can be used for less exacting tasks, offering reductions of required inspections and assuring part-to-part reproducibility, with reduced rejections. Such a system is at the heart of automated production, yet remains a research area. GRA

N86-29222# Naval Academy, Annapolis, Md. Dept. of Mechanical Engineering.
A REVIEW OF TITANIUM WELDING PROCESSES Final Report, Feb. 1985 - Feb. 1986
D. F. Hasson 3 Feb. 1986 30 p Presented at the TMS/AIME Annual Meeting, New York, N.Y., 26 Feb. 1985
(AD-A166442; USNA-EW-9-86) Avail: NTIS HC A03/MF A01 CSCL 13/8

The efficient and cost-effective utilization of conventional and advanced titanium alloys in structural applications has required the advanced development of several welding processes. These developments have been prompted to a great extent by the high reactivity of titanium as compared to other commonly-welded structural metals, but also by titanium's unique physical and metallurgical properties. This review discusses the current state-of-the-art of welding processes for titanium, concentrating on arc and beam welding processes. Recent advances in processes designed to weld thicknesses ranging from thin sheet to heavy plate are discussed. The presentation deals with advances in the U.S. However, work conducted abroad is also considered. The general conclusion is that the weldability of titanium and its alloys is excellent. As in the welding of any structural metal, the specific application should be examined to select the best welding process. Author (GRA)

N86-29223# Memory Metals, Inc., Stamford, Conn.
REMOTELY OPERABLE SHAPE MEMORY ALLOY SEALS FOR PLASMA CONFINEMENT SYSTEMS
1985 20 p
(Contract DE-AC01-84ER-80195)
(DE86-005206; DOE/ER-80195/T1) Avail: NTIS HC A02/MF A01

The objective of this research program was to demonstrate the feasibility of exploiting vacuum seals fabricated from shape memory alloys as a means of making remotely operable seals. A Ni-Ti shape memory alloy was fabricated by hot isostatic pressing of powder alloy in the form of a rod which was then hot swagged to a 1/4 inch diameter rod. This rod was then formed into a ring and electron beam welded and heat treated. The force generated on recovery of a ring which had been deformed into an elliptical cross was measured and the procedures for clamping in a flange system were studied. Successful vacuum sealing was demonstrated to a level of 10 Torr 1/sec. Design for several closures which are fast action, non-bolt, and potentially capable of remote operation, are presented. DOE

N86-29224# Miami Univ., Coral Gables, Fla.
WASTE HEAT RECOVERY IN A 1600 cc METHANOL FUELED ENGINE
M. R. Swain, P. V. Scott, and M. N. Swain Jan. 1986 34 p
(Contract DE-AC05-84OR-21400)
(DE86-005260; ORNL/Sub-85-27420/1) Avail: NTIS HC A03/MF A01

The results of an experimental and theoretical investigation are presented in this report. The purpose of the investigation was to compare various methods of utilizing methanol as a fuel for reciprocating piston type internal combustion engines. Three different methods of fuel preparation were analyzed. The three methods of fuel preparation were: (1) methanol dissociation with waste heat prior to entering intake manifold; (2) methanol vaporization with waste heat prior to entering intake manifold; and (3) methanol vaporization with waste heat within the cylinder during the compression stroke. The results of the investigation are presented as miles per gallon of methanol for the three fueling methods. DOE

N86-29225# Technical Research Centre of Finland, Espoo.
USE TECHNIQUE OF ALTERNATIVE FUELS IN VEHICLE ENGINES. LITERATURE REVIEW
T. Eklund, N. -O Nylund, and K. Sipilae Apr. 1985 84 p In FINNISH
(DE86-750278; VTT-TIED-443) Avail: NTIS (US Sales Only) HC A05/MF A01

Different alternatives of running engines used in transport vehicles with substitute fuels are introduced. The introduction is divided into three groups depending on whether one fuel suitable for the process is used, two fuels are used simultaneously or greater modifications are made in the engine to optimize the use of the substitute fuel. The greater changes in the engine, the easier it is to achieve good results in the use of a certain substitute fuel as regards the operation and efficiency of the engine. For example, if neat alcohol is used, better cold-run and wear results are achieved with a dual-fuel system. An even higher efficiency is reached by injecting the alcohol at the compression ratio of the diesel engine directly into the combustion chamber and by igniting it with the aid of a spark. The last-mentioned solution also offers a good so-called multifuel readiness for a car equipped with an engine of this kind. Proper multi-fuel engines have been developed at a lower compression ratio than the diesel engine, using direct injection and spark ignition. These so-called hybrid engines can operate with hydrocarbon fuels that have a wide range of distillation, and with alcohols, only with minor changes in regulations, at a high efficiency and with better cold-start and cold-run properties than the spark ignition engines. These engines are not yet manufactured in series. Gas turbines and stirling engines burning fuel with a continuous flame can also be included in the multi-fuel engines. The use of different fuels (liquid and gaseous) requires minor modifications, and the exhaust gas emission and efficiency properties are good according to research results. However, car versions of these engines are neither yet in serial manufacture. The literature study clearly revealed the scarcity of studies carried out in cold conditions. DOE

N86-29226# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
CYCLE-RESOLVED VELOCITY AND TURBULENCE MEASUREMENTS IN AN IC ENGINE WITH COMBUSTION
M. J. Hall, F. V. Bracco, and D. A. Santavicca (Pennsylvania State Univ., University Park.) 1986 12 p Presented at the Society of Automotive Engineering Congress, Detroit, Mich., Feb. 1986
(Contract DE-AC04-81AL-16338)
(DE86-008169; CONF-860263-3) Avail: NTIS HC A02/MF A01

Laser Doppler velocimetry has been used to make cycle-resolved velocity and turbulence measurements in a homogeneous-charge, spark-ignition engine. The engine had a ported intake and disc-shaped chamber with a compression ratio of 8 to 1. It was operated at a speed of 1200 rpm and with a TDC swirl number of 4. A stoichiometric propane-air mixture was used, and ignition was near the wall. The velocity measurements were made at three spatial locations at the midpoint of the clearance height. Tests were made to determine whether the presence of the flame affected the accuracy of the velocity measurements. It was found that the ensemble-averaged mean velocity shows a small deviation, and the rms fluctuation intensity is significantly influenced, but the effects appear to be confined to the flame zone. Data rates were sufficiently high in the preflame and postflame regions to determine the velocity history in each cycle (cycle resolved). The cycle resolved turbulence intensity was found to increase across the flame. The turbulence intensity in the burned gas was found to be homogeneous at the three spatial locations examined and to decay rapidly. There was little or no increase in turbulence intensity ahead of the flame. Author

N86-29227# Oak Ridge National Lab., Tenn. Plant and Equipment Div.
WELDING PROCEDURE SPECIFICATION: GAS TUNGSTEN ARC WELDING OF CHROMIUM-NICKEL STEEL TO NICKEL-CHROMIUM-IRON
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Aug. 1985 37 p
(Contract DE-AC05-84OR-21400)
(DE86-001535; ORNL/M-49) Avail: NTIS HC A03/MF A01

Procedure WPS-26-3-ASME-6 is qualified under Section IX of the American Society of Mechanical Engineering (ASME) Boiler and Pressure Vessel Code for gas tungsten arc welding of 300 series Cr-Ni steels (P-8-1) to nickel-chromium-iron (P-43), in thiskness range 0.432 inch; filler metal is ERNiCr-3 (F-43); shielding gas is argon. DOE

N86-29228# Oak Ridge National Lab., Tenn.
CONVERSION OF A SERVOMANIPULATOR FROM ANALOG TO DIGITAL CONTROL
S. M. Killough, H. L. Martin, and W. R. Hamel 1986 20 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-000090; CONF-860434-1) Avail: NTIS HC A02/MF A01

Oak Ridge National Laboratory (ORNL) has developed expertise in computer control of force-reflecting master/slave servomanipulators as a result of research for the Consolidated Fuel Reprocessing Program. These computer control capabilities have been applied to a commercially available servomanipulator, the TeleOperator Systems SM-229. All of the servo drive and control circuitry has been replaced with commercially available digital controls and amplifiers, and a customer software package has been developed. This conversion to digital computer control resulted in significant improvements in force-reflection characteristics, ease of operation, diagnostic capabilities, indexing features, and potential increased reliability. The system will be used at the Tokamak Fusion Test Reactor at the Princeton Plasma Physics Laboratory (PPPL) for maintenance demonstrations. DOE

N86-29229# Los Alamos National Lab., N. Mex.
APPLICATION OF TELEOPERATOR EXPERTISE TO ROBOTICS
D. L. Grisham and J. E. Lambert 1985 10 p Presented at the Robots Conference, Chicago, Ill., 20 Apr. 1986
(Contract W-7405-eng-36)
(DE86-003659; LA-UR-85-4066; CONF-860487-3) Avail: NTIS HC A02/MF A01

The evolution, capabilities and accomplishments of the Monitor remote handling system are discussed. It is suggested that the equipment and operational expertise can be applied to robotic systems in radioactive and other hostile environments. The Monitor methods of operation, the tooling devised and employed and the applications of these methods to robotic systems are described. DOE

N86-29230# Oak Ridge National Lab., Tenn.
AUTONOMOUS ROBOTS FOR HAZARDOUS AND UNSTRUCTURED ENVIRONMENTS
W. R. Hamel, S. M. Babcock, M. G. Hall, C. C. Jorgenson, S. M. Killough, and C. R. Weisbin 1986 18 p Presented at the Robots Conference, Chicago, Ill., 20 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-005019; CONF-860487-1) Avail: NTIS HC A02/MF A01

This paper reports continuing research in the areas of navigation and manipulation in unstructured environments, which is being carried out at the Center for Engineering Systems Advanced Research (CESAR) at the Oak Ridge National Laboratory (ORNL). The HERMIES-II mobile robot, a low-cost prototype of a series that will include many of the major features required for remote operations in hazardous environments, is discussed. Progress toward development of a high-performance research manipulator is presented, and application of an advanced parallel computer to mobile robot problems, which is under way, is discussed. DOE

N86-29231# Oak Ridge National Lab., Tenn.
ELECTRON BEAM WELDING OF HEAVY-SECTION 3 Cr-1.5 Mo ALLOY
J. F. King, S. A. David, J. E. Sims, and A. M. Nasreldin 1986 34 p Presented at the 67th Annual American Welding Society Meeting, Atlanta, Ga., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-005595; CONF-8604123-1) Avail: NTIS HC A03/MF A01

Electron beam welding is a process that could have advantages for the fabrication of heavy-section steel components such as pressure vessels. The penetrating ability of the beam produces welds with high depth-to-width ratios at relatively high travel speeds, making it possible to weld thick sections with one or two passes without filler metals and other consumables. This paper describes a study that was undertaken to investigate the feasibility of using a high-power electron beam welding machine to weld heavy-section steel of 3 Cr-1.5 Mo-0.1 V alloy. Single-pass welds were made in 102-mm thick (4 in.) plates of this alloy. The main emphasis of this work was concentrated on determining the mechanical properties of the resulting weldment, characterizing the microstructure of the various weldment regions, and comparing these results with those from other welding processes. All characterization testing showed that the electron beam weldment in 3 Cr-1.5 Mo-0.1 V steel had excellent properties either matching or exceeding those of the base metal and weld metal from submerged arc welding and shielded metal arc welding processes. DOE

N86-29232# Oak Ridge National Lab., Tenn.
INVERSE DYNAMICS POSITION CONTROL OF A COMPLIANT MANIPULATOR
M. G. Forrest-Barlach and S. M. Babcock 1986 33 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-001333; CONF-860434-2) Avail: NTIS HC A03/MF A01

The cycle time of typical industrial manipulators is limited by vibrational characteristics associated with drive train compliance. In this paper the effects of drive train compliance and actuator dynamics in a two-degree-of-freedom manipulator are modeled and a position controller based on inverse dynamics is developed. For comparison, independent joint control neglecting compliance and independent joint control including actuator dynamics and drive

train compliance are also considered. Simulation of various controllers is performed utilizing the Advanced Continuous Simulation Language. It is shown that the closed loop frequency response of the manipulator can be increased beyond typical industrial practices by considering the drive train compliance in the design and providing suitable feedback measurements. Simulations suggest that satisfactory performance can be obtained as high as the limit imposed by the manipulators unmodeled higher vibration modes. The controller based on inverse dynamics is shown to effectively decouple the manipulator's nonlinearly coupled degrees of freedom and perform better than a linear independent joint controller which also considers drive train compliance. DOE

N86-29233# Fermi National Accelerator Lab., Batavia, Ill.
DESIGN CHARTS FOR VACUUM PLATES
J. E. OMeara Jan. 1986 10 p
(Contract DE-AC02-76CH-03000)
(DE86-008119; FNAL-TM-1052-A) Avail: NTIS HC A02/MF A01

This paper presents design charts to aid designers in selection of a wall thickness for flat plates used on vacuum vessels. These charts display both stress and deflections for a given wall thickness and plate dimensions. Since both stress and deflection are plotted on a single graph, one may select the proper wall thickness quite readily. Precautions for use of the charts are also presented. DOE

N86-29234# Lawrence Livermore National Lab., Calif.
VARIABLE STRUCTURE MODEL FOLLOWING CONTROL DESIGN FOR ROBOTICS APPLICATIONS
K. D. Young Feb. 1986 17 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract W-7405-eng-48)
(DE86-008136; UCRL-94074; CONF-860434-6) Avail: NTIS HC A02/MF A01

The increased demand on robotic system performance leads to the use of advanced control strategies. In this paper a variable structure model following control design is proposed for robotics applications. DOE

N86-29235 United Kingdom Atomic Energy Authority, Harwell (England). Materials Development and Engrg. Projects Div.
COMPOSITE/METAL JOINTING TECHNOLOGY FOR VEHICLE WEIGHT REDUCTION Summary Report
D. T. Livey and J. C. McCarthy Dec. 1985 21 p
(AERE-R-12020) Copyright. Avail: Issuing Activity

A comprehensive program of work was carried out on the development and validation of design procedures for adhesively bonded composite-metal joints. Two computer programs were developed for the design of turbular joints (e.g., driveshafts) and sheet-sheet joints (e.g., for bodywork) which take account of the extensive yielding of adhesives in stressed joints. Associated materials, testing and assessment work included the determination of adhesive and joint mechanical properties required for the validation of the design stress analyses. A materials data base for future use in joint design was established. Test methods were developed to provide more reliable and accurate data on adhesive properties. Environmental durability and surface treatment combinations on joint components; testing of full size component joints for drive shafts and hatchback doors under both static and fatigue loads; and a preliminary assessment of non-destructive testing techniques are discussed. Author

N86-29236# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Structures and Materials Panel.
AIRCRAFT AND BEARING TRIBOLOGICAL SYSTEMS
Loughton, England Feb. 1986 232 p Meeting held in San Antonio, Tex., 22-26 Apr. 1985
(AGARD-CP-394; ISBN-92-835-1509-9) Avail: NTIS HC A11/MF A01

Advances in aircraft gear and bearing tribology are discussed. Future trends and problems, gear and bearing materials, and lubricants are discussed. For individual titles, see N86-29237 through N86-29254.

N86-29237# Westland Helicopters Ltd., Yeovil (England).
THE VALUE OF LABORATORY SIMULATION TESTING FOR PREDICTING GEARBOX PERFORMANCE
P. B. Macpherson *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 11 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

The evolution of a successful gearbox design involves much development testing which is both time consuming and expensive. For this reason full advantage should be taken of laboratory simulation tests for which, to be successful, predictions must, obviously, be reliable. Some of the more salient aspects of simulation testing are set out along with a few examples drawn from the author's experience. Heat treatment design rules, future test methods, and testing machines are discussed. Author

N86-29238# Schaefer (Georg) and Co., Schweinfurt (West Germany).
EFFECTS OF UNFAVORABLE ENVIRONMENTAL CONDITIONS ON THE SERVICE LIFE OF JET ENGINE AND HELICOPTER BEARINGS
Hans-Karl Loroesch *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 9 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Aircraft bearings normally operate at high speeds and have to meet demanding reliability requirements. If conventional guidelines for their design are used, the resultant stresses are low. The stresses are particularly low if compared to those customarily applied in testing rolling fatigue. Potential fatigue life, the influence of plastic deformation in the raceways, the influence of surface damage and loading, service life under favorable lubricating conditions, achievable fatigue life at loads above the endurance limit, and the influence of contamination are discussed. Author

N86-29239# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
AERO-ENGINE GEARS: MANUFACTURING CRACKS AND THEIR EFFECT ON OPERATION
J. Specht *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 10 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

The effect of cracks in gear splines is discussed. After black-oxidising of case-hardened gears, stress corrosion cracking may occur. This was determined from damage analysis of cracked gears of flight engines and from sample testing. Besides design measures to reduce operational stresses, corrective action may be in the form of modified manufacturing procedures and improved crack inspection. Author

N86-29240# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. for Technical Physics.
TRIBOLOGY IN AIRCRAFT SYSTEMS: BASIC PRINCIPLES AND APPLICATIONS
E. Jantzen and V. Buck *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 13 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

The historical origin of the name tribology is outlined. The trends for the next two decades are reviewed: reduction of fuel consumption, improvement of the ratio of specific output to weight, reduction of maintenance, and further improvement of safety. Then the consequences from these trends are outlined with respect to research in tribology. The current status of research is sketched and some unsolved problems are discussed: interaction of material/lubricant in areas with mixed friction (reaction layers); interaction of material/lubricant in the hydrodynamic region; friction and wear of synthetic bearings with and without lubrication; friction, wear and service time if solid lubricants are used; and topographical

features of surfaces. Many government sponsored research to gain the wide spread of basic knowledge necessary for new and better solutions. Author

N86-29241# Schaefer (Georg) and Co., Schweinfurt (West Germany).
DESIGN AND CALCULATION OF HIGH SPEED ENGINE BEARINGS
H. J. Koeber *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 12 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

New aspects in design and calculation of high speed ball and roller bearings are discussed in as much as they affect bearing performance in the speed range of DxN = 3.0 x 1 million min-1 and beyond. For roller bearings the guide flange to roller end configuration as well as roller excursion within the cage pocket are linked to the phenomena of skewing and skidding. The need for under-race-lubrication in small diameter engine bearings is derived from this and a special solution (integral scoop) is shown along with related performance data. The influence of incorporating state of the art rolling elements made of silicon nitride on the design and calculation of high speed ball and roller bearings is shown taking into account hardness, density, Young's modulus and the Poisson ratio. Increase speeds coupled with additional design features being incorporated (such as lubrication holes, grooves, slots) require that inner rings of improved fracture toughness be developed with existing materials of known properties thus supplementing the material development activities already under way. Author

N86-29242# Boeing Vertol Co., Philadelphia, Pa.
A STUDY OF THE POTENTIAL BENEFITS ASSOCIATED WITH THE DEVELOPMENT OF A DEDICATED HELICOPTER TRANSMISSION LUBRICANT c27
Raymond J. Drago, Pasquale J. Mangione (Naval Air Propulsion Test Center, Trenton, N.J.), and Raymond D. Wendrzycki *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 11 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

A common oil is now used in both the engines and transmissions of virtually all U.S military helicopters. While this provides significant logistic advantages, these advantages are attained only by compromising the optimization of the oil for either system. The results of two studies undertaken to determine what benefits would accure through the development of a special oil tailored specifically to meet the unique requirements of high-speed, heavily loaded helicopter transmission systems are summarized. These studies, conducted independently by two major helicopter manufacturers under the direction of the Naval Air Propulsion Center, addressed specific problem areas as related to typical production aircraft in order to reach well-documented conclusions. In addition, the effect of the availability of such a special gearbox lubricant on the development of other advanced-technology components was evaluated and documented. Author

N86-29243# KHD Luftfahrttechnik G.m.b.H., Oberursel (West Germany).
MULTIFUNCTIONAL REQUIREMENTS FOR A GEARBOX SECONDARY POWER SYSTEM IN A MODERN FIGHTER AIRCRAFT AND ITS COMPONENTS AND INTERFACE REQUIREMENTS
Manfred Pucher *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 14 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

The basic task of the gearbox in a Secondary Power System (SPS) of an aircraft is to provide and distribute mechanical energy from the Auxiliary Power Unit (APU) or from the Main Engine (ME) to the accessories, e.g., generators, hydraulic pumps and fuel pumps. The complexity as well as the functional facilities increase by incorperating further functional requirements such as main engine start, cross drive operation between redundant systems with the associated control devices, including oil supply to the accessories into the gearbox oil system. The Tornado-SPS is one of the most modern systems flying today. The system shows a high reliability although the aircraft has been in service for only a few years. The experience gained with major components like gearbox housing, gearing, freewheel clutches, dry friction cluthes and components of the oil system is reported. Some aspects from this experience are given for the design of gearboxes for future secondary power systems. Author

N86-29244# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
REQUIREMENTS ON LUBRICATIN OIL FROM THE VIEW OF A HELICOPTER MANUFACTURER c27
Joachim Hartmann and Wolfgang Jonda *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 6 p (For primary document see N86-29236 20-37)
Avail NTIS HC A11/MF A01

Experience with known oil types, used in helicopters for transmissions, engines, hydraulics and brakes has shown that 3 main conditions if available, would improve drastically the performance of the aircraft. These 3 main conditions are: the same type of oil should be usable for all the above mentioned systems; the oils brands, produced according to a common specification, but by different manufacturers, should be mixable without restrictions; and some features of the oil, which are specially important for helicopter operations, should be improved. Author

N86-29245# Army Materials and Mechanics Research Center, Watertown, Mass. Physical Metallurgy Branch.
DIRECTION OF R AND D AND CURRENT STATUS OF UNDERSTANDING OF ADVANCED GEAR STEELS c26
P. J. Fopiano, J. E. Krzanowski, and G. M. Crawford *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 15 p (For primary document see N86-29236 20-37)
Avail NTIS HC A11/MF A01

High performance gears in the modern helicopter must operate at ever increasing torque and RPM. A major consequence of this increased torque and RPM is a significant increase in the surface temperature and increased scuffing of the gears. In response to this problem, Boeing-Vertol introduced a new class of steel (hot work tool steel) as a high performance aircraft gear steel and started a trend which all subsequent work has confirmed to be a correct decision. The three most prominent candidate critical high temperature aircraft gear steels including Vasco X-2M, CARTECH X-53 (PYROWEAR 53), and CBS600 are discussed. The heat treatment responses of these alloys will be compared. Three additional alloys (M50NiL, CBS1000M, and AMAX B) are discussed in less detail. Author

N86-29246# Westland Helicopters Ltd., Yeovil (England). Materials Lab.
THE ROLE OF RESIDUAL STRESS IN THE PERFORMANCE OF GEARS AND BEARINGS
A. V. Olver *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 16 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Residual stresses are an inevitable consequence of the manufacture and service conditions to which mechanical components are subjected. A wide range of evidence is presented to show the decisive effect of residual stress, both pre-existing and service induced, on the performance of gears and rolling element bearings. The results of measurement of residual stresses arising from a range of manufacturing procedures are presented, particular emphasis being placed on carburized steels. The effect of such stresses on fatigue performance is demonstrated. Possible causes of residual stress change during service are reviewed and the results of new experimental and theoretical work on the role of residual contact stress in a number of relevant tribological failure modes are presented. Author

N86-29247# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mechanical Engineering.
THE LUBRICATION OF DYNAMICALLY LOADED CONCEN-

TRATED HARD LINE CONTACTS: TEMPERATURE AND PRESSURE MEASUREMENTS
M. J. W. Schouten, H. J. vanLeeuwen, and H. A. Meijer *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 12 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Some results of temperature and pressure measurements in two types of dynamically loaded concentrated contacts are reported, viz., a cam-flat follower contact and a cylindrical roller - outer race contact. The measurement technique utilizes miniature vapour deposited thin layer transducers and a counter current circuit and an amplifier. These first results are very encouraging. The transducers worked well, even under very adverse conditions of pure sliding and dynamic loads. Author

N86-29248# Atlantic Industrial Research Inst., Halifax (Nova Scotia).
WEAR OF HIGH SPEED ROLLER BEARINGS
T. Savaskan, E. E. Laufer (Nova Scotia Technical Coll., Halifax.), and D. E. Veinot (Defence Research Establishment Atlantic, Dartmouth, Nova Scotia) *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 12 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

A laboratory bearing test rig was constructed to study wear in three high-speed roller bearings simultaneously under different conditions of loading and lubrication. A test run of 355 hours duration was performed during which wear of the bearings was monitored using DR ferrography. The test bearings from the rig were examined using metallography and microhardness measurements. Wear debris particles were collected from oil samples using ferrography. These were studied using bichromatic microscopy, scanning electron microscopy and energy dispersive X-ray analysis. The results of ferrography were correlated with the metallographic results. Author

N86-29249# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
MILITARY AIRCRAFT PROPULSION LUBRICANTS: CURRENT AND FUTURE TRENDS c27
G. A. Beane, IV, Lois J. Gschwender, Carl E. Snyder, Jr., and John T. Shimski (Naval Air Propulsion Test Center, Trenton, N.J.) *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 16 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

An assessment of the performance of MIL-L-7808J and MIL-L-23699C Military Specification lubricating oils in turbine engines and helicopter gear boxes is presented along with predicted performance of current and upgraded military specification oils in advanced and growth engine designs. Data is presented on advanced ester base engine lubricants, corrosion inhibited engine oils, and separate helicopter gear box oils evolving from current developmental research efforts. Future high temperature candidate fluids representing the ultimate stability for turbine engine oils are also discussed. Their use, in most cases, entails engine design considerations to accommodate their unique properties. The advantages and disadvantages of the various classes of synthetic lubricants for turbine engine applications are discussed, and deficiencies are identified where additional research programs are needed. Author

N86-29250# Imperial Coll. of Science and Technology, London (England).
FUTURE TRENDS IN HELICOPTER TRANSMISSION LUBRICANTS c27
H. A. Spikes *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 10 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Some recent fundamental studies relating to the lubrication of helicopter transmissions are presented, as well as implications for future oil development. The resulting enhanced understanding of lubrication mechanisms has shown that real potential exists both for improved performance and for the ability to cater to higher temperatures, by means of the formulation and use of improved transmission oils. If such benefits are recognized and if the new knowledge is correctly applied, there is no reason why helicopter gearbox reliability should not be appreciably improved by the end of the decade. Author

N86-29251# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
AIRCRAFT ENGINE OILS AND THEIR BEHAVIOUR AT HIGH TEMPERATURES c27
K. Maier *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 12 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Characteristics of aero-engine oils are changed considerably under high-temperature conditions (> 200 to 250 C). Consequences of this are the formation of aging products and deposits, deficiences in the tribological behavior and spontaneous ignition, in extreme cases. The problems arising from these are illustrated using several selected examples, and their effects on engine functioning are described. Author

N86-29252# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
PERFORMANCE MODELLING: A TOOL FOR LUBRICANT DEVELOPMENT c27
Howard E. Bandow *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 11 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

A basic requirement for the development of lubricants and aerospace fluids is to understand the physical properties of these fluids required to optimize performance of the lubricated system. Computer models have been used to predict the effects of lubricant properties on rolling element bearing performance. Studies were performed to validate models, to predict performance under various operating conditions, and to predict the effects of proposed design or lubricant changes on system performance. The results of some of these studies are described and compared with experimental measurements. Models which predict traction forces in lubricated contacts from thermal and rheological properties of the lubricant and bearing materials, and the geometry and operating conditions of the contact are compared with experimental results from a two disk traction device with a micro-computer based control/data acquisition system. The capabilities of models with the ability to predict the performance of hydraulic systems, the components making up these systems and lubricated contacts within the components are described and the methodology of studies to determine required fluid properties discussed. Author

N86-29253# Technische Univ., Munich (West Germany).
SCORING TESTS OF AIRCRAFT TRANSMISSION LUBRICANTS AT HIGH SPEEDS AND HIGH TEMPERATURES c27
H. Winter and K. Michaelis *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 9 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Aircraft engines always contain gears that have to be lubricated under conditions of high speeds and extremely high temperatures. In this field of application scoring damage is likely to occur. In Europe and partly also in the USA the scoring load capacity of gear oils is expressed in terms of FZG Scoring Load Stage. The FZG Gear Test Rig is described. The normal test procedure A/8.3/90 as standardized in DIN 51 354 using A-type gears at a pitch line velocity of v = 8.3 m/s and a starting oil temperature of 90 C is presented. A modified procedure at double speed and increased oil temperature A/16.6/140 is discussed. Because of the high costs and problems with the availability of test gears a modified FZG Ryder Test was developed. The method is presented and comparative results of typical aircraft engine oils in the FZG, the FZG-Ryder and the original Ryder Gear Test are shown. From this experience it becomes obvious that alternative test methods for the evaluation of scoring load capacity of aircraft transmission lubricants can be available in the near future. Author

N86-29254# Blok (Harmen), Rijswijk (Netherlands).
CRITICAL ANALYSIS OF ACHIEVEMENTS AND MISSING LINKS IN GEAR AND BEARING TRIBOLOGY IN RELATION TO POWER ENVELOPES
Harmen Blok *In* AGARD Aircraft and Bearing Tribological Systems Feb. 1986 15 p (For primary document see N86-29236 20-37)
Avail: NTIS HC A11/MF A01

Power envelopes provide a convenient and informative basis of comparison for the development of gear transmissions towards higher power densities. Each such envelope consists of a sequence of segments representing power barriers due to a variety of critical phenomena. Most of these phenomena and barriers are tribologically affected. They may be exemplified by the occurrence of contact between the rubbing surfaces whenever a fully separating lubricant film can no longer be maintained and, further, by pitting and scuffing. For every gear transmission at least two power envelopes have to be considered in conjunction, i.e., for the most vulnerable pair of gears and rolling-element bearing, respectively. The trends of these two envelopes, as well as their mutual position, depend on the configuration of the major elements in the transmission concerned and on certain tribologic characteristics of the solid rubbing materials and the lubricant. The power envelopes, being tribologically affected, prove useful for developing tribology into tribotechnology, so as to enable its integration into the design of gear transmissions. Once certain missing links have been filled in, tribology may provide breakthroughs for developing the technology of both gears and bearings to the high-tech level required for creatively increasing the power densities permissible in gear transmissions. Here, the concentration is upon those segments of the two power envelopes that are called contact barriers. Author

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-29255*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PRODUCT ASSURANCE TECHNOLOGY FOR CUSTOM LSI/VLSI ELECTRONICS External Report, Oct. 1982 - Sep. 1984
M. G. Buehler, B. R. Blaes, G. A. Jennings, B. T. Moore, R. H. Nixon, C. A. Pina, H. R. Sayah, M. W. Sievers, and N. F. Stahlberg Jun. 1985 218 p
(Contract NAS7-918)
(NASA-CR-177167; JPL-Publ-85-76; NAS 1.26:177167) Avail: NTIS HC A10/MF A01 CSCL 14D

The technology for obtaining custom integrated circuits from CMOS-bulk silicon foundries using a universal set of layout rules is presented. The technical efforts were guided by the requirement to develop a 3 micron CMOS test chip for the Combined Release and Radiation Effects Satellite (CRRES). This chip contains both analog and digital circuits. The development employed all the elements required to obtain custom circuits from silicon foundries, including circuit design, foundry interfacing, circuit test, and circuit qualification. For individual titles, see N86-29256 through N86-29265.

N86-29256*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
[PRODUCT ASSURANCE TECHNOLOGY EFFORTS: TECHNICAL ACCOMPLISHMENTS]
In its Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 55 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

Product assurance technology topics addressed include: wafer acceptance procedures, test chips, test structures, test chip methodology, fault models, and the Combined Release and Radiation Effects Satellite test chip. B.G.

N86-29257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PINHOLE ARRAY CAPACITOR FOR OXIDE INTEGRITY ANALYSIS c35
Martin G. Buehler, Brent R. Blaes, Cesar A. Pina, and Thomas W. Griswold *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p Repr. from Solid State Technology, v. 26, no. 11, Nov. 1983 p 131-137 Previously announced in IAA as A84-35500 Sponsored in cooperation with DARPA and NSA (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

The integrity of the metal-poly oxide and the gate oxide was evaluated for several 5-micron CMOS-bulk process. The pinhole array capacitor consists of diffused and poly fingers that form a network of MOS transistors (elements), which are capped by a deposited oxide and metal layer. The smallest structure used contained about 15,000 elements and the largest structure contained about 68,000 elements. Each structure was divided into several subarrays. The structures are placed a number of times on each wafer. From a yield analysis of the subarrays, the elements per defect were found to be typically in excess of 50,000 elements/defect for the metal-poly oxide and 100,000 elements/defect for the gate oxide. From the switching behavior of the transistors, the gate oxide defects were tentatively identified as gate-to-body shorts rather than gate-to-diffusion shorts. Author

N86-29258*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONTACT-RESISTANCE PROCESS CLIFF c33
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

Several approaches were investigated to obtain a measure of the quality of the contact resistance between metal and a diffused or polysilicon layer. These approaches have included the use of both short and very long contact strings as well as arays of contacts with different sizes to determine the contact resistance process cliff. Results from these approaches are discussed. B.G.

N86-29259*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ADDRESSABLE INVERTER MATRIX FOR PROCESS AND DEVICE CHARACTERIZATION c33
Martin G. Buehler and Hoshyar R. Sayah *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 7 p Repr. from Solid State Technology, May 1985 p 185-191 Previously announced in IAA as A86-16549 (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 14D

The addressable inverter matrix consists of 222 inverters each accessible with the aid of a shift register. The structure has proven useful in characterizing the variability of inverter transfer curves and in diagnosing processing faults. For good 3-micron CMOS bulk inverters investigated, the percent standard deviation of the inverter threshold voltage was less than one percent and the inverter gain (the slope of the inverter transfer curve at the inverter threshold vltage) was less than 3 percent. The average noise margin for the inverters was near 2 volts for a power supply voltage of 5 volts. The specific faults studied included undersize pull-down transistor widths and various open contacts in the matrix. Author

N86-29260*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RELIABILITY ANALYSIS
In its Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 24 p Presented at the Spring Meeting of the Electrochemical Society, Inc., San Francisco, Calif., 1983 Sponsored in cooperation with DARPA and NSA (For primary document see N86-29255 20-38)
(Contract NAS7-100)
Avail: NTIS HC A10/MF A01 CSCL 14D

The objective was to search for and demonstrate approaches and concepts for fast wafer probe tests of mechanisms affecting the reliability of MOS technology and, based on these, develop and optimize test chips and test procedures. Progress is reported on four important wafer-level reliability problems: gate-oxide radiation hardness; hot-electron effects; time-dependence dielectric breakdown; and electromigration. B.G.

N86-29261*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JMOSFET: A MOSFET PARAMETER EXTRACTOR WITH GEOMETRY-DEPENDENT TERMS **c33**
Martin G. Buehler and B. T. Moore *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 42 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09A

The parameters from metal-oxide-silicon field-effect transistors (MOSFETs) that are included on the Combined Release and Radiation Effects Satellite (CRRES) test chips need to be extracted to have a simple but comprehensive method that can be used in wafer acceptance, and to have a method that is sufficiently accurate that it can be used in integrated circuits. A set of MOSFET parameter extraction procedures that are directly linked to the MOSFET model equations and that facilitate the use of simple, direct curve-fitting techniques are developed. In addition, the major physical effects that affect MOSFET operation in the linear and saturation regions of operation for devices fabricated in 1.2 to 3.0 mm CMOS technology are included. The fitting procedures were designed to establish single values for such parameters as threshold voltage and transconductance and to provide for slope matching between the linear and saturation regions of the MOSFET output current-voltage curves. Four different sizes of transistors that cover a rectangular-shaped region of the channel length-width plane are analyzed. B.G.

N86-29262*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE 1.2 MICRON CMOS TECHNOLOGY **c33**
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 10 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

A set of test structures was designed using the Jet Propulsion Laboratory (JPL) test chip assembler and was used to evaluate the first CMOS-bulk foundry runs with feature sizes of 1.2 microns. In addition to the problems associated with the physical scaling of the structures, this geometry provided an additional set of problems, since the design files had to be generated in such a way as to be capable of being processed through p-well, n-well, and twin-well processing lines. This requirement meant that the files containing the geometric design rules as well as the structure design files had to produce process-insensitive designs, a requirement that does not apply to the more mature 3.0-micron CMOS feature size technology. Because of the photolithographic steps required with this feature size, the maximum allowable chip size was 10 x 10 mm, and this chip was divided into 24 project areas, with each area being 1.6 x 1.6 mm in size. The JPL-designed structures occupied 13 out of the 21 allowable project sizes and provided the only test information obtained from these three preliminary runs. The structures were used to successfully evaluate three different manufacturing runs through two separate foundries. Author

N86-29263*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST CHIP ASSEMBLER AND TEST PROGRAM GENERATOR **c33**
Cesar A. Pina *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 6 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

One of the major problems in working at the geometry level for the generation of either test structure or functional circuit designs is the amount of labor involved in the design phase. To reduce the amount of labor involved in both the design and test of the structures used, JPL has developed a design and test program consisting of a Test Chip Assembler (TCA) and a Test Program Generator (TPG), which creates the geometrical description of the structures and generates the necessary test information using a high-level language. This system reduces the design time for a test chip by a factor of 30. To analyze the data obtained from wafer probing, a statistical package called STMJPL was developed. Some of the capabilities of the JPL software (STMJPL) are described. B.G.

N86-29264*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FAULT MODELS **c33**
Hoshyar R. Sayah and Martin G. Buehler *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 p 6 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

A major problem in the qualification of integrated circuit cells and in the development of adequate tests for the circuits is to lack of information on the nature and density of fault models. Some of this information is being obtained from the test structures. In particular, the Pinhole Array Capacitor is providing values for the resistance of gate oxide shorts, and the Addressable Inverter Matrix is providing values for parameter distributions such as noise margins. Another CMOS fault mode, that of the open-gated transistor, is examined and the state of the transistors assessed. Preliminary results are described for a number of open-gated structures such as transistors, inverters, and NAND gates. Resistor faults are applied to various CMOS gates and the time responses are noted. The critical value for the resistive short to upset the gate response was determined. B.G.

N86-29265*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MOS INTEGRATED CIRCUIT FAULT MODELING **c33**
M. Sievers *In its* Product Assurance Technology for Custom LSI/VLSI Electronics Jun. 1985 15 p (For primary document see N86-29255 20-38)
Avail: NTIS HC A10/MF A01 CSCL 09C

Three digital simulation techniques for MOS integrated circuit faults were examined. These techniques embody a hierarchy of complexity bracketing the range of simulation levels. The digital approaches are: transistor-level, connector-switch-attenuator level, and gate level. The advantages and disadvantages are discussed. Failure characteristics are also described. B.G.

N86-29266# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN APPLICATION OF QUALITY CONTROL THEORY TO VENDOR-SUPPLIED PARTS AT AN AEROSPACE MANUFACTURING COMPANY M.S. Thesis
Daniel E. Gellenbeck Aug. 1985 283 p (AD-A166418; AFIT/CI/NR-86-13T) Avail: NTIS HC A13/MF A01 CSCL 05/1

Quality assurance functions at some major industrial manufacturers are confronted with test data on a massive scale and are not capable through manual methods of the indepth analyses that are necessary for effective quality control. This report details the development of a quality control system for use at the Garrett Turbine Engine Company, Phoenix, Arizona, in analyzing the results of testing of vendor-supplied castings and forgings. Traditional quality control chart theory and more elaborate statistical testing, such as analysis of variance, were integrated into the computer programs to produce detailed quality control charts and summaries of data analysis and testing. These programs were integrated into a quality control system to allow management to make more timely and better founded decisions on accepting castings/forgings from vendors, modifying testing plans, and modification of material specifications, thereby reducing costs. The testing results of two selected parts were used to verify operation of the programs. Three example situations were developed to demonstrate the system decision making; primarily comparisons of vendor and

Garret testing of the same casting/forging and/or comparing different vendors. Further improvements were discussed and recommendations made. Although the system was designed specifically for use by Garrett, it could be used by statistically experienced or inexperienced quality assurance personnel in other firms and/or manufacturing disciplines. GRA

N86-29267# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
CORRELATION OF PINCH WELD STRENGTH WITH ACOUSTIC EMISSION
A. F. Riechman 1985 19 p Presented at the 46th DAMSUL Committee Meeting, Oak Ridge, Tenn., 5 Jun. 1985
(Contract DE-AC09-76SR-00001)
(DE86-008047; DP-MS-85-122; CONF-8506255-2) Avail: NTIS HC A02/MF A01

Acoustic emission (AE) data was collected during the pinch welding of 304L S.S. tubes similar to those used for fill stems on deuterium/tritium gas reservoirs. Attempts to correlate the AE data with welding variables and pinch weld strength were made. This work was done as one element of the Closure (Pinch Weld) Reliability Program. One of five main tasks of this program is to develop an technique to determine pinch weld quality. The main objective is to demonstrate a nondestructive test which is suitable for production use that will ensure high-strength pinch welds. DOE

N86-29268# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
TESTING THE QUALITY OF INDUSTRIAL PRODUCTS [QUALITE INDUSTRIELLE AUX ESSAIS]
C. Genty 1986 23 p In FRENCH Presented at colloquium Les Essais: Outils de la Qualite, 15-16 Oct. 1985
(SNIAS-861-430-113; ESA-86-97175) Avail: NTIS HC A02/MF A01

The quality control procedures, management system, and test design criteria adopted by a large aerospace company are reviewed. The whole quality sector is conceived as a separate industry where the product is the control test. All the management principles governing industrial organizations are then extended to quality control. ESA

N86-29269# Societe Nationale Industrielle Aerospatiale, Paris (France).
QUALITY IN THE YEAR 2000: A LINE DIVIDING CALCULATED RISK AND ERROR [LA QUALITE A L'HORIZON 2000: UNE LIGNE DE PARTAGE ENTRE LE RISQUE CALCULE ET L'ERREUR]
Georges Sertour 1986 19 p In FRENCH Presented at 7th AFCIQ Congress on Gestion par la Qualite, Paris, France, 1985
(SNIAS-861-551-102; DCQ-2/85; ESA-86-97177) Avail: NTIS HC A02/MF A01

The quality concepts necessary to the organization and efficiency of an industry are discussed. The construction of quality using available human and knowledge resources; the orientation of investment to provide for higher levels of quality potential; and the control of quality management are considered. Examples from the aerospace industry are given. ESA

N86-29270# Lawrence Livermore National Lab., Calif.
RELIABILITY ANALYSIS OF STIFF VERSUS FLEXIBLE PIPING Final Project Report
S. C. Lu and C. K. Chou May 1985 39 p
(Contract NRC-FIN-A0383)
(TI85-012990; NUREG/CR-4263; UCRL-20410) Avail: NTIS HC A03/MF A01

The overall objective of this research project is to develop a technical basis for flexible piping designs which will improve piping reliability and minimize the use of pipe supports, snubbers, and pipe whip restraints. The current study was conducted to establish the necessary groundwork based on the piping reliability analysis. A confirmatory piping reliability assessment for stiff versus flexible piping systems indicated that removing rigid supports tends, in general, to reduce thermal stress but to increase seismic stress in the pipe. As a result, piping design can be made more reliable by some reduction of rigid supports. It was observed that piping design using snubbers among support devices may not exhibit the intended reliability because snubbers often fail to perform the desired function. It was demonstrated that certain piping systems with snubbers removed actually exhibit higher reliability than do those of the original design. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N86-29271*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL CLASSICAL FLUTTER REESULTS OF A COMPOSITE ADVANCED TURBOPROP MODEL
O. Mehmed and K. R. V. Kaza Jul. 1986 18 p Presented at the Bisplinghoff Memorial Symposium on Recent Trends in Aeroelasticity, Structures and Structural Dynamics, Gainesville, Fla., 6-7 Feb., 1986; sponsored by Fla. Univ.
(NASA-TM-88792; E-3127; NAS 1.15:88792) Avail: NTIS HC A02/MF A01 CSCL 20K

Experimental results are presented that show the effects of blade pitch angle and number of blades on classical flutter of a composite advanced turboprop (propfan) model. An increase in the number of blades on the rotor or the blade pitch angle is destablizing which shows an aerodynamic coupling or cascade effect between blades. The flutter came in suddenly and all blades vibrated at the same frequency but at different amplitudes and with a common predominant phase angle between consecutive blades. This further indicates aerodynamic coupling between blades. The flutter frequency was between the first two blade normal modes, signifying an aerodynamic coupling between the normal modes. Flutter was observed at all blade pitch angles from small to large angles-of-attack of the blades. A strong blade response occurred, for four blades at the two-per-revolution (2P) frequency, when the rotor speed was near the crossing of the flutter mode frequency and the 2P order line. This is because the damping is low near the flutter condition and the interblade phase angle of the flutter mode and the 2P response are the same. Author

N86-29272*# Stanford Univ., Calif. Guidance and Control Lab.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF SENSOR LOCATION FOR OPTIMAL AEROELASTIC SYSTEM STATE ESTIMATION Final Report
Gang Liu Sep. 1985 182 p
(Grant NsG-4002)
(NASA-CR-177115; NAS 1.26:177115; SU-SUDAAR-552) Avail: NTIS HC A09/MF A01 CSCL 20K

One of the major concerns in the design of an active control system is obtaining the information needed for effective feedback. This involves the combination of sensing and estimation. A sensor location index is defined as the weighted sum of the mean square estimation errors in which the sensor locations can be regarded as estimator design parameters. The design goal is to choose these locations to minimize the sensor location index. The choice of the number of sensors is a tradeoff between the estimation quality based upon the same performance index and the total costs of installing and maintaining extra sensors. An experimental study for choosing the sensor location was conducted on an aeroelastic system. The system modeling which includes the unsteady aerodynamics model developed by Stephen Rock was improved. Experimental results verify the trend of the theoretical predictions of the sensor location index for different sensor locations at various wind speeds. Author

N86-29273*# Kansas Univ. Center for Research, Inc., Lawrence.
ECONOMIC EVALUATION OF COMPUTERIZED STRUCTURAL ANALYSIS Final Report
Paul E. Fortin Aug. 1985 13 p
(Grant NCC2-251)
(NASA-CR-177078; NAS 1.26:177078) Avail: NTIS HC A02/MF A01 CSCL 20K

This completed effort involved a technical and economic study of the capabilities of computer programs in the area of structural analysis. The applicability of the programs to NASA projects and to other users was studied. The applications in other industries was explored including both research and development and applied areas. The costs of several alternative analysis programs were compared. A literature search covered applicable technical literature including journals, trade publications and books. In addition to the literature search, several commercial companies that have developed computerized structural analysis programs were contacted and their technical brochures reviewed. These programs include SDRC I-DEAS, MSC/NASTRAN, SCADA, SUPERSAP, NISA/DISPLAY, STAAD-III, MICAS, GTSTRUDL, and STARS. These programs were briefly reviewed as applicable to NASA projects. Author

N86-29274*# National Aeronautics and Space Administration, Washington, D.C.
THE MECHANICS OF SOLIDS IN THE PLASTICALLY-DEFORMABLE STATE
R. V. Mises Jul. 1986 19 p Transl. into ENGLISH from Nachrichten von der Koeniglichen Gesellschaft der Wissenschaften (West Germany), 1913 p 582-592 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88448; NAS 1.15:88448) Avail: NTIS HC A02/MF A01 CSCL 20K

The mechanics of continua, which is based on the general stress model of Cauchy, up to the present has almost exclusively been applied to liquid and solid elastic bodies. Saint-Venant has developed a theory for the plastic or remaining form changes of solids, but it does not give the required number of equations for determining motion. A complete set of equations of motion for plastic deformable bodies is derived. This is done within the framework of Cauch mechanics. And it is supported by certain experimental facts which characterize the range of applications. E.R.

N86-29275# Centre de Recherches de l'Inst. Superieur Industriel Catholique du Hainaut (Belgium).
COMPUTER PROGRAMS FOR THE DETERMINATION OF STRESSES AND DISPLACEMENTS IN FOUR LAYERED SYSTEMS WITH FIXED BOTTOM Final Report
F. van Cauwelaert, M. Lequeux, and F. Delaunois Feb. 1986 162 p
(Contracts DAJA45-85-C-0013; DA Proj. 1T1-61102.BH-57)
(AD-A166441) Avail: NTIS HC A08/MF A01 CSCL 13/2

This report deals with the mathematical aspects required for the establishment of a computer program able to calculate all stresses and displacements in a four layered system. The materials of the different layers may be isotropic or anisotropic. The interface conditions cover all the cases from full friction to full slip including partial friction. The bottom of the fourth layer is considered to be fixed (no vertical deflections). The report is based on (1) previous research on isotropic multilayer theory and (2) original research on interface conditions (fixed bottom, partial friction) and satisfactory convergency. This report contains: (1) a theoretical outline wherein the basic equations are given, the specific boundary conditions discussed and the particular numerical problems related to the accuracy at the surface and in the first layer are solved; (2) the general mathematical analysis of the chosen numerical solution and a description of the programs and their utilization; and (3) appendices, detailed mathematical and algebrical analyses for the different considered cases. The programs are written in FORTRAN 77 and run on IBM PC or other compatible equipment. GRA

N86-29276# Australian Atomic Energy Commission, Lucas Heights.
RESULTS OF PIPE BEND ANALYSIS. PART 12: STRESSES IN ELBOWS WITH LONG TANGENTS UNDER OUT-OF-PLANE BENDING
J. F. Whatham May 1985 61 p
(DE86-700535; AAEC/E-605-Pt-12) Avail: NTIS (US Sales Only) HC A04/MF A01

Graphs of outside surface stress distributions are presented and numerical values of stresses on inside and outside surfaces tabulated for a wide range of 90 deg pipe bends with long tangent pipes subjected to out-of-plane bending. The calculations are based on linear thin shell theory. A computer program, BENDPAC, was designed to calculate the stresses in and the flexibility of pipe bends with tangents under in-plane or out-of-plane bending, or flanged pipe bends under any loading. DOE

N86-29277# Ames Lab., Iowa.
PREDICTING INITIATION OF CRACK GROWTH UNDER STRESS CORROSION CRACKING CONDITIONS
R. Ranjan and O. Buck 1985 26 p Presented at the American Society of Mechanical Engineers Winter Annual Meeting, Miami, Fla., 17 Nov. 1985
(Contract W-7405-eng-82)
(DE85-015515; IS-M-550; CONF-851125-20) Avail: NTIS HC A03/MF A01

Under stress corrosion conditions, the major portion of the useful life of a structure is spent in initiation and growth of microcracks, often referred to as the incubation period. Although this period can be a very large fraction of the total time to failure, the prediction of the remaining life of the component during this period is very difficult since there is still a lack of understanding of the processes involved in incubation. To overcome these difficulties, a physical model was developed which, at the present time, is specific to stress corrosion cracking of Cu-30 Zn brass in a nontarnishing ammoniacal solution. The predictions of the model in terms of time to initiation have been tested using experimental data of the effects of applied potential on crack initiation. Coupling of simple nondestructive testing techniques with metallographic observations and scanning electron microscopy provided information on the transition from corrosion pitting to microcrack initiation. Implications of this research on nondestructive evaluation of a component under stress corrosion conditions are discussed. DOE

N86-29278# Stanford Univ., Calif Div. of Applied Mechanics.
CONSISTENT RETURN MAPPING ALGORITHM FOR PLANE STRESS ELASTOPLASTICITY
J. C. Simo and R. L. Taylor May 1985 31 p Prepared in cooperation with California Univ., Berkeley
(Contract C-W-7405-eng-48)
(DE86-006901; UCB/SESM-85/04) Avail: NTIS HC A03/MF A01

An unconditionally stable algorithm for plane stress elastoplasticity is developed, based upon the motion of elastic predictor return mapping (plastic corrector). Enforcement of the consistency condition is shown to reduce to the solution of a simple nonlinear equation. Consistent elastoplastic tangent moduli are obtained by exact linearization of the algorithm. Use of these moduli is essential in order to preserve the asymptotic rate of quadratic convergence of Newton methods. An exact solution for constant strain rate over the typical time step is derived. On the basis of this solution the accuracy of the algorithm is assessed by means of iso-error maps. The excellent performance of the algorithm for large time steps is illustrated in numerical experiments. DOE

N86-29279# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Dir. Scientifique de la Resistance des Structures.
BOUNDARY LAYER MODEL TO COMPUTE THE EDGE EFFECTS IN STRATIFIED COMPOSITE PLATES Final Report [UN MODELE DE COUCHE LIMITE POUR LE CALCUL DES EFFETS

DE BORD DANS LES PLAQUES STRATIFIEES COMPOSITES]
R. Girard Oct. 1985 21 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-7/3542-RY-041-R; ESA-86-97202) Avail: NTIS HC A02/MF A01

The limit conditions are used to modify the classical solution to satisfy the three dimensional conditions, in order to study a complex stress distribution that could result in composite layer delaminating. The general equations of a zero order model are presented. They reveal the interface complex conditions, which are theoretically simple to solve. The practical solutions are not simple, and the particular cases for which a comparison with analytical solutions is possible, are discussed. ESA

N86-29280# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Dir. Scientifique de la Resistance des Structures.
STRESS APPROXIMATION IN COMPOSITE PLATES Final Report [UNE APPROXIMATION DES CONTRAINTES DANS LES PLAQUES COMPOSITES]
R. Girard Oct. 1985 24 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-27/3043-RY-043-R; ESA-86-97203) Avail: NTIS HC A02/MF A01

A model to describe the stress variations within a composite plate is presented and compared to the exact analytical solution of a flexing plate. The numerical solution follows a modified Hellinger-Reissner principle. The results show that stress and strain in the same plane are correctly approximated while the strain along a transversal plane is not correct. ESA

N86-29281# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
A BOUNDARY ELEMENT METHOD FOR THREE-DIMENSIONAL CRACK PROBLEMS
Ernst P. Stephan and Martin Costabel Oct. 1985 11 p Presented at 4th International Symposium on Numerical Methods in Engineering, Atlanta, Ga., 24-28 Mar. 1986
(Grant NSF G-37-634)
(Preprint-941; ESA-86-97428) Avail: NTIS HC A02/MF A01

Boundary integral equations for the Dirichlet and the Neumann crack problem of three-dimensional linear elasticity are presented. It is shown that the crack problem can be reduced to a system of first kind boundary integral equations with the unknown density function being the jump of stresses (in the Dirichlet case) and the jump of the displacements (in the Neumann case) across the crack surface. Existence, uniqueness, and regularity results for the solution of the integral equations are established in appropriate Sobolev spaces. The integral equations are used to derive the asymptotic expansion of their solution showing its singular behavior near the edge of the crack surface. By adding singular elements which simulate this edge behavior to the regular splines as test and trial functions, an augmented Galerkin procedure is performed for the boundary integral equations to obtain an improved rate of convergence for the approximate solution. ESA

42 GEOSCIENCES (GENERAL)

N86-29282*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCEEDINGS OF THE SECOND PILOT CLIMATE DATA SYSTEM WORKSHOP
1986 268 p Workshop held in Greenbelt, Md., 29-30 Jan. 1986
(NASA-CP-2430; NAS 1.55:2430) Avail: NTIS HC A12/MF A01 CSCL 04B

The proceedings of the workshop held on January 29 and 30, 1986 are discussed. Data management, satellite radiance data, clouds, ultraviolet flux variations in the upper atmosphere, rainfall during El Nino events, and the use of optical disks are among the topics covered. For individual titles, see N86-29283 through N86-29300.

N86-29283*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROGRAM STATUS c47
Paul Smith *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 19 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The Pilot Climate Data System (PCDS) was designed to support a variety of users that have been arbitrarily categorized into four groups: researchers, data producers, occasional users, and management. The expanding capabilities of the system are attracting the attention of both academic and other scientific institutions worldwide. Highlighted by progress in networking capabilities, hardware acquisitions, software developments, data set additions, and tutorial developments, exciting advances have taken place since the First PCDS Workshop. In the plans for the 1986 fiscal year, recommendations from an ad hoc users' group meeting in May 1985 and from the First PCDS workshop are apparent. This year's plans are listed, along with comments made at the users' group meeting. Although the PCDS is presently considered to be in a developmental phase, plans for making the transition to an operational phase are being implemented. Author

N86-29284*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PCDS OVERVIEW c62
Lloyd Treinish *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 18 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

A brief overview of the philosophy, design, and organization of the Pilot Climate Data System (PCDS) is presented. The design has evolved, over time, to deal with numerous data sets, provide appropriate tools for the manipulation and display of such data, and support a wide variety of users. The user interface to the system is provided by the Transportable Applications Executive (TAE). A user can choose one of the five major subsystems from the root menu display. These subsystems are CATALOG, INVENTORY, DATA ACCESS, DATA MANIPULATION, and GRAPHICS. Each subsystem was discussed and examples were given, demonstrating the flexibility provided by the existing PCDS software, Version 3.3. Three of these subsystems are presently being redesigned to provide a more flexible and friendly structure, to allow more consistency and facilitate the ability to support new data sets. Ongoing developmental efforts to migrate from the Version 3.3 prototype phase of PCDS to the operational Version 4.0 stress increased flexibility and data independence. Author

N86-29285*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA SET MANAGEMENT c61
Mary Reph *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 17 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The data sets currently supported by the Pilot Climate Data System (PCDS) are listed, many of which are Level II and Level III Nimbus-7 data sets. Those data sets planned for future access through the PCDS were also listed, and their current installation status was stated. The tasks involved in supporting data sets within the PCDS were identified and described. After a data set is approved for implementation into the system and communication with the data producers is established, the information for the detailed catalog entry is gathered. This information then is reviewed with the scientists involved before producing a catalog summary. Once this is done, the catalog information can be provided to users, even before the data set is installed. The next several tasks involve software development and can prove to be the most time-consuming aspect in the data set support. These tasks can be simplified if the data producers provide complete and accurate

documentation of their product. Software for reading and interpreting the data sets is developed and the data sets, or portions therefore, that will be made available for use within the PCDS are inventoried. Users can access this information via the INVENTORY Subsystem of the PCDS. Author

N86-29286*# Science Applications Research, Lanham, Md.
DEMONSTRATION OF NEW PCSD CAPABILITIES c61
Michael Grough *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 8 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The new, more flexible and more friendly graphics capabilities to be available in later releases of the Pilot Climate Data System were demonstrated. The LIMS-LAMAT data set was chosen to illustrate these new capabilities. Pseudocolor and animation were used to represent the third and fourth dimensions, expanding the analytical capabilities available through the traditional two-dimensional x-y plot. In the new version, variables for the axes are chosen by scrolling through viable selections. This scrolling feature is a function of the new user interface customization. The new graphics are extremely user friendly and should free the scientist to look at data and converse with it, without doing any programming. The system is designed to rapidly plot any variable versus any other variable and animate by any variable. Any one plot in itself is not extraordinary; however, the fact that a user can generate the plots instead of a programmer distinguishes the graphics capabilities of the PCDS from other software packages. In addition, with the new CDF design, the system will become more generic, and the new graphics will become much more rigorous in the area of correlative studies. Author

N86-29287*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
ISCCP REDUCED RESOLUTION SATELLITE RADIANCE DATA c47
William Rossow *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 23 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The International Satellite Cloud Climatology Project (ISCCP) is the first active project of the World Climate Research Program. It is a multinational data collection project focused on collecting a data set that will improve the ability to predict and/or simulate the radiative effects of clouds on climate. For specified cloud parameters, the goals are to archieve values for 3-hour periods over the whole globe for 5 years at 30 km resolution. The task of collecting and processing radiance data from both geosynchronous and polar orbiting satellites began in July 1983. A diagram was shown illustrating the flow of data from the transmitting satellites to the various receiving institutions that handle it. The various stages of processing were then explained in detail, emphasizing Level B3-normalized, reformatted, reduced raw satellite data. The reduction of data by sampling is an essential step in the flow. By the time the ISCCP data reaches the Global Processing Center at Goddard Institute for Space Studies (GISS), the volume has been reduced by a factor of 1000. The Pilot Climate Data System (PLDS) will provide access to the ISCCP data set. It should prove to be one of the cleanest satellite data sets because it will have been through three filters--that of the operational agency, the Global Processing Center, and the PCDS. The ISCCP data set also includes other correlative data sets delivered in compatible format. Author

N86-29288*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE FIRE PROJECT c47
David McDougal *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 11 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The International Satellite Cloud Climatology Project's (ISCCP) First ISCCP Regional Experiment (FIRE) project is a program to validate the cloud parameters derived by the ISCCP. The 4- to 5-year program will concentrate on clouds in the continental United States, particularly cirrus and marine stratocumulus clouds. As part of the validation process, FIRE will acquire satellite, aircraft, balloon, and surface data. These data (except for the satellite data) will be amalgamated into one common data set. Plans are to generate a standardized format structure for use in the PCDS. Data collection will begin in April 1986, but will not be available to the general scientific community until 1987 or 1988. Additional pertinent data sets already reside in the PCDS. Other qualifications of the PCDS for use in this validation program were enumerated. Author

N86-29289*# Iowa State Univ. of Science and Technology, Ames. Dept. of Meteorology.
USING PCDS TO STUDY THE INFLUENCE OF UV FLUX VARIATION ON THE MIDDLE ATMOSPHERE c47
Warren Heilman *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 12 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The value of the Pilot Climate Data System (PCDS) in examining the influences of short-period solar flux variations on the middle atmosphere was demonstrated. Several Nimbus satellite data sets proposed for the study exist in the PCDS. Planned for retrieval through the PCDS are ozone mixing ratios and cumulative ozone profiles available from the Backscatter Ultraviolet Spectrophotometer on Nimbus-4. Also to be accessed are Nimbus-7 data sets that will provide ozone and nitrogen dioxide mixing ratios, temperature profiles from the Limb Infrared Monitor of the Stratosphere, and ozone mixing ratio profiles from the Solar Backscatter Ultraviolet Spectrophotometer. Bypassing the time-consuming process of reading raw data tapes, the researchers plan to transfer the PCDS processed data to an IBM PC at Iowa State University. The IBM PC will serve as an intermediate vehicle for transferring the data to the NOAA CYBER 840 at Boulder, Colorado, where research will continue on both an eight-layer radiative-photochemical numerical model and on a nonlinear dynamical model. in this research are the FGGE and ERB data sets. These relevant data sets also reside in the PCDS. Problems associated with remote access to the PCDS were discussed in regard to all the PCDS data sets. Author

N86-29290*# Michigan Univ., Ann Arbor.
PCDS AS A TOOL IN TEACHING AND RESEARCH AT THE UNIVERSITY OF MICHIGAN c47
Vincent Abreu *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 3 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The Space Physics Research Laboratory's (SPRL) use of the Pilot Climate Data System (PCDS) is discussed. For this purpose, a computer center was established to provide the hardware and software necessary to fully utilize existing data bases for research and teaching purposes. A schematic of the SPRL network is given. The core of the system consists of two VAX 11/750s and a VAX 8600, networked through ETHERNET to several LSI 11/23 microprocessors. Much of the system is used for external communications with major networks and data centers. A VAX 11/750 provides DECNET services through the SPAN network to the PCDS. A functional diagram of PCDS usage is given. The browsing capabilities of the PCDS are used to generate data files, which are later transferred to the SPRL center for further data manipulation and display. This mode of operation for classroom instruction will be used to effectively use terminals and to simplify usage of the data base. The Atmosphere Explorer data base has been used successfully in a similar manner in courses related to the thermosphere and ionosphere. The main motivation to access the PCDS was to complement research efforts related to the High Resolution Doppler Imager (HRDI), to be flown on the Upper Atmosphere Research Satellite (UARS). Author

N86-29291*# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite Data and

Informat.

PLANNING FOR THE UTILIZATION OF THE PCDS IN STUDYING THE INTERACTION OF CLOUDS (ISCCP-C DATA) AND THE EARTH RADIATION BUDGET (ERBE DATA) **c47**

Herbert Jacobowitz *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 7 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

The Pilot Climate Data System (PCDS) affords an opportunity to analyze data from different but highly complementary data sets. Two of these highly complementary data sets supported by the PCDS are the International Satellite Cloud Climatology Project (ISCCP) and the Earth Radiation Budget Experiment (ERBE). Both data set sponsors are aware of the utility of one data set to the other, and both projects utilize gridded data on a 2.5 deg by 2.5 deg grid. The ISCCP data have been collected since July 1983, and the NOAA-9 data for ERBE have been collected for more than a year. Therefore, there is a good chance to use these temporally overlapping data sets to investigate hypothesized relationships. Changes in cloudiness affect both cloud albedo feedback (shortwave) and the greenhouse effect (longwave). The relative importance of the effects of clouds on albedo versus outgoing longwave radiation (OLR) in determining the radiation balance has long been a matter of controversy. Now, however, changes in cloud amount as observed by the ISCCPO can be correlated to corresponding changes in the albedo and changes in the OLR from ERBE. Monthly means can be utilized in all instances. Author

N86-29292*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

UV ALBEDO OF CLOUDS FROM TOMS DATA **c47**

David Short *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 8 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

The Pilot Climate Data System (PCDS) was found to be useful in examining a subset of data from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS). The TOMS instrument scans with six channels between .3 and .4 micrometers. It was suggested that by analyzing albedo values from the longer wavelength channels of the TOMS, the effects of increasing optical depth could be determined. It is spectral relationship of albedo-to-optical depth that is investigated here. The question can be stated: Is there spectral differentiation in albedo with changes in the optical depth of clouds? Nimbus-7 TOMS data were obtained through the PCDS for an area and time period for which correlative NOAA AVHRR data were available. The AVHRR data were important in determining the existing cloud patterns. As expected, no spectral differentiation was observed at very high albedos (associated with high optical depths). However, at lower optical depths, evidence of spectral dependence on albedo was observed. Mapping the results geographically was deemed highly desirable but was not possible through the PCDS at the time. The PCDS can be viewed as an effective research tool to access selected portions of data. Without being intimately familiar with a data set, a PCDS user can successfully manipulate data in a scientific study. Author

N86-29293*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ANALYSIS OF RAINFALL OVER NORTHERN PERU DURING EL NINO: A PCDS APPLICATION **c47**

Richard Goldberg and Gilberto Tisnado (Instituto Nacional de Investigacion de Transportes (Peru).) *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 23 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

In an examination of GOES satellite data during the 1982 through 1983 El Nino period, the appearance of lee wave cloud patterns was revealed. A correlation was hypothesized relating an anomalous easterly flow across the Andes with the appearance of these wave patterns and with the subsequent onset of intense rainfall. The cloud patterns are belived to be associated with the El Nino period and could be viewed as precursors to significant changes in weather patterns. The ultimate goal of the researchers will be the ability to predict occurrences of rainstorms associated with the appearance of lee waves and related cloud patterns as harbingers of destruction caused by flooding, huaycos, and other catastrophic consequences of heavy and abnormal rainfall. Rainfall data from about 70 stations in northern Peru from 1980 through 1984 were formatted to be utilized within the Pilot Climate Data System (PCDS). This time period includes the 1982 through 1983 El Nino period. As an example of the approach, a well-pronounced lee wave pattern was shown from a GOES satellite image of April 4, 1983. The ground truth data were then displayed via the PCDS to graphically demonstrate the increase in intensity and areal distribution of rainfall in the northern Peruvian area in the next 4 to 5 days. Author

N86-29294*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

CENTRAL ON-LINE DATA DIRECTORY **c82**

James Thieman *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 3 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

The National Space Science Data Center (NSSDC) Central On-Line Data Directory (CODD), which allows the general scientist remote access to information about data sets available not only at NSSDC, but throughout the scientific community, is discussed. A user may search for data set information within CODD by specifying spacecraft name, experiment name, investigator name, and/or keywords. CODD will include information on atmospheric science data sets contained not only within the PCDS, but also within other data sets that are deemed important. Keywords to be used in locating these data sets are currently being formulated. The main type of keyword to be used for categorization of data sets will be discipline related. The primary discipline keyword for PCDS-type data sets would be ATMOSPHERIC SCIENCE. A good set of subdiscipline keywords is needed under this discipline to subdivide the data sets. A sheet containing a strawman set of subdiscipline keywords was distributed, and a request was made for the knowledgeable scientists to modify or replace the proposed keywords. Author

N86-29295*# Pennsylvania State Univ., University Park. Dept. of Meteorology.

UNIVERSITY PARTICIPATION VIA UNIDATA, PART 1 **c82**

John Dutton *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 7 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

The UNIDATA Project is a cooperative university project, operated by the University Corporation for Atmospheric Research (UCAR) with National Science Foundation (NSF) funding, aimed at providing interactive communication and computations to the university community in the atmospheric and oceanic sciences. The initial focus has been on providing access to data for weather analysis and prediction. However, UNIDATA is in the process of expanding and possibly providing access to the Pilot Climate Data System (PCDS) through the UNIDATA system in an effort to develop prototypes for an Earth science information system. The notion of an Earth science information system evolved from discussions within NASA and several advisory committees in anticipation of receiving data from the many Earth observing instruments on the space station complex (Earth Observing System). Author

N86-29296*# University Corp. for Atmospheric Research, Boulder, Colo.

UNIVERSITY PARTICIPATION VIA UNIDATA, PART 2 **c82**

David W. Fulker *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 3 p (For primary document see N86-29282 20-42)

Avail: NTIS HC A12/MF A01 CSCL 04B

The University Corporation for Atmospheric Research (UCAR)

is presently completing UNIDATA, Phase II, considered to be the design phase of the UNIDATA Project. The four major components of the UNIDATA System are: (1) global services which access is provided, (2) long haul communication for providing that access, (3) local services for providing access and local management of acquired data, and (4) local interactive processing and graphical display. Each component is described in detail with linkages among the components elucidated. Within this framework, access to the PCDS is discussed. It is pointed out that access to the PCDS could occur via general purpose computer-to-computer communications providing remote log on to the system. The UNIDATA System could also be used to transfer information from the PCDS, provided the appropriate software is available to receive the data. Both of these scenarios require agreements on the access protocols and appropriate physical connections. Universities' needs for weather information on a near real-time basis, and UNIDATA has already established a satellite broadcast data service for this purpose.
Author

N86-29297*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NETWORK ACCESS TO PCDS (SPAN, ESN, SESNET, ARPANET) **c82**
James Green *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 29 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

One of the major goals of the National Space Science Data Center is to increase access to NASA data systems by enhancing networking activities. The activities are centered around three basic networking systems: the Space Physics Analysis Network (SPAN); the Earth Science Network (ESN); and the NASA Packet Switched System (NPSS). Each system is described, linkages among systems are explained, and future plans are announced. The inclusion of several new climate nodes on SPAN or ESN are also mentioned. Presently, the Pilot Climate Data System is accessible through SPAN and will be accessible through NPSS by summer and ESN by the end of 1986. Ambitious plans for implementation are underway. The implementation of these plans will represent a major advance in the utilization and accessibility of data worldwide.
Author

N86-29298*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHODS OF DOWNLOADING TO USER INSTITUTIONS **c82**
Lloyd Treinish *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 10 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The Pilot Climate Data System (PCDS) not only supports the ability to output data in a uniform structure via the Common Data Format (CDF, but also supports the ability to provide data in native format for any data set supported by the PCDS. Methods are discussed for acquiring data in either format from the PCDS for further work at remote sites. Four levels of remote utilization are defined, based on the extent of offloading the National Space Science Data Center (NSSDC) computer and local PCDS processing. Characteristics of each level are thoroughly explained, including details of information and data transfers, downloading, uploading, and offloading of the NSSDC computer. Only the levels themselves are specified here. The first level defined is that of a network-based distributed PCDS. A subset of the PCDS software is ported to another VAX and made available on a network (i.e., SPAN) node. There is no subset of the PCDS at the second level, but it is also network based. Non-network utilization of the PCDS, requiring dial-up log on, is denoted as a third level. Finally, at the fourth level, personal computer utilization of the PCDS through dial-up log on with proper terminal emulation is defined.
Author

N86-29299*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTICAL DISKS **c35**
Brian Lopez-Swafford *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 9 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

A comprehensive overview of the different types of optical storage technology is presented. Research efforts to integrate this technology into the VAX/VMS environment are discussed. In addition, plans for future applications of optical disk technology are described. The applications should prove to be beneficial to the NSSDC user community as a whole. Of particular interest is the concentration on the collaboration with the Dynamics Explorer project.
Author

N86-29300*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE CDF SOFTWARE PACKAGE **c61**
C. Edwin Wilson *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 11 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

The concepts that are fundamental to the new Common Data Format are outlined. With Pilot Climate Data System (PCDS) Version 4.0, the Common Data Format (CDF) will supersede the Climate Data File (also CDF) or earlier versions. This new format incorporates generalizations in both design and terminology that make it applicable to multidisciplinary data sets. Furthermore, the new CDF will be made available to programmers as a software package that shields them from the low-level details of file formats. The CDF interface routines create an abstract conceptual environment for the scientific programmer. The principle concept for visualizing a CDF is known as the basic grid. A basic grid is an n-dimensional block by means of which a CDF is constructed. The size of the block may vary from one CDF to another, but is consistent within any individual CDF. Thus, the basic grid serves as a fundamental uniform building block for a CDF. The number of grid dimensions and the size of each dimension are chosen by the scientist/programmer to represent the patterns by which data are structured. The uniform grid structure appears to the programmer to be propagated into each record for each variable. The CDF stores a variable value for each lattice point of the grid for each record. These data values are inserted and retrieved simply by specifying the variable's identifier, a record number, and the indices that specify the lattice point of interest.
Author

N86-29301*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THERMOSPHERE DYNAMICS WORKSHOP, VOLUME 2
Hans G. Mayr, ed. and Nathan J. Miller, ed. Jun. 1986 461 p Workshop held in Beltsville and Calverton, Md., 3-5 Oct. 1984
Original contains color illustrations
(NASA-CP-2389; Rept-85B0268; NAS 1.55:2389) Avail: NTIS HC A20/MF A01 CSCL 04A

Atmospheric observations reported on include recent measurements of thermospherical composition, gas temperatures, auroral emissions, ion-neutral collisional coupling, electric fields, and plasma convection. Theoretical studies reported on include model calculations of thermospherical general circulation, thermospheric tides, thermospheric tidal coupling to the lower atmosphere, interactions between thermospheic chemistry and dynamics and thermosphere-ionosphere coupling processes. The abstracts provide details given in each talk but the figures represent the fundamental information exchanged within the workshop For individual titles, see N86-29302 through N86-29338.

N86-29302*# National Center for Atmospheric Research, Boulder, Colo.
APPLICATIONS OF A VENUS THERMOSPHERIC CIRCULATION MODEL **c91**
S. W. Bougher, R. E. Dickinson, E. C. Ridley, and R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 1-21 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

A variety of Pioneer Venus observations suggest a global scale, day-to-night Venus thermospheric circulation. Model studies of the dynamics and energetics of the Venus thermosphere are presented in order to address new driving, mixing and cooling mechanisms for an improved model simulation. The adopted approach was to reexamine the circulation by first using a previous two dimensional code to quantify those physical processes which can be inferred from the Pioneer Venus observations. Specifically, the model was used to perform sensitivity studies to determine the degree to which eddy cooling, eddy or wave drag, eddy diffusion and 15 micrometer radiational cooling are necessary to bring the model temperature and composition fields into agreement with observations. Three EUV heating cases were isolated for study. Global temperature and composition fields in good agreement with Pioneer data were obtained. Large scale horizontal winds < 220 m/s were found to be consistent with the observed cold nightside temperatures and dayside bulges of O, CO and CO2. Observed dayside temperatures were obtained by using a 7 to 19% EUV heating efficiency profile. The enhanced 15 micrometer cooling needed for thermal balance is obtained using the best rate coefficient available for atomic O collisional excitation of CO2(0, 1,0). Eddy conduction was not found to be a viable cooling mechanism due to the weakened global circulation. The strong 15 micrometer damping and low EUV efficiency imply a very weak dependence of the general circulation to solar cycle variability. The NCAR terrestrial thermospheric general circulation model was adapted for Venus inputs using the above two dimensional model parameters, to give a three dimensional benchmark for future Venus modelling work. Author

N86-29303*# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.

DYNAMICS OF THE NIGHTTIME THERMOSPHERE AT ARECIBO **c46**

R. G. Burnside, J. C. G. Walker, and C. A. Tepley (Arecibo Ionospheric Observatory, Puerto Rico.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 23-28 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

Incoherent scatter radar observations of the nighttime F layer at Arecibo, Puerto Rico, are used to determine the O+ diffusion velocity at different altitudes. Further analysis allows evaluation of the neutral wind and the ion-drag force in the direction of the magnetic meridian. The local acceleration of the meridional neutral wind is also determined. The possibility of evaluating the viscous force using incoherent scatter radar data was also investigated. Preliminary results indicate that, at certain times and at altitudes above about 350 km, viscous drag may be a significant term in the neutral equation of motion. Combining these results allows height profiles of the meridional pressure gradient to be deduced. The pressure gradients thus derived is compared with that determined from measurements of the horizontal temperature gradient and that given by the MSIS model atmosphere. Author

N86-29304*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.

MEDIUM AND LARGE-SCALE VARIATIONS OF DYNAMO-INDUCED ELECTRIC FIELDS FROM AE ION DRIFT MEASUREMENTS **c46**

W. R. Coley and J. P. McClure *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 29-50 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

Current models of the low latitude electric field are largely based on data from incoherent scatter radars. These observations are extended through the addition of the rather extensive high quality electric field measurements from the Ion Drift Meter (IDM) aboard the Atmosphere Explorer (AE) spacecraft. Some preliminary results obtained from the Unified Abstract files of satellite AE-E are presented. This satellite was active from the end of 1975 through June 1981 in various elliptical and circular orbits having an inclination near 20 deg. The resulting data can be examined for the variation of ion drift with latitude, longitude, season, solar cycle, altitude, and magnetic activity. The results presented deal primarily with latitudinal variations of the drift features. Diagrams of data are given and briefly interpreted. The preliminary results presented here indicate that IDM data from the AE and the more recent Dynamics Explorer B spacecraft should continue to disclose some interesting and previously unobserved dynamical features of the low latitude F region. Author

N86-29305*# Augsburg Coll., Minneapolis, Minn. Dept. of Physics.

ATOMIC NITROGEN DENSITIES NEAR THE POLAR CUSP **c46**

M. J. Engebretson and J. T. Nelson *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 51-61 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

The neutral atmospheric composition spectrometer on board the Dynamics Explorer 2 spacecraft sampled several major and minor thermospheric gases including atomic nitrogen. A selection of passes over the polar cusp that provide a quantitative measure of N densities in this region and provide evidence of localized density increases due to soft particle precipitation is presented. Increases in N densities are frequently observed but are smaller than accompanying increases in N2 densities. The observations support earlier studies suggesting that N densities increase more rapidly than O densities during periods of high solar EUV flux and N densities are larger in the summer hemisphere than in the winter hemisphere. A series of passes in February 1983, late in the lifetime of DE 2, indicated N densities at 200 km altitude were a factor of 2 larger near the southern cusp than near the northern cusp. Author

N86-29306*# National Center for Atmospheric Research, Boulder, Colo.

SIMULATION OF THE THERMOSPHERIC TIDES BY USE OF THE NCAR THERMOSPHERIC GENERAL CIRCULATION MODEL **c46**

C. G. Fensen, R. E. Dickinson, and R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 63-77 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

Numerical calculations of the thermospheric tidal winds and temperatures at equinox are presented. The calculations were made using the National Center for Atmospheric Research Thermospheric General Circulation Model (TGCM), which includes the effects of viscosity, conductivity, diffusion, ion drag, winds, and temperature gradients. The thermospheric diurnal and semidiurnal tides are excited in situ by solar heating and by ion-neutral momentum coupling. The semidiurnal tidal calculations also include the effects of upward propagating waves generated by heating in the lower atmosphere. This semidiurnal propagating component is modeled by use of the classical tidal perturbations as lower boundary conditions. The model is tuned by adjusting the propagating tidal forcing term until calculated semidiurnal wind and temperature fields best approximate incoherent scatter observations. The tidal-TGCM results are consistent with previous theoretical work and successfully reproduce high altitude temperature and meridional velocity data, but they give significantly lower magnitudes for velocities and temperatures near 160 km than are seen by observations. Author

N86-29307*# Boston Univ., Mass. Dept. of Electrical, Computer and Systems Eng.

TIDAL COUPLING WITH THE LOWER ATMOSPHERE (INVITED REVIEW) **c46**

Jeffrey M. Forbes *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 79-96 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

The various ways are reviewed in which propagating tidal components excited in the mesophere and below affect the structure of the thermosphere and ionosphere above 100 km.

Dynamo effects are not treated here. The physical processes affecting the propagation of upward propagating tides are examined and how they are interrelated in the context of a numerical model. Propagating diurnal and semidiurnal tides which reach thermospheric heights are excited primarily by insolation absorption by tropospheric water vapor (0 to 5 km) and stratospheric/mesospheric ozone (40 to 60 km), respectively. Simulation of these oscillations requires consideration of mean zonal winds and meridional temperature gradients, and the damping effects of turbulent and molecular dissipation, radiative cooling, and ion drag. These effects must be considered on a spherical rotating atmosphere extending from the ground to above 300 km, as they are in the model developed by Forbes depicted schematically.
Author

N86-29308*# National Center for Atmospheric Research, Boulder, Colo.
THE EFFECT OF BREAKING GRAVITY WAVES ON THE DYNAMICS AND CHEMISTRY OF THE MESOSPHERE AND LOWER THERMOSPHERE (INVITED REVIEW) c46
Rolando R. Garcia *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 97-103 Sponsored by NSF (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The influence of breaking gravity waves on the dynamics and chemical composition of the 60 to 110 km region is investigated with a two dimensional model that includes a parameterization of gravity wave momentum deposition and diffusion. The dynamical model is described by Garcia and Solomon (1983) and Solomon and Garcia (1983) and includes a complete chemical scheme for the mesosphere and lower thermosphere. The parameterization of Lindzen (1981) is used to calculate the momentum deposited and the turbulent diffusion produced by the gravity waves. It is found that wave momentum deposition drives a very vigorous mean meridional circulation, produces a very cold summer mesopause and reverse the zonal wind jets above about 85 km. The seasonal variation of the turbulent diffusion coefficient is consistent with the behavior of mesospheric turbulences inferred from MST radar echoes. The large degree of consistency between model results and various types of dynamical and chemical data supports very strongly the hypothesis that breaking gravity waves play a major role in determining the zonally-averaged dynamical and chemical structure of the 60 to 110 km region of the atmosphere.
Author

N86-29309*# Liege Univ. (Belgium). Inst. d'Astrophysique.
THERMOSPHERIC NITRIC OXIDE AND ITS ROLE IN THERMOSPHERIC DYNAMICS AND COMPOSITION c46
J.-Cl. Gerard and R. G. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 105-117 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The global distribution of thermospheric nitric oxide has been measured under different geophysical conditions by the Atmosphere Explorer (AE) and Solar Mesosphere Explorer (SME) satellites. These observations show a great variability in the NO concentration but the existence of a latitudinal gradient is clearly evidenced by statistical maps of the NO meridional distribution. A two dimensional zonally averaged chemical-dynamical model was used to investigate the importance of nitric oxide 5.3 micrometer cooling and its role on thermospheric temperature, dynamics and major gas composition. For this purpose, a 2-D background atmosphere code and an odd nitrogen code were coupled and run to steady state. The NO distribution obtained is in good agreement with the AE-D global picture calculated at solstice for solar minimum activity. The importance of each term in the thermodynamic equation was studied spatially. It is found that the NO I.R. cooling term competes with conduction in the upper thermosphere and reaches its maximum value near 200 km at high summer latitudes. The primary effect of including the NO cooling term is to increase the temperature in the upper winter thermosphere and decrease it in the other hemisphere, if the global average temperature is fixed. In general, the strength of the circulation is decreased and the thermal gradient is smoother. As a consequence of these changes in the wind and temperature fields, the O2, N2 and O densities also react to the effect of the NO cooling. The importance of this process depends on the level of solar activity which controls the NO distribution.
Author

N86-29310*# Polytechnic Inst. of New York, Farmingdale.
GLOBAL LARGE SCALE STRUCTURES IN THE F REGION c46
S. H. Gross *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 119-135 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Measurements of neutral densities, temperatures and ion density and temperature by the Atmosphere Explorer C and E satellites exhibit fluctuations made up of coherent waves of scale size from hundreds to thousands of kilometers. The fluctuations in the AE-C data are found at times of low magnetic activity to extend from the auroral region in one hemisphere across the equator to the corresponding region in the other hemisphere with little change in apparent wavelength. The fluctuations in the AE-E data similarly exhibit at times of low magnetic activity nearly uniform wave structure encircling the equatorial belt. Typical examples of waves of more than 1000 km apparent wavelength in both the AE-C and AE-E data are presented. These observations during quiet times may be explained by a system of quasi-stationary waves excited by the auroral belts that are distributed about the Earth possibly with tidal or sub-tidal periods and scale lengths determined by the structure of the belts. According to this interpretation, Traveling Ionospheric Disturbance (TID's) are manifestations of transient wave systems moving past a ground observatory that result from changes in magnetic activity with periods and scale sizes associated with the regions of enhanced auroral activity. Some evidence suggesting tidal-like stationary waves from the Millstone Hill incoherent scatter radar is presented.
Author

N86-29311*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.
THE MEASURED MOTIONS INSIDE EQUATORIAL PLASMA BUBBLES c46
W. B. Hanson and D. K. Bamgboye (Ilorin Univ., Nigeria) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 137-151 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

A preliminary study of the vertical and north-south horizontal ion motions in plasma bubbles in the near-equatorial ionosphere utilizing drift meter data from Atmosphere Explorer E is presented. High resolution data show that the vertical ion velocity in some bubbles increase approximately linearly with (N(0)-N)N, where N(0) is the background ion concentration and N is the bubble ion concentration. At sufficiently large N(0)/N the vertical ion velocity saturates, but often at a value substantially larger than the ratio of the gravitational acceleration to the ion neutral collision frequency. These larger than nominal velocities may result from background eastward electric fields and/or from a vertically elongated bubble cross section. The unanticipated observations that large poleward horizontal drifts accompany these vertical drifts seems to follow naturally from a redistribution of plasma along flux tubes as the plasma convects from the bottomside of the F region to high altitudes.
Author

N86-29312*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
UT/LONGITUDINAL VARIATIONS OF COMPOSITION IN DE DATA c46
A. E. Hedlin *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 153-162 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Composition data obtained by the quadrupole mass spectrome-

ter (NACS) carried aboard the DE-B satellite were examined for variations in the polar regions during magnetically quiet conditions. The corresponding predictions of the MSIS-83 model are often used for comparison. The MSIS-83 model is used to emphasize the variations of interest by suppressing all other variations. A persistent enhancement of N2 density and a depletion of He density are present in the vicinity of the magnetic poles with maximum density response in the morning hours (magnetic) on average. A universal time (UT) variation in average density levels is evident near both the geographic and magnetic poles. There are systematic morphology changes with UT and between summer and winter which are qualitatively consistent with the simple concept that thermospheric heating effects are shifted or spread in the downwind direction of the global circulation systems driven by EUV and magnetospheric sources. The magnitude of the UT variations is larger in the southern hemisphere and is larger in local winter than summer. Author

N86-29313*# Texas Univ. at Dallas, Richardson. Center for Space Science.
CONVECTION PATTERN MORPHOLOGY AND VARIATIONS (INVITED REVIEW) **c46**
R. A. Heelis *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 163-178 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

A fairly straightforward consideration of the interaction between a southward interplanetary magnetic field and the Earth's magnetic field will result in the prediction of a two cell convection pattern in the high latitude ionosphere. This is shown schematically where the antisunward flow at high latitudes results from the application of the solar wind electric field to the ionosphere and the return sunward flow results from an electric field generated in the plasma sheet to ensure continuity. This convection pattern can be quite easily characterized in terms of the radius of the approximately circular region containing the antisunward flow, called the polar cap and the maximum potential difference applied across this region. The convection pattern described is at least understandable in terms of solar wind/magnetosphere interaction in which open field lines are recirculated in the polar cap and a viscous interaction process exists near the flanks of the magnetosphere's equatorial plane giving rise to the lower latitude convection cells. Author

N86-29314*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERACTION OF THE EQUATORIAL MIDNIGHT PRESSURE BULGE AND THERMOSPHERIC ZONAL WINDS **c46**
F. A. Herrero *In its* Thermosphere Dynamics Workshop. Volume 2 Jun. 1986 p 179-184 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The zonal component of the thermospheric neutral wind in the equatorial region is found to flow eastward all night, having a minimum near midnight. The data, obtained by Spencer et al. on the Dynamics Explorer-2 (DE-2) satellite, and reported more recently by Wharton et al., indicate that the minimum feature is significant. The minimum is illustrated by a 4th order Fourier series fit to the data points reported by Wharton et al. A table gives the amplitudes and phases of the four harmonic components used with the estimated error for each amplitude. It is asked whether this behavior is due to the local passage of the equatorial midnight pressure bulge associated with the midnight temperature anomaly. If so, it is to be expected that other data characterizing the midnight temperature anomaly should show consistency with this observation, especially in view of the large changes observed in the zonal velocity in the midnight sector. Consistency in momentum conservation may be checked using available data from previous independent experiments. Such data, taken under similar conditions of solar activity, was substituted into the momentum equation and found to be consistent using a priori estimates of the effect of viscosity. Author

N86-29315*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
ION NEUTRAL COUPLING IN THE HIGH LATITUDE THERMOSPHERE, PART 1 **c46**
T. L. Killeen *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 185-187 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Measurements of the neutral wind in the polar F region from Dynamics Explorer-2 (DE-2) were used to illustrate asymmetries in the neutral circulation that are dependent on the sign of the B sub y component of the interplanetary magnetic field (IMF). Individual DE-2 orbits and averaged data sets from different Universal times are presented. The data are categorized according to the sign of the hourly averaged IMF B sub y component measured by ISEE-3 for the hour preceding the DE-2 measurement. The major features observed are: (1) an asymmetry in the polar cap neutral flow velocity with the region of most rapid antisunward flow shifting from the dawn side to the dusk side of the polar cap as B sub y changes from positive to negative; (2) a shift in magnetic local time of the region of entry of neutral gas into the polar cap from a location on the dawn side of the noon-midnight meridian for B sub y positive to one more biased towards the dusk side for B sub y negative; (3) an enhancement in the velocities associated with the dawn, anti-clockwise neutral vortex B suby y negative relative to those observed for B sub y positive. The B sub y neutral wind asymmetries can be explained by similar asymmetries, previously observed, in the polar ion convection pattern. They imply a direct causal relationship between solar wind/magnetosphere coupling and neutral thermospheric dynamics. Author

N86-29316*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
ION-NEUTRAL COUPLING IN THE HIGH LATITUDE THERMOSPHERE, PART 2 **c46**
T. L. Killeen *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 189-193 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

On the 24th November, 1982, The North-South (Bz) component of the Interplanetary Magnetic Field (IMF) became positive for a period of about 11 hours reaching a relatively large and steady value of approximately 25 nT. During this rare occurrence, the Dynamics Explorer-2 (DE-2) spacecraft was in a configuration that enabled the dynamics of both ionic and neutral species of the high latitude F region to be measured simultaneously along the track of the polar orbiting satellite. Results from two Northern (winter) polar passes of DE-2, extracted from a larger data set, are shown to illustrate the response of the neutral F region to ion drag forcing arising from a configuration of ion convection characteristics of strongly northward IMF. The measured neutral winds differ appreciably from those more commonly observed for periods of southward IMF. The multi-cellular ion drift pattern associated with positive Bz is observed to drive a similar but less structured and weaker neutral wind configuration in the winter polar cap. Major features of the ion drift pattern are mimicked by the neutral circulation but smaller scale and more irregular sturctures of ion flow are not. This is ascribed to the relatively long time constant (few hours) for momentum exchange between the ion and neutral gases. The results demonstrate that sunward flow of neutral gas can be established and maintained by ion drag in the central polar cap for positive Bz. Author

N86-29317*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
GEOSTROPHIC ADJUSTMENT IN A SHALLOW-WATER NUMERICAL MODEL AS IT RELATES TO THERMOSPHERIC DYNAMICS **c46**
M. F. Larsen and I. S. Mikkelsen (Danish Meteorological Inst., Copenhagen.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 195-204 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

The theory of geostrophic adjustment and its applications to the dynamics of the high latitude thermosphere have been discussed in previous papers based on a linearized treatment of the fluid dynamical equations. However, a linearized treatment is only valid for small Rossby numbers given by Ro = V/fL, where V is the wind speed, f is the local value of the Coriolis parameter, and L is a characteristic horizontal scale for the flow. For typical values in the auroral zone, the approximation is not reasonable for wind speeds greater than 25 m/s or so. A shallow-water (one layer) model was developed that includes the spherical geometry and full nonlinear dynamics in the momentum equations in order to isolate the effects of the nonlinearities on the adjustment process. A belt of accelerated winds between 60 deg and 70 deg latitude was used as the initial condition. The adjustment process was found to proceed as expected from the linear formulation, but that an asymmetry between the response for an eastward and westward flow results from the nonlinear curvature (centrifugal) terms. In general, the amplitude of an eastward flowing wind will be less after adjustment than a westward wind. For instance, if the initial wind velocity is 300 m/s, the linearized theory predicts a final wind speed of 240 m/s, regardless of the flow direction. However, the nonlinear curvature terms modify the response and produce a final wind speed of only 200 m/s for an initial eastward wind and a final wind speed of almost 300 m/s for an initial westward flow direction. Also, less gravity wave energy is produced by the adjustment of the westward flow than by the adjustment of the eastward flow. The implications are that the response of the thermosphere should be significantly different on the dawn and dusk sides of the auroral oval. Larger flow velocities would be expected on the dusk side since the plasma will accelerate the flow in a westward direction in that sector. Author

N86-29318*# Air Force Geophysics Lab., Hanscom AFB, Mass.
SATELLITE ACCELEROMETER MEASUREMENTS OF NEUTRAL DENSITY AND WINDS DURING GEOMAGNETIC STORMS c46
Frank A. Marcos and Jeffrey M. Forbes (Boston Univ., Mass.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 205-219 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

A new thermospheric wind measurement technique is reported which is based on a Satellite Electrostatic Triaxial Accelerometer (SETA) system capable of accurately measuring accelerations in the satellite's in-track, cross-track and radial directions. Data obtained during two time periods are presented. The first data set describes cross-track winds measured between 170 and 210 km during a 5-day period (25 to 29 March 1979) of mostly high geomagnetic activity. In the second data set, cross-track winds and neutral densities from SETA and exospheric temperatures from the Millstone Hill incoherent scatter radar are examined during an isolated magnetic substorm occurring on 21 March 1979. A polar thermospheric wind circulation consisting of a two cell horizontal convection pattern is reflected in both sets of cross-track acceleration measurements. The density response is highly asymmetric with respect to its day/night behavior. Latitude structures of the density response at successive times following the substorm peak suggest the equatorward propagation of a disturbance with a phase speed between 300 and 600 m/s. A deep depression in the density at high latitudes (less than 70 deg) is evident in conjunction with this phenomenon. The more efficient propagation of the disturbance to lower latitudes during the night is probably due to the midnight surge effect. Author

N86-29319*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRANSFER FUNCTION ANALYSIS OF THERMOSPHERIC PERTURBATIONS c46
H. G. Mayr, I. Harris, F. Varosi (Science Applications Research, Riverdale, Md.), F. A. Herrero, and N. W. Spencer *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 221-231 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Applying perturbation theory, a spectral model in terms of vectors spherical harmonics (Legendre polynomials) is used to describe the short term thermospheric perturbations originating in the auroral regions. The source may be Joule heating, particle precipitation or ExB ion drift-momentum coupling. A multiconstituent atmosphere is considered, allowing for the collisional momentum exchange between species including Ar, O2, N2, O, He and H. The coupled equations of energy, mass and momentum conservation are solved simultaneously for the major species N2 and O. Applying homogeneous boundary conditions, the integration is carred out from the Earth's surface up to 700 km. In the analysis, the spherical harmonics are treated as eigenfunctions, assuming that the Earth's rotation (and prevailing circulation) do not significantly affect perturbations with periods which are typically much less than one day. Under these simplifying assumptions, and given a particular source distribution in the vertical, a two dimensional transfer function is constructed to describe the three dimensional response of the atmosphere. In the order of increasing horizontal wave numbers (order of polynomials), this transfer function reveals five components. To compile the transfer function, the numerical computations are very time consuming (about 100 hours on a VAX for one particular vertical source distribution). However, given the transfer function, the atmospheric response in space and time (using Fourier integral representation) can be constructed with a few seconds of a central processing unit. This model is applied in a case study of wind and temperature measurements on the Dynamics Explorer B, which show features characteristic of a ringlike excitation source in the auroral oval. The data can be interpreted as gravity waves which are focused (and amplified) in the polar region and then are reflected to propagate toward lower latitudes. Author

N86-29320*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
EQUATORIAL THERMOSPHERIC MEASUREMENTS OF TEMPERATURES AND WINDS AT AREQUIPA, PERU c46
John W. Meriwether, Jr. and Manfred A. Biondi (Pittsburgh Univ., Pa.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 233-251 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Enhancement of FPI temperatures above quiet levels was observed a few hours after the start of magnetic activity. Magnitude of this enhancement is about 300 degrees. This is followed by relaxation to prestorm levels. Apparent average offset of RPI temperatures from mass spectrometer incoherent scatter radar by 100 to 200 degrees for relatively quiet times is also observed. There was a definite suggestion of a midnight thermal enhancement for April and August data, with a magnitude of about 100 degrees, seen in both 1983 and 1984 observations. There was a definite enhancement of 6300A surface brightness in the south as compared with other directions, probably connected to the tropical airglow arcs. Meridional winds were small (less than 25 m/s) throughout night. Indication of northward migration of the observed 6300A enhancement in the evening hours as observations approach local winter solstice. This is probably related to the observed poleward (to the south) meridional wind (of magnitude 50 m/s) in this period. Zonal component of winds always eastward, but speed approaches zero sooner near equinox than at summer solstice. Typical magnitude at peak is of order 100 to 150 m/s. Suggestion of zonal wind increase after twilight and recovery of 6300A emission for April data. Origin not clear but may be related to midnight thermal enhancement. Meridional wind virtually zero for equinox in 1983; shows evening flow towards winter hemisphere in early evening for solstice data. Suggestion of post-midnight surge in April 1984 data. No major effects associated with magnetic storm activity, but a suggestion of decrease in zonal component below nominal levels. Author

N86-29321*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
POLAR CAP OBSERVATIONS OF THERMOSPHERIC WINDS AND TEMPERATURES AT SONDRE STROMFJORD, GREEN-

LAND c46
John W. Meriwether, Jr. and P. Shih *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 253-261 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

An agreement of averaged temperatures with mass spectrometer incoherent scatter radar looked reasonable for several nights, but for many nights there are differences: (1) midnight period of cooling, and (2) temperature increases associated with overhead crossings of the auroral belt. The observed rise of the temperature before dawn in conjunction with the high 6300A intensities suggests a connection between the two effects: soft particle precipitation most likely candidate but frictional heating perhaps also a possibility. A comparison with the thermospheric general circulation model calculations also needed. The technique for formulating neutral wind vectors performs well in most cases. The observed patterns show evidence for abatement in the midnight sector in the meridional wind component at the separatix between the two cells with a frequency of the order of 20 to 25%, also observed in radar observations at Sondre Stromfjord. The observed patterns for magnetically quiet conditions show flow characteristic of the auroral belt, westward in evening followed by the midnight surge. The observed patterns for active conditions show dominance either by the evening cell or the morning cell, but most often the former. Author

N86-29322*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ZONAL WIND OBSERVATIONS DURING A GEOMAGNETIC STORM c46
N. J. Miller and N. W. Spencer *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 263-267 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

In situ measurements taken by the Wind and Temperature Spectrometer (WATS) onboard the Dynamics Explorer 2 spacecraft during a geomagnetic storm display zonal wind velocities that are reduced in the corotational direction as the storm intensifies. The data were taken within the altitudes 275 to 475 km in the dusk local time sector equatorward of the auroral region. Characteristic variations in the value of the Dst index of horizontal geomagnetic field strength are used to monitor the storm evolution. The detected global rise in atmospheric gas temperature indicates the development of thermospheric heating. Concurrent with that heating, reductions in corotational wind velocities were measured equatorward of the auroral region. Just after the sudden commencement, while thermospheric heating is intense in both hemispheres, eastward wind velocities in the northern hemisphere show reductions ranging from 500 m/s over high latitudes to 30 m/s over the geomagnetic equator. After 10 hours storm time, while northern thermospheric heating is diminishing, wind velocity reductions, distinct from those initially observed, begin to develop over southern latitudes. In the latter case, velocity reductions range from 300 m/s over the highest southern latitudes to 150 m/s over the geomagnetic equator and extend into the Northern Hemisphere. The observations highlight the interhemispheric asymmetry in the development of storm effects detected as enhanced gas temperatures and reduced eastward wind velocities. Zonal wind reductions over high latitudes can be attributed to the storm induced equatorward spread of westward polar cap plasma convection and the resulting plasma-neutral collisions. However, those collisions are less significant over low latitudes; so zonal wind reductions over low latitudes must be attributed to an equatorward extension of a thermospheric circulation pattern disrupted by high latitude collisions between neutrals transported via eastward winds and ions convecting westward. Author

N86-29323*# State Univ. of New York, Albany. Dept. of Atmospheric Science.
MEASUREMENTS OF THERMOSPHERIC RESPONSE TO AURORAL ACTIVITIES c46
S. Okano (Tohoku Univ., Sendai, Japan) and J. S. Kim *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 269-274 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The Joule heating produced by auroral electrojets and its thermospheric response can be studied by monitoring the thermospheric temperatures by optical methods; simultaneously, the concurrent auroral electrojet activities can be investigated by using geomagnetic records obtained from stations along a meridian close to the observation site of optical measurements. The measurements are reported of thermospheric response to auroral activities which were made at Albany (42.68 deg N, 73.82 deg W), New York on September 2, 1978 (UT) when an isolated substorm occured. The thermospheric temperatures were measured by using a high resolution Fabry-Perot interferometer that determines the line profiles of the (OI) 6300A line emission. The intensities and latitudinal positions of auroral electrojets were obtained by the analysis of magnetograms from the IMS Fort Churchill meridian chain stations. Author

N86-29324*# Massachusetts Inst. of Tech., Cambridge. Haystack Observatory.
INITIAL RESULTS OF THE GLOBAL THERMOSPHERIC MAPPING STUDY (GTMS) c46
W. L. Oliver, J. E. Salah, R. G. Musgrove, J. M. Holt, V. B. Wickwar (SRI International Corp., Menlo Park, Calif.), G. J. Hernandez (National Oceanic and Atmospheric Administration, Boulder, Colo.), and R. G. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 275-296 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The Global Thermospheric Mapping Study (GTMS) is a multi-technique experimental study of the thermosphere designed to map simultaneously its spatial and temporal morphology with a thoroughness and diversity of measurement techniques heretofore unachieved. The GTMS is designed around the Incoherent Scatter Radar Chain in the western hemisphere. The European incoherent scatter radars and the worldwide communities of Fabry-Perot interferometers, meteor wind radars, partial reflection drifts radars, MST radars, and satellite probes are included to extend the spatial coverage and types of measurements available. Theoretical and modeling support in the areas of thermospheric and ionospheric structure, tides, and electric fields are included to aid in program planning and data interpretation. Solar activity was low on the three observation days (F10.7 = 97, 98, 96) and magnetic conditions were unsettled to active (A = 10, 12, 20). All six incoherent scatter radar facilities collected data. Each collected F region data day and night while Saint Santin and Millstone Hill additionally collected E region data during daylight hours. Initial results from Sondrestrom and Millstone Hill are presented. Good quality Fabry Perot data were collected at Fritz Peak and San Jose dos Campos. Weather conditions produced poor results at Arequipa and Arecibo. Initial results from Fritz Peak are presented. Mesosphere/lower-thermosphere observations were conducted under the ATMAP organization. The magnetometer chains also were operational during this campaign. Initial thermospheric general circulation model predictions were made for assumed solar-geophysical conditions, and selected results are presented. Author

N86-29325*# University Coll., London (England). Dept. of Physics and Astronomy.
OBSERVATIONS OF VERTICAL WINDS AND THE ORIGIN OF THERMOSPHERIC GRAVITY WAVES LAUNCHED BY AURORAL SUBSTORMS AND WESTWARD TRAVELLING SURGES c46
David Rees *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 297-322 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Several sequences of observations of strong vertical winds in the upper thermosphere are discussed, in conjunction with models

of the generation of such winds. In the auroral oval, the strongest upward winds are observed in or close to regions of intense auroral precipitation and strong ionospheric currents. The strongest winds, of the order of 100 to 200 m/sec are usually upward, and are both localized and of relatively short duration (10 to 20 min). In regions adjacent to those displaying strong upward winds, and following periods of upward winds, downward winds of rather lower magnitude (40 to about 80 m/sec) may be observed. Strong and rapid changes of horizontal winds are correlated with these rapid vertical wind variations. Considered from a large scale viewpoint, this class of strongly time dependent winds propagate globally, and may be considered to be gravity waves launched from an auroral source. During periods of very disturbed geomagnetic activity, there may be regions within and close to the auroral oval where systematic vertical winds of the order of 50 m/sec will occur for periods of several hours. Such persistent winds are part of a very strong large scale horizontal wind circulation set up in the polar regions during a major geomagnetic disturbance. This second class of strong horizontal and vertical winds corresponds more to a standing wave than to a gravity wave, and it is not as effective as the first class in generating large scale propagating gravity waves and correlated horizontal and vertical oscillations. A third class of significant (10 to 30 m/sec) vertical winds can be associated with systematic features of the average geomagnetic energy and momentum input to the polar thermosphere, and appear in statistical studies of the average vertical wind as a function of Universal Time at a given location. Author

N86-29326*# University Coll., London (England). Dept. of Physics and Astronomy.

THE TIME-DEPENDENT DYNAMICAL RESPONSE OF THE THERMOSPHERE TO MAJOR GEOMAGNETIC DISTURBANCES c46

David Rees *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 323-339 Original contains color illustrations (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

Several recent observations of thermospheric dynamics made in the polar regions during extremely disturbed geomagnetic periods are reviewed. In general, the magnitude and the variability of winds in the thermospheric polar regions increases with magnetic activity, as measured by any of the conventional indices. However, none of the conventional indices is a particularly good aid to predicting wind magnitudes. In very general terms, two major factors may be considered in describing the wind system. The magnitude of the Interplanetary Magnetic Field (IMF) and, in particular, its southward component, determine the size of the auroral oval, and the strength of the cross-polar cap potential. This determines the size of the auroral oval, the magnitude of the sunward winds in the auroral oval and of those blowing anti-sunward over the polar cap, and is probably the major factor in determining the rate of geomagnetic energy deposition in the thermosphere. Superimposed on this enhanced polar circulation system are the effects of discrete auroral substorms. From a global view point, the effect of substorms is to generate a series of strong disturbances which propagate from their source region, usually near magnetic midnight in the auroral oval. The energy associated with discrete substorms is, however, usually a rather small proportion of the total global geomagnetic input during disturbed periods. These observations of thermospheric wind disturbances will be evaluated by comparison with global simulations of the thermospheric response to theoretical and semi-empirical models of the polar electric field, and of the effects of magnetospheric particle precipitation. Author

N86-29327*# University Coll., London (England). Dept. of Physics and Astronomy.

SELF-CONSISTENT MODELLING OF THE POLAR THERMOSPHERE AND IONOSPHERE TO MAGNETOSPHERIC CONVECTION AND PRECIPITATION (INVITED REVIEW) c46

David Rees, Tim Fuller-Rowell, Shaun Quegan (Marconi Space and Defence Systems Ltd., Chelmsford England), and Roy Moffett (Sheffield Univ., England.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 341-360 Original contains color illustrations (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

It has recently been demonstrated that the dramatic effects of plasma precipitation and convection on the composition and dynamics of the polar thermosphere and ionosphere include a number of strong interactive, or feedback, processes. To aid the evaluation of these feedback processes, a joint three dimensional time dependent global model of the Earth's thermosphere and ionosphere was developed in a collaboration between University College London and Sheffield University. This model includes self consistent coupling between the thermosphere and the ionosphere in the polar regions. Some of the major features in the polar ionosphere, which the initial simulations indicate are due to the strong coupling of ions and neutrals in the presence of strong electric fields and energetic electron precipitation are reviewed. The model is also able to simulate seasonal and Universal time variations in the polar thermosphere and ionospheric regions which are due to the variations of solar photoionization in specific geomagnetic regions such as the cusp and polar cap. Author

N86-29328*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.

PARTICLE PRECIPITAION INTO THE THERMOSPHERE (INVITED REVIEW) c46

Patricia H. Reiff *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 361-367 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

A review of research on particle precipitation into the thermosphere is presented. Particle precipitation plays an important role in thermospheric dynamics, often being both the most important ionization source and the most important heat source, comparable to Joule heating rates in the auroral zones and typically exceeding solar ultraviolet as an ionization mechanism in the nightside auroral zones and winter polar caps. Rees (1963) has shown that, roughly speaking, one electron-ion pair is produced by each 35 eV of incident electron energy flux; thus, over half of the incident electron energy flux goes into heating rather than into ionization. Precipitating ions also can produce ionization, also requiring roughly 35 eV per pair; however, since ion energy fluxes are typically much weaker than electron fluxes, they have often been neglected. The particle precipitation into the thermosphere is both an important ionization source and an important heat source; since the globally integrated value can vary over more than a factor of ten, and the instantaneous local rate can vary over nearly three orders of magnitude global, maps of precipitation rates are extremely important for predicting thermospheric weather. Author

N86-29329*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.

A METHOD FOR EXTRACTING MERIDONAL WINDS FROM IONOSONDE MEASUREMENTS BY USING IONOSPHERIC MODELS c46

P. G. Richards and D. G. Torr *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 369-374 (For primary document see N86-29301 20-42)

Avail: NTIS HC A20/MF A01 CSCL 04A

There has been great progress in modelling and measuring the dynamics of the neutral upper atmosphere in recent years. However, future progress will depend on the availability of global measurements of neutral winds. Attention is drawn to a relatively cheap means of supplementing the data base of neutral winds provided by radar and optical measurements with data obtained by ionosondes. Rishbeth in his review of F-region dynamics, derived the relationship between the height of the F2 layer and the component of the neutral wind parallel to the magnetic field of the Earth. The sensitivity is examined of the height and density of the F2 layer over Boulder, Colorado on 30 July 1982 to changes in meridional wind speed using a comprehensive interhemispheric numerical model that solves the continuity and momentum

equations for H+ and O+, the energy equations for Te and Ti, and the 2-stream photoelectron equations to obtain electron heating rates. For the neutral atmosphere temperature and densities, the mass spectrometer incoherent scatter radar model of Hedin was used. Author

N86-29330*# Southampton Univ. (England). Dept. of Physics.
THE QUADRUPOLE IONOSPHERE **c46**
H. Rishbeth *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 375-377 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The principal features that might exist in the terrestrial paleoionosphere, if the geomagnetic field were to assume a quadrupole form during a polarity reversal are discussed. Complicated phenomena would be expected to occur at magnetic equators and magnetospherically-driven plasma convection might occur at latitudes where the magnetic field is steeply inclined. The influence of magnetic field strength on ionospheric structure is considered in general terms. Author

N86-29331*# Science Research Council, Chilton (England). Rutherford Appleton Lab.
EISCAT VELOCITY PATTERNS FOR THEORETICAL PLASMA CONVECTION MODELS **c46**
H. Rishbeth and J. J. Sojka (Utah State Univ., Logan.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 379-382 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Theoretical line-of-sight velocities, as would be observed by the EISCAT radar, are computed for idealized models of plasma convection in the polar ionosphere. The calculations give the velocity as a function of range and Universal Time. For several variants of the Volland and Heelis convection models, how the maxima, minima and reversals of velocity depend on beam azimuth is examined. The analysis is designed to be applied to data from the UK-POLAR experiment, an example of which is shown. Author

N86-29332*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
RESULTS OF VARIOUS STUDIES MADE WITH THE NCAR THERMOSPHERIC GENERAL CIRCULATION MODEL (TGCM) (INVITED REVIEW) **c46**
R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 383-413 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

The NCAR thermospheric general circulation model (TGCM) has been used for a variety of thermospheric dynamic studies. It has also been used to compare model predictions with measurements made from various ground-based Fabry-Perot interferometer stations, incoherent scatter radar stations and the Dynamics Explorer satellites. The various input and output features of the model are described. These include the specification of solar EUV fluxes, and descriptions of empirical models to specify auroral particle precipitation, ion drag, and magnetospheric convection. Results are presented for solstice conditions giving the model perturbation temperature and circulation response to solar heating forcing alone and along with the inclusion of magnetospheric convections for two different dawn-dusk potential drops 20 and 60 kV respectively. Results at two constant pressure levels Z = +1 at 300 km and Z= -4 at 120 km are presented for both the winter and summer polar cap regions. The circulation over the Northern Hemisphere polar cap in both the upper and lower thermosphere are presented along with a figure showing that the circulation is mainly a non-divergent irrotational flow responding to ion drag. The results of a study made on the Southern Hemisphere polar cap during October 1981 where Dynamics Explorer satellite measurements of winds, temperature and composition are compared to TGCM predictions are also presented. A diagnostic package that has been developed to analyze the balance of forces operating in the TGCM is presented next illustrating that in the F-region ion drag and pressure provide the main force balance and in the E-region ion drag, pressure and the coriolis forces provide the main balance. The TGCM prediction for the June 10, 1983 total solar eclipse are next presented showing a thermospheric disturbance following the path of totality. Finally, results are presented giving the global circulation, temperature and composition structure of the thermosphere for solar minimum conditions at equinox with 60 kV magnetospheric convection forcing at high latitudes. Author

N86-29333*# Massachusetts Inst. of Tech., Cambridge. Haystack Observatory.
MILLSTONE HILL MEASUREMENTS AND TGCM SIMULATION FOR THE 30 MAY 1984 ANNULAR SOLAR ECLIPSE **c46**
J. E. Salah, W. L. Oliver, B. A. Emery (National Center for Atmospheric Research, Boulder, Colo.), R. G. Roble, E. C. Ridley, and H. C. Carlson (Air Force Geophysics Lab., Hanscom AFB, Mass.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 415-438 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

On 30 May 1984, the Millstone Hill incoherent scatter radar was operated to gather data on the effects of the annular solar eclipse on the structure and dynamics of the ionosphere and thermosphere. The eclipse path was about 3 deg. south of Millstone which experienced a maximum obscuration of 86% at about 1705 UT. Both the zenith steerable antennas at Millstone were used in the experiment to collect data on the temporal evolution of the eclipse effects. This experiment represented the first opportunity at Millstone to collect data during an eclipse in the absence of a major magnetospheric disturbance which had previously made the unravelling of eclipse effects difficult. In addition, the configuration of the experiment and analysis of the data included a detailed examination of the effects on the neutral atmosphere. A major catalyst for this study was the opportunity to compare the results with the predictions made from the Thermospheric General Circulation Model (TGCM) at NCAR, as a calibration point for the model. The Arecibo and Sondrestrom radars also participated as part of a radar chain experiment. The analysis of the data from these stations is in progress; the initial results from Millstone Hill are presented. Author

N86-29334*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A DYNAMO THEORY PREDICTION FOR SOLAR CYCLE 22: SUNSPOT NUMBER, RADIO FLUX, EXOSPHERIC TEMPERATURE, AND TOTAL DENSITY AT 400 km **c46**
K. H. Schatten and A. E. Hedin *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 439-444 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Using the dynamo theory method to predict solar activity, a value for the smoothed sunspot number of 109 + or - 20 is obtained for solar cycle 22. The predicted cycle is expected to peak near December, 1990 + or - 1 year. Concommitantly, F(10.7) radio flux is expected to reach a smoothed value of 158 + or - 18 flux units. Global mean exospheric temperature is expected to reach 1060 + or - 50 K and global total average total thermospheric density at 400 km is expected to reach 4.3 x 10 to the -15th gm/cu cm + or - 25 percent. Author

N86-29335*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A THREE DIMENSIONAL MODEL OF THE VENUSIAN THERMOSPHERE WITH SUPERROTATION **c91**
D. R. Stevens-Rayburn (Applied Research Corp., Landover, Md.), H. G. Mayr, and I. Harris *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 445-450 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

An improved three dimensional spectral model of the thermo-

sphere of Venus is described. The model solves the Navier-Stokes equations and includes nonlinear effects for an arbitrary number of atmospheric species. A two dimensional axisymmetric model of the superrotation of the thermosphere is also presented. This model addresses the Pioneer-Venus mission finding, which suggested the thermospheric rotation rate to be much higher than that of the planet as seen from the asymmetric distribution of hydrogen and helium. Both models include the effects of an anisotropic eddy diffusion that is consistent with atmospheric mixing length theory. Author

N86-29335*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
JOULE HEATING AND FIELD-ALIGNED CURRENTS: PRELIMINARY RESULTS FROM DE-2 **c46**
M. Sugiura *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 451-461 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

There are three main processes by which energy is transferred from the magnetosphere to the thermosphere: (1) charge exchange of the ring current particles; (2) precipitation of charged particles; and (3) joule dissipation by the magnetosphere-ionosphere current systems. The importance of this last process has been recognized and the rate of joule heating has been estimated by many workers. Observations of the electric (E) and magnetic (B) fields from Dynamics Explorer Satellite 2 are providing a new set of data on field-aligned currents. One of the remarkable features found in these observations is the high correlation between an orthogonal pair of the E and B field components. In recent years, observational data have accrued concerning the relationship between the interplanetary magnetic field and the size of the polar cap and also about the evolution of a substorm or a magnetic storm. It is suggested that these findings be incorporated in future model calculations. Author

N86-29337*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF COMPOSITION FROM PIONEER VENUS **c91**
H. A. Taylor, Jr. *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 463-465 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

Long latitude distributions of atmospheric neutral hydrogen were derived at Venus for the period 1979 to 1980. In-situ measurements of H+, O+, O, and CO2 obtained from the ion and neutral mass spectrometers on the Pioneer Venus orbiter are combined with the appropriate chemical equilibrium relationship to determine the abundance of neutral hydrogen which is very difficult to measure directly. The measurements are all obtained below 165 km on the nightside and below 200 km on the dayside, based on evidence for chemical equilibrium prevailing up to those altitudes. During the period examined nearly three complete diurnal cycles were available and a comparison of the year-to-year variation in hydrogen content is made across the dawn region where the distributions of light gases are most pronounced. The dawn bulge in H (and also in He) which was reported from the first diurnal cycle by Brinton et al. is found to persist. Superimposed upon the diurnal variation are strong day-to-day variations in which n(H) changes by as much as a factor of five. Such variations are linked to pronounced changes in the ion and neutral composition which sometimes occur in association with solar wind disturbances passing the planet. The interaction of the solar wind and the planetary environment somehow results in large changes in the relative abundances and scale heights of the ion and neutral species, thus modifying the derived values of n(H). These variations in the ion distributions are not surprising owing to the strong dependence of the nightside ionization upon convection from the dayside and associated sensitivity of this convection to changes in solar wind pressure and interplanetary magnetic field variations. The variation exhibited by the neutrals, however, appears to require some other explanation owing to the limited momemtum transfer between the ions and neturals. Allowing for these short term perturbations, there appears to be no clear evidence for interannual variation in n(H) during the period examined, apparently consistent with the very small change in solar EUV flux over the same interval. Author

N86-29338*# York Univ. (England). Centre for Research in Experimental Space Science.
WAMDII OBSERVATION OF AN AURORAL ATMOSPHERE WAVE EVENT **c46**
R. H. Wiens, G. G. Shepherd, and K. V. Paulson (Saskatchewan Univ., Saskatoon.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 467 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

Field tests of WAMDII (Wide Angle Michelson Doppler Imaging Interferometer) on February 23 to 24, 1984 in Saskatoon produced wind images of the aurora that show well defined wave structures in lambda 5577. Wavelengths and velocities of these structures suggest an acoustic-gravity wave interpretation, but their short duration warrants their being termed an event. The Dopplergrams are presented with emphasis on the interpretation of the waves and a discussion of possible sources. Author

N86-29463# Delaware Univ., Lewes.
THE OVERALL PLAN: A SCIENTIFIC STRATEGY
Ferris Webster *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 5 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29464# World Meteorological Organization, Geneva (Switzerland).
NATIONAL AND REGIONAL ACTIVITIES RELATED TO THE TROPICAL OCEAN GLOBAL ATMOSPHERE (TOGA) PROJECT
In its International Conference on the TOGA Scientific Program Sep. 1985 62 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-29339# Danish Meteorological Inst., Copenhagen.
SNOW PACK MAXIMUM WATER EQUIVALENT IN DENMARK: EVALUATED BY A SIMULATION MODEL
Peter Allerup, Henning Madsen, Bent Hasholt, and Henrik Sogaard 1985 52 p
(DMI-CP-14; ISBN-87-7478-258-4) Avail: NTIS HC A04/MF A01

In 1981 the Danish Meteorological Institute (MI) received a request from the Codes of Practice Committee to prepare an update on snow loads. Snow loads provide the governing load requirements for the structural design of roofs, hence a correct evaluation of snow loads will be of economic interest. MI agreed to participate and the resources required for an investigation of water equivalent of maximal snowfall were provided. The project started November 1982 and was finished October 1984. B Hansen and J. J. Riis (Geographic Institute) and A. Rasmussen (Meteorological Institute) have all been engaged in problems concerning data processing as well as the important task of implementing the simulation program on the UNIVAC 1100 computer. Author

N86-29340# Environmental Research Inst. of Michigan, Ann Arbor.
CALIBRATED L-BAND TERRAIN MEASUREMENTS AND ANALYSIS PROGRAM Interim Report, Apr. 1984 - Apr. 1985
R. W. Larson, E. S. Kasischke, and A. Maffett Feb. 1986 157 p (Contract F19628-84-C-0081)
(AD-A165916; ERIM-174200-5-P; RADC-TR-85-266) Avail: NTIS HC A08/MF A01 CSCL 08/6

This report presents the initial results of a three year program for the collection and analysis of L-band calibrated backscatter data from various terrain types. During the first year advantages was taken of two SAR data collection programs to obtain ground measurements simultaneously with the SAR flights. These data collection flights were conducted in North Carolina during April 1984 sponsored by USGS and during August - September 1984 in Long Island, sponsored by ONR. Ground data were collected at specific sites during both SAR flights and included measurement of dielectric constant, surface roughness and moisture. The reduction of ground data and the calibration of the SAR are described. Calibration of the SAR has been verified and an error of less than 3 dB in absolute calibration of the L-band channel demonstrated. GRA

N86-29341# Lawrence Livermore National Lab., Calif.
CONTOUR-TO-GRID METHODS FOR THE ARAC SYSTEM
J. F. Barbieri Dec. 1985 15 p Presented at the Geographic Information Systems in the Government Workshop, Springfield, Va., 10 Dec. 1985
(Contract W-7405-eng-48)
(DE86-004919; UCRL-93415; CONF-851252-1) Avail: NTIS HC A02/MF A01

By combining a digitizing system with a contour-to-grid program, digital elevation data may be developed from contour maps automatically for any existing contour map. DOE

N86-29342# Department of Energy, Morgantown, W. Va.
DEEP SOURCE GAS Technology Status Report
Jan. 1986 29 p
(DE86-001036; DOE/METC-86-0234) Avail: NTIS HC A03/MF A01

Deep source gas research exists to verify that natural gas can exist at depths in excess of 30,000 feet, to relate these occurences to conceptual models, to define the limits of target areas, to quantify the resource, and to determine the potential significance of such finds on the nation's future gas supply. There are three separate emplacement concepts that could explain the occurrence of gas at extreme depths: abiogenic gas; subducted, organic-origin gas; and deep sedimentary basin gas. Of these concepts, deep source gas research focuses on the subducted, organic-origin concept. The research emphasizes an earth science study (geochemistry, and geophysics) of the Cordilleran Geologic Province of western North America. Detailed geochemical studies have indicated that the deep-source, gas-generating capacity of the Aleutian Trench area of southern Alaska may be high. A new technique has helped determine that methane gas can exist at depths up to 40,000 feet. This new technique uses a combination of theoretical computer modeling and laboratory experiments with test rock samples that contain fluid inclusions. DOE

N86-29343# Department of Energy, Morgantown, W. Va.
GAS HYDRATES: TECHNOLOGY STATUS REPORT
Jan. 1986 37 p
(DE86-001037; DOE/METC-86-0230) Avail: NTIS HC A03/MF A01

The DOE Morgantown Energy Technology Center (METC) implemented a gas hydrates R and D program that emphasized an understanding of the resource through (1) an assessment of current technology, (2) the characterization of gas hydrate geology and reservoir engineering, and (3) the development of diagnostic tools and methods. Recovery of natural gas from gas hydrates will be made possible through (1) improved instrumentation and recovery methods, (2) developing the capability to predict production performance, and (3) field verification of recovery methods. Gas hydrates research has focused primarily on geology. As work progressed, areas where gas hydrates are likely to occur were identified, and specific high potential areas were targeted for detailed investigation. A Geologic Analysis System (GAS) was developed. GAS contains approximately 30 software packages and can manipulate and correlate several types of geologic and petroleum data into maps, graphics, and reports. The system also contains all well information currently available from the Alaskan North Slope area. Laboratory research on gas hydrates includes the characterization of the physical system, which focuses on creating synthetic methane hydrates and developing synthetic hydrate cores using tetrahydrofuran (THF), consolidated rock cores, frost base mixtures, water/ice-base mixtures, and water-base mixtures. Laboratory work produced measurements of the sonic velocity and electrical resistivity of these synthetic hydrates. During 1983, a sample from a natural hydrate core recovered from the Pacific coast of Guatemala was tested for these properties by DOE/METC. More recently, natural hydrate samples acquired from the Gulf of Mexico are being tested. Modeling and systems analysis work has focused on the development of GAS and preliminary gas hydrate production models. DOE

N86-29344# Department of Energy, Morgantown, W. Va.
GEOLOGICAL OCCURRENCE OF GAS HYDRATES AT THE BLAKE OUTER RIDGE, WESTERN NORTH ATLANTIC
K. L. Dominic and D. L. Barlow Mar. 1986 28 p
(DE86-001078; DOE/METC-86-2024) Avail: NTIS HC A03/MF A01

The occurrence of gas hydrates at the Blake Outer Ridge, as confirmed by the Deep Sea Drilling Project (DSDP), is governed not only by gas-water phase relationships but also by interrelated geological constraints. The results of this reexamination of the DSDP data show that seafloor processes, topography, and sediment properties are among the factors that impact the stability and distribution of gas hydrate at the ridge. Rapid sedimentation and erosion have local and transient effects on thermal gradients, which cause the base of the hydrate stability zone to migrate. To a large degree, the convex shape of the Blake Outer Ridge allows gas hydrates to be stable. Low-permeability sediments occupy the interval in which the stability zone exists, and they influence hydrate occurrence by controlling the distribution of gas. A brief comparison of the Blake Outer Ridge with two more recently confirmed hydrate localities (the northern Gulf of Mexico and the Middle America's trench) shows little similarity among the three hydrate environments, but calls attention to the complex and often subtle effects that the geological system imposes on hydrate stability. DOE

N86-29345# World Meteorological Organization, Geneva (Switzerland).
GUIDELINES FOR COMPUTERIZED DATA PROCESSING IN OPERATIONAL HYDROLOGY AND LAND AND WATER MANAGEMENT
1985 223 p Prepared in cooperation with Food and Agriculture Organization of the UN
(WMO-634; ISBN-92-63-10634-7; ESA-86-97078) Avail: NTIS MF A01; HC from WMO, Geneva, Switzerland

The guidelines for computerized data processing in operational hydrology and land and water management introduces to land and water experts the concepts, terminology, and application of computerized data processing. The Guidelines are designed for operational use by national hydrological services, field projects and experts of WMO and FAO. ESA

N86-29346# Geological Survey, Iowa City, Iowa. Water Resources Div.
WATER RESOURCES DATA FOR IOWA, WATER YEAR 1984 Annual Water-Data Report, 1 Oct. 1983 - 30 Sep. 1984
V. E. Miller, W. J. Matthes, M. G. Detroy, and R. E. Hansen 8 Jul. 1985 274 p
(PB86-173077; USGS/WRD/HD-85/263; USGS/WDR/IA-84/1) Avail: NTIS HC A12/MF A01 CSCL 08H

Water resources data for the 1984 water year for Iowa consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; ground-water levels; and ground-water quality. Discharge records for 115 gaging stations; stage and contents for 7 lakes and reservoirs; water quality for 17 gaging stations; and water levels for 90 observation wells are given. Also included are 120 crest-stage partial-record stations. GRA

N86-29181 Technische Univ., Hanover (West Germany).
INVESTIGATIONS OF SYSTEMATIC IMAGE DEFECTS NOT TAKEN INTO ACCOUNT IN AEROTRIANGULATION [UNTERSUCHUNG NICHT BERUECKSICHTIGTER SYSTEMATISCHER BILDFEHLER BEI AEROTRIANGULATIONEN]
K. Jacobsen *In* Deutsche Geodaetische Kommission Camera Calibration in Photogrammetric Practice 1985 p 65-71 In GERMAN (For primary document see N86-29175 20-35)
Avail: Issuing Activity

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-29347*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCEEDINGS OF THE 25TH PROJECT INTEGRATION MEETING Progress Report, Oct. 1984 - Jun. 1985
W. Phillips Jun. 1985 674 p Meeting held in Pasadena, Calif., 19-20 Jun. 1985
(Contracts NAS7-918; DE-AI01-85CE-69008)
(NASA-CR-176815; JPL-5101-271; DOE/JPL-1012-119; JPL-Publ-86-4; NAS 1.26:176815; PR-25) Avail: NTIS HC A99/MF E03 CSCL 10A

Topics addressed include: silicon sheet growth and characterization, silicon material, process development, high-efficiency cells, environmental isolation, engineering sciences, and reliability physics. For individual titles, see N86-29348 through N86-29408.

N86-29348*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FSA FUTURE DIRECTIONS: RELIABILITY AND ENGINEERING SCIENCES FY85-FY86 ACTIVITIES AND PLANS
R. G. Ross, Jr. *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 75-81 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Objectives were listed for four areas: engineering science, reliability physics, module development, and module performance and failure analysis. The engineering science efforts are to develop module design requirements for large-scale photovoltaic (PV) applications and to develop generic module and array design and construction technology to meet the needed performance, safety, reliability, and system interfaces. The reliability physics effort is to develop the technology for 30-year life modules. The module development efforts are to transfer new technology to PV manufacturers and their products, and to evaluate these advanced modules. The module performance and failure analysis efforts are to determine PV module performance, to identify needed development, and to assess suitability for large-scale use. B.G.

N86-29349*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FSA FUTURE DIRECTIONS: FSA TECHNOLOGY ACTIVITIES IN FY86
M. H. Leipold *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 83-86 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The silicon material, advanced silicon sheet, device research, and process research activities are explained. There will be no new initiatives. Many activities are targeted for completion and the emphasis will then be on technology transfer. Industrial development of the fluidized-bed reactor (FBR) deposition technology is proceeding. Technology transfer and industry funding of sheet development are continuing. B.G.

N86-29350*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SUMMARY OF HIGH-EFFICIENCY SOLAR-CELL RESEARCH
Ram Kachare *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 87-92 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

High-efficiency solar-cell activities supporting efforts to achieve the DOE Five-Year Plan goals are summarized. Specific objectives are to identify and resolve key generic problems that limit cell efficiency to below theoretically predicted values and to design and fabricate cells having efficiences equal to or greater than 20% (AM1.5). Theoretical curves for various p-n junction cells were shown. The effects of practical barriers on cell efficiency was depicted along with the modeling parameters. Cell design parameters used in the analyses were described. The usefulness and present limitations of the existing modeling capabilities were presented. The historical evolution of the efficiencies of cells made from web and edge-defined film-fed growth (EFG) silicon ribbons were also described. The status of contemporary higher-efficiency technical capabilities and future activities to raise efficiencies were stated. Author

N86-29351*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OVERVIEW OF PROCESSING ACTIVITIES AIMED AT HIGHER EFFICIENCIES AND ECONOMICAL PRODUCTION
D. B. Bickler *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 93-98 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

An overview of processing activities aimed at higher efficiencies and economical production were presented. Present focus is on low-cost process technology for higher-efficiency cells of up to 18% or higher. Process development concerns center on the use of less than optimum silicon sheet, the control of production yields, and making uniformly efficient large-area cells. High-efficiency cell factors that require process development are bulk material perfection, very shallow junction formation, front-surface passivation, and finely detailed metallization. Better bulk properties of the silicon sheet and the keeping of those qualities throughout large areas during cell processing are required so that minority carrier lifetimes are maintained and cell performance is not degraded by high doping levels. When very shallow junctions are formed, the process must be sensitive to metallizatin punch-through, series resisitance in the cell, and control of dopant leaching during surface passivation. There is a need to determine the sensitivity to processing by mathematical modeling and experimental activities. Author

N86-29352*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SUMMARY OF PROCESS RESEARCH ANALYSIS EFFORTS
Dale R. Burger *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 99-103 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A summary of solar-cell process research analysis efforts was presented. Process design and cell design are interactive efforts where technology from integrated circuit processes and other processes are blended. The primary factors that control cell efficiency are: (1) the bulk parameters of the available sheet material, (2) the retention and enhancement of these bulk parameters, and (3) the cell design and the cost to produce versus the finished cells performance. The process sequences need to be tailored to be compatible with the sheet form, the cell shape form, and the processing equipment. New process options that require further evaluation and utilization are lasers, robotics, thermal pulse techniques, and new materials. There are numerous process

control techniques that can be adapted and used that will improve product uniformity and reduced costs. Two factors that can lead to longer life modules are the use of solar cell diffusion barriers and improved encapsulation. Author

N86-29353*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
METALLO-ORGANIC DECOMPOSITION FILMS
B. D. Gallagher *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 105-110 (For primary document see N86-29347 20-44)
Avail; NTIS HC A99/MF E03 CSCL 10A

A summary of metallo-organic deposition (MOD) films for solar cells was presented. The MOD materials are metal ions compounded with organic radicals. The technology is evolving quickly for solar cell metallization. Silver compounds, especially silver neodecanoate, were developed which can be applied by thick-film screening, ink-jet printing, spin-on, spray, or dip methods. Some of the advantages of MOD are: high uniform metal content, lower firing temperatures, decomposition without leaving a carbon deposit or toxic materials, and a film that is stable under ambient conditions. Molecular design criteria were explained along with compounds formulated to date, and the accompanying reactions for these compounds. Phase stability and the other experimental and analytic results of MOD films were presented. Author

N86-29354*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DIRECTED-ENERGY PROCESS TECHNOLOGY EFFORTS
Paul Alexander *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 111-122 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A summary of directed-energy process technology for solar cells was presented. This technology is defined as directing energy or mass to specific areas on solar cells to produce a desired effect in contrast to exposing a cell to a thermal or mass flow environment. Some of these second generation processing techniques are: ion implantation; microwave-enhanced chemical vapor deposition; rapid thermal processing; and the use of lasers for cutting, assisting in metallization, assisting in deposition, and drive-in of liquid dopants. Advantages of directed energy techniques are: surface heating resulting in the bulk of the cell material being cooler and unchanged; better process control yields; better junction profiles, junction depths, and metal sintering; lower energy consumption during processing and smaller factory space requirements. These advantages should result in higher-efficiency cells at lower costs. The results of the numerous contracted efforts were presented as well as the application potentials of these new technologies. Author

N86-29355*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CRYSTAL GROWTH FOR HIGH-EFFICIENCY SILICON SOLAR CELLS WORKSHOP: SUMMARY
Katherine A. Dumas *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 123-136 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The state of the art in the growth of silicon crystals for high-efficiency solar cells are reviewed, sheet requirements are defined, and furture areas of research are identified. Silicon sheet material characteristics that limit cell efficiencies and yields were described as well as the criteria for the ideal sheet-growth method. The device engineers wish list to the material engineer included: silicon sheet with long minority carrier lifetime that is uniform throughout the sheet, and which doesn't change during processing; and sheet material that stays flat throughout device processing, has uniform good mechanical strength, and is low cost. Impurities in silicon solar cells depreciate cell performance by reducing diffusion length and degrading junctions. The impurity behavior, degradation mechanisms, and variations in degradation threshold with diffusion length for silicon solar cells were described. Author

N86-29356*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RELIABILITY AND ENGINEERING OF THIN-FILM PHOTOVOLTAIC MODULES
E. L. Royal *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 137-143 Previously announced as N86-12759 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Objectives were to: examine thin-film cell attributes that influence module performance and reliability, explore the lessons and applicability of crystalline-silicon module technology to thin-film modules, review the current status of thin-film module technologies, and identify problem areas and needed research. A major need is to separate the effects and resons for reversible degradatin from nonreversible degradation. Amorphous-silicon (a-Si) reliability investigations are focusing on exploratory research investigations, accelerated Arrhenius-type testing of a-Si cells, real-time outdoor exposure testing of a-Si cells, cell failure analysis, and failure mechanism research. Studies included the reduction in strength of glass by high temperature depositions on glass and laser scribing, encapsulation materials development needs, and the testing of modules. The new materials and processes in thin-film modules will require a delinquent reliability effort, including: establishment of mechanism-specific reliability goals; quantification of mechanism parameter dependencies; prediction of expected long-term degradation; identification of cost-effective solutions; and testing and failure analysis of trial solutions. Author

N86-29357*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHOTOTHERMAL DEGRADATION STUDIES
Ranty H. Liang *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 151-156 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Key reaction intermediates of photooxidation identified and characterized by laser flash Electron Spin Resonance (ESR) spectroscopy were discussed. Effects of temperature and ultraviolet intensity were studied in order to develop meaningful accelerated testing procedures for encapsulant evaluation. In a program to study the failure of Tedlar/ethylene vinyl acetate (EVA)/stainless steel modules, failure modes similar to those observed outdoors in real-time conditions were simulated in accelerated testing. An experimental technique was developed to quantitatively assess the extent of degradation. Author

N86-29358*# Cincinnati Univ., Ohio.
PHOTOVOLTAICS MODULE INTERFACE: GENERAL PURPOSE PRIMERS
J. Boerio *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 157-168 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The interfacial chemistry established between ethylene vinyl acetate (EVA) and the aluminized back surface of commercial solar cells was observed experimentally. The technique employed is called Fourier Transform Infrared (FTIR) spectroscopy, with the infrared signal being reflected back from the aluminum surface through the EVA film. Reflection infrared (IR) spectra are given and attention is drawn to the specific IR peak at 1080/cm which forms on hydrolytic aging of the EVA/aluminum system. With this fundamental finding, and the workable experimental techniques, candidate silane coupling agents are employed at the interface, and their effects on eliminating or slowing hydrolytic aging of the EVA/aluminum interface are monitored. Author

N86-29359*# Springborn Labs., Inc., Enfield, Conn.
ENCAPSULATION MATERIALS RESEARCH
P. Willis *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 169-190 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The successful use of outdoor mounting racks as an acceler-

ated aging technique (these devices are called optal reactors); a beginning list of candidate pottant materials for thin-film encapsulation, which process at temperatures well below 100 C; and description of a preliminary flame retardant formulation for ethylene vinyl acetate which could function to increase module flammability ratings are presented. Author

N86-29360*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MOISTURE-TEMPERATURE DEGRADATION IN MODULE ENCAPSULANTS: THE GENERAL PROBLEM OF MOISTURE IN PHOTOVOLTAIC ENCAPSULANTS
G. R. Mon *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 191-199 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A general research approach was outlined toward understanding water-module interactions and the influence of temperature involving the need to: quantify module performance loss versus level of accumulated degradation, establish the dependence of the degradation reaction rate on module moisture and temperature levels, and determine module moisture and temperature levels in field environments. These elements were illustrated with examples drawn from studies of the now relatively well understood module electrochemical degradation process. Research data presented include temperature and humidity-dependent equilibrium leakage current values for multiparameter module material and design configurations. The contributions of surface, volume, and interfacial conductivities was demonstrated. Research directions were suggested to more fully understand the contributions to overall module conductivity of surface, volume, and interfacial conductivities over ranges of temperature and relative humidity characteristic of field environments. Author

N86-29361*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PRELIMINARY STUDY: MOISTURE-POLYMER INTERACTION. STUBY OBJECTIVES
L.-C. Wen *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 201-216 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The problems associated with mathematically modeling water-module interaction phenomena, including sorption and desorption, diffusion, and permeation are discussed. With reliable analytical models, an extensive materials data base, and solar radiation surface meteorological observations (SOLMET) weather data, predicting module lifetimes in realistic environments can become a practical reality. The status of the present techniques of simulating the various transport mechanisms was reported. The Dent model (a modified Brunauer-Emmet-Teller) approach represented polyvinyl butyral (PVB) sorption data. A 100-layer material model and Fick's diffusion model gave diffusivity values exhibiting adequate agreement with those measured for PVB. Diffusivity of PVB is concentration dependent, decreasing as the water content in PVB increases. The temperature dependence of diffusion in PVB is well modeled by the Arrhenius rate equation. Equilibrium conductivity and leakage current data are well represented by Hearle's model for bulk ionic conductivity. A nodal network analysis using the Systems Improved Numerical Differencing Analyzer (SINDA) Thermal Analyzer gave reasonable correlation with measurable data. It is concluded that realistic lifetime predictions seem to be feasible. Author

N86-29362*# Wilkes Coll., Wilkes-Barre, Pa.
WATER PERMEATION AND DIELECTRIC BREAKDOWN. WATER PERMEABILITY IN PUB TEDLAR. PUB/TEDLAR AS A FUNCTION OF TEMPERATURE AND HUMIDITY
John Orehotsky *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 217-233 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Moisture transport and dielectric breakdown of polyvinyl butyral (PVB), Tedlar, and PVB/Tedlar composites were addressed. Data for the temperature range between 20 and 80 C showed that the moisture flux through the composite is governed by the slower material; and that the composite permeability is intermediate to those of the component material, as predicted by theory. Data for Tedlar at 71 C, showing the dependence of moisture flux on relative humidity, was also presented. Dielectric breakdown data were less precise and less conclusive. The generally applied theoretical model does not match the experimental data. The PVB/Tedlar composite exhibited greater voltage breakdown resistance than either component. Testing of EVA and EVA/Tedlar composites is underway. Author

N86-29363*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE (RH+t) AGING CORRELATION. ELECTRICAL RESISTIVITY OF PVB AT VARIOUS TEMPERATURES AND RELATIVE HUMIDITIES
E. F. Cuddihy *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 235-245 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Electrical products having organic materials functioning as pottants, encapsulants, and insulation coatings are commonly exposed to elevated conditions of temperature and humidity. In order to assess service life potential from this method of accelerated aging, it was empirically observed that service life seems proportional to an aging correlation which is the sum of temperature in degrees Celsius (t), and the relative humidity (RH) expressed in percent. Specifically, the correlation involves a plot of time-to-failure on a log scale versus the variable RH + T plotted on a linear scale. A theoretical foundation is provided for this empirically observed correlation by pointing out that the correlation actually involves a relationship between the electrical resistivity (or conductivity) of the organic material, and the variable RH + t. If time-to-failure is a result of total number of coulombs conducted through the organic material, then the correlation of resistivity versus RH + t is synonymous with the empirical correlation of time-to-failure versus RH + t. Author

N86-29364# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SILICON MATERIAL AND JPL WEB TEAM
Ralph Lutwack *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 247 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Silicon material activities are described. Topics discussed include: fluidized bed technology, model predictions (reaction kinetics and grid design parameters), seed-particle cleaning procedure, runaway nucleation, thermal analysis of dendritic ribbons, and residual stress in dendritic ribbons. B.G.

N86-29365# Union Carbide Corp., New York.
SILANE PROCESS RESEARCH AND DEVELOPMENT
S. Iya *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 249-254 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Progress in the program to develop fluidized-bed technology for the silane system is described. Quartz liners used in experimental runs continue to fail on cool-down. A modified reactor was designed to permit the use of commercially available quartz tubes and to improve the liner seals. Experiments with the new reactor will be done during the contract extension. Improvements in the cleaning procedure for the seed material were indicated by the purity measurements. In a 110-hour run at a silane concentration in the range of 20 to 30% in H2, several kilograms of product were obtained. A layered structure of the particles was found using scanning electron microscope (SEM) analyses. Author

N86-29366*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JPL IN-HOUSE FLUIDIZED BED REACTOR RESEARCH

N. K. Rohatgi *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 255-259 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The progress in the in-house program on the silane fluidized-bed system is reported. A seed-particle cleaning procedure was developed to obtain material purity near the level required to produce a semiconductor-grade product. The liner-seal design was consistently proven to withstand heating/cooling cycles in all of the experimental runs. Author

N86-29367*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
WEB TEAM OVERVIEW
R. R. McDonald *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 261-262 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Analytical and experimental work were combined to develop a stress model to determine the temperature profile which will yield a satisfactory web. A thermal model of the web will be used to determine the thermal configuration which will yield the desired temperature profile. Thermal analysis of growth interface and the susceptor melt will be developed to determine a thermal configuration which will improve stability of growth process. The thermal configurations will be designed, fabricated, and tested and the results fed back into the models. B.G.

N86-29368# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SILICON DENDRITIC WEB GROWTH THERMAL ANALYSIS TASK
R. Richter and P. Bhandari *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 263-299 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A thermal analysis model is presented which describes the dendritic ribbon process. The model uses a melt-dendrite interface which projects out of the bulk melt as the basic interpretation of the ribbon production process. This is a marked departure from the interpretations of the interface phenomena which were used previously. The model was extensively illustrated with diagrams and pictures of ribbon samples. This model should have great impact on the analyses of experimental data as well as on future design modifications of ribbon-pulling equipment. Author

N86-29369*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH-EFFICIENCY DEVICE RESEARCH
Dale R. Burger *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 299-300 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Progress on research in high-efficiency silicon solar cells is presented. Topics addressed include: recombination measurement techniques, doped crystals, minority carrier transport, oxygen process in solar cells, solar cell models, loss mechanics in solar cells, high-efficiency metal insulators, dendritic web cells, and surface and bulk loss reduction by low-energy hydrogen doping. B.G.

N86-29370*# Florida Univ., Gainesville.
HEAVY DOPING CONSIDERATIONS AND MEASUREMENTS IN HIGH-EFFICIENCY CELLS
F. Lindholm *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 301-311 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Theoretical work on heavily doped silicon was described. Heavily doped polysilicon was used as a back-surface passivant replacing the usual back-surface field (BSF). Very good first results were achieved and there is the promise of a simple, low temperature deposition process. Short-circuit current-decay measurement methods were also covered. Author

N86-29371*# Pennsylvania Univ., Philadelphia.
ADVANCED TECHNIQUES FOR THE MEASUREMENT OF MULTIPLE RECOMBINATION PARAMETERS IN SOLAR CELLS
M. Newhouse and M. Wolf *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 313-327 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A survey of bulk recombination measurement techniques was presented. Classical methods were reviewed along with their limiting assumptions and simplifications. A modulated light measurement system was built and showed the large effects of junction capacitance. Techniques for extension of classical methods for measurement of multiparameter multiregression measurements were identified and analyzed. Author

N86-29372*# Stanford Univ., Calif.
MEASUREMENT OF MINORITY CARRIER TRANSPORT PARAMETERS IN HEAVILY DOPED n-TYPE SILICON
J. delAlamo and R. M. Swanson *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 329-337 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Measurement of minority transport parameters in heavily doped silicon is covered. The basic transport equations were used to define two independent parameters. Use of special vertical and lateral transistor test devices permitted the measurement of both parameters. Prior studies were normalized to show excellent agreement over the heavy doping region. Author

N86-29373*# State Univ. of New York, Albany.
STUDIES OF OXYGEN-RELATED AND CARBON-RELATED DEFECTS IN HIGH-EFFICIENCY SOLAR CELLS
James W. Corbett *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 339-348 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Oxygen and carbon related defects in silicon, particularly as related to high-efficiency silicon solar cells were studied. A summary of oxygen processes in silicon versus process temperature was shown along with experimental results. The anamolous diffusion of oxygen was explained by the dissociation of the center allowing O sub i to move through the lattices. Author

N86-29374*# Research Triangle Inst., Research Triangle Park, N.C.
COMPREHENSIVE SOLAR CELL MODELING AND CORRELATION STUDIES
M. L. Lamorte *In* JPL, Pasadena, Calif. Proceedings of the 25th 25th Project Integration Meeting Jun. 1985 p 349-371 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Modeling and correlation studies of solar cells was discussed. Recursive relationships were used to generate solutions at a number of mesh points within the emitter region. Photoexcited hole concentration and built-in electric field were calculated as a function of position. Simulated and experimentally determined I-V curves were shown to have good fit. Author

N86-29375*# Sah (C. T.) Associates, Urbana, Ill.
LOSS MECHANISMS IN HIGH-EFFICIENCY SOLAR CELLS: STUDY OF MATERIAL PROPERTIES AND HIGH-EFFICIENCY SOLAR-CELL PERFORMANCE ON MATERIAL COMPOSITION: PROJECT TASKS
C. Tang Sah *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 373-377 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Loss mechanisms in high-efficiency solar cells were discussed. Fundamental limitations and practical solutions were stressed. Present cell efficiency is limited by many recombination sites:

emitter, base, contacts, and oxide/silicon interface. Use of polysilicon passivation was suggested. After reduction of these losses, a 25% efficient cell could be built. A floating emitter cell design was shown that had the potential of low recombination losses. Author

N86-29376*# Washington Univ., Seattle.
HIGH-EFFICIENCY SILICON SOLAR CELLS
Larry C. Olsen *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 379-388 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Fabrication and characterization of high-efficiency metal insulator, n-p (MINP) cells is described. Particular attention was paid to development of measurement methods for surface recombination and density of surface states. A modified Rosier test structure was used successfully for density of surface states. Silicon oxide and silicon nitride passivants were studied. Heat treatment after plasma enhanced chemical vapor deposition (CVD) of silicon nitride was shown to be beneficial. A more optimum emitter concentration profile was modeled. Author

N86-29377*# Westinghouse Electric Corp., Pittsburgh, Pa.
DEVELOPMENT OF HIGH-EFFICIENCY SOLAR CELLS ON SILICON WEB
A. Rohatgi, D. L. Meier, R. B. Campbell, R. G. Seidensticker, and P. Rai-Choudhury *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 389-399 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

High-efficiency dendritic cells were discussed. The influence of twin planes and heat treatment on the location and effect of trace impurities was of particular interest. Proper heat treatment often increases efficiency by causing impurities to pile up at twin planes. Oxide passivation had a beneficial effect on efficiency. A very efficient antireflective (AR) coating of zinc selenide and magnesium fluoride was designed and fabricated. An aluminum back-surface reflector was also effective. Author

N86-29378*# Pennsylvania State Univ., University Park.
SURFACE AND BULK-LOSS REDUCTION RESEARCH BY LOW-ENERGY HYDROGEN DOPING
S. Fonash *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 401-407 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Surface and bulk loss reduction by low energy hydrogen doping of silicon solar cells was examined. Hydrogen ions provided a suppression of space charge recombination currents. Implantation of hydrogen followed by the anneal cycle caused more redistribution of boron than the anneal which could complicate processing. It was demonstrated that passivation leads to space charge current reduction. Author

N86-29379*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PROCESS DEVELOPMENT
Donald B. Bickler *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 409-411 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

An overview is given of seven process development activities which were presented at this session. Pulsed excimer laser processing of photovoltaic cells was presented. A different pulsed excimer laser annealing was described using a 50 w laser. Diffusion barrier research focused on lowering the chemical reactivity of amorphous thin film on silicon. In another effort adherent and conductive films were successfully achieved. Other efforts were aimed at achieving a simultaneous front and back junction. Microwave enhanced plasma deposition experiments were performed. An updated version of the Solar Array Manufacturing Industry Costing Standards (SAMICS) was presented, along with a life cycle cost analysis of high efficiency cells. The last presentation was on the evaluation of the ethyl vinyl acetate encapsulating system. E.R.

N86-29380*# ARCO Solar, Inc., Chatsworth, Calif.
PULSED EXCIMER LASER PROCESSING
David Wong *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 413-428 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The status of pulsed excimer laser processing of PV cells is presented. The cost effective feasibility of fabricating high efficiency solar cells on Czochralski wafers using a pulsed excimer laser for junction formation, surface passivation, and front metallization. Laser annealing results were promising with the best AR coated cell having an efficiency of 16.1%. Better results would be expected with larger laser spot size because there was some degradation in open circuit voltage caused by laser spot overlap and edge effects. Surface heating and photolytic decomposition by the laser was used to deposit tungsten from the reaction of tungsten hexafluoride and hydrogen. The line widths were 5 to 10 mils, and the depositions passed the tape adhesion test. Thinner lines are practical using an optimized optical system. Author

N86-29381*# Spire Corp., Bedford, Mass.
EXCIMER LASER ANNEALING FOR FABRICATION OF LOW-COST SOLAR CELLS
M. B. Spitzer, A. C. Greenwald, and S. J. Hogan *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 429-434 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Pulsed excimer laser annealing was successfully performed using a 50 w laser. Both polished and texturized cells were tried, however, there are serious problems with nonuniformity on texturized cells. A number of cells were produced and compared to diffusion furnace annealed cells. There was no clear economic advantage in using an excimer laser and there was a small penalty on average efficiency. The conclusion was that the excimer laser anneal process must be able to produce superior cells to be considered as a viable process option. Author

N86-29382*# California Inst. of Tech., Pasadena.
AMORPHOUS METALLIC FILMS IN SILICON METALLIZATION SYSTEMS
Frank So, Elzbieta Kolawa, and Marc-A. Nicolet *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 435-441 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Diffusion barrier research was focussed on lowering the chemical reactivity of amorphous thin films on silicon. An additional area of concern is the reaction with metal overlays such as aluminum, silver, and gold. Gold was included to allow for technology transfer to gallium arsenide PV cells. Amorphous tungsten nitride films have shown much promise. Stability to annealing temperatures of 700, 800, and 550 C were achieved for overlays of silver, gold, and aluminum, respectively. The lower results for aluminum were not surprising because there is an eutectic that can form at a lower temperature. It seems that titanium and zirconium will remove the nitrogen from a tungsten nitride amorphous film and render it unstable. Other variables of research interest were substrate bias and base pressure during sputtering. Author

N86-29383*# Purdue Univ., West Lafayette, Ind.
MOD SILVER METALLIZATION: SCREEN PRINTING AND INK-JET PRINTING
R. W. Vest and G. M. Vest *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 443-456 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Basic material efforts have proven to be very successful. Adherent and conductive films were achieved. A silver neodecanoate/bismuth 2-ethylhexanoate mixture has given the best results in both single and double layer applications. Another effort is

continuing to examine the feasibility of applying metallo-organic deposition films by use of an ink jet printer. Direct line writing would result in a saving of process time and materials. So far, some well defined lines have been printed. Author

N86-29384*# Westinghouse Electric Corp., Pittsburgh, Pa.
PROCESS RESEARCH OF NON-Cz MATERIAL
Robert B. Campbell *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 457-466 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Efforts were aimed at achieving a simultaneous front and back junction. Lasers and other heat sources were tried. Successful results were gained by two different methods: laser and flash lamp. Polymer dopants were applied to both sides of dendritic web cells. Rapid heating and cooling avoided any cross contamination between two junctions after removal of the dendrites. Both methods required subsequent thermal annealing in an oven to produce maximum efficiency cells. Author

N86-29385# Westinghouse Electric Corp., Pittsburgh, Pa.
LASER-ASSISTED SOLAR-CELL METALLIZATION PROCESSING
A. Rohatgi, P. G. McMullin, and P. Rai-Choudhury *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 467-472 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Effort was directed toward metal patterning by use of argon laser and silver/bismuth metallo-organic deposition material. Excellent cell efficiencies were seen along with good ohmic contact and adhesion. Line widths down to .002 in were achieved. The only remaining process drawback is line thickness. At present, a secondary electroplating process step is required to obtain sufficient conductivity. Author

N86-29386# Superwave Technology, Inc., Santa Clara, Calif.
MICROWAVE-ENHANCED THIN-FILM DEPOSITION
S. Chitre *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 473-475 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Microwave enhanced plasma deposition experiments are reported. Advantages foreseen for use of microwaves are: higher electron plasma density by about 4 orders of magnitude, long species lifetime to allow separation of reactor and plasma generation, more control of deposition kinetics with less substrate damage, controlled film gradients or doping, lower power requirements, and lower reactive gas consumption. The feasibility of this process was demonstrated by the formation of silicon and silicon nitride films. Author

N86-29387*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LIFE-CYCLE COSTS OF HIGH-PERFORMANCE CELLS
Ron Daniel, Dale Burger, and Leonard Reiter *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 477-483 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A life cycle cost analysis of high efficiency cells was presented. Although high efficiency cells produce more power, they also cost more to make and are more susceptible to array hot-spot heating. Three different computer analysis programs were used: SAMICS (solar array manufacturing industry costing standards), PVARRAY (an array failure mode/degradation simulator), and LCP (lifetime cost and performance). The high efficiency cell modules were found to be more economical in this study, but parallel redundancy is recommended. Author

N86-29388*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SAMICS ON THE IBM PC
R. Chamberlain *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 485-487 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

An updated version of the Solar Array Manufacturing Industry Costing Standards (SAMICS) was presented. This version will run on the IBM PC-XT or compatibles, and embodies user friendly input screens and numerous help options. Use of this microcomputer version will still produce the old main frame direct cost driven analysis, although at some cost in turnaround time. A typical simulation will take about 4 hours. The program allows for unattended report printout. Also available is the IBM PC (or compatibles) version of the Improved Price Estimation Guidelines (IPEG). This program allows rapid analysis of process variables using SAMICS-generated coefficients. Author

N86-29389*# Springborn Labs., Inc., Enfield, Conn.
ENCAPSULATION PROCESSING AND MANUFACTURING YIELD ANALYSIS
P. Willis *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 489-500 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Evaluation of the ethyl vinyl acetate (EVA) encapsulation system is presented. This work is part of the materials baseline needed to demonstrate a 30 year module lifetime capability. Process and compound variables are both being studied along with various module materials. Results have shown that EVA should be stored rolled up, and enclosed in a plastic bag to retard loss of peroxide curing agents. The TBEC curing agent has superior shelf life and processing than the earlier Lupersol-101 curing agent. Analytical methods were developed to test for peroxide content, and experimental methodologies were formalized. Author

N86-29390# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ADVANCED SILICON SHEET
Anthony Briglio, Jr. *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 501-502 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The session chairman's overview of ten presentations made covering research on silicon-shaped sheet technology is presented. E.R.

N86-29391*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
SILICON RIBBON STRESS/STRAIN WORKSHOP
M. H. Leipold *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 503-505 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Highlights of the Flat Plate Solar Array Project sponsored Silicon Ribbon Stress/Strain Workshop that was held 23 to 24 January 1985 are reported. The presentations and discussions were aimed at acquiring a generic understanding of the sources of stress, deformation, and structural characteristics occurring during the growth of silicon ribbon. Author

N86-29392*# Westinghouse Electric Corp., Pittsburgh, Pa.
ADVANCED DENDRITIC WEB GROWTH DEVELOPMENT
R. H. Hopkins *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 507-525 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

A program to develop the technology of the silicon dendritic web ribbon growth process is examined. The effort is being concentrated on the area rate and quality requirements necessary to meet the JPL/DOE goals for terrestrial PV applications. Closed loop web growth system development and stress reduction for high area rate growth is considered. Author

N86-29393*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEFECT CHARACTERIZATION OF SILICON DENDRITIC WEB

RIBBONS
Li-Jen Cheng *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 527-535 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Progress made in the study of defect characterization of silicon dendritic web ribbon is presented. Chemical etching is used combined with optical microscopy, as well as the electron beam induced current (EBIC) technique. Thermal annealing effect on carrier lifetime is examined. Author

N86-29394*# Cornell Univ., Ithaca, N.Y.
ELECTRICAL, STRUCTURAL, AND CHEMICAL CHARACTERIZATION OF SILICON SHEET MATERIALS
D. G. Ast and S. L. Hyland *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 537-542 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Progress on the electrical, structural, and chemical characterization of silicon sheet material is reported. In the study on high temperature deformation of dendritic web ribbon, experimental creep tests were performed in four point bending under constant load conditions, and unusual behavior was observed. Also, measurements of oxygen content in web ribbon were made. Two conclusions reached are creep behavior of web which is very different from any seen for single crystal silicon and oxygen level in web silicon which is near the saturation level at the melting point of silicon. Author

N86-29395*# Kentucky Univ., Lexington.
ANALYSIS OF SILICON STRESS/STRAIN RELATIONSHIPS
O. Dillon *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 543-563 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

In the study of stress-strain relationships in silicon ribbon, numerous solutions were calculated for stresses, strain rates, and dislocation densities through the use of the Sumino model. It was concluded that many cases of failure of computer solutions to converge are analytical manifestations of shear bands (Luder's band) observed in experiments. Author

N86-29396*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
STRESS STUDIES IN EDGE-DEFINED FILM-FED GROWTH OF SILICON RIBBONS
J. Kalejs *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 565-573 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Stress and efficiency studies on sheet silicon are reported. It was found that the bulk diffusion length of stressed float zone and Czochralski silicon is limited by point defect recombination to about 20 micrometers in dislocation free regions after high temperature heat treatment and stress application. If in-diffusion by iron occurs, dislocations, carbon and oxygen, do not produce significant gettering with annealing. Further work ideas are suggested. Author

N86-29397*# Massachusetts Inst. of Tech., Cambridge.
ANALYSIS OF HIGH-SPEED GROWTH OF SILICON SHEET IN INCLINED-MENISCUS CONFIGURATION
P. D. Thomas and R. A. Brown *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 575-585 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The study of high speed growth of silicon sheet in inclined-meniscus configurations is discussed. It was concluded that the maximum growth rates in vertical and inclined growth are set by thermal-capillary limits. Also, the melt/crystal interface was determined to be flat. And, vertical growth is qualitatively modelled by one dimensional heat transfer. Author

N86-29398*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
HIGH-PURITY SILICON CRYSTAL GROWTH INVESTIGATIONS
T. F. Ciszek, J. L. Hurd, and T. Schuyler *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 587-600 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The study of silicon sheet material requirements for high efficiency solar cells is reported. Research continued on obtaining long lifetime single crystal float zone silicon and on understanding and reducing the mechanisms that limit the achievement of long lifetimes. The mechanisms studied are impurities, thermal history, point defects, and surface effect. The lifetime related crystallographic defects are characterized by X-ray topography and electron beam induced current. Author

N86-29399*# Illinois Univ., Chicago.
SILICON SHEET SURFACE STUDIES
S. Danyluk *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 601-619 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Results of the program are presented on developing an understanding of the basic mechanisms of abrasion and wear of silicon and on the nondestructive measurement of residual stresses in sheet silicon. Experiments were conducted at various temperatures and in the presence of various fluids. In abrasive wear, it was shown that dislocations, microtwins, and cracks are generated beneath the contact surface. Residual stresses in ribbon by the edge defined film growth process were measured by use of a shadow moire interferometry technique. Author

N86-29400*# Spire Corp., Bedford, Mass.
HIGH-EFFICIENCY MODULE DESIGN
M. B. Spitzer *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 623-632 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Progress on the development of a high efficiency module is described. The effort includes development of high efficiency cells using crystalline silicon wafers from float zone silicon. Module-size cells, 53 sq cm in area, were fabricated with efficiency of 18%. Operating temperature reduction is also studied. Author

N86-29401*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MODULE FLAMMABILITY RESEARCH
R. S. Sugimura and D. H. Otth *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 633-636 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

New materials were developed which show promise of fabricating modules that can pass the Underwriter Laboratories Class A burning brand test for fire ratable solar cell modules. It is concluded that fire resistant module design require special high temperature materials and constructions to achieve Class B and Class A ratings. Also, synergisms exist between back surface materials and module configuration. Author

N86-29402*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DEVELOPMENT OF DESIGN CRITERIA AND A QUALIFICATION TEST FOR BYPASS DIODES
D. H. Otth *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 637-640 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The development of a qualification test for modules bypass diodes is reviewed. Diode junction temperature is measured, indirectly, under laboratory ambient conditions, and extrapolated to field conditions. Criteria are given for diode reliability. Author

N86-29403*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

DEVELOPMENT OF AM 1.5 GLOBAL MEASUREMENT PROCEDURES AND INTERNATIONAL CELL MEASUREMENT ROUND ROBIN
R. Mueller *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 641-648 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The development of the capability for measurement under global irradiance spectral distribution is reported. The airmass 1.5 global measurement procedure is given. Also given is the procedure and justification for using the large area pulsed solar simulator (LAPSS). The status of the international round robin of reference cell measurements managed by the Commission of European Communities (CEC) is described. Author

N86-29404*# Clemson Univ., S.C.
AMORPHOUS-SILICON CELL RELIABILITY TESTING
J. W. Lathrop *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 649-658 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The work on reliability testing of solar cells is discussed. Results are given on initial temperature and humidity tests of amorphous silicon devices. Calibration and measurement procedures for amorphous and crystalline cells are given. Temperature stress levels are diagrammed. Author

N86-29405*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHOTOCURRENT IMAGES OF AMORPHOUS-SILICON SOLAR-CELL MODULES
Q. Kim, A. Shumka, and J. Trask *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 659-672 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Results obtained in applying the unique characteristics of the solar cell laser scanner to investigate the defects and quality of amorphous silicon cells are presented. It is concluded that solar cell laser scanners can be effectively used to nondestructively test not only active defects but also the cell quality and integrity of electrical contacts. Author

N86-29406*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
AMORPHOUS-SILICON MODULE HOT-SPOT TESTING
C. C. Gonzalez *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 673-684 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Hot spot heating occurs when cell short-circuit current is lower than string operating current. Amorphous cell hot spot are tested to develop the techniques required for performing reverse bias testing of amorphous cells. Also, to quantify the response of amorphous cells to reverse biasing. Guidelines are developed from testing for reducing hot spot susceptibility of amorphous modules and to develop a qualification test for hot spot testing of amorphous modules. It is concluded that amorphous cells undergo hot spot heating similarly to crystalline cells. Comparison of results obtained with submodules versus actual modules indicate heating levels lower in actual modules. Module design must address hot spot testing and hot spot qualification test conducted on modules showed no instabilities and minor cell erosion. E.R.

N86-29407*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PVARRAY: A SOFTWARE TOOL FOR PHOTOVOLTAIC ARRAY DESIGN
Dale R. Burger *In its* Proceedings of the 25th Project Integration Meeting Jun. 1985 p 685-690 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

The application of PVARRAY, a software program for design of photovoltaic arrays are described. Results of sample parametric studies on array configurations are presented. It is concluded that PVARRAY could simulate a variety of configurations. Author

N86-29408*# Westinghouse Electric Corp., Pittsburgh, Pa.
DENDRITIC WEB-TYPE SOLAR CELL MINI-MODULES
R. B. Campbell *In* JPL, Pasadena, Calif. Proceedings of the 25th Project Integration Meeting Jun. 1985 p 691-692 (For primary document see N86-29347 20-44)
Avail: NTIS HC A99/MF E03 CSCL 10A

Twenty-five minimodules composed of dendritic web solar cells with nominal glass size of 12 by 40 cm were provided for study. The modules were identical with respect to design, materials, and manufacturing and assembly processes to full scale modules. The modules were also electrically functional. These minimodules were fabricated to provide test vehicle for environmental testing and to assess reliability of process and design procedures. The module design and performance are outlined. E.R.

N86-29409*# Akron Univ., Ohio. Dept. of Chemical Engineering.
THEORETICAL AND EXPERIMENTAL FLOW CELL STUDIES OF A HYDROGEN-BROMINE FUEL CELL, PART 1 M.S. Thesis. Final Report
Robert F. Savinell and Sharon D. Fritts 1 Mar. 1986 214 p (Grant NAG3-500)
(NASA-CR-177165; NAS 1.26:177165) Avail: NTIS HC A10/MF A01 CSCL 10B

There is increasing interest in hydrogen-bromine fuel cells as both primary and regenerative energy storage systems. One promising design for a hydrogen-bromine fuel cell is a negative half cell having only a gas phase, which is separated by a cationic exchange membrane from a positive half cell having an aqueous electrolyte. The hydrogen gas and the aqueous bromide solution are stored external to the cell. In order to calculate the energy storage capacity and to predict and assess the performance of a single cell, the open circuit potential (OCV) must be estimated for different states of change, under various conditions. Theoretical expressions were derived to estimate the OCV of a hydrogen-bromine fuel cell. In these expressions temperature, hydrogen pressure, and bromine and hydrobromic acid concentrations were taken into consideration. Also included are the effects of the Nafion membrance separator and the various bromide complex species. Activity coefficients were taken into account in one of the expressions. The sensitivity of these parameters on the calculated OCV was studied. Author

N86-29410# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LONG-TERM POWER SYSTEM SIMULATION FOR REAL-TIME TRAINING WITH A REDUCED SIZE PROGRAM
Marco AlfredoDiLascio Apr. 1986 8 p Presented at the IEEE/Power Engineering Society Summer Meeting, Mexico City, Mexico, 20-25 Jul. 1986 Submitted for publication
(INPE-3859-PRE/923) Avail: NTIS HC A02/MF A01

The results of a reduced size computer program for long term power systems simulation are discussed. Detailed models of a hydro, a coal-fired, and a pressurized water reactor (PWR) generation plant are included. Typical data taken from operating records were used. Since the simulation runs faster than real-time, the program can be used for power system simulator operator training. Author

N86-29411*# United Technologies Corp., South Windsor, Conn. Power Systems Div.
ADVANCED ON-SITE POWER PLANT DEVELOPMENT TECHNOLOGY PROGRAM Annual Report, 1984
Fred S. Kemp Feb. 1985 276 p
(Contracts DEN3-289; DE-AI21-80ET-17088)
(NASA-CR-175007; NAS 1.26:175007; FCR-6848; DOE/NASA/0389-3) Avail: NTIS HC A13/MF A01 CSCL 10B

A 30-cell stack was tested for 7200 hours. At 6000 hours the stack was successfully refilled with acid with no loss of performance. A second stack containing the advanced Configuration B

cell package was fabricated and assembled for testing in 1985. A 200-kW brassboard inverter was successfully evaluated, verifying the design of the two-bridge ASCR circuit design. A fuel processing catalyst train was tested for 2000 hours verifying the catalyst for use in a 200-kW development reformer. The development reformer was fabricated for evaluation in 1985. The initial test plan was prepared for a 200-kW verification test article. Author

N86-29412*# National Aeronautics and Space Administration, Washington, D.C.
CURRENT DEVELOPMENTS IN ELECTROCHEMICAL STORAGE SYSTEMS FOR SATELLITES
G. Gutmann Jul. 1986 22 p Transl. into ENGLISH from Zeitschrift fuer Flugwissenschaften und Weltraumforschung (West Germany), v. 9, Jul. - Aug. 1985 p 229-235 Original language document was announced in IAA as A86-11760 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original document was prepared by Deutsche Automobilgesellschaft
(Contract NASw-4005)
(NASA-TM-88471; NAS 1.15:88471; ISSN-0342-068X) Avail: NTIS HC A02/MF A01 CSCL 10C

The need for batteries with greater power capacity and service life for power satellites is examined. The Ni/Cd and Ni/H batteries now being used must be upgraded to meet advanced space requirements. Improvements in power capacity, service life, and cycle count for various satellites in LEO and GEO orbits are discussed. The Ni/Cd and Ni/H cell reactions are explained, and the solubility and volume changes for various charged and uncharged masses are described. A chart of the energy content and cycle count for various cell systems is presented, and the factors which cause aging and failure in the Ni/Cd and Ni/H cell systems are discussed. The advantages of the Ni/H battery are given and the need for more developed electrochemical storage systems because of an increase in the mass of satellites is explained. The requirements for space batteries and the work currently done by NASA and West Germany on advanced batteries are discussed. Author

N86-29413# Texas Technological Coll., Lubbock. Dept. of Mathematics.
SOLAVG: RADIALLY AVERAGED OPTICAL POWER RATIO CALCULATIONS. THE CROSBYTON SOLAR POWER PROJECT
W. T. Ford and R. M. Anderson 15 Aug. 1985 155 p
(Contract DE-AC04-83AL-21557)
(DE86-004960; DOE/AL-21557/T5) Avail: NTIS HC A08/MF A01

Several analytical and computational models have been developed during the course of the Crosbyton Solar Power Project (CSPP) to aid design and prediction of performance for the solar bowl technology. The ROSA (Ratio of Solid Angles) code has been previously reported. This report deals with the SOLAVG (Solar Average) code. The SOLAVG code produces output to be used as input to the WATER1 code which is being reported elsewhere. The SOLAVG code includes much of the ROSA code to obtain concentrations to be averaged around the receiver using the Romberg algorithm. These averages vary with distance along the receiver. The WATER1 code uses these averaged solar concentrations to compute thermodynamic quantities along the length of the receiver. Sixteen examples of output from SOLAVG are listed and plotted in this report. An example of the output from WATER1 based on input from SOLAVG is given as a complete print, and three examples of such output are plotted. ROSA, SOLAVG, and WATER1 are all available on disks which were recorded on an IBM-XT. All three codes compile using Microsoft FORTRAN (c) to produce operable object codes. All listed and plotted results in this report are also available on disks upon request. DOE

N86-29414# Lawrence Livermore National Lab., Calif.
ENERGY AND TECHNOLOGY REVIEW
Nov. 1985 42 p
(Contract W-7405-eng-48)
(DE86-005295; UCRL-52000-85-11) Avail: NTIS HC A03/MF A01

This issue is devoted entirely to X-ray laser technology. It includes information on theory, LASNEX and XRASER modeling codes, experiments, the Novette laser system, X-ray lasing targets, time-resolving X-ray spectrometers capable of subnanosecond resolution for diagnostics, and future directions in X-ray laser physics. DOE

N86-29415# Gould, Inc., Rolling Meadows, Ill. Research Center.
FUNDAMENTAL THERMAL MANAGEMENT ASPECTS OF THE LITHIUM METAL SULFIDE BATTERY Final Report
D. M. Chen and H. F. Gibbard Jul. 1985 115 p
(Contract DE-AC03-76SF-00098)
(DE86-005871; LBL-20026) Avail: NTIS HC A06/MF A01

Objectives of this project were the determination of heat generation rates and measurement of temperature distributions of lithium-metal sulfide batteries. The experimental methods used were calorimetry, emf and polarization measurements, and direct measurements of internal cell temperature. DOE

N86-29416# Sandia National Labs., Albuquerque, N. Mex.
OXIDATION/SULFIDATION OF MATERIAL CANDIDATES FOR DISTRIBUTED SOLAR RECEIVER THERMOCHEMICAL TRANSPORT PROGRAM
L. J. Weirick 1986 16 p Presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-005633; SAND-85-1657C; CONF-860406-6) Avail: NTIS HC A02/MF A01

Metals for potential use in the dissociator and the synthesizer reactors of a distributed solar receiver thermochemical transport loop utilizing SO3/SO2/O2 molecular chemistry includes stainless steels and iron-base, nickel-base and cobalt-base superalloys. We tested these alloys in SO2/O2 mixtures and SO3 gas at 500(0)C and 900(0)C, respectively, for times of up to four weeks. Weight gain measurements were used to determine the oxidation/sulfidation kinetics and electron microprobe analysis was used to measure penetration of oxygen and sulfur into the metal and to identify the formation of internal oxides and sulfides. Results of these tests showed that the most promising candidates are those containing sufficient quantities of both aluminum and chromium alloying additions to be alumina and chromia formers, such as Kanthal A-1, Nimonic 105 and Cabot 214. DOE

N86-29417# Sandia National Labs., Albuquerque, N. Mex.
DOE INNOVATIVE CONCENTRATOR PROJECT
T. R. Mancini 1986 12 p Presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-000205; SAND-85-1658C; CONF-860406-3) Avail: NTIS HC A02/MF A01

The purpose of the Department of Energy Solar Thermal Program Concentrator Task is to develop efficient, low cost methods of concentrating solar energy as a high temperature thermal source for process heat applications and for electrical power generation. The annual efficiency and cost of point-focus concentrators are presently about 62% and $650/M(2), respectively. The long-term program goals are to produce point-focus concentrators which are 78% efficient for a cost of $140/M(2). DOE

N86-29418# Pacific Northwest Lab., Richland, Wash.
PRIMER OF TURBULENCE IN THE WIND TURBINE LAYER
J. R. Connell Aug. 1985 11 p Presented at the WINDPOWER '85, San Francisco, Calif., 27 Aug. 1985
(Contract DE-AC06-76RL-01830)
(DE86-001643; PNL-SA-13102; CONF-850834-4) Avail: NTIS HC A02/MF A01

Some wind turbine fatigue problems are caused by the turbulent wind, and there is an engineering need to understand both qualitatively and quantitatively the characteristics of the wind that

are causing untimely damage to wind turbine components. To meet this need, the paper describes, in simple terms, turbulent motion: where it is generated and how it changes with differences in terrain, height above the ground, meteorological conditions, time, and distance from its source. The character of the turbulent wind as it is experienced at points on a rotating rotor blade is also examined. Some ways in which turbulent wind interacts with a turbine rotor to produce fluctuating forces and stresses on turbine components are identified. Stresses calculated or otherwise estimated from recent more realistic turbulence information can be much more severe than if the new turbulence information is not used in the analysis of turbine response. The paper concludes with examples of several computational methods and several measurement methods of modeling the turbulent wind that loads and stresses turbine rotors. DOE

N86-29419# Meridian Corp., Falls Church, Va.
PHOTOVOLTAIC RESEARCH OPPORTUNITIES Final Report
B. Macaleer, J. Bowers, and B. Hurlbut 19 Nov. 1985 134 p
(Contract DE-AC01-84ER-30064)
(DE86-007417; DOE/ER-30064/T1) Avail: NTIS
HC A07/MF A01

The purpose of this study is to identify opportunities for photovoltaic (PV) research projects to capitalize on related but non-PV research. The study is performed under the assumption that a considerable body of ongoing semiconductor research in non-PV areas could be of value to its PV Program and the PV community in general. Research related to III-V compounds, thin films, and crystalline silicon materials is included. Research that is known to be PV-related or sponsored by DOE was excluded from consideration. The study resulted in 11 recommendations (research areas) and a subset of 58 specific research projects. In addition, over 75 non-PV research managers in the semiconductor field are identified as potential sources of ideas which could benefit photovoltaics. DOE

N86-29420# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
EVALUATION OF TWO PERFORMANCE PREDICTION METHODS FOR HORIZONTAL-AXIS WIND TURBINES BY COMPARISON WITH EXPERIMENTAL RESULTS
J. A. vanEgmond 1985 39 p Sponsored by National Research Program on Wind Energy (NOW II)
(Contract ECN-4401-3.4)
(NLR-TR-85028-L; ESA-86-97403) Avail: NTIS HC A03/MF A01

A computer program based on Glauert's blade element theory and a program based on a rotating lifting line theory with nonlinear vortex wake modeling were compared with experimental results for two horizontal-axis wind turbines. In spite of the higher level of sophistication of the lifting line/vortex wake model, the quality of the predicted characteristics of both methods is equal. The blade element theory is far less expensive in computing costs than the rotating lifting line theory. Large differences between theory and experiment can only be explained partly from uncertainties in the aerodynamic characteristics of the basic airfoil sections. For the two different turbine configurations considered, no systematic differences between theory and experiment are found, raising questions about the reliability of the measured data. The rotating lifting line theory suggests that a slightly different optimum blade geometry with wider tip chord than predicted by blade element theory might lead to a performance increase. ESA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-29421*# San Francisco State Univ., Calif. Frederick Burk Foundation.
BIOLOGICALLY PRODUCED VOLATILE COMPOUNDS: N1O EMISSIONS FROM SOILS Final Scientific Report, 1 Sep. 1984 - 30 Aug. 1985
A. Banin Sep. 1985 12 p
(Contract NCC2-321)
(NASA-CR-177111; NAS 1.26:177111) Avail: NTIS
HC A02/MF A01 CSCL 13B

Tropospheric nitrous concentration has increased by 0.2 0.4% per year over the period 1975 to 1982, amounting to net addition to the atmosphere of 2.8 - 5.6 Tg N2O-N per year. This perturbation, if continued into the future, will affect stratospheric chemical cycles, and the thermal balance of the Earth. In turn it will have direct and indirect global effects on the biosphere. Though the budget and cycles of N2O on Earth are not yet fully resolved, accumulating information and recent modelling efforts permit a more complete evaluation and better definition of gaps in our knowledge. Author

N86-29422*# National Aeronautics and Space Administration, Washington, D.C.
TREATMENT FOR HYDRAZINE-CONTAINING WASTE WATER SOLUTION
N. Yade Aug. 1986 12 p Transl. into ENGLISH of Japanese Patent No. 54-23071 (21 Feb. 1979) p 383-386 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88472; NAS 1.15:88472) Avail: NTIS
HC A02/MF A01 CSCL 13B

The treatment for waste solutions containing hydrazine is presented. The invention attempts oxidation and decomposition of hydrazine in waste water in a simple and effective processing. The method adds activated charcoal to waste solutions containing hydrazine while maintaining a pH value higher than 8, and adding iron salts if necessary. Then, the solution is aerated. Author

N86-29423# Rhode Island Univ., Narragansett. Graduate School of Oceanography.
ELEMENT TRACERS OF SOURCE REGIONS OF CONTAMINANTS IN PRECIPITATION Quarterly Report
K. A. Rahn 15 Jan. 1986 22 p
(Contract DE-FG22-84PC-71253)
(DE86-005405; DOE/PC-71253/4; QR-4) Avail: NTIS
HC A02/MF A01

Activity was continued on the following projects: each rain at Narragansett was collected and analyzed with its corresponding aerosol samples. The rain-sampling procedure was improved. Analytical blanks associated with the plastic bags were reduced by large factors. The precipitation and aerosol data are being examined for systematic features. In addition we have begun an informal cooperative effort to apply our analytical technique to measuring elemental abundances in several waterways of Rhode Island, in conjunction with Rhode island College. We are laying more concrete plans to expand our study of precipitation and aerosol in China. Each of these topics is discussed in more detail. DOE

N86-29424# Department of Energy, Washington, D. C. Carbon Dioxide Research Div.
DETECTING THE CLIMATIC EFFECTS OF INCREASING CARBON DIOXIDE
M. C. MacCracken. ed. and F. M. Luther, ed. Dec. 1985 221 p
(DE86-006223; DOE/ER-0235) Avail: NTIS HC A12/MF A01

This report documents what is known about detecting the CO2-induced changes in climate, and describes the uncertainties and unknowns associated with this monitoring and analysis effort. The various approaches for detecting CO2-induced climate changes are discussed first, followed by a review of applications of these strategies to the various climatic variables that are expected to be changing. Recommendations are presented for research and analysis activities. Separate abstracts have been prepared for the individual papers. DOE

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-29425*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EL NINO AND OUTGOING LONGWAVE RADIATION: AN ATLAS OF NIMBUS-7 EARTH RADIATION BUDGET OBSERVATIONS
H. Lee Kyle (Research and Data Systems, Inc., Lanham, Md.), Philip E. Ardanuy, and Richard R. Hucek Apr. 1986 184 p
(Contract NAS5-27728)
(NASA-RP-1163; NAS 1.61:1163; Rept-85B0565) Avail: NTIS HC A05/MF A01 CSCL 04A

Five years of broadband Earth Radiation Budget (ERB) measurements taken by the Nimbus-7 ERB experiment have been archived. This five year period included the 1982 to 1983 El Nino/Southern Oscillation event, which reached its peak in January 1983 (near the beginning of the fifth data year). An outgoing longwave radiation subset of the data, for the period June 1980 to October 1983, was processed to enhance spatial resolution. This atlas contains the analyses of the resultant fields. In addition, a set of anomaly maps, based on a definition of pre-El Nino climatology, is included. Together, these two sets of maps provide the first broadband glimpse of the terrestrial outgoing longwave radiation response to the El Nino event. Author

N86-29426*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTRAPLATE DEFORMATION DUE TO CONTINENTAL COLLISIONS: A NUMERICAL STUDY OF DEFORMATION IN A THIN VISCOUS SHEET
Steven C. Cohen and Richard C. Morgan Oct. 1985 27 p
(NASA-TM-86235; 86B0019; NAS 1.15:86235) Avail: NTIS HC A03/MF A01 CSCL 08G

Continental collisions can result in the transmission of stress from the boundary between tectonic plates into the plate interiors. Extensive crustal deformations characterized by both horizontal and vertical crustal movements have occurred as a consequence of collisions in both contemporary and ancient tectonic environments. These deformations have been analyzed by a number of observers who in recent years have begun to propose various geological and numerical models of the collision processes. One of the more successful models involves the penetration of a rigid punch (one plate) into a deformable sheet (another plate). For example, this model has been used by Tapponier and Molnar (1977), Vilotte et al. (1982), and others as an aid in understanding the tectonics of the India-Eurasia collision. In this paper we examine in detail some of the features of this model as first formulated by England and coworkers (1982, 1983, 1985; Houseman and England, 1985). Using a linear viscous flow law for most of our calculations, we compute the magnitude and rate of change of crustal thickness, the velocity of various mass points, strain rates and their principal axes, modes of deformation, areal changes, and stress. Particular attention is paid to the role of lateral boundary conditions. In general a free lateral boundary reduces the magnitude of changes in crustal thickening (compared to a fixed lateral boundary) by allowing material to more readily escape the advancing punch. The shearing that occurs diagonally in front of the advancing punch terminates in compression or extension depending on whether the lateral boundary is fixed or free to move. When the ratio for the diameter of the punch to that of the viscous sheet exceeds about one-third, the deformation in front of the punch is insensitive to the specific choice of lateral boundary conditions. Although gravitational effects can then reduce the rate of compression and crustal thickening in a plate deforming by nonlinear viscous flow, this effect is minor for linear flow unless the viscosity is small and/or the topographic relief substantial. the leading point (center) of the punch. While many of the other observed qualitative deformation features are present for both linear and nonlinear flow laws, some change significantly. In particular, the variation in compression rate with distance from the punch is sensitive to the choice of rheological law. With a linear law, the axial distance from the middle of the punch to the point of local maximum compression is relatively invariant with time. This maximum occurs much farther from the punch than is predicted from recently published approximate analytical expressions. For a nonlinear law, the location of the maximum propagates away from the punch/sheet boundary. Author

N86-29427# Finnish Meteorological Inst., Helsinki.
THE STRUCTURE OF THE MARINE ATMOSPHERIC BOUNDARY LAYER: A REVIEW FROM THE POINT OF VIEW OF DIFFUSIVITY, TRANSPORT AND DEPOSITION PROCESSES
Sylvain M. Joffre Nov. 1985 120 p
(FMI-TR-29; ISBN-9051-697-220-9; ISSN-0355-1733) Avail: NTIS HC A06/MF A01

Through a review of the literature, the structure of the marine atmospheric boundary layer (MABL) was sketched for the mean flow with profiles of velocity, temperature, water vapor and trace species and for turbulence with profiles of variances, fluxes and eddy exchange coefficients. Results from the few field experiments available were compiled and compared if possible to theoretical or model predictions. It appears that mainly the slightly to strongly unstable types of MABL were studied but, e.g., the stably stratified case remains rather unknown observationally. This suggests priorities for future experimental efforts. Some climatological knowledge was gained through the analysis of a few years' data of averaged wintertime ocean weather ship observations for mean quantities. In conclusion, the MABL height seems to be, except for convective conditions, in the range of 400 to 800 m, but the often present capping cloud layer with its own independent vertical mixing obscures the interpretation of the profiles. Author

N86-29428*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SAM 2 MEASUREMENTS OF THE POLAR STRATOSPHERIC AEROSOL, VOLUME 8 Report, Apr. - Oct. 1982
M. Patrick McCormick and David Brandl (Systems and Applied Sciences Corp., Hampton, Va.) Aug. 1986 80 p
(NASA-RP-1165; L-16106; NAS 1.61:1165) Avail: NTIS HC A05/MF A01 CSCL 04A

The Stratospheric Aerosol Measurement (SAM) 2 sensor aboard Nimbus 7 is providing extinction measurements of Antarctic and Arctic stratospheric aerosols with a vertical resolution of 1 km. Representative examples and weekly averages including corresponding temperature profiles provided by NOAA for the time and place of each SAM 2 measurement (Apr. 1982 - Oct. 1982) are presented. Contours of aerosol extinction as a function of altitude and longitude or time are plotted, and aerosol optical depths are calculated for each week. Typical values of aerosol extinction at 1.0 microns in the main stratospheric aerosol layer are approximately 4 to 6 times .0001/km at the beginning to 1 to 2 times .001/km at the end of the time period for the Antarctic region and approximately 1 to 3 times .001/km for the Arctic region throughout the time period. Stratospheric optical depths are about 0.002 to 0.009 for the Antarctic region and about 0.007 at the beginning to 0.024 at the end of the time period for the Arctic region. Polar stratospheric clouds were observed during the Antarctic winter, as expected. This report provides, in a ready-to-use format, a representative sample of the eighth 6 months of data to be used in atmospheric and climatic studies. Author

N86-29429# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
HIGH RESOLUTION MEASUREMENTS OF OH INFRARED AIRGLOW STRUCTURE Ph.D. Thesis
Parris C. Neal 1985 285 p
(AD-A166377; AFIT/CI/NR-86-26D) Avail: NTIS HC A13/MF A01 CSCL 04/1

Disturbances in the normally calm atmospheric airglow layer, which cause bright and dark band or stripes to appear, have been observed. These disturbances are attributed to gravity waves propagating through the atmosphere. An instrument capable of resolving the temporal, spatial, and spectral attributes of OH

infrared emissions was designed to gather quantitative data on airglow structure. An optically compensated interferometer spectrometer was chosen as the basic instrument to measure this phenomenon. Spatial data were obtained by matchng the interferometer's high throughput to a unique optical system which includes a 50-cm diameter telescope. This Dall Kirkham telescope maintains the large throughput of the interferometer but narrows the instrument field of view to less than a degree. The spatial resolution of the system is 14 milliradians. A bright OH Meinel airglow structure event was recorded. The structures were measured at elevation angles near the horizon. Apparent wavelengths, periods, and phase velocities, of 24 + or - 1 km, 14 + or - 1 minutes, and 28 + or - 2 meters/second, respectively, were calculated for the recorded structure. GRA

N86-29430# Naval Research Lab., Washington, D. C.
CONVECTIVE STABILIZATION OF IONOSPHERIC PLASMA CLOUDS
J. F. Drake and J. D. Huba 19 Mar. 1986 47 p
(AD-A166431; NRL-MR-5722) Avail: NTIS HC A03/MF A01 CSCL 04/1

We derive a stability criteria for the large-scale structuring of ionospheric plasma clouds due to the E X B gradient drift instability. For the equilibrium we consider a cylindrical 2D waterbag cloud aligned along a uniform magnetic field that is polarized by a neutral wind. We perform a stability analysis that allows three dimensional perturbations (in r, theta, and z), and consider both local and global modes. We find that when the parallel wavenumber k sub z exceeds a threshold value, exponentially growing global eigenmodes form which are localized on the backside of the cloud. This is in contrast to the k sub z = 0 limit in which there are no exponential solutions. As k sub z is increased further, the unstable modes localize at a finite angle away from the backside; at a point where the diamagnetic propagation velocity (V sub d) balances the convective flow velocity of the background plasma around the cloud (V sub b). We find that the E X B gradient drift instability is stable when V sub d - V sub b so that the cloud is no longer susceptible to large-scale structuring. GRA

N86-29431# Naval Ocean Systems Center, San Diego, Calif.
LIDAR MEASUREMENTS INDICATING ATMOSPHERIC INHOMOGENEITIES Final Report, 1 Jul. - 31 Oct. 1985
Merle H. Paulson 1 Feb. 1986 15 p
(AD-A166440; NOSC/TD-867) Avail: NTIS HC A02/MF A01 CSCL 04/1

Various methods for interpreting lidar data require that the atmospheric aerosol distributions be homogeneous in the horizontal direction. While many workers in aerosol extinction and lidar backscatter report that rarely, if ever, is the atmosphere sufficiently homogeneous horizontally for this to be a good assumption, most of them make the assumption anyway, or select cases where they say that, for their purposes, it is sufficiently homogeneous horizontally. This document considers some of the findings reported in the literature and presents some examples of lidar data obtained off the bluff at Point Loma in San Diego, California, showing pronounced aerosol inhomogeneities in the horizontal. It is concluded that while the lidar may be useful for studying atmospheric aerosols when used in conjunction with other meteorological measurements, it probably cannot be used as a stand-alone device for determining visibility. GRA

N86-29432*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BIDIRECTIONAL ELECTRON ANISOTROPIES IN THE DISTANT TAIL: ISEE-3 OBSERVATIONS OF POLAR RAIN
D. N. Baker, S. J. Bame, W. C. Feldman, J. T. Gosling, R. D. Zwickl, J. A. Slavin, and E. J. Smith 1985 20 p Presented at the Chapman Conference on Magnetotail Physics, Laurel, Md., 28 Oct. 1985 Prepared in cooperation with Los Alamos National Lab., Calif.
(Contract W-7405-eng-36)
(DE86-004737; LA-UR-85-4310; CONF-8510254-1) Avail: NTIS HC A02/MF A01

A detailed observational treatment of bidirectional electrons (50 approx. 500 eV) in the distant magnetotail (or greater than or equal to 100 R sub E) is presented. It is found that electrons in this energy range commonly exhibit strong, field-aligned anisotropies in the tail lobes. Because of large tail motions, the ISEE-3 data provide extensive sampling of both the north and south lobes in rapid succession, demonstrating directly the strong asymmetries that exist between the north and south lobes at any one time. The bidirectional fluxes are found to occur predominantly in the lobe directly connected to the sunward IMF in the open magnetosphere model (north lobe for away sectors and south lobe for toward sectors). Electron anisotropy and magnetic field data are presented which show the transition from unidirectional (sheath) electron populations to bidirectional (lobe) populations. Taken together, the present evidence suggests that the bidirectional electrons that we observe in the distant tail are closely related to the polar rain electrons observed previously at lower altitudes. Furthermore, these data provide strong evidence that the distant tail is comprised largely of open magnetic field lines in contra distinction to some recently advanced models. DOE

N86-29433# Los Alamos National Lab., N. Mex.
CONSOLIDATION AND SHEAR FAILURE LEADING TO SUBSIDENCE AND SETTLEMENT, PART 1
W. V. Abeele Nov. 1985 44 p
(Contract W-7405-eng-36)
(DE86-005880; LA-10261-MS-Pt-1) Avail: NTIS HC A03/MF A01

Subsidence and settlement are phenomena that are much more destructive than generally thought. In shallow land burials they may lead to cracking of the overburden and eventual exposure and escape of waste material. The primary causes are consolidation and cave-ins. Laboratory studies performed at Los Alamos permit us to predict settlement caused by consolidation or natural compaction of the crushed tuff overburden. We have also investigated the shear failure characteristics of crushed tuff that may lead to subsidence. Examples of expected settlement and subsidence are calculated based on the known geotechnical characteristics of crushed tuff. The same thing is done for bontonite/tuff mixes because some field experiments were performed using this additive (bentonite) to reduce the hydraulic conductivity of the crushed tuff. Remedial actions, i.e., means to limit the amount of settlement, are discussed. Finally, we briefly comment on our current field experiment, which studies the influence of subsidence on layered systems in general and on biobarriers in particular. DOE

N86-29434# New Mexico State Univ., Las Cruces. Dept. of Mechanical Engineering.
ATMOSPHERIC ATTENUATION OF SOLAR RADIATION AND CALIBRATION OF MULTIPLE WAVELENGTH SUN PHOTOMETERS
D. M. Price, G. P. Mulholland, L. K. Matthews, and D. L. King (Sandia National Labs., Albuquerque, N. Mex.) Jan. 1986 106 p Prepared in cooperation with Sandia National Labs., Albuquerque, NM.
(Contract DE-AC04-76DP-00789)
(DE86-006546; SAND-85-7010) Avail: NTIS HC A06/MF A01

The activities detailed in this report include a review of the literature pertaining to the atmospheric attenuation of solar radiation, the maintenance and calibration of Volz and Sandia designed sun photometers, a comparison of the SOLTRAN5 and LOW-TRAN6 spectral irradiance models, an evaluation of the Li-Cor LI-1800 spectral radiometer, and a comparison between Li-Cor measurements of solar spectral irradiance and the modeled results from LOWTRAN6. Suggestions for the improvement of the sun photometers and the Li-Cor are also given. DOE

N86-29435# Los Alamos National Lab., N. Mex.
APPLICATION OF SUPERCOMPUTERS TO 3-D MANTLE CONVECTION
J. R. Baumgardner 1986 44 p Presented at the NATO Advanced Study Institute on the Physics of Planets: Their Origin, Evolution and Structure, Los Alamos, N. Mex., 1 May 1984

(Contract W-7405-eng-36)
(DE86-006004; LA-UR-86-6; CONF-8405385-1) Avail: NTIS HC A03/MF A01

Current generation vector machines are providing for the first time the computing power needed to treat planetary mantle convection in a fully three-dimensional fashion. A numerical technique known as multigrid has been implemented in spherical geometry using a hierarchy of meshes constructed from the regular icosahedron to yield a highly efficient three-dimensional compressible Eulerian finite element hydrodynamics formulation. The paper describes the numerical method and presents convection solutions for the mantles of both the Earth and the Moon. In the case of the Earth, the convection pattern is characterized by upwelling in narrow circular plumes originating at the core-mantle boundary and by downwelling in sheets or slabs derived from the cold upper boundary layer. The preferred number of plumes appears to be on the order of six or seven. For the Moon, the numerical results indicate that development of a predominately L = 2 pattern in later lunar history is a plausible explanation for the present large second-degree non-hydrostatic component in the lunar figure. DOE

N86-29436# Lawrence Livermore National Lab., Calif.
SAC: A SIGNAL PROCESSING SYSTEM FOR RESEARCH SEISMOLOGY
J. E. Tull 1986 5 p Presented at the Institute for Electrical and Electronics Engineers International Conference on Circuits and Systems, San Jose, Calif., 5 May 1986
(Contract W-7405-eng-48)
(DE86-008018; UCRL-94153; CONF-860589-1) Avail: NTIS HC A02/MF A01

The Seismic Analysis Code (SAC) is a general purpose interactive program designed for the study of sequential signals, especially time-series data. Emphasis has been placed on analysis tools used by research seismologists in the detailed study of seismic events. Analysis capabilities include Fourier transforms, three spectral estimation techniques, IIR and FIR filtering, arithmetic operations, a signal stacking, decimation, and seismic phase picking. SAC also contains a very extensive graphics capability. DOE

N86-29437# National Oceanic and Atmospheric Administration, Boulder, Colo.
DIRECTORY OF WORLD SEISMOGRAPH STATIONS. VOLUME 2, EAST ASIA: CHINA, JAPAN, KOREA AND MONGOLIA
S. Miyamura Dec. 1985 277 p Sponsored by NOAA Prepared in cooperation with Oki Electric Industry Ltd., Tokyo, Japan
(PB86-164316) Avail: NTIS HC A13/MF A01 CSCL 08K

Knowledge of the location of seismological instruments, their technical characteristics, dates of operation, and availability of data are fundamental to data exchange and to science. The volume is a directory of world seismograph stations in East Asia: China, Japan, Korea, and Mongolia. GRA

N86-29438# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 495, NOVEMBER 1985. PART 1: (PROMPT REPORTS). DATA FOR OCTOBER 1985, SEPTEMBER 1985 AND LATE DATA
H. E. Coffey, ed. Nov. 1985 84 p
(PB86-165123; SGD-495-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 03B

Solar Geophysical Data Number 495, November 1958; Part 1 (Prompt Reports); Data for October, 1985, September, 1985, and Late Data contains information on the following: Detailed index for 1985; Data for October 1985; IUWDS alert periods (Advance and Worldwide); Solar activity indices, solar flares, solar radio emission, Stanford mean solar magnetic field); Data for September 1985 (solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); and geomagnetic indices, calcium plage data for March 1983. GRA

N86-29439# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 495, NOVEMBER 1985. PART 2: (COMPREHENSIVE REPORTS). DATA FOR MAY 1985 AND MISCELLANEA
H. E. Coffey, ed. Nov. 1985 86 p
(PB86-165131; SGD-495-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 03B

Solar-Geophysical Data Report Number 495, November 1985; Part 2 (Comprehensive Reports); Data for May 1985, and Miscellanea contains the following information: Detailed index for 1985; Data for April 1985 (Meudon carte synoptique, Solar radio bursts at fixed frequencies, Solar x-ray radiation from GOES satellite, Mass ejections from the sun); Data for July - December 1984--Solar flares July 1984 to December 1984; and Miscellaneous data--Active prominences and filaments May 1985. GRA

N86-29440# Federal Geodetic Control Committee, Washington, D.C.
INPUT FORMATS AND SPECIFICATIONS OF THE NATIONAL GEODETIC SURVEY DATA BASE. VOLUME 3: GRAVITY CONTROL DATA (REVISED SEPTEMBER 1985)
W. T. Dewhurst Sep. 1985 166 p
(PB86-187010) Avail: NTIS HC A08/MF A01 CSCL 08E

The user's guide to the formats and specifications used within the National Geodetic Survey (NGS) data base is commonly referred to as the Blue Book, and is comprised of three volumes. Gravity control (GRAV) data are discussed. GRA

N86-29303*# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.
DYNAMICS OF THE NIGHTTIME THERMOSPHERE AT ARECIBO
R. G. Burnside, J. C. G. Walker, and C. A. Tepley (Arecibo Ionospheric Observatory, Puerto Rico.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 23-28 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29304*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.
MEDIUM AND LARGE-SCALE VARIATIONS OF DYNAMO-INDUCED ELECTRIC FIELDS FROM AE ION DRIFT MEASUREMENTS
W. R. Coley and J. P. McClure *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 29-50 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29305*# Augsburg Coll., Minneapolis, Minn. Dept. of Physics.
ATOMIC NITROGEN DENSITIES NEAR THE POLAR CUSP
M. J. Engebretson and J. T. Nelson *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 51-61 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29306*# National Center for Atmospheric Research, Boulder, Colo.
SIMULATION OF THE THERMOSPHERIC TIDES BY USE OF THE NCAR THERMOSPHERIC GENERAL CIRCULATION MODEL
C. G. Fensen, R. E. Dickinson, and R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 63-77 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29323*# State Univ. of New York, Albany. Dept. of Atmospheric Science.
MEASUREMENTS OF THERMOSPHERIC RESPONSE TO AURORAL ACTIVITIES
S. Okano (Tohoku Univ., Sendai, Japan) and J. S. Kim *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 269-274 (For primary document see

N86-29307*# Boston Univ., Mass. Dept. of Electrical, Computer and Systems Eng.
TIDAL COUPLING WITH THE LOWER ATMOSPHERE (INVITED REVIEW)
Jeffrey M. Forbes *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 79-96 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29308*# National Center for Atmospheric Research, Boulder, Colo.
THE EFFECT OF BREAKING GRAVITY WAVES ON THE DYNAMICS AND CHEMISTRY OF THE MESOSPHERE AND LOWER THERMOSPHERE (INVITED REVIEW)
Rolando R. Garcia *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 97-103 Sponsored by NSF (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29309*# Liege Univ. (Belgium). Inst. d'Astrophysique.
THERMOSPHERIC NITRIC OXIDE AND ITS ROLE IN THERMOSPHERIC DYNAMICS AND COMPOSITION
J.-Cl. Gerard and R. G. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 105-117 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29310*# Polytechnic Inst. of New York, Farmingdale.
GLOBAL LARGE SCALE STRUCTURES IN THE F REGION
S. H. Gross *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 119-135 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29311*# Texas Univ. at Dallas, Richardson. Center for Space Sciences.
THE MEASURED MOTIONS INSIDE EQUATORIAL PLASMA BUBBLES
W. B. Hanson and D. K. Bamgboye (Ilorin Univ., Nigeria) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 137-151 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29312*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
UT/LONGITUDINAL VARIATIONS OF COMPOSITION IN DE DATA
A. E. Hedlin *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 153-162 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29313*# Texas Univ. at Dallas, Richardson. Center for Space Science.
CONVECTION PATTERN MORPHOLOGY AND VARIATIONS (INVITED REVIEW)
R. A. Heelis *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 163-178 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29314*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERACTION OF THE EQUATORIAL MIDNIGHT PRESSURE BULGE AND THERMOSPHERIC ZONAL WINDS
F. A. Herrero *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 179-184 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29315*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
ION NEUTRAL COUPLING IN THE HIGH LATITUDE THERMOSPHERE, PART 1
T. L. Killeen *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 185-187 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29316*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
ION-NEUTRAL COUPLING IN THE HIGH LATITUDE THERMOSPHERE, PART 2
T. L. Killeen *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 189-193 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29317*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
GEOSTROPHIC ADJUSTMENT IN A SHALLOW-WATER NUMERICAL MODEL AS IT RELATES TO THERMOSPHERIC DYNAMICS
M. F. Larsen and I. S. Mikkelsen (Danish Meteorological Inst., Copenhagen.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 195-204 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29318*# Air Force Geophysics Lab., Hanscom AFB, Mass.
SATELLITE ACCELEROMETER MEASUREMENTS OF NEUTRAL DENSITY AND WINDS DURING GEOMAGNETIC STORMS
Frank A. Marcos and Jeffrey M. Forbes (Boston Univ., Mass.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 205-219 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29319*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRANSFER FUNCTION ANALYSIS OF THERMOSPHERIC PERTURBATIONS
H. G. Mayr, I. Harris, F. Varosi (Science Applications Research, Riverdale, Md.), F. A. Herrero, and N. W. Spencer *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 221-231 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29320*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
EQUATORIAL THERMOSPHERIC MEASUREMENTS OF TEMPERATURES AND WINDS AT AREQUIPA, PERU
John W. Meriwether, Jr. and Manfred A. Biondi (Pittsburgh Univ., Pa.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 233-251 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29321*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
POLAR CAP OBSERVATIONS OF THERMOSPHERIC WINDS AND TEMPERATURES AT SONDRE STROMFJORD, GREENLAND
John W. Meriwether, Jr. and P. Shih *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 253-261 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29322*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ZONAL WIND OBSERVATIONS DURING A GEOMAGNETIC STORM
N. J. Miller and N. W. Spencer *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 263-267 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29324*# Massachusetts Inst. of Tech., Cambridge. Haystack Observatory.
INITIAL RESULTS OF THE GLOBAL THERMOSPHERIC MAPPING STUDY (GTMS)
W. L. Oliver, J. E. Salah, R. G. Musgrove, J. M. Holt, V. B. Wickwar (SRI International Corp., Menlo Park, Calif.), G. J. Hernandez (National Oceanic and Atmospheric Administration, Boulder, Colo.), and R. G. Roble (National Center for Atmospheric Research, Boulder, Colo.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 275-296 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29325*# University Coll., London (England). Dept. of Physics and Astronomy.
OBSERVATIONS OF VERTICAL WINDS AND THE ORIGIN OF THERMOSPHERIC GRAVITY WAVES LAUNCHED BY AURORAL SUBSTORMS AND WESTWARD TRAVELLING SURGES
David Rees *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 297-322 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29326*# University Coll., London (England). Dept. of Physics and Astronomy.
THE TIME-DEPENDENT DYNAMICAL RESPONSE OF THE THERMOSPHERE TO MAJOR GEOMAGNETIC DISTURBANCES
David Rees *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 323-339 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29327*# University Coll., London (England). Dept. of Physics and Astronomy.
SELF-CONSISTENT MODELLING OF THE POLAR THERMOSPHERE AND IONOSPHERE TO MAGNETOSPHERIC CONVECTION AND PRECIPITATION (INVITED REVIEW)
David Rees, Tim Fuller-Rowell, Shaun Quegan (Marconi Space and Defence Systems Ltd., Chelmsford England), and Roy Moffett (Sheffield Univ., England.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 341-360 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29328*# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
PARTICLE PRECIPITAION INTO THE THERMOSPHERE (INVITED REVIEW)
Patricia H. Reiff *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 361-367 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29329*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences
A METHOD FOR EXTRACTING MERIDONAL WINDS FROM IONOSONDE MEASUREMENTS BY USING IONOSPHERIC MODELS
P. G. Richards and D. G. Torr *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 369-374 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29330*# Southampton Univ. (England). Dept. of Physics.
THE QUADRUPOLE IONOSPHERE
H. Rishbeth *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 375-377 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29331*# Science Research Council, Chilton (England). Rutherford Appleton Lab.
EISCAT VELOCITY PATTERNS FOR THEORETICAL PLASMA CONVECTION MODELS
H. Rishbeth and J. J. Sojka (Utah State Univ., Logan.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 379-382 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29332*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
RESULTS OF VARIOUS STUDIES MADE WITH THE NCAR THERMOSPHERIC GENERAL CIRCULATION MODEL (TGCM) (INVITED REVIEW)
R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 383-413 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29333*# Massachusetts Inst. of Tech., Cambridge. Haystack Observatory.
MILLSTONE HILL MEASUREMENTS AND TGCM SIMULATION FOR THE 30 MAY 1984 ANNULAR SOLAR ECLIPSE
J. E. Salah, W. L. Oliver, B. A. Emery (National Center for Atmospheric Research, Boulder, Colo.), R. G. Roble, E. C. Ridley, and H. C. Carlson (Air Force Geophysics Lab., Hanscom AFB, Mass.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 415-438 Original contains color illustrations (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29334*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A DYNAMO THEORY PREDICTION FOR SOLAR CYCLE 22: SUNSPOT NUMBER, RADIO FLUX, EXOSPHERIC TEMPERATURE, AND TOTAL DENSITY AT 400 km
K. H. Schatten and A. E. Hedin *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 439-444 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29336*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
JOULE HEATING AND FIELD-ALIGNED CURRENTS: PRELIMINARY RESULTS FROM DE-2
M. Sugiura *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 451-461 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29338*# York Univ. (England). Centre for Research in Experimental Space Science.
WAMDII OBSERVATION OF AN AURORAL ATMOSPHERE WAVE EVENT
R. H. Wiens, G. G. Shepherd, and K. V. Paulson (Saskatchewan Univ., Saskatoon.) *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 467 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 04A

N86-29462# California Univ., La Jolla.
EFFECTS OF EL NINO/SOUTHERN OSCILLATION ON THE ATMOSPHERIC CONTENT OF CARBON DIOXIDE
C. D. Keeling and R. Revelle *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 13 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-29441# World Meteorological Organization, Geneva (Switzerland). TOGA Scientific Steering Group.
INTERNATIONAL CONFERENCE ON THE TOGA SCIENTIFIC PROGRAM World Climate Research Program
Sep. 1985 339 p Conference held in Paris, France, 17-21 Sep. 1984 Prepared in cooperation with ICSC, Rome, Italy
(WCRP-4; WMO/TD-65; ESA-86-97075) Avail: NTIS MF A01; print copy available at WMO, Geneva

An international research program to study global atmospheric interactions; El Nino and the Pacific; the monsoon and the Indian Ocean; the tropical Atlantic Ocean; and the biological effects of El Nino and the Southern Oscillation was discussed. For individual titles, see N86-29442 through N86-29464.

N86-29442# Oxford Univ. (England). Clarendon Lab.
AN OVERVIEW OF THE DYNAMICS OF THE TROPICAL OCEANS AND GLOBAL ATMOSPHERE
A. E. Gill *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 12 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Atmosphere-ocean coupling in tropical regions is reviewed and its effects on climate are discussed. The relations between atmospheric heating and cloud and rainfall patterns are considered. Atmospheric modeling and wind flow are treated. ESA

N86-29443# Delaware Univ., Lewes.
OBJECTIVES OF THE TOGA CONFERENCE
Ferris Webster *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 4 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The aims of the Tropical Ocean Global Atmosphere project are to assess knowledge of the interannual variability of the tropical ocean and the global atmosphere and form the scientific basis for a research program. Program objectives are: to determine to what extent the time-dependent behavior of the tropical ocean and global atmosphere system is predictable on time scales of months to years and to understand the mechanism of this behavior; to study the feasibility of modeling the coupled ocean-atmosphere system for predicting its variations on time scales of months to years; and to provide the scientific background for designing an observing and data transmission system for operational prediction if this capability is demonstrated by coupled ocean-atmosphere models. ESA

N86-29444# Washington Univ., Seattle.
ATMOSPHERIC RESPONSE TO EQUATORIAL SEA-SURFACE TEMPERATURE ANOMALIES
J. M. Wallace *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 12 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The effects of the interaction of the tropical oceans with the global atmosphere on climate are discussed. El Nino and long range weather forecasting are considered. Empirical evidence of global teleconnections between the El Nino Southern Oscillation phenomenon and atmospheric temperature and pressure and rainfall is shown. Equatorial sea surface temperature and precipitation patterns are compared. The effects of changes in equatorial rainfall patterns on higher latitudes through the redistribution of planetary waves are outlined. Atmospheric forcing of the ocean is treated. ESA

N86-29445# Scripps Institution of Oceanography, La Jolla, Calif.
EXTRA-TROPICAL CONNECTIONS
Jerome Namias *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 11 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Empirical and numerical modeling evidence which strongly indicates that atmospheric forcing must consider not only events in the tropics, but equally in the extra-tropics and polar regions as instigators of climate and weather not only there but even in the tropics is presented. The complementary role of the tropics and extra-tropics in numerical models for predictions on monthly or seasonal time scales is underlined. El Nino's effect on the global climate is discussed. It is stressed that the El Nino-Southern Oscillation phenomenon is only one of a number of interactive and often synergistic forces influencing long range weather forecasting. ESA

N86-29446# Maryland Univ., College Park. Center for Ocean-Land-Atmosphere Interactions.
VARIABILITY OF THE TROPICAL CIRCULATION
J. Shukla and E. M. Rasmusson (National Meteorological Center, Washington, D.C.) *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 16 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Correlations based on observations and controlled numerical sensitivity experiments with global general circulation models that support the hypothesis that changes in the lower boundary conditions are one of the most significant factors responsible for the interannual variability of the tropical atmosphere are presented. It is shown that a significant fraction of the local interannual variability over different parts of the tropics is a regional manifestation of the planetary scale El Nino-Southern Oscillation-Monsoon phenomenon. Large anomalies in circulation and rainfall, comprising a major portion of the interannual variability, are strongly phase-locked with the seasonal cycle, and major tropical droughts and floods are either due to modulation of the annual cycle or shifts in the locations, or timing of maximum amplitude. It is conjectured that the tropical variability related to the slowly changing boundary conditions, and the associated low frequency planetary scale circulations, is potentially predictable at a range beyond the limits of deterministic predictability. ESA

N86-29447# Hawaii Univ., Honolulu. Dept. of Oceanography.
WATER DISPLACEMENTS DURING 1982-83 AND THE GENESIS OF EL NINO AND THE SOUTHERN OSCILLATION c48
Klaus Wyrtki *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 10 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Sea level response during 1982-83 to the changing wind system is summarized. Water mass displacements during the 1982-83 El Nino are outlined. The genesis of El Nino and the Southern Oscillation is discussed. For the Tropical Ocean Global Atmosphere (TOGA) program, it is argued that in view of the importance of ocean heat storage for the analysis and understanding of climatic cycles, a complete documentation and continuous monitoring of the heat storage field in the ocean is an indispensable prerequisite for research in TOGA. The heat storage field can be best documented by a program of systematic XBT sections from ships of opportunity, supplemented by drifting thermistor chains and by a network of sea level gages. Data from this network should be available in real time so that monthly maps of ocean heat storage can be compiled and made available for analysis. ESA

N86-29448# National Meteorological Center, Washington, D.C. Climate Analysis Center.
CLIMATE VARIABILITY AND THE SOUTHERN OSCILLATION
Eugene M. Rasmusson *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 11 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The relationship between the Southern Oscillation and the annual cycle is reviewed. The 1982-83 El Nino-Southern Oscillation event is described. The global nature of the interaction between the event and sea surface temperature anomalies is stressed. ESA

N86-29449# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.
PREDICTABILITY OF EL NINO **c48**
S. G. H. Philander and N.-C. Lau *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 8 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The effects of atmospheric and oceanic variability on the predictability of El Nino are discussed, and air-sea interactions are considered. It is argued that El Nino is not caused by instabilities of either the atmosphere or the ocean, but by an instability of the interactions between the tropical ocean and atmosphere. Predictability for periods of weeks to months should be possible because the time-scale for the amplification of initial perturbations is relatively long, and because the perturbations have to satisfy certain conditions in order to amplify. ESA

N86-29450# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
OBSERVATIONAL STRATEGY FOR TOGA PACIFIC **c48**
Bruce A. Taft *In* WMO International Conference on the TOGA Scientific Program Sep 1985 11 p Sponsored by NOAA Equatorial Pacific Ocean Climate Studies Program (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The oceanographic program needed to describe large scale, low frequency variations of key variables for the entire tropical Pacific over a 10yr period is outlined. Measurement of processes which modify the heat content of the upper ocean; ocean model verification; and assimilation of data into predictive models are considered. Use of merchant ships, and moored and drifting thermistor chains to measure the thermal field is suggested. Moored equatorial current measures and surface current measures with drifters are required to study circulation. Sea level can be monitored by existing means. ESA

N86-29451# Florida State Univ., Tallahassee. Dept. of Meteorology.
THE ANNUAL CYCLE OF THE MONSOON OVER THE GLOBAL TROPICS
T. N. Krishnamurti, Naomi Surgi, and John Monobianco *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 21 p (For primary document see N86-29441 20-47)
(Grants NSF ATM-83-04809; NOAA-NA-82AA-D-0004)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Summer and winter patterns of divergent atmospheric circulations are discussed. Longer term variability of the rotational and divergent motions at 200 mb is considered. The sum and difference of these fields during El Nino and non El Nino years reveals tropical teleconnection patterns. Besides the familiar Pacific North American pattern of this data set also reveals an interesting low pressure anomaly over the monsoon region in the upper troposphere. This pattern is associated with a long-lasting westerly anomaly during the El Nino years; the implications of this feature on the evolution of monsoons, are addressed. ESA

N86-29452# Scripps Institution of Oceanography, La Jolla, Calif.
INTERACTION OF THE MONSOON AND TRADEWIND SYSTEM
T. P. Barnett and K. E. Trenberth (National Center for Atmospheric Research, Boulder, Colo.) *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 10 p (For primary document see N86-29441 20-47)
(Grant NSF ATM-82-13279)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A near-global sea level pressure (SLP) field covering the period 1951-80 was developed and analyzed by complex empirical orthogonal function analysis. The results show the existence of a large scale SLP signal that seems to be generated over Asia, move down over the Indian Ocean and propagate eastward across the Pacific. This signal is a dipole with anomalies of different sign in the eastern and western hemispheres. This signal represents the coupling of the monsoon and tradewind systems at interannual time scales. It may also be thought of as an empirical framework for understanding near-global climate variation since it includes the Southern Oscillation, monsoon variation, key tropical-midlatitude teleconnection patterns and numerous other large scale climate features. Study of upper air data in the tropical strip shows the propagating, dipole signal to be confined to levels below 500 mb. Above 500 mb the signal is a monopole covering the entire tropical belt. There is no sign of propagation at these altitudes. ESA

N86-29453# Oxford Univ. (England). Dept. of Atmospheric Physics.
MODELLING THE INDIAN OCEAN **c48**
David L. T. Anderson *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 5 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Modeling of the response of the equatorial ocean to wind stress since the papers on the Indian Ocean by Lighthill (1969) and Cox (1970) is reviewed. The Somali current and equatorial currents are discussed. ESA

N86-29454# Laboratoire d'Oceanographie Physique, Paris (France).
OBSERVATIONAL STRATEGY FOR TOGA IN THE TROPICAL INDIAN OCEAN
M. Fieux *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 8 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

An observational program to study the processes that control sea surface temperature changes and upper ocean heat content on intraseasonal, annual, and interannual time scales and, in particular, to determine the relative importance of advection, upwelling, surface fluxes, and heat storage is proposed for the Indian Ocean. The program includes XBT observations, drifting buoys, direct sea level measurements, satellite data collection and analysis, and a voluntary observing ship meteorological program. ESA

N86-29455# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NORTHEAST BRAZIL DROUGHTS AND ATLANTIC SEA SURFACE (SST) ANOMALIES
Antonio Divino Moura *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 8 p (For primary document see N86-29441 20-47)
Avail: NTIS M,F A01; print copy available at WMO, Geneva

Research relating sea surface temperature (SST) anomalies in the Atlantic and rainfall over tropical South America is reviewed. Occurrences of droughts over Northeast Brazil associated with positive SST anomalies over the North and negative SST anomalies over the South tropical Atlantic, respectively, are discussed. Associated with the anomalies is sea level anomalous convergence near warmer waters and anomalous divergence over colder waters. This anomalous circulation is associated with excessive rainfall over the Guianas and severe droughts over NE Brazil. The association of the El Nino phenomenon and droughts over NE Brazil is considered in relation to the Southern Oscillation. Teleconnection of drought occurrences with anomalous cyclonic activity in the Newfoundland area and the role of the position and intensity of the ITCZ are treated. Analysis of the monthly departures of relative vorticity over the globe shows planetary scale wavelike patterns linking the Atlantic to distant regions during years of droughts and floods over NE Brazil. ESA

N86-29456# Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France).
RELATIONSHIPS OF DROUGHT IN AFRICA TO ANOMALIES IN GLOBAL CIRCULATION
Y. M. Tourre *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 14 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Global (tropical) and local (African) atmospheric and oceanic patterns associated to Sahelian drought are discussed. Warm equatorial sea surface temperature (SST) seems to correspond to Sahelian dry years. Intensity and thickness of the local monsoon regime upstream of Africa are critical for drought forecasting. Position, intensity, and number of the seasonal Walker cells can be strongly modified. The main ascending branch of the train of East/West circulation cells is often phase locked with the warm pool of SST in the Pacific ocean, while the main subsiding branch is located over west Africa. Zonal circulation indices at 850 mb and 200 mb obtained from the large scale velocity potential field accurately document the diffluent (divergence) part of the windfield over the Atlantic ocean and neighboring Africa. Weak values of the indices at both levels allow the positioning of the subsiding branch, responsible for the lack of precipitation. ESA

N86-29457# Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France).
DIAGNOSTIC STUDIES OF THE THERMAL STRUCTURE OF THE TROPICAL ATLANTIC OCEAN **c48**
J. Merle *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 17 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

Large scale, low frequency forcings and responses of the tropical Atlantic Ocean are reviewed. The dynamical response of the ocean is described. The heat budget and heat transport are considered. Sea surface temperature response is outlined. The double oscillations of the thermocline on an East-West and North-South rotation imply seasonal redistributions of the heat zonally and meridionally that are an order of magnitude larger and out of phase with the heat flux across the surface. This means that the dynamical interior response of the tropical ocean is the most important for understanding and predicting the ocean's role in the overall climate system. Zonal equatorial heat transport may account for El Nino like phenomena on seasonal time scale or interannual time scale, as in the Pacific. ESA

N86-29458# Valparaiso Univ., Vina del Mar (Chile). Inst. de Oceanologia.
THE EFFECTS OF EL NINO ON SOUTHEAST PACIFIC FISHERIES **c48**
S. Avaria *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 15 p (For primary document see N86-29441 20-47)
MF A01; print copy available at WMO, Geneva

Ecological and economic effects of the 1982 El Nino on the fishing grounds of the Chilean, Peruvian, and Ecuadorian fleets are shown. The primary effect is a dramatic reduction in the anchovy population, with a consequent perturbation of the ecology of the ocean. Jack mackerel latitudinal distribution widened, but stocks remained constant, unlike mackerel whose numbers fell. Shrimp production, however, increased, and mollusks such as scallop greatly increased. The sea bird population of Peru fell from 6 million adults in March 1982 to 0.3 million in May 1983. Sardine response was extremely varied, the species dissapearing off Ecuador, remaining stable off Peru, and greatly increasing off Chile. ESA

N86-29459# Far Seas Fisheries Research Lab., Shimizu (Japan). Div. of Oceanography and Southern Ocean Resources.
EFFECT OF EL NINO ON FISH MIGRATION AND YIELD IN THE WESTERN PACIFIC OCEAN **c48**
Hajime Yamanaka *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 7 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The abnormally cold water temperatures in the western Pacific Ocean caused by the 1982 El Nino event are shown. The relationship between the occurrence of El Nino and changes in the distribution and migration of the Pacific bluefin tuna is discussed. The relationship between El Nino and fluctuations in stocks of the Japanese sardine is considered. Abnormal migration and distribution of fishes and marine mammals around Japan during 1983-84 are analyzed. ESA

N86-29460# Duke Univ. Beaufort, N.C. Marine Lab.
PLANKTON PRODUCTION DURING EL NINO **c48**
Francisco P. Chavez and Richard T. Barber *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 9 p (For primary document see N86-29441 20-47)
(Grant NSF OCE-81-10702)
Avail: NTIS MF A01; print copy available at WMO, Geneva

A decrease in primary plankton productivity of 1 gigaton C during the 300-day duration of the 1982-83 El Nino is estimated. The fraction of this anomaly which can be attributed to a decrease in new production is 0.6 gC, but this new production anomaly is approximately equivalent to a predicted degassing anomaly of 0.57 gC. Models which consider degassing from equatorial upwelling as an important contributor to atmospheric carbon dioxide levels should also consider the effects of upwelling on new primary production. ESA

N86-29461# Museum of Natural History, Los Angeles, Calif.
THE ROLE OF CENTRAL PACIFIC SEABIRDS IN PREDICTING THE 1982-83 ENSO **c48**
Ralph W. Schreiber and Elizabeth Anne Schreiber *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 6 p (For primary document see N86-29441 20-47)
(Grants NSF OCE-83-08756; NSF OCE-84-04152; NGS-265783)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The ornithology of tropical seabirds, particularly those on Christmas Island, is introduced. It is suggested that since the birds react to changes in oceanographic parameters by changes in, e.g., breeding patterns, it may be possible to predict events such as El Nino by studying data on the birds. ESA

N86-29462# California Univ., La Jolla.
EFFECTS OF EL NINO/SOUTHERN OSCILLATION ON THE ATMOSPHERIC CONTENT OF CARBON DIOXIDE **c46**
C. D. Keeling and R. Revelle *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 13 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The relationship between the quasi-global character and interconnectedness of the Southern Oscillation phenomenon and the behavior of CO2 in the atmosphere is discussed. Interannual and spatial variations in the concentration and isotopic composition of atmospheric CO2 are related to the changes in oceanic and atmospheric circulation that accompany the hemispheric oscillation of air pressure across the South Pacific. Oceanwide time-series measurements of the partial pressure of CO2 and the concentration of dissolved inorganic carbon in subsurface ocean waters are needed to elucidate these relationships. Deeper understanding also requires studies of the temporal and spatial fluctuations in marine biological production and gas exchange across the sea surface. ESA

N86-29463# Delaware Univ., Lewes.
THE OVERALL PLAN: A SCIENTIFIC STRATEGY **c42**
Ferris Webster *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 5 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The aims of the Tropical Ocean Global Atmosphere project are to assess knowledge of the interannual variability of the tropical ocean and the global atmosphere. Program objectives are: to determine to what extent the time-dependent behavior of the tropical ocean and global atmosphere system is predictable on time scales of months to years and to understand the mechanism of this behavior; to study the feasibility of modeling the coupled ocean-atmosphere system for predicting its variations on time scales of months to years; and to provide the scientific background for designing an observing and data transmission system for operational prediction if this capability is demonstrated by coupled ocean-atmosphere models. ESA

N86-29464# World Meteorological Organization, Geneva (Switzerland).
NATIONAL AND REGIONAL ACTIVITIES RELATED TO THE TROPICAL OCEAN GLOBAL ATMOSPHERE (TOGA) PROJECT **c42**
In its International Conference on the TOGA Scientific Program Sep. 1985 62 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

The contributions of the Australian, Canadian, Chinese, French, Indian, Indonesian, Mauritian, New Zealand, Senegalese, Seychelles, USSR, UK, USA, and Uraguyan meteorological and oceanographic services to the Tropical Ocean Global Atmosphere project are summarized. Joint investigations of El Nino are described.
ESA

N86-29465*# Chicago Univ., Ill. Lab. for Atmospheric Probing.
ANALYSIS OF DOPPLER LIDAR WIND MEASUREMENTS Final Technical Report
Ramesh C. Srivastava May 1986 67 p
(Contract NAS8-34770)
(NASA-CR-178849; NAS 1.26:178849) Avail: NTIS HC A04/MF A01 CSCL 04B

Doppler lidar and multiple Doppler radar data were obtained in a convectively mixed planetary boundary layer. The lidar measurements were possible due to scattering from existing aerosols; radar reflecting chaff was released in the atmosphere to make it visible to the multiple Doppler radar network. The data were analyzed to obtain detailed horizontal wind structures. The divergence of the horizontal wind was calculated and the anelastic continuity equation integrated to obtain vertical air motions. Differences between the areally averaged quantities and the grid point values provided a measure of the fluctuations in the wind components or the turbulent wind fluctuations. Vertical profiles of the mean winds and quantities related to the turbulent kinetic energy components and the turbulent momentum transfers were also calculated.
M.G.

N86-29466*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
A SIMPLIFIED MODEL OF THE TURBULENT MICROBURST
L. Roberts and Tung Wan Mar. 1985 27 p
(Contract NCC2-270)
(NASA-CR-177108; NAS 1.26:177108; SU-JIAA-TR-59) Avail: NTIS HC A03/MF A01 CSCL 04B

A simple model was developed to describe the low altitude shear associated with a microburst (or small downburst) in the atmosphere. Such microbursts are thought to be the cause of convective radial flows near the ground which represent potentially hazardous conditions to aircraft during approach and landing. Closed form solutions are presented for the equations of mass, momentum, and thermal energy to give the spreading rate of the microburst and the velocity and temperature decay due to turbulence. An analysis of the impact of the microburst and its radial spreading over the ground is given and illustrated examples are provided. The solution for the downward and outward wind velocities are given in terms of simple dimensionless algebraic parameters which can be computed readily in realtime during a piloted simulation of an aircraft flying through a microburst. Author

N86-29467# Finnish Meteorological Inst., Helsinki.
A STUDY OF THE DIFFERENCES BETWEEN VARIOUS METHODS IN USE FOR THE REDUCTION OF ATMOSPHERIC PRESSURE
Eino Hellsten and Daniel Soederman *Dec. 1985 18 p*
(FMI-TR-30; ISBN-951-697-230-6; ISSN-0355-1733) Avail: NTIS HC A02/MF A01

Attention is drawn to the differences between the numerous reduction formulae used by World Meteorological Organization (WMO) members for converting the surface pressure measured at observing stations considerably above sea level (500 m or more) to mean sea level pressure. No particular method so far has been recommended by the WMO, but certain steps towards standardization of conversion methods are apparently needed. Some progress has already taken place in this regard. The Extraordinary Session of the WMO Commission for Basic System in its meeting from 21 October to 1 November 1985 in Hamburg agreed that urgent action was necessary to standardize the procedure for pressure reduction. The Commission decided to refer this task to a group of experts to develop a proposal for the solution of this problem. The differences between the reduction formulae used by various countries is studied in some detail.
Author

N86-29468# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
OBJECTIVE ANALYSIS OF TROPICAL CYCLONE INTENSITY, STRENGTH, AND SIZE USING ROUTINE AIRCRAFT RECONNAISSANCE DATA M.S. Thesis
Charles B. Stanfield May 1986 126 p
(AD-A166417; AFIT/CI/NR-86-28T) Avail: NTIS HC A07/MF A01 CSCL 04/2

The feasibility of objectively analyzing routine aircraft reconnaissance data for the purpose of quantifying tropical cyclone intensity, strength, and size is examined. A computer program is developed which may be used in near real time or after the fact to evaluate localized pressure/wind relationships in the tropical cyclone environment. This program compensates for the system motion and the relative position of the point of observation relative to the vortex center location at flight level and at the surface (thus accounting for the vertical tilt of the center). A representative set of data is obtained over a 13 month period for the entire spectrum of storms from tropical depression to super typhoon. These data are used to try to establish empirical pressure/wind relationships and a means of determining effective storm size. It is shown that a program of this nature may be used with gradient wind and pressure gradient relationships to evaluate intensity and strength and to define storm size, provided adequate data are available at sufficient distances from the center.
Author (GRA)

N86-29469# Naval Research Lab., Washington, D. C.
A SIMPLE MODEL OF AEROSOL OPTICAL PROPERTIES IN A WELL-MIXED BOUNDARY LAYER FOR A WAVELENGTH OF 0.50 MICROMETERS
J. W. Fitzgerald 25 Mar. 1986 25 p
(AD-A166433; NRL-MR-5764) Avail: NTIS HC A02/MF A01 CSCL 04/2

A simple model to predict the aerosol optical properties in the marine boundary layer at visible wavelengths is described. The model assumes that the boundary layer is well mixed and predicts the vertical profile of aerosol extinction and the aerosol optical thickness given the relative humidity, temperature and aerosol extinction coefficient at the surface (shipboard level) and the height of the boundary layer. The model is presented in the form of both analytical approximation formulas and nomograms.
GRA

N86-29470# Midwest Research Inst., Kansas City, Mo.
SOLERAS. UNIVERSITY RESEARCH PROJECT: GEORGIA INSTITUTE OF TECHNOLOGY. ATLAS OF SATELLITE INSOLATION IN THE US, MEXICO AND SOUTH AMERICA
1986 285 p
(Contract DE-AC02-83CH-10093)
(DE86-005641; MRI/SOL-1704) Avail: NTIS HC A13/MF A01

A summary is given of the development, testing and applications of the satellite insolation estimation project of the National Oceanic and Atmospheric Administration (NOAA) Agriculture and Resources Inventory Surveys through Aerospace Remote Sensing (AgRISTARS) program. The NOAA/AgRISTARS procedure uses data from the Geostationary Operational Environmental Satellite (GOES) to estimate daily total insolation (on a horizontal surface) at an array of 1 deg. x 1 deg. latitude-longitude locations throughout the continental United States, Mexico, and parts of South America. This methodology is compared with some other satellite techniques in terms of accuracy and applicability. Summary maps of monthly average daily total insolation for the period July 1982 through December 1983, as well as annual total maps for 1983, are presented for all three geographic coverage areas. As measures of temporal and spatial variability, monthly and annual data are

also presented for the standard deviation of the daily insolation values about the monthly mean, and for root-mean-square values of both north-south and east-west differences over 1 deg. latitude or longitude spacing. From the estimated error analysis the monthly mean values appear to be accurate to about 5% of the mean value, except for the western part of the United States when GOES-1 was put back into temporary service as the western GOES satellite. DOE

N86-29471# Pacific Northwest Lab., Richland, Wash.
RESEARCH ON TURBULENT WIND IN THE US WIND ENERGY TECHNOLOGY PROGRAM
J. R. Connell Nov. 1985 28 p Presented at the 14th IEA Experts Meeting on Turbulence Loads on Wind Turbines, Stockholm, Sweden, 4 Dec. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004871; PNL-SA-13562; CONF-851259-1) Avail: NTIS HC A03/MF A01

Redesign and analytical testing of turbine rotors, after the fluctuating forces of operating in the turbulent wind have been experienced, often place a high priority on accounting for the details of turbulence. Thus the part of the DOE wind energy technology program dedicated to turbulent wind characterization has found a strong coupling with the primary DOE program elements of aerodynamics and mechanical design and testing of wind turbines. The responsibility for turbulence research and the characterization and modeling of turbulence experienced by wind turbines has been assigned to DOE's Pacific Northwest Laboratory. Inter-laboratory cooperative activities with Sandia and the NASA, and more recently with the Solar Energy Research Institute (SERI), have transformed some of the basic research done by PNL into interim models of turbulent wind specialized for their particular use of aerodynamics models. This paper outlines the US DOE wind energy technology program's past progress in turbulence wind research, current activity and future directions. DOE

N86-29472# Brookhaven National Lab., Upton, N. Y.
AQUEOUS-PHASE REACTIONS IN CLOUDS
S. E. Schwartz Nov. 1985 10 p Presented at the 191st American Chemical Society National Meeting, New York, N.Y., 13 Apr. 1986
(Contract DE-AC02-76CH-00016)
(DE86-005249; BNL-37332; CONF-860425-15) Avail: NTIS HC A02/MF A01

Reaction of dissolved gases in clouds occurs by the sequence gas-phase diffusion, interfacial mass transport, and concurrent aqueous-phase diffusion and reaction. Evaluation of the rate of such reactions requires information of two types, fundamental and situational. Fundamental data, determined by laboratory experiments, include equilibrium constants, gas solubilities, kinetic rate laws, including dependence on pH and catalysts or inhibitors, diffusion coefficients, and mass-accommodation coefficients. Situational data, which must be measured in the field or else modeled or assumed, include pH and concentrations of reagents and other species influencing reaction rates, liquid-water content, drop size distribution, insolation, temperature, etc. Aqueous-phase oxidation of S(IV) by H2O2 and O3 can be important for representative conditions. Free-radical reactions may also be significant. No important aqueous-phase reactions of nitrogen species have been identified. Field measurements and studies of reaction kinetics in authentic precipitation samples are consistent with these evaluations. DOE

N86-29473# Pacific Northwest Lab., Richland, Wash.
ACCURATE DETERMINATION OF WIND SPEEDS OVER A MICROSCALE AREA USING A NUMERICAL MODEL
J. C. Barnard, H. L. Wegley, and T. R. Hiester Aug. 1985 7 p Presented at the WINDPOWER '85, San Francisco, Calif., 27 Aug. 1985 Prepared in cooperation with FloWind Corp., Pleasanton, Calif.
(Contract DE-AC06-76RL-01830)
(DE86-001644; PNL-SA-13114; CONF-850834-5) Avail: NTIS HC A02/MF A01

This paper describes a technique of using a mass-consistent numerical model to derive wind speeds over a microscale region of complex terrain. A serious limitation in the use of these numerical models is the sensitivity of the calculated wind field to some of the input parameters, such as that used to simulate the atmospheric stability, for which accurate values are not usually known. However, values for these parameters can be found by tuning the model to existing wind observations within a microscale area. This tuning uses a single-variable, unconstrained optimization procedure that adjusts the unknown parameters so that the error between the observed winds and model calculations of these winds is minimized. Model verification is accomplished using eight cases of hourly averaged wind data, obtained from measurements made at approximately 30 sites covering a wind farm development in the Altamont Pass area. When the model was tuned to a small subset of the 30 sites, an accurate determination of the wind speeds was made for the remaining sites in six of the eight cases. (The two that failed were low wind speed cases.) Therefore, when this technique is used, numerical modeling shows great promise as a tool for microscale siting of wind turbines in complex terrain. DOE

N86-29474# World Climate Programme, Geneva (Switzerland).
REPORT OF THE THIRD SESSION OF THE JSC/CCCO WORKING GROUP ON SATELLITE OBSERVING SYSTEMS FOR CLIMATE RESEARCH
Oct. 1985 34 p Session held in Madison, Wisc., 29 Apr. - 2 May 1985
(WCP-105; ESA-86-97071) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Satellite data access; temperature and moisture soundings; geostationary satellite wind vectors; cloud climatology; radiation budget climatology; precipitation climatology; sea surface temperature; global winds; surface wind and wind stress; ocean surface topography and geostrophic component of ocean circulation; sea ice; land surface climatology; air-sea interface fluxes; distribution of chlorophyll and small flux patterns; aerosols; and the global positioning system were discussed. ESA

N86-29475# World Climate Programme, Geneva (Switzerland).
REPORT OF THE THIRD SESSION OF THE JSC/CCCO TOGA SCIENTIFIC STEERING GROUP
Nov. 1985 80 p Session held in La Jolla, Calif., 22-26 Apr. 1985
(WCP-107; ESA-86-97073) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Implementation of observational and data processing activities for the Tropical Oceans and Global Atmosphere (TOGA) program was reviewed. Tropical sea-level; ocean subsurface data; ocean surface circulation; ocean-atmosphere interface fluxes; sea surface temperature; surface wind/wind stress; precipitation; analyses of atmospheric meteorological parameters for TOGA; ocean modeling; use of real-time products in tropical ocean modeling and dissemination of predictions based on these; TOGA real-time monitoring strategy; and satellite observing systems for TOGA were discussed. ESA

N86-29476# World Meteorological Organization, Geneva (Switzerland). TOGA Scientific Steering Group.
SCIENTIFIC PLAN FOR THE TROPICAL OCEAN AND GLOBAL ATMOSPHERE PROGRAM
Sep 1985 173 p
(WCRP-3; ESA-86-97074) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The Tropical Ocean and Global Atmosphere plan includes a description of the variability of the atmosphere, ocean, and the coupled ocean/atmosphere system. The development of coupled ocean/atmosphere models for simulating and eventually predicting this variability is discussed. Data requirements for the program for diagnostic and process studies and for model development and validation are specified. The observing systems needed to provide these are described and the data management activity to assemble consistent quality controlled global data sets is outlined. ESA

N86-29477# World Meteorological Organization, Geneva (Switzerland).
FIRST IMPLEMENTATION PLAN FOR THE WORLD CLIMATE RESEARCH PROGRAM
Nov. 1985 151 p
(WCRP-5; ESA-86-97076) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland
The World Climate Research Program activities are organized according to six subprograms whose objectives are to establish the physical basis of long range weather forecasting; understand the predictable aspects of global climate variations over periods of several months to several years, and assess the response of climate to natural or man-made influences over periods of several decades. The subprograms are: Atmospheric Climate Prediction; Coupled Atmosphere-Ocean Boundary Layer; Tropical Ocean and Global Atmosphere project; World Ocean Circulation Experiment; Cryosphere; and Climatic Sensitivity Assessment. ESA

N86-29478# World Meteorological Organization, Geneva (Switzerland).
WORLD WEATHER WATCH. REGIONAL ASSOCIATION 4 (NORTH AND CENTRAL AMERICA) HURRICANE OPERATIONAL PLAN
1985 79 p
(WMO-524; ISBN-92-63-10524-3; ESA-86-97077) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland
A plan to enhance the cooperative efforts of Members within WMO Region 4 in carrying out their roles in preparing for and issuing forecasts and warnings of all tropical cyclones affecting the area is presented. Responsibilities of Members are defined. Tropical cyclone releases issued by the Regional Meteorological Center Miami are explained and examples provided. Observational platforms, including land-based radar, satellites, and aircraft reconnaissance are discussed. Where differences exist between the USA's National Hurricane Operational Plan (NHOP) and this plan, aircraft radar and upper-air observations made by the US Department of Defense comply with NHOP. Communication procedures are outlined emphasizing headings required to assure computer-processing and distribution of messages. Hurricane names for the Caribbean Sea, Gulf of Mexico, North Atlantic Ocean, and the eastern North Pacific are included. ESA

N86-29479# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Numerische Modelle.
A QUESTIONNAIRE ON COLD FRONTS IN ALPINE REGIONS
Klaus-Peter Hoinka and Roger K. Smith Jan. 1986 81 p In ENGLISH and GERMAN
(DFVLR-Mitt-86-02; ISSN-0176-7739; ESA-86-97452) Avail: NTIS HC A05/MF A01; DFVLR, Cologne, West Germany, DM 23
Replies to a questionnaire concerning the analysis and prognosis of cold fronts over and in the vicinity of the European Alps from Austrian, Canadian, French, German, and Swiss meteorologists are summarized. It addresses matters such as the relative use of satellite, radar, conventional surface, and upper air-data, and numerical forecast products for the analysis and prognosis of fronts. It seeks to determine those aspects of frontal analysis and prognosis the forescasters consider important for future research. ESA

N86-29480# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
PARAMETERIZATION OF CLOUD-MICROPHYSICAL PROCESSES IN A THREE-DIMENSIONAL CONVECTIVE MESOSCALE MODEL
Hartmut Hoeller Dec. 1985 86 p
(DFVLR-FB-86-02; ISSN-0171-1342; ESA-86-97456) Avail: NTIS HC A05/MF A01; DFVLR, Cologne, West Germany, DM 23.50
A parameterization scheme of cloud-microphysical processes appropriate for 3-D numerical convection model is described. Bulk-physical formulations for the mass transfer rates between the different kinds of particles like cloud droplets, raindrops, frozen cloud droplets, frozen raindrops, ice crystals, snowflakes, graupels, and hailstones are given. The model considers liquid phase (autoconversion and accretion of droplets) as well as ice phase processes (nucleation, aggregation, accretion, riming and melting). ESA

N86-29481# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
MPDA-1: METEOROLOGICAL PROCESSOR FOR DIFFUSION ANALYSIS, USER'S GUIDE
J. Paumier, D. Stinson, T. Kelly, C. Bollinger, and J. S. Irwin Mar. 1986 184 p Prepared in cooperation with Computer Sciences Corp., Research Triangle Park, N. C.
(PB86-171402; EPA/600/8-86/011) Avail: NTIS HC A09/MF A01 CSCL 04B
Version I of the Meteorological Processor for Diffusion Analysis (MPDA-1) is a first attempt to provide a processor that can organize avaliable meteorological data into a format accessible to diffusion analysis. MPDA-1 provides methods for preparing three types of data: National Weather Service (NWS) twice-daily radio-sonde reports, NWS hourly surface observations, and user-supplied on-site data. To incorporate the surface scaling parameters, the meteorological processor is structured in accordance with current concepts of the idealized states of the planetary boundary layer. Profiles of wind velocity, temperature, and the standard deviations of vertical and lateral wind velocity fluctuations at user-specified heights are estimated. The output from MPDA-1 was formatted to accommodate the TUPOS Gaussian-plume model, which uses wind fluctuation data to characterize the diffusion parameters. Future versions will provide additional output formats to accommodate other popular diffusion estimation models. GRA

N86-29482# National Oceanic and Atmospheric Administration, Boulder, Colo. Air Resources Lab.
GEOPHYSICAL MONITORING FOR CLIMATIC CHANGE, NUMBER 13 Summary Report, 1984
E. C. Nickerson Feb. 1986 122 p
(PB86-169661) Avail: NTIS HC A06/MF A01 CSCL 04B
Geophysical Monitoring for Climatic Change Report Number 13(Summary Report 1984) discusses the following: Observatory reports; Aerosols and radiation group; Carbon dioxide group; Trace gases group; Acquisition and data management group; and Director's office continuing programs. GRA

N86-29483# National Weather Service, Honolulu, Hawaii.
TROPICAL CYCLONES, 1984, CENTRAL NORTH PACIFIC
W. Au, A. Chun, A. Inouye, L. Iwai, and H. Rosendal Mar. 1986 31 p
(PB86-183951; NOAA-TM-NWSTM-PR-30) Avail: NTIS HC A03/MF A01 CSCL 04B
Tropical storms in the Central North Pacific Ocean for 1984 are described and classified. GRA

N86-29484# National Weather Service, Washington, D.C. Climate Analysis Center.
MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MAY 1986, VOLUME 40, NUMBER 9, APRIL 29, 1986
29 Apr. 1986 10 p
(PB86-191053) Avail: NTIS HC A02/MF A01 CSCL 04B
Temperature and precipitation probabilities for the monthly and seasonal weather for North America are given. GRA

N86-29485# National Weather Service, Salt Lake City, Utah. Western Region.
MESOSCALE CONVECTIVE COMPLEX TYPE STORM OVER THE DESERT SOUTHWEST
D. Randerson Apr. 1986 65 p
(PB86-190998; NOAA-TM-NWS-WR-196) Avail: NTIS HC A04/MF A01 CSCL 04B
On 10 August 1981 a mesoscale convective complex (MCC) developed over extreme east-central Nevada and moved south-southeastward into northwestern Arizona. The storm affected a total area of nearly 200,000 square kilometers, traveled ap-

proximately 500 km, and lasted nearly 15 hrs. Strong surface winds, hail, heavy rain, and dense blowing dust and sand were reported on the right flank of the MCC. Estimated rainfall rates of 3 to 4 in/hr produced total rainfall amounts of 3 to 6 in over a large area to the northeast of Las Vegas, Nevada. GRA

N86-29486# Bureau of Reclamation, Denver, Colo. Div. of Atmospheric Resources Research.
PROJECT SKYWATER: THE 1984-85 SCPP (SIERRA COOPERATIVE PILOT PROJECT) DATA INVENTORY
Aug. 1985 263 p
(PB86-184512) Avail: NTIS HC A12/MF A01 CSCL 04B

The report contains an inventory of all data collected from October 15, 1984, through April 1985 in association with the Sierra Cooperative Pilot Project (SCPP), a weather modification research project in winter orographic cloud seeding. GRA

N86-29487# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
WEATHER SATELLITES: USER VIEWS ON THE CONSEQUENCES OF ELIMINATING A CIVILIAN POLAR ORBITER
Mar. 1986 62 p
(PB86-180254; GAO/RCED-86-111; B-222140) Avail: NTIS HC A04/MF A01 CSCL 04B

It was found that the polar orbiters are used by NOAA for weather forecasting, search and rescue operations, and other purposes; by NASA for climate research; by DOD as a supplement and backup to its own weather satellites; and by countries worldwide for weather forecasting and environmental data collection. Some users in NOAA and DOD reported that the elimination of one of NOAA's polar-orbiting weather satellites would harm their programs, but most users said that they would continue their programs with one satellite. All user's, however, said that the second satellite was important as a backup to the first and that the loss of all service would have serious consequences. GRA

N86-29283*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROGRAM STATUS
Paul Smith *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 19 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29287*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
ISCCP REDUCED RESOLUTION SATELLITE RADIANCE DATA
William Rossow *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 23 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29288*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE FIRE PROJECT
David McDougal *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot climate Data System Workshop 1986 11 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29289*# Iowa State Univ. of Science and Technology, Ames. Dept. of Meteorology.
USING PCDS TO STUDY THE INFLUENCE OF UV FLUX VARIATION ON THE MIDDLE ATMOSPHERE
Warren Heilman *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 12 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29290*# Michigan Univ., Ann Arbor.
PCDS AS A TOOL IN TEACHING AND RESEARCH AT THE UNIVERSITY OF MICHIGAN
Vincent Abreu *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 3 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29291*# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite Data and Informat.
PLANNING FOR THE UTILIZATION OF THE PCDS IN STUDYING THE INTERACTION OF CLOUDS (ISCCP-C DATA) AND THE EARTH RADIATION BUDGET (ERBE DATA)
Herbert Jacobowitz *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 7 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29292*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
UV ALBEDO OF CLOUDS FROM TOMS DATA
David Short *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 8 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29293*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ANALYSIS OF RAINFALL OVER NORTHERN PERU DURING EL NINO: A PCDS APPLICATION
Richard Goldberg and Gilberto Tisnado (Instituto Nacional de Investigacion de Transportes (Peru).) *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 23 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-29488# Science Applications International Corp., College Station, Tex.
A STUDY OF SEA ICE KINEMATICS AND THEIR RELATIONSHIP TO ARCTIC AMBIENT NOISE. PART 1. TECHNICAL PAPERS. PART 2. ICE AND ATMOSPHERIC PARAMETERS Final Report, Mar. 1985 - Feb. 1986
James K. Lewis and Warren W. Denner Feb. 1986 346 p *refs*
(Contract N00014-85-C-0531)
(AD-A165303; AD-E301922; SAIC-85/1950-Pt-1/2; SAIC-1-425-07-356-10-Pt-1/2) Avail: NTIS HC A15/MF A01 CSCL 08/12

This report details a study of sea ice processes and ambient noise variations from data sets collected during the Arctic Ice Dynamics Joint Experiment (AIDJEX) in 1975 and 1976. The data, which come from buoys drifting with the ice for over one year in the Beaufort Sea, consist of ambient noise, position, atmospheric temperature and pressure, etc. and a number of other parameters. This volume includes technical papers on: Calculation of an Effective Ice Thickness Term for Pack Ice Using Lagrangian Data; Seasonal Variability of the Principle Modes of Ice Movement in the Beaufort Sea; Arctic Ambient Noise in the Beaufort Sea and Its Relationship to Sea Ice Kinematics. Also included are a number of appendices that present most of the ice and atmospheric data used in this study in graphical format. GRA

N86-29489# Sea Tech, Inc., Corvallis, Oreg.
REMOTE OPTICAL SETTLING TUBE Final Report, for FY 1984
R. Bartz 28 Feb. 1986 46 p
(Contract N00014-84-C-0045)
(AD-A165736) Avail: NTIS HC A03/MF A01 CSCL 08/10

A remote optical settling tube was designed, calibrated and tested at Sea Tech, Inc. The instrument was delivered to the Woods Hole Oceanographic Institution where it underwent preliminary field testing. Problems encountered in the field testing

phase were addressed and solved at Sea Tech and the instrument was returned to Woods Hole for deployment. The remote optical settling tube was moored in the Atlantic Ocean as part of the ongoing HEBBBLE research program. Recovery of the mooring will take place in April 1986. Software was developed and tested at Sea Tech for the analysis of data from the settling tube. This software has been used successfully on a previous data set obtained with a prototype optical settling tube. GRA

N86-29490# Skidaway Inst. of Oceanography, Savannah, Ga.
COORDINATION: SOUTHEAST CONTINENTAL SHELF STUDIES Progress Report, 1 Jun. 1984 - 31 Dec. 1985
D. W. Menzel and J. O. Blanton 3 Jan. 1986 33 p
(Contract DE-AS09-76EV-00901)
(DE86-005139; DOE/EV-00901/T5) Avail: NTIS HC A03/MF A01

This overview and report of progress on the South Atlantic Bight Program includes discussions of: (1) dynamics of the coastal zone; (2) circulation studies; (3) biological transformations in the coastal boundary zone; (4) sediment geochemistry; and (5) continental shelf processes. DOE

N86-29491# Danish Meteorological Inst., Copenhagen.
THE ICE CONDITIONS IN THE GREENLAND WATERS, 1974
Sep. 1985 113 p In ENGLISH and DANISH
(ISBN-87-7478-249-5; ESA-86-97064) Avail: NTIS HC A06/MF A01

Monthly ice charts for the entire Greenland region and local reconnaisance charts are presented. ESA

N86-29492# World Climate Programme, Geneva (Switzerland).
REPORT OF THE TOGA DRIFTERS PLANNING MEETING
Sep. 1985 35 p Meeting held in La Jolla, Calif., 27-29 Mar. 1985
(WCP-103; ESA-86-97072) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Mechanisms for specifying a set of criteria for the parameters to be measured by TOGA drifters and for describing the engineering performance standards which the buoys need to attain were defined. There should be no attempt to standardize the types of buoys which may be deployed for TOGA, but there should be an attempt to standardize the types of calibration and system performance information, which are required to be part of the research buoy data sets. ESA

N86-29493# Ecole Polytechnique, Palaiseau (France). Lab. d'Optique Appliquee.
GYROMETRY USING PASSIVE RESONANT CAVITIES [GYROMETRIE A CAVITE RESONNANTE PASSIVE]
Y. B. Andre, B. Lamouroux, and B. Prade 17 Dec. 1985 16 p In FRENCH and ENGLISH
(Contract DRET-81-495)
(ESA-86-97206) Avail: NTIS HC A02/MF A01

An electromagnetic resonant cavity is formed by an optical fiber ring in order to measure the angular velocity of the body carrying the fiber loop. The light inlet and outlet are assured by optical couplers which were specifically designed. The system presents multiple resonance peaks under varying laser frequencies. The measurement of the difference between resonant frequencies of waves traversing the ring in the opposite direction allows a sensitivity of the order of 0.03 deg/hr/Hz. The practical realization of the system with and He-Ne laser shows a background noise equivalent to 100 deg/hr. ESA

N86-29447# Hawaii Univ., Honolulu. Dept. of Oceanography.
WATER DISPLACEMENTS DURING 1982-83 AND THE GENESIS OF EL NINO AND THE SOUTHERN OSCILLATION
Klaus Wyrtki *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 10 p (For primary document see N86-29441 20-47)
Avail. NTIS MF A01; print copy available at WMO, Geneva

N86-29449# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.
PREDICTABILITY OF EL NINO
S. G. H. Philander and N.-C. Lau *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 8 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29450# National Oceanic and Atmospheric Administration, Seattle, Wash. Pacific Marine Environmental Lab.
OBSERVATIONAL STRATEGY FOR TOGA PACIFIC
Bruce A. Taft *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 11 p Sponsored by NOAA Equatorial Pacific Ocean Climate Studies Program (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29453# Oxford Univ. (England). Dept. of Atmospheric Physics.
MODELLING THE INDIAN OCEAN
David L. T. Anderson *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 5 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29457# Office de la Recherche Scientifique et Technique Outre-Mer, Paris (France).
DIAGNOSTIC STUDIES OF THE THERMAL STRUCTURE OF THE TROPICAL ATLANTIC OCEAN
J. Merle *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 17 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29458# Valparaiso Univ., Vina del Mar (Chile). Inst. de Oceanologia.
THE EFFECTS OF EL NINO ON SOUTHEAST PACIFIC FISHERIES
S. Avaria *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 15 p (For primary document see N86-29441 20-47)
MF A01; print copy available at WMO, Geneva

N86-29459# Far Seas Fisheries Research Lab., Shimizu (Japan). Div. of Oceanography and Southern Ocean Resources.
EFFECT OF EL NINO ON FISH MIGRATION AND YIELD IN THE WESTERN PACIFIC OCEAN
Hajime Yamanaka *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 7 p (For primary document see N86-29441 20-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29460# Duke Univ. Beaufort, N.C. Marine Lab.
PLANKTON PRODUCTION DURING EL NINO
Francisco P. Chavez and Richard T. Barber *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 9 p (For primary document see N86-29441 20-47)
(Grant NSF OCE-81-10702)
Avail: NTIS MF A01; print copy available at WMO, Geneva

N86-29461# Museum of Natural History, Los Angeles, Calif.
THE ROLE OF CENTRAL PACIFIC SEABIRDS IN PREDICTING THE 1982-83 ENSO
Ralph W. Schreiber and Elizabeth Anne Schreiber *In* WMO International Conference on the TOGA Scientific Program Sep. 1985 6 p (For primary document see N86-29441 20-47)
(Grants NSF OCE-83-08756; NSF OCE-84-04152; NGS-265783)
Avail: NTIS MF A01; print copy available at WMO, Geneva

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-29494# General Accounting Office, Washington, D. C.
BIOTECHNOLOGY: THE US DEPARTMENT OF AGRICULTURE'S

BIOTECHNOLOGY RESEARCH EFFORTS
Oct. 1985 80 p
(GAO/RCED-86-39BR) Avail: NTIS HC A05/MF A01

Topics discussed include: United States Department of Agriculture biotechnology research efforts; funding; accomplishments; institutions receiving grants; and the state experimental stations and colleges of veterinary science. Author

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-29495*# Stanford Univ., Calif. Div. of Cardiology.
EFFECTS OF SIMULATED WEIGHTLESSNESS ON REGIONAL BLOOD FLOW SPECIFICALLY DURING CARDIOVASCULAR STRESS Final Report
Donald C. Harrison 1986 15 p
(Contract NCC2-126)
(NASA-CR-177117; NAS 1.26:177117) Avail: NTIS HC A02/MF A01 CSCL 06S

Significant changes in the cardiovasular system of humans and animals have been observed following exposure to prolonged periods of weightlessness during space flight. Although adaption to weightlessness is relatively uncomplicated, marked changes in cardiovascular deconditioning become evident upon return to normal gravity, including orthostatic hypotension and tachycardia. Some evidence that myocardial degeneration occurs has been demonstrated in animals who have been immobilized for two months. Also, evidence of possible loss of myocardial mass following manned space flight has been obtained by means of echocardiographic studies. These findings have serious implications in light of the increasing frequency and duration of Space Shuttle missions and the prospect of extended space station missions in the future. A number of both military and civilian investigators, including middle-aged scientists, will probably encounter prolonged periods of weightlessness. It has been imperative, therefore, to determine the effects of prolonged weightlessness on cardiovascular deconditioning and whether such effects are cumulative or reversible. The research project conducted under NASA Cooperative Agreement NCC 2-126 was undertaken to determine the effects of prolonged simulated weightlessness on regional blood flow. Research results are reported in the three appended publications. Author

N86-29496*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SKELETAL RESPONSE TO SHORT-TERM WEIGHTLESSNESS Final Technical Report
Thomas J. Wronski and Emily R. Morey-Holton 1986 16 p
(Grant NCC2-337)
(NASA-TM-88778; NAS 1.15:88778) Avail: NTIS HC A02/MF A01 CSCL 06S

Male Sprague Dawley rats were placed in orbit for 7 days aboard the space shuttle. Bone histomorphometry was performed in the long bones and lumbar vertebrae of flight rats and compared to data derived from ground based control rats. Trabecular bone mass was not altered during the first week of weightlessness. Strong trends were observed in flight rats for decreased periosteal bone formation in the tibial diaphysis, reduced osteoblast size in the proximal tibia, and decreased osteoblast surface and number in the lumbar vertebra. Histologic indices of bone resorption was relatively normal in flight rats. The results indicate that 7 day of weightlessness are not of sufficient duration to induce histologicaly detectable loss of trabecular bone in rats. However, cortical and trabecular bone formation appear to be diminished during the first week of space flight. Author

N86-29497*# California Univ., San Diego.
CARDIAC RESERVE DURING WEIGHTLESSNESS SIMULATION AND SHUTTLE FLIGHT Final Report, 15 Oct. 1984 - 14 Oct. 1985
Ary L. Goldberger Oct. 1985 32 p
(Grant NCC2-335)
(NASA-CR-177085; NAS 1.26:177085; LR-7552) Avail: NTIS HC A03/MF A01 CSCL 06S

Bedrest deconditioning is suspected to reduce cardiac function. However, quantitation of subtle decreases in cardiac reserve may be difficult. Normal subjects show considerable variability in heart rate response, reflected by a relatively broadband interbeat interval power spectrum. We hypothesized that the deconditioning effects of bedrest would induce narrowing of this spectrum, reflecting a reduction in the autonomically-modulated variability in heart rate. Ten aerobically conditioned men (average 35-50 years) underwent orthostatic tolerance testing with lower body negative pressure pre-bedrest and after 10 days of bedrest, while on placebo and after intravenous atropine. Spectra were derived by Fourier analysis of 128 interbeat interval data sets from subjects with sufficient numbers of beats during matched periods of the protocol. Data suggest that atropine unmasks the deconditioning effect of bedrest in athletic men, evidenced by a reduction in interbeat interval spectral power compared with placebo. Spectral analysis offers a new means of quantitating the effects of bedrest deconditioning and autonomic perturbations on cardiac dynamics. Author

N86-29498*# Vanderbilt Univ., Nashville, Tenn. School of Medicine.
WEIGHTLESSNESS SIMULATION: PHYSIOLOGICAL CHANGES IN FAST AND SLOW MUSCLE Final Technical Report, 1 Jun. 1984 - 31 May 1985
Wolf-D. Dettbarn 31 May 1985 22 p
(Grant NAG2-301)
(NASA-CR-176945; NAS 1.26:176945) Avail: NTIS HC A02/MF A01 CSCL 06P

The role of the intact motor system in the maintenance of normal skeletal muscle structure and function were examined. Using a multidisciplinary approach, changes in slow and fast muscle were examined in response to three experimental paradigms: motor nerve denervation, spinal cord section, and nonsurgically induced disuse (or hypokinesia). The effects of use and disuse on the free radical scavenging system in relation to the mitochondrial oxidative metabolism in fast twitch and slow twitch muscle were also investigated. The effects of denervation and reinnervation on cuprozinc superoxide dismutase, manganosuperoxide dismutase, glutathione peroxidase, fumarase, cytochrome c oxidase, and GSH-peroxidase were studied. Changes in biochemical, histochemical, and physiological characteristics of the predominately slow (type 1) soleus and predominately fast (type 2) extensor digitorum longus are correlated with electromyogram assessment of muscle activation. B.G.

N86-29499# Sea-Space Research Co., Inc., Harvey, La.
EVALUATION OF THE USE OF HYDROGEN-OXYGEN AS A BREATHING GAS IN DEEP-SEA DIVING
Peter Edel 1986 31 p
(Contract N00014-85-C-0592)
(AD-A165797) Avail: NTIS HC A03/MF A01 CSCL 06/11

An attempt is made to define the state-of-the-art for the use of Hydrogen-Oxygen mixtures for diving operations. Information relative to past and current research efforts in the U.S. and foreign countries is compiled. This information is utilized to identify possible areas of application with this mixture in appropriate conditions and in areas in which hydrogen-oxygen mixtures could offer physiological advantages not possible with currently used breathing mixtures. Further research is needed prior to operational use of this mixture, and recommendations for current and future research and development needs are included in this report. Hydrogen-oxygen mixtures have shown sufficient advantage to warrant further research. Present experience indicates that H2-02 mixtures offer some potential advantages over present helium-oxygen bounce

diving applications for operations where on-site gas storage space is limited and/or resupply of breathing gas mixtures are a potential problem. Present experience indicates that H2-He-02 mixtures offer some potential advantages over present helium-oxygen saturation diving operations at depths where increased diver performance and reduction of breathing resistance is an important factor. Hydrogen narcosis effects and decompression requirements are the major primary physiological research areas requiring investigation prior to possible applications of such mixtures. GRA

N86-29500# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
METHOD FOR THE DETERMINATION OF RESPIRATORY WORK IN PROTECTIVE MASKS
Iage Berglund and Kenneth Nyren Jun. 1985 27 p In SWEDISH; ENGLISH summary
(FOA-C-40213-C2; ISSN-0347-2124; ESA-86-97042) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

A method for estimating respiratory work by measuring flow and pressure in a protective mask on a dummy head, during inhalation and exhalation, with a respiratory pump is described. Data acquisition, evaluation, and graphical presentation for a respiratory cycle are performed with a laboratory computer. Malfunction of the inlet valve may lead to leakage so that expired air wrongly passes through the filter. Actually the user of the mask would compensate for this by increasing the respired volume, thus increasing the respiratory work. In the described method this leakage indicates, on the contrary, lower respiratory workload. ESA

N86-29501# Chicago Univ., Ill. Dept. of Radiology.
MTF's AND WIENER SPECTRA OF RADIOGRAPHIC SCREEN-FILM SYSTEMS. VOLUME 2: (INCLUDING SPEEDS OF SCREENS, FILMS AND SCREEN-FILM SYSTEMS)
K. Doi, Y. Kodera, L. N. Loo, H. P. Chan, and Y. Higashida Mar. 1986 110 p Sponsored by FDA
(Contracts PHS-223-78-6003; PHS-223-81-6014)
(PB86-184934; HHS/PUB/FDA-86-8257-Vol-2; FDA/CDRH-86/103-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 06E

Volumes I and II of the report constitute a consistent, quantitative evaluation of the physical imaging performance of most currently available radiographic screens and films. Volume I (HHS Publication FDA 82-8187, April 1982) reported measurements of MTF's and Wiener spectra of a large number of screen-film systems and described the methodology. Volume II reports measurement (using the same methodology) of MTF's and Wiener spectra of additional systems. Volume II also reports absolute speeds (determined according to ANSI Standard PH 2.43-1982) for selected systems and relative speeds for a large group of screens and films; methodology for these measurements is described in detail. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-29502*# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
EFFECT OF TIME SPAN AND TASK LOAD ON PILOT MENTAL WORKLOAD
Scott L. Berg and Thomas B. Sheridan Mar. 1985 150 p
(Grant NAG2-227)
(NASA-CR-177099; NAS 1.26:177099) Avail: NTIS HC A07/MF A01 CSCL 05H

Two sets of experiments were run to examine how the mental workload of a pilot might be measured. The effects of continuous manual control activity versus discrete assigned mental tasks (including the length of time between receiving an assignment and executing it) were examined. The first experiment evaluated the strengths and weaknesses of measuring mental workload with an objective perforamance (altitude deviations) and five subjective ratings (activity level, complexity, difficulty, stress, and workload). The second set of experiments built upon the first set by increasing workload intensities and adding another performance measure: airspeed deviation. The results are discussed for both low and high experience pilots. B.G.

N86-29503*# California State Univ., Hayward. Dept. of Psychology.
HESITATIONS IN CONTINUOUS TRACKING INDUCED BY A CONCURRENT DISCRETE TASK
Stuart T. Klapp, Patricia A. Kelly, and Allan Netick 1985 40 p (Contract NCC2-223)
(NASA-CR-177019; NAS 1.26:177019) Avail: NTIS HC A03/MF A01 CSCL 05I

Subjects performed a continuous visually-guided pursuit tracking task with the right hand. From time to time (intervals averaging 30 sec) an auditory tone appeared signaling the subjects to perform a discrete response with the left hand. The presence of this tone was frequently associated with a hesitation in right-hand tracking which lasted 1/3 sec or longer. The rate of occurrence of these hesitations was about the same when the left-hand response involved a choice between competing responses as when the left hand responded in a predetermined direction. Hesitations occurred for three different mechanical tracking manipulanda using different controlling muscles, and appeared to be due to freezing rather than to relaxation of muscular action. The rate of occurrence of hesitations declined with practice, and this improvement in right-hand performance was accompanied by an improvement in performance of the concurrent left-hand response. The presence of hesitations, and their reduction with practice, can be interpreted within several viewpoints. Author

N86-29504*# California Univ., Los Angeles. School of Engineering and Applied Science.
MODEL-BASED APPROACHES FOR PARTITIONING SUBJECTIVE WORKLOAD ASSESSMENTS Final Technical Report
John Lyman Feb. 1986 19 p Presented at the Annual Conference of Manual Control, Jun. 1986
(Grant NAG2-216)
(NASA-CR-177030; NAS 1.26:177030) Avail: NTIS HC A02/MF A01 CSCL 05I

Modified Petri nets (MPNs) were investigated as a workload modeling tool. The MPN model was screened for general sensitivity to changes in workloads. A canonical correlation was conducted between the MPN parameters and the workload ratings. The results of the canonical correlation indicated that the MPN model of the experimental task represented the task components that influenced the subjective workload. B.G.

N86-29505*# Ohio State Univ., Columbus. Dept. of Aviation.
THE EFFECTS OF EXPRESSIVITY AND FLIGHT TASK ON COCKPIT COMMUNICATION AND RESOURCE MANAGEMENT Final Report, 1 Aug. 1982 - 31 Aug. 1985
R. S. Jensen Jun. 1986 95 p
(Contract NCC2-206; RF Proj. 76327/714794)
(NASA-CR-177036; NAS 1.26:177036; APL-86-1) Avail: NTIS HC A05/MF A01 CSCL 05I

The results of an investigation to develop a methodology for evaluating crew communication behavior on the flight deck and a flight simulator experiment to test the effects of crew member expressivity, as measured by the Personal Attributes Questionnarie, and flight task on crew communication and flight performance are discussed. A methodology for coding and assessing flight crew communication behavior as well as a model for predicting that behavior is advanced. Although not enough crews were found to provide valid statistical tests, the results of the study tend to indicate that crews in which the captain has high expressivity perform better than those whose captain is low in expressivity. There appears to be a strong interaction between captains and first

officers along the level of command dimension of communication. The PAQ appears to identify those pilots who offer disagreements and inititate new subjects for discussion. Author

N86-29506# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
RAPID MEASUREMENT OF INDIVIDUAL STRESS REACTION LEVEL: DEVELOPMENT OF THE EMOTIONAL REACTION QUESTIONNAIRE (ESRQ)
Gerry Larsson Jan. 1986 33 p In SWEDISH; ENGLISH summary
(FOA-C-50034-H3; ISSN-0347-7665; ESA-86-97044) Avail: NTIS HC A03/MF A01

A questionnaire which estimates the magnitude of the stress reaction of an individual in a given situation in less than a minute is described. Psychological coping potential can also be predicted. Derivation of the questionnaire from coping theory is outlined. The process of instrument development is described and instructions for usage and interpretation of the questionnaire are given. Normative data as well as assessments of reliability and validity are presented. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

includes human engineering; biotechnology; and space suits and protective clothing.

N86-29507*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SHOULDER AND HIP JOINTS FOR HARD SPACE SUITS AND THE LIKE Patent
Hubert C. Vykukal Issued 8 Jul. 1986 12 p Filed 20 Aug. 1984 Supersedes N84-33021 (22 - 22, p 3633)
(NASA-Case-ARC-11534-1; US-Patent-4,598,428; US-Patent-Appl-SN-642602; US-Patent-Class-2-2.1A; US-Patent-Class-285-168; US-Patent-Class-285-184; US-Patent-Class-285-227; US-Patent-Class-138-120; US-Patent-403-164) Avail: US Patent and Trademark Office CSCL 06Q

For use in hard space suits and the like, a joint between the torso covering and the upper arm covering (i.e., shoulder) or between the torso covering and upper leg covering (i.e., hip) is disclosed. Each joint has an outer covering and a inner covering. The outer covering has plural perferably truncated toroidal sections decreasing in size proceeding outwardly. In one embodiment at each joint there are two bearings, the first larger than the second. The outer race of the larger bearing is attached to the outer edge of the smaller end of each section and the inner race of the larger bearing is attached to the end wall. The inner race of the smaller bearing is attached to the end wall. The outer race of the smaller bearing is attached to the larger end of the next section. Each bearing hask appropriate seals. Between each section is a rubber ring for the comfort of the wearer. Such rubber rings have radial flanges attached to the inner races of two adjacent bearings. Matching semicircular grooves are formed in the abutting overlapping surfaces. Bellows-like inner walls are also provided for each section fixed at one end to an inner cylindrical flange and, at the opposite end, to an end wall. Each outer section may rotate 360 deg relative to the next outer section, whereas the bellows sections do not rotate, but rather expand or contract locally as the rigid sections rotate relative to each other. NASA

N86-29508*# Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.
PILOT INTERACTION WITH AUTOMATED AIRBORNE DECISION MAKING SYSTEMS Semiannual Progress Report, Mar. - Aug. 1984
William B. Rouse, John M. Hammer, Nancy M. Morris, Annette E. Knaeuper, Edward N. Brown, Charles M. Lewis, and Wan C. Yoon Aug. 1984 45 p
(Grant NAG2-123)
(NASA-CR-177002; NAS 1.26:177002) Avail: NTIS HC A03/MF A01 CSCL 05H

Two project areas were pursued: the intelligent cockpit and human problem solving. The first area involves an investigation of the use of advanced software engineering methods to aid aircraft crews in procedure selection and execution. The second area is focused on human problem solving in dynamic environments, particulary in terms of identification of rule-based models land alternative approaches to training and aiding. Progress in each area is discussed. B.G.

N86-29509*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
EFFECTS OF CONSUMING VARIOUS FOODS AND NUTRIENTS ON OBJECTIVE AND SUBJECTIVE ASPECTS OF HUMAN PERFORMANCE AND BEHAVIOR Final Report, 1 Sep. 1983 - 31 Aug. 1984
Richard J. Wurtman and Harris R. Lieberman 31 Aug. 1984 10 p
(Grant NAG2-132)
(NASA-CR-177003; NAS 1.26:177003) Avail: NTIS HC A02/MF A01 CSCL 06H

A variety of behavioral tests were established and studies performed on young healthy subjects who received tryptophan, tyrosine or placeboes and on young and old subjects receiving protein and carbohydrate meals. The behavioral effect of the homone melatonin on human circadian rhythms was examined. The results are discussed. B.G.

N86-29510# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics and Logistics Dept.
THE SCIENTIFIC/ENGINEERING WORKSTATION EXPERIMENT: PRELIMINARY RESULTS, CONCLUSIONS AND RECOMMENDATIONS Progress Report, Apr. - Aug. 1984
Richard T. VanEseltine and Mary B. Marquardt Dec. 1985 35 p
(AD-A163059; DTNSRDC/CMLD-85/05) Avail: NTIS HC A03/MF A01 CSCL 05/9

A Scientific/Engineering Workstation Experiment is being conducted to determine the characteristics of workstations which would significantly improve the productivity of scientists and engineers in the Naval Laboratories. This report discusses the evaluation methodology and results. Furthermore, the report presents preliminary comments and recommendations for scientific-/engineering workstation specifications. The initial results of the experiment are based on the time interval from April to August, 1984. Four major preliminary conclusions were reached. First, workstations can be effectively used for real projects. Second, the individual scientists or engineer's working environment plays an important role in the utilization of a workstation. Third, certain features and capabilities were found to be used by scientists and engineers on certain features and capabilities were found to be used by scientists and engineers on almost all workstations. Finally, workstation specifications should be primarily based on performance requirements that insure the actual needs of scientists and engineers are met. GRA

N86-29511# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.
ANTHROPOMETRY RESEARCH PROGRAM
Anita Aven, Sven Dahlman, and Lena Sperling Dec. 1985 51 p In SWEDISH; ENGLISH summary Sponsored by Swedish Work Environment Fund
(FOA-C-50032-H2; ISSN-0347-7665; ESA-86-97043) Avail: NTIS HC A04/MF A01

Swedish anthropometry investigations; collecting data on stature and body weight of people in Sweden; methods for comparing the body dimensions of different groups of people; and the use of anthropometry when designing equipment and enviroments were discussed. ESA

N86-29512# Centre d'Essais en Vol, Istres (France). Lab. de Medecine Aerospatiale.

THE CHOICE OF SEAT BACK ANGLE TO IMPROVE ACCELERATION TOLERANCE
J. M. Clere, H. Vieillefond, and J. L. Poirier Oct. 1985 51 p
(Contract DRET-82-1131)
(CEV-70-209; ESA-86-97195) Avail: NTIS HC A04/MF A01

The optimization of pilot seat back angle at accelerations of 7.8 to 9 g was studied using centrifugal simulation facilities. The physiological parameters such as heart rate, blood pressure, and visual field were measured at seat back angles from 30 to 60 deg. It is shown that the seat back angle of 60 deg eliminates visual problems at 9 g and protects against blood circulation problems. Angles of 30 deg produce clear intolerance symptoms. ESA

N86-29513*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPACE TELEOPERATION RESEARCH. AMERICAN NUCLEAR SOCIETY EXECUTIVE CONFERENCE: REMOTE OPERATIONS AND ROBOTICS IN THE NUCLEAR INDUSTRY; REMOTE MAINTENANCE IN OTHER HOSTILE ENVIRONMENTS
A. J. Meintel, Jr. and R. W. Will 1985 51 p Presented at the Executive Conference on Remote Operations and Robotics in the Nuclear Industry, Pine Mountain, Ga., 21 Apr. 1985
(NASA-TM-89234; NAS 1.15:89234; DE85-902186;
CONF-850425-5) Avail: NTIS HC A04/MF A01 CSCL 05H

This presentation consists of four sections. The first section is a brief introduction to the NASA Space Program. The second portion summarized the results of a congressionally mandated study of automation and robotics for space station. The third portion presents a number of concepts for space teleoperator systems. The remainder of the presentation describes Langley Research Center's teleoperator/robotic research to support remote space operations. DOE

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-29514# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.
PROCEEDINGS AND PROGRAM DRAFT IN GRAVITATIONAL BIOLOGY IN THE FEDERAL REPUBLIC OF GERMANY
Oct. 1985 194 p In GERMAN; ENGLISH summary Conference held in Cologne, West Germany, 14-15 Jun. 1985 Report will also be announced as translation (ESA-TT-988)
(DFVLR-Mitt-85-16; ISSN-0176-7739; ESA-86-96885) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of weightlessness on animal organisms to better understand effects on human body during space flights are discussed. Investigations on vertebrate physiology, reproduction, genetics, neurobiology, and behavioral and motion physiology are proposed. For individual titles, see N86-29515 through N86-29532.

N86-29515# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Bereich fuer Projekttraegerschaften.
THE ROLE OF THE DFVLR PROJECT MANAGEMENT LIFE SCIENCES IN THE SPACE PROGRAM OF THE FEDERAL REPUBLIC OF GERMANY
Ferdinand Dahl *In its* Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) Oct. 1985 p 9-20 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The German space program in cooperation with ESA and NASA is focussed on Spacelab 1 mission, on Eureca mission, the Long Duration Exposure Facility, the International Microgravity Laboratory, Spacelab D2 mission, as well as on bioracks, European Radiation Assembly and Human Physiology Laboratory. Experiments are carried out in radiobiology, exobiology, physiology, botany, microbiology, rhythmic processes, and biotechnology. The DFVLR project management and the experiment/project selection procedure by scientific advisory committees are presented. ESA

N86-29516# Stuttgart Univ. (West Germany). Abt. Bioenergetik.
A THEORETICAL CONCEPT FOR STATE CHANGES AND SHAPE CHANGES IN WEIGHTLESSNESS
Reto J. Strasser *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) Oct. 1985 p 23-31 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A theoretical concept for state and shape changes in weightlessness based on thermodynamics principles for open systems is developed. The influence of light, temperature, pressure, and gravity on the shape and state of a biological system, and therefore on the phenotype with steady genome are studied. Experiments are carried out on leaves, chloroplasts, neurospores and mammalian cell spheroids. An experimental module for cellular biology was built for automatic optical and electrode measurements. The data are recorded, stored, and processed at a ground station. Experiments in space stations are recommended to study the influence of gravity and geomagnetism on the shape and the biochemical processes of a biological system and to obtain data on the phylogenesis of more complicated organisms. ESA

N86-29517# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin.
SOME REMARKS ON GRAVITATIONAL BIOLOGY
Wolfgang Briegleb *In its* Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) Oct. 1985 p 33-44 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A functional system including direct/primary, indirect/secondary and various indirect/tertiary interactions between an organism and gravity was developed to study the genetic and phylogenic consequences of gravity on animals living in water or on land. Gravity influences the gravity receptors leading to humoral or neuronal responses according to cell or proprioreceptor excitation. The immersed condition with no indirect gravity influence is compared with real weightlessness to analyze gravity direct influence on an isolated cell function or on a bunch of cells in egg ontogenesis and to analyze the effects of gravity on statocyst differentiation. In animals living on land, the antigravity structures and functions are influenced by gravity. The mutational effects of gravity leading to gene evolution through neuronal and functional morphological responses are presented. Hypergravity and weightlessness should be further studied. ESA

N86-29518# Konstanz Univ. (West Germany). Biologische Fakultaet.
INVESTIGATIONS OF PARAMECIUM CELLS ANALYZED UNDER MICROGRAVITY CONDITIONS
Helmut Plattner *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVLR-Mitt-85-16) Oct. 1985 p 47-52 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Paramecium tetraurelia cells were studied using light microscopy, video recording, amino-ethyl dextran as redocking trigger agent and electronic microscopy to analyze exocytosis movements, redocking cycles on the cellular membrane and trichocyst building-up for 12 hr. The relationship between trichocyst ejection and motion behavior under microgravity conditions is studied using behavior mutants and secretion mutants to assess the negative or positive selection pressure of trichocyst presence or absence. ESA

N86-29519# Bonn Univ. (West Germany). Zoologisches Inst.
THE ORIGIN OF THE SPICULE SKELETON OF FRESH WATER SPONGES (SPONGILLIDES)

Norbert Weissenfels *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 53-56 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Young fresh water sponges cultivated in laboratory in constant temperate water and in ambient temperature were used to study the origin of the sponge spicule skeleton. The SiO2 spicules are formed in scleroblasts. Aged spicules leave the scleroblasts and are transported by transport cells to their functional location where they adhere to the base plate through epongin which ensures their stability. The life cycle of the spongillides throughout the seasons is described. The influence of gravity on the development of young sponges should be studied. ESA

N86-29520# Cologne Univ. (West Germany). Zoologisches Inst.
LIMB REGENERATION IN AMPHIBIANS, A SUITABLE MODEL FOR INVESTIGATIONS OF THE EFFECTS OF WEIGHTLESSNESS AS REGARDS EVOLUTION AND MODIFICATIONS
Hermann Josef Anton *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 63-68 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Limb regeneration in urodeles, amphibians which have experienced a phylogenetic evolution to overcome the effects of gravity, was studied to analyze the long term effects of weightlessness depending on environmental conditions and on gene activation. The study gives data on evolution processes and phylogenesis under weightlessness, on calcium exchange, and physiological regeneration of the skeleton as supporting and moving apparatus. ESA

N86-29521# Ruhr Univ., Bochum (West Germany). Fakultaet fuer Biologie.
INVESTIGATIONS OF THE REPRODUCTIVE PHYSIOLOGY OF THE RAINBOW TROUT (SALMO GAIRDNERI RICHARDSON)
Volker Bluem and Ruediger Schulz *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 69-73 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Morphological and endocrinal investigations on the reproductive physiology of the rainbow trout of either sex were performed to study hypothalamic production of gonadotropin releasing hormone (GnRH) using histological and histometrical analysis, to demonstrate the presence of gonadotrop hormone receptors (GTH-receptors) in testes and ovaries based on radioimmunological quantification and using the immunofluorescent technique. An in vitro system for gonad tissues was developed to study steroid genesis in short-time cultures. The effects of puberty in rainbow trout on material exchange are studied. Ethiological studies were carried out to determine the influence of sexual and/or parental phases. The morphological control of gametogenesis in micro-g environment is recommended as well as in vivo and in vitro investigations of reproduction-dependent hormonal systems. ESA

N86-29522# Essen Univ. (West Germany). Abt. fuer Zoophysiologie.
CHANGES IN THE MORPHOLOGICAL AND MOLECULAR BIOLOGICAL PROCESSES DURING EARLY EMBRYO DEVELOPMENT IN AMPHIBIANS UNDER MICRO G CONDITIONS
Horst Grunz *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 75-80 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of micro-g conditions on vegetative polarity (absence of change) in aging oocytes over 2 months were studied to determine the role of gene regulatory factors and the changes in nucleus-cytoplasm interactions. Cell affinity and induction should be investigated under micro-g conditions to study the processes of reaggregation between ectoderm and endoderm and the changes in the standard structure so as to understand normal and pathological embryo development. ESA

N86-29523# Giessen Univ. (West Germany). Genetischen Inst.
XIPHOPHORUS: A SYSTEM TO RECOGNIZE RADIATION-INDUCED MUTATIONS AND TO STUDY THE EFFECTS OF ZERO-GRAVITY ENVIRONMENT ON EMBRYO DEVELOPMENT
Carl-Rudolf Schmidt and Fritz Anders *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 81-85 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The reproduction physiology of Xiphophorus is described. Laboratory mutants constitute a system of 60 stable and genetically determined species. Resulting from their crossbreeding melanomas appear due to a disorded oncogene. The Xiphophorus system is studied to determine the oncogene characteristics, regulation and transmission. Studies on Xiphophorus under weightlessness are recommended: influence of 0-g environment on skeleton and skeletonmuscle structure; epigenetic and/or genetic effects of 0-g environment on embryogenesis in vivo and in vitro; and the effects of the combined action of cosmic radiation and weightlessness on embryos, sub-adult and adult animals of the mutation-sensitive Xiphophurus test species to investigate mutagenesis and teratogenesis. ESA

N86-29524# Luebeck Univ. (West Germany). Inst. fuer Physiologie.
HYPOXIC HYPOXIA AS A STIMULUS OF ERYTHROPOIESIS IN VIVO AND IN VITRO
Wolfgang Jelkmann *In* DFVLR Proceedings and program draft in Gravitational Biology in the Federal Republic of Germany Oct. 1985 p 95-100 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The action of weightlessness on red blood volume in astronaut's anemia and on erythropoiesis leading to increased hemolysis is studied. Several generations of mice and rats bred in weightlessness were studied to determine the effects of weightlessness on the erythropoetic tissues, on erythropoiesis and on calcification. Causes of astronaut's anemia are listed. The effects of weightlessness on the erythropoietic system ontogenesis were measured based on circulative blood and erythrocyte volumes, the functional integrity of the hematopoietic tissue and the capacity of the erythropoietic system to react to hypoxia. ESA

N86-29525# Marburg Univ. (West Germany). Arbeitsgruppe Verhaltensphysiologie.
A LEARNING MODEL AS A BASIS FOR INVESTIGATIONS OF THE EFFECTS OF GRAVITY ON THE LEARNING PROCESSES AND MEMORY FORMULATION
Christiane Buchholtz *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 107-113 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The effects of gravity on learning strategy were studied using conditioned mice and a data acquisition computer system recording the daily performance of each mouse. The records are used to develop learning models. Increased gravity causes changes in the functional relationship between data storage units. These changes depend on the calculation result of proprioceptive feedbacks, and on time dependent effects represented by transmission of data from a short term memory related to the biophysical phase to long term memory related to the biochemical phase. ESA

N86-29526# Duesseldorf Univ. (West Germany). Inst. fuer Physikalische Biologie.
LONG-TERM ADAPTATION OF THE OTOLITH ORGANS
Rolf Eckmiller *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 115-120 In GERMAN; ENGLISH

summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Reduction in sensitivity of otolith organs in primates before a space mission and methods to reduce it were investigated to avoid space motion sickness. A procedure should be developed under neurophysiological control of the otolith afferences to influence the size and location of otoconia. ESA

N86-29527# Ulm Univ. (West Germany). Abt. Neurologie.
FUNCTIONAL DEVELOPMENT OF GRAVITY RECEPTORS IN INSECTS AND AMPHIBIANS
Eberhard Horn *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 121-128 In GERMAN; ENGLISH summary Sponsored by Deutsche Forschungsgeimschaft (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Insects using a proprioceptive system and amphibians using a statocyst system were studied to analyze the functional development of a sensory system and its influence of the body muscle structure. The effects of micro-g through gravity receptors on the efficiency of the sensory system, on the adaptative mechanisms of the neuronal development under changing living conditions or under the animal pathological conditions, and on the hormonal environment are studied. The studies are based on eye reflex (Xenopus) and head reflex (Gryllus) and on equilibrium observations. ESA

N86-29528# Stuttgart Univ. (West Germany). Inst. fuer Zoologie.
FUNCTION-DEPENDENT PLASTICITY IN THE NERVOUS SYSTEM
Hinrich Rahmann and Wolfgang Probst *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 135-139 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The tectum opticum of fish midbrain is studied to demonstrate the involvement of gangliosides in the functional plastic changes in synaptic systems and in visual acuity. The structural synaptic plasticity after light variations involving synaptic vesicles and after temperature variations involving the nervous system are studied using differential quantitative light and electronic microscopes. The biochemical neuronal plasticity after temperature variations involves sialo-glycoconjugate bonds and gangliosides. The molecule basic properties are determined using the monolayer technique for physico-chemical in vitro experiments with various neuronal membrane lipids combined with calcium ions. Further investigations are recommended to study neuronal plasticity in reduced or in absence of gravity. ESA

N86-29529# Bonn Univ. (West Germany). Zoologisches Inst.
MORPHOLOGY AND DEVELOPMENT OF THE INNER EAR OF ANURANS
Hans Schneidor and Iris Hertwig *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 141-146 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The Anuran inner ear consists of five sensory sections for orientation in space and perception of acoustic signals. Utriculus, sacculus and lagena are gravity receptors possessing otoliths. The ampullae of the semicircular canals are responsible for rotation sense. Papillia basilaris and papilla amphiborum allow respectively perception of high frequencies and low frequencies. The development of the labyrinth in amphibians begins after neurulation. The receptors consist of sensory cells and support cells. Experiments in simulated weightlessness show that the development of sensory epithelia and otoliths do not depend on gravity and should be confirmed by experiments in space. ESA

N86-29530# Bielefeld Univ. (West Germany). Abt. Neuroanatomie.
QUESTIONS ON THE EVOLUTION OF THE DEVELOPMENTAL PROGRAM OF THE VERTEBRATE INNER EAR UNDER LONG TERM ZERO G CONDITIONS
Bernd Fritzsch *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 151-156 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

The long-term effects of weightlessness on the formation and function of the vestibular system are studied with particular focus on the persistence of motion defects of larva up to adult age, on the reproduction function, on the adaptation or selection of the offspring and hybrids resulting from successful reproduction under weightlessness, and on the sensory epithelium differentiation. The structural changes of the inner ear in adapted or selected offspring are studied using electronic microscope and the afferent and efferent connections using tracer methods. High generation succession frequency and offspring number, applicable reproductive behavior and easy culture, and live food are the minimum requirements for program implementation. ESA

N86-29531# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
LONG DURATION CONFINEMENT OF AQUATIC ORGANISMS IN WEIGHTLESSNESS (AQUASPACE)
Rainer Froese *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 159-164 In GERMAN; ENGLISH summary (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

A confinement facility resulting from the study of the transition phase between water and air was developed to study aquatic organisms in weightlessness. The facility is a closed system filled with water and consists of a central supply unit, confinement tanks, a lock system, a computer system for food supply control and measurement processing, videocameras monitoring growth, reproduction and behavior of the aquatic organisms, and two chambers to remove the gases released in water through a diffusion membrane and store oxygen in a gas mixture. The facility can be used to study the catabolism of the aquatic organisms in weightlessness and the effects of weightlessness and radiation on the reproduction biology. ESA

N86-29532# Ulm Univ. (West Germany). Abt. Neurologie.
PROGRAM DRAFT FOR A SPECIAL FIELD: GRAVITATIONAL BIOLOGY
Eberhard Horn *In* DFVLR Proceedings and Program Draft in Gravitational Biology in the Federal Republic of Germany (DFVL R-Mitt-85-16) Oct. 1985 p 173-189 In GERMAN (For primary document see N86-29514 20-55)
Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 50

Gravitational biology as a special field for fundamental research on organism biology in weightlessness is discussed. Cellular and molecular biology, genetics; reproduction and development biology; vegetative biology and matter exchange biology; neurobiology; behavioral and motion physiology; population genetics, and evolution biology, and ecology and life preservation systems are suitable fields of research. The cooperation between the different field specialists and experts can contribute to the knowledge of body stabilization and plasticity and adaptativity in weightlessness. ESA

N86-29533# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF 60 Hz ELECTRIC FIELDS ON OPERANT AND SOCIAL STRESS BEHAVIOR OF NONHUMAN PRIMATES Quarterly Technical Progress Report, 28 Sep. - 20 Dec. 1985
W. R. Rogers 3 Jan. 1986 5 p
(Contract DE-AC02-80RA-50219)
(DE86-005067; DOE/RA-50219/T7; QTPR-20) Avail: NTIS HC A02/MF A01

This research program will evaluate the aversive character of

exposure to 60 Hz electric fields by determining the threshold intensity which produces avoidance or escape responses, will estimate the threshold intensity for detection of 60 Hz electric fields, will assess effects of chronic exposure to 60 Hz electric fields on the performance of two operant conditioning tasks, fixed ratio and differential reinforcement of low rate responding, will investigate, using the systematic quantitative observational sampling methods of primatology, the possible stress-inducing effects of chronic exposure to 60 Hz electric fields on the behavior of baboons living in small social groups. In all experiments, the electric fields will be described, characterized, and controlled to account for recognized artifacts associated with high intensity 60 Hz electric fields and the health of all subjects will be described using the methods of primate veterinary medicine. DOE

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-29534*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IS RANDOM ACCESS MEMORY RANDOM?
Peter J. Denning 30 Jan. 1986 11 p Submitted for publication
(Contract NCC2-387)
(NASA-TM-89394; RIACS-TR-86.1; NAS 1.15:89394) Avail: NTIS HC A02/MF A01 CSCL 09B

Most software is contructed on the assumption that the programs and data are stored in random access memory (RAM). Physical limitations on the relative speeds of processor and memory elements lead to a variety of memory organizations that match processor addressing rate with memory service rate. These include interleaved and cached memory. A very high fraction of a processor's address requests can be satified from the cache without reference to the main memory. The cache requests information from main memory in blocks that can be transferred at the full memory speed. Programmers who organize algorithms for locality can realize the highest performance from these computers. Author

N86-29535*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PARALLEL STRUCTURES IN HUMAN AND COMPUTER MEMORY
Pentti Kanerva Jan. 1986 8 p Proposed for presentation at COGNITIVA 85, Paris, France Sponsored by System Development Foundation
(NASA-TM-89402; RIACS-TR-86.2; NAS 1.15:89402) Avail: NTIS HC A02/MF A01 CSCL 09B

If one thinks of our experiences as being recorded continuously on film, then human memory can be compared to a film library that is indexed by the contents of the film strips stored in it. Moreover, approximate retrieval cues suffice to retrieve information stored in this library. One recognizes a familiar person in a fuzzy photograph or a familiar tune played on a strange instrument. A computer memory that would allow a computer to recognize patterns and to recall sequences the way humans do is constructed. Such a memory is remarkably similiar in structure to a conventional computer memory and also to the neural circuits in the cortex of the cerebellum of the human brain. It is concluded that the frame problem of artificial intelligence could be solved by the use of such a memory if one were able to encode information about the world properly. Author

N86-29536*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VIRTUAL MEMORY
Peter J. Denning 25 Mar. 1986 16 p
(Contract NCC2-387)
(NASA-TM-89401; RIACS-TR-86.8; NAS 1.15:89401) Avail: NTIS HC A02/MF A01 CSCL 09B

Virtual memory was conceived as a way to automate overlaying of program segments. Modern computers have very large main memories, but need automatic solutions to the relocation and protection problems. Virtual memory serves this need as well and is thus useful in computers of all sizes. The history of the idea is traced, showing how it has become a widespread, little noticed feature of computers today. Author

N86-29537# Manchester Univ. (England). Inst. of Science and Technology.
THE DEVELOPMENT OF DESIGN GUIDES FOR THE IMPLEMENTATION OF MULTIPROCESSING ELEMENT SYSTEMS Final Report, 1980 - 1984
D. Aspinall Sep. 1985 87 p
(Contract F49620-80-C-0012)
(AD-A163055; UMIST/RADC/1; RADC-TR-84-273) Avail: NTIS HC A05/MF A01 CSCL 09/2

Multi Processing-Element Systems are complex and it is important that designers have as much help as possible in arriving at an efficient and reliable design. The primary objective of the research project was to identify aspects of a design which could be investigated through simulation. Two aspects of the problem were identified. The first of these was the interconnection structure or system by which the separate processing elements are interconnected. The second concerned the language to be used in order to design the processes to be distributed throughout the Multi Processing-Element Systems. GRA

N86-29538# Stanford Univ., Calif.
HEURISTIC PROGRAMMING PROJECT Final Report, Oct. 1982 - Sep. 1985
Edward A. Feigenbaum and Bruce G. Buchanan 4 Mar. 1986 19 p
(Contract N00039-83-C-0136; ARPA Order 3423)
(AD-A165995) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report summarizes basic and applied research into the science and engineering of knowledge-based systems. This work focused on five important and interrelated problems in building and using knowledge-based systems: 1) Basic Research in Knowledge-Based System Design and Implementation; 2) Intelligent Agents and tools for interacting with complex systems, planning, and cooperative problem solving; 3) The Blackboard Model and integration of knowledge from different sources; 4) Advanced Knowledge-based System Architectures for high performance parallel processing hardware and software; and 5) Knowledge-based VLSI tools for design and testing of integrated circuits. All of the research described in this report was performed within the Knowledge Systems Laboratory (KSL), formerly known as the Heuristic Programming Project (HPP). Sections 3 through 7 of this report summarize the KSL research under this contract. Publications resulting from this work contain the details of results and methodology, and are listed at the end of each section. Section 8 describes the computing environment of the KSL, the equipment purchases made under this contract, and the systems research and development that support the computing resources of the KSL. GRA

N86-29539# Lawrence Livermore National Lab., Calif.
EARLY MIMD EXPERIENCE WITH A PLASMA PHYSICS SIMULATION PROGRAM ON THE CRAY X-MP
C. E. Rhoades, Jr. Feb. 1986 16 p

(Contract W-7405-eng-48)
(DE86-006542; UCID-20656) Avail: NTIS HC A02/MF A01

This paper describes some early experience with converting a plasma physics simulation program to the CRAY X-MP, a current multiple instruction, multiple data (MIMD) computer consisting of two processors with architecture similar to that of the CRAY-1. The computer program used in this study is an all Fortran version of SELF, a two species, one space, two velocity, electromagnetic, Newtonian, particle in cell, plasma simulation code. The approach to converting SELF to use both processors of the CRAY X-MP is described in some detail. The resulting multiprocessor version of SELF is nearly a factor of two faster in real time than the single processor version. The multiprocessor version obtains 58.2+ or -.1 seconds of central processor time in 30+ or -.5 seconds of real time. For comparison, the CRAY-1 execution time if 74.5 seconds. For SELF, which is mostly scalar coding, the CRAY X-MP is about 2.5 times faster overall than the CRAY-1. DOE

N86-29540# Argonne National Lab., Ill.
USING THE IBM 6670 INFORMATION DISTRIBUTOR AT ANL
A. Heiberger and R. Slade Feb. 1986 61 p
(Contract W-31-109-eng-38)
(DE86-008110; ANL/TM-434) Avail: NTIS HC A04

Using the IBM 6670 Information Distributor at the Argonne National Lab. tells you how to code files for the IBM 6670 Information Distributor and send those files to the IBM 6670 from CMS, Wylbur, VAX/VMS, or MVS batch. CMS users should find the detailed information on the recommended TYPE6670 option particularly helpful. The IBM 6670 Information Distributor is a laser page printer that can function as a computer printer, a word processing printer, and a communications device. DOE

N86-29541# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
REALIZATION OF EXCHANGE MODULES FOR SM90 MULTIPROCESSOR MACHINES Ph.D. Thesis [REALISATION DE MODULES D'ECHANGE DANS UNE MACHINE MULTIPROCESSOR LA SM 90]
Damien Lefort Jul. 1984 106 p In FRENCH
(ENST-84E020; ISSN-0751-1353; ESA-86-97208) Avail: NTIS HC A06/MF A01

The architecture and characteristics of the SM90 and the development of exchange modules are described. The SM90 is characterized by the Unix exploitation system written in Pascal language and Pascal compiler. The advantages of the 8086 microprocessor used for the exchange modules are discussed. Several exchange modules and their functional characteristics to assure the management of peripheral equipment are described. The possibility to evolve the machine using a 32 bit microprocessor is discussed. ESA

N86-29542# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
[ACTIVITIES REPORT OF THE COMPUTER SYSTEMS DEPARTMENT] Annual Report, 1984-1985 [RAPPORT D'ACTIVITES, 1984-1984: DEPARTEMENT INFORMATIQUE]
Oct. 1985 123 p In FRENCH
(ENST-85D004; ISSN-0751-1345; ESA-86-97210) Avail: NTIS HC A06/MF A01

Research in computer systems, computerized telecommunications, data analysis, operations research, artificial intelligence, and computer programming is summarized. ESA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-29543*# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
ALGORITHMS AND PROGRAMMING TOOLS FOR IMAGE PROCESSING ON THE MPP Report, May 1984 - Nov. 1985
Anthony P. Reeves Nov. 1985 160 p
(Grant NAG5-403)
(NASA-CR-177302; NAS 1.26:177302) Avail: NTIS HC A08/MF A01 CSCL 09B

Topics addressed include: data mapping and rotational algorithms for the Massively Parallel Processor (MPP); Parallel Pascal language; documentation for the Parallel Pascal Development system; and a description of the Parallel Pascal language used on the MPP. For individual titles, see N86-29544 through N86-29546.

N86-29544*# Cornell Univ., Ithaca, N.Y.
ALGORITHMS AND PROGRAMMING TOOLS FOR IMAGE PROCESSING ON THE MPP, INTRODUCTION Thesis
In its Algorithms and Programming Tools for Image Processing on the MPP Nov. 1985 —p 1-51 (For primary document see N86-29543 20-61)
Avail: NTIS HC A08/MF A01 CSCL 09B

The programming tools and parallel algorithms created for the Massively Parallel Processor (MPP) located at the NASA Goddard Space Center are discussed. A user-friendly environment for high level language parallel algorithm development was developed. The issues involved in implementing certain algorithms on the MPP were researched. The expected results were compared with the actual results. B.G.

N86-29545*# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
ALGORITHMS AND PROGRAMMING TOOLS FOR IMAGE PROCESSING ON THE MPP. APPENDIX A: VMS COMMAND FILE USED TO IMPLEMENT pp COMMAND
In its Algorithms and Programming Tools for Image Processing on the MPP Nov. 1985 p 52-57 (For primary document see N86-29543 20-61)
Avail: NTIS HC A08/MF A01 CSCL 09B

A detailed description of the data mapping and rotation algorithms for the Massively Parallel Processor is given. B.G.

N86-29546*# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering.
APPENDIX E: PARALLEL PASCAL DEVELOPMENT SYSTEM
In its Algorithms and Programming Tools for Image Processing on the MPP Nov. 1985 54 p (For primary document see N86-29543 20-61)
Avail: NTIS HC A08/MF A01 CSCL 09B

The Parallel Pascal Development System enables Parallel Pascal programs to be developed and tested on a conventional computer. It consists of several system programs, including a Parallel Pascal to standard Pascal translator, and a library of Parallel Pascal subprograms. The library includes subprograms for using Parallel Pascal on a parallel system with a fixed degree of parallelism, such as the Massively Parallel Processor, to conveniently manipulate arrays which have dimensions than the hardware. Programs can be conveninetly tested with small sized arrays on the conventional computer before attempting to run on a parallel system. Author

N86-29547*# Research Triangle Inst., Research Triangle Park, N.C.
AN EXPERIMENT IN SOFTWARE RELIABILITY Final Report
Janet R. Dunham and John L. Pierce May 1986 62 p
(Contract NAS1-16489)
(NASA-CR-172553; NAS 1.26:172553; Rept-412U-2094-12; Rept-412U-2094-14) Avail: NTIS HC A04/MF A01 CSCL 09B

The results of a software reliability experiment conducted in a controlled laboratory setting are reported. The experiment was undertaken to gather data on software failures and is one in a series of experiments being pursued by the Fault Tolerant Systems Branch of NASA Langley Research Center to find a means of credibly performing reliability evaluations of flight control software. The experiment tests a small sample of implementations of radar tracking software having ultra-reliability requirements and uses

n-version programming for error detection, and repetitive run modeling for failure and fault rate estimation. The experiment results agree with those of Nagel and Skrivan in that the program error rates suggest an approximate log-linear pattern and the individual faults occurred with significantly different error rates. Additional analysis of the experimental data raises new questions concerning the phenomenon of interacting faults. This phenomenon may provide one explanation for software reliability decay. M.G.

N86-29548*# Texas Technological Univ., Lubbock.
A SIMPLE ALGORITHM FOR COMPUTING CANONICAL FORMS
H. Ford, L. R. Hunt, and S. Renjeng 1986 27 p
(Grants NAG2-189; NAG2-203; Contract N0014-76-C1136)
(NASA-CR-177105; NAS 1.26:177105) Avail: NTIS HC A03/MF A01 CSCL 09B

It is well known that all linear time-invariant controllable systems can be transformed to Brunovsky canonical form by a transformation consisting only of coordinate changes and linear feedback. However, the actual procedures for doing this have tended to be overly complex. The technique introduced here is envisioned as an on-line procedure and is inspired by George Meyer's tangent model for nonlinear systems. The process utilizes Meyer's block triangular form as an intermedicate step in going to Brunovsky form. The method also involves orthogonal matrices, thus eliminating the need for the computation of matrix inverses. In addition, the Kronecker indices can be computed as a by-product of this transformation so it is necessary to know them in advance. Author

N86-29549*# California Univ., Los Angeles. Dept. of Electrical Engineering.
A SURVEY OF THE STATE OF THE ART AND FOCUSED RESEARCH IN RANGE SYSTEMS, TASK 2 Semiannual Report
Kung Yao Jan. 1986 27 p
(Grant NAG2-304)
(NASA-CR-177034; NAS 1.26:177034) Avail: NTIS HC A03/MF A01 CSCL 09B

Many communication, control, and information processing subsystems are modeled by linear systems incorporating tapped delay lines (TDL). Such optimized subsystems result in full precision multiplications in the TDL. In order to reduce complexity and cost in a microprocessor implementation, these multiplications can be replaced by single-shift instructions which are equivalent to powers of two multiplications. Since, in general, the obvious operation of rounding the infinite precision TDL coefficients to the nearest powers of two usually yield quite poor system performance, the optimum powers of two coefficient solution was considered. Detailed explanations on the use of branch-and-bound algorithms for finding the optimum powers of two solutions are given. Specific demonstration of this methodology to the design of a linear data equalizer and its implementation in assembly language on a 8080 microprocessor with a 12 bit A/D converter are reported. This simple microprocessor implementation with optimized TDL coefficients achieves a system performance comparable to the optimum linear equalization with full precision multiplications for an input data rate of 300 baud. The philosophy demonstrated in this implementation is dully applicable to many other microprocessor controlled information processing systems. Author

N86-29550*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPROXIMATE ALGORITHMS FOR PARTITIONING AND ASSIGNMENT PROBLEMS
M. Ashraf Iqbal Jun. 1986 31 p
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178130; ICASE-86-40; NAS 1.26:178130) Avail: NTIS HC A03/MF A01 CSCL 09B

The problem of optimally assigning the modules of a parallel/pipelined program over the processors of a multiple computer system under certain restrictions on the interconnection structure of the program as well as the multiple computer system was considered. For a variety of such programs it is possible to find linear time if a partition of the program exists in which the load on any processor is within a certain bound. This method, when combined with a binary search over a finite range, provides an approximate solution to the partitioning problem. The specific problems considered were: a chain structured parallel program over a chain-like computer system, multiple chain-like programs over a host-satellite system, and a tree structured parallel program over a host-satellite system. For a problem with m modules and n processors, the complexity of the algorithm is no worse than O(mnlog(W sub T/epsilon)), where W sub T is the cost of assigning all modules to one processor and epsilon the desired accuracy. Author

N86-29551*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STATISTICAL METHODOLOGIES FOR THE CONTROL OF DYNAMIC REMAPPING Final Report
Joel H. Saltz and David M. Nicol Jul. 1986 38 p Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178129; ICASE-86-46; NAS 1.26:178129) Avail: NTIS HC A03/MF A01 CSCL 09B

Following an initial mapping of a problem onto a multiprocessor machine or computer network, system performance often deteriorates with time. In order to maintain high performance, it may be necessary to remap the problem. The decision to remap must take into account measurements of performance deterioration, the cost of remapping, and the estimated benefits achieved by remapping. We examine the tradeoff between the costs and the benefits of remapping two qualitatively different kinds of problems. One problem assumes that performance deteriorates gradually, the other assumes that performance deteriorates suddenly. We consider a variety of policies for governing when to remap. In order to evaluate these policies, statistical models of problem behaviors are developed. Simulation results are presented which compare simple policies with computationally expensive optimal decision policies; these results demonstrate that for each problem type, the proposed simple policies are effective and robust. Author

N86-29552*# Illinois Inst. of Tech., Chicago. Dept. of Electrical and Computer Engineering.
ERROR CONTROL FOR RELIABLE DIGITAL DATA TRANSMISSION AND STORAGE SYSTEMS Final Report
Daniel J. Costello, Jr. and Robert H. Deng 30 Sep. 1985 94 p
(Grant NAG2-202)
(NASA-CR-176935; NAS 1.26:176935) Avail: NTIS HC A05/MF A01 CSCL 09B

A problem in designing semiconductor memories is to provide some measure of error control without requiring excessive coding overhead or decoding time. In LSI and VLSI technology, memories are often organized on a multiple bit (or byte) per chip basis. For example, some 256K-bit DRAM's are organized in 32Kx8 bit-bytes. Byte oriented codes such as Reed Solomon (RS) codes can provide efficient low overhead error control for such memories. However, the standard iterative algorithm for decoding RS codes is too slow for these applications. In this paper we present some special decoding techniques for extended single-and-double-error-correcting RS codes which are capable of high speed operation. These techniques are designed to find the error locations and the error values directly from the syndrome without having to use the iterative alorithm to find the error locator polynomial. Two codes are considered: (1) a d sub min = 4 single-byte-error-correcting (SBEC), double-byte-error-detecting (DBED) RS code; and (2) a d sub min = 6 double-byte-error-correcting (DBEC), triple-byte-error-detecting (TBED) RS code. Author

N86-29553# Sandia National Labs., Albuquerque, N. Mex.
DATA ACQUISITION AND ANALYSIS USING THE IBM COMPUTER SYSTEM 9000
G. E. Mueller Oct. 1985 62 p
(Contract DE-AC04-76DP-00789)
(DE86-005799; SAND-85-1448) Avail: NTIS HC A04/MF A01

A data-acquisition, analysis, and graphing program has been

developed on the IBM CS-9000 multitask computer to support the UNM/SNL/GA Thermal-Hydraulic Test Facility. The software has been written in Computer System BASIC which allows accessing and configuring I/O devices. The CS-9000 has been interfaced with an HP 3497A Data Acquisition/Control Unit and an HP 7470A Graphics Plotter through the IEEE-488 Bus. With this configuration the system is capable of scanning 60 channels of analog thermocuple compensated input, 20 channels of analog pressure transducer input, and 16 channels of digital mass flow rate input. The CS-9000 graphics coupled with the HP 7470A provides useful visualization of changes in measured parameters. DOE

N86-29554# Japan Atomic Energy Research Inst., Tokyo.
PALLAS-1D(7): A CODE FOR DIRECT INTEGRATION OF TRANSPORT EQUATION IN ONE-DIMENSIONAL PLANE AND SPHERICAL GEOMETRIES
K. Takeuchi and S. Tanaka Dec. 1984 81 p Prepared in cooperation with Japan Atomic Energy Research Inst., Tokai, Ibaraki
(DE86-701087; JAERI-M-84-214) Avail: NTIS (US Sales Only) HC A05/MF A01

The PALLAS-1D (7) program is the revised version of the PALLAS-PL, SP-Br code which was developed in 1981 on the basis of a method of direct integration of the Boltzmann transport equation to neutron and gamma-ray transport in one-dimensional plane and spherical geometries. The PALLAS-1D (7) code can treat transport of both neutrons and gamma rays, in particular of secondary gamma rays including the bremsstrahlung and annihilation photons or secondary photons from nuclear reactions of neutrons. The document gives a full description of theoretical calculation, input and output data, as well as code implementation information and the input description of several sample problems. DOE

N86-29555# Lawrence Livermore National Lab., Calif.
VECTOR AND PARALLEL COMPUTERS FOR QUANTUM MONTE CARLO COMPUTATIONS
P. J. Reynolds, S. Alexander, D. Logan, and W. A. Lester, Jr. Aug. 1985 28 p Presented at the Conference on Supercomputer Simulations in Chemistry, Montreal, Quebec, 25 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002955; LBL-20085; CONF-8508156-1) Avail: NTIS HC A03/MF A01

Monte Carlo simulations are inherently computer-bound. Although short computations may provide order-of-magnitude estimates, long CPU times are generally required to achieve the accuracy needed for reliable comparison of Monte Carlo results with experiment or theory. The advent of supercomputers, which have made possible significantly increased computer speeds for those applications which are amenable to vector or parallel processing, thus offers promise for Monte Carlo applications. In fact, Monte Carlo codes are often highly parallel, and offer multiple avenues for both parallelisation and vectorization. We explore the gains to be obtained with supercomputers for the quantum Monte Carlo (QMC) method. The QMC algorithm treated here is used in quantum mechanical molecular calculations, to obtain solutions to the Schroedinger equation. This approach has recently been shown to achieve high accuracy in electronic structure computations. QMC is here demonstrated to fully take advantage of parallel and vector processor systems. Levels of parallelism are discussed, and an overview of parallel computer architectures, as well as present vector supercomputers is given. We also discuss how one adapts QMC to these machines. Performance ratios (versus scalar operation) for a number of supercomputer systems are given.DOE

N86-29556# Oak Ridge National Lab., Tenn.
CONTROL ALGORITHMS FOR AUTONOMOUS ROBOT NAVIGATION
C. C. Jorgensen 20 Sep. 1985 29 p Presented at the International Topical Meeting on Advances in Human Factors in Nuclear Power Systems, Knoxville, Tenn., 21 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-002209; CONF-860415-1) Avail: NTIS HC A03/MF A01

This paper examines control algorithm requirements for autonomous robot navigation outside laboratory environments. Three aspects of navigation are considered: navigation control in explored terrain, environment interactions with robot sensors, and navigation control in unanticipated situations. Major navigation methods are presented and relevance of traditional human learning theory is discussed. A new navigation technique linking graph theory and incidental learning is introduced. DOE

N86-29557# Los Alamos National Lab., N. Mex.
EXPERT ASSISTANTS FOR DESIGN
J. Aldridge, J. Cerutti, W. Draisin, and M. Steuerwalt 1986 12 p Presented at the 1st International Conference on Applications of AI to Engineering Problems, Southhampton, England, 1 Apr. 1986
(Contract W-7405-eng-36)
(DE86-003679; LA-UR-85-3970; CONF-860472-1) Avail: NTIS HC A02/MF A01

Two expert programs currently under development at the Los Alamos National Laboratory, PROCON and the Designer's Apprentice, are briefly described. Both codes define interface to simulations that provide a wide variety of information about the performance of complex devices. DOE

N86-29558# Argonne National Lab., Ill.
LINEAR ALGEBRA ON HIGH-PERFORMANCE COMPUTERS
J. J. Dongarra and D. C. Sorensen Jan. 1986 45 p
(Contract W-31-109-eng-38)
(DE86-007265; ANL-86-2) Avail: NTIS HC A03/MF A01

This paper surveys work recently done at Argonne National Laboratory in an attempt to discover ways to construct numerical software for high-performance computers. The numerical algorithms are taken from several areas of numerical linear algebra. We discuss certain architectural features of advanced-computer architectures that will affect the design of algorithms. The technique of restructuring algorithms in terms of certain modules is reviewed. This technique has proved successful in obtaining a high level of transportability without severe loss of performance on a wide variety of both vector and parallel computers. The module technique is demonstrably effective for dense linear algebra problems. However, in the case of sparse and structured problems it may be difficult to identify general modules that will be as effective. New algorithms have been devised for certain problems in this category. We present examples in three important areas: banded systems, sparse QR factorization, and symmetric eigenvalue problems. DOE

N86-29559# Sandia National Labs., Albuquerque, N. Mex.
GRASP USER MANUAL: A COMPUTER PROGRAM FOR PRESSURE ANALYSIS, VERSION 1.0
W. C. Mills-Curran Feb. 1986 40 p
(Contract DE-AC04-76DP-00789)
(DE86-007406; SAND-85-2423) Avail: NTIS HC A03/MF A01

The GRASP computer code (Graphic Analyzer and Shell Shock Preprocessor) is an interactive tool for analyzing large amounts of pressure data on a conical shell. With GRASP, the user can visualize the complex pressure distributions on an aeroshell at any time step. Pressure data from multiple sources can be compared, and load data for structural analysis may be generated. GRASP is extremely user friendly and is written to use the Sandia, Virtual Device Interface. DOE

N86-29560# Illinois Univ., Urbana. Dept. of Computer Science.
APPLICATIONS OF A SOFTWARE INTERCONNECTION SYSTEM IN MATHEMATICAL PROBLEM SOLVING ENVIRONMENTS
J. M. Purtilo Mar. 1986 19 p
(Contract DE-AC02-76ER-02383)
(DE86-007642; UIUCDCS-R-86-1254; UILU-ENG-86-1709; COO-2383-0117) Avail: NTIS HC A02/MF A01

The project called Polylith at University of Illinois at Urbana studies environment construction by first addressing those problems embedded in the underlying software interconnection technology. A new model of interconnection has been proposed, and a run-time system consistent with that model is implemented.

The result is a software design system that facilitates rapid prototyping and reuse of existing tools. In that our project applies these techniques to instantiating environments for mathematical problem solvers, we view Polylith as an environment design system. In this paper we discuss how Polylith can directly aid both environment builders and users alike. Section 2 of this paper gives an overview of our system, and then considers difficulties that arise in construction of environments where older interconnection technology is employed. Section 3 cites examples of new functionality that can be available in environments built using our type of tool bus. DOE

N86-29561# Lawrence Livermore National Lab., Calif.
CODE DEVELOPMENT WITH THE EAGLES ENGINEERING PROBLEM-SOLVING ENVIRONMENT
B. S. Lawver, D. W. OBrien, and M. E. Poggio Feb. 1986 9 p (Contract W-7405-eng-48)
(DE86-008107; UCID-20666) Avail: NTIS HC A02/MF A01

EAGLES is a set of computer programs which assist in the development and use of engineering analysis and simulation codes. This paper introduces EAGLES to the developers of engineering codes. EAGLES' capabilities, functions, and tools for code development are explained. DOE

N86-29562*# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
THE UCLA DESIGN DIVERSITY EXPERIMENT (DEDIX) SYSTEM: A DISTRIBUTED TESTBED FOR MULTIPLE-VERSION SOFTWARE
A. Avizienis, P. Gunningberg, J. P. J. Kelly, L. Strigini, P. J. Traverse, K. S. Tso, and U. Voges 1986 11 p Presented at 15th IEEE Ann. Intern. Symp. on Fault Tolerance Computing, Ann Arbor, Mich., 19-21 Jun. 1985 Sponsored by FAA Prepared in cooperation with California Univ., Los Angeles
(Grants NAG1-512; NSF MCS-81-21696)
(NASA-CR-177171; NAS 1.26:177171; SNIAS-861-111-107; ESA-86-97144) Avail: NTIS HC A02/MF A01 CSCL 09B

To establish a long-term research facility for experimental investigations of design diversity as a means of achieving fault-tolerant systems, a distributed testbed for multiple-version software was designed. It is part of a local network, which utilizes the Locus distributed operating system to operate a set of 20 VAX 11/750 computers. It is used in experiments to measure the efficacy of design diversity and to investigate reliability increases under large-scale, controlled experimental conditions. ESA

N86-29563*# Societe Nationale Industrielle Aerospatiale, Toulouse (France).
SOFTWARE FAULT-TOLERANCE BY DESIGN DIVERSITY DEDIX: A TOOL FOR EXPERIMENTS
A. Avizienis, P. Gunningberg, J. P. J. Kelly, R. T. Lyu, L. Strigini, P. J. Traverse, K. S. Tso, and U. Voges 1986 8 p Presented at SAFECOMP 85, Como, Italy, 1-3 Oct. 1985 Sponsored by FAA Prepared in cooperation with California Univ., Los Angeles
(Grants NAG1-512; NSF MCS-81-21696)
(NASA CR-177172; NAS 1.26:177172; SNIAS-861-111-108; ESA-86-97145) Avail: NTIS HC A02/MF A01 CSCL 09B

The use of multiple versions of a computer program, independently designed from a common specification, to reduce the effects of an error is discussed. If these versions are designed by independent programming teams, it is expected that a fault in one version will not have the same behavior as any fault in the other versions. Since the errors in the output of the versions are different and uncorrelated, it is possible to run the versions concurrently, cross-check their results at prespecified points, and mask errors. A DEsign DIversity eXperiments (DEDIX) testbed was implemented to study the influence of common mode errors which can result in a failure of the entire system. The layered design of DEDIX and its decision algorithm are described. ESA

N86-29564# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
THE BLAS ON THE CYBER 205
Margreet Louter-Nool Dec. 1985 27 p Submitted for publication (CWI-NM-R8524; B8660190; ESA-86-97512) Avail: NTIS HC A03/MF A01

The efficiency of a set of linear algebra subprograms, the so-called BLAS, as implemented on a 1-pipe Cyber 205 is discussed. Operations on nonsequentially stored vector elements, leading to so-called stride problems, are considered. It is shown that splitting the real and imaginary components for the COMPLEX BLAS without an additional stride problem is not the most efficient manner. But, if there is a stride problem, and consequently disjunct vectors of real and of imaginary components are created, it is recommended to take full advantage of this data structure. All execution times of the CDC BLAS subprograms can be improved for all increment values >1, except for the subprograms SCNRM2 and CSSCAL. The performance of SCNRM2 and CSSCAL do not suffer on the inherent troublesome storage of a COMPLEX vector. Like the REAL SASUM and SROT, the execution times of the COMPLEX routines SCASUM and CSROT can be speeded up. In the case of an additional stride problem, the performance with two disjunct vectors delivers such a considerable gain, that even when only one vector has an increment value value greater than one, it is better to split the real and imaginary components of the other sequentially stored vector. In contradiction with the REAL BLAS, all suggestions are independent of the size of the increment value. ESA

N86-29565# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A SPICE INPUT TO NETWORK DESCRIPTION AND MODELING LANGUAGE (NDML) COMPILER
R. J. J. vanWaes Dec. 1984 62 p
(ESA-86-97531) Avail: NTIS HC A04/MF A01

A piecewise linear simulator for electronic circuits was developed. To be able to accept circuit descriptions prepared for the simulator SPICE, and to compare the performance of the piecewise linear simulator and SPICE, a compiler was constructed. The compiler translates input for SPICE to input written in Network Description and Modeling Language which is the input language of the piecewise linear simulator. ESA

N86-29566# Kernforschungszentrum, Karlsruhe (West Germany).
FINITE ELEMENT DATA INTERFACE STANDARD (FEDIS)
P. Groth, H. M. Hilber, C. Katz, and H. Werner Nov. 1985 92 p In GERMAN; ENGLISH summary
(Contract BMFT-F11.021-RT-TPG/11)
(KfK-PFT-114; ESA-86-96909) Avail: NTIS HC A05/MF A01

A standard interface for the transfer of data between independent programs for the generation, analysis, and postprocessing of finite element models is proposed. The interface program supports and facilitates the integration of program packages which are simultaneously used for one project. The data types and the general structure of the proposed interface are presented. The interface program is documented. The program architecture, data management system, and interpreter are described. Applications are given to illustrate the state of the program development ESA

N86-29567# National Bureau of Standards, Gaithersburg, Md. Inst. for Computer Sciences and Technology.
INTEGRATED SOFTWARE FOR MICROCOMPUTER SYSTEMS Final Report
L. S. Rosenthal Jan. 1986 41 p
(PB86-167830; NBS-SP-500-135; LC-86-600500) Avail: NTIS HC A03/MF A01; also available SOD HC $1.75 as 003-003-02711-1 CSCL 09B

Integrated software products combine several applications within a single program and permit information to be shared between the applications. The report defines five approaches to integration: the all-in-one, product suite, software integrator, operating environment, and background utility. Each of these approaches is designed to achieve different objectives by emphasizing the power and importance of the features of each approach. Consequently, there is no best approach to software integration. The selection of an approach depends on the application require-

ments, current system configurations, and personal preferences. Selecting an integrated product begins by considering the various approaches to integration and determining which one is most appropriate. Subsequently, the products within the chosen approach are evaluated against a preestablished set of criteria relating to the product design, technical capabilities, and product quality. Careful selection of an integrated product will insure that the benefits to be gained from its use can be achieved. GRA

N86-29285*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA SET MANAGEMENT
Mary Reph *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 17 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29286*# Science Applications Research, Lanham, Md.
DEMONSTRATION OF NEW PCSD CAPABILITIES
Michael Gough *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 8 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29300*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE CDF SOFTWARE PACKAGE
C. Edwin Wilson *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 11 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

62 COMPUTER SYSTEMS

Includes computer networks.

N86-29568*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ACCESS CONTROL AND PRIVACY IN LARGE DISTRIBUTED SYSTEMS
Barry M. Leiner and Matt Bishop 7 Mar. 1986 18 p
(Contract NCC2-387)
(NASA-TM-89397; RIACS-TR-86.6; NAS 1.15:89397) Avail: NTIS HC A02/MF A01 CSCL 09B

Large scale distributed systems consists of workstations, mainframe computers, supercomputers and other types of servers, all connected by a computer network. These systems are being used in a variety of applications including the support of collaborative scientific research. In such an environment, issues of access control and privacy arise. Access control is required for several reasons, including the protection of sensitive resources and cost control. Privacy is also required for similar reasons, including the protection of a researcher's proprietary results. A possible architecture for integrating available computer and communications security technologies into a system that meet these requirements is described. This architecture is meant as a starting point for discussion, rather that the final answer. Author

N86-29569*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WHITE PAPER: A PLAN FOR COOPERATION BETWEEN NASA AND DARPA TO ESTABLISH A CENTER FOR ADVANCED ARCHITECTURES
Peter J. Denning, George B. Adams, III, Robert L. Brown, Pentti Kanerva, Barry M. Leiner, and Michael R. Raugh 25 Apr. 1986 14 p
(Contract NCC2-387)
(NASA-TM-89388; RIACS-TR-86.10; NAS 1.15:89388) Avail: NTIS HC A02/MF A01 CSCL 09B

Large, complex computer systems require many years of development. It is recognized that large scale systems are unlikely to be delivered in useful condition unless users are intimately involved throughout the design process. A mechanism is described that will involve users in the design of advanced computing systems and will accelerate the insertion of new systems into scientific research. This mechanism is embodied in a facility called the Center for Advanced Architectures (CAA). CAA would be a division of RIACS (Research Institute for Advanced Computer Science) and would receive its technical direction from a Scientific Advisory Board established by RIACS. The CAA described here is a possible implementation of a center envisaged in a proposed cooperation between NASA and DARPA. Author

N86-29570# Texas Univ., Austin. Dept. of Computer Sciences.
A COMPUTABILITY THEORY FOR DISTRIBUTED SYSTEMS Final Report
Jayadev Misra 13 Mar. 1986 87 p
(Contract N00014-85-K-0057)
(AD-A166081) Avail: NTIS HC A05/MF A01 CSCL 09/2

The work proposed under this grant was to develop theories which will contribute to the design and analysis of distributed systems. The major emphasis of the proposed research was to study how and why processes in a message passing system need to communicate. Contents: Learning from incomplete information; Understanding a Byzantine algorithm; On the nonexistence of robust commit protocol; How processes learn; A Really abstract concurrent model and its temporal logic; and Systolic algorithms as programs. GRA

N86-29571# Rochester Univ., N. Y. Dept. of Computer Science.
DISTRIBUTED DATA STRUCTURES: A CASE STUDY
Carla S. Ellis Aug. 1985 33 p
(Contract N00014-82-K-0193; Grants NSF MCS-82-03306; NSF DCR-83-20136)
(AD-A166083; TR-150) Avail: NTIS HC A03/MF A01 CSCL 09/2

In spite of the amount of work recently devoted to distributed system, distributed applications are relatively rare. One hypothesis to explain this scarcity of different examples is a lack of experience with algorithm design techniques tailored to an environment in which out-of-date and incomplete information is the rule. Since the design of data structures is an important aspect of traditional algorithm design, it is important to consider the problem of distributing data structures. This paper investigates these issues by developing a distributed version of an extendible hash file which is a dynamic indexing structure that could be useful in a distributed database. Hashing has long been recognized as a fast method for accessing records by key in large relatively static databases. However, when the amount of data is likely to vary significantly, traditional hashing can suffer from performance degradation and may eventually require rehashing all the records into a larger space. GRA

N86-29572# Illinois Univ., Urbana. Dept. of Computer Science.
ENVIRONMENTS FOR PROTOTYPING PARALLEL ALGORITHMS
J. Purtilo, D. A. Reed, and D. C. Grunwald Feb. 1986 24 p
(Contract DE-AC02-76ER-02383)
(DE86-007645; UIUCDCS-R-86-1249; UILU-ENG-86-1707; COO-2383-0118) Avail: NTIS HC A02/MF A01

The current ferment in parallel computer architecture has exacerbated the already large problems in developing and testing parallel algorithms. Although only experimentation will identify effective designs, the variety of computing paradigms has precluded development of the (necessary) general environment for parallel programming. We propose an environment design system where design specification is divorced from implementation. Because the design system, Polylith, provides the communication structure of a parallel computation, the computation's individual tasks can be written in one of several relatively portable sequential languages. The resulting parallel program is architecture independent; only Polylith's underlying communication support need be ported to execute code on a different parallel machine. This approach is

illustrated using examples from both parallel simulation and partial differential equations. DOE

N86-29573# Sandia National Labs., Albuquerque, N. Mex.
THE 9600 BPS ROUTING VIA SYNCHRONIZED PACX 1000 NETWORK
M. M. Miller 25 Mar. 1986 10 p Presented at the Gaidalf PACX User Group Meeting, Atlanta, Ga., 25 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007824; SAND-86-0575C; CONF-860387-1) Avail: NTIS HC A02/MF A01

In order to achieve 9600 bps routing through the Gandalf PACX-based terminal switching network at Sandia National Laboratories, the network was upgraded to PACX 1000 switches synchronized to GLM 528 multiplexers. This presentation describes the network architecture and how the PACX switches and multiplexers have been synchronized to achieve minimum data distortion and improved character transmission rate. DOE

N86-29574# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
STUDY, IMPLEMENTATION AND MODELS OF LOW STAGE PROTOCOLS FOR INTEGRATED SERVICE NETWORKS Ph.D. Thesis [ETUDES, REALISATION ET MODELISATION DES COUCHES BASES DE PROTOCOLES POUR LES RESEAUX A INTEGRATION DE SERVICE]
Wu Ai Oct. 1985 133 p In FRENCH
(ENST-85E008; ISSN-0751-1353; ESA-86-97212) Avail: NTIS HC A07/MF A01

The architecture and protocols for integrated service local networks are studied. The design and implementation of a computer program for the data link stage of the experimental Excalibur network are described. A model and the evaluation of the Excalibur network are presented. The choice of a semideterministic access protocol assures a minimum data flow for each station. The Excalibur architecture is efficient for data transmission, telephony, and television applications as well. ESA

N86-29284*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PCDS OVERVIEW
Lloyd Treinish *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 18 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-29575*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
BEYOND SINGULAR VALUES AND LOOP SHAPES
Gunter Stein Oct. 1985 18 p
(Grant NAS2-297)
(NASA-CR-177018; NAS 1.26:177018; LIDS-P-1504) Avail: NTIS HC A02/MF A01 CSCL 09B

The status of singular value loop-shaping as a design paradigm for multivariable feedback systems is reviewed. It shows that this paradigm is an effective design tool whenever the problem specifications are spacially round. The tool can be arbitrarily conservative, however, when they are not. This happens because singular value conditions for robust performance are not tight (necessary and sufficient) and can severely overstate actual requirements. An alternate paradign is discussed which overcomes these limitations. The alternative includes a more general problem formulation, a new matrix function mu, and tight conditions for both robust stability and robust performance. The state of the art currently permits analysis of feedback systems within this new paradigm. Synthesis remains a subject of research. Author

N86-29576# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
MODELING AND CONTROL OF ASSEMBLY TASKS AND SYSTEMS Interim Report
Bruce H. Krogh and Arthur C. Sanderson Jul. 1985 39 p
(AD-A166445; CMU-RI-TR-86-1) Avail: NTIS HC A03/MF A01 CSCL 05/1

This report reviews ongoing research in modeling and control of assembly systems. A modeling framework is developed for representing assembly tasks as a collection of discrete operations with precedence relations reflecting physical constraints. Devices are mapped into the subtask description leading to an 'operation precedence graph' which is useful for analyzing alternative system configurations and supervisory control structures. Underlying continous processes determine the tolerance requirements for accomplishing the subtasks. Since reducing uncertainty in the system configuration is the fundamental objective in assembly tasks, two alternatives for representing uncertainty are defined and illustrated by examples. These representations of uncertainty are discussed with respect to alternative feedback control strategies for satisfying tolerance constaints. The concluding section identifies directions for future research. GRA

N86-29577# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
OPTIMAL CONTROL AND SIMULATION: EXTENSION OF THE INTERACTIVE PROGRAM PACKAGE SATER
Guoji Sun (Xian Jiaotong Univ., China) May 1984 44 p Sponsored by Netherlands government
(ER-84/01; ESA-86-97521) Avail: NTIS HC A03/MF A01

Application programs, such as continuous simulation, s-z conversion, and optimal control, were written to extend the interactive program package SATER for identification of linear single input single output systems. For solving the matrix Riccati differential equation of optimal control with a quadratic performance index, and Kalman filter of the continuous systems, three methods and their comparison of convergence speed are presented. In the continuous simulation, which can be applied to calculate the responses of the open-loop system and the closed-loop system with optimal feedback, the Euler method, fourth Runge-Kutta method and Runge-Kutta-Merson variable-step method are provided. The bilinear z-transformation is used for s-z conversion. The algorithm for calculating the feedback matrices of optimal control and state observer of discrete models is described. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-29578*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
APPROXIMATING LINEARIZATIONS FOR NONLINEAR SYSTEMS Semiannual Progress Report
L. R. Hunt (Texas Univ., Dallas.), R. Su (Colorado Univ., Boulder.), and G. Meyer 1986 23 p
(Grants NAG2-189; NAG2-366; NAG2-203; Contract N00014-76-C1136)
(NASA-TM-88772; NAS 1.15:88772) Avail: NTIS HC A02/MF A01 CSCL 12A

The following problem is examined: given a nonlinear control system dot-x(t) = f(x(t)) + the sum to m terms(i=1) u sub i (t)g sub i (x(t)) on R(n) and a point x(0) in R(n), approximate the system near x(0) by a linear system. One approach is to use the usual Taylor series linearization. However, the controllability properties of both the nonlinear and linear systems depend on certain Lie brackets of the vector field under consideration. This suggests that a linear approximation based on Lie bracket matching should be constructed at x(0). In general, the linearizations based on the Taylor method and the Lie bracket approach are different. However, under certain mild assumptions, it is shown that there is

a coordinate system for R(n) near x(0) in which these two types of linearizations agree. The importance of this agreement is indicated by examining the time responses of the nonlinear system and its linear approximation and comparing the lower order kernels in Volterra expansions of each. M.G.

N86-29579*# Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
LINEAR AND NONLINEAR DYNAMIC ANALYSIS OF REDUNDANT LOAD PATH BEARINGLESS ROTOR SYSTEMS
Status Report
V. R. Murthy Dec. 1985 94 p
(Grant NAG2-306)
(NASA-CR-177098; NAS 1.26:177098) Avail: NTIS HC A05/MF A01 CSCL 12A

The bearingless rotorcraft offers reduced weight, less complexity and superior flying qualities. Almost all the current industrial structural dynamic programs of conventional rotors which consist of single load path rotor blades employ the transfer matrix method to determine natural vibration characteristics because this method is ideally suited for one dimensional chain like structures. This method is extended to multiple load path rotor blades without resorting to an equivalent single load path approximation. Unlike the conventional blades, it isk necessary to introduce the axial-degree-of-freedom into the solution process to account for the differential axial displacements in the different load paths. With the present extension, the current rotor dynamic programs can be modified with relative ease to account for the multiple load paths without resorting to the equivalent single load path modeling. The results obtained by the transfer matrix method are validated by comparing with the finite element solutions. A differential stiffness matrix due to blade rotation is derived to facilitate the finite element solutions. Author

N86-29580*# Massachusetts Inst. of Tech., Cambridge.
MULTIVARIABLE CONTROL SYSTEMS WITH SATURATING ACTUATORS ANTIRESET WINDUP STRATEGIES
Petros Kapasouris and Michael Athans May 1985 6 p Sponsored in part by General Electric Co.
(Grants NAG2-297; NGL-22-009-124)
(NASA-CR-177100; NAS 1.26:177100; LIDS-P-1461) Avail: NTIS HC A02/MF A01 CSCL 12A

Preliminary, promising, results for introducing antireset windup (ARW) properties in multivariable feedback control systems with multiple saturating actuator nonlinearities and integrating actions are presented. The ARW method introduces simple nonlinear feedback around the integrators. The multiloop circle criterion is used to derive sufficient conditions for closed-loop stability that employ frequency-domain singular value tests. The improvement in transient response due to the ARW feedback is demonstrated using a 2-input 2-outpurt control system based upon F-404 jet engine dynamics. Author

N86-29581*# Honeywell Systems and Research Center, Minneapolis, Minn.
BEYOND SINGULAR VALUES AND LOOP SHAPES
Gunter Stein 30 Aug. 1985 19 p
(Grant NAG2-297)
(NASA-CR-177087; NAS 1.26:177087; LIDS-P-1504) Avail: NTIS HC A02/MF A01 CSCL 12A

The status of singular value loop-shaping as a design paradigm for multivariable feedback systems is reviewed. It is demonstrated that this paradigm is an effective design tool whenever the problem specifications are spacially round. The tool can be arbitrarily conservative, however, when they are not. This happens because singular value conditions for robust performance are not tight (necessary and sufficient) and can severely overstate actual requirements. An alternate paradigm is discussed which overcomes these limitations. The alternative includes a more general problem formulation, a new matrix function mu, and tight conditions for both robust stability and robust performance. The state of the art currently permits analysis of feedback systems within this new paradigm. Synthesis remains a subject of research. Author

N86-29582# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A NONLINEAR BOUNDARY VALUE PROBLEM AND APPLICATIONS TO A DIFFUSION PROBLEM WITH RADIAL SYMMETRIES
Sonia Maria Gomes May 1986 21 p Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil) Presented for publication
(INPE-3909-PRE/949) Avail: NTIS HC A02/MF A01

Diffusion controlled growth of planar, cylindrical, or spherical particles is considered, where the composition satisfies a generalized diffusion equation. Similarity solutions for this problem are analyzed via an equivalent one-dimensional nonlinear boundary value problem. For such problems it is shown existence, uniqueness, and solutions comparison theorems. Then, in the diffusion context again, several results are stated and completed specially those concerning a limit flux averaged at infinity. Author

N86-29583# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SOME ASPECTS TO BE CONSIDERED IN THE ATTEMPT TO FIND MORE EFFICIENT METHODS FOR SOLVING OPTIMIZATION PROBLEM BY ENUMERATION
Nei Yoshihiro Soma and Horacio Hideki Yanasse May 1986 18 p Presented at the 3rd Latin Ibero American Congress on Operations Research, Santiago, Chile, 18-22 Aug., 1986
(INPE 3898-PRE/940) Avail: NTIS HC A02/MF A01

In an enumeration scheme to solve the unidimensional knapsack problem, two characteristics called attention: the reduction of an N-dimensional problem to one in the plane; and visiting states and stages in a different sequence than the traditional dynamic programming improved memory and computational requirements. The implementation resulted in a more efficient algorith compared with others using dynamic programming. The focus of this work is making comparisons with the traditional methods. Such observations are potentially useful to other researches in developing new and more efficient methods for solving some optimization problems. Author

N86-29584# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DESIGN OF A STOCHASTIC LINEAR DISCRETE REGULATOR BASED ON AN OPTIMAL STATE ESTIMATION APPROACH
A. Rios-Neto May 1986 12 p Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil) Submitted for publication
(INPE-3902-PRE/943) Avail: NTIS HC A02/MF A01

The problem of regulator design for stochastic linear discrete-time systems by otpimizing a quadratic index of performance is considered. Loose separability is assumed and one-step-ahead minimization of control magnitude and of controlled state deviation from zero is imposed to determine the control law. To determine the weighting matrices in the index of performance, a state estimation based scheme of analysis is proposed. With this approach these matrices are taken as covariance matrices, through the use, one step ahead, of the information about allowed control magnitude and possible and desirable state deviation from zero. Convergence of the proposed regulator is analyzed also using a state estimation equivalent problem approach. Complete observability and complete controllability are shown to guarantee the existence of a sequence of stabilizing control values, which can be estimated by the adopted optumization design approach. The structure of the resulting control law depends only on past and present knowledge of system dynamics, making the proposed solution suitable for applications where adaptive control is necessary. Author

N86-29585# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BATCH AND SEQUENTIAL DATA SMOOTHING AND COMPRESSION BY CURVE FITTING USING AND ADAPTIVE STATE ESTIMATION TECHNIQUE
Valcir Orlando, Atair Rios Neto, and Helio Koiti Kuga May 1986

17 p To be presented at the 10th World Congress International Fedeation of Automatic Control, Munich, West Germany, 26-31 Jul. 1987 Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil) To be submitted for publication
(INPE-3885-PRE/935) Avail: NTIS HC A02/MF A01

The problem of data smoothing and compression by curve fitting is formulated to allow the application of Kalman filtering and a state noise estimation technique to its solution. This leads to a procedure that can be used to process the data either in batch or sequentially. The capability of sequential processing opens the possiblity of curve fiting in real time. Tests done with digitally simulated satellite tracking data indicate that the procedure has a satisfactory performance, being a potentially promising tool for data preprocessing. Author

N86-29586# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STATE ESTIMATION OF MULTIVARIABLE SYSTEMS USING THE DUALITY CONCEPT
Agenor DeToledoFleury and Atair Rios Neto Apr. 1986 26 p Presented at the 10th Diname-Symposium on Dynamical Systems in Mechanics Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil) Submitted for publication
(INPE-3857-PRE/921) Avail: NTIS HC A03/MF A01

A state estimator for dynamic systems based upon the duality concept between state estimation and optimal control problems was developed. This leads to an estimator algorithm silmilar to the Extended Kalman Filter for use in real time nonlinear systems, which can recursively be approximated by linear systems. The duality concept is used to transform the original estimation problem into an equivalent one of virtual control. This control problem is then used to generate an adaptive, locally convergent algorithm where, instead of full state estimation, one has to estimate just a control vector with smaller dimension than the state vector. The control formulation also allows the development of convergence acceleration criteria. Three convergence criteria, as well as adaptive noise methods to compensate for model errors, are then developed and used with the proposed estimator in the test problem created to validate the estimator. The algorithm is implemented in a digital computer to estimate the orbit of a low Earth orbit satellite under simulated conditions. Numerical results include test cases considering different initial values for the estimator and different standard deviations for the observations provided by three Earth stations, allowing a preliminary evaluation of the estimator characteristics. Author

N86-29587*# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering and Computer Science.
A CANONICAL FORM FOR NONLINEAR SYSTEMS
Renjeng Su and L. R. Hunt 1985 19 p
(Grants NAG2-203; NAG2-189; Contract N00014-76-C-1136)
(NASA-CR-176941; NAS 1.26:176941) Avail: NTIS HC A02/MF A01 CSCL 12A

The conceptions of transformation and canonical form have been much used to analyze the structure of linear systems. A coordinate system and a corresponding canonical form are developed for general nonlinear control systems. Their usefulness is demonstrated by showing that every feedback linearizable system becomes a system with only feedback paths in the canonical form. Author

N86-29588# Indian Inst. of Geomagnetism, Bombay.
[RESEARCH AND DEVELOPMENT ACTIVITIES OF THE INDIAN INSTITUTE OF GEOMAGNETISM]
Nanabhai Moos Marg 1983 68 p
Avail: NTIS HC A04/MF A01

The progress in research and on the developmental activities of the Institute during the year 1982 to 1983 is presented. Research activities of the Institute during the year covered some aspects of the geomagnetic variations in the Indian region on quiet and disturbed days, electrojet field, electromagnetic induction, aeronomy, radio scintillations, magnetosphere and solar wind, magnetic pulsations and solar-terrestrial relationships. Significant result of these investigations are given. A list of papers published or under publication during the year is also given. E.R.

N86-29589# Yale Univ., New Haven, Conn. Dept. of Computer Science.
A COMPARISON OF DOMAIN DECOMPOSITION TECHNIQUES FOR ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS AND THEIR PARALLEL IMPLEMENTATION
David E. Keyes and William D. Gropp Dec. 1985 54 p
(Contract N00014-82-K-0184; Grants NSF MCS-81-06181; AF-AFOSR-0360-84)
(AD-A165996; YALEU/DCS/RR-448) Avail: NTIS HC A04/MF A01 CSCL 12/1

Several preconditioned conjugate gradient (PCG)-based domain decomposition techniques for self-adjoint elliptic partial differential equations in two dimensions are compared against each other and against conventional PCG iterative techniques in serial and parallel contexts. The authors consider preconditioners that make use of fast Poisson solvers on the subdomain interiors. Several preconditioners for the interfacial equations are tested on a set of model problems involving two or four subdomains, which are prototype of the stripwise and boxwise decompositions of a two-dimensional region. Selected methods have been implemented on the Intel Hypercube by assigning one processor to each subdomain, making use of up to 64 processors. The choice of a 'best' method for a given problem depends in general upon: (a) the domain geometry, (b) the variability of the operator, and (c) machine characteristics such as the number of processors available and their interconnection scheme, the memory available per processor, and communication and computation rates. Emphasized is the importance of the third category, which has not been as extensively explored as the first two in the domain decomposition literature to date. third category, which has not been as extensively explored as the first two in the domain decomposition literature to date. Author (GRA)

N86-29590# Warwick Univ. Coventry (England). Mathematics Inst.
FLUX AND DIFFERENCES IN ACTION FOR CONTINUOUS TIME HAMILTONIAN SYSTEMS
R. S. MacKay and J. D. Meiss Dec. 1985 12 p
(Contract DE-FG05-80ET-53088)
(DE86-005402; DOE/ET-53088/221; IFSR-221) Avail: NTIS HC A02/MF A01

For a time periodic Hamiltonian H(p,q,t) of period T, the area crossing a collection of curves at time O spanning two homotopic orbits of common period nT, in a time T, is shown to be the difference between the actions, contour integral pdq-Hdt, of the orbits. Similarly in an autonomous Hamiltonian system of two degrees of freedom the flux of energy surface volume per unit time through a surface spanning two homotopic orbits of the same energy is given by the difference between the actions, contour integral p-dq, of the orbits. Analogous results hold for pairs of orbits which converge together in both directions of time. DOE

N86-29591# New York Univ., New York. Mathematics and Computing Lab.
NUMERICAL ANALYSIS AND THE SCIENTIFIC METHOD
J. Glimm and D. H. Sharp Jan. 1986 29 p
(Contracts DE-AC02-76ER03077; W-7405-eng-36)
(DE86-005404; DOE/ER-03077/270) Avail: NTIS HC A03/MF A01

The computer has given rise to a new mode of scientific practice, and today computational science stands beside theory and experiment as a fundamental methodology. The impact of the computer revolution on science can be projected from current trends. The demands to be made on computing methodologies will be reviewed. One of the demands is an ongoing need for excellence in computational methodologies. Generic difficulties encountered in meeting these challenges will be discussed. Recent work of the authors and others will be reviewed in this context. DOE

N86-29592# Illinois Univ., Urbana. Dept. of Computer Science.
PERFORMANCE OF RUNGE-KUTTA CODES WHEN STABILITY RESTRICTS THE STEPSIZE
G. Hall Dec. 1985 18 p
(Contract DE-AC02-76ER-02383)
(DE86-005804; UIUCDCS-R-85-1238; UILU-ENG-85-1746; COO-2383-0114) Avail: NTIS HC A02/MF A01

A theory is given which accounts for the observed behavior of Runge-Kutta codes when the stepsize is restricted by stability. The theory deals with the general case when the dominant eigenvalues of the Jacobian may be a complex conjugate pair. A simple condition on a method is obtained which characterizes its performance in this type of situation and some example calculations are given to illustrate the consequences of the theory. DOE

N86-29593# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation.
ABOUT A METHOD OF SOLUTION OF THE INVERSE SCATTERING PROBLEM
R. S. Egikyan and E. P. Zhidkov 1985 9 p In RUSSIAN
(DE86-701306; JINR-5-85-366) Avail: NTIS (US Sales Only) HC A02/MF A01

The problem of restoring potential in a Schroedinger equation based on scattering data is considered. In the case of zero orbital momentum, explicit formulae representing potential and wave function through scattering data are proved. The procedure, reducing the general case already considered, is described. DOE

N86-29594# Universidade Federal de Paraiba (Brazil). Dept. de Fisica.
S-EQUIVALENT LAGRANGIANS IN GENERALIZED MECHANICS
L. J. Negri and E. G. daSilva 1985 40 p
(DE86-701307; UFPB-DF-02/85) Avail: NTIS (US Sales Only) HC A03/MF A01

The problem of s-equivalent Lagrangians is considered in the realm of generalized mechanics. Some results corresponding to the ordinary (non-generalized) mechanics are extended to the generalized case. A theorem for the reduction of the higher order Lagrangian description to the usual order is found to be useful for the analysis of generalized mechanical systems and leads to a new class of equivalence between Lagrangian functions. Some new perspectives are pointed out. DOE

N86-29595# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
SYMBOLIC INTEGRATION OF OVERDETERMINED SYSTEMS OF PARTIAL DIFFERENTIAL EQUATIONS (APPLICATION TO THE COMPUTATION OF INFINITESIMAL SYMMETRIES OF NONLINEAR DIFFUSION EQUATIONS)
Paul H. M. Kersten and Peter K. H. Gragert Jul. 1984 123 p
(Memo-430; ESA-86-97360) Avail: NTIS HC A06/MF A01

LISP software was developed for the integration of overdetermined systems of partial differential equations. Application to the computation of the complete Lie algebras of infinitesimal symmetries of nonlinear diffusion equations is illustrated. ESA

N86-29596# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
CRITICAL SETS IN PARAMETRIC OPTIMIZATION
H. Th. Jongen, P. Jonker, and F. Twilt Jul. 1984 26 p
(Memo-433; ESA-86-97361) Avail: NTIS HC A03/MF A01

Finite dimensional optimization problems depending on one parameter are considered. The constraints are of equality and inequality type. Under generic regularity conditions, the local structure of the set of (generalized) critical points is classified. The change of linear and quadratic indices is studied. The subset of critical points of Kuhn-Tucker type is discussed. ESA

N86-29597# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
EXISTENCE OF SPANNING AND DOMINATING TRAILS AND CIRCUITS
H. J. Veldman Jun. 1984 16 p
(Memo-440; ESA-86-97363) Avail: NTIS HC A02/MF A01

For T, a trail of a graph G, T is a spanning trail (S-trail) if T contains all vertices of G; T is a dominating trail (D-trail) if every edge of G is incident with at least one vertex of T. A circuit is a nontrivial closed trail. Sufficient conditions involving lower bounds on the degree-sum of vertices or edges are derived for graphs to have an S-trail, S-circuit, D-trail, or D-circuit. A result of Brualdi and Shanny (1981) on Hamiltonian line graphs and one by Lesniak-Foster and Williamson (1977) on spanning and dominating circuits are improved. ESA

N86-29598# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
PACKINGS OF DIGRAPHS
A. Benhocine, H. J. Veldman, and A. P. Wojda May 1984 13 p
(Memo-454; ESA-86-97366) Avail: NTIS HC A02/MF A01

For D and D', digraphs of order n, a packing of D and D' exists if there are arc-disjoint copies of D and D' with the same vertex set. Using a probabilistic argument, it is shown that a packing of D and D' exists if the product of the sizes of D and D' is $< n(n-1)$. As a consequence, a packing of D and D' exists if the sum of the sizes is at most 2n-2. A constructive proof of the latter result is presented, and the pairs D, D', for which the sum of the sizes equals 2n-1 while there is no packing of D and D',are characterized. ESA

N86-29599# Technische Hogeschool, Eindhoven (Netherlands).
SPECTRUM SHAPING WITH MARKOV CHAINS M.S. Thesis
P. H. N. deWith 1986 69 p Sponsored by Philips Research Laboratories, Eindhoven, Netherlands and Technische Hogeschool, Eindhoven, Netherlands
(NAT-LAB-5926; ESA-86-97392) Avail: NTIS HC A04/MF A01

Performance criteria for dc-free codes are considered. Maximum entropies of binary sequences subject to a particular spectral constraint are presented. It is shown that codes with nearly optimum rate can have considerable differences in dc content. In order to improve the code spectrum, sequences with a bound on the running digital sum (RDS) and on the sum of the RDS are introduced. It is shown that, besides a dc-free power spectrum, these sequences have a zero second derivative at zero frequency, resulting in a substantial decrease of dc content. ESA

N86-29600# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
STABILIZATION OF EXPLICIT METHODS FOR HYPERBOLIC INITIAL-VALUE PROBLEMS
F. W. Wubs Sep. 1985 15 p Submitted for publication Sponsored by Netherlands Foundation for Technical Research
(CWI-NM-R8521; B8660187; ESA-86-97509) Avail: NTIS HC A02/MF A01

A technique by which it is possible to stabilize explicit methods for quasi-linear hyperbolic equations is proposed. The stabilization turns out to be so effective that explicit methods become a good alternative to unconditionally stable implicit methods. ESA

N86-29601# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
THE NUMERICAL SOLUTION OF NONLINEAR VOLTERRA INTEGRAL EQUATIONS OF THE SECOND KIND BY COLLOCATION AND ITERATED COLLOCATION METHODS
J. G. Blom and H. Brunner (Fribourg Univ. (Switzerland).) Oct. 1985 31 p Submitted for publication
(CWI-NM-R8522; B8660186; ESA-86-97510) Avail: NTIS HC A03/MF A01

A variable-stepsize one-step collocation method for solving general nonlinear second kind Volterra integral equations is presented. The iterated collocation method corresponding to polynomial spline collocation is extended to nonlinear Volterra integral equations of the second kind. The resulting superconvergence properties of the collocation approximation or the iterated collocation approximation are used to obtain (local and global) error estimates which in turn form the basis of a variable stepsize

code. The performance of this code is illustrated by test problems. ESA

N86-29602# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
CONVERGENCE AND ORDER REDUCTION OF RUNGE-KUTTA SCHEMES APPLIED TO EVOLUTIONARY PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS
J. M. Sanz-Serna, J. G. Verwer, and W. H. Hundsdorfer Dec. 1985 15 p Submitted for publication
(CWI-NM-R8525; B8660184; ESA-86-97513) Avail: NTIS HC A02/MF A01

Convergence of fully discrete explicit Runge-Kutta approximations is discussed. It is proved that under certain conditions, the order in time of the fully discrete scheme equals the conventional order of the Runge-Kutta formula being used. However, these conditions, which are necessary for the result to hold, are not natural. As a result, in many problems the order in time is strictly smaller than the conventional one, a phenomenon called order reduction. Although results are valid for parabolic and hyperbolic problems, the examples are taken from the hyperbolic field, as there explicit discretizations are most appealing. ESA

N86-29603# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
UNIQUENESS AND NONEXISTANCE OF SOME GRAPHS RELATED TO M 22
A. E. Brouwer Jun. 1985 11 p Submitted for publication
(CWI-PM-R8503; B8660194; ESA-86-97514) Avail: NTIS HC A02/MF A01

The unique distance regular graph with intersection array (7, 6, 4, 4; 1, 1, 1, 6) is discussed. It has 330 vertices, and its automorphism group M sub 22.2 acts distance transitively. It does not have an antipodal 2-cover, but it has a unique antipodal 3-cover, and this latter graph has automorphism group 3.M sub 22.2 acting distance transitively. Uniqueness of the strongly regular graph with parameters (v, k, lambda, mu) = (231, 30, 9, 3) under the assumption that it is a gamma space with lines of size 3 is shown. ESA

N86-29604# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A GROUP THEORETIC INTERPRETATION OF WILSON POLYNOMIALS
T. H. Koornwinder Jun. 1985 23 p Presented at International Conference on Complex Analysis and Applications, Varna, Bulgaria, 5-11 May 1985 Submitted for publication
(CWI-PM-R8504; B8660193; ESA-86-97515) Avail: NTIS HC A02/MF A01

A group theoretic interpretation of Racah polynomials in connection with O(p)xO(r)-invariant spherical harmonics on S sup p+q+r-1, and by analytic continuation, a group theoretic interpretation of Wilson polynomials in connection with O(p)xO(q)xO(r)-invariant harmonics on the hyperboloid O(p+q,r)/O(p+q,r-1) are presented. Full proofs are not given. ESA

N86-29605# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
ON THE CHARACTERIZATION AND PARAMETER ESTIMATION OF MULTIPLE INPUT MULTIPLE OUTPUT (MIMO) SYSTEMS
Pieter Eykhoff Jul. 1984 23 p
(ER-84/03; ESA-86-97523) Avail: NTIS HC A02/MF A01

Model representations and estimation methods for multiple input multiple output (MIMO) systems are summarized. When extending the identification/estimation procedures from single to MIMO-processes, problems grow considerably. For model selection this is particularly due to the number of parameters needed for a model structure that leaves open all feasible (but probably nonexistent) interconnections, interactions, and noise-influences. This implies the desire to include as much a priori knowledge as possible in the selection of the model structure. For parameter estimation, it is desirable to choose the model as being linear-in-the-parameters, in order to attain simple (recursive) estimation algorithms. Unfortunately, this is not compatible with the requirements with respect to the restriction of the number of parameters. For example, a Markov parameter model has the linearity property, but it has a large (infinite) number of parameters. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

No abstracts in this category.

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-29606*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FAIRNESS OF CHANNEL ACCESS FOR NON-TIME-CRITICAL TRAFFIC USING THE FDDI TOKEN RING PROTOCOL
Marjory J. Johnson Mar. 1986 14 p
(Contracts NAS2-11530; NCC2-387)
(NASA-TM-89389; RIACS-TR-86.9; NAS 1.15:89389) Avail: NTIS HC A02/MF A01 CSCL 12B

The Fiber Distributed Data Interface (FDDI) is an ANSI draft proposed standard for a 100 megabit per second fiber optic token ring. FDDI supports two types of traffic, synchronous and asynchronous. Synchronous traffic is time critical traffic; stations are assigned guaranteed bandwidth to support their synchronous needs. Asynchronous traffic is lower priority and is sent only if time permits. It is proved analytically that the FDDI access protocol provides all stations on the ring with equal access to the channel to transmit asynchronous frames, regardless of the relative sizes of synchronous bandwidth allocations for individual stations. Analytic results are supported with data from simulation runs. Author

N86-29607# Yale Univ., New Haven, Conn. Dept. of Computer Science.
A PROJECTION METHOD FOR PARTIAL POLE ASSIGNMENT IN LINEAR STATE FEEDBACK
Youcef Saad Jan. 1986 17 p
(Contracts N00014-82-K-0184; DAAG29-83-C-0177; DE-AC02-81ER-0996)
(AD-A165997; YALEU/DCS/RR-449) Avail: NTIS HC A02/MF A01 CSCL 12/2

A projection method is proposed for the partial pole placement in continuous time linear control systems. The procedure is of interest in the common situation where the system is very large and only a few of its poles must be assigned. It is based on computing an orthonormal basis of the left invariant subspace associated with the eigenvalues to be assigned and then solving a small inverse eigenvalue problem resulting from projecting the initial problem into that subspace. Also presented is an equivalent version of this method, which can be regarded as a variant of the Wielandt deflation techniques used in eigenvalue methods. Author (GRA)

N86-29608# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction des Etudes de Synthese.
APPLICATION OF THE SADDLE POINT LOCATION METHOD USED FOR DIFFERENTIAL GAMES TO THREE-DIMENSIONAL PURSUIT-EVASION Final Report [APPLICATION DE LA METHODE D'ENCADREMENT DU POINT-SELLE D'UN JEU DIFFERENTIAL A UN PROBLEME TRIDIMENSIONNEL DE POURSUITE-EVASION]
Nguyen Van Nhan 12 Aug. 1985 61 p In FRENCH

(ONERA-RT-4/3534-SN; ESA-86-97200) Avail: NTIS HC A04/MF A01

The location of the saddle point is carried out by closed loop strategy approximations. The three dimensional interception of a maneuvering aircraft is simulated in a differential pursuit-evasion game using dynamic models with realistic constraints. The saddle point limits are determined by the Marchal method. The evaluation of the degree of optimization achieved and the ways to improve that optimization are discussed. It is shown that the given method permits avoiding the difficult identification of the saddle point, giving a pair of strategies where the degree of optimization can be estimated. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-29609*# Lehigh Univ., Bethlehem, Pa.
ON THE SOLUTION OF INTEGRAL EQUATIONS WITH A GENERALIZED CAUCHY KERNAL
A. C. Kaya and F. Erdogan Hampton, Va. NASA Jun. 1986 23 p
(Grants NGR39-007-011; NSF MEA-84-14477)
(NASA-CR-178139; NAS 1.26:178139) Avail: NTIS HC A02/MF A01 CSCL 12A

A certain class of singular integral equations that may arise from the mixed boundary value problems in nonhonogeneous materials is considered. The distinguishing feature of these equations is that in addition to the Cauchy singularity, the kernels contain terms that are singular only at the end points. In the form of the singular integral equations adopted, the density function is a potential or a displacement and consequently the kernal has strong singularities of the form (t-x)(-2), x(n-2) (t+x)(n), (n is = or > 2, 0 < x, t . b). The complex function theory is used to determine the fundamental function of the problem for the general case and a simple numerical technique is described to solve the integral equation. Two examples from the theory of elasticity are then considered to show the application of the technique. Author

N86-29610*# Lehigh Univ., Bethlehem, Pa.
ON THE SOLUTION OF INTEGRAL EQUATIONS WITH STRONGLY SINGULAR KERNELS
A. C. Kaya and F. Erdogan Jun. 1986 26 p
(Grant NGR39-007-011)
(NASA-CR-178138; NAS 1.26:178138) Avail: NTIS HC A03/MF A01 CSCL 12A

Some useful formulas are developed to evaluate integrals having a singularity of the form (t-x) sup-m ,m greater than or equal 1. Interpreting the integrals with strong singularities in Hadamard sense, the results are used to obtain approximate solutions of singular integral equations. A mixed boundary value problem from the theory of elasticity is considered as an example. Particularly for integral equations where the kernel contains, in addition to the dominant term (t-x) sup -m , terms which become unbounded at the end points, the present technique appears to be extremely effective to obtain rapidly converging numerical results. Author

N86-29611# Georgia Inst. of Tech., Atlanta. Production and Distribution Research Center.
NECESSARY AND SUFFICIENT CONDITIONS FOR THE EXISTENCE OF COMPLEMENTARY SOLUTIONS AND CHARACTERIZATIONS OF THE MATRIX CLASSES Q AND QO
Faiz A. Al-Khayyal Nov. 1985 17 p
(Contract N00014-83-K-0147)
(AD-A165936; PDRC-85-05) Avail: NTIS HC A02/MF A01 CSCL 12/1

The linear complementarity problem has a solution if and only if there exists a right-hand-side vector of an associated dual linear program such that at least one LP solution falls inside a specific open set. This condition is used to given different characterizations of the matrix classes Q and Q sub O. Moreover, they are used to derive verifiable sufficient conditions for a subclass of Q. GRA

N86-29612# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
REDUCTION OF DISPERSION IN HYPERBOLIC DIFFERENCE SCHEMES BY ADAPTING THE SPACE DISCRETIZATION
P. J. vanderHouwen and B. P. Sommeijer Sep. 1985 15 p Submitted for publication
(CWI-NM-R8519; B8660189; ESA-86-97507) Avail: NTIS HC A02/MF A01

A fourth-order accurate difference scheme for systems of hyperbolic equations is presented. The dispersion in this scheme can be reduced if it is known in advance in which region the frequencies of the dominant Fourier components are located. All method parameters are explicitly expressed in terms of the bounds on the dominating frequencies. The performance of the method is illustrated by application to shallow water equations. ESA

N86-29613# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
THREE LECTURES ON FORMAL GROUPS
Michiel Hazewinkel Jul. 1985 23 p Presented at Canadian Mathematical Society Summer School in Lie Algebra and Related Topics, Windsor, Canada, Jul. 1984
(CWI-PM-R8505; B8660192; ESA-86-97516) Avail: NTIS HC A02/MF A01

Bialgebras; Lie algebra of a formal group; commutativity theorem; logarithms; universal formal groups; a universal p-typical formal group and a formal group universal over Z(p)-algebras; construction of a universal formal group; application to algebraic topology; Atkin-Swinnerton Dyer congruences for elliptic curves; Witt vectors; curves (Frobenius and Verschiebung); Cart(A); Cartier-Dieudonne classification theory; p-typification; universality of the formal group of the Witt vectors; U(W); and noncommutative formal group theory are discussed. ESA

N86-29614# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
A GROUP THEORETIC INTERPRETATION OF THE LAST PART OF DE BRANGES' PROOF OF THE BIEBERBACH CONJECTURE
T. H. Koornwinder Aug. 1985 12 p Submitted for publication
(CWI-PM-R8506; B8660183; ESA-86-97517) Avail: NTIS HC A02/MF A01

A more conceptual and less computational proof for the last part of de Branges' (1985) proof of the Bieberbach conjecture, i.e., where the special functions enter and the Askey-Gasper inequality is applied is given. General solutions of de Branges' system of differential equations are brought in 1-1 correspondence with Fourier-sine series and with spherical function expansions on the sphere S(3). Restriction of spherical functions of S(5) to S(3) and positive definiteness complete the proof. ESA

N86-29615# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Pure Mathematics.
PARAMETERIZATION PROBLEMS FOR SPACES OF LINEAR INPUT-OUTPUT SYSTEMS
Michiel Hazewinkel Sep. 1985 11 p Submitted for publication
(CWI-PM-R8507; B8660191; ESA-86-97518) Avail: NTIS HC A02/MF A01

The problem of finding good parameterizations of sets of possible models, mainly finite dimensional dynamic input-output models is discussed. The general problem is addressed in the case where it is impossible to find one global parameterization. ESA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-29616# Sandia National Labs., Albuquerque, N. Mex.
SANDIA TECHNOLOGY. VOLUME 9, NO. 4

P. L. Mead, ed. Dec. 1985 35 p
(Contract DE-AC04-76DP-00789)
(DE86-C03430; SAND-85-0799) Avail: NTIS HC A03/MF A01

This issue includes articles on ion-beam focusing in the Particle Beam Fusion Accelerator; embedded atom theory of metals; new experiments on convective heat loss; and an experiment establishing that molten nitrate salt is an efficient working fluid for generating electric power in a solar-thermal central-receiver system. DOE

N86-29617# California Univ., Berkeley. Lawrence Berkeley Lab.
REC AND NdFe MAGNETIC MOMENT IRREVERSIBILITY FROM TEMPERATURE CYCLING
E. Hoyer, J. W. G. Chin, and D. Shuman Oct. 1985 9 p Presented at the International Conference on Insertion Devices, Stanford, Calif., 28 Oct. 1985
(Contract DE-AC03-76SF-00098)
(DE86-007503; LBL-20386; CONF-8510186-10) Avail: NTIS HC A02/MF A01

Presented are the results of thermal cycling tests carried out on rare earth compounds (REC) and NdFe samples, to determine the irreversible losses in room temperature open circuit magnetic moment. A stabilization prescription was developed for a REC alloy that will allow two 4 day/175C temperature cycles, which simulate two UHV bakeouts, with only a 0.35% average loss and a 0.65% loss variation in the room temperature open circuit magnetic moment after stabilization. DOE

N86-29618# Lawrence Livermore National Lab., Calif.
PROGRESS IN DIAMOND CELL EXPERIMENTS: PRESSURED ABOVE THREE MEGABARS
K. A. Goettel, R. Reichlin, W. C. Moss, and S. Martin 23 Jan. 1986 4 p Presented at the Lunar and Planetary Science Conference, Houston, Tex., 17 Mar. 1986 Prepared in cooperation with Brown Univ., Providence, R.I.
(Contract C-W-7405-eng-48)
(DE86-006726; UCRL-93975; CONF-860375-1) Avail: NTIS HC A02/MF A01

Diamond cell experiments at pressures above 2 megabars have many important applications with respect to planetary interiors (e.g., metallization of hydrogen). To make possible acquisition of data at extreme pressures on materials of planetary interest, we have been exploring both numerically and experimentally several aspects of diamond cell design and methodology. We have conducted detailed finite element analyses of the diamond cell to explore how bevelled anvils and material properties of the gasket affect diamond cell performance. These calculations include nonlinear equations of state, gasket plasticity, and diamond-gasket interfacial friction. Gasket plasticity has a dramatic effect on the stress field and thus must be included in any physically realistic analysis of the diamond cell. Purely elastic calculations, therefore, cannot model adequately the behavior of a diamond cell. Gasket yield strengh is very important in facilitating generation of extreme pressures in a diamond cell. Increasing gasket yield strength allows a higher radial pressure gradient to be supported at a given gasket thickness, which means that failure of an experiment by deformation of the anvils to allow anvil-anvil contact occurs at higher pressures than would occur with a lower yield strength gasket. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-29619# Aeronautical Research Inst. of Sweden, Bromma.
PROCEEDINGS OF THE IEA WORKSHOP ON WIND TURBINE NOISE MEASUREMENTS
1984 187 p refs Partly in ENGLISH and DANISH Workshop held in Stockholm, Sweden, 12-13 Nov. 1984
(FFAP-110; ESA-85-95402) Avail: NTIS HC A09/MF A01

Measurement of background noise around wind turbines; masking of wind turbine noise by wind noise; acoustic source power levels of wind turbines; wind turbine noise; and tower wake effects on wind turbine noise were discussed. For individual titles, see N86-29620 through N86-29626.

N86-29620# Central Electricity Generating Board, Bristol (England). Scientific Services Dept.
MEASUREMENT METHODS USED TO DETERMINE BACKGROUND NOISE AND WIND TURBINE NOISE EMISSION AT CARMARTHEN BAY
Peter J. Narine *In* Aeronautical Research Inst. of Sweden Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 19 p (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

A system to measure background noise around a prototype 250 kW wind turbine was developed. Permanent microphones controlled by a microprocessor (PANDORA system) provide automatic data samples to characterize background noise and noise emissions, which exhibit high variability. The system consists of 4 microphones 50 m from the turbine (2 sonic and 2 infrasonic) and a single microphone (sonic) adjacent to residences 600 m from the turbine. Noise data are obtained at intermediate distances using portable equipment. Results establish the relationship between background noise (wind noise floor) versus wind speed. Noise emission characteristics from mechanical and aerodynamic sources are described in dB(A), 1/3 octave band, and discrete frequency terms. The PANDORA system was employed to determine the variation of background noise levels inside residences with wind speed and direction. ESA

N86-29621# IFM Akustibyran A.B., Stockholm (Sweden).
MASKING OF WIND TURBINE NOISE BY WIND NOISE
Ove Bennerhult *In* Aeronautical Research Inst. of Sweden Proceedings of IEA Workshop on Wind Turbine Noise Measurements 1984 10 p (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

Wind noise produced in tree and building measurements was measured in two areas to judge to what extent noise from wind turbines is masked by wind noise. The first place corresponds to a rural area. Buildings are low and thinly scattered. The trees are principally high hardwood. The second place is a suburb with large gardens. The vegetation consists of hedges, bushes, fruit trees, and high hardwoods. The wind speed varies in the range of 3 to 10 m/sec at a height of 7 m. It is not possible to draw conclusions about the shape of the frequency spectrum of the external wind noise in the low frequency region, below 250 Hz. For higher frequencies 1/3 octave band spectra are reliable and are almost independent of frequency; a slight decrease with frequency of 1 dB/octave can be observed in the frequency range of 250 to 4000 Hz. ESA

N86-29622# Technische Physische Dienst TNO-TH, Delft (Netherlands). Inst. of Applied Physics.
DETERMINATION OF THE ACOUSTIC SOURCE POWER LEVELS OF WIND TURBINES
Alex deBruijn, W. J. Stam (Netherlands Energy Research Foundation, Petten.), and W. B. deWolf (National Aerospace Lab., Emmeloord, Netherlands) *In* Aeronautical Research Inst. of Sweden Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 11 p (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

To facilitate Wind Energy Conversin System (WECS) licensing, it is recommended to obtain the immission-relevant sound power from the WECS, since this quantity fits into most recommendations for industrial installations. Measurements on small and medium-scale WECS show that rotor rotation speed is a more important parameter than the wind velocity with regard to the radiated noise. An acoustic telescope was used to identify noise sources on two medium-size wind turbines. The mechanical

noise from the nacelle is mostly predominant but the trailing edge aerodynamic noise is not negligible. A prediction model for this type of noise, which leads to good agreement with experimental data was developed. A method to suppress turbulence signals around WECS is a set-up with twin microphones, using correlation techniques on both signals. ESA

N86-29623# Gesamthochschule, Kassel (West Germany).
NOISE MEASUREMENTS AT THE WIND ENERGY CONVERTER (WEC) GROWIAN
B. Hoffman and F. Koerber (Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).) *In* Aeronautical Research Inst. of Sweden Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 16 p (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

The A-weighted sound level around the GROWIAN wind turbine was measured at standstill, no load operation, and rated power conditions. The equivalent continuous noise level and percentages levels near GROWIAN were taken over several hours at standstill and rated power. The 1/3 octave band data clarify primary sound sources. Comparison of standstill and rated power data show that sound caused by the gear and the blades is of the same intensity. Gear noise dominates, however, because of its audible tone components. Atmospheric parameters, and generator output and speed were measured. Radiated sound level data were obtained, in spite of atypical wind velocity and direction. ESA

N86-29624# Danish Boiler Owners Association, Soeborg.
NOISE MEASUREMENTS AROUND THE NIBE (DENMARK) WIND TURBINES AND THE WINDANE 31 WIND TURBINE
Joergen Kristensen *In* Aeronautical Research Inst. of Sweden Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 28 p In ENGLISH and DANISH (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

Noise around the two 640 kW wind turbines, and a 300 kW wind turbine at various distances and wind velocities was measured. The results are stated partly as the energy equivalent, A-weighted sound pressure level as a function of the wind velocity, partly as frequency analyses based on tape recordings of the A-weighted sound pressure level. A subjective evaluation of the noise emission from the wind turbines is given. ESA

N86-29625# IFM Akustibyran A.B., Stockholm (Sweden).
MEASUREMENTS OF NOISE EMISSION AROUND SWEDISH TURBINES
Tommy Zetterling *In* Aeronautical Research Inst. of Sweden Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 22 p (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

Noise around two wind turbine prototypes and around buildings 2 km from the machines was measured. Results show that equipment for the low frequency range has an unsatisfactory high noise level for this type of measurement, since it is designed to measure sonic booms with pressure levels far from 100 dB. However, no other system for the frequency range below 2 to 3 Hz was found. It can be questioned if it is necessary to perform measurements below 2 Hz to judge acoustic quality. Measurements and analyses in the frequency range above 2 Hz were carried out without problems. ESA

N86-29626# Aeronautical Research Inst. of Sweden, Bromma.
MEASUREMENT OF THE TOWER WAKE OF THE SWEDISH PROTOTYPE WIND ENERGY CONVERSION SYSTEM (WECS) MAGLARP (SWEDEN) AND CALCULATIONS OF ITS EFFECT ON NOISE AND BLADE LOADING
Kenneth Barman, Jan-Aake Dahlberg, and Staffan Meijer *In its* Proceedings of the IEA Workshop on Wind Turbine Noise Measurements 1984 9 p Presented at European Wind Energy Conference, Hamburg, West Germany, Oct. 1984 (For primary document see N86-29619 20-71)
Avail: NTIS HC A09/MF A01

Hot-wire measurements of the velocity deficit in the wake behind the tower of a wind turbine are presented. The measurements were performed at one height and at three distances from the tower center when the turbine was not running. The low frequency noise caused by the passage of a turbine blade through the wake of the tower is calculated using wake data from the measurements. A comparision with noise emission measurements is included. The variation in blade loading and turbine power output caused by the wake are also calculated. Results show that wake deficits can be of the same order of magnitude as the freestream velocity. ESA

N86-29627# Shock and Vibration Information Center (Defense), Washington, D. C.
THE SHOCK AND VIBRATION DIGEST, VOLUME 17, NO. 12 Monthly Report
Judith Nagle-Eshleman, ed. Dec. 1985 193 p
(AD-A164990) Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/1

Topics addressed include: acoustic emissions from wire and synthetic ropes; turbulent flow noise mechanisms; book reviews; and abstracts from current literature. For individual titles, see N86-29628 through N86-29629.

N86-29628# Institute of Applied Mechanics, Puerto Belgrano Naval Base (Argentina).
ACOUSTIC EMISSIONS FROM WIRE AND SYNTHETIC ROPES
P. A. A. Laura *In* Shock and Vibration Information Center (Defense) The Shock and Vibration Digest, Volume 17, No. 12, Dec. 1985 p3-6 (For primary document see N86-29627 20-71)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/1

The rupture of mechanical cables used in towing operations, remote control of equipment, and salvage operations can result in loss of both life and equipment. Accordingly, reliable and simple methods to assess the structural integrity of mechanical cables are of utmost importance. Applications of the acoustic emission method is reviewed from the point of view of the nondestructive evaluation of wire and synthetic ropes and monitoring their mechanical status while in operation. Author

N86-29629# Minnesota Univ., Minneapolis. Hydraulic Lab.
RECENT RESEARCH ON TURBULENT FLOW NOISE MECHANISMS
D. F. Long and R. E. A. Arndt *In* Shock and Vibration Information Center(Defense), The Shock and Vibration Digest, Volume 17, No.1 2, Dec. 1985 p 7-15 (For primary document see N86-29627 20-71)
Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375 CSCL 20/1

The pressure field generated by large-scale coherent motions in turbulent flows is examined. A general decompostion is discussed that evaluates the magnitude of the coherence in an unbiased way. The tool is described in terms of two flows of current interest, jets and boundary layers. Author

N86-29630*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MODELING THE EFFECTS OF WIND TUNNEL WALL ABSORPTION ON THE ACOUSTIC RADIATION CHARACTERISTICS OF PROPELLERS
Kenneth J. Baumeister and Walter Eversman (Missouri Univ., Rolla.) Jul. 1986 21 p Presented at the 10th Aeroacustics Conference, Seattle, Wash., 9-11 Jul. 1986; sponsored by AIAA
(NASA-TM-87333; E-2812; NAS 1.15:87333; AIAA-86-1876) Avail: NTIS HC A02/MF A01 CSCL 20A

Finite element theory is used to calculate the acoustic field of a propeller in a soft walled circular wind tunnel and to compare the radiation patterns to the same propeller in free space. Parametric solutions are present for a 'Gutin' propeller for a variety of flow Mach numbers, admittance values at the wall, microphone position locations, and propeller to duct radius ratios. Wind tunnel boundary layer is not included in this analysis. For wall admittance

nearly equal to the characteristic value of free space, the free field and ducted propeller models agree in pressure level and directionality. In addition, the need for experimentally mapping the acoustic field is discussed. Author

N86-29631*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN OUTFLOW ACOUSTIC BOUNDARY CONDITION FOR INTERNAL DUCT FLOWS
Marianne Mosher Feb. 1986 24 p
(NASA-TM-86708; Rept-86105; NAS 1.15:86708) Avail: NTIS HC A02/MF A01 CSCL 20A

A boundary condition for the linear acoustic equation has been developed that allows the acoustic pressure waves to propagate out of the computational domain boundary, just as they would propagate in an infinitely long duct. The problem is divided into two domains: numerical and analytical. The boundary condition provides a matching of the two domains. Examples show this method works well in an acoustic panel program for a model problem (simple source in a rectangular duct with several propagating modes present). The boundary condition is described so that it can be used with various duct various duct geometries and numerical methods. Author

N86-29632*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERACTION OF AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY PLATES. VOLUME 2: EXPERIMENTAL STUDY
Michael C. McGary Jul. 1986 36 p
(NASA-TM-87747; NAS 1.15:87747) Avail: NTIS HC A03/MF A01 CSCL 20A

The interaction of airborne and structureborne noise radiated by aircaraft materials was studied. The results corroborate the findings of an earlier analytical study by showing that the noise radiation of vibrating plates due to combined airborne and structureborne inputs possesses a stong synergistic nature. The large influence of the interaction between the airborne and structureborne inputs was hitherto ignored by researchers of aircraft interior noise problems. Author

N86-29633*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERACTION OF AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY PLATES. VOLUME 1: ANALYTICAL STUDY
Michael C. McGary Jul. 1986 61 p
(NASA-TM-87746; NAS 1.15:87746) Avail: NTIS HC A04/MF A01 CSCL 20A

The interaction of airborne and structureborne noise radiated by aircraft materials was examined. The theory and results of several computer simulations of the noise radiated by thin, isotropic, rectangular aluminum plates due to fully coherent combined acoustic and vibrational inputs is presented. The most significant finding was the extremely large influence that the relative phase between inputs has on the combined noise radiation of the plates. Phase dependent effects manifest themselves as cross terms in both the dynamic and acoustic portions of the analysis. Computer simulations show that these cross terms can radically alter the combined sound power radiated by plates constructed of aircraft-type materials. The results suggest that airborne-structureborne interactive effects could be responsible for a significant portion of the overall noise radiated by aircraft-type structures in the low frequency regime. This implies that previous analytical and experimental studies may have neglected an important physical phenomenon in the analayses of the interior noise of propeller dirven aircraft. Author

N86-29634# Delaware Univ., Newark. College of Marine Studies.
STUDY OF THE EFFECT OF FLOCS ON ACOUSTIC SCATTERING AND TRANSMISSION IN SEAWATER Final Report
Ronald J. Gibbs 14 Feb. 1986 10 p
(Contract N00014-83-K-2019)
(AD-A165894) Avail: NTIS HC A02/MF A01 CSCL 20/1

In the ocean the primary particle size of the sediments in the water column and on the bottom is 1 to 2 micrometer in diameter. However, in the high salt concentration of the ocean these primary particles are attracted to each other to form flocs. The effect of these flocs on the scattering and transmission of sound in the ocean is unknown. This paper presents laboratory measurements of scattering of ultrasound from flocs at various stages of formation. These data are used to estimate the effect these flocs have on sound transmission and scattering, and to evaluate the possibility of using sound to study flocs in the oceans. GRA

N86-29635# Lawrence Livermore National Lab., Calif.
FAST ULTRASONIC IMAGING IN A LIQUID FILLED PIPE
W. F. Kolbe, B. T. Turko, and B. Leskovar Oct. 1985 11 p
Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985
(Contract DE-AC03-76SF-00098)
(DE86-004100; LBL-19207; CONF-851009-33) Avail: NTIS HC A02/MF A01

A new method is described for the imaging of the interior of a liquid filled metallic pipe using acoustical techniques. The experimental system incorporates an array of 20 acoustical transducers and is capable of capturing the images of moving bubbles at a frame rate in excess of 300/s. The transducers are mounted circumferentially around the pipe. Each transducer is pulsed in sequence, and the echoes reflected from vapor bubbles in the interior are detected, digitized and processed by a computer to generate an image. The high rate of speed was achieved by the use of newly developed software and electronic circuitry. This approach has eliminated most of the spurious echo signals which degraded the performance of previous imaging systems. The capability of the method is illustrated by imaging actual vapor bubbles in rapid sequence in the pipe. DOE

N86-29636# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
A STUDY ON THE TRANSMISSION OF SOUND THROUGH FLOW DUCTS OF VARYING CROSS SECTION
S. W. Rienstra 15 Oct. 1983 50 p
(Contract NIVR-311.4-1946)
(NLR-TR-83128-U; B8660348; ESA-86-97503) Avail: NTIS HC A03/MF A01

Sound propagation through axially varying ducts with mean flow is studied. Analytical theories for low and high frequencies are derived. A computer program for Nayfeh's (1980) wave envelope approach was tested to see if bottlenecks could be identified, what parameter range is attainable, and to what extent the classical uniform duct model produces satisfactory results. Although in principle amenable to high frequencies and circumferential periodicities, the method has parts of purely numerical nature, which do not allow a too detailed field; for sound propagating into a contraction (the usual case in a turbo engine intake) the prediction of the uniform duct model seems to be always conservative. A spectacular increase of the reflected wave is found for a combination of high Mach number and thin boundary layer in the contraction. ESA

N86-29337# Southwest Research Inst., San Antonio, Tex.
PROGRAM FOR FIELD VALIDATION OF THE SYNTHETIC APERTURE FOCUSING TECHNIQUE FOR ULTRASONIC TESTING (SAFT UT) Final Report
D. R. Hamlin Nov. 1985 170 p
(Contract NRC-FIN-B5605; SwRI Proj. 17-5023)
(TI86-900627; NUREG/CR-4078) Avail: NTIS HC A08/MF A01

This final report describes work performed by Southwest Research Institute for the Nuclear Regulatory Commission (NRC) in fulfillment of NRC Contract No. NRC-04-77-145; 'Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT UT).' The purpose was to validate the effectiveness of SAFT UT as a nondestructive examination technique for nuclear power and other related industries. SAFT UT is an ultrasonic imaging method for accurate measurement of the spatial location and extent of acoustically reflective surfaces

(flaws) contained in objects such as structural components and weldments in nuclear power reactor systems. The increased measurement accuracy offered by SAFT, when compared with that provided by measurement methods now in use, will improve the reliability of flaw severity assessment with resultant safety and economic benefits to the nuclear power industry. This report presents a comprehensive discussion of the work accomplished in evaluating the performance capabilities of the developed SAFT UT inspection system. Inspection results obtained using both 0-degree longitudinal and angle-beam operating modes are presented. These results include laboratory and nuclear power plant field site examinations on a variety of defect types contained within carbon and stainless steel flat plate and cylindrical test specimens or components. The SAFT UT processed data flaw images are evaluated by comparing them to results obtained from destructive sectioning or by using flaw fabrication data which predicted actual flaw depth, orientation and size. On the basis of these evaluations conclusions are presented which summarize the performance capabilities of the SAFT UT inspection technique. Author

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-29638# Texas Univ., Austin. Dept. of Physics.
NUCLEAR STRUCTURE STUDIES USING THE HIGH RESOLUTION SPECTROMETER AT THE LOS ALAMOS CLINTON P. ANDERSON MESON PHYSICS FACILITY Progress Report
Dec. 1985 162 p
(Contract DE-AS05-80ER-10638)
(DE86-004997; DOE/ER-10638/6) Avail. NTIS HC A08/MF A01

Research which was done using the High Resolution Spectrometer (HRS) at the Los Alamos Clinton P. Anderson Meson Physics Facility (LAMPF) is examined. This research focuses on: (1) providing p + nucleus scattering data which test nonrelativistic and relativistic models of the medium energy proton + nucleus interaction, (2) providing data which are to be analyzed to provide new nuclear structure information (both ground state and excited state), (3) providing proton + nucleon data to aid in the systematic study of the fundamental nucleon-nucleon interaction, and (4) developing and improving the pA models themselves. Other efforts involve work at the Brookhaven National Laboratory and are associated with experiments studying: (1) the formation and use of hypernuclei as a new tool for nuclear structure studies, and (2) strange dibaryon resonances. DOE

N86-29639# New York Univ., New York. Dept. of Physics.
ENERGY-RELATED ATOMIC AND MOLECULAR STRUCTURE AND SCATTERING STUDIES Annual Report, 1 Jun. 1985 - 31 May 1986
B. Bederson 1986 39 p
(Contract DE-AC02-78ER-04971)
(DE86-005802; DOE/ER-04971/7) Avail: NTIS HC A03/MF A01

This is the Annual Report for the period June 1, 1985 to May 31, 1986 for Energy-Related Atomic and Molecular Structure and Scattering Studies. During the past year efforts were concentrated on two specific experiments. These were: (1) an attempt to measure the polarizability of the optically pumped excited state of thallium 6s6p sup 2 P(sub 3/2), including its tensor components, and (2) a study of the differential scattering at small angles of electrons at low energies by several alkali halide molecules. In the thallium experiment some preliminary measurements have been performed, although these were temporarily discontinued in order to update the beams machine upon which this experiment is being performed. DOE

N86-29640# Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.
LOW TEMPERATURE AND NEUTRON PHYSICS STUDIES Progress Report, Jul. 1984 - Oct. 1985
Nov. 1985 6 p
(Contract DE-AC02-76ER-03342)
(DE86-005803; DOE/ER-03342/13; COO-3342-13; MIT-3342-13)
Avail: NTIS HC A02/MF A01

Experiments were carried out during the past year in which the magnetic neutrality of the neutron was explored, leading to a new upper limit value for the magnetic monopole charge of 1.3(+ or - 3.0) times 10 to the -20 power Dirac charge units. The increased sensitivity of the present experiment resulted from the exploitation of the anomalous small effective mass of neutrons in a diffracting crystal. Transverse deflections of the neutron trajectory under the action of a homogeneous magnetic field were studied in the experiment. Theoretical analysis of a new Pendelloesung-Larmor resonance action in crystal has been carried out and this suggests that pronounced intensity effects can be expected in experiments. This should lead to more sensitive studies of neutron spin-orbit scattering in crystals. Further theoretical study has been to questions of the measurement process in quantum systems and a relativistic paradox with a neutron interferometer has been examined. DOE

N86-29641# Kansas Univ., Lawrence. Dept. of Chemistry.
MANY-BODY PROCESSES IN ATOMIC AND MOLECULAR PHYSICS Progress Report, 1 Sep. 1984 - 31 Aug. 1986
S. I. Chu Feb. 1986 58 p
(Contract DE-AC02-80ER-10748)
(DE86-007032; DOE/ER-10748/6) Avail: NTIS HC A04/MF A01

Brief overviews of the research efforts of the author are given. The areas of research which are reviewed are: (1) the development of complex-coordinate coupled-channel formalisms for the treatment of energy and widths of multichannel predissociating resonances in van der Waals molecules; (2) a L(2)-complex-coordinate quasi-energy method for the treatment of photoionization of H atoms in intense magnetic fields; (3) a perturbative approach for the treatment of two-photon dissociation of heteronuclear diatomic molecules; (4) a semiclassical treatment of charge transfer reactions at low collision velocities and high beam intensities; and (5) the development of calculation technique using the L(2)-nonhermetian Floquet method. DOE

N86-29642# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Technologische Unternehmensplanung.
A SEPARABLE APPROXIMATION OF THE NN-PARIS-POTENTIAL IN THE FRAMEWORK OF THE BETHE-SALPETER EQUATION
K. Schwarz (Technische Univ., Graz, Austria), J. Haidenbauer (Osaka Univ., Suita, Japan), and J. Froelich Sep. 1985 37 p
Sponsored by Fonds zur Foerderung der wissenschaftlichen Forschung
(OEFZS-4331; NT-5/85; ESA-86-97068) Avail: NTIS HC A03/MF A01

The Bethe-Salpeter equation is solved with a separable kernel for the most important nucleon-nucleon partial wave states. The Ernst Shakin-Thaler method is used in the framework of minimal relativity (Blankenbeckler-Sugar equation) to generate a separable representation of the meson-theoretical Paris potential. These separable interactions, which closely approximate the on-shell and half-off-shell behavior of the Paris potential, are cast in a covariant form for application in the Bethe-Salpeter equation. The role of relativistic effects is discussed with respect to on-shell and off-shell properties of the NN-system. ESA

N86-29643# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
PARTICLE INTERACTIONS WITH ALFVEN SOLUTIONS
C. R. Ovendon, H. A. Shah, and S. J. Schwartz Dec. 1985 20 p
Sponsored by ICTP, Trieste
(IFSI-85-15; ESA-86-97099) Avail: NTIS HC A02/MF A01

Velocity and the corresponding energy changes due to nonresonant interactions of protons with Alfven solitons are computed. It is seen that the protons heat in the perpendicular direction but associated with this is a cooling in the parallel direction. ESA

N86-29644# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
PHOTODISSOCIATION OF THE H2O IN THE FIRST ABSORPTION BANDS. DEPENDENCE OF THE OH STATE DISTRIBUTION ON THE ROTATIONAL STATE OF THE H2O MOLECULE Thesis [PHOTODISSOZIATION VON H2O IN DER ERSTEN ABSORPTIONSBANDE ABHAENGIGKEIT DER OH-ZUSTANDSVERTEILUNG VOM ROTATIONSZUSTAND DES H2O-MOLEKUELS]
D. Haeusler Nov. 1985 127 p In GERMAN
(MPIS-25/1985; ISSN-0436-1199; ESA-86-96905) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

The dissociation of single rotational states of the asymmetric yield oscillation of water after optical excitation in the first absorption bands was investigated. The H2O state was prepared with a tuneable UV-laser. The specific states of the OH fragments were determined. The fragmentation strongly depends on the rotational state of the H2O-mother molecule. The experimental results were reproduced by a Franck-Condon theory; good agreement is found in the rotational and fine-structure distributions. The theoretical model shows that the fragmentation of single H2O-rotational states is independent of repulsive potential plane and photon energy. The application of this model to previous dissociation experiments demonstrates that the dissociation process can be analyzed with the Franck-Condon theory. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N86-29645# Oak Ridge National Lab., Tenn.
HIGH ENERGY TRANSPORT CODE HETC
T. A. Gabriel Sep. 1985 24 p Presented at the LEP Experimenters' Workshop on Shower Simulation, Geneva, Switzerland, 29 Jan. 1985
(Contract DE-AC05-84OR-21400)
(DE86-001366; ORNL/TM-9727; CONF-850140-2-Rev) Avail: NTIS HC A02/MF A01

The physics contained in the High Energy Transport Code (HETC), in particular the collision models, are discussed. An application using HETC as part of the CALOR code system is also given. DOE

N86-29646# Sandia National Labs., Albuquerque, N. Mex.
CURRENT NEUTRALIZATION OF INTENSE LIGHT ION BEAMS IN ARGON GAS
J. A. Swegle and S. A. Slutz Dec. 1985 93 p
(Contract DE-AC04-76DP-00789)
(DE86-004853; SAND-85-1886) Avail: NTIS HC A05/MF A01

This paper describes a theoretical treatment for the current neutralization of intense ion beams propagating radially inward through the drift region of a cylindrical Applied-B diode. The drift region is bounded by conducting walls, and the beams are taken to have a current density profile that is constant across the surface transverse to the direction of propagation. The current neutralization calculation involves breaking the return current density into spatial harmonics in the transverse coordinate in such a way that the return current density vanishes at the walls. Each spatial harmonic is then shown to approximately obey a magnetic decay equation with a time constant proportional to the electrical conductivity of the gas. This conductivity is time dependent and is calculated locally from the degree of ionization and plasma heating created by the beam and the return current. Beams composed of protons and carbon ions are considered, and time of flight effects on the beam current and energy spectra are taken into account. The effects of drift region parameter variations on the time development of the conductivity and current neutralization are evaluated. DOE

N86-29647# Lawrence Livermore National Lab., Calif.
BEAM BREAKUP AND THE CONCEPTUAL DESIGN OF GUIDED AND UNGUIDED ACCELERATORS
G. J. Caporaso Oct. 1985 34 p
(Contract W-7405-eng-48)
(DE86-004907; UCID-20615) Avail: NTIS HC A03/MF A01

A series of drawings illustrate the beam breakup instability, laser guiding, quadrupole channels, phase mix damping, and a cavity model. Model equations are solved for a continuous beam breakup model. DOE

N86-29648# California Univ., Berkeley. Lawrence Berkeley Lab.
NEGATIVE ION BEAM ACCELERATION AND TRANSPORT EXPERIMENTS
W. S. Cooper, O. A. Anderson, J. Kwan, and W. F. Steele Nov. 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov., 1985
(Contract DE-AC03-76SF-00098)
(DE86-005234; LBL-19578; CONF-851102-67) Avail: NTIS HC A02/MF A01

The design of a negative ion beam transport system is discussed. The ion source and accelerator have produced a 1-A, 8 keV beam of H^- ions with a pulse length of 30 seconds. The beam was additionally characterized as to electron content, uniformity along the slot, emittance perpendicular to the slot, and the beam divergence. DOE

N86-29649# Chicago Univ., Ill. Dept. of Physics.
THEORETICAL HIGH ENERGY PHYSICS RESEARCH Technical Progress Report
J. L. Rosner 1985 17 p
(Contract DE-AC02-82ER-40073)
(DE86-005765; DOE/ER-40073/4) Avail: NTIS HC A02/MF A01

The research activities summarized include: neutral heavy leptons, unusual DESY and CERN events, exotic fermions in superstring models, magnetic monopoles, nonleptonic hyperon decays, heavy quark spectroscopy, supersymmetric quantum mechanics and inverse scattering. SU(3) breaking and the H dibaryon, P-wave mesons with one heavy quark, CP violation, magnetic moments of baryons, dynamical mass gene ration, lattice gauge theories that include fermions, modification of quantum mechanics to include a fundamental length, speculation concerning physics near the Planck scale, novel physics possibilities of hadron colliders, inclusive structure functions in e(+) e(-) colliders especially at the Z resonance, and global structure of supermanifolds. DOE

74 OPTICS

Includes light phenomena.

N86-29650*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MULTISPECTRAL LINEAR ARRAY MULTIBAND SELECTION DEVICE Patent
Herbert L. Richard Issued 8 Jul. 1986 8 p Filed 2 May 1984 Supersedes N84-25016 (22 - 15, p 2335)
(NASA-Case-GSC-12911-1; US-Patent-4,599,001;
US-Patent-Appl-SN-606426; US-Patent-Class-356-419;
US-Patent-Class-356-402; US-Patent-Class-350-315;
US-Patent-Class-350-318) Avail: US Patent and Trademark Office CSCL 20F

An apparatus for detecting multiple spectral bands, individually or concurrently, using linear detector arrays is described. The system employs a beamsplitter to divide the optical source into two or more optical beams which are directed at the linear detector arrays. Filter trays are positioned in the focal planes of the optical beams so that the beams pass through the filter trays prior to impinging upon the detector arrays. Multiple filters are placed on the filter trays. Linear actuators positioned adjacent the filter trays translate the trays across the focal planes of the optical beams

so that individual filters are positioned in the path of beams such that those frequencies of the beams that fall within the spectral ranges of the individual bandpass filter through which it passes may be detected by the detector arrays for further examination and analysis. Author

N86-29651*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
OPTIMAL COOPERATIVE CONTROL SYNTHESIS OF ACTIVE DISPLAYS Final Report
Sanjay Garg and David K. Schmidt 22 Oct. 1985 160 p
(Grant NAG2-228)
(NASA-177102; NAS 1.177102) Avail: NTIS HC A08/MF A01 CSCL 20F

A technique is developed that is intended to provide a systematic approach to synthesizing display augmentation for optimal manual control in complex, closed-loop tasks. A cooperative control synthesis technique, previously developed to design pilot-optimal control augmentation for the plant, is extended to incorporate the simultaneous design of performance enhancing displays. The technique utilizes an optimal control model of the man in the loop. It is applied to the design of a quickening control law for a display and a simple K/s(2) plant, and then to an F-15 type aircraft in a multi-channel task. Utilizing the closed loop modeling and analysis procedures, the results from the display design algorithm are evaluated and an analytical validation is performed. Experimental validation is recommended for future efforts. Author

N86-29652*# Stanford Univ., Calif. Computer Systems Lab.
RESEARCH IN HIGH SPEED FIBER OPTICS LOCAL AREA NETWORKS Technical Report, 1 Jan. 1985 - 28 Feb. 1986
Fouad A. Tobagi Feb. 1986 19 p
(Grants NAG2-292; NAGW-419)
(NASA-CR-176998; NAS 1.26:176998; CASIS-D300-1986-1) Avail: NTIS HC A02/MF A01 CSCL 17B

The design of high speed local area networks (HSLAN) for communication among distributed devices requires solving problems in three areas: the network medium and its topology, the medium access control, and the network interface. Considerable progress was already made in the first two areas. Accomplishments are divided into two groups according to their theoretical or experimental nature. A brief summary is given. Author

N86-29653# Spectron Development Labs., Inc., Albuquerque, N. Mex.
MASTER OSCILLATOR AND DIAGNOSTIC UNIT DESIGN Final Report, 7 May 1984 - 8 Jan. 1985
F. C. Way and D. F. Schaack Jan. 1986 72 p
(Contract F29601-84-C-0043)
(AD-A165626; Rept-85-2383-12; AFWL-TR-85-16) Avail: NTIS HC A04/MF A01 CSCL 20/6

This report describes the design and development of a Dye Laser operating at 353 nm and an associated beam diagnostics unit capable of measuring UV phase, intensity and energy. The dye laser consists of a flashlamp pumped oscillator, including spatial and temporal mode selectors and a wavelength tuning device. The output of the oscillator at 706 nm is amplified by a flashlamp pumped dye amplifier. The resulting output is frequency doubled to 353 nm via a second harmonic generator (SHG). A pulse slicer is incorporated prior to the SHG to allow pulsewidth selectivity. The diagnostic unit was designed and fabricated to be versatile and rugged. Near-field phase and intensity and far-field intensity are photographically recorded, and energy and pulsewidth are monitored by the device. GRA

N86-29654# Letterman Army Inst. of Research, San Francisco, Calif.
A PORTABLE SOLID STATE DARK ADAPTOMETER Final Report
Gary A. Wheeler and Harry Zwick Oct. 1985 28 p
(AD-A165914; LAIR-LN-85-55) Avail: NTIS HC A03/MF A01 CSCL 06/12

Many technological advances produced the field-portable dark adaptometer. The LED light source provides an inexpensive, rugged and entirely portable alternative to conventional illumination sources. Microcomputer technology facilitated dark adaptometry data acquisition and analysis. Further refinements in the microcomputer industry have produced smaller, truly portable, and relatively inexpensive computers with the IEEE-488 communications interface standard. The IEEE-488 interface, in turn, is a powerful tool for streamlining the clinical dark adaptometer. Its power and utility come from its inherent ability to maintain communications among many devices concurrently and from the wide availability of IEEE-488 support products. These technologies are integrated in this dark adaptometer to produce a unit that is a compact and rugged alternative to laboratory and clinical visual function test equipment, and brings new sophistication to visual function diagnosis in field work. Author (GRA)

N86-29655# Purdue Univ., West Lafayette, Ind. Dept. of Physics.
STUDY OF THE INTERACTION OF LIGHT WITH SUB-MICRON METALLIC SURFACES Progress Report
R. Reifenberger Oct. 1985 6 p
(Contract DE-FG02-84ER-45162)
(DE86-004709; DOE/ER-45162/1) Avail: NTIS HC A02/MF A01

This research project is devoted to the study of the interaction of laser light with sub-micron metallic surfaces. The fundamental physical process studied is the photoexcitation of electrons from field emission tips by a focussed Argon-ion laser beam tuned to operate at a particular wavelength. The photoexcited electrons escape into the vacuum by tunnelling through a surface potential barrier which is distorted by the application of a strong electric field. The interest in these experiments lies in the information derived from a study of the final state energy distribution. The shape of this distribution should be influenced by the electronic structure of the solid under study, the quantum mechanical transmission of the electron through the surface potential barrier and the nature of the photoexcitation process of low photon energies (tau omega less than phi). This research is attempting to address all of these issues. The basic information gained from this research should be relevant for the better design and fabrication of opto-electronic and infrared devices which rely on strong interface electric fields for proper performance. fields for proper performance. DOE

N86-29656# Lawrence Livermore National Lab., Calif.
INJECTOR MODELING AND ACHIEVEMENT/MAINTENANCE OF HIGH BRIGHTNESS
J. K. Boyd Oct. 1985 41 p
(Contract W-7405-eng-48)
(DE86-004906; UCID-20619) Avail: NTIS HC A03/MF A01

Viewgraphs for the workshop presentation are given. The presentation has three fundamental parts. In part one the need for numerical calculations is justified and the available computer codes are enumerated. The capabilities and features of the DPC computer code are the focal point in this section. In part two the injector design issues are discussed. These issues include such things as the beam optics and magnetic field profile. In part three the experimental results of two injector designs are compared with DPC predictions. DOE

N86-29657# Oak Ridge Y-12 Plant, Tenn.
EFFECTS OF MACHINING PARAMETERS AND OPTICAL ALIGNMENT IN OFF-CENTERED CONIC MIRRORS
R. C. Yoder 16 Dec. 1985 53 p
(Contract DE-AC05-84OS-21400)
(DE86-005108; Y-2342) Avail: NTIS HC A04/MF A01

Expressions are derived in simple, closed form (in terms of the aperture coordinates) for the optical signatures resulting from misalignment and from several controllable machining parameters in the manufacture of diamond-turned mirrors of the type comprising conic sections of revolution. Limited in validity to the lowest order in terms of the magnitudes of both angular misalignment and machining parameters, these wavefront error expressions are

generally valid for optics of arbitrarily wide aperture. Through control of these signatures, dynamically induced part distortions can, in some cases, be eliminated. DOE

N86-29658# EG and G Energy Measurements, Inc., San Ramon, Calif.
HIGH-SPATIAL-RESOLUTION STREAK IMAGE TUBE
C. K. Hinrichs and R. W. Olsen Dec. 1985 26 p Presented at the Meeting of the Plasma Physics Division of the American Physical Society, San Diego, Calif. 4 Nov. 1985
(Contract DE-AC08-83NV-10282)
(DE86-005736; EGG-10282-4049; CONF-851136-5) Avail: NTIS HC A03/MF A01

A new streak tube was designed to provide improved spatial resolution across a large-diameter photocathode to obtain more spatial information. The first version of the tube did not employ an accelerator electrode. Tube design goals were achieved when operating at 30 kV. Spatial resolutions of 19 line pairs per millimeter (lp/mm) or better were measured across a 1-in.-diameter photocathode at one focus voltage providing 500 lp of limiting resolution, and measured time resolutions of 62 to 100 ps, depending on the wavelength of illumination. The electronic resolution is limited by chromatic aberrations to about 57 lp/mm; the overall tube resolution is limited to about 30 lp/mm by the 2-micron phosphor particle size used in the screen. In the second design, an accelerator electrode was placed in close proximity to the cathode to rapidly accelerate the photoelectrons. The chromatic aberration was dramatically reduced and the limiting time resolution was reduced to about 3 ps, making this version useful for inertial confinement fusion experiments. Reduction of the chromatic aberration all ows good resolution at further off-axis positions so that a 2-in. photocathode can be used, approximately doubling the number of line pairs of resolution to about 1000. Detailed tube characteristics are provided herein. DOE

N86-29659# University of Southern California, Los Angeles. Center for Laser Studies.
SPECTRAL ABSORPTION STUDIES OF VISIBLE MATERIALS Final Report
M. Bass and R. T. Swimm 1986 9 p
(Contract W-7405-eng-48)
(DE86-006718; UCRL-15734) Avail: NTIS HC A02/MF A01

Results of studies of optical absorption in twelve thin-film optical coatings at 482 nm wavelength, surface and bulk absorption in sapphire throughout the visible and near IR, and initial measurements in KDP are described. Laser calorimetry was carried out at room temperature, using an unfocused laser beam at normal incidence. All thin-film absorption data yielded values of P(sub abs)/P(sub inc) in the range 3 x 10 to the -4 to 3 x 10 to the -3 power at a wavelength of 482 nm. Sapphire absorption showed Urbach-tail behavior at 350 nm to 1300 nm. The range of absorption, being far lower than usual, extends the range of application of Urbach's rule. Finally, KDP measurements were attempted, but surface degradation due to the hydroscopic nature of the samples resulted in excessive light scatter. DOE

N86-29660# Lawrence Livermore National Lab., Calif.
NONLINEAR OPTICS AND SURFACE SCIENCE
Y. R. Shen Nov. 1985 14 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC03-76SF-00098)
(DE86-006293; LBL-20064; CONF-851217-48) Avail: NTIS HC A02/MF A01

The recent status of applications of nonlinear optics to surface science is reviewed. The basic theory of wave mixing on a surface layer, and the possibility of using various nonlinear optical processes for surface probing are briefly discussed. Emphasis is on surface second harmonic generation, which is shown with many illustrations to be a rather unique and versatile tool for surface studies. DOE

N86-29661# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Infrarottechnik.
SIMULATION OF THE INFLUENCE OF ATMOSPHERIC PARAMETERS ON INFRARED TARGET SIGNATURE
Rudolf Richter Dec. 1985 60 p
(DFVLR-Mitt-86-03; ISSN-0176-7739; ESA-86-97453) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany, DM 19.50

The radiation temperature of targets is studied as a function of horizontal range for different target temperatures and atmospheric conditions. The atmospheric infrared window regions 3 to 5 and 8 to 14 microns are investigated simulating AGA 680 cameras as sensors. Atmospheric parameters are summer/winter atmospheres, rural/maritime aerosols, humidity, and meteorological range. Target/background contrast of radiation temperature is given as a function of the chosen atmospheric and range parameters. Target detection probabilities for simple homogeneous backgrounds can be calculated from the results. ESA

N86-29662# Ecole Polytechnique, Palaiseau (France). Lab. d'Optique Appliquee.
GYROMETRY USING PASSIVE RESONANT CAVITIES (SUPPLEMENT) [GYROMETRIE A CAVITE RESONNANTE PASSIVE (SUPPLEMENT)]
B. Prade and B. Lamouroux 17 Dec. 1985 16 p In FRENCH
(Contract DRET-81-495)
(ESA-86-97205) Avail: NTIS HC A02/MF A01

The development of a single mode coupler to form a resonant cavity with an optical fiber ring is described. A 0.6328 micron wavelength monomode fiber with a 8 micron core diameter was planed in a V groove machined in a 50 mm diameter silica cylindrical body. The manufacturing and control of the optical coupler are detailed. It is shown that this technique is reliable. The optical systems that can be implemented by the described method are discussed. ESA

N86-29663# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Electronique et Physique.
LIGHT SIGNAL AMPLIFICATION USING THE NONLINEAR EFFECT OF THE FOUR PHOTON MIXING TYPE IN SINGLE MODE OPTICAL FIBERS Ph.D. Thesis [AMPLIFICATION DE SIGNAUX LUMINEUX EXPLOITANT L'EFFET NON LINEAIRE DU TYPE 'MELANGE A QUATRE PHOTONS' DANS LES FIBRES OPTIQUES NUMERIQUES]
Emma Randrianandrasana Sep. 1985 208 p In FRENCH
(ENST-85E009; ISSN-0751-1353; ESA-86-97213) Avail: NTIS HC A10/MF A01

Expressions for parametric gain and amplification are derived from coupled wave equations in case of single mode fibers. With high peak pump power (95 watt) a gain as high as 33 dB is obtained for 85.7 microwatt input power signal at 1.57 microns wavelength in a 29 m long single mode fiber. Phase matching is finely tuned using temperature effects. ESA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-29664# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ISOTOPIC ENRICHMENT IN A PLASMA CENTRIFUGE
E. DelBosco, R. S. Dallaqua, G. O. Ludwig, and J. A. Bittencourt May 1986 15 p Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil) Submitted for publication
(INPE-3894-PRE/936) Avail: NTIS HC A02/MF A01

High rotational velocity and centrifugal isotopic separation of carbon in a vacuum-arc plasma centrifuge are presented. Enrichments of up to 390% for C-13 are measured at 6 cm radius with angular rotation frequencies in excess of 100,000 rad/s in an axial magnetic field of 0.12T. Author

N86-29665# Nagoya Univ. (Japan).
PROCEEDINGS OF TOPICAL MEETING ON PARTICLE BEAM FUSION AND ITS RELATED PROBLEMS, VOLUME 2
Keishiro Niu, ed. Mar. 1986 121 p Proceedings held in Nagoya, Japan (no dates given)
(IPPJ-769-(2)-Vol-2) Avail: NTIS HC A06/MF A01

Topics addressed include: pulsed power technique; pulsed ion beam extraction; plasma focus diode; proton beam focusing; ablation process of ion beam targets; inductive postacceleration of high neutralized, intense pulsed ion beams, light ion beam fusion; and pellet compression schemes. B.G.

N86-29666# Nagoya Univ. (Japan). Inst. of Plasma Physics.
EXPERIMENTAL CHARACTERISTICS OF ION BERNSTEIN WAVE HEATING ON JIPP T-2U TOKAMAK
Y. Ogawa, K. Kawahata, R. Ando, E. Kato, T. Watari, Y. Hirokura, Y. Kawasumi, S. Morita, K. Sato, S. Tanahashi et al Mar. 1986 28 p
(IPPJ-770) Avail: NTIS HC A03/MF A01

The directly launched Ion Berstein Wave (IBW) heating experiments were carried out on JIPP T-IIU tokamak for two experimental conditions: the 3rd branch of the IBW between the 3rd and 4th cyclotron harmonics of the deuterium, and the 2nd branch of the IBW between the 2nd and 3rd cyclotron harmonics. In the first case, the direct hydrogen heating at omega = 1.5 OMEGA sub H was found in previous experiments. Additional data is presented to support this subharmonics heating. While, in the second case, the remarkable increase of the electron temperature was observed, especially at the central region of the plasma, and it was estimated from the global energy balance that almost all of IBW power is delivered to the electron. To investigate this difference of the heating mode, the power absorption was calculated with the ray tracing code, taking into account the effect of the plasma/antenna coupling. It is concluded from the consideration of the electron Landau damping that the transition from the ion heating mode to the electron mode would be explained by the difference of the electron temperature at the ohmic phase; i. e., T sub e (0) = 0.7 keV for the first case and T sub e (0) = 1.3 keV for the second case. Author

N86-29667# Nagoya Univ. (Japan). Inst. of Plasma Physics.
SUSTAINING A STEADY-STATE FIELD-REVERSED CONFIGURATION
Masao Okamoto May 1986 22 p
(IPPJ-771) Avail: NTIS HC A02/MF A01

A method is considered to sustain the steady-state field-reversed configuration by driving the bootstrap current. A consistent steady-state solution is obtained within a framework of one dimensional one-fluid equations including equilibrium. It is found that the amount of seed current necessary to induce the bootstrap current (or diamagnetic current) maintaining the steady state depends strongly on the transport and loss rate of plasma particles. Author

N86-29668# Nagoya Univ. (Japan). Inst. of Plasma Physics.
NON-STOCHASTIC PROMPT PROTON ACCELERATION BY FAST MAGNETOSONIC SHOCKS IN THE SOLAR PLASMA
Jun-ichi Sakai and Yukiharu Ohsawa Mar. 1986 34 p
(IPPJ-772) Avail: NTIS HC A03/MF A01

It is shown by theory and particle simulation that a quasi-perpendicular magnetosonic shock wave accelerates some resonant ions up to the speed upsilon is approximate to upsilon sub A (m sub i/m sub e) (sup 1/2) x (M sub A - 1) (sup 3/2) promptly within the order of the ion cyclotron period, 1/omega sub ci, times (m sub i/m sub e) (sup 1/2). The final maximum speed in this acceleration is independent of the ion mass, hence the kinetic energy is proportional to the ion mass. The coronal heating and proton acceleration by magnetosonic shock waves originating from the solar flares are discussed, and it is shown that this mechanism could be important in the solar plasma. Author

N86-29669# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ENERGY RELAXATION DURING TAIL-ANISOTROPY INSTABILITY IN LOWER-HYBRID CURRENT RISE
M. Yamagiwa and M. Okamoto Apr. 1986 14 p
(IPPJ-774) Avail: NTIS HC A02/MF A01

Relaxation in energy of electrons during tail-anisotropy instability in lower-hybrid current rise in a tokamak is investigated. An unstable tail distribution of electrons is obtained by solving a Fokker-Planck equation combined with the return field and rf-associated terms. Quasi-linear relaxation of such an unstable distribution under the influence of the plasma waves excited by the instability is examined by taking into account the particle loss due to the ripple of the toroidal magnetic field. It is found that the energy relaxation in short time scale of the instability leads to the inward shift of the plasma column, which is on the order of ten percent of the minor radius in magnitude. Energy loss due to field ripple in longer time scale of parallel diffusion due to lower-hybrid waves is also discussed. Author

N86-29670# Nagoya Univ. (Japan). Inst. of Plasma Physics.
EFFECT OF IN SITU CARBON COATING ON ICRF-HEATED TOKAMAK PLASMAS RELATING TO RADIATION LOSS BY IRON-IMPURITIES IN JIPP-T-2U
N. Noda, Y. Ogawa, K. Masai, I. Ogawa, R. Ando, S. Hirokura, E. Kako, Y. Taniguchi, R. Akiyama, and Y. Kawasumi Apr. 1986 18 p
(IPPJ-773) Avail: NTIS HC A02/MF A01

In-situ carbon coating was made with a glow discharge in a methane/hydrogen mixture gas. Without carbon coating, iron contamination was so severe with megawatts ion cyclotron radio frequency (ICRF) heating that the total radiation loss exceeds the rf-heating power and the electron temperature, after once heated up, decreases continuously during the latter half of 55 ms RF pulse. With carbon coating, the radiation loss is reduced to be one fifth of the RF power and the electron temperature T sub e comes to be stationary in the end of the RF pulse. As a result of this change in T sub e, total stored energy increases compared to the one obtained before the carbon coating is applied. The the effect of the carbon coating was clearly demonstated for tokamak plasmas with high power heating. Author

N86-29671# Nagoya Univ. (Japan). Inst. of Plasma Physics.
AN ICRF CURRENT DRIVE EXPERIMENT ON JIPP T-2U
R. Ando, E. Kako, Y. Ogawa, and T. Watari Apr. 1986 23 p
(IPPJ-775) Avail: NTIS HC A02/MF A01

In JIPP T-2U tokamak the fast wave current drive by five loop antennas was successfully carried out with a relatively high density plasma. The radio frequency is 40 MHz and the toroidal field is 2 kG, which corresponds to omega = 13 omega (sub cH). To exclude the effect of the inductive field, the plasma production and the start-up of the plasma current were done with ion cyclotron radio frequency (ICRF) wave only. The density and temperature of a plasma produced by the RF wave are that eta bar (sub e) is approximately 2 x 10 to the 18th power/cu m and T (sub e) is approximately 10 eV, where only the fast wave can propagate excluding out the possibility of a slow wave current drive. This density is two orders of magnitude higher than the density limit predicted for the slow wave current drive. The maximum plasma current of 3.5 kA is driven with the RF power of about 400 kW. The efficiency eta = I (sub p) eta bar (sub e) R/P (sub rf) is around 2 x 10 to the 16 power A/sq m/W, which is two orders of magnitude lower than that of recent lower hybrid current drive. A large magnetohydrodynamic oscillation is observed and the electron temperature is limited around 10 eV, although the safety factor is about 10 or more. Author

N86-29672# Nagoya Univ. (Japan). Inst. of Plasma Physics.
AVERAGING METHOD FOR STUDYING MAGNETOHYDRODYNAMIC EQUILIBRIUM AND STABILITY OF TOROIDAL HELICAL SYSTEMS
Jiro Todoroki Apr. 1986 23 p
(IPPJ-776) Avail: NTIS HC A02/MF A01

Formulae of stellarator approximation valid for finite aspect

ratio helical tori are derived by using coordinate transformation and method of averaging. The three dimensional problem of magnetohydrodynamic equilibrium and stability is reduced to two dimensional one; this makes possible conversion of tokamak codes to stellarator codes. The importance of including residual magnetic field to recover the three dimensional magnetic field from averaged equilibrium is stressed. Author

N86-29673# Systems Science and Software, La Jolla, Calif.
THE ROLES OF VxB AND DENSITY GRADIENTS IN PLASMA ELECTRIC FIELDS MEASURED FROM THE SHUTTLE ORBITER
J. R. Lilley, Jr., I. Katz, and D. L. Cooke Jun. 1985 14 p
(Contract F19628-82-C-0081)
(AD-A165230; SSS-R-85-7339; AFGL-TR-85-0257; SR-3) Avail: NTIS HC A02/MF A01 CSCL 22/1

Plasma electric fields due to motion through the geomagnetic field and to density gradients are of the same order of magnitude in the wake of shuttle sized objects. Density gradient fields dominate in the wakes of smaller satellites while vxB fields dominate behind larger structures. Supporting experimental data is cited. Computational results (calculated using the spacecraft charging code POLAR) which demonstrate the roles of the two fields in the wake are also presented. GRA

N86-29674# Naval Research Lab., Washington, D. C.
NUMERICAL SIMULATION OF A LOW DENSITY PLASMA EROSION OPENING SWITCH Interim Report
J. M. Grossmann, P. F. Ottinger, J. M. Neri, and A. T. Drobot 19 Mar. 1986 46 p
(AD-A166456; AD-E301928; NRL-MR-5724) Avail: NTIS HC A03/MF A01 CSCL 20/9

The conduction of current through a low density (approx 10 to the 12th power per cu cm) collisionless plasma injected between two coaxial conducting cylinders is simulated using a 2 1/2D, electromagnetic particle-in-cell code. Plasma is injected through the anode towards the cathode with flow velocity, VF, and is assumed to be azimuthally symmetric. Current is driven through the plasma so that the 100 kA level is reached in approx. 5 ns. The opening process, when current is diverted to a load, is also treated. Electrons are found to carry current in a narrow current channel across the plasma by E X B drift. A large electric field is established by charge separation in the plasma in order to provide the drift. The motion of the anode end of the current channel controls the time of opening and is found to be independent of VF and to depend strongly on density and length. GRA

N86-29675# Lawrence Livermore National Lab., Calif.
APPLICATIONS OF DIGITAL PROCESSING FOR NOISE REMOVAL FROM PLASMA DIAGNOSTICS
R. J. Kane, J. V. Candy, and T. A. Casper 11 Nov. 1985 6 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-005137; UCRL-92511; CONF-851102-73) Avail: NTIS HC A02/MF A01

The use of digital signal techniques for removal of noise components present in plasma diagnostic signals is discussed, particularly with reference to diamagnetic loop signals. These signals contain noise due to power supply ripple in addition to plasma characteristics. The application of noise canceling techniques, such as adaptive noise canceling and model-based estimation, will be discussed. The use of computer codes such as SIG is described. DOE

N86-29676# Lawrence Livermore National Lab., Calif.
DESCRIPTION OF THE PLASMA POTENTIAL CONTROL (PPC) SYSTEM ON THE TANDEM MIRROR EXPERIMENT-UPGRADE (TMX-U)
P. S. Surrena and R. H. Underwood 11 Nov. 1985 5 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-005142; UCRL-92513; CONF-851102-69) Avail: NTIS HC A02/MF A01

A set of 18 separately controlled plates have been added to each end of the Tandem Mirror Experiment Upgrade (TMX-U) vessel to allow measurement of end-wall currents and to provide a means of plasma potential control (PPC). These plates are shaped to form elliptical rings separated into quadrants. Each plate can be individually grounded, float at plasma potentials, or be actively biased to control the plasma. Voltage and current monitoring are provided for each of the plates, and the control and monitoring functions are controlled by the PPC system computer. The details of the field line mapping and the plate shapes are discussed, and the control architecture and performance are presented. DOE

N86-29677# Illinois Univ., Urbana. Fusion Technology Lab.
APPLICATION OF RAILGUN PRINCIPLE TO HIGH-VELOCITY HYDROGEN PELLET INJECTION FOR MAGNETIC FUSION REACTOR REFUELING Progress Report
K. Kim Jan. 1986 8 p
(Contract DE-FG02-84ER-52111)
(DE86-005153; DOE/ER-52111/T1) Avail: NTIS HC A02/MF A01

Using a tungsten-needle arc initiator in conjunction with Paschen curves characteristics, hydrogen pellets have been accelerated with a two-stage electromagnetic railgun system. This scheme produced velocities on the order of 1.6 km/s. The effects on performance of the bore size have been studied. Questions of pretriggering, misfiring, plasma-arc stalling, railgun geometry, and railgun currents have been addressed. DOE

N86-29678# Texas Univ., Austin. Inst. for Fusion Studies.
EFFECT OF TOROIDICITY DURING LOWER HYBRID MODE CONVERSION
S. Riyopoulos and S. Mahajan Nov. 1985 23 p
(Contract DE-FG05-80ET-53088)
(DE86-005399; DOE/ET-53088/202; IFSR-202) Avail: NTIS HC A02/MF A01

The effect of toroidicity during lower hybrid mode conversion is examined by treating the wave propagation in an inhomogeneous medium as an eigenvalue problem for omega (2) = omega (2) (m,n),m,n poloidal and toroidal wave numbers. Since the frequency regime near omega (2) = omega (2) /sub LH/ is an accumulation point for the eigenvalue spectrum, the degenerate perturbation technique must be applied. The toroidal eigenmodes are constructed by a zeroth order superposition of monochromatic solutions with different poloidal dependence m, thus they generically exhibit a wide spectrum in k/sub parallel/ for given fixed omega even for small inverse aspect ratio epsilon. In case that the average <k/sub parallel/> is in the neighborhood of k/sub min/, the minimum wave number for accessibility of the mode conversion regime, it is expected that excitation of toroidal modes rather than geometric optics will determine the wave coupling to the plasma. DOE

N86-29679# Texas Univ., Austin. Inst. for Fusion Studies.
DESTABILIZATION OF MHD MODES WITH FINITE LARMOR RADIUS EFFECTS IN TANDEM MIRRORS
M. Kotschenreuther and H. L. Berk Jan. 1986 20 p
(Contract DE-FG05-80ET-53088)
(DE86-005401; DOE/ET-53088/219; IFSR-219) Avail: NTIS HC A02/MF A01

Difficulties in the stabilization of ideal magnetohydrodynamic (MHD) ballooning modes by finite Larmor radius (FLR) effects are considered, in tandem mirror geometry for azimuthal mode numbers l > 1. A kinetic formalism is used to obtain corrections to the long thin approximation, when keeping terms of quadratic order in the curvature. If eta (sub i) = delta lnT (sub i)/ delta lnn (sub i) > or = to 0, with T (sub i), n (sub i), the ion temperature and density, ion resonance effects eliminate absolute FLR stability, though the residual growth rates are substantially reduced from the MHD values. Even lowest order FLR stability is difficult to achieve with choke coils present, but is possible with a more

gradually tapered mirror. However, the residual modes are still important, and mixing length estimates of the confinement degradation from modes with l > 1 indicate they can still severely limit the achievement of reactor-grade operation near and above the threshold beta value predicted from the ideal MHD theory. This is most severe if the ion temperature gradient decreases radial eta (sub i) > 0, whereupon significant instabilities can even arise below the ideal threshold. However, if the ion temperature gradient can be made posititve, and -eta (sub i) > 2/3, the lowest order FLR theory suffices to produce stability. DOE

N86-29680# Oak Ridge National Lab., Tenn.
NEOCLASSICAL TRANSPORT FLUXES IN THE PLATEAU REGIME IN NONAXISYMMETRIC TOROIDAL PLASMAS
K. C. Shaing, S. P. Hirshman, and J. D. Callen Jan. 1986 32 p Prepared in cooperation with Wisconsin Univ., Madison
(Contract DE-AC05-84OR-21400)
(DE86-006749; ORNL/TM-9594) Avail: NTIS HC A03/MF A01

The neoclassical fluxes in the plateau regime in an arbitrary large-aspect-ratio, nonaxisymmetric toroidal system are calculated based on the moment equation approach. The results are applicable for any nonaxisymmetric system. Two specific examples, one for a stellarator, and the other one for a rippled tokamak, are considered. It is found that for most stellarators, the helical magnetic field contribution to the particle and heat fluxes is as important as the toroidicity contributions, and should not be neglected. Further, the helical magnetic field contribution to the parallel viscosity is capable of reversing the directions of the bootstrap current and Ware pinch flux, while in a rippled tokamak, the neoclassical particle and heat fluxes are the same as those in an axisymmetric tokamak after the radial electric field and parallel flow velocity are determined without the external sources. DOE

N86-29681# Princeton Univ., N. J. Plasma Physics Lab.
PROPAGATION OF ION BEAMS THROUGH A TENUOUS MAGNETIZED PLASMA
E. F. Chrien, E. J. Valeo, R. M. Kulsrud, and C. R. Oberman Oct. 1985 30 p
(Contract DE-AC02-76CH-03073)
(DE86-002527; PPPL-2100) Avail: NTIS HC A03/MF A01

When an ion beam is propagated through a plasma, the question of charge neutralization is critical to its propagation. Such a problem is considered where the plasma is magnetized with magnetic field perpendicular to the beam. The plasma-number density and beam-number density are assumed comparable. The problem is reduced to a two-dimensional model, which is then solved. The solution suggests that it should be possible to attain charge neutralization if the beam density is properly varied along itself. Author

N86-29682# Princeton Univ., N. J. Plasma Physics Lab.
THERMONUCLEAR INVERSE MAGNETIC PUMPING POWER CYCLE FOR STELLARATOR REACTORS
D. D.-M. Ho and R. M. Kulsrud Sep. 1985 47 p
(Contract DE-AC02-76CH-03073)
(DE86-002539; PPPL-2249) Avail: NTIS HC A03/MF A01

A novel power cycle for direct conversion of alpha-particle energy into electricity is proposed for an ignited plasma in a stellerator reactor. The plasma column is alternately compressed and expanded in minor radius by periodic variation of the toroidal magnetic field strength. As a result of the way a stellarator is expected to work, the plasma pressure during expansion is greater than the corresponding pressure during compression. Therefore, negative work is done on the plasma during a complete cycle. This work manifests itself as a back-voltage in the toroidal field coils, and direct electrical energy is obtained from this voltage. For a typical reactor, the average power obtained from this cycle (with a minor radius compression factor on the order of 50%) can be as much as 50% of the electrical power obtained from the thermonuclear neutrons without compressing the plasma. Thus, if it is feasible to vary the toroidal field strength, the power cycle provides an alternative scheme of energy conversion for a deuterium-tritium fueled reactor. The cycle may become an important method of energy conversion for advanced neutron-lean fueled reactors. By operating two or more reactors in tandem, the cycle can be made self-sustaining. Author

N86-29683# Lawrence Livermore National Lab., Calif.
ATOMS IN DENSE PLASMAS
R. M. More Jan. 1986 63 p Presented at the NATO Advanced Study Institute on Atoms in Unusual Situations, Cargese, France, 13 Jun. 1985
(Contract W-7405-eng-48)
(DE86-005388; UCRL-93926; CONF-8506239-2) HC A04/MF A01

Recent experiments with high-power pulsed lasers have strongly encouraged the development of improved theoretical understanding of highly charged ions in a dense plasma environment. This work examines the theory of dense plasmas with emphasis on general rules which govern matter at extreme high temperature and density. DOE

N86-29684# TRW Space Technology Labs., Redondo Beach, Calif.
STM PROGRAM Quarterly Progress Report, Oct. - Dec. 1985
Jan. 1986 14 p
(Contract DE-AC03-85ER-51089)
(DE86-005791; DOE/ER-51089/T2) Avail: NTIS HC A02/MF A01

Improvements in the barium ion beam diagnostic system have been completed which have provided sufficient gain in signal noise to allow measurements of the diamagnetic field and space potentials in a STM hydrogen plasma. This diagnostic provides the capability to measure these properties under any STM operating condition in hydrogen. One complete radial scan of these parameters has been completed, and the results are discussed in this report. DOE

N86-29685# Department of Energy, Washington, D. C. Office of Fusion Energy.
INTERNATIONAL PROGRAM ACTIVITIES IN MAGNETIC FUSION ENERGY
Mar. 1986 20 p
(DE86-005797; DOE/ER-0258) Avail: NTIS HC A02/MF A01

The following areas of our international activities in magnetic fusion are briefly described: (1) policy; (2) background; (3) strategy; (4) strategic considerations and concerns; (5) domestic program implications, and (6) implementation. The current US activities are reviewed. Some of our present program needs are outlined. DOE

N86-29686# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
TIME-RESOLVED SPECTROSCOPY OF PLASMA RESONANCES IN HIGHLY EXCITED SILICON AND GERMANIUM
C. Y. Huang, A. M. Malvezzi, N. Bloembergen, and H. Kurz 1985 13 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex. and Technische Hochschule, Aachen, West Germany
(Contract W-7405-eng-36)
(DE86-006035; LA-UR-86-340; CONF-851217-43) Avail: NTIS HC A02/MF A01

The dynamics of the electron-hole plasma in silicon and germanium samples irradiated by 20 ps. 532 nm laser pulses has been investigated in the near infrared by time-resolved picosecond optical spectroscopy. The experimental reflectivities and transmission are compared with the predictions of the thermal model for degenerate carrier distributions through the Drude formalism. Above a certain fluence, a significant deviation between measured and calculated values indicates a strong increase of the recombination rate as soon as the plasma resonances become comparable with the band gaps. These new plasmon-aided recombination channels are particularly pronounced in germanium. DOE

N86-29687# Los Alamos National Lab., N. Mex.
EXCIMER LASER DEVELOPMENT FOR FUSION

D. Giovanielli 1985 8 p Presented at the 17th European Conference on Laser Interaction with Matter, Rome, Italy, 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-007385; LA-UR-86-503; CONF-851128-1) Avail: NTIS HC A02/MF A01

The future utility of inertial confinement fusion (ICF) requires a new driver. Successful experiments coupling laser energy to targets and our understanding of fuel capsule behavior strongly suggest that a laboratory thermonuclear source is attainable and power production may be considered if a suitable driver with high efficiency, high repetition rate, and most importantly, low capital cost, can be identified. No adequate driver exists today. However, the krypton fluoride laser holds great promise. By the end of this decade, driver development can be brought to the point that a technically justifiable choice can be made for the future direction of ICF. DOE

N86-29688# Wisconsin Univ., Madison. Dept. of Electrical and Computer Engineering.
STELLARATOR THEORY AND STABILITY
W. N. G. Hitchon 1986 38 p
(Contract DE-FG02-85ER-53201)
(DE86-008054; DOE/ER-53201/1) Avail: NTIS HC A03/MF A01

This report summarizes our work in the past year on stellarator transport theory and stability. We have developed two methods of calculating diffusion rates due to ripple transport: a hybrid bounce-averaged/guiding-center Monte Carlo code, and a numerical method of solving the bounce-averaged Fokker-Planck equation. We have modified a one-dimensional transport code to describe the Wisconsin stellarator experiments and applied it to interpret experimental results, and we have studied stability in stellarators by writing a computer code which solves the linearized double-adiabatic equations as an initial value problem. DOE

N86-29689# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
OBLIQUE PROPAGATION OF NONLINEAR MAGNETOSONIC WAVES IN SPACE PLASMAS
H. A. Shah and R. Bruno Sep. 1985 20 p Sponsored by ICTP, Trieste
(IFSI-85-11; ESA-86-97095) Avail: NTIS HC A02/MF A01

Obliquely (with respect to the ambient magnetic field) propagating nonlinear magnetosonic waves in a hot plasma with an arbitrary beta are considered. It is shown that two dimensional propagation for the fast and slow modes is governed by the Kadomtsev-Petiashvilli soliton equation. Explicit expressions for the physical quantities involved are obtained via the soliton solution. Application to the distant magnetotail, and other possible applications in astrophysical and space plasmas are discussed. ESA

N86-29690# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
COMPOSITION AND PLASMA PROPERTIES OF THE PLASMA SHEET IN THE EARTH'S MAGNETOTAIL
S. Orsini, K. Altwegg, and H. Balsiger Oct. 1985 27 p Submitted for publication
(IFSI-85-12; ESA-86-97096) Avail: NTIS HC A03/MF A01

Plasma sheet data from the ISEE-1 Ion Composition Experiment between 10 Re and 22 Re were analyzed to compare plasma density and temperature of H(+) and He(++) as a function of magnetospheric substorm activity and satellite position. The origin of the plasma sheet population is investigated; the contribution of the solar wind component and of the ionospheric component is discussed. The temperatures of H(+) and He(++) are well correlated. It is shown that high He(++) relative abundances are observed at high distances from the Earth, irrespective of the activity level. The plasma sheet H(+) temperature depends on the distance from the Earth: higher temperatures are detected at lower Re; the relative change of the H(+) temperature with Re is shown to depend on the average value of the activity index. ESA

N86-29691# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisica dello Spazio Interplanetario.
MAGNETIC FIELD CONTROL SYSTEM FOR THE SIMPLEX IONOSPHERIC PLASMA SIMULATOR [SISTEMA DI CONTROLLO DEL CAMPO MAGNETICO PER IL SIMULATORE DI PLASMA IONOSFERICO SIMPLEX]
G. Vannaroni Jan. 1986 22 p In ITALIAN
(IFSI-86-2; ESA-86-97101) Avail: NTIS HC A02/MF A01

Magnetic field control of the Simplex project, which includes a plasma generator and a vacuum chamber 4 by 1.7 m, requiring three axis vectorial control is described. The system is implemented by orthogonal windings designed to produce on each axis a magnetic field of up to 3 Gs. The residual magnetic field within the 1 cu m experimental volume is 2.8 mGs. The controlled fields are produced using currents of up to 50 A. The geometrical details of the windings are given. ESA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-29692*# National Aeronautics and Space Administration, Washington, D.C.
REVIEW OF METHODS FOR PREPARATION OF ZINC AND CADMIUM SULFIDE, SELENIDE AND TELLURIDE SINGLE CYRSTALS
Mieczyslaw Kucharczyk and Krystyna Zabludowska May 1986 28 p Transl. into ENGLISH from Matematy ka Fizyka, Chemia (Poland), no. 1, 1976 p 3-21 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88426; NAS 1.15:88426) Avail: NTIS HC A03/MF A01

The growth method of (Zn,Cd)S, (Zn,Cd)Se, (Zn,Cd)Te single crystals is reviewed. It is suggested that the method of sublimation-condensation is the most suitable to the conditions and facilities available, and should be employed in the Department of Physics of Bislystok Polytechnic. Author

N86-29693# Colorado Research Development Corp., Fort Collins.
SEMICONDUCTING TRANSITION METAL SILICIDES FOR ELECTRO-OPTIC VSLI INTERCONNECTS Interim Report
John E. Mahan 27 Nov. 1985 7 p
(Contract N00014-85-C-0874)
(AD-A165911; IR-2) Avail: NTIS HC A02/MF A01 CSCL 20/12

Optical and electrical measurements of the chromium disilicide forbidden energy gap have been made. These activities are detailed. The samples used for this experiment were formed by sputtering chromium onto silicon (100) wafers which had been thermally oxidized and then coated with a polysilicon layer. Chromium disilicide layers were formed with annealing temperatures ranging from 500 to 1100C to investigate the effect of this fabrication parameter on the forbidden energy gap of the films. Some initial measurements of the optical transmittance and reflectance of the chromium silicide films are shown using films formed on bare silicon wafers. These data have been analyzed using a computer model of the silicide film-silicon substrate system. The manganese and iridium sputtering targets have not arrived from the vendor. The work on these materials will begin as soon as these targets are received. GRA

N86-29694# Colorado State Univ., Fort Collins.
COMPOUND SEMICONDUCTOR SURFACES AND INTERFACES Final Report
C. W. Wilmsen 1986 10 p
(Contract N00014-76-C-0387)
(AD-A165947) Avail: NTIS HC A02/MF A01 CSCL 20/12

All semiconductor devices and integrated circuits require dielectric layers for interconnect isolation, gate oxides, passivation,

etc. Thermally grown SiO2 is the primary dielectric film for silicon technology. This ONR contract investigated the chemistry and electrical properties of the interface between III-V compound semiconductors and electrical properties of grown and deposited oxides. When this study began, very little was known about these oxides or their interfaces. The results of the research supported by this contract has added substantially to the fundamental understanding of the oxide growth, properties and electronic structure. Much of the experimental work was obtained with surface analytical techniques and significant contributions were also made in this field. The original ONR contract began in October 1975 and initially concentrated on the grown oxides of InP and GaAs. This work evolved over the years to include the study of deposited insulator/InP interfaces and trapping at the interface. The ONR contract has supported the publication of 31 journal articles and book chapters and numerous conference presentations. GRA

N86-29695# San Diego State Univ., Calif.
QUATERNARY NARROW-BAND SEMICONDUCTORS (HgTe)X (InSb)1-x FOR FAR-INFRARED DETECTORS Annual Report, 1 Sep. 1984 - 31 Aug. 1985
Lev I. Berger 31 Aug. 1986 97 p
(Contract N00014-83-K-0588)
(AD-A166008) Avail: NTIS HC A05/MF A01 CSCL 17/5

This annual report includes a description of results from work on an investigation of the quaternary system (HgTe)x(InSb)1-x in accordance with Project N00014-83-K-0588 during the second year, from September 1, 1984 to August 31, 1985. In the course of this time period, the systems for Bridgman-stockbarger growth, hot-wall epitaxial growth, and isothermal epitaxial growth were designed, assembled, and tested. On the basis of the results of the testing stage, the temperature-pressure-time regimes for single-crystal and epitaxial layer growth were developed. Several single crystals of the solid solutions of HgTe in InSb with the HgTe contents up to 15 mole percent were grown and assessed. The report includes growth parameters for the bulk crystals with composition x = 0.05, 0.10, 0.12 and 0.15. These crystals cover the energy gap range from 0.10 to 0.14 eV or the cut-off wavelength range from 12.4 to 8.9 micron. GRA

N86-29696# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
MAGNETO-OPTIC STUDIES OF SEMICONDUCTOR STRUCTURES AT HYDROSTATIC PRESSURE AND LOW TEMPERATURE Ph.D. Thesis
Harro Ackermann Dec. 1985 145 p
(AD-A166419; AFIT/CI/NR-86-25D) Avail: NTIS HC A07/MF A01 CSCL 20/12

We developed an unique experimental system to perform optical investigations of semiconductor materials in environments generally beyond the capability of other techniques. Using the solid helium pressure generating method and a superconducting magnet, we performed laser induced luminescence studies on a variety of structures at low temperature (less than or equal to 4K), high hydrostatic pressure, and high magnetic field. A quartz fiber was utilized to provide an optical path to and from a sample subjected to values of the external parameters. The use of the fiber alleviated the need for pressure chamber windows and concern for the transmissivity of the pressure medium, and allowed investigations over a frequency range limited only by the optical properties of the fiber. GRA

N86-29697# Argonne National Lab., Ill. Materials Science and Technology Div.
NOVEL CHARACTERIZATION OF THIN FILM MULTILAYERED STRUCTURES; MICROCLEAVAGE TRANSMISSION ELECTRON MICROSCOPY
Yves Lepetre, Ivan K. Schuller, George Rasigni (Aix-Marseilles Univ., France), Rene Rivoira, Roger Philip, and Pierre Dhez (Paris-Sud Univ., Orsay, France) Jul. 1985 7 p Presented at SPIE's 29th Annual International Technical Symposium: Applications of Thin-Film Multilayered Structures to Figured X-ray Optics, San Diego, Calif., 18-23 Aug. 1985
(DE85-019373; CONF-850887-43) Avail: NTIS HC A02/MF A01

Microcleavage Transmission Electron Microscopy has been applied to the study of many properties of multilayered samples. The unique capabilities of this technique are illustrated to study long range perpendicular thickness drifts, lateral variations, roughness, substrate quality and island structures. Author

N86-29698# Lawrence Livermore National Lab., Calif.
MOLECULAR DYNAMICS STUDIES OF ENERGY TRANSFER PROCESSES IN CRYSTAL SYSTEMS Annual Summary Report
A. M. Karo and F. E. Walker Dec. 1985 9 p
(Contract W-7405-eng-48)
(DE86-004917; UCID-20620) Avail: NTIS HC A02/MF A01

During the preceding contract period, our molecular dynamics codes have been significantly extended to allow for a monitoring of local variables, such as energy as a function of time for any selected region, or for the entire ensemble of interacting particles. In this way we can observe the manner in which energy flows into and out of any particular unit, and, in the case of a polyatomic unit, the energy flux between different degrees of freedom. Further compacting of the flux data has been found desirable and is accomplished by computing the temporal Fourier transforms. This can be done for varying time intervals and the whole history reduced to a manageable number of figures. Thus, the frequency fingerprints for a given system can be presented before, during, and after shock front transit through the tagged system. For a one- or two-atom unit one can completely specify the state of the system by giving its center-of-mass energy, its rotational energy about the center of mass, and its vibrational energy. We have chosen to separate the total energy of any assembly into these constituents. The energy components are not constants of the motion, and even for a two-body system the vibrational and rotational motions are coupled by the Coriolis coupling which can be very strong. DOE

N86-29699# Oak Ridge National Lab., Tenn.
EFFECTIVE VIBRATION ISOLATION SYSTEM FOR PERFECT-CRYSTAL NEUTRON INTERFEROMETRY
J. Arthur 1985 7 p Presented at the Workshop on the Investigation of Fundamental Interactions With Cold Neutrons, Gaithersburg, Md., 14 Nov. 1985
(Contract DE-AC05-84OR-21400)
(DE86-005025; CONF-8511137-3) Avail: NTIS HC A02/MF A01

Perfect-crystal neutron interferometers are subject to degradation of their performance caused by vibrational accelerations. It is shown that the most seriously offending accelerations are rotational. An effective and simple vibration isolation system that was developed at the MIT Neutron Diffraction Laboratory is described. DOE

N86-29700# Lawrence Livermore National Lab., Calif.
SEMICONDUCTOR DEVICE MODELING WITH BURN42: A ONE-DIMENSIONAL CODE FOR MODELING SOLID STATE DEVICES
W. J. Orvis and J. H. Yee Aug. 1985 28 p
(Contract W-7405-eng-48)
(DE86-005101; UCID-20602) Avail: NTIS HC A03/MF A01

Version 42 of the BURN series of computer codes, models a one-dimensional semiconductor device in a simple external circuit. This code will model a two-pole semiconductor device made from a single material (currently assumed to be silicon) with an arbitrary doping profile. The code handles high and low applied voltages, high and low temperatures, and includes electrical generation of heat in the modeled device. The code has been used to model semiconductor diode operation and failure during high voltage transients, similar to those expected to be generated by an electromagnetic pulse (EMP) or a beam of intense microwaves. The results agree well with experimental data and show some unexpected details in the pulse failure threshold curve for a small signal diode. DOE

N86-29701# Sandia National Labs., Albuquerque, N. Mex.
MONTE CARLO SIMULATION OF GROWTH OF CRYSTALLINE

AND AMORPHOUS SILICON
B. W. Dodson and P. A. Taylor 1985 6 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-005635; SAND-85-1402C; CONF-851217-38) Avail: NTIS HC A02/MF A01

The authors have previously introduced a method, based on Monte Carlo techniques, for simulation of crystal growth processes in a continuous space. We have applied the method, initially used to simulate growth of two-dimensional Lennard-Jones systems, to treat growth of silicon in three dimensions. The interaction model for silicon is taken to be the recently introduced Stillinger-Weber (S-W) potential, which is a two- and three-body classical potential. Although the early stages of growth seem to be well modelled by the S-W potential, growth of even a single monolayer of epitaxial (111) silicon does not seem to be possible. Modifications to the S-W potential were considered, and found to be unacceptable physically. More accurate treatment of non-ideal atomic configuration energies is necessary to arrive at physically realistic growth simulations. DOE

N86-29702# Brookhaven National Lab., Upton, N. Y.
ELECTRON BAND THEORY PREDICTIONS AND THE CONSTRUCTION OF PHASE DIAGRAMS
R. E. Watson, L. H. Bennett, J. W. Davenport, and M. Weinert 1985 14 p Presented at the TMS/AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985 Prepared in cooperation with National Bureau of Standards, Washington, D.C.
(Contract DE-AC02-76CH-00016)
(DE86-005811; BNL-37534; CONF-8510168-8) Avail: NTIS HC A02/MF A01

The priori theory of metals is yielding energy results which are relevant to the construction of phase diagrams - to the solution phases as well as to line compounds. There is a wide range in the rigor of the calculations currently being done and this is discussed. Calculations for the structural stabilities (fcc vs bcc vs hcp) of the elemental metals, quantities which are employed in the constructs of the terminal phases, are reviewed and shown to be inconsistent with the values currently employed in such constructs (also see Miodownik elsewhere in this volume). Finally, as an example, the calculated heats of formation are compared with experiment for PtHf, IrTa and OsW, three compounds with the same electron to atom ratio but different bonding properties. DOE

N86-29703# Pacific Northwest Lab., Richland, Wash.
RAMAN STUDIES OF PHASE TRANSFORMATIONS IN PULSE LASER IRRADIATED DIELECTRIC FILMS
G. J. Exarhos Oct. 1985 19 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004881; PNL-SA-13528; CONF-851217-45) Avail: NTIS HC A02/MF A01

Sputter deposited TiO2 and ZrO2 films on silica have been characterized. Multilayer stacks, useful for high energy laser mirror applications, have also been studied using probe wavelengths, which take advantage of the coating optical properties to enhance the Raman signal through interference effects. Spatially and time-resolved Raman spectra from these oxidic coatings have been acquired immediately following irradiation at 1.064, .532, or .355 microns and at longer times. Transient measurements are designed to follow surface transformation/relaxation phenomena; measurements at longer times characterize the equilibrium damage state. Irradiated anatase coatings exhibit vibrational features that irreversibly shift to higher frequencies, suggesting an increase in localized stress. Catastrophic damage is manifested by the appearance of a higher density rutile phase. Rutile coatings examined after irradiation show only intensity changes, although marked changes in the polarized Raman scattering are apparent for grain-oriented coatings, suggesting that recrystallization has occurred. Amorphous coatings were found to rapidly crystallize under high-pulse energy irradiation. Results of these studies are compared with equilibrium Raman measurements of thermally-induced transformations in these materials. DOE

N86-29704# Lawrence Livermore National Lab., Calif.
DRIVING FORCE FOR EXAGGERATED GRAIN GROWTH
A. W. Searcy Oct. 1985 11 p Presented at the 38th American Ceramic Society Pacific Coast Regional Meeting, Irvine, Calif., 28 Oct. 1985
(Contract DE-AC03-76SF-00098)
(DE86-006060; LBL-20524; CONF-8510111-1) Avail: NTIS HC A02/MF A01

The driving force for exaggerated grain growth is derived from a new surface thermodynamic theory which reconciles the kinetics of equilibrium to the thermodynamics of equilibrium between subparts of a particle with anisotropic surface energies. Exaggerated growth is driven by the reduction in dislocation and grain boundary free energies produced when a larger grain sweeps out a volume element formerly occupied by small grains. Whether the advancing boundary is planar, concave, or convex depends on the relative rates of ledge nucleation and growth, on the growth direction, and on whether growth occurs at screw dislocations. The model is compared to observations and additional tests are suggested. DOE

N86-29705# Argonne National Lab., Ill.
CRYSTALLINE-TO-AMORPHOUS PHASE TRANSITION IN IRRADIATED SILICON
D. N. Seidman (Northwestern Univ., Evanston, Ill.), R. S. Averback, P. R. Okamoto, and A. C. Baily Jan. 1986 9 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract W-31-109-eng-38)
(DE86-006170; CONF-851217-40) Avail: NTIS HC A02/MF A01

The amorphous(a)-to-crystalline (c) phase transition has been studied in electron(e(-)) and/or ion irradiated silicon (Si). The irradiations were performed in situ in the Argonne High Voltage Microscope-Tandem Facility. The irradiation of Si, at <10 K, with 1-MeV e(-) to a fluence of 14 dpa failed to induce the c-to-a transition. Whereas an irradiation, at <10 K, with 1.0 or 1.5-MeV Kr+ ions induced the c-to-a transition by a fluence of approx.0.37 dpa. Alternatively a dual irradiation, at 10 K, with 1.0-MeV e(-) and 1.0 or 1.5-MeV Kr+ to a Kr+ fluence of 1.5 dpa where the ratio of the displacement rates for e(-) to ions was approx.0.5 - resulted in the Si specimen retaining a degree of crystallinity. These results are discussed in terms of the degree of dispersion of point defects in the primary state of damage and the mobilities of point defects. DOE

N86-29706# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
POLYCRYSTALLINE THIN-FILMS Annual Report
K. Zweibel and R. Mitchell Feb. 1986 32 p
(Contract DE-AC02-83CH-10093)
(DE86-004426; SERI/PR-211-2874) Avail: NTIS HC A03/MF A01

This annual report summarizes the status, accomplishments, and projected future research directions of the Polycrystalline Thin Film Task in the Photovoltaic Program Branch of the Solar Energy Research Institute's Solar Electric Research Division. Major subcontracted work in this area has concentrated on development of CuInSe2 and CdTe technologies. During FY 1985, major progress was achieved by subcontractors in: (1) developing a new, low-cost method of fabricating CuInSe2, and (2) improving the efficiency of CuInSe2 devices by about 10% (relative). The report also lists research planned to meet the Department of Energy's goals in these technologies. DOE

N86-29707# Naval Research Lab., Washington, D. C.
SPECTROSCOPIC STUDIES OF HYDROGENATED AMORPHOUS SILICON Annual Report, 15 Mar. 1984 - 15 Mar. 1985
S. G. Bishop and W. E. Carlos Feb. 1986 18 p
(Contract DE-AC02-83CH-10093)
(DE86-004427; SERI/STR-211-2896) Avail: NTIS HC A02/MF A01

Nuclear magnetic resonance (NMR), electron spin resonance (ESR), and photoluminescence (PL) spectroscopies have been used to study amorphous silicon films prepared by SERI subcontractors. NMR measurements show that the bonding of hydrogen in material propared by chemical vapor deposition (CVD) is similar to that in a-Si:H prepared using glow discharge. ESR and PL have been used to depth profile defects in CVD prepared films. These measurements indicate a concentration of defects in the top 5000 A. Light-induced effects in CVD-prepared films and dopants in microcrystalline Si:H have also been studied using ESR. DOE

N86-29708# State Univ. of New York, Stony Brook. Dept. of Physics.
CALCULATIONS OF RESISTIVITY AND SUPERCONDUCTING T/SUB c/ IN TRANSITION METALS
P. B. Allen, T. P. Beaulac, F. S. Khan, W. H. Butler, F. J. Pinski, and J. C. Swihart 1985 13 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-007869; CONF-851217-58) Avail: NTIS HC A02/MF A01

A survey is given of various electron-phonon effects which have been calculated for the metals Nb, Mo, Ta, Pd, and Cu. These effects include the mass enhancement lambda, superconducting T sub c, electrical and thermal resistivity, Hall coefficient, magnetoresistance, and the successfully tested predictions of linewidths (GAMMA)O of phonons. The calculations use local density approximations (LDA) energy bands, experimental phonons, and the rigid muffin tin (RMT) approximation. Mesh size noise is less than 1% and the Bloch-Boltzmann integral equation has been solved to unprecedented accuracy. DOE

N86-29709# Argonne National Lab., Ill.
CRYSTAL DIFFRACTION LENS AS A LONG RANGE GAMMA RAY SENSOR
R. K. Smither 1985 31 p Presented at the Workshop on Interactive Discrimination, Cambridge, Mass., 18 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-005562; CONF-8511162-1) Avail: NTIS HC A03/MF A01

A need has been identified for a detection system that could detect the presence of nuclear warhead in a missile or a satellite. The interrogation of a missile would most likely be active considering the short time available and the long distances involved (100 km to 1000 km). Although some sort of active interrogation process could be considered for the satellite case in peacetime, it would be highly desirable if the system were passive. It would also be highly desirable if the system could operate at relatively long distances from the satellite (1 km to 100 km). This proposal uses new technology developed at the Argonne National laboratory to develop a detector system that appears to have the needed sensitivity, directionality, and selective response function to achieve these goals. The system will use crystal diffraction lenses to detect the presence of characteristic x-rays and gamma-rays emitted from the fissile material and surrounding support structures. The angular resolution of the lens is sufficient to construct an image of the fissile material in the satellite assembly and detect the rpesence of more than one concentration of fissile material if there are multiple warheads on board if the lens is within 10 km of the object. A typical crystal lens would be 2 to 4 meters in diameter and consist of many thousands of small crystals mounted in circular arrays. DOE

N86-29710# Florida State Univ., Tallahassee.
He-ATOM SURFACE SCATTERING APPARATUS FOR STUDIES OF CRYSTALLINE SURFACE DYNAMICS Progress Report, 1 May 1985 - 30 Apr. 1986
1986 6 p
(Contract DE-FG05-85ER-45208)
(DE86-006794; DOE/ER-45208/1) Avail: NTIS HC A02/MF A01

The primary goal of this grant is the construction of a state-of-the-art He atom-crystal surface scattering apparatus which will be capable of measuring both elastic and inelastic scattering of He atoms from crystal surfaces of metals, semiconductors and insulators. First, the apparatus will be constructed and characterized, after which a program of studies on the surface dynamics of a variety of crystal surfaces will be started. DOE

N86-29711# Michigan Technological Univ., Houghton. Dept. of Physics.
THEORY OF DEFECTS IN NON-METALLIC SOLIDS Progress Report, 1 Aug. 1985 - 31 Dec. 1985
A. B. Kunz Feb. 1986 9 p
(Contract DE-FG02-85ER-45224)
(DE86-007660; DOE/ER-45224/1) Avail: NTIS HC A02/MF A01

A general method based upon ab initio quantum mechanical modeling of the region of a solid in the vicinity of a defect or impurity and upon the use of classical modeling of more remote regions in a self-consistent way is being undertaken. The initial progress has been in defining the scope of the model, validation of the several concepts, generation of some necessary theoretical formalism, and finally in an initial study of the excitonic spectra of several alkali iodides. This latter study is significant in several ways. It establishes: the size of cluster needed for such studies; the utility of norm-conserving core replacing pseudo potentials; and the need of treating spin-orbit and multiple structure in a proper way for localized excitation. DOE

N86-28980# Joint Publications Research Service, Arlington, Va.
PHILIPS DEVELOPS A NEW KIND OF SEMICONDUCTOR IMAGE SENSOR
In its West Europe report: Science and Technology (JPSR-WST-85-021) 12 Jul. 1985 2 p Transl. into ENGLISH from Frankfurter Zeitung/Blick Durch die Wirtschaft (Frankfurt-Main, West Germany), 8 May 1985 p 5 (For primary document see N86-28978 20-16)
Avail: NTIS HC A04/MF A01

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-29712# Lawrence Livermore National Lab., Calif.
SOME OF DUHEM'S CONTRIBUTIONS TO THERMODYNAMICS
D. G. Miller Oct. 1985 9 p Presented at the History of Science Society Annual Meeting, Bloomington, Ind., 31 Oct. 1985
(Contract W-7405-eng-48)
(DE86-002138; UCRL-93525; CONF-8510189-1) Avail: NTIS HC A02/MF A01

A number of Duhem's contributions to thermodynamics are presented. These include the systematic use of the thermodynamic potential and chemical potentials to obtain useful results, the Gibbs-Duhem and Duhem-Margules equations, the first rigorous definition of reversible processes, an excellent axiomatization of the First Law, and generalization of the Phase Rule to include masses. DOE

N86-29713# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
THE HARMONIC MAP AND KILLING FIELDS FOR SELF-DUAL SU(3) YANG-MILLS EQUATIONS
Paul Kersten and Ruud Martini Jun. 1984 89 p
(Memo-443; ESA-86-97364) Avail: NTIS HC A05/MF A01

Using symbolic computations, the unique metric in the manifold of fields, required to describe self-dual SU(3) Yang-Mills equations by a harmonic map between Riemannian manifolds, is determined. The complete Lie-algebra of Killing fields for this metric is established. ESA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-29714# Committee on Science and Technology (U. S. House).
SPACE COMMERCIALIZATION: 1985
1986 826 p Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 1st Session, no. 90, 18-20 Jun., 10-11 Sep., 30-31 Oct. 1985
(GPO-54-584) Avail: Subcommittee on Space Science and Applications

The prospects for emerging space-related industries and the potential markets were examined as a baseline for exploring the financial and commercialization issues confronting commercial space ventures and the role of Government. B.G.

N86-29715# Department of Defense, Washington, D. C.
DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR) ABSTRACTS OF PHASE 1 AWARDS, 1984
16 Apr. 1985 224 p
(AD-A165856) Avail: NTIS HC A10/MF A01 CSCL 15/5

This document is a bibliography of technical abstracts which describe the nature of the funded FY 1984 Phase 1 Small Business Innovation Research (SBIR) projects. Proprietary information is not provided in these abstracts. Therefore, technical details may be missing. For this reason, the report supplies the names of individuals in the small business firms who may be contacted should more information be needed on a specific project. Each abstract lists the company, responsible partly, title, service or agency, and gives award and dollar amount. GRA

N86-29716# Massachusetts Inst. of Tech., Cambridge.
PLANNING FOR CONJUNCTIVE GOALS M.S. Thesis. Technical Report, 1983 - 1985
David Chapman Nov. 1985 64 p Sponsored in part by IBM
(Contract N00014-80-C-0505; Grants NSF MCS-79-12179; NSF MCS-81-17633)
(AD-A165883; AI-TR-802) Avail: NTIS HC A04/MF A01 CSCL 05/1

The problem of achieving conjunctive goals has been central to domain-independent planning research; the nonlinear constraint-posting approach has been most successful. Previous planners of this type have been complicated, heuristic, and ill-defined. I have combined and distilled the state of the art into a simple, precise, implemented algorithm (TWEAK) which I have proved correct and complete. I analyze previous work on domain-independent conjunctive planning; in retrospect it becomes clear that all conjunctive planners, linear and nonlinear, work the same way. The efficiency of these planners depends on the traditional add/delete-list representation for actions, which drastically limits their usefulness. I present theorems that suggest that efficient general purpose planning with more expressive action representations is impossible, and suggest ways to avoid this problem. GRA

N86-29717# Kernforschungszentrum, Karlsruhe (West Germany).
STRATEGIES FOR IMPLEMENTING CAD. APPLICATION OF CAD AS A PROCESS OF PERSONNEL AND ORGANIZATIONAL DEVELOPMENT. PREPARATION AND REALIZATION OF THE IMPLEMENTATION PROCESS, VOLUME 1
W. Schaffitzel, U. Sellmer, K. Schlagenhauf, R. Kupferschmitt, and B. Schmid Aug. 1985 270 p In GERMAN; ENGLISH summary
(Contract BMFT-F11-050-KA-IAO/11)
(KfK-PFT-110-Vol-1; ESA-86-96906) Avail: NTIS HC A12/MF A01

Guidelines for the implementation of integrated CAD/CAM systems in industry and experience with industrial partners are presented. A project to analyze the experience of innovative companies and to stimulate the CAD/CAM applications in industry was developed. ESA

N86-29718# Kernforschungszentrum, Karlsruhe (West Germany).
STRATEGIES FOR IMPLEMENTING CAD. APPLICATION OF CAD AS A PROCESS OF PERSONNEL AND ORGANIZATIONAL DEVELOPMENT. PREPARATION AND REALIZATION OF THE IMPLEMENTATION PROCESS, VOLUME 2
W. Schaffitzel, U. Sellmer, K. Schlagenhauf, R. Kupferschmitt, B. Schmid, and V. Vassilakopoulos Aug. 1985 226 p In GERMAN; ENGLISH summary
(Contract BMFT-F11-050-KA-IAO/11)
(KfK-PFT-111-Vol-2; ESA-86-96907) Avail: NTIS HC A11/MF A01

A complete concept for CAD education is presented with a view to integration of CAD/CAM systems in industry. The concept is directed towards experts and politicians. It is based on investigations of CAD education activities, on advice of commissions, and on inquiries made in industries, universities, and institutes of technology. A market analysis among CAD tenderers is explained. An example of user-oriented tailoring of education material (teachware) is given. ESA

N86-29719# Farrell Lines, Inc., N.Y.
MICROCOMPUTER-BASED COST ANALYSIS SYSTEM. EXECUTIVE SUMMARY Report, Oct. 1982 - Jan. 1985
L. Smith and N. F. Kondas Nov. 1985 11 p Sponsored by Maritime Administration Prepared in cooperation with Temple, Barker and Sloane, Inc., Lexington, Mass.
(PB86-181930; MA-RD-770-85040) Avail: NTIS HC A02/MF A01; also available in set of 3 reports HC E99 as PB86-181922 CSCL 05A

This is the final report on a project to develop an overall corporate cost accounting and planning system having four main objectives: to create productivity standards and cost accountability at the local level by implementing an automated weekly cost reporting system; and to capture detailed intermodal transportation cost and summarize cost and recovery to help tariff making and cost control; to use the automated cost reporting system data base to improve accuracy and timeliness of preparation of corporate financial statements; and to create matrices of intermodal through unit costs for flexible freight solicitation decision making. Author

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-29720* National Aeronautics and Space Administration, Washington, D.C.
NASA THESAURUS SUPPLEMENT: A 4-PART CUMULATIVE SUPPLEMENT TO THE 1985 EDITION OF THE NASA THESAURUS
May 1986 155 p
(NASA-SP-7053(Supp-1); NAS 1.21:7053(Supp-1)) Avail: NTIS HC A08 CSCL 05B

The four part cumulative NASA Thesaurus Supplement to the 1985 edition ofthe NASA Thesaurus includes Part 1, Hierarchical Listing, Part 2, Access Vocabulary, Part 3, NASA Thesaurus Definitions, and Part 4, Changes. The semiannual supplement gives complete hierarchies for new terms. Author

N86-29721# University of Southern California, Marina del Rey. Information Sciences Inst.
DESIGN OF A MASTER LEXICON
Susanna Cumming Feb. 1986 28 p
(Contract MDA903-81-C-0335)
(AD-A165999; ISI/RR-85-163) Avail: NTIS HC A03/MF A01 CSCL 05/7

This document describes the design for a 'Master Lexicon' which is intended to serve all the lexical needs of the two grammars (RUS, an ATN parser, and Nigel, a systemic production grammar) of the JANUS natural language project. Each grammar had previously been using its own lexicon, and these two lexicons were significantly different, both in terms of content and in terms of design. The Master Lexicon incorporates features of each of the previous lexicons, significantly Nigel's feature hierarchy and RUS's treatment of morphology and cross-indexing; plus it includes several novel features, most notably a new lexical acquisition interface which allows the non-specialist user to add lexical items. Nigel is able to access the Master Lexicon directly, while a set of translation rules (given in the appendix) transform ML lexical entries to lexical entries of the style used by RUS. igel, Penman, RUS, Syntax, Systemic Linguistics, Text generation, Vocabulary, Word acquisition, Wordclass hierarchy, Wordclasses. GRA

N86-29722# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STRUCTURAL OPTIMIZATION METHOD FOR INFORMATION RESOURCE MANAGEMENT Ph.D. Thesis
Richard E. Peschke Dec. 1985 234 p
(AD-A166420; AFIT/CI/NR-86-12D) Avail: NTIS HC A11/MF A01 CSCL 05/1

The mainstays of management activity and managers have traditionally been the organizational resources of manpower, money, material and machines. The inclusion of these support resources early in the acquisition process has had a significant impact on the support of major systems. However, traditional management of these resources alone, is no longer adequate to insure the successful accomplishment of organizational goals and objectives. Organizational planning must include information and information systems in the early stages of the development process if system activities are to continue to insure mission support. The application of a multiattribute design methodology is a practical way to describe alternative versions of a proposed information system. This research makes a contribution to the Information Resource Management concept by developing a structured optimization methodology that will allow the designer-planner to efficiently guide the information system design process toward consistently meeting the IRM requirements of the organization. Additionally, this research devel ops a formal criterion function modeling procedure that evaluates alternative candidate systems through explicit analysis of both qualitative and quantitative criteria. GRA

N86-29723# Lawrence Livermore National Lab., Calif.
SPATIAL DATA HANDLING CAPABILITIES IN EMERGENCY RESPONSE
H. Walker Dec. 1985 14 p Presented at the Geographic Information Systems in the Government Workshop, Springfield, Va., 10 Dec. 1985
(Contract W-7405-eng-48)
(DE86-005089; UCRL-93416; CONF-851252-2) Avail: NTIS HC A02/MF A01

The ability of organizations to respond effectively to emergencies requires the utilization of many types of data. For the Atmospheric Release Advisory Capability (ARAC), an operational system at the Lawrence Livermore National Laboratory which provides assessments of the environmental consequences of an accidental release of radioactive material, much of the necessary data are geographical in nature. A system has been created that integrates numerical models, data acquisition systems, data analysis techniques, and professional staff. The ARAC system relies on two types of spatial data. First, digital terrain data is used as input to atmospheric models and, when presented in a graphical form, also serve to orient ARAC staff in unfamiliar areas. Secondly, geographic features (roads, rivers, political boundaries) are used as a base map to provide a reference frame for the graphical output from the ARAC models. A terrain system has been developed that provides terrain data at 500 meter resolution around any location in the conterminous United States within five minutes after an emergency notification. The ability to quickly create an appropriate base map using paper map products and digital map data also exists. Interactive computer graphics is an essential part of both the terrain and base mapping systems. DOE

N86-29724# Pacific Northwest Lab., Richland, Wash.
ASSURANCE PROGRAM FOR REMEDIAL ACTION (APRA) MICROCOMPUTER-OPERATED BIBLIOGRAPHY MANAGEMENT SYSTEM
R. D. Stenner, D. K. Washburn, and D. H. Denham Oct. 1985 10 p Presented at the 19th Midyear Topical Symposium on Health Physics Considerations in Decontamination and Decommissioning, Knoxville, Tenn., 2 Feb. 1986
(Contract DE-AC06-76RL-01830)
(DE86-007739; PNL-SA-13520; CONF-860203-15) Avail: NTIS HC A02/MF A01

Pacific Northwest Laboratory (PNL) provided technical assistance to the Office of Operational Safety (OOS) in developing their Assurance Program for Remedial Action (APRA). The APRA Bibliography Management System (BMS), a microcomputer-operated system designed to file, locate and retrieve project-specific bibliographic data, was developed to manage the documentation associated with APRA. The BMS uses APRABASE, a PNL-developed computer program written in dBASE II language, which is designed to operate using the commercially available dBASE II database software. The paper describes the APRABASE computer program, its associated subprograms, and the dBASE II APRA file. Although the BMS was designed to manage APRA-associated documents, it could be easily adapted for use in handling bibliographic data associated with any project. DOE

N86-29725# Societe Nationale Industrielle Aerospatiale, Paris (France).
RESEARCH IN THE FRAMEWORK OF A TERMINOLOGY NETWORK IN THE FIELD OF SPACE TECHNOLOGY [TRAVAIL DANS LE CADRE D'UN RESEAU DE TERMINOLOGIE EN MATIERE DE TECHNOLOGIE DE L'ESPACE]
Meyer Boudjedid 1986 9 p In FRENCH Presented at 2nd Infoterm Symposium
(SNIAS-861-550-101; ESA-86-97178) Avail: NTIS HC A02/MF A01

The network implemented by a leading aerospace company is described. It is based on a terminological and linguistic coordination extended to national and international levels, a terminological data bank, and a dictionary publishing center. The integration of these activities in an industrial organization is explained. The role played by automatic translation systems is discussed. ESA

N86-29726# Office of the Under Secretary of Defense for Policy, Washington, D.C.
CONTROL OF UNCLASSIFIED TECHNICAL DATA WITH MILITARY OR SPACE APPLICATION
D. Whitman May 1985 37 p
(PB86-183282; DOD-5230.25-PH) Avail: NTIS HC A03/MF A01 CSCL 05B

A report on Control of Unclassified Technical Data with Military or Space Application includes the following: Introduction, Background, Public Law 98-94, Defense implementation, Overall effect of the system. GRA

N86-29727# Touche, Ross and Co., Washington, D.C.
CORPORATE DATA NETWORK (CDN) DATA REQUIREMENTS TASK: PRELIMINARY STRATEGIC DATA PLAN
Nov. 1985 163 p
(Contract NRC-FIN-D1225)
(TI86-900472; NUREG/CR-4322-Vol-4) Avail: NTIS HC A08/MF A01

Background of the data requirement tasks; objective of the

strategic data plan; overview of the Corportation Data Network (CDN) and the logical data bases in the CDN; approach to plan development; evaluation criteria and methodology; qualitative factors which potentially affect developing priorities; development strategy; and schedule and budget estimates are summarized.
Author

N86-29728# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SCIENCE AND TECHNOLOGY POLICY
19 May 1986 90 p Transl. into ENGLISH from various Russian articles
(JPRS-UST-86-014) Avail: NTIS HC A05/MF A01

Science and technology topics addressed incude: organization, planning, and coordination; facilities and manpower; training and eductation; automation and information policy; patents and inventions; conferences and expositions; awards and prizes; and international relations. For individual titles, see N86-29729 through N86-29730.

N86-29729# Joint Publications Research Service, Arlington, Va.
KAZAKH SCIENTIFIC, TECHNICAL INFORMATION ORGANS
T. Tursunbayev and M. Goldman *In its* USSR Report: Science and Technology Policy (JPRS-UST-86-014) 19 May 1986 p 39-44 Transl. into ENGLISH from Narodnoye Khozyaystvo Kazakhstana (Alma-Ata, USSR), no. 12, Dec. 1985 p 26-28 (For primary document see N86-29728 20-82)
Avail: NTIS HC A05/MF A01

The information support of scientific and technical progress is an indispensable condition of the development of the economy in the direction of its utmost intensification. The republic scientific and technical information system (RSNTI) is a part of the statewide scientific and technical information system. The tasks of the information support ad tracking of both comprehensive goal and other programs of the national economy were assigned to the structural subdivisions of this system. The level of the information service of the republic makes it possible to offer the users of scientific and technical information more than 20 forms and methods of specific services. At present 25,000 enterprises and organizations are using the service. The service to the users was automated and was significantly improved. The improvements are discussed along with their impacts on the information system.B.G.

N86-29730# Joint Publications Research Service, Arlington, Va.
PROBLEMS IN PUBLICATION OF SCIENTIFIC, TECHNICAL LITERATURE
M. Razmakhnin, ed. *In its* USSR Report: Science and Technology Policy (JPRS-UST-86-014) 19 May 1986 p 45-48 Transl. into ENGLISH from Knizhnoye Obozreniye (Moscow, USSR), no. 47, 22 Nov. 1985 p 6 (For primary document see N86-29728 20-82)
Avail: NTIS HC A05/MF A01

The impact of lack of computerized equipment in the printing industry is discussed, especially the impact on availability of technical publications. Suggestions to speed up the process are discussed.
B.G.

N86-29294*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CENTRAL ON-LINE DATA DIRECTORY
James Thieman *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 3 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29295*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
UNIVERSITY PARTICIPATION VIA UNIDATA, PART 1
John Dutton *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 7 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29296*# University Corp. for Atmospheric Research, Boulder, Colo.
UNIVERSITY PARTICIPATION VIA UNIDATA, PART 2
David W. Fulker *In* NASA. Goddard Space Flight Center Proceedings of the Second Pilot Climate Data System Workshop 1986 5 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29297*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NETWORK ACCESS TO PCDS (SPAN, ESN, SESNET, ARPANET)
James Green *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 29 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

N86-29298*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHODS OF DOWNLOADING TO USER INSTITUTIONS
Lloyd Treinish *In its* Proceedings of the Second Pilot Climate Data System Workshop 1986 10 p (For primary document see N86-29282 20-42)
Avail: NTIS HC A12/MF A01 CSCL 04B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-29731*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA/DOE AUTOMOTIVE STIRLING ENGINE PROJECT: OVERVIEW 1986 Final Report
Donald G. Beremand and Richard K. Shaltens 1986 21 p Prepared for presentation at the 21st Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25-29 Aug. 1986 (NASA-TM-87345; DOE/NASA-50112/66; E-3098; NAS 1.15:87345) Avail: NTIS HC A02/MF A01 CSCL 13F

The DOE/NASA Automotive Stirling Engine Project is reviewed and its technical progress and status are presented. Key technologies in materials, seals, and piston rings are progressing well. Seven first-generation engines, and modifications thereto, have accumulated over 15,000 hr of test time, including 1100hr of in-vehicle testing. Results indicate good progress toward the program goals. The first second-generation engine is now undergoing initial testing. It is expected that the program goal of a 30-percent improvement in fuel economy will be achieved in tests of a second-generation engine in a Celebrity vehicle.
Author

N86-29732*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERVIEW OF NASA LEWIS RESEARCH CENTER FREE-PISTON STIRLING ENGINE TECHNOLOGY ACTIVITIES APPLICABLE TO SPACE POWER SYSTEMS Final Report
Jack G. Slaby 1986 13 p Proposed for presentation at the 4th Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 12-16 Jan. 1987; sponsored by the Institute for Space Nuclear Power Studies
(Contract DE-AI05-82OR-1005)
(NASA-TM-88815; DOE/NASA-1005/10; E-3170; NAS 1.15:88815) Avail: NTIS HC A02/MF A01 CSCL 10B

Free piston Stirling technology is applicable for both solar and nuclear powered systems. As such, the Lewis Research Center serves as the project office to manage the newly initiated SP-100 Advanced Technology Program. This five year program provides the technology push for providing significant component and subsystem options for increased efficiency, reliability and survivability, and power output growth at reduced specific mass. One of the major elements of the program is the development of advanced power conversion concepts of which the Stirling cycle is a viable candidate. Under this program the research findings of the 25 kWe opposed piston Space Power Demonstrator Engine (SPDE) are presented. Included in the SPDE discussions are initial differences between predicted and experimental power outputs and power output influenced by variations in regenerators. Projections are made for future space power requirements over the next few decades. And a cursory comparison is presented showing the mass benefits that a Stirling system has over a Brayton system for the same peak temperature and output power. Author

N86-29733# Lawrence Livermore National Lab., Calif.
EE TECHNICAL REVIEW
Dec. 1985 79 p
(Contract W-7405-eng-48)
(DE86-005304; UCRL-50025-85-3) Avail: NTIS HC A05/MF A01

Brief summaries are given of electronics engineering work, including: laser engineering, engineering research, nuclear energy systems, engineering services, and field test systems. Individual papers are abstracted separately. DOE

N86-29734# Washington Consulting Group, Inc., Washington, D.C.
TECHNOLOGY TRANSFER PILOT STUDY Final Report
28 Jan. 1986 47 p Prepared in cooperation with Compass Corp., Inc., Milwaukie, OR.
(Contract DE-AC01-84DP-20143)
(DE86-005777; DOE/DP-20143/T1) Avail: NTIS HC A03/MF A01

Four specific technologies based on the Inertial Confinement Fusion Program were targeted for this initial study. The areas chosen were the CO2 laser, high pressure freon cleaning, video multiplexer, and plano-optics polishing. The study concluded that both Government and Industry are willing and anxious to promote and to reap the benefits of technology transfer. Recommendations were made in the areas of patent policy, documentation procedures in the transfer process, awareness training, and expansion of the scope of the study. DOE

N86-29735# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ACCEPTANCE, VERIFICATION, AND PERFORMANCE TEST RESULTS FOR THE BEDFORD CF ELECTRIC VAN
H. W. Heiselmann Jan. 1986 193 p
(Contract DE-AC07-76ID-01570)
(DE86-007650; EGG-SE-7033) Avail: NTIS HC A09/MF A01

Acceptance, verification, and performance testing of a production Bedford CF Electric Van from Lucas Chloride Electric Vehicle Systems was performed for the US Department of Energy by EG and G Idaho, Inc. Battery characterization, as well as vehicle track and dynamometer tests, were performed. The track and dynamometer tests were performed in accordance with the Society of Automotive Engineers Electric Vehicle Test Procedures and the US Code of Federal Regulations, Title 10, Part 475. Results show the Bedford van is a sturdy, dependable vehicle with adequate accessories and good performance characteristics for its intended short-haul service use. City driving range is approximately 60 miles with an ac energy economy of approximately 0.9 kWh/mile. DOE

N86-29736# Brookhaven National Lab., Upton, N. Y.
TECHNOLOGY TRANSFER REPORT, FY 1985
1986 35 p
(Contract DE-AC02-76CH-00016)
(DE86-008394; BNL-37865) Avail: NTIS HC A03/MF A01

In FY 1985, the ORTA intensified its efforts in interacting with the private sector. Visits to the laboratory by industrial scientists searching for laboratory capabilities or inventions that would be of value to them increased. Several venture capital groups visited the laboratory and discussed mechanisms by which they might be able to implement the commercialization of laboratory technology. The ORTA has interacted with neighboring educational institutions and local government officials in the interest of establishing an incubator facility, a middle ground research facility, and a NASA sponsored space commercialization center. These activities will continue and a proposal has been submitted to DOE to initiate a mini-incubator at the laboratory to serve as an interim facility until a permanent facility is established. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-29737*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HUBBLE SPACE TELESCOPE METEOROID-DEBRIS PROTECTION ANALYSIS
Jennifer Horn and Juan Maldonado Jun. 1986 38 p
(NASA-TM-86552; NAS 1.15:86552) Avail: NTIS HC A03/MF A01 CSCL 03A

A system level failure could occur if the Hubble Space Telescope's (ST) capability to operate as a facility on-orbit is critically reduced or when a significant reduction in the quality of science data is registered. Failure could occur if a meteoroid/debris impact damages a component of a major support subsystem or if a meteoroid/debris penetration causes straylight contamination in the light shield, forward shell, aft shroud, or through the aperture door. The ST was analyzed to find the probability of no critical penetration. This probability value was found to be 92.25% for a two-year service life. A straylight leakage repair technique was recommended for the aft shroud, the region found most likely to be critically penetrated. Fozar tape and multilayer insulation blankets are suggested as posible repair materials. M.G.

N86-29738*# Stanford Univ., Calif. Guidance and Control Lab.
SPACE INFRARED TELESCOPE POINTING CONTROL SYSTEM. INFRARED TELESCOPE TRACKING IN THE PRESENCE OF TARGET MOTION Final Report
J. David Powell and Julie Benson Schneider 6 Jun. 1986 112 p
(Grant NCA2-IR745-407)
(NASA-CR-177007; NAS 1.26:177007) Avail: NTIS HC A06/MF A01 CSCL 03A

The use of charge-coupled-devices, or CCD's, has been documented by a number of sources as an effective means of providing a measurement of spacecraft attitude with respect to

the stars. A method exists of defocussing and interpolation of the resulting shape of a star image over a small subsection of a large CCD array. This yields an increase in the accuracy of the device by better than an order of magnitude over the case when the star image is focussed upon a single CCD pixel. This research examines the effect that image motion has upon the overall precision of this star sensor when applied to an orbiting infrared observatory. While CCD's collect energy within the visible spectrum of light, the targets of scientific interest may well have no appreciable visible emissions. Image motion has the effect of smearing the image of the star in the direction of motion during a particular sampling interval. The presence of image motion is incorporated into a Kalman filter for the system, and it is shown that the addition of a gyro command term is adequate to compensate for the effect of image motion in the measurement. The updated gyro model is included in this analysis, but has natural frequencies faster than the projected star tracker sample rate for dim stars. The system state equations are reduced by modelling gyro drift as a white noise process. There exists a tradeoff in selected star tracker sample time between the CCD, which has improved noise characteristics as sample time increases, and the gyro, which will potentially drift further between long attitude updates. A sample time which minimizes pointing estimation error exists for the random drift gyro model as well as for a random walk gyro model. Author

N86-29739*# Helsinki Univ. (Finland).
A NOTE ON HAPKE'S BIDIRECTIONAL REFLECTANCE SPECTROSCOPY. PART 3: CORRECTION FOR MACROSCOPIC ROUGHNESS
Kari Lumme and Edward Bowell (Lowell Observatory, Flagstaff, Ariz.) 1986 13 p
(Grant NsG7-500)
(NASA-CR-176965; NAS 1.26:176965) Avail: NTIS HC A02/MF A01 CSCL 03A

The multiple-scattering theory of K. Lumme and E. Bowell (1981) was criticized by B. Hapke by stating, in particular, that energy is not conserved. It is shown that Hapke's treatment is, in this respect, inferior to that of Lumme and Bowell, and itself violates the principal concepts of radiative transfer theory. Hapke's additinal claim that, in Lumme and Bowell's work, the reflectance tends to zero at the limb is also refuted. Comment is made on the deduction of surface physical properties by modeling photometric observations. Author

N86-29740# Los Alamos National Lab., N. Mex.
LIGHT AND VELOCITY CURVES OF BUMP CEPHEIDS
A. N. Cox and C. R. Proffett 1985 4 p Presented at the 4th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, Santa Fe, N. Mex., 16 Oct.1985
(Contract W-7405-eng-36)
(DE86-003651; LA-UR-85-4110; CONF-8510265-3) Avail: NTIS HC A02/MF A01

Presented are light and velocity curves for eight hydrodynamic bump Cepheid models. All of the models were converged to the fundamental mode solution using a relaxation technique developed by Stellingwerf (1974). Use of this method assures that the time behavior repeats each period to better than one part in a thousand. The motivation for this work was to help Buchler, at the University of Florida, to develop his theory of modal interactions in pulsating stars. DOE

N86-29741# Los Alamos National Lab., N. Mex.
THEORETICAL INTERPRETATIONS OF ANOMALOUS CEPHEID PULSATIONS
A. N. Cox and C. R. Proffett 1985 4 p Presented at the 4th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, Santa Fe, N. Mex., 16 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003652; LA-UR-85-4109; CONF-8510265-2) Avail: NTIS HC A02/MF A01

Anomalous Cepheids are variable stars found in metal poor systems, with a low mass main sequence turnoff, that are significantly brighter (0.4 to 1.0 magnitude) than the RR Lyrae variables in the same system. They do have similar periods and effective temperatures. In dwarf spheroidal systems such as Draco, Leo II, Sculptor and Ursae Major, they are quite common, but they are rare in globular clusters. Only one is well known in the globular cluster NGC 5466 (Zinn and Dahn, 1976), but there are other possible candidates in M15 and omega Centauri. Similar objects are found in the SMC, but none are seen in the LMC. DOE

N86-29742# Los Alamos National Lab., N. Mex.
COMPARISON OF THEORETICAL AND OBSERVED SODIUM D2 LINE PROFILES FOR TWO LATE-TYPE DWARFS
D. C. Boice 1985 4 p Presented at the 4th Cambridge Workshop on Cool Stars, Stellar Systems, and the Sun, Santa Fe, N. Mex., 16 Oct. 1985
(Contract W-7405-eng-36)
(DE86-003678; LA-UR-85-3983; CONF-8510265-1) Avail: NTIS HC A02/MF A01

For many years the Ca II H and K lines and the Mg II h and k lines have been used as chromospheric diagnostics to compute semi-empirical model chromospheres for late-type stars. However, since Johnson (1964) showed that the Na I D1 and D2 lines are collision-controlled in the atmospheres of late-type stars, only a few researchers have studied the detailed NLTE formation of these lines. Such a study for the two stars, EQ Vir (dK5e) and Gliese 616.2 (dm1.5e) is summarized. A detailed discussion of this research can be found in Boice (1985). High resolution observations of the D lines for these two stars have been obtained at the KPNO 4-meter Mayall telescope using the echelle spectrometer with a resolution of 0.158A at D2. DOE

N86-29743# Royal Greenwich Observatory, Herstmonceux (England).
TELESCOPES, INSTRUMENTS, RESEARCH, AND SERVICES: OCTOBER 1, 1980 - SEPTEMBER 30, 1985
Paul Murdin, ed. and Jasper Wall, ed. 1985 129 p
(ESA-86-97102) Avail: NTIS HC A07/MF A01

Research in galaxies; extragalactic region; black holes; star formation; star clusters; astrometry; and space geodesy is summarized. Astronomical telescopes; satellite laser ranging; the HIPPARCOS mission; and services provided to scientists and the public by the Royal Greenwich Observatory are described. ESA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-29744*# Scripps Institution of Oceanography, La Jolla, Calif. Geological Research Div.
CARBONACEOUS CHONDRITES: EARLY IRRADIATION AND Pu-244 FISSION RECORDS Final Technical Report, 1 Feb. 1975 - 31 Jan. 1983
J. D. Macdougall. 1983 8 p refs
(Grant NsG-7121)
(NASA-CR-177288; NAS 1.26:177288) Avail: NTIS HC A02/MF A01 CSCL 03B

The carbonaceous meteorites were studied. The studies which were conducted have evolved from investigations of early irradiation to mineralogic and petrologic studies of refractory inclusions and to an examination of the time scales of alteration processes on the parent bodies. The attached listing of papers and abstracts provide the details. Author

N86-29745*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL STUDIES OF COLLAPSING INTERSTELLAR CLOUDS Final Technical Report
Peter H. Bodenheimer (Lick Observatory, Santa Cruz, Calif.), Karen R. Villere (California Univ., Santa Cruz.), and David C. Black 15 Feb. 1986 21 p
(Contract NCC2-269)

(NASA-TM-88771; NAS 1.15:88771) Avail: NTIS HC A02/MF A01 CSCL 03B

Numerical simulation of the structure and evolution of interstellar clouds was initiated. Steps were taken toward an integrated treatment of the dynamical, thermal, and chemical processes entering model calculations. A detailed study was made of radiative transfer in molecular lines to allow model predictions to be tested against empirical data. The calculations have successfully reproduced and explained several observed cloud properties, including abundances of complex molecular species and the apparent depletion of CO in dense cores. Author

N86-29746# Lick Observatory, Santa Cruz, Calif.
PHYSICS OF SUPERNOVAE
S. E. Woosley and T. A. Weaver (Lawrence Livermore National Lab., Calif.) 13 Dec. 1985 31 p Prepared in cooperation with Lawrence Livermore National Lab., CA.
(Contract W-7405-eng-48)
(DE86-005619; UCRL-93818) Avail: NTIS HC A03/MF A01

Presupernova models of massive stars are presented and their explosion by delayed neutrino transport examined. A new form of long duration Type II supernova model is also explored based upon repeated encounter with the electron-positron pair instability in stars heavier than about 60 M sub solar. Carbon deflagration in white dwarfs is discussed as the probable explanation of Type I supernovae and special attention is paid to the physical processes whereby a nuclear flame propagates through degenerate carbon. DOE

N86-29747# Lawrence Livermore National Lab., Calif.
GAMMA RAY BURSTS AND NEUTRON STAR STRUCTURE
E. Liang Jun. 1985 7 p Presented at the 4th Marcel Grossmann Meeting on General Relativity, Rome, Italy, 17 Jun. 1985
(Contract W-7405-eng-48)
(DE86-002140; UCRL-93514; CONF-8506208-1) Avail: NTIS HC A02/MF A01

New results are summarized on neutron star structure and vibrational frequencies using the redshift database derived from gamma ray burst annihilation lines. DOE

N86-29748# Los Alamos National Lab., N. Mex.
CHEMICO-PHYSICAL MODELS OF COMETARY ATMOSPHERES
W. F. Huebner, J. J. Keady, D. C. Boice, H. U. Schmidt, and R. Wegmann 1985 10 p Presented at the International Astronomical Union Symposium, Goa, India, 3 Dec. 1985 Prepared in cooperation with Max-Planck-Institut fuer Physik und Astrophysik, Garching, West Germany
(Contract W-7405-eng-36)
(DE86-006031; LA-UR-86-268; CONF-851262-2) Avail: NTIS HC A02/MF A01

Sublimation (vaporization) of the icy component of a cometary nucleus determines the initial composition of the coma gas as it streams outward and escapes. Photolytic reactions in the inner coma, escape of fast, light species such as atomic and molecular hydrogen, and solar wind interaction in the outer coma alter the chemical composition and the physical nature of the coma gas. Models that describe these interactions must include: (1) chemical kinetics; (2) coma energy balance; (3) multifluid flow for the rapidly escaping light components, the heavier bulk fluid, and the plasma with separate temperatures for electrons and the remainder of the gas; (4) transition from a collision dominated inner region to free molecular flow of neutrals in the outer region; (5) pickup of cometary ions by the solar wind; (6) counter and cross streaming of neutrals with respect to the plasma which outside of the contact surface also contains solar wind ions; and (7) magnetic fields carried by the solar wind. Progress on such models is described and results including velocity, temperature, and number density profiles for important chemical species are presented and compared with observations. DOE

N86-29749# Los Alamos National Lab., N. Mex.
COMPUTATION OF MOLECULAR ABUNDANCES OF OPACITIES IN THE ATMOSPHERES OF LATE-TYPE STARS
C. M. Sharp 1985 3 p Presented at the International Astronomical Union Symposium, Goa, India, 3 Dec. 1985
(Contract W-7405-eng-36)
(DE86-006038; LA-UR-86-348; CONF-851262-1) Avail: NTIS HC A02/MF A01

The presence of molecules in cool stellar atmospheres can dominate the opacity. Some calculations have been done with a carbon-rich mixture of C/O = 2, and the molecules C2, CN, HCN and C2H2 are major sources of opacity due to their large abundances. New calculations with HCN and C2H2 show they can be important. DOE

N86-29750# Los Alamos National Lab., N. Mex.
PG1159 VARIABLES
A. N. Cox 1985 9 p Presented at the International Astronomical Union Meeting, New Delhi, India, 17 Nov. 1985
(Contract W-7405-eng-36)
(DE86-006041; LA-UR-86-379; CONF-8511151-1) Avail: NTIS HC A02/MF A01

A 0.6 solar mass model is discussed that has a temperature ranging from 100,000 K for its surface effective temperature to a maximum of almost 200 million K, and then a decrease to about 85 million K at the center. This temperature inversion is caused by strong neutrino losses at the high central densities. These internal densities range from 0.000001 to one million K, g/cm(3) from the surface to the center. For luminosities considerably lower than the 1.075 x 10 to the 35th power erg/sec for this model, the central temperature inversion disappears and the central density grows larger. For the PG1159 class of stars however, there is always this inversion. DOE

N86-29751# Chicago Univ., Ill.
COSMOLOGIST'S TOUR THROUGH THE NEW PARTICLE ZOO (CANDY SHOP)
M. S. Turner Jan. 1986 40 p Presented at the International Astronomical Union Meeting, Princeton, N.J., 24 Jun. 1985 Prepared in cooperation with Fermi National Accelerator Lab., Batavia, Ill.
(Contract DE-AC02-76CH-03000)
(DE86-007889; FNAL/C-86/18-A; CONF-8506199-3) Avail: NTIS HC A03/MF A01

Recent developments in elementary particle physics have led to a renaissance in cosmology and in the study of structure formation. Already, the study of the very early (t less than or equal to 0.01 sec) history of the Universe has provided valuable hints as to the initial data for the structure formation problem - the nature and origin of the primeval density inhomogeneities, the quantity and composition of matter in the Universe today, and numerous candidates for the constituents of the ubiquitious dark matter. I review the multitude of WIMP candidates for the dark matter provided by modern particle physics theories, putting them into context by briefly discussing the theories which predict them. I also review their various birth sites and birth processes in the early Universe. At present the most promising candidates seem to be a 30 or so eV neutrino, a few GeV photino, or the invisible axion (weighing in at about 0.00001 eV), with a planck mass monopole, quark nuggets, and shadow matter as the leading dark horse candidates. I also mention some ve ry exotic possibilities - unstable WIMPs, cosmic strings, and even the possibility of a relic cosmological term. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-29752*# National Aeronautics and Space Administration, Washington, D.C.

VERTICAL THERMAL STRUCTURE OF THE VENUS ATMOSPHERE FROM TEMPERATURE AND PRESSURE MEASUREMENTS
V. M. Linkin, Zh. Blamon, A. P. Lipatov, S. I. Devyatkin, A. V. Dyachkov, S. I. Ignatova, V. V. Kerzhanovich, K. Malyk, V. I. Stadny, Ya. V. Sanotskiy et al May 1986 9 p Transl. into ENGLISH from Pismma v AZh (USSR), v. 12, no. 2, 1986 p 100-105 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88420; NAS 1.15:88420) Avail: NTIS HC A02/MF A01 CSCL 03B

Accurate temperature and pressure measurements were made on the Vega-2 lander during its entire descent. The temperature and pressure at the surface were 733 K and 89.3 bar, respectively. A strong temperature inversion was found in the upper troposphere. Several layers with differing static stability were visible in the atmospheric structure. Author

N86-29753*# National Aeronautics and Space Administration, Washington, D.C.
CHEMICAL ANALYSIS OF AEROSOL IN THE VENUSIAN CLOUD LAYER BY REACTION GAS CHROMATOGRAPHY ON BOARD THE VEGA LANDERS
B. G. Gelman, Yu. V. Drozdov, V. V. Melnikov, V. A. Rotin, V. N. Khokhlov, V. B. Bondarev, G. G. Dolnikov, A. V. Dyachkov, D. F. Nenarokov, L. M. Mukhin et al May 1986 8 p Transl. into ENGLISH from Pisma v AZh (USSR), v. 12, no. 2, 1986 p 106-109 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88421; NAS 1.15:88421) Avail: NTIS HC A02/MF A01 CSCL 03B

The experiment on sulfuric acid aerosol determination in the Venusian cloud layer on board the Vega landers is described. An average content of sulfuric acid of approximately 1 mg/cu m was found for the samples taken from the atmosphere at heights from 63 to 48 km and analyzed with the SIGMA-3 chromatograph. Sulfur dioxide (SO2) was revealed in the gaseous sample at the height of 48 km. From the experimental results and blank run measurements, a suggestion is made that the Venusian cloud layer aerosol consists of more complicated particles than the sulfuric acid water solution does. Author

N86-29754*# National Aeronautics and Space Administration, Washington, D.C.
MEASUREMENTS OF THE COMPOSITION OF AEROSOL COMPONENT OF VENUSIAN ATMOSPHERE WITH VEGA 1 LANDER, PRELIMINARY DATA
Yu. A. Surkov, V. F. Ivanova, A. N. Pudov, V. P Volkov, E. P. Sheretov, B. I. Kolotilin, M. P. Safonov, R. Thomas, J. Lespagnol, A. Hauser et al May 1986 8 p Transl. into ENGLISH from Pisma v AZh (USSR), v. 12, no. 2, 1986 p 110-113 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88422; NAS 1.15:88422) Avail: NTIS HC A02/MF A01 CSCL 03B

Preliminary investigation of mass spectra of gaseous products of pyrolyzed Venusian cloud particles collected and analyzed by the complex device of mass-spectrometer and collector pyrolyzer on board Vega 1 lander revealed the presence of heavy particles in the upper cloud layer. Based on 64 amu peak (SO2+), an estimate of the lower limit of the sulfuric acid aerosol content at the 62 to 54 km heights of approximately 2.0 mg/cu m is obtained. A chlorine line (35 and 37 amu) is also present in the mass spectrum with a lower limit of the chlorine concentration of approximately 0.3 mg/ cu m. Author

N86-29302*# National Center for Atmospheric Research, Boulder, Colo.
APPLICATIONS OF A VENUS THERMOSPHERIC CIRCULATION MODEL
S. W. Bougher, R. E. Dickinson, E. C. Ridley, and R. G. Roble *In* NASA. Goddard Space Flight Center Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 1-21 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

N86-29335*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A THREE DIMENSIONAL MODEL OF THE VENUSIAN THERMOSPHERE WITH SUPERROTATION
D. R. Stevens-Rayburn (Applied Research Corp., Landover, Md.), H. G. Mayr, and I. Harris *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 445-450 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

N86-29337*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF COMPOSITION FROM PIONEER VENUS
H. A. Taylor, Jr. *In its* Thermosphere Dynamics Workshop, Volume 2 Jun. 1986 p 463-465 (For primary document see N86-29301 20-42)
Avail: NTIS HC A20/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-29755# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RAPID SPECTRAL AND FLUX TIME VARIATIONS IN A SOLAR-BURST OBSERVED AT VARIOUS DM-MM WAVE LENGTHS AND AT HARD X-RAYS
A. M. Zodi Vaz, P. Kaufmann, E. Correia, J. E. R. Costa, E. W. Cliver (Air Force Geophysics Lab., Hanscom AFB, Mass.), T. Takakura (Tokyo Univ. (Japan).), and K. F. Tapping (Herzberg Inst. of Astrophysics, Ottawa (Ontario).) Feb. 1986 15 p refs Presented at the SMM Topical Workshop on Rapid Fluctuations in Solar Flares, Lanham, Md., 29 Sep. - 4 Oct. 1985 Submitted for publication
(INPE-3811-PRE/897) Avail: NTIS HC A02/MF A01

A solar burst was observed with high sensitivity and time resolution at cm-mm wavelengths by two different radio observatories (Itapetinga and Algonquin), with high spectral time resolution at dm-mm wavelengths by patrol instruments (Sagamore Hill), and at hard X-rays (HXM-Hinotori). At the onset of the major burst time structure there was a rapid rise in the spectral turnover frequency (from 5 to 15 GHz), in about 10s, coincident to a reduction of the spectral index in the optically thin part of the spectrum. The burst maxima were not time coincident at the optically thin radio frequencies and at the different hard X-ray energy ranges. The profiles at higher radio frequencies exhibited better time coincidence to the higher energy X-rays. The hardest X-ray spectrum (-3) coincided with peak radio emission at the higher frequency (44 GHz). The event appear to be built up by a first major injection of softer particles followed by other injections of harder particles. Ultrafast time structures were identified as superimposed on the burst emission at the cm-mm high sensitivity data at X-rays, with predominant repetition rates ranging from 2.0 to 3.5 Hz. Author

N86-29756*# Alaska Univ., Fairbanks. Geophysical Inst.
A SIMULATION STUDY OF TWO MAJOR EVENTS IN THE HELIOSPHERE DURING THE PRESENT SUNSPOT CYCLE
S.-I. Akasofu, W. Fillius (California Univ., San Diego, La Jolla.), Wei SUN, C. Fry, and M. Dryer (National Oceanic and Atmospheric Administration, Boulder, Colo.) 1985 48 p
(Grant NAG2-153)
(NASA-CR-176943; NAS 1.26:176943) Avail: NTIS HC A03/MF A01 CSCL 03B

The two major disturbances in the heliosphere during the

present sunspot cycle, the event of June to August, 1982, and the event of April to June, 1978, are simulated by the method developed by Hakamada and Akasofu (1982). Specifically, an attempt was made to simulate the effects of six major flares from three active regions in June and July, 1982, and April and May, 1978. A comparison of the results with the solar wind observations at Pioneer 12 (approximately 0.8 au), ISEE-3 (approximately 1 au), Pioneer 11 (approximately 7 to 13 au) and Pioneer 10 (approximately 16 to 28 au) suggests that some major flares occurred behind the disk of the sun during the two periods. The method provides qualitatively some information as to how such a series of intense solar flares can greatly disturb both the inner and outer heliospheres. A long lasting effect on cosmic rays is discussed in conjunction with the disturbed heliosphere. Author

N86-29757# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
COMPARISONS OF MODELED AND MEASURED SPECTRAL SOLAR IRRADIANCE DATA
C. J. Riordan Feb. 1986 55 p
(Contract DE-AC02-83CH-10093)
(DE86-004425; SERI/TR-215-2809) Avail: NTIS HC A04/MF A01

This report contains comparisons of modeled and measured spectral solar irradiance data made at the Solar Energy research Institute (SERI). The modeled data were generated using a simple, spectral solar irradiance model developed at SERI; measured data were obtained with LI-COR model LI-1800 portable spectroradiometers specially modified at SERI. This work is part of a continuing endeavor to verify spectral irradiance models and to generate spectral irradiance data for different locations and climates. DOE

N86-29758# Bern Univ. (Switzerland). Div. of Solar Observations.
BERNE SOLAR OBSERVATIONS FOR JANUARY-DECEMBER 1985
1986 14 p
(Rept-52; ESA-86-97070) Avail: NTIS HC A02/MF A01

The results of the standard measurements carried out at the solar observatory are presented. The measurements show start, maximum, duration, peak flux, and circular polarization at peak as a percentage of outstanding events. ESA

N86-29759# Consiglio Nazionale delle Ricerche, Frascati (Italy). Ist. di Fisico dello Spazio Interplanetario.
A MODEL FOR PROTON HEATING IN THE SOLAR WIND
H. A. Shah, L. Iess, and M. Dobrowolny Sep. 1985 38 p
Sponsored by ICTP, Trieste
(IFSI-85-9; ESA-86-97093) Avail: NTIS HC A03/MF A01

Quasilinear theory is used to calculate the power dissipated via obliquely propagating Alfven waves to heat the solar wind protons. This shows good agreement with the power which needs to be supplied to the solar wind protons as deduced from Helios observations. A corresponding calculation is made to obtain the evolution of parallel proton temperature with increasing heliocentric distance. Theoretical results and those obtained from Helios data compare well, especially for the fast streams. ESA

N86-29760# National Oceanic and Atmospheric Administration, Boulder, Colo. World Data Center A for Solar-Terrestrial Physics.
SOLAR MAGNETIC FIELD, 1976 THROUGH 1985: AN ATLAS OF PHOTOSPHERIC MAGNETIC FIELD OBSERVATIONS AND COMPUTED CORONAL MAGNETIC FIELDS FROM THE JOHN M. WILCOX SOLAR OBSERVATORY AT SANFORD, 1976-1985
J. T. Hoeksema and P. H. Scherrer Jan. 1986 370 p
(PB86-183522; UAG-94) Avail: NTIS HC A16/MF A01 CSCL 03B

Daily magnetogram observations of the large-scale photospheric magnetic field have been made at the John M. Wilcox Solar Observatory at Stanford since May of 1976. These measurements provide a homogeneous record of the changing solar field through most of Solar Cycle 21. Using the photospheric data, the configuration of the coronal and heliospheric fields can be calculated using a Potential Field - Source Surface model. This provides a 3-dimensional picture of the heliospheric field evolution during the solar cycle. In the report the authors present the complete set of synoptic charts of the measured photospheric magnetic field, the computed field at the source surface, and the coefficients of the multipole expansion of the coronal field. The general underlying structure of the solar and helispheric fields, which determine the environment for solar terrestrial relations and provide the context within which solar activity related events occur, can be approximated from these data. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N86-29761# California Univ., Berkeley. Lawrence Berkeley Lab.
REVIEW OF COSMIC BACKGROUND RADIATION SPECTRUM MEASUREMENTS: LIMITS ON DISTORTIONS, ENERGY RELEASE AND COSMOLOGICAL PROCESSES
G. F. Smoot Jan. 1986 12 p Presented at the International Astronomical Union Meeting, New Delhi, India, 17 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE86-007487; LBL-20942; CONF-8511151-2) Avail: NTIS HC A02/MF A01

This paper reviews the three major cosmic microwave background radiation (CMBR) spectrum measurement programs conducted and published since the last (XVII) IAU General Assembly. The results are consistent with a Planckian spectrum with temperature 2.72 +- 0.03 K spanning a wavelength range of 0.1 to 12 cm. Limits on possible distortions and implications are outlined. Ongoing and future measurements are discussed. DOE

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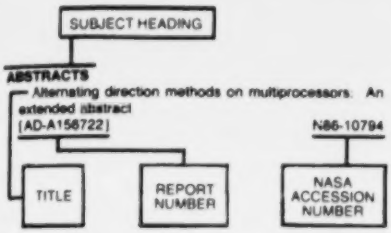

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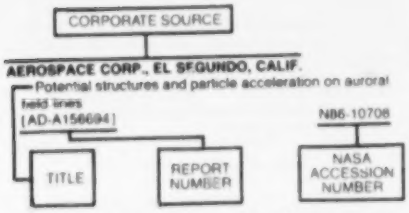

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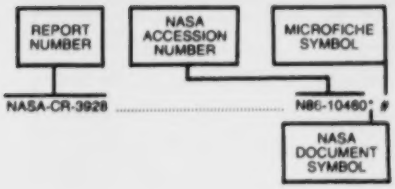

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Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3390**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **3391**

89 ASTRONOMY **3396**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3397**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3398**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS **3399**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **3400**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATION AND ABSTRACT

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

VOLUME 24 NUMBER 21 / NOVEMBER 8, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-29762*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MOTION AND INTERACTION OF DECAYING TRAILING VORTICES IN SPANWISE SHEAR WIND
Chen-Huei Liu and Ting Lu (New York Univ., New York.) Sep. 1986 26 p
(NASA-TP-2599; L-16040; NAS 1.60:2599) Avail: NTIS HC A03/MF A01 CSCL 01B

A simulation is presented of the drift of trailing vortices in a cross-wind near the ground by an unsteady, two-dimensional, rotational flow field with a concentration of large vorticity in vortical spots (having a finite but small effective size and finite total strength). The problem is analyzed by a combination of the method of matched asymptotic analyses for the decay of the vortical spots and the Euler solution for the unsteady rotational flow. Using the method of averaging, a special numerical method is developed in which the grid size and time step depend only on the length and velocity scales of the background flow and are independent of the effective core size of a vortical spot. The core size can be much smaller than the grid size, whereas the peak velocity in the core is inversely proportional to the spot size. Numerical results are presented to demonstrate the strong interaction between the trajectories of the vortical spots and the change of the vorticity distribution in the background flow field. Author

N86-29763# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTRODUCTION TO THE RECENT DEVELOPMENTS OF CHINA'S CIVIL AVIATION
11 Mar. 1986 10 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 1, 1985 p 11-12
(AD-A166194; FTD-ID(RS)T-1165-85) Avail: NTIS HC A02/MF A01 CSCL 01/2

The Civil Aviation Administration of China, abbreviated CAAC, is in charge of the whole China civil aviation system. It is different from ordinary airline companies but similar to the Traffic Administration of the Japan Transportation Ministry. Its responsibility includes making policy and regulations for civil aviation, aviation traffic, operation and maintenance of civil airlines, selling of airline tickets and other commodities, management of airports, passenger lounges and anything related to civil aviation. GRA

N86-29764# Air Command and Staff Coll., Maxwell AFB, Ala.
THE SEARCH FOR AN ADVANCED FIGHTER: A HISTORY FROM THE XF-108 TO THE ADVANCED TACTICAL FIGHTER
Robert P. Lyons, Jr. Apr. 1986 101 p
(AD-A166724; ACSC-86-1575) Avail: NTIS HC A06/MF A01 CSCL 05/1

This report traces the Air Force's progress in developing advanced fighters from the XF-108 and the YF-12A for long-range supersonic interception; through the F-111 with its goal of multi-mission commonality through the F-15 air superiority fighter; then to the Lightweight Fighter Prototypes (YF-16 and YF-17) and the Air Combat Fighter competition won by the F-16. The report also covers the technology and fighter enhancement programs (such as AFTI, HiMAT, X-29A, and MSIP) which build the base for the Advanced Tactical Fighter now in Concept Development. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-29765*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSONIC NAVIER-STOKES WING SOLUTION USING A ZONAL APPROACH. PART 1: SOLUTION METHODOLOGY AND CODE VALIDATION
J. Flores, T. L. Holst, Unver Kaynak (Sterling Software, Palo Alto, Calif.), K. Gundy, and S. D. Thomas Apr. 1986 2 p Presented at the AGARD Symposium on Applications of Computational Fluid Dynamics in Aeronautics, Aix En Provence, France, 7-10 Apr. 1986
(NASA-TM-88248; A-86206; NAS 1.15:88248) Avail: NTIS HC A02/MF A01 CSCL 01A

A fast diagonalized Beam-Warming algorithm is coupled with a zonal approach to solve the three-dimensional Euler/Navier-Stokes equations. The computer code, called Transonic Navier-Stokes (TNS), uses a total of four zones for wing configurations (or can be extended to complete aircraft configurations by adding zones). In the inner blocks near the wing surface, the thin-layer Navier-Stokes equations are solved, while in the outer two blocks the Euler equations are solved. The diagonal algorithm yields a speedup of as much as a factor of 40 over the original algorithm/zonal method code. The TNS code, in addition, has the capability to model wind tunnel walls. Transonic viscous solutions are obtained on a 150,000-point mesh for a NACA 0012 wing. A three-order-of-magnitude drop in the L2-norm of the residual requires approximately 500 iterations, which takes about 45 min of CPU time on a Cray-XMP processor. Simulations are also conducted for a different geometrical wing called WING C. All cases show good agreement with experimental data. Author

N86-29766*# Kansas Univ. Center for Research, Inc., Lawrence.
AN INVESTIGATION OF TIP PLANFORM INFLUENCE ON THE AERODYNAMIC LOAD CHARACTERISTICS OF A SEMI-SPAN, UNSWEPT WING AND WING-TIP Final Technical Report
Johannes M. vanAken Dec. 1985 83 p
(Contract NCC2-112)
(NASA-CR-177110; NAS 1.26:177110; CRINC-5171-1) Avail: NTIS HC A05/MF A01 CSCL 01A

A semi-span wing, equipped with an interchangeable tip, which was varied in planform and size was examined. Total wing aerodynamic loading was obtained from the wind tunnel scale system. The wing tip was mounted on a separate six-component strain gauge balance, which provided the aerodynamic loads on the tip. The tests were accomplished in the NASA Ames 7 x 10 foot Wind Tunnel at a Mach number of 0.178. The aerodynamic load characteristics of the wing and of the tip were presented with the tip at several incidence angles relative to the wing inboard section. B.G.

N86-29767*# Massachusetts Inst. of Tech., Cambridge. Fluid Dynamics Research Lab.
CALCULATIONS OF AXISYMMETRIC VORTEX SHEET ROLL-UP USING A PANEL AND A FILAMENT MODEL
John P. Kantelis and Sheila E. Widnall Feb. 1986 182 p
(Grant NAG2-251)
(NASA-CR-177081; NAS 1.26:177081; FDRL-86-1) Avail: NTIS HC A09/MF A01 CSCL 01A

A method for calculating the self-induced motion of a vortex sheet using discrete vortex elements is presented. Vortex panels and vortex filaments are used to simulate two-dimensional and axisymmetric vortex sheet roll-up. A straight forward application using vortex elements to simulate the motion of a disk of vorticity with an elliptic circulation distribution yields unsatisfactroy results where the vortex elements move in a chaotic manner. The difficulty is assumed to be due to the inability of a finite number of discrete vortex elements to model the singularity at the sheet edge and due to large velocity calculation errors which result from uneven sheet stretching. A model of the inner portion of the spiral is introduced to eliminate the difficulty with the sheet edge singularity. The model replaces the outermost portion of the sheet with a single vortex of equivalent circulation and a number of higher order terms which account for the asymmetry of the spiral. The resulting discrete vortex model is applied to both two-dimensional and axisymmetric sheets. The two-dimensional roll-up is compared to the solution for a semi-infinite sheet with good results. Author

N86-29768*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
ANALYTICAL INVESTIGATION OF ROTOR WAKE FORMATION AND GEOMETRY Progress Report, 15 Apr. - 15 Oct. 1985
Rene Miller and Earll M. Murman 16 Jan. 1986 21 p
(Grant NAG2-275)
(NASA-CR-177032; NAS 1.26:177032) Avail: NTIS HC A02/MF A01 CSCL 01A

A number of refinements in the computer code were worked out and tested. Three codes have been written to date. One program is for an isolated wing and is being used to compare with data for the vortex wake (Weston). The second code is for an isolated wing with a streamwise vortex passing above it. This program is being used to validate the computational procedure for incorporating the vortex into the Euler equation calculations. The third program is the hovering rotor code which is the overall objective of the research. The optimization calculations for a hovering helicopter rotor have been completed. Author

N86-29769*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
AN EXPERIMENTAL AND ANALYTICAL METHOD FOR APPROXIMATE DETERMINATION OF THE TILT ROTOR RESEARCH AIRCRAFT ROTOR/WING DOWNLOAD Final Report, 30 May 1984 - 30 Nov. 1985
David E. Jordon, William Patterson, and Doral R. Sandlin Nov. 1985 116 p
(Contract NCC2-259)
(NASA-CR-176970; NAS 1.26:176970) Avail: NTIS HC A06/MF A01 CSCL 01A

The XV-15 Tilt Rotor Research Aircraft download phenomenon was analyzed. This phenomenon is a direct result of the two rotor wakes impinging on the wing upper surface when the aircraft is in the hover configuration. For this study the analysis proceeded along tow lines. First was a method whereby results from actual hover tests of the XV-15 aircraft were combined with drag coefficient results from wind tunnel tests of a wing that was representative of the aircraft wing. Second, an analytical method was used that modeled that airflow caused gy the two rotors. Formulas were developed in such a way that acomputer program could be used to calculate the axial velocities were then used in conjunction with the aforementioned wind tunnel drag coefficinet results to produce download values. An attempt was made to validate the analytical results by modeling a model rotor system for which direct download values were determinrd.. Author

N86-29770*# Iowa State Univ. of Science and Technology, Ames. Coll. of Engineering.
VORTEX SHEET MODELING WITH HIGHER ORDER CURVED PANELS Ph.D Thesis Final Technical Report
M. Gawad Nagati 1985 115 p
(Contract NCC2-19)
(NASA-CR-176971; NAS 1.26:176971) Avail: NTIS HC A06/MF A01 CSCL 01A

A numerical technique is presented for modeling the vortex sheet with a deformable surface definition, along which a continuous vortex strength distribution in the spanwise direction is applied, so that by repeatedly modifying its shape, its true configuration is approached, in the proximity of its generating wing. Design problems requiring the inclusion of a realistic configuration of the vortex sheet are numerous. Examples discussed include: control effectiveness and stability derivatives, longitudinal stability, lateral stability, canards, propellers and helicopter rotors, and trailing vortex hazards. B.G.

N86-29771*# Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
CORRELATION OF TRANSONIC-CONE PRESTON-TUBE DATA AND SKIN FRICTION Final Report, Nov. 1980 - May 1984
A. S. Abu-Mostafa and T. D. Reed May 1984 104 p
(Grant NAG2-76)
(NASA-CR-176902; NAS 1.26:176902) Avail: NTIS HC A06/MF A01 CSCL 01A

Preston-tube measurements obtained on the Arnold Engineering Development Center (AEDC) Transition Cone have been correlated with theoretical skin friction coefficients in transitional and turbulent flow. This has been done for the NASA Ames 11-Ft Transonic Wind Tunnel (11 TWT) and flight tests. The developed semi-empirical correlations of Preston-tube data have been used to derive a calibration procedure for the 11 TWT flow quality. This procedure has been applied to the corrected laminar data, and an effective freestream unit Reynolds number is defined by requiring a matching of the average Preston-tube pressure in flight and in the tunnel. This study finds that the operating Reynolds number is below the effective value required for a match in laminar Preston-tube data. The distribution of this effective Reynolds number with Mach number correlates well with the freestream noise level in this tunnel. Analyses of transitional and turbulent data, however, did not result in effective Reynolds numbers that can be correlated with background noise. This is a result of the fact that vorticity fluctuations present in transitional and turbulent boundary layers dominate Preston-tube pressure fluctuations and, therefore, mask the tunnel noise eff ects. So, in order to calibrate the effects of noise on transonic wind tunnel tests only laminar data should be used, preferably at flow conditions similar to those in flight tests. To calibrate the effects of transonic wind-tunnel noise on drag measurements, however, the Preston-tube data must be supplemented with direct measurements of skin friction. M.G.

N86-29772*# Iowa State Univ. of Science and Technology, Ames. Dept. of Aerospace Engineering.
[NUMERICAL COMPUTATION OF VISCOUS FLOW AROUND BODIES AND WINGS MOVING AT SUPERSONIC SPEEDS] Final Report, 15 Nov. 1971- 31 Mar. 1984
John C. Tannehill Apr. 1984 21 p
(Grant NGR-16-002-038)
(NASA-CR-176903; NAS 1.26:176903; ISU-ERI-Ames-84483; CFD-9) Avail: NTIS HC A02/MF A01 CSCL 01A

Research in aerodynamics is discussed. The development of equilibrium air curve fits; computation of hypersonic rarefield leading edge flows; computation of 2-D and 3-D blunt body laminar flows with an impinging shock; development of a two-dimensional or axisymmetric real gas blunt body code; a study of an over-relaxation procedure forthe MacCormack finite-difference scheme; computation of 2-D blunt body turbulent flows with an impinging shock; computation of supersonic viscous flow over delta wings at high angles of attack; and computation of the Space Shuttle Orbiter flowfield are discussed. Author

N86-29773*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
EXPERIMENTAL AND THEORETICAL STUDY OF PROPELLER SPINNER/SHANK INTERFERENCE M.S. Thesis
Carl Clayton Cornell May 1986 143 p
(Contract NAS3-272)
(NASA-CR-176954; NAS 1.26:176954) Avail: NTIS
HC A07/MF A01 CSCL 01A

A fundamental experimental and theoretical investigation into the aerodynamic interference associated with propeller spinner and shank regions was conducted. The research program involved a theoretical assessment of solutions previously proposed, followed by a systematic experimental study to supplement the existing data base. As a result, a refined computational procedure was established for prediction of interference effects in terms of interference drag and resolved into propeller thrust and torque components. These quantities were examined with attention to engineering parameters such as two spinner finess ratios, three blade shank forms, and two/three/four/six/eight blades. Consideration of the physics of the phenomena aided in the logical deduction of two individual interference quantities (cascade effects and spinner/shank juncture interference). These interference effects were semi-empirically modeled using existing theories and placed into a compatible form with an existing propeller performance scheme which provided the basis for examples of application. Author

N86-29774*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF REYNOLDS NUMBER AND MACH NUMBER ON FLOW ANGULARITY PROBE SENSITIVITY
Leigh Ann Smith and Jerry B. Adcock Sep. 1986 28 p
(NASA-TM-87750; L-16069; NAS 1.15:87750) Avail: NTIS
HC A03/MF A01 CSCL 01A

Preliminary calibrations were performed on nine flow angularity probes in the Langley 7- by 10-Foot High-Speed Tunnel (7 x 10 HST) and the Langley 0.3-Meter Transonic Cryogenic Tunnel (0.3-m TCT). These probes will be used in surveying the test section flows of the National Transonic Facility (NTF). The probes used in this study have a pyramid head with five pressure orifices. The calibrations consisted of both isolated probe measurements and rake-mounted multiprobe measurements that covered a range of subsonic Mach numbers up to 0.90 and Reynolds numbers per foot up to 40 X 10 to the 6th power. The preliminary calibration in the 7 x 10 HST included testing the probes both individually and in a rake. The 0.3-m TCT calibration tested two probes singly at varying Reynolds numbers. The results from these tests include Mach number, Reynolds number, and rake-mounting effects. The results of these tests showed probe sensitivity to be slightly affected by Mach number. At Reynolds numbers per foot above 10 x 10 to the 6th power, the probe did not exhibit a Reynolds number sensitivity. Author

N86-29775*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY AND CONTROL OF COMPRESSIBLE FLOWS OVER A SURFACE WITH CONCAVE-CONVES CURVATURE Final Report
Lucio Maestrello, Alvin Bayliss, Paresh Parikh, and Eli Turkel Jul. 1986 34 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107; NAS1-17919)
(NASA-CR-178143; ICASE-86-48; NAS 1.26:178143) Avail: NTIS
HC A03/MF A01 CSCL 01A

The active control of spatially unstable disturbances in a laminar, two-dimensional, compressible boundary layer over a curved surface is numerically simulated. The control is effected by localized time-periodic surface heating. We consider two similar surfaces of different heights with concave-convex curvature. In one, the height is sufficiently large so that the favorable pressure gradient is sufficient to stabilize a particular disturbance. In the other case the pressure gradient induced by the curvature is destabilizing. It is shown that by using active control that the disturbance can be stabilized. The results demonstrate that the curvature induced mean pressure gradient significantly enhances the receptivity of the flow localized time-periodic surface heating and that this is a potentially viable mechanism in air. Author

N86-29776*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PSEUDO-TIME ALGORITHMS FOR THE NAVIER-STOKES EQUATIONS
R. C. Swanson and E. Turkel (Tel-Aviv Univ. (Israel).) May 1986 33 p
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178127; ICASE-86-37; NAS 1.26:178127) Avail: NTIS
HC A03/MF A01 CSCL 01A

A pseudo-time method is introduced to integrate the compressible Navier-Stokes equations to a steady state. This method is a generalization of a method used by Crocco and also by Allen and Cheng. We show that for a simple heat equation that this is just a renormalization of the time. For a convection-diffusion equation the renormalization is dependent only on the viscous terms. We implement the method for the Navier-Stokes equations using a Runge-Kutta type algorithm. This permits the time step to be chosen based on the inviscid model only. We also discuss the use of residual smoothing when viscous terms are present. Author

N86-29777*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN ENTROPY CORRECTION METHOD FOR UNSTEADY FULL POTENTIAL FLOWS WITH STRONG SHOCKS
Woodrow Whitlow, Jr., Mohamed M. Hafez (California Univ., Davis.), and Stanley J. Osher (California Univ., Los Angeles.) Jun. 1986 14 p
(NASA-TM-87769; NAS 1.15:87769) Avail: NTIS
HC A02/MF A01 CSCL 01A

An entropy correction method for the unsteady full potential equation is presented. The unsteady potential equation is modified to account for entropy jumps across shock waves. The conservative form of the modified equation is solved in generalized coordinates using an implicit, approximate factorization method. A flux-biasing differencing method, which generates the proper amounts of artificial viscosity in supersonic regions, is used to discretize the flow equations in space. Comparisons between the present method and solutions of the Euler equations and between the present method and experimental data are presented. The comparisons show that the present method more accurately models solutions of the Euler equations and experiment than does the isentropic potential formulation. Author

N86-29778# Montana State Univ., Missoula. Supersonic Wind Tunnel Lab.
BOUNDARY LAYER STABILITY MEASUREMENTS OVER A FLAT PLATE AT MACH 3 Final Report
Anthony Demetriades Nov. 1985 203 p
(Grant AF-AFOSR-0267-80)
(AD-A166188; SWT-TR-85-1; AFOSR-86-0056TR) Avail: NTIS
HC A10/MF A01 CSCL 20/4

Amplification of natural disturbances in a flat plate laminar boundary layer at edge Mach number 3 have been measured in a supersonic wind tunnel with and without turbulent sidewall boundary layers. Detailed flowfield measurements were made to define the self-similar region and the point where the velocity profile first departs from the Blasius theory. The first instability mode was detected with a minimum critical momentum Reynolds number of

190 and a maximum amplified frequency of 0.000225. Amplification rates for this mode agree with the available theoretical predictions, and its low-frequency, low-R region is not as distorted by monotonic amplification as previously thought. A second, very prominent and extensive instability was found which extends to much higher frequencies beyond F = 0.00035 and which dominates the pretransitional flow. The neutral branch location of this mode associates it with the second instability mode found in hypersonic flow and serves to clarify and present a stability diagram rational over the M = 0 to 8 range. The overall amplitude gain before the first departure is still confined to low frequencies with the first mode contributing little net gain, the combined first-second modes contributing a gain of about 3, while an additional factor of 5 to 10 is provided by a mechanism active near the leading edge and apparently consistent with Mack's forcing-stability approach.
GRA

N86-29779# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EFFECT OF ENGINE DISCHARGING JET EFFLUX ON VEHICLE AERODYNAMIC PERFORMANCE
Dao-wei Yang 24 Feb. 1986 12 p Transl. into ENGLISH from Binggong Xuebao (China), no. 1, Feb. 1985 p 45-50
(AD-A166277; FTD-ID(RS)T-1254-85) Avail: NTIS HC A02/MF A01 CSCL 20/4

Based on the fundamental theories of gas dynamics, this paper discusses the general effects of the engine discharging jet efflux (EDJE) on the flow around a vehicle, and analyzes the effect of the high temperature EDJE on vehicle aerodynamic performance, using compressed air in a wind-tunnel test to simulate the high temperature EDJE in a real jet engine. Experimental results are cited and analyzed.
GRA

N86-29780# Poseidon Research, Irvine, Calif.
PRELIMINARY RESEARCH ON POST-STALL AERODYNAMICS Annual Report
S. C. Crow and R. B. Myers Sep. 1985 79 p
(Contract F49620-84-C-0084)
(AD-A166279; TR-81; AFOSR-86-0073TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

Fundamental results for two and three dimensional unsteady flows are derived. A model for vortex shedding at salient edges is advanced. A two dimensional Euler solver that implements this vortex shedding mechanism is described. Results of applying this model to impulsively started flat plates with fixed and with oscillating chord at angle of attack are presented. Implications for manipulation of the vortex wake in a post stall maneuver are discussed. Extension of the numerical methodology to three dimensions is also discussed.
GRA

N86-29781# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
COMPONENT BASE FLOW ANALYSIS Final Technical Report, 19 Apr. - 30 Sep. 1983
J. L. Sims Oct. 1985 166 p
(Contract DAAH01-83-D-A013)
(AD-A166283; AD-E950821; AMSMI/RD-CR-85-10) Avail: NTIS HC A08/MF A01 CSCL 20/4

A component model computer program for the solution of power-on base pressure at supersonic speeds has been modified to (1) include the effects of the upstream boundary layers upon the free shear layers and to (2) incorporate the angular recompression criterion developed by ONERA for the wake closure condition. After the program modifications were completed, an extensive set of calculations were made for comparison with experimental data. These comparisons showed that, in general, the calculated base pressures are greater than the experimental base pressures. This lack of agreement raises questions about the applicability of a single stream recompression criterion to the solution of the two stream problem.
Author (GRA)

N86-29782# Grumman Aerospace Corp., Bethpage, N.Y. Research and Development Center.
AN INVESTIGATION OF TURBULENCE MECHANISMS IN V/STOL UPWASH FLOW FIELDS Final Report, Mar. 1982 - Jun. 1985
Barry Gilbert 15 Sep. 1985 94 p
(Contract F49620-82-C-0025)
(AD-A166286; RE-707; AFOSR-86-0096TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

This report presents results of an experimental investigation of the abnormally high turbulent mixing layer growth rate characteristics found in the upwash regions of V/STOL flows in ground effect. The fundamental turbulent V/STOL upwash mechanisms were investigated in increasingly more complex flow configurations. Most of this study uses the two-dimensional upwash formed by the collision of opposed two-dimensional wall jets. Initial parameters used to characterize the upwash formation were identified as the maximum wall jet velocity and wall jet half velocity width. Upwash measurements were taken in flows formed from equal wall jets with the same maximum velocities and equal wall jets with the same half widths. While mixing layer growth rates were larger than those found in a free two-dimensional jet, these values were less than those previously reported. An explanation based on non-similarity conditions in the flow is offered. Abnormally high turbulence levels reported by other investigators were not found. The increased growth rate seem to be a direct effect of the head-on collisi on process. There is an indication that in the far field the upwash growth characteristics are approaching those found in free jets which has profound implications to the turbulence modelers.
GRA

N86-29783# Flow Research, Inc., Kent, Wash.
IMPROVEMENTS IN CODE TUNCOR FOR CALCULATING WALL INTERFERENCE CORRECTIONS IN THE TRANSONIC REGIME Final Report, Apr. 1983 - Dec. 1985
M. H. Rizk Mar. 1986 34 p
(Contract F40600-83-C-0003)
(AD-A166766; AEDC-TR-86-6) Avail: NTIS HC A03/MF A01 CSCL 20/4

Modifications are introduced to Code TUNCOR to allow its use in determining wall interference corrections in a wind tunnel. The modifications include conversion to cylindrical coordinates and converting the measured pressure data to a form acceptable by the code.
GRA

N86-29784# Sandia National Labs., Albuquerque, N. Mex.
COMPARISONS OF CFD FLOW FIELD SOLUTIONS WITH EXPERIMENTAL DATA AT MACH 14
M. A. Walker and D. D. McBride 1986 33 p Presented at the 14th AIAA Aerodynamics Testing Conference, West Palm Beach, Fla., 5 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004915; SAND-86-0006C; CONF-860368-1) Avail: NTIS HC A03/MF A01

Experimental data obtained in the Sandia National Laboratories Hypersonic Wind Tunnel (HWT) are compared with numerical predictions made by a Computational Fluid Dynamics (CFD) computer code. The data compared are force and moment coefficients for a slender blunted cone at Mach 14. The CFD code is a Parabolized Navier-Stokes (PNS) code. Schlieren photographs of the shock shapes are compared with predictions made by the PNS code for angles of attack up to 14 deg. Oil flow photographs are compared with the numerical prediction of the location of the cross flow separation. Overall, the numerical predictions agree with the experimental data.
DOE

N86-29785# Sandia National Labs., Albuquerque, N. Mex. Parachute Systems Div.
DEVELOPMENT DROP TEST RESULTS OF THE 15-FT-DIA RIBBON PARACHUTE AND 73-FT-DIA CROSS PARACHUTE FOR THE US ARMY NATICK LABORATORY UHLCADS SYSTEM
William H. Pepper Sep. 1985 27 p
(DE85-017614; SAND-84-2183) Avail: NTIS HC A03/MF A01

An existing parachute system has been adapted for delivery

of a resupply container at high altitudes from aircraft. The parachute system consists of a 15-ft-dia ribbon parachute reefed for 10 s and a 73-ft-dia cross parachute. A solid state recorder in the 2360-lb drop test vehicle was used to obtain deceleration history with time. Twelve drop tests from the C-130 aircraft were conducted at the US Army Yuma Proving Ground, Arizona. Drop release conditions were generally 130 KCAS as 25,000 ft above sea level. Several improvements to the parachute system were tested: (1) no reefing of the 73-ft cross parachute; (2) nylon instead of Kevlar for the 15-ft ribbon parachute; and (3) a new 16-s delay pyrotechnic reefing line cutter was successfully used to stage from the 15-ft ribbon parachute to the 73-ft cross parachute. Author

N86-29786# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Struct

INFLUENCE OF THE ANGLE OF ATTACK AND FLUTTER ON THE LIFT OF A SUPERCRITICAL WING. COMPARISON BETWEEN THEORY AND EXPERIMENT Final Report [INFLUENCE DE L'INCIDENCE ET DU VRILLAGE SUR LE FLOTTEMENT D'UNE AILE SUPERCRITIQUE. COMPARAISON THEORIE-EXPERIENCE]

R. Destuynder and A. Gravelle Dec. 1985 40 p In FRENCH (Contract STPA-84-95-015)

(ONERA-RT-24/3064-RY-044-R; ESA-86-97276) Avail: NTIS HC A03/MF A01

Variations of the critical lift velocity in transonic flow (Mach 0.8) was studied. A first method is based on a linear computation of the corrections to perform on wind tunnel steady flow pressure measurements. A second nonlinear method is based on the analysis of small perturbations which take in account the deformations and the exact profile of the model. The comparison shows that both methods are close to the experimental results. ESA

N86-29787# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafdel. Stromingen.

SIMPLIFIED EXAMINATIONS OF THE AERODYNAMIC PERFORMANCES OF TIP VANE ROTORS [VEREENVOUDIGDE BESCHOUWINGEN OVER DE AERODYNAMISCHE PRESTATIES VAN TIPVAAN ROTOREN]

O. deVries and J. W. Slooff Jun. 1984 107 p In DUTCH Sponsored by National Development Program on Wind Energy (NOW II) Project Management Bureau for Energy Research (Contract ECN-4401-3.4)

(NLR-M-AT-84-007-L; ESA-86-97401) Avail: NTIS HC A06/MF A01

Based on a limit examination for a rotor with an infinite number of blades and a constant circulation distribution over rotor blade and tip vane, an estimate method for the optimal performances of a tip vane wind turbine was developed. It reveals the positive contribution of the winglet effect; that circulation (mass flow increase) and high speed are inversely proportionate; increase of the area of rotor blades and tip vanes (the quantity of blade material) leads to a mass flow increase; and performance susceptibility to the induced tip vane resistance (e.g., by incomplete synchronization). A practical consequence might be the rejection of earlier estimated optimal performances. ESA

N86-29788# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafdel. Stromingen.

ESTIMATE OF THE AERODYNAMIC PERFORMANCES OF TIP VANE ROTORS USING THE HELIX PROGRAM [SCHATTING VAN DE AERODYNAMISCHE PRESTATIES VAN TIPVAAN ROTOREN M.B.V. HET PROGRAMMA HELIX]

O. deVries and W. J. Piers Feb. 1985 62 p In DUTCH Sponsored by National Development Program on Wind Energy (NOW II) Project Management Bureau for Energy Research

(NLR-TR-85027-L; ESA-86-97402) Avail: NTIS HC A04/MF A01

The computer program Helix, based on the lifting line approach, was used in performance calculations of tip vane rotors with given load distribution. Although a considerable power increase seems possible, this is limted to low high-speed values. Application of wing profiles with a high bearing force coefficient might improve the economic perspectives of the tip vane. ESA

N86-29789# National Aerospace Lab., Amsterdam (Netherlands). Hoofdafdel. Stromingen.

AERODYNAMIC RESEARCH ON TIP VANE ROTORS, CARRIED OUT BY NLR, AND A ROUGH EVALUATION OF THE TIP VANE CONCEPT [AERODYNAMISCH ONDERZOEK T.B.V. TIPVAAN ROTOREN, UNITGEVOERD DOOR NLR, EN EEN GLOBALE EVALUATIE VAN HET TIPVAAN CONCEPT]

O. deVries and J. W. Slooff Mar. 1985 39 p In DUTCH Sponsored by National Development Program on Wind Energy (NOW II) Project Management Bureau for Energy Research

(NLR-TR-85064-L; ESA-86-97406) Avail: NTIS HC A03/MF A01

Estimates for the attainable performances of a complete tip vane rotor were derived from limit models and a rotating lifting-line model. It appears that the economic perspectives are more limited than expected. An accurate feasibility analysis, preferably to be carried out by the industry, is recommended. ESA

N86-29860# Ecole Centrale de Lyon (France). Lab. de Mecanique des Fluides.

THEORY AND EXPERIMENTAL STUDY OF A 3-D JET INTRODUCED INTO THE SECONDARY FLOW OF A TURBINE INLET GUIDE VANE [ETUDE EXPERIMENTALE ET THEORIQUE DUN JET TRIDIMENSIONNEL INTRODUIT DANS LECOULEMENT SEONDAIRE DUNE GREILLE DISTRIBUTRICE DE TURBINE]

A. Onvani, C. Ollivier, F. Bario, and F. Leboeuf *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 18 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-29790# National Transportation Safety Board, Washington, D. C.

SAFETY RECOMMENDATION

Jim Burnett 28 Mar. 1986 2 p

(NTSB-A-86-22; NTSB-A-86-23; Rept-4346/I-60A) Avail: NTIS HC A02/MF A01

On June 25, 1985, a Cessna Model 150 airplane, N704ZS, sustained substantial damage after a loss of engine power in flight forced the pilot to execute an emergency landing at Rushville, Missouri. The National Transportation Safety Board's investigation of the accident disclosed that the power loss occurred because a self-locking nut became disengaged from the bolt that connects the throttle cable rod end to the carburetor throttle arm, permitting the bolt to back out of the bolt hole. Since January 1, 1980, throttle linkages have become disconnected from carburetor throttle arms for similar reasons on seven other Cessna Model 150 airplanes. Additionally, the loss of connecting hardware has caused the separation of engine throttle or mixture controls on Cessna Model 152, 172, 177RG, A188, and U206 airplanes, resulting in six accidents, one incident, and eight service difficulty reports. Author

N86-29791# National Transportation Safety Board, Washington, D. C.

NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATION

7 Apr. 1986 6 p

(NTSB-4360/33) Avail: NTIS HC A02/MF A01

Problems that have been experienced by the Pratt & Whitney Aircraft JT8D-1 through -17AR engines are discussed. Thses problems include failures of combustion chambers, removable

sleeve spacers in the high-pressure compressor, combustion chamber outer cases, second-stage low-pressure turbine disks, second-stage fan blades, and high-pressure and low-pressure turbine blades. Author

N86-29792# National Transportation Safety Board, Washington, D. C.
NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATION
17 Apr. 1986 2 p
(NTSB-4357/1) Avail: NTIS HC A02/MF A01

On July 16, 1984, a Hiller Aviation UH-12E helicopter, N1043L, crashed while engaged in an agricultural spraying operation near Redmond, Oregon. The helicopter was destroyed. The pilot, the sole occupant, received minor injuries. The investigation by the National Transportation Safety Board revealed that an outboard section of main rotor blade had separated in flight. Subsequent detailed examination of the fractured surfaces of main rotor blade spar in the Safety Board's metallurgical laboratory revealed that a fatigue crack had propagated through 80 percent of the spar cross section prior to separation. The fatigue crack originated at the interface between the spar lower surface leading edge and the external spar doubler. The failed blade was manufactured by the Parsons Company, a Hiller Aviation vendor, in the 1960's. The Safety Board understands that this was the fourth such blade failure since the AD was issued. All four failures reportedly occurred when the blades had accumulated about 4,000 hours, although the approved service life of the PN 2253-1101-04 blade is 6,600 hours. The inspection now being conducted at 100-hour intervals apparently is not adequate to identify fatigue crack propagation originating at the interface between the spar lower surface leading edge and the external spar doubler. The Safety Board concludes that a one-time inspection using ultrasonic or eddy current techniques should be imposed on the remaining Parsons main rotor blades with more than 3,000 hours of accumulated time, in addition to the existing AD requirement. Data from this one-time inspection program should be evaluated to determine if any further nondestructive tests are necessary or if the approved service life of the blades should be reduced. Author

N86-29793# Federal Aviation Administration, Washington, D.C. Emergency Evacuation Task Force.
TASK FORCE REPORT ON EMERGENCY EVACUATION OF TRANSPORT AIRPLANES, VOLUME 1 Final Summary Report
Jul. 1986 109 p
(DOT/FAA/VS-86/1.1) Avail: NTIS HC A06/MF A01

This is one of two volumes that report on the study of the emergency evacuation of transport airplanes that was sponsored by the Federal Aviation Administration (FAA). The study included the September 1985 Public Technical Conference and the public meetings of the three technical working groups formed during the conference as part of a task force effort. The working groups are: Design and Certification, Training and Operations, and Maintenance and Reliability. The task force program focused on the reassessment of existing Federal Aviation Regulations pertaining to emergency evacuation. Topics considered in the study include: evacuation demonstrations; emergency exits; evacuation slide certification, inspection, and maintenance; emergency equipment; crewmember training and duties; passenger safety information; air carrier operations; and others. Volume I, Summary Report, summarizes the issues considered during the study and the outcome of those issues. Volume II, Supporting Documentation, contains meeting reports, formal presentation papers, and other documents on which the summary report is based. Author

N86-29794# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
HALON EXTINGUISHER AGENT BEHAVIOR IN A VENTILATED SMALL AIRCRAFT Final Report, Mar. - Jul. 1984
G. R. Slusher, J. Wright, and J. E. Demaree Jun. 1986 53 p
(DOT/FAA/CT-86/5) Avail: NTIS HC A04/MF A01

Hand held fire extinguishers (Halon 1211 and Halon 1301) were evaluated in a four-passenger Cessna Model 210C aircraft. The aircraft was operated in the FAA's Technical Center airflow facility under simulated flight conditions. Extinguishers were discharged without fires to determine the dissipation rate and toxicity levels of Halon extinguishing agents. Agent concentrations dissipated rapidly. Analysis of dose calculations demonstrated that 2.5 pound Halon 1211 and 3.0 pound Halon 1301 extinguishers were safe in the four-passenger test aircraft. Dose calculations for the pilot were a maximum of 60 percent of the limit for Halon 1211, and maximum dose was 31 percent of the limit for Halon 1301. Stratification of the Halons together with cabin ventilation resulted in safe conditions for the pilot. Distribution of extinguishing agents under the instrument panel was investigated. When the extinguishers were discharged on either the pilot's or the copilot's side, four percent concentration was measured on the side opposite of the discharge of the extinguishers. Extinguisher gas stratification was determined by measuring agent levels on the cabin floor. Author

N86-29795# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM PHOTOGRAPHIC/VIDEO COVERAGE Final Report, May 1983 - Dec. 1984
John D. Gregoire Apr. 1986 430 p
(Contract DTFA03-80-A-00215)
(DOT/FAA/CT-85/35; JPL-D-2534) Avail: NTIS HC A19/MF A01

The Full-Scale Transport Controlled Impact Demonstration Program was recorded on both film and video tape by the Photo-Duplication Section 642 of the Jet Propulsion Laboratory, California Institute of Technology. Photographic coverage was requested by the Federal Aviation Administration (FAA) on the antimisting kerosene (AMK) fuel and crashworthiness experiments. Instrumentation and documentation cinematography and videography produced a catalog of images that recorded completely the pre-/post-elements of the event. Author

N86-29796# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.
INVESTIGATION OF HAZARDS OF HELICOPTER OPERATIONS AND ROOT CAUSES OF HELICOPTER ACCIDENTS Final Report, Oct. 1983 - Sep. 1985
Franklin R. Taylor and Richard J. Adams Jul. 1986 177 p
(Contract DTFA01-80-C-10080)
(FAA/PM-86/28) Avail: NTIS HC A09/MF A01

During 1983 and 1984, Systems Control Technology, Inc. conducted a country-wide survey of civil helicopter pilot organizations involved in a wide range of helicopter operations for the purpose of determining the hazards of the latter and the root causes of the high rate of helicopter accidents. The survey was conducted through personal interviews, meetings, and questionnaires. The questionnaire included census data, profiles of the pilot work environment and procedures,and their own perspectives on the hazards of helicopter operations and causes of helicopter accidents. These data were compared with historical National Transportation Safety Board accident reports and accident briefs to determine more specifically the causes of helicopter accidents. The results of the analysis include a list of hazards and probable causes of accidents, as well as technological, training and standardization remedies. Author

N86-29797# Federal Aviation Administration, Washington, D.C. Associate Administrator for Aviation Standards.
TASK FORCE REPORT ON EMERGENCY EVACUATION OF TRANSPORT AIRPLANES. VOLUME 2: SUPPORTING DOCUMENTATION Final Report
Jul. 1986 429 p
(FAA/VS-86/1,2) Avail: NTIS HC A19/MF A01

This is one of two volumes that report on the study of the emergency evacuation of transport airplanes that was sponsored by the Federal Aviation Administration (FAA). The study included the September 1985 Public Technical Conference and the public meetings of the three technical working groups formed during the conference as part of a task force effort. The working groups are:

Design and Certification, Training and Operations, and Maintenance and Reliability. The task force program focused on the reassessment of existing Federal Aviation Regulations pertaining to emergency evacuation. Topics considered in the study include: evacuation demonstrations; emergency exits; evacuation slide certification, inspection and maintenance; emergency equipment, crewmember training and duties; passenger safety information; air carrier operations, and others, Volume I, Summary Report, summarizes the issues considered during the study and the outcome of those issues. Volume II, Supporting Documentation, contains meeting reports and other documents on which the summary report is based. Author

N86-29798# Scientific Systems, Inc., Cambridge, Mass.
VECTORED THRUST DIGITAL FLIGHT CONTROL FOR CREW ESCAPE, VOLUME 1 Final Report, 1 Jun. 1982 - 28 Feb. 1985
James V. Carroll and Robert F. Gendron Dec. 1985 215 p
(Contract F33615-C-82-3402)
(AD-A166580; AFWAL-TR-85-3116-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 01/4

Work of Meyer and Cicolani was adapted for application to open seat escape systems in current Air Force fighter aircraft. The control system design is a fully self-contained system whose major on-seat components are: acceleration, rate, attitude and altitude sensors, real-time control logic imbedded on a microprocessor chip, rocket thrusters with thrust vectoring and throttling capability, and various avionics and support subsystem hardware items (e.g., power supply). The control concept is based on a comparison of measured translational and rotational accelerations with desired values; the propulsion system is then configured to provide adequate energy to follow the desired trajectory and simultaneously eliminate acceleration errors. The concept uses nonlinear models and incorporates state and control constraints. This volume contains the detailed documentation of specification development, control logic design, hardware identification, and trade study efforts. Volume II (Ad-A166 596) contains a description of the prototype design, real time breadboard simulation, and the results an d analysis of the verification task. Volume III contains the supporting appendices for volumes I and Ii. Volume IV details the results of the real time hybrid computer simulation effort. GRA

N86-29799# Scientific Systems, Inc., Cambridge, Mass.
VECTORED THRUST DIGITAL FLIGHT CONTROL FOR CREW ESCAPE, VOLUME 2 Final Report, 1 Jun. 1982 - 28 Feb. 1985
James V. Carroll and Robert F. Gendron Dec. 1985 208 p
(Contract F33615-82-C-3402)
(AD-A166596; AFWAL-TR-85-3116-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 01/4

Work of Meyer and Cicolani was adapted for application to open seat escape systems in current Air Force fighter aircraft. The control system design is a fully self-contained system whose major on-seat components are: acceleration, rate, attitude and altitude sensors, real-time control logic imbedded on a microprocessor chip, rocket thrusters with thrust vectoring and throttling capability, and various avionics and support subsystem hardware items (e.g., power supply). The control concept is based on a comparison of measured translational and rotational accelerations with desired values; the propulsion system is then configured to provide adequate energy to follow the desired trajectory and simultaneously eliminate acceleration errors. The concept uses nonlinear models and incorporates state and control constraints. Volume I (AD-A166580) contains the detailed documentation of specification development, control logic design, hardware identification, and trade study efforts. Volume II contains a description of the prototype design, real time breadboard simulation, and the results and an alysis of the verification task. GRA

N86-30019# Boeing Co., Seattle, Wash.
CURRENT DESIGN PROCEDURES FOR MINIMIZING POST CRASH FIRE HAZARDS
H. Skavdahl *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 261-276 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

N86-30020# Aviation Fuel Safety Co., Chelmsford, Mass.
AMINE-CO2 ADDUCTS AS AVIATION FUEL GELLING AGENTS
William W. Bannister *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 279-298 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

N86-30022# Akron Univ., Ohio.
JET FUEL VISCOSITY AT LOW TEMPERATURES WITH NOTES ON n-ALKALINE CRYSTALS Final Report
Dale Schruben *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 317-356 (For primary document see N86-30007 21-28)
(Grant NAG3-488)
(NASA-CR-174911; NAS 1.26:174911) Avail: NTIS HC A17/MF A01 CSCL 21D

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-29800*# University of Southern Colorado, Pueblo. School of Applied Science and Engineering Technolo
TECHNOLOGY RESEARCH FOR STRAPDOWN INERTIAL EXPERIMENT AND DIGITAL FLIGHT CONTROL AND GUIDANCE Final Technical Report, 1 Oct. 1979 - 31 Dec. 1984
Ralph A. Carestia and Don E. Cottrell 1985 113 p
(Contract NCC2-41)
(NASA-CR-176907; NAS 1.26:176907) Avail: NTIS HC A06/MF A01 CSCL 17G

A helicopter flight-test program to evaluate the performance of Honeywell's Tetrad - a strapdown, laser gyro, inertial navitation system is discussed. The results of 34 flights showed a mean final navigational velocity error of 5.06 knots, with a standard deviation of 3.84 knots; a corresponding mean final position error of 2.66 n.mi., with a standard deviation of 1.48 n.m.; and a modeled mean-position-error growth rate for the 34 tests of 1.96 knots, with a standard deviation of 1.09 knots. Tetrad's four-ring laser gyros provided reliable and accurate angular rate sensing during the test program and on sensor failures were detected during the evaluation. Criteria suitable for investigating cockpit systems in rotorcraft were developed. This criteria led to the development of two basic simulators. The first was a standard simulator which could be used to obtain baseline information for studying pilot workload and interactions. The second was an advanced simulator which integrated the RODAAS developed by Honeywell into this simulator. The second area also included surveying the aerospace industry to determine the level of use and impact of microcomputers and related components on avionics systems. M.G.

N86-29801# Ohio Univ., Athens. Dept. of Electrical and Computer Engineering.
INVESTIGATIONS FOR IMPROVING OPERATIONAL RELIABILITY AND MAINTAINABILITY OF INSTRUMENT LANDING SYSTEM COMPONENTS. VOLUME 1: TEXT AND APPENDICES Final Report, Feb. 1983 - Feb. 1986
Richard H. McFarland, Walter D. Phipps, Larry D. Brady, Jeff Dennis, and Joe D. Longworth Feb. 1986 272 p
(Contract DTFA01-83-C-20025)
(DOT/FAA/PM-86/7,1-Vol-1; OU/AEC/EER-79-1-Vol-1) Avail: NTIS HC A12/MF A01

An investigation of anomalous performance of the glide slope at Lambert-St. Louis is reported. An analysis of the Instrument Landing System (ILS) Reference Datum Heights (RDH) is reported, as well as the results of an investigation of glide slope critical

areas. The feasibility of developing ground bases checking techniques for validating the Sideband Reference (SBR) glide slope is presented as well as an assessment of the current standards and tolerances used to qualify glide slope structure. In addition, a proposed methodology for mathematical model validation is discussed. Author

N86-29802# Federal Aviation Administration, Washington, D.C.
ENGINEERING PERFORMANCE EVALUATION OF SMALL COMMUNITY AIRPORT MICROWAVE LANDING SYSTEM (TI-MODEL) AT PHILADELPHIA INTERNATIONAL AIRPORT RUNWAY 17 Final Report
G. D. Adams and C. E. Richardson Aug. 1986 68 p
(Contract DTFA01-82-Y-10521)
(FAA/PM-86/24) Avail: NTIS HC A04/MF A01

The Microwave Landing System (MLS) program is designed to meet both civil and military operational needs. It will eventually replace the Instrument Landing System (ILS). After a system/equipment development phase, the Federal Aviation Administration in 1979 began a Service Test And Evaluation Program (STEP) to obtain experience for developing criteria for siting, installation and preliminary operational procedures. Feasibility demo ground equipment from the development phase was used and user aircraft were equipped with MLS receivers. This report contains engineering evaluation of the FAA Technical Center flight test data taken on the Texas Instruments' manufactured Small Community MLS, as installed for STEP at Philadelphia International Airport Runway 17. The equipment performance was found to generally meet the FAA-STD-022b Path Following Error and Control Motion Noise requirement, but not the linearity requirement. Apparent aircraft propeller induced noise effects were identified. Author

N86-29803# Naval Postgraduate School, Monterey, Calif.
SOME NAVIGATION AND ALMANAC ALGORITHMS M.S. Thesis
Rex H. Shudde Sep. 1985 57 p
(AD-A165840; NPS55-85-023) Avail: NTIS HC A04/MF A01 CSCL 17/7

A detailed discussion is presented of the use of the general spherical triangle as a means of eliminating the many special cases of quadrant determination that plague most navigation computations and steal memory from computer programs. Also included are two programs, NAVALGOR and NAVEPHM which are written for the Radio Shack TRS-80 Model 4 Computer. NAVALGOR implements three sets of computational procedures: direct solution algorithms for speroid and spherical earth models, inverse solution algorithms for spheroid and spherical earth models, and rhumb line approximations to great circle routes. NAVEPHM implements a procedure for the determination of the position of the Sun, Moon and navigational planets that reproduce The Nautical Almanac and The Air Almanac to within 0.2'. GRA

N86-29804# Mitre Corp., McLean, Va.
THE CONCEPT OF ALMOST-PARALLEL IFR (INSTRUMENT FLIGHT RULES) APPROACHES TO PARALLEL RUNWAYS
Armando C. Silva Mar. 1986 52 p
(Contract DTFA01-84-C-00001)
(AD-A166485; MTR-86W11; FAA-DL5-86-1) Avail: NTIS HC A04/MF A01 CSCL 01/2

Under today's rules independent parallel approaches are restricted to runways separated by at least 4300 feet. Currently the FAA is investigating a proposal to achieve reductions down to 3000 feet with the use of an improved surveillance system (1 milliradian accuracy/1 second update). This paper proposes new procedures to achieve such reduction, using existing radars, by executing almost-parallel MLS or ILS approaches. Almost-parallel approaches include curved paths where very shallow rates of turn are required and offset straight paths where the angle of offset with respect to the extended runway centerline is less than 3 degrees. Some issues of concern that arise, such as blunder resolution and pilot's loss of sight of other approach course during curved approaches, are discussed in this paper. Alternatives for an early implementation and site-specific sample applications are presented. The objective of this paper is to present in a concise manner this preliminary concept that has already generated some interest as a solution to reduced parallel operations. As with any new concept, analysis by all concerned parties have to be performed followed by simulations and/or demonstrations before the concept can be considered implementable. Author (GRA)

N86-29805# Air Command and Staff Coll., Maxwell AFB, Ala.
WILL THE USAF NEED GROUND-BASED AIR TRAFFIC CONTROL RADAR IN THE YEAR 2000?
George L. Varn Apr. 1986 49 p
(AD-A166504; AD-E750871; ACSC-86-2585) Avail: NTIS HC A03/MF A01 CSCL 17/7

Advanced technology in military aviation is developing rapidly. The Global Positioning System (GPS) and Microwave Landing System (MLS) will give the pilot precision navigation capability when fully deployed in the 1990s. The Joint Tactical Information Distribution System (JTIDS) will give the pilot the capability to display enemy and friendly aircraft in his area in his cockpit. At the same time, our mobile air traffic control (ATC) radars are aging and need to be replaced. But, with the new technology in the cockpit, it may be more feasible to eliminate ground-based ATC radar and let the pilot do his own ATC from the cockpit. This study examines the feasibility of a cockpit-based ATC system by looking at the requirement for military ATC, specific capabilities that new technologies give the pilot, and human considerations in a cockpit-based ATC system. The study concludes that a cockpit-based ATC system is not feasible and that there will be a need for ground-based ATC radar, at least through the year 2000. Author (GRA)

N86-29806# Lear Siegler, Inc., Grand Rapids, Mich. Inst. Div.
OPERATING AND SUPPORT HAZARD ANALYSIS FOR THE SELF-CONTAINED NAVIGATION SYSTEM LSI MODEL 6216A, B AND C GROUP A
John T. Reeves 13 Mar. 1986 20 p
(Contract F09603-85-C-1224)
(AD-A166815; GRR-6216-014) Avail: NTIS HC A02/MF A01 CSCL 17/7

This document constitutes the Operating and Support Hazard Analysis (O&SHA) for the C-130 Self-Contained Navigation System (SCNS) installation. It provides a hazard assessment of use and maintenance of the SCNS installation. The purpose of an O&SHA is to identify and control hazards to personnel and to the system, or related to production, installation, maintenance, test, operation, etc. This O&SHA is limited to installation and checkout of the A-kits and system and to the safety of personnel working in or around the equipment, including ground and flight crews. The scope of this analysis for Data Item 0103 is limited to the SCNS installation task 'A-kit' components (viz. wiring harness, brackets, racks, control panels, relay boxes, circuit breakers), B-kit components (viz. ICDUs, BICU, DVS, INU), and the physical interfaces with existing equipment (viz. CACD or Sensors, Radar, Air Data Sensors). These items will be analyzed in respect to safe installation, safe hardware, and safe usage (viz. installation, removal, in-place test, and handling). GRA

N86-29807# Lear Siegler, Inc., Grand Rapids, Mich. Inst. Div.
SUBSYSTEM HAZARD ANALYSIS FOR THE LSI MODELS 6216A, B AND C SELF-CONTAINED NAVIGATION SYSGEM GROUP A
John T. Reeves 13 Mar. 1986 19 p
(Contract F09603-85-C-1224)
(AD-A166816; GRR-6216-013) Avail: NTIS HC A02/MF A01 CSCL 09/5

This document constitutes the Subsystem Hazard Analysis (SSHA) for the C-130 Self-Contained Navigation System (SCNS) installation. It provides a safety assessment of the SCNS installation. The purpose of an SSH is to evaluate the parts making up a system for items that could adversely affect the system safety through component failure, performance degradation, functional failure and inadvertent operation. The scope of this analysis for Data Item 0103 is limited to the SCNS installation task A kit

components (viz. wiring harness, brackets, racks control panels, relay boxes, circuit breakers), B-kit components (viz., ICDUs, BICU, DVS, INU), and the physical interfaces with existing equipment (viz., CADC or Sensors, Radar, Air Data Sensors). These items will be analyzed in respect to safe installation, safe hardware, and safe usage (viz. installation, removal, in-place test, and handling). GRA

N86-29808# Oak Ridge National Lab., Tenn.
PROCEEDINGS OF THE 2ND WORKSHOP ON PLANNING AND SENSING FOR AUTONOMOUS NAVIGATION
E. S. Howe, ed. and C. R. Weisbin, ed. Jan. 1986 195 p Workshop held in Los Angeles, Calif., 18 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-006813; ORNL/TM-9923; CONF-8508163) Avail: NTIS HC A09/MF A01

This report represents the proceedings of the second DOE/CESAR Workshop entitled Planning and Sensing for Autonomous Navigation. The meeting was held August 18 to 19, 1985, in conjunction with, and just prior to the International Joint Conference on Artificial Intelligence at the University of California, Los Angeles. The workshop was organized around several issues developed to focus attention and clarify workshop priorities. The issues dealt with methods for world mapping and discovery in unstructured environments, approaches to real-time planning with sensor feedback, computer architectures and concurrent algorithms, sensor integration, and uncertainty representation and propagation. A series of overview papers contained herein served as background for discussion. Written summaries of group discussions were prepared during the meeting and are included in these proceedings. DOE

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-29809*# Stanford Univ., Calif.
OPTIMAL LANDING OF A HELICOPTER IN AUTOROTATION
Allan Yeow-Nam Lee Jul. 1985 322 p
(Contract NCC2-106)
(NASA-CR-177082; NAS 1.26:177082) Avail: NTIS HC A14/MF A01 CSCL 01C

Gliding descent in autorotation is a maneuver used by helicopter pilots in case of engine failure. The landing of a helicopter in autorotation is formulated as a nonlinear optimal control problem. The OH-58A helicopter was used. Helicopter vertical and horizontal velocities, vertical and horizontal displacement, and the rotor angle speed were modeled. An empirical approximation for the induced velocity in the vortex-ring state were provided. The cost function of the optimal control problem is a weighted sum of the squared horizontal and vertical components of the helicopter velocity at touchdown. Optimal trajectories are calculated for entry conditions well within the horizontal-vertical restriction curve, with the helicopter initially in hover or forwared flight. The resultant two-point boundary value problem with path equality constraints was successfully solved using the Sequential Gradient Restoration Technique. Author

N86-29810*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechani
FLAP-LAG-TORSIONAL DYNAMICS OF HELICOPTER ROTOR BLADES IN FORWARD FLIGHT Final Report, Jan. 1984 - Jun. 1986
M. R. M. CrespodaSilva Jun. 1986 6 p
(Grant NAG2-274)
(NASA-CR-176976; NAS 1.26:176976) Avail: NTIS HC A02/MF A01 CSCL 01C

A perturbation/numerical methodology to analyze the flap-lead/lag motion of a centrally hinged spring restrained rotor blade that is valid for both hover and for forward flight was developed. The derivation of the nonlinear differential equations of motion and the analysis of the stability of the steady state response of the blade were conducted entirely in a Symbolics 3670 Machine using MACSYMA to perform all the lengthy symbolic manipulations. It also includes generation of the fortran codes and plots of the results. The Floquet theory was also applied to the differential equations of motion in order to compare results with those obtained from the perturbation analysis. The results obtained from the perturbation methodology and from Floquet theory were found to be very close to each other, which demonstrates the usefullness of the perturbation methodology. Another problem under study consisted in the analysis of the influence of higher order terms in the response and stability of a flexible rotor blade in forward flight using Computerized Symbolic Manipulation and a perturbation technique to bypass the Floquet theory. The derivation of the partial differential equations of motion is presented. B.G.

N86-29811*# Bio-Dynamics Research and Development Corp., Eugene, Oreg.
FEASIBILITY STUDY FOR ERGONOMIC ANALYSIS AND DESIGN OF FUTURE HELICOPTER COCKPIT SYSTEMS
Harold L. Hawkins May 1985 52 p
(Contract NAS2-12056)
(NASA-CR-176942; NAS 1.26:176942) Avail: NTIS HC A04/MF A01 CSCL 01C

The Army's light scout-attack helicopters (LHXs), planned for deployment in the 1990's, will fly nap-of-the-earth (NOE) missions in high threat environments, often under poor visibility and adverse atmospheric conditions, and probably with a one man crew. A procedure for the analysis of pilot workload that will identify and explicate the main characteristics of those LHX mission components holding overload potential is described. A principled, in-depth, explication of the cognitive demans of LHX piloting is essential to any effective effort to address the human factors issues. A task-analytic procedure that will yield the detail and organizstion needed to achieve these goals is examined. B.G.

N86-29812*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
STUDY OF NEW FLIGHT TEST TECHNIQUES Final Report
Dirk Deam Aug. 1984 29 p
(Grant NsG-4019)
(NASA-CR-176952; NAS 1.26:176952; KU-FRL-407-10) Avail: NTIS HC A03/MF A01 CSCL 01C

The modification and testing of a small electromechanical vibrator are described. The vibrator wac designed for the flutter testing of aircraft wings and was built to specifications that make it compatible with the X-29 experimental aircraft. The device uses alternating electromagnetic forces to move a magnetic mass and produce vibration. Its unconventional way of producing vibration avoids the need for complex mechanisms and makes efficient use of space and weight. B.G.

N86-29813*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT CONTROL SYSTEM DEVELOPMENT AND FLIGHT TEST EXPERIENCE WITH THE F-111 MISSION ADAPTIVE WING AIRCRAFT
Richard R. Larson Aug. 1986 21 p To be presented at the AIAA Guidance, Navigation, and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88265; H-1366; NAS 1.15:88265; AIAA-86-2237-CP) Avail: NTIS HC A02/MF A01 CSCL 01C

The wing on the NASA F-111 transonic aircraft technology airplane was modified to provide flexible leading and trailing edge flaps. This wing is known as the mission adaptive wing (MAW) because aerodynamic efficiency can be maintained at all speeds. Unlike a conventional wing, the MAW has no spoilers, external flap hinges, or fairings to break the smooth contour. The leading edge flaps and three-segment trailing edge flaps are controlled by a redundant fly-by-wire control system that features a dual digital

primary system architecture providing roll and symmetric commands to the MAW control surfaces. A segregated analog backup system is provided in the event of a primary system failure. This paper discusses the design, development, testing, qualification, and flight test experience of the MAW primary and backup flight control systems. Author

N86-29814*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHT TEST OF A DECOUPLER PYLON FOR WING/STORE FLUTTER SUPPRESSION
F. W. Cazier, Jr. and M. W. Kehoe (National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.) Jul. 1986 14 p Presented at the AIAA 3rd Flight Testing Conference, Las Vegas, Nev., 2-4 Apr. 1986
(NASA-TM-87767; NAS 1.15:87767) Avail: NTIS HC A02/MF A01 CSCL 01B

The decoupler pylon is a NASA concept of passive wing-store flutter suppression achieved by providing a low store-pylon pitch frequency. Flight tests were performed on an F-16 aircraft carrying on each wing an AIM-9J wingtip missile, a GBU-8 bomb near midspan, and an external fuel tank. Baseline flights with the GBU-8 mounted on a standard pylon established that this configuration is characterized by an antisymmetric limited amplitude flutter oscillation within the operational envelope. The airplane was then flown with the GBU-8 mounted on the decoupler pylon. The decoupler pylon successfully suppressed wing-store flutter throughout the flight envelope. A 37-percent increase in flutter velocity over the standard pylon was demonstrated. Maneuvers with load factors to 4g were performed. Although the static store displacements during maneuvers were not sufficiently large to be of concern, a store pitch alignment system was tested and performed successfully. One GBU-8 was ejected demonstrating that weapon separation from the decoupler pylon is normal. Experience with the present decoupler pylon design indicated that friction in the pivoting mechanism could affect its proper functioning as a flutter suppressor. Author

N86-29815*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND FABRICATION OF LARGE SUCTION PANELS WITH PERFORATED SURFACES FOR LAMINAR FLOW CONTROL TESTING IN A TRANSONIC WIND TUNNEL
Dal V. Maddalon and William A. Poppen, Jr. Aug. 1986 67 p
(NASA-TM-89011; NAS 1.15:89011) Avail: NTIS HC A04/MF A01 CSCL 01C

Considerable progress has been made in the development of perforated suction surface material for laminar flow control applications. Electron-beam perforated titaniuum skin was used as the suction surface. Critical issues related to suction panel manufacturing were identified and largely resolved. The final product included fabrication of a 7-foot chord by 7-foot span perforated laminar flow control wind tunnel model. Techniques used can be adapted to modern aircraft production lines. The report includes details on panel instrumentation and other features required for testing in a transonic pressure tunnel. Author

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-29816# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Flight Mechanics Panel.
ANALOGUE SIGNAL CONDITIONING FOR FLIGHT TEST INSTRUMENTATION
D. W. Veatch and R.K. Bogue Apr. 1986 179 p
(AGARD-AG-160-Vol-17; ISBN-92-835-1520-X) Avail: NTIS HC A09/MF A01

The application of analog signal conditioning to flight-test data-acquisition systems is discussed. Emhasis is placed on practical applications of signal conditioning for the most common flight-test data-acquisition systems. A limited amount of theoretical discussion is included to assist the reader in a more complete understanding of the subject matter. Nonspecific signal conditioning, such as amplification, filtering, and multiplexing, is discussed. Signal conditioning for various specific transducers and data terminal devices is also discussed to illustrate signal conditioning that is unique to particular types of transducers. The purpose is to delineate for the reader the various signal-conditioning technique options, together with tradeoff considerations, for commonly encountered flight-test situations. Author

N86-29817# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
IMPROVING THE INTERPRETABILITY OF AN AIRCRAFT ATTITUDE INDICATOR M.S. Thesis
Mark A. DiPadua 1986 59 p
(AD-A166329; AFIT/CI/NR-86-27T) Avail: NTIS HC A04/MF A01 CSCL 01/4

Two display types and four aircraft size ratios were investigated in this thesis to determine their effect on attitude display interpretability. The two display designs used were an outside-in (moving plane) and an inside-out (moving horizon) display. The four aircraft symbol lengths were measured relative to the size of the artificial horizon (33 percent, 50 percent, 67 percent, 100 percent). Twenty flight naive subjects were tested in two phases with both display types and all four size ratios. The first phase tested subjects' reaction to the sudden awareness of a change in attitude. The dependent variables measured, reaction time and error rate, indicated a preference for the outside-in display. The small size ratio was significantly better than the larger ones with reaction time as the dependent variable. A significant difference between sizes was not the case when the dependent variable error rate was measured. The second phase consisted of a dynamic flying task on an Apple PC computer. The dependent measures were the root mean square (RMS) error due to roll and the RMS error due to pitch. A significant difference in display types, favoring the outside-in type, was found with the RMS error due to roll as the dependent measure. No significant differences were found when the RMS error due to pitch was used as the dependent measure. Sizes did, however, approach significance in this case. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-29818*# Oklahoma Univ., Norman.
TRANSMISSION LINE DESIGN FOR A POWER DISTRIBUTION SYSTEM AT 20 kHz FOR AIRCRAFT
Leon W. Zelby, John B. Mathes, and John W. Shawver Washington NASA Jul. 1986 38 p
(Grant NAG3-508)
(NASA-CR-3987; NAS 1.26:2987) Avail: NTIS HC A03/MF A01 CSCL 21E

A low inductance, low characteristic impedance transmission line was designed for a 20 kHz power distribution system. Several different conductor configurations were considered: strip lines, interdigitated metal ribbons, and standard insulated wires in multiwire configurations (circular and rectangular cylindrical arrangements). The final design was a rectangular arrangement of multiple wires of the same gauge with alternating polarities from wire to wire. This offered the lowest inductance per unit

length (on the order of several nanohenries/meter) and the lowest characteristic impedance (on the order of one Ohm). Standard multipin connectors with gold-plated elements were recommended with this transmission line, the junction boxes to be internally connected with flat metal ribbons for low inductance, and the line to be constructed in sections of suitable length. Computer programs for the calculation of inductance of multiwire lines and of capacitances of strip lines were developed. Author

N86-29819*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
MULTI-VARIABLE CONTROL OF THE GE T700 ENGINE USING THE LQG/LTR DESIGN METHODOLOGY
William H. Pfeil (General Electric Co., Lynn, Mass.), Michael Athans, and H. Austin Spang, III (General Electric Co., Schenectady, N.Y.) Apr. 1986 16 p
(Grant NAG2-297)
(NASA-CR-177080; NAS 1.26:177080; LIDS-P-1547) Avail: NTIS HC A02/MF A01 CSCL 21E

The design of scalar and multi-variable feedback control systems for the GET700 turboshaft engine coupled to a helicopter rotor system is examined. A series of linearized models are presented and analyzed. Robustness and performance specifications are posed in the frequency domain. The linear-quadratic-Gaussian with loop-transfer-recovery (LQG/LTR) methodology is used to obtain a sequence of three feedback designs. Even in the single-input/single-output case, comparison of the current control system with that derived from the LQG/LTR approach shows significant performance improvement. The multi-variable designs, evaluated using linear and nonlinear simulations, show even more potential for performance improvement. Author

N86-29820*# Wu (Jiunn-Jenq), Sierra Madre, Calif.
EXPERIMENTS ON HIGH SPEED EJECTORS
Jiunn-Jenq Wu Jul. 1966 82 p
(NASA Order A40174-C; Contract F49620-81-C-0043)
(NASA-CR-177419; NAS 1.26:177419) Avail: NTIS HC A05/MF A01 CSCL 21E

Experimental studies were conducted to investigate the flow and the performance of thrust augmenting ejectors for flight Mach numbers in the range of 0.5 to 0.8, primary air stagnation pressures up to 107 psig (738 kPa), and primary air stagnation temperatures up to 1250 F (677 C). The experiment verified the existence of the second solution ejector flow, where the flow after complete mixing is supersonic. Thrust augmentation in excess of 1.2 was demonstrated for both hot and cold primary jets. The experimental ejector performed better than the corresponding theoretical optimal first solution ejector, where the mixed flow is subsonic. Further studies are required to realize the full potential of the second solution ejector. The research program was started by the Flight Dynamics Research Corporation (FDRC) to investigate the characteristic of a high speed ejector which augments thrust of a jet at high flight speeds. Author

N86-29821# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INVESTIGATION OF SURFACE STRAINS IN FIR TREE TURBINE BLADE ATTACHMENTS M.S. Thesis
Joseph P. Marksteiner 1985 86 p
(AD-A166330; AFIT/CI/NR-86-7T) Avail: NTIS HC A05/MF A01 CSCL 21/5

Surface strains in the fillet regions of test model specimens of fir tree turbine blade attachments were examined. The fir tree specimens are loaded under cyclic tension-tension in the elastic range. The strains were recorded with an interferometric technique at the center and near the edges of the exposed unloaded face of the fir tree. Data were recorded for a total of over 700 load cycles on 23 differecnt specimenns. Two different load bearing surface geometries were investigaed. The effect of machining tolerances were determined for both geometries. The load split between the two sets of load bearing surfaces was determined. Actual strains were compared to those predicted by superposition of strain fields. Stresses computed from the recorded strains were compared to photoelastic and finite element analyses. GRA

N86-29822# Department of the Air Force, Washington, D.C.
SELF-RETAINED PLATFORM COOLING PLATE FOR TURBINE VANE Patent Application
Stephen N. Finger, inventor (to Air Force) Filed 13 Nov. 1985 13 p
(AD-D012218; US-Patent-Appl-SN-797581) Avail: NTIS HC A02/MF A01 CSCL 21/5

A turbine stator vane assembly for gas turbine or turbojet engines has an improved structure for retention of a cooling impingement plate. Two inwardly directed flanges are added to the wall-like extensions extending from the bottom of the platform upon which the vane is mounted. The cooling impingment plate is resiliently snapped into place between pin fins on the bottom of the platform and the flanges. Author (GRA)

N86-29823# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
HEAT TRANSFER AND COOLING IN GAS TURBINES
Loughton, England Sep. 1985 528 p In ENGLISH and FRENCH Symposium held in Bergen, Norway, 6-10 May 1985
(AGARD-CP-390; ISBN-92-835-0378-3) Avail: NTIS HC A23/MF A01

Heat transfer and cooling in gas turbines is one of the crucial fields in the quest for higher performance as well as life and reliability. The purpose of this symposium was to bring together experts from industry, research establishments and universities to discuss fundamental and applied heat transfer problems relevant to gas turbines and to exchange practical experience gained in component and engine development and testing. The symposium focussed on turbine blade cooling including the interaction of cooling and aerodynamics. Furthermore, heat transfer in compressors and combustion systems as well as heat exchangers was covered. Emphasis was also placed on heat transfer modeling, experimental techniques, and test facilities. For individual titles, see N86-29824 through N86-29862.

N86-29824# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
COOLING TECHNIQUES FOR GAS TURBINE AIRFOILS: A SURVEY c34
Darryl E. Metzger *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

A brief general background discussion of turbine heat transfer and cooling with compressor discharge air is given. Specific reference is made to a selection of current research areas for gas turbine engine cooling, including blade tip heat transfer, heat transfer in serpentine passages, multiple jet array impingement, heat transfer in pin fin arrays, disk heat transfer, and film cooling. An overview of various experimental methods used to acquire heat transfer data is also given, with an emphasis on newer methods used to acquire detailed local convection heat transfer information. Author

N86-29825# Rolls-Royce Ltd., Bristol (England). Turbine Research and Methods.
ROTATING HEAT TRANSFER INVESTIGATIONS ON A MULTI-PASS COOLING GEOMETRY c34
R. J. Clifford *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The effect of rotation on the heat transfer in a complex 3D multi-pass turbine blade cooling geometry is reviewed. The test rig, the experimental technique and the initial results are discussed in detail. Basic checks at zero rotational speed showed good agreement with data obtained earlier on this model using an alternative transient technique. Rotation was shown to have a significant effect on the heat transfer distribution (+ or - 30%) which when averaged over the gas washed surfaces showed a reduction to 90% of the static value. The effect of these changes on the blade predicted metal temperatures and lives are also

reviewed. Investigations are continuing to fully evaluate the implications of both Coriolis and buoyancy effects on the heat transfer distributions in these complex 3D geometries. M.G.

N86-29826# Hull Univ. (England). Dept. of Engineering Design and Manufacture.

LOCAL AND MEAN HEAT TRANSFER ON THE LEADING AND TRAILING SURFACES OF A SQUARE-SECTIONED DUCT ROTATING IN THE ORTHOGONAL-MODE c34

W. D. Morris and S. P. Harasgama (Royal Aircraft Establishment, Farnborough (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The results of an experimental study of local and mean heat transfer over the leading and trailing surfaces of a square-sectioned duct which is constrained to rotate about an axis perpendicular to the main direction of through flow are described. Both radially outward and inward coolant flow conditions are considered. Physical arguments are discussed which explain the data trends found in terms of Coriolis-induced secondary flows and rotational buoyancy and these trends are compared with the corresponding problem in circular-sectioned tubes. Author

N86-29827# Pratt and Whitney Aircraft of Canada Ltd., Longueuil (Quebec).

PRESSURE DROP AND HEAT TRANSFER CHARACTERISTICS OF CIRCULAR AND OBLONG LOW ASPECT RATIO PIN FINS c34

S. C. Arora and W. Abdel Messeh *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 15 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The pressure drop and heat transfer characteristics of circular and oblong pin fins of height-to-diameter ratio of unity used to augment internal cooling of gas turbine airfoils are presented. Data were obtained for an array of 10 rows of staggered pin fins in a 25:1 aspect ratio channel, with both pins and channel endwalls forming the heat transfer surface. Results show that the array average friction factor increases with increasing blockage caused by different arrangement of pin fin geometries in the channel. The local heat transfer coefficient increases up to the 3rd row of pin fins and decreases thereafter. Oblong pin fins with gamma=90 deg (major axis parallel to the direction of flow) result in higher heat transfer rates and lower friction factor than the circular pin fins. For other orientations, oblong pin fins do not offer any advantage over circular pin fins for Re $<$ or $=$ 20,000 (typical of small gas turbine engines). M.G.

N86-29828# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).

EXTERNAL HEAT TRANSFER STUDY ON A HP TURBINE ROTOR BLADE c34

T. Arts and C. G. Graham (Rolls-Royce Ltd., Bristol (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

An experimental investigation of the effects of Mach number, Reynolds numbers and free stream turbulence intensity on the heat transfer performance of a high pressure gas turbine rotor blade in a stationary linear cascade arrangement is described. This study was undertaken in the von Karman Institute short duration isentropic compression tube facility. The tests were performed for outlet Mach numbers ranging between 0.7 and 1, whereas the outlet Reynolds number was varied between 500,000 and 1,500,000; free stream turbulence levels between 1% and nearly 8% were considered. The experimental results were compared with boundary layer predictions provided by a finite difference program (STAN5), which solves the simplified, two dimensional, steady Navier-Stokes equations. M.G.

N86-29829# Karlsruhe Univ. (West Germany). Lehrstuhl und Inst. fuer Thermische Stroemungsmach

EFFECTS OF WAKES ON THE HEAT TRANSFER IN GAS TURBINE CASCADES c34

S. Wittig, A. Schulz, H. J. Bauer, and K. H. Sill *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The interaction between consecutive blade rows can be expected to have important effects on the heat transfer in cooled gas turbine cascades. In the present study, the influence of the wake from a blade profile - traversed in front of a cooled gas turbine cascade in planes with varying distances from the leading edge - on the local heat transfer coefficient along the suction and pressure side has been analyzed. The investigation is part of a research program to develop experimentally verified numerical codes for heat transfer calculations. With the aid of a finite element program, the local heat transfer coefficients along the cooled blades are derived from surface and coolant temperature measurements. It is shown that in addition to the axial distances the orientation of the wake with respect to the leading edge is of dominant influence. In particular, the measurements demonstrate with increasing free stream turbulence levels a rapid rise of the heat transfer rate along the pressure surface as well as in the stagnation region. The laminar-turbulent transition is relocated towards the leading edge along the suction surface. The measurements are compared with those derived from flows with grid-produced turbulence. In general, slower transition behaviour is observed than foundwith numerical codes. Author

N86-29830# Oxford Univ. (England). Dept. of Engineering Science.

WAKE-PASSING IN A TURBINE ROTOR CASCADE c34

D. J. Doorly, M. L. G. Oldfield, and C. T. J. Scrivener (Rolls-Royce Ltd., Derby, England) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 18 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

A technique for generating realistic wakes upstream of a stationary turbine blade cascade at full scale Mach numbers and Reynolds numbers is described. High speed Schlieren photographs showing the development of the wake flow through the cascade are presented, together with unique high speed measurements of the fluctuations of the surface heat transfer rate as the nozzle guide vane (NGV) wakes pass over the rotor blade surface. Combining the flow visualization results with the unsteady heat transfer measurements reveals the radically different nature of the boundary layer transition caused by wake passing; an understanding of which will be essential for the development of improved prediction techniques. M.G.

N86-29831# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Antriebstechnik.

EFFECTS OF HOLE GEOMETRY, WALL CURVATURE AND PRESSURE GRADIENT ON FILM COOLING DOWNSTREAM OF A SINGLE ROW c34

H. Kruse *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Film cooling with injection through a single row of discrete circular holes is a 3-dimensional process which becomes more and more 2-dimensional with downstream distance from the injection site. In order to develop and verify prediction methods experimental investigations within the mixing region downstream of the coolant injection were undertaken. The measurements discussed in this paper were carried out using simple film cooled models at a mainstream temperature of about 100 C and a coolant temperature of about 30 C. Coolant distributions on the adiabatic wall, adiabatic wall effectiveness and heat transfer coefficients affected by blowing are presented. The blowing parameter was varied from 0.5 to 2 and the pitch to diameter ratio was varied from 1.5 to 5 with a constant hole diameter of 2 mm. Injection angles of 10 deg., 45 deg. and 90 deg. are covered.

A flexible wall was used to produce zero, favorable and adverse pressure gradients along the flat plate. Author

N86-29832# Sussex Univ., Brighton (England).
EFFECTS OF SURFACE ROUGHNESS ON HEAT TRANSFER TO GAS TURBINE BLADES **c34**
A. B. Turner, F. H. A. Tarada, and F. J. Bayley *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

A brief, preliminary sample of results of an investigation into the effect of surface roughness on heat transfer to gas turbine blades is presented. Only the kind of roughness due to the accretion of dirt or dust is considered and this has been simulated in cascade flow by attaching various grades of abrasive powders to the blade surface with a water soluble adhesive. A significant increase in heat is reported particularly with high free stream turbulent levels. Roughness on the pressure surface alone is shown to increase the overall heat transfer without any corresponding increase in profile loss. Author

N86-29833# Oxford Univ. (England). Dept. of Engineering Science.
THE EFFECT OF DENSITY RATIO ON THE FILM-COOLING OF A FLAT PLATE **c34**
C. J. P. Forth, P. J. Loftus, and T. V. Jones *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The effect of varying the ratio of coolant-to-freestream density on the film-cooling process is illustrated. This effect is of great importance since most design data has been acquired at temperature ratios and hence density ratios far removed from those occurring in modern gas turbines. There is no consensus at present on how to scale this data to engine conditions. Experimental data is presented for heat transfer downstream from a single row of 30 degree-inclined film-cooling holes, obtained for air at a wide range of gas-to-coolant temperature ratios. These results exhibit a marked effect of density ratio. Scaling is discussed, and good collapse of data is achieved in the two regimes identified, characterised by weak and strong blowing. Conditions representative of the turbine environment are created using an isentropic light piston tunnel: the Mach number M = 0.55, and the unit Reynolds number Re/m = 2.7 x 10(5)/m. The experiments are unique in that they simulate the gas-to-coolant and gas-to-wall temperature ratios typical of those in gas turbines, producing density ratios hiterto only attained in experiments employing foreign gas injection. Author

N86-29834# Societe Nationale d'Etudes et de Construction de Moteurs d'Aviation, Moissy-Cramayel (France). Etudes Generales Aerothermiques.
STUDIES OF HEAT TRANSFER ON THE BASE OF TURBINE NOZZLES WITH AND WITHOUT FILM COOLING [ETUDES DES TRANSFERTS THERMIQUES SUR LES PLATES-FORMES DE DISTRIBUTEUR DE TURBINE AVEC ET SANS FILM DE REFROIDISSEMENT] **c34**
Ann-Elisabeth Bouiguignon *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 9 p In FRENCH (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The severity of the aerothermal environment of high-pressure nozzles in modern engines requires base cooling using techniques similar to those used for guide vanes, i.e., convection, films etc. These experiments measure the exchange coefficients for several bases of different configurations, and which show variations in the film cooling structure; measurement of the characteristics of the flow in the vicinity of the wall is also done. This document presents the analysis of the results obtained, compared with the predicted results. The correlations deduced from this analysis show a general method of determining the thermal transfer coefficients for air injection cooling. M.G.

N86-29835# Rolls-Royce Ltd., Derby (England). Mechanical Technology.
SHROUD SEGMENTS FOR UNSHROUDED BLADE TURBINES **c34**
R. S. Attwood *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

For hot and high speed turbines it is desirable to use blades without tip shrouds, which are an embarrassment from the point of view of centrifugal weight and cooling. The static shroud segments are then exposed to very severe thermal conditions. It is difficult to design shroud segments which will survive these conditions without demanding so much cooling air that the specific fuel consumption advantage of the shroudless blade is completely absorbed. The problem involves two parameters: cooling requirements and integrity. Therefore, for a variety of possible segment section design concepts, the fundamental relationships which control the cooling requirements are examined. The second part of the paper explains the decision to evaluate experimentally the integrity of section of designs, and a description and technical justification of the chosen test technique, which overcomes the heat-transfer compromises involved in testing at atmospheric pressure. Author

N86-29836# Brown, Boveri und Cie, A.G., Baden (Switzerland).
ENGINE TESTS ON A COOLED GAS TURBINE STAGE **c34**
H. J. Graf *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

A new cooling system was designed for the 45 MW gas turbine type 8. Extensive tests were carried out in a new power station to verify the reliability of the cooled components. Wall temperatures were measured using thermocouples, thermal paints and pyrometers. Cooling air temperature, pressure and mass flow measurements allowed a detailed analysis of the first stage under operating conditions. The results and comparisons with design calculations are presented. The applicability and accuracy of the three measuring techniques are discussed. Author

N86-29837# Westinghouse Canada, Inc., Hamilton (Ontario).
HEAT TRANSFER TEST EVALUATION OF THE SHELL-SPAR BLADE COOLING CONCEPT APPLIED TO INDUSTRIAL GAS TURBINES **c34**
G. P. Butt and W. Edward North (Westinghouse Electric Corp., Concordville, Pa.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 17 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

A series of heat transfer experiments to verify the theoretical prediction techniques adopted for the design of shell-spar cooled turbine vanes and blades is described. Tests were performed on flat plate specimens representing a wide range of channel geometries. Each specimen was installed in one wall of a test section downstream of a combustor which was run at various operating temperatures. A recommended design approach was formulated from analysing the results. The potential of shell-spar cooling applied to industrial gas turbines is discussed. Author

N86-29838# Calspan Advanced Technology Center, Buffalo, N.Y. Physical Sciences Dept.
HEAT-FLUX MEASUREMENTS AND ANALYSIS FOR A ROTATING TURBINE STAGE **c34**
Michael G. Dunn *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

A measurement and analysis program is described which utilizes: (1) a Garrett TFE 731-2 high-pressure turbine stage and (2) a Garrett low aspect ratio turbine (LART) stage. The major emphasis of this program has been placed on obtaining accurate measurements of heat-flux distributions in the full-scale rotating turbine stage. The experimental technique being used is the

short-duration, shock-tunnel approach, in which fast-response, thin-film thermometers are used to measure the surface temperature histories at prescribed positions on the various component parts. Heat flux values are then inferred from these temperature histories using standard data reduction procedures. A summary and discussion of the TFE 731-2 high pressure turbine results with particular emphasis on nozzle guide vane (NGV) tip endwall data not previously reported are provided. A significantly more brief discussion of the LART stage instrumentation is also included. In addition, a summary discussion of the experimental technique and the associated instrumentation is included. Author

N86-29839# Karlsruhe Univ. (West Germany). Inst. fuer Hydromechanik.

CALCULATION OF LAMINAR-TURBULENT BOUNDARY LAYER TRANSITION ON TURBINE BLADES c34

W. Rodi and G. Scheuerer (Erlangen-Nuremberg Univ. (West Germany).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Calculations are presented for the flow development and heat transfer in transitional two-dimensional boundary layers of relevance to turbine blades. They were obtained with the Patankar-Spalding finite difference program, using a low Reynolds number version of the k-epsilon turbulence model for simulating the turbulent transport. For the higher free-stream turbulence levels prevailing in gas turbines (say above 1%), the model is capable of simulating the physical transition mechanism which is governed by the transport of the turbulent fluctuations from the free stream into the laminar boundary layer. The calculation examples comprise a variety of flat-plate boundary layers with various favorable and adverse pressure gradients as well as various levels of free-stream turbulence, and a simulation of the boundary layer development of an experimentally investigated turbine blade. The calculations are compared with measurements in each case (mainly the distribution of heat transfer coefficients). The agreement is generally good, but the model has a tendency to predict a somewhat faster transition than was observed in the experiments. M.G.

N86-29840# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.

A MODEL FOR CORRELATING FLAT PLATE FILM COOLING EFFECTIVENESS FOR ROWS OF ROUND HOLES c34

M. R. LEcuyer and F. O. Soechting (Pratt and Whitney Aircraft, West Palm Beach, Fla.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

An effective method of cooling, that has found widespread application in aircraft gas turbines, is the injection of a film of cooling air through holes into the hot mainstream gas to provide a buffer layer between the hot gas and the airfoil surface. Film cooling has been extensively investigated and the results have been reported in the literature. However, there is no generalized method reported in the literature to predict the film cooling performance as influenced by the major variables. A generalized film cooling correlation has been developed, utilizing data reported in the literature, for constant velocity and flat plate boundary layer development. This work provides a basic understanding of the complex interaction of the major variables effecting film cooling performance. Author

N86-29841# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.

COMPUTATION OF THERMAL RADIATION FOR GAS TURBINE CONDITIONS c34

M. G. Carvalho, D. F. G. Durao, and F. C. Lockwood (Imperial Coll. of Science and Technology, London (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 7 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The prediction of the fluid flow, combustion and heat release processes in a 'can' combustion chamber of a gas turbine is addressed. A three-dimensional numerical solution technique is used to solve the governing time-average partial differential equations and the physical modelling for the turbulence, combustion and thermal radiation. The thermal radiation modelling is emphasized in this paper. The implications of neglecting radiative heat transfer in gas turbine combustion chamber calculations are explored and discussed. Author

N86-29842# Sussex Univ., Brighton (England). Thermo-Fluid Mechanics Research Centre.

PREDICTION OF TRANSIENT TEMPERATURES FOR AN AIR-COOLED ROTATING DISC c34

C. A. Long and J. M. Owen *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The numerical solution of Fourier's conduction equation is used to compute the transient temperature distribution in a rotating disc. The convective boundary conditions for the disc surfaces are based on simple formulae obtained from the solutions of the boundary-layer equations, and the computed surface temperatures are compared with measurements made on a rotating-disc rig. Free-disc tests, at rotational Reynolds numbers up to Re sub phi = 2.5 x 10(6), are used to provide a datum from which to judge the numerical method. Although the numerical solution tends to overestimate the cooling rate of the heated free disc at high Reynolds numbers, the agreement between computed and measured temperatures is considered reasonable. Rotating-cavity tests, in which a heated disc is cooled by a radial outflow of air, are used to examine the suitability of the simple convective boundary conditions. As the computed temperatures show reasonable agreement with the measured values, it is suggested that the proposed formulae for convection in a rotating cavity might be useful for design purposes. Author

N86-29843# Norges Tekniske Hoegskole, Trondheim. Dept. of Engineering Thermodynamics.

HEAT TRANSFER IN GAS TURBINE COMBUSTORS: A DISCUSSION OF MATHEMATICAL MODELING OF COMBUSTION, HEAT AND MASS TRANSFER WITH EMPHASIS ON HEAT TRANSFER IN GAS TURBINE COMBUSTORS c34

Bjorn F. Magnussen *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 17 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Heat transfer problems in gas turbine combustors are addressed with particular emphasis given to the treatment of heat generation in the combustor. The heat is generated through chemical reactions that take place when reactants are mixed at molecular scale at sufficient high temperature. It is known that the microscale processes which are decisive for the molecular mixing as well as the dissipation of turbulence energy into heat are severely intermittent, i.e. concentrated into isolated regions whose entire volume is only a small fraction of the volume of the fluid. The paper reviews the eddy dissipation concept (EDC) for chemical reactions in turbulent flow developed by Magnussen. The EDC is a reactor concept which is unique in that it takes into account the intermittent behavior of the small scale structures on the chemical reactions. Both fast and slow chemical reactions can be treated simultaneously. Flame stabilization, extinction and ignition characteristics, as well as blow-off, turbulent flame propagation velocities and reaction rates are discussed in relation to the EDC. Computations of heat transfer rates to the walls taking into a account the cooling effect of the secondary air are demonstrated. The physical implications of the various sub-models are discussed. M.G.

N86-29844# Trent Polytechnic, Nottingham (England). Dept. of Mechanical Engineering.

EFFECTIVENESS MEASUREMENTS FOR A COOLING FILM DISRUPTED BY A SINGLE JET WITH WALL PLUNGING c34

B. L. Button *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Experimental measurements of the effectiveness downstream of a slot airflow with the jet airflow normal to the wall were performed in a wind tunnel. The separate and combined effects of the slot and jet airflows with and without wall plunging on the effectiveness and flow characteristics are presented over a range of slot and jet airflow conditions relevant to gas turbine combustors. The slot consisted of three rows of holes inclined at 10 degrees to the main airflow. The jet center line was positioned one, two and three diameters downstream from the slot exit. The jet diameter corresponded to five slot heights. Three wall plunge heights were used and corresponded to : 02, 0.4 and 12 jet diameters. The main airflow was constant at a Mach number of 0.05 and various combinations of the slot mass velocity ratio (0.5, 1.0 and 1.5) with the jet mass velocity ratio (0.5, 1.0 and 2.0) were tested. The effectiveness measurements covered an area eight jet diameters downstream of the slot exit by four jet diameters laterally. The results show that the major interactions between the three airflows occur downstream of the jet center line in a small region about three diameters long and two diameters wide. In general, such interactions reduce the effectiveness by up to forty percent when compared to the values with no jet injection. The combined and the separate effectiveness of the slot airflow and of the jet airflow are presented. Author

N86-29845# Detroit Diesel Allison, Indianapolis, Ind.

ALTERNATE COOLING CONFIGURATIONS FOR GAS TURBINE COMBUSTION SYSTEMS c34

D. A. Nealy, S. B. Reider, and H. C. Mongia *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 15 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Work aimed at the synthesis, characterization, and evaluation of several alternate types of advanced wall cooling schemes is reviewed -- specifically, film-convection cooling, laminated porous wall cooling, and angled, multihole (effusion) cooling. The concept definition, heat transfer performance characterization, and design problems associated with each basic concept are reviewed, and relevant rig and engine experience cited. A brief assessment of the structural limitations of the several cooling schemes is also made, together with a review of the key materials and fabrication considerations. M.G.

N86-29846# Leeds Univ. (England). Dept. of Fuel and Energy.

FULL COVERAGE IMPINGEMENT HEAT TRANSFER: THE VARIATION IN PITCH TO DIAMETER RATIO AT A CONSTANT GAPP c34

G. E. Andrews, A. A. Asere, C. I. Hussain, and M. C. Mkpadi *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Impingement heat transfer is widely used in turbine blade cooling and is becoming more common in combustion chamber wall cooling. For the latter application, geometries that give impingement cooling of large surface areas are required. The geometrical requirements of full coverage heat transfer for combustion chamber cooling are outlined. A series of hole sizes, D, are investigated at a constant pitch, X, and constant impingement gap Z. The usual practice of keeping Z/D constant as X/D has been varied and has been rejected as unrealistic. Design considerations limit practical values of Z to a fairly narrow range of 2-12 mm and it is shown that over this range, Z, has no influence on the impingement heat transfer. The application of the present type of heat transfer correlation to the prediction of impingement cooling chambers is considered. Measured wall temperature data is presented for an impingement/effusion wall cooling geometry. The heating of the impingement plate by the impingement jets being deflected backwards is identified an as area where no heat transfer correlations exist. At low coolant flow rates the temperature rise of the impingement air as it passes through the impingement plate is significant and unless it is taken into account the impingement cooling effectiveness will be overpredicted. Author

N86-29847# Societe Nationale d'Etudes et de Construction de Moteurs d'Aviation, Moissy-Cramayel (France). Centre de Villaroche

COOLING TECHNIQUES FOR TURBOJET PRE-HEATER CHANNELS [TECHNIQUES DE FROIDISSEMENT DES CANAUX DE RECHAUFFE DES TURBOREACTEURS] c34

M. Desaulty, P. Troullot, and S. Coutor *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 11 p In FRENCH (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

Increases in the performance of turbojets with pre-heating are dependent upon technological research in the area of protection of the wall in pre-heater channels. The procedures used to cool the thermal protection jackets have undergone important improvements which have optimized performance, reduced weight and improved cooling efficiency. This report presents a comparison of the thermal protection jackets for several SNECMA engines, as well as the principal stages of development for the jacket from the design stages through static engines tests. M.G.

N86-29848# Oxford Univ. (England). Dept. of Engineering Science.

THE MEASUREMENT OF LOCAL HEAT TRANSFER COEFFICIENTS IN BLADE COOLING GEOMETRIES c34

P. T. Ireland and T. V. Jones *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

An account is given of the experimental technique employed in measuring heat transfer coefficients in blade cooling passages. A hot air flow is suddenly started through a perspex model of the blade cooling passage. The surface temperature of the model is monitored during this time and the internal heat transfer coefficient deduced from this temperature history. Thin and thick walled models are employed and the surface temperature measured using liquid crystal thermochromic indicators. The analysis for the interpretation of the experimental results is given together with the experimental precautions required for the measurement. The use of liquid crystals in this form of transient experiment is discussed. A study of the detailed heat transfer distribution around pedestals and other heat transfer enhancement devices is also described. These devices are tested at approximately x 100 scale in order to obtain the required detail and full scale Reynolds number is simulated. Author

N86-29849# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

AN OPTICAL PYROMETER TO MEASURE TURBINE BLADE SURFACE TEMPERATURE c34

Marc Charpenel and Jean Wilhem *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)

Avail: NTIS HC A23/MF A01

The development of a cooled infrared pyrometric probe, with a high spatial and temporal resolving power, made it possible to establish by pyrometric methods surface temperature charts of the mobile blades of a turbine. The use of a sensor with a 1 sec time constant yields a resulting power on the blade surface of the order of 2 sq mm. This sensor is cooled at -40 C, which ensures a good detectivity and temperature measurements above 450 C. A water cooled metallic tube, ending by a right angle deflecting prism, makes up the light guide of the pyrometer and can be inserted between the various turbine stages. The probe has been designed to withstand the pressure and temperature conditions prevailing in the turbine blade test section, and was subjected without damage to 20 bar and 2100 K. The use of this pyrometer with the expermental turbine specially designed for qualifying new blade cooling methods has shown that pyrometry involves difficulties connected to: the non-zero blade reflection coefficient (emissivity lower than 1); and the gas radiation due to the gases. The above difficulties were analyzed and solutions were proposed; in particular a correcting program for the temperatures was

perfected which takes into account the blade to blade mutual reflections. Author

N86-29850# Massachusetts Inst. of Tech., Cambridge.
HIGH FREQUENCY RESPONSE HEAT FLUX GAUGE FOR METAL BLADING c34
A. H. Epstein, G. R. Guenette, R. J. G. Norton (Rolls-Royce, Inc., Atlanta, Ga.), and Cao Yuzhang (Beijing Inst. of Aeronautics and Astronautics (China).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

Double-sided, high frequency response heat flux gauge technology developed specifically for use on metal turbine blading in short duration turbine test facilities is described in detail. The gauges consist of a metal film (1500A) resistance thermometer sputtered on both sides of a thin (25 micron) polyamide sheet. This sheet, containing 25 gauges, is then adhesively bonded (and completely covers) the airfoil surface. The temperature difference across the polyamide is a direct measure of the heat flux at low frequencies, while a quasi-1D analysis is used to infer the high frequency heat flux from the upper surface temperature history. The design criteria, construction and application techniques, and calibration procedures are discussed in detail. Sample measurements in a high pressure turbine are presented. Author

N86-29851# Royal Aircraft Establishment, Farnborough (England). Propulsion Dept.
THE ISENTROPIC LIGHT PISTON ANNULAR CASCADE FACILITY AT RAE PYESTOCK
A. J. Brooks, D. E. Colbourne, E. T. Wedlake, T. V Jones (Oxford Univ. (England).), M. L. G. Oldfield, D. L. Schultz, and P. J. Loftus (Maryland Univ., College Park.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 23 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

An accurate assessment of heat transfer rates to turbine vanes and blades is an important aspect of efficient cooling system design and component life prediction in gas turbines. Techniques have been developed at Oxford University which permit such measurements to be obtained in test rigs which provide short duration steady flow through a turbine cascade. The temperature ratio between the gas stream and the turbine correctly models that found in an engine environment. Reynolds number and Mach numaber can be varied over a wide range to match engine conditions. The design, construction and operation of a new facility at Royal Aircraft Establishment (RAE) Pyestock, incorporating these techniques, is described. Heat transfer and aerodynamic measurements have been made on airfoil surfaces and endwalls of a fully annular cascade of nozzle guide vanes. These results are discussed and compared with those obtained from the same profile in 2-D cascade tests, and with computed 3-D flow predictions. Author

N86-29852# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.
MEASUREMENTS OF FLUCTUATING GAS TEMPERATURES USING COMPENSATED FINE WIRE THERMOCOUPLES c34
M. N. R. Nina and G. P. Pita *In* AGARD Heat Transfer and Cooling in jGas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

Thermocouples with three different wire diameters (15, 40 and 50 microns) were used in association with an analog compensation circuit connected to a data acquisition system. Measurements of the time constant were performed using two different heating techniques; Joule effect and external heating by laser beam. The thermocouples were used to quantify the fluctuating temperature field in a hot air jet and in a premixed propane flame. In the reacting case the catalytic effect was evaluated by comparing coated and uncoated wires. Conclusions were also obtained regarding frequency spectra, temperature probability distribution function and time constant. Author

N86-29853# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
TWO SPOT LASER VELOCIMETER MEASUREMENTS OF VELOCITY AND TURBULENCE INTENSITY IN SHOCK TUBE DRIVEN TURBINE FLOWS c34
Richard B. Rivir, William C. Elrod (Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.), and Michael G. Dunn (Calspan Advanced Technology Center, Buffalo, N.Y.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

Full-scale rotating turbine heat transfer tests are discussed. The turbine is driven by a shock tube of short duration. Heat transfer distributions are measured during the test by thin film surface gages on the various component parts. Direct measurement of the velocity and turbulence intensity is needed to accurately compute the heat transfer for comparison with the measured values. An investigation to determine if measurements of velocity and turbulence intensity could be obtained with a two-spot laser velocimeter in the turbine for these short duration shock driven flows was undertaken. Two seed materials were investigated with satisfactory results: propylene glycol and Dow 200. The velocimeter was initially set up on a low-pressure-ratio shock tube which could be cycled quickly to determine the seeding requirements. The velocimeter was transferred to the high-pressure, full-scale turbine after successful measurements in the low-pressure shock tube. Author

N86-29854# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
INFLUENCE AND TIP CLEARANCE MEASUREMENT IN TURBOMACHINES c37
Jacques Paulon *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The clearance between the tip of the blades and the casing of a turbomachine is an important parameter. The performances of an engine are strongly subject to tip clearance. These gap effects are illustrated and numbered through some examples. Then, it would be desirable to control it permanently and to adjust the temperature of the casing in order to operate in optimum conditions. To this effect, a capacitive transducer is in development at ONERA and good results have been obtained in comparison with other devices. Author

N86-29855# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
SIMULATION OF FLOW AND HEAT TRANSFER IN ANNULAR CAVITIES BETWEEN DISKS IN TURBOMACHINERY c37
Denis Dutoya *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The first developments of a numerical code for the prediction of flow and heat transfer within the annular cavities extending between the rotating and stationary disks of turbomachines are discussed. A short description of the numerical method and of the turbulence model used is presented and a few examples of calculations performed in simple flow configurations are shown: acoustics within cavities, some turbulent flows with singular heat losses, and flow calculations in shrouded disk systems with or without radial outflow. Comparison with published experimental data allows one to measure the qualities and limits of the chosen turbulent model. Author

N86-29856# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
TRANSIENT THERMAL BEHAVIOUR OF A COMPRESSOR ROTOR WITH VENTILATION: TEST RESULTS UNDER SIMULATED ENGINE CONDITIONS c34
E. Reile, U. Radons, and D. K. Hennecke *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 9 p (For primary document

see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The development of advanced compressors for modern aero-engines requires detailed knowledge of the transient thermal behavior of the rotor disks to enable accurate prediction of rotor life and, additionally, of the thermal growth of the rotor for the evaluation of tip clearances. In the quest for longer life and higher reliability of the parts as well as reduced clearances even at transient conditions, the designer has to be able to influence the thermal behavior of the rotor. A very effective way is to vent small amounts of air through the rotor cavities. The design of such a vented rotor is presented. The main emphasis is placed on a detailed description of a test rig specially built for this purpose. The testing was carried out under simulated engine conditions for a wide range of parameters. The results are compared with those obtained with a theoretical model derived from fundamental tests at the University of Sussex, where heat transfer in rotating cavities is investigated. Good agreement is observed. Some final tests were done in an engine. The results also exhibit good agreement with the rig results under simulated conditions, when the proper dimensionless parameters are considered, providing the validity of the simulation. Author

N86-29857# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.
HEAT EXCHANGERS IN REGENERATIVE GAS TURBINE CYCLES **c34**
M. N. R. Nina and M. P. N. Aguas *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

Advances in compact heat exchanger design and fabrication together with fuel cost rises continuously improve the attractability of regenerative gas turbine helicopter engines. In this study cycle parameters aiming at reduced specific fuel consumption and increased payload or mission range, have been optimized together with heat exchanger type and size. The discussion is based on a typical mission for an attack helicopter in the 900 kw power class. A range of heat exchangers is studied to define the most favorable geometry in terms of lower fuel consumption and minimum engine plus fuel weight. Heat exchanger volume, frontal area ratio and pressure drop effect on cycle efficiency are considered. Author

N86-29858# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
CERAMIC HEAT EXCHANGERS FOR GAS TURBINES OR TURBOJET ENGINES **c37**
Serge Boudigues and Jean Fabri *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

Heat exchangers made of steel and placed downstream of the last turbine of a turbojet engine or any gas turbine are too heavy and too cumbersome. With a heat exchanger made of silicon carbide mass, performance, volume and cost balances which greatly benefit civilian or military use can be obtained. Silicon carbide has good thermal performance and makes it possible to situate the heat exchanger between turbine stages. Both the pressure of cold and hot gases are thus increased, the heat exchange processes are amplified, the length and the diameter of the exchanger are reduced. With the density of this material being only 3.2, the overall mass of the exchanger is considerably reduced. It is also possible to shortcut part of the cold air, and thus obtain a controlling parameter. A kind of after burner effect is obtained, although a single combustor is used, and the corresponding thermodynamic process has a higher efficiency than the after burning process. Author

N86-29859# Technische Univ., Aachen (West Germany). Inst. for Jet Propulsion and Turbomachinery.
EFFECT OF FILM COOLING ON THE AERODYNAMIC PERFORMANCE OF A TURBINE CASCADE **c34**
O. Koellen and W. Koschel *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The aerodynamic performance of a film cooled turbine cascade for a typical design with multiple rows of cooling holes was investigated in an annular cascade rig with air at room temperature. The work was concentrated on the individual effect of the injection row position on the aerodynamic cascade losses and on the downstream flow field. For six different single row configurations the tests were conducted in a wide range of varying coolant mass flow rates and main stream Mach numbers. Typical results of these measurements are presented and discussed. Three models for the aerodynamic loss prediction based on different theoretical approaches, which are known from literature, were examined and improved. The presented two mixing layer models take into account the penetration of the injected cooling air into the main stream, whereas the third model predicts flow losses by a boundary layer calculation with film cooling air injection. Some tests with flow visualization by Schlieren photography were carried out showing the mixing effects of the injected coolant flow. Finally results of the predicted performance are compared with the experimental data. M.G.

N86-29860# Ecole Centrale de Lyon (France). Lab. de Mecanique des Fluides.
THEORY AND EXPERIMENTAL STUDY OF A 3-D JET INTRODUCED INTO THE SECONDARY FLOW OF A TURBINE INLET GUIDE VANE [ETUDE EXPERIMENTALE ET THEORIQUE DUN JET TRIDIMENSIONNEL INTRODUIT DANS LECOULEMENT SEONDAIRE DUNE GREILLE DISTRIBUTRICE DE TURBINE] **c02**
A. Onvani, C. Ollivier, F. Bario, and F. Leboeuf *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 18 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The interaction effects between a jet introduced from the side wall and the 3-D secondary flow of a turbine inlet guide vane are defined. Only aerodynamical effects are studied. The trajectory, velocity and characteristic lengths of the jet are determined. The experimental work gives the measurements of pressure and velocity. The measurement of an intermittence coefficient with a hot wire allows also the definition of the trajectory and the shape of the jet. Experimental results show that the jet trajectory is weakly influenced by yaw angle of the hole for the ratio of momentum quantities used. Theoretical prediction is done with the help of an integral calculation method based on the use of continuity and Navier-Stokes equations averaged on the transverse section of the jet. The streamwise vorticity generated in the jet and predicted with a transport equation, and the introduction of a sink effect allow the computation of the induced transverse velocities. Experimental results and calculated quantities are in a good agreement. Author

N86-29861# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
AERODYNAMIC EFFECT OF COOLANT EJECTION IN THE REAR PART OF TRANSONIC ROTOR BLADES **c34**
F. H. Kost and A. T. Holmes (Rolls-Royce Ltd., Bristol, England) *In* AGARD Heat transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

An investigation of transonic turbine blades designed by Rolls-Royce/Bristol concerning the aerodynamic penalties of coolant flow for two alternative cooling configurations is discussed. Rolls-Royce designed a blade with a thick trailing edge where the coolant is ejected through slots in the trailing edge and a second blade with a thin trailing edge where coolant is ejected through a row of holes on the pressure side and a row of holes on the suction side. Tests were performed in a plane cascade wind tunnel. The results indicate the sensitivity of the blade performance to cooling configuration and coolant flow rate. By combining measured

data from blade surface and wake traverses it was possible to separate the various loss mechanisms. Therefore, the separate losses due to the momentum of the coolant, change of base pressure, and change of blade friction could be determined quantitatively as a function of coolant flow rate. M.G.

N86-29862# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Design Aerodynamics.
THE BOUNDARY LAYER BEHAVIOUR OF AN ADVANCED GAS TURBINE ROTOR BLADE UNDER THE INFLUENCE OF SIMULATED FILM COOLING c34
R. Kiock, H. Hoheisel, H. J. Dietrichs (Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).), and A. T. Holmes (Rolls-Royce Ltd., Bristol (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 19 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

The aerodynamic properties of highly loaded turbine blades are strongly influenced by local supersonic flow fields and cooling air ejection. The boundary layer interaction with shock waves and simulated cooling flows was examined in a cascade wind tunnel by means of boundary layer and wake traverses and pressure distribution measurements as well as by the application of Schlieren observation. Air was ejected through holes and slots at different locations of the blade contour. Special emphasis was put on magnitude and direction of the local jet velocity in case of multiple cooling operation. The characteristics of the blade without and with different cooling configurations were determined. The results show the effects of air ejection on boundary layer transition and shock configurations. Author

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-29863*# Stanford Univ., Calif. Guidance and Control Lab.
THE DESIGN OF MULTIRATE DIGITAL CONTROL SYSTEMS Final Report
Martin Conrad Berg Mar. 1986 217 p
(Grant NsG-4002)
(NASA-CR-177126; NAS 1.26:177126; SU-SUDAAR-553) Avail: NTIS HC A10/MF A01 CSCL 01C

The successive loop closures synthesis method is the only method for multirate (MR) synthesis in common use. A new method for MR synthesis is introduced which requires a gradient-search solution to a constrained optimization problem. Some advantages of this method are that the control laws for all control loops are synthesized simultaneously, taking full advantage of all cross-coupling effects, and that simple, low-order compensator structures are easily accomodated. The algorithm and associated computer program for solving the constrained optimization problem are described. The successive loop closures , optimal control, and constrained optimization synthesis methods are applied to two example design problems. A series of compensator pairs are synthesized for each example problem. The succesive loop closure, optimal control, and constrained optimization synthesis methods are compared, in the context of the two design problems. Author

N86-29864*# Kansas Univ., Lawrence. Dept. of Aerospace Engineering.
AN INVESTIGATION OF EMPENNAGE BUFFETING Status Report, 15 Sep. 1985 - 15 Jan. 1986
C. Edward Lan and I. G. Lee 28 Jan. 1986 50 p
(Grant NAG2-371)
(NASA-CR-176973; NAS 1.26:176973) Avail: NTIS HC A03/MF A01 CSCL 01C

Progress in the investigation of empennage buffeting in reviewed. In summary, the following tasks were accomplished: relevant literatures was reviewed; equations for calculating structural response were formulated; root-mean-square values of root bending moment for a 65-degree rigid delta wing were calculated and compared with data; and a water-tunnel test program for an F-18 model was completed. Author

N86-29865*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
FLIGHT DETERMINATION OF THE AERODYNAMIC STABILITY AND CONTROL CHARACTERISTICS OF THE NASA SGS 1-36 SAILPLANE IN THE CONVENTIONAL AND DEEP STALL ANGLES-OF-ATTACK OF BETWEEN -5 AND 75 DEGREES Final Report
Faramarz A. Mahdavi and Doral R. Sandlin 1 Jun. 1984 110 p (Contract NCC4-1)
(NASA-CR-176962; NAS 1.26:176962) Avail: NTIS HC A06/MF A01 CSCL 01C

The flight test procedure and the preliminary analysis of the results obtained from twenty manned flights of the SGS 1-36 in the high angles of attack Deep Stall region are discussed. A comparison of the flight determined stability and control derivatives, those of the wind tunnel, and the estimated aerodynamic data is also presented. Furthermore, deep stall dynamics response of the SGS 1-36 is discussed briefly to explain some of the unexpected flight observations. Author

N86-29866*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIENCE WITH SYNCHRONOUS AND ASYNCHRONOUS DIGITAL CONTROL SYSTEMS
Victoria A. Regenie, Claude V. Chacon, and Wilton P. Lock Aug. 1986 19 p To be Presented at the AIAA Guidance, Navigation and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88271; H-1372; NAS 1.15:88271; AIAA-86-2239-CP)
Avail: NTIS HC A02/MF A01 CSCL 01C

Flight control systems have undergone a revolution since the days of simple mechanical linkages; presently the most advanced systems are full-authority, full-time digital systems controlling unstable aircraft. With the use of advanced control systems, the aerodynamic design can incorporate features that allow greater performance and fuel savings, as can be seen on the new Airbus design and advanced tactical fighter concepts. These advanced aircraft will be and are relying on the flight control system to provide the stability and handling qualities required for safe flight and to allow the pilot to control the aircraft. Various design philosophies have been proposed and followed to investigate system architectures for these advanced flight control systems. One major area of discussion is whether a multichannel digital control system should be synchronous or asynchronous. This paper addressed the flight experience at the Dryden Flight Research Facility of NASA's Ames Research Center with both synchronous and asynchronous digital flight control systems. Four different flight control systems are evaluated against criteria such as software reliability, cost increases, and schedule delays. Author

N86-29867*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
MODEL-FOLLOWING CONTROL FOR AN OBLIQUE-WING AIRCRAFT
Gurbux S. Alag, Robert W. Kempel, Joseph W. Pahle, John J. Bresina, and Febo Bartoli Aug. 1986 13 p Presented at the AIAA Conference on Guidance and Control, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88269; H-1362; NAS 1.15:88269; AIAA-86-2244CP)
Avail: NTIS HC A02/MF A01 CSCL 01C

A variable-skew oblique wing offers a substantial aerodynamic performance advantage for aircraft missions that require both high efficiency in subsonic flight and supersonic dash or cruise. The most obvious characteristic of the oblique-wing concept is the asymmetry associated with wing-skew angle which results in significant aerodynamic and inertial cross-coupling between the aircraft longitudinal and lateral-directional axes. A technique for

synthesizing a decoupling controller while providing the desired stability augmentation. The proposed synthesis procedure uses the cncept of explicit model following. Linear quadratic optimization techniques are used to design the linear feedback system. The effectiveness of the control laws developed in achieving the desired decoupling is illustrated for a given flight condition by application to linearized equations of motion, and also to the nonlinear equations of six degrees of freedom of motion with nonlinear aerodynamic data. Author

N86-29868*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
EIGENSYSTEM SYNTHESIS FOR ACTIVE FLUTTER SUPPRESSION ON AN OBLIQUE-WING AIRCRAFT
Gurbux S. Alag (University of Western Michigan, Kalamazoo.), John J. Burken, and Glenn B. Gilyard Aug. 1986 9 p Presented at the AIAA Guidance, Navigation and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-88275; H-1359; NAS 1.15:88275; AIAA-86-2243-CP) Avail: NTIS HC A02/MF A01 CSCL 01C

The application of the eigensystem synthesis technique to place the closed-loop eigenvalues and shape the closed-loop eigenvectors has not been practical for active flutter suppression, primarily because of the availability of only one control surface (aileron) for flutter suppression. The oblique-wing aircraft, because of its configuration, provides two independent surfaces (left and right ailerons), making the application of eigensystem synthesis practical. This paper presents the application of eigensystem synthesis using output feedback for the design of an active flutter suppression system for an oblique-wing aircraft. The results obtained are compared with those obtained by linear quadratic Gaussian techniques. Author

N86-29869# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
INTRODUCTION TO ROBUST MULTIVARIABLE CONTROL Final Report, Oct. 1983 - Sep. 1985
D. Brett Ridgely and Siva S. Banda Feb. 1986 430 p
(AD-A165891; AFWAL-TR-85-3102) Avail: NTIS HC A19/MF A01 CSCL 01/3

Linear multiple-input multiple-output (multivariable) control systems are considered. The intent of this report is to familiarize the working engineers with some of the developments in the area of robust multivariable control theory that have occurred in the past 10 years. The concepts of singular values are used to systematically develop robust control systems analysis and design techniques. The advantages and limitations of these techniques are discussed. Examples are used to illustrate the methods. Author (GRA)

N86-29870# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Elastomechanik und Aeroelastische Stabilitaet
ACTIVE FLUTTER SUPPRESSION ON A DELTA WING MODEL STRUCTURE
Raymond Freymann and Kunyi Cheng Dec. 1985 72 p
(DFVLR-FB-86-01; ISSN-0171-1342; ESA-86-97455) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 26

Active flutter suppression systems were designed for a flexible model delta wing structure based either on the concept of fictitious structural modifications or on frequency response methods. For validation of the results from the analytical investigations, extensive tests were performed on the model delta wing structure in a 3m x 3m low speed wind tunnel. During the tests the flutter speed of the actively controlled wing was increased by 25% compared to the basic, uncontrolled system. Good agreement between calculated and measured results is found. ESA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-29871*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADAPTIVE WALL WIND TUNNELS: A SELECTED, ANNOTATED BIBLIOGRAPHY
Marie H. Tuttle (Vigyan Research Associates, Inc., Hampton, Va.) and Raymond E. Mineck Aug. 1986 55 p
(NASA-TM-87639; L-16084; NAS 1.15:87639) Avail: NTIS HC A04/MF A01 CSCL 14B

This bibliography, with abstracts, consists of 257 citations arranged in chronological order. Selection of the citations was made for their value to researchers working to solve problems associated with reducing wall interference by the design, development, and operation of adaptive wall test sections. Author, source, and subject indexes are included. Author

N86-29872*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CRYOGENIC WIND TUNNELS FOR HIGH REYNOLDS NUMBER TESTING
Pierce L. Lawing, Robert A. Kilgore, and Peggy D. McGuire May 1986 95 p
(NASA-TM-87743; NAS 1.15:87743) Avail: NTIS HC A05/MF A01 CSCL 14B

A compilation of lectures presented at various Universities over a span of several years is discussed. A central theme of these lectures has been to present the research facility in terms of the service it provides to, and its potential effect on, the entire community, rather than just the research community. This theme is preserved in this paper which deals with the cryogenic transonic wind tunnels at Langley Research Center. Transonic aerodynamics is a focus both because of its crucial role in determining the success of aeronautical systems and because cryogenic wind tunnels are especially applicable to the transonics problem. The paper also provides historical perspective and technical background for cryogenic tunnels, culminating in a brief review of cryogenic wind tunnel projects around the world. An appendix is included to provide up to date information on testing techniques that have been developed for the cryogenic tunnels at Langley Research Center. In order to be as inclusive and as current as possible, the appendix is less formal than the main body of the paper. It is anticipated that this paper will be of particular value to the technical layman who is inquisitive as to the value of, and need for, cryogenic tunnels. Author

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-29873*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MANNED MARS MISSIONS: A WORKING GROUP REPORT Summary Report
Michael B. Duke, ed. and Paul W. Keaton (Los Alamos National Lab., N. Mex.) May 1986 86 p Working Papers presented at Marshall Space Flight Center, Huntsville, Ala., 10-14 Jun. 1985
(NASA-TM-88777; NASA-M001; NAS 1.15:88777) Avail: NTIS HC A05/MF A01 CSCL 22A

The findings and conclusions of the Manned Mars Mission Working Group are summarized. The following issues are individually discussed: scientific objectives of Mars missions, Mars

surface activities, mission concepts, transportation trades and options, space vehicle and subsystems design, life science and life support issues, impacts on the space infrastructure, and cost and schedules. M.G.

N86-29874# Lawrence Livermore National Lab., Calif.
TOWARD A PERMANENT LUNAR SETTLEMENT IN THE COMING DECADE: THE COLUMBUS PROJECT
R. A. Hyde, M. Y. Ishikawa, and L. L. Wood 19 Nov. 1985 28 p
Presented at the US Space Foundation Symposium, Colorado Springs, Colo., 20 Nov.1985
(Contract W-7405-eng-48)
(DE86-006709; UCRL-93621; CONF-8511155-1) Avail: NTIS HC A03/MF A01

The motivation for creating a permanent lunar settlement is sketched, and reasons for doing so in the coming decade are put forward. A basic plan to accomplish this is outlined, along technical and programmatic axes. It is concluded that founding a lunar settlement on the five hundredth anniversary of the Columbus landing - a Columbus Project - could be executed as a volunteer-intensive American enterprise requiring roughly six thousand man-years of skilled endeavor and a total Governmental contribution of the order of a half-billion dollars. DOE

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-29875# National Oceanic and Atmospheric Administration, Washington, D. C. Systems Design and Applications Branch.
A DESCRIPTION OF PREDICTION ERRORS ASSOCIATED WITH THE T-BUS-4 NAVIGATION MESSAGE AND A CORRECTIVE PROCEDURE
Frederick W. Nagle Jul. 1986 33 p
(NOAA-TM-NESDIS-16) Avail: NTIS HC A03/MF A01

The instantaneous positions of the NOAA-x orbiting satellites predicted by means of the T-Bus orbital parameters have been subject to considerable error. The nature of this error is described , and although its precise cause is unknown, it appears possible to introduce corrections which greatly reduce it. The correcting algorithm makes use of the fact that the Equator-to-Equator orbital period of a NOAA-x satellite is highly predictable, and this periodicity can be employed to stabilize the predicted positions by adjusting the along-track predictions to correspond to the known times of Equator crossing. Author

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-29876*# National Aeronautics and Space Administration, Washington, D.C.
AN OVERVIEW OF THE KALININGRAD SPACEFLIGHT CONTROL CENTER
May 1986 35 p Transl. into ENGLISH of the mono. "Tsentr Upravleniya Poletom" Moscow, USSR, Mashinostroyeniye, 1985 p 1-33 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-87980; NAS 1.15:87980) Avail: NTIS HC A03/MF A01 CSCL 14B

A general description is given of the Kaliningrad Spaceflight Center near Moscow, where Soviet orbiting and interplanetary spacecraft are monitored and controlled. Brief descriptions of the equipment used and the scope of work done at the center are included. Author

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-29877*# Martin Marietta Aerospace, Denver, Colo.
NEAR-FIELD TESTING OF THE 15-METER MODEL OF THE HOOP COLUMN ANTENNA. VOLUME 2: NEAR- AND FAR-FIELD PLOTS FOR THE LaRC FEEDS
John Hoover, Neill Kefauver, Tom Cencich, and Jim Osborn Mar. 1986 282 p
(Contract NAS1-18016)
(NASA-CR-178060; NAS 1.26:178060; MCR-85-640-Vol-2) Avail: NTIS HC A13/MF A01 CSCL 22B

The technical results from near-field testing of the 15-meter model of the hoop column antenna at the Martin Marietta Denver Aerospace facility are described. The antenna consists of a deployable central column and a 15-meter hoop, stiffened by cable into a structure with a high tolerance repeatable surface and offset feed location. The surface has been configured to have four offset parabolic apertures, each about 6 meters in diameter, and is made of gold plated molybdenum wire mesh. Pattern measurements were made with feed systems radiating at frequencies of 7.73, 11.60, 2.27, 2.225, and 4.26 (all in GHz). This report (Volume II) gives the detailed patterns measured with the LaRC feeds (7.73, 11.60, 2.27, and 4.26 GHz). Volume I covers the testing from an overall viewpoint and contains information of generalized interest for testing large antennas, including the deployment of the antenna in the Martin Facility and the measurements to determine mechanical stability and trueness of the reflector surface, the test program outline, and a synopsis of antenna electromagnetic performance. A detailed listing of the antenna patterns are provided for the 2.225 Ghz feed in Volume III of this report. Author

N86-29878# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
COMPUTER SIMULATION OF ROCKET/MISSILE SAFING AND ARMING MECHANISM (CONTAINING PIN PALLET RUNAWAY ESCAPEMENT, THREE-PASS INVOLUTE GEAR TRAIN AND ACCELERATION DRIVEN ROTOR) Final Technical Report, Jan. 1983 - May 1985
P. T. Gorman and F. R. Tepper Mar. 1986 135 p
(AD-A166667; AD-E401472; ARAED-TR-85010) Avail: NTIS HC A07/MF A01 CSCL 19/1

A complete simulation of missile and rocket safing and arming (S&A) mechanisms containing an acceleration-driven rotor, a three-pass involute gear train, and a pin pallet runaway escapement was developed. In addition, a modification to this simulation was formulated for the special case of the PATRIOT M143 S&A mechanism which has a pair of driving gears in addition to the three-pass gear train. The three motion regimes involved in escapement operation - coupled motion, free motion, and impact - are considered in the computer simulation. The simulation determines both the arming time of the device and the non-impact contact forces of all interacting components. The program permits parametric studies to be made, and is capable of analyzing pallets with arbitrarily located centers of mass. A sample simulation of the PATRIOT M143 S&A in an 11.9 g constant acceleration arming test was run. The results were in good agreement with laboratory test data. GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-29879*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AEROSPACE SAFETY ADVISORY PANEL REPORT TO THE NASA ACTING ADMINISTRATOR Annual Report, Calendar Year 1985
Jan. 1986 118 p The Panel's annual report, findings and recommendations were completed prior to the STS-51L accident
(NASA-TM-89226; NAS 1.15:89226) Avail: NTIS HC A06/MF A01 CSCL 22B

The level of activity of the Aerospace Safety Advisory Panel was increased smewhat during 1985 in concert with the increased mission rate of the National Space Transportation System, the evolutionary changes in management and operation of that program, and the preparation of the Vandenberg Launch Site; the implementation of the Program Definition Phase of the Space Station Program; and the actual flight testing of the X-29 research aircraft. Impending payload STS missions and NASA's overall aircraft operations are reviewed. The safety aspects of the LEASAT salvage mission were assessed. The findings and recommendation of the committee are summerized. Author

N86-29880# Air Force Geophysics Lab., Hanscom AFB, Mass.
SHUTTLE CONTAMINATION MODELING: THE PLASMA WAVE FIELD OF SPACECRAFT
Michael Heinemann 22 Nov. 1985 43 p
(AD-A166605; AFGL-TR-85-0300; AFGL-ERP-936) Avail: NTIS HC A03/MF A01 CSCL 22/1

We investigate the behavior of waves and shock-like disturbances produced by the interaction of spacecraft with the plasma environment. We find that (1) there are three ranges of wave frequency for which waves can propagate to large distances from the spacecraft, (2) that waves in these frequency ranges are confined to propagate within specific ranges of directions, and (3) that it is possible for these waves to form shocks. Approximate analytic solutions are given to describe the behavior of waves and shocks of spacecraft origin. The waves that are important to these phenomena can be classed as Alfven, whistler, and upper hybrid waves. While we believe it unlikely to occur, we have identified analytically those conditions necessary for extremely rapid spatial wave growth near the spacecraft. GRA

N86-29881# Mound Lab., Miamisburg, Ohio.
CRYOGENIC EXPLOSION ENVIRONMENT MODELING AND TESTING OF SPACE SHUTTLE AND LIGHT-WEIGHT RADIOISOTOPE HEATER UNIT INTERACTIONS
E. W. Johnson Oct. 1985 27 p
(Contract DE-AC04-76DP-00053)
(DE86-005901; MLM-3303) Avail: NTIS HC A03/MF A01

In order to assess the risk to the world's populace in the event of a Space Shuttle accident when radioisotope-containing heat sources are on board, testing of that system must be performed to determine release point, environments required and the size distribution of the released fuel. To evaluate the performance of the Light-Weight Radioisotope Heater Unit (LWRHU) (101 of these 1-W items are placed on the Galileo spacecraft which will be launched from the Space Shuttle), some high-velocity impact and flyer plate testing was carried out. The results showed that a bare urania-fueled LWRHU clad (approximately 1-mm thick platinum-30 wt % rhodium alloy) will withstand 1100 m/s flyer plate (3.5-mm thick aluminum) impacts and 330 m/s impacts upon the Space Shuttle floor (approximately 12-mm thick aluminum) without rupture or fuel release. Velocities in the order of 600 m/s on a steel surface will cause clad failure with fuel release. The fuel breakup patterns were characterized as to quantity in a specific size range. These data were employed in the formal Safety Analysis Report for the LWRHU to support the planned 1986 Galileo launch. LWRHU to support the planned 1986 Galileo launch. DOE

N86-29882# Joint Publications Research Service, Arlington, Va.
WEST EUROPE REPORT: SCIENCE AND TECHNOLOGY
4 Apr. 1986 62 p Transl. into ENGLISH from various West European articles
(JPRS-WST-86-016) Avail: NTIS HC A04/MF A01

Topics addressed include: advanced materials; aerospace industry; automobile industry; civil aviation; computers; scientific and industrial policy; metallurgical industry; and microelectronics. For individual titles, see N86-29883 through N86-29883.

N86-29883# Joint Publications Research Service, Arlington, Va.
DIFFERENCES BETWEEN HERMES, US SHUTTLE HIGHLIGHTED
In its West Europe Report: Science and Technology (JPRS-WST-86-016) 4 Apr. 1986 p 8-9 Transl. into ENGLISH from Die Weltwoche (Zuerich, West Germany), 6 Feb. 1986 p 29 (For primary document see N86-29882 21-16)
Avail: NTIS HC A04/MF A01

In response to French urging, the European Space Agency (ESA) decided to regularly upgrade the Ariane Launch Vehicle. Ariane-5 will be able to launch a payload of 15 tons into an orbit 400 km high, and transport 5 tons into a geostationary orbit 36,000 km above the earth's surface. At least 7.5 billion DM will be needed to finance the Hermes, which can be launch by the Ariane-5. The versatility of the Hermes is discussed. The impact of the Challenger explosion on building of the Hermes is examined. The differences between the two space shuttles is also discussed. B.G

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-29884*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
A RADAR DATA PROCESSING AND ENHANCEMENT SYSTEM
Karl F. Anderson, John W. Wrin, and Robert James (GMD Systems, Lancaster, Calif.) 1986 19 p Presented at the IRIG Electronic Trajectory Measurements Group Meeting, El Paso, Tex., 6 Aug. 1986
(NASA-TM-88274; H-1377; NAS 1.15:88274) Avail: NTIS HC A02/MF A01 CSCL 09F

This report describes the space position data processing system of the NASA Western Aeronautical Test Range. The system is installed at the Dryden Flight Research Facility of NASA Ames Research Center. This operational radar data system (RADATS) provides simultaneous data processing for multiple data inputs and tracking and antenna pointing outputs while performing real-time monitoring, control, and data enhancement functions. Experience in support of the space shuttle and aeronautical flight research missions is described, as well as the automated calibration and configuration functions of the system. Author

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-29885*# National Aeronautics and Space Administration. Washington, D.C.

THE ELECTRIFICATION OF SPACECRAFT
A. I. Akishin and L. S. Novikov Jul. 1985 75 p Transl. into ENGLISH of the book "Elektrizatsiya Kosmicheskikh Apparatov" Znaniye Press, Moscow, USSR, 1985 p 1-61 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-77653; NAS 1.15:77653) Avail: NTIS HC A04/MF A01 CSCL 22B

Physical and applied aspects of the electrification of space vehicles and natural celestial objects are discussed, the factors resulting in electrification of spacecraft are analyzed, and methods of investigating various phenomena associated with this electrification and ways of protecting spacecraft against the influence of static electricity are described. The booklet is intended for the general reader interested in present day questions of space technology. Author

N86-29886*# Massachusetts Inst. of Tech., Cambridge. Space Systems Lab.
STUDY OF ONBOARD EXPERT SYSTEMS TO AUGMENT SPACE SHUTTLE AND SPACE STATION AUTONOMY Final Report, 1 Aug. 1984 - 31 Dec. 1985
Clifford R. Kurtzman, David L. Akin, David Kranzler, and Edith Erlanson 31 Jul. 1986 91 p
(Grant NAG5-445)
(NASA-CR-176958; NAS 1.26:176958; SSL-16-86) Avail: NTIS HC A05/MF A01 CSCL 22B

The feasibility of onboard crew activity planning was examined. The use of expert systems technology to aid crewmembers in locating stowed equipment was also investigated. The crew activity planning problem, along with a summary of past and current research efforts, was discussed in detail. The requirements and specifications used to develop the crew activity planning system was also defined. The guidelines used to create, develop, and operate the MFIVE Crew Scheduler and Logistics Clerk were discussed. Also discussed is the mathematical algorithm, used by the MFIVE Scheduler, which was developed to aid in optimal crew activity planning. B.G.

N86-29887# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A SELF-TUNING REGULATOR BASED ON POLE PLACEMENT DESIGN FOR USE IN SATELLITE ATTITUDE CONTROL
Jose Francisco Ribeiro, Antonio Felix Martins Neto, and Joao Moro Apr. 1986 19 p Submitted for publication
(INPE-3861-PRE/924) Avail: NTIS HC A02/MF A01

The problem of controlling a three axis stabilized satellite is approached by using self tuning pole assignment techniques. Considering the requirements of the Brazilian Remote Sensing satellite, a controller is designed and its performance is analyzed by using digital simulation for similar satellite dynamics. This simulation considers a 500 km altitude satellite with almost polar orbit, subjected to environmental disturbances (gravity gradient, aerodynamical torques, solar radiation, etc), and provided with a set of on board sensors (Earth sensor, sun sensor and gyrometers). Author

N86-29888*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PROCEEDINGS OF THE 2ND ANNUAL CONFERENCE ON NASA/UNIVERSITY ADVANCED SPACE DESIGN PROGRAM
Jun. 1986 31 p Conference held at Cocoa Beach, Fla., 18-20 Jun. 1986
(Grant NGT21-002-080)
(NASA-TM-89399; NAS 1.15:89399) Avail: NTIS HC A03/MF A01 CSCL 22B

Topics discussed include: lunar transportation system, Mars rover, lunar fiberglass production, geosynchronous space stations, regenerative system for growing plants, lunar mining devices, lunar oxygen transporation system, mobile remote manipulator system, Mars exploration, launch/landing facility for a lunar base, and multi-megawatt nuclear power system. B.G.

N86-29889*# National Aeronautics and Space Administration, Washington, D.C.
X-RAY SATELLITE (ROSAT) Status Report, 1985
Apr. 1986 54 p Transl. into ENGLISH OF "Roentgensatellit Statusbericht; 4. Quartal 1985" Porz-Wahn (West Germany), 1 Dec. 1985 p 1-68 Transl. by Scitran, Inc., Santa Barbara, Calif. Original document was prepared by DFVLR
(Contract NASw-4004)
(NASA-TM-88481; NAS 1.15:88481; SR-4; DFVLR-RF-TN-4) Avail: NTIS HC A04/MF A01 CSCL 22B

An overview of the current status of the ROSAT X-Ray satellite project is given. Areas discussed include an overview of problem areas, systems and mechanical subsystems, the electrical subsystem, power supply, data processing and transmission, the wide field camera, ground support equipment and the production scheduling. It is shown that the project is proceeding according to schedule, including the hardware production and costs. However, it is stated that estimated additional costs will exceed the plan. The previous schedule for production of the flight model will no longer be met. A modified milestone plan has been worked out with Dornier Systems. The current working schedule calls for a launch data of December 21, 1987; however, this does not take into account a 4-week buffer prior to transporting the flight model to the launch site. As of the date of this report, milestone M5 has been met. Previous problems with the gold vapor deposition on the flight model mirror due to contamination have been eliminated. Author

N86-29890# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
ACOSS ELEVEN (ACTIVE CONTROL OF SPACE STRUCTURES) S Final Report, Oct. 1983 - Jul. 1984
D. R. Hegg, G. J. Kissel, N. H. McClamroch, M. J. Villalba, and I. G. Rosen Sep. 1985 286 p
(Contracts F30602-81-C-0180; ARPA Order 3655; AF Proj. C65-5)
(AD-A165864; CSDL-R-1721; RADC-TR-85-165) Avail: NTIS HC A13/MF A01 CSCL 15/4

The main lines of effort in flexible structure control have been: (1)synthesis of reduced order control for vibration suppression; (2)system identification, with special attention to the resolution of closely spaced modes; and (3)generation of smooth large angle slew control. Highlights of current results are as follows. A final account is given of insights obtained during a systematic investigation of mutual interactions within the overall active control systhesis process between reduced order modeling, actuator and sensor selection, and controller feedback strategy determination. Using linear multivariate loop transfer recovery, full order stability robustness to unmodeled high frequency dynamics in the presence of wideband disturbances is demonstrated on ACOSS model no. 2. A perspective on electromechanical actuator dynamics modeling is presented. Interface constraints with the controller synthesis process associated with the use of high resolution spectrum estimation for reduced order modeling are analyzed. Parametric use of the data sampling period to assist in the resolution of closely spaced modes is discussed or demonstrated. An improved technique for parameter estimation in distributed parameter systems is generated. Author

N86-29891# Massachusetts Inst. of Tech., Cambridge.
WAVE PROPAGATION MEASUREMENTS ON TWO-DIMENSIONAL LATTICE Technical Report, 1 Feb. - 15 Sep. 1985
James H. Williams, Jr., Jia J. Zhang, and Samson S. Lee 15 Sep. 1985 32 p
(Contract F49620-83-C-0092)
(AD-A166207; AFOSR-86-0095TR) Avail: NTIS HC A03/MF A01 CSCL 22/2

Wave propagation characteristics of large space structures (LSS) affect their performance, integrity and the ability to nondestructively assess their integrity. In this study, wave propagation characteristics of a periodic lattice structure are determined

experimentally. The structure considered is an aluminum multi-bay planar lattice. Two ultrasonic piezoceramic longitudinal transducers are mounted at various locations on the structure. Wave measurements are obtained by injecting an impulsive load via the transmitting transducer and recording the response via the receiving transducer. The waves injected into the structure are longitudinal waves, transverse to the surface, although a complex stress distribution which may be described by directivity functions is actually realized. The impulsive loading signal has a broad frequency spectrum containing frequencies greater than 0.5 MHz. This preliminary experimental study demonstrates that wave propagation characteristics of a lattice structure can be obtained. In particular, the wave speed, the frequency at the maximum amplitude of the output spectrum, and the attenuation of the maximum amplitude of the output spectrum per lattice bay traversed appear to be useful parameters in the characterization of wave propagation properties of LSS. Further study should investigate the effects of boundaries, lattice member connectivities, and structural defects on these parameters. GRA

N86-29892# Massachusetts Inst. of Tech., Cambridge.
FAILURE PROPAGATION IN CONTINUUM MODELS OF LSS (LARGE SPACE STRUCTURES), PART 1 Technical Report, 1 Sep. - 1 Nov. 1985
James H. Williams, Jr. and Samson S. Lee 1 Nov. 1985 30 p
(Contract F49620-85-C-0148)
(AD-A166208; AFOSR-86-0094TR-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 13/13

Large space structures (LSS) can often be modelled adequately as equivalent anisotropic continua. In this study concepts in failure mechanics and wave propagation are applied to analyze the dynamic failure (fracture, buckling, joint disassembly, etc.) and failure arrest behavior of such an equivalent continuum. For simplicity, the equivalent continuum is assumed to be orthotropic. Furthermore, the transverse shear deformation of the equivalent continuum is assumed to dominate. Double cantilever beam models are well established fracture mechanics models in the study of crack propagation in a continuum. An orthotropic double cantilever shear beam (DCSB) model is adopted here to study Mode I dynamic failure (which for convenience is assumed to be fracture) and arrest in continuum models of lattice structures. The orthotropic DCSB model consists of both a primary material and a finite width arrester section. The DCSB model has predicted that under the proper conditions the crack may arrest when any of the following conditions is satisfied: 1) When the initial reflected disturbance catches the crack tip, before the crack tip reaches the arrester section; 2) When the crack tip enters the arrester section; 3) When the crack tip exits the arrester section; or 4) When the initial reflected disturbance catches the crack tip, after the crack tip has exited from the arrester section. It is shown that condition (1) is absolute, meaning that the crack is always arrested. GRA

N86-29893# Toronto Univ. (Ontario). Dept. of Electrical Engineering.
CHARGE ACCUMULATION AND ARC DISCHARGES ON SPACECRAFT MATERIALS AND COMPONENTS Final Report, 1 Sep. 1984 - 31 Aug. 1985
K. G. Balmain 11 Nov. 1985 62 p
(Grant AF-AFOSR-0342-84)
(AD-A166216; AFOSR-86-0057TR) Avail: NTIS HC A04/MF A01 CSCL 22/2

A study of arc discharge strength was carried out, emphasizing its variation with the thickness of the dielectric-sheet specimens which had been exposed to an incident 20 keV electron beam at a current density of a thickness at which the peak current and the energy released into a load resistor are maximized. The addition of a low-energy ion beam was found to reduce discharge strength without significantly altering thickness-scaling. Also, experimental evidence was presented for a new effect called the ion spot phenomenon in which the incident ions are focussed into a central spot which then glows due to electron-impact luminescence. The first stage in the analysis of the ion spot phenomenon has been carried out and is described in this report. A two-dimensional analysis reveals complex ion trajectories which produce not only a strip (equivalent to a spot) of ion deposition, but are also such as to produce a spot with very sharply defined edges, just as observed experimentally. As for the spacecraft-charging experimental facility, a chamber capable of holding specimens up to 30 cm diameter has been completed. Arc discharges of 700 A peak have been recorded for the largest specimens and a system for making surface potential measurements has been tested. GRA

N86-29894# Hughes Research Labs., Malibu, Calif.
POSITIVE ION EJECTION SYSTEM (PIES) Final Report, 14 Mar. 1983 - 30 Apr. 1985
R. Robson, W. Williamson, and J. Hyman Sep. 1985 75 p
(Contract F19628-83-C-0057)
(AD-A166560; AFGL-TR-85-0251) Avail: NTIS HC A04/MF A01 CSCL 20/3

The Contractor has designed, fabricated, tested, and delivered both a breadboard- and a flight-model Positive Ion Ejection System (PIES). The flight-model system will be employed to eject positive charge from a rocket (BERT I) in order to simulate and investigate spacecraft charging. The PIES models each consist of an argon-ion source; an argon expellant tank; power, command, and telemetry electronics; and suitable packaging. The ion source emits an unneutralized argon-ion beam at selected voltages in the energy range from 0.5 to 4.5 keV, with selected ion-beam currents in the range of 0.02 to 20 mA. The flight-model PIES exhibits environmental-tolerance attributes suitable for rocket launch. Design considerations, final design configuration, and test data are presented. GRA

N86-29895# Air Force Geophysics Lab., Hanscom AFB, Mass.
SPACECRAFT SHEATH MODIFICATION DURING BEAM EJECTION
Shu T. Lai, Herbert A. Cohen, and William J. McNeil 11 Sep. 1985 20 p Presented at the International School for Space Simulations, Kauai, Hawaii, 3-16 Feb. 1985
(AD-A166604; AFGL-TR-85-0215; AFGL-ERP-929) Avail: NTIS HC A02/MF A01 CSCL 22/1

Numerical solutions to the equations relating the charge ejection to spacecraft potential have been used to study the response of spacecraft potential to ion and electron beam emissions. Ionization occurs within the sheath due to the return current. The charge density and potential profile in the sheath are altered. Non-monotonic behavior of spacecraft potential as a function of beam current is obtained. Parametric studies on the effects of neutral density, electron temperature, mean free path, and spacecraft size have been performed. Experimental evidence of spacecraft sheath modification during beam ejections is discussed. GRA

N86-29896# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A COMPREHENSIVE ANALYSIS ALGORITHM FOR ABLATION, TEMPERATURE FIELDS AND THERMAL STRESSES OF THE CARBON-BASE NOSETIPS
Zhen Zhong Huang 24 Feb. 1986 24 p Transl. into ENGLISH from Yuhang Xuebao (China), no. 7, 1984 p 30-38
(AD-A166615; FTD-ID(RS)T-0746-85) Avail: NTIS HC A02/MF A01 CSCL 22/2

The principles of the synthetic analysis and treatment techniques concerning vehicle re-entry thermal environment, ablation, heat transfer and thermal stresses are described. The thermochemical ablation calculations for chemical reactions on the ablating surfaces of carbon-base materials are simplified using selective calculation results. The temperature fields are calculated using the three-level explicit difference schemes for both constant and non-constant space steps within the total region. The thermal stresses are calculated, based on the incomplete generalized potential energy variational principles under the supposed conditions of linear elasticity, using the finite element method. This method can also be usd to calculate the effects of the various displacement boundary conditions. An automatic grid generation technique has been developed during the computer code editing, which helps improve the shape selection calculations. GRA

N86-29897# Joint Publications Research Service, Arlington, Va.
WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT
13 May 1986 39 p Transl. into ENGLISH from various worldwide articles
(JPRS-TTP-86-013) Avail: NTIS HC A04/MF A01

Telecommunication topics addressed include: telephone switching systems, computer automation, satellites, Telecom Network, technology transfer, Bigfon Network, Aerospatiale satellite construction, and fiber optics. For individual titles, see N86-29898 through N86-29898.

N86-29898# Joint Publications Research Service, Arlington, Va.
SATELLITES SAID TO FUNCTION WELL, PLANS REVEALED
In its Worldwide Report: Telecommunications Policy, Research, and Development (JPRS-TTP-86-013) 13 May 1986 p 16-17 Transl. into ENGLISH from the Times of India (Bombay, India), 7 Apr. 1986 p 12 (For primary document see N86-29897 21-18)
Avail: NTIS HC A03/MF A01

The fabrication of INSAT-1C (Indian National Satellite 1-C) is nearing completion and the acceptance test for the satellite would be conducted in April, 1986. The lauching of the satellite was delayed due to the recent setback in the U. S. space shuttle program. The current status of the satellite program was reviewed. B.G.

N86-30589*# Northwestern Univ., Evanston, Ill. Astronomical Research Center.
THE USE OF TETHERED SATELLITES FOR THE COLLECTION OF COSMIC DUST AND THE SAMPLING OF MAN MADE ORBITAL DEBRIS FAR FROM THE SPACE STATION
G. J. Corso *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 52-53 refs Prepared in cooperation with Loyola Univ., Chicago, Ill. (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30595*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTS OF THE LOW EARTH ORBITAL ENVIRONMENT ON SPACECRAFT MATERIALS Abstract Only
Lubert J. Leger *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 67 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30598*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE SOLAR MAXIMUM SATELLITE CAPTURE CELL: IMPACT FEATURES AND ORBITAL DEBRIS AND MICROMETEORITIC PROJECTILE MATERIALS
D. S. McKay, F. J. M. Rietmeijer (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.), L. S. Schramm, R. A. Barrett, H. A. Zook, and G. E. Blanford (Houston Univ., Clear Lake, Tex.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 72-75 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30599*# National Aeronautics and Space Administration, Washington, D.C.
DUST COLLECTION ON SERVICEABLE SATELLITES
Joseph A. Nuth, III *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 76 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30602*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE STATION
David R. Thompson *In* Lunar and Planetary Inst. IN Trajectory Determination and Collection of Micrometeoroids on the Space Station 1986 p 83-84 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-29899# MATRA Espace, Toulouse (France). Div. Instrumentation.
IMAGING AND SOUNDING INSTRUMENTS IN THE SPIN STABILIZED VERSION OF THE SECOND GENERATION METEOSAT Final Report [METEOSAT, DEUXIEME GENERATION. ETUDE DES INSTRUMENTS IMAGEUR ET SONDEUR EN VERSION SATELLITE SPINNE]
A. Peraldi, P. Hollier, G. Eichen, B. Laurent, and V. Poinsignon Paris ESA 25 Jul. 1985 86 p In FRENCH
(Contract ESA-6163/85-F-RD(S))
(Rept-60/1568; ESA-CR(P)-2172; ESA-86-97218) Avail: NTIS HC A05/MF A01

The preliminary study of Meteosat imaging and sounding instruments is presented. The analysis shows to what extent it is possible to develop the design of the actual radiometer including the improving of the telescope, the passive radiator, image fixing, focus adjustment, and scanning modes. The solutions presented allow an improved performance without using unproved technologies. The concepts include combining both instruments with a single telescope or to design them separately. ESA

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-29900*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
FAILURE CONTROL TECHNIQUES FOR THE SSME, PHASE 1 Final Report
T. C. Evatt 1986 161 p
(Contract NAS8-36305)
(NASA-CR-178845; NAS 1.26:178845; RI/RD86-165) Avail: NTIS HC A08/MF A01 CSCL 21H

A failure data base and current test stand configurations were reviewed to develop requirements for a computer that analyzes the Space Shuttle Main Engine (SSME) test parameters to sense oncoming engine failurs. The minimum number of reliable indicators for use in the failure detection algorithm based on the sensor reliability and repeatability of the sensors will be selected to detect particular incidence types. The majority of the effort is anticipated in the selection of the failure to be simulated along with development and test of the failure algorithm to anchor system level requirement. B.G.

N86-29901*# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
OXIDIZER HEAT EXCHANGER COMPONENT TESTING Final Report
T. Kmiec and P. Kanic Aug. 1986 60 p
(Contract NAS3-24238)
(NASA-CR-179487; NAS 1.26:179487; P/W/GPD-FR-19134-3)
Avail: NTIS HC A04/MF A01 CSCL 21H

As part of the RL10 Rocket Engine Product Improvement Program, Oxidizer Heat Exchanger (OHE) stages 1, 2, and 3 were designed and fabricated during late 1983 and early 1984. The purpose of the OHE is to provide gaseous oxygen to the pro-

pellant injector for stable engine operation at tank head idle and pumped idle operating modes. This report summarizes the OHE stages 1 and 3 rig testing, and includes the separation of the stage 1-and-2 assembly and the remanifolding of stage 1. The OHE performance analysis and analytical model modifications for both stages are also presented. The flow tests were accomplished during the time period from 9 October 1984 to 12 November 1984. Author

N86-29902# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FIREWORKS IN SPACE
21 Feb. 1986 7 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 2, Feb. 1985 p 17-18
(AD-A166268; FTD-ID(RS)T-0863-85) Avail: NTIS HC A02/MF A01 CSCL 21/8

Inspired by fireworks, our ancestors invented rockets. The ignition of rockets (including the carrier rocket which is responsible for carrying a satellite into space) is conducted by a special starting device. The operating principle is to light with electricity the propellant of the engine in a rocket, putting the engine in a working condition so as to product thrust, and push it into space. At the order for ignition from a commander, the multistage rocket which carries a communication satellite starts soaring up into the sky, the whole Earth being shaken. GRA

N86-30585*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN IN-SITU MEASUREMENT OF PARTICULATES FROM SOLID ROCKET MOTORS FIRED IN SPACE
John W. Alred *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 43-44 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-29903# Groningen Rijksuniversiteit (Netherlands). Materials Science Center.
[ACTIVITIES REPORT OF THE MATERIALS SCIENCE CENTER] Annual Report, 1984
May 1985 141 p
(ESA-86-97388) Avail: NTIS HC A07/MF A01

Trends in materials science, and research in solid state physics; applied physics; nuclear accelerator physics; inorganic chemistry; chemical physics; physical chemistry; and polymer chemistry are discussed. ESA

N86-29904# Groningen Rijksuniversiteit (Netherlands). Materials Science Center.
[ACTIVITIES REPORT OF THE MATERIALS SCIENCE CENTER] Annual Report, 1983
May 1984 146 p
(ESA-86-97389) Avail: NTIS HC A07/MF A01

Trends in materials science, and research in solid state physics; applied physics; nuclear accelerator physics; inorganic chemistry; chemical physics; physical chemistry; and polymer chemistry are discussed. ESA

24 COMPOSITE MATERIALS

Includes laminates.

N86-29905*# California Univ., Davis. Div. of Textiles and Clothing.
DIFFERENCES IN INTERFACIAL BOND STRENGTHS OF GRAPHITE FIBER-EPOXY RESIN COMPOSITES Final Report
Howard L. Needles 1985 26 p
(Contract NCC2-264)
(NASA-CR-176912; NAS 1.26:176912) Avail: NTIS HC A03/MF A01 CSCL 11D

The effect of epoxy-size and degree of cure on the interfacial bonding of an epoxy-amine-graphite fiber composite system is examined. The role of the fiber-resin interface in determining the overall mechanical properties of composites is poorly understood. A good interfacial adhesive bond is required to achieve maximum stress transfer to the fibers in composites, but at the same time some form of energy absorbing interfacial interaction is needed to achieve high fracture toughening. The incompatibility of these two processes makes it important to understand the nature and basic factors involved at the fiber-resin interface as stress is applied. The mechanical properties including interlaminar shear values for graphite fiber-resin composites are low compared to glass and boron-resin composites. These differences have been attributed to poor fiber-matrix adhesion. Graphite fibers are commonly subjected to post-treatments including application of organic sizing in order to improve their compatibility with the resin matrix and to protect the fiber tow from damage during processing and lay-up. In such processes, sized graphite fiber tow is impregnated with epoxy resin and then layed-up into the appropriate configuration. Following an extended ambient temperature cure, the graphite-resin composite structure is cured at elevated temperature using a programmed temperature sequence to cure and then cool the product. Author

N86-29906# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
A MODIFIED MICROBONDING TEST FOR DIRECT IN-SITU FIBER/MATRIX BOND STRENGTH DETERMINATION IN FIBER COMPOSITES
J. F. Mandell, D. H. Grande, T.-H. Tsiang, and F. J. McGarry Dec. 1984 48 p Sponsored in part by Owens Corning Fiberglass Corp.
(Contract DAAG46-77-C-0070)
(MIT-RR-R84-3) Avail: NTIS HC A03/MF A01

A test method for determining the in-situ fiber/matrix bond strength of composites is described. In a sequence of steps a compressive load is applied to individual fibers oriented normal to a polished surface, and the interface is observed microscopically between loading steps, until debonding occurs. The direct result of a test is the force to produce debonding of a particualr fiber. The data are reduced to a nominal interfacial shear strength through a finite element analysis using a simplified model of the fiber, surrounding matrix, and uniform composite properties beyond the matrix. The finite element results indicate that failure is dominated by the interfacial shear stress component which reaches a maximum value at a distance of approximately half the fiber diameter below the surface, and is insensitive to the local probe/fiber contact problem. The data reduction is only approximate since the complete geometry of each local fiber arrangement cannot be included for every test. Thus, the interfacial strength is considered to be a nominal value for some equivalent fiber arrangement characterized only by the distance to the nearest neighbor fiber. Author

N86-29907*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TENSION STRENGTH OF A THICK GRAPHITE/EPOXY LAMINATE AFTER IMPACT BY A 1/2-IN. RADIUS IMPACTOR
C. C. Poe, Jr., W. Illg, and D. P. Garber (PRC Kentron, Inc., Hampton, Va.) Jul. 1986 130 p
(NASA-TM-87771; NAS 1.15:87771) Avail: NTIS HC A07/MF A01 CSCL 11D

NASA is developing graphite/epoxy filament-wound cases for solid rocket motors of the space shuttle. They are wet-wound with AS4W graphite fiber and HBRF-55A epoxy. The membrane region is about 1.4 inches thick. Two 30-inch-diameter by 12-inch-long cylinders were impacted every two inches of circumference with 1/2-inch radius impactors that were dropped from various

heights. One cylinder was empty and the other was filled with inert propellant. Two-inch-wide test specimens were cut from the cylinders. Each was centered on an impact site. The specimens were x-rayed and loaded to failure in uniaxial tension. Rigid body mechanics and the Hertz law were used to predict impact force, local deformations, contact diameters, and contact pressures. The depth of impact damage was predicted using Love's solution for pressure applied on part of the boundary of a semi-infinite body. The predictions were reasonably good. The strengths of the impacted specimens were reduced by as much as 37 percent without visible surface damage. Even the radiographs did not reveal the nonvisible damage. Author

N86-29908*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CARBON-RICH CERAMIC COMPOSITES FROM ETHYNYL AROMATIC PRECRUSORS
Frances I. Hurwitz 1986 13 p Presented at the Tenth Annual Conference on Composites and Advanced Ceramic Materials, Cocoa, Beach, Fla., 19-24 Jan. 1986; sponsored by the American Ceramic Society
(NASA-TM-88812; E-3167; NAS 1.15:88812) Avail: NTIS HC A02/MF A01 CSCL 11D

A number of polyfunctional aromatic acetylenes thermally polymerize at low temperatures (180 C) and pyrolyze with greater than 90 char yield. In nonoxidizing environments, they are thermally stable to 1450 C. These monomers were chosen as the basis of a model system to study the fabrication and mechanical properties of continuous filament ceramic matrix composite. Composites were fabricated from aryl poly(acetylenes), SiC particulate filler and graphite, Avco SiC, Nicalon and Nextel fibers. Microstructure, physical and mechanical properties are reported. Author

N86-29909# Florida Univ., Gainesville. Dept. of Engineering Sciences.
IMPROVEMENT AND OPTIMIZATION OF INTERNAL DAMPING OF FIBER REINFORCED COMPOSITE MATERIALS Final Report, Jun. 1983 - Nov. 1985
C. T. Sun 17 Dec. 1985 174 p
(Grant AF-AFOSR-0154-83)
(AD-A166173; AFOSR-86-0049TR) Avail: NTIS HC A08/MF A01 CSCL 11/4

Analysis of material damping and optimization of both material damping and specific stiffness of laminated, continuous or discontinuous fiber reinforced polymer matrix is the major objective of this study. The analytical solution was achieved by using a force-balanced model to derive the equivalent modulus of unidirectional aligned short fiber composites. We then apply the elastic-viscoelastic correspondence principle and separating the real and imaginary parts to obtain the storage and the loss moduli of the composite. In laminated composites we also investigate the influence of interlaminar stress on damping. To this end, we use a finite-element program to evaluate the three-dimensional stress distribution in the plane of each lamina and also at each interface. We then formulate the total strain energy and apply the elastic-viscoelastic correspondence principle to obtain the analytical expression of damping of laminated composites, which is defined as the ratio of the energy dissipated per cycle and the total energy. Analytical results are compared with those obtained from classical two-dimensional lamination theory. Sequential Simplex method, laminated plate theory, and an elastic-viscoelastic correspondence principle are used to optimize both material damping and a specific stiffness of composites. GRA

N86-29910# Institute for Defense Analyses, Alexandria, Va.
A BRIEF ASSESSMENT OF STRUCTURAL COMPOSITE MATERIALS RESEARCH IN UNIVERSITIES IN THE UNITED STATES Final Report, Oct. 1984 - Oct. 1985
R. L. Kerber Dec. 1985 30 p
(Contract MDA903-84-C-0031)
(AD-A166665; AD-E500759; IDA-M-156; IDA/HQ-86-30809) Avail: NTIS HC A03/MF A01 CSCL 11/4

The use of advanced composite structural materials in defense systems is rapidly increasing and it is expected that this trend will continue in the foreseeable future. Thus, it is important to assess the role of universities to support the technology base and provide appropriate manpower to the defense industry. The results of such a survey and assessment are presented. It is recommended that DARPA support about 5-8 new university-operated composite material activities which should have a strong interaction with industry. Suggested funding needs and technical initiatives are outlined. GRA

N86-29911# IIT Research Inst., Chicago, Ill.
NONDESTRUCTIVE EVALUATION OF METAL MATRIX COMPOSITES Final Report, 12 Apr. 1982 - 30 Jun. 1984
S. W. Schramm, G. M. Koller, and J. W. Adams Dec. 1985 118 p
(Contracts DAAG46-82-C-0039; DA Proj. 1L2-63102-D-071)
(AD-A166774; IITRI-K06035-30; MTL-TR-85-31) Avail: NTIS HC A06/MF A01 CSCL 11/4

The objective of this program was to apply nondestructive evaluation (NDE) methods to identify potentially harmful casting defects in FP/magnesium composites; establish detectability and reproducibility limits of NDE applied to FP/magnesium composites; and establish relationships between casting defects and failure modes of FP/magnesium composites. The material investigated was ZE41A magnesium alloy reinforced with FP (aluminum oxide) fibers. The 27 coupons (four coupons each of five flaw types and seven coupons from a related program were evaluated using ultrasonic scanning, wave propagation velocity, and wave attenuation inspection techniques. The coupons evaluated were 12.7 cm (5 in.) long x 3.8 cm (1.5 in.) wide x 0.6 cm (0.25 in.) thick, with a fiber volume fraction of 0.50. After the detectability and reproducibility NDE inspections, tensile and/or bend specimens were machined from the parent coupons, strain gaged, and statically loaded to failure. Micrographs were made of the fracture surfaces for comparison with the NDE records. It was found that ultrasonic scanning using a 2 0 MHz compression wave, focused transducer operated in the pulse-echo mode generating an analog C-scan provided 100% detectability and reproducibility of the intentionally flawed coupons. GRA

N86-29912# Department of the Air Force, Washington, D.C.
PHENYLQUINOXALINE RESIN COMPOSITIONS Patent Application
Marilyn R. Unroe, inventor (to Air Force) Filed 16 Jan. 1986 15 p
(AD-D012230; US-Patent-Appl-SN-819322) Avail: NTIS HC A02/MF A01 CSCL 11/9

This invention relates to phenylquinoxaline resin compositions. The acetylene-terminated polyphenylquinoxalines disclosed in previous patents represent promising new matrix resins for advanced structural materials. These materials propagate and cure by addition reactions to form high molecular weight, thermally stable compositions. The addition process obviates all problems associated with volatile by-product formation that occurs when such materials are prepared by condensation processes. The thermally induced free radical polymerization of aromatic and heterocyclic diacetylenes provides a linear conjugated polyene of 6 to 8 repeating units which results in a cluster-shaped species whose growth is inhibited by the steric hindrance of the monomer or oligomer backbone structure. Although the free radical at the hub of the cluster is reactive its growth becomes increasingly more difficult as the reacton proceeds, reaching a finite limit. Subsequent reaction of dangling acetylene groups of a cluster results in a highly cross-linked polyene network. Such cross-linking has a direct effect on the network topology which manifests itself in mechanical behavior. It is an object of the present invention to provide novel quinoxaline resin systems having a low crosslink density. GRA

N86-29913# North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Mechanical Engineering.
EFFECTS OF THERMAL AND CYCLIC LOADS ON SILICON CARBIDE YARN REINFORCED GLASS MATRIX COMPOSITES

Progress Report, Feb. 1 - 31 Dec. 1985
V. S. Avva and J. Sankar 15 Jan. 1986 7 p
(Contract DE-FG05-84ER-45140)
(DE86-006793; DOE/ER-45140/2) Avail: NTIS HC A02/MF A01
Six panels of SiC/7740 borosilicate composite materials were studied. Static ultimate strength, strain values, and fatigue of the laminate were determined. DOE

N86-29914# Los Alamos National Lab., N. Mex.
PERFORMANCE OF COMMERCIAL AND RESEARCH GRADE SiC WHISKERS IN A BOROSILICATE GLASS MATRIX
F. D. Gac, J. J. Petrovic, J. V. Milewski, and P. D. Shalek 1986 13 p Presented at the 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19 Jan. 1986
(Contract W-7405-eng-36)
(DE86-007379; LA-UR-86-628; CONF-860152-1) Avail: NTIS HC A02/MF A01
Dry blending of the whiskers and glass powder yielded composites of satisfactory, but not optimum, homogeneity is discussed. The whiskers inhibited composite densification, but this could be remedied by modifying the hot-pressing conditions. All types of whiskers produced improvements in the flexural strength of the composites, with the highest value achieved with the smallest diameter whiskers. The composites displayed a 4- to 5-fold increase in fracture toughness compared to that displayed by the unreinforced glass, but definitive trends could not be related to the whisker size characteristics. DOE

N86-29915# Colorado Univ., Boulder.
STUDIES OF METAL/CARBON SURFACE CHEMISTRY, SEPTEMBER 1, 1985-November 30, 1985
B. E. Koel 31 Dec. 1985 5 p
(Contract DE-FG22-84PC-70779)
(DE86-007419; DOE/PC-70779/6) Avail: NTIS HC A02/MF A01
The purpose of this research is to identify stable surface species formed from molecular adsorption and reaction on metal/carbon surfaces. This research has practical application in improving the fundamental understanding of catalytic coal gasification. Well-defined model catalysts for carbon gasification will be studied by vapor depositing alkali and transition metal atoms on carbon surfaces. Vibrational spectroscopy using high resolution electron energy loss spectroscopy (HREELS) and photoelectron spectroscopy of these surfaces will be used to develop an atomic-level understanding of the chemical bonding, structure, and reactivity of the metal carbon surface and of the adsorbed molecular species. DOE

N86-29916# Cornell Univ., Ithaca, N.Y. School of Mechanical and Aerospace Engineering.
EXPERIMENTS AND MICROMECHANICAL MODELS FOR CREEP-RUPTURE IN POLYMER MATRIX COMPOSITES Progress Report, 15 Jun. 1985 - 14 Jun. 1986
S. L. Phoenix Mar. 1986 9 p
(Contract DE-FG02-84ER-45112)
(DE86-007980; DOE/ER-45112/2) Avail: NTIS HC A02/MF A01
The purpose is to develop statistical and micromechanical models of time-dependent failure in fiber composites in order to forecast long-term reliability. Three problems are being studied: micromechanics of stress transfer at fiber fracture sites; modeling time-dependent effects in both fiber and matrix under one unified power-law framework; and creep-rupture of single Kevlar 49 fibers at high temperatures up to 200 C. DOE

N86-29917# Foersvarets Forskingsansalt, Stockholm (Sweden).
MATERIAL PROPERTIES OF EPOXY RESINS REINFORCED WITH CARBON FIBERS, AFFECTED BY HEAT RADIATION
Fritz Larsson Jan. 1986 64 p In SWEDISH; ENGLISH summary
(FOA-C-20597-F9; ISSN-0347-3694; ESA-86-97235) Avail: NTIS HC A04/MF A01
Carbon fiber reinforced epoxy resins of aircraft quality (unidirectional laminates of thickness 0.95, 1.86, and 3.91 mm, and cross-ply laminates of 1.82 mm thickness) were exposed on one surface to heat radiation with intensity 7.5 to 60 kW/sqm. Temperature as a function of time was calculated for points on the surface as well as for points within the laminate, and formulas for determining the temperature at which damage occurs are given: the lowest is 260 C. The mass loss for a damage spread through the material is < 1%. The residual mechanical strength after the heat radiation was measured, and exposure time resulting in visible defects was determined. ESA

N86-29918# Foersvarets Forskingsansalt, Stockholm (Sweden).
PARTICLES AND GASES PRODUCED BY CUTTING FIBER COMPOSITES WITH A 250 W CONTINUOUS WAVE CARBON DIOXIDE LASER
Tom Karlsson Feb. 1986 33 p In SWEDISH; ENGLISH summary
(FOA-C-20599-D6; ISSN-0347-3694; ESA-86-97236) Avail: NTIS HC A03/MF A01
Four matrices reinforced with unidirectional HT-carbon fibers and three epoxides reinforced with E-glass, Kevlar, and boron fibers were cut with nitrogen or air in the protective gas jet. Carbon fibers were vaporized: 90% are oxidized to carbon monoxide and carbon dioxide by the surrounding air. The glass from the glass fiber composite was quantitatively recovered as small pearls or as a very fine powder, the matrix being totally vaporized. About 3.5% of the Kevlar composite formed gases and the rest a powder and half molten, short pieces of Kevlar fibers. The boron fibers melt and a small part was oxidized to boron trioxide, the matrix being totally destroyed. Quantitative measurements of the carbon-oxides, hydrocyanic acid, and the nitrogen oxides were made.ESA

N86-29919# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Dept. Production-Recherches.
GENERAL INVESTIGATIONS OF COMPOSITE MATERIALS. ADHESIVE BONDING OF CARBON COMPOSITES Final Report [ETUDES GENERALES SUR LES MATERIAUX COMPOSITES]
P. Dublineau and G. Durivaud 14 Dec. 1985 75 p In FRENCH
(Contract STPA-83-96-003-00-471-75-86)
(SNIAS-2647/DCI-PR/85; ESA-86-97268) Avail: NTIS HC A04/MF A01
The influence of the polymerization cycle and atmospheric moisture on the final properties of epoxy-amine adhesives used for adhesive bonding of carbon fiber composites is studied. The analysis of the polymerization time or temperature effects does not show a significant effect. Moisture absorption is shown to have a negative effect on the bonded joint properties. Different elements, either epoxy-carbon composites or bonded joints, could be processed simultaneously in the polymerization autoclave. ESA

N86-29920# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Service Technique des Programmes Aeronautiques.
INFLUENCE OF THE TEST METHOD AND THE MATERIAL STIFFNESS ON THE LOW VELOCITY IMPACT DAMAGE OF CARBON-EPOXY COMPOSITES, PART 2 [INFLUENCE DE LA METHODE D'ESSAI ET DE LA RIGIDITE DU MATERIAU SUR LES DOMMAGES OCCASIONNES PAR LES CHOCS A BASSE VITESSE SUR COMPOSITES CARBONE EPOXY (DEUXIEME PARTIE)]
G. Hilaire and B. Soulezelle 27 Dec. 1985 81 p In FRENCH
(Contract STPA-83-96003)
(PV-47-166/F-Pt-2; ESA-86-97269) Avail: NTIS HC A05/MF A01
The performance of carbon-epoxy materials and the influence of the stiffness of the specimen are studied. The IM6 and AS6 fibers with the Narmco 5245 resin composites show impact damage at higher energy levels. The effect of stiffness on the T300 fiber with Narmco 5208 resin composites is clearly negative for all tested composite assembling combinations. A large reduction of the composite compression resistance (50% to 65%) is observed in all specimens showing impact damage. ESA

N86-29921# Societe Nationale Industrielle Aerospatiale, Suresnes (France).
AGING OF CARBON-EPOXY COMPOSITE IN HUMID ENVIRONMENTS [VIEILLISSEMENT HUMIDE DES COMPOSITES CAR-

BONE-EPOXY]
G. Hilaire and J. N. Dewas 23 Oct. 1985 173 p In FRENCH
(Contract DRET-81-34-250-00)
(PV-42-791/F; ESA-86-97270) Avail: NTIS HC A08/MF A01

The influence of temperature-humidity cycles on the water diffusion kinetics in T300/914 and T300/5208 composites was studied. The evolution of the coefficients of the Langmuir model was analyzed as a function of temperature, humidity, and the number of absorption cycles. The glass transition point was determined after each cycle. The consequences of thermal shock and the influence of a moisture barrier paint are also examined. A total of 168 specimens were tested. It is found that moisture absorption increases after a first cycle and is stable afterwards. The diffusion coefficient is temperature dependant following an Arrhenius function. A different behavior under thermal shock is found for the two composites. Protective paints do not show significant effects. The complexity of a model that could include all experimental data is pointed out. ESA

N86-29922# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique des Materiaux.
DETERMINATION OF THE BASIC PARAMETERS IN THE MICROMECHANICAL BEHAVIOR OF COMPOSITE MATERIALS [DETERMINATION DES PARAMETRES ESSENTIELS DANS LE COMPORTEMENT MICROMECANIQUE DES MATERIAUX]
J. P. Favre, C. Marais, and P. Sigety Feb. 1985 60 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-41/7086-M; ESA-86-97275) Avail: NTIS HC A04/MF A01

Cracking and delamination faults are studied in order to identify the parameters and to develop composite choice criteria. The experimental design is limited to composite structures to avoid considering spurious problems. The specimens are carbon-epoxy composites with unidirectional 14 layer structure. The results show that the breaking energy is a function of the damaged length. It is possible to differentiate three phases of the failure mechanism: initiation, propagation, and crack stabilization. The dispersion of the results is related to the specimen morphology. The factors explaining the variance of the results are discussed. ESA

N86-29923# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Struct
INVESTIGATION OF DELAMINATION OF A COMPOSITE BAR Final Report [ETUDE DU DELAMINAGE D'UN BARREAU COMPOSITE]
L. Anquez and F. Nataf Dec. 1985 42 p In FRENCH
(Contract DEN-84-70-145)
(ONERA-RT-9/3542-RY-044-R; ESA-86-97277) Avail: NTIS HC A03/MF A01

A finite element numerical study was carried out to simulate a cracked bar and to compute the energy related to the shape of the crack. Analytical computations are also presented. It is shown that when the length of crack is larger than twice the thickness of a composite layer, the analytical computation works well giving the energy along the three axes and the crack opening in two axes. Numerical results showing the values of the restitution energy as a function of the crack length are presented. Coming up from the bottom of the crack the profile is a straight line with slope which is a function of the crack length. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-29924*# Polyatomics Research, Inc., Mountain View, Calif.
ON THE EXTENSION OF THE MCSCF/CI METHOD Final Report, 15 Sep. 1981 - 31 Aug. 1984
Charles Bauschlicher, Jr., Constance J. Nelin, and Andrew Komornicki 31 Aug. 1984 112 p
(Contract NCC2-158)
(NASA-CR-176933; NAS 1.26:176933) Avail: NTIS HC A06/MF A01 CSCL 07D

Research conducted during this period was focused on two main areas: (1) bonding in transition metal oxides; and (2) adsorption of CO on Al and Ni. In both of these theoretical studies a major interest was to obtain a better understanding of the nature of the bonding in transition metal containing systems. The studies used self consistent field (SCF), multi-configuration self cosistent field (MCSCF) and configuration interaction (CI) methods in the treatment of the transition metal oxides and only the SCF method in the adsorption studies. The reports of three principle investigators who contributed to this work during the tenure of the project are presented along with associated published papers. For individual titles, see N86-29925 through N86-29929.

N86-29925*# Polyatomics Research, Inc., Mountain View, Calif.
THE NATURE OF CHEMISORBED OXYGEN ON Ni(100) AND Cu(100)
Charles W. Bauschlicher, Jr., Stephen P. Walch, Paul S. Bagus (IBM Research Lab., San Jose, Calif.), and C. R. Brundle *In its* On the Extension of the MCSCF/CI Method 31 Aug. 1984 9 p (For primary document see N86-29924 21-25)
Avail: NTIS HC A06/MF A01 CSCL 07D

Model calculations indicate two low-lying states for the interaction of O with Ni and Cu(100). The oxide state is approximately 1 eV more stable and its R(perpendicular) for Ni(100) is consistent with the experimental value for Ni(100), indicating only one type of stable chemisorption bond. This agrees with XPS (X-ray photoemission spectroscopy) and EXAFS (extended X-ray absorption fine structure) data for the observed LEED (low energy electron diffraction) structures. Interpretations of EELS (electron energy loss spectroscopy) data in terms of a radical state forthe p(2x2) and the oxide state for the c(2x2) structure must be seriously questioned. Author

N86-29926*# Polyatomics Research, Inc., Mountain View, Calif.
A FINAL REPORT ON THE EXTENSION OF THE MCSCF/CI METHOD
Constance J. Nelin *In its* On the Extension of the MCSCF/CI Method 31 Aug. 1984 28 p (For primary document see N86-29924 21-25)
Avail: NTIS HC A06/MF A01 CSCL 07D

For the period of July 1982 through January 1983, the research carried out focused on the nature of metal adsorbate bonding. Two main areas were investigated in detail: (1) the adsorption of CO on Al, Na, Mg and Ni; and (2) bonding in transition metal oxides, CuO, CrO and MoO. These theoretical studies have lead to a new understanding of CO-metal bonding as well as to a better understanding of the d involvement in the bonding in transition metal oxides. Four areas associated with cluster model studies are discussed in detail: hybridization and changing in cluster model studies, the adsorption of CO on metals (Al, Na, Mg), the adsorption of CO on Ni, and finally the use of effective core potentials (ECP) in cluster models. Author

N86-29927*# Polyatomics Research, Inc., Mountain View, Calif.
CHARGING AND HYBRIDIZATION IN THE FINITE CLUSTER MODEL
Charles W. Bauschlicher, Jr., Paul S. Bagus (IBM Research Lab., San Jose, Calif.), and Constance J. Nelin *In its* On the Extension of the MCSCF/CI Method 31 Aug. 1984 14 p (For primary document see N86-29924 21-25)
Avail: NTIS HC A06/MF A01 CSCL 07D

Cluster wavefunctions which have appropriate hybridization and polarization lead to reasonable properties for the interaction of an adsorbate with a solid surface. However, for Al clusters, it was

found that the atomic charge distribution is not uniform. The finite cluster size leads to changes not representative for an extended system. This effect appears to be dependent on the particular materials being studied; it does not occur in all cases. Author

N86-29928*# Polyatomics Research, Inc., Mountain View, Calif.
ON THE LOW-LYING STATES OF CuO
Paul S. Bagus (IBM Research Lab., San Jose, Calif.), Constance J. Nelin, and Charles W. Bauschlicher, Jr. *In its* On the Extension of the MCSCF/CI Method 31 Aug. 1984 20 p (For primary document see N86-29924 21-25)
Avail: NTIS HC A06/MF A01 CSCL 07D

Self consistent field and correlated wave functions have been computed for the ground and for several low-lying states of CuO. The ground state is X(2)PI and the lowest excited state, at approximately 8,000/cm above X(2)PI, is a previously unidentified 2-sigma(+) state. The separation of these states is compared to that for the similar states of KO and is analysed in terms of integrals between orbitals of the separated free ions. A classification of the states of the molecule based on states of Cu(+) and O(-) which leads to a division into manifolds of states arising from Cu(+) 3d(10) and Cu(+) 3d(9) 4s(1) is considered. It is predicted that the state of the 3d(9) 4s(1) manifold are 10,000 to 30,000/cm above the ground state and assign the observed A2-sigma(+) state at 16,500/cm to this manifold. M.G.

N86-29929*# Oslo Univ. (Norway). Dept. of Chemistry.
A VECTORIZED MOLECULE CODE Final Report
Jan Almlof *In* Polyatomics Research, Inc.,Mountain View, Calif. On the Extension of the MCSCF/CI Method 31 Aug. 1984 26 p (For primary document see N86-29924 21-25)
Avail: NTIS HC A06/MF A01 CSCL 07D

The vectorization of the computational chemistry code, MOLECULE, is discussed. Computational simplifications of molecular integrals, memory management, and contraction schemes are addressed and a brief guide for users is included. M.G.

N86-29930*# National Aeronautics and Space Administration, Washington, D.C.
PRODUCTION OF AN ION-EXCHANGE MEMBRANE-CATALYTIC ELECTRODE BONDED MATERIAL FOR ELECTROLYTIC CELLS
Hiroyasu Takenaka and Eiichi Torikai Apr. 1986 10 p Transl. into ENGLISH from Japanese Patent No. 55-38934, (Appl. 78/110,267 7 Sep. 1978) 18 Mar. 1980 p147-150 Transl. by Scitran, Inc., Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88392; NAS 1.15:88392) Avail: NTIS HC A02/MF A01 CSCL 07D

A good bond is achieved by placing a metal salt in solution on one side of a membrane and a reducing agent on the other side so that the reducing agent penetrates the membrane and reduces the metal. Thus, a solution containing Pt, Rh, etc., is placed on one side of the membrane and a reducing agent such as NaBH, is placed on the other side. The bonded metal layer obtained is superior in catalytic activity and is suitable as an electrode in a cell such as for solid polymer electrolyte water electrolysis. Author

N86-29931# Toronto Univ. (Ontario). Dept. of Chemistry.
MOLECULAR DYNAMICS OF REACTIONS FORMING ELECTRONICALLY EXCITED PRODUCTS Final Report, 15 Oct. 1980 - 14 Oct. 1985
J. C. Polanyi 22 Dec. 1985 6 p
(Grant AF-AFOSR-0027-81)
(AD-A166168; AFOSR-86-0133TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The objective of this research was to improve understanding at a fundamental level of chemical processes leading to the formation of electronically excited products (nonadiabatic processes). The quasi-classical trajectory (QCT) method was used in order to map out various types of nonadiabatic dynamics, and to correlate these types of behavior with the interaction potentials that give rise to them. Three dimensional trajectory surface hopping (TSH) was applied to pairs of potential energy surfaces that interacted along a seam in the exit valley (i.e. as products separated). This report summarizes the molecular dynamics of exoergic chemical reactions that yield products in both ground and electronically excited states. GRA

N86-29932# M L Energia, Inc., Princeton, N.J.
RADIATIVE AUGMENTED COMBUSTION Annual Report, 15 Jul. 1984 - 14 Jul. 1985
Moshe David 12 Aug. 1985 87 p
(Contract F49620-83-C-0133)
(AD-A166185; ENG-102-ATR-8508; AFOSR-86-0085TR; AR-2) Avail: NTIS HC A05/MF A01 CSCL 07/5

Radiative augmented combustion is based on the fact that radiation of selected wavelengths is capable of photodissociating stable molecules, combustion intermediates and other inhibiting species into reactive radicals. Subsequent increases in concentrations of these radicals can modify the overall kinetics and produce radiative ignition and combustion enhancements. The potential of this technique was previously demonstrated under static conditions. Recently, it has been also demonstrated under flow conditions, with advanced vacuum ultraviolet (VUV) and ultraviolet (UV) light sources. This program emphasizes research on the interaction between VUV/UV radiation and combustion under flow conditions. The main objective is to demonstrate proof of concept by radiatively igniting combustible mixtures at conditions where thermal ignition is unreliable. Additional objectives are to provide non-intrusive (optical) flameholding and to increase flame speed. Another important goal is to improve the fundamental understanding of the role of photochemical reactions within the whole kinetic scheme, and ultimately to identify the most effective photodissociative path. Consequently, the program is divided into two main subjects: ignition and enhancement. GRA

N86-29933# California Univ., Berkeley. Dept. of Mechanical Engineering.
APPLICATION OF RAYLEIGH SCATTERING TO TURBULENT FLOW WITH HEAT TRANSFER AND COMBUSTION Annual Report, 1 May 1984 - 30 Apr. 1985
L. Talbot 7 Aug. 1985 7 p
(Grant AF-AFOSR-0124-84)
(AD-A166223; AFOSR-86-0072TR) Avail: NTIS HC A02/MF A01 CSCL 21/2

Studies of premixed turbulent V-shaped flames have been carried out using two-point Rayleigh scattering. Density fluctuation intensities, two point density covariances, and mean density profiles were found to be in good agreement with a wrinkled laminar flame model which is an extension of the Bray Moss Libby model. The probability density function for the location of the flame sheet within the turbulent flame brush was measured and found to be approximately gaussian. Mean density profiles of the turbulent flame brush were found to have a self similar behavior when scaled with the maximum slope thickness. A new optical system was developed to make time resolved Rayleigh scattering measurements along a length of a laser beam, thus extending the two point technique to a multipoint one. GRA

N86-29934# California Univ., Santa Barbara. Quantum Inst.
CLUSTER-MODEL CALCULATION OF RAMAN INTENSITY FOR VIBRATION OF CO ADSORBED ON COPPER Annual Report
Ji-An Wu, Horia Metiu, and Bernard Kirtman Feb. 1986 28 p Submitted for publication
(Contract N00014-81-K-0598; Grant NSF CHE-82-06130)
(AD-A166239; TR-2) Avail: NTIS HC A03/MF A01 CSCL 07/4

The discovery of surface enhanced Raman spectroscopy has inspired a large body of work which has been summarized in several recent review articles. While much has been learned about various enhancement sources there is still disagreement regarding the proportion in which different factors contribute to the observed Raman cross section. Even though it is difficult to include all the opinions in a broad classification, it is fair to say that the main debate is centered around the relative importance

of chemical versus electromagnetic (EM) enhancement factors. As emphasized in the Introduction, the intention was to estimate to what extent the non-resonant Raman signal for the C-O stretch is increased when CO binds to a Cu surface. An HCUCO cluster has been used to simulate the on-top binding of CO on Cu(100). The fact that our cluster reproduces the binding properties of adsorbed CO and the CO valence orbitals of pyramidal Cu5CO gives us hope that a correct estimate of the Raman intensity has been obtained. This is especially likely since the property sought is a local quantity. Our result is that the chemical enhancement is about a factor of four which is in general agreement with the few careful estimates based on experimental data. We emphasize that the present calculation does not deal with the question of resonant enhancement. GRA

N86-29935# California Univ., Santa Barbara. Quantum Inst.
AN EFFICIENT METHOD FOR SOLVING QUANTUM LIOUVILLE EQUATION: APPLICATIONS TO ELECTRONIC ABSORPTION SPECTROSCOPY Annual Technical Report
Bo Hellsing and Horia Metiu Feb. 1986 20 p
(Contract N00014-81-K-0598)
(AD-A166260; TR-14) Avail: NTIS HC A02/MF A01 CSCL 07/4

We examine a method for solving Liouville's equation, consisting of successive application of short time propagators which are evaluated by using fast Fourier transforms. The method is examined numerically by computing electronic absorption spectra. The procedure is very efficient when applied to the study of short time dynamics of systems whose quantum degrees of freedom are spatially localized. GRA

N86-29936# Washington State Univ., Pullman. Shock Dynamics Lab.
ELECTRONIC SPECTRA OF VARIOUS LIQUIDS UNDER SHOCK CONDITIONS Annual Report, 1 Oct. 1984 - 30 Sep. 1985
George E. Duvall 30 Dec. 1985 38 p
(Contract N00014-77-C-0232)
(AD-A166510; AD-E750871) Avail: NTIS HC A03/MF A01 CSCL 07/4

A series of experiments is described in which the time resolve spectra of several liquids have been recorded as they were compressed by shock waves reverberating between two sapphire plates. The extent of chemical reaction is reported as indicated by red shift of the uppermost absorption band in the UV or visible. Most of the liquids were organic materials containing 0,1 or 2 carbon double bonds. Unsaturated substances are, on the whole, more reactive than saturated ones, but the relation is not simple. One of the few inorganics studied was HI, which reacted very rapidly an in two stages. Some comments on possible mechanism are included, along with cautions about the interpretation of this kind of experiment. GRA

N86-29937# Georgia Univ., Athens. Dept. of Chemistry.
GRAPH THEORY IN THE STUDY OF METAL CLUSTER BPONDING TOPOLOGY: APPLICATIONS TO METAL CLUSTERS HAVING FUSED POLYHEDRA
R. B. King 2 Apr. 1986 26 p
(Contract N00014-85-K-0365)
(AD-A166623; TR-20) Avail: NTIS HC A03/MF A01 CSCL 07/4

The energy levels in delocalized two- or three-dimensional chemical structure are related to the eigenvalues of the graph representing the corresponding bonding topology. Such relatively crude but computationally undemanding graph theory derived models provide a clear demonstration of the close relationship between two-dimensional aromatic systems such as benzene and three-dimensional aromatic systems such as deltahedral boranes, carboranes, and metal clusters. The basic building blocks for the three dimensional aromatic systems are deltahedra having no degree 3 vertices. Delocalized bonding in such systems having v vertices requires two electrons for a multicenter core bond as well as 2v electrons for pairwise surface bonding. A problem of particular interest is how metal cluster polyhedra can fuse together leading ultimately to the infinite structures of the bulk metals. As a model for such processes the fusion of rhodium carbonyl octahedra is examined using graph theory derived methods. These lead to reasonable electron-precise models for the bonding topologies in the 'biphenyl an alogue (Rh12(CO)30)2-, the naphthalene analogue (Rhg(CO)19)3-, the anthracene analogue H2Rh12 (CO)25, and the perinaphthene analogue (Rh11(CO)23)3-. Similar models can also be developed for clusters based on centered larger rhodium polyhedra as exemplified by the centered cuboctahedral clusters of the type (Rh13(CO)24H5-q)q- (q = 2, 3, 4) representing a fragment of the hexagonal close packed metal structure. Author (GRA)

N86-29938# Lawrence Livermore National Lab., Calif.
MODELING OF CHEMICAL KINETICS IN PULSE COMBUSTORS
C. K. Westbrook Sep. 1985 20 p Presented at the Fall Meeting of the American Flame Research Committee, Livermore, Calif., 17 Oct. 1985
(Contract W-7405-eng-48)
(DE86-001571; UCRL-92765; CONF-8510182-1) Avail: NTIS HC A02/MF A01

Chemical kinetic modeling of the successive reignition of fuel-air mixtures, under conditions of pressure and temperature very similar to those encountered in conventional pulse combustion systems are described. The overall system model is described and the kinetic model is discussed in some detail. Computed results for ignition delay times are then related to time scales of interest in pulse combustion. From these comparisons, some of the physical and chemical factors which control the operation of the pulse combustor can be identified and quantified. In addition, the dependence of pulse combuston performance on various system parameters can be addressed, including the mass flow rate, fuel composition, presence of selected diluents and inhibitors, and combustion chamber geometry. DOE

N86-29939# Lawrence Livermore National Lab., Calif.
SIMULTANEOUS COMBUSTION SYNTHESIS AND DENSIFICATION OF REFRACTORY MATERIALS
J. B. Holt, S. M. Bianchini, and D. D. Kingman Jan. 1986 18 p Presented at the DARPA/ARMY Symposium, Daytona Beach, Fla., 21 Oct. 1985
(Contract W-7405-eng-48)
(DE86-006528; UCRL-93467; CONF-8510280-1) Avail: NTIS HC A02/MF A01

When the temperature of a self-propagating combustion reaction is below the melting temperature of the product, which is usually the case, the product is a powder or has a highly porous structure. Contributing to the large volume of porosity is the difference of molar volume of the products and reactants, porosity in the reactant compact prior to combustion, and the evolution of impurity gases during combustion. Since there is no data on the effect of volatile gases on the amount of porosity and the morphology of the pores in combustion products we will present the preliminary results of our research on the influence of different outgassing temperatures on the structure of 0.5 TiB - 0.5 tiB2, a product of the reaction Ti + 1.5 B. By combining the synthesis process with high pressure techniques, it is possible to densify the refractory products in one simple operation. Our experiments using a gas gun to apply large pressure waves immediately after combustion will be described for different chemical reactions. Both single phase (TiC) and composite materials (0.5 TiB - 0.5 TiB2, TiB2 - Fe and TiC - 2 Al2O3) have been simultaneously synthesized and densified to over 95% of theoretical density. DOE

N86-29940# Lawrence Livermore National Lab., Calif.
COMBUSTION SYNTHESIS OF Si3N4 AND AlN
J. B. Holt, D. D. Kingman, and G. M. Bianchini Jan. 1986 15 p Presented at the DARPA/ARMY Symposium, Daytona Beach, Fla., 21 Oct. 1985
(Contract W-7405-eng-48)
(DE86-006530; UCRL-93468; CONF-8510280-3) Avail: NTIS HC A02/MF A01

Si3N4 and AlN have been synthesized by combustion of the respective metal powders in high pressure nitrogen gas. The

Si3N4 product consists of a powder containing both the (ALPHA)- and (BETA)- forms. While operating in the pressure range of 100 to 1000 atmospheres, the highest yield for Si3N4 was 95%. An important parameter in producing a high yield is the silicon particle size. A silicon powder with an average particle size of 3 (MU)m was used in most of the experiments. The optimum experimental conditions are described for the synthesis of Si3N4. The AlN formed by the combustion of aluminum powders was in the forms of a dense (approx.92%) part. The experimental parameters control whether the combustion reaction goes to completion and the structure of the product. The preliminary results are favorable for the development of a process to produce dense AlN components using the combustion of aluminum powder in nitrogen gas. DOE

N86-29941# Lawrence Livermore National Lab., Calif.
DETECTION OF CHEMICAL VAPOR MIXTURES BY SORPTION ON MULTIPLE PIEZOELECTRIC CRYSTALS
D. U. Olness, T. B. Hirschfeld, K. Kishiyama, I., J. E. Lane, and R. J. Steinhause Nov. 1985 7 p Presented at the Chemical Defense Conference, Aberdeen Proving Ground, Md., 19 Nov. 1985
(Contract W-7405-eng-48)
(DE86-006698; UCRL-93121; CONF-8511140-3) Avail: NTIS HC A02/MF A01

The use of the piezoelectric sorption sensor, in which an analyte's absorption in a thin surface layer on a piezoelectric vibrator changes its resonant frequency, has been extensively described. Chemical selectivity of the device hinges on that of the absorbing layer. An alternative approach uses an array of crystals covered with a number of different absorbing layers. These are so thin that they operate in the saturation mode, with different partition coefficients against air, resulting in different frequency shifts for each layer. The behavior in Fourier space of these frequency shifts is then used for pattern recognition of individual chemicals. Mixture overlap can be handled via time derivative measurements, factor analysis, or correlation spectroscopy. A portable multichannel correlation piezobalance system has been built which has sensitivities well below 1 ug/lt, can be electrically tuned selectively to an arbitrary compound, responds in less than one minute, and can deal with mixed samples via a variety of algorithms. DOE

N86-29942# Council for Mineral Technology, Randburg (South Africa). Analytical Science Div.
DETERMINATION OF RELATIVE SENSITIVITY FACTORS FOR USE IN SPARK-SOURCE MASS SPECTROMETRY
D. C.G. Pearton 1 Feb. 1985 13 p
(DE86-700715; MINTEK-M-188) Avail: NTIS (US SAles Only) HC A02/MF A01

Six synthetic standards were prepared containing various combinations of 40 elements in a matrix of 90 percent silver. These synthetic standards were analyzed by spark-source mass spectrometry, and a large suite of relative sensitivity factors was compiled by use of 22 internal standards. DOE

N86-29943# Brookhaven National Lab., Upton, N. Y.
X-RAY STUDIES OF THE SOLID-ELECTROLYTE INTERFACE
W. E. OGrady Oct. 1985 4 p Presented at the In Situ Characterization in Electrochemical Processes, Denver, Colo., 18 Oct. 1985
(Contract DE-AC02-76CH-00016)
(DE86-003639; BNL-37260; CONF-8510243-1) Avail: NTIS HC A02/MF A01

This report contains an historical discussion of the techniques that have been used to study the composition and structure of the electrolyte/solid interface. Experiments which are presently being undertaken include extended x-ray absorption fine structure (EXAFS) and x-ray absorption near edge structure (XANES). Local electronic and geometric structures as well as long range order in solid-electrolyte interfaces can be determined with x-ray techniques. The influence of the electrode potential on the electronic and geometric structures of the platinum-phosphoric acid interface has already been observed. It now seems certain that the broad application of x-ray techniques to the studies of electrolyte interfaces will lead to an unprecedented growth in the knowledge and understanding of their structures. DOE

N86-29944# Los Alamos National Lab., N. Mex.
HYDROGEN-COMBUSTION ANALYSES OF LARGE-SCALE TESTS
R. G. Gido and A. Koestel 1986 9 p Presented at the Thermal Reactor Safety Meeting, San Diego, Calif., 2 Feb. 1986
(Contract W-7405-eng-36)
(DE86-004722; LA-UR-85-4172; CONF-860204-24) Avail: NTIS HC A02/MF A01

This report uses results of the large-scale tests with turbulence performed by the Electric Power Research Institute at the Nevada Test Site to evaluate hydrogen burn-analysis procedures based on lumped-parameter codes like COMPARE-H2 and associated burn-parameter models. The test results: (1) confirmed, in a general way, the procedures for application to pulsed burning, (2) increased significantly our understanding of the burn phenomenon by demonstrating that continuous burning can occur, and (3) indicated that steam can terminate continuous burning. Future actions recommended include: modification of the code to perform continuous-burn analyses, which is demonstrated; analyses to determine the type of burning (pulsed or continuous) that will exist in nuclear containments and the stable location if the burning is continuous; and changes to the models for estimating burn parameters. DOE

N86-29945# Argonne National Lab., Ill.
ELECTRODE KINETIC MEASUREMENTS OF VERY FAST REACTIONS: METAL DEPOSITION-DISSOLUTION IN MOLTEN HALIDES
Z. Nagy and J. L. Settle 1986 20 p Presented at the International Workshop on High Temperature Molten Salt Batteries, Argonne, Ill., 16 Apr. 1986
(Contract W-31-109-eng-38)
(DE86-006109; CONF-8604116-1) Avail: NTIS HC A02/MF A01

Metal deposition-dissolution reactions in molten salts are very fast and difficult to investigate, as evidenced by large discrepancies in the reported exchange current densities. An error analysis of the d-c relaxation techniques was carried out, and it was determined that the measurement of the exchange current density can have a systematic error if the surface reaction rate is much faster than the diffusion rate. This systematic error will result in measured exchange current densities approximately equal to the largest exchange current density measurable under the given conditions. This sytematic error can also result in fortuitously linear log i0 versus log C and log i0 versus 1/T plots, even when the results are grossly in error. A computer curve-fitting data evaluation coupled with a statistical sensitivity analysis is suggested to avoid these problems. The exchange current densities of iron, nickel and molybdenum were measured in LiCl-KCl eutectic melt at 450(0)C using an improved double pulse galvanostatic technique. Only that of iron could be measured reliably (1.7 +- 0.4 A c m(-2) at 1.3 x 10(-6) mol cm(-3) Fe(++) ion concentration), the nickel reaction is too fast to be measured (at least 5 A cm(-2) at 1 x 10(-6) mol cm(-3)Ni(++) ion concentration). The large discrepancies between these results and some results reported by earlier can be explained on the basis of error analysis. DOE

N86-29946# Sandia National Labs., Albuquerque, N. Mex.
ECUT PULSE COMBUSTION RESEARCH PROGRAM: A MILESTONE REPORT
T. T. Bramlette, ed. Feb. 1986 58 p
(Contract DE-AC04-76DR-00789)
(DE86-007747; SAND-85-8028) Avail: NTIS HC A04/MF A01

Purpose of this document is: (1) to report the technical progress achieved in the pulse combustion research project that is sponsored by the Energy Conversion and Utilization Technologies (ECUT) Program of the Department of Energy, and (2) to make the experimental and theoretical capabilities developed in this project known to a wide audience in order to stimulate collaborative interactions with manufacturers and potential users of pulse combustion equipment. The Sandia pulse combustion facility is

described in detail and the current understanding of the fluid mechanics, combustion, valving dynamics, chemical kinetics, and heat transfer associated with pulse combustion is summarized. The computer models are described and preliminary results discussed. Objectives and current status of the work recently initiated on a Rijke-type pulse combustor that burns liquid fuels are discussed. Finally, the future direction of the program is indicated. DOE

N86-29947# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
COMBUSTION IN IC ENGINES Final Technical Report, 1 Oct. 1980 - 31 Dec. 1985
F. V. Bracco Mar. 1986 14 p
(Contract DE-AC04-81AL-16338)
(DE86-007846; DOE/AL-16338/T2) Avail: NTIS HC A02/MF A01

A major accomplishment of this program has been the development of a state of the art engine combustion research laboratory where advanced laser diagnostic techniques are applied to making space and time resolved measurements of gas velocity, temperature and composition in four transparent-piston transparent-head single-cylinder research engines. In the world, this laboratory is a unique university facility and its use of advanced laser techniques is second only to the Combustion Research Laboratory at Sandia-Livermore. This is a laboratory that is capable of addressing the fundamental questions of engine combustion and of serving as an exceptional educational facility. Another major accomplishment of this research program is its contributions to the development of multi-dimensional engine combustion and engine spray models. These models are well regarded by automotive industries in three continents because their results are painstakingly checked against the detailed measurements made in our laboratory and in a few other places. Our models are now in use at General Motors, Volkswagen, Fiat, Cummins, Komatsu, and Nissan. DOE

N86-29948# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
DISCUSSION OF TURBULENT FLAME STRUCTURE IN PRE-MIXED CHARGES
J. Abraham, F. A. Williams, and F. V. Bracco 1985 16 p Presented at the SAE International Congress and Exhibition, Detroit, Mich., 27 Feb. 1985
(Contract DE-AC04-81AL-16338)
(DE86-008174; CONF-850254-5; SAE-Congr-850345) Avail: NTIS HC A02/MF A01

Propagation of turbulent flames in spark-ignition engines is considered from the viewpoint of the different possible regimes of premixed turbulent combustion. Nondimensional parameters defining known combustion regimes are reviewed, and numerical values of these parameters are estimated for both research and production engines. The reaction-sheet regime is inferred to apply at least for some operating conditions, and therefore literature on turbulent flame propagation in the reaction-sheet regime is reviewed. Implications of these results on interpretations of existing experimental observations of combustion in engine cylinders and on modeling of turbulent flame propagation in engines are discussed. DOE

N86-29949# Los Alamos National Lab., N. Mex.
TRANSPORT COEFFICIENTS FOR CARBON, HYDROGEN, AND THE ORGANIC MIXTURE C2H3
G. Rinker Feb. 1986 40 p
(Contract W-7405-eng-36)
(DE86-008323; LA-10608-MS) Avail: NTIS HC A03/MF A01

Electrical and thermal transport coefficients are calculated for amorphous elemental carbon and hydrogen, using the best available systematic theoretical methods. The density range considered is 10 to the minus 3 power g/cu.cm. less than or equal to rho less than or equal to 10 to the 6 power g/cu.cm. for carbon, and 10 to the minus 4 g/cu.cm. less than or equal to rho less than or equal to 10 to the 5 power g/cu.cm. for hydrogen. The temperature range considered is 10 to the minus 2 eV less than or equal to kT less than or equal to 10 to the 4th power eV. Calculational methods include relativistic partial-wave analysis of the extended Ziman theory, and nonrelativistic plane-wave analysis (Born approximation) of the original Ziman theory. Physical models include relativistic Dirac-Fock-Slater and nonrelativistic Thomas-Fermi-Dirac electron-ion potentials, and one-component-plasma ion-ion structure factors. A mixing algorithm is used to obtain approximate transport coefficients for the atomic ratio C2H3. DOE

N86-29950# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
LASER INDUCED FLUORESCENCE OF FCO RADICALS IN THE GAS PHASE [LASER INDUZIERTE FLUORESZENZ VON FCO-RADIKALEN IN DER GASPHASE]
G. Dornhoefer and W. Hack Sep. 1985 31 p In GERMAN; ENGLISH summary
(MPIS-17/1985; ISSN-0436-1199; ESA-86-96903) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

Laser induced fluorescence (LIF) of FCO in an isothermal flow reactor was studied in the pressure range between 0.5 and 11.2 mbar at room temperature. The FCO-radicals were generated in various chemical systems F+(CO and HFCO) and O+(C2F4, C2F3Cl, and C2F3H). A microwave discharge of COF2Ar and C2O2F2/Ar mixtures produced the FCO. No FCO-radicals are obtained in the IR multiphoton dissociation in COF2/Ar and C2O2F2/Ar mixtures. Excitation spectra were obtained in the wavelength range between 314.5 and 315.5 nm with a spectral resolution of 0.15 1/cm. Exciting at 315.06 nm, an emission spectrum in the range between 314.5 and 410 nm with bands separated by 630 1/cm is observed. The collisionless lifetime of the emitting state is 40 + or - 3 nsec. The chemical evidence indicating whether the FCO is responsible for the observed LIF-emission is discussed. ESA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-29951 British Library Lending Div., Boston Spa (England).
NON-METALLIC INCLUSIONS IN CAST LOW-ALLOY STEEL WITH TITANIUM ADDITIONS
V. I. Machikin, V. A. Kharchenko, and E. F. Dolzhenkova 1985 5 p Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 10, 1985 p 152
(BLL-M-36733-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The influence of titanium on non-metallic inclusions in a low-alloy steel was investigated on 60 kg heats made in an induction furnace and cast into 5 kg ingots. It was found that with over 0.025% titanium its role mainly as a nitride-forming element is enhanced, titanium carbonitrides becoming the major part of the inclusions. Author

N86-29952 British Library Lending Div., Boston Spa (England).
PROPERTIES OF SPRING STEELS HARDENED IN POLYMER-BEARING MEDIUM
V. I. Alimov, V. T. Karbyshev, and O. G. Volkova 1985 4 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 10, 1985 p 153-154
(BLL-M-36734-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A study was made of the microstructure and mechanical properties of heat-treated spring steels 60S2 and 55S2 when a polymer-base coolant is used during hardening instead of petroleum oil. Author

N86-29953 British Library Lending Div., Boston Spa (England).
CONNECTION OF HIGH-TEMPERATURE STRENGTH AND STRUCTURAL STATE OF STEEL 12KhIMF WITH PARAMETERS

OF SIGNALS OF ACOUSTIC EMISSION UNDER TENSION
A. N. Smirnov and N. A. Chelyshev 1985 4 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 10, 1985 p 156-157
(BLL-M-36738-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

An express method for estimation of long-term strength from the parameters of signals of acoustic emission under tension was investigated on heat-resistant pearlitic chromium-molybdenum-vanadium steel 12Kh1MF. A connection was established between the nature of signals of acoustic emission in 12Kh1MF and the structural state of the steel. Author

N86-29954 British Library Lending Div., Boston Spa (England).
CERTAIN RULES GOVERNING DAMPING OF VIBRATIONS IN TWO-PHASE ALLOYS
N. P. Borovkov and V. I. Kucherov 1986 10 p Transl. into ENGLISH from Izvestiya (USSR) p 115-119
(BLL-M-36760-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The damping of vibrations in solids is investigated with special reference to two-phase alloys. A new model is proposed that permits the volume fractions, moduli of elasticity and relaxation times of elements and the frequency of vibrations to be linked to the logarithmic decrement. The model shows that minimal internal friction corresponds to maximal ratio of the moduli of elasticity and the relaxation times of the structural elements. Author

N86-29955 British Library Lending Div., Boston Spa (England).
DEPENDENCE OF BOND STRENGTH OF LAYERS ON ENERGY STATE OF CONTACT SURFACES DURING CLADDING OF BIMETALS
A. G. Kobelev, V. N. Lebedev, and A. M. Baiduganov 1985 4 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 11, 1985 p 134-135
(BLL-M-36769-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

An investigation was made of the influence of the energy state of the contact surfaces on the bond strength of layers of steel-copper bimetals. Author

N86-29956 British Library Lending Div., Boston Spa (England).
POWDER METALLURGY: ACHIEVEMENTS, DETAILS AND PLANS
V. B. Akimenko 1985 16 p Transl. into ENGLISH from Stal. (USSR), no. 12, 1985 p 55-59
(BLL-M-36780-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The history of powder metallurgy in the USSR is reviewed and new powder metallurgy techniques and technologies now being used or planned are discussed. Details of the considerable savings are given. A considerable contribution will be made to the economy. Author

N86-29957 British Library Lending Div., Boston Spa (England).
PROCESS OF STRUCTURE FORMATION OF SINTERED STEEL Kh6V3M
V. K. Narva, N. S. Loshkareva, and V. I. Nevzorov 1985 6 p Transl. into ENGLISH from Stal (USSR), no. 12, 1985 p 59-61
(BLL-M-36781-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A study was made of the density and homogeneity of sintered iron-base material containing differing amounts of alloying elements. X-ray microanalysis and X-ray diffraction analysis were employed to investigate the structure of the sintered compositions and to establish the nature of the diffusion processes taking place during sintering. Author

N86-29958*# Eloret Corp., Sunnyvale, Calif.
STRUCTURAL CHARACTERIZAITON AND GAS REACTIONS OF SMALL METAL PARTICLES BY HIGH-RESOLUTION, IN-SITU TEM AND TED Annual Report, 1 Jan. - 31 Dec. 1984
1984 102 p
(Contract NCC2-283)
(NASA-CR-176905; NAS 1.26:176905) Avail: NTIS
HC A06/MF A01 CSCL 11F

The existing in-situ transmission electron microscopy (TEM) facility was improved by adding a separately pumped mini-specimen chamber. The chamber contains wire-evaporation sources for three metals and a specimen heater for moderate substrate temperatures. A sample introduction device was constructed, installed, and tested, facilitating rapid introduction of a specimen into the mini-chamber while maintaining the background pressure in that chamber in the 10(-9) millibar range. Small particles and clusters of Pd, grown by deposition from the vapor phase in an in-situ TEM facility on amorphous and crystalline support films of alumina and on ultra-thin carbon films, were analyzed by conventional high-resolution TEM and image analysis in terms of detectability, number density, and size distribution. The smallest particles that could be detected and counted contained no more than 6 atoms; size determinations could be made for particles > 1 nm in diameter. The influence of various oxygen plasma treatments, annealing treatments, and of increasing the substrate temperature during deposition was investigated. The TEM technique was employed to demostrate that under otherwise identical conditions the lattice parameter of Pd particles in the 1 to 2 nm size range and supported in random orientation on ex-situ prepared mica films is expanded by some 3% when compared to 5 nm size particles. It is believed that this expansion is neither a small-particle diffraction effect nor due to pseudomorphism, but that it is due to a annealing-induced transformation of the small as-deposited particles with predominantly composite crystal structures into larger particles with true f.c.c. structure and thus inherently smaller lattice parameter. Author

N86-29959*# Eloret Corp., Sunnyvale, Calif.
STRUCTURAL CHARACTERIZATION AND GAS REACTIONS OF SMALL METAL PARTICLES BY HIGH-RESOLUTION TEM AND TED Semiannual Technical Report, 1 Jan. - 30 Jun. 1985
Klaus Heinemann 30 Jun. 1985 49 p
(Contract NCC2-283)
(NASA-CR-176949; NAS 1.26:176949) Avail: NTIS
HC A03/MF A01 CSCL 11F

The interaction of 100 and 200 keV electron beams with amorphous alumina, titania, and aluminum nitride substrates and nanometer-size palladium particulate deposits was investigated for the two extreme cases of (1) large-area electron-beam flash-heating and (2) small-area high-intensity electron-beam irradiation. The former simulates a short-term heating effect with minimum electron irradiation exposure, the latter simulates high-dosage irradiation with minimum heating effect. All alumina and titania samples responded to the flash-heating treatment with significant recrystallization. However, the size, crystal structure, shape, and orientation of the grains depended on the type and thickness of the films and the thickness of the Pd deposit. High-dosage electron irradiation also readily crystallized the alumina substrate films but did not affect the titania films. The alumina recrystallization products were usually either all in the alpha phase, or they were a mixture of small grains in a number of low-temperature phases including gamma, delta, kappa, beta, theta-alumina. Palladium deposits reacted heavily with the alumina substrates during either treatment, but they were very little effected when supported on titania. Both treatments had the same, less prominent localized crystallization effect on aluminum nitride films. M.G.

N86-29960*# Eloret Corp., Sunnyvale, Calif.
THEORETICAL RESEARCH PROGRAM TO STUDY TRANSITION METAL TRIMERS AND EMBEDDED CLUSTERS Semiannual Progress Report
Stephen P. Walch 1985 72 p
(Contract NCC2-296)
(NASA-CR-176948; NAS 1.26:176948) Avail: NTIS
HC A04/MF A01 CSCL 11F

Small transition metal clusters at a high level of approximation i.e. including all the valence electrons in the calculation and also including extensive electron correlation were studied. Perhaps the

most useful end result of these studies is the qualitative information about the electronic structure of these small metal clusters, including the nature of the bonding. The electronic structure studies of the small clusters are directly applicable to problems in catalysis. From comparison of dimers, trimers and possibly higher clusters, it is possible to extrapolate the information obtained to provide insights into the electronic structure of bulk transition metals and their interaction with other atoms and molecules at both surface and interior locations. Author

N86-29961*# National Aeronautics and Space Administration, Washington, D.C.
THERMAL SMOOTHING OF ROUGH SURFACES IN VACUO
Georg Wahl May 1986 14 p Transl. into ENGLISH from Forschung im Ingenieurwesen (West Germany), v. 37, no. 4, 1971 p 119-122 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88425; NAS 1.15:88425) Avail: NTIS HC A02/MF A01 CSCL 11F

The derivation of equations governing the smoothing of rough surfaces, based on Mullins' (1957, 1960, and 1963) theories of thermal grooving and of capillarity-governed solid surface morphology is presented. As an example, the smoothing of a one-dimensional sine-shaped surface is discussed. Author

N86-29962*# National Aeronautics and Space Administration, Washington, D.C.
OUTGASSING MEASUREMENT OF THE ALUMINUM ALLOY UHV CHAMBER
M. Miyamoto, T. Itoh, S. Komaki, K. Narushima, and H. Ishimaru Mar. 1986 10 p Transl. into ENGLISH of conference paper presented at the 8th Symposium on ISIAT, Japan, 1984 p 87-90; sponsored by the National Laboratory for High Energy Physics Symposium held in Ibaraki, Japan, 16 Oct. 1984 Submitted for publication Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88433; NAS 1.15:88433) Avail: NTIS HC A02/MF A01 CSCL 11F

A large vacuum chamber (580 mm diameter) was fabricated from an aluminum alloy surface treated by a special process normally used on small chambers. The chamber was tested unbaked and baked at various temperatures, pressures, and holding periods. The chamber was filled with N2 gas, and the outgassing rate was measured after one hour. Then the ultimate pressure was measured. Outgassing rates for baked and unbaked groups were compared. It is concluded that the same surface treatment technique can be used on both large and small chambers produced by the same special extrusion process. Author

N86-29963# Naval Postgraduate School, Monterey, Calif.
MICROSTRUCTURAL FORMATION AND EFFECTS ON THE PERFORMANCE OF PLATINUM MODIFIED ALUMINIDE COATINGS Final Report, 1981 - 1985
P. Deb and D. H. Boone Nov. 1985 66 p
(AD-A166166; NPS69-85-008) Avail: NTIS HC A04/MF A01 CSCL 11/3

The use of noble metal modified aluminide coatings has gained renewed interest as the requirements of improved protectivity for gas turbine engine components has increased. Increasing temperature, severity of operating environment and required lifetime extension are cited as reasons for their selection. While the literature documents examples of significant improvements in hot corrosion resistance at low (800 C) and high (800 C) temperatures and in cyclic oxidation with Pt additions, there are also examples of limited improvements and even detrimental effects. These controversies have been preliminarily ascribed to the considerable differences in microstructural features possible in these systems and to the variation in test procedures between laboratories, and between rigs and engines. A systematic study was therefore initiated to identify the microstructural variations obtained for platinum-modified aluminide coatings on IN738 and to develop a fundamental understanding of their mechanism of formation. In this final report, the several classical structural types are defined together with the beginnings of their formation understanding. These microstructures were then subjects to a series of tests under conditions including hot corrosion at 700 and 900 C, and cyclic oxidation. In addition, measurements of mechanical properties such as DBTT were performed. It was found tha platinum addition to a standard aluminate is beneficial at 900 C, so far as hot corrosion attack is concerned. GRA

N86-29964# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SOME TENTATIVE IDEAS ON DEVELOPING OUR LOW-ALLOY AND ALLOY STEEL
Chuandian Zhou 14 Mar. 1986 25 p Transl. into ENGLISH from Gangtie (China), no. 7, 1983 p 1-8
(AD-A166269; FTD-ID(RS)T-0929-85) Avail: NTIS HC A02/MF A01 CSCL 11/6

The decision that every effort will be made to develop low-alloy and alloy steel made by the State Council has great strategic significance; it shows that our steel industry is shifting its emphasis to quality control and increasing economic profits, especially benefiting society. Compared with ordinary carbon steel, low-alloy and alloy steel are qualitatively better and economically more profitable. GRA

N86-29965# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE DEVELOPMENT OF ALADIN (ALUMINUM ALLOY DESIGN INVENTOR), AN EXPERT SYSTEM FOR ALUMINUM ALLOY DESIGN Interim Report
Martha L. Farinacci, Mark S. Fox, Ingemar Hulthage, and Michael D. Rychener Jan. 1986 19 p
(AD-A166278; CMU-RI-TR-86-5) Avail: NTIS HC A02/MF A01 CSCL 11/6

ALADIN is an expert system that aids metallurgists in the design of new aluminum alloys. The project began in January 1984, and two major iterations of the system design have been completed. The current system is a hybrid of several approaches and artificial intelligence techniques. Declarative representations are used for metallurgical data and concepts. The basic design procedure is rule-based, with the potential for flexible control and participation by the user. The system is based on the hypothesize-and-test model, and a constraint-based search is used to find alternative designs. Strategies are included for resolving the interactions and trade-offs among conflicting property targets. Metallurgical relationships cover a broad range of symbolic and numerical types of reasoning, which are integrated in the system. In this article, an overview of the project is given, including discussions of knowledge acquisition techniques, design decisions and implementation. GRA

N86-29966# Michigan State Univ., East Lansing. Dept. of Metallurgy Mechanics and Materials Sciences.
INHIBITING CORROSION CRACKING: CRACK TIP CHEMISTRY AND PHYSICS Final Report, 1 Apr. 1984 - 14 Mar. 1986
Robert Summitt 14 Mar. 1986 36 p
(Contract N00014-84-K-0419)
(AD-A166317) Avail: NTIS HC A03/MF A01 CSCL 11/6

Aqueous metallic corrosion is a complex process involving a variety of individual steps in the overall mechanism for a given alloy. The problems of pitting corrosion, crevice corrosion, stress corrosion cracking (SCC), and corrosion fatigue (CF) are, to say the least, significantly more complex. If the discussion is extended further to include the action of substances which either accelerate or inhibit these processes, the complexity of the problems is increased further by orders of magnitude. The subject of the research program discussed in this report is an experimental exploration of the relations between accelerant/inhibitor properties and the electrochemistry and electrokinetics of corrosion, SCC, and CF in aluminum alloys. Experimental microtechniques are used to determine physical and chemical conditions at a corrosion crack tip while the bulk exterior environment is modified by the presence of corrosion accelerants or inhibitors. The chemistry of the

nitrogen-system inhibitors is being explored systematically to identify accelerant/inhibitor characteristics which are effective in determining corrosion crack growth rates, thereby leading to practical inhibitor formulations. GRA

N86-29967# Naval Research Lab., Washington, D. C.
A LITERATURE REVIEW ON THE INFLUENCE OF SMALL-AMPLITUDE CYCLIC LOADING ON STRESS-CORROSION CRACKING IN ALLOYS
T. W. Crooker and J. A. Hauser, II 3 Apr. 1986 20 p
(AD-A166403; AD-E950826; NRL-MR-5763) Avail: NTIS HC A02/MF A01 CSCL 11/6

Stress-corrosion cracking (SCC) is a cracking process caused by the conjoint action of stress and a corrodent. Traditionally, the stress that causes SCC has been regarded as a sustained tensile stress. When corrosion-assisted cracking is caused by cyclic stress, the problem is termed corrosion fatigue. Thus, test methods for SCC rely upon static (or quasi-static) tensile loading. However, in recent years researchers have developed new information showing that, at least in certain instances, small-amplitude cyclic loading superimposed on high tensile loads (ripple-loading) can have a significant influence on SCC behavior. The trend revealed is that ripple-loading reduces the apparent SCC stress or stress-intensity threshold and accelerates time-to-failure for stresses or stress-intensities above threshold levels. The implication of these findings is that traditional static tests for SCC may, in fact, be non-conservative. The mechanism of ripple-load cracking is thought to involve film rupture at active SCC sites. The recent literature on ripple-loading has been identified and reviewed . Several notable examples have been cited and discussed. Directions for further study are delineated. Author (GRA)

N86-29968# California Univ., Berkeley. Dept. of Materials Science and Engineering.
FATIGUE BEHAVIOR OF LONG AND SHORT CRACKS IN WROUGHT AND POWDER ALUMINUM ALLOYS Research Progress and Forecast Report, 15 Apr. - 15 Nov. 1985
Robert O. Ritchie 15 Nov. 1985 4 p
(Grant AF-AFOSR-0181-82)
(AD-A166466; AFOSR-86-0088TR) Avail: NTIS HC A02/MF A01 CSCL 11/6

The fatigue behavior of short cracks, which are small compared to the scale of the microstructure, small compared to the scale of local plasticity or simply physically small (i.e., approx. 1 mm), must be considered as one of the major factors limiting the application of defect-tolerant fatigue design for airframe and engine components. Accordingly, the current program is aimed at identifying factors which govern the growth of such short cracks (in contrast to long cracks) in a series of commercial aluminum alloys, with specific reference to behavior at near-threshold levels (below approx. 0.100000 mm/cycle). A summary of the research performed during the past six months is described, together with a review of future work. GRA

N86-29969# Knolls Atomic Power Lab., Schenectady, N. Y.
MECHANISM OF STRESS-CORROSION CRACKING OF ALLOY X-750 IN HIGH PURITY WATER
C. A. Grove and L. D. Petzold Nov. 1985 40 p Presented at the ASM International Conference on Corrosion of Nickel Base Alloys, Cincinnati, Ohio, 2-3 Oct. 1984
(Contract DE-AC12-76SN-00052)
(DE86-006361; KAPL-4186; CONF-8410208-3) Avail: NTIS HC A03/MF A01

The high strength Ni-base Alloy X-750 is susceptible to stress-corrosion cracking (SCC) in high purity, deaerated water. Crack initiation occurs at high temperatures (>400 F). Crack propagation occurs in both high-temperature and low-temperature (<300 F) water. High-temperature crack growth rates are on the order of mils/day. Low-temperature cracking is extremely rapid (approx.100 in./day). Three heat treatments of Alloy X-750 are investigated: (1) Stress Equalized - 1625 F/24 hr + 1300 F/20 hr, (2) Direct Aged - 1300 F/24 hr, and (3) Solution Annealed and Direct Aged - 2000 F/1 hr + 1300 F/20 hr. Stress-equalized Alloy X-750 is most susceptible to SCC; solution-annealed and direct-aged Alloy X-750 is least susceptible. A Hydrogen Embrittlement Model of SCC is developed that predicts SCC performance on the basis of grain boundary chemistry and grain boundary carbides. Phosphorus segregates to the grain boundary in concentrations of up to approx.100 times the bulk concentration during processing and heat treatment. Phosphorus at the grain boundaries increases susceptibility to high- and low-temperature SCC. The presence of M23C6-type carbides and/or the absence of MC-type carbides at the grain boundaries improves SCC performance in high-temperature water. DOE

N86-29970# Argonne National Lab., Ill.
PRODUCTION AND PROPERTIES OF METALLIC SUPERLATTICES
I. K. Schuller Oct. 1985 5 p Presented at the National Congress of the French Physical Society, Nice, France, 9 Sep. 1985
(Contract W-31-109-eng-38)
(DE86-003058; CONF-8509237-1) Avail: NTIS HC A02/MF A01

Considerable interest has been generated by the recent observation of large anomalies in the elastic, magnetic, superconducting, and structural properties of metallic superlattices. This paper summarizes part of our work on the preparation, characterization, and physical properties (mostly superconductivity) of metallic superlattices of combinations that do not form solid solutions in their equilibrium binary phase diagrams. Metallic superlattices with accurate control over their structure can be prepared using sputtering and molecular beam epitaxy (MBE) techniques. The magnetic, elastic and superconducting properties show unusual behavior which can be controlled by changing preparation conditions. DOE

N86-29971# State Univ. of New York, Stony Brook.
THEORETICAL STUDIES OF CHEMISORPTION ON COPPER NICKEL ALLOYS AND SURFACE EMBRITTLEMENT Progress Report, 15 Jun. 1985 - 14 Jun. 1986
J. L. Whitten 15 Feb. 1986 8 p
(Contract DE-FG02-84ER-45100)
(DE86-007034; DOE/ER-45100/2) Avail: NTIS HC A02/MF A01

The current research is part of a theoretical program to study the structure and energetics of molecules adsorbed on solid surfaces, with emphasis on transition metal substrates. During the past year, the research effort can be divided into several categories: application of the embedding theory to nickel and titanium systems, further development of the theoretical techniques including some very promising recent work on simplifications, and several miscellaneous treatments of molecular excited states. DOE

N86-29972# Sandia National Labs., Albuquerque, N. Mex.
SOLIDIFICATION DYNAMICS AND MICROSTRUCTURE OF METALS IN PULSED LASER IRRADIATION
P. S. Peercy 1985 40 p Presented at the NATO Advanced Study Inst. on Laser Surface Treatment of Metals, San Miniato, Italy, 2 Sep. 1985
(Contract DE-AC04-76DP-00789)
(DE86-002169; SAND-85-1350C; CONF-8509150-3) Avail: NTIS HC A03/MF A01

There is an important and growing technology in laser processing of metals. The more well-developed aspects of this technology include applications such as cutting, maching, welding, surface hardening, surface alloying, etc. These applications use primarily high power cw lasers. In contrast, the technology for pulsed laser - metal interactions for laser pulse widths in the nanosecond, or shorter, time regime is not as well-developed; however, studies in this time regime are providing important insight into the processes that control metastable and amorphous phase formation of importance for certain applications. Selected activities in this area are reviewed in this paper with emphasis on al-based alloys. When appropriate, system produced by pulsed surface melting are compared to related systems produced by ion implantation. DOE

N86-29973# Wisconsin Univ., Madison.
NUCLEATION OF ALLOTROPIC PHASES DURING PULSED LASER ANNEALING OF MANGANESE
J. H. Perepezko, D. M. Follstaedt, and P. S. Peercy 1985 7 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-004584; SAND-85-1292C; CONF-851217-44) Avail: NTIS HC A02/MF A01

Manganese has four allotropes with an equilibrium melting point of the high temperaure delta-phase at 1517 K and calculated metastable melting points for the (GAMMA), (BETA), and (ALPHA) phases at 1501, 1481, and 1395 K, respectively. Our observations for Mn irradiated with a pulsed laser and supporting estimates of maximum allotropic transition rates indicate that transformations between allotropes are suppressed during heating with approximately 25 ns laser pulses, as well as during subsequent cooling. Upon pulsed heating of (ALPHA)-Mn to the melt threshold, the melt is undercooled 122 K below the delta-Mn melting point. For incident laser pulse energy densities near the melting threshold, resolidification involves regrowth of (ALPHA)-Mn from the substrate. At energy densities well above the threshold, the (GAMMA)-Mn phase forms by separate nucleation and growth from the undercooled melt, and is retained upon rapid solidification. We conclude that significant melt undercooling, which may exceed 100 K, can occur during pulsed laser melting of metallic crystals and that the resulting crystalline structure is determined by both thermodynamics and nucleation kinetics. DOE

N86-29974# Pacific Northwest Lab., Richland, Wash.
THEORY OF AMORPHIZATION KINETICS IN INTERMETALLICS
E. P. Simonen Oct. 1985 21 p Presented at the ASM Metals Congress/TMS-AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-004858; PNL-SA-13169; CONF-8510160-13) Avail: NTIS HC A02/MF A01

An examination of amorphization kinetics in intermetallic alloys indicated that both a model based on cascade-induced point defects and a model based on a uniform production of point defects rationalized observed amorphization kinetics in ion irradiated NiTi. The dose dependencies of average defect concentrations were calculated and the fluctuations in concentration were simulated using a Monte Carlo technique. Assumed low interstitial mobilities and high sink strengths promoted amorphization. Faster interstitial mobilities caused shorter lifetime for cascades and lesser accumulation of cascade damage. Assuming uniform production of point defects, the predicted dose exponent for amorphization increased with increasing critical defect concentration and increasing critical cluster size. DOE

N86-29975# Kuo and Associates, McLean, Va.
MICROALLOYED NICKEL-3/ALUMINUM, A NEW MEDIUM TEMPERATURE ALLOY
1986 5 p
(Contract DE-AC01-85ER-30078)
(DE86-006227; DOE/ER-30078/T1) Avail: NTIS HC A02/MF A01

ORNL conducted a research project in 1981, sponsored as part of the DOE Seed Money Program, to create microalloys of nickel-3/aluminum and study their properties. The response of industry has included inquiries from more than 20 firms expressing interest in obtaining licensing rights for the ORNL developed microalloy of nickel-3/aluminum. ORNL has recently signed a license agreement with the Cummins Engine Company for an exclusive license to use the alloy in heavy duty diesel engine parts. Information has been provided to virtually every major supplier of nickel-based materials, specialty steel, heat exchanger tubes, producers of aircraft engines, major tool and diemakers, and manufacturers of fasteners and molds. Nickel-3/aluminum microalloys are expected to gradually be used in many medium temperature applications (diesel engines, turbochargers, gas turbines, welded tubing, fasteners, castings, etc.). DOE

N86-29976# California Univ., Berkeley. Lawrence Berkeley Lab.
CRYOGENIC MECHANICAL PROPERTIES OF Al-Cu-Li-Zr ALLOY 2090
J. Glazer, S. L. Verzasconi, E. N.C. Dalder, W. Yu, R. A. Emigh, R. O. Ritchie, and J. W. Morris, Jr. Aug. 1985 17 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985 Prepared in cooperation with Lawrence Livermore National Lab., CA.
(Contract DE-AC03-76SF-00098)
(DE86-006285; LBL-19232; CONF-850814-36) Avail: NTIS HC A02/MF A01

The mechanical properties of aluminum-lithium alloy 2090- T8E41 were evaluated at 298(0)K, 77(0)K, and 4(0)K. Previously reported tensile and fracture toughness properties at room temperature were confirmed. This alloy exhibits substantially improved properties at cryogenic temperatures; the strength, elongation, fracture toughness and fatigue crack growth resistance all improve simultaneously as the testing temperature decreases. This alloy has cryogenic properties superior to those of aluminum alloys currently used for cryogenic applications. DOE

N86-29977# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
COMPUTER SIMULATIONS OF THE STRUCTURE AND PROPERTIES OF GRAIN BOUNDARY DISLOCATIONS
P. D. Bristowe Oct. 1985 12 p
(Contract DE-FG02-84ER-45116)
(DE86-007005; DOE/ER-45116/10) Avail: NTIS HC A02/MF A01

The core structure of intrinsic grain boundary dislocations embedded in twist grain boundaries has been modelled using conventional atomistic techniques and a variety of empirical and pseudo-potentials representing fcc metals. In particular the width of the dislocation core region in the boundary plane has been studied as a function of the periodicity of the boundary (SIGMA) and interatomic potential. Generally, the core width increases with increasing (SIGMA) and is wider than that of lattice dislocations. Also the core width of twist grain boundary dislocations can be wider than that of tilt grain boundary dislocations. The presence of resolvable cusps on the computed energy/misorientation curve is related to the degree of core localization and the formation of domains of relatively low energy structure. The results are compared to transmission electron microscope observations, previous calculations, and the structural unit/grain boundary dislocation model. DOE

N86-29978# Lehigh Univ., Bethlehem, Pa. Dept. of Mechanical Engineering and Mechanics.
INVESTIGATIONS OF CREEP CAVITATION IN TYPE 304 STAINLESS STEEL Progress Report, 7 Jan. 1985 - 6 Jan. 1986
T. J. Delph, R. J. Fields, and D. G. Harlow 1986 140 p
(Contract DE-FG02-84ER-45088)
(DE86-007187; DOE/ER-45088/2) Avail: NTIS HC A07/MF A01

The focus of the investigation is upon creep cavitation in metals with particular emphasis upon AISI type 304 stainless steel. The investigation consists of both experimental and analytical phases. Work in the experimental phase of the investigation is concentrated upon image analyzing computer measurements of cavitation under conditions of uniaxial and multiaxial stress. The analytical portion of the investigation involved two efforts: the first of these is the development of a nonlinear finite element code which will allow the prediction of the time-varying stress and deformation fields in specimens with complex biaxial states of stress. The second effort, which is now essentially complete, involves the micromechanical modeling of probabilistic effects in creep cavitation. DOE

N86-29979# Knolls Atomic Power Lab., Schenectady, N. Y.
MICROSTRUCTURE EFFECTS ON ION AND ELECTRON TRANS-

PORT PARAMETERS DURING PASSIVE CORROSION OF ZIRCALOY
P. Baldasaro Feb. 1986 31 p
(Contract DE-AC12-76SN-00052)
(DE86-007189; KAPL-4188) Avail: NTIS HC A03/MF A01

Analytical models have been developed and numerical predictions have been made to quantify the effect of zirconia microstructure (grain boundary and microcrack network) on ion and electron transport parameters. Analytical predictions are shown to agree with the available data, supporting a large microstructure effect on ion diffusion and a small effect on electron mobility. Results of this analysis have been interpreted in terms of the zircaloy corrosion process to conclude: (1) the transition process predominantly affects ion transport resistance and has relatively little effect on electron transport and (2) medium penetration into the zirconia film during transition is not necessary to initiate loss of corrosion protection. DOE

N86-29980# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
PHASE TRANSFORMATIONS IN NICKEL-ALUMINUM ALLOYS DURING ION BEAM MIXING
J. Eridon, L. Rehn, and G. Was Jan. 1986 8 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-007519; CONF-851217-55) Avail: NTIS HC A02/MF A01

The effect of ion beam mixing of nickel-aluminum alloys with 500 keV krypton ions has been investigated over a range of temperature, composition, ion dose, and post-irradiation thermal treatments. Samples were formed by alternate evaporation of layers of aluminum and nickel. A portion of these samples was subsequently annealed to form intermetallic compounds. Irradiations were performed at both room temperature and 80K using the 2MV ion accelerator at Argonne National Laboratory. Phase transformations were observed during both in situ irradiations in the High Voltage Electron Microscope (HVEM) at Argonne, and also in subsequent analysis of an array of irradiated samples. Electron diffraction indicates the presence of metastable crystalline structures not present in the conventional nickel-aluminum phase diagram. Transformations occur at doses as low as 5 x 10(14) cm(-2) and continue to develop as the irradiation progresses up to 2 x 10(16) cm(-2). Layer mixing is followed through Rutherford Backscattering analysis. Samples are also checked with x-rays and Electron Energy Loss Spec troscopy (EELS). A thermodynamic argument is presented to explain the phase transformations in terms of movements on a free energy diagram. This analysis explains the interesting paradox concerning the radiation hardness of the NiAl phase and the amorphous structure of mixed Ni-50% Al layers. DOE

N86-29981# Idaho National Engineering Lab., Idaho Falls.
USE OF MINIATURIZED TESTS TO PREDICT FLOW PROPERTIES AND ESTIMATE FRACTURE TOUGHNESS IN DEFORMED STEEL PLATES
F. M. Haggag, W. L. Server G. E. Lucas, and G. R. Odette 1985 20 p Presented at the International Conference and Exhibition on Fatigue, Corrosion Cracking, Fracture Mechanic and Failure Analysis, Salt Lake City, Utah, 2 Dec. 1985 Prepared in cooperation with California Univ., Santa Barbara.
(Contract DE-AC07-76ID-01570)
(DE86-007644; EGG-M-05285; CONF-851203-4) Avail: NTIS HC A02/MF A01

Prediction of instability in a structure requires knowledge of the mechanical properties of the materials involved. In the case of serious accidents, such as derailments of railroad tank cars carrying hazardous materials, prediction of instability in damaged components is difficult due to insufficient knowledge of: the deformed material fracture toughness, the cracks induced by the accident, and the stress state in the damaged region. This paper evaluates the fracture toughness problem. Miniaturized shear punch tests on virgin, strained, and deformed steel plates (typical of railroad tank car construction) were conducted over a wide range of test temperatures. These data were compared with tensile measurements on identical materials. The use of these data coupled with micro-mechanical models of fracture allows estimation of the deformed material fracture toughness. Comparisons of the predicted fracture toughness with actual measurements are made. DOE

N86-29982# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
LOCAL DENSITY THEORY OF HEATS OF FORMATION AND SHORT-RANGE ORDER PARAMETERS IN SUBSTITUTIONALLY DISORDERED ALLOYS Progress Report
A. J. Freeman and A. Gonis 1986 6 p
(Contract DE-FG02-84ER-45080)
(DE86-007979; DOE/ER-45080/T2) Avail: NTIS HC A02/MF A01

Purpose of this project is the study and the calculation of polyatomic interactions in substitutionally disordered alloys, with the ultimate goal the calculation of alloy phase diagrams from first principles. Of particular importance in these calculations are the heats of formation, (DELTA)H, of substitutionally disordered alloys, the short-range-order (SRO) parameters, P/sub ij//sup (ALPHA)(BETA)/, giving the probability of obtaining simultaneously a configuration consisting of atoms of type (ALPHA) and (BETA) on sites i and j, respectively, and the polyatomic interactions, i.e., irreducible energy contributions associated with configurations consisting of atoms of types (ALPHA),(BETA),...(GAMMA), at sites, i,j...k, respectively. DOE

N86-29983# Pacific Northwest Lab., Richland, Wash.
MICROSTRUCTURE, MICROCHEMISTRY, AND MICRODEFORMATION OF ALLOY 600 TUBING Final Report
S. M. Bruemmer, L. A. Charlot, and C. H. Henager, Jr. Feb. 1986 55 p
(Contract DE-AC06-76RL-01830)
(DE86-007947; EPRI-NP-4465) Avail: NTIS (US Sales Only) HC A04/MF A01

Using microanalytic techniques, scientists have found grain-boundary carbides to be the source of dislocations during deformation of alloy 600 tubing. The higher density of grain-boundary carbides in thermally treated tubing compared with mill-annealed tubing appears to have a controlling effect on intergranular stress corrosion cracking (IGSCC) in primary water. DOE

N85-29984# Paris-Sud Univ., Orsay (France). Lab. de Physique des Gaz et des Plasmas.
PLASMA NITRIDING OF METALLIC SURFACES [NITRURATION PAR PLASMA DE SURFACE METALLIQUES]
J. L. Marchand, H. Michel, and A. Ricard Nov. 1985 20 p In FRENCH
(LP-211; ESA-86-97186) Avail: NTIS HC A02/MF A01

The length of the electric discharge was studied in nitriding using an H2/N2 gas mixture at a given flow and adjustable voltage and intensity of the electric discharge. The electrical variables were chosen to keep the specimen temperature at 550 C. The vibrational energy distribution observed in the N2 spectrum is given. An increased concentration of the first level population is found in the case of a longer discharge. The finding is well correlated with the specimen analysis. The X-ray diffraction shows a clear increase of nitriding for the longer discharge. ESA

N86-29985# Kernforschungsanlage, Juelich (West Germany). Zentralinst. fuer Angewandte Mathematik.
THE CALCULATION OF HYDROGEN DIFFUSION THROUGH METAL MEMBRANES
M. Profant, R. vonSeggern, P. Wienhold, and E. Horlitz Dec. 1985 57 p In GERMAN; ENGLISH summary
(JUEL-2029; ISSN-0366-0885; ESA-86-97424) Avail: NTIS HC A04/MF A01

The computer program PERM was developed to calculate the solution of the one-dimensional diffusion equation with quadratic boundary conditions. The knowledge of this function is important

for the estimation of the hydrogen content and the tritium inventory of fusion devices. The diffusion equation was transformed into a dimensionless form for numerical treatment. The transformed wall thickness L which is identical to the permeation number is the only physical parameter of the problem. The common difference methods fail at the beginning of the computation because of the large range of L (between 10 to the minus 5th power and 10 billion) and the incompatibility of the boundary conditions with the initial condition. A variant of the boundary integral method was derived using the Laplace transformation. By this method the solution of the diffusion equation can be calculated with selected accuracy in the whole range of the parameter L. The main difficulties in implementing this method are due to the discretization of convolution integrals over space and time which contain Jacobi's Theta function. ESA

N86-29986# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.
CORROSION OF VANADIUM AND THE ALLOY V 3Ti 1Si IN FLOWING LITHIUM Thesis - Karlsruhe Univ., West Germany
J. Konys Jan. 1986 221 p In GERMAN; ENGLISH summary
(KfK-4006; ESA-86-97425) Avail: NTIS HC A10/MF A01

The corrosion behavior of V3Ti 1Si in flowing lithium was studied in a pumped lithium loop fabricated from a titanium-stabilized type 316 steel. Pure vanadium was used as a reference material. At temperatures of 823K, experiments were performed without any problems over a duration of more than 7500 hr. The influence of a magnetic traps incorporated just before the flowmeter to avoid the precipitation of magnetic particles was investigated; it reduces significantly the weight loss of V in the alloy, probably due to the reduction of the nitrogen content of Li. The corrosion rate of V is 14 microm/year, independently of the N-content of Li. The corrosion rate of V 3Ti 1Si is as low as 4 microm/year depending on the N-concentration of Li. Both V and V3 Ti 1Si pickup more N than C from Li; pure V twice as much N than the alloy. Nitrogen diffuses into the bulk of both materials, while C is bound near the surface; the hardening at the surface is due to the imbedded N. The vanadium-carbon nitride and the vanadium-titanium nitride-layers, respectively have a strong effect on the weight loss and the uptake to nonmetals. The results show that the dissolution due to V-loss does not affect alloy lifetime. nd the uptake to nonmetals. The results show that the dissolution due to V-loss does not affect alloy lifetime. ESA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-29987 British Library Lending Div., Boston Spa (England).
INCREASE OF LIFE OF THREADED JOINTS OF TUBE COUPLINGS IN OIL PIPELINE RANGE THROUGH USE OF ANTICORROSION COATINGS
M. A. Losukarev, I. A. Filippova, L. L. Belikova, I. A. Sukhomlin, A. V. Mombelli, and A. S. Koshevoi 1985 6 p Transl. into ENGLISH from Iz. (USSR), no. 10, 1985 p 86-88
(BLL-M-36718-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The zinc phosphate and manganese phosphate solutions suggested by the authors bestow a high protective capacity on the resultant films, which enables them to be used effectively for protection of the threaded joints of tubes in the oil-extraction range. Agitating the solutions during phosphating considerably enhances the anticorrosion properties of the resultant phosphate films. Author

N86-29988*# National Aeronautics and Space Administration, Washington, D.C.
RELATION BETWEEN MICROSTRUCTURAL HETEROGENEOUS SURFACE LAYER AND NITROGEN PRESSURE DURING SINTERING IN SI3N4-VgO-AI2O3 CERAMICS
K. Hayashi and Y. Onomura Apr. 1986 18 p Transl. into ENGLISH from Journal of the Japan Society of Powder and Powder Metallurgy (Japan), v. 32, no. 5, Jul. 1985 p 200-204 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88409; NAS 1.15:88409) Avail: NTIS HC A02/MF A01 CSCL 11B

The effects of N2 pressure (0.1 to 50 MPa) during sintering on the thickness of the microstructurally heterogeneous layer (MHL) formed near the surface of the compact, transverse-rupture strength, were investigated for Si3N4-(10 to 20) mol % MgO-5.5 mol % Al2O3 ceramics. The sintering temperature and time were 1973 K and 3.6 ks, respectively. The N2 gas was introduced into the furnace at about 1273 K. When the compacts were sintered under a certain N2 pressure, for example, about 20 and 7 MPa for 10 and 15 mol% MgO, respectively, the evolutions of N and Si were suppressed. The thickness of the MHL became very small and at the same time the strength of the surface layer of the compact (which was normally less than that of the inside in the case of 0.1 MPa) became nearly the same value as that of the inside. At higher pressure, the strength of both surface layer and the inside decreased considerably. Some discussion was made on these results. Author

N86-29989*# Boeing Aerospace Co., Seattle, Wash.
DEVELOPMENT OF COMPOSITE TUBE PROTECTIVE COATINGS Final Report
H. Dursch and C. Hendricks Jul. 1986 109 p
(Contract NAS1-16854)
(NASA-CR-178116; NAS 1.26:178116; D180-29767-1) Avail: NTIS HC A06/MF A01 CSCL 11G

Protective coatings for graphite/epoxy (Gr/Ep) tubular structures proposed for the Space Station are evaluated. The program was divided into four parts; System Definition, Coating Concept Selection and Evaluation, Scale-up and Assembly, and Reporting. System Definition involved defining the structural and environmental properties required of the Gr/Ep tubes. The prepreg and ply sequence selected was a P75S/934 (O2, + or - 20, O2)sub s layup which meets the various structural requirements of the Space Station. Coating Concept and Selection comprised the main emphasis of the effort. Concepts for protectively coating the Gr/Ep tubes included the use of metal foil and electroplating. The program results demonstrated that both phosphoric and chromic acid anodized Al foil provided adequate adhesion to the Gr/Ep tubes and stability of optical properties when subjected to atomic oxygen and thermal cycling representative of the LEO environment. SiO2/Al coatings sputtered onto Al foils also resulted in an excellent protective coating. The electroplated Ni possessed unacceptable adhesion loss to the Gr/Ep tubes during atomic oxygen testing. Scale-Up and Assembly involved fabricating and wrapping 8-ft-long by 2-in-diameter Gr/EP tubes with chromic acid anodized foil and delivering these tubes, along with representative Space Station erectable end fittings, to NASA LaRC. Author

N86-29990# University of Southern California, Los Angeles.
CHEMISTRY OF NEW SILICON CONTAINING POLYMERS TRIPLY BONDED SILICON INTERMEDIATES Final Report, 31 Aug. 1982 - 31 Oct. 1985
William P. Weber Dec. 1985 11 p
(Grant AF-AFOSR-0333-82)
(AD-A166085; AFOSR-86-0131TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

A method to generate (O=Si=O) in the gas phase by flash vacuum pyrolysis (FVP) of 2,3:4,7 diepoxy 5-silaspiro (4.4) nonane was developed. Reactive pi-bonded silicon nitrogen double bonds intermediates were generated by FVP of dimethoxymethylsilyl-bis (trimethylsilyl) amine. Photolysis of dodecamethylcyclohexasilane yields both dimethylsilylene and methylsilene. The oxidation of dimethylsilylene with sulfoxides yields silanones. Sterically bindered T-butyldimethyl-silaned permits control in the silyl hydroformylation reaction. GRA

N86-29991# Pennsylvania Univ., Philadelphia. Center for Chemical Electronics.
SPIN-COATED AMORPHOUS CHALCOGENIDE RESISTS SPIN-COATED AMORPHOUS CHALCOGENIDE GLASSES Final Report, 29 Jul. 1981 - 29 Nov. 1984
I. Lauks, S. Rabii, J. J. Santiago, and J. N. Zemel 24 Dec. 1985 73 p
(Grants AF-AFOSR-0320-84; AF-AFOSR-0201-81)
(AD-A166270; AFOSR-86-0079TR) Avail: NTIS HC A04/MF A01 CSCL 09/1

Amorphous films of several chalcogenides were spin-cast from solutions prepared by dissolving the starting material in organic solvents. As-deposited materials were identified as amine and amide salts. A mechanism was proposed for the dissolution of arsenic trisulfide in the organic solvent as maromolecular clusters. Thermal annealing to 200 C of arsenic trisulfide solution-cast material showed decomposition of the organic salt about 90 C followed by cross-linking of arsenic sulfide clusters above 130 C. Technologically utile, quality thin films were obtained with spin deposited arsenic trisulfides. Pattern replication using ultra-violet photodoping by silver was demonstrated and a scheme for high resolution lithography was proposed. The 0.4 micrometer wide patterns over 1 micrometer topography were replicated without dimensional loss. Multilayer films of up to 4.5 micrometers were obtained for optical measurements by several consecutive spinning-baking sequence, without reduction in flatness. The mean value of the index of refraction and optical band gap were 2.227 + or - 0.055 and 2.273 + or - 0.024 eV respectively. Electronic structure of As4S4 and As4Se4 molecules were calculated and the resulting molecular band gaps were consistent with the measure value for the corresponding glasses. The calculated density-of-valence-states for the molecules were of very good agreement with valence band XPS measurement on the solids. GRA

N86-29992# Southwest Research Inst., San Antonio, Tex. Div. of Engineering and Materials Science.
STUDY OF TEST METHODS FOR URETHANE ELASTOMERS Interim Report
J. J. Dziuk, Jr., W. A. McMahon, C. H. Parr, W. A. Mallow, and H. S. Silvus 18 Oct. 1985 90 p
(Contract DAAK70-85-C-0007)
(AD-A166293; BFLRF-204) Avail: NTIS HC A05/MF A01 CSCL 11/10

The feasibility of using a portable instrument to determine the physical condition of fabric-reinforced polyurethane fuel tanks was studied during this project. The condition of the polyurethane was determined by measuring its surface electrical resistivity. Electrical resistivity of a polymer will change as it ages or deteriorates. An instrument designed and built by Southwest Research Institute personnel was found to be effective in determining the relative surface resistivity of polyurethane. This instrument was able to measure the surface resistivity of polyurethane samples in varying degrees of degradation due to aging. GRA

N86-29993# Akron Univ., Ohio. Inst. of Polymer Science.
THE INFLUENCE OF CHEMICAL STRUCTURE ON THE STRENGTH OF RUBBER
A. N. Gent Apr. 1986 24 p
(Contract N00014-85-K-0222)
(AD-A166355; TR-4) Avail: NTIS HC A02/MF A01 CSCL 11/10

The detailed chemical structure of the polymer molecule has surprisingly little effect upon many of the important physical properties of crosslinked elastomers. For example, the elastic modulus, extensibility, tensile strength and tear strength are all much the same for many common elastomers. However, the strength of elastomers under some conditions is strikingly different. Two particular modes of fracture are considered here: tearing, and abrasive wear. Certain elastomers crystallize rapidly on stretching and become self-reinforcing, so that their tear strength is greatly enhanced. Factors that govern the speed of strain-induced crystallization are reviewed. In abrasive wear, the macroradicals generated by molecular rupture are highly reactive and their reactions affect both the nature and the extent of wear. The wear processes that occur in various reinforced elastomers are described and compared. GRA

N86-29994# Akron Univ., Ohio. Inst. of Polymer Science.
ELASTICITY, TEAR STRENGTH AND STRENGTH OF ADHESION OF SOFT PVC GELS
A. N. Gent and N. Shimizu Apr. 1986 42 p
(Contract N00014-85-K-0222)
(AD-A166356; TR-6) Avail: NTIS HC A03/MF A01 CSCL 11/9

An experimental study is described of the tensile modulus E of elasticity, tear strength G sub c and strength G sub a of adhesion of a Mylar substrate, for polyvinyl chloride (PVC) gels prepared with a wide range of PVC concentrations and with four different plasticizers. The modulus E, measured under quasi-equilibrium conditions, was found to be approximately proportional to C superscript 3, where c is the volume concentration of PVC. The tensile behavior suggests that the molecular strands comprising the undiluted elastic network are relatively short, only about 26 C atoms long. G sub c under threshold conditions was found to vary with C superscript 2.25 and to be considerably larger than (about 10X), the value expected for a molecular network of short PVC chains. This difference is attributed to yielding of crystallites before molecular rupture can take place. Adhesion to Mylar of PVC gels was relatively weak. Both the tear strength and strength of adhesion were strongly dependent upon rate of fracture propagation and upon temperature, in good accord with the WLF rate-temperature equivalence for simple glass-forming substances. Thus, the strength of PVC gels appears to be determined largely by the glass temperature of the composition, and not by the amount or type of plasticizer except insofar as they affect the glass temperature. GRA

N86-29995# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CHALCOGENIDE GLASSES. PART 2: OPTICAL THICKNESS TEMPERATURE RELATION IN CHALCOGENIDE GLASS FILMS Final Report, 1 Oct. 1983 - 30 Sep. 1984
Koto White, Conrad M. Phillippi, and Laura S. Rea Feb. 1986 28 p
(AD-A166589; AFWAL-TR-85-4092-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 20/6

The optical thickness, which is a multiplication of the refractive index and the physical thickness of a film, is the most important parameter in designing a spectral interference filter. This quantity should be stable against all environmental effects, particularly the heating effect. The changes in optical thickness due to heating may be divided into two categories; a reversible change and irreversible change. This report describes the reversible portion of changes in refractive index, film thickness and optical thickness with temperature, caused by temperature coefficient of refractive index and thermal expansion coefficient of chalcogenide glass films. Film compositions studied were; As2S3, As3S7, AsS4, Ge3S7, and Ge5As38S57. This report also describes the spectrophotometric technique utilized to determine the optical parameters. GRA

N86-29996# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
CHALCOGENIDE GLASSES. PART 3: CHALCOGENIDE GLASS-FORMING SYSTEMS Final Report, 1 Oct. 1982 - 30 Sep. 1984
Koto White Feb. 1986 78 p
(AD-A166592; AFWAL-TR-85-4122-Pt-3) Avail: NTIS HC A05/MF A01 CSCL 20/6

This report summarizes the literature search on glass-forming regions of chalcogenide compositional systems. Brief discussions on physical, chemical and structural properties are also included. This study was conducted to select and evaluate the chalcogenide glasses which are suitable for use in graded optical filter applications. Continuous variations of optical properties may be achieved by continuously varying the compositions of multicomponent glasses. The usefulness of this approach is severely limited in some multi-component glasses because of their tendency for phase

separation and crystallization, which lead to inhomogeneous microstructures. GRA

N86-29997# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHEMICALLY CROSS-LINKED HEAT-SHRINKABLE POLYETHYLENE TUBES
Ion Mihalcea, Silviu Jipa, Sorin Ilie, Constantin Cazac, and Vlaicu Contineanu 10 Apr. 1986 12 p Transl. into ENGLISH from Materiale Plastice (Romania), v. 20, no. 2, Apr. - Jun. 1983 p 113-116
(AD-A166745; FTD-ID(RS)T-0480-85) Avail: NTIS HC A02/MF A01 CSCL 11/9

The memory effect of heat-shrinkable tubes made of low density polyethylene obtained by irradiation with accelerated electrons is presented. The dependence of the cross-linked polyethylene contraction force on time, temperature, degree of cross-linking, etc., is emphasized. Some mechanical, electrical and chemical properties of the irradiated polyethylene are evident. Within the temperature range where the polymers have a thermoelastic behavior, their imprinted deformations lead to macromolecular orientations. These orientations stay after cooling, hence strong inner tension occurs. Through heat, the polymer tends to relax which cancels almost entirely the previous imprinted deformations. This feature is known as plastic materials' memory. The memory phenomenon has been noticed with a large number of polymers such as polyethylene; polypropylene; vinyl-poly-chloride; vinyliden-poly-fluoride; poly-tetra-fluor ethylene; polyurethene; ethylene copolymers with vinyl-acetate, with ethyl-acrylate and with butanyene; neoprene rubber; fluoride rubber; silicone rubber, etc. The experiment shows that the memory effect grows stronger with the increasing number of cross-linking in the polymer. GRA

N86-29998# Department of the Air Force, Washington, D.C.
PHENYLQUINOXALINE RESIN MONOMERS Patent Application
Marilyn R. Unroe, inventor (to Air Force) Filed 16 Jan. 1986 15 p
(AD-D012236; US-Patent-Appl-SN-819334) Avail: NTIS HC A02/MF A01 CSCL 11/9

This invention relates to phenylquinoxaline resin monomers. The acetylene-terminated polyphenylquinoxalines disclosed in a previous invention represent promising new matrix resins for advanced structural materials. These materials propagate and cure by addition reactions to form high molecular weight, thermally stable compositions. The addition process obviates all problems associated with volatile by-product formation that occurs when such materials are prepared by condensation processes. The thermally induced free radical polymerization of aromatic and heterocyclic diacetylenes provides a linear conjugated polyene of 6 to 8 repeating units which results in a cluster-shaped species whose growth is inhibited by the steric hindrance of the monomer or oligomer backbone structure. Although the free radical at the hub of the cluster is reactive, its growth becomes increasing more difficult as the reaction proceeds, reaching a finite limit. Subsequent reaction of dangling acetylene groups of a cluster results in a highly cross-linked polyene network. Such cross-linking has a direct effect on the network topology which manifests itself in mechanical behavior. Phenylquinoxaline monomers containing sterically hindered ethynyl groups are provided by the present invention. These monomers can be crosslinked to provide thermoset resins consisting of a phenylquinoxaline linking unit and an aromatic ether or thioether. GRA

N86-29999# KMS Fusion, Inc., Ann Arbor, Mich.
HOLLOW DROPLET GENERATOR FOR POLYMER SHELL PRODUCTION
R. Crawley 1985 16 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC08-82DP-40152)
(DE86-006482; KMSF-U-1674; CONF-851174-30) Avail: NTIS HC A02/MF A01

Small, spherical, polymer shells are used as fuel containers in inertial fusion experiments. These shells have traditionally been made by spray drying or more recently using droplet generators. It has proven difficult to control product size and wall thickness for thermosetting materials. A dual orifice droplet generator is described for making hollow shell preforms. The inner orifice injects bubbles of a desired gas into the polymer solution droplet stream. The stream is agitated using a piezoelectric diaphragm and produces uniformly size hollow droplets. Shells formed from these hollow preforms have tight distributions of diameter and wall thickness. DOE

N86-30000# Sandia National Labs., Albuquerque, N. Mex.
INTERFACIAL TENSION OF DEMIXED POLYMER SOLUTIONS
J. H. Aubert 1986 4 p Presented at the 191st American Chemical Society National Meeting, New York, N.Y., 13 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-003035; SAND-85-2476C; CONF-860425-14) Avail: NTIS HC A02/MF A01

The interfacial tension of demixed polymer solutions is an important topic because an accurate description of this phenomenon is the first step toward a description of spinodal decomposition in polymer solutions. DeGennes has argued that the interfacial thickness of demixed polymer solutions equals the correlation length in the most concentrated phase. Therefore, a mean field description could not be expected to work. For example, the mean field theory of Roe predicts interfaces much broader than the correlation length and subsequently predicts interfacial tensions smaller than observed by over 100%. In this paper we attempt to make DeGennes' prediction quantitative. This is accomplished by using the Gibb's adsorption isotherm which relates interfacial tension to polymer adsorption and chemical potential. The latter is obtained from an empirical Flory-Huggins fit to equilibrium phase diagrams. The predictions of interfacial tension are quantitative, with an accuracy comparable to that of the empirical fit of the phase diagrams. DOE

N86-30001# Sandia National Labs., Albuquerque, N. Mex.
UV CURED EPOXIDE COATING
K. B. Wischmann 1986 12 p Presented at the 31st National Symposium and Exhibition of the Society for the Advancement of Material and Process Engineering, Las Vegas, Nev., 8 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-003728; SAND-85-1042C; CONF-860438-1) Avail: NTIS HC A02/MF A01

A new uv cured epoxide protective coating has been developed. This coating is based on a cycloaliphatic epoxide that can be cured in seconds with photoinitiators to a clear, durable surface. Modifiers can be added to improve flexibility, toughness, and adhesion. This coating is 100% solids; thus, compared to other solvent based coatings, it has the following advantages: low outgassing, low cure shrinkage, good aging characteristics, rapid processing, low toxicity, abrasion resistance, and excellent electrical and mechanical properties. The coating will bond to virtually any clean substrate. It has been successfully used on several projects and should continue to find wide-spread application. DOE

N86-30002# Oak Ridge National Lab., Tenn.
COMPILATION OF INFORMATION ON COMMERCIALLY AVAILABLE CERAMIC COATINGS FOR HIGH-TEMPERATURE APPLICATIONS
J. Federer, I. and A. J. Moorhead Dec. 1985 41 p
(Contract DE-AC05-84OR-21400)
(DE86-006740; ORNL/TM-9875) Avail: NTIS HC A03/MF A01

Ceramic recuperator materials are exposed to high temperature corrosive/fouling flue gases during service. Recent exposure tests have shown that SiC ceramics are susceptible to corrosion in certain furnace environments. Ceramic coatings might protect SiC ceramics and other recuperator materials from corrosion. This compilation presents commercially available ceramic coatings that could be considered for corrosion protection of heat exchanger materials. The coatings include compositions based on alumina, alumina-magnesia, chromia, hafnia, silica, silicon carbide, titania,

and zirconia. Recommendations for a program to evaluate and compare coatings are also presented. DOE

N86-30003# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
SMALL ANGLE NEUTRON SCATTERING STUDY ON A POLYMER BLEND: CHARACTERIZATION OF THE DEFORMATION BEHAVIOR
J. M. Lefebvre, R. S. Porter, and G. D. Wignall 1986 13 p Presented at the American Society of Plastics Engineers Conference, Boston, Mass., 28 Apr. 1986 Prepared in cooperation with ORNL
(Contract DE-AC05-84OR-21400)
(DE86-006099; CONF-8604120-2) Avail: NTIS HC A02/MF A01

Among the various techniques developed to characterize the structure of polymer blends, Small Angle Neutron Scattering (SANS) has received considerable attention over the past few years. By using SANS it is possible to determine the conformation of the polymer chain as well as the interaction parameter between the components of the blend. DOE

N86-30004# Los Alamos National Lab., N. Mex.
THERMOCHEMICAL MODELING OF CERAMIC SYSTEMS FORMED BY COMBUSTION
R. G. Behrens and H. T. Brush 1985 25 p Presented at the DARPA/ARMY Symposium, Daytona Beach, Fla., 21 Oct. 1985 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.
(Contract W-7405-eng-36)
(DE86-007370; LA-UR-86-751; CONF-8510280-8) Avail: NTIS HC A02/MF A01

Preliminary work showed that an appropriate stoichiometric mixture of yttrium, silicon dioxide, and graphite will react exothermically. However, the product which was formed was not the desired Y_2O_3 + SiC mixture, but rather a complex eutectic-like material. Preliminary attempts to ignite an exothermic reaction with an appropriate stoichiometric mixture of zirconium, silicon dioxide, and graphite (which was predicted to react and to form a ZrO_2 + SiC mixture) were not successful. The approach used to further study the high-temperature synthesis chemistry of these two complex chemical systems involved using equilibrium thermochemical modeling techniques. Parametric studies were performed to evaluate the effect of temperature and pressure on the gas and solid equilibrium phase relationships. While system temperature and pressure were varied in a systematic manner, stoichiometry of the reacting materials was held constant according to the equations $4Y + 3SiO_2 + 3C = 2Y_2O_3 + 3SiC$ and $Zr + SiO_2 + C = ZrO_2 + SiC$. DOE

N86-30005# Sandia National Labs., Albuquerque, N. Mex.
ULTRA-LOW DENSITY MICROCELLULAR FOAMS
P. B. Rand 1986 12 p Presented at the 5th Annual Target Fabrication Specialists Meeting, Las Vegas, Nev., 24 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007701; SAND-86-0407C; CONF-860330-1) Avail: NTIS HC A02/MF A01

Ultra-low density (<6.0 mg/cc) microcellular foams (cell size less than 20 microns) have been developed to support the NARYA pulsed-power-driven X-ray laser program. Other pulsed power targets using these foams are anticipated. Because of the extreme fragility of these foams emphasis was placed on molding to shape to avoid machining. The foams are made by a thermally induced phase separation process from solutions of water soluble polymers. In practice the solutions are rapidly frozen to induce the phase separation, and they are then freeze dried to remove the solvent without destroying the foam's structure. A number of water soluble polymers have proven capable of meeting the density and cell size requirements. However, polyacrylic acid was used in most of our work because of its low shrinkage during molding and its purity. These foams have been molded into rods (1, 2, and 3 mm dia.), half rods, half annuli, and most recently full annuli with 3.0 mm outside diameter and 2.0 mm inside diameter. The molding techniques have varied with the various shapes. The rods were molded by freezing the solution in thin walled silicone rubber molds, extracting the frozen preform from the mold, and then freeze drying. Metal molds were used to make all other shapes. Rapid surface melting, followed by rapid refreezing, was used to remove the more complex shapes from their molds. In the case of the foam annuli, a pin with a very small taper was used to form the inner diameter. The foam rods have been successfully used in gas-puff implosion experiments on the PROTO-II accelerator. DOE

N86-30006# Florida Univ., Gainesville. Dept. of Chemistry.
SYNTHESIS OF MODEL POLYMERS AND RELATED STRUCTURES IN SUPPORT OF VINYL MONOMER GRAFTING STUDIES
Progress Report
T. E. Hogen-Esch and G. B. Butler 15 Jan. 1986 35 p
(Contract DE-FG05-84ER-45104)
(DE86-008204; DOE/ER-45104/2) Avail: NTIS HC A03/MF A01

The objectives of the proposed research program are to study graft copolymerization of vinyl monomers onto cellulose or cellulose derivatives. Grafting will be carried out by redox initiation such as Ce(4+), by thermal decomposition (cellulose xanthates), or by nucleophilic displacement of cellulose derivatives by living polymers. The structure of the resulting water-soluble graft copolymer will be determined as well as the grafting efficiency of the initiation systems. Cellulose derivatives containing side chains capable of micellization will also be synthesized. In support of these objectives, water-soluble, block-, star- and cyclic polymers will be synthesized in order to aid in establishing property-structure relationships. Characterization of the polymers will be carried out by IR and by proton or carbon-13 NMR as well as size exclusion chromatography, viscometry, osmometry and other physico chemical techniques. Rheological studies designed to clarify structure-rheology relationships are also planned. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-30007# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.
PROCEEDINGS OF FUEL SAFETY WORKSHOP
31 Dec. 1985 382 p Workshop held in Alexandria, Va., 29 Oct. - 1 Nov. 1985 Prepared in cooperation with Analysis Group, Inc., Washington, D.C.
(DOT/FAA/PM-86/13) Avail: NTIS HC A17/MF A01 CSCL 21D

The workshop served a four-fold purpose: (1) to discuss the results of the Federal Aviation Administration/NASA Controlled Impact Demonstration (CID) conducted December 1984 at Edwards Air Force Base, California; (2) to explore potential approaches to preventing post-crash aircraft fuel fires, including possible combinations of various approaches; (3) to re-evaluate past approaches in terms of current technology; and (4) to propose a course of action for future industry/government research, especially any future FAA research and development program. These proceedings contain the formal conference presentations followed by the recommendations of the attendees as agreed upon in the three informal working breakout sessions. For individual titles, see N86-30008 through N86-30022.

N86-30008# Federal Aviation Administration, Washington, D.C.
ANTIMISTING FUEL TECHNOLOGY FOR TRANSPORT CATEGORY AIRCRAFT
E. P. Klueg *In its* Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 11-60 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

The antimisting kerosene (AMK) program is described. Details of the production and testing of AMK are given. Rheological studies

on properties of antimisting, filtration, flammability, and viscoelasticity; heat transfer and frictional characteristics; and degradation levels are described. AMK flammability tests were performed in both the laboratory and in air crashes. Production details presented include in-line blending limitations and compatibility and degradation considerations. The organizational structure of the AMK development effort is described, and economic aspects of converting to AMK are discussed. J.P.B.

N86-30009# Federal Aviation Administration, Washington, D.C.
AMK FULL-SCALE TRANSPORT AIRCRAFT VALIDATION PHASE SUMMARY
Bruce C. Fenton *In its* Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 61-114 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

Fuel system modifications for CV-880 and B-720 aircraft were designed, built, and flight/crash tested in a controlled impact demonstration (CID),in order to assess the feasibility of antimisting kerosene (AMK) in fire retardation. Central to the fuel system modification was the degrader design. The inline blending of AMK at fueling point demonstrated consistently high fuel quality. The degrader demonstrated successful flight operation, and engine performance under degraded AMK was comparable to performance with jet A under nominal flight conditions. It is concluded that transport aircraft can operate on AMK with minor modifications, although there are accident scenarios where AMK may not prevent a fuel spill fireball attachment to the wing/fuselage. J.P.B.

N86-30010# Federal Aviation Administration, Washington, D.C.
POST CONTROLLED IMPACT DEMONSTRATION (CID) ANALYSIS
William T. Westfield *In its* Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 115-135 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

The unplanned deviations in a Controlled Impact Demonstration (CID) to test an antimisting kerosene (AMK) are reported. Post-impact tests were conducted to assess the performance of the fire-retardant fuel; some of these tests were modified because of the deviations from the planned impact. The history of the planning of the CID is given. Experiments to explain the (often unexpected) behavior of the fuel on impact were conducted. It is concluded that the CID was not typical of accident impacts and that the antimisting fuel was exposed to circumstances which it was not designed to withstand. Even so, the antimisting fuel presented a less hostile environment through its slower vaporization and heat release. J.P.B.

N86-30011# Federal Aviation Administration, Washington, D.C.
FAA FUEL CONTAINMENT R AND D
Lawrence M. Neri *In its* Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 137-148 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

Fuel containment research by the Federal Aviation Administration (FAA) is summarized. The objective is to make post-crash fires less fatal and injurious. Three types of aircraft (transport airplanes, rotorcraft, and general aviation airplanes) are addressed independently. Data presented include: (1) compilation of accident data generated by airplane manufacturers; (2) accident percentage versus major failure modes; (3) accident percentage versus fire and fatalities; (4) impact events which possess the highest fuel spill potential; (5) generic technical approach addressing fuel containment; and (6) sequence of events leading to design criteria to satisfy program objectives. J.P.B.

N86-30012# Royal Aircraft Establishment, Farnborough (England). Materials and Structures Dept.
UK WORK ON SAFETY FUELS
S. P. Wilford *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 163-179 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

Work on safety fuels in the United Kingdom is described with respect to antimisting fuel development, fuel systems design, degradation, blending, and engine combustion. Current research focuses on cavitation studies, where preliminary results indicate that use of FM9 antimisting kerosene (AMK) may lead to increased cavitation damage; and quality control, where a Capillary Trajectory Rig (CTR) has advanced quality testing to the point where a margin of fire safety may be determined. Finally, investigation of the unexpected results of the Controlled Impact Demonstration (CID) is briefly reported. J.P.B.

N86-30013# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HEAT TRANSFER, FRICTION, AND RHEOLOGICAL CHARACTERISTICS OF ANTIMISTING KEROSENE
E. Matthys and V. Sarohia *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 181-183 (For primary document see N86-30007 21-28)
(Contracts NAS7-918; DTFA03-80-00215)
Avail: NTIS HC A17/MF A01 CSCL 21D

Experiments were performed to determine the skin friction and heat transfer behavior of antimisting kerosene (AMK) in pipe flows. The additive used was FM-9. Based on the results of the experiments, which identify high viscosity and viscoelasticity for AMK, it is recommended that AMK be degraded. Sufficient degradation produces behavior similar to that of jet A. J.P.B.

N86-30014# Army Fuels and Lubricants Research Lab., San Antonio, Tex.
US ARMY FIRE RESISTANT FUEL (FRF) PROGRAM PRESENTATION TO FAA AVIATION FUEL SAFETY MEETING
Forrest W. Schaekel *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 185-201 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

In its search for a diesel fuel that will self-extinguish in case of ignition, the U.S. Army has most recently investigated the inclusion of surfactant-stabilized emulsified water in diesel fuel. Such aqueous microemulsions yield diminished mist flammability while either eliminating pool burning or providing rapid self-extinguishment of pool fires. The Fire-Resistant Fuel (FRF) has such pool-fire resistance, but logistical constraints and low-temperature instability preclude for the time being Army-wide adaptation of this fuel. The recommendation of a Short-Term Advisory Services team led to ballistic tests with cooled fuel and antimisting agents, in which 90 mm shaped charges have been used against armored personnel carrier fuel tanks. J.P.B.

N86-30015# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONTINUOUS INLINE BLENDING OF ANTIMISTING KEROSENE
P. Parikh, A. Yavrouian, and V. Sarohia *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 203-217 (For primary document see N86-30007 21-28)
(Contracts NAS7-917; DTFA03-80-A-00215)
Avail: NTIS HC A17/MF A01 CSCL 21D

A continuous inline blender was developed to blend polymer slurries with a stream of jet A fuel. The viscosity of the slurries ranged widely. The key element of the blender was a static mixer placed immediately downstream of the slurry injection point. A positive displacement gear pump for jet A was employed, and a progressive cavity rotary screw pump was used for slurry pumping. Turbine flow meters were employed for jet A metering while the slurry flow rate was calibrated against the pressure drop in the injection tube. While using one of the FM-9 variant slurries, a provision was made for a time delay between the addition of slurry and the addition of amine sequentially into the jet A stream. J.P.B.

N86-30016# Conoco, Inc., Ponca City, Okla.
OLEFIN POLYMERS AS JET FUEL ANTIMIST ADDITIVES
Steven L. Baxter and John M. Iwasyk (Du Pont de Nemours

(E. I.) and Co., Wilmington, Del.) *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 221-240 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

Ultra-high molecular weight, oil-soluble polymers (designated AM-2) have been developed which may have potential as antimist additives. Tests show that these polymers significantly reduce the concentration of fines in fuel spray and increase mean particle diameter. Impact of the additives on other fuel properties is briefly discussed. J.P.B.

N86-30017# ICI Americas, Inc., Wilmington, Del.
AMK: STILL VIABLE?
Charles G. Rivers, Jr. *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 241-249 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

The status of antimisting kerosene (AMK) as a fire-retardant fuel is discussed. Research to date indicates the likelihood that antimisting is effective; future research must be aimed at identifying the envelope of effectiveness. Existing technology appears adequate to provide for the onboard blending requirement for using AMK. Few problems in the area of aircraft operability using AMK have been encountered to date; however, a number of potential problems related to gelling remain. Extended engine testing may effectively address remaining concerns. J.P.B.

N86-30018# McDonnell-Douglas Corp., Long Beach, Calif.
SAFETY FUELS-SPECIFICATIONS AND PROGRESS
A. T. Peacock *In* FAA Proceedings Fuel Safety Workshop 31 Dec. 1985 p 255-260 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

This paper discusses fuel standardization and quality control and the mechanisms already in place to attain them. It reflects 20 years of development of safety fuels and considers where the Federal Aviation Administration (FAA) should go from here. The need for a standard technical description of aviation turbine fuels that are developed to enhance fuel safety is discussed. Fuel property descriptions, test methods, and standardization procedures are also discussed, along with approvals for additives and fuel quality control. The role of the American Society for Testing and Materials (ASTM) in standardization is outlined, and a short history of safety fuels is given. It is suggested that fuel modification should not be abandoned as a method of improving safety. Author

N86-30019# Boeing Co., Seattle, Wash.
CURRENT DESIGN PROCEDURES FOR MINIMIZING POST CRASH FIRE HAZARDS c03
H. Skavdahl *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 261-276 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

In designing jet aircraft fuel systems, experience has resulted in current attention to the following considerations for fire safety: (1) elimination of ignition sources; (2) where (1) is not possible, minimizing oxygen supply, ventilating the fuel sufficiently to prevent combustible mixtures, or eliminating the fuel source with valves or drains; (3) shrouding of fuel lines in pressurized compartments; (4) impact-resistant location of fuel tanks; (5) safety features for pressure fueling; (6) strut breakaway design; and (7) fire walls, air cooling, and careful location of fuel system components to further minimize fire hazards. Airplane fuel systems are discussed in general, and criteria which must be satisfied in the design of a new component or subsystem are described. J.P.B.

N86-30020# Aviation Fuel Safety Co., Chelmsford, Mass.
AMINE-CO2 ADDUCTS AS AVIATION FUEL GELLING AGENTS c03
William W. Bannister *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 279-298 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

On addition of small amounts of cyclododecylamine (CDDN) to jet fuels, with subsequent addition of CO2, a zwitterionic carbamate forms to set up a gelling matrix within the fuel. This system is proposed for application in controlled crash landings in which the crew would have one or two second to undertake fire-prevention measures. There is also a possibility for use in very low non-gelling concentrations which may still provide antimisting kerosene (AMK) characteristics, in which case there would be no weight penalties and no reaction time would be required. Use with other additives may provide synergistic effects. Cost estimates, payload requirements, heat of combustion and NOx emission data are included. Author

N86-30021# General Technology Applications, Inc., Reston, Va.
GTA/BASF ANTIMISTING FUEL RESEARCH
Jerry C. Trippe *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 301-311 (For primary document see N86-30007 21-28)
Avail: NTIS HC A17/MF A01 CSCL 21D

The research resulting in a process for dissolving polyisobutylene (PIB) in antimisting fuel is described. Reasons for continued private industry research into antimisting fuel are outlined. The background of investigations of the relationship between high molecular weight polymer additives, droplet size, and mist-induced fires is reported. The promise of PIB in antimisting fuels is summarized on the basis of theses characteristics: (1) satisfactory effectiveness at very low concentrations; (2) satisfactory effectiveness under high shear forces; (3) compatibility with current fuel specifications and unmodified fuel systems; (4) low cost under current high volume production; (5) ease of handling and application; and (6) elimination of catastrophic fuel explosions. J.P.B.

N86-30022# Akron Univ., Ohio.
JET FUEL VISCOSITY AT LOW TEMPERATURES WITH NOTES ON n-ALKALINE CRYSTALS Final Report c03
Dale Schruben *In* FAA Proceedings of Fuel Safety Workshop 31 Dec. 1985 p 317-356 (For primary document see N86-30007 21-28)
(Grant NAG3-488)
(NASA-CR-174911; NAS 1.26:174911) Avail: NTIS HC A17/MF A01 CSCL 21D

Apparatus and procedures were developed to collect jet fuel viscosity versus temperature data for temperatures down to about -60 deg C in a manner compatible with prior jet fuel data bases generated with the Brookfield viscometer. Viscosity data showed good reproducibility even at temperatures a few degrees into the two-phase region. The viscosity-temperature relationship could be correlated by two linear segments when plotted as a standard log-log type representation. The breakpoint between the high and low temperature line segments is the filter flow temperature, a fuel characteristic approximated by the freezing point. A generalized correlation appears sufficiently accurate for many design or performance calculations. In the low temperature two-phase region, wax precipitation is significant. Qualitative literature was quantitatively analyzed along with data in this study to plot crystal size versus composition for the fuel model C sub 20-C sub 24 n-alkane system in solvent. This suggested that wax mixtures tend towards smaller crystal sizes than pure wax species. Complex mixtures in jet fuels lead to two-phase states, at least in some instances, that have small enough crystals to be treated as a continuum. Author

N86-30023*# United Technologies Research Center, East Hartford, Conn.
ROLE OF FUEL CHEMICAL PROPERTIES ON COMBUSTOR RADIATIVE HEAT LOAD
T. J. Rosfjord 19 Apr. 1984 36 p
(Contract NAS3-23167)
(NASA-CR-177096; NAS 1.26:177096) Avail: NTIS HC A03/MF A01 CSCL 21I

In an attempt to rigorously study the fuel chemical property influence on combustor radiative heat load, United Technologies Research Center (UTRC) has conducted an experimental program using 25 test fuels. The burner was a 12.7-cm dia cylindrical device fueled by a single pressure-atomizing injector. Fuel

physical properties were de-emphasized by selecting injectors which produced high-atomized, and hence rapidly-vaporizing sprays. The fuels were specified to cover the following wide ranges of chemical properties; hydrogen, 9.1 to 15- (wt) pct; total aromatics, 0 to 100 (vol) pct; and naphthalene, 0 to 30 (vol) pct. They included standard fuels, specialty products and fuel blends. Fuel naphthalene content exhibited the strongest influence on radiation of the chemical properties investigated. Smoke point was a good global indicator of radiation severity. Author

N86-30024# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANTIMISTING KEROSENE: EVALUATION OF IMPROVED FM-9 ADDITIVE Final Report, Aug. 1983 - Nov. 1984
A. Yavrouian, P. Parikh, and V. Sarohia Jun. 1986 51 p
(Contract DTFA3-80-A-00215)
(DOT/FAA/CT-85-4; JPL-D-2581) Avail: NTIS HC A04/MF A01

During the past few years, studies by the Federal Aviation Administration (FAA) and other government agencies have shown that the hazards from aircraft crash fires might be significantly decreased if an antimisting kerosene (AMK) fuel could be utilized. The addition of polymeric additive at low concentrations to jet fuels is known to suppress mist formation and ignition of the fuels under circumstances often encountered in survivable aircraft crash landings. An antimisting additive, FM-9 (Trademark) has been developed by Imperial Chemical Industries (ICI) and is available under the trade name AVGARD. This material when dissolved in jet fuels imparts a strong time-dependent threshold type shear-thickening behavior. In case of fuel spillage from a ruptured fuel tank during an aircraft crash, the fuel misting is prevented. Simulated aircraft crash landing fuel spillage tests have indicated that fuel misting can be sufficiently suppressed, and the ignition and the subsequent fireball formation can be greatly reduced or eliminated. Optimization of FM-9 dissolution rate to attain acceptable mist suppression and degradation properties within 15 to 20 minutes of inline blending was carried out by ICI. This report discusses the evaluation of FM-9 variant which has better dissolution rate and consequently better degradability and compatibility with engine filters and fuel control system and was identified as a candidate additive to be used in a Control Impact Demonstration (CID) test. Author

N86-30025# Ballistic Research Labs., Aberdeen Proving Ground, Md.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF FLAMESPREADING PROCESSES IN COMBUSTIBLE-CASED, STICK PROPELLANT CHARGES
Thomas C. Minor and Albert W. Horst Feb. 1986 40 p
(AD-A166461; AD-E301935; BRL-TR-2710) Avail: NTIS HC A03/MF A01 CSCL 19/6

Attention has shifted over recent years in the United States to the use of stick propellant in high-performance artillery charges. The substitution of the natural flow channels offered by a bundle of stick propellant over the tortuous path encountered in a bed of granular propellant all but eliminates the problem of pressure waves so often associated with high-pressure gun malfunctions. Further, performance advantages may be realizable because of the higher natural loading density of stick propellant as well as unique hydrodynamic features associated with its geometry. However, recent testing has revealed that the postulated flow of igniter gases and flamespreading from the basepad forward through the bundle of sticks in a simple, one-dimensional manner may be significantly complicated by the presence of a combustible case, the initial permeability, mechanical strength, and ignition and combustion characteristics of which may play major roles themselves in characterizing the aforementioned sequence of events. The US Army has just completed development of a new top-zone propelling charge designated M203E2 and type classified M203A1 to replace the M203 Charge for the 155-mm, M198 Towed Howitzer. A number of these charges were modified to permit direct viewing of the interior of the charge and fired in the Ballistic Research Laboratory 155-mm Howitzer Simulator. Companion calculations were performed using the TDNOVA two-dimensional, two-phase interior ballistic code. GRA

N86-30026# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
COMPARISON OF EXTRACTION TECHNIQUES AND SOLVENTS FOR EXPLOSIVE RESIDUES IN SOIL
Thomas F. Jenkins and Daniel C. Leggett Nov. 1985 37 p
(AD-A166474; CRREL-SR-85-22; AMXTH-TE-TR-85041) Avail: NTIS HC A03/MF A01 CSCL 07/1

Extraction of TNT, Trinitrobenzene, RDX and HMX from two soils was studied in terms of process kinetics and recovery. Two solvents, acetonitrile and methanol, and four extraction techniques, Soxhlet, ultrasonic bath, mechanical shaker and homogenizer-sonicator were compared. The results were complex in that some interactions among analyte, method and solvent were found. Acetonitrile was found to be clearly superior to methanol for RDX and HMX. Soxhlet and ultrasonic bath generally recovered more than homogenizer or shaker, although a complicating factor is that all techniques were not necessarily at equilibrium. In terms of sample throughput, the ultrasonic bath and shaker are preferred over Soxhlet and homogenizer-sonicator. The ultrasonic bath generally approached equilibrium more rapidly than the shaker so it appears to be the best overall choice. Another complicating factor is that times to reach equilibrium were different for the two soils and for the different analytes. This points to the need for more kinetic studies on other soils and sediments. plosives; HMX; Pollution; RDX; Soil pollution; Soils; TNT; TNB. GRA

N86-30027# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
SCANNING ELECTRON MICROSCOPE STUDY OF NITROGUANIDINE, M31A1 AND m30 PROPELLANTS
Scott Morrow Apr. 1986 41 p
(AD-A166669; AD-E700023; ARAED-TR-86011) Avail: NTIS HC A03/MF A01 CSCL 19/1

Canadian nitroguanidine (NQ) used in triple base propellant ceased to be manufactured in 1978. In order to provide a replacement for this critical material, manufacture was initiated at the Sunflower Army Ammunition Plant (SFAAP). A critical part of the process is control of particle size. A difficult problem in this regard is the on-stream measurement of the particle size. Nor is it a trivial matter to measure the particle size of the end product. Comprehensive studies have been made of the best means for making both types of particle size measurements. The Fisher Sub Sieve Sizer (FSSS) is the current specification method used to measure the dry product. Many other methods have been investigated, too. Scanning electron photomicrographs were made of a reference sample of nitroguanidine (NQ). Similar photos of nitroguanidine made at the Sunflower Army Ammunition Plant (SFAAP) and at the U.S. Army Armament Research and Development Center (ARDC) were compared to the Canadian reference material. From these photomicrographs the range of crystal sizes in the different samples was estimated. These NQ samples were incorporated into M31A1 and M30 propellants. Scanninng electron microscope (SEM) photomicrographs of the resultant propellants revealed the long NQ needles break up during processing and that particle size differences in the original NQ are also seen in the same order in finished products. GRA

N86-30028# Lawrence Livermore National Lab., Calif.
EIGHTH SYMPOSIUM (INTERNATIONAL) ON DETONATION, VOLUME 3
1985 240 p Symposium held at Albuquerque, N. Mex., 15 Jul. 1985
(Contract W-7405-eng-48)
(DE86-006785; CONF-850706-Vol-3) Avail: NTIS HC A11/MF A01

Volume three contains twenty-eight papers on chemical explosives and detonations. All papers have been processed for inclusion in the Energy Data Base. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-30029# Federal Aviation Administration, Washington, D.C.
RESILLIENT MODULUS OF FREEZ-THAW AFFECTED GRANULAR SOILS FOR PAVEMENT DESIGN AND EVALUATION. PART 1: LABORATORY TESTS ON SOILS FROM WINCHENDON, MASSACHUSETTS, TEST SECTIONS
D. Cole, D. Bentley, G. Durell, and T. Johnson Jul. 1986 78 p
Sponsored in part by Army
(Contract FHWA8-3-0187)
(FAA/PM-84/16.1; CRREL-86-4) Avail: NTIS HC A05/MF A01

This is the first of a series of four reports about laboratory and field testing of various granular road and airfield subgrades. This report details the acquisition, testing and analysis of six soils from a test site in Winchendon, Massachusetts. Repeated load triaxial tests were done on frozen and thawed soils to characterize the variations in the their resilient properties throughout the seasons. Linear regression yielded empirical equations relating the resilient modulus to applied stress, unfrozen water content (for frozen soils), moisture tension (for thawed soils) and density. Equipment and test procedures (given in detail) were developed that allowed simulation in the laboratory of the gradual recovery of stiffness that occurs in the field after thawing. The resilient moduli were strongly dependent on soil state, dropping at least two orders of magnitude upon thawing. For all soils the moduli increased with increasing confining stress, generally decreased with increasing principal stress ratio, and increased with increasing moisture tension levels. The resilient moduli increased by a factor of approximately two as the materials recovered from the effects of a freeze-thaw cycle. The recovery process is well modeled as a function of soil moisture tension level. The stress sensitivity did not appear to be a function of the soil moisture tension level. The report also includes tabulations of all the repeated load triaxial test data. Author

N86-30030# Kernforschungsanlage, Juelich (West Germany).
CRITERIA FOR THE CHOICE OF WORK PIECES FOR CONVENTIONAL OR NUMERICAL-CONTROL (NC) MANUFACTURING (TURNING, DRILLING, AND CUTTING) [KRITERIEN ZUR AUSWAHL VON WERKSTUECKEN FUER KONVENTIONELLE ODER NC-FERTIGUNG (DREH-, BOHR- UND FRAESBEARBEITUNG)]
C. Doose Nov. 1985 50 p In GERMAN
(JUEL-SPEZ-338; ISSN-0343-7639; ESA-86-97420) Avail: NTIS HC A03/MF A01

Methods to prepare and check the use of conventional and numerical control (NC) machines in research workshops where single and prototype manufacturing prevail are discussed. The methods permit determination of which work pieces are suited for conventional and which for NC-machining. The methods of qualified work piece visual assessment and of the comparison of fabrication costs provide evaluation criteria. Starting from manufacturing-relevant geometrical and technological characteristics, the work pieces to be produced can be objectively classed with a single machine type. The results over a one-year period can give a reliable basis for long term investment decisions. If the requirements are fulfilled, conventional machines should be replaced by NC-machines, although the number of NC-machines is very limited compared to conventional machines. ESA

N86-30031# Office of Technology Assessment, Washington, D.C.
ANTI-SATELLITE WEAPONS, COUNTERMEASURES, AND ARMS CONTROL
Sep. 1985 16 p
(PB86-182953; OTA-ISC-281; LC-85-600587) Avail: NTIS HC A02/MF A01 CSCL 15C

Anti-satellite weapons, countermeasures, and arms control; MILSATs, ASATs, and national security; ASAT capabilities and countermeasures; ASAT arms control: history; ASAT arms control: options; and a comparative evaluation of ASAT policy options are discussed. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-30032 Forschungsinstitut fuer Hochfrequenzphysik, Werthoven (West Germany).
DATA TRANSMISSION BY RADAR
H.-J. Bueckmann Aug. 1985 36 p In GERMAN; ENGLISH summary Sponsored by Bundesministeriums der Verteidigung
(Rept-8-85; Lfd-239; ESA-86-97416) Copyright. Avail: Issuing Activity

The use of the radar for jamming-resistant data transmission was investigated. The possibilities and limits of data transmission via mechanically rotating radars are presented. The low time and spatial duty cycle of the radar pulses and the antenna main beam, respectively, result in a low average data rate. Thus only short messages of the order of 100 bit during each antenna rotation cycle can be transmitted with high resistance against jamming. A lower immunity from disturbance must be tolerated in order to increase the data rate. Several methods are described, consisting of the modification of signal parameters and modulation, and the use of the antenna sidelobes for transmission. A concept of burst transmission with preamble detection in order to circumvent the high detection loss due to fluctuating sidelobes is given. ESA

N86-30033 Forschungsinstitut fuer Hochfrequenzphysik, Werthoven (West Germany).
A COMPARISON OF METHODS FOR ADAPTIVE JAMMING SUPPRESSION
J. Worms Aug. 1985 80 p In GERMAN; ENGLISH summary
(Contract BMvG-T/RF31/71435/71340)
(Rept-9-85; Lfd-240; ESA-86-97417) Copyright. Avail: Issuing Activity

Methods for the optimal suppression of jamming in partially adaptive antenna arrays were developed. Recursive algorithms to solve the Wiener filter equation were considered. The iteration methods sample matrix gradient, single step method, and successive-over-relaxation were generalized to stochastic approximation methods. The direct methods of recursive covariance matrix decomposition as well as spatial lattice filters were derived. The methods are illustrated by simulations and by a comparison of the number of point operations of the variance, and of the convergence rate. ESA

N86-30034 Forschungsinstitut fuer Hochfrequenzphysik, Werthoven (West Germany).
RADAR DETECTION RANGES, TAKING INTO ACCOUNT WAVE PROPAGATION PHENOMENA
H. Kuschel Oct. 1985 39 p In GERMAN; ENGLISH summary
(Contract BMvG-T/RF31/E0020/E1317)
(Rept-13-85; Lfd-244; ESA-86-97419) Copyright. Avail: Issuing Activity

Radar detection ranges were studied under real conditions, taking into account atmospheric refraction and diffraction effects on the detection of low flying objects. The topographic information was derived from a digital terrain data base. This allows the calculation of the attenuation of an electromagnetic field due to the actual terrain profile. The use of a digital computer provides access to the terrain data base as well as the calculation of frequency and terrain-specific mean values of the detection range, based on a statistically relevant number of simulations. Target direction errors due to diffraction at a vertical edge are discussed. ESA

N86-30035*# Hawaii Univ., Manoa. Dept. of Electrical Engineering.
CODING FOR RELIABLE SATELLITE COMMUNICATIONS Final Report, 1 Jul. 1984 - 30 Jun. 1986
N. T. Gaarder and Shu Lin 1986 21 p
(Grant NAG5-407)
(NASA-CR-177262; NAS 1.26:177262) Avail: NTIS HC A02/MF A01 CSCL 17B

This research project was set up to study various kinds of coding techniques for error control in satellite and space communications for NASA Goddard Space Flight Center. During the project period, researchers investigated the following areas: (1) decoding of Reed-Solomon codes in terms of dual basis; (2) concatenated and cascaded error control coding schemes for satellite and space communications; (3) use of hybrid coding schemes (error correction and detection incorporated with retransmission) to improve system reliability and throughput in satellite communications; (4) good codes for simultaneous error correction and error detection, and (5) error control techniques for ring and star networks. Author

N86-30036# Centre National d'Etudes Spatiales, Toulouse (France).
VARAN-S: AN AIRBORNE SYNTHETIC APERTURE RADAR FOR RESEARCH IN MICROWAVE REMOTE SENSING
D. Vaillant 3 May 1985 10 p Presented at EARSeL Symposium, Strasbourg, France, 31 Mar. 3 Apr. 1985
(CNES-CT/DRT/TIT/RL-93-T; ESA-86-97185) Avail: NTIS HC A02/MF A01

An X-Band side-looking airborne radar, VARAN-S, was tested in real aperture mode in the Marginal Ice Zone experiment. The VARAN-S is planned to work in SAR mode. The digital raw data, recorded on-board over a swath width > 10 km, is processed with 3 m resolution without multilook, or 9 m resolution using 9 looks. Two polarizations (H and V) are available. The VARAN-S is designed to simulate satellite-borne radar images to make microwave remote sensor users ready for satellite data analyses and help the development of satellite-borne SAR. ESA

N86-30037*# Illinois Univ., Urbana. Electromagnetic Communication Lab.
MMIC DEVICES FOR ACTIVE PHASED ARRAY ANTENNAS Final Report
R. Mittra 31 Jul. 1986 61 p
(Contract NCC3-8)
(NASA-CR-176990; NAS 1.26:176990) Avail: NTIS HC A04/MF A01 CSCL 20N

The use of finlines for microwave monolithic integrated circuit application in the 20 to 40 GHz frequency range. Other wave guiding structures, are also examined from a comparative point of view and some sonclusions are drawn on the basis of the results. For individual titles, see N86-30038 through N86-30038.

N86-30038*# Illinois Univ., Urbana.
ASYMMETRICAL COUPLED COPLANAR-TYPE TRANSMISSION LINES WITH ANISOTROPIC SUBSTRATES
Toshihide Kitazawa, Yoshio Hayashi, and Raj Mittra *In its* MMIC Devices for Active Phased Array Antennas 31 Jul. 1986 32 p
(For primary document see N86-30037 21-32)
Avail: NTIS HC A04/MF A01 CSCL 20N

Various types of transmission lines with anisotropic substances were investigated for use in microwave and millimeter wave integrated circuits. These include single and coupled striplines, slot lines, and coplanar-type transmission lines. The coplanar-type transmission lines (CTLs) are promising because of their easy adaptation to shunt element connections. The application of coupled coplanar-type transmission lines (C-CTLs) were studied based on the quasistatic and hybrid mode formulations and accurate numerical values are available for the cases with isotropic and/or anisotropic substrates. However, most of them assume structural symmetry. The theoretical approach for the asymmetrical version is available only for the propagation constant of the case with a single isotropic substrate. The analytical method for the general structure of asymmetrical C-CTLs with an anisotropic substrate. This method includes both the hybrid mode and the quasistatic formulations and is useful for accurately computing the characteristics impedances as well as propagation constants of various types of assymetrical C-CTLs. GRA

N86-30039*# Illinois Univ., Urbana-Champaign. Electromagnetics Lab.
A SIMPLE CIRCULAR-POLARIZED ANTENNA: CIRCULAR WAVEGUIDE HORN COATED WITH LOSSY MAGNETIC MATERIAL
C. S. Lee, S. W. Lee, and D. W. Justice Aug. 1986 32 p
(Grant NAG3-475)
(NASA-CR-177092; NAS 1.26:177092; UILU-ENG-86-2554; ELSR-86-8) Avail: NTIS HC A03/MF A01 CSCL 20N

A circular waveguide horn coated with a lossy material in its interior wall can be used as an alternative to a corrugated waveguide for radiating a circularly polarized (CP) field. To achieve good CP radiation, the diameter of the structure must be larger than the free-space wavelength, and the coating material must be sufficiently lossy and magnetic. This device is cheaper and lighter in weight than the corrugated one. Author

N86-30040# University of South Florida, Tampa. Dept. of Electrical Engineering.
ANALYTICAL METHODS FOR CHARACTERIZATION OF NONLINEAR DEVICES AND NETWORKS, VOLUME 1 Final Report, Apr. 1983 - Apr. 1984
V. K. Jain, S. J. Garrett, and A. R. Gondeck Dec. 1985 54 p
(Contract F30602-82-C-0135)
(AD-A165837; RADC-TR-85-243-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 17/2

Multichannel communication systems are often mildly nonlinear and can be characterized by a truncated Volterra series. The purpose of this report is to present, in a practical way, techniques for effective representation of nonlinear circuits/systems by Volterra NLFTs. The nonlinear current method is applied to various communication type problems. These include systems of nonlinear differential equations, nonlinear devices, and nonlinear circuits. GRA

N86-30041# University of South Florida, Tampa. Dept. of Electrical Engineering.
STABLE COMPENSATION OF NONLINEAR COMMUNICATIONS SYSTEMS (USING VOLTERRA SYSTEMS CHARACTERIZATION), VOLUME 2 Final Report, Jan. 1984 - Apr. 1985
V. K. Jain and T. E. McClellan Dec. 1985 98 p
(Contract F30602-82-C-0135)
(AD-A165838; RADC-TR-85-243-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 17/2

Using a mean-square IM criterion, a new approach for the reduction of intermodulation distortion is developed here. Advantages realized are: (1) reduction of IM distortion by 15 to 50 dB, (2) guaranteed stability of the compensator, (3)a minimum prespecified damping ration of the blocks of the nonlinear compensator. A design program based on the approach is also presented. GRA

N86-30042# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL STUDY OF CHEMICAL ALLEVIATION FOR IMPROVING REENTRY COMMUNICATION
Zonghou Chu, Boyi Wang, and Lie Lin 5 Feb. 1986 23 p Transl. into ENGLISH from Lixue Xuebao (China), v. 16, no. 5, Jul. 1984 p 408-416
(AD-A165862; FTD-ID(RS)T-1049-85) Avail: NTIS HC A02/MF A01 CSCL 17/2

Chemical alleviation for improvement of reentry communication by solid ablation and liquid injection has been a practical technique. The mechanism of chemical alleviation and the method of experimental studies of simulation in an arc tunnel are discussed in this paper. Experiments are performed in the H11DF arc tunnel by two diagnostic methods which are the microwave method and

the probe method. From the experiments, the effects of ablative products from the heat-protection material upon the electron concentration in the flow field and upon the transmission of the electromagnetic wave and the effect of the injection of different electrophilic reagents upon the electron concentration in the flow field are determined. This has provided the basis for selecting the heat-protection materials and determining their properties. GRA

N86-30043# Princeton Univ., N. J. Dept. of Electrical Engineering and Computer Science.
EFFICIENT ALGORITHMS AND STRUCTURES FOR ROBUST SIGNAL PROCESSING Interim Report, 30 Sep. 1984 - 27 Apr. 1985
Bradley W. Dickinson 14 May 1985 7 p
(Grant AF-AFOSR-0381-84)
(AD-A166147; AFOSR-86-0040TR) Avail: NTIS HC A02/MF A01 CSCL 17/2

During the past 7 months, the research efforts supported by this grant have concentrated on robust estimation techniques for autoregressive models and some related system theoretic problems associated with parameter estimation problems for time series models. The motivation for this work arises from applications in signal processing such as linear predictive signal modeling, signal detection, and spectral analysis. The overall goal of this research has been to put together ideas and techniques from statistics, signal processing, and system theory to bring new perspectives to such problems. GRA

N86-30044# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DATA TRANSMISSION SYSTEMS CIRCUITS AND EXCHANGE PARAMETERS ON THE C3 INTERFACE IN THE CASE OF THE PARALLEL INPUT-OUTPUT OF DISCRETE INFORMATION
19 Mar. 1986 26 p Transl. into ENGLISH of Gos. Obshchesoyuznyy Standart 18146-72 (USSR), 1972 p 1-20
(AD-A166206; FTD-ID(RS)T-0208-86) Avail: NTIS HC A03/MF A01 CSCL 17/2

The present standard extends to interface circuits between terminal data equipment (OOD) and data transmission equipment (APD), containing an error protection device (UZO), in the case of parallel character-by-character input-output of data and the radial method of information exchange. The standard establishes the nomenclature of interface circuits, the electrical parameters of the signals sent by way of these circuits, and the technical requirements. GRA

N86-30045# Rome Air Development Center, Griffiss AFB, N.Y.
A REVIEW OF PHASE-ONLY SIDELOBE NULLING INVESTIGATIONS AT RADC (ROME AIR DEVELOPMENT CENTER) Report, Jan. - Jul. 1985
Robert A. Shore Aug. 1985 29 p
(AD-A166602; RADC-TR-85-145) Avail: NTIS HC A03/MF A01 CSCL 09/5

A review is presented of work performed at RADC on the subject of phase-only null synthesis and adaptive nulling in the sidelobes of linear array antenna patterns. Beam space representations are used in much of this work. Related investigations outside RADC are summarized, and a general bibliography of phase-only pattern control investigations is included. GRA

N86-30046# Naval Research Lab., Washington, D. C.
MULTICHANNEL RELATIVE-ENTROPY SPECTRUM ANALYSIS Memorandum Report, Oct. 1983 - Oct. 1985
R. W. Johnson and B. R. Musicus 25 Mar. 1986 25 p
(AD-A166625; NRL-MR-5723) Avail: NTIS HC A02/MF A01 CSCL 09/4

A new relative-entropy method is presented for estimating the power spectral density matrix for multichannel data, given correlation values for linear combinations of the channels, and given an initial estimate of the spectral density matrix. A derivation of the method from the relative-entropy principle is given. The basic approach is similar in spirit to Multisignal Relative Entropy Spectrum Analysis, but the results differ significantly because the present method does not arbitrarily require the final distributions of the various channels to be independent. For the special case of separately estimating the spectra of the signal and noise, given the correlations to their sum, Multichannel Relative Entropy Spectrum Analysis turns into a two stage procedure. First a smooth power spectrum model is fitted to the correlations of the signal plus noise. Then final estimates of the spectra and cross spectra are obtained through linear filtering. For the special case where p uniformly spaced correlations are known, and where the initial estimate of the signal plus noise spectrum is all-pole with order p or less, this method fits a standard Maximum Entropy autoregressive spectrum to the noisy correlations, then linearly filters to calculate the signal and noise spectra and cross spectra. Consideration is given to the case where only an initial estimate of the noise power spectrum is available. An illustrative numerical example is given. GRA

N86-30047# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
ROUND ROBIN SCHEDULING FOR FAIR FLOW CONTROL IN DATA COMMUNICATION NETWORKS
Ellen L. Hahne and Robert G. Gallager Mar. 1986 14 p Presented at the IEEE International Conference on Communications, Jun. 1986 Sponsored in part by AT and T Bell Labs.
(Contract N00014-84-K-0357; Grant NSF ECS-83-10698; DARPA Order-3045; ONR Proj. 049-383)
(AD-A166728; LIDS-P-1537) Avail: NTIS HC A02/MF A01 CSCL 17/2

Round robin link scheduling, in conjunction with conventional window flow control, can be used to achieve throughput fairness in point-to-point packet networks with virtual circuit routing. Consider a data communication network consisting of store-and-forward nodes joined by point-to-point links. Each user session is assigned a fixed path (often called a virtual circuit) through the network, and data for the session are sent in packets along this path. In such a network it is possible for the incoming traffic rate at a node to exceed the outgoing rate, causing a data queue to build up at that node. This queue may eventually overflow the node's storage space, or the delay of acknowledgements may cause transmitters to assume that data were lost. These problems result in wasteful retransmission that effectively reduce the capacity of the network. Flow control procedures attempt to prevent or alleviate this degradation by regulating the appropriate traffic sources. GRA

N86-30048# Rome Air Development Center, Griffiss AFB, N.Y.
PROCEEDINGS OF THE 1985 ANTENNA APPLICATIONS SYMPOSIUM, VOLUME 1
Dec. 1985 337 p Symposium held at Urbana, Ill.
(AD-A166754; RADC-TR-85-242-Vol-1) Avail: NTIS HC A15/MF A01 CSCL 09/5

The Proceedings of the 1985 Antenna Applications Symposium is a collection of state-of-the-art papers relating to phased array antennas, multibeam antennas, satellite antennas, microstrip antennas, reflectors antennas, HF, VHF, UHF an various other antennas. GRA

N86-30049# Department of the Navy, Washington, D. C.
WIDE-BAND DISTRIBUTED RF COUPLER Patent
Larry R. Barnett, Yue-Ying Lau, Kwo C. Chu, and L. Granatstein, inventors (to Navy) Issued 28 Jan. 1986 16 p Supersedes AD-D009782
(AD-D012214; US-Patent-4,567,401; US-Patent-Appl-SN-389132; US-Patent-Class-315-5) Avail: NTIS Avail: US Patent and Trademark Office CSCL 09/1

A wide-band distributed coupler for coupling rf energy from and input waveguide into a tapered interaction waveguide in a traveling-wave amplifier comprising a plurality of channel filters connecting between the input and interaction waveguides, with each filter coupled to the interaction waveguide at the appropriate cross-sectional position along its tapered length where the interaction waveguide cutoff frequency approximately matches the wave frequency propagated by the filter is discussed. Each filter

comprises, in one embodiment, a main coaxial cavity tuned to a distinct center frequency, a first simple isolation cavity for coupling rf energy between the input waveguide and the main cavity, and at least one second simple isolation cavity for coupling energy between the main cavity and the tapered interaction waveguide. Author (GRA)

N86-30050# Department of the Air Force, Washington, D.C.
ADAPTIVE MICROWAVE CHANNELIZATION Patent Application
Ronald W. Minarik, inventor (to Air Force) Filed 15 Jan. 1986 15 p
(AD-D012215; US-Patent-Appl-SN-819073) Avail: NTIS HC A02/MF A01 CSCL 09/1

A signal processing system is disclosed that divides a broad band of input signals into separate channels separated by stopbands and permits operation in the crossover frequencies occuring at these stopbands. A triplexer separator recieves and divides the broad band of input signals into a first, second and third band of signals, and sends them respectively to a first, second and third signal channel. The first and third signal channels are narrow bands which respectively occur at the lower and upper frequency end of the broad band of input signals. The second signal channel is identical to the broad band of input signals. In normal operation the first, second and third signal channels separately and independently conduct their respective signals to a triplexer combiner, where they are recombined. However, if signal processing is planned at crossover frequencies in the stopbands of either the first or third signal channel, the first or third band of signals can be directed into the second signal channel to permit such operation. GRA

N86-30051# Department of the Air Force, Washington, D.C.
TEST CONFIGURATION AND PROCEDURE FOR DETERMINING THE OPERATIONAL STATUS OF A PHASED ARRAY ANTENNA Patent Application
Stephen V. Zezuto, inventor (to Air Force) Filed 15 Jan. 1986 14 p
(AD-D012216; US-Patent-Appl-SN-818924) Avail: NTIS HC A02/MF A01 CSCL 09/5

The operational status of individual phase control modules within a phased array antenna can be determined using a radio frequency oscillator, a directional coupler, a spiral antenna, an attenuator, a harmonic frequency converter, a network analyzer, and a phase magnitude display. The radio frequency oscillator generates a test radio frequency signal which is conducted into the sum port of the array by the directional coupler. The phase control modules normaly phase shift radio frequency signals they receive from the sum port by amounts indicated in a command signal from the radar control system. When using this test system, the radar control system should be directed to send a test command signal which direct the phase control modules to repeatedly phase shift received radio frequency signals between a first and second phase state. The spiral antenna, when placed in proximity of each individual phase control module, receives and conducts phase shifted radio frequency signals to the harmonic analyzer. The harmonic analyzer samples and conducts the phase shifted radio frequency signals in to the network analyzer for comparison. When the first phase state is 180, deg the display, which receives the output of the network analyzer clearly indicates if the phase control module is phase shifting the radio frequency signal in response to the test command signal. Author (GRA)

N86-30052# Department of the Navy, Washington, D. C.
DUAL SCAN RATE RADAR Patent
William M. Waters, inventor (to Navy) Issued 25 Feb. 1986 6 p Supersedes AD-D010190
(AD-D012221; US-Patent-4,573,050; US-Patent-Appl-SN-467421; US-Patent-Class-343-17.1R) Avail: NTIS Avail: US Patent and Trademark Office CSCL 17/9

A dual scan rate radar system (DSR) includes a phased array antenna, a transmitter, a receiver and a control unit. Each rf pulse from the transmitter includes contiguous long-range and short-range pulses. The control unit adjusts the antenna so that the long-range pulse is transmitted into a slow beam at theta s and the short-range pulse is transmitted into a fast beam at theta F. The control unit also adjusts the antenna to receive the short-range pulse echos during a first part of the interpulse interval and the long-range pulse echos during a second part of the interpulse interval. The angles theta S and theta F are varied so that the slow and fast beam are scanned at dual rates RS and RF, respectively, where RS < RF. GRA

N86-30053# Department of the Army, Washington, D. C.
RANDOM BEAM POSITIONING SURVEILLANCE PROCESS Patent Application
Michael G. Allen, Howard Feacher, and Dennis McCallam, inventors (to Army) Filed 18 Feb. 1986 18 p
(AD-D012251; US-Patent-Appl-SN-841083) Avail: NTIS HC A02/MF A01 CSCL 09/5

Random beam positioning for an E-scan radar system having an electronically steerable antenna is controlled by a digital computer which is programmed to generate lists or files of portions of the desired area of surveillance. Two separate lists are generated corresponding to the forward and rear portions of the area of coverage. These lists are thereafter independently randomized and combined to generate beam position commands for the desired surveillance region, thereby providing full radar coverage over a desired region while decreasing the probability of being tracked by an undesired detector. GRA

N86-30054# Oak Ridge National Lab., Tenn.
ELECTROMAGNETIC FIELDS IN 3-D FOR VARIOUS CAVITY ANTENNAS AND FARADAY SHIELDS
G. L. Chen, J. H. Whealton, R. W. McGaffey, R. J. Raridon, M. A. Bell, E. F. Jaeger, and D. J. Hoffman 16 Dec. 1985 21 p
(Contract DE-AC05-84OR-21400)
(DE86-007563; DOE/OR-21400/T244) Avail: NTIS HC A02/MF A01

Maxwell's equations are solved for vectors E and H for various cavities of interest. The results are shown to be in agreement with existing theory for the fundamental resonance of a long ridge wave guide. This analysis has been applied to the testing cavity antenna for D-III. The method can include the addition of an arbitrarily-shaped Faraday shield. We have explored the electromagnetic effects of Faraday shield by measurement and computation. This correlation of theory and experiments is then used to predict power limits of an antenna by voltage- and current-limitations. DOE

N86-30055# Sao Paulo Univ. (Brazil). Inst. de Fisica.
TIME DEPENDENT VARIATIONAL DESCRIPTION OF ONE-DIMENSIONAL INELASTIC SCATTERING
M. A. M. deAguiar and C. P. Malta 1985 23 p
(DE86-700610; IFUSP-P-510) Avail: NTIS (US Sales Only) HC A02/MF A01

The time dependent variational principle is applied to generate semi-classical approximations in the description of inelastic collisions in one-dimension. This is achieved by using appropriately parametrized trial wave functions. The method is applied to an exactly solvable model and the results are fairly good, in general much better than other approximate calculations. DOE

N86-30056# Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
STUDY OF MULTIPATH FADING IN LINE OF SIGHT RADIO LINKS: BIBLIOGRAPHY SUMMARY [ETUDE DES TRAJETS MULTIPLES SUR LES LIAISONS EN VISIBILITE: SYNTHESE BIBLIOGRAPHIQUE]
M. Sylvain Jun. 1984 265 p In FRENCH
(CRPE-NT-133; ESA-86-97188) Avail: NTIS HC A12/MF A01

Radio signal fading at fixed frequency; fixed frequency statistics with channel diversity; space diversity and frequency diversity effects on single frequency transmission; frequency selectivity in multipath transmission; models describing the contribution of

meteorological factors to multipath fading; and multipath consequences and the means to reduce effects are discussed. ESA

N86-30057# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A SATELLITE BROADCAST RECEIVING TERMINAL
S. H. Mneney Mar. 1984 31 p Sponsored by NUFFIC
(ESA-86-97317) Avail: NTIS HC A03/MF A01

Input and output requirements, the design, and the construction of a satellite Earth station for reception of television and radio signals in remote rural communities, from a satellite with a strong beam are described. The station receives from the GORIZONT-2 satellite at 4 GHz. Television and radio broadcasts are received at Eindhoven (Netherlands) from the All-Union station in Moscow. Other, weaker, stations can be received, albeit less clearly, from other transponders of GORIZONT-2 and GORIZONT-3 satellites. The same receiver, placed in other locations, can be used to receive from satellites operating at S or C-band, such as the INSAT or Arabsat. ESA

N86-30058# Technische Hogeschool, Eindhoven (Netherlands). Onderafdel. der Wiskunde en Informatica.
FIELD CALCULATIONS OF AXISYMMETRIC CURRENT COILS IN VACUUM [VELDBEREKENINGEN AAN AXIAAL-SYMMETRISCHE STROOMSPOELEN IN VACUUEM]
M. A. J. Voermans 1985 106 p In DUTCH
(ESA-86-97547) Avail: NTIS HC A06/MF A01

Expressions for the magnetic induction of the field resulting from an axisymmetric current configuration were mutually related. Expressions with elliptic integrals and Legendre functions series for singular circular coils and circle cylindric current films are given. For voluminous circle cylindric current coils, only expressions in Legendre functions series and the form of integrals are known. By an appropriate bifurcation of the integral interval, the induction in each point of the voluminous coil was calculated. The homopolar direct current generator with superconducting coil packet was examined. ESA

N86-30059# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
THE DELFT UNIVERSITY OF TECHNOLOGY SCATTEROMETER (DUTSCAT) REPORT Status Report
Paul Snoeij 9 Jul. 1984 7 p
(ESA-86-97550) Avail: NTIS HC A02/MF A01

Internal and external calibration of a C band wind scatterometer for ESA is outlined. Final results are not available. ESA

N86-30060# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
THE ESA C-BAND WIND SCATTEROMETER CAMPAIGN: PRELIMINARY CAMPAIGN DEFINITION
G. P. deLoor and E. P. W. Attema May 1984 86 p
(ESA-86-97552) Avail: NTIS HC A05/MF A01

Data on radar cross sections, and equipment in Europe for the wind scatterometer campaign defined by ESA are described. The experiment consists of a preliminary campaign performed by the member nations themselves and a grouped main campaign. Problems which need immediate attention are calibration (intercalibration on the antenna-range of ESTEC or calibration over a land target) and data delivery time and the format problem. ESA

N86-30061# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
THE ESA C-BAND WIND SCATTEROMETER CAMPAIGN: DATA PROCESSING Second Progress Report
Otto Rompelman and Paul Snoeij Jan. 1985 13 p Sponsored by Netherlands Remote Sensing Board
(Contract ESTEC-5633/83-NL-MD)
(ESA-86-97555) Avail: NTIS HC A02/MF A01

The ESA C-band wind scatterometer was calibrated using reflected power data. A technique for roll correction was developed. The calibrating and roll-corrected data were resampled to obtain a data format which meets ESA requirements. ESA

N86-30062# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
INTERNAL SIDE-LOOKING AIRBORNE RADAR (SLAR) CALIBRATION [INTERNE SLAR CALIBRATIE]
P. Snoeij Nov. 1985 12 p In DUTCH Sponsored by Netherlands Remote Sensing Board
(I85.68220.002; BCRS-85-03; ESA-86-97558) Avail: NTIS HC A02/MF A01

A one-point internal calibration in a SLAR was developed. Radiometric calibration is necessary if the SLAR is used for remote sensing applications. The calibration signal was injected between the T/R cell (a switch to protect the mixer/preamplifier combination against transmission pulse overcharges) and the mixer using a delay line to abolish the impact of the T/R switching time. Measurements show good results. ESA

N86-30063# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
WAVE OBSERVATION AT SEA WITH THE DUTCH SIDE-LOOKING AIRBORNE RADAR (SLAR) [GOLFWAARNEMING OP ZEE MET DE NEDERLANDSE SLAR (SIDE-LOOKING AIRBORNE RADAR)]
H. C. Peters Mar. 1984 31 p In DUTCH Sponsored by Netherlands Remote Sensing Board
(I83.533.005; ESA-86-97559) Avail: NTIS HC A03/MF A01

Theoretical limits for sea wave observation with SLAR systems were investigated by modeling the interaction between microwave radiation and the sea surface. A description of the SLAR, in which three-dimensional spatial wave extension, two-dimensional antenna variations, pulse modulation, and platform movements are assimilated is given. A two-dimensional collection of equidistant point objects for microwave scattering at the rough sea surface is given. Resolution characteristics and speckle behavior were analyzed. Spatial resolution in range and azimuth is limited by pulse width and azimuth aperture angle of the antenna. As the modulation transfer function amplitude has a low value, small variations are lost in noise and speckle. Image error as a result of the observation of moving wave patterns with a flying radar are discussed. Recommendations to improve the radar characteristics are given. ESA

N86-30064# Joint Publications Research Service, Arlington, Va.
WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT
28 Apr. 1986 64 p Transl. into ENGLISH from various worldwide articles
(JPRS-TTP-86-011) Avail: NTIS HC A04/MF A01

Telecommunication topics addressed include: fiber optics, satellite communications, bids for construction of the Anik E Satellite, trillium telephone marketing, digital equipment, remote sensing, television relay stations, digital phone systems, and microwave links. For individual titles, see N86-30065 through N86-30066.

N86-30065# Joint Publications Research Service, Arlington, Va.
CHINA'S SATELLITE COMMUNICATIONS DISCUSSED
Zong Ruhou *In its* Worldwide Report: Telecommunications Policy, Research and Development (JPRS-TTP-86-011) 28 Apr. 1986 p 1-6 Transl. into ENGLISH from Xiandaihua (Beijing, China), v. 8, no. 1, 25 Jan. 1986 p 21 (For primary document see N86-30064 21-32)
Avail: NTIS HC A04/MF A01

In 1972, China began to enter the age of satellite comunications, and it was realized that satellites could play a large role in television transmission in China. The experimental broadcasting of satellite television programs was begun in 1978, and satisfactory results were obtained. The success of the television transmission demonstration has led to important decisions regarding development of a domestic satellite communications system. Before specialized communications satellites are launched, the decision was made to lease an international communications satellite transmitter. The responsibility of the ground stations were discussed. B.G.

N86-30066# Joint Publications Research Service, Arlington, Va.
DEVELOPMENT OF CHINA'S FIBER OPTIC TECHNOLOGY DISCUSSED
Qizhang Bai *In its* Worldwide Report: Telecommunications Policy, Research and Development (JPRS-TTP-86-011) 28 Apr. 1986 p 7-9 Transl. into ENGLISH from Xiandaihua (Beijing, China), v.8, no. 1, 25 Jan. 1986 p 17 (For primary document see N86-30064 21-32)
Avail: NTIS HC A04/MF A01

Fiber optic technology is a new transmission technology having the outstanding advantages of low loss, high capacity, no magnetic interference, all-dielectric transmission, small size, and light weight. Research into fiber optic technology began in the mid-1970's in China. The scope of applications for fiber optic communications systems is divided into three categories: junction lines, trunk lines, and subscriber lines. Each of the categories are briefly discussed. The advantages and economic suitability of fiber optics are discussed. B.G.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-30067# Royal Signals and Radar Establishment, Malvern (England).
A STUDY OF GROUP-TYPE SINGLE-PHASE UNIDIRECTIONAL SAW TRANSDUCERS ON LINbO3 AND QUARTZ
M. F. Lewis Jun. 1985 51 p
(AD-A165670; RSRE-MEMO-3833; BR98351; ESA-86-97114)
Avail: NTIS HC A04/MF A01

A development of the single phase unidirectional transducer concept which employs sampled transducers to allow the introduction of reflector banks within the transducers is discussed. The fabrication of such devices requires a single stage of photolithography. Prototypes show very encouraging passband characteristics with an insertion loss < 3 dB on LiNbO3 at 100 MHz, and < 6 dB on quartz at 400 MHz. In each case the amplitude response is essentially ripple-free, and the phase characteristic linear. ESA

N86-30068*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HYTESS 2: A HYPOTHETICAL TURBOFAN ENGINE SIMPLIFIED SIMULATION WITH MULTIVARIABLE CONTROL AND SENSOR ANALYTICAL REDUNDANCY
Walter C. Merrill Jun. 1986 39 p
(NASA-TM-87344; E-3014; NAS 1.15:87344) Avail: NTIS HC A03/MF A01 CSCL 21E

A hypothetical turbofan engine simplified simulation with a multivariable control and sensor failure detection, isolation, and accommodation logic (HYTESS II) is presented. The digital program, written in FORTRAN, is self-contained, efficient, realistic and easily used. Simulated engine dynamics were developed from linearized operating point models. However, essential nonlinear effects are retained. The simulation is representative of the hypothetical, low bypass ratio turbofan engine with an advanced control and failure detection logic. Included is a description of the engine dynamics, the control algorithm, and the sensor failure detection logic. Details of the simulation including block diagrams, variable descriptions, common block definitions, subroutine descriptions, and input requirements are given. Example simulation results are also presented. Author

N86-30069*# California Univ., Los Angeles. Dept. of Electrical Engineering.
A SURVEY OF THE STATE OF THE ART AND FOCUSED RESEARCH IN RANGE SYSTEMS, TASK 2 Semiannual Report
Kung Yao Jun. 1986 22 p
(Grant NAG2-304)
(NASA-CR-176988; NAS 1.26:176988) Avail: NTIS HC A02/MF A01 CSCL 09C

Contract generated publications are compiled which describe the research activities for the reporting period. Study topics include: equivalent configurations of systolic arrays; least squares estimation algorithms with systolic array architectures; modeling and equilization of nonlinear bandlimited satellite channels; and least squares estimation and Kalman filtering by systolic arrays. For individual titles, see N86-30070 through N86-30072.

N86-30070*# California Univ., Los Angeles. Dept. of Electrical Engineering.
ON SOME EQUIVALENT CONFIGURATIONS OF SYSTOLIC ARRAYS
C. Y. Chang and K. Yao *In its* A Survey of the State-of-the-Art and Focused Research in Range Systems, Task 2 Jun. 1986 5 p (For primary document see N86-30069 21-33)
Avail: NTIS HC A02/MF A01 CSCL 09C

A systematic approach is presented for designing systolic arrays and their equivalent configurations for certain general classes of recursively formulated algorithms. A new method is also introduced to reduce the input bandwidth and storage requirements of the systolic arrays through the study of dependence among the input data. Many well known systolic arrays can be rederived and also many new systolic arrays can be discovered by this approach. Author

N86-30071*# California Univ., Los Angeles. Dept. of Electrical Engineering.
MODELING AND EQUALIZATION OF NONLINEAR BANDLIMITED SATELLITE CHANNELS
K. Konstantinides (Hewlett-Packard Co., Palo Alto, Calif.) and K. Yao *In its* A Survey of the State-of-the-Art and Focused Research in Range Systems, Task 2 Jun. 1986 5 p (For primary document see N86-30069 21-33)
Avail: NTIS HC A02/MF A01 CSCL 09C

The problem of modeling and equalization of a nonlinear satellite channel is considered. The channel is assumed to be bandlimited and exhibits both amplitude and phase nonlinearities. A discrete time satellite link is modeled under both uplink and downlink white Gaussian noise. Under conditions of practical interest, a simple and computationally efficient design technique for the minimum mean square error linear equalizer is presented. The bit error probability and some numerical results for a binary phase shift keyed (BPSK) system demonstrate that the proposed equalization technique outperforms standard linear receiver structures. M.G.

N86-30072*# California Univ., Los Angeles.
ON REALIZATIONS OF LEAST-SQUARES ESTIMATION AND KALMAN FILTERING BY SYSTOLIC ARRAYS
M. J. Chen and K. Yao *In its* A Survey of the State-of-the-Art and Focused Research in Range Systems, Task 2 Jun. 1986 10 p (For primary document see N86-30069 21-33)
Avail: NTIS HC A02/MF A01 CSCL 09C

Least-squares (LS) estimation is a basic operation in many signal processing problems. Given $y = Ax + v$, where A is a m x n coefficient matrix, y is a m x 1 observation vector, and v is a m x 1 zero mean white noise vector, a simple least-squares solution is finding the estimated vector x which minimizes the norm of $/Ax-y/$. It is well known that for an ill-conditioned matrix A, solving least-squares problems by orthogonal triangular (QR) decomposition and back substitution has robust numerical properties under finite word length effect since 2-norm is preserved. Many fast algorithms have been proposed and applied to systolic arrays. Gentleman-Kung (1981) first presented the trianglular systolic array for a basic Givens reduction. McWhirter (1983) used this array structure to find the least-squares estimation errors. Then by geometric approach, several different systolic array realizations of the recursive least-squares estimation algorithms of Lee et al (1981)

were derived by Kalson-Yao (1985). Basic QR decomposition algorithms are considered in this paper and it is found that under a one-row time updating situation, the Householder transformation degenerates to a simple Givens reduction. Next, an improved least-squares estimation algorithm is derived by considering a modified version of fast Givens reduction. From this approach, the basic relationship between Givens reduction and Modified-Gram-Schmidt transformation can easily be understood. This improved algorithm also has simpler computational and inter-cell connection complexities while compared with other known least-squares algorithms and is more realistic for systolic array implementation. M.G.

N86-30073*# Westinghouse Research and Development Center, Pittsburgh, Pa.
DOUBLE-INJECTION, DEEP-IMPURITY SWITCH DEVELOPMENT Final Report, 27 Feb. 1984 - 28 Feb. 1985
D. W. Whitson 28 Mar. 1985 120 p
(Contract NAS3-23882)
(NASA-CR-174936; NAS 1.26:174936; WRDC-85-9F4-DIDIS-R1) Avail: NTIS HC A06/MF A01 CSCL 09A

The overall objective of this program was the development of device design and process techniques for the fabrication of a double-injection, deep-impurity (DI) sup 2 silicon switch that operates in the 2-10 kV range with conduction current values of 5 A at 2 kV and 1 A at 10 kV. Other major specifications include a holding voltage of 10 V with no gate current, 10 microsec switching time, and power dissipation of 50 W at 75 C. It was decided to concentrate on the lateral circular devices in order to optimize the gold diffusion. This resulted in devices that are much better switches (approx.1 micro sec switching time), and in a gold diffusion process that is much more controllable than those previously developed. Some results with injection-gated devices were also obtained. The current conduction for V less than VT was analyzed and seen to agree, for the most part, with Lampert's theory. Various sections of this report describe the device designs, wafer-processing techniques, and various measurements which include ac and dc characteristics and four-point probe. Author

N86-30074# DRF, Inc., Soquel, Calif.
ADAPTIVE CONTROL SYSTEM. VOLUME 1. EQUIPMENT AND TESTING Final Report, May 1983 - Mar. 1985
Abraham M. Fuchs Jan. 1986 136 p
(Contract F33615-83-C-3203)
(AD-A166036; AFWAL-TR-85-3095-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 09/3

This final report describes a two year effort to enhance the dynamic response of the load electro-hydraulic control systems used in fatigue testing by a combination of adding control functions of resonance compensation, integral control, and feedforward to the electronic controller; making frequency response measurements of the open-loop control system as a basis for closed loop adjustment; and using a small computer to assist in the optimum adjustment of the control equipments. Hardware was developed and produced for three systems including computer controlled frequency response analyzer, and manual or computer setup controller, resonance compensation and manual integral control and feedforward networks. Software was developed to make the frequency response measurements, to optimize system adjustments, to set the control hardware, and to make on-line digital data taking and data reduction possible. The individual components and the overall system was demonstrated and upgraded by application to real test setups in the Structures Test Laboratory. Significant improvements in dynamic performance and run time were achieved. Adaptive setup and on-line adjustment are now possible. Author (GRA)

N86-30075# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
MACROMODELING AND OPTIMIZATION OF DIGITAL MOS VLSI CIRCUITS
Mark D. Matson and Lance A. Glasser Mar. 1986 46 p
(Contracts N00014-80-C-0622; F49620-84-C-0004)
(AD-A166658; VLSI-MEMO-86-303) Avail: NTIS HC A03/MF A01 CSCL 09/5

Power consumption and signal delay are crucial to the design of high-performance VLSI circuits. This paper presents CAD tools for modeling and optimizing digital MOS designs. The tools determine the transistor sizes that minimize circuit power consumption subject to constraints on signal path delays. Computational efficiency is obtained through macromodeling techniques and a specialized optimization algorithm. The macromodels are based on device equations, and encapsulate logic gate behavior in a set of simple yet accurate formulas. The optimization algorithm exploits properties of the digital MOS domain to convert the primal optimization problem into a dual form which is much easier to solve. The result is a pair of CAD tools that can optimize a circuit in roughly the amount of time needed to perform a transistor level simulation of the circuit. Author (GRA)

N86-30076# Department of the Air Force, Washington, D.C.
MONOLITHIC LOW NOISE AMPLIFIER WITH LIMITING Patent Application
James P. Young, inventor (to Air Force) Filed 27 Jan. 1986 15 p
(AD-D012225; US-Patent-Appl-SN-822579) Avail: NTIS HC A02/MF A01 CSCL 09/5

A single circuit which provides forward biasing, input impedance matching and voltage input limiting to a transistor which has a source, gate and drain terminal is presented. Biasing, input matching and limiting for a transistor is accomplished using two inductor coils, five crystal diodes, a positive voltage source, and three resistors. The forward biasing is achieved using three resistors, and the third, fourth and fifth crystal diode. The third resistor connects the drain terminal of the transistor to the positive voltage source. The second resistor connects the junction between the third resistor and the drain terminal to the transistor's gate terminal. The fourth and fifth crystal diodes are connected in series between the source terminal and the common electrical ground. The first resistor and third diode are connected in parallel between the transistor's gate terminal and the common electrical ground. Limiting of the input voltages over the gate terminal is accomplished by the first and second crystal diodes which are connected in series with each other and in a parallel circuit with the first resistor 1 diode and the common electrical ground. GRA

N86-30077# Department of the Air Force, Washington, D.C.
LOW PHASE NOISE TWO PORT VOLTAGE CONTROLLED OSCILLATOR Patent Application
Watkins and Staley, inventors (to Air Force) Filed 6 Jan. 1986 35 p
(AD-D012234; US-Patent-Appl-SN-816596) Avail: NTIS HC A03/MF A01 CSCL 09/5

A low noise two port voltage controlled oscillator apparatus having a coarse tuning circuit serially connected to an inductor to form a resonant circuit is described. A fine tuning circuit is serially connected between the resonant circuit and the input to the amplifier. A large capacitance series silicon varactor minimizes noise at the frequency of operation while optimizing the coarse tuning range. GRA

N86-30078# Department of the Air Force, Washington, D.C.
MICRO MUSHROOM INSTRUMENTATION SYSTEM Patent Application
Walter F. Davidson, inventor (to Air Force) Filed 15 Jan. 1986 48 p
(AD-D012235; US-Patent-Appl-SN-818945) Avail: NTIS HC A03/MF A01 CSCL 20/6

An electronics circuit which provides for the recording of instrumentation data on an optical disk is disclosed. The optical disk is formatted in a spiral format instead of concentric tracks. The spiral format allows data to be recorded without the gaps that would be associated with concentric tracks. The instrumentation system provides each channel with a program instrumentation amplifier, a six pole lowpass switched capacitor filter, a sample and hold amplifier, and a digital to analog converter to provide

automatic offset capability. Since each channel has its own components, simultaneous samples of every channel can be captured. All of the input signal's channel variables can be captured. All of the input signal's channel variables can be changed under software control without hardware changes. A single board computer is used for a system controller. GRA

N86-30079# Department of the Air Force, Washington, D.C.
PULSE REPETITION MODULATOR APPARATUS Patent Application
Steinmayer, inventor (to Air Force) 3 Feb. 1986 22 p
(AD-D012237; US-Patent-Appl-SN-824998) Avail: NTIS HC A02/MF A01 CSCL 17/2

A pulse repetition modulator apparatus is described which is comprised of a pulse width modulator to supply a series of maximum transmitter power output bursts that have been generated with a pulse time correlation to the sampled amplitude of the voice signal input to the link. The output bursts would therefore be of variable length with the durations proportional to the amplitude of the voice input signal. GRA

N86-30080# Argonne National Lab., Ill.
FIRST INTERNATIONAL WORKSHOP ON BATTERY TESTING, 30 SEPTEMBER-2 OCTOBER 1985, HEIDELBERG, FRG Summary Report
F Hornstra 1985 4 p Workshop held at the Annual Battery and Electrochemical Energy Storage Contractors' Meeting, Washington, D.C., 18 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-004058; CONF-851146-3) Avail: NTIS HC A02/MF A01

In June 1984, after the last Contractor's Conference, representatives from several countries met in Washington, DC to discuss international cooperation in advanced battery research and development. Because of the diversity of approaches in various countries and the minimum attention in international forums for battery testing, the representatives agreed on the desirability of a workshop to discuss testing methodologies. As a result, the first International Workshop on Battery Testing was organized and held in Heidelberg, Germany from 30 September through 2 October 1985. DOE

N86-30081# Argonne National Lab., Ill.
INVESTIGATION OF ALTERNATIVE MCFC CATHODE MATERIALS AT ARGONNE NATIONAL LABORATORY
R. D. Pierce and J. L. Smith 1986 6 p Presented at the International Symposium on Fuel Cell and Advanced Battery, Tokyo, Japan, 22 Jan. 1986
(Contract W-31-109-eng-38)
(DE86-005576; CONF-860138-1) Avail: NTIS HC A02/MF A01

The conventional cathode material for a molten carbonate fuel cell (MCFC) is NiO. However, these cathodes have limited longevity due to dissolution at cathode conditions and precipitation as metal at anode conditions. Alternative cathode materials are being sought through a process of identifying stable materials in the cathode environment, evaluating their properties, and modifying their conductivity through doping. The work has centered on LiFeO2 and Li2MnO3 which are stable, have low solubility, and do not migrate under cell conditions. LiFeO2 can be produced with resistivity in the range of 10 to 40 ohm-cm at 650(0)C in realistic cathode gases. DOE

N86-30082# Lawrence Livermore National Lab., Calif.
POINTING ALIGNMENT BY ORTHOGONAL PHASE-LOCK FEEDBACK LOOPS
M. C. Rushford and P. J. Kuzmenko 25 Nov. 1985 8 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-Optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-006707; UCRL-91874; CONF-860117-4) Avail: NTIS HC A02/MF A01

Orthogonally acting phase-locked loops operating at distinct, well-separated dither frequencies are used to automatically align (maximize output power) an argon ion pump laser, its pointing into a ring dye laser, and optimize a dye laser beam coupling into a single mode fiber of 4 micron core diameter. Such a system of feedback loops or combination of them is an ATOM (Alignment Through Orthogonal Maxima). DOE

N86-30083# Los Alamos National Lab., N. Mex.
ELECTRONICS DIVISION RESEARCH AND DEVELOPMENT Progress Report, 1 Oct. 1984 - 30 Sep. 1985
C. Spirio, comp. and E. Courtney, comp. Jan. 1986 205 p
(Contract W-7405-eng-36)
(DE86-008327; LA-10656-PR) Avail: NTIS HC A10/MF A01

This report describes progress in continuing research and development activities and presents new technical initiatives that the Electronics Division at Los Alamos National Laboratory has undertaken in FY 1985. Much of this work is carried out under sponsorship of the Laboratory's internal supporting research and development program. Five technology areas form the focus of this work and consist of research in: (1) solid state/optoelectronics, (2) hardened electronics, (3) defense electronics systems, (4) fuel cell power sources, and (5) computer-aided engineering. This report is fourth in an annual series. DOE

N86-30084# Tri-Univ. Meson Facility, Vancouver (British Columbia).
500 MHZ CCD SERIAL ANALOG MEMORY
J. Cresswell, I. Carvahlo, M. LeNoble, A. Benolo (Communications Research Centre, Ottawa (Ontario).), and R. Kule Oct. 1985 2 p Presented at the IEEE Nuclear Science Symposium, San Francisco, Calif., 23 Oct. 1985 Prepared in cooperation with Communications Research Centre, Ottawa, Ontario (Canada).
(DE86-901019; TRI-PP-85-96; CONF-851009-67) Avail: NTIS (US Sales Only) HC A02/MF A01

The design of a GaAs charge coupled device as a solution to transient recording of electrical signals is discussed. The requirements of Experiment 787 and others require the analysis of signals with a 250 MHz bandwidth. Some initial results of the work are presented. DOE

N86-30085# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
A FAST HIGH POWER LIGHT PULSE GENERATOR [EIN SCHNELLER LICHTPULSGENERATOR HOHER LEISTUNG]
W. J. Hiller, H.-M. Lent, G. E. A. Meier, and B. Stasicki Jul. 1984 15 p In GERMAN
(MPIS-18/1985; ISSN-0436-1199; ESA-86-96904) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

A device for the production of flashes for high speed photography was developed. Light diodes were used as the light source. The maximum light power per diode is 500 mW in case of coupling with a 1 m long glass monofiber. The pulse frequency reaches 1 MHz, and the pulse duration can be adjusted between 50 nsec and 1 microsec. The light has a wavelength of 660 nm; it is well suited for interference-optical research due to its coherence. ESA

N86-30086# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
21 Apr. 1986 67 p Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-011) Avail: NTIS HC A04/MF A01

Topics addressed include: biotechnology, energy, and electronics. For individual titles, see N86-30087 through N86-30087.

N86-30087# Joint Publications Research Service, Arlington, Va.
ISSUES IN LSI AUTOMATION, PROTOCOL STANDARDIZATION
Naoshi Sugiyama *In its* Japan Report: Science and Technology (JPRS-JST-86-011) 21 Apr. 1986 p 46-57 Transl. into ENGLISH from Denshi Kogyo Geppo (Tokyo, Japan), Sep. 1985 p 14-26
(For primary document see N86-30086 21-33)
Avail: NTIS HC A04/MF A01

In order to realize the complete unmanned factory, many problems such as clean robot technology, clean transfer technol

ogy, and fault restoration countermeasures have to be solved. The present conditions of automation technology are presented and then the standardization trends of hardware and software (communication agreement protocol) essential to the construction of unmanned factories are examined. B.G.

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-30088 British Library Lending Div., Boston Spa (England).
HYDRODYNAMICS AND HEAT TRANSFER IN A LIQUID FILM UNDER THE END OF A ROTATING CYLINDER
V. A. Timofeev 1986 10 p Transl. into ENGLISH> from IZ. (USSR), p 40-44
(BLL-M-36755-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The situation considered in this theoretical study is that a metallic cylinder is placed in a liquid heated to a certain temperature and is itself heated by the passage of an electric current to a certain temperature. The cylinder is rotated. Equations describing the hydrodynamics and heat transfer in the liquid metallic film formed under the end of the cylinder are derived. They show that the film thickness decreases with increasing distance from the axis of rotation. Melting is weakest in the zone near the axis of rotation and the edge of the cylinder. Author

N86-30089 Royal Netherlands Aircraft Factories Fokker, Amsterdam.
STUDY OF HEAT EXCHANGERS BETWEEN A LIQUID LOOP FEEDER AND A HEAT-PIPE RADIATOR
A. F. J. Morgownik 9 Aug. 1984 128 p Sponsored by Netherlands Agency for Aerospace Programs
(FOK-TR-R-84-108; ESA-86-97500) Copyright. Avail: Issuing Activity

Heat exchanger designs, capable of transporting 2500 W from the cooling liquid (Freon 114) to the vapor of the radiator heat pipes were developed. The thermal, flow, mass, micrometeorite vulnerability, and manufacturing performance were analyzed. A finned evaporator concept, concentric interface concept, clamped folded-interface concept, and soldered interface concept are described. Best performance predictions are obtained for the clamped interface concept. ESA

N86-30090*# Nevada Univ., Reno. Engineering Research and Development Center.
COMPUTATIONS AND TURBULENT FLOW MODELING IN SUPPORT OF HELICOPTER ROTOR TECHNOLOGY Final Report, 1 Jun. 1984 - 30 Nov. 1985
William C. Rose Nov. 1985 53 p
(Grant NsG-2291)
(NASA-CR-177095; NAS 1.26:177095) Avail: NTIS
HC A04/MF A01 CSCL 20D

The angle of attack (AOA) tandem cavity wind tunnel experiment was prepared. Actual wind tunnel testing started shortly after the beginning of 1985. A multi-probe aerodynamic rake was designed and installed for use in surveying the shear layers present over the open cavity on the Kuiper Airborne Observatory (KAO). The nature of the behavior of the thermal environment within the KAO cavity at operational altitudes was determined. Assistance was given in the design of the cavity for the University of Denver radiometer. Attempts to distinguish between the optical terms of blur circle size (or image size) and the term due to jitter were discussed. B.G.

N86-30091*# Clarkson Univ., Potsdam, N.Y. Dept. of Mechanical and Industrial Engineering.
SEPARATED FLOWS NEAR THE NOSE OF A BODY OF REVOLUTION Final Project Report, 1 Jan. 1984- 28 Feb. 1986
S. P. Lin 28 Feb. 1986 89 p
(Contract NCC2-280)
(NASA-CR-177107; NAS 1.26:177107) Avail: NTIS
HC A05/MF A01 CSCL 20D

The solution of the Navier-Stokes equations for the problem of cross-flow separation about a deforming cylinder was achieved by iteration. It was shown that the separation starts at the rear stagnation point and the point of primary separation moves upstram along the cylinder surface. A general method of linear stability analysis for nonparallel external flows was constructed, which consists of representing the eigenfunctions with complete orthogonal sets and forms characteristic equations with the Galerkin method. The method was applied to the Kovasznay flow which is an exact solution of the Navier-Stokes equation. The results show that when the critical parameter is exceeded, there are only a few isolated unstable eigen-frequencies. Another exact solution is shown to be absolutely and monotonically stable with respect to infinitesimal disturbances of all frequencies. The flow is also globally, asymptotically, and monotonically stable in the mean with respect o three-dimensional disturbances. This result forms the sound foundation of rigorous stability analysis for nonparallel flows, and provides an invaluable test ground for future studies of nonparallel flows in which the basic states do not posses exact solutions. The application of this method to the study of the formation of spiral vorticies near the nose of a rotating body of revolution is underway. The same method will be applied to the stability analysis of reversed flow over a plate with suction. B.G.

N86-30092*# California Univ., Davis. Dept. of Mechanical Engineering.
NUMERICAL AND EXPERIMENTAL STUDIES OF PARTICLE FLOW IN A HIGH-PRESSURE BOUNDARY-LAYER WIND TUNNEL Semiannual Progress Report, Jan. - Jun. 1984
B. R. White Jun. 1984 11 p
(Contract NCC2-252)
(NASA-CR-177008; NAS 1.26:177008) Avail: NTIS
HC A02/MF A01 CSCL 20D

The approach was to simulate the surface environment of Venus as closely as practicable and to conduct experiments to determine threshold wind speeds, particle flux, particle velocities, and the characteristics of various aeolian bedforms. The Venus Wind Tunnel (VWT) is described and the experimental procedures that were developed to make the high-pressure wind tunnel measurements are presented. In terrestrial simulations of aeolian activity, it is possible to conduct experiments under pressures and temperatures found in natural environments. Because of the high pressures and temperatures, Venusian simulations are difficult to achieve in this regard. Consequently, extrapolation of results to Venue potentially involves unknown factors. The experimental rationale was developed in the following way: The VWT enables the density of the Venusian atmosphere to be reproduced. Density is the principal atmospheric property for governing saltation threshold, particle flux, and the ballistics of airborne particles (equivalent density maintains dynamic similarity of gas flow). When operated at or near Earth's ambient temperature, VWT achieves Venusian atmospheric density at pressures of about 30 bar, or about one third less than those on Venus, although still maintaining dynamic similarity to Venus. Author

N86-30093*# Dayton Univ., Ohio.
NUMERICAL SIMULATION OF THE FLOWFIELD OVER ICE ACCRETION SHAPES Semiannual Progress Report, 30 Apr. 1985 - 30 Apr.1986
James N. Scott Apr. 1986 19 p Submitted for publication
(Grant NAG3-665)
(NASA-CR-176960; NAS 1.26:176960) Avail: NTIS
HC A02/MF A01 CSCL 20D

The primary goals are directed toward the development of a numerical method for computing flow about ice accretion shapes and determining the influence of these shapes on flow degradation. It is expedient to investigate various aspects of icing independently

in order to assess their contribution to the overall icing phenomena. The specific aspects to be examined include the water droplet trajectories with collection efficiencies and phase change on the surface, the flowfield about specified shapes including lift, drag, and heat transfer distribution, and surface roughness effects. The configurations computed were models of ice accretion shapes formed on a circular cylinder in the NASA Lewis Icing Research Tunnel. An existing Navier-Stokes program was modified to compute the flowfield over four shapes (2, 5, and 15 minute models of glaze ice, and a 15 minute accumulation of rime ice). B.G.

N86-30094*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
EXPERIMENTAL RESULTS OF THE CONTROL OF A VORTICAL FLOW BY TANGENTIAL BLOWING
N. J. Wood and L. Roberts May 1986 73 p Sponsored by NASA
(NASA-CR-176932; NAS 1.26:176932; JIAA-TR-71) Avail: NTIS HC A04/MF A01 CSCL 20D

The results of a wind tunnel test to investigate the controlling effects of tangential, leading edge blowing on the vortical flow over a delta wing are given. Blowing is used to directly control the crossflow separation points at the rounded leading edge and hence, the trajectory of the feeding sheet and the location of the vortex. Experiments were conducted for both co-flowing and counter-flowing configurations over a range of angles of attack from 0 to 90 degrees. Results in the form of pressure distributions, overall force coefficients and flow mappings were obtained. The emphasis is on data presentation rather than detailed analysis. The initial results indicate that the co-flowing configuration was capable of extending the regime of stable, controlled vortical flow over the upper surface by approximately 30 degrees angle of attack for modest blowing requirements. Increases in maximum normal force coefficient of approximately 30% were achieved and significant rolling moments produced at angles of attack from 30 to 60 degrees. The counter-flowing configuration indicated only minor lift augmentation with the exception of an isolated occurrence at 20 degrees angle of attack. At that condition, with very weak blowing, a lift augmentation of approximately 20 was measured. Author

N86-30095*# Polyatomics Research, Inc., Mountain View, Calif.
OPTICAL DIAGNOSTICS OF GAS-DYNAMIC FLOWS USING ADVANCED LASER MEASUREMENT TECHNIQUES Final Report, 1 Oct. 1983 - 31 Dec. 1984
Kenneth P. Gross 17 Jul. 1985 61 p
(Contract NCC2-244)
(NASA-CR-176950; NAS 1.26:176950) Avail: NTIS HC A04/MF A01 CSCL 20D

Using laser-induced fluorescence to probe nitrogen flows seeded with small amounts of nitric oxide, simultaneous measurements of all three thermodynamic scalar quantities temperature, density, and pressure, were demonstrated in a supersonic turbulent boundary layer. Instrumental uncertainty is 1% for temperature and 2% for density and pressure, making the techniques suitable for measurements of turbulent fluctuations. This technology is currently being transferred to an experimental program designed to use these optical techniques in conjunction with traditional methods to make measurements in turbulent flowfields that were not possible before. A detailed descritpion of the research progress and pertinent results are presented. B.G.

N86-30096*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONSTRUCTION OF HIGHER ORDER ACCURATE VORTEX AND PARTICLE METHODS Final Report
R. A. Nicolaides (Carnegie-Mellon Univ., Pittsburgh, Pa.) Jun. 1986 21 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0137-84)
(NASA-CR-178132; NAS 1.26:178132; ICASE-86-42) Avail: NTIS HC A02/MF A01 CSCL 20D

The standard point vortex method has recently been shown to be of high order of accuracy for problems on the whole plane, when using a uniform initial subdivision for assigning the vorticity to the points. If obstacles are present in the flow, this high order deteriorates to first or second order. New vortex methods are introduced which are of arbitrary accuracy (under regularity assumptions) regardless of the presence of bodies and the uniformity of the initial subdivision. Author

N86-30097*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INCIPIENT TRANSITION PHENOMENA IN COMPRESSIBLE FLOWS OVER A FLAT PLATE Final Report
Gordon Erlebacher and M. Yousuff Hussaini Jun. 1986 22 p Presented at the 10th International Conference on Numerical Methods in Fluid Dynamics
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178111; NAS 1.26:178111; ICASE-86-39) Avail: NTIS HC A02/MF A01 CSCL 20D

The full three-dimensional time-dependent compressible Navier-Stokes equations are solved by a Fourier-Chebyshev method to study the stability of compressible flows over a flat plate. After the code is validated in the linear regime, it is applied to study the existence of the secondary instability mechanism in the supersonic regime. Author

N86-30098*# Old Dominion Univ., Norfolk, Va.
THERMAL SENSING OF CRYOGENIC WIND TUNNEL MODEL SURFACES Final Report, 15 May 1984 - 28 Feb. 1985
Kamran Daryabeigi and Robert L. Ash Jul. 1986 56 p
(Contract NAS1-17099)
(NASA-CR-178136; NAS 1.26:178136) Avail: NTIS HC A04/MF A01 CSCL 20D

Different sensors and installation techniques for surface temperature measurement of cryogenic wind tunnel models were investigated. Silicon diodes were selected for further consideration because of their good inherent accuracy (their average absolute temperature deviation in comparison tests with standard platinum resistance thermometers was found to be 0.2 K in the range from 125 to 273 K). Subsurface temperature measurement was selected as the installation technique in order to minimize aerodynamic interference. Temperature distortion caused by an embedded silicon diode was studied numerically. Author

N86-30099*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
MODELING OF TRANSIENT HEAT PIPE OPERATION Semiannual Status Report, 19 Aug. 1985 - 18 Feb. 1986
Gene T. Colwell and James G. Hartley Jun. 1986 32 p
(Grant NAG1-392)
(NASA-CR-177143; NAS 1.26:177143) Avail: NTIS HC A03/MF A01 CSCL 20D

Mathematical models and associated solution procedures which can be used to design heat pipe cooled structures for use on hypersonic vehicles are being developed. The models should also have the capability to predict off-design performance for a variety of operating conditions. It is expected that the resulting models can be used to predict startup behavior of liquid metal heat pipes to be used in reentry vehicles, hypersonic aircraft, and space nuclear reactors. Work to date related to numerical solutions of governing differential equations for the outer shell and the combination capillary structure and working fluid is summarized. Finite element numerical equations using both implicit, explicit, and combination methods were examined. Author

N86-30100*# Old Dominion Univ., Norfolk, Va. Research Foundation.
CONVECTIVE HEAT TRANSFER FROM CIRCULAR CYLINDERS LOCATED WITHIN PERFORATED CYLINDRICAL SHROUDS Final Report, 16 Oct. 1985 - 30 Sep. 1986
Kamran Daryabeigi and Robert L. Ash Washington NASA Aug. 1986 99 p
(Contract NAS1-17993)
(NASA-CR-4005; NAS 1.26:4005) Avail: NTIS HC A05/MF A01 CSCL 20D

The influence of perforated cylindrical shrouds on the convec-

tive heat transfer to circular cylinders in transverse flow has been studied experimentally. Geometries studied were similar to those used in industrial platinum resistance thermometers. The influence of Reynolds number, ventilation factor (ratio of the open area to the total surface area of shroud), radius ratio (ratio of shroud's inside radius to bare cylinder's radius), and shroud orientation with respect to flow were studied. The experiments showed that perforated shrouds with ventilation factors in the range 0.1 to 0.4 and radius ratios in the range 1.1 to 2.1 could enhance the convective heat transfer to bare cylinders up to 50%. The maximum enhancement occurred for a radius ratio of 1.4 and ventilation factors between 0.2 and 0.3. It was found that shroud orientation influenced the heat transfer, with maximum heat transfer generally occurring when the shroud's holes were centered on either side of the stagnation line. However, the hole orientation effect is of second order compared to the influence of ventilation factor and radius ratio. Author

N86-30101*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE ADVANTAGES OF THE VORTICITY-VELOCITY FORMULATION OF THE EQUATIONS OF FLUID DYNAMICS
Final Report
Charles G. Speziale May 1986 11 p Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178125; NAS 1.26:178125; ICASE-86-35) Avail: NTIS HC A02/MF A01 CSCL 20D

The mathematical properties of the pressure-velocity and vorticity-velocity formulations of the equations of viscous flow are compared. It is shown that a vorticity-velocity formulation exists which has the interesting property that non-inertial effects only enter the problem through the implementation of initial and boundary conditions. This valuable characteristic, along with other advantages of the vorticity-velocity approach, are discussed in detail. Author

N86-30102# Borg-Luther Group, Atascadero, Calif.
MAGNUS EFFECT: AN OVERVIEW OF ITS PAST AND FUTURE PRACTICAL APPLICATIONS, 1850-1985, VOLUMES 1 AND 2
John Borg 1986 197 p
(Contract N00024-83-C-5350; s03-98)
(AD-A165902; AD-E750983) Avail: NTIS HC A09/MF A01 CSCL 20/4

The report is in two volumes and is intended to present the known data and past and future applications of Magnus effect devices. (Magnus effect devices are very high lift devices which can be used in applications where airfoils are currently used.) This first volume includes the history of Magnus effect devices, theory and principles, a significant patent review, practical marine applications, formulas and experimental data, comparisons of Magnus effect and other state-of-the-art devices, identification of further testing needed, and a proposed test program. Appendices include rudder research and a literature critique. The second volume is a collection of the drawings for 39 magnus effect patents plus a critique of each patent evaluating its potential, especially for marine applications. Author (GRA)

N86-30103# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
EXPERIMENTAL OBSERVATION OF THE STRUCTURE OF SHOCK WAVES IN DUSTY GAS
Hongru Yu, Jianmin Lin, Shengxue Yuan, and Zhongfa Li 27 Mar. 1986 16 p Transl. into ENGLISH from Lixue Xuebao (China), no. 6, 1983 p 531-537
(AD-A166301; FTD-ID(RS)T-1262-85) Avail: NTIS HC A02/MF A01 CSCL 20/4

The structure of shock waves in dusty gas was studied by shock tube experiments. Pressure, shock wave velocity and dust concentration were measured under the condition that the dusty loading ratio was less than 0.4 and the shock Mach number was less than 1.5. The frozen and equilibrium pressures behind the shock wave can be well described by the Rankine Hugoniot relation. But the relaxation length was significantly shorter than that calculated from the drag of a sphere at steady motion. And the disperse shock waves in dusty gas were observed. It was found that the presence of dust decreases the pressure fluctuation in the flow. The propagation velocity of the shock wave agrees with the result of the model analysis on an effective gas. GRA

N86-30104# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BLASTING AND BLAST EFFECTS IN COLD REGIONS. PART 1: AIR BLAST
Malcolm Mellor Dec. 1985 68 p
(AD-A166315; CRREL-SP-85-25-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 19/4

Numerous topics relative to blasting and blast effects in cold regions are discussed. Ideal blast waves in free air; the shock equations for air blast; scaling procedures for comparison of explosions; reflection and refraction of airblast; effect of charge height, or height of burst; attenuation of air blast and variation of shock front properties; Air blast from nuclear explosions; air blast from underground explosions; air blast from underwater explosions; air blast damage criteria; effects of ambient pressure and temperature; explosions in vacuum or in space; air blast attenuation over snow surfaces; shock reflection from snow surfaces; shock velocity over snow; variation of shock pressure with charge height over snow; and release of avalanches by air blast are among the topics discussed. GRA

N86-30105# Ballistic Research Labs., Aberdeen Proving Ground, Md.
TRANSIENT HEAT CONDUCTION IN SEMI-INFINITE SOLIDS WITH TEMPERATURE DEPENDENT PROPERTIES
Lang-Mann Chang Mar. 1986 40 p
(AD-A166613; BRL-TR-2720) Avail: NTIS HC A03/MF A01 CSCL 20/3

Similarity solutions are obtained for the transient heat conduction in a semi-infinite solid with temperature-dependent thermal properties. The surface of the solid is considered subjected to a time-varying boundary condition, either heat flux Q sub w = a t to the bth power or temperature T sub w = t sub 0(1 + t to the bth power). Solutions for the temperature distribution and the local heat flux are presented. In particular, type 420 stainless steel, whose thermal properties are strong functions of temperature, was chosen for analysis to demonstrate the significance of the effect of the temperature dependence of thermal properties on heat transfer calculations. GRA

N86-30106# Sandia National Labs., Albuquerque, N. Mex.
TWO-DIMENSIONAL FLUX-CORRECTED TRANSPORT SOLVER FOR CONVECTIVELY DOMINATED FLOWS
M. R. Baer and R. J. Gross Jan. 1986 78 p
(Contract DE-AC04-76DP-00789)
(DE86-005329; SAND-85-0613) Avail: NTIS HC A05/MF A01

A numerical technique designed to solve a wide class of convectively dominated flow problems is presented. An attractive feature of the technique is its ability to resolve the behavior of field quantities possessing large gradients and/or shocks. The method is a finite-difference technique known as flux-corrected transport (FCT) that maintains four important numerical considerations - stability, accuracy, monotonicity, and conservation. The theory and methodology of two-dimensional FCT is presented. The method is applied in demonstrative example calculations of a 2-D Riemann problem with known exact solutions and to the Euler equations in a study of classical Rayleigh-Taylor and Kelvin-Helmholtz instability problems. The FCT solver has been vectorized for execution on the Cray 1S - a typical call with a 50 by 50 mesh requires about 0.00428 cpu seconds of execution time per call to the routine. Additionally, we have maintained a modular structure for the solver that eases its implementation. Fortran listings of two versions of the 2-D FCT solvers are appended with a driver main program illustrating the call sequence for the modules. DOE

N86-30107# Los Alamos National Lab., N. Mex.
LYAPUNOV STABILITY OF IDEAL COMPRESSIBLE AND INCOMPRESSIBLE FLUID EQUILIBRIA IN THREE DIMENSIONS
D. D. Holm Aug. 1985 78 p Presented at the Fluidized Bed Combustion (FBC) Materials Workshop, Nova Scotia, Canada, 29 Jul. 1985
(Contract W-7405-eng-36)
(DE86-003648; LA-UR-85-4140; CONF-8507103-2) Avail: NTIS HC A02/MF A01

Linearized stability of ideal compressible and incompressible fluid equilibria in three dimensions is analyzed using Lyapunov's direct method. An action principle is given for the Eulerian and Lagrangian fluid descriptions and the family of constants of motion due to symmetry under fluid-particle relabelling is derived in the form of Ertel's theorem for each description. In an augmented Euleriah description, the steady equilibrium flows of these two fluids theories are identified as critical points of the conserved Lyapunov functionals defined by the sum, H + C, of the energy H, and the Ertel constants of motion, C. It turns out that unconditional linear Lyapunov stability of these flows in the norm provided by the second variation of H + C is precluded by vortex-particle stretching, even for otherwise shear-stable flows. Conditional Lyapunov stability of these flows is discussed. DOE

N86-30108# Rio Grande do Sul Univ., Porto Alegre (Brazil). Escola de Engenharia.
NAVIER-STOKES EQUATIONS BY THE FINITE ELEMENT METHOD M.S. Thesis
P. E. Portella 1984 100 p In PORTUGUESE
(DE86-700661; INIS-BR-389) Avail: NTIS (US Sales Only) HC A05/MF A01

A computer program to solve the Navier-Stokes equations by using the Finite Element Method is implemented. The solution variables investigated are stream-function/vorticity in the steady case and velocity/pressure in the steady state and transient cases. For steady state flow the equations are solved simultaneously by the Newton-Raphson method. For the time dependent formulation, a fractional step method is employed to discretize in time and artificial viscosity is used to preclude spurious oscilations in the solution. The element used is the three node triangle. Some numerical examples are presented and comparisons are made with applications already existent. DOE

N86-30109# Laboratorio de Computacao Cientifica, Rio de Janeiro (Brazil).
FINITE-ELEMENT MODEL IN VORTICITY AND CURRENT FUNCTION FOR THE NUMERICAL SOLUTION OF THE NAVIER-STOKES EQUATIONS
F. daCunhaFurtado and A. C. N. R. Galeao 1984 22 p In PORTUGUESE Presented at the 5th Latin-American Congress on Computational Methods for Engineering, Salvador, Brazil, 1 Oct. 1984
(DE86-700787; LCC-027/84; CONF-8410361-1) Avail: NTIS (US Sales Only) HC A02/MF A01

A numerical procedure for the integration of the incompressible Navier-Stokes equations, when expressed in terms of a stream function equation and a vorticity transport equation, is presented. This procedure comprises the variational formulation of the equations, the construction of the approximation spaces by the finite element method and the discretization via the Galerkin method. For the stationary problems, the system of non-linear algebraic equations resulting from the discretization is solved by the Newton-Raphson algorithm. Finally, for the transient problems, the solution of the non-linear ordinary differential equations resulting from the spatial discretization is accomplished through a Crank-Nicolson scheme. DOE

N86-30110# KMS Fusion, Inc., Ann Arbor, Mich.
OBSERVATIONS OF MASS TRANSPORT PHENOMENA IN MULTICOMPONENT LIQUID MIXTURES
M. T. Mruzek, D. L. Musinski, and R. B. Jacobs 1985 8 p Presented at the 32nd National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC08-82DP-40152)
(DE86-006483; KMSF-U-1678e; CONF-851174-31) Avail: NTIS HC A02/MF A01

Examples of surface tension effects on liquid behavior are common, such as liquid rising in a capillary tube or the beading of rain drops on a freshly waxed car. Usually though, the surface tension forces are small compared to other forces such as gravity. Situations exist, however, where the simple statement attributed to Marangoni can explain striking and unexpected observations. If for any reason difference of surface tension exists along a free liquid surface, liquid will flow toward the region of higher surface tension. Such flows are called Marangoni flows. Observations of isotopic hydrogen fuel mixtures in cryogenic Inertial Confinement Fusion targets can be explained on the basis of Marangoni flows. Additional experiments at KMS with common room temperature mixtures have produced similar results. DOE

N86-30111# Sandia National Labs., Albuquerque, N. Mex.
EVIDENCE OF NONUNIQUENESS AND OSCILLATORY SOLUTIONS IN COMPUTATIONAL FLUID MECHANICS
J. W. Nunziato, D. K. Gartling, and M. E Kipp 1985 55 p Presented at the Workshop on Oscillation Theory Computation and Methods of Compensated Compactness, Minneapolis, Minn., 1 Apr. 1985
(Contract DE-AC04-76DP-00789)
(DE86-006493; SAND-85-0861C; CONF-8504203-1) Avail: NTIS HC A04/MF A01

We will review some of our recent experiences in computing solutions for nonlinear fluids in relatively simple, two-dimensional geometries. The purpose of this discussion will be to display by example some of the interesting but difficult questions that arise when ill-behaved solutions are obtained numerically. We will consider two examples. As the first example, we will consider a nonlinear elastic (compressible) fluid with chemical reactions and discuss solutions for detonation and detonation failure in a two-dimesnisonal cylinder. In this case, the numerical algorithm utilizes a finite-difference method with artifical viscosity (von Neuman-Richtmyer method) and leads to two, distinctly different, stable solutions depending on the time step criterion used. The second example to be considered involves the convection of a viscous fluid in a rectangular container as a result of an exothermic polymerization reaction. A solidification front develops near the top of the container and propagates down through the fluid, changing the aspect ratio of the region ahead of the front. Using a Galerkin-based finite element method, a numerical solution of the partial differential equations is obtained which tracks the front and correctly predicts the fluid temperatures near the walls. However, the solution also exhibits oscillatory behavior with regard to the number of cells in the fluid ahead of the front and in the strength of the cell. More definitive experiments and analysis are required to determine whether this oscillatory phenomena is a numerical artifact or a physical reality. DOE

N86-30112# Minnesota Univ., Minneapolis.
INTERNATIONAL WORKSHOP ON TWO-PHASE FLOW FUNDAMENTALS
Joseph Kestin and Michael Z. Powdowski, ed. Jan. 1986 104 p Workshop held in Gaithersburg, Md., 22-27 Sep. 1985 Prepared in cooperation with NBS, Gaithersburg, Md.
(Contract DE-AC02-83ER-13056)
(DE86-006548; DOE/ER-13056/1) Avail: NTIS HC A06/MF A01

This document contains a report of the International Workshop on Two-Phase Flow Fundamentals. It includes summaries of the workshop discussions and recommendations of the Workshop Evaluation Committee. The primary objective of the workshop was to identify, formulate and prioritize research problems in the field of multiphase flow and heat transfer which are important for the development of efficient energy systems. In addition, contributions were made to the development of multiphase science by creating a basis for the systematic comparison between mathematical models and experiments. DOE

N86-30113# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
PRESSURE DROP IN FLASHING FLOW THROUGH OBSTRUCTIONS
M. E. Weinle and B. S. Johnston 19 Dec. 1985 19 p
(Contract DE-AC09-76SR-00001)
(DE86-007152; DPST-85-964) Avail: NTIS HC A02/MF A01

An experiment was designed to investigate the pressure drop for flashing flow across obstructions of different geometries at various flow rates. Tests were run using two different orifices to determine if the two-phase pressure drop could be characterized by the single phase loss coefficient and the general behavior of the two-phase multiplier. For the geometries studied, it was possible to correlate the multiplier in a geometry-independent fashion. DOE

N86-30114# Argonne National Lab., Ill.
STRUCTURAL DYNAMICS AND FLUID FLOW IN SHELL-AND-TUBE HEAT EXCHANGERS. SUMMARY AND OVERVIEW OF A DOE/ECUT-SPONSORED RESEARCH PROGRAM
M. W. Wambsganss, H. Halle, and T. M. Mulcahy Dec. 1985 79 p
(Contract W-31-109-eng-38)
(DE86-007798; ANL-85-76) Avail: NTIS HC A05/MF A01

Objective of the research program is to contribute to the design and development of energy-efficient, reliable, and cost-competitive industrial shell-and-tube heat exchangers. This report highlights the many technical contributions of the DOE/ECUT-sponsored program, reviews industry's use of the program results, and identifies research needs. Vibration excitation mechanisms, fluid/structure coupling, and flow distribution are briefly reviewed to provide background information. To date, the program has focused on the development of data bases of tube vibration and pressure drop information, derived from tests of a specially designed industrial-size heat exchanger. The development of an improved prediction method for fluid-elastic instability thresholds and the numerical simulation and measurement of flow distribution have also been addressed. Gas and two-phase flow testing is among the future research needs identified; such testing would require substantial modifications to the existing Heat Exchanger Test Facility. Industrial support, leading to a DOE/industry co-sponsored research pr ogram, is sought to allow for required modifications to the test facility, subsequent gas and two-phase flow testing, and expansion of the program to include further development of vibration and flow distribution prediction methods and related research. DOE

N86-30115# Technical Research Centre of Finland, Espoo.
INFLUENCE OF CONDITIONS ON THE PERFORMANCE OF SMALL HEAT PUMPS
R. Wiksten Sep. 1985 29 p In FINNISH
(DE86-751178; VTT-TUTK-366) Avail: NTIS (US Sales Only) HC A03/MF A01

In the report the use of laboratory measurement results of small heat pumps are examined when the conditions differ from those in the laboratory. First, the influences of different conditions on the continuous operation are examined. The investigation is both theoretical and empirical. According to the measurements, changes in the fluid flow to the evaporator do not influence the coefficient of performance but they do influence the heating power from the condensator. The annual coefficient of performance is also calculated, based on measurement results from laboratory. The annual coefficient of performance is calculated for a ground heat pump and for an air-to-air heat pump. The annual coefficient of performance for an air-to-air heat pump cannot be calculated by taking the coefficient of performance at average outdoor temperature. It can be calculated with the aid of the heat demand for the building and the corresponding outdoor temperature and the energy flows of the heat pump measured in stationary conditions. There is then no need for a dynamical coefficient of performance. DOE

N86-30116# Los Alamos National Lab., N. Mex.
NASA-VOF2D: A COMPUTER PROGRAM FOR INCOMPRESSIBLE FLOWS WITH FREE SURFACES
M. D. Torrey, L. D. Cloutman, R. C. Mjolsness, and C. W. Hirt Dec. 1985 138 p
(Contract W-7405-eng-36)
(DE86-007195; LA-10612-MS) Avail: NTIS HC A07/MF A01

We present the NASA-VOF2D two-dimensional, transient, free-surface hydrodynamics program. It has a variety of options that provide capabilities for a wide range of applications, and it is designed to be relatively easy to use. It is based on the fractional volume-of-fluid method, and allows multiple free surfaces with surface tension and wall adhesion. It also has a partial cell treatment that allows curved boundaries and internal obstacles. This report includes a discussion of the numerical method, a code listing, and a selection of sample problems. DOE

N86-30117# Oak Ridge National Lab., Tenn.
NEW AND FUTURE HEAT PUMP TECHNOLOGIES
F. A. Creswick 1986 11 p Presented at the Meeting Customer Needs With Heat Pumps Seminar and Exposition, Kansas City, Mo., 8 Apr. 1886
(Contract DE-AC05-84OR-21400)
(DE86-007866; CONF-860477-1) Avail: NTIS HC A02/MF A01

It is not possible to say for sure what future heat pumps will look like, but there are some interesting possibilities. In the next five years, we are likely to see US heat pumps with two kinds of innovations: capacity modulation and charge control. Capacity modulation will be accomplished by variable-speed compressor motors. The objective of charge control is to keep the refrigerant charge in the system where it belongs for best performance; there are probably many ways to accomplish this. Charge control will improve efficiency and durability; capacity modulation will further improve efficiency and comfort. The Stirling cycle heat pump has several interesting advantages, but it is farther out in time. At present, we don't know how to make it as efficient as the conventional vapor-compression heat pump. Electric utility people should be aware that major advances are being made in gas-fired heat pumps which could provide strong competition in the future. However, even a gas-fired heat pump has a substantial auxiliary electric power requirement. The resources needed to develop advanced heat pumps are substantial and foreign competition will be intense. It will be important for utilities, manufacturers, and the federal government to work in close cooperation. DOE

N86-30118# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
COMPUTATION OF DENSE SPRAY JETS
A. U. Chatwani and F. V. Bracco 1985 12 p Presented at the 3rd International Conference on Liquid Atomisation and Spray Systems, London, England, 8 Jul. 1985
(Contract DE-AC04-81AL-16338)
(DE86-008176; CONF-850796-1) Avail: NTIS HC A02/MF A01

A dense-spray model, that already accounted for drop collisions and coalescence and the influence of liquid volume-fraction on the exchange rates of mass, momentum, and energy between gas and drops, is here extended, using a line source technique, to account also for the intact liquid core in full-cone sprays from jet atomizers. The intact core significantly modifies the computed structure of the near field. The far field is found again not to be sensitive to the near field events and representation and the computed far field drop velocities are shown to compare favorably with measurements. DOE

N86-30119# Oak Ridge National Lab., Tenn.
MODELING OF FLOW FIELDS IN OSCILLATING DROPLETS
T. C. Scott 1986 28 p Presented at the 1st International Conference on Separations Science and Technology, New York, N.Y., 16 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008232; CONF-860411-2) Avail: NTIS HC A03/MF A01

Quantitative and qualitative flow visualization techniques have been used to model flow fields which occur in the droplet-continuum system for liquid-liquid solvent extraction. It was determined that the streamlines for flow in and around oscillating droplets can be modeled as the vectorial addition of low Reynolds number

Hadamard flow and flow caused by an oscillating Dirichlet ellipsoid. DOE

N86-30120# Los Alamos National Lab., N. Mex.
CAVEAT: A COMPUTER CODE FOR FLUID DYNAMICS PROBLEMS WITH LARGE DISTORTION AND INTERNAL SLIP
F. L. Addessio, D. E. Carroll, J. K. Dukowicz, F. H. Harlow, J. N. Johnson, B. A. Kashiwa, M. E. Maltrud, and H. M. Ruppel Feb. 1986 223 p
(Contract W-7405-eng-36)
(DE86-008570; LA-10613-MS) Avail: NTIS HC A10/MF A01

This report describes the CAVEAT computer code, which numerically solves the equations of transient, multimaterial, compressible fluid dynamics. General material equations of state are allowed by the use of the SESAME library. Of particular interest is the general capability to handle material interfaces, including slip, cavitation, or void closure. Also included is the capability to treat material strength and plasticity, high explosive (HE) detonations, and a k-epsilon model of turbulence. DOE

N86-30121# Metraflu, Ecully (France).
SPECTRAL STUDY OF TURBULENCE. PURE ROTATION AND INTRODUCTION TO MODE COMPOSITION Final Report [ETUDE SPECTRALE DE LA TURBULENCE. ROTATION PURE ET INTRODUCTION A LA DECOMPOSITION MODALE]
C. Cambon, C. Teissedre, and D. Jeandel Feb. 1985 64 p In FRENCH
(Contracts DRET-83-225; DRET-83-34-225-00-470-75-01)
(ESA-86-97273) Avail: NTIS HC A04/MF A01

A theoretical and simulation study of turbulence is presented. A three dimensional spectral description in a Fourier space is adopted. The nonlinear interactions are studied using a computerized simulation of a three dimensional anisotropic configuration which is too expensive for aeronautical use but useful for model validation. A simplified configuration taking into account Coriolis force in the evolution of triple correlations predicts an anisotropic evolution of the double correlations and a reduction of the energy transfer due to rotation effects. A small number of modes is found for a large number of anisotropic flows even in the case of large evolution times. ESA

N86-30122# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
MODELS AND PREDICTION OF TURBULENT FLOW WITH SUSPENDED PARTICLES Interim Report [ETUDE SUR LA MODELISATION ET LA PREDICTION D'ECOULEMENTS TURBULENTS AVEC PARTICULES (RAPPORT INTERMEDIAIRE)]
A. Berlemont, P. Desjonqueres, G. Gouesbet, and B. Julien 17 Dec. 1985 53 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-22/7135-EY; ESA-86-97278) Avail: NTIS HC A04/MF A01

The validity of the Stokes term contained in the Tchen equation and the overall validity of the Tchen equation are examined. A criterion to decide wether the Stokes term is sufficient is described. It takes in account turbulent quantities such as the velocity fluctuations. A computer program was prepared. The rotation of particles in a turbulant flow was studied. This is related to the Arnason experimental results indicating the easier dispersion of larger particles. Preliminary computation shows that the additional contributions of two lift forces could explain Arnason's results. These are a lift related to particle angular velocity and a second lift characteristic of shear flow. ESA

N86-30123# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
MODELS AND PREDICTION OF TURBULENT FLOW WITH SUSPENDED PARTICLES. REPORT ON THE WORK DONE BY ROUEN UNIVERSITY IN 1984-85 [ETUDE SUR LA MODELISATION ET LA PREDICTION D'ECOULEMENTS TURBULENTS AVEC PARTICULES. SYNTHESE DES TRAVAUX 84-85 DE L'UNIVERSITE DE ROUEN]
A. Berlemont, P. Desjonqueres, G. Gouesbet, and B. Julien 17 Dec. 1985 69 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-23/7135-EY; ESA-86-97279) Avail: NTIS HC A04/MF A01

The validity of the Stokes term contained in the Tchen equation and the overall validity of the Tchen equation are examined. Criteria are found to decide whether the Stokes contribution is sufficient to describe the main term of the movement of a particle in a turbulent flow. For the overall analysis it is noticed that some forces are not included in the Tchen equation and that the Arnason experimental results indicating the easier dispersion of larger particles should be explained. A Lagrangian approach is adopted and the Scope computer program was developed. Results show that an exponential Lagrangian correlation is not good enough. A correlation using Frenkiel functions is being explored. ESA

N86-29824# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
COOLING TECHNIQUES FOR GAS TURBINE AIRFOILS: A SURVEY
Darryl E. Metzger *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29825# Rolls-Royce Ltd., Bristol (England). Turbine Research and Methods.
ROTATING HEAT TRANSFER INVESTIGATIONS ON A MULTI-PASS COOLING GEOMETRY
R. J. Clifford *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29826# Hull Univ. (England). Dept. of Engineering Design and Manufacture.
LOCAL AND MEAN HEAT TRANSFER ON THE LEADING AND TRAILING SURFACES OF A SQUARE-SECTIONED DUCT ROTATING IN THE ORTHOGONAL-MODE
W. D. Morris and S. P. Harasgama (Royal Aircraft Establishment, Farnborough (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29827# Pratt and Whitney Aircraft of Canada Ltd., Longueuil (Quebec).
PRESSURE DROP AND HEAT TRANSFER CHARACTERISTICS OF CIRCULAR AND OBLONG LOW ASPECT RATIO PIN FINS
S. C. Arora and W. Abdel Messeh *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 15 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29828# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
EXTERNAL HEAT TRANSFER STUDY ON A HP TURBINE ROTOR BLADE
T. Arts and C. G. Graham (Rolls-Royce Ltd., Bristol (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29829# Karlsruhe Univ. (West Germany). Lehrstuhl und Inst. fuer Thermische Stroemungsmach
EFFECTS OF WAKES ON THE HEAT TRANSFER IN GAS TURBINE CASCADES
S. Wittig, A. Schulz, H. J. Bauer, and K. H. Sill *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29830# Oxford Univ. (England). Dept. of Engineering Science.
WAKE-PASSING IN A TURBINE ROTOR CASCADE

D. J. Doorly, M. L. G. Oldfield, and C. T. J. Scrivener (Rolls-Royce Ltd., Derby, England) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 18 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29831# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Antriebstechnik.
EFFECTS OF HOLE GEOMETRY, WALL CURVATURE AND PRESSURE GRADIENT ON FILM COOLING DOWNSTREAM OF A SINGLE ROW
H. Kruse *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29832# Sussex Univ., Brighton (England).
EFFECTS OF SURFACE ROUGHNESS ON HEAT TRANSFER TO GAS TURBINE BLADES
A. B. Turner, F. H. A. Tarada, and F. J. Bayley *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29833# Oxford Univ. (England). Dept. of Engineering Science.
THE EFFECT OF DENSITY RATIO ON THE FILM-COOLING OF A FLAT PLATE
C. J. P. Forth, P. J. Loftus, and T. V. Jones *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29834# Societe Nationale d'Etudes et de Construction de Moteurs d'Aviation, Moissy-Cramayel (France). Etudes Generales Aerothermiques.
STUDIES OF HEAT TRANSFER ON THE BASE OF TURBINE NOZZLES WITH AND WITHOUT FILM COOLING [ETUDES DES TRANSFERTS THERMIQUES SUR LES PLATES-FORMES DE DISTRIBUTEUR DE TURBINE AVEC ET SANS FILM DE REFROIDISSEMENT]
Ann-Elisabeth Bouiguignon *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 9 p In FRENCH (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29835# Rolls-Royce Ltd., Derby (England). Mechanical Technology.
SHROUD SEGMENTS FOR UNSHROUDED BLADE TURBINES
R. S. Attwood *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29836# Brown, Boveri und Cie, A.G., Baden (Switzerland).
ENGINE TESTS ON A COOLED GAS TURBINE STAGE
H. J. Graf *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29837# Westinghouse Canada, Inc., Hamilton (Ontario).
HEAT TRANSFER TEST EVALUATION OF THE SHELL-SPAR BLADE COOLING CONCEPT APPLIED TO INDUSTRIAL GAS TURBINES
G. P. Butt and W. Edward North (Westinghouse Electric Corp., Concordville, Pa.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 17 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29838# Calspan Advanced Technology Center, Buffalo, N.Y. Physical Sciences Dept.
HEAT-FLUX MEASUREMENTS AND ANALYSIS FOR A ROTATING TURBINE STAGE
Michael G. Dunn *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29839# Karlsruhe Univ. (West Germany). Inst. fuer Hydromechanik.
CALCULATION OF LAMINAR-TURBULENT BOUNDARY LAYER TRANSITION ON TURBINE BLADES
W. Rodi and G. Scheuerer (Erlangen-Nuremberg Univ. (West Germany).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29840# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.
A MODEL FOR CORRELATING FLAT PLATE FILM COOLING EFFECTIVENESS FOR ROWS OF ROUND HOLES
M. R. LEcuyer and F. O. Soechting (Pratt and Whitney Aircraft, West Palm Beach, Fla.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29841# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.
COMPUTATION OF THERMAL RADIATION FOR GAS TURBINE CONDITIONS
M. G. Carvalho, D. F. G. Durao, and F. C. Lockwood (Imperial Coll. of Science and Technology, London (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 7 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29842# Sussex Univ., Brighton (England). Thermo-Fluid Mechanics Research Centre.
PREDICTION OF TRANSIENT TEMPERATURES FOR AN AIR-COOLED ROTATING DISC
C. A. Long and J. M. Owen *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29843# Norges Tekniske Hoegskole, Trondheim. Dept. of Engineering Thermodynamics.
HEAT TRANSFER IN GAS TURBINE COMBUSTORS: A DISCUSSION OF MATHEMATICAL MODELING OF COMBUSTION, HEAT AND MASS TRANSFER WITH EMPHASIS ON HEAT TRANSFER IN GAS TURBINE COMBUSTORS
Bjorn F. Magnussen *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 17 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29844# Trent Polytechnic, Nottingham (England). Dept. of Mechanical Engineering.
EFFECTIVENESS MEASUREMENTS FOR A COOLING FILM DISRUPTED BY A SINGLE JET WITH WALL PLUNGING
B. L. Button *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29845# Detroit Diesel Allison, Indianapolis, Ind.
ALTERNATE COOLING CONFIGURATIONS FOR GAS TURBINE COMBUSTION SYSTEMS
D. A. Nealy, S. B. Reider, and H. C. Mongia *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 15 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29846# Leeds Univ. (England). Dept. of Fuel and Energy.
FULL COVERAGE IMPINGEMENT HEAT TRANSFER: THE VARIATION IN PITCH TO DIAMETER RATIO AT A CONSTANT GAPP

G. E. Andrews, A. A. Asere, C. I. Hussain, and M. C. Mkpadi *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 13 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29847# Societe Nationale d'Etudes et de Construction de Moteurs d'Aviation, Moissy-Cramayel (France). Centre de Villaroche
COOLING TECHNIQUES FOR TURBOJET PRE-HEATER CHANNELS [TECHNIQUES DE FROIDISSEMENT DES CANAUX DE RECHAUFFE DES TURBOREACTEURS]
M. Desaulty, P. Troullot, and S. Coutor *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 11 p In FRENCH (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29848# Oxford Univ. (England). Dept. of Engineering Science.
THE MEASUREMENT OF LOCAL HEAT TRANSFER COEFFICIENTS IN BLADE COOLING GEOMETRIES
P. T. Ireland and T. V. Jones *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29849# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AN OPTICAL PYROMETER TO MEASURE TURBINE BLADE SURFACE TEMPERATURE
Marc Charpenel and Jean Wilhem *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29850# Massachusetts Inst. of Tech., Cambridge.
HIGH FREQUENCY RESPONSE HEAT FLUX GAUGE FOR METAL BLADING
A. H. Epstein, G. R. Guenette, R. J. G. Norton (Rolls-Royce, Inc., Atlanta, Ga.), and Cao Yuzhang (Beijing Inst. of Aeronautics and Astronautics (China).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29851# Royal Aircraft Establishment, Farnborough (England). Propulsion Dept.
THE ISENTROPIC LIGHT PISTON ANNULAR CASCADE FACILITY AT RAE PYESTOCK
A. J. Brooks, D. E. Colbourne, E. T. Wedlake, T. V Jones (Oxford Univ. (England).), M. L. G. Oldfield, D. L. Schultz, and P. J. Loftus (Maryland Univ., College Park.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 23 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29852# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.
MEASUREMENTS OF FLUCTUATING GAS TEMPERATURES USING COMPENSATED FINE WIRE THERMOCOUPLES
M. N. R. Nina and G. P. Pita *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 10 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29853# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Aero Propulsion Lab.
TWO SPOT LASER VELOCIMETER MEASUREMENTS OF VELOCITY AND TURBULENCE INTENSITY IN SHOCK TUBE DRIVEN TURBINE FLOWS
Richard B. Rivir, William C. Elrod (Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.), and Michael G. Dunn (Calspan Advanced Technology Center, Buffalo, N.Y.) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29856# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).
TRANSIENT THERMAL BEHAVIOUR OF A COMPRESSOR ROTOR WITH VENTILATION: TEST RESULTS UNDER SIMULATED ENGINE CONDITIONS
E. Reile, U. Radons, and D. K. Hennecke *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 9 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29857# Instituto Superior Tecnico, Lisbon (Portugal). Dept. of Mechanical Engineering.
HEAT EXCHANGERS IN REGENERATIVE GAS TURBINE CYCLES
M. N. R. Nina and M. P. N. Aguas *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29859# Technische Univ., Aachen (West Germany). Inst. for Jet Propulsion and Turbomachinery.
EFFECT OF FILM COOLING ON THE AERODYNAMIC PERFORMANCE OF A TURBINE CASCADE
O. Koellen and W. Koschel *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 16 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29861# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
AERODYNAMIC EFFECT OF COOLANT EJECTION IN THE REAR PART OF TRANSONIC ROTOR BLADES
F. H. Kost and A. T. Holmes (Rolls-Royce Ltd., Bristol, England) *In* AGARD Heat transfer and Cooling in Gas Turbines Sep. 1985 12 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29862# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Design Aerodynamics.
THE BOUNDARY LAYER BEHAVIOUR OF AN ADVANCED GAS TURBINE ROTOR BLADE UNDER THE INFLUENCE OF SIMULATED FILM COOLING
R. Klock, H. Hoheisel, H. J. Dietrichs (Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).), and A. T. Holmes (Rolls-Royce Ltd., Bristol (England).) *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 19 p (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-30124*# Princeton Univ. Observatory, N. J.
EVALUATION OF SELECTED DETECTOR ARRAYS FOR SPACE APPLICATIONS Final Report, 1 Jun. 1982 - 30 Jun. 1985
John L. Lowrance Jun. 1985 31 p
(Grant NAG5-241)
(NASA-CR-176979; NAS 1.26:176979) Avail: NTIS HC A03/MF A01 CSCL 14B

The development of a high density Schottky barrier Infrared Charged Coupled Device (IRCCD) type image sensor for earth observation was initiated. A dual band 512 pixel linear array was developed, which was capable of being butted end to end to make an arbitrarily long linear array. Measurement made on palladium silicide IRCCDs that were two-dimensional 63 x 32 pixel arrays were summarized. The test data on a 512 pixel linear array is also summarized. B.G.

N86-30125*# Rockwell International Corp., Canoga Park, Calif.
NON-INTRUSIVE SPEED SENSOR
L. Wyett Apr. 1966 47 p
(Contract NAS8-34658)
(NASA-CR-178873; NAS 1.26:178873; RI/RD-85-283) Avail: NTIS HC A03/MF A01 CSCL 14B

In Phase I of the Non-Intrusive Speed Sensor program, a computerized literature search was performed to identify candidate technologies for remote, non-intrusive speed sensing applications in Space Shuttle Main Engine (SSME) turbopumps. The three most promising technologies were subjected to experimental evaluation to quantify their performance characteristics under the harsh environmental requirements within the turbopumps. Although the infrared and microwave approaches demonstrated excellent cavitation immunity in laboratory tests, the variable-source magnetic speed sensor emerged as the most viable approach. Preliminary design of this speed sensor encountered no technical obstacles and resulted in viable and feasible speed nut, sensor housing, and sensor coil designs. Phase II of this program developed the variable-source magnetic speed sensor through the detailed design task and guided the design into breadboard fabrication. The speed sensor and its integral speed nut were evaluated at both unit and system level testing. The final room-temperature and cryogenic spin testing of the hardware demonstrated that the sensor was capable of generating sufficient output signal to enable remote speed sensing from 1500 to 40000 rpm over a speed nut/sensor separation of 3.5 inches. Author

N86-30126# Defense Mapping Agency, Washington, D.C.
POTENTIALS OF LARGE FORMAT CAMERA PHOTOGRAPHY Final Report
R. C. Malhotra 7 Mar. 1986 33 p
(AD-A166079) Avail: NTIS HC A03/MF A01 CSCL 14/5

From the viewpoint of improved precision, resolution, area coverage, and other terrain mapping considerations, a large format camera of 30-cm focal length and a pair of stellar cameras to determine camera attitude were recommended for Apollo Missions. In this paper, the potentials of a Large Format Camera (LFC) photography are explored specifically for the purpose of carrying out photogrammetic control extension. This study is based on the error propagation analysis is in photogrammetric triangulation of a block of 22 LFC frames, having and approximate scale of 1:755,000 and taken during the October '84 Shuttle Mission 41-G. The results of the study are shown graphically as error curves of each of the simulated systems. The best results are achievable when the Geodetic Positioning System (GPS), along with minimum ground control, is used in the LFC photography block triangulation. The stellar camera is also useful in conjunction with the Geodetic Positioning System, in areas where the ground control is not available for use in the block triangulation. Average standard deviation of determination of coordinates of triangulated ground points can be as good as + or - 2.7 meters + or - 3.5 micrometers (planimetry) and + or - 5.4 meters (elevation). These correspond to + or - 3.5 micrometers (planimetry) and ; or - 7.2 micrometers (elevation) at the photo scale. GRA

N86-30127# Royal Signals and Radar Establishment, Malvern (England).
THE MELLIN TRANSFORM FILTER: A COMPUTER GENERATED HOLOGRAM
C. L. West Aug. 1985 27 p
(AD-A166191; RSRE-MEMO-3874; DRIC-BR-98698) Avail: NTIS HC A03/MF A01 CSCL 12/1

The procedure for designing a detour phase computer generated holograms is described with particular reference to a scale and rotation invariant transformation filter known as a Mellin transform filter. Experimental results are presented which demonstrate the main features of the devices. GRA

N86-30128# Air Force Academy, Colo. Research Lab.
ADVANCED LASER BASED INERTIAL INSTRUMENT DEVELOPMENT Final Report, Jan. 1984 - Mar. 1986
James R. Rotge 1986 18 p
(AD-A166307; FJSRL-TR-86-0001) Avail: NTIS HC A02/MF A01 CSCL 17/7

Active laser gyroscopes suffer from a lock-in phenomenon, a result of backscatter from the cavity optical elements, which limit their performance in the regime of near-zero rotation. The flip-flop gyro proposed and initially investigated under this effort shows potential for minimizing or avoiding this lock-in effect. The need for a high accuracy, inexpensive and reliable clock, suitable for avionics applications was the motivation for the laser clock proposed and studied during the course of this effort. Both devices require and deserve further investigation to properly demonstrate their utility. GRA

N86-30129# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
USACRREL (US ARMY COLD REGIONS RESEARCH AND ENGINEERING LABORATORY) PRECISE THERMISTOR METER
Gary M. Trachier, James S. Morse, and Steven F. Daly Dec. 1985 39 p
(AD-A166470; CRREL-SR-85-26) Avail: NTIS HC A03/MF A01 CSCL 14/2

To facilitate the study of frazil ice in the field, a highly accurate, portable water temperature meter was required. The USACRREL Precise Thermistor Meter was designed and built to meet this need. The meter is rugged, battery-operated, waterproof, and able to operate over a wide range of ambient temperatures. A unique feature of this instrument is the use of software to compensate for temperature-dependent variation in the analog electronics. The circuitry consists of an analog printed circuit board and a low power microcomputer. The resistance of a calibrated thermistor is determined and its temperature calculated using the Steinhart-Hart equation. The accuracy of the meter was determined both theoretically and in cold room tests. The hardware and software used in the meter are described. GRA

N86-30130# Pennsylvania State Univ., University Park.
RESEARCH WITH NEARFIELD ACOUSTIC HOLOGRAPHY Final Report, 1 Aug. 1982 - 30 Sep. 1985
Julian D. Maynard Mar. 1986 18 p
(Contract N00014-82-K-0610)
(AD-A166679) Avail: NTIS HC A02/MF A01 CSCL 14/5

The main objective of the research was to characterize the potential and limitations of a new sound radiation and intensity vector field measurement technique in regard to both general theory and hardware application. The topics for study included: measurement system considerations (including array construction, data acquisition electronics, calibration of transducer elements, environmental effects, tests of the system accuracy, etc.), plane hologram data processing (including wrap-around error elimination, spatial resolution limits, zoom imaging, array processor algorithms, etc.), cylindrical and spherical data processing algorithms, wideband noise research, and holography for odd-shaped surfaces. The discovery of a technique for reconstructing radiation from odd shaped surfaces represents a major breakthrough, as it allows the use of a plane array of transducers to image the backside of a three dimensional object. GRA

N86-30131# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
INVESTIGATION OF FAST REACTION SAW (SURFACE ACOUSTIC WAVE) ACCELEROMETER Final Technical Report, 2 Oct. 1980 - 30 Sep. 1984
M. E. Motamedi Nov. 1985 54 p

(Contracts MDA903-81-C-0081; DARPA Order 4061)
(AD-A166779; MRDC41082.16FR) Avail: NTIS HC A04/MF A01 CSCL 17/7

The objective is to develop surface acoustic wave (SAW) accelerometers with improved bias stability characteristics for moderately accurate inertial navigation. Methods of fabricating dual-resonator crystals with low absolute and differential aging characteristics have been developed. Tests have been performed at 10 Gs acceleration on integrated noise levels for simulated guidance system mission times of up to 20 min. Error rates less than 15 meters per hour in position of accuracy and velocity error less than 0.013 m/s have been achieved. Sensor device has a frequency stability of part in 10 to the 10th power with a dynamic range of 10 to the 6th power. Simulation shows a bit quantization of 0.0013 m/s and frequency scale factor of 770 Hz/m/sq s can be achieved. The concept of SAW accelerometer is based on construction of a SAW resonator on the surface of a piezoelectric quartz cantilever beam. Acceleration loading of the beam induces a surface strain in the resonator areas, resulting in a deviation of the center frequency. This frequency change is proportional to the acceleration input and it provides an inherent direct frequency digital output for the signal processing of the device.Author (GRA)

N86-30132# Department of the Air Force, Washington, D.C.
ROCKET EXHAUST PROBE Patent Application
Philip A. Kessel, inventor (to Air Force) Filed 10 Jan. 1986 17 p
(AD-D012224; US-Patent-Appl-SN-817714) Avail: NTIS HC A02/MF A01 CSCL 14/2

Disclosed is a rocket exhaust probe for collecting particulates from a rocket exhaust plume. The probe comprises a tungsten nose tip, a tip holder, a probe body, and a tail section. Rocket exhaust gas enters the probe at the nose tip inlet and passes into a mixing chamber where the exhaust gas mixes with an inert cooling gas that cools and decelerates the exhaust gas. The mixture of exhaust gas and inert gas then passes into a diffusion chamber where it further cools and decelerates before passsing through a submicron particle collection filter. GRA

N86-30133# Department of the Air Force, Washington, D.C.
FATIGUE TEST MACHINE Patent Application
David I. G. Jones, inventor (to Air Force) Filed 6 Dec. 1985 14 p
(AD-D012232; US-Patent-Appl-SN-805518) Avail: NTIS HC A02/MF A01 CSCL 20/11

This invention relates to an apparatus for testing materials under combined static and dynamic loads. Materials used in rotating components of, for example, jet engines are subjected to unusually severe environmental conditions during their operational lifetimes. Components such as disks and blades are subjected to high temperature excursions, high levels of 'steady' stress from centrifugal loads (low cycle stress), as well as high levels of high frequency 'dynamic' stress from resonant vibration response (high cycle stress). The thermal-mechanical cycling of the component material can lead to initiation and propagation of cracks at voids, defects or scratches. The crack initiation and propagation characteristics of materials used in jet engine components vary widely, according to whether the material is more or less ductile, and depend on temperature, low cycle stress, high cycle stress, frequency, dwell time, local atmospheric conditions and many other parameters. This abstract discloses fatigue testing machine for testing materials under combined static and dynamic loads. The mach ine comprises a right circular ring, a pair of specimen clamps adapted for slidably fitting into diametrically opposed openings in the ring, a support cradle for the ring and a shaker. The clamps comprises means for applying a static load to a specimen clamped therebetween. GRA

N86-30134# Varian Associates, Palo Alto, Calif.
INFRARED MONITORING OF GYROTRON WINDOWS
H. Huey, L. Ives, N. Lopez, and L. Mundie 1985 11 p Presented at the Infrared Information Exchange, New Orleans, La., 1 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-002449; CONF-8510202-1) Avail: NTIS HC A02/MF A01

Ceramic and single crystal windows for the transmission of high average power (greater than 50 kW) microwave and millimeter wave tubes such as the gyrotron are a key limitation in practical tube development. Thermal stresses can be calculated by computer modeling, but various assumptions lead to large uncertainties. To determine the actual window condition, a technique for monitoing the temperature distribution over the window surface with an ir camera while the gyrotron is in operation has been developed. The ir camera views the window through a perforated waveguide wall and serves both as a guide for the safe opearation of the gyrontron, as well as an aid in the analysis of new window designs. The technique is applicable to many types of high average power microwave and millimeter wave tubes. DOE

N86-30590*# Chicago Univ., Ill. Lab. for Astrophysics and Space Research.
A NEW INSTRUMENT TO MEASURE CHARGED AND NEUTRAL COMETARY DUST PARTICLES AT LOW AND HIGH IMPACT VELOCITIES
T. Economon, J. A. Simpson, and A. J. Tuzzolino *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 54-55 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30606*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CAPACITOR-TYPE MICROMETEOROID DETECTORS
J. J. Wortman (North Carolina State Univ., Raleigh.), D. P. Griffis (North Carolina Univ., Chapel Hill.), S. R. Bryan, and W. Kinard *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 94-96 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-30135*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
A 3-COMPONENT LASER-DOPPLER VELOCIMETER DATA ACQUISITION AND REDUCTION SYSTEM
L. C. Rodman, J. H. Bell, and R. D. Mehta Aug. 1985 86 p
(Contract NCC2-294)
(NASA-CR-176929; NAS 1.26:176929; JIAA-TR-63) Avail: NTIS HC A05/MF A01 CSCL 20E

A laser doppler velocimeter capable of measuring all three components of velocity simultaneously in low-speed flows is described. All the mean velocities, Reynolds stresses, and higher-order products can be evaluated. The approach followed is to split one of the two colors used in a 2-D system, thus creating a third set of beams which is then focused in the flow from an off-axis direction. The third velocity component is computed from the known geometry of the system. The laser optical hardware and the data acquisition electronics are described in detail. In addition, full operating procedures and listings of the software (written in BASIC and ASSEMBLY languages) are also included. Some typical measurements obtained with this system in a vortex/mixing layer interaction are presented and compared directly to those obtained with a cross-wire system. M.G.

N86-30136*# CLS Laser Systems, Inc., South Windsor, Conn.
NASA LIDAR SYSTEM SUPPORT AND MOPA TECHNOLOGY DEMONSTRATION Final Report
L. M. Laughman, B. Capuano, and R. J. Wayne Aug. 1986 88 p
(Contract NAS1-17127)
(NASA-CR-178144; NAS 1.26:178144) Avail: NTIS HC A05/MF A01 CSCL 20E

A series of lidar design and technology demonstration tasks in support of a CO2 lidar program is discussed. The first of these

tasks is discussed in Section VI of this report under the heading of NASA Optical Lidar Design and it consists of detailed recommendations for the layout of a CO2 Doppler lidar incorporating then existing NASA optical components and mounts. The second phase of this work consisted of the design, development, and delivery to NASA of a novel acousto-optic laser frequency stabilization system for use with the existing NASA ring laser transmitter. The second major task in this program encompasses the design and experimental demonstration of a master oscillator-power amplifier (MOPA) laser transmitter utilizing a commercially available laser as the amplifier. The MOPA design including the low chirp master oscillator is discussed in detail. Experimental results are given for one, two and three pass amplification. The report includes operating procedures for the MOPA system.Author

N86-30137# Sigma Tau Standards Corp., Tuscaloosa, Ala.
LIGHT-WEIGHT HYDROGEN MASER Final Report, Mar. 1979 - Jul. 1984
Harry E. Peters Dec. 1985 22 p
(Contract F19628-79-C-0104)
(AD-A165850; RADC-TR-85-262) Avail: NTIS HC A02/MF A01 CSCL 20/5

Based upon a new approach to cavity resonator and atom storage assembly design, experimental work was undertaken to develop a much smaller and lighter hydrogen maser frequency standard. An operational prototype maser of light-weight and small size resulted, but the new cavity and bulb design did not result in improved stability. Upon knowledge gained in this program further work funded by other government agencies has resulted in successful hydrogen maser oscillators having unprecedent frequency stability. GRA

N86-30138# Washington State Univ., Pullman.
INVESTIGATION OF BASIC CHARACTERISTICS OF LASER HEATING IN THERMOLUMINESCENCE AND OF LASER-STIMULATED LUMINESCENCE Annual Report, 15 Jul. 1985 - 15 Jul. 1986
Peter F. Braunlich, Abdollah Abtahi, Paul Kelly, and M. Runkel 18 Mar. 1986 92 p
(Contract N00014-82-K-0529; RRO-1107)
(AD-A166089) Avail: NTIS HC A05/MF A01 CSCL 20/13

A general solution of the heat diffusion equation is presented for the case of a semi-infinite two-layer system that is heated with a localized cw laser beam of Gaussian or uniform circular intensity profile. As an example, this theory is applied to thin layers of a thermoluminescent material on a substrate. The transident thermoluminescence emission response is calculated and compared with experimental results, illustrating the validity of oxide-semiconductor sandwiches, which are discussed. The theory of heating a semi-infinite two-layer system with a localized CO2 laser beam of uniform circular intensity profile is also applied to configurations consisting of thin thermoluminescent LiF; Ti, Mg phosphor layers on borosilicate glass substrates. Two optically stimulable phosphors (MgS:Ce, Sm and CaS;Ce, Sm) have been developed with the goal to eventually apply them to imaging of neutron dose distributions. These phosphors exhibit luminescence emission spectra that are different for UV excitation and for IR stimulation, a property necessary for nearly real-time radiography. GRA

N86-30139# Stanford Univ., Calif. Lab. of Physics.
STUDIES ON RADIATIVE COLLISIONAL AND ULTRAVIOLET LASERS Final Technical Report, Oct. 1982 - Sep. 1985
S. E. Harris and J. F. Young Nov. 1985 24 p
(Contract F49620-83-C-0016)
(AD-A166193; AFOSR-86-0011TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

Significant accomplishments of this program include: the first microwave pumping of an excimer laser; the first use of pulsed hollow cathode technology to produce substantial quantities of core excited metastable atoms; the use of these metastable atoms to delineate a partial Grotrian diagram for core excited sodium; the proposal of the concept of quasi-metastable quartet levels and the experimental verification of their importance in the column I metals; and the proposal for short wavelength systems based on super Coster Kronig transitions. GRA

N86-30140# Avco-Everett Research Lab., Mass.
PULSED CHEMICAL LASER TECHNOLOGY DEVELOPMENT TEST PLAN SINGLE PULSE DIAGNOSTIC TESTING
James P. Moran 15 Apr. 1986 18 p
(Contract DAAH01-83-C-0282)
(AD-A166203) Avail: NTIS HC A02/MF A01 CSCL 20/5

Single pulse DF and DF/CO2 transfer laser testing will be conducted to expand the data base for verification and extension of performance scaling relations. Scaling relations are currently based on the analytical effort completion under Task I and the comparison of this analysis with the available data. Tests will explore the effects on performance of gas composition with constituents included F2, D2, O2, HF, NF3, He, N2, and CO2 at both DF and CO2 wavelengths. Tests will explore the nature of the medium in terms of F atom initiation level and gain, the nature of the initiating electron beam source in terms of energy deposition level and uniformity and pulse length, and laser yield in terms of total energy, pulse shape and time resolved spectra. The system will operate at pressures ranging from 200 to 760 torr. GRA

N86-30141# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A HIGH REPETITION RATE AND MODE-LOCKED PHOSPHATE GLASS LASER
Huijuan He, Guoxian Lu, Yongchun Li, Linxin Qian, and Shenru Gu 4 Apr. 1986 12 p Transl. into ENGLISH from Zhong Guo Jiguang (China), v. 11, no. 7, 1984 p 385-388
(AD-A166303; FTD-ID(RS)T-0003-86) Avail: NTIS HC A02/MF A01 CSCL 20/5

High repetition rate operation of a picosecond glass laser up to 10 Hz was achieved by using a new kind of phosphate glass. The pulse duration is 24 ps, the spectral width is 0.84 A and the total energy of the pulse train is 6 mJ. The key to the operation of glass materials at high repetition rates lies not only in an improvement of their thermal conductivity, but also in an avoidance or elimination of the undesired optical pumping induced thermal effects, such as the optical path change due to change in the index of refraction with temperature, and the linear expansion coefficient. For silicate glass, both are positive. The new-type of phosphate glass adopted in our laboratory exhibits negative and positive linear expansion coefficient behavior, so that changes in the optical path resulting from both of them can be compensated by each other. As a result, such a change can reach a minimum value each time when light travels back and forth in a laser cavity. GRA

N86-30142# Litton Systems, Inc., Morris Plains, N. J. Airtron Div.
INVESTIGATION OF OXIDE AND FLUORIDE HOSTS FOR BLUE-GREEN LASERS Final Report, 1 Oct. 1982 - 31 Jan. 1985
R. F. Belt, R. Uhrin, and E. Niemczyk Aug. 1985 66 p
(Contract N00014-83-C-0072)
(AD-A166620) Avail: NTIS HC A04/MF A01 CSCL 20/5

Mixed crystals of the perovskite type structure of the system La A1(1-x) Sc(x) O3 were examined over the compositions of x=0.15-0.30. Single crystals were grown from melts in iridium crucibles using the Czochralski method. Seed crystals of (111) pure La A1 O3 were used. The growth atmosphere was controlled at 99.75% N2 and 0.25% H2. Dopants of Ce(3+) were maintained at 0.01-0.05 atomic per cent. Preliminary work on polycrystalline materials showed that blue-green luminescence at 485 nm was found. The grown crystals had various amounts of Sc incorporated and were usually translucent. At the x=.30 formulation of melt, about 60-75% of Sc is believed to enter the crystal. No direct evidence was found for ordered type structures. The phase data, compositions, crystal quality, luminescence data, and x-ray results are discussed. Several mixed fluorides were examined for

possible blue-green emission by doping with rare earths. Among the host compositions was K Mg Y3 F12, a crystal which could be doped with transition elements and rare earths. A sizeable effort provided fairly good single crystal s for future seeds. Several polycrystalline preparations were made with Ce(3+), Pr(3+), Ti(3+), Nd(3+), Cr(3+), and Er(3+). GRA

N86-30143# Department of the Air Force, Washington, D.C.
A CONDUCTIVELY COOLED LASER DIODE ARRAY PUMPED LASER Patent Application
Larry K. Conaway, inventor (to Air Force) Filed 10 Jan. 1986 17 p
(AD-D012217; US-Patent-Appl-SN-817637) Avail: NTIS HC A02/MF A01 CSCL 20/5

A conductively cooled semiconductor laser comprises a laser rod surrounded by arrays of laser diodes. The laser diodes are mounted to ceramic plates that are excellent heat extractors and electrical insulators. The ceramic plates have steps which permit diode mounting without plate to plate interference when the plates are assembled into the arrays. Conductive coatings on selected portions of the ceramic plates are used to electrically connect the diodes. GRA

N86-30144# Los Alamos National Lab., N. Mex.
CRITICAL REVIEW OF GAMMA-RAY LASER PROPOSALS
G. C. Baldwin 1985 5 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-006020; LA-UR-86-192; CONF-851185-8) Avail: NTIS HC A02/MF A01

Laser sources generating sub-nm radiation, using recoilless nuclear transitions in solids, have been proposed for years. This review examines, from the standpoint of kinetics, many solutions (e.g., narrowed line, explosive neutron pump, two-stage pump, two-step pump) that have been proposed for the basic problem: that pumping can inhibit or destroy the Moessbauer and Borrman effects, which are essential for gain. DOE

N86-30145# KMS Fusion, Inc., Ann Arbor, Mich.
NON-LTE ATOMIC PHYSICS MODEL FOR LASER FUSION AND X-RAY LASER SIMULATION
P. M. Campbell Aug. 1985 28 p
(Contract DE-AC08-82DP-40152)
(DE86-006487; KMSF-U-1662) Avail: NTIS HC A03/MF A01

In this report a method for calculating nonequilibrium atomic physics parameters in hot plasmas is described. This type of calculation is necessary for accurate simulation of laser fusion target experiments, where, generally, outside the ablation surface the target is non-LTE (Local Thermal Equilibrium). Another problem of interest in which non-LTE is important is in x-ray laser experiments. Here the whole process of interest depends on achieving a non-equilibrium atomic state, namely, a population inversion in selected atomic levels. The present model should provide a valuable calculational tool in support of several areas important to KMS programs. DOE

N86-30146# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NONLINEAR THEORY OF THE FREE-ELECTRON LASER
A. C.-L. Chian and A. dePaduaBrito Serbeto 1984 12 p
(DE86-700668; INPE-3193) Avail: NTIS (US Sales Only) HC A02/MF A01

A theory of Raman free-electron laser using a circularly polarized electromagnetic pump is investigated. Coupled wave equations that describe both linear and nonlinear evolution of stimulated Raman scattering are derived. The dispersion relation and the growth rate for the parametric instability are obtained. Nonlinear processes that may lead to saturation of the free-electron laser are discussed. DOE

N86-30147# Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo (Brazil).
DEVELOPMENT OF A SOLID STATE LASER OF Nd:YLF M.S. Thesis
R. doAmaralNeto 1984 99 p In PORTUGUESE
(DE86-700770; INIS-BR-401) Avail: NTIS (US Sales Only) HC A05/MF A01

The CW laser action was obtained at room temperature of a Nd:YLF crystal in an astigmatically compensated cavity, pumped by an argon laser. This laser was completely projected, constructed and characterized in our laboratories. It initiates a broader project on laser development that will have several applications like nuclear fusion, industry, medicine, telemetry, etc. Throught the study of the optical properties of the Nd:YLF crystal, laser operation was predicted using a small volume gain medium on the mentioned cavity, pumped by an Ar 514,5 nm laser line. To obtain the laser action at polarizations sigma (1,053 (MU)m) and (PI) (1.047 (MU)m) an active medium was prepared which was a crystalline plate with a convenient crystallographic orientation. The laser characterization is in reasonable agreement with the initial predictions. For a 3.5% output mirror transmission, the oscillation threshold is about 0.15 W incident on the crystal, depending upon the sample used. For 1 W of incident pump light, the output power is estimated to be 12 mw, which corresponds to almost 1.5% slope efficiency. The versatile arrangement is applicable to almost all optically pumped solid state laser materials. DOE

N86-30148# Lawrence Livermore National Lab., Calif.
THEORY AND ANALYSIS OF SOFT X-RAY LASER EXPERIMENTS
B. L. Whitten and A. U. Hazi Oct. 1985 15 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract W-7405-eng-48)
(DE86-005177; UCRL-93829; CONF-851053-11) Avail: NTIS HC A02/MF A01

The atomic modeling of soft X-ray laser schemes presents a formidable challenge to the theorists - a challenge magnified by the recent successful experiments. A complex plasma environment with many ion species present must be simulated. Effects such as turbulence, time dependence, and radiation transport, which are very difficult to model accurately, may be important. We shall describe our efforts to model the recently demonstrated soft X-ray laser in collisionally pumped neon-like selenium, with emphasis on the ionization balance and excited state kinetics. The relative importance of various atomic processes, such as collisional excitation and dielectronic recombination, on the inversion kinetics will be demonstrated. We shall compare our models with experimental results and evaluate the success of this technique in predicting and analyzing the results of X-ray laser experiments. DOE

N86-30149# California Univ., Berkeley. Lawrence Berkeley Lab.
DESIRABLE EXCITATION PATTERNS FOR TAPERED WIGGLERS
K. Halbach Nov. 1985 19 p Presented at the 7th International Free-Electron Laser Conference, Tahoe City, Calif., 8 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-005997; LBL-20564; CONF-850956-21) Avail: NTIS HC A02/MF A01

Angular and displacement errors associated with excitation patterns of tapered wigglers will be discussed, and patterns will be described that do not lead to such errors even when the energy of the electrons changes along the length of the wiggler, and when the real excitation is different from the ideal excitation because of systematic iron saturation. DOE

N86-30150# Los Alamos National Lab., N. Mex.
NUCLEAR STRUCTURE PROPERTIES FOR GAMMA-RAY LASERS
D. D. Strottman, E. D. Arthur, and D. G. Madland 1985 5 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract W-7405-eng-36)
(DE86-006027; LA-UR-86-249; CONF-851185-11) Avail: NTIS HC A02/MF A01

We summarize some initial results in our investigation of the nuclear physics issues of gamma-ray lasers. We describe what is known thus far from existing experimental data and illustrate how theoretical models may be employed for systematic searches of candidate nuclei. DOE

N86-30151# Rice Univ., Houston, Tex. Dept. of Chemistry.
LASER IGNITION STUDIES
L. Fredin, G. P. Hansen, J. L. Margrave, and R. G. Behrens Oct. 1985 9 p Presented at the DARPA/ARMY Symposium, Daytona Beach, Fla., 21 Oct. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-006043; LA-UR-86-383; CONF-8510280-5) Avail: NTIS HC A02/MF A01

The goal of this work is to study the details of laser induced ignition and combustion of high-temperature condensed-phase exothermic reactions. In this work high-speed photography (HSP) and real-time optical pyrometry have been combined to provide a diagnostic tool with a 1 ms temporal resolution for studying laser ignition and combustion wave propagation. Previous experiments have involved the use of HSP for studying combustion wave propagation (1) Real-time pyrometry studies of the ignition process have also been performed previously. The present paper describes how HSP has been expanded to include three-view split-frame photography to allow the ignition and combustion processes to be recorded and studied simultaneously. DOE

N86-30152# Brookhaven National Lab., Upton, N. Y.
FREQUENCY QUADRUPLED Nd-Yag LASER FOR LEGS
D. H. Dowell, G. Giordano, O. Kistner, G. Matone, A. M. Sandorfi, C. Schaerf, and C. E. Thorn 1985 6 p
(Contract DE-AC02-76CH-00016)
(DE86-006133; BNL-37623) Avail: NTIS HC A02/MF A01

In the backscattering experiment of laser light against high energy electrons at BNL Laser Electron Gamma Source (LEGS) it is planned to use an argon ion laser tuned on the 351.1 nm wave length. It is proposed to quadruple the infrared line of a Nd-YAG laser to the uv-line of 266 nm by using two crystals: a KTP for the transition ir (YIELDS) green and D-KDP for the transition green (YIELDS) uv. Modifications of the system are summarized. It is proposed that a feasibility study be started. DOE

N86-30153# Oak Ridge National Lab., Tenn.
LASER INDUCED OXIDATION OF HEAVILY DOPED SILICON
E. Fogarassy (Centre de Recherches Nucleaires, Strasbourg (France).), C. W. White, D. H. Lowndes, and J. Narayan 1985 7 p Presented at the Symposium on Phase Transitions in Condensed Systems: Experiments and Theory, Pittsburgh, Pa., 2 Dec. 1985 Prepared in cooperation with Strasbourg-1 Univ., 67 (France). Centre de Recherches Nucleaires.
(Contract DE-AC05-84OR-21400)
(DE86-006212; CONF-851260-2) Avail: NTIS HC A02/MF A01

We have investigated the incorporation of oxygen into heavily doped silicon during uv excimer laser irradiation. For the case of repetitive laser irradiations in air, the amount of oxygen incorporated into Si depends markedly on the dopant. For As and Sb implanted silicon, there is no anomalous oxygen incorporation. By contrast, increasing amounts of O are incorporated into In implanted silicon as a function of number of laser shots. The incorporation of O is associated with degradation of the optical and structural properties of the surface, and a deep diffusion of the dopant. This behavior is believed to be partly related to specific chemical reactions between oxygen and indium present in the surface at high concentrations as the result of dopant segregation during solidification. DOE

N86-30154# Oak Ridge National Lab., Tenn.
DITHER-FREE STABILIZATION OF CO2 LASERS FOR FAR INFRARED PUMPING: A PHOTOACOUSTIC APPROACH
C. A. Bennett, Jr. and D. P. Hutchinson Feb. 1986 10 p
(Contract DE-AC05-84OR-21400)
(DE86-007078; ORNL/TM-9830) Avail: NTIS HC A02/MF A01

A method based on the photoacoustic technique is described for dither-free frequency stabilization of the optical pump in a CH3OH laser operating at 119 (MU)m. Heterodyne measurements on two independently locked far infrared radiation (FIR) lasers indicate excellent long term frequency and power stability. This stabilization scheme should be applicable to all optially pumped FIR lasants. DOE

N86-30155# Lawrence Livermore National Lab., Calif.
CHARACTERIZATION OF HIGH POWER FLASHLAMPS AND APPLICATION TO Nd:GLASS LASER PUMPING
H. T. Powell, A. C. Erlandson, and K. S. Jancaitis 17 Jan. 1986 58 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-Optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-007116; UCRL-94147; CONF-860117-5) Avail: NTIS HC A04/MF A01

Detailed spectral and temporal measurements of the output radiation from Xe flashlamps are reported together with their use in predicting the pumping efficiency of Nd-doped laser glass. We have made absolute spectral-intensity measurements for 0.5, 1.5, and 4.2-cm-bore flashlamps for input powers ranging from 5 to 90 kW/cm(2) and pulselengths of 800 (MU)s. Under quasi-stationary conditions these flashlamps emit essentially identical spectra when excited at equal input power per unit-area of the bore. This behavior is characteristic of an optically-thick radiator although it is not completely clear why flashlamps should behave this way. A simple model is also described which accounts for the transient response of flashlamps by characterizing the output spectra and radiation efficiencies in terms of the radiant output power rather than the electrical input power. DOE

N86-30156# Lawrence Livermore National Lab., Calif.
SPECTROSCOPIC, OPTICAL AND THERMO-MECHANICAL PROPERTIES OF GSGG AND ITS LASER PERFORMANCE
W. F. Krupke Jan. 1986 8 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract W-7405-eng-48)
(DE86-005773; UCRL-93853; CONF-851185-6) Avail: NTIS HC A02/MF A01

Spectroscopic, optical, and thermo-mechanical properties central to the design of high average Nd:Cr: gadolinium scandium gallium garnet (GSGG) lasers are presented. The status of crystal growth and achieved laser performance levels are briefly reviewed. DOE

N86-30157# Sandia National Labs., Albuquerque, N. Mex.
NUMERICAL SIMULATION OF GAIN-GUIDED DIODE LASER ARRAYS
G. R. Hadley 1986 10 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007833; SAND-86-0490C; CONF-860366-2) Avail: NTIS HC A02/MF A01

We present a self-consistent numerical model of light propagation in diode laser arrays. This model has been used to study the free-running modes of a five-element gain-guided array operated just below threshold. The resulting calculations show that, in contrast to index-guided arrays, the modeshapes in general bear little or no resemblance to the "supermodes" obtained previously from linear perturbation theories. In addition, we find more than 5 modes for an 5-element device, so that the intensity maxima in the near-field are not necessarily centered over the stripes. These observations are explainable in terms of a simple plane wave model of the array cavity. DOE

N86-30158# Rochester Univ., N. Y. Lab. for Laser Energetics.
LLE REVIEW, VOLUME 25 Quarterly Report, Oct. - Dec. 1985
A. Schmid, ed. 1986 60 p
(Contract DE-FC08-85DP-40200)
(DE86-008195; DOE/DP-40200/19-Vol-25) Avail: NTIS

HC A04/MF A01

This volume of the LLE Review comprises reports on the performance of the active-mirror-boosted glass development laser (GDL) single-beam system; the implementation of multichannel, soft x-ray diagnostic instrumentation; computer simulation of recent OMEGA laser implosion experiments; materials and ultrafast technology developments in the LLE advanced technology program; and the the National Laser Users Facility activities for October-December 1985. The following are some highlights of the work described in this issue: (1) The active-mirror booster stage on GDL brings single-beam, 1054-nm output energy near the kilojoule level for 1-ns pulses. (2) Measurements of soft x-ray emission from 100 to 200 eV are now possible with the help of a four-channel, GHz-bandwidth diode spectrometer, which is fully integrated into a digital data acquisition system. (3) Comparison of experimental data and predictions of one-dimensional numerical simulations of OMEGA implosion experiments reveal discrepancies that can be resolved to two-dimensional calculations. (4) The technique ofpulse chirping allows temporal stretching and recompression operations to be carried out in picosecond pulses, to amplify pulses in compact systems and avoid the dangers of optical nonlinearities due to high peak powers. (5) High-average-power glass lasers require glasses with improved thermal-shock resistance. Recent gains in ion-exchange surface treatments of a phosphate-composition glass have led to a fivefold increase in thermal-shock resistance for that glass. DOE

N86-30159# Colorado Univ., Boulder. Dept. of Physics.
NEAR RESONANT ABSORPTION BY ATOMS IN INTENSE FLUCTUATING LASER FIELDS Progress Report, 1 Aug. 1985 - 31 Jul. 1986
S. J. Smith Mar. 1986 8 p
(Contract DE-FG02-85ER-13421)
(DE86-008513; DOE/ER-13421/1) Avail: NTIS HC A02/MF A01

We have proceeded with analysis and publication of data obtained using the double optical resonance technique to study the effects of phase fluctuations in saturated absorption in a 3s-3p transition in atomic sodium. We have initiated development of techniques for observing the effects of fluctuations in resonance fluorescence radiation in the same transition, using optical heterodyning. We have investigated the possibilities for carrying out studies on a partially saturated two-photon transition in molecular sodium. The major effort has been concentrated on development and application of a technique for investigating the role of amplitude fluctuations on two-photon Doppler free absorption in the 3s-5s transition in atomic sodium. In addition, a brief collaboration with scientists from other universities addresses the question of the role of fluctuations in Hanle effect measurements. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-30160*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INSTABILITY IN ROTATING MACHINERY
Dec. 1985 458 p Symposium held in Carson City, Nev., 10-14 Jun. 1985; sponsored by Bently Rotor Dynamics Research Corp. (NASA-CP-2409; E-2652; NAS 1.55:2409) Avail: NTIS HC A21/MF A01 CSCL 13I

The proceedings contain 45 papers on a wide range of subjects including flow generated instabilities in fluid flow machines, cracked shaft detection, case histories of instability phenomena in compressors, turbines, and pumps, vibration control in turbomachinery (including antiswirl techniques), and the simulation and estimation of destabilizing forces in rotating machines. The symposium was held to serve as an update on the understanding and control of rotating machinery instability problems. For individual titles, see N86-30161 through N86-30204.

N86-30161*# Ingersoll-Rand Co., Phillipsburg, N.J.
FULL LOAD SHOP TESTING OF 18,000-HP GAS TURBINE DRIVEN CENTRIFUGAL COMPRESSOR FOR OFFSHORE PLATFORM SERVICE: EVALUATION OF ROTOR DYNAMICS PERFORMANCE
R. Gordon Kirk and Mark Simpson (Ingersoll-Rand Co. Ltd., Wythenshawe (England).) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 1-13 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The results for in-plant full load testing of a 13.4 MW (18000 HP) gas turbine driven centrifugal compressor are presented and compared to analytical prertictions of compressor rotor stability. Unique problems from both oil seals and labyrinth gas seals were encountered during the testing. The successful resolution of these problems are summarized. Author

N86-30162*# Stromberg-Carlson Corp., Rochester, N. Y.
INSTABILITY ANALYSIS PROCEDURE FOR 3-LEVEL MULTI-BEARING ROTOR-FOUNDATION SYSTEMS
Shixiang Zhou and Neville F. Rieger *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 15-36 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A procedure for the instability analysis of a three-level multispan rotor systems is described. This procedure is based on a distributed mass elastic representation of the rotor system in several eight-coefficient bearings. Each bearing is supported from an elastic foundation on damped, elastic pedestals. The foundation is represented as a general distributed mass elastic structure on discrete supports, which may have different stiffness and damping properties in the horizontal and vertical directions. This system model is suited to studies of instability threshold conditions for multirotor turbomachines on either massive or flexible foundations. The instability conditions is found by obtaining the eigenvalues of the system determinant, which is obtained by the transfer matrix method from the three-level system model. The stability determinant is solved for the lowest rotational speed at which the system damping becomes zero in the complex eigenvalue, and for the whirl frequency corresponding to the natural frequency of the unstable mode. An efficient algorithm for achieving this is described. Application of this procedure to a rigid rotor in two damped-elastic bearings and flexible supports is described. A second example discusses a flexible rotor with four damped-elastic bearings. The third case compares the stability of a six-bearing 300 Mw turbine generator unit, using two different bearing types. These applications validate the computer program and various aspects of the analysis. Author

N86-30163*# Melbourne Univ., Parkville (Australia).
SIMULATION OF NON-LINEAR BEARING FORCES FOR POST-STABILITY INVESTIGATION
Z. A. Parszewski, J. M. Krodiewski, K. Krynicki, and A. E. Salek *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 37-46 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Different types of bearing designs were developed to improve dynamic properties of rotor-bearing systems. Elliptical bearings, multisleeve bearings, tilting pad and other designs such as herringbone groove were utilized to increase resistance to the onset of self excited vibrations. Experimental trials are costly, two alternative methods are used to gain a qualitative insight. The first one creates mathematical model and applies both a digital or an analog computer simulation. The second one investigates phenomena occurring on the laboratory rig with the bearing replaced by an electronic simulating device, working in a feedback loop, which produces forces,which are functions of journal displacement and velocity. The simulated hydrodynamic forces are produced according to assumed characteristics matched to the bearing type. The principal benefit of the analog simulation is that nonlinear characteristics of a subsystem are precisely identified and mathematical methods applied for a wide class of problems are checked on the experimental installation. Author

N86-30164*# Bently Rotor Dynamics Research Corp., Minden, Nev.
MEASUREMENT OF ROTOR SYSTEM DYNAMIC STIFFNESS BY PERTURBATION TESTING
Donald E. Bently and Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 47-58 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Specific aspects of the application of Modal Analysis to rotating machines are discussed. For lowest mode analysis, the circular force perturbation testing gives the best results. Examples of application are presented. Author

N86-30165*# Bently Rotor Dynamics Research Corp., Minden, Nev.
WHY HAVE HYDROSTATIC BEARINGS BEEN AVOIDED AS A STABILIZING ELEMENT FOR ROTATING MACHINES
Donald E. Bently and Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 59-64 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The advantages are discussed of hydrostatic, high pressure bearings as providers of higher margin of stability to the rotor/bearing systems. It is apparent that deliberate use of hydrostatic bearing high pressure lubricated (any gas or liquid) can easily be used to build higher stability margin into rotating machinery, in spite of the thirty years bias against high pressure lubrication. Since this supply pressure is controllable (the Direct Dynamic Stiffness at lower eccentricity is also controllable) so that within some rotor system limits, the stability margin and dynamic response of the rotor system is more readily controllable. It may be possible to take advantage of this effect in the various seals, as well as the bearings, to assist with stability margin and dynamic response of rotating machinery. The stability of the bearing can be additionally improved by taking advantage of the anti-swirling concept. The high pressure fluid supply inlets should be located tangentially at the bearing circumference and directed against rotation. The incoming fluid flow creates stability by reducing the swirling rate. E.R.

N86-30166*# Bently Nevada (UK) Ltd., Birchwood (England).
TURBINE INSTABILITIES: CASE HISTORIES
C. W. Laws *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 65-81 (For primary document see N86-30160 21-37)
Avail NTIS HC A21/MF A01 CSCL 13I

Several possible causes of turbine rotor instability are discussed and the related design features of a wide range of turbomachinery types and sizes are considered. The instrumentation options available for detecting rotor instability and assessing its severity are also discussed. Author

N86-30167*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TWO-PHASE FLOWS WITHIN SYSTEMS WITH AMBIENT PRESSURE
R. C. Hendricks, M. J. Braun (Akron Univ., Ohio.), R. L. Wheeler, III, and R. L. Mullen (Case Western Reserve Univ., Cleveland, Ohio.) *In its* Instability in Rotating Machinery (date) p 83-96 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

In systems where the design inlet and outlet pressures are maintained above the thermodynamic critical pressure, it is often assumed that two phase flows within the system cannot occur. Designers rely on this simple rule of thumb to circumvent problems associated with a highly compressible two phase flow occurring within the supercritical pressure system along with the uncertainties in rotordynamics, load capacity, heat transfer, fluid mechanics, and thermophysical property variations. The simple rule of thumb is adequate in many low power designs but is inadequate for high performance turbomachines and linear systems, where two phase regions can exist even though outlet pressure is greater than critical pressure. Rotordynamic-fluid-mechanic restoring forces depend on momentum differences, and those for a two phase zone can differ significantly from those for a single-phase zone. Using the Reynolds equation the angular velocity, eccentricity, geometry, and ambient conditions are varied to determine the point of two phase flow incipience. Author

N86-30168*# Universidade Federal de Paraiba (Brazil).
MODELING OF ELASTICALLY MOUNTED VERTICAL ROTOR
Seyyed Said Dana and Hans Ingo Weber (Universidade Estadual de Campinas, Brazil) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 105 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The evaluation of the dynamic behavior of a rotating system is possible by means of modal parameters (Eigenvalues and Eigenvectors). A mixed analytical and experimetal approach is used to identify the modal parameters of a specially designed test rig. The modal identification is done both for nonrotating as well as rotating systems. These modal parameters are used to validate a developed Finite Element Model. Author

N86-30169*# Texas A&M Univ., College Station.
EXPERIMENTAL VERIFICATION AND PRACTICAL APPLICATION OF TORQUEWHIRL THEORY OF ROTORDYNAMIC INSTABILITY
J. M. Vance, S. T. Noah, and K. B. Yim (Sundstrand Corp., Rockford, Ill.) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 107-123 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A theory developed by Vance in 1978 to explain the destabilizing effect of torque on a whirling rotor was experimentally verified. The measurements made on a specially designed test apparatus are described. New computer models were also developed to investigate the effect of torque on rotordynamic stability of multidisk flexible rotor bearing systems. The effect of torque was found to be most pronounced when the system is already marginally stable from other influences. The modifications required to include torque in a typical shaft transfer matrix are described, and results are shown which identify the type of rotor design most sensitive to load torque. Author

N86-30170*# Liaohe Chemical Fertilizer Plant, Panjin (China).
CO2 COMPRESSOR VIBRATION AND CAUSE ANALYSIS
Yin Lin Ying *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 125-133 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The operational experience of a large turbine drive carbon dioxide compressor train in a urea plant with capacity of 1620 tons/day is considered. After the initial start-up in 1976, the vibration in the HP cylinder was comparatively serious. The radial vibration reached 4.2 to 4.5 mils and fluctuated around this value. It was attributed to the rotating stall based on the spectrum analysis. Additional return line from the 4th to 4th and higher temperature of the 4th inlet has cured the vibration. Problems are described which were encountered in the operation along with their solutions, and/or improvements. Author

N86-30171*# North Staffordshire Polytechnic, Stafford (England).
INFLUENCE OF DESIGN PARAMETERS ON OCCURENCE OF OIL WHIRL
Peter J. Ogrodnik, Michael J. Goodwin, and John E. T. Penny (Aston Univ., Birmingham England) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 135-144 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Oil whirl instability is a serious problem in oil lubricated journal bearings. The phenomenon is characterized by a subsynchronous vibration of the journal within the bush and is particularly apparent in turbogenerators, aeroengines and electric motors. A review is presented of previous papers on the subject of oil whirl, and a simple theory is described which was used to aid the design of

an oil whirl test rig. Predictions of the onset of oil whirl made by the theory presented were found to agree with those of previous researchers. They showed that increasing the shaft flexibility, or the lubricant viscosity, and decreasing the bearing radial clearance tended to reduce the oil whirl onset speed thus making the system more unstable. Author

N86-30172*# Concordia Univ., Montreal (Quebec).
BACKWARD WHIRL IN A SIMPLE ROTOR SUPPORTED ON HYDRODYNAMIC BEARINGS
R. Subbiah, R. B. Rhat, T. S. Sankar, and J. S. Rao (Embassy of India, Washington, D.C.) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 145-153 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The asymmetric nature of the fluid film stiffness and damping properties in rotors supported on fluid film bearings causes a forward or a backward whirl depending on the bearing parameters and the speed of the rotor. A rotor was designed to exhibit backward synchronous whirl. The rotor-bearing system exhibited split criticals, and a backward whirl was observed between the split criticals. The orbital diagrams show the whirl pattern. Author

N86-30173*# Bently Rotor Dynamics Research Corp., Minden, Nev.
WHIRL AND WHIP: ROTOR/BEARING STABILITY PROBLEMS
Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 155-177 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A mathematical model of a symmetric rotor supported by one rigid and one fluid lubricated bearing is proposed. The rotor model is represented by generalized (modal) parameters of its first bending mode. The rotational character of the bearing fluid force is taken into account. The model yields synchronous vibrations due to rotor unbalance as a particular solution of the equations of motion, rotor/bearing system natural frequencies and corresponding self-excited vibrations known as oil whirl and oil whip. The stability analysis yields rotative speed threshold of stability. The model also gives the evaluation of stability of the rotor synchronous vibrations. In the first balance resonance speed region two more thresholds of stability are yielded. The width of this stability region is directly related to the amount of rotor unbalance. The results of the analysis based on this model stand with very good agreement with field observations of rotor dynamic behavior and the experimental results. Author

N86-30174*# Kaiserslautern Univ. (West Germany).
SOME NEW RESULTS CONCERNING THE DYNAMIC BEHAVIOR OF ANNULAR TURBULENT SEALS
H. Massmann and R. Nordmann *In* NASA. Lewis Research center Instability in Rotating Machinery Dec. 1985 p 179-194 Sponsored in part by Deutsche Forschungsgemeinschaft, West Germany (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The dynamic characteristics of annular turbulent seals applied in high pressure turbopumps can be described by stiffness, damping, and inertia coefficients. An improved procedure is presented for determining these parameters by using measurements made with newly developed test equipment. The dynamic system seal, consisting of the fluid between the cylindrical surfaces of the rotating shaft and the housing, is excited by test forces (input), and the relative motion between the surfaces (output) is measured. Transformation of the input and output time signals into the frequency domain leads to frequency response functions. An analytical model, depending on the seal parameters, is fitted to the measured data in order to identify the dynamic coefficients. Some new results are reported that show the dependencies of these coefficients with respect to the axial and radial Reynolds numbers and the geometrical data of the seal. Author

N86-30175*# Stevens Inst. of Tech., Hoboken, N. J.
ANALYTICAL PREDICTION OF LABYRINTH-SEAL-FLOW-INDUCED AROTOR EXCITATION FORCES
C. Rajakumar and E. Sisto *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 195-203 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

An analytical method to calculate the rotor excitation forces arising from labyrinth seals is presented. The objective is to model the gas flow through the seal clearance passages and cavities when the rotor is positioned eccentricly relative to the stator center. The seal flow model used in the analysis yields solutions which validate the experimentally observed influence of seal parameters on seal forces reported in the literature. The analytically predicted seal pressure distributions and forces were compared with published experimental results. Author

N86-30176*# Virginia Univ., Charlottesville.
OIL SEAL EFFECTS AND SUBSYNCHRONOUS VIBRATIONS IN HIGH-SPEED COMPRESSORS
Paul E. Allaire and John A. Kocur, Jr. *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 205-223 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Oil seals are commonly used in high speed multistage compressors. If the oil seal ring becomes locked up against the fixed portion of the seal, high oil film crosscoupled stiffnesses can result. A method of analysis for determining if the oil seals are locked up or not is discussed. The method is then applied to an oil seal in a compressor with subsynchronous vibration problems. Author

N86-30177*# Arizona State Univ., Tempe.
EFFECT OF COULOMB SPLINE ON ROTOR DYNAMIC RESPONSE
C. Nataraj, H. D. Nelson, and N. Arakere *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 225-233 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A rigid rotor system coupled by a coulomb spline is modelled and analyzed by approximate analytical and numerical analytical methods. Expressions are derived for the variables of the resulting limit cycle and are shown to be quite accurate for a small departure from isotropy. Author

N86-30178*# Liaoyang Petrochemical Fibre Co., Liaoning (China).
ROTOR-TO-STATOR RUB VIBRATION IN CENTRIFUGAL COMPRESSOR
Jin Ji Gao and Qi Min Qi *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 235-244 (For primary document see N86-30160 21-37)
Avail NTIS HC A21/MF A01 CSCL 13I

One example of excessive vibration encountered during loading of a centrifugal compressor train (H type compressor with HP casing) is discussed. An investigation was made of the effects of the dynamic load on the bearing stiffness and the rotor-bearing system critical speed. The high vibration occurred at a 'threshold load,' but the machine didn't run smoothly due to rubs even when it had passed through the threshold load. The acquisition and discussion of the data taken in the field as well as a description of the case history which utilizes background information to identify the malfunction conditions is presented. The analysis shows that the failures, including full reverse precession rub and exact one half subharmonic vibration, were caused by the oversize bearings and displacement of the rotor center due to foundation deformation and misalignment between gear shafts, etc. The corrective actions taken to alleviate excessive vibration and the problems which remain to be solved are also presented. Author

N86-30179*# Qinghua Univ. (China).
MEASURING DYNAMIC OIL FILM COEFFICIENTS OF SLIDING BEARING
Guanping Feng and Xikuan Tang *In* NASA. Lewis Research center Instability in Rotating Machinery Dec. 1985 p 245-251 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A method is presented for determining the dynamic coefficients of bearing oil film. By varying the support stiffness and damping, eight dynamic coefficients of the bearing were determined. Simple and easy to apply, the method can be used in solving practical machine problems. Author

N86-30180*# Westinghouse Electric Corp., Cheswick, Pa.
CRACKED SHAFT DETECTION ON LARGE VERTICAL NUCLEAR REACTOR COOLANT PUMP
L. Stanley Jenkins *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 253-265 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Due to difficulty and radiation exposure associated with examination of the internals of large commercial nuclear reactor coolant pumps, it is necessary to be able to diagnose the cause of an excessive vibration problem quickly without resorting to extensive trial and error efforts. Consequently, it is necessary to make maximum use of all available data to develop a consistent theory which locates the problem area in the machine. This type of approach was taken at Three Mile Island, Unit #1, in February 1984 to identify and locate the cause of a continuously climbing vibration level of the pump shaft. The data gathered necessitated some in-depth knowledge of the pump internals to provide proper interpretation and avoid misleading conclusions. Therefore, the raw data included more than just the vibration characteristics. Pertinent details of the data gathered is shown and is necessary and sufficient to show that the cause of the observed vibration problem could logically only be a cracked pump shaft in the shaft overhang below the pump bearing. Author

N86-30181*# Borg-Warner Industrial Products, Inc., Long Beach, Calif.
PUMP INSTABILITY PHENOMENA GENERATED BY FLUID FORCES
S. Gopalakrishnan *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 267-276 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Rotor dynamic behavior of high energy centrifugal pumps is significantly affected by two types of fluid forces; one due to the hydraulic interaction of the impeller with the surrounding volute or diffuser and the other due to the effect of the wear rings. The available data on these forces is first reviewed. A simple one degree-of-freedom system containing these forces is analytically solved to exhibit the rotor dynamic effects. To illustrate the relative magnitude of these phenomena, an example of a multistage boiler feed pump is worked out. It is shown that the wear ring effects tend to suppress critical speed and postpone instability onset. But the volute-impeller forces tend to lower the critical speed and the instability onset speed. However, for typical boiler feed pumps under normal running clearances, the wear ring effects are much more significant than the destabilizing hydraulic interaction effects. Author

N86-30182*# Tennessee Valley Authority, Soddy-Daisy.
VERTICAL REACTOR COOLANT PUMP INSTABILITIES
Robert M. Jones *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 277-286 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The investigation conducted at the Tennessee Valley Authority's Sequoyah Nuclear Power Plant to determine and correct increasing vibrations in the vertical reactor coolant pumps is described. Diagnostic procedures to determine the vibration causes and evaluate the corrective measures taken are also described. Author

N86-30183*# Massachusetts Inst. of Tech., Cambridge.
PREDICTION OF DESTABILIZING BLADE TIP FORCES FOR SHROUDED AND UNSHROUDED TURBINES
Yuan J. Qiu and M. MartinezSanchez *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 287-299 (For primary document see N86-30160 21-37)
(Contract NAS8-35018)
Avail: NTIS HC A21/MF A01 CSCL 13I

The effect of a nonuniform flow field on the Alford force calculation is investigated. The ideas used here are based on those developed by Horlock and Greitzer. It is shown that the nonuniformity of the flow field does contribute to the Alford force calculation. An attempt is also made to include the effect of whirl speed. The values predicted by the model are compared with those obtained experimentally by Urlicks and Wohlrab. The possibility of using existing turbine tip loss correlations to predict beta is also exploited. The nonuniform flow field induced by the tip clearnance variation tends to increase the resultant destabilizing force over and above what would be predicted on the basis of the local variation of efficiency. On the one hand, the pressure force due to the nonuniform inlet and exit pressure also plays a part even for unshrouded blades, and this counteracts the flow field effects, so that the simple Alford prediction remains a reasonable approximation. Once the efficiency variation with clearance is known, the presented model gives a slightly overpredicted, but reasonably accurate destabilizing force. In the absence of efficiency vs. clearance data, an empirical tip loss coefficient can be used to give a reasonable prediction of destabilizing force. To a first approximation, the whirl does have a damping effect, but only of small magnitude, and thus it can be ignored for some purposes. E.R.

N86-30184*# Bently Rotor Dynamics Research Corp., Minden, Nev.
IDENTIFICATION OF BEARING AND SEAL DYNAMIC STIFFNESS PARAMETERS
Donald E. Bently and Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 301-315 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The results are presented of two simple tests, mainly steady state load test and squeeze film test, for establishing the coefficients of bearings and seals. It also discusses the methodology of the tests and some observed conclusions from the obtained data. Perturbation testing results are given as an example of verification and proof of validity of the two previous tests. Author

N86-30185*# Ecole Polytechnique Federale, Zurich (Switzerland).
MAGNETIC BEARINGS FOR VIBRATION CONTROL
G. Schweitzer *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 317-326 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A survey is presented on the research of the Institute of Mechanics of the ETH in the field of vibration control with magnetic bearings. It shows a method for modelling an elastic rotor so that it can be represented by a low order model amenable to control techniques. It deals with the control law and spill-over effects, and it also discusses experimental results for an active resonance damper. Author

N86-30186*# Ingersoll-Rand Co., Phillipsburg, N.J.
ACTIVE MAGNETIC BEARINGS FOR OPTIMUM TURBOMACHINERY DESIGN
Jerry Hustak, R. Gordon Kirk, and Kenneth A. Schoeneck *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 327-336 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The design and shop test results are given for a high speed eight stage centrifugal compressor supported by active magnetic bearings. A brief summary of the rotor dynamics analysis is presented with specific attention given to design considerations for optimum rotor stability. The concerns for retrofit of magnetic bearings in existing machinery are discussed with supporting analysis of a four stage centrifugal compressor. Recommendations are given on design and analysis requirements for successful

machinery operation of either retrofit or new design turbomachinery. Author

N86-30187*# Bently Rotor Dynamics Research Corp., Minden, Nev.
ROTOR INTERNAL FRICTION INSTABILITY
Donald E. Bently and Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 337-348 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Two aspects of internal friction affecting stability of rotating machines are discussed. The first role of internal friction consists of decreasing the level of effective damping during rotor subsynchronous and backward precessional vibrations caused by some other instability mechanisms. The second role of internal frication consists of creating rotor instability, i.e., causing self-excited subsynchronous vibrations. Experimental test results document both of these aspects. Author

N86-30188*# Agrico Chemical Co., Donaldsonville, La.
TOPPING TURBINE (103-JAT) ROTOR INSTABILITY IN 1150-STPD KELLOGG AMMONIA PLANTS
Richard Thomas *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 349-359 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

In two of Agrico's three plants, instabilities in the rotor/bearing system have been an ongoing problem. On occasion plant rates, i.e., machine speed, have been restricted in order to limit the exhaust and shaft relative vibration on the 103-JAT to a maximum value of 89 micrometer (0.0035) peak to peak. The purpose is to acquaint one with Agrico's experiences with exhaust end vibration and rotor instabilities on the 103-JAT topping turbine. The final conclusions arrived at were based on: (1) field acquired data both during steady state and transient conditions; (2) computer modeling of the rotor/bearing system; and (3) vibration data taken from a control rotor during a series of test runs in a high speed balancing machine from 0 to 110% of operating speed. Author

N86-30189*# Bently Rotor Dynamics Research Corp., Minden, Nev.
HYDRAULIC INDUCED INSTABILITY ON A VERTICAL SERVICE
R. F. Bosmans *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 361-368 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The case history contained provides insight toward the mechanical and hydraulic behavior of a vertical pump. It clearly demonstrates the need for measurements on the rotor at or near the impeller area. The results are reported of an analysis on a service water pump. This pump is typical of the water pumps used throughout the power generation industry. Although little is known of the mechanical behavior of vertical pumps because of difficulty in modeling the rotor system, recent developments in the application of submersible proximity transducers have made possible the measurement of pump dynamics under operating conditions. The purpose of this study was to determine the proper selection and installation of vibration-monitoring transducers as well as to measure the effects of imbalance, misalignment, and hydraulics on the performance and reliability of vertical pumps. In addition, the cause of shaft failures on this pump was to be determined. Author

N86-30190*# Machinery Diagnostics, Inc., Minden, Nev.
AERODYNAMIC INSTABILITY: A CASE HISTORY
Robert C. Eisenmann *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 369-377 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The identification, diagnosis, and final correction of complex machinery malfunctions typically require the correlation of many parameters such as mechanical construction, process influence, maintenance history, and vibration response characteristics. The progression is reviewed of field testing, diagnosis, and final correction of a specific machinery instability problem. The case history presented addresses a unique low frequency instability problem on a high pressure barrel compressor. The malfunction was eventually diagnosed as a fluidic mechanism that manifested as an aerodynamic disturbance to the rotor assembly. Author

N86-30191*# Technische Univ., Darmstadt (West Germany).
REMARKS ON ROTOR STABILITY (A CONTRIBUTION TO DISCUSSICN DURING SYMPOSIUM ON INSTABILITY IN ROTATING MACHINERY)
E. Kraemer *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 379-383 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Influence of nonlinear factors in fluid lubricated bearings on rotor vibrations is discussed as are computation of threshold of stability for systems with multiple degrees of freedom. The reason for this investigation was to learn more about the influence of tilting pad bearings on vertical rotors. The eigenvalues, the stability threshold, the response on the Heaviside-function and the unbalance response were calculated for a rigid rotor, a Jeffcott rotor and for the finite element model of a real rotor. The comparison of the linear and nonlinear calculations shows the limit of the linear calculations. The computation is supposed to show, that the model of the Jeffcott rotor is not sufficient in most practical cases to determine the stability threshold. This was known for some years, when computed results were compared with the behavior of real machines. That's why a program was developed, which is roughly described. E.R.

N86-30192*# Polish Academy of Sciences, Gdansk.
EIGENVALUES AND STABILITY PROBLEMS OF ROTORS
Zbigniew Walczyk *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 385-397 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The essential theoretical results of the application of a developed transfer matrix method to the free transverse vibration of a rotor are shown. Gyroscopic and shear effects, rotary inertia, and external and internal damping as well as the influence of sleeve bearings and rotor supports are taken into consideration. The eigenvalues of the motion equations of the rotor are searched by using a modified determinant method. Author

N86-30193*# Technische Univ., Vienna (Austria).
CHANGES OF INSTABILITY THRESHOLDS OF ROTOR DUE TO BEARING MISALIGNMENTS
Helmut Springer, Horst Ecker, and Edgar J. Gunter (Virginia Univ., Charlottesville.) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 399-408 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The influence of bearing misalignment upon the dynamic characteristics of statistically indeterminant rotor bearing systems is investigated. Both bearing loads and stability speed limits of a rotor may be changed significantly by magnitude and direction of bearing misalignment. The useful theory of short journal bearings is introduced and simple analytical expressions, governing the misalignment problem, are carried out. Polar plots for the bearing load capacities and stability maps, describing the speed limit in terms of misalignment, are presented. These plots can be used by the designer to estimate deviations between calculation and experimental data due to misalignment effects. Author

N86-30194*# Bently Rotor Dynamics Research Corp., Minden, Nev.
DEMONSTRATION OF VARIOUS ROTOR INSTABILITIES (EXHIBIT OF BENTLY ROTOR DYNAMICS RESEARCH CORPORATION LABORATOR RIGS AT SYMPOSIUM ON INSTABILITY IN ROTAING MACHINERY)
Agnes Muszynska *In* NASA. Lewis Research Center Instability in

Rotating Machinery Dec. 1985 p 409-413 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The operation of rotor rigs used to demonstrate various instability phenomena occurring in rotating machines is described. The instability phenomena demonstrated included oil whirl/whip antiswirl, rub, loose rotating parts, water-lubricated bearing instabilities, and cracked shaft. The rotor rigs were also used to show corrective measures for preventing instabilities. Vibrational response data from the rigs were taken with modern, computerized instrumentation. The rotor nonsynchronous perturbation rig demonstrated modal identification techniques for rotor/bearing systems. Computer-aided data acquisition and presentation, using the dynamic stiffness method, makes it possible to identify rotor and bearing parameters for low modes. The shaft mode demonstrator presented the amplified modal shape line of the shaft excited by inertia forces of unbalance (synchronous perturbation). The first three bending modes of the shaft can be demonstrated. The user-friendly software, Orbits, presented a simulation of rotor precessional motion that is characteristic of various instability phenomena. The data presentation demonstration used data measured on a turbine driven compressor train as an example of how computer aided data acquisition and presentation assists in identifying rotating machine malfunctions. Author

N86-30195*# Bently Nevada Corp., Minden.
WHIRL/WHIP DEMONSTRATION
Robert Grissom *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 415-422 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Fluid flow in bearings and seals, set in motion by shaft rotation, generates dynamic forces which may result in a well recognized instability known as whirl and whip. These are lateral, forward precessional, self excited, subsynchronous vibrations in which the amplitude may vary from very small to nearly the limit of the bearing or seal clearances. Oil whirl in lubricated bearings, in particular, typically occurs at somewhat less than half rotative speed. As the rotative speed increases, the frequency relationship remains constant until the whirl frequency approaches the first balance resonance. Now the whirl is smoothly replaced by whip at a nearly constant frequency asymptotically approaching first balance resonance, independent of increasing rotative speed. Changes in bearing/seal radial loading can permit, prevent, or eliminate this instability. The oil whirl/whip rig demonstrates the effects of fluid dynamic forces generated by the rotating shaft. At low rotative speeds, this produces changes of the journal static equilibrium position within the bearing. The demonstrator shows the relationship between any load direction and the average journal equilibrium position. At higher rotative speeds, the instability threshold is observed as a function of unidirectional radial load, unbalance, and rotor configuration. Author

N86-30196*# Bently Rotor Dynamics Research Corp., Minden, Nev.
ANTI-SWIRLING DEMONSTRATION
Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Maching Dec. 1985 p 423-426 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Fluid in bearings and seals, involved in motion due to shaft rotation and generating fluid dynamic forces, represents the well recognized source of instability known as whirl and whip. It is characterized by shaft forward circular precession at subysnchronous frequency. Control of the flow pattern in the bearing/seal clearance may enhance the stability. The rotor system demonstrates the dynamic effect of perturbation of the flow pattern in a seal gap by blowing compressed air in the rotor tangential direction. This effect results in shifting the rotor threshold of stability to a higher value of rotative speed when the air jet direction opposes rotation, and to a lower value of rotative speed when the air jet direction coincides with rotation. This effect implies that an unstable rotor can be stabilized by blowing air in the direction opposite to rotation. This technique is known as anti-swirl. Author

N86-30197*# Bently Nevada Corp., Minden.
PARTIAL ROTOR-TO-STATOR RUB DEMONSTRATION
Robert Grissom *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 427-430 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

A rotor radial rub typically occurs in seals or at a blade tip or shroud when there is insufficient clearance, high vibration, or the shaft equilibrium position has been displaced to effectively limit the clearance (eccentricity). There are two extreme cases of radial rubs: full annular rub, when the rotor maintains continuous contact with the seal, etc.; and a partial rub, when the contact occurs during a fraction of the precession period. They both involve similar physical phenomena such as friction and modification of stiffness. In partial rubs with consecutive impacts, a significant average value of radial force is generated. This results in shaft average displacement in the direction opposite the rub location. The rotor rig demonstrates the characteristics of a partial lateral rub of varying severity and location. These characteristics include: (1) subharmonic components as a function of rotative speed/first balance resonance ratio and radial force; (2) higher harmonic content as a function of severity; (3) increased average rotor stiffness resulting in increased first balance resonance speed; and (4) change in overall orbital pattern as a sum of the unbalance response (1x) and subharmonic response (1nx). Author

N86-30198*# Bently Rotor Dynamics Research Corp., Minden, Nev.
ROTOR INSTABILITY DUE TO LOOSE ROTATING PART
Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 431-437 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Loosening of a rotating part from its fixed position on the shaft or a part of the stator which comes loose and begins to turn with the rotor very frequently represents machinery malfunction. The loose part becomes involved in rotative motion mostly due to dry or fluid friction, and thus its motion is very erratic. The loose part can also move axially along the shaft. Detachment of the rotating part causes changes in the rotor balance state. Most often this results in higher unbalance. During steady-state operation the effect of a loose rotating part can manifest itself through heat vibration. It can be diagnosed by observing periodic changes of amplitude and phase of the synchronous response. During start-up (or shutdown) a loose rotating part carrying some amount of unbalance may manifest its dynamic action in the form of subsynchronous vibrations, very similar to those of other instabilities. The objective of this demonstration is to observe the effect of a loose rotating part (fixed, however, in the axial direction) under both steady-state (rotor constant speed) and transient (rotor start-up or shutdown) operation. The dynamic response depends very much on the amount of damping in the system: lubrication of the loose part/shaft surfaces and addition/elimination of aerodynamic drag blades, mounted on the loose disk, significantly change the rotor response. Author

N86-30199*# Bently Rotor Dynamics Research Corp., Minden, Nev.
INSTABILITY IN HYDRAULIC MACHINES DEMONSTRATION RIG
Agnes Muszynska and M. J. Braun (Akron Univ., Ohio.) *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 439-442 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

In fluid flow machines, the working fluid involved in rotative motion due to shaft rotation significantly modifies the rotor synchronous response. This can result in the rotor maintaining the high vibration amplitude that occurs at resonance over an extended rotative speed range. The phase changes in this range are typically very small. The fluid may also create rotor instability,

i.e., subsynchronous self-excited vibrations, when the rotative speed is sufficiently high. This rotor instability is often related and increases with higher rotor unbalance (Opposite to other types of instability such as oil whirl/whip, internal friction, etc.). The rotor rig demonstrates typical dynamic behavior of hydraulic machines. At lower speeds the effect of amplitude/phase mentioned above is noticeable; at higher speeds the subsynchronous instability occurs. Author

N86-30200*# Bently Rotor Dynamics Research Corp., Minden, Nev.
CRACKED ROTOR DEMONSTRATION
R. F. Bosmans *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 443-446 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The purpose of this demonstration is to observe the behavior of a rotor with a single crack. This will be presented in oscilloscope orbits, 2X POLAR PLOTS, and spectrum cascade diagrams. Crack detection must be observed in all three formats and monitored over a period of time or start-ups. The change in the 2X behavior pattern provides an early warning that a crack potentially exists and that it is likely propagating toward total rotor fracture. Author

N86-30201*# Bently Rotor Dynamics Research Corp., Minden, Nev.
ROTOR/BEARING SYSTEM DYNAMIC STIFFNESS MEASUREMENTS
Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 447-456 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Sweep perturbation testing as used in Modal Analysis when applied to a rotating machine has to take into consideration the machine dynamic state of equilibrium at its operational rotative speed. This stands in contrasts to a static equilibrium of nonrotating structures. The rotational energy has a significant influence on rotor dynamic characteristics. The best perturbing input for rotating machines is a forward or reverse rotating, circular force applied directly to the shaft. Determination of Dynamic Stiffness Characteristics of the rotor bearing system by nonsynchronous perturbation of a symmetric rotating shaft supported in one relatively rigid and one oil lubricated bearing. Author

N86-30202*# Bently Nevada Corp., Minden.
SHAFT MODE SHAPE DEMONSTRATION
Robert Grissom *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 457-458 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

The dynamic response of a rotating machine is directly influenced by its geometric configuration and all aspects of the rotor construction. These determine two significant parameters, mass distribution and stiffness, which yield a spectrum of natural frequencies and mode shapes. The mode shapes can be presented as snapshots of the characteristic amplitude/phase reponse patterns of the shaft, due to the major forcing function of unbalance, at different rotative speeds. To demonstrate the three shaft mode shapes of the rotor rig using the Shaft Mode Demonstrator and oscilloscopes. The synchronous (1X) amplitude and phase of the rotor vibration in the vertical direction from several points along the shaft is displayed on corresponding points of the demonstrator. Unfiltered vibration from vertical and horizontal probe pairs is displayed on the oscilloscopes in orbit format for a dynamic presentation of the mode shape. Author

N86-30203*# Bently Rotor Dynamics Research Corp., Minden, Nev.
ORBITS: COMPUTER SIMULATION
Agnes Muszynska *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 459-464 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

In rotating machinery dynamics an orbit (Lissajous curve) represents the dynamic path of the shaft centerline motion during shaft rotation and resulting precession. The orbit can be observed with an oscilloscope connected to XY promixity probes. The orbits can also be simulated by a computer. The software for HP computer simulates orbits for two cases: (1) Symmetric orbit with four frequency components with different radial amplitudes and relative phase angles; and (2) Nonsymmetric orbit with two frequency components with two different vertical/horizontal amplitudes and two different relative phase angles. Each orbit carries a Keyphasor mark (one-per-turn reference). The frequencies, amplitudes, and phase angles, as well as number of time steps for orbit computation, have to be chosen and introduced to the computer by the user. The orbit graphs can be observed on the computer screen. Author

N86-30204*# Bently Rotor Dynamics Research Corp., Minden, Nev.
DATA PRESENTATION TECHNIQUES FOR ROTATING MACHINERY MALFUNCTION DIAGNOSIS
Thomas Spettel *In* NASA. Lewis Research Center Instability in Rotating Machinery Dec. 1985 p 465-468 (For primary document see N86-30160 21-37)
Avail: NTIS HC A21/MF A01 CSCL 13I

Baseline steady state data is excellent for documentation of vibration signals at normal operating conditions. Assuming that a set of initial data was acquired with the machinery in a good state of repair, any future changes or deterioration in mechanical condition can be easily compared to the baseline information. Often this type of comparison will yield sufficient information for evaluation of the problem. However, many malfunctions require the analysis of transient data in order to identify the malfunction. Steady-state data formats consist of: Time Base Waveform, Orbit, Spectrum. Transient data formats consist of: Polar, Bode, Cascade. Our objective is to demonstrate the use of the above formats to diagnose a machine malfunction. A turbine-driven compressor train is chosen as an example. The machine train outline drawing is shown. Author

N86-30205*# Spectra Research Systems, Inc., Huntsville, Ala.
BEARING TESTER DATA COMPILATION ANALYSIS, AND REPORTING AND BEARING MATH MODELING Monthly Progress Report, Jul. 1986
Joe C. Cody Aug. 1986 21 p
(Contract NAS8-36183)
(NASA-CR-176909; NAS 1.26:176909; SRS/STD-PR-535/21; Rept-5350) Avail: NTIS HC A02/MF A01 CSCL 13I

Integration of heat transfer coefficients, modified to account for local vapor quality, into the 45 mm bearing model has been completed. The model has been evaluated with two flow rates and subcooled and saturated coolant. The evaluation showed that by increasing the flow from 3.6 to 7.0 lbs/sec the average ball temperature was decreased by 102 F, using a coolant temperature of -230 F. The average ball temperature was decreased by 63 F by decreasing the inlet coolant temperature from saturated to -230 F at a flow rate of 7.0 lbs/sec. Since other factors such as friction, cage heating, etc., affect bearing temperatures, the above bearing temperature effects should be considered as trends and not absolute values. The two phase heat transfer modification has been installed in the 57 mm bearing model and the effects on bearing temperatures have been evaluated. The average ball temperature was decreased by 60 F by increasing the flow rate from 4.6 to 9.0 lbs/sec for the subcooled case. By decreasing the inlet coolant temperature from saturation to -24 F, the average ball temperature was decreased 57 F for a flow rate of 9.0 lbs/sec. The technique of relating the two phase heat transfer coefficient to local vapor quality will be applied to the tester model and compared with test data. Author

N86-30206*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FEASIBILITY STUDY OF A DISCRETE BEARING/ROLLER DRIVE ROTARY JOINT FOR THE SPACE STATION
Stuart H. Loewenthal and Fredrick T. Schuller Jul. 1986 43 p

(NASA-TM-88800; E-3138; NAS 1.15:88800) Avail: NTIS HC A03/MF A01 CSCL 13I

The most critical mechanism on board the proposed space station is the continously rotating joint which must accurately align the solar power units with the sun during earth orbit. The feasibility of a multiple, discrete bearing supported joint driven by a self-loading, pinch drive actuator was investigated for this application. This concept appears to offer greater protection against catastrophic jamming, less sensitivity to adverse thermal gradients, greater accessibility to inorbit servicing or replacement and greater adaptability to very large (5 m) truss members than to more conventional continuous support bearing/gear reducer joints. Analytical trade studies performed herein establish that a discrete cam roller bearing support system having eight hangers around a continuous ring would provide sufficient radial and bending stiffness to prevent any degradation in the fundamental frequencies of the solar wing structure. Furthermore, it appears that the pinch roller drive mechanism can be readily sized to meet or exceed system performance and service life requirements. Wear life estimates based on experimental data for a steel roller coated with an advanced polyimide film show a continuous service life more than two orders of magnitude greater than required for this application. Author

N86-30207# CRC Automatic Welding Co., Houston, Tex.
SUBMERGED ARC WELDING CONTROL VIA ARC SENSING
Final Report, 13 Sep. 1985 - 31 Jan. 1986
Milton D. Randall, George E. Cook, and Mark E. Shepard 31 Jan. 1986 178 p
(Contract N00014-85-C-0750)
(AD-A166320; CRCAW-0001AC) Avail: NTIS HC A09/MF A01 CSCL 13/8

The overall objective of this Phase I research was to establish the feasibility of using intelligence gleaned from the electrical arc signals of the submerged arc welding (SAW) process to adaptively control the position and geometry of the weld head relative to the weld joint. By so doing, it was expected that the weld joint could be tracked accurately and that proper fusion into the joint sidewall (and/or adjacent weld beads in a multipass per layer weld) and uniform fill could be adaptively maintained in real time. The limited research effort of the Phase I research program has shown that through-the-arc sensing and control methodology offers excellent promise for the SAW process. Indeed, the results achieved suggest that through-the-arc sensing will be potentially more powerful as a diagnostic and control tool for the SAW process than the other consumable electrode processes, where it has already met with high success. The results of this Phase I research indicates that the SAW process may prove to be the most applicable for through-the-arc methodologies. Therefore, additional Phase 2 research is necessary and very important and is strongly recommended. GRA

N86-30208# Army Missile Command, Redstone Arsenal, Ala. Structures Directorate.
A VISCOELASTIC-DAMAGE SIMULATION MODEL FOR FILAMENT-WOUND PRESSURE VESSELS
Johnny L. Prater May 1985 67 p
(AD-A166389; AD-E950806; AMSMI/RL-85-4-TR) Avail: NTIS HC A04/MF A01 CSCL 13/4

A model to predict the viscoelastic/damage response of a filament-wound composite cylindrical pressure vessel to a proof-test loading is developed. The matrix material of the composite system is assumed to be isotropic and linearly viscoelastic. A damage model is proposed which produces a quadratic relationship between the transverse modulus and the circumferential strains. A nonlinear model results and is solved by iterative solution based on the damage response. The elastic-viscoelastic correspondence principle is used to produce, in the Laplace domain, an associated elastic solution for the circumferential strains. The associated elastic solution is inverted by using the method of collocation to yield the time-dependent circumferential strain. A numerical example to demonstrate the simulation model is included. A proof-test loading of 5.5 MPa is applied for one minute. Results indicate that the damage as modeled reduces the instantaneous failure load from 9.977 MPa to 7.771 MPa, or 22%. The creep that occurs during the constant load phase of the proof-test loading induces a 3.65% increase in the damage. After removal of the proof-test loading, the strain recovers to zero. However, the transverse modulus does not recover. This emphasizes the need to consider the effects of proof-test loading when the in-service load limits are determined. Author (GRA)

N86-30209# Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
STEADY AND UNSTEADY AIR FLOW THROUGH AN INTAKE VALVE OF A RECIPROCATING ENGINE
A. F. Bicen, C. Vafidis, and J. H. Whitelaw 1986 9 p
(DE86-005208; DOE/NBM-6005208) Avail: NTIS HC A02/MF A01

An experimental investigation of the air flow through various axisymmetric intake ports of a reciprocating engine is reported. Detailed velocity field measurements obtained by laser Doppler anemometry and for steady and various unsteady flow conditions are presented together with valve discharge coefficients from steady flow tests. The results showed that the flow at the valve exit exhibited four regimes with a 45° seat angle compared to three in the case of a 60° valve. The overall behavior of the 45° valve, however, was found to be generally better. Rounding of the edges of the 45° valve reduced the number of flow regimes to two with marked improvements on discharge coefficient. The flow angle at the valve exit depended less on the flow regime and more on the cylinder confinement, in the absence of which the transition from one regime to another was delayed. The mean flow pattern at the valve exit was found to be insensitive to flow unsteadiness, piston confinement and valve operation and thus could be predicted with reasonable accuracy from steady flow tests. The in-cyclinder flow characteristics were also insensitive to valve operation, but strongly depended on piston interaction, flow unsteadiness and residual effects from the previous cycle. DOE

N86-30210# Allied Bendix Corp., Kansas City, Mo.
REPEATABILITY STUDY OF A 6-AXIS ROBOT
L. L. Brown Jan. 1986 26 p
(Contract DE-AC04-76DP-00613)
(DE86-006417; BDX-613-3342) Avail: NTIS HC A03/MF A01

Two tests were performed with a six-axis anthropomorphic type robot to evaluate its short-term repeatability and its drift characteristics. One test was taken with the robot mounted on a wood particle base plate; the second was taken with the robot mounted on a metal base plate. Once the robot was past an initial warm-up period, good repeatability characteristics with no significant drift were shown by the robot when it was mounted on a metal base plate. The robot mounted on the wood base plate showed significant drift from the predefined test point. DOE

N86-30211# Rockwell International Corp., Golden, Colo.
A 1000 AMP AC/DC CURRENT SOURCE FOR THE CALIBRATION OF WELDING SYSTEMS
1986 9 p Presented at the IEEE Conference on Instrumentation and Measurements, Boulder, Colo., 25 Mar. 1986
(Contract DE-AC04-76DP-03533)
(DE86-004924; RFP-3872; CONF-860354-3) Avail: NTIS HC A02/MF A01

Calibration of welding systems and parameter monitoring data acquisition systems (DAS) assures transfer of identical welds between similar welders as well as assuring continued quality control of the welding process. A 1000 amp ac/dc current source was developed to aid in the calibration of these welding systems. The equipment used to create the current source is discussed. Engineering data is presented on the performance of the current source to date. The proposed technique for traceability to the National Bureau of Standards (NBS) is given. Test results of current sensors tested are presented and how these results will influence future tests are discussed. Future work is discussed for extending

the current source's accuracy and phase capability for the current source are discussed. DOE

N86-30212# California Univ., Berkeley. Lawrence Berkeley Lab.
CRYOGENIC MECHANICAL PROPERTIES OF HIGH-MANGANESE STEEL WELDMENTS
J. W. Chan and J. W. Morris, Jr. Aug. 1985 11 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-005219; LBL-19226; CONF-850814-37) Avail: NTIS HC A02/MF A01

The structural alloys used in fusion reactor magnets of the next generation are required to have a 4.2 K yield strength and fracture toughness combination superior to that of alloys used currently. An alloy of nominal composition 18Mn-5Ni-16Cr-0.22N after proper thermomechanical treatment approaches the JAERI projected requirements and exceeds the proposed US requirements for 4.2 K yield strength and fracture toughness in the base metal. However, the properties in the welded condition are still uncertain. This work investigates the effect of autogenous GTAW on the cryogenic properties of this alloy. It was found that the 4.2 K yield strength of the weld can be increased through the addition of nitrogen to a 75% He/25% Ar shield gas; specifically, a yield strength comparable to that of the base metal was achieved for a 6 vol % nitrogen addition. Fracture toughness data are still preliminary; however, autogenous welds made on this alloy approach the US requirements for both yield strength and K/sub Ic/. DOE

N86-30213# Ad-Ex Translations International/USA, Menlo Park, Calif.
CUTTING OF METAL COMPONENTS BY INTERGRANULAR CRACKING
J. Chavand (Commissariat a l'Energie Atomique, Grenoble, France), A. Gauthier, J. J. Lopez, and G. Tanis 20 Nov. 1985 86 p Transl. into ENGLISH from "Decoupe de Composants Mettalique, part Fissuration Intergranulaire" (France) Prepared for Pacific Northwest Labs., Richland, Wash.
(Contract DE-AC06-76RL-01830)
(DE86-006949; PNL-TR-454) Avail: NTIS HC A05/MF A01

The objective of this contract was to study a new steel-sheet cutting technique for dismantling nuclear installations without in principle producing secondary waste. This technique is based on intergranular cracking of steel induced by the combined action of penetration of molten metal into the steel and application of a mechanical load. Cutting has been achieved for stainless-steel sheets with thicknesses ranging from a few mm to 50 mm and for carbon-steel plates with thicknesses between 20 and 60 mm. For carbon steel is seems possible that components as thick as 100 mm can be cut. The tests have permitted selection of the heating methods and determination of the cracking parameters for the materials and range of thickness studied. In the case of thin sheets, results were obtained for cutting in varied positions suited to the techniques of dismantling in hot cells. A temperature-measuring system using an infrared camera has been developed to determine the variation of the temperature field established in the component. In association with the three-dimensional computation code COCO developed by the CEA, this system permits prediction of the changes in stresses in the cracked zone when the cutting parameters are modified. DOE

N86-30214# California Univ., Berkeley.
MECHAN: DYNAMIC ANALYSIS OF PLANAR MECHANISMS
Charles W. Radcliffe 1 Jul. 1985 70 p
(Contract W-7405-eng-48)
(DE85-018023; UCID-30200-83-11) Avail: NTIS HC A04/MF A01

The kinematic and dynamic analysis of many common planar mechanisms can be accomplished as a sequence of subproblems where each subproblem involves the analysis of a standard component. These standard components typically involve two rigid bodies and three points of connection between the bodies themselves and or other components which make up the complete mechanism. MECHAN is an interactive computer program for the kinematic and dynamic analysis of planar mechanisms. The program is written in Microsoft Basic (MS-Basic) and will run under either the CP/M or MS DOS operating system. MECHAN allows the user to interactively define the complete mechanism as a series of standard components, specify the input motion parameters, and begin either a kinematic or dynamic analysis of the mechanism. In addition to the analysis of the primary sequence of components, the program allows the specification of arbitrary points attached to any of the moving rigid bodies and the calculation of their position, velocity, and acceleration for each position of the input member. The input member can be specified as a rotating crank, a slider moving in an arbitrary direction, or a crank driven by a linear actuator such as a hydraulic cylinder. The output of the program is in the form of a series of tables which display the angular motion of each rigid body in the mechanism, the linear motion components for each point which has been identified, the relative sliding motion at each slider, and the force components at each joint where members are connected. The force analysis can include the effect of springs or viscous dampers acting between arbitrary pairs of points on separate members. Author

N86-30215# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
COMPOSITE TURBINE BLADE DESIGN OPTIONS FOR CLAUDE (OPEN) CYCLE OTEC POWER SYSTEMS
T. R. Penney Nov. 1985 7 p Presented at the 5th International Symposium and Exhibit on OMAE, Tokyo, Japan, 13 Apr. 1986
(Contract DE-AC02-83CH-10093)
(DE85-016876; SERI/TP-252-2792; CONF-860491-1) Avail: NTIS HC A02/MF A01

Small-scale turbine rotors made from composites offer several technical advantages for a Claude (open) cycle ocean thermal energy conversion (OTEC) power system. Westinghouse Electric Corporation has designed a composite turbine rotor/disk using state-of-the-art analysis methods for large-scale (100-MW sub e) open cycle OTEC applications. Near-term demonstrations using conventional low-pressure turbine blade shapes with composite material would achieve feasibility and modern credibility of the open cycle OTEC power system. Application of composite blades for low-pressure turbo-machinery potentially improves the reliability of conventional metal blades affected by stress corrosion. DOE

N86-30216# Ingersoll-Rand Research, Inc., Princeton, N.J.
SYN-FUEL RECIPROCATING CHARGE PUMP IMPROVEMENT PROGRAM Quarterly Report, Jan. 1 - 31 Mar. 1985
1985 13 p
(Contract DE-AC22-82PC-50033)
(DE86-007482; DOE/PC-50033/T11) Avail: NTIS HC A02/MF A01

Two floating piston seals have been tested in the Ingersoll-Rand Standard Pump Div. Model No. 3V3 triplex reciprocating pump which was special built for this development program. The third leg of the pump was operated in the conventional mode to service as a baseline wear rate. The pump operated in a 110 mesh sand-water slurry at 150 rev. per minute with a plunger stroke of 3 inches and a piston stroke of 1.42 inches. This duplicated the intended piston speed and stroke of the Cattettsburg 7V3 reciprocating charge pump. However, the plunger stroke is unavoidably low, it should be seven inches to match the Catlettsburg pump. The pistons were flushed at the rate of 0.5%. The pump was operated for 200 hours. The flush liquid to the pump was interrupted for several hours because of a drive belt failure. However, even with that problem, biased on the observed wear rates during these tests, both seals should have a life in sand of approximately 500 to 550 hours. The wear rate in sand indicates that both seals would have a life in a coal slurry which would exceed two to four thousand hours. Both seals maintained a clean volume of liquid between the piston and the plunger/packing area throughout the tests. There was no change in operating characteristics during the 200 hour tests with both pistons. The conventional leg failed twice during the tests, requiring replacement of packing, plunger, and throat bushing. DOE

N86-30217# New Energy Development Organization, Tokyo (Japan).
DEVELOPMENT OF STIRLING ENGINE IN FY 1984
Aug. 1985 33 p
(DE86-900207; NP-6900207) Avail: NTIS (US Sales Only) HC A03/MF A01

Four engine types utilizing the Stirling cycle are studied. The engines include: a 3 kW displacer, a 3 kW two-piston, a 30 kW swash plate, and a 30 kW double-crank engine. The engines were developed for use in air conditioners and electric generators. DOE

N86-30218# Oak Ridge National Lab., Tenn.
ROBOTICS APPLICATIONS ON AN ADVANCED HYPERCUBE MULTIPROCESSOR: INITIAL DEVELOPMENTS
J. Barhen, M. C. G. Hall, and J. R. Einstein 1986 8 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008237; CONF-860434-7) Avail: NTIS HC A02/MF A01

Specialized computer architectures for advanced robotics applications at ORNL/CESAR are based on the hypercube ensemble concept. We summarize the current status of algorithm development and present results for robot dynamics and navigation problems. DOE

N86-30219# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Struct
PRELIMINARY INSTRUMENTATION FOR AEROELASTIC TESTS AT THE COMPRESSOR LEVEL Final Report [INSTRUMENTATION PRELIMINAIRE AUX ESSAIS AEROELASTIQUES AU BANC COMPRESSEUR]
I. Cafarelli Dec. 1985 15 p In FRENCH
(Contract SNECMA-265.806-VY)
(ONERA-RT-95/7108-RY-054-R; ESA-86-97274) Avail: NTIS HC A02/MF A01

Unsteady pressure characterization methods are presented. The instrumentation of the blades before being assembled is described, including the unsteady sensors and an interface printed circuit. The assembling procedures and supplementary precautions such as protective painting are also discussed. ESA

N86-30220# Battelle Columbus Labs., Ohio.
BACKGROUND REVIEW ON COMPRESSORS FOR GAS ENGINE-DRIVEN HEAT PUMPS Task Technical Report, Sep. 1985 - Mar. 1986
R. L. Hall and J. C. Swain Apr. 1986 94 p
(Contract GRI-5084-242-1118)
(PB86-201175; N-4577-0401; GRI-86/0084) Avail: NTIS HC A05/MF A01 CSCL 13A

The efficiency and durability of various types of open shaft compressors for potential application to residential and light commercial gas engine-driven heat pump applications are examined. Variable speed efficiency data for hermetic, semihermetic, and open shaft compressors were obtained from the public literature and from compressor manufacturers in the U. S., Japan, and in Europe. Efficiency comparisons based upon refrigerants R12 and R22 at a fixed compressor pressure ratio indicate that reciprocating compressors have the highest coefficients of performance (COPs) for compressor speeds ranging from 1000 to 2500 rpm. Scroll and Wankel compressors appear to offer the highest COPs above 2500 rpm. An important finding is that open shaft compressors with proven life and reliability for residential gas engine heat pump applications do not appear to be available as production units. GRA

N86-29854# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
INFLUENCE AND TIP CLEARANCE MEASUREMENT IN TURBOMACHINES
Jacques Paulon *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 8 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29855# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
SIMULATION OF FLOW AND HEAT TRANSFER IN ANNULAR CAVITIES BETWEEN DISKS IN TURBOMACHINERY
Denis Dutoya *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

N86-29858# Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
CERAMIC HEAT EXCHANGERS FOR GAS TURBINES OR TURBOJET ENGINES
Serge Boudigues and Jean Fabri *In* AGARD Heat Transfer and Cooling in Gas Turbines Sep. 1985 14 p In FRENCH; ENGLISH summary (For primary document see N86-29823 21-07)
Avail: NTIS HC A23/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-30221 British Library Lending Div., Boston Spa (England).
USE OF ACOUSTIC EMISSION IN STUDY OF DEFECTS IN BUTT WELD DURING COOLING
V. I. Petrov, G. T. Kortovin, and N. A. Chelyshev 1985 5 p Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 10, 1985 p 151-152
(BLL-M-36732-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The use of acoustic emission during cooling of butt-welded articles such as drills, milling cutters etc. to assess the soundness of the joint was studied on specimens 16-30 mm in diameter made up of a carbon-steel part up to 300 mm and a high-speed-cutting steel part up to 90 mm long. The butt-welded joint was sound in some and defective in other specimens. Author

N86-30222 British Library Lending Div., Boston Spa (England).
INDUSTRIAL INSPECTION OF GRAIN SIZE OF PRECISION TUBES AFTER HEAT TREATMENT
V. I. Frolova and P. P. Gusev 1985 4 p Transl. into ENGLISH from Stal (USSR), no. 11, 1985 p 55
(BLL-M-36744-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A special immersion bath has been developed for ultrasonic inspection of the grain size of precision tubes by the echo-pulse method directly after heat treatment. A brief outline of this process is given. Such inspection permits in-line adjustment of heat treatment schedules to be carried out. Author

N86-30223# Los Alamos National Lab., N. Mex.
APPLICATION OF SYSTEMS ANALYSIS TECHNIQUES TO VULNERABILITY STUDIES OF COMPLEX INSTALLATIONS
T. F. Bott 1986 7 p Presented at the 9th Advances in Reliability Technology Symposium, London, Engl., 1 Apr. 1986
(Contract W-7405-eng-36)
(DE86-006012; LA-UR-86-119; CONF-8604111-1) Avail: NTIS HC A02/MF A01

Application of reliability and risk analysis methods (particularly fault trees) to failure analysis of systems in hostile manmade environments is discussed. Methods for constructing, analyzing, and interpreting the fault trees, graphs, and diagrams are described. The application of fault-trees, directed graphs, and functional diagrams to problems in sabotage, survivability, and information protection is discussed in general terms. Special problems

encountered in this type of analysis are discussed, and future research directions are considered. DOE

N86-30224# Oak Ridge Y-12 Plant, Tenn.
ULTRASONIC ANALYSIS OF THIN ADHESIVE BONDS
C. A. Pickett Jul. 1985 9 p Presented at the Review of Progress in Quantitative NDE, Williamsburg, Va., 23 Jun. 1985
(Contract DE-AC05-84OS-21400)
(DE86-006515; Y/DW-580; CONF-8506110-7) Avail: NTIS HC A02/MF A01

An investigation is reported whose purpose was to determine the cause of amplitude variation that occurs during the ultrasonic inspection of very thin adhesive bonds. Results indicate that the metal-adhesive-metal package behaves like a narrow bandpass filter for signals in the ultrasonic domain. This effect is attributed to a mechanical resonance resulting from material thicknesses and acoustic impedances, and its effects on ultrasonic inspection are discussed. Further work is planned in determining the adhesive thickness of thin bonds ultrasonically and in extending inspection capabilities to include larger thickness range. DOE

N86-30225# Mound Lab., Miamisburg, Ohio.
STRENGTH CHARACTERIZATION METHOD FOR EVALUATING CERAMIC-TO-METAL BONDS
D. L. Sheppard 14 Feb. 1986 11 p
(Contract DE-AC04-76DP-00053)
(DE86-007526; MLM-3336) Avail: NTIS HC A02/MF A01

A quick and reliable method has been devised for characterizing bond strengths of cylindrically shaped ceramic-to-metal structures. The method uses simplified geometry to evaluate the contribution of bond strength to the overall strength of ceramic-to-metal structures. Data show that strength differences resulting from process variations can be measured through this straightforward technique. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-30226 British Library Lending Div., Boston Spa (England).
CALCULATING THE TEMPERATURE AND STRESSES WHEN ONE SIDE OF A PLATE IS HEATED WITH A CONSTANT FLOW OF HEAT
V. M. Guba and Yu. S. Postolnik 1986 8 p Transl. into ENGLISH from Iz. (USSR), p 119-122
(BLL-M-36723-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

A mathematical procedure based on earlier work is given for determining the temperature and stress fields in plates, one of the surfaces of which is heated by a constant flow of heat and the other by convection from the ambient atmosphere. A model is used, and approximate analytical relationships are obtained for calculating the temperature and stresses in plates. The procedure is applied to free plates and plates rigidly held. Author

N86-30227*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
INTEGRATED RESEARCH IN CONSTITUTIVE MODELLING AT ELEVATED TEMPERATURES, PART 1 Final Report
W. E. Haisler and D. H. Allen Jun. 1986 332 p
(Grant NAG3-491)
(NASA-CR-177237; NAS 1.26:177237; MM-4998-86-13-Pt-1) Avail: NTIS HC A15/MF A01 CSCL 20K

Topics covered include: numerical integration techniques; thermodynamics and internal state variables; experimental lab development; comparison of models at room temperature; comparison of models at elevated temperature; and integrated software development. For individual titles, see N86-30228 through N86-30232.

N86-30228*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
[INTEGRATED RESEARCH IN CONSTITUTIVE MODELLING AT ELEVATED TEMPERATURES: SUMMARY OF THE PROJECT]
W. E. Haisler and D. H. Allen *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 37 p (For primary document see N86-30227 21-39)
Avail: NTIS HC A15/MF A01 CSCL 20K

This research centers on evaluation of thermoviscoplastic constitutive models for metals at elevated temperatures. The intent of the research was to improve existing experimental facilities at the research site, to compare existing models to experiment for the materials in question, and to extend existing models where necessary to better predict complex material response. Conclusions of the research to date include the following: (1) Euler's method is the most efficient for integrating the models of methods considered; (2)Walker's model is the most economical to integrate, while Miller's model is least economical and also tends to be unstable; (3) ISV theory can be used as a general framework for comparing all models in the current literature; (4) a laboratory has been developed to perform all of the complicated elevated temperature experiments necessary for the research; (5) for aluminum at room temperature, none of the models considered appears accurate at predicting uniaxial cyclic response; and (6) at 1100 deg F Walker's model appears to be most accurage for predicting the uniaxial cyclic response of IN718. J.P.B.

N86-30229*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
NUMERICAL CONSIDERATIONS IN THE DEVELOPMENT AND IMPLEMENTATION OF CONSTITUTIVE MODELS
W. E. Haisler and P. K. Imbrie *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 17 p Previously announced as N85-31541 (For primary document see N86-30227 21-39)
Avail: NTIS HC A15/MF A01 CSCL 20K

Several unified constitutive models were tested in uniaxial form by specifying input strain histories and comparing output stress histories. The purpose of the tests was to evaluate several time integration methods with regard to accuracy, stability, and computational economy. The sensitivity of the models to slight changes in input constants was also investigated. Results are presented for In100 at 1350 F and Hastelloy-X at 1800 F. Author

N86-30230*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
EVALUATION OF THE NUMERICAL STABILITY AND SENSITIVITY OF MATERIAL PARAMETER VARIATIONS FOR SEVERAL UNIFIED CONSTITUTIVE MODELS
P. K. Imbrie, W. E. Haisler, and D. H. Allen *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 88 p (For primary document see N86-30227 21-39)
(MM-4998-85-6-Pt-1) Avail: NTIS HC A15/MF A01 CSCL 20K

The sensitivity of unified constitutive theories to numerical integration techniques was investigated. Numerical simulations of Hastelloy-X at 1800 F were evaluated in uniaxial form. Both single and multistep integration schemes were used. The various algorithms were compared with regard to accuracy, stability, and computational economy. The material parameter sensitivity was studied by varying the material constants by a specified amount and comparing predicted responses. Numerical comparisons show that, of the numerical integration methods studied, Eulers method is the most accurate, stable, and efficient procedure. The input sensitivity studies indicated that some constitutive models are more sensitive to experimental errors than others and that a 5% error in certain material constraints may lead to 15 to 30% changes in predicted response. B.G.

N86-30231*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
ON THE USE OF INTERNAL STATE VARIABLES IN THERMO-VISCOPLASTIC CONSTITUTIVE EQUATIONS
D. H. Allen and J. M. Beek *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 20 p
Previously announced as N85-31536 (For primary document see N86-30227 21-39)
Avail: NTIS HC A15/MF A01 CSCL 20K

The general theory of internal state variables are reviewed to apply it to inelastic metals in use in high temperature environments. In this process, certain constraints and clarifications will be made regarding internal state variables. It is shown that the Helmholtz free energy can be utilized to construct constitutive equations which are appropriate for metallic superalloys. Internal state variables are shown to represent locally averaged measures of dislocation arrangement, dislocation density, and intergranular fracture. The internal state variable model is demonstrated to be a suitable framework for comparison of several currently proposed models for metals and can therefore be used to exhibit history dependence, nonlinearity, and rate as well as temperature sensitivity.
E.A.K.

N86-30232*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
A COMPARISON OF CURRENT MODELS FOR NONLINEAR RATE-DEPENDENT MATERIAL BEHAVIOR OF CRYSTALLINE SOLIDS M.S. Thesis c76
Joachim Michael Beek *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 148 p
(For primary document see N86-30227 21-39)
Avail: NTIS HC A15/MF A01 CSCL 20K

Three theories for prediction of inelastic deformation which are based on considerations of the microstructural behavior of materials are reviewed. The mechanics of continua with internal state variables and the historical development of constitutive modeling are summarized. A detailed discussion, including chronological development, review of theory, and method of determination of material parameters, of each model follows. An experimental data base is established from which the material parameters of the constitutive equations are calculated. Finally computer simulations of various load histories are performed and compared to the experiment, and conclusions of the ability of each theory to model inelastic deformation are drawn.
B.G.

N86-30233*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNIQUE FOR MEASURING SIDE FORCES ON A BANKED AIRCRAFT WITH A FREE-SWIVELING NOSE GEAR
Sandy M. Stubbs and John A. Tanner Aug. 1986 23 p
(NASA-TM-87719; L-16137; NAS 1.15:87719) Avail: NTIS HC A02/MF A01 CSCL 20K

An experimental investigation was conducted at the Langley Research Center to determine a method for towing an aircraft to measure the side forces of a free-swiveling nose gear due to variations in bank angle. A F-106 aircraft and the Space Shuttle orbiter OV-101 were towed to measure side forces on full-size aircraft for bank angles up to 3 deg. These tests indicate that substantial side forces will occur if an aircraft is rolling on a runway in a banked attitude even when the nose gear is free to swivel. Corotation of a twin-tire nose gear appears to cause a substantial increase in side force due to bank angle compared with a nose gear with indepdendently rotating wheels.
Author

N86-30234*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SIMPLE NONLINEAR JOINT MODEL
W. B. Fichter Aug. 1986 7 p
(NASA-TM-87749; L-16169; NAS 1.15:87749) Avail: NTIS HC A02/MF A01 CSCL 20K

Hertzian contact theory is applied to a butt joint with specially mismatched bearing surfaces to devise a simple mathematical model of nonlinear axial force-displacement behavior in jointed members. Normalized tangent stiffness-force plots, for several values of a joint imperfection parameter, are presented for the sample case of solid structural members of circular section. The results illustrate the potential problem of high joint compliance at low axial-force levels, as well as the generally desirable stiffening and linearizing effects of preload. A nonlinear oscillator problem based on the static model is also formulated and solved to illustrate the effect of amplitude on natural frequency. As expected, natural frequency is low when amplitude is small. The results call attention to the important roles that tight tolerances and preload are expected to play in the design and fabrication of deployable and erectable truss-type space structures.
Author

N86-30235*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURES AND DYNAMICS DIVISION RESEARCH AND TECHNOLOGY PLANS FOR FY 1986 AND ACCOMPLISHMENTS FOR FY 1985
Kay S. Bales Jul. 1986 105 p
(NASA-TM-87742; NAS 1.15:87742) Avail: NTIS HC A06/MF A01 CSCL 20K

Presented are the Objectives, FY 1986 Plans, Approach, and FY 1986 Milestones for the Structures and Dynamics Division's research programs. FY 1985 Accomplishments are presented where applicable. This information is useful in program coordination with other governmental organizations in areas of mutual interest.
Author

N86-30236*# Cleveland State Univ., Ohio. Dept. of Civil Engineering.
COMPLIANCE MATRICES FOR CRACKED BODIES Final Report
R. Ballarini Jul. 1986 8 p
(Contract NCC3-46)
(NASA-CR-179478; E-3158; NAS 1.26:179478) Avail: NTIS HC A02/MF A01 CSCL 20K

An algorithm is presented which can be used to develop compliance matrices for cracked bodies. The method relies on the numerical solution of singular integral equations with Cauchy-type kernels and provides an efficient and accurate procedure for relating applied loadings to crack opening displacements. The algorithm should be of interest to those performing repetitive calculations in the analysis of experimental results obtained from fracture specimens.
Author

N86-30237# George Washington Univ., Washington, D.C. School of Engineering and Applied Science.
CREEP AND FRACTURE CHARACTERISTICS OF MATERIALS AND STRUCTURES AT ELEVATED TEMPERATURES Technical Progress Report
Harold Liebowitz 14 Feb. 1986 348 p
(Contract N00014-84-K-0027)
(AD-A166575) Avail: NTIS HC A15/MF A01 CSCL 20/11

A major focus of the first year was on the mixed-mode fracture problem. Theoretical work on the computational methodology for the calculation of mixed-mode stress intensity factors was performed. The convergence properties of several algotithms were delineated and guidelines for the accurate calculation of mixed-mode stress intensity factors were established. This study also investigated the effects and influence of loading holes on the calculations. Appendices contained in this report refer to Determination of Two-Dimensional Stress Intensity; Fracture Under Mixed-Mode Loading; Prediction of Plasticity Characteristics for Three-Dimensional Fracture Specimens Comparison With Experiment; Accurate Modeling of Ductile and Creep Fracture Specimens and Processes; Creep Testing and Constitutive modeling; Finite Element Formulation for Creep Problems; Finite Element Methodology for Elastic Fracture Problems in 3-Dimensions.
GRA

N86-30238# Argonne National Lab., Ill.
REVIEW OF FRACTURE PROPERTIES OF NUCLEAR MATERIALS DETERMINED BY HERTZIAN INDENTATION
J. Routbort and H. Matzke 1985 13 p Presented at the

Conference on Indentation Fracture and Mechanical Properties of Ceramic Fuels, Waste Ceramics and Glasses, Karlsruhe, West Germany, 11 Nov. 1985 Prepared in cooperation with Commission of the European Communities, Karlsruhe, West Germany
(Contract W-31-109-eng-38)
(DE86-005520; CONF-8511146-1) Avail: NTIS HC A02/MF A01

A brief description of the determination of the surface fracture energy and the fracture toughness from a Hertzian indentation test is given. A number of theoretical and experimental problems are discussed. Results obtained on a variety of nuclear fuels and nuclear-waste-containment materials are reviewed and compared with values measured by other techniques. The Hertzian indentation test yields reliable fracture parameters. DOE

N86-30239# Stanford Univ., Calif. Div. of Applied Mechanics.
COMPUTATIONAL SIGNIFICANCE OF THE INTERMEDIATE CONFIGURATION AND HYPERELASTIC STRESS RELATIONS IN FINITE DEFORMATION ELASTROPLASTICITY
J. C. Simo, R. L. Taylor, and T. J. R. Hughes Jan. 1986 52 p
(Contract W-7405-eng-48)
(DE86-006720; UCRL-15754) Avail: NTIS HC A04/MF A01

The computational significance of the intermediate configuration and hyperelastic stress relations in finite deformation elastoplasticity is addressed. A fully three-dimensional finite-strain viscoelestic damage model is formulated. The variational foundations of assumed strain methods are discussed. A consistent return mapping algorithm is developed for plane stress elastoplasticity. DOE

N86-30240# Pacific Northwest Lab., Richland, Wash.
FAILURE ANALYSIS AND MICROCRACK DEPENDENT DISCONTINUUM MECHANICS
R. B. Stout Nov. 1985 15 p Presented at the International Conference and Exhibition on Fatigue, Corrosion Cracking, Fracture Mechanic and Failure Analysis, Salt Lake City, Utah, 2 Dec. 1985
(Contract W-7405-eng-48)
(DE86-006710; UCRL-92226; CONF-851203-1) Avail: NTIS HC A02/MF A01

The failure of many materials involves creating dense sets of microcracks. Each microcrack created results in a discontinuity in the deformation between atoms in the material and a change in the thermodynamic energy content of the material. Continuum mechanics does not provide a physical description of the discontinuities nor assign correct internal energy contributions for various thermodynamic processes during microcrack kinetics. In order to represent discontinuities in the deformation and various internal energy contributions during microcrack kinetics, a microcrack dependent discontinuum mechanics has been formulated. This discontinuum mechanics describes a microcrack density function in terms of physical attributes and statistical concepts; represents deformation as a functional to explicitly include interatomic discontinuities from the density of microcrack defects; and models both equilibrium and nonequilibrium thermodynamic processes of microcrack creation, microcrack growth, and microcrack surface energy changes. This contrasts to the empirical methodology of continuum mechanics that seeks a phenomenological description. An illustrative example of the microcrack dependent discontinuum approach is presented for the uniaxial tensile test. This analysis provides realistic representations for microcrack density evolution, local (true) stress response, and loading history for an input of total strain rate. DOE

N86-30241# Technische Hogeschool Twente, Enschede (Netherlands). Dept of Mechanical Engineering.
RESIDUAL STRESS AND DEFORMATION ENERGY UNDER GROUND-SURFACES OF BRITTLE SOLIDS Thesis
O. Podzimek Sep. 1985 114 p
(WB-85-16; ESA-86-97356) Avail: NTIS HC A06/MF A01

Deformation energy accumulated under the surface of brittle solids, especially those of optical glass, during the free abrasive grinding process was analyzed. The distribution of deformation energy density in depth under the ground surface was investigated. A model for the free abrasive grinding process was derived using the deformation energy density experimentally determined in relation to the abrasive size, grinding rate, and input power. The model was validated against a series of relations between process parameters from the literature. ESA

N86-30242# Koninklijke/Shell-Lab., Amsterdam (Netherlands).
INVESTIGATION OF THE EXTENT AND NATURE OF THE CRACKS FOUND IN SEGMENTS OF TWO Cr - 0.5 Mo PRESSURE VESSELS FROM THE NIL RESIDUAL CREEP LIFE PROGRAM
A. Deurhof and P. E. L. B. Rodrigues 22 Jul. 1985 25 p
(MR/814/85; ESA-86-97501) Avail: NTIS HC A02/MF A01

A metallographic investigation was carried out on samples taken from two 1 Cr - 0.5 Mo steel headers, operating at 525 C; 81 N/sqmm; 18,000 hr in a controlled test. A nozzle section from each vessel was examined. Both samples show discontinuous surface breaking cracks and microvoids. This damage could be due to reheat cracking which occurred during post weld heat treatment or due to creep. Micrographically it is not possible to distinguish between these two forms of cracking after the vessel is exposed to high temperature. Weld inplant testing may be a way of establishing the sensitivity of this material to reheat cracking and therefore clarify the cause of failure. ESA

42 GEOSCIENCES (GENERAL)

N86-30243# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BASIC ELEMENTS OF NUCLEAR GEOPHYSICS
D. J. R. Nordemann and E. B. Pereira 1984 31 p In PORTUGUESE
(DE86-700735; INPE-3002) Avail: NTIS (US Sales Only) HC A03/MF A01

Nuclear Geophysics applies the nuclear radiation detection methodology to the geosciences, specially to study the dynamical processes of the lithosphere, the hydrosphere and the atmosphere as well as some aspects of planetology and astrophysics. Here the main methods are described: alpha-ray and gamma-ray spectrometry, the interaction of alpha and gamma radiation with matter and the detectors used (grid chambers, surface barrier silicon detector for alpha radiation; and sodium iodide thallium activated phosphors, hyp··pure and lithium drifted germanium semiconductor detectors for gamma radiation). The principal applications of Nuclear Geophysics are given as examples to ilustrate the use of the methods described. DOE

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-30244# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VISUAL AERIAL PHOTOGRAPH TESTURE DISCRIMINATION FOR DELINEATING HOMOGENEOUS RESIDENTIAL SEGTORS: AN INSTRUMENT FOR URBAN PLANNERS
Maria doLourdes Neves deOliveiraKurkdjian May 1986 7 p Presented at the International Symposium on Remote Sensing, Enschede, Netherlands, Aug. 1986
(INPE-3896-PRE/938) Avail: NTIS HC A02/MF A01

A method is given for the definition of a geographical reference system to be used by planners in urban residential area analysis. The purpose of the method is to exploit, in the diagnosis, the spatial component of the town which is the concrete result of the interactions between its physical and social elements. The assumptions made are: (1) the urban residential areas in Brazilian

towns are extremely differentiated as a result of the social statification existent in the country; (2) there is a strong association between physical aspects of these areas and the socioeconomic characteristics of their resident population. The method preconizes the use of panchromatic aerial photographs at a scale of 1:10000 for the delimitation of homogeneous residential sectors. The procedures described are based on the human visual capability to descriminate different textures. In order to test its validity, survey data obtained through its application to Sao Jose dos Campos, SP, Brazil, were analysed using cluster analysis technique. The results of the work showed that photointerpretation may be usefully applied for delineating homogeneous residential urban sectors.
Author

N86-30245# Hebrew Univ., Jerusalem (Israel). Inst. of Earth Sciences.
A PROCEDURE FOR EVALUATION OF DUST POTENTIAL IN DESERT TERRAINS
Ran Gerson, Sari Grossman, and Rivka Amit 1985 87 p
(Contract DAJA45-83-C-0041)
(AD-A166491) Avail: NTIS HC A05/MF A01 CSCL 08/2

The evaluation of dust potential in hot deserts is based on the association of well defined dust bearing soils and surficial deposits with specific landforms. Thses landforms are readily identified on airphotos (and in many cases on topographic maps and space imagery). The user may follow a sequence of operations, from the selection of a target area through the identification of relevant landforms and associated soils/surficial deposits, to the evaluation of the content, composition and distribution of dust in these media. The accompanying report is essential for the proper use of this procedure.
GRA

N86-30246# Army Engineer Topographic Labs., Fort Belvoir, Va.
IMPLEMENTATION OF MAP-TO-IMAGE-CORRESPONDENCE FOR SYNTHETIC APERTURE RADAR IMAGE ANALYSIS
George E. Lukes and J. Hannes Raggam 1985 11 p
(AD-A166791; ETL-R-082) Avail: NTIS HC A02/MF A01 CSCL 08/2

Radargrammetric techniques, developed to support stereo mensuration and data capture from synthetic aperture radar (SAR) imagery, have been extended to enable map-to-image correspondence for computer-assisted radar image analysis. This mechanism projects existing digital map data into the image space of a new SAR image rigorously accounting for the sensor imaging geometry and terrain configuration. Prerequisites for SAR map-to-image correspondence include (1) an analytical sensor model, (2) recovery of the image acquisition parameters and (3) three-dimensional (3d) digital map data. Analytical radar mapping techniques address the first two issues. Suitable 3d planimetric map data can be compiled directly from stereo photography using analytical plotters or indirectly using elevation data interpolated from digital elevation models to augment conventional two-dimensional map data derived from manuscripts. The approach is illustrated by selected examples from a case study conducted for a test area near Frieburg, West Germany. Here, 3d digital data for transportation and landcover maps were assembled from cartographic sources using plan metric augmentation.
GRA

N86-30247# Argonne National Lab., Ill.
GEOLOGY AND PETROLEUM RESOURCES OF THE BARENTS-NORTHERN KARA SHELF IN LIGHT OF NEW GEOLOGIC DATA
G. Ulmishek Oct. 1985 93 p
(Contract W-31-109-eng-38)
(DE86-008472; ANL/ES-148) Avail: NTIS HC A05/MF A01

The Barents-northern Kara shelf, one of the largest continental shelves in the world, is still in the earliest stage of exploration for oil and gas. During the last several years, numerous seismic surveys have been conducted, a number of wells have been drilled, and several gas fields have been discovered. This report summarizes the geological data gathered during recent exploration activities and presents the changes in earlier concepts necessitated by consideration of these new data. The revised assessment of undiscovered petroleum resources is based on new information about the distribution and quality of source rocks and reservoir rocks and the structural framework of the shelf. Special attention is paid to evaluating the oil versus gas potential of the shelf, an evaluation that strongly depends on the expected offshore extension of oil-source facies in the Lower-Middle Triassic section. The most probable amounts of undiscovered petroleum resources of the shelf are estimated at 14.2 x 10 to the 9th power barrels of oil and 312.2 x 10 to the 12th power cubic feet of gas. The Finnmark trough, the south Barents and North Novaya Zemlya depressions, and the offshore continuation of the Timan-Pechora basin possess the great majority of these resources.
DOE

N86-30248# International Centre for Theoretical Physics, Trieste (Italy).
GEM 10B SATELLITE GRAVITY DATA AND NIGERIAN OIL PROSPECTS
S. C. Garde and W. Y. Kim Nov. 1984 11 p
(DE86-701366; IC-84/202) Avail: NTIS (US Sales Only) HC A02/MF A01

Extension of the hydrocarbon rich Benue depression and the Niger delta basin in the bight of Benin is construed from the gravity data of gravity Earth Model (GEM) 10B Satellite, published by NASA, Goddard Space Flight Center in 1977. This interpretation is based on the supposition that: 1) the depth of a buried horizontal cylinder can be estimated by the Fourier transform of the vertical gravity field; and 2) the oil horizons of southern Nigeria are basically connected to the separation of South American and African plates.
DOE

N86-30249# Netherlands Agency for Aerospace Programs, Delft.
REPORT ON THE PHASE A STUDY OF A JOINT INDONESIAN-NETHERLANDS TROPICAL EARTH RESOURCES SATELLITE (TERS) PROGRAM
Mahsun Irsyam, ed. and Albert P. Hoeke, ed. Feb. 1985 45 p
(JTERS-84-10; ESA-86-97498) Avail: NTIS HC A03/MF A01

The baseline of the Tropical Earth Resources Satellite (TERS) System was established. Using the possibilities of the high true equatorial orbit, 4 observation opportunities per day, a coverage area of at least 10 deg N to 10 deg S latitude, and the selective viewing capability combined with a cloud sensor, the TERS concept is an appropriate system to complement and to compete with the conventional systems with optical instruments and planned radar systems. User requirements for TERS as a monitoring device for Indonesia are specified. Results of a cost/benefit assessment indicate expected benefits which for Indonesia alone may justify the investment. The political/legal aspects were assessed and a public information plan was drafted.
ESA

N86-30250# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
MICROWAVE REMOTE SENSING AND VEGETATION: PROBLEMS, PROGRESS AND SOLUTIONS, A REVIEW
L. Krul Sep. 1984 8 p
(ESA-86-97556) Avail: NTIS HC A02/MF A01

Two approaches to radar signal processing for remote sensing are reviewed. The first considers the microwave region as just another window to be used in combination with the ones already existing in other wavelength regions. The second tries to solve the problem by fundamental investigations in the interaction between microwaves and remote sensing objects.
ESA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-30251*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND INITIAL TESTING OF A ONE-BLADED 30-METER-DIAMETER ROTOR ON THE NASA/DOE MOD-O WIND TURBINE Final Report
R. D. Corrigan and C. B. F. Ensworth 1986 19 p Presented at the Energy-Sources Technology Conference Exhibition, New Orleans, La., 23-28 Feb. 1986; sponsored by ASME
(Contract DE-AI01-76ET-20320)
(NASA-TM-88810; E-3162; DOE/NASA-20320/70; NAS 1.15:88810) Avail: NTIS HC A02/MF A01 CSCL 10A

The concept of a one-bladed horizontal-axis wind turbine has been of interest to wind turbine designers for many years. Many designs and economic analyses of one-bladed wind turbines have been undertaken by both United States and European wind energy groups. The analyses indicate significant economic advantages but at the same time, significant dynamic response concerns. In an effort to develop a broad data base on wind turbine design and operations, the NASA Wind Energy Project Office has tested a one-bladed rotor at the NASA/DOE Mod-O Wind Turbine Facility. This is the only known test on an intermediate-sized one-bladed rotor in the United States. The 15.2-meter-radius rotor consists of a tip-controlled blade and a counterweight assembly. A rigorous test series was conducted in the Fall of 1985 to collect data on rotor performance, drive train/generator dynamics, structural dynamics, and structural loads. This report includes background information on one-bladed rotor concepts, and Mod-O one-bladed rotor test configuration, supporting design analysis, the Mod-O one-blade rotor test plan, and preliminary test results. Author

N86-30252# Brookhaven National Lab., Upton, N. Y.
PROCEEDINGS OF THE NINTH DOE SOLAR PHOTOCHEMISTRY RESEARCH CONFERENCE
1985 206 p Conference held at Lake Mohonk, N.Y., 2 Jun. 1985 Prepared in cooperation with Department of Energy, Washington, D.C.
(Contract DE-AC02-76CH-00016)
(DE86-006167; BNL-51890; CONF-8506244) Avail: NTIS HC A10/MF A01

This meeting brought together contractors and grantees of the Division of Chemical Sciences in its basic research program on solar photochemical energy conversion to exchange information and discuss problems of mutual interest. This volume contains the program of the meeting, the abstracts of 28 formal presentations and 42 posters, a record of questions and answers following each presentation, and a list of attendees. DOE

N86-30253# Sandia National Labs., Albuquerque, N. Mex.
DESIGN CONSIDERATIONS FOR STAND-ALONE PHOTOVOLTAIC SYSTEMS
R. N. Chapman 1986 11 p Presented at the 1st International Symposium on Applications of Solar and Renewable Energy, Cairo, Egypt, 23 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-006470; SAND-85-2390C; CONF-860322-1) Avail: NTIS HC A02/MF A01

Long-term availability, defined as the total energy delivered over the lifetime of a system divided by the total energy demand, is a major design criterion for stand-alone photovoltaic systems. Using long-term insolation data from 18 US sites and a newly developed performance model, we found that common sizing practices do not reliably provide desired availability. We developed a new technique that allows the designer to size for a specific long-term availability. This new technique can be used for most climatic types found worldwide and for any stand-alone photovoltaic system. The long-term insolation data and performance model were also used to study the yearly variations in availability. We found that even with systems designed for high long-term availability, there will be periods of very low availability. DOE

N86-30254# Oak Ridge National Lab., Tenn.
APPLICATIONS OF LASER ANNEALING AND LASER-INDUCED DIFFUSION TO PHOTOVOLTAIC CONVERSION
R. F. Wood, R. D. Westbrook, and G. E. Jellison, Jr. 1985 13 p Presented at the Progress Review Meeting of SERI's Advanced High Efficiency Concepts Program, Lakewood, Colo., 12 Sep. 1985
(Contract DE-AC05-84OR-21400)
(DE86-003809; CONF-8509247-1) Avail: NTIS HC A02/MF A01

Recent results of studies of pulsed laser processing of high-efficiency silicon solar cells are reported. These studies have focussed on intrinsic and extrinsic surface passivation of cells fabricated by glow-discharge implantation and either furnace annealing or laser annealing. DOE

N86-30255# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
HIGH INTENSITY SOLAR CELLS
R. J. Schwartz, J. L. Gray, and M. S. Lundstrom Jan. 1986 88 p
(Contract DE-AC04-76DP-00789)
(DE86-006550; SAND-85-7014) Avail: NTIS HC A05/MF A01

Two computer codes, SCAP1D and SCAP2D, are being used to analyze silicon concentrator solar cells. The models used in these codes are constantly being evaluated for accuracy and are updated as necessary. For example, the effects of carrier-carrier scattering on mobility have been included and documented in this report. In addition, modifications to SCAP2D have been made to allow the modeling of minority carrier reflecting contacts. A semianalytical model was developed and used to estimate the theoretical limit of efficiency of silicon concentrator cells. It is predicted that efficiencies near 30% may be possible at high concentration. Reprints of published papers are included in the appendices. DOE

N86-30256# Spire Corp., Bedford, Mass.
GALLIUM ARSENIDE AND MULTIBANDGAP SOLAR CELL RESEARCH Semiannual Subcontract Report, Apr. - Oct. 1984
S. M. Vernon and R. G. Wolfson Nov. 1985 56 p
(Contract DE-AC02-83CH-10093)
(DE85-016894; SERI/STR-211-2824) Avail: NTIS HC A04/MF A01

This report covers the first six months of research on high-efficiency, low-cost solar cells. The basic approach involved the heteroepitaxial growth of a III-V compound material onto a single-crystal silicon wafer. The growth technique employed was metal-organic chemical vapor deposition (MO-CVD) in an atmospheric pressure reactor. The silicon wafer may be a mechanical substrate and ohmic contact for a single-junction device, or it may contain a p-n junction of its own as the bottom cell of a two-junction, tandem device. The III-V single-junction cell material is GaAs and the two-junction material is either GaAlAs or GaAsP; either material could yield a band gap of about 1.7eV. Single-crystal films of Ge, deposited onto silicon wafers by CVD, are also being studied. DOE

N86-30257# Sandia National Labs., Albuquerque, N. Mex.
WIND TURBINE FATIGUE CONSIDERATIONS
D. Berg 1985 10 p Presented at the IEA Fatigue Experts Meeting, Stuttgart, West Germany, 28 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-006499; SAND-85-2617C; CONF-8511164-1) Avail: NTIS HC A02/MF A01

Current methods of analyzing wind turbine fatigue life are reviewed and found to be inadequate. One reason for this inadequacy is that these methods treat material fatigue properties as well-defined values, when they are, in fact, more accurately described as statistically varying values. Tools for incorporating statistically varying properties into fatigue life analysis exist, and development of improved analysis methods is currently in progress. Easy access to a wind turbine material fatigue characteristics data base and recommended procedures for determining factors of safety would increase the confidence level in fatigue life estimation. DOE

N86-30258# Minnesota Mining and Mfg. Co., St. Paul. Electronic and Information Sector Labs.
RESEARCH ON HIGH-EFFICIENCY, SINGLE-JUNCTION, MONOLITHIC, THIN-FILM AMORPHOUS SILICON SOLAR CELLS Semiannual Subcontract Progress Report, 1 Dec. 1984 - 31 May 1985
G. R. Ashton, F. E. Aspen, R. L. Jacobson, F. R. Jeffrey, and N. T. Tran Jan. 1986 85 p
(Contract DE-AC02-83CH-10093)
(DE86-004420; SERI/STR-211-2861) Avail: NTIS HC A05/MF A01

This report presents interim results of research in high-efficiency, single-junction, monolithic thin-film amorphous silicon solar cells, which consists of five research tasks: (1) amorphous silicon materials research, (2) nonsemiconductor materials research, (3) solar cell research, (4) monolithic, intraconnected cells/submodule research, and (5) multichamber deposition system research. The subcontracted work reported here advances the state of the art in thin-film amorphous silicon solar cell development through work on flexible substrates. A multichamber deposition system for depositing a-Si onto polyimide flexible web is essentially complete. DOE

N86-30259# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
RAPID THERMAL PROCESSING OF ION IMPLANTED SILICON AS A VIABLE SOLAR CELL TECHNOLOGY Quarterly Report, Nov. 1985 - Jan. 1986
G. A. Rozgonyi 31 Jan. 1986 20 p
(DE86-008216; DOE/JPL-957175/Q3) Avail: NTIS HC A02/MF A01

The main objective of the past quarter was to find the optimal pre-process heat treatment for enhancing minority carrier lifetime. The silicon substrates were both n- and p-type and had varied oxygen concentration and process induced defects. Pre-process heat treatments include traditional furnace thermal cycling and low thermal budget rapid thermal process (RTP). The rapid thermal process was performed in Ar, while furnace annealing had either N2 or O2 ambients. Chemical etch-pit delineation, x-ray topography and FTIR techniques were used to determine the bulk gettering and oxygen precipitation for the heat-treated Si substrates. Minority carrier generation lifetime and the change of oxygen content were measured before and after heat treatment. DOE

N86-30260# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
LASER-ASSISTED SOLAR CELL METALLIZATION PROCESSING Annual Report, 13 Dec. 1984 - 30 Sep. 1985
A. Rohatgi, P. G. McMullin, and T. W. OKeeffe Jan. 1986 57 p
(Contract DE-NAS7-100-9-56615)
(DE86-008328; DOE/JPL-956615/86/2) Avail: NTIS HC A04/MF A01

In this contract, Laser-assisted processing techniques for producing high-quality solar cell metallization patterns are being investigated, developed, and characterized. The tasks comprising these investigations are outlined. Four new batches of solar cells were processed, in addition to several test runs on wafers, using the laser decomposition of spun-on silver neodecanoate to metallize cells. Decomposition of silver neodecanoate was carried out at different laser powers on different cells on a given wafer to determine whether this would have any effect on cell performance. A one watt laser power gave an electroplated linewidth of 50 microns , while at 8 watts the line width was 90 microns. DOE

N86-30261# Foersvarets Forskingsansalt, Stockholm (Sweden).
CONTROL OF WINDPOWERED STATION WITH VARIABLE SPEED; SMALL RANGE
Bjoern Jakobsson and Eskil Ulen Feb. 1986 73 p In SWEDISH; ENGLISH summary
(FOA-C-20600-E3; ISSN-0347-3694; ESA-86-97237) Avail: NTIS HC A04/MF A01

Control of windpowered generators with maximum speed set to 20% over synchronous speed is discussed. A simulation package for electrical torque regulation and aerodynamic speed regulation was developed. Different configurations in the electric control (with and without integration) as well as different methods of damping the resonance between drive train compliance and generator inertia were studied. ESA

N86-30262# Foersvarets Forskingsansalt, Stockholm (Sweden).
CONTROL RESEARCH IN WINDPOWER PROJECT 506259-1 CONTROL FOA, STAGE 1 Final Report
Eskil Ulen Feb. 1986 14 p In SWEDISH; ENGLISH summary
(FOA-C-20601-E3; ISSN-0347-3694; ESA-86-97238) Avail: NTIS HC A02/MF A01

A simplified rotor blade control for engines with variable speed; resonance compensation; and turbulence and gust models for controller development are discussed. Control of windpowered generators, and the simulation of a stochastic process with nonrational spectrum are considered. Computer control programs for a windpowered electric power plant are mentioned. ESA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-30263# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.
QUALITY ASSURANCE FOR WATER SAMPLING Final Report
Thomas C. Thomas and Ray I. Nakasone Feb. 1986 27 p
(AD-A165842; OEHL-86-015S0253BSA) Avail: NTIS HC A03/MF A01 CSCL 13/2

The quality assurance of water sampling is examined. Covered are sample collection, container types, sample preservation, holding times, shipment of samples, quality checks for field equipment and requirements for chain-of-custody forms. GRA

N86-30264# Oak Ridge National Lab., Tenn.
DATABASE ASSESSMENT OF POLLUTION CONTROL IN THE MILITARY EXPLOSIVES AND PROPELLANTS PRODUCTION INDUSTRY Final Report
Bimal C. Pal and Michael G. Ryon Feb. 1986 222 p
(Contract DE-AC05-85OR21400)
(AD-A165853; ORNL-6202) Avail: NTIS HC A10/MF A01 CSCL 13/2

A database on the current and proposed methods of pollution abatement in the munition production industry is presented. Information on current pollution status and waste treatment methods for the Army ammunition plants (AAPs) is also presented. Section 2 of this document deals with the physical and chemical properties of selected explosives, by-products, and related materials. Section 3 deals with the manufacture of the specific munitions. A scenario is presented in Section 4 to show the interaction among different agencies involved in the pollution abatement program. Actual and potential air pollution, water pollution, and solid wastes from the AAPs are covered in Sections 5 through 7. The current pollution and pollution abatement status of the various AAPs is discussed in Section 8. Modernization, waste management, monitoring programs, and regulatory aspects are the respective subject matter of Sections 9 through 12. Data gaps and research needs identified as a result of literature analysis are discussed throughout the document. The general term

TNT is used in this document to imply the specific isomer, alpha-trinitrotoluene. GRA

N86-30265# Oak Ridge National Lab., Tenn.
PANDORA: AN ELEVEN-BOX GEOCHEMICAL MODEL OF THE WORLD OCEAN
T. H. Peng and W. S. Broecker 1985 10 p Presented at the Carbon Transfer Conference, Lake Arrowhead, Calif., 5 May 1985 Prepared in cooperation with Lamont-Doherty Geological Observatory, Palisades, N.Y.
(Contract DE-AC05-84OR-21400)
(DE86-006122; CONF-8505239-1) Avail: NTIS HC A02/MF A01

To evaluate the impacts on the CO2 content of the atmosphere caused by possible differences between the operation of the glacial and the interglacial ocean-atmosphere systems, an 11-box global ocean model was developed which operates something like the real system. The individual reservoirs in this model are identified as (1) northern Atlantic. (2) surface Atlantic, (3) intermediate North Atlantic, (4) deep Atlantic, (5) intermediate South Atlantic, (6) surface Antarctic, (7) deep Antarctic, (8) intermediate Indopacific, (9) surface Indopacific, (10) deep Indopacific, and (11) northern Pacific. This report discusses the basic model structure. DOE

N86-30266# Lamont-Doherty Geological Observatory, Palisades, N. Y.
IMPACT OF CO2 ON THE CLIMATE CHANGE IN NORTH AMERICA DURING THE 20TH CENTURY Final Report, 1 Aug. 1984 - 31 Jul. 1985
G. J. Kukla Dec. 1985 11 p
(Contract DE-AC02-83ER-60162)
(DE86-006126; DOE/ER-60162/3) Avail: NTIS HC A02/MF A01

The geographic and seasonal pattern of changes in the mean maximum, minimum and average surface air temperature, as well as precipitation over North America between 1941 and 1980 was examined. An analysis of the data revealed a statistically significant decrease in the temperature range, particularly in summer and early autumn. The decrease in the range appears to be associated with increasing precipitation at many stations. However, further statistical tests have shown that increased precipitation, and by inference, atmospheric water vapor and cloud cover can not fully account for the large number of stations with a decreased range. Using climate division data over the United States, a recent increase in spring and summer temperature of approx.1(0)C and decrease in precipitation by 20 to 40% was found for the Central and Northern Great Plains. Comparisons of urban/rural station pairs in North America revealed an annual mean relative warming of the urban sites of between 0.12 and 0.15(0)C/decade. DOE

N86-30267# Duke Univ., Durham, N. C.
DIRECT EFFECTS OF INCREASING CARBON DIOXIDE ON VEGETATION
B. R. Strain, ed. and J. D. Cure, ed. Dec. 1985 304 p
(DE86-007397; DOE/ER-0238) Avail: NTIS HC A14/MF A01

CO2 is an essential environmental resource. It is required as a raw material of the orderly development of all green plants. As the availability of CO2 increases, perhaps reaching two or three times the concentration prevailing in preindustrial times, plants and all other organisms dependent on them for food will be affected. Humans are releasing a gaseous fertilizer into the global atmosphere in quantities sufficient to affect all life. This volume considers the direct effects of global CO2 fertilization on plants and thus on all other life. Separate abstracts have been prepared for individual papers. DOE

N86-30268# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
DATA COLLECTION AND ANALYSIS FOR HCl, SO2, AND NO2 IMMISSION-EMISSION DIFFERENTIAL ABSORPTION LIDARS
A. Breinig, W. Staehr, W. Lahmann, H.-J. Heinrich, C. Weitkamp, and W. Michaelis 11 Sep. 1985 9 p Presented at Workshop on Differential Absorption Lidar (DIAL) Data Collection and Anal. Tech., Virginia Beach, Va., 18-21 Nov. 1985
(GKSS-85/E/53; ISSN-0344-9629; ESA-86-97409) Avail: NTIS HC A02/MF A01

Data collection and analysis with space-resolving differential absorption and scattering lidars are discussed. Results of a Monte-Carlo simulation of emission measurements in a randomly meandering plume are presented. Practical experience with a transportable land-based SO2/NO2 lidar and a shipborne device for HCl measurements in the marine atmosphere is reported. ESA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N86-30269 Institut d'Aeronomie Spatiale de Belgique, Brussels.
THE INFLUENCE OF NEGATIVE IONS ON THE INCOHERENT DIFFUSION OF ELECTROMAGNETIC WAVES IN THE D REGION OF THE IONOSPHERE Ph.D. Thesis - Brussels Univ., Belgium [INFLUENCE DES IONS NEGATIFS SUR LA DIFFUSION INCOHERENTE D'UNE ONDE ELECTROMAGNETIQUE DANS LA REGION D DE L'IONOSPHERE TERRESTRE]
J. Wisemberg 1985 283 p In FRENCH; ENGLISH summary
(Aeronomica-Acta-A-302-1985; ESA-86-97484) Avail: Issuing Activity

A systematic analysis of the chemistry of charged particles is developed using signal flow graph theory. A matrix formalism based on a hydrodynamic approach is presented. The method takes into account the fluctuations linked to the probabilistic aspect of the chemical reactions in the D region. A characteristic distance, different from the Debye distance, is introduced to relate the chemistry of negative ions to the power level and the width of the spectra. The use of equivalent models leads to a stochastic approach which describes the chemical fluctuations. The analysis and a numerical simulation method show that the chemical fluctuations are an important mechanism in the incoherent scattering. A research study of the form of the possibly observable spectra in the polar D region during corpuscular precipitation is presented. ESA

N86-30270# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LATITUDINAL VARIATION OF DS
R. P. Kane May 1986 19 p Submitted for publication Sponsored by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3906-PRE/947) Avail: NTIS HC A02/MF A01

Using the data from several locations for a few selected events, the latitudinal variation of a storm-time logitudinal inequality component (DS) is studied. From a maximum near equator, DS seems to drop very sharply in the first 10 degree and then more slowly up to about 20 degrees, followed by an increase up to about 30 degrees. Some ionospheric contributions may be present during daytime. Author

N86-30271# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Ministerio da Ciencia e Tecnologia.
LONGITUDINAL DIFFERENCE IN THE Sq PROFILES IN THE SOUTH AMERICAN REGION
R. P. Kane Jul. 1986 10 p Submitted for publication Sponsored by the Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3944-PRE/966) Avail: NTIS HC A02/MF A01

The average daily variation profiles of the H component at Huancayo on the west coast and Eusebio, Fortaleza, on the east coast in the dip equator region and La Quiaca near the west coast and Vassouras near the east coast in the southern low latitude region of the South American continent indicate that the profiles are broader for the east coast. Thus, distortions in the overhead current systems while passing from one coast to the other are indicated. Author

N86-30272*# Alabama Univ., Huntsville. School of Science.
THERMAL ION HEATING IN THE VICINITY OF THE PLASMAPAUSE: A DYNAMICS EXPLORER GUEST INVESTIGATION Final Report, Oct. 1984 - Mar. 1985
Richard H. Comfort Mar. 1986 13 p
(Grant NAG5-475)
(NASA-CR-176993; NAS 1.26:176993) Avail: NTIS HC A02/MF A01 CSCL 04A

The ion thermal structure of the plasmasphere was investigated in a series of experiments. It appears that energy may be generally available to ion and electrons in the vinicity of the plasmapause from Coulomb interactions between ambient thermal plasma and low energy ring current and suprathermal ions, particularly O+. The amount of energy transferred depends on the densities and energies of each of the components. The spatial distribution of heating in turn depends critically on the spatial distribution of the different populations, especially on the density gradients. The spatial distribution of the thermal plasma is found to vary significantly on a diurnal time scale and is complicated by the plasmasphere erosion and refilling processes associated with magnetic activity and its aftermath. Thermal ion composition also appears to be influenced by the heating taking place, often increasing the heavy ion population in the vicinity of the plasmapause. The observations of equatorial heating near the plasmapause in the presence of equatorial noise also raise the likelihood of a wave source of energy. It is not unreasonable to expect that both particle and wave heat sources are significant, although not necessarily at the same times and places. B.G.

N86-30273*# California Univ., Los Angeles. Dept. of Atmospheric Sciences.
PERTURBATIONS OF THE RICHARDSON NUMBER FIELD BY GRAVITY WAVES Final Technical Report, 1 May 1979 - 31 Dec. 1984
M. G. Wurtele and R. D. Sharman 1 Jul. 1985 74 p
(Grant NsG-4024)
(NASA-CR-176910; NAS 1.26:176910) Avail: NTIS HC A04/MF A01 CSCL 08N

An analytic solution is presented for a stratified fluid of arbitrary constant Richardson number. By computer aided analysis the perturbation fields, including that of the Richardson number can be calculated. The results of the linear analytic model were compared with nonlinear simulations, leading to the following conclusions: (1) the perturbations in the Richardson number field, when small, are produced primarily by the perturbations of the shear; (2) perturbations of in the Richardson number field, even when small, are not symmetric, the increase being significantly larger than the decrease (the linear analytic solution and the nonlinear simulations both confirm this result); (3) as the perturbations grow, this asymmetry increases, but more so in the nonlinear simulations than in the linear analysis; (4) for large perturbations of the shear flow, the static stability, as represented by N2, is the dominating mechanism, becoming zero or negative, and producing convective overturning; and (5) the convectional measure of linearity in lee wave theory, NH/U, is no longer the critical parameter (it is suggested that (H/u sub 0) (du sub 0/dz) takes on this role in a shearing flow). M.G.

N86-30274# Indian Inst. of Geomagnetism, Bombay.
[RESEARCH AND DEVELOPMENT ACTIVITIES OF THE INDIAN INSTITUTE OF GEOMAGNETISM] Annual Report, 1984 - 1985
Nanabhai Moos Marg 1985 72 p
Avail: NTIS HC A04/MF A01

Investigations on the following topics were performed during the year: variations of the quiet and disturbed day magnetic field, both in the equatorial region and outside it; electromagnetic induction studies using the array data as well as satellite data; physics of the ionosphere and radio-wave scintillations; magnetosphere and solar wind; and solar physics. A list of papers published or under publication during the year is given. Author

N86-30275*# Alabama Univ., Huntsville.
INTERNAL WAVE MOTION Progress Report, 1 Mar. - 31 Aug. 1986
R. J. Hung 1986 59 p
(NAS8-33726)
(NASA-CR-178871; NAS 1.26:178871) Avail: NTIS HC A04/MF A01 CSCL 04A

The distribution of atmospheric ozone is nonuniform both in space and time. Local ozone concentration vary with altitude, latitude, longitude, and season. Two year ozonesonde data, January 1981 to December 1982, observed at four Canadian stations and 2.5 year backscattered ultraviolet experiment data on the Nimbus-4 satellite, April 1970 to August 1972, observed over five American stations were used to study the relationship between the total ozone, vertical height distribution of the ozone mixing ratio, vertical height distribution of half total ozone, and the local tropopause height. The results show that there is a postive correlation between total ozone in Dobson Units and the tropopause height in terms of atmospheric pressure. This result suggests that local intrusion of the statosphere into the troposphere, or the local decreasing of tropopause height could occur if there is a local increasing of total ozone. A comparison of the vertical height distribution of the ozone mixing ratio, the modified pressure height of half total ozone and the tropopause height shows that the pressure height of an ozone mixing ratio of 0.3 micrograms/g, and the modified pressure height of half total ozone are very well correlated with the tropopause pressure height. Author

N86-30276# Air Force Geophysics Lab., Hanscom AFB, Mass.
TURBULENT HEATING AND TRANSFER IN THE STRATOSPHERE AND LOWER MESOSPHERE
Samuel P. Zimmerman and Thomas J. Keneshea 9 Aug. 1985 40 p
(AD-A166591; AFGL-TR-85-0184; AFGL-ERP-925) Avail: NTIS HC A03/MF A01 CSCL 04/1

The analysis of rocketsonde experimental data from 20 to 70 km altitude and from a latitude band 9.3 deg N to 76.6 N, grouped around longitude 78 deg W + or - 2.5 deg, results in the determination of the dynamically and statically unstable regions of the stratosphere and lower mesosphere. Richardson number normalization of the ratio of non-dimensional turbulent to mean parameters, allows us to extrapolate these results to the upper atmosphere. At the Richardson number (R sub i) indicated unstable regions, the steady state turbulent energy rate equation is solved, resulting in heat and momentum transfer coefficients, fluxes, and the rate of energy dissipation. Given contiguously unstable regions, the vertical heat and momentum flux divergences are also determined. Summer and winter averages of the results of these analyses are given. GRA

N86-30277# Illinois Univ., Urbana. Dept. of Atmospheric Sciences.
A CUMULUS PARAMETERIZATION STUDY WITH SPECIAL ATTENTION TO THE ARAKAWA-SCHUBERT SCHEME
Chih-Yue J. Kao and Yoshi Ogura Jun. 1985 224 p
(Contract F19628-82-K-0030)
(AD-A166801; AFGL-TR-85-0159; SR-1) Avail: NTIS HC A10/MF A01 CSCL 04/1

The importance of the vertical transports of heat, moisture, vorticity, and momentum by cumulus clouds has long been recognized not only in the numerical predictions of weather and climate but also in the simulation studies on mesoscale circulations such as tropical convective systems, mid-latitude frontogenesis, and the sea-land breeze. However, it is impractical to resolve those individual cumulus clouds because of the distinct scale difference between them and larger-scale circulations. In the past two decades, there have been numerous attempts to relate subgrid-scale cumulus convection to large-scale fields by specifying the cumulus activity as a function of large-scale variables, which is now commonly referred to as cumulus parameterization. The goal of cumulus parameterization is to predict the change of large-scale disturbances due to cumulus convection by describing not each of the many individual clouds, but only their collective effects. GRA

best copy available

N86-30278# Naval Research Lab., Washington, D. C.
THE EFFECT OF FINITE BLOB SIZE ON THE CURRENT CONVECTIVE INSTABILITY IN THE AURORAL IONOSPHERE
J. D. Huba and P. K. Chaturvedi 11 Apr. 1986 36 p
(AD-A166806; NRL-MR-5730) Avail: NTIS HC A03/MF A01 CSCL 04/1

It has been suggested that the current convective instability may be responsible for the structuring, i.e., generation of density irregularities, of density enhancements (known as blobs) in the auroral ionosphere. However, previous theories have neglected the finite extent of the blob along the geomagnetic field. In this paper we develop a non-local theory of the current convective instability which considers the finite extent of an ionospheric blob parallel to the geomagnetic field. We find that the growth rate of the instability can be substantially reduced in the finite-sized blob case from the value obtained in the local approximation for an infinitely long blob. For auroral ionosphere parameters, the reduction in the growth rate for medium scale irregularities (1-10 km) can be one to two orders of magnitude for the typical observed values of blob sizes (approx. a few hundred km). Thus, it appears that the current convective instability is not a viable mechanism to generate scintillation causing irregularities, i.e., 1-10 km irregularities. GRA

N86-30279# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STUDY OF NO GAMMA BANDS IN THE MESOSPHERE FROM SPACELAB 1 M.S. Thesis
Edward H. Erwin 1985 44 p
(AD-A166852; AD-E950814; AFIT/CI/NR-86-50T) Avail: NTIS HC A03/MF A01 CSCL 03B

The imaging Spectrometric Observatory obtained simultaneous spatial, as well as spectral data of NO in the mesosphere during the 1983 Spacelab 1 mission. The well-defined rotational lines of the 1-0 gamma band in the ultraviolet were used to infer atmospheric temperature profiles. The slant path intensity profiles exhibit higher intensities than are predicted by a recent model and are in good agreement with the NO profile obtained in the infrared during the same Spacelab 1 mission. GRA

N86-30280# Department of Energy, Washington, D. C. Carbon Dioxide Research Div.
ATMOSPHERIC CARBON DIOXIDE AND THE GLOBAL CARBON CYCLE
J. R. Trabalka, ed. Dec. 1985 327 p
(DE86-006222; DOE/ER-0239) Avail: NTIS HC A15/MF A01

This state-of-the-art volume presents discussions on the global cycle of carbon, the dynamic balance among global atmospheric CO2 sources and sinks. Separate abstracts have been prepared for the individual papers. DOE

N86-30281# Sandia National Labs., Albuquerque, N. Mex.
SOME THOUGHTS ON THE MODELING OF ATMOSPHERIC TURBULENCE FROM THE PERSPECTIVE OF A NON-EXPERT
D. Berg 1985 8 p Presented at the 14th IEA experts Meeting on Turbulence Loads on Wind Turbines, Stockholm, Sweden, 4 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-006493; SAND-86-0014C; CONF-851259-2) Avail: NTIS HC A02/MF A01

Recent work with a wind turbulence model has demonstrated that the effects of wind turbulence may be large. This work also illustrates that turbulence models do not need to accurately reproduce all the details in the physical wind to be of benefit to the wind turbine community. Their use, however, will be facilitated if they are packaged in easy-to-use codes that function as subroutines. Several US projects which are now in the planning stages are designed to measure the turbulence in the incident wind and the resultant response of the turbine. Knowledge gained from these tests will enhance our understanding of the role of turbulence in turbine response. DOE

N86-30282# Edgerton, Germeshausen and Grier, Inc., Los Alamos, N. Mex. Energy Measurements Group.
OCCULTATION OF THE ATS-3 SATELLITE BY THE AVEFRIA BARIUM ION CLOUD
T. J. Fitzgerald, D. J. Simons (Los Alamos National Lab., N. Mex.), M. B. Pongratz, and J. R. Clynch (Texas Univ., Austin.) Oct. 1985 28 p Prepared in cooperation with Los Alamos National Lab., NM.; Texas Univ., Austin.
(Contract DE-AC08-83NV-10282)
(DE86-008346; EGG-10282-5018) Avail: NTIS HC A03/MF A01

The barium ion cloud from the May 1978 AVEFRIA DOS barium release experiment occulted the line of sight (LOS) from the Antelope Valley, Nevada ground observation station to the ATS-3 satellite for approximately 5 minutes. This opportunity was used to measure and calculate the radio scintillations caused by the cloud. Optical measurements were compared to the radio measurements of scintillations. The barium cloud was measured optically with intensified cameras by viewing the 455.4-nm wavelength fluorescent ion line. The amplitude scintillations of the 136.47-MHz signal from the ATS-3 satellite were monitored. It was found that the radio scintillation patterns calculated from optical observations were approximately in agreement with the radio measurements. The calculated patterns are unable to produce the short timescale (less than a few seconds) details observed by radio, and contain time shifts due to cloud evolution not considered in the analysis. Possible sources for the limitations of the optical method are identified and recommendations are made for improvements. DOE

N86-30283# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
REMOTE MEASUREMENT OF TROPOSPHERIC PARAMETERS BY LIDAR
C. Weitkamp 8 Nov. 1985 17 p Presented at Workshop on Experiences with the Application of Advanced Air Pollution Assessment Methods and Monitoring Techniques, Lindau, West Germany, 2-4 Oct. 1985
(GKSS-85/E/50; ISSN-0344-9629; ESA-86-97408) Avail: NTIS HC A02/MF A01

Emission and immission measurements and the investigation of transport phenomena of acid gases such as SO2, NO2, and HCl with a differential absorption and scattering lidar are described. A Raman lidar for CO2 and moisture profiling is presented. A Rayleigh temperature lidar is introduced. ESA

N86-30596*# New Mexico Univ., Albuquerque. Dept. of Geology.
STRATOSPHERIC DUST COLLECTIONS: VALUABLE RESOURCES FOR SPACE AND ATMOSPHERIC SCIENTISTS
Ian D. R. Mackinnon *In* Lunar and Planetary Inst. Trajectory Determination and Collection of Micrometeoroids on the Space Station 1986 p 68-69 refs (For primary document see N86-30584 21-88)
Avail. NTIS HC A06/MF A01 CSCL 03B

N86-30597*# New Mexico Univ., Albuquerque. Dept. of Geology.
TARGETED FLIGHT OPPORTUNITIES WITH LARGE AREA COLLECTORS
Ian D. R. Mackinnon *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 70-71 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-30284 Delft Hydraulics Lab. (Netherlands).
FORECASTING CURRENT VELOCITY ON ROUTINE BASIS
R. A. H. Thabet and H. P. L. Vlasblom Sep. 1985 10 p Presented at the International Conference on Numerical and Hydraulical Modelling of Ports and Harbours, Birmingham, England, 23-25 Apr.

1985; sponsored by BHRA, Bedford, England and International Assoc. for Hydraulic Research
(Publ-345; ESA-86-97397) Copyright. Avail: Issuing Activity

A current forecast system was set up as an aid to executional operations of the storm surge barrier in the mouth of the Oosterschelde Estuary (Netherlands). The system uses deterministic models (hydraulic and mathematical) and/or time series analysis techniques. The application of frequency response functions to forecast (tidal) current velocity is discussed. The method is applicable for harbors and the like. An average error of almost nil and a standard deviation < 10% is achieved. ESA

N86-30285*# Dayton Univ., Ohio.
THE PHYSICAL AND EMPIRICAL BASIS FOR A SPECIFIC CLEAR-AIR TURBULENCE RISK INDEX Final Report, 2 Jul. 1982 - 30 Aug. 1985
John L. Keller Washington NASA Apr. 1986 48 p
(Contract NAS8-34687)
(NASA-CR-3971; NAS 1.26:3971) Avail: NTIS HC A03/MF A01 CSCL 04B

The fundamental emphasis of this research was to develop a technique which would be a significant improvement over those currently used for flight planning to avoid clear air turbulence (CAT). The technique should, ideally, be both quantitative in determining potential intensity and specific in locating regions of relatively high risk. Furthermore, it should not rely on specialized data but be functional using the currently available rawinsonde observation (raob) system. Encouraging results documented in an earlier investigation were considered compelling enough to warrant a closer look into the possibilities of a Specific Clear Air Turbulence Risk (SCATR) index approach to the clear air turbulence problem. Unlike that research, which considered sustained periods of flight in light to moderate clear air turbulence, this study focuses on several cases of documented severe CAT. Results of these case studies suggest that a SCATR index is not an unrealizable goal and that uses of such an index, event in its current prototype level of development, are also apparent. Author

N86-30286# Finnish Meteorological Inst., Helsinki.
THE DEVELOPMENT OF AGROMETEOROLOGICAL SERVICES IN FINLAND
Aulis Ansalehto, Esko Elomaa, Martti Esala, and Anneli Nordlund Dec. 1985 28 p
(FMI-TN-31; ISBN-951-697-231-4; ISSN-0355-1733) Avail: NTIS HC A03/MF A01

A study for developing meteorological and advisory service for agriculture was carried out in Finland for the years 1982 to 1984. The Finnish Meteorological Institute, the Agricultural Research Centre, the Association of Agricultural Producers in Finland formed a working group for the task. The goal was to present the requirements of agrometeorological research and the need of daily service, to estimate costs and benefits of the service and to make suggestions for the agrometeorological service in the whole country. In three growing seasons 1982 to 1984 the working group offered experimental services for farmers in a small area in southern Finland. For evaluating the service questionnaires were sent to farmers. The potential benefits and losses were also considered. The cost/benefit-ratio has been evaluated by agronomic experts and the work was based on the answers of farmers. It turned out to be 1/30. At the 1984 cost level, we could estimate the cost of a nationwide agrometeorological service at around FIM 4.2 million a year. The total yearly national benefit would then be around FIM 120 million. In 1985 the working group made its proposals for extending the agrometeorological service to the whole country during the years 1986 - 1991. Author

N86-30287*# Columbia Univ., New York.
ATMOSPHERIC, CLIMATIC AND ENVIRONMENTAL RESEARCH Semiannual Progress Report, 1 Oct. 1985 - 30 Sep. 1986
Wallace S. Broecker and Inez Fung 1986 15 p
(Contract NCC5-29)
(NASA-CR-176880; NAS 1.26:176880) Avail: NTIS HC A02/MF A01 CSCL 04B

Research conducted during the past year in the climate and atmospheric modeling programs was focused on the development of appropriate atmospheric and upper ocean models, and preliminary applications of these models. Principal models are a one-dimensional radiative-convection model, a three-dimensional global climate model, and an upper ocean model. Principal application is the study of the impact of CO_2, aerosols and the solar constant on climate. Also the performance of the International Satellite Cloud Climatology Project cloud detection algorithm was evaluated, concentrating initially on its application to geosynchronous data, with an eventual switch of the developed methodologies to data from polar orbiting satellites. In the process, a number of improvements were made, in particular: an improved technique for tracking small scale day to day variability in clear sky continental temperatures; a number of techniques for the statistical assessment of cloud detection uncertainties due to cloud types which are spatially and temporally invariant; and a method used to detect those cloudy regions which have long term spatial and temporal stability. B.G.

N86-30288# Air Force Systems Command, Patrick AFB, Fla. Space and Missile Center.
APPLICATIONS OF SATELLITE METEOROLOGY IN SUPPORT OF SPACE SHUTTLE Technical Report, 1981 - 1985
B. B. Boyd, T. M. Myers, and C. S. Funk Dec. 1985 13 p
(AD-A166227; ESMC-TR-85-07) Avail: NTIS HC A02/MF A01 CSCL 04/2

The United States Air Force (USAF) Air Weather Service's Detachment 11 of the 2nd Weather Squadron is tasked to provide meteorological and environmental support to the USAF Eastern Space and Missile Center (ESMC), the National Aeronautics and Space Administration's (NASA) Kennedy Space Center (KSC), and the Department of Defense (DOD) Manager for Space Shuttle Support Operations. They provide weather support to the Cape Canaveral Air Force Station (CCAFS), Patrick Air Force Base (PAFB), KSC, and the entire Eastern Test Range (ETR); primarily through the Cape Canaveral Forecast Facility (CCFF). The CCFF is a 24-hour-a-day forecasting and observing operation. As part of its normal support, it provides specialized forecasts for all missile and space launches from the ETR/KSC and weather services for recovery forces. By far, the launch, landing, and ground operations of the Space Shuttle require the most precise weather support. Most aspects of Space Shuttle operations are sensitive to one or more meteorological parameters. As the Shuttle proved itself in its early missions and became operational with a significant increase in the number of scheduled missions, it was evident that weather and weather support would become critical elements in achieving and maintaining the higher launch rate. Through the efforts of the MSMP, and joint funding by the Air Force and NASA, several improvements in meteorological systems were accomplished, allowing better utilization of satellite data. GRA

N86-30289# Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.
AFOSR (AIR FORCE OFFICE OF SCIENTIFIC RESEARCH) CHEMICAL AND ATMOSPHERIC SCIENCES PROGRAM REVIEW (29TH)
Larry P. Davis and Eunice L. Luther Sep. 1985 117 p
(AD-A166285; AFOSR-TR-85-0960) Avail: NTIS HC A06/MF A01 CSCL 04/2

A review is presented of research efforts sponsored by the Directorate of Chemical and Atmospheric Sciences which have completed their period of support. Illustrated accounts resulting from the basic research programs in the Atmospheric and Chemical Sciences are highlighted. The Atmospheric Science is concerned with meteorology and upper atmospheric structure and dynamics. The meteorology focuses on mesoscale meteorology, cloud physics, and atmospheric dynamics. The Chemical Sciences deal with chemical techniques, chemical structures, surface chemistry, chemical dynamics, and synthesis and properties of materials. GRA

N86-30290# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ANOMALOUS US WEATHER PATTERNS ACCOMPANYING STRATOSPHERIC SUDDEN WARMING M.S. Thesis
Donald A. Douglas May 1985 123 p
(AD-A166371; AFIT/CI/NR-86-8T) Avail: NTIS HC A06/MF A01 CSCL 04/1

Key signatures of tropospheric circulation are investigated for months during which major Stratospheric Sudden Warming (SSW) occurred in the period 1955 to 1980. For the contiguous United States, monthly values of cyclone frequency, storm paths, precipitation and surface temperature are determined for 17 January and February months and compared against the years in which no SSW events occurred. Consistent with studies of energetics which show that the troposphere loses energy to the stratosphere during SSW, cyclone frequency is approximately 22% less during SSW. Also, consistent with a modification of planetary-scale waves during SSW, mean storm tracks are altered. Most notably, the Colorado Low disappears during SSW. Precipitation totals reflect the changes in cyclone behavior. The Ohio River Valley is the most anomalously dry region of an abnormally dry United States during SSW. During February, the southwestern states exhibit anomalously high precipitation totals. Surface temperatures are significantly below normal, especially east of the Rocky Mountains. During January, every state shows below normal temperatures except Nevada. Author (GRA)

N86-30291# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
FACTORS LEADING TO THE FORMATION OF ARC CLOUD COMPLEXES M.S. Thesis
Mark John Welshinger Dec. 1985 123 p
(AD-A166501; AD-E750871; AFIT/CI/NR-86-11T) Avail: NTIS HC A06/MF A01 CSCL 04/1

As a thunderstorm propagates past a station there is a rise and oscillation of the surface pressure. Downdrafts descending from thunderstorm cells are the source of air forming a cold dome over the ground which leads to a rise in surface pressure. If the cold downdrafts are strong enough and last for a sufficient time, an organized high pressure system develops at the surface, which is called a mesohigh. In satellite imagery the leading edge of a mesohigh appears as an arc-shaped line of convective clouds moving out in all directions from a dissipating thunderstorm area. Twelve mesoscale convective systems (MCSs) were investigated. The duration of the gust front, produced by each MCS, was used to classify the MCSs. Category 1 MCSs were defined as ones that produced a gust front which lasted for more than 6 h; there were 7 category 1 MCSs in the sample. Category 2 MCSs were defined as ones that produced a gust front which lasted for 6 h or less; there were 4 category 2 MCSs. All the category 1 MCSs produced arc cloud complexes (ACCs), while only one of the category 2 MCSs produced an ACC. Composite analyses showed that Category 1 MCSs, on average, had higher thunderstorm heights, greater precipitation intensities, colder cloud top temperatures and produced larger magnitudes of surface divergence than category 2 MCSs. GRA

N86-30292# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DAYTIME AND NIGHTTIME NEUTRAL WIND AND TEMPERATURE MEASUREMENTS FROM INCOHERENT SCATTER RADAR AT 300 KM OVER ARECIBO M.S. Thesis
Leslie O. Belsma Dec. 1985 40 p
(AD-A166600; AFIT/CI/NR-86-33T) Avail: NTIS HC A03/MF A01 CSCL 04/1

Arecibo's twenty acre spherical radar reflector detects the weak electromagnetic energy reflected when pulses are transmitted into the ionosphere. The information contained in this reflected energy reveals the electron temperature, the electron/ion temperature ratio, the line of sight plasma velocity and the electron density among other parameters. This information, combined with neutral densities obtained from the global thermospheric model based on Mass Spectrometer and Incoherent Scatter data, MSIS-83, is used to determine the neutral temperature and winds in the F region. This study pertains to the F2 region at a height of 300km over Arecibo (18 N latitude with a magnetic dip angle of 50). A few trends in previous data are noted, followed by a description of the 300km temperature and neutral wind for daytime and nighttime from 12 days of data, in sets of three days, from January 1984 and 1985, September 1984, and June, 1984. The experimental neutral temperature is compared to the MSIS model prediction. The observed temperature closely agrees in phase, but averages 50K lower than the mode l. GRA

N86-30293# Naval Research Lab., Washington, D. C.
SENSITIVITY OF REFRACTIVE INDEX PROFILE MODELS TO RELATIVE HUMIDITY SENSOR ERRORS
S. G. Gathman 27 Mar. 1986 39 p
(AD-A166626; NRL-MR-5758) Avail: NTIS HC A03/MF A01 CSCL 04/1

The problem of errors in the measurement of relative humidity from radiosondes and their possible effects on the detection of radar ducts in the boundary layer are discussed. Some numerical studies of the detection algorithm are presented. A statistical study of horizontal variations in relative humidity in the marine boundary is presented as a limitation on the accuracy requirement for data feeding into programs such as IREPS. A discussion of sensor development and a summary of sensor intercomparisons is included for completeness. GRA

N86-30294# Texas Technological Univ., Lubbock. Inst. for Disaster Research.
EXTREME WINDS AND TORNADOES: AN OVERVIEW
J. R. McDonald 1985 82 p Presented at the DOE Natural Phenomena Hazards Mitigation Conference, Las Vegas, Nev., 7 Oct. 1985
(Contract W-7405-eng-48)
(DE86-006162; UCRL-15745; CONF-8510118-Pt-4) Avail: NTIS HC A05/MF A01

The objective of this course on extreme winds, hurricanes, and tornadoes is to provide an overview of these natural phenomenon from the perspective of design of new buildings and structures or the evaluation of existing ones. Information is directly applicable to design and evaluation processes. The premise is that the facility under consideration, which may consist of various building, structures, processing equipment, stacks, ventilation ducts, etc., can be classified into certain categories, depending on the importance of the mission performed in the facility or the hazard that is presented by the particular operation. Having classified the facility into an appropriate category will automatically define certains design goals for the facility. The design goals are then met by selecting a design wind speed that is appropriate for the specified exceedance probability and by following certain specified design procedures. The problem then is to determine appropriate wind loads and other applicable loads, including dead loads, live loads, seismic loads, and other loads that may act on the structures. The design process can then proceed in the usual manner. In the case of existing facilities the strengths of the various structural elements, subsystems, and systems are evaluated and these strengths are related to wind speeds that would result in failure to meet the design goals. DOE

N86-30295# East Anglia Univ., Norwich (England).
GRID POINT SURFACE AIR TEMPERATURE DATA SET FOR THE SOUTHERN HEMISPHERE
P. D. Jones, S. C. B. Raper, C. M. Goodess, B. S. G. Cherry, and T. M. L. Wigley Feb. 1986 79 p
(Contracts DE-FG02-86ER60397; DE-AC02-79EV-10098)
(DE86-007205; DOE/EV-10098/6) Avail: NTIS HC A05/MF A01

A compilation of 610 station records of monthly surface air temperature has been assembled for the Southern Hemisphere, north of 62.5(0)S. In order to use these data to construct the first grid point temperature data set for the Southern Hemisphere, the homogeneity of each of the station records has been assessed. Each station has been classed into one of three groups: immediately usable, corrected, or uncorrectable. The results are presented in tabular form. Of the 610 station records, 293 were used to produce a gridded data set on a 5(0) latitude by 10(0) longitude grid between 5(0)S and 60(0)S inclusive. Grid point

anomalies for 1851 to 1984, with respect to the reference period 1951 to 1970, were interpolated from station data using a simple algorithm. In order to produce a best possible data set, Antarctic data were included after they became available in 1957. DOE

N86-30296# Oregon State Univ., Corvallis. Wind Resources Assessment Lab.
PACIFIC NORTHWEST WIND REGIONAL ENERGY ASSESSMENT PROGRAM. VOLUME 2. APPENDIX
R. W. Baker, J. E. Wade, W. Frick, R. J. Wittrup, and J. Buckley Oct. 1985 245 p
(Contract DE-AC79-81BP-25593)
(DE86-007114; DOE/BP-25593/1-Vol-2; BPA-85-19-Vol-2) Avail: NTIS HC A11/MF A01
This appendix includes site listings by state and maps, site screening matrix, and detailed area assessments. DOE

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-30297# Scripps Institution of Oceanography, La Jolla, Calif.
THE MAGNETIC EFFECTS OF SHALLOW WATER INTERNAL SOLITONS
Alan D. Chave Mar. 1986 52 p
(Contract N00014-85-C-0104)
(AD-A165852; SIO-REF-86-7) Avail: NTIS HC A04/MF A01 CSCL 08/3
Since internal waves are a common feature of the oceans, there has been some interest in computing their electromagnetic effects in order to assess their role in the oceanic electromagnetic environment. This report extends previous analyses to cover the electromagnetic effects of coastal internal wave packets. While no observations of the electromagnetic fields produced by them have been reported, the large amplitude of shallow water internal waves is expected to induce substantial electromagnetic anomalies. The report is organized into five sections. The next part contains a review of oceanographic observations of internal wave packets from both surface ships and satellite imagery. Section 3 outlines the hydrodynamic theory for nonlinear internal waves. Section 4 contains a derivation of expressions for the electromagnetic fields produced by an isolated internal solution both at the seafloor and above the sea surface. The last part of the report contains a discussion of the theoretical results, including a detailed look at the predicted magnetic field using measured parameters from three well-documented occurrences of internal wave packets.GRA

N86-30298# Washington Univ., Seattle.
AN INTRODUCTION TO ICE IN THE POLAR OCEANS
Gary A. Maykut Sep. 1985 116 p
(Contract N00014-84-C-0111)
(AD-A166140; APL-UW-8510) Avail: NTIS HC A06/MF A01 CSCL 08/12
This report provides a general review of the formation, growth, distribution, properties, and behavior of sea ice in the polar oceans. Aspects of sea ice that are discussed include its extent, formation, growth, heat balance, mass balance, mechanical properties, morphology, optical properties, salinity, structure, thermal properties, and thickness distribution. GRA

N86-30299# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
MECHANICAL PROPERTIES OF MULTI-YEAR SEA ICE. PHASE 2: TEST RESULTS
Gordon F. N. Cox, Jacqueline A. Richter-Menge, Wilford F. Weeks, Hazen Bosworth, and Nancy Perron Oct. 1985 84 p
(AD-A166333; CRREL-85-16) Avail: NTIS HC A05/MF A01 CSCL 08/12
This report presents the results of the second phase of a test program designed to obtain a comprehensive understanding of the mechanical properties of multi-year sea ice from the Alaskan Beaufort Sea. In Phase II, 62 constant-strain-rate uniaxial compression tests were performed on horizontal and vertical ice samples from multi-year pressure ridges to examine the effect of sample orientation on ice strength. Also conducted were 36 constant-strain-rate tension tests, 55 conventional triaxial tests and 35 constant-load compression tests on multi-year pressure ridge samples to provide data for developing ice yield criteria and constitutive laws. Data are presented on the strength, failure strain and modulus of multi-year sea ice under different loading conditions. The effects of ice temperature, porosity, structure, strain rate, confining pressure and sample orientation on the mechanical properties of multi-year sea ice are examined. GRA

N86-30300# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
THE STABILITY OF LOW-LATITUDE SEA-SURFACE TEMPERATURES: AN EVALUATION OF THE CLIMAP RECONSTRUCTION WITH EMPHASIS ON THE POSITIVE SST ANOMALIES
Warren L. Prell Jul. 1985 53 p
(Contract DE-AC02-83ER-60167)
(DE85-016190; DOE/ER-60167/1) Avail: NTIS HC A04/MF A01
A global data base of species composition of planktonic foraminifera has been compiled from sea floor samples (NS=1-145). This database has been used to evaluate the CLIMAP (1981) paleotemperature estimates and as the basis for an alternative method of estimating past sea surface temperatures: the modern analog technique (MAT). Evaluation of the CLIMAP foraminiferal equations reveals that they generaly do not work well on oceans not included in their calibration database and that some Pacific estimates may be biased toward warm values. The MAT estimates of SST are shown to be similar or higher correlation coefficients and to have lower standard estimates of errors than the comparable CLIMAP equations. Application of both methods to the 18K data results in positive SST anomalies in the south central Pacific and western tropical Indian Ocean. This comparison indicates that the positive SST anomalies of the CLIMAP reconstruction are real and do not reflect methodological bias. DOE

N86-30301# Old Dominion Univ., Norfolk, Va.
CONTINENTAL SHELF PROCESSES AFFECTING THE OCEANOGRAPHY OF THE SOUTH ATLANTIC BIGHT Progress Report, 1 Jun. 1985 - 31 May 1986
L. P. Atkinson Jan. 1986 16 p
(Contract DE-FG05-85ER-60348)
(DE86-008212; DOE/ER-60348/1) Avail: NTIS HC A02/MF A01
The purpose was to investigate the processes involved in the transport of fresh water from the inner shelf to the outer shelf in the vicinity of the Charleston Bump during the spring season of high fresh water discharge. The distribution of temperature, salinity, nutrients, and humic fluorescence were determined so that flow fields and distributions of variables could be related to wind forcing events. The time change in nutrient concentration and salinity at selected locations was determined. DOE

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-30302*# National Aeronautics and Space Administration, Washington, D.C.
LIFE SCIENCES SPACE STATION PLANNING DOCUMENT: A REFERENCE PAYLOAD FOR THE LIFE SCIENCES RESEARCH FACILITY
Aug. 1986 132 p
(NASA-TM-89188; NAS 1.15:89188) Avail: NTIS HC A07/MF A01 CSCL 06B
The Space Station, projected for construction in the early 1990s, will be an orbiting, low-gravity, permanently manned facility providing unprecedented opportunities for scientific research. Facilities for Life Sciences research will include a pressurized

research laboratory, attached payloads, and platforms which will allow investigators to perform experiments in the crucial areas of Space Medicine, Space Biology, Exobiology, Biospherics and Controlled Ecological Life Support System (CELSS). These studies are designed to determine the consequences of long-term exposure to space conditions, with particular emphasis on assuring the permanent presence of humans in space. The applied and basic research to be performed, using humans, animals, and plants, will increase our understanding of the effects of the space environment on basic life processes. Facilities being planned for remote observations from platforms and attached payloads of biologically important elements and compounds in space and on other planets (Exobiology) will permit exploration of the relationship between the evolution of life and the universe. Space-based, global scale observations of terrestrial biology (Biospherics) will provide data critical for understanding and ultimately managing changes in the Earth's ecosystem. The life sciences community is encouraged to participate in the research potential the Space Station facilities will make possible. This document provides the range and scope of typical life sciences experiments which could be performed within a pressurized laboratory module on Space Station. Author

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-30303*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE TEMPORAL RESPONSE OF BONE TO UNLOADING

Ruth K. Globus, Daniel D. Bikle (California Univ., San Francisco.), and Emily Morey-Holton 19 Dec. 1984 34 p Prepared in cooperation with Veterans Administration Hospital, San Francisco, Calif.

(Grant NAGw-236)

(NASA-TM-89228; NAS 1.15:89228) Avail: NTIS HC A03/MF A01 CSCL 06P

Rats were suspended by their tails with the forelimbs bearing the weight load to simulate the weightlessness of space flight. Growth in bone mass ceased by 1 week in the hindlimbs and lumbar vertebrae in growing rats, while growth in the forelimbs and cervical vertebrae remained unaffected. The effects of selective skeletal unloading on bone formation during 2 weeks of suspension was investigated using radio iostope incorporation (with Ca-45 and H-3 proline) and histomorphometry (with tetracycline labeling). The results of these studies were confirmed by histomorphometric measurements of bone formation using triple tetracycline labeling. This model of simulated weightlessness results in an initial inhibition of bone formation in the unloaded bones. This temporary cessation of bone formation is followed in the accretion of bone mass, which then resumes at a normal rate by 14 days, despite continued skeletal unloading. This cycle of inhibition and resumption of bone formation has profound implication for understanding bone dynamics durng space flight, immobilization, or bed rest and offers an opportunity to study the hormonal and mechanical factors that regulate bone formation. B.G.

N86-30304# Army Research Inst. of Environmental Medicine, Natick, Mass.

THERMOREGULATION AFTER ATROPINE AND PRALIDOXIME ADMINISTRATION

Margaret A. Kolka, Lou A. Stephenson, Stephen P. Bruttig, Bruce S. Cadarette, and Richard R. Gonzalez Mar. 1986 19 p

(AD-A165868) Avail: NTIS HC A02/MF A01 CSCL 06/15

The effects of intramuscular saline (control), atropine (2mg), pralidoxime (600 mg) or a combination of the two drugs on heat exchange was evaluated in four healthy males during moderately intense seated, cycle exercise (55% v02 peak) in a temperate environment (T sub a = 30.3 C, P sub W = 1.0 kPa). Esophageal, rectal, and mean skin temperatures, and chest and forearm sweating were continuously measured. Skin blood flow (FBF) from the forearm was measured twice each minute by venous occulusion plethysmography. Whole body sweating was calculated from weight changes. The expected result of atropine injection, decreased eccrine sweating (-60%, P 0.05) with ensuent elevated esophageal (+0.4C, $P<0.05$) and skin temperature (+2.1C, $P<0.05$) was observed relative to control. Heart rate (+28 b/min) and FBF (+9 ml/100cc) were higher after atropine. Pralidoxime, in general, did not affect the core and skin temperature responses to the exercise differently from control; however, a slightly elevated FBF (+3ml/100cc min, 33%) compensated for the reduction in whole body sweating (-45%, $p<0.05$) that we observed. The combination of the drugs resulted in significantly higher esophageal (0.4C) and skin (0.9C) temperatures than atropine alone, as has been previously shown. The thermoregulatory disadvantage of inhibited sweating by atropine was partially compensated for by enhanced skin blood flow in this environment where T sub a>T sub sk. Pralidoxime was shown to decrease whole body sweating, by a mechanism as yet unexplained. GRA

N86-30305# Army Research Inst. of Environmental Medicine, Natick, Mass.

HUMAN VASCULAR FLUID RESPONSES TO COLD STRESS ARE NOT ALTERED BY COLD ACCLIMATION

Andrew J. Young, Stephen R. Muza, Michael N. Sawka, and Kent B. Pandolf Mar. 1986 26 p

(AD-A165869; USARIEM-M-19/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

Repeated cold water immersion can induce the development of an insulative type of cold acclimation in man. This investigation determined if repeated cold water immersion produced changes in vascular fluid response to cold stress in addition to the previously reported changes in thermoregulation. Seven male subjects performed a standardized cold air and cold water exposure before and again after a cold acclimation program. The cold acclimation program consisted of daily immersion (90 min) in cold water (18 C, stirred) repeated five times per week for five consecutive weeks. Cold acclimation did not alter the responses of plasma volume or electrolyte concentrations, nor urinary flow or electrolyte excretion during either cold air or cold water exposure. The percent reduction in plasma volume was larger ($P<0.01$) in cold water (-17%) than in cold air (-12%). Cold water immersion resulted in greater ($P<0.01$) diuresis than cold air exposure. Plasma K(+) concentration increased ($P<0.01$) during cold (both air and water) exposure while plasma Na(+) concentration was unchanged. Calculated renal clearance and urinary excretion rate of both Na(+) and K(+) increased during cold (both air and water) exposure. It is concluded that: (1)insulative cold acclimation does not influence vascular fluid responses to cold stress; and (2)although vascular fluid shifts, body cooling and diuresis are all greater in cold water than air, a consistent relationship among these parameters could not be established for an individual's response. GRA

N86-30306# Naval Submarine Medical Research Lab., Groton, Conn.

CALCIUM AND VITAMIN D METABOLISM IN SUBMARINERS: CARBON DIOXIDE, SUNLIGHT AND ABSORPTION CONSIDERATIONS

David M. Sack, M. Holick, and K. R. Bondi 15 Jan. 1986 25 p

(AD-A166292; NSMRL-1037) Avail: NTIS HC A02/MF A01 CSCL 06/16

A 42% decrease in 25(OH)vitamin D levels has been noted in subjects over the course of submarine patrols and is thought to be the result of prolonged sunlight deprivation. The influence of the submarine environment on absorption of ingested vitamin D has not been previously investigated. This study examines the vitamin D absorption patterns of 5 subjects at the beginning, middle, and end of a 89 day patrol on a normal diet and with no exposure to sunlight. It was found that the magnitude and pattern of absorption does not change appreciably. It is concluded that the absorption of vitamin D is not affected by the submarine environment and that any drop in 25(OH) vitamin D levels seen during patrol is caused by lack of sunlight, ultraviolet light in particular. Implications in terms of sunlight deprivation and calcium metabolism

are discussed in a historical review of calcium and vitamin D investigations on submarines. GRA

N86-30307# Army Research Inst. of Environmental Medicine, Natick, Mass.
AN ENVIRONMENTALLY-CONTROLLED EXTENDED-USE SMALL ANIMAL HYPOBARIC CHAMBER
James A. Devine and Allen Cymerman Apr. 1986 14 p
(AD-A166729; USARIEM-M-23/86) Avail: NTIS HC A02/MF A01 CSCL 06/19

An environmentally-controlled extended-use small animal hypobaric chamber has been designed to study small laboratory animals at low barometric pressures for long periods of exposure. The rectangular chamber (91.4 x 71.1 x 50.8 cm) is constructed of aluminum plate and acrylic resin with a volume of 330,000 cc. A computer/data acquisition control unit provides for controlling and collecting data on pressure, temperature, and relative humidity (RH) for sustained operations. Altitude simulation is achieved using a two-stage, air-cooled vacuum pump with a displacement of 30 cc/min. The pressure within the chamber is controlled by an incremental throttling valve in the vacuum line. Temperature (0-100 C) is accomplished by using a remote-controlled constant temperature circulating bath. RH (20-80%) is regulated by pre-conditioning the ventilation purge air prior to entering the chamber. Acceptable levels of oxygen and carbon dioxide gases are maintained by purging with sufficient volumes of fresh air. GRA

N86-30308# Argonne National Lab., Ill.
MULTIPARAMETER DATA ACQUISITION SYSTEMS FOR STUDIES OF CIRCADIAN RHYTHMS
K. R. Groh, C. F. Ehret, W. J. Eisler, Jr., and D. A. LeBuis 1985 15 p Presented at the NATO Advanced Workshop on Chronobiotechnology, Cardiff, Wales, 21 Apr. 1985
(Contract W-31-109-eng-38)
(DE86-004041; CONF-8504206-1) Avail: NTIS HC A02/MF A01

Long-term, simultaneous monitoring of multiple metabolic circadian cycles such as energy metabolism, animal activity, and body temperature together have revealed ultradian fine-structure rhythms which are dependent on circadian phase and the perturbations of environmental influences. Because of the variation between individual animals, these experiments need to have large sample sizes for each experimental condition. To this end we have designed, constructed, and used four microcomputer controlled data acquisition systems to collect circadian data from individually housed rats and mice. DOE

N86-30309# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Aerospace Medical Panel.
MEDICAL SELECTION AND PHYSIOLOGICAL TRAINING OF FUTURE FIGHTER AIRCREW
Loughton, England Dec. 1985 146 p refs In ENGLISH and FRENCH Conference held in Athens, Greece, 25-26 Apr. 1985
(AGARD-CP-396; ISBN-92-835-0385-6) Avail: NTIS H A07/MF A01

The conference proceedings reviewed and made recommendations with respect to the medical selection and physiological and physical training of pilots who are to operate future fighter aircraft. The relevant characteristics of a proposed USAF fighter and the European Fighter Aircraft were discussed and used as the basis for selection and training considerations. Contributors drew upon the experience of the medical selection of pilots for present fighter aircraft. The cardiovascular, vision, and vertebral column aspects of medical selection and monitoring are considered in depth and recommendations made as to the methods which should be employed in the future. The influence of physical fitness upon pilot performance is addressed. The philosophy and practice of physiological training of aircrews is reviewed with emphasis on the value of the human centrifuge in teaching G protective maneuvers. For individual titles, see N86-30310 through N86-30327.

N86-30310# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIRCREW ASPECTS OF UNITED STATED FUTURE FIGHTER AIRCRAFT
Richard D. Krobusek *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 5 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The cockpit environment of fighter aircraft for the year 2000 and beyond will undoubtedly need aircraft technologies and protective devices to meet the ever growing enemy challenge. Recent advances in aircraft structures, flight controls, sensors, multipurpose and touch-sensitive displays, voice recognition and synthesis, enemy defenses, and chemical/biological warfare (CBW) technologies will combine to create a cockpit environment for future fighter aircraft vastly different and potentially more complex than any previously encountered by aircrews. This integration of equipment and crewmembers will interact such that new stresses will be created and existing ones aggravated. Special maneuver capability through the use of direct side force may provide significant tactical advantage at the expense of stress due to lateral acceleration forces. A few of these current technolooies and some of the driving forces which will affect the cockpit environment of tomorrow's aircraft will be identified and discussed briefly. These technologies, as well as others, should receive further study for their effects on the aircrew prior to application in future aircraft. Proper application of the results of these studies will prevent the unbridled growth of cockpit complexity. Author

N86-30311# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
CANADIAN FORCES APPROACH TO AIRCREW MEDICAL SELECTION
Gary Gray *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 6 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

With advances in aircraft performance capabilities and in medical screening technology, major changes in Canadian Forces aircrew medical screening procedures were proposed and are being introduced. In addition to the standard battery of tests, additional screening procedures being introduced or evaluated include drug screening for cannabinoids, contrast sensitivity function visual assessment, echocardiograms, cardiovascular risk assessment, pulmonary function testing, an aeromedical history questionnaire, and a psychosocial and clinical review by a flight surgeon. Screening electroencephalograms are being continued. This data is used to reject candidates who fail to meet slection standards, and to provide a Medical Suitabiliyt Rating for acceptable candidates. Of candidates screened 2.8% had positive tests for urinary cannabinoids. Contrast sensitivity norms for the aircrew candidate population are higher than for other populations studied. Contrast sensitivity may be helpful in assessing candidates whose vision is close to standards. This approach to initial medical screening should reduce attrition of experienced aircrew for medical reasons, and will enhance flight safety over the years to come. Author

N86-30312# Tactical Air Command, Langley AFB, Va.
MEDICAL SELECTION AND PHYSIOLOGICAL TRAINING OF FIGHTER PILOTS: A 1985 PERSPECTIVE AND OVERVIEW
Rufus M. DeHart *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 5 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

From an aeromedical perspective, there are two major goals for the Tactical Air Force. The first is to reduce the aircraft mishap rate due to human factor variables. The second is to enchance pilot capability to perform in the modern fighter environment. Fighter pilots can perform in the 9G (sub z) environment effectively and safely if they are properly selected, educated, and trained. In addition to being good aviators, smart, and aggressive, fighter pilots must be physically healthy and in excellent physical condition.

A thorough understanding of high-G physiology and the personal physiological flight envelope is needed. Accomplishing the variety of initiatives required to realize these goals is an exciting challenge for the aerospace medical community. Author

N86-30313# School of Aerospace Medicine, Brooks AFB, Tex.
CARDIOVASCULAR STANDARDS FOR SELECTION AND RETENTION OF HIGH PERFORMANCE PILOTS IN THE USAF: PERSPECTIVES FOR THE NEXT DECADE
James R. Hickman, Jr., George M. McGranahan, Jr., Robert M. Paull, and Rufus M. DeHart (Tactical Air Command, Langley AFB, Va.) *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 7 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Cardiovascular selection and retention standard must be based upon a number of considerations which are primarily epidemiological in nature. In young applicants, there is little rationale in the performance of expensive, labor intensive studies which yield nonspecific results, most of which are normal variants. Stress tests and Holter monitors fall into this category. Since the significance of nonspecific findings is determined by the presence or absence of underlying organic structural defects, it is recommended that testing in a young population be directed toward the detection of anatomical defects. It is also recommended that abnormal findings of a structural nature then be assessed with functional tests to determine whether the applicant may enter some form of aviation training or be disqualified from all training. B.G.

N86-30314# Centre Principal d'Expertises Medicales du Personnel Navigant de l'Aeronautique, Paris (France).
SELECTION AND MEDICAL TESTING OF MIRAGE 2000 PILOTS: REPORT OF ECHOCARDIOGRAPHY [SELECTION ET SURVEILLANCE MEDICALES DES PILOTES DE MIRAGE 2000: APPORT DE L'ECHOCARDIOGRAPHIE]
H. Ille, A. Didier, N. Allegrini, and C. Maurel *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 13 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The use of echocardiological examinations in the selection of prospective combat aircraft crews is discussed. Included is a comparative study of two homogeneous pilot cohorts; one consists of 54 transport aircraft pilots, and the other consists of 32 combat pilots. It is shown that the two cohorts present the same anomalies of the right cardiac region (mitral valvular prolapsus). However, it is shown that the anomalies of the right cardiac region form a right ventricular dilation only in combat pilots. Two hypotheses were developed: that the anomalies are an adaptation of the right cardiac region to accelerations, or that they are a stage preceeding secondary myocardial shock due to aeronautical constraints. B.G.

N86-30315# Hopital d'Instruction des Armees, Versailles (France).
CONTINUOUS ECG MONITORING OF MIRAGE 2000 PILOTS (COMPARISON WITH MIRAGE 3 AND F1 PILOTS) [ENRIGISTREMENT CONTINU DE L'E.C.G. CHEZ LES PILOTES DE MIRAGE 2000 (COMPARAISON AVEC LES PILOTES DE MIRAGE 3 ET F1)]
A. Seigneuric, G. Leguay, J. P. Burlaton, G. Poyot, and M. Sylvestre *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 3 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Continuous Electrocardiographic monitoring for a duration of 24 hours allows a comparison of a sample of 24 conventional combat aircraft pilots (Mirage III and FI), with 7 Mirage 2000 pilots. A comparison of problems due to excitability during flight does not show signification differences among the two groups. Problems due to solar repolarization were recorded only for high-performance aircraft pilots. Differences primarily included cardiac frequencies in flight; they were clearly lower for the Mirage 2000 pilots as observed acceleration was increased. This corresponds with the differences in characteristics of the two populations, pertaining to the different missions. It is shown that modern combat aircraft, characterized by intense and prolonged acceleration, are capable of causing a certain excitability factor for the pilots. It is important to determine the influence of this acceleration on the cardiovascular system. B.G.

N86-30316# Centre d'Essais en Vol, Bretigny-sur-Orge (France).
THE USE OF ECG CHANGES CAUSED BY ACCELERATION AS TOLERANCE PREDICITION FACTORS [LES MODIFICATIONS ELECTROCARDIOGRAPHIQUES INDUITES PAR LES ACCELERATIONS, FACTEUR PREDICTIF DE LA TOLERANCE]
J. H. Clere, H. Vielleford, and J. L. Poirier *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 7 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

High-G accelerations experienced by combat aircraft pilots are arythmogenic. Of 328 electrocardiographic (EKG) tests done on 146 subjects submitting to accelerations of 4 to 11 G at a duration of 20 to 60 seconds, 215 supraventricular anomalies were observed on 181 tests, and 37 ventricular anomalies were observed on 31 tests. The frequency of these anomalies are a function of the intensity of the acceleration. However, there appeared to be no correlation between the EKG anomalies and the hemodynamic phenomena caused by problems of visual function or psychomotor problems. Thus it is stated that EKG monitoring may be of interest for use as a prediction factor for acceleration tolerance. It is stated that the anomalies of rhythm are probably based on vagus reflexes caused by attempts by the heart to protect against the acceleration, as well as by the venous responses to the centrifuge. B.G.

N86-30317# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
ENTRY VISUAL STANDARDS AND OCULAR EXAMINATION TECHNIQUES FOR FUTURE FIGHTER AIRCREW
D. H. Brennan *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 6 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The visual tasks of future fighter aircrew are likely to increase both in magnitude and complexity. The increasing adoption of devices for visual enhancement and protection, even now, poses problems for integration with spectacles. The visual standards required for initial selection for training as a pilot or navigator should, if numbers permit, be such that trained aircrew are unlikely to require a visual aid until presbyopia physiologically demands correction in the latter half of the fourth decade. The visual standards considered appropriate for future fighter aircrew and the related ocular examination techniques both conventional and those designed to test such specialized ocular functions as stereopsis, glare resistance, dark adaptation, hue discrimination, and modulation transfer function are discussed. Author

N86-30318# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
SENSITIVITY TO COLOR CONTRASTS AND THE SELECTION OF NAVIGATOR PERSONNEL [SENSIBILITE AU CONTRASTE EN COULEURS ET SELECTION DU PERSONNEL NAVIGANT]
J. P. Menu, G. Santucci, and C. Corbe *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 8 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Using a specific psychophysical method, the sensitivity to color contrasts (FSC) was systematically tested for subjects undergoing ophthalmological examinations. Following FSC examinations, several subjects with ametrophic conditions were studied. The FSC examinations were modified to obtain the exact nature of the ophthalmological I problem. It is shown that there is a change in the spatial frequencies of the blue section for subjects with myopic disorders, and a change in the red section for far-sighted subjects. This change is shown to be proportional to the degree of

ametrophic disorder. Thus, FSC tests are proposed as a basis for tests for the selection of navigators. B.G.

N86-30319# School of Aerospace Medicine, Brooks AFB, Tex. Neurosciences Function.
COMPUTER ANALYSIS OF VISUAL AND VESTIBULAR OCULOMOTOR FUNCTION IN THE MEDICAL SELECTION OF FIGHTER AIRCREW MEMBERS
James W. Wolfe, Edward J. Engelken, and Kennith Stevens, W. *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 6 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Methods for evaluating visual and vestibular-oculomotor function in aircrew members are reviewed. Three specific tests are described: pursuit tracking, harmonic angular acceleration, and saccadic tracking. In all of these tests, on-line computer analysis is used to quantify and describe the input/output relationships. An example of clinical data from pursuit tracking and harmonic angular acceleration tests for a patient with known pathology are used to demonstrate changes in test results. The major point is that it is now practical to evaluate oculomotor function in pilots and aircrew members selected for fighter aircraft duty. Author

N86-30320# Naval Aerospace Medical Research Lab., Pensacola, Fla.
VISUAL CAPABILITIES RELATED TO FIGHTER AIRCREW PERFORMANCE IN THE F-14 AND ADVERSARY AIRCRAFT
W. A. Monaco and P. V. Hamilton *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 9 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Standards for aviation personnel should be based on capacities for performing critical tasks. The use of scores on task-relevant visual tests to predict air-to-air target detection performance of pilots involved in air combat maneuver (ACM) training was determined. A series of automated vision tests was determined in a mobile field laboratory located at a Tactical Air Combat Training System (TACTS) range. A computerized telemetry network provides extensive real time data on observer and target aircraft flight dynamics, and environmental parameters. A pilot's performance on each ACM engagement was measured by the slant range at the instant he sighted a target aircraft. Priminary analyses show that about 30% of the variance in the slant range is accounted for by flight dynamics, and environmental parameter, and vision data. Author

N86-30321# Naval Aerospace Medical Research Lab., Pensacola, Fla.
VISION TEST BATTERY THRESHOLD AND RESPONSE TIME AS PREDICTORS OF AIR-TO-AIR VISUAL TARGET ACQUISITION IN F-14 AND ADVERSARY AIRCRAFT
A. Morris, P. V. Hamilton, W. A. Morey, and R. P. Briggs (University of Southern California, Los Angeles.) *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 8 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The Naval Aerospace Medical Research Laboratory (NAMRL) Vision Test Battery provides assessment of various visual functions, including spot detection, acuity at high and low contrast, glare sensitivity, and accommodative flexibility. Within these tests are measures of threshol, threshold-stressed response time (for near-threshold stimuli), and unconfounded response time (for supra-threshold stimuli). The contribution of response time variables to predicting flight performance was evaluated for 73 fighter pilots. Vision test data were compared to performance in air combat maneuver training. The distance (slant range) between the observer and target aircraft at time of initial visual detection was used as the performance variable. Availability of response time variables enhanced the ability to predict the air-to-air visual target detection performance of these pilots. Four vision variables accounted for about 32% of the variance in performance of those pilots who detected target aircraft at slant ranges greater than the group average. Prediction of performance is improved by incorporating other vision data and additional refinement of the performance measure. Author

N86-30322# Hopital d'Instruction des Armees, Paris (France).
THE VERTEBRAL COLUMN: SELECTION AND APTITUDE OF COMBAT AIRCRAFT PILOTS OF THE FUTURE [COLONNE VERTEBRALE: SELECTION ET APTITUDE DES PILOTES D'AVION DE COMBAT DU FUTUR]
P. J. Metges, J. Flageat, R. Aufret, R. P. Delahaye, and H. Vieillefond *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 3 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The new generation of combat aircraft is characterized by the possibility of negative effects on the vertebral column due to extended or peak acceleration forces. In order to provide the pilot with optimal capacity for visual information assimilation, the cervical rachis must remain mobile and is therfore vulnerable under certain circumstances. Lesions may occur in this area during flight. Prevention of this condition is based on three elements: extensive radiological examination of the rachis for pilot applicants; technical improvements in helmet alignment; and physical adaptation training. B.G.

N86-30323# Militair Hospitaal Dr. A. Mathijsen, Utrecht (Netherlands).
SYSTEMATIC RADIOGRAPHIC EXAMINATION OF THE SPINE FOR SELECTION OF F-16 PILOTS: A PRELIMINARY REPORT
Albert vanDalen and Harry H. M. VanDenBiggelaar (Royal Netherlands Air Force, Soesterberg.) *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 4 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

With the introduction of the high performance aircraft F-16 in the Royal Netherlands Air Force an increase in spinal column disorders was anticipated. Therefore, a systematic whole spine radiography of candidate student pilots (CSPs) and qualified pilots (QPs) designated to fly F-16 were performed since December 1982. To reduce radiation exposure radiographs were made using a modern 14 inch intensifier. So far, 225 CSPs and 196 QPs were examined. Strict application of the medical criteria leads to a rejection of 20% of the CSPs because of spinal disorders visualized on X-ray. For F-16 pilots, the major region of interest seems to be the cervical spine. The rejection rate could be reduced by readjustment of the medical criteria and separate selection of helicopter and fighter pilots. Systematic examination of QPs who had no or incomplete previous examinations uncovers a high rate of spinal disorders. In the series QPs without any symptoms were only rejected because of cervical discopathy with osteophyte formation on the backside of the vertebrae and resulting narrowing of the spinal canal. Author

N86-30324# CEAM, Mont-de-Marsan (France).
PHYSICAL TRAINING OF MIRAGE 2000 PILOTS [ENTRAINEMENT PHYSIQUE DES PILOTES DE MIRAGE 2000]
G. Poyot, J. M. Clere, J. Lemot, and J. P. Delattre *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 5 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Nine combat aircraft pilots underwent physical training specifically designed to increase their tolerance to acceleration forces. The suitability of the training was studied using centrifuge tests. The increase in tolerance could be attributed to the effects of the physical training or to an adaptation to the centrifuge. It is shown that together with an excellent original physical condition, specific physical training may increase the tolerance of acceleration forces. Further testing of this is expected. B.G.

N86-30325# Belgian Air Force, Brussels.
TREADMILL SPIROERGOMETRY IN THE SELECTION AND SCREENING OF HIGH-PERFORMANCE COMBAT AIRCRAFT

PILOTS IN THE BELIGAN AIR FORCE [SPIROERGOMETRIE SUR TAPIS ROULANT DANS LA SELECTION ET LA SURVEILLANCE DES PILOTES D'AVIONS A HAUTES PERFORMANCES DE LA FORCE AERIENNE BELGE]
G. Pirquin, J. Vastesaeger, and P. Vandenbosch *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 5 p In FRENCH (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

All pilots of the Belgian Air Force who were designated for conversion to the F-16 aircraft underwent cardiovascular and respiratory examinations. One of the tests was a test for maximum treadmill effort. In the first study, the results of the screening were combined with the results of tests conducted on a group of young candidate student pilots. The aerobic capacity of this population was then evaluated. The test sample included 156 persons of various ages and in different stages of physical conditioning. In the second study, the positive effects of physical training on the treadmill spiroergometric examination of a group of F-16 pilots were examined. B.G.

N86-30326# Naval Aerospace Medical Research Lab., Pensacola, Fla.
RELATIONSHIP OF CARDIOPULMONARY FITNESS TO FLIGHT PERFORMANCE IN TACTICAL AVIATION
G. R. Banta and J. D. Grissett *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 11 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

Current endeavors to identify whether cardiopulmonary fitness can positively influence flight performance in a tactical fighter community are discussed. Population analyses of experienced and student Naval aviators present evidence that the U. S. Navy aviation pilot community is in an above the average state of physical fitness with less than average coronary heart disease potential. Correlations found between cardiopulmonary fitness and psychophysiological responses that occur during simulated and/or actual flight operations present strong ecidence that flight performance could be favorably affected. Author

N86-30327# Naval Aerospace Medical Inst., Pensacola, Fla. Aviation Physiology Dept.
HYPOBARIC TRAINING OF FLIGHT PERSONNEL WITHOUT COMPROMISING QUALITY OF LIFE
Don Montelle Herron *In* AGARD Medical Selection and Physiological Training of Future Fighter Aircrew Dec. 1985 7 p (For primary document see N86-30309 21-52)
Avail: NTIS HC A07/MF A01

The increased incidence in decompression sickness during physiology training among U. S. Navy aircrew personnel and medical attendants requires a search for alternative means of permitting recognition and corrective action of hypoxia. The requirement for individual hypoxia training is considered valid not just by Navy regulations but by aeromedical practioners throughout the world. A proposal is made to utilize a gas mixture consisting of 7.4% oxygen and 92.6% nitrogen to induce hypoxia at ground level. This would permit ground level hypoxia training with similar symptoms of hypoxia as presently demonstrated at 25,000 feet in a decompresion chamber but would alleviate the primary cause of decompression sickness. All other U. S. Navy training objectives for the chamber exposure would be safely met and more efficiently demonstrated. The initial financial burden in modifying the existing decompression training chamber would be moderate when considering development and manufacturing of a new training device. The ultimate gain exists in decreased human suffering and the necessary return of credibility to the aeromedial training community. This is a must if we are to profess to do no harm. Author

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-30328* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DIVISION OF ATTENTION AS A FUNCTION OF THE NUMBER OF STEPS, VISUAL SHIFTS, AND MEMORY LOAD
Richard A. Chechile (Tufts Univ., Medford, Mass.), Keith Butler, William Gutowski, and Everett A. Palmer 1986 11 p
(Contract NCA2-OR785-801)
(NASA-TM-88775; NAS 1.15:88775) Avail: NTIS HC A02/MF A01

The effects on divided attention of visual shifts and long-term memory retrieval during a monitoring task are considered. A concurrent vigilance task was standardized under all experimental conditions. The results show that subjects can perform nearly perfectly on all of the time-shared tasks if long-term memory retrieval is not required for monitoring. With the requirement of memory retrieval, however, there was a large decrease in accuracy for all of the time-shared activities. It was concluded that the attentional demand of longterm memory retrieval is appreciable (even for a well-learned motor sequence), and thus memory retrieval results in a sizable reduction in the capability of subjects to divide their attention. A selected bibliography on the divided attention literature is provided. Author

N86-30329# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
THE EFFECT OF SPECTRALLY SELECTIVE FILTERS ON VISUAL SEARCH PERFORMANCE Final Report
G. T. Chisum, J. B. Sheehy, P. E. Morway, and G. K. Askew 8 Aug. 1985 17 p
(AD-A165835; NADC-85115-60) Avail: NTIS HC A02/MF A01 CSCL 06/16

The effect of five spectrally selective filters on the performance of an acuity dependent visual search task was evaluated. The filters were: (A)a neutral density filter (control condition); (B)a 52 00A green interference filter; (C)a 3215-250 red filter; (D)a neodymium visor; and (E)a holographic filter. The observers were presented with five blocks of ten slides per filter. Each slide projected a 6 by 6 deg field of 900 ten min of arc letter Os which contained a single Landolt C. The observers were required to search the field and report the orientation of the opening in the C. The opening in the C, which subtended 2.64 min of arc, required an acuity of 0.39 for detection. Response time, error rate, accommodative accuracy, and the number of fixations and their duration were recorded for each slide presentation. The results demonstrate that filter type had no effect on any of the response measures. During the first three trial blocks the observers appeared to optimize their search strategies, after which they began to revert to their initial performance levels. Although this effect was not supported statistically, this trend indicates that initially search proficiency increases with practice after which it is offset by fatigue. GRA

N86-30330# Pittsburgh Univ., Pa. Psychiatric Inst. and Clinic.
THE IMPORTANCE OF SPECIALIZED COGNITIVE FUNCTION IN THE SELECTION OF MILITARY PILOTS
Harold W. Gordon and Robert Leighty 19 Mar. 1966 43 p
(Contract N00014-83-K-0208)
(AD-A165889) Avail: NTIS HC A03/MF A01 CSCL 05/10

Visuospatial skills significantly distinguished student Naval aviators who dropped out of aviation training from those who received their wings. While both groups were better than average on these tests, the winged aviators were better than the dropout group by 0.25 standard deviation which is highly significant ($P<0.0001$) for the total sample of 600 subjects. Performance on verbal-sequential skills did not distinguish between the groups. Logistic regression not only confirmed the group difference but demonstrated an interaction with verbal-sequential skills. High

performance on these skills helped the odds of being winged for aviators with low visuospatial ability but hindered those with high visuospatial ability. Distribution of visuospatial scores for the 2 groups demonstrated reasonable cut-off points at which considerably more drop-outs than winged aviators could have been eliminated. However, these data are relevant only for the selected sample of aviators accepted for the training programs. An additional study on the entire group of applicants including those rejected would allow comparison between the special cognitive tests used in this study and those already used as selection criteria. GRA

N86-30331# SRI International Corp., Menlo Park, Calif.
SPATIOTEMPORAL CHARACTERISTICS OF VISUAL LOCALIZATION Final Report, 1 Jun. 1982 - 31 Aug. 1985
Christina A. Burbeck 30 Oct. 1985 21 p
(Contract F49620-82-K-0024)
(AD-A166097; AFOSR-86-0109TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

The main thrust of this research effort has been investigation of the spatial and temporal properties of the visual processes underlying relative spatial localization by human observers. The initial tasks were development of a suitable laboratory display system for generating the required stimuli, and development of appropriate experimental paradigms for studying the localization of widely separated objects. The second task was to make careful quantitative measurements of the spatial and temporal properties of the system underlying localization of widely separated objects. It was found that many of the stimulus manipulations that are critical in determination of contrast detection thresholds have little or no effect on localization accuracy. The relative localization of widely separated objects is a highly robust visual ability. Those variations in localization accuracy with changes in the spatial and temporal parameters of the stimulus that were obtained could readily be modeled as natural extensions of the threshold properties. The final task of this project was testing of existing models of spatial ability that can be accounted for by current models of spatial vision. Specific extensions of the existing model were suggested by the data. GRA

N86-30332# Nova Technical, Inc., Tarzana, Calif.
AN INVESTIGATION OF THE USE OF STEADY-STATE EVOKED POTENTIALS FOR HUMAN PERFORMANCE AND WORKLOAD ASSESSMENT AND CONTROL Final Technical Report, 15 Jun. 1983 - 14 Jun. 1985
Samuel L. Moise, Jr. Jun. 1985 66 p
(Contract F49620-83-C-0102)
(AD-A166205; AFOSR-86-0110TR) Avail: NTIS HC A04/MF A01 CSCL 05/10

This program of research investigated Steady-State Evoked Potential (SSEP) measures to determine their utility for evaluating sensory inputs, workload, and performance variables in human operators. A primary purpose was to find techniques and measures that could be generalized to groups of subjects in operational environments. SSEP measures included power (amplitude), coherence, phase lag, and Relative Transmission Time (RTT). Included in this effort were studies of: (1) Frequency masking, where multiple frequencies were presented simultaneously. (2) Sensory inputs which may manipulate SSEP (e.g., color, intensity, cross-modality stimulation). (3) Correlation of SSEP measures with fatigue and tack difficulty. (4) The relationship between performance in a tracking task and SSEP measures. GRA

N86-30333# New York Univ. Medical Center.
NOVEL ARCHITECTURES FOR IMAGE PROCESSING BASED ON COMPUTER SIMULATION AND PSYCHOPHYSICAL STUDIES OF HUMAN VISUAL CORTEX Final Report, 15 Apr. 1983 - 15 Apr. 1985
Eric L. Schwartz 2 Jan. 1986 96 p
(Contract F49620-83-C-0108)
(AD-A166222; AFOSR-86-0059TR) Avail: NTIS HC A05/MF A01 CSCL 05/10

This final report consists of two parts. The first part is a computer simulation of the functional architecture of the visual cortex, and an examination of the possible significance that this architecture may have for understanding both human visual computation and machine vision. The second part of this report is a psychophysical investigation of human shape perception in terms of boundary descriptors of curvature. GRA

N86-30334# Naval Submarine Medical Research Lab., Groton, Conn.
THE EFFECTS OF COLOR-CODING IN GEOSIT (GEOGRAPHICAL SITUATIONAL) DISPLAYS. 2: REDUNDANT VERSUS NON-REDUNDANT COLOR-CODING Interim Report
Alan R. Jacobsen, William H. Rogers, and David F. Neri 15 Jan. 1986 26 p
(AD-A166263; NSMRL-1069-2) Avail: NTIS HC A03/MF A01 CSCL 05/8

The effect on search time of redundant versus non-redundant color-coding of symbols in geographical situational (GEOSIT) displays was evaluated using 36 observers who were randomly assigned to three coding schemes: monochrome-coding, redundant color-coding, and non-redundant color-coding. In the color-coding schemes, only the threat information (Friendly, Unknown, and Hostile) was color coded, either redundantly with shape or not. The platform information (Submerged, Surface, and Airborne) was coded by shape in all three coding schemes. Performance when searching for the color-coded threat target categories was enhanced by over 100% compared to monochrome shape-coding. In addition, response time on the non-color-coded platform categories was significantly faster under the non-redundant color-coding scheme than under the redundant color-coding scheme. Author (GRA)

N86-30335# Institute for Perception Research, Eindhoven (Netherlands).
[ACTIVITIES REPORT IN PERCEPTION RESEARCH] Annual Report, 1984
1985 161 p
(IPO-19-1984; ESA-86-97398) Avail: NTIS HC A08/MF A01

Research concerning hearing and speech; vision and reading; cognition and communication; information ergonomics; communication aids for the handicapped; and perception studies instrumentation and software is summarized. ESA

N86-30336# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Cognitive Psychology Group.
COGNITIVE ASPECTS OF COMMAND AND CONTROL
G. Keren and J. G. W. Raaijmakers Jan. 1986 45 p
(IZF-1986-2; TDCK-86-0580; ESA-86-97399) Avail: NTIS HC A03/MF A01

Topics and specific studies within cognitive sciences that have direct relevance to the functioning of a C3 unit are reviewed. Issues related to the manner in which information is obtained and processed, and the different aspects that are related to the decision process are discussed. Research subjects on command and control systems are suggested. ESA

N86-30337# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Human Performance Group.
ATTENTION TASKS AND THEIR RELATION TO AGING AND FLIGHT EXPERIENCE
L. C. Boer Feb. 1986 28 p
(Contract A83/KLu/078)
(IZF-1986-4; TDCK-86-0585; ESA-86-97400) Avail: NTIS HC A03/MF A01

The Dichotic Listening Task (DLT) of Gopher and Kahneman (1971) was studied in a group of 143 aviators, aged between 17 and 70 yr. Other tasks of the study were the Continuous Memory Task (CMT) and two choice-RT tasks with visual stimuli. An attention questionnaire was also administered. Aging has negative effects on all tasks, especially on the DLT. With age factored out, no substantial correlations between DLT and other tasks are found. The only exception is a moderate correlation with choice RT. Differences between subgroups of aviators (42 airline pilots and

50 private pilots) were studied. The assumption was that airline pilots had higher levels of aviator skill. The DLT, CMT, and one of the RT tasks correlate with aviator subgroup. A second study with 16 flight cadets finds significant correlations between DLT and RT tasks on the one hand, and pilot gradings obtained later. It is concluded that DLT and RT tasks offer prospects for improving the selection of aviators. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-30338*# California Univ., Davis. Dept. of Psychology.
IMPLICATIONS OF PRIVACY NEEDS AND INTERPERSONAL DISTANCING MECHANISMS FOR SPACE STATION DESIGN Progress Report, Jul. - Aug. 1985
Albert A. Harrison, Robert Sommer, Nancy Struthers, and Kathleen Hoyt 30 Aug. 1985 26 p
(Grant NAG2-357)
(NASA-CR-176938; NAS 1.26:176938) Avail: NTIS HC A03/MF A01 CSCL 05H

Privacy needs, or the need of people to regulate their degree of contact with one another, and interpersonal distancing mechanisms, which serve to satisfy these needs, are common in all cultures. Isolation, confinement, and other conditions accociated with space flight may at once accentuate privacy needs and limit the availability of certain common interpersonal contact. Loneliness occurs when people have less contact with one another than they desire. Crowding occurs when people have more contact with one another than they desire. Crowding, which is considered the greater threat to members of isolated and confined groups, can contribute to stress, a low quality of life, and poor performance. Drawing on the general literature on privacy, personal space, and interpersonal distancing, and on specialized literature on life aboard spacecraft and in spacecraft-analogous environments, a quantitative model for understanding privacy, interpersonal distancing, loneliness, and crowding was developed and the practical implications of this model for space station design were traced. Author

N86-30339*# SRI International Corp., Menlo Park, Calif.
SPECIFICATIONS PHYSIOLOGICAL MONITORING SYSTEM
15 Jul. 1985 73 p
(Contract NAS9-16811)
(NASA-CR-171926; NAS 1.26:171926) Avail: NTIS HC A04/MF A01 CSCL 06B

The operation of a physiological monitoring system (PMS) is described. Specifications were established for performance, design, interface, and test requirements. The PMS is a compact, microprocessor-based system, which can be worn in a pack on the body or may be mounted on a Spacelab rack or other appropriate structure. It consists of two modules, the Data Control Unit (DCU) and the Remote Control/Display Unit (RCDU). Its purpose is to collect and distribute data from physiological experiments in the Spacelab and in the Orbiter. Author

N86-30340# Clarke Ambrose, Inc., Knoxville, Tenn.
HUMAN FACTORS ACTIVITIES IN TELEOPERATOR DEVELOPMENT AT THE OAK RIDGE NATIONAL LABORATORY
J. V. Draper and J. N. Herndon 1986 15 p Presented at the International Topical Meeting on Advances in Human Factors in Nuclear Power Systems, Knoxville, Tenn., 21 Apr. 1986 Prepared in cooperation with ORNL, Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-005160; CONF-860415-2) Avail: NTIS HC A02/MF A01

The Consolidated Fuel Reprocessing Program (CFRP) at the Oak Ridge National Laboratory is developing advanced teleoperator systems for maintenance of future nuclear reprocessing facilities. Remote maintenance systems developed by the CFRP emphasize man-in-the-loop teleoperation. Consequently, human factors issues which affect teleoperator performance must be addressed. This paper surveys research and development activities carried out by the human factors group within the Remote Control Engineering Task of the CFRP. DOE

N86-30341# Foersvarets Forskingsansalt, Stockholm (Sweden).
ASSISTED POSITIVE PRESSURE BREATHING AND MODIFIED ANTI-ACCELERATION SUIT FILLING TESTED UP TO 9 G IN A HUMAN CENTRIFUGE, KAROLINSKA INSTITUTE
Ulf I. Balldin Feb. 1986 14 p In SWEDISH; ENGLISH summary Sponsored by Swedish Material Administration of Armed Forces Air Material Department
(FOA-C-50038-H1; ISSN-0347-7665; ESA-86-97242) Avail: NTIS HC A02/MF A01

A modified anti-acceleration suit with ready pressure, faster filling, and higher end-pressure combined with normal breathing, and assisted and unassisted positive pressure breathing, was tested. Two acceleration-induced losses of consciousness occur at 8 to 9 G with normal breathing, but not with positive pressure breathing. Further negative physiological reactions are not recorded. Assisted positive pressure breathing is usually rated as best. Additional physical inconvenience occurs as a consequence of the high acceleration stresses, irrespective of equipment. ESA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-30342*# Columbia Univ., New York.
EFFECTS OF SIMULATED WEIGHTLESSNESS ON MEIOSIS, FERTILIZATION, AND EARLY DEVELOPMENT IN MICE Final Report, 1 Jul. 1982 - 30 Apr. 1986
Debra J. Wolgemuth 1986 18 p
(Grant NAG2-324)
(NASA-CR-177106; NAS 1.26:177106) Avail: NTIS HC A02/MF A01 CSCL 06C

The initial goal was to construct a clinostat which could support mammalian cell culture. The clinostat was selected as a means by which to simulate microgravity conditions within the laboratory, by constant re-orientation of cells with respect to the gravity vector. The effects of this simulated microgravity on in-vitro meiotic maturation of oocytes, using mouse as the model system, was investigated. The effects of clinostat rotation on fertilization in-vitro was then examined. Specific endpoints included examining the timely appearance of male and female pronuclei (indicating fertilization) and the efficiency of extrusion of the second polar body. Particular attention was paid to detecting anomalies of fertilization, including parthenogenetic activation and multiple pronuclei. Finally, for the preliminary studies on mouse embryogenesis, a key feature of the clinostat was modified, that of the position of the cells during rotation. A means was found to immobilize the cells during the clinostat reotation, permitting the cells to remain at the axis of rotation yet not interfering with cellular development. B.G.

N86-30343*# Maryland Univ., Baltimore. Dept. of Neurology.
A POSSIBLE ROLE FOR ENDOGENOUS GLUCOCORTICOIDS IN ORCHIECTOMY-INDUCED ATROPHY OF THE RAT LEVATOR ANI MUSCLE: STUDIES WITH RU38486, A POTENT AND SELECTIVE ANTIGLUCOCORTICOID
Masaaki Konagaya (Nara Medical Coll., Japan) and Stephen R. Max Nov. 1985 17 p Submitted for publication
(Grant NAG2-100)
(NASA-CR-177029; NAS 1.26:177029) Avail: NTIS HC A02/MF A01 CSCL 06C

RU38486, a potent and selective antiglucocorticoid, was employed to study a possible role for endogenous glucocorticoids in atrophy of the levator ani muscle secondary to castration of male rats. RU38486 was shown to block (3H) triamcinolone acetonide binding to cytosol from levator ani muscle. Daily oral administration of RU38486 to castrated rats partially prevented

atrophy of the levator ani muscle, as well as a decrease in RNA concentration. In a control group receiving RU38486 alone, the levator ani underwent significant (20%) hypertrophy. Administration of exogenous dexamethasone also caused pronounced atrophy of the levator ani muscle. This atrophy was prevented, to a significant degree, by simultaneous oral administration of RU38486. It is concluded that endogenous glucocorticoids, the actions of which are blocked by RU38486, may be involved in regulation of the mass of the levator ani muscle in intact rats. M.G.

N86-30344# Pacific Northwest Lab., Richland, Wash.
BIOLOGICAL STUDIES OF SWINE EXPOSED TO 60-Hz ELECTRIC FIELDS. VOLUME 5: HEMATOLOGY AND SERUM CHEMISTRY Final Report
Dec. 1985 127 p
(Contract DE-AC06-76RL-01830)
(DE86-005362; EPRI-EA-4318-Vol-5) Avail: NTIS
HC A07/MF A01

The hematologic and serum chemistry responses in three generations of miniature swine chronically exposed to a 30-kV/m, 60-Hz electric field have been assessed in a series of screening experiments. Based on comprehensive analyses and sequential statistical evaluation of the data, there are no significant differences in any hematologic parameters in either the F sub 0 or F sub 1 generations when the exposed and sham exposed groups are compared. In F sub 2 swine, at 42 days of age reticulocyte values were significantly higher in both sexes exposed to the electric field than in the control group. In addition, the exposed males at 42 days had significantly lower values for erythrocytes, hemoglobin and volume of packed red cells than the control males. Other values were comparable between exposed and control groups. Serum chemistry evaluations between exposed and control groups also showed no consistent statistical differences. A few parameters did show occasional differences between groups in the F sub 1 and F sub 2 generations, including: higher levels of urea nitrogen, triglyceride and alkaline phosphatase in exposed F sub 1 piglets; significantly lower serum protein levels in exposed F sub 2 males; and fewer serum globulins in both sexes of the F sub 2 generation. In summary, when hematologic and serum chemistry parameters were compared in exposed and sham-exposed groups of swine, some sporadic effects were evident. These effects, however, failed to replicate consistently at subsequent sampling periods or across generations and were not present as statistical trends when appropriate multivariate analyses were performed. DOE

N86-30345# Pacific Northwest Lab., Richland, Wash.
BIOLOGICAL STUDIES OF SWINE EXPOSED TO 60-Hz ELECTRIC FIELDS. VOLUME 6: IMMUNOLOGY Final Report
Dec. 1985 61 p
(Contract DE-AC06-76RL-01830)
(DE86-005363; EPRI-EA-4318-Vol-6) Avail: NTIS
HC A04/MF A01

Immunological response in three generations of miniature swine chronically exposed to a 30-kV/m, 60-Hz electric field have been assessed in a series of screening experiments. The study was designed to investigate functional aspects of the humoral and cellular components of the mammalian immune system. Circulating levels of immunoglobulins were measured in parental-generation (F sub 0) sows (0 to 22 months of exposure), first-generation fetuses (F sub 1) at 100 days of gestation, F sub 1 females (0 to 32 months of exposure) and second-generation (F sub 2) weanlings at 1.5 and 6 months of age. No consistent, statistically significant changes in the levels of serum immunoglobins were observed when exposed groups were compared with sham-exposed controls, either within or across generations. An examination of cellular immunity included measurements of the mitogen response of peripheral-blood lymphocytes (PBL), spleen cells and lymph-node cells of F sub 0 sows sacrificed after 100 days of pregnancy, and PBL, spleen cells and thymocytes of F sub 1 fetuses at 100 days of gestation. Mitogen response studies of PBL, spleen cells, thymocytes and lymph-node cells of 42-day-old F sub 1 male weanlings and F sub 2 male and female swine were also conducted. In the statistical comparisons of mitogen-response data obtained for F sub 0 , F sub 1 , and F sub 2 swine, no consistent differences were observed between exposed and matched sham-exposed control groups. These observations indicate that the distribution of cells in the various tissues studied and the responses observed were not altered as a result of exposure to the fields. DOE

N86-30346# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF 60 Hz ELECTRIC FIELD ON OPERANT AND SOCIAL STRESS BEHAVIORS OF NONHUMAN PRIMATES Technical Status Report, Jun. 8 - 2 Aug. 1985
2 Aug. 1985 19 p
(Contract DE-AC02-80RA-50219)
(DE85-016121; DOE/RA-50219/T5) Avail: NTIS
HC A02/MF A01

Progress made at calibrating the electric field distribution within and around cages used for behavorial testing of baboons is described. It is concluded that all of the parts of the system are rather constant in their readings. The only component which seems to show appreciable variability is the 4 cm probe. Although the optically coupled 4 cm spherical dipole probe usually performs well, it is becoming apparent that sometimes it can produce misleading results. Although we do not yet understand the situation completely, it appears as though there are at least two variables affecting the probe, battery voltage and humidity. DOE

N86-30347# Southwest Research Inst., San Antonio, Tex.
EFFECTS OF 60 Hz ELECTRIC FIELDS ON OPERANT AND SOCIAL STRESS BEHAVIORS OF NONHUMAN PRIMATES Project Technical Status Report, 23 Nov. 1985 - 17 Jan. 1986
24 Jan. 1986 13 p
(Contract DE-AC02-80RA-50219)
(DE86-005807; DOE/RA-50219/T8) Avail: NTIS
HC A02/MF A01

The objective was to investigate, using baboons (superspecies Papio cynocephalus) as surrogates, possible behavioral effects associated with exposure to high intensity 60 Hz electric fields. This program consists of four major projects. The first will evaluate the potential aversive character of exposure to 60 Hz electric fields by determining the threshold intensity which produces avoidance or escape responses. The second project will estimate the threshold intensity for detection of 60 Hz electric fields. The third will assess effects of chronic exposure to 60 Hz electric fields on the performance of two operant conditioning tasks, fixed ratio (FR) and differential reinforcement of low rate responding (DRL). The fourth will investigate the possible stress-inducing effects of chronic exposure to 60 Hz electric fields on the behavior of baboons living in small social groups. DOE

N86-30348# Institute of Nuclear Energy Research, Lung-Tan (Taiwan).
BACTERIAL INACTIVATION BY MEANS OF IONIZING RADIATION
M. S. Chang, L. H. Chen, and Y. K. Fu Nov. 1984 19 p In CHINESE and ENGLISH
(DE86-901038; INER-0575) Avail: NTIS (US Sales Only)
HC A02/MF A01

Spores of Bacillus subtillis and Escherichia coli are the most common air-borne bacteria. B. subtilis is radiation resistant and is commonly used as the test strain for routine control of heat sterilization. A study of surviving fractions of spores of B. subtilis, E. coli, and Streptococcus faecium A21 irradiated by (60)Co gamma-rays was carried out to determine the suitable dose for medical sterilization by irradiation. DOE

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-30349*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

DEVELOPMENT OF AN ALGORITHM TO MODEL AN AIRCRAFT EQUIPPED WITH A GENERIC CDTI DISPLAY
Wade C. Driscoll (Youngstown State Univ., Ohio.) and Jacob A. Houck Jul. 1986 58 p
(NASA-TM-87732; NAS 1.15:87732) Avail: NTIS HC A04/MF A01 CSCL 12A

A model of human pilot performance of a tracking task using a generic Cockpit Display of Traffic Information (CDTI) display is developed from experimental data. The tracking task is to use CDTI in tracking a leading aircraft at a nominal separation of three nautical miles over a prescribed trajectory in space. The analysis of the data resulting from a factorial design of experiments reveals that the tracking task performance depends on the pilot and his experience at performing the task. Performance was not strongly affected by the type of control system used (velocity vector control wheel steering versus 3D automatic flight path guidance and control). The model that is developed and verified results in state trajectories whose difference from the experimental state trajectories is small compared to the variation due to the pilot and experience factors. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-30350# Softech, Inc., Fairborn, Ohio.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: SOFTECH, INC. ADAVAX COMPILER VERSION 2.47, VAX8600, VAX-11/780, VAX-11/785; AND MICROVAX 2 US ING VAX/VMS VERSION 4.1 AND MICROVMS 4.1M Report, 30 Aug. 1985 - 30 Aug. 1986
30 Aug. 1985 28 p
(AD-A166213) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the SofTech-AdaVAX compiler, Version 2.47. On-site testing was performed by the Federal Software Management Support Center (FSMSC)--an Ada Validation Facility--in accordance with current Ada Validation Office policies and procedures. Testing was done on the VAX-11/780, the VAX-11/785, and the VAX 8600. The suite of test known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC suite of tests is used to validate conformance of the compiler to ANSI/MIL-STD-1815A (Ada). The SofTech Compiler AdaVAX, Version 2.47, using VAX/VMS 4.1 and MicroVMS 4.1M, were tested with version 1.6 of the ACVC validation tests. The SofTech AdaVAX Ada Compiler was also tested. GRA

N86-30351# Office of Software Development, Falls Church, Va. Federal Software Management Support Center.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: DIGITAL EQUIPMENT CORPORATION VAX ADA COMPILER VERSION 1.1 VAX 8600, VAX-11/785, VAX-11/780, VAX-11/782, VAX-11/750, VAX-11/730, MICROVAX 1 AND 2 VAXSTATION 1 AND 2 USING VAX/VMS AND MICROVMS VERSION 4.2 AND VAXELN VERSION 2
6 Sep. 1985 28 p
(AD-A166354) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the Digital Equipment Corporation VAX Ada Compiler. On-site testing was performed during 12-16 August 1985 at Digital Equipment Corporation, Nashua, New Hampshire, by an Ada Validation Facility, the Federal Software Management Support Center, according to current Ada Validation Office (AVO) policies and procedures. The DEC VAX Ada Compiler is hosted on those systems listed in the table below. The hosts, as well as selected VAX/VMS and VAXELN based systems served as the target systems. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC is used to validate conformance of the compiler to ANSI/MIL-STD-1815A. This standard is described in the ANSI Ada Reference Manual, February 17, 1983. Not all tests in the ACVC test suite are applicable to this specific implementation. Also, known test errors in Version 1.6 are present in some tests; these tests were withdrawn. The purpose of the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal constructs. GRA

N86-30352# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
TOFACS (TECHNICAL OFFICE AUTOMATION AND COMMUNICATION SYSTEM) SOFTWARE DEVELOPMENT AND ENHANCEMENTS FOR FISCAL YEAR 1983 - FISCAL YEAR 1985 Final Report, Oct. 1982 - Oct. 1985
Bob Wybraniec Feb. 1986 63 p
(AD-A166563; DTNSRDC/CMLD-86/06) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Technical Office Automation and Communication System (TOFACS) is a pilot system that has been in operation for approximately five years. TOFACS provides users with workstations (terminal, modem and printer) and gives each user access to a comprehensive set of office automation capabilities such as electronic mail, document processing, calendar management, ticklers, and phone message management. Enhancements and development of new capabilities has improved the system and increased its overall functionality. This report chronicles the software enhancements and development made to TOFACS during fiscal years 1983 through 1985. GRA

N86-30353# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Information Systems and Technology Center.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: INTERMETRICS, INC. I2ADA COMPILER, VERSION 17.08 FOR THE IBM 370 ARCHITECTURE UNDER UTS 2.3 Report, 10 Dec. 1985 - 10 Dec. 1986
10 Dec. 1985 68 p
(AD-A166818; AVF-VSR-22.0286) Avail: NTIS HC A04/MF A01 CSCL 09/2

This Validation Summary Report presents the results and conclusions of testing performed on the Intermetrics, Inc. I2Ada Compiler, Version 17.08. Standardized tests serve as input to an Ada complier, producing results which are evaluated by the validation team. This summary briefly states the highlights of the Intermetrics, Inc. I2Ada Complier, Version 17.08 validation. On-site testing was performed 6 Dec. 1985 through 10 Dec 1985 at Intermetrics, Inc. in Cambridge MA under the auspices of the Ada Validation Facility (AVF), according to Ada (C.R.) Validation Office (AVO) policies and procedures. The Intermetrics, Inc. I2Ada Compiler, Version 17.08 is hosted on the IBM 370 architecture operating under UTS 2.3. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC is used to validate conformance of a compiler to ANSI/MIL-STD-1815A Ada. The purpose of testing is to ensure that a compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation dependent but permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, or during execution. Author (GRA)

N86-30354# Lawrence Livermore National Lab., Calif.
MULTIPROCESSOR MODEL WITH DISTRIBUTED TASK CREATION
J. E. Wirsching Jun. 1985 47 p
(Contract W-7405-eng-48)
(DE86-005302; UCRL-53648) Avail: NTIS HC A03/MF A01

A model has been constructed that simulates the operation of

a multiprocessor by means of a computer program, MULTIMOD, which simulates the execution of a FORTRAN program. During the execution of MULTIMOD, all application program operands are moved from memory locations through connection networks and ancillary registers and queues to their destinations. (The model simulates hardware, including processors, memory modules, connection networks, and connective registers and queues.) The arithmetic of the application and all indexing are performed, and all loop operations are carried out. MULTIMOD times all work done, and mutual interference of all elements is accounted for. The present model requires the FORTRAN source program to be augmented, and the augmented FORTRAN program supports a completely decentralized task-creation method. The hardware modeled uses fully implemented Banyan networks or full crossbars for data and synchronization and a ring network for task handling. Two kinds of sentinels are used in handling operands: one kind is used to control data requests, and the second is used to describe the data state. In addition, MULTIMOD implements such concepts as OUT-OF-BOUNDS, READ-ONLY, LOCK, EMPTY/FULL, and TAG-MATCH. Whenever possible, the model uses data-flow-methods. DOE

N86-30355# European Organization for Nuclear Research, Geneva (Switzerland).
PROCEEDINGS OF THE 1984 CERN SCHOOL OF COMPUTING
Jul. 1985 384 p Meeting held in Algua Blava, Spain, 9 Sep. 1984
(DE86-700783; CERN-85-09; CONF-8409223) Avail: NTIS (US Sales Only) HC A17/MF A01

The eighth CERN School of Computing covered subjects mainly related to computing for elementary-particle physics. These proceedings contain written versions of most of the lectures delivered at the School. Notes on the following topics are included: trigger and data-acquisition plans for the LEP experiments; unfolding methods in high-energy physics experiments; Monte Carlo techniques; relational data bases; data networks and open systems; the Newcastle connection; portable operating systems; expert systems; microprocessors - from basic chips to complete systems; algorithms for parallel computers; trends in supercomputers and computational physics; supercomputing and related national projects in Japan; application of VLSI in high-energy physics, and single-user systems. See hints under the relevant topics. DOE

N86-30356# Mess und System Technik G.m.b.H., Oberschleissheim (West Germany).
DIGITAL MAGNETIC TAPE MASS MEMORY STORE Final Report, Oct. 1984
Michael Horvatin Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 30 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-151; ISSN-0340-7608; ESA-86-97439) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6.50

Two microprocessor-controlled high capacity mass storage devices were developed using standard cassette tapes or the cartridge DC 300. The development was based on the recording standard ECMA-34 and ECMA-46 for digital data on tapes. In order to increase the capacity, the standards concerning the recording codes and the flux change density were given up. The systems have the following features: the use of standard recording media; they are autonomous without the need of computer control; comfortable operating system and user commands; high capacity; and allround application possibilities. ESA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-30357*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCEEDINGS OF TENTH ANNUAL SOFTWARE ENGINEERING WORKSHOP
Dec. 1985 366 p Workshop held in Greenbelt, Md., 4 Dec. 1985
(NASA-TM-88780; SEL-85-006; NAS 1.15:88780) Avail: NTIS HC A16/MF A01 CSCL 09B

Papers are presented on the following topics: measurement of software technology, recent studies of the Software Engineering Lab, software management tools, expert systems, error seeding as a program validation technique, software quality assurance, software engineering environments (including knowledge-based environments), the Distributed Computing Design System, and various Ada experiments. For individual titles, see N86-30358 through N86-30369.

N86-30358*# Maryland Univ., College Park. Dept. of Computer Science.
MEASURING THE SOFTWARE PROCESS AND PRODUCT: LESSONS LEARNED IN THE SEL
Victor R. Basili *In* NASA: Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 39 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

The software development process and product can and should be measured. The software measurement process at the Software Engineering Laboratory (SEL) has taught a major lesson: develop a goal-driven paradigm (also characterized as a goal/question/metric paradigm) for data collection. Project analysis under this paradigm leads to a design for evaluating and improving the methodology of software development and maintenance. J.P.B.

N86-30359*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STUDIES AND EXPERIMENTS IN THE SOFTWARE ENGINEERING LAB (SEL)
Frank E. McGarry and David N. Card (Computer Sciences Corp., El Segundo, Calif.) *In its* Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 37 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

The Software Engineering Laboratory (SEL) is an organization created nearly 10 years ago for the purpose of identifying, measuring and applying quality software engineering techniques in a production environment. The members of the SEL include NASA/Goddard Space Flight Center (GSFC, the sponsor and organizer), University of Maryland, and Computer Sciences Corporation. Since its inception the SEL has conducted numerous experiments, and has evaluated a wide range of software technologies. This paper describes several of the more recent experiments as well as some of the general conclusions to which the SEL has arrived. Author

N86-30360*# Reifer Consultants, Inc., Torrance, Calif.
SOFTWARE MANAGEMENT TOOLS: LESSONS LEARNED FROM USE
Donald J. Reifer, J. Valett (National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.), J. Knight (Virginia Univ., Charlottesville), and G. Wenneson (Informatics General Corp., Palo Alto, Calif.) *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 23 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

Experience in inserting software project planning tools into more than 100 projects producing mission critical software are discussed. The problems the software project manager faces are listed along with methods and tools available to handle them. Experience is reported with the Project Manager's Workstation (PMW) and the SoftCost-R cost estimating package. Finally, the

results of a survey, which looked at what could be done in the future to overcome the problems experienced and build a set of truly useful tools, are presented. J.P.B.

N86-30361*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DEASEL: AN EXPERT SYSTEM FOR SOFTWARE ENGINEERING
Jon D. Valett and Andrew Raskin *In its* Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 21 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

For the past ten year, the Software Engineering Laboratory (SEL) has been collecting data on software projects carried out in the Systems Development Branch of the Flight Dynamics Division at NASA's Goddard Space Flight Center. Through a series of studies using this data, much knowledge has been gained on how software is developed within this environment. Two years ago work began on a software tool which would make this knowledge readily available to software managers. Ideally, the Dynamic Management Information Tool (DynaMITe) will aid managers in comparison across projects, prediction of a project's future, and assessment of a project's current state. This paper describes an effort to create the assessment portion of DynaMITe, called the DynaMITe Expert Advisor for the SEL (DEASEL).Author

N86-30362*# Virginia Univ., Charlottesville. Dept. of Computer Science.
AN EXPERIMENTAL EVALUATION OF ERROR SEEDING AS A PROGRAM VALIDATION TECHNIQUE
John C. Knight and Paul E. Ammann *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 4 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

A previously reported experiment in error seeding as a program validation technique is summarized. The experiment was designed to test the validity of three assumptions on which the alleged effectiveness of error seeding is based. Errors were seeded into 17 functionally identical but independently programmed Pascal programs in such a way as to produce 408 programs, each with one seeded error. Using mean time to failure as a metric, results indicated that it is possible to generate seeded errors that are arbitrarily but not equally difficult to locate. Examination of indigenous errors demonstrated that these are also arbitrarily difficult to locate. These two results support the assumption that seeded and indigenous errors are approximately equally difficult to locate. However, the assumption that, for each type of error, all errors are equally difficult to locate was not borne out. Finally, since a seeded error occasionally corrected an indigenous error, the assumption that errors do not interfere with each other was proven wrong. Error seeding can be made useful by taking these results into account in modifying the underlying model. J.P.B.

N86-30363*# Informatics General Corp., Palo Alto, Calif.
QUALITY ASSURANCE SOFTWARE INSPECTIONS AT NASA AMES: METRICS FOR FEEDBACK AND MODIFICATION
Greg Wenneson *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 22 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

Software inspections are a set of formal technical review procedures held at selected key points during software development in order to find defects in software documents--is described in terms of history, participants, tools, procedures, statistics, and database analysis. J.P.B.

N86-30364*# Boeing Computer Services Co., Seattle, Wash.
A KNOWLEDGE BASED SOFTWARE ENGINEERING ENVIRONMENT TESTBED
Chris Gill, A. Reedy (Planning Research Corp., Washington, D. C.), and L. Baker (TRW Defense Systems Group, Cleveland, Ohio) *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 11 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

The Carnegie Group Incorporated and Boeing Computer Services Company are developing a testbed which will provide a framework for integrating conventional software engineering tools with Artificial Intelligence (AI) tools to promote automation and productivity. The emphasis is on the transfer of AI technology to the software development process. Experiments relate to AI issues such as scaling up, inference, and knowledge representation. In its first year, the project has created a model of software development by representing software activities; developed a module representation formalism to specify the behavior and structure of software objects; integrated the model with the formalism to identify shared representation and inheritance mechanisms; demonstrated object programming by writing procedures and applying them to software objects; used data-directed and goal-directed reasoning to, respectively, infer the cause of bugs and evaluate the appropriateness of a configuration; and demonstrated knowledge-based graphics. Future plans include introduction of knowledge-based systems for rapid prototyping or rescheduling; natural language interfaces; blackboard architecture; and distributed processing J.P.B.

N86-30365*# Planning Research Corp., Washington, D. C.
EXPERIENCE WITH A SOFTWARE ENGINEERING ENVIRONMENT FRAMEWORK
R. Blumberg, A. Reedy, and E. Yodis *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 25 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

Experience with a software engineering environment framework tool called the Automated Product Control Environment (APCE) is described. The goals of the framework design, an overview of the major functions and features of the framework, and implementation and use of the framework are presented. Aspects of the framework discussed include automation and control; portability, distributability, and interoperability; cost/benefit analysis; and productivity. Results of using the framework are discussed and the framework approach is briefly compared to other software development environment approaches. J.P.B.

N86-30366*# TRW Defense Systems Group, Huntsville, Ala.
ONE APPROACH FOR EVALUATING THE DISTRIBUTED COMPUTING DESIGN SYSTEM (DCDS)
John T. Ellis *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 24 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

The Distributed Computer Design System (DCDS) provides an integrated environment to support the life cycle of developing real-time distributed computing systems. The primary focus of DCDS is to significantly increase system reliability and software development productivity, and to minimize schedule and cost risk. DCDS consists of integrated methodologies, languages, and tools to support the life cycle of developing distributed software and systems. Smooth and well-defined transistions from phase to phase, language to language, and tool to tool provide a unique and unified environment. An approach to evaluating DCDS highlights its benefits. Author

N86-30367*# Century Computing, Inc., Laurel, Md.
EXPERIMENTS WITH ADA
D. Roy, M. McClimens (Mitre Corp., Bedford, Mass.), and W. Agresti (Computer Sciences Corp., Silver Spring, Md.) *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 42 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

A 1200-line Ada source code project simulating the most basic functions of an operations control center was developed. We selected George Cherry's Process Abstraction Methodology for

Embedded Large Applications (PAMELA) and DEC's Ada Compilation System (ACS) under VAX/VMS to build the software from requirements to acceptance test. The system runs faster than its FORTRAN implementation and was produced on schedule and under budget with an overall productivity in excess of 30 lines of Ada source code per day. Author

N86-30368*# Mitre Corp., Bedford, Mass.
OBSERVATIONS FROM A PROTOTYPE IMPLEMENTATION OF THE COMMON APSE INTERFACE SET (CAIS)
Mike McClimens, Rebecca Bowerman, Chuck Howell, Helen Gill, and Robbie Hutchison *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 29 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

This paper presents an overview of the Common Ada Programming Support Environment (APSE) Interface Set (CAIS), its purpose, and its history. The paper describes an internal research and development effort at the Mitre Corporation to implement a prototype version of the current CAIS specification and to rehost existing Ada software development tools onto the CAIS prototype. Based on this effort, observations are made on the maturity and functionality of the CAIS. These observations support the government's current policy of publicizing the CAIS specification as a baseline for public review in support of its evolution into a standard which can be mandated for use as Ada is today. Author

N86-30369*# Computer Sciences Corp., Silver Spring, Md.
MEASURING ADA AS A SOFTWARE DEVELOPMENT TECHNOLOGY IN THE SOFTWARE ENGINEERING LABORATORY (SEL)
William W. Agresti *In* NASA. Goddard Space Flight Center Proceedings of Tenth Annual Software Engineering Workshop Dec. 1985 36 p (For primary document see N86-30357 21-61)
Avail: NTIS HC A16/MF A01 CSCL 09B

An experiment is in progress to measure the effectiveness of Ada in the National Aeronautics and Space Administration/Goddard Space Flight Center flight dynamics software development environment. The experiment features the parallel development of software in FORTRAN and Ada. The experiment organization, objectives, and status are discussed. Experiences with an Ada training program and data from the development of a 5700-line Ada training exercise are reported. Author

N86-30370*# Colorado State Univ., Fort Collins. Inst. for Computational Studies.
REMOTE ACCESS FOR NAS: SUPERCOMPUTING IN A UNIVERSITY ENVIRONMENT Final Report, 1 Apr. 1985 - 31 Mar. 1986
Gary Johnson, Becky Olson, Julie Swissheim, Dan Pryor, and John Ziebarth 31 Mar. 1986 60 p
(Contract NCC2-344)
(NASA-CR-177020; NAS 1.26:177020) Avail: NTIS HC A04/MF A01 CSCL 09B

The experiment was designed to assist the Numerical Aerodynamic Simulation (NAS) Project Office in the testing and evaluation of long haul communications for remote users. The objectives of this work were to: (1) use foreign workstations to remotely access the NAS system; (2) provide NAS with a link to a large university-based computing facility which can serve as a model for a regional node of the Long-Haul Communications Subsystem (LHCS); and (3) provide a tail circuit to the University of Colorado a Boulder thereby simulating the complete communications path from NAS through a regional node to an end-user. Author

N86-30371*# Texas Technological Coll., Lubbock. Dept. of Electrical Engineering/Computer Science.
A CANONICAL FORM FOR NONLINEAR SYSTEMS
Renjeng Su and L. R. Hunt (Texas Univ., Dallas.) 1986 21 p
(Grants NAG2-203; NAG2-189; Contracts N0014-76-C-1136; N00014-84-C-0104)
(NASA-CR-176974; NAS 1.26:176974) Avail: NTIS HC A02/MF A01 CSCL 09B

The concepts of transformation and canonical form have been used in analyzing linear systems. These ideas are extended to nonlinear systems. A coordinate system and a corresponding canonical form are developed for general nonlinear control systems. Their usefulness is demonstrated by showing that every feedback linearizable system becomes a system with only feedback paths in the canonical form. For control design involving a nonlinear system, one approach is to put the system in its canonical form and approximate by that part having only feedback paths. Author

N86-30372# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE ALGORITHM RMS-DIIS AND AN ALGOL PROGRAM FOR THE B-6800 COMPUTER TO DIAGONALIZE LARGE MATRICES
Mauricio Fabbri Apr. 1986 21 p Submitted for publication
(INPE-3878-PRE/931) Avail: NTIS HC A02/MF A01

The recent RMS-DIIS method of Bendt and Zunger for large matrix eigenproblems is presented in some detail, together with its main limitations and a discussion of the approximations involved. Also included is a description of an ALGOL program available for immediate use in the B-6800 computer. Preliminary results are shown, which indicates that RMS-dIIS can be, in some cases, one of the best developed techniques to isolate eigenvalue-eigenvector pairs from huge matrices. Author

N86-30373*# Eloret Corp., Sunnyvale, Calif.
THEORETICAL RESEARCH PROGRAM TO STUDY CHEMICAL REACTIONS IN AOTV BOW SHOCK TUBES Technical Progress Report, 1 Nov. 1985 - 30 Jun. 1986
Peter Taylor 30 Jun. 1986 69 p
(Contract NCC2-371)
(NASA-CR-176992; NAS 1.26:176992) Avail: NTIS HC A04/MF A01 CSCL 09B

Progress in the development of computational methods for the characterization of chemical reactions in aerobraking orbit transfer vehicle (AOTV) propulsive flows is reported. Two main areas of code development were undertaken: (1) the implementation of CASSCF (complete active space self-consistent field) and SCF (self-consistent field) analytical first derivatives on the CRAY X-MP; and (2) the installation of the complete set of electronic structure codes on the CRAY 2. In the area of application calculations the main effort was devoted to performing full configuration-interaction calculations and using these results to benchmark other methods. Preprints describing some of the systems studied are included. For individual titles, see N86-30374 through N86-30377.

N86-30374*# Eloret Corp., Sunnyvale, Calif.
INTEGRAL PROCESSING IN BEYOND-HARTREE-FOCK CALCULATIONS
Peter R. Taylor *In its* Theoretical Research Program to Study Chemical Reactions in AOTV Bow Shock Tubes 30 Jun. 1986 21 p (For primary document see N86-30373 21-61)
Avail: NTIS HC A04/MF A01 CSCL 09B

The increasing rate at which improvements in processing capacity outstrip improvements in input/output performance of large computers has led to recent attempts to bypass generation of a disk-based integral file. The direct self-consistent field (SCF) method of Almlof and co-workers represents a very successful implementation of this approach. This paper is concerned with the extension of this general approach to configuration interaction (CI) and multiconfiguration-self-consistent field (MCSCF) calculations. After a discussion of the particular types of molecular orbital (MO) integrals for which -- at least for most current generation machines -- disk-based storage seems unavoidable, it is shown how all the necessary integrals can be obtained as matrix elements of Coulomb and exchange operators that can be calculated using a direct approach. Computational implementations of such a scheme are discussed. M.G.

N86-30375*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BENCHMARK FULL CONFIGURATION-INTERACTION CALCULATIONS ON H2O, F- AND F
Charles W. Bauschlicher, Jr. and Peter R. Taylor (Eloret Corp., Sunnyvale, Calif.) *In* Eloret Corp. Theoretical Research Program to Study Chemical Reactions in AOTV Bow Shock Tubes 30 Jun. 1986 15 p (For primary document see N86-30373 21-61)
Avail: NTIS HC A04/MF A01 CSCL 09B

Full configuration-interaction calculations are reported, and compared to other methods, for H2O at its equilibrium geometry and at two geometries with the H-O bonds stretched. Since the percentage of the self-consistent field (SCF) reference in the full configuration-interaction (FCI) wave function decreases greatly with the bond elongation, the accuracy of techniques based on a single reference do not compare well with the FCI results. However, the results from a complete active space SCF/multireference configuration-interaction (CASSCF/MRCI) treatment are in good agreement with the FCI. Correlation effects in F compared to Ne are far more similar than for F- compared to Ne, despite F- and Ne being isoelectronic. Since the importance of higher than double excitations is more important for F- than F, a very high percentage of the correlation must be obtained to accurately compute the electron affinity. In a CASSCF/MRCI treatment the higher than quadruple excitations contribute 0.02 eV to the electron affinity (EA), even for modest basis sets. M.G.

N86-30376*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BENCHMARK FULL CONFIGURATION-INTERACTION CALCULATIONS ON HF AND NH2
Charles W. Bauschlicher, Jr., Stephen R. Langhoff, Peter R. Taylor (Eloret Corp., Sunnyvale, Calif.), Nicholas C. Handy (Cambridge Univ. (England).), and Peter J. Knowles (University of Western Ontario, London.) *In* Eloret Corp. Theoretical Research Program to Study Chemical Reactions in AOTV Bow Shock Tubes 30 Jun. 1986 16 p (For primary document see N86-30373 21-61)
Avail: NTIS HC A04/MF A01 CSCL 09B

Full configuration-interaction (FCI) calculations are performed at selected geometries for the 1-sigma(+) state of HF and the 2-B(1) and 2-A(1) states of NH2 using both DZ and DZP gaussian basis sets. Higher excitations become more important when the bonds are stretched and the self-consistent field (SCF) reference becomes a poorer zeroth-order description of the wave function. The complete active space SCF - multireference configuration-interaction (CASSCF-MRCI) procedure gives excellent agreement with the FCI potentials, especially when corrected with a multi-reference analog of the Davidson correction. M.G.

N86-30377*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ON THE ELECTRON AFFINITY OF THE OXYGEN ATOM
Charles W. Bauschlicher, Jr., Stephen R. Langhoff, Harry Partridge, and Peter R. Taylor (Eloret Corp., Sunnyvale, Calif.) *In* Eloret Corp. Theoretical Research Program to Study Chemical Reactions in AOTV Bow Shock Tubes 30 Jun. 1986 14 p (For primary document see N86-30373 21-61)
Avail: NTIS HC A04/MF A01 CSCL 09B

The electron affinity (EA) of oxygen is computed to be 1.287 eV, using 2p electron full configuration-interaction (CI) wave functions expanded in a 6s5p3d2f Slater-type orbital basis. The best complete active space self-consistent field - multireference CI (CASSCF-MRCI) result including only 2p correlation is 1.263 eV. However, inclusion of 2s intrashell and 2s2p intershell correlation increases the computed EA to 1.290 at the CASSCF-MRCI level. At the full CI basis set limit, the 2s contribution to the electron affinity is estimated to be as large as 0.1 eV. This study clearly establishes the synergistic effect between the higher excitations and basis set completeness on the electron affinity when the 2s electrons are correlated. M.G.

N86-30378*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SEARCH AND RETRIEVAL OF OFFICE FILES USING dBASE 3
William L. Breazeale and Charlotte R. Talley Aug. 1986 85 p
(NASA-TM-86550; NAS 1.15:86550) Avail: NTIS HC A05/MF A01 CSCL 09B

Described is a method of automating the office files retrieval process using a commercially available software package (dBASE III). The resulting product is a menu-driven computer program which requires no computer skills to operate. One part of the document is written for the potential user who has minimal computer experience and uses sample menu screens to explain the program; while a second part is oriented towards the computer literate individual and includes rather detailed descriptions of the methodology and search routines. Although much of the programming techniques are explained, this document is not intended to be a tutorial on dBASE III. It is hoped that the document will serve as a stimulus for other applications of dBASE III. Author

N86-30379*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC REMAPPING OF PARALLEL COMPUTATIONS WITH VARYING RESOURCE DEMANDS Final Report
David M. Nicol and Joel H. Saltz Jul. 1986 56 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178150; ICASE-86-45; NAS 1.26:178150) Avail: NTIS HC A04/MF A01 CSCL 09B

A large class of computational problems is characterized by frequent synchronization, and computational requirements which change as a function of time. When such a problem must be solved on a message passing multiprocessor machine, the combination of these characteristics lead to system performance which decreases in time. Performance can be improved with periodic redistribution of computational load; however, redistribution can exact a sometimes large delay cost. We study the issue of deciding when to invoke a global load remapping mechanism. Such a decision policy must effectively weigh the costs of remapping against the performance benefits. We treat this problem by constructing two analytic models which exhibit stochastically decreasing performance. One model is quite tractable; we are able to describe the optimal remapping algorithm, and the optimal decision policy governing when to invoke that algorithm. However, computational complexity prohibits the use of the optimal remapping decision policy. We then study the performance of a general remapping policy on both analytic models. This policy attempts to minimize a statistic W(n) which measures the system degradation (including the cost of remapping) per computation step over a period of n steps. We show that as a function of time, the expected value of W(n) has at most one minimum, and that when this minimum exists it defines the optimal fixed-interval remapping policy. Our decision policy appeals to this result by remapping when it estimates that W(n) is minimized. Our performance data suggests that this policy effectively finds the natural frequency of remapping. We also use the analytic models to express the relationship between performance and remapping cost, number of processors, and the computation's stochastic activity. Author

N86-30380*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE FORCE ON THE FLEX: GLOBAL PARALLELISM AND PORTABILITY Final Report
Harry F. Jordan (Colorado Univ., Boulder.) Aug. 1986 22 p
(Contract NAS1-17070; Grant AF-AFOSR-0189-85)
(NASA-CR-178161; ICASE-86-54; NAS 1.26:178161) Avail: NTIS HC A02/MF A01 CSCL 09B

A parallel programming methodology, called the force, supports the construction of programs to be executed in parallel by an unspecified, but potentially large, number of processes. The methodology was originally developed on a pipelined, shared memory multiprocessor, the Denelcor HEP, and embodies the primitive operations of the force in a set of macros which expand into multiprocessor Fortran code. A small set of primitives is sufficient to write large parallel programs, and the system has been used to produce 10,000 line programs in computational fluid dynamics. The level of complexity of the force primitives is

intermediate. It is high enough to mask detailed architectural differences between multiprocessors but low enough to give the user control over performance. The system is being ported to a medium scale multiprocessor, the Flex/32, which is a 20 processor system with a mixture of shared and local memory. Memory organization and the type of processor synchronization supported by the hardware on the two machines lead to some differences in efficient implementations of the force primitives, but the user interface remains the same. An initial implementation was done by retargeting the macros to Flexible Computer Corporation's ConCurrent C language. Subsequently, the macros were caused to directly produce the system calls which form the basis for ConCurrent C. The implementation of the Fortran based system is in step with Flexible Computer Corporations's implementation of a Fortran system in the parallel environment. Author

N86-30381# Dunlap and Associates, Inc., Norwalk, Conn.
THE COMPUTER-AIDED ANALYTIC PROCESS MODEL. OPERATIONS HANDBOOK FOR THE ANALYTIC PROCESS MODEL DEMONSTRATION PACKAGE Research Note, May 1980 - Feb. 1983
Ronald G. Shapiro, Richard F. Bloom, and John F. Oates, Jr. Jan. 1986 65 p
(Contracts MDA903-80-C-0345; DA Proj. 2Q2-63743-A-794)
(AD-A166180; ARI-RN-86-06) Avail: NTIS HC A04/MF A01 CSCL 09/2

The objective of the computer-aided APM is to provide a routinized, thorough, adaptive and efficient procedure to help testers, analysts and researchers develop design specifications and evaluation measures for any planned or existing human-machine system, and especially for any training system. The demonstration version of the computer-aided model performs a sample of the routines expected in any ultimate version that may be developed in the future. Specifically, the demonstration model helps one to derive evaluation measures, but not design specifications. In addition, it contains data bases for training systems, but not for any other human-machine system. Finally, it contains data bases for only half of the six training subsystems (for design, enabling and delivery, but not for command, logistics or emplacement). For demonstration purposes, this development represents an appropriate and sufficient allocation of project resources, since the more significant effort was needed to develop the underlying concepts for both a feasible manual model and the computer-aided model. GRA

N86-30382# Naval Postgraduate School, Monterey, Calif.
ALGORITHM FOR SEGMENTATION OF MULTICHANNEL IMAGES M.S. Thesis
James F. Janecek Dec. 1985 44 p
(AD-A166215) Avail: NTIS HC A03/MF A01 CSCL 09/2

Segmentation is an important step in the computer based analysis of images. This thesis addresses the segmentation of images of multiple channels of data. Such images are referred to as multichannel images. Examples of these are color images, where the channels represent color components, and remote sensing data, where the channels may represent signals from various visible and infrared frequency bands. This thesis describes and demonstrates how segmentation of multichannel images into homogeneous regions can be accomplished using linear predictive filtering. Results are given for some synthetically generated color images of two textures. GRA

N86-30383# California Univ., Berkeley. Dept. of Electrical Engineering and Computer Science.
A BROWSER FOR DIRECTED GRAPHS Technical Report, 15 Nov. 1981 - 30 Dec. 1985
Carl Meyer 30 Dec. 1985 63 p
(Contracts N00039-82-C-0235; ARPA Order 4031)
(AD-A166622) Avail: NTIS HC A04/MF A01 CSCL 09/2

The availability of low-cost workstations with a bit-mapped display and mouse has made possible widespread use of graphics software. User interfaces can display data through a convenient graphics interface rather than the textual presentations necessitated by older technology. One of the most applicable structures of computer science is a graph (i.e., a graph with vertices and edges as opposed to a drawing). If the graph drawing problems could be overcome, a tool could be written to browse through graphs using the natural graphical display. Such a tool, or graph browser, would display graphs in a reasonable format and allow users to query or edit the data represented by the graphs. This report describes the design of a general graph browser based on our experiences with an earlier prototype. Chapter 2 discusses the prototype and the limitations encountered with it. Chapter 3 describes the design of a general graph browser, called GRAB, and the user interface it provides. Chapter 4 describes an implementation design of GRAB, including the database design and the heuristics used to draw reasonable-looking graphs. Chapter 5 concludes with a summary and a discussion of future extensions to GRAB. GRA

N86-30384# Institute for Defense Analyses, Alexandria, Va.
THE STATUS OF VERIFICATION TECHNOLOGY FOR THE ADA (TRADEMARK) LANGUAGE Final Report
Karl A. Nyberg, Audrey A. Hook, and Jack F. Kramer Jul. 1985 43 p
(Contract MDA903-84-C-0031)
(AD-A166664; AD-E500758; IDA-P-1859; IDA/HQ-85-30214) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report provides a detailed research and development plan for the development and deployment of an Ada verification capability. The background, history, and goals of both Ada and verification are discussed. Specific recommendations for integrating verification technology in the software development process (particularly with Ada) are presented. The necessary research items to be pursued in support of the goals are also presented. This report consists of two major sections - the text and supporting appendices and references. The appendices generally describe efforts being undertaken in various areas and are annotated with status and points of contact for further information. GRA

N86-30385# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A DIGITAL FILTER FOR REMOVING KNOWN COMPONENTS FROM SPECTROSCOPIC DATA M.S. Thesis
Carey G. Mumford, III Aug. 1985 68 p
(AD-A166680; AFIT/CI/NR-86-36T) Avail: NTIS HC A04/MF A01 CSCL 07/4

This document presents a computational system designed to remove known components from spectroscopic data. The system realization is a FORTRAN-77 program; a listing of the program's source code is included in the Appendix. The program first performs a nine-point quadratic least-squares smoothing function. It then removes the known component with a non-recursive filter based on a least-squares prediction of the observed spectrum and a least-squares prediction of a computer generated synthetic spectrum of the known component. The program was tested using an artificial spectrum created for the sole purpose of testing the program's function. The program's function was verified with three segments of the 12 micron band of ethane taken from data recorded on the Fourier transform spectrometer at the McMath solar telescope at the Kitt Peak National Observatory. The segments are located near 804.0, 815.0, and 819.5/cm. Plots of the spectral data and of the resultant data are included. GRA

N86-30386# Brookhaven National Lab., Upton, N. Y.
PROCEEDINGS OF THE 4TH DOE WORKSHOP ON COMPUTER AIDED ENGINEERING
1985 54 p Workshop held at Upton, N.Y., 10 Oct. 1985
(Contract DE-AC02-76CH-00016)
(DE86-006129; BNL-51935; CONF-851060-Absts) Avail: NTIS HC A04/MF A01

The Proceedings for the Fourth DOE Workshop in Computer Aided Engineering follows the practice established in the three prior workshops in that only the abstracts or summaries of the presentations are published. Those wishing a more detailed manuscript of the work described are encouraged to contact the author directly. Most of the work described has been conducted

under contract to the US Department of Energy. The individual authors would be able to inform interested parties of any restrictions placed upon the use of the work described herein. DOE

N86-30387# Allied Bendix Corp., Kansas City, Mo.
INTELLIGENT N/C CONTROLLERS
V. E. Gross Oct. 1985 4 p Presented at the Joint Meeting of the CAM-I Advance Numerical Control (ANC), Process Planning (PP), and Quality Assurance Programs, Arlington, Tex., 30 Oct. 1985
(Contract DE-AC04-76DP-00613)
(DE86-003132; BDX-613-3398; CONF-8510211-1) Avail: NTIS HC A02/MF A01

The objective of this presentation is to initiate the discussion for the eventual preparation of a specification for intelligent numerical control N/C controllers. The items in this presentation are not intended to be all inclusive. This is a starting point for the research and preparation required to develop a specification. The intelligent N/C controller is defined and requirements, standards, and benefits are discussed. Development of specifications is recommended. DOE

N86-30388# Sandia National Labs., Albuquerque, N. Mex.
COMPOSITING DISSPLA OUTPUT WITH SYNTHETIC IMAGES ISSCO WEEK 86
J. Mareda 1986 8 p Presented at the ISSCO Week, New Orleans, La., 10 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004555; SAND-85-2054C; CONF-860363-1) Avail: NTIS HC A02/MF A01

A number of graphics packages exist at Sandia to provide scientists and engineers a means of efficiently representing their data. These packages include DISSPLA, TELL-A-GRAF, Mapper, Movie BYU, Weasel, and some state of the art scene software currently under development. Some very enhanced graphics can be obtained by combining the output of some of these graphics packages. This presentation will discuss a method that was developed which allows incorporating the output of DISSPLA, the most widely used graphics package at Sandia for representing scientific data, with the scene software. The result of this combination is a high quality very informative graph. The procedures that are used to perform this combination will be discussed and many examples of the resulting output will be presented. The technique can be used for simply adding annotation to an image generated using the scene software or to add an attractive background from the scene software to a text slide made using DISSPLA. This technique can also be used to merge a ray-traced 3-D surface with a corresponding 3-D DISSPLA vector plot. This is how the two graphs from Sandia on the 1985 ISSCO poster for the Battle of the Artists were made. DOE

N86-30389# Argonne National Lab., Ill.
COMPARISON OF THE CRAY X-MP-4, FUJITSU VP-200, AND HITACHI S-810/20: AN ARGONNE PERSPECTIVE
J. J. Dongarra and A. Hinds Oct. 1985 48 p
(Contract W-31-109-eng-38)
(DE86-006665; ANL-85-19) Avail: NTIS HC A03/MF A01

A set of programs, gathered from major Argonne computer users, was run on the current generation of supercomputers: the CRAY X-MP-4, Fujitsu VP-200, and Hitachi S-810/20. The results show that a single processor of a CRAY X-MP-4 is a consistently strong performer over a wide range of problems. The Fujitsu and Hitachi excel on highly vectorized programs and offer an attractive opportunity to sites with IBM-compatible computers. DOE

N86-30390# Allied Bendix Corp., Kansas City, Mo.
ROBOTIC SIMULATION
B. L. Peck Feb. 1986 9 p
(Contract DE-AC04-76DP-00613)
(DE86-006517; BDX-613-3410) Avail: NTIS HC A02/MF A01

Simulation software offers great potential for cost savings and added assurance of maximum efficiency in manufacturing operations. It is estimated that 60 to 80% of a total robotic work cell implementation effort is involved in layout, equipment design, robot selection, and hardware mock up of the cell. The remainder of the effort is taken up with programming and final refinements made on the shop floor. Simulation techniques are also contributing significantly to development of offline programming. Simulation programs can offer a major cost savings. DOE

N86-30391# Department of Energy, Washington, D. C. Office of Energy Research.
ENERGY SCIENCES ADVANCED COMPUTATION PROGRAM PLAN
Feb. 1986 25 p
(DE86-006958; DOE/ER-0259) Avail: NTIS HC A02/MF A01

This document describes the Energy Sciences Advanced Computation (ESAC) activity of the Applied Mathematical Sciences program within the Office of Energy Research (ER) of the Department of Energy (DOE). It also describes the ESAC program plans for the next five fiscal years. These plans are derived from several sessions of a working group which was composed of researchers from DOE national laboratories and universities and which examined the ESAC activity to offer recommendations regarding the direction of this activity, and from a panel chaired by Dr. John Killeen, Director, National Magnetic Fusion Energy Computer Center, which investigated overall ER supercomputer issues and requirements. DOE

N86-30392# Los Alamos National Lab., N. Mex.
REFERENCE GUIDE FOR USING IGVIEW, AN IGES COMPATIBLE GEOMETRY DISPLAY, EDITING, AND ANALYSIS SYSTEM
R. M. Dolin and D. L. Jaeger Dec. 1985 46 p
(Contract W-7405-eng-36)
(DE86-007190; LA-10565-M) Avail: NTIS HC A03/MF A01

This report provides an introduction to the Initial Graphics Exchange Specification (IGES) compatible code called IGVIEW. This software can be used to display, edit, and analyze two-dimensional IGES formatted geometry. IGVIEW was written to comply with IGES version 2.0, which is the current national geometry standard. This report is intended only to serve as a reference manual for IGVIEW users. It contains a description of all the possible commands that can be used, and how to execute them. It details how to execute the code, read in a geometry file, and write a geometry file. There is also a discussion about what types of computer systems and terminals the current version of IGVIEW will support. The procedures for developing a material library are shown, and a short example library is provided. DOE

N86-30393# Sandia National Labs., Albuquerque, N. Mex.
SHARED MEMORY, CACHE, AND FRONTWIDTH CONSIDERATIONS IN MULTIFRONTAL ALGORITHM DEVELOPMENT
R. E. Benner 23 Jan. 1986 24 p
(Contract DE-AC04-76DP-00789)
(DE86-007245; SAND-85-2752) Avail: NTIS HC A02/MF A01

A concurrent, multifrontal algorithm (Benner and Weigand 1986) for solution of finite element equations was modified to better use the cache and shared memories on the ELXSI 6400, and to achieve better load balancing between child processes via frontwidth reduction. The changes were also tailored to use distributed memory machines efficiently by making most data local to individual processors. The test code initially used 8 Mbytes of incached shared memory and 155 cp (concurrent processor) sec (a speedup of 1.4) when run on 4 processors. The changes left only 50 Kbytes of uncached, and 470 Kbytes of cached, shared memory, plus 530 Kbytes of data local to each child process. Total cp time was reduced to 57 sec and speedup increased to 2.8 on 4 processors. Based on those results an addition to the ELXSI multitasking software, asynchronous I/O between processes, is proposed that would further decrease the shared memory requirements of the algorithm and make the ELXSI look like a distributed memory machine as far as algorithm development is concerned. This would make the ELXSI an extremely useful tool for further development of special-purpose, finite element computations. DOE

N86-30394# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
THE STEINER TREE PROBLEM. LINEAR PROGRAMMING MODEL AND DECOMPOSITION TECHNIQUE RESOLUTION Ph.D. Thesis [LE PROBLEME DE L'ARBRE DE STEINER. MODELISATION PAR PROGRAMMATION LINEAIRE ET RESOLUTION PAR DES TECHNIQUES DE DECOMPOSITION]
Lucile Guyard-Daher Oct. 1985 250 p In FRENCH
(ENST-85E010; ISSN-0751-1353; ESA-86-97214) Avail: NTIS HC A11/MF A01

A combinatorial optimization analysis is presented. A general linear programming analytical approach is detailed. A second heuristic approach allows the treatment of graphs with 200 peaks and 1500 arcs, with an error < 10%. The resolution of Steiner problems is discussed. The iteration complexity and the computer memory used by the methods discussed are compared, showing that the choice of algorithm may affect the cost factors by an order of magnitude. ESA

N86-30395# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communication.
WEIGHTED DECODING OF BLOCK LINEAR CODES Ph.D. Thesis [DECODAGE PONDERE DES CODES LINEAIRES EN BLOCS]
Juing Fang Jan. 1986 202 p In FRENCH
(ENST-86E001; ISSN-0751-1353; ESA-86-97216) Avail: NTIS HC A10/MF A01

A decoding algorithm was studied to determine its average complexity and its asymptotic behavior. Computerized simulations confirm the positive evaluation. Suboptimal Battail algorithm variants are examined and their simulation shows acceptable efficiency. The analysis and simulation shows that the channel nonuniform quantifying does not significantly improve the gain. Complexity theory is used to demonstrate that efficient probabilistic algorithms or polynomial time suboptimal algorithms are reasonable solutions. The modulations using a large number of states are also studied, concluding the error correcting codes may be useful for that case also. ESA

N86-30396# Technische Hogeschool, Eindhoven (Netherlands).
AN IMPROVED TEST FOR THE EQUALITY OF COEFFICIENTS OF VARIATION
R. Doornbos, J. Dijkstra, and J. B. Dijkstra Apr. 1984 9 p
(THE-RC-54335B; ESA-86-97307) Avail: NTIS HC A02/MF A01

The D-test for the quality of coefficients of variation in normal populations proposed by Doornbos and Dijkstra (1983) was modified. The modification yields a simpler algorithm; better control over the chosen size of the test; and a considerable improvement of the power. The last two remarks are especially true for small samples. ESA

N86-30397# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
REPORT ON THE AI TRIP
R. P. vandeRiet Mar. 1984 51 p
(IR-82; ESA-86-97320) Avail: NTIS HC A04/MF A01

The imbedding of AI in the whole of computer science; equipment; communication; and VLSI in the UK, USA, and Canada are discussed. Contacts between universities and industry are treated. ESA

N86-30398# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A RELATIONAL DATABASE ENVIRONMENT FOR SOFTWARE DEVELOPMENT
Anthony I. Wasserman and Martin L. Kersten May 1984 20 p Sponsored by Netherlands Organization for the Advancement of Pure Research
(IR-86; ESA-86-97322) Avail: NTIS HC A02/MF A01

The software tool environment for the User Software Engineering (USE) methodology is built around a compact relational database management system (Troll/USE). Within this environment, called the Unified Support Environment, tools communicate with Troll/USE through message passing. Tools include a database browser and editor, a rapid prototyping system, and interactive database design aid, a data dictionary system, a programming language, and a version control/configuration management system. The way in which these tools support the USE methodology is described. The resulting environment is highly flexible and well suited for development of software systems and additional tools. ESA

N86-30399# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
AN ALGORITHM TO FIND MINIMAL SEQUENCES OF PASS DIRECTIONS FOR ATTRIBUTE GRAMMARS
Henk Alblas 1983 47 p
(INF-83-6; ESA-86-97371) Avail: NTIS HC A03/MF A01

A polynomial time algorithm that delivers a shortest sequence of pass directions for several simple multipass grammars is discussed. It starts from a given sequence of pass directions and tries to find a shorter one by considering possible distributions of the attributes over the passes and crossing out empty passes. An extension of the algorithm also reconsiders and possibly changes directions in order to find passes that become empty. The resulting sequences of pass directions are minimal with respect to the subsequence ordering, i.e., no subsequence exists for which an associated distribution of the attributes over the passes meets the simple multipass requirements. ESA

N86-30400# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A NOTATION FOR THE MOST GENERAL FORM OF REPETITION
Maarten M. Fokkinga Feb. 1984 13 p
(INF-84-3; ESA-86-97372) Avail: NTIS HC A02/MF A01

A notation with which all forms of repetition, including WHILE, REPEAT, DO OD, IT TI, events, and multilevels exits can be written in a very simple and uniform way is presented. The notation uses recursion and name-giving as the canonical way to denote a large class of infinite programs in a finite way. ESA

N86-30401# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
EXCEPTION HANDLING CONSTRUCTS CONSIDERED UNNECESSARY
Maarten M. Fokkinga Apr. 1984 13 p
(INF-84-8; ESA-86-97373) Avail: NTIS HC A02/MF A01

It is shown that, as Black (1982) argues, normal control structures, together with the data type discriminated union, suffice to replace exception handling facilities in a satisfactory way. Even with the discriminated union approach, incremental program construction is still possible. Programs using discriminated unions resemble the programs using exception handling facilities more than Black suggests. ESA

N86-30402# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
INPUT SIGNAL DESIGN FOR SYSTEM IDENTIFICATION; A COMPARATIVE ANALYSIS
A. Krolikowski and P. Eykhoff Oct. 1984 25 p
(ER-84/06; ESA-86-97526) Avail: NTIS HC A02/MF A01

Input signal design for system identification when the input signal is amplitude constrained and the input sequence is of finite-length is investigated. Optimality criteria used to derive the optimal identifying input sequence include Rissanen's Minimum Description Length criterion; the determinant of the information matrix; the information matrix determinant ratio; and the trace of the parameter error covariance matrix. These input design criteria can also be used in structure selection (multivariate systems) or in model order (univariate systems) estimation procedures. Autoregressive models are empasized, and the input signal sequences are derived using a dynamic programming approach. Analytical results and simulations are presented. ESA

N86-30403# Technische Hogeschool, Eindhoven (Netherlands).
ON-LINE DESIGN RULE CHECKER
L. Orbons 10 Jul. 1984 64 p
(ESA-86-97529) Avail: NTIS HC A04/MF A01

An on-line design rule checker for the interactive layout editors ISLE and CM was developed. It can check a layout consisting of paraxial rectangles for width and spacing violations. Error messages are immediatly reported to the designer, detected errors are also stored in error lists. The checker can also be used off-line. ESA

N86-30404*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A COLLECTION OF AREA OF INTEREST (AOI) ALGORITHMS Final Report
Ann Griesel, James Gillis, E. Drell, R. J. Gardner, and F. Lesh Jul. 1985 105 p
(Contract NAS7-918)
(NASA-CR-176984; JPL-D-171; NAS 1.26:176984; AD-A166509) Avail: NTIS HC A06/MF A01 CSCL 09/2

This report presents several independently developed and tested algorithms implemented in Pascal and FORTRAN 77 for determining if a point falls within a specified quadrilateral Area of Interest (AOI). These algorithms represent several ways of mathematically solving the AOI point inclusion problem, and provide a set of unclassified benchmarks against which existing system algorithms can be evaluated. Each of the other reports, listed in Appendix A, analyzes algorithms from several existing Intelligence and Electronic Warfare I/EW systems that perform a single function and examine their underlying mathematics. The main functional areas studied have been correlation, geographic transformations, and direction finding and location (fix) estimation. In this introductory section, the basic mathematical and geometric considerations on which the AOI algorithms presented later are based will be introduced, and the potential order dependence inherent in defining a polygon by the location of its vertices discussed. The second section presents the algorithms, and the third third section, an overview of testing results and algorithm evaluations. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-30405*# DeAnza Coll., Los Altos Hills, Calif.
OPTIMIZATION OF AN INTERACTIVE DISTRIBUTIVE COMPUTER NETWORK Final Report, Oct. 1979 - Dec. 1984
Vivian Frederick Jul. 1985 6 p
(Contract NCC2-31)
(NASA-CR-177373; NAS 1.26:177373) Avail: NTIS HC A02/MF A01 CSCL 09B

The activities under a cooperative agreement for the development of a computer network are briefly summarized. Research activities covered are: computer operating systems optimization and integration; software development and implementation of the IRIS (Infrared Imaging of Shuttle) Experiment; and software design, development, and implementation of the APS (Aerosol Particle System) Experiment. Author

N86-30406*# National Aeronautics and Space Administration, Washington, D.C.
ORGANIZATION OF THE CHANNEL-SWITCHING PROCESS IN PARALLEL COMPUTER SYSTEMS BASED ON A MATRIX OPTICAL SWITCH
Yu. V. Golomidov, S. K. Li, S. A. Popov, and V. B. Smolov Jul. 1986 23 p Transl. into ENGLISH from Elektronnoye Modelirovaniya (USSR), v. 6, Sep. - Oct. 1984 p 16-23; 39 Original language document was announced in IAA as A85-11834 Transl. by The Corporate Word, Inc., Pittsburgh, Pa.
(Contract NASw-4006)
(NASA-TM-88452; NAS 1.15:88452; ISSN-0204-3572) Avail: NTIS HC A02/MF A01 CSCL 09B

After a classification and analysis of electronic and optoelectronic switching devices, the design principles and structure of a matrix optical switch is described. The switching and pair-exclusion operations in this type of switch are examined, and a method for the optical switching of communication channels is elaborated. Finally, attention is given to the structural organization of a parallel computer system with a matrix optical switch. E.R.

N86-30407# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
DATAFLOW ARCHITECTURES Interim Report
David E. Culler 12 Feb. 1986 35 p
(Contract N00014-83-K-0125)
(AD-A166235; MIT/LCS/TM-294) Avail: NTIS HC A03/MF A01 CSCL 09/2

Dataflow graphs are described as a machine language for parallel machines. Static and dynamic dataflow architectures are presented as two implementations of the abstract dataflow model. Static dataflow allows at most one token per arc in dataflow graphs and thus only approximates the abstract model where unbounded token storage per arch is assumed. Dynamic architectures tag each token and keep them in a common pool of storage, thus permitting a better approximation of the abstract model. The relative merits of the two approaches are discussed. Functional data structures and I-structures are presented as two views of data structures which are both compatible with the dataflow model. These views are contrasted and compared in regard to efficiency and exploitation of potential parallelism in programs. A discussion of major dataflow projects and a prognosis for data flow architectures are also presented. Author (GRA)

N86-30408# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
PROTECTION AND RESOURCE CONTROL IN DISTRIBUTED OPERATING SYSTEMS
Sape J. Mullender and Andrew S. Tanebaum 15 Mar. 1984 31 p Revised
(IR-79; ESA-86-97319) Avail: NTIS HC A03/MF A01

A method to protect local networks against malicious users without placing any restrictions on the kinds of operating systems that can be constructed is discussed. Depending on the hardware, one-way functions or public key cryptography forms the basis for the protection. It is shown how a traditional object-oriented capability system can be implemented on top of the basic protection mechanism, and how a service for accounting and resource control can be constructed. ESA

N86-30409# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep: Interface, Protocol en Service Systemen.
FUNCTIONS WITHIN THE DATA COMMUNICATION LAYERS OF THE ISO OPEN SYSTEMS INTERCONNECTION (OSI) MODEL Ph.D. Thesis
A. Pras Mar. 1984 76 p
(INF83/IPS/042; ESA-86-97368) Avail: NTIS HC A05/MF A01

Two service types for the data-communication layers of the ISO-OSI model: the connectionless and the connection-oriented service, are discussed. The main difference between these service types is that the latter incorporates a three party negotiation phase. Although connection-orientation is one of the basic ideas behind the reference model for open system interconnection, the connection approach may not be the best for all data-communication layers. Many functions within these layers can also be performed with a connectionless service type. It is argued that it is possible with a connectionless network service to avoid congestion. ESA

N86-30410# Technische Hogeschool Twente, Enschede (Netherlands). Vagroep: Interface, Protocol en Service Systemen.
A FORMAL DESCRIPTION TECHNIQUE AND THE ISO TRANSPORT LAYER Ph.D. Thesis
J. W. C. Trouwee Mar. 1984 102 p
(INF83/IPS/007; ESA-86-97369) Avail: NTIS HC A06/MF A01

A formal specification language for protocol systems, based on the temporal ordering of interaction primitives, was studied to

aid standardizing the ISO Reference Model for Open System Interconnection (OSI). The specification of these standards has to be done unambiguously in a formal language. The way the language can be used to specify the OSI standards was assessed by describing formally the Transport Service-standard and Transport Protocol-standard from the ISO Reference Model. From the standards, a functional substructure was constructed. ESA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-30411# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
OVERVIEW OF ROME: A REASON-ORIENTED MODELING ENVIRONMENT Interim Report
Donald W. Kosy and Ben P. Wise Dec. 1985 19 p
(AD-A166259; CMU-RI-TR-85-21) Avail: NTIS HC A02/MF A01 CSCL 09/2

The ROME system is an experimental decision support system (DSS) generator that incorporates facilities originally developed for expert artificial intelligence systems. Like other DSS generators, it provides a set of tools for building, running, and documenting mathematical models of business activities. Beyond that, however, the system includes explicit differentiation between hard facts and softer information such as assumptions and expectations, a set of procedures for evaluating and explaining results, and a natural language user interface. In this paper, we discuss the representation of knowledge in ROME and show how it is used to answer questions, explain trends, detect anomalous values, and assess the credibility of model assumptions. GRA

N86-30412# Sandia National Labs., Albuquerque, N. Mex.
SENSOR DRIVEN ROBOT SYSTEMS TESTBED
R. W. Harrigan 1986 18 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-005892; SAND-85-2032C; CONF-860366-1) Avail: NTIS HC A02/MF A01

Intelligent robot systems which operate in a semiautonomous fashion (i.e., the operator serves only as a high level supervisor) require the integration of sensors and mechanisms coupled by intelligent software. Since robot systems operate in the real world with imperfect knowledge of that world, error recovery is an important aspect of any control strategy. Configured with a 6 degree-of-freedom robot manipulator, two dimensional vision and force sensing, the Sensor Driven Robot Systems Testbed offers an environment for the development of control concepts for intelligent machine systems. The Sensor Driven Robot Systems Testbed has led to the development of active sensing concepts using complementary sensors and a highly modular control software concept. Both concepts are currently being implemented within the testbed environment. DOE

N86-30413# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNIQUES TO FAULT DIAGNOSIS FOR PRINTED CIRCUITS Ph.D. Thesis [APPLICATION DES TECHNIQUES DE L'INTELLIGENCE ARTIFICIELLE AU DIAGNOSTIC DE DEFAUTS DES CIRCUITS IMPRIMES]
Eric Barrielle Dec. 1985 131 p Partly in FRENCH and ENGLISH
(ENST-85E011; ISSN-0751-1353; ESA-86-97215) Avail: NTIS HC A07/MF A01

A fault diagnosis system based on a Prolog language is described. Artificial intelligence languages are discussed in order to justify the choice. The system is composed of five experts dealing with successive tasks: a manager task, a how to look at the problem task, a measurement choice task, a measurement and fault location task, and a last task to verify the diagnosis. A logics printed circuit can be seen as an oriented graph whose components are strongly connected. A program development subsystem is used to interpret the rules and to verify the interface between the manager and the expert. The advantages derived from the use of Prolog are emphasized. Simplicity and efficiency are claimed. ESA

N86-30414# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
APPLICATION OF INPUT SIGNAL DESIGN IN SYSTEM IDENTIFICATION FOR ADAPTIVE CONTROL
A. Krolikowski Sep. 1984 32 p
(ER-84/04; ESA-86-97524) Avail: NTIS HC A03/MF A01

An approach to the dual control problem, based on the heuristic combination of the input signal design (probing action) with the suboptimal adaptive control algorithm (control action) is proposed. The computation of the probing inputs requires no additional effort so the overall algorithm is easy to implement, and consistent computationally. The algorithm seems to be especially appealing in the case of a short control horizon, high noise level, and for a large uncertainty associated with the unknown system parameters. The crucial problem remains how to choose the probing action length, the amplitude constraint, and the learning parameter in the case of the active adaptive control algorithm. ESA

N86-30415# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
ADAPTIVE CONTROL OF FIRST-ORDER SYSTEMS WITH TIME-DELAY
A. Krolikowski Oct. 1984 11 p
(ER-84/05; ESA-86-97525) Avail: NTIS HC A02/MF A01

An infinite horizon control problem of a linear discrete-time, first-order system with time delay is considered. The performance of the control strategy is evaluated by the multistep quadratic loss function. In the case of known system parameters, the optimal input is shown to be a simple saturation of the minimum variance control input. In the case of unknown system parameters, an adaptive control algorithm based on the recursive maximum likelihood estimation procedure is presented. Simulation results for various magnitudes of the amplitude constraint are given. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-30416 Technische Hogeschool, Eindhoven (Netherlands). Onderafdel. der Wiskunde en Informatica.
ITERATIVE METHODS FOR NONDEFINITE SYMMETRIC SYSTEMS, WITH APPLICATION TO A DISCRETE STOKES PROBLEM [ITERATIVE METHODEN VOOR NIET-DEFINIETE SYMMETRISCHE STELSELS, MET TOEPASSING OP EEN GEDISCRETIS EERD STOKES PROBLEEM]
P. G. M. Penders Sep. 1984 121 p In DUTCH
(ESA-86-97548) Avail: Issuing Activity

The solution of indefinite symmetric linear systems in matrix form is discussed. The finite element method was applied to a Stokes problem in two dimensions. The resulting linear system was resolved by reduction to a series of positive definite problems. An algorithm was constructed to resolve the stated problem using an incomplete Cholesky factorization and a preconditioned conjugate gradient method. An error analysis concerning the constructed algorithm is given. Numerical results of examples tested are given. ESA

N86-30417*# Texas Technological Univ., Lubbock.
APPROXIMATIONS OF NONLINEAR SYSTEMS HAVING OUTPUTS

L. R. Hunt and Renjeng Su 1985 24 p
(Grants NAG2-189; NAG2-203; Contract N000014-76-C-1136)
(NASA-CR-176946; NAS 1.26:176946) Avail: NTIS HC A02/MF A01 CSCL 12A

For a nonlinear system with output derivative x = f(x) and y = h(x), two types of linearizations about a point x(0) in state space are considered. One is the usual Taylor series approximation, and the other is defined by linearizing the appropriate Lie derivatives of the output with respect to f about x(0). The latter is called the obvservation model and appears to be quite natural for observation. It is noted that there is a coordinate system in which these two kinds of linearizations agree. In this coordinate system, a technique to construct an observer is introduced. M.G.

N86-30418# Loughborough Univ. of Technology (England). Dept. of Mathematics.
COUNTING NUMBERS REPRESENTABLE AS SUMS OF TWO SQUARES
P. Shiu Jun. 1984 26 p
(LUT-MR-180) Avail: NTIS HC A03/MF A01

Let W(x) count the number of positive integers not exceeding x that are sums of two squares. The values for W(x) are calculated for x = 10 to the k power, k = 1,2,...,12. The method is based on that given by E. D. F. Meissel and D. H. Lehmer for the computation of the values for the prime counting function. A reappraisal of the method shows how simple checking procedures can be incorporated into the calculations. Author

N86-30419# Tata Inst. of Fundamental Research, Bombay (India).
GENERATING IDEALS IN POLYNOMIAL RINGS
S. Mandal and A. Roy 1986 11 p
Avail: NTIS HC A02/MF A01

Boratynski proved that if I is an ideal in a polynomial ring k[X sub 1,...,X sub n] over a field k, then I is set-theoretically generated by mu(I/I squared) elements (mu denotes the minimal number of generators). A theorem is presented which extends Boratynski's result in the following way: suppose R = A[X] is a polynomial ring over a noetherian commutative ring A and I is an ideal in R that contains a monic polynomial; then I is set-theoretically generated by mu(I/I squared) elements. It also follows from this that if R = A[X sub 1,...,X sub n,Y sub 1(sup + or - 1),...,Y sub r(sup + or - 1)] and I is an ideal in R such that ht I > or = dim A + 1, then I is set-theoretically generated by mu(I/I squared) elements. In addition, some partial results concerning the question of whether mu(I) = mu(I/I squared) are proved. M.G.

N86-30420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIGRID METHOD FOR THE EQUILIBRIUM EQUATIONS OF ELASTICITY USING A COMPACT SCHEME Final Report
Shlomo Taasan May 1986 25 p
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178120; NAS 1.26:178120; ICASE-86-23) Avail: NTIS HC A02/MF A01 CSCL 12A

A compact difference scheme is derived for treating the equilibrium equations of elasticity. The scheme is inconsistent and unstable. A multigrid method which takes into account these properties is described. The solution of the discrete equations, up to the level of discretization errors, is obtained by this method in just two multigrid cycles. Author

N86-30421*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A MINIMUM ENTROPY PRINCIPLE IN THE GAS DYNAMICS EQUATIONS Final Report
Eitan Tadmor May 1986 21 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107; DAAG29-85-K-0190; Grant NSF DMS-85-03294)
(NASA-CR-178123; NAS 1.26:178123; ICASE-86-33) Avail: NTIS HC A02/MF A01 CSCL 12A

Let u(x bar,t) be a weak solution of the Euler equations, governing the inviscid polytropic gas dynamics; in addition, u(x bar, t) is assumed to respect the usual entropy conditions connected with the conservative Euler equations. We show that such entropy solutions of the gas dynamics equations satisfy a minimum entropy principle, namely, that the spatial minimum of their specific entropy, (Ess inf s(u(x,t)))/x, is an increasing function of time. This principle equally applies to discrete approximations of the Euler equations such as the Godunov-type and Lax-Friedrichs schemes. Our derivation of this minimum principle makes use of the fact that there is a family of generalized entrophy functions connected with the conservative Euler equations. Author

N86-30422*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONVENIENT STABILITY CRITERIA FOR DIFFERENCE APPROXIMATIONS OF HYPERBOLIC INITIAL-BOUNDARY VALUE PROBLEMS Final Report
Moshe Goldberg (Technion - Israel Inst. of Tech., Haifa.) and Eitan Tadmor (Tel-Aviv Univ., Israel.) Jun. 1986 39 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107; DAAG29-85-K-0190; Grants AF-AFOSR-0150-83; NSF DMS-85-03294)
(NASA-CR-178134; NAS 1.26:178134; ICASE-86-44) Avail: NTIS HC A03/MF A01 CSCL 12A

The purpose of this paper is to achieve more versatile, convenient stability criteria for a wide class of finite-difference approximations to initial boundary value problems associated with the hyperbolic system u sub t = au sub x + Bu + f in the quarter-plane x greater than or equal to 0, t greater than or equal to 0. With these criteria, stability is easily established for a large number of examples, thus incorporating and generalizing many of the cases studied in recent literature. Author

N86-30423*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON COMPACTNESS OF ADMISSIBLE PARAMETER SETS: CONVERGENCE AND STABILITY IN INVERSE PROBLEMS FOR DISTRIBUTED PARAMETER SYSTEMS Final Report
H. T. Banks (Brown Univ., Providence, R. I.) and D. W. Iles Jun. 1986 17 p Presented at the Conference on Control Systems Governed by Partial Differential Equations, Gainesville, Fla., 3-6 Feb. 1986
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178128; NAS 1.26:178128; ICASE-86-38) Avail: NTIS HC A02/MF A01 CSCL 12A

A series of numerical examples is reported and several algorithms compared for estimation of coefficients in differential equation models. Unconstrained, constrained and Tikhonov regularization methods are tested for their behavior with regard to both convergence (of approximation methods for the states and parameters) and stability (continuity of the estimates with respect to perturbations in the data or observed states). Author

N86-30424*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ESTIMATION OF DISCONTINUOUS COEFFICIENTS AND BOUNDARY PARAMETERS FOR HYPERBOLIC SYSTEMS Final Report
Patricia K. Lamm (Southern Methodist Univ., Dallas, Tex.) and Katherine A. Murphy (Brown Univ., Providence, R. I.) Jun. 1986 40 p
(Contracts NAS1-17070; NAS1-18107; Grants NSF DMS-82-00883; NSF DMS-82-05355; NSF DMS-85-04316; AF-AFOSR-0398-84)
(NASA-CR-178133; NAS 1.26:178133; ICASE-86-43) Avail: NTIS HC A03/MF A01 CSCL 12A

The problem of estimating discontinuous coefficients, including locations of discontinuities, that occur in second order hyperbolic systems typical of those arising in I-D surface seismic problems is discussed. In addition, the problem of identifying unknown parameters that appear in boundary conditions for the system is treated. A spline-based approximation theory is presented, together with related convergence findings and representative numerical examples. Author

N86-30425*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON SUBSTRUCTURING ALGORITHMS AND SOLUTION TECHNIQUES FOR THE NUMERICAL APPROXIMATION OF PARTIAL DIFFERENTIAL EQUATIONS
M. D. Gunzburger (Carnegie-Mellon Univ., Pittsburgh, Pa.) and R. A. Nicolaides May 1986 32 p
(Contracts NAS1-18107; CDAAG-29-83-4-0084; Grants AF-AFOSR-0101-83; AF-AFOSR-0231-83)
(NASA-CR-178122; ICASE-86-30; NAS 1.26:178122) Avail: NTIS HC A03/MF A01 CSCL 12A

Substructuring methods are in common use in mechanics problems where typically the associated linear systems of algebraic equations are positive definite. Here these methods are extended to problems which lead to nonpositive definite, nonsymmetric matrices. The extension is based on an algorithm which carries out the block Gauss elimination procedure without the need for interchanges even when a pivot matrix is singular. Examples are provided wherein the method is used in connection with finite element solutions of the stationary Stokes equations and the Helmholtz equation, and dual methods for second-order elliptic equations. Author

N86-30426*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE EXPANDED LAGRANGIAN SYSTEM FOR CONSTRAINED OPTIMIZATION PROBLEMS
Aubrey B. Poore (Colorado State Univ., Fort Collins.) Jul. 1986 30 p
(Contract NAS1-18107; Grants NSF DMS-85-10201; AFOSR-ISSA-85-00079)
(NASA-CR-178142; ICASE-86-47; NAS 1.26:178142) Avail: NTIS HC A03/MF A01 CSCL 12A

Smooth penalty functions can be combined with numerical continuation/bifurcation techniques to produce a class of robust and fast algorithms for constrainted optimization problems. The key to the development of these algorithms is the Expanded Lagrangian System which is derived and analyzed in this work. This parameterized system of nonlinear equations contains the penalty path as a solution, provides a smooth homotopy into the first-order necessary conditions, and yields a global optimization technique. Furthermore, the inevitable ill-conditioning present in a sequential optimization algorithm is removed for three penalty methods: the quadratic penalty function for equality constraints, and the logarithmic barrier function (an interior method) and the quadratic loss function (an interior method) for inequality constraints. Although these techniques apply to optimization in general and to linear and nonlinear programming, calculus of variations, optimal control and parameter identification in particular, the development is primarily within the context of nonlinear programming. Author

N86-30427*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRECONDITIONING FOR FIRST-ORDER SPECTRAL DISCRETIZATION
Craig L. Streett and Michele G. Macaraeg Aug. 1986 25 p
(NASA-TM-87619; NAS 1.15:87619) Avail: NTIS HC A02/MF A01 CSCL 12A

Efficient solution of the equations from spectral discretizations is essential if the high-order accuracy of these methods is to be realized. Direct solution of these equations is rarely feasible, thus iterative techniques are required. A preconditioning scheme for first-order Chebyshev collocation operators is proposed herein, in which the central finite difference mesh is finer than the collocation mesh. Details of the proper techniques for transferring information between the meshes are given here, and the scheme is analyzed by examination of the eigenvalue spectra of the preconditioned operators. The effect of artificial viscosity required in the inversion of the finite difference operator is examined. A second preconditioning scheme, involving a high-order upwind finite difference operator of the van Leer type is also analyzed to provide a comparison with the present scheme. Finally, the performance of the present scheme is verified by application to several test problems. Author

N86-30428# Iowa State Univ. of Science and Technology, Ames.
CONFIDENCE REGIONS FOR VARIANCE COMPONENTS IN UNBALANCED MIXED LINEAR MODELS
Alan P. Fenech and David A. Harville Jan. 1986 30 p
(Contract N00014-85-K-0418)
(AD-A165841; PREPRINT-SER-86-12) Avail: NTIS HC A03/MF A01 CSCL 12/1

A general procedure for obtaining exact confidence regions for the variance components in unbalanced mixed linear models is presented. The procedure utilizes, as pivotal quantities, quadratic forms that may depend on the variance components in a complicated way and that are distributed independently as chi-square variates. In the special case of balanced classificatory models, the pivotal quantities simplify to scalar multiples of sums of squares from the usual analysis of variance. The procedure can be easily modified so as to obtain an exact confidence region for ratios of variance components and can be regarded as a generalization of Wald's procedure for obtaining a confidence interval for a single variance ratio. Author (GRA)

N86-30429# Naval Postgraduate School, Monterey, Calif.
PRELIMINARY INVESTIGATION OF A CALCULUS OF FUNCTIONAL DIFFERENCES: FIXED DIFFERENCES
Bruce J. MacLennan Feb. 1986 28 p
(AD-A165879; NPS52-86-010) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document introduces a notion of functional differences in which the difference of a function f with respect to a function h is that function g that describes how the value of f changes when its argument is altered by h: f(h x) = g(f x). It also introduce the inverse operation of functional integration and derive useful properties of both operations. The result is a calculus that facilitates derivation and reasoning about recursive programs. This is illustrated in a number of simple examples. The author presents preliminary results pertaining to fixed differences, that is, functional differences that do not depend on the value of the argument x. Author (GRA)

N86-30430# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
WALSH-FOURIER ANALYSIS OF DISCRETE-VALUED TIME SERIES
David S. Stoffer Nov. 1985 45 p
(Contract F49620-85-C-0008)
(AD-A166139; TR-85-46; AFOSR-86-0064TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

An approach to the analyses of discrete-valued time series is discussed. The analyses are accomplished in the spectral domain using the Walsh-Fourier transform which is based on Walsh functions. This approach will enable an investigator of discrete systems to analyze the data in terms of square-waveforms and sequency rather than sine-waves and frequency. This document develops a general signal-plus-noise type model for discrete-valued time series in which Walsh-Fourier spectral analysis is of interest. The author considers the problems of detecting whether or not a common signal exists in repeated measures on discrete-valued time series and in discrete-valued processes collected in an experimental design. It is shown that these models may depend on unknown regression parameters and consistent estimates of these parameters based on the finite Walsh-Fourier transform are developed. Applications to certain Markov models are given, however, the methods presented also apply to non-Markov cases. Author (GRA)

N86-30431# Kent State Univ., Ohio.
INVESTIGATIONS ON IMPROVED ITERATIVE METHODS FOR SOLVING SPARSE SYSTEMS OF LINEAR EQUATIONS Final Report, 1 Jul. 1981 - 30 Jun. 1984
Richard S. Varga Nov. 1985 16 p
(Grant AF-AFOSR-0226-80)

(AD-A166170; AFOSR-86-0027TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The research conducted under this effort was centered about general matrix methods and applications of matrix theory in solving large systems of linear equations. In particular, the classification of certain factorizations of M matrices was undertaken. An extension of the Stein-Rosenberg theorem comparing the spectral radii of matrices useful in constructing iterative solution techniques was obtained. The use of summability methods and approximated conformal mapping techniques in the study of iterative methods was pursued. Finally, a study of SOR and SSOR iterative methods was accomplished using the theory of H matrices. Eleven papers appeared in the referred literature during this effort. GRA

N86-30432# Johns Hopkins Univ., Baltimore, Md. Dept. of Mathematical Sciences.

STATE ESTIMATION FOR COX PROCESSES WITH UNKNOWN LAW: PARAMETRIC MODELS

Alan F. Karr Nov. 1985 18 p

(AD-A166179; AFOSR-86-0020TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let (N sub i, M sub i) be i.i.d. copies of a Cox pair (N,M), with the Cox processes N sub i, but not the directing measures M Sub i, observable. Suppose that the probability law of (N,M) belongs to a finite-dimensional parametric family sub theta but is otherwise unknown. Approximations are derived for state estimators. Under standard smoothness and requlrarity assumptions n times the difference between the true and pseduo-state estimators converges in distribution to a Gaussian random measure, with respect to the variation norm topology. Computation of maximum likelihood estimators by the EM algorithm is discussed in general and for two specific examples. GRA

N86-30433# Brown Univ., Providence, R. I. Center for Dynamical Systems.

ANALYSIS OF DYNAMICAL SYSTEMS Report, 1 Sep. 1984 - 31 Aug. 1985

Jack K. Hale 5 Dec. 1985 8 p

(Grant AF-AFOSR-0376-84)

(AD-A166224; AFOSR-86-0068TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This research involves extensive studying of the problem of transverse homoclinic orbits of periodic orbits of functional differential equations (FDE's), and also systems of reaction diffusion equations and attempting to understand the effects of boundary conditions on the flow when the diffusion coefficients and the boundary conditions are varied. GRA

N86-30434# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.

ASYMPTOTIC METHODS FOR THE ANALYSIS, ESTIMATION AND CONTROL OF STOCHASTIC DYNAMIC SYSTEMS Annual Report, 11 Nov. 1984 - 10 Nov. 1985

Alan S. Willsky and George C. Verghese 4 Dec. 1985 26 p

(Grant AF-AFOSR-0258-82)

(AD-A166234; LIDS-SR-1516; AFOSR-86-0026TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The basic scope of this grant is to carry out fundamental research in the analysis, control, and estimation of complex systems, with particular emphasis on the use of methods of asymptotic analysis and multiple time scales to decompose complex problems into interconnections of simpler ones. During the time period covered by this report, significant progress had been made in several areas, leading to important results and to promising direction for further research. The Specific topics covered in this report are: 1) Analysis and Estimation for Finite-State and Hybrid Processes Possessing Time or Spatial Decompositions; 2) Analysis and control of Singularly Perturbed and Weakly Coupled Linear Systems; and 3) Analysis and Estimation for Singular Systems. GRA

N86-30435# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ISOMORPHISM BETWEEN GAUGE GROUPS BEFORE AND AFTER RENORMALIZATION IN THE PRESENCE OF ABEL SUBGROUPS AND HIGGS FIELDS

Rong Wang 14 Mar. 1986 26 p Transl. into ENGLISH from Wuli Xuebao (China), v. 30, no. 6, Jun. 1981 p 731-746

(AD-A166276; FTD-ID(RS)T-0049-86) Avail: NTIS HC A03/MF A01 CSCL 12/1

We give a rigorous proof on the isomorphism between gauge groups before and after renormalization, in the presence of Abel subgroups and Higgs fields. GRA

N86-30436# Naval Postgraduate School, Monterey, Calif.

ROBUST EMPIRICAL BAYES ANALYSES OF EVENT RATES

Donald P. Gaver and Iognaid G. OMuircheartaigh Mar. 1986 56 p

(AD-A166681; NPS55-86-007) Avail: NTIS HC A04/MF A01 CSCL 12/1

A number, I, of nominally similar items generate events (e.g., failures) at possibly different rates, or mean time intervals. This paper addresses the problem of appropriately pooling the data from the different sources. The approach is parametric empirical Bayes: true individual item rates are assumed to come from a fixed superpopulation. It is shown how parameters of a superpopulation model can be estimated from all of the data, and combined with individual unit history, can provide improved estimates of individual rates. The procedure can be robust: evidence that a particular rate is far off from the main body of rates permits that outlier to stand by itself, i.e., to resist pooling. Illustrative analyses of data are supplied. GRA

N86-30437# Naval Weapons Center, China Lake, Calif.

THE OUTPUT OF LINEAR SYSTEMS TO QUASIPOLYNOMIAL INPUTS Final Report, 1983 - 1985

J. M. Martin and G. A. Hewer Sep. 1985 41 p

(AD-A166740; AD-E900546; NWC-TP-6666) Avail: NTIS HC A03/MF A01 CSCL 12/1

The purpose of this report is to summarize some of our joint research on zeros of multivariable linear control systems. This report unifies the many diverse results found in the open literature. It also corrects and generalizes some of the misleading incorrect results found there. This report serves as a basis for subsequent publications and as a guide for applications. GRA

N86-30438# Central Inst. of Physics, Bucharest (Rumania).

PIECEWISE ANALYTICAL PERTURBATION SERIES METHODS FOR SOLVING LINEAR ORDINARY DIFFERENTIAL EQUATIONS. PART 2: THE RADIAL SCHROEDINGER EQUATIONS

Gh. Adam Dec. 1984 44 p

(DE86-700606; IFIN-FT-257-1984-Pt-2) Avail: NTIS (US Sales Only) HC A03/MF A01

The general scheme established in the previous paper for the efficient use of piecewise analytical perturbation series (PAPS) methods to solve linear ordinary differential equations is applied to the radial Schroedinger equation. Starting with a step function approximation to the potential, four optimal PAPS algorithms are written down which show orders of accuracy equal respectively to two, four, six and eight. A comparison with previously published methods in this class illustrates the importance of the optimal choice of the various parameters which enter the PAPS algorithms (approximation of the potential, keeping into the algorithm relevant terms only, adequate difinition of the finite basis set of functions in terms of which the algorithm is expressed). A comparison with the Numerov method in its summed form (which is the most stable version with respect to round off) illustrates the significantly better performances of the optimal sixth order PAPS algorithns. DOE

N86-30439# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.

A FAST, TREE-BASED ACCESS METHOD

Wiebren deJonge, Andrew S. Tanenbaum, and Reind P. vandRiet Mar. 1984 32 p

(Grant ZWO-62-139)

(IR-85; ESA-86-97321) Avail: NTIS HC A03/MF A01

A highly compact representation of binary trees is presented. It is shown how these compact binary trees can be used to represent separators efficiently. The fanout, and thus performance, of a B-tree can be improved by using the method within each index page for representing separators. An index organization, slightly different from a B-tree, that offers another improvement is outlined. The result is a fast, tree-based access method for dynamic files. The idea behind the compact binary trees can be employed for representing pictures and quadtrees compactly. ESA

N86-30440# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
DIMENSION OF BINARY CONVEX STRUCTURES
M. vandeVel Mar. 1984 40 p
(IR-226; ESA-86-97325) Avail: NTIS HC A03/MF A01

It is shown that for compact spaces with a normal binary convexity, the dimension functions dim, ind, Ind, and cohomological dimension are all equal. An n-dimensional compact space X with a normal binary convexity embeds in a product of an n-dimensional connected quotient of X with the space of X-components. Both results are obtained with an auxiliary theory of convex dimension. Applications to completely distributive lattices are given. ESA

N86-30441# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
CONTINUITY OF CONVEXITY PRESERVING FUNCTIONS
M. vandeVel Mar. 1984 23 p
(IR-237; ESA-86-97328) Avail: NTIS HC A02/MF A01

A result of Shirley and Stralka (1971) on the continuity of surjective homomorphisms between finite dimensional lattices is extended to binary convex structures and convexity preserving surjections, and this extension also applies to trees. An additional condition for the finite dimensional case is presented. Similarities with vector spaces lead to the formulation of a general problem. ESA

N86-30442# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
ON MODERATE AND LARGE DEVIATIONS IN MULTINOMIAL DISTRIBUTIONS
Wilbert C. M. Kallenburg May 1984 28 p
(IR-242; ESA-86-97332) Avail: NTIS HC A03/MF A01

Moderate and large deviation theorems for the likelihood ratio statistic and the chi-square statistic in multinomial distributions are presented. Let k be the number of parameters and n the number of observations. Moderate and large deviation theorems are available in literature only if k is kept fixed when n tends to infinity. Although attention is focussed on k = k (n) as n tends to infinity explicit inequalities are obtained for k and n fixed. These inequalities imply results for the whole scope of moderate and large deviations for fixed k and for k (n) tends to infinity as n tends to infinity. It turns out that the Chi-squared approximation continues to hold, even if k tends to infinity. Applications include the study of the influence of the choice of the number of classes on the power in goodness of fit tests. ESA

N86-30443# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A CODIMENSION TWO BIFURCATION WITH A THIRD ORDER PICARD-FUCHS EQUATION
R. Cushman and J. A. Sanders Mar. 1984 23 p
(IR-249; ESA-86-97338) Avail: NTIS HC A02/MF A01

Using a third order Picard-Fuchs equation, it is shown that a certain two parameter family of planar vector fields for parameter values in a certain cone has a unique limit cycle, which is born from a Hopf bifurcation and dies in a saddle connection. This removes a superfluous hypothesis in Theorem 3.2, Chapter 13 of Chow and Hale (1982). ESA

N86-30444# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
ONE-PARAMETER FAMILIES OF OPTIMIZATION PROBLEMS: EQUALITY CONSTRAINTS Thesis
H. Th. Jongen, P. Jonker, and F. Twilt 25 Feb. 1986 26 p
Submitted for publication
(ESA-86-97357) Avail: NTIS HC A03/MF A01

Generalized critical points are introduced and their relationship with other concepts of critical and stationary points is discussed. Under generic regularity conditions, the set of generalized critical points, in particular the change of the Morse index is studied. Problems with equality constraints only are considered. Extending the theory to problems with inequality constraints is indicated. ESA

N86-30445# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
THE ESTIMATION OF MINIMAL POLYNOMIAL COEFFICIENTS AND A START SEQUENCE OF MARKOV PARAMETERS M.S. Thesis
J. L. J. M. vanderWeijden Sep. 1984 101 p
(ESA-86-97519) Avail: NTIS HC A06/MF A01

Two least-squares methods for estimating the minimal polynomial coefficients and the start sequence of Markov parameters are presented. The first method tries to find the minimum of a quadratic loss function (being the squared distance of the estimated Markov parameters to the available noise corrupted set of parameters) by an iteration process. The second algorithm uses a hill climbing procedure to find the optimum of the error function (in this case the squares of the differences between the estimated output signals and the measured signals). Both procedures are compared with each other and with an explicit iterative algorithm that estimates truncated impulse responses. ESA

N86-30446# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
IDENTIFICATION OF MULTIVARIABLE SYSTEMS AND REPRESENTATION IN CANONICAL AND PSEUDO-CANONICAL FORM M.S. Thesis
P. M. Carriere Nov. 1984 130 p
(ESA-86-97520) Avail: NTIS HC A07/MF A01

The structural and parametric identification of stable, linear, time-invariant, time-discrete, and observable (or controllable) multivariable systems is treated. The structural identification is performed by methods using the determinants ratio and the singular value decomposition. The compensated least squares method, and the instrumental variable method are used to accomplish the parametric identification. The processes are identified in an Input/Output model and from there transformations to represent them in the canonical and pseudo-canonical form of the state space model are performed. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-30447*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ASSIST: USER'S MANUAL
Sally C. Johnson Aug. 1986 42 p
(NASA-TM-87735; NAS 1.15:87735) Avail: NTIS HC A03/MF A01 CSCL 12A

Semi-Markov models can be used to compute the reliability of virtually any fault-tolerant system. However, the process of delineating all of the states and transitions in a model of a complex system can be devastingly tedious and error-prone. The ASSIST program allows the user to describe the semi-Markov model in a high-level language. Instead of specifying the individual states of the model, the user specifies the rules governing the behavior of the system and these are used by ASSIST to automatically generate the model. The ASSIST program is described and illustrated by examples. Author

N86-30448# George Mason Univ., Fairfax, Va. Dept. of Systems Engineering.
MATHEMATICAL AND STATISTICAL CHARACTERIZATIONS

OF GENERALIZED HYPEREXPONENTIAL DISTRIBUTION FUNCTIONS
Robert F. Botta, Carl M. Harris, and William G. Marchal Feb. 1986 46 p
(Contract N00014-86-K-0029)
(AD-A165892; GMU/49146/101) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper examines in detail the class of generalized hyperexponential (GH) probability distribution functions. The family is compared to and contrasted with similar popular classes of distributions used in stochastic modeling. Each of these families arises from a desire to preserve the computationally attractive feature of memorylessness possessed by the exponential probability distribution while extending the representations to a broader class in order to approximate an arbitrary probability distribution function. Thus, the simple structure and attractive properties of the GH probability distribution functions are presented with a view toward facilitating the mathematical operations which frequently occur in practice. Author (GRA)

N86-30449# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
SELECTING THE BEST POPULATION, A DECISION THEORETIC APPROACH: THE CASE OF PARETO DISTRIBUTION
N. Dailami (Sheffield Univ., England.), K. Subramanyam, and M. B. Rao Nov. 1985 36 p
(Contract F49620-85-C-0008)
(AD-A166152; TR-85-41; AFOSR-86-0061TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The main ideas in selecting the best populations meeting some prescribed optimality criterion have been mooted originally by Bechchofer and Gupta and the subject has gone from strength to strength by several contributions by several statisticians over the last three decades. In this paper, the selection problem is tackled from a decision theoretic point of view. In selecting the best population, we take into account the cost of sampling and the penalties for taking a wrong decision. We are basically interested in selecting the best Pareto population following the lead given by Somerville and Ofosu. The Pareto proposed this model to study the distribution of incomes in various societies for comparison. In medical circles, this has been used as a model for the remission rate of discharged psychiatric patients as a survival model for cardiac patients waiting for a heart transplant operation. This paper considers four different types of penalty functions including the one considered by Ofosu. Under three of these penalty function we derive the minimax sample sizes. The maximum of the resultant loss function is explicitly derived overcoming the difficulty faced by Ofosu. GRA

N86-30450# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
EXPONENTIAL BOUNDS OF MEAN ERROR FOR THE NEAREST NEIGHBOR ESTIMATES OF REGRESSION FUNCTIONS
L. C. Zhao Nov. 1985 17 p
(Contract F49620-85-C-0008)
(AD-A166156; TR-85-44; AFOSR-86-0065TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper establishes an expontential bound of the mean deviation between m sub n (x) and m (x) given the training sample z subn = (x sub 1), ...,X sub n, under the conditions as weak as possible. This is a substantial improvement on Beck's results. GRA

N86-30451# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE NUMBER OF CLASSES IN CHI-SQUARE GOODNESS OF FIT TESTS
W. C. M. Kallenberg and J. Oosterhoff Mar. 1984 45 p
(IR-246; ESA-86-97336) Avail: NTIS HC A03/MF A01

The power of chi-square goodness of fit tests based on different partitions is studied by considering contamination and exponential families of densities between the null density and fixed alternative densities. For sample sizes n tends to infinity, local asymptotic theory with respect to the number of classes k is developed for such families. Simple sufficient and almost necessary conditions under which it is asymptotically optimal to let k tend to infinity with n are derived. A numerical study shows that the results of the asymptotic local theory for contamination families agree well with power performance of chi-square tests. For heavy-tailed alternatives these tests have the best power when k is relatively large. Unbalanced partitions with small classes in the tails perform surprisingly well, particularly when the alternatives have fairly heavy tails. ESA

N86-30452# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A SIMPLE EXAMPLE WHERE THE JACKNIFE FAILS
W. C. M. Kallenberg May 1984 11 p
(IR-256; ESA-86-97344) Avail: NTIS HC A02/MF A01

An example where the jacknife procedure fails in reducing the bias of the maximum likelihood estimator is presented. By considering an asymptotically equivalent, yet easier, estimating problem in terms of Bernoulli random variables it is shown why straightforward application of the jacknife procedure fails, and how bias reduction can be obtained by application of the jacknife procedure on the right statistic. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-30453# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
USE OF A VIRTUAL CONTROL APPROACH IN STATE ESTIMATION
A. T. Fleury and A. Rios-Neto May 1986 21 p Proposed for presentation at the 10th World IFAC Congress, Munich, West Germany, 26-31 Jul. 1987
(INPE-3903-PRE/944) Avail: NTIS HC A02/MF A01

This work presents the development of a state estimator for dynamic systems and explores the dual function existing between state estimation and optimal control problems. An estimator algorithm similar to the Extended Kalman Filter can be used in real-time nonlinear systems which can be recursively approximated by linear systems. The original estimation problem is transformed into an equivalent one of virtual control. This control problem is then used to generate and adaptive, locally convergent algorithm where, instead of full state estimation, one has to estimate just a control vector with smaller dimension than the state vector. The control formulation also allows the development of convergence acceleration criteria. The algorithms are implemented in a digital computer to estimate the orbit of a low Earth orbit satellite under simulated conditions. Numerical results are presented for a test case considering critical initial values for the estimator and observations provided by three Earth stations. Author

N86-30454# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Ministerio da Ciencia e Technologia.
CONTROL OF NONLINEAR SYSTEMS USING FIXED POINT THEOREMS
J. A. M. FelippeDeSouza Jun. 1986 14 p Proposed for presentation at the 10th World IFAC Congress, Munich, West Germany, 26-31 Jul. 1987
(INPE-3923-PRE/957) Avail: NTIS HC A02/MF A01

Several fixed point techniques used in control of nonlinear systems are discussed. These techniques consider a space of functions U as the set of admissible functions. Some new techniques which allow cases where the set of admissible functions U sub ad is a bounded, closed and convex subset of U are also presented. The semigroup approach is used so that distributed parameter systems are considered. A brief discussion on the

various types of fixed point theorems are given, as well as some references. Author

N86-30455# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STATE ESTIMATION AND PARAMETER IDENTIFICATION OF LINEAR AND SEMILINEAR DISTRIBUTED PARAMETER SYSTEMS
J. A. M. FelippeDeSouza and A. J. Pritchard May 1986 8 p Presented at the 2d conference on Telecommunication and Control, Rio de Janeiro, Brazil, 10-13 Dec. 1985
(INPE-3904-PRE/945) Avail: NTIS HC A02/MF A01

Some results are presented for the joint problem of state estimation and parameter identification of linear systems of the type: z = Az + A sub 1 alpha, z(0) = z sub zero, and semilinear systems of the type: z = Az + A sub 1 Alpha + N(z,a), z(0) = z sub zero, where A and A sub 1 are linear operators and N is nonlinear operator defined on an appropriate Banach space Z, the state space, and are dependent on the parameter alpha epsilon IR superscript p to be identified. The initial state z sub zero is unknown. The observation process is described by: y = Cz, where C is a linear operator from Z to Y (output space). It is assumed that the dynamics of the linear part can be described in terms of a strongly continuous semigroup on Z, so that this formulation includes distributed parameter systems and delay systems as well as lumped parameter system. Author

N86-30456# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Ministerio da Ciencia e Tecnologia.
STATE ESTIMATION AND PARAMETER IDENTIFICATION FOR SEMILINEAR DISTRIBUTED PARAMETER SYSTEMS
J. A. M. FelippeDeSouza Jun. 1986 8 p Presented at the 6th Conference on Automatic Control, Belo Horizonte, Brazil, 25-28 Nov. 1986
(INPE-3932-PRE/964) Avail: NTIS HC A02/MF A01

The problem is considered of state estimation and parameter identification of semilinear systems of the type derivitive z=Az+Nz (A=A(alpha) linear, N (alpha) nonlinear, alpha and R sup P being the p parameters to be identified) with an observation y = Cz (C linear). It is assumed that the dynamic of the linear part (i.e., derivitive z = Az) can be described in terms of a strongly continuous semigroup on an appropriate Banach space Z, so that this formulation includes distributed parameter systems and delay systems as well as lumped parameter systems. First of all we develop some theoretical results by using fixed point theorems with some mappings F:X yields X, where X is a space of functions from the interval (O,T) to Z (the possible trajectories of the system). However, these results are obtained by imposing some conditions on the space of output functions, which restrict the class of systems studied. Therefore we also consider an approach involving the pair (z sub 0,z(.)) consisting of the initial state and the trajectory in a space M which is the cross product Z x X between the state space Z and the space of trajectories X. We show that the solution of the problems of state estimation and parameter identification can be obtained via the fixed point of a variety of maps F:M yields M. Author

N86-30457# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Ministerio da Ciencia e Tecnologia.
CONTROL OF NONLINEAR DISTRIBUTED PARAMETER SYSTEMS USING FIXED POINT TECHNIQUES
J. A. M. FelippedeSouza Jun. 1986 8 p Presented at the 9th Congresso Nacional de Matematica Aplicada e Computacional, Brasilia, Brazil, 25-29 Aug. 1986
(INPE-3922-PRE/956) Avail: NTIS HC A02/MF A01

Fixed point theorems have been an important tool used by mathematicians in the study of the existence of a solution to nonlinear differential equations, and nonlinear operator equations in general, since the beginning of the century. The present paper discuss the several fixed point techniques used in control of nonlinear systems in papers already published on this subject. The semigroup approach is used so that distributed parameter systems are considered. Author

N86-30458# Naval Postgraduate School, Monterey, Calif.
ON INFERENCE AND TRANSIENT RESPONSE FOR M/G/1 MODELS
Donald P. Gaver and Patrica A. Jacobs Mar. 1986 19 p
(AD-A166578; NPS55-86-006) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper addresses two problems of interest in service system analysis: (a) that of making statistical, data-driven estimates of the long-run probability of a long delay, and (b) the assessment of rate of approach to a long-run system performance measure such as expected delay, the rate being characterized by a simple exponential, at least initially. Both are illustrated by reference to M/G/1 and related systems. Author (GRA)

N86-30459# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computer Science.
VALID INEQUALITIES FOR MIXED 0-1 PROBLEMS M.S. Thesis
P. W. M. M. Hermans Sep. 1984 87 p
(ESA-86-97305) Avail: NTIS HC A05/MF A01

Mixed zero-one regions which are described by one single inequality, concerning both zero-one variables and continuous variables, and by bounding-restrictions in the continuous variables are considered. Classes of valid linear inequalities (or facets of the underlying polytope) are derived. Given a point that is no element of the underlying polytope, methods to detect such valid linear inequalities (or facets) which are also violated by this point are derived. The detected inequalities (or facets) can be used to strengthen the formulation of mixed zero-one problems, so that, e.g., a branch and bound method, applied to the strengthened formulation, might reach the optimal solution sooner than if the original formulation is used. ESA

N86-30460# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computer Science.
A NOTE ON THE EVALUATION OF THE MEAN VALUE SCHEME FOR CLOSED MULTICHAIN QUEUEING NETWORKS
Jan vanDoremalen Apr. 1984 9 p
(MEMO-COSOR-84-04; ESA-86-97309) Avail: NTIS HC A02/MF A01

An algorithm for the evaluation of the mean value scheme in closed multichain queueing networks, based on mean value analysis is presented. The algorithm does not involve a nested enumeration of population vectors. It is not very efficient, but implementation is simple. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-30461# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
TAIL BEHAVIOR FOR THE SUPREMA OF GAUSSIAN PROCESSES WITH A VIEW TOWARDS EMPIRICAL PROCESSES Technical Report, Sep. 1985 - Aug. 1986
Robert J. Adler and Gennady Samorodnitsky Nov. 1985 54 p
(Contract F49620-85-C-0144; Grant AF-AFOSR-0104-84)
(AD-A166151; TR-127; AFOSR-86-0015TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Initially this document considers the standard isonormal linear process L on a Hilbert space H, and applying metric entropy methods obtains bounds for a certain probability. Under the assumption that the entropy function of C grows polynomially, we find bounds of the form where delta squared is the maximal variance of L. We use a notion of entropy finer than that usually employed, and specifically suited to the non-stationary situation. As a result we obtain, in the non-stationary setting, more precise bounds than any in the literature. We then treat a number of examples in which the power alpha is identified. These include the distribution of the maximum of certain locally stationary processes. GRA

N86-30462# Centro Tecnico Aerospacial, San Jose dos Campos (Brazil). Inst. de Estudos Avancados.
COMPUTATIONAL EFFICIENCY STUDY OF A SEMI-ANALYTICAL TECHNIQUE FOR THE ANGULAR INTEGRAL ESTIMATION FOUND IN TRANSFER MATRIX GENERATION
R. D.M. Garcia 1984 10 p In PORTUGUESE
(DE86-700784; CTA-IEAV-NT-011/84) Avail: NTIS (US Sales Only) HC A02/MF A01

The computational efficiency of a semi-analytic technique recently proposed for the evaluation of certain angular integrals encountered in the generalization of the isotropic and linearly anisotropic components of elastic and discrete inelastic transfer matrices is studied. It is concluded from a comparison with results obtained with the use of numerical quadratures that the technique has certain computational advantages that recommend its implementation. DOE

N86-30463# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
CLOSED IMAGES OF TOPOLOGICAL GROUPS
Jan vanMill Mar. 1984 11 p
(IR-243; ESA-86-97333) Avail: NTIS HC A02/MF A01

It is shown that every separable metrizable space is a closed image of a separable metrizable topological group. It is shown that there are homogeneous Borel subsets of IR that are not a perfect image of a topological group. ESA

N86-30464# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
CHEBYSHEV SETS AND CONTINUOUS POSITION
M. vandeVel Mar. 1984 11 p
(IR-245; ESA-86-97335) Avail: NTIS HC A02/MF A01

A subset of a vector space is in continuous position if it satisfies a certain relative closure condition for convex open sets. Every convex set is in continuous position. The converse statement (for closed sets only) leads to a problem which is similar to the Chebyshev set problem. It is shown that a combination of the two conditions leads to the convexity of the given set in a Hilbert space. Results concerning boundedly compact sets in a Banach space, and compact sets in an arbitrary locally convex space are derived. ESA

N86-30465# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
DESCRIPTIVE COMPLEXITY OF FUNCTION SPACES
J. vanMill, D. Lutzer, and R. Pol 6 Feb. 1985 19 p Sponsored in part by Vrije University, Amsterdam, Netherlands
(Grant NSF MCS-80-016617)
(IR-278; ESA-86-97354) Avail: NTIS HC A02/MF A01

It is shown that C pi (X), the set of continuous, real-valued functions on X topologized by the pointwise convergence topology, can have arbitrarily high Borel or projective complexity in R sup X, even when X is a countable regular space with a unique limit point. It is shown how to construct countable regular spaces X for which C pi (X) lies nowhere in the projective hierarchy of the complete separable metric space R sup X. ESA

N86-30466# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
CRITICAL SETS IN PARAMETRIC OPTIMIZATION Thesis
H. Th. Jongen, P. Jonker, and F. Twilt Aug. 1985 36 p Revised Submitted for publication
(ESA-86-97358) Avail: NTIS HC A03/MF A01

The concept of a generalized critical point (gc point) is introduced. Every local minimum, Kuhn-Tucker point, and point of Fritz John type is a gc point. Under fairly weak (even generic) conditions the set consisting of all gc points is studied. Due to the parameter, the set is pieced together from one-dimensional manifolds. The points of the set can be divided into five (characteristic) types. The subset of nondegenerate critical points (first type) is open and dense (nondegenerate means strict complementarity nondegeneracy of the corresponding quadratic form, and linear independence of the gradients of binding constraints). A nondegenerate critical point is completely characterized by four indices. The change of these indices along the set is presented. The Kuhn-Tucker subset is studied in connection with the (failure of the) Mangasarian-Fromowitz constraint qualification. ESA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-30467# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering and Applied Physics.
FUNDAMENTAL RELATIVISTIC SOLUTION FOR THE RAILGUN Interim Report, Aug. - Dec. 1985
Richard L. Liboff, Gregory K. Schenter, and G. L. Ferrentino (Army Armament Research and Development Command, Dover, N. J.) Apr. 1986 17 p Sponsored in part by Battelle Columbus Labs, Ohio
(Contract DAAG29-81-D-0100)
(AD-A166607; ARFSD-CR-86004) Avail: NTIS HC A02/MF A01 CSCL 20/3

A fully relativistic analysis is made of the dynamics of a railgun based on three assumptions: (1) Ohm's law is valid in the rest frame of the plasma, (2) total electron momentum is transferred to the projectile, and (3) motion of the projectile is constrained to one direction. With these assumptions, a relativistic equation for the velocity of the projectile is obtained whose solution monotonically increases to one of two values depending on field strengths. For B>E, the maximum velocity is cE/B whereas for E>B it is c where c is the speed of light, and E and B are applied electric and magnetic fields, respectively. GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-30468# Royal Aircraft Establishment, Farnborough (England).
INVESTIGATION OF THE AERODYNAMIC PERFORMANCE AND NOISE CHARACTERISTICS OF A 1/5TH SCALE MODEL OF THE DOWTY ROTOL R212 PROPELLER
W. J. G. Trebble 15 Nov. 1983 35 p
(RAE-TM-AERO-1983; BR90678; ESA-86-97104) Avail: NTIS HC A03/MF A01

The four-bladed Dowty Rotol R212 propeller (NACA 16 sections) was studied at 1/5th scale (0.7 m diameter) in 1.5 m acoustic tunnel. Propeller power absorption and thrust were measured over a range of rotational speeds up to 8000 rev/min at mainstream speeds from 15 to 60 m/sec for a range of blade settings. Slipstream wake surveys show outward movement of the position of the peak pressure as propeller loading is increased. Noise analysis demonstrates the predominance of multiple tones whose number and intensity increase with helical-tip Mach number. An empirical formula shows that the fundamental tone sound pressure level varies with tip speed and power loading in an identical manner to that observed on an ARA-D section propeller. ESA

N86-30469*# PRC Kentron, Inc., Hampton, Va. Aerospace Technologies Div.
NOISE PREDICTIONS OF A HIGH BYPASS TURBOFAN ENGINE USING THE LOCKHEED NEAR-FIELD NOISE PREDICTION PROGRAM
John W. Rawls, Jr. Jul. 1986 71 p
(Contract NAS1-18000)
(NASA-CR-178146; NAS 1.26:178146) Avail: NTIS HC A04/MF A01 CSCL 20A

The prediction of engine noise during cruise using the Near-Field Noise Prediction Program developed by Lockheed is examined. Test conditions were established which simulate the

operation of a high bypass turbofan engine under a wide range of operating conditions. These test conditions include variations in altitude, flight Mach number and thrust setting. Based on the results of noise prediction made using the Lockheed program, an evaluation of the impact of these test conditions on the overall sound pressure level(OASPL)and the one-third octave band spectra is made. An evaluation of the sensitivity of flight condition parameters is also made. The primary noise source from a high bypass turbofan was determined to be fan broadband shock noise. This noise source can be expected to be present during normal cruising conditions. When present, fan broadband shock noise usually dominates at all frequencies and all directivity angles. Other noise sources of importance are broadband shock noise from the primary jet, fan noise, fan mixing noise and turbine noise. Author

N86-30470*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SONIC-BOOM RESEARCH: SELECTED BIBLIOGRAPHY WITH ANNOTATION
Harvey H. Hubbard (Bionetics Corp., Hampton, Va.), Domenic J. Maglieri, and David G. Stephens Sep. 1986 44 p
(NASA-TM-87685; L-16127; NAS 1.15:87685) Avail: NTIS HC A03/MF A01 CSCL 20A

Citations of selected documents are included which represent the state of the art of technology in each of the following subject areas: prediction, measurement, and minimization of steady-flight sonic booms; prediction and measurement of accelerating-flight sonic booms; sonic-boom propagation; the effects of sonic booms on people, communities, structures, animals, birds, and terrain; and sonic-boom simulator technology. Documents are listed in chronological order in each section of the paper, with key documents and associated annotation listed first. The sources are given along with acquisition numbers, when available, to expedite the acquisition of copies of the documents. Author

N86-30471*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NEW VERSION OF THE HELICOPTER AURAL DETECTION PROGRAM, ICHIN
Arnold W. Mueller, Charles D. Smith (PRC Kentron, Inc., Hampton, Va.), Kevin P. Shepherd (Bionetics Corp., Hampton, Va.), and Brenda M. Sullivan Jul. 1986 8 p
(NASA-TM-87745; NAS 1.15:87745) Avail: NTIS HC A02/MF A01 CSCL 20A

NASA Langley Research Center personnel have conducted an evaluation of the helicopter aural detection program I Can Hear It Now (ICHIN version-5). This was accomplished using flight noise data of five helicopters, obtained from a joint NASA and U.S. Army acoustics measurement program. The evaluation consisted of presenting the noise data to a jury of 20 subjects and to the ICHIN-5 program. A comparative study was then made of the detection distances determined by the jury and predicted by ICHIN-5. This report presents the changes made in the ICHIN-5 program as a result of this comparative study. The changes represent current psychoacoustics and propagation knowledge. Author

N86-30472# Texas Univ., Austin. Applied Research Lab.
NONLINEAR EFFECTS IN LONG RANGE UNDERWATER ACOUSTIC PROPAGATION
Frederick D. Cotaras 1 Nov. 1985 219 p
(Contracts N00014-75-C-0867, N00014-84-K-0574; DA Proj. RR0-1108)
(AD-A166432; ARL-TR-85-32) Avail: NTIS HC A10/MF A01 CSCL 20/1

This report investigates the propagation of finite amplitude acoustic signals through an inhomogeneous ocean both analytically and numerically. In the numerical study the ocean is assumed to be stratified. The effects of inhomogeneity, ordinary attenuation and dispersion, and nonlinear geometrical acoustics are discussed. Two explosion waveforms are considered: a weak shock with an exponentially decaying tail and a more realistic waveform that includes the first bubble pulse. Numerical propagation of the simpler wave along a 58.1 km path starting at a depth of 300 m leads to the following conclusions: (1) The effect of inhomogeneity on nonlinear distortion is small. (2) Dispersion plays an important role in determining the arrival time of the pulse. (3) Neither nonlinearity nor ordinary attenuation (and dispersion) are paramount; both need to be included. For a more realistic wave, propagation is along a 23 km ray path starting from a depth of 4300 m. Two charge weights, 0.818 kg and 22.7 kg TNT, are assumed. In each case the energy spectrum of the signal obtained by considering finite amplitude effects for the entire 23 km path is compared with spectra obtained by neglecting finite amplitude effects entirely, after the first 150 m, and after the first 1100 m. Finite amplitude effects are of small consequence in the case of the 0.818 kg TNT explosion for frequencies below 6 kHz at distances beyond 1100 m. For the 22.7 kg explosion the corresponding quantities are 4 kHz and 1100 m. GRA

N86-30473# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
LORENTZ INVARIANCE AND THE ROTOR DOPPLER SHIFT EXPERIMENTS
W. A. RodriguesJunior (Universidade Estadual de Campinas (Brazil).) and J. Tiomno 1984 23 p Prepared in cooperation with Universidade Estadual de Campinas (Brazil). Inst. de Matematica.
(DE86-700614; CBPF-NF-017/84) Avail: NTIS (US Sales Only) HC A02/MF A01

It is shown that rotor doppler shift experiments provide a way to distinguish Einstein's Special Relativity (SR) from Lorentz's Aether Theory (LAT). Misconceptions in previous papers involving the Doppler shift experiments are examined. The theoretical and experimental data available on rotor Doppler shift experiments are analysed. Two models of SR violating theories are used to predict the output of a recently proposed experiment by Torr and Kolen. The first one corresponds to (strict) LAT and the other to an extended form of LAT Contrary to the first, the second theory leads to results in agreement with the preliminary experimental data of Torr et al indicating a breakdown both of SR and strict LAT. DOE

N86-30474# Foersvarets Forskingsansalt, Stockholm (Sweden).
AUDITORY HELICOPTER DETECTION AND LOCALIZATION; A LITERATURE REVIEW FOCUSING ON SEARCH FOR HELICOPTERS
Clemens Weikert Jan. 1986 19 p In SWEDISH; ENGLISH summary
(FOA-C-50033-H2; ISSN-0347-7665; ESA-86-97241) Avail: NTIS HC A02/MF A01

About 300 references on auditory localization were reviewed. Detection of low frequency sound is discussed. Literature shows that man's ability to localize sounds by auditory detection is good. Vision may also assist the auditory localization. A helicopter approaching at a great height (1500 feet) is easier to localize than a low flying one (200 feet), and a helicopter heading into the wind is significantly more difficult to localize than one having the wind astern, even when the wind speed is low. When background conditions are quiet, one may expect to detect a noisy helicopter at a distance over 13 km. ESA

N86-30475# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
EXPERIMENTAL INVESTIGATION OF RESISTIVE DAMPING ELEMENTS
J. R. Piechna and G. E. A. Meier Jul. 1985 40 p
(MPIS-19/1985; ISSN-0436-1199; ESA-86-97432) Avail: NTIS HC A03/MF A01; *Fachinformationszentrum*, Karlsruhe, West Germany DM 15

Resistive damping elements for acoustic waves in ducts were investigated. The resistive type elements have the form of splitter plates made from thin resistive material. The resistive elements are located inside circular and rectangular ducts parallel to the main stream. The aerodynamic drag of these elements is relatively

small and the damping efficiency high. Investigations of permeable splitter plates confirm numerical calculations. ESA

N86-30476# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
INFRASOUND FROM DISTANT ROCKET LAUNCHES
G. E. Greene and A. J. Bedard Feb. 1986 25 p
(PB86-182771; NOAA-TM-ERL-WPL-131) Avail: NTIS HC A02/MF A01 CSCL 20N

From 1959 through 1969 low-frequency (0.02-1.0 Hz) acoustic signals related to missile launches from Cape Canaveral were recorded by an infrasonic station in Washington, D.C. Although the characteristics of these signals are considerably more variable than those from other known sources, the acoustic signatures can resemble those from sources both natural and manmade. A general summary includes 61 missile-related signals with specific examples of their features. Author

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-30477# Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
LASER STUDIES OF HALOGENS AND OXYGEN Final Report, 1 Nov. 1984 - 31 Oct. 1985
Paul L. Houston 1 Jan. 1986 6 p
(Contract F49620-83-K-0012)
(AD-A166257; AFOSR-86-0105TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

Interconversions of energy between the metastable species of halogens, interhalogens, and oxygen are important to the determination of the mechanisms for the chemical oxygen/iodine and IF lasers and to the development of a better fundamental understanding of electronic energy transfer. Previous research by our group in this broad area has investigated the kinetics of the equilibrium $I^* + O2 = I + O2(1 Delta)$, has measured electronic-to-vibrational energy transfer from I^* to I2, and has determined the rates of deactivation of I^* by alkyl and perfluoroalkyl iodides. During the past three years our efforts have focused on better ways to detect O2 (1 Delta), on the deactivation kinetics of I^* by Cl2, and on the photodisociative generation of iodine atoms. Sensitive detection of O2 (1 Delta by multiphoton ionization is reported. The deactivation of I^* by Cl2 is found to be much slower than previously thought. The photodissociation of ICN and CH3I have been examined. The relaxation of I^* by alkyliodides and perfluoroalkyliodides is reported. GRA

N86-30478# California Univ., Santa Barbara. Quantum Inst.
MEAN TRAJECTORY GAUSSIAN WAVE PACKET APPROACH TO ROTATIONALLY INELASTIC MOLECULE-SURFACE DIFFRACTION Annual Report
Bret Jackson and Horia Metiu Feb. 1986 12 p
(Contract N00014-81-K-0598)
(AD-A166275; TR-10) Avail: NTIS HC A03/MF A01 CSCL 20/10

The rotationally inelastic diffraction of H2 from a corrugated surface is investigated using a mean trajectory model. The center of mass motion is treated using Gaussian wave packets, which propagate on a rotationally averaged potential. This trajectory in turn drives the rotational transitions. The method is non-perturbative and allows for changes in mj, the rotational orientation, and agrees well with recent close coupling calculations. A connection is also made with the recent semiclassical trajectory work of DePrito. The effects of the attractive well depth on rotational excitation and diffraction are considered. GRA

N86-30479# Wisconsin Univ., Madison. Dept. of Physics.
MOLECULAR REACTION RATES Final Report, 6 Apr. 1982 - 30 Sep. 1985
Chun C. Lin and Sunggi Chung 28 Oct. 1985 59 p
(Contract F19628-82-C-0042)
(AD-A166518; AFGL-TR-85-0262) Avail: NTIS HC A04/MF A01 CSCL 07/4

The energies and wave functions for several series of Rydberg states of the nitrogen molecule have been calculated. Based on these results a long-wave infrared emission spectrum of the nitrogen molecule is predicted. The optical cross sections for exciting a series of atomic oxygen emission lines in the long-wave infrared region by electron impact on oxygen molecules have been obtained. GRA

N86-30480# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
MEASUREMENT OF ABSOLUTE EMISSION CROSS SECTIONS FOR EXTREME ULTRAVIOLET (EUV) PHOTONS IN THERMAL COLLISIONS OF METASTABLE HELIUM (2 SUP 1 S) WITH NEON AND HELIUM Thesis [MESSUNG ABSOLUTER EMISSIONSQUERSCHNITTE FUER EUV-PHOTONEN BEI THERMISCHEN STOESSEN VON METASTABILEM HELIUM (21S) MIT NEON UND HELIUM]
Guenter Hoffmann Jun. 1985 87 p In GERMAN
(MPIS-14/1985; ISSN-0436-1199; ESA-86-96901) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19

Under single-collision conditions EUV photons emitted in the collision of metastable He with Ne and He-atoms were directly observed in an atomic beam experiment. The EUV emission was measured as a function of collision energy. The emission cross sections were calibrated in absolute units. The method uses the natural decay photons of the free metastable He. Stueckelberg oscillations are resolved in the total cross section with Ne; Close-coupling calculations were performed for the dominant excitation process in He. A comparison between theory and measurements shows three onset thresholds for several photon groups, and the collision dynamics picture is clarified. In the collision system metastable He-He the deexcitation is determined as energy-dependent EUV emission. ESA

N86-30481# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
ORIENTATION EFFECTS AND FINE STRUCTURE TRANSITIONS IN DIFFERENTIAL SCATTERING CROSS SECTIONS Thesis [ORIENTIERUNGSEFFEKTE UND FEINSTRUKTURUEBERGAENGE IN DIFFERENTIELLEN STREUQUERSCHNITTEN]
E. Hasselbrink Jun. 1985 117 p In GERMAN
(MPIS-15/1985; ISSN-0436-1199; ESA-86-96902) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

Theoretical fundamentals of the interaction between alkali and noble gas atoms are explained. The differential cross sections were determined in atomic beam experiments. The atomic beam was excited by a dye laser. A left-right polarization asymmetry was observed in the total differential cross section of the scattering of oriented K and Na-atoms in the first electronically excited state. The fine structures occurring in the asymmetry can be understood as remains of Stueckelberg oscillations. The asymmetry can be understood by the amplitude of the fine structure splitting in relation to the interaction between nuclear motion and electronic angular momentum. The fast oscillations in the total differential scattering cross section of the system K-Ne are determined and explained by a model potential calculation. Measurements of the differential cross section for fine structure transitions in the systems K-Ar, Kr, show directly Stueckelberg oscillations, confirming the asymmetry in the total cross section. ESA

N86-30482# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Kernphysik.
COULOMB DISSOCIATION AS A SOURCE OF INFORMATION ON RADIATIVE CAPTURE PROCESSES OF ASTROPHYSICAL INTEREST
G. Baur, C. A. Bertulani, and H. Rebel Jan. 1986 29 p
(KfK-4032; ISSN-0303-4003; ESA-86-97426) Avail: NTIS HC A03/MF A01

Experimental studies of the break up of light nuclear projectiles in the Coulomb field of a heavy nucleus, acting as a source of

virtual photons, as an access to information about the reverse reaction, the fusion of the fragment particles at small relative energies, are proposed. The mechanism of Coulomb dissociation is studied and the cross section of such reactions, being potentially of astrophysical interest, is estimated. The conditions of dedicated experimental investigations are discussed. ESA

N86-30483# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
THEORETICAL INVESTIGATION OF THE SCATTERING OF THE ROTATION-BENDING COUPLING, AND STUDY OF INTENSITY WEAKENING USING AN OPTICAL MODEL: CALCULATIONS FOR THE SYSTEMS H2-LIF(001) AND HD-Ag(111) Thesis [STREUTHEORETISCHE UNTERSUCHUNG DER ROTATIONS-BEUGUNGS-KOPPLUNG UND STUDIE ZUR INTENSITAET-SABSCHWAECHUNG MIT HILFE EINES OPTISCHEN MODELLS: RECHNUNGEN ZU DEN SYSTEMEN H2-LIF (001) UND HD-AG (111)]
A. Kaufhold Aug. 1985 231 p In GERMAN
(MPIS-16/1985; ISSN-0436-1199; ESA-86-97431) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 46

The rotation-bending coupling of biatomic molecules during collision on corrugated solid state surfaces was theoretically investigated. The close-coupling calculations were drastically simplified using a cloud potential with simple structure. For relatively strongly corrugated surfaces and highly anisotropic molecules the so-called diffractive rotational selective adsorption resonances were identified. A modified Hantel pair potential model allowed the systematic investigation of processes related to resonances averaged over the change in global molecule mass. For H2-LiF(001) a potential hyperplane was calculated, based on additive, in pairs, two-particle interactions. The scattering intensity weakening was studied by a generalized optical potential model. A method which allows in a relatively simple way to simulate the Debye-Waller factor within close-coupling calculations, and which takes into account effects in the optical potential due to resonance processes was developed. ESA

N86-30484# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
ELEMENTARY REACTIONS OF ELECTRONICALLY EXCITED MOLECULES 6. QUENCHING OF O2(1 DELTA G) BY AMINES, FURANES, PYRROLES, AND THIOPHENES
W. Hack, C. Voehringer, and H. Gg. Wagner Sep. 1985 62 p
(MPIS-21/1985; ISSN-0436-1199; ESA-86-97433) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

The quenching of singlet oxygen was studied in an isothermal discharge flow system with dimol emission detection. The main carrier gas was He, the total pressure varied in the range 1 to 10 p/mbar. Room temperature quenching rate constants were obtained. The observation that quenching rate constants become pressure dependent at p < or = 3 mbar can be explained by taking into account heterogeneous contributions to the total loss rate. Above p = 3 mbar the reactions are simple homogeneous bimolecular reactions, first order in both O2 and quencher. No simple correlation between physical properties of the quenchers and the rate constants of their quenching reactions is found. The best quencher for O2 in the gas phase is 2,5 dimethylpyrrole. It can be used as a titrant. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-30485*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CROSS SECTION CALCULATIONS FOR SUBTHRESHOLD PION PRODUCTION IN PERIPHERAL HEAVY-ION COLLISIONS
John W. Norbury (Old Dominion Univ., Norfolk, Va.), Francis A. Cucinotta, Philip A. Deutchman (Idaho Univ., Moscow.), and Lawrence W. Townsend Aug. 1986 27 p
(Grant NSF PHY-84-11009)
(NASA-TP-2600; L-16129; NAS 1.60:2600) Avail: NTIS HC A03/MF A01 CSCL 20H

Total cross sections angular distributions, and spectral distributions for the exclusive production of charged and neutral subthreshold pions produced in peripheral nucleus-nucleus collisions are calculated by using a particle-hole formalism. The pions result from the formation and decay of an isobar giant resonance state formed in a C-12 nucleus. From considerations of angular momentum conservation and for the sake of providing a unique experimental signature, the other nucleus, chosen for this work to be C-12 also, is assumed to be excited to one of its isovector (1+) giant resonance states. The effects of nucleon recoil by the pion emission are included, and Pauli blocking and pion absorption effects are studied by varying the isobar width. Detailed comparisons with experimental subthreshold pion data for incident energies between 35 and 86 MeV/nucleon are made. Author

N86-30486# Mission Research Corp., San Diego, Calif.
ELECTRON-ION RECOMBINATION IN AIR AT EMP FIELDS Technical Report, 16 Mar. 1984 - 16 Apr. 1985
J. G. Chervenak and V. A. J. vanLint 12 Jun. 1985 68 p
(Contract DNA001-84-C-0137; DNA Proj. X99-QMXV)
(AD-A166211; MRC/SD-R170; DNA-TR-85-202) Avail: NTIS HC A04/MF A01 CSCL 20/4

A pulsed electron beam and a parallel plate ion chamber have been used to measure the electron ion recombination coefficient, beta sub e, in dry and moist air as a function of the electric field. In moist air the value at 1000 V/cm (100,000 V/m) is in agreement with the value normally used in EMP calculations and results from the agglomeration and clustering of the air ions. An increase in beta sub e at lower fields is consistent with a recombination process in which H2O molecules act as a third body. The dry air results are a decade below the moist air values at a given field. Direct measurement of the equilibrium field, E sub s, was made and found to be consistent with the value expected from the measured recombination coefficient. The measured values of beta sub e and E sub s show that three-body recombination is not a significant electron removal process at EMP fields. GRA

N86-30487# Naval Research Lab., Washington, D. C.
THE REBATRON AS A HIGH ENERGY ACCELERATOR
D. Dialetis, S. J. Marsh, and C. A. Kapetanakos 4 Apr. 1986 85 p
(AD-A166624; NRL-MR-5655) Avail: NTIS HC A05/MF A01 CSCL 20/7

A detailed numerical and analytical study of the beam dynamics in a rebatron acceleration has shown that energies approaching 1 GeV can be achieved within 5-10 microseconds. Since the acceleration in the rebatron occurs within a short time, the device may not be sensitive to the various instabilities and the loss to synchrotron radiation should be small. The rapid acceleration is produced by convoluted parallel transmission lines, which provide a high gradient electric field. At the initial stage of the acceleration, the beam is confined inside the torus by a strong focusing torsatron magnetic field, which makes the beam insensitive to the mismatch and to the external field index of a vertical magnetic field. This local field is generated by two coaxial cylindrical plates located symmetrically around the minor axis of the torus, and carrying currents in opposite directions. The energy of the beam increases in synchronism with the vertical magnetic field so that the beam remains matched (i.e., the beam radius remains constant) during the entire acceleration. As a result of the periodic nature of the acceleration, it was found that resonances can be excited, which cause the orbits to expand. The only disruptive resonance occurs at gamma = approx. 1830, i.e., when the vertical magnetic field reaches twice the value of the toroidal magnetic field. GRA

N86-30488# Lawrence Livermore National Lab., Calif.
HIGH AVERAGE POWER INDUCTION ACCELERATORS
J. C. Swingle, ed. Oct. 1985 50 p
(Contract W-7405-eng-48)
(DE86-005288; UCID-20605) Avail: NTIS HC A03MF A01

The induction accelerator is discussed with respect to general background and concept, beam transport, scaling, pulse power technology, and the electron beam injector. A discussion of the factors which affect the scaling of the intensity of the beam is given. Limiting factors include collective forces in the beam, virtual cathode formation, surroundings, and beam breakup instability. DOE

N86-30489# Los Alamos National Lab., N. Mex.
GENERAL-PURPOSE HEAT SOURCE SAFETY VERIFICATION TEST SERIES: SVT-1 THROUGH SVT-6
D. Pavone, T. G. George, and C. E. Frantz Jun. 1985 43 p
(Contract W-7405-eng-36)
(DE85-017956; LA-10353-MS) Avail: NTIS HC A03/MF A01

The General-Purpose Heat Source (GPHS) is a modular heat source that will supply energy for Radioisotope Thermoelectric Generators (RTGs) in space missions. The Safety Verification Tests (SVTs) are performed to assess the plutonium containment capability of heat source modules subjected to certain accident environments. This interim report described the GPHS module configuration, the test environment, and the response of the module components following simulated reentry and solid Earth impact. The specific test environment of these initial six tests results from failure of the booster rocket to place the spacecraft in a proper trajectory and subsequent reentry of the GPHS modules from Earth orbit. DOE

N86-30490# Pacific Northwest Lab., Richland, Wash.
CERMET FUELS FOR SPACE POWER SYSTEMS
J. O. Barner, E. P. Coomes, R. E. Williford, and L. A. Neimark Nov. 1985 5 p Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13 Jan. 1986 Prepared in cooperation with Argonne National Lab., Ill.
(Contracts W-31-109-eng-38; DE-AC06-76RL-01830)
(DE86-005543; CONF-860102-2) Avail: NTIS HC A02/MF A01

A refractory-metal matrix, UN-fueled cermet is a very promising fuel candidate for a wide range of multi-megawatt space reactor systems, e.g., steady-state, flexible duty-cycle, or bimodal, single- or two-phase liquid-metal cooled reactors, or thermionic reactors. Cermet fuel is especially promising for reactor designs that require operational strategies which incorporate rapid power changes because of its anticipated capability to withstand thermal shock. DOE

N86-30491# Argonne National Lab., Ill.
IN SITU HIGH VOLTAGE ELECTRON MICROSCOPE STUDIES OF ION- AND ELECTRON-BEAM INDUCED MODIFICATION OF MATERIALS
P. R. Okamoto, N. Q. Lam, and A. Taylor Nov. 1985 10 p Presented at the International Symposium on Behavior or Lattice Imperfections in Materials: In Situ Experiments with HVEM, Osaka, Japan, 18 Nov. 1985
(Contract W-31-109-eng-38)
(DE86-005577; CONF-8511159-1) Avail: NTIS HC A02/MF A01

In situ high-voltage electron microscope (HVEM) studies have shown that the highly focused electron beams normally employed for irradiation purposes in the HVEM can cause easily measurable composition changes in the irradiated volume of thin alloy films (Ni-Al). The kinetics of this beam-induced composition change has been investigated and found to exhibit a strong dependence not only on temperature and peak electron flux, but also on the beam diameter. The dependence on beam diameter has far reaching implications for HVEM studies of radiation effects in alloys, and for microchemical analysis techniques. DOE

N86-30492# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Jun. 1984
T. G. George, comp. Nov. 1985 37 p
(Contract W-7405-eng-36)
(DE86-007197; LA-10557-PR) Avail: NTIS HC A03/MF A01

This technical monthly report covers studies related to the use of (238)PuO2 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Most of the studies discussed are ongoing; the results and conclusions described may change as the work continues. DOE

N86-30493# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Aug. 1984
T. G. George, comp. Nov. 1985 40 p
(Contract W-7405-eng-36)
(DE86-007206; LA-10571-PR) Avail: NTIS HC A03/MF A01

This technical monthly report covers studies related to the use of (238)PuO2 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Most of the studies discussed are ongoing; the results and conclusions described may change as the work progresses. DOE

74 OPTICS

Includes light phenomena.

N86-30494# Rochester Univ., N. Y. Inst. of Optics.
THE EFFECT OF ABERRATIONS AND APODISATION ON THE PERFORMANCE OF COHERENT IMAGING SYSTEMS Final Report, 3 Nov. 1983 - 30 Sep. 1984
J. P. Mills Feb. 1986 203 p
(Contract F29601-84-K-0014)
(AD-A165886; AFWL-TR-85-80) Avail: NTIS HC A10/MF A01 CSCL 14/5

The effect of aberrations on coherent imaging systems and the utility of apodisation in improving the performance of such systems was theoretically and experimentally investigated. The imaging performance of these systems was evaluated in terms of the images of certain simple objects--a point, two closely-spaced points, an edge, and a slit. Apodisation is defined as the deliberate modification of the amplitude transmittance of the exit pupil of the optical system. The effects on the imaging performance for various amounts of defocus, astigmatism, coma, and spherical aberration were determined for both unapodised and apodised systems. It is well known that for an aberration-free system, apodisation is effective in moderating the deleterious effects of the coherent imaging process. Since all real optical systems have aberrations, this dissertation addressed the more general case of apodisation in aberrated coherent imaging systems. It was found that apodisation was effective in improving the performance of these aberrated systems, i.e., ringing in the image of an edge or slit was greatly reduced and the mensuration error in the image of two points was almost eliminated. The performance of an unaberrated system was seen to be a special case. Experiments have been conducted which verified the theoretical model which was used to make extensive theoretical predictions. GRA

N86-30495# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA OPTICA SINICA (SELECTED ARTICLES)
Min Yi, Chunfei Li, and Qihong Wu 4 Apr. 1986 19 p Transl. into ENGLISH from Guangxue Xuebao (China), v. 5, no. 2, 1985 p 117; 157-161
(AD-A166281; FTD-ID(RS)T-1089-85) Avail: NTIS HC A02/MF A01 CSCL 20/6

An automatic photometric ellipsometer with rotating-analyzer is used in our vacuum thin film coater. This ellipsometer can measure the polarization of the depositing thin film instantly. The inhomogeneity of the refractive index can be analyzed from the path curve of the polarization parameters. Delta and Psi which

vary with the thickness of the thin film. The experimental results show that both Zinc Sulfide and Zinc Selenide have about 100 A of inhomogeneous transition layers at the inner and outer boundaries. In the central region, it has homogeneous refractive index. GRA

N86-30496# Naval Submarine Medical Research Lab., Groton, Conn.
THE EFFECT OF BACKGROUND LUMINANCE AND AMBIENT ILLUMINATION ON COLOR DISCRIMINATION IN A CRT DISPLAY Interim Report
Alan R. Jacobsen 16 Jan. 1986 20 p
(AD-A166297; NSMRL-1070) Avail: NTIS HC A02/MF A01 CSCL 20/6

The ability to discriminate among colors presented on self-luminous displays, such as CRT monitors, continues to be an important area of research. It is widely agreed that when color is used for coding purposes in visual displays, the largest increase in performance will result when the colors used are easily discriminable from one another. A matching task was used to measure the effects of ambient illumination, raster luminance, and target size on color discriminability in a CRT display. A set of ten easily distinguishable colors was presented under two conditions of ambient illumination (dark and bright) and two conditions of raster luminance (low and intermediate). Below this set, a target color was presented as either a circle of 1.4 degrees diameter or a line 1.4 degrees high and 7 minutes wide. Observers were required to match this target with the appropriate color presented in the display above. Under the dark ambient illumination, the intermediate raster yielded faster response times and lower error rates than the low raster. Under the bright ambient, significantly more errors were made with the intermediate than low raster luminance. Color discriminability appears best under conditions where the background luminance is intermediate. Consequently, under dark ambient conditions, raster luminance should be set at an intermediate level but decreased as the ambient light decreases. GRA

N86-30497# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
DIRECTED SYNTHESIS/FABRICATION AND SURFACE MODIFICATION OF IR WINDOW MATERIALS FOR THE 8-14 MICRON REGION Annual Report, 1 Mar. 1985 - 28 Feb. 1986
Alan Harker and Peter Morgan Apr. 1986 11 p
(Contract N00014-85-C-0140)
(AD-A166661; SC5422.AR; AR-1) Avail: NTIS HC A02/MF A01 CSCL 20/6

Nearly monosize particles of pure NaLaS2 have been made by a sulfide fused salt technique. Such particles promise easier compaction and HIPing to highly dense IR window material. The increased fracture toughness of glass substrates due to the addition of a thin compressive overlayer has been measured. The fracture toughness appears to increase linearly with the total film stress and is independent of the film thickness necessary to provide that stress. GRA

N86-30498# Universal Energy Systems, Inc., Dayton, Ohio.
CRITERIA FOR SELECTION OF GRADED INDEX FILTER MATERIALS BASED ON AN ANALYSIS OF WAVE PROPAGATION IN A PERIODIC MEDIUM Final Report, 10 Aug. 1984 - 28 Feb. 1985
Roger J. Becker Jan. 1986 142 p
(Contract F33615-82-C-5001)
(AD-A166809; AFWAL-TR-85-4129) Avail: NTIS HC A07/MF A01 CSCL 20/6

This report includes a survey of the factors affecting the performance of a filter. Although specifically directed at optical filters, most of the discussion is quite general, applying to the propagation of any wave in a medium with a spatially modulated response or susceptance. The intent of this work is to examine the factors affecting filter performance with a view toward perfecting filter design, to gain a deeper understanding of the relationship between rugate index profile parameters and the consequent optical properties, and to guide rugate deposition experiments. A wide range of systems which are usually treated as unique share important features with optical filters. Examples are acoustic filters, electronic energy bands in solid, lattice dynamics, transmission line theory, and waveguide theory. This report begins to lay the groundwork for development of an optimum transfer function and to determine the appropriate values for the filter parameters. GRA

N86-30499# Department of the Air Force, Washington, D.C.
FIBER OPTIC ROTARY SWITCHING DEVICE Patent Application
Stanley D. Battle, inventor (to Air Force) Filed 15 Jan. 1986 14 p
(AD-D012231; US-Patent-Appl-SN-818922) Avail: NTIS HC A02/MF A01 CSCL 20/6

A fiber optic rotary switching device having a single optical fiber rotatable between a plurality of optical fibers is described. The arrangement for rotating the single optical fiber is designed such that the single optical fiber flexes but does not twist with respect to an end thereof which is fixed to a light source (or, in the alternative to a light detector). As a result, the switching device switches light passing through the single optical fiber to a preselected one of the plurality of optical fibers while simultaneously preventing extraneous light from reaching the other optical fibers. GRA

N86-30500# Oak Ridge National Lab., Tenn.
SCATTERING AND ABSORPTION OF LIGHT DUE TO SURFACE RESONANCES ON SUBMICRON OBLATE SPHEROIDAL PARTICULATES
S. W. Kennerly, R. J. Warmack, and T. L. Ferrell Jan. 1986 90 p
(Contract DE-AC05-84OR-21400)
(DE86-005261; ORNL/TM-9407) Avail: NTIS HC A05/MF A01

The experimental part of this report consists of measuring the optical absorbance of a collection of silver oblate spheroidal particulates as a function of wavelength, polarization, and angle of incidence. The method of producing such a collection is described along with measuring a few of the important characteristics like particle size, separation, and density. The experimental data are then compared with theoretical absorbances calculated using scattering and absorption cross sections. The cross sections are derived using a dipole approximation. DOE

N86-30501# KMS Fusion, Inc., Ann Arbor, Mich.
STIMULATED RAMAN SCATTERING: COMPARISON OF THEORY AND EXPERIMENT
R. L. Berger, G. E. Busch, E. F. Gabl, R. J. Schroeder, C. L. Shepard, and J. A. Tarvin 1985 12 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif. 28 Oct. 1985
(Contract DE-AC08-82DP-40152)
(DE86-006480; KMSF-U-1671; CONF-851053-10) Avail: NTIS HC A02/MF A01

Experiments at KMSF and elsewhere have observed stimulated Raman scattered light whose energy is correlated with the energy in hot electrons as expected, on the basis of energy conservation in the three wave process (Manley Rowe relations). The instability is observed under conditions that are below the theoretical threshold for the convectively unstable interaction, and above that for the absolutly unstable interaction. However, the spectral characteristics are those of the convective modes. The laser intensity threshold is measured to be independent of the plasma density scale length, rather than inversely dependent on the scale length as theoretically predicted if the threshold is defined by the observation of SRS light. However, the amount of SRS light increases exponentially with laser intensity as expected for a convective instability. The SRS light is typically concentrated in rather short wavelengths where the associated Langmuir wave should be strongly damped. These spectral characteristics are not explained by the wavelength variation of the gain or the bremsstrahlung light wave source. Calculations were given to show that

the Langmuir wave source has the right properties to reproduce the observed spectra. DOE

N86-30502# Lawrence Livermore National Lab., Calif.
VERSATILE LASER GLASS INSPECTION AND DAMAGE TESTING FACILITY
J. E. Marion, G. J. Greiner, J. H. Campbell, P. H. Chaffee, J. S. Hildum, J. Z. Grens, C. L. Weinzapfel, S. M. Winfree, and D. Milam 17 Jan. 1986 11 p Presented at the Boulder Damage Symposium, Boulder, Colo. 5 Oct. 1985
(Contract W-7405-eng-48)
(DE86-006306; UCRL-93251; CONF-8510101-4) Avail: NTIS HC A02/MF A01

A test facility is described which detects small opaque inclusions in large transparent components by using a commercial laser which delivers high energy pulses to the test sample at moderate frequency in a small diameter beam. The sample is automatically scanned such that each point in the volume is irradiated with ten pulses at twice the inclusion damage threshold - an amount sufficient to cause visible damage at inclusion sites. This approach permits detection of opaque inclusions in the parts per trillion and lower concentration range. The specifics of the device design and its performance are discussed in the context of automatic inclusion inspection and mapping in large laser optics. DOE

N86-30503# Lawrence Livermore National Lab., Calif.
VARIED LINE-SPACE GRATINGS: PAST, PRESENT AND FUTURE
M. C. Hettrick Aug. 1985 16 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif., 18 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-007498; LBL-20115; CONF-850887-44) Avail: NTIS HC A02/MF A01

A classically ruled diffraction grating consists of grooves which are equidistant, straight and parallel. Conversely, the so-called holographic grating (formed by the interfering waves of coherent visible light), although severely constrained by the recording wavelength and recording geometry, has grooves which are typically neither equidistant, straight nor parallel. In contrast, a varied line-space (VLS) grating, in common nomenclature, is a design in which the groove positions are relatively unconstrained yet possess sufficient symmetry to permit mechanical ruling. Such seemingly exotic gratings are no longer only a theoretical curiosity, but have been ruled and used in a wide variety of applications. These include: (1) aberration-corrected normal incidence concave gratings for Seya-Namioka monochromators and optical demultiplexers, (2) flat-field grazing incidence concave gratings for plasma diagnostics, (3) aberration-corrected grazing incidence plane gratings for space-borne spectrometers, (4) focusing grazing incidence plane grating for synchrotron radiation monochromators, and (5) wavefront generators for visible interferometry of optical surfaces (particularly aspheres). Future prospects of VLS gratings as dispersing elements, wavefront correctors and beam-splitters appear promising. The author discusses the history of VLS gratings, their present applications, and their potential in the future. DOE

N86-30504# Krupp Atlas-Elektronik, Bremen (West Germany).
NEW ACOUSTO-OPTICAL BEAM FORMER Final Report, Dec. 1983
Dirk Rathjen Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 67 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-154; ISSN-0340-7608; ESA-86-97440) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

A laboratory model of an optically incoherent processor which can be used for beam forming on linear antenna arrays is described. The individual electronic sensor signals are converted into light. The beam forming is achieved by spatial filtering of the overall light distribution in an acousto-optical modulator. For narrow-band signals, the array beam pattern is controlled by varying the spatial frequency of the sinusoidal filter function. The theoretical fundamentals of the processor, and measurement results with synthetic and real underwater sound signals are presented. The signals of an eight-sensor array can be processed. A dynamic range of 35 dB is achieved without particularly high technical complexity. Although the laboratory model is a large, heavy structure which is not suitable for practical use, the concept, when applied to other technologies, opens up possibilities for the development of small, light-weight modules for large arrays. ESA

N86-30505# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
FIBER OPTICAL DATA LINK EXTENSION FOR THE IEC-625 INTERFACE BUS
Gerd-Jan Dijkers Dec. 1984 81 p
(ESA-86-97532) Avail: NTIS HC A05/MF A01

A fiber optics device capable of extending the limited length of 20 m of a normal IEC-bus to 5 km was designed. Maximum throughput rate of 1 Mbyte/sec is feasible, with slower throughput rates in the command mode, which is acceptable when the number of bytes in the command mode is much smaller. Software changes in the controller are necessary when it is desirable to empty the FIFO-memory of the device. When these software changes are not made, it is possible that data bytes, stored in the FIFO-memory during the data mode, can not get out of this memory and are lost. No parallel poll possibilities exist for the extended devices. ESA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-30506# Cornell Univ., Ithaca, N.Y. School of Electrical Engineering and Appl. Physics.
ONE-COMPONENT PLASMA MODEL AND LARGE Z LABORATORY PLASMAS Interim Report, Aug. - Dec. 1985
Richard L. Liboff and G. L. Ferrentino (Army Armament Research and Development Command, Dover, N. J.) Apr. 1986 16 p Sponsored in part by Battelle Columbus Labs., Ohio
(Contract DAAG29-81-D-0100)
(AD-A166606; ARFSD-CR-86005) Avail: NTIS HC A02/MF A01 CSCL 20/9

Stemming from an expression for the mean two-particle potential energy of a two-component laboratory plasma comprised of ions of charge Ze and electrons, it is argued that for sufficiently large Z, thermodynamic properties of such plasmas are the same as those relevant to Wigner's one-component plasma model, Thus, an equation of state is obtained for a strongly coupled laboratory plasma with Z greater than or approximately 5. GRA

N86-30507# California Univ., Berkeley. Lawrence Berkeley Lab.
DESIGN AND FABRICATION OF AN ACTIVELY COOLED LANGMUIR PROBE FOR LONG PULSE APPLICATIONS
J. A. Paterson, L. A. Biagi, K. W. Ehlers, and G. W. Koehler Nov. 1985 4 p Presented at the 11th Symposium on Engineering Problems in Fusion Research, Austin, Tex., 18 Nov., 1985
(Contract DE-AC03-76SF-00098)
(DE86-005231; LBL-19531; CONF-851102-77) Avail: NTIS HC A02/MF A01

The details of the mechanical design and fabrication for a Langmuir Probe for the continuous monitoring of plasma density are given. The probe was designed for use as a diagnostic tool in the development of long pulse positive ion plasma sources for use on neutral beam systems. The essential design feature of this probe is the incorporation of two electrically isolated cooling water circuits which actively cool the probe tip and probe jacket.

The electrical isolation is required to prevent drain currents from the probe body disturbing the measurement of the probe tip current and thereby the plasma density measurement. The successful realization of the design requires precision components and vacuum tight ceramic to refractory metal brazes. To date this design has successfully operated in steady-state in plasma densities up to 250 mA/cm² and surface heat fluxes of 25 W/cm². DOE

N86-30508# Princeton Univ., N. J. Plasma Physics Lab.
MEASUREMENT OF POPULATION INVERSIONS AND GAIN IN CARBON FIBER PLASMAS
H. Milchberg, C. H. Skinner, S. Suckewer, and D. Voorhees Oct. 1985 16 p
(Contract DE-AC02-76CH-03073)
(DE86-002532; PPPL-2274) Avail: NTIS HC A02/MF A01

A CO2 laser (approx. 0.5 kJ energy, 70 nsec pulse width) was focussed onto the end of an axially oriented, thick (35-350 microns)carbon fiber with or without a magnetic field present along the laser-fiber axis. Evidence is presented for axial-to-transverse enhancement of the CVI 182A (n = 3 + 2) transition, which is correlated with the appearance of a population inversion between levels n = 3 and 2. For the B = O kG, zero field case, the maximum gain-length product of kl approx. equal to 3 (k approx. equal to 6/cm) was measured for a carbon fiber coated with a thin layer of aluminum (for additional radiation cooling). The results are interpreted in terms of fast recombination due mostly to thermal conduction from the plasma to the cold fiber core. Author

N86-30509# Princeton Univ., N. J. Plasma Physics Lab.
GENERALIZED BANANA-DRIFT TRANSPORT
H. E. Mynick Oct. 1985 50 p
(Contract DE-AC02-76CH-03073)
(DE86-002535; PPPL-2271) Avail: NTIS HC A03/MF A01

The theory of tokamak ripple transport in the banana-drift and ripple-plateau is extended in a number of directions. The theory is valid for small values of the toroidal periodicity number n of the perturbation, as well as for the moderate values (n approx. 10 - 20) previously assumed. It is shown that low-n perturbations can produce much greater transport than the larger-n perturbations usually studied. In addition, the ripple perturbation is allowed arbitrary values of poloidal mode number m and frequency omega, making it applicable to the transport induced by MHD modes. Bounce averaging is avoided, so the theory includes the contributions to transport from all harmonics of the bounce frequency, providing a continuous description of the transition from the banana drift to the ripple-plateau regime. The implications of the theory for toroidal rotation in tokamaks are considered. Author

N86-30510# Princeton Univ., N. J. Plasma Physics Lab.
RESISTIVE INSTABILITIES IN TOKAMAKS
P. H. Rutherford Oct. 1985 35 p
(Contract DE-AC02-76CH-03073)
(DE86-002538; PPPL-2277) Avail: NTIS HC A03/MF A01

Low-m tearing modes constitute the dominant instability problem in present-day tokamaks. The stability criteria for representative current profiles with q(0)-values slightly less than unity are reviewed; 'sawtooth' reconnection to q(0)-values just at, or slightly exceeding, unity is generally destabilizing to the m = 2, n = 1 and m = 3, n = 2 modes, and severely limits the range of stable profile shapes. Feedback stabilization of m less than or equal to 2 modes by rf heating or current drive, applied locally at the magnetic islands, appears feasible; feedback by island current drive is much more efficient, in terms of the radio-frequency power required, than feedback by island heating. Feedback stabilization of the m = 1 mode -- although yielding particularly beneficial effects for resistive-tearing and high-beta stability by allowing q(0)-values substantially below unity -- is more problematical, unless the m = 1 ideal-MHD mode can be made positively stable by strong triangular shaping of the central flux surfaces. Feedback techniques require a detectable, rotating MHD-like signal; the slowing of mode rotation -- or the excitation of non-rotating modes -- by an imperfectly conducting wall is also discussed. Author

N86-30511# California Univ., Los Angeles. Dept. of Fusion Engineering.
TECHNICAL ISSUES AND REQUIREMENTS OF EXPERIMENTS AND FACILITIES FOR FUSION NUCLEAR TECHNOLOGY, FINESSE PHASE 1, VOLUME 2
Dec. 1985 654 p
(Contract DE-AS03-84ER-52105)
(DE86-006503; PPG-909-Vol-2; UCLA-ENG-85-39-Vol-2) Avail: NTIS HC A99/MF A01

Liquid metal blankets are discussed with respect to the critical issues, existing facilities, basic measurements, modeling techniques, material interactions, insulators, electromagnets, and tritium recovery. These topics are also discussed with regard to solid breeder blankets. In addition, tritium processing, vacuum systems, and plasma interactive components are discussed. Existing fusion facilities are described, and blanket development planning is discussed. DOE

N86-30512# Texas Univ., Austin. Institute for Fusion Studies.
TWO DIMENSIONAL ANALYTICAL CONSIDERATIONS OF LARGE MAGNETIC AND ELECTRIC FIELDS IN LASER PRODUCED PLASMAS
S. Eliezer and A. Loeb (Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.) Aug. 1985 25 p
(DE86-00235; DOE/ET-53088/200) Avail: NTIS HC A02/MF A01

A simple model in two dimensions is developed and solved analytically taking into account the electric and magnetic fields in laser produced plasmas. The electric potential in this model is described by the nonlinear differential equation d-squared psi/dx-squared + psi(d psi/dx)/(1 - psi) = 0, psi = (e phi)/T, where (e phi) is the electric potential energy and T is the temperature in energy units. The physical branch psi < 1, defined by the electron density n = n(0) exp psi boundary conditions n(x = 0) = const and n(x = (+)infinity) = 0, introduces a typical electrostatic double layer. The stationary solution of this model is consistent for -0.1 approx. < psi < 1, with electron temperature in the KeV region and a ratio of the electric (E) to magnetic (B) fields of [E/10(6) v/cm]/[B/MGauss] being approximately 1. M.G.

N86-30513# Paris-Sud Univ., Orsay (France). Lab. de Physique des Gaz et des Plasmas.
RADIAL DISTRIBUTION OF EXCITED ATOMS IN A PLASMA COLUMN PRODUCED BY A SURFACE WAVE [DISTRIBUTION RADIALE DES ATOMES EXCITES DANS UNE COLONNE DE PLASMA PRODUITE PAR UNE ONDE DE SURFACE]
C. M. Barbeau, H. Hubert, M. Moisan, and A. Ricard Jan. 1986 52 p In FRENCH
(LP-214; ESA-86-97187) Avail: NTIS HC A04/MF A01

The radial distribution of excited states of He, Ne and Ar were studied either individually or in mixtures with one another and with O2. The plasma columns are produced by a high frequency wave (300 to 1000 MHz) propagating along the tube surface and penetrating radially. The flat profiles obtained are related to the propagation of the radial electric field which follows a modified Bessel function, where its parameter is a function of the electron density. The spectrum lines of metastable states present positive curvature profiles, while those of the fundamental states are more often of negative curvature. In the condition of high power absorption obtained by multiple reflexions the concentration of metastable states is very high and the radial distribution profile is flat. ESA

N86-30514# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.
STUDY OF SURFACES AND SURFACE LAYERS ON HIGH TEMPERATURE MATERIALS AFTER SHORT-TIME THERMAL LOADS
H. Bolt, H. Hoven, K. Koizlik, J. Linke, H. Nickel, and E. Wallura Nov. 1985 77 p
(JUEL-2024; ISSN-0366-0885; ESA-86-97422) Avail: NTIS HC A05/MF A01

Erosion and redeposition processes of first wall materials during

tokamak operation are discussed. An important redepareition process of eroded material is the formation of thin films by atomic condensation. Examinations of first wall components after operation suggest that these thin metallic films tend to agglomerate to small particles under subsequent heat load. Laboratory experiments show that thin metallic films on various substrates can agglomerate under short time high heat fluxes and also under longer lasting lower thermal loads, thus verifying the agglomeration hypothesis. ESA

N86-30515# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Plasmaphysik.
ENHANCED SMALL SCALE TURBULENCE OSCILLATIONS CORRELATED TO SAWTOOTH RELAXATIONS IN THE TEXTOR TOKAMAK
A. Rogister, G. Hasselberg, A. Kaleck, A. Boileau, H. W. H. VanAndel, and M. vonHellermann Nov. 1985 34 p
(JUEL-2025; ISSN-0366-0885; ESA-86-97423) Avail: NTIS HC A03/MF A01

A periodic enhancement of the microturbulence level by sawtooth relaxations was detected by CO2 laser forward scattering in the TEXTOR tokamak. This feature is reproduced quantitatively by a heat transport code in which the anomalous electron transport coefficient is calculated self consistently following a theoretical model of the saturation of the dissipative trapped electron instability. The code also predicts a strong modulation of the heat flux throughout the whole plasma and a strong profile consistency as continuous temperature measurements demonstrate. Calculated global plasma parameters, such as the energy confinement time and the loop voltage, are in good agreement with the measured values. ESA

N86-30516# Technische Hogeschool, Eindhoven (Netherlands). Onderwerpgroep Atoom- en Plasmafysica.
AN INVESTIGATION OF DISCHARGE STRUCTURES IN THE SUBMILLIMETER BAND IN AN MHD GENERATOR [EEN ONDERZOEK NAAR ONTLADINGSSTRUCTUREN IN HET SUB-MILLIMETERGEBIED IN EEN MHD GENERATOR]
H. J. W. Schenkelaars Aug. 1984 96 p In DUTCH
(VDF-NT-84-16; ESA-86-97549) Avail: NTIS HC A05/MF A01

The characteristic length scale of the discharge structure occurring in an MHD generator was determined using collective scatterings of CO2 laser light and heterodyne detection techniques. Mixing of scattered and nonscattered radiation was used to get a spatial resolution in the submillimeter range and to increase the signal to noise ratio. A discharge model to interpret the measured signals was formulated. The length scale of the electron density fluctuations of (2.5 + or - 0.5) x 0.0001 m is found. The smallest diameter of the substructure is explained by elaborating particle and energy balance equations. A characteristic discharge diameter of (2 to 4) x 0.0001 m for electron temperatures between 2500 and 4000 K and a 3000 V/m electric field is found by balancing Joule dissipation and electron heat conductivity terms. For temperatures falling outside the temperature field, terms lost become of increasing importance, probably due to radiation processes and dissociative recombination. ESA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-30517*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
A SUPERCONDUCTING TUNNEL JUNCTION RECEIVER FOR MILLIMETER-WAVE ASTRONOMY
Shing-Kuo Pan and Anthony R. Kerr Jul. 1986 243 p
(NASA-TM-87792; NAS 1.15:87792) Avail: NTIS HC A11/MF A01 CSCL 20L

The development and construction of an ultralow noise heterodyne receiver for millimeter wave astronomy is described along with its use for 115.3 GHz Co line observations. The receiver uses a Superconductor-Insulator-Superconductor (SIS) quasiparticle tunnel junction mixer to convert the millimeter wave signal to a microwave intermediate frequency. Experiments aimed at quantitative verification of J. R. Tucker's quantum mixer theory are studied, to see whether it could be used as the basis for the design of a practical receiver. The experimental results were in excellent agreement with the theory, assuming the three frequency approximation. Infinite available gain and negative output resistance were observed for the first time, nonclassical effects which are not seen in conventional diode mixers. Using Tucker's theory, an SIS receiver was then designed and constructed. At 115 GHz, the single sideband receiver noise temperature is 83K, the lowest ever reported in this frequency range. A CO survey toward Cygnus-X region, using this SIS receiver on the Columbia-GISS 4 ft. telescope, is also described. Author

N86-30518*# National Aeronautics and Space Administration, Washington, D.C.
PREPARATION AND OPTICAL PROPERTIES OF GA(X)IN(1-X)P ALLOYS
H. Rodot, J. Horak, G. Rouy, and J. Bourneix May 1986 9 p
Transl. into ENGLISH from Comptes Rendus, Serie B, Sciences Physiques (Paris, France), v. 269, no. 9, 1 Sep. 1969 p 381-384
Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-88431; NAS 1.15:88431) Avail: NTIS HC A02/MF A01 CSCL 20L

The solution crystallization method was used to obtain Ga(z)in (1-x)P alloys for all values of x desired between zero and 1. The method of preparation makes it possible to crystallize the solid at a constant temperature. The points obtained by cathodoluminescence are nearly in straight lines. The optical absorption thresholds are confirmed in the results and make it possible to define the nature of the transitions except when x is in the neighborhood of 0.65. These determinations agree with those of Hilsum and Porteus (1968), but are not in agreement with those obtained by Lorenz et al, (1968). Author

N86-30519# Colorado Research Development Corp., Fort Collins.
SEMICONDUCTING TRANSITION METAL SILICIDES FOR ELECTRO-OPTIC VSLI INTERCONNECTS Interim Report
John E. Mahan 15 Jan. 1986 6 p
(Contract N00014-85-C-0874)
(AD-A165895; IR-3) Avail: NTIS HC A02/MF A01 CSCL 20/12

We have optically characterized the CrSi2 samples, and fabricated thin films of MnSi(1.7) and IrSi(1.75). X-ray analysis of the latter two silicides has also been accomplished. These developments are summarized. A forbidden energy gap of approx. 0.3eV is obtained from the onset of strong absorption at that energy. The interference fringes correspond to a refractive index-film thickness product of approx. 10 microns; the estimated film thickness of 2.4 microns gives a refractive index of approximately 4.2 below the absorption edge. Thin films of this material were formed by ion beam sputtering and furnace reaction techniques as described for CrSi2 in our first progress report. X-ray diffraction analysis of the films confirms the presence of the semiconducting manganese silicide, with no other detectable phase except the silicon substrate. A representative X-ray diffraction pattern for a film formed at 750C is shown. Again, the data indicate the well-crystallized semiconducting silicide phase and no other except for the silicon substrate. GRA

N86-30520# Columbia Univ., New York.
INSTRUMENTATION FOR SURFACE STUDIES FOR NOVEL ELECTRONICS PROCESSING Final Report, 15 Dec. 1984 - 14 Dec. 1985
R. M. Osgood Dec. 1985 11 p
(Grant AF-AFOSR-0046-85)
(AD-A166093; AFOSR-86-0051TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

The instrumentation purchased on this contract is to be used in the study of solid-surface phenomena and the relation of these

phenomena to developing new processing or fabrication techniques for micro-electronics. Development of new processing techniques including laser direct writing, photon-assisted dry processing, the formation of metal silicides, and ion etching are currently major research efforts in the Columbia Microelectronics Sciences Laboratories. The work is supported by research contracts with AFOSR, DARPA, JSEP, and Rome Air Development Center. GRA

N86-30521# United Technologies Research Center, East Hartford, Conn.
THEORETICAL STUDY OF THE RADIATIVE AND KINETIC PROPERTIES OF SELECTED METAL OXIDES AND AIR MOLECULES Final Technical Report, 15 Jan. 1983 - 5 Feb. 1985
H. H. Michels and R. H. Hobbs 1 May 1985 89 p
(Contract DNA001-83-C-0044; DNA Proj. S99-QMXB)
(AD-A166113; UTRC-926388; DNA-TR-85-156) Avail: NTIS HC A05/MF A01 CSCL 07/4

A theoretical research program directed toward the study of the energetics and LWIR radiative properties of selected uranium/oxygen band systems has been undertaken. Included in this research program was the investigation of the strongest electronic and vibrational bands in the LWIR region for the species UO, UO(+), UO2, UO(++). The program for accomplishing this research effort was formulated into three separate tasks: a) adaption of our electronic structure codes to the DNA CYBER 176 System, b) calculation of pertinent electronic wavefunctions and energies, as a function of internuclear separation within a relativistic framework, for selected species of the uranium/oxygen system which may be important in the LWIR region, and c) calculation of electronic transition moments and transition probabilities between specific vibrational levels of the electronic states corresponding to the strongest radiating band systems belonging to the uranium/oxygen system and prediction of IR and possible optical oscillator strengths. Our calculations indicated that the species UO(+) will be efficiently solar pumped and will exhibit strong absorption/radiation. Further, we predict efficient conversion of solar photons to IR photons for this species. GRA

N86-30522# Westinghouse Research and Development Center, Pittsburgh, Pa.
SUPERCONDUCTING ELECTRONIC FILM STRUCTURES Semi-annual Report, 1 Jan. - 30 Jun. 1985
A. I. Braginski and J. R. Gavaler 5 Aug. 1985 20 p
(Contract F49620-85-C-0043)
(AD-A166183; Rept-85-9C9-SUPER-R2; AFOSR-86-0097TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

Data from Nb/Sn and Nb/Al diffusion couple experiments provided supporting evidence for a proposed hypothesis that superconducting A15 compounds are formed via an oxygen catalyzed reaction. Both epitaxy, and the addition of an impurity (carbon) were successful in increasing the critical temperatures of NbN deposited at low temperature. Critical temperatures of over 16K were obtained in epitaxially grown NbN films sputtered on substrates held at less than 100 C. RHEED (reflection high energy electron diffraction) and X-ray rocking curve data show that the new UHV deposition and analytical facility has the capability for epitaxially growing high quality single crystals of the technologically important A15 and B1 superconductors. Low-leakage all-NbN tunnel junctions have been developed with ion-beam oxidized Al and Mg barriers, or rf-sputtered MgO barriers. The first Nb-Sn based junctions with refractory counterelectrodes were fabricated. XPS, RHEED, and tunneling have been used to characterize: (1)the structure of epitaxial films, (2)the role of ion-beam oxidation in the preparation of tunnel barriers that can be used with refractory counter electrodes, and (3)anisotropic surface oxide growth on single crystal films. Nb single crystal films were prepared which have three times lower rf surface losses compared to polycrystalline Nb. Author (GRA)

N86-30523# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMPARATIVE STUDIES OF ELECTRON AFFINITIES AND WORK FUNCTIONS FOR GaAs AMD Si
Yirong Xing 14 Mar. 1986 20 p Transl. into ENGLISH from Bandaoti Xuebao (China), v. 6, no. 4, Jul. 1985 p 362-368
(AD-A166225; FTD-ID(RS)T-1181-85) Avail: NTIS HC A02/MF A01 CSCL 07/4

Ultra-violet Photoemission Spectra (UPS) involving core level photoemission peaks (Ga 3d for GaAs and Si 2p for Si) is measured for the (111), (110), (111), and (001) surfaces of GaAs and Si using the light from a Helium lamp (21.2 eV and 40.8 eV) and from the Berlin synchrotron radiation source BESSY (108.6 eV), respectively. These surfaces are prepared by ion bombardment and annealing on cylindrically shaped GaAS and Si crystals with 110 as their axis. The GaAs cylinder is in addition prepared by molecular beam epitaxy yielding As-rich phases on (111) and (001). The work function Phi and the electron affinity x are evaluated from the low energy (secondary electron) threshold and the energy position of the core level photoemission peak. It is shown that due to the crystal polarity and differences in surface composition, the electron affinity depends strongly on the orientation for GaAs. For Si, the missing bulk polarity is responsible for the small variations of X, which may be caused by the different surface reconstructions. On GaAs, the Variation of Phi and X are essentially parallel indicating no strong band bending variations. On Si, however, the relatively strong variations of Phi indicate strong variations of the band bending. GRA

N86-30524# Cornell Univ., Ithaca, N.Y.
EXPERIMENTAL STUDY OF ELECTRONIC STATES AT METAL-DIELECTRIC INTERFACES Interim Technical Report, 2 Feb. 1981 - 1 Feb. 198
A. J. Sievers 23 Dec. 1985 21 p
(Grant AF-AFOSR-0121-81)
(AD-A166242; AFOSR-86-0077TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

By means of new infrared techniques we are exploring both the time and frequency domain spectra of electronic interface states. These data can be used to obtain information specific to interfaces such as mobility and diffusion, lifetimes, energy levels and the density of states. We shall continue the development of new infrared techniques which are ideally matched to the interface problem and then use these techniques to measure and characterize the physical properties of electronic states at metal-dielectric interfaces. Since these techniques rely on evanescent electromagnetic waves a closely related objective is to explore the near field electrodynamics of structures which produce evanescent fields. Metal semiconductor interfaces can be studied with broadband SEW spectroscopy using incoherent thermal radiation for a source and the surface photoconductivity for a detector. With coherent sources power dependent absorption measurements and also light scattering from surface electrokinetic phenomena become feasible. These instruments will not only be used to probe the excitation spectra of metal-semiconductor interface states but also to explore the magnetic field dependence of the energy levels in n-type InSbNiSb eutectic. GRA

N86-30525# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
SUPERCONDUCTIVITY OF THIN FILM INTERMETALLIC COMPOUNDS Annual Report, 1 Sep. 1984 - 31 Aug. 1985
Allen M. Goldman 15 Sep. 1985 53 p
(Grant AF-AFOSR-0347-84)
(AD-A166271; AFOSR-86-0155TR) Avail: NTIS HC A04/MF A01 CSCL 20/3

The macroscopic as well as microscopic properties of selected thin film superconducting compounds are being investigated. The materials being studied are either members of technologically significant systems or involve possible unique mechanisms for superconductivity whose realization should extend the range of critical parameters to either higher temperatures of higher critical fields. Materials under study are the superconducting Cheverel phase compounds, selected Heavy Fermion compounds and a low carrier density superconductor, T1 doped PbTe. The latter is being investigated with an idea to understanding the superconduc-

ting field effect. Processing of the Chevrel Phase compounds is carried out in a multi-source deposition system. The latter has been upgraded and improved during the grant period. The electrical and magnetic properties of the reentrant superconductor HoMo6S8 have been investigated in some detail with the magnetic and superconducting character of the low-temperature phase found to be dependent on the degree of disorder in the film. Single crystal films of the Heavy Fermion compound UPt3 have been prepared. Although these films are highly ordered they have not been found to be superconducting, perhaps because they are off stoichiometry by as little as one percent. GRA

N86-30526# California Univ., Santa Barbara. Quantum Inst.
ON THE INTERPLAY BETWEEN CHEMICAL REACTIONS AND PHASE TRANSITIONS FOR MOLECULES ADSORBED ON SOLID SURFACES Annual Report
Mark Stiles and Horia Metiu Feb. 1986 28 p
(Contract N00014-81-K-0598)
(AD-A166273; TR-15) Avail: NTIS HC A03/MF A01 CSCL 07/4

There is a large body of experimental evidence suggesting that the rate of product formation in a reaction between adsorbed molecules is deeply modified when one of the reagents undergoes a phase transition or, more broadly speaking, an aggregation of some kind. Specific examples are: H2 and CO oxidation; methanol transformation into a methoxy radical on O/Cu; the water reaction with oxygen to form 2OH; the decomposition of N2O on Pt(111) which is affected by a phase transition in the outermost Pt layer; and the oxidation of Ni7. It is suspected that similar effects might operate on supported metal catalysts. We use Monte Carlo simulations to examine the manner in which reagent aggregation affects the reaction rate between molecules adsorbed on a solid surface. We discuss the temperature and concentration dependence of the rate of product formation. GRA

N86-30527# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
EXPERIMENTAL STUDY OF ELECTRONIC STATES AT METAL-DIELECTRIC INTERFACES Final Report, 2 Feb. 1981 - 31 May 1985
A. J. Sievers 23 Dec. 1985 51 p
(Grant AF-AFOSR-0121-81)
(AD-A166274; AFOSR-86-0080TR) Avail: NTIS HC A04/MF A01 CSCL 07/4

Novel high resolutions electromagnetic wave techniques have been used in the optical, infrared and far infrared spectral regions to explore the electronic states at metal dielectric interfaces. Because infrared surface plasmons on metal surfaces propagate for many wavelengths, a measurement of the transmission of these surface excitations has proven to be a sensitive probe of the surface itself. Both broadband and single frequency generation techniques have been developed. Reconstructed surfaces as well as surfaces covered with a chemisorbed atomic monolayer or a thin dielectric or molecular film have been investigated with these new methods. GRA

N86-30528# Cornell Univ., Ithaca, N.Y.
EXPERIMENTAL STUDY OF ELECTRONIC STATES AT METAL-DIELECTRIC INTERFACES Interim Technical Report, 2 Feb. 1982 - 1 Feb. 198
A. J. Sievers 23 Dec. 1985 9 p
(Grant AF-AFOSR-0121-81)
(AD-A166290; AFOSR-86-0076TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Because infrared surface plasmons on metal surfaces propagate for many wavelengths, a measurement of the transport of these excitations can be used to monitor the surface itself, using the metal edge with a broadband continuous source. Measurements of the transmission of IR surface plasmons across metal surfaces covered with a chemisorbed atomic monolayer or with thin dielectric or molecular films have been carried out and, compared with those obtained by reflection spectroscopy. GRA

N86-30529# California Univ., Santa Barbara. Quantum Inst.
A MULTIPLE GAUSSIAN WAVE PACKET THEORY OF H2 DIFFRACTION AND ROTATIONAL EXCITATION BY COLLISION WITH SOLID SURFACES Annual Report
Bret Jackson and Horia Metiu Feb. 1986 43 p
(Contract N00014-81-K-0598)
(AD-A166291; TR-11) Avail: NTIS HC A03/MF A01 CSCL 07/4

The Gaussian wave packets and the coupled channel method are combined to develop a theory of H2 diffraction and rotational excitation by collision with surfaces. This improves our previous work on H2 diffraction since it eliminates the mean trajectory approximation; it also extends Heller's work to problems in which the dynamics require the creation of new packets which must be coupled to each other as they are propagated through the interaction region. The approximations involved in the above Gaussian wave packet approach can be removed by extending a method proposed by Flect, Morris and Felt, which propagates the Gaussian wave function exactly and efficiently. GRA

N86-30530# Chicago Univ., Ill. Dept. of Chemistry.
PSEUDOPOTENTIALS AND STRUCTURE-PROPERTY RELATIONSHIPS IN THE SOLID STATE Annual Report, 14 Apr. 1985 - 1 Apr. 1986
Jeremy K. Burdett 1 Apr. 1986 4 p
(Contract N00014-85-K-0354)
(AD-A166385) Avail: NTIS HC A02/MF A01 CSCL 20/12

The dielectric theory of Phillips and Van Vechten defines crystalline ionicity in terms of optical properties and predicts first-order structural phase transitions. Their approach, while very successful, is, nonetheless, empirical and has yet to be justified via an ab initio quantum mechanical approach. We present such an approach for examining the relationship between spectroscopic crystal ionicity and spatial structure. We demonstrate that the structural predictions based on ionicity scales derived from the dielectric theory are consistent with a microscopic point of view. Pseudopotential radii are used to sort ternary systems. By and large the sorting is only slightly better than that found using ionic radii, although the use of a third parameter allows sorting of the spinel and Cr3S4 types. GRA

N86-30531# Rockwell International Corp., Anaheim, Calif. Science Center.
FERROELECTRIC TUNGSTEN BRONZE CRYSTALS FOR FAR INFRARED ELECTRO-OPTIC DEVICE APPLICATIONS Final Report, 12 Jan. 1983 - 30 Sep. 1985
R. R. Neurgaonkar Nov. 1985 47 p
(Contracts DAAK70-83-C-0016; AF Proj. 2131)
(AD-A166484; SC5356.56FR) Avail: NTIS HC A03/MF A01 CSCL 20/2

The primary objective of this research program is to develop for electro-optic and nonlinear optical applications high quality, striation-free crystals of a number of interesting tungsten bronze compositions such as Ba(2-x)Sr(x)K(1-y)Na(y)Nb5O15 (BSKNN), Ba6Ti2Nb8O30 (BTN), and a few compositions which are close to a morphotropic phase boundary, using the Czochralski and edge defined crystal growth techniques. The large transverse and longitudinal electro-optic response obtainable near morphotropic phase boundaries are studied in particular detail for optical device applications. A second objective is to improve material photorefractive performance using selected dopants. Several undoped and doped tungsten bronze BSKNN-1 and BSKNN-2 single crystals have been grown by the Czochralski technique. Optical evaluation shows that both the crystals show minimum striations, and are useful for optical studies. Current growth results suggest that the existence of striations depends on the type of dopant and the purity of starting materials. Both BSKNN-1 and BSKNN-2 crystals show excellent ferroelectric and optical properties which are similar to perovskite BaTiO3 rather than to tungsten bronze SBN:60 single crystals. The unit cells for BSKNN-1 and BSKNN-2 are slightly bigger than SBN:60 crystal and for these small changes their entire ferroelectric properties are different. GRA

N86-30532# Allied Corp., Charlotte, N.C. Synthetic Crystal Products Group.
RESEARCH IN GADOLINIUM SCANDIUM GALLIUM GARNET (GSGG) CRYSTAL DEVELOPMENT Final Report, 1 May - 31 Dec. 1984
Jul. 1985 73 p
(Contract DE-AC08-84DP-40203)
(DE86-004292; DOE/DP-40203/1) Avail: NTIS HC A04/MF A01

The Czochralski growth technique was utilized for the development of a large diameter, laser quality gadolinium, scandium gallium garnet co-doped with neodymium and chromium (Nd:Cr:GSGG). Vary aspects of the development were determinations of raw material purity, foule growth runs, boule composition and lattice parameters, and losses. DOE

N86-30533# Bell Communications Research, Inc., Murray Hill, N.J.
CONTRIBUTIONS OF ELECTRON MICROSCOPY TO THE UNDERSTANDING OF REACTIONS ON COMPOUND SEMICONDUCTOR SURFACES
T. Sands Nov. 1985 19 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with California Univ., Lawrence Berkeley Lab.
(Contract DE-AC03-76SF-00098)
(DE86-005230; LBL-20509; CONF-851217-27) Avail: NTIS HC A02/MF A01

Reacted films on compound semiconductor substrates present challenging materials characterization problems which often require the application of transmission electron microscopy (TEM) techniques. In this paper, both the problem-solving potential of the TEM techniques and the limits imposed by preparation of thin film/compound semiconductor TEM specimens are discussed. Studies of the Ni/GaAs, CuCl(aq)/CdS and Pd/GaAs reactions exemplify the role of TEM in identifying and determining the spatial distribution of interface-stabilized polymorphs and new ternary phases (e.g., tetragonal CuS, NiGaAs and Pd/sub x/GaAs). These examples also serve to clarify the relationship between TEM and complementary analysis techniques such as Rutherford backscattering spectrometry, Auger electron spectroscopy and glancing-angle x-ray diffraction. In particular, it is argued that a combination of (1) high-spatial-resolution information obtained by TEM and (2) an indication of the average behavior provided by data from a complementary characterization technique provide the minimum quality and quantity of data necessary to understand most reactions on compound semiconductor substrates. DOE

N86-30534# Argonne National Lab., Ill.
POINT DEFECTS AND HIGH-TEMPERATURE DEFORMATION OF NiO
K. C. Goretta and J. L. Routbort 1985 9 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract W-31-109-eng-38)
(DE86-005560; CONF-851217-30) Avail: NTIS HC A02/MF A01

The steady-state flow stress tau(sub s) in nonstoichiometric NiO single crystals has been measured in the temperature range of 1428 to 1653 K with oxygen partial pressures p(O2) between 6 and 1 x 10 to the 5th power Pa. Strain rates epsilon were varied from 1 x 10 to the -5 power to 2 x 10 to the -3 power/sec. Transmission electron microscopy indicates that dislocation climb is the primary mechanism of recovery. Because dislocation climb is diffusion controlled, the data may be described at fixed temperature by epsilon = A tau(sub s)(sup n) p(O2)(sup 1/m), where n is the stress exponent and m is a parameter that is determined by the dominant atomic defects on each sublattice. At high temperatures and p(O2) > 2 x 10 to the 4th power Pa, n was found to be in agreement with dislocation-climb models; however, n increased at low p(O2) owing to effects of impurities. The values of m are consistent with control of climb rate by diffusion of singly charged oxygen vacancies for low p(O2) and by diffusion of neutral oxygen interstitials for high p(O2). At lower temperatures, the values of n are strongly affected by dislocation/impurity interactions for all p(O2). DOE

N86-30535# State Univ. of New York, Stony Brook. Dept. of Materials Science and Engineering.
LIGHT-INDUCED EXCESS CONDUCTIVITY AND THE ROLE OF ARGON IN THE DEPOSITION OF DOPING-MODULATED AMORPHOUS SILICON SUPERLATTICES
F. C. Su, S. Levine, P. E. Vanier (Brookhaven National Lab., Upton, N. Y.), and F. J. Kampas 1985 6 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, NY.
(Contract DE-AC02-76CH-00016)
(DE86-005812; BNL-37573; CONF-851217-39) Avail: NTIS HC A02/MF A01

Amorphous semiconductor superlattice structures consisting of alternating n-type and p-type doped layers of hydrogenated amorphous silicon (a-Si:H) have been made by silane glow discharge in a single chamber system. These multilayered films show the novel phenomenon of light-induced excess conductivity (LEC) associated with a metastable state having a lifetime on the order of days. This report shows that the LEC effect is quite dependent on the specific details of the deposition parameters, namely dilution of the silane with inert gas, substrate temperature and layer thickness. In order to investigate the origin of the LEC effect, argon dilution was used for specific regions of the structure. This experiment shows that the slow states are distributed throughout the layers, and are not concentrated at the interfaces. DOE

N86-30536# Exxon Research and Engineering Co., Annandale, N.J. Corporate Research Science Lab.
MICROSTRUCTURAL DYNAMICS OF PRIMARY AND SECONDARY RECRYSTALLIZATION
M. P. Anderson, G. S. Grest, and D. J. Srolovitz (Los Alamos National Lab., N. Mex.) 1985 18 p Presented at the Computer Simulation of Microstructural Evolution Symposium, Toronto, Ontario, 14 Oct., 1985 Prepared in cooperation with Los Alamos National Lab., NM.
(Contract W-7405-eng-36)
(DE86-006046; LA-UR-86-421; CONF-8510273-1) Avail: NTIS HC A02/MF A01

Monte Carlo computer simulation techniques have been applied to the problem of recrystallization in a two dimensional matrix. Both primary and secondary recrystallization are investigated. Primary recrystallization is modelled under conditions where the degree of stored energy is varied and nucleation occurs either continuously as a function of time or as site saturated. The degree of stored energy is adjusted to range from heterogeneous nucleation at grain edges and corners to homogeneous nucleation throughout the microstructure. Secondary recrystallization is modelled: (a) where the driving force is provided solely by curvature and (b) where the driving force is provided by the difference in the solid-vapor surface energy between grains of different crystallographic orientation. The role of particles in initiating secondary recrystallization is also addressed. The microstructure and kinetics for the different recrystallization processes are discussed and compared. DOE

N86-30537# Kuo and Associates, McLean, Va.
ION IMPLANTATION AND LASER ANNEALING
1986 5 p
(Contract DE-AC01-85ER-30078)
(DE86-006220; DOE/ER-30078/T3) Avail: NTIS HC A02/MF A01

Three ion implantation and laser annealing projects have been performed by ORNL through the DOE sponsored Seed Money Program. The research has contributed toward improving the characteristics of wear, hardness, and corrosion resistance of some metals and ceramics, as well as the electrical properties of semiconductors. The work has helped to spawn related research, at ORNL and elsewhere, concerning the relationships between microstructure and materials properties. ORNL research has resulted in major advances in extended life and non-corrosive artificial joints (hip and knee), high performance semiconductors, failure resistant ceramics (with potential energy applications), and

solar cells. The success of the seed money projects was instrumental in the formation of ORNL's Surface Modification and Characterization Facility (SMAC). More than 60 universities and companies have participated in SMAC programs. DOE

N86-30538# Brookhaven National Lab., Upton, N. Y.
FLUX PINNING BY GRAIN BOUNDARIES IN A15 SUPERCONDUCTORS
D. O. Welch, M. Suenaga, C. L. Snead, Jr., and R. D. Hatcher (Queens Coll., Flushing, N. Y.) 1985 4 p Presented at the International Symposium on Flux Pinning and Electromagnetic Properties in Superconductors, Fukuoka, Japan, 11 Nov. 1985 Prepared in cooperation with Queens Coll., Flushing, NY.
(Contract DE-AC02-76CH-00016)
(DE86-006250; BNL-37574; CONF-8511126-3) Avail: NTIS HC A02/MF A01

The form of the scaling law for flux pinning by grain boundaries in A15-structure compounds, primarily in the case of Nb3Sn and its alloys, is discussed, and the effect of alloying and radiation damage on the pinning strength is compared with predictions of the electron-scattering theory of the elementary pinning force. In addition, some preliminary results of 2-dimensional computer simulations are discussed in relation to the observed effects of alloying on the form of the scaling law for Nb3Sn. DOE

N86-30539# Naval Research Lab., Washington, D. C.
THEORY OF ELECTRONIC STATES IN DISORDERED ALLOY HYDRIDES
D. A. Papaconstantopoulos, P. M. Laufer, and A. C. Switendick 1985 16 p Presented at the North Atlantic Treaty Organization Advanced Study Institute, Heraklion Crete, Greece, 16 Sep. 1985 Prepared in cooperation with Naval Research Lab., Washington, DC.
(Contract DE-AC04-76DP-00789)
(DE86-006260; SAND-85-2633C; CONF-8509175-2) Avail: NTIS HC A02/MF A01

Band structure calculations of metal hydrides have provided understanding of the bonding characteristics of these materials and clarified the mechanisms involved in various physical properties such as superconductivity. This article focuses on the methodology and results of disordered hydrides (TiFeH(sub x), transition-metal dihydrides, Pd-noble metal hydrides). This disorder can occur on the metal site of the hydride by considering random substitutions of the host metal or on the hydrogen sublattice where vacancies appear. The theory used is based on the coherent potential approximation and proceeds as follows. Self-consistent band structure calculations of typical metal hydrides are performed by the augmented plane wave method. Results are fitted to a tight-binding Hamiltonian using a Slater-Koster type of procedure. This Hamiltonian is then used in a tight-binding version of the coherent potential approximation which gives us the electronic densities of states for different metal and hydrogen compositions. DOE

N86-30540# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECTS OF 500 keV ELECTRON IRRADIATION AND SUBSEQUENT ANNEALING ON 1/f NOISE IN COPPER FILMS
J. Pelz and J. Clarke Oct. 1985 7 p Presented at the 8th International Conference on Noise in Physical System and 4th International Conference on 1/f Noise, Rome, Italy, 9 Sep. 1985
(Contract DE-AC03-76SF-00098)
(DE86-002954; LBL-20385; CONF-8509249-1) Avail: NTIS HC A02/MF A01

Polycrystalline copper films were maintained at 90K on the cold stage of an electron microscope and irradiated with 500keV electrons to induce defect. With an electron dose of about 5 x 10(20)cm(-2), the spectral density of the noise voltage across the films increased by an order of magnitude while the electrical resistivity increased by at most 10%. The films were annealed at progressively higher temperatures; after each annealing process the 1/f noise and resistivity were remeasured at 90K. Both the 1/f noise and resistivity were reduced, but at the lower annealing temperatures the fractional reduction in the added noise was substantially more than in the added resistivity. These results suggest that a large fraction of the added noise may be generated by a small mobile fraction of the added defects that are more readily annealed than the majority of the defects. After a room temperature annealing process, both the noise and resistivity returned nearly to their initial values. The temperature dependence of the noise after irradiation and partial annealing was consistant with the Dutta-Dimon-Horn thermal activation model. DOE

N86-30541# Exxon Research and Engineering Co., Annandale, N.J. Corporate Research Science Lab.
COMPUTER SIMULATION OF MICROSTRUCTURAL DYNAMICS
G. S. Grest, M. P. Anderson, and D. J. Srolovitz 1985 13 p Presented at the Computer Simulation of Microstructural Evolution Symposium, Toronto, Ontario, 14 Oct. 1985 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-006045; LA-UR-86-420; CONF-8510273-2) Avail: NTIS HC A02/MF A01

Since many of the physical properties of materials are determined by their microstructure, it is important to be able to predict and control microstructural development. A number of approaches have been taken to study this problem, but they assume that the grains can be described as spherical or hexagonal and that growth occurs in an average environment. We have developed a new technique to bridge the gap between the atomistic interactions and the macroscopic scale by discretizing the continuum system such that the microstructure retains its topological connectedness, yet is amenable to computer simulations. Using this technique, we have studied grain growth in polycrystalline aggregates. The temporal evolution and grain morphology of our model are in excellent agreement with experimental results for metals and ceramics. DOE

N86-30542# New Mexico Univ., Albuquerque.
ELECTRICAL CHARACTERISTICS AND TESTING CONSIDERATIONS FOR GATE OXIDE SHORTS IN CMOS ICs
C. F. Hawkins and J. M. Soden 1985 13 p Presented at the International Test Conference, Philadelphia, Pa., 19 Nov. 1985 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE85-016168; SAND-85-0705C; CONF-851130-1) Avail: NTIS HC A02/MF A01

This paper examines the electrical characteristics and testing considerations of gate oxide shorts. Gate oxide shorts will cause increased IDD and in the majority of cases will degrade logic voltage levels and propagation delay times, but may not affect functionality. Stuck-at and functional models are therefore inadequate for testing gate oxide shorts in CMDS ICs unless they are used in conjunction with IDD measurements. DOE

N86-30543# Oak Ridge National Lab., Tenn.
ROLE OF INTERFACES IN CAVITY FORMATION
M. H. Yoo and H. Trinkaus 10 Oct. 1985 29 p Presented at the ASM Metals Congress/TMS-AIME Fall Meeting, Toronto, Ontario, 13 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-004763; CONF-8510160-14) Avail: NTIS HC A03/MF A01

Nucleation of intergranular and interfacial cavities in two-phase materials during deformation at elevated temperatures is examined using a classical nucleation model under time-dependent vacancy supersaturation. Various potential sites of cavity nucleation in structural alloys are reviewed. A predictive capability for the propensity of cavity nucleation is developed on the basis of the mobilities of dislocations involved in the stress concentration and relaxation process. If the mobility of interfacial dislocations at two-phase interfaces is increased to a level close to that of grain-boundary dislocations, cavity formation in two-phase materials can be generally suppressed. DOE

N86-30544# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Physics.
HIGH PRESSURE ELECTRON RESONANCE STUDIES OF ELECTRONIC, MAGNETIC AND STRUCTURAL PHASE TRANSITIONS Final Technical Report, 1 May 1982 - 30 Apr. 1984
Joe H. Fifer and Mark C. Croft Jun. 1985 13 p
(Contract DE-AS05-82ER-12061)
(DE85-016971; DOE/ER-12061/3) Avail: NTIS HC A02/MF A01

The construction and testing of a high pressure (100 kbar) X-band electron resonance probe capable of operating down to 1.5 K has been completed. The probe design differs radically from a conventional EPR cavity system and also from the design of other high pressure EPR systems. The pressure is generated by a gasketed diamond anvil cell. The pressure gasket is a rectangular BeCu plate whose length is one half of the microwave wavelength (3 cm). The gasket thus acts as a resonant antenna to receive and store the microwave energy which is transmitted to the gasket by a waveguide that passes through the center of the pressure cell. The waveguide can be rotated relative to the resonator to allow ortical coupling. The diamond anvils, gasket, and sample are supported at the center of the waveguide on sapphire posts. Force is applied to the cell by a differential screw which permits the pressure to be changed while the diamond cell is at low temperature. Pressure calibration is carried out at low temperature using the pressure induced shift of a ruby fluorescence line. Author

N86-30545# Argonne National Lab., Ill. Fusion Power Program.
ELASTIC AND INELASTIC SURFACE EFFECTS ON ION PENETRATION AND THE RESULTING SPUTTERING AND BACKSCATTERING
A. M. Hassanein and D. L. Smith 1985 16 p
(DE85-016604; CONF-850813-1) Avail: NTIS HC A02/MF A01

The computer code ITMC (Ion Transport in Materials and Compounds) has been developed to study in detail the transport of charged particles in solid materials and surfaces related phenomena such as sputtered atoms and backscattered ions. The code is based on Monte Carlo methods to follow the path and the damage produced by the charged particles in three dimension as they slow down in target materials. Single-element targets as well as alloys with possible different surface and bulk compositions or with layered structures of different materials can be used. Various models developed to calculate the inelastic energy losses with target electrons can be used in the code. Most known interatomic potentials can also be used to calculate the elastic energy losses. The major advantages of the code are its ability and flexibility to use and compare various models of elastic and inelastic energy losses in any target with different compounds and different surface and bulk compositions. Author

N86-30546# Rockwell International Science Center, Thousand Oaks, Calif. Science Center.
ELECTROCHEMICAL PHOTOCAPACITANCE SPECTROSCOPY OF AMORPHOUS SILICON ALLOY MATERIALS Annual Subcontract Report, 1 Jun. 1984 - 30 Sep. 1985
R. Haak Jan. 1986 41 p
(Contract DE-AC02-83CH-10093)
(DE86-004421; SERI/STR-211-2888) Avail: NTIS HC A03/MF A01

The goal of this work was to develop electrochemical photocapacitance spectroscopy (EPS) as an analytical tool to map the energy-level distributions and concentrations of intrabandgap states of hydrogenated amorphous silicon (a-Si:H) and amorphous silicon alloy thin-film materials. EPS should contribute to improving a-Si materials by identifying film deposition condiditons or approaches to eliminate or reduce the number of such states. The emphasis of this work was on optimizing EPS measurement conditions and determining the quantitative accuracy of EPS for this particular sample type; applying EPS to a-Si:H and alloy samples acquired from various sources; and investigating light-induced effects on intrabandgap state levels. Results show that EPS is indeed a simple, sensitive means of evaluating intrabandgap, i.e., dangling bond states, in both p-i and p-i-n a-Si:H materials/devices and p-i-n a-Si:Ge:H devices. DOE

N86-30547# Sandia National Labs., Albuquerque, N. Mex.
PROCEEDINGS OF THE SECOND WORKSHOP ON ION MIXING AND SURFACE LAYER ALLOYING
Jan. 1986 219 p Workshop held at Pasadena, Calif., 19 Apr. 1985 Prepared in cooperation with Argonne National Lab., Ill. and California Inst. of Tech., Pasadena
(Contract DE-AC04-76DP-00789)
(DE86-006159; SAND-85-2465; CONF-8504116) Avail: NTIS HC A10/MF A01

The intent was to bring together, in an informal setting, those individuals whose work deals with ion mixing and high dose ion implantation. Primary objectives of the workshop were to discuss the basic physical processes underlying ion mixing, compare the approach of ion mixing to that of high dose ion implantation, assess the areas of greatest practical applications for ion mixing, and identify critical areas on which future investigations should focus. The meeting also afforded an opportunity to evaluate progress in the various areas over the past two years. The workshop was primarily concerned with ion mixing phenomena observed for ion energies of about 50 to 500 keV, because accelerators designed for ion implantation in semiconductors are readily available in this energy range. DOE

N86-30548# Sandia National Labs., Albuquerque, N. Mex.
ANOMALOUS BEHAVIOR DURING THE SOLIDIFICATION OF SILICON IN THE PRESENCE OF IMPURITIES
M. O. Thompson and P. S. Peercy Dec. 1985 13 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC04-76DP-00789)
(DE86-007395; SAND-85-1405C; CONF-851217-53) Avail: NTIS HC A02/MF A01

Nanosecond pulsed laser irradiation of silicon results in the melting of the surface with subsequent solidification from a crystalline substrate. In the presence of impurities or alloys, the solidification dynamics are greatly affected by the nature of the impurities. Five classes of materials have been investigated: amorphous Si, mutually soluble alloys, high solubility impurities, low solubility impurities, and compound forming materials. Solidification of each of these classes of materials is discussed. Several anomalous kinetic regimes are observed, including explosive crystallization, surface nucleation of solid, and internal nucleation of melt. These results are interpreted in terms of thermodynamic modifications of the melting temperature in the alloy regions. DOE

N86-30549# California Univ., Berkeley. Lawrence Berkeley Lab.
TOPICS IN PRECIPITATION AND ORDERING REACTIONS AND THEIR RELATED PHENOMENA
K. H. Westmacott and U. Dahmen Dec. 1985 19 p Presented at the International Symposium on Behavior or Lattice Imperfections in Materials: In Situ Experiments with HVEM, Osaka, Japan, 18 Nov. 1985
(Contract DE-AC03-76SF-00098)
(DE86-007483; LBL-20460; CONF-8511159-2) Avail: NTIS HC A02/MF A01 CSCL 05/9

The application of high voltage electron microscopy to the study of phase transformations is illustrated with a number of examples of precipitation reactions (Al-Si; Al-Ge; Fe-Cu; Pt-C; Fe-N). The importance of lattice defects is emphasized and it is shown how strain accommodation is accomplished for various types of transformations. DOE

N86-30550# California Univ., Berkeley. Lawrence Berkeley Lab.
STRUCTURE AND ELECTRICAL PROPERTIES OF Au CONTACTS TO GaAs
Z. Liliental-Weber, N. Newman, W. E. Spicer, R. Gronsky, J. Washburn, and E. R. Weber Nov. 1985 10 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985 Prepared in cooperation with Stanford Univ., Calif.
(Contract DE-AC03-76SF-00098)

(DE86-007499; LBL-20618; CONF-851217-56) Avail: NTIS HC A02/MF A01

The structure and electrical properties of Au contacts to GaAs have been studied by analytical and high-resolution transmission electron microscopy (TEM) combined with electrical characterization and photoemission spectroscopy (PES). The contacts were prepared by in-situ deposition of Au onto ultra-high vacuum cleaved n-GaAs (110) surfaces. The effects of annealing on the electrical, morphological and chemical properties of the Au:GaAs contacts were studied. It was shown that the formation of Schottky contacts is correlated with the change in stoichiometry of the GaAs substrate near the Au/GaAs interface. The change to Ohmic behavior for the samples annealed above Au-Ga eutectic was explained by leakage currents at the periphery of the devices. TEM micrographs of the structures revealed the existence of elongated Au crystallites on the GaAs surface at the periphery of the contacts. These leakage currents were eliminated by removing the current path at the periphery using a mesa-etch. DOE

N86-30551# IIT Research Inst., Bartlesville, Okla. National Inst. for Petroleum and Energy Research.
CRYSTALLINE SURFACTANT DISPERSIONS BY RADIO FREQUENCY ABSORPTION
S. H. Tedder Mar. 1986 26 p
(Contract DE-FC22-83FE-60149)
(DE86-000267; NIPER-103) Avail: NTIS HC A03/MF A01

Recently interest has increased in the use of liquid crystalline surfactant dispersions for enhanced oil recovery. The object of the work described in the report was to develop a method of measuring the electrical properties of colloidal surfactant particles, which control the structure and stability of the surfactant dispersion. A further object was to find how these electrical properties are affected by the method used to mix the components of the dispersion. The results may be useful in solving several practical problems, including the identification of optimally performing liquid crystalline surfactant formulations for oil recovery use. Another possible use is to identify and categorize effects of the method of mixing surfactants on the final product. This information would provide guidelines for field handling of chemical recovery agents. The absorption of radio frequency energy, a process which is mediated by the surface electrical properties of the surfactant particles, was used to measure several electrical parameters of the surfactant mixtures. Two commercial petroleum surfactants were tested by the radio frequency absorption method, and a model of their electrical properties was developed and used to fit the data. The strength of the layer of electric charges surrounding the surfactant particles was found to be related to the stability of the solution. DOE

N86-30552# Arizona State Univ., Tempe. Dept. of Physics.
IMAGING OF SURFACES AND DEFECTS OF CRYSTALS Final Technical Report, 1 May 1979 - 30 Nov. 1985
J. M. Cowley Dec. 1985 19 p
(Contract DE-AC02-76ER-02995)
(DE86-008302; DOE/ER-02995/25) Avail: NTIS HC A02/MF A01

The research program has been concerned with the application of new methods for the exploration of the structures, properties and reactions of surfaces with high spatial resolution. The surfaces studied have been those of metals and ceramic oxides. The surface reactions investigated have included the oxidation processes of metals and the interactions of thin films or small particles of metals with oxide surfaces. DOE

N86-30553# Technische Hochschule, Aachen (West Germany). Inst. fuer Theoretische Elektrotechnik.
SELECTIVE LOW-PRESSURE SILICON EPITAXY Final Report, Sep. 1984
Heinz-Juergen Voss and Hans Kuerten Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 89 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-133; ISSN-0340-7608; ESA-86-97436) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18.50

Selective epitaxy in the low pressure procedure was investigated. The lateral dielectric insulation of devices is performed by selective low pressure silicon epitaxy. The nucleation of Si on the masking oxide and nitride surface can be prevented by water pretreatment and addition of HCl to the reaction gas. The use of low temperature low pressure epitaxy allows to grow layers with homogeneous thickness within the epitaxial islands as well as among the islands. The formation of facets at the boundary between the masking and the epitaxial layer was studied. Electrical and optical measurements of the crystal quality show that selective epitaxy is suitable for semiconductor devices. ESA

N86-30232*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
A COMPARISON OF CURRENT MODELS FOR NONLINEAR RATE-DEPENDENT MATERIAL BEHAVIOR OF CRYSTALLINE SOLIDS M.S. Thesis
Joachim Michael Beek *In its* Integrated Research in Constitutive Modelling at Elevated Temperatures, Part 1 Jun. 1986 148 p
(For primary document see N86-30227 21-39)
Avail: NTIS HC A15/MF A01 CSCL 20K

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-30554*# California Univ., Los Angeles. School of Engineering and Applied Science.
DYNAMICS INSULATION SYSTEMS
W. E. W. Chen, W. A. Hepler, S. W. K. Yuan, and T. H. K. Frederking Oct. 1985 38 p
(Grant NAG2-253)
(NASA-CR-177026; NAS 1.26:177026; UCLA-ENG-8532) Avail: NTIS HC A03/MF A01 CSCL 20M

Advanced dynamic insulation systems were analyzed from a thermodynamic point of view. A particular performance measure is proposed in order to characterize various insulations in a unique manner. This measure is related to a base quantity, the refrigeration power ratio. The latter is the minimum refrigeration power, for a particular dynamic insulation limit, to the actual reliquefaction power associated with cryoliquid boiloff. This ratio serves as reference quantity which is approximately constant for a specific ductless insulation at a chosen normal boiling point. Each real container with support structure, vent tube, and other transverse components requires a larger refrigeration power. The ratio of the actual experimental power to the theoretical value of the support-less system is a suitable measure of the entire insulation performance as far as parasitic heat leakage is concerned. The present characterization is illustrated using simple thermodynamic system examples including experiments with liquid nitrogen. Numerical values are presented and a comparison with liquid helium is given. M.G.

N86-30555*# Stanford Univ., Calif. Dept. of Physics.
HIGH ACCURACY HEAT CAPACITY MEASUREMENTS THROUGH THE LAMBDA TRANSITION OF HELIUM WITH VERY HIGH TEMPERATURE RESOLUTION Final Report, 1 Sep. 1980 - 31 Aug. 1983
William M. Fairbanks and John A. Lipa Apr. 1984 51 p
(Grant NAG2-62)
(NASA-CR-177037; NAS 1.26:177037) Avail: NTIS HC A04/MF A01 CSCL 20M

A measurement of the heat capacity singularity of helium at the lambda transition was performed with the aim of improving tests of the Renormalization Group (RG) predictions for the static

thermodynamic behavior near the singularity. The goal was to approach as closely as possible to the lambda-point while making heat capacity measurements of high accuracy. To do this, a new temperature sensor capable of unprecedented resolution near the lambda-point, and two thermal control systems were used. A short description of the theoretical background and motivation is given. The initial apparatus and results are also described. B.G.

N86-30556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STABILITY OF SURFACE NUCLEATION
Joshua Salik Aug. 1986 9 p
(NASA-TM-88806; E-3154; NAS 1.15:88806) Avail: NTIS HC A02/MF A01 CSCL 20H

The growth and decomposition rates of nuclei on a surface are expressed in microscopic terms. A stability factor is defined and employed for the derivation of a criterion for nucleus stability. Simulation results indicate that the stability factor can be used as a measure of the system stability. Author

N86-30557# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Chemical and Environmental Engineering.
EFFECT OF INTERFACIAL PHENOMENA ON CONTACT LINE HEAT TRANSFER, 1 Annual Report, 1 Oct. 1984 - 30 Sep. 1985
Peter C. Wayner, Jr. 20 Oct. 1985 9 p
(Grant AF-AFOSR-0306-84)
(AD-A166088; AFOSR-86-0084TR) Avail: NTIS HC A02/MF A01 CSCL 20/13

The heat transfer characteristics of the contact line region of an evaporating thin liquid film were studied experimentally and theoretically. The effects of composition and temperature gradients on surface shear were analyzed and the results were successfully compared with previously reported experimental trends. The use of a constant vapor pressure boundary condition allowed the relative effects of surface tension, composition and temperature on fluid flow to be mapped. A small heat transfer cell was designed, built and used on the scanning stage of a scanning microphotometer. The unique use of a microphotometer allows the microscopic detail to be measured. The preliminary results are being analyzed to evaluate the effect of capillarity on the evaporating meniscus in heat pipes. Additional development work on the heat transfer cell is required. Modeling studies are being extended. GRA

N86-30558# California Univ., Santa Barbara. Quantum Inst.
A GAUSSIAN WAVE PACKET METHOD FOR STUDYING TIME DEPENDENT QUANTUM MECHANICS IN A CURVE CROSSING SYSTEM: LOW ENERGY MOTION, TUNNELING AND THERMAL DISSIPATION Annual Technical Report
Shin-Ichi Sawada and Horia Metiu Feb. 1986 89 p
(Contract N00014-81-K-0598)
(AD-A166262; TR-7) Avail: NTIS HC A05/MF A01 CSCL 20/10

We explore numerically the behavior of a method of describing the time dependent quantum mechanics of a curve crossing system. The two nuclear wave functions corresponding to the two electronic states are each described by a Gaussian wave packet. The packet describing the incident state mimics the initial wave function, and the other packet is created by the time dependent Schroedinger equation. They are both propagated by using a variational method. The packets interact and we do not assume that they have a small width. Exploratory calculations are made for curve crossing dynamics at low kinetic energy above the barrier of the lowest adiabatic state, for tunneling, for multiple crossings, and for a curve crossing system which is strongly coupled to a harmonic bath whose motion is described by a mean trajectory classical Langevin method. GRA

N86-30559# Lawrence Livermore National Lab., Calif.
DEVELOPMENT OF ACCURATE ESTIMATION METHODS FOR CALCULATING HEAT CAPACITIES OF REFRACTORY MATERIALS
O. H. Krikorian Dec. 1985 11 p Presented at the 1st Asian Thermophysical Properties Conference, Beijing, China, 21 Apr. 1986
(Contract W-7405-eng-48)
(DE86-004242; UCRL-93198; CONF-860474-1) Avail: NTIS HC A02/MF A01

Factors that contribute to the heat capacities of solids are analyzed and correlation methods are developed for accurately estimating these factors for the refractory borides, carbides, nitrides, and oxides. High temperature heat capacities calculated for the borides are found to agree with experiment to within +/3%. DOE

N86-30560# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
ON EXPERIMENTS TO DETECT POSSIBLE FAILURES OF RELATIVITY THEORY
W. A. Rodrigues, Jr. and J. Tiomno 1985 39 p
(DE86-700613; CBPF-NF-009/85) Avail: NTIS (US Sales Only) HC A03/MF A01

Two recently proposed experiments by Kolen and Torr designed to show failures of Einstein's Special Relativity (SR) are analysed. It is pointed out that these papers contain a number of imprecisions and misconceptions which are cleared out. Also the very spread of misconception about anisotropy of propagation of light in vacuum in Lorentz Aether Theory (LAT) is analysed showing that the anisotropy is only a coordinate effect. Comparison of the correct results in LAT theory, leading to violation of SR, with new theoretical and experimental results of Torr et al is made. Some of these new results are shown to be incorrect and/or inconsistent with both SR and LAT. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-30561# Universal Energy Systems, Inc., Dayton, Ohio.
UNITED STATES AIR FORCE SUMMER FACULTY RESEARCH PROGRAM MANAGEMENT REPORT, 1985 Annual Report
Rodney C. Darrah and Susan K. Espy Dec. 1985 284 p
(Contract F49620-85-C-0013)
(AD-A166175; AFOSR-86-0138TR) Avail: NTIS HC A13/MF A01 CSCL 14/2

The Graduate Student Summer Support Program (GSSSP) is conducted as part of the Summer Faculty Research Program as the Air Force Office of Scientific Research. The program provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the Graduate Students of universities, colleges, and technical institutions throughout the United States. The program is available to Graduate Students enrolled in either Masters Degree or Doctorate Programs. It has proven especially beneficial to the students who are starting their academic research programs. Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program. This document lists the participants and abstracts of their research completed on this project. GRA

N86-30562# Universal Energy Systems, Inc., Dayton, Ohio.
UNITED STATES AIR FORCE SUMMER FACULTY RESEARCH PROGRAM, 1985 TECHNICAL REPORT, VOLUME 1 Annual Report
Rodney C. Darrah and Susan K. Espy Dec. 1985 199 p
(Contract F49620-85-C-0013)
(AD-A166176; AFOSR-86-0139TR-Vol-1) Avail: NTIS HC A09/MF A04 CSCL 05/9

The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who

holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This three volume document is a compilation of the final reports written by the assigned students members about their summer research efforts. GRA

N86-30563# Universal Energy Systems, Inc., Dayton, Ohio.
UNITED STATES AIR FORCE SUMMER FACULTY RESEARCH PROGRAM, 1985 TECHNICAL REPORT, VOLUME 2 Annual Report
Rodney C. Darrah and Susan K. Espy Dec. 1985 437 p
(Contract F49620-85-C-0013)
(AD-A166177; AFOSR-86-0140TR-Vol-2) Avail: NTIS
HC A19/MF A05 CSCL 05/1

The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This second volume of a three volume set presents 50 final reports on a wind range of topics of interest to the Air Force, from Optimum design of structures with multiple contraints to ATR performance vs image measurements. GRA

N86-30564# Universal Energy Systems, Inc., Dayton, Ohio.
UNITED STATES AIR FORCE SUMMER FACULTY RESEARCH PROGRAM 1985 TECHNICAL REPORT, VOLUME 3 Annual Report
Rodney C. Darrah and Susan K. Espy Dec. 1985 47 p
(Contract F49620-85-C-0013)
(AD-A166178; AFOSR-86-0141TR-Vol-3) Avail: NTIS
HC A03/MF A03 CSCL 05/9

The United States Air Force Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. The specific objectives of the 1985 USAF-GSSSP are: To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; To further the research objectives of the United States Air Force; To enhance the research productivity. This final volume of a three volume set presents 51 final reports ranging from topics like Blast propagation through a composite wall section to Heat transfer correlation for nosetip with stagnation point gas injection. GRA

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-30565# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
DECISION PROCESSES IN INFLUENCE DIAGRAMS: FORMULATION AND ANALYSIS Ph.D. Thesis
Joseph A. Tatman 1985 165 p
(AD-A166327; AFIT/CI/NR-86-24D) Avail: NTIS
HC A08/MF A01 CSCL 05/1

This thesis addresses the problem of extending influence diagram theory such that decision processes can be effectively modeled within this graphical modeling language. Specifically, the extension allows value function separability and the principle of optimality to be captured in an influence diagram and then used in analysis. To accomplish this, the concept of a subvalue node has been developed. The set of value preserving operations on influence diagrams have been expanded to include operations that exploit the presence of these nodes. Also an algorithm has been developed to solve influence diagrams with subvalue nodes. This work is important from two perspectives. From the decision analysis perspective, it allows a full and simple exploitation of all separability in the value function of a decision problem. Importantly, this means that algorithms can be designed to solve influence diagrams that automatically recognize the opportunity for applying the the principle of optimality. From the decision processes perspective, influence diagrams with subvalue nodes allow efficient formulation and solution of nonstandard decision processes. Also it allows the conditional independence among the variables in the problem to be exploited. This significantly reduces the data storage requirements and computational complexity of solving the problem. Finally, the influence diagram with subvalue nodes enhances the understanding of many of the critical characteristics of various decision processes. GRA

N86-30566# Air Command and Staff Coll., Maxwell AFB, Ala.
A PROGRAM MANAGER'S GUIDE ON MULTIYEAR PROCUREMENT
Clinton J. Asbury, III Apr. 1986 38 p
(AD-A166463; ACSC-86-0130) Avail: NTIS HC A03/MF A01
CSCL 15/5

Multiyear procurement (MYP) is an acquisition strategy that can stabilize weapon system procurement and reduce program costs through economic production rates. This guide is oriented toward government program managers and other system program office representatives interested in the application of MYP to their program. It explains the concept of MYP, gives a brief history, walks through an example, tracks MYP legislation, and describes the criteria for MYP approval and where it can best be applied. GRA

N86-30567# Department of Energy, Washington, D. C.
SMALL BUSINESS INNOVATION RESEARCH. ABSTRACTS OF PHASE 2 AWARDS, 1985
1985 35 p
(DE86-005392; DOE/ER-0209-1) Avail: NTIS HC A03/MF A01

Contained in this booklet are abstracts of the Phase II awards made in 1985 under the Small Business Innovation Research (SBIR) program in the Department of Energy (DOE). This program, now completing its third year, was established in compliance with the Small Business Innovation Development Act of 1982, Public Law 97-219. The DOE received 844 proposals in response to its annual program solicitation, and on July 13, 1984, 106 were selected for Phase I funding. The Phase II SBIR program competition was limited to the 101 of these that subsequently proceeded to Phase I contracts and awards. Proposers desiring to maintain project funding continuity from Phase I to Phase II were invited to submit their proposals to DOE not later than February 15, 1985, approximately 6 weeks before the end of their Phase I contracts. Thirty four Phase II proposals were submitted by that date and 13 were selected for Phase II awards; those projects were then able to continue without funding interruption between Phases I and II. The deadline for the submission of Phase II proposals for proposers not seeking to maintain project funding continuity was May 15, 1985. From the 57 proposals submitted by this date and from the 21 unfunded proposals from the February 15 submissions, 33 were selected for Phase II awards. The 46 Phase projects described herein consists of these 33 projects and the 13 projects that were funded from the February 15 submissions. DOE

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-30568*# National Aeronautics and Space Administration. Lyndon B Johnson Space Center, Houston, Tex.
SCIENTIFIC AND TECHNICAL PAPERS PRESENTED OR PUBLISHED BY JSC AUTHORS IN 1985
Aug. 1986 111 p
(NASA-TM-58273; S-553; NAS 1.15:58273) Avail: NTIS HC A06/MF A01 CSCL 05B

The Lyndon B. Johnson Space Center contributions to the scientific and technical literature in aerospace and life sciences made during calendar year 1985 are described. Citations include NASA formal series reports, journal articles, conference and symposium presentations, papers published in proceedings or other collective works, and seminar and workshop results. Author

N86-30569*# National Aeronautics and Space Administration, Washington, D.C.
NASA THESAURUS SUPPLEMENT
May 1986 150 p
(NASA-SP-7053-Supp-1; NAS 1.21:7053-Supp-1) Avail: NTIS HC A07 CSCL 05B

The four cumulative NASA Thesaurus Supplement to the 1985 edition of the NASA Thesaurus includes Part 1, Hierarchical Listing, Part 2, Access Vocabulary, Part 3, NASA Thesaurus Definitions, and Part 4, Changes. The semiannual supplement gives complete hierarchies for new terms. Author

N86-30570# Defense Technical Information Center, Alexandria, Va. Office of Information Systems and Technology.
THE DoD GATEWAY INFORMATION SYSTEM: PROTOTYPE EXPERIENCE Final Report
Gladys A. Cotter Apr. 1986 9 p
(AD-A166200; DTIC/TR-86/6) Avail: NTIS HC A02/MF A01 CSCL 05/2

The Department of Defense (DoD) Research and Engineering community requires rapid, easy access to scientific and technical information relevant to its mission. This information is contained in a multiplicity of databases maintained within the federal and commercial sectors. The DoD Gateway Information System (DGIS) is being developed to provide this community with a modern tool for accessing these databases and extracting information products from them. DGIS is designed to provide the DoD researcher with a single, user-friendly system front-end that can be used to identify, access, interrogate, and post-process information from numerous databases. The DGIS transforms these database and processing resources into a single entity - a virtual database. The Defense Technical Information Center (DTIC) is responsible for managing the design, development, and implementation of DGIS. A prototype version of DGIS is now undergoing test and evaluation. Eight information services have been selected as targets of the prototype gateway. The utility of DGIS will rest on the early acceptance and wide spread participation of users. The design accommodates, transparent to the user, the complexities of accessing, downloading, merging, and processing information from diverse sources. This paper describes DGIS developments and evaluations to date. GRA

N86-30571# Massachusetts Inst. of Tech., Cambridge. School of Management.
DESIGN OF A DATA STORAGE HIERARCHY DSH-I2: SOFTWARE AND HARDWARE
Michael J. Abraham Mar. 1986 120 p
(Contract N00039-83-C-0463)
(AD-A166287; M010-8603-19; TR-19) Avail: NTIS HC A06/MF A01 CSCL 09/2

Modern organizations are becoming increasingly reliant on the storage and processing of very large data bases in support of their accounting, operational control, and high-level decision-making functions. Contemporary Data Base Management Systems are capable of handling data bases on the order of a trillion bits of data, and can process transactions at rates of up to 100 queries per second. However, it is expected that future high-performance DBM's will be required to provide storage capacities and transaction rates several orders of magnitude greater than those of any current systems. It is not unreasonable to project requirements of a quadrillion bits and one million database accesses per second. This report presents a refined set of control algorithms which take advantage of theoretical properties of INFOPLEX-like storage systems. Section 2 presents an overview of the INFOPLEX design issues and tradeoffs related to performance and reliability, and develops a general strategy for efficient READ/WRITE control and reliable fault handling. Section 3 develops the functional design of D SH-III in more detail, including functional descriptions of the system components and their interfaces. GRA

N86-30572# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SCIENTIFIC AND TECHNICAL INFORMATION SEARCH AND SERVICE IN THE RESEARCH AND DEVELOPMENT OF MILITARY PRODUCTS
Xiu C. Wang 28 Mar. 1986 15 p Transl. into ENGLISH from Quingbao Kexue (China), v. 5, no. 3, Jun. 1984 p 65-67
(AD-A166300; FTD-ID(RS)T-0883-85) Avail: NTIS HC A02/MF A01 CSCL 05/2

Combining working experiences, the relation of search and service of technical information and research and development of military products, the necessity of the support of strategic and tactic information, and their relation are clarified. The special features of technical information of military products and the channels to obtain such information are also clarified. These include a flow chart of research and development foreign information, tactical information, searching for information and editing. Several important stages of technical information search and service are discussed in the end of this paper. GRA

N86-30573# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE ROLE OF DATABASES IN KNOWLEDGE-BASED SYSTEMS Interim Report
Mark S. Fox and John McDermott Feb. 1986 29 p
(Contract F49620-82-K-0017)
(AD-A166365; CMU-RI-TR-86-3) Avail: NTIS HC A03/MF A01 CSCL 09/2

This paper explores the requirements for database (DB) techniques in the construction of knowledge-based systems (KBS). While early work in Artificial Intelligence (AI) has focused on techniques such as representation and problem-solving, scant attention was paid to the issues to which database research has focused (e.g., data sharing, query optimization, transaction processing). Our principal premise is that although it has appeared that there was little intersection between the particular focus of each group, there is a significant overlap in needs. The maturing of AI techniques has recently led to their application outside of the laboratory, thus thrusting upon them problems requiring DB solutions. On the other hand, DB needs have expanded to include more expressive data models and more powerful query languages (e.g., supporting inference). To ascertain KBS requirements for DBs, three KBSs are described. Each is analyzed from the perspective of the symbol and knowledge level concepts developed by Newell NEWE81. Limitations inherent in this perspective are identified. A new level, the organization level, is proposed as a means of identifying and dealing with these limitations. Three knowledge-based systems are reviewed: XCON/R1, ISIS, and Callisto. GRA

N86-30574# Hughes Aircraft Co., Long Beach, Calif. Support Systems.
ARTIFICIAL INTELLIGENCE INDEXING: CREATING KNOW-

LEDGE BASES OF INDEX TERMS ORDERED BY SEMANTIC RELATIONS Final Report, 2 Jun. - 12 Dec. 1985
Jay J. Myers, David Y. Kamemoto, and Arthur F. Griffin Dec. 1985 34 p
(Contract DAAK21-85-C-0031)
(AD-A166768; HDL-CR-85-031-1) Avail: NTIS HC A03/MF A01 CSCL 05/2

This report summarizes an investigation of concepts related to the development of intelligent, automated text indexing. It discusses the construction of knowledge bases of index terms and semantic relations extracted from several different types of full-text documents. Approaches to automating this indexing process are examined, including work related to semantic knowledge representation, knowledge engineering, natural language understanding, and semantic inferencing. This research was conducted using a software package which uses semantic networks both for representing knowledge and for displaying a graphical data base. An approach to language processing is outlined which does not require a large lexicon but instead makes use of high-frequency, low-content words supplemented with knowledge of key verbs and generic and domain-specific seed knowledge. This approach uses word order, prepositions, and word endings to determine parts of speech, to identify index terms, and to infer the semantic relations among objects, modifiers, actions, and attributes. The parameters of the requisite seed knowledge and a framework for representing and making use of verb knowledge are described. This artificial intelligence approach to indexing is contrasted with human indexing performance.
Author (GRA)

N86-30575# Army Engineer Topographic Labs., Fort Belvoir, Va.
GIS (GEOGRAPHIC INFORMATION SYSTEM)-BASED APPLICATIONS WITH A WORLDWIDE DATABASE
K. Kurtz and T. E. Jorgensen 1985 8 p
(AD-A166825; ETL-R-077) Avail: NTIS HC A02/MF A01 CSCL 05/2

This presentation will deal with difficulties associated with developing GIS-based applications programs capable of being used worldwide, or for a significant portion of the world. Issues discussed will include data format requirements, on- and off-lone storage requirements, coordinate and datum transformation problems, and the need to write software which can be easily used by an operator who may not be an expert in Geographic Information System (GIS) operation or in a particular discipline for which the software is based. Alternate solutions to the problems will be presented, and trade-offs involved in the various solutions, with respect to the issues mentioned above, will be discussed. GRA

N86-30576# Los Alamos National Lab., N. Mex.
TRANSLATION TABLE FOR DOE/OSTI - COSATI BIBLIOGRAPHIC RECORDS TO MARC FORMAT RECORDS
K. Gursky, I. Holtkamp, S. Landenberger, C. Ostrander, C. Nook, M. Shanks, and M. Hall Nov. 1985 65 p Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex., ORNL, Tenn. and DOE, Oak Ridge, Tenn.
(DE86-006473; DOE/TIC-4639; LA-UR-86-136) Avail: NTIS HC A04/MF A01

This report contains the recommendations of the committee for the conversion of data in OSTI fields to MARC fields. It is intended as a tool for OSTI to use in developing software that would enable DOE libraries to download OSTI records into MARC-based systems. Goal is to transfer as complete a set of data for each record as possible. No attempt was made to incorporate changes in the use of numerical tags that OSTI has made over the years. In addition, there are a few OSTI fields generated for internal OSTI use only, or that cannot be transferred into any MARC field in the Books format; these OSTI fields have been designated as not converted in the table. DOE

N86-30577# Boeing Co., Seattle, Wash.
RECORDS, DOCUMENTATION STORAGE AND RETRIEVAL SYSTEM, PHASE 2 Interim Report
1986 99 p
(DE86-007219; DOE/NBM-6007219) Avail: NTIS HC A05/MF A01

This interim report defines a documentation storage and retrieval system to be implemented, with any necessary modifications, by the Bonneville Power Administration. Also included is a configuration management system based upon specific change flows and change controls utilizing a change board. The body of the report is divided into three sections as follows: Management Summary, Operating Procedures, and Implementation Plan. DOE

N86-30578# Stanford Linear Accelerator Center, Calif.
INTRODUCTION TO THE FASTBUS
D. B. Gustavson Dec. 1985 12 p Presented at the BUSCON Conference, San Jose, Calif., 14 Jan. 1986
(Contract DE-AC03-76SF-00515)
(DE86-005830; SLAC-PUB-3844; CONF-860142-1) Avail: NTIS HC A02/MF A01

The Fastbus is a modular data bus system for data acquisition and data processing. It is a multiprocessor system with multiple bus segments which operate independently but link together for passing data. It operates asynchronously to accommodate very high and very low speed devices over long or short paths, using handshake protocols for reliability. It can also operate synchronously with pipelined handshakes for transfer of data blocks at maximum speed. The goals, history and motivation for the Fastbus are summarized briefly. The structure of the Fastbus system is described in general and some details of its operation are introduced. DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-30579*# Mechanical Technology, Inc., Latham, N. Y. Stirling Engine Systems Div.
AUTOMOTIVE STIRLING ENGINE DEVELOPMENT PROGRAM Semiannual Progress Report, 1 Jul. - 31 Dec. 1985
W. Ernst, A. Richey, R. Farrell, G Riecke, G. Smith, R. Howarth, M. Cronin, M. Simetkosky, and J. Meacher May 1986 66 p
(Contracts DEN3-32; DE-AI01-85CE-50112)
(NASA-CR-175045; NAS 1.26:175045; Rept-86ASE507SA9; DOE/NASA-0032/80-7) Avail: NTIS HC A04/MF A01 CSCL 13F

This is the ninth Semiannual Technical Progress Report prepared under the Automotive Stirling Engine Development

Program. It covers the twenty-eighth and twenty-ninth quarters of activity after award of the contract. Quarterly Technical Progress Reports related program activities from the first through the thirteenth quarters; thereafter, reporting was changed to a Semiannual format. This report summarizes the study of higher-power kinematic Stirling engines for transportation use, development testing of Mod I Stirling engines, and component development activities. Component development testing included successful conical fuel nozzle testing and functional checkout of Mod II controls and auxiliaries on Mod I engine test beds. Overall program philosophy is outlined and data and test results are presented.
Author

N86-30580*# National Aeronautics and Space Administration, Washington, D.C.
HUNGARIAN SPACE RESEARCH 1981-1985: LECTURES AND REVIEW ARTICLES
Gyorgy Benko, ed. Jul. 1986 11 p Transl. into ENGLISH from proceedings of the Scientific Session of the Intercosmos Council of the Hungarian Academy of Sciences, 1986 Conference held in Budapest, Hungary, 1986 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-87992; NAS 1.15:87992; ISBN-963-372-392-2) Avail: NTIS HC A02/MF A01 CSCL 05A

This monograph presents an overview of Hungarian space research from 1981 to 1985. Topics discussed in the original report include the development of space research centers, the flight of the first Hungarian astronaut, Hungarian participation in international space programs such as the Vega/Halley's Comet mission and the BEALUCA materials science experiment, advances in astronomical research, and activities of the Cosmic Geodetic Observatory. Other topics discussed include space biomedical studies, meteorological applications of space research, satellite communications, and satellite power supply systems.
Author

N86-30581# Essex Corp., Goleta, Calif. Human Factors Research Div.
TECHNOLOGY TRANSFER AND ARTIFICIAL INTELLIGENCE
Robert R. Mackie and C. D. Wylie Dec. 1985 147 p
(Contract N62269-83-D-0115)
(AD-A166035; TR-51231-1) Avail: NTIS HC A07/MF A01 CSCL 05/1

The purpose of this study was to identify critical user acceptance issues in applying artificial intelligence (AI) technology (e.g., expert systems) to military decision aids, and to develop a technology transfer plan. The application of new technology does not necessarily yield a good product, and even good products do not necessarily succeed on their own merits. Product development and introduction must consider the perspectives of potential users, especially when use of the innovation can be regarded as optional. The officers generally expressed optimism about the potential value of AI. However, negative beliefs held by many officers need to be considered carefully. A number of general design issues were identified, and several man-machine interface preferences were determined, including the desire for: display of historical data on request; use of probability estimates; embedded training and on-line tutorial; auto mode settings with user override; easy updating; suggestive rather than authoritative output; and brief rather than conversational output. A technology transfer plan based on the findings of this study is presented which stresses communications with potential users, involvement of users in design, design for acceptance, and demonstration.
GRA

N86-30582# Army War Coll., Carlisle Barracks, Pa.
TRANSFER OF HIGH-TECHNOLOGY TO THE SOVIET UNION. A PREDICAMENT FOR THE US
John E. Holland, Jr. 21 Mar. 1986 29 p
(AD-A166469) Avail: NTIS HC A03/MF A01 CSCL 15/4

Through reading Western open-source literature and by international purchases of U.S. computers and electronics, the Soviets have been able to modernize their military forces. This raises the question, Should U.S. technology be in the public domain and available for exploitation by the Soviet Union? The scope of Soviet information gathering operations raises concerns about the true Russian motivation for detente. Complicating the technology-transfer issue has been the prevailing attitude that parity promotes stability among world powers. As a result of this philosophy, the United States has found itself restrained from acquiring a significant technology advantage over the Soviet Union. The U.S. finds itself in the predicament of both needing a technology edge yet being unable to have a significant one. Thus, ensuring that the Soviets are not able to apply U.S. technology too quickly becomes an important aspect of the technology-transfer solution. Although technology controls are expensive and require the commitment of the American public, they are necessary. Should the Soviets gain technological parity, Then the U.S. would be compelled to match Soviet conventional forces to ensure that Russian expansionism is equally restrained.
GRA

N86-30583# Los Alamos National Lab., N. Mex.
INSTITUTIONAL SUPPORTING RESEARCH AND DEVELOPMENT, 1985
H. Motz. comp. Feb. 1986 83 p
(Contract W-7405-eng-36)
(DE86-008580; LA-10600) Avail: NTIS HC A05/MF A01

This report presents 25 articles on projects currently supported by the Institutional Supporting Research and Development Program at Los Alamos National Laboratory. Articles are grouped into several categories: chemistry and materials sciences, life sciences, geosciences and space physics, techniques/instrumentation/devices, and physics. Much of the work reported here relies on multi-disciplinary approaches; it encompasses not only basic research but also important, technically challenging applied research relevant to the Laboratory's mission.
DOE

88 SPACE SCIENCES (GENERAL)

N86-30584*# Lunar and Planetary Inst., Houston, Tex.
TRAJECTORY DETERMINATIONS AND COLLECTION OF MICROMETEOROIDS ON THE SPACE STATION. REPORT OF THE WORKSHOP ON MICROMETEORITE CAPTURE EXPERIMENTS
Friedrich Hoerz, ed. 1986 105 p refs Workshop held in Houston, Tex., 16-18 Dec. 1985
(Contract NASw-4066)
(NASA-CR-177303; NAS 1.26:177303; LPI-TR-86-05) Avail: NTIS HC A06/MF A01 CSCL 03B

Summaries of papers presented at the Workshop on Micrometeorite Capture Experiments are compiled. The goals of the workshop were to define the scientific objectives and the resulting performance requirements of a potential Space Station facility and to identify the major elements of a coherent development program that would generate the desired capabilities within the next decade. Specific topics include cosmic dust and space debris collection techniques, particle trajectory and source determination, and specimen analysis methods. For individual titles, see N86-30585 through N86-30607.

N86-30585*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN IN-SITU MEASUREMENT OF PARTICULATES FROM SOLID ROCKET MOTORS FIRED IN SPACE c20
John W. Alred *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 43-44 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Current models exist that predict the damage caused by the impact of aluminum oxide exhaust particles as well as their lifetime in useable space. In these models, two necessary inputs are the size and flux of the particles. An experiment, referred to as the Plume Witness Plate, was designed for the Remote Manipulator System of the space shuttle orbiter to measure in-situ the flux

and material effects of a solid rocket motor (SRM) firing in space. Five different types of samples were used to provide a broad range of substances: (1) fused quartz glass (representative of orbiter windows); (2) germanium micrometeroid capture cells; (3) orbiter HRTS tiles from the thermal protection system; (4) Kapton foil; and (5) metallic disks of aluminum, copper, titanium, graphite epoxy, and gold. The analyses of the data show excellent agreement with ground-based SRM firings in terms of particle size distribution and mass distribution. The Particle Impact Damage Integrator computer model used to calculate potential damage of orbiter surfaces by SRM exhaust plumes agrees favorable with the results in terms of particle size and velocity distributions though it may be conservative by as much as 20%. M.G.

N86-30586*# McCrone Research Inst., Chicago, Ill.
THIN-SECTIONING AND MICROANALYSIS OF INDIVIDUAL EXTRATERRESTRIAL PARTICLES **c90**
J. P. Bradley *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 45-46 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

A long standing constraint on the study of micrometeorites has centered on difficulties in preparing them for analysis. This is due largely to their small dimensions and consequent practical limitations on sample manipulation. Chondritic micrometeorites provide a good example; although much has been learned about their chemistry and mineralogy almost nothing was known about such basic properties as texture and petrographic associations. The only way to assess such properties is to examine microstructure indigenous to the particles. Unfortunately, almost all micrometeorites, out of necessity, have been crushed and dispersed onto appropriate substances prior to analysis, and most information about texture and petrography was lost. Recently, thin-sections of individual extraterrestrial particles have been prepared using an ultramicrotome equipped with a diamond knife. This procedure has been applied to stratospheric micrometeorites and Solar Max impact debris. In both cases the sections have enabled observation of a variety of internal particle features, including textures, porosity, and petrographic associations. The sectioning procedure is described and analysis results for chondritic micrometeoroids and select particles from Solar Max are presented. M.G.

N86-30587*# Washington Univ., St. Louis, Mo. Dept. of Physics.
INTERPLANETARY DUST: THE INTERSTELLAR CONNECTION **c90**
William C. Carey and Robert M. Walker *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 47-48 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Although not proven, there is the widespread belief that comets consist, at least in part, of interstellar material that was originally present in the solar nebula. Furthermore, there are strong arguments in favor of the view that much of the interplanetary dust complex is derived from comets. The main arguments supporting this view are based on mass balance, analysis of the orbital parameters of meteors, and the long known association between meteor showers and specific comets. Laboratory measurements on interplanetary dust particles (IDPs) collected in the stratosphere have confirmed the view that many of the dust particles are primitive in the sense that they show striking enrichments of D/H relative to average solar system materials. It has also been demonstrated that the mid-infrared absorption spectra of one infrared red class of particles show strong similarities to IR sources such as the protostar W-33A. However, the laboratory studies of IDPs have shown that they represent a diverse set of objects and the measurement of the orbital parameters of specific dust particles is essential to answering the question of sources. The observation of the IRAS dust bands reopens the question of the role of asteroids in supplying a significant fraction of the dust and part of the diversity observed may be due to the fact that some of the dust is asteroidal and some cometary. In addition, some fraction of interplanetary dust must consist of an interstellar component intercepted by the solar system in its motion through the local interstellar medium. It has been shown that dust derived from nearby stars will have 75% of their orbits with eccentricities < or equal to 1.1 and might be difficult to distinguish from interplanetary dust based on orbital measurements alone. M.G.

N86-30588*# Washington Univ., St. Louis, Mo. Dept. of Physics.
PROSPECTS FOR AN ORBITAL DETERMINATION AND CAPTURE CELL EXPERIMENT **c90**
William C. Carey and Robert M. Walker *In* Lunar and Planetary Inst. Trajectory Determinations and Collections of Micrometeoroids on the Space Station 1986 p 49-51 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

A dust experiment which combines measurements of the elemental and isotopic composition of individual particles with orbital information would contribute fundamental, new scientific information on the sources contributing to the micrometeoroid population. The general boundary conditions for such a system are: (1) it must be capable of measuring velocities in the range of 10 km/sec to 100 km/sec with several percent accuracy; (2) it must collect particles in such a way that the debris atoms are locally concentrated so that precise isotopic measurements are possible; (3) it should collect particles over a wide range of sizes starting with a lower limit of 10 microns; (4) it should incorporate materials that will not compromise the isotopic measurements; and (5) it should be large enough to obtain statistically meaningful results within a reasonable exposure time. Techniques which may satisfy these conditions are described. M.G.

N86-30589*# Northwestern Univ., Evanston, Ill. Astronomical Research Center.
THE USE OF TETHERED SATELLITES FOR THE COLLECTION OF COSMIC DUST AND THE SAMPLING OF MAN MADE ORBITAL DEBRIS FAR FROM THE SPACE STATION **c18**
G. J. Corso *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 52-53 refs Prepared in cooperation with Loyola Univ., Chicago, Ill. (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The use of a tethered subsatellite employed downward into the earth's upper atmosphere to an altitude of about 110 km above the earth would eliminate the orbital contamination problem while at the same time affording a measure of atmospheric braking to reduce the velocities of many particles to where they may be captured intact or nearly so with properly designed collectors. The same technique could also be used to monitor the flux of all types of man-made orbital debris out to a distance of more than a hundred kilometers in any direction from the space station. In this way the build up of any debris belt orbiting earth could be determined. The actual collecting elements used for both purposes could be of several different materials and designs so as to optimize the collection of different types of particles with different densities. Stacks of foils, films, plastics, and foams, as well as simple capture cells would be mounted in clusters around the outside of a tethered satellite and protected by iris covers until the tethered had been fully deployed. If the orientation history of the satellite were known the direction of the incoming material could be infered. A chief advantage in deploying such tethered collectors from the Space Station instead of from the shuttle is the ability to maintain deployment of the tether for days instead of hours resulting in much greater yields of intact particles and impact debris. M.G.

N86-30590*# Chicago Univ., Ill. Lab. for Astrophysics and Space Research.
A NEW INSTRUMENT TO MEASURE CHARGED AND NEUTRAL COMETARY DUST PARTICLES AT LOW AND HIGH IMPACT VELOCITIES **c35**
T. Economon, J. A. Simpson, and A. J. Tuzzolino *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of

Micrometeoroids on the Space Station 1986 p 54-55 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

A new class of dust particle detector, the PVDF dust detector, was designed for space missions such as the Halley Comet missions where the particle impact velocity is very high. It is demonstrated that this same PVDF detector (operating in a different mode) also has the capability of detecting dust particles having low velocity (approx. 100 m/s). This low velocity detection capability is extremely important in terms of planned missions requiring measurement of low velocity dust particles such as comet rendezvous missions. An additional detecting element (charge induction cylinder) was also developed which, when combined with a PVDF detector, yields a system which will measure the charge (magnitude and sign) carried by a cometary particle as well as the particle velocity and mass for impact velocities in the range 100 to 500 m/s. Since the cylinder-PVDF detector system has a relatively small geometry factors, an array of PVDF detectors was included having a total sensing area of 0.1 sq m for measurements in regions of space where the dust flux is expected to be low. The characteristics of the detectors in this array have been chosen to provide optimum mass sensitivity for both low-velocity cometary dust as well as high-velocity asteroid associated and interplanetary dust. Author

N86-30591# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LASER MICROPROBE STUDY OF COSMIC DUST (IDPS) AND POTENTIAL SOURCE MATERIALS c90
E. K. Gibson, Jr. and M. S. Sommer, II *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 56-57 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The study of cosmic dust or interplanetary dust particles (IDP) can provide vital information about primitive materials derived primarily from comets and asteroids along with a small unknown fraction from the nearby interstellar medium. The study of these particles can enhance our understanding of comets along with the decoding of the history of the early solar system. In addition the study of the cosmic dust for IDP particles can assist in the elucidation of the cosmic history of the organogenic elements which are vital to life processes. Studies to date on these particles have shown that they are complex, heterogeneous assemblages of both amorphous and crystalline components. In order to understand the nature of these particles, any analytical measurements must be able to distinguish between the possible sources of these particles. A study was undertaken using a laser microprobe interfaced to a quadrupole mass spectrometer for the analysis of the volatile components present in cosmic dust particles, terrestrial contaminants present in the upper atmosphere, and primitive carbonaceous chondrites. From the study of the volatiles released from the carbonaceous materials it is hoped that one could distinguish between components and sources in the IDP particles analyzed. The technique is briefly described and results for the CI, CM, and CV chondrites and cosmic dust particle W7027B8 are presented. M.G.

N86-30592*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HYPERVELOCITY PARTICLE CAPTURE: SOME CONSIDERATIONS REGARDING SUITABLE TARGET MEDIA c90
Friedrich Horz, Mark J. Cintala, and Thomas H. See (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 58-60 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Hypervelocity particles colliding with passive capture media will be traversed by shock waves; depending on the stress amplitude, the particle may remain solid or it may melt or vaporize. Any capture mechanism considered for cosmic dust collection in low Earth-orbit must be designed such that sample alteration and hence loss of scientific information is minimized. Capture of pristine particles is fundamentally difficult, because the specific heat of melting and even vaporization is exceeded upon impact at typical, geocentric encounter velocities. From the results of calculated and observed melting behaviors it is concluded that shock stresses in excess of 50 GPA should be avoided during hypervelocity particle capture on board Space Station and that stresses < 20 GPa, even at 15 km/s collision velocities, should constitute desirable instrument design goals. Some principal characteristics of the capture medium that may satisfy these requirements are identified. M.G.

N86-30593*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITAL DEBRIS MEASUREMENTS c90
D. J. Kessler *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 61-63 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

What is currently known about the orbital debris flux is from a combination of ground based and in-space measurements. These measurements have revealed an increasing population with decreasing size. A summary of measurements is presented for the following sources: the North American Aerospace Defense Command Catalog, the Perimeter Acquisition and Attack Characterization System Radar, ground based optical telescopes, the Explorer 46 Meteoroid Bumper Experiment, spacecraft windows, and Solar Max surfaces. Author

N86-30594*# Technische Univ., Munich (West Germany). Institut fuer Luft-und Raumfahrt.
ACOUSTIC PENETRATION AND IMPACT DETECTOR FOR MICROMETEOROID AND SPACE DEBRIS APPLICATION c90
H. Kuzcera, H. Iglseder, U. Weishaupt, and E. Igenbergs *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 64-66 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The Two-Stage Acoustic Penetration and Impact Detector is a simple device for measuring the impact event time, the projectile velocity, the flight path direction and the momentum. The results of laboratory tests have shown that this detector can be used in a wide range of projectile size and velocity. According to measurement purposes the size of the detection area, the distance between the front foil and the target plate and the number of microphones as well as the evaluation procedure can easily be adjusted. The target plate area can also be replaced by another foil detector, if two penetration stages are preferred. This active detector is suitable for a variety of applications in meteoroid and space debris exploration. It can also be supplied with capture cell properties for chemical analysis of inside-deposits. Therefore, this measurement principal has been taken into consideration as a possible flight experiment for instance for a later Longer Duration Exposure Facility (LDEF) flight or future space station activities. Author

N86-30595*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTS OF THE LOW EARTH ORBITAL ENVIRONMENT ON SPACECRAFT MATERIALS Abstract Only c18
Lubert J. Leger *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 67 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

It is evident from space flights during the last three years that the low Earth orbital (LEO) environment interacts with spacecraft surfaces in significant ways. One manifestation of these interactions is recession of, in particular, organic-polymer-based surfaces presumably due to oxidation by atomic oxygen, the major component of the LEO environment. Three experiments have been conducted on Space Shuttle flights 5, 8 and 41-G to measure reaction rates and the effects of various parameters on reaction rates. Surface recession on these flights indicates reaction efficiencies approximately 3 x 10(-24) cu cm/atoms for unfilled

organic polymers. Of the metals, silver and osmium are very reactive. Effects on spacecraft or experiment surfaces can be evaluated using the derived reaction efficiencies and a definition of the total exposure to atomic oxygen. This exposure is obtained using an ambient density model, solar activity data and spacecraft parameters of altitude, attitude and operational date. Oxygen flux on a given surface is obtained from the ambient density and spacecraft velocity and can then be integrated to provide the total exposure or fluence. Such information can be generated using simple computational programs and can be converted to various formats. Overall, the extent of damage is strongly dependent on the type of surface and total exposure time. Author

N86-30596*# New Mexico Univ., Albuquerque. Dept. of Geology.

STRATOSPHERIC DUST COLLECTIONS: VALUABLE RESOURCES FOR SPACE AND ATMOSPHERIC SCIENTISTS c46

Ian D. R. Mackinnon *In* Lunar and Planetary Inst. Trajectory Determination and Collection of Micrometeoroids on the Space Station 1986 p 68-69 refs (For primary document see N86-30584 21-88)

Avail: NTIS HC A06/MF A01 CSCL 03B

The stratospheric collection at the Johnson Space Center Curatorial Facility offers a unique opportunity to study well-documented, individual particles (or groups of particles) from a wide variety of sources. The nature of the collection and curation process, as well as the timeliness of some sampling periods, ensures that all data obtained from stratospheric particles is a valuable resource for scientists from a wide range of disciplines. A few samples of the uses of these stratospheric dust collections are outlined. An understanding of global parameters at a particular point in time in the stratosphere can be obtained from a study of complete collection surfaces. For example, an accurate assessment of particle concentration over a wide range of sizes was experimentally determined for the stratospheric cloud formed one month after the eruption of El Chichon. Additional studies on the El Chichon cloud over a six-month period showed that volcanic ash settles out of the stratosphere at a rate determined primarily by particle shape and density. Another study during a volcanically quiescent period has shown that total particle number density during the summer of 1981 was approx. 2.7 x 10(-1) cm(-3), for particles > 1 micron diameter. However, > 95% of these particles were < 5 micrometers diameter. With the above classification scheme, an estimate of micrometeorite number density at 20km altitude can also be made. Continuation of these types of studies, for shorter collection periods at regular intervals, can provide important experimental data on the contributions of orbital debris, rocket firings and transient events on the total stratospheric particle budget. Author

N86-30597*# New Mexico Univ., Albuquerque. Dept. of Geology.

TARGETED FLIGHT OPPORTUNITIES WITH LARGE AREA COLLECTORS c46

Ian D. R. Mackinnon *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 70-71 refs (For primary document see N86-30584 21-88)

Avail: NTIS HC A06/MF A01 CSCL 03B

A major factor in the stratospheric collection process is the relative density of particles at the collection altitude. With current aircraft-borne collector plate geometries, one potential extraterrestrial particle of about 10 micron diameter is collected approximately every hour. However, a new design for the collector plate, termed the Large Area Collector (LAC), allows a factor of 10 improvement in collection efficiency over current conventional geometry. The implementation of LAC design on future stratospheric collection flights will provide many opportunities for additional data on both terrestrial and extraterrestrial phenomena. With the improvement in collection efficiency, LAC's may provide a suitable number of potential extraterrestrial particles in one short flight of between 4 and 8 hours duration. Alternatively, total collection periods of approximately 40 hours enhance the probability that rare particles can be retrieved from the stratosphere. This latter approach is of great value for the cosmochemist who may wish to perform sophisticated analyses on interplanetary dust greater than a picogram. The former approach, involving short duration flights, may also provide invaluable data on the source of many extraterrestrial particles. The time dependence of particle entry to the collection altitude is an important parameter which may be correlated with specific global events (e.g., meteoroid streams) provided the collection time is known to an accuracy of < 2 hours. Author

N86-30598*# National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

THE SOLAR MAXIMUM SATELLITE CAPTURE CELL: IMPACT FEATURES AND ORBITAL DEBRIS AND MICROMETEORITIC PROJECTILE MATERIALS c18

D. S. McKay, F. J. M. Rietmeijer (Lockheed Engineering and Management Services Co., Inc., Houston, Tex.), L. S. Schramm, R. A. Barrett, H. A. Zook, and G. E. Blanford (Houston Univ., Clear Lake, Tex.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 72-75 refs (For primary document see N86-30584 21-88)

Avail: NTIS HC A06/MF A01 CSCL 03B

The physical properties of impact features observed in the Solar Max main electronics box (MEB) thermal blanket generally suggest an origin by hypervelocity impact. The chemistry of micrometeorite material suggests that a wide variety of projectile materials have survived impact with retention of varying degrees of pristinity. Impact features that contain only spacecraft paint particles are on average smaller than impact features caused by micrometeorite impacts. In case both types of materials co-occur, it is believed that the impact feature, generally a penetration hole, was caused by a micrometeorite projectile. The typically smaller paint particles were able to penetrate though the hole in the first layer and deposit in the spray pattern on the second layer. It is suggested that paint particles have arrived with a wide range of velocities relative to the Solar Max satellite. Orbiting paint particles are an important fraction of materials in the near-Earth environment. In general, the data from the Solar Max studies are a good calibration for the design of capture cells to be flown in space and on board Space Station. The data also suggest that development of multiple layer capture cells in which the projectile may retain a large degree of pristinity is a feasible goal. Author

N86-30599*# National Aeronautics and Space Administration, Washington, D.C.

DUST COLLECTION ON SERVICEABLE SATELLITES c18

Joseph A. Nuth, III *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 76 (For primary document see N86-30584 21-88)

Avail: NTIS HC A06/MF A01 CSCL 03B

One rationale for the Space Shuttle program which was dramatically realized during the repair of the Solar Maximum Mission (SMM) is the efficiency of in-orbit satellite servicing. An unexpected benefit of this repair mission was the return of parts of the Solar Max satellite which had been exposed for four years to the space environment. Studies conducted on these parts have yielded valuable data on the micrometeorite flux and composition at shuttle altitudes during this time period. The scientific results from studies of the cosmic dust component of the observed particle impacts are not yet complete but it is clear from the preliminary data available that such studies will be a valuable adjunct to the studies of cosmic dust particles collected in the atmosphere. The success of the initial studies of particles collected during repairs of the SMM spacecraft on a surface not specifically designed as a particle collector nor retrieved in a manner intended to minimize or eliminate local contamination raises the possibility that even more interesting results might be obtained if serviceable satellites were initially designed with these objectives in mind. All designs for modern satellites utilize some form of thermal blanket material in order to minimize thermal stresses inside the spacecraft. It is proposed that all future satellites be designed with standardized removeable

sections of thermal blanket material which could be replaced during on-orbit servicing and returned to earth for detailed study. M.G.

N86-30600*# Evans (Charles) and Associates, Redwood City, Calif.
LASER MICROPROBE CHARACTERIZATION OF C SPECIES IN INTERPLANETARY DUST PARTICLES (IDP) c90
Filippo Radicati diBrozolo, T. E. Bunch (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.), S. Chang, and D. E. Brownlee (Washington Univ., Seattle.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 77-79 (For primary document see N86-30584 21-88)
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Preliminary results of a study whose aim is the characterization of carbon (C) species in microvolumes of materials by means of laser ionization mass spectrometry (LIMS) are presented. The LIMS instrument employs a pulsed UV laser to produce nearly instantaneous vaporization and ionization of materials, followed by acceleration and time-of-flight analysis of the ions produced. LIMS provides a survey technique with nearly simultaneous acquisition of mass spectra covering the entire elemental range. The main limitation of the LIMS technique at present is its limited ability to perform quantitative analysis, due in part to insufficient knowledge of the mechanism of laser-solid interaction. However, considerable effort is now being directed at making LIMS a more quantitative technique. A variety of different C samples, both natural and man made were analyzed to establish the ability of LIMS to differentiate among the various C phases. The results of preliminary analyses performed on meteoritical and interplanetary dust samples are also presented. The C standards selected for the LIMS characterization range from essentially amorphous soot to diamond, which exhibits the highest degree of ordering. M.G.

N86-30601*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
THE IMPORTANCE OF CAPTURING UNMODIFIED CHONDRITIC POROUS MICROMETEORITES ON THE SPACE STATION c90
Frans J. M. Rietmeijer *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 80-82 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The survival of interplanetary dust particles (IDP's) during deceleration by the Earth's atmosphere is determined by their entry parameters, velocity, size and mass. These IDP's reach their terminal velocity at about 55 to 95 km altitude before they gradually settle to 18 to 21 km altitude where they are collected by high flying aircraft. Chondritic porous IDP's (also called chondritic porous (CP) aggregates) show properties consistent with an extraterrestrial origin. It is conceivable that CP aggregates may be collected above the Earth's atmosphere using capture devices on a space station or satellite. In order to preserve pristine CP aggregates, i.e., aggregates with minimal perturbation or degradation of its particulate matter, it is necessary to transfer the kinetic energy on impact so that a minimum amount of energy is dissipated into the impacting particle. It is likely that low-temperature minerals (e.g., layer silicates), volatile phases (e.g., sulfides), structural defects (e.g. nuclear tracks) and hydrocarbons in CP aggregates are sensitive to the efficiency of kinetic energy dissipation. M.G.

N86-30602*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE STATION c18
David R. Thompson *In* Lunar and Planetary Inst. IN Trajectory Determination and Collection of Micrometeoroids on the Space Station 1986 p 83-84 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The Space Station is being defined as a multi-purpose facility with emphasis in the following areas: scientific and technology research laboratory; permanent observatory; spacecraft servicing facility; construction and assembly facility; manufacturing facility; transportation node; and staging base for future space endeavors. The Station complex, in its initial operating capability configuration, includes a continuously habitable manned element, a polar orbiting unmanned platform, and a second unmanned platform co-orbiting with the manned element. All elements are dependent on the Space Transportation System (STS) for initial placement on-orbit and for subsequent logistical services. The manned element will be designed for long duration operations with systems maintainable on-orbit and operationally autonomous from ground control. A major feature of the Station will be its adaptability to evolutionary technology upgrades; and the Space Station, as a system, is to be designed for maximum ease of use by its users. Author

N86-30603*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTACT CAPTURE OF HYPERVELOCITY PARTICLES c90
Peter Tsou, Donald E. Brownlee (Washington Univ., Seattle.), and Arden L. Albee (California Inst. of Tech., Pasadena.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 85-87 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Knowledge of the phase, structure, and crystallography of cosmic particles, as well as their elemental and isotopic compositions, would be very valuable information toward understanding the nature of our solar system. This information can be obtained from the intact capture of large mineral grains of cosmic particles from hypervelocity impacts. Hypervelocity experiments of intact capture in underdense media have indicated realistic potential in this endeaver. The recovery of the thermal blankets and louvers from the Solar Max spacecraft have independently verified this potential in the unintended capture of cosmic materials from hypervelocity impacts. Passive underdense media will permit relatively simple and inexpensive missions to capture cosmic particles intact, either by going to a planetary body or by waiting for the particles to come to the Shuttle or the Space Station. Experiments to explore the potential of using various underdense media for an intact comet sample capture up to 6.7 km/s were performed at NASA Ames Research Center Vertical Gun Range. Explorative hypervelocity experiments up to 7.9 km/s were also made at the Ernst Mach Institute. These experiments have proven that capturing intact particles at hypervelocity impacts is definitely possible. Further research is being conducted to achieve higher capture ratios at even higher hypervelocities for even smaller projectiles. Author

N86-30604*# Technische Univ., Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
COSMIC DUST DETECTION WITH LARGE SURFACE PIEZOCERAMICS c90
U. Weishaupt *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 88-90 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

Piezoelectric transducers mounted on targets made out of metal plates or plastic foils have been used in many former space missions to detect impacting dust particles and to determine some of their parameters (e.g., momentum). The proposed detector is based on a large disc made out of piezoceramic material. Dust particles impacting on the detector will cause electrical charge pulses due to the piezoelectric nature of the target material. These charge pulses are measured on the electrodes of the disc and transformed with a charge sensitive amplifier (CSA) to voltage pulses. Counting the number of pulses leads to the dust-flux impacting on the detector. Additionally the amplitude and the rise time of the pulse slopes are determinated to evaluate the momentum and the size of the dust particles. Due to the high charge production rate per force unit of piezoceramics and momentum transfer without loss the sensivity of this acoustic sensor is very high. A method to derive size and momentum from the rising slope of an acoustic signal is described. M.G.

N86-30605*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A MICROMETEOROID DECELERATION AND CAPTURE EXPERIMENT: CONCEPTUAL EXPERIMENT DESIGN DESCRIPTION **c90**
J. H. Wolfe (San Jose State Univ., Calif.), R. W. Ballard, G. C. Carle, and T. E. Bunch *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 91-93 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

The preliminary conceptual design for a cosmic dust collector is described. For the case of low Earth orbit (LEO), dust particles enter the collector through the collimator at a few volts negative potential due to charging in the ionosphere, at a velocity of 1 to 50 km/sec. The particles then pass through an electron stream and are charged to about 1 KV negative (regardless of incoming polarity). The 1 KV negatively charged particle then passes through three sensing grids coupled to charge sensitive preamps (CSP). The comparison of the two pulses provided by S(1) and S(2) are utilized by the microprocessor to determine the charge, q, on the particle (pulse amplitude) and its velocity, v (by time of flight). The third sensing grid, S(3), is kept at about 20 KV negative so that the dust particle will now be decelerated in passing from S(2) (zero potential) to S(3). S(3) is capacitively coupled to its CSP and the pulse from S(3) is utilized by the microprocessor to determine the particle's energy, E, and therefore its mass, m (again by time of flight) by comparison with the pulses from S(1) and S(2). The microprocessor can now precisely program the high-voltage switching network for the proper timing in the grounding of the successive deceleration grids. As determined by the microprocessor, each successive deceleration grid is grounded just after the dust particle passes, thus reducing the particle's energy by the amount q*100 KV at each stage. The microprocessor also determines at which stage the particle will fall below a certain critical energy where all remaining grids remain unswitched so that the particle will drift to the collector. The collector is kept at about 100V positive and is covered with gold foil to eliminate contamination and is removable for subsequent return to earth for detailed analysis. Author

N86-30606*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CAPACITOR-TYPE MICROMETEOROID DETECTORS **c35**
J. J. Wortman (North Carolina State Univ., Raleigh.), D. P. Griffis (North Carolina Univ., Chapel Hill.), S. R. Bryan, and W. Kinard *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 94-96 refs (For primary document see N86-30584 21-88)
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The metal oxide semiconductor (MOS) capacitor micrometeoroid detector consists of a thin dielectric capacitor fabricated on a silicon wafer. In operation, the device is charged to a voltage level sufficiently near breakdown that micrometeoroid impacts will cause dielectric deformation or heating and subsequent arc-over at the point of impact. Each detector is capable of recording multiple impacts because of the self-healing characteristics of the device. Support instrumentation requirements consist of a voltage source and pulse counters that monitor the pulse of recharging current following every impact. An investigation has been conducted in which 0.5 to 5 micron diameter carbonized iron spheres traveling at velocities of 4 to 10 Km/sec were impacted on to detectors with either a dielectric thickness of 0.4 or 1.0 micron. This study demonstrated that an ion microprobe tuned to sufficiently high resolution can detect Fe remaining on the detector after the impact. Furthermore, it is also possible to resolve Fe ion images free of mass interferences from Si, for example, giving its spatial distribution after impact. Specifically this technique has shown that significant amounts of impacting particles remain in the crater and near it which can be analyzed for isotopic content. Further testing and calibration could lead to quantitive analysis. This study has shown that the capacitor type micrometeoroid detector is capable of not only time and flux measurements but can also be used for isotopic analysis. M.G.

N86-30607*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PRECISION REQUIREMENTS ON COSMIC DUST TRAJECTORY MEASUREMENTS **c90**
H. A. Zook *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 97-100 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

It has been known for some time that the orbital parameters of certain major meteor streams rather closely match those of presently observed comets. There is therefore a clear parent-daughter orbital relationship between meteoroids in certain streams and the comets that they derived from. For meteoroids in the photographic meteor range, it has been estimated that from 1% to 10% of the meteoroid mass is concentrated into the major streams. However, for the smaller, more numerous meteoroids observed as radar meteors, streams are less intense but there are more of them. Sekanina (1973) has established for the radar meteors that, in addition to comets, some of the parent bodies appear to be asteroids. As noted by Grun et al. (1985), meteoroid lifetimes, due to collisional destruction or Poynting-Robertson (P-R) drag losses, range from 10(5) yr downward to less than 10(3) yr; these meteoroids therefore need to be continuously be replenished by source bodies to maintain the meteoritic complex in some sort of temporal equilibrium. It will be very important to obtain their precise trajectories when meteoroids are collected with a capture apparatus in Earth orbit, as is made apparent with the following logic: a chemical, isotopic, or other analysis of any particular meteoroid constitutes a similarly detailed analysis of a small part of the parent comet or asteroid that is orbitally associated with it. One can, consequently, do rather detailed cometary or asteroid science utilizing only an Earth-orbiting cosmic dust capturing facility. Author

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-30608*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
SPACE INFRARED TELESCOPE POINTING CONTROL SYSTEM. AUTOMATED STAR PATTERN RECOGNITION Final Report
J. David Powell and Roel W. H. VanBezooijen Jan. 1985 44 p
(Contract NCC2-2-29)
(NASA-CR-176911; NAS 1.26:176911) Avail: NTIS HC A03/MF A01 CSCL 03A

The Space Infrared Telescope Facility (SIRTF) is a free flying spacecraft carrying a 1 meter class cryogenically cooled infrared telescope nearly three oders of magnitude most sensitive than the current generation of infrared telescopes. Three automatic target acquisition methods will be presented that are based on the use of an imaging star tracker. The methods are distinguished by the number of guidestars that are required per target, the amount of computational capability necessary, and the time required for the complete acquisition process. Each method is described in detail. B.G.

N86-30609*# California Univ., San Diego, La Jolla. Center for Astrophysics and Space Sciences.
DEVELOPMENT OF OPTIMIZED DETECTOR/SPECTROPHOTOMETER TECHNOLOGY FOR LOW BACKGROUND SPACE ASTRONOMY MISSIONS Final Report, 1 Nov. 1982 - 30 Apr. 1985
B. Jones 1985 32 p
(Contract NASw-3702)
(NASA-CR-177142; NAS 1.26:177142; UCSD-488870/26360)
Avail: NTIS HC A03/MF A01 CSCL 03A

This program was directed towards a better understanding of some of the important factors in the performance of infrared detector arrays at low background conditions appropriate for space astronomy. The arrays were manufactured by Aerojet Electrosystems Corporation, Azusa. Two arrays, both bismuth doped silicon, were investigated: an AMCID 32x32 Engineering mosiac Si:Bi accumulation mode charge injection device detector array and a metal oxide semiconductor/field effect transistor (MOS-FET) switched array of 16x32 pixels. Author

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-30610*# Cornell Univ., Ithaca, N.Y. Dept. of Physics.
ASTROPHYSICAL MATERIALS SCIENCE: THEORY Final Technical Report
N. W. Ashcroft 1984 13 p
(Grant NAG2-159)
(NASA-CR-177021; NAS 1.26:177021) Avail: NTIS HC A02/MF A01 CSCL 03B

A method of structural expansions for use in determining the equation of state of metallic hydrogen (and indeed other metals) up to the 4th order in the perturbation theory was developed. The electrical and thermal transport properties of the planetary interior of Jupiter were calculated. The nature of the interaction between molecules at short range and the importance of multicenter terms in arriving at an adequate description of the thermodynamic functions of condensed molecular hydrogen were also investigated. B.G.

N86-30611*# California Univ., Santa Cruz.
EVOLUTION OF PRIMORIDAL GAS CLOUDS Final Technical Report, 15 Feb. 1984 - 28 Feb. 1986
Peter H. Bodenheimer Feb. 1986 23 p
(Contract NCC2-281)
(NASA-CR-176959; NAS 1.26:176959) Avail: NTIS HC A02/MF A01 CSCL 03B

The dynamical, chemical, and thermal evolution of zero-metal gas clouds was modeled to study conditions of star formation in the early universe. Numerical results are given for the collapse of spherical clouds of mass 1000 and 50000 solar mass. Cooling by H2 lines and by photons emitted in H + e(-) yields H(-) = h (sup nu) maintains collapse until formation of an equilibrium protostellar core of mass 0.02 solar mass. The cooling by photons produced with H is essential for low mass star formation. If the cloud is fragmented, the evolution of the pieces is similar to that of the parent cloud, but the equilibrium core has larger density and mass. Author

N86-30612*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE HYDROGEN COMA OF COMET HALLEY BEFORE PERIHELION: PRELIMINARY OBSERVATIONS WITH DYNAMICS EXPLORER 1
J. D. Craven, L. A. Frank, R. L. Rairden, and M. R. Dvorsky Feb. 1986 17 p Original document contains color illustrations
(Grants NAG5-483; NGL-16-001-002; Contract N00014-85-K-0404)
(NASA-CR-177091; NAS 1.26:177091; IU-86-09) Avail: NTIS HC A02/MF A01 CSCL 03B

The hydrogen coma of Comet Halley has been observed in resonantly scattered solar Lyman-alpha radiation during the period 1-29 January 1986 as the comet approached perihelion. These observations were obtained with the imaging photometer for vacuum-ultraviolet wavelengths on the spacecraft Dynamics Explorer 1. For the initial analysis of observations available in 17 orbits distributed throughout the period, least-squares fits are computed for the observed exponential decrease in brightness with radial distance from the nucleus. Brightness at the nucleus increased from approx. 3 to 17 kR during the observing period. Preliminary analysis yields water production rates of approx. 3.6 x 10 to the 29th power and 1.9 x 10 to the 30th power molecules/sec on 1 and 29 January, respectively. Author

N86-30613# Universidade Estadual de Campinas (Brazil). Inst. de Matematica, Estatistica e Ciencia da Comp
CONSIDERATIONS ABOUT THE APPARENT SUPERLUMINAL EX PANSIONS IN ASTROPHYSICS
E. Recami, A. Castellino (Catania Univ., Italy), G. D. Maccarrone, and M. Rodono 1984 35 p Prepared in cooperation with Catania Univ. (Italy). Ist. di Fisica.
(DE86-701328; UNICAMP-IMECC-RI-278) Avail: NTIS (US Sales Only) HC A03/MF A01

The orthodox models devised to explain the apparent superluminal expansions observed in astrophysics - and here briefly summarized and discussed together with the experimental data - do not seem to be too sucessful, especially when confronted with the most recent observations, suggesting complicated expansion patterns, even with possible accelerations. At this point it may be, therefore, of some interest to explore the possible alternative models in which actual Superluminal motions take place. The ground is prepared starting from a variational principle, introducing the elements of a tachyon mechanics within special relativity, and arguing about the expected behaviour of tachyonic objects when interacting (gravitationally, for instance) among themselves or with ordinary matter. Then the simplest Superluminal models are reviewed and developed, paying particular attention to the observations which they would give rise to. It is concluded that some of them appear to be physically acceptable and are statistically favoured with respect to the orthodox ones. DOE

N86-30586*# McCrone Research Inst., Chicago, Ill.
THIN-SECTIONING AND MICROANALYSIS OF INDIVIDUAL EXTRATERRESTRIAL PARTICLES
J. P. Bradley *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 45-46 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30587*# Washington Univ., St. Louis, Mo. Dept. of Physics.
INTERPLANETARY DUST: THE INTERSTELLAR CONNECTION
William C. Carey and Robert M. Walker *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 47-48 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30588*# Washington Univ., St. Louis, Mo. Dept. of Physics.
PROSPECTS FOR AN ORBITAL DETERMINATION AND CAPTURE CELL EXPERIMENT
William C. Carey and Robert M. Walker *In* Lunar and Planetary Inst. Trajectory Determinations and Collections of Micrometeoroids on the Space Station 1986 p 49-51 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30591# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LASER MICROPROBE STUDY OF COSMIC DUST (IDPS) AND POTENTIAL SOURCE MATERIALS
E. K. Gibson, Jr. and M. S. Sommer, II *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 56-57 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30592*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HYPERVELOCITY PARTICLE CAPTURE: SOME CONSIDERATIONS REGARDING SUITABLE TARGET MEDIA
Friedrich Horz, Mark J. Cintala, and Thomas H. See (Lockheed

Engineering and Management Services Co., Inc., Houston, Tex.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 58-60 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30593*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITAL DEBRIS MEASUREMENTS
D. J. Kessler *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 61-63 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30594*# Technische Univ., Munich (West Germany). Institut fuer Luft-und Raumfahrt.
ACOUSTIC PENETRATION AND IMPACT DETECTOR FOR MICROMETEOROID AND SPACE DEBRIS APPLICATION
H. Kuzcera, H. Iglseder, U. Weishaupt, and E. Igenbergs *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 64-66 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30600*# Evans (Charles) and Associates, Redwood City, Calif.
LASER MICROPROBE CHARACTERIZATION OF C SPECIES IN INTERPLANETARY DUST PARTICLES (IDP)
Filippo Radicati diBrozolo, T. E. Bunch (National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.), S. Chang, and D. E. Brownlee (Washington Univ., Seattle.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 77-79 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30601*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
THE IMPORTANCE OF CAPTURING UNMODIFIED CHONDRITIC POROUS MICROMETEORITES ON THE SPACE STATION
Frans J. M. Rietmeijer *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 80-82 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30603*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTACT CAPTURE OF HYPERVELOCITY PARTICLES
Peter Tsou, Donald E. Brownlee (Washington Univ., Seattle.), and Arden L. Albee (California Inst. of Tech., Pasadena.) *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 85-87 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30604*# Technische Univ., Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
COSMIC DUST DETECTION WITH LARGE SURFACE PIEZOCERAMICS
U. Weishaupt *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 88-90 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30605*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A MICROMETEOROID DECELERATION AND CAPTURE EXPERIMENT: CONCEPTUAL EXPERIMENT DESIGN DESCRIPTION
J. H. Wolfe (San Jose State Univ., Calif.), R. W. Ballard, G. C. Carle, and T. E. Bunch *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 91-93 (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

N86-30607*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PRECISION REQUIREMENTS ON COSMIC DUST TRAJECTORY MEASUREMENTS
H. A. Zook *In* Lunar and Planetary Inst. Trajectory Determinations and Collection of Micrometeoroids on the Space Station 1986 p 97-100 refs (For primary document see N86-30584 21-88)
Avail: NTIS HC A06/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-30614*# Lunar and Planetary Inst., Houston, Tex.
PROCEEDINGS OF THE MECA WORKSHOP ON THE EVOLUATION OF THE MARTIAN ATMOSPHERE
Michael Carr, ed., Philip James, ed., Leovy Conway, ed., Robert Pepin, ed., and James Pollack, ed. Aug. 1985 56 p
(Contract NASw-4066)
(NASA-CR-176899; NAS 1.26:176899; LPI-TR-86-07) Avail: NTIS HC A04/MF A01 CSCL 03B

Topics addressed include: Mars' volatile budget; climatic implications of martian channels; bulk composition of Mars; accreted water inventory; evolution of CO_2; dust storms; nonlinear frost albedo feedback on Mars; martian atmospheric evolution; effects of asteroidal and cometary impacts; and water exchange between the regolith and the atmosphere/cap system over obliquity timescales. B.G.

N86-30615*# National Aeronautics and Space Administration, Washington, D.C.
VOLATILE COMPONENTS AND CONTINENTAL MATERIAL OF PLANETS
K. P. Florenskiy and O. V. Nikolayeva Aug. 1986 33 p Transl. into ENGLISH from Geokhimiya (Moscow, USSR), no. 9, 1984 p 1251-1267 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-4004)
(NASA-TM-88478; NAS 1.15:88478) Avail: NTIS HC A03/MF A01 CSCL 03B

It is shown that the continental material of the terrestrial planets varies in composition from planet to planet according to the abundances and composition of true volatiles (H_2O, CO_2, etc.) in the outer shells of the planets. The formation of these shells occurs very early in a planet's evolution when the role of endogenous processes is indistinct and continental materials are subject to melting and vaporizing in the absence of an atmosphere. As a result, the chemical properties of continental materials are related not only to fractionation processes but also to meltability and volatility. For planets retaining a certain quantity of true volatile components, the chemical transformation of continental material is characterized by a close interaction between impact melting vaporization and endogeneous geological processes. Author

N86-30616*# National Aeronautics and Space Administration, Washington, D.C.
BILATERAL SYMMETRY OF CIRCULAR IMPACT STRUCTURES OF ASTROBLEMES
V. L. Masaytis and M. S. Mashchak Aug. 1986 16 p Transl. into ENGLISH from Meteoritika, (Leningrad, USSR), no. 41, 1982 p 150-156 Transl. by Scitran, Inc., Santa Barbar, Calif. Original document was prepared by All-Union Scientific Research Inst. of Geology, Leningrad, USSR
(Contract NASw-4004)

(NASA-TM-88480; NAS 1.15:88480) Avail: NTIS HC A02/MF A01 CSCL 03B

The relief of the true crater-bottom and the distribution of impactites and allogenic breccias for the Popigay and Kara astroblemes is examined. It is shown that the crater morphology and the distribution of ejecta of fragmented and melted masses has a series of features of symmetry in common with lunar analogs of large astroblemes, formed as a result of an oblique impact, as well as with impact and impact-explosive craters. This leads to the conclusion that both structures were formed as a result of oblique impact of meteoroid bodies; the trajectory projection of the body which formed the Popigay crater had an azimuth of 200 + or - 10 deg., while this azimuth for the Kara crater was 50 + or - 10 deg. Author

N86-30617*# National Aeronautics and Space Administration, Washington, D.C.

PRELIMINARY RESULTS OF DETERMINATION OF CHEMICAL ELEMENT CONCENTRATIONS IN THE AEROSOL OF VENUS CLOUDS

B. M. Andreychikov, L. M. Mukhin, B. N. Korchuganov, I. K. Akhmetshin, Ye. N. Tokarev, A. V. Medvedev, M. N. Goldfeld, V. M. Faynboym, A. V. Kalyuzhnyy, I. V. Petryanov et al May 1986 7 p Transl. into ENGLISH from Pisma v AZh (USSR), v. 12, no. 2, 1986 p 120-122 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-88423; NAS 1.15:88423) Avail: NTIS HC A02/MF A01 CSCL 03B

An X-ray radiometeric experiment is described along with the results of measurements of the elemental composition of aerosols in Venusian clouds. A preliminary analysis of the data showed that sulfur is present in the range of heights 63 to 47 km with mean content of 5.8 mg/cu m and that chlorine is present in the height range 61 to 52 km with a mean content of 4.1 mg/cu m. The results of measurements in the range 52 to 47 km may come to an agreement if phosphorus is present in the aerosol with a mean concentration of 7.7 mg/cu m. Author

N86-30618*# National Aeronautics and Space Administration, Washington, D.C.

PRELIMINARY RESULTS OF MEASUREMENTS BY AUTOMATED PROBES VEGA 1 AND 2 OR PARTICLE CONCENTRATION IN CLOUDS OF VENUS AT HEIGHTS 47-63 KM

Yu. V. Zhulanov, L. M. Mukhin, and D. F. Nenarokov May 1986 13 p Transl. into ENGLISH from Pisma v AZh (USSR), v. 12, no. 2, 1986 p 123-130 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-88424; NAS 1.15:88424) Avail: NTIS HC A02/MF A01 CSCL 03B

Results of the preliminary processing of the Vega 1 and 2 descender data on the cloud layer structure of the Venusian atmosphere are discussed. A photoelectric counter for aerosol particles is described together with its optical and pneumatic circuits and operation algorithm. Vertical profiles of concentrations of particles with a diameter of 0.4 microns agree quantitatively with the Pioneer-Venus and Venera 9 and 10 data. Concentrations of these particles are: in the B layer, up to 190/cu cm; in the C layer, up to 10/cu cm; and in the D layer, up to 130/cu cm. Layers have sharp boundaries with a significant vertical heterogeneity of the aerosol concentration field inside them. Author

N86-30619*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

ANALYSIS OF JOVIAN DECAMTERIC DATA: STUDY OF RADIO EMISSION MECHANISMS Final Report, 15 Sep. 1982 - 31 May 1986

David H. Staelin, Philip W. Rosenkranz, Tomas A. Arias, Peter N. Garnavich, and Roel Hammerschlag 12 Aug. 1986 30 p

(Grant NAGw-373)

(NASA-CR-176878; NAS 1.26:176878) Avail: NTIS HC A03/MF A01 CSCL 03B

This research effort involved careful examination of Jovian radio emission data below 40 MHz, with emphasis on the informative observations of the Planetary Radio Astronomy experiment (PRA) on the Voyager 1 and 2 spacecraft. The work is divided into three sections, decametric arcs, decametric V bursts, and hectometric modulated spectral activity (MSA). Author

N86-30620*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FUGACITY AND CONCENTRATION GRADIENTS IN A GRAVITY FIELD

Charles E. May Jul. 1986 39 p

(NASA-TM-88809; E-3157; NAS 1.15:88809) Avail: NTIS HC A03/MF A01 CSCL 03B

Equations are reviewed which show that at equilibrium fugacity and concentration gradients can exist in gravitational fields. At equilibrium, the logarithm of the ratio of the fugacities of a species at two different locations in a gravitational field is proportional to the difference in the heights of the two locations and the molecular weight of the species. An analogous relation holds for the concentration ratios in a multicomponent system. The ratio is calculated for a variety of examples. The kinetics for the general process are derived, and the time required to approach equilibrium is calculated for several systems. The following special topics are discussed: ionic solutions, polymers, multiphase systems, hydrostatic pressure, osmotic pressure, and solubility gradients in a gravity field. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-30621*# Resource Management Associates, Inc., Lafayette, Calif.

PRELIMINARY DEVELOPMENT OF A GLOBAL 3-D MAGNETOHYDRODYNAMIC COMPUTATIONAL MODEL FOR SOLAR WIND-COMETARY AND PLANETARY INTERACTIONS

Stephen S. Stahara May 1986 20 p

(Contract NASw-4011)

(NASA-CR-177090; NAS 1.26:177090; RMA-TR-101) Avail: NTIS HC A02/MF A01 CSCL 03B

This is the final summary report by Resource Management Associates, Inc., of the first year's work under Contract No. NASW-4011 to the National Aeronautics and Space Administration. The work under this initial phase of the contract relates to the preliminary development of a global, 3-D magnetohydrodynamic computational model to quantitatively describe the detailed continuum field and plasma interaction process of the solar wind with cometary and planetary bodies throughout the solar system. The work extends a highly-successful, observationally-verified computational model previously developed by the author, and is appropriate for the global determination of supersonic, super-Alfvenic solar wind flows past planetary obstacles. This report provides a concise description of the problems studied, a summary of all the important research results, and copies of the publications. Author

N86-30622# Lawrence Livermore National Lab., Calif.

RADIATING SHOCKS AND CONDENSATIONS IN FLARES

G. H. Fisher 1985 12 p Presented at the NSO/SMM Summer Workshop, Sacramento, Calif., 1 Aug. 1985

(Contract W-7405-eng-48)

(DE86-005620; UCRL-93858; CONF-8508157-1) Avail: NTIS HC A02/MF A01

Rapid energy release (by either thick target (beam) or thermal models of heating) in solar flare loop models usually leads to chromospheric evaporation, the process of heating cool chromospheric material to coronal temperatures, and the resulting increase in hot soft x-ray emitting plasma. The evaporated plasma flows up into the coronal portion of the loop because of the increased

pressure in the evaporated region. However, the pressure increase also leads to a number of interesting phenomena in the flare chromosphere. The sudden pressure increase in the evaporated plasma initiates a downward moving chromospheric condensation, an overdense region which gradually decelerates as it accretes material and propagates into the gravitationally stratified chromosphere. Solutions to an equation of motion for this condensation shows that its motion decays after about one minute of propagation into the chromosphere. When the front of this downflowing region is supersonic relative to the atmosphere ahead of it, a radiating shock will form. If the downflow is rapid enough, the shock strength should be sufficient to excite UV radiation normally associated with the transition region, and furthermore, the radiating shock will be brighter than the transition region. These results lead to a number of observationally testable relationships between the optical and ultraviolet spectra from the condensation and radiating shock. DOE

N86-30623# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
CHARGE STATES OF ENERGETIC SOLAR PARTICLES [DIE LADUNGSZUSTAENDE SOLARER ENERGETISCHER TEILCHEN]
Achim M. Luhn Feb. 1986 141 p In GERMAN
(MPE-195; ISSN-0178-0719; ESA-86-95407) Avail: NTIS
HC A07/MF A01

Ion charges of energetic solar particles were measured and interpreted in order to study their origin, and to understand processes which lead to the heating and acceleration of ions and which play a role in their transport to the earth. Measurements on ions of C, N, O, Ne, Mg, Si, S, and Fe were performed with the ULEZEQ sensor on the ISEE-3 satellite; energy, charge number, and ion charge were separately and independently determined. In order to investigate the influence of nonequilibrium processes on the formation of ion charges, the effect of a suprathermal tail in the electron distribution as well as a time-dependent ionization in the source region plasma were studied; however, the measurements on N, Si, and S could not be explained. During He3-rich periods the average charges of Si and Fe are significantly higher than in a normal solar flare. This is not the case during He(+)-rich events. ESA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-30624*# Wisconsin Univ., Madison. Dept. of Physics.
COSMIC X-RAY PHYSICS Semiannual Status Report, 1 Jan. - 30 Jun. 1986
D. McCammon, D. P. Cox, W. L. Kraushaar, and W. T. Sanders Jul. 1986 16 p
(Grant NAG5-629)
(NASA-CR-177227; NAS 1.26:177227) Avail: NTIS
HC A02/MF A01 CSCL 03B

The analysis of the beryllium-filtered data from Flight 17.020 was completed. The data base provided by the Wisconsin diffuse X-ray sky survey is being analyzed by correlating the B and C band emission with individual velocity components of neutral hydrogen. Work on a solid state detector to be used in high resolution spectroscopy of diffuse or extend X-ray sources is continuing. A series of 21 cm observations was completed. A paper on the effects of process parameter variation on the reflectivity of sputter-deposited tungsten-carvon multilayers was published. B.G.

N86-30625*# Smithsonian Astrophysical Observatory, Cambridge Mass.
A STUDY OF (OI) 63.2 AND 145.5 MICRON EMISSION FROM M17 AND SGR A FROM THE LEAR JET Final Report, 1 Oct. 1982 - 31 Mar. 1986
Gary G. Melnick Mar. 1986 27 p
(Grant NAG2-188)
(NASA-CR-177015; NAS 1.26:177015) Avail: NTIS
HC A03/MF A01 CSCL 03B

The Lear Jet Observatory was used to observe the 157.7 micron (C II) line from the galactic H II regions W3 and W51. These measurements established a lower limit in the 157.7 micron line for solar luminosity of 360 from W3, assuming adistance of 2 kpc, and a solar luminosity of 4100 from W51, assuming a distance of 7 kpc. The data indicated that the CII/far infrared continuum ratio for both W3 and W51 were within the range found for other galactic H II regions. B.G.

N86-30626# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
NONLINEAR TEMPORAL MODULATION OF PULSAR RADIO-EMISSION
A. C.-L. Chian 1984 17 p
(DE86-700670; INPE-3272) Avail: NTIS (US Sales Only)
HC A02/MF A01

A nonlinear theory is discussed for self-modulation of pulsar radio pulses. A nonlinear Schroedinger equation is derived for strong electromagnetic waves propagating in an electron-positron plasma. The nonlinearities arising from wave intensity induced relativistic particle mass variation may excite the modulational instability of circularly and linearly polarized pulsar radiation. The resulting wave envelopes can take the form of periodic wave trains or solitons. These nonlinear stationary wave forms may account for the formation of pulsar microstructures. DOE

99 GENERAL

No abstracts in this category.

SUBJECT INDEX

Typical Subject Index Listing

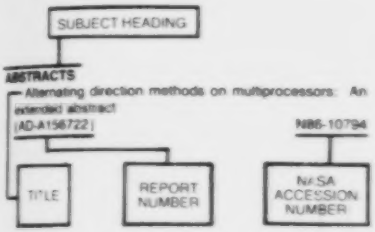

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A

ABEL FUNCTION
On the isomorphism between gauge groups before and after renormalization in the presence of Abel subgroups and Higgs fields
[AD-A166276] N86-30435
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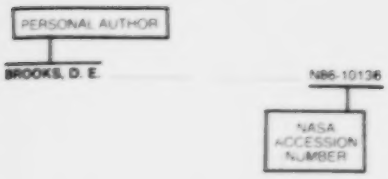

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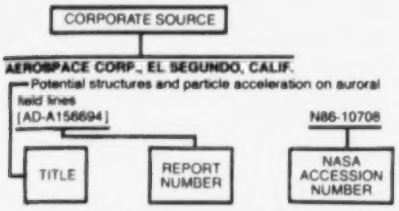

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Engine tests on a cooled gas turbine stage N86-29836

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The stability of low-latitude sea-surface temperatures: An evaluation of the CLIMAP reconstruction with emphasis on the positive SST anomalies
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CALIFORNIA INST. OF TECH., PASADENA.
Proceedings of the Second Workshop on Ion Mixing and Surface Layer Alloying
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CALIFORNIA POLYTECHNIC STATE UNIV., SAN LUIS OBISPO.
An experimental and analytical method for approximate determination of the tilt rotor research aircraft rotor/wing download
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Differences in interfacial bond strengths of graphite fiber-epoxy resin composites
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[NASA-CR-177008] N86-30092
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CALIFORNIA UNIV., SANTA CRUZ.
Evolution of primordial gas clouds
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CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N.Y.
Heat-flux measurements and analysis for a rotating turbine stage N86-29838

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Physical training of Mirage 2000 pilots N86-30324

CENTRAL INST. OF PHYSICS, BUCHAREST (RUMANIA).
Piecewise analytical perturbation series methods for solving linear ordinary differential equations. Part 2: The radial Schroedinger equations
[DE86-700606] N86-30438

CENTRE D'ESSAIS EN VOL, BRETIGNY-SUR-ORGE (FRANCE).
The use of ECG changes caused by acceleration as tolerance predicition factors N86-30316

CENTRE D'ETUDES ET DE RECHERCHES DE MEDECINE AEROSPATIALE, PARIS (FRANCE).
Sensitivity to color contrasts and the selection of navigator personnel N86-30318

CENTRE DE RECHERCHES EN PHYSIQUE DE L'ENVIRONNEMENT, ISSY-LES-MOULINEAUX (FRANCE).
Study of multipath fading in line of sight radio links: Bibliography summary
[CRPE-NT-133] N86-30056

CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).
VARAN-S: An airborne synthetic aperture radar for research in microwave remote sensing
[CNES-CT/DRT/TIT/RL-93-T] N86-30036

CENTRE PRINCIPAL D'EXPERTISES MEDICALES DU PERSONNEL NAVIGANT DE L'AERONAUTIQUE, PARIS (FRANCE).
Selection and medical testing of Mirage 2000 pilots: Report of echocardiography N86-30314

CENTRO BRASILEIRO DE PESQUISAS FISICAS, RIO DE JANEIRO.
Lorentz invariance and the rotor Doppler shift experiments
[DE86-700614] N86-30473
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[DE86-700613] N86-30560

CENTRO TECNICO AEROSPACIAL, SAN JOSE DOS CAMPOS (BRAZIL).
Computational efficiency study of a semi-analytical technique for the angular integral estimation found in transfer matrix generation
[DE86-700784] N86-30462

CENTURY COMPUTING, INC., LAUREL, MD.
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CHICAGO UNIV., ILL.
Pseudopotentials and structure-property relationships in the solid state
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CINCINNATI UNIV., OHIO.
Flap-lag-torsional dynamics of helicopter rotor blades in forward flight
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CLARKE AMBROSE, INC., KNOXVILLE, TENN.
Human factors activities in teleoperator development at the Oak Ridge National Laboratory
[DE86-005160] N86-30340

CLARKSON UNIV., POTSDAM, N.Y.
Separated flows near the nose of a body of revolution
[NASA-CR-177107] N86-30091

CLEVELAND STATE UNIV., OHIO.
Compliance matrices for cracked bodies
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CLS LASER SYSTEMS, INC., SOUTH WINDSOR, CONN.
NASA Lidar system support and MOPA technology demonstration
[NASA-CR-178144] N86-30136

COLORADO RESEARCH DEVELOPMENT CORP., FORT COLLINS.
Semiconducting transition metal silicides for electro-optic VSLI interconnects
[AD-A165895] N86-30519

COLORADO STATE UNIV., FORT COLLINS.
Remote access for NAS: Supercomputing in a university environment
[NASA-CR-177020] N86-30370

COLORADO UNIV., BOULDER.
Studies of metal/carbon surface chemistry, September 1, 1985-November 30, 1985
[DE86-007419] N86-29915
Near resonant absorption by atoms in intense fluctuating laser fields
[DE86-008513] N86-30159

COLUMBIA UNIV., NEW YORK.
Atmospheric, climatic and environmental research
[NASA-CR-176880] N86-30287
Effects of simulated weightlessness on meiosis. Fertilization, and early development in mice
[NASA-CR-177106] N86-30342
Instrumentation for surface studies for novel electronics processing
[AD-A166093] N86-30520

COMMISSION OF THE EUROPEAN COMMUNITIES, KARLSRUHE (WEST GERMANY).
Review of fracture properties of nuclear materials determined by Hertzian indentation
[DE86-005520] N86-30238

COMPUTER SCIENCES CORP., SILVER SPRING, MD.
Measuring Ada as a software development technology in the Software Engineering Laboratory (SEL) N86-30369

CONCORDIA UNIV., MONTREAL (QUEBEC).
Backward whirl in a simple rotor supported on hydrodynamic bearings N86-30172

CONOCO, INC., PONCA CITY, OKLA.
Olefin polymers as jet fuel antimist additives N86-30016

CORNELL UNIV., ITHACA, N.Y.
Experiments and micromechanical models for creep-rupture in polymer matrix composites
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Anomalous behavior during the solidification of silicon in the presence of impurities
[DE86-007395] N86-30548
Astrophysical materials science: Theory
[NASA-CR-177021] N86-30610

COUNCIL FOR MINERAL TECHNOLOGY, RANDBURG (SOUTH AFRICA).
Determination of relative sensitivity factors for use in spark-source mass spectrometry
[DE86-700715] N86-29942

CRC AUTOMATIC WELDING CO., HOUSTON, TEX.
Submerged arc welding control via arc sensing
[AD-A166320] N86-30207

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DAYTON UNIV., OHIO.
Numerical simulation of the flowfield over ice accretion shapes
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The physical and empirical basis for a specific clear-air turbulence risk index
[NASA-CR-3971] N86-30285

DEANZA COLL., LOS ALTOS HILLS, CALIF.
Optimization of an interactive distributive computer network
[NASA-CR-177373] N86-30405

DEFENCE AND CIVIL INST. OF ENVIRONMENTAL MEDICINE, DOWNSVIEW (ONTARIO).
Canadian forces approach to aircrew medical selection N86-30311

DEFENSE MAPPING AGENCY, WASHINGTON, D.C.
Potentials of large format camera photography
[AD-A166079] N86-30126

DEFENSE TECHNICAL INFORMATION CENTER, ALEXANDRIA, VA.
The DoD gateway information system: Prototype experience
[AD-A166200] N86-30570

DELFT HYDRAULICS LAB. (NETHERLANDS).
Forecasting current velocity on routine basis
[PUBL-345] N86-30284

DEPARTMENT OF ENERGY, OAK RIDGE, TENN.
Translation table for DOE/OSTI - COSATI bibliographic records to MARC format records
[DE86-006473] N86-30576

DEPARTMENT OF ENERGY, WASHINGTON, D. C.
Proceedings of the Ninth DOE Solar Photochemistry Research Conference
[DE86-006167] N86-30252
Atmospheric carbon dioxide and the global carbon cycle
[DE86-006222] N86-30280
Energy Sciences Advanced Computation program plan
[DE86-006958] N86-30391
Small Business Innovation Research. Abstracts of Phase 2 awards, 1985
[DE86-005392] N86-30567

DEPARTMENT OF THE AIR FORCE, WASHINGTON, D.C.
Self-retained platform cooling plate for turbine vane
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Test configuration and procedure for determining the operational status of a phased array antenna
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Low phase noise two port voltage controlled oscillator
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DEPARTMENT OF THE ARMY, WASHINGTON, D. C.
Random beam positioning surveillance process
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DEPARTMENT OF THE NAVY, WASHINGTON, D. C.
Wide-band distributed RF coupler
[AD-D012214] N86-30049
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DETROIT DIESEL ALLISON, INDIANAPOLIS, IND.
Alternate cooling configurations for gas turbine combustion systems N86-29845

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).
The boundary layer behaviour of an advanced gas turbine rotor blade under the influence of simulated film cooling N86-29862

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).
Effects of hole geometry, wall curvature and pressure gradient on film cooling downstream of a single row N86-29831

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
Aerodynamic effect of coolant ejection in the rear part of transonic rotor blades N86-29861
Active flutter suppression on a delta wing model structure
[DFVLR-FB-86-01] N86-29870

DRAPER (CHARLES STARK) LAB., INC., CAMBRIDGE, MASS.
ACOSS eleven (Active Control Of Space Structures) s
[AD-A165864] N86-29890

DRF, INC., SOQUEL, CALIF.
Adaptive control system. Volume 1. Equipment and testing
[AD-A166036] N86-30074

DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, S.C.
Pressure drop in flashing flow through obstructions
[DE86-007152] N86-30113

DUKE UNIV., DURHAM, N. C.
Direct effects of increasing carbon dioxide on vegetation
[DE86-007397] N86-30267

DUNLAP AND ASSOCIATES, INC., NORWALK, CONN.
The computer-aided analytic process model. Operations handbook for the analytic process model demonstration package
[AD-A166180] N86-30381

E

EAST ANGLIA UNIV., NORWICH (ENGLAND).
Grid point surface air temperature data set for the Southern Hemisphere
[DE86-007205] N86-30295

ECOLE CENTRALE DE LYON (FRANCE).
Theory and experimental study of a 3-D jet introduced into the secondary flow of a turbine inlet guide vane N86-29860

ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
The Steiner tree problem. Linear programming model and decomposition technique resolution
[ENST-85E010] N86-30394
Weighted decoding of block linear codes
[ENST-86E001] N86-30395
Application of artificial intelligence techniques to fault diagnosis for printed circuits
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ECOLE POLYTECHNIQUE FEDERALE, ZURICH (SWITZERLAND).
Magnetic bearings for vibration control N86-30185

EDGERTON, GERMESHAUSEN AND GRIER, INC., LOS ALAMOS, N. MEX.
Occultation of the ATS-3 satellite by the AVEFRIA barium ion cloud
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ELORET CORP., SUNNYVALE, CALIF.
Structural characterizaiton and gas reactions of small metal particles by high-resolution, in-situ TEM and TED
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ESSEX CORP., GOLETA, CALIF.
Technology transfer and artificial intelligence
[AD-A166035] N86-30581

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH, GENEVA (SWITZERLAND).
Proceedings of the 1984 CERN School of Computing
[DE86-700783] N86-30355

EVANS (CHARLES) AND ASSOCIATES, REDWOOD CITY, CALIF.
Laser microprobe characterization of C species in Interplanetary Dust Particles (IDP) N86-30600

EXXON RESEARCH AND ENGINEERING CO., ANNANDALE, N.J.
Microstructural dynamics of primary and secondary recrystallization
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Computer simulation of microstructural dynamics
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FEDERAL AVIATION ADMINISTRATION, ATLANTIC CITY, N.J.
Halon extinguisher agent behavior in a ventilated small aircraft
[DOT/FAA/CT-86/5] N86-29794

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Task Force report on emergency evacuation of transport airplanes, volume 1
[DOT/FAA/VS-86/1.1] N86-29793
Investigation of hazards of helicopter operations and root causes of helicopter accidents
[FAA/PM-86/28] N86-29796
Task force report on emergency evacuation of transport airplanes. Volume 2: Supporting documentation
[FAA/VS-86/1,2] N86-29797
Engineering performance evaluation of small community airport microwave landing system (TI-model) at Philadelphia International Airport Runway 17
[FAA/PM-86/24] N86-29802
Proceedings of Fuel Safety Workshop
[DOT/FAA/PM-86/13] N86-30007
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Resillient modulus of freez-thaw affected granular soils for pavement design and evaluation. Part 1: Laboratory tests on soils from Winchendon, Massachusetts, test sections
[FAA/PM-84/16.1] N86-30029

FINNISH METEOROLOGICAL INST., HELSINKI.
The development of agrometeorological services in Finland
[FMI-TN-31] N86-30286

FLORIDA UNIV., GAINESVILLE.
Improvement and optimization of internal damping of fiber reinforced composite materials
[AD-A166173] N86-29909
Synthesis of model polymers and related structures in support of vinyl monomer grafting studies
[DE86-008204] N86-30006

FLOW RESEARCH, INC., KENT, WASH.
Improvements in code TUNCOR for calculating wall interference corrections in the transonic regime
[AD-A166766] N86-29783

FOERSVARETS FORSKINGSANSALT, STOCKHOLM (SWEDEN).
Material properties of epoxy resins reinforced with carbon fibers, affected by heat radiation
[FOA-C-20597-F9] N86-29917
Particles and gases produced by cutting fiber composites with a 250 W continuous wave carbon dioxide laser
[FOA-C-20599-D6] N86-29918
Control of windpowered station with variable speed; small range
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[FOA-C-20601-E3] N86-30262
Assisted positive pressure breathing and modified anti-acceleration suit filling tested up to 9 G in a human centrifuge, Karolinska Institute
[FOA-C-50038-H1] N86-30341
Auditory helicopter detection and localization; a literature review focusing on search for helicopters
[FOA-C-50033-H2] N86-30474

FORSCHUNGSINSTITUT FUER HOCHFREQUENZPHYSIK, WERTHHOVEN (WEST GERMANY).
Data transmission by radar
[REPT-8-85] N86-30032
A comparison of methods for adaptive jamming suppression
[REPT-9-85] N86-30033
Radar detection ranges, taking into account wave propagation phenomena
[REPT-13-85] N86-30034

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GENERAL TECHNOLOGY APPLICATIONS, INC., RESTON, VA.
GTA/BASF antimisting fuel research N86-30021

GEORGE MASON UNIV., FAIRFAX, VA.
Mathematical and statistical characterizations of generalized hyperexponential distribution functions
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GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Creep and fracture characteristics of materials and structures at elevated temperatures
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GEORGIA INST. OF TECH., ATLANTA.
Component base flow analysis
[AD-A166283] N86-29781
Modeling of transient heat pipe operation
[NASA-CR-177143] N86-30099

GEORGIA UNIV., ATHENS.
Graph theory in the study of metal cluster bonding topology: Applications to metal clusters having fused polyhedra
[AD-A166623] N86-29937

GKSS-FORSCHUNGSZENTRUM GEESTHACHT (WEST GERMANY).
Data collection and analysis for HCl, SO2, and NO2 immission-emission differential absorption lidars
[GKSS-85/E/53] N86-30268
Remote measurement of tropospheric parameters by lidar
[GKSS-85/E/50] N86-30283

GRONINGEN RIJKSUNIVERSITEIT (NETHERLANDS).
Activities report of the Materials Science Center
[ESA-86-97388] N86-29903
Activities report of the Materials Science Center
[ESA-86-97389] N86-29904

GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
An investigation of turbulence mechanisms in V/STOL upwash flow fields
[AD-A166286] N86-29782

H

HAWAII UNIV., MANOA.
Coding for reliable satellite communications
[NASA-CR-177262] N86-30035

HEBREW UNIV., JERUSALEM (ISRAEL).
A procedure for evaluation of dust potential in desert terrains
[AD-A166491] N86-30245

HOPITAL D'INSTRUCTION DES ARMEES, PARIS (FRANCE).
The vertebral column: Selection and aptitude of combat aircraft pilots of the future N86-30322

HOPITAL D'INSTRUCTION DES ARMEES, VERSAILLES (FRANCE).
Continuous ECG monitoring of Mirage 2000 pilots (comparison with Mirage 3 and F1 pilots) N86-30315

HUGHES AIRCRAFT CO., LONG BEACH, CALIF.
Artificial intelligence indexing: Creating knowledge bases of index terms ordered by semantic relations
[AD-A166768] N86-30574

HUGHES RESEARCH LABS., MALIBU, CALIF.
Positive Ion Ejection System (PIES)
[AD-A166560] N86-29894

HULL UNIV. (ENGLAND).
Local and mean heat transfer on the leading and trailing surfaces of a square-sectioned duct rotating in the orthogonal-mode N86-29826

I

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AMK: Still viable? N86-30017
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Use of miniaturized tests to predict flow properties and estimate fracture toughness in deformed steel plates
[DE86-007644] N86-29981
IIT RESEARCH INST., BARTLESVILLE, OKLA.
Crystalline surfactant dispersions by radio frequency absorption
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IIT RESEARCH INST., CHICAGO, ILL.
Nondestructive evaluation of metal matrix composites
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ILLINOIS UNIV., URBANA.
MMIC devices for active phased array antennas
[NASA-CR-176990] N86-30037
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A cumulus parameterization study with special attention to the Arakawa-Schubert scheme
[AD-A166801] N86-30277
ILLINOIS UNIV., URBANA-CHAMPAIGN.
A simple circular-polarized antenna: Circular waveguide horn coated with lossy magnetic material
[NASA-CR-177092] N86-30039
IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Steady and unsteady air flow through an intake valve of a reciprocating engine
[DE86-005208] N86-30209
INDIAN INST. OF GEOMAGNETISM, BOMBAY.
Research and development activities of the Indian Institute of Geomagnetism N86-30274
INFORMATICS GENERAL CORP., PALO ALTO, CALIF.
Quality assurance software inspections at NASA Ames: Metrics for feedback and modification N86-30363
INGERSOLL-RAND CO., PHILLIPSBURG, N.J.
Full load shop testing of 18,000-hp gas turbine driven centrifugal compressor for offshore platform service: Evaluation of rotor dynamics performance N86-30161
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Syn-fuel reciprocating charge pump improvement program
[DE86-007482] N86-30216
INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
The influence of negative ions on the incoherent diffusion of electromagnetic waves in the D region of the ionosphere
[AERONOMICA-ACTA-A-302-1985] N86-30269
INSTITUTE FOR DEFENSE ANALYSES, ALEXANDRIA, VA.
A brief assessment of structural composite materials research in universities in the United States
[AD-A166665] N86-29910
The status of verification technology for the Ada (Trademark) language
[AD-A166664] N86-30384
INSTITUTE FOR PERCEPTION RESEARCH, EINDHOVEN (NETHERLANDS).
Activities report in perception research
[IPO-19-1984] N86-30335
INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG (NETHERLANDS).
Cognitive aspects of command and control
[IZF-1986-2] N86-30336
Attention tasks and their relation to aging and flight experience
[IZF-1986-4] N86-30337
INSTITUTE OF NUCLEAR ENERGY RESEARCH, LUNG-TAN (TAIWAN).
Bacterial inactivation by means of ionizing radiation
[DE86-901038] N86-30348
INSTITUTO DE PESQUISAS ENERGETICAS E NUCLEARES, SAO PAULO (BRAZIL).
Development of a solid state laser of Nd:YLF
[DE86-700770] N86-30147
INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
A self-tuning regulator based on pole placement design for use in satellite attitude control
[INPE-3861-PRE/924] N86-29887
Nonlinear theory of the free-electron laser
[DE86-700668] N86-30146
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[DE86-700670] N86-30626
INSTITUTO SUPERIOR TECNICO, LISBON (PORTUGAL).
Computation of thermal radiation for gas turbine conditions N86-29841
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Heat exchangers in regenerative gas turbine cycles N86-29857
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE (ITALY).
GEM 10B Satellite gravity data and Nigerian oil prospects
[DE86-701366] N86-30248
IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Vortex sheet modeling with higher order curved panels
[NASA-CR-176971] N86-29770
Numerical computation of viscous flow around bodies and wings moving at supersonic speeds
[NASA-CR-176903] N86-29772
Confidence regions for variance components in unbalanced mixed linear models
[AD-A165841] N86-30428
IOWA UNIV., IOWA CITY.
The hydrogen coma of Comet Halley before perihelion: Preliminary observations with dynamics Explorer 1
[NASA-CR-177091] N86-30612

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Full-Scale Transport Controlled Impact Demonstration Program photographic/video coverage
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Heat transfer, friction, and rheological characteristics of antimisting kerosene N86-30013
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Intact capture of hypervelocity particles N86-30603
JOHNS HOPKINS UNIV., BALTIMORE, MD.
State estimation for Cox processes with unknown law: Parametric models
[AD-A166179] N86-30432
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
West Europe report: Science and technology
[JPRS-WST-86-016] N86-29882
Differences between Hermes, US shuttle highlighted N86-29883
Worldwide report: Telecommunications policy, research, and development
[JPRS-TTP-86-013] N86-29897
Satellites said to function well, plans revealed N86-29898
Worldwide report: Telecommunications policy, research and development
[JPRS-TTP-86-011] N86-30064
China's satellite communications discussed N86-30065
Development of China's fiber optic technology discussed N86-30066
Japan report: Science and technology
[JPRS-JST-86-011] N86-30086
Issues in LSI automation, protocol standardization N86-30087

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KAISERSLAUTERN UNIV. (WEST GERMANY).
Some new results concerning the dynamic behavior of annular turbulent seals N86-30174
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An investigation of empennage buffeting
[NASA-CR-176973] N86-29864
KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
An investigation of tip planform influence on the aerodynamic load characteristics of a semi-span, unswept wing and wing-tip
[NASA-CR-177110] N86-29766
Study of new flight test techniques
[NASA-CR-176952] N86-29812
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Cooling techniques for gas turbine airfoils: A survey N86-29824
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The calculation of hydrogen diffusion through metal membranes
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[JUEL-2025] N86-30515
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Corrosion of vanadium and the alloy V 3Ti 1Si in flowing lithium
[KFK-4006] N86-29986
Coulomb dissociation as a source of information on radiative capture processes of astrophysical interest
[KFK-4032] N86-30482
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Hollow droplet generator for polymer shell production
[DE86-006482] N86-29999
Observations of mass transport phenomena in multicomponent liquid mixtures
[DE86-006483] N86-30110
Non-LTE atomic physics model for laser fusion and X-ray laser simulation
[DE86-006487] N86-30145
Stimulated Raman scattering: Comparison of theory and experiment
[DE86-006480] N86-30501
KNOLLS ATOMIC POWER LAB., SCHENECTADY, N. Y.
Mechanism of stress-corrosion cracking of Alloy X-750 in high purity water
[DE86-006361] N86-29969
Microstructure effects on ion and electron transport parameters during passive corrosion of zircaloy
[DE86-007189] N86-29979
KONINKLIJKE/SHELL-LAB., AMSTERDAM (NETHERLANDS).
Investigation of the extent and nature of the cracks found in segments of two Cr - 0.5 Mo pressure vessels from the NIL residual creep life program
[MR/814/85] N86-30242
KRUPP ATLAS-ELEKTRONIK, BREMEN (WEST GERMANY).
New acousto-optical beam former
[BMFT-FB-T-85-154] N86-30504
KUO AND ASSOCIATES, MCLEAN, VA.
Microalloyed nickel-3/aluminum, a new medium temperature alloy
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Ion implantation and laser annealing
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L

LABORATORIO DE COMPUTACAO CIENTIFICA, RIO DE JANEIRO (BRAZIL).
Finite-element model in vorticity and current function for the numerical solution of the Navier-Stokes equations
[DE86-700787] N86-30109

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N. Y.
Pandora: An eleven-box geochemical model of the world ocean
[DE86-006122] N86-30265
Impact of CO2 on the climate change in North America during the 20th century
[DE86-006126] N86-30266

LAWRENCE LIVERMORE NATIONAL LAB., CALIF.
Toward a permanent lunar settlement in the coming decade: the Columbus Project
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Modeling of chemical kinetics in pulse combustors
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Combustion synthesis of Si3N4 and AlN
[DE86-006530] N86-29940
Detection of chemical vapor mixtures by sorption on multiple piezoelectric crystals
[DE86-006698] N86-29941
Cryogenic mechanical properties of Al-Cu-Li-Zr alloy 2090
[DE86-006285] N86-29976
Eighth Symposium (International) on Detonation, volume 3
[DE86-006785] N86-30028
Pointing alignment by orthogonal phase-lock feedback loops
[DE86-006707] N86-30082
Theory and analysis of soft X-ray laser experiments
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Characterization of high power flashlamps and application to Nd:glass laser pumping
[DE86-007116] N86-30155
Spectroscopic, optical and thermo-mechanical properties of GSGG and its laser performance
[DE86-005773] N86-30156
Multiprocessor model with distributed task creation
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Development of accurate estimation methods for calculating heat capacities of refractory materials
[DE86-004242] N86-30559
Radiating shocks and condensations in flares
[DE86-005620] N86-30622

LEAR SIEGLER, INC., GRAND RAPIDS, MICH.
Operating and support hazard analysis for the self-contained navigation system LSI model 6216A, B and C group A
[AD-A166815] N86-29806
Subsystem hazard analysis for the LSI models 6216A, B and C self-contained navigation sysgem group A
[AD-A166816] N86-29807

LEEDS UNIV. (ENGLAND).
Full coverage impingement heat transfer: The variation in pitch to diameter ratio at a constant gapp
N86-29846

LEHIGH UNIV., BETHLEHEM, PA.
Investigations of creep cavitation in type 304 stainless steel
[DE86-007187] N86-29978

LIAOHE CHEMICAL FERTILIZER PLANT, PANJIN (CHINA).
CO2 compressor vibration and cause analysis
N86-30170

LIAOYANG PETROCHEMICAL FIBRE CO., LIAONING (CHINA).
Rotor-to-stator rub vibration in centrifugal compressor
N86-30178

LITTON SYSTEMS, INC., MORRIS PLAINS, N. J.
Investigation of oxide and fluoride hosts for blue-green lasers
[AD-A166620] N86-30142

LOCKHEED ENGINEERING AND MANAGEMENT SERVICES CO., INC., HOUSTON, TEX.
The importance of capturing unmodified chondritic porous micrometeorites on the space station
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LOS ALAMOS NATIONAL LAB., N. MEX.
Performance of commercial and research grade SiC whiskers in a borosilicate glass matrix
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Lyapunov stability of ideal compressible and incompressible fluid equilibria in three dimensions
[DE86-003648] N86-30107
NASA-VOF2D: a computer program for incompressible flows with free surfaces
[DE86-007195] N86-30116
CAVEAT: A computer code for fluid dynamics problems with large distortion and internal slip
[DE86-008570] N86-30120
Critical review of gamma-ray laser proposals
[DE85-006020] N86-30144
Nuclear structure properties for gamma-ray lasers
[DE86-006027] N86-30150
Laser ignition studies
[DE86-006043] N86-30151
Application of systems analysis techniques to vulnerability studies of complex installations
[DE86-006012] N86-30223
Reference guide for using IGVIEW, an IGES compatible geometry display, editing, and analysis system
[DE86-007190] N86-30392
General-Purpose Heat Source safety verification test series: SVT-1 through SVT-6
[DE85-017956] N86-30489
Space Nuclear Safety Program
[DE86-007197] N86-30492
Space Nuclear Safety Program
[DE86-007206] N86-30493
Computer simulation of microstructural dynamics
[DE86-006045] N86-30541
Translation table for DOE/OSTI - COSATI bibliographic records to MARC format records
[DE86-006473] N86-30576
Institutional supporting research and development, 1985
[DE86-008580] N86-30583

LOUGHBOROUGH UNIV. OF TECHNOLOGY (ENGLAND).
Counting numbers representable as sums of two squares
[LUT-MR-180] N86-30418

LOYOLA UNIV., CHICAGO, ILL.
The use of tethered satellites for the collection of cosmic dust and the sampling of man made orbital debris far from the space station N86-30589

LUNAR AND PLANETARY INST., HOUSTON, TEX.
Trajectory determinations and collection of micrometeoroids on the space station. Report of the Workshop on Micrometeorite Capture Experiments
[NASA-CR-177303] N86-30584
Proceedings of the MECA Workshop on The Evoluation of the Martian Atmosphere
[NASA-CR-176899] N86-30614

M

M L ENERGIA, INC., PRINCETON, N.J.
Radiative augmented combustion
[AD-A166185] N86-29932

MACHINERY DIAGNOSTICS, INC., MINDEN, NEV.
Aerodynamic instability: A case history N86-30190

MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Near-field testing of the 15-meter model of the hoop column antenna. Volume 2: Near- and far-field plots for the LaRC feeds
[NASA-CR-178060] N86-29877

MARYLAND UNIV., BALTIMORE.
A possible role for endogenous glucocorticoids in orchiectomy-induced atrophy of the rat levator ani muscle: Studies with RU38486, a potent and selective antiglucocorticoid
[NASA-CR-177029] N86-30343

MARYLAND UNIV., COLLEGE PARK.
Measuring the software process and product: Lessons learned in the SEL N86-30358

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Calculations of axisymmetric vortex sheet roll-up using a panel and a filament model
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Analytical investigation of rotor wake formation and geometry
[NASA-CR-177032] N86-29768
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[AD-A166208] N86-29892
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[MIT-RR-R84-3] N86-29906
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[DE86-007005] N86-29977
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[DE86-007370] N86-30004
Round robin scheduling for fair flow control in data communication networks
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Macromodeling and optimization of digital MOS VLSI circuits
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[AD-A166287] N86-30571
Analysis of Jovian decamteric data: Study of radio emission mechanisms
[NASA-CR-176878] N86-30619

MASSACHUSETTS UNIV., AMHERST.
Small angle neutron scattering study on a polymer blend: Characterization of the deformation behavior
[DE86-006099] N86-30003

MATRA ESPACE, TOULOUSE (FRANCE).
Imaging and sounding instruments in the spin stabilized version of the second generation Meteosat
[REPT-60/1566] N86-29899

MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
Charge states of energetic solar particles
[MPE-195] N86-30623

MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
Laser induced fluorescence of FCO radicals in the gas phase
[MPIS-17/1985] N86-29950
A fast high power light pulse generator
[MPIS-18/1985] N86-30085
Experimental investigation of resistive damping elements
[MPIS-19/1985] N86-30475
Measurement of absolute emission cross sections for extreme ultraviolet (EUV) photons in thermal collisions of metastable helium (2 sup 1 S) with neon and helium
[MPIS-14/1985] N86-30480
Orientation effects and fine structure transitions in differential scattering cross sections
[MPIS-15/1985] N86-30481
Theoretical investigation of the scattering of the rotation-bending coupling, and study of intensity weakening using an optical model: Calculations for the systems H2-LiF(001) and HD-Ag(111)
[MPIS-16/1985] N86-30483
Elementary reactions of electronically excited molecules 6. Quenching of O2(1 delta g) by amines, furanes, pyrroles, and thiophenes
[MPIS-21/1985] N86-30484

MCCRONE RESEARCH INST., CHICAGO, ILL.
Thin-sectioning and microanalysis of individual extraterrestrial particles N86-30586

MCDONNELL-DOUGLAS CORP., LONG BEACH, CALIF.
Safety fuels-specifications and progress N86-30018

MECHANICAL TECHNOLOGY, INC., LATHAM, N. Y.
Automotive Stirling engine development program
[NASA-CR-175045] N86-30579

MELBOURNE UNIV., PARKVILLE (AUSTRALIA).
Simulation of non-linear bearing forces for post-stability investigation N86-30163

MESS UND SYSTEM TECHNIK G.M.B.H., OBERSCHLEISSHEIM (WEST GERMANY).
Digital magnetic tape mass memory store
[BMFT-FB-T-85-151] N86-30356
METRAFLU, ECULLY (FRANCE).
Spectral study of turbulence. Pure rotation and introduction to mode composition
[ESA-86-97273] N86-30121
MICHIGAN STATE UNIV., EAST LANSING.
Inhibiting corrosion cracking: Crack tip chemistry and physics
[AD-A168317] N86-29966
MICHIGAN UNIV., ANN ARBOR.
Phase transformations in nickel-aluminum alloys during ion beam mixing
[DE86-007519] N86-29980
MIDWEST RESEARCH INST., GOLDEN, COLO.
Composite turbine blade design options for Claude (open) cycle OTEC power systems
[DE85-016876] N86-30215
MILITAIR HOSPITAAL DR. A. MATHIJSEN, UTRECHT (NETHERLANDS).
Systematic radiographic examination of the spine for selection of F-16 pilots: A preliminary report
N86-30323
MINNESOTA MINING AND MFG. CO., ST. PAUL.
Research on high-efficiency, single-junction, monolithic, thin-film amorphous silicon solar cells
[DE86-004420] N86-30258
MINNESOTA UNIV., MINNEAPOLIS.
International Workshop on Two-Phase Flow Fundamentals
[DE86-006548] N86-30112
Superconductivity of thin film intermetallic compounds
[AD-A168271] N86-30525
MISSION RESEARCH CORP., SAN DIEGO, CALIF.
Electron-ion recombination in air at EMP fields
[AD-A168211] N86-30486
MITRE CORP., BEDFORD, MASS.
Observations from a prototype implementation of the Common APSE Interface Set (CAIS) N86-30368
MITRE CORP., MCLEAN, VA.
The concept of almost-parallel IFR (Instrument Flight Rules) approaches to parallel runways
[AD-A166485] N86-29804
MONTANA STATE UNIV., MISSOULA.
Boundary layer stability measurements over a flat plate at mach 3
[AD-A166188] N86-29778
MOTOREN- UND TURBINEN-UNION MUENCHEN G.M.B.H. (WEST GERMANY).
Transient thermal behaviour of a compressor rotor with ventilation: Test results under simulated engine conditions N86-29856
MOUND LAB., MIAMISBURG, OHIO.
Cryogenic explosion environment modeling and testing of space shuttle and light-weight radioisotope heater unit interactions
[DE86-005901] N86-29881
Strength characterization method for evaluating ceramic-to-metal bonds
[DE86-007526] N86-30225

N

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
An overview of the Kaliningrad Spaceflight Control Center
[NASA-TM-87980] N86-29876
The electrification of spacecraft
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X-ray satellite (Rosat)
[NASA-TM-88481] N86-29889
Production of an ion-exchange membrane-catalytic electrode bonded material for electrolytic cells
[NASA-TM-88392] N86-29930
Thermal smoothing of rough surfaces in vacuo
[NASA-TM-88425] N86-29961
Outgassing measurement of the aluminum alloy UHV chamber
[NASA-TM-88433] N86-29962
Relation between microstructural heterogeneous surface layer and nitrogen pressure during sintering in SiSNA-MI2O3 ceramics
[NASA-TM-88409] N86-29986
Life Sciences Space Station planning document: A reference payload for the Life Sciences Research Facility
[NASA-TM-89188] N86-30302
Organization of the channel-switching process in parallel computer systems based on a matrix optical switch
[NASA-TM-88452] N86-30406
Preparation and optical properties of GA(x)IN(1-x)P alloys
[NASA-TM-88431] N86-30518
NASA thesaurus supplement
[NASA-SP-7053-SUPP-1] N86-30569
Hungarian space research 1981-1985: Lectures and review articles
[NASA-TM-87992] N86-30580
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Volatile components and continental material of planets
[NASA-TM-88478] N86-30615
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[NASA-TM-88423] N86-30617
Preliminary results of measurements by automated probes Vega 1 and 2 or particle concentration in clouds of Venus at heights 47-63 KM
[NASA-TM-88424] N86-30618
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Transonic Navier-Stokes wing solution using a zonal approach. Part 1: Solution methodology and code validation
[NASA-TM-88248] N86-29765
Flight control system development and flight test experience with the F-111 mission adaptive wing aircraft
[NASA-TM-88265] N86-29813
Experience with synchronous and asynchronous digital control systems
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[NASA-TM-89228] N86-30303
Division of attention as a function of the number of steps, visual shifts, and memory load
[NASA-TM-88775] N86-30328
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Benchmark full configuration-interaction calculations on HF and NH2 N86-30376
On the electron affinity of the oxygen atom
N86-30377
A micrometeoroid deceleration and capture experiment: Conceptual experiment design description N86-30605
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. DRYDEN (HUGH L.) FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Model-following control for an oblique-wing aircraft
[NASA-TM-88269] N86-29867
Eigensystem synthesis for active flutter suppression on an oblique-wing aircraft
[NASA-TM-88275] N86-29868
A radar data processing and enhancement system
[NASA-TM-88274] N86-29884
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD INST. FOR SPACE STUDIES, NEW YORK.
A superconducting tunnel junction receiver for millimeter-wave astronomy
[NASA-TM-87792] N86-30517
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Aerospace Safety Advisory Panel report to the NASA acting administrator
[NASA-TM-89226] N86-29879
Proceedings of Tenth Annual Software Engineering Workshop
[NASA-TM-88780] N86-30357
Studies and experiments in the Software Engineering Lab (SEL) N86-30359
DEASEL: An expert system for software engineering
N86-30361
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Proceedings of the 2nd Annual Conference on NASA/University Advanced Space Design Program
[NASA-TM-89399] N86-29888
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Manned Mars missions: A working group report
[NASA-TM-88777] N86-29873
Scientific and technical papers presented or published by JSC authors in 1985
[NASA-TM-58273] N86-30568
An in-situ measurement of particulates from solid rocket motors fired in space N86-30585
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Precision requirements on cosmic dust trajectory measurements N86-30607
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Motion and interaction of decaying trailing vortices in spanwise shear wind
[NASA-TP-2599] N86-29762
Effect of Reynolds Number and Mach Number on flow angularity probe sensitivity
[NASA-TM-87750] N86-29774
Stability and control of compressible flows over a surface with concave-conves curvature
[NASA-CR-178143] N86-29775
Pseudo-time algorithms for the Navier-Stokes equations
[NASA-CR-178127] N86-29776
An entropy correction method for unsteady full potential flows with strong shocks
[NASA-TM-87769] N86-29777
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[NASA-TM-87767] N86-29814
Design and fabrication of large suction panels with perforated surfaces for laminar flow control testing in a transonic wind tunnel
[NASA-TM-89011] N86-29815
Adaptive wall wind tunnels: A selected, annotated bibliography
[NASA-TM-87639] N86-29871
Cryogenic wind tunnels for high Reynolds number testing
[NASA-TM-87743] N86-29872
Tension strength of a thick graphite/epoxy laminate after impact by a 1/2-in. radius impactor
[NASA-TM-87771] N86-29907
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OFFICE OF SOFTWARE DEVELOPMENT, FALLS CHURCH, VA.
Ada (trade name) compiler validation summary report: Digital Equipment Corporation VAX Ada compiler version 1.1 VAX 8600, VAX-11/785, VAX-11/780, VAX-11/782, VAX-11/750, VAX-11/730, MicroVAX 1 and 2 VAXstation 1 and 2 using VAX/VMS and MicroVMS version 4.2 and VAXELN version 2
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OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
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[DE86-006473] N86-30576

SAO PAULO UNIV. (BRAZIL).
Time dependent variational description of one-dimensional inelastic scattering
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SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
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SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
The magnetic effects of shallow water internal solitons
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SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
A study of (OI) 63.2 and 145.5 micron emission from M17 and SGR A from the Lear jet
[NASA-CR-177015] N86-30625

SOCIETE NATIONALE D'ETUDES ET DE CONSTRUCTION DE MOTEURS D'AVIATION, MOISSY-CRAMAYEL (FRANCE).
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SOCIETE NATIONALE INDUSTRIELLE AEROSPATIALE, SURESNES (FRANCE).
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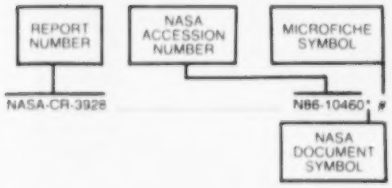

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Subject scope of *STAR*, and *IAA* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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03 AIR TRANSPORTATION AND SAFETY 3412
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For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

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Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
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Includes cockpit and cabin display devices; and flight instruments.
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07 AIRCRAFT PROPULSION AND POWER 3417
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.
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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
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ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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13 ASTRODYNAMICS 3421
Includes powered and free-flight trajectories; and orbit and launching dynamics.

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For related information see also *09 Research and Support Facilities (Air)*.

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Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

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Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.
For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

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For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3424
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20 SPACECRAFT PROPULSION AND POWER 3431
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **3432**
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24 COMPOSITE MATERIALS **3432**
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Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
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Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

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28 PROPELLANTS AND FUELS **3444**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) **3445**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **3445**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING **3451**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuity.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

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37 MECHANICAL ENGINEERING **3470**
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38 QUALITY ASSURANCE AND RELIABILITY **3472**
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39 STRUCTURAL MECHANICS **3473**
Includes structural element design and weight analysis, fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

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For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION **3479**
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Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS **3483**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
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47 METEOROLOGY AND CLIMATOLOGY **3494**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **3496**
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

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Includes genetics.

52 AEROSPACE MEDICINE **3499**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **3500**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **3500**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **3502**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE **3503**
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63 CYBERNETICS **3508**
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Includes mathematical modeling; network analysis; and operations research.

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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **3529**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **3535**
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82 DOCUMENTATION AND INFORMATION SCIENCE **3535**
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83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE **3536**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3537**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
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SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **3538**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3540**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3541**
Includes planetology; and manned and unmanned flights.
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92 SOLAR PHYSICS **3542**
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AUTHOR

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HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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01 AERONAUTICS (GENERAL)

N86-30627# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Bonn (West Germany).
THE SECOND INTERNATIONAL SYMPOSIUM ON AEROELASTICITY AND STRUCTURAL DYNAMICS
1985 713 p Symposium held in Aachen, West Germany, 1-3 Apr. 1985; sponsored in cooperation with DFVLR, NLR and ONERA (DGLR-85-02; ISBN-3-922010-29-8; ESA-86-97411) Avail: NTIS HC A99/MF E03

Unsteady aerodynamics and aeroelastic characteristics; active control technology; structural modeling and optimization; structural system identification; and structural dynamics design verification of space structures were discussed. For individual titles, see N86-30628 through N86-30689.

N86-30628# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
TRANSONIC EQUIVALENT STRIP METHOD FOR AEROELASTIC APPLICATIONS **c02**
D. D. Liu, Y. F. Kao, and K. Y. Fung (Arizona Univ., Tucson) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 17-32 Sponsored by DTNSRDC/NAVAIR (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

For unsteady flow computations of arbitrary wing planforms including control surfaces, a method based on the transonic equivalent strip (TES) model is developed. It consists of two consecutive correction steps to a given unsteady two-dimensional code. The latter can be a time-linearized transonic code or a nonlinear one such as LTRAN2 code. The mean-flow correction step involves an equivalent airfoil design procedure; the spanwise phase correction step accounts for the effects of acoustic wave propagation in three dimensions. Computed results using the TES method are compared with those obtained by methods such as versions of XTRAN3 code, Isogai's full potential code, and measured data. Computed cases include the Northrop F-5 wing in pitching oscillation, the AGARD standard RAE wing with an oscillating flap, and the LANN wing in pitching oscillation. ESA

N86-30629# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
CALCULATION OF THREE-DIMENSIONAL TRANSONIC POTENTIAL FLOWS BY A FIELD PANEL METHOD **c02**
R. Voss *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 33-46 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A calculation method for three dimensional transonic flows around oscillating wings is described. It solves the time-linearized unsteady transonic small perturbation equation by an integral equation method with a field panel technique. In a computer code called PTRAN3, the field panel technique is combined with a finite difference method. Accuracy and computer costs of the code are acceptable for routine flutter applications. Results for applications to pitching motions of a rectangular wing and two swept wings (LANN wing and F5 wing) with high and low aspect ratio are shown. ESA

N86-30630# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
APPLICATION OF TRANSONIC UNSTEADY METHODS FOR CALCULATION OF FLUTTER AIRLOADS **c08**
H. Zimmermann and S. Vogel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 47-61 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The supercritical MBB-A3 profile was used as an example for calculating steady and unsteady pressure distribution by unsteady transonic codes. Most of the calculations were performed using the nonlinear TSP-equation and its time linearized form solved by a time marching method and by an integral method. The influence of the coefficient of the nonlinear term, of the inclusion of the steady or quasi-steady boundary layer thickness, and of the fulfillment of the Rankine-Hugoniot condition on the resulting pressure distribution is shown. Flutter calculations were made for a two degree of freedom representative section. The resulting critical speeds show a considerable variation depending on which method was used. Results show that there are good arguments for using time-linearized TSP methods in flutter calculations in the transonic domain. ESA

N86-30631# Fairchild Republic Div., Farmingdale, N. Y.
EXACT CLOSED-FORM SOLUTIONS FOR NONLINEAR UNSTEADY TRANSONIC AERODYNAMICS **c02**
Gabriel A. Oyibo *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 71-78 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The existence of exact closed-form solutions for nonlinear unsteady aerodynamics is established. The full nonlinear unsteady velocity potential equations for an airfoil are considered. Evidence indicating why the traditional hodograph approach is ineffective for solving these equations is provided. A mapping scheme transforms these full nonlinear equations into the hodograph plane. Examination of the resulting hodograph equations reveals that by prescribing the Jacobian of the transformation, ab initio, the exact closed-form solutions can be obtained for the nonlinear unsteady aerodynamic characteristics of an airfoil in a potential flow. The shockless transonic results for inviscid analysis show trends that agree with previous data. Dips are observed in the pressure distributions as the free stream Mach number is varied. There are finite optimum reduced frequencies (Strouhal numbers) for the pressure distributions. This suggests a solution to the transonic dip problem associated with aeroelastic stability characteristics at transonic Mach numbers. ESA

N86-30632# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.

STEADY AND UNSTEADY PRESSURE DISTRIBUTION ON VARIOUS PROFILES IN SEPARATED SUBSONIC AND TRANSONIC FLOW c02

H. Triebstein *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 99-119 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

Steady, mean, and unsteady aerodynamic data were measured on two dimensional rectangular wings, one with a supercritical MBB-Va2 profile and one with a NACA 0012 in subsonic flow and another supercritical MBB-A3 profile in transonic flow. The measurements were performed to produce systematic results with respect to Mach number, reduced frequency, incidence (wing, spoiler, tab) and amplitude of oscillation, and for use in the development and assessment of subsonic and transonic codes. The higher harmonic parts of the unsteady pressure in the region of pressure jumps and flow separation are emphasized. The wind tunnels, test setups, wing configurations, electronic data recording and processing devices, and the measuring procedure are described. ESA

N86-30633# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).

AN IMPROVED POTENTIAL GRADIENT METHOD FOR THE CALCULATION OF UNSTEADY AERODYNAMIC PRESSURES ON OSCILLATING WINGS IN SUPERSONIC FLOW c02

F.-Q. Zhang and H. Foersching *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 153-162 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

A method to calculate pressure distributions on harmonically oscillating wings is presented. The method uses an integral variable substitution, by which the computer time is reduced considerably together with an improvement of computation accuracy, especially for low supersonic Mach numbers and high reduced frequencies. Comparisons with other methods and experimental results show quite satisfactory agreement. ESA

N86-30634# Tel-Aviv Univ. (Israel). Dept. of Solid Mechanics, Materials and Structures.

AN EXACT FORMULATION OF THE UNSTEADY AERODYNAMIC THEORY OF LIFTING SURFACES UNDERGOING ARBITRARY SMALL MOTIONS IN A SUPERSONIC FLOW FIELD c02

Liviu Librescu *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 163-168 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

The indirect theory of unsteady lifting surfaces is developed. The integral equation (IE) relating a known downwash distribution to an unknown pressure distribution is derived without any restriction on the time dependence of field variables. The IE for simple harmonic motions and arbitrary small motions starting from rest at a certain time are obtained. In the latter case, the theory of generalized functions is used to derive the appropriate integral equation, by incorporating the associated initial conditions, and by highlighting properties of the aerodynamic kernel such as causality. The relationship between the aerodynamic kernels in the time and frequency domains is established. The problem analyzed is useful in the evaluation of the structural response of flight vehicles as well as in the active control problem of aeroelastic response. ESA

N86-30635# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelasticity.

THEORETICAL FLUTTER INVESTIGATIONS ON A PLANE CASCADE IN INCOMPRESSIBLE FLOW c08

V. Carstens *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 169-179 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

An analysis which predicts the aeroelastic behavior of a plane cascade in incompressible flow is presented. The unsteady aerodynamic forces and moments acting on the blades are calculated by the method of surface layers. In the general case of bending and/or torsional modes, this method is based on the simultaneous solution of two linear integral equations of the second kind which contain the interaction of steady and unsteady blade loading as well as the influence of all other specific cascade parameters. The solution of the flutter equations for a two degree of freedom model is discussed on the basis of a given cascade configuration. ESA

N86-30636# Technische Univ., Brunswick (West Germany). Inst. fuer Stroemungsmechanik.

APPLICATION OF UNSTEADY WING COLLOCATION METHODS TO CASCADES IN SUBSONIC FLOW c02

A. Klose and B. Laschka *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 180-186 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

A method to calculate the pressure distribution and unsteady forces on the blades of a flat plate cascade in subsonic flow during harmonic oscillation is presented. A collocation method as used in lifting surface theories for single airfoils was adapted to solve the cascade equation. Pressure distribution and aerodynamic forces for several values of stagger, reduced frequency, space-to-chord ratio, Mach number and interblade phase angle were calculated. The results were compared to published data. Significant differences are discovered. ESA

N86-30637# Northwestern Polytechnical Univ., Xian (China).

A NUMERICAL ANALYSIS FOR VERTICAL GUST FIELD INDUCED BY GUST GENERATOR c08

Yongnian Yang and Jianpei Wang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 187-193 (For primary document see N86-30627 22-01)

Avail: NTIS HC A99/MF E03

A method for calculating vertical gust field induced by a gust generator, which consists of a group of oscillating vanes, based on subsonic unsteady lifting surface theory is presented. When the geometry of the gust generator, oscillating frequency and amplitude, and Mach number are given, the unsteady downwash field can be determined. In the calculation, the interference among the vanes is considered. Through numerical calculation, the characteristics of the vertical gust field induced by one, two, or three vanes with various reduced frequencies and Mach numbers are investigated. The influence of the gust generator on the characteristics of the vertical gust field are discussed, and conclusions for gust wind tunnel design are outlined. ESA

N86-30638*# California Univ., Berkeley. Dept. of Mechanical, Aerospace and Nuclear Enginee Ring.

A NEW LOOK AT ARBITRARY MOTION UNSTEADY AERODYNAMICS AND ITS APPLICATION TO ROTARY-WING AEROELASTICITY c02

Peretz P. Friedmann *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 194-210 (For primary document see N86-30627 22-01)

(Grant NAG2-209)

Avail: NTIS HC A99/MF E03 CSCL 01B

Research on arbitrary motion unsteady aerodynamics, emphasizing applications to rotary wing aeroelastic problems, is reviewed. Generalization of Greenberg's theory and its application to hingeless rotor aeroelastic stability; a technique for formulating finite state approximations to unsteady aerodynamic theories, suitable for fixed and rotary-wing applications, and its application to generalize Loewy's theory; comparison of fixed wing and rotary wing indicial response functions; influence of arbitrary motion aerodynamics, as represented by dynamic inflow on a helicopter in ground resonance; and comparison of dynamic inflow with arbitrary motion unsteady airfoil aerodynamics are covered. ESA

N86-30639# Shenyang Aircraft Corp. (China).
EXPERIMENTAL TRANSONIC PRESSURE DISTRIBUTIONS OF A FLEXIBLE WING-AILERON MODEL AND COMPARISONS WITH RESULTS OF SEVERAL THEORETICAL METHODS c02
De Guan, Weixing Liu, Zhiquan Gao, and Yuxin Zhang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 211-218 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Analytical methods for the prediction of transonic load distribution due to large aileron deflection angle on a flexible wing were investigated. A 60 deg delta wing model with representative stiffness level and deflected aileron was tested in a high speed wind tunnel, and pressure distributions were measured. Second order transonic small disturbance theory, linearized aerodynamic theory, and an empirical method based on rigid model pressure distributions were used to calculate the load distribution. The empirical method seems more powerful. ESA

N86-30640# Northwestern Polytechnical Univ., Xian (China).
CALCULATION OF THE LOAD DISTRIBUTION, AERODYNAMIC DERIVATIVES AND DYNAMIC CHARACTERISTICS OF QUASI-STATIC ELASTIC AIRCRAFT c02
Qiangang Liu, Changlin Wu, Zheng Jian, and Kai Wu *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 219-228 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A numerical method for predicting the aerodynamic characteristics of quasi-static elastic aircraft is presented. The method can be used to evaluate the load distribution, control surface efficiency, aerodynamic derivatives and dynamic properties at subsonic speed. The aerodynamic calculations are based on the Green's function method. In structure deformation calculations, the free-structure influence coefficient method is used to evaluate the deformation of the elastic aircraft in free flight. The calculations are carried out for a large elastic aircraft. Results on load distribution, elevator efficiency, longitudinal aerodynamic derivatives, frequency responses to elevator input, and other dynamic properties are compared with those of the same aircraft where the elastic effect is not considered. ESA

N86-30641# Israel Aircraft Industries Ltd., Ben-Gurion Airport.
STATIC AEROELASTIC ANALYSIS USING AIRCRAFT VIBRATION MODES c39
Z. Sheena and M. Karpel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 229-232 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A method for the calculation of the airload distribution and aeroelastic effectiveness parameters of a flexible aircraft from the distribution of a rigid one, using its vibration modes, is presented. The method uses modal data of the model in the form of a limited number of low frequency mode shapes and their associated generalized stiffnesses. The mathematical operations are done on the generalized matrices of the model which have a small number of degrees of freedom. The method can calculate the static aeroelastic properties of a free-free aircraft using its elastic, inertial, and aerodynamic properties. The method is suitable for making parametric analyses involving changes in the stiffness of the structure and the aerodynamics of the model. Numerical examples are given and the convergence with the number of modes taken into account is discussed. ESA

N86-30642# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.
A REVIEW OF AEROELASTIC RESEARCH AT THE FLIGHT DYNAMICS LABORATORY c08
T. M. Harris, T. E. Noll, T. J. Hertz, and W. A. Sotomayer *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 233-243 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Research on aeroservoelasticity, adaptive flutter suppression, the effects of stores carriage on body freedom flutter, and three dimensional transonic unsteady aerodynamics is discussed. Aeroservoelasticity studies involve research to develop tools for aeroelastic analyses of aircraft when active feedback control systems are taken into account. Adaptive flutter suppression for aircraft carrying external stores is evaluated by wind tunnel tests. Subsonic wind tunnel tests were performed to evaluate the effect of store location, mass, and inertia on aeroelastic stability. ESA

N86-30643# Fairchild Republic Div., Farmingdale, N. Y.
AEROELASTIC WIND TUNNEL SIMILARITY THEORY FOR ANISOTROPIC AIRCRAFT WINGS c08
Gabriel A. Oyibo *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 257-264 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A theory outlining a simplified approach for aeroelastically simulating anisotropic aircraft wings is presented. An examination of the fundamental aeroelastic equations of motion for anisotropic aircraft wings, with the help of affine transformations, reveals that a unified simulation theory, which reduces to the existing theory in the isotropic limit can be formulated. It is discovered that the necessary condition for preserving the Strouhal number (reduced frequency) between the real aircraft wing and its wind tunnel model is by preserving the generalized forms of the similarity parameters suggested by Theodorsen and Garrick as well as new parameters. The additional similarity parameters reflect directional and coupling stiffness properties of anisotropic materials in a given aerospace structure. The results reduce to those for aircraft wings fabricated of isotropic materials if these new parameters are set equal to zero. ESA

N86-30644# British Aerospace Dynamics Group, Hatfield (England). Civil Div.
THE CHOICE OF TECHNIQUES USED FOR FLIGHT FLUTTER CLEARANCE WITH PARTICULAR REFERENCE TO THE BAe 146 AND BAe 125 c08
A. G. Woods *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 265-275 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The considerations necessary to arrive at a safe and cost effective method of flutter clearance are discussed. Flight flutter tests of the BAe 146 and BAe 125, for both of which a fast sweep technique was chosed, are described. Methods of excitation, recording, and analysis are given. ESA

N86-30645# Saab-Scania, Linkoping (Sweden).
FLUTTER CALCULATION BY A NEW PROGRAM c08
Valter J. E. Stark *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 276-285 Sponsored by Swedish Defence Administration and Saab Scania A.B. (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A flutter and response program based on general equations of motion is described. The equations are solved by Laplace transformation and by reducing the inversion integral to a sum of the residues at the poles at the zeros of the determinant. The resulting nonlinear eingenvalue problem, i.e., the problem of finding the zeros, is solved by the Newton-Raphson formula with numerical methods for calculation of the determinant and the principle of the argument for finding initial approximations. The program permits choice of different kinds of analytic functions in the linear approximation that is employed for approximating the aerodynamic transfer functions. Equations representing control laws of a flutter suppression system can be included. ESA

N86-30646# Pilatus Aircraft Ltd., Stans (Switzerland).
EXPERIENCE WITH AEROELASTIC ANALYSIS OF A SINGLE ENGINE TURBO TRAINER USING FINITE ELEMENT METHODS c39
M. J. Reinicke, A. S. Turi (Omega G.m.b.H., Immenstaad West

Germany), and A. Vollan *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 286-296 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The PC-9 trainer aircraft dynamic analysis concept, based on a theoretical approach relying upon results of extensive ground vibration tests conducted on the similar structure of the PC-7, is outlined. The mathematical model shows good agreement with test results. Flight flutter tests verify the calculated aeroelastic stability. The program dealing with modal variation of mass, stiffness and damping allows changes on superelement level. Hence, the size of the residual structure can be further reduced and the CPU time cut down accordingly. ESA

N86-30647# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A FLUTTER SUPPRESSION CONTROL LAW BY USE OF LINEAR QUADRATIC GAUSSIAN AND CONSTRAINED OPTIMIZATION DESIGN TECHNIQUES c08
William M. Adams and Sherwood H. Tiffany *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 297-308 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

A control law to suppress symmetric flutter for a mathematical model of an aeroelastic research vehicle is developed. An implementable control law is attained by including modified linear quadratic Gaussian design techniques, controller order reduction, and gain scheduling. A complementary design approach for a flight condition wherein nongradient-based constrained optimization techniques are applied to maximize controller robustness is illustrated. ESA

N86-30648# London Univ. (England). Dept. of Aeronautical Engineering.
FINITE STATE MODELLING OF AEROELASTIC SYSTEMS FOR ACTIVE CONTROL APPLICATIONS: A GENERAL THEORY c63
Ranjan Vepa *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 309-319 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The theory of modeling aeroelastic systems by finite state models is discussed. The models are classified as autonomous finite state models, time varying system models, and differential delay system models. It is shown that control law synthesis for active control can be performed using the differential delay model, which does not contribute to any additional states and is valid for the closed and open loop cases. However, control law implementation requires that the states used for feedback be measured directly or estimated from measurements which are linear combinations of system states. Direct measurements of all feedback states is probably not practical so that sensor output data processing is required. Two alternatives are the statistical Kalman-Bucy filter with error dynamics governed by the statistics of the measurements noise, and a state estimator with error dynamics selected arbitrarily. ESA

N86-30649# National Aerospace Lab., Amsterdam (Netherlands). Dept. of Aeroelasticity.
NLR EXPERIENCE IN THE APPLICATION OF ACTIVE FLUTTER SUPPRESSION AND GUST LOAD ALLEVIATION, APPLIED TO A WIND TUNNEL MODEL c08
P. A. vanGelder *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 320-329 Sponsored by Netherlands Agency for Aerospace Programs and NLR (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Control laws for flutter suppression and gust load alleviation systems were developed and tested using an aeroelastic model in a subsonic wind tunnel with the capability to simulate discrete or random gusts. Flutter suppression up to the maximum wind tunnel speed (1.4 m/sec) is achieved, while the gust load alleviation system reduces the wing root bending moment by 25% at 0.9 m/sec for simulated gusts with a Dryden spectrum. ESA

N86-30650# Royal Aircraft Establishment, Farnborough (England).
THE DESIGN AND WIND TUNNEL DEMONSTRATION OF AN ACTIVE CONTROL SYSTEM FOR GUST LOAD ALLEVIATION AND FLUTTER SUPPRESSION c08
I. W. Kaynes, C. W. Skingle, and J. C. Copley *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 330-347 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Wind tunnel tests on a flexible model with an active control system are described. A flutter suppression control law was designed and tested. It is shown that flutter suppression is achieved in the presence of gusts. The mathematical model of the aircraft includes descriptions of the whole aircraft motion and the flexible aircraft deformations. Physically realistic modifications were made to the mathematical model to enhance the agreement between predictions and the measured loads and responses. Physical understanding of the active controls is facilitated by an interactive control system design package. The predicted and measured performance of the control laws are presented. ESA

N86-30651# Northwestern Polytechnical Univ., Xian (China).
CONTROL LAW SYNTHESIS FOR GUST LOAD ALLEVIATION USING LINEAR QUADRATIC GAUSSIAN THEORY c08
Jin Chang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 362-367 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A method of using linear quadratic Gaussian synthesis in the design of multiloop gust alleviation for a flexible aircraft is presented. To obtain an aeroelastic sytem with a finite-order state form matrix equation, the aerodynamic influence coefficients are approximated by a rational function of s. A technique to minimize the number of augmented states is presented. For all the coefficient matrices, a matrix least squares formula is established. The fitting accuracy of this methods is better than other methods. ESA

N86-30652*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STIFFNESS CONTROL OF LARGE SPACE STRUCTURES c18
Jay-Chung Chen and James L. Fanson *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 368-373 Sponsored by NASA (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

A method of using internal force producing dual element/actuators for vibration suppression of large space structures is proposed. The technique is applied to a vibrating string and to a low order system. Response feedback control for the vibrating string and selected modal control are used for achieving the modal damping. The actuators may be electrically powered and are suitable for structures with extremely low rigidity. ESA

N86-30653# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ASPECTS OF ACTIVE ISOLATION AS APPLIED TO A SATELLITE STRUCTURE WITH SHAPE PRECISION PAYLOAD c18
W. Charon *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 374-380 (For primary document see N86-30627 22-01)
(Contract ESTEC-5326/83-NL-PB(SC))
Avail: NTIS HC A99/MF E03

Active vibration control of flexible spacecraft is discussed. The satellite structure is divided into two rigid modules: the shape precision payload and a vibrating equipment module containing the attitude sensors and the attitude actuators. The two modules are connected by six spring-force actuator devices considered together to determine the isolation control forces. These connections transmit the low-frequency attitude control to the precision payload but attenuate the higher-frequency disturbances whose

shape and magnitude are unknown to the isolation control system. ESA

N86-30654# Grumman Aerospace Corp., Bethpage, N.Y.
THE APPLICATION OF PRACTICAL OPTIMIZATION TECHNIQUES IN THE PRELIMINARY STRUCTURAL DESIGN OF A FORWARD-SWEPT WING **c05**
Edwin Lerner *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 381-392 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The application of optimization technology in design studies that preceded the full development of the Grumman X-29, forward swept wing, demonstrator aircraft is outlined. Finite-element resizing methods were developed to satisfy optimality criteria for strength and divergence-velocity constraints. Application of the methods in an initial feasibility study of a variable sweep wing and in a more detailed, fixed wing design study are described. The usefulness of the methodology at various stages of design in demonstrated by tracing the process that led to the selection of an efficient cover-laminate configuration. ESA

N86-30655# Cranfield Inst. of Tech. Bedford (England). Coll. of Aeronautics.
STRUCTURAL OPTIMIZATION PROGRAMS AND METHODS **c05**
A. J. Morris *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 393-406 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Minimum weight design algorithms used in computer aided aircraft design are reviewed. Applications to carbon fiber composite wings, aircraft flaps, fuselages, and an automobile seat are illustrated. ESA

N86-30656# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
VARIATION OF ANISOTROPIC BEHAVIOR IN STRUCTURAL OPTIMIZATION **c05**
G. Hornung, D. W. Mathias, and H. Roehrle *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 407-414 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Use of the gradient method to optimize carbon fiber reinforced composite airframe design is described. The optimization process consists of two major parts. The first part of the calculation is done to select the fiber orientations for a given structure under a given load. In the second part this preoptimized configuration is improved by varying the thicknesses of the layers, leading to the optimum design. This design having preoptimized compounds is compared with a corresponding quasiisotropic structure and a design having four fixed fiber directions but different thicknesses of the layers. The preoptimized design is shown to be best adapted to the load bearing requirements of the structure. ESA

N86-30657# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
TAILORING METHODOLOGY FOR AEROELASTIC STABILITY AND LATERAL CONTROL ENHANCEMENT **c08**
Terrance A. Weisshaar *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 415-425 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Uses of aeroelastic tailoring to enhance aircraft structural design for dynamic response are discussed. The incorporation of directional stiffness into a design may alter drastically the mode shapes and frequencies of lifting surface. This alteration affects dynamic aeroelastic interactions between modal forces as well as the modal forces themselves. Tailoring to increase flutter speed generally produces a degradation of the classical divergence speed. As a result, the freedom of the wing to move as a rigid body in concert with the fuselage may render the aircraft susceptible to an attitude instability called body-freedom flutter. Thus, aeroelastic tailoring may lead to aeroelastic behavior characteristics not unlike those of swept forward wings. Tailoring may improve controllability at reduced cost. It may provide increased effectiveness of active control by creating a harmonious control/structure environment. ESA

N86-30658# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
STRUCTURAL OPTIMIZATION WITH CONSTRAINTS IN DYNAMICS **c18**
Horst J. Baier *In* DGLR The 2nd International Symposium on Elasticity and Structural Dynamics 1985 p 426-433 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Application of mathematical programming for spacecraft optimum structural design, especially weight minimization under static constraints is discussed. Since optimization under dynamic response in general leads to highly nonconvex problems, special care has to be taken for considering local optima. Whatever solution strategy is applied, availability of derivatives of the response is highly desirable. The control force approach is an interesting alternative to the classical mathematical optimization approaches. Since it usually leads to linear problems it is very efficient and circumvents problems related with nonconvexity. Examples to outline the findings are given. ESA

N86-30659# Fairchild Republic Div., Farmingdale, N. Y.
ANISOTROPIC WING AEROELASTIC THEORIES WITH WARPING EFFECTS **c02**
Gabriel A. Oyibo and Julian H. Berman *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 434-440 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The influence of warping (spanwise axial constraints on wing twist) on anisotropic wing aeroelastic oscillations is investigated using a similarity rule approach. Results show that a high aspect ratio anisotropic wing could behave aeroelastically like a low aspect ratio wing and vice-versa. Similarity parameters derived in the analysis expose conditions for which this might happen. The analysis also indicates that the parameter that is currently used in determining when warping is important (or when not to use the St Venant's torsion theory) is inaccurate for anisotropic wings. The correct parameter is presented. ESA

N86-30660# Tel-Aviv Univ. (Israel). Faculty of Engineering.
RECENT RESULTS ON THE WEIGHT MINIMIZATION OF PANELS WITH A FLUTTER SPEED CONSTRAINT **c05**
L. Librescu and L. Beiner *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 441-450 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Weight minimization of flat and curved panels exposed to a supersonic flow and subjected to a flutter speed constraint is described. The analysis encompasses axisymmetric circular cylindrical shells and rectangular orthotropic flat panels. Optimal control in a single variable and of distributed parameter systems is used in deriving the optimality equations. In order to ensure that the flutter speed of the optimal panel coincides with the constrained one, a flutter instability condition is employed. Galerkin's technique is used for solving the optimality equations and the influence of orthotropicity ratio, in-plane loads, aspect ratio, and boundary conditions on the optimal thickness distribution is determined. For the case of pure transverse shear panels, an aeroelastic paradox similar to the membrane paradox is revealed. The cases of 1-D type panels and isotropic 2-D panels are also considered. ESA

N86-30661# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
EFFECTS OF ANISOTROPIC DESIGN ON THE STATIC AEROELASTICITY OF A SWEPT WING
Matthias Piening *In* DGLR The 2nd International Symposium on

Aeroelasticity and Structural Dynamics 1985 p 451-456 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A simple structural idealization is adopted to model an arbitrary swept anisotropic wing of moderate to high aspect ratio. The related differential equations are solved for the deformations and internal forces by multiple shooting. The divergence speed is calculated by searching the lowest eingenvalue of the structural matrix formed from the transfer matrices of the wing sections and the according boundary conditions. Parametric evaluations are performed. ESA

N86-30662# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
AEROELASTIC PROBLEMS AND STRUCTURAL DESIGN OF A TAILLESS CARBON FIBER COMPOSITE (CFC) SAILPLANE **c05**
J. Schweiger, O. Sensburg, and H. J. Berns (Technische Univ., Brunswick, West Germany) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 457-468 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Severe instability at low speed in a 1/3 scale model of a 15 m sailplane was studied. Flutter calculations using data from a ground resonance test show that coupling of the rigid body short period mode with the first elastic mode causes the phemomenon. The wing was redesigned with the optimization programs FASTOP and TSO to find optimum fiber orientations and stiffness distributions for aeroelastic and strength requirements. By applying these computer codes the flutter speed is increased to an acceptable level with small modifications of the wing root geometry, a new design of the main spar, and by using a high modulus fiber type. With a small weight penalty compared to the initial design the flutter speed can be doubled. ESA

N86-30663# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
SIMULATION OF AIRCRAFT TAXI TESTING ON THE AGILE SHAKER TEST FACILITY **c09**
Raymond Freymann and William P. Johnson (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 468-476 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Use of the Aircraft Ground Induced Loads Excitation test facility, an array of three independent shakers which allows laboratory simulation of an aircraft taxiing on rough surfaces, in the dynamic qualification process and for verification of the mathematical structural model of an aircraft is described. Experimental determination of the elastomechanical characteristics of aircraft landing gears and tires is outlined. ESA

N86-30664# Liege Univ. (Belgium).
DYNAMIC ANALYSIS OF STRUCTURES WITH FLEXIBLE ROTORS **c07**
M. Geradin and N. Kill *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 477-485 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Analytical tools for the dynamic structural analysis of machines with rotating parts such as aircraft engines are described. The finite element analysis is used for discretization, and the rotating parts are described using a 3-D formalism which includes in the kinetic energy expression the gyroscopic effects induced by the local changes of angular velocity produced by the deformation. The implementation of the formalism is specialized to the modeling of flexible rotors made of shafts and disks typical of modern aircraft engines. The effectiveness of the component mode synthesis method to reduce the size of the system of equations is demonstrated in the case of systems made of rotating and fixed parts. Critical speed and stability analyses and unbalance response calculations are performed by a sweeping procedure. The concepts are applied to the dynamic analysis of a high by-pass ratio aircraft engine. ESA

N86-30665# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
STRUCTURAL DYNAMIC ASPECTS OF ROTOR NODAL ISOLATION **c05**
J. Stoppel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 486-494 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

An Antiresonance Isolation System (ARIS) for helicopters is described. In the passive nodal isolation system, the antiresonant frequency is tuned to the main rotor passage frequency to prevent the transmission of the oscillatory hub forces and moments to the fuselage. Analysis demonstrates that the nodal rotor isolation system may be strongly influenced by the structural dynamics of the helicopter. Due to the numerous eingenvalues the antiresonant frequency of the isolation system may be compensated by an adjacent natural frequency. In this case the desired isolating effect disappears. The complexity of the three dimensional structure aggravates the understanding and prediction of vibration system. For the BK 117 helicopter with MBB-ARIS, the structural optimization is demonstrated using finite element methods. ESA

N86-30666# RESSULT, Soechtenau (West Germany).
ANALYTICAL FINITE ELEMENTS **c39**
Peter H. Kulla *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 495-503 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Continuous element techniques for analyzing linear dynamic systems are outlined, and their efficient use of computer power is described. Systems can be condensed without loss of accuracy. It is not necessary to choose the coordinates to be eliminated in such a way that the error introduced by static reduction schemes is minimized. This gives the freedom to eliminate systematically all inner coordinates of a (sub-) structure and to describe a system in the coordinates of the boundary points only. This feature is highly desirable if two or more structures are considered substructures and are assembled to a higher level system. For reasons of flexibility this procedure has to work repeatedly at different system levels. The approach is only feasible if every substructure (including the final one) is a selfcontained module. ESA

N86-30667# Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
INFLUENCE OF AXIAL FORCE ON RANDOM VIBRATION RESPONSE OF A STRUCTURE **c39**
Isaac Elishakoff *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 504-511 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Random vibration of a beam simply supported at its ends, including the effect of a deterministic axial loading is studied. The beam is excited by a random transverse load represented by a space and time wise ideal white noise. A closed-form solution is obtained for the displacement space-time correlation function at zero time lag. It is shown that as the axial load approaches the Euler buckling level, the random displacement response increases indefinitely. For axial loads below this level, the obtained expressions permit direct evaluation of probabilistic characteristics of the response. ESA

N86-30668# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF BOTH COMPLEX CHARACTERISTIC STRUCTURAL VALUES AND NORMAL MODE PARAMETERS FROM HARMONIC EXCITATION NEAR RESONANCE **c39**
J. Artmann *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 512-522 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A method of performing system identification on damped elastomechanical structures is proposed. It applies a complex transformation to the usual generalized dynamic equation of motion, giving the possibility to use arbitrary complex response modes to set up the equation of motion. Using harmonic excitation, such response modes can be produced easily and quickly in a conventional vibration test, because no adjustment to natural frequencies or force vectors is necessary. As a consequence of transforming the generalized equation of motion, complex structural system parameters are created, being the elements of two complex matrices which are neither diagonal nor symmetric. However, simple mathematical relations can be derived to compute the elements of these matrices. Any dynamic structural problem, e.g., the flutter problem, can be solved without further knowledge of the usual normal mode parameters. ESA

N86-30669# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. of Aeroelasticity.
ADVANCES IN GROUND VIBRATION TESTING USING A COMBINATION OF PHASE RESONANCE AND PHASE SEPARATION METHODS **c39**
N. Niedbal *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 523-528 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A ground vibration test (GVT) method that uses the complex response modes obtained directly from harmonic excitation near resonance with the arbitrary force distribution to set up the generalized dynamic equation of motion without knowledge of normal modes and normal mode parameter was derived. The dominating quantities of the method are the response mode matrices and the characteristic matrices which may be compared with the generalized mass and stiffness matrices of the phase resonance method. It is demonstrated how to derive normal mode shapes and associated normal mode parameters from the information contained in the characteristic matrices and in the response mode matrices. The method was validated by applying it to the solution of a flutter problem and the evaluation of normal mode parameters. Data were obtained from a GVT performed on a full-scale aircraft. ESA

N86-30670# Franche-Comte Univ., Besancon (France). Lab. de Mecanique Appliquee.
SIMULTANEOUS DETERMINATION OF NORMAL EIGENMODES AND GENERALIZED DAMPING MATRIX FROM COMPLEX EIGENMODES **c39**
Qiang Zhang and Gerard Lallement *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 529-535 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

An iterative method that deals simultaneously with the eigensolutions of the associated conservative structure from identified complex eigensolutions, and the generalized damping matrix from the identified complex eigensolutions is outlined. It leads to an improved coherence of these two types of data. It proves to be relatively stable and little modified by the errors of generalized masses. The method is illustrated by numerical and experimental examples. ESA

N86-30671# Kassel Univ. (West Germany).
IDENTIFICATION AND DYNAMIC CONDENSATION OF PHYSICAL SYSTEM MATRICES USING INCOMPLETE DYNAMIC RESPONSE DATA **c39**
M. Link and K. Badenhausen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 536-545 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Two direct identification methods, one in the frequency domain the other in the time domain, are presented. The concept of so-called incomplete system identification is introduced. The application of the two methods to a small scale hardware model is shown. ESA

N86-30672# Spar Aerospace Ltd., Toronto (Ontario).
MODAL PARAMETERS ESTIMATION FROM DRIVEN-BASE TESTS **c18**
S. Draisey, F. R. Vigneron (Department of Communications, Ottawa, Ontario), Y. Soucy, and J.-G. Beliveau (Sherbrooke Univ., Quebec) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 546-552 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The theory for a modal method of extraction of modal parameters from uniaxial driven base tests is outlined. With accelerometer data from the driven base and points on the structure, modal frequencies, damping factors, mode shapes, and the product of modal momentum times normalization constant can be determined. The results of a structure tested in driven base random and sine are presented. The structure tested represented a configuration typical of communications satellite in stowed configuration. The driven base results are compared with those obtained from a fixed base single point random survey. Comparison shows that the method is accurate and practical. ESA

N86-30673# London Univ. (England). Dept. of Aeronautical Engineering.
DETERMINATION OF FORCE DISTRIBUTIONS IN MULTI-POINT RESONANCE TESTING USING VARIOUS DIRECT METHODS **c39**
K. Alexiou and J. R. Wright *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 553-564 Sponsored by UK Ministry of Defence (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Direct methods, which use the measured receptance matrix between several measurement and force positions, are applied to simulated six degree of freedom data with two closely spaced modes. An alternative to Asher's (1958) method, based on an eigenvalue solution followed by an eigenvector interpolation, is shown to improve the determination of the number of effective modes (and hence exciters needed) and also of the required force distribution. A similar eigenvalue method based on the characteristic phase lag theory proposed by Traill-Nash (1958) is also studied and, apart from an apparent sensitivity to noise which needs further consideration, seems to be an improvement on both approaches to Asher's method. ESA

N86-30674# Franche-Comte Univ., Besancon (France). Lab. de Mecanique Appliquee.
EIGENSOLUTION IDENTIFICATION OF NON SELF-ADJOINT MECHANICAL STRUCTURES **c39**
Qiang Zhang and Lallement Gerard *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 565-570 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

An identification method of left hand side and right hand side eigenvectors for non self-adjoint structures which have to be modelled by nonsymmetric state matrices is proposed. The method is based on the results of modal identifications successively performed on the initial structure and the same structure with additional masses. It gives good results for two simple laboratory structures. ESA

N86-30675# Manchester Univ. (England). Simon Engineering Labs.
RECENT DEVELOPMENTS IN THE IDENTIFICATION OF NONLINEARITY IN MODAL TESTING **c39**
G. R. Tomlinson *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 571-580 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The optimum frequency response function, the bispectrum and Volterra series, and the Hilbert transform are reviewed. It is shown that the use of the optimum frequency response function produces a linearized function but this cannot be used directly to identify the nonlinearity, whereas with the Hilbert transform a direct

indication of nonlinearity is obtained. The bispectrum and Volterra series are discussed in relation to their applicability in modal testing. Details on the Hilbert transform and its application in modal testing is presented. ESA

N86-30676# Old Dominion Coll., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
ADVANCES IN TIME DOMAIN MODAL IDENTIFICATION AND MODELING OF STRUCTURES **c39**
Samir R. Ibrahim *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 581-594 Sponsored by AFWAL (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Modal identification frequency domain methods from the Kennedy and Pancu technique (1947) to existing transfer function methods is reviewed. Time domain methods are discussed. A time domain approach using an upper Hessenberg sparse matrix is presented and shown to reduce computational requirements and produce higher identification accuracy for damping factors. Future directions and hardware and software needs are summarized. ESA

N86-30677# London Univ. (England). Queen Mary Coll.
COMPARISON OF SOME TIME DOMAIN METHODS FOR STRUCTURAL SYSTEM IDENTIFICATION **c39**
J. E. Cooper and J. R. Wright *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 595-604 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Time domain parameter identification methods based on the difference equation model relating sampled response and excitation are considered. The least squares, instrumental variables, and correlation fit methods are described and applied to one and two mode simulated data in the presence of input or measurement noise with various noise-to-signal ratios. Test results are compared statistically to examine the scatter on damping results and whether they are biased. The correlation fit method is seen to be the most suitable for development. ESA

N86-30678# Northwestern Polytechnical Univ., Xian (China). Dept. of Aircraft Engineering.
DETERMINATION OF NATURAL VIBRATION PROPERTIES OF A WING WITH WINGLET BY EXPERIMENTAL MODE SYNTHESIS TECHNIQUE **c05**
S. N. Gu, W. J. You, and J. S. Jiang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 605-611 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Nine lowest natural frequencies and their corresponding natural modes of a wing model with winglet were determined using electric measurement and laser time-averaged holographic interferometry supplemented by sand contours. Three-dimensional quantitative analysis and orthogonalization of the three lowest natural modes of wing with winglet are carried out. Modal synthesis is used to get lower ordered natural frequencies and modes of the wing model with winglet, by using the six lowest orthogonalized modes of the wing and three lowest orthogonalized modes of the winglet. Calculated results of natural frequencies and modes of the wing with winglet and its wing by finite element method agree quite well with experimental data. ESA

N86-30679# Israel Aircraft Industries Ltd., Ben-Gurion Airport.
RAPID VIBRATION MODE ANALYSIS OF AIRCRAFT WITH EXTERNAL STORES **c05**
M. Karpel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 612-616 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A method for coupling the vibration modes of a central structure to additional substructures is presented. A set of low frequency natural modes, including rigid body modes, represents the central structure. These modes are obtained by a mathematical model loaded with a set of fictitious masses at the connection to the substructures degrees of freedom. The substructures are represented by their mass properties, vibration modes with clamped boundary conditions and free-free rigid body modes. The connection of each substructure to the central structure is statically determinate. The method is applied for vibration analysis of aircraft with external stores. The coupled aircraft + stores dynamic properties may be efficiently used for flutter analysis. Comparison with vibration modes obtained by a direct (full-size) eigensolution shows very accurate coupling results with low order eigensolutions. ESA

N86-30680# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ANALYSIS-TEST CORRELATION OF DYNAMIC MATHEMATICAL MODELS **c18**
B. Caesar *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 617-624 (For primary document see N86-30627 22-01)
(Contract ESTEC-5597/83/NL-PB(SC))
Avail: NTIS HC A99/MF E03

The reasons for correlation of test and analysis results as well as for the mathematical model update process are summarized and related to the total development flow of a spacecraft structure. Correlation methods such as modal scale factor, assurance criteria, and enhanced frequency response functions are reviewed. Berman's method symmetry, and orthogonality conditions with a least squares deviation of updated against previous mass and stiffness matrices is improved by taking into account rigid body masses. The algorithmic approaches are discussed leading to linear least squares problems under equality constraints. Applications of this method based on simulated test data and recommendations for improvements in related modal tests are given. ESA

N86-30681# Technische Univ., Hanover (West Germany).
UPDATING MATHEMATICAL MODELS ON THE BASIS OF VIBRATION AND MODAL TEST RESULTS, A REVIEW OF EXPERIENCE **c39**
H. G. Natke and N. Cottin *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 625-631 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Structural model updating procedures based on the method of weighted least squares are reviewed. These use input and output, residuals, the equation error, and partial residuals for modal quantities. Results of simulated tests show the (statistical) properties of the applied least squares estimators. Real applications are presented. ESA

N86-30682*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST AND ANALYSIS CORRELATION FOR STRUCTURAL DYNAMIC SYSTEMS **c18**
Ben K. Wada and Jay-Chung Chen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 632-647 Sponsored by NASA (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

Activities in modifying a structural mathematical model to correlate with its modal test results are summarized. Results from the Viking and Galileo spacecraft, and developments in the parameter estimation of structural mathematical models of large flexible structures using multiple boundary condition tests are presented. ESA

N86-30683*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC VERIFICATION OF VERY LARGE SPACE STRUCTURES **c18**
Brantley Hanks, R. *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 648-655 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

A research program in spacecraft structures, structural dynamics, and controls verification using a relatively large, flexible beam as a focus is introduced. This research effort addresses fundamental problems applicable to the verification of large, flexible space structures and combines ground tests, flight behavior prediction, and instrumented orbital tests. The program is expected to produce quantitative results for use in improving the validity of ground tests for verifying flight performance analyses. ESA

N86-30684# Technische Hochschule, Aachen (West Germany). Inst. fuer Leichtbau.
RECONSTRUCTION OF FORCING FUNCTIONS BASED ON MEASURED STRUCTURAL RESPONSES **c18**
H. Oery, H. Glaser, and D. Holzdeppe *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 656-668 Sponsored by Deutsche Forschungsgemeinschaft, ESA, and MBB/Erno G.m.b.H. (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A structural analysis procedure to reconstruct the significant parts of the forcing function time-histories based on a restricted number of test records is presented. Use of the inverse application of the phase-plane method and Williams' method is proposed. The procedure is based on the fact that very slowly varying loads induce deformations, which can be determined using the stiffness matrix only. It can be applied to aerospace structures and to earthquake engineering. ESA

N86-30685# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SPACECRAFT STRUCTURES DESIGN AND VERIFICATION **c18**
C. Stavrinidis *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 669-671 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Definition of spacecraft design loads, design and development of spacecraft structures, and qualification and acceptance of spacecraft structures are discussed. State of the art structural engineering; maturity of methodologies; sequence of events as they arise in spacecraft projects; trends; and future requirements are described. ESA

N86-30686# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
LOW FREQUENCY DESIGN VERIFICATION OF LARGE SPACECRAFT STRUCTURES **c18**
E. Erben and K. Eckhardt *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 672-682 Sponsored by INTELSAT and ESTEC (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Multiaxis vibration system (MAVIS) testing of large spacecraft structures is described. Specified acceleration time histories are compared with the realized time histories measured at base point of test item. For the uniaxial excitation compliance is very good. During two axis excitation the differences between specified and measured input time histories are significant. The deviations are associated with strong frequency and amplitude changes in the transient motion. However, these results are achieved with an open loop control configuration of test facility and improvements are possible. Simulations of antenna reactions suggest deviations between applied and specified forces but resulting acceleration responses on different structure points are comparable with results achieved in test with complete S/C (same order of maximum acceleration peaks). ESA

N86-30687# Department of Communications, Ottawa (Ontario). David Florida Lab.
VIBRATION QUALIFICATION AT THE DAVID FLORIDA LABORATORY **c18**
Rolf Mamen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 683-688 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

A facility for spacecraft integration and environmental tests to qualify flight hardware is presented. Its thermal vacuum, mass properties, radio frequency, and vibration testing services are used for programs ranging from black box level to complete spacecraft and space systems. Its comprehensive structural qualification capabilities were selected for the Remote Manipulator System, ANIK-D, Brazilsat, and L-Sat. ESA

N86-30688# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
INFLUENCE OF NONLINEAR SPACECRAFT COMPONENTS ON DYNAMIC LAUNCH AND IN-ORBIT RESPONSE **c18**
I. Kolsch and H. Baier *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 689-696 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

Analytical and experimental investigations of a BAPTA-yoke-solar array system are presented. Harmonic balance, Fourier expansion, and perturbation methods were selected, since the system could be reasonably reduced to a springs-masses model with measured nonlinear force-displacement curves. The investigation shows significant dependency on maximum response frequencies and amplifications (pseudo damping) with (harmonic and random) input levels. Due to a shift in the point of operation in the nonlinear stiffness relation caused by quasistatic acceleration, the response data also significantly depend on the applied g-level, leading to considerable shifts in maximum response frequencies and loss of symmetries. For in-orbit dynamics with low static and dynamic input levels, maximum response frequencies could be relatively low. ESA

N86-30689# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SIGNIFICANCE AND RELIABILITY OF DYNAMIC ANALYSIS METHODS DEMONSTRATED IN THE INSTRUMENT POINTING SYSTEM PROJECT **c16**
E. Hilbrandt and J. Kroeker *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 697-699 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

The dynamic load analysis of the Instrument Pointing System to obtain design loads which can be used for detailed stress analysis and for the proof of safe life or fail safe design is summarized. Such design loads may be defined as a reduced load set enveloping the actual flight loads. The flight loads themselves are not used for stress analysis because of their great variety and because they are extremely dependent upon the design itself. It is the aim of the design loads to provide a flight load envelope which can remain unchanged throughout the entire course of the design process. As the transient load-contribution represents the greatest severity for the primary structure the determination of the design loads needs only to be demonstrated for the transient loads. ESA

N86-30690# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERNATIONAL AVIATION (SELECTED ARTICLES)
Tien Shey-Shi, Kuan-Ming Hsu, I-Tsai Kuo, and Chien Huang 14 Mar. 1986 35 p Transl. into ENGLISH from Guoji Hangkong (China), no. 2(264), Feb. 1985 p 24-26; 27-29; 45-46
(AD-A166748; FTD-ID(RS)T-0843-85) Avail: NTIS HC A03/MF A01 CSCL 01/3

Following are the partial contents of a report on international aviation: A few points on longitudinal jet ejection techniques; Foreign technology studies on external store separation; Stealth aircraft technology Current development and future prospects. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-30691*# New York Univ., New York. Courant Mathematics and Computing Lab.
THE METHOD OF COMPLEX CHARACTERISTICS FOR DESIGN OF TRANSONIC BLADE SECTIONS Research and Development Report
M. R. Bledsoe Jun. 1986 203 p
(Grant NAG2-345; Contract DE-AC02-76ER-03077; Grant NSF DMS-83-20430)
(NASA-CR-176978; NAS 1.26:176978; DOE/ER-03077/273) Avail: NTIS HC A10/MF A01 CSCL 01A

A variety of computational methods were developed to obtain shockless or near shockless flow past two-dimensional airfoils. The approach used was the method of complex characteristics, which determines smooth solutions to the transonic flow equations based on an input speed distribution. General results from fluid mechanics are presented. An account of the method of complex characteristics is given including a description of the particular spaces and coordinates, conformal transformations, and numerical procedures that are used. The operation of the computer program COMPRES is presented along with examples of blade sections designed with the code. A user manual is included with a glossary to provide additional information which may be helpful. The computer program in Fortran, including numerous comment cards is listed. B.G.

N86-30692*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
AERODYNAMIC DRAG REDUCTION TESTS ON A BOX-SHAPED VEHICLE Final Report
Randall Lee Peterson and Doral R. Sandlin Aug. 1981 53 p
(Contract NCC4-1)
(NASA-CR-176982; NAS 1.26:176982) Avail: NTIS HC A04/MF A01 CSCL 01A

The intent of the present experiment is to define a near optimum value of drag coefficient for a high volume type of vehicle through the use of a boattail, on a vehicle already having rounded front corners and an underbody seal, or fairing. The results of these tests will constitute a baseline for later follow-on studies to evaluate candidate methods of obtaining afterbody drag coefficients approaching the boattail values, but without resorting to such impractical afterbody extensions. The current modifications to the box-shaped vehicle consisted of a full and truncated boattail in conjunction with the faired and sealed underbody. Drag results from these configurations are compared with corresponding wind tunnel results of a 1/10 scale model. Test velocities ranged up to 96.6 km/h (60 mph) and the corresponding Reynolds numbers ranged up to 1.3 x 10 to the 7th power based on the vehicles length which includes the boattail. A simple coast-down technique was used to define drag. Author

N86-30693*# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
AERODYNAMIC DATA BANKS FOR CLARK-Y, NACA 4-DIGIT AND NACA 16-SERIES AIRFOIL FAMILIES Final Report
K. D. Korkan, J. Camba, III, and P. M. Morris Jan. 1986 272 p
(Contract NAS3-272)
(NASa-CR-176883; NAS 1.26:176883) Avail: NTIS HC A12/MF A01 CSCL 01A

With the renewed interest in propellers as means of obtaining thrust and fuel efficiency in addition to the increased utilization of the computer, a significant amount of progress was made in the development of theoretical models to predict the performance of propeller systems. Inherent in the majority of the theoretical performance models to date is the need for airfoil data banks which provide lift, drag, and moment coefficient values as a function of Mach number, angle-of-attack, maximum thickness to chord ratio, and Reynolds number. Realizing the need for such data, a study was initiated to provide airfoil data banks for three commonly used airfoil families in propeller design and analysis. The families chosen consisted of the Clark-Y, NACA 16 series, and NACA 4 digit series airfoils. The various component of each computer code, the source of the data used to create the airfoil data bank, the limitations of each data bank, program listing, and a sample case with its associated input-output are described. Each airfoil data bank computer code was written to be used on the Amdahl Computer system, which is IBM compatible and uses Fortran. Author

N86-30694*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
COMPARISON OF EXPERIMENTAL SURFACE PRESSURES WITH THEORETICAL PREDICTIONS ON TWIN TWO-DIMENSIONAL CONVERGENT-DIVERGENT NOZZLES
John R. Carlson, Odis C. Pendergraft, Jr., and James R. Burley, II Aug. 1986 31 p Presented at the AIAA 4th Applied Aerodynamics Conference, San Diego, Calif., 9-11 Jun. 1986
(NASA-TM-87757; NAS 1.15:87757; AIAA-86-1803-CP) Avail: NTIS HC A03/MF A01 CSCL 01A

A three-dimensional subsonic aerodynamic panel code (VSAERO) was used to predict the effects of upper and lower external nozzle flap geometry on the external afterbody/nozzle pressure coefficient distributions and external nozzle drag of nonaxisymmetric convergent-divergent exhaust nozzles having parallel external sidewalls installed on a generic twin-engine high performance aircraft model. Nozzle static pressure coefficient distributions along the upper and lower surfaces near the model centerline and near the outer edges (corner) of the two surfaces were calculated, and nozzle drag was predicted using these surface pressure distributions. A comparison between the theoretical predictions and experimental wind tunnel data is made to evaluate the utility of the code in calculating the flow about these types of non-axisymmetric afterbody configurations. For free-stream Mach numbers of 0.60 and 0.90, the conditions where the flows were attached on the boattails yielded the best comparison between the theoretical predictions and the experimental data. For the Boattail terminal angles of greater than 15 deg., the experimental data for M = 0.60 and 0.90 indicated areas of separated flow, so the theoretical predictions failed to match the experimental data. Even though calculations of regions of separated flows are within the capabilities of the theoretical method, acceptable solutions were not obtained. Author

N86-30695*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL AND NUMERICAL RESULTS FOR A GENERIC AXISYMMETRIC SINGLE-ENGINE AFTERBODY WITH TAILS AT TRANSONIC SPEEDS
James R. Burley, II, John R. Carlson, and William P. Henderson Aug. 1986 20 p Presented at the AIAA 4th Applied Aerodynamics Conference, San Diego, Calif., 9-11 Jun. 1986
(NASA-TM-87755; NAS 1.15:87755; AIAA-86-1797-CP) Avail: NTIS HC A02/MF A01 CSCL 01A

Static pressure measurements were made on the afterbody, nozzle and tails of a generic single-engine axisymmetric fighter configuration. Data were recorded at Mach numbers of 0.6, 0.9, and 1.2. NPR was varied from 1.0 to 8.0 and angle of attack was varied from -3 deg. to 9 deg. Experimental data were compared with numerical results from two state-of-the-art computer codes. Author

N86-30696*# Colorado Univ., Boulder. Dept. of Aerospace Engineering Sciences.
NUMERICAL STUDIES OF POROUS AIRFOILS IN TRANSONIC FLOW Ph.D. Thesis. Final Report, 1 Jun. 1985 - 31 Aug. 1986
Chuen-Yen Chow 1986 114 p
(Contract NCC2-355)
(NASA-CR-179655; NAS 1.26:179655) Avail: NTIS HC A06/MF A01 CSCL 01A

A numerical tool is constructed to examine the effects of a porous surface on transonic airfoil performance and to help understand the flow structure of passive shockwave/boundary layer interactions. The porous region is located near the shock with a cavity underneath it. This study is composed of two parts. Solved in the first part, with an inviscid-flow approach, is the transonic full-potential equation associated with transpiration boundary conditions which are obtained from porosity modeling. The numerical results indicate that a porous airfoil has a wave drag lower than that of a solid airfoil. The observed lambda-shock structure in the wind-tunnel testing can be predicted. Furthermore, the lift could be increased with an appropriate porosity distribution. In the second part of this work, the modified version of either an interactive boundary layer (IBL) algorithm or a thin-layer Navier-Stokes (TLNS) algorithm is used to study the outer flow, while a stream-function formulation is used to model the inner flow in the shallow cavity. The coupling procedure at the porous surface is based on Darcy's law and the assumption of a constant total pressure in the cavity. In addition, a modified Baldwin-Lomax turbulence model is used to describe the transpired turbulent boundary layer in the TLNS approach, while the Cebeci turbulence model is used in the IBL approach. According to the present analysis, a porous surface can reduce the wave drag appreciably, but can also increase the viscous losses. As has been observed experimentally, the numerical results indicate that the total drag is reduced at higher Mach numbers and increased at lower Mach numbers when the angles of attack are small. Furthermore, the streamline pattern of passive shock/boundary layer interaction are revealed. Author

N86-30697*# Cornell Univ., Ithaca, N.Y. School of Mechanical and Aerospace Engineering.
AERODYNAMICS OF ENGINE-AIRFRAME INTERACTION Annual Progress Report, 1 Oct. 1985 - 30 Sep. 1986
D. A. Caughey 30 Aug. 1986 29 p
(Grant NAG2-373)
(NASA-CR-179657; NAS 1.26:179657) Avail: NTIS HC A03/MF A01 CSCL 01A

The report describes progress in research directed towards the efficient solution of the inviscid Euler and Reynolds-averaged Navier-Stokes equations for transonic flows through engine inlets, and past complete aircraft configurations, with emphasis on the flowfields in the vicinity of engine inlets. The research focusses upon the development of solution-adaptive grid procedures for these problems, and the development of multi-grid algorithms in conjunction with both, implicit and explicit time-stepping schemes for the solution of three-dimensional problems. The work includes further development of mesh systems suitable for inlet and wing-fuselage-inlet geometries using a variational approach. Work during this reporting period concentrated upon two-dimensional problems, and has been in two general areas: (1) the development of solution-adaptive procedures to cluster the grid cells in regions of high (truncation) error;and (2) the development of a multigrid scheme for solution of the two-dimensional Euler equations using a diagonalized alternating direction implicit (ADI) smoothing algorithm. M.G.

N86-30698*# Vigyan Research Associates, Inc., Hampton, Va.
PAN AIR APPLICATION TO THE F-106B
Farhad Ghaffari Aug. 1986 60 p
(Contract NAS1-17919)
(NASA-CR-178165; NAS 1.26:178165) Avail: NTIS HC A04/MF A01 CSCL 01A

The PAN AIR computer code was employed in the present study to investigate the aerodynamic effects of the various geometrical changes and flow conditions on a configuration similar to the F-106B half-airplane tested in the Langley 30x60-foot wind tunnel. The various geometries studied included two forebodies (original and shortened), two inlet flow conditions (open and closed) two vortex flap situations (off and on). The attached flow theoretical solutions were obtained for Mach number of 0.08 and angle of attack of 8 deg., 10 deg., 12 deg., and 14 deg. In general this investigation revealed that the shortening of the forebody or closing of the inlet produced only a small change in the overall aerodynamic coefficients of the basic F-106B configuration throughout the examined angles of attack. However, closing the inlet of the configuration resulted in a slightly higher drag level at low angles of attack. Furthermore, at and above 10 deg. angle of attack, it was shown that the presence of the vortex flap causes an increase in the total lift and drag. Also, these theoretical results showed the expected reduction in longitudinal stability level with addition of the vortex flap to the basic F-106B configuration. Author

N86-30699# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PRESSURE TEST OF THREE ELLIPTIC MISSILE BODY CONFIGURATIONS Final Report, 15 - 17 Sep. 1985
Marvin E. Sellers (Calspan Field Services, Inc., Arnold AFS, Tenn.) Oct. 1985 39 p Prepared in cooperation with Calspan Corp., Arnold
(AD-A166552; AEDC-TSR-85-P19) Avail: NTIS HC A03/MF A01 CSCL 20/4

A wind tunnel test was conducted to obtain the surface pressure distributions of three elliptic missile body configurations. The test was performed at nominal Mach numbers from 0.4 to 1.3 at a constant nominal free-stream unit Reynolds number of 2.4 million per ft. The angle-of-attack range was -4 to 20 deg at sideslip angles of -4, 0, and 4 deg. Only sample tabulations of the test results are included in the report. GRA

N86-30700# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AIR-ON DEMONSTRATION OF THE AEDC PWT TUNNEL 16T CAPTIVE TRAJECTORY SUPPORT SYSTEM Final Report, 21 Jul. - 26 Jul. 1985
Louisa L. Arendt (Calspan Field Services, Inc. Arnold AFS, Tenn.) Sep. 1985 68 p Prepared in cooperation with Calspan Field Service
(AD-A166888; AEDC-TSR-85-P17) Avail: NTIS HC A04/MF A01 CSCL 20/4

An air-on demonstration of the Captive Trajectory Support (CTS) system was conducted in the AEDC Propulsion Wind Tunnel (16T). The test objectives were: (1) to demonstrate the structural integrity of the CTS system; (2) to demonstrate the ability of the CTS system to satisfactorily obtain grid and trajectory generation data for a typical store model in free stream and relative to a simulated (flat plate) aircraft in a dynamic wind tunnel environment; (3) to obtain a Mach number calibration for the Tunnel 16T Cart 2 (Multipurpose Cart) with the CTS system installed. The 1/4-scale Maximum Volume Bomb (MVB) was used to represent a typical store. Data were obtained at free-stream numbers from 0.6 to 1.6 and at various compressor ratios. GRA

N86-30701# Dayton Univ., Ohio. Research Inst.
A SEMI-ANALYTICAL APPROACH TO THE INTEGRAL EQUATION (IN TERMS OF THE ACCELERATION POTENTIAL) FOR THE LINEARIZED SUBSONIC, OSCILLATORY FLOW OVER AN AIRFOIL Final Report, Mar. 1983 - Sep. 1985
Karl G. Guderley Mar. 1986 183 p
(Contract F33615-83-K-3207)
(AD-A167313; UDR-TR-85-91; AFWAL-TR-85-3119) Avail: NTIS HC A09/MF A01 CSCL 20/4

The kernel of the integral equation which describes the oscillatory flow over an airfoil has severe singularities. The mathematical questions that arise here are usually circumvented by the use of physical concepts; one concentrates, for instance, the pressures into lines, or even points and evaluates the upwash field by means of the Biot Savart law. The upwash so expressed in terms of the parameters that describe the pressure field is then matched at selected control points with the upwash prescribed by the boundary conditions. One thus obtains a finite linear system of equations for the parameters describing the pressure distribution. The selection of control points contains an element of uncertainty, because the upwash field generated by a pressure distribution of the assumed character is highly singular. In the present approach the pressure distribution is again represented

by a finite number of parameters and one ultimately solves a linear system of equations. But for the pressure a much smoother representation is chosen (piece-wise linear continuous functions). The upwash is then computed directly from the integral equation. Matching between the upwash distribution due to the unknown pressure distribution and that given by the boundary conditions is carried out in the average over upwash areas. Such a procedure requires repeated integrations. GRA

N86-30628# Arizona State Univ., Tempe. Dept. of Mechanical and Aerospace Engineering.
TRANSONIC EQUIVALENT STRIP METHOD FOR AEROELASTIC APPLICATIONS
D. D. Liu, Y. F. Kao, and K. Y. Fung (Arizona Univ., Tucson) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 17-32 Sponsored by DTNSRDC/NAVAIR (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30629# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
CALCULATION OF THREE-DIMENSIONAL TRANSONIC POTENTIAL FLOWS BY A FIELD PANEL METHOD
R. Voss *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 33-46 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30631# Fairchild Republic Div., Farmingdale, N. Y.
EXACT CLOSED-FORM SOLUTIONS FOR NONLINEAR UNSTEADY TRANSONIC AERODYNAMICS
Gabriel A. Oyibo *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 71-78 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30632# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
STEADY AND UNSTEADY PRESSURE DISTRIBUTION ON VARIOUS PROFILES IN SEPARATED SUBSONIC AND TRANSONIC FLOW
H. Triebstein *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 99-119 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30633# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).
AN IMPROVED POTENTIAL GRADIENT METHOD FOR THE CALCULATION OF UNSTEADY AERODYNAMIC PRESSURES ON OSCILLATING WINGS IN SUPERSONIC FLOW
F.-Q. Zhang and H. Foersching *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 153-162 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30634# Tel-Aviv Univ. (Israel). Dept. of Solid Mechanics, Materials and Structures.
AN EXACT FORMULATION OF THE UNSTEADY AERODYNAMIC THEORY OF LIFTING SURFACES UNDERGOING ARBITRARY SMALL MOTIONS IN A SUPERSONIC FLOW FIELD
Liviu Librescu *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 163-168 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30636# Technische Univ., Brunswick (West Germany). Inst. fuer Stroemungsmechanik.
APPLICATION OF UNSTEADY WING COLLOCATION METHODS TO CASCADES IN SUBSONIC FLOW
A. Klose and B. Laschka *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 180-186 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30638*# California Univ., Berkeley. Dept. of Mechanical, Aerospace and Nuclear Enginee Ring.
A NEW LOOK AT ARBITRARY MOTION UNSTEADY AERODYNAMICS AND ITS APPLICATION TO ROTARY-WING AEROELASTICITY
Peretz P. Friedmann *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 194-210 (For primary document see N86-30627 22-01)
(Grant NAG2-209)
Avail: NTIS HC A99/MF E03 CSCL 01B

N86-30639# Shenyang Aircraft Corp. (China).
EXPERIMENTAL TRANSONIC PRESSURE DISTRIBUTIONS OF A FLEXIBLE WING-AILERON MODEL AND COMPARISONS WITH RESULTS OF SEVERAL THEORETICAL METHODS
De Guan, Weixing Liu, Zhiquan Gao, and Yuxin Zhang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 211-218 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30640# Northwestern Polytechnical Univ., Xian (China).
CALCULATION OF THE LOAD DISTRIBUTION, AERODYNAMIC DERIVATIVES AND DYNAMIC CHARACTERISTICS OF QUASI-STATIC ELASTIC AIRCRAFT
Qiangang Liu, Changlin Wu, Zheng Jian, and Kai Wu *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 219-228 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30659# Fairchild Republic Div., Farmingdale, N. Y.
ANISOTROPIC WING AEROELASTIC THEORIES WITH WARPING EFFECTS
Gabriel A. Oyibo and Julian H. Berman *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 434-440 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-30702# Simula, Inc., Tempe, Ariz.
SEAT EXPERIMENT RESULTS OF FULL-SCALE TRANSPORT AIRCRAFT CONTROLLED IMPACT DEMONSTRATION Final Report, Jan. - Jul. 1985
Mark R. Cannon and Richard E. Zimmermann (RMS Technologies, Inc., Trevose, Pa.) Jul. 1986 248 p
(Contract DTFA03-81-C-00040)
(DOT/FAA/CT-85/25; TR-85413) Avail: NTIS HC A11/MF A01

The results of the Federal Aviation Administration (FAA) seat experiments tested in the joint FAA/NASA Controlled Impact Demonstration (CID) are described. Twenty-three seats were placed on the test aircraft. Thirteen seats were modifications of existing transport seats which were designed structurally to improve their crashworthiness. The remaining experiments were unmodified standard seats which included seven light and heavy-weight forward-facing seats, two aft-facing seats, and one flight attendant seat. Three additional seat experiments were placed onboard the test aircraft: two by NASA, and one by a private contractor. Onboard instrumentation was placed at specific locations to obtain data pertaining to airframe structural loads and seat/occupant response. Accelerometers were attached to the airframe and floor structure, the seat experiments, and the anthropomorphic dummies occupying the seats. The data base resulting from the test was intended for

validating crash prediction models and occupant/seat dynamic simulation models. Author

N86-30703# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT REPORT: PROVINCETOWN, BOSTON AIRLINES FLIGHT 1039, EMBRAER BANDEIRANTE, EMB-110P1, N96PB, JACKSONVILLE, FLORIDA, DECEMBER 6, 1984
24 Jun. 1986 100 p
(PB86-910405; NTSB/AAR-86/04) Avail: NTIS HC A05/MF A01

Provincetown-Boston Airlines Flight 1039, an Embraer Bandeirante, was cleared from the Jacksonville International Airport, Jacksonville, Florida, to Tampa, Florida at 1805 eastern standard time on December 6, 1985, in visual flight conditions. There were 11 passengers and 2 crewmembers aboard the scheduled domestic passenger flight operating under 14 CFR 135. At 1812, flight 1039 was cleared for takeoff, and, at 1813, while over the departure end of the runway and climbing, the crew acknowledged a frequency change Thirty seconds later, about 1814, the airplane was seen in a steep descent near the extended centerline of the runway. Flight 1039 struck the ground 7,800 feet beyond the departure end of runway 31 and 85 feet to the northeast (right) of the extended runway centerline in an inverted nose down attitude, after which it caught fire and burned. The airplane was demolished, and all 13 persons aboard were killed. Before ground impact, the horizontal stabilizer, including bulkhead No. 36, had separated from the fuselage. Both elevators and elevator tips, the tail cone assembly, and the aft portion of the ventral fin also had separated in flight. Author

N86-30704# Calspan Field Services, Inc., Arnold AFS, Tenn.
AIRCRAFT TRANSPARENCY TESTING: ARTIFICIAL BIRDS Final Report, 1 Jul. 1984 - 1 May 1985
C. J. Welsh and Vincent Centonze Apr. 1986 18 p Prepared in cooperation with AEDC
(AD-A166832; AEDC-TR-86-2) Avail: NTIS HC A02/MF A01 CSCL 14/2

An analysis was made concerning the use of artificial birds in bird impact testing of aircraft transparencies. Results of this analysis, including impact measurements at a nominal velocity of 500 fps, indicated that the use of artificial birds for impact testing at these conditions is impractical. This follows from the importance and difficulty of simulating the shear strength characteristics of real birds in transparency impacts. GRA

N86-30705# Weather Corp., Weston, Mass.
DEVELOPMENT OF AIRBORNE ELECTRIC FIELD AND LIGHTNING DETECTION INSTRUMENTATION FOR AVIATION SAFETY Final Report
Ralph Markson 20 Apr. 1986 30 p
(Contract N00014-85-C-0707)
(AD-A167342) Avail: NTIS HC A03/MF A01 CSCL 01/4

The objectives of Phase I were to investigate the use of simple corona current instrumentation on aircraft to measure thunderstorm electric fields and to conduct a feasibility study of a single station aircraft lightning interferometer to detect the occurrence and position of lightning. Both of these techniques have the common purpose of providing warning to aircraft crews when they are approaching potentially hazardous clouds and thunderstorms. The electric field measurement has the advantage of detecting electrified clouds which may not be producing lightning flashes but are nevertheless dangerous because an aircraft can trigger lightning; however this is a relatively short range system (on the order of 10 to 20 miles). The interferometer, which responds to RF pulses from lightning, has the advantage of long range detection (more than 100 miles) and can map the the position of lightning flashes in a manner similar to the way radar maps areas of rain. Thus the systems complement each other. GRA

N86-30706# Koninklijk Inst. voor de Marine, Den Helder (Netherlands).
THE BLACK BOX. SILENCE IS SILVER, SPEECH IS GOLDEN [DE ZWARTE DOOS. ZWIJGEN IS ZILVER, SPREKEN IS GOUD]
A. W. Pol Jul. 1984 151 p Partly in DUTCH and ENGLISH
(ESA-86-97394) Avail: NTIS HC A08/MF A01

Requirements, design and development, and feasibility aspects of Flight Data Recorders (FDR) and Cockpit Voice Recorders (CVR) are treated. Examples of existing systems (e.g., the U.S. Navy Universal Locator Airborne Data Systems, and the solid-state FDR) are given. Installation of FDR/CVR combined crash recorders in Westland Lynx helicopters is discussed. Aircraft accident relevant information, necessary adaptions of the helicopter, and feasibility were investigated. As the present aircraft indicating instruments often contain information after accidents it is concluded that installation of only a CVR is a feasible solution. However, future aircraft instruments (e.g., digital computers, and displays) might necessitate FDRs also. ESA

N86-30707# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
AVIATION WEATHER HAZARDS: FAA (FEDERAL AVIATION ADMINISTRATION) SYSTEM FOR DISSEMINATING SEVERE WEATHER WARNINGS TO PILOTS Briefing Report
Apr. 1986 34 p
(PB86-195070; GAO/RCED-86-152BR; B-222882) Avail: NTIS HC A03/MF A01 CSCL 01B

Controllers at the nation's busiest airports sometimes do not have time to disseminate weather information to pilots. In addition, when weather information is given, it may not be given as soon as possible because controllers are too busy performing their primary duty of separating aircraft. FAA's procedure for communicating weather warnings by having controllers read them over their radio frequencies is too slow to avoid potential hazards, and some pilots may not receive any warning because of radio frequency changes. On-airport weather detection systems (LLWAS and ASR) do not provide controllers adequate detection or information about potentially hazardous weather because the radar cannot detect storm intensities, and the wind shear system cannot reliably detect the most dangerous form of wind shear, microbursts. GRA

N86-30708# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
INTERACTION BETWEEN EMP (ELECTROMAGNETIC PULSE), LIGHTNING AND STATIC ELECTRICITY WITH AIRCRAFT AND MISSILE AVIONICS SYSTEMS
1986 144 p Presented at a Lecture Series, Ankara, Turkey, 29-30 May 1986, Oberpfaffenhofen, West Germany, 2-3 Jun. 1986, and The Hague, The Netherlands, 5-6 Jun. 1986; sponsored by Avionics Panel and the Consultant and Exchange Programme of AGARD
(AGARD-LS-144; ISBN92-835-1528-5) Avail: NTIS HC A07/MF A01

Interactions between transient electromagnetic waves with aircraft and missile avionics systems are described. Transient electromagnetic waves include electromagnetic pulses (EMP) from nuclear explosions, lightning, and static electricity. Interactions are introduced by coupling of EMP and lightning induced currents and voltages with avionics components. Shielding against these interactions is discussed with respect to induced currents and voltages from EMP and lightning, and induced voltages from static charging effects. Several examples of interactions, coupling, shielding, and measurement techniques are presented. This Lecture Series, sponsored by the Avionics Panel of AGARD, has been implemented by the Consultant and Exchange Program of AGARD. Author

N86-30709# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
CRASHWORTHINESS OF AIRFRAMES
1986 34 p Presented at the 61st Meeting of the Structures and Materials Panel of AGARD in Oberammergau, West Germany, 8-13 Sep. 1985
(AGARD-R-737; ISBN92-835-1525-0) Avail: NTIS

HC A03/MF A01

At its 61st Meeting the AGARD Structures and Materials Panel heard three papers as a preliminary to setting up a Sub-Committee on this topic; this publication contains these papers. They survey a range of theoretical and experimental aspects of crashworthiness relating to metallic structures. For structures made of these materials theoretical methods are becoming useful design tools, but much further development is required before composite structures can be satisfactorily handled. There is a very great need for a data base of reliable experimental information (including accident data bases) on both metallic and composite structures. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-30710*# Ohio Univ., Athens. Dept. of Electrical and Computer Engineering.

SPECIFICATION OF A NAVSTAR GLOBAL POSITIONING SYSTEM (GPS) RECEIVER FOR A DIFFERENTIAL GPS GROUND SYSTEM

Daryl L. McCall and Richard N. Turner Oct. 1984 18 p

(Grant NAG2-231)

(NASA-CR-177073; NAS 1.26:177073; TM-H-4) Avail: NTIS HC A02/MF A01 CSCL 17G

One step towards the successful completion of a functional ground unit for the Differential Global Positioning System (DGPS) will be in choosing a currently available GPS receiver that will accurately measure the propagation times of the satellite signals and have the capability to be electrically interfaced with and controlled by a Digital Equipment Corporation (DEC) PDP-11/34A computer. The minimum requirements and characteristics of a NAVSTAR Global Positioning System (GPS) receiver are described. The specific technical specifications addressed include data accuracies and resolutions, receiver interface/external control, enclosure dimensions and mounting requirements, receiver operation, and environmental specifications. M.G.

N86-30711# Radio Technical Commission for Aeronautics, Washington, D. C.

MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRBORNE AREA NAVIGATION EQUIPMENT USING OMEGA/VLF INPUTS

May 1986 187 p Supersedes RTCA/DO-140

(RTCA/DO-190; RTCA/DO-140) Avail: NTIS HC A09/MF A01

Minimum operational performance standards for airborne area navigation equipment (2D and 3D) operated in the National Airspace System (NAS) using Omega/Very Low Frequency (VLF) signals are presented. Incorporated within these standards are equipment characteristics that should be useful to users, designers, manufacturers, and installers of the equipment. The performance functions and features are defined for a 2D system which performs both lateral and vertical guidance. Equipment may be manufactured and tested to meet 2D or 3D requirements (or both) in the in route mode. Author

N86-30712# Federal Aviation Agency, Atlantic City, N.J. Technical Center.

COMPREHENSIVE TEST AND EVALUATION OF THE DALMO VICTOR TCAS 2 INDUSTRY PROTOTYPES Final Report, Feb. 1986

Albert Rehmann Feb. 1986 245 p

(FAA/PM-862; FAA/CT-86/2) Avail: NTIS HC A11/MF A01

The test procedure and results of a five-part comprehensive evaluation of two prototype minimum Traffic Alert and Collision Avoidance System (TCAS) II units are described. The five parts include: (1) hardware and software verification, (2) cockpit display and operational procedure verification. (3) pilot and inflight observer training, (4) TCAS II demonstration to the aviation community, and (5) readiness for airworthiness certification testing. Overall, the minimum TCAS II prototype has matured into an acceptable test-bed for the 8-month inservice evaluation in a commercial airliner. System reliability has improved and pilot acceptance was generally good. It is expected that minimum TCAS II will provide a valuable service to airline pilots. Author

N86-30713# Defense Mapping Agency, Washington, D.C.

THE DMA/GPS EARTH ORIENTATION PREDICTION SERVICE Final Report

John A. Bangert 28 Apr. 1986 16 p

(AD-A166830) Avail: NTIS HC A02/MF A01 CSCL 08/5

Since mid-1984, the Defense Mapping Agency (DMA) has been computing predictions of pole position (x and y) and time difference (UT1-UTC = delta UT) to support the NAVSTAR/GPS orbit determination process. These predictions are based upon the derived Earth orientation parameters published in the U.S. Naval Observatory's Earth Orientation Bulletin (Series 7) and are obtained by fitting these data to a set of models specified in the DMA/GPS Interface Control Document. This paper presents a review of the models and processes by which the Earth orientation predictions are computed at DMA. The results of a study to assess the accuracy of these predictions are also presented. Finally, several proposed methods for improving the prediction accuracies without altering the basic models are discussed and evaluated. GRA

N86-30714# Computer Technology Associates, Inc., Englewood, Colo.

OPERATIONS CONCEPT FOR THE TCCC (TOWER CONTROL COMPUTER COMPLEX) MAN-MACHINE INTERFACE Final Report

H. L. Ammerman, E. S. Becker, L. J. Bergen, D. K. Davies, and E. E. Inman 28 Mar. 1986 771 p

(Contract DTFA01-85-Y-01034)

(AD-A166899; FAA/AP-86/02) Avail: NTIS HC A99/MF A02 CSCL 17/7

Operations Concept for the TCCC Man-Machine Interface analyzes the tower Air Traffic Controller's job in the Tower Control Computer Complex (TCCC) environment. It considers the operations in today's towers and the automated capabilities planned for the TCCC, to reach an understanding of the Controller's job after TCCC implementation. Three separate positions are analyzed: Local Control, Ground Control, and Clearance Delivery/Flight Data. Analysis results include composition graphs and narratives showing the logical flow through the sub-activities of the three positions; task analysis, presenting the tasks of each position; task characterizations, including information requirements, cognitive/sensory attributes, and performance criteria associated with each task; and a top-level dialogue description summarizing the interaction between controller and TCCC. Traceability between tasks and system level specification requirements is also provided. GRA

N86-30715# Federal Aviation Agency, Atlantic City, N.J.

HARDWARE PERFORMANCE ANALYSIS OF THE BASIC NARROW MICROWAVE LANDING SYSTEM (MLS) AT WASHINGTON NATIONAL AIRPORT (DCA) IN THE SERVICE TEST AND EVALUATION PROGRAM (STEP) Final Technical Note, 1 Jan. 1981 - 30 Jun. 1983

Marvin S. Plotka Sep. 1985 141 p

(AD-A166916; FAA/CT-TN85/19) Avail: NTIS HC A07/MF A01 CSCL 17/7

This is the final technical note for the Hardware Performance Analysis of the Basic Narrow Microwave Landing System (MLS) at Washington National Airport (DCA) in the Service Test and Evaluation Program (STEP) for the period January 1, 1981 through June 30, 1983. The MLS configuration, limits of signal operation, system and subsystem operation, data collection and analysis are

described. Equipment and environmental problem areas uncovered during the test and evaluation are discussed in the Results section of this report. Chargeable failures are identified and listed and engineering investigations are discussed. Remote Maintenance Monitoring System (RMMS) data analysis are presented. Conclusions and recommendations are listed. GRA

N86-30716# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
AVIATION SAFETY: SERIOUS PROBLEMS CONCERNING THE AIR TRAFFIC CONTROL WORK FORCE
Mar. 1986 113 p
(PB86-194586; GAO/RCED-86-121; B-222217) Avail: NTIS HC A06/MF A01 CSCL 17G

The report entitled Aviation Safety: Serious Problems Concerning the Air Traffic Control Work Force contains the following: GAO statement on conditions within the air traffic control work force; Supplement to GAO statement on conditions within the air traffic control work force; GAO statement on conditions within air traffic control work force at six FAA facilities. GRA

N86-30717# National Weather Service, Fort Worth, Tex.
NATIONAL WEATHER SERVICE (NWS) SOUTHERN REGION QPF (QUANTITATIVE PRECIPITATION FORECASTING) WORKSHOP
Apr. 1986 98 p Workshop held in Houston, Tex., 3-5 Feb. 1986
(PB86-196201; NOAA-TM-NWS-SR-117) Avail: NTIS HC A05/MF A01 CSCL 17G

The National Weather Service (NWS) Southern Region QPF (Quantitative Precipitation Forecasting) Workshop 1986 held at Houston, Texas, on February 3 to 5, 1986 discussed the following: Synoptic climatology for heavy snowfall across Louisiana; The practical realities of QPF; An automated QPF verification program which provides both real-time and long-term statistical scores in a user-friendly environment; A closer look at the NGM QPF; Verification results for NMC 24-hour QPF; Operational satellite derived rainfall estimates with hurricanes Bob, Danny and Elena; Techniques at the National hurricane center for estimating maximum rainfall from tropical disturbances; and Synoptic climatology of heavy rainfall over South Florida, November to April. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-30718*# California Univ., Los Angeles. Dept. of Computer Science.
A.I.-BASED REAL-TIME SUPPORT FOR HIGH PERFORMANCE AIRCRAFT OPERATIONS Report, 15 May 1984 - 14 May 1985
Jacques Vidal, J. 1985 52 p
(Grant NAG2-302)
(NASA-CR-176906; NAS 1.26:176906) Avail: NTIS HC A04/MF A01 CSCL 01C

Artificial intelligence (AI) based software and hardware concepts are applied to the handling system malfunctions during flight tests. A representation of malfunction procedure logic using Boolean normal forms are presented. The representation facilitates the automation of malfunction procedures and provides easy testing for the embedded rules. It also forms a potential basis for a parallel implementation in logic hardware. The extraction of logic control rules, from dynamic simulation and their adaptive revision after partial failure are examined. It uses a simplified 2-dimensional aircraft model with a controller that adaptively extracts control rules for directional thrust that satisfies a navigational goal without exceeding pre-established position and velocity limits. Failure recovery (rule adjusting) is examined after partial actuator failure. While this experiment was performed with primitive aircraft and mission models, it illustrates an important paradigm and provided complexity extrapolations for the proposed extraction of expertise from simulation, as discussed. The use of relaxation and inexact reasoning in expert systems was also investigated. Author

N86-30719# Federal Aviation Administration, Washington, D.C.
ADVISORY CIRCULAR: AUXILIARY FUEL SYSTEM INSTALLATIONS
2 May 1986 53 p
(FAA/AC-25-8) Avail: NTIS HC A04/MF A01

The advisory circular (AC) provides guidance and criteria for the installation of auxillary fuel systems, i.e., those which supplement essential fuel systems to provide additional range, in transport category airplanes. It is intended primarily for installations in which the auxillary fuel is carried with the fuselage, such as within cargo or baggage compartments, the main deck or other similar areas. B.G.

N86-30720*# National Aeronautics and Space Administration, Washington, D.C.
NASA AND GENERAL AVIATION
Jeffrey L. Ethell 1986 140 p Original contains color illustrations
(NASA-SP-485; NAS 1.19:485) Avail: NTIS HC A07/MF A01 CSCL 01C

General aviation remains the single most misunderstood sector of aeronautics in the United States. A detailed look at how general aviation functions and how NASA helps keep it on the cutting edge of technology in airfoils, airframes, commuter travel, environmental concerns, engines, propellers, air traffic control, agricultural development, electronics, and safety is given. Author

N86-30721*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPACT DATA FROM A TRANSPORT AIRCRAFT DURING A CONTROLLED IMPACT DEMONSTRATION
Edwin L. Fasanella (PRC Kentron, Inc., Hampton, Va.), Emilio Alfaro-Bou, and Robert J. Hayduk Sep. 1986 88 p
(NASA-TP-2589; L-16125; NAS 1.60:2589) Avail: NTIS HC A05/MF A01 CSCL 01B

On December 1, 1984, the FAA and NASA conducted a remotely piloted air-to-ground crash test of a Boeing 720 transport aircraft instrumented to measure crash loads of the structure and the anthropomorphic dummy passengers. Over 330 time histories of accelerations and loads collected during the Full-Scale Transport Controlled Impact Demonstration (CID) for the 1-sec period after initial impact are presented. Although a symmetric 1 deg. nose-up attitude with a 17 ft/sec sink rate was planned, the plane was yawed and rolled 13 deg. at initial (left-wing) impact. The first fuselage impact occurred near the nose wheel well with the nose pitched down 2.5 deg. Peak normal (vertical) floor accelerations were highest in the cockpit and forward cabin near the nose wheel well and were approximately 14G. The remaining cabin floor received normal acceleration peaks of 7G or less. The peak longitudinal floor accelerations showed a similar distribution, with the highest (7G) in the cockpit and forward cabin, decreasing to 4G or less toward the rear. Peak transverse floor accelerations ranged from about 5G in the cockpit to 1G in the aft fuselage. Author

N86-30722*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
THE PERFORMANCE EVALUATION OF A JET FLAP ON AN ADVANCED SUPERSONIC HARRIER Final Report
Larry Dean Lipera and Doral R. Sandlin Aug. 1984 84 p
(Contract NCC2-238)
(NASA-CR-179653; NAS 1.26:179653) Avail: NTIS HC A05/MF A01 CSCL 01C

The performance concept of a supersonic vertical and short takeoff and landing (V/STOL) fighter, model 279-3, modified to utilize a jet flap was evaluated. Replacing the rear nozzles of the 279-3 with the jet flap favorably alters the pressure distribution over the airfoil and dramatically increases lift. The result is a significant decrease in takeoff distance, an increase in payload, and an improvement in combat performance. To investigate the

benefit in increased payload, the 279-3 and the jet flapped 279-3JF were modeled on the NASA Aircraft Synthesis (ACSYNT) computer code and flown on a 250 feet takeoff distance interdiction mission. The increase in payload weight that the 279-3JF could carry was converted into fuel in one case, and in another, converted to bomb load. When the fuel was increased, the 279-3JF penetrated into enemy territory almost four times the distance of 279-3, and therefore increased mission capability. When the bomb load was increased, the 279-3JF carried 14 bombs the same distance the 279-3 carried four. The increase in mission performance and improvements in turning rates was realized with only a small penalty in increased empty weight. Author

N86-30723*# National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.
MODIFIED US ARMY U-8F GROUND VIBRATION TEST
Michael W. Kehoe Aug. 1986 50 p
(NASA-TM-86741; H-1297; NAS 1.15:86741) Avail: NTIS HC A03/MF A01 CSCL 01C

The Dryden Flight Research Facility of NASA Ames Research Center conducted a ground vibration test on a modified U.S. Army U-8F airplane. Modifications included new engines, propellers, and engine-mounted truss assemblies. The ground vibration test was conducted using sine dwell, single-point random, and impact excitations. The test was performed to determine modal frequencies, mode shapes, and structural damping coefficients of the airframe and propeller with full and empty fuel tanks. The data presented include frequency response plots, rigid-body and structural modal frequencies, and mode shapes. Author

N86-30724# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
LIQUID HYDROGEN FUELED PASSENGER AIRCRAFT
Yongnian Qian 11 Mar. 1986 11 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 11, Nov. 1984 p 22-23
(AD-A166229; FTD-ID(RS)T-0862-85) Avail: NTIS HC A02/MF A01 CSCL 01/3

The idea that passenger aircraft will eventually use liquid hydrogen fuel is discussed. There is a large reserve of hydrogen and hydrogen poses no danger to the environment. Hydrogen has high calorific value, high specific heat, low density and low temperature. Aircraft will have to have a liquid fuel tank to carry the hydrogen and will have to be partially redesigned. Lockheed and NASA have considered such designs. A problem remains in the planning--the high cost of large extraction of liquid hydrogen. GRA

N86-30725# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
ELECTROSTATIC HAZARDS OF URETHANE PACKED FUEL TANKS Final Report, Mar. 1977 - Apr. 1978
Thomas C. Hillman, Jon R. Manheim, and George A. Spencer Mar. 1986 95 p
(AD-A166803; AFWAL-TR-82-2022) Avail: NTIS HC A05/MF A01 CSCL 13/12

An experiment investigation has been been carried out to determine the primary factors that have contributed to recent aircraft electrostatically induced ground refueling fire incidents. It was found that the explosion suppression open pore polyurethane fuel tank foams along with the charging characteristics of the JP-4 fuel resulted in charge accumulation and electrostatic spark discharging. The polyurethane foams accumulated charge due to their highly resistive nature (blue, 10 to the 15th power ohm-cm; red, 10 to the 14th power ohm-cm; yellow, to the 14th power ohm-cm; and orange, 10 to the 13th power ohm-cm). The fuel flow rate and velocity entering the tank and impinging on the open pore polyurethane foam directly affected the magnitude of the charge separation which was occurring. The number of refuelings that had taken place also was a critical factor due to its effect on charge accumulation/discharge frequency levels. The last major variable investigated was pro-static (Gulf-178) and conductivity improving (shell ASA-3) fuel additives. The Gulf-178 additive dramatically increased the levels of charge separation and accumulation taking place along with a reversal in the polarity of charge. The Shell ASA-3 fuel additive eliminated the aircraft ground refueling electrostatic discharge hazard decreasing the level of charge accumulation. GRA

N86-30726# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Strucutures and Materials Panel.
THE INFLUENCE OF LARGE-SCALE COMPUTING ON AIRCRAFT STRUCTURAL DESIGN
Apr. 1986 67 p
(AGARD-R-726; ISBN92-835-1522-6) Avail: NTIS HC A04/MF A01

An outcome of the AGARD Working Group on Large Scale Computing was the institution by the Structures and Materials Panel of a Sub-Committee to consider this topic in relation to Aircraft Structural design. The publication contains papers on various aspects of the topic heard by the Sub-Committee plus a summary. These cover likely developments in both soft- and hardware, and their applications to the Design process. This Report was sponsored by the Structures and Materials Panel of AGARD. Author

N86-30727# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
STORE SEPARATION FLIGHT TESTING
R. J. Arnold, C. S. Epstein, and R. K. Bogue, ed. Apr. 1986 161 p
(AGARD-AG-300-Vol-5; ISBN92-835-1523-4) Avail: NTIS HC A08/MF A01

This volume in the AGARD Flight Test Techniques Series treats stores separation testing from the overall systems standpoint. All aspects of testing are described from the time of identification of a particular aircraft/store requirement through all steps leading to the establishment of a satisfactory employment envelope. Considerable emphasis is placed on the planning and execution of the flight test phase of the stores clearance program, including the definition of a basic structure, and a set of procedures which will maximize the safe and efficient execution of such a program. Author

N86-30654# Grumman Aerospace Corp., Bethpage, N.Y.
THE APPLICATION OF PRACTICAL OPTIMIZATION TECHNIQUES IN THE PRELIMINARY STRUCTURAL DESIGN OF A FORWARD-SWEPT WING
Edwin Lerner *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 381-392 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30655# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
STRUCTURAL OPTIMIZATION PROGRAMS AND METHODS
A. J. Morris *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 393-406 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30656# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
VARIATION OF ANISOTROPIC BEHAVIOR IN STRUCTURAL OPTIMIZATION
G. Hornung, D. W. Mathias, and H. Roehrle *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 407-414 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30660# Tel-Aviv Univ. (Israel). Faculty of Engineering.
RECENT RESULTS ON THE WEIGHT MINIMIZATION OF PANELS WITH A FLUTTER SPEED CONSTRAINT
L. Librescu and L. Beiner *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 441-450 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30662# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
AEROELASTIC PROBLEMS AND STRUCTURAL DESIGN OF A TAILLESS CARBON FIBER COMPOSITE (CFC) SAILPLANE
J. Schweiger, O. Sensburg, and H. J. Berns (Technische Univ., Brunswick, West Germany) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 457-468 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30665# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
STRUCTURAL DYNAMIC ASPECTS OF ROTOR NODAL ISOLATION
J. Stoppel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 486-494 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30678# Northwestern Polytechnical Univ., Xian (China). Dept. of Aircraft Engineering.
DETERMINATION OF NATURAL VIBRATION PROPERTIES OF A WING WITH WINGLET BY EXPERIMENTAL MODE SYNTHESIS TECHNIQUE
S. N. Gu, W. J. You, and J. S. Jiang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 605-611 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30679# Israel Aircraft Industries Ltd., Ben-Gurion Airport.
RAPID VIBRATION MODE ANALYSIS OF AIRCRAFT WITH EXTERNAL STORES
M. Karpel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 612-616 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-30728# Aerojet Electrosystems Co., Azusa, Calif.
DESIGN, DEVELOPMENT AND INTEGRATE/INSTALL AN AIRBORNE REMOTE INSTRUMENTATION SYSTEM (AIREYE) Final Report
J. J. Bommarito and L. E. Saylor Aug. 1985 79 p
(Contract DTCG23-80-C-20012)
(AD-A166755; Rept-7921; USCG-D-27-85) Avail: NTIS HC A05/MF A01 CSCL 01/3

A prototype airborne remote instrument system, AIREYE, was developed for the U.S. Coast Guard by Aerojet ElectroSystems Company. This multisensor system permits real-time day/night, all weather detection, mapping and documentation of vessels and pollution at sea. The system was installed aboard a coast Guard Hu-25A Falcon fanjet aircraft and flight tested off the California coast. Surveillance data were obtained from natural oil seeps, known optical and radar targets, routine shipping and targets of opportunity. The AIREYE system consists of a sidelooking radar, infrared/ultraviolet line scanner, active gated television systems, aerial reconnaissance camera and a processor/display recording subsystem with real-time digital image enhancement capability. The system reliably detected and mapped oil seeps and vessel locations for environmental conditions ranging from dense undercast to clear, windspeeds from 0 to greater than 25 knots and from daytime to total darkness. The ability to read a vessel's name and determine deck activity in total darkness was demonstrated. The AIREYE real-time digital enhancement provided detection, recognition and identification of targets of interest when not otherwise possible with unenhanced imagery. Test results demonstrated that the AIREYE system will provide greatly enhanced capability in the U.S. Coast Guard missions of Marine Environmental Protection (MEP), Enforcement of Laws and Treaties and Search and Rescue. Author (GRA)

N86-30729# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
AIRBORNE NAVIGATION REMOTE MAP READER EVALUATION Final Report, 1 Sep. 1984 - 30 Sep. 1985
James C. Byrd Mar. 1986 56 p
(AD-A166976; ASD-TR-86-5004) Avail: NTIS HC A04/MF A01 CSCL 01/3

The U.S. Air Force evaluated the Full-Color Remote Map Reader built by Thomson-CSF of France under the Foreign Weapons, Equipment, and Technology Evaluation program. The unit is used in a military aircraft to provide a moving map video display for the aircrew. Map data is contained in a 65-foot roll of 35mm film at 11.4:1 reduction, which allows approximately 550 sq. ft. of aeronautical charts of any standard scale to be stored in one cassette. The unit moves the film with microprocessor-controlled servo motors and performs scanning, rotation and zoom with a microprocessor-controlled flying spot scanner. It obtains navigation data from the aircraft MIL-STD-1553 data bus and presents video on a full-color, shadow-mask cathode ray tube. The evaluation determined that the moving map display is useful in several Air Force missions, and that the French map reader technology is roughly equivalent to devices recently developed in the U.S. Author (GRA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-30730*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
UNSTEADY DESIGN-POINT FLOW PHENOMENA IN TRANSONIC COMPRESSORS Final Report
J. B. Gertz and A. H. Epstein Aug. 1986 210 p
(Grant NGL-22-009-383)
(NASA-CR-176879; NAS 1.26:176879) Avail: NTIS HC A10/MF A01 CSCL 21E

High-frequency response probes which had previously been used exclusively in the MIT Blowndown Facility were successfully employed in two conventional steady state axial flow compressor facilities to investigate the unsteady flowfields of highly loaded transonic compressors at design point operation. Laser anemometry measurements taken simultaneously with the high response data were also analyzed. The time averaged high response data of static and total pressure agreed quite well with the conventional steady state instrumentation except for flow angle which showed a large spread in values at all radii regardless of the type of instrumentation used. In addition, the time resolved measurements confirmed earlier test results obtained in the MIT Blowdown Facility for the same compressor. The results of these tests have further revealed that the flowfields of highly loaded transonic compressors are heavily influenced by unsteady flow phenomena. The high response measurements exhibited large variations in the blade to blade flow and in the blade passage flow. The observed unsteadiness in the blade wakes is explained in terms of the rotor blades' shed vorticity in periodic vortex streets. The wakes were modeled as two-dimensional vortex streets with finite size cores. The model fit the data quite well as it was able to reproduce the average wake shape and bi-modal probability density distributions seen in the laser anemometry data. The presence of vortex streets in the blade wakes also explains the large blade to blade fluctuations

seen by the high response probes which is simply due to the intermittent sampling of the vortex street as it is swept past a stationary probe. Author

N86-30731*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Mechanical Engineering.
THERMODYNAMIC EVALUATION OF TRANSONIC COMPRESSOR ROTORS USING THE FINITE VOLUME APPROACH Status Report
Stephen Nicholson and John Moore Aug. 1986 292 p
(Grant NAG3-593)
(NASA-CR-176947; NAS 1.26:176947; JM/86-6) Avail: NTIS HC A13/MF A01 CSCL 21E

A method was developed which calculates two-dimensional, transonic, viscous flow in ducts. The finite volume, time marching formulation is used to obtain steady flow solutions of the Reynolds-averaged form of the Navier Stokes equations. The entire calculation is performed in the physical domain. The method is currently limited to the calculation of attached flows. The features of the current method can be summarized as follows. Control volumes are chosen so that smoothing of flow properties, typically required for stability, is now needed. Different time steps are used in the different governing equations to improve the convergence speed of the viscous calculations. A new pressure interpolation scheme is introduced which improves the shock capturing ability of the method. A multi-volume method for pressure changes in the boundary layer allows calculations which use very long and thin control volumes. A special discretization technique is also used to stabilize these calculations. A special formulation of the energy equation is used to provide improved transient behavior of solutions which use the full energy equation. The method is then compared with a wide variety of test cases. The freestream Mach numbers range from 0.075 to 2.8 in the calculations. Transonic viscous flow in a converging diverging nozzle is calculated with the method; the Mach number upstream of the shock is approximately 1.25. The agreement between the calculated and measured shock strength and total pressure losses is good. Essentially incompressible turbulent boundary layer flow in a adverse pressure gradient is calculated and the computed distribution of mean velocity and shear stress are in good agreement with the measurements. At the other end of the Mach number range, a flat plate turbulent boundary layer with a freestream Mach number of 2.8 is calculated using the full energy equation; the computed total temperature distribution and recovery factor agree well with the measurements when a variable Prandtl number is used through the boundary layer. Author

N86-30732*# Systems Control Technology, Inc., Palo Alto, Calif.
ROBUST DETECTION, ISOLATION AND ACCOMMODATION FOR SENSOR FAILURES Final Report
Abbas Emami-Naeini, Muhammad M. Akhter, and Stephen M. Rock Jul. 1986 164 p
(Contract NAS3-24079)
(NASA-CR-174825; NAS 1.26:174825; SCT-85-5449) Avail: NTIS HC A08/MF A01 CSCL 21E

The objective is to extend the recent advances in robust control system design of multivariable systems to sensor failure detection, isolation, and accommodation (DIA), and estimator design. This effort provides analysis tools to quantify the trade-off between performance robustness and DIA sensitivity, which are to be used to achieve higher levels of performance robustness for given levels of DIA sensitivity. An innovations-based DIA scheme is used. Estimators, which depend upon a model of the process and process inputs and outputs, are used to generate these innovations. Thresholds used to determine failure detection are computed based on bounds on modeling errors, noise properties, and the class of failures. The applicability of the newly developed tools are demonstrated on a multivariable aircraft turbojet engine example. A new concept call the threshold selector was developed. It represents a significant and innovative tool for the analysis and synthesis of DIA algorithms. The estimators were made robust by introduction of an internal model and by frequency shaping. The internal mode provides asymptotically unbiased filter estimates. The incorporation of frequency shaping of the Linear Quadratic Gaussian cost functional modifies the estimator design to make it suitable for sensor failure DIA. The results are compared with previous studies which used thresholds that were selcted empirically. Comparison of these two techniques on a nonlinear dynamic engine simulation shows improved performance of the new method compared to previous techniques Author

N86-30733*# Detroit Diesel Allison, Indianapolis, Ind.
FEASIBILITY STUDY FOR CONVERTIBLE ENGINE TORQUE CONVERTER
Oct. 1985 72 p
(Contract NAS3-24092)
(NASA-CR-175082; NAS 1.26:175082; EDR-12118) Avail: NTIS HC A04/MF A01 CSCL 21E

The feasibility study has shown that a dump/fill type torque converter has excellent potential for the convertible fan/shaft engine. The torque converter space requirement permits internal housing within the normal flow path of a turbofan engine at acceptable engine weight. The unit permits operating the engine in the turboshaft mode by decoupling the fan. To convert to turbofan mode, the torque converter overdrive capability bring the fan speed up to the power turbine speed to permit engagement of a mechanical lockup device when the shaft speed are synchronized. The conversion to turbofan mode can be made without drop of power turbine speed in less than 10 sec. Total thrust delivered to the aircraft by the proprotor, fan, and engine during tansient can be controlled to prevent loss of air speed or altitude. Heat rejection to the oil is low, and additional oil cooling capacity is not required. The turbofan engine aerodynamic design is basically uncompromised by convertibility and allows proper fan design for quiet and efficient cruise operation. Although the results of the feasibility study are exceedingly encouraging, it must be noted that they are based on extrapolation of limited existing data on torque converters. A component test program with three trial torque converter designs and concurrent computer modeling for fluid flow, stress, and dynamics, updated with test results from each unit, is recommended. Author

N86-30734# Exotech, Inc., Campbell, Calif.
TIME RESOLVED AND TIME AVERAGED FLOW EVALUATION FOR AN ISOLATED TRANSONIC COMPRESSOR ROTOR Final Report
F. Neuhoff Mar. 1986 61 p
(Contract N00014-84-C-0766)
(AD-A166759; TR-8601) Avail: NTIS HC A04/MF A01 CSCL 20/4

A 0.28-m single stage transonic fan was operated in a rotor only configuration. Overall performance was measured and radial distributions of inlet and outlet velocity were obtained using time-averaging combination temperature-pneumatic probes. These results were compared to the prediction of a finite element computer code (TURBOFEM) prediction. The blade-to-blade velocity and pressure distributions were measured using the Dual Probe Digital Sampling technique (involving two commercial semi-conductor probes of simple design). Data were obtained from hub-to-tip at both near-sonic and at supersonic inlet relative Mach numbers. The rotor losses were derived as blade-to-blade distributions and the shock losses were evaluated as components of the total loss at each radius. Based on the limited data obtained near sonic conditions, a combination of the profile loss model of Koch & Smith and shock loss model of Dunker was found to predict the measured radial loss distribution quite well. Preliminary observations of rotor shock oscillations were also reported. Compressor rotors, Compressor stators, Transonic flow, Turbomachinery flow fields, Transonic loss measurements, and Finite element codes. GRA

N86-30735# Doellner (O. Leonard), Tucson, Ariz.
JET-ENGINE COMBUSTOR SPECTRAL RADIATION MEASUREMENTS USING FIBEROPTIC INSTRUMENTATION SYSTEM. RADIANT ENERGY POWER SOURCE FOR JET AIRCRAFT Final Report

O. Leonard Doellner Feb. 1986 121 p
(Contract DE-FG01-82CE-15144)
(DE86-007289; DOE/CE-15144/T2) Avail: NTIS
HC A06/MF A01

This report is a summary of spectral radiation measurements made at Williams Air Force Base, Chandler, Arizona on a General Electric J-85-5 engine. The spectral radiation measurements consisted of a complete axial profile down the combustor and are directed toward the application of Radiant Energy Power Source for Jet Aircraft. Radiant Energy Power Source for Jet Aircraft relates to the use of photovoltaic cells to generate the electrical power demands of the aircraft. The photovoltaic cells are mounted inside the casing of the jet engine, are thermally insulated from the normally hot engine casing, and are appropriately cooled. The photovoltaic cells receive their required radiant energy from the combustion flame by holes in the combustion liner. The instrumentation system used to make these measurements employed fiberoptic probes - entering the engine by way of an existing (modified) access plate - to obtain the radiation measurements. Such an instrumentation system has the strong advantage of being able to measure radiation from all the holes running axially down the combustor without making any holes in the plenum/engine casing - as would be necessary if sapphire observation windows were used. DOE

N86-30664# Liege Univ. (Belgium).
DYNAMIC ANALYSIS OF STRUCTURES WITH FLEXIBLE ROTORS
M. Geradin and N. Kill *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 477-485 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-30736*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronatuical Engineering.
LONGITUDINAL STABILITY AND CONTROL DERIVATIVES OBTAINED FROM FLIGHT DATA OF A PA-30 AIRCRAFT Final Report
Dale R. Turley and Doral R. Sandlin Apr. 1981 60 p
(Contract NCC4-1)
(NASA-CR-176999; NAS 1.26:176999) Avail: NTIS
HC A04/MF A01 CSCL 01C

In order to obtain reliable and accurate values of the stability and control derivatives, the Dryden Fligh Research Center (DFRC) developed a technique for extracting the derivatives from flight data. This technique is implemented by a set of FORTRAN computer programs that is based on a modified maximum likelihood estimator that uses the Newton-Raphson algorithm to perform the required minimization of the derivatives. Data was obtained with a PA-30, light twin-engine general aviation aircraft in zero, half, and full flap configuration in level unaccelerated flight with the landing gear retracted. The derivatives were plotted as functions of angle of attack using various graphical arrangements to show variations of wind tunnel and flight determined values at zero flap settings. Also, data was displayed to show the effects of flap deflection and thrust variation on the longitudinal stability derivatives. The angle of attack and angle of sideslip were measured. The dynamic pressure, velocity, and altitude were calculated, using a FORTRAN computer program, from the static and dynamic pressures. The control deflections of the stabilator, ailerons, and rudder also were recorded along with left throttle position, engine rpm, and manifold pressure. B.G.

N86-30737*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
THE INTEGRATED MANUAL AND ATUOMATIC CONTROL OF COMPLEX FLIGHT SYSTEMS Semiannual Status Report, Jul. 1984 - Mar. 1985
David K. Schmidt 12 Apr. 1985 68 p
(Grant NAG4-1)
(NASA-CR-176940; NAS 1.26:176940) Avail: NTIS
HC A04/MF A01 CSCL 01C

The flight test results obtained recently (1984) by CALSPAN on pitch-rate flight control systems in the flared landing task, obtained with the Total In-Flight Simulator (TIPS), were analyzed. The analysis approach considered is based on the Optimal Control/Frequency Domain (OC/FD) techniques. These techniques originally stem from an optimal-control approach to perform a Neal-Smith-like analysis on aircraft attitude dynamics, but were extended and used successfully to analyze the flared landing task. B.G.

N86-30738*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
A SURVEY OF HANDLING QUALITIES CRITERIA AND THEIR APPLICATIONS TO HIGH PERFORMANCE AIRCRAFT Final Report
David L. Peahl, Faysal Kolkailah, and Doral R. Sandlin Jan. 1986 68 p
(Contract NCC2-338)
(NASA-CR-179654; NAS 1.26:179654) Avail: NTIS
HC A04/MF A01 CSCL 01C

Various handling qualities criteria and their application to high performance aircraft including state-of-the-art and highly augmented aircraft were surveyed. Neal-Smith, Bandwidth, Equivalent Systems, and Military Specification 8785 criteria are applied to flight test data from aircraft such as the F-8 Digital Fly-By-Wire, the YF-12, and an Advanced Fighter Aircraft. Backgrounds and example applications of each criteria are given. The results show that the handling qualities criteria investigated can be applied to highly augmented aircraft with fairly good results in most cases; however, since no one method excelled, more than one criteria should be used whenever possible. Equivalent time delays appear to be the most frequent critical factor in determining pilot rating levels of highly augmented aircraft. Author

N86-30739# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
AIRCRAFT RESPONSE TO TURBULENCE
1985 32 p Presented at the 61st Meeting of the Structures and Materials Panel of AGARD, Oberammergau, West Germany, 8-13 Sep. 1985
(AGARD-R-738; ISBN92-835-0393-7) Avail: NTIS
HC A03/MF A01

In 1985 the Structures and Materials Panel initiated an activity to consider the flight of flexible aircraft in turbulence. As a preliminary to the start of this activity, the Panel heard the two papers included in this report. One of the two papers discusses measurements of time histories of turbulence made by specially equipped aircraft and turbulence event statistics obtained from aircraft in commercial operation. The other paper considers aspects of collection and analysis of flight data, methods of calculating aircraft response and constraints in operation. Author

N86-30740# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
APPLICATION OF Ada HIGHER ORDER LANGUAGE TO GUIDANCE AND CONTROL
May 1986 106 p Presented at a Lecture Series, Ottawa, Ontario, 20-21 May 1986; London, England, 2-3 Jun. 1986; and Cologne, West Germany, 5-6 Jun. 1986; sponsored by the Guidance and Control Panel and the Consultant and Exchange Programme of AGARD
(AGARD-LS-146; ISBN92-835-1527-7) Avail: NTIS
HC A06/MF A01

The need to reduce escalating software life-cycle costs is the rationale for Ada. Early experience with the language suggests that the promise of increased software productivity can be fulfilled.

However, many problems remain; the need for validated and efficient compilers targeted for computers suitable to the guidance and control application, and software development environments built around Ada, are two among the foremost. This Lecture Series, sponsored by the Guidance and Control Panel of AGARD, has been implemented by the Consultant and Exchange Programme of AGARD. Author

N86-30741# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
GUST LOAD PREDICTION AND ALLEVIATION ON A FIGHTER AIRCRAFT
J. Becker Jun. 1986 22 p Presented at the 61st Meeting of the Structures and Materials Panel of AGARD, Oberammergau, West Germany, 8-13 Sep. 1985
(AGARD-R-728; ISBN92-835-1532-3) Avail: NTIS HC A02/MF A01

In 1985 the AGARD Structures and Materials Panel initiated an activity on the flight of flexible aircraft in turbulence. As a preliminary the Panel heard this paper which discusses the influence of turbulence -induced dynamic loads on the structural design of fighter aircraft. Methods for calculating dynamic response are given, and the problems associated with improved ride are considered. Author

N86-30630# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
APPLICATION OF TRANSONIC UNSTEADY METHODS FOR CALCULATION OF FLUTTER AIRLOADS
H. Zimmermann and S. Vogel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 47-61 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30635# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelasticity.
THEORETICAL FLUTTER INVESTIGATIONS ON A PLANE CASCADE IN INCOMPRESSIBLE FLOW
V. Carstens *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 169-179 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30637# Northwestern Polytechnical Univ., Xian (China).
A NUMERICAL ANALYSIS FOR VERTICAL GUST FIELD INDUCED BY GUST GENERATOR
Yongnian Yang and Jianpei Wang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 187-193 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30642# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.
A REVIEW OF AEROELASTIC RESEARCH AT THE FLIGHT DYNAMICS LABORATORY
T. M. Harris, T. E. Noll, T. J. Hertz, and W. A. Sotomayer *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 233-243 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30643# Fairchild Republic Div., Farmingdale, N. Y.
AEROELASTIC WIND TUNNEL SIMILARITY THEORY FOR ANISOTROPIC AIRCRAFT WINGS
Gabriel A. Oyibo *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 257-264 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30644# British Aerospace Dynamics Group, Hatfield (England). Civil Div.
THE CHOICE OF TECHNIQUES USED FOR FLIGHT FLUTTER CLEARANCE WITH PARTICULAR REFERENCE TO THE BAe 146 AND BAe 125
A. G. Woods *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 265-275 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30645# Saab-Scania, Linkoping (Sweden).
FLUTTER CALCULATION BY A NEW PROGRAM
Valter J. E. Stark *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 276-285 Sponsored by Swedish Defence Administration and Saab Scania A.B. (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30647# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A FLUTTER SUPPRESSION CONTROL LAW BY USE OF LINEAR QUADRATIC GAUSSIAN AND CONSTRAINED OPTIMIZATION DESIGN TECHNIQUES
William M. Adams and Sherwood H. Tiffany *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 297-308 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

N86-30649# National Aerospace Lab., Amsterdam (Netherlands). Dept. of Aeroelasticity.
NLR EXPERIENCE IN THE APPLICATION OF ACTIVE FLUTTER SUPPRESSION AND GUST LOAD ALLEVIATION, APPLIED TO A WIND TUNNEL MODEL
P. A. vanGelder *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 320-329 Sponsored by Netherlands Agency for Aerospace Programs and NLR (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30650# Royal Aircraft Establishment, Farnborough (England).
THE DESIGN AND WIND TUNNEL DEMONSTRATION OF AN ACTIVE CONTROL SYSTEM FOR GUST LOAD ALLEVIATION AND FLUTTER SUPPRESSION
I. W. Kaynes, C. W. Skingle, and J. C. Copley *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 330-347 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30651# Northwestern Polytechnical Univ., Xian (China).
CONTROL LAW SYNTHESIS FOR GUST LOAD ALLEVIATION USING LINEAR QUADRATIC GAUSSIAN THEORY
Jin Chang *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 362-367 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30657# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
TAILORING METHODOLOGY FOR AEROELASTIC STABILITY AND LATERAL CONTROL ENHANCEMENT
Terrance A. Weisshaar *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 415-425 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-30742# Transportation Systems Center, Cambridge, Mass.
AIRPORT CAPACITY ENHANCEMENT PLAN Final Report, Nov.

1984 - Jan. 1986
1986 172 p
(AD-A166686; DOT-TSC-FAA-86-2; DOT/FAA/CT-86/1) Avail: NTIS HC A08/MF A01 CSCL 05/1

The first edition of the Airport Capacity Enhancement Plan has been developed by the Federal Aviation Administration's newly established Airport Capacity Program Office (ACPO). The plan is intended to increase the capacity and efficient utilization of airports, and to alleviate current and projected aircraft operating delays in the nation's airport system without compromises to safety or to the environment. This plan delineates the goals of the capacity enhancement program. It identifies the concerns of air system users and defines the extent and causes of the capacity and delay problem as it currently exists and is projected for the next decade. The allocation of responsibility for capacity and delay activities within the FAA is discussed. The 53 planned and ongoing FAA projects intended to reduce capacity-related problems are identified. The plan provides descriptions of each of these projects, significant milestones, estimates of their capacity-related benefits, and references to more detailed descriptions of each project. GRA

N86-30663# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
SIMULATION OF AIRCRAFT TAXI TESTING ON THE AGILE SHAKER TEST FACILITY
Raymond Freymann and William P. Johnson (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 468-476 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30967# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
EUROPEAN ECONOMIC COMMUNITY (EEC) TEST STAND COMPARISON [VERGLEICH DER EG-PRUEFSTAENDE]
B. Harbrink *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 82-116 In GERMAN Original document contains color illustrations (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-30743*# South Carolina Univ., Columbia.
THE ASSOCIATION OF SCHOOLS OF JOURNALISM AND MASS COMMUNICATION JOURNALIST-IN-SPACE PROJECT Final Report
31 Jul. 1986 22 p
(Contract NCCW-6)
(NASA-CR-176961; NAS 1.26:176961) Avail: NTIS HC A02/MF A01 CSCL 22A

During the summer of 1985, NASA asked the Association of Schools of Journalism and Mass Communication (ASJMC) to select a U. S. journalist who could ride aboard the space shuttle and report the experience to the American public. Eligibility critieria and selection procedures are discussed. The forty semifinalists are listed. B.G.

N86-30744*# Colorado Univ., Boulder. Center for Space Law and Policy.
A STUDY OF FACTORS RELATED TO COMMERCIAL SPACE PLATFORM SERVICES
S. Neil Hosenball Aug. 1986 254 p
(Grant NAGw-884)
(NASA-CR-176881; NAS 1.26:176881) Avail: NTIS HC A12/MF A01 CSCL 22A

In the past four years, the issue of the commercial development of space has come to the forefront of the U. S. national space policy. Though the Administration, Congress and NASA have all shown strong support for encouraging the private sector to become more actively involved in the commercial utilization of space, the question remains whether they must do more to foster the creation and development of a viable U. S. commercial space industry. Marketing aspects, insurance and risk loss, tax related factors, space transportation, termination liability, institutional barriers, and procurement laws and regulations are discussed. B.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-30745# Hatfield Polytechnic (England). Numerical Optimization Center.
PRELIMINARY STUDY OF THE USE OF LAPLACE AND MOMENTUM VECTORS IN THE DETERMINATION OF INTERPLANETARY LOW THRUST TRAJECTORIES
M. C. Bartholomew-Biggs, L. C. W. Dixon, and S. E. Hersom Jul. 1985 32 p
(Contract ESA-6134/84-D-JS(SC))
(ESA-CR(P)-2173; ESA-86-97219) Avail: NTIS HC A03/MF A01

The feedback and Pontryagin approaches to the optimization of low thrust trajectories using the momentum and Laplace vectors are considered. The feedback algorithm runs into numerical difficulties at the final point and at intermediary points where the efficiencies are low. These difficulties can be avoided by using the switching function, but impractical trajectories can still occur and hence cause trouble if this happens inside an optimization routine. The algorithm readily produces final orbits which are correct except for the argument of perihelion, but is of no practical use to proceed beyond this point. In the Pontryagin approach, the use of the first order approximation, in which the adjoint variables are assumed constant, is justified. This enables optimization to be undertaken with a much shorter computer time per iteration and with little degradation in performance. ESA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-30746*# Stanford Univ., Calif. Space, Telecommunications and Radioscience Lab.
REMOTE SCIENCE OPERATION CENTER RESEARCH Semiannual Report
Peter M. Banks 1 Jul. 1986 80 p Sponsored by NASA
(NASA-CR-176869; NAS 1.26:176869; SEL-39-85) Avail: NTIS HC A05/MF A01 CSCL 14B

Progress in the following areas is discussed: the design, planning and operation of a remote science payload operations control center; design and planning of a data link via satellite; and the design and prototyping of an advanced workstation environment for multi-media (3-D computer aided design/computer aided engineering, voice, video, text) communications and operations. B.G.

N86-30747# Department of the Navy, Washington, D. C.
GROUND LAUNCHED MISSILE CONTROLLED RATE DECELERATOR Patent

Harold G. Brittain and Charles B. Brantley, inventors (to Navy) Issued 11 Mar. 1986 8 p
(AD-D012212; US-Patent-4,575,026; US-Patent-Appl-SN-626958; US-Patent-Class-244-63) Avail: NTIS US Patent and Trademark Office CSCL 16/1

This patent discloses a deceleration sled to decelerate and safely contain a launched test missile. The sled has crushable honeycomb which absorbs the initial impact of the missile as the sled accelerates along a track to the same speed as the missile. As the deceleration sled is pushed down the rails, forming shoes on both sides of the sled engage flat metal plates. The forming shoes roll the flat plates into a U shape. The energy required to roll these plates can be changed by varying their thickness. GRA

N86-30748# Los Alamos National Lab., N. Mex.
HIMASS ELECTROMAGNETIC LAUNCHER AT LOS ALAMOS
E. L. Zimmermann, C. M. Fowler, E. Foley, and J. V. Parker 1986 4 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20-24 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008734; LA-UR-86-925; CONF-8604147-6) Avail: NTIS HC A02/MF A01

The HIMASS electromagnetic launcher is a unique large-bore, large-mass railgun driven by a helical flux compression generator. Two experiments were conducted at 3 to 4 MA current levels. The objective of the experiments was to study the effects of scaling, ablation, and material parameters on electromagnetic launcher performance. Data from these two experiments are presented. DOE

N86-30749# Los Alamos National Lab., N. Mex.
RAILGUNS POWERED BY EXPLOSIVE DRIVEN FLUX COMPRESSION GENERATORS
C. M. Fowler, E. L. Zimmermann, C. E. Cummings, R. F. Davidson, E. Foley, R. S. Hawke, J. F. Kerrisk, J. V. Parker, W. M. Parsons, D. R. Peterson et al 1986 7 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20-24 Apr. 1986 Prepared in cooperation with LLNL, Calif. and Texas Univ., Austin
(Contract W-7405-eng-36)
(DE86-008735; LA-UR-86-926; CONF-8604147-8) Avail: NTIS HC A02/MF A01

Explosive driven flux compression generators (FCG's) are single-shot devices that convert part of the energy of high explosives into electromagnetic energy. Some classes of these generators have served quite well as railgun power sources. In this paper and the following paper we describe strip and helical type FCG's, both of which are in use in the Los Alamos railgun program. Advantages and disadvantages these generators have for railgun power supplies will be discussed, together with experimental results obtained and some of the diagnostics we have found particularly useful. DOE

N86-30750# Los Alamos National Lab., N. Mex.
LAUNCHER BARREL FOR THE LETHALITY TEST SYSTEM RAILGUN
J. R. Sims, K. E. Christensen, C. E. Cummings, and N. C. Calkins 1986 5 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20-24 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008739; LA-UR-86-942; CONF-8604147-7) Avail: NTIS HC A02/MF A01

A reusable plasma armature railgun barrel design is described. This barrel was designed and is being fabricated at the Los Alamos National Laboratory for use in a kinetic energy lethality test system. The performance goals for this barrel are (1) that it be able to withstand the loads generated when accelerating a 30-g projectile to a velocity of 15 km/s without sustaining permanent damage, (2) that it have multiple shot capability, and (3) that it be capable of being repaired and/or modified. The barrel consists of a multipiece modular core contained in an outer structural shell. The core assembly, composed of rails and insulators, is accessible for repair or replacement. The outer structural shell is designed to allow access to the core and is used to preload the core compressively. The barrel design incorporates various features that will allow the use of stronger and stiffer materials such as structural ceramics and reinforced coppers as they become available. DOE

N86-30751# Los Alamos National Lab., N. Mex.
PREDICTING BORE DEFORMATIONS AND LAUNCHER STRESSES IN6 RAILGUNS
R. F. Davidson, W. A. Cook, D. A. Rabern, and N. M. Schnurr 1986 7 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008738; LA-UR-86-941; CONF-8604147-2) Avail: NTIS HC A02/MF A01

The structural responses of launchers are important because they affect the projectile performance and the operating limits of the railgun system. Structural analysis makes it possible to make better decisions in launcher design. Example analyses of the Los Alamos HIMASS and Lethality Test System launchers are presented in this paper. Also, a discussion of the benefits and limitations of these analyses is included. DOE

N86-30752# Los Alamos National Lab., N. Mex.
RAILGUN CONDUCTOR HEATING FROM MULTIPLE CURRENT PULSES
J. F. Kerrisk 1986 7 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008724; LA-UR-86-815; CONF-8604147-4) Avail: NTIS HC A02/MF A01

A numerical technique for solving current- and thermal-diffusion problems in railgun conductors has been used to study joule heating in rails that are subject to multiple current pulses. Copper rails that are 25 mm high by the 12.5 mm wide with a 20-mm-square bore and a current pulse with 1-MA peak current and 1-ms pulse width at half maximum were assumed. This combination of parameters is sufficient to accelerate an 80-g projectile to 2-3 km/s with which current pulse. Three parameters were varied in the analysis: the repetition rate or current pulse frequency (3.3 to 100 Hz), the coolant heat-transfer coefficient (5 x 10(4) and 5 x 10(5) W/m(2) .K), and the coolant channel distribution in the rail. Detailed results are used to illustrate the acceptability or unacceptability of particular combinations of these parameters for operation at steady state. An uncooled rail was not acceptable for steady-state operation. Repetition rates of about 30 Hz were acceptable with the higher coolant heat-transfer coefficient and the best coolant-channel distribution; this included cooling the rail exterior surface. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-30753*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A MECHANICAL PROPERTY AND STRESS CORROSION EVALUATION OF VIM-ESR-VAR WORK STRENGTHENED AND DIRECT DOUBLE AGED INCONEL 718 BAR MATERIAL
J. W. Montano Sep. 1986 37 p
(NASA-TP-2634; NAS 1.60:2634) Avail: NTIS HC A03/MF A01 CSCL 11F

Presented are the mechanical properties and the stress corrosion resistance of triple melted [vacuum arc remelted (VIM), electro-slag remelted (ESR), and vacuum arc remelted (VAR)], solution treated, work strengthened and direct double aged Inconel 718 alloy bars [4.00 in. (10.16) and 5.75 in. (14.60 cm) diameter]. Tensile, charpy v-notched impact, and compact tension specimens were tested at ambient temperature in both the longitudinal and

transverse directions. Longitudinal tensile and yield strengths in excess of 220 ksi (1516.85 MPa) and 200 ksi (1378.00 MPa) respectively, were realized at ambient temperature. Additional charpy impact and compact tension tests were performed at -100 F (-73 C). Longitudinal charpy impact strength equalled or exceeded 12.0 ft-lbs (16.3 Joules) at ambient and at -100 F(-73 C) while longitudinal compact (LC) tension fracture toughness strength remained above 79 ksi (86.80 MPa) at ambient and at -100 F(-73 C) temperatures. No failures occurred in the longitudinal or transverse tensile specimens stressed to 75 and 100 percent of their respective yield strengths and exposed to a salt fog environment for 180 days. Tensile tests performed after the stress corrosion test indicated no mechanical property degradation.

Author

N86-30754# Los Alamos National Lab., N. Mex.
LOW-THRUST ROCKET TRAJECTORIES
P. W. Keaton Jan. 1986 21 p
(Contract W-7405-eng-36)
(DE86-007573; LA-10625-MS) Avail: NTIS HC A02/MF A01

The development of low-thrust propulsion systems to complement chemical propulsion systems will greatly enhance the evolution of future space programs. Two advantages of low-thrust rockets are stressed. First, in a strong gravitational field, such as occurs near the Earth, freighter missions with low-thrust engines require one-tenth as much propellant as do chemical engines. Second, in a weak gravitational field, such as occurs in the region between Venus and Mars, low-thrust rockets are faster than chemical rockets with comparable propellant mass. The purpose here is to address the physics of low-thrust trajectories and to interpret the results with two simple models. Analytic analyses are used where possible - otherwise, the results of numerical calculations are presented in graphs.

DOE

N86-30786# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
INCREASING USE OF COMPOSITE STRUCTURE ON ARIANE LAUNCHERS
F. Perez and P. Eymard (Centre National d'Etudes Spatiales, Paris, France) *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 239-244 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30787# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
DEVELOPMENT OF THE ARIANE 4 INTERSTAGE 2-3 IN CFRP
C. Blaas *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 245-249 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30788# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
THE DEVELOPMENT OF THE ARIANE 4 SPELDA
N. G. Thomas and W. T. Oliver *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 251-263 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30790# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
DESIGN AND DEVELOPMENT TESTING OF THE BONDED JOINT BETWEEN A TYPICAL LAUNCH VEHICLE ATTACHMENT RING AND CFRP THRUST CONE
J. T. Sharkey, G. H. F. Nayler, and J. Reynolds *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 275-284 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-30755*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF THE EARTH'S MAGNETIC FIELD FROM THE SHUTTLE: USING THE SPARTAN CARRIER AS A MAGNETIC SURVEY TOOL
W. J. Webster, Jr. Jul. 1986 39 p
(NASA-TM-87796; NAS 1.15:87796) Avail: NTIS HC A03/MF A01 CSCL 08B

The shuttle-deployed and recovered Spartan shows promise as an inexpensive and simple support module for potential field measurements. The results of a preliminary engineering study on the applications of the Spartan carrier to magnetic measurements shows: (1) Extension of the mission duration to as long as 7 days is feasible but requires more reconfiguration of the internal systems; (2) On-board recording of Global Positioning System signals will provide position determination with an accuracy consistent with the most severe requirements; and (3) Making Spartan a magnetically clean spacecraft is straight forward but requires labor-intensive modifications to both the data and power systems. As a magnetic survey tool, Spartan would allow surveys at regularly spaced intervals and could make quick-reaction surveys at times of instability in the secular variation.

Author

N86-30756*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LATERAL STABILITY AND CONTROL DERIVATIVES EXTRACTED FROM FIVE EARLY FLIGHTS OF THE SPACE SHUTTLE COLUMBIA
James R. Schiess Aug. 1986 34 p
(NASA-TM-88994; NAS 1.15:88994) Avail: NTIS HC A03/MF A01 CSCL 22B

Flight data taken from the first five flights (STS-2, 3, 4, 5 and 9) of the Space Transportation System Shuttle Columbia during entry are analyzed to determine the Shuttle lateral aerodynamic characteristics. Maximum likelihood estimation is applied to data derived from accelerometer and rate gyro measurements and trajectory, meteorological and control surface data to estimate lateral-directional stability and control derivatives. The estimated parameters are compared across the five flights and to preflight predicted values.

Author

N86-30689# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SIGNIFICANCE AND RELIABILITY OF DYNAMIC ANALYSIS METHODS DEMONSTRATED IN THE INSTRUMENT POINTING SYSTEM PROJECT
E. Hilbrandt and J. Kroeker *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 697-699 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-30757# Range Commanders Council, White Sands Missile Range, N. Mex. Telemetry Group.
DIRECTORY OF TRANSDUCER USERS, SEVENTH EDITION
Mar. 1986 72 p Supersedes RCC-100-83

(AD-A167162; RCC-100-86; RCC-100-83) Avail: NTIS HC A04/MF A01 CSCL 09/6

The Directory of Transducer Users is a compilation of knowledgeable transducer personnel at various government activities, aerospace contractors and universities. The Directory has been published to promote the exchange of information between transducer users with common problems. The requirement for the first edition (1973) of this publication was generated at the 7th Transducer Workshop, which was hosted at Albuquerque, N.M., during April 1972 by the Transducer Committee, Telemetry Group, Range Commanders Council. The workshop concluded that a major problem existed in the lack of information-exchange between transducer users. The seventh edition of the Directory of Transducer Users was generated following the 13th Transducer Workshop conducted at Monterey, Cal., in Jun 1985. An index of types of transducers has been included in this edition so that organizations and individuals associated with specific types of transducers can be easily identified. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-30758# European Space Agency, Paris (France).
PROCEEDINGS OF A WORKSHOP ON COMPOSITES DESIGN FOR SPACE APPLICATIONS
W. R. Burke, comp. Feb. 1986 375 p Workshop held in Noordwijk, Netherlands, 15-18 Oct. 1985
(ESA-SP-243; ISSN-0379-6566; ESA-86-97217) Avail: NTIS HC A16/MF A01

The choice and characteristics of composite materials for space applications, calculation and design methods, and dimensional stability were some areas of discussion in this workshop. Also discussed was integrity control, Ariane applications of composites, load carrying structures in satellites, and satellite antenna and solar array applications. For individual titles, see N86-30759 through N86-30799.

N86-30759# Fulmer Research Inst. Ltd., Stoke Poges (England).
THE APPLICATION OF COMPOSITES TO SPACE STRUCTURES: GUIDELINES ON IMPORTANT ASPECTS FOR THE DESIGNER
D. P. Bashford *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 9-16 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Guidelines and surveys on the state of composites as structural aerospace materials were produced. The guidelines give a detailed background on composites for spacecraft and are intended for designers and engineers unfamiliar with composites. Topics covered include: selection of composite materials; aramid composites; prepreg and resin procurement specifications; nondestructive tests polymeric matrices; mechanical test methods for composites; joining techniques; and moisture absorption/thermal cycling response. ESA

N86-30760# Salford Univ. (England). Dept. of Pure and Applied Physics.
HYGROTHERMAL CHARACTERISTICS OF ANTENNA MATERIALS
J. W. Atkinson, G. H. Wostenholm, and B. Yates *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 17-24 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Increases in mass resulting from the absorption of water by epoxy resins reinforced with Kevlar 49 and Nomex fibers are reported. The influence of relative humidity over the range 12% to 93% at 23 C was studied, along with the effects of fiber volume fraction and fiber type on the final moisture content of the systems. High volume fraction materials absorb less than low volume fraction materials. Nomex absorbs more moisture than Kevlar. The modified Boltzmann transport model proposed by Carter and Kibler (1978) gives a better description of the behavior than the classical Fickian model proposed by Shen and Springer (1976). Absorption from atmospheres at low humidities appears to be governed by different laws from those operating at intermediate and high humidities. ESA

N86-30761# National Engineering Lab., East Kilbride (Scotland).
FATIGUE AND DAMAGE IN FIBRE REINFORCED NYLON c24
W. S. Carswell *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 25-29 Sponsored by UK Dept. of Trade and Industry (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Fatigue tests with a range of mean loads and at two temperatures were carried out on short glass-fiber nylon and short graphite-fiber reinforced nylon. Changes were monitored by noting the peak deflection. Range of deflections and the peak deflection increase, indicating a rotation of the hysteresis loop and creep in the direction of maximum load. The range of deflections at room temperature and at elevated temperature indicates endurance, although there are differences in performance at elevated temperature. The extent of such changes necessary for failure is obscure. ESA

N86-30762# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THERMAL RESIDUAL STRESSES IN SYMMETRIC AND UNSYMMETRIC CARBON FIBER REINFORCED PLASTICS: SOME TENTATIVE WAYS OF EVALUATION c39
J. P. Favre *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 31-38 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Effects of thermal stresses which develop during fabrication on the integrity of composites used in spacecraft are discussed. For an unsymmetric material, the result is a modification of the shape. In the simple case of a long and thin cross-ply specimen, residual stresses in the transverse plies can be deduced from reading the curvature. For a plate, the existence of several stable shapes according to the aspect ratio is verified. For the symmetric material, in-situ estimation of residual stress magnitude by X-ray diffraction using a metallic powder embedded between the plies is described. ESA

N86-30763# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
DYNAMIC MECHANICAL ANALYSIS AS AN AID TO THE CHARACTERIZATION OF COMPOSITE MATERIALS c24
D. H. Bowen, R. Davidson, R. J. Lee, and M. Aguirre *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 39-46 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Dynamic mechanical analysis (DMA) was used to assess the thermal properties of polymeric materials and resin matrix carbon fiber composites. By considering the storage and loss moduli and damping as a function of temperature, information relating to the nature, state of cure, and hysteretic characteristics of the matrix can be obtained. This information assists in the interpretation of the impact strengths and creep resistance of polymers and composites. Examples of the use of DMA in research and development programs with composite materials based on heat resistant thermoplastic (PES, PEI, PEEK) and thermosetting polymers (phenolics, bismaleimides and epoxides) are given. The factors and limitations affecting the quantitative stiffness measurements of orthotropic composite materials by DMA are discussed,

specifically measurements on unidirectional carbon fiber reinforced polyether ether ketone. ESA

N86-30764# Southampton Univ. (England). Inst. of Sound and Vibration Damping.
DAMPING OF COMPOSITES **c39**
T. A. Willway *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 47-52 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Methods of predicting the damping characteristics of composite materials and the effects of various parameters on that damping are reviewed. Experimentally determined values of the damping of composite materials are given. ESA

N86-30765# Imperial Coll. of Science and Technology, London (England). Center for Composite Materials.
THE STRENGTH OF BOLTED JOINTS IN KEVLAR RP **c39**
J. M. Hodgkinson, D. L. deBeer, and F. L. Matthews *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 53-61 Sponsored by ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Failure data for single and multibolt joints in woven Kevlar reinforced epoxy resin are presented. The results are relevant to 6-ply, 0.5 mm thick, symmetrical laminates of different fiber orientation. Bolts used were M4 diameter (d) with standard washers. Lay-up, bolt tensile load, and hence washer pressure, end (e) and width (w) effects were explored in single and double lap joint configurations. Quasi-isotropic lay-ups fail at higher stresses than orthotropic laminates, and, for sufficiently large e/d and w/d ratios, failure is in bearing with no observable edge effects. Multiple bolt tests concerned lines and rows of bolts, the pitch being varied to determine the effects of bolt interaction. These tests were performed on the preferred quasi-isotropic lay-up. ESA

N86-30766# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ORTHOTROPIC PROPERTIES OF LAYERED FIBER COMPOSITES **c24**
G. R. Kress *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 65-70 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

A mathematical method to replace orthotropic and symmetric laminates by a homogeneous material whose mechanical properties are defined in all three spatial directions is presented. A very good agreement between the out-of-plane properties calculated with the method and those obtained using a finite element approach is shown. The values for the in-plane properties are identical to those obtained by the classical lamination theory. ESA

N86-30767# Waldrich Siegen Werkzeugmaschinen G.m.b.H., Burbach (West Germany).
THEORETICAL AND EXPERIMENTAL BEHAVIOR OF CARBON FIBER REINFORCED PLASTICS UNDER MECHANICAL AND THERMAL LOAD **c24**
U. Bieling *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 71-78 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Based on a fiber resin system for aerospace components, the linear and nonlinear stress-strain behavior of CRP laminates is investigated. Theoretical and experimental results correlate very well up to high loads by entering strain-dependent coefficients into the stiffness matrix. Approaches for tracking the initiation of microcracks and crack propagation by acoustic emission and dissipation of energy are presented. By measuring the coefficients of thermal expansion (CTE) of a basic lamina and the equations of classical lamination theory, CTE's of any laminate can be calculated. ESA

N86-30768# Politecnico di Milano (Italy). Dept. of Aerospace Engineering.
ANALYTICAL AND EXPERIMENTAL RESULTS OF ADVANCED COMPOSITE STIFFENED PANELS UNDER COMBINED LOADS **c39**
Giulio Romeo *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 79-86 Sponsored by Italian Ministry of Education (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

A theoretical analysis to design advanced composite hat and blade-stiffened panels under uni and biaxial compression and/or shear is reported. The analysis is based on the buckling equation of the simply-supported orthotropic plate to predict the overall buckling of the panel and the local buckling of each cross-section element, and on the torsional instability theory for the blade-stiffened panels. A computer program to evaluate the minimum-mass optimization of the panels was designed. Tests on graphite/epoxy hat and blade-stiffened panels under uniaxial compression and unstiffened panels under shear were conducted. Adequate correlation between theoretical analysis and experimental results is obtained. ESA

N86-30769# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
HAND CALCULATION METHOD FOR BUCKLING OF COMPOSITE SHELL STRUCTURES **c39**
R. F. P. vanZelst *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 87-93 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The buckling load of a simply supported composite shell structure is determined. The laminate properties including the transverse shear properties are derived from the classical laminate theory. From the general buckling equation the panel buckling allowable and the local buckling allowable of several types of cross sections are derived. The equations are put into a small FORTRAN program. Results for an undisturbed shell structure are in good agreement with the results from the finite difference program BOSOR 4. ESA

N86-30770# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
ADEQUATE FIBER REINFORCED STRUCTURAL ELEMENTS IN LOAD INTRODUCTION AREA OF FIBER REINFORCED SHELLS **c39**
F. S. D. Rekers *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 95-99 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Design of reinforcements around access holes and near cylinder ends in structural shells is discussed. Elements necessary for introduction of axial-load and bending moment in a cylinder are presented. Monolithical behavior; hoop stiffness; torsional stiffness; shear stiffness; and shear introduction were implemented in three different shell-configurations. ESA

N86-30771# Brussels Univ. (Belgium).
NEW PREDICTION METHODS FOR COMPOSITES HYGROTHERMAL BEHAVIOR **c24**
C. C. Hiel *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 101-107 Sponsored by NAS-NRC and NATO (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

A method to predict the thermal expansion and swelling of a composite material due to temperature and moisture variations which typically occur in a launch environment is presented. It is demonstrated that constitutive equations for moisture absorption and moisture-induced dimensional changes can be obtained with an internal variable method rooted in the theory of irreversible thermodynamics. Realism is injected into the model through the concept of free volume. ESA

N86-30772# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
DESIGN AND MANUFACTURING ASPECTS OF SPACE TRUSSES
H. W. Bergmann *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 109-115 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The dimensional stability of fiber reinforced composites for large space structure trusses is discussed. Temperature and moisture effects cannot be accurately assessed by extrapolation from the response of small test coupons. The buckling strength of hollow filament-wound struts depends very sensitively on the angular directions of the individual plies. Optimal configurations can be derived by a computerized program. An alternative approach to filament-wound strut construction by surrounding a prefabricated foam core by carbon fiber rovings or fabrics is viable. The interconnection of struts in rigid three-dimensional trusses is possible by filament-wound joints with the advantages of low cost, low weight, and improved thermal compatibility. ESA

N86-30773# Construcciones Aeronauticas S.A., Madrid (Spain). Space and Systems Div.
HIGH-STABILITY TELESCOPE STRUCTURES c89
G. Galipienso and S. DellAmico *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 119-132 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

A methodology for the design of structures requiring a high degree of dimensional stability, of the Space Telescope/GRIST type, was derived. The optimum structural configuration and the optimum laminate lay-up compatible with the structural strength and stiffness requirements were determined. The global behavior of the complete structure as a function of less-than-ideal component properties was established. Levels of maximum allowable deviations for real properties of components belonging to different families were determined. A method for adjustment of the coefficient of thermal expansion after manufacturing to compensate for unavoidable deviations in component properties was devised. A test method allowing measurement of very small distortions was developed. ESA

N86-30774# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautical Structures and Materials.
THERMAL STABILITY OF SANDWICH REFLECTORS c24
H. Groth *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 133-139 Sponsored by Ericsson Radio System (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The inplane coefficient of thermal expansion (CTE) of the honeycomb sandwich of a spacecraft antenna reflector was treated using an analytical model, where the panel is treated like a sandwich panel, and an approach using the finite element method. Both methods are based on linear elasticity. For the first model the influence of different sandwich parameters is discussed. For the second model, the CTE is calculated for a typical panel, and results are compared with the first model. A difference between the two models is explained by the behavior of the honeycomb core. In the analytical model the core and the faces are assumed to keep their initial shape, i.e., no bending or out of plane deformations of the honeycomb cell walls or of the faces. The analytical model may therefore serve as an upper bound solution of the thermal expansion of the panel. ESA

N86-30775# European Space Agency, Paris (France). Mechanical Systems Div.
DIMENSIONAL STABILITY OF CFRP TUBES FOR SPACE STRUCTURES
G. G. Reibaldi *In its* Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 141-147 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Dimensional stability of CFRP tubes used in spacecraft structures was investigated as a function of the number of thermal cycles. Length and weight decrease with the number of cycles. Thermal cycling generates microcracking, which increases desorption rate for the weight and length. For the SPAS tube T006 the length increases with respect to the initial value, probably due to large microcracking. The polythene bag does not influence the absorption rate. No clear asymptotic value for the weight and length variation with the increasing of thermal cycles is found. Permanent deformations are expected in orbit, about 25 microns after 300 thermal cycles. Lay-up of the CFRP tube is important for dimensional stability. A CIBA-GEIGY tube shows lower length variation, even if the weight loss is similar to that of the SPAS. ESA

N86-30776# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
HOLOGRAPHIC INTERFEROMETRY FOR DISTORTION MEASUREMENTS OF ANTENNAS c35
H. U. Frey *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 149-155 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Holographic interferometry was developed and adapted to a space environment simulation chamber. The test method is described and test results of antenna dishes from 1.2 to 3.6 m diameter are presented. ESA

N86-30777# California Univ., Berkeley. Dept. of Mechanical Engineering and Center for Advanced Materials.
DELAMINATION FRACTURE TOUGHNESS OF COMPOSITE SPACECRAFT STRUCTURES
C. K. H. Dharan *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 159-167 (For primary document see N86-30758 22-18)
(Contract DE-AC03-76SF-00098)
Avail: NTIS HC A16/MF A01

Opening mode (mode 1) delamination fracture behavior of graphite and aramid-epoxy composites was investigated. The effect of loading rate and reinforcement geometry (unidirectional vs woven) on fracture toughness was determined, and observation of the fracture surface was used to derive microfailure modes. A micromechanical delamination model to estimate the relative contributions of the matrix and the fiber-matrix interface to the overall delamination fracture toughness is proposed. Results show that the mode 1 delamination fracture toughness of graphite composites is small relative to glass composites. Woven graphite composites exhibit opening mode delamination crack energy release rates 2.5 times those of the unidirectionally reinforced material. The fracture surface of the graphite-epoxy laminates is characterized by clean exposed fiber surfaces indicating poor interfacial fracture toughness. ESA

N86-30778# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautical Structures and Materials.
DAMAGE ZONE FRACTURE ANALYSIS OF FIBROUS COMPOSITES c39
Kaj Hollmann, Per Clarin, C.-G. Aronsson, and Jan. Baecklund *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 169-174 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Excellent results were achieved using the Damage Zone Model (DZM) to predict mode 1 fracture loads of notched composites. A computer program of high computational efficiency, called FRACOM, was developed. Computations are performed in a few minutes on a personal computer and result in an estimated load-displacement behavior and damage zone characteristics under quasi-static loading. ESA

N86-30779# Engineering System International, Rungis (France).
INDUSTRIAL CALCULATION OF DAMAGE TOLERANCE AND STRESS ALLOWABLES IN COMPONENTS MADE OF COM-

POSITE MATERIALS USING THE PAM-FISS/BIPHASE MATERIAL MODEL **c39**
A. deRouvray and E. Haug *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 175-185 Sponsored by ESA/ESTEC (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

A finite element code to simulate the heterogeneous constitution of composite materials during the damage process was developed. The code simulates the basic damage mechanisms; matrix micro and macrocracking, fiber ruptures, layer delamination. It is used to calculate initial, tangent, and residual rheological properties, as well as damage (or defect) initiation and stable/unstable growth, in the critical zones of arbitrary composite structures. It provides realistic equivalent homogeneous properties (moduli; stress/strain allowables) compatible with an efficient damage tolerant design. ESA

N86-30780# Paderborn Univ. (West Germany). Fachgebeit Technische Mechanik.
ON CORRELATION BETWEEN THERMAL STRESSES, ELASTIC STRAIN ENERGY AND DEBONDING IN THERMALLY LOADED FIBER-REINFORCED COMPOSITE MATERIALS **c39**
F.-G. Buchholz *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 187-196 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Correlations between thermal stresses, elastic strain energy, and the energy release rate during debonding of unidirectionally fiber reinforced composite materials are investigated numerically. It is shown that the strain energy caused by thermal loads in a single circular unit cell of such a material is directly correlated with the energy spent by the compound on debonding of fiber and matrix. For a corresponding hexagonal unit cell within a compound two additional influences are effective, resulting in an interferred correlation and distinctly lower energy release rates during the process of debonding. ESA

N86-30781# Strathclyde Univ., Glasgow (Scotland). Dept. of Mechanics of Materials.
ASSESSING THE EFFECTS OF DELAMINATIONS ON THE POSTBUCKLING STRENGTH OF CRFP PANELS **c39**
W. M. Banks, J. Rhodes, and G. B. Chai *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 197-202 Sponsored by UK Ministry of Defense and ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The effect of deliberately inbuilt delaminations on the postbuckling strength of carbon fiber composite panels with a b/t ratio of 70 and 50 was tested. The panels are fabricated from 14 layers of unidirectional carbon fiber using an autoclave process. The delamination positions were chosen to coincide with the position of highest interlaminar shear stress, the position of highest direct strain, the central buckle peak, and the inflection points on the panel. The control panel for a b/t ratio of 68.57 failed prematurely due to unforeseen edge effects. However it is clear that the worst position for delamination is when it coincides with the highest interlaminar shear stress at the edge of the panel. There appears to be little effect with the delamination at the buckle peak. ESA

N86-30782# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
ON THE DEFECT SENSITIVITY OF SPACECRAFT TYPICAL THIN CFRP LAMINATES **c24**
J. Bischoff *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 203-209 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The brittleness of high modulus CFRP laminates used in spacecraft was investigated. It is shown that small defects can cause a crucial reduction of loading capacity. The dependence of this reduction on fiber orientation and the laminate stacking sequence is discussed. Fiber-matrix-bonding is identified as an essential factor affecting the notch sensitivity. ESA

N86-30783# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
INTEGRITY OF CARBON FIBER REINFORCED PLASTICS. STRUCTURAL ELEMENTS, SCREENING PROCEDURES, OPPORTUNITIES AND OPEN ISSUES **c24**
Werner H. Paul *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 211-215 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Activities (of the standard design procedure) necessary to prevent catastrophic failures of CFRP manufactured items in manned spaceflight due to global or local deficiencies are discussed. Criteria which CFRP structural elements must meet in order to be used in STS are given. ESA

N86-30784# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
NONDESTRUCTIVE TESTING OF FIBER REINFORCED COMPOSITES USING X-RAY FINE STRUCTURE PROCEDURES **c38**
J. Walter and Henschel (Bundesanstalt fuer Materialpruefung, Berlin, West Germany) *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 217-229 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Nondestructive inspection (NDI) of fiber reinforced composites is introduced. Nondestructive testing with the X-ray fine structure procedure is based on the fact that the paracrystalline microstructure of the fibers diffracts the X-rays at the lattice planes. The long chain molecules are arranged in a nearly crystalline (paracrystalline) configuration; the chains have a high degree of orientation parallel to the fiber axis, so that the X-ray pattern produced by a bundle of fibers irradiated in a directional normal to their long axis is typical for the specific type. This property can be used as NDI-criterion and thickness layer measurement method. ESA

N86-30785# Fulmer Research Inst. Ltd., Stoke Poges (England).
DEVELOPMENTS IN THE NONDESTRUCTIVE EVALUATION (NDE) OF COMPOSITE MATERIALS **c38**
R. L. Crocker *In its* Proceedings of a Workshop on Composites Design for Space Applications (ESA-SP-243) Feb. 1986 p 231-235 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The effects on composites inspection of digital techniques of computing and data storage, robotics, and image processing made possible by digitizing raw data are assessed. Ultrasonics, X-radiography, thermography, mechanical impedance, vibrothermography, and laser holography are discussed. In many cases the actual defect detection capability is not changed by introducing these techniques, it is the integrity of the inspection or evaluation which is improved. ESA

N86-30786# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
INCREASING USE OF COMPOSITE STRUCTURE ON ARIANE LAUNCHERS **c15**
F. Perez and P. Eymard (Centre National d'Etudes Spatiales, Paris, France) *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 239-244 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The progressive use of composite structures on Ariane launchers 1 to 4 generation and the tendency for Ariane 5 is outlined. Carbon fiber and glass fiber reinforced plastics are involved. Mass saving, rigidity requirements, and cost arguments are mentioned. Rupture criteria, orthotropic effects, thermal effects and quality control are discussed. ESA

N86-30787# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.

DEVELOPMENT OF THE ARIANE 4 INTERSTAGE 2-3 IN CFRP **c15**
C. Blaas *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 245-249 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

For the Ariane 4 interstage 2/3, stiffened skin panels of CFRP were developed. The panels are 1.0 m wide and 2.7 m long. Each panel has 15 blade-type stiffeners with a height of 25 mm on a pitch of 68 mm. The material used is Fiberite 976-T300 in laying sequences of 45 and 0 deg. The total mass reduction of the structure compared to the aluminum version is greater than 20%. In the design of the structure, classical laminate theory and the numerical programs BOSOR 4, NASTRAN and SINDA were used. ESA

N86-30788# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
THE DEVELOPMENT OF THE ARIANE 4 SPELDA **c15**
N. G. Thomas and W. T. Oliver *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb 1986 p 251-263 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Structural design of the load carrying external structure used as Ariane upper payload support and lower payload protector, the so-called SPELDA, is outlined. Major design drivers for SPELDA were mass, stiffness, and strength. A CFRP faced honeycomb sandwich was adopted. The models, test methods, design steps, and manufacturing and analysis problems are summarized. ESA

N86-30789# National Space Development Agency, Tokyo (Japan).
DESIGN AND DEVELOPMENT OF THE GRAPHITE EPOXY STRUCTURE FOR CS-3 SATELLITE
Tsuneo Kawashima, Toshio Inoue (Mitsubishi Electric Corp., Kanagawa, Japan), and Hiromi Seko *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 267-274 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The CS-3 satellite design requirements, internal load analysis of the structural members, laminate design of CFRP components, sheet/core design of equipment panels, configurations of the structural members, development tests, of the structural thermal model, and the results of weight reductions are described. Designs that attain the minimum weight were performed for main structures such as the thrust tube and the equipment panels. Weight reductions of the secondary structures such as joints, brackets and end fittings of struts greatly contribute to the weight reduction of the structure. The structure weighs 53 kg, i.e., 4.9% of the 1088 kg launch weight. ESA

N86-30790# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
DESIGN AND DEVELOPMENT TESTING OF THE BONDED JOINT BETWEEN A TYPICAL LAUNCH VEHICLE ATTACHMENT RING AND CFRP THRUST CONE **c15**
J. T. Sharkey, G. H. F. Nayler, and J. Reynolds *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 275-284 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The development of the principal structural joint of a Shuttle payload is described. The joint is subjected to large tension and compression loads due to the spacecraft being cantilevered perpendicular to the direction of flight of the launch vehicle. Finite element modeling was included in the investigation of joint designs. A bonded and bolted double lap shear configuration was chosen. Manufacturing and inspection methods were developed and testing of joint samples was undertaken including static, thermal and fatigue loading. The static test results were used to determine the design allowable strength of the joint. ESA

N86-30791# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
ON THE DEVELOPMENT OF A CORRUGATED CFRP CENTRAL CYLINDER FOR SATELLITES
D. Brosda *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 285-290 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Development of a corrugated central cylinder for satellites in the DFS-class, including design, analyses, manufacture, assembly and tests is summarized. The central cylinder has a mean diameter of 938 mm and a length of 1780 mm. The cylinder wall consists of a corrugated CFRP shell of variable thickness. Three CFRP rings provide for the attachment of antenna, equipment, and payload platforms. The thrust cylinder is designed to meet the standard frequency requirements (less than 15 Hz lateral and less than 35 Hz axial) and carry the loads associated with a typical satellite mass of 1400 kg whose CG position lies 1000 mm above the separation plane. The first flight structure to be equipped with the cylinder is the German communication satellite DFS Kopernikus. ESA

N86-30792# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
COMPARISON OF CLASSICAL AND COCURING MANUFACTURING TECHNIQUES FOR A CFRP HONEYCOMB CENTRAL TUBE **c31**
J. L. Pettex *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 291-294 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Classical and cocuring manufacturing of a sandwich structure using CFRP skins and an aluminum alloy honeycomb core for the Arabsat central tube are compared. The cocuring technology leads to a simplification of the manufacturing and consequently to a cost reduction. ESA

N86-30793# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
FIBER REINFORCED PLASTIC CASES FOR SOLID PROPELLANT MOTORS **c20**
H. Krings and J. Scharringhausen *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 295-299 Sponsored by ESA, BMFT, DFVLR and CNR (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The design, fabrication, and tests performed for the FRP-cases for solid propellant motors of MAGE apogee boost motors are described. Definition of launcher and satellite requirements, and qualification of the motor are presented. ESA

N86-30794# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
STRENGTH OF CARBON FIBER COMPOSITE/TITANIUM BONDED JOINTS AS USED FOR SPAS-TYPE STRUCTURES
J. Franz and H. Laube *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 301-308 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The analytical and experimental verification of bonded tubes used for SPAS strut assemblies is described. The strut elements consist of a carbon fiber tube and two titanium mounting elements, connected by tapered, double-shear bonded joints. The analysis of the geometric design minimized the shear stress peaks at the ends of the overlapping section under external and temperature loadings. The load capability is verified by a destructive qualification test program (static load and fatigue) and each individual strut is acceptance tested before integration into a satellite structure. Data can be used for load capability estimations for similar strut components, i.e., with increased or decreased tube diameter, or with modified overlapping length of the bonding section. ESA

N86-30795# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Neue Technologie.
MANUFACTURING TECHNOLOGY OF GRAZING-INCIDENCE MIRROR CARRIERS MADE OF CARBON FIBER REINFORCED

EPOXY MATRIX SYSTEMS c89
J. Klug *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 311-318 Sponsored by ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

Manufacturing techniques for the low energy telescopes for the X-ray Multi Mirror mission were studied. X-ray parabolic mirror carriers onto which the reflecting X-ray surface was transferred by the replica method as developed for EXOSAT were fabricated. Instead of using beryllium carriers, the use of carbon fiber reinforced epoxy carriers was investigated, for the series production envisaged for XMM. Carrier design and manufacturing, carrier characteristics obtained, critical areas encountered during the feasibility study, and future activities are discussed. ESA

N86-30796# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
DESIGN AND DEVELOPMENT OF THE ADVANCED RIGID ARRAY (ARA) SOLAR PANEL c44
R. W. H. Horsselenberg *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 319-328 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The Advanced Rigid Array panel technologies are summarized: specific weight is less than 1.2 kg/sqm; can survive extreme thermal cycling (plus 80 to minus 180 C); excellent flatness and dimensional stability; extremely high stiffness properties due to application of GY-70 carbon fiber; high satellite interface flexibility; high panel sizing flexibility; and simple and low cost production. Developments include the establishment of panel technologies to obtain specific weights below 0.8 kg/sqm via open lay-up CFRP facesheet technology. ESA

N86-30797# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
DEVELOPMENT OF AN ANTENNA STRUCTURE FOR A DEPLOYABLE OFFSET ANTENNA c32
H. Herbig, W. Tauber, and H. Vorbrugg *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 329-336 (For primary document see N86-30758 22-18) (Contract ESTEC-5206/82-NL-PB(S6))
Avail: NTIS HC A16/MF A01

An unfurlable spacecraft antenna is described. The antenna consists of a central hub, ribs being radially arranged around the hub, and a mesh which produces the parabolic reflector surface shape. The hub and the ribs are made of CFRP. For the stowed and deployed reflector configuration the CFRP-components were analyzed and optimized under dynamical and dimensional stability aspects. The analytical results and the development of the CFRP components are presented. ESA

N86-30798# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
STRUCTURAL ANALYSIS, MANUFACTURING AND TEST EVALUATION OF A POLARIZATION SENSITIVE REFLECTOR c32
W. Weiss, K. Pfeifer, and R. Leitner *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 337-347 (For primary document see N86-30758 22-18) (Contract ESTEC-5494/84-NL(CM))
Avail: NTIS HC A16/MF A01

A parabolic reflector for space applications was developed. The reflector consists of two Kevlar/Nomex sandwich shells with a diameter of 1100 mm. Their edges are connected by a Kevlar/glass ring. The rear shell is fixed to the satellite by a conical carbon fiber composite cylinder and stiffened by four Kevlar/Nomex ribs. To minimize the thermal stresses the thermal expansion coefficients were adjusted to the reflector shells. In the static analysis a finite element calculation was performed for an acceleration of 15 g and for the most critical Sun irradiation with a partly shadowed reflector. All stresses are below the strength limits. The antenna was tested by sine vibration, acoustic noise, thermal cycling, and solar simulation without failure. ESA

N86-30799# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
A STEP TOWARDS AN ESA COMPOSITES DESIGN HANDBOOK FOR SPACE STRUCTURE APPLICATIONS
J. Bolz *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 351-355 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

The European Space Agency initiated a Composites Design Handbook for Space Structure Applications, because the increasing application of composite materials in space structures requires harmonization. Establishment of a Handbook structure and the compilation of information on as many topics as possible is described. ESA

N86-30800*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICATION OF THE LQG/LTR TECHNIQUE TO ROBUST CONTROLLER SYNTHESIS FOR A LARGE FLEXIBLE SPACE ANTENNA
Suresh M. Joshi, Ernest S. Armstrong, and N. Sundararajan (Old Dominion Univ., Norfolk, Va.) Sep. 1986 64 p
(NASA-TP-2560; L-16076; NAS 1.60:2560) Avail: NTIS HC A04/MF A01 CSCL 22B

The problem of synthesizing a robust controller is considered for a large, flexible space-based antenna by using the linear-quadratic-Gaussian (LQG)/loop transfer recovery (LTR) method. The study is based on a finite-element model of the 122-m hoop/column antenna, which consists of three rigid-body rotational modes and the first 10 elastic modes. A robust compensator design for achieving the required performance bandwidth in the presence of modeling uncertainties is obtained using the LQG/LTR method for loop-shaping in the frequency domain. Different sensor actuator locations are analyzed in terms of the pole/zero locations of the multivariable systems and possible best locations are indicated. The computations are performed by using the LQG design package ORACLS augmented with frequency domain singular value analysis software. Author

N86-30801*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF MODEL ERROR ON CONTROL OF LARGE FLEXIBLE SPACE ANTENNA WITH COMPARISONS OF DECOUPLED AND LINEAR QUADRATIC REGULATOR CONTROL PROCEDURES
Harold A. Hamer and Katherine G. Johnson Sep. 1986 52 p
(NASA-TP-2604; L-16114; NAS 1.60:2604) Avail: NTIS HC A04/MF A01 CSCL 22B

An analysis was performed to determine the effects of model error on the control of a large flexible space antenna. Control was achieved by employing two three-axis control-moment gyros (CMG's) located on the antenna column. State variables were estimated by including an observer in the control loop that used attitude and attitude-rate sensors on the column. Errors were assumed to exist in the individual model parameters: modal frequency, modal damping, mode slope (control-influence coefficients), and moment of inertia. Their effects on control-system performance were analyzed either for (1) nulling initial disturbances in the rigid-body modes, or (2) nulling initial disturbances in the first three flexible modes. The study includes the effects on stability, time to null, and control requirements (defined as maximum torque and total momentum), as well as on the accuracy of obtaining initial estimates of the disturbances. The effects on the transients of the undisturbed modes are also included. The results, which are compared for decoupled and linear quadratic regulator (LQR) control procedures, are shown in tabular form, parametric plots, and as sample time histories of modal-amplitude and control responses. Results of the analysis showed that the effects of model errors on the control-system performance were generally comparable for both control procedures. The effect of mode-slope error was the most serious of all model errors. Author

N86-30802# Tri-Con Associates, Inc., Cambridge, Mass.
DESIGN, FABRICATE AND TEST SPACECRAFT AUTOMATIC ACTIVE DISCHARGE SYSTEM (SAADS) Final Report, 20 Jul. 1983 - 15 Jun. 1985
Robert S. Hills 25 Sep. 1985 18 p
(Contract F19628-83-C-0153)
(AD-A166559; C-214; AFGL-TR-85-0236) Avail: NTIS HC A02/MF A01 CSCL 22/2

The objective of this contract is the design, fabrication, and testing of a Spacecraft Automatic Active Discharge System (SAADS) which will attempt to automatically control and dissipate the vehicle charge as a function of natural or induced disturbances in space. A microprocessor based controller will monitor and manipulate data from a Proton Electrostatic Analyzer (ESA) to determine if the vehicle charge is greater than a predetermined value and then activate a Plasma Source to discharge the vehicle. The plasma source short circuits the charge. This equipment is to be flown as part of the BERT I payload to demonstrate the feasibility of the system for eventual use in a satellite in a true space environment. GRA

N86-30803# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CONTROL OF LARGE FLEXIBLE SYSTEMS BY SPATIAL MODAL INPUT-DISTRIBUTION CONTROL M.S. Thesis
Craig V. Bendorf 1985 113 p
(AD-A166912; AFIT/CI/NR-86-47T) Avail: NTIS HC A06/MF A01 CSCL 22/2

A common problem in controlling a large flexible structure with a reduced order model is the excitation of the residual (non-modeled) modes by the control inputs resulting in control spillover. In this thesis a new approach to eliminate control spillover is examined. This approach, based on the independent modal-space control method, uses a finite number of spatially distributed input points to eliminate control spillover. Control of an undamped beam and a finite degree of freedom truss is accomplished through computer simulation. The results of the seven example problems shows that this new approach does effectively eliminate control spillover. GRA

N86-30804# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
WINDING WITH THERMOPLASTIC POLYMERS
J. L. Tisne and J. Bouvard 1986 8 p Presented at 3rd European Symposium on Spacecraft Materials in Space Environment, Noordwijk, Netherlands, 3 Oct. 1985 Previously announced as N86-22613
(SNIAS-861-430-106; ESA-86-97168) Avail: NTIS HC A02/MF A01

Filament winding of continuous fibers impregnated with thermoplastic resins for spacecraft structure manufacturing is described. The mandrel is at ambient temperature, or is maintained below the fusion temperature, which enables winding unstable trajectories by means of the under layer/strand sticking. Another method consists in having the material and the mandrel at the fusion temperature while winding. This process simplifies the machine but presents two drawbacks, with respect to the thermoset resins: it is impossible to wind other than stable trajectories, close to geodetic ones; and the curing on the thermoset epoxy (maximum 180 C) is replaced by a fusion in an oven (from 250 to 400 C). This poses a problem of resistance of the enclosed parts and tools. ESA

N86-30805*# Martin Marietta Corp., Denver, Colo.
SPACE STATION AUTOMATION STUDY. VOLUME 1: EXECUTIVE SUMMARY. AUTONOMOUS SYSTEMS AND ASSEMBLY Final Report
Nov. 1984 64 p
(Contract NAS8-35042)
(NASA-CR-176860; NAS 1.26:176860; DE85-902179; MCR-84-1878-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 22B

The purpose of the Space Station Automation Study (SSAS) was to develop informed technical guidance for NASA personnel in the use of autonomy and autonomous systems to implement space station functions. DOE

N86-30652*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
STIFFNESS CONTROL OF LARGE SPACE STRUCTURES
Jay-Chung Chen and James L. Fanson *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 368-373 Sponsored by NASA (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

N86-30653# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ASPECTS OF ACTIVE ISOLATION AS APPLIED TO A SATELLITE STRUCTURE WITH SHAPE PRECISION PAYLOAD
W. Charon *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 374-380 (For primary document see N86-30627 22-01)
(Contract ESTEC-5326/83-NL-PB(SC))
Avail: NTIS HC A99/MF E03

N86-30658# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
STRUCTURAL OPTIMIZATION WITH CONSTRAINTS IN DYNAMICS
Horst J. Baier *In* DGLR The 2nd International Symposium on Elasticity and Structural Dynamics 1985 p 426-433 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30672# Spar Aerospace Ltd., Toronto (Ontario).
MODAL PARAMETERS ESTIMATION FROM DRIVEN-BASE TESTS
S. Draisey, F. R. Vigneron (Department of Communications, Ottawa, Ontario), Y. Soucy, and J.-G. Beliveau (Sherbrooke Univ., Quebec) *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 546-552 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30680# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ANALYSIS-TEST CORRELATION OF DYNAMIC MATHEMATICAL MODELS
B. Caesar *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 617-624 (For primary document see N86-30627 22-01)
(Contract ESTEC-5597/83/NL-PB(SC))
Avail: NTIS HC A99/MF E03

N86-30682*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST AND ANALYSIS CORRELATION FOR STRUCTURAL DYNAMIC SYSTEMS
Ben K. Wada and Jay-Chung Chen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 632-647 Sponsored by NASA (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

N86-30683*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC VERIFICATION OF VERY LARGE SPACE STRUCTURES
Brantley Hanks, R. *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 648-655 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03 CSCL 01B

N86-30684# Technische Hochschule, Aachen (West Germany). Inst. fuer Leichtbau.
RECONSTRUCTION OF FORCING FUNCTIONS BASED ON MEASURED STRUCTURAL RESPONSES

H. Oery, H. Glaser, and D. Holzdeppe *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 656-668 Sponsored by Deutsche Forschungsgemeinschaft, ESA, and MBB/Erno G.m.b.H. (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30685# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
SPACECRAFT STRUCTURES DESIGN AND VERIFICATION
C. Stavrinidis *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 669-671 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30686# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
LOW FREQUENCY DESIGN VERIFICATION OF LARGE SPACECRAFT STRUCTURES
E. Erben and K. Eckhardt *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 672-682 Sponsored by INTELSAT and ESTEC (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30687# Department of Communications, Ottawa (Ontario). David Florida Lab.
VIBRATION QUALIFICATION AT THE DAVID FLORIDA LABORATORY
Rolf Mamen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 683-688 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30688# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
INFLUENCE OF NONLINEAR SPACECRAFT COMPONENTS ON DYNAMIC LAUNCH AND IN-ORBIT RESPONSE
I. Kolsch and H. Baier *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 689-696 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N86-30806*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Research Lab.
ULTRAVIOLET SPECTROMETER AND POLARIMETER (UVSP) SOFTWARE DEVELOPMENT AND HARDWARE TESTS FOR THE SOLAR MAXIMUM MISSION Final Report
M. E. Bruner and B. M. Haisch 31 Jan. 1986 223 p
(Contract NAS5-24119)
(NASA-CR-177889; NAS 1.26:177889; LMSC-F067851) Avail: NTIS HC A10/MF A01 CSCL 14B

The Ultraviolet Spectrometer/Polarimeter Instrument (UVSP) for the Solar Maximum Mission (SMM) was based on the re-use of the engineering model of the high resolution ultraviolet spectrometer developed for the OSO-8 mission. Lockheed assumed four distinct responsibilities in the UVSP program: technical evaluation of the OSO-8 engineering model; technical consulting on the electronic, optical, and mechanical modifications to the OSO-8 engineering model hardware; design and development of the UVSP software system; and scientific participation in the operations and analysis phase of the mission. Lockheed also provided technical consulting and assistance with instrument hardware performance anomalies encountered during the post launch operation of the SMM observatory. An index to the quarterly reports delivered under the contract are contained, and serves as a useful capsule history of the program activity. B.G.

N86-30807*# Honeywell, Inc., Clearwater, Fla. Space and Strategic Avionics Div.
MODELING AND ANALYSIS OF PINHOLE OCCULTER EXPERIMENT Final Report
J. R. Ring 20 Jun. 1986 84 p
(Contract NAS8-36101)
(NASA-CR-178875; NAS 1.26:178875; CEL-K-156-137) Avail: NTIS HC A05/MF A01 CSCL 14B

The objectives were to improve pointing control system implementation by converting the dynamic compensator from a continuous domain representation to a discrete one; to determine pointing stability sensitivites to sensor and actuator errors by adding sensor and actuator error models to treetops and by developing an error budget for meeting pointing stability requirements; and to determine pointing performance for alternate mounting bases (space station for example). B.G.

N86-30808# Air Force Ballistic Missile Div., Norton AFB, Calif.
NOVEL REENTRY VEHICLE INSTRUMENT: THE PHOTODIODE
S. R. Blodgett, B. T. Conrad, K. W. Shrock, A. C. Wilken, M. W. Sterk, and R. J. Chaffin 1986 12 p Presented at the 3rd Flight Testing Conference, Las Vegas, Nev., 2 Apr. 1986 Prepared in cooperation with Sandia National Labs., Albuquerque, N.M.
(Contract DE-AC04-76DP-00789)
(DE86-006234; SAND-85-2086C; CONF-8604115-1) Avail: NTIS HC A02/MF A01

Photodiodes are used as detectors to provide a simple, inexpensive, and reliable method of obtaining data pertaining to reentry vehicle flight performance. These devices are used primarily to measure boundary layer transition onset, but can also measure vehicle roll rate and roll position. This paper will describe the instrument, construction details, installation, cost, and advantages, and will conclude with supporting flight data. DOE

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N86-30809*# Auburn Univ., Ala. Engineering Experiment Station.
SOLID-PROPELLANT ROCKET MOTOR INTERNAL BALLISTICS PERFORMANCE VARIATION ANALYSIS, PHASE 5 Final Report
Richard H. Sforzini and Jesse E. Murph Jan. 1980 65 p
(NASA-CR-177145; NAS 1.26:177145) Avail: NTIS HC A04/MF A01 CSCL 21H

The results of research aimed at improving the predictability of internal ballistics performance of solid-propellant rocket motors (SRM's) including thrust imbalance between two SRM's firing in parallel are presented. Static test data from the first six Space Shuttle SRM's is analyzed using a computer program previously developed for this purpose. The program permits intentional minor design biases affecting the imbalance between any two SMR's to be removed. Results for the last four of the six SRM's, with only the propellant bulk temperature as a non-random variable, are generally within limits predicted by theory. Extended studies of internal ballistic performance of single SRM's are presented based on an earlier developed mathematical model which includes an assessment of grain deformation. The erosive burning rate law used in the model is upgraded and made more general. Excellent results are obtained in predictions of the performances of five different SRM's of quite different sizes and configurations. These SRM's all employ PBAN type propellants with ammonium perchlorate oxidizer and 16 to 20% aluminum except one which uses carboxyl terminated butadiene binder. The only non-calculated parameters in the burning rate equations that are changed for the

different SRM's are the zero crossflow velocity burning rate coefficients and exponents. The results, in general, confirm the importance of grain deformation. The improved internal ballistic model makes practical development of an effective computer program for application of an optimization technique to SRM design which is also demonstrated. The program uses a pattern search technique to minimize the difference between a desired thrust-time trace and one calculated based on the internal ballistic model. M.G.

N86-30810# Weapons Systems Research Lab., Adelaide (Australia).
EVALUATION OF IGNITER COMPOSITIONS SR371C AND SR44
L. M. Davis Nov. 1985 20 p
(AD-A167007; WSRL-0424-TM) Avail: NTIS HC A02/MF A01 CSCL 21/2

The ignition performance of compositions SR371C and SR44 in two types of containers was examined in a test vessel. It was found that igniters containing composition SR44 had lower ignition delay times and maximum pressures than those with composition SR371C. It is recommended that further investigations be conducted to determine the minimum mass of composition SR44 required to ignite a given rocket motor. Author (GRA)

N86-30793# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
FIBER REINFORCED PLASTIC CASES FOR SOLID PROPELLANT MOTORS
H. Krings and J. Scharringhausen *in* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 295-299 Sponsored by ESA, BMFT, DFVLR and CNR
(For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-30811# Lawrence Livermore National Lab., Calif.
CHEMISTRY RESEARCH RESOURCE Monthly Progress Report, Jan. 1986
Feb. 1986 94 p
(Contract W-7405-eng-48)
(DE86-008765; UCID-20622-86-1) Avail: NTIS HC A05/MF A01

The research is reported in twelve sections: synthesis of new materials, development of analytical techniques, chemical kinetics and transport processes, cryogenic and other physical properties of hydrogen isotopes, artificial intelligence, characterization techniques development, materials modeling analysis, mechanical properties of polymers, physical metallurgy (mechanical properties), physical metallurgy (phase transformations), surface modification and surface studies, and new materials development and properties. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-30812*# Textron Bell Helicopter, Fort Worth, Tex.
FLIGHT SERVICE EVALUATION OF COMPOSITE COMPONENTS ON THE BELL HELICOPTER MODEL 206L Annual Flight Service Technical Summary Report
H. E. Wilson, II Aug. 1986 53 p
(Contract NAS1-15279)
(NASA-CR-178148; NAS 1.26:178148; AFSR-2) Avail: NTIS HC A04/MF A01 CSCL 11D

This is the second annual report on the flight service components for the Bell Model 206L JetRanger helicopter. The components have been placed in service in the Continental United States, Canada, and Alaska. The report covers the period from 1 August 1983 to 1 January 1986. The status of 34 sets of components is discussed in this report. Approximately 73,000 flight hours were accumulated on the components as of 1 January 1986. Three years of coupon tests on the components are presented with test results. A vertical fin had been struck by lightning and the results of its examination and tests are included. Author

N86-30813# Illinois Univ., Urbana. Dept. of Ceramic Engineering.
INFLUENCE OF Al2O3 ON PROPERTIES OF YTTRIA STABILIZED ZIRCONIA-Al2O3 COMPOSITES Interim Report, Oct. 1985 - Apr. 1986
R. C. Buchanan and W. W. Davison 15 Apr. 1986 43 p
(Contract N00014-80-K-0969; Grant NSF DMR-80-20250)
(AD-A167328; TR-13) Avail: NTIS HC A03/MF A01 CSCL 11/2

Composite structures of yttria (4.5 mol%) stabilized zirconia (YSZ) with added Al2O3 (0.3 to 7.5 wt%) were investigated. Pressed YSZ compacts prepared from submicrometer powders of >99% purity were sintered in the range 1200 to 1350 C for 0.5 to 24 h. Uniform grain size microstructures (0.2 to 0.4 micrometers) were obtained which showed discrete Al2O3 grains dispersed throughout. X-ray diffraction and Raman spectral analysis indicated a combination of both cubic and tetragonal phases. Measured lattice parameters were observed to vary irregularly with Al2O3 content. DC conductivity was found to increase with added Al2O3 less than 3 wt%. Strength vaules obtained for the composites were in excess of 9 Mpa x the squareroot of M (K sub Ic) and 425 MPa (MOR), significantly higher than reported for cubic phase YSZ. The increased strength was attributed to small grain size as well as to crack deflection and arrest mechanisms associated with the dispersed high modulus and lower expansion second phase. The presence of a monoclinic phase was not detected in the samples either before or after fracture, hence the strengthening could not be ascribed to transformation toughening. GRA

N86-30814# Oak Ridge National Lab., Tenn.
IMPROVED FIBER-REINFORCED SiC COMPOSITES FABRICATED BY CHEMICAL VAPOR INFILTRATION
D. P. Stinton, A. J. Caputo, R. A. Lowden, and T. M. Besmann 1986 13 p Presented at the 10th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19 Jan. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008539; CONF-860152-2) Avail: NTIS HC A02/MF A01

Fabrication of fiber-reinforced composites by a patented chemical vapor infiltration process has continued. Modifications to the process used for infiltration of unidirectional preforms resulted in more uniform matrix deposition throughout the preform and improved mechanical properties of the composites. Infiltration of improved cloth preforms containing more uniform porosity resulted in composites with fewer and smaller voids. DOE

N86-30815# North Carolina State Univ., Raleigh. Dept. of Materials Engineering.
MICROSTRUCTURAL EFFECTS IN SOLID-PARTICLE EROSION Progress Report, 1 Jan. 1985 - 1 Jan. 1986
H. Conrad and R. Scattergood 1986 213 p
(Contract DE-FG05-84ER-45115)
(DE86-008211; DOE/ER-45115/2) Avail: NTIS MF A01

The following were studied: particle feed rate effects during erosion testing; erosion of WC-Co alloys; erosion studies on composites, ceramics, and stainless steel; erosion of SiC reinforced alumina; and erosion mechanisms in Al and Al-Si alloys. DOE

N86-30816# Oak Ridge National Lab., Tenn.
PULSED LASER AND ION BEAM SURFACE MODIFICATION OF SINTERED ALPHA-SiC
K. L. More, R. F. Davis, B. R. Appleton, D. Lowndes, and P. Smith 2 Dec. 1985 9 p Presented at the Symposium on Phase Transitions in Condensed Systems: Experiments and Theory,

Pittsburgh, Pa., 2 Dec. 1985 Prepared in cooperation with North Carolina State Univ., Raleigh and Microelectronics Center or North Carolina, Research Triangle Park
(Contracts DE-AC05-84OR21400; DE-AC05-76OR-00033)
(DE86-008978; CONF-851260-3) Avail: NTIS HC A02/MF A01

Pulsed laser annealing and ion beam mixing have been used as surface modification techniques to enhance the physical properties of polycrystalline (ALPHA)-SiC. Thin Ni overlayers (20 nm to 100 nm) were evaporated onto the SiC surface. The specimens were subsequently irradiated with pulses of a ruby or krypton fluoride (KrF) excimer laser or bombarded with high energy Xe(+) or Si(+) ions. Both processes are nonequilibrium methods and each has been shown to induce unique microstructural changes at the SiC surface which are not attainable by conventional thermal treatments. Under particular (and optimum) processing conditions, these changes considerably increased the mechanical properties of the SiC; following laser irradiation, the fracture strength of the SiC was increased by as much as 50%, but after ion beam mixing, no strength increase was observed. High resolution cross-section transmission electron microscopy (X-TEM), scanning electron microscopy (SEM), and Rutherford backscattering techniques were used to characterize the extent of mixing between the Ni and the SiC as a result of the surface modification. DOE

N86-30817# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
HOLOGRAPHY: THE NONDESTRUCTIVE TESTING OF COMPOSITE STRUCTURES
P. Barbier and C. LeFloch 1986 6 p Presented at 3rd European Symposium on Spacecraft Material on Space Environment, Noordwijk, Netherlands, 3 Oct. 1985 Previously announced in IAA as A86-22611
(SNIAS-861-430-103; ESA-86-97165) Avail: NTIS HC A02/MF A01

Industrial applications of holography are discussed. The principle of nondestructive testing by laser holographic interferometry, and the parts to be tested (parts of motor case in composite materials) are described. The test facility, which involves a complex mechanical system, is presented, and the technical choices are justified. Economic aspects are treated. ESA

N86-30761# National Engineering Lab., East Kilbride (Scotland).
FATIGUE AND DAMAGE IN FIBRE REINFORCED NYLON
W. S. Carswell *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 25-29 Sponsored by UK Dept. of Trade and Industry (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30763# Atomic Energy Research Establishment, Harwell (England). Materials Development Div.
DYNAMIC MECHANICAL ANALYSIS AS AN AID TO THE CHARACTERIZATION OF COMPOSITE MATERIALS
D. H. Bowen, R. Davidson, R. J. Lee, and M. Aguirre *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 39-46 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30766# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ORTHOTROPIC PROPERTIES OF LAYERED FIBER COMPOSITES
G. R. Kress *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 65-70 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30767# Waldrich Siegen Werkzeugmaschinen G.m.b.H., Burbach (West Germany).
THEORETICAL AND EXPERIMENTAL BEHAVIOR OF CARBON FIBER REINFORCED PLASTICS UNDER MECHANICAL AND THERMAL LOAD
U. Bieling *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 71-78 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30771# Brussels Univ. (Belgium).
NEW PREDICTION METHODS FOR COMPOSITES HYGROTHERMAL BEHAVIOR
C. C. Hiel *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 101-107 Sponsored by NAS-NRC and NATO (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30774# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautical Structures and Materials.
THERMAL STABILITY OF SANDWICH REFLECTORS
H. Groth *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 133-139 Sponsored by Ericsson Radio System (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30782# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
ON THE DEFECT SENSITIVITY OF SPACECRAFT TYPICAL THIN CFRP LAMINATES
J. Bischoff *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 203-209 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30783# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
INTEGRITY OF CARBON FIBER REINFORCED PLASTICS. STRUCTURAL ELEMENTS, SCREENING PROCEDURES, OPPORTUNITIES AND OPEN ISSUES
Werner H. Paul *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 211-215 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-30818*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIATION DATA DEFINITIONS AND COMPILATION FOR EQUIPMENT QUALIFICATION DATA BANK
Frank L. Bouquet and John W. Winslow 1986 215 p
(Contract NAS7-100)
(NASA-CR-176259; NAS 1.26:176259; NPO-16426/5907) Avail: NTIS HC A10/MF A01 CSCL 07D

Dose definitions, physical properties, mechanical properties, electrical properties, and particle definitions are listed for insulators and dielectrics, elastomeric seals and gaskets, lubricants, adhesives, and coatings. B.G.

N86-30819# Princeton Univ., N. J. Dept. of Chemical Engineering.
REACTIONS OF ORGANIC MOLECULES ON TRANSITION METAL SURFACES Final Report, 1 Sep. 1982 - 31 Oct. 1985
Jay B. Benziger Feb. 1986 14 p
(Grant AF-AFOSR-0302-82)
(AD-A166214; AFOSR-86-0148TR) Avail: NTIS HC A02/MF A01

CSCL 07/4

This project has examined reactions of organic molecules on transition metal surfaces to develop a mechanistic framework for clasifying surface reactions. Electron and mass spectroscopies in conjunction with infrared spectroscopy have been used to examine reactions of organic compounds on well characterized tungsten and nickel surfaces in vacuum, as well as using voltammetry with infrared spectroscopy to study reactions on platinum electrodes. The semi-infinite nature of the metal surface provides a reagent that can act as both an electron donor and acceptor from the same Fermi level. The surface also imposes steric constraints that cause dramatic changes in adsorption with subtle changes in molecular structure. These effects have been demonstrated through spectroscopic measurements of the molecular orientation and surface reactions of benzene and pyradine and their methyl-substituted derivatives on a Ni(100) surface. GRA

N86-30820# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

LASER SPECTROSCOPY OF OZONE Final Report, 1 Jul. 1980 - 30 Sep. 1985

James L. Kinsey 18 Dec. 1985 11 p

(Contract F19628-80-K-0088)

(AD-A166516; AFGL-TR-86-0006) Avail: NTIS HC A02/MF A01 CSCL 07/4

Data have been obtained for the first time on the fluorescence spectrum of ozone in the Hartley continuum region. This type of data provides information for a new kind of spectroscopy with hitherto unprecedented capabilities for studying both ground state vibrational structure and excited state dissociation dynamics. From this data and theoretical models, qualitative generalizations are made about the potential energy surface of the electronic state of the Hartley transition. Experiments have also been conducted to obtain the high resolution spectrum of some of the Huggins bands for jet-cooled ozone. An analysis of the partially resolved rotational structure of these bands indicates that the symmetry of the Huggins bands is the same as that for the Hartley continuum. GRA

N86-30821# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

THE USE OF A PYROCHEMILUMINESCENT NITROGEN ANALYZER AS A CAPILLARY GC (GAS CHROMATOGRAPH) DETECTOR Final Report, Mar. - May 1985

Edward W. Pitzer Feb. 1986 21 p

(AD-A166597; AFWAL-TR-85-2077) Avail: NTIS HC A02/MF A01 CSCL 07/4

A study was conducted to determine the feasibility of interfacing a pyrochemiluminescent nitrogen analyzer to a high resolution glass capillary gas chromatograph. The instruments used were a Varian Model 3700 gas chromatograph and an Antek Model 703C pyrochemiluminescent nitrogen analyzer. Known standards of nitrogen containing compounds were prepared in shale derived jet propulsion fuel that had been previously determined to have no nitrogen containing species. These solutions were then chromatographed on the GC/CLD system. The resulting data were reduced using relative response factors with an internal standard. The nitrogen content of the standard solutions were validated by analyses on a separate Antek nitrogen analyzer used to determine total nitrogen content. The method of GC/CLD was deemed feasible. However, it is recommended that appropriate design changes be made to the Antek Model 703C nitrogen analyzer to accommodate the type of flows common with capillary gas chromatographs. GRA

N86-30822# California Univ., Berkeley. Dept. of Mechanical Engineering.

A LINEAR ARRAY FOR RAYLEIGH SCATTERING Final Report, 1 Sep. 1983 - 31 Jan. 1985

L. Talbot 11 Jun. 1985 27 p

(Grant AF-AFOSR-0229-83)

(AD-A167109; AFOSR-86-0161TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

Gas density under combustion conditions can be obtained by measuring the intensity of the molecular (Rayleigh) scattering of light from a laser beam. A system which obtains an essentially continuous record of the density along a length of the laser beam is described. The temperature and degree of combustion can thus be determined for a number of interesting combustion configurations, which will ultimately lead to a better description and understanding of combustion flow flame field phenomena. An image of Rayleigh scattered light from the combustion region is projected onto a monolithic self scanning linear photodiode array by means of a lens, bandpass filter, slit, image intensifier, and fiber optic reducer. The video output of the linear array is digitized and stored, creating a space-time map of the density which can be visualized and manipulated as an image. Analysis of these images by image processing techniques gives qualitative and quantitative information about such features of the combustion zone as flame wrinkling and periodicity, flame thickness and continuity, and other structural and time dependent properties in the combustion region. Following a brief introduction, the components are described, the system performance characteristics are discusssed, and an example of a processed image from a simple turbulent flame is presented. GRA

N86-30823# Pittsburgh Univ., Pa.

MEASUREMENT OF RATE CONSTANTS OF ELEMENTARY GAS-REACTIONS OF IMPORTANCE TO UPPER ATMOSPHERE AND COMBUSTION SYSTEMS Final Report, 14 Dec. 1984 - 13 Dec. 1985

Frederick Kaufman 24 Feb. 1986 10 p

(Grant AF-AFOSR-0044-85)

(AD-A167177; AFOSR-86-0222TR) Avail: NTIS HC A02/MF A01 CSCL 14/2

This report discusses the Air Force's enhanced flow reactor. The major items purchased were a bakeable, differentially pumped, UHV envelope to interface the mass spectrometer to the flow tube and an excimer pumped dye laser system for laser excited fluorescence (LEF) detection of radicals in the flow tube. The LEF system, employing a Lambda Physik excimer pumped dye laser (EMG 103 MSC/FL 2001), has been operational since mid-autumn. It has already been used in preliminary studies of our new methoxy radical source. Completion of the mass spectrometer system was delayed by a variety of problems. However, by late October the required parts were on hand, and the vacuum envelope, sans mass spectrometer, was successfully pumped down. The complete system is currently assembled and undergoing final testing. GRA

N86-30824# Lawrence Livermore National Lab., Calif.

X-RAY ABSORPTION SPECTROSCOPY

C. L. S. Lewis 14 Nov. 1985 8 p

(Contract W-7405-eng-48)

(DE86-006728; UCRL-15731) Avail: NTIS HC A02/MF A01

An X-ray absorption spectrometric technique is described. A preliminary experiment to observe emission lines from a wide range of targets was attempted. DOE

N86-30825# Mound Lab., Miamisburg, Ohio.

CHARACTERIZATION AND ANALYSIS OF ENERGETIC AND PLASTIC MATERIALS BY THERMAL ANALYSIS MASS SPECTROMETRY (TA/MS)

R. O. Yelton and T. L. Shell 1985 12 p Presented at the Joint Department of Defense/Department of Energy Explosives Surveillance Meeting, Albuquerque, N. Mex. 3 Dec. 1985

(Contract DE-AC04-76DP-00053)

(DE86-006140; MLM-3330(OP); CONF-851256-5) Avail: NTIS HC A02/MF A01

A thermal analysis mass spectrometer (TA/MS) system was developed where a differential scanning calorimeter and a thermogravimetric analysis instrument were interfaced to a computer controlled quadrupole mass spectrometer in order that thermal data as well as mass spectrometric information on the gaseous by-products of decomposition may be simultaneously obtained during the analysis of energetic and plastic materials. Examples of the applications of TA/MS in the characterization of

explosive powders, WR plastics, and a field aged MC-3003 propellant grain formulation are presented. DOE

N86-30826# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
MODELING AND DIAGNOSTICS OF COMBUSTION IN SPARK-IGNITION ENGINES
F. V. Bracco 1985 13 p Presented at the International Symposium on Diagnostics and Modeling of Combustion in Reciprocating Engines, Tokyo, Japan, 4 Sep. 1985
(Contract DE-AC04-81AL-16338)
(DE86-008173; CONF-850915-1) Avail: NTIS HC A02/MF A01

Subjects are considered that have not been extensively covered in recent reviews. The following is concluded. Simple ensemble averaging is not suited for engine flows. In an engine, what is turbulence and what is bulk (mean) flow is relative to the process that is influenced by the flow. Near TDC, turbulence is always insensitive to the details of the turbulence generated during intake. For a given engine, without strong squish and/or swirl, turbulence intensity and diffusivity near TDC increase with increasing initial turbulent diffusivity but run into upper limits imposed by turbulence damping due to the chamber walls. In spite of many uncertainties and limitations, multi-dimensional combustion models have been shown to be useful by industrial applications. Improved modeling of the flame structure is the subject of greatest current interest. Spatially and temporally resolved measurements are needed of: turbulence intensity with combustion; turbulence length scales without and with combustion; flame establishment and structure; interactions of flame and walls; and the onset of knock. DOE

N86-30827# Los Alamos National Lab., N. Mex.
USING TEMPERATURE-PROGRAMMED REACTION FOR KINETIC ANALYSIS OF REACTIONS IN DILUTE AQUEOUS SOLUTIONS AT HIGH PRESSURE
L. F. Brown and B. A. Robinson 1986 26 p Presented at the 9th International Symposium on Chemical Reaction Engineering, Philadelphia, Pa., 18 May 1986
(Contract W-7405-eng-36)
(DE86-003683; LA-UR-85-3936; CONF-860530-2) Avail: NTIS HC A03/MF A01

The technique of temperature-programmed reaction (TPR) is shown to be a practical experimental method for determining reaction-rate expressions and kinetics parameters for reactions in dilute aqueous solutions under high ambient pressure. By sampling and measuring the extent of reaction during a rise in temperature, information normally obtained from a series of isothermal batch kinetics experiments can be found in a single TPR test. The use of nonlinear least-squares regression eliminates the need to achieve a constant rate of temperature rise, simplifies the experimental requirements for TPR results, and gives more accurate answers than does a linear analysis of TPR results. Numerical simulations of TPR tests in the presence of random concentration-measurement error is used to assess the accuracy of the technique and to identify the best values of crucial operating parameters. The results of two TPR experiments measuring the alkaline hydrolysis of ethyl acetate demonstrate the applicability of the technique to reactions in dilute aqueous solutions at high pressure. These preliminary experimental results, along with numerical simulations, allow us to chart a course for future TPR kinetics experiments on a large number of similar reactions. DOE

N86-30828# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.
EXPERIMENTAL VALIDATION OF DIESEL SPRAY COMBUSTION Annual Report
Colin R. Ferguson 1985 83 p
(Contract DE-AC04-81AL-17085)
(DE86-007773; DOE/AL-17085/T2) Avail: NTIS HC A05/MF A01

Multidimensional models are being developed to predict flow, heat transfer and combustion within internal combustion engines. Measurements have been made of the total rate of heat loss and the half radius swirl velocity of an unsteady, turbulent swirling flow within a cylinder for different aspect ratios. The instantaneous heat loss correlates with the half radius swirl velocity by Nusselt-Reynolds number power law. The correlation is independent of aspect ratio if the filling of the cylinder results in a flow field which is axi-symmetric and shows no axial variation outside the boundary layers. Heat loss and angular momentum decay in a constant volume cylindrical vessel is of interest because the flow has features similar to flows in internal combustion engines. The relationship of the ideal experiment to the more practical case is analogous to the relation between a flat plate and an airfoil. A technical review of laser shadowgraph, contract schlieren and color schlieren flow visualization techniques is presented. Demonstration experiments are performed to graphically illustrate the effects of system design variables on image quality. Techniques for obtaining exposure durations on the order of ten microseconds or less are demonstrated. DOE

N86-30829# Sandia National Labs., Albuquerque, N. Mex.
SANDIA COOPERATIVE GROUP ON THE AEROTHERMOCHEMISTRY OF TURBULENT COMBUSTION
S. C. Johnston Mar. 1986 43 p
(Contract DE-AC04-76DR-00789)
(DE86-008838; SAND-86-8213) Avail: NTIS HC A03/MF A01

A turbulent reacting flow working group has been established through the Department of Energy/Office of Basic Energy Sciences. The purpose of this group is to establish and maintain a strong interaction and active dialogue between workers currently involved in modeling turbulent reacting flows and those involved in related experiments. One objective of this collaboration is to develop an increased understanding of the fundamental interaction between the chemical and fluid dynamical processes occurring in chemically reacting flows, and to utilize this understanding to improve predictive capabilities for turbulent combustion of hydrocarbon fuels. Regular members, who represent academia, private industry, and national laboratories, and guests participate in the meetings. Several guests are invited to each meeting to provide an influx of different ideas and opinions to the discussions. This document is a summary of the discussion that took place during the sixth meeting, which was held at Cornell University on October 7 to 8, 1985. DOE

N86-30830# Pacific Northwest Labs., Richland, Wash.
MODEL OF CRACK ELECTROCHEMISTRY
C. A. Oster and M. J. Danielson Mar. 1986 58 p
(Contract DE-AC06-76RL-01830)
(DE86-009346; PNL-5821) Avail: NTIS HC A04/MF A01

This document describes a rather general mathematical model of crack tip electrochemistry. First the general mass transport problem is discussed along with the chemistry expected to take place within the crack. The final equations used are extracted and the numerical algorithm presented for producing the final approximation to the original problem. At least two items have been ignored in the paper. A number of models for the crack tip exist. Only one is described here. Initial experience indicates that other geometries may complicate things during computation but have little effect on the final solution. The second item involves limiting the electrochemistry by solubility limits. Experiments indicate that when precipitation of $Ni(++)$ occurs there is a dramatic reduction in anodic current. Indeed, examination of the boundary condition and other governing equations indicate that if precipitation occurs over any finite continuous interval which includes the tip, then the total anodic current at the tip vanishes. Hence the crack growth from corrosion stops. This observation indicates that more research is needed to obtain a useful model of the crack tip when precipitation occurs. DOE

N86-30831# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SILICA GEL SORPTION PROPERTIES UNDER ADIABATIC CONDITIONS
A. A. Pesaran and K. Choudhury Feb. 1986 61 p
(Contract DE-AC02-83CH-10093)
(DE86-004439; SERI/TR-252-2704) Avail: NTIS

HC A04/MF A01

The SERI Sorption Test Facility was modified from isothermal operation to adiabatic operating conditions so that we could measure the adsorption/desorption characteristics of silica-gel-coated, parallel-channel geometry as a function of operating conditions and aspect ratio under adiabatic conditions. We performed single-blow experiments on two single-passage test cells with different aspect ratios, air flow rates, and inlet conditions. Both adsorption and desorption runs were performed. As the air flow rate and aspect ratio increase when other parameters are kept constant, the desiccant matrix loses its sorption capacity faster. The test cell operated near isothermal conditions rather than adiabatically because the cell walls had a large thermal mass compared with the amount of desiccant used. Since constructing single-passage test cells with small thermal masses that can be operated adiabatically at the Sorption Test Facility is difficult, further testing at this facility will be primarily for isothermal operation. The adiabatic experiments can best be done with multipassage test cells having small thermal masses relative to desiccant mass. A single-blow test facility for performing experiments with multipassage test cells was fabricated in FY 1984, and experiments were performed in an FY 1985 desiccant project. DOE

N86-30832# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abt. Mechanik.

STRUCTURE OF THE EQUATION OF STATE OF REAL GASES AND LIQUIDS [STRUKTUR DER ZUSTANDSFUNKTION REALER GASE UND FLUESSIGKEITEN]

J. Bortfeldt Dec. 1985 26 p In GERMAN; ENGLISH summary
(PTB-Me-69; ISSN-0341-6720; ESA-86-97415) Avail: NTIS HC A03/MF A01

Questions concerning the structure of the equation of state of real gases and liquids were studied. The virial theorem of mechanics and an assumption on the expression for potentials were used. Data for water were used to get an insight into the behavior of real matter. The result valid for a perfect Bose-Einstein gas was also confirmed for real gases: at each temperature there is a maximum density at which condensation begins to occur, dividing the fluid into saturated gas and liquid. In real gases this maximum density is exactly correlated to the minima of the isotherms of the real factor Z which appear in the domain of the International Skeleton Table of water up to the 600 C isotherm. The pressure range (up to 1000 bar) is too low for the appearance of minima at higher temperatures. The domain of this table for water (pressure between 1 and 1000 bar; temperature between 200 and 800 C; specific density between 0.2 and 924 kg/cum) is well described. ESA

N86-30833# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.

POTASSIUM-WATER REACTIONS IN THE VAPOR PHASE

Norbert Schwarz, Milos Komurka, and Hans Lichtl Jul. 1985 37 p In GERMAN; ENGLISH summary
(OEFZS-4327; RS-260/85; ESA-86-97065) Avail: NTIS HC A03/MF A01

The possible reactions of water leaking into a potassium condenser were investigated. The emphasis was on the development of pressure in the K-condenser and the expected reaction products. Theoretical considerations on possible reactions and reaction products, and the thermodynamics of K-reactions are given. The K-H2O reaction experiments are described. It is shown that water leakages into a potassium condenser are much less dangerous than expected on the basis of first estimations. The pressure increase is not only determined by the simple K-H2O reaction but also strongly by other reactions. The obtained maximum pressure is quickly reduced. For small continuous leaks an equilibrium is obtained. ESA

N86-30834# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.

POTASSIUM INSTRUMENTATION AND EXPERIMENTS ON POTASSIUM VAPOR

Norbert Schwarz and Hans Lichtl Jul. 1985 19 p In GERMAN; ENGLISH summary
(OEFZS-4328; RS-261/85; ESA-86-97066) Avail: NTIS HC A02/MF A01

Temperature and pressure instrumentation for the investigation of potassium boiling phenomena were tested. In a small test rig thermocouples and a pressure transducer were tested in potassium at 870 C. A potassium vapor flame was generated by producing an artificial leak. The development of flame and aerosol was filmed. The measured data are qualitatively described. The vapor flame test confirms the good performance of the pressure measurement. The high rate of temperature changes does not allow a correct temperature measurement. The investigation of boiling phenomena thus requires directly immersed probes. ESA

N86-30835# Yale Univ., New Haven, Conn. Section of Applied Physics.

IN SITU MONITORING OF ELECTROCHEMICAL REACTIONS BY SURFACE ENHANCED RAMAN SCATTERING Final Report, 1 Jul. 1983 - 31 Dec. 1985

Richard K. Chang and Victor E. Henrich Feb. 1986 45 p
(Contract GRI-5083-260-0795)
(PB86-201076; GRI-86/0054) Avail: NTIS HC A03/MF A01 CSCL 07D

Surface enhanced Raman scattering (SERS) was applied in investigating the nature of the water adsorbates and the protonation of Ag-oxides on Ag electrodes immersed in various electrolytes and undergoing oxidation-reduction cycles. The vibrational frequency of the O-D stretching mode of water adsorbates was determined for the two possible orientations (oxygen pointing away from or toward the Ag surface) and the two possible species (deuterium or hydrogen) on the other bond. To better quantify the SERS on metallic microstructures, e-beam lithography was used to produce microstructure arrays of uniform size, shape, and separation. The experimental studies on coinage metal surfaces provide information as to how SERS can be extended to catalytically more interesting metal surfaces. GRA

N86-31410*# Alabama Univ., Birmingham. Dept. of Physics.

MOSSBAUER SPECTROSCOPY OF EXTRATERRESTRIAL MATERIALS

David G. Agresti *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 10 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 07D

N86-31419*# New Mexico State Univ., Las Cruces. Dept. of Mechanical Engineering.

FIRE CONTROL METHOD AND ANALYTICAL MODEL FOR LARGE LIQUID HYDROCARBON POOL FIRES

Donald L. Fenton *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 14 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 21B

N86-31423*# LeTourneau Coll., Longview, Tex. Dept. of Chemistry.

REVIEW AND ANALYSIS OF HIGH TEMPERATURE CHEMICAL REACTIONS AND THE EFFECT OF NON-EQUILIBRIUM CONDITIONS

Richard E. Johnson *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 19 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 07D

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-30836 British Library Lending Div., Boston Spa (England).

STUDY OF SETTLING OF METALLIZED SINTER IN REDUCING

ATMOSPHERE
A. R. Zhak, A. N. Pyrikov, and V. M. Borisov 1985 3 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), v. 7, 1985 p 161-162
(BLL-M-36597-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

Utilization of the reducing capacity of gases during the complete reduction of partially metallized materials by solid carbon in an arc steel making furnace is examined. During heating, the layer of charge shrinks (compacts) under the pressure of the mass of charge materials lying above it. Results show that an increase in the fuel consumption raises the temperature at the start of shrinkage and simultaneously reduces the shrinkage range. B.G.

N86-30837*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE VARIATION OF CORROSION POTENTIAL WITH TIME FOR COATED METAL SURFACES
Merlin D. Danford and Ward W. Krockemus (Huntingdon Coll., Montgomery, Ala.) Sep. 1986 27 p
(NASA-TP-2636; NAS 1.60:2636) Avail: NTIS HC A03/MF A01 CSCL 11F

The variation of corrosion potential (EsubCORR) with time has been measured for 4130 steel coated with a preservative compound and for primer coated 2219-T87 aluminum. The data for coated steel samples show a great deal of scatter, and a smoothing procedure has been developed to enable proper interpretation of the data. The EsubCORR-time curves for coated steel exhibit a maximum, in agreement with the results of previous studies, where the data were the average of those for a large number of samples, while the present data were obtained from a single sample. In contrast, the EsubCORR-time curves for primer coated 2219-T87 aluminum samples show no significant variations, although considerable activity is indicated by the resistance-time and corrosion rate-time curves. Author

N86-30838# Dayton Univ., Ohio. Research Inst.
ADVANCES IN THE STUDY OF THE MECHANICAL BEHAVIOR OF MATERIALS Final Report, 15 Jun. 1981 - 30 Sep. 1984
Noel E. Ashbaugh, M. Khobaib, T. Weerasooriya, George A. Hartman, A. M. Rajendran, D. C. Maxwell, and R. C. Goodman Dec. 1985 138 p
(Contract F33615-81-C-5015; AF Proj. 2307)
(AD-A164656; AFWAL-TR-85-4124) Avail: NTIS HC A07/MF A01 CSCL 11/6

The design of high performance aircraft engines requires the development of reliable life-predication methodology to aid in the evaluation and safety of the critical gas-turbine engine components. A comprehensive multi-task research and development program was conducted to establish a sound life-prediction methodology. The program consisted mainly of: (1) Experimental investigations and analytical modeling of crack growth behavior; (2) Experimental investigation of mechanical properties and performance characteristics of structural materials; (3) Environmental effect on elevated temperature mechanical behavior; and (4) Development of test techniques, upgrading, and maintenance of the AFWAL/MLLN Mechanical Test Facility. GRA

N86-30839# Massachusetts Inst. of Tech., Cambridge. Materials Processing Center.
MICROSTRUCTURE/PROPERTY RELATIONSHIPS FOR CARBON FIBER REINFORCED ALUMINUM ALLOYS Final Report
R. G. Dixon, J. A. Cornie, and M. C. Flemings 25 Jul. 1985 108 p
(Contract N00014-83-K-0677)
(AD-A165992) Avail: NTIS HC A06/MF A01 CSCL 11/6

Graphite fibers with various coatings were tested for strength. Longitudinal composites were produced from the coated fibers using pure aluminum as the matrix by pressure casting. The strength and microstructure of the composites was evaluated. Longitudinal and transverse composites were also produced using uncoated graphite fibers with various alloy matrices and their strength and microstructure evaluated. The coated fibers were leached from the pure aluminum matrix and examined. The uncoated graphite fibers were leached from the alloy matrices and tested for strength. The coated fibers were not found to be stronger than the uncoated fibers, nor were they effective in increasing composite strengths. Composites produced from uncoated fibers and alloy matrices were quite strong longitudinally with strengths of up to 93 percent of rule of mixtures strength. The same material, when tested in the transverse direction exhibited low strengths, with the failure being interfacial. Author (GRA)

N86-30840# Johns Hopkins Univ., Baltimore, Md. Dept. of Physics and Astronomy.
FERROMAGNETIC RELAXATION IN ULTRATHIN FILMS OF AMORPHOUS ALLOYS Final Report, 15 Jul. 1985 - 15 Feb. 1986
George T. Rado 4 Apr. 1986 13 p
(Contract N00014-85-K-2027)
(AD-A166727) Avail: NTIS HC A02/MF A01 CSCL 11/6

It is suggested that the shielding effectiveness of devices designed for electromagnetic pulse (FMR) mitigation could be significantly improved by the use of ferromagnetic materials which are amorphous rather than crystalline. Prior to investigating ferromagnetic relaxation, i.e., magnetic losses, in such materials, it is necessary to understand ferromagnetic resonance field (or frequencies), especially for materials in the form of ultrathin films. In the present report this aim is accomplished by the development and use of a method which allows the first reliable measurement of magnetic surface anisotropy. GRA

N86-30841# Naval Ocean Systems Center, San Diego, Calif.
COMPREHENSIVE CHEMICAL ANALYSIS OF METAL ALLOYS BY MEANS OF INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROSCOPY Interim Report, Oct. 1984 - Sep. 1985
W. E. Glad Oct. 1985 27 p
(AD-A166842; AD-E950814; NOSC/TR-1078) Avail: NTIS HC A03/MF A01 CSCL 11/6

The purpose of this study was to extend the analysis capability of inductively coupled plasma (ICP) optical spectroscopy to as many different copper, aluminum, and iron base alloys as possible, and investigate the development of analytical methods capable of determining all important elements in a particular base through the use of a single set of analytical lines and a single preparation method. Analyses of standard reference materials show that the analysis lines used were effective for determining those elements which can be brought into solution, particularly copper, chromium, cobalt, manganese, molybdenum, silicon, vanadium, and phosphorous. Other materials, notably aluminum, boron, titanium, niobium, tungsten, and zirconium in an iron base were more difficult to analyze, probably because they form carbides or other species that are difficult to dissolve. The uses of NaOH/H2O2 to dissolve aluminum base material and HC1/H2O2 to dissolve copper base material show promise as good comprehensive dissolution techniques. The conductive solids nebulizer (CSN) proved effectivein bypassing the dissolution step. GRA

N86-30842# Battelle Columbus Labs., Ohio.
EFFECT OF MANUFACTURING PROCESSES ON STRUCTURAL ALLOWABLES, PHASE 1 Final Report, 29 Jun. 1984 - 29 Jul. 1985
Paul E. Ruff Jan. 1986 95 p
(Contract F33615-84-C-5030)
(AD-A166857; AFWAL-TR-85-4128) Avail: NTIS HC A05/MF A01 CSCL 11/6

This report contains the results of tests to determine the effect of manufacturing processes on the mechanical properties of four aerospace materials, 7149-T73 hand forgings, Ti-15V-3Cr-3Sn-3A1 solution treated sheet, 15-5PH (H935) castings, and Inconel 718 solution treated and aged sheet. Tensile, compression, shear,

bearing, and fatigue (notched and unnotched for three stress ratios), except for 15-5PH (H935) castings, properties were obtained.GRA

N86-30843# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
THE EFFECT OF BAKING AND STRESS ON THE HYDROGEN CONTENT OF CADMIUM PLATED HIGH STRENGTH STEELS Progress Report
D. A. Berman Dec. 1985 24 p
(AD-A166869; NADC-86035-60) Avail: NTIS HC A02/MF A01 CSCL 11/6

Variations in the diffusible hydrogen concentration of cadmium plated AISI 4340 and 300M steels due to baking and stress are reported. Long baking times of greater than 100 hours at 190C are needed to remove all the hydrogen from bright cadmium plated specimens, and around 40 hours for dull cadmium plated ones. Very short baking not only does not remove hydrogen, but actually pumps it in. Baking for 96 hours is insufficient to remove hydrogen embrittlement from sharp, double notched 300M tensile specimens having a notched tensile strength of 1800 MPa. It is shown that there is not difference in the hydrogen concentration does not change with time for cadmium plated specimens standing for one month at room temperature. Stressing, on the other hand, causes an increase in the hydrogen, presumably by allowing it to enter from the plate due to lattice deformation. GRA

N86-30844# Naval Research Lab., Washington, D. C.
AN INVESTIGATION OF STRESS-CORROSION CRACKING SUSCEPTIBILITY IN CANDIDATE STEELS FOR TENSION LEG PLATFORM TENDONS Interim Report
J. A. Hauser, II and T. W. Crooker 24 Apr. 1986 15 p
(AD-A167286; NRL-MR-5773) Avail: NTIS HC A02/MF A01 CSCL 13/13

Consideration of the use of high-strength steels in tension leg platform (TLP) tendons raises questions concerning the possibility of stress-corrosion cracking (SCC) occurring over long periods of time. For this reason, an investigation was undertaken to experimentally characterize the SCC susceptibility of eleven candidate materials using state-of-the-art fracture mechanics methodology. The materials studied in this program were provided by Conoco, Inc. and Chevron Corporation from samples being characterized to TLP service. The materials included steels in various product forms including forgings, rolled plate and weldments with yield strengths ranging from 80 to 125 ksi. The SCC tests were conducted at the NRL Marine Corrosion Research Laboratory in Key West, Florida. Bolt-loaded wedge-opening-loaded precracked specimens were exposed to fresh flowing natural seawater while cathodically coupled to zinc anodes for a minimum of 8,000 hours (333 days). No evidence of SCC susceptibility was found in any of the materials tested. A limited number of additional experiments were conducted to further confirm this favorable finding. Static-load SCC does not appear to pose a threat to the structural integrity of high-strength steel TLP tendons. GRA

N86-30845# Universidade Federale do Rio de Janeiro (Brazil). Coordenacao dos Programas de Pos-graduacao de Engenharia.
CORROSION FATIGUE OF ZIRCALLOY-4 IN CHLORIDE MEDIUM Tese (M.Sc.)
C. S. S. Monnerat 1984 86 p In PORTUGUESE; ENGLISH summary
(DE86-780339; INIS-BR-373) Avail: NTIS (US Sales Only) HC A05/MF A01

The fatigue behavior of Zircalloy-4 in a 0.5 M NaCl aqueous solution was studied. The tests were performed under potenciostatic control at room temperature and mean frequency of 80 Hz. The tests have shown that Zircalloy-4 does not have its fatigue life decreased under cathodic potentials action. The application of anodic potentials, however, has markedly influenced the life of the material. This influence is characteristic for a certain range of applied potential and cyclic stress level. It was shown that, for a maximum stress higher than yield stress and potential values higher than +120 mV sub(sce), the life of the material was drastically reduced due to pit formation and intergranular attack. This critical potential is, however, lower than the pit potential (approx. +180 mV sub(Sce)) obtained by the usual electrochemical methods. For maximum cyclic stress lower than the yield stress, the material did not fail even at potential values higher than the critical +120 mV sub(sce). The application of potential values lower than +120 mV sub(sce) led to an increase in the fatigue properties of the material, that is characterized by an increase in fatigue life as compared to that observed in air. This behavior is attributed to the high velocity of repassivation presented by Zircalloy-4. DOE

N86-30846# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
GRAIN BOUNDARY DISLOCATION STRUCTURES IN [001] SYMMETRIC TILT BOUNDARIES IN ALUMINUM
J. S. Liu and R. W. Balluffi Aug. 1985 20 p
(Contract DE-FG02-84ER-45116)
(DE86-007003; DOE/ER-45116/8) Avail: NTIS HC A02/MF A01

Grain boundary dislocation (GBD) structures were studied in (001) symmetric tilt boundaries in aluminum bicrystals of controlled geometry using transmission electron microscopy. The intrinsic GBD structure of near-(SIGMA)1, (SIGMA)5 and (SIGMA)13 boundaries consisted of families of straight edge GBDs with Burgers vectors b = <100> or 1/2<110>, 1/10<310> and 1/26-<510>, respectively. In each case the system chose GBDs with the smallest perfect Burgers vector perpendicular to the boundary in agreement with previous computer simulations using the method of molecular statics and a pairwise pseudo potential model. In addition, the b = <100> GBDs were straight and not serrated due to dissociations into partial GBDs and patches of stacking fault, as they are in gold according to earlier work. This result was attributed to the higher stacking fault energy of aluminum. Observations were also made of extrinsic GBD structures produced by the superposition of lattice dislocations on the intrinsic GBD arrays. The results were consistent with structures which could be obtained by a sequence of reactions in which each lattice dislocation dissociated into GBDs possessing Burgers vectors corresponding to the boundary DSC Lattice which then interacted in various ways with the intrinsic array. DOE

N86-30847# Oak Ridge National Lab., Tenn.
SENSITIVITY ANALYSIS OF A NUMERICALLY SIMULATED HgCdTe SOLIDIFICATION PROCESS BY STATISTICAL METHODS
M. Morris and V. Alexiades Feb. 1986 19 p
(Contract DE-AC05-84OR-21400)
(DE86-007935; ORNL-6210) Avail: NTIS HC A02/MF A01

Statistical response surface methodology is applied to the problem of determining simple approximations for outputs as functions of input parameter values in a numerical simulation of the solidification of a mercury-cadmium-telluride alloy. The approximating polynomials are then differentiated with respect to parameter values to determine sensitivities. A table of percent changes in output values as a result of 1% changes in parameter values is presented. The empirical procedure used constitutes an unorthodox application of the statistical methodology, but it is easy to use, quite generally applicable and very effective. DOE

N86-30848# Commission of the European Communities (Luxembourg). Community Bureau of Reference.
CERTIFICATION OF CARBON, NITROGEN AND OXYGEN IN ZIRCALOY. (BCR NOS. 275 AND 276)
C. Vandecasteele, H. Marchandise, and E. Colinet 1984 38 p
(DE86-750679; EUR-9525) Avail: NTIS (US Sales Only) HC A03/MF A01

The experimental procedures for the certification of carbon, nitrogen, and oxygen in zircaloy are described. The samples were analyzed in different laboratories using the following analytical methods: combustion, photon activation analysis, and deuteron activation analysis for carbon; reducing fusion, Kjeldahl's method, photon activation analysis, and charged particle activation analysis for nitrogen; and reducing fusion, photon activation analysis, and charged particle activation analysis for oxygen. The analytical

methods and the statistical approach used to analyze the data are presented. Two materials available as samples with different dimensions were certified: BCR Nos. 275 and 276. The certified mass fractions and the uncertainties are given. DOE

N86-30849# Oak Ridge National Lab., Tenn.
REFRACTORY ALLOY PERFORMANCE: UNRESOLVED ISSUES AND STATUS SUMMARY
W. O. Harms 1985 7 p Presented at the SP-100 Systems Selection Committee Review on Fuels and Materials Conference, Los Alamos, N. Mex., 20 Jun. 1985
(Contract DE-AC05-84OR-21400)
(DE85-014657; CONF-8506153-3) Avail: NTIS HC A02/MF A01
A report on refractory alloy performance was presented at the SP-100 Systems Selection Committee Review on Fuel and Materials Conference, Los Alamos, N.M., 20 Jun. 1985. DOE

N86-30850# Colorado School of Mines, Golden. Center for Welding Research.
MICROSTRUCTURE AND PROPERTIES OF FERROUS ALLOY WELDMENTS Progress Report, 1 Jan. 1985 - 31 Dec. 1985
D. L. Olson and D. K. Matlock 1985 70 p
(Contract DE-FG02-84ER-45066)
(DE86-008368; DOE/ER-45066/2) Avail: NTIS HC A04/MF A01
The microstructures and properties of new compositional grades of multipass austenitic weld metal for low and high temperature applications are being evaluated. Alloy modifications, which include substitutions for chromium, are being considered. Expressions for predicting as-solidified weld metal microstructures are being extended to include the effects of composition gradients. The effects of compositional and microstructural gradients on the thermal stability and mechanical properties of the modified austenitic weld metals is being evaluated in both single and multipass weldments. DOE

N86-30851# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
EFFECT OF NEUTRON IRRADIATION ON VANADIUM ALLOYS
D. N. Braski 1986 28 p Presented at the 2nd International Conference on Fusion Reactor Materials, Chicago, Ill., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009156; CONF-860421-18) Avail: NTIS HC A03/MF A01
Neutron-irradiated vanadium alloys were evaluated for their susceptibility to irradiation hardening, helium embrittlement, swelling, and residual radioactivity, and the results were compared with those for the austenitic and ferritic stainless steels. The VANSTAR-7 and V-15Cr-5Ti alloys showed the greatest hardening between 400 and 600(0)C while V-3Ti-1Si and V-20Ti had lower values that were comparable to those of ferritic steels. The V-15Cr-5Ti and VANSTAR-7 alloys were susceptible to helium embrittlement caused by the combination of weakened grain boundaries and irradiation-hardened grain matrices. Specimen fractures were entirely intergranular in the most severe instances of embrittlement. The V-3Ti-1Si and V-20Ti alloys were more resistant to helium embrittlement. Except for VANSTAR-7 irradiated to 40 dpa at 520(0)C, all of the vanadium alloys exhibited low swelling that was similar to the ferritic steels. Swelling was greater in specimens that were preimplanted with helium using the tritium trick. The vanadium alloys clearly exhibit lower residual radioactivity after irradiation than the ferrous alloys. DOE

N86-30852# Argonne National Lab., Ill.
OXIDATION/CORROSION BEHAVIOR OF LOW-CHROMIUM Fe-Cr-Ni ALLOYS CONTAINING ZIRCONIUM OF NIOBIUM
D. J. Baxter and K. Natesan Feb. 1986 22 p Presented at the 115th American Institute of Mining, Metallurgical and Petroleum Engineering Annual Meeting, New Orleans, La., 2 Mar. 1986
(Contract W-31-109-eng-38)
(DE86-008005; CONF-860340-1) Avail: NTIS HC A02/MF A01
Chromium is a vital constituent in many alloys and, as a general rule, at least 20 wt % Cr is required for the formation of protective scales on Fe-Cr-Ni alloys at temperatures up to 1000(0)C. However, in view of the strategic nature of Cr, it is desirable that new alloys with lower Cr contents be developed in order that the overall demand for Cr can be reduced. To address this requirement, a new series of Fe, 12% Cr, 8 to 12% Ni alloys containing Zr or Nb has been designed. Zirconium or Nb concentrations of up to 6 wt % were used to compensate for the low Cr contents, with the aim of providing oxidation/corrosion resistance comparable to that of commercial alloys containing in excess of 20% Cr. Experimental results show that at a high p/sub O2/, 1% Zr or Nb is sufficient to promote protective oxidation behavior, whereas at a low p/sub O2/, more than 3% of the quaternary addition may be required. In mixed-oxidant (O2/S2) environments, Zr and Nb reduce both scaling rates and internal penetration of aggressive elements from the exposure environments. DOE

N86-30853# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
CHLORIDE STRESS CORROSION CRACKING OF INSULATED AUSTENITIC STAINLESS STEEL: SOLAR HEATING CONSIDERATIONS
J. J. Peters and C. F. Jenkins 1986 21 p Presented at the Corrosion '86, Houston, Tex., 17 Mar. 1986
(Contract DE-AC09-76SR-00001)
(DE86-008907; DP-MS-85-2; CONF-860304-6) Avail: NTIS HC A02/MF A01
Chloride stress corrosion cracking (CSCC) of insulated pipe systems is discussed, and sources of chloride ions, moisture, and temperature increases in an industrial environment are considered. A recent CSCC failure of above-ground insulated austenitic stainless steel piping at the Department of Energy's Savannah River Plant (SRP) prompted investigation of the subject. Tests were run to establish pipe surface temperatures and temperature variations beneath thermal insulation during normal operation and under idle conditions. The effects of temperature on the pipe surface by sustained solar heating and unregulated electrical heat tracings were determined. The surface temperatures exceeded 54(0)C (130(0)F) on a sunny summer day. SRP design requires consideration of CSCC at 40(0)C (104(0)F), prompting the need for preventive methods to avoid failure above 40(0)C whenever stainless steel and chlorides occur simultaneously. Recommended preventive techniques are discussed. DOE

N86-30854# Los Alamos National Lab., N. Mex.
EVALUATION OF FACTORS AFFECTING THE ANALYSIS OF METALS USING LASER-INDUCED BREAKDOWN SPECTROSCOPY
D. A. Cremers and D. J. Romero 1986 7 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. 1986
(Contract W-7405-eng-36)
(DE86-008726; LA-UR-86-837; CONF-860366-4) Avail: NTIS HC A02/MF A01
Some of the main factors affecting the analysis of solid steel using laser-induced break-down spectroscopy (LIBS) have been investigated and are reported here. Pulses from an electro-optically Q-switched Nd:YAG laser were focused on steel samples to generate a high temperature plasma. The spectrally resolved plasma light was time resolved and detected using a photodiode array. The effects that changes in the lens-to-sample distance, laser pulse energy, and position of the imaging lens had on the LIBS analysis are described. These effects were minimized by ratioing the absolute element signals to adjacent Fe-lines. Calibration curves for Mn, Si, and Cr are presented and the accuracy and precision of LIBS analysis listed for several elements. DOE

N86-30855# Michigan State Univ., East Lansing. Div. of Engineering Research.
DYNAMIC RECRYSTALLIZATION DURING HIGH TEMPERATURE LOW CYCLE FATIGUE OF NICKEL Progress Report, 1 Jun. 1985 - 31 May 1986
G. Gottstein Jan. 1986 32 p
(Contract DE-FG02-85ER-45205)
(DE86-009010; DOE/ER-45205/1) Avail: NTIS HC A03/MF A01
The occurrence of dynamic recrystallization in single and

polycrystals under nonmonotonic loading conditions was investigated. Intermediate annealing, load inversion or changing the strain path facilitates dynamic recrystallization. Low cycle fatigue in the elastic regime has about the same effect as static recovery for the same time period. Invariably, the initiation of dynamic recrystallization is controlled by dynamic recovery, as indicated by a constant ratio sigma(sub R)/sigma(sub S). During low-cycle fatigue at 0.5 Tm with 1% plastic strain amplitude, dynamic recrystallization can be initiated at much lower stresses than in monotonic tests, but recrystallization progresses much more slowly. The static recrystallization behavior of rolled Ni3Al was investigated to establish the conditions for the occurrence of dynamic recrystallization in this material. DOE

N86-30856# Oak Ridge National Lab., Tenn.
MECHANICAL PROPERTY MEASUREMENTS ON ION-IRRADIATED METALS
S. J. Zinkle and W. C. Oliver 1986 22 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009147; CONF-860421-20) Avail: NTIS HC A02/MF A01

A recently developed mechanical microprobe (MPM) has been used to investigate strength and elastic modulus changes in ion-irradiated metals. The indenter load and its displacement are simultaneously monitored while the indentation is being made and also during unloading. Microhardness measurements have been performed on ion-irradiated copper and Cu-O.15% Zr (AMZIRC). The depth dependence of the ion damage has been investigated in selected specimens which were prepared using a cross-section technique. This procedure allows a direct comparison to be made of microhardness data from different irradiation depths while the indent size held constant. The displacement damage associated with ion irradiation caused either hardening or softening, depending on the irradiation conditions and the material. DOE

N86-30857# Hanford Engineering Development Lab., Richland, Wash.
PLASTICITY AND STRESS RELAXATION IN FRACTURE MECHANICS TEST OF COPPER AND CUPRONICKEL
L. A. James Mar. 1986 26 p
(Contract DE-AC06-76FF-02170)
(DE86-009425; HEDL-7578) Avail: NTIS HC A03/MF A01

Load relaxation tests were performed using precracked fracture mechanics specimens of annealed copper and as-received 90-10 cupronickel alloy. Test temperatures were 100(0), 150(0), and 250(0)C with, in some cases, exposure times out to 2439 hours. Significant load relaxation was noted in some cases, and the applicability of using these specimens in such cases is discussed. DOE

N86-30858# Universidade Federale do Rio de Janeiro (Brazil). Coordenacao dos Programas de Pos-Graduacao de Engenharia.
STUDY OF THE POLARIZATION FOR INCOLOY 800 AND FOR THE STAINLESS STEEL AISI 304 IN MIXTURES OF IRON, NICKEL AND CHROMIUM CHLORIDES
A. M. Travalloni, L. Sathler, and O. R. Mattos 1985 10 p In PORTUGUESE Presented at the 12th National Seminar on Corrosion, Salvador, Brazil, 13 May 1985
(DE86-701576; INIS-BR-432; CONF-8505227-3) Avail: NTIS (US Sales Only) HC A02/MF A01

Polarization curves for the Incoloy 800 and for the stainless steel AISI 304 were obtained with static and rotational electrodes. The electrolytes employed showed growing concentrations of mixtures as iron, nickel and chromium chlorides their proportion being the same as the content of these elements in the respective alloys. The alloys under investigation exhibited a continuous transition behavior from the passive to the active-passive and to the active conditions. Also, the pH was found to be the main parameter controlling the anodic behavior of the alloy. DOE

N86-30859# Instituto de Engenharia Nuclear, Rio de Janeiro (Brazil).
EVALUATION OF THE CORROSION OF ALUMINUM TUBES UNDER CONDITIONS OF NATURAL IMMERSION IN AQUEOUS MEDIUM
M. F. de Oliveira 1985 14 p In PORTUGUESE Presented at the 12th National Seminar on Corrosion, Salvador, Brazil, 13 May 1985
(DE86-701579; INIS-BR-430; CONF-8505227-4) Avail: NTIS (US Sales Only) HC A02/MF A01

This work evaluates the corrosion of aluminum tubes under conditions of natural immersion in aqueous medium. Local attack was observed on the surface of the tubes for all temperatures studied. It was found that the mass fluctuation of the samples tested in deionized water at room temperatures is practically inexistent. However, at temperatures of 45 and 60(0)C the aluminum react rapidly with water forming a film of hydrated oxide of aluminum known as bayerite. It was verified that the contact of graphite and particles containing high content of Cu with aluminum forms a galvanic couple which should be avoided. DOE

N86-30860# Commission of the European Communities (Luxembourg).
PROPERTIES OF POINT DEFECTS IN METALS AND ALLOYS
W. Schuele 1984 26 p In FRENCH Prepared in cooperation with Commission of the European Communities, Ispra, Italy
(DE86-780413; EUR-9451) Avail: NTIS (US Sales Only) HC A03/MF A01

Experimental results, both old and new, are discussed and interpreted. It is shown in a straightforward way that the properties of point defects are completely different from those commonly assumed during the last 25 years. The properties of interstitials, vacancies and divacancies of some pure metals are listed and those of some alloy materials are given in the context of the paper. The corresponding radiation damage model is called the modified two-interstitial model, which develops from the two interstitial model. On the basis of the new radiation damage model structural changes observed in stainless steel alloys and the value of simulation experiments in fusion reactor technology are discussed. DOE

N86-30861# California Univ., Berkeley. Lawrence Berkeley Lab.
THEORY OF STRENGTHENING BY ORDERED PRECIPITATES
J. Glazer and J. W. Morris, Jr. Feb. 1986 18 p Presented at the International Conference on Aluminum Alloys, Charlottesville, W. Va., 15 Jun. 1986
(Contract DE-AC03-76SF-00098)
(DE86-009355; LBL-21156; CONF-8606107-1) Avail: NTIS HC A02/MF A01

A model for the critical resolved shear stress neat peak strength of alloys hardened by ordered precipitates is developed. The model is applied to the specific case of delta' precipitates in binary aluminum-lithium alloys and found to be in good quantitative agreement with measured aging behavior. The effects of precipitate size, size distribution and shape on the critical resolved shear stress are explored via the model and predictions for more optimized microstructures presented. DOE

N86-30862# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.
POTASSIUM NATURAL CONVECTION LOOP HT4, OPERATING REPORT NUMBER 1
Norbert Schwarz, Hannes Himmler, Hans Lichtl, and Wolfgang Prislinger Aug. 1985 36 p In GERMAN; ENGLISH summary
(OEFZS-4329; RS-262/85; ESA-86-97067) Avail: NTIS HC A03/MF A01

Operating experience with a potassium natural convection loop is summarized. The HT4-loop was put into operation in order to investigate high temperature resistant material corrosion and boiling phenomena. The sensitivity of the flowmeter is calculated to be 0.17 mV/(l)min. The values obtained with several calibration methods strongly differ. Further temperature sensors were installed to improve this situation. The operating and data acquisition experiences over the first 3000 hr of operation at a maximum temperature of 400 C are described. ESA

N86-30863# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials Engineering.
ANALYSIS OF THE TOUGHNESS CHARACTERISTICS OF CRYOGENIC 9% NICKEL STEELS Final Report, Jul. 1984 - Nov. 1985
R. D. Stout and S. K. Tarby Jan. 1986 37 p
(Contract GRI5080-352-0322)
(PB86-196144; GRI-86/0002) Avail: NTIS HC A03/MF A01 CSCL 11F

A statistical analysis of the Charpy notch toughness exhibited by production heats of 9% nickel steels as affected by the year of manufacture and compositional variations has been performed. Data from more than 600 heats show a notable increase in notch toughness during the past 15 years and a level of performance far superior to minimum requirements of ASTM standards. A multiple regression analysis indicated that much of the improvement has been attained by lowering the sulfur and carbon contents of the steel. The unexplained variance of notch toughness may be due to effects of heat treatment, the within-heat scatter, and composition variables that lay outside the data available for analysis. Doubling the required minimum Charpy notch toughness appears feasible without hardship to steel producers but with an enhancement of the reliability of LNG storage tanks. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-30864*# AiResearch Mfg. Co., Los Angeles, Calif.
SPACE STATION MOLECULAR SIEVE DEVELOPMENT Final Report
Craig Chang (Signal Research Center, Inc., Des Plaines, Ill.) and Jean Rousseau 1 May 1986 59 p
(Contract NAS8-36424)
(NASA-CR-178885; NAS 1.26:178885; Rept-86-30002) Avail: NTIS HC A04/MF A01 CSCL 07B

An essential function of a space environmental control system is the removal of carbon dioxide (CO_2) from the atmosphere to control the partial pressure of this gas at levels lower than 3 mm Hg. The use of regenerable solid adsorbents for this purpose was demonstrated effectively during the Skylab mission. Earlier sorbent systems used zeolite molecular sieves. The carbon molecular sieve is a hydrophobic adsorbent with excellent potential for space station application. Although carbon molecular sieves were synthesized and investigated, these sieves were designed to simulate the sieving properties of 5A zeolite and for O_2/N_2 separation. This program was designed to develop hydrophobic carbon molecular sieves for CO_2 removal from a space station crew environment. It is a first phase effort involved in sorbent material development and in demonstrating the utility of such a material for CO_2 removal on space stations. The sieve must incorporate the following requirements: it must be hydrophobic; it must have high dynamic capacity for carbon dioxide at the low partial pressure of the space station atmosphere; and it must be chemically stable and will not generate contaminants. B.G.

N86-30865*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
A METHOD FOR PREDICTING SERVICE LIFE OF ZINC RICH PRIMERS ON CARBON STEEL
Charles W. Hoppesch Apr. 1986 18 p
(NASA-TM-83101; NAS 1.15:83101) Avail: NTIS HC A02/MF A01 CSCL 11C

The service life of zinc rich primers on carbon steel can be estimated by immersing a primer coated glass slide into an aqueous copper sulfate solution and measuring the amount of zinc that reacts with the copper in 15 minutes. This zinc availability test was used to evaluate eleven primers currently available for which marine beach exposure data was available from previous programs. Results were evaluated and a correlation between zinc availability and ASTM rust grade was shown. Author

N86-30866# Massachusetts Univ., Amherst.
IMPROVED STRUCTURAL POLYMER ALLOYS AND COMPOSITES Final Report, 1 May 1984 - 30 Apr. 1985
Frank E. Karasz 24 Dec. 1985 18 p
(Contract F49620-84-C-0051)
(AD-A166150; UMASS-5-28246; AFOSR-86-0132TR) Avail: NTIS HC A02/MF A01 CSCL 11/9

Substantial progress was made in both experimental and theoretical elements. First, procedures were devised to synthesize: (1) sulfonated polysulfone with a controlled and reproducible structure, (2) sulfonated polyaryletheretherketone with less than 30% sulfonation that has potential as a new high-temperature ionomer, and (3) polyaryletherketone-co-ethersulfone made by a novel ether interchange. Blending studies centered on copolyester LCP's and polybenzimadazole/polyimide combinations. The latter are rendered compatible through specific interaction but which can be phased separated. This finding could result in greatly enhanced opportunities for the use of PBI resins. The major objectives with the LCP blends was to define criteria for miscibility and to improve their processability. Theoretical research was conducted on both LCP/LCP and random coil blends. Particularly important was work on the effect of sequence distribution on phase behavior in random coil blends. A model, containing an ordering parameter, successfully explained the special case of a random/alternating copolymer of the same composition. GRA

N86-30867# Virginia Polytechnic Inst. and State Univ., Blacksburg. Technical Center for Adhesion Science.
AN INTERDISCIPLINARY APPROACH TO PREDICTIVE MODELING OF STRUCTURAL ADHESIVE BONDING CHARACTERIZATION OF CHROMIC ACID AND ANODIZED Ti-6Al-4V AND ANODIZED Ti-6Al-4V SINGLE LAP BONDS TO POLYPHENYLQUINOXALINE Annual Report
Jean A. Skiles and J. P. Wightman Jan. 1986 52 p
(Contract N00014-82-K-0185)
(AD-A166313) Avail: NTIS HC A04/MF A01 CSCL 11/6

The purpose of this 1985 status report is to describe the following: (1) morphology, thickness and structure characterization of chromic acid anodized Ti-6Al-4V determined by Transmission Electron Microscopy (TEM) and Selected Area Electron Diffraction (SAED); (2) unfulled polyphenylquinoxaline (PPQ) chromic acid anodized (CAA) Ti-6Al-4V unaged single lap bond strength data; (3) unstressed thermal aging tests in progress for PPQ - CAA Ti-6Al-4V single lap bonds; and (4) tests in progress to determine the electrical properties of CAA Ti-6Al-4V. These tests will determine the anodic oxide capacitance, dielectric constant and bulk resistivity. GRA

N86-30868# Cincinnati Univ., Ohio. Dept. of Materials Science and Engineering.
PHASE RELATIONS AND MISCIBILITY IN POLYMER BLENDS CONTAINING COPOLYMERS
R. J. Roe and D. Rigby 15 Apr. 1986 82 p
(Contract N00014-85-K-0245)
(AD-A166773; TR-4) Avail: NTIS HC A05/MF A01 CSCL 07/4

This article reviews the reported work on thermodynamics of polymer blends in which at least one of the components is a copolymer. Theoretical and experimental studies of miscibility and phase transition and separation behaviors in such systems are summarized. Chapter 2 deals with blends involving random copolymers, including the cases in which a random copolymer AB is mixed with either a homopolymer A, or a homopolymer C, or two homopolymers A and B. Chapter 3 deals with blends involving a block copolymer, and after giving a brief overview of systems containing a pure block copolymer alone, it reviews the blend systems containing a block copolymer AB mixed with a homopolymer A or two homopolymers A and B. GRA

N86-30869# Illinois Univ., Urbana. Dept. of Chemistry.
NMR STUDY OF DISORDERED MATERIALS UNDER EXTREME

CONDITIONS OF PRESSURE AND TEMPERATURE Final Report, 1 Oct. 1980 - 30 Sep. 1985
Jiri Jonas 5 Feb. 1986 20 p
(Grant AF-AFOSR-0010-81)
(AD-A167063; AFOSR-86-0204TR) Avail: NTIS HC A02/MF A01 CSCL 20/2

A new nuclear magnetic resonance (NMR) method for measuring the crystallization kinetics of polymers under high pressure, sensitive on a molecular scale to the dynamics of chain motion, was developed. The very rapid formation of extended chain crystals of polyethylene was directly observed. The techniques has much promise for future experiments including polymer crystallization, melting and annealing. Polarization microscopy and NMR experiments on various alkali salts of alkalicarboxylates elucidated the dynamic structure of these interesting ionic liquid crystalline materials. Experiments on highly viscous liquids explained the origin of the anomalous discontinuity observed in the temperature dependence of the shear viscosity of glass forming liquids. Molecular level interpretation of the coupling between translational and rotational motions in viscous liquids was achieved. The Debye and Stokes-Einstein equations were found to be applicable at the molecular level in viscous liquids. Volume effects were shown to be important for dynamics of viscous liquids. GRA

N86-30870# State Univ. of New York, Buffalo. Dept. of Chemistry.
MOLECULAR MECHANICS OF SUBMICRON THIN MONOMERIC AND POLYMERIC MOLECULAR FILMS Final Report, 30 Jul. 1984 - 29 Jul. 1985
Paras N. Prasad 31 Mar. 1986 6 p
(Grant AF-AFOSR-0281-84)
(AD-A167277; AFOSR-86-0228TR) Avail: NTIS HC A02/MF A01 CSCL 11/9

This grant, through the DOD-University Instrumentation program, was provided to acquire a picosecond laser system for the study of non-linear optical effects as well as for structural characterization of submicron films. The laser system consists of a CW mode-locked Nd-Yag laser (Spectra-Physics, Model 300), the output of which, after frequency doubling, is split by a 50% beam splitter to sync pump two dye lasers (Spectra-Physics, Model 375). The outputs from these dye lasers are fed into two amplifiers (Quanta Ray, Model PDA) which are pumped by the second harmonic of a 20Hz pulsed Nd-Yag laser (Quanta-Ray, Model DCR-2A). the amplified pulses are 7ps wide with 0.5MJ of pulse energy. The laser system has proven to be extremely versatile and, therefore, valuable for a number of different experiments. This arrangement also gives us the choice to generate tunable picosecond u.v. and IR pulses by mixing either of two dye laser beams with the fundamental from the pulse Yag laser. GRA

N86-30871# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
LIFETIME PREDICTION OF ORGANIC COATING/METAL SYSTEMS Final Report, 1 Jul. 1979 - 31 Oct. 1985
F. Mansfeld and M. Kendig Apr. 1986 97 p
(Contract N00014-79-C-0437)
(AD-A167281; SC5222.FR) Avail: NTIS HC A05/MF A01 CSCL 11/3

A lifetime prediction model has been developed for polymer coating/metal systems. The elements of the model fall into the category of system variables that describe the surface of the substrate, the coating or the environment, or the category of processes that determine the degradation of the coated metal. These processes include formation of defects in the coating and at the metal/coating interface, transport of corrosive species to the metal, loss of adhesion, corrosion and failure. The casual relationship between system variables and processes has been discussed. The lifetime prediction model is based on a series of experimental studies which have been performed during the course of this project. A number of new techniques have been developed which can be used to determine the properties of the coating/metal compound and its changes during interaction with corrosive environments. Electrochemical impedance spectroscopy (EIS) has been found to be very valuable in providing information concerning the coating and the metal surface and degradation of the coatings as corrosion proceeds. An acoustic pulse technique has been used to detect areas of delamination and corrosion. Acoustic emission from coated steel during straining of the sample has provided characteristic fingerprints for surface and coating properties and has demonstrated the importance of the mechanical properties of the coating. GRA

N86-30872# Lawrence Livermore National Lab., Calif.
ASSESSMENT OF THE APPLICATION OF THE SPUTTERING PROCESS TO BERYLLIUM FOR HARDENING OPTICAL COATINGS
C. W. Chen and C. S. Alford 11 Nov. 1985 13 p
(Contract W-7405-eng-48)
(DE86-006656; UCID-20601) Avail: NTIS HC A02/MF A01

Two principal deposition processes are compared for the case of depositing 1 to 2 microns beryllium on fused-silica substrates. While the evaporation-deposition process offers advantages such as higher deposition rate, purification of the evaporant and efficient use of masks, the sputter-deposition is more versatile, and therefore more effective, in varying and controlling the microstructure of the deposits. The versatility comes about because the latter process has five major operational parameters to be selected or adjusted. Consequently, sputter-deposited beryllium films are expected to display more desirable microstructures and better surface finish than evaporation-deposited films. DOE

N86-30873# Oak Ridge National Lab., Tenn.
CORROSION OF SiC CERAMICS IN SYNTHETIC COMBUSTION ATMOSPHERES CONTAINING HALIDES
J. I. Federer, J. M. Robbins, P. J. Jones, and C. Hamby, Jr. Dec. 1985 27 p
(Contract DE-AC05-84OR-21400)
(DE86-006732; ORNL-6258) Avail: NTIS HC A03/MF A01

Corrosion of SiC ceramics has occurred in several industrial furnace environments. Halides derived from fluxes in aluminum remelt furnaces have been suspected to be responsible for corrosion in those furnaces. The present work involved exposure of SiC ceramics to synthetic combustion atmospheres (SCA) in laboratory furnaces to determine if halide species cause corrosion and, if so, to determine the corrosion mechanism. Specimens were exposed to SCA containing HCl, NaCl, and NaF at 1200 C for approximately 1000 h each. Exposure to SCA-HCl resulted only in small weight and dimensional increases similar to those occurring during air oxidation. However, exposure to SCA-NaCl and SCA-NaF resulted in significant corrosion characterized by weight losses and formation of glassy coatings. The coatings, which consisted mainly of SiO2, also contained Na2O and other metallic oxides. The Si content of SiC lost by corrosion far exceeded the Si content of the coatings, which suggested that other Si species formed during corrosion. The corrosion mechanism inferred from the results and from thermodynamic free energies of reaction involves formation of volatile Si halides. Direct evidence for formation of Si halides, however, was not found. Flexure strengths at 1100 C (with corrosion products intact) were not significantly decreased relative to unexposed specimens. In fact, strengths increased in some cases even though tensile surfaces were roughened by corrosion. DOE

N86-30874# Schott Glass Technologies, Inc., Duryea, Pa.
MEGAJOULE LASER GLASS DEVELOPMENT Final Status Report
L. M. Cook Aug. 1985 14 p
(Contract W-7405-eng-48)
(DE86-006731; UCRL-15713) Avail: NTIS HC A02/MF A01

Various compositions of glass for use in a megajoule laser are examined. The desired properties are a high fluorescence lifetime at approx. 5 x 10(20) ions/cm(3), a cross section less than or equal to 3.0, and melting characteristics comparable with the semi-continuous phosphate melting system being designed. In

addition, efforts are reported for attempts to improve thermal shock and concentration quenching. DOE

N86-30875# Lawrence Livermore National Lab., Calif.
PLATINUM PARTICLES IN THE Nd:DOPED DISKS OF PHOSPHATE GLASS IN THE NOVA LASER
D. Milam, C. W. Hatcher, and J. H. Campbell 20 Feb. 1986 19 p Presented at the Boulder Damage Symposium, Boulder, Colo., 15 Oct. 1985
(Contract W-7405-eng-48)
(DE86-007119; UCRL-93253; CONF-8510101-6) Avail: NTIS HC A02/MF A01

The disks of Nd:doped phosphate glass in the amplifiers of the Nova laser contain platinum particles with sizes ranging from less than 5 (MU)m (detection limit) to about 100 (MU)m. The particle density varies from about 0.01 to 1.0 cm(-3). These particles cause fractures when irradiated at fluences greater than 2.5 J/cm(2) delivered in 1-ns, 1054-nm pulses. Under repeated irradiation at 5 to 7 J/cm(2), damage from small (less than 5 (MU)m) particles asymptotically approaches a limiting size, but damage surrounding the larger particles grows steadily. The damage threshold fluence, 2.5 J/cm(2), corresponds to operation of Nova at one-half the desired output for pulse durations longer than 1 nsec. Operation at higher fluences causes accumulation of damage in the output amplifiers and requires replacement of the disks in those amplifiers on an accelerated schedule. DOE

N86-30876# Sandia National Labs., Albuquerque, N. Mex.
EFFECT OF SURFACE CORROSION ON GLASS FRACTURE
B. C. Bunker and T. A. Michalske 1985 21 p Presented at the 4th International Symposium on the Fracture Mechanics of Ceramics, Blacksburg, Va., 8 Jun. 1985
(Contract DE-AC04-76DP-00789)
(DE86-008404; SAND-86-0582C; CONF-8506128-4) Avail: NTIS HC A02/MF A01

The nature of aqueous corrosion reactions on glass surfaces varies with glass composition and environmental conditions. We have shown how the physical effects of the various surface reactions can be incorporated into simple fracture mechanics models to predict measured crack velocity effects in silicate glasses. Reactions on glass surfaces are divided into four categories; bond rupture reactions, alteration layer formation, surface deposition, and intermolecular surface forces. These results demonstrate the effect of chemical reaction mechanisms on the long-term mechanical behavior of glasses. DOE

N86-30877# Air Force Weapons Lab., Kirtland AFB, N. Mex.
RAMAN SCATTERING ANALYSIS OF THIN-FILM COATINGS USING GUIDED WAVES
Alan F. Stewart, David R. Tallant (Sandia National Labs., Albuquerque, N. Mex.), and K. L. Higgins 1985 20 p Presented at the 17th Annual Symposium on Optical Materials for High-power Lasers, Boulder, Colo., 28 Oct. 1985 Prepared in cooperation with Air Force Weapons Lab., Kirtland AFB, N.M.
(Contract DE-AC04-76DP-00789)
(DE86-008776; SAND-85-2076C; CONF-851052-5) Avail: NTIS HC A02/MF A01

Selected refractory-oxide, thin-film coatings were analyzed using Raman spectroscopy. Diamond and rutile prisms were used to couple the probe beam into the thin-film coatings which served as waveguides. Propagation of the probe beam as a guided wave in the thin film increases the probability for Raman scattering by species in the thin film compared to techniques which depend on a single pass through or probe beam reflection at the film. Because the probe beam is confined entirely within the thin-film coating, Raman spectra are obtained which are generally free of vibrational bands due to the substrate. The combination of of more efficient coupling between the probe beam and the thin film and the elimination of substrate interferences results in improved sensitivity and the ability to record recognizable Raman spectra of thin films composed even of materials that are relatively inefficient Raman scatters. DOE

N86-30878# Technical Research Centre of Finland, Espoo.
JOINING OF CERAMICS FOR HIGH TEMPERATURE APPLICATIONS
M. Vilpas Aug. 1985 37 p In FINNISH
(DE86-751572; VTT-TIED-481) Avail: NTIS (US Sales Only) HC A03/MF A01

The report summarizes a literature survey of the methods for joining ceramics to ceramics or ceramics to metals for high temperature applications. Also mechanical properties and potential applications of the joints are considered. The joining of ceramics is usually carried out by brazing or diffusion bonding. Especially the letter has been found useful and increased the applications of joined ceramics. Recently also the possibilities to use electron beam and laser beam welding for joining of ceramics have been investigated. The joining of ceramics has found numerous applications, typical for high operating temperatures being different sensors and thermocouples. DOE

N86-30879# Florida Univ., Gainesville. Dept. of Materials Science and Engineering.
WETTING AND DISPERSION IN CERAMIC/POLYMER MELT INJECTION MOLDING SYSTEMS
M. D. Sacks, J. W. Williams, and C. D. Batich Nov. 1985 11 p
(Contract DE-FG05-85ER-45202)
(DE86-009001; DOE/ER-45202/1) Avail: NTIS HC A02/MF A01

The major goal of this program is to achieve an improved understanding of the factors influencing dispersion of ceramic particles in polymer melts. In general, there are three requirements in the dispersion of a powder in a liquid medium (e.g., a polymer melt): (1) wetting of the powder by the liquid; (2) breaking up powder agglomerates; and (3) maintaining the dispersed state (e.g., avoiding particle coagulation). Work has been initiated in each of these areas. Preliminary results are described. DOE

N86-30880# Allied Bendix Corp., Kansas City, Mo.
STRESS RELAXATION OF CELLULAR SILICONE MATERIAL: 1984
J. W. Schneider Mar. 1986 22 p
(Contract DE-AC04-76DP-00613)
(DE86-009131; BDX-613-3420) Avail: NTIS HC A02/MF A01

The long-term (10 years) stress relaxation properties of cellular silicone materials at room temperature are under evaluation. Both equilibrium (random copolymer) and condensation (block copolymer) type base polymers are included. The equilibrium-type material used urea as the leachable filler, and the condensation-type material used ammonium chloride. Each material was compounded to yield densities of 0.34 and 0.52 g/cm(3) for thicknesses of 1.17, 1.52, and 2.54 mm. These density-thickness combinations were compressed to nominal compressions of 20 and 40% with nine replicates at each condition. A specially designed fixture was used to maintain a specific compression on the cellular sample, and a universal test machine acquired the load data. Currently, the predicted load retention is between 60 and 68% of the original load. DOE

N86-30881# Oak Ridge National Lab., Tenn.
NEEDS ASSESSMENT FOR NONDESTRUCTIVE TESTING AND MATERIALS CHARACTERIZATION FOR IMPROVED RELIABILITY IN STRUCTURAL CERAMICS FOR HEAT ENGINES
D. R. Johnson, R. W. McClung, M. A. Janney, and W. M. Hanusiak 1986 8 p Presented at the 2nd International Symposium on Ceramic Materials and Components for Engines, Luebeck-Travemuende, West Germany, 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-010039; CONF-860413-2) Avail: NTIS HC A02/MF A01

A general ceramic processing flowsheet and inspections at each stage of the flowsheet are shown. The inspections shown identified as potentially important from the point of view of the development of highly reliable ceramics. The inspections shown were all considered in the assessment of the relative priorities for development of inspection techniques. It is anticipated that a limited number of key inspections will be identified for any given product

line. This paper reviews the status and needs for inspections in raw materials, green bodies, and dense ceramics. DOE

N86-30882# National Bureau of Standards, Gaithersburg, Md. Inst. for Materials Science and Engineering.
INSTITUTE FOR MATERIALS SCIENCE AND ENGINEERING, CERAMICS: TECHNICAL ACTIVITIES, 1985
S. M. Hsu and C. R. Hubbard Feb. 1986 81 p
(PB86-196771; NBSIR-85/3188) Avail: NTIS HC A05/MF A01 CSCL 11B

The report of the Institute for Materials Science and Engineering, Ceramics: Technical Activities 1985, contains the following: Properties/performance, Mechanical properties; Glass and composites; Tribology; Optical properties; Structure/stability-High temperature chemistry; structural chemistry; Ceramic powder characterization; Surface chemistry and bioprocesses; Processing-Structural science; and Ceramic chemistry. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-30883# Federal Aviation Agency, Atlantic City, N.J. Technical Center.
ANTIMISTING FUEL RESEARCH AND DEVELOPMENT FOR COMMERCIAL AIRCRAFT Final Report
Michael Yaffee Apr. 1986 78 p
(FAA/CT-86/7) Avail: NTIS HC A05/MF A01

This report covers the research, development, testing, and evaluation conducted by the Federal Aviation Administration (FAA) in pursuit of an effective, feasible antimisting agent for kerosene jet fuels that would prevent or reduce the dangers of postcrash, fuel mist fires. For the past eight years, most of this effort was focused on a high molecular weight polymer, FM-9 (Trademark), as a representative agent to prove the antimisting fuel concept. The results of this work indicate that the goal is achievable: Jet fuel can be modified to provide a significant degree of protection against postcrash fires in impact-survivable accidents. Additional development and testing would be required before the fuel is operationally acceptable. It would be necessary to make some modifications in fuel handling procedures and hardware in aircraft and at airports. But there appear to be no technically insurmountable problems. Author

N86-30884# Ballistic Research Labs., Aberdeen Proving Ground, Md.
REVIEW ON COMPRESSION IGNITION SENSITIVITY STUDIES OF LIQUID GUN PROPELLANTS
John D. Knapton and Eberhard Schmolinske Mar. 1986 31 p
(AD-A165969; BRL-MR-3497) Avail: NTIS HC A03/MF A01 CSCL 21/2

Most of the past work on the compression ignition sensitivity of liquid gun propellants did not succeed in elucidating the fundamental processes involved in compression ignition. Existing theoretical predictions rely on simplifying assumptions and remain unvalidated until appropriate experimental investigations are made. Recent experimental studies have focused on safety aspects and have tried to define reaction limits based on the ullage present, the bubble size, and the pressurization rate resulting in go or no-go type of tests. Many of the tests have revealed, for cases where a compression ignition event was observed, a finite induction time before there is a significant pressure generation. There are five theoretical mechanisms (hot spot, impact (micro-jetting), chemical, cooperative effects, and oscillations) which may be involved during the ignition of a pressurized bubbly Lp and it is difficult to say which is the right one. Moreover, if one succeeds in discovering the mechanisms for ignition, adiabatic compression could be considered as a practical ignition source for a liquid propellant gun. Another important unknown in all of the adiabatic compression tests conducted to-date is the amount of dissolved gas in the propellant. For future tests, therefore, gas solubility measurements should be considered. GRA

N86-30885# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
DESCRIPTIVE CHARACTERIZATION OF SOLID INGREDIENTS Interim Report, Oct. 1984 - Feb. 1986
K. G. Chandler and P. C. Trulove Mar. 1986 17 p
(AD-A166874; AFRPL-TR-86-016) Avail: NTIS HC A02/MF A01 CSCL 21/9

Presently weight median diameter measurements are used to correlate oxidizer particle size to ballistic performance in solid propellants. Propellant burning is a heterogenous process that is greatly influenced by available surface area of oxidizer particles. Weight median diameter measurements do not accurately reflect the available oxidizer surface area so there are inherent errors in burn rate correlations. This study focuses on the development of a new oxidizer particle characterization technique that is surface dependent to improve accuracy in correlating oxidizer particles to ballistic performance. Author (GRA)

N86-30886# Technical Research Centre of Finland, Espoo.
VEGETABLE OILS AS DIESEL FUELS. REDUCTION OF CARBON FOULING
M. Kytoe, N. O. Nylund, and K. Sipilae Jun. 1985 44 p In FINNISH; ENGLISH summary
(DE86-750610; VTT-TIED-464) Avail: NTIS (US Sales Only) HC A03/MF A01

It is accepted that vegetable oil is fairly well suited as fuel for diesel engines in short-term use. Good results have also been obtained in long-term experiments with precombustion chamber diesels. In direct-injection diesel engines heavy carbon fouling often causes problems. In the experimental part of the research work the ability of certain additives to reduce fouling was studied on a direct-injection Petter AVB engine in a 20 h test. A mixture consisting of 50% diesel oil and 50% alkali refined rape oil was used as the fuel. Additives rated effective according to literature references did not reduce fouling in these experiments, whereas fairly good results were obtained using an ignition improver. DOE

N86-30887# Retallick (William B.), West Chester, Pa.
HYDROGEN STORAGE SYSTEM Interim Report
W. B. Retallick 18 Feb. 1986 8 p
(Contract DE-FG01-85CE-15230)
(DE86-006990; DOE/CE-15230/T1) Avail: NTIS HC A02/MF A01

Hydrogen can be stored in the form of a metal hydride. The formation of the hydride is highly exothermic. Hence the rate at which hydrogen can be added to or removed from the storage system is limited by the rate of heat transfer. Heat transfer is facilitated by displaying the hydride on a metal support that conducts heat. The task was to find a binder to make hydride stay put on a metal support through at least 250(0) cycles of hydriding-dehydriding and to measure the rate of hydrogen uptake. DOE

N86-30888# Sandia National Labs., Albuquerque, N. Mex.
ELECTRONIC SIMULATOR AND CALIBRATOR FOR ELECTROTHERMAL RESPONSE TEST SYSTEMS
Larry M. Moore, Arnold C. Strasburg, and James J. Spates (Ktech Corp., Albuquerque, N. Mex.) Feb. 1986 26 p
(Contract DE-AC04-76DP-00789)
(DE86-008874; SAND-85-2259) Avail: NTIS HC A03/MF A01

The electrothermal response (ETR) test is performed on electroexplosive devices (EED). A device is described which simulates these EED's. The simulator generates a voltage analog which varies exponentially with time and has an amplitude which is proportional to the third power of the input current. This exponential response is superimposed on a square wave analog which simulates the constant voltage drop across the cold

resistance of a bridgewire. Also described is a calibrator for ETR testers. The calibrator generates a known change in resistance for determining the response of a system under test. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-30889*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
JPL PREFERRED PARTS LIST: RELIABLE ELECTRONIC COMPONENTS
Robert E. Covey, W. Richard Scott, Lawrence M. Hess, T. George Steffy, and Frank R. Stott 20 Jul. 1982 290 p
(Contract NAS7-918)
(NASA-CR-176258; NAS 1.26:176258; NPO-16028/5821) Avail: NTIS HC A13/MF A01 CSCL 13B

The JPL Preferred Parts List was prepared to provide a basis for selection of electronic parts for JPL spacecraft programs. Supporting tests for the listed parts were designed to comply with specific spacecraft environmental requirements. The list tabulates the electronic, magnetic, and electromechanical parts applicable to all JPL electronic equipment wherein reliability is a major concern. The parts listed are revelant to equipment supplied by subcontractors as well as fabricated at the laboratory. B.G.

N86-30890# New Mexico Univ., Albuquerque. Engineering Research Inst.
FIRE EXTINGUISHING AGENTS FOR OXYGEN-ENRICHED ATMOSPHERES Final Report, 1 Apr. 1982 - 30 Nov. 1985
Martin A. Plugge, Christopher W. Wilson, Dennis M. Zallen, and Joseph L. Walker Dec. 1985 98 p
(Contract F29601-81-C-0013)
(AD-A166967; NMERI-TA3-19; ESL-TR-85-26) Avail: NTIS HC A05/MF A01 CSCL 13/12

Fire-suppression agent requirements for extinguishing fires in oxygen-enriched atmospheres were determined employing small-, medium-, large-, and full-scale test apparatuses. The small- and medium-scale tests showed that a doubling of the oxygen concentration required five times more HALON for extinguishment. For fires of similar size and intensity, the effect of oxygen enrichment of the diluent volume in the HC-131A was not as grate as in the smaller compartments of the B-52 which presented a higher damage scenario. The full-scale tests showed that damage to the airframe was as important a factor in extinguishment as oxygen enrichment. GRA

N86-31425*# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Electrical Engineering.
ENGINEERING GRAPHICS DATA ENTRY FOR SPACE STATION DATA BASE
R. C. Lacovara *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 13 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 13B

N86-30792# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
COMPARISON OF CLASSICAL AND COCURING MANUFACTURING TECHNIQUES FOR A CFRP HONEYCOMB CENTRAL TUBE
J. L. Pettex *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 291-294 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-30891*# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
NEAR MILLIMETER WAVE IMAGING/MULTI-BEAM INTEGRATED ANTENNAS Technical Report, 1 Oct. 1985 - 31 Mar. 1986
K. Sigfrid Yngvesson 1986 71 p
(Grant NAG1-279)
(NASA-CR-176989; NAS 1.26:176989) Avail: NTIS HC A04/MF A01 CSCL 20N

Theoretical models of single element Linearly Tapered Slot Antennas (LTSA) and coupling effects of LTSA arrays are discussed. A list of publications is given. For individual titles, see N86-30892 through N86-30893.

N86-30892*# Massachusetts Univ., Amherst.
THEORETICAL MODELS OF SINGLE-ELEMENT LTSA ANTENNA ELEMENTS
In its Near Millimeter Wave Imaging/Multi-Beam Integrated Antennas 1986 53 p (For primary document see N86-30891 22-32)
Avail: NTIS HC A04/MF A01 CSCL 20N

The spectral domain computations for slotline guide wavelength and characteristic impedance provide the basic parameters that are need to calculate the radiation pattern of an Linearly Tapered Slot Antenna (LTSA) by using the half-plane Green's function and a stepped approximation to the LTSA structure. However, the spectral domain computations are somewhat time consuming and not suitable for computer aided design application. Therefore, the results of several computation were fitted by formulas that are readily evaluated on a calculator or computer. Antenna measurements were continued, and an attempt was made to predict the truncation effect by three different methods. B.G.

N86-30893*# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
CHARACTERISTIC IMPEDANCE OF A WIDE SLOT LINE ON LOW PERMITTIVITY SUBSTRATES
R. Janaswamy and D. H. Schaubert *In its* Near Millimeter Wave Imaging/Multi-Beam Integrated Antennas 1986 15 p (For primary document see N86-30891 22-32)
Avail: NTIS HC A04/MF A01 CSCL 20N

Computed results on the characteristics impedance of wide slots etched on an electrically thin substrate of low dielectric constant epsilon sub r are presented. These results are used to help provide design data for slotlines. Curves are presented for epsilon sub r = 2.22, 3.0, 3.8, and 9.8. Comparison is shown for the characteristic impedance between the present calculations and those available in the literature for high-epsilon sub r substrates. Empirical formulas, based on least square curve fitting, are presented for the normalized slot wavelength lambda prime/lambda sub 0 and the characteristic impedance Z sub 0 over the range: 0.0015 is equal to or less than W/lambda sub 0 equal to or less than 1.0, 0.006 is equal to or less than d/lambda sub 0 equal to or less than 0.06, 2.22 is equal to or less than epsilon sub 0 equal to or less than 9.8. Author

N86-30894# Selenia Industrie Associate S.p.A., Rome (Italy).
RIVISTA TECNICA SELENIA, VOLUME 9, NUMBER 4
1985 49 p
(ESA-86-97244) Avail: NTIS HC A03/MF A01

Application of number theory to high speed radar signal processing; multistatic detection of radar, signals for Swerling models of the target, magnetostatic wave applications to microwave analog signal processing; and an example of integrated logistic

support applied to production testing are discussed. For individual titles, see N86-30895 through N86-30898. ESA

N86-30895# Selenia Industrie Associate S.p.A., Rome (Italy). Signal Processing Dept.
NUMBER THEORY: A PROPOSAL FOR HIGH SPEED PROCESSORS
Tullio Bucciarelli and Carlo Conti *In its* Rivista Tecnica Selenia, v. 9, no. 4 1985 p 1-10 (For primary document see N86-30894 22-32)
Avail: NTIS HC A03/MF A01

Use of number theory for real time, high speed processing of radar signals is discussed. Number theory can be applied to optimize parallel channel processing, by which sampling times less than 50 nsecs may be achieved. The mainstays of number theory such as consistency and representation, are outlined. The ways in which such theory may be applied to transverse filtering are shown and limits are discussed. ESA

N86-30896# Selenia Industrie Associate S.p.A., Pome (Italy). Radar Dept.
MULTISTATIC DETECTION OF RADAR SIGNALS FOR SWERLING MODELS OF THE TARGET
Egido DAddio, Alfonso Farina (Naples Univ., Italy), Ernesto Conte, and Maurizio Longo *In its* Rivista Tecnica Selenia, v. 9, no. 4, 1985 p 11-17 (For primary document see N86-30894 22-32)
Avail: NTIS HC A03/MF A01

Optimum detection of radar signals by a multistatic configuration of sensors is discussed. Starting from the case of multiple observations, a systematic analysis of the model leads to a unified optimum receiver for signals fluctuating according to Swerling models 1 to 4. Suboptimum solutions through which considerable streamlining of processing structures can be achieved are found. ESA

N86-30897# Selenia Industrie Associate S.p.A., Rome (Italy). Search Dept.
MAGNETOSTATIC WAVE APPLICATION TO MICROWAVE ANALOG SIGNAL PROCESSING
Paolo DeGasperis (Consiglio Nazionale delle Ricerche, Rome, Italy), Carlo DiGregorio, Giuseppe Miccoli, and Riccardo Roveda *In its* Rivista Tecnica Selenia, v. 9, no. 4, 1985 p 18-25 (For primary document see N86-30894 22-32)
Avail: NTIS HC A03/MF A01

The physical principles underlying the operation of magnetostatic wave (MSW) devices are presented, and developments and applications are outlined. The technique promises direct handling at microwave frequencies (0.5 to 20 GHz) thanks to the control of the propagation of MSW in thin magnetic garnet films grown by liquid phase epitaxy. ESA

N86-30898# Selenia Industrie Associate S.p.A., Rome (Italy). Engineering Support Dept.
AN EXAMPLE OF INTEGRATED LOGISTIC SUPPORT APPLIED ALSO TO PRODUCTION TESTING
Vincenzo Buontempo *In its* Rivista Tecnica Selenia, v. 9, no. 4, 1985 p 26-45 (For primary document see N86-30894 22-32)
Avail: NTIS HC A03/MF A01

The basic concepts of an aerospace industry integrated logistic support plan are presented. An example shows that as well as achieving overall economy on system life cycle support cost, it reduces production costs by designing support means and production test in harmony with the logistic support means. A life cycle computation model related to the logistic support is provided. The model is also applicable to on board avionic systems such as Tornado and AMX aircraft and EH 101 helicopter. ESA

N86-30899# Computer Sciences Corp., Falls Church, Va. Systems Div.
CSC METEOR BURST MODEL ENHANCEMENT TEST REPORT Interim Report, Apr. 1985 - Feb. 1986
W. Stettancin and D. Brown Feb. 1986 51 p
(Contract DCA100-84-C-0030)
(AD-A165993) Avail: NTIS HC A04/MF A01 CSCL 17/2

This report describes enhancements made to the CSC meteor burst model in 1985 and presents and analyzes the effects of the enhancements on model results. The enhancements made include the effects of: overdense bursts, transverse resonance, burst formation, atmospheric refraction, ionospheric absorption, shower meteors and the earth's gravitational effect on meteor radiants. GRA

N86-30900# Army Military Personnel Center, Alexandria, Va.
A GaAs BASED DIGITAL SERIAL COMMUNICATIONS SYSTEM Final Report
Ramon Zulaybar delRosario 25 Mar. 1986 106 p
(AD-A166060) Avail: NTIS HC A06/MF A01 CSCL 17/2

Described are the design and simulation of a one gigabit per second synchronous transmitter and receiver system. The circuitry is to be integrated on a 32-pin gallium arsenide semicustom digital gate array. Digital logic components are built using enhancement and depletion mode n-channel metal-semiconductor field-effect transistors. The computer simulations indicate that, under a one micron gate process technology and using a 2V voltage supply, inverter propagation delays as small as 60 picoseconds can be achieved. Designs for both the transmitter and the receiver have been successfully simulated at the one gigahertz clock rate. GRA

N86-30901# Army Missile Command, Redstone Arsenal, Ala. Advanced Sensors Directorate.
THE TECHNICAL COOPERATION PROGRAM SUBGROUP K PANEL PRESENTATIONS
E. M. Holliday Sep. 1985 32 p
(AD-A166407; AD-E950826; AMSMI/RE-85-24-TR) Avail: NTIS HC A03/MF A01 CSCL 17/9

Two topics presented at recent annual meetings of The Technical Cooperation Program (TTCP), Subgroup K, are documented and discuss accomplishments and theory of group complementary coding for pulse compression in a radar system. Author (GRA)

N86-30902# Naval Weapons Center, China Lake, Calif.
NEAR-FIELD VECTOR POTENTIALS FOR THIN DIPOLE ANTENNAS Interim Report, Oct. 1984 - Sep. 1985
P. L. Overfelt Sep. 1985 20 p
(AD-A166542; AD-E900544; NWC-TP-6645) Avail: NTIS HC A02/MF A01 CSCL 20/14

A generall method for exact integration of vector potentials of thin dipole antennas characterized by various current distributions is developed. Such solutions are shown to be independent of the usual far-field restrictions involving dipole length, observation point distance, and wavelength. Their convergence is rapid in the induction and near-field regions. GRA

N86-30903# Naval Underwater Systems Center, New London, Conn.
COMPARISONS OF 76Hz TRANSVERSE AND RADIAL MAGNETIC FIELD STRENGTH COMPONENTS RECEIVED IN CONNECTICUT
Peter R. Banniister 11 Mar. 1986 145 p
(AD-A166548; NUSC-TD-7523) Avail: NTIS HC A07/MF A01 CSCL 20/14

Since June 1970, we have made extremely low frequency (ELF) measurements of the transverse horizontal magnetic field strength, H sub phi, received in Connecticut. Occasionally, we also have measured either the vertical electric field strength, E sub v, or the radial horizontal magnetic field strength, H sub rho. The AN/BSR-1 ELF receivers are located at the Naval Underwater Systems Center (NUSC), at New London, CT. The transmission source for these farfield (1.6-Mm range) measurements is the U.S. Navy's ELF Wisconsin Test Facility (WTF), located in the Chequamegon National Forest in north-central Wisconsin. The results of 136 days of radial magnetic field measurements taken from November 1977 through June 1984 are discussed in this report. The main result is that during disturbed propagation conditions, the radial and transverse magnetic field strength daily

plots (versus GMT) are usually dissimilar (in both amplitude and relative phase). GRA

N86-30904# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INTERSATELLITE LINK DESIGN ISSUES M.S. Thesis
Richard S. Fuhrmann 1985 112 p
(AD-A166761; AFIT/CI/NR-86-43T) Avail: NTIS HC A06/MF A01 CSCL 17/2

An intersatellite link is a communications link that directly connects two separate satellites. One satellite could have several links to numerous other satellites. In some of the literature, ISLs have also been called crosslinks. The first Intersatellite Link (ISL) was demonstrated by radio amateurs in 1975. The National Aeronautics and Space Administration (NASA) pursued testing that same year. NASA established links between satellites then in orbit. Sponsored by the U.S. Air Force and Navy, Lincoln Experimental Satellites (LES) 8 and 9 were launched in 1976 and established the technical feasibility of ISLs. This thesis explores some of the major design issues involved in ISLs. Two basic approaches are considered, millimeter wave (MMW) and optical. For the MMW approach, the design issues covered were frequency, antenna positioning, acquisition and tracking, antenna type, power amplification, and link analysis. For the optical approach, the design issues covered were laser source selection, optical detection, tracking and acquisition, and proposed systems. Trade-offs involved in system design were analyzed and possible applications of ISLs discussed. GRA

N86-30905# Mitre Corp., Bedford, Mass.
ADVANCED ARCHITECTURES FOR DIGITAL SIGNAL PROCESSORS Final Report, Oct. 1983 - Oct. 1984
A. L. Bequillard, D. O. Carhoun, and W. L. Eastman Oct. 1985 172 p
(Contract F19628-84-C-0001)
(AD-A166921; MTR-9647; RADC-TR-85-203) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report is concerned with the development and application of improved techniques for digital signal processing, based on use of residue number system (RNS) to implement the processing functions associated with isolated-word speech recognition. Specifically, the use of RNS in combination and systolic architectures for implementation of speech recognition algorithms was explored. The implementation of time-warping speech algorithm in RNS is described. GRA

N86-30906# Naval Ocean Systems Center, San Diego, Calif.
A LOW-DATA-RATE VOICE TRANSMISSION SYSTEM (LDRVTS) FOR HF COMMUNICATION Final Report, Oct. 1980 - Sep. 1984
G. B. Johnson Sep. 1985 78 p
(AD-A166946; NOSC/TR-1103) Avail: NTIS HC A05/MF A01 CSCL 17/2

This report details the present capabilities of speech recognition and synthesis systems in relation to Marine Corps field HF-communication problems. Work includes the design and testing of a battery-powered, field version of a low-data-rate voice transmission system. GRA

N86-30907# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
A MODIFICATION OF THE H-133 GROUND COMMUNICATIONS HEADSET FOR USE IN INTENSE NOISE ENVIRONMENTS
Charles W. Nixon and Henry C. Sommer 7 Mar. 1986 31 p
(AD-A166981; AAMRL-TR-86-009) Avail: NTIS HC A03/MF A01 CSCL 17/2

Detailed technical information and instructions are provided for a simple modification of the Air Force standard H-133 ground communications headset for use in intense noise environments at levels of 135 db (SPL) and higher. This modification involves the replacement of the conventional H-136 earphone with a miniaturized receiver mounted on a custom molded insert earplug. An adaptor box-line potentiometer is fabricated to provide manual control of the level of the speech signal at the ear of the wearer. The modified H-133 communications headset has been utilized at selected Air Force bases by ground maintenance personnel who rate the hearing protection and voice communications performance as excellent. GRA

N86-30908# Mitre Corp., Bedford, Mass.
MONOPOLE ELEMENT AT THE CENTER OF A CIRCULAR GROUNDPLANE OF ARBITRARY RADIUS. VOLUME 1: THEORY AND RESULTS Final Report
M. M. Weiner, S. P. Cruze, C. C. Li, and W. J. Wilson Mar. 1986 136 p
(Contract F19628-84-C-0001)
(AD-A166991; MTR-9622-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 20/14

The Air Force SINCGARS VHF-FM radio is a frequency-hopping anti-jam device utilizing electrically short antenna to minimize aerodynamic drag on airborne platforms. The development of optimally efficient, electronically tuneable antennas for this radio is of interest. Although the antenna groundplane is platform-dependent, it is usually small compared to an rf wavelength. A circular groundplane provides a standardized geometry with which to model and evaluate candidate antennas. Accordingly, a VHF antenna range with an 8 ft. diameter circular groundplane has been constructed to evaluate candidate antennas. The electrical properties of a monopole element at the center of a circular groundplane of finite radius are of interest to this program for (1) qualifying the antenna range; (2) establishing antenna standards with which to measure test antennas; and (3) modeling candidate antennas. A survey of the literature revealed that although this antenna has the simplest geometry of any monopole antenna, its properties are neither well understood nor standardized, particularly for groundplane radii which are small or comparable to a wavelength. This paper attempts to address this deficiency. Author (GRA)

N86-30909# SRI International Corp., Menlo Park, Calif.
STRIATION EFFECT ON HF SIGNALS Technical Report, 8 Sep. 1983 - 8 May 1984
Gary H. Price 1 Jun. 1985 41 p
(Contract DNA001-83-C-0413; DNA Proj. S99-QMXB)
(AD-A167017; DNA-TR-85-250) Avail: NTIS HC A03/MF A01 CSCL 20/14

Methods are described for calculating the effects of forward scatter by ionospheric irregularities on high-frequency sky-wave radio signals. The approach combines the forward-scatter theory (developed to treat refracted-ray paths in the context of acoustic propagation in oceans) with the model of ionospheric irregularities developed by the Defense Nuclear Agency. Expressions are given for calculating signal decorrelation in time, space and frequency. GRA

N86-30910# Pennsylvania State Univ., State College. Applied Research Lab.
PHASE COMPARISON TIME DELAY ESTIMATION USING WIDEBAND SIGNALS M.S. Thesis
J. D. Hatlestad and D. W. Ricker Apr. 1986 77 p
(AD-A167025; TR-86-03) Avail: NTIS HC A05/MF A01 CSCL 17/2

A method of phase comparison time delay estimation using large time-bandwidth product signals is presented. This method compares the phases of the matched filters for each channel, and it is shown that for signals with symmetric power spectra, a meaningful estimate of the time delay can be expected from this phase information and knowledge of the carrier frequency of the signal. The estimator is evaluated while operating in white Gaussian noise which is in general correlated between channels, and curves are given for the density function, mean, and variance of the estimator for various noise assumptions. The estimator is shown to take advantage of the processing gain of large time-bandwidth product signals to reduce the variance of the time delay estimate. GRA

N86-30911# Naval Postgraduate School, Monterey, Calif.
CERENKOV RADIATION AND ELECTROMAGNETIC PULSE PRODUCED BY ELECTRON BEAMS TRAVERSING A FINITE PATH IN AIR
F. R. Buskirk and J. R. Neighbours Mar. 1986 29 p
(AD-A167058; NPS 61-86-011) Avail: NTIS HC A03/MF A01 CSCL 20/8

Coherent Cerenkov radiation has been investigated previously in the time domain for an infinite path. The present calculations for a finite path length show an effect analogous to diffraction (in the frequency domain) in which radiation fields appear both at Cerenkov angles and at other angles. The latter have previously been named electromagnetic pulse fields. GRA

N86-30912# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
TWO-DIMENSIONAL SIGNAL PROCESSING AND STORAGE AND THEORY AND APPLICATIONS OF ELECTROMAGNETIC MEASUREMENTS Annual Report, 1 Jan. - 31 Dec. 1985
R. W. Schafer and D. T. Paris 1 Jan. 1986 30 p
(Contract DAAG29-84-K-0024)
(AD-A167175) Avail: NTIS HC A03/MF A01 CSCL 09/2

This is an annual report on research conducted under the auspices of the Joint Services Electronics Program. Specific topics covered are: digital signal processing, parallel processing architectures, two-dimensional optical storage and processing, hybrid optical/digital signal processing, electromagnetic measurements in the time domain, and automatic radiation measurements for near-field and far-field transformations. GRA

N86-30913# Naval Research Lab., Washington, D. C.
AN INVESTIGATION OF DIELECTRIC LOADED RIDGED WAVEGUIDE Final Report, Jun. 1981 - Dec. 1984
Charles W. Young, Jr. 31 Mar. 1986 145 p
(AD-A167269; NRL-8917) Avail: NTIS HC A07/MF A01 CSCL 09/1

In this report, a complete modal analysis is made for ridged waveguide partially loaded with dielectric. Cutoff frequency calculations are derived for the different waveguide modes to provide the actual single mode bandwidth. Mathematical solutions for propagation characteristics, both phase and loss, and for peak power breakdown levels are derived for the dominant mode. It is shown that true TE or TM modes do not exist in the dielectric loaded ridged waveguide, contrary to the assumption made in the only published analysis of such waveguide. Numerical examples are cited to demonstrate the large single mode bandwidths that may be achieved with dielectric loaded ridge waveguide and the considerable increase in theoretical peak power breakdown levels over that of either empty ridged waveguide or dielectric slab loaded rectangular waveguide having the same single mode bandwidth. Author (GRA)

N86-30914# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A TWO-DIMENSIONAL STUDY OF THE INFLUENCE ON TARGET LOADING OF NUMERICAL WAVE REFLECTIONS FROM TRANSMISSIVE COMPUTATIONAL BOUNDARIES Final Report, Feb. 1984 - Jun. 1985
Richard E. Lottero and John D. Wortman Mar. 1986 48 p
(AD-A167299; BRL-MR-3503) Avail: NTIS HC A03/MF A01 CSCL 20/4

This report quantifies the changes in the loading on a target caused by the arrival of artificial, numerically-induced reflections of waves from the transmissive boundaries of a computational grid. Several computations were performed, using the two-dimensional Cartesian coordinates mode of the Ballistic Research Laboratory's version of the airblast HULL hydrodynamics computer code. HULL uses a two-step, explicit differencing method to solve the inviscid, unsteady Euler equations. A target is simulated in the computational grid by generating aggregates of rigid, immobile, and impermeable flow-field cells. The simple transmissive boundaries in HULL simulate a zero-gradient condition across the boundary for both the pressure and the normal component of velocity. Simple transmissive boundaries such as these will partially reflect waves that strike them, including shock, compression, and expansion waves. The strength of these reflected waves is directly related to the strength of the incident waves. These reflected waves then travel back into the computational grid, modifying the flow-field conditions in the regions through which they pass, thereby ending the simulation of free-field conditions. GRA

N86-30915# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
SIGNAL PROCESSING USING MODEL SELECTION METHODS
Z. D. Bai, P. R. Krishnaiah, and L. C. Zhao Jan. 1986 20 p
(Contracts N00014-85-K-0292; F49620-85-C-0008)
(AD-A167318; TR-86-03; AFOSR-86-0253TR) Avail: NTIS HC A02/MF A01 CSCL 09/4

In this paper, the authors gave a review of some recent developments on multivariate statistical techniques for detection of the number of signals using eigenvalues. The main emphasis of the review is on efficient detection criterion (EDC) procedures proposed by the authors recently. These procedures are strongly consistent. GRA

N86-30916# Naval Underwater Systems Center, New London, Conn.
CONNECTICUT ELF (EXTREMELY LOW FREQUENCY) FIELD-STRENGTH MEASUREMENTS, AUGUST TO DECEMBER 1977 AND JULY TO SEPTEMBER 1978
Peter R. Bannister 5 Mar. 1986 100 p
(AD-A167344; NUSC-TR-7357) Avail: NTIS HC A05/MF A01 CSCL 20/14

From August 1976 to September 1978, extremely low frequency (ELF) field-strength measurements were taken continuously in Connecticut. The results of measurements taken from August to December 1977 and from July to September 1978 are discussed in this report. The principal result is that, for the 2 year period of August 1976 to September 1978, amplitude peak-to-trough variations of 5 dB, or greater, were observed 25 percent of the time. GRA

N86-30917# Department of the Air Force, Washington, D.C.
MOTION SENSITIVE FRAME INTEGRATION Patent Application
Roger A. May, inventor (to Air Force) Filed 24 Feb. 1986 15 p
(AD-D012291; US-Patent-Appl-SN-831894) Avail: NTIS HC A02/MF A01 CSCL 17/2

Noise smoothing of imaging data is performed using frame integration, by averaging pixels over time instead of space, without resulting in a smear of moving objects by: sensing image motion; and enabling frame integration on only stationary scene pixels. Image motion is sensed by: producing a differencing signal which indicates the difference between new image data and frame integrated data; and comparing the differencing signal with a threshold signal. When the threshold signal has a value which approximately equals expected image noise, then the image data processed by a particular pixel may be deemed non-moving when the difference signal is less than the threshold signal, and the image data may be deemed to depict moving objects otherwise. Finally, image data is conducted unprocessed to the display for moving scene pixels, while frame integrated image data is conducted to the display for stationary scene pixels. Author (GRA)

N86-30918# Department of the Air Force, Washington, D.C.
DOUBLE SIDEBAND GENERATION WITH SERRODYNE MODULATORS Patent Application
Minarik, inventor (to Air Force) et al Filed 3 Feb. 1986 19 p
(AD-D012293; US-Patent-Appl-SN-825107) Avail: NTIS HC A02/MF A01 CSCL 17/2

The present invention utilizes a pair of single sideband serrodyne frequency modulators to achieve double sideband generation with carrier and unwanted sideband suppression that is characteristic of the individual single sideband serrodyne modulator. The RF input signal is applied to a 90 degree 3 dB hybrid power divider to obtain two RF carrier signals that are

90 degrees out of phase. One of the RF carrier signals is applied to the first single sideband serrodyne modulators which is used to frequency shift the drive signal above the RF carrier signal. The other serrodyne modulator is used to frequency shift the drive signal below the RF carrier signal. The output signals from the individual modulators which are 90 degrees out of phase, are then combined in a second 90 degree 3 dB hybrid power divider to obtain the upper and lower sidebands at the output. In order to achieve true double sideband, suppressed-carrier operation, the modulating frequencies to each serrodyne modulator would be the same, but out of phase. GRA

N86-30919# Oak Ridge National Lab., Tenn.
A 3-D ANALYSIS OF MAXWELL'S EQUATIONS FOR CAVITIES OF ARBITRARY SHAPE
J. H. Whealton, G. L. Chen, R. W. McGaffey, R. J. Raridon, E. F. Jaeger, M. A. Bell, and D. J. Hoffman Mar. 1986 26 p
(Contract DE-AC05-84OR-21400)
(DE86-007883; ORNL/TM-9792) Avail: NTIS HC A03/MF A01

A three-dimensional analysis of cavity antennas is presented. The analysis is based on the finite difference method with a successive overrelaxation convergence scheme. This method permits the calculation of resonance frequencies and corresponding electric and magnetic fields of eigenmodes in a cavity antenna with an arbitrary shape. DOE

N86-30920# Sandia National Labs., Albuquerque, N. Mex.
METHODS FOR DEVELOPING JAM-RESISTANT SECURITY COMMUNICATIONS NETWORKS AT FIXED-SITE FACILITIES
D. J. Gangel, J. E. Heustess, and M. K. Snell 1986 6 p Presented at the Carnahan Conference on Security, Lexington, Ky., 14 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-001321; SAND-85-2128C; CONF-860519-1) Avail: NTIS HC A02/MF A01

Considerable work has been done identifying and developing equipment and procedures that can be used to improve the survivability of a security communications network during a jamming assault. Insight is given into alternate communications methods that can be used to develop resistance to jamming by supplementing existing radio communications. The spatial properties of jamming are then discussed and examples of how these properties can be exploited are examined. Also discussed are spread-spectrum radios that are highly resistant to jamming and the importance of jamming exercises. DOE

N86-30921# Begeleidingscommissie Remote Sensing, Delft (Netherlands).
THE DETERMINATION OF MODULATION TRANSFER FUNCTIONS FROM THE 'NOORDWIJK' RADAR MEASUREMENTS IN 1978 AND 1979
P. Hoogeboom 19 Aug. 1985 81 p
(BCRS-85-02; FEL-TNO-1985-70; ESA-86-97494) Avail: NTIS HC A05/MF A01

Times series of 20 min and longer, simultaneously recorded from a wave gage and an X-band FM-CW radar are analyzed. Modulation Transfer Functions (MTF) are determined as a function of polarization and incidence angle. The coherence between the wave gage signal and the radar signal is taken into account (cross spectral analysis). For comparison with previous results, the incoherent MTF is also determined (division of auto power spectra). A theoretical background for the MTF and its coherent determination is given. The measurement configuration and the preprocessing of the data are discussed. ESA

N86-30922# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
RECEIVER FOR DIGITAL RADIO BROADCASTING VIA SATELLITE [EEN ONTVANGER VOOR DIGITALE RADIO-OMROEP VIA EEN SATELLIET]
C. R. deGraaf Oct. 1984 106 p In DUTCH
(ESA-86-97313) Avail: NTIS HC A06/MF A01

Quadrature Phase Shift Keying (QPSK) demodulators were investigated; a differential-coherent demodulator (with delay-line) for a 20.48 Mbit/sec and 118 MHz medium frequency was developed. A modified professional coherent demodulator (With Costas-loop carrier wave regaining) (CD), was compared with the DQPSK. At the cost of higher circuit complexity and more adjustings, the CD shows better performances; both demodulators show deviation values < 2dB. Applied bit error detection and correction methods were investigated and decoding tables were developed. In cases of high system reserves (e.g., central antenna installations of TV-receiver installations) the cheaper DQPSK is recommended. A prefabricated delay-line (and medium frequency filter) in surface acoustic wave technique is recommended to avoid complicated adjusting procedures. ESA

N86-30923# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie.
DEVELOPMENT OF A SMALL MULTIFUNCTIONAL GROUND STATION (MGS) FOR SATELLITE COMMUNICATION ON 11/14 GHz [DE ONTWIKKELING VAN EEN KLEIN MULTIFUNKTIONEEL GRONDSTATION VOOR SATELLIETCOMMUNCATIE OP 11/14 GHZ]
W. H. G. Deguelle Mar. 1984 133 p In DUTCH
(ESA-86-97314) Avail: NTIS HC A07/MF A01

Experiments on digital telephony (using separate carrier waves for each channel) and image telephony with 32 kbit/sec and 8.448 Mbit/sec transmission rates, were done using an MGS with a 3 m antenna. System aspects of digital satellite communication and requirements and development of a ground station were treated. An orthomode transducer, used for simultanous transmission and reception with one antenna, is discussed. Noise ratio, phase noise characteristics, and technical realization of the receiver chain are treated. Realization of the transmitter chain and the impact of nonlinear effects of traveling wave tubes on the system degradation are discussed. Experiments on analog TV-reception from the OTS were carried out. ESA

N86-30924# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
THE CLASSICAL RADIOMETER EQUATION IN A LIMITED MEDIUM IN WHICH DISCRETE PARTICLES ABSORB AND SCATTER [DE KLASSIEKE RADIOMETER VERGELIJKING IN EEN BEGRENSD MEDIUM, WAARIN DISKRETE DEELTJES ABSORBEREN EN VERSTROOIEN]
G. Kuiken Jun. 1984 174 p In DUTCH
(ESA-86-97315) Avail: NTIS HC A08/MF A01

Conversion temperature (CT) calculations of absorbing and scattering particles in a precipitation medium were performed using the radiation equation and a cylindrical precipitation model. Data of the cumulative distribution function of satellite transmission path attenuation are necessary for satellite/ground-station connection designs. Rain, wind direction, and wind velocity impact on CT was investigated. Calculated and measured CT values were compared at 11.4 GHz frequency. The CT values calculated with a Joss-Thunderstorm drop distribution and a 0.5 ground emission coefficient are located in the 250 to 260 K area. The calculations agree with a cumulative distribution determined on a 66 hr registration time. ESA

N86-30925# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
PROPAGATION RESEARCH OF A SATELLITE COMMUNICATION PATH AT THE TECHNICAL UNIVERSITY, EINDHOVEN (THE NETHERLANDS) USING OTS: MODELING AND MEASUREMENTS [PROPAGATIEONDERZOEK OP EEN SATELLIETCOMMUNICATIEPAD MET BEHULP VAN DE OTS AAN DE THE: MODELVORMING EN METINGEN]
A. C. M Stokkermans Dec. 1984 176 p In DUTCH
(ESA-86-97316) Avail: NTIS HC A09/MF A01

The modeling of electromagnetic wave damping and depolarization by rain was investigated to create a base for satellite communication systems design. Models for Intelsat concerning adaptive compensation for depolarization are discussed. Propagation measurements results with OTS are described. Processing

programs were developed. Using these results, statements concerning the absorber temperature to be used when predicting the damping with a radiometer are given. Data processing recommendations for future experiments are presented. ESA

N86-30926# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Elektromechanica en Vermogenselektronica.
APPLICATION OF AN ADDITIONAL CONTROLLABLE LOAD (ACL) WITH CHOPPER CONNECTED TO THE DIRECT CURRENT LINK (DCL) OF AN AUTONOMOUS WIND ENERGY POWER SYSTEM (WEPS) [TOEPASSING VAN EEN EXTRA REGELBARE BELASTING MET CHOPPER DIE WORDT AANGESLOTEN OP DE GELIJKSTROOMTUSSENTRAP VAN EEN AUTONOME WINDENERGIECENTRALE]
A. H. A. M. Smets May 1984 125 p In DUTCH
(EMV84-05; ESA-86-97318) Avail: NTIS HC A06/MF A01

An ACL consisting of a (fast) thyristor chopper with indirect commutation and loaded by a resistor is described. The ACL provides a reduction of grid voltage distortions, reactive power of the WEPS diesel generator, and the amplitude of higher harmonic currents in the autonomous grid. Ripple currents in the DCL are limited by the connection between chopper and DCL. An additional choke is connected in series with the existing choke in the DCL. Chopper and a smoothing capacitor were connected with one pole to the junction of both chokes. A resonance circuit is formed using chokes and capacitor. The resonance frequency is chosen such that no impermissible oscillations occur in the DCL. Equations to calculate components of the DCL and chopper for their dimensioning were derived. In an experimental set-up consisting of a part of the WEPS, measurements were carried out. ESA

N86-30927# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
FOUR-PHASE MODEMS FOR A SATELLITE CHANNEL: DEMODULATION VIA DIFFERENTIAL DETECTION [VIER FASE-MODEMS VOOR EN SATELLITE-KANAAL: DEMODULATIE VIA DIFFERENTIELE DETEKTIE]
J. L. Manders May 1984 60 p In DUTCH; ENGLISH summary
(ESA-86-97390) Avail: NTIS HC A04/MF A01

Two quarternary phase shift keying modems in which demodulation takes place according to the principle of differential detection (DQPSK-modems) were developed, for investigations concerning digital transmission via communication satellites. Both modems, one with a 4 Mbit/sec bit rate and Nyquist Shaping (NS) in the transmitter, the other a 8.448 Mbit/sec bit rate and NS in the receiver, work on a 70 MHz intermediate frequency. Bit error rate was measured in back-to-back operation, via a translator loop, and via the A2 transponder of the OTS-2 satellite. The 4 Mbit/sec modem shows a 2.5 dB degradation with respect to the ideal DQPRS curve, while the 8.448 Mbit/sec modem shows a 1.8 dB deviation at a $Pe = 0.0001$ random error. ESA

N86-30928# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
A MODEL DESCRIPTION FOR RADAR REFLECTION ON THE SEA SURFACE 2 [EEN MODELBESCHRIJVING VOOR DE RADARREFLECTIE AAN HET ZEE-OPPERVLAK 2]
L. Krul May 1984 19 p In DUTCH
(ESA-86-97553) Avail: NTIS HC A02/MF A01

The dispersion of electromagnetic waves at the rough sea surface was studied. The radar signature of a surface covered with a two-dimensional collection of point objects was treated. Speckle and resolution characteristics of the voltage in flight direction were investigated. ESA

N86-30929# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
SPACE-TIME PROCESSING FOR WEAK SIGNAL DETECTION IN NON-GAUSSIAN AND NONUNIFORM ELECTROMAGNETIC INTERFERENCE (EMI) FIELDS
David Middleton Feb. 1986 185 p Sponsored by DOD
(PB86-193406; NTIA-CR-86-36) Avail: NTIS HC A09/MF A01 CSCL 09D

A canonical theory of threshold, or weak-signal detection in

A canonical theory of threshold, or weak-signal detection in
non-Gaussian space-time fields is developed (Part 1) and Impledesired signals and non-Gaussian electromagnetic interference (EMI) environments. Both optimum threshold and suboptimum processing algorithms are obtained and their performance evaluated in the general weak-signal regimes. The major extension of the present study with regard to recent work involving weak-signal reception is to include the effects of nonuniform spatial noise fields on beam forming and signal detection with arbitrary arrays. Various array structures, fading models, noise statistics (Class A, B noise, etc.), as well as numerical examples are included, to illustrate the concepts, methods, and applications for telecommunication environments. GRA

N86-30930*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
WILD BEARING ANALYSIS. EAAF (EXTENDED ALGORITHM ANALYSIS FAMILY) Interim Report
Michael Rennie 10 Jul. 1985 14 p Prepared in cooperation with Mathematical Analysis Research Corp., Claremont, Calif.
(Contract NAS7-918)
(NASA-CR-176985; JPL-D-2783; NAS 1.26:176985; AD-A166509; AD-E750871; TM-3) Avail: NTIS HC A02/MF A01 CSCL 17C

This is one of a series of algorithm analysis reports performed for the US Army Intelligence Center and School covering selected algorithms in existing or planned Intelligence and Electronic Warfare (IEW) systems. This report addresses derivation of a method of accounting probabilistically for the possibility of a given bearing being wild. It is an interim report on one of several methodological investigations in progress in this area. Author (GRA)

N86-30931# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
DETERMINATION OF ANTENNAE PATTERNS AND RADAR REFLECTION CHARACTERISTICS OF AIRCRAFT
H. Bothe, D. Macdonald, and A. Pool, ed. May 1986 138 p
(AGARD-AG-300-Vol-4; ISBN92-835-1530-7) Avail: NTIS HC A07/MF A01

The different types of aircraft antennas, their radiation characteristics and their preferred siting on the airframe are described. Emphasis is placed on the various methods for determining aircraft antenna radiation patterns (ARP) and advantages, disadvantages and limitations of each method are indicated. Mathematical modelling, model measurements and in-flight measurements in conjunction with the applied flight test techniques are included. Examples of practical results are given. Methods of determining aircraft radar characteristics are also described, indicating advantages, disadvantages and limitations of each method. Relevant fundamentals of radar theory are included only as necessary to appreciation of the real meaning of radar cross section (RCS) and angular glint. The measuring methods included are dynamic full-scale, static full-scale, sub-scale optical, ultrasonic and radio modelling. References are made to RCS measuring facilities in the USA and Europe and the UK Radio Modelling Facility is used extensively to exemplify the sub scale technique. Author

N86-30797# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
DEVELOPMENT OF AN ANTENNA STRUCTURE FOR A DEPLOYABLE OFFSET ANTENNA
H. Herbig, W. Tauber, and H. Vorbrugg *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 329-336 (For primary document see N86-30758 22-18)
(Contract ESTEC-5206/82-NL-PB(S6))
Avail: NTIS HC A16/MF A01

N86-30798# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
STRUCTURAL ANALYSIS, MANUFACTURING AND TEST EVALUATION OF A POLARIZATION SENSITIVE REFLECTOR
W. Weiss, K. Pfeifer, and R. Leitner *In* ESA Proceedings of a

Workshop on Composites Design for Space Applications Feb. 1986 p 337-347 (For primary document see N86-30758 22-18) (Contract ESTEC-5494/84-NL(CM))
Avail: NTIS HC A16/MF A01

N86-31086# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
PRINCIPLE OF SAR AND X-SAR PERFORMANCE. THE X-SAR/SIR-C MISSION. SOME REMARKS CONCERNING ORGANIZATION ASPECTS
H. Oettl *In its* The X-SAR Science Plan Nov. 1985 p 11-26 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

N86-31087# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
RADAR TECHNOLOGY
F. Heel and D. Solimini *In its* The X-SAR Science Plan Nov. 1985 p 27-41 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

N86-31413*# Houston Univ., Tex. Dept. of Applied Mathematical Sciences.
DISTRIBUTED SYNTHETIC APERTURE RADAR SIMULATION
Brian A. Bourgeois *In* NASA. Johnson Space Center NASA/American Society for Engineering Educaqtion (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 8 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 17I

N86-31085# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
THE X-SAR SCIENCE TEAM
H. Oettl *In its* The X-SAR Science Plan Nov. 1985 p 7-10 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-30932*# Georgia Inst. of Tech., Atlanta. Microelectronics Research Center.
THEORETICAL AND MATERIAL STUDIES ON THIN-FILM ELECTROLUMINESCENT DEVICES Biannual Report, 1 Oct. 1985 - 31 Mar. 1986
C. J. Summers and K. F. Brennan Jul. 1986 37 p
(Grant NAG1-586; Proj. A-4168)
(NASA-CR-177150; NAS 1.26:177150; BAR-2) Avail: NTIS HC A03/MF A01 CSCL 09A

A theoretical study of resonant tunneling in multilayered heterostructures is presented based on an exact solution of the Schroedinger equation under the application of a constant electric field. By use of the transfer matrix approach, the transmissivity of the structure is determined as a function of the incident electron energy. The approach presented is easily extended to many layer structures where it is more accurate than other existing transfer matrix or WKB models. The transmission resonances are compared to the bound state energies calculated for a finite square well under bias using either an asymmetric square well model or the exact solution of an infinite square well under the application of an electric field. The results show good agreement with other existing models as well as with the bound state energies. The calculations were then applied to a new superlattice structure, the variablly spaced superlattice energy filter, (VSSEP) which is designed such that under bias the spatial quantization levels fully align. Based on these calculations, a new class of resonant tunneling superlattice devices can be designed. Author

N86-30933*# Foldes, Inc., Wayne, Pa.
A DESIGN STUDY FOR THE USE OF A MULTIPLE APERTURE DEPLOYABLE ANTENNA FOR SOIL MOISTURE REMOTE SENSING SATELLITE APPLICATIONS Final Report
Peter Foldes Aug. 1986 208 p
(Contract NAS1-17209)
(NASA-CR-178154; NAS 1.26:178154) Avail: NTIS HC A10/MF A01 CSCL 09A

The instrumentation problems associated with the measurement of soil moisture with a meaningful spatial and temperature resolution at a global scale are addressed. For this goal only medium term available affordable technology will be considered. The study while limited in scope, will utilize a large scale antenna structure, which is being developed presently as an experimental model. The interface constraints presented by a singel Space Transportation System (STS) flight will be assumed. Methodology consists of the following steps: review of science requirements; analyze effects of these requirements; present basic system engineering considerations and trade-offs related to orbit parameters, number of spacecraft and their lifetime, observation angles, beamwidth, crossover and swath, coverage percentage, beam quality and resolution, instrument quantities, and integration time; bracket the key system characteristics and develop an electromagnetic design of the antenna-passive radiometer system. Several aperture division combinations and feed array concepts are investigated to achieve maximum feasible performance within the state STS constraints. B.G.

N86-30934# Naval Research Lab., Washington, D. C.
ONE DIMENSIONAL MODELS FOR RELATIVISTIC ELECTRON BEAM DIODE DESIGN Interim Report, 1 Jan. 1984 - 30 Apr. 1985
John M. Finn, Arne W. Fliflet, and Wallace M. Manheimer 28 Feb. 1986 28 p
(AD-A165953; NRL-MR-5727) Avail: NTIS HC A03/MF A01 CSCL 09/1

Several one dimensional models are derived which approximate the relativistic flow of high current beams in diodes. Using these models as a starting point, a diode for a 1 GW beam for a 35 GHz gyrotron oscillator is easily designed. The analysis is based on four one dimensional planar or conical models for electron flow in diodes. The planar models are relativistic and can be used to obtain electrode shapes for space charge limited flow. The conical models shed light on important geometric effects. Principally, it is shown that the space charge limited current is larger in realistic geometries than in the corresponding planar configuration. GRA

N86-30935# Naval Ocean Systems Center, San Diego, Calif.
TESTABILITY MEASURES ON A STATE-OF-THE-ART CIRCUIT Final Report
J. C. Bussert Feb. 1986 61 p
(AD-A165978; NOSC/TD-835) Avail: NTIS HC A04/MF A01 CSCL 09/5

By means of design for testability (DFT) techniques, the NOSC Test Technology Office (Code 936) evaluated testability improvements in a state-of-the-art printed-circuit board. Data were gathered to provide a direct comparison among various testability figure of ment (TFOM) tools. GRA

N86-30936# Polytechnic Inst. of New York, Brooklyn. Microwave Research Inst.
BASIC RESEARCH IN ELECTRONICS (JSEP) Annual Report, 1 Jan. - 31 Dec. 1985
Arthur A. Oliner 31 Dec. 1985 88 p
(Contract F49620-85-C-0078)
(AD-A166075; POLY-MRI-1446-85; AFOSR-86-0078TR) Avail: NTIS HC A05/MF A01 CSCL 09/5

This report presents a summary of the scientific progress and accomplishments on research projects funded by the Joint Services

Electronics Program (JSEP) for the contract periods from 1 January 1985 through 31 December 1985. It does not contain information regarding accomplishments on research projects funded in other ways. The Joint Services Electronics Program at the Polytechnic is the core of interdisciplinary research in electronics encompassing programs in the Departments of Electrical Engineering, Physics and Chemistry under the aegis of the Microwave Research Institute. The research encompassed by this program is grouped under three broad categories: Electromagnetics, Solid State Electronics and Information Electronics. The detailed projects (research units) comprising the complete program are listed in the Table of Contents. GRA

N86-30937# Brown Univ., Providence, R. I. Center for Dynamical Systems.
STOCHASTIC SYSTEMS WITH SMALL NOISE, ANALYSIS AND SIMULATION: A PHASE LOCKED LOOP EXAMPLE
P. Dupuis and H. Kushner Aug. 1985 49 p
(Grant AF-AFOSR-0116-81)
(AD-A166148; LCDS-85-20; AFOSR-86-0033TR) Avail: NTIS HC A03/MF A01 CSCL 09/4

Systems with wide bandwidth noise inputs are a common occurrence in stochastic control and communication theory and elsewhere; e.g., tracking or synchronization systems such as phase locked loops (PLL). One is often interested in calculating such quantities as the probability of escape from a desired error set, in some time interval, or the mean time for such escape. Diffusion approximations (the system obtained in the limit bandwidth approaches infinity) are often used for this, being easier to analyze. We study a particular form of the PLL owing to the great practical importance of the system and because it provides a useful vehicle for understanding the extent of validity of the asymptotic methods for such systems. The basic analytical techniques are from the theory of large deviations. One seeks information on the escape probabilities, mean times, and on the most likely exit paths and exit locations. Also, we seek information on the interactions between the signals to be tracked and the noise which are most likely to lead to exit. The large deviations technique is eminently suited to this job. Simulations are taken in order to understand the range of validity of the asymptotic method. Agreement between the predictions and sample estimates is good over noise intensity levels which seem to be ever larger than those typically occurring in practice. GRA

N86-30938# Missouri Univ., St. Louis.
FUNDAMENTAL QUANTUM 1/f NOISE IN ULTRASMALL SEMICONDUCTOR DEVICES AND THEIR OPTIMAL DESIGN PRINCIPLES Progress Report, 1 May - 30 Nov. 1985
Peter H. Handel 1 Dec. 1985 35 p
(Grant AF-AFOSR-0130-85)
(AD-A166154; AFOSR-85-0130TR; PR-1) Avail: NTIS HC A03/MF A01 CSCL 09/3

As a first step of a more general study of 1/f noise in semiconductor devices n(+)(-)p diodes have been investigated with emphasis on HgCdTe photodetectors. Quantum 1/f noise has been calculated in the surface and bulk recombination currents, in the diffusion and field currents, and in the tunneling currents. Due to the large localized electric field at the surface, a larger fractional quantum 1/f noise power is obtained for surface recombination currents than for similar bulk recombination currents. All quantum 1/f noise calculations are first principles calculations with no free parameters, based on the quantum 1/f effect in scattering and recombination cross sections, as well as in tunneling rates. Together, the quantum 1/f mobility fluctuations, bulk and surface recombination speed fluctuations and tunneling rate fluctuations can account for the observed 1/f noise and can be used for optimizing small devices, as indicated by experiments at SBRC, Univ. of Minnesota and Florida. Some suggestions are given at the end of Sec. II. For devices larger than 10 microns coherent state quantum 1/f noise becomes important, according to a new interpolation formula. The new interpolation formula which bridges the gap between conventional (incoherent) quantum 1/f noise and coherent state quantum 1/f noise is in general agreement with measurements in p-n diodes and transistors, and will be tested in more detail in the near future. The theory has also been successfully applied to SQUIDs. GRA

N86-30939# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
STUDY OF ELECTRICAL RESISTIVITY ON THE LOCATION AND IDENTIFICATION OF CONTAMINATION Ph.D. Thesis
Brian D. McCarty 1985 273 p
(AD-A166405; AD-E950826; AFIT/CI/NR-86-14T) Avail: NTIS HC A12/MF A01 CSCL 09/3

Electrical resistance studies were conducted in two laboratory models to determine electrical resistivity relationships and to use those defined relationships to identify contamination spikes. A good correlation was established between resistance data and the composition of leachate and copper spiked leachate gelatin blocks under study. The major variable that could not be eliminated from this study which had the greatest effect on data was moisture content. This thesis contains a review of the theory and field application of electrical resistivity, a description of the experimental approach used, and a summary of the data collected. GRA

N86-30940# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
SIGNAL DELAY IN LEAKY RC MESH MODELS FOR BIPOLAR INTERCONNECT
Peter OBrien and John L. Wyatt, Jr. Oct. 1985 68 p
(Contract N00014-80-C-0622; Grant NSF ECS-83-10941)
(AD-A166786; VSLI-MEMO-85-278) Avail: NTIS HC A04/MF A01 CSCL 09/5

This paper extends the results of Penfield and Rubinstein on signal delay in RC tree networks. Both estimates and bounds are derived for the step response of leaky RC trees and meshes, a class of networks that is appropriate for modelling interconnect in digital bipolar circuits. This paper is intended to serve as a tutorial as well as a research report. Therefore existing work is explained in some detail along with the derivation of new results. Author (GRA)

N86-30941# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
SYNTHESIS OF A SELF-TIMED CONTROLLER FOR A SUCCESSIVE-APPROXIMATION A/D CONVERTER
Tam-Anh Chu and Lance A. Glasser Oct. 1985 15 p
(Contract N00014-80-C-0622; Grant NSF MCS-79-15255)
(AD-A166788; VSLI-MEMO-85-274) Avail: NTIS HC A02/MF A01 CSCL 09/5

This paper documents the procedure for designing a self-timed controller for a successive-approximation A/D converter. From the functional specification, a Signal Transition Graph is constructed to describe the operation of the control circuit. This graph is then modified into a well-formed graph. Such a graph can be transformed into a deadlock-free and hazard-free implementation directly. The structure of the control circuit and the logic equations are then derived directly from the graph. Author (GRA)

N86-30942# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SYNCHRONIZER FAILURE IN A/D CONVERTERS
Lance A. Glasser Oct. 1985 14 p
(Contract N00014-80-C-0622)
(AD-A166819; VLSI-MEMO-85-276) Avail: NTIS HC A02/MF A01 CSCL 09/5

Analog-to-digital converters that must produce a valid output in a specified period of time are subject to synchronizer failure. Three types of A/D converters are examined: flash converters, clocked successive approximation converters, and self-timed successive approximation converters. Lower bounds on their worst-case conversion time as a function of the fault probability are derived. GRA

N86-30943# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
A HIGH-SPEED ASYNCHRONOUS COMMUNICATION TECH-

NIQUE FOR MOS (METAL-OXIDE-SEMICONDUCTOR) VLSI SYSTEMS M.S. Thesis
Paul D. Bassett Dec. 1985 104 p
(Contract N00014-80-C-0622)
(AD-A166846; AD-E950814; VLSI-MEMO-85-283) Avail: NTIS HC A06/MF A01 CSCL 20/12

As MOS technologies advance, the relative differences between on-chip and off-chip delays increase. Drivers and receivers can be designed which allow high bit rate communications (greater than 100 Mbits/sec) between MOS chips at the expense of increased latency. Designing synchronous systems which couple a high clock frequency with large and variable delays is difficult and expensive due to the complexity of insuring that no delays violate the constraints imposed by synchronous operation. A circuit-based technique for automatically adjusting signal delays in an MOS system has been developed. The Dynamic Delay Adjustment (DDA) technique provides reliable high speed communications directly between MOS chips independent of the delay between the chips. The amount of phase jitter immunity provided by the synchronizer can be traded off against circuit complexity; the signal delays are adjusted continuously to track temperature induced delay variations. A 3 micron DDA synchronizer has been fabricated to confirm the validity of the DDA approach; test results will be presented. Author (GRA)

N86-30944# Massachusetts Inst. of Tech., Cambridge.
A COHERENT VLSI DESIGN ENVIRONMENT Semiannual Report, 1 Oct. - 31 Mar. 1986
Paul Penfield, Jr. 31 Mar. 1986 62 p
(Contract N00014-80-C-0622)
(AD-A166848; AD-E950814) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report covers the period from October 1, 1985 through March 31, 1986. The research discussed here is described in more detail in several published and unpublished reports cited below. The CAD frame Schema has received limited but instructive applications. Connections to remote simulation servers are transparent to the user. More substantial uses are anticipated during the next half year. Waveform bounding results have been extended to ECL technology, and a variety of the results are being applied to an analog application in early vision. Many of the previous results have been transferred to industry and are being used in commercial simulators. Fundamental speed limits of collections of active devices with parasitics have been found. These are independent of how the devices are interconnected. A reliability simulator has been written, and models are being developed for it, to describe three important effects, namely mental migration, hot-electron trapping, and time-dependent dielectric breakdown. Work continues on the fat-tree architecture, and on the efficient realization of various classes of circuits. New results in graph bisection and routing were made during this period. It is now known how to imbed some classes of communications networks in others, for example binary trees in hypercubes. Author (GRA)

N86-30945# Avco-Everett Research Lab., Mass.
DIFFUSE DISCHARGE SWITCH ANALYSIS Final Report, 1 Jul. 1982 - 30 Sep. 1985
P. Rostler Feb. 1986 65 p
(Contract F33615-82-C-2249)
(AD-A167282) Avail: NTIS HC A04/MF A01 CSCL 09/1

The growth of streamers which leads to arcing is studied for the high current discharge needed to make an opening switch. The scaling of discharge parameters is analyzed for the switch application and previous experimental work on streamer growth is reviewed. A general theory of streamer growth is developed from fundamental gas and electrodynamic equations and an equation is derived which predicts the streamer growth rate and which can be evaluated numerically. The implications for e-beam controlled switches are discussed. GRA

N86-30946# Department of the Air Force, Washington, D.C.
GAS MIXTURE FOR TRIGGERABLE SPARK GAPS Patent Application
R. E. Wootton, inventor (to Air Force) Filed 12 Mar. 1986 17 p
(AD-D012289; US-Patent-Appl-SN-838976) Avail: NTIS HC A02/MF A01 CSCL 21/2

A particular gas mixture (90% N2 + 10% Xe) in a triggerable spark gap discharger is disclosed which allows the spark gap to be triggered with a low main-gap voltage over a much wider range of trigger voltages (e.g., 16-30 or more kV), than with nitrogen (e.g., 19-22 kV) or other commonly used gases and mixtures. The improvement is important where triggerable spark gaps are used in protective circuits. GRA

N86-30947# Department of the Navy, Washington, D. C.
CONTAINER FOR MULTICHIP HYBRID PACKAGE Patent Application
Ernest A. Capelle, inventor (to Navy) Filed 24 Jun. 1985 10 p
(AD-D012308; US-Patent-Appl-SN-747601) Avail: NTIS HC A02/MF A01 CSCL 09/5

A container for storing and handling multichip hybrid packages (MHP's) during manufacture, testing and inspection is described. The receptacle and cover are recessed to receive a wide range of MHP sizes and configurations. An aperture in the cover provides visible access to the MHP without removing it or opening the container. The container is made of electrically conductive, high temperature resistant carbon plastic for protection from electrostatic discharges and environmental temperature chamber testing. GRA

N86-30948# Sandia National Labs., Albuquerque, N. Mex.
MEASUREMENT OF INTERNAL CAPACITANCES OF INTEGRATED CIRCUITS
K. White, D. Palmer, C. F. Hawkins, and G. L. Martin 1986 9 p Presented at the Electronic Components Conference, Seattle, Wash., 5 May 1986 Prepared in cooperation with New Mexico Univ., Albuquerque
(Contract DE-AC04-76DP-00789)
(DE86-006494; SAND-85-2420C; CONF-860566-1) Avail: NTIS HC A02/MF A01

Direct probe measurements have been made of intra-transistor and interconnection capacitances in integrated circuit CMOS technologies down to 2 microns detail. Resolution of measurements have been confirmed to 1 femtofarad. These differential capacitance measurements are taken at 1 MHz, comparable to the normal frequency range of circuit operation. These measurements are performed directly on structures normally occurring on integrated circuit wafers, not on special enhanced capacitive test keys or using custon on-chip amplifiers. The method used the HP-4062B semiconductor parameter extractor. Elaborate shielding and ac-guarding of adjacent microfeatures were necessary to measure only the capacitances of interest. Extensive signal averaging and system capacitance canceling was performed. Although elaborate and detailed, the method developed can be used by any semiconductor production facility on their standard test structures. The voltage dependence of the junction capacitances of the drain to p-well and the gate to p-well were found consistent with calculation down to 2 micron dimensions. The gate to drain overlap capacitance was also examined allowing an estimate of the fringing contribution. DOE

N86-30949# Sandia National Labs., Albuquerque, N. Mex.
TESTING, DESIGN AND MODELING ISSUES IN RADIATION-HARDENED CMOS INTEGRATED CIRCUITS
James E. Gover and Mark R. Ackermann 1986 8 p Presented at the 3d International Workshop on Future Electron Devices, Tokyo, Japan, 11 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007707; SAND-86-0334C; CONF-860385-1) Avail: NTIS HC A02/MF A01

Continued research and greater understanding of ionization damage mechanisms in silicon/silicon dioxide structures will lead to improved total dose modeling techniques and a better definition of proper total dose testing conditions. Combining computer models with laboratory test data will allow engineers to predict the total dose response of components for irradiation periods ranging from

years to less than a second. Recent progress in the understanding of dose-rate phenomena in integrated circuits has identified Rail Span Collapse as a possible upset mechanism. Use of this model aids the design of ICs expected to have an upset level above 1E10 rad(Si)/sec. Further research into photo current generation, rail span collapse, and local upset mechanisms will allow maximization of IC upset levels. DOE

N86-30950# Los Alamos National Lab., N. Mex.
EXPERIMENTAL MEASUREMENT OF ABLATION EFFECTS IN PLASMA ARMATURE RAILGUNS
Jerald V. Parker and William M. Parsons 1986 9 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20-24 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008740; LA-UR-86-943; CONF-8604147-3) Avail: NTIS HC A02/MF A01

Experimental evidence supporting the importance of ablation in plasma armature railguns is presented. Experiments conducted using the HYVAX and MIDI-2 railguns are described. Several indirect effects of ablation are identified from the experimental results. An improved ablation model of plasma armature dynamics is proposed which incorporates the restrike process. DOE

N86-30951# California Univ., Berkeley. Lawrence Berkeley Lab.
RELATIVISTIC KLYSTRON
R. Marks Sep. 1985 23 p
(Contract DE-AC03-76SF-00098)
(DE86-009217; LBL-20918) Avail: NTIS HC A02/MF A01

Theoretical analysis is presented of a relativisic klystron; i.e., a high-relativistic bunched electron beam which is sent through a succession of tuned cavities and has its energy replenished by periodic induction accelerator units. Parameters are given for a full-size device and for an experimental device using the FEL at the ETA; namely the ELF Facility. DOE

N86-30952# Sandia National Labs., Albuquerque, N. Mex.
NUMERICAL AND EXPERIMENTAL STUDY OF RESIDUAL STRESSES AND THERMAL FATIGUE IN SOLDERED ELECTRONIC ASSEMBLIES
R. J. Bourcier and J. J. Stephens 1986 28 p Presented at the Symposium on Computer Modeling of Fabrication Processes and Constitutive Behavior of Metals, Ottawa, Ontario, 15 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-008779; SAND-86-0803C; CONF-860590-1) Avail: NTIS HC A03/MF A01

The assembly examined consists of thin plates of alumina, Kovar, 410 stainless steel and 6061 aluminum bonded together using layers of three different solder alloys: 63% Sn - 37% Pb, 50% Pb - 50% In and 40% In - 40% Sn - 20% Pb. Numerical simulation of the fabrication process was performed using a simplified axisymmetric finite element microcell model of the actual assembly. The alumina, Kovar, 410 stainless steel and 6061 aluminum layers were modeled as temperature-dependent elastic-plastic materials while the solder alloys were treated as creeping solids following solidification. Experimental testing of the solder alloys was used to generate input for the finite element code constitutive models. The numerical results of this study have provided guidelines for the successful fabrication of the subject assembly. In particular, slower cooling rates following solidification of the solders have been shown to dramatically lower bending stresses generated in the alumina plate. The experimental portion of the program has provided data on the degration of solder bond integrity used to thermal cycling and has identified possible important factors in the mechanical response of thin solder layers. DOE

N86-30953# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
CIRCULAR WAVEGUIDE MODE CONVERTERS AT 140 GHz
J. Trulsen, P. Woskoboinikow, and R. J. Temkin Jan. 1986 62 p
(Contract DE-AC02-78ET-51013)
(DE86-009075; DOE/ET-51013/173; PFC/RR-86-2) Avail: NTIS HC A04/MF A01

A unified derivation of the coupled mode equations for circular waveguide is presented. Also, approximate design criteria for TE/sub 0n/ to TE/sub 0n'/ axisymmetric, TE01 to TE11 wriggle, and TE01 to TM11 bend converters are reviewed. Numerically solving the coupled mode equations, an optimized set of mode converters has been designed for conversion of a 2 millimeter wave TE03 mode into TE11. This set consists of axisymmetric TE03 to TE02 and TE02 to TE01 converters followed by a wriggle TE01 to TE11 converter. This mode converter set was fabricated and tested using a 3 kW, 137 GHz gyrotron. A TE11 mode purity of better than 97% was achieved. The TE01 to TE11 wriggle converter was experimentally optimized for a measured conversion efficiency of better than 99% not including ohmic losses. DOE

N86-30954# Sandia National Labs., Albuquerque, N. Mex.
IN SITU EXAMINATION OF SEGREGATION AND WEAR PROCESSES OF PRECIOUS METAL ELECTRICAL CONTACT ALLOYS
L. E. Pope and D. E. Peebles 1986 28 p Presented at the 32nd Holm Conference, Boston, Mass., 27 Oct. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009089; SAND-85-2570C; CONF-861051-2) Avail: NTIS HC A03/MF A01

The electrical contact resistance and friction coefficient of gold based (ASTM B541) and palladium based (ASTM B540) precious metal electrical contact materials have been measured simultaneously with an in situ pin-on-plate device in a scanning Auger analytical system. Intermittent surface analysis of the wear track was performed. The friction coefficient varied from 2.2 to 2.6 for high vacuum ambients containing oxygen (10(-6) torr) or nitrogen (10(-7) torr), but was 1.6 for an atmospheric ambient (700 torr) containing both oxygen (5%) and nitrogen (95%). In comparison, the friction coefficient was less than 0.5 in laboratory air. The electrical contact resistance was less than 15 milliohms for all test conditions but varied inversely with the friction coefficient. Segregation of sulfur to the wear track was observed in situ in the 700 torr ambient after as few as ten wear cycles. The friction coefficients for these tests were larger than for previous experiments; the increase was attributed to surface depletion of copper. DOE

N86-30955# Sandia National Labs., Albuquerque, N. Mex.
ESTIMATED BURST POWER REQUIREMENTS FOR SELECTED SDI MISSIONS
W. H. McCulloch 1986 22 p Presented at the 3rd Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex., 13 Jan. 1986
(Contract DE-AC04-76DP-00789)
(DE86-005438; SAND-85-1840C; CONF-860102-6) Avail: NTIS HC A02/MF A01

Power requirements are estimated for several candidate missions proposed for the Strategic Defense Initiative. The missions of interest are those requiring large electric power supply and power conditioning systems for space-based directed energy weapons, including electromagnetic launchers, free-electron lasers, and neutral particle beams. In general, the power requirements are determined by working backward from lethality considerations, using preliminary descriptions of weapons performance and of candidate engagement scenarios. DOE

N86-30956# Lawrence Livermore National Lab., Calif.
SIMPLE, COMPACT, HIGH BRIGHTNESS SOURCE FOR X-RAY LITHOGRAPHY AND X-RAY RADIOGRAPHY
A. M. Hawryluk 19 Feb. 1986 10 p Presented at the Society of Photo-Optical Instrumentation Engineers Conference on Electron-beam, X-ray and Ion-beam Techniques for Submicrometer Lithographies, Santa Clara, Calif., 9 Mar. 1986
(Contract W-7405-eng-48)
(DE86-009723; UCRL-93474; CONF-8603111-1) Avail: NTIS HC A02/MF A01

A simple, compact, high brightness x-ray source has recently

been built. This source utilizes a commercially available, cylindrical geometry electron beam evaporator, which has been modified to enhance the thermal cooling to the anode. Cooling is accomplished by using standard, low-conductivity laboratory water, with an inlet pressure of less than 50 psi, and a flow rate of approx.0.3 gal/min. The anode is an inverted cone geometry for efficient cooling. The x-ray source has a measured sub-millimeter spot size (FWHM). The anode has been operated at 1 KW e-beam power (10 KV, 100 ma). Higher operating levels will be investigated. A variety of different x-ray lines can be obtained by the simple interchange of anodes of different materials. Typical anodes are made from easily machined metals, or materials which are vacuum deposited onto a copper anode. Typically, a few microns of material is sufficient to stop 10 KV electrons without significantly decreasing the thermal conductivity through the anode. The small size and high brightness of this source make it useful for step and repeat exposures over several square centimeter areas, especially in a research laboratory environment. For an aluminum anode, the estimated Al-K x-ray flux at 10 cms from the source is 70 microW/cm. DOE

N86-30957# United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
LOW LEVEL RADIATION TESTING OF MICROELECTRONIC COMPONENTS. PART 2: PRELIMINARY STUDIES OF GAMMA DOSE RATE EFFECTS ON CMOS INVERTERS, USING THE LORAD FACILITY Final Report
M. Hardman, J. Farren, D. Mapper, and J. H. Stephen Feb. 1985 78 p
(Contract ESTEC-5313/83-NL-HP)
(AERE-R-11679-Pt-2; HL85/1108-Pt-2; ESA-CR(P)-2174-Pt-2; ESA-86-97220) Avail: NTIS HC A05/MF A01

The Low Radiation Test Facility (LORAD) is described and results of threshold voltage shifts versus total ionizing dose on CMOS 4007 inverter devices are presented. The results indicate a dose rate effect and a dependence on the energy of the ionizing gamma photons. The tests demonstrate the validity of LORAD as a facility to simulate the space radiation environment. ESA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-30958*# Stanford Univ., Calif. Dept. of Mechanical Engineering.
SIMULATION AND MODELING OF HOMOGENEOUS, COMPRESSED TURBULENCE
C.-T. Wu, J. H. Ferziger, and D. R. Chapman May 1985 206 p
(Contract NCC2-15)
(NASA-CR-176939; NAS 1.26:176939; SU-TF-21) Avail: NTIS HC A10/MF A01 CSCL 20D

Low Reynolds number homogeneous turbulence undergoing low Mach number isotropic and one-dimensional compression was simulated by numerically solving the Navier-Stokes equations. The numerical simulations were performed on a CYBER 205 computer using a 64 x 64 x 64 mesh. A spectral method was used for spatial differencing and the second-order Runge-Kutta method for time advancement. A variety of statistical information was extracted from the computed flow fields. These include three-dimensional energy and dissipation spectra, two-point velocity correlations, one-dimensional energy spectra, turbulent kinetic energy and its dissipation rate, integral length scales, Taylor microscales, and Kolmogorov length scale. Results from the simulated flow fields were used to test one-point closure, two-equation models. A new one-point-closure, three-equation turbulence model which accounts for the effect of compression is proposed. The new model accurately calculates four types of flows (isotropic decay, isotropic compression, one-dimensional compression, and axisymmetric expansion flows) for a wide range of strain rates. Author

N86-30959*# Computational Mechanics Consultants, Austin, Tex.
ADAPTIVE COMPUTATIONAL METHODS FOR SSME INTERNAL FLOW ANALYSIS Final Report
J. Tinsley Oden 1986 58 p
(Contract NAS8-36647)
(NASA-CR-178864; NAS 1.26:178864; TR86-05) Avail: NTIS HC A04/MF A01 CSCL 20D

Adaptive finite element methods for the analysis of classes of problems in compressible and incompressible flow of interest in SSME (space shuttle main engine) analysis and design are described. The general objective of the adaptive methods is to improve and to quantify the quality of numerical solutions to the governing partial differential equations of fluid dynamics in two-dimensional cases. There are several different families of adaptive schemes that can be used to improve the quality of solutions in complex flow simulations. Among these are: (1) r-methods (node-redistribution or moving mesh methods) in which a fixed number of nodal points is allowed to migrate to points in the mesh where high error is detected; (2) h-methods, in which the mesh size h is automatically refined to reduce local error; and (3) p-methods, in which the local degree p of the finite element approximation is increased to reduce local error. Two of the three basic techniques have been studied in this project: an r-method for steady Euler equations in two dimensions and a p-method for transient, laminar, viscous incompressible flow. Numerical results are presented. A brief introduction to residual methods of a-posterior error estimation is also given and some pertinent conclusions of the study are listed. M.G.

N86-30960*# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mechanical Engineering.
MEASUREMENTS IN LIQUID FUEL SPRAYS Final Report, 15 Dec. 1983 - 14 Dec. 1985
Norman Chigier and Chien-Pei Mao 1985 51 p
(Contract NCC3-37)
(NASA-CR-177088; NAS 1.26:177088) Avail: NTIS HC A04/MF A01 CSCL 20D

A ground test facility is being established at NASA Lewis Research Center to simulate the environmental and flight conditions needed to study adverse weather effects. One of the most important components is the water spray system which consists of many nozzles fitted on spray bars. Water is injected through air-assisted atomizers to generate uniform size drops to simulate icing in clouds. The primary objective is to provide experimental data on drop size distribution over a wide range of operating conditions. Correlation equations for mean drop size and initial injection parameters are being determined to assist in the design and modification of the Altitude Wind Tunnel. Special emphasis is being placed on the study of the aerodynamic structure of the air-assisted atomizer sprays. Detailed measurements of the variation of drop size distribution and velocity as a function of time and space are being made. Accurate initial and boundary conditions are being provided for computer model evaluation. B.G.

N86-30961*# Lockheed Missiles and Space Co., Huntsville, Ala. Engineering Center.
VISCOUS FLOW COMPUTATIONS FOR ELLIPTICAL TWO-DUCT VERSION OF THE SSME HOT GAS MANIFOLD Interim Report
R. P. Roger 7 Mar. 1986 68 p
(Contract NAS8-36090)
(NASA-CR-178868; NAS 1.26:178868; LMSC-HEC-TR-D065161) Avail: NTIS HC A04/MF A01 CSCL 20D

The objective of the effort was to numerically simulate viscous subsonic flow in a proposed elliptical two-duct version of the fuel side Hot Gas Manifold (HGM) for the Space Shuttle Main Engine (SSME). The numerical results were to complement both water flow and air flow experiments in the two-duct geometry performed at NASA-MSFC and Rocketdyne. The three-dimensional character

of the HGM consists of two essentially different geometries. The first part of the construction is a concentric shell duct structure which channels the gases from a turbine exit into the second part comprised of two cylindrically shaped transfer ducts. The initial concentric shell portion can be further subdivided into a turnaround section and a bowl section. The turnaround duct (TAD) changes the direction of the mean flow by 180 degress from a smaller radius to a larger radius duct which discharges into the bowl. The cylindrical transfer ducts are attached to the bowl on one side thus providing a plane of symmetry midway between the two. Centerline flow distance from the TAD inlet to the transfer duct exit is approximately two feet. Details of the approach used to numerically simulate laminar or turbulent flow in the HGM geometry are presented. Computational results are presented and discussed. Author

N86-30962# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany). Abt. Mechanik.
PROBLEMS OF LARGE GAS FLOW MEASUREMENTS AT HIGH AND LOW PRESSURES [PROBLEME DER MESSUNG GROSSER GASSTROEME IM HOCH- UND NIEDERDRUCKBEREICH]
Ludwig Narjes, ed. Jul. 1985 458 p In GERMAN; ENGLISH summary Presented at Physik.-Tech. Bundesanstalt 45th Symp., Brunswick, 24-25 Jan. 1984
(PTB-Me-58; ISSN-0341-6720; ESA-86-96927) HC A20/MF A01

Precision measurement facilities of large gas flowrates and evaluation criteria are reviewed. Metrological principles, industrial measurement techniques, and normal measuring instruments were discussed. Laser Doppler anemometry applications to fluctuant gas flows; application of turbine wheel gas counters; vortex flowmeters; gas measuring bells; and the charging procedure for determination of stationary mass flowrates of gases are presented. For individual titles, see N86-30963 through N86-30982.

N86-30963# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
METROLOGICAL EVALUATION CRITERIA FOR PRECISION MEASUREMENT OF LARGE GAS FLOWS [METROLOGISCHE BEWERTUNGSKRITERIEN ZUR PRAEZISIONSMESSUNG GROSSER GASSTROEME]
L. Narjes *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 7-15 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

Metrological evaluation criteria, based on principles of flow physics, for a metrological connection system are presented, as well as calibrating curve and time-stability; classified measurement inaccuracy; number of connection phases for calibrating curve production; and connection procedure. Experience in using rotary reverse gas meters, turbine disk gas meters, and critical Venturi nozzles in precision measurement of large gas flows is reviewed. Calibrating curves are plotted to determine errors. Three high pressure gas meter test benches are compared. Test points are within the statistical inaccuracy. ESA

N86-30964# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
FLOW RATE MEASURING DEVICES FOR GAS FLOWS [DURCHFLUSSMESSVERFAHREN FUER GASSTROEME] c35
K. W. Bonfig *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 16-42 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

Flowrate measuring devices are described: volume meter with fixed or mobile walls; turbine meter; throttling procedure; ultrasonic and Doppler methods; vortex method; rotary flowmeter; and swinging body flow measuring procedure. Flowrate can also be measured from the force exerted on bodies immersed in a fluid or based on thermodynamical principles. The characteristics and operating envelope of each device/method are given. ESA

N86-30965# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
TWO COMPONENT VELOCITY MEASUREMENTS IN FLUCTUATING GAS FLOWS USING A LASER DOPPLER ANEMOMETER (LDA) [2-KOMPONENTEN-GESCHWINDIGKEITSMESSUNGEN IN FLUKTUIERENDEN GAS-STROEMUNGEN MIT HILFE EINES LASER-DOPPLER-ANEMOMETERS (LDA)]
K. A. Buetefisch, V. Strunck, F.-R. Grosche, J. Kompenhans, H.-R. Hoefer, and K.-H. Sauerland *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 43-51 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

A two component Laser Doppler Anemometer (LDA) to determine velocity distribution in large wind tunnels was developed and tested. The anemometer operates in backscattering mode with up to 2.30 m operating interval allowing positioning with a transverse fixture. Measurement is performed automatically in a 1 m x 1 m x 0.5 m field point area through a computer system. Three velocity components can be measured. High scattering of LDA data due to wall distance distortion through model variations is noted. Measurements in turbulent pipe flows were performed to assess accuracy. Results compared to pressure sensor readings show good agreement. The device can be applied to determine volume flows accurately and to give complete velocity profiles. ESA

N86-30966# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
VELOCITY PRECISION MEASUREMENTS USING LASER DOPPLER ANEMOMETRY [PRAEZISIONSMESSUNGEN VON GESCHWINDIGKEITEN MITTELS LASER-DOPPLER-ANEMOMETRIE] c35
D. Dopheide, G. Taux, and L. Narjes *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 52-81 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

A Laser Doppler Anemometer (LDA) was calibrated to determine its applicability to high pressure measurements (up to 10 bars) for industrial purposes. The measurement procedure with LDA and the experimental computerized layouts are presented. The calibration procedure is based on absolute accuracy of Doppler frequency and calibration of interference strip intervals. A four-quadrant detector allows comparison of the interference strip distance measurements and computer profiles. Further development of LDA is recommended to increase accuracy (0.1% inaccuracy) and to apply the method industrially. ESA

N86-30967# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
EUROPEAN ECONOMIC COMMUNITY (EEC) TEST STAND COMPARISON [VERGLEICH DER EG-PRUEFSTAENDE] c09
B. Harbrink *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 82-116 In GERMAN Original document contains color illustrations (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

The accuracy of different EEC test stands is compared using gravimetry and volumetry for primary test stands, and dispersion methods for secondary test stands. The comparison shows a systematic relative inaccuracy of 0.3%. Laser Doppler Anemometry (LDA) could be used to measure volume stream with accuracy. An LDA high pressure test stand would allow direct calibration within a measurement range of 0 to 3000 cubic meter/hr with flow rate determined with 0.1% inaccuracy. ESA

N86-30968# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
ACCURACY OF HIGH PRESSURE GAS METER CALIBRATION IN THE NETHERLANDS [GENAUIGKEIT DER HOCHDRUCKGASZAEHLEREICHUNG IN DEN NIEDERLANDEN] c35
P. M. A. vanderKam *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 117-144 In GERMAN (For primary document see N86-30962 22-34)

Avail NTIS HC A20/MF A01

High pressure test facilities for industrial gas meters in the Netherlands are described. The calibration procedures and systems are presented. Gas compressibility effects on calibration and test facility accuracy are studied. Quality follow-up of the test facilities is described. ESA

N86-30969# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

MEASUREMENT AND CALCULATION OF THE DENSITY OF NATURAL GASES [MESSUNG UND BERECHNUNG DER DICHTE VON ERDGASEN]

M. Jaeschke *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 144-186 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

The density of natural gases is calculated from a state equation based on the AGA NX-19 calculation procedure, with 0.3% accuracy. The density is measured by weighing in laboratory with interferometric layout on a refraction index with an accuracy of 0.03% and with densitometers based on the oscillation procedure with variable accuracy according to the gases studied. The effects of the sonic velocity on the density measurement and their correction are described. With Solartron density cells, the sound dependency is compensated for by a thermal action on the spring constant of the oscillating system. Results with the densitometers show good agreement with the densities measured in the laboratory. ESA

N86-30970# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

PRESSURE AND TEMPERATURE MEASUREMENTS ON NATURAL GASES ALONG ISOCHORES IN THE TECHNICALLY IMPORTANT STATE RANGING FROM 270 TO 300 K AND AT PRESSURES UP TO 60 BARS [P,T-MESSUNGEN AN ERDGASEN ENTLANG ISOCHOREN IM TECHNISCH WICHTIGEN ZUSTANDSBEREICH VON 270 K BIS 300 K UND BEI DRUECKEN BIS 60 BAR]

R. Weiss *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 187-204 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

An isochoric test facility consisting of two pressure vessels, a thermostat, and fixtures for pressure and temperature measurement was used to calculate the gas density from pressure and temperature analytical data and measured values. The facility is analyzed for accuracy and to determine the virial factors for methane measured in a one-phase area. The composition of Ekofiskfeld natural gas samples is studied in a two-phase area based on measurement of the refraction index and of the expansion behavior. A simple state equation is used to compare measured values with the theoretical state parameters. Results show a relative inaccuracy of 2 per mill. The virial equation is applied to 4 other natural gases and shows good results for a temperature from 0 to 20 C and for a density up to 70 kg/C meter. ESA

N86-30971# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

FIRST MEASUREMENTS WITH A LASER DOPPLER ANEMOMETER IN A HIGH PRESSURE NATURAL GAS PIPE [ERSTE MESSUNGEN MIT EINEM LASER-DOPPLER-ANEMOMETER IN EINER HOCHDRUCK-ERDGASLEITUNG]

D. Dopheide, G. Taux, and L. Narjes *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 205-228 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

The applicability of Laser Doppler Anemometry (LDA) to velocity measurement in a natural gas pipe and the inaccuracy of the Doppler frequencies are studied. Test measurements show that the measuring procedure and the calibration methods can be applied at high pressure. The frequency inaccuracy is measured using a remote control programmable interference generator to obtain the signal-to-interference ratio required. The LDA emitting and receiving optics is studied, based on light particle forward scattering and backscattering for signal-to-interference ratio measurement. Bad signal quality due to high fluid velocity can be compensated for with higher laser performance. The frequency of the laser Doppler signals can be measured with an accuracy of 0.0001. ESA

N86-30972# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

ORIFICE PLATE AND DIFFERENTIAL PRESSURE MEASUREMENT [BLENDEN- UND WIRKDRUCKMESSUNG]

W. Kerkmann *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 229-258 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

The dynamics of the static pressure in the inlet distance of the plus and minus sides of a standard orifice plate with direct connection to a piezoelectric pressure indicator and along differential pressure pipes were studied. The static pressure is due to vortices and cavitation in the pipe. The dynamics of the outlet signal of the differential pressure transmitter was measured. The high pressure behavior of volume and turbine gas meters and of rotary lobe meters is discussed. ESA

N86-30973# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

MODERN DIFFERENTIAL PRESSURE GAS COUNTER (WIGZ) MEASUREMENT [MODERNE WIRKDRUCK-GASZAEHLERMESSUNG] **c35**

O. Brandt *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 259-300 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

The differential pressure gas counter facility developed to measure gas flow rate on orifice plates in the pipe system transporting Soviet gas to West Germany and France was equipped with small computers which record all the parameters of a measuring system and calculate the standard volume and the quantity of heat. These parameters are used to calibrate the facility. The differential pressure indicators and operating densitometers, the standard densitometers, pressure and temperature sensors, and calorific value indicators are described. The operation of and processing by the 16-bit microprocessor computers of all parameters are summarized. The central computer and the performance recording facility are presented. ESA

N86-30974# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

PRACTICAL EXPERIENCES WITH HIGH PRESSURE (HP) GAS COUNTERS. PROBLEMS OF OPERATING CALIBRATION WITH HP [PRAKTISCHE ERFAHRUNGEN MIT HOCHDRUCK-GASZAEHLERN. PROBLEME DER BETRIEBSEICHUNG MIT HOCHDRUCK] **c35**

Buresch *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 301-314 In GERMAN (For primary document see N86-30962 22-34)

Avail: NTIS HC A20/MF A01

The experience gained in the use of lobed impeller meters in natural gas supply is reviewed. The problems arising from the application of turbine gas counters in high pres e measurement resulting from an unbalanced force ratio between the driving impulse of the flowing gas volume on the wheel and the frictional and inertial forces are presented. The financial and technical problems of calibration of counters for application at HP are reported. The European HP calibration test benches and the availability of accurate HP norms are discussed. ESA

N86-30975# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).

BEHAVIOR OF TURBINE WHEEL GAS COUNTERS AT HIGH PRESSURES [VERHALTEN VON TUR-

BINENRADGASZAEHLERN IM HOCHDRUCKBEREICH] c35
Dieter Schmitter *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 315-355 In GERMAN (For primary document see N86-30962 22-34)
Avail. NTIS HC A20/MF A01

The rpm rate of a turbine wheel gas meter rotor was used to determine the flow velocity of the gas. The behavior of the turbine wheel gas counters depends on the rpm measurement errors, on the total pressure loss in the counter and on the flow axial force in high pressure pipes. The forces and moments on the measuring wheel, the flow resistance, and the optimal layout of a flow channel are described. The HP deviations depend on the Reynolds number and the resonance sensitivity. A neutral behavior of the turbine can be achieved by optimizing the manufacture and installation. ESA

N86-30976# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
PRIMARY MEASUREMENT [PRIMAERE MESSUNG]
Fischer *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 356-368 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

The economical aspects of accurate gas measurement with orifice plates and turbine gas counters are reviewed. The economical application of test benches and facilities for analysis and calibration of the counters is discussed. Vortex and supersonic counters are investigated for long-time stability and repeatability as well as the effects of the installation methods. Cost-to-accuracy analysis of the measuring instruments and the flow computers for automatic temperature and pressure correction and for calculation of the gas compressibility is reported. The introduction of computer monitoring of the entire pipe system and of an information system is presented. ESA

N86-30977# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
MEASUREMENT OF SMALL PRESSURE DIFFERENCES AT A HIGH STATIC PRESSURE [MESSUNG KLEINER DRUCKDIFFERENZEN BEI HOHEM STATISCHEN DRUCK]
G. Klingenberg *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 369-390 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

Test procedures using differential pressure transducers are presented. The effects of static pressure on measurement accuracy are studied. The effects of heating, time, resistance, and interference voltages on the transducers are presented and the ripple of the outlet parameter is determined. The results show voltage displacement, temperature hysteresis, and a calibration error greater than 0.3%. Float-type pressure gages, double piston gages, and fluid gages are tested. All measures show that no pressure difference greater than 12 Pa appears with the static pressure increasing to 8 MPa. ESA

N86-30978# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
INFLUENCE OF THE FORM OF THE VORTEX BODIES ON THE TECHNICAL PERFORMANCE OF A VORTEX METER [EINFLUSS DER WIRBELKOERPERFORM AUF DAS MESSTECHNISCHE VERHALTEN DER WIRBELDURCHFLUSSMESSER]
H.-G. Kalkhof *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 391-407 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

The performance of the vortex meter is reviewed. The measuring properties of the vortex meter depend on the behavior of the Strouhal, Reynolds, and Mach numbers. The vortex cavitation frequency is measured with an isothermal hot-film anemometer. Vortex bodies with T and delta profiles are studied by measuring the signal frequency period. The body thickness and length and the Reynolds number influence the Strouhal number and the relative standard difference of the period. Results are compared with measurements with a differential pressure flowmeter. The pressure loss of the vortex meter is smaller than that of the orifice plate, equal to that of the nozzle, and greater than that of the venturi nozzle. ESA

N86-30979# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
EFFECTS OF PREVIOUS DISTURBANCES ON THE METER FACTORS OF A VORTEX METER [EINFLUESS VON VORSTOERUNGEN AUF ZAEHLERFAKTOREN VON WIRBELZAEHERN] c35
J. Boehm *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 408-428 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

Pulsations (100 to 120 dB) generated by a pressure chamber amplifier are studied to determine their effects on the vortex meter. The vortex meter is disturbed when the pulsating frequency is in phase with the vortex cavitation frequency. Perturbations in the velocity profile through curvatures and slide valves lead to meter factor displacement. The residual angular momentum vectors behind a bundle of pipes and behind the aperture plates are in opposite directions. The effects of a chamber curvature without and with the installation of a rectifier are presented. Gas density indicators are used to study the gas type influence with a bifurcated oscillator and a pipe oscillator. The pressure differences depend on the oscillating and sonic velocity and on the gas density. The gas type influence can be corrected by reducing the oscillating velocity of the structure and by applying the error difference of two density indicators with differential oscillating velocity. ESA

N86-30980# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
VORTEX GAS COUNTER TYPE WBZ 08. PRACTICAL EXPERIENCE [WIRBELGASZAEHLER TYP WBZ 08 - PRAXISERFAHRUNGEN] c35
Hans-Juergen Kastner *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 429-444 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

The performance of the vortex gas counter type WBZ 08 is reviewed. The counter consists of vortex bodies with T profiles, a thermistor for vortex scanning, and an electronic monitoring unit. Error curves from low and high pressure test benches show a measurement accuracy of 0.3%. The vortex gas counter shows good robustness, stability and reproductibility. The theoretical self-cleaning of the vortex bodies through vortex cavitation is confirmed. The theoretical counter factors show good agreement with the ones measured through dry calibration. The functional error safety of the entire measuring facility can be optimized by connecting flow computers. ESA

N86-30981# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
THE GAS MEASURING BELL: A BASIC NORMAL EQUIPMENT FOR THE REPRESENTATION OF VOLUME UNIT FOR GASES [DIE GASMESSGLOCKE - EIN BASISNORMALGERAET ZUR DARSTELLUNG DER VOLUMENEINHEIT FUER GASE] c35
H. Brunnemann and A. Aschenbrenner *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 445-449 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

A 1 cubic meter gas meter was used to determine the volume unit. A bell cylinder sinks into spindle oil used as a sealing liquid in a bell tank, which causes compression of an air volume. The volume is determined by a geometrical measurement of the bell cylinder along six mantle lines. A table gives the bell volume at 5 mm intervals. The intermediate values can be determined accurately through interpolation. The bell position is determined with an optoelectronic distance indicator with a resolution of 0.01 mm. The conversion of the compressed air

volume to the testpiece can be done with pressure and temperature measurements at different points of the bell and of the testpiece. Evaluation of the measurements is done with a microcomputer. The BASIC software allows the state-dependent calculation of the gas volume, and the representation of the testpiece error curves. A reproductibility of 0.03% and a measuring inaccuracy of the bell of 0.1% are achieved. ESA

N86-30982# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
A NEW METHOD FOR THE DETERMINATION OF STATIONARY MASS FLOW RATES OF GASES [NEUARTIGES VERFAHREN ZUR BESTIMMUNG STATIONAEREH MASSESTROEME VON GASEN]
L. Narjes and M. Zander *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 450-452 In GERMAN; ENGLISH summary (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

The feasibility of a one-step connection of gas measuring instruments was studied. The method consists of a pressure regulator, the gas counter to be checked, a nozzle, and a charging vessel. The method is based on the enthalpy differential equation of the first law of thermodynamics for an open adiabatic system with time-dependent variation of the quantity of energy. Thermostatting of the charging vessel is studied. The method allows instantaneous, dynamic measurement acquisition. ESA

N86-30983# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
INTRODUCTION TO COMPUTATIONAL FLUID DYNAMICS
1986 419 p Lecture Series held in Rhode-Saint-Genese, Belgium, 13-17 Jan. 1986
(VKI-LS-1986-01; ESA-86-97481) Avail: NTIS HC A18/MF A01

Boundary layer equations; the finite element method in computational fluid dynamics; and implicit time dependent methods for inviscid and viscous compressible flows are introduced. For individual titles, see N86-30984 through N86-30987.

N86-30984# Maryland Univ., College Park.
COMPUTATIONAL FLUID DYNAMICS, INTRODUCTION
John D. Anderson *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1986 269 p (For primary document see N86-30983 22-34)
Avail: NTIS HC A18/MF A01

The philosophy and power of computational fluid dynamics; the governing equations; solution techniques; and the vocabulary of the discipline are introduced. Low speed incompressible flow to hypersonic flow is covered. ESA

N86-30985# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
BOUNDARY LAYER EQUATIONS AND METHODS OF SOLUTION
R. Grundmann *In its* Introduction to Computational Fluid Dynamics 1986 31 p (For primary document see N86-30983 22-34)
Avail: NTIS HC A18/MF A01

Laminar boundary layer theory, starting from Prandtl's ideas is described. The hierarchy of the boundary layer equations is discussed, and the relationship of the different types of boundary layer equations to the Navier-Stokes equations is demonstrated. Transformation techniques to reduce the problems of solution are indicated. A generalized discretization scheme is applied to a set of laminar compressible boundary layer equations and a numerical solution scheme for calculating the remaining tridiagonal linear difference equations is shown. A laminar boundary layer along the symmetry line of a highly inclined ellipsoid is calculated. ESA

N86-30986# Ghent Univ. (Belgium).
THE FINITE ELEMENT METHOD IN FLUID MECHANICS
E. Dick *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1986 38 p (For primary document see N86-30983 22-34)
Avail: NTIS HC A18/MF A01

Elliptic partial differential equations encountered in fluid mechanics boundary value problems are introduced. Finite element method applications to steady compressible and incompressible potential flow, and steady incompressible Navier-Stokes equations are illustrated. ESA

N86-30987# Sherbrooke Univ. (Quebec).
IMPLICIT TIME DEPENDENT METHODS FOR INVISCID AND VISCOUS COMPRESSIBLE FLOWS
G. Degrez *In* Von Karman Inst. for Fluid Dynamics Introduction to Computational Fluid Dynamics 1986 61 p (For primary document see N86-30983 22-34)
Avail: NTIS HC A18/MF A01

Generalizations to partial differential equations of linear multistep methods for the compressible Euler and Navier-Stokes equations are introduced. The one step predictor/corrector scheme, an implicit extension of the explicit MacCormack scheme, is presented. Single step schemes with centered differencing in space are described. Characteristic modeling schemes for the Euler equations, i.e., schemes featuring noncentered discretization in space, are outlined. ESA

N86-30988# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NUMERICAL TECHNIQUES FOR VISCOUS FLOW CALCULATIONS IN TURBOMACHINERY BLADINGS
1986 516 p Lecture Series held in Rhode-Saint-Genese, Belgium, 20-24 Jan. 1986
(VKI-LS-1986-02; ESA-86-97482) Avail: NTIS HC A22/MF A01

Governing equations and solution methods of Navier-Stokes equations; numerical modeling of Navier-Stokes equations; turbulence models; grid generation systems in turbomachinery; Navier-Stokes computations for circulation controlled airfoils and exotic airfoils; multigrid convergence acceleration techniques for explicit Euler solvers and applications to Navier-Stokes calculations; and application of full Navier-Stokes solvers to turbomachinery flow problems were discussed. For individual titles, see N86-30989 through N86-30998. ESA

N86-30989# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
GOVERNING EQUATIONS
R. Grundmann *In its* Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 19 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

The inviscid Euler equations are discussed by transporting viscous flow properties, and a hierarchy of the boundary layer equations is evaluated for a steady, compressible, laminar flow over a two dimensional curved surface by an order-of-magnitude analysis. The gap between the second order boundary layer theory and the full viscous equations is closed by mentioning the Reynolds averaged Navier-Stokes equations, the thin shear layer approximation, the parabolic approximation and the viscid-inviscid interaction. ESA

N86-30990# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
SOLUTION METHOD OF PARABOLIZED NAVIER-STOKES EQUATIONS
R. Grundmann *In its* Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 22 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

Laminar and turbulent incompressible flow through curved channels is studied via artificially parabolized Navier-Stokes equations. It is shown how the laminar secondary flow develops if at the inlet of a streamwise curved channel a rigid body vortex moving in the cross section is prescribed. For low Reynolds numbers where no separation is expected, the fully parabolic Navier-Stokes equations can be applied. Using a grid spacing of 21 x 21 points in the cross flow section, the computer time needed

for one calculation is less than 30sec on a Cray-1S. A solution method for engineering purposes to calculate turbulent flows in curved three dimensional ducts with variable cross sections was developed. Calculation time on the Cray-1S (21 x 21 grid) is less than 48 sec. ESA

N86-30991# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
NUMERICAL MODELING OF NAVIER-STOKES EQUATIONS
M. Borsboom *In its* Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 67 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

It is argued that the relative magnitude of the truncation error rather than the order of accuracy of a discretization scheme determines how well a solution procedure predicts the solution of a system of differential equations. For the numerical simulation of the Navier-Stokes equations at high Reynolds number, this means that only a very small amount of numerical diffusion can be tolerated in regions where the viscous effects are relatively important. A technique using artificial diffusion, in the form of turbulent viscosity, to damp out high frequency modes of solution where a high concentration of grid points is not available, is outlined. The method is extended to blade-to-blade flow calculations and unsteady calculations. The time derivative is considered as a part of the source term, and is discretized in space using a trapeziodal rule. The discretization scheme combines high accuracy on a wide variety of grid structures with ease of programming, as is demonstrated by the calculation of the flow over a backward facing step, where excellent results are obtained using a highly distorted grid. storted grid. ESA

N86-30992# Lyon-1 Univ. (France). Lab. de Mecanique des Fluides.
TURBULENCE MODELS
J. P. Bertoglio, B. Gay, and J. N. Gence *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 62 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

Statistical and space averaging approaches to turbulence modeling in rotating machines are reviewed. Ways in which to devise closure relations in turbulence modeling are outlined. Two-point closures and large eddy simulation are treated. ESA

N86-30993# Ecole Polytechnique, Montreal (Quebec).
INTRODUCTION TO GRID GENERATION SYSTEMS IN TURBOMACHINERY
R. Camarero, B. Ozell, M. Reggio, and A. Caron *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 75 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

Body-fitted curvilinear grid generation for the numerical simulation of three dimensional flow in turbomachines is introduced. The grids yield coordinate curves aligned with the domain boundaries. The numerical scheme for the governing equations is carried out on a rectangular mesh, giving a simpler and more accurate algorithm since bondaries coincide with coordinate grids, and no interpolation is required. The geometric complexity, through the transformation, is imbedded into the coefficients of the governing equations, affording the possibility of writing generalized codes applicable to a variety of geometries. This results in a great saving in the code development effort. ESA

N86-30994# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFICIENT SOLUTION METHODS FOR THE NAVIER-STOKES EQUATIONS
Thomas H. Pulliam *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 104 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

Implicit finite difference schemes for solving two-dimensional and three-dimensional Euler and thin layer Navier-Stokes equations are addressed. The methods are demonstrated in fully vectorized codes for a Cray type architecture. The Beam and Warming implicit approximate factorization algorithm in generalized coordinates is used. The methods are either time accurate or accelerated non-time accurate steady state schemes. Acceleration and efficiency modifications such as matrix reduction, diagonalization, and flux split schemes are presented. Two dimensional inviscid and viscous calculations (e.g., airfoils with a deflected spoiler, circulation control airfoils, and unsteady buffeting) and of three dimensional viscous elliptical bodies, exhausting boattails, and generic oblique wing computations are discussed. ESA

N86-30995# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NAVIER-STOKES COMPUTATIONS FOR CIRCULATION CONTROLLED AIRFOILS
Thomas H. Pulliam, Dennis C. Jesperen, and Timothy J. Barth *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 18 p Presented at 18th AIAA Fluid Dynamics and Plasmadynamics and Lasers Conference, Cincinnati, Ohio, 16-18 Jul. 1985 (For primary document see N86-30988 22-34)
(AIAA-85-1587) Avail: NTIS HC A22/MF A01

Navier-Stokes computations of subsonic to transonic flow past airfoils with augmented lift due to rearward jet blowing over a curved trailing edge are presented. The approach uses a spiral grid topology. Solutions are obtained using a Navier-Stokes code which employs an implicit finite difference method, an algebraic turbulence model, and developments which improve stability, convergence, and accuracy. Results are compared against experiments for no jet blowing and moderate jet pressures and demonstrate the capability to compute these complicated flows. ESA

N86-30996# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NAVIER-STOKES COMPUTATIONS FOR EXOTIC AIRFOILS
Timothy J. Barth (Informatics General Corp., Palo Alto, Calif.), Thomas H. Pulliam, and Peiter G. Buning *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 17 p Presented at 23rd AIAA Aerospace Science Meeting, Reno, Nev., 14-17 Jan. 1985 (For primary document see N86-30988 22-34)
(AIAA-85-0109) Avail: NTIS HC A22/MF A01

A hyperbolic grid generator with improvements for handling sharp corners and concave surfaces combined with a Navier-Stokes flow solver is applied to complex two dimensional airfoil configurations. Steady separated flow about an iced leading edge of an airfoil is presented. Unsteady viscous separated flows past an airfoil at two angles of attack with a spoiler deployed at 60 deg are compared with experiment. The spoiler computations are performed with two different topological maps of the physical domain to the computational domain. Graphical techniques for the static and unsteady display of the flow fields are discussed. ESA

N86-30997# United Technologies Corp., East Hartford, Conn.
MULTIGRID CONVERGENCE ACCELERATION TECHNIQUES FOR EXPLICIT EULER SOLVERS AND APPLICATIONS TO NAVIER-STOKES CALCULATIONS
Ron-Ho Ni *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 61 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

The power of the multiple-grid technique in improving the rate of convergence for Euler and Navier-Stokes calculations for turbomachinery applications is shown. The classical multigrid method development and solution algorithms are reviewed to provide a better understanding of the origin of the multigrid

convergence acceleration techniques. Jameson's (1983) application of the classical multigrid solution algorithm and construction of the formal multigrid technique to gain significant improvements in the computational efficiency from an explicit time-marching procedure for solving the Euler flow equations are described. ESA

N86-30998# Cambridge Univ. (England). Whittle Lab.
APPLICATION OF FULL NAVIER-STOKES SOLVERS TO TURBOMACHINERY FLOW PROBLEMS
W. N. Dawes *In* Von Karman Inst. for Fluid Dynamics Numerical Techniques for Viscous Flow Calculations in Turbomachinery Bladings 1986 56 p (For primary document see N86-30988 22-34)
Avail: NTIS HC A22/MF A01

The design of computer codes for the solution of the equations of three dimensional viscous compressible flow in turbomachinery is discussed. The form of the governing equations and the modeling of the effects of turbulence; the computational mesh; discretization methodology; discretization of the governing equations; the form and implementation of the boundary conditions; iterative solution of the discretized equations; and the form of artificial dissipation added are considered. ESA

N86-30999*# Aeronautical Research Associates of Princeton, Inc., N. J.
A FUNDAMENTAL STUDY OF DRAG AND AN ASSESSMENT OF CONVENTIONAL DRAG-DUE-TO-LIFT REDUCTION DEVICES
John E. Yates and Coleman duP. Donald Washington NASA Sep. 1986 34 p
(Contract NAS1-18065)
(NASA-CR-4004; NAS 1.26:4004; ARAP-577) Avail: NTIS HC A03/MF A01 CSCL 20D

The integral conservation laws of fluid mechanics are used to assess the drag efficiency of lifting wings, both CTOL and various out-of-plane configurations. The drag-due-to-lift is separated into two major components: (1) the induced drag-due-to-lift that depends on aspect ratio but is relatively independent of Reynolds number; (2) the form drag-due-to-lift that is independent of aspect ratio but dependent on the details of the wing section design, planform and Reynolds number. For each lifting configuration there is an optimal load distribution that yields the minimum value of drag-due-to-lift. For well designed high aspect ratio CTOL wings the two drag components are independent. With modern design technology CTOL wings can be (and usually are) designed with a drag-due-to-lift efficiency close to unity. Wing tip-devices (winglets, feathers, sails, etc.) can improve drag-due-to-lift efficiency by 10 to 15% if they are designed as an integral part of the wing. As add-on devices they can be detrimental. It is estimated that 25% improvements of wing drag-due-to-lift efficiency can be obtained with joined tip configurations and vertically separated lifting elements without considering additional benefits that might be realized by improved structural efficiency. It is strongly recommended that an integrated aerodynamic/structural approach be taken in the design of (or research on) future out-of-plane configurations. Author

N86-31000*# Mechanical Technology, Inc., Latham, N. Y.
PERFORMANCE OF OIL PUMPING RINGS: AN ANALYTICAL AND EXPERIMENTAL STUDY Final Report
M. W. Eusepi, J. A. Walowit, O. Pinkus, and P. Holmes Jan. 1986 233 p
(Contracts DEN3-256; DE-AI01-85CE-50112)
(NASA-CR-175083; DOE/NASA-0256/1; NAS 1.26:175083; MTI-86TR17) Avail: NTIS HC A11/MF A01 CSCL 20D

A steady-state design computer program was developed to predict the performance of pumping rings as functions of geometry, applied loading, speed, ring modulus, and fluid viscosity. Additional analyses were developed to predict transient behavior of the ring and the effects of temperature rises occurring in the hydrodynamic film between the ring and shaft. The analysis was initially compared with previous experimental data and then used to design additional rings for further testing. Tests were performed with Rulon, carbon-graphite, and babbit rings. The design analysis was used to size all of the rings and to select the ranges of clearances, thickness, and loading. Although full quantitative agreement was lacking, relative agreement existed in that rings that were predicted to perform well theoretically, generally performed well experimentally. Some causes for discrepanices between theory and experiment are believed to be due to starvation, leakage past the secondary seal at high pressures, and uncertainties in the small clearances and local inlet temperatures to the pumping ring. A separate preliminary analysis was performed for a pumping Leningrader seal. This anlaysis can be used to predict the film thickness and flow rate thr ough the seal as a function of pressure, speed, loading, and geometry. M.G.

N86-31001*# California Polytechnic State Univ., San Luis Obispo. Dept. of Aeronautical Engineering.
APPLICATION OF A LOW ORDER PANEL METHOD TO COMPLEX THREE-DIMENSIONAL INTERNAL FLOW PROBLEMS Interim Report
Dale L. Ashby and Doral R. Sandlin Dec. 1985 100 p
(Contract NCC2-226)
(NASA-CR-179656; NAS 1.26:179656) Avail: NTIS HC A05/MF A01 CSCL 20D

An evaluation of the ability of a low order panel method to predict complex three-dimensional internal flow fields was made. The computer code VSAERO was used as a basis for the evaluation. Guidelines for modeling internal flow geometries were determined and the effects of varying the boundary conditions and the use of numerical approximations on the solutions accuracy were studied. Several test cases were run and the results were compared with theoretical or experimental results. Modeling an internal flow geometry as a closed box with normal velocities specified on an inlet and exit face provided accurate results and gave the user control over the boundary conditions. The values of the boundary conditions greatly influenced the amount of leakage an internal flow geometry suffered and could be adjusted to eliminate leakage. The use of the far-field approximation to reduce computation time influenced the accuracy of a solution and was coupled with the values of the boundary conditions needed to eliminate leakage. The error induced in the influence coefficients by using the far-field approximation was found to be dependent on the type of influence coefficient, the far-field radius, and the aspect ratio of the panels. Author

N86-31002# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Mathematics.
[THE NUMERICAL SOLUTION OF THE NAVIER-STOKES EQUATIONS FOR INCOMPRESSIBLE FLOWS AND THE APPLICABILITY OF THE STREAM FUNCTION FORMULATION OF THE NAVIER-STOKES EQUATIONS] Final Report, for 1 Jun. 1982 - 30 Jun. 1985
R. A. Nicolaides Dec. 1985 4 p
(Grant AF-AFOSR-0213-82)
(AD-A166061; AFOSR-86-0070TR) Avail: NTIS HC A02/MF A01 CSCL 20/4

This effort was focused on basic work on the numerical solution of the Navier-Stokes equations for incompressible flows. A basic problem in this theory is the compatibility of the finite element space used to approximate the pressure field. The investigator was able to devise a simple test of the finite element space. An inspection of the solution to this linear system immediately reveals whether the proposed scheme is stable. A second area of activity was an investigation of the applicability of the stream function formulation of the Navier-Stokes equations. This effort resulted in a number of publications in the scientific literature. GRA

N86-31003# Air Force Armament Lab., Eglin AFB, Fla.
AN EVALUATION OF A PARABOLIZED NAVIER-STOKES (PNS) CODE FOR CONE-CYLINDER-FLARED CONFIGURATIONS Final Report, Oct. 1982 - May 1984
Charles J. Cottrell and Gary T. Chapman Apr. 1986 10 p
Previously announced in IAA as A84-42361
(AD-A166650; AFATL-TR-86-16) Avail: NTIS HC A02/MF A01

CSCL 20/4

A Parabolized Navier-Stokes (PNS) code's capability to predict the onset of laminar and turbulent boundary layer separation, forces, moments, and pressure distributions was investigated. Predictions of incipient separation show good agreement with experimental results. Force and moment calculations were found to agree favorably with experimental data for a wide range of geometries for mach numbers from 2 to 4 with turbulent boundary layers. Limited comparison of pressure distribution data also showed good agreement. Skin friction and Stanton number calculations are presented to indicate the code's capability to calculate this information and hence, provide a complete data base for attached flow conditions. The sensitivity of these calculations to smoothing and marching parameter variations was examined and found to be acceptable for most design work. The code was found to be suitable to complement or reduce wind tunnel experimentation for the design of this class of configuration with regard to accuracy, cost and usability. GRA

N86-31004# Exotech, Inc., Campbell, Calif.
FLOW MEASUREMENTS IN A CENTRIFUGAL DIFFUSOR TEST DEVICE Final Report, 1 Oct. 1984 - 31 May 1985
Thomas Vitting Jun. 1985 134 p
(Contract N00014-84-C-0766)
(AD-A166758; TR-8501) Avail: NTIS HC A07/MF A01 CSCL 13/7

This work sought to verify concepts used in the design of a large scale, low speed, radial cascade wind tunnel which was to be used to investigate flow phenomena in and the performance of vaned radial diffusors. A major contributor to centrifugal compressor efficiency is the performance of the vaned diffusor which closely follows the impeller of the compressor. The purpose of this diffusor is to efficiently convert most of the kinetic energy of the transonic flow entering the vane into pressure. The need for an experimental facility which could simulate adequately, at low cost and in a controlled way, the environment of the centrifugal compressor motivated the development of the Centrifugal Diffusor Test Device (CDTD). It was expected that the generation of a three dimensional flow would provide improved empirical data on annular cascade performance. This measurement program surveyed the axial and circumferential uniformity of the flow at the inlet of a transonic wedge-type blading mounted in the device. Evaluation of the results showed the flow uniformity to be unsatisfactory. Leakage and other small perturbations in the flow field in the swirl generator are believed to be amplified by the basic flow configuration of the device. GRA

N86-31005# Exotech, Inc., Campbell, Calif.
WAVE ROTOR RESEARCH: A COMPUTER CODE FOR PRELIMINARY DESIGN OF WAVE DIAGRAMS Final Report, 1 Oct. 1984 - 31 May 1985
Atul B. Mathur Jun. 1985 71 p
(Contract N00014-84-C-0766)
(AD-A166760; TR-8502) Avail: NTIS HC A04/MF A01 CSCL 20/4

A one-dimensional Euler code for solving the unsteady, inviscid, compressible flow in wave rotor devices is described. The Random Choice Method program (RCM) implemented in the code is shown to be very suitable for describing the multiple discontinuities and wave interactions in these flows. The modular structure of the program allows studying different families of wave diagrams quickly and inexpensively. Example applications are included.
Author (GRA)

N86-31006# Iowa Univ., Iowa City. Inst. of Hydraulic Research
EQUATIONS OF LAMINAR AND TURBULENT FLOWS IN GENERAL CURVILINEAR COORDINATES Technical Report, Nov. 1985 - Feb. 1986
M. C. Richmond, H. C. Chen, and V. C. Patel Feb. 1986 86 p
(Contract N00014-83-K-0136)
(AD-A166837; AD-E950814; IIHR-300) Avail: NTIS HC A05/MF A01 CSCL 20/4

Recent developments in computational fluid mechanics and grid generation have made it possible to consider complex three dimensional laminar and turbulent flows using nonorthogonal coordinates. However, the necessary equations in generalized nonorthogonal coordinates are not readily available in a single reference. The purpose of this report is to present these equations for an incompressible fluid. Methods of curvilinear tensor analysis are used to develop the most commonly used equations. Their relationship with the more familiar equations in orthogonal coordinates is shown. Finally, the practical problems of evaluating the many geometric coefficients which appear in these equations are examined by considering numerically generated coordinates for flow around three dimensional bodies. GRA

N86-31007# Naval Ship Research and Development Center, Bethesda, Md.
ERGODICITY AND MIXING IN A FIVE-MODE SPECTRAL MODEL OF TWO-DIMENSIONAL TURBULENCE Final Report
M. C. Mosher Apr. 1986 29 p
(AD-A166922; DTNSRDC-86/009) Avail: NTIS HC A03/MF A01 CSCL 20/4

A dynamical system derived by truncating to five frequencies a Fourier representation of the Euler equations for incompressible, two dimensional fluid flow is investigated. In using Fourier representations to model turbulence, investigators have assumed that the truncated systems are ergodic and mixing, although the validity of this assumption is an open question. The truncated Fourier system has seven independent constants of motion which define a three dimensional torus. Since a component of the solution to the system is quasiperiodic, the flow of the system can never be mixing and, in particular, cannot be mixing on the three dimensional tours defined by the constants of motion. GRA

N86-31008# Office of Naval Research, London (England).
TURBULENT SHEAR-LAYER/SHOCK-WAVE INTERACTION Conference Report
Eugene F. Brown 1 Apr. 1986 10 p Presented at the Symposium of the International Union of Theoretical and Applied Mechanics on Turbulent Shear-Layer/Shock-Wave Interactions, Palaiseau, France
(AD-A166934; ONRL-C-2-86) Avail: NTIS HC A02/MF A01 CSCL 20/4

This report reviews presentations given at the September 1985 symposium of the International Union of Theoretical and Applied Mechanics and concludes that calculation of two-dimensional shock-wave/boundary-layer interaction problems is advancing well. For three-dimensional flows, accurate numerical calculation needs more experimental data to clarify the mechanisms and flow structures involved. Of greatest priority in this area is obtaining accurate unsteady measurements so that the mechanisms of shock oscillation and its results on the flow field can be better understood. GRA

N86-31009# Office of Naval Research, London (England).
THE 6TH GAMM (GESELLSCHAFT FUER ANGEWANDTE MATHEMATIK UND MECHANIK) CONFERENCE ON NUMERICAL METHODS IN FLUID MECHANICS Conference Report
Eugene F. Brown 1 Apr. 1986 8 p Conference presented at Goettingen, West Germany, 25-27 Sep. 1985
(AD-A166960; ONRL-C-1-86) Avail: NTIS HC A02/MF A01 CSCL 20/4

Presentations as aero-acoustic modeling, transition control, vortex shedding, domain decomposition methods, TVD (Total Variation Diminishing) calculations, viscous/inviscid interaction, and Euler solutions are reviewed. Papers dealing with methods (in contrast with applications) were stressed at this meeting. GRA

N86-31010# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
THREE-DIMENSIONAL SHOCK WAVE AND TURBULENT BOUNDARY LAYER INTERACTIONS Final Report, 1 Aug. 1981 - 31 Jul. 1984
Seymour M. Bogdonoff Sep. 1985 75 p
(Contract F49620-81-K-0018)

(AD-A167086; Rept-1723-MAE; AFOSR-85-1242TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

An extensive experimental study of three-dimensional shock wave turbulent boundary layer interactions caused by shock generators defined solely by angles has been carried out at Mach 3. Sharp fins, sharp swept fins, swept wedges, and semi-cones have been used to generate a wide range of shock waves. The interaction of these waves with turbulent boundary layers has been investigated by surface flow visualization, mean surface static pressure distributions, flowfield surveys of total pressure and yaw, and several flowfield visualization techniques. Some exploratory high frequency surface pressure measurements have been carried out to evaluate the steadiness of these interactions. Scaling laws for both surface and flowfield features have been derived. Some limited studies were carried out at a Mach number of 2. A flowfield study has shown that the initial part of interactions caused by the same strength and geometrical shock wave generated by different shock generators are all similar. The footprints of the interactions, as shown by surface flow visualization, can be categorized as approximately conical or cylindrical, and the boundaries between these two regions have been defined for both Mach 3 and Mach 2. There are still questions with regards to the detailed flowfield structures and physical mechanisms, but the three-dimensional interactions appeared to be less unsteady than that of two-dimensional separated flows. GRA

N86-31011# Abramovich (Shaul), Haifa (Israel).
GAS DYNAMICS OF LASER EXHAUST EXTERNAL TO SPACE-CRAFT
Shaul Abramovich Nov. 1985 118 p
(Contract N62271-83-M-1939; DARPA Order 4573)
(AD-A167143; NPS-67-84-006CR) Avail: NTIS HC A06/MF A01 CSCL 20/4

Some procedures have been developed to analyze the flowfield of highly underexpanded axisymmetric ring jets operated at high altitudes. The Method of Characteristics (MOS) was used to compute the Prandtl Meyer expansion fan and flow parameters in that region. The MOC may also be used to obtain some indications about the repetitive expansion compression behavior of the jet as well as the divergent shape of the compression part downstream, when the ambient pressure goes below certain limits. The continuum methods may be used as far as the limit where translational equilibrium ceases to exist. The breakdown of the continuum theory may be evaluated using the experimental breakdown parameter. Beyond this limit, the molecular Direct-Simulation-Monte-Carlo method (DSMC) is applied. The axisymmetric Monte Carlo Simulation begins outside the nozzle, where the breakdown parameter has a value of approximately 0.05. The actual shape of this breakdown limit is a closed lobe surface which starts at the nozzle lips, approximately follows a specific Mach wave in the Prandtl Meyer fan and closes back to the axis far downstream. Because our interest is limited to the close vicinity of the corners, there the shape of this limit may be approximated to a straight line (for an axisymmetric flow making cone). GRA

N86-31012# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
BURSTS AND PRESSURE FLUCTUATIONS IN TURBULENT BOUNDARY LAYERS Final Report, Nov. 1984 - Nov. 1985
P. Bradshaw and J. F. Morrison Jan. 1986 52 p
(Contract DAJA45-84-C-0049; DA Proj. 1L1-61102-BH-57)
(AD-A167186) Avail: NTIS HC A04/MF A01 CSCL 20/4

Surface pressure fluctuations below turbulent boundary layers were studied, in part, because they can be regarded as footprints of passing turbulent eddies. The pressure fluctuations are formally described by a Poisson equation, implying that the pressure fluctuation at a given point is mathematically represented by the integral of a source term over the whole flow field, with a weighting inversely proportional to the distance of the source from the given point. In turbulent boundary layers, fluctuations were made in a low-speed constant pressure the high-frequency part of the wall pressure fluctuations is generated mainly within the inner layer - say, the first 20% of the boundary layer thickness - and the low-frequency part is generated mainly in the outer layer. Measurements of velocity and surface-pressure turbulent boundary layer well downstream of an extensive region of wall roughness. The turbulence near the wall was representative of a smooth-wall flow, while that in the outer layer was typical of the upper stream rough-wall flow. Comparison with previous measurements on an entirely smooth wall illustrates the relative contributions of the inner and outer layers to the surface pressure fluctuations. GRA

N86-31013# Lawrence Livermore National Lab., Calif.
MAP MODELS OF THE TRANSITION TO TURBULENCE IN TWO AND THREE DIMENSIONAL PIPE FLOW
J. A. Viecelli 3 Feb. 1986 42 p
(Contract W-7405-eng-48)
(DE86-006842; UCID-20661) Avail: NTIS HC A03/MF A01

Couette flow, at least when the outer cylinder is fixed, seems to be yielding gradually to theoretical analysis, but Couette flow with the outer cylinder rotating, and Poiseuille flow are still not well understood. These latter cases exhibit a snap transition from laminar to turbulent flow which is not well explained by traditional theory. Certainly, the predictions of linearized stability theory do not agree with observed transition Reynolds numbers, and although a number of nonlinear theories have evolved, they have not been more successful. Especially difficult from the viewpoint of traditional theory is the existence of intermittency; near the Reynolds number at which the flow snaps from laminar to turbulent short burst of turbulence spaced at random intervals are observed. Reported here are studies of the properties of dissipative coupled implicit map models, how they are related to a stochastic model of turbulence, and to the Navier-Stokes equations. Power spectra of the solutions and comparisons of the implicit map model predictions with experimental observations are included. Bifurcation diagrams, velocity profiles, and flow resistance coefficients are covered. Finally, some findings on the general shape of velocity return maps for pipe flow are discussed. DOE

N86-31014# Associacao Brasileira de Ciencias Mecanicas, Rio de Janeiro.
PROCEEDINGS OF THE 3RD BRAZILIAN SYMPOSIUM ON PIPING AND PRESSURE VESSELS
1984 799 p In ENGLISH, SPANISH and PORTUGUESE Symposium held in Salvador, Brazil, 29 Oct. 1984
(DE86-700752; INIS-BR-400; CONF-8410360) Avail: NTIS (US Sales Only) HC A99/MF A01

Papers addressing stress analysis in pipelines, heat transfer in fluid flow, deformation of materials, and fracture and failures in pressure vessels are presented. DOE

N86-31015# Tampere Univ. of Technology (Finland). Dept. of Mechanical Engineering.
EXPERIMENTS ON BINARY REFRIGERANT MIXTURES IN HEAT PUMPS [KOKEITA BINAEAERISEOKSELLA LAEMPOEPUMPUSSA]
Antero Aittomaeki and Antti Keskitalo 1984 45 p In FINNISH
(DE86-750845; TTKK-LT-39) Avail: NTIS (US Sales Only) HC A03/MF A01

Principles for utilization of binary mixtures and variable temperatures in heat pumps as well as the theory of a compressor heat pump are shortly examined in the report. A theoretical study on liquid cycle process and variable temperatures is made. The mixtures in the study, were the following refrigerants: R22/E181, R22/DMF, R12/R13, R22/R113, and H2O/NH3. The use of binary mixtures in a cold vaporization process was examined by a special test and measuring equipment. At least part of the waste heat of a compressor could be utilized in heating, but the compressor must be then cooled sufficiently. DOE

N86-31016# Sandia National Labs., Albuquerque, N. Mex.
DRAG OF BODIES OF REVOLUTION IN CAVITATING FLOW
W. L. Oberkampf and W. P. Wolfe 1986 10 p Presented at the 4th Fluid Mechanics Plasma Dynamics and Laser Conference, Atlanta, Ga., 12 May 1986 Previously announced in IAA as A86-38487

(Contract DE-AC04-76DP-00789)
(DE86-005171; SAND-85-2324C; CONF-860517-1) Avail: NTIS HC A02/MF A01

The present paper describes work in progress concerning the fluid dynamics of cavitating flow. The flow field and drag of bodies of revolution at zero angle of attack is predicted for cavity coefficients from fully-wetted flow to sigma = 0. Excellent agreement for drag coefficient is demonstrated between theory and a water tunnel experiment. It is shown that skin friction drag is the dominant drag component for zero cavity coefficient. Excellent agreement is also demonstrated between theory and a high-speed water entry experiment. This agreement corroborates the experimental measurement that the cavity pressure is equal to the water vapor pressure, contrary to low-speed water entry. DOE

N86-31017# Lawrence Livermore National Lab., Calif.
SIMULATING SOME STATISTICAL FEATURES OF DUSTY GAS TURBULENT FLOW
A. C. Buckingham 15 Nov. 1985 6 p Presented at the 4th Fluid Mechanics Plasma Dynamics and Laser Conference, Atlanta, Ga., 12 May 1986
(Contract W-7405-eng-48)
(DE86-005774; UCRL-93615; CONF-860517-2) Avail: NTIS HC A02/MF A01

Described is the application of numerical simulations as extensions of turbulent flow experiments. These computations are designed to predict the interactive influences of solid dispersants on the turbulent continuous gas phase that entrains them. Interest derives from the view that these interactions may contribute significant modulating influence to turbulent phase constituent and molecular component evolution, reactive mixing, heat, and mass transfer in solid propellant combustion. The numerical simulation procedure utilizes spectral transform projection and spectral averaging collocation methods to represent the continuous phase Navier-Stokes equations. The continuous phase is iteratively matched at discrete time intervals to a random-walk Lagrangian statistical sampling procedure for the dispersed phase momenta and position expectancies. Ensemble averaging produces statistical velocity moments for both dispersed and continuous phases. DOE

N86-31018# Los Alamos National Lab., N. Mex.
NUMERICAL EXPERIMENTS WITH CONCHAS-SPRAY: INSTALLATION OF THE FLOE ALGORITHM
Lawrence D. Cloutman Feb. 1986 35 p
(Contract W-7405-eng-36)
(DE86-007575; LA-10626-MS) Avail: NTIS HC A03/MF A01

The rezoning phase of the CONCHAS-SPRAY program models the advection terms in the Navier-Stokes equations. Consequently, this code suffers from all the numerical difficulties associated with these terms, except for pure Lagrangian calculations. In particular, the use of any of the available differencing options other than pure donor cell can create artificial oscillations in the solution through the dispersive truncation errors. This report describes the installation of a flux-limiting procedure similar to Chapman's FRAM technique that suppresses these oscillations by locally adding enough donor-cell differencing to prevent nonphysical growth of local maxima and minima. DOE

N86-31019# Los Alamos National Lab., N. Mex.
ACOUSTIC DAMPING FOR EXPLICIT CALCULATIONS OF FLUID FLOW AT LOW MACH NUMBER
J. D. Ramshaw, P. J. ORourke, and A. A. Amsden Jan. 1986 15 p
(Contract W-7405-eng-36)
(DE86-007576; LA-10641-MS) Avail: NTIS HC A02/MF A01

A method is proposed for damping the sound waves in explicit calculations of fluid flow at low Mach number, where sound waves are usually not of interest but may distract attention from other flow features. The method is based on the introduction of an artificial pressure q of the form q = - q0rhoc(2)(DELTA)t(del x u - del x u0), where q0 is a coefficient of order unity, rho is the density, c is the sound speed, (DELTA)t is the time step, and u0 is the velocity field that would obtain at zero Mach number. When del x u0 is zero, the method becomes equivalent to the use of an artificial bulk viscosity q0rhoc(2)(DELTA)t. However, del x u0 can be substantially different from zero in problems with heat or mass sources (e.g., combustion), and its inclusion is then essential to obtain the correct pressure field. The method is well suited for use in conjunction with explicit numerical schemes that employ acoustic subcycling or artificial reduction of the sound speed for improved efficiency at low Mach number. The beneficial effects of the method are illustrated by means of calculations with an acoustic subcycling computer program. DOE

N86-31020# Los Alamos National Lab., N. Mex.
INTEGRATED GRADIENTS: A DERIVATION OF SOME DIFFERENCE FORMS FOR THE EQUATION OF MOTION FOR COMPRESSIBLE FLOW IN TWO-DIMENSIONAL LAGRANGIAN HYDRODYNAMICS, USING INTEGRATION OF PRESSURES OVER SURFACES
Philip L. Browne Feb. 1986 86 p
(Contract W-7405-eng-36)
(DE86-008325; LA-10587-MS) Avail: NTIS HC A05/MF A01

This paper describes a method of deriving gradients (that is, accelerations) for difference calculations of the equations of motion (momentum conservation) in two-dimensional Lagrangian meshes in an r-z coordinate system. The method basically considers various ways of defining the masses associated with each vertex and methods of integrating pressures over the surfaces of those masses, and then combining them in various ways to conserve momentum transfer between vertices. These gradients are derived analytically for planes, cylinders, and spheres to test for uniform motion. All results described have been tested with actual numerical calculations. DOE

N86-31021# California Inst. of Tech., Pasadena.
CALTECH-DOE PROGRAM ON NUMERICAL ANALYSIS, SCIENTIFIC COMPUTING AND FUNDAMENTAL STUDIES OF MOTION, ENERGY AND MASS TRANSFER IN FLUIDS Summary Report, 1 Apr. 1983 - 31 Mar. 1986
1986 8 p
(Contracts DE-AS03-76ER-72012; DE-AM03-76SF-00767)
(DE86-008369; DOE/ER-72012/T3; SR-11) Avail: NTIS HC A02/MF A01

This report concerning the CALTECH-DOE program presents information on: vortex dynamics, turbulence and separated flows; flow in porous media and Hele-Shaw fingering; steady viscous flows with and without bifurcations; continuation methods; and boundary conditions on artificial boundaries. DOE

N86-31022# Oak Ridge National Lab., Tenn.
APPROXIMATE ANALYSIS OF THE FORMATION OF A BUOYANT SOLID SPHERE IN A SUPERCOOLED MELT
A. D. Solomon, D. G. Wilson, and V. Alexiades Mar. 1986 16 p
(Contract DE-AC05-84OR-21400)
(DE86-007882; ORNL-6212) Avail: NTIS HC A02/MF A01

A mathematical model is presented for the idealized formation and development of a buoyant sphere solidifying in an infinite pool of supercooled liquid. The solid and liquid are of the same pure material and the solid is less dense than the liquid. Initially the liquid is at a uniform temperature that is below its equilibrium freezing temperature, T/sub cr/, but above the so called hypercooled temperature, T/sub cr/ - H/c/sub L/. Here H and c/sub L/ are the latent heat of solidification and the specific heat of the liquid, respectively. An approximate solution is derived based on the Megerlin approximation method. DOE

N86-31023# Illinois Univ., Urbana. Dept. of Chemistry.
TRANSPORT AND RELAXATION PROCESSES IN SUPERCRITICAL FLUIDS Technical Progress Report, Oct. 1 - 31 Dec. 1985
J. Jonas 1985 7 p
(Contracts DE-FG22-82PC50800; DE-FG22-85PC-80503)
(DE86-008329; DOE/PC-50800/T13) Avail: NTIS HC A02/MF A01

Preparations for the study of naphthalene diffusion dissolved in the supercritical fluids carbon dioxide and ethylene have proceeded as follows. We plan to use the fixed field gradient NMR technique to monitor the diffusion of the dissolved naphthalene. However, the technique is not feasible in systems with spin-spin coupling among the nuclei of interest; unfortunately the protons on naphthalene exhibit this coupling. We thus intend to use totally deuterated naphthalene and monitor the deuterium signal, a nucleus whose coupling is negligible. We therefore have designed and built a new high pressure NMR probe for the measurement of deuterium. This probe is similar to the one used in the previous naphthalene solubility study, and accommodates the same supercritical sample cells. The probe is machined from Vespel SP-1 (a high temperature plastic), and houses a 17-1/2 turn solenoid NMR coil along with thermocouples located slightly above and below the sample area. The probe has been successfully tested to 2 kbar gas pressure. The data acquisition system for the NMR spectrometer used for supercritical fluid studies has been developed and described in this report. DOE

N86-31024# Commission of the European Communities (Luxembourg).
COMPUTER CODE CONDIF-01 (RELEASE 2) FOR TRANSIENT CONVECTIVE-CONDUCTIVE HEAT TRANSFER: USER'S MANUAL
S. Giuliani and H. Laval 1984 85 p
(DE86-780411; EUR-9448) Avail: NTIS (US Sales Only) HC A05/MF A01

CONDIF-01 is a finite element computer code developed at J.R.C. Ispra to solve natural and forced convection problems, for use in Post Accident Heat Removal studies following a hypothetical fast-reactor core meltdown. The new version of the code is capable of analyzing problems in which there exists initially a liquid (solid) region which may change phase to solid (liquid), as time proceeds. A variant of the enthalpy method is employed to model the phase change process. The presence of structures enclosing the liquid (solid) region is accounted for, but such structures are assumed to remain in the solid phase. Plane and axisymmetric situations may be analyzed. The essential characteristics of the code are outlined here. This report gives instructions for preparing input data to CONDIF-01, release 2, and describes two test problems in order to illustrate both the input and the output of the code. DOE

N86-31025# Commission of the European Communities (Luxembourg).
VOID FRACTION MEASUREMENT IN TWO-PHASE FLOW WITH X-RAYS
W. Hufschmidt and E. deClercq 1984 4 p Prepared in cooperation with Commission of the European Communities, Ispra, Italy
(DE86-780422; EUR-9487) Avail: NTIS (US Sales Only) HC A02/MF A01

The exact knowledge of the void fraction in two phase flow systems with water and vapor is of great importance for water reactors. A measurement method not disturbing the fluid flow is the absorption technique x rays. This method has been tested for the present case of small absorption lenghts (about 16mm). In collaboration with the Lehrstuhl fuer Elektronische Schaltungen of the Ruhruniversitaet, Bochum (FRG), a rapid measurement device has been developed using ionization chambers. At present steady state fluid in vertical tubes with homogeneous distribution of the two phase water vapor are tested at pressures in the range from 70 to 150 bars and rather good agreements with calculated values are found. DOE

N86-31026# Los Alamos National Lab., N. Mex.
DERIVATION OF THE EQUATIONS OF CONSERVATION OF MASS, MOMENTUM AND ENERGY OF COMPRESSIBLE FLUID MECH ANICS IN BOTH LAGRANGIAN AND EULERIAN FORMS FROM AN INTEGRAL VIEWPOINT
P. L. Browne Feb. 1986 26 p
(Contract W-7405-eng-36)
(DE86-007210; LA-10588-MS) Avail: NTIS HC A03/MF A01

This report derives, then shows the equivalence of, the Lagrangian and Eulerian equations by use of Reynolds' Transport Theorem. The differential forms of the equations are also deduced from the integral forms. Finally, some common simplifications of the equations are derived. DOE

N86-31027# Lawrence Livermore National Lab., Calif.
TIME INTEGRATION AND CONJUGATE GRADIENT METHODS FOR THE INCOMPRESSIBLE NAVIER-STOKES EQUATIONS
P. M. Gresho Jan. 1986 25 p Presented at the 6th International Conference on Finite Elements in Water, Lisbon, Portugal, 1 Jun. 1986
(Contract W-7405-eng-48)
(DE86-007177; UCRL-94000; CONF-860681-1) Avail: NTIS HC A02/MF A01

This paper addresses one class of iterative methods that are promising for cost effective Navier-Stokes simulations. The approach is based on the conjugate gradient (CG) method for solving linear algebraic systems with a symmetric positive-definite (SPD) matrix. These methods have many important characteristics: monotone convergence (in an appropriate error norm), optimal error minimization, finite termination, the direct exploitation of sparseness in the matrix, and no need to estimate iteration parameters. DOE

N86-31028# Oak Ridge National Lab., Tenn.
REMARKS ON THE CHOICE OF A STIFF ORDINARY DIFFERENTIAL EQUATION SOLVER FOR THE SOLUTION OF FLUID FLOW PROBLEMS
S. Thompson Mar. 1986 39 p
(Contract DE-AC05-84OR-21400)
(DE86-010080; ORNL-6189) Avail: NTIS HC A03/MF A01

Several aspects of the solution of fluid flow problems are discussed. A model problem is described which captures several of the salient characteristics of such problems. The model problem is derived from the one-dimensional Euler equations. It corresponds to the subcooled liquid region of a three region reactor steam generator model. The defining partial differential equations are discretized spatially using the method of pseudo-characteristics. The resulting system of ordinary differential equations is then solved by the method of lines using each of several available ordinary differential equation (ode) solvers. In addition to demonstrating that fluid flow problems can be solved effectively using adaptive mathematical software, the results also illustrate the typical performance of each solver as well as the relative merits of special solver features (eg., automatic method switching and exploitation of problem sparsity or bandedness). The model problem is also modified and used to illustrate several commonly observed characteristics of fluid flow models. The results illustrate the potential effect of solver performance of characteristics such as inaccurate water property calculations. Consequently, they explain apparent anomalies often attributed incorrectly to poor solver design and algorithmic implementation. The results also support the choice of the sparse ordinary differential solver LSODES for the solution of fluid flow problems. DOE

N86-31029# National Bureau of Standards, Gaithersburg, Md. Center for Fire Research.
CHEMICALLY REACTING TURBULENT FLOW Final Report, 1 Oct. 1982 - 30 Sep. 1985
W. M. Pitts and T. Kashiwagi Mar. 1986 43 p Sponsored by AF
(PB86-196722; NBSIR-85/3299) Avail: NTIS HC A03/MF A01 CSCL 20D

Summarized are the results of the first three years of a study on chemically reacting turbulent flow. The development of new diagnostics for variable density flows are described. These include Rayleigh light scattering for real-time, spatially-resolved concentration measurements, combined Rayleigh light scattering and hot-wire anemometry for simultaneous concentration and velocity measurements, and the development of a digital line camera which has allowed the concentration measurements to be made along a line. A study of heat transfer from heated cylinders is discussed which

has generated a much improved correlation of experimental results. These studies have also included a limited investigation of Reynolds number (Re) effects. The observed dependence of the mixing behavior on the density ratio and Re have led us to make new hypotheses concerning the nature of turbulent mixing. GRA

N86-31414*# Washington State Univ., Pullman. Dept. of Mechanical Engineering.
CONDENSATION HEAT TRANSFER UNDER A MICROGRAVITY ENVIRONMENT
L. C. Chow *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 24 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20D

N86-31424*# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
AN ANALYSIS OF ULLAGE HEAT TRANSFER IN THE ORBITAL REFUELING SYSTEM
David Kauffman *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 74 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20D

N86-31427*# Hawaii Univ., Honolulu. Dept. of Mechanical Engineering.
MATERIALS CONSIDERATIONS IN THE DESIGN OF A METAL-HYDRIDE HEAT PUMP FOR AN ADVANCED EXTRAVEHICULAR MOBILITY UNIT
Bruce E. Liebert *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 62 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20D

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-31030*# General Electric Co., Wilmington, Mass. Aircraft Instruments Dept.
HIGH ACCURACY FUEL FLOWMETER Final Report
1986 346 p
(Contract NAS3-22139)
(NASA-CR-174869; NAS 1.26:174869) Avail: NTIS HC A15/MF A01 CSCL 14B

All three flowmeter concepts (vortex, dual turbine, and angular momentum) were subjected to experimental and analytical investigation to determine the potential portotype performance. The three concepts were subjected to a comprehensive rating. Eight parameters of performance were evaluated on a zero-to-ten scale, weighted, and summed. The relative ratings of the vortex, dual turbine, and angular momentum flowmeters are 0.71, 1.00, and 0.95, respectively. The dual turbine flowmeter concept was selected as the primary candidate and the angular momentum flowmeter as the secondary candidate for prototype development and evaluation. B.G.

N86-31031*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
SUPPORT OF THE BALLOON-BORNE ULTRAVIOLET STELLAR SPECTROGRAPH Final Report
J. G. Timothy May 1986 14 p
(Contract NASw-3935)
(NASA-CR-177152; NAS 1.26:177152) Avail: NTIS HC A02/MF A01 CSCL 14B

A (256 x 1024)-pixel imaging ultraviolet Multi-mode Microchannel Array (MAMA) detector system for flight was fabricated, evaluated, and environmentally tested for flight on the Balloon Borne Ultraviolet Stellar Spectrograph (BUSS). The goal of the program was to replace the existing SEC Vidicon with the pulse-counting MAMA detector in order to, first, improve the overall sensitivity of the BUSS telescope and spectrograph for observations of stars down to m sub v = 7 and fainter, and, second, to improve the spectral resolution and wavelength accuracy by eliminating the image drifts in the Vidicon caused by magnetic field effects. A sealed MAMA detector tube structure employing a remotely processed photocathode mounted on a window in proximity focus with the front face of the MCP was developed to avoid contamination produced by a noisy and unstable device. The configuration of the BUSS detector system in its flight ready configuration is shown. The quantum efficiency curve for the semi-transparent Cs2Te photocathode is also shown. E.R.

N86-31032# Honeywell Electro-Optics Center, Lexington, Mass.
USE OF HOLOGRAPHIC FRINGE LINEARIZATION INTERFEROMETRY (FLI) FOR DETECTION OF DEFECTS Final Report, 15 Jan. 1984 - Aug. 1985
George O. Reynolds, Donald A. Servaes, Luis Ramos, Daniel Pierce, and Ronald Mayville Nov. 1985 92 p
(Contract F49620-82-C-0001)
(AD-A166141; AFOSR-86-0108TR) Avail: NTIS HC A05/MF A01 CSCL 14/5

This final report shows that the two-exposure FLI holographic method is feasible. The two-exposure FLI technique can be utilized by increasing the linear fringe frequency. Reprints of the published papers from this contract describing the modeling/experiment program are appended. The feasibility of an automatic readout for the linear fringe method is demonstrated by showing that observable and measureable effects at the defect site can be monitored. The sensitivity analysis and results from a simple dynamic loading model are presented. A preliminary FLI experiment on composite samples with both static and thermal loading failed to find defects. Finally, recommendations of work necessary to develop the FLI technique are given. GRA

N86-31033# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ANALYSIS OF A DOUBLY COUPLED SINGLE FIBER RESONATOR M.S. Thesis
Richard L. Glover Dec. 1985 67 p
(AD-A166851; AD-E950814; AFIT/CI/NR-86-52T) Avail: NTIS HC A04/MF A01 CSCL 17/7

An analysis of a doubly coupled single fiber resonator has been made. The addition of a second coupler to a typical single coupler resonator with less than 100 percent coupling is shown to greatly improve the finesse and sensitivity to fiber attenuation of the resonator. A simple method of achieving extremely high finesse with approximately 70 percent coupling is also shown. With typical fiber and coupler loss values from the literature included in the calculations, this device shows a minimum detectable signal on the order of 20 picometers as a microbend sensor and .17 microradians per second as a laser gyroscope. GRA

N86-31034# Sao Paulo Univ., Sao Carlos (Brazil). Inst. de Fisica e Quimica.
DEVELOPMENT OF A PULSE HEIGHT ANALYZER M.S. Thesis
E. S. Moreira 1984 119 p In PORTUGUESE
(DE86-700768; INIS-BR-387) Avail: NTIS (US Sales Only) HC A06/MF A01

The development of a Pulse Height Analyzer is described. This equipment is essential to analize data coming from detectors producing information codified in pulse amplitudes. The system developed consists of a Signal Input Module connected to a Controller Module based on a 8085A microprocessor capable of memorizing pulses up to 1 uS in 256 channels with a resolution

better than 20 mV. A Communication Module with a serial interface is used for data transfer to a host computer using RS232c protocol. The Monitoring and Operation Module consists of a hexadecimal Keybord, a 6 digit 7-segment display and a XY analog output enabling real time visualization of data on a XY monitor. The hardware and the software designed for this low cost system were optimized to obtain a typical dead time of approximately 100 uS. This device was used to acquire curves at the Small Angle X-ray Scattering Laboratory in this department. The appraratus performance was tested by comparing its data with a Northern Pulse Height Analizer model NS633 output, with favorable results. DOE

N86-31035# Massachusetts Inst. of Tech., Cambridge.
AE MONITORING INSTRUMENTATION FOR HIGH PERFORMANCE SUPERCONDUCTING DIPOLES AND QUADRUPOLES, PHASE 2 Progress Report, 1 Feb. 1985 - 31 Jan. 1986
Y. Iwasa 22 Jan. 1986 105 p
(Contract DE-AC02-83ER-40121)
(DE86-007414; DOE/ER-40121/6) Avail: NTIS HC A06/MF A01

In the past year and a half, attention has been focused on the development of instrumentation for on-line monitoring of high-performance superconducting dipoles and quadrupoles. This instrumentation has been completed and satisfactorily demonstrated on a prototype Fermi dipole. Conductor motion is the principal source of acoustic emission (AE) and the major cause of quenches in the dipole, except during the virgin run when other sources are also present. The motion events are mostly microslips. The middle of the magnet is most susceptible to quenches. This result agrees with the peak field location in the magnet. In the virgin state the top and bottom of the magnet appeared acoustically similar but diverged after training, possibly due to minute structural asymmetry, for example differences in clamping and welding strength; however, the results do not indicate any major structural defects. There is good correlation between quench current and AE starting current. The correlation is reasonable if mechanical disturbances are indeed responsible for quench. Based on AE cumulative history, the average frictional power dissipation in the whole dipole winding is estimated to be approx. 10 (MU)W cm(-3). We expect to implement the following in the next phase of this project: Application of room-temperature techniques to detecting structural defects in the dipole; application of the system to other dipoles and quadrupoles in the same series to compare their performances; and further investigation of AE starting current approx. quench current relationship. Work has begun on the room temperature measurements. Preliminary Stress Wave Factor measurements have been made on a model dipole casing. DOE

N86-30776# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
HOLOGRAPHIC INTERFEROMETRY FOR DISTORTION MEASUREMENTS OF ANTENNAS
H. U. Frey *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 149-155 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30964# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
FLOW RATE MEASURING DEVICES FOR GAS FLOWS [DURCHFLUSSMESSVERFAHREN FUER GASSTROEME]
K. W. Bonfig *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 16-42 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

N86-30966# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
VELOCITY PRECISION MEASUREMENTS USING LASER DOPPLER ANEMOMETRY [PRAEZISIONSMESSUNGEN VON GESCHWINDIGKEITEN MITTELS LASER-DOPPLER-ANEMOMETRIE]
D. Dopheide, G. Taux, and L. Narjes *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 52-81 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

N86-30968# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
ACCURACY OF HIGH PRESSURE GAS METER CALIBRATION IN THE NETHERLANDS [GENAUIGKEIT DER HOCHDRUCK-GASZAEHLEREICHUNG IN DEN NIEDERLANDEN]
P. M. A. vanderKam *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 117-144 In GERMAN (For primary document see N86-30962 22-34)
Avail NTIS HC A20/MF A01

N86-30973# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
MODERN DIFFERENTIAL PRESSURE GAS COUNTER (WIGZ) MEASUREMENT [MODERNE WIRKDRUCK-GASZAEHLERMESSUNG]
O. Brandt *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 259-300 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-30974# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
PRACTICAL EXPERIENCES WITH HIGH PRESSURE (HP) GAS COUNTERS. PROBLEMS OF OPERATING CALIBRATION WITH HP [PRAKTISCHE ERFAHRUNGEN MIT HOCHDRUCK-GASZAEHLERN. PROBLEME DER BETRIEBSEICHUNG MIT HOCHDRUCK]
Buresch *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 301-314 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-30975# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
BEHAVIOR OF TURBINE WHEEL GAS COUNTERS AT HIGH PRESSURES [VERHALTEN VON TURBINENRADGASZAEHLERN IM HOCHDRUCKBEREICH]
Dieter Schmitter *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 315-355 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-30979# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
EFFECTS OF PREVIOUS DISTURBANCES ON THE METER FACTORS OF A VORTEX METER [EINFLUESS VON VORSTOERUNGEN AUF ZAEHLERFAKTOREN VON WIRBELZAEHERN]
J. Boehm *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 408-428 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-30980# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
VORTEX GAS COUNTER TYPE WBZ 08. PRACTICAL EXPERIENCE [WIRBELGASZAEHLER TYP WBZ 08 - PRAXISERFAHRUNGEN]
Hans-Juergen Kastner *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 429-444 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-30981# Physikalisch-Technische Bundesanstalt, Brunswick (West Germany).
THE GAS MEASURING BELL: A BASIC NORMAL EQUIPMENT FOR THE REPRESENTATION OF VOLUME UNIT FOR GASES [DIE GASMESSGLOCKE - EIN BASISNORMALGERAET ZUR DARSTELLUNG DER VOLUMENEINHEIT FUER GASE]

H. Brunnemann and A. Aschenbrenner *In its* Problems of Large Gas Flow Measurements at High and Low Pressures Jul. 1985 p 445-449 In GERMAN (For primary document see N86-30962 22-34)
Avail: NTIS HC A20/MF A01

N86-31416*# Hawaii Univ., Hilo. Dept. of Geography.
APPLICATION OF COMPUTER IMAGE ENHANCEMENT TECHNIQUES TO SHUTTLE HAND-HELD PHOTOGRAPHY
Bruce E. David *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 69 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 14E

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-31036*# Old Dominion Univ., Norfolk, Va. Dept. of Geology.
THEORY AND OPERATION OF THE REAL-TIME DATA ACQUISITION SYSTEM FOR THE NASA-LaRC DIFFERENTIAL ABSORPTION LIDAR (DIAL) Final Report, 1 Jan. - 31 Dec. 1985
Carolyn Butler Jun. 1986 55 p
(Contract NCC1-28)
(NASA-CR-177151; NAS 1.26:177151; GSTR-86-4) Avail: NTIS HC A04/MF A01 CSCL 20E

The improvement of computer hardware and software of the NASA Multipurpose Differential Absorption Lidar (DIAL) system is documented. The NASA DIAL system is undergoing development and experimental deployment at NASA Langley Research Center for the remote measurement of atmospheric trace gas concentrations from ground and aircraft platforms. A viable DIAL system was developed capable of remotely measuring O3 and H2O concentrations from an aircraft platform. Test flights of the DIAL system were successfully performed onboard the NASA Goddard Flight Center Electra aircraft from 1980 to 1985. The DIAL Data Acquisition System has undergone a number of improvements over the past few years. These improvements have now been field tested. The theory behind a real time computer system as it applies to the needs of the DIAL system is discussed. This report is designed to be used as an operational manual for the DIAL DAS. E.R.

N86-31037*# Colorado Univ., Boulder. Dept. of Chemistry.
DESIGN AND CHEMICAL SYNTHESIS OF IODINE-CONTAINING MOLECULES FOR APPLICATION TO SOLAR-PUMPED I* LASERS Semiannual Progress Report, 1 Jan. - 30 Jun. 1986
Christopher S. Shiner 1986 4 p
(Grant NAG1-437)
(NASA-CR-176854; NAS 1.26:176854) Avail: NTIS HC A02/MF A01 CSCL 20E

The design and chemical synthesis of new media for solar pumped iodine molecule lasers are explored. In an effort to prepare an iodo fluorocarbon compound absorbing strongly at 300 nm or above, the synthesis of perfluoro allylic iodides was investigated. These compounds furnish especially stable allylic radicals upon photodissociation. The desired red shift is anticipated in the absorption maximum could correlate with increasing radical stability. This expectation was based upon the analysis, previously reported, of the structures and absorption maxima of compounds studied earlier. A previously unknown substance was prepared, a prototypical target molecule, perfluoro-3-iodocyclopent-1-ene. It was obtained by reaction of perfluorocyclopentene with sulfur trioxide under the influence of antimony pentafluoride catalyst, followed by treatment of the resulting allylic fluorosulfonate with sodium iodide in sulfoland solvent. Preliminary data indicate that the absorption maximum for the iodo fluorocarbon is not shifted significantly to longer wavelength. It is not certain whether this result reflects an unexpected influence of the cyclic structure upon the position of the absorption maximum. E.R.

N86-31038# State Univ. of New York, Buffalo. Dept. of Chemistry.
TRANSIENT EXCITATION OF ANHARMONIC ADSPECIES BY PULSED LASER RADIATION Interim Report
J. T. Lin, Xi-Yi Huang, and Thomas F. George Apr. 1986 10 p
(Contract N00014-86-K-0043)
(AD-A166308; UBUFFALO/DC/86/TR-6) Avail: NTIS HC A02/MF A01 CSCL 20/5

The excitation of anharmonic adspecies by pulsed laser radiation is investigated theoretically in the transient regimes. New features include the optimum values of pulse duration and detuning and the oscillatory behavior of the time dependent excitation caused by the anharmonicity. GRA

N86-31039# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHINESE JOURNAL OF LASERS, THE TENTH YEAR (1974-1984)(SELECTED ARTICLES)
Zhang Meizhen, Li Chengfu, Zhou Yongzong, Fan Relying, and Lu Yuemei 11 Apr. 1986 26 p Transl. into ENGLISH from Zhong Guo Jiguang (China), v. 11, no. 11, 1984 p 665-666; 686-690
(AD-A166747; FTD-ID(RS)T-0006-86) Avail: NTIS HC A03/MF A01 CSCL 20/5

Lasing Characteristics of High Quality Nd:YAG Crystals Grown by Temperature Gradient Technique are discussed. A Nd:YAG crystal of 05x50 mm in size was grown by a temperature gradient technique. It has good optical homogeneity (interference fringe number is zero) and an efficiency of 1% at 1 or 2 pps. It is easy to be operated in TEM sub 00 mode. Antireflective Coating has high efficiency at 1.06 micrometers. The error of the two-layer antireflective coating is analysed. It is shown that optical properties of the film composed of non-quarter wavelength stack are more stable that those of the film composed of quarter wavelength stack. The two-layer antireflective film has been made on K9 substrate and Ta2O5 and SiO2 used as coating material. Its reflectivity at one surface is lower than 0.03% and laser induced damage threshold is over 7 GW/cc (at 1.06 micrometer and 1 ns). GRA

N86-31040# Illinois Univ., Chicago. Dept. of Physics.
COHERENT EXTREME ULTRAVIOLET GENERATION AND SURFACE STUDIES USING ULTRAVIOLET EXCIMER LASERS Final Report, 15 Jul. 1984 - 31 Jan. 1985
Charles K. Rhodes 10 Feb. 1986 129 p
(Grant AF-AFOSR-0365-83)
(AD-A167087; AFOSR-86-0168TR) Avail: NTIS HC A07/MF A01 CSCL 20/5

The goal of this research program is the development of coherent X-ray sources is the kilovolt range. An initial application of short wavelength radiation in the vacuum ultraviolet region for photoemission studies of GaHz surfaces has been performed demonstrating the feasibility of this class of experiments. A basic and long-standing problem in the field of coherent sources is that associated with the generation of coherent energy in the extreme ultraviolet and soft x-ray regions. During the last three years, picosecond rare gas halogen (RGH) excimert laser technology, on account of the very favorable scaling relationships governing the spectral brightness of these sources, has emerged as a key factor in new techniques useful for generation of coherent radiation below 100 nm. The operation of RGH systems will be extended down into the femtosecond region, a development that will enable sources with peak powers P in the 1TW < or = 10TW range to be used in physical studies. Light sources of this kind should permit the generation of focal intensities above approx 10 to the 20th power S/c c. GRA

N86-31041# Naval Research Lab., Washington, D. C.
ARGON PUFF GAS SOFT X-RAY LASER
J. Davis, J. P. Apruzese, C. Agritellis, and P. Kepple 25 Apr.

1986 42 p
(AD-A167127; NRL-MR-5771) Avail: NTIS HC A03/MF A01 CSCL 20/5

A non-LTE dynamic argon pinch model has been applied to investigate the feasibility of creating conditions favorable to gain coefficients in excess of unity during the implosion of a cylindrical annular argon gas puff plasma. Preliminary results obtained from the SIMPLODE model suggest that it is possible to achieve measureable gain in the 3p-3s lasing transition at 434 A in neonlike argon. GRA

N86-31042# Department of the Air Force, Washington, D.C.
TRIPLE CAVITY LASER Patent Application
L. Smith, inventor (to Air Force) Filed 4 Mar. 1986 21 p
(AD-D012292; US-Patent-Appl-SN-836043) Avail: NTIS HC A02/MF A01 CSCL 20/5

The invention comprises a semiconductor laser having an attached etalon which imposes two additional reflective cavity resonance conditions on a laser diode. The etalon has partially reflective front surface and an inner surface which act in conjunction with the internal cavity of the laser diode to reduce side mode emission from the laser. This results in laser emission of a single dominant mode, i.e., a single discrete wavelength of coherent light, from the surface. GRA

N86-31043# Lawrence Livermore National Lab., Calif.
OPTIMIZED FLASHLAMP PUMPING OF DISC AMPLIFIERS
J. E. Murray, H. T. Powell, and B. W. Woods 17 Jan. 1986 56 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-007121; UCRL-93321; CONF-860117-6) Avail: NTIS HC A04/MF A01

Disk amplifier design for inertial fusion lasers has evolved with changing fusion-driver requirements from a primary emphasis on gain to a primary emphasis on efficiency. In this paper we compare Shiva and Nova amplifiers to a developmental amplifier (SSA) and show greater than a two-fold improvement in efficiency over past designs under all operating conditions. Experiments to optimize the efficiency of the SSA show that preionization of the flashlamps produces significant benefits and that the packing fraction of lamps is more important than the flashlamp reflector shape. They also show that the optimized flashlamp pulselength and reflector geometry depend on the desired stored energy in the laser medium. We have demonstrated a 7% storage efficiency at a stored fluence per disk of 0.5 J/cm(2) (stored energy density of 0.06 J/cm(3)) and 4% at 2.0 J/cm(2) (0.25 J/cm(3)). Comparison of SSA measurements with storage-efficiency calculations show that our flashlamp model accurately predicts the single-pass pumping of disk amplifiers. DOE

N86-31044# Rochester Univ., N. Y. Lab. for Laser Energetics.
LABORATORY FOR LASER ENERGETICS Annual Report, 10 Oct. 1984 - 30 Sep. 1985
Jan. 1986 232 p
(Contract DE-FC08-85DP-40200)
(DE86-006834; DOE/DP-40200/05) Avail: NTIS HC A11/MF A01

Overviews of the GDL and OMEGA facilities are given. The retrofit of the GDL with liquid crystal polarizers is described. Synchronization of the actively mode-locked and actively Q-switched oscillators is described. Progress in laser fusion includes a theory of electron heat transport, sputter-coating of laser targets, absorption line measurement of the tamper, x-ray conversion for high-Z targets, mass ablation in uv-irradiated targets, uv target designs, stimulated Raman scattering in a collisional homogeneous plasma, and absorption spectroscopy as a diagnostic. DOE

N86-31045# Los Alamos National Lab., N. Mex.
INVESTIGATION OF OPTICAL DAMAGE VIA RESONANCE IONIZATION MASS SPECTROMETRY
R. C. Estler and N. S. Nogar 1985 7 p Presented at the 17th Annual Symposium on Optical Materials for High-Power Lasers, Boulder, Colo., 28 Oct. 1985
(Contract W-7405-eng-36)
(DE86-007369; LA-UR-86-769; CONF-851052-4) Avail: NTIS HC A02/MF A01

Resonance ionization mass spectrometry (RIMS) has been used as a diagnostic for interrogating optical damage events. RIMS involves multistep laser photoionization, generally through real intermediate states, followed by mass separation and detection. It is a sensitive and selective means of detection, and has the potential for detection of ultratrace inclusions in substrates and/or coatings. In initial experiments, damage on uncoated CaF2 substrates was initiated by pulses of 1.06-(MU)m light from a Q-switched ND(+3):YAG laser. Interrogation of the spalled plume revealed CaF radicals only when damage events occurred. No Ca atoms were observed, and no attempt was made to detect F atoms or CaF2. In subsequent experiments conducted at laser intensities below the damage threshold, we observed the presence of surface adsorbents and a correlation between the presence of the adsorbents and the occurrence of optical damage. DOE

N86-31046# Lawrence Livermore National Lab., Calif.
FREE-ELECTRON LASERS FOR STRATEGIC DEFENSE: THE BENEFITS OF SCIENTIFIC OPEN SCIENTIFIC EXCHANGE
W. A. Barletta 24 Feb. 1986 8 p Presented at the International Seminar on Nuclear War, Erice, Italy, 19 Aug. 1985
(Contract W-7405-eng-48)
(DE86-008033; UCRL-94166; CONF-8508154-3) Avail: NTIS HC A02/MF A01

A dominant theme of the Fifth International Seminar on Nuclear War, held at Erice, Sicily, (August 19-24, 1985), was the appeal for openness in science and in technological research. In his address to the seminar, Italian Foreign Minister Giulio Andreotti cited the remarkable achievements at the European Center for Nuclear Research (CERN), as an inspiring example of the benefits of scientific collaboration across national borders - science without frontiers. Dr. Edward Teller eloquently argued that, thanks to a nearly complete lack of official secrecy, computer technology has flourished in the free societies of the United States, Japan, and Western Europe. The superiority of this technology, vis-a-vis its status in the Soviet bloc, has enhanced both the national security and the economic vitality of the United States and its allies. A further example of the success of science without secrecy can be found in another technology of major importance to the goals of America's Strategic Defense Initiative (SDI). The technology of note is the free electron laser (FEL). DOE

N86-31047# Oak Ridge National Lab., Tenn. Computing and Telecommunications Div.
MATHEMATICAL MODELING OF LASER INDUCED ULTRA-RAPID MELTING AND SOLIDIFICATION
V. Alexiades, J. B. Drake, G. A. Geist, G. E. Giles, A. D. Solomon, and R. F. Wood Mar. 1986 52 p
(Contract DE-AC05-84OR-21400)
(DE86-008482; ORNL-6129) Avail: NTIS HC A04/MF A01

Mathematical and numerical aspects of laser induced phase change modeling are discussed. Several numerical formulations, including explicit and implicit enthalpy, adaptive grid finite volume and front tracking are derived and results are presented. In addition, a novel hyperbolic formulation is explored analytically and numerically. The explicit enthalpy approach allows the greatest flexibility and efficiency in modeling problems with complicated phase transitions. The LASER8 program is described. DOE

N86-31048# Los Alamos National Lab., N. Mex.
NARROW BAND TUNING WITH SMALL LONG PULSE EXCIMER LASERS
R. C. Sze, N. Kurnit, D. Watkins, and I. Bigio Dec. 1985 19 p Presented at the 8th International Conference on Lasers, Las Vegas, Nev., 2 Dec. 1985
(Contract W-7405-eng-36)
(DE86-007368; LA-UR-86-770; CONF-851208-3) Avail: NTIS HC A02/MF A01

We discuss frequency narrowing and tuning with simple dispersion elements with small long-pulse excimer lasers. The improved performance over short-pulse lasers is discussed and attributed to the increased number of round trips. A physical model of the dynamics of line narrowing is presented. DOE

N86-31049# Lawrence Livermore National Lab., Calif.
BETATRON MOTION AND OPTICAL DEFLECTION IN FREE ELECTRON LASERS
T. J. Karr Oct. 1985 49 p
(Contract W-7405-eng-48)
(DE86-009556; UCRL-53718) Avail: NTIS HC A03/MF A01

Transverse displacement of the electron beam at input to the wiggler induces betatron oscillation, imparting a sinusoidal transverse displacement to the gain medium seen by the optical beam. As the light propagates down this rippled medium it is guided by the dispersion, thereby acquiring some transverse sinusoidal displacement. At output from the wiggler the optical beam in general has acquired some transverse component of velocity, that is, it propagates off-axis. As the e-beam displacement fluctuates statistically with every pulse, the optical output direction jitters around the nominal axis. The jitters is estimated with a model that includes off-axis optical propagation through a rippled gain medium but neglects feedback of the off-axis light on the e-beam. The model is solved in perturbation theory. The jitter is calculated at the final aperture of the optical system beyond the wiggler. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-31050 Bundesanstalt fuer Materialpruefung, Berlin (West Germany).
TRIBOLOGY DOCUMENTATION: WEAR, FRICTION, AND LUBRICATION
H. Tischer, E. Rudolph, and D. Mercks 1985 1179 p In ENGLISH and GERMAN
(BAM-GFT-19-1983/84; ISSN-0340-3475; ESA-86-97477) Copyright. Avail: Issuing Activity

Six thousand references covering all aspects of tribology, including experimental methods and equipment; friction and wear laws, mechanisms, and effects; appearance of damage; wear and friction under specific stressing conditions; materials and combinations of materials; surface coatings; operating conditions; environment influences; lubrication; applications of tribology in technical design and processes; and basic information on solid surfaces and contacts are listed. ESA

N86-31051# Southwest Research Inst., San Antonio, Tex. Belvoir Fuels and Lubricants Research Facility.
FUEL COMPONENT AND HETEROATOM EFFECTS ON DEPOSITS AND WEAR Interim Report, 1 Oct. 1981 - 30 Sep. 1984
E. A. Frame Dec. 1985 50 p
(Contracts DAAK70-85-C-0007; DAAK70-82-C-0001)
(AD-A166839; AD-E950814; BFLRF-190) Avail: NTIS HC A03/MF A01 CSCL 21/4

The objective of this project was to investigate the effects of fuel heteroatom compounds on diesel engine performance, particularly engine deposition and wear. This work involved operating a single-cylinder diesel research engine using a highly controlled base fuel (JP-7) which was extremely low in sulfur and nitrogen. The engine lubricant was a synthetic polyalphaolefin material, also free of sulfur and nitrogen. Thus, wear and deposit effects observed during the 60-hour single-cylinder laboratory engine test were directly related to the heteroatom compound added to the base fuel. Through these controlled laboratory engine tests, wear and deposit effects were studied using four different types of known fuel sulfur complexes, and two different fuels containing naturally occurring sulfur compounds. Fuel sulfur type did not appear to directly influence wear rate, whereas the disulfide-type sulfur was found to produce high piston deposit tendencies. No increase in engine wear was observed for three fuels each of which contain a different known nitrogen compound. Fuel injector deposits and fouling occurred with some of the nitrogen-containing fuels. A fuel containing a combination of both known sulfur and nitrogen hetero-atoms was tested and no synergistic effects on wear or deposits were observed. GRA

N86-31052# Department of the Air Force, Washington, D.C.
LOW TEMPERATURE RATE CONTROLLER Patent
Arthur Holmberg, Jr. and Earl M. Altman, inventors (to Air Force) Issued 25 Feb. 1986 4 p Supersedes AD-D011029
(AD-D012277; US-Patent-4,572,488; US-Patent-Appl-SN-559612; US-Patent-Class-267-8R) Avail: NTIS Avail: US Patent and Trademark Office CSCL 22/2

This invention relates generally to shock absorbers, and, more particularly, to shock absorbers that are used in outer space applications. The present invention uses a pair of flexible metal bellows sealed to a piston and a housing by continous welds. A gas occupies sealed volumes external to the bellows on either side of the piston and is metered through a resistive channel to that volume on the opposite side of the piston. A center volume between these volumes is open to the external environment. This center volume, is a typical shock absorber, internal to the two bellows is filled with a damping fluid. An actuator rod is attached to the piston and one end is attached to a load while the other end is attached to a stable platform. A spring that is used to drive the load in a given direction is attached to the rod and motion thereof is damped by the rate controller. One object of the present invention is to provide in outer space. Another object of the present invention is to provide a rate controller that is hermetically sealed. GRA

N86-31053# Army Engineer Topographic Labs., Fort Belvoir, Va.
GEOGRAPHIC INFORMATION SYSTEMS IN ROBOTIC VEHICLES
Bruce B. Zimmerman, Richard L. Rosenthal, and Jerry M. Breen 1986 13 p
(AD-A166859; ETL-R-083) Avail: NTIS HC A02/MF A01 CSCL 13/6

Robotic vehicles offer potential to the Army for force multiplication and removing the soldier from hazardous environments. The Army robotic vehicle program will provide a supervised autonomy capability with full battlefield mobility. To accomplish this the control system will require a person in the control loop at least part of the time. The Army program incorporates several technologies including a digital terrain data base, product generation capabilities, stereo vision, and an inertial position and attitude unit. These technologies allow for vehicle operation over-the-hill and beyond line-of-sight. This paper will discuss the detailed use of terrain data and terrain data products, such as route planning and three-dimensional synthetic scenes, in the interactive control of a robotic vehicle. Of particular importance is the relation of the terrain data to the vision data and position and attitude data. This paper will also discuss the similarities and difference between GIS requirements for interactive robotic vehicle control and autonomous vehicles, such as in the DARPA Autonomous Land Vehicle Program. Author (GRA)

N86-31054# Department of the Navy, Washington, D. C.
DOUBLE-STAGE AIR FILTER Patent Application
W. D. Craig, inventor (to Navy) Filed 10 Feb. 1986 20 p
(AD-D012307; US-Patent-Appl-SN-827589) Avail: NTIS HC A02/MF A01 CSCL 13/11

This patent application discloses an improved double-stage air filter of modular construction for attachment between aligned openings of a spaced double wall structure to supply filtered air flow to a controlled area. The filter is generally made up of casing means and combined plate means and sleeve means. Both the casing means and plate are provided with a flange means. The sleeve means is provided with a series of perforations and the plate means flange means is provided with a plurality of relatively

spaced slots. The casing means flange means is affixed to the outer wall so that the casing means extends between the walls. The plate means includes retainer means that is affixed to the inner wall so that the sleeve means is inserted in the casing means. Inner and outer filter means for cleaning and purifying an air flow are disposed about the sleeve means. Retainer means are connected to the casing means flange means so as to hold the filter means in sealing engagement between the last mentioned retainer means and the plate means. During filter use, an airflow to be filtered is directed through the sleeve perforations, the filter means, and the slots of the plate flange means thereby supplying filtered air to the controlled area. GRA

N86-31055# Sanders (Nicholas A.), Norwich, Vt.
ENGINE HEATING DEVICE Final Report
N. A. Sanders 1986 83 p
(Contract DE-FG01-82CE-15141)
(DE86-005095; DOE/CE-15141/T1) Avail: NTIS HC A05/MF A01

The engine heating device development project was supported by DOE grant No. DE-FG01-82CE15141. The engine heating device recovers waste engine exhaust heat and stores it for later use in rewarming the cold engine prior to starting. Heat is stored in the phase change and sensible heat capacity of a storage material. This device finds application in the cold weather starting of gasoline and diesel engines. During the grant period three major technical issues were addressed: (1) design optimization; (2) quantifying device performance, and (3) field testing. Two totally different designs were looked at during design optimization, i.e., a horizontally mounted unit and a vertically mounted unit. The latter, with its up and down concentric flow pattern, proved to be the best design. This is because of its superior heat storage ability and its simpler design. A number of different heat storage materials were looked at during this stage of the program. The material selected best for this application was Lithium Nitrate (LiNO3). A problem of low heat transfer rates from the heat storage material was solved by the insertion of wire mesh into the storage material. DOE

N86-31056# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
TRITIUM GAS TRANSFER PUMP DEVELOPMENT
C. L. Sharpe 1985 14 p Presented at the 46th DAMSUL Committee Meeting, Oak Ridge, Tenn., 5 Jun. 1985
(Contract DE-AC09-76SR-00001)
(DE86-007164; DP-MS-85-108; CONF-8506255-1) Avail: NTIS HC A02/MF A01

Non-lubricated, hermetically sealed pumps for tritium service have been selected to replace Sprengel pumps in the existing Tritium Facility. These pumps will be the primary gas-transfer pumps in the planned Replacement Tritium Facility. The selected pumps are Metal Bellows Corporation's bellows pumps and Normetex scroll pumps. Pumping range for a Normetex/Metal Bellows system is from 0.01 torr suction to 2300 torr discharge. Performance characteristics of both pumps are presented. DOE

N86-31057# Sandia National Labs., Livermore, Calif. Joining Model Labs. Div.
PREDICTION OF ELECTRON BEAM WELDING DEPTH OF PENETRATION
W. H. Giedt Feb. 1986 26 p
(Contract DE-AC04-76DR-00789)
(DE86-007837; SAND-86-8205) Avail: NTIS HC A03/MF A01

Analytical and experimental results showing the relationship between electron beam welder settings and penetration depth were reviewed. This led to the development an equation for representing the relation between partial penetration and the independent variables involved in electron beam welding. Beam focus current deviation was found to have the greatest influence on predicted penetration. The priority for precision in machine settings was concluded to be: (1) optimum beam focus current; (2) beam voltage or current; (3) travel speed; and (4) focus coil to work distance. M.G.

N86-31058# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
ZIRCONIA TO CAST IRON BRAZING FOR UNCOOLED DIESEL ENGINES
M. L. Santella, J. P. Hammond, S. A. David, and W. A. Simpson 1985 8 p Presented at the 21st Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Mich., 14-17 Nov. 1983
(Contract DE-AC05-84OR-21400)
(DE86-008982; CONF-8510103-7) Avail: NTIS HC A02/MF A01

Partially stabilized zirconia has been successfully brazed to nodular cast iron by the active substrate process. The process involves coating the ceramic with an agent that promotes wetting and allows the use of commercially available ductile brazing alloys. Process details and the microstructure of zirconia-cast iron joints are described. A method of testing the shear strength of braze interfaces is outlined, and data for zirconia interfaces tested at 25 and 400(0)C are presented. Joints between zirconia and cast iron or titanium develop shear strengths typically in excess of 130 MPa at 25(0)C, but strength at 400(0)C is lower. The reduced strength is related to porosity in the braze joints, and a means of eliminating this porosity is discussed. Preliminary observations indicate that aging at 400(0)C produces no major microstructural changes in the braze joints. Also, the brazing of 115-mm-diameter discs of zirconia and cast iron, and the nondestructive examination of these brazements, is discussed. DOE

N86-31059# California Univ., Santa Barbara.
DUTY CYCLE TESTING AND PERFORMANCE EVALUATION OF THE SM-229 TELEOPERATOR
R. S. Stoughton and D. P. Kuban Nov. 1985 28 p Presented at the 20th Aerospace Mechanism Symposiu, Cleveland, Ohio, 7 May 1986 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-004780; CONF-860560-1) Avail: NTIS HC A03/MF A01

This paper contains the first known experimental studies and analyses of teleoperator performance for specific duty cycles. The results are presented in two distinct areas as position usage patterns, and as three-dimensional power grids. The position usage patterns are a valuable means to assess the available motion range. The power grids are a unique concept for evaluating joint performance. Final conclusions contain recommendations to upgrade the teleoperator for optimum performance. DOE

N86-31060# Technical Research Centre of Finland, Espoo.
OIL HYDRAULICS IN ARCTIC REGIONS
H. Vainio, M. Lehmusto, and S. Mikkonen Dec. 1984 37 p In FINNISH
(DE86-751569; VTT-TIED-395) Avail: NTIS (US Sales Only) HC A03/MF A01

Oil hydraulics in arctic conditions has been studied. Seals, oils and hydraulic motors were tested down to the temperature -50 deg C. Some seals operated satisfactory at the temperature -50 deg C when lightly loaded. Because of good viscosity properties the hydraulic oils used for aeroplanes are well suited for use in cold environments. High speed low torque-hydraulic motors operated satisfactory in cold environment. A hydraulic system of a cargo hatch in an arctic vessel was tested in a cold room. The effects of large differences in temperature must be taken into account when planning hydraulic systems. DOE

N86-31061# Allied Bendix Corp., Kansas City, Mo.
ROBOT-ASSISTED TORQUE MEASUREMENT
J. R. Lembke Mar. 1986 27 p
(Contract DE-AC04-76DP-00613)
(DE86-009129; BDX-613-3478) Avail: NTIS HC A03/MF A01

An Intelledex 605T robot was used to evaluate the feasibility of automating the measurement of rotary solenoid torque, with the goal of improving productivity. The solenoid chosen for the evaluation is expected to be produced in relatively large quantities for several programs. A new measurement concept was devised, in which the robot connects the solenoid shaft to a torque sensor,

rotates the solenoid housing, and correlates rotational data with digitized torque measurements. Prototype tooling was designed and fabricated, and the measurement concept was evaluated in comparison with the manual method which is presently used. The automatic robot-based measurement system was shown to yield results that are in good agreement with manual measurements. The technique automatically performs all necessary operations once the solenoids have been placed into a part loading fixture, with a cycle time significantly reduced from the manual method. Manual interpretation of chart data is not required, because the results are digitized. The system can compare the measured torque to specification limits and can provide a printed report of acceptance or rejection. its and can provide a printed report of acceptance or rejection. DOE

N86-31062# Sandia National Labs., Albuquerque, N. Mex.
CALORIMETRY OF PULSED VERSUS CONTINUOUS GAS TUNGSTEN ARC WELDS
G. A. Knorovsky and P. W. Fuerschbach 1986 19 p Presented at the ASM International Trends in Welding Research Meeting, Gatlinburg, Tenn., 18 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-009285; SAND-86-0818C; CONF-860594-1) Avail: NTIS HC A02/MF A01

A technique to measure heat input to welds is used in conjunction with metallography to compare the heat inputs, penetrations, volumes melted, and arc and melting efficiencies of pulsed versus conventional Gas Tungsten Arc autogenous standing edge welds in thin gauge 304L stainless steel. These results are a necessary link between computer models and real weld machine settings. Results show that machine output and heat input correlate better with RMS values of current than with average values. Arc efficiency increased slightly and melting efficiency increased dramatically for increased travel speed at nominally constant heat inputs. Also, for two conditions of average current and travel speed corresponding to similar nominal heat inputs, one an efficient combination (81 amps at 12.2 mm/s) the other an inefficient combination (42 amps at 6.3 mm/s), current pulsing increased penetration only for the inefficient case. Comparing the processes on the basis of penetration divided by heat input, the continuous weld made under efficient conditions was best. However, some nonreproducible pulsed welds gave an exceptionally high value for this parameter. It is believed that resonance between the liquid pool motion and the pulse frequency may explain this phenomenon. DOE

N86-31063# Battelle Columbus Labs., Ohio.
GAS-ENGINE HEAT PUMP TEST PROCEDURES Topical Report, Oct. 1985 - Feb. 1986
S. G. Talbert and A. L. Rutz Apr. 1986 67 p
(Contract GRI-5084-242-1118)
(PB86-201662; GRI-86/0083) Avail: NTIS HC A04/MF A01 CSCL 13A

The purpose is to establish standardized procedures for testing gas engine-driven heat pumps,and to define the various engine heat pump performance factors. The recommended test methods outlined should enable Gas Research Institute to better monitor the several research projects now underway to develop gas engine heat pumps for residential and light commercial use. Altogether, 17 performance test points are described which will be sufficient to describe the heating and cooling performance of a variable speed heat pump over its expected range of outdoor temperatures. The tests include 11 steady-state tests, two part-load tests one defrost test, one auxiliary heater test, and two domestic water heating tests. Equations and procedures also are outlined so that the various heat pump performance factors can be calculated, as well as its expected seasonal and annual performance. GRA

N86-31064# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
DESIGN OF BOLTED JOINTS IN COMPOSITES
1985 27 p Presented at the 60th Meeting of the Structures and Materials Panel of AGARD, San Antonio, Tex., 21-26 Apr. 1985
(AGARD-R-727; ISBN92-835-1531-5) Avail: NTIS HC A03/MF A01

This publication contains three papers heard by the Structures and Materials Panel Sub-Committee on Mechanically Fastened Joints in Composites. The papers survey the various parameters governing the behaviour of bolted joints, and give some experimental data representative of behaviour under load. It is concluded that poor static strength, rather than good fatigue strength, is a characteristic of this type of joint; a Panel Specialists Meeting is to review the topic. Author

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-31065*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DETERMINATION OF GRAIN SIZE DISTRIBUTION FUNCTION USING TWO-DIMENSIONAL FOURIER TRANSFORMS OF TONE PULSE ENCODED IMAGES
Edward R. Generazio Jun. 1986 24 p
(NASA-TM-88790; E-3125; NAS 1.15:88790) Avail: NTIS HC A02/MF A01 CSCL 11F

Microstructural images may be tone pulse encoded and subsequently Fourier transformed to determine the two-dimensional density of frequency components. A theory is developed relating the density of frequency components to the density of length components. The density of length components corresponds directly to the actual grain size distribution function from which the mean grain shape, size, and orientation can be obtained. Author

N86-31066# Oak Ridge Y-12 Plant, Tenn.
ACOUSTIC EMISSION TRANSIENT RECORDING
S. A. Wallace, E. W. Walker, J. W. Whittaker, and J. R. Younkin Nov. 1985 32 p
(Contract DE-AC05-84OS-21400)
(DE86-006908; Y/DW-612) Avail: NTIS HC A03/MF A01

Laser welds of less than eight seconds duration are routinely performed at the Oak Ridge Y-12 Plant. The primary material welded is stainless steel sheet of thickness 0.25 mm or less. Cracking and porosity formation in the weld are a significant concern. Due to the difficulty of ultrasonically observing cracks in the small weld beads, an investigation is underway to evaluate the acoustic emission technique as an in-process means of identifying crack formation. The recording system being used is described and a signature algorithm is included for locating acoustic activity at a one millisecond resolution. DOE

N86-31067# Allied Bendix Corp., Kansas City, Mo.
IMPROVED MAGNETIC PARTICLE INSPECTION OF SMALL THREADED FASTENERS
J. A. Brunk Mar. 1986 21 p
(Contract DE-AC04-76DP-00613)
(DE86-009324; BDX-613-3283) Avail: NTIS HC A02/MF A01

Magnetic particle inspection is required for over 100 types of threaded fasteners used at Bendix Kansas City Division of Allied Corporation. Most are purchased screws and bolts made to AN, MS, and NAS specifications. These specifications invariably require that testing be in accordance with MIL-I-6868E, Inspection Process, Magnetic Particle. This specification includes directions for magnetization of test objects that are inappropriate for many small parts, particularly for screws and bolts of less than about 8-mm thread diameter. Following those directions is more likely to interfere with the detection of serious defects than to ensure that they will be found. Alternate testing techniques that make it easier to find and correctly interpret defect indications have been developed. A new semiautomatic magnetic particle testing machine for threaded fasteners and other small parts up to 9.5 mm in

diameter and 150 mm in length is being built to BKC specifications, with delivery scheduled for April, 1985. Interim procedures using existing equipment have been adopted to improve the reliability of magnetic particle inspection of small fasteners. DOE

N86-30784# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
NONDESTRUCTIVE TESTING OF FIBER REINFORCED COMPOSITES USING X-RAY FINE STRUCTURE PROCEDURES
J. Walter and Henschel (Bundesanstalt fuer Materialpruefung, Berlin, West Germany) *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 217-229
(For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30785# Fulmer Research Inst. Ltd.. Stoke Poges (England).
DEVELOPMENTS IN THE NONDESTRUCTIVE EVALUATION (NDE) OF COMPOSITE MATERIALS
R. L. Crocker *In its* Proceedings of a Workshop on Composites Design for Space Applications (ESA-SP-243) Feb. 1986 p 231-235
(For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-31068# British Library Lending Div., Boston Spa (England).
EXPERIMENTAL AND ANALYTICAL RESULTS OF LARGE-SCALE PRESSURIZED THERMAL SHOCK TESTING
A. Sauter, H. Huber, and T. Nguyen-Huy 1986 33 p Transl. into ENGLISH from "Experimentelle und Analytische Ergebnisse eines Grossversuchs zur Notkuehlsimulation" Stuttgart, West Germany 33 p Presented at the 11th MPA Seminar, Stuttgart, West Germany, 10-11 Oct. 1985
(BLL-Risley-TR-5282-(9091.9F)) Avail: British Library Lending Div., Boston Spa, England

The systems engineering activity concentrated on evaluation of emission model characteristics and the requirements they impose on the Orbit Transfer Vehicles (OTV), establishing debris/meteoroid shielding criteria, and updating Mission and Systems Requirements document. The Macintosh based computer system was expanded to encompass performance calculations coupled with the mission model. Two configuraton updates were indicated for the baseline vechicles: the ground based vehicle will have debris/meteoroid shielding added to the propellant tanks; the space based vehicle will be resized to accommodate the new driving manned GEO sortie mission (probably to the vicinity of 75,000 pounds propellant load). The optimum cargo bay appears to be tending towards the shortest possible configuration, the torous LOX tank version. The definition of the aeroassist trade vehicles is progressing, but conclusions are not yet available. The trajectory control evaluations were conducted for all 14 STS upper atmosphere profiles, and the guidance algorithm performs accurately in all cases. B.G.

N86-31069*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SENSTITIVTY ANALYSIS AND OPTIMIZATION OF NODAL POINT PLACEMENT FOR VIBRATION REDUCTION
Jocelyn I. Pritchard, Howard M. Adelman, and Raphael T. Haftka (Virginia Polytechnic Inst. and State Univ., Blacksburg.) Jul. 1986 34 p
(NASA-TM-87763; NAS 1.15:87763) Avail: NTIS HC A03/MF A01 CSCL 20K

A method is developed for sensitivity analysis and optimization of nodal point locations in connection with vibration reduction. A straightforward derivation of the expression for the derivative of noda' locations is given, and the role of the derivative in assessing design trends is demonstrated. An optimization process is developed which uses added lumped masses on the structure as design variables to move the node to a preselected location - for example, where low response amplitude is required or to a point which makes the mode shape nearly orthogonal to the force distribution, thereby minimizing the generalized force. The optimization formulation leads to values for added masses that adjust a nodal location while minimizing the total amount of added mass required to do so. As an example, the node of the second mode of a cantilever box beam is relocated to coincide with the centroid of a prescribed force distribution, thereby reducing the generalized force substantially without adding excessive mass. A comparison with an optimization formulation that directly minimizes the generalized force indicates that nodal placement gives essentially a minimum generalized force when the node is appropriately placed. Author

N86-31070*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AEROELASTIC CONSIDERATIONS FOR TORSIONALLY SOFT ROTORS
Wayne R. Mantay and William T. Yeager, Jr. Aug. 1986 20 p Presented at the AHS 2nd Decennial Specialists' Meeting on Rotorcraft Dynamics, Moffett Field, Calif., 7-9 Nov. 1984
(NASA-TM-87687; NAS 1.15:87687; USAAVSCOM-TR-86-B-1)
Avail: NTIS HC A02/MF A01 CSCL 20K

A research study was initiated to systematically determine the impact of selected blade tip geometric parameters on conformable rotor performance and loads characteristics. The model articulated rotors included baseline and torsionally soft blades with interchangeable tips. Seven blade tip designs were evaluated on the baseline rotor and six tip designs were tested on the torsionally soft blades. The designs incorporated a systemmatic variation in geometric parameters including sweep, taper, and anhedral. The rotors were evaluated in the NASA Langley Transonic Dynamics Tunnel at several advance ratios, lift and propulsive force values, and tip Mach numbers. A track sensitivity study was also conducted at several advance ratios for both rotors. Based on the test results, tip parameter variations generated significant rotor performance and loads differences for both baseline and torsionally soft blades. Azimuthal variation of elastic twist generated by variations in the tip parameters strongly correlated with rotor performance and loads, but the magnitude of advancing blade elastic twist did not. In addition, fixed system vibratory loads and rotor track for potential conformable rotor candidates appears very sensitive to parametric rotor changes. Author

N86-31071*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRESS ANALYSIS OF THE CRACKED LAP SHEAR SPECIMENS: AN ASTM ROUND ROBIN
W. S. Johnson Aug. 1986 87 p
(NASA-TM-89006; NAS 1.15:89006) Avail: NTIS HC A05/MF A01 CSCL 20K

This ASTM Round Robin was conducted to evaluate the state of the art in stress analysis of adhesively bonded joint specimens. Specifically, the participants were asked to calculate the strain-energy-release rate for two different geometry cracked lap shear (CLS) specimens at four different debond lengths. The various analytical techniques consisted of 2- and 3-dimensional finite element analysis, beam theory, plate theory, and a combination of beam theory and finite element analysis. The results were examined in terms of the total strain-energy-release rate and the mode I to mode II ratio as a function of debond length for each specimen geometry. These results basically clustered into two groups: geometric linear or geometric nonlinear analysis. The geometric nonlinear analysis is required to properly analyze the CLS specimens. The 3-D finite element analysis gave indications of edge closure plus some mode III loading. Each participant described his analytical technique and results. Nine laboratories participated. Author

N86-31072# Minnesota Univ., Minneapolis. Dept. of Aerospace Engineering and Mechanics.
STRUCTURAL INELASTICITY 28: A FINITE ELEMENT VECTORIZATION METHOD FOR THE SOLUTION OF CRACK GROWTH PROBLEMS IN 2 OR 3 DIMENSIONS Final Report
Philip G. Hodge, Jr. Feb. 1986 34 p
(Contract N00014-82-K-0020)
(AD-A166545; AEM-H2-4) Avail: NTIS HC A03/MF A01 CSCL 20/11

A summary and bibliography are presented of the investigations of structural inelasticity. Research conducted under this contract included two distinct projects. The first was concerned with using simple truss models to illustrate certain critical aspects of nonlinear material behavior. The other project was concerned with using a constant-strain finite element method to find complete solutions for the stress and displacement in a plate with a centered crack. The elastic solution was obtained first. The elastic/plastic solution was completed after the expiration of this contract. GRA

N86-31073# California Univ., Berkeley. Dept. of Civil Engineering.
AN AUGMENTED ALAGRANGIAN FORMULATION FOR THE FINITE ELEMENT SOLUTION OF CONTACT PROBLEMS Interim Report, Jan. - Dec. 1985
Joseph A. Landers and Robert L. Taylor Mar. 1986 42 p
(Contract N62583-85-M-R079; YR0-2303)
(AD-A166649; NCEL-CR-86.008) Avail: NTIS HC A03/MF A01 CSCL 13/13

A solution method for small deformation frictionless contact problems is developed. First, a review of various solution methods for contact problems is given. Next, a detailed discussion is made of the augmented Lagrangian method. Then, the finite element implementation is discussed. Finally, sample problems and their solutions are presented to demonstrate the usefulness of the method. Both the static and dynamic solution algorithms are described in this report. Author (GRA)

N86-31074# Brown Univ., Providence, R. I. Div. of Engineering.
USE OF THE SHADOW SPOT METHOD IN EVALUATING J FOR DUCTILE STEELS
A. Marchand, L. B. Freund, C. C. Ma, and J. Duffy Feb. 1986 50 p
(Contract N00014-85-K-0597)
(AD-A166834; ONR-0597/1) Avail: NTIS HC A03/MF A01 CSCL 20/11

Caustic curve patterns obtained by the shadow spot method have been used in the past to give direct optical measurement of the elastic stress intensity factor in nominally brittle material. An advantage of the optical shadow spot method is that it provides a direct measure of the intensity of the crack tip stress field. The method is based on the idea that the value of the stress intensity factor can be related to features of the optical field obtained by transmitting parallel light through the crack tip region of a transparent specimen or by reflecting light from the surface of an opaque specimen. Most structural materials that contain cracks undergo substantial plastic deformation under rising load prior to onset of crack growth. Recently, the range of applicability of the shadow spot method was extended to the elastic-plastic power hardening materials. It was noted that the value of Rice's J-integral can be viewed as a plastic strain intensity factor. Methods for measuring values of J for ductile fracture specimens are available but the methods are indirect, in the sense that values of J are inferred from other measured quantities, typically load-deflection data. The shadow spots obtained in the test should be formed by reflection of light arrays from points well within the crack tip plastic zone where the one parameter plastic intensity singular field is dominant. The method of caustics provides a measurement which is customarily interpreted on the basis of plane stress. GRA

N86-31075# Brown Univ., Providence, R. I. Div. of Engineering.
THE STRESS INTENSITY FACTOR HISTORY DUE TO THREE DIMENSIONAL TRANSIENT LOADING OF THE FACES OF A CRACK
L. B. Freund Feb. 1986 28 p
(Contract N00014-85-K-0597; Grant NSF MSM-85-13096)
(AD-A166835) Avail: NTIS HC A03/MF A01 CSCL 20/11

A procedure is described for determining dynamic stress intensity factor histories for a half plane crack in an otherwise unbounded elastic body, with the crack faces subjected to tractions that result in variation of the stress intensity factor along the crack edge. The procedure is based on integral transform methods and the properties of analytic functions of a complex variable. The procedure is illustrated for the case of a pair of opposed line loads suddenly applied on the crack faces along a line perpendicular to the crack edge. An exact expression is obtained for the resulting mode I stress intensity factor as a function of time for any point along the crack edge. Some features of the solution, as well as possible extensions of the procedure, are discussed. Author (GRA)

N86-31076# Army Armament Research and Development Command, Watervliet, N. Y. Close Combat Armaments Center.
A DESIGN METHOD FOR AUTOFRETTAGED THICK-WALLED CYLINDERS WITH OUTSIDE DIAMETER DISCONTINUITIES Final Technical Report
J. J. Busuttil, Jr. and J. A. Kapp Feb. 1986 29 p
(AD-A166881; AD-E440321; ARCCB-TR-86009) Avail: NTIS HC A03/MF A01 CSCL 20/11

A design method has been developed to determine the fatigue life of thickwalled autofrettaged cylinders containing outside diameter (OD) notches which act as failure initiation sites. The method uses local strain analysis for fatigue crack initiation and fracture mechanics analysis for crack propagation to failure. The method is relatively easy to program and thus can be used to optimize cylinder designs with respect to OD initiated failures. The computer program developed requires only minimal input to estimate life: cylinder dimensions, notch depth and root radius, internal pressure, and material yield strength. Other material properties (low cycle fatigue data, fracture toughness, and crack growth law) and permanently stored. The program calculates the elastic stress concentration factor using a Neuber diagram as a default. If the elastic kt is known from other sources, this feature of the program can be overridden. The stress concentration factor is used to calculate notch root stresses from which local strains are estimated. Once the local strains are known, crack initiation life is estimated using the stored low cycle fatigue data. A crack is then assumed to exist and a power law is integrated to determine crack propagation life to failure. The total life is the sum of the initiation and propagation lives. The applicability of the design method is demonstrated by using it to predict the total fatigue lives of existing cylinder designs with measured fatigue lives. GRA

N86-31077# Maryland Univ., College Park Dept. of Aerospace Engineering.
A NEW EFFICIENT APPROACH TO THE FORMULATION OF MIXED FINITE ELEMENT MODELS FOR STRUCTURAL ANALYSIS Interim Report, May - Jun. 1986
S. W. Lee and J. J. Rhiu Feb. 1986 32 p
(Contract N00014-84-K-0385)
(AD-A167340) Avail: NTIS HC A03/MF A01 CSCL 20/11

A new finite element formulation is developed based on the Hellinger-Reissner principle with independent strain. By dividing the assumed strain into the lower order part and the higher order part, the new formulation can be made much more efficient than the standard mixed formulation. In addition the present new approach provides a rational way of introducing stabilization matrix to suppress undesirable kinematic modes. Author (GRA)

N86-31078# Sandia National Labs., Albuquerque, N. Mex.
DYNAMIC RESPONSE OF RANDOM PARAMETERED STRUCTURES WITH RANDOM EXCITATION
L. J. Branstetter and T. L. Paez Feb. 1986 161 p
(Contract DE-AC04-76DP-00789)
(DE86-007246; SAND-85-1175) Avail: NTIS HC A08/MF A01

A Taylor series expansion technique is used for numerical evaluation of the statistical response moments of a linear

multidegree of freedom (MDF) system having random stiffness characteristics, when excited by either stationary or nonstationary random load components. Equations are developed for the cases of white noise loading and single step memory loading, and a method is presented to extend the solution to multistep memory loading. The equations are greatly simplified by the assumption that all random quantities are normally distributed. A computer program is developed to calculate the response moments of example systems. A program user's manual and listing (DYNAMO) are included. Future extensions of the work and potential applications are discussed. DOE

N86-31079# Sandia National Labs., Albuquerque, N. Mex.
DYNAMIC RESPONSE MOMENTS OF RANDOM PARAMETERED STRUCTURES WITH RANDOM EXCITATION
L. J. Branstetter and T. L. Paez 1986 8 p Presented at the 3rd ASCE Engineer Mechanics Specialty Conference on Dynamic Response of Structures, Los Angeles, Calif., 31 Mar. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004567; SAND-85-1887C; CONF-860371-1) Avail: NTIS HC A02/MF A01

First and second order statistical response are formulated for linear multi-degree of freedom dynamical systems having both random load and random structural characteristics. A matrix, ordinary differential equation describing system response is discretized in time, integrated, and then rewritten in the form of a Taylor series expansion of each random element about its mean value. This equation is then used to form response moment expression. Evaluation of the moments is made possible by the development of useful recursive formulas. Results are verified with analytic solutions. The method is useful for the analysis of static or dynamic random response. DOE

N86-31080# Argonne National Lab., Ill.
TWO-SURFACE PLASTIC MODEL FOR CONCRETE AND GEO-MATERIALS
J. C. Chern, F. B. Lin, and A. H. Marchertas 1986 7 p Presented at the International Conference on Computational Mechanics, Tokyo, Japan, 25 May 1986 Prepared in cooperation with National Taiwan Univ., Taipei and Northwestern Univ., Evanston, Ill.
(Contract W-31-109-eng-38)
(DE86-007475; CONF-860585-1) Avail: NTIS HC A02/MF A01

A constitutive model based on the elastic-plastic formulation coupled with the critical state theory used in soils is presented. A conventional elastic-plastic model is applied to represent the structural behavior up to the maximum strength capacity of material. Beyond this point, the modified critical state theory is used to simulate the material response. In this way, the softening (or hardening) of the material can be accounted for. The softening (or hardening) of the material is facilitated by the shrinkage (or expansion) of a limiting surface in the stress space. This surface is assumed to coincide with the failure surface at the maximum strength of material. It is derived with the help of the five-parameter Willam-Warnke failure surface. The shape of the limiting surface has the same angular dependence as the failure surface of the deviatoric plane. In the meridian plane, the shape is assumed to be that of a slanted ellipse. The described constitutive model is very simple, requiring a minimum of experimental data for input. It is applicable to concrete, geomaterials, and other materials which have different strengths in tension and compression. DOE

N86-31081# Los Alamos National Lab., N. Mex.
FLEXURE STRENGTH ANALYSIS OF LOS ALAMOS CERAMIC BODIES Al-13, Al-18, AND MgO-Y2O3
Jack H. Enloe, Frank G. Gac, and Eralio J. Trujillo Feb. 1986 29 p
(Contract W-7405-eng-36)
(DE86-008576; LA-10617-MS) Avail: NTIS HC A03/MF A01

Flexure strength was determined by four-point loading and analyzed using Weibull analysis for selected Los Alamos National Laboratory ceramic materials including an MgO-3 wt % Y2O3 body and alumina bodies AL-13 and AL-18. Fractographic and microstructural characterizations were also performed on the materials. Results of the Weibull analysis conclude that AL-13 has exceptionally high strength reliability, whereas AL-18 and MgO-3 wt% Y2O3 have strength reliabilities comparable to most ceramic materials. Strength data were also compared to data for similar materials from commercial literature. DOE

N86-31082# Knolls Atomic Power Lab., Schenectady, N. Y.
EFFECTIVE TEARING MODULUS: A MODEL FOR BRITTLE FRACTURE AND TEARING INSTABILITY
B. D. Macdonald Mar. 1986 38 p
(Contract DE-AC12-76SN-00052)
(DE86-008785; KAPL-4190) Avail: NTIS HC A03/MF A01

The objective of this study was to determine a model for the transition regime and upper shelf fracture resistance of low-strength/high-toughness structural steels. The success of the model was measured in two ways: (1) the condition for fracture specimen maximum load, intersection of applied and material effective tearing modulus curves, was satisfied for compact tension data in the transition and upper shelf fracture regimes; (2) maximum load attained by surface-flawed intermediate test vessels (ITV's) was accurately calculated by using the model and associated compact tension data. The fracture model attribute of stress-dependent plastic zone constraint was thought to be primarily responsible for its thickness insensitivity. Metallurgical fracture mode insensitivity of the model in the transition regime was thought to be primarily due to the use of a plastic zone addition to the physical crack size. Calculation of the fracture model parameters (crack driving/resistance forces and their derivatives with respect to the plastic-zone-corrected crack) was enhanced by the availability of and relationship to linear elastic fracture mechanics formulas. Ligament size criteria consistent with the fracture model were determined empirically for the compact tension specimen. Pressure vessel analyses indicated that model accuracy was acceptable provided that the average hoop stress was less than the yield stress. DOE

N86-31083# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
THE PROSPECTS FOR FINITE ELEMENT ANALYSIS METHODS FOR STRUCTURAL QUALIFICATION
Apr. 1986 15 p Presented at the 61st Meeting of the Structures and Materials Panel of AGARD, Oberammergau, West Germany, 8-13 Sep. 1985
(AGARD-R-736; ISBN92-835-1526-9) Avail: NTIS HC A02/MF A01

As part of its 61st Meeting the AGARD Structures and Materials Panel considered whether or not it should set up an activity to examine the possibilities of Structural Qualification by using Finite Element Analytical Methods in place of testing. As a preliminary to its discussions it heard the two papers printed here. The first of these looks in general terms at the capabilities of existing organisations and systems vis- a-vis the standards which must necessarily be established before FEM qualification procedures can be implemented. The second paper looks in rather more detail at how non-linear FEM may be applied in support of structural tests. Author

N86-30641# Israel Aircraft Industries Ltd., Ben-Gurion Airport.
STATIC AEROELASTIC ANALYSIS USING AIRCRAFT VIBRATION MODES
Z. Sheena and M. Karpel *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 229-232 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30646# Pilatus Aircraft Ltd., Stans (Switzerland).
EXPERIENCE WITH AEROELASTIC ANALYSIS OF A SINGLE ENGINE TURBO TRAINER USING FINITE ELEMENT METHODS
M. J. Reinicke, A. S. Turi (Omega G.m.b.H., Immenstaad West Germany), and A. Vollan *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 286-296 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30666# RESSULT, Soechtenau (West Germany).
ANALYTICAL FINITE ELEMENTS
Peter H. Kulla *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 495-503 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30667# Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
INFLUENCE OF AXIAL FORCE ON RANDOM VIBRATION RESPONSE OF A STRUCTURE
Isaac Elishakoff *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 504-511 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30668# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DETERMINATION OF BOTH COMPLEX CHARACTERISTIC STRUCTURAL VALUES AND NORMAL MODE PARAMETERS FROM HARMONIC EXCITATION NEAR RESONANCE
J. Artmann *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 512-522 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30669# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. of Aeroelasticity.
ADVANCES IN GROUND VIBRATION TESTING USING A COMBINATION OF PHASE RESONANCE AND PHASE SEPARATION METHODS
N. Niedbal *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 523-528 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30670# Franche-Comte Univ., Besancon (France). Lab. de Mecanique Appliquee.
SIMULTANEOUS DETERMINATION OF NORMAL EIGENMODES AND GENERALIZED DAMPING MATRIX FROM COMPLEX EIGENMODES
Qiang Zhang and Gerard Lallement *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 529-535 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30671# Kassel Univ. (West Germany).
IDENTIFICATION AND DYNAMIC CONDENSATION OF PHYSICAL SYSTEM MATRICES USING INCOMPLETE DYNAMIC RESPONSE DATA
M. Link and K. Badenhausen *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 536-545 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30673# London Univ. (England). Dept. of Aeronautical Engineering.
DETERMINATION OF FORCE DISTRIBUTIONS IN MULTI-POINT RESONANCE TESTING USING VARIOUS DIRECT METHODS
K. Alexiou and J. R. Wright *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 553-564 Sponsored by UK Ministry of Defence (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30674# Franche-Comte Univ., Besancon (France). Lab. de Mecanique Appliquee.
EIGENSOLUTION IDENTIFICATION OF NON SELF-ADJOINT MECHANICAL STRUCTURES
Qiang Zhang and Lallement Gerard *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 565-570 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30675# Manchester Univ. (England). Simon Engineering Labs.
RECENT DEVELOPMENTS IN THE IDENTIFICATION OF NON-LINEARITY IN MODAL TESTING
G. R. Tomlinson *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 571-580 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30676# Old Dominion Coll., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
ADVANCES IN TIME DOMAIN MODAL IDENTIFICATION AND MODELING OF STRUCTURES
Samir R. Ibrahim *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 581-594 Sponsored by AFWAL (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30677# London Univ. (England). Queen Mary Coll.
COMPARISON OF SOME TIME DOMAIN METHODS FOR STRUCTURAL SYSTEM IDENTIFICATION
J. E. Cooper and J. R. Wright *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 595-604 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30681# Technische Univ., Hanover (West Germany).
UPDATING MATHEMATICAL MODELS ON THE BASIS OF VIBRATION AND MODAL TEST RESULTS, A REVIEW OF EXPERIENCE
H. G. Natke and N. Cottin *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 625-631 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

N86-30762# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
THERMAL RESIDUAL STRESSES IN SYMMETRIC AND UNSYMMETRIC CARBON FIBER REINFORCED PLASTICS: SOME TENTATIVE WAYS OF EVALUATION
J. P. Favre *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 31-38 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30764# Southampton Univ. (England). Inst. of Sound and Vibration Damping.
DAMPING OF COMPOSITES
T. A. Willway *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 47-52 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30765# Imperial Coll. of Science and Technology, London (England). Center for Composite Materials.
THE STRENGTH OF BOLTED JOINTS IN KEVLAR RP
J. M. Hodgkinson, D. L. deBeer, and F. L. Matthews *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 53-61 Sponsored by ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30768# Politecnico di Milano (Italy). Dept. of Aerospace Engineering.
ANALYTICAL AND EXPERIMENTAL RESULTS OF ADVANCED COMPOSITE STIFFENED PANELS UNDER COMBINED LOADS
Giulio Romeo *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 79-86 Sponsored by Italian Ministry of Education (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30769# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.

HAND CALCULATION METHOD FOR BUCKLING OF COMPOSITE SHELL STRUCTURES
R. F. P. vanZeist *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 87-93 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30770# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
ADEQUATE FIBER REINFORCED STRUCTURAL ELEMENTS IN LOAD INTRODUCTION AREA OF FIBER REINFORCED SHELLS
F. S. D. Rekers *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 95-99 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30778# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Aeronautical Structures and Materials.
DAMAGE ZONE FRACTURE ANALYSIS OF FIBROUS COMPOSITES
Kaj Hollmann, Per Clarin, C.-G. Aronsson, and Jan. Baecklund *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 169-174 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30779# Engineering System International, Rungis (France).
INDUSTRIAL CALCULATION OF DAMAGE TOLERANCE AND STRESS ALLOWABLES IN COMPONENTS MADE OF COMPOSITE MATERIALS USING THE PAM-FISS/BIPHASE MATERIAL MODEL
A. deRouvray and E. Haug *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 175-185 Sponsored by ESA/ESTEC (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30780# Paderborn Univ. (West Germany). Fachgebeit Technische Mechanik.
ON CORRELATION BETWEEN THERMAL STRESSES, ELASTIC STRAIN ENERGY AND DEBONDING IN THERMALLY LOADED FIBER-REINFORCED COMPOSITE MATERIALS
F.-G. Buchholz *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 187-196 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30781# Strathclyde Univ., Glasgow (Scotland). Dept. of Mechanics of Materials.
ASSESSING THE EFFECTS OF DELAMINATIONS ON THE POSTBUCKLING STRENGTH OF CRFP PANELS
W. M. Banks, J. Rhodes, and G. B. Chai *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 197-202 Sponsored by UK Ministry of Defense and ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

42 GEOSCIENCES (GENERAL)

N86-31084# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
THE X-SAR SCIENCE PLAN
Herwig Oettl and Francesco Valdoni (Consiglio Nazionale delle Ricerche, Rome, Italy) Nov. 1985 165 p
(DFVLR-Mitt-85-17; ISSN-0176-7739; ESA-86-97451) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Use of the X-SAR/SIR-C radar for geology, hydrology, oceanography, ice and snow cover, and vegetation remote sensing are discussed. For individual titles, see N86-31085 through N86-31092. ESA

N86-31085# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
THE X-SAR SCIENCE TEAM **c32**
H. Oettl *In its* The X-SAR Science Plan Nov. 1985 p 7-10 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

The SIR-C X-band SAR mission for remote sensing of weather, oceans, ice, vegetation, pollution, and geological features is introduced. Mission objectives include comparison of different polarizations and investigations of frequencies for SAR applications. ESA

N86-31086# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
PRINCIPLE OF SAR AND X-SAR PERFORMANCE. THE X-SAR/SIR-C MISSION. SOME REMARKS CONCERNING ORGANIZATION ASPECTS **c32**
H. Oettl *In its* The X-SAR Science Plan Nov. 1985 p 11-26 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

The principles of SAR are recalled and its technical limitations are reviewed. Specifications of the SIR-C mission for X-band remote sensing are given: 9.6 GHz frequency; VV polarization; 25 m geometrical resolution; 10 to 45 km swath width; viewing angle 15 to 60 deg; and radiometric resolution of 2.5 dB at sigma = -18 dB. Project organization is described. ESA

N86-31087# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
RADAR TECHNOLOGY **c32**
F. Heel and D. Solimini *In its* The X-SAR Science Plan Nov. 1985 p 27-41 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Atmospheric and ionospheric effects on SAR signal performance in the frequency range of the S-SAR/SIR-C mission are reviewed. Mission accompanying ground truth activities and calibration facilities are discussed. Processor capability to achieve improved SAR image quality is assessed. ESA

N86-31088# Technische Univ., Clausthal-Zellerfeld (West Germany). Inst. fuer Geologie und Palaeontologie.
GEOLOGY **c46**
P. Kronberg and P. Murino (Naples Univ., Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 43-74 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Experiments to study how spaceborne imaging radar can improve geological mapping capability and capacity are proposed for the X-SAR/SIR-C mission. Complementary data X-SAR-type imagery can provide at regional to global scales as compared to information from Landsat sensors is discussed. Expected information on rocks, soils, and structures is assessed. Effect of radar operating parameters (illumination geometry, frequency, and polarization) on radar backscatter of rock units and surficial deposits in diverse type of terrain (arid, semi-arid, Mediterranean, humid, tropical areas; plains, rolling country, hilly and mountainous terrain) is considered. Test areas to evaluate the application potential of multifrequency, multipolarization, and multi-incidence-angle imagery for regional and global geological mapping projects are suggested. ESA

N86-31089# Bundesanstalt fuer Geowissenschaften und Rohstoffe, Hannover (West Germany).
HYDROLOGY **c43**
W. Kruck and P. Pampaloni (Consiglio Nazionale delle Ricerche, Florence, Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 75-95 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Hydrological parameters that can be studied by spaceborne imaging radar are listed. Test sites for X-SAR/SIR-C mission remote

sensing of precipitation and surface runoff; ground water, evaporation, and evapotranspiration; and soil moisture, and surface and radar penetration parameters are proposed. ESA

N86-31090# Bremen Univ., (West Germany).
OCEANOGRAPHY **c48**
W. Alpers, K. Richter (Deutsches Hydrographisches Inst., Hamburg (West Germany), and P. Lombardini (Consiglio Nazionale delle Ricerche, Turin, Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 97-110 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Radar imaging of ocean surface phenomena at three different radar frequencies (L, C, and X-band) different polarizations (VV, HH and VH, HV) and different incidence angles by the X-SAR radar is discussed. Objectives of the X-SAR/SIR-C mission include studies of the short wave-current interaction as a function of (Bragg) wave number; the SAR imaging mechanism of long surface waves as a function of radar frequency, polarization, and incidence angle; the excitation threshold of short (Bragg) waves by the wind as a function of wave number and air/sea temperature difference; the damping of short (Bragg) waves by surface films as a function of a wave number, and film material for studying the applicability of spaceborne SARs for oil pollution surveillance; and the distribution of temporal variations of internal waves, eddies, fronts, and bores in the Mediterranean. ESA

N86-31091# Deutsches Hydrographisches Inst., Hamburg (West Germany).
ICE AND SNOW **c43**
Klaus Struebing *In* DFVLR The X-SAR Science Plan Nov. 1985 p 111-131 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Ice and snow observation by the X-SAR/SIR-C mission is outlined. Targets include sea ice and icebergs, ice sheets, ice shelves, glaciers, and snow cover. Parameters to be studied include snow line; edges and boundaries; ice concentration (total and partial); stage of development (ice type, thickness); form (floe size); openings (fractures, leads, polynyas); surface roughness (ridges, rubble fields, rafted ice); and stage of melting (puddles, melt ponds). Test sites, seasonal constraints, technical requirements, and ground truth and airborne campaigns are indicated. ESA

N86-31092# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
VEGETATION **c43**
A. J. Sieber, F. Posa (Bari Univ., Italy), and M. Ricottilli (Consiglio Nazionale delle Ricerche, Rome, Italy) *In its* The X-SAR Science Plan Nov. 1985 p 133-155 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

Economic and technical advantages of X-SAR/SIR-C remote sensing of vegetation and land use are discussed. Investigations for the X-SAR mission are summarized: Radar response as function of biophysical properties of crops; crop type identification; phenological evaluation; vegetation stress conditions; vegetation indexes; rangeland assessment; and synergic effects of combining optical and SAR data for identifying and characterizing crop cover. ESA

N86-31093*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOPOTENTIAL RESEARCH MISSION, SCIENCE, ENGINEERING AND PROGRAM SUMMARY
Thomas Keating, ed., Patrick Taylor, ed., Werner Kahn, ed., and Francis Lerch, ed. Jul. 1986 209 p
(NASA-TM-86240; Rept-86B0409; NAS 1.15:86240) Avail: NTIS HC A10/MF A01 CSCL 08E

This report is based upon the accumulated scientific and engineering studies pertaining to the Geopotential Research Mission (GRM). The scientific need and justification for the measurement of the Earth's gravity and magnetic fields are discussed. Emphasis is placed upon the studies and conclusions of scientific organizations and NASA advisory groups. The engineering design and investigations performed over the last 4 years are described, and a spacecraft design capable of fulfilling all scientific objectives is presented. In addition, critical features of the scientific requirements and state-of-the-art limitations of spacecraft design, mission flight performance, and data processing are discussed. Author

N86-31094*# National Aeronautics and Space Administration, Washington, D.C.
EARTH OBSERVING SYSTEM. DATA AND INFORMATION SYSTEM. VOLUME 2A: REPORT OF THE EOS DATA PANEL
1986 63 p
(NASA-TM-87777; NAS 1.15:87777) Avail: NTIS HC A04/MF A01 CSCL 05B

The purpose of this report is to provide NASA with a rationale and recommendations for planning, implementing, and operating an Earth Observing System data and information system that can evolve to meet the Earth Observing System's needs in the 1990s. The Earth Observing System (Eos), defined by the Eos Science and Mission Requirements Working Group, consists of a suite of instruments in low Earth orbit acquiring measurements of the Earth's atmosphere, surface, and interior; an information system to support scientific research; and a vigorous program of scientific research, stressing study of global-scale processes that shape and influence the Earth as a system. The Eos data and information system is conceived as a complete research information system that would transcend the traditional mission data system, and include additional capabilties such as maintaining long-term, time-series data bases and providing access by Eos researchers to relevant non-Eos data. The Working Group recommends that the Eos data and information system be initiated now, with existing data, and that the system evolve into one that can meet the intensive research and data needs that will exist when Eos spacecraft are returning data in the 1990s. Author

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-31095# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
A COMPARISON OF ADOS (AFRICAN DOPPLER SURVEY) POINT POSITIONING RESULTS FROM VARIOUS SOFTWARES Final Report
Thomas J. Knopp 27 Feb. 1986 16 p Presented at the International Geodetic Symposium on Satellite Positioning, Austin, Tex., 28 Apr. - 2 May 1986
(AD-A166840; AD-E950814) Avail: NTIS HC A02/MF A01 CSCL 08/5

The African Doppler Survey project (ADOS) is a multi-national effort to establish primary control (via Doppler satellite observations) on the African continent. There are four Computing Centers under the ADOS project which use three different point positioning programs. These programs are: DOPL79, GEODOP V, and ORB-SPP. The differences observed in the computations using the various softwares were recently investigated. This paper presents preliminary results of this study. GRA

N86-31096# Argonne National Lab., Ill.
DISTRIBUTED GEOGRAPHIC MAPPING USING A CENTRALIZED DISSPLA-BASED MAPPING SYSTEM AND AUTOCAD PC SOFTWARE
M. Snider 1986 7 p Presented at the ISSCO Week, New Orleans, La., 10 Mar. 1986
(Contract W-31-109-eng-38)
(DE86-009184; CONF-860363-2) Avail: NTIS HC A02/MF A01

This paper describes procedures devised for transferring mapped information between a DISSPLA-based geographic

mapping system on a centralized computer and an AUTOCAD system on a PC. The centralized mapping system is used as a repository for the large map data bases and to provide capabilities for drawing maps on various output devices including graphics terminals. The map data from any map drawn on the centralized system can be down-loaded to the PC. AUTOCAD is then used to view and edit the map and to add information. Final maps can be drawn using the AUTOCAD software or the AUTOCAD files can be sent to the centralized system to be included in the central data bases. These procedures allow us to take advantage of DISSPLA software, data management facilities, and graphical analytic functions available on the central system, while using the more interactive features available in AUTOCAD for viewing, entering, and editing the data. DOE

N86-31097# Royal Netherlands Aircraft Factories Fokker, Amsterdam.
PHASE A TECHNICAL STUDY SUMMARY REPORT FOR A TROPICAL EARTH RESOURCES SATELLITE (TERS)
1984 116 p Prepared in cooperation with National Aerospace Lab., Amsterdam, Netherlands, Signaal, Utrecht State Univ., Netherlands, and Technische Physische Dienst TNO-TH, Delft, Netherlands
(JTERS-84-07; ESA-86-97496) Avail: NTIS HC A06/MF A01

The high (1681 km) equatorial orbit of the Tropical Earth Resources Satellite with its particle radiation hazards (as compared to an alternative low near equatorial orbit with operational complications) was studied. Selective viewing by cloud sensor and cross track instrument pointing was analyzed. The consequences of the high spectral resolution (20 m color, 10 m panchromatic) for the designs of instrument, satellite systems, data handling, and ground data processing were assessed. Ground observations at different solar illumination angles and view angles were simulated. A satellite configuration concept was defined. The concept seems feasible, although it is technologically challenging. Radiation aspects require a careful development and may influence the design of instrument and spacecraft systems. ESA

N86-31098# Royal Netherlands Aircraft Factories Fokker, Amsterdam.
PROPOSAL TO NIVR FOR A SYSTEM DEFINITION STUDY OF A TROPICAL EARTH RESOURCES SATELLITE (TERS)
1984 158 p Prepared in cooperation with National Aerospace Lab., Amsterdam, Netherlands, Signaal, Utrecht State Univ., Netherlands, and Technische Physische Dienst TNO-TH, Delft, Netherlands
(NTERS-84-11; ESA-86-97497) Avail: NTIS HC A08/MF A01

A study to provide a technical definition of the Tropical Earth Resources Satellite (TERS) spacecraft, ground station, data preprocessing facilities and satellite operations in sufficient detail for a reliable estimate of the required budget and time for the realization of a TERS project is proposed. It should also provide a better insight into the feasibility aspects of such a project. The technical definition includes system and subsystem design specifications, and definition of the products to be supplied to the users. The execution of the project is defined up to and including the in-orbit checkout. ESA

N86-31089# Bundesanstalt fuer Geowissenschaften und Rohstoffe, Hannover (West Germany).
HYDROLOGY
W. Kruck and P. Pampaloni (Consiglio Nazionale delle Ricerche, Florence, Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 75-95 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

N86-31091# Deutsches Hydrographisches Inst., Hamburg (West Germany).
ICE AND SNOW
Klaus Struebing *In* DFVLR The X-SAR Science Plan Nov. 1985 p 111-131 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

N86-31092# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
VEGETATION
A. J. Sieber, F. Posa (Bari Univ., Italy), and M. Ricottilli (Consiglio Nazionale delle Ricerche, Rome, Italy) *In its* The X-SAR Science Plan Nov. 1985 p 133-155 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels*, and *85 Urban Technology and Transportation*.

N86-31099*# Old Dominion Univ., Norfolk, Va. Dept. of Mathematical Sciences.
SUMMARY OF MATHEMATICAL MODELS FOR A CONVENTIONAL AND VERTICAL JUNCTION PHOTOCONVERTER Progress Report, 1 Mar. - 30 Jun. 1986
John H. Heinbockel Jun. 1986 104 p
(Grant NAG1-148)
(NASA-CR-177144; NAS 1.26:177144) Avail: NTIS HC A06/MF A01 CSCL 10A

The geometry and computer programming for mathematical models of a one-dimensional conventional photoconverter, a one-dimensional vertical junction photoconverter, a three-dimensional conventinal photoconverter, and a three-dimensional vertical junction solar cell are discussed. B.G.

N86-31100# Department of the Army, Washington, D. C.
ELECTROLYTE FOR USE IN HIGH ENERGY LITHIUM BASED RECHARGEABLE ELECTROCHEMICAL CELL AND RECHARGEABLE ELECTROCHEMICAL CELL INCLUDING THE ELECTROLYTE Patent Application
Robert J. Mammone and Michael Binder, inventors (to Army) Filed 17 Apr. 1986 12 p
(AD-D012310; US-Patent-Appl-SN-855855) Avail: NTIS HC A02/MF A01 CSCL 03B

The general object of this invention is to provide a lithium based rechargeable electrochemical cell having an improved capacity. A more specific object of the invention is to provide an electrolyte for such a cell. A still further object of the invention is to provide such a cell. A still further object of the invention is to provide such a rechargeable electrochemical cell that permits the oxidation of dithionite to occur without using chlorine as an intermediate oxidizing agent. It has now been found that the aforementioned objects can be attained by providing an electrolyte including bromine dissolved in the liquid complex Li(s02)3A1C14. GRA

N86-31101# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SYSTEM PERFORMANCE ANALYSIS OF STRETCHED MEMBRANE HELIOSTATS
J. V. Anderson, L. M. Murphy, W. Short, and T. Wendelin Dec. 1985 8 p Presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC02-83CH-10093)
(DE85-016885; SERI/TP-253-2819; CONF-860406-5) Avail: NTIS HC A02/MF A01

The optical performance of both focused and unfocused stretched membrane heliostats was examined in the context of the overall cost and performance of central receiver systems. The sensitivity of optical performance to variations in design

parameters such as the system size (capacity), delivery temperature, heliostat size, and heliostat surface quality was also examined. The results support the conclusion that focused stretched membrane systems provide an economically attractive alternative to current glass/metal heliostats over essentially the entire range of design parameters studied. In addition, unfocused stretched membrane heliostats may be attractive for a somewhat more limited range of applications, which would include the larger plant sizes (e.g., 450 MW) and lower delivery temperatures (e.g., 450(0)C), or situations in which the heliostat size could economically be reduced. DOE

N86-31102# PSE and G Research Corp., Newark, N.J.
TECHNICAL AND ECONOMIC ASSESSMENTS OF ELECTROCHEMICAL ENERGY STORAGE SYSTEMS. VOLUME 1: EXECUTIVE SUMMARY Final Report, Sep. 1978 - May 1985
J. L. DelMonaco, M. P. Chavaraju, and A. W. Quade 1 Aug. 1985 63 p
(Contract DE-AC02-78ET-26950)
(DE86-006855; DOE/ET-26950/1-Vol-1) Avail: NTIS HC A04/MF A01

Results show that it is technically feasible to use the four types of batteries (ZnCl2, Na2S, ZnBr2 and Pb/acid) as load-leveling energy storage devices. In terms of short circuit impact, stability and reliability, no adverse problems were uncovered. Economic benefits of using batteries for load-leveling are marginal. Preliminary assessment of possible cost reductions in battery cost estimates show that batteries can be economical for some load-leveling applications. The relationship of battery breakeven cost vs battery system cost projections indicates that some types of battery systems would be economical for peaking duty, compared with combustion turbines (CT's). Since one of the battery systems studied had the lowest estimated installed cost and the highest breakeven cost, it would justify up to a 3% penetration. Initial estimates indicate that several battery systems are clearly not competitive with CT's, or only competitive at low penetration levels. Battery breakeven costs decline with increasing battery penetration. However, this trend is in step with the reduced unit costs which will hopefully be achieved with maturing production processes. Potential for cost reduction is estimated at about 25%. DOE

N86-31103# SOLAC Builders Ltd., Albuquerque, N. Mex.
DEVELOPMENT OF AN ELASTIC-IMPULSE POWER TRANSMISSION FOR WIND ENERGY CONVERSION SYSTEMS Final Report
B. Pahl Jan. 1986 43 p
(DE86-900708; NMERDI-2-73-4627) Avail: NTIS HC A03/MF A01

A multiload-capable elastic-impulse power transmission for use in Wind Energy Conversion Systems (WECS) was designed, prototype constructed and bench tested. The transmission interposes a temporary energy storage device between the input and output shafts, and therefore allows the two shafts to rotate at virtually independent speeds. For utility interface induction generators which must run at essentially constant speed, the transmission allows the turbine rotor to run at variable speed, thereby maintaining the constant tip-speed ratio corresponding to the peak-power point. The transmission was found to work in principle, but the first construction prototype exhibited low efficiencies (24%) due to the constraints imposed by the utilization of commercial components. DOE

N86-31104# Oak Ridge National Lab., Tenn.
NUMERICAL STUDY OF THE PERFORMANCE OF LATENT HEAT STORAGE FOR SOLAR DYNAMIC POWER SYSTEMS
A. D. Solomon Jan. 1986 23 p
(Contract DE-AC05-84OR-21400)
(DE86-006748; ORNL-6218) Avail: NTIS HC A02/MF A01

A conceptual design of a space station power system based on a Brayton cycle and solar powered has been developed. A key component of such a system is the thermal energy storage module, which is of crucial importance during periods of darkness. We have developed a computer program, FPAK1.F, simulating one possible storage design. We describe the code and, using it, raise some questions about the system under study. DOE

N86-31105# Oak Ridge National Lab., Tenn. Engineering Technology Div.
SPACE POWER USING SOLAR PHOTOVOLTAIC PANELS: COSTS AND LIMITATIONS
Kent A. Williams Mar. 1986 80 p
(Contract DE-AC05-84OR-21400)
(DE86-008953; ORNL/TM-9856) Avail: NTIS HC A05/MF A01

Solar photovoltaic panels (SPPs) have been suggested as a possible prime space power source for multi-kilowatt applications within a ballistic missile defense (BMD) system. As a first step in an attempt to assess the affordability of possible BMD space power sources, the limitations and costs of space power satellites using SSPs in conjunction with an electrochemical energy storage system have been investigated. Both high and low earth orbital missions are considered. An extensive literature search was conducted to determine values for the principal technology-driven performance and cost figures of merit. A small computer code was then developed to evaluate the total power cost, including launch, in dollars per watt of desired space power load. The unit costs obtained were found to be heavily influenced by the nature of the mission (altitude) and the attainable specific power for the two major system components. DOE

N86-31106# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
PROCEEDINGS OF THE HIGH-EFFICIENCY PHOTOVOLTAIC SUBCONTRACTOR'S REVIEW MEETING
Jan. 1986 210 p Meeting held in Lakewood, Colo., 12-13 Sep. 1985
(Contract DE-AC02-83CH-10093)
(DE86-004415; SERI/CP-211-2875) Avail: NTIS HC A10/MF A01

Separate abstracts were prepared for 20 papers in these proceedings. Topics covered include high-efficiency solar cell concepts and crystalline silicon. DOE

N86-31107# Johnson Controls, Inc., Milwaukee, Wis. Globe Battery Div.
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF LEAD-ACID BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1985
D. E. Bowman Mar. 1986 32 p
(Contract W-31-109-eng-38)
(DE86-008518; ANL-86-12) Avail: NTIS HC A03/MF A01

Cycle life of the 15-electrode Advanced-1 design, utilizing the all lead-plastic grids, was increased from less than 150 to 296 cycles (C-420) by using an additive to strengthen the positive active material (PAM). This cell demonstrated a specific energy of 44.6 Wh/kg at the C/3 rate. The utilization of the PAM was increased from 45.2 Ah/1b PAM to 58.4 Ah/1b PAM. The 58.4 Ah/1b value represents an increase of 91% in the utilization as compared to an EV-2300 at the same rate. The flow-through cell operates in an oxygen recombination mode and the cell design controls the efficiency of the recombination. The main failure mode of the cells was the loss of the preferred structure of the PAM, resulting in the cracking and dislodging of pellets. A secondary failure mode is the change of the physical and chemical properties of the negative active material. A new, cell component (diffuser) increased the uniformity of the electrolyte flow through the positive electrode. Die cutting Lexan sheet stock reduced test cell building labor costs by 75%. A 3-electrode screening cell design was develope d which utilizes a gasketing material to seal the assembly. DOE

N86-31108# California Univ., Berkeley. Lawrence Berkeley Lab.
BIMETALLIC FUEL CELL CATALYSTS
B. C. Beard and P. N. Ross Dec. 1985 68 p
(Contract DE-AC03-76SF-00098)
(DE86-009259; LBL-20741) Avail: NTIS HC A02/MF A01

Platinum electrocatalysts alloyed with various transition metals

have been found to give improved acid fuel cell performance over pure Pt catalyst electrodes. This study has investigated the chemical and structural environment of the transition metal in the alloy catalyst. EXAFS analysis is an ideal structural probe of the lattice of these low concentration (10 wt % Pt with ca. 1 wt % transition metal) supported catalysts. EXAFS analysis of such materials has been run. DOE

N86-31109# Technical Research Centre of Finland, Espoo.
WIND ENERGY IN ELECTRIC POWER PRODUCTION, PRELIMINARY STUDY
R. Lento and E. Peltola Jan. 1984 134 p In FINNISH
(DE86-751566; VTT-TIED-282) Avail: NTIS (US Sales Only) HC A07/MF A01

The wind speed conditions in Finland have been studied with the aid of the existing statistics of the Finnish Meteorological Institute. With the aid of the statistics estimates on the available wind energy were also made. Eight hundred wind power plants, 1.5 MW each, on the windiest west coast would produce about 2 TWh energy per year. Far more information on the temporal, geographical and vertical distribution of the wind speed than the present statistics included is needed when the available wind energy is estimated, when wind power plants are dimensioned optimally, and when suitable locations are chosen for them. The investment costs of a wind power plant increase when the height of the tower or the diameter of the rotor is increased, but the energy production increases, too. Thus, overdimensioning the wind power plant in view of energy needs or the wind conditions caused extra costs. The cost of energy produced by wind power can not yet compete with conventional energy, but the situation changes to the advantage of wind energy, if the real price of the plants decreases (among other things due to large series production and increasing experience), or if the real price of fuels rises. The inconvinience on the environment caused by the wind power plants is considered insignificant. The noise caused by the plant attenuates rapidly with distance. No harmful effects to birds and other animals caused by the wind power plants have been observed in the studies made abroad. Parts of the plant getting loose during an accident, or ice forming on the blades are estimated to fly even from a large plant only a few hundred meters. DOE

N86-31110# Sandia National Labs., Albuquerque, N. Mex.
DETERMINATION OF OPTIMUM MOUNTING CONFIGURATIONS FOR FLAT-PLATE PHOTOVOLTAIC MODULES BASED ON A STRUCTURED FIELD EXPERIMENT AND SIMULATED RESULTS FROM PVFORM, A PHOTOVOLTAIC SYSTEM PERFORMANCE MODEL
D. F. Menicucci Jan. 1986 42 p
(Contract DE-AC04-76DP-00789)
(DE86-009539; SAND-85-1251) Avail: NTIS HC A03/MF A01

The performance of a photovoltaic (PV) system is affected by its mounting configuration. The optimal configuration is unclear because of lack of experience and data. Sandia National Laboratories, Albuquerque (SNLA), has conducted a controlled field experiment to compare four types of the most common module mounting. The data from the experiment were used to verify the accuracy of PVFORM, a new computer program that simulates PV performance. PVFORM was then used to simulate the performance of identical PV modules on different mounting configurations at 10 sites throughout the US. This report describes the module mounting configurations, the experimental methods used, the specialized statistical techniques used in the analysis, and the final results of the effort. The module mounting configurations are rank ordered at each site according to their annual and seasonal energy production performance, and each is briefly discussed in terms of its advantages and disadvantages in various applications. DOE

N86-31111# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
FALLING FILM FLOW CHARACTERISTICS OF THE DIRECT ABSORPTION RECEIVER
T. A. Newell, K. Y. Wang, and R. J. Copeland Mar. 1986 57 p
(Contract DE-AC02-83CH-10093)
(DE86-004432; SERI/TR-252-2641) Avail: NTIS HC A04/MF A01

This report examines the characteristics of a thin, falling film used in a direct absorption receiver, investigates the system performance, and discusses the flow similarities between water and salt. In this receiver concentrated radiation is directly absorbed within a thin layer of molten carbonate salt flowing down near vertical wall. System capacities of 25 to 360 MW/sub t/ were analyzed. The experiments were isothermal; therefore, heat transfer characteristics were determined from film shear stress. A 25 MW/sub t/ receiver at a high turn-down ratio (5:1) marginally violates a film breakdown criterion. At high film flow rates gas and liquid interactions can cause a droplet removal phenomenon. Neither of these should affect film flow stability. Film thickness is also important in predicting operating characteristics. A rough wall surface significantly enhances wall-to-film heat transfer, but the roughness height should not exceed what the film's thickness would be over a smooth surface. In general, a molten carbonate salt film should be stable over the anticipated range of receiver capacities and operating conditions. Only small systems at low flow conditions may be near a critical opration limit. DOE

N86-31112# Varian Associates, Palo Alto, Calif. Device Lab.
DEVELOPMENT OF A THIN AgaAs SOLAR CELL
G. F. Virshup and J. G. Werthen Mar. 1986 30 p
(Contract DE-AC04-76DP-00789)
(DE86-009544; SAND-86-7027) Avail: NTIS HC A03/MF A01

A process for fabricating thin AlGaAs solar cells suitable for use as the top cell in a mechanically stacked, cascade cell has been developed. Significant progress was achieved in optimization of the AlGaAs cell structure with one-sun efficiencies of 17% (AM1.5, 100 mW/cm(2)) for 1.65-eV cells and efficiencies around 18% under concentration (200X to 800X) for 1.72-eV cells. Removal of the GaAs substrate had a very low yield, but new methods that should improve the yields have been identified. DOE

N86-31113# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF A SIMULATION CODE FOR A LATENT HEAT THERMAL ENERGY STORAGE SYSTEM IN A SPACE STATION
A. D. Solomon, M. D. Morris, J. Martin, and M. Olszewski Apr. 1986 48 p
(Contract DE-AC05-84OR-21400)
(DE86-010070; ORNL-6213) Avail: NTIS HC A03/MF A01

A conceptual design of a space station power system based on a Brayton cycle and solar powered has been developed. A key part of such a system is the thermal energy storage module, which is of crucial importance during periods of darkness. We have developed a simulation code for one possible storage configuration. In this report, we describe the considerations entering into the code development, and some results obtained thus far. DOE

N86-31114# Brookhaven National Lab., Upton, N. Y. Dept. of Applied Science.
FUEL CELL REACTIONS IN SUPER ACID ELECTROLYTES Final Report, Jun. 1982 - Dec. 1985
William E. OGrady Jan. 1986 95 p
(Contract GRI-5081-260-0584)
(PB86-201084; GRI-86/0058) Avail: NTIS HC A05/MF A01 CSCL 10B

The series of acids including CF3SO3H, C4F9SO3H, CF2(SO3H)2, (CF2SO3H)2, (CF2)2(SO3H)2,(CF2)3(SO3H)2,(CF2)4(SO3H)2, (CF3SO2)2NH, C6F5SO3H, SF5CHFSO3H, (CF3SO2)2CH2, CF3CFHCF2SO3H, C5F11CHFCF2SO3H, CF3PO(OH)2, CH3PO(OH)2, (CF3)2POOH and CF2(PO3H2)2 have been tested as fuel cell electrolytes. Oxygen reduction activity on platinum has been examined in each of the electrolytes. The conductivity as a function of the temperature has been examined in a number of them. All unusual entropy change occuring at the hydrogen electrode was observed in the perfluorosulfonic acids which is a function of the acid concentration. GRA

N86-30796# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.
DESIGN AND DEVELOPMENT OF THE ADVANCED RIGID ARRAY (ARA) SOLAR PANEL
R. W. H. Horsselenberg *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 319-328 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-31418*# Prairie View Agricultural and Mechanical Coll., Tex. Dept. of Electrical Engineering.
AN IBM PC-BASED MATH MODEL FOR SPACE STATION SOLAR ARRAY SIMULATION
Ervin M. Emanuel *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 28 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 10A

N86-31430*# South Carolina Univ., Columbia. Dept. of Mechanical Engineering.
THERMALLY REGENERATIVE HYDROGEN/OXYGEN FUEL CELL POWER CYCLES
Jeffrey H. Morehouse *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 28 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 10B

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-31115# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GROUND BASED OZONE MEASUREMENTS IN AN EQUATORIAL RAINFOREST
Volker W. J. H. Kirchhoff Apr. 1986 30 p Presented at the Spring AGU Meeting, Baltimore, Md., 19-23 May 1986 Sponsored by the Fundo Nacional de Desenvolvimento Cientifico e Tecnologico
(INPE-3858-PRE-922) Avail: NTIS HC A03/MF A01

Ozone concentrations have been measured in Manaus (3 deg. S, 60 deg. W) during NASA's ABLE expedition of July 1985. Diurnal variations of surface ozone were measured using UV surface ozone sensors, and 14 ozonesondes were launched to obtain vertical profiles of ozone in the troposphere and stratosphere. The diurnal variations are rather strong. At night it is not uncommon to obtain zero mixing ratios, diurnal values being around 10-20 ppbv, maximizing around 13 L.T. Tropospheric mixing ratios are much lower than at Natal (6 deg. S, 35 deg. W), and the mixing ratio gradient close to the ground is more than twice as large as at Natal. Author

N86-31116*# Maryland Univ., College Park. Dept. of Chemistry.
VOLCANIC IMPACT ON STRATOSPHERIC AEROSOL CHEMISTRY Final Report, Mar. 1980 - Dec. 1983
William H. Zoller 1984 16 p
(Grant NAG2-28)
(NASA-CR-176901; NAS 1.26:176901) Avail: NTIS HC A02/MF A01 CSCL 13B

Samples collected by the National Center for Atmospheric Research (NCAR) using the multiple-filter sampler on the U-2 were analyzed. The sampler is capable of exposing a number of 110 mm filters in sequence to ram air flow. Two types of filters, IPC cellulose and polystrene, were used, both of which have high blank levels for the trace elements determined. The levels of most trace elements in the stratosphere are so low under normal circumstances that none can be seen. Results from the eruption of Mt. St. Helens, a mystery cloud (probably volcanic in origin) in 1982, and the El Chichonal eruption in 1983 are discussed. To improve the collection of particles for chemical analysis, a new sampling system was developed for use on the U-2. The sampler consisted of an electrostatic collection of particles between 1 and 0.001 micron diameter dierectly onto electron microscopic grids, followed by a thermal precipitation for the smaller particles. The system was built and tested in the laboratory, but never flown on the U-2. B.G.

N86-31117# Brookhaven National Lab., Upton, N. Y.
ACID DEPOSITION: A NATIONAL PROBLEM
George R. Hendrey 1985 15 p Presented at the Acid Deposition: Environmental, Economic, and Policy Issues, Plattsburgh, N.Y., 10 Jun. 1983
(Contract DE-AC02-76CH-00016)
(DE86-007810; BNL-36875; CONF-8306288-1) Avail: NTIS HC A02/MF A01

The deposition of excessive quantities of sulfur and nitrogen from the atmosphere constitutes a problem encompassing all of the United States east of the Mississippi River. It also occurs in some areas of the western US. Calculations based on emission inventories and simplifying assumptions indicate electric utilities account for 66% of SO2 emissions, 29% of NO/sub x/ emissions and about half of precipitation acidity. Acidification of clearwater lakes and streams is a widespread problem only in areas receiving rain with an average acidity less than or equal to 4.7. The dominant anion in such waters is SO4(2-) and concentrations of aluminum derived from watershed acidification may exceed 200 (MU)g 1(-1). Changes in assemblages of aquatic biota become increasingly apparent as pH decreases below 6.0, and elimination of fish from some waters has been documented. The sensitivity of surface saters is controlled by and represents an integration of biogeochemical processes in their edaphic settings. Changes in surface water chemistry imply changes in the terrestrial environment. Direct evidence of changes in terrestrial environments is sparse. Nevertheless, observations of forest dieback in the US and abroad suggest that acid deposition may contribute to the problem. Very few credible studies are available which allow an evaluation of acid precipitation effects on crops. DOE

N86-31118# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Hauptabteilung Umwelttechnik und Additivenergier.
DEVELOPMENTS AND TRENDS IN ENVIRONMENTAL PROTECTION
Edgar Cabela Dec. 1985 27 p In GERMAN; ENGLISH summary
(OEFZS-4342; NU-18/85; ESA-86-97245) Avail: NTIS HC A03/MF A01

Developments in the field of environmental problems are reviewed. Attention is drawn to the present and future main areas of global environmental hazards. Possible strategies and technological solutions for environmental protection and restoration are discussed. ESA

N86-31433*# University of Southeastern Louisiana, Hammond. Dept. of Biological Sciences.
IN VITRO CYTOGENETIC STUDIES OF ORGANIC CHEMICALS FOUND AS CONTAMINANTS IN SPACECRAFT CABIN ATMOSPHERES
Joseph Torres *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 6 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-31119*# Lunar and Planetary Inst., Houston, Tex. Publications Office.

PAPERS PRESENTED TO THE CONFERENCE ON HEAT AND DETACHMENT IN CRUSTAL EXTENSION ON CONTINENTS AND PLANETS

1985 169 p refs Conference held in Sedona, Ariz., 10-12 Oct. 1985; sponsored by Lunar and Planetary Inst., Geological Survey, American Geophysical Union, Geological Society of America, and Rio Grande Rift Consortium

(Contract NASw-3389)

(NASA-CR-176837; NAS 1.26:176837; LPI-Contrib-575) Avail: NTIS HC A08/MF A01 CSCL 08G

Several topics relative to heat and detachment in crustal extension on continents and planets are discussed. Rifting on Venus, heat flow and continental breakup, magnetism, the mountains and tectonic processes of Io, and the ductile extension of planetary lithospheres are among the topics covered. For individual titles, see N86-31120 through N86-31165.

N86-31120*# Pittsburgh Univ., Pa. Dept. of Geology and Planetary Science.

EXTENT AND CHARACTER OF EARLY TERTIARY PENETRATIVE DEFORMATION, SONORA, NORTHWEST MEXICO

T. H. Anderson *In* Lunar and Planetary Inst. Papers presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 1 (For primary document see N86-31119 22-46)

Avail NTIS HC A08/MF A01 CSCL 08G

Reconnaissance field work has led to the recognition of extensive Early Tertiary gneiss and schist which are distinguished by weakly developed to highly conspicous northeast to east-trending stretching lineation commonly accompanied by low-dipping foliation. This structural fabric has been imposed on Precambrian to Paleogene rocks. Regionally, minimum ages of deformation are based upon interpreted U-Pb isotopic ages from suites of cogenetic zircon from the Paleogene orthogneiss. Locally, the interpreted ages indicate that ductile deformation continued as late as Oligocene (Anderson and others, 1980; Silver and Anderson, 1984). The consistency of the deformational style is such that, although considerable variation in intensity exists, the fabric can be recognized and correlated in rocks away from the Paleogene orthogneiss. Author

N86-31121*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RIFTING ON VENUS: IMPLICATIONS FOR LITHOSPHERIC STRUCTURE **c91**

W. B. Banerdt and M. P. Golombek *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 2 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Lithospheric strength envelopes on Venus are reviewed and their implications for large scale rifting are discussed. Their relationship to crustal thicnesses and thermal gradients are explored. Also considered are the implications of a theory for rift formation. Author

N86-31122*# AMAX Exploration, Inc., Tucson, Ariz.

THERMAL REGIMES IN THE DETACHMENT FAULT ENVIRONMENT AS DEDUCED FROM FLUID INCLUSIONS

Richard E. Beane, Joe Wilkins, Jr. (Saint Joe American, Tucson, Ariz.), and Tom L. Heidrick (Gulf Oil Corp., Bakersfield, Calif.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 7-9 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Extensional tectonism, which dominates middle- and late-Tertiary geology in western Arizona, southeastern California, and southern Nevada, is characterized by normal regionally extensive, low-angle detachment faults. The decollement movement of Fupper plate rocks relative to lower plate assemblages created extensive zones of dilatency, including synthetic and antithetic listric normal faults, tear faults, tectonic crush breccias, shatter breccias, and gash veins in lithologic units above and below the detachment. The tectonically enhanced permeability above and below the detachment fault permitted mass migration of large volumes of hydrothermal solutions along the fault zone during and following upper plate movement. Major quantities of MgO, CaO, K2O, FeO/Fe2O3, SiO2 and CO2 were added to rocks in and near the detachment and related structures. Also introduced were varying amounts of trace elements including Mn, Cu, S, Mo, Ba, Au, Pb, Zn, U and/or Ag. Minerals containing fluid inclusions were collected from all of these loci at locations in detachment faulted terranes in western Arizona and southeastern California. Author

N86-31123*# Tel-Aviv Univ. (Israel). Dept. of Geophysics and Planetary Sciences.

HEAT FLOW AND CONTINENTAL BREAKUP: THE GULF OF ELAT (AQABA)

Zvi Ben-Avraham and Richard P. VonHerzen (Woods Hole Oceanographic Institution, Mass.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 10-11 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Heat flow measurements were made in the major basins of the Gulf of Elat (Aqaba), northern Red Sea. The gulf is located at the southern portion of the Dead Sea rift which is a transform plate boundary. Gradient measurements at each site were made with a probe which allows multiple penetration of the bottom during a single deployment of the instrument. Thermal conductivity was determined by needle probe measurements on sedimentary cores. The mean heat flux, about 80 mWm(-2), is significantly above the continental mean, and probably also above that from the adjacent Sinai and Arabian continental blocks. The heat flow appears to increase from north to south. Such an increase may be related to the more advanced rifting stage of the Red Sea immediately to the south, which presently includes creation of an oceanic crust. This trend also corresponds to the general trend of the deep crustal structure in the gulf. Evidence from various geophysical fields suggest a gradual thinning of the crust towards the direction of the Red Sea where a normal oceanic crust exists. The heat flow data, together with other geophysical data, indicate a propagation of mature rifting activity from the Red Sea into the Gulf of Elat. This process is acting simultaneously with the transform motion along the Dead Sea rift. Author

N86-31124*# Southern Methodist Univ., Dallas, Tex. Dept. of Geological Sciences.

EVOLUTION OF BASIN AND RANGE STRUCTURE IN THE RUBY MOUNTAINS AND VICINITY, NEVADA

D. D. Blackwell, N. M. Reese, and S. A. Kelley *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 12-14 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Results from various age dating techniques, seismic reflection profiling hydrocarbon maturation studies, and structural analysis were used to evaluate the Cenozoic deformation in the Ruby Mountains and adjoining ranges (pinyon Range and Cortez Range) in Elko and Eureka Counties, Nevada. Age dating techniques used include potassium-argon ages of biotites from granites published by Kistler et al. (1981) and fission track ages from apatite and zircon. Fission track ages from apatite reflect a closing temperature of 100 plus or minus 20 deg C. Zircon fission track ages reflect a closing temperature of 175 plus or minus 25 deg C and potassium-argon ages from brotite reflect a closing temperature of 250 plus or minus 30 deg C. Thus these results allow a reasonably precise

tracking of the evolution of the ranges during the Cenozoic. Seismic reflection data are available from Huntington Valley. Access to seismic reflection data directly to the west of the Harrison Pass Pluton in the central Ruby Mountains was obtained. In addition results are available from several deep exploration holes in Huntington Valley. Author

N86-31125*# University of Southern Mississippi, Hattiesburg. Dept. of Geology.

LATE CRETACEOUS EXTENSIONAL TECTONICS AND ASSOCIATED IGNEOUS ACTIVITY ON THE NORTHERN MARGIN OF THE GULF OF MEXICO BASIN

R. L. Bowen and D. A. Sundeen *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 15-17 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Major, dominantly compressional, orogenic episodes (Taconic, Acadian, Alleghenian) affected eastern North America during the Paleozoic. During the Mesozoic, in contrast, this same region was principally affected by epeirogenic and extensional tectonism; one episode of comparatively more intense tectonic activity involving extensive faulting, uplift, sedimentation, intrusion and effusion produced the Newark Series of eposits and fault block phenomena. This event, termed the Palisades Disturbance, took place during the Late Triassic - Earliest Jurassic. The authors document a comparable extensional tectonic-igneous event occurring during the Late Cretaceous (Early Gulfian; Cenomanian-Santonian) along the southern margin of the cratonic platform from Arkansas to Georgia. Author

N86-31126*# Geological Survey, Denver, Colo.

A REGIONAL 17-18 MA THERMAL EVENT IN SOUTHWESTERN ARIZONA

William E. Brooks *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 18-21 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

A regional thermal event in southwestern Arizona 17 to 18 Ma ago is suggested by discordances between fission track (FT) and K-Ar dates in Tertiary volcanic and sedimentary rocks, by the abundance of primary hydrothermal orthoclase in quenched volcanic rocks, and by the concentration of Mn, Ba, Cu, Ag, and Au deposits near detachment faults. A high condont alteration index (CAI) of 3 to 7 is found in Paleozoic rocks of southwestern Arizona. The high CAI may have been caused by this mid-Tertiary thermal event. Resetting of temperature-sensitive TF dates (2) 17 to 18 Ma with respect to K-Ar dates of 24 and 20 Ma has occurred in upper plate volcanic rocks at the Harcuvar and Picacho Peak detachments. Discordances between FT and K-Ar dates are most pronounced at detachment faults. However, on a regional scale Ft dates from volcanic and sedimentary rocks approach 17 to 18 Ma event in areas away from known detachment faults. Effects of detachment faulting on the K-Ar system suggest that dates of correlative rocks will be younger as the detachment fault is approached. Author

N86-31127*# University of Northern Arizona, Flagstaff. Dept. of Geology.

GEOMETRIC AND CHRONOLOGIC EVOLUTION OF THE VERDE AND PAYSON BASINS OF CENTRAL ARIZONA AND POSSIBLE RELATIONSHIPS TO DETACHMENT FAULTING

D. S. Brumbaugh *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 22-24 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

The Transition Zone of Arizona and the structural basins therein have been poorly understood features from a structural standpoint. This is true both of their overall geometry as well as their formation. Yet these basins have developed within the last 13 million years and thus represent perhaps the most recent phase of development related to the extensional tectonics of the Basin and Range province. Recent work (Smith, 1984; Vance, 1983) as well as some older studies (Anderson and Creasy, 1985; Pedersen and Royce, 1970) provide data on the geometry of the Verde and Payson basins which can be used to constrain some hypotheses related to the development of these basins. The work of Cloos (1868), Anderson et. al. (1983), Wernicke and Burchfiel (1982) and Davis et. al. (1980) suggest a spatial and chronologic relation exists between planar high angle normal faults and low angle detachment faults. Perhaps one of the clearest examples from the Basin and Range area appears to be from seismic reflection profiles of the Sevier Desert Basin area of Utah (Fig. 1). These profiles suggest the existence fault-controlled extension basin development above it. Faults that appear either listric or planar intersect it from above. Author

N86-31128*# New Mexico State Bureau of Mines and Mineral Resources, Socorro.

POTASSIUM METASOMATISM OF VOLCANIC AND SEDIMENTARY ROCKS IN RIFT BASINS, CALDERAS AND DETACHMENT TERRANES

C. E. Chapin and J. I. Lindley (North Carolina Univ., Chapel Hill.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 25-31 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

The chemical, mineralogical, and oxygen-isotopic changes accompanying K-metasomatism are described. The similarities with diagenetic reactions in both deep marine and alkaline, saline-lake environments are noted. The common occurrence of K-metasomatism in upper-plate rocks of detachment terranes indicates that the early stage of severe regional extension causes crustal downwarping and, in arid to semi-arid regions, development of closed hydrographic basins. Author

N86-31129*# Institut Francais du Petrole, Rueil-Malmaison.

EXTENSIONAL TECTONICS AND COLLAPSE STRUCTURES IN THE SUEZ RIFT (EGYPT)

P. Y. Chenet, B. Colletta, G. Desforges (Gameat Dowal Arabia, Cairo (Egypt).), E. Ousset, and E. A. Zaghloul *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 32-33 (For primary document see N86-31119 22-46)

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The Suez Rift is a 300 km long and 50 to 80 km wide basin which cuts a granitic and metamorphic shield of Precambrian age, covered by sediments of Paleozoic to Paleogene age. The rift structure is dominated by tilted blocks bounded by NW-SE normal faults. The reconstruction of the paleostresses indicates a N 050 extension during the whole stage of rifting. Rifting began 24 My ago with dikes intrusions; main faulting and subsidence occurred during Early Miocene producing a 80 km wide basin (Clysmic Gulf). During Pliocene and Quaternary times, faulting is still active but subsidence is restricted to a narrower area (Present Gulf). On the Eastern margin of the gulf, two sets of fault trends are predominant: (1) N 140 to 150 E faults parallel to the gulf trend with pure dip-slip displacement; and (2) cross faults, oriented NOO to N 30 E that have a strike-slip component consistent with the N 050 E distensive stress regime. The mean dip cross fault is steeper (70 to 80 deg) than the dip of the faults parallel to the Gulf (30 to 70 deg). These two sets of fault define diamond shaped tilted block. The difference of mechanical behavior between the basement rocks and the overlying sedimentary cover caused structural disharmony and distinct fault geometries. Author

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TECTONIC DETERMINATIONS OF LITHOSPHERIC THICKNESS ON GANYMEDE AND CALLISTO c91

Steven K. Croft *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 34-37 (For primary document see N86-31119 22-46)

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The concept of the Maxwell time of a viscoelastic material (4.5) is used in conjunction with calculated thermal profiles to evaluate the significance of tectonic estimates of lithospheric thickness. Thermal lithospheric thicknesses provide fundamental constraints on planetary thermal histories that complement the constraints provided by dateable surface deposits of endogenic origin. Lithospheric constraints are of particular value on the icy satellites where our understanding of both rheology and surface ages is considerably poorer than it is for the terrestrial planets. Certain extensional tectonic features can and have been used to estimate lithospheric thicknesses on Ganymede and Callisto. These estimates, however, refer to the depth of the elastic lithosphere defined by the zone of brittle failure. The relation between the elastic lithosphere and the thermal lithosphere (generally defined by the zone of conductive heat transport) is not straightforward, because the depth of brittle failure depends not only on the thermal profile, but also on rheology and strain rate (or the characteristic time over which stresses build towards failure). Characteristic time considerations are not trivial in this context because stresses generating brittle failure on the icy satellites may be produced by impacts, with characteristic times of seconds to days, or by geologic processes with time scales of hundreds of millions of years. Author

N86-31131*# Arizona Univ., Tucson. Dept. of Geosciences.

METAMORPHIC CORE COMPLEXES: EXPRESSION OF CRUSTAL EXTENSION BY DUCTILE-BRITTLE SHEARING OF THE GEOLOGIC COLUMN

G. H. Davis *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 38-39 (For primary document see N86-31119 22-46)

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Metamorphic core complexes and detachment fault terranes in the American Southwest are products of stretching of continental crust in the Tertiary. The physical and geometric properties of the structures, fault rocks, and contact relationships that developed as a consequence of the extension are especially well displayed in southeastern Arizona. The structures and fault rocks, as a system, reflect a ductile-through-brittle continuum of deformation, with individual structures and faults rocks showing remarkably coordinated strain and displacement patterns. Careful mapping and analysis of the structural system has led to the realization that strain and displacement were partitioned across a host of structures, through a spectrum of scales, in rocks of progressively changing rheology. By integrating observations made in different parts of the extensional system, especially at different inferred depth levels, it has been possible to construct a descriptive/kinematic model of the progressive deformation that achieved continental crustal extension in general, and the development of metamorphic core complexes in particular. Author

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THERMAL HISTORY OF A METAMORPHIC CORE COMPLEX

Roy K. Dokka, Michael J. Mahaffie, and Arthur W. Snoke (Wyoming Univ., Laramie.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 40-41 (For primary document see N86-31119 22-46)

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Fission track (FT) thermochronology studies of lower plate rocks of the Ruby Mountains-East Humbolt Range metamorphic core complex provide important constraints on the timing an nature of major middle Tertiary extension of northeast Nevada. Rocks analyzed include several varieties of mylonitic orthogneiss as well as amphibolitic orthognesses from the non-mylonitic infrastructural core. Oligocene-age porphyritic biotite granodiorite of the Harrison Pass pluton was also studied. The minerals dated include apatite, zircon, and sphene and were obtained from the same rocks that have been previously studied. FT ages are concordant and range in age from 26.4 Ma to 23.8 Ma, with all showing overlap at 1 sigma between 25.4 to 23.4 Ma. Concordancy of all FT ages from all structural levels indicates that the lower plate cooled rapidly from temperatures above approx. 285 C (assumed sphene closure temperature (2)) to below approx. 150 C (assumed apatite closure temperature) near the beginning of the Miocene. This suggests that the lower plate cooled at a rate of at least approx. 36 deg C/Ma during this event. Rapid cooling of the region is considered to reflect large-scale tectonic denudation (intracrustal thinning), the vertical complement to intense crustal extension. FT data firmly establish the upper limit on the timing of mylonitization during detachment faulting and also coincide with the age of extensive landscape disruption. Author

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THERMAL-MECHANICAL RESPONSE TO SIMPLE SHEAR EXTENSION

K. P. Furlong *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 42-44 (For primary document see N86-31119 22-46)

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The mechanism of extension in the continental crust is apparently much more complex than that acting in the oceanic lithosphere. Recently, Wernicke has proposed that a significant fraction of extension in the continental lithosphere may occur by a simple shear mechanism along discrete fault/shear zones which cut the crust, and perhaps extend into the uppermost mantle. Clearly much of the surface evidence for extension supports this concept, but the depth extent of simple shear extension in the continental crust is unclear. Using numerical simulations, the thermal and associated mechanical behavior of the continental lithosphere in response to lithosphere extension along a low-angle simple shear zone which cuts through the lithospheric plate was determined in order to evaluate the resolving ability of thermal (heat flow and metamorphic P-T-time paths) and elevation observations in constraining the mode of continental extension. Author

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LITHOSPHERIC STRENGTH OF GANYMEDE: CLUES TO EARLY THERMAL PROFILES FROM EXTENSIONAL TECTONIC FEATURES **c91**

M. P. Golombek and W. B. Banerdt *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 45-49 (For primary document see N86-31119 22-46)

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While it is generally agreed that the strength of a planet's lithosphere is controlled by a combination of brittle sliding and ductile flow laws, predicting the geometry and initial characteristics of faults due to failure from stresses imposed on the lithospheric strength envelope has not been thoroughly explored. Researchers used lithospheric strength envelopes to analyze the extensional features found on Ganymede. This application provides a quantitative means of estimating early thermal profiles on Ganymede, thereby constraining its early thermal evolution. Author

N86-31135*# London Univ. (England). Dept. of Extra-Mural Studies.

IO: MOUNTAINS AND CRUSTAL EXTENSION

M. J. Heath *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 50-54 (For primary document see N86-31119 22-46)

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It is argued that there is good reason to conclude that mountains on Io, like those on Earth, are subject to growth and decay. The decay of mountains will be assisted by the ability of SO sub 2 to rot silicate rock and by explosive escape of sub-surface SO sub 2 from aquifers (Haemus Mons is seen to be covered by bright material, presumably fallout from a SO sub 2 rich plume

which had been active on the mountain flanks). On the west side of the massif at 10 degrees S, 270 degrees W a rugged surface consists of long ridges running perpendicular to the downslope direction, suggesting tectonic denudation with crustal blocks sliding down the mountain flank. Tectonic denudation may be assisted, as in the case of the Bearpaw Mountains, Montana by overloading mountain flanks with volcanic products. The surfaces of some massifs exhibit a well developed, enigmatic corrugated terrain, consisting of complex ridge systems. Ridges may bifurcate, anastomose to form closed depressions and form concentric loops. Taken together, observations of morphology, heat flux, surface deposits and styles of volcanism may point to the existence of lithosphere domains with distinct compositions and tectonic regimes. Author

N86-31136*# New Mexico Inst. of Mining and Technology, Socorro.

PN VELOCITY BENEATH WESTERN NEW MEXICO AND EASTERN ARIZONA

Lawrence H. Jaksha *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 55-57 (For primary document see N86-31119 22-46)

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The experiment involved observing Pn arrivals on an areal array of 7 seismic stations located in the transition zone and along the Jemez lineament. Explosions in coal and copper mines in New Mexico and Arizona were used as energy sources as well as military detonations at White Sands Missile Range, New Mexico, Yuma, Arizona, and the Nevada Test Site. Very preliminary results suggest a Pn velocity of 7.94 km/s (with a fairly large uncertainty) beneath the study area. The Pn delay times, which can be converted to estimates of crustal thickness given knowledge of the velocity structure of the crust increase both to the north and east of Springerville, Arizona. As a constraint on the velocity of Pn, researchers analyzed the reversed refraction line GNOME-HARDHAT which passes through Springerville oriented NW to SE. This analysis resulted in a Pn velocity of 7.9-8.0 km/s for the transition zone. These preliminary results suggest that a normal Pn velocity might persist even though the crust thins (from north to south) by 15 km along the length of the Arizona-New Mexico border. If the upper mantle is currently hot anywhere in western New Mexico or eastern Arizona then the dimensions of the heat source (or sources) might be small compared to the intra-station distances of the seismic arrays used to estimate the velocity of Pn. Author

N86-31137*# Geological Survey, Menlo Park, Calif.

BRITTLE EXTENSION OF THE CONTINENTAL CRUST ALONG A ROOTED SYSTEM OF LOW-ANGLE NORMAL FAULTS: COLORADO RIVER EXTENSIONAL CORRIDOR

Barbara E. John and Keith A. Howard *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 58 (For primary document see N86-31119 22-46)

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A transect across the 100 km wide Colorado River extensional corridor of mid-Tertiary age shows that the upper 10 to 15 km of crystalline crust extended along an imbricate system of brittle low-angle normal faults. The faults cut gently down a section in the NE-direction of tectonic transport from a headwall breakaway in the Old Woman Mountains, California. Successively higher allochthons above a basal detachment fault are futher displaced from the headwall, some as much as tens of kilometers. Allochthonous blocks are tilted toward the headwall as evidenced by the dip of the cappoing Tertiary strata and originally horizontal Proterozoic diabase sheets. On the down-dip side of the corridor in Arizona, the faults root under the unbroken Hualapai Mountains and the Colorado Plateau. Slip on faults at all exposed levels of the crust was unidirectional. Brittle thinning above these faults affected the entire upper crust, and wholly removed it locally along the central corridor or core complex region. Isostatic uplift exposed metamorphic core complexes in the domed footwall. These data support a model that the crust in California moved out from under Arizona along an asymmetric, rooted normal-slip shear system. Ductile deformation must have accompanied mid-Tertiary crustal extension at deeper structural levels in Arizona. Author

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THERMOMECHANICAL MODELING OF THE COLORADO PLATEAU-BASIN AND RANGE TRANSITION ZONE

Michael D. Londe *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 59-63 (For primary document see N86-31119 22-46)

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The Colorado Plateau (CP) basin and range (B & R) boundary is marked by a transition zone on the order of 75 to 150 km in width. As one moves westward across this transition from the CP interior to the B & R there is a variation in the surface topography, surface heat flow, Bouguer gravity, seismicity, and crustal structure. This transition extends eastward into the western CP from the Wastach-Hurricane fault line and is largely coincident with the high plateaus of Utah and the Wasatch Mountains. It has been suggested that this transition zone marks a thermal and tectonic encroachment of the CP by the B & R. A simple two dimensional numerical model of the thermal regime for the transition zone was constructed to test the hypothesis that the observed geophysical signatures across the transition are due to lateral heat conduction from steady state uniform extension within the B & R lithosphere. Surface heat flow, uplift due to flexure from thermal buoyant loading, and regional Bouguer gravity are computed for various extension rates, crustal structures, and compensation depths. Author

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HEAT AND DETACHMENT IN CORE-COMPLEX EXTENSION

Ivo Lucchitta *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 64-68 (For primary document see N86-31119 22-46)

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It is proposed here that the Miocene to Recent structural and volcanic features of the Basin and Range Province can be explained by a single thermotectonic process acting through time. This process consists of a thermal pulse resulting in a high-temperature regime that includes a steep thermal front moving first up toward the topographic surface, then down owing to cooling induced by a combination of convection and conduction. Within the front is a condition defining a critical surface that separates brittle from ductile behavior, and is marked by a nearly horizonal detachment fault. The most prominent and structurally highest position of the detachment results from interaction between the critical surface and a hydrothermal system near the topographic surface. These various features can be superposed on older ones through thermal remobilization or structural reactivation. Author

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HEAT FLOW INCREASE FOLLOWING THE RISE OF MANTLE ISOTHERMS AND CRUSTAL THINNING

Jean-Claude Mareschal and George Bergantz *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension and Continents and Planets 1985 p 69-70 (For primary document see N86-31119 22-46)

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Heat flow measurements in the western United States define a zone of high heat flow which coincides with the Basin and Range Province where extension has taken place recently. In this region, the average reduced heat flow is approx 30 mW sq. meters higher than in stable continental provinces; locally (e.g. Battle Mountain High), the heat flow anomaly can be more than 100 mW/sq meters above average. Estimates of the amount of extension range between 30% and 100% for the past 30 Ma. In the Colorado Plateau, which has been uplifted without major

tectonic deformation, the heat flow is only slightly above average. Analytical calculations show that an abrupt change in heat flow at the base of the lithosphere 30 Ma ago would not affect the surface significantly. Uplift would proceed at a slow rate. A thermal perturbation at the base of a 40 km thick crust, however, would reach the surface faster and, after 30 Ma, the increase in surface heat flow would be about 75% of the amplitude of the heat flow anomaly. The number of volcanic rocks in the Basin and Range suggests that magma intrusions may provide an effective heat transfer mechanism. It can be show that if the source of the intrusions is at the base of the lithosphere, the response time will be much longer than 30 Ma, and most ot the heat transferred from the asthenosphere will be absorbed in the lithosphere.

Author

N86-31141*# Texas A&M Univ., College Station. Dept. of Geology.
RELATIONS BETWEEN EXTENSIONAL TECTONICS AND MAGMATISM WITHIN THE SOUTHERN OKLAHOMA AULACOGEN
D. A. McConnell and M. C. Gilbert *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 71-75 (For primary document see N86-31119 22-46)
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Variations in the geometry, distribution and thickness of Cambrian igneous and sedimentary units within southwest Oklahoma are related to a late Proterozoic - early Paleozoic rifting event which formed the Southern Oklahoma aulacogen. These rock units are exposed in the Wichita Mountains, southwest Olkahoma, located on the northern margin of a Proterozoic basin. identified in the subsurface by COCORP reflection data. Overprinting of the Cambrian extensional event by Pennsylvanian tectonism obsured the influence of pre-existing basement structures and contrasting basement lithologies upon the initial development of the aulacogen.

Author

N86-31142*# Arizona State Univ., Tempe. Dept. of Geology.
HOT-SPOT TECTONICS ON IO **c91**
Alfred S. McEwen *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 76-80 (For primary document see N86-31119 22-46)
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The thesis is that extensional tectonics and low-angle detachment faults probably occur on Io in association with the hot spots. These processes may occur on a much shorter timescale on Ion than on Earth, so that Io could be a natural laboratory for the study of thermotectonics. Furthermore, studies of heat and detachment in crustal extension on Earth and the other terresrial planets (especially Venus and Mars) may provide analogs to processes on Io. The geology of Io is dominated by volcanism and hot spots, most likely the result of tidal heating. Hot spots cover 1 to 2% of Io's surface, radiating at temperatures typically from 200 to 400 K, and occasionally up to 700K. Heat loss from the largest hot spots on Io, such as Loki Patera, is about 300 times the heat loss from Yellowstone, so a tremendous quantity of energy is available for volcanic and tectonic work. Active volcanism on Io results in a resurfacing rate as high as 10 cm per year, yet many structural features are apparent on the surface. Therefore, the tectonics must be highly active.

Author

N86-31143*# Arizona Univ., Tucson. Lunar and Planetary Lab.
THE HEART MOUNTAIN FAULT: IMPLICATIONS FOR THE DYNAMICS OF DECOLLEMENT
H. J. Melosh *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 81-84 (For primary document see N86-31119 22-46)
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The Hart Mountain docollement in Northwestern Wyoming originally comprised a plate of rock up to 750m thick and 1300 sq kilometers in area. This plate moved rapidly down a slope no steeper than 2 deg. during Early Eocene time, transporting some blocks at least 50m from their original positions. Sliding occurred just before a volcanic erruption and was probably accompanied by seismic events. The initial movement was along a bedding plane fault in the Bighorn Dolomite, 2 to 3 meters above its contact with the Grove Creek member of the Snowy Range formation. The major pecularity of this fault is that it lies in the strong, cliff-forming Bighorn Dolomite, rather than in the weaker underlying shales. The dynamics of decollement are discussed.

Author

N86-31144*# Moscow State Univ. (USSR). Geological Faculty.
OCEANIC STRUCTURES OF THE EARTH AND THE NORTH DEPRESSION OF MARS: A COMPARISON OF THE FORMATION MECHANISMS
E. E. Milanovsky and A. M. Nikishin *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 85-88 (For primary document see N86-31119 22-46)
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The system of contemporary oceans on Earth and the North Depression of Mars are quasi-symmetrical in reference to the centers of of the hemispheres. Both systems had been formed over the common megacycle of evolution of planets and their origin is likely to have similar features. The formation of the Earth's oceanic system within the South Hemisphere seems to have proceeded in three stages: (1) the formation of a network of passive rifts at the center of the Gondwana; (2) the formation of the system of active rifts at the zones of forthcoming spreading; and (3) the spreading of the oceanic crust. The formation of the Mar's North Depression seems to have proceeded in two stages: (1) a formation of a dense network of grabens and faults at the center of the North Hemisphere over the upper mantle zone characterized by an anomalous warm-up and a density decrease; and (2) a collapse of the ancient crust and it's overflowing by basalts. The first stage of the ocean formation on Earth and Mars is similar. But there seems to have been a thinner lithosphere on Mars. The dense areal rifting was immediately followed by a total collapse.

Author

N86-31145*# Moscow State Univ. (USSR). Geological Faculty.
THE EVOLUTION OF RIFTING PROCESS IN THE TECTONIC HISTORY OF THE EARTH
E. E. Milanovsky and A. M. Nikishin *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 89-90 (For primary document see N86-31119 22-46)
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The continental rifting is the response of the lithosphere to the oriented tension. The distribution of viscosity in the lithosphere plays an essential role during all stages of the rifting. The viscosity is a function of the temperature, the lithostatic pressure, the rock composition, the deformation rate and other factors. The temperature is the most important factor. The vertical section of continental lithosphere of the rift zone may be divided into the following layers: the upper crust, in which brittle deformation prevails; the medial-crust, in which the role of plastic deformation increases; the lower crust, in which plastic deformation prevails; and the uppermost plastic part of the mantle overlapping asthenosphere. The depth of the boundaries in the crust layers are mainly controlled by the temperature.

Author

N86-31146*# Arizona State Univ., Tempe. Dept. of Geology.
EXTENSIONAL TECTONICS OF THE SATURNIAN SATELLITES **c91**
Jeffrey M. Moore *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 91-92 (For primary document see N86-31119 22-46)
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The saturnian satellites were imaged by the Voyager spacecraft at sufficient resolutions to reveal landforms that indicate histories of extensional tectonics for several of these bodies. The re-

lationships among landforms on various satellites imply that extensional tectonism is a consequence of several different energy sources. Case histories of several satellites are discussed to illustrate the interaction of various phenomena associated with extensional tectonism. Author

N86-31147*# Institut Francais du Petrole, Rueil-Malmaison.
LITHOSPHERIC AND CRUSTAL THINNING
I. Moretti *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 93-96 (For primary document see N86-31119 22-46)
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In rift zones, both the crust and the lithosphere get thinner. The amplitude and the mechanism of these two thinning situations are different. The lithospheric thinning is a thermal phenomenon produced by an asthenospherical uprising under the rift zone. In some regions its amplitude can exceed 200%. This is observed under the Baikal rift where the crust is directly underlaid by the mantellic asthenosphere. The presence of hot material under rift zones induces a large negative gravity anomaly. A low seismic velocity zone linked to this thermal anomaly is also observed. During the rifting, the magmatic chambers get progressively closer from the ground surface. Simultaneously, the Moho reflector is found at shallow depth under rift zones. This crustal thinning does not exceed 50%. Tectonic stresses and vertical movements result from the two competing effects of the lithospheric and crustal thinning. On the one hand, the deep thermal anomaly induces a large doming and is associated with extensive deviatoric stresses. On the other hand, the crustal thinning involves the formation of a central valley. This subsidence is increased by the sediment loading. The purpose here is to quantify these two phenomena in order to explain the morphological and thermal evolution of rift zones. Author

N86-31148*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.
THERMAL CONTROL OF THE STYLE OF EXTENSIONAL TECTONICS
Paul Morgan *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 97-98 (For primary document see N86-31119 22-46)
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Crustal extension is accommodated by a wide range of structural styles ranging from high-angle normal faults to low-angle detachments. In some areas different structural styles are superposed by multiple extension events, and in other areas different structural styles are juxtaposed. As shown with examples from the Rio Grande rift and the Red Sea-Gulf of Aden rift system, high strains and low-angle faulting are commonly spatially and temporally associated with a hot and probably thin lithosphere as indicated by major magmatic activity. Theoretical studies of strength profiles in the lithosphere suggest that there may effectively be a critical range for the geotherm above which low-angle faulting and crustal decollement may be favored over high-angle faulting. Author

N86-31149*# Technische Univ., Clausthal-Zellerfeld (West Germany). Inst. fuer Geophysik.
EXTENSIONAL TECTONICS ON CONTINENTS AND THE TRANSPORT OF HEAT AND MATTER
Horst J. Neugebauer *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 99- 100 (For primary document see N86-31119 22-46)
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Intracontinental zones of extensional tectonic style are commonly of finite width and length. Associated sedimentary troughs are fault-controlled. The evolution of those structures is accompanied by volcanic activity of variable intensity. The characteristic surface structures are usually underlaid by a lower crust of the transitional type while deeper subcustal areas show delayed travel times of seismic waves especially at young tectonic provinces. A correspondence between deep-seated processes and zones of continental extension appears obvious. A sequential order of mechanisms and their importance are discussed in the light of modern data compilations and quantitative kinematic and dynamic approaches. The Cenozoic exensional tectonics related with the Rhine River are discussed. Author

N86-31150*# Moscow State Univ. (USSR). Geological Faculty.
ON THE DIFFERENCES IN CONTINENTAL RIFTING AT THE EARTH, MARS AND VENUS
A. M. Nikishin and E. E. Milanovsky *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 101 - 103 (For primary document see N86-31119 22-46)
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During the process of continental rifting on Earth, the lower ductile crust stretches, forming a neck, while the upper brittle crust is broken in blocks by faults, and the blocks sink down the thinned lower crust; if the stretching continues, the neck may break and a newly originated oceanic crust is formed at this place. The rift system structure depends on the depth of the boundary surface between the brittle crust and the ductile crust, the litospheric thickness, the tension value, etc.. The rigid brittle rifting when narrow necks form in the lower crust is characteristic of the contemporary Earth; on Mars the brittle rifting with large subsidence was characteristic of the Tharsis upland formation epoch. The ductile rifting is typical of the Venus. The differences in rheologic features of the lithospheres of different planets causes the variation in types of rifting. Author

N86-31151*# Los Alamos National Lab., N. Mex.
HEAT AND EXTENSION AT MID- AND LOWER CRUSTAL LEVELS OF THE RIO GRANDE RIFT
Kenneth H. Olsen, W. Scott Baldridge, and Jonathan F. Callender (New Mexico Univ., Albuquerque.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 104 - 105 (For primary document see N86-31119 22-46)
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The process by which large amounts (50 to 200 percent) of crustal extension are produced was concisely described by W. Hamilton in 1982 and 1983. More recently, England, Sawyer, P. Morgan and others have moved toward quantifying models of lithospheric thinning by incorporating laboratory and theoretical data on rock rheology as a function of composition, temperature, and strain rate. Hamilton's description identifies three main crustal layers, each with a distinctive mechanical behavior; brittle fracturing and rotation in the upper crust, discontinuous ductile flow in the middle crust and laminar ductile flow in the lower crust. The temperature and composition dependent brittle-ductile transition essentially defines the diffuse boundary between upper and middle crust. It was concluded that the heat responsible for the highly ductile nature of the lower crust and the lensoidal and magma body structures at mid-crustal depths in the rift was infused into the crust by relatively modest (< 10 percent by mass) magmatic upwelling (feeder dikes) from Moho levels. Seismic velocity-versus-depth data, supported by gravity modeling and the fact that volumes of rift related volcanics are relatively modest (< 6000 cubic km) for the Rio Grande system, all imply velocities and densities too small to be consistent with a massive, composite, mafic intrusion in the lower crust. Author

N86-31152*# South Carolina Univ., Columbia. Earth Sciences and Resources Inst.
LOW-ANGLE NORMAL FAULTING AND ISOSTATIC RESPONSE IN THE GULF OF SUEZ: EVIDENCE FROM SEISMIC INTERPRETATION AND GEOMETRIC RECONSTRUCTION
S. K. Perry and S. Schamel *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 106 - 110 (For primary document see N86-31119 22-46)
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Tectonic extension within continental crust creates a variety of major features best classed as extensional orogens. These features have come under increasing attention in recent years, with the welding of field observation and theoretical concepts. Most recent advances have come from the Basin and Range Province of the southwestern United States and from the North Sea. Application of these geometric and isostatic concepts, in combination with seismic interpretation, to the southern Gulf of Suez, an active extensional orogen, allows generation of detailed structural maps and geometrically balanced sections which suggest a regional structural model. Geometric models which should prove to be a valuable adjunct to numerical and thermal models for the rifting process are discussed. Author

N86-31153*# Geological Survey, Reston, Va.
THE RELATIONSHIP OF EXTENSIONAL AND COMPRESSIONAL TECTONICS TO A PRECAMBRIAN FRACTURE SYSTEM IN THE EASTERN OVERTHRUST BELT, USA
Howard Pohn *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 111 - 112 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

The central and southern Appalachians have a long history of interrelated extensional and compressional tectonics. It is proposed that each episode was controlled by a reactivation of a fracture system in the Precambrian basement. Proprietary seismic-reflection profiles show a system of down-to-the-east Precambrian extensional faults. When under renewed extension, these faults produce features such as the western border faults of Mesozoic basins, and when under compression, probably produce tectonic ramps in the overlying sedimentary cover rocks as well as the spatially and genetically related Alleghenian folds. This system, which parallels the Appalachian trend, is cut by a system of cross-strike hinge or scissors faults that have probable strike-slip movements. Reactivation of this cross-strike system appears to have produced lateral ramps that connect decollements at different stratigraphic levels and caused abrupt changes in fold wavelength along strikes. Continued reactivation of this cross-strike system is suggested by east-west border faults and Precambrian highs between Mesozoic basins. The present activity of this system is suggested by the fact that more than 35% of recent earthquakes are coincident with cross-strike faults and lateral ramps. Author

N86-31154*# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
LOW-ANGLE NORMAL FAULTS-LOW DIFFERENTIAL STRESS AT MID CRUSTAL LEVELS
W. L. Power *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 113 - 114 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

A simple model for frictional slip on pre-existing faults that considers the local stress state near the fault and the effect of non-hydrostatic fluid pressures predicts that low-angle normal faulting is restricted to areas of the crust characterized by low differential stress and nearly lithostatic fluid pressures. The model considers frictional slip on a cohesionless low-angle normal fault governed by the failure criterion tau = mu sub f (sigma (*) sub n) =mu sub f (sigma sub n - P sub f) where tau and sigma sub n are the shear and normal stresses across the fault plane, mu sub f is the static coefficient of friction, and P sub f is the pore fluid pressure. As a first approximation, the model considers a vertical greatest principal compressive stress, sigma sub 1. It is apparent that if slip on low-angle normal faults is governed by the avove frictional failure criterion, slip on the low-angle normal fault occurs only if the least effective principal stress, sigma (*) sub 3 = sigma sub 3 - P sub f, is tensile, whenever tan superscrip -1(mu sub f> d, where d is the dip of the fault. If detachment faulting occurs at any significant depth in the crust, P sub f> sigma sub 3 is required. In light of this conclusion I allow P sub f to vary as necessary to allow slip on the low-angle normal fault. Author

N86-31155*# Peking Univ. (China). Dept. of Geology.
LATE PRECAMBRIAN AULACOGENS OF THE NORTH CHINA CRATON
Xianglin Qian *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 115 - 117 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

According to tectonic styles, the Precambrian evolution history of the North China craton may be subdivided into four stages: (1) Archean consolidation in 3.5 to 2.5 Ga, (2) Early Proterozoic rifting in 2.5 to 1.8 Ga, (3) Late Precambrian aulacogen in 1.8 to 0.8 Ga and (4) Platform regime after 0.8 Ga. In the Late Precambrian aulacogen stage of the North China craton there were two main aulacogens, Yanliao and Zhongtiao (Y and Z), developed in Middle Proterozoic time with an age 1.8 to 1.0 Ga. Their NE trend caused them to meet together in the central part of the craton and build up one great Y-Z aulacogen throughout the craton. Author

N86-31156*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIAL RIFT AND BLOCK TECTONICS AROUND THE THARSIS BULGE: INTRODUCTIONAL POSTULATION
J. Raitala *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extention on Continents and Planets 1985 p 118 - 122 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

Although the Vallis Marineris canyon and radial fossae grabens have been extensively studied, their origin and formation mechanism is still the subject of numerous questions. Possible rift formation is only one point of view and does not explain the rifting mechanism and the radial pattern of these structures around the Tharsis bulge. Both active and passive rifting must be taken into account. According to the active mechanism the building of a colcanic complex like the Tharsis bulge is caused by the rising of a huge mantle plume and adjoining extrusions which tap the generated magma. The surrounding fossae and valley structures are caused by more passive crustal rifting due to tensional failure of the surface layers. The main rising mantle plume activated and regenerated failure patterns radial to the centre of activity. These radial zones of weakness are then most easily utilized by the rising mantle plume. Deep zones of weakness regulate the penetration and distribution of hot mantle rock into upper levels while, contrarily, the effective impingement of the hot mantle plume into the lithosphere opens up new weakness zones. Author

N86-31157*# New Mexico State Bureau of Mines and Mineral Resources, Socorro.
HEAT FLOW AND THERMAL PROCESSES IN THE JORNADA DELMUERTO, NEW MEXICO
Marshall Reiter *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 123 - 127 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

Most heat flow data in rifts are uncertain largely because of hydrologic disturbances in regions of extensive fracturing. Estimates of heat flow in deep petroleum tests within a large basin of the Rio Grande rift, which has suffered little syn-rift fracturing, may begin to provide clearer insight into the relationships between high heat flow and crustal thinning processes. The Jornada del Muerto is a large basin located in the Rio Grande rift of south central New Mexico. The region of interest within the Jornada del Muerto is centered about 30 km east of the town of Truth or Consequences, and is approximately 60 km north-south by 30 km east-west. High heat flows are estimated for the region. Values increase from about 90 mWm(-2) in the northern part of the study area to about 125 mWm(-2) in the southern part. These high heat flows are rather enigmatic because in the immediate vicinities of the sites there is little evidence of Cenozoic volcanism or syn-rift extensional tectonics. It is suggested that the geothermal anomaly in the southern Jornada del Muerto (approx. 125 to approx. 95 mWm(-2)

results from some type of mass movement-heat transfer mechanism operating in the crust just below the elastic layer. This conclusion is consistent with the geologic and geophysical data which describe a thin crust, apparently devoid of features indicative of extensional-tectonics in the upper part of the lastic crust.

Author

N86-31158*# Arizona Bureau of Geology and Mineral Technology, Tucson.

CENOZOIC EXTENSION AND MAGMATISM IN ARIZONA

S. J. Reynolds and J. E. Spencer *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 128 - 132 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

The Basin and Range Province of Arizona was the site of two episodes of Cenozoic extension that can be distinguished on the basis of timing, direction and style of extension, and associated magmatism. The first episode of extension occurred during Oligocene to mid-Miocene time and resulted in the formation of low-angle detachment faults, ductile shear zones (metamorphic core complexes), and regional domains of tilted fault blocks. Evidence for extreme middle Tertiary crustal extension in a NE to SW to SW to ENE to WSW direction has been recognized in various parts of the Basin and Range of Arizona, especially in the Lake Mead area and along the belf of metamorphic core complexes that crosses southern Arizona from Parker to Tucson. New geologic mapping and scrutiny of published geologic maps indicates that significant middle Tertiary extension is more widely distributed than previously thought. The state can be subdivided into regional tilt-block domains in which middle Tertiary rocks dip consistently in one direction. The dip direction in any tilt-block domain is generally toward the breakaway of a low-angle detachment fault that underlies the tilt-block domain; we interpret this an indicating that normal faults in the upper plate of a detechment fault are generally synthetic, rather than antithetic, with respect to the detachment fault.

Author

N86-31159*# California Univ., Los Angeles.

A NUMERICAL STUDY OF FORCED LITHOSPHERIC THINNING

G. Schubert, A. Anderson (Los Alamos National Lab., N. Mex.), and E. Fishbein *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 133 - 134 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Subsolidus lithospheric thinning by mantle plumes may be involved in the creation of swells, hotspots, and rifts. Among the major questions concerning this process are the timescale on which it occurs and the structure of the plumes. The lithosphere is known to have been substantially thinned in 10 Ma or less. Current studies are focused on the lithospheric thinning by time-dependent plumes hypothesized to have large temperature differences across them.

Author

N86-31160*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.

KINEMATICS OF A LARGE-SCALE INTRAPLATE EXTENDING LITHOSPHERE: THE BASIN-RANGE

Robert B. Smith and Paul K. Eddington *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 135 - 137 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

Upper lithospheric structure of the Cordilleran Basin Range (B-R) is characterised by an E-W symmetry of velocity layering. The crust is 25 km thick on its eastern active margin, thickening to 30 km within the central portion and thinning to approx. 25 km on the west. Pn velocities of 7.8 to 7.9 km/s characterize the upper mantle low velocity cushion, 7.4 km/s to 7.5 km/s, occurs at a depth of approx. 25 km in the eastern B-R and underlies the area of active extension. An upper-crustal low-velocity zone in the eastern B-R shows a marked P-wave velocity inversion of 7% at depths of 7 to 10 km also in the area of greatest extension. The seismic velocity models for this region of intraplate extension suggest major differences from that of a normal, thermally underformed continental lithosphere. Interpretations of seismic reflection data demonstrate the presence of extensive low-angle reflections in the upper-crust of the eastern B-R at depths from near-surface to 7 to 10 km. These reflections have been interpreted to represent low-angle normal fault detachments or reactivated thrusts. Seismic profiles across steeply-dipping normal faults in unconsolidated sediments show reflections from both planar to downward flatening (listric) faults that in most cases do not penetrate the low-angle detachments. These faults are interpreted as late Cenozoic and cataclastic mylonitic zones of shear displacement.

Author

N86-31161*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences

RIFT SYSTEMS ON VENUS: AN ASSESSMENT OF MECHANICAL AND THERMAL MODELS c91

Sean C. Solomon and James W. Head (Brown Univ., Providence, R. I.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 138 - 141 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

The formation and distribution of major tectonic features on Venus are closely linked to the dominant mechanism of lithospheric heat loss. Among the most spectacular and extensive of the major tectonic features on Venus are the Chasmata, deep linear valleys generally interpreted to be the products of lithospheric extension and rifting. Systems of chasmata and related features can be traced along several tectonic zones up to 20,000 km in linear extent. Mechanical and thermal models for terrestrial continental-rifting are applied to the rift systems of Venus. The models are tested against known topographic and tectonic characteristics of Venus chasmata as well as independent information on the physical properties of the Venus crust and lithosphere.

Author

N86-31162*# Arizona Bureau of Geology and Mineral Technology, Tucson.

POSSIBLE ROLE OF CRUSTAL FLEXURE IN THE INITIAL DETACHMENT OF EXTENSIONAL ALLOCHTHONS

Jon E. Spencer *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 142 - 144 (For primary document see N86-31119 22-46)

Avail: NTIS HC A08/MF A01 CSCL 08G

The existence of low-angle normal faults indicates that the ratio of shear stress (TAU) to normal stress (sigma sub N) needed to cause slip on faults is substantially less than would be predicted based on experimental data. Because the tensional strength of rock at a large scale is exceedingly low, the upper plate of a low-angle normal fault cannot be pulled down the fault ramp, but must be driven down it by its own weight. The active or recently active Sevier Desert detachment fault in western Utah dips regionally at 12 deg. The radio of shear stress to normal stress due to the weight of the upper plate on a 12 deg dipping fault surface is 0.2. In contrast, laboratory experiments indicate that slip on fracture surfaces occurs with almost all rock types when (tau/sigma) reaches values of 0.6 to 0.85, corresponding to normal-fault dips of 30 deg to 40 deg. Seismological data indicate that low deviatoric stresses are associated with movement on faults of other geometrics and are not unique to low-angle normal faults. It thus appears that approximately planar fault zones with surface areas of hundreds to thousands of square kilometers have different mechanical properties than would be predicted based on laboratory studies of fractured rock. Modeling of stresses indicates that deviatoric stresses greater than 5kb exist and are sustainable in oceanic lithosphere, and that failure occurs when tau/sigma sub N approaches 0.6 to 0.85.

Author

N86-31163*# State Univ. of New York, Buffalo. Dept. of Geological Sciences.
THE EFFECTS OF STRAIN HEATING IN LITHOSPHERIC STRETCHING MODELS
Mike Stanton, Dennis Hodge, and Frank Cozzarelli *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 145 - 146 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

The deformation by stretching of a continental type lithosphere has been formulated so that the problem can be solved by a continuum mechanical approach. The deformation, stress state, and temperature distribution are constrained to satisfy the physical laws of conservation of mass, energy, momentum, and an experimentally defined rheological response. The conservation of energy equation including a term of strain energy dissipation is given. The continental lithosphere is assumed to have the rheology of an isotropic, incompressible, nonlinear viscous, two layered solid. Author

N86-31164*# Geological Survey, Menlo Park, Calif.
GEOMETRY OF MIOCENE EXTENSIONAL DEFORMATION, LOWER COLORADO RIVER REGION, SOUTHEASTERN CALIFORNIA AND SOUTHWESTERN ARIZONA: EVIDENCE FOR THE PRESENCE OF A REGIONAL LOW-ANGLE NORMAL FAULT
R. M. Tosdal and D. R. Sherrod *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 147 - 151 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

The geometry of Miocene extensional deformation, which changes along a 120 km-long, northeast-trending transect from the southestern Chocolate Mountains, southeastern California, to the Trigo and southern Dome Rock Mountains, southwestern Arizona is discussed. Based upon regional differences in the structural response to extension and estimated extensional strain, the transet can be divided into three northwesterly-trending structural domains. From southwest to northeast, these domains are: (1) southestern Chocolate-southernmost Trigo Mountains; (2) central to northern Trigo Mountains; and (3) Trigo Peaks-southern Dome Rock Mountains. All structures formed during the deformation are brittle in style; fault rocks are composed of gouge, cohesive gouge, and local microbreccia. In each structural domain, exposed lithologic units are composed of Mesozoic crystalline rocks unconformably overlain by Oligocene to Early Miocene volcanic and minor interbedded sedimentary rocks. Breccia, conglomerate, and sandstone deposited synchronously with regional extension locally overlie the volcanic rocks. Extensional deformation largely postdated the main phase of volcanic activity, but rare rhyolitic tuff and flows interbedded with the syndeformational clastic rocks suggest that deformation began during the waning stages of valcanism. K-Ar isotopic ages indicate that deformation occurred in Miocene time, between about 22 and m.y. ago. Author

N86-31165*# State Univ. of New York, Geneseo. Dept. of Gelogical Sciences.
SIMILARITIES AND CONTRASTS IN TECTONIC AND VOLCANIC STYLE AND HISTORY ALONG THE COLORADO PLATEAUS-TO-BASIN AND RANGE TRANSITION ZONE IN WESTERN ARIZONA: GEOLOGIC FRAMEWORK FOR TERTIARY EXTENSIONAL TECTONICS
R. A. Young, E. H. McKee, J. H. Hartman, and A. M. Simmons *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 152 - 155 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

The overall temporal and spatial relations between middle Tertiary volcanism and tectonism from the Basin and Range province onto the edge of the Colorado Plateaus province suggest that a single magnetic-tectonic episode affected the entire region more or less simultaneously during this period. The episode followed a post-Laramide (late Eocene through Oligocene) period of 25 million years of relative stability. Middle Tertiary volcanism did not migrate gradually eastward in a simple fashion onto the Colorado Plateau. In fact, late Oligocene volcanism appears to be more voluminous near the Aquarius Mountains than throughout the adjacent Basin and Range province westward to the Colorado River. Any model proposed to explain the cause of extension and detachment faulting in the eastern part of the Basin and Range province must consider that the onset of volcanism appears to have been approximately synchronous from the Colorado River region of the Basin and Range across the transition zone and onto the edge of the Colorado Plateaus. Author

N86-31166*# San Jose State Univ., Calif. Dept. of Meteorology.
AN ATLAS OF OBJECTIVELY ANALYZED ATMOSPHERIC CROSS SECTIONS, 1973-1980
Jindra Goodman, Steven E. Gaines, and R. Stephen Hipskind Sep. 1985 197 p
(Contract NCC2-73)
(NASA-CR-176937; NAS 1.26:176937) Avail: NTIS HC A09/MF A01 CSCL 04A

Atmospheric variability over time scales greater than one month is conceptually simplified and readily recognized from vertical cross-sections of zonal-monthly mean data. The reduction to two dimensions, latitude and height, explicitly eliminates all zonal waves but implicity retains their effects on the thermal-pressure fields and the dynamically related zonal wind fields. This atlas contains 96 examples, spanning all latitudes in both the northern and southern hemispheres and two decades in pressure, from 1000 to 10 mb. Four analyses, representing each month from January 1973 through December 1980, depicts the potential virtual temperature, the observed zonal wind velocity, the virtual temperature and the geostrophic zonal wind velocity. Each variable is contoured at a close interval to facilitate visual estimates of stability and vorticity via their gradients. The analyses are generated and contoured by objective computer methods from just one data source: in situ measurements from the conventional rawinradiosonde system. Although the analyses are independently made at constant pressure levels (the mandatory levels) the cross-sections are drawn with geopotential height as the ordinate. With this ordinate one can observe the seasonal expansion and contraction of the earth's atmosphere, especially that of the polar stratosphere. Also, the quasi-biannual cycle can be identified and studied directly from successive cross-sections. M.G.

N86-31167# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A STUDY OF ULTRAVIOLET EMISSIONS FROM THE OXIDES OF CARBON IN THE MESOSPHERE AND SHUTTLE ENVIRONMENT M.S. Thesis
Robert P. Tomic 1985 77 p
(AD-A166376; AFIT/CI/NR-86-4T) Avail: NTIS HC A05/MF A01 CSCL 04/1

This study seeks to determine if carbon oxide (CO, CO(+), CO2(+)) ultraviolet emissions in the mesosphere are observable, thus presenting an alternate method of determining the concentrations of these species. By developing photochemical models for CO(+) and CO2(+) it is shown that the concentration levels of CO(+) and CO2(+) are not adequate to produce UV band emissions bright enough to be detectable by spectrometric instruments. For CO, actual measurements of the concentrations were used in conjunction with g-factors to predict volume emission rates. These predictions indicate that only the CO fourth positive bands will be bright enough to measure by optical techniques. Mesospheric ultraviolet spectra obtained by the Imaging Spectrometeric Observatory (ISO) on the Spacelab 1 Mission are examined for the presence of the CO fourth positive bands and several bands are identified which are believed to be CO fourth positive. The CO fourth positive 1-6 band is used to calculate a density height profile for mesospheric CO. These calculations closely agree with measurements by others for mesospheric CO. This band system provides a viable method for measuring CO in the 80 km

to 110 km altitude region. A second study objective is to investigate whether carbon oxide emissions are found in the major products of shuttle engine exhaust and carbon materials are found to undergo significant mass loss on orbit. GRA

N86-31168# Aerodyne Research, Inc., Billerica, Mass.
A STUDY OF ATMOSPHERIC REACTIONS OF NEUTRAL SODIUM SPECIES AND OTHER METALS OF METEORIC ORIGIN Final Report, 10 Nov. 1982 - 9 Feb. 1986
J. A. Silver and C. E. Kolb 10 Feb. 1986 112 p
(Contract F19628-83-C-0010)
(AD-A166561; ARI-RR-508; AFGL-TR-86-0010) Avail: NTIS HC A06/MF A01 CSCL 04/1

The reactions of metallic species introduced into the atmosphere by meteor ablation may play a significant role in the chemistry of the lower thermosphere and upper stratosphere. The work described in this report summarizes a series of experimental rate constant measurements for reactions pertinent to these atmospheric regions. Prior to this work, virtually no direct kinetic parameters had been measured for the reactions of alkalis, and in particular sodium, which are believed to occur between 30 and 100 km in altitude. Model predictions of excited sodium emissions, expected concentration levels of the various alkali species, and the potential impact of alkali chemistry on the ozone balance all depended on theoretical estimates of reaction rate constants and product branching rations. Using a high temperature fast flow reactor and a variety of atomic and molecular species source and detection techniques, we have measured rate constants for over a dozen reactions. GRA

N86-31169# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
DETAILED GRAVITY ANOMALIES AND SEA SURFACE HEIGHTS DERIVED FROM GEOS-3/SEASAT ALTIMETER DATA
Richard H. Rapp Aug. 1985 134 p
(Contract F19628-82-K-0022)
(AD-A166593; OSU/DGSS-365; AFGL-TR-85-0191; SR-9) Avail: NTIS HC A07/MF A01 CSCL 08/5

Gravity anomalies and sea surface heights have been computed on a 0.125 deg grid in the ocean areas from a combined Geos-3/Seasat altimeter data set. The basic procedure used least squares collocation estimation where model covariance models were tailored to individual areas through altimeter residual variance scaling. Preliminary tests led to production prediction procedures using a reference model defined by a set of potential coefficients complete to degree 180. Comparisons of the predicted anomalies with ship derived values showed agreements varying from + or - 9 to + or - 30 mgals. No corrections to the altimeter implied sea surface heights were made for sea surface topography effects. The maximum anomaly predicted was 396 mgals near Hawaii and the most negative anomaly was -361 mgals over the Puerto Rican Trench. The 0.125 data set has been used to display the results using color plots, contour maps, and perspective views. The gridded data was used to compute 1 deg x 1 deg and 0.5 x 0.5 deg mean values. 1 deg mean anomalies were compared to terrestrial data where a difference of f + or - 7 mgals was found in comparing 10139 values. GRA

N86-31170# California Inst. of Tech., Pasadena. Seismological Lab.
INTERACTION OF SEISMIC WAVES WITH COMPLEX STRUCTURES Report, 12 Jan. 1984 - 11 Jan. 1985
Donald V. Helmberger, David G. Harkrider, and Robert W. Clayton 21 May 1985 52 p
(Contract F19628-83-K-0010)
(AD-A166715; AFGL-TR-85-0139; SR-2) Avail: NTIS HC A04/MF A01 CSCL 08/11

Recent models of earth structure suggest large horizontal gradients, especially in shear velocities. Some changes in existing methods are required to construct synthetics for broadband signals in many situations, especially when energy can reach the receiver by up-going as well as down going paths. This can be accomplished by allowing locally dipping structure and making some modifications to generalized ray theory. Local ray parameters are expressed in terms of a global reference which allows a de Hoop contour to be constructed for each generalized ray with the usual application of the Cagniard de Hoop technique. Synthetics generated from this method are compared with finite-difference runs using an advanced stable free surface boundary condition where lateral velocity and density variations at the free surface are treated properly. The method is implicit, but only requires a simple pentadiagonal system solver to implement. When coupled with second- and fourth order interior solutions, the overall problems appears to be stable for shear to compressional wave velocity greater than 0.01 and 0.02, respectively. The method is compared with other published algorithms for accuracy and stability. GRA

N86-31171# Utah State Univ., Logan.
INFRARED AIRGLOW CLUTTER Final Report, 15 Jul. 1983 - 30 Nov. 1985
J. Ulwick, K. Baker, and A. J. Steed Jan. 1986 46 p
(Contract F49620-83-C-0122)
(AD-A166994; AFOSR-86-0152TR) Avail: NTIS HC A03/MF A01 CSCL 04/1

A rocket and ground-based measurement programs was conducted to investigate infrared airglow and atomic oxygen density as part of the international MAP/WINE campaign in northern Scandinavia. The mean OH Meinel rotational temperature was approximately 199 K during a stratospheric warning event measured by a ground-based interferometer at ESRANGE in Sweden. This temperature is approximately 30 to 40 degress cooler than measurements taken when no stratospheric events were taking place and confirms the coupling theory that stratospheric warming results in mesospheric cooling. The atomic oxygen profiles measured by a rocket-borne resonance lamp technique showed a peak concentration of approximately 10 to the 11th power/cc between 90 and 100 km. The rocket results obtained between 90 and 180 km altitude show densities consistently almost an order of magnitude less than predicted by standard models. However, the rocket results are consistent with other measurements taken under similar conditions: winter nights with no particle precipitation. The 1.6 micrometer rocket-borne infrared radiometer also provided excellent altitude profiles of OH emissions. The STATE campaign examined some of the same phenomena with sounding rockets and in-situ probes launched from the Poker Flat Research Range, Alaska. GRA

N86-31172# Hebrew Univ., Jerusalem (Israel).
THE ORIENTATION DISTRIBUTION OF NONSPHERICAL AEROSOL PARTICLES WITHIN A CLOUD Final Report
Isaiah Gallily Dec. 1985 37 p
(Contract DAJA45-83-C-0004; DA Proj. 1T1-61102-BH-57)
(AD-A167326) Avail: NTIS HC A03/MF A01 CSCL 04/1

The orientation distribution of non-spherical particles within a cloud was studied. Theoretically, the subject was treated for a general laminar flow of immediate as well as weak and strong character, and for a turbulent flow whose Kolmogoroff scale was much larger than the particles themselves. The laminar flow served as one realization for the turbulent field within the cloud. It is found that the orientation distribution function in a laminar medium is generally structured with a preferred orientation while that of the turbulent medium is random on the average but with a significant dispersion. Experimentally, a horizontal wind tunnel was erected for orientation measurements; it was equipped with a dedicated hot-wire computerized system for turbulence characterization, which was shown to conform to the determinations of Laufer. Light scattering signals were used as the orientation-gauge. GRA

N86-31173# Los Alamos National Lab., N. Mex.
EVALUATION OF THE TOTAL MAGNETOSPHERIC ENERGY OUTPUT PARAMETER, U/SUB T/
R. D. Zwickl, L. F. Bargatze, D. N. Baker, C. R. Clauer, and R. L. McPherron 1985 18 p Presented at the Chapman Conference on Magnetotail Physics, Laurel, Md., 28 Oct. 1985 Prepared in cooperation with Stanford Univ., Calif. and California Univ., Los

Angeles
(Contract W-7405-eng-36)
(DE86-006017; LA-UR-86-166; CONF-8510254-4) Avail: NTIS HC A02/MF A01

Over the last few years the relationship between U(sub T), the magnetospheric energy consumption or output rate, and epsilon, a commonly used solar wind-magnetosphere energy input function, has been explored in some detail. Very high correlations between U(sub T) and epsilon are found during periods of strong activity, and by using linear prediction filtering techniques a delta-function impulse response was found for filter elements representing essentially zero delay. In light of these remarkable results, the derivation of U(sub T) for these intervals is re-examined. We find that U(sub T) is dominated in each event interval by the term containing tau(sub R), the ring current decay time, and that when tau(sub R) is defined as a function of epsilon the delta-function impulse response is present. If a constant tau(sub R) is assumed, the delta-function part of the filter disappears completely. Thus, this delta-function, which has been taken as being indicative of the directly driven component is an artifact of the earlier analysis, and it is due to the dependence of U(sub T) on epsilon. Our results imply that until U(sub T) can be derived independently from epsilon, these two quantities cannot be compared in a meaningful way, and that results obtained in previous studies are not valid. DOE

N86-31174# Geological Survey, Denver, Colo.
TOPOGRAPHY, STRESSES, AND STABILITY AT YUCCA MOUNTAIN, NEVADA
H. S. Swolfs and W. Z. Savage 1985 11 p Presented at the 26th US Symposium on Rock Mechan ics, Rapid City, S.D., 26 Jun. 1985
(Contract DE-AI08-78ET-44802)
(DE86-008247; CONF-850671-21) Avail: NTIS HC A02/MF A01

Plane-strain solutions are used to analyze the influence of topography on the state of stress at Yucca Mountain, Nye County, Nevada. The results are in good agreement with the measured stress components obtained in drill holes by the hydraulic-fracturing technique, particularly those measured directly beneath the crest of the ridge, and indicate that these stresses are gravitationally induced. A separate analysis takes advantage of the fact that a well-developed set of vertical faults and fractures, subparallel to the ridge trend, imparts a vertical transverse isotropy to the rock and that, as a consequence of gravitational loading, unequal horizontal stresses are induced in directions perpendicular and parallel to the anisotropy. DOE

N86-31175# Brookhaven National Lab., Upton, N. Y.
CHEMICAL INSTRUMENTATION FOR FIELD STUDIES OF ATMOSPHERIC WET DEPOSITION PROCESSES
R. L. Tanner Nov. 1985 8 p Presented at the 191st American Chemical Society National Meeting, New York, N.Y., 13 Apr. 1986
(Contract DE-AC02-76CH-00016)
(DE86-005255; BNL-37346; CONF-860425-10) Avail: NTIS HC A02/MF A01

Field studies of wet deposition processes require the differentiation and determination of many trace reactive species in the atmosphere. These species may be present in clear-air gaseous or aerosol phases, or they may be distributed between cloudwater or precipitation and interstitial gaseous phases. Analytical requirements on existing techniques have been extremely rigorous and, in several cases, have required development of new approaches to the sampling and determination of critical species. This paper reviews these developments with respect to airborne sampling in all general areas. DOE

N86-31176# Los Alamos National Lab., N. Mex.
BISTATIC PHASE SOUNDING IN THE IONOSPHERE ABOVE THE MINOR SCALE EXPLOSION
Joseph Fitzgerald Feb. 1986 27 p
(Contract W-7405-eng-36)
(DE86-008582; LA-10657-MS) Avail: NTIS HC A03/MF A01

A 4.8-kT chemical explosion named Minor Scale was detonated at the White Sands Missile Range on June 26, 1985. Following the detonation, three bistatic HF phase sounders observed disturbances in the ionosphere directly over the explosion. The path from transmitters to receivers, which were 283 km apart, had a midpoint 7 km northeast of ground zero. We describe the experiment and present time histories of the power spectra of the three transmission. Between 300 and 360 s after the explosion, all three links showed changes in spectra. The lowest frequency shifted by -1 Hz, indicating the passage of the acoustic wave from the explosion through the total reflection height in the E-layer at about 95 km. We model the Doppler shift and absorption change to be expected for this disturbance assuming the acoustic wave had an N-wave profile with a maximum amplitude of 15%. The spectra of the lowest frequency also show temporary peaks at negative Doppler that indicate partial reflection modes from upper and lower edges of the N-wave. We calculate the Doppler shift and reflection coefficients for these partial reflection modes. During the same time period, the spectra of the two higher frequency transmissions also showed temporary peaks at negative Doppler that rapidly changed their frequency offset. DOE

N86-31177# Argonne National Lab., Ill.
DEWITT FIELD STUDY: SURFACE FLUX OBSERVATIONS, IN SITU SOUNDINGS AND REMOTE SENSING OF CONDITIONS AFFECTING THE BEHAVIOR OF THE MIXED LAYER OVER LAND
R. L. Coulter, M. L. Wesely, D. L. Sisterson, T. J. Martin, R. L. Hart, D. R. Cook, P. E. Hess, E. W. Eloranta, and B. B. Hicks Mar. 1986 175 p
(Contract W-31-109-eng-38)
(DE86-008942; ANL/ER-85-1) Avail: NTIS HC A08/MF A01

The DeWitt field study, conducted July 10 to 21, 1979, provides information on the structure of the lower 2 km of the atmosphere and the surface boundary conditions for flat farmland in central Illinois. Mean wind and temperature profiles in the lower atmosphere were measured by in-situ soundings both with high-resolution miniature radiosondes and an instrument package carried aloft by a kytoon. The height and depth of the entrainment zone at the top of the boundary layer, and some wind velocity component means and turbulence statistics were measured with lidar and solar remote sensing systems. Standard meteorological surface observations, measurements of solar and net radiation, and eddy fluxes of momentum, heat, water vapor, and ozone over a local maize canopy complete the body of data collected. This report summarizes methods of observation and data reduction and presents the processed data in tabular and graphic forms in a series of appendices. These results can be used to test models of planetary boundary layer behavior, including the influences of surface fluxes and entrainment aloft on the variation of mixed layer heights and mixing processes in the boundary layer. DOE

N86-31178# Kiruna Geophysical Inst. (Sweden).
DETERMINATION OF THE THERMOSPHERIC NEUTRAL WIND FROM INCOHERENT SCATTER RADAR MEASUREMENTS
I. Haeggstroem, J. Murdin, and D. Rees (University Coll., London (England).) Nov. 1984 27 p Original document contains color illustrations
(KGI-186; ISSN-0347-6405; ESA-86-97225) Avail: NTIS HC A03/MF A01

Measurements made by the EISCAT UHF incoherent scatter radar were used to derive thermospheric winds, which were compared to Fabry-Perot interferometer measurements of the neutral wind made simultaneously. Lack of knowledge of the vertical component of the neutral wind (assumed to be zero) and the neutral gas temperature (MSIS model values assumed) produces large uncertainties in the radar neutral wind. A Fabry-Perot interferometer observing vertically upwards through the radar scattering volume would produce estimates of the vertical component of the neutral wind and neutral temperature, however, with uncertainty in the altitude of the measurements. ESA

N86-31179# Uppsala Ionospheric Observatory (Sweden).
[ACTIVITIES REPORT OF THE IONOSPHERIC OBSERVATORY]

Annual Report, 1985
1986 52 p
(UIO-SR-86-01; ISSN-0349-2699; ESA-86-97227) Avail: NTIS HC A04/MF A01

Research in high latitude ionospheric phenomena and phenomena related to the interaction of the ionosphere with the magnetosphere and with the neutral atmosphere is summarized. In situ experiments with sounding rockets and the Swedish Viking satellite are described. Ground-based, remote sensing experiments use radar and radio techniques, in particular EISCAT, backscatter radars, and equipment for observing stimulated electromagnetic emissions from heating experiments. Routine monitoring of ionospheric conditions is performed using the ionosonde, riometer, and backscatter radar techniques. ESA

N86-31180# National Bureau of Standards, Gaithersburg, Md. National Engineering Lab.
SKY LUMINANCE AND DIRECT BEAM ILLUMINANCE
S. J. Treado, W. E. Remmert, and J. W. Bean Mar. 1986 51 p
(PB86-196755; NBSIR-85/3251) Avail: NTIS HC A04/MF A01 CSCL 13A

Measurement of sky illuminance, sky luminance, direct beam illuminance and direct beam irradiance are analyzed and discussed. The database consisted of an annual set of integrated hourly measurements made at the National Bureau of Standards, Gaithersburg, Maryland. The relationship between diffuse sky illuminance and luminance of selected portions of the sky dome is examined. Measured sky luminances are compared to luminance calculated using equations for three standard sky types - clear, partly cloudy and overcast. The results indicate that the luminance distribution of actual skies varies considerably from the standard skies. GRA

N86-31181*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 497, JANUARY 1986. PART 1: (PROMPT REPORTS). DATE FOR DECEMBER 1985, NOVEMBER 1985 AND LATE DATA
H. E. Coffey Jan. 1986 95 p
(Contract NASA Order-W-15519; Grant NSF ATM-83-18491)
(NASA-CR-177170; NAS 1.26:177170; PB86-168630;
SGD-497-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 03B

Solar-Geophysical Data Number 497, January 1986, Part 1 (prompt reports); Data for December 1985, November 1985 and Late Data contains the Data for December 1985-(IUWDS alert periods (advance and worldwide), solar activity indices, Solar flares, Vostok inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field); data for November 1985-(solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); and late data-(geomagnetic indices, calcium plage data). GRA

N86-31182*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 497, JANUARY 1986. PART 2: (COMPREHENSIVE REPORTS). DATA FOR JULY 1985, AND MISCELLANEA
H. E. Coffey Jan. 1986 47 p
(Contract NASA Order-W-15519; Grant NSF ATM-83-18491)
(NASA-CR-177169; NAS 1.26:177169; PB86-168648;
SGD-497-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Solar-Geophysical Data Number 497, January 1986. Part 2: (Comprehensive Reports); Data for July 1985, and Miscellanea contains the following: a detailed index for 1985; data for July 1985-(solar flares, solar radio bursts at fixed frequencies, solar x-ray radiation from GOES satellite, mass ejections from the sun, active prominences and filaments); and miscellaneous data-(Meudon carte synoptique 16 April - 13 May 1985, number of solar flares August 1966 - July 1985). GRA

N86-31088# Technische Univ., Clausthal-Zellerfeld (West Germany). Inst. fuer Geologie und Palaeontologie.
GEOLOGY
P. Kronberg and P. Murino (Naples Univ., Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 43-74 (For primary document see N86-31084 22-42)
Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-31183*# New York Univ., New York. Dept. of Applied Science.
APPLICATION OF SOLAR MAX ACRIM DATA TO ANALYZE SOLAR-DRIVEN CLIMATIC VARIABILITY ON EARTH Final Report, 1 Feb. 1985 - 31 Jan. 1986
Martin I. Hoffert Sep. 1986 20 p
(Grant NAG5-503)
(NASA-CR-176855; NAS 1.26:176855; NYU/DAS-86-151) Avail: NTIS HC A02/MF A01 CSCL 04B

Terrestrial climatic effects associated with solar variability have been proposed for at least a century, but could not be assessed quantitatively owing to observational uncertainities in solar flux variations. Measurements from 1980 to 1984 by the Active Cavity Radiometer Irradiance Monitor (ACRIM), capable of resolving fluctuations above the sensible atmosphere less than 0.1% of the solar constant, permit direct albeit preliminary assessments of solar forcing effects on global temperatures during this period. The global temperature response to ACRIM-measured fluctuations was computed from 1980 to 1985 using the NYU transient climate model including thermal inertia effects of the world ocean; and compared the results with observations of recent temperature trends. Monthly mean ACRIM-driven global surface temperature fluctuations computed with the climate model are an order of magnitude smaller, of order 0.01 C. In constrast, global mean surface temperature observations indicate an approx. 0.1 C increase during this period. Solar variability is therefore likely to have been a minor factor in global climate change during this period compared with variations in atmospheric albedo, greenhouse gases and internal self-inducedoscillations. It was not possible to extend the applicability of the measured flux variations to longer periods since a possible correlation of luminosity with solar annual activity is not supported by statistical analysis. The continuous monitoring of solar flux by satellite-based instruments over timescales of 20 years or more comparable to timescales for thermal relaxation of the oceans and of the solar cycle itself is needed to resolve the question of long-term solar variation effects on climate. Author

N86-31184# Air Force Geophysics Lab., Hanscom AFB, Mass.
METEOROLOGICAL MEASUREMENTS ON LINE-OF-SIGHT MICROWAVE RADIO LINKS: ENVIRONMENTAL RESEARCH PAPERS, 1983 - 1985
James F. Morrissey, Yutaka Izumi, and Owen Cote 22 Nov. 1985 66 p
(AD-A166627; AFGL-TR-85-0299; AFGL-ERP-935) Avail: NTIS HC A04/MF A01 CSCL 17/2

Meteorological measurements on two experimental microwave radio links in New England are presented. The links were from Pack Monadnock in N.H. to Prospect Hill in Waltham, Mass., in 1983, and from Saddleback Mountain in N.H. to Prospect Hill in 1984. These data are then used in ray-trace programs to determine multipath delays and variations in the angle of arrival at the receiver. Several cases of low-level ducts due to inversions caused by radiational cooling are analyzed. GRA

N86-31185# Air Force Geophysics Lab., Hanscom AFB, Mass.
A CANDIDATE MESOSCALE NUMERICAL CLOUD/PRECIPITATION MODEL: ENVIRONMENTAL RESEARCH PAPERS, SEP. 1984 - SEP. 1985
Daniel Ridge, George Modica, and Arthur Jackson 10 Oct. 1985 30 p
(AD-A166628; AFGL-TR-85-0252; AFGL-ERP-931) Avail: NTIS HC A03/MF A01 CSCL 04/2

A numerical mesoscale forecast model was selected for potential use by the Air Force in an operational mode, either in a nested configuration, or as a stand-alone model in a base-weather station. The model was developed at the National Oceanographic and Atmospheric Association's (NOAA) Environmental Research Laboratory (ERL), and many of its numerical and meteorological features are described in this report. Two versions are specified: the first under development at NOAA/ERL and another at AFGL (the NOAA/AFGL model). A baseline test of the latter model revealed several problems. The initialization scheme computed initial fields of mass and momentum that failed to mutually adjust after several hours of integration. Subsequent techniques designed to improve the initial conditions appeared to be a step in the right direction. The nonmeteorological gravity-inertia wave noise evident in most of the forecast fields appeared to result from poor treatment of the variables at the lateral boundaries. Author (GRA)

N86-31186# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECT OF SMOOTHING THE DOPPLER RADAR DERIVED WIND FIELD ON PERTURBATION PRESSURE RETRIEVAL M.S. Thesis
George Philip Rosser, Jr. May 1986 53 p
(AD-A166631; AFIT/CI/NR-86-31T) Avail: NTIS HC A04/MF A01 CSCL 04/2

Gridded u and v wind components derived from dual-Doppler radar data were utilized to study the behavior of the perturbation pressure field when different amounts of smoothing were applied to the wind field. Data-void areas in the wind field were filled by extrapolation. Three-point and nine-point smoothing operators were employed to smooth the wind field prior to retrieving the perturbation pressure field. Smoothing the wind field produced a nonlinear variation of the central pressure value in a meso-low with respect to the smoothing parameter. The central pressure value decreased as the smoothing parameter increased. Pressure centers less than 0.1 kPa (1 mb) in absolute magnitude tended to amplify and migrate slightly. False pressure centers created by the data-void filling technique were removed when a smoothing parameter greater than or equal to 0.4 was employed. Smoothing parameters greater than or equal to 0.5 created a false pressure center.Author (GRA)

N86-31187# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
METEOROLOGICAL TELECONNECTIONS BETWEEN THE SAHEL AND THE EASTERN UNITED STATES M.S. Thesis
Jeffrey Earl Malan Dec. 1985 69 p
(AD-A166632; AFIT/CI/NR-86-32T) Avail: NTIS HC A04/MF A01 CSCL 04/2

The existence of atmospheric teleconnections between the Sahel and the eastern United States is investigated on a seasonal time scale. Precipitation data for the Sahel and surface temperature data for the eastern United States from the years 1951 through 1977 in the months June through October are used. The statistical procedures applied are principal component analysis; Pearson's product-moment and Spearman's rank correlation, simple linear regression. Data of the 700 mb height data are used to produce composite charts of seasonal circulation and for conducting circulation analysis in an effort to associate climate signals with anomalous conditions of the general circulation. Two readily identifiable modes of large-scale spatial variability are found in the first and second principal components. The first indicates the existence of an inverse relationship between precipitation in the Sahel and surface temperature in the eastern United States. The second principal component indicates a direct relationship between these two regimes. Circulation analyses reveal patterns in the 700 mb height anomaly field which may be connected with the postulated inverse relationship. Author (GRA)

N86-31188# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
TYPHOON STRUCTURAL VARIABILITY Thesis
Candis L. Weatherford Oct. 1985 94 p
(Grant NSF ATM-84-19116)
(AD-A166772; AFIT/CR/NR-86-10T) Avail: NTIS HC A05/MF A01 CSCL 04/2

This paper describes the varying structure of the tropical cyclone wind profile in terms of its core intensity, outer strength, and size where core intensity is defined by the tropical cyclone's minimum central sea-level pressure. Outer strength is an average tangential wind speed from 60 to 150 b nu (111-278 km), and size measures the radial extent of 30-kt and 50-kt surface winds. Analysis was performed on 700 mb aircraft data from over 500 reconnaissance mission into 66 Tropical cyclones of the northwestern Pacific. All these cyclones were of typhoon intensity sometime during their lifecycle. This data set is uniquely suited to fill the dual needs of: 1) providing inner wind profile information out to 4 deg radius, thus allowing the cyclone's strength to be measured; and 2) being able to sample the entire life cycle of the tropical cyclone from depression through supertyphoon stages. The focus of this study is on the outer strength region. GRA

N86-31189# Army Electronics Research and Development Command, White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
THE US ARMY YUMA PROVING GROUND, ARIZONA 22-YEAR CLIMATE CALENDAR 1954-1975 Final Technical Report
James C. Devine Mar. 1986 64 p
(AD-A166878; AD-E440321; ERADCOM/ASL-TR-0200) Avail: NTIS HC A04/MF A01 CSCL 04/2

This report contains, in calendar form, the following data for the Yuma Proving Ground, AZ: average daily maximum and minimum temperatures, record extremes of these parameters, and year of occurrences; monthly average maximum and minimum temperatures, and average relative humidity; average windspeed in knots; prevailing wind direction; average and maximum precipitation values daily and by month; average sky cover and average number of days clear, partly cloudy, and cloudy. Tables covering data of interest include: maximum and minimum temperatures, to include total occurrences and percentage of overall occurrence as well as monthly percentages of occurrence; seasonal maximum, minimum, and daily average temperatures; precipitation by monthly occurrence and monthly and annual totals; sky condition; relative humidity; soil temperatures; station atmospheric pressure; degree days both heating and cooling; and sunrise-sunset tables. The general terrain features, climate, trafficability, thunderstorms, and periods of special weather interest are covered in the text and appendix A. GRA

N86-31190# Oak Ridge National Lab., Tenn.
HIERARCHY THEORY AND GLOBAL CHANGE
R. V. ONeill 1985 27 p Presented at the Workshop on Global Change, St. Petersburg, Fla., 28 Oct. 1985
(Contract DE-AC05-84OR-21400)
(DE86-005154; CONF-8510284-1) Avail: NTIS HC A03/MF A01

Hierarchy theory asserts that a useful way in which to deal with complex, multiscaled systems is to focus on a single phenomenon and a single time-space scale. By so limiting the problem, it is possible to define it clearly and choose the proper system to emphasize. This paper applies the theory to the problem of global change. DOE

N86-31191# Lawrence Livermore National Lab., Calif.
RESULTS OF COMPARISON STUDIES OF INFRARED RADIATIVE TRANSFER MODELS
F. M. Luther Feb. 1986 11 p Presented at the 6th Conference on Atmospheric Radiation, Williamsburg, Va., 12 May 1986
(Contract W-7405-eng-48)
(DE86-006531; UCRL-93488; CONF-860562-1) Avail: NTIS HC A02/MF A01

The capability to accurately model the natural and perturbed climate is important to the understanding of current-related issues. It is important that all the major physical processes and feedback mechanisms in climate models be evaluated as to their accuracy and limitations. Since the transfer of solar and longwave radiation represents the prime physical process that drives the circulation of the atmosphere and its temperature structure, an evaluation of the modeling of radiative processes is a critical element in the overall evaluation of the models. This paper discusses model comparison studies of infrared radiative transfer models that have

been conducted for the purpose of validating and improving these models. DOE

N86-31192# Australian Atomic Energy Commission, Lucas Heights.
SOME ATMOSPHERIC DISPERSION, WIND AND TEMPERATURE STATISTICS FROM JERVIS BAY, AUSTRALIAN CAPITAL TERRITORY 1972 TO 1974
G. H. Clark Jul. 1985 23 p
(DE86-701370; AAEC/E-606) Avail: NTIS (US Sales Only) HC A02/MF A01

A meteorological study of winds, temperatures and Pasquill stability categories was conducted in the coastal conditions at Jervis Bay. Three Pasquill stability categorisation schemes were compared. These indicated a predominance of neutral to slightly unstable conditions. During the daytime, north bay breezes and north-east sea breezes were most common together with on-shore south-east winds. Off-shore south-west winds prevailed during winter and were observed most frequently at night. DOE

N86-31193# International Centre for Theoretical Physics, Trieste (Italy).
PARAMETERS DETERMINING MAXIMUM WIND VELOCITY IN A TROPICAL CYCLONE
A. M. Choudhury Sep. 1984 11 p Submitted for publication Sponsored by IAEA and UNESCO
(DE86-701371; IC-84/159) Avail: (US Sales Only) NTIS HC A02/MF A01

The spiral structure of a tropical cyclone was earlier explained by a tangential velocity distribution which varies inversely as the distance from the cyclone centre outside the circle of maximum wind speed. The case has been extended in the present paper by adding a radial velocity. It has been found that a suitable combination of radial and tangential velocities can account for the spiral structure of a cyclone. This enables parametrization of the cyclone. Finally a formula has been derived relating maximum velocity in a tropical cyclone with angular momentum, radius of maximum wind speed and the spiral angle. The shapes of the spirals have been computed for various spiral angles. DOE

N86-31194# Oregon State Univ., Corvallis. Wind Resources Assessment Lab.
PACIFIC NORTHWEST WIND REGIONAL ENERGY ASSESSMENT PROGRAM, VOLUME 1 Final Report
R. W. Baker, J. E. Wade, W. Frick, R. Wittrup, and J. Buckley Oct. 1985 163 p
(Contract DE-AC79-81BP-25593)
(DE86-007113; DOE/BP-25593/1-Vol-1; BPA-85-19-Vol-1) Avail: NTIS HC A08/MF A01

In 1980 BPA began a 5-year Wind Regional Energy Assessment Program (WIND REAP) to assess the wind resource potential throughout the BPA service area. Areas showing evidence of high wind potential were identified and instrumented with anemometers. The wind data indicate that there is a very diverse wind flow over the region as the wind strength varies considerably both on a daily and seasonal basis. Some areas indicate strong winter winds, while others recorded the strongest winds in the spring and/or summer. Wind data were analyzed for 300 sites, and it was found that there are 39 areas that have wind energy development potential. The intermittent but diverse energy resource is available during most seasons. However, there are a few major development obstacles such as transmission network strength and land-use constraints that may limit or prevent the implementation of some of this resource. DOE

N86-31195# National Severe Storms Forecast Center, Kansas City, Mo.
SEVERE LOCAL STORM WARNING VERIFICATION PRELIMINARY PROCEDURES
Leo A. Grenier and John T. Halmstead Apr. 1986 18 p
(PB86-194362; NOAA-TM-NWS-NSSFC-12) Avail: NTIS HC A02/MF A01 CSCL 04B

Verification of severe local storm warnings issues by National Weather Service offices is performed at the National Severe Storms Forecast Center (NSSFC). Issued warnings and event reports are collected and processed prior to verification. As part of these preliminary procedures two products are routinely disseminated nationally via the AFOS network. A summary of severe local storm event reports received during the previous 24 hours (CCCSTADTS) is prepared daily. Once each week, a summary (CCCSTAXXX) is prepared for each WSFO. The summary lists events and warnings processed during the previous week for all stations within the management area of that WSFO. A thorough knowledge of preliminary verification procedures and routine use of these products, as presented in the report, can insure greater accuracy of data and aid the WSFO in the preparation of Storm Data and Unusual Weather Phenomena (Form F-8). GRA

N86-31196# National Center for Atmospheric Research, Boulder, Colo. Atmospheric Analysis and Prediction Div.
INTRODUCTION TO THE CCM MODULAR PROCESSOR (VERSION PROCO1)
Michael A. Dias Jan. 1986 54 p
(Grant NSF ATM-82-17015)
(PB86-188679; NCAR/TN-262-IA) Avail: NTIS HC A04/MF A01 CSCL 04B

The technical note provides an introduction to the CCM Modular Processor, a post-processing software package for the analysis of data on history tapes (mass storage volumes) output by the NCAR Community Climate Model (CCM). The document is designed as a tutorial to teach new users how to access the processor and complete simple tasks, and as a quick reference guide for more experienced users. The introduction/tutorial is not a comprehensive description of the modular processor. GRA

N86-31197# National Center for Atmospheric Research, Boulder, Colo. Atmospheric Analysis and Prediction Div.
CCM MODULAR PROCESSOR USERS' GUIDE (VERSION PROCO1)
Richard J. Wolski Jan. 1986 172 p
(Grant NSF ATM-82-17015)
(PB86-187069; NCAR/TN-261-IA) Avail: NTIS HC A08/MF A01 CSCL 04B

The NCAR CCM Modular Processor is the primary tool for the analysis of data output by the NCAR Community Climate Model. The User's Guide contains complete instructions for running the PROCO1 version of the Processor on the Crays at NCAR, and replaces Part 1 of the previous Users' Guide (NCAR/TN-216+IA), August 1983). Operations available in the PROCO1 version include the computation of spatial and time averages (plus related statistics), vertical interpolation to pressure surfaces, horizontal interpolation and filtering in spectral space, time filtering, comparison of different Model Case, and the computation of new quantities (derived fields) based on those output by the Model. Output from the Processor may take the form of printed values, binary data for subsequent analysis by the Processor or other programs, and a wide variety of graphics. Data may be plotted as (1) field-value curves, two-dimensional contours, or vector arrows, all on several spatial projections; (2) time series curves or contours; and (3) curves of spectral coefficients. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-31198*# National Aeronautics and Space Administration, Washington, D.C.
NASA OCEANIC PROCESSES PROGRAM Annual Report, fiscal year 1985
Aug. 1986 162 p
(NASA-TM-88987; NAS 1.15:88987) Avail: NTIS HC A08/MF A01 CSCL 08C

This, the Sixth Annual Report for NASA's Oceanic Processes

Program, provides an overview of recent accomplishments, present activities, and future plans. Although the report was prepared for Fiscal Year 1985 (October 1, 1984 to September 30, 1985), the period covered by the Introduction extends into June 1986. Sections following the Introduction provide summaries of current flight projects and definition studies, brief descriptions of individual research activities, and a bibliography of refereed journal articles appearing within the past two years. Author

N86-31199# Naval Research Lab., Washington, D. C.
INTERACTIONS BETWEEN OCEAN SURFACE WAVES AND CURRENTS Memorandum Report, Sep. 1984 - Aug. 1985
A. L. Cooper 2 Apr. 1986 21 p
(AD-A166688; NRL-MR-5755) Avail: NTIS HC A02/MF A01 CSCL 20/4

A mathematical model is developed to describe the interaction between random ocean surface waves and the wake produced by a surface ship. Calculations are presented for the mean square free surface displacement energy for the short wave length components of the wave field and Its modification due to refraction by the surface wake. It is demonstrated that a significant reduction of the short wavelength contribution to the surface energy can result from this interaction. A procedure to calculate the spectral composition of the free surface and the spatial realization of the free surface displacement is outlined. Free surface realizations will be presented in a forthcoming report. GRA

N86-31200# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY: SOUTHERN CALIFORNIA COASTAL PROCESSES DATA SUMMARY
Douglas L. Inman, Robert T. Guza, David W. Skelly, and Thomas E. White Feb. 1986 580 p
(AD-A166699; CCSTWS-86-1) Avail: NTIS HC A25/MF A01 CSCL 08/3

The intent of this report is to provide a broad picture of the physical, mechanical and geological processes pertaining to coastal engineering along the shorelines of southern California, and to give references to data sources. Citation to the originators of concepts, theories, etc. are not always given because this is a data summary for the region, not a review of the nearshore processes literature. Interested readers should consult the extensive coastal engineering and nearshore processes literature for a historical perspective of the topics discussed. Because of space constraints, some topics are only scantily covered. Chapters 1 and 2 and portions of the following chapters were written by Douglas L. Inman. Chapter 3 and the sections on neashore waves and currents for each cell described in Chapters 4 through 11 were written by Robert T. Guza. For Chapters 4 through 11 the sections on coastal erosion, shoreline changes, sediment sources and the budget of sediment were written by David W. Skelly; while the sections on sediment transport modes and sediment sinks were written by Thomas E. White. Unpublished notes provided by Dr. Reinhard Flick were used for the preparation of Chapter 3.4 on tides and sea level fluctuations. GRA

N86-31201# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY. SHORELINE MOVEMENT DATA REPORT: PORTUGUESE POINT TO MEXICAN BORDER (1852-1982)
Paul F. May and Brian M. Baldwin Dec. 1985 172 p
(AD-A166749; CCSTWS-85-10) Avail: NTIS HC A08/MF A01 CSCL 08/6

This report describes the results of a cooperative study of shoreline movement conducted as part of the Coast of California Storm and Tidal Waves Study (CCSTWS). The study area comprised the Pacific Ocean coast from Portuguese Point. CA, (Near Los Angeles) south to the United States/Mexico Border, a distance of approximately 125 miles. Changes in shoreline position ranging from as early as 1852 or as late as 1959, up to 1982, are analyzed using survey data from NOAA's National Ocean Service (NOS) and its predecessor, the U.S. Coast and Geodetic Survey. A series of shoreline movement maps for this coastal reach produced by NOS is intended to accompany this report. This report provides a basic data set for use in management and engineering decisions related to the coastal zone. It is designed primarily to describe and partially quantify shoreline movement maps that accompany it. Average yearly land area and shoreline movement rates of change were calculated for each minute of longitude for the area from Portuguese Point south to Anaheim Bay (east-west-trending shoreline), and for each minute of latitude from Anaheim Bay to the U.S./Mexico border (north-south trending shoreline). The sole purpose of this report is to describe and quantify historic shoreline movement. No attempts were made to identify or even speculate on the reasons for these movements. GRA

N86-31202# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY: SOUTHERN CALIFORNIA COASTAL PHOTOGRAPHY AND BEACH PROFILE INDEX
Feb. 1986 140 p
(AD-A166780; CCSTWS-86-2) Avail: NTIS HC A07/MF A01 CSCL 08/6

The purpose of this report is to compile an inventory of the aerial photography, ground photos and beach profile data long the Coast of California that are available in the U.S. Army Corps of Engineers, Los Angeles District (LAD; also includes other Federal, State, and local governmental agencies). These photographs and beach profiles were compiled to document dimensions and beach characteristics, historic shoreline changes, effects of storms and structures on the beach, and any significant beach and inlet changes. The information described in this report is available for use and inspection by Government agencies, educational institutions, coastal engineers and other coastal interest groups. GRA

N86-31203# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY. HYDRAULIC DATA INVENTORY: SOUTHERN CALIFORNIA COASTAL ZONE
Dec. 1985 39 p
(AD-A166781; CCSTWS-85-9) Avail: NTIS HC A03/MF A01 CSCL 08/8

This report is a literature review and data summary covering the topics of river sediment discharge, lagoon storage, streambed sediment, and wind transport. This literature review and data summary are limited to California coastal rivers/streams between Ragged Point (San Luis Obispo County) and the Mexican border and are limited to literature containing measurements or quantitative estimates pertaining to the above topics. A summary of results is as follows. Twenty-three references were located which contain quantitative information on river sediment discharge. Practically no quantitative information on lagoon sediment storage for Southern California was located during this review. Seven references were located which contain results of sediment gradation tests of streambed samples. These references give data for 11 Southern California streams. No quantitive information on wind transport of sediment was located for the Southern California Coast. Some information concerning coastal sand dune locations in one reference and some concerning wind direction in another reference may be useful for estimating wind transport in future analyses. GRA

N86-31204# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY. HYDRAULIC DATA INVENTORY: SOUTHERN CALIFORNIA COASTAL ZONE
Dec. 1985 282 p
(AD-A166782; CCSTWS-85-8) Avail: NTIS HC A13/MF A01 CSCL 08/8

This report details the results of a data search on the hydrology

of the coastal watersheds between Ragged Point, San Luis Obispo County and the U.S. - Mexican Border. Included in this report are general hydrological descriptions of the drainage areas, in order to provide background information. These sections are followed by detailed accounts of the sources of hydrologic data which are available. Data of interest include streamflow history at the shoreline of streams and stream groups, volume-frequency analyses, historic hydrographs of major floods, sediment yield, effects of various structures and fire effects. Included in the discussion are the location of data, data formats available and indications of the quality of the data. Data gaps and limitations are noted, and recommendations are presented for reducing these limitations. GRA

N86-31205# Naval Postgraduate School, Monterey, Calif.
OCEANOGRAPHIC ANALYSIS OF SUN GLINT IMAGES TAKEN ON SPACE SHUTTLE MISSION STS 41-G M.S. Thesis
Mark G. Fischer Mar. 1986 42 p
(AD-A167142) Avail: NTIS HC A03/MF A01 CSCL 14/5

A series of four sun glint images taken by the crew of the space shuttle Challenger, mission STS 41-G, on 8 October 1984 were analyzed and compared to NOAA-7 AVHRR infrared images and to bathythermographs of the same area. Evidence of the Almaria Front, a persistant oceanographic feature east of the Alboran Basin, was found on all three data sets, and the efficacy of using sun glint images for the location of acoustically important oceanographic features was supported. A practical use of sun glint photographs taken from low earth orbit was demonstrated and the investigation of its use to help in the employment of acoustic sensors is further justified by this work. Author (GRA)

N86-31206# National Center for Atmospheric Research, Boulder, Colo.
A GENERAL CIRCULATION MODEL INVESTIGATION OF THE ATMOSPHERIC RESPONSE TO EL NINO Ph.D. Thesis - Miami Univ.
Jose Oribe RochadeArago 1986 161 p
(Grant NSF ATM-82-17015)
(PB86-196243; NCAR/CT-100) Avail: NTIS HC A08/MF A01 CSCL 08C

The atmospheric response to sea surface temperature anomalies associated with El Nino episodes is simulated with the use of the NCAR general circulation model. The model features the annual march of both insolation and sea surface temperature. The model's tropical response is similar to the anomalous features which have been found in previous observational studies. For example, the upper level anticyclone pair in the central Pacific is present for almost all months. An anomalous Walker Circulation is found in the vertical plane along the equatorial region. Rainfall departures from the long-term mean are found elsewhere in the entire equatorial belt. GRA

N86-31090# Bremen Univ., (West Germany).
OCEANOGRAPHY
W. Alpers, K. Richter (Deutsches Hydrographisches Inst., Hamburg (West Germany), and P. Lombardini (Consiglio Nazionale delle Ricerche, Turin, Italy) *In* DFVLR The X-SAR Science Plan Nov. 1985 p 97-110 (For primary document see N86-31084 22-42) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 32

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-31207# Naval Research Lab., Washington, D. C.
ADVANTAGES OF THE GAS EXCHANGE APPROACH TO MICROBIOLOGICAL STUDIES Memorandum Report, 1983 - 1985
P. J. Hannan and D. S. Jones 3 Apr. 1986 43 p
(AD-A166887; NRL-MR-5744) Avail: NTIS HC A03/MF A01 CSCL 06/13

Studies of the effects of various chemical or physical stimuli on the growth rates of microorganisms generally involve some measure of biomass. In the case of algae, one might measure the cell number, the chlorophyll concentration, the fluorescence, or the wet weight of the culture as a function of time. Each such measurement requires a sampling of the culture which could be a disturbing factor in the system being measured. Another disadvantage of these traditional measurements is that the times required for significant change to take place in the culture might be hours or days; furthermore, growth rate measurements calculated from the data must be based on the assumption that during the time between measurements the growth rate was constant. This report describes another approach to the problem. It consists simply of monitoring the O2 or CO2 concentration of an air stream passing through the system (the gas exchange method), and it has several distinct advantages: (1) there is no need to take samples of the culture, (2) each measurement is a rate measurement and indicates the performance of the culture at that very moment, and (3) transitory changes in growth rates are readily detected. Examples are given of studies made previously with this method at NRL. Also the possible value of these methods in a study of the corrosion susceptibility of alloys is described. GRA

N86-31208# Georgia Univ., Athens. Dept. of Chemistry.
THE PREDICTION OF BIOLOGICAL ACTIVITY USING MOLECULAR CONNECTIVITY INDICES
Dennis H. Rouvray 23 Apr. 1986 31 p
(Contract N00014-84-K-0365)
(AD-A166986; TR-21) Avail: NTIS HC A03/MF A01 CSCL 06/15

A highly influential paper by Randic entitled On characterization of molecular branching appeared in the Journal of the American Chemical Society. In this paper a new topological index was introduced which has since become known as the molecular connectivity index. Topological indices (Tis) are graph-theoretical invariants which are employed extensively as matheamtical descriptors for a wide range of molecular species. They have been used mainly for the purpose of correlating the properties of molecular species with their topological structure. The molecular connectivity index was originally put forward with the aim of characterizing the branching in alkane species, but more recently has been shown to have numerous applications in both the physical and biological sciences. In this review we shall focus on the use of the index in the more biologically oriented sciences, such as pharmacology and toxicology. In particular, we shall discuss the prediction of biological activity in chemical species by means of this index. The molecular connectivity index as originally presented by Randic was designed to parallel the ordering obtained for sets of isomeric alkane molecules based on their physicochemical properties. GRA

N86-31209# University of Southern California, Los Angeles.
LASER KINETIC SPECTROSCOPY OF UNIMOLECULAR AND BIMOLECULAR PROCESSES IN THE GAS PHASE Final Report, 1 Oct. 1982 - 30 Sep. 1985
Curt Wittig and Hanna Reisler 15 Nov. 1985 14 p
(Grant AF-AFOSR-0022-83)
(AD-A166998; AFOSR-86-0226TR) Avail: NTIS HC A02/MF A01 CSCL 07/5

This research is concerned with the study of unimolecular processes in the gas phase. We concentrated on simple bond fission reactions, and determined both the collision free unimolecular rates Benzylamine (C6H5CH2NH2), Nitrosomethane (CH3)3CNO), and the energy disposal in the products Nitroeyl cyanide (NCN0), Trifluoronitrile methane (CF3CN), Cyanogeniodide (ICN). Most of the molecules were dissociated either via IRMPD(CF3CN, C6H5CH2NH2) or by electronic excitation followed by radiationless transitions (NCNO(CH3)3CNO). They exhibited statistical behavior, and the results were compared with the predictions of statistical theories. The most detailed experiments involved the photodissociation of NCNO, which provided complete mapping. of product internal states. The CN and NO E,V,R distributions are textbook examples of statistical product state distributions deriving from a unimolecular reaction. In our studies

of the direct photodissociation of ICN, we obtained sub-Doppler LIF spectra of nascent CN(X2 sigmat state), following the 266 nm photolysis of 300 K molecules. These studies provided a detailed picture of the fragment recoil spatial anisotropies as well as CN E,V,R, T and and I/I excitations. The CN rotational distributions were dissected into two separate distributions for the channels producing I and I. GRA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-31210# Systems Research Labs., Inc., Dayton, Ohio.
THE EFFECT OF BREATHING ELEVATED CO2 GAS MIXTURES ON TRACKING PERFORMANCE, BLOOD PRESSURE, AND SUBJECTIVE TOLERANCE AT 1Gz
Thomas G. Shriver, Daniel W. Repperger, John W. Frazier, Charles D. Goodyear, and Lloyd D. Tripp Mar. 1986 52 p
(Contract F33615-81-C-0500)
(AD-A165974; AAMRL-TR-86-006) Avail: NTIS HC A04/MF A01 CSCL 06/19

The addition of small concentrations (5-10%) of carbon dioxide (CO2) to the breathing gas has been identified as a possible technique to increase Gz tolerance for pilots. Eight subjects participated in an experiment to examine tracking performance, physiological parameters, and subjective tolerance when breathing the four following gas mixtures: air; 100% O2; 2.5% CO2 and 97.5% O2; and 3.5% CO2 and 96.5% O2. Tracking performance was not significantly different when breathing any of these four gas mixtures. Learning, which continued to occur throughout the experiment, was inhibited when the subjects were breathing the 3.5% CO2 mixture. When using either of the CO2 mixtures there was a significant increase in relative respiratory volume and a modest increase in systolic (11 mm Hg) and diastolic (6 mm Hg) blood pressure. One subject, when breathing 3.5% CO2, aborted the run after 12 minutes because of air hunger. GRA

N86-31211# Army Research Inst. of Environmental Medicine, Natick, Mass.
METABOLIC CHANGES FOLLOWING ECCENTRIC EXERCISE IN TRAINED AND UNTRAINED MEN
W. J. Evans, C. N Meredith, J. G. Cannon, C. A. Dinarello, and W. R. Frontera 1986 24 p
(AD-A166521; AD-E900544; USARIEM-M-20/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

The effects of one 45 minute bout of high intensity eccentric exercise (250 Watts) were studied in 4 male runners and 5 untrained men. Plasma creatine kinase (CK) activity in these runners was high ($p < 0.001$) than in the untrained men before exercise and peaked at 207 IU/ml one day after exercise, while in untrained men the maximum was 2143 IU/ml five days after exercise. Plasma interleukin-1 (IL-1) in the trained men was also higher ($p < 0.001$) than in the untrained men before exercise but did not significantly increase after exercise. In the untrained men, IL-1 was significantly elevated 3 hours after exercise ($p < 0.001$). In the untrained group only, 24-hour urines were collected before and after exercise while the men consumed a meat-free diet. Urinary 3-methylhistidine/creatinine in the untrained group rose significantly from 126 umol/g before exercise to 180 umol/g ten days after exercise. The results suggest that in untrained men, eccentric exercise leads to a metabolic response indicative of delayed muscle damage. Regularly performed long distance running was associated with chronically elevated plasma IL-1 levels and serum CK activities without acute increases after an eccentric exercise bout. GRA

N86-31212# Army Research Inst. of Environmental Medicine, Natick, Mass.
INDUCED ERYTHROCYTHEMIA AND MAXIMAL AEROBIC POWER: AN EXAMINATION OF MODIFYING FACTORS
Michael N. Sawka, Andrew J. Young, Stephen R. Muza, Richard R. Gonzalez, and Kent B. Pandolf Apr. 1986 23 p
(AD-A166522; AD-E900544; USARIEM-M-22/86) Avail: NTIS HC A02/MF A01 CSCL 06/5

Induced erythrocythemia is associated with an increase in maximal oxygen uptake. Two factors which might influence inter-subject variability for this increase in maximal oxygen uptake are the magnitude of change in hemoglobin concentration and the individual's initial aerobic fitness. To examine these factors, we have obtained and combined individual data from our own research and three other studies which employed similar procedures. In each study freeze-preserved erythrocytes representing the product of two blood units were reinfused and maximal oxygen uptake was measured within 24 to 72-h after reinfusion. The 30 subjects had an initial aerobic power which ranged from 36 to 88 ml 02/dg/min. The combined results from these studies indicate that after erythrocyte reinfusion: 1) the increase in hemoglobin concentration is fairly homogeneous; 2) nearly all individuals demonstrate an increase in maximal oxygen uptake; 3) the magnitude of increase in hemoglobin concentration is not related to the magnitude of increase in maximal oxygen uptake is related to the individual's initial aerobic fitness. Individuals with an initial aerobic fitness between 50 to 64ml O2/kg/min experience approximately twice the increase in maximal oxygen uptake after erythrocyte reinfusion compared to individuals with lesser or greater fitness. GRA

N86-31213# Army Research Inst. of Environmental Medicine, Natick, Mass.
INTRINSIC ALTERATION OF THE REACTIVE PROPERTIES OF ARTERIES DURING HYPOTHERMIA
N. R. Bandick and Donald E. Roberts 21 Mar. 1986 23 p
(AD-A166523; AD-E900544; USARIEM-M-21/86) Avail: NTIS HC A02/MF A01 CSCL 06/5

This study compared the reactive and contractile properties of helical strips of femoral arteries taken from normothermic rabbits and rabbits that were anesthetized with pentobarbitol and cooled to 25 C at a rate of 7 C per hour. The purpose of this comparison was to see if intrinsic factors would alter the sensitivity and/or contractility of this vascular muscle to norepinephrine during whole body hypothermia. We found that, after two hours of in vivo hypothermia, the hypothermic derived tissue was from 10 to 100 times more sensitive to norepinephrine than the normothermic derived tissue. This augmented sensitivity continued while the tissue was in vitro for at least twelve hours. The dose-response curves of the hypothermic derived arteries were shifted to the left of the normothermic arteries resulting in a greater contractility at lower levels of agonist. Moreover, the normothermic tissue contracted slower than the hypothermic. The maximal tension developed by the strips was equivalent. This study has identified prolonged alterations of receptor sensitivities and contractility properties attributable to in vivo influences that can, in part, explain the disruptions of blood pressure during and following whold body hypothermia. GRA

N86-31214# Air Force cupational and Environmental Health Lab., Brooks AFB, Tex.
ASSESSING POSSIBLE DAMAGE DUE TO RADIO FREQUENCY RADIATION Final Report
Bruce J. Poitrast Feb. 1986 13 p
(AD-A166913; OEHL-86-020C0111BRA) Avail: NTIS HC A02/MF A01 CSCL 06/18

This report is written in response to requests from the field for guidance in the clinical examination of radio frequency radiation exposures. The report contains basic information on radio frequency radiation and its biological interactions. It also contains a suggested history and physical examination, a list of expected clinical findings, and suggestions for referral if necessary. GRA

N86-31215# Pacific Northwest Labs., Richland, Wash.
PHYSICAL INTERACTION OF HUMANS AND ANIMALS WITH POWER-FREQUENCY ELECTRIC AND MAGNETIC FIELDS
W. T. Kaune Feb. 1986 11 p Presented at the IEEE Power Engineering Society Winter Meeting, New York, N.Y., 2 Feb. 1986

(Contract DE-AC06-76RL-01830)
(DE86-007734; PNL-SA-13716; CONF-860210-3) Avail: NTIS HC A02/MF A01

Research has been underway for more than 15 years investigating the biological and physical interactions of power-frequency electric fields coupled to humans and animals through the air dielectric around electric-power facilities. Currently, fairly detailed analyses can be made for homogeneous human- and animal-shaped models standing on ground while exposed to a vertical electric field. Some data are available for ungrounded exposure conditions. However, little is known about the effects of the nonuniform electrical properties of living tissues on induced-current distributions. Recently, interest has also developed in the interaction of humans and animals with power-frequency magnetic fields. Little data are available, and only simple estimates, using homogeneous ellipsodial models, can be made at present. Relatively simple calculational techniques are available, however, to analyze two- and three-dimensional models of humans and animals, and it can be expected that considerable progress will be made in the next few years. DOE

N86-31426*# Texas A&M Univ., College Station. Dept. of Biomedical Engineering.
ANALYSIS OF NYSTAGMUS RESPONSE TO A PSEUDORANDOM VELOCITY INPUT
Charles S. Lessard *In* NASA. Johnson Space Center NASA/American Soceity for Engineering Eduction (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 104 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06P

N86-31428*# Texas Univ., Galveston. Dept. of Internal Medicine.
FLOW CYTOMETRY ANALYSIS OF HORMONE RECEPTORS ON HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS TO IDENTIFY STRESS-INDUCED NEUROENDOCRINE EFFECTS
Richard T. Meehan *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 7 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06P

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-31216# California Univ., Los Angeles. Medical Center.
NEUROPHYSIOLOGICAL RESEARCH SUPPORTING THE INVESTIGATION OF ADAPTIVE NETWORK ARCHITECTURES Final Report, 1 Mar. 1983 - 28 Feb. 1985
Charles D. Woody 14 Aug. 1985 90 p
(Contract F49620-83-C-0077)
(AD-A166074; AFOSR-86-0083TR) Avail: NTIS HC A05/MF A01 CSCL 06/16

The investigators have shown that single cortical neurons adapt in such a way as to support learned behavior. What is particularly interesting is the indication that purposefully complex, molecular cascades exist at the level of single nerve cells to permit successful adaptions to occur. Successful adaptions are defined as: (a) producing the desired alteration of response to the appropriate input, (b) enduring over time, (c) not interfering with other adaptions occurring for another purpose in the same cell, and (d) not interfering with the main-throughput-message transfer property of the nerve cell. The result of these adaptations is to support the operation of a self-organizing information processing system with a high success: error ratio and excellent survivability in the face of substantial environmental change. Changes in the excitability of cortical neurons occur that lead to acquisition of the ability to perform specific motor tasks in response to specific auditory stimuli. Rates of acquiring this ability can be substantially increased by adding electrical stimulation of the hypothalamus associatively, to presentations of conventional conditioned and unconditioned stimuli. Part of this acceleration of learning the motor response may derive from recruitment of a new performance pathway, reflected in a longer transmission latency for movement production. A long range goal of the research is to understand how the system picks the right pathway. GRA

N86-31217# Northwestern Univ., Evanston, Ill. Vision Lab.
SENSITIVITY TO VISUAL MOTION IN STATISTICALLY DEFINED DISPLAYS Final Report, Nov. 1981 - Nov. 1982
R. W. Sekuler, D. W. Williams, and S. A. Harp Mar. 1986 148 p
(Contract MDA903-80-C-0154; DA Proj. 2Q1-61102-B-74-F)
(AD-A167291; ARI-RN-86-30) Avail: NTIS HC A07/MF A01 CSCL 05/10

This project explored aspects of how human observers perceive moving targets, particularly targets whose motion is apparent rather than continuous. Major topics covered include origins of global motion Percepts, and size factors in apparent motion. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-31218*# Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.
PILOT INTERACTION WITH AUTOMATED AIRBORNE DECISION MAKING SYSTEMS Semiannual Progress Reports, Aug. - Jul. 1985
William B. Rouse, John M. Hammer, Christine M. Mitchell, Nancy M. Morris, C. Michael Lewis, and Wan C. Yoon Jul. 1985 50 p
(Grant NAG2-123)
(NASA-CR-176986; NAS 1.26:176986) Avail: NTIS HC A03/MF A01 CSCL 05H

Progress was made in the three following areas. In the rule-based modeling area, two papers related to identification and significane testing of rule-based models were presented. In the area of operator aiding, research focused on aiding operators in novel failure situations; a discrete control modeling approach to aiding PLANT operators was developed; and a set of guidelines were developed for implementing automation. In the area of flight simulator hardware and software, the hardware will be completed within two months and initial simulation software will then be integrated and tested. For individual titles, see N86-31219 through N86-31220.

N86-31219*# Georgia Inst. of Tech., Atlanta.
REPRESENTATION FOR CLOSED FORM SIGNIFICANCE TESTING IN VL1
C. Michael Lewis *In its* Pilot Interaction With Automated Airborne Decision Making Systems Jul. 1985 11 p (For primary document see N86-31218 22-54)
Avail: NTIS HC A03/MF A01 CSCL 05H

Within the constraints of the syntax language, the set of observation descriptions which determines the discriminations which can be made, and the number of observations classified, a method is to be devised for determining the relative frequency over instantiation with which a rule of equal or greater generality would be identified. Generality, here, is defined as the number of observations described by a rule. A covering algorithm (Aq, Michalski 1973) was used to identify pilot strategy (system of rules) in maneuvering to avoid intruders. B.G.

N86-31220*# Georgia Inst. of Tech., Atlanta.
A DISCRETE CONTROL MODEL OF PLANT
Christine M. Mitchell *In its* Pilot Interaction With Automated Airborne Decision Making Systems Jul. 1985 31 p (For primary document see N86-31218 22-54)

Avail: NTIS HC A03/MF A01 CSCL 05H

A model of the PLANT system using discrete control modeling techniques developed by Miller is described. Discrete control models attempt to represent in a mathematical form how a human operator might decompose a complex system into simpler parts and how the control actions and system configuration are coordinated so that acceptable overall system performance is achieved. Basic questions include knowledge representation, information flow, and decision making in complex systems. The structure of the model is a general hierarchical/heterarchical scheme which structurally accounts for coordination and dynamic focus of attention. Mathematically, the discrete control model is defined in terms of a network of finite state systems. Specifically, the discrete control model accounts for how specific control actions are selected from information about the controlled system, the environment, and the context of the situation. The objective is to provide a plausible and empirically testable accounting and, if possible, explanation of control behavior. B.G.

N86-31221# Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF THERMOELECTRIC WATER HEATING-COOLING DEVICES Final Rept. Feb. - Oct. 1985
B. Mathipraksam 25 Oct. 1985 28 p
(Contracts DAAK60-85-C-0011; DA Proj. 1L1-62724-AH-99)
(AD-A166949; NATICK-TR-86/019) Avail: NTIS HC A03/MF A01 CSCL 13/1

A simple, safe, and reliable thermoelectric device for heating or cooling potable water for use in military vehicles was developed. The unit is capable of cooling water to 60 F in ambient temperatures up to 130 F and heating to 150 F in ambient temperatures of 40 F. Freezing/overheating and undervoltage protections are provided. The unit has also cooling/heating indicators, water ready indicators, and automatic switch off. A total of six units were built, tested, and delivered to U.S. Army Natick R&D Center. Author (GRA)

N86-31222# Sandia National Labs., Albuquerque, N. Mex.
MAKING THE HUMAN-MACHINE INTERFACE RESPONSIVE TO MANY CLASSES OF USERS
R. W. Barnard 1986 15 p Presented at the DECUS Symposium, Dallas, Tex., 27 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-003453; CONF-860470-1) Avail: NTIS HC A02/MF A01

An applications program must be able to interact with users who have a range of familiarity with its operation. A novice user needs more guidance than an experienced one, and a rigid type of interaction (such as menus) will not meet the needs of all users. Frustrations with the program are reduced and productivity is increased by using a flexible means of response which matches the level of response to the needs of the user. This paper illustrates techniques to provide only as much guidance as the user requires. The methods discussed here permit the user to switch among three levels of guidance (none, short prompts, and menus) and to have context-sensitive help readily available. Because frequent users of a program will soon become quite proficient, supplying default answers and command entry shortcuts are also beneficial. These techniques have been used in a program which meets the needs of users who have all ranges of proficiency. DOE

N86-31223# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. System Safety Development Center.
BASIC HUMAN FACTORS CONSIDERATIONS
R. J. Nertney and D. L. Fillmore Dec. 1985 37 p
(Contract DE-AC07-76ID-01570)
(DE86-008181; SSDC-34) Avail: NTIS HC A03/MF A01

Models and concepts for analyzing the human element in working programs and systems are introduced. The method of attack is a functional one based on analysis of the work to be done (job-task analysis). Based on the results of the job-task analysis, psychological and physiological requirements and criteria can be defined for the system. DOE

N86-31224# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. System Safety Development Center.
IMPACT OF THE HUMAN ON SYSTEM SAFETY ANALYSIS
R. J. Nertney and R. L. Horman Sep. 1985 34 p
(Contract DE-AC07-76ID-01570)
(DE86-008182; SSDC-32) Avail: NTIS HC A03/MF A01

The impact of the human and human reliability on the results of probabilistic risk assessment studies is discussed in terms of some of the standard models used in risk quantification. Three levels of analysis are considered: (1) identification of areas where the human affects the operational risks; (2) rough scaling and quantification of the effect of the human on operational outcome; and (3) complete quantification of the risks including consideration of human reliability. DOE

N86-31225# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
PROCESS OF TASK ANALYSIS
H. S. Blackman, D. I. Gertman, and L. N. Haney Sep. 1985 32 p
(Contract DE-AC07-76ID-01570)
(DE86-008183; EGG-SSDC-31) Avail: NTIS HC A03/MF A01

The paper presents a task analysis form for the organization of task analysis efforts. In terms of the form, task descriptions for use in task analysis data collection are given, and detailed definitions of 35 task analysis categories are offered. The categories include important aspects of task performance, consequences, and feedback, as well as aspects of training and knowledge requirements. Methods behind the derivations of tasks and subtasks, and category analysis are explained. Aspects of data applications concerning who and how are discussed. Task analysis can be used in the development of behavioral learning objectives and instructional strategies. Action verbs are often used in category analysis and human capabilities identification. Curriculum and tests may be developed by analyzing what people do and need in their jobs. The process of task analysis is a useful tool in the analysis and improvement of human job performance. DOE

N86-31226# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. System Safety Development Center.
HUMAN FACTORS MANAGEMENT
R. J. Nertney and D. L. Fillmore Jul. 1985 44 p
(Contract DE-AC07-76ID-01570)
(DE86-008184; SSDC-30) Avail: NTIS HC A03/MF A01

Evaluating a system to determine if it has the right people working using the right procedures and management controls with the right hardware at all times is the facet of human factors discussed in this manual. The following areas of concern are specifically addressed: (1) the selection process must be proper to select qualified workers who are given proper training for the work and whose skills are maintained; (2) a proper behavioral climate must be established at the work station; (3) all task assignments must contain elements of instruction and training; and (4) all supporting systems must interact with the human to ensure that the work can be completed. All of these areas of concern can be successfully completed using the existing company organization by following the considerations presented in this document and maintaining proper interfaces between the different branches of the company. DOE

N86-31412*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATING SPACE STATION APPLICATIONS OF AUTOMATION AND ROBOTICS TECHNOLOGIES FROM A HUMAN PRODUCTIVITY POINT OF VIEW
Jonathan F. Bard *In its* NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 46 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 05H

N86-31422*# Utah Univ., Salt Lake City. Center for Occupational and Environmental Health.

DEFINING RECLAIMED WATER POTABILITY REQUIREMENTS
Daniel S. Janik *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 49 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06K

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-31421*# East Carolina Univ., Greenville, N.C. Dept. of Biology.
EFFECTS OF LUNAR SOIL, ZAGAMI METEORITE, AND OCEAN RIDGE BASALT ON THE EXCRETION OF ITOIC ACID, A SIDEROPHORE, AND COPROPORPHYRIN BY BACILLUS SUBTILIS
Takeru Ito *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 12 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06C

N86-31431*# Texas Univ., Houston. Dept. of Environmental Sciences.
CYTOGENETIC ANALYSES OF PERIPHERAL LYMPHOCYTES SUBJECTED TO SIMULATED SOLAR FLARE RADIATION
Howard M. Prichard *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 9 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06R

N86-31436*# Houston Univ., Tex. Dept. of Human Development.
SELECTION OF AN APPROPRIATE ANIMAL MODEL FOR STUDY OF BONE LOSS IN WEIGHTLESSNESS
Ira Wolinsky *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 7 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06S

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-31227*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
[SUMMARY OF RESEARCH IN APPLIED MATHEMATICS, NUMERICAL ANALYSIS, AND COMPUTER SCIENCES] Final Semiannual Report, 3 Oct. 1985 - 31 Mar. 1986
Apr. 1986 57 p
(Contract NAS1-18107)
(NASA-CR-178119; NAS 1.26:178119) Avail: NTIS HC A04/MF A01 CSCL 12A

The major categories of current ICASE research programs addressed include: numerical methods, with particular emphasis on the development and analysis of basic numerical algorithms; control and parameter identification problems, with emphasis on effective numerical methods; computational problems in engineering and physical sciences, particularly fluid dynamics, acoustics, and structural analysis; and computer systems and software, especially vector and parallel computers. B.G.

N86-31228# Kentucky Univ., Lexington. Dept. of Statistics.
PROCEEDINGS OF THE 17TH SYMPOSIUM ON THE INTERFACE OF COMPUTER SCIENCE AND STATISTICS Report, for 1 Mar. 1985 - 4 Mar. 1986
4 Mar. 1986 311 p Symposium held in Lexington, Ky., 17-19 Mar. 1985
(Contract N00014-85-G-0157)
(AD-A166019) Avail: NTIS HC A14/MF A01 CSCL 12/1

The Seventeenth Symposium on the Interface of Computer Sciences and Statistics was held in the Radisson Plaza Hotel, Lexington, Kentucky on March 17-19, 1985. The sessions encompassed a broad range of topics. A number of sessions dealt with computational methods for traditional statistical areas. These included time series, nonlinear models, repeated measures data analysis, and categorical data analysis. Some sessions were in the relatively new areas of statistics such as artificial intelligence, the metadata of computational processes, statistical computing languages, and statistical workstations. There were also sessions in numerical methods, density estimation, teaching of statistical computing, statistical and mathematical software and graphics. During one session the entire audience participated in a round table discussion on the performance of statisticians with statistical software. Written versions of nearly all these papers are in this volume. GRA

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N86-31229# Softech, Inc., Fairborn, Ohio.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: AFATL ADA CROSS-COMPILER VERSION 1.0, CDC CYBER HOST/ZILOG Z8002 TARGET Final Report, 6 Dec. 1985 - 6 Dec. 1986
6 Dec. 1985 52 p
(Contract F33600-84-D-0280)
(AD-A166212) Avail: NTIS HC A04/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the Air Force Armament Laboratory (AFATL) Ada Compiler, developed by Florida State University (FSU). The AFATL Ada Compiler (Version 1.0) is hosted on the CDC Cyber 170/760 and targeted to the Zilog Z8002 Development Module. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The purpose of the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal language constructs. The testing also identifies implementation-dependent behavior permitted by the standard. Six classes of tests are used. These tests are designed to perform checks at compile time, during execution, and at link time. GRA

N86-31230# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) TRAINING CURRICULUM. REAL-TIME SYSTEMS IN ADA L401 TEACHER'S GUIDE, VOLUME 1
1986 376 p
(Contract DAAB07-83-C-K514)
(AD-A166351) Avail: NTIS HC A17/MF A01 CSCL 05/9

Course outline: Part 1 Concurrent Programming Concepts Section (1) Concurrent Processes, Section (2) Reasons for Concurrency, (3) Concurrent Programming Problems; Part 2 Ada Tasking Concepts (4) Task Types and Task Objects, (5) Task Declarations and Task Types, (6) Task Activition and Termination; and Part 3 Task Cooperation (7) Simple Rendezvous, (8) Selective Waits, (9) Select Statements for Making Entry Calls, (10) Avoiding Deadlock. GRA

N86-31231# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) TRAINING CURRICULUM. REAL-TIME SYSTEMS IN ADA L401 TEACHER'S GUIDE, VOLUME 2
1986 560 p Supersedes report dated Jul. 1984, AD-A146783

(Contract DAAB07-83-C-K514)
(AD-A166352) Avail: NTIS HC A24/MF A01 CSCL 05/9
Course outline:(continued): Part 4 Fundamental Task Designs (11) Server and User Tasks, (12) Monitors, (13) Message Buffers, (14) Cyclic Processing, (15) Stream-Oriented Task Design; Part 5 Other Tasking Features (16) Aborting Tasks, (17) Exceptions in Multitask Programs, (18) Interrupt Entries, (19) Entry Families, (20) TAsk Priorities; Part 6 Improving Performance (21) When and Why to Tune, (22) Shared Variables, (23) Minimizing Blocking, (24) Merging Tasks, (25) Non-Concurrent Tuning, (26) What's Best Left to the Compiler; and Part 7 Module Wrap-up (27) A Complete Example. GRA

N86-31232# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Information Systems and Technology Center.
ADA (TRADE NAME) COMPLIER VALIDATION SUMMARY REPORT: VERDIX ADA DEVELOPMENT SYSTEM, VERSION 5.2 FOR THE SEQUENT BALANCE UNDER DYNIX, RELEASE 1.3.2
15 Nov. 1985 79 p
(AD-A167231; AVF-VSR-15.0286) Avail: NTIS HC A05/MF A01 CSCL 09/2
The Validation Summary Report describes how an Ada compiler conforms to the language standard. This report explains all technical terms used within it and thoroughly reports the Ada Compiler Validation Capability test results. Ada compilers must be written according to the language specification as given in ANSI/MIL-STD-1815A Ada. All implementation-defined features must be included for the compiler to conform to the Standard. Following the guidelines of the Standard ensures continuity between compilers. That is, the entire Standard must be implemented, and nothing can be implemented that is not in the standard. Even though all validated Ada compilers conform to the Standard, it must be understood that some differences do exist between implementations. ANSI/MIL-STD-1815A permits some implementation dependencies--e.g., the maximum length of identifiers, the maximum values of integer types, etc. These implementation-dependent features limit the portability of programs between compilers. Other differences between compilers are due to limitations imposed on a compiler by the operating system and by the hardware. All of these dependencies are given in the report. GRA

N86-31233# Sandia National Labs., Albuquerque, N. Mex.
DATA FLOW ACCELERATOR MODULE FOR GENERAL PURPOSE PROCESSORS
1986 25 p
(Contract DE-AC04-76DP-00789)
(DE86-008405; SAND-86-0710C) Avail: NTIS HC A02/MF A01
This invention is a Data Flow Accelerator Module (DFAM) designed to promote use of parallelism by general purpose processors. The DFAM is a tagged architecture memory module used to accelerate execution of parallel algorithms using small grain computations. The DFAM architecture allows the modularization of software tasks into much finer grains than was previously reasonable because it drastically reduces the communication and synchronization overheads. DOE

N86-31234# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.
DEVELOPMENT OF DYNAMIC VERY LARGE SCALE INTEGRATION MEMORIES Final Report, Jan. 1985
Dieter Kantz, Willibald Meyer, and Heinz Schulte Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 117 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-176; ISSN-0340-7608; ESA-86-97448) Avail NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 24.50
A 256K MOS dynamic random access memory including manufacturing technology was developed. The storage cell for increased storage capacity, the low-ohmic tantalum silicide, laser redundancy for yield improvement, and nibble mode as an operation with higher data bandwidth are described. Developments in testing, analyzing, and reliability are outlined. The chip size is 45 sqmm. An access time of 150 nsec is achieved. ESA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-31235*# Stanford Univ., Calif. Applied Psychology Lab.
COGNITIVE AND PERCEPTUAL PRINCIPLES OF WINDOW-BASED COMPUTER DIALOGUES Annual Progress Report, Dec. 1985 - Nov. 1986
M. Pavel and S. Card 1986 100 p
(Grant NAG2-269)
(NASA-CR-176964; NAS 1.26:176964) Avail: NTIS HC A05/MF A01 CSCL 09B
The information-space flyer concept is similar to a flight simulator where one traverses over information topology (such as a sematic network) rather than a geographical terrain. Research and software engineering are discussed. Also included is a user manual. B.G.

N86-31236*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPECTED PERFORMANCE OF m-SOLUTION BACKTRACKING Final Report
David M. Nicol Aug. 1986 26 p Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178162; NAS 1.26:178162; ICASE-86-55) Avail: NTIS HC A03/MF A01 CSCL 09B
This paper derives upper bounds on the expected number of search tree nodes visited during an m-solution backtracking search, a search which terminates after some preselected number m problem solutions are found. The search behavior is assumed to have a general probabilistic structure. The results are stated in terms of node expansion and contraction. A visited search tree node is said to be expanding if the mean number of its children visited by the search exceeds 1 and is contracting otherwise. It is shown that if every node expands, or if every node contracts, then the number of search tree nodes visited by a search has an upper bound which is linear in the depth of the tree, in the mean number of children a node has, and in the number of solutions sought. Also derived are bounds linear in the depth of the tree in some situations where an upper portion of the tree contracts (expands), while the lower portion expands (contracts). While previous analyses of 1-solution backtracking have concluded that the expected performance is always linear in the tree depth, the model allows superlinear expected performance. Author

N86-31237*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GEOMETERIAL DESCRIPTION FOR A PROPOSED AEROASSIST FLIGHT EXPERIMENT VEHICLE
F. McNeil Cheatwood, Fred J. DeJarnette (North Carolina State Univ., Raleigh.), and H. Harris Hamilton, II Jul. 1986 38 p
(NASA-TM-87714; NAS 1.15:87714) Avail: NTIS HC A03/MF A01 CSCL 09B
One geometry currently under consideration for the Aeroassist Flight Experiment (AFE) vehicle is composed of several segments of simple general conics: an ellipsoidal nose tangent to an elliptical cone and a base skirt with the base plane raked relative to the body axis. An analytic representation for the body coordinates and first and second partial derivatives of this configuration has been developed. Equations are given which define the body radius and partial derivatives for a prescribed axial and circumferential position on the vehicle. The results for a sample case are tabulated and presented graphically. Author

N86-31238# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) CURRICULUM. BASIC ADA PROGRAMMING L202 TEACHER'S GUIDE. LABORATORY MANUAL AND

EXERCISES
1986 76 p Revised
(Contract DAAB07-83-C-K514)
(AD-A166043) Avail: NTIS HC A05/MF A01 CSCL 09/2

This Army training manual or Basic Ada Programming contains exercises to be completed during the laboratory training sessions. They cover such topics as procedure names, object declarations and attributes, directing output to a file, programming to compute the cross product of two vectors, programming inventory systems, storing aircraft records, and programming to suppress information. GRA

N86-31239# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) TRAINING CURRICULUM. BASIC ADA PROGRAMMING L202 TEACHER'S GUIDE, VOLUME 1
1986 622 p Supersedes report dated May 1984, AD-A143584
(Contract DAAB07-83-C-K514)
(AD-A166366) Avail: NTIS HC A99/MF A01 CSCL 09/2

This course teaches a working subset of the Ada Language. Its intended audience is beginning Ada programmers with little experience with Ada. However this course does require the student to have working knowledge of at least one high order programming language. The course presents the fundamental concepts of the language. This course does not attempt to teach the full Ada language. Course Outline (partial): (1) Introduction to Software Engineering; (2) Ada Technical Overview; (3) Lexical Elements; (4) Introduction to Data; (5) Enumeration Types and Control Structures; (6) Numeric Types; (7) Additional Features of Scalar Types; and (8) Array Types and Iterative Control Structures. GRA

N86-31240# Softech, Inc., Waltham, Mass.
ADA (TRADE NAME) TRAINING CURRICULUM. BASIC ADA PROGRAMMING L202 TEACHER'S GUIDE, VOLUME 2
1986 591 p Supersedes report dated May 1984, AD-A143585
(Contract DAAB07-83-C-K514)
(AD-A166367) Avail: NTIS HC A25/MF A01 CSCL 09/2

This course teaches a working subset of the Ada language. Its intended audience is beginning Ada programmers with little experience with Ada. However, this course does require the student to have a working knowledge of at least one high order programming language. The course presents the fundamental concepts of the language. This course does not attempt to teach the full Ada language. Course Outline (continued): (9) record types; (10) access types; (11) program structure and separate compilation; (12) using library units; (13) packages; 14) exceptions; (15) input/output; and (16) overview of other language features. GRA

N86-31241# Lamont-Doherty Geological Observatory, Palisades, N. Y.
SYNTHETIC SEISMOGRAMS, GRAPHIC SOFTWARE AND COMPUTER FACILITIES Final Report, Sep. 1984 - May 1985
David W. Simpson May 1985 12 p
(Contract F19628-84-K-0046)
(AD-A166517; AFGL-TR-85-0306) Avail: NTIS HC A02/MF A01 CSCL 09/2

A SUN-1/100U graphic workstation, which was installed in the Seismology Computing Lab. at Lamont-Doherty, has become the centerpiece of a digital waveform processing and analysis facility. A local area network (LAN) comprising Ethernet/TCP-IP protocols connects the SUN-1 with the Observatory's pre-existing VAX 11/780 and PDP 11/70 installations. The operating systems on the VAX (VMS) and the PDP (Unix bsd 2.9) were updated and modified to provide support for the full set of Ethernet utilities. The Ethernet LAN is undergoing start-up testing and soon will be fully operational. While the SUN-1 offers only rudimentary computational power, its state-of-the-art graphic capabilities have enabled us to develop a quick-look digital data-handling facility. Once the network is fully operational, the resources of the Observatory's other computer laboratories will become available to the SUN-1. The VAX will be used as the network file-server, peripheral handler, and computational node, while the SUN will be used for the graphic analysis of waveforms and digital images. Preliminary experiments with the network suggest that powerful graphic workstations integrated vertically with file-servers, computational nodes, and supercomputer communication capability provide a flexible, powerful, and productive computational environment for research in seismology and tectonophysics. GRA

N86-31242# Cornell Univ., Ithaca, N.Y. Dept. of Computer Science.
ABSTRACTIONS FOR FAULT TOLERANCE IN DISTRIBUTED SYSTEMS Interim Report
Fred B. Schneider Apr. 1986 9 p
(Contract N00014-86-K-0092)
(AD-A166549; CU-CSD-TR-86-745) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper describes abstractions that are useful in implementing fault-tolerant and distributed systems. The same abstractions serve both fault tolerance and distribution, supporting our belief that the two concerns are not separable. The abstractions we present have a somewhat different flavor from abstractions prevalent in sequential and concurrent programming, which encapsulate state information and/or provide operations to manipulate that state (e.g., a stack or a monitor). Our abstractions are best thought of as properties of protocols or control. Section 2 describes abstractions of processors that can fail and section 3 reviews some fundamentals for coping with failures. Section 4 discusses the state machine approach, a general way to construct fault-tolerant distributed computing services. The state machine approach motivates two abstractions: Agreement and Order. Section 5 discusses a second approach for constructing a fault-tolerant computing service and this motivates two more abstractions: Failure Detection and Stable Storage. Implementing abstractions by exploiting hardware is discussed in section 6. Section 7 discusses related work. GRA

N86-31243# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A QUANTITATIVE CHARACTERIZATION OF CONTROL FLOW CONTEXT: SOFTWARE MEASURES FOR PROGRAMMING ENVIRONMENTS M.S. Thesis
James W. Howatt 1985 146 p
(AD-A166762; AFIT/CI/NR-86-37D) Avail: NTIS HC A07/MF A01 CSCL 09/2

A review of published measures of control flow complexity in programs reveals three major deficiencies; loss of information, lack of specificity, and lack of analytical support. A new approach is used to characterize the control structure of a program, with the aim of defining properties and measures of control flow that can be of immediate use to programmers, regardless of their utility as complexity measures. Mathematical rigor and analytical evaluation techniques are used to define a set of properties of control structure and a corresponding vector of measures. Instead of defining the properties and measures for an entire flowgraph, they are defined at the node level, reflecting the control flow surrounding each node in a flowgraph. The properties and their measures reflect the following characteristics of control flow; nesting, iteration, structuredness, and predecessors. Algorithms for computing the properties and their measures are presented. An assessment of the computational complexity of the algorithms shows that they are feasible programming environment tools. A finite path set, representing all possible execution sequences, is evaluated as a characterizing property. Desired characteristics of the path set are defined and used to evaluate four published path subset criteria. Those criteria are shown to be deficient, so a fifth criterion is defined. However, the path set satisfying this fifth criterion is shown to be too large to be of practical use to a programmer. DOE

N86-31244# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
SOLVING MULTI-STATE VARIABLE DYNAMIC PROGRAMMING MODELS USING VECTOR PROCESSING M.S. Thesis
Stuart W. Stopkey Dec. 1985 111 p
(AD-A166763; AFIT/CI/NR-86-45T) Avail: NTIS HC A06/MF A01 CSCL 09/2

One of the classical allocation models is known as the pallet loading problem. It consists of optimally loading parcels with various

weight and volume parameters on a pallet. This pallet has weight and volume limits which constrain the amount of parcels that can be loaded. An optimal load is that combination of parcels which maximized the summed utilities of all parcels that are loaded. The pallet loading problem can ge generalized to a 2-state variable (weight and volume) Dynamic Programming model. However, the problem can be solved by other methods. In the past, these other methods were preferred due to the difficulty of Dynamic Programming in solving problems of more than one state variable. With the advent of new computer technology in the form of vector processing, that difficulty can be overcome. The efficient column manipulating nature of vector processing is a perfect match for the column nature of the Dynamic Programming problem formulation. Based upon the algorithm developed using the ideas for vector processing, Dynamic Programming can be considered a very efficient solution technique to the 2-state variable problem. Using the vector processing capability of the ETA Systems supplied CDC Cyber 205, 2-state variable problems too large to be solved previously using DP can now be solved with small computational times. Also, an analysis of the results show that computation time increases linearly as the problem parameters are increased, not exponentially. Author (GRA)

N86-31245# Massachusetts Inst. of Tech., Cambridge.
COMPUTER-AIDED FABRICATION SYSTEM IMPLEMENTATION
Semiannual Report, 1 Oct. 1985 - 31 Mar. 1986
Paul Penfield, Jr., Stanley B. Gershwin, Dimitri A. Antoniadis, and Donald E. Troxel 31 Mar. 1986 22 p
(Contract N00014-85-K-0213)
(AD-A166787) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report covers the period from October 1, 1985 through March 31, 1986. The research discussed here is described in more detail in several published and unpublished reports cited below. During this period, the installation of the central computing machine for the MIT CAF work, known as CAF and all the necessary software was substantially completed. The machine is a VAX 11/785. It has a large cadre of users. A rudimentary CAF system, known as CAFE (Computer-Aided Fabrication Environment), has been implemented. So far this system provides an electronic personal notebook, machine instructions, and equipment status reports. Four fabrication facilities are being served, at least in part. Even though crude, CAFE has been in constant use. The requirements of a scheduling program are being studied. One surprising result so far is the importance of setup operations in scheduling some equipment. Two new process-simulation modules have been developed. One is for a focused ion beam operation used for implanting, and the other is for nonuniform oxidation. Improved models were inserted into the simulators SUPREM and MINIMOS. GRA

N86-31246# Stanford Univ., Calif. Systems Optimization Lab.
LSSOL (VERSION 1.0): A FORTRAN PACKAGE FOR CONSTRAINED LINEAR LEAST-SQUARES AND CONVEX QUADRATIC PROGRAMMING. USER'S GUIDE
Philip E. Gill, Sven J. Hammarling, Walter Murray, Michael A. Saunders, and Margaret H. Wright Jan. 1986 44 p
(Contracts N00014-85-K-0343; DAAG29-84-K-0156; DE-AA03-76SF-00326; DE-AS03-76ER-72018)
(AD-A166945; SOL-86-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report forms the user's guide for Version 1.0 of LSSOL, a set of Fortran 77 subroutines for linearly constrained linear least-squares and convex quadratic programming. The method of LSSOL is of the two-phase, active-set type, and is related to the method used in the package SOL/QPSOL. Two main features of LSSOL are its exploitation of convexity and treatment of singularity. LSSOL may also be used for linear programming, and to find a feasible point with respect to a set of linear inequality constraints. LSSOL treats all matrices as dense, and hence is not intended for large sparse problems. Author (GRA)

N86-31247# Sandia National Labs., Albuquerque, N. Mex.
SOFTWARE PROTECTION: MYTH OR REALITY
J. R. Gosler 1 Nov. 1985 15 p Presented at Crypto '85, Santa Barbara, Calif., 18 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE86-003719; SAND-85-1589C; CONF-8508152-1) Avail: NTIS HC A02/MF A01

Staggering amounts of commercial software are marketed to fulfill needs from the PC explosion. Unfortunately, such software is trivial to duplicate. From the vendors' viewpoint a way to protect profit is needed. Typically, they have resorted to various schemes that attempt to inhibit the duplication process. Although protection of future profit is important, so is protection against current loss. Commercial and business related software must be adequately protected least data be stolen or manipulated. However, more important than any of these classes is protection of government computer resources, especially classified and operational software and data. Loss of control in this realm could be detrimental to national security. This paper addresses current technologies employed in protection schemes: signatures (magnetic and physical) on floppy disks, Software Analysis Denial (SAD), Hardware Security Devices (HSD), and Technology Denial Concepts (TDC) are presented, with an emphasis on SAD. Advantages and disadvantages of these schemes will be clarified. DOE

N86-31248# Los Alamos National Lab., N. Mex.
LOS ALAMOS SOFTWARE DEVELOPMENT TOOLS
G. Cort and R. O. Nelson 1985 10 p Presented at the US DECUS Symposium, Anaheim, Calif., 9 Dec. 1985
(Contract W-7405-eng-36)
(DE86-006024; LA-UR-86-214; CONF-851264-4) Avail: NTIS HC A02/MF A01

We present the details of a strategy for acquiring a comprehensive set of software tools to support a life-cycle-based software development methodology. Specific criteria for evaluating software tools are presented with examples from the Los Alamos tool kit. The importance of an environment to support both the tools and the methodology is discussed. DOE

N86-31249# Sandia National Labs., Albuquerque, N. Mex.
SEMICONDUCTOR DEVICE MODELING ON A WORKSTATION
C. Diegert Sep. 1985 15 p Presented at the Workshop on Large Scale Computational Device Modeling, Chicago, Ill., 18 Apr. 1985
(Contract DE-AC04-76DP-00789)
(DE86-001125; SAND-85-0844; CONF-8504207-1) Avail: NTIS HC A02/MF A01

We choose to move from large mainframe computers to workstations to gain the interactive graphics we need to prepare and to analyze semiconductor device modeling problems. Given this much on a workstation, it is convenient to attempt to solve the entire problem there. We find that a top-of-the-line Apollo 660 workstation, with bit-slice processor, pipelined arithmetic processor, and 4 megabytes of real memory, is surprisingly effective in finding solutions when running the Pisces II device modeling code. In our experiment we find where the workstation bogs down when running these problems. We both analyze the Pisces CPU time log and we sample the executing program to accumulate a histogram of execution time as distributed over the source code. Results suggest how Pisces could be adapted to solve somewhat larger problems entirely on the workstation. Evolution of a trusted derivative of Pisces, to be used on supercomputers without interactivity, is suggested to complement our success with Pisces on workstations. DOE

N86-31250# Oak Ridge Gaseous Diffusion Plant, Tenn.
INTERPRETED MULTIPROCESS DISPLAY CONTROL SYSTEM
J. M. Heidle 1986 11 p Presented at the DECUS Symposium, Dallas, Tex., 27 Apr. 1986
(Contract DE-AC05-84OT-21400)
(DE86-008844; K/AIS-5004; CONF-860470-2) Avail: NTIS HC A02/MF A01

Designing a human-interface system for a large data acquisition and process control facility presented many challenges for the software development team. The design goal was to support many

classes of users who require simple coordination of multiple devices along with flexible representation and manipulation of real-time data. DOE

N86-31251# Oak Ridge Gaseous Diffusion Plant, Tenn. Computer-Aided Engineering.
IN-HOUSE CAD TRAINING: A REALISTIC APPROACH
Tony Whitus 10 Apr. 1986 11 p Presented at the American Institute for Design and Drafting Convention, Hollywood, Fla., 7 Apr. 1986
(Contract DE-AC05-84OT-21400)
(DE86-008926; K/D-5697; CONF-8604150-1) Avail: NTIS HC A02/MF A01

The need for industry to retrain its engineering personnel to use a CAD system can be demanding, as well as frustrating. In fact, the larger and more diverse the organization, the more demanding these requirements may be. It should be noted that in preparing for CAD implementation, the training needs and requirements are often underestimated. Additionally, most engineering organizations implementing CAD do not have personnel experienced in developing training programs or in teaching manipulative skills. This text describes the evolution of the in-house CADAM basic training program at Martin Marietta Energy Systems, Inc. Rather than emphasize the theoretical aspects of designing such a program, the paper will concentrate on the practical, more realistic aspects of program development. The paper should serve as a guide to others desiring to develop a similar program. This paper first presents a brief look at factors concerning retraining the experienced engineering employee. Then, the actual planning, organization, structuring, implementation, and evaluation of the training program, as well as possible future directions are presented. Finally, the paper offers advice to those planning similar in-house CAD training programs. DOE

N86-31252# Oak Ridge National Lab., Tenn.
USING SMF RECORDS IN MANAGING A CADAM SYSTEM
J. H. Rosser Feb. 1986 15 p Presented at the CADAM User's Exchange International Conference, Dallas, Tex., 3 Mar. 1986
(Contract DE-AC05-84OT-21400)
(DE86-006408; K/CSD/INF-85/24; CONF-860370-1) Avail: NTIS HC A02/MF A01

Computer-Aided Design (CAD) requires a larger commitment of resources within an organization. It is imperative that methods be developed and implemented which will aid in the efficient management of CAD systems. The purpose of this paper is to discuss one of the methods by which Martin Marietta Energy Systems is addressing these management problems using utilization data which are available from the CAD host computer. Also, to be examined are the integration of these data with related data in applications databases and their use for resource management, equipment management, human resource management, cost tracking, and productivity analysis. DOE

N86-31253# New York Univ., New York. Mathematics and Computing Lab.
HYPERCUBE ALGORITHMS AND IMPLEMENTATIONS
O. A. McBryan and E. F. VandeVelde Feb. 1986 118 p Presented at the 2nd Society for Industrial and Applied Mathematics Conference on Parallel Computing, Norfolk Va., 18 Nov. 1985
(Contract DE-AC02-76ER-03077)
(DE86-007439; DOE/ER-03077/271; CONF-8511169-1) Avail: NTIS HC A06/MF A01

Parallel algorithms are presented for important components of Computational Fluid Dynamics algorithms along with implementations on hypercube computers. Elliptic equations with 1.6 million unknowns and hyperbolic equations with 4 million unknowns have been solved using 128 processors. For elliptic equations, a parallel Preconditioned Conjugate Gradient method is described which has been used to solve pressure equations discretized with high-order finite elements on irregular grids. A parallel Full Multigrid Method and a parallel Fast Poisson Solver are also presented. Hyperbolic Conservation Laws have been discretized with parallel versions of finite difference methods and with the Random Choice Method. The performance of these algorithms is analyzed in terms of machine efficiency, communication time, bottlenecks and software development costs. A key aspect of this work is the development of a library of parallel operators for distributed vectors and matrices, efficient for both full and sparse data. The implementation of these operators on hypercubes is described along with measurements of communication effects. Using the library the PDE algorithms mentioned above have been implemented on both serial computers and on hypercubes without any code modification. All inter-process communication is hidden in library routines. A general parallel computer simulator is described along with its use in the development of the algorithms. DOE

N86-31254# Argonne National Lab., Ill.
FULLY PARALLEL ALGORITHM FOR THE SYMMETRIC EIGENVALUE PROBLEM
J. J. Dongarra and D. C. Sorensen Jan. 1986 25 p Presented at the 2nd Society for Industrial and Applied Mathematics Conference on Parallel Computing, Norfolk Va., 18 Nov. 1985
(Contracts W-31-109-eng-38; DE-AC05-84OR-21400; DE-FG02-85ER-25001)
(DE86-007553; ANL/MCS-TM-62; CONF-8511169-2) Avail: NTIS HC A02/MF A01

In this paper we present a parallel algorithm for the symmetric algebraic eigenvalue problem. The algorithm is based upon a divide and conquer scheme suggested by Cuppen for computing the eigensystem of a symmetric tridiagonal matrix. We extend this idea to obtain a parallel algorithm that retains a number of active parallel processes that is greater than or equal to the initial number throughout the course of the computation. The algorithm does not suffer from loss of parallelism associated with a typical divide and conquer dependency graph. We give a new deflation technique which together with a robust root finding technique will assure computation of an eigensystem to full accuracy in the residuals and in the orthogonality of eigenvectors. A brief analysis of the numerical properties and sensitivity to round off error is presented to indicate where numerical difficulties may occur. We also suggest a way to combine the tridiagonal method with a parallelization of the initial reduction to tridiagonal form to obtain a fully parallel algorithm for the symmetric eigenvalue problems. The algorithm is able to exploit parallelism at all levels of the computation and is well suited to a variety of architectures. We also touch upon implementation and portability issues with particular attention paid to the role of the algorithm as a library subroutine. We discuss a technique used to implement the algorithm which allows the code to be transported to a significant variety of existing parallel computers. Computational results are presented for several machines to demonstrate this. These results are very encouraging with respect to both accuracy and speedup. A surprising result is that the parallel algorithm, even when run in serial mode, can be significantly faster than the best sequential algorithm on large problems, and is effective on moderate size problems when run in serial mode. DOE

N86-31255# Argonne National Lab., Ill.
USER GUIDE FOR JAKEF, REVISION 1
K. E. Hillstrom Dec. 1985 33 p
(Contract W-31-109-eng-38)
(DE86-007554; ANL/MCS-TM-16-Rev-1) Avail: NTIS HC A03/MF A01

JAKEF is a language processor that accepts as input a single precision or double precision FORTRAN subroutine defining an objective function f(x) or a vector function F(x) and produces as output a single precision or double precision FORTRAN subroutine defining the gradient of f(x) or the Jacobian of F(x). JAKEF accepts as input ANSI 1977 standard FORTRAN subroutines and produces as output ANSI 1977 FORTRAN subroutines. JAKEF itself is written in ANSI 1977 standard FORTRAN, except for the use of an extended character set and transfers of control into an IF-block from outside the IF-block. This report serves as a user guide for the processor. DOE

N86-31256# Stanford Univ., Calif. Systems Optimization Lab.
FORTRAN PACKAGE FOR CONSTRAINED LINEAR LEAST-SQUARES AND CONVEX QUADRATIC PROGRAMMING. USER'S GUIDE FOR LSSOL (VERSION 1.0)
P. E. Gill, S. J. Hammarling, W. Murray, M. A. Saunders, and M. H. Wright Jan. 1986 44 p
(Contract DE-AS03-76ER-72018)
(DE86-009083; DOE/ER-72018/T22) Avail: NTIS HC A03/MF A01

This report forms the user's guide for Version 1.0 of LSSOL, a set of Fortran 77 subroutines for linearly constrained linear least-squares and convex quadratic programming. The method of LSSOL is of the two-phase, active-set type, and is related to the method used in the package SOL/QPSOL. Two main features of LSSOL are its exploitation of convexity and treatment of singularity. LSSOL may also be used for linear programming, and to find a feasible point with respect to a set of linear inequality constraints. LSSOL treats all matrices as dense, and hence is not intended for large sparse problems. DOE

N86-31257# Allied Bendix Corp., Kansas City, Mo.
CAD-CAM DATA EXCHANGE PILOT PROJECT
J. Hintz and D. Williams Mar. 1986 30 p
(Contract DE-AC04-76DP-00613)
(DE86-009128; BDX-613-3418) Avail: NTIS HC A03/MF A01

CAD-CAM data were exchanged between dissimilar CAD systems and the information was used to fabricate three parts. Problems were identified and solutions were proposed or implemented in the area of translation methods, data verification, CAD drawing conventions, and data handling. Additional software needed for productive data exchange has been identified. DOE

N86-31258# European Organization for Nuclear Research, Geneva (Switzerland).
PASCAL FOR ENGINEERS: A COURSE INCLUDING OMEGASOF PASCAL FOR MICROCOMPUTERS
L. A. Tausch 16 Sep. 1985 133 p
(DE86-701701; CERN-85-14) Avail: NTIS (US Sales Only) HC A07/MF A01

These are the notes of a PASCAL course for controls engineers at CERN. The course starts with Standard Pascal and includes OMEGASOFT Pascal, a powerful extension of Pascal towards real-time and systems applications. It demonstrates how a language such as Pascal, with adequate extensions for systems programming and embedded microprocessor-driven systems, can substantially increase the productivity of programmers and the reliability of their products. Also enhanced will be the legibility of the programs and their maintainability, since programming in Pascal automatically leads to autodocumentation. Simple examples show how OMEGASOFT-PASCAL can be used for efficient programming of embedded systems for real-time data acquisition and control using the MC6809 microprocessor. DOE

N86-31259# Oak Ridge National Lab., Tenn.
DEVELOPMENT AND EVALUATION OF DOTTOR, A COMPUTER CODE TO COUPLE TWO-DIMENSIONAL TO THREE-DIMENSIONAL DISCRETE ORDINATES CALCULATIONS
J. L. Thompson, M. B. Emmett, and H. L. Dodds, Jr. Apr. 1986 83 p
(Contract DE-AC05-84OR-21400)
(DE86-010081; ORNL/TM-9919) Avail: NTIS HC A05/MF A01

A method has been developed to couple two-dimensional (d-D) to three-dimensional (3-D) discrete ordinates transport calculations. This method is useful for problems in which a 3-D Cartesian (X-Y-Z geometry) region of interest is very far from a point source. A 3-D solution from the source including the region of interest is prohibited due to the large computing cost of such calculations. The problem is solved by first performing a 2-D discrete ordinates calculation from the source past the region of interest. The results of the 2-D calculations are transformed into a boundary condition on the surface of the 3-D region of interest. This transformation or coupling method is developed and implemented in the DOTTOR computer code. The boundary condition is then used for a subsequent 3-D discrete ordinates calculation in the region of interest. Simple test problems were used to evaluate the accuracy and speed (i.e., computing cost) of the DOTTOR code. The evaluation indicates that the DOTTOR code produces accurate results with acceptable computing costs. The algorithm chosen showed a significant speed advantage over others tested when applied to large problems. DOE

N86-31260*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONFIDENCE ELLIPSE RESEARCH SOFTWARE (EAAF) Final Report
Janet Myhre, Will Duquette, and Daniel Hockman 8 Aug. 1985 48 p Prepared in cooperation with Mathematical AnalysisResearch Corp., Claremont, Calif.
(Contract NAS7-918)
(NASA-CR-176983; JPL-D-2786; NAS 1.26:176983; AD-A166479; TM-6) Avail: NTIS HC A03/MF A01 CSCL 09/2

This document describes three programs used by MARC in studying and testing confidence ellipses. Genellipse is an ellipse graphing and combination program. It allows the user to specify up to twenty confidence ellipses, combine ellipses, graph ellipses, and test ellipses for combination. It has been used primarily to explore the geometric properties of the combination method, but has also been used to create figures for a number of other reports. Ellsim is a 'confidence ellipse simulation' program. It has been used to explore the robustness and properties of the statistical test (which is used to decide whether or not to combine two ellipses). In it, two normal data distributions are specified, corresponding to two emitters. Confidence ellipses are generated, tested, and combined, and various descriptive statistics are compiled. In addition, there is a routine to calculate the power of the statistical test in certain cases. Ellipstuff is an 'ellipse routine library,' which contains a large number of routines to make working with ellipses easier. As such, both Genellipse and Ellsim contain all these routines, but they are all listed separately. If more programs need to be written, these are the routines on which to build. They contain all of these routines, but they are also listed separately. If more programs need to be written, these are the routines to build them with. GRA

N86-31411*# Houston Univ., Tex. Dept. of Mechanical Engineering.
DESIGN CRITERIA FOR EXPERT SYSTEMS
Robert Allen *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 12 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 09B

N86-31429*# McNeese State Univ., Lake Charles, La. Dept. of Electrical Engineerig.
AUTOMATION OF REVIEW/APPROVAL CYCLE OF MCAUTO CAD/CAM GENERATED DRAWINGS AND DOCUMENTS
Howard S. Minn *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 17 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 09B

N86-31432*# Missouri Univ., St. Louis. Dept. of Computer Science.
INTEGRATION OF AN EXPERT SYSTEM INTO A USER INTERFACE LANGUAGE DEMONSTRATION
Daniel C. StClair *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 47 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks.

N86-31261*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTIMAL PARTITIONING OF RANDOM PROGRAMS ACROSS TWO PROCESSORS Final Report
David M. Nicol Aug. 1986 27 p Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178159; ICASE-86-53; NAS 1.26:178159) Avail: NTIS HC A03/MF A01 CSCL 09B

The optimal partitioning of random distributed programs is discussed. It is concluded that the optimal partitioning of a homogeneous random program over a homogeneous distributed system either assigns all modules to a single processor, or distributes the modules as evenly as possible among all processors. The analysis rests heavily on the approximation which equates the expected maximum of a set of independent random variables with the set's maximum expectation. The results are strengthened by providing an approximation-free proof of this result for two processors under general conditions on the module execution time distribution. It is also shown that use of this approximation causes two of the previous central results to be false. Author

N86-31262# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
BROADCASTING TOPOLOGY AND ROUTING INFORMATION IN COMPUTER NETWORKS
John M. Spinelli Mar. 1986 16 p
(Contract N00014-84-K-0357; DARPA Order-3045)
(AD-A166663; AD-E500758; LIDS-P-1543) Avail: NTIS HC A02/MF A01 CSCL 09/2

An efficient algorithm is presented which allows each node in a computer network to maintain a correct view of the network topology despite link and node failures. Reliability is achieved without transmitting any information other than the operational status of links. Messages are only sent in response to topological changes: periodic retransmission is not required. The algorithm is extended to allow nodes to maintain congestion measurements used in making routing decisions. Author (GRA)

N86-31263# Purdue Univ., West Lafayette, Ind.
TOPOLOGICAL PROPERTIES OF INTERCONNECTION NETWORKS FOR PARALLEL PROCESSORS. A UNIFIED APPROACH, APPENDIX E Ph.D. Thesis
Robert R. Seban Dec. 1985 271 p
(Contract DAAG29-82-K-0101; Grant NSF ECS-81-20896)
(AD-A167336; ARO-18790.17-EL-App-E) Avail: NTIS HC A12/MF A01 CSCL 09/2

Two methods are used to speed up the execution of a computational task. One is new technology development and the other is the exploitation of parallelism in the computation. To take an advantage of the parallelism in a task requires the utilization of parallel computer architectures. At a certain high level of abstraction a parallel computer system is represented as a graph where the nodes represent processors, memories, or other devices, and the edges represent the communication links. In this thesis the following problems of parallel processing are studied. First is a theoretical study of topological properties of interconnection networks. Second is a case study of a network design for a real-time system. Lastly, the use of SIMD(Single Instruction Stream Multiple Data Stream) networks for performing shuffles is discussed. A general model that can be used to describe networks and systems with arbitrary topologies is developed. Based upon the morphism of groups, the concept of morphism of systems is developed. The morphism of systems is called quasimorphism and allows a method of comparison between topologically arbitrary parallel computer systems. The quasimorphism is used to study the emulation of one system by another. GRA

N86-31264# Australian National Univ., Canberra. Plasma Research Lab.
NETWORK APPROACH TO LARGE-SCALE EXPERIMENTAL DATA ACQUISITION AND ANALYSIS
M. A. Corbould and J. A. How 1984 20 p
(DE86-701200; ANU-PRL-84/4) Avail: NTIS (US Sales Only) HC A02/MF A01

The Plasma Research Laboratory at the Australian National University has developed a sophisticated and flexible data acquisition system for its LT-4 tokamak that requires very little support to construct, maintain, and expand. It is novel in that is based on a minicomputer network and is built almost entirely of commercially available products. Benchmarks show that the network system outperforms conventional stand-alone and time-shared data systems. DOE

N86-31417*# City Univ. of New York, N.Y. Bronx Community Coll.
INVESTIGATION OF LOCAL AREA NETWORKS FOR AN ORBITING SPACE STATION Final Report
Louis A. DeAcetis *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 4 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 09B

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N86-31265*# Toledo Univ., Ohio. Dept. of Electrical Engineering.
CONTROL DESIGN FOR ROBUST STABILITY IN LINEAR REGULATORS: APPLICATION TO AEROSPACE FLIGHT CONTROL Final Report, 1 Jun 1985 - 17 Jul. 1986
Rama K. Yedavalli 1986 63 p
(Grant NAG1-578)
(NASA-CR-176858; NAS 1.26:176858) Avail: NTIS HC A04/MF A01 CSCL 09B

Time domain stability robustness analysis and design for linear multivariable uncertain systems with bounded uncertainties is the central theme of the research. After reviewing the recently developed upper bounds on the linear elemental (structured), time varying perturbation of an asymptotically stable linear time invariant regulator, it is shown that it is possible to further improve these bounds by employing state transformations. Then introducing a quantitative measure called the stability robustness index, a state feedback conrol design algorithm is presented for a general linear regulator problem and then specialized to the case of modal systems as well as matched systems. The extension of the algorithm to stochastic systems with Kalman filter as the state estimator is presented. Finally an algorithm for robust dynamic compensator design is presented using Parameter Optimization (PO) procedure. Applications in a aircraft control and flexible structure control are presented along with a comparison with other existing methods. Author

N86-31266# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
THE COMPUTATIONAL COMPLEXITY OF TWO-LEVEL MORPHOLOGY
G. Edward Barton, Jr. Nov. 1985 39 p Presented at the Workshop on Finite-State Morphology, Stanford, Calif., 29-30 Jul. 1985
(Contract N00014-80-C-0505)
(AD-A165991; AI-M-856) Avail: NTIS HC A03/MF A01 CSCL 05/7

Morphological analysis requires knowledge of the stems, affixes, combinatory patterns, and spelling-change processes of a natural language. The computational difficulty of the task can be clarified by investigating the computational characteristics of specific models of morphological processing. The use of finite-state

machinery in the two-level model by Kimmo Kosken-niemi gives it the appearance of computational efficiency, but closer examination shows the model does not guarantee efficient processing. Reductions of the satisfiability problem show that finding the proper lexical-surface correspondence in a two-level generation or recognition problem can be computationally difficult. However, another source of complexity in the existing algorithms can be sharply reduced by changing the implementation of the dictionary component. A merged dictionary with bit-vectors reduces the numbers of choices among alternative dictionary subdivisions by allowing several subdivisions to be searched at once.

Author (GRA)

N86-31267# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
APPLICATION OF YBJ (YOULA, BONGIORNO AND JABR) CONTROL THEORY TO THE INITIAL RESPONSE PROBLEM M.S. Thesis
Paul J. Warden May 1986 110 p
(AD-A166756; AFIT/CI/NR-86-46T) Avail: NTIS HC A06/MF A01 CSCL 09/3

In this thesis, two theorems were derived. First, the Initial Response Theorem describes the necessary and sufficient conditions for a series compensator for a feedback control system to simultaneously stabilize the system and cause the initial system response to achieve prescribed constraints. A single input-single output, continuous time linear system is considered, with a delta function driving any rational transfer function in the s-domain being the system input. Design constraints can be placed on the initial response value, and on any of the derivatives (from the right) of the initial response. Second, the Initial Response Parameterization gives a parameterization of the complete set of compensators that will meet the given constraints whenever the conditions of the Initial Response Theorem are met. The area of Youla, Bongiorno and Jabr (YBJ) Control Theory was used for the derivations, but first required a system transformation to convert the initial value problem to one of stability. Author (GRA)

N86-31268# Brown Univ., Providence, R. I. Center for Dynamical Systems.
FILTERING AND CONTROL FOR WIDE BANDWIDTH NOISE DRIVEN SYSTEMS Interim Report
H. J. Kushner and W. Runggaldier Jan. 1986 60 p
(Contracts DAAG29-84-K-0082; N00014-83-K-0542; DA Proj. 230-4; Grant AF-AFOSR-0116-81)
(AD-A166964; LCDS-86-8; AFOSR-86-0258TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

Much of modern stochastic control theory uses ideal white noise driven models (Ito equations). If the observed data is corrupted by noise, then the noise is usually assumed to be white Gaussian. Typically, if the underlying models are linear, one uses a Kalman-Bucy filter to get an estimate of the state, and then bases the control on this estimate. In practice, the noises are rarely white, and the reference signals and the systems are only approximations in some sense to a diffusion. Never-the-less, owing to lack of viable alternatives, one still uses the Kalman-Bucy filter, etc. Then the estimates are not optimal and, indeed, might be quite far from being optimal, and similarly for the corresponding control. (Examples are given to illustrate this.) The sense in which the estimates and/or control is useful need to be examined in order to justify the use of the commonly used procedure. The issue is much deeper than mere robustness in the usual sense, since basic questions of interpretation of the results are involved. The paper deals with these questions. For the filtering problem where the signal is a near Gauss-Markov process and the observation noise wide band, it is shown that the usual method is nearly optimal with respect to a class of alternative data processors. This alternative class is rather natural and includes the data processors which one would normally want to use. GRA

N86-31269# Los Alamos National Lab., N. Mex.
INTELLIGENT INTERFACE FOR DESIGN AND SIMULATION
W. Draisin and E. Peter 1986 8 p Presented at the Expert Database Systems Conference, Charleston, S.C., 1 Apr. 1986
(Contract W-7405-eng-36)
(DE86-000762; LA-UR-3275; CONF-860458-1) Avail: NTIS HC A02/MF A01

We are developing a system composed of intelligent interfaces, expert systems, and databases that uses artificial intelligence techniques to simplify the use of large simulation codes and to help design complicated physical devices. The simulation codes are used in analyzing and designing weapons, and the devices are themselves parts of weapon systems. From a designer's point of view, the simulation process is the same no matter what is being simulated. In the course of developing two intelligent interfaces for the design of nuclear weapons, we have found that data-driven programming is a useful technique for implementing an open-ended user interface to assist the designer. We discuss the simulation process as it is done now and as it could be done with intelligent interfaces. We then discuss the use of data-driven programming in a database environment to support an interface for an arbitrary number of simulation codes. DOE

N86-31270# Argonne National Lab., Ill.
AUTOMATED REASONING: BASIC RESEARCH PROBLEMS
L. Wos Mar. 1986 40 p
(Contract W-31-109-eng-38)
(DE86-009214; ANL/MCS-TM-67) Avail: NTIS HC A03/MF A01

In this paper, we present some of the open research problems in the field of automated reasoning. By collecting these problems in one place, we intend to stimulate research and thus reduce the time required to reach one of the primary objectives of the field. That objective is to design and implement a computer program that functions as a high-level automated reasoning assistant. This paper is intended for new researchers as well as those who have been active in the field. We therefore include an overview of automated reasoning itself, touching on the basic elements, various examples and some of its applications. The existence of single automated reasoning programs that have provided valuable assistance in answering open questions in mathematics and logic, designing superior circuits, validating existing circuit designs, and proving properties of computer programs establishes the usefulness and versatility of such programs. The degree of assistance future automated reasoning programs will offer depends on which of the open problems cited in this paper are solved. DOE

N86-31271# Oak Ridge National Lab., Tenn.
REAL-TIME PRODUCTION SYSTEM FOR INTELLIGENT ROBOT CONTROL
G. deSaussure, D. Kammer, and C. R. Weisbin 1986 13 p Presented at the National Conference on Artificial Intelligence, Philadelphia, Pa., 11 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008501; CONF-860848-1) Avail: NTIS HC A02/MF A01

The use of a production system for the control of an autonomous robot presents several attractive features: the explicitness and homogeneity of the knowledge representation facilitates explaining, verifying and modifying the rules which determine the robot's behavior; it also permits the intremental extension of the domain of competence. However, real-time operation poses a number of challenges due to the dynamic nature of the data and because the system must frequently deal with a large knowledge base in a limited time. An implementation of a knowledge base is discussed where a large commercial real-time expert system originally designed for industrial process diagnostic was adapted to the control of an autonomous mobile robot planning, executing and monitoring a set of navigational tasks. DOE

N86-31272# Grenoble-1 Univ. (France). Lab. de Mathematiques Appliquees.
OPTIMUM PARAMETER IDENTIFICATION IN A DYNAMIC SYSTEM DESCRIBED BY A STOCHASTIC LINEAR DIFFERENTIAL EQUATION WITH CONTROL FUNCTIONS Ph.D. Thesis [IDENTIFICATION OPTIMALE DES PARAMETRES D'UN SYSTEME DYNAMIQUE REGI PAR UNE EQUATION DIFFERENTIELLE STOCHASTIQUE LINEAIRE COMMANDEE]

Nadia Brahimi 1985 140 p In FRENCH
(ESA-86-97280) Avail: NTIS HC A07/MF A01

The estimation of parameters along a system variation in a given time interval for a chosen strategy and the determination of the optimal control in the sense of obtaining criteria linked to the Fisher information matrix to improve the quality of the estimation are considered. Discrete time and continuous time strategies are studied. In the first case the Girsanov theorem justifies the Markov chain approach. It is shown that the maximum likelihood estimator is consistent with a normal asymptotic function. The continuous case is treated by approximations given by the limits of series of processes. The second problem remains unsolved. The reasons are discussed. ESA

N86-30648# London Univ. (England). Dept. of Aeronautical Engineering.
FINITE STATE MODELLING OF AEROELASTIC SYSTEMS FOR ACTIVE CONTROL APPLICATIONS: A GENERAL THEORY
Ranjan Vepa *In* DGLR The 2nd International Symposium on Aeroelasticity and Structural Dynamics 1985 p 309-319 (For primary document see N86-30627 22-01)
Avail: NTIS HC A99/MF E03

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-31273*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
METHODS FOR THE IDENTIFICATION OF MATERIAL PARAMETERS IN DISTRIBUTED MODELS FOR FLEXIBLE STRUCTURES Final Report
H. T. Banks, J. M. Crowley, and I. G. Rosen May 1986 61 p Submitted for publication
(Contracts NAS1-16394; NAS1-17130)
(NASA-CR-178135; NAS 1.26:178135; ICASE-84-66) Avail: NTIS HC A04/MF A01 CSCL 12A

Theoretical and numerical results are presented for inverse problems involving estimation of spatially varying parameters such as stiffness and damping in distributed models for elastic structures such as Euler-Bernoulli beams. An outline of algorithms used and a summary of computational experiences are presented. Author

N86-31274# Technische Hogeschool, Eindhoven (Netherlands). Measurement and Control Group.
SYSTEM IDENTIFICATION. MINI COURSE
P. Eykhoff and A. J. W. vandenBoom Jul. 1984 39 p Mini course held in Eindhoven, Netherlands, Jul. 1984
(ER-84/02; ESA-86-97522) Avail: NTIS HC A03/MF A01

The coherence among system identification methods is discussed. A generalized diagram for various parameter estimation methods is presented. The coherence in pseudo-linear regression schemes is considered. For individual titles, see N86-31275 through N86-31276. ESA

N86-31275# Technische Hogeschool, Eindhoven (Netherlands).
ON THE COHERENCE AMONG THE MULTITUDE OF SYSTEM IDENTIFICATION METHODS **c65**
P. Eykhoff and A. J. W. vandenBoom *In its* System Identification. Mini Course Jul. 1984 p 3-24 Presented at 6th IFAC Symposium on Identification and System Parameter Estimation, Washington, 1982 (For primary document see N86-31274 22-64)
Avail: NTIS HC A03/MF A01

The choice of template functions/series that span function spaces of process input-output in system identification is discussed. Based on the template functions/series choice, estimation methods, as well as their properties, can be split into three classes, depending on whether the template functions and observations are deterministic or stochastic. Depending on the class to which they belong, the properties of the estimators range from complete statistical information to only limit-measures for the estimation accuracy attainable. The Cramer-Rao relation and the information matrix play an essential role. Linearity, pseudo-linearity and nonlinearity-in-the-parameters of the models used are related to such fundamental aspects. ESA

N86-31276# Technische Hogeschool, Eindhoven (Netherlands).
A GENERALIZED DIAGRAM FOR VARIOUS PARAMETER ESTIMATION METHODS; THE COHERENCE IN PSEUDO-LINEAR REGRESSION SCHEMES **c65**
P. Eykhoff and A. J. W. vandenBoom *In its* System Identification. Mini Course Jul. 1984 p 25-37 (For primary document see N86-31274 22-64)
Avail: NTIS HC A03/MF A01

The relationships between recursive estimation schemes for single-input single-output systems are established by presenting a general diagram of which the least squares, generalized least squares, extended matrix, instrumental variable, approximated maximum likelihood, implicit quasilinearization, filtered instrumental variable estimation, (sub) optimal instrumental variable, and the instrumental variable variant of the extended matrix method estimators are special cases. In the diagram, three operations can be distinguished: noise filtering; model extension; and instrumental variable generation. It is shown that by proper combination of these three main operations, all the estimators mentioned can be constructed. ESA

N86-31277# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Application.
PARALLEL SOLUTION OF LINEAR SYSTEMS WITH STRIPED SPARSE MATRICES. PART 1. VLSI NETWORKS FOR STRIPED MATRICES
Rami Melhem Jan. 1986 50 p
(Contract N00014-85-K-0339)
(AD-A166046; ICMA-86-91-Pt-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

The multiplication of a matrix by a vector and the solution of triangular linear systems are the most demanding operations in the majority of iterative techniques for the solution of linear systems. Data-driven VLSI networks that perform these two operations efficiently for sparse matrices are introduced. In order to avoid computations that involve zero operands, the non-zero elements in a sparse matrix are organized in the form of non intersecting stripes, and only the elements within the stripe structure of the matrix are manipulated. Detailed analysis of the networks proves that both operations may be completed in n global cycles with minimal communication overhead, where n is the order of the linear system. The number of cells in each network as well as the communication overhead are determined by the stripe structure of the matrix. A companion paper examines this structure for the class of sparse matrices generated in Finite Element Analysis. Author (GRA)

N86-31278# Pittsburgh Univ., Pa. Inst. for Computational Mathematics and Application.
PARALLEL SOLUTION OF LINEAR SYSTEMS WITH STRIPED SPARSE MATRICES. PART 2. STIFFNESS MATRICES, A CASE STUDY
Rami Melhem Jan. 1986 34 p
(Contract N00014-85-K-0339)
(AD-A166047; ICMA-86-92-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

The stripe structures of stiffness matrices resulting from irregular domains covered by regular grids are analysed. It is proved that the non-zero elements in these matrices may be covered by very few stripes, and that these stripes may be non-overlapping, if the nodes of the grids are numbered appropriatly. The exact number of stripes, which is independent of the size of the problem, is derived for different types of grids and different numbering schemes. The stripe structure of some irregular grids are also examined. GRA

N86-31279# Washington Univ., St. Louis, Mo. Dept. of Systems Science and Mathematics.

DEVELOPMENT AND APPLICATION OF THE P-VERSION OF THE FINITE ELEMENT METHOD Annual Report, 30 Sep. 1984 - 29 Sep. 1985
I. Norman Katz 21 Nov. 1985 35 p
(Grant AF-AFOSR-0315-82)
(AD-A166056; AFOSR-86-0087TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The p-version of the finite element method is a new, important, computationally efficient, approach to finite element analysis. It is more robust than the conventional h-version and its rate of convergence, for domains with corners and for other singularity problems, is twice that of the h-version. Hierarchic elements which implement the p-version efficiently have been formulated so as to enforce C(0) or C(1) continuity in the planar case, and so as to enforce C(0) continuity in three dimensions. GRA

N86-31280# Maryland Univ., College Park. Dept. of Computer Science.
ON USING MULTIPLE INVERTED TREES FOR PARALLEL UPDATING OF GRAPH PROPERTIES
Shaunak Pawagi and I. V. Ramakrishnan May 1985 28 p
(Contracts N00014-84-K-0530; F49620-83-C-0082; Grant NSF ECS-84-04399)
(AD-A166058; CAR-TR-124; CS-TR-1502; AFOSR-86-0045TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Fast parallel algorithms are presented for updating the distance matrix, shortest paths for all pairs and biconnected components for an undirected graph and the topological ordering of vertices of a directed acyclic graph when an incremental change has been made to the graph. The kinds of changes that are considered here include insertion of a vertex of insertion and deletion of an edge or a change in the weight of an edge. The machine model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper require O(log n) time and use 0(N-cubed) processors. These algorithms are efficient when compared to previously known 0(log-squared of n) time start-over algorithms for initial computation of the above mentioned properties of graphs. The previous solution is maintained in multiple inverted trees (a rooted tree where a child node points toward its parent) and after a minor change the new solution is rapidly recomputed from these trees. GRA

N86-31281# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
PERFORMANCE OF DISCRETE-TIME PREDICTORS OF CONTINUOUS-TIME STATIONARY PROCESSES Technical Report, Sep. 1985 - Aug. 1986
Stamatis Cambanis and Elias Masry Dec. 1985 52 p
(Contracts F49620-85-C-0144; N00014-84-K-0042)
(AD-A166231; TR-123; AFOSR-86-0013TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

This document studies the asymptotic performance of linear predictors of continuous-time stationary processes from observations at n sampling instants on a fixed observation interval. Considered are both optimal and simpler choices of predictor coefficients; uniform sampling, as well as nonuniform sampling tailored to the statistics of the process under prediction. The authors concentrate on stationary processes with rational spectral densities and obtain the asymptotic performance for cases with no and with one quadratic-mean derivative. The analytical results are supplemented by numerical examples depicting small and large sample size performance. Author (GRA)

N86-31282# Vanderbilt Univ., Nashville, Tenn. Dept. of Mathematics.
MATCHING EXTENSION AND THE GENUS OF A GRAPH
Michael D. Plummer Mar. 1986 38 p
(Contract N00014-85-K-0488)
(AD-A166562) Avail: NTIS HC A03/MF A01 CSCL 12/1

Let G be a graph with p points having a perfect matching and suppose n is a positive integer with n < or = (p-2)/2. Then G is n-extendable if every matching in G containing n lines is a subset of a perfect matching. In this paper we obtain an upper bound on the n-extendability of a graph in terms of its genus. Author (GRA)

N86-31283# Stanford Univ., Calif. Lab. for Computational Statistics.
BIASED AND UNBIASED CROSS-VALIDATION IN DENSITY ESTIMATION
David W. Scott and George R. Terrell Apr. 1986 52 p
(Contracts N00014-85-K-0100; DAAG29-85-K-0212; N00014-83-K-0472; Grant N00014-83-G-0121)
(AD-A166905; LCS-TR-23) Avail: NTIS HC A04/MF A01 CSCL 12/1

Nonparametric density estimation requires the specification of smoothing parameters. The demands of statistical objectivity make it highly desirable to base the choice on properties of the data set. This paper introduces some biased cross-validation criteria for selection of smoothing parameters for kernel and histogram density estimators. These criteria are obtained by estimating L sub 2-norms of derivatives of the unknown density and provide slightly biased estimates of the average squared-L sub 2 error or mean integrated squared error. These criteria are roughly the analog of the generalized cross-validation procedure for orthogonal series density estimators. The authors present the relationship of the biased cross-validation procedure to the least squares cross-validation procedure, which provides unbiased estimates of the mean integrated squared error. Both methods are shown to be based on U-statistics. The two methods are compared through theoretical calculation of the noise in the cross-validation functions and corresponding cross validated smoothing parameters, by Monte Carlo simulation, and by example. Surprisingly large gains in asymptotic efficiency are observed between biased and unbiased cross-validation when the underlying density is sufficiently smooth. Reliability of cross-validation for finite samples is discussed. GRA

N86-31284# Texas Univ., Austin. Dept. of Aerospace Engineering and Engineering Mec
OPTIMUM ACCELERATION FACTORS FOR ITERATIVE SOLUTIONS OF LINEAR AND NON-LINEAR SYSTEMS Final Report, 1 Dec. 1984 - 30 Nov. 1985
George S. Dulikravich and David M. Young, Jr. 30 Dec. 1985 47 p
(Grant AF-AFOSR-0052-85)
(AD-A167171; AFOSR-86-0221TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Two different approaches to the acceleration of iterative algorithms for the numerical solution of differential systems have been developed. General form of the non-linear minimal residual method has been analytically determined and numerically confirmed for solving linear and non-linear problems. The method was applied to multi-step algorithms for effectively determining optimal values of each of the acceleration parameters at each time step. It was found that both the rate of iterative convergence and the smoothness of the iterative convergence can be substantially augmented by the use of these multiple optimal acceleration parameters. The second approach involves a composite adaptive method which is based on variational techniques. An automatic procedure for determining splitting parameters needed in the iterative solution of large sparse linear systems was developed. It was then complemented with the generalized conjugate gradient acceleration procedures and successfully applied in the symmetric successive overrelaxation method and in the shifted incomplete Cholesky method. GRA

N86-31285# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
EXTREME POINT METHODS IN THE DETERMINATION OF THE STRUCTURE OF A CLASS OF BIVARIATE DISTRIBUTIONS AND SOME APPLICATIONS TO CONTINGENCY TABLES
M. B. Rao, P. R. Krishnaiah, and K. Subramanyam Jan. 1986 32 p
(Contract F49620-85-C-0008)
(AD-A167230; TR-86-01; AFOSR-86-0254TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

A decomposition of the class of all bivariate positive quadrant dependent distribution into compact convex subsets is obtained. Extreme points of these compact convex subsets are investigated. A similar decomposition works out for the class of all bivariate distributions. Extreme points of the compact convex sets figuring in this decomposition are analyzed. An application to contingency tables is presented. GRA

N86-31286# Rockwell International Corp., Richland, Wash. Rockwell Hanford Operations.
UNIQUE SOLUTION TO A NONLINEAR ORDINARY DIFFERENTIAL EQUATION
Niall W. Kline (Boeing Computer Services Co., Richland, Wash.) Dec. 1985 13 p
(Contract DE-AC06-77RL-01030)
(DE86-005236; RHO-BW-SA-479-P) Avail: NTIS HC A02/MF A01

Numerous approaches have been employed in solving the equation governing unsteady conduction of heat along the radius of an annular cross section. One such method is described by Ozisik, in the spatial propagation of temperature is approximated by an elementary function of the penetration distance of a limiting quantity of heat. This method reduces the original problem, solving a partial differential equation for a function of two independent variables, to that of solving an ordinary differential equation for the approximate penetration distance as a function of time. Of interest here is the solution to the equation for penetration distance when, instead of heat conduction, the approximation method is applied to radial diffusion of decaying mass. DOE

N86-31287# Central Inst. of Physics, Bucharest (Rumania).
PIECEWISE ANALYTICAL PERTURBATION SERIES METHODS FOR SOLVING LINEAR ORDINARY DIFFERENT EQUATION. PART 1: GENERAL SCHEMES FOR ALGORITHM IMPLEMENTATION
Gh. Adam Dec. 1984 44 p
(DE86-700605; IFIN-FT-256-1984-Pt-1) Avail: NTIS (US Sales Only) HC A03/MF A01

The piecewise analytical perturbation series (PAPS) approach to the solution of linear ordinary differential equations is shown to provide both PAPS algorithms and equations for the accumulated discretization errors, each of which involving the same set of propagators, a property which is very important for the implementation of PAPS codes with global control over the discretization error. Finite, simple and flexible PAPS algorithms can be derived provided the coefficients of the given differential equation are approximated by truncated piecewise Legendre series. Theoretical realization of such algorithms are outlined and their orders of accuracy are established. DOE

N86-31288# Illinois Univ., Urbana. Dept. of Computer Science.
POTENTIAL FOR PARALLELISM IN ORDINARY DIFFERENTIAL EQUATIONS
C. W. Gear Feb. 1986 19 p Presented at the 2d International Conference on Computational Mathematics, Benin City, Nigeria, 1 Jan. 1986
(Contract DE-AC02-76ER-02383)
(DE86-007594; UIUCDCS-R-86-1246; UILU-ENG-86-1705; COO-2383-0115; CONF-860154-1) Avail: NTIS HC A02/MF A01

In this paper we are concerned with initial value problems. Techniques for boundary value problems (with the exception of shooting methods) are sufficiently different to those for initial value problems that the parallel techniques and impediments discussed in this paper are inapplicable to boundary value problems. DOE

N86-31289# Sandia National Labs., Albuquerque, N. Mex.
CELLULAR AUTOMATA METHOD FOR PHASE UNWRAPPING
D. C. Ghiglia and G. A. Mastin Oct. 1985 5 p Presented at the Topical Meeting on Signal Recovery and Synthesis, Honolulu, Hawaii, 2 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-002124; SAND-85-2323C; CONF-860457-1) Avail: NTIS HC AC2/MF A01

Research into phase unwrapping has led to the discovery of a cellular automaton that can unwrap phase in one- and two-dimensions. The extremely interesting behavior of the automaton and the aesthetically pleasing structure that evolves from repeated iterates will be presented. DOE

N86-31290# Los Alamos National Lab., N. Mex.
AUTONOMOUS DIFFERENTIAL EQUATIONS FOR THE HENON MAP AND OTHER TWO-DIMENSIONAL DIFFEOMORPHISMS
G. Mayer-Kress 1986 19 p
(Contract W-7405-eng-36)
(DE86-007384; LA-UR-86-554) Avail: NTIS HC A02/MF A01

For the study of bifurcations and chaotic behavior of nonlinear dynamical systems discrete mappings turned out to be extremely useful. In order to study the smooth evolution underlying two dimensional invertible mappings, we discuss the suspension of the Henon map of the plane, the standard map on the torus and more general Cremona transformations of the plane. DOE

N86-31291# Oklahoma State Univ., Stillwater. Dept. of Physics.
SUPERCONFORMAL LAGRANGIAN WITHOUT THE NEED TO INTRODUCE CONSTRAINTS
C. H. Pilot Jan. 1986 40 p
(Contract DE-FG05-85ER-40215)
(DE86-009006; DOE/ER-40215/T2) Avail: NTIS HC A03/MF A01

A field Lagrangian invariant under all the symmetries of the superconformal group has been constructed without the need to introduce constraints on the curvatures. We have thus generalized the action of Townsend, van Nieuwenhuizen, and Kaku. We maintain that any and all constraints on the curvatures should result as a consequence of spontaneous symmetry breaking and not be a priori enforced. DOE

N86-31292# Sandia National Labs., Albuquerque, N. Mex.
PACKAGE FOR SOLVING LARGE SPARSE SYSTEMS OF STIFF ORDINARY DIFFERENTIAL EQUATIONS
D. E. Salane Feb. 1986 25 p
(Contract DE-AC04-76DP-00789)
(DE86-009545; SAND-85-2762) Avail: NTIS HC A02/MF A01

In this report we present a subroutine (DEBDFS) for solving large sparse systems of stiff ordinary differential equations. For many problems, DEBDFS is able to take advantage of sparsity to reduce significantly the cost of finding a solution. A preprocessor program acts as a user interface and makes DEBDFS reasonably easy to use. Moreover, the preprocessor program provides facilities for detailed problem analysis and helps the user to use DEBDFS efficiently. DOE

N86-31293# Sandia National Labs., Albuquerque, N. Mex.
EFFECTS OF STIFFNESS
L. F. Shampine Mar. 1986 18 p
(Contract DE-AC04-76DP-00789)
(DE86-009559; SAND-86-0304) Avail: NTIS HC A02/MF A01

One-step methods for the numerical solution of the initial value problem for a system of ordinary differential equations are studied. The question addressed is, what happens when a code intended for non-stiff problems is applied to a stiff problem. DOE

N86-31294# Oak Ridge National Lab., Tenn.
PROPAGATORS FOR GENERAL NONLINEAR EQUATIONS
D. G. Cacuci, R. B. Perez, and V. Protopopescu May 1986 14 p
(Contract DE-AC05-84OR-21400)
(DE86-010071; ORNL/TM-10016) Avail: NTIS HC A02/MF A01

Propagators - advanced and retarded - are introduced for nonlinear problems and it is shown that they generalize the Green's functions used to solve linear problems. These propagators are generated by using the dual operator which plays, for the nonlinear problem, the same role as the customary adjoint operator for linear problems. The propagators obey a reciprocity relationship and satisfy a closed nonlinear integral equation or, alternatively, a linear integral equation that depends parametrically on the

problem's solution. These equations are formulated in a canonical way, independent of dimensionally, boundary conditions and type of the underlying nonlinear problem. DOE

N86-31295# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
MARTINGALES WITH GIVEN ABSOLUTE VALUE FROM THE MULTIPLICATIVE DECOMPOSITION OF POSITIVE SUBMARTINGALES
D. Gilat and P. J. Holewijn Mar. 1984 13 p
(IR-224; ESA-86-97323) Avail: NTIS HC A02/MF A01
Methods of construction of martingales whose absolute value is preassigned are discussed. Two alternative constructions of a martingale whose absolute value is a given submartingale possessing a multiplication decomposition are presented. In the presence of a multiplicating decomposition the construction in continuous-time is no more difficult than for a submartingale-sequence. ESA

N86-31296# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
BINARY CONVEXITIES AND DISTRIBUTIVE LATTICES
M. vandeVel Mar. 1984 63 p
(IR-225; ESA-86-97324) Avail: NTIS HC A04/MF A01
The fact that the distributive lattices with convexity of all order-convex sublattices correspond exactly to the intervals of a binary convex structure which has a certain separation property is presented. These orderings are used for constructing an intrinsic topology of distributive lattices. Applications are given. ESA

N86-31297# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
AN INEQUALITY FOR STOPPED BROWNIAN MOTION
D. P. vanderVecht Mar. 1984 10 p
(IR-227; ESA-86-97326) Avail: NTIS HC A02/MF A01
The standard stopping time classes with respect to Brownian motion are considered. The fact that for any standard stopping time T, the distrubution of the maximum of stopping process associated to distribution Brownian Motion at T is dominated by Lebesgue measure of images of Hardy-Littelwood maximal function is proved. ESA

N86-31298# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
PROPERTY C AND FINE HOMOTOPY EQUIVALENCES
Jan vanMill and Jerzy Mogilski Mar. 1984 6 p
(IR-233; ESA-86-97327) Avail: NTIS HC A02/MF A01
The problem of dimensionality properties of infinite-dimensional spaces under fine homotopy equivalences is studied. The fact that the cell-like maps which are fine homotopy equivalences preserve countable dimension (property C) is proved. ESA

N86-31299# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
ON THE CONSTRUCTION OF MARTINGALES WITH GIVEN ABSOLUTE VALUE, 2
P. J. Holewijn Mar. 1984 17 p
(IR-241; ESA-86-97331) Avail: NTIS HC A02/MF A01
Methods of construction of martingales whose absolute value is preassigned are considered. It is shown how the problem of construction of martingales (with absolute value preassigned) can be reduced to the case where the given submartingale is bounded below by a constant nonrandom positive. ESA

N86-31300# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
ON GENERIC POINTS IN THE CARTESIAN SQUARE OF CHACON'S TRANSFORMATION
A. DeJunco and M. Keane Mar. 1984 19 p
(Grant NSF MCS-80-03038)
(IR-244; ESA-86-97334) Avail: NTIS HC A02/MF A01
The fact that there exists a compact space X and a strictly ergodic homeomorphism of X with invariant probability with the property that the set of couples of points which are not generic is a countable set, is proved. Chacon's transform is used. ESA

N86-31301# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
SOLUTIONS OF BOUNDARY VALUE PROBLEMS FOR THE TRICOMI-EQUATION
R. J. P. Groothuizen Mar. 1984 31 p
(IR-247; ESA-86-97337) Avail: NTIS HC A03/MF A01
The simple boundary value problem (elliptic and hyperbollic cases) for the homogeneous Tricomi equation is discussed. The fact that Fourier integral operators are more useful for describing qualitative than quantitative properties of solution is shown. The fact that the numerical aspect of the solution forms another problem is noted. ESA

N86-31302# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE ASYMPTOTIC EXPANSION OF THE GLOBAL ERROR OF THE BOX SCHEME IN A STIFF CASE
M. vanVeldhuizen Mar. 1984 28 p
(IR-251; ESA-86-97340) Avail: NTIS HC A03/MF A01
The existence of an asymptotic expansion of the global error for a stiff ordinary differential equation on a highly nonuniform mesh is considered. A stability estimate for the box scheme (scalar case only) almost without any restriction between the mesh and stiffness parameter is given. The possible extensions and the difficulties involved are also discussed. ESA

N86-31303# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
EXTRAPOLATED MIDPOINT RULE FOR DIFFERENTIAL EQUATIONS. PART 1: EXPANSION THEOREMS
Maarten deGee May 1984 39 p
(IR-255-Pt-1; ESA-86-97343) Avail: NTIS HC A03/MF A01
The approximation obtained by the explicit midpoint rule, initialized by one Euler step, of delay-differential equation is considered. The fact that there are functions ek such that the expansion of the global discretization error depending on ek exists even if the solution of delay-differential equation has jump discontinuities in its derivatives over certain points, is discussed. The fact the Richardson extrapolation to the limit is applied to improve the approximation is proved. Results show that the local extrapolation as in Gragg-Bulirsch-Stoer method for ordinary differential equations by consideration of a set of fixed step sizes can be used. ESA

N86-31304# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
DISCRETE APPROXIMATION OF EIGENFUNCTION EXPANSIONS OF SELF ADJOINT ORDINARY DIFFERENTIAL OPERATORS
G. Y. Nieuwland Jul. 1984 22 p Presented at Symposium dedicated to Professor A. van de Vooren, Groningen, Netherlands, 22 Jun. 1984
(IR-263; ESA-86-97347) Avail: NTIS HC A02/MF A01
The fact that the spectrum, spectral measures and the eigenfunctions for a self adjoint ordinary differential operator (ODO) can be approximated by numerically implementable algorithm is discussed. The fact that strong discrete approximation of a set adjoint ODO implies distributional convergence of spectral resolution is presented. ESA

N86-31305# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE BEST BOUND IN THE L LOG L INEQUALITY OF HARDY AND LITTLEWOOD AND ITS MARTINGALE COUNTERPART
David Gilat Sep. 1984 15 p Sponsored by Vrije Univ., Amsterdam, Netherlands
(IR-266; ESA-86-97348) Avail: NTIS HC A02/MF A01
The inequalities deduced from the maximal Hardy-Littlewood theorem and the Doob's theorem similar martingale are considered. The sharpness for the L log L (L times the logarithm of L) is studied. The best bound of L log L and its corresponding martingale description are presented. ESA

N86-31306# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
TRANSFINITE CLASSIFICATION OF WEAKLY-INFINITE DIMENSIONAL SPACES
Piet Borst Feb. 1985 35 p
(IR-276; ESA-86-97353) Avail: NTIS HC A03/MF A01

The fact that every weakly infinito-dimensional space X which does not have a weakly infinito-dimensional metric compactification can be an associate of two ordinal numbers called index X and weakly-ind X, is discussed. The fact that for every small infinito-dimensional space X the index is a function of the ordinal exponentiation, is proved. The number index X is a generalization of Pol's concept over weakly infinito-dimensional compact metric spaces. ESA

N86-31307# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
EXTREMAL DIGRAPHS WITHOUT DIRECTED PATHS OF LENGTH THREE OR TWO
A. Pawel Wojda May 1984 12 p
(Memo-449; ESA-86-97365) Avail: NTIS HC A02/MF A01

Diagraphs with $n > 3$ vertices and with exactly (nsq/4) arcs without a path of length 2 are described. Diagraphs with $n < 5$ vertices and (nsq/4) arcs without any directed path of length 3 are also described. ESA

N86-31308*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TESTING AND COMBINATION OF CONFIDENCE ELLIPSES: A GEOMETRIC ANALYSIS Final Report
Janet Myhre, Michael Rennie, and Will Duquette 5 Aug. 1985 54 p Prepared in cooperation with Mathematical Analysis Research Corp., Claremont, Calif.
(Contract NAS7-918)
(NASA-CR-176987; JPL-D-2782; NAS 1.26:176987; AD-A166581) Avail: NTIS HC A04/MF A01 CSCL 15/4

This document is one of a series of algorithm analysis reports performed for the US Army Intelligence Center and School covering selected algorithms in existing or planned Intelligence and Electronic Warfare (IEW) systems. This report proves several properties of the ellipse combination process as used in correlation algorithms, both alone and in combination with the associated statistical tests. In particular, it is shown that the statistical tests introduce order dependence to the combination process. A confidence ellipse, sometimes called an EEP, is one of the ways in which intelligence data concerning an emitter's location is summarized. Such an ellipse is always centered at the estimated emitter location and is a measure of the possible error in the location estimate. The goal of this paper is to examine the geometric implications and properties of the statistical test for deciding whether two estimates refer to the same emitter, and of the method of combination for confidence ellipses. GRA

N86-31420*# Prairie View Agricultural and Mechanical Coll., Tex. Dept. of Mechanical Engineering.
DEVELOPMENT OF A NUMERICAL PROCEDURE TO MAP A GENERAL 3-D BODY ONTO A NEAR-CIRCLE
Mark J. Hommel *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 5 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-31309# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
TABLES FOR OBTAINING CONFIDENCE BOUNDS FOR REALIZED SIGNAL TO NOISE RATIO WITH AN ESTIMATED DISCRIMINANT FUNCTION
C. G. Khatri, C. Radhakrishna Rao, and Y. N. Sun Nov. 1985 17 p
(Contracts N00014-85-K-0292; F49620-85-C-0008)
(AD-A166059; TR-85-40; AFOSR-86-0062TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Percentage points of a new distribution involving a confluent-hypergeometric distribution are tabulated. The use of the tabulated values in obtaining a lower confidence bound for the realized signal to noise ratio based on an estimated discriminant function for signal detection is explained. Author (GRA)

N86-31310# Stanford Univ., Calif. Dept. of Statistics.
ALL SUBSETS REGRESSION IN COX MODEL
Anthony Y. C. Kuk 4 Mar. 1986 16 p
(Contracts N00014-76-C-0475; NR Proj. 042-267)
(AD-A166897; TR-370) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper shows that within the framework of the proportional hazards model all subset regression can be performed with very little computational efforts. A selection criterion based on Wald statistic is motivated by a cross-validation argument in which the status of one observation is changed from uncensored to censored. This criterion is seen to be formally equivalent to Mallow's C sub P and thus the problem is reduced to one readily handled by standard statistical packages. The procedure is applied to the multiple myeloma data to give results remarkably different from those obtained by previous workers using stepwise procedures. New insights are gained and the superiority of all subset regression over stepwise regression is clearly demonstrated. GRA

N86-31311# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
BOOTSTRAPPING NONLINEAR LEAST SQUARES ESTIMATES IN THE KALMAN FILTER MODEL
David S. Stoffer Jan. 1986 27 p
(Contract F49620-85-C-0008; Grant AF-AFOSR-0113-84)
(AD-A167099; TR-86-02; AFOSR-86-0252TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The bootstrap is proposed as a method for estimating the precision of forecasts and maximum likelihood estimates of the transition parameters of the Kalman filter model when the estimates are obtained via Newton-Raphson. It is shown that when the system and the filter are in steady state, the bootstrap applied to the Gaussian innovations yields asymptotically consistant standard errors. That the boot strap works well with moderate sample sizes and supplies robustness against departures from normality is substantiated by emperical evidence. Author (GRA)

N86-31312# Oak Ridge National Lab., Tenn.
CENTRAL LIMIT THEOREM FOR VARIABLE SIZE SIMPLE RANDOM SAMPLING FROM A FINITE POPULATION
T. Wright Feb. 1986 27 p
(Contract DE-AC05-84OR-21400)
(DE86-007092; ORNL/TM-9864) Avail: NTIS HC A03/MF A01

This paper introduces a sampling plan for finite populations herein called variable size simple random sampling and compares properties of estimators based on it with results from the usual fixed size simple random sampling without replacement. Necessary and sufficient conditions (in the spirit of Hajek) for the limiting distribution of the sample total (or sample mean) to be normal are given. DOE

N86-31313# Oak Ridge National Lab., Tenn.
VARIANCE REDUCTION METHODS APPLIED TO DEEP-PENETRATION MONTE CARLO PROBLEMS
S. N. Cramer and J. S. Tang Jan. 1986 78 p
(Contract DE-AC05-84OR-21400)
(DE86-007080; ORNL/TM-9643) Avail: NTIS HC A05/MF A01

A review of standard variance reduction methods for deep-penetration Monte Carlo calculations is presented. Comparisons and contrasts are made with methods for nonpenetration and reactor core problems. Difficulties and limitations of the Monte

Carlo method for deep-penetration calculations are discussed in terms of transport theory, statistical uncertainty and computing technology. Each aspect of a Monte Carlo code calculation is detailed, including the natural and biased forms of (1) the source description, (2) the transport process, (3) the collision process, and (4) the estimation process. General aspects of cross-section data use and geometry specification are also discussed. Adjoint calculations are examined in the context of both complete calculations and approximate calculations for use as importance functions for forward calculations. The idea of importance and the realization of the importance function are coverd in both general and mathematical terms. Various methods of adjoint importance generation and its implementation are covered, including the simultaneous generation of both forward and adjoint fluxes in one calculation. A review of the current literature on mathematical aspects of variance reduction and statistical uncertainty is given. Three widely used Monte Carlo codes MCNP, MORSE, and TRIPOLI - are compared and contrasted in connection with many of the specific items discussed throughout the presentation. DOE

N86-31314# Technische Hogeschool, Eindhoven (Netherlands). Onderafdel. der Wiskunde en Informatica.
ASYMPTOTIC DISTRIBUTIONS IN PARAMETERIZED FUNCTIONAL RELATIONS [ASYMPTOTISCHE VERDELINGEN IN GEPARAMETRISEERDE FUNCTIONELE RELATIES]
H. N. Linssen and L. T. M. E. Hillegers Jul. 1984 27 p In DUTCH
(Memo-COSOR-84-09; ESA-86-97311) Avail: NTIS HC A03/MF A01

For a large class of functional relations the asymptotics of the estimators were derived using Wilks' theory of estimate equations. A special case of the theory, the normality of perceptual errors, was treated. The error covariance matrix was parameterized, which made the asymptotics complex, with an asymptotic dependance upon the structural parameter and error parameter estimators. Simple identification conditions are given. A calculus for the differentiation of multivariate statistical matrix functions was developed. ESA

N86-31315# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
SOME CONTINUITY THEOREMS IN PROBABILITY
D. P. vanderVecht May 1984 40 p
(IR-257; ESA-86-97345) Avail: NTIS HC A03/MF A01

A sequence of means of images of random variables of a continuous function is considered. The fact that a sequence of random variables is weakly convergent when the sequence of means of images of random variables depending on a continuous function is also convergent, is proved. The properties of functions of bounded variation are used. ESA

N86-31275# Technische Hogeschool, Eindhoven (Netherlands).
ON THE COHERENCE AMONG THE MULTITUDE OF SYSTEM IDENTIFICATION METHODS
P. Eykhoff and A. J. W. vandenBoom *In its* System Identification. Mini Course Jul. 1984 p 3-24 Presented at 6th IFAC Symposium on Identification and System Parameter Estimation, Washington, 1982 (For primary document see N86-31274 22-64)
Avail: NTIS HC A03/MF A01

N86-31276# Technische Hogeschool, Eindhoven (Netherlands).
A GENERALIZED DIAGRAM FOR VARIOUS PARAMETER ESTIMATION METHODS; THE COHERENCE IN PSEUDO-LINEAR REGRESSION SCHEMES
P. Eykhoff and A. J. W. vandenBoom *In its* System Identification. Mini Course Jul. 1984 p 25-37 (For primary document see N86-31274 22-64)
Avail: NTIS HC A03/MF A01

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-31316*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TOWARDS AUTOMATIC MARKOV RELIABILITY MODELING OF COMPUTER ARCHITECTURES
Carlos A. Liceaga and Daniel P. Siewiorek (Carnegie-Mellon Univ., Pittsburgh, Pa.) Aug. 1986 67 p
(NASA-TM-89009; NAS 1.15:89009) Avail: NTIS HC A04/MF A01 CSCL 12B

The analysis and evaluation of reliability measures using time-varying Markov models is required for Processor-Memory-Switch (PMS) structures that have competing processes such as standby redundancy and repair, or renewal processes such as transient or intermittent faults. The task of generating these models is tedious and prone to human error due to the large number of states and transitions involved in any reasonable system. Therefore model formulation is a major analysis bottleneck, and model verification is a major validation problem. The general unfamiliarity of computer architects with Markov modeling techniques further increases the necessity of automating the model formulation. This paper presents an overview of the Automated Reliability Modeling (ARM) program, under development at NASA Langley Research Center. ARM will accept as input a description of the PMS interconnection graph, the behavior of the PMS components, the fault-tolerant strategies, and the operational requirements. The output of ARM will be the reliability of availability Markov model formulated for direct use by evaluation programs. The advantages of such an approach are (a) utility to a large class of users, not necessarily expert in reliability analysis, and (b) a lower probability of human error in the computation. Author

N86-31317# Alphatech, Inc., Burlington, Mass.
STUDIES IN MATHEMATICAL MODELS OF HUMAN DECISION-MAKING IN GAMING SITUATIONS Final Report, 1 Aug. 1984 - 31 Jan. 1986
David A. Castanon 6 Apr. 1986 155 p
(Contract N00014-84-C-0458)
(AD-A166698; TR-283) Avail: NTIS HC A08/MF A01 CSCL 05/10

This document studies two classes of mathematical models of dynamics multiperson decisionmaking which focus on the subjective nature of human decisionmaking. It develops extensions to game theory models which allow for differences in subjective perceptions of the decision problem among decisionmakers. Studies are the effects of these extensions on qualitative results available for two multiperson decisionmaking paradigms, one cooperative and one noncooperative, and characterize new classes of outcomes which become rational under our theory. The results provide a foundation for the development of a quantitative predictive theory of multiperson decisionmaking which incorporates the subjective properties of human decisionmaking behavior. GRA

N86-31318# Oak Ridge National Lab., Tenn.
DETERMINISTIC SENSITIVITY THEORY FOR NONLINEAR SYSTEMS: THE FORWARD AND THE ADJOINT METHOD
D. G. Cacuci 1986 80 p Presented at the ISPRA Course on Data Uncertainties, Sensitivities, Consistency and Adjustment, Ispra, Italy, 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009512; CONF-8604168-1) Avail: NTIS HC A05/MF A01

The main aspects underlying the rigorous mathematical formulation of deterministic sensitivity theory for nonlinear systems are presented; this formulation is based on the work by Cacuci and employs concepts and methods of nonlinear functional analysis. The functional analytic concepts underlying sensitivity theory are briefly reviewed in Section 2. The rigorous formulation of sensitivity theory for nonlinear systems is presented in Section 3. Section 3. A presents the sensitivity theory for nonlinear

systems with operator-type responses. Section III.B presents the development of the sensitivity theory for nonlinear systems with responses defined at critical points of a function of the system's state vector and parameters (maxima, minima, and saddle points). Section III.C presents sensitivity theory for nonlinear systems with feedback. Finally, Section IV summarizes and highlights the main points underlying deterministic sensitivity theory for nonlinear systems and discusses the potential of using functional analytic concepts to extend further the scope of this theory. DOE

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-31319# Wisconsin Univ., Milwaukee. Dept. of Mathematical Sciences.
SIEVES FOR GAUSSIAN PROCESSES Annual Report, 30 Sep. 1984 - 29 Sep. 1985
Jay H. Beder 27 Nov. 1985 6 p
(Grant AF-AFOSR-0329-84)
(AD-A166055; AFOSR-86-0069TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Several important properties of a proposed sieve estimator for the mean of a Gaussian process of known covariance have been established. The estimator is itself a Gaussian process; under a separability assumption, it is asymptotically unbiased and weakly consistent at each time t, and is strongly consistent (globally) in an appropriate norm. For a Gaussian process with zero mean and unknown covariance, it is shown that the likelihood for the covariance is in general unbounded almost surely. Moreover, properties of a proposed sieve estimator have been developed for the covariance analogous to those for the mean. No assumption is made about the nature of the time parameter t, either for the mean estimator or for the covariance estimator. Author (GRA)

N86-31320# University of Northern Illinois, De Kalb.
SEQUENTIAL AND PARALLEL MATRIX COMPUTATIONS Interim Report, 1 Sep. 1984 - 31 Aug. 1985
Biswa N. Datta Nov. 1985 6 p
(Grant AF-AFOSR-0334-83)
(AD-A166062; AFOSR-86-0067TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The major objectives of this project are to develop computational algorithms, both sequential and parallel, for several important linear algebra problems that arise in the design and analysis of linear control systems governed by the systems of ordinary differential equations. These include controllability problems, stability and inertia problems, pole assignment problems, matrix equations problems, relative primeness of polynomials and matrices and the cauchy-index problems of rational functions etc. Besides, a part of the project is devoted to the theoretical study of the parallel arithmetic complexity of these problems; that is, how fast these problems can be solved in parallel assuming that sufficiently many processors are available. Though some numerically viable sequential algorithms have been designed for some of these problems in recent years, parallel algorithms and algorithms for large scale problems are virtually non-existent. GRA

N86-31321# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
VARIATIONAL COUPLING BETWEEN Q-NUMBER AND C-NUMBER DYNAMICS [ACOPLAMENTO VARIACIONAL ENTRE DINAMICAS Q-NUMBER E DINAMICAS C-NUMBER]
C. M. do Amaral and S. Joffily 1984 18 p In PORTUGUESE
(DE86-700604; CBPF-NF-066/84) Avail: NTIS (US Sales Only) HC A02/MF A01

The time-dependent quantum variational principle is generalized for the case of Hamiltonian operators having real parameters and their time derivates. The obtained variational system is formed by a Schroedinger equation coupled to a Lagrange equation system. Where the lagrangian is the average value of the parametrized Hamiltonian operator. The consequent dynamics of the variational principle describes the interaction between a q-number sub-dynamics with a c-number sub-dynamics. In the (h/2(PI))(0)-order W.K.B. approximation, the variational system reduces to a Hamilton-Jacobi-like equation, coupled to a lagrange equation family. The formal features of the obtained variational system are appropriated for the description of, adiabatics and non-adiabatics, time-dependent q-number c-number interactions. DOE

N86-31322# Osaka City Univ. (Japan). Dept. of Physics.
FIELD THEORY OF STRINGS. EFFECTIVE ACTION FOR MASSLESS FIELDS
Keiji Kikkawa May 1985 13 p Presented at the International Symposium on Quantum Field Theory, Positano, Italy, May 1985
(DE86-900006; OU-HET-76) Avail: (US Sales Only) NTIS HC A02/MF A01

After giving a review for the field theory of string and the recent development in the superstring theory, the effective action for massless particles in the string theory is introduced. In the zero-slope limit the action is shown to reduce to the Einstein gravity theory with vanishing cosmological constant plus a massive dilaton term. DOE

N86-31323# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE HASSE-WITT MATRIX OF A FORMAL GROUP
H. A. W. M. Kneppers May 1984 24 p
(IR-238; ESA-86-97329) Avail: NTIS HC A02/MF A01

A lifting of the Hasse-Witt matrix (matrix of the semilinear Frodenius map) containing the structure constants of a formed group is considered. The fact that the classification up to isomorphism of smooth commutative formal groups is a matter of finding normal forms for Hasse-Witt matrix of formal groups is used. Preliminary reductions of formal groups of an algebraic curve of arbitrary dimension over an algebraically closed field are derived. The intrinsic definitions of the discrete isomorphism invariants are given. The fact that the covariant classification of two-dimensional smooth commutative formed groups using discrete isomorphism invariants is more transparent and needs less subcases than other techniques is proved. ESA

N86-31324# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A METHOD FOR CONSTRUCTING ORDERED CONTINUA
Klaas Pieter Hart and Jan vanMill Mar. 1984 25 p
(IR-240; ESA-86-97330) Avail: NTIS HC A02/MF A01

Compact, connected linear ordered topological spaces (ordered continuums) are considered. A general method for constructing ordered continua from families of subjets of the real interval of extremities 0 and 1 is given. An example of a continuum with the property that every uncountable subset contains an uncountable subset isomorphic to the subset of the real numbers system is given. ESA

N86-31325# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE HOPF ALGEBRA OF SYMMETRIC FUNCTIONS [DE HOPFALGEBRA VAN DE SYMMETRISCHE FUNCTIES]
E. J. Ditters May 1984 98 p In DUTCH
(IR-250; ISBN-90-71058-01-8; ESA-86-97339) Avail: NTIS HC A05/MF A01

The isomorphism theta between the Hopf algebra of symmetric funtions in the complex plane (C) and theta R(Sn) for n=0... infinite (R(Sn) is the ring of virtual complex representations of the symmetric group Sn) was studied to find the in-product on the last ring in C. Using Liulevicus, proofs applicable to other basic rings than just in the real plane are derived. Two canonical bilinear forms in C, one positively definite corresponding with the classical in-product, and the other indefinite, were constructed. Without using representations, the existence of an orthonormal base (Schur-functions) is found. Using Dieudonne, S-adic symmetric functions are defined. An S-adic Newton rule and a duality proposition for

the S-adic symmetric functions algebra are found. A representation of Grothendiecks lambda-ring is given, using Hilbert operators from the theory of commutative formal groups, valuable for rings without additive torsion, and satisfying mild mathematical conditions. ESA

N86-31326# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A SEPARABLE NORMAL TOPOLOGICAL GROUP WHICH IS NOT LINDELOEF
Klaas Pieter Hart and J. vanMill May 1984 17 p
(IR-252; ESA-86-97341) Avail: NTIS HC A02/MF A01
An example of a separable normal group which contains a closed subspace homeomorphic to an incountable regular cardinal, in Zermelo-Frankel Choice axiom (ZFC) is given. This is a negative answer to the question when a separable normal topological space is not Lindelof. A separable hereditary normal topological group without nice covering properties in ZFC is not shown. ESA

N86-31327# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
CONVEX HILBERT CUBES IN SUPEREXTENSIONS
M. vandeVel Mar. 1984 18 p
(IR-254; ESA-86-97342) Avail: NTIS HC A02/MF A01
It is proved that every nondegenerate compact convex subset of the superextension (all maximal linked families of closed subsets of a normal space Z) of a metric continuum is homeomorphic to the Hilben cube. The selection theorem for convex structures is used. Two related open problems are described. ESA

N86-31328# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
FUNCTION SPACES OF LOW BOREL COMPLEXITY
J. Dijkstra, T. Grilliot, D. Lutzer, and J. vanMill Jun. 1984 17 p
(IR-260; ESA-86-97346) Avail: NTIS HC A02/MF A01
The set C(x) of continuous real valued functions on a topological space X with the product topology on R sup X is considered. The fact that C(X) is dense in R sup X is proved. The fact that C(X) is dense in R sup x is equivalent to C(X) is completely Harsdurff, is also proved. ESA

N86-31329# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
INVARIANT ARCS, WHITNEY LEVELS, AND KELLEY CONTINUA
M. vandeVel Oct. 1984 41 p
(IR-268; ESA-86-97349) Avail: NTIS HC A03/MF A01
The convexity in spaces of arcs is considered. An arc is mapped back onto itself in spaces of arcs. It is shown that certain Whitney levels are absolute retracts. The Kelley continua is characterized by approximating coselections. ESA

N86-31330# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
A DOWKES GROUP
Klaas Pieter Hart and Jan vanMill Nov. 1984 13 p
(IR-269; ESA-86-97350) Avail: NTIS HC A02/MF A01
An example of a normal topological group whose product with the circle group is not normal is given. The group is constructed in Zermelo-Fraenkel choice only. ESA

N86-31331# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE AZEMA-YOR STOPPING TIME AND ULTIMATENESS
D. P. vanderVecht Jan. 1985 7 p
(IR-273; ESA-86-97351) Avail: NTIS HC A02/MF A01
The sequences of standard Brownian motion with stopping time standard are considered. A uniqueness-property for the stopping time of Azema-Yor's (1977) models (special standard stopping time T with respect to the class of Brownian motion standard stopping Times) is proved. ESA

N86-31332# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
ON THE PRODUCT OF HOMOGENEOUS SPACES
W. W. Comfort and Jan vanMill Jan. 1985 24 p
(IR-274; ESA-86-97352) Avail: NTIS HC A02/MF A01
The productive closure in the indetermediate class of homogeneous spaces is considered. The fact that in Zermelo-Fraenkel Choice there are pseudocompact, homogeneous spaces such that the product is not pseudocompact is proved. When the Martin Axiom is supposed the component spaces may be chosen countably compact. The results are a consequence of Uspenski's Theorem. The fact that every compact space can be embedded as a retract in a countably compact homogeneous space is also proved. The fact that for every cardinal number there exists a countably compact, homogeneous space whose Souslin numbers exceeds this cardinal number, is reported. ESA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-31333# Lawrence Livermore National Lab., Calif.
ENERGY AND TECHNOLOGY REVIEW, JUNE 1985
Gordon L. Struble, ed., Wallace E. Clements, ed., Lauren deVore, ed., Mary Ann Esser, ed., Eleanor M. ONeal, ed., and Palmer T. VanDyke, ed. Jun. 1985 43 p
(Contract W-7405-eng-48)
(DE85-014146; UCRL-52000-85-6) Avail: NTIS HC A03/MF A01
Topics covered in this issue include: short-wavelength laser, fractional quantum Hall effect, and quantum-mechanical simulation of liquids. Abstracts of individual items were prepared separately for the data base. DOE

N86-31334# JAYCOR, San Diego, Calif.
PRODUCTION OF ULTRAHIGH MAGNETIC FIELDS Technical Progress Report
25 Oct. 1985 75 p
(Contract DE-FG03-84ER-13302)
(DE86-006838; DOE/ER-13302/T1) Avail: NTIS HC A04/MF A01
A general method for producing controlled ultrahigh magnetic fields up to the order to 100 MG has been proposed recently. The general method involves imploding a plasma in which a magnetic field has been entrained. The imploding plasma compresses the magnetic field to high strengths. This paper reports the experimental test at the 1 to 2 MG level and high repetition rate of an embodiment of this method using a gas-puff Z pinch. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-31335*# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.
A STUDY OF METHODS TO PREDICT AND MEASURE THE TRANSMISSION OF SOUND THROUGH THE WALLS OF LIGHT AIRCRAFT Semiannual Status Report, 1 Oct. 1985 - 15 May 1986
R. J. Bernhard, J. S. Bolton, B. Gardner, J. Mickol, C. Mollo, and C. Bruer May 1986 35 p
(Grant NAG1-58)
(NASA-CR-177147; NAS 1.26:177147; PRF-520-1288-0353; Rept-0353-3; HL86-19) Avail: NTIS HC A03/MF A01 CSCL 20A
Progress was made in the following areas: development of a numerical/empirical noise source identification procedure using bondary element techniques; identification of structure-borne noise paths using structural intensity and finite element methods;

development of a design optimization numerical procedure to be used to study active noise control in three-dimensional geometries; measurement of dynamic properties of acoustical foams and incorporation of these properties in models governing three-dimensional wave propagation in foams; and structure-borne sound path identification by use of the Wigner distribution. Author

N86-31336*# Columbia Univ., New York. Dept. of Civil Engineering and Engineering Mechanics.
VIBRATION AND STRUCTUREBORNE NOISE IN SPACE STATION Progress Report, 1 Jan. - 30 Jun. 1986
Rimas Vaicaitis 1986 23 p
(Grant NAG1-541)
(NASA-CR-177146; NAS 1.26:177146) Avail: NTIS HC A02/MF A01 CSCL 20A

Analytical models and computer programs for structural response calculations under action of mechanical point loads were developed for single wall shells (composite or aluminum), double wall shells (composite or aluminum), and single wall or double wall circular plates (aluminum). The design configuration of the habitability modules of the space station concept are expected to be discretely stiffened cylindrical shells with truncated cone type end caps or flat but stiffened circular end plates. Analytical formulations and response calculations were performed for the case where the stiffened shell is represented by an orthotropic shell model. The natural frequencies can be calculated. For application to low frequency (below 1000Hz) vibrations and noise generation, such a model might be adequate to evaluate vibration and noise transmission characteristics of space station habitability modules. Parametric studies are now being performed to assess interior noise environment inside a habitability module to mechanically induced vibrations. B.G.

N86-31337*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTIC TREATMENT OF THE NASA LANGLEY 4- BY 7-METER TUNNEL: A FEASIBILITY STUDY
James C. Yu and A. Louis Abrahamson (Comtek, Grafton, Va.) Aug. 1986 38 p
(NASA-TP-2563; L-16037; NAS 1.60:2563) Avail: NTIS HC A03/MF A01 CSCL 20A

A feasibility study for upgrading the NASA Langley 4- by 7-Meter Tunnel so that it may be used for aeroacoustic research related to helicopters is described. The requirements for noise research leading to the design of the next generation of helicopters impose a set of acoustic test criteria that no existing wind tunnel in the United States can presently meet. Included in this feasibility study are the following considerations: (1) an evaluation of general wind-tunnel requirements and desired tunnel background noise levels for helicopter aeroacoustic research; (2) an assessment of the present acoustic environment for testing model rotors; (3) a diagnostic investigation of tunnel background noise sources and paths; (4) acoustic treatment options for tunnel background noise reduction and a trade-off study between these options; (5) an engineering feasibility assessment of the selected option; and (6) an integrated analysis of study components and recommendations of treatment for an approach to meet the tunnel background noise reduction goal. It is concluded that the Langley 4- by 7-Meter Tunnel is a fundamentally suitable facility for helicopter aeroacoustic research. It is also concluded that acoustic treatment of this facility for meeting the required tunnel background noise goal can be accomplished technically at reasonable risk and cost. M.G.

N86-31338*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ADVANCED TURBOPROP NOISE PREDICTION: DEVELOPMENT OF A CODE AT NASA LANGLEY BASED ON RECENT THEORETICAL RESULTS
F. Farassat, M. H. Dunn (PRC Kentron, Inc., Hampton, Va.), and S. L. Padula Jul. 1986 58 p Presented at the 9th AIAA Aeroacoustics Conference, Williamsburg, Va., Oct. 1984
(NASA-TM-88993; NAS 1.15:88993; AIAA-84-2303) Avail: NTIS HC A04/MF A01 CSCL 20A

The development of a high speed propeller noise prediction code at Langley Research Center is described. The code utilizes two recent acoustic formulations in the time domain for subsonic and supersonic sources. The structure and capabilities of the code are discussed. Grid size study for accuracy and speed of execution on a computer is also presented. The code is tested against an earlier Langley code. Considerable increase in accuracy and speed of execution are observed. Some examples of noise prediction of a high speed propeller for which acoustic test data are available are given. A brisk derivation of formulations used is given in an appendix. Author

N86-31339*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTUREBORNE NOISE IN AIRCRAFT: MODAL TESTS
Sherman A. Clevenson and Vern L. Metcalf Jul. 1986 36 p
(DA Proj. 1L1-61102-AH-45)
(NASA-TM-87739; NAS 1.15:87739; USAAVSCOM-TM-86-B-3) Avail: NTIS HC A03/MF A01 CSCL 20A

As part of an investigation to develop measurement techniques for structureborne noise, three modal surveys have been conducted on an OV-10A aircraft and the results have been presented. The purpose of the modal surveys was to identify suitable locations for mounting accelerometer and strain gages in subsequent tests in which transfer functions relating wing vibration to interior noise were to be determined. These surveys are as follows:(1) wing/fuselage modal survey utilizing one shaker under the right wing; (2) complete wing modal survey utilizing two shakers, one under each wing; and (3) fuselage side panel modal survey utilizing a small instrumented hammer. The predominant frequencies and damping ratios for each analysis were listed in tables. The primary mode shapes at the lower frequencies and at frequencies near the expected engine driving frequencies have been shown for each survey. Author

N86-31340*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACOUSTICS DIVISION RECENT ACCOMPLISHMENTS AND RESEARCH PLANS
Lorenzo R. Clark and Homer G. Morgan Jul. 1986 144 p
(NASA-TM-89012; NAS 1.15:89012) Avail: NTIS HC A07/MF A01 CSCL 20A

The research program currently being implemented by the Acoustics Division of NASA Langley Research Center is described. The scope, focus, and thrusts of the research are discussed and illustrated for each technical area by examples of recent technical accomplishments. Included is a list of publications for the last two calendar years. The organization, staff, and facilities are also briefly described. Author

N86-31341*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIRECTIVITY AND TRENDS OF NOISE GENERATED BY A PROPELLER IN A WAKE
P. J. W. Block and Carl L. Gentry, Jr. Sep. 1986 63 p
(NASA-TP-2609; L-16131; NAS 1.60:2609) Avail: NTIS HC A04/MF A01 CSCL 20A

An experimental study of the effects on far-field propeller noise of a pylon wake interaction was conducted with a scale model of a single-rotation propeller in a low-speed anechoic wind tunnel. A detailed mapping of the noise directivity was obtained at 10 test conditions covering a wide range of propeller power landings at several subsonic tip speeds. Two types of noise penalties were investigated-pulser and spacing. The pusher noise penalty is the difference in the average overall sound pressure level, OASPL, for pusher and tractor installations. (In a pusher installation, the propeller disk is downstream of a pylon or another aerodynamic surface.) The spacing noise penalty is the difference in the average OASPL for different distances between the pylon trailing edge and the propeller. The variations of these noise penalties with axial, or flyover, angle theta and circumferential angle phi are presented, and the trends in these noise penalties with tip Mach number and power loading are given for selected values of theta

and phi. The circumferential directivity of the noise from a pusher installation showed that the addition noise due to the interaction of the pylon wake with the propeller had a broad peak over a wide range of circumferential angles approximately perpendicular to the pylon with a sharp minimum 90 deg. to the pylon for the majority of cases tested. The variation of the pusher noise penalty with theta had a minimum occurring near the propeller plane and maximum values of as much as 20 dB occurring toward the propeller axes. The magnitude of the pusher noise penalty generally decreased as propeller tip Mach number or power loading was increased. Author

N86-31342# Systems Control Technology, Inc., Palo Alto, Calif.
TRACK PARAMETER EXTRACTION USING MULTIPATH DELAY AND DOPPLER INFORMATION Final Report
Khosrow Lashkari, Benjamin Friedlander, and Jonathan Abel Feb. 1986 195 p
(Contract N00014-84-C-0408)
(AD-A166044; Rept-5517) Avail: NTIS HC A09/MF A01 CSCL 17/1

The goal of the multipath project is to develop techniques to make use of the multipath reflections of acoustic signals travelling in the ocean to localize and track radiating sources. There have been two main areas of study under this contract. The first area concentrates on the detection and estimation of the multipath (or differential) delays in the received signals; the second is the development of localization and tracking algorithms. Previous work on the multipath project included the development of differential delay estimation algorithms as well as theoretical studies resulting in bounds on the variance of estimating multipath delay. Bounds were also placed on the accuracy of estimating various so-called track parameters -speed, depth, and range at closest approach of the target to the sensor array. Under the present contract, software was developed to estimate multipath delay using real or simulated data as input. Also under the present contract, tracking algorithms were developed. GRA

N86-31343# Texas Univ., Austin. Dept. of Mechanical Engineering.
PROBLEMS IN NONLINEAR ACOUSTICS: PARAMETRIC RECEIVING ARRAYS, FOCUSED FINITE AMPLITUDE SOUND AND DISPERSIVE NONLINEAR INTERACTIONS Annual Summary Report, 1 Sep. 1985 - 30 Apr. 1986
Mark F. Hamilton 30 Apr. 1986 23 p
(Contract N00014-85-K-0708)
(AD-A167311; ASR-1) Avail: NTIS HC A02/MF A01 CSCL 20/1

Contract N00014-85-K-0708 provides for basic research on nonlinear acoustics. The three projects currently supported by the contract are as follows: 1) Use of a Parametric Receiving Array to Measure Ship Noise; 2) Focused Finite Amplitude Sound; and 3) Dispersive Nonlinear Wave Interactions in a Duct. The first project is the primary research effort supported by the contract, and the investigation is predominantly theoretical. The second involves computational analysis, the third experimental. Each project is discussed separately in the following sections. GRA

N86-31344# Department of the Air Force, Washington, D.C.
DUCTLESS ACOUSTICAL NOISE ATTENUATOR Patent Application
Robert H. Eustace, inventor (to Air Force) Filed 12 Mar. 1986 14 p
(AD-D012288; US-Patent-Appl-SN-838850) Avail: NTIS HC A02/MF A01 CSCL 13/1

A ductless noise attenuator is disclosed which includes a supply fitting mounted between an air conditioning unit and a recipient. The supply fitting blocks line-of-sight soundwaves using triangular-shaped protrusions on the inlet and outlet edges of a housing, and diamond-shaped core which fits in the housing and has edges which extend to the space between the triangular-shaped edges of the inlet and outlet of the housing. The diamond-shaped core is composed of: two leading edges, which form a wedge with its point facing the housing inlet; and two trailing edges which is overlapped by the triangular protrusions of the housing. Finally, a return fitting conducts air back to the air conditioning unit while blocking line-of-sight soundwaves with a diagonal divider within a return housing. The design of the attenuator is intended to provide a mininum construction on the airflow from the air conditioning unit, with a maximum of sound attenuation at audible frequencies by blocking line-of-sight soundwaves. GRA

N86-31345# Department of Energy, Morgantown, W. Va.
SURFACE ACOUSTIC WAVE DUST-DEPOSITION SENSOR
G. E. Fasching and N. S. Smith Feb. 1986 16 p
(DE86-001068; DOE/METC-86-4059) Avail: NTIS HC A02/MF A01

Surface acoustic waves travel by interaction between the atoms near the surface of a solid, with the consequence that attenuation of these waves can be sensitive to dust accumulation on the surface across which they propagate. This report reviews the relevant acoustic theory and its application to the design of a system for evaluating the feasibility of using the attenuation of surface acoustic waves for monitoring surface dust-deposition rates. The monitoring system is described, and the results of preliminary experiments are given. The results indicate that multireflected surface acoustic waves are attenuated sufficiently by a specified, maximum dust-layer surface density of 3.10 x 10(5) mg/m(2) (200 mg/in(2)) and that this approach should be investigated further for application in high-temperature, corrosive-atmosphere, coal-conversion process applications. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-31346# Arizona Univ., Tucson. Dept. of Physics.
TIME-OF-FLIGHT SPECTROSCOPY OF IONIC AND METASTABLE FRAGMENTS FROM DISSOCIATING MOLECULES Final Technical Report, 15 Jun. 1980 - 14 Jun. 1985
Willis E. Lamb, Jr. and L. C. McIntyre, Jr. 14 Oct. 1985 40 p
(Grant AF-AFOSR-0218-80)
(AD-A166063; AFOSR-86-0071TR) Avail: NTIS HC A03/MF A01 CSCL 07/4

This research involved the dissociation of hydrogen-containing molecules by electron impact and the subsequent measurement of the velocity of proton or metastable hydrogen fragments using time-of-flight methods. The proton velocity distribution resulting from dissociation of the hydrogen halides resulted in information on excited states of the corresponding molecular ions with inner-shell electron holes. Another completed project involved the proton velocity distribution from electron bombardment of the triatomic molecules, water and hydrogen sulfide. A final experiment involved the detection, in coincidence, of proton and metastable hydrogen fragments from electron bombardment of hydrogen molecules. GRA

N86-31347# Hawaii Univ., Honolulu. Dept. of Physics and Astronomy.
DEVELOPMENT OF LOW-ENERGY X-RAY SPECTROGRAPH SYSTEM Final Technical Report, 1 Jun. 1983 - 31 May 1984
Burton L. Henke Dec. 1985 10 p
(Grant AF-AFOSR-0222-83)
(AD-A166195; AFOSR-86-0052TR) Avail: NTIS HC A02/MF A01 CSCL 20/8

The technical report describes the design and construction of a state of the art, large aperture focussing spectrograph of the Johann/Johannson geometry, specially developed for the low energy x ray region of 50-5000 eV. The spectrographic system includes (1) a four kilowatt, demountable low voltage x ray excitation source, (2) a three-position holder for samples which are closely coupled to the excitation source and with a variable take-off angle, (3) a stepping motor driven scanner which accomodates large aperture curved crystal analyzers, a 10 in. diameter focussing circle, and an automatically adjusted exit slit that provides a constant solid angle of measured radiation from the same sample area

and at the same time take off angle for all Bragg angles, (4) tunable gas flow, sub-atmospheric pressure counter, and finally (5) provisions for a rapid and easy interchange of thin window filter mounts for both the x ray source and for the counter. A small computer has been specially interfaced to provide scan control, data acquisition and presentation, and preliminary data analysis. It is connected to a large computer for programmed resolution enhancement, de-convolution and the determination of absolute radiative yields from the experimental, overlapping atomic or molecular orbital spectral components. GRA

N86-31348# SRI International Corp., Menlo Park, Calif. Physical Sciences Div.
STUDIES OF HIGHLY EXCITED ATOMS Final Report
Ravinder Kachru 2 Apr. 1986 72 p
(Contract N00014-79-C-0202)
(AD-A166838; AD-E950814) Avail: NTIS HC A04/MF A01 CSCL 17/5

Rydberg states of atoms have intrinsic properties that should allow their use as highly sensitive and tunable detectors at far infrared wavelengths. The intrinsic limit of such atomic detectors are collisional processes. This report describes the results of a research program to better understand an important class of collisions--namely, the resonant collision of two Rydberg atoms. We have extensively measured the linewidths and the collision cross sections and have determined their dependence on parameters such as the principal quantum number and the Rydberg state angular momentum. The resonant collisions are shown to occur for a wide variety of initial states with cross sections of the order of 10 to the 9th power square-Angstroms and scaling as (n*O to the 4th order). GRA

N86-31349# Los Alamos National Lab., N. Mex.
EXPERIMENT TO MEASURE THE GRAVITATIONAL FORCE ON THE ANTIPROTON
Ronald E. Brown 1985 16 p Presented at the Workshop on the Design of A Low Energy Antimatter Facility, Madison, Wis., 3-5 Oct. 1985
(Contract W-7405-eng-36)
(DE86-008725; LA-UR-86-820; CONF-8510263-2) Avail: NTIS HC A02/MF A01

A collaboration has been formed to measure the acceleration of antiprotons in the earth's gravitational field. The technique is to produce, decelerate, and trap quantities of antiprotons, to cool them to untralow energy, and to measure their acceleration in a time-of-flight experiment. Present plans and the results of initial efforts toward this end are presented. DOE

N86-31350# Max-Planck-Inst. fuer Physik und Astrophysik, Munich (West Germany). Werner-Heisenberg-Inst. fuer Physik.
[ACTIVITIES OF THE WERNER-HEISENBERG INSTITUTE OF PHYSICS] Annual Report, 1985
Jan. 1986 173 p In GERMAN
(ISSN-0173-6256; ESA-86-97430) Avail: NTIS HC A08/MF A01

The Experimental Division A performed experiments at CERN, on the Teratron accelerator of the Fermilab and on the electron-positron storage ring PETRA using the CELLO-detector; experiments on the electron-proton storage ring HERA and preliminary investigations of a possible double-beta-decay experiment were conducted; electronic devices, and data processing and evaluation systems were developed. The Experimental Division B made investigations of charm particles in hadronic interaction, and phenomenological studies; the ALEPH project is prepared for the electron-position storage ring LEP; silicon detectors, integrated electronics, and calorimeters were developed. The organization of the technical division and its tasks for current and planned experiments are described. The research work of the theoretical division (renormalization, grid calibration, elementary particles, standard model, cosmology, neutrino detector, quantum mechanics, nonlinear multiparticle physics) is summarized. ESA

N86-31351# Stockholm Univ. (Sweden). Inst. of Physics.
INDUCED HIGGS COUPLINGS TO NEUTRAL BOSONS IN E+E- COLLISIONS
L. Bergstroem and G. Hulth Feb. 1985 30 p Sponsored by Swedish Natural Science Research Council
(USIP-85-08; ESA-86-97228) Avail: NTIS HC A03/MF A01

Induced couplings of the type HVgamma in the standard model, where H is a Higgs meson and V is a virtual or real neutral gauge boson are calculated. Applications for e+e- collisions and Higgs meson decays are given. The calculated rates are too low to make these processes an attractive way to search for the Higgs boson. However, once it is found, it is argued that these processes should be studied experimentally since the induced couplings probe the structure of the gauge theory in an interesting way. It may be possible to infer the existence of one or more heavy fermion generations by observing their virtual effects in radiative decays into Higgs particles. The related coupling HVgamma with V a heavy quarkonium vector state is mentioned. ESA

N86-31352# Stockholm Univ. (Sweden). Inst. of Physics.
IDENTIFICATION OF NEUTRAL HIGGS BOSONS IN THE DELPHI DETECTOR AT LEP
P. O. Hulth and K. Hultquist Mar. 1985 26 p
(USIP-85-09; ESA-86-97229) Avail: NTIS HC A03/MF A01

A Monte Carlo study was performed to investigate the possibilites of observing and identifying a neutral Higgs boson H(0) in the DELPHI detector using the reaction e+e- yields Z(0) yields l(+) l(-) where l(+) and l(-) are leptons. Methods for identifying the H by its decay characteristics as predicted by the Lund Monte Carlo were considered. The most promising methods for identifying the H through its decay are the sphericity of the decay products in the H rest system and the number of leptons in the H decay. These methods require an integrated luminosity in the region 20 to 300 p/b, depending on the H mass, for a 3 sigma separation between H decay and the decay of a particle with equal couplings to all quarks. ESA

N86-31353# Stockholm Univ. (Sweden). Inst. of Physics.
FEYNMAN DIAGRAMS AS FUNCTIONS OF QUARK MASS MATRICES, CP-VIOLATION, ELECTRIC DIPOLE MOMENTS AND THETA-PARAMETER OF QCD
C. Jarlskog Nov. 1985 17 p Sponsored by Swedish Natural Science Research Council
(USIP-85-22; ESA-86-97230) Avail: NTIS HC A02/MF A01

Feynman diagrams of the Standard Electroweak Model are written as functions of the quark mass matrices, and their CP properties are emphasized. The formalism is applied to the problem of the electric dipole moment of the quark. The connection between the determinant of the commutator of mass matrices and the renormalization of the theta-parameter of QCD is discussed. ESA

N86-31354# Stockholm Univ. (Sweden). Inst. of Physics.
THE F MESON
K. E. Johansson Jan. 1986 31 p
(USIP-86-01; ESA-86-97231) Avail: NTIS HC A03/MF A01

The experimental status of the F meson is reviewed. As its measurements are exceptionally difficult, mainly because of the complex ambiguity problems and the small F cross section, the results are not always very significant, and can be contradictory. Measurement of the F mass results in very different values, varying from 2040 to (1971 +or- 5) MeV/sqcm. The lifetime is not very precisely determined, but is estimated at (1 to 4) x 10 to the minus 13th power sec. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-31355# Los Alamos National Lab., N. Mex.
NUMERICAL PREDICTIONS OF RAILGUN PERFORMANCE

INCLUDING THE EFFECTS OF ABLATION AND ARC DRAG
N. M. Schnurr, J. F. Kerrisk, and J. V. Parker 1986 7 p Presented at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20-24 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008718; LA-UR-86-861; CONF-8604147-1) Avail: NTIS HC A02/MF A01

Thermal radiation from plasma armatures in railguns may cause vaporization and partial ionization of the rail and insulator materials. This causes an increase in mass of the arc, which has an adverse effect on projectile velocity. Viscous drag on the arc also has a deleterious effect, particularly at high velocities. These loss mechanisms are modeled in the Los Alamos Railgun Estimator code. Simulations were performed and numerical results were compared with experimental data for a wide range of tests performed at the Los Alamos and Lawrence Livermore National Laboratories, the Ling Temco Vought Aerospace and Defense Company, and the Center for Electromechanics at the University of Texas at Austin. The effects of ablation and arc drag on railgun performance are discussed. Parametric studies illustrate the effects of some design parameters on projectile velocity and launcher efficiency. Some strategies for reducing the effects of ablation are proposed. DOE

N86-31356# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
EXPERIMENTAL AND THEORETICAL HIGH ENERGY PHYSICS Progress Report, 1 Jan. 1985 - 31 Dec. 1985
1986 30 p
(Contract DE-AC02-83ER-40105)
(DE86-009052; DOE/ER-40105/512) Avail: NTIS HC A03/MF A01

Progress is reported in these theoretical areas: duality in quantum chromodynamics; KNO scaling and violations at high energies; covariant confinement equation with screening; cosmic ray antiprotons produced by a heavy galactic halo of stable photinos; W boson pair production in supersymmetry; hadronic interactions at very high energies; field theory in curved space; string theory; high-temperature transition from weak to strong coupling in QCD and in grand unified models; and strong coupling phase transitions in supersymmetric grand unified models. Experimental high energy physics activities include: testing of grand unified and supersymmetric models of the fundamental interactions through a search for proton decay and other rare phenomena; study of quantum chromodynamics in high energy, large angle hadronic interactions; study of weak interactions with emphasis on CP violation in neutral kaon decay; and a search for fractionally charged particles. The foremost accomplishment is reported to be the apparent discovery of underground, high-energy radiation related to the X-ray binary Cygnus X-3. DOE

74 OPTICS

Includes light phenomena.

N86-31357*# Nevada Univ., Reno. Engineering Research and Development Center.
AERODYNAMICS OF SEEING ON LARGE TRANSPORT AIRCRAFT Progress Report, 1 Dec. 1985 - 31 May 1986
William C. Rose 31 May 1986 102 p
(Contract NCC2-382)
(NASA-CR-177035; NAS 1.26:177033) Avail: NTIS HC A06/MF A01 CSCL 20F

Data were obtained in the full scale flight environment of the Kuiper Airborne Observatory (KAO) on the nature of turbulent shear layer over the open cavity. These data were used to verify proposed aerodynamic scaling relationships to describe the behavior of the turbulent layers and to estimate the optical performance of systems of various wavelengths operating within the KAO environment. These data and wind tunnel data are used to scale the expected optical effects for a potential stratospheric observatory for infrared astronomy (SOFIA) in which a telescope approximately 3.5 times larger than that on the KAO is envisioned. It appears that the use of combinations of active and passive aeromechanical flow control techniques can improve the optical behavior of systems in the SOFIA environment. Experiments to verify these potential improvements can be performed on the KAO with sufficient modifications to the cavity and aero-mechanical technique installations. Author

N86-31358*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
DEVELOPMENT OF HIGH THROUGHPUT X-RAY TELESCOPES FOR X-RAY IMAGING AND DISPERSIVE SPECTROMETERS Semiannual Report, 1 Jul. 1985 - 30 Jun. 1986
Paul Gorenstein Aug. 1986 20 p
(Grant NsG-5138)
(NASA-CR-177074; NAS 1.26:177074; SAR-18; SAR-19) Avail: NTIS HC A02/MF A01 CSCL 20F

During the past year the technical approach to the realization of a high throughput Kirkpatrick-Baez X-ray mirror became better defined in terms of construction methodology and factors which affect maximum size. More progress was made than anticipated in the area of automatic figure formation. However, effort to improve the resolution of float glass by simple techniques were not successful. Mirror development, spectroscopy, all sky telescope, and explorer concept studies are discussed. B.G.

N86-31359# Dayton Univ., Ohio. Research Inst.
TECHNIQUES FOR OPTICAL INTERFERANEMOGRAPHY Final Report, 15 Sep. 1983 - 16 Jun. 1985
A. J. Lightman and S. Cartwright Dec. 1985 120 p
(Contract F33615-83-C-3020)
(AD-A165950; UDR-TR-85-101; AFWAL-TR-85-3098) Avail: NTIS HC A06/MF A01 CSCL 20/6

The suitability of available anemometry and interferometry systems for forming an optical interfranemography system has been evaluated. It was determined that a three-dimensional laser Doppler interferometer (LDA) should be able to provide the spatial and velocity resolution required. All standard interferometric systems measure the integrated index variation along the line of sight. Consequently, they do not provide spatial resolution and are only adequate in systems that are symmetric along the line of sight. If spatial resolution is required, a tomographic system can be used but the optical access required exceeds that commonly available in wind tunnels. To overcome these shortcomings a new interferometric technique was searched for. It was found that the Lau interferometer could be modified so that measurements were made in a restricted volume. The interferometer that was assembled and tested operated in a shearing mode. The system used a white light source, yielding a bright image, and the system is able to withstand severe vibrations without degrading the signal. The Lau interfereometer has been examined in detail and the theory of operation is presented. GRA

N86-31360# Science Applications International Corp., Tucson, Ariz.
ELECTRO-OPTICAL DEVELOPMENT SYSTEM Final Report, 16 Apr. 1984 - 30 Sep. 1985
Devon G. Crowe 27 Sep. 1985 51 p
(Contract DAAK70-84-C-0034)
(AD-A166546) Avail: NTIS HC A04/MF A01 CSCL 20/6

This final report describes the successful delivery of all required items under the contract, as well as additional work not originally anticipated at the time the proposal was written. The original statement of work called for the development of an integrated system utilizing micro-channel plate (MCP) image intensification of a solid-state detector array with C-mount interface to a small diameter cystoscope. Five complete PAIR (Portal Aperture Image Refocusing) units were built and delivered. This task required devising a sophisticated optical design utilizing nine optical

elements, in addition to a unique mechanical housing and coupling mechanism. GRA

N86-31361# Florida Univ., Gainesville. Dept. of Nuclear Engineering Sciences.
MULTIAPERTURE OPTICS Final Report, 15 Sep. 1984 - 14 Jan. 1986
Richard T. Schneider 1 Mar. 1986 81 p
(Grant AF-AFOSR-0304-84)
(AD-A167060; AFOSR-86-0233TR) Avail: NTIS HC A05/MF A01 CSCL 20/6

The basic principles of Multiaperture Optics are discussed. Based on the results generated under this program, certain applications for multiaperture optics were identified. The main features of an optical instrument based on the multiaperature principle are, that such a sensor will necessarily have to be small, and need to be a mass product. Large scale integration would have to be used to evaluate data collected and perform pattern recognition. It is a necessity to perform these functions in the sensor itself, using parallel input into the circuitry and experimental device has been built and tested. It is capable of recognizing simple shapes. The development of optical instruments, at least the photographic camera, was undoubtedly inspired by the then existing knowledge of the anatomy of the human eye. Therefore it is probably appropriate to try this approach again for the development of a new type of optical instrument based on the design of the insect eye. A brief description is given of the anatomy of the insect eye and an instrument is designed using similar components. GRA

N86-31362# Texas Technological Univ., Lubbock. Systems Lab.
SPACE-VARIANT OPTICAL SYSTEMS Annual Report, 30 Sep. 1984 - 30 Nov. 1985
John F. Walkup and Thomas F. Krile Jan. 1986 19 p
(Grant AF-AFOSR-0382-84)
(AD-A167275; AFOSR-86-0232TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

Both analytical and experimental investigations of 1-D and 2-D coherent and incoherent space-variant optical processors have been conducted. The investigations included: (1) investigation of an improved measure of the degree of invariance of a linear system and its applications to piecewise isoplanatic space-variant systems; (2) a process for generalized linear filtering of 1-D signals; (3) investigation of a very fast architecture for performing optical multiplication of binary numbers and (4) techniques for both linear and nonlinear space-variant processing based on the bilinear transform. GRA

N86-31363# Los Alamos National Lab., N. Mex.
FRESNEL DIFFRACTION IN AN OPTICAL SYSTEM WITH FOCUSING
R. G. Wenzel 1985 5 p Presented at the 8th International Conference on Lasers, Las Vegas, Nev., 2 Dec. 1985
(Contract W-7405-eng-36)
(DE86-006044; LA-UR-86-400; CONF-851208-2) Avail: NTIS HC A02/MF A01

The migration of the axial intensity maximum from the geometrical focus toward the diffracting aperture, known as the focal shift, is explained in terms of the asymmetry of the Fresnel diffraction about focus. Conditions for the reversal or elimination of the focal shift are predicted. DOE

N86-31364# Army Armament Research and Development Command, Dover, N. J.
EFFECTS OF SURFACE MICROROUGHNESS IN ELLIPSOMETRY
E. L. Church and J. M. Zavada Dec. 1985 30 p Presented at the Workshop on Optical Fabrication and Testing, Tucson, Ariz., 18-22 Oct. 1976 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE86-008014; BNL-37051; CONF-761041-3; CONF-750993-4) Avail: NTIS HC A03/MF A01

We calculate the effects of surface roughness on the ellipsometric angles using plans-wave Rayleigh-Rice vector scattering theory. In the perturbation limit, these effects can be written in terms of weighted intergals over the power spectral density of the surface roughness. We present results in this limit for surfaces with arbitrary optical index and arbitrary two-dimensional roughness distributions, and then illustrate and assess them by considering four distinct limits: (1) deterministic roughness in the form of periodic corrugations; (2) statistical roughness with large transverse correlation lengths relative to the incident wavelength; (3) statistical roughness with small transverse correlation lenghts; and (4) highly reflecting surface materials. DOE

N86-31365# California Univ., Berkeley. Lawrence Berkeley Lab.
BASIC CONSIDERATIONS ON SURFACE OPTICAL NONLINEARITIES
P. Guyot-Sionnest, W. Chen, and Y. R. Shen Jan. 1986 3 p Presented at the 8th International Conference on Lasers, Las Vegas, Nev. 2-6 Dec. 1985
(Contract DE-AC03-76SF-00098)
(DE86-008378; LBL-20065; CONF-851208-4) Avail: NTIS HC A02/MF A01

The origins of the surface nonlinearity in surface second harmonic generation are discussed. It is shown that this second-order nonlinear optical process is characterized by a surface nonlinear susceptibility tensor containing both local and nonlocal contributions. DOE

N86-31366# Los Alamos National Lab., N. Mex.
GLOBAL COORDINATES AND EXACT ABERRATION CALCULATIONS APPLIED TO PHYSICAL OPTICS MODELING OF COMPLEX OPTICAL SYSTEMS
G. Lawrence, C. Barnard, and V. K. Viswanathan 1986 8 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. - 4 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008751; LA-UR-86-1027; CONF-860366-3) Avail: NTIS HC A02/MF A01

Historically, wave optics computer codes have been paraxial in nature. Folded systems could be modeled by unfolding the optical system. Calculation of optical aberrations is, in general, left for the analyst to do with off-line codes. While such paraxial codes were adequate for the simpler systems being studied 10 years ago, current problems such as phased arrays, ring resonators, coupled resonators, and grazing incidents optics require a major advance in analytical capability. This paper describes extension of the physical optics codes GLAD and GLAD V to include a global coordinate system and exact ray aberration calculations. The global coordinate system allows components to be positioned and rotated arbitrarily. Exact aberrations are calculated for components in aligned or misaligned configurations by using ray tracing to compute optical path differences and diffraction propagation. Optical path lengths between components and beam rotations in complex mirror systems are calculated accurately so that coherent interactions in phased arrays and coupled devices may be treated correctly. DOE

N86-31367# National Bureau of Standards, Boulder, Colo.
PROGRESS IN THE DESIGN OF OPTICAL FIBER SENSORS FOR THE MEASUREMENT OF PULSED ELECTRIC CURRENTS
G. W. Day, L. R. Veeser, G. I. Chandler, and R. W. Cernosek 1986 13 p Presented at the Conference on Measurement of Electrical Quantities in Pulse Power Systems-2. Gaithersburg, Md. 5 Apr. 1986 Prepared in cooperation with Los Alamos National Lab, N. Mex. and Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-007831; SAND-86-0498C; CONF-860384-6) Avail: NTIS HC A02/MF A01

The state of the art in the design of fiber sensors for pulsed electric currents is reviewed. Some of the more useful configurations are described and compared. Transfer functions are computed and used to illustrate the effect of linear birefringence and twisting on the characteristics of the sensors. The technique of annealing bend-induced birefringence is described and its present capabilities

indicated. An analysis of the ultimate limits to noise equivalent current is given, indicating that several orders of magnitude improvement should be obtainable. DOE

N86-31368# California Univ., Berkeley. Lawrence Berkeley Lab.
MULTILAYER REFLECTORS FOR THE EXTREME ULTRAVIOLET SPECTRAL REGION
J. B. Kortright Aug. 1985 17 p Presented at the 2nd International Synchrotron Radiation Instrumentation Conference, Standford, Calif., 29 Jul. 1985
(Contract DE-AC03-76SF-00098)
(DE86-008374; LBL-20135; CONF-850734-23) Avail: NTIS HC A02/MF A01

Reflectivity data from Al-Nb multilayers in the 300 to 450 A wavelength range at angles 20 to 50 deg from normal incidence are presented. Constructive interference between the 10 layer-pairs of this structure is observed. Multilayers deposited on a super-polished optical flat had a much higher reflectivity than those deposited on Si (111) wafers. Annealing multilayers on Si at 330(0)C for 3 hr further reduced their reflectivity. Measured peak reflectivities for the multilayer on the super-polished optical flat are 17% and less depending on the angle of incidence. The measured reflectivity is not more than half of that calculated using a model assuming sharp interfaces between elemental materials. The resolution of this device, lambda/(DELTA)lambda approx. = 6 to 7, is in good agreement with the calculated values. DOE

N86-31369# Kiruna Geophysical Inst. (Sweden).
EVIDENCE FOR A NEW INTENSITY FORMULA FROM STANDARD TABLES OF SPECTRAL LINE INTENSITIES
Bo Thelin and Sten Yngstroem Oct. 1985 9 p
(KGI-Preprint-085; ISSN-0349-2656; ESA-86-97224) Avail: NTIS HC A02/MF A01

It is shown that a formula for the intensity of optical emission lines is in very good agreement with experimental results reported in standard tables of spectral data. It is emphasized that the formula is consistent with main features of the spectrum of the Sun. The formula is: I(h nu) = C(h nu) x exp(-J/kT)/(exp(h nu/Kt)-1) where nu is the frequency of the atomic spectral line, J is the ionization energy of the atom, and C(h nu) is a product of factors given by the experimental design (apparatus and sample properties), and the transition probability rate of the atom in the sample. ESA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-31370# Nagoya Univ. (Japan).
ANNUAL REVIEW: APRIL 1984 - MARCH 1985
K. Adati, ed., H. Amano, ed., J. Fujita, ed., M. Fujiwara, ed., Y. H. Ichikawa, ed., T. Kawamura, ed., H. Obayashi, ed., M. Otsuka, ed., and Y. Tomita, ed. Mar. 1985 229 p
(ISSN-0547-1567) Avail: NTIS HC A11/MF A01

Topics addressed include: design study of an R-device tokamak; research activities; radio frequency containment; high energy beam experiment; bumpy torus; high beta pinch plasmas; laser produced plasmas; inertial confinement fusion; atomic processes; theory and computation; and plasma diagnositics. A list of publications is given. B.G.

N86-31371# Georgia Inst. of Tech., Atlanta. School of Physics.
RECOMBINATION AND REACTIONS IN DENSE IONIZED GASES
Final Report, 1 Jan. 1980 - 30 Jun. 1984
M. R. Flannery 10 Dec. 1985 26 p
(Grant AF-AFOSR-0055-80)
(AD-A166190; GIT-85-004; AFOSR-86-0082TR) Avail: NTIS HC A03/MF A01 CSCL 20/9

A list of publications of the research performed during the period 1/1/80-6/30/84 is provided. Theoretical research has been conducted a) on ion-ion recombination in high pressure plasmas, b) on the theory of Rydberg collisions with electrons, ions and neutrals, and c) on the theory of ion-molecule collisions at (1 eV-5 keV)/AMU. Papers in these topics (a)-(c) have been written up and published as papers already submitted to AFOSR. In particular, a new and basic theory of ion-ion recombination in a dense gas has been developed from basic microscopic principles. The recombination rate is provided as a function of gas density and time. The theory has been published in papers already submitted to AFOSR. Appendix A of this report contains the published chapter on Theory of Ion-Molecule collisions at (1 eV-50 keV)/AMU. GRA

N86-31372# Los Alamos National Lab., N. Mex.
REVERSED FIELD PINCH: PRESENT STATUS TO FUTURE POTENTIAL
J. M. DiMarco 1986 17 p Presented at the 13th Annual Energy Technology Conference and Exposition (ET '86), Washington, D.C., 17 Mar. 1986
(Contract W-7405-eng-36)
(DE86-006026; LA-UR-86-221; CONF-860303-3) Avail: NTIS HC A02/MF A01

This paper is divided into four sections. The first deals with the potential of the Reversed-Field pinch as cost effective reactor. The second gives the status of the experimental data base. The third section is a summary of cost optimized design. The fourth section is a proposal for a development path to fusion reactor prototypes. DOE

N86-31373# Los Alamos National Lab., N. Mex.
ZT-P: AN ADVANCED AIR CORE REVERSED FIELD PINCH PROTOTYPE
Kurt F. Schoenberg, C. J. Buchenauer, L. C. Burkhardt, L. D. Caudill, R. S. Dike, T. Dominguez, J. N. Downing, P. R. Forman, J. A. Garcia, A. J. Giger et al Jan. 1986 67 p
(Contract W-7405-eng-36)
(DE86-007204; LA-10593-MS) Avail: NTIS HC A04/MF A01

The ZT-P experiment, with a major radius of 0.45 m and a minor radius of 0.07 m, was designed to prototype the next generation of reversed field pinch (RFP) machines at Los Alamos. ZT-P utilizes an air-core poloidal field system, with precisely wound and positioned rigid copper coils, to drive the plasma current and provide plasma equilibrium with intrinsically low magnetic field errors. ZT-P's compact configuration is adaptable to test various first wall and limiter designs at reactor-relevant current densities in the range of 5 to 20 MA/m(2). In addition, the load assembly design allows for the installation of toroidal field divertors. Design of ZT-P began in October 1983, and assembly was completed in October 1984. This report describes the magnetic, electrical, mechanical, vacuum, diagnostic, data acquisition, and control aspects of the machine design. In addition, preliminary data from initial ZT-P operation are presented. Because of ZT-P's prototypical function, many of its design aspects and experimental results are directly applicable to the design of a next generation RFP. DOE

N86-31374# Science Applications International Corp., Boulder, Colo. Plasma Research Inst.
STABILIZATION OF MAGNETOHYDRODYNAMIC MODES BY APPLIED RADIOFREQUENCY WAVES
D. A. DIppolito and J. R. Myra Jan. 1986 47 p
(Contract DE-AC03-76ET-53057)
(DE86-008564; SAIC-85/1922; PRI-94) Avail: NTIS HC A03/MF A01

A kinetic theory describing the nonlinear interaction of radiofrequency waves with low frequency magnetohydrodynamic modes is presented. The calculation of the nonlinear force density on a fluid element includes both ponderomotive and sideband mode coupling terms and allows arbitrary rf wave polarization. Electromagnetic effects and wave-particle interactions are retained in the analysis. The influence of the nonlinear force on magnetohydrodynamic plasma stability is calculated self-consistently, and a generalized low mode number ballooning equation is obtained for paraxial magnetic mirror geometry. The low frequency stability problem is thereby shown to involve the coupling of four waves

and the system of governing equations is presented. Specialized limits of the general equations are discussed, and a physical interpretation of rf stabilization is given. It is shown that stability is enhanced by placing the antenna and conducting cavity walls close to the plasma surface. DOE

N86-31375# International Centre for Theoretical Physics, Trieste (Italy).
STABILITIES OF MHD ROTATIONAL DISCONTINUITIES
S. Wang Nov. 1984 9 p
(DE85-703231; IC-84/216) Avail: NTIS (US Sales Only) HC A02/MF A01

The stabilities of MHD rotational discontinuities are analyzed. The results show that the rotational discontinuities in an incompressible magnetofluid are not always stable with respect to infinitesimal perturbation. The instability condition in a special case is obtained. DOE

N86-31435*# Rice Univ., Houston, Tex. Dept. of Mechanical Engineering and Materials Science.
LASER TECHNIQUES FOR ARC JET PLASMA DIAGNOSTICS; CONTINUATION OF A FEASIBILITY AND DESIGN STUDY
F. A. Wierum *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 33 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20I

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-31376 British Library Lending Div., Boston Spa (England).
ATOMISTIC STUDY OF STACKING FAULTS IN ORDERED Ni SUB 3 Fe PHASE
M. D. Starostenkov, B. F. Demyanov, and N. V. Gorlov 1985 9 p Transl. into ENGLISH from Izvestiya VUZ Chernaya Metallurgiya (USSR), no. 10, 1985 p 74-78
(BLL-M-36717-(5828.4)) Avail: British Library Lending Div., Boston Spa, England

The variational method was used to determine the atomic configuration of a superstructural stacking fault occurring in ordered Ni3Fe phase during a/3 shear in direction <112> of one part of a crystal in relation to the other along a closely packed /111/-type plane. Calculations were conducted in approximation of the Morse potential. Author

N86-31377*# Stanford Univ., Calif. Dept. of Materials Science and Engineering.
COMPUTER SIMULATION OF SURFACE AND FILM PROCESSES Final Report, 1 May 1981 - 30 Apr. 1984
W. A. Tiller and M. T. Halicioglu 1 Nov. 1984 75 p
(Contract NCC2-125)
(NASA-CR-176966; NAS 1.26:176966; SU-DMS-85-R-1) Avail: NTIS HC A04/MF A01 CSCL 20L

All the investigations which were performed employed in one way or another a computer simulation technique based on atomistic level considerations. In general, three types of simulation methods were used for modeling systems with discrete particles that interact via well defined potential functions: molecular dynamics (a general method for solving the classical equations of motion of a model system); Monte Carlo (the use of Markov chain ensemble averaging technique to model equilibrium properties of a system); and molecular statics (provides properties of a system at T = 0 K). The effects of three-body forces on the vibrational frequencies of triatomic cluster were investigated. The multilayer relaxation phenomena for low index planes of an fcc crystal was analyzed also as a function of the three-body interactions. Various surface properties for Si and SiC system were calculated. Results obtained from static simulation calculations for slip formation were presented. The more elaborate molecular dynamics calculations on the propagation of cracks in two-dimensional systems were outlined. B.G.

N86-31378*# Wisconsin Univ., Madison. Applied Superconductivity Center.
THERMAL AND ELECTRICAL CONTACT CONDUCTANCE STUDIES Final Report, 1 Jun. 1983 - 31 Aug. 1985
S. W. VanSciver and M. Nilles 1985 146 p
(Grant NAG2-242)
(NASA-CR-177093; NAS 1.26:177093) Avail: NTIS HC A07/MF A01 CSCL 20L

Prediction of electrical and thermal contact resistance for pressed, nominally flat contacts is complicated by the large number of variables which influence contact formation. This is reflected in experimental results as a wide variation in contact resistances, spanning up to six orders of magnitude. A series of experiments were performed to observe the effects of oxidation and surface roughness on contact resistance. Electrical contact resistance and thermal contact conductance from 4 to 290 K on OFHC Cu contacts are reported. Electrical contact resistance was measured with a 4-wire DC technique. Thermal contact conductance was determined by steady-state longitudinal heat flow. Corrections for the bulk contribution ot the overall measured resistance were made, with the remaining resistance due solely to the presence of the contact. Author

N86-31379# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.
REACTIONS OF LASER-GENERATED FREE RADICALS AT SEMICONDUCTOR SURFACES Final Report, 1 Oct. 1982 - 30 Sep. 1985
Jeffrey I. Steinfeld 25 Nov. 1985 7 p
(Grant AF-AFOSR-0007-83)
(AD-A166233; AFOSR-86-0103) Avail: NTIS HC A02/MF A01 CSCL 07/4

Reactions of laser-generated free radicals at semiconductor surfaces have been investigated by photoelectron spectroscopy of adsorbed surface layers and by laser induced fluorescence detection of the gas-phase species. Systems investigated include dissociative chemisorption of XeF2 and CF3 on Si(111), IR multiple photon dissociation of alkylsilanes and characterization of SiH2. Theoretical calculations of spectroscopic, structural, and thermodynamic properties of reactive free radical intermediates have also been undertaken. GRA

N86-31380# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A NEW MATERIAL WITH GREAT PROSPECT: RAPIDLY SOLIDIFIED MICROCRYSTAL MATERIAL
Shi-Xun Zhang 17 Mar. 1986 6 p Transl. into ENGLISH from Jin Shu Re Chu Li (China), no. 1(n77), 1984 p 15-16
(AD-A166304; FTD-ID(RS)T-1155-85) Avail: NTIS HC A02/MF A01 CSCL 20/2

The main characteristics of the rapidly solidified microcrystal material are: 1) It has a very fine and homogeneous structure. When the cooling rate is 100,000 - 1,000,000 C/s, the size of the crystal grain is about 0.5 to a few micrometers. Its partial resolution is very small. The range of the partial resolution, and the distance between each crystal branch arm is about 0.5-5 micrometers. As the cooling rate increases, the crystal grain can be further refined and the partial resolutin can be further reduced or even eliminated. Because of the very fine and homogeneous structure, the microcrystal material has very good mechanical properties. Compared with ordinary materials, its strength and ductility, stress and corrosion resistance, fatigue fracture resistance, and high temperature oxidation resistance are much higher. 2) The solid solubility is enhanced remarkably. Due to the high cooling rate, the solid solubility of the rapidly solidified material can be increased remarkably. By using the rapid solidification technique, we not only can obtain a high strength material, but more importantly we can also add some metal elements into the metal

alloys, which have some special properties and cannot be obtained ordinarily. GRA

N86-31381# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION ON GROWTH AND LASER PROPERTIES OF GGG:(Nd,Cr) SINGLE CRYSTALS
Lehui Zhang, Chengtian Lin, Hairun Liu, Lin Liu, and Huanan Zhu 4 Apr. 1986 15 p Transl. into ENGLISH from Zhong Guo Jiguang (China), v. 11, no. 6, 1984 p 347-351
(Contract F33657-84-D-0165)
(AD-A166392; FTD-ID(RS)T-0002-86) Avail: NTIS HC A02/MF A01 CSCL 20/2

Investigation on the growth and laser properties of gadolinium gallium garnet crystal doped with neodymium and chromium is reported. As the segregation coefficient of Nd in GGG is less than 1 and that of Cr is greater than 1, a modified Czochralski method for growth is adopted in order to keep the dopants being uniform in the grown crystal. GRA

N86-31382# Advanced Research and Applications Corp., Sunnyvale, Calif.
SCANNING PHOTOVOLTAGE TECHNIQUE FOR HIGH RESOLUTION NON-DESTRUCTIVE CHARACTERIZATION OF SEMICONDUCTOR WAFERS Final Report, 2 Jul. 1984 - 2 Jan. 1985
L. J. Palkuti and A. A. Milgram Oct. 1985 42 p
(Contract F33615-84-C-5088)
(AD-A166864; ARACOR-FR-85-351-1; AFWAL-TR-86-4043) Avail: NTIS HC A03/MF A01 CSCL 20/12

Near-surface defects in semiconductor wafers have a primary influence upon device properties, both, the yield and radiation hardness. In phase I of this program, a scanning photovoltage (SPV) technique was experimentally evaluated for the high-resolution, non-destructive identification and mapping of near-surface defects in wafers. The SPV technique shows promise of being useful for this purpose in semi-insulating materials such as GaAs, silicon-on-sapphire and InP. All the goals in the Phase I program were met; experimental apparatus was developed and the differential SPV signal correlated with surface dislocation networks in GaAs wafers. The results strongly support the development and further evaluation of the SPV techniques. The apparatus utilizes an Ar-ion scanning laser system with a programmable x-y table and a focussed laser beam. A photovoltage signal is measured due to the modulated laser beam. Author (GRA)

N86-31383# Honeywell Systems and Research Center, Minneapolis, Minn.
SUPERLATTICE OPTICAL BISTABILITY RESEARCH Semiannual Report, 1 Oct. - 30 Dec. 1985
Mohammad M. Tehrani 31 Jan. 1986 5 p
(Contract F49620-84-C-0071)
(AD-A167163; AFOSR-86-0166TR) Avail: NTIS HC A02/MF A01 CSCL 20/6

This report summarizes our progress and results during this reporting period. Our experiments show that the growth of thick (approx 5 micrometers) superlattice samples of HgTe/CdTe requires the use of a molecular beam epitaxy (MBE) system with in situ diagnostic capability to assure stability of growth parameters for periods of several hours. Our efforts with our in house MBE system have not succeeded in growing thick superlattice samples needed for the optical experiments. GRA

N86-31384# Honeywell Systems and Research Center, Minneapolis, Minn.
SUPERLATTICE OPTICAL BISTABILITY RESEARCH Quarterly Technical Report, 1 Jul. - 30 Sep. 1985
Mohammad M. Tehrani 30 Sep. 1985 4 p
(Contract F49620-84-C-0071)
(AD-A167176; AFOSR-86-0165TR) Avail: NTIS HC A02/MF A01 CSCL 13/8

The automation of Molecular Beam Epitaxy (MBE) system shutters was completed for the substrate and the Mercury, Cadmium Telluride and Telluride sources. As reported earlier, the automated shutter operations allow for much more precise thickness control of the superlattice layers during the deposition. Also, from signal-to-noise considerations, performing the nonlinear optical experiments requires the use of thick (>2 micrometer) superlattice samples which involve several hundred layers of Mercury Telluride and Cadmium Telluride. This can best be accomplished by using an automated Molecular Beam Epitaxy system. The current superlattice design calls for alternate layers of HgTe and CdTe with thicknesses of 100-150 A. A p-type sample with this structure is expected to yield a third order susceptibility (x(3)) of 100 times larger than that of the bulk HgCdTe. A number of test runs were carried out with the automated MBE system. These runs resulted in five superlattice samples of various thicknesses. One sample is now being used in a preliminary experiment of optical phase conjugation to establish baseline data. GRA

N86-31385# Utah Univ., Salt Lake City. Dept. of Physics.
STRUCTURAL INSTABILITIES, IMPURITIES AND DEFECTS IN ELECTRONIC MATERIALS Final Report, 15 Aug. 1983 - 14 Aug. 1985
P. C. Taylor 14 Aug. 1985 39 p
(Contract N00014-83-K-0535)
(AD-A167272) Avail: NTIS HC A03/MF A01 CSCL 20/12

The research supported under the present contract has been directed toward an understanding of some basic optical properties in materials of potential importance to the development of electronic devices. One important class of materials studied has been thin films of III-V semi-conductors which are grown using organometallic transport gases. These materials have been investigated using both individual layers and multiple-layer structures. In the layer structures, some effects due to the quantum confinement of electrons have been studied. A second class of materials studied has been amorphous semiconductors. In this class of solids we have investigated diffusion of impurities in oxide glass and amorphous silicon films. Research has also been performed on the effects of light on the optical and structural properties of thin layers of chalcogenide glasses. GRA

N86-31386# Harry Diamond Labs., Adelphi, Md.
PHYSICAL PROCESSES ASSOCIATED WITH RADIATION-INDUCED INTERFACE STATES
Peter S. Winokur, F. Barry McLean, and H. Edwin Boesch, Jr. Apr. 1986 27 p
(AD-A167280; HDL-TR-2081) Avail: NTIS HC A03/MF A01 CSCL 07/4

The buildup of interface states in Al-Si02-Si metal oxide semiconductor capacitors following exposure to pulsed electron beam irradiation has been previously shown to be a two-stage process. In the present work, we further examined the buildup by varying the polarity and magnitude of the field across the oxide during the two stages of the buildup. Specifically, both early (.000001 to 1 s) and late (1 to 10000 s) time regimes are explored. An empirical model of radiation-induced interface states at the Si02/Si interface is presented. The formulation, which explicitly addresses the time-dependent two-stage nature of the buildup process, gives the mathematical dependencies of the experimentally observed buildup on time, field, temperature, and dose. Along with the results of the field-switching experiments, the implications of the empirical model for the microscopic mechanisms involved in the buildup are discussed. In particular, the first stage is attributed to positive ion release in the bulk of the oxide via interactions with radiation-generated holes. The second stage is then associated with the transport of the liberated ions to the Si02/Si interface (for positive gate bias) where a subsequent interaction results in the appearance of electrically observable interface states. GRA

N86-31387# Auburn Univ., Ala.
SEMICONDUCTOR ALLOY THEORY Final Report, 1 Sep. 1984 - 31 Dec. 1985
An-Ban Chen 14 Jan. 1986 38 p
(Grant AF-AFOSR-0282-84)
(AD-A167306; AFOSR-86-0160TR) Avail: NTIS HC A03/MF A01

CSCL 11/6

This grant supported our work on semiconductor alloy theory. Many useful results have been obtained, including; (1) generalization of Brooks' formula for alloy-scattering limited electron mobility to including multiple bands and indirect gaps, (2) calculation of SiGe alloys band structure, electron-mobility and core-exciton binding energy and linewidth, (3) comprehensive calculation of bond energy, bond length and mixing enthalpy for all III-V and II-VI pseudo-binary alloys, (4) development of a statistical theory which shows a non-random distribution of atoms in most alloys, (5) studying the sensitivity of defect levels to band structures and impurity potentials, (6) a study of the dipolar contribution to the mixing energy and its implication to the long-range order in alloys, e.g., GaAlAs, and (7) a model which allows a simple but detailed calculation of alloy band-edge properties. GRA

N86-31388# Department of the Navy, Washington, D. C.
HETEROJUNCTION D(-) (OR A(+)) MILLIMETER AND SUBMILLIMETER WAVE DETECTOR Patent Application
Ben V. Shanabrook and William J. Moore, inventors (to Navy) Filed 27 Nov. 1985 16 p
(AD-D012309; US-Patent-Appl-SN-802286) Avail: NTIS HC A02/MF A01 CSCL 20/12

A solid state detector for use in detecting submillimeter and millimeter for wave radiation. The solid state detector comprises a semilattice of alternating thin epitaxial layers of GaAsl and AlGaAs doped with impurities having the same conductivity type. Eecause of the transfer of charge carriers in order to obtain thermal equilibrium, the charge carriers in the higher energy doped layer transfer to the adjacent lower energy doped layer and form a predetermined number of either D- or + centers in this layer. This D- or A+ center formation is obtained without the use of an optical bias. The ionization energy for these D- or A+ centers is small enough that photons from millimeter or submillimeter wave radiation is sufficient to ionize these carriers and yield a measurable conductivity in the device. GRA

N86-31389# Massachusetts Inst. of Tech., Cambridge. National Magnet Lab.
BASIC STUDIES OF SUBMICRON LAYERS OF Nb-Al Progress Report
1986 9 p
(Contract DE-FG02-85ER-45206)
(DE86-006985; DOE/ER-45206/2) Avail: NTIS HC A02/MF A01

Recent work with powder metallurgy processed Nb-Al has shown that thin layers of extruded Nb and Al reacted at low temperatures can form superconducting Nb-Al with high transition temperatures well above that expected from the equilibrium phase diagram for Nb-Al and high critical current densities. The basic mechanisms for the low temperature reaction and the importance of surface effects, impurities, and the dependence of layer thickness in Nb-Al are not understood. Purpose of the research program is a basic study of model layered structures of Nb and Al in order to develop an understanding of the basic properties of low temperature reacted Nb-Al. The research employs bilayers and multilayers of Nb and Al to study the effects of layer structures, oxygen, third element additives, proximity, and mechanisms for high critical currents in thin layers. In a controlled manner, the model systems can be studied and analyzed, and made to approach the actual systems produced by powder processing techniques. DOE

N86-31390# Sandia National Labs., Albuquerque, N. Mex.
MONTE CARLO STABILITY ANALYSIS OF STRAINED LAYER SUPERLATTICE INTERFACES
B. W. Dodson 1985 6 p Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC04-76DP-00789)
(DE86-007146; SAND-85-1403C; CONF-851217-50) Avail: NTIS HC A02/MF A01

We have developed a procedure, based on conventional Monte Carlo methods, to investigate the limits of stability of a strained layer superlattice (SLS) system as a function of lattice mismatch and layer thickness. The method is demonstrated by the analysis of two-dimensional Lennar-Jones SLS systems, for which the regime of absolute SLS stability is mapped out. Extension of the technique to three-dimensional silicon-like model systems is discussed, and appropriate model potentials for stability analysis of the Si/SiGe system are introduced. DOE

N86-31391# Material Progress Corp., Santa Rosa, Calif.
GROWTH OF LARGE GSGG CRYSTALS Final Report
F. J. Bruni Oct. 1985 19 p
(Contract W-7405-eng-48)
(DE86-006700; UCRL-15735) Avail: NTIS HC A02/MF A01

This report describes research intended to study the growth of crystals of gadolinium scandium gallium garnet (Gd3Sc2-Ga3O12) doped with neodymium and chromium. A specific goal of this project was to grow crystals 2.5 inches (6.4 cm) in diameter by 10 inches (25.4 cm) long with chromium and neodymium doping levels of 2 x 10(20) ions/cc each. The growth of undoped crystals of gadolinium scandium gallium garnet (GSGG) was studied as well in order to investigate the general engineering issues associated with the growth of GSGG crystals of this size. DOE

N86-31392# Pittsburgh Univ., Pa. Dept. of Metallurgical and Materials Engineering.
IN-SITU SAX INVESTIGATIONS OF ISOTHERMAL CRYSTALLIZATION IN POLY(TMPS) FRACTIONS
J. H. Magill, J. M. Schultz, and J. S. Lin Nov. 1985 46 p Presented at the American Physical Society Meeting, Baltimore, Md., 25 Mar. 1985 Prepared in cooperation with Delaware Univ., Newark and ORNL, Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-003816; CONF-8503216-1) Avail: NTIS HC A03/MF A01

The isothermal crystallization kinetics of poly(TMPS) has been measured by ISSAXS and results obtained for a molecular weight fraction (21,000) below the critical entanglement molecular weight (25,000) and another one above it (371,000). The SAXS intensity vs time curves suggest that a single transformation mechanism exist. The SAXS long period is independent of crystallization time for both poly(TMPS) fractions. However, the interlamellar thickness contribution to the long period is dependent upon molecular weight and crystallization temperature, increasing with temperature and molecular weight. The crystallite contribution also increases over the range studied. Both fractions exhibit a significant, but reversible decrease in thickness on cooling the sample from the crystallization temperature to room temperature and recycling again. The change is more pronounced for 371,000 specimen in keeping with its lower crystallinity. The path dependence of lamellar dimensions has significant implications in the morphological characterization of polymers annealed or crystallized at one temperature and then measured at another one. DOE

N86-31393# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
DIFFRACTION AND MICROSCOPY STUDIES OF THE STRUCTURE OF GRAIN BOUNDARIES IN Fe, Fe-BASE ALLOYS AND CERAMIC MATERIALS Final Technical Report
S. L. Sass Dec. 1985 13 p
(Contract DE-FG02-84ER-45152)
(DE86-007983; DOE/ER-45152/3) Avail: NTIS HC A02/MF A01

This is the final technical report for Contract No. FG02-84ER45152. The long range goal of this research project is to obtain information on the atomic structure of grain boundaries in bcc metals and ceramics, to understand how segregation influences grain boundary structure and causes boundaries to become embrittled in Fe-base alloys, to understand how segregation and the ionization state of the solute influences the boundary structure in ceramic materials, and to study faceting and the frequency of its occurrence in ceramic materials. Electron microscopy and electron diffraction techniques were used to carry out the studies on grain boundaries. Most of the work reported is on influence of Fe solute on the structure of grain boundaries in MgO. DOE

N86-31394# Sandia National Labs., Albuquerque, N. Mex.
MODIFICATION OF POINT DEFECTS IN QUARTZ FOR DEVICE APPLICATIONS
J. C. King and D. R. Koehler Feb. 1986 10 p
(Contract DE-AC04-76DP-00789)
(DE86-007988; SAND-85-2450) Avail: NTIS HC A02/MF A01

Impurity centers in quartz play a significant role in the behavior of precision crystal resonators subjected to ionizing radiation. The substitutional Al center, charge-compensated by Na, Li, H, or a hole, is now known to be the primary contributing factor in most radiation-induced effects. Acoustic loss measurements, electron spin resonance measurements, optical studies, and infrared studies of these defects, over extended temperature ranges, have contributed substantially to our understanding of the role of impurity centers. Radiation-induced frequency and acoustic loss changes in quartz-crystal resonators are now understood in terms of the evolving character of the defect center in a radiation field. This understanding has prompted such material modifications as high-temperature electrolysis and doping technologies that permit, for instance, the fabrication of frequency control devices that are little affected by hostile environments. DOE

N86-31395# Temple Univ., Philadelphia, Pa.
DYNAMIC ASPECTS OF THE DYE-SENSITIZED PHOTOCONDUCTIVITY OF SEMICONDUCTORS Final Technical Report, 1 Apr. 1984 - 31 May 1985
A. M. P. Goncalves 1985 7 p
(Contract DE-AC02-81ER-10881)
(DE86-007662; DOE/ER-10881/1) Avail: NTIS HC A02/MF A01

The work carried out in the current period was a continuation of that done previously under this contract. The goal was to elucidate the dynamics of the processes which determine the efficiency of dye-sensitized semiconductor/electrolyte photoelectrochemical cells. In particular, direct fluorescence lifetime measurements were undertaken to explore the competition between the primary event, electron transfer, and other processes which shorten the lifetime of the dye excited state. DOE

N86-31396# California Univ., Berkeley. Lawrence Berkeley Lab.
SCHOTTKY AND OHMIC Au CONTACTS ON GaAs, MICROSCOPIC AND ELECTRICAL INVESTIGATION
Zuzanna Liliental-Weber, R. Gronsky, J. Washburn, N. Newman (Stanford Univ., Calif.), W. E. Spicer, and E. R. Weber (California Univ., Berkeley.) Feb. 1986 25 p Presented at the Conference on Physics and Chemistry of Semiconductor Interfaces, Pasadena, Calif., 28-30 Jan. 1986 Submitted for publication
(Contract DE-AC03-76SF-00098)
(DE86-007610; LBL-21010; CONF-860159-1) Avail: NTIS HC A02/MF A01

Electrical device measurements and transmission electron microscopy (TEM) methods were used to investigate the electrical, morphological and structural properties of Au/GaAs Schottky diodes. The electrical charcteristics of Au diodes formed on atomically clean and air-exposed GaAs (110) surfaces change from rectifying to ohmic behavior after annealing above the Au-Ga eutectic temperature (360(0)C), owing to an ohmic-like contact at the periphery of the device. TEM indicate that the ohmic peripheral current pathway can be correlated with the formation of near-surface Ga-rich Au crystallites at the diode circumference upon annealing. Removal of these Au crystallites by mesa-etching is also accompanied by the elimination of the ohmic current. The morphology of the overlayer depends strongly on annealing and surface treatment. The interface is flat and abrupt for all unannealed diodes, as well as for annealed diodes formed on atomically clean surfaces. For annealed diodes formed on the air-exposed surfaces, the metal-semiconductor interface contains large metallic protrusions extending up to several hundred Angstroms into the semiconductor. The morphology of annealed diodes formed using typical commercial processing technology (i.e., formed on chemically prepared (100) surfaces annealed in forming gas) was also investigated using TEM. The interface for these structures is more complex than interfaces formed on the atomically clean and air-exposed cleaved (110) surfaces. Au diffuses through the interfacial native oxide layer and forms islands in intimate contact with the semiconductor.DOE

N86-31397# Los Alamos National Lab., N. Mex.
GRAIN GROWTH PHENOMENA IN FILMS: A MONTE CARLO APPROACH
D. J. Srolovitz 1986 23 p Presented at the International Conference on Metallurgical Coatings, San Diego, Calif., 7-11 Apr. 1986 Submitted for publication
(Contract W-7405-eng-36)
(DE86-008755; LA-UR-86-1061; CONF-860495-2) Avail: NTIS HC A02/MF A01

A statistical model of microstructural evolution is developed for the evolution of grain structure during deposition. In cases where the atomic mobility on the surface greatly exceeds that in the bulk of the film, the bulk microstructure may be viewed as static while all of the evolution is controlled by the free surface. This leads naturally to a two-dimensional model of microstructural evolution. Since the surface is advancing at a constant rate during deposition there is a linear relationship between time in the two-dimensional model and depth in the film. A Monte Carlo computer simulation technique is described which models the evolution of microstructure in this way. Various driving forces are included. Simulated microstructures in the plane of the film and in the plane perpendicular to the free surface are shown. DOE

N86-31398# General Electric Co., Largo, Fla. Neutron Devices Dept.
CHARACTERIZATION OF THE IMPURITIES IN TUNGSTEN/SILICON-GERMANIUM CONTACTS
H. A. Gregg, Sr. 26 Mar. 1986 17 p
(Contract DE-AC04-76DP-00656)
(DE86-008791; GEPP-TIS-892) Avail: NTIS HC A02/MF A01

Secondary ion mass spectrometry and Auger electron spectrometry depth profiling were used to determine impurity distributions in sputter deposited tungsten films over N-type and P-type 80/20 silicon-germanium elements of thermoelectric devices. These analyses showed that silicon, oxygen, sodium, boron, and phosphorous were present as impurities in the tungsten film. All these impurities except oxygen and sodium came from the substrate. Oxygen was gettered by the tungsten films, while sodium was possibly the result of sample handling. Further, the results from this study indicate that an oxide build-up, primarily at the tungsten/silicon-germanium interface of the N-type materials, is the major contributor to contact resistance in thermoelectric devices. DOE

N86-31399# Stanford Univ., Calif. Electronics Labs.
SIPOS HETEROJUNCTION CONTACTS TO SILICON
Young H. Kwark and R. M. Swanson Feb. 1986 275 p
(Contract DE-AC04-76DP-00789)
(DE86-008879; SAND-85-7022) Avail: NTIS HC A12/MF A01

Deliberate introduction of controlled amounts of an oxygen-bearing species such as nitrous oxide into the deposition ambient normally used for chemical vapor deposition of polysilicon produces SIPOS, a class of silicon oxides that exhibits a wide range of physical properties is discussed. It is possible to tailor SIPOS film characteristics such as refractive index by altering the oxygen partial pressure in the deposition ambient. The addition of a dopant species converts these films from semi-insulating to a form that can be made sufficiently conductive after annealing to make them interesting for electronic applications. The potential for conveniently altering the effective mobility gap in this material suggests its use in heterojunction contact structures to silicon. Incorporation of these films into the emitter structure of an NPN bipolar transistor has been found to reduce the emitter saturation current fifty fold. This suppression of reverse injected hole transport has often been assumed to be the result of a wider gap in the SIPOS due to the presence of incorporated oxygen. However, this seems to be an oversimplification in view of microstructural studies that revealed a multi-phase structure consisting of a fine dispersion of silicon microcrystals embedded in an oxide-like matrix. DOE

N86-31400# Missouri Univ., Columbia. Research Reactor Facility.
INELASTIC SCATTERING IN CONDENSED MATTER WITH HIGH INTENSITY MOSSBAUER RADIATION Annual Report, 1 Mar. 1985 - 28 Feb. 1986
W. B. Yelon and G. Schupp Feb. 1986 9 p
(Contract DE-FG02-85ER-45200)
(DE86-007007; DOE/ER-45200/2) Avail: NTIS HC A02/MF A01

The past year has seen the completion of most of the design and construction phases of our instrument development and the beginning of our scientific investigations. Many technical difficulties relating to mechanical strains in the source cryostat and in the MICE detector assembly caused by cycling them between 300 and 100 K have been overcome. The scientific work has been highlighted by the performance of the MICE director and how it has allowed us to measure the asymmetry parameters in (183)W and (182)W much more reliably than in the past and by the high momentum resolution made possible with our intense sources as demonstrated by studies on Si. Quasielastic scattering in a liquid metal is planned as well as investigation of interference and time reversal parameters in (182)W (100 keV), (183)W (46.5 keV), (197)Au (77 keV), and (193)Ir (73 keV). Additional work on the TaS2 1T using the 46.5 keV transition in (183)W is also planned in an effort to explore the already-observed anomaly at the 79(0)C incommensurate to quasi-commensurate transition. DOE

N86-31401# Wisconsin Univ., Madison. Materials Science Center.
CRYSTALLIZATION OF SPUTTER DEPOSITED AMORPHOUS METAL THIN FILMS
R. E. Thomas, J. H. Perepezko, and J. D. Wiley 1985 16 p
Presented at the AVS Tri-state Symposium on Surface Analysis and Thin Film Technology, Oconomowoc, Wisc., 1 Apr. 1985
(Contract DE-FG02-84ER-45096)
(DE86-008958; CONF-8504224-1) Avail: NTIS HC A02/MF A01

Au overlayers on W-Si can reduce the crystallization temperatures by 100(0)C. In this paper we report on further work done on the W-Si system. Using Differential Thermal Analysis (DTA) we have measured the crystallization temperature versus composition from approximately 5 at. % Si to 40 at. % Si. Additional overlayers of W, Cu, and Al have been investigated. Both the W and Cu overlayers appear to have little effect on the stability of the underlying W-Si, while the Al reduces the crystallization temperature by at least 100(0)C. These results reinforce the observation that the choice of overlayer plays a critical role in determining the overall stability of the metallization, and indicate that W-Si is a viable candidate for diffusion barriers on silicon. DOE

N86-31402# International Centre for Theoretical Physics, Trieste (Italy).
CORE LEVEL SHIFTS IN SEMICONDUCTORS: A STUDY OF THE ELECTROSTATIC MODEL
Xuefu Zhong Aug. 1984 11 p
(DE85-703224; IC-84/120) Avail: NTIS (US Sales Only) HC A02/MF A01

A different electrostatic model is proposed for core level shift calculation in semiconductors on the basis of a critical analysis of so called bond charge model by Bechstedt et al. The population of valence charge on anion and on cation is no longer a linear function of Phillips ionicity, f sub (i), and a set of additive covalent radii is used instead of a nonadditive one. A phenomenological expression is given for bond charge which decreases as ionicity, f sub (i), increases. The results are in agreement with experiments, and the reasons for errors are explained. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-31403# Stanford Linear Accelerator Center, Calif.
RESEARCH PROGRAM WITH NO MEASUREMENT PROBLEM
H. P. Noyes, C. Gefwert, and M. J. Manthey Jul. 1985 10 p
Presented at the Conference on New Techniques and Ideas in Quantum Measurement Theory, New York, N.Y., 21 Jan. 1986
Prepared in cooperation with Suomen Akatemia, Helsinki (Finland) and New Mexico Univ., Albuquerque
(Contract DE-AC03-76SF-00515)
(DE86-006952; SLAC-PUB-3734; CONF-860147-1) Avail: NTIS HC A02/MF A01

The measurement problem of contemporary physics is met by recognizing that the physicist participates when constructing and when applying the theory consisting of the formulated formal and measurement criteria (the expressions and rules) providing the necessary conditions which allow him to compute and measure facts, yet retains objectivity by requiring that these criteria, rules and facts be in corroborative equilibrium. We construct the particulate states of quantum physics by a recursive program which incorporates the non-determinism born of communication between asynchronous processes over a shared memory. Their quantum numbers and coupling constants arise from the construction via the unique 4-level combinatorial hierarchy. The construction defines indivisible quantum events with the requisite supraluminal correlations, yet does not allow supraluminal communication. Measurement criteria incorporate c, h-bar, and m/sub p/ or (not and) G. The resulting theory is discrete throughout, contains no infinities, and, as far as we have developed it, is in agreement with quantum m echanical and cosmological fact. DOE

N86-31404# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
POSSIBLE VIOLATIONS OF THE RELATIVITY THEORY
J. Tiomno 1985 28 p In PORTUGUESE
(DE86-700611; CBPF-NF-001/85) Avail: NTIS (US Sales Only) HC A03/MF A01

A review of previous works of the author and collaborators on possible violations of the Theory of Relativity (SR) is made. It is shown that there is no contradiction of the predictions of the Lorentz Aether Theory, in the form presented in these papers, with existing experiments. Further experiments to detect these violations (or to confirm SR) are indicated. DOE

N86-31405# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
EINSTEIN'S SPECIAL RELATIVITY VERSUS LORENTZ'S AETHER THEORY
Waldyr Alves Rodrigues, Jr. and Jayme Tiomno 1984 21 p
Prepared in cooperation with Univ. Estadual de Campinas (Brazil).
(DE86-700627; CBPF-NF-018/84) Avail: NTIS (US Sales Only) HC A02/MF A01

Conditions under which failures are expected of Einstein's relativity are examined. For this a comparison is made with Lorentz's Aether theory. Two classes of possible experiments to detect violation of special relativity are examined with corresponding theorems proving them to lead to negative results, contrary to the statements of the proponents. Possible sources of violation of relativity theory are examined. DOE

N86-31406# Oklahoma State Univ., Stillwater. Dept. of Physics.
OBTAINING THE EINSTEIN-HILBERT ACTION FROM A SUPERCONFORMAL THEORY
C. H. Pilot Jan. 1986 41 p
(Contract DE-FG05-85ER-40215)

(DE86-009007; DOE/ER-40215/T3) Avail: NTIS HC A03/MF A01

By breaking the superconformal group it is possible to obtain an Einstein-Hilbert type action starting from one quadratic in the curvatures. The Newtonian gravitational constant is interpreted as a ratio of order parameters; at present low energies, these approach constant values of inherent dimension (much like the magnetization in a ferromagnet). Radiative corrections are forwarded as the mechanism responsible for spontaneous symmetry breaking (SSB). DOE

N86-31407# Oklahoma State Univ., Stillwater. Dept. of Physics.

CONCERNING THE TRANSFORMATION BEHAVIOR OF FIELDS UNDER THE SUPERCONFORMAL SYMMETRIES

C. H. Pilot Dec. 1985 29 p

(Contract DE-FG05-85ER-40215)

(DE86-009008; DOE/ER-40215/T1) Avail: NTIS HC A03/MF A01

The transformation behavior of fields under external type symmetries (such as the superconformal group) is gone over emphasizing the formal distinction between the group transformations of fields and their Lie transformations (often called Lie derivatives). We show how some of the standard results ordinarily expected for the Poincare group have to be generalized if the full symmetries of the superconformal group are to be respected. As far as classical scalar field theories go only massless phi(4) theories are superconformally invariant. DOE

N86-31408# Lawrence Livermore National Lab., Calif.

COMPUTATION OF ADIABATIC FLAME TEMPERATURES AND OTHER THERMODYNAMIC QUANTITIES

C. K. Westbrook 15 Apr. 1986 30 p Presented at the Symposium on Industrial Combustion Technology, Chicago, Ill., 29 Apr. 1986

(Contract W-7405-eng-48)

(DE86-009388; UCRL-94450; CONF-8604156-1) Avail: NTIS HC A03/MF A01

The equilibrium final temperature and composition of a given fuel-oxidizer mixture have both theoretical and practical importance for helping to understand the behavior of combustion systems. Both are needed in order to estimate levels of chemical pollutants such as oxides of nitrogen (NO sub x), and the final temperature is necessary to predict the expected thermal efficiency and heating value of a given combustor. Knowledge of the ways that various radical and stable intermediate chemical species vary as operating conditions are changed can also suggest system modifications to improve overall performance. In this paper, the methods available for computing chemical equilibrium conditions such as adiabatic flame temperatures will be reviewed. The dependence of computed values on available thermochemical data bases will be demonstrated. Examples of equilibrium flame temperatures and compositions for mixtures of interest and importance in natural gas combustion will be presented. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-31409*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

NASA/AMERICAN SOCIETY FOR ENGINEERING EDUCATION (ASEE) SUMMER FACULTY FELLOWSHIP PROGRAM, 1985

Robert G. Chilton, ed. (Texas A&M Univ., College Station.) and Clarence E. Williams, ed. Jul. 1986 733 p Program held in Houston, Tex., 1985

(Grant NGT-44-001-800)

(NASA-CR-171931; NAS 1.26:171931) Avail: NTIS HC A99/MF E03 CSCL 05I

The 1985 NASA/ASEE Summer Faculty Fellowship Research Program was conducted by Texas A&M University and the Johnson Space Center. The ten week program was operated under the auspices of the American Society for Engineering Education (ASEE). The faculty fellows spent the time at JSC engaged in research projects commensurate with their interests and background and worked in collaboration with NASA/JSC colleagues. This document is a compilation of the final reports of their research during the summer of 1985. For individual titles, see N86-31410 through N86-31436.

N86-31410*# Alabama Univ., Birmingham. Dept. of Physics.

MOSSBAUER SPECTROSCOPY OF EXTRATERRESTRIAL MATERIALS **c25**

David G. Agresti *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 10 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 07D

Mossbauer Spectroscopy (MS) has recently been added to the tools used by Dr. Richard Morris of the Experimental Planetology Branch of the Solar System Exploration Division at Johnson Space Flight Center in his research on synthetic and natural analogs of lunar and Martian soils. A least-squares fitting program for MS data written originally for an IBM 360 Mainframe computer was adapted for use on an IBM-PC microcomputer. The adapted program has been applied to the analysis of MS spectra obtained from several samples of Antarctic soil under investigation at JSC as analogs to soil of the Martian regolith. Preliminary conclusions have been drawn from the MS data about the composition of the Antarctic samples. Inferences from optical spectra obtained for these same samples have been compared with the MS results. Author

N86-31411*# Houston Univ., Tex. Dept. of Mechanical Engineering.

DESIGN CRITERIA FOR EXPERT SYSTEMS **c61**

Robert Allen *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 12 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 09B

Knowledge based expert systems are applicable to a wide range of engineering problems ranging from formation to derivation. At the formation end of the spectrum, design, planning and prediction have been identified as generic tasks with similar issues that are dealt with by experts, and need to be formalized for successful expert system implementation. At the derivation end, diagnosis, interpretation and monitoring have been identified as generic tasks with similar subproblems with which experts must cope. At the implementation level, four levels of programming have been identified: logic programming, production system programming, object oriented programming and hybrid programming. Author

N86-31412*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EVALUATING SPACE STATION APPLICATIONS OF AUTOMATION AND ROBOTICS TECHNOLOGIES FROM A HUMAN PRODUCTIVITY POINT OF VIEW **c54**

Jonathan F. Bard *In its* NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 46 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 05H

The role that automation, robotics, and artificial intelligence will play in Space Station operations is now beginning to take shape. Although there is only limited data on the precise nature of the payoffs that these technologies are likely to afford there is a general consensus that, at a minimum, the following benefits will be realized: increased responsiveness to innovation, lower operating costs, and reduction of exposure to hazards. Nevertheless, the question arises as to how much automation can be justified with the technical and economic constraints of the program? The purpose of this paper is to present a methodology which can be used to evaluate and rank different approaches to automating the functions and tasks planned for the Space Station. Special attention is given to the impact of advanced automation

on human productivity. The methodology employed is based on the Analytic Hierarchy Process. This permits the introduction of individual judgements to resolve the confict that normally arises when incomparable criteria underly the selection process. Because of the large number of factors involved in the model, the overall problem is decomposed into four subproblems individually focusing on human productivity, economics, design, and operations, respectively. The results from each are then combined to yield the final rankings. To demonstrate the methodology, an example is developed based on the selection of an on-orbit assembly system. Five alternatives for performing this task are identified, ranging from an astronaut working in space, to a dexterous manipulator with sensory feedback. Computational results are presented along with their implications. A final parametric analysis shows that the outcome is locally insensitive to all but complete reversals in preference. Author

N86-31413*# Houston Univ., Tex. Dept. of Applied Mathematical Sciences.

DISTRIBUTED SYNTHETIC APERTURE RADAR SIMULATION **c32**

Brian A. Bourgeois *In* NASA. Johnson Space Center NASA/American Society for Engineering Educaqtion (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 8 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 17I

Synthetic aperture radar (SAR) depends primarily on attainable frequency resolution rather than on large physical size of the antenna array. The distributed architecture concept (DSAR) incorporates active elements (amplifiers) at or near the elemental radiators of the array. Since SAR's are expensive to build and expensive to test, a computer modeling approach is a feasible method of predicting the quality or nature of the SAR image from the proposed system parameters. The goal of this project is to produce a DSAR simulation software package. This report describes the progress made thus far and the work which remains to be done. Extensive work on this project had been done previously by two NASA contractors. The principal task remaining involved the creation of a suitable interface between these programs and the hardware and software available at the Johnson Space Center. Author

N86-31414*# Washington State Univ., Pullman. Dept. of Mechanical Engineering.

CONDENSATION HEAT TRANSFER UNDER A MICROGRAVITY ENVIRONMENT **c34**

L. C. Chow *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 24 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 20D

A description of the condensation heat transfer process in microgravity is given. A review of the literature is also reported. The most essential element of condensation heat transfer in microgravity is the condensate removal mechanism. Two mechanisms for condensate removal are analyzed by looking into two problems. The first problem is concerned with film condensation on a flat porous plate with the condensate being removed by suction at the wall. The second problem is an analytical prediction of the heat transfer coefficient for condensing annular flows with the condensate film driven by the vapor shear. It is concluded that both suction and vapor shear can effectively drain the condensate to ensure continuous operation of the condensers operated under a microgravity environment. It is recommended that zero-g flight experiments be carried out to verify the prediction made in the present report. The results contained in this report should also aid in the design of future space condensers. Author

N86-31415*# Oregon State Univ., Corvallis.

CHRONOLOGY AND ISOTOPIC GEOCHEMISTRY OF APOLLO 14 BASALTS AND SKAERGARD GABBRO, EASTERN GREENLAND Final Report **c91**

E. Julius Dasch *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 6 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 03B

Work completed on Apollo 14 basalts has been published. The two dates obtained from these rocks comprised the oldest and two of the three oldest ages (4.1 and 4.3 billion years) known for lunar maria basalts; thus their ages are important in understanding the moon's earliest history. Wing to the antiquity of these rocks, two more fragments have been dated as part of a second ASEE/NASA SFF program. The new ages are 3.95 and 4.12 billion years, thus further establishing and amplifying the earlier results. This work, although perhaps more interesting for its chronologic information, was begun as a test of chemical and petrographic models. Fragments of Apollo basalt were placed into five categories, based on petrologic and chemical, especially rare-earth element, composition. Isotopic studies were begun in an attempt to determine if the five groups of basalts were related by age or initial isotopic composition (isotopic composition of lava at time of extrusion). Although a few of the representatives of the five groups have the same age and/or initial strontium-isotopic composition, within the analytical uncertainties, most apparently are unrelated. Petrologic implications of these data will be published in an appropriate journal. Author

N86-31416*# Hawaii Univ., Hilo. Dept. of Geography.

APPLICATION OF COMPUTER IMAGE ENHANCEMENT TECHNIQUES TO SHUTTLE HAND-HELD PHOTOGRAPHY **c35**

Bruce E. David *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 69 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 14E

With the advent of frequent Space Transportation System Shuttle missions, photography from hyperaltitudes stands to become an accessible and convenient resource for scientists and environmental managers. As satellite products (such as LANDSAT) continue to spiral in costs, all but the most affluent consumer is finding Earth imagery from space to be more and more unavailable. Therefore, the potential for Shuttle photography to serve a wide variety of users is increasing. However, despite the popularity of photos from space as public relations tools and report illustrations, little work has been performed to prove their scientific worth beyond that as basic mapping bases. It is the hypothesis of this project that hand-held Earth photography from the Space Shuttle has potentially high scientific merit and that primary data can be extracted. In effect, Shuttle photography should be considered a major remote sensing information resource. Author

N86-31417*# City Univ. of New York, N.Y. Bronx Community Coll.

INVESTIGATION OF LOCAL AREA NETWORKS FOR AN ORBITING SPACE STATION Final Report **c62**

Louis A. DeAcetis *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 4 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 09B

An investigation and test of various equipment was conducted to determine its state of repair and suitability for use in a test-bed computer network (to be used to simulate a space station configuration of computers for control and monitoring). A research study was also made of various network types, including the IEEE network standards: (1) Carrier Sense Multiple Access with Collision Detection. (2) Token Passing Bus (3) Token Passing Ring, and (4) the draft ANSI standard for a High Speed Local Network CSMA with Collision Avoidance. No firm conclusions are possible at this time as to which would be most suitable. An evaluation of the user interface of a space station database program, FREDSS (Formatted Retrieval and Entry of Data for Space Station preliminary version), was also conducted and recommendations were made for possible improvements. Author

N86-31418*# Prairie View Agricultural and Mechanical Coll., Tex. Dept. of Electrical Engineering.
AN IBM PC-BASED MATH MODEL FOR SPACE STATION SOLAR ARRAY SIMULATION c44
Ervin M. Emanuel *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 28 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 10A

This report discusses and documents the design, development, and verification of a microcomputer-based solar cell math model for simulating the Space Station's solar array Initial Operational Capability (IOC) reference configuration. The array model is developed utilizing a linear solar cell dc math model requiring only five input parameters: short circuit current, open circuit voltage, maximum power voltage, maximum power current, and orbit inclination. The accuracy of this model is investigated using actual solar array on orbit electrical data derived from the Solar Array Flight Experiment/Dynamic Augmentation Experiment (SAFE/DAE), conducted during the STS-41D mission. This simulator provides real-time simulated performance data during the steady state portion of the Space Station orbit (i.e., array fully exposed to sunlight). Eclipse to sunlight transients and shadowing effects are not included in the analysis, but are discussed briefly. Integrating the Solar Array Simulator (SAS) into the Power Management and Distribution (PMAD) subsystem is also discussed. Author

N86-31419*# New Mexico State Univ., Las Cruces. Dept. of Mechanical Engineering.
FIRE CONTROL METHOD AND ANALYTICAL MODEL FOR LARGE LIQUID HYDROCARBON POOL FIRES c25
Donald L. Fenton *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 14 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 21B

The dominate parameter governing the behavior of a liquid hydrocarbon (JP-5) pool fire is wind speed. The most effective method of controlling wind speed in the vicinity of a large circular (10 m dia.) pool fire is a set of concentric screens located outside the perimeter. Because detailed behavior of the pool fire structure within one pool fire diameter is unknown, an analytical model supported by careful experiments is under development. As a first step toward this development, a regional pool fire model was constructed for the no-wind condition consisting of three zones -- liquid fuel, combustion, and plume -- where the predicted variables are mass burning rate and characteristic temperatures of the combustion and plume zones. This zone pool fire model can be modified to incorporate plume bending by wind, radiation absorption by soot particles, and a different ambient air flow entrainment rate. Results from the zone model are given for a pool diameter of 1.3 m and are found to reproduce values in the literature. Author

N86-31420*# Prairie View Agricultural and Mechanical Coll., Tex. Dept. of Mechanical Engineering.
DEVELOPMENT OF A NUMERICAL PROCEDURE TO MAP A GENERAL 3-D BODY ONTO A NEAR-CIRCLE c64
Mark J. Hommel *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 5 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 12A

Conformal mapping is a classical technique utilized for solving problems in aerodynamics and hydrodynamics. Conformal mapping is utilized in the construction of grids around airfoils, engine inlets and other aircraft configurations. These shapes are transformed onto a near-circle image for which the equations of fluid motion are discretized on the mapped plane and solved numerically by utilizing the appropriate techniques. In comparison to other grid-generation techniques such as algerbraic or differential type, conformal mapping offers an analytical and accurate form even if the grid deformation is large. One of the most appealing features is that the grid can be constrained to remain orthogonal to the body after the transformation. Hence, the grid is suitable for analyzing the supersonic flow past a blunt object. The associated shock as a coordinate surface adjusts its position in the course of computation until convergence is reached. The present work applied conformal mapping to 3-D bodies with no axis of symmetry such as the Aerobraking Flight Experiment (AFE) vehicle, transforming the AFE shape onto a near-circle image. A numerical procedure and code are used to generate grids around the AFE body. Author

N86-31421*# East Carolina Univ., Greenville, N.C. Dept. of Biology.
EFFECTS OF LUNAR SOIL, ZAGAMI METEORITE, AND OCEAN RIDGE BASALT ON THE EXCRETION OF ITOIC ACID, A SIDEROPHORE, AND COPROPORPHYRIN BY BACILLUS SUBTILIS c55
Takeru Ito *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 12 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06C

Samples of lunar soil (10084,151), Zagami meteorite, postulated to be ejected from Mars, and ocean ridge basalt, the most abundant volcanic rock on earth, all completely inhibited the excretion of itoic acid and of coproporphyrin by Bacillus subtilis, a common airborne bacterium. Since such inhibition has been known to occur only under iron rich growth conditions(the excretion of these compounds occurs under iron deficient growth conditions), the result indicated that the organism was capable of extracting iron quite readily from these materials. A sample of synthetic ilmenite completely failed to inhibit the excretion of coproporphyrin, and inhibited the excretion of itoic acid only slightly. The result suggested that much of the iron extracted by the organism must have come from iron sources other than ilmenite,such as pyroxenes and olivines,in these natural materials tested. Author

N86-31422*# Utah Univ., Salt Lake City. Center for Occupational and Environmental Health.
DEFINING RECLAIMED WATER POTABILITY REQUIREMENTS c54
Daniel S. Janik *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 49 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06K

Water used during previous space missions has been either carried or made aloft. Future human space endeavors will probably have to utilize some form of water reclamation and recycling. There is little applied experience in either the US or foreign space programs with this technology. Water reclamation and recycling constitutes an engineering challenge of the broadest nature and will require an intensive research and development effort if this technology is to mature in time for practical use on the proposed US spacestation. In order for this to happen, reclaimed/recycled water specification will need to be devised to guide engineering development. Perhaps the most strigent specifications will involve water to be consumed. NASA's present Potable Water Specifications are not applicable to reclaimed or recycled potable water. No specifications for reclaimed or recycled potable water presently exist either inside or outside NASA. NASA's past experience with potable water systems is reviewed, limitations of the present Potable Water Specifications are examined, present world expertise with potable water reclamation/recycling systems and system analogs is reviewed, and an approach to developing pertinent Reclaimed/Recycled Potable Water Specifications for spacecraft is presented. Author

N86-31423*# LeTourneau Coll., Longview, Tex. Dept. of Chemistry.
REVIEW AND ANALYSIS OF HIGH TEMPERATURE CHEMICAL REACTIONS AND THE EFFECT OF NON-EQUILIBRIUM CONDITIONS c25

Richard E. Johnson *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 19 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 07D

Chemical reactions at high temperatures have been considered extensively because of their importance to the heating effects on re-entry of space vehicles. Data on these reactions however, are not abundant and even when found there are discrepancies in data collected by various investigators. In particular, data for recombination reactions are calculated from the dissociation reactions or vice versa through the equilibrium constant. This involves the use of the principle of detailed balancing. This principle is discussed in reference to conditions where it is valid as well as to those where it is not valid. Related topics that merit further study or for which applicable information was available are briefly mentioned in an appendix to this report. Author

N86-31424*# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
AN ANALYSIS OF ULLAGE HEAT TRANSFER IN THE ORBITAL REFUELING SYSTEM **c34**
David Kauffman *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 74 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20D

The Orbital Refueling System was an experiment flown on Shuttle Mission STS 41-G in October, 1984. Liquid hydrazine fuel was transferred back and forth from one spherical bladder tank to another using pressurized nitrogen as the driving force. Compressive heating of the ullage gas in the receiving tank could lead to a hazardous situation if any hydrazine leaked through to the ullage side of the bladder and was heated above about 175 F, where it can undergo spontaneous exothermic decomposition. Early analysis of the flight data indicated that the ullage compression process was much closer to an isothermal than an adiabatic one. In this study, a thorough review of the pertinent literature was used to make an a priori best-estimate for the ullage gas heat transfer coefficient (defining the Nusselt Number as a function of Reynolds and Rayleigh Numbers). Experimental data from the flight were analyzed in detail. It is evident that there is considerably more heat transfer than can be accounted for by conduction alone, but the observed increases do not correlate well with Reynolds Number, Rayleigh Number or vehicle acceleration. There are large gaps in the present understanding of convective heat transfer in closed containers with internal heat generation, especially in the presence of vibrations or other random disturbances. A program of experiments to fill in these gaps is suggested, covering both ground and orbital environments. Author

N86-31425*# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Electrical Engineering.
ENGINEERING GRAPHICS DATA ENTRY FOR SPACE STATION DATA BASE **c31**
R. C. Lacovara *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 13 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 13B

The entry of graphical engineering data into the Space Station Data Base was examined. Discussed were: representation of graphics objects; representation of connectivity data; graphics capture hardware; graphics display hardware; site-wide distribution of graphics, and consolidation of tools and hardware. A fundamental assumption was that existing equipment such as IBM based graphics capture software and VAX networked facilities would be exploited. Defensible conclusions reached after study and simulations of use of these systems at the engineering level are: (1) existing IBM based graphics capture software is an adequate and economical means of entry of schematic and block diagram data for present and anticipated electronic systems for Space Station; (2) connectivity data from the aforementioned system may be incorporated into the envisioned Space Station Data Base with modest effort; (3) graphics and connectivity data captured on the IBM based system may be exported to the VAX network in a simple and direct fashion; (4) graphics data may be displayed site-wide on VT-125 terminals and lookalikes; (5) graphics hardcopy may be produced site-wide on various dot-matrix printers; and (6) the system may provide integrated engineering services at both the engineering and engineering management level. Author

N86-31426*# Texas A&M Univ., College Station. Dept. of Biomedical Engineering.
ANALYSIS OF NYSTAGMUS RESPONSE TO A PSEUDORANDOM VELOCITY INPUT **c52**
Charles S. Lessard *In* NASA. Johnson Space Center NASA/American Soceity for Engineering Eduction (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 104 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06P

Space motion sickness was not reported during the first Apollo missions; however, since Apollo 8 through the current Shuttle and Skylab missions, approximately 50% of the crewmembers have experienced instances of space motion sickness. Space motion sickness, renamed space adaptation syndrome, occurs primarily during the initial period of a mission until habilation takes place. One of NASA's efforts to resolve the space adaptation syndrome is to model the individual's vestibular response for basis knowledge and as a possible predictor of an individual's susceptibility to the disorder. This report describes a method to analyse the vestibular system when subjected to a pseudorandom angular velocity input. A sum of sinusoids (pseudorandom) input lends itself to analysis by linear frequency methods. Resultant horizontal ocular movements were digitized, filtered and transformed into the frequency domain. Programs were developed and evaluated to obtain the (1) auto spectra of input stimulus and resultant ocular resonse, (2) cross spectra, (3) the estimated vestibular-ocular system transfer function gain and phase, and (4) coherence function between stimulus and response functions. Author

N86-31427*# Hawaii Univ., Honolulu. Dept. of Mechanical Engineering.
MATERIALS CONSIDERATIONS IN THE DESIGN OF A METAL-HYDRIDE HEAT PUMP FOR AN ADVANCED EXTRAVEHICULAR MOBILITY UNIT **c34**
Bruce E. Liebert *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 62 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20D

A metal-hydride heat pump (HHP) has been proposed to provide an advanced regenerable nonventing thermal sink for the liquid-cooled garment worn during an extravehicular activity (EVA). The conceptual design indicates that there is a potential for significant advantages over the one presently being used by shuttle crew personnel as well as those that have been proposed for future use with the space station. Compared to other heat pump designs, a HHP offers the potential for extended use with no electrical power requirements during the EVA. In addition, a reliable, compact design is possible due to the absence of moving parts other than high-reliability check valves. Because there are many subtleties in the properties of metal hydrides for heat pump applications, it is essential that a prototype hydride heat pump be constructed with the selected materials before a committment is made for the final design. Particular care must be given to the evaporator heat exchanger worn by the astronaut since the performance of hydride heat pumps is generally heat transfer limited. Author

N86-31428*# Texas Univ., Galveston. Dept. of Internal Medicine.
FLOW CYTOMETRY ANALYSIS OF HORMONE RECEPTORS ON HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS TO

IDENTIFY STRESS-INDUCED NEUROENDOCRINE EFFECTS c52

Richard T. Meehan *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 7 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 06P

Understanding the role of circulating peptide hormones in the pathogenesis of space-flight induced disorders would be greatly facilitated by a method which monitors chronic levels of hormones and their effects upon in vivo cell physiology. Single and simultaneous multiparameter flow cytometry analysis was employed to identify subpopulations of mononuclear cells bearing receptors for ACTH, Endorphin, and Somatomedin-C using monoclonal antibodies and monospecific antisera with indirect immunofluorescence. Blood samples were obtained from normal donors and subjects participating in decompression chamber studies (acute stress), medical student academic examination (chronic stress), and a drug study (Dexamethasone). Preliminary results indicate most ACTH and Endorphin receptor positive cells are monocytes and B-cells, exhibit little diurnal variation but the relative percentages of receptor positive cells are influenced by exposure to various stressors and ACTH inhibition. This study demonstrates the capability of flow cytometry analysis to study cell surface hormone receptor regulation which should allow insight into neuroendocrine modulation of the immune and other cellular systems during exposure to stress or microgravity.

N86-31429*# McNeese State Univ., Lake Charles, La. Dept. of Electrical Engineerig.

AUTOMATION OF REVIEW/APPROVAL CYCLE OF MCAUTO CAD/CAM GENERATED DRAWINGS AND DOCUMENTS c61

Howard S. Minn *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 17 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 09B

The review/approval of MCAUTO/UNIGRAPHICS CAD/CAM generated drawings and documents is done through routing of hard copies of drawings and memos via mail, a process both time consuming and expensive. It is proposed that a set of procedures and the required software tools be designed for transmission, revision, and signing-off of such documents via electronic data transfer, while maintaining a sufficient degree of data integrity and individual security. A main resistance to such a technique will be the limited size of the display screen (19 inch class) and infrequent layer switching with the attendant time delay during the process of reviewing the drawing. Such opposition should diminish as the users become familiar with the hardwares and its operation. It is suggested that user profiles be set so that the protection class list of the originator of the drawing include at least one common class with each of the individuals who will be involved in the Revision/Approval cycle. In this way the originator will be able to tranfer a file for their review and also be able to copy back the file to make the necessary permanent changes. Individual security is maintained by restricted access to signature files and by restricting the list of individuals who will be authorized to sign off. This is accomplished through two software tools: LAYCOPY and SIGN. It is felt that these proposed procedures and techniques will adequately maintain both the file integrity and individual security during Review/Approval Cycle of MCAUTO generated drawings without the need for hardcopy routing. Author

N86-31430*# South Carolina Univ., Columbia. Dept. of Mechanical Engineering.

THERMALLY REGENERATIVE HYDROGEN/OXYGEN FUEL CELL POWER CYCLES c44

Jeffrey H. Morehouse *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 28 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 10B

Two innovative thermodynamic power cycles are analytically examined for future engineering feasibility. The power cycles use a hydrogen-oxygen fuel cell for electrical energy production and use the thermal dissociation of water for regeneration of the hydrogen and oxygen. The TDS (thermal dissociation system) uses a thermal energy input at over 2000 K to thermally dissociate the water. The other cycle, the HTE (high temperature electrolyzer) system, dissociates the water using an electrolyzer operating at high temperature (1300 K) which receives its electrical energy from the fuel cell. The primary advantages of these cycles is that they are basically a no moving parts system, thus having the potential for long life and high reliability, and they have the potential for high thermal efficiency. Both cycles are shown to be classical heat engines with ideal efficiency close to Carnot cycle efficiency. The feasibility of constructing actual cycles is investigated by examining process irreversibilities and device efficiencies for the two types of cycles. The results show that while the processes and devices of the 2000 K TDS exceed current technology limits, the high temperature electrolyzer system appears to be a state-of-the-art technology development. The requirements for very high electrolyzer and fuel cell efficiencies are seen as determining the feasbility of the HTE system, and these high efficiency devices are currently being developed. It is concluded that a proof-of-concept HTE system experiment can and should be conducted. Author

N86-31431*# Texas Univ., Houston. Dept. of Environmental Sciences.

CYTOGENETIC ANALYSES OF PERIPHERAL LYMPHOCYTES SUBJECTED TO SIMULATED SOLAR FLARE RADIATION c55

Howard M. Prichard *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 9 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 06R

Solar flare protons share many radiological health characteristics of the inner Van Allen Belt protons, and both types of radiation pose serious dangers to a number of missions planned. It is appropriate to evaluate crew dose determination procedures in terms of the type of radiation responsible for the major part of the projected exposure, i.e., protons in the neighborhood of 100 MeV Monitoring chromosome abnormalities in peripheral lymphocytes is one method to determine an individual's accumulated radiation dosage. Cell culture and harvest is a relatively simple procedure and is well within the capabilities of a station health facility, but the evaluation of prepared microscopic slides is a time consuming and subjective procedure. This project is part of an effort to demonstrate the utility of automated image processing and evaluation procedures in expediting dose evaluation. The initial goal of this project is to produce a set of reference chromosome spreads produced from control lymphocytes and from lymphocytes exposed in whole blood to protons or gamma rays. The results of manual and automated aberration scoring will ultimately be compared to test for systematic differences between the two evaluation procedures and between the two radiation qualities. Proton irradiations are performed at the University of Texas Health Science Center at Houston Cyclotron Facility. Proton dosimetry is supplemented by TLD packets from and by assay of short-lived proton activation products in the irradiation blood samples. Author

N86-31432*# Missouri Univ., St. Louis. Dept. of Computer Science.

INTEGRATION OF AN EXPERT SYSTEM INTO A USER INTERFACE LANGUAGE DEMONSTRATION c61

Daniel C. StClair *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program. 1985 Jul. 1986 47 p (For primary document see N86-31409 22-80)

Avail: NTIS HC A99/MF E03 CSCL 09B

The need for a User Interface Language (UIL) has been recognized by the Space Station Program Office as a necessary tool to aid in minimizing the cost of software generation by multiple users. Previous history in the Space Shuttle Program has shown that many different areas of software generation, such as operations, integration, testing, etc., have each used a different

user command language although the types of operations being performed were similar in many respects. Since the Space Station represents a much more complex software task, a common user command language--a user interface language--is required to support the large spectrum of space station software developers and users. To assist in the selection of an appropriate set of definitions for a UIL, a series of demonstration programs was generated with which to test UIL concepts against specific Space Station scenarios using operators for the astronaut and scientific community. Because of the importance of expert system in the space station, it was decided that an expert system should be embedded in the UIL. This would not only provide insight into the UIL components required but would indicate the effectiveness with which an expert system could function in such an environment.
Author

N86-31433*# University of Southeastern Louisiana, Hammond. Dept. of Biological Sciences.
IN VITRO CYTOGENETIC STUDIES OF ORGANIC CHEMICALS FOUND AS CONTAMINANTS IN SPACECRAFT CABIN ATMOSPHERES c45
Joseph Torres *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 6 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 13B

Astronauts can be exposed during spaceflight to organic chemical contaminants in the spacecraft cabin atmosphere. Toxic exposures may cause lesions in the cellular DNA which are subsequently expressed as sister-chromatid exchanges (SCE). Analysis of SCE is a sensitive short-term assay technique to detect and quantitate exposures to DNA-damaging (mutagenic) substances. The increase in SCE incidence over baseline (control) levels is generally proportional to the concentration of the mutagen and to the duration of exposure. Dichloromethane (methylene chloride) was chosen for this study since it occurred as an atmospheric contaminant in ten of the first 12 STS flights, and has been reported to have toxic and mutagenic effects in various test systems. Glutaraldehyde was chosen because relatively few data are available on the toxicity or mutagenicity of this common biological fixative, which is carried on STS flights for use in biological experiments. The BHK-21 baby hamster kidney cell line was the in vitro test system used in this study. Neither dichloromethane (10 ppm to 500 ppm) nor glutaraldehyde (1 ppm to 10 ppm) increased SCE levels following 20-hour exposure of BHK-21 cells to the test chemicals.
Author

N86-31434*# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Electrical Engineering.
CSTAR STAR CATALOGUE DEVELOPMENT c89
Jo A. Uhde-Lacovara *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 14 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 03A

The Continuous Stellar Tracking Attitude Reference (CSTAR) system is an in-house project for the Space Station to provide high accuracy, drift free attitude and angular rate information for the GN&C system. Constraints exist on the star catalogue incorporated in the system. These constraints include the following: mass memory allocated for catalogue storage, star tracker imaging sensitivity, the minimum resolvable separation angle between stars, the width of the field of view of the star tracker, and the desired number of stars to be tracked in a field of view. The Smithsonian Astrophysical Observatory (SAO) catalogue is the basis reference for this study. As it stands, the SAO does not meet the requirements of any of the above constraints. Star selection algorithms have been devised for catalogue optimization. Star distribution statistics have been obtained to aid in the development of these rules. VAX based software has been developed to implement the star selection algorithms. The software is modular and provides a design tool to tailor the catalogue to available star tracker technology. The SAO catalogue has been optimized for the requirements of the present CSTAR system.
Author

N86-31435*# Rice Univ., Houston, Tex. Dept. of Mechanical Engineering and Materials Science.
LASER TECHNIQUES FOR ARC JET PLASMA DIAGNOSTICS; CONTINUATION OF A FEASIBILITY AND DESIGN STUDY c75
F. A. Wierum *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 33 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 20I

This study is concerned with the continuation of a feasibility and design study of laser-based diagnostic techniques for the non-instrusive measurement of species concentrations, temperatures, and velocity in the low density, high enthalpy flow through the arc-heated wind tunnel facility (ARMSEF) at NASA/JSC. Last summer several laser-induced radiation scattering methods were investigated and some preliminary measurements of the spectral distribution of radiation emitted by the arc-heated gas flow were made. Based upon those preliminary measurements and subsequent investigations, four laser-induced radiation scattering methods were selected for further detailed study, and preliminary design of a measurement system has been undertaken. Further measurements of the spectral distribution of radiation emitted from the arc-heated free stream and shock layer flows, using a redesigned measurement system, have been made for one axial position in the flow for a range of tunnel operating power levels. Further study of the literature for physical property data, theoretical models of processes, and applications of the diagnostic methods has been also carried out.
Author

N86-31436*# Houston Univ., Tex. Dept. of Human Development.
SELECTION OF AN APPROPRIATE ANIMAL MODEL FOR STUDY OF BONE LOSS IN WEIGHTLESSNESS c55
Ira Wolinsky *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 7 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 06S

Prolonged weightlessness in space flight results in a slow progressive demineralization of bone accompanied by an increased calcium output in the urine resulting in negative calcium balances. This possibly irreversible bone loss may constitute a serious limiting factor to long duration manned space flight. A number of preventative measures have been suggested, i.e., exercise during flight, dietary calcium supplements, use of specific prophylactic drugs. In order to facilitate research in these areas it is necessary to develop appropriate ground-based animal models that simulate the human condition of osteoporsis. An appropriate animal model would permit bone density studies, calcium balance studies, biochemical analyses, ground-based simulation models of weightlessness (bed rest, restraint, immobilization) and the planning of inflight experiments. Several animal models have been proposed in the biomedical research literature, but have inherent deficiencies. The purpose of this project was to evaluate models in the literature and determine which of these most closely simulates the phenomenon of bone loss in humans with regard to growth, bone remodeling, structural, chemical and mineralization similarities to human. This was accomplished by a comprehensive computer assisted literature search and report. Three animal models were examined closely for their relative suitability: the albino rat, monkey, and Beagle.
Author

N86-31437*# Hampton Inst., Va.
HAMPTON UNIVERSITY/AMERICAN SOCIETY FOR ENGINEERING EDUCATION/NASA SUMMER FACULTY FELLOWSHIP PROGRAM 1986 Contractor Report, 2 Jun. - 8 Aug. 1986
John H. Spencer, comp. Sep. 1986 124 p
(Grant NGT-47-020-800)
(NASA-CR-178169; NAS 1.26:178169) Avail: NTIS HC A06/MF A01 CSCL 05I

Since 1964, the National Aeronautics and Space Administration (ASA) has supported a program of summer faculty fellowships r engineering and science educators. In a series of collaborations etween NASA research and development centers and nearby niversities, engineering faculty members spend 10 or 11 weeks orking with professional peers on research. The Summer Faculty rogram Committee of the American Society of Engineering ducation supervises the programs. Objectives: (1) To further the rofessional knowledge of qualified engineering and science faculty embers; (2) to stimulate and exchange ideas between participants nd NASA; (3) To enrich and refresh the research and teaching ctivities of participants' institutions; (4) to contribute to the esearch objectives of the NASA center. Program Description: College or university will be faculty members appointed as Research Fellows to spend 10 weeks in cooperative research and study at he NASA-Langley Research Center. The Fellow will devote pproximately 90 percent of the time to a research problem and he remaining time to a study program. The study program will onsist of lectures and seminars on topics of general interest or hat are directly relevant to the Fellows' research project. The ecturers and seminar leaders will be distinguished scientists and ngineers from NASA, education or industry. Author

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-31438# Office of the Deputy Under Secretary of Defense for Research and Development (Research and Advanced Technology), Washington, D.C.
THE DEPARTMENT OF DEFENSE STATEMENT ON SCIENCE IN THE MISSION AGENCIES AND FEDERAL LABORATORIES BEFORE THE TASK FORCE ON SCIENCE POLICY OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY OF THE UNITED STATES HOUSE OF REPRESENTATIVES, 99TH CONGRESS, FIRST SESSION
Donald I. Carter 2 Oct. 1985 23 p
(AD-A166041) Avail: NTIS HC A02/MF A01 CSCL 14/2

The DoD is supporting a vigorous Science and Technology program which is designed to assure the continued technological superiority of our defense systems. The program is planned to meet our critical needs and exploit technological opportunities. From basic research through development, our program successfully integrates the efforts of the university, industrial and in-house laboratory performers. Through attentive management and careful coordination we are maximizing the return on our S&T investment. We see areas which require our concern and attention to maintain the momentum of our S&T program. We are addressing the critical areas of science and engineering education and laboratory modernization. GRA

N86-31439# Office of the Deputy Under Secretary of Defense for Research and Development (Research and Advanced Technology), Washington, D.C.
THE DEPARTMENT OF DEFENSE STATEMENT ON SCIENCE IN THE SCIENCE AND TECHNOLOGY PROGRAM BEFORE THE SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE COMMITTEE ON ARMED SERVICES OF THE UNITED STATES HOUSE OF REPRESENTATIVES, 99TH CONGRESS, SECOND SESSION
Ronald L. Kerber 12 Mar. 1986 46 p
(AD-A166042) Avail: NTIS HC A03/MF A01 CSCL 14/2

Topics discussed in the statement, promising opportunities are being explored in the non-medical aspects of biotechnology research to increase the efficiency and reduce costs in logistics functions, robotics and manufacturing sciences. The program is balanced to cover these and other revolutionary and evolutionary technologies essential for modernization of future forces. The Department is committed to ensuring that the Science and Technology (S&T) program is maintained at a viable level and that it will continue to be performed by a combination of industry, universities and DoD in-house laboratories. It is our view that this broad innovative base has served the country well and we will continue to depend upon it for the concepts, equipment and techniques needed for continued U.S. national security strength. GRA

N86-31440# Alphatech, Inc., Burlington, Mass.
HQ AFSC/TE (HEADQUARTERS, AIR FORCE SYSTEMS COMMAND DEPUTATE FOR TEST AND EVALUATION) RESOURCE MANAGER'S HANDBOOK
Steven R. Smith Apr. 1986 49 p
(Contract N00014-84-C-0458)
(AD-A166705; ACSC-86-2350) Avail: NTIS HC A03/MF A01 CSCL 05/1

This handbook will give the HQ AFSC/TE (Air Force Systems Command Deputate for Test and Evaluation) resource manager an abbreviated overview of the Planning, Programming, and Budgeting System (PPBS), AFSC implementation of PPBS, a discussion of AFSC's corporate review structure, an explanation of the documents used in the PPBS review process, and some resource manager's lessons learned in dealing with PPBS. This handbook is intended to be a starting point for newly assigned resource managers and a reference for fully trained resource managers and supervisors. The handbook will inform the resource manager concerning the PPBS process he will be involved in. GRA

N86-31441# Air Command and Staff Coll., Maxwell AFB, Ala.
A PRIMER FOR PROGRAM MANAGERS: EMBEDDED SOFTWARE ACQUISITION
Cecilia C. Albert Apr. 1986 40 p
(AD-A166731; AD-E801284; ACSC-86-0045) Avail: NTIS HC A03/MF A01 CSCL 15/5

Computer Software has become an ever increasing element in today's major defense system acquisitions. This study was written for the program manager with no software experience who is faced with the prospect of acquiring a major defense system which contains embedded software. It provides an overview of the software development process and a discussion of why things go wrong. Both the software development itself and the implications of the software on the system are considered. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-31442# Department of Defense, Washington, D. C. Directorate for Information Operations and Reports.
DEFENSE ACQUISITION MANAGEMENT DATA SYSTEM CODE TRANSLATION MANUAL FISCAL YEAR 1985 Annual Report
1985 15 p
(AD-A165987; DIOR/MN04-85) Avail: NTIS HC A02/MF A01 CSCL 05/2

The first line of each entry identifies the contractor, the place of performance (city and state or country), the contractors unique identification number (DUNS code), and the codes (FIPS) for the place of performance. Data on each individual award to that contractor are then displayed on the following lines. This manual provides information on the meaning of the column headings which apply to those lines. This manual is intended to assist the user of these computer listings in understanding the range of data presented. While the meanings of many of the codes used in the listing are provided here, not all codes have been explained. Where applicable, references have been provided which identify other DIOR manuals and/or regulations that the reader may find useful. GRA

N86-31443# University of Southern California, Marina del Rey. Information Sciences Inst.
A GUIDE TO LEXICAL ACQUISITION IN THE JANUS SYSTEM
Susanna Cumming and Robert Albano Feb. 1986 82 p
(Contract MDA903-81-C-0335)
(AD-A166078; ISI/RR-85-162) Avail: NTIS HC A05/MF A01 CSCL 05/7

This document is a users' guide to LapItUp, the program which is used to add words to the Master Lexicon component of the JANUS natural language system, where syntactic, morphological, orthographic and semantic information particular to individual words and phrases is stored. The Master Lexicon is designed to serve all the lexical needs of the two grammars which form part of the JANUS system: RUS, an ATN parsing grammar, and Nigel, a systemic generation grammar. The user's guide contains a description of the organization of the Master Lexicon, instructions for adding words to the lexicon, and descriptions of each of the features that can be acquired using LapItUp. There are two important aspects to the Master Lexicon: the wordclass organization, which organizes the syntactic and morphological features used in lexical item specification, and the lexical item organization. In addition to a feature specification, the latter contains cross-indexing information or properties, semantic pointers, and record-keeping information. LapItup uses the wordclass hierarchy to guide the use through a series of choices, presented in the form of menus of features with accompanying descriptive text. In addition, LapItUp contains facilities for acquiring morphological information, properties, and the other kinds of auxiliary information. GRA

N86-31444# Defense Technical Information Center, Alexandria, Va.
INFORMATION ANALYSIS CENTERS IN THE DEPARTMENT OF DEFENSE Final Report
M. C. Rothschild Apr. 1986 166 p
(AD-A167001; DTIC/TR-86/4) Avail: NTIS HC A08/MF A01 CSCL 05/2

The Department of Defense (DoD) Information Analysis Centers (IACs) have been assisting the research, development, and engineering efforts of the defense community for over forty years by analyzing, repackaging, and disseminating highly technical information in specialized subject areas to a select community. An overview of the IACs is presented, including an analysis of the IAC concept, followed by a brief history of the DoD IACs and an examination of some of the issues of concern to DoD IACs. IACs are not without their problems; nevertheless, they continue to have a significant role in the transfer of scientific and technical information. GRA

N86-31445# Defense Technical Information Center, San Diego, Calif. Matris Office.
DIRECTORY OF RESEARCHES FOR HUMAN RESEARCH AND DEVELOPMENT PROJECTS
1 May 1986 119 p
(AD-A167100) Avail: NTIS HC A06/MF A01 CSCL 05/2

The Directory of Researchers for Human Research and Development Projects lists individuals who perform and/or manage current people-related research and development for the Department of Defense. It is one of several documents produced at the Defense Technical Information System (MATRIS) office. MATRIS is an expanded information system that includes the data formerly contained in the Research and Development Information System (RDIS). This edition of the Directory of Researchers has been cosponsored and prepared with the support of the Office of the Assistant Secretary of Defense, Force Management and Personnel (OASD/FM&E), and the Office of the Under Secretary of Defense, Research and Engineering (OUSD/R&E). GRA

N86-31446# Polydyne and Associates, Inc., San Mateo, Calif.
COST DATA MANAGEMENT SYSTEM, CDMS VERSION 2.2 Final Report
J. M. Weingart Dec. 1985 118 p
(Contract DE-AC04-76DR-00789)
(DE86-005064; SAND-85-8178) Avail: NTIS HC A06/MF A01

The Cost Data Management System (CDMS) is a cost data base computer program developed by Polydyne, Inc. and Associates for Sandia National Laboratories Livermore (SNLL). This program constitutes a unique and powerful tool for interactive development and documentation of complex cost data bases for power plants and other construction projects. This program is operational on the Digital Equipment Corporation's VAX computers operating under the latest version (4.1) of the VMS operating system. The original version of the CDMS (Version 1.1) has been extensively used by SNLL in the development, documentation, and analysis of the cost data base for Solar One. As a result of this work, a number of desirable enhancements to the CDMS were identified, and as a follow-on effort, Polydyne, Inc. has revised the original software. This report summarizes the extensive revisions and enhancements made to the CDMS, and discusses the features of the new program (CDMS Version 2.2). DOE

N86-31447# Oak Ridge National Lab., Tenn.
ISSUES IN DEVELOPING A DISTRIBUTED DATA ACQUISITION AND CONTROL SYSTEM
W. W. Manges 1986 4 p Presented at the 18th Southeast Symposium on System Theory, Knoxville, Tenn., 7 Apr. 1986
(Contract DE-AC05-84OT-21400)
(DE86-005491; K/AIS-5005; CONF-860479-2) Avail: NTIS HC A02/MF A01

This paper discusses issues and implications in the development of a minicomputer-based, distributed intelligence data acquisition and control system to support complex experimental facilities. Atomic Vapor Laser Isotope Separation is typical of programs that require the large-scale experimental facilities that have led to the design philosophy described in this paper. Incorporating computer systems in the instrumentation of ORNL's experimental facilities has increased productivity. However, several challenging issues must be addressed in developing such systems: (1) scientific as well as engineering goals; (2) ultimate goals with intermediate capabilities; (3) budget, scope, and schedule fluctuations; and (4) overlapping maintenance and development. The techniques and philosophy were used to provide the computer system hardware, software, architecture, and interfaces for the instrumentation and control system for large-scale developmental facilities which were developed for use at ORNL, but can be related to developing any large-scale experimental facility. DOE

N86-31448# Oak Ridge National Lab., Tenn. Fusion Energy Library.
INTEGRATED LIBRARY SYSTEM AT ORNL: LION
Ta-Chang Liu Mar. 1986 11 p
(Contract DE-AC05-84OR-21400)
(DE86-008867; DOE/OR-21400/T257) Avail: NTIS HC A02/MF A01

Viewgraphs describing the ORNL minicomputer system LION comprise the report. This library system provides information resources and services to support research and development activities. DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-31449# Committee on Appropriations (U. S. House).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-

INDEPENDENT AGECIES APPROPRIATIONS BILL, 1987
Boland Washington GPO 1986 84 p Presented by the Committee on Appropriations, 99th Congr., 2d Sess., 31 Jul. 1986 (H-Rept-99-731; GPO-61-562) Avail: US Capitol, House Document Room

The recommendations for the federal budget allocations for the Department of Housing and Urban Development and 17 independent agencies and offices are discussed. For individual titles, see N86-31450.

N86-31450# Committee on Appropriations (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Department of Housing and Urban Development-Independent Agencies Appropriations Bill, 1987 1986 p 42-49 (For primary document see N86-31449 22-84)
Avail: US Capitol, House Document Room

Budget allocations for the orbital space station, space flight control and data communications, space shuttles, construction of new facilities, research and project management, Advanced Communications Technology Satellite (ACTS) program, space commercialization, and the shuttle infrared telescope facility (SIRTF) are discussed. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-31451*# National Aeronautics and Space Administration, Washington, D.C.
SPINOFF 1985
James J. Haggerty 1986 131 p
(NASA-TM-89240; NAS 1.15:89240) Avail: NTIS HC A07/MF A01 CSCL 05A

Mainline NASA programs, whose challenging objectives necessitate advances across a diverse scientific/technological spectrum are summarized. A representative selection of spinoff products and processes are presented and the NASA technology from which these transfers are derived, are described. The mechanisms NASA employs to foster technology utilization and stimulate interest among prospective users of the technology are detailed. B.G.

N86-31452*# Sverdrup Technology, Inc., Cleveland, Ohio.
EVALUATION OF A STIRLING ENGINE HEATER BYPASS WITH THE NASA LEWIS NODAL-ANALYSIS PERFORMANCE CODE Final Report
Timothy J. Sullivan May 1986 26 p
(Contracts NAS3-24105; DE-AI01-77CS-51040)
(NASA-CR-179460; DOE/NASA/4105-1; E-3113; NAS 1.26:179460) Avail: NTIS HC A03/MF A01 CSCL 10B

In support of the U.S. Department of Energy's Stirling Engine Highway Vehicle Systems program, the NASA Lewis Research Center investigated whether bypassing the P-40 Stirling engine heater during regenerative cooling would improve engine performance. The Lewis nodal-analysis Stirling engine computer simulation was used for this investigation. Results for the heater-bypass concept showed no significant improvement in the indicated thermal efficiency for the P-40 Stirling engine operating at full-power and part-power conditions. Optimizing the heater tube length produced a small increase in the indicated thermal efficiency with the heater-bypass concept. Author

N86-31453# Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.
AFOSR (AIR FORCE OFFICE OF SCIENTIFIC RESEARCH) TECHNICAL REPORT SUMMARIES Quarterly Report, Oct. - Dec. 1985
Barbara J. Wert Dec. 1985 267 p
(AD-A166142; AFOSR-TR-86-0093) Avail: NTIS HC A12/MF A01 CSCL 05/2

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly in March, June, September, and December of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports. The Subject index has a Subject field title of reports and AD number (Accession Number). The Personal author index has a Primary author, Title of Report and AD Number. The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting. Examples of topics are: Ion Bombardment, Lasers, Air Flow, and Radar Reflections. GRA

N86-31454# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
FISCAL YEAR 1987 TECHNICAL OBJECTIVE DOCUMENT Annual Report, Jan. 1985 - Jan. 1986
Mar. 1986 115 p Supersedes AFWAL-TR-85-2000
(AD-A166659; AFWAL-TR-86-2000; AFWAL-TR-85-2000) Avail: NTIS HC A06/MF A01 CSCL 21/5

This Technical Objective Document was prepared to provide science and industry with specific technical objectives which the Air Force feels are critical to maintain aerospace superiority in the future. The TOD contains three functional areas (Aircraft, Missile and Space) which provide planning objectives covering the technical disciplines of airbreathing propulsion, aerospace vehicle power, fire protection, and aircraft and missile fuels and lubrication. GRA

N86-31455# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 40, NUMBER 5 Monthly Report
C. J. Fox May 1986 46 p
(AD-A166682; ESN-40-2-Vol-40-No-5) Avail: NTIS HC A03/MF A01 CSCL 05/2

European Science Note (ESN) is a monthly publication with brief articles on recent developments in European scientific research. This issue includes articles on the following topics: Neurobiology Research in Belgium; Plant Genetics Systems/University/Industry Collaboration; Euromech 201. Applications of the mechanics of granular materials to geophysics; Fracture Research at the Fraunhofer-Gesellschaft for Werkstoffmechanik; Institut De soudre (The French Welding Institute); The first International Conference on Laser Anemometry; Turbulent Flow Meeting in Cardiff; INRIA Conference on Computing Methods in Applied Sciences and Engineering., Military Applied Laser Research at FIAR of Milan; Optoelectronics, Quantum Optics, Quantum Electronics and Instability Research in Florence; Science Policy -- Collaborative government-industry research at Fraunhofer-Gesellschaft. GRA

N86-31456# Air Force Human Resources Lab., Brooks AFB, Tex.
[SUMMARY OF THE TECHNICAL OBJECTIVES OF AIR FORCE EFFORTS IN THE FIELDS OF TRAINING AND PERSONNEL SYSTEMS TECHNOLOGY] Report, fiscal year 1987
Apr. 1986 36 p
(AD-A167348; AFHRL-TR-86-16) Avail: NTIS HC A03/MF A01 CSCL 05/9

This document provides the academic and industrial research and development community with a summary of the technical objectives of Air Force efforts in the fields of training and personnel systems technology. The areas covered are (a) manpower and

force management, (b) logistics technology, and (c) training technology. GRA

N86-31457# Wisconsin Board of Vocational, Technical and Adult Education, Madison.
WISCONSIN ELECTRIC AND HYBRID VEHICLE DEMONSTRATION PROJECT Final Report, 1981 - 1985
10 Feb. 1986 7 p
(Contract DE-FC08-81NV-10243)
(DE86-009318; DOE/NV-10243/1) Avail: NTIS HC A02/MF A01

In 1981, the Wisconsin Board of Vocational, Technical and Adult Education (WBVTAE) was selected by the US Department of Energy for participation in the National Electric and Hybrid Vehicle Demonstration Program. On September 30, 1985, the data collection phase of the project was completed. The project was to purchase ten (10) electric vehicles and assign five (5) to Northeast Wisconsin Technical Institute (NWTI) in Green Bay and five (5) vehicles to the Madison Area Technical College. DOE

N86-31458# Tennessee Valley Authority, Chattanooga. Div. of Energy Demonstrations and Technology.
ELECTRIC VEHICLE TRACTION BATTERY MODULE MONITOR TEST RESULTS FOR WYLE AND PROPEL SYSTEMS
R. K. Buffett and T. W. Blickwedel May 1985 96 p
(DE86-900543; TVA/OP/EDT-85/21) Avail: NTIS HC A05/MF A01

The Wyle and Propel units for monitoring parameters of the traction battery of electric vehicles were tested by the Tennessee Valley Authority (TVA). The monitors are designed to indicate modules that are providing significantly less energy than other modules in the battery pack and which therefore need maintenance or need to be replaced. Testing was performed on the bench as a part of static load tests, and in vehicles. Both monitors sought to detect low energy capacity modules by measurement of pack current, evaluation of an equation, and comparison of the result with the actual voltage of each module. With the Wyle breadboard unit, the equation parameters were adjustable; whereas with the Propel unit, the equation parameters were not adjustable. Based on the results from static load tests, the Wyle monitor was deemed unacceptable due to numerous false alarms exhibited in its use. The Propel monitor detected low energy capacity modules and reliably indicated modules with a low electrolyte level. During static load tests, the pack voltage and current, as well as each module voltage, were recording using a digital computer, and results were compared with those displayed by the monitor under test. The monitors were tested in Volkswagen Electrotransporter electric vehicles for over one year. About 5989 miles were logged with the Wyle, and about 6015 miles were logged with the Propel DOE

N86-31459# Technische Physische Dienst TNO-TH, Delft (Netherlands).
[ACTIVITIES REPORT IN APPLIED PHYSICS] Annual Report 1983
1984 69 p In ENGLISH and DUTCH
(ESA-86-97387) Avail: NTIS HC A04/MF A01

Research concerning acoustics; heat; human environment; optical instrumentation; data processing and information systems; glass ceramics; and X-ray diffraction is described. A simulation model to predict noise transmission in open air; a method for speech intelligibility determination in halls and similar places; solar houses; a laser ranger to determine the distance to geodetic satellites; a simulation model of the pulping process in the paper industry; and a miniature echo-acoustic sensor for a small diving vessel are discussed. ESA

N86-31460# Kiruna Geophysical Inst. (Sweden).
[ACTIVITIES REPORT OF THE GEOPHYSICAL INSTITUTE] Annual Report, 1985
Lars Eliasson, ed. and Ingrid Sandahl, ed. 1986 52 p
(ISSN-0283-1686; ESA-86-97226) Avail: NTIS HC A04/MF A01

Research activities concerning hot plasmas (experimental studies using satellites, theoretical studies, and ionospheric and magnetospheric research based on sounding rocket experiments); computer simulation of plasma; and research based on ground based instrumentation (EISCAT, optical methods) are summarized. A laboratory for mechanical waves; and the program of the geophysical observatory are described. ESA

N86-31461# Amsterdam Univ. (Netherlands). Dept. of Science Dynamics.
EVALUATION OF RESEARCH: EXPERIENCES AND PERSPECTIVES IN THE NETHERLANDS
Stuart Blume, Henk Dits, Peter Groenewegen, Loet Leydesdorff, Ad Prins, Jan Willem Smeenk, Jack Spaapen, and Sjerp Zeldenrust Dec. 1984 47 p
(ESA-86-96709) Avail: NTIS HC A03/MF A01

Dutch research is evauated in relation to government science and technology policy. Universities and special research institutes are covered. ESA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-31462*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
[ACTIVE PLASMA RELEASE EXPERIMENTS]
1986 81 p
(Grant NAG5-610)
(NASA-CR-176897; NAS 1.26:176897) Avail: NTIS HC A05/MF A01 CSCL 03A

A pulse code modulator (PCM) encoder capable of storing data onboard into the mass memory in the encoder at up to 12 megabits per second was designed and constructed. This telemetry system was programed for two successful flights. All parts of the electronic system functioned perfectly during both previous flights and the detectors performed perfectly. However, in the first flight in Pokerflat, Alaska, an electron arm did not deploy for reasons as yet unkown. The ion arm deployed perfectly and good data was acquired. For individual titles, see N86-31463 through N86-31464.

N86-31463*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
A MAGNETOSPHERIC CRITICAL VELOCITY EXPERIMENT: PARTICLE RESULTS
R. B. Torbert and Patrick T. Newell *In its* Active Plasma Release Experiments 1986 29 p (For primary document see N86-31462 22-89)
Avail: NTIS HC A05/MF A01 CSCL 03A

In March of 1983, a barium injection sounding rocket experiment (The Star of Lima) was conducted to investigate Alfven's critical ionization velocity (CIV) hypothesis in space. Included in the instrumented payload was a particle detection experiment consisting of five retarding potential analyzers. Despite conditions that appeared to be optimal for the critical velocity effect, the particle data, in agreement with optical observations, indicates that a fractional ionization of only approximately .0005 was observed, indicating that the conditions required for the effect to occur are still not well understood. However many of the required phenomena associated with the CIV effect were observed; in particular a superthermal electron population was formed at the expense of ion drift kinetic energy in the presence of intense electrostatic waves near the lower hybrid frequency. The amount of ionization

produced is plausibly consistent with the observed electron flux, but could also be accounted for by residual solar UV at the injection point. It is shown based on the data set that one obvious explanation for the low ionization efficiency, namely that the ionizing superthermal electrons may rapidly escape along field lines, can be ruled out. Author

N86-31464*# Alaska Univ., Fairbanks. Geophysical Inst.
BLACK HOLES, WAVES, AND ENERGIZED PARTICLES FROM HIGH ALTITUDE EXPLOSIVE PLASMA PERTURBATION EXPERIMENTS
E. M. Wescott, H. C. Stenbaek-Nielsen, T. Hallinan, C. Deehr, J. Romick, J. Olson, M. C. Kelley (Cornell Univ., Ithaca, N.Y.), R. Pfaff, R. B. Torbert (California Univ., San Diego.), P. Newell et al *In* California Univ. Active Plasma Release Experiments 1986 52 p (For primary document see N86-31462 22-89)
Avail: NTIS HC A05/MF A01 CSCL 03A

High explosive shaped charge experiments King Crab, Bubble Machine I and II, designed to perturb the ambient plasma and magnetic fields were flown above 460 km on Taurus Tomahawk rockets from Poker Flat in March 1980, 1981, and 1982, respectively. The last two flights were a mother-daughter combination with the instrumentation section remaining attached to the rocket. The first experiment, King Crab, revealed the existence of a barium plasma depleted region or black hole of about 5 km diameter centered on the burst. All electric power to the instruments failed on the liftoff of the 1981 Bubble Machine I, but useful optical data were obtained. The third flight a year later produced useful data from all but the electron detector. Ground based optical and telluric field instrumentation recorded evidence for injection induced waves of about 5 second period. Delay times indicate a slow (175 to 385 km/sec) propagation from the burst point. Concerning locally produced electrostatic instabilities the wave measurements indicate that finite Larmor radius stabilization occurs for the weakly driven low (barium) density situation, but that shorter wavelength waves can occur early in the expansion event when the barium density is higher. Author

N86-31465*# Lowell Observatory, Flagstaff, Ariz.
THE SIZE, SHAPE, DENSITY, AND ALBEDO OF CERES FROM ITS OCCULTATION OF BD+8 DEG 471
R. L. Millis, L. H. Wasserman, O. G. Franz, R. A. Nye, R. C. Oliver, T. J. Kreidl, S. E. Jones, W. Hubbard (Arizona Univ., Tucson.), L. Lebofsky, R. Goff et al 1986 36 p Sponsored in part by F. I. T., Office of Development, and by American Astronautical Society
(Grants NsG-7603; NsG-7500; NsG-7045; NsG-7322; NsG-7114; NsG-7526; NSF 84-14141)
(NASA-CR-177089; NAS 1.26:177089) Avail: NTIS HC A03/MF A01 CSCL 03A

The occultation of BD+8 degrees 471 by Ceres on 13 November 1984 was observed photoelectrically at 13 sites in Mexico, Florida, and the Caribbean. These observations indicate that Ceres is an oblate spheroid having an equatorial radius of 479.6 + or - 2.4 km and a polar radius of 453.4 + or - 4.5 km. The mean density of this minor planet is 2.7 gm/cubic cm + or - 5%, and its visual geometric albedo is 0.070. While the surface appears globally to be in hydrostatic equilibrium, firm evidence of real limb irregularities is seen in the data. Author

N86-31466*# Cornell Univ., Ithaca, N.Y. Dept. of Astronomy.
OBSERVATIONS OF FAR-INFRARED MOLECULAR EMISSION LINES FROM THE ORION MOLECULAR CLOUD Ph.D. Thesis
Paul Joseph Viscuso Aug. 1986 236 p
(Grant NsG-2347)
(NASA-CR-176876; NAS 1.26:176876; CRSR-849) Avail: NTIS HC A11/MF A01 CSCL 03A

The Orion Nebula was the subject of intensive study for over one hundred years. Recently, several far infrared transitions among the low-lying levels of OH were observed toward IRc2. The OH is thought to be abundant, and plays an important role in the chemical evolution of shock and post-shock regions. The OH emission serves as a sensitive probe of the temperature and density for the shock-processed gas. A rigorous treatment of the radiative transfer of these measured transitions was performed using the escape probability formalism. From this analysis, the temperature of the OH-emitting region was determined to be on the order of 40K. This suggests that the gas is part of the post-shock gas that has cooled sufficiently, most likely by way of radiative cooling by CO. Such cooling from shock temperatures of several degrees can be accomplished in 100 years. A molecular hydrogen density of 3 million/cubic cm and an OH column density of 1.0 x 10 to the 17th /sq cm is found. The beam filling factor is determined to be 36%. Author

N86-31467*# Washington Univ., Seattle. Dept. of Astronomy.
A STUDY OF THE DISCREPANT QSO X-RAY LUMINOSITY FUNCTION FROM THE HEAO-2 DATA ARCHIVE Final Technical Report
Bruce Margon 1986 64 p
(Grant NAG8-433)
(NASA-CR-176875; NAS 1.26:176875) Avail: NTIS HC A04/MF A01 CSCL 03A

Sensitive X-ray information for approximately 90 previously uncataloged Quasi-Stellar Objects (QSOs) in the redshift range 1.8 is less than or equal to z which is less than or equal to 3. Even with the longest existing Einstein Observatory X-ray exposures, only 25% of these objects are positively detected in X-rays The data were used to investigate the ensemble X-ray properties of high redshift QSOs, and the QSO population in general. B.G.

N86-31468# Army Engineer Topographic Labs., Fort Belvoir, Va.
ASTROGEODETIC DEFLECTIONS OF THE VERTICAL FROM STARS OBSERVATIONS WITH THE DANJON ASTROLABE, OR SIMILAR INSTRUMENTS
Angel A. Baldini 1985 9 p
(AD-A166886; ETL-R-079) Avail: NTIS HC A02/MF A01 CSCL 03/1

This report is a sequel to the report Basic Formulae for Determining the Computation of the Deflection of the Vertical from Astronomic Star Observations (AD-A154 912). It addresses a new observational method that allows one to compute the astronomic zenith distance of the astrolabe instrument as a function of the time when the stars cross the almucantar of the astrolabe and their right ascension and declination, therefore independent of the astronomic station coordinates. The xi and eta deflection of the vertical components are obtained from an equation that relates the astronomic and geodetic zenith distance. The last is derived for each star as a function of the U. T. 1 time and geodetic latitude and longitude. GRA

N86-30773# Construcciones Aeronauticas S.A., Madrid (Spain). Space and Systems Div.
HIGH-STABILITY TELESCOPE STRUCTURES
G. Galipienso and S. DellAmico *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 119-132 (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-30795# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Neue Technologie.
MANUFACTURING TECHNOLOGY OF GRAZING-INCIDENCE MIRROR CARRIERS MADE OF CARBON FIBER REINFORCED EPOXY MATRIX SYSTEMS
J. Klug *In* ESA Proceedings of a Workshop on Composites Design for Space Applications Feb. 1986 p 311-318 Sponsored by ESA (For primary document see N86-30758 22-18)
Avail: NTIS HC A16/MF A01

N86-31434*# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Electrical Engineering.
CSTAR STAR CATALOGUE DEVELOPMENT
Jo A. Uhde-Lacovara *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 14 p (For primary

document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-31469*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTARCTIC METEORITE NEWSLETTER, VOLUME 9, NO. 2
James L. Gooding, ed. Jun. 1986 31 p Sponsored by NSF
(NASA-TM-88774; NAS 1.15P:88774) Avail: NTIS HC A03/MF A01 CSCL 03B

Preliminary description and classifications of meteorites that were completed since publication of the February issue are contained. Most large (greater than 150 g) specimens (regardless of petrologic type) and all pebble sized (less than 150 g) specimens of special petrologic type are represented by separate descriptions. However, specimens of nonspecial petrologic type are listed only as single line entries. For convenience, new specimens are also recast by petrologic type. Each macroscopic description summarizes features that were visible to the eye at the time the meteorite was first examined. Classification is based on microscopic petrography and resonnaissance-level electron-probe microanalysis. The pairing list was updated. B.G.

N86-31470*# Delaware Univ., Newark. Dept. of Physics.
EX-111 THERMAL EMISSION FROM HOT WHITE DWARFS: THE SUGGESTED He ABUNDANCE-TEMPERATURE CORRELATION. EX-112: THE UNIQUE EMISSION LINE WHITE DWARF STAR GD 356 Semiannnual Status Report, 1 Dec. 1985 - 1 Jun. 1986
Harry L. Shipman 27 Aug. 1986 110 p
(Grant NAG8-564)
(NASA-CR-176866; NAS 1.26:176866) Avail: NTIS HC A06/MF A01 CSCL 03B

Progress in the EXOSAT data analysis program is reported. EXOSAT observations for four white dwarfs (WD1031-115, WD0004+330, WD1615-154, and WD0109-264) were obtained. Counting rates were unexpectedly low, indicating that these objects have a substantial amount of x-ray absorbing matter in their photosheres. In addition, soft x-ray pulsations characterized by a 9.25 minute cycle were discovered in the DA white dwarf V471 Tauri. A residual x-ray flux from the K dwarf companion can be seen during the white dwarf eclipse at orbital phase 0.0. Pronounced dips in the soft x-ray light curve occur at orbital phases 0.15, 0.18, and 0.85. The dips may be correlated with the triangular Lagrangian points of the binary orbit. Smaller dips at phases near the eclipse may be associated with cool loops in the K star corona. Data for the white dwarf H1504+65 was also analyzed. This object is particularly unusual in that its photoshere is devoid of hydrogen and helium. Finally, existing data on the white dwarf Sirius B were analyzed to see what constraints from other data can be placed on the properties of this star. Interrelationships between radius, rotational velocity, and effective temperature were derived. M.G.

N86-31471# Instituto de Fisica Teorica, Sao Paulo (Brazil).
QUASAR-GALAXY ASSOCIATIONS WITH DISCORDANT REDSHIFTS AS A TOPOLOGICAL EFFECT, PART 1
H. V. Fagundes 1984 38 p
(DE86-700669; IFT-P-10/84-Pt-1) Avail: NTIS (US Sales Only) HC A03/MF A01

A previously advanced conjecture is developed, that may eventually solve the quasar redshift controversy in a constructive fashion. The claimed galaxy-quasar and other associations with discordant redshifts are recognized as such, but on the level of a little known possibility: that each associated group is the multiple image of a single source, produced by rays emitted along paths of different lengths. This is allowed by the multiply connected topologies of Friedman's closed models of negative spatial curvature. The distances indicated by the cosmological interpretation of the redshifts are now seen as image distances, only one of them being the source's separation from us. In this first part of a two-paper sequence the problem is dealt in the relatively simple context of a hyperbolic 2-dimensional space. This is physically unrealistic, but leads to a few qualitative observational suggestions and it permits the introduction of the needed mathematical machinery, centered on the tesselations of hyperbolic spaces, in a visualizable way. Thus the reader will be prepared for the less intuitive 3-dimensional research, which is outlined in the last section and will be elaborated in Part II. Some related theoretical topics are discussed along the way. They include reinterpretations of the cosmic isotropy and of the homogeneity principle, and hints of an argumentation for the assumes closure of space. DOE

N86-31472# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
HOMOCLINIC PHENOMENA IN THE GRAVITATIONAL COLLAPSE
J. Koiller, J. R. T. de MelloNeto, and I. D. Soares 1984 15 p Previously announced in AIAA as A85-45751 Prepared in cooperation with Rio de Janeiro Univ., Brazil
(DE86-700671; CBPF-NF-039/84) Avail: (US Sales Only) HC A02/MF A01

A class of Bianchi IX cosmological models is shown to have chaotic gravitational collapse, due to Poincare's homoclinic phenomena. Such models can be programmed so that for any given positive integer N (N=infinity included) the universe undergoes N non-periodic oscillations (each oscillation requiring a long time) before collapsing. For N=infinity the universe undergoes periodic oscillations. DOE

N86-31473# Instituto de Fisica Teorica, Sao Paulo (Brazil).
RELATIVISTIC COSMOLOGIES WITH CLOSED, LOCALLY HOMOGENEOUS SPACE SECTIONS
H. V. Fagundes 1985 12 p Previously announced in AIAA as A85-28135
(DE86-700673; IFT-P-02/85) Avail: NTIS (US Sales Only) HC A02/MF A01

The homogeneous Bianchi and Kantowski-Sachs metrics of relativistic cosmology are investigated through their correspondence with recent geometrical results of Thurston. These allow a partial classification of the topologies for closed, locally homogeneous spaces according to Thurston's eight geometric types. Besides, which of the Bianchi-Kantowski-Sachs metrics can be imposed on closed space sections of cosmological models are learned. This is seen as a progress toward implementation of a postulate of the closure of space for both classical and quantum gravity. DOE

N86-31474# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
UNIFIED MODEL FOR GRAVITY-ELECTRO-WEAK INTERACTIONS
M. Novello and L. M. C. S. Rodrigues 1984 13 p Previously announced in AIAA as A85-43721
(DE86-700688; CBPF-NF-063/84) Avail: NTIS (US Sales Only) HC A02/MF A01

A model is presented in which gravity and electroweak interactions are described in a unique framework. As a consequence very massive particles (of masses approximately 369 and 520.3 GeV) with intermediate W(mu)-W(mu) and W(mu)-Z(mu) interactions are predicted. This new interaction is the short-range counterpart of gravitational interaction. DOE

N86-31475# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
EFFECTIVE POTENTIAL IN N=1, d=4 SUPERGRAVITY COUPLED TO THE VOLKOV-AKULOV FIELD
R. S. Jasinschi and Alexander W. Smith 1984 11 p
(DE86-700634; CBPF-NF-060/84) Avail: NTIS (US Sales Only) HC A02/MF A01

The only-loop effective potential for N=1, d=4 supergravity theory coupled to the Volkov-Akulov field is calculated. Then it is

shown that after an adjustment of some parameters the local supersymmetry is dynamically broken and as a consequence the gravitino acquires mass. DOE

N86-31476# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics.
MAGNETIC FIELDS OF COSMIC BODIES
B. V. Vasilev 1985 6 p In RUSSIAN Submitted for publication (DE86-701119; JINR-R-17-85-255) Avail: (US Sales Only) NTIS HC A02/MF A01

Magnetic fields generation for rotating cosmic bodies due to the gravitationally induced electrical polarization is discussed. DOE

N86-31477# Los Alamos National Lab., N. Mex.
NOVA OUTBURST MODELING AND ITS APPLICATION TO THE RECURRENT NOVA PHENOMENON
W. M. Sparks, S. Starrfield, and J. Truran Dec. 1985 13 p Presented at the Conference on RS Ophiuchi and the Recurrent Nova Phenomenon, Manchester, England, 1 Dec. 1985 Prepared in cooperation with Illinois Univ., Urbana
(Contract W-7405-eng-36)
(DE86-008715; LA-UR-86-806; CONF-851272-1) Avail: NTIS HC A02/MF A01

The thermonuclear runaway (TNR) theory for the cause of the common novae is reviewed. Numerical simulations of this theory were performed using an implicit hydrodynamic Lagrangian computer code. Relevant physical phenomena are explained with the simpler envelope in place calculations. Next the models that include accretion are discussed. The calculations agree very well with observations of common novae. The observational differences between common novae and recurrent novae are examined. We propose input parameters to the TNR model which can give the outburst characteristics of RS Ophiuchi and discuss the implications. This review is concluded with a brief discussion of two current topics in novae research: shear mixing on the white dwarf and Neon novae. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology, and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-31478*# State Univ. of New York, Stony Brook. Lab. for Planetary Atmospheres Research.
STUDIES OF THE AURORALLY-INDUCED ULTRAVIOLET EMISSIONS ON THE NIGHTSIDE OF VENUS Report, 1 Jan. 1985 - 31 Mar. 1986
J. L. Fox 31 Mar. 1986 23 p
(Grant NAG2-329)
(NASA-CR-177004; NAS 1.26:177004) Avail: NTIS HC A02/MF A01 CSCL 03B

The effect of a monoenergetic flux of electrons on a model atmosphere of the nightside thermosphere of Venus was examined. The neutral model chosen is that of Hedin for high solar activity and 165 degrees solar zenith angle. The model is based on measurements made by the Pioneer Venus Orbiter Neutral Mass Spectrometer. Four species were included in the calculation: CO_2, O, CO, and N_2. The numerical method that was chosen for energy deposition of the primary electrons is the continuous slowing down approximation. The secondary electron distribution was computed using the empirically determined shape of the differential cross section. B.G.

N86-31479*# Massachusetts Univ., Amherst. Dept. of Physics and Astronomy.
STUDIES OF RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES Semiannual Status Report, 1 Dec. 1985 - 31 May 1986
William M. Irvine and F. Peter Schloerb 31 Jul. 1986 13 p
(Grant NGL-22-010-023)
(NASA-CR-176898; NAS 1.26:176898) Avail: NTIS HC A02/MF A01 CSCL 03B

A set of high signal-to-noise spectra of the 18 cm OH emission from the comet P/Halley was obtained. During the course of the Halley OH campaign, high signal-to-noise spectra were also obtained on the comets P/Giacobini-Zinner, C/Thiele, and C/Hartley-Good. The HCN observations of Comet Halley were performed during a total of 56 individual observing sessions between 18 November 1985 and 11 May 1986. These observations represent the largest monitoring program of HCN emission from any comet, and moreover, represent the first time that a cometary parent molecule was so extensively observed. In addition to offering a direct means to monitor the production of a parent molecule from the nucleus, these data also provide fundamental information about the kinematics of parent molecules in the coma. Finally, in addition to monitoring HCN from the comet, attempts were also made to detect other molecues via millimeter-wave spectroscopy. Future plans are descussed. B.G.

N86-31480# Los Alamos National Lab., N. Mex.
EXISTENCE OF UNDISCOVERED URANIAN SATELLITES
D. C. Boice Apr. 1986 9 p
(Contract W-7405-eng-36)
(DE86-008161; LA-10669-MS) Avail: NTIS HC A02/MF A01

Structure in the Uranian ring system as observed in recent occultations may contain indirect evidence for the existence of undiscovered satellites. Using the Alfven and Arrhenius (1975, 1976) scenario for the formation of planetary systems, the orbital radii of up to nine hypothetical satellites interior to Miranda are computed. These calculations should provide interesting comparisons when the results from the Voyager 2 encounter with Uranus are made public. DOE

N86-31121*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RIFTING ON VENUS: IMPLICATIONS FOR LITHOSPHERIC STRUCTURE
W. B. Banerdt and M. P. Golombek *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 2 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31130*# Arizona Univ., Tucson. Lunar and Planetary Lab.
TECTONIC DETERMINATIONS OF LITHOSPHERIC THICKNESS ON GANYMEDE AND CALLISTO
Steven K. Croft *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 34-37 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31134*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LITHOSPHERIC STRENGTH OF GANYMEDE: CLUES TO EARLY THERMAL PROFILES FROM EXTENSIONAL TECTONIC FEATURES
M. P. Golombek and W. B. Banerdt *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 45-49 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31142*# Arizona State Univ., Tempe. Dept. of Geology.
HOT-SPOT TECTONICS ON IO
Alfred S. McEwen *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 76-80 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31146*# Arizona State Univ., Tempe. Dept. of Geology.
EXTENSIONAL TECTONICS OF THE SATURNIAN SATELLITES
Jeffrey M. Moore *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 91-92 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31161*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences
RIFT SYSTEMS ON VENUS: AN ASSESSMENT OF MECHANICAL AND THERMAL MODELS
Sean C. Solomon and James W. Head (Brown Univ., Providence, R. I.) *In* Lunar and Planetary Inst. Papers Presented to the Conference on Heat and Detachment in Crustal Extension on Continents and Planets 1985 p 138 - 141 (For primary document see N86-31119 22-46)
Avail: NTIS HC A08/MF A01 CSCL 08G

N86-31415*# Oregon State Univ., Corvallis.
CHRONOLOGY AND ISOTOPIC GEOCHEMISTRY OF APOLLO 14 BASALTS AND SKAERGARD GABBRO, EASTERN GREENLAND Final Report
E. Julius Dasch *In* NASA. Johnson Space Center NASA/American Society for Engineering Education (ASEE) Summer Faculty Fellowship Program, 1985 Jul. 1986 6 p (For primary document see N86-31409 22-80)
Avail: NTIS HC A99/MF E03 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-31481# Los Alamos National Lab., N. Mex.
SUPERPOSED EPOCH ANALYSIS OF MAGNETOSPHERIC SUBSTORMS USING SOLAR WIND, AURORAL ZONE AND GEOSTATIONARY ORBIT DATA SETS
L. F. Bargatze, D. N. Baker, and R. L. McPherron 1985 25 p Presented at the Chapman Conference on Magnetotail Physics, Laurel, Md., 28 Oct. 1985 Prepared in cooperation with California Univ., Los Angeles
(Contract W-7405-eng-36)
(DE86-006036; LA-UR-86-344; CONF-8510254-2) Avail: NTIS HC A02/MF A01

A primary goal in solar wind-magnetosphere studies is to understand how and what role the solar wind plays in controlling the temporal sequence of events during substorms at many widely separated regions within the magnetosphere. Here, the average, correlated behavior of definitve solar wind, auroral zone, and geostationary orbit parameters during isolated substorms is examined. High time resolution (1 min) measurements of two solar wind quantities: B/sub z/ and VB/sub s/, two auroral electrojet indices: AE and AI, and three paramenters which define the energetic (30 to 300keV) electron distribution at geostationary orbit from 13 events are analyzed by using the superposed epoch technique. The zero epoch time used to organize the analyses were defined by the time of energetic electron injection at geostationary orbit. The average variations of the auroral zone and geostationary orbit parameters in relation to the solar wind are discussed in context of the three phase (growth, expansion, and recovery) model of substorms. Notably, we find an approximate 6 minute time lag of expansion phase onset at geostationary orbit relative to time of expansion phase onset in the auroral zone. A possible explanation for this time lag is briefly discussed. DOE

N86-31482# National Center for Atmospheric Research, Boulder, Colo.
LARGE-SCALE STRUCTURE AND DYNAMICS OF SOLAR ACTIVE REGIONS OBSERVED IN THE FAR ULTRAVIOLET Ph.D. Thesis - Colorado Univ.
Andrew James Klimchuk 1986 219 p
(Grant NSF ATM-82-17015)
(PB86-188802; NCAR/CT-96) Avail: NTIS HC A10/MF A01 CSCL 03B

High resolution Dopplergrams in CIV (1548) are examined for the purpose of understanding the large-scale dynamics of solar active regions and the closely related problem of magnetic structure. The Dopplergrams are compared with photospheric magnetograms and H(alpha) filtergrams in order to determine the relationship of the flows to the overall magnetic field topology. These observations sample three different heights in the atmosphere and can potentially be used to map the field from the photosphere up through the transition region. Vector properties of the flow and field are inferred from center to limb variations in the measured Doppler shift and longitudinal field component. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-31483*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NINETEENTH INTERNATIONAL COSMIC RAY CONFERENCE. CONFERENCE PAPERS: INVITED RAPPORTEUR, HIGHLIGHT, MISCELLANEOUS, VOLUME 9
Frank C. Jones, comp. Feb. 1986 555 p Conference held in La Jolla, Calif., 11-23 Aug. 1985
(NASA-CP-2376-Vol-9; NAS 1.55:2376-Vol-9) Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

Invited talks, rapporteur talks, and highlight talks are included. Topics of the invited and highlight talks include astrophysical jets, gamma-ray line astronomy, cosmic rays and gamma rays in astrophysics, the early universe, elementary particle physics, solar flares and acceleration of energetic particles, cosmogenic nuclei, extragalactic astronomy, composition of solar flare particles, very high energy gamma ray sources, gamma-ray bursts, shock acceleration in the solar wind, cosmic rays in deep underground detectors, spectrum of cosmic rays at 10 to the 19th power eV, and nucleus-nucleus interactions. For individual titles, see N86-31484 through N86-31521.

N86-31484*# Institute of Astronomy, Cambridge (England).
COSMIC JETS
Martin J. Rees *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 17 p (For primary document see N86-31483 22-93)
Avail; NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

The evidence that active galactic nuclei produce collimated plasma jets is summarised. The strongest radio galaxies are probably energised by relativistic plasma jets generated by spinning black holes interacting with magnetic fields attached to infalling matter. Such objects can produce e(+)-e(-) plasma, and may be relevant to the acceleration of the highest-energy cosmic ray primaries. Small-scale counterparts of the jet phenomenon within our own galaxy are briefly reviewed. Author

N86-31485*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GAMMA-RAY LINE ASTROPHYSICS
Richard E. Lingenfelter (California Univ., La Jolla.) and Reuven Ramaty *In its* Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 23 p (For primary document see N86-31483 22-93)

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Recent observations of gamma-ray line emission from solar flares, gamma-ray bursts, the galactic center, the interstellar medium and the jets of SS433 are reviewed. The implications of these observations on high energy processes in these sources are discussed. Author

N86-31486*# National Aeronautics and Space Administration, Washington, D.C.

CONSTRAINTS ON GALAXY FORMATION THEORIES

Alexander S. Szalay *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 11 p Prepared in cooperation with Eotvos Lorand Univ., Budapest, Hungary (For primary document see N86-31483 22-93)

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The present theories of galaxy formation are reviewed. The relation between peculiar velocities, temperature fluctuations of the microwave background and the correlation function of galaxies point to the possibility that galaxies do not form uniformly everywhere. The velocity data provide strong constraints on the theories even in the case when light does not follow mass of the universe. Author

N86-31487*# Oxford Univ. (England). Dept. of Nuclear Physics.

ELEMENTARY PARTICLE PHYSICS

D. H. Perkins *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 18 p (For primary document see N86-31483 22-93)

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Elementary particle physics is discussed. Status of the Standard Model of electroweak and strong interactions; phenomena beyond the Standard Model; new accelerator projects; and possible contributions from non-accelerator experiments are examined. Author

N86-31488*# Centre National de la Recherche Scientifique, Orsay (France).

COSMOGENIC NUCLEI

G. M. Raisbeck *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 13 p (For primary document see N86-31483 22-93)

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Cosmogenic nuclei, nuclides formed by nuclear interactions of galactic and solar cosmic rays with extraterrestrial or terrestrial matter are discussed. Long lived radioactive cosmogenic isotopes are focused upon. Their uses in dating, as tracers of the interactions of cosmic rays with matter, and in obtaining information on the variation of primary cosmic ray flux in the past are discussed. R.J.F.

N86-31489*# California Univ., San Diego. Center for Astrophysics and Space Sciences.

EXTRAGALACTIC ASTRONOMY

E. Margaret Burbidge *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 6 p (For primary document see N86-31483 22-93)

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Components of the active extragalactic universe are examined to discover what extragalactic objects exhibit physical processes of the same kind as those thought to be important within the galaxy. Radio galaxies; quasars; bulk ejection from galactic objects such as novae supernovae, and other galactic nuclei; the red shifts of quasars; and the possibility of non-cosmological red shifts are among the topics discussed. It is concluded that the highest energy cosmic rays may have an extragalactic or extragalactic origin. R.J.F.

N86-31490*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.

GAMMA RAY ASTRONOMY FROM SATELLITES AND BALLOONS

V. Schoenfelder *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 17 p (For primary document see N86-31483 22-93)

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A survey is given of gamma ray astronomy topics presented at the Cosmic Ray Conference. The major conclusions at the Cosmic Ray Conference in the field of gamma ray astronomy are given. (1) MeV-emission of gamma-ray bursts is a common feature. Variations in duration and energy spectra from burst to burst may explain the discrepancy between the measured log N - log S dependence and the observed isotropy of bursts. (2) The gamma-ray line at 1.809 MeV from Al(26) is the first detected line from a radioactive nucleosynthesis product. In order to understand its origin it will be necessary to measure its longitude distribution in the Milky Way. (3) The indications of a gamma-ray excess found from the direction of Loop I is consistent with the picture that the bulk of cosmic rays below 100 GeV is produced in galactic supernova remnants. (4) The interpretation of the large scale distribution of gamma rays in the Milky Way is controversial. At present an extragalactic origin of the cosmic ray nuclei in the GeV-range cannot be excluded from the gamma ray data. (5) The detection of MeV-emission from Cen A is a promising step towards the interesting field of extragalactic gamma ray astronomy. Author

N86-31491*# Leeds Univ. (England). Dept. of Physics.

COSMIC GAMMA-RAYS AND COSMIC NUCLEI ABOVE 1 TeV

A. A. Watson *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 30 p (For primary document see N86-31483 22-93)

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Work on cosmic gamma rays and cosmic nuclei above I TeV is described and evaluated. The prospect that gamma ray astronomy above I TeV will give new insights into high energy cosmic ray origin within our galaxy is particularly bright. Author

N86-31492*# Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.

GALACTIC COSMIC RAY COMPOSITION

Jean-Paul Meyer *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 73 p (For primary document see N86-31483 22-93)

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An assessment is given of the galactic cosmic ray source (GCRS) elemental composition and its correlation with first ionization potential. The isotopic composition of heavy nuclei; spallation cross sections; energy spectra of primary nuclei; electrons; positrons; local galactic reference abundances; comparison of solar energetic particles and solar coronal compositions; the hydrogen; lead; nitrogen; helium; and germanium deficiency problems; and the excess of elements are among the topics covered. R.J.F.

N86-31493*# Academy of Sciences (USSR), Moscow. Ionosphere and Radio Wave Propagation Dept.

COSMIC RAY SOURCES, ACCELERATION AND PROPAGATION

V. S. Ptuskin *In* NASA. Goddard Space Flight Center Nineteenth

International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 21 p (For primary document see N86-31483 22-93)
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A review is given of selected papers on the theory of cosmic ray (CR) propagation and acceleration. The high isotropy and a comparatively large age of galactic CR are explained by the effective interaction of relativistic particles with random and regular electromagnetic fields in interstellar medium. The kinetic theory of CR propagation in the Galaxy is formulated similarly to the elaborate theory of CR propagation in heliosphere. The substantial difference between these theories is explained by the necessity to take into account in some cases the collective effects due to a rather high density of relativisitc particles. In particular, the kinetic CR stream instability and the hydrodynamic Parker instability is studied. The interaction of relativistic particles with an ensemble of given weak random magnetic fields is calculated by perturbation theory. The theory of CR transfer is considered to be basically completed for this case. The main problem consists in poor information about the structure of the regular and the random galactic magnetic fields. An account is given of CR transfer in a turbulent medium. Author

N86-31494*# California Univ., Berkeley. Space Sciences Lab.
PARTICLE ACCELERATION BY THE SUN
R. P. Lin *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 13 p (For primary document see N86-31483 22-93)
(Grant NAG5-376)
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A review is given of the analysis of new observations of energetic particles and energetic secondary emissions obtained over the solar maxium (approx. 1980) by the Solar Maximum mission, Hinotori, the international Sun-Earth Explorer, Helios, Explorer satellites, and Voyager spacecraft. Solar energetic particle events observed in space, He(3)- rich events, solar gamma rays and neutrons, and solar neutrinos are discussed. R.J.F.

N86-31495*# Malaya Univ., Kuala-Lumpur. Dept. of Mathematics
CORONAL AND INTERPLANETARY PROPAGATION, INTERPLANETARY ACCELERATION, COSMIC-RAY OBSERVATIONS BY DEEP SPACE NETWORK AND ANOMALOUS COMPONENT
C. K. Ng *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 13 p (For primary document see N86-31483 22-93)
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The purpose is to provide an overview of the contributions presented in sessions SH3, SH1.5, SH4.6 and SH4.7 of the 19th International Cosmic Ray Conference. These contributed papers indicate that steady progress continues to be made in both the observational and the theoretical aspects of the transport and acceleration of energetic charged particles in the heliosphere. Studies of solar and interplanetary particles have placed emphasis on particle directional distributions in relation to pitch-angle scattering and magnetic focusing, on the rigidity and spatial dependence of the mean free path, and on new propagation regimes in the inner and outer heliosphere. Coronal propagation appears in need of correlative multi-spacecraft studies in association with detailed observation of the flare process and coronal magnetic structures. Interplanetary acceleration has now gone into a consolidation phase, with theories being worked out in detail and checked against observation. Author

N86-31496*# Central Research Inst. for Physics, Budapest (Hungary).
MODULATION AND ANISOTROPY OF GALACTIC COSMIC RAYS IN THE HELIOSPHERE
J. Kota *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 25 p Prepared in cooperation with Arizona Univ., Tucson (For primary document see N86-31483 22-93)
(Grants NSF ATM-220-18; NSF INT-84-00591)
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Modulation model are discussed with more time spent on two current ideas: episodic modulation and drift models. The various types of anisotropies are addressed. Finally, other time variations and correlation studies are reviewed. Author

N86-31497*# Bern Univ. (Switzerland). Physikalisches Inst.
FORBUSH DECREASES GEOMAGNETIC AND ATMOSPHERIC EFFECTS COSMOGENIC NUCLIDES
Erwin O. Flueckiger *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 21 p (For primary document see N86-31483 22-93)
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An overview and synthesis is given of recent developments that have occurred in the areas of Forbush decreases, geomagnetic and atmospheric effects, and cosmogenic nuclides. Experimental evidence has been found for substantial differences in the effects of the various types of interplanetary perturbations on cosmic rays, and for a dependence of these effects on the three-dimensional configuration of the interplanetary medium. In order to fully understand and to be able to simulate the solar cosmic ray particle access to the polar regions of the earth we need accurate models of the magnetospheric magnetic field. These models must include all major magnetospheric current systems (in particular the field aligned currents), and they should represent magnetically quiet time periods as well as different levels of geomagnetic activity. In the evolution of magnetospheric magnetic field models, cosmic ray and magnetospheric physicists should work closely together since cosmic ray measurements are a powerful additional tool in the study of the perturbed magnetosphere. In the field of cosmogenic nuclides, finally, exciting new results and developments follow in rapid succession. Thanks to new techniques and new isotopes the analysis of cosmic ray history has entered into a new dimension. Author

N86-31498*# Michigan Univ., Ann Arbor. Dept. of Physics.
HIGH ENERGY INTERACTIONS OF COSMIC RAY PARTICLES
Lawrence W. Jones *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 14 p (For primary document see N86-31483 22-93)
Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

The highlights of seven sessions of the Conference dealing with high energy interactions of cosmic rays are discussed. High energy cross section measurements; particle production-models of experiments; nuclei and nuclear matter; nucleus-nucleus collision; searches for magnetic monopoles; and studies of nucleon decay are covered. Author

N86-31499*# Yokohama National Univ. (Japan).
EMULSION CHAMBER OBSERVATIONS AND INTERPRETATION (HE 3)
M. Shibata *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 19 p (For primary document see N86-31483 22-93)
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Experimental results from Emulsion Chamber (EC) experiments at mountain altitudes or at higher levels using flying carriers are examined. The physical interest in this field is concentrated on the strong interaction at the very high energy region exceeding the accelerator energy, also on the primary cosmic ray intensity and its chemical composition. Those experi-

ments which observed cosmic ray secondaries gave information on high energy interaction characteristics through the analyses of secondary spectra, gamma-hadron families and C-jets (direct observation of the particle production occuring at the carbon target). Problems of scaling violation in fragmentation region, interaction cross section, transverse momentum of produced secondaries, and some peculiar features of exotic events are discussed. B.G.

N86-31500*# Adelaide Univ. (Australia). Dept. of Physics.
EXTENSIVE AIR SHOWERS (HE-4)
R. W. Clay *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 26 p (For primary document see N86-31483 22-93)
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Ultra high energy (UHE) gamma ray astronomy is an exciting area which has added a new sense of purpose to ground based array work. There is much to be done before UHE gamma ray showers can be understood properly and it is important to remain conservative with claims while the properties of such showers are still not clear. The muon content is only one of the properties that needs to be clarified. It remains to be seen how well progress occurs on the second order problem of detailed interaction parameters once the gross features are clarified. The shower disk thickness has become an area of intense study with interest in Linsley's technique for measuremnts of giant showers and in the study of structure near the core for improving fast timing and studying delayed subshowers. Perhaps the most significant area of promise for the future is individual shower develpments with Cerenkov and, particularly, air fluorescence techniques. The importance and potential of having relatively complete information on a complete set of individual showers can hardly be overestimated. A complete understanding of the observation process is needed to determine whether or not the recorded data set is complete at a given energy, apparent core distance, and zenith angle. B.G.

N86-31501*# Wisconsin Univ., Madison. Dept. of Physics.
MUONS AND NEUTRINOS
T. Stanev *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 16 p Prepared in cooperation with Delaware Univ., Newark (For primary document see N86-31483 22-93)
(Contract DE-AC02-76ER-00881)
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The first generation of large and precise detectors, some initially dedicated to search for nucleon decay has accumulated significant statistics on neutrinos and high-energy muons. A second generation of even better and bigger detectors are already in operation or in advanced construction stage. The present set of experimental data on muon groups and neutrinos is qualitatively better than several years ago and the expectations for the following years are high. Composition studies with underground muon groups, neutrino detection, and expected extraterrestrial neutrino fluxes are discussed. B.G.

N86-31502*# Durham Univ. (England). Dept. of Physics.
GROUND-BASED VERY HIGH ENERGY GAMMA RAY ASTRONOMY: OBSERVATIONAL HIGHLIGHTS
K. E. Turver *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 8 p (For primary document see N86-31483 22-93)
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It is now more than 20 years since the first ground based gamma ray experiments involving atmospheric Cerenkov radiation were undertaken. The present highlights in observational ground-based very high energy (VHE) gamma ray astronomy and the optimism about an interesting future for the field follow progress in these areas: (1) the detection at increased levels of confidence of an enlarged number of sources so that at present claims were made for the detection, at the 4 to 5 sd level of significance, of 8 point sources; (2) the replication of the claimed detections with, for the first time, confirmation of the nature and detail of the emission; and (3) the extension of gamma ray astronomy to the ultra high energy (UHE) domain. The pattern, if any, to emerge from the list of sources claimed so far is that X-ray binary sources appear to be copious emitters of gamma rays over at least 4 decades of energy. These X-ray sources which behave as VHE and UHE gamma ray emitters are examined. Author

N86-31503*# Leeds Univ. (England). Dept. of Physics.
WHY IS CYGNUS X-3 (WITH RELATED SOURCES) A HIGHLIGHT OF COSMIC-RAY ASTROPHYSICS?
A. M. Hillas *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 8 p (For primary document see N86-31483 22-93)
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Cygnus X-3 and some apparently related systems have sprung into remarkable prominence. The reasons for this great interest are summarized. Some recent developments in the picture of these sources are also outlined. B.G.

N86-31504*# Academy of Sciences (USSR), Leningrad. Physical-Technical Inst.
OBSERVATIONAL PROPERTIES OF COSMIC GAMMA-RAY BURSTS
E. P. Mazets *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 16 p (For primary document see N86-31483 22-93)
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A brief overview of the major observational results obtained in gamma-ray burst studies is presented. Also discussed is to what extent the thermonuclear model, which appears at present to be the most plausible, can account for the observed properties of the bursts. The investigation of gamma-ray bursts should cover observations of the time histories of events, energy spectra, and their variablility, source localization, and inspection of the localization regions during the active and quiescent phases of the source in other wavelengths, as well as, evaluation of the statistical distributions of the data obtained. Author

N86-31505*# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
OBSERVATIONS OF SHOCK ACCELERATION PROCESSES IN THE SOLAR WIND
M. Scholer *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Misacellaneous, Volume 9 Feb. 1986 10 p (For primary document see N86-31483 22-93)
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Substantial evidence was accumulated over more than two decades that ion acceleration occurs at all collisionless shocks sampled directly in the solar system. The various shock waves in the heliosphere and the associated energetic particle phenomena are shown schematically. Three shocks have attracted considerable attention in recent years: corotating shocks due to the interaction of fast and slow solar wind streams during solar minimum, travelling interplanetary shocks due to coronal mass ejections, and planetary bow shocks. The signatures of these shocks and of their energetic particles are briefly reviewed. The most prominent theoretical models for shock acceleration are also reviewed. Recent observations at the earth's bow shock and at quasi-parallel interplanetary shocks are discussed in detail. Author

N86-31506*# Academy of Sciences (USSR), Moscow.
IS THE SIGNAL FROM CYG X-3, AS RECORDED IN SOME UNDERGROUND EXPERIMENTS, REAL?
A. E. Chudakov *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

Most of the excitement concerning the underground detection of signals from Cyg X-3 comes not from astrophysical grounds, but from the contradiction with surface experimental data. Believing in the Cyg X-3 signal underground and also that the main processes of muon production are well knownm the conclusion was drawn that the signal in EAS Cherenkov or counter experiments could be remarkably high, which is not the case. Possible solutions to this discrepancy are discussed. B.G.

N86-31507*# Argonne National Lab., Ill. High Energy Physics Div.
EVIDENCE FROM THE SOUDAN 1 EXPERIMENT FOR UNDERGROUND MUONS ASSOCIATED WITH CYGNUS X-3
D. S. E. Ayres *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 10 p (For primary document see N86-31483 22-93)
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The Soudan 1 experiment has yielded evidence for an average underground muon flux of approximately 7 x 10 to the minus 11th power/sq cm/s which points back to the X-ray binary Cygnus X-3, and which exhibits the 4.8 h periodicity observed for other radiation from this source. Underground muon events which seem to be associated with Cygnus X-3 also show evidence for longer time variability of the flux. Such underground muons cannot be explained by any conventional models of the propagation and interaction of cosmic rays. Author

N86-31508*# Consiglio Nazionale delle Ricerche, Turin (Italy). Istituto di Cosmogeofisica.
OBSERVATION OF MUONS FROM CYGNUS X-3 IN THE NUSEX EXPERIMENT
B. DEttorre Piazzoli *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 10 p (For primary document see N86-31483 22-93)
Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

Ground based observations by means of Cerenkov light detectors and air shower arrays have established that Cyngus X-3 is a powerful source of high energy particles. The detection of a 10 to the 15th power eV signal was first reported by the Kiel experiment. Air showers with large age parameter were accepted in order to select those generated by primary gamma rays. At variance with the expectation, the muon density associated with these events was found to be surprisingly high. This puzzling result stimulated a temporal analysis of the muons recorded in Nucleon Stability Experiment (NUSEX) coming from the region around the source. A positive signal was found suggesting the presentation of this result. The analysis of the data recorded during the 2.4 years of effective working time is presented with a fine tuning of the period and the energy spectrum of the muons from the Cygnus X-3 direction derived assuming consistency between NUSEX and SOUDAN results. Author

N86-31509*# Commissariat a l'Energie Atomique, Saclay (France). Dept. de Physique des Particules Elementaires.
SEARCH FOR A PERIODIC SIGNAL FROM CYGNUS X-3 USING-MUONS OBSERVED UNDERGROUND IN THE FREJUS DETECTOR (4800 MWE)
P. Bareyre, R. Barloutaud, K. H. Becker (Gesamthochschule, Wuppertal (West Germany).), L. Behr (Ecole Polytechnique, Palaiseau (France).), C. Berger (Technische Hochschule, Aachen (West Germany).), R. W. Bland (Ecole Polytechnique, Palaiseau (France).), G. Chardin, H. J. Daum (Gesamthochschule, Wuppertal (West Germany).), B. Degrange (Ecole Polytechnique, Palaiseau (France).), S. Demski (Gesamthochschule, Wuppertal (West Germany).) et al *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 9 p (For primary document see N86-31483 22-93)
Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

Periodic signals from Cygnus X-3 in the ultra high energy range were recently reported by air shower arrays and attributed to gamma rays. Although gamma rays are expected to produce muon-poor showers, the preceding observations have stimulated similar studies based on underground muons. Two groups have claimed a significant underground signal coming from Cygnus X-3. The results are, however, extremely difficult to explain in the present framework of particle physics, and clearly need confirmation. The preliminary results obtained from the Frejus underground detector during its first 16 months of operation (March 1984 to June 1985) are presented. Author

N86-31510*# New Mexico Univ., Albuquerque. Dept. of Physics and Astronomy.
THE COSMIC RAY SPECTRUM ABOVE 10(19) EV AT VOLCANO RANCH AND HAVERAH PARK
John Linsley *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 12 p (For primary document see N86-31483 22-93)
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The cosmic ray energy per particle spectrum above 10 to the 19th power eV is measured the same way that energy spectra are measured at much lower energies, by counting all of the particles in a specified energy range that are incident per unit time with trajectories within specified geometrical limits. Difficulties with background or poorly known detection efficiency are markedly less than in some other cosmic ray measurements. The fraction of primary energy given to muons, neutrinos, and slow hadrons is less than 10% in this region, so the primary energy equals the track length integral of the secondary electrons with only a small correction for the energy given to other kinds of particles. Results from Volcano Ranch and Haverah Park are compared with results from the Yakutsk experiment. Author

N86-31511*# Moscow State Univ. (USSR). Inst. of Nuclear Physics.
MEASURING THE ENERGY SPECTRUM OF PRIMARY COSMIC RAYS WITH THE YAKUTSK EAS ARRAY
G, B. Khristiansen *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb., 1986 11 p (For primary document see N86-31483 22-93)
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The Yakutsk Extensive Air Showers (EAS) array was designed for detecting the showers generated by the 10 to the 47th power to 10 to the 20th power eV primary cosmic rays and consists of numerous electron, muon, and Cerenkov light detectors arranged on a 20 sq km area terrain. The array is featured by the feasibility to detect the EAS-produced Cerenkov light, hence, as will be shown, to find the mean energy of the primary particles generating an ensemble of EAS of given size. Date collected is discussed. Author

N86-31512*# Sydney Univ. (Australia). School of Physics.
THE COSMIC RAY SPECTRUM ABOVE 10(17) eV
M. M. Winn, J. Ulrichs, L. Horton, C. B. A. McCusker, and L. S. Peak *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 9 p Sponsored in part by AFOSR (For primary document see

N86-31483 22-93
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The final analysis of the data obtained by the Sydney University Giant Airshower Recorder (SUGAR) is presented. The data has been reanalysed to take into account the effects of afterpulsing in the photomultiplier tubes. Event data was used to produce a spectrum of equivalent vertical muon number and from this a model dependent primary energy spectrum was obtained. These spectra show good evidence for the Ankle: a flattening at 10(19) eV. There is no sign of the cut-off which would be expected from the effects of the universal black body radiation. Author

N86-31513*# Institute of Nuclear Physics, Krakow (Poland).
HIGH ENERGY NUCLEUS-NUCLEUS COLLISIONS
Barbara Wosiek *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 10 p (For primary document see N86-31483 22-93)
(Grant NSF PHY-83-04003)
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Experimental results on high energy nucleus-nucleus interactions are presented. The data are discussed within the framework of standard super-position models and from the point-of-view of the possible formation of new states of matter in heavy ion collisions. Author

N86-31514*# Leeds Univ. (England). Dept. of Physics.
STUDIES OF AIR SHOWERS PRODUCED BY PRIMARIES > 10(16) eV USING A COMBINED SCINTILLATION AND WATER-CERENKOV ARRAY
G. Brooke, J. C. Perrett, and A. A. Watson *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p Sponsored in part by Science and Engineering Research Council (For primary document see N86-31483 22-93)
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An array of 8 x 1.0 sq m plastic scintillation counters and 13 water-Cerenkov detectors (1 to 13.5 sq m) were operated at the center of the Haverah Park array to study some features of air showers produced by 10(16) eV primaries. Measurements of the scintillator lateral distribution function, the water-Cerenkov lateral distribution function, and of the distance dependence of the Cerenkov/scintillator ratio are described. Author

N86-31515*# Pennsylvania Univ., Philadelphia. Depts. of Physics and Astronomy.
THE HOMESTAKE SURFACE-UNDERGROUND SCINTILLATORS: INITIAL RESULTS
M. L. Cherry, S. Corbato, T. Daily, E. J. Fenyves (Texas Univ., Dallas.), D. Kieda, K. Lande, and C. K. Lee *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
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The first 70 tons of the 140-ton Large Area Scintillation Detector (LASD) have been operating since Jan. 1985 at a depth of 4850 ft. (4200 m.w.e.) in the Homestake Gold Mine, Lead, S.D. A total of 4 x 10(4) high-energy muons (E sub mu is approx. 2.7 TeV at the surface) have been detected. The remainder of the detector is scheduled to be in operation by the Fall of 1985. In addition, a surface air shower array is under construction. The first 27 surface counters, spaced out over an area of 270' x 500', began running in June, 1985. The LASD performance, the potential of the combined shower array and underground muon experiment for detecting point sources, and the initial results of a search for periodic emission from Cygnus X-3 are discussed. M.G.

N86-31516*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
LEAD, PLATINUM AND OTHER HEAVY ELEMENTS IN THE PRIMARY COSMIC RADIATION: HEAO-3 RESULTS
C. J. Waddington, W. R. Binns (Washington Univ., St. Louis, Mo.), N. R. Brewster, D. J. Fixsen, T. L. Garrard (California Inst. of Tech., Pasadena.), M. H. Israel (Washington Univ., St. Louis, Mo.), J. Klarmann, B. J. Newport (California Inst. of Tech., Pasadena.), and E. C. Stone *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
(Grants NAG8-498; NGR-05-002-160; NGR-24-005-050; NGR-26-008-001)
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An observation of the abundances of cosmic-ray lead and platinum-group nuclei using data from the HEAO-3 Heavy Nuclei Experiment (HNE) which consisted of ion chambers mounted on both sides of a plastic Cherenkov counter (Binns et al., 1981) is reported. Further analysis with more stringent selections, inclusion of additional data, and a calibration at the LBL Bevalac, have allowed the determination of the abundance ratio of lead and the platinum group of elements for particles that had a cutoff rigidity R(c) > 5 GV. The observed ratio for Pb/Pt is distinctly lower than that predicted by any of the standard models for cosmic ray sources. It is possible that the difference is not an indication that the cosmic ray source composition is greatly different from that of the solar system, but rather that there is less Pb in the solar system and in the r-process than is assumed in the standard models. M.G.

N86-31517*# Minnesota Univ., Minneapolis. School of Physics and Astronomy.
AUTOMATED SCANNING OF PLASTIC NUCLEAR TRACK DETECTORS USING THE MINNESOTA STAR SCANNER
P. J. Fink and C. J. Waddington *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
(Grant NGR-24-005-050)
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The problems found in an attempt to adapt an automated scanner of astronomical plates, the Minnesota Automated Dual Plate Scanner (APS), to locating and measuring the etch pits produced by ionizing particles in plastic nuclear track detectors (CR-39) are described. A visual study of these pits was made to determine the errors introduced in determining positions and shapes. Measurements made under a low power microscope were compared with those from the APS. M.G.

N86-31518*# La Paz Univ. (Bolivia).
COSMIC RAY ANISOTROPIES AT HIGH ENERGIES
N. J. Martinic, A. Alarcon, and F. Teran *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
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The directional anisotropies of the energetic cosmic ray gas due to the relative motion between the observers frame and the one where the relativistic gas can be assumed isotropic is analyzed. The radiation fluxes formula in the former frame must follow as the Lorentz invariance of dp/E, where p, E are the 4-vector momentum-energy components; dp is the 3-volume element in the momentum space. The anisotropic flux shows in such a case an amplitude, in a rotating earth, smaller than the experimental measurements from say, EAS-arrays for primary particle energies larger than 1.E(14) eV. Further, it is shown that two consecutive Lorentz transformations among three inertial frames exhibit the

violation of dp/E invariance between the first and the third systems of reference, due to the Wigner rotation. A discussion of this result in the context of the experimental anisotropic fluxes and its current interpretation is given. Author

N86-31519*# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
HIGH ENERGY ELECTRONS BEYOND 100 GEV OBSERVED BY EMULSION CHAMBER
J. Nishimura, M. Fujii, A. Yoshida, T. Taira (Kanagawa Univ., Japan), H. Aizu (Kanagawa Prefectual Coll., Japan), Y. Nomura, T. Kobayashi (Aoyamagakuin Univ., Tokyo, Japan), M. Kazuno (Toho Univ., Tokyo, Japan), A. Nishio (Kyoto Univ., Kumatori, Japan), R. L. Golden (New Mexico State Univ., Las Cruces) et al *In* NASA: Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
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Much efforts have been expended to observe the spectrum of electrons in the high energy region with large area emulsion chambers exposed at balloon altitudes, and now 15 electrons beyond 1 TeV have been observed. The observed integral flux at 1 TeV is (3.24 + or - 0.87)x10(-5)/sq m sec sr. The statistics of the data around a few hundred GeV are also improving by using new shower detecting films of high sensitivity. The astrophysical significance of the observed spectrum are discussed for the propagation of electrons based on the leaky box and the nested leaky box model. Author

N86-31520*# National Center for Atmospheric Research, Boulder, Colo. High Altitude Observatory.
DIFFUSIVE ELECTRON ACCELERATION AT SNR SHOCK FRONTS AND THE OBSERVED SNR RADIO SPECTRAL INDICES
T. J. Bogdan, M. A. Lee (New Hampshire Univ., Durham), I. Lerche (South Carolina Univ., Columbia), and G. M. Webb (Arizona Univ., Tucson) *In* NASA. Goddard Space Flight Center Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 4 p (For primary document see N86-31483 22-93)
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The radio synchrotron emission from relativistic electrons in shell supernova remnants (SNRs) provides a unique opportunity to probe the energy distribution of energetic electrons at their acceleration site (SNR shock fronts). This information provides insight into the acceleration mechanism(s). The implications of these observations for the diffusive (first-order Fermi) acceleration of electrons at the SNR shock fronts are discussed. M.G.

N86-31521*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ELEMENTAL ABUNDANCES IN COROTATING EVENTS
T. T. vonRosenvinge and R. E. McGuire *In its* Nineteenth International Cosmic Ray Conference. Conference Papers: Invited Rapporteur, Highlight, Miscellaneous, Volume 9 Feb. 1986 2 p Prepared in cooperation with Maryland Univ., College Park (For primary document see N86-31483 22-93)
Avail: NTIS HC as boxed set only $200/MF A01 per volume or E99 per entire set CSCL 03B

Large, persistent solar-wind streams in 1973 and 1974 produced corotating interaction regions which accelerated particles to energies of a few MeV/nucleon. The proton to helium ratio (H/He) reported was remarkably constant at a value (22 + or - 5) equal to that in the solar wind (32 + or - 3), suggesting that particles were being accelerated directly out of the solar wind. Preliminary results from a similar study approximately 11 years (i.e., one solar cycle) later are reported. Corotating events were identified by surveying the solar wind data, energetic particle time-histories and anisotropies. This data was all obtained from the ISEE-3/ICE spacecraft. These events also show H/He ratios similar to that in the solar wind. In addition, other corotating events were examined at times when solar flare events could have injected particles into the corresponding corotating interaction regions. It was found that in these cases there is evidence for H/He ratios which are significantly different from that of the solar wind but which are consistent with the range of values found in solar flare events. M.G.

N86-31522*# California Univ., San Diego, La Jolla.
GRADIENTS AND ANISOTROPIES OF HIGH ENERGY COSMIC RAYS IN THE OUTER HELIOSPHERE
Walker Fillius, E. C. Roelof (Johns Hopkins Univ., Laurel, Md.), Edward J. Smith (Jet Propulsion Lab., California Inst. of Tech., Pasadena.), David Wood, and Wing-Huen Ip (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).) 1985 4 p (Grant NAG2153)
(NASA-CR-176944; NAS 1.26:176944) Avail: NTIS HC A02/MF A01 CSCL 03B

Two cosmic rays which pass through the same point going in opposite directions will, in the absence of scattering and inhomogeneities in the magnetic field, trace helices about adjacent flux tubes, whose centerlines are separated by one gyrodiameter. A directional anisotropy at the point suggests a difference in the number of cosmic rays loading the two flux tubes; that is, a density gradient over the baseline of a gyrodiameter. Previous studies at lower energies have shown that the cosmic ray density gradients vary in time and space. It is suggested that the radial gradient associated with solar cycle modulation is supported largely by narrow barriers which encircle the sun and propagate outward with the solar wind. If so, the anisotropy is a desirable way to detect spatial gradients, because it can be associated with the local solar wind and magnetic field conditions. Anisotropic measurements made by Cerenkov detectors on Pioneers 10 and 11 were studied. It was found that local anisotropy varies greatly, but that the long term average is consistent with the global radial gradient measured between two spacecraft over a baseline of many AU. Author

N86-31523# Universidade Estadual de Campinas (Brazil). Inst. de Fisica.
TOPICS ON COSMIC RAYS. VOL. 1: 60TH ANNIVERSARY OF C.M.G. LATTES
J. BellandiFilho and A. Pemmaraju 1984 250 p
(DE86-700674; INIS-BR-404-Vol-1) Avail: NTIS (US Sales Only) HC A11/MF A01

Some theoretical and experimental results concerning cosmic radiation works or with related ones, mainly of the Brazil-Japan Collaboration, are presented in honor of the 60th anniversary of C.M.G. Lates. DOE

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N86-31524*# National Aeronautics and Space Administration. Washington, D.C.
ASTRONAUTICS AND AERONAUTICS, 1977: A CHRONOLOGY
Eleanor H. Ritchie 1986 323 p
(NASA-SP-4022; NAS 1.21:4022) Avail: NTIS HC A14/MF A01 CSCL 05D

This publication is a chronology of events during the year 1977 in the fields of aeronautical and space research, development, activity, and policy. It includes appendixes, an index, and illustrations. Chronological entries list sources for further inquiry. Author

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Typical Subject Index Listing

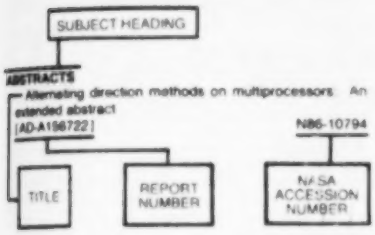

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Institute for Materials Science and Engineering, Ceramics: Technical activities, 1985
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Institute for Materials Science and Engineering, Ceramics: Technical activities, 1985
[PB86-196771] N86-30882

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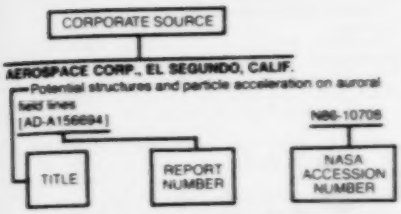

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ARMY ENGINEER DISTRICT, LOS ANGELES, CALIF.
Coast of California storm and tidal waves study: Southern California coastal processes data summary
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Coast of California storm and tidal waves study. Shoreline movement data report: Portuguese Point to Mexican border (1852-1982)
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Coast of California storm and tidal waves study: Southern California coastal photography and beach profile index
[AD-A166780] N86-31202
Coast of California storm and tidal waves study. Hydraulic data inventory: Southern California coastal zone
[AD-A166781] N86-31203
Coast of California storm and tidal waves study. Hydraulic data inventory: Southern California coastal zone
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Proceedings of the 3rd Brazilian Symposium on Piping and Pressure Vessels
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Solid-propellant rocket motor internal ballistics performance variation analysis, phase 5
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BUNDESANSTALT FUER MATERIALPRUEFUNG, BERLIN (WEST GERMANY).
Tribology documentation: Wear, friction, and lubrication
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Duty cycle testing and performance evaluation of the SM-229 teleoperator
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Microstructure and properties of ferrous alloy weldments
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Certification of carbon, nitrogen and oxygen in zircaloy. (BCR nos. 275 and 276)
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CSC meteor burst model enhancement test report
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DEUTSCHES HYDROGRAPHISCHES INST., HAMBURG (WEST GERMANY).
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PASCAL for engineers: A course including OMEGASOF PASCAL for microcomputers
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EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Proceedings of a Workshop on Composites Design for Space Applications
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EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
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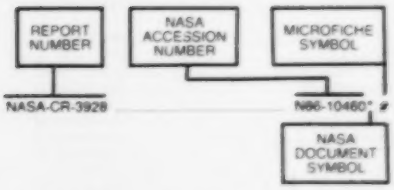

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

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02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

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Includes passenger and cargo air transport operations; and aircraft accidents.
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Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
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Includes cockpit and cabin display devices; and flight instruments.
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07 AIRCRAFT PROPULSION AND POWER 3557
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.
For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

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Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
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ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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13 ASTRODYNAMICS 3562
Includes powered and free-flight trajectories; and orbit and launching dynamics.

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Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.
For related information see also *09 Research and Support Facilities (Air).*

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Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 3564
Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.
For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING 3564
Includes telemetry; space communications networks; astronavigation; and radio blackout.
For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3565
Includes spacecraft thermal and environmental control; and attitude control.
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19 SPACECRAFT INSTRUMENTATION 3567
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20 SPACECRAFT PROPULSION AND POWER 3567
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **3570**
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **3570**
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY **3573**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
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26 METALLIC MATERIALS **3576**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

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Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **3584**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
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31 ENGINEERING (GENERAL) **3585**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **3586**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

33 ELECTRONICS AND ELECTRICAL ENGINEERING **3590**
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For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

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For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

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Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources.* For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation.*

36 LASERS AND MASERS **3604**
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING **3605**
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39 STRUCTURAL MECHANICS **3609**
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Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
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43 EARTH RESOURCES **3613**
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **3619**
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
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45 ENVIRONMENT POLLUTION **3622**
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS **3623**
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY **3626**
Includes weather forecasting and modification.

48 OCEANOGRAPHY **3633**
Includes biological, dynamic and physical oceanography; and marine resources.

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Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) **3634**
Includes genetics.

52 AEROSPACE MEDICINE **3635**
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES **3636**
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **3637**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **3638**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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60 COMPUTER OPERATIONS AND HARDWARE **3639**
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61 COMPUTER PROGRAMMING AND SOFTWARE **3640**
Includes computer programs, routines, and algorithms.

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Includes mathematical modeling; network analysis; and operations research.

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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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72 ATOMIC AND MOLECULAR PHYSICS **3657**
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Includes quantum mechanics; and Bose and Fermi statistics.
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Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) **N.A.**
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT **3668**
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE **3670**
Includes information storage and retrieval technology; micrography; and library science.
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83 ECONOMICS AND COST ANALYSIS **N.A.**
Includes cost effectiveness studies

84 LAW AND POLITICAL SCIENCE **3671**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3671**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **3671**

89 ASTRONOMY **3676**
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS **3677**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **3679**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

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Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **N.A.**
Includes cosmic radiation; and inner and outer earth's radiation belts.
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99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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AUTHOR

C. P. Chen Aug. 1985 22 p refs

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AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included. Author

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N86-31525* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 202)
1986 130 p
(NASA-SP-7037(202); NAS 1.21:7037(202)) Avail: NTIS HC A07 CSCL 01A

This bibliography lists 447 reports, articles and other documents introduced into the NASA scientific and technical information system in June 1986. Author

N86-31526* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 203)
1986 129 p
(NASA-SP-7037(203); NAS 1.21:7037(203)) Avail: NTIS HC A07 CSCL 01A

This bibliography lists 449 reports, articles and other documents introduced into the NASA scientific and technical information system in July 1986. Author

N86-31527*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ELLIPTIC GENERATION OF COMPOSITE THREE-DIMENSIONAL GRIDS ABOUT REALISTIC AIRCRAFT
Reese L. Sorenson Mar. 1986 22 p
(NASA-TM-88240; A-86165; NAS 1.15:88240) Avail: NTIS HC A02/MF A01 CSCL 01B

An elliptic method for generating composite grids about realistic aircraft is presented. A body-conforming grid is first generated about the entire aircraft by the solution of Poisson's differential equation. This grid has relatively coarse spacing, and it covers the entire physical domain. At boundary surfaces, cell size is controlled and cell skewness is nearly eliminated by inhomogeneous terms, which are found automatically by the program. Certain regions of the grid in which high gradients are expected, and which map into rectangular solids in the computational domain, are then designated for zonal refinement. Spacing in the zonal grids is reduced by adding points with a simple, algebraic scheme. Details of the grid generation method are presented along with results of the present application, a wing-body configuration based on the F-16 fighter aircraft. Author

N86-31528# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INTERNATIONAL AVIATION (SELECTED ARTICLES)
Daxi Yang and Lingyen Zhong 4 Apr. 1986 14 p Transl. into ENGLISH from Guoji Hangkong (China), no. 5(267), May 1985 p 2-3; 26; 52
(AD-A166298; FTD-ID(RS)T-0844-85) Avail: NTIS HC A02/MF A01 CSCL 01/3

This translation of the Chinese International Aviation contains articles on the following: the use of winglets on the T-5 Transport; and a talk by Payley of Dassault Breguet (France) on Aerodynamicists of the year 2000. The Application of Winglets on Transport-5 Aircraft; Payley of Dassault Breguet (France) talks about the Aerodynamicists of the Year 2000. GRA

N86-31529# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYTICAL METHODOLOGY FOR PREDICTING REPAIR TIME DISTRIBUTIONS OF ADVANCED TECHNOLOGY AIRCRAFT M.S. Thesis
Dennis C. Dietz Dec. 1985 226 p
(AD-A167149; AFIT/GOR/OS/85D-3) Avail: NTIS HC A11/MF A01 CSCL 15/5

Classical probability theory is applied to analytically combine known or hypothesized subsystem reliability distribution for repair time of an advanced technology aircraft. While repair time of a weapon system is determined by a complex interaction of many factors, the relatively high reliability predicted for advanced technology aircraft justifies several simplifying assumptions which permit an analytical approach. The applicability of the analytical method is examined by comparing analytical repair time distributions with distributions produced by Monte Carlo simulation. Using the Advanced Tactical Fighter as an example, comparisons are performed over a wide range of relevant factors. Overall aircraft reliability emerges as the single critical factor determining the applicability of the method. A simple model is presented for translating the aircraft repair time distribution into measures of aircraft operational effectiveness (availability and sortie generation rate) under a specified concept of operations. The translation model demonstrates how the analytical method for forming a repair time distribution could be used to heuristically determine how to best allocate a reliability and maintainability budget to various subsystems as an aircraft design is developed. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-31530*# Technische Hochschule, Aachen (West Germany). Aerodynamisches Inst.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF VORTEX BREAKDOWN Final Technical Report, 1 Jun. 1985 - 31 May 1986
Egon Krause 1986 47 p
(Grant NAGw-816)
(NASA-CR-176853; NAS 1.26:176853) Avail: NTIS HC A03/MF A01 CSCL 01A

IBUNGSFREIEN MEHRWIRBEL- MODELLS ZUR BERECHNUNG DER WIRBELSTROEMUNG HINTER EINEM TRAGFLUEGEL MIT SPOILER]
W. Czichowsky 15 Oct. 1984 71 p In GERMAN
(ISL-R-133/84; ESA-86-97621) Avail: NTIS HC A04/MF A01

The flow about an airfoil profile with spoiler was calculated using an inviscid multivortex model. This flow leads at the airfoil trailing edge and the spoiler edge to boundary layer separation and wakes with vortices. The model replaces the separated vortex boundary layers by a series of discrete potential vortices. By a conformal transformation of the outside of a circle onto the outside of a profile, the flow about a profile is reduced to the simple case of a flow about a circular cylinder with potential vortices, the complex flow potential of which is known. The intensity of the new vortices are obtained from the production of circulation in the boundary layers. The coordinates of the vortex centers are empirically fixed in the immediate vicinity of the separation edges. The vortex motions are calculated by numerical integration of the vortex differential equations. The forces on the profile are directly obtained from the generalized Blasius formula for unsteady flows. For the supercritical profile RA16-SC1 with a 40 deg arc spoiler, the formation and separation of vortices, the evolution of the circulation production rate in the boundary layers, and aerodynamic coefficients are obtained. ESA

N86-31546# European Space Agency, Paris (France).
CALCULATION OF SEPARATED LAMINAR SUPERSONIC FLOWS OVER BLUNT BODIES OF REVOLUTION AT ZERO ANGLE OF ATTACK
Bernhard Mueller Dec. 1985 144 p Original language document was announced as N86-14256
(ESA-TT-953; DFVLR-FB-85-30; ESA-86-97801) Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 40.50

The applicability of the thin layer approximation method for the description of thin separation bubbles and large separation areas and data acquisition on the structure of separated three dimensional flow distribution is studied using the numerical simulation of separated laminar supersonic flows over blunt bodies of revolution. The influence of numerical damping on the consistency, stability, convergence and accuracy of the finite difference scheme of Beam and Warming is studied. The topologic structure of the separation area depends on the Reynolds number. The thin layer approximation allows an accurate description of flows with small or large separation areas at high Reynolds numbers. ESA

N86-31547# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abteilung Grenzschichten und Unterschallstroemungen.
WALL SHEAR STRESS MEASUREMENTS ON A PROLATE SPHEROID AT ZERO INCIDENCE IN THE GERMAN-NETHERLANDS WIND (DNW) TUNNEL
Hans-Peter Kreplin, Hans Ulrich Meier, Edzard Mercker, and Andreas Landhaeusser Feb. 1986 41 p
(DFVLR-Mitt-86-06; ISSN-0176-7739; ESA-86-97822) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 11.50

Surface hot film measurements were carried out on a prolate spheroid in the three closed test sections of a wind tunnel. For axisymmetric flow conditions the regions of laminar-turbulent boundary layer transition were determined from measured wall shear stress distributions and instantaneous hot film signals. The results clearly indicate that the location of the boundary layer transition moves downstream at a given tunnel Reynolds number as the turbulence intensity decreases with increasing nozzle contraction. ESA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-31548*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA'S AIRCRAFT ICING ANALYSIS PROGRAM
Robert J. Shaw 1986 26 p Presented at the International Conference of the Aeronautical Sciences (ICAS), London, England, 7-12 Sept. 1986
(NASA-TM-88791; E-3121; NAS 1.15:88791) Avail: NTIS HC A03/MF A01 CSCL 01C

An overview of the NASA ongoing efforts to develop an aircraft icing analysis capability is presented. Discussions are included of the overall and long term objectives of the program as well as current capabilities and limitations of the various computer codes being developed. Descriptions are given of codes being developed to analyze two and three dimensional trajectories of water droplets, airfoil ice accretion, aerodynamic performance degradation of components and complete aircraft configurations, electrothermal deicer, fluid freezing point depressant antideicer and electro-impulse deicer. The need for bench mark and verification data to support the code development is also discussed, and selected results of experimental programs are presented. Author

N86-31549# Test Wing (4950th), Wright-Patterson AFB, Ohio.
FIREPROOF HYDRAULIC BRAKE SYSTEM Final Report, May - Nov. 1985
Michael W. Dillard Apr. 1986 66 p
(AD-A167774; Rept-4950/FTR-86-1) Avail: NTIS HC A04/MF A01 CSCL 13/7

The Fireproof Hydraulic Brake System (FHBS) flight test program verified that the FHBS is a feasible method of eliminating aircraft hydraulic fluid fires ignited by hot brakes. The FHBS uses a new nonflammable hydraulic fluid, chlorotrifluoroethylene (CTFE), in the wheel well and landing gear area while retaining standard hydraulic fluid (MIL-H-5606) in the rest of the aircraft hydraulic system. The two fluids were separated downstream of the antiskid valve by a reservoir/separator unit. A C-135E was used as the test aircraft. The modification consisted of instrumentation to monitor brake system parameters and the FHBS installation for the left outboard wheel pair. The testing consisted of maximum effort braking runs at light aircraft gross weights to induce antiskid cycling. The FHBS was evaluated subjectively by the test pilot and objectively by comparing its performance with that of the standard C-135 brake system established by baseline testing. GRA

N86-31550# Army Aviation Systems Command, St. Louis, Mo.
FULL-SCALE CRASH TEST (T-41) OF THE YAH-63 ATTACK HELICOPTER
Kent F. Smith Apr. 1986 99 p
(AD-A167813; USAAVSCOM-TR-86-D-2) Avail: NTIS HC A05/MF A01 CSCL 01/3

T-41 was jointly conducted by the Aviation Applied Technology Directorate and the NASA-Langley Research Center. The purpose of the effort was to assess the effectiveness of the structural crashworthiness features designed into the YAH-63 during a severe but potentially survivable accident and to evaluate the performance of several developmental crashworthy systems in a real-world helicopter crash environment. Because this was the first crash test of an attack helicopter and the first of a helicopter having designed-in crashworthiness, T-41 offers unique data for predicting the crash impact behavior of future helicopters. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-31551*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION EVALUATION OF DISPLAY/FLIR CONCEPTS FOR LOW-ALTITUDE, TERRAIN-FOLLOWING HELICOPTER OPERATIONS
Harry N. Swenson, Clyde H. Paulk, Jr., Robert L. Kilmer (IBM Federal Systems Div., Owego, N. Y.), and Frank G. Kilmer Dec. 1985 13 p
(NASA-TM-86779; Rept-85349; NAS 1.15:86779) Avail: NTIS HC A02/MF A01 CSCL 17G

A piloted simulation of three head-down display (HDD) concepts with flight-director guidance superimposed on forward-looking infrared (FLIR) imagery was performed to evaluate the task of low-level, terrain-following (TF), manual helicopter flight. The three display concepts were examined for the purpose of finding ways by which aircraft flight-attitude and command symbols and FLIR imagery could be integrated onto one instrument. In all cases, the FLIR imagery was centered on the flight-path vector of the aircraft. The three displays were then characterized by having: (1) pitch attitude conformal to the FLIR imagery; (2) pitch attitude conformal to the FLIR imagery, but with an increase in the scaling; and (3) pitch attitude nonconformal to the FLIR imagery with the same pitch scaling as in (2). The simulation was conducted on the Vertical Motion Simulator (VMS) at Ames Research Center, using NASA and Air Force test pilots. The pilots indicated that the nonconformal pitch attitude and FLIR display was the preferred way to display information because of the absence of pitch-attitude information on displays (1) and (2) during some portions of the operational flight envelope. Author

N86-31552# Department of the Air Force, Washington, D.C.
PORTABLE GLIDE SLOPE INDICATOR Patent Application
Harry L. Task, inventor (to Air Force) Filed 26 Jan. 1986 15 p
(AD-D012240; US-Patent-Appl-SN-823872) Avail: NTIS HC A02/MF A01 CSCL 17/7

An improved glide slope indicator system for facilitating aircraft landings under adverse lighting conditions on remote or austere landing sites is provided which comprises a pair of indicators deployable near ground level on each side of a runway, each indicator including a housing having an optical window and a pair of light sources mounted in predetermined spaced relationship to each other and to the optical window and connected to a power source and related circuitry to project a well defined first blinking and second steady light beam of predetermined angular divergence and overlap, one indicator disposed to project beams with an overlap elevated at a first angle relative to horizontal and the other indicator disposed to project beams with an overlap elevated at a second angle relative to horizontal different from the first, with a preselected glide path lying between the two overlaps. An infrared filter may be included in each indicator to project beams observable only with infrared sensitive viewing aids. The system may be battery powered for portability. GRA

N86-31553# Army Engineer Topographic Labs., Fort Belvoir, Va.
A COST/PERFORMANCE ANALYSIS OF HYBRID INERTIAL/EXTERNALLY REFERENCED POSITIONING/ORIENTATION SYSTEMS
Eugene J. Rose, Sam C. Bose, James T. Kouba, and David A. Sobek Sep. 1985 23 p
(AD-A167685; ETL-R-086) Avail: NTIS HC A02/MF A01 CSCL 17/7

Combining inertial positioning or navigation systems with externally referenced aids such as the Global Positioning System (GPS) or the U.S. Army's Position Location Reporting System (PLRS) will result in significant improvements over one of these systems acting on its own. These improvements will include lower cost, since less accurate inertial systems can be used during periods when the external reference is unavailable; better immunity to jamming than in the case of only an externally referenced system; and higher accuracy than can be obtained with only an inertial system. This paper presents the results of an analysis of the position, heading, and attitude accuracies which can be obtained using various combinations of inertial and externally referenced systems. A computer simulation was performed to incorporate extensive error models for all of the sensors involved. A 24-state Kalman filter was used to control the errors. In addition, a cost versus performance analysis is presented based on representative subsystem costs and hybridization considerations. GRA

N86-31554# Arinc Research Corp., Annapolis, Md.
EVALUATION OF ALTERNATIVES FOR AN ARMY PRECISION LANDING SYSTEM Final Report
R. Lancaster, R. Lewsen, and B. Mitchell Sep. 1985 130 p
(Contract DAEA18-84-C-0127)
(AD-A167780; Rept-2959-01-1-3759) Avail: NTIS HC A07/MF A01 CSCL 17/7

This study was conducted to determine the need for Army Precision Landing System requirements for aviation deployment in the combat zone. The study identifies the need and best approaches for satisfying Army requirements within air traffic management functions, applying current tactical doctrine. Existing landing systems are compared with alternate systems not presently developed or fielded from a technical and operational viewpoint. Availability, operational concepts, and cost data are analyzed for each proposed system. The study also developed strengths and weaknesses of the existing, as well as proposed precision landing systems for ATC. Final results and recommendations to support air traffic control requirements on the battlefield beyond the year 2000 are depicted. GRA

N86-31555# Federal Aviation Administration, Atlantic City, N.J.
LORAN C 1984 SPRING-SUMMER STABILITY
Frank Lorge Mar. 1986 81 p
(AD-A167867; DOT/FAA/CT-TN86/10) Avail: NTIS HC A05/MF A01 CSCL 17/7

The report describes a flight test designed to examine Loran C seasonal stability. Flights were conducted in the spring and summer of 1984. Plot data are presented which show seasonal shifts in signal-to-noise ratio, envelope-to-cycle discrepancy, and time differences across the continental United States. A later report will compare these data to new data collected in the winter season. GRA

N86-31556# Aeronautical Research Labs., Melbourne (Australia).
ANALYSIS OF A MIRROR DECK LANDING AID
A. Ross Feb. 1986 64 p
(AD-A167988; ARL/SYS-TM-86) Avail: NTIS HC A04/MF A01 CSCL 01/4

This report provides details of the MDLA system, installation details and calculations concerning performance, coverage, calibration and accuracy requirements. A graphical method of presenting operational settings for height and elevation is described, as also is a simplified technique for calibration. GRA

N86-31557# Bonn Univ. (West Germany). Geodaetisches Inst.
DEVELOPMENT OF A RECEIVER CONCEPT FOR GEODETIC APPLICATION OF THE NAVSTAR GLOBAL POSITIONING SYSTEM (GPS) SATELLITE NAVIGATION SYSTEM Final Report, Feb. 1985
Erich Saur Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 25 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-036; ISSN-0170-1339; ESA-86-97474) Avail: NTIS

HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5.50

The instrument measurement errors in a GPS receiver (a coherent C/A code cross-correlation receiver with carrier phase measurements and higher process gain, capable of using the P code modulated L2 frequency) are studied. The GPS receiver consists of a ZF amplifier, a mixing frequency preparation unit, and a digital signal processing unit including a code generator, a correlator, a numerical oscillator, and control and evaluation computers. The geodetic GPS receiver is analyzed as regards mobility, human factors engineering, interference, possible connections, and independence from external data sources. The cost effective multiplex scheme is selected for simultaneous measurements of four satellites leading to signal delay reduction. A subminiature rubidium standard is used as a receiver black to avoid loss of accuracy at higher integration times. ESA

N86-31558# European Space Agency, Paris (France).
A FEASIBILITY STUDY FOR THE USE OF ELECTRONIC FLIGHT STRIPS IN AIR TRAFFIC CONTROL (ATC) CONTROLLER WORKSTATIONS
Juergen Grigat and Josef Thomas Oct. 1985 89 p Original language document was announced as N85-31039
(ESA-TT-928; DFVLR-FB-85-08; ESA-86-97572) Avail: NTIS HC A05/MR A01; original German version available from DFVLR, Cologne, West Germany DM 47

Flight progress strip importance in air traffic control was studied and a concept for flight strip representation on electronic displays supported by an automatic data exchange between adjacent control stations and adapted to the ATMOS (Air Traffic Management and Operations Simulator) air traffic control simulator was developed. Data important for executive controllers and for schedule controllers per sector and per flight are displayed on two different screens. The concept allows a rapid exact data exchange to all workstations and a reduction in the controllers data acquisition so that they can dedicate their attention to approach monitoring. Pilot communications are also reduced. The feasibility of the concept is demonstrated in a case study. ESA

N86-31559# European Space Agency, Paris (France).
TENDENCIES FOR LIBERALIZATION IN EUROPEAN AIR TRANSPORT
Rolf Juergen Haupt and Paul-Juergen Weber Dec. 1985 160 p Original language document was announced as N86-10030
(ESA-TT-947; DFVLR-FB-85-23; ESA-86-97580) Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 37.50

Deregulation of European air transportation is discussed. Aim and content of proposed or decided regulations are considered, and proposals for the further development of the air transport system are offered. Aspects of competition, market entry, and tariff regulations are presented and the fundamentals of air transport policy of Great Britain, Federal Republic of Germany, and the Netherlands are described, indicating the points of view of the air transport managers (governments, airlines, and travel agencies) and of the users. ESA

N86-31560# Technische Hogeschool, Delft (Netherlands). Dept. of Geodesy.
COURSE ON RADIOPOSITIONING
G. Bakker, J. C. deMunck, and G. L. StrangvanHees 1985 343 p Presented at Delft Univ. of Technology, Netherlands, 14-17 Jan. 1985
(ESA-86-98039) Avail: NTIS HC A15/MF A01

Matrices and least squares adjustment used in radiopositioning are introduced. Testing of geodetic networks; signals and systems (wave propagation, geometry and signals); survey computations (geodetic coordinates and datum transformation, reductions to ellipsoid, conformal mapping, computations on the sphere and ellipsoid); and adjustment of hyperbolic patterns and Kalman filtering are explained. ESA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-31561 Ecole Polytechnique, Palaiseau (France).
AERIAL COMBAT [COMBAT AERIEN]
5 Dec. 1985 36 p In FRENCH Presented at Journee Nationale Science et Defense, Palaiseau, France, 5 Dec. 1985
(ESA-86-97271) Avail: Issuing Activity

The development trends of combat aircraft technology are discussed. The analysis of the operational environment problems includes target assignment, target identification, and radar signatures. Fighter design trends and missile evolution are discussed. It is shown that a single missile type can accomplish short range and out of sight missions by combining inertial and optical guidance systems. The ergonomic aspects of fighter design are examined. ESA

N86-31562*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IN-FLIGHT PHOTOGRAMMETRIC MEASUREMENT OF WING ICE ACCRETIONS
Robert C. McKnight, Richard L. Palko (Calspan Field Services, Inc., Arnold AFS, Tenn.), and Robert L. Humes 1986 14 p Presented at the 24th Aerospace Sciences Meeting, Reno, Nev., 6-8 Jan. 1986; sponsored by AIAA
(NASA-TM-87191; E-2847; NAS 1.15:87191) Avail: NTIS HC A02/MF A01 CSCL 01C

A photographic instrumentation system was developed for the Lewis icing research aircraft to measure wind ice accretions during flight. The system generates stereo photographs of the accretions which are then photogrammetrically measured by the Air Force Arnold Engineering and Development Center. The measurements yield a survey of spatial coordinates of an accretion's surface to an accuracy of at least + or - 0.08 cm. The accretions can then be matched to corresponding icing cloud and aerodynamic measurements. The system is being used to measure rime, mixed, and clear natural ice accretions. Author

N86-31563*# National Aeronautics and Space Administration, Washington, D.C.
MISSION ADAPTIVE WING SOARS AT NASA FACILITY
Debra Rahn and Leslie Reinertson (National Aeronautics and Space Administration. Dryden (Hugh L.) Flight Research Center, Edwards, Calif.) 29 Aug. 1986 2 p
(P86-10182) Avail: NTIS HC A02/MF A01 CSCL 01C

Research pilots have flown the Mission Adaptive Wing (MAW) aircraft, a highly modified F-111 jet fighter, from subsonic speeds up to Mach 1.4 in initial flight tests. The inital test flights are clearing the envelope with the wings flexed at various curvatures. This process allows further research data to be safely gathered so that designers of future variable camber wing aircraft have the best information possible. The altitude envelope was cleared from 27,500 down to 7,500 feet where denser air can cause more stress on the aircraft. Testing with the aircraft was conducted with wing sweep angles of 26 and 58 degrees. At the conclusion of the performance tests in the manual configuration, the system will be reconfigured for automatic mode tests. The limited automatic modes include maneuver camber control where the wings are deflected automatically to the best lift versus drag combination for a particular speed; cruise camber control which can help protect the aircraft from high G stresses; and maneuver enhancement/gust alleviation which is designed to improve the aircraft's up and down movement response to pilot commands and reduce the aircraft response to turbulence. B.G.

N86-31564# Federal Aviation Administration, Washington, D.C.
ADVISORY CIRCULAR: DESIGN CONSIDERATIONS TO PROTECT FUEL SYSTEMS DURING A WHEELS-UP LANDING

24 Jul. 1986 4 p
(FAA-AC/25.994-1) Avail: NTIS HC A02/MF A01

Guidelines and methods for complying with the requirements of the Federal Aviation Regulations (FAR) are presented. These guidelines pertain to protecting fuel system components located in the engine nacelles and the fuselage from damage which could result in spillage of enough fuel to constitute a fire hazard as a consequence of a wheels-up landing on a paved runway. Author

N86-31565# Societe Nationale Industrielle Aerospatiale, Paris (France).
ANEMOBAROMETRY IN FLIGHT CONTROL. A-320 AERODYNAMICS. THE TURBOREACTORS AIR INLET [L'ANEMOBAROMETRIE: ELEMENT ESSENTIEL DE LA CONDUITE DU VOL. AERODYNAMIQUE A-320. ENTREE D'AIR DES TURBOREACTORS]
1985 10 p In FRENCH Presented at the Aeronautique Toulouse 2000, Toulouse, France, Dec. 1985; sponsored by Confederation Francaise de l'Encladrement CGC
(SNIAS-861-111-114; ESA-86-97592) Avail: NTIS HC A02/MF A01

The utilization and calibration of barometric altimeters and the design and wind tunnel verification of the aerodynamic characteristics of the A-320 aircraft turbojet engine air intake are discussed. For individual titles, see N86-31566 through N86-31567.

N86-31566# Societe Nationale Industrielle Aerospatiale, Paris (France).
ANEMOBAROMETRY: AN ESSENTIAL ELEMENT OF FLIGHT CONTROL [L'ANEMOBAROMETRIE: ELEMENT ESSENTIEL DE LA CONDUITE DU VOL] c08
J. Bardou *In its* Anemobarometry in Flight Control. A-320 Aerodynamics. The Turboreactors Air Inlet 1985 3 p In FRENCH
(For primary document see N86-31565 23-05)
Avail: NTIS HC A02/MF A01

The exploitation of the atmospheric pressure to determine flight altitude is reviewed and the calibrating procedures are described. The utilization of ground based radars and towed cones in calibrating anemometric altimeters is discussed. An analysis of the measurement errors is included. ESA

N86-31567# Societe Nationale Industrielle Aerospatiale, Paris (France).
THE A-320 AERODYNAMICS. THE TURBOREACTOR AIR INLET [AERODYNAMIQUE A-320. ENTREE D'AIR DES TURBOREACTORS]
Andre Condaminas *In its* Anemobarometry in Flight Control. A-320 Aerodynamics. The Turboreactors Air Inlet 1985 6 p In FRENCH
(For primary document see N86-31565 23-05)
(Note-427.021/86) Avail: NTIS HC A02/MF A01

The design of air inlets is discussed and the solution adopted for the A-320 aircraft engines is described. The tests performed in wind tunnel are detailed. The results show that the flow around the nacelle is in agreement with the specifications in the whole range of operational Mach number and incidence angles. ESA

N86-31568*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FLIGHT TEST OF PASSIVE WING/STORE FLUTTER SUPPRESSION
F. W. Cazier, Jr. and M. W. Kehoe Aug. 1986 27 p Presented at the 1986 Aircraft/Stores Compatibility Symposium, Wright-Patterson AFB, Ohio, 8-10 Apr. 1986
(NASA-TM-87766; NAS 1.15:87766) Avail: NTIS HC A03/MF A01 CSCL 01C

Flight tests were performed on an F-16 airplane carrying on each wing an AIM-9J wingtip missile, a GBU-8 bomb near midspan, and an external fuel tank. Baseline flights with the GBU-8 mounted on a standard pylon established that this configuration is characterized by an antisymmetric limited amplitude flutter oscillation within the operational envelope. The airplane was then flown with GBU-8 mounted on the decoupler pylon. The decoupler pylon is a NASA concept of passive wing-store flutter suppression achieved by providing a low store-pylon pitch frequency. The decoupler pylon successfully suppressed wing-store flutter throughout the flight envelope. A 37 percent increase in flutter velocity over the standard pylon was demonstrated. Maneuvers with load factors to 4g were performed. Although the static store displacements during maneuvers were not sufficiently large to be of concern, a store pitch alignment system was tested and performed successfully. One GBU-8 was ejected demonstrating that weapon separation from the decoupler pylon is normal. Author

N86-31569# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE APPLICATION OF ENERGY TECHNIQUES TO PROPELLER-DRIVEN AIRPLANES M.S. Thesis
Douglas B. Youngblood Dec. 1985 92 p
(AD-A167113; AFIT/CI/NR-86-53T) Avail: NTIS HC A05/MF A01 CSCL 01/2

This thesis examines the validity of using the energy technique on propeller-driven aircraft during a climb analysis. It compares an accepted subsonic aircraft climb analysis method (pure potential energy increase) with an acceleration analysis procedure (pure kinetic energy increase) that has been a subject of criticism when used within a subsonic flight test program because of aircraft power limitations and flight test assumptions. The energy-state approximation was applied to a subsonic, propeller-driven aircraft using both a sawtooth climb analysis procedure and level acceleration method. Results showed that energy techniques, i.e., correlation between sawtooth and level acceleration methods, are a valuable support tool to the previously isolated potential energy (sawtooth climb) method. Data demonstrated a test time savings of approximately 7:1 with a variance in overall correlation that, although not within acceptable standards, is believed to be reducible with a more dedicated instrumentation selection. Data correlation suggested good agreement on best rate-of-climb speed determination. However, this should be an asset in reducing the time previously required for determination of excess thrust horsepower. Further testing, specifically with the level acceleration method, using higher resolution data acquisition equipment (with possibly an accelerometer) would fully demonstrate the extent of unaccountable losses and resulting disagreement between the two methods. GRA

N86-31570# Boeing Military Airplane Development, Seattle, Wash.
VULNERABILITY METHODOLOGY AND PROTECTIVE MEASURES FOR AIRCRAFT FIRE AND EXPLOSION HAZARDS. VOLUME 2: AIRCRAFT ENGINE NACELLE FIRE TEST PROGRAMS. PART 1: FIRE DETECTION, FIRE EXTINGUISHMENT AND SURFACE IGNITION STUDIES Final Report, Feb. 1981 - Oct. 1984
A. M. Johnson and A. F. Grenich Jan. 1986 279 p
(Contract F33615-78-C-2063)
(AD-A167356; D180-28861-1; AFWAL-TR-85-2060-V-2-Pt-1) Avail: NTIS HC A13/MF A01 CSCL 01/3

Fire tests and extinguishant concentration tests were conducted using a simulated portion of the F-16 aircraft engine compartment in the Aircraft Engine Nacelle (AEN) fire test simulator at WPAFB. Combat damage simulation included outer compartment wall penetration allowing either inflow or outflow of ventillation airflow through and external wound and fan perforation or engine bleed air line damage. Standard fire and agent concentration test techniques were developed. Existing specifications were found to be adequate in terms of quantity of fire extinguishing agent. Results also indicated that more rapid agent release resulted in more effective use of the agent. Halon 1301 performed significantly better than Halon 1202, contrary to what the available literature indicated. Fires with combat damage inflow simulation added were the most difficult to extinguish because hot surface ignition sources were created soon after the test fire was ignited. For these, the quantity of agent specified would have been adequate only if the agent reached the fire within a few seconds after ignition. GRA

N86-31571# Boeing Military Airplane Development, Seattle, Wash.
VULNERABILITY METHODOLOGY AND PROTECTIVE MEASURES FOR AIRCRAFT FIRE AND EXPLOSION HAZARDS. VOLUME 1: EXECUTIVE SUMMARY Final Report, Feb. 1981 - Oct. 1984
A. F. Grenich Jan. 1986 40 p
(Contract F33615-78-C-2063)
(AD-A167443; D180-28860-1-Vol-1; AFWAL-TR-85-2060-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 13/12

This report summarizes the research conducted by the contractor on airplane engine compartment and fuel tank fire safety research. The value of ground testing, using the Aircraft Engine Nacelle (AEN) and the Simulated Aircraft Fuel Tank Environment (SAFTE) facilities, was clearly evident as the testing proceeded. Extinguishant tests of simulated nacelle fires indicated that current criteria for extinguishant concentration and duration were more than adequate for intact nacelles inert gas generator systems (OBIGGS) revealed that both the permeable membrane and molecular sieve adequately inerted the test fuel tank. However, some minor operational difficulties were experienced with both test units which would have to be corrected prior to producing flight hardware. GRA

N86-31572# Boeing Military Airplane Development, Seattle, Wash.
VULNERABILITY METHODOLOGY AND PROTECTIVE MEASURES FOR AIRCRAFT FIRE AND EXPLOSION HAZARDS. VOLUME 2: AIRCRAFT ENGINE NACELLE FIRE TEST PROGRAMS. PART 2: SMALL SCALE TESTING OF DRY CHEMICAL FIRE EXTINGUISHANTS Final Report, Feb. 1981 - Oct. 1984
L. A. Desmarais Jan. 1986 279 p
(Contract F33615-78-C-2063)
(AD-A167444; D180-28862-Vol-2-Pt-2; AFWAL-TR-85-2060-Vol-2-Pt-2) Avail: NTIS HC A13/MF A01 CSCL 01/2

Dry chemical fire extinguishing agents were studied in a simulated small scale aircraft engine nacelle environment to observe the ability of these agents to prevent re-ignition, a known deficiency of the presently used gaseous agents. An injector was developed which effectively dispersed agent into the airstream; a fuel spray behind a flameholder, ignited and sustained by a hot surface, was used as the test scenario. The agents were found to be effective in very small quantities (less than 30 grams) for initial suppression of the fire, but permanent extinguishment was found to be a function of test conditions. The agents tended to accumulate on test surfaces and cause some corrosion as the result of repeated applications but were easily cleaned from affected surfaces. GRA

N86-31573# Boeing Military Airplane Development, Seattle, Wash.
VULNERABILITY METHODOLOGY AND PROTECTIVE MEASURES FOR AIRCRAFT FIRE AND EXPLOSION HAZARDS. VOLUME 3: ON-BOARD INERT GAS GENERATOR SYSTEM (OBIGGS) STUDIES. PART 2: FUEL SCRUBBING AND OXYGEN EVOLUTION TESTS Final Report, Feb. 1981 - Oct. 1984
P. M. McConnell, G. A. Dalan, and C. L. Anderson Jan. 1986 84 p
(Contract F33615-78-C-2063)
(AD-A167445; AFWAL-TR-85-2060-Vol-3-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 01/2

A basic consideration in designing an on-board inert gas generator system (OBIGGS) is to manage the evolution of dissolved oxygen in the fuel such that an inert ullage is maintained. Fuel scrubbing, in which an inert gas is bubbled through the fuel, is the common method of removing dissolved oxygen. Analytical modeling of the scrub gas requirements for fuel scrubbing required experimental data for validation. Tests were conducted to determine if a model based on the ideal gas law, published solubility coefficients, and partial pressure relationships was valid. The excellent agreement between calculated results and test data verified that such a model is valid. GRA

N86-31574# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
AERIAL REFUELING EVALUATION OF THE CH-47D HELICOPTER Final Report, 6-9 Aug. 1985
Robert D. Robbins, Patrick J. Sullivan, and Michael K. Herbst Aug. 1985 56 p
(AD-A167575) Avail: NTIS HC A04/MF A01 CSCL 01/3

A feasibility evaluation of aerial refueling the Boeing Vertol CH-47D helicopter (USA S/N 84-24159) equipped with a Boeing Vertol designed prototype aerial refueling system was conducted by the US Army Aviation Engineering Flight Activity (USAAEFA). Aerial refueling operations were performed with an HC-130P tanker aircraft and included a tanker turbulence evaluation, handling qualities while performing refueling procedures, and prototype aerial refueling system operations. Twenty-five refueling probe to drogue engagements were performed. During one engagement, 5070 pounds of fuel were transferred from the tanker to the CH-47D. Six shortcomings, all of which were related to the aerial refueling system, were identified for correction in the production design. The most significant of these was the increased maintenance requirements imposed by the use of refueling probe restraint cables. Within the limited scope of this evaluation aerial refueling of the CH-47D helicopter is a feasible concept. GRA

N86-31575# Naval Postgraduate School, Monterey, Calif.
A TRADE-OFF STUDY OF TILT ROTOR AIRCRAFT VERSUS HELICOPTERS USING VASCOMP 2 AND HESCOMP M.S. Thesis
Thomas P. Walsh Mar. 1986 218 p
(AD-A167719) Avail: NTIS HC A10/MF A01 CSCL 01/3

Trade-off studies were conducted wherein two versions of tilt rotor aircraft were examined to determine optimum mission distances where the tilt rotor designs were superior to a comparable contemporary (pure) helicopter. Two FORTRAN computer programs (VASCOMP 2 and HESCOMP) were used to predict aircraft performance. Program results were validated using data from independent sources. A simplified user's manual is included (with sample data and program output) for VASCOMP 2. The experimental results substantiate that the V-22, designated to replace the CH-46F among other aircraft, will offer significant improvements in speed, loiter endurance, hover endurance, performance, and efficiency. The results lend further credence to the manufacturer's claims that tilt rotor aircraft can transport more passengers/payload over longer distances in less time than conventional helicopters while retaining the important advantage of vertical takeoff and landing. It is acknowledged that the tilt rotor can readily perform transport missions using less fuel than helicopters but if a large percentage of hovering flight is required, conventional rotary wing aircraft are far more efficient from a fuel consumption standpoint. However, they do not have the staying power that the tilt rotor demonstrates. GRA

N86-31576# Sandia National Labs., Albuquerque, N. Mex.
AIRBORNE INTRUDER DETECTION CONSIDERATIONS
R. P. Syler Feb. 1986 5 p Presented at the Carnahan Conference on Security, Lexington, Ky., 14 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-006462; SAND-85-2236; CONF-860519-4) Avail: NTIS HC A02/MF A01

This paper addresses the considerations the DOE-OSS is giving to the airborne threat to their sensitive facilities. They are working towards establishing prohibited airspace over these facilities and tasked SNL to study the techniques for monitoring this airspace. The SNL study looked at various technologies that might be employed to monitor designated airspace. The results of the study indicate that certain dedicated radar systems are candidates, but that alternatives to these are needed. SNL is presently working on developing a system utilizing FAA ASR data at the DOE facilities, and on a seismic-acoustic helicopter detector system; these are possible alternatives to dedicated radars. DOE

N86-31577# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Bereich Luftfahrt.
TECHNOLOGY DEMONSTRATION FOR INVESTIGATION OF THE NEW POSSIBILITIES OF AMPHIBIOUS FLYING BOATS, PHASE 2 Final Report, Dec. 1984
Gerhard Kriechbaum Bonn, West Germany Bundesministerium

fuer Forschung und Technologie Dec. 1985 201 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-022; ISSN-0170-1339; ESA-86-97466) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36.50

The effects of new technologies on the amphibious flying boat open-sea capability, efficiency, and economical and flexible application were studied during a flight test program. Configuration and manufacture are described and technical characteristics are presented. Tests were performed on land, in water (inland water areas) and at sea to determine the corrosion resistance, the effects of the introduction of fiber composite materials in wings, and the all-weather landing procedures for amphibious aircraft. The craft can be used in open sea and does not require a maintenance and overhaul infrastructure, and shows good resistance to corrosion in salty water. The development of shock-absorbing fiber composite material structures is recommended. ESA

N86-31578# European Space Agency, Paris (France).
INVESTIGATIONS IN LANDING PROCESS OF AIRCRAFT BY MEANS OF THE MONTE-CARLO METHOD
Hanns-Juergen Peters Dec. 1985 109 p Original language document was announced as N86-14269
(ESA-TT-951; DFVLR-FB-85-27; ESA-86-97583) Avail: NTIS HC A06/MF A01; original German version available from DFVLR, Cologne, West Germany DM 35.50

A landing approach simulation model based on the data from a civil airport and on the Monte Carlo theory is developed using the General Purpose Simulation System on FORTRAN 4. The model is improved to investigate the landing process with constant and variable landing times. The theoretical landing time distribution with waiting times verified with the Chi-square test show good agreement with the empirical landing time distribution. The turn time and landing time distribution with waiting time parameters are verified by statistical comparison of the simulated distribution and the empirical one. The efficiency of the test distributions is improved with a relevant landing time delimitation. The test distributions are tested successfully in other airports. ESA

N86-31579# European Space Agency, Paris (France).
USER'S MANUAL FOR THE FALCON SYSTEM
Dec. 1985 110 p Original language document was announced as N86-10721
(ESA-TT-936; DFVLR-Mitt-85-08; ESA-86-97800) Avail: NTIS HC A06/MF A01; original German version available from DFVLR, Cologne, West Germany DM 36.50

The user manual for the meteorological research aircraft Falcon E, operated by DFVLR, is presented. The system and its technical data are described. The meteorological mission possibilities are discussed, and measuring compaigns are reviewed. Basic and special equipment is described. The onboard data acquisition system and the operational data evaluation programs are discussed. ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-31580# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.
CHARACTERISTICS OF ALTITUDE ERROR AT REDUCED QUANTIZATION Final Report
Gene A. Wong Aug. 1986 33 p
(FAA/PM-86/35) Avail: NTIS HC A03/MF A01 CSCL 01D

An analysis of the impact of reducing the quantization level on the altitude error produced by the altimetry system is described. Specifically, the mean and the standard deviation of the altitude error at the output of the aircraft's onboard quantization device are derived assuming altitude error at its input is normally distributed. The formulae derived are very general, exact, and applicable to all ranges of input statistics and quantization levels. A computer program was written to evaluate the impact of reduced quantization for a wide range of input error standard deviation and several quantization levels. Additionally, a comparison is made between the commonly used and approximate uniform distribution model method and the exact formulae derived herein for calculating the quantized altitude error. Author

N86-31581# Koninklijk Inst. voor de Marine, Den Helder (Netherlands).
FLIGHT DATA RECORDERS (FDR) AND/OR COCKPIT VOICE RECORDERS (CVR) IN THE LOCKHEED ORION P-3C UPDATE 2 [FDR EN/OF CVR IN DE LOCKHEED ORION P-3C UPDATE 2]
J. J. Coorens Jul. 1984 136 p In DUTCH and ENGLISH
(ESA-86-97395) Avail: NTIS HC A07/MF A01

Installation of Flight Data Recorder/Cockpit Voice Recorder (FDR/CVR) combinations in the P-3C Update aircraft is discussed. Requirements, design and development, and feasibility aspects of FDRs and CVRs are treated. Examples of existing systems (e.g., the U.S. Navy Universal Locator Airborne Data Systems, and the solid-state FDR) are given. Aircraft accident relevant information, necessary adaptions of the P-3 aircraft, and feasibility were investigated. Because of the high FDR cable system costs, installation of only a CVR is concluded to be the most feasible solution. ESA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-31582*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SMALL GAS TURBINE COMBUSTOR EXPERIMENTAL STUDY: COMPLIANT METAL/CERAMIC LINER AND PERFORMANCE EVALUATION
Waldo A. Acosta (Army Aviation Research and Development Command, Cleveland, Ohio) and Carl T. Norgren 1986 16 p Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE, and ASEE
(NASA-TM-87304; E-3016; NAS 1.15:87304) Avail: NTIS HC A02/MF A01 CSCL 21E

Combustor research relating to the development of fuel efficient small gas turbine engines capable of meeting future commercial and military aviation needs is currently underway at NASA Lewis. As part of this combustor research, a basic reverse-flow combustor has been used to investigate advanced liner wall cooling techniques. Liner temperature, performance, and exhaust emissions of the experimental combustor utilizing compliant metal/ceramic liners were determined and compared with three previously reported combustors that featured: (1) splash film-cooled liner walls; (2) transpiration cooled liner walls; and (3) counter-flow film cooled panels. Author

N86-31583*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VISUALIZATION OF FLOWS IN A MOTORED ROTARY COMBUSTION ENGINE USING HOLOGRAPHIC INTERFEROMETRY
Yolanda R. Hicks, Harold J. Schock, James E. Craig (Spectron Development Labs., Inc., Costa Mesa, Calif.), Holly L. Umstatter, and David Y. Lee 1986 15 p Presented at the 22nd Joint

Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE
(NASA-TM-88804; E-3148; NAS 1.15:88804; AIAA-86-1557) Avail: NTIS HC A02/MF A01 CSCL 21E

The use of holographic interferometry to view the small- and large-scale flow field structures in the combustion chamber of a motored Wankel engine assembly is described. In order that the flow patterns of interest could be observed, small quantities of helium were injected with the intake air. Variation of the air flow patterns with engine speed, helium flow rate, and rotor position are described. The air flow at two locations within the combustion chamber was examined using this technique. Author

N86-31584*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESCRIPTION OF A 20 KILOHERTZ POWER DISTRIBUTION SYSTEM
Irving G. Hansen Aug. 1986 7 p Presented at the 21st Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25-29 Aug. 1986; cosponsored by ACS, SAE, ANS, ASME, IEEE, AIAA, and AIChE
(NASA-TM-87346; NAS 1.15:87346) Avail: NTIS HC A02/MF A01 CSCL 21E

A single phase, 440 VRMS, 20 kHz power distribution system with a regulated sinusoidal wave form is discussed. A single phase power system minimizes the wiring, sensing, and control complexities required in a multi-sourced redundantly distributed power system. The single phase addresses only the distribution link; mulitphase lower frequency inputs and outputs accommodation techniques are described. While the 440 V operating potential was initially selected for aircraft operating below 50,000 ft, this potential also appears suitable for space power systems. This voltage choice recognizes a reasonable upper limit for semiconductor ratings, yet will direct synthesis of 220 V, 3 power. A 20 kHz operating frequency was selected to be above the range of audibility, minimize the weight of reactive components, yet allow the construction of single power stages of 25 to 30 kW. The regulated sinusoidal distribution system has several advantages. With a regulated voltage, most ac/dc conversions involve rather simple transformer rectifier applications. A sinusoidal distribution system, when used in conjunction with zero crossing switching, represents a minimal source of EMI. The present state of 20 kHz power technology includes computer controls of voltage and/or frequency, low inductance cable, current limiting circuit protection, bi-directional power flow, and motor/generator operating using standard induction machines. A status update and description of each of these items and their significance is presented. M.G.

N86-31585*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AEROPROPULSION OPPORTUNITIES FOR THE 21ST CENTURY
William C. Strack 1986 32 p Presented at the Scenario for 21st Century Aero Engine Design Seminar, Bristol, England, 16-17 May 1986; sponsored by the Institute of Mechanical Engineers
(NASA-TM-88817; E-3177; NAS 1.15:88817) Avail: NTIS HC A03/MF A01 CSCL 21E

A large number of novel aeropropulsion system concepts are presented for subsonic through hypersonic applications offering large potential improvements. Collectively, these examples illustrate the revolutionary opportunities and challenges that could enable truly revolutionary aircraft capabilities in the future. Certainly not all of these concepts will ultimately prove fruitful. Nevertheless, the sheer number of existing concepts, including many unmentioned herein, is so large and the applications so vast, that the prognosis for the future of aeropropulsion is very encouraging indeed. Author

N86-31586*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A PARAMETRIC STUDY OF A GAS-GENERATOR AIRTURBO RAMJET (ATR)
Christopher A. Snyder 1986 19 p Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE
(NASA-TM-88808; E-3156; NAS 1.15:88808) Avail: NTIS HC A02/MF A01 CSCL 21E

Parametric engine performance calculations were carried out for an airturbo ramjet (ATR). A LOX-LH2 rocket powered turbine powered the compressor. The engine was flown over a typical flight path up to Mach 5 to show the effect of engine off design operation. The compressor design efficiency, compressor pressure ratio, rocket turbine efficiency, rocket turbine inlet temperature, and rocket chamber pressure were varied to show their effect on engine net thrust and specific impulse at Mach 5 cruise. Estimates of engine weights as a fucntion of the ratio of compressor air to rocket propellant flow and rocket champer pressure are also included. In general, the Mach 5 results indicate that increasing the amount of rocket gas produced increased thrust but decreased the specific impulse. The engine performance was fairly sensitive to rocket chamber pressure, especially at higher compressor pressure ratios. At higher compressor pressure ratios, the engine thrust was sensitive to turbine inlet temperature. At all compressor pressure ratios, the engine performance was not sensitive to compressor or turbine efficiency. Author

N86-31587*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN OVERVIEW OF THE SMALL ENGINE COMPONENT TECHNOLOGY (SECT) STUDIES
M. R. Vanco, W. T. Wintucky, and R. W. Niedzwiecki Jun. 1986 20 p Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; cosponsored by AIAA, ASME, SAE, and ASEE
(NASA-TM-88796; E-3131; NAS 1.15:88796; USAAVSCOM-TR-86-C-23; AIAA-86-1542) Avail: NTIS HC A02/MF A01 CSCL 21E

The objectives of the joint NASA/Army SECT Studies were to identify high payoff technologies for year 2000 small gas turbine engine applications and to provide a technology plan for guiding future research and technology efforts applicable to rotorcraft, commuter and general aviation aircraft and cruise missiles. Competitive contracts were awarded to Allison, AVCO Lycoming, Garrett, Teledyne CAE and Williams International. This paper presents an overview of the contractors' study efforts for the commuter, rotorcraft, cruise missile, and auxiliary power (APU) applications with engines in the 250 to 1,000 horsepower size range. Reference aircraft, missions and engines were selected. Advanced engine configurations and cycles with projected year 2000 component technologies were evaluated and compared with a reference engine selected by the contractor. For typical commuter and rotorcraft applications, fuel savings of 22 percent to 42 percent can be attained. For $1/gallon and $2/gallon fuel, reductions in direct operating cost range from 6 percent to 16 percent and from 11 percent to 17 percent respectively. For subsonic strategic cruise missile applications, fuel savings of 38 percent to 54 percent can be achieved which allows 35 percent to 60 percent increase in mission range and life cycle cost reductions of 40 percent to 56 percent. High payoff technologies have been identified for all applications. Author

N86-31588*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TURBULENT DISPERSION OF THE ICING CLOUD FROM SPRAY NOZZLES USED IN ICING TUNNELS
C. John Marek and William A. Olsen, Jr. May 1986 17 p Presented at the 3rd International Workshop on Atmospheric Icing of Structures, Vancouver, British Columbia, 6-8 May 1986
(NASA-TM-87316; E-3047; NAS 1.15:87316) Avail: NTIS HC A02/MF A01 CSCL 21E

To correctly simulate flight in natural icing conditions, the turbulence in an icing simulator must be as low as possible. But some turbulence is required to mix the droplets from the spray nozzles and achieve an icing cloud of uniform liquid water content. The goal for any spray system is to obtain the widest possible spray cloud with the lowest possible turbulence in the test section

of a icing tunnel. This investigation reports the measurement of turbulence and the three-dimensional spread of the cloud from a single spray nozzle. The task was to determine how the air turbulence and cloud width are affected by spray bars of quite different drag coefficients, by changes in the turbulence upstream of the spray, the droplet size, and the atomizing air. An ice accretion grid, located 6.3 m downstream of the single spray nozzle, was used to measure cloud spread. Both the spray bar and the grid were located in the constant velocity test section. Three spray bar shapes were tested: the short blunt spray bar used in the NASA Lewis Icing Research Tunnel, a thin 14.6 cm chord airfoil, and a 53 cm chord NACA 0012 airfoil. At the low airspeed (56 km/hr) the ice accretion pattern was axisymmetric and was not affected by the shape of the spray bar. At the high airspeed (169 km/hr) the spread was 30 percent smaller than at the low airspeed. For the widest cloud the spray bars should be located as far upstream in the low velocity plenum of the icing tunnel. Good comparison is obtained between the cloud spread data and predicitons from a two-dimensional cloud mixing computer code using the two equation turbulence (k epsilon g) model. Author

N86-31589# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
NEW TECHNOLOGY PROPULSION (ANT) FOR GENERAL AVIATION AIRCRAFT, PHASE 1 Final Report, Aug. 1985
Ingo Borchers, Klaus Jonas, Rudolf Matecki, Hubert Kroje, Dieter Welte, and Herbert Zimmer Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 158 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-031; ISSN-0170-1339; ESA-86-97472) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32.50

The ANT concept for bimotor-turbopropelled aircraft developed from market-oriented requirements is characterized by two rear propellers and two engines installed inside the fuselage behind the passenger cabin, connected by transmission shafts. The concept is analyzed as regards aerodynamic quality, propeller installation efficiency, noise conditions and propeller load. The analysis is based on theoretical methods and wind tunnel tests with a 1:7 model. The propeller installation efficiency is improved by 10% to 14%. The specific range compared to that of an aircraft with conventional engine aircraft arrangement is increased by 15% and the maximum cruising speed by 7%. The noise level limit can be kept to 85 dB(A) and below. The dynamic behavior of the powerplant and noise should be further investigated. ESA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-31590*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
FLIGHT CONTROL SYNTHESIS FOR FLEXIBLE AIRCRAFT USING EIGENSPACE ASSIGNMENT
John B. Davidson and David K. Schmidt Jun. 1986 230 p (Grant NAG1-254)
(NASA-CR-178164; NAS 1.26:178164) Avail: NTIS HC A11/MF A01 CSCL 01C

The use of eigenspace assignment techniques to synthesize flight control systems for flexible aircraft is explored. Eigenspace assignment techniques are used to achieve a specified desired eigenspace, chosen to yield desirable system impulse residue magnitudes for selected system responses. Two of these are investigated. The first directly determines constant measurement feedback gains that will yield a close-loop system eigenspace close to a desired eigenspace. The second technique selects quadratic weighting matrices in a linear quadratic control synthesis that will asymptotically yield the close-loop achievable eigenspace. Finally, the possibility of using either of these techniques with state estimation is explored. Application of the methods to synthesize integrated flight-control and structural-mode-control laws for a large flexible aircraft is demonstrated and results discussed. Eigenspace selection criteria based on design goals are discussed, and for the study case it would appear that a desirable eigenspace can be obtained. In addition, the importance of state-space selection is noted along with problems with reduced-order measurement feedback. Since the full-state control laws may be implemented with dynamic compensation (state estimation), the use of reduced-order measurement feedback is less desirable. This is especially true since no change in the transient response from the pilot's input results if state estimation is used appropriately. The potential is also noted for high actuator bandwidth requirements if the linear quadratic synthesis approach is utilized. Even with the actuator pole location selected, a problem with unmodeled modes is noted due to high bandwidth. Some suggestions for future research include investigating how to choose an eigenspace that will achieve certain desired dynamics and stability robustness, determining how the choice of measurements effects synthesis results, and exploring how the phase relationships between desired eigenvector elements effects the synthesis results. Author

N86-31591*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A TAKEOFF PERFORMANCE MONITORING SYSTEM
Raghavachari Srivatsan (Kansas Univ., Lawrence), David R. Downing, and Wayne H. Bryant Aug. 1986 11 p Presented at the AIAA Guidance, Navigation and Control Conference, Williamsburg, Va., 18-20 Aug. 1986
(NASA-TM-89001; NAS 1.15:89001) Avail: NTIS HC A02/MF A01 CSCL 01C

The development and testing of a real-time takeoff performance monitoring system is discussed. The algorithm is madeup of two segments: a pretakeoff segment and a real-time segment. One-time inputs of ambient conditions and airplane configuration information are used in the pretakeoff segment to generate schedule performance data for that takeoff. The real-time segment uses the scheduled performance data generated in the pretakeoff segment, runway length data, and measured parameters to monitor the performance of the airplane throughout the takeoff roll. Airplane and engine performance deficiencies are detected and annunciated. An important feature of this algorithm is the one-time estimation of the runway rolling friction coefficient. The algorithm was tested using a six degree of freedom airplane model in a computer simulation. Results from a series of sensitivity analysis are also included. Author

N86-31592# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ON THE HANDLING QUALITIES OF FLIGHT VEHICLES THROUGH VARIABLE FLIGHT CONDITIONS M.S. Thesis
Kenneth C. Green Jan. 1986 100 p
(AD-A167727; AFIT/CI/NR-86-56T) Avail: NTIS HC A05/MF A01 CSCL 20/4

Specifications of flight vehicle handling qualities are currently based on the solution of linear, constant coefficient equations of motion, even when certain flight vehicles encounter continuously varing conditions in parts or all of their flight regime. This thesis develops an approach to encompass flight vehicle dynamics that vary during the performance of piloted tasks in the specification of handling qualities. Asymptotic methods, particularly Generalized Multiple Scales, are used to develop approximate analytical solutions to time-varying equations of motion. The solutions are valid throughout the time of variation, with constant flight conditions as a special case. Two classes of flight vehicles are examined to demonstrate the application of asymptotic methods to obtaining parameters pertinent to handling quality analyses. Extensions to existing criteria are suggested. This treatment of variable dynamics can give a clearer understanding of the response characteristics, and therefore of the stability and control requirements, of many piloted vehicles. GRA

N86-31593# European Space Agency, Paris (France).
ON CONTROL CONCEPT FOR IN-FLIGHT SIMULATION INCLUDING ACTUATOR NONLINEARITIES AND TIME DELAYS
Frohmut Hebschel Nov. 1985 67 p Original language document was announced as N86-10047
(ESA-TT-946; DFVLR-FB-85-24; ESA-86-97581) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne, West Germany DM 23.50

A model-following system was developed to study the dynamic behavior of transport aircraft with reduced longitudinal stability. The system is divided into two parts. The first consists of feedforward branches. If a linear description of the model and the basic aircraft is assumed an exact model-following is achieved by this part. For the control matrices algebraic expressions are derived. In the equations the influence of actuator dynamics is considered. A set of formulas in which all variables are assumed to be discretized for processing on a digital computer is developed. By the second subsystem an error suppression is achieved. The application of a cost vector method is demonstrated for one example. It is shown that nonlinearities and time lags can be included in the calculation of the feedback gains. ESA

N86-31566# Societe Nationale Industrielle Aerospatiale, Paris (France).
ANEMOBAROMETRY: AN ESSENTIAL ELEMENT OF FLIGHT CONTROL [L'ANEMOBAROMETRIE: ELEMENT ESSENTIEL DE LA CONDUITE DU VOL]
J. Bardou *In its* Anemobarometry in Flight Control. A-320 Aerodynamics. The Turboreactors Air Inlet 1985 3 p In FRENCH
(For primary document see N86-31565 23-05)
Avail: NTIS HC A02/MF A01

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-31594*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRFOIL FLUTTER MODEL SUSPENSION SYSTEM Patent Application
Wilmer H. Reed, III, inventor (to NASA) (DEI-Tech, Inc., Newport News, Va.) Filed 30 Jul. 1986 14 p
(Contract NAS1-17686)
(NASA-Case-LAR-13522-1; US-Patent-Appl-SN-890575) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention is a wind tunnel suspension system for testing flutter models under various loads and at various angles of attack. The invention comprises a mounting bracket assembly affixing the suspension system to the wind tunnel, a drag-link assembly and a compound spring arrangement. The compound spring arrangement comprises a plunge spring working in opposition to a compressive spring so as to provide a high stiffness to trim out steady state loads and simultaneously a low stiffness to dynamic loads. By this arrangement an airfoil may be tested for oscillatory response in both plunge and pitch modes while being held under high lifting loads in a wind tunnel. NASA

N86-31595*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPERATING ENVELOPE CHARTS FOR THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC WIND TUNNEL
Rosemary A. Rallo, David A. Dress, and Henry J. A. Siegle Aug. 1986 23 p
(NASA-TM-89006; NAS 1.15:89008) Avail: NTIS HC A02/MF A01 CSCL 14B

To take full advantage of the unique Reynolds number capabilities of the 0.3-meter Transonic Cryogenic Tunnel (0.3-m TCT) at the NASA Langley Research Center, it was designed to accommodate test sections other than the original, octagonal, three-dimensional test section. A 20- by 60-cm two-dimensional test section was installed in 1976 and was extensively used, primarily for airfoil testing, through the fall of 1984. The tunnel was inactive during 1985 so that a new test section and improved high speed diffuser could be installed in the tunnel circuit. The new test section has solid adaptive top and bottom walls to reduce or eliminate wall interference for two-dimensional testing. The test section is 33- by 33-cm in cross section at the entrance and is 142 cm long. In the planning and running of past airfoil tests in the 0.3-m TCT, the use of operating envelope charts have proven very useful. These charts give the variation of total temperature and pressure with Mach number and Reynolds number. The operating total temperature range of the 0.3-m TCT is from about 78 K to 327 K with total pressures ranging from about 17.5 psia to 88 psia. This report presents the operating envelope charts for the 0.3-m TCT with the adaptive wall tes t section installed. They were all generated based on a 1-foot chord model. The Mach numbers vary from 0.1 to 0.95. Author

N86-31596# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
FIELD PERFORMANCE OF FIBER-REINFORCED CONCRETE AIRFIELD PAVEMENTS Final Report, Jan. 1983 - Jan. 1985
Raymond S. Rollings Jul. 1986 53 p
(Contract DTFA01-83-Y-30606)
(FAA/PM-86/26; WES-TR-GL-86-11) Avail: NTIS HC A04/MF A01

A field survey of steel fiber-reinforced concrete airfield pavements found the most serious performance problem to be permanent, early age curl of slabs and associated cracking. An examination of possible causes of this curl indicates it is probably due to the use of large slabs and thin sections. This study recommends slab sizes which should minimize this problem in the future. Other identified performance problems unique to this type pavement include loose surface fibers and nonfunctioning contraction joints. The design criteria for fiber-reinforced concrete were reviewed, and new criteria are proposed that are compatible with the Corps of Engineers change in portland cement concrete design criteria. A new method of overlay design was also proposed. Author

N86-31597# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION ON REDUCTION OF FLOW NOISE OF THE 0.6m X 0.6m TRISONIC WIND TUNNELS
Qilin Yun 28 Mar. 1986 25 p Transl. into ENGLISH from Kongqidonglixue Xuebao (China), no. 2, 1985 p 51-60 Original language document was announced in IAA as A85-38968
(AD-A166302; FTD-ID(RS)T-0034-86) Avail: NTIS HC A02/MF A01 CSCL 20/1

A significant reduction of the tunnel flow noise was achieved and the noise level has been among the lowest of the intermittent wind tunnels both at home and abroad by adding a noise-reducing device after the pressure regulating valve. Mounting screens on the perforated walls in the test section permitted further reduction of the flow noise in the section. It has been shown however, that the screen-mounting technique on the walls needs to be improved. GRA

N86-31598# Naval Postgraduate School, Monterey, Calif.
DESIGN OF A VERTICAL THRUST STAND FOR A REMOTELY PILOTED MODEL HELICOPTER M.S. Thesis
Theodore J. Urda Mar. 1986 42 p
(AD-A167811) Avail: NTIS HC A03/MF A01 CSCL 14/2

This paper discusses the necessary functional characteristics for the design of a test stand to measure the vertical thrust of a remotely piloted model helicopter as a function of power output, in different degrees of ground effect. A number of potential design choices are presented along with possible instrumentation schemes to obtain both the power output and the lifting force generated by

the Heli-Star model helicopter equipped with a Gold Cup HP.61 engine. Included are the results of preliminary validation testing of the test stand design chosen and a discussion of the methods used to eliminate or control vibrations which hampered the utility of the test stand. Recommendations for possible future modifications are also included. GRA

N86-31599# Naval Postgraduate School, Monterey, Calif.
APPLICATIONS OF INFRARED THERMOGRAPHY IN CONVECTIVE HEAT TRANSFER M.S. Thesis
Timothy M. Spence Mar. 1986 69 p
(AD-A167872) Avail: NTIS HC A04/MF A01 CSCL 21/5

A full-scale model of a double-wedge, simulating a jet vane used in guided missile thrust vector control (TVC), was constructed for subsonic wind tunnel testing to evaluate the feasibility of using a thermal imaging (infrared) system vice thermocouples to determine a surface heat transfer coefficient. The model was preheated, then allowed to cool via forced convection to ambient conditions. Surface temperature readings were taken using thermocouples and a thermal imaging system during the cooldown process. These readings were then reduced to solve for a heat transfer coefficient (h), using Newton's Law of Cooling. The results were compared with the theoretical solution for a flat plate and with the results obtained by testing an actual TVC vane configuration under the identical flow conditions. GRA

N86-31600# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
A VISIT TO CHINA'S FIRST DOMESTIC MADE FIGHTER FLIGHT SIMULATOR
Xin Ri 6 May 1986 5 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 1, 1984 p 4-5
(AD-A167898; FTD-ID(RS)T-0884-85) Avail: NTIS HC A02/MF A01 CSCL 05/9

China's first domestic made fighter flight simulator underwent official state evaluation and was put into service with the Air Force. The flight simulator is made up primarily of three components: the computer room, the fuselage room and the scenery viewing room; the movable simulator cockpit; and the scenery system. The fuselage room is center stage of the entire simulator. The drill and instruction of flight students and the flight training of aircrews is all done here. GRA

N86-31601# Dayton Univ., Ohio. Research Inst.
AIRCREW TRAINING DEVICES: UTILITY AND UTILIZATION OF ADVANCED INSTRUCTIONAL FEATURES. PHASE III: ELECTRONIC WARFARE TRAINERS Final Report, May - Sep. 1984
Donald J. Polzella and David C. Hubbard Apr. 1986 71 p
(Contract F33615-81-C-0005)
(AD-A167922; AFHRL-TR-85-49) Avail: NTIS HC A04/MF A01 CSCL 05/9

An aircrew training device (ATD) is not merely a flight simulator. It is also equipped with sophisticated hardware and software capabilities, known as advanced instructional features (AIFs), that permit a simulator instructor to control, monitor and fabricate simulator training missions. This report describes the third phase of a three-phase project designed to determine the utility and utilization of AIFs by means of a survey of simulator instructors from the Air Force Major Commands. Phase I surveyed 134 instructor pilots and weapons director instructors assigned to principal Tactical Air Command (TAC) ATD training sites. Phase II surveyed 273 instructor pilots, flight engineers, and radar/navigators from Air Training Command (ATC), Military Airlift Command (MAC), and Strategic Air Command (SAC). Phase III extended the survey to 155 electronic warfare and aerial gunnery instructors from ATC, SAC, and TAC training facilities. Based on utility and utilization ratings, the T-5 and T-4 trainers were the most favorably evaluated devices surveyed. They were followed, in order, by the F-4G simulator, B-52 weapon system trainer, and A-10 simulator. The level of AIF use was affected somewhat by hardware and software unreliability, implementation time, functional limitations, and design deficiencies. GRA

N86-31602# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.
AIRPORT NOISE CONTROL STRATEGIES
Patricia A. Cline May 1986 126 p
(AD-A167977; FAA-EE-86-02) Avail: NTIS HC A07/MF A01 CSCL 20/1

The Federal Aviation Administration's (FAA) Airport Noise Control Strategies Data File contains a comprehensive listing of airport noise control actions. The information contained in this data file is an updated version of the June 1983 Airport Noise Control Strategies report. Originally, the data were collected from the Environmental Data Bank of March 1979, the National Business Aircraft Association and the Aircraft Operators Council International. Additional data were garnered from the FAA Airport Facility Directory. For this version, the FAA regional offices reviewed the latest information and made appropriate changes. Thirty-seven categories of noise control actions have been identified and are in use, singly or in combination, by approximately 400 airports. GRA

N86-31603# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Warmte- en Stromingsleer.
QUALITY DETERMINATION OF THE HEAT AND FLOW THEORY DEPARTMENT (WS) SUBSONIC WIND TUNNEL AND EXPERIMENTS USING LASER DOPPLER VELOCITY MEASUREMENT Ph.D. Thesis [KWALITEITSBEPALING VAN DE WS SUBSONE WINDTUNNEL EN EXPERIMENTEN HIERIN MET LASER-DOPPLER SNELHEIDSMETING]
Hans vanWolferen Jul. 1984 97 p In DUTCH
(ESA-86-97355) Avail: NTIS HC A05/MF A01

Wind tunnel characteristics, i.e., the static pressure distribution along the tunnel axis, ventilator characteristics, and quality of the measurement section determined by the velocity distribution and turbulence level, were investigated using pressure and hot-wire velocity measurements. The utility of laser Doppler anemometers (LDA) in the tunnel was examined using a two-beam and real-fringe formation. The photomultiplier detector signal was processed with a digital autocorrelator. The best formation for an optimal correlation function was determined. Autocorrelation processing of velocity and turbulence was performed. The spectral density of the LDA signal was determined from the autocorrelation function with the maximum entropy method. The spectral analysis was tested with test signals and the LDA results in the wake of a cylinder at a Reynolds number of 15,000 to 45,000. ESA

N86-31604# VDO-Luftfahrtgeraete Werk Adolf Schindling G.m. b.H., Frankfurt (West Germany). Bereich Luftfahrt.
STUDIES FOR THE APPLICATION OF A FLEXIBLE WEIGHT AND BALANCE (W/B) MEASURING FACILITY FOR COMMERCIAL AIRCRAFT Final Report, Jun. 1984
Hans Werner Fischer Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 73 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-029; ISSN-0170-1339; ESA-86-97471) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15.50

A weight and balance measuring facility incorporating shear stress sensors was developed and studied as regards accuracy, stability and applicability. The sensor system measures shear stress on the landing gear frame or on the nose landing gear tire axis. The construction, efficiency, maneuverability, and interfaces on the shear stress system are described. The causes of hysteresis in the measuring systems at the nose landing gear are experimentally investigated. The facility can be applied to series measurement. ESA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-31605 Ecole Polytechnique, Palaiseau (France).
SPACE AND DEFENSE [ESPACE ET DEFENSE]

5 Dec. 1985 29 p In FRENCH Presented at Journee Nationale Science et Defense, Palaiseau, France, 5 Dec. 1985 Prepared in cooperation with Direction des Recherches Etudes et Techniques (ESA-86-97272) Avail: Issuing Activity

The problems of detecting and destroying missiles using satellites with energy weapons are discussed. The analysis of the satellite system shows that a large number of satellites (over 100) are necessary to assure the simultaneous presence of 5 satellites over the region to be defended. The minimum time requirement for the development of such a strategic defense system is 25 yr. The potentials of several types of weapons are examined, showing that the most promising system is a chemical laser in the infrared. Such a laser could be developed in 10 yr to produce megawatts of continuous energy with an effective range of 1500 km. It is concluded that because of the severe development problems and the basic nature of the system itself it is quite probable that complete protection cannot be assured. ESA

N86-31606*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EVALUATION OF SOLAR ARRAY FLIGHT EXPERIMENT RESPONSE DURING FLIGHT FOR EXTENSION/RETRACTION PHASE
Jerry Slaby Jun. 1986 17 p
(NASA-TM-86551; NAS 1.15:86551) Avail: NTIS HC A02/MF A01 CSCL 22A

This post flight evaluation of the Solar Array Flight Experiment's (SAFE) deployment dynamics explains the encountered resonances. Author

N86-31607# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
FEASIBILITY STUDY OF SURVEILLANCE AVOIDANCE DURING THE DEPLOYMENT OF SOVIET PAYLOADS OF MILITARY INTEREST INTO ORBIT FROM A SOVIET SHUTTLE M.S. Thesis
Edward F. Faudree, Jr. Dec. 1985 85 p
(AD-A167661; AFIT/GSO/ENS/85D-9) Avail: NTIS HC A05/MF A01 CSCL 17/9

The purpose of this thesis was to start a line of inquiry into how well the North American Aerospace Defense Command's (NORAD) radars can detect a satellite deployment from a Soviet space shuttle, one that is comparable to the U.S. space shuttle in size and capability. The radar locations and capabilities were assumed to be the ones presently operating plus a new PAVE PAWS radar in Texas and a new mechanical tracker on the island of Saipan. All radars were assumed to be in working order, and tracking the shuttle. The shuttle was assumed to be launched in a 51.62 deg. inclination, and would attempt deployment only at an ascending or descending node. The satellite could move away from the shuttle along the shuttle's radius vector, velocity vector, or angular momentum vector, so that it is approximately 50 kilometers from the shuttle one half an orbital revolution later. The geocentric angular separation, absolute distance apart and range difference is calculated when the pair are closest to the radar. The elevation angle above the radar's horizon is estimated, and assuming the worst-cas e viewing geometry of the shuttle and satellite by the radar site, a topocentric range difference and angular separation are determined. These values of angle and distance are compared to that particular radar's capabilities. GRA

N86-31608# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
THE USE OF MANNED SPACE FLIGHT [NUTZEN DER BEMANNTEN RAUMFAHRT]
Ruediger Scheunemann and Hans-Leo Richter Oct. 1985 20 p In GERMAN Original contains color illustrations
(ESA-86-97412) Avail: NTIS HC A02/MF A01

The use and the future applications of manned space flight research results are discussed. Scientific experiments in Spacelab and the possible utilization of the results for research and industry on Earth are described. The effects of weightlessness on materials research and the production of new materials; the production in space of GaAs crystals for microelectronics and superchips; turbine blades made of single crystals; the production of large biological single crystals; biology in space; living cells under conditions of weightlessness; medical experiments on astronauts; space sickness; investigations of the vestibular apparatus; and the TEXUS-program are treated. ESA

N86-31609# Technische Hochschule, Aachen (West Germany). Inst. fuer Physikalische Chemie.
INTERDIFFUSION !!! BINARY SALT MELTING UNDER WEIGHTLESSNESS Final Report, Jan. 1984
Juergen Hermanns, Achim Hahne, Wilhelm Merkens, and Joachim Richter Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 106 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-017; ISSN-0170-1339; ESA-86-97461) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22.50

A laboratory facility based on the plane source method was used to measure interdiffusion coefficients of binary alkaline and silver nitrate melts depending on the concentration at 300C using an interpolation interferometer. The applicability of the flowing junction cell under reduced gravity is demonstrated. Gas bubbles resulting from the reaction of the melt with the sealing material show a laminar flow in the measuring cell. After venting of the cell through a large gas bubble the melt forms a tight boundary. The flowing junction cell facility was improved to increase its operating reliability and to reduce the test duration. The concentration difference between melts can be reduced to 1 mole % through hydrodynamic boundary production to increase measurement accuracy. ESA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-31610*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STUDY OF A HOMOTOPY CONTINUATION METHOD FOR EARLY ORBIT DETERMINATION WITH THE TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS)
R. L. Smith (Computer Sciences Corp., Beltsville, Md.) and C. Huang Washington Mar. 1986 140 p
(NASA-TM-86230; NAS 1.15:86230) Avail: NTIS HC A07/MF A01 CSCL 22B

A recent mathematical technique for solving systems of equations is applied in a very general way to the orbit determination problem. The study of this technique, the homotopy continuation method, was motivated by the possible need to perform early orbit determination with the Tracking and Data Relay Satellite System (TDRSS), using range and Doppler tracking alone. Basically, a set of six tracking observations is continuously transformed from a set with known solution to the given set of observations with unknown solutions, and the corresponding orbit state vector is followed from the a priori estimate to the solutions. A numerical algorithm for following the state vector is developed and described in detail. Numerical examples using both real and simulated TDRSS tracking are given. A prototype early orbit determination algorithm for possible use in TDRSS orbit operations was extensively tested, and the results are described. Preliminary studies of two extensions of the method are discussed: generalization to a least-squares formulation and generalization to an exhaustive global method. Author

N86-31611# Sandia National Labs., Albuquerque, N. Mex.
POINT-MASS SIMULATION TOOL (PMAST) USER'S MANUAL
D. E. Salguero Mar. 1986 181 p

(Contract DE-AC04-76DP-00789)
(DE86-009547; SAND-85-2039) Avail: NTIS HC A09/MF A01

The Point-Mass Simulation Tool (PMAST) is designed to meet the need for a comprehensive conceptual-level trajectory analysis tool that is easy to use. Three degree-of-freedom equations of motion that simulate the flight vehicle as a point mass are used to compute the trajectories. Guidance commands input by the user control the vehicle so that it performs the desired maneuvers. During the development of PMAST, special attention was given to the input and output data formats in an effort to make the code easy to use. This manual describes the format of the input and output data files, and it shows how to execute the program on both the VAX and CRAY computer systems. DOE

N86-31612# Hatfield Polytechnic (England). Numerical Optimization Center.
START SOLUTION FOR INTERPLANETARY LOW THRUST TRAJECTORY OPTIMIZATION AND MODEL REFINEMENT, VOLUME 1
L. C. W. Dixon, S. E. Hersom, Z. A. Maany, and K. D. Patel Paris, France ESA Feb. 1985 119 p
(Contract ESA-4774/81-D-JS(SC))
(ESA-CR(P)-2175-Vol-1; ESA-86-97490-Vol-1) Avail: NTIS HC A06/MF A01

A robust method of starting the optimization of satellite orbits, typically between the Earth and an asteroid when the satellite is powered by a low thrust RTG or solar power unit is presented. The original software located an approximation to an optimal orbit, if started within a certain region of attraction of that orbit (in the space of the optimization variables). An automatic method of locating such a starting point and a method for refining the solution were developed. ESA

N86-31613# Hatfield Polytechnic (England). Numerical Optimization Center.
START SOLUTION FOR INTERPLANETARY LOW THRUST TRAJECTORY OPTIMISATION AND MODEL REFINEMENT. VOLUME 2: USER'S GUIDE TO THE SOFTWARE FOR LOW THRUST ORBIT OPTIMIZATION FOR INTERPLANETARY MISSIONS USING A LINEAR MODEL
S. E. Hersom, Z. A. Maany, and K. D. Patel Paris, France ESA Nov. 1984 66 p
(Contract ESA-4774/81-D-JS(SC))
(ESA-CR(P)-2175-Vol-2; ESA-86-97491-Vol-2) Avail: NTIS HC A04/MF A01

A user guide for a low thrust orbit control problem is presented. ESA

N86-31614# Hatfield Polytechnic (England). Numerical Optimization Center.
START SOLUTION FOR INTERPLANETARY LOW THRUST TRAJECTORY OPTIMIZATION AND MODEL REFINEMENT. VOLUME 3: LOW THRUST ORBIT OPTIMIZATION FOR INTERPLANETARY MISSIONS USING A PONTRYAGIN/LAMBERT APPROACH
S. E. Hersom and Z. A. Maany Paris, France ESA Mar. 1985 113 p
(Contract ESA-4774/81-D-JS(SC))
(ESA-CR(P)-2175-Vol-3; ESA-86-97492-Vol-3) Avail: NTIS HC A06/MF A01

Descriptions are given of the package written for the European Space Operations center for low thrust orbit control problem solving. ESA

N86-31615# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
PROBLEMS OF ARCADE-3 SATELLITE ATTITUDE DETERMINATION
J. C. Kosik 29 May 1984 96 p In FRENCH; ENGLISH summary
(CNES-CT/DTI/MS/CD/122; ESA-86-97649) Avail: NTIS HC A05/MF A01

Due to partial failure of the infrared Earth sensor, the attitude of ARCADE-3 satellite in a polar orbit was calculated using magnetometer and Sun sensor data. The origins of a lower precision in attitude calculation are examined, including instrument bias, spacecraft magnetic noise, and the polar orbit. A correction function by which the attitude error is reduced by half is described. The importance of the infrared Earth sensor in determining accurate attitudes is discussed. ESA

N86-31616# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
THEMATIC CLASSIFICATION OF ANALYTIC MODELS FOR ORBIT PREDICTION, VOLUME 1
J. C. Agnese 17 Oct. 1984 31 p In FRENCH; ENGLISH summary
(CNES-CT/DTI/MS/MN/240-Vol-1; ESA-86-97654-Vol-1) Avail: NTIS HC A03/MF A01

Orbit calculation mathematical models were classified by orbit type, such as circular, equatorial, or transfer orbits. Perturbations are also used as classification labels, including Earth potential, atmospheric drag, solar wind and radiation pressure. ESA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters, and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-31617*# Alabama Univ., Huntsville. Dept. of Mechanical Engineering.
MODELING DIRECTIONAL SOLIDIFICATION FURNACES Final Technical Report
James E. Smith, Jr. and Gerald R. Karr Aug. 1986 53 p
(Grant NAG8-553)
(NASA-CR-177148; NAS 1.26:177148) Avail: NTIS HC A04/MF A01 CSCL 14B

Theoretical considerations on the axial and radial temperature profiles are examined to serve as a guide to the furnace designer. Analytical and numerical studies were performed and the results were summarized. B.G.

N86-31618# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
AN ANALYSIS OF THE CENTAUR GROUND PROCESSING SYSTEM AT THE KENNEDY SPACE CENTER/CAPE CANAVERAL AFS M.S. Thesis
John T. Brock Dec. 1985 299 p
(AD-A167123; AFIT/GSO/ENS/85D-3) Avail: NTIS HC A13/MF A01 CSCL 16/1

This project determined the capability and limitations of the new Shuttle/Centaur ground processing system at the Kennedy Space Center/Cape Canaveral AFS FL. In particular, it investigates whether or not the system could process four Centaur vehicles in a one year period. To determine the system's capability two tools were developed: a PERT network graph and a SLAM simulation model of the system. The output from these two sources formed the basis for the analysis of the system. The PERT network was constructed using data from the Centaur Program Office and from Cape Canaveral AFS FL. The critical path through the network was also identified. Analysis of the PERT network indicated that it will take over 230 days to process one Centaur vehicle and that there is no slack time in the processing schedule. The SLAM model was built for the proposed system and simulation runs were conducted using versions of the processing system with modified elements, i.e., increased facilities. These runs indicated that additional resources must be procured if the system is to reach four flight per year processing rate. As currently configured, the system can support only two flights a year. GRA

N86-31619# Materials Research Labs., Ascot Vale (Australia).
RAIL INDUCTANCE CALCULATIONS FOR SOME SIMPLE CURRENT DISTRIBUTIONS
V. Kowalenko Feb. 1986 44 p
(AD-A167915; MRL-R-976) Avail: NTIS HC A03/MF A01 CSCL 20/3

In this study, an expression for the inductance per unit length of the rails for a railgun-type electromagnetic launcher (EML) is derived from first principles using simple quasi-stationary models for the current distribution in the rails. The results are applied in particular, to the MRL railgun and are compared with work by others in the field. The study concludes with discussions on the problems associated with current diffusion in the rails, and the resulting influence upon the equation-of-motion used in evaluating projectile performance. Author (GRA)

N86-31620# Los Alamos National Lab., N. Mex.
ELECTROMAGNETIC RAILGUN AND ITS APPLICATIONS
S. Jinhua and J. Hao 1986 19 p Transl. into ENGLISH from Pao Cha Yu Chung-Chi (Communist China), v. 4, no. 2, 1984 p 90-96
(Contract W-7405-eng-36)
(DE86-009487; LA-tr-86-15) Avail: NTIS HC A02/MF A01

This paper briefly introduces the research history and current state of research of the electromagnetic railgun, describes its basic structure and energy systems, and notes fundamental research into several possible applications, including military and atmospheric firings. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-31621*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CENTAUR ENGINE GIMBAL FRICTION CHARACTERISTICS UNDER SIMULATED THRUST LOAD
James W. Askew Sep. 1986 21 p
(NASA-TM-87335; E-3080; NAS 1.15:87335) Avail: NTIS HC A02/MF A01 CSCL 20H

An investigation was performed to determine the friction characteristics of the engine gimbal system of the Centaur upper stage rocket. Because the Centaur requires low-gain autopilots in order to meet all stability requirements for some configurations, control performance (response to transients and limit-cycle amplitudes) depends highly on these friction characteristics. Forces required to rotate the Centaur engine gimbal system were measured under a simulated thrust load of 66,723 N (15,000 lb) and in an altitude/thermal environment. A series of tests was performed at three test conditions; ambient temperature and pressure, ambient temperature and vacuum, and cryogenic temperature and vacuum. Gimbal rotation was controlled, and tests were performed in which rotation amplitude and frequency were varied by using triangular and sinusoidal waveforms. Test data revealed an elastic characteristic of the gimbal, independent of the input signal, which was evident prior to true gimbal sliding. The torque required to initiate gimbal sliding was found to decrease when both pressure and temperature decreased. Results from the low amplitude and low frequency data are currently being used in mathematically modeling the gimbal friction characteristics for Centaur autopilot performance studies. M.G.

N86-31622# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Apparate.
DEVELOPMENT OF FLIGHT CONTROL SYSTEMS FOR MANEUVERABLE MISSILE WEAPON SYSTEMS. EXAMPLE OF OPERATION ORGANIZATION [ENTWICKLUNG VON FLUGFUEHRUNGSSYSTEMEN FUER LENKFLUGKOERPERWAFFENSYSTEME. EIN BEISPIEL EINER BEARBEITUNGSORGANISATION]
Werner Bub 14 Oct. 1985 18 p In GERMAN
(MBB-UA-929/85; ESA-86-97480) Avail: NTIS HC A02/MF A01

The organization of the development of flight control systems for maneuverable missiles is discussed. The basic functions of a flight control system are explained. The working domains of the different divisions taking part in the development are described. These divisions are control and systems theory, control and systems technique, control and steering electronics, computer aided systems, flight control software, simulation and computer technique, and the main division control and simulation. ESA

N86-31623# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
STUDY OF THE FIXATION OF HERMES VEHICLE ON THE ARIANE 5 LAUNCH VEHICLE [ETUDE DE L'ACCROCHAGE DU VEHICULE HERMES SUR LE LANCEUR ARIANE 5]
M. Agrain 1986 7 p In FRENCH Presented at CNES Struct. des Vehicules Spatiaux, Toulouse, 2-4 Dec. 1985
(SNIAS-861-422-121; ESA-86-97606) Avail: NTIS HC A02/MF A01

The preliminary design of an Ariane-Hermes adaptor is discussed. The cross section transition from Hermes shape to circular is made around the Hermes body and the design provides for aerodynamic requirements. Fixation methods are discussed. ESA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-31624# Air Command and Staff Coll., Maxwell AFB, Ala.
STS (SPACE TRANSPORTATION SYSTEM) EXPERIMENT SUPPORT STRUCTURE NEEDS ASSESSMENT
Wallace A. Beauchamp Apr. 1986 42 p
(AD-A167859; ACSC-86-0230) Avail: NTIS HC A03/MF A01 CSCL 22/1

The DOD space-based research and development program has a growing dependence on the Space Transportation System (STS). A shortfall in STS experiment support structures impedes the flight of the DOD payloads. This study looks at the existing support system from a management perspective in order to develop a procurement strategy for additional experiment support structures. The study concludes that a major problem is the existing NASA manifesting system. It recommends procurement of a flexible support structure and increased inventories of NASA sponsored carriers. The increased support includes funding for additional hardware and manpower for NASA. Author (GRA)

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-31625*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACTS EXPERIMENTS PROGRAM
Ronald J. Schertler 1986 12 p Proposed for presentation at Globecom '86, Houston, Tex., 1-4 Dec. 1986; sponsored by the Institute of Electrical and Electronics Engineers
(NASA-TM-88820; E-3182; NAS 1.15:88820) Avail: NTIS HC A02/MF A01 CSCL 17B

An overview of the ACTS Experiments Program is presented.

ACTS is being developed and will flight test the advanced technologies associated with: a Ka-band multibeam antenna, onboard signal processing and switching as well as laser communications. A nominal 3 yr experiments program is planned. Through the experiments program, the capabilities of the ACTS system will be made available to U.S. industry, university and government experimenters to test, prove the feasibility and evaluate the key ACTS system technologies. Communication modes of operation using the baseband processor and microwave switch matrix are presented, along with the antenna coverage pattern. Potential experiment categories are also presented and briefly discussed. An overall schedule of activities associated with the experiments program is outlined. Results of the ACTS Experiments Program will provide information vital to successful industry implementation of ACTS technology in a future operational system. Author

N86-31626# Institut Franco-Allemand de Recherches, St. Louis (France).
TELEMETRY SYSTEM FOR VERY HIGH ACCELERATION [SYSTEME DE TELEMESURE POUR PROJECTILES SOUMIS A DE TRES FORTES ACCELERATIONS]
Ph. Rateau 1 Jul. 1985 17 p In FRENCH Presented at 1st Journee Internationale des Telemesures of the 36th Salon International de l'Aeronautique et de l'Espace, Bourget, France, 1985
(ISL-CO-214/85; ESA-86-97626) Avail: NTIS HC A02/MF A01

Hybrid radio transmission electronic modules designed for telemetry utilization and inclusion in gun projectiles are described. The dimensions of each module are 10 x 10 x 2 mm and they can be used in projectiles with a minimum of 20 mm diameter. The effective transmission trajectory range varies from 1 km for 30 mm projectiles to 30 km for heavy artillery projectiles. A large variety of measurements are possible including ballistic, aerodynamic, mechanical, and physical parameters. The circuits of several modules are detailed. ESA

N86-31627# Societe Nationale Industrielle Aerospatiale, Paris (France).
NUMERICAL FUSION OF REDUNDANT TELEMETRY SOURCES
F. Pellet 1986 9 p Presented at ITC 85 Conference on Transition to Space Based Instrumentation System: Preparing for the Challenge of the 80's, Las Vegas, Nev., 28-31 Oct. 1985
(SNIAS-861-422-113; ESA-86-97600) Avail: NTIS HC A02/MF A01

A method to obtain delayed information about all on-board emitted data during the flight test of a missile or a launcher is presented. A deferred restitution of data transmitted at 1 Mbit/sec during several minutes is obtained up to 1 bit using the redundancies in recording information sources. The method allows a complete analysis of the way the vehicle systems work and gives useful knowledge on the contribution of each station, signal quality, error transmission, and the usefulness of each redundancy. ESA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-31628 National Aerospace Lab., Amsterdam (Netherlands). Space Div.
SOLICITED PROPOSAL FOR A NAVSAT CONTROL SEGMENT HARMONIZATION STUDY
O. B. M. Pietersen, J. Ryan, and F. Visser 1985 41 p
(NLR-Memo-RS-85-020-L; ESA-86-97781) Avail: Issuing Activity

A proposal to harmonize two studies on the Navsat Control Segment, carried out by Racal-Decca Advanced Development Ltd, under ESA contract number 5501/83/F/RD(SC), with a subcontract to Delft University of Technology, is made. The two studies diverge quite considerably because of differences in the baseline system concept, different emphases and different decisions taken for technical solutions. It is believed that discrepancies can be harmonized by discussions between NLR and Racal-Decca, while recommendations can be given to solve remaining differences. ESA

N86-31629 Centre National d'Etudes Spatiales, Toulouse (France).
DESIGN OF SPACECRAFT
Daniel Marty and Frederic dAllest 1986 669 p In FRENCH; ENGLISH summary
(ISBN-2-225-80732-9; ESA-86-97643) Copyright. Avail: CEPADUES, Toulouse, France

Satellite orbit calculation, orbit perturbations, structural design, thermal control, satellite tests, interplanetary vehicles, conventional launchers, space shuttles, avionics, propulsion, stability and optimization are covered in this textbook. ESA

N86-31630*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRELOADED SPACE STRUCTURAL COUPLING JOINTS Patent Application
Marvin D. Rhodes, inventor (to NASA) Filed 30 Jul. 1986 16 p
(NASA-Case-LAR-13489-1; US-Patent-Appl-SN-890445) Avail: NTIS HC A02/MF A01 CSCL 22B

This invention relates to a coupling device for tubular members, of large truss structures, with a locking collar being the only moving part. Each tubular member is constructed with an end bell section that has a belled flange with a mating face, and a necked area which is smaller in diameter than the tubular members to be joined. A split ring is affixed to each tubular member and is constructed so that when two tubular members are laterally moved into axial alignment and the collar is rotated thereover, the split ring loads the joint with axial force by pressing the belled flange mating surfaces together, and a preloading force is provided by the collar mating with a taper on the outside of the split rings. All free play is thereby removed by preloaded force. A major object of the invention is to provide an ability to remove and replace individual tubular members without disturbing other structural parts of a truss structure. An additional anticipated use of this joint is to couple high pressure fluid lines. NASA

N86-31631*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
THE INVESTIGATION OF TETHERED SATELLITE SYSTEM DYNAMICS Quarterly Report, 15 Feb. - 14 May 1986
Enrico C. Lorenzini Jun. 1986 113 p
(NASA-CR-178895; NAS 1.26:178895; QR-7) Avail: NTIS HC A06/MF A01 CSCL 22B

The analysis of the rotational dynamics of the satellite was focused on the rotational amplitude increase of the satellite, with respect to the tether, during retrieval. The dependence of the rotational amplitude upon the tether tension variation to the power 1/4 was thoroughly investigated. The damping of rotational oscillations achievable by reel control was also quantified while an alternative solution that makes use of a lever arm attached with a universal joint to the satellite was proposed. Comparison simulations between the Smithsonian Astrophysical Observatory and the Martin Marietta (MMA) computer code of reteival maneuvers were also carried out. The agreement between the two, completely independent, codes was extremely close, demonstrating the reliability of the models. The slack tether dynamics during reel jams was analytically investigated in order to identify the limits of applicability of the SLACK3 computer code to this particular case. Test runs with SLACK3 were also carried out. Author

N86-31632*# Ball Aerospace Systems Div., Boulder, Colo.
PHASE 3 STUDY OF SELECTED TETHER APPLICATIONS IN

SPACE, MID-TERM REVIEW
10 Jul. 1986 67 p
(Contract NAS8-36617)
(NASA-CR-178900; NAS 1.26:178900; DPD-665; DR-3) Avail: NTIS HC A04/MF A01 CSCL 22B

Topics addressed include: guidelines for the Space Transportation System (STS) payload deployer design; mini-orbital maneuvering vehicle (MOMV) design: shuttle tether deployer systems (STEDS); cost modeling; tethered platform analysis; fuel savings analysis; and STEDS control simulation. B.G.

N86-31633*# National Aeronautics and Space Administration, Washington, D.C.
NASA TO LAUNCH NOAA-G WEATHER SATELLITE
Jim Kukowski, Bud Littin, and Jim Elliott 19 Aug. 1986 11 p
(NASA-TM-89245; NASA-News-Release-86-115; P86-10175; NAS 1.15:89245) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, BWI Airport, Md. 21240 CSCL 22B

A meteorological weather satellite, NOAA-G, is scheduled to be launched from Vandenberg Air Force Base, Calif., aboard a U.S. Air Force Atlas-E launch vehicle, no earlier than 11:47 a.m., EDT, August 30. The satellite, a third-generation operational weather satellite, will be placed into a near-polar orbit at an altitude of 518 miles. The spacecraft, NOAA-10 in orbit, will circle the globe 14 times each day observing a different position of the Earth's surface on each revolution as the Earth turns beneath the spacecraft's orbit. It will become the morning satellite, joining NOAA-9, in NOAA's two polar orbit satellite system. The satellite's orbital period will be approximately 101 minutes. The orbit is planned to be Sun synchronous so that the spacecraft will cross the equator at approximately 7:30 a.m. (southbound) and 7.30 p.m. (northbound), local solar time. Like other NOAA satellites, NOAA-G will collect meteorological data and transmit the information directly to users around the world to enhance local weather analysis and forecasting. In addition to assisting in local weather forecasting, the satellite data are used for hurricane tracking and warning, and for agricultural, commercial fishing, forestry, maritime and other industrial uses. Author

N86-31634*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF AN OXYGEN PLASMA ON THE PHYSICAL AND CHEMICAL PROPERTIES OF SEVERAL FLUIDS FOR THE LIQUID DROPLET RADIATOR
Daniel A. Gulino and Carolyn E. Coles 1986 12 p Proposed for presentation at the 25th Aerospace Sciences Meeting, Reno, Nev., 12-15 Jan. 1987; sponsored by the American Institute of Aeronautics and Astronautics
(NASA-TM-88839; E-3222; NAS 1.15:88839) Avail: NTIS HC A02/MF A01 CSCL 07D

The Liquid Droplet Radiator is one of several radiator systems currently under investigation by NASA Lewis Research Center. It involves the direct exposure of the radiator working fluid to the space environment. An area of concern is the potential harmful effects of the low-Earth-orbit atomic oxygen environment on the radiator working fluid. To address this issue, seven candidate fluids were exposed to an oxygen plasma environment in a laboratory plasma asher. The fluids studied included Dow Corning 705 Diffusion Pump Fluid, polymethylphenylsiloxane and polydimethlsiloxane, both of which are experimental fluids made by Dow Corning, Fomblin Z25, made by Montedison, and three fluids from the Krytox family of fluids, Krytox 143AB, 1502, and 16256, which are made by DuPont. The fluids were characterized by noting changes in visual appearance, physical state, mass, and infrared spectra. Of the fluids tested, the Fomblin and the three Krytoxes were the least affected by the oxygen plasma. The only effect noted was a change in mass, which was most likely due to an oxygen-catalyzed deploymerization of the fluid molecule. Author

N86-31635# Societe Nationale Industrielle Aerospatiale, Cannes (France).
THERMAL CONTROL IN TELECOMMUNICATION AND DIRECT TELEVISION SATELLITES [LA THERMIQUE DANS LES SATELLITES DE TELECOMMUNICATIONS ET DE TELEVISION DIRECTE]
Charles Carton 1986 17 p In FRENCH Presented at Rencontre SFT 1985
(SNIAS-861-440-102; ESA-86-97611) Avail: NTIS HC A02/MF A01

The solutions adopted to obtain thermal equilibrium in geostationary satellites such as TDF, TV SAT, TELE-X and Arabsat are reviewed. Passive and active temperature control devices are described, including heat pipe systems, insulators, radiation reflectors and electrical heating. It is shown that the design of a satellite is strongly determined by thermal equilibrium considerations. ESA

N86-31636# National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Div.
ATTITUDE CONTROL OF SPACECRAFT: AN OVERVIEW OF RECENT DEVELOPMENTS AND RESEARCH
T. Zwartbol 27 Jun. 1985 24 p In DUTCH; ENGLISH summary Submitted for publication
(NLR-MP-85055-U; B8664362; ESA-86-97681) Avail: NTIS HC A02/MF A01

The application of modern control techniques for the development of spacecraft attitude estimation and control algorithms is reviewed. Control theories, and the mathematical modeling of the systems such as optical systems, flexible spacecraft, and liquid sloshing in microgravity are treated. The Modular Attitude Control System (MACS) is presented. The MACS test and simulation assembly, built for ESA, is described. ESA

N86-31637# Societe Nationale Industrielle Aerospatiale, Paris (France).
SPACEBUS: MULTIMISSION COMMUNICATION SATELLITES [SPACEBUS: SATELLITES DE TELECOMMUNICATION MULTIMISSIONS]
A. Daguet 1986 5 p In FRENCH Presented at Journees Industrielles France-Canada, Ottawa, Ontario, 10-12 Sep. 1985
(SNIAS-861-422-119; ESA-86-97604) Avail: NTIS HC A02/MF A01

The Spacebus satellite system is described. The family includes three capacities (Spacebus 100 to 300). The characteristics are a modular design, three axis stabilization, unified two component propulsion and deployable solar generator. Output power is from 1400 W to 6000 W. The mass in synchronous orbit is from 650 kg to 1500 kg. Arabsat is an example of Spacebus 100 design. ESA

N86-31638# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PREDICTION OF THE HIGH FREQUENCY RESPONSE OF SATELLITES TO DIFFUSE ACOUSTIC ENVIRONMENTS
B. Trocet, T. DangTrong, and C. Vidal 1986 7 p Presented at CNES Conference on Structures des Vehicules Spatiaux, Toulouse, France, 2-4 Dec. 1985
(SNIAS-861-422-122; ESA-86-97607) Avail: NTIS HC A02/MF A01

The application of the LASCAR computer program to the analysis of the acoustical response of the Ariane, Sylda and Arabsat spacecraft structures is discussed. The program is an improved version of the BRUIT program, successfully applied to the prediction of Ariane high frequency response. FORTRAN 77 is used, and LASCAR is available on IBM and CDC computers. The program predictions show good agreement with the measured response of complex structures and of equipment box attachment points. ESA

N86-31639# Societe Nationale Industrielle Aerospatiale, Cannes (France).
USE OF MoS2 APPLIED BY PHYSICAL VAPOR DEPOSITION (PVD) ON SPACE MECHANISMS
J. F. Patin, M. Maillat, and H. E. Hintermann 1986 6 p Presented at Second ESA European Symposium on Space Mechanisms and Tribology, Schloss Meersburg, West Germany, 9-11 Oct. 1985
(SNIAS-861-440-101; ESA-86-97610) Avail: NTIS HC A02/MF A01

The laboratory test results of sputter coatings of MoS2 are described. The lubricating film, produced using a physical vapor deposition technique was used in the Arabsat, SPOT and TDF satellites. The test program includes the study of the influence of many parameters, including speed, vacuum, temperature, load, and air humidity in the case of ground tests. The tests show that MoS2 is an excellent lubricant for space mechanisms. The only remaining problem is its high sensitivity to moisture when performing ground tests. ESA

N86-31640# Societe Nationale Industrielle Aerospatiale, Cannes (France).
DESIGN AND TEST OF A SPACE DEPLOYABLE RADIATOR
B. Moschetti, M. Amidieu, and B. Tatry 1986 8 p
(SNIAS-861-440-103; ESA-86-97612) Avail: NTIS HC A02/MF A01

A deployable panel of hinged type where the power is spread over the surface by means of embedded heat pipes and the thermal rotating joints are coaxial with the panel hinge is described. The prototype model has a radiation panel of 800 x 600 mm with 5 embedded heat pipes and 2 radiative faces capability. In the hot case the capability is 160 W to maintain 30 C. Thermal performance test results are given. ESA

N86-31641# Societe Nationale Industrielle Aerospatiale, Cannes (France).
NEW ALUMINUM ALLOYS FOR SATELLITE STRUCTURES
J. L. Cecconi and J. F. Patin 1986 9 p
(SNIAS-861-440-111; ESA-86-97619) Avail: NTIS HC A02/MF A01

The utilization of aluminum-lithium alloys in spacecraft structures is discussed. The weight reduction attainable is 10% to 13% compared with other aluminum alloy options. The applications are examined and carbon fiber reinforced plastic alternatives are analyzed. It is shown that the optimum choice depends on the required shape and properties of the spacecraft constituents. ESA

N86-31642# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
IN-FLIGHT ATTITUDE ESTIMATION AND CONTROL EXPERIMENTS WITH IRAS BASED ON MODERN CONTROL THEORY
A. P. Terpstra, T. Zwartbol, and C. P. R. C. Slippens 19 Apr. 1984 104 p
(Contract NIVR-1998)
(NLR-TR-84029-U; B8665727; ESA-86-98035) Avail: NTIS HC A06/MF A01

In three in-flight experiments with IRAS, algorithms for spacecraft state estimation and attitude control, and for inertial-optical attitude determination were loaded from the ground into the IRAS on-board computer and tested. The estimation and control experiments show that the model following control concept can be applied successfully to maneuvering spacecraft like IRAS and can be used with any type of closed-loop regulator. The inertial-optical attitude determination experiment demonstrates the feasibility of in-orbit estimation of gyro drift using measurements by an absolute attitude sensor. ESA

N86-31643# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
DYNAMICS OF FLEXIBLE SPACECRAFT: AN ANALYSIS OF APPROACHES TOWARDS MATHEMATICAL MODEL ORDER REDUCTION
P. Th. L. M. vanWoerkom 16 Apr. 1985 202 p
(Contract NIVR-1910)
(NLR-TR-85068-U; B8665500; ESA-86-98038) Avail: NTIS HC A10/MF A01

Reduction of the mathematical order (i.e., of the mathematical complexity) of the open loop spacecraft dynamics model with minimal loss of model accuracy is discussed. Approaches to open loop model order reduction were analyzed regarding application to dynamic models of flexible spacecraft. Parameter optimization, aggregation, singular perturbation, modal dominance, and component cost analysis were compared. The latter two approaches appear to be most meaningful and convenient amongst the five. ESA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N86-31644# Officine Galileo S.p.A., Florence (Italy).
STANDARD CALIBRATION PROCEDURE FOR PENCIL BEAM INFRARED SENSORS ON SPINNING SATELLITES, VOLUME 1 Final Report
Roberta Baldassini Fontana and Ivo Varano Paris, France ESA Jan. 1982 158 p
(Contract ESTEC-3843/79-NL-DG(SC))
(Rept-209-DT-54-Vol-1; ESA-CR(P)-2155-Vol-1; ESA-86-97486-Vol-1) Avail: NTIS HC A08/MF A01

A standard procedure for the calibration of pencil beam IR sensors, based on a simplified laboratory test program that, in conjunction with a suitable software, allows the determination of the unit's operative characteristics in standard laboratory conditions, was developed. The sensor parameters so defined, processed by a computer program together with other input parameters available at the spacecraft control operative center, provide an effective use of the sensor for attitude reconstruction beyond the conditions simulated in laboratory. The procedure simplifies the required tests, and gives better accuracy thanks to the quantity of the available input data processed by the computer. ESA

N86-31645# Officine Galileo S.p.A., Florence (Italy).
STANDARD CALIBRATION PROCEDURE FOR PENCIL BEAM INFRARED SENSORS ON SPINNING SATELLITES. VOLUME 2: APPLICABLE SOFTWARE AND USER MANUALS Final Report
Roberta Baldassini Fontana and Lido Cecconi Paris, France ESA Jan. 1982 44 p
(Contract ESTEC-3843/79-NL-DG(SC))
(Rept-209-DT-55-Vol-2; ESA-CR(P)-2155-Vol-2; ESA-86-97487-Vol-2) Avail: NTIS HC A03/MF A01

The updating and testing software for general satellite-borne IR sensor electronics, nonuniform detector responsivity, and optional rotation of the field of view around the telescope line of sight are described. Two standardized packages of software useful for optimizing the sensor parameters and for generating calibration data relative to the specific mission were produced. ESA

N86-32010*# Ball Aerospace Systems Div., Boulder, Colo.
SUBSYSTEM FACT SHEETS FOR NASA CO2 PROJECT, REVISION 3
Tom Lookabaugh *In* Little (Arthur D.), Inc. System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 212 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 14B

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-31646*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEST PROGRAM TO PROVIDE CONFIDENCE IN LIQUID OXYGEN COOLING OF HYDROCARBON FUELED ROCKET THRUST CHAMBERS
Elizabeth S. Armstrong 1986 11 p Presented at the JANNAF Propulsion Meeting, New Orleans, La., 25-28 Aug. 1986

(NASA-TM-88816; E-3174; NAS 1.15:88816) Avail: NTIS HC A02/MF A01 CSCL 21H

An experimental program has been planned at the NASA Lewis Research Center to build confidence in the feasibility of liquid oxygen cooling for hydrocarbon fueled rocket engines. Although liquid oxygen cooling has previously been incorporated in test hardware, more runtime is necessary to gain confidence in this concept. In the previous tests, small oxygen leaks developed at the throat of the thrust chamber and film cooled the hot-gas side of the chamber wall without resulting in catastrophic failure. However, more testing is necessary to demonstrate that a catastrophic failure would not occur if cracks developed further upstream between the injector and the throat, where the boundary layer has not been established. Since under normal conditions cracks are expected to form in the throat region of the thrust chamber, cracks must be initiated artificially in order to control their location. Several methods of crack initiation are discussed in this report. Four thrust chambers, three with cracks and one without, should be tested. The axial location of the cracks should be varied parametrically. Each chamber should be instrumented to determine the effects of the cracks, as well as the overall performance and durability of the chambers. Author

N86-31647*# Rockwell International Corp., Canoga Park, Calif. Propulsion Programs.

SPACE STATION PROPULSION TECHNOLOGY Annual Progress Report, 24 May 1985 - 23 May 1986

G. L. Briley 1986 92 p

(Contract NAS8-36418)

(NASA-CR-178897; NAS 1.26:178897; RI/RD86-226; Rept-0737p-105-; APR-1) Avail: NTIS HC A05/MF A01 CSCL 21H

The progress on the Space Station Propulsion Technology Program is described. The objectives are to provide a demonstration of hydrogen/oxygen propulsion technology readiness for the Initial Operating Capability (IOC) space station application, specifically gaseous hydrogen/oxygen and warm hydrogen thruster concepts, and to establish a means for evolving from the IOC space station propulsion to that required to support and interface with advanced station functions. The evaluation of concepts was completed. The accumulator module of the test bed was completed and, with the microprocessor controller, delivered to NASA-MSFC. An oxygen/hydrogen thruster was modified for use with the test bed and successfully tested at mixture ratios from 4:1 to 8:1. B.G.

N86-31648*# Page (R. J.) Co., Santa Ana, Calif.

SLIP CASTING AND EXTRUDING SHAPES OF RHENIUM WITH METAL OXIDE ADDITIVES. 1: FEASIBILITY DEMONSTRATION

Francis A. Barr and Russell J. Page Apr. 1986 17 p

(Contract NAS3-23884)

(NASA-CR-174970; NAS 1.26:174970) Avail: NTIS HC A02/MF A01 CSCL 11F

The feasibility of fabricating small rhenium parts with metal oxide additives by means of slip casting and extrusion techniques is described. The metal oxides, ZrO_2 and HfO_2 were stabilized into the cubic phase with Y_2O_3. Additions of metal oxide to the rhenium of up to 15 weight percent were used. Tubes of 17 mm diameter with 0.5 mm walls were slip cast by adapting current ceramic oxide techniques. A complete cast double conical nozzle demonstrated the ability to meet shapes and tolerances. Extrusion of meter long tubing lengths of 3.9 mm o.d. x 2.3 mm i.d. final dimension is documented. Sintering schedules are presented to produce better than 95% of theoretical density parts. Finished machining was found possible were requried by electric discharge machining and diamond grinding. Author

N86-31649*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EVALUATION OF A HYBRID HYDROSTATIC BEARING FOR CRYOGENIC TURBOPUMP APPLICATION

Paul W. Spica, Ned P. Hannum, and Scott D. Meyer 1986 19 p

(NASA-TM-87255; E-2945; NAS 1.15:87255) Avail: NTIS HC A02/MF A01 CSCL 13K

A hybrid hydrostatic bearing was designed to operate in liquid hydrogen at speeds to 80,000 rpm and radial loads to 440 n (100 lbf). The bearing assembly consisted of a pair of 20-mm angular-contact ball bearings encased in a journal, which was in turn supported by a fluid film of liquid hydrogen. The size and operating conditions of the bearing were selected to be compatible with the operating requirements of an advanced technology turbopump. Several test parameters were varied to characterize the bearing's steady-state operation. The rotation of the tester shaft was varied between 0 and 80,000 rpm. Bearing inlet fluid pressure was varied between 2.07 and 4.48 MPa (300 and 650 psia), while the fluid sump pressure was independently varied between 0.34 and 2.07 MPa (50 and 300 psia). The maximum radial load applied to the bearing was 440 N (110 lbf). Measured hybrid-hydrostatic-bearing stiffness was 1.5 times greater than predicted, while the fluid flow rate through the bearing was 35 to 65 percent less than predicted. Under two-phase fluid conditions, the stiffness was even greater and the flow rate was less. The optimal pressure ratio for the bearing should be between 0.2 and 0.55 depending on the balance desired between bearing efficiency and stiffness. Startup and shutdown cyclic tests were conducted to demonstrate the ability of the hybrid-hydrostatic-bearing assembly to survive at least a 300-firing-duty cycle. For a typical cycle, the shaft was accelerated to 50,000 rpm in 1.8 sec. The bearing operated for 337 start-stop cycles without failure. Author

N86-31650*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PERFORMANCE CHARACTERISTICS OF RING-CUSP THRUSTERS WITH XENON PROPELLANT

Michael J. Patterson 1986 35 p Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE

(NASA-TM-87338; E-3085; NAS 1.15:87338; AIAA-86-1392) Avail: NTIS HC A03/MF A01 CSCL 21H

The performance characteristics and operating envelope of several 30-cm ring-cusp ion thrusters with xenon propellant were investigated. Results indicate a strong performance dependence on the discharge chamber boundary magnetic fields and resultant distribution of electron currents. Significant improvements in discharge performance over J-series divergent-field thrusters were achieved for large throttling ranges, which translate into reduced cathode emission currents and reduced power dissipation which should be of significant benefit for operation at thruster power levels in excess of 10 kW. Mass spectrometry of the ion beam was documented for both the ring-cusp and J-series thrusters with xenon propellant for determination of overall thruster efficiency, and lifetime. Based on the lower centerline values of doubly charged ions in the ion beam and the lower operating discharge voltage, the screen grid erosion rate of the ring-cusp thruster is expected to be lower than the divergent-field J-series thruster by a factor of 2. Author

N86-31651*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE NONCAVITATING PERFORMANCE AND LIFE OF A SMALL VANE-TYPE POSITIVE DISPLACEMENT PUMP IN LIQUID HYDROGEN

Thomas E. Ulbricht and Joseph A. Hemminger 1986 28 p Presented at the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE and ASEE

(NASA-TM-87347; E-3100; NAS 1.15:87347; AIAA-86-1438) Avail: NTIS HC A03/MF A01 CSCL 21H

The low flow rate and high head rise requirements of hydrogen/oxygen auxiliary propulsion systems make the application of centrifugal pumps difficult. Positive displacement pumps are well-suited for these flow conditions, but little is known about their performance and life characteristics in liquid hydrogen. An experimental and analytical investigation was conducted to determine the performance and life characteristics of a vane-type, positive displacement pump. In the experimental part of this effort, mass flow rate and shaft torque were determined as functions of

shaft speed and pump pressure rise. Since liquid hydrogen offers little lubrication in a rubbing situation, pump life is an issue. During the life test, the pump was operated intermittently for 10 hr at the steady-state point of 0.074 lbm/sec (0.03 kg/sec) flow rate, 3000 psid (2.07 MPa) pressure rise, and 8000 rpm (838 rad/sec) shaft speed. Pump performance was monitored during the life test series and the results indicated no loss in performance. Material loss from the vanes was recorded and wear of the other components was documented. In the analytical part of this effort, a comprehensive pump performance analysis computer code, developed in-house, was used to predict pump performance. The results of the experimental investigation are presented and compared with the results of the analysis. Results of the life test are also presented. M.G.

N86-31652*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF THE GAS PARTICLE RADIATOR (GPR)
Donald L. Chubb Jul. 1986 35 p
(NASA-TM-88786; E-2639-1; NAS 1.15:88786) Avail: NTIS HC A03/MF A01 CSCL 20D

The theoretical performance of a new space radiator concept, the gas particle radiator (GPR), is calculated. The GPR uses a gas containing emitting, submicron particles as the radiating media. A transparent window contains the gas particle mixture around the solid radiator emitting surface. A major advantage of the GPR is that large emissivity (e sub T is greater than or = 0.8) is achieved without the use of emissive coatings. A radiation heat transfer analysis shows that for a modest volume fraction (approx. 10(-4)) of submicron particles and gas thickness (approx. 1 cm) the emissivity, e sub T, is limited by the window transmittance. Besides determining the emissivity, the window is the critical element for making it possible for the GPR to have lower mass than a tube type radiator. The window acts as a bumper to provide meteoroid protection for the radiator wall. The GPR was compared to a proposed titanium wall, potassium heat pipe radiator. For both radiators operating at a power level of 1.01 MW at 775 K it was calculated that the GPR mass was 31 percent lower than the heat pipe radiator. Author

N86-31653*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DETERMINATION OF SOLID ROCKET MOTOR (SRM) CASE SEGMENT GROWTH
Lisa Hanks Mitchell Jul. 1986 15 p
(NASA-TM-86557; NAS 1.15:86557) Avail: NTIS HC A02/MF A01 CSCL 21H

Presented is an assessment of case growth for two D6AC steel SRM case segments with multiple flight use and a comparison of these two cases with two new cases. Dimensional changes in the sealing diameter areas were recorded for the used cases and after hydroproofing of the new cases. Author

N86-31654*# Continuum, Inc., Huntsville, Ala.
SSME MAIN COMBUSTION CHAMBER AND NOZZLE FLOW-FIELD ANALYSIS Final Report
Richard C. Farmer, Ten-See Wang, Sheldon D. Smith, and Robert J. Prozan 1 Mar. 1986 43 p
(Contract NAS8-35510)
(NASA-CR-178893; NAS 1.26:178893; CI-FR-0085) Avail: NTIS HC A03/MF A01 CSCL 21H

An investigation is presented of the computational fluid dynamics (CFD) tools which would accurately analyze main combustion chamber and nozzle flow. The importance of combustion phenomena and local variations in mixture ratio are fully appreciated; however, the computational aspects of the gas dynamics involved were the sole issues addressed. The CFD analyses made are first compared with conventional nozzle analyses to determine the accuracy for steady flows, and then transient analyses are discussed. Author

N86-31655# Department of the Air Force, Washington, D.C.
SOLID ROCKET MOTOR WITH NOZZLE CONTAINING AROMATIC AMIDE FIBERS Patent
Joseph W. Lewis, inventor (to Air Force) Issued 11 Mar. 1986 5 p
(AD-D012250; US-Patent-4,574,700; US-Patent-Appl-SN-671395; US-Patent-Class-102-287) Avail: US Patent and Trademark Office CSCL 21/8

It is an object of the present invention to provide an improved nozzleless solid rocket motor comprising means for reducing erosive burning effects in the nozzle portion. In accordance with the present invention there is provided a solid rocket motor comprising a rocket case having a closed front end and an open second end, and a centrally ported propellant grain comprising a main portion and a nozzle portion, wherein the main portion is a shaped and cured first propellant, wherein the nozzle portion comprises a shaped and cured second propellant composition having a plurality of aromaic polyamide fibers dispersed throughout. GRA

N86-31656# Department of the Air Force, Washington, D.C.
DOME RESTRAINT ASSEMBLY FOR ROCKET MOTORS Patent
Peter F. ODriscoll, inventor (to Air Force) 25 Mar. 1986 7 p
Supersedes AD-D011041
(AD-D012278; US-Patent-4,577,542; US-Patent-Appl-SN-586952; US-Patent-Class-86-20D) Avail: US Patent and Trademark Office CSCL 21/8

This invention relates to an adjustable restraint assembly connectable between a dome portion of a solid propellant rocket motor casing and a rigid base or support, for use during the curing of a propellant in the casing. The assembly includes an upper attach bracket connectable to the dome portion, a lower attach bracket connectable to a rigid base, upper and lower brackets, respectively, and an adjustable threaded turn-buckle-like member connected between the flanges. The assembly is used to establish a maximum net downward deflection of the dome portion upon maximum pressurization of the uncured propellant in the motor casing and is thereafter adjusted at various times during the curing process to reduce and ultimately eliminate the deflection in increments to thereby improve the bond between the grains of the cured propellant and the casing in the region of the forward dome. GRA

N86-31657# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY ON ALGORITHMS FOR PREDICTION OF SOLID PROPELLANT ROCKET MOTOR PERFORMANCE
Xin Wang and Zhongqin Zhang 22 Apr. 1986 15 p Transl. into ENGLISH from Hang Kong Xuebao (China), v. 5, no. 3, Sep. 1984 p 288-295
(AD-A167842; FTD-ID(RS)T-0152-86) Avail: NTIS HC A02/MF A01 CSCL 21/8

This article introduces two predictive algorithms for the performance of solid propellant rocket motor. The emphasis is on the introduction of Time-Space Algorithm. The authors proposed a general two-dimensional grain calculation procedure in order to conduct the grain calculations. Therefore, the predictive algorithms for performance introduced by this article show generality. A comprehensive computer program for the aforementioned method has been written and applied to calculating the performance of three different solid rocket motors. The calculated results are consistent with those derived from experimental data. GRA

N86-31658# European Space Agency, Paris (France).
THE HIGHLY UNDEREXPANDED EXHAUST PLUME FROM NOZZLES WITH BOUNDARY LAYER
Karl Wieland Naumann Sep. 1985 114 p Original language document was announced as N85-31230
(ESA-TT-929; DFVLR-FB-85-10; ESA-86-97573) Avail: NTIS HC A06/MF A01; original German version available from DFVLR, Cologne, West Germany DM 28

The expansion of underexpanded free jets from a conical hypersonic nozzle is analyzed for Reynolds numbers typical of satellite attitude control thrusters. The laminar nozzle boundary

layer is measured. Streamlines in the free jet and the flow conditions inside the barrel shock are determined. Comparison with the Simons continuum plume model shows discrepancies proceeding from rarefaction effects in the Prandtl-Meyer expansion originating at the nozzle lip (freezing of the expansion curvature). The suitable formulation of a freezing parameter allows the fixing of the frozen streamline directions and flow conditions in the free jet expansion even for the streamlines originating from the nozzle boundary layer. Approximated free jet configurations show good agreement with experiments. ESA

N86-31659# Societe Europeenne de Propulsion, Vernon (France).
ADVANTAGES AND LIMITATIONS OF LIQUID PROPELLANT ROCKET ENGINES [GRANDEUR ET SERVITUDES DE LA PROPULSION PAR MOTEURS FUSEES A LIQUIDES]
Philippe Bordier and Philippe Buffet 1984 8 p In FRENCH
(ESA-86-97631) Avail: NTIS HC A02/MF A01

The design of rocket engines is discussed, with particular reference to the Ariane launch vehicle. The parameters affecting engine efficiency are explained as well as the design problems. Trends are illustrated by the description of the HM60 engine which is a H2/O2 system in development for the future Ariane 5 launcher. The HM60 is designed for 900 kN thrust. ESA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-31660# Wisconsin Univ., Madison. Dept. of Chemistry.
CHEMICAL REACTIONS AND PROPERTIES OF ORGANOSILICON COMPOUNDS RELATED TO NEW MATERIALS Final Report, 1 Feb. 1982 - 30 Sep. 1985
Robert West 31 Oct. 1985 23 p
(Contract F49620-83-C-0044)
(AD-A166338; AFOSR-86-0144TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

The chemistry of compounds containing silicon-silicon double bonds was investigated. Two new disilenes were synthesized and rotational barriers to cis-trans interconversion were determined to be 25-31 Kcal/mol. Oxidation of disilenes led to the 1,3-cyclodisiloxanes, as well as to disilene epoxide and 1,2-dioxetanes, all novel structures. Many new polysilane high polymers were synthesized, and their photoactivity was investigated. Several new methods for crosslinking of polysilanes were developed, and the first polysilanes containing functional side groups were prepared. Several cyclosilane families of compounds were also investigated. GRA

N86-31661# Lawrence Livermore National Lab., Calif.
CHEMISTRY RESEARCH RESOURCE Progress Report, Feb. 1986
Mar. 1986 93 p
(Contract W-7405-eng-48)
(DE86-009393; UCID-20622-86-2) Avail: NTIS HC A05/MF A01

Research is reported in the following fields: synthesis of new materials; development of analytical techniques; chemical kinetics and transport processes; cryogenic and other physical properties of hydrogen isotopes; artificial intelligence; development of techniques for characterization; materials modelling analysis; mechanical properties of polymers; physical metallurgy; phase transformations; surface modification and surface studies; and new materials development and properties. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N86-31662# Royal Aircraft Establishment, Farnborough (England).
AUTOCLAVE MOULDING OF CARBON FIBRE REINFORCED PLASTICS
D. Purslow and R. Childs 15 Apr. 1986 33 p
(RAE-TR-85039; RAE-Mat/Struct-121; BR97683; ESA-86-97260)
Avail: Issuing Activity

Cure cycles in autoclave molding of CFRP are discussed. Partial-cure, dwell-time, dual vacuum, and dual pressure were examined. Their significance to laminate quality is explained. It is argued that the packing of the fibers is determined by processes other than, and remote from, the autoclave. Thus the final thickness and fiber volume fraction are not under the autoclave operator's control. The cure cycle must be tuned to give, not a specific thickness, but that thickness which is inherent in the prepreg laminae used. The common factor behind all these phenomena is shown to be the relationship of viscosity to gel time in that resin can flow only until gelation effectively stops all flow. ESA

N86-31663*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FIBER COMPOSITE SANDWICH THERMOSTRUCTURAL BEHAVIOR: COMPUTATIONAL SIMULATION
C. C. Chamis, R. A. Aiello, and P. L. N. Murthy (Cleveland State Univ., Ohio) 1986 18 p Presented at the 27th Structures, Structural Dynamics and Materials Conference (SDM), San Antonio, Tex., 19-21 May 1986; sponsored by AIAA, ASME, ASCE and AHS
(NASA-TM-88787; E-3112; NAS 1.15:88787) Avail: NTIS HC A02/MF A01 CSCL 11D

Several computational levels of progressive sophistication/simplification are described to computationally simulate composite sandwich hygral, thermal, and structural behavior. The computational levels of sophistication include: (1) three-dimensional detailed finite element modeling of the honeycomb, the adhesive and the composite faces; (2) three-dimensional finite element modeling of the honeycomb assumed to be an equivalent continuous, homogeneous medium, the adhesive and the composite faces; (3) laminate theory simulation where the honeycomb (metal or composite) is assumed to consist of plies with equivalent properties; and (4) derivations of approximate, simplified equations for thermal and mechanical properties by simulating the honeycomb as an equivalent homogeneous medium. The approximate equations are combined with composite hygrothermomechanical and laminate theories to provide a simple and effective computational procedure for simulating the thermomechanical/thermostructural behavior of fiber composite sandwich structures. Author

N86-31664*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ICAN: A VERSATILE CODE FOR PREDICTING COMPOSITE PROPERTIES
Carol A. Ginty and Christos C. Chamis 1986 20 p Presented at the 31st National SAMPE Symposium and Exhibition, Las Vegas, Nev., 7-10 Apr. 1986
(NASA-TM-87334; E-2017; NAS 1.15:87334) Avail: NTIS HC A02/MF A01 CSCL 11D

The Integrated Composites ANalyzer (ICAN), a stand-alone computer code, incorporates micromechanics equations and laminate theory to analyze/design multilayered fiber composite structures. Procedures for both the implementation of new data in ICAN and the selection of appropriate measured data are summarized for: (1) composite systems subject to severe thermal environments; (2) woven fabric/cloth composites; and (3) the selection of new composite systems including those made from high strain-to-fracture fibers. The comparisons demonstrate the versatility of ICAN as a reliable method for determining composite properties suitable for preliminary design. M.G.

N86-31665*# Rensselaer Polytechnic Inst., Troy, N.Y.
COMPOSITE STRUCTURAL MATERIALS Annual Progress Report, 1 May 1985 - 30 Apr. 1986
Robert Loewy and Stephen E. Wiberley Aug. 1986 119 p

(Grant NGL-33-018-003)
(NASA-CR-179659; NAS 1.26:179659; Rept-49) Avail: NTIS HC A06/MF A01 CSCL 11D

Overall emphasis is on basic long-term research in the following categories: constituent materials, composite materials, generic structural elements, processing science technology; and maintaining long-term structural integrity. Research in basic composition, characteristics, and processing science of composite materials and their constituents is balanced against the mechanics, conceptual design, fabrication, and testing of generic structural elements typical of aerospace vehicles so as to encourage the discovery of unusual solutions to present and future problems. Detailed descriptions of the progress achieved in the various component parts of this comprehensive program are presented. B.G.

N86-31666*# Materials Sciences Corp., Spring House, Pa.
TEMPERATURE DEPENDENT NONLINEAR METAL MATRIX LAMINAE BEHAVIOR Final Technical Report, Dec. 1984 - Nov. 1985
David J. Barrett and Kent W. Buesking Washington NASA Sep. 1986 123 p
(NAS1-17822)
(NASA-CR-4016; NAS 1.26:4016; MSC-TFR-1607/0211) Avail: NTIS HC A06/MF A01 CSCL 11D

An analytical method is described for computing the nonlinear thermal and mechanical response of laminated plates. The material model focuses upon the behavior of metal matrix materials by relating the nonlinear composite response to plasticity effects in the matrix. The foundation of the analysis is the unidirectional material model which is used to compute the instantaneous properties of the lamina based upon the properties of the fibers and matrix. The unidirectional model assumes that the fibers properties are constant with temperature and assumes that the matrix can be modelled as a temperature dependent, bilinear, kinematically hardening material. An incremental approach is used to compute average stresses in the fibers and matrix caused by arbitrary mechanical and thermal loads. The layer model is incorporated in an incremental laminated plate theory to compute the nonlinear response of laminated metal matrix composites of general orientation and stacking sequence. The report includes comparisons of the method with other analytical approaches and compares theoretical calculations with measured experimental material behavior. A section is included which describes the limitations of the material model. M.G.

N86-31667# Department of the Navy, Washington, D. C.
PROCESS FOR PRODUCING CARBIDE COATINGS Patent
Irwin L. Singer and Russell A. Jeffries, inventors (to Navy) Issued 21 Jan. 1986 4 p Supersedes AD-D011295
(AD-D012202; US-Patent-4,565,710; US-Patent-Appl-SN-617777; US-Patent-Class-427-35) Avail: US Patent and Trademark Office CSCL 11/6

A surface alloy is formed upon a solid alloy substrate by implanting ions into a heated solid substrate. By this method, for example, an Ti binary surface alloy may be formed upon a carbon steel. Also, this process allows solid-state gettering of selected minority solutes in alloys. GRA

N86-31668# Martin Marietta Aerospace, Denver, Colo.
DAMPING CHARACTERISTICS OF METAL MATRIX COMPOSITES Quarterly Letter Report
10 Apr. 1986 6 p
(Contract N00014-85-C-0857)
(AD-A167792; MCR-85-721) Avail: NTIS HC A02/MF A01 CSCL 11/4

Damping test data of Gr/Al composites, from previous measurements at Martin Marietta Denver Aerospace, CO suggest that composites exhibit higher damping than aluminum and titanium base structural alloys. Enhanced material damping of metal matrix composite (MMC), as a structural material will significantly improve the stability control and reliability of space structures. The objectives of the present investigation are: (1) to identify the mechanism and the source of damping in MMC (P55 Gr/6061 Al); (2) to determine the role of microstructural parameters, e.g., fiber volume, fiber orientation and interfiber spacing, and (3) to define the role of fiber matrix interfaces. GRA

N86-31669# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
DEVELOPMENT OF FRACTURE MECHANICS MAPS FOR COMPOSITE MATERIALS, VOLUME 1 Final Report, Jan. 1982 - Jan. 1985
H. W. Bergmann Dec. 1985 224 p
(AD-A168002; AFWAL-TR-85-4150-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 11/4

The Institute for Structural Mechanics of the German Aerospace Research Establishment (DFVLR) has conducted a research program aimed at the characterization of the fracture behavior of carbon-fiber-reinforced epoxy resins. The research effort encompassed to comprehensive experimental and analytical investigation of the response of test specimens under a broad range of material, loading and environmental parameters. By combining an evaluation of global laminate properties with an investigation of miro-and macroscopic modes of failure, the understanding of the fracture and fatigue behavior of carbon-fiber-reinforced composites was enhanced. It is expected that the results of the research program and their representation in the form of tables, figures, graphs and maps will assist the design engineer and lead to improved engineering concepts. GRA

N86-31670# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
DEVELOPMENT OF FRACTURE MECHANICS MAPS FOR COMPOSITE MATERIALS, VOLUME 2 Final Report, Jan. 1982 - Jan. 1985
H. W. Bergmann Dec. 1985 208 p
(AD-A168003; AFWAL-TR-85-4150-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 11/4

The Institute for Structural Mechanics of the German Aerospace Research Establishment (DFVLR) has conducted a research program aimed at the characterization of the fracture behavior of carbon-fiber-reinforced epoxy resins. The research effort encompassed a comprehensive experimental and analytical investigation of the response of test specimens under a broad range of material, loading and environmental parameters. By combining an evaluation of global laminate properties with an investigation of micro- and macroscopic modes of failure, the understanding of the fracture and fatigue behavior of carbonfiber-reinforced composites was enhanced. It is expected that the results of the research program and their representation in the form of tables, figures, graphs and maps will assist the design engineer and lead to improved engineering concepts. Volume 2 includes the following: Response of Mechanically Fatigued Notched Specimens; Response of Thermally Fatigued Un-Notched Specimens; Strain Capabilities and Strain Rate Effects in Epoxy Resins and Laminates; Radiative and Oxidative Effects; Fractographical Investigations; Fracture Mechanics Aspects; Evaluation of Fracture Models; and Mechanisms of Fracture. GRA

N86-31671# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
DEVELOPMENT OF FRACTURE MECHANICS MAPS FOR COMPOSITE MATERIALS, VOLUME 3 Final Report, Jan. 1982 - Jan. 1985
H. W. Bergmann Dec. 1985 268 p
(AD-A168004; AFWAL-TR-85-4150-Vol-3) Avail: NTIS HC A12/MF A01 CSCL 11/4

The Institute for Structural Mechanics of the German Aerospace Research Establishment (DFVLR) has conducted a research program aimed at the characterization of the fracture behavior of carbon-fiber-reinforced epoxy resins. The research effort encompassed a comprehensive experimental and analytical investigation of the response of test specimens under a broad range of material, loading and environmental parameters. By combining an evaluation of global laminate properties with an investigation of micro- and macroscopic modes of failure, the understanding of the fracture

and fatigue behavior of carbon-fiber-reinforced composites was enhanced. It is expected that the results of the research program and their representation in the form of tables, figures, graphs and maps will assist the design engineer and lead to improved engineering concepts. GRA

N86-31672# Washington Univ., St. Louis, Mo. Center for Composites Research.
DAMAGE ASSESSMENT BY ACOUSTO-ULTRASONIC TECHNIQUES IN COMPOSITES
Luis Lorenzo and H. T. Hahn Apr. 1986 41 p
(Contract N00014-85-K-0795)
(AD-A168097; WU/CCR-86/2) Avail: NTIS HC A03/MF A01 CSCL 11/7

This paper addresses the non-destructive evaluation of cross-ply 0/90 subscript 2S and 90/0 subscript 25 S-2 G1/DER 332 laminates using acousto-ultrasonic and acoustic emission techniques. Acoustic emission and acousto-ultrasonic measurements gave early warnings of damage initiation before transverse cracks became visible. AU parameters such as peak amplitude, energy and stress wave factor were equally sensitive to damage initiation but peak amplitude and energy were more sensitive to damage accumulation. Variations of peak amplitude, event duration, ringdown counts, and rise time in AU tests were analyzed to show that internal damage not only increased the apparent attenuation but also affected the wave envelope. The same effect was also present in AE tests. Acousto-ultrasonic tests of an undamaged cross-ply laminate showed that the apparent attenuation coefficients were almost independent of the wave propagation direction. The strongest wave was found along the fibers in the ply in contact with the transducers and the weakest wave traveled at an angle of 45 deg to the fibers. GRA

N86-31673# Lawrence Livermore National Lab., Calif.
MECHANICS RESEARCH DIRECTIONS IN COMPOSITES AND MANUFACTURING TECHNOLOGIES
R. M. Christensen Mar. 1986 22 p
(Contract W-7405-eng-48)
(DE86-008787; UCID-20691) Avail: NTIS HC A02/MF A01

This document is comprised of two papers: mechanics of fiber composites; and manufacturing and processing (of metals, ceramics, polymers). In the first, life predictions based on damage kinetics for various types of composite material combinations are studied. Structural optimization using the inherent anisotropy of composites offers potential rewards of increased performance. In the second, manufacturing and materials processing provide a wide spectrum of mechanics related problems. The reduction in defects ultimately relates to controlled processes which in turn come from realistic modelling of the physical events. New methods to produce lightweight materials with carefully controlled microstructure is studied. E.R.

N86-31674# Sandia National Labs., Albuquerque, N. Mex.
MECHANICAL TESTING OF GRAPHITE-EPOXY COMPOSITE TUBES
W. A. Kawahara, J. J. Totten, J. S. Korellis, and S. L. Brandon Apr. 1986 31 p
(Contract DE-AC04-76DP-00789)
(DE86-009608; SAND-86-8216) Avail: NTIS HC A03/MF A01

The in-plane elastic moduli of a unidirectional graphite-epoxy laminate were evaluated by loading tubular specimens in tension, torsion, and internal pressure. Similarly, effective moduli for crossply tubes of a prescribed lay-up were evaluated, then compared with predictions based upon plate lamination theory and the unidirectional moduli. Fixture design and software for test control, data acquisition, and data reduction are documented. DOE

N86-31675# Sandia National Labs., Livermore, Calif.
STRONGBACK BASELINE DESIGN: MECHANICAL PROPERTIES OF COMPOSITE FACESHEETS
W. A. Kawahara, M. L. Tootle, C. E. Comroe, and J. J. Totten May 1986 28 p
(Contract DE-AC04-76DR-00789)
(DE86-011913; SAND-86-8221) Avail: NTIS HC A03/MF A01

A current Sandia project responsibility involves the design and construction of a structure requiring high stiffness to weight ratio and extreme thermal stability. To meet these requirements, a baseline design proposes a sandwich type construction with facesheets composed of Pitch 75/ 3501-6 graphite/epoxy composite material. We have performed experiments to quantify the in-plane stiffness characteristics of this material. These tests are essential for two reasons. First, the results are to be input into a structural computer code to perform numerical simulations of component performance. Second, it is essential to verify that the fabricated product meets the specifications claimed by the vendor: this is especially important for composite materials because the final product depends strongly upon raw material condition as well as the layup and autoclaving procedures. Finally, we report preliminary attempts at measuring the in-plane thermal expansion coefficients of the composite plates using strain gages. DOE

N86-31676# British Petroleum Co. Ltd., Sunbury-on-Thames (England).
DEVELOPMENT AND APPLICATION OF ENERGY ABSORBING COMPOSITE DEVICES IN CRASH-WORTHY STRUCTURES
J. K. Wells 1985 20 p
(ESA-86-97253) Avail: NTIS HC A02/MF A01

By careful control of fiber, resin, and geometrical parameters, structural composite sections which collapse in a progressive manner, absorbing a large amount of energy, were developed. Energy absorption per unit weight is between 5 and 10 times that of metallic structures. A wide variety of fibers, resins and constructions were tested at speeds between quasi-static and 17 m/sec (40 mph). The variability of the sustained load during collapse and the control of break-out load are discussed. Applications of the technology for automotive and aerospace uses are discussed. The devices are shown to offer a very low weight solution to energy absorption problems. ESA

N86-31677# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
CONTRIBUTION OF CARBON FIBERS TO THE IMPROVEMENT OF THE PERFORMANCE OF COMPOSITE CONTAINERS [CONTRIBUTION DE LA FIBRE DE CARBONE A L'AMELIORATION DES PERFORMANCES DES RESERVOIRS COMPOSITES]
Georges Rouille and Alain Pradier 1986 10 p In FRENCH Presented at Journees Europeennes des Composites, 4-5 Mar. 1986
(SNIAS-861-430-115; ESA-86-97609) Avail: NTIS HC A02/MF A01

The characteristics of metal lined carbon fiber composite containers used for satellite fuel storage are discussed. A comparison is made with pure titanium and titanium/Kevlar composite designs. The tank is made of a 0.9 mm titanium shell covered by 9 layers of carbon epoxy composite wound directly over the metallic shell. The operating pressure is 300 bar. It is shown that the proposed design has for the same volume (51 lt) a lower mass and a higher breaking pressure than the equivalent Kevlar design. ESA

N86-31678# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
SPECIFIC NEED FOR COMPOSITE STRUCTURES IN AEROSPACE APPLICATIONS
F. Perez 1986 9 p Presented at MRS Conference on Advanced Materials Research and Development for Transport, Strasbourg, France, 26-29 Nov. 1985
(SNIAS-861-422-111; ESA-86-97598) Avail: NTIS HC A02/MF A01

The application of carbon fiber reinforced plastics to launcher and satellite structures, satellite antennas, and optical supports are reviewed. The advantages given by high strength, high modulus, and low thermal expansion coefficient are discussed. The applica-

tions to the Ariane program are described and the development of European technological ability in this field is examined. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-31679# Defence Research Information Centre, Orpington (England).
PHASE-SENSITIVE a.c. POLAROGRAPHY AND ITS DATA PROCESSING BY MICROCOMPUTER-CONTROLLED ELECTROANALYTICAL SYSTEM
T. Wasa (Osaka Perfecture, Japan), K. Akimoto, and H. Yamamoto Dec. 1985 13 p Transl. into ENGLISH from Bunseki Kagaku (Japan). v. 33, no. 8, 1984 p T69-T72
(DRIC-T-7634; BR98337; ESA-86-97262) Avail: Issuing Activity

A phase-sensitive ac polarograph and its automatic data-processing system were constructed through incorporation of a small-amplitude ac voltage source, an IR-drop compensator, and a lock-in amplifier into a microcomputer-controlled, electroanalytical system. System control and data-processing programs are the same as those of differential pulse polarography. System performance and applicability are evaluated through comparison of results obtained by computer data processing and manual treatment. The overall precision of the system for determination of depolarizers [Pb (II), Cd (II), Zn (III), pyrazinamide, etc.] in the range 0.02 nM to 0.5 nM is within 2% for peak current, 1% for peak potential, and 2% for half-peak width. Data-processing time is 1 to 3 min/peak. Characteristics of the fitting functions, such as Gaussian, Lorenzian, and theoretical equations are investigated. ESA

N86-31680*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A MATHEMATICAL APPROACH FOR EVALUATING NICKEL-HYDROGEN CELLS
Harold F. Leibecki 1986 18 p Proposed for presentation at the 1986 Fall Annual Meeting of the AIChE, Miami, Fla., 2-7 Nov. 1986
(NASA-TM-88803; E-3114; NAS 1.15:88803) Avail: NTIS HC A02/MF A01 CSCL 10C

A mathematical equation is presented which gives a quantitative relationship between time-voltage discharge curves, when a cell's ampere-hour capacity is determined at a constant discharge current. In particular the equation quantifies the initial exponential voltage decay; the rate of voltage decay; the overall voltage shift of the curve and the total capacity of the cell at the given discharge current. The results of 12 nickel-hydrogen boiler plate cells cycled to 80 percent depth-of-discharge (DOD) are discussed in association with these equations. Author

N86-31681# California Univ., Berkeley. College of Engineering.
COHERENT STRUCTURES IN TURBULENT SHEAR LAYERS AND RELATION TO MIXING REACTION AND COMBUSTION Final Report
Apr. 1986 8 p
(Contract N00014-80-C-0694)
(AD-A167042) Avail: NTIS HC A02/MF A01 CSCL 20/4

A number of numerical analyses served as experiments which led to a broad range of ideas about the dynamics of mixing layer. One theme which emerged early was the adversary role of vorticity and of deformation - two quantities which attempt to subjugate each other and whose competition is the subject matter of the development and growth to the shear flow. Another strand of the work follows a number of instabilities (two and three dimensional) which lead to recognizable non-linear motions. A third focus of the work relates vorticity and the mixing of scalars. The work started out to attempt to explain striking experimental results and ended by making a number of predictions which have not yet been experimentally established. A significant fraction, though not all of the typical motions which are dynamically plausible in a shear layer have been examined and given simple analytic representation. Finally the basis for the effective control of the shear layer has been laid. GRA

N86-31682# Aerospace Corp., El Segundo, Calif. Lab. Operations.
PHOTODESORPTION CLEANING OF SILICON WITH VACUUM ULTRAVIOLET IRRADIATION
A. R. Calloway and P. A. Bertrand 4 Apr. 1986 21 p
(Contracts F04701-85-C-0086; F04701-83-c-0084)
(AD-A167420; TR-0086(6766)-1; SD-TR-86-18) Avail: NTIS HC A02/MF A01 CSCL 13/8

An investigation into the use of vacuum-ultraviolet irradiation for photodesorption cleaning of the surface of silicon contaminated by carbonyl and hydrocarbon adsorbates has been made. GRA

N86-31683# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.
IN-SITU SOLID-PROPELLANT BURN-RATE MEASUREMENTS USING FLASH CINERADIOGRAPHY Final Report, 1 Oct. 1983 - 30 Sep. 1984
R. Y. Walker, R. A. Gamble, and L. M. Smith (Tennessee Univ. Space Inst., Tullahoma) Apr. 1986 45 p Prepared in cooperation with AEDC
(AD-A167637; AEDC-TR-85-22) Avail: NTIS HC A03/MF A01 CSCL 21/8

Flash radiography has been applied to the measurement of solid-propellant burn rates during a series of solid-propellant rocket motor tests at AEDC. This technique offers the advantage of realistic operating conditions and higher data rates than other measurement techniques. The propellant grains were cylindrically perforated and had action times ranging from 2.2 to 3 sec. Four of the six motors were designed to exhibit varying degrees of erosive burning. Chamber pressure and axial thrust were measured on each of the tests. Approximately 25 radiographs (at a rate of 6 per second) were recorded during the tests. These radiographs were subjected to three different methods of image processing. In addition to the quantitative data obtained, many interesting burn anomalies were revealed in the radiographs. GRA

N86-31684# Los Alamos National Lab., N. Mex.
WORKSHOP ON THE FRONTIERS OF THEORETICAL AND EXPERIMENTAL ELECTROCHEMISTRY
S. Gottesfeld, comp., A. Redondo, comp., and R. Lemons, comp. Jan. 1986 35 p Workshop held at Los Alamos, N. Mex., 25 Feb. 1985
(Contract W-7405-eng-36)
(DE86-007188; LA-10606-C; CONF-8502118-Summ) Avail: NTIS HC A03/MF A01

The Workshop on the Frontiers of Theoretical and Experimental Electrochemistry was held at the Los Alamos National Laboratory, February 25 to 26, 1985, to identify those problems and techniques that are at the forefront of electrochemistry research and to generate a summary that will be a guide to the most fruitful areas of electrochemistry research and a foundation for long-term support of such work in this country. Among the conclusions, major advances in understanding electrochemical systems are expected from the application of the new tools for in situ characterization of the solid/electrolyte interface. Parallel thrusts are needed in the areas of theory, experiments on well-defined surfaces, and exploratory research on new interfacial phenomena and new electrode materials. Several specific areas for new research are described in this report. DOE

N86-31685# Sandia National Labs., Albuquerque, N. Mex.
RAMAN SPECTRA OF RINGS IN SILICATE MATERIAL
D. R. Tallant, B. C. Bunker, C. J. Brinker, and C. A. Balfe 1986 7 p Presented at the Materials Research Society Spring Meeting, Palo Alto, Calif., 15 Apr. 1986
(Contract DE-AC04-76DP-00789)

(DE86-009629; SAND-85-2447C; CONF-860445-6) Avail: NTIS HC A02/MF A01

Raman spectroscopic studies on gel-derived silicates have confirmed that narrow bands near 607 cm-1 and 492 cm-1, first observed in the Raman spectrum of fused silica, are associated with three- and four-fold siloxane rings. Using these results, we have identified three- and four-fold siloxane rings in other high-surface-area silica materials, including leached glasses and Cab-O-Sil. This Raman spectroscopic evidence not only shows that small siloxane rings are a common characteristic of a number of silica materials but also suggests that they form preferentially at silica surfaces. This paper reviews the Raman spectroscopic evidence that led to the identification of the vibrational frequencies of the small siloxane rings and presents the results of Raman experiments on high-surface-area silica materials in which the concentration of small siloxane rings is enhanced compared to fused silica. DOE

N86-31686# Illinois Inst. of Tech., Chicago.
THEORETICAL STUDIES OF COMBUSTION DYNAMICS Final Technical Report
J. M. Bowman 1986 4 p
(Contract DE-AC02-81ER-10900)
(DE86-009312; DOE/ER-10900/T3) Avail: NTIS HC A02/MF A01

We developed a novel quantum theory of reactive scattering in which two degrees of freedom are explicitly coupled together and the remaining degrees of freedom are treated in several approximate ways. These approximations have the effect of uncoupling the remaining degrees of freedom from the two which are coupled. Thus, explicit coupling is retained in a reduced dimensionality space. Applications of this theory are discussed and the results are reviewed. A vibrational analysis of polyatomic molecules is included. DOE

N86-31687# California Univ., Berkeley. Lawrence Berkeley Lab.
INTERMITTENCY AND CONDITIONAL VELOCITIES IN PRE-MIXED CONICAL TURBULENT FLAMES
R. K. Chang and I. G. Shepherd Apr. 1986 20 p Presented at the Spring Meeting of the Western States Section of the Combustion Institute, Alberta, Canada, 28 Apr. 1986 Prepared in cooperation with California Univ., Berkeley
(Contract DE-AC03-76SF-00098)
(DE86-009363; LBL-21299; CONF-8604144-3) Avail: NTIS HC A02/MF A01

A turbulent premixed ethylene/air conical flame in a large Bunsen type burner has been studied using a two-component laser Doppler anemometry (LDA) system. Conditioned reactant velocity statistics were measured using a silicon oil aerosol, which evaporated and burned through the flame fronts, as the LDA seed. The intermittency was also determined by monitoring the Mie scattering intensity from the aerosol. The unconditioned velocity statistics were measured using aluminum oxide particles. A conditional analysis method was developed to deduce the conditioned product velocities. The method is based on deconvolution of the velocity probability density function (pdf). The difference between the conditioned mean product velocity and the conditioned mean reactant velocity, (DELTA)U, within the oblique region of the Bunsen flame is less than that observed previously in v-shaped premixed turbulent flames. The main reason is that combustion induced flow acceleration is lower for the lean test mixture. The conditioned product rms velocities are almost equal to the conditioned reactant rms velocities meaning that flame generated turbulence is not significant. The unconditioned and conditioned covariance (Reynolds stress) are negligibly small through the flame. Since the flame brush is almost parallel to the burner axis, this result is consistent with the covariances for the v-flames after the data was transformed with respect to the flame co-ordinate. DOE

N86-31688# Lawrence Livermore National Lab., Calif.
ROLE OF THE RADICAL POOL IN COMBUSTION
J. R. Creighton and A. K. Oppenheim 1985 11 p Presented at the 10th International Colloquium on Dynamics of Explosions and Reactive Systems, Berkeley, Calif., 4 Aug. 1985 Prepared in cooperation with California Univ., Berkeley
(Contract W-7405-eng-48)
(DE86-010159; UCRL-91994; CONF-850830-8) Avail: NTIS HC A02/MF A01

We present numerical solutions of the detailed chemical kinetics mechanisms for the reactions of hydrogen with fluorine and oxygen on a phase plane where temperature is plotted vs the concentration of one of the radicals, F or H. We observe that for given initial reactant concentrations, all solutions follow a common path, after an initial transient, regardless of initial temperature of initial radical concentration. We then analyze the reaction mechanism and fine that the rate equations for radical species rapidly reach a stable steady state that couples all of the radicals into a pool. The pool concentration then grow until onset of a reaction that consumes two radicals, resulting in a steady state of the entire pool. Further growth of the pool is due entirely to the temperature dependence of the steady state, which has the form of an equilibrium constant. We show that the rate of temperature increase is proportional to the radical pool concentration, particularly its steady-state value. DOE

N86-31689# Alabama Univ., University. Dept. of Chemistry.
AMBIENT TEMPERATURE LIQUEFACTION USING LIQUID CLATHRATES Quarterly Report, 15 Jan. - 14 Apr. 1986
J. L. Atwood 1986 7 p
(Contract DE-FG22-85PC-80912)
(DE86-010361; DOE/PC-80912/T2; QR-2) Avail: NTIS HC A02/MF A01

One of the more significant advances during the last quarter were observations which lead to an enhanced understanding of the basic liquid clathrate itself. This is a particularly relevant point because there is significant agreement that we can never reach full utility for liquid clathrates in coal liquefaction until we fully understand the liquid clathrate effect. It is well known that liquid clathrates form with a variety of aromatic solvents. Early on we attempted to make a liquid clathrate with 1-methylnaphthalene. This was a desirable choice because of the presence of the aromatic rings which seem to mimic some of the products found in work-ups of more classic coal liquefaction experiments. However, to our surprise 1-methylnaphthalene reacts with liquid clathrate-forming salts to yield a pure one-phase solution. In the course of a detailed examination of this phenomenon, we carried out experiments with 1-methylnaphthalene/toluene mixtures. A variety of different concentrations were utilized. The ones of greatest importance are 20% toluene, 80% 1-methylnaphthalene, 50-50, and 80-20. All of these form liquid clathrates. The ones which have the most toluene form liquid clathrates at room temperature. The one with the least toluene forms a liquid clathrate only at low temperature. For each concentration in the range given above there is a critical change from one phase to two phase behavior with temperature. DOE

N86-31690# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
AROMATICS OXIDATION AND SOOT FORMATION IN FLAMES Progress Report, year beginning 15 Aug. 1985
J. B. Howard 1986 5 p
(Contract DE-FG02-84ER-13282)
(DE86-010585; DOE/ER-13282/2) Avail: NTIS HC A02/MF A01

Kinetics and mechanisms of aromatics oxidation and soot formation in flames are being studied by measuring profiles of soot particle size and number concentration, stable and radical gaseous species concentrations, and temperature in premixed flat flames at 2.67 kPa. Net reaction rates calculated from these measurements are used to test mechanisms of soot formation and oxidation of aromatic species. The technique for measuring radical species is molecular-beam sampling with on-line mass spectrometry, which also provides stable species data. The latter are supplemented by the data from microprobe sampling, and optical methods are being considered for supplementing the H-atom and/or OH-radical measurements. In order to utilize extensive data from previous and current molecular beam mass

spectrometry research in this laboratory, the experimental conditions are chosen to match those of the other work. DOE

N86-31691# Oak Ridge National Lab., Tenn.
DEGRADATION OF MATERIALS IN COMBUSTION ENVIRONMENTS
J. I. Federer, J. M. Robbins, W. P. Parks, Jr., and J. S. Reid 1986 8 p Presented at the 6th Annual Energy Technology Conference, Houston, Tex., 17 Jun. 1986 Prepared in cooperation with Babcock and Wilcox Co., Lynchburg, Va.
(Contract DE-AC05-84OR-21400)
(DE86-011771; CONF-860607-1) Avail: NTIS HC A02/MF A01

Degradation mechanisms in conventional refractories, structural ceramics, and metallic alloys were revealed by examination of materials exposed to industrial and synthetic flue gases. Deterioration of refractory oxides and oxide structural ceramics involved formation of new liquid, glass, and solid phases, which resulted in loss of structural integrity. Destructive stresses associated with volume changes in the case of new solid phases were sometimes increased by thermal cycling. In the case of silicon carbide ceramics the viscosity of the normally protective oxide film was lowered by reaction with alkali oxides, which resulted in enhanced oxygen diffusion and active oxidation. Silicon carbide was also attacked by halide-containing atmospheres. Degradation was also caused by excessive temperatures, thermal cycling, and stresses caused by adhering slags. Several types of degradation mechanisms were observed in metallic alloys including breakaway oxidation, intergranular oxidation and attack, and sulfidation-oxidation. DOE

N86-31692# Kiruna Geophysical Inst. (Sweden).
A NEW WAY OF ORGANIZING SPECTRAL LINE RATIO FLUCTUATIONS
Bo Thelin Oct. 1985 17 p
(KGI-Preprint-084; ISSN-0349-2656; ESA-86-97223) Avail: NTIS HC A02/MF A01

An analysis method of organizing spectral line ratio fluctuations was developed to see which line pair of analysis is more or less stable at repeated measurements. A linear graph is obtained for iron lines when the spectral line ratio fluctuations were plotted versus the photon energies of these lines. When these fluctuations were plotted versus the upper energies instead, no linear structure is obtained. This means that there is no linearity with the conventional intensity formula with the Boltzmann exponent, but there is if exp (-h nu sub mn/kT) is used. The same result is achieved on absolute intensities of iron lines using intensity tables from direct current arc measurements with photographic registration. ESA

N86-31693# Endress und Hauser G.m.b.H. und Co., Maulburg (West Germany). Bereich Forschung und Entwicklung.
MOISTURE MEASUREMENT IN SOLIDS Final Report, Jan. 1985
Walter Borst, Rainer Herrmann, Rainer Silbermann, and Dieter Trefzer Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 71 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-174; ISSN-0340-7608; ESA-86-97446) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

A system using the damping of microwave radiation was developed for the measurement of the moisture content of solids in industrial applications. For the microwave part a compensating principle was selected, and the circuit was optimized with respect to sensitivity, high dynamic range, and temperature stability. Algorithms for the moisture content dependence on the damping factor were derived; they take into account temperature and density of the material as well as standing wave effects of the microwave arrangement. In laboratory tests with prototypes the algorithms were confirmed, and the influence of disturbances was successfully compensated. ESA

N86-31694# Battelle Inst., Frankfurt am Main (West Germany).
REMOTE GAS ANALYSIS WITH LASERS. ANALYTIC LABORATORY INVESTIGATIONS IN THE 3.4 TO 4.2 MICRONS RANGE Final Report, Jul. 1980
Joerg Boscher and Wolfgang Diehl Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 186 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-020; ISSN-0170-1339; ESA-86-97464) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 35

The absorption spectra of methane, ethane, propane, isobutane, n-butane, proprene 1, 1-butene, methyl chloride and hydrogen chloride were measured with lead salt diode laser spectrometers with respect to wavelength, pressure, and temperature. The measurements were analyzed to evaluate the accuracy and the applications of the spectrometer. Doppler-propagated spectra at low pressures in pure gases and shock-propagated spectra in mixed gases with synthetic air at variable pressures were measured. The spectra are classified by spectral line density, individual line force and width. The gases are classified into three groups according to their spectral structure. The value of the absorption factor determines the applicability of differential absorption spectrometry. The high resolution diode laser spectrometer should be used to measure individual line structure only. ESA

N86-31695# European Space Agency, Paris (France).
MODEL FOR NORMAL AND EROSIVE BURNING OF COMPOSITE PROPELLANTS
Jean-Claude Godon Dec. 1985 186 p Original language document was announced as N85-24024
(ESA-TT-910; ONERA-NT-1984-3; ESA-86-97798) Avail: NTIS HC A09/MF A01

Processes governing the normal combustion of composite propellants, and the causes of the erosive burning phenomenon are discussed. Analytical expression of the combustion mechanisms leads to the construction of numerical models describing the autonomous combustion of ammonium perchlorate and the normal combustion of composite propellants. A first coupling with a calculation for a turbulent boundary layer with wall injection gives an evaluation of the intensification of combustion in erosive conditions, due to the existence of a high specific mass flow rate sweeping the surface. Each model is based on experimental data or data from the literature. Results show good agreement with experimental data. ESA

N86-31696# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Dept. de Petroleo, Materiales Functionales y Protectivos.
LIQUID CHROMATOGRAPHY ANALYSIS OF ESTER TYPE SYNTHETIC LUBRICANTS [ANALISIS POR CROMATOGRAFIA LIQUIDA DE LUBRICANTES SINTETICOS TIPO ESTER]
M. C. Gutierrez and L. Aliste 1985 20 p In SPANISH
(ESA-86-97811) Avail: NTIS HC A02/MF A01

A chromatographic analytical method is described. The method is adapted to a Waters modular instrument and an absorption infrared spectrophotometer. The measurement parameters are described and several examples are presented. It is shown that the combination of inverted phase and classic column procedures gives the best possibility to solve analytical problems. ESA

N86-31697# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
CHARACTERIZATION OF CELLULOSE NITRATE WITH LIQUID CHROMATOGRAPHY AND MEMBRANE OSMOMETRY
Anders Wirsen and Eyvind Helleday Feb. 1986 35 p In SWEDISH; ENGLISH summary
(FOA-C-20602-D1; ISSN-0347-3694; ESA-86-97858) Avail: NTIS HC A03/MF A01

Cellulose nitrate (CN) of varying molecular weight, nitration, and molecular weight distribution was studied. The average molecular weights were determined on line with a low angle laser detector (LALLS) and the degree of nitration with an infrared detector, both in combination with a concentration detector

(differential refractometer). The molecular weight data were in good agreement with static LALLS and membrane osmometry on unfractioned samples. Qualitative correlation with viscosimetry was observed. The degree of nitration was accurately determined for pure CN as well as for CN in propellants. ESA

N86-32358*# Lawrence Livermore National Lab., Calif.
PRODUCTION RATES OF NEON XENON ISOTOPES BY ENERGETIC NEUTRONS
D. A. Leich, R. J. Borg, and V. B. Lanier *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 07D

N86-32361*# Los Alamos National Lab., N. Mex.
RESONANCE IONIZATION MASS SPECTROMETRY FOR ISOTOPIC ABUNDANCE MEASUREMENTS
C. M. Miller *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 07D

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-31698*# McDonnell-Douglas Research Labs., St. Louis, Mo.
STUDY ON EFFECTS OF POWDER AND FLAKE CHEMISTRY AND MORPHOLOGY ON THE PROPERTIES OF Al-Cu-Mg-X-X-X POWDER METALLURGY ADVANCED ALUMINUM ALLOYS Final Report
P. J. Meschter, R. J. Lederich, and J. E. ONeal Aug. 1986 74 p (Contract NAS1-17107)
(NASA-CR-178145; NAS 1.26:178145) Avail: NTIS HC A04/MF A01 CSCL 11F

A study was conducted: (1) to develop rapid solidification processed (RSP) dispersoid-containing Al-3Cu-2Li-1Mg-0.2Zr alloys as substitutes for titanium alloys and commercial 2XXX aluminum alloys for service to at least 150 C; and (2) to develop RSP Al-4Li-Cu-Mg-Zr alloys as substitutes for high-strength commercial 7XXX alloys in ambient-temperature applications. RSP Al-3Cu-2Li-1Mg-0.2Zr alloys have density-normalized yield stresses at 150 C up to 52% larger than that of 2124-T851 and up to 30% larger than that of Ti-6Al-4V. Strength at 150 C in these alloys is provided by thermally stable delta' (Al_3Li), T1 (Al_2LiCu), and S' (Al_2CuMg) precipitates. Density-normalized yield stresses of RSP Al-3Cu-2Li-1Mg-0.2Zr alloys are up to 100% larger than that of 2124-T851 and equivalent to that of Al-8Fe-4Ce at 260 C. Strength in the RSP alloys at 260 C is provided by incoherent dispersoids and subboundary constituent particles such as T1 and S. The RSP alloys are attractive substitutes in less than or = 100-h exposures for 2xxx and Al-4Fe-Ce alloys up to 260 C and for titanium alloys up to 150 C. RSP Al-4Li-Cu-Mg-Zr alloys have ambient-temperature yield and ultimate tensile stresses similar to that of 7050-T7651, and are 14% less dense. RSP Al-4Li-0.5Cu-1.5Mg-0.2Zr has a 20% higher specific yield stress, 40% higher specific elastic modulus, and superior corrosion resistance compared to the properties of 7050-T7651. Strength in the Al-4Li-Cu-Mg-Zr alloy class is primarily provided by the substructure and delta' precipitates and is independent of Cu:Mg ratio. Improvements in fracture toughness and transverse-orientation properties in both alloy classes depend on improved melt practices to eliminate oxide inclusions which are incorporated into the consolidated forms. Author

N86-31699*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE LOW CYCLE FATIGUE BEHAVIOR OF A PLASMA-SPRAYED COATING MATERIAL
John Gayda, Timothy P. Gabb, and Robert V. Miner, Jr. 1986 17 p Presented at the 1986 TMS-AIME Annual Meeting, New Orleans, La., 2-6 Mar. 1986
(NASA-TM-87318; E-3050; NAS 1.15:87318) Avail: NTIS HC A02/MF A01 CSCL 11F

Single crystal nickel-base superalloys employed in turbine blade applications are often used with a plasma spray coating for oxidation and hot corrosion resistance. These coatings may also affect fatigue life of the superalloy substrate. As part of a large program to understand the fatigue behavior of coated single crystals, fully reversed, total strain controlled fatigue tests were run on a free standing NiCoCrAlY coating alloy, PWA 276, at 0.1 Hz. Fatigue tests were conducted at 650 C, where the NiCoCrAlY alloy has modest ductility, and at 1050 C, where it is extremely ductile, showing tensile elongation in excess of 100 percent. At the lower test temperature, deformation induced disordering softened the NiCoCrAlY alloy, while at the higher test temperature cyclic hardening was observed which was linked to gradual coarsening of the two phase microstructure. Fatigue life of the NiCoCrAlY alloy was significantly longer at the higher temperature. Further, the life of the NiCoCrAlY alloy exceeds that of coated, /001/-oriented PWA 1480 single crystals at 1050 C, but at 650 C the life of the coated crystal is greater than that of the NiCoCrAlY alloy on a total strain basis. Author

N86-31700*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MICROSTRUCTURE-PROPERTY RELATIONSHIPS IN DIRECTIONALLY SOLIDIFIED SINGLE CRYSTAL NICKEL-BASE SUPERALLOYS
Rebecca A. MacKay and Michael V. Nathal 1986 37 p Presented at MiCon 1986: Optimization of Processing, Properties and Service Performance through Microstructural Control, Philadelphia, Pa., 15-16 May 1986; sponsored by ASTM
(NASA-TM-88788; E-3122; NAS 1.15:88788) Avail: NTIS HC A03/MF A01 CSCL 11F

Some of the microstructural features which influence the creep properties of directionally solidified and single crystal nickel-base superalloys are discussed. Gamma precipitate size and morphology, gamma-gamma lattice mismatch, phase instability, alloy composition, and processing variations are among the factors considered. Recent experimental results are reviewed and related to the operative deformation mechanisms and to the corresponding mechanical properties. Special emphasis is placed on the creep behavior of single crystal superalloys at high temperatures, where directional gamma coarsening is prominent, and at lower temperatures, where gamma coarsening rates are significantly reduced. It can be seen that very subtle changes in microstructural features can have profound effects on the subsequent properties of these materials. M.G.

N86-31701*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE CONTINUING BATTLE AGAINST DEFECTS IN NICKEL-BASE SUPERALLOYS
Robert L. Dreshfield 1986 27 p Presented at the 115th TMS Annual Meeting, New Orleans, La., 2-6 Mar. 1986; sponsored by AIME
(NASA-TM-87343; E-3092; NAS 1.15:87343) Avail: NTIS HC A03/MF A01 CSCL 11F

In the six decades since the identification of age hardenable nickel-base superalloys their compositions and microstructures have changed markedly. Current alloys are tailored for specific applications. Thus their microstructures are defined for that application. This paper briefly reviews the evolution of superalloy microstructures and comments on the appearance and implications of microstructural defects in high performance superalloys. It is seen that new alloys and processes have generated new types of defects. Thus as the industry continues to develop new alloys and processes it must remain vigilant toward the identification and control of new types of defects. Author

N86-31702*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE EFFECT OF VARIATIONS OF COBALT CONTENT ON THE CYCLIC OXIDATION RESISTANCE OF SELECTED NI-BASE

SUPERALLOYS
Charles A. Barrett Mar. 1986 24 p Presented at the Annual Meeting of the Metallurgical Society of the American Inst. of Mining, Metallurgical, and Petroleum Engineers, New Orleans, La., 2-6 Mar. 1986
(NASA-TM-87297; E-2952; NAS 1.15:87297) Avail: NTIS HC A02/MF A01 CSCL 11F

Cobalt levels were systematically varied in the Ni-base turbine alloys U-700 (cast), U-700m(PM/HIP), Waspaloy, Mar-M-247, In-738, Nimonic-115, U-720, and SX-R-150. The cobalt levels ranged from 0 wt % to the nominal commercial content in each alloy. The alloys were tested in cyclic oxidation in static air at 1000, 1100 and 1150 C for 500, 200 and 100 hr respectively. An oxidation attack parameter, Ka derived from the specific weight change versus time data was used to evaluate the oxidation behavior of the alloys along with X-ray diffraction analysis of the surface oxides. The alloys tend to form either Cr2O3/chromite spinel or Al2O3/aluminate spinel depending on the CR/Al ratio in the alloys. Alloys with a ratio of 3.5 or higher tend to favor the Cr oxides while those under 3.0 form mostly Al oxides. In general the Al2O3/aluminate spinel forming alloys have the better oxidation resistance. Increased cobalt content lowers the scaling resistance of the higher Cr alloys while a 5.0 wt % Co content is optimum for the Al controlling alloys. The refractory metals, particularly Ta, appear beneficial to both types of oxides perhaps due to the formation of the omni-present trirutile Ni(Ta,Cb,Mo,W)2O6. Both scales break down as increasing amounts of NiO is formed.
Author

N86-31703# Army Armament Research and Development Command, Watervliet, N. Y. Close Combat Armaments Center.
MECHANICAL PROPERTY DEVELOPMENT IN HOT ISOSTATIC PRESSED (HIP) LOW ALLOY STEEL POWDER Final Technical Report
Peter Thornton, John Senick, and John Atchinson Jan. 1986 25 p
(AD-A168666; AD-E440318; ARCCB-TR-86005) Avail: NTIS HC A02/MF A01 CSCL 11/6

The mechanical properties of a low alloy steel gas atomized powder, which was hot isostatically pressed (Hipped) to full density, were developed using typical commercial heat treatment practices. Tempering temperatures were varied systematically from 1000 F to 1200 F and the tensile and impact properties evaluated along with the corresponding microstructural conditions. Yield strengths on the order of 180,000 psi accompanied by low temperature, impact toughness values of 18-20 ft-lb were developed in billets of this material, 4 inches in diameter. The results of this study demonstrate that hot isostatic pressing of low alloy steel powder can be utilized to produce high quality components for critical applications which will benefit from near-net shape manufacturing techniques. GRA

N86-31704# Department of the Navy, Washington, D. C.
WEAR IMPROVEMENT IN TITANIUM ALLOYS BY ION IMPLANTATION Patent
Ronald G. Vardiman, inventor (to Navy) Issued 4 Feb. 1986 5 p Supersedes AD-D011694
(AD-D012203; US-Patent-4,568,396; US-Patent-Appl-SN-657115; US-Patent-Class-148/133) Avail: US Patent and Trademark Office CSCL 11/6

This invention relates to a method of making titanium alloy more resistant to sliding wear and fretting fatigue comprising the steps of: implanting carbon ions with at least one energy onto titantium alloy until at least 1 x 10 to the 17th power carbon ions/sq. cm have fallen onto the titanium alloy, said energy level of carbon ions being implanted being greater than 10 KeV. A second method comprises an additional step of heating the implanted titanium alloy to between 300 C. and 500 C. for 0.5 hours to 2 hours. The second method has a lower number of carbon ions/sq. cm implanted onto the titanium. GRA

N86-31705# Naval Ship Research and Development Center, Annapolis, Md. Ship Materials Engineering Dept.
THE INFLUENCE OF INCUBATION TIME ON THE PASSIVE FILM BREAKDOWN OF ALUMINUM ALLOYS IN SEAWATER
Denise M. Aylor and Patrick J. Moran Apr. 1986 22 p
(AD-A167398; DTNSRDC/SME-86-11) Avail: NTIS HC A02/MF A01 CSCL 11/6

Potential-controlled electrochemical methods were used to characterize the pitting behavior of 6061 alloy aluminum in synthetic ocean water. Irreproducible breakdown potentials (E sub bd) and reproducible repassivation potentials (E sub rp) were determined from cyclic anodic polarization (CAP). Reproducible breakdown and repassivation potentials were found from the quasi-stationary anodic polarization method; however, the breakdown potential values were shifted in the electronegative direction relative to the CAP method due to the allowance of a longer incubation time. These results support the theory that with sufficient incubation time, pit initiation and propagation will occur at potentials at or slightly above the repassivation potential, and that the repassivation potential value is the only characteristic potential for aluminum. The quasi-stationary anodic polarization method used for E sub rp determination provides a reproducible electrochemical method for obtaining E sub rp after minimal pit growth or surface damage. Cyclic anodic polarization can also be used for determining a representative potential if surface damage subsequent to pit initiation is minimized. GRA

N86-31706# Michigan Technological Univ., Houghton. Dept. of Metallurgical Engineering.
ADVANCED PROCESSING AND PROPERTIES OF HIGH PERFORMANCE ALLOYS
D. A. Koss 25 Mar. 1986 19 p
(Contract N00014-85-K-0427)
(AD-A167404; TR-4) Avail: NTIS HC A02/MF A01 CSCL 11/6

Progress is reviewed for a research program whose primary purpose is to establish a fundamental understanding of the applications and consequences of selected advanced processing techniques to high performance alloys. The broadly-ranged research effort includes studies of powder processing (hot isostatic pressing), fracture of alloys containing processing-induced defects (porosity), and application of advanced processing techniques to high performance alloys (rapidly solidified, dispersion-strengthened titanium alloys). Many aspects of the program also constitute fundamental studies of deformation and fracture utilizing engineering alloys containing processing-induced defects. Progress for the period October 1, 1985 to December 31, 1985 is reviewed for the following parts of the research program: the influence of void/pore distributions on fracture, hot isostatic pressing of metallic powders, deformation of rapidly solidified Ti alloys at elevated temperatures, and strain-path effects and the combined influence of stress state and grain size on the fracture of alloys containing hydrides. GRA

N86-31707# Brown Univ., Providence, R. I. Dept. of Chemistry.
PREPARATION AND CHARACTERIZATION OF NICKEL SUBSTITUTED Fe5C2
Z-D. Zhang, R. Kershaw, K. Dwight, and A. Wold 12 May 1986 8 p
(Contract N00014-86-K-0234)
(AD-A167410; TR-1) Avail: NTIS HC A02/MF A01 CSCL 07/2

Nickel can be substituted into Fe5C2 to the extent of 20 atomic percent. Samples were prepared by codecomposition of mixed nitrates followed by reduction at 290 C in a 9:1 H2:CO atmosphere. Confirmation of the limit of substitution was made by both magnetic and X-ray analysis. It has been shown by a number of investigators that the catalytic activity of iron catalysts, used to reduce CO by hydrogen, was related to the extent of carbide formation. Fournier et al. reported that the phases Fe5C2 and Fe were detectable both from X-ray diffraction patterns and from thermomagnetic curves taken from products which were quenched after 10 minutes of reaction time (at maximum activity). It was shown that the active catalysts formed from both Fe2O3 and metallic iron contain Fe5C2. Catalyst deactivation is most probably associated with unreactive graphite which is formed during the methanation process. There have been no reports concerning the crystallographic or magnetic properties of the system Fe5-xNixC2. Since Fe5C2 shows a Curie

point at 246 C, any substitution of nickel into the phase could be determined by changes in the Curie point. Furthermore, the optimum solubility of nickel into Fe5C2 could be determined from X-ray diffraction studies of members of the system Fe5-xNixC2. Since pure nickel does not appear to carbide under Fisher-Tropsch conditions, it should be present as a separate phase when maximum solubility is achieved. GRA

N86-31708# Naval Postgraduate School, Monterey, Calif.
THE VARIATION OF THE DISLOCATION DENSITY IN ALUMINUM DEFORMED TO LARGE STEADY-STATE CREEP STRAINS M.S. Thesis
Timothy S. Wetter Mar. 1986 56 p
(AD-A167715) Avail: NTIS HC A04/MF A01 CSCL 11/6

This thesis reports trends in the variation of the subgrain size and density of dislocations not associated with subgrain boundaries (forest dislocations) in high purity aluminum with strain during primary and steady-state creep at temperatures in the power-law regime utilizing torsional deformation. Any microstructural feature responsible for strength is expected to be constant during steady-state deformation. Earlier work addressed changes in the subgrain size over a wide range of steady-state strain. A constant subgrain size was found. The present effort primarily examined the dislocation density but also further evaluated the conclusion of a constant subgrain size during steady-state. The subgrain size data were found consistent with the earlier work. In contrast to constant-stress tests in other investigations, it was found, here, that the forest dislocation density monotonically increased until a steady-state at a strain of approximately 0.20. The forest dislocation density is essentially constant at steady-state. These two findings are consistent with dislocation network theories for creep. Optical micrographs were taken from tangential sections of the torsion samples, which substantiated the finding that the subgrain size is fixed during steady-state. GRA

N86-31709# Worcester Polytechnic Inst., Mass. Dept. of Mechanical Engineering.
CHARACTERIZATION OF ION IMPLANTED AND LASER PROCESSED WEAR SURFACES Final Report, 1 Dec. 1984 - 28 Feb. 1986
Sara A. Dillich 22 Apr. 1986 52 p
(Contract N00014-85-K-0066)
(AD-A167878) Avail: NTIS HC A04/MF A01 CSCL 20/11

SEM/EDX (Scanning Electron Microscopy/Energy Dispersing X Ray Analysis) and scanning Auger microscope analysis were employed to characterize wear surfaces and debris on friction tested, laser processed metal-carbide composite surfaces. The friction and wear of the composite samples were found to be influenced by the compatibility (degree of mutual solubility) of the carbides with the steel counterface, as well as by local inhomogeneities in the carbide distribution. High fluence Ti implantation resulted in increased friction and wear, possibly due to an implantation induced softening or degradation of the carbides. Cavitation erosion tests were performed on nonimplanted and ion implanted samples of a Co based hardface alloy (Stoody 3). Erosion of the test samples was found to initiate by debonding at the carbide-matrix interfaces and by crack propagation through the carbides. The erosion mechanisms in the alloy were altered by both N and Ti implantations. Ti implantation, in particular, appeared to significantly increase the erosion resistance of the alloy. TEM (Transmission Electron Microscopy) studies were made on nonimplanted and ion implanted foils of Stoody 3, to investigate structural changes induced by implantation. Ti implantation produced a surface layer with an amorphous matrix phase and recrystallized carbides, while N implantation greatly increased the stacking fault density in the matrix phase. GRA

N86-31710# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
TO WHAT EXTENT ARE GRAIN BOUNDARIES IN METALS ORDERED STRUCTURES
R. W. Balluffi Sep. 1985 13 p
(Contract DE-FG02-84ER-45116)
(DE86-007004; DOE/ER-45116/9) Avail: NTIS HC A02/MF A01

It appears likely on the basis of present information that the structural unit/grain boundary dislocation model is applicable to all types of boundaries (short and long period, tilt, twist and mixed) at low temperatures (T less than T(sub m)/3). Such boundaries therefore consist of ordered arrays of various types of structural units which are generally systematically distorted to at least some extent over the boundary areas. These arrays obey a crystallography dictated by the base vectors of the units and the boundary periodicities. This ordered framework is not affected by a possible multiplicity of the units. The less extensive (and more contradictory) information available at high temperatures (T greater than T(sub m)/3) suggests that this same model is again generally applicable for at least many boundaries up to essentially T(sub m). However, increasing disorder in the form of increasing structural unit multiplicity and increasing vibrational amplitudes and anharmonicity may be expected. The possibility that more extensive disordering transitions occur well below T(sub m) in some boundaries (particularly long period boundaries with complex unit structures) cannot be precluded. DOE

N86-31711# Instituto de Engenharia Nuclear, Rio de Janeiro (Brazil).
CORROSION BEHAVIOUR OF ALUMINIUM PLATES IN AQUEOUS MEDIUM
M. F. deOliveira and J. C. Gaio 1985 9 p In PORTUGUESE Presented at the 12th National Seminar on Corrosion, Salvador, Brazil, 13 May 1985
(DE86-701575; INIS-BR-431; CONF-8505227-2) Avail: NTIS (US Sales Only) HC A02/MF A01

The process of corrosion of aluminum 1050 plate was studied at room temperature, 45 to 60 C, in deionized water from the Argonauta Reactor Water. In addition to the influence of temperature, the effect of chloride ions and oxygen were also verified. It was found that the amount of oxide formed at room temperatures is almost negligible. It was observed that there is risk of corrosion in the case of Reactor Water contaminated with chloride ions. The results have shown that the aluminum can be used since the medium is not strongly oxidizing. At potentials higher than - 900M sup(V) ess (-280 m sup(V) sub(H)), the material will undergo pitting corrosion. DOE

N86-31712# Oak Ridge National Lab., Tenn.
ANALYSIS OF HEAT-AFFECTED ZONE CRACKING IN NI3AI ALLOYS
M. L. Santella, M. C. Maguire, and S. A. David 1986 4 p Presented at the 67th Annual American Welding Society Meeting, Atlanta, Ga., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009449; CONF-8604123-2) Avail: NTIS HC A02/MF A01

A key issue in the development of Ni3Al for engineering applications is their weldability. Detailed welding studies have been done which show that iron-containing nickel aluminides are prone to heat-affected zone (HAZ) cracking. Hot ductility testing of these alloys has suggested that grain boundary cohesive strength controls high temperature ductility and the resistance to HAZ cracking. This analysis cannot, however, be used to explain the behavior of other aluminide alloys. The intention of this work is to more fully characterize the relationship between mechanical behavior and HAZ cracking susceptibility for Ni3Al alloys. DOE

N86-31713# Oak Ridge National Lab., Tenn.
IN-VACUUM CYCLIC FATIGUE BEHAVIOR OF VANSTAR-7 AT ELEVATED TEMPERATURES
K. C. Liu 1986 6 p Presented at the American Nuclear Society Annual Meeting, Reno, Nev., 15 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-007322; CONF-860610-21) Avail: NTIS HC A02/MF A01

Refractory metal alloys have been proposed for fusion reactor and space power applications because of their high temperature strength, low thermal stress properties, good compatibility with liquid metal coolants and radiation resistance. However, little is known about the cyclic fatigue properties which are important to

some fusion reactor first wall systems that operate in thermal cycles. This paper presents limited results of in-vacuum cyclic fatigue tests on Vanstar-7 (9Cr-3Fe-Zr) at room temperature, 550 and 650(0)C. Miniature hourglass-shaped specimens were used with a gage diameter of 3.18 mm. The material was annealed 1 h in vacuum at 1400(0)C before machining, to produce an average grain size of ASTM No. 7. The specimens were stress relieved for 0.5 h at 1400(0)C after machining. Tests were performed on a servocontrolled hydraulic testing system equipped with a vacuum chamber capable of pressures below 10(-5) Pa. Specimens were heated by an induction heater, maintaining temperatures within +-2(0)C of the nominal temperature during the test. A diametral extensometer was used, but axial strain calculated via a strain computer was used for machine control. A fully reversed triangular wave function beginning with compression was employed at a strain rate of 4 x 10(-3) s(-1) for all low-cycles tests. High cycle testing was conducted initially in strain control but switched to load control after stable essentially elastic cycling was established. DOE

N86-31714# Los Alamos National Lab., N. Mex.
MECHANICAL PROPERTIES TESTING OF SEVERAL 800 MeV PROTON IRRADIATED BCC METALS AND ALLOYS
R. D. Brown, M. S. Wechsler, and C. Tschalaer 1986 25 p Presented at the 13th International Symposium on the Effects of Radiation on Materials, Seattle, Wash., 23 Jun. 1986 Prepared in cooperation with Iowa State Univ. of Science and Technology, Ames and Schweizerisches Inst. fuer Nuklearforschung, Villigen
(Contract W-7405-eng-36)
(DE86-007372; LA-UR-86-733; CONF-860605-4) Avail: NTIS HC A02/MF A01

A spallation neutron source for the 600-MeV proton accelerator facility at the Swiss Institute for Nuclear Research (SIN) consists of a vertical cylinder filled with molten Pb-Bi. The proton beam enters the cylinder, passing upward through a window in contact with the Pb-Bi eutectic liquid. Investigations are underway at the 800-MeV proton accelerator at LAMPF to test the performance of candidate SIN window materials. Based on considerations of chemical compatibility with molten Pb-Bi, as well as radiation damage mechanisms, Fe, Ta, Fe-2.25Cr-1Mo, and Fe-12Cr-1Mo (Ht-9) were chosen as candidate materials. Sheet tensile samples were sealed inside capsules containing Pb-Bi and were proton-irradiated at LAMPF to two fluences, 4.8 and 54 x 10(23) p/m(2). The beam current was approximately equal to the 1 mA anticipated for the upgraded SIN accelerator. Yield and ultimate strengths increased upon irradiation in all materials, while the ductility decreased. The pure metals, Ta and Fe, exhibited the greatest radiation hardening and embrittlement. The HT-9 alloy showed the smallest changes in strength and ductility. DOE

N86-31715# Argonne National Lab., Ill.
RADIATION-INDUCED SEGREGATION AND PRECIPITATION IN MOLYBDENUM-RHENIUM ALLOYS
R. A. Erck, C. M. Wayman, and L. E. Rehn Feb. 1986 20 p Presented at the 13th International Symposium on the Effects of Radiation on Materials, Seattle, Wash., 23 Jun. 1986 Prepared in cooperation with Illinois Univ., Urbana
(Contract W-31-109-eng-38)
(DE86-007521; CONF-860605-8) Avail: NTIS HC A02/MF A01

Specimens of Mo-7 at. % Re and Mo-30 at. % Re were irradiated with 1.8 MeV (4)He(+) ions at elevated temperatures. Radiation-induced segregation of Re was measured during irradiation by in situ Rutherford backscattering spectrometry. Segregation of the undersized Re atoms in the same direction as the defect fluxes, i.e., toward the external surface, was observed. The amount of Re enrichment in the near-surface region was measured as a function of temperature and of dose at a calculated near-surface displacement rate near 1 x 10(-4)dpa/s. Segregation was observed at temperatures from 800 to 1500(0)C in Mo-7Re, and from 850 to 1225(0)C in Mo-30Re. Irradiated disks were examined by transmission electron microscopy. Precipitates of Chi phase were observed on grain boundaries, or in a thin layer at the irradiated surface in Mo-30Re after irradiation at temperatures from 750 to 1075(0)C. Frequently, Chi precipitates formed with a crystallographic twin orientation with respect to the host matrix. No voids were observed for doses up to 1.6 dpa. DOE

N86-31716# Oak Ridge National Lab., Tenn.
EFFECT OF NEUTRON IRRADIATION ON THE TENSILE PROPERTIES AND MICROSTRUCTURE OF SEVERAL VANADIUM ALLOYS
D. N. Braski 1986 34 p Presented at the 13th International Symposium on the Effects of Radiation on Materials, Seattle, Wash., 23 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008234; CONF-860605-9) Avail: NTIS HC A03/MF A01

Specimens of V-15Cr-5Ti, VANSTAR-7, and V-3Ti-1Si were encapsulated in TZM tubes containing (7)Li to prevent interstitial pickup and irradiated in FFTF (MOTA experiment) to a damage level of 40 dpa. The irradiation temperatures were 420, 520, and 600(0)C. For a better simulation of fusion reactor conditions, helium was preimplanted in some specimens using a modified version of the tritium trick. The V-15Cr-5Ti alloy was most susceptible to irradiation hardening and helium embrittlement, followed by VANSTAR-7 and V-3Ti-1Si. VANSTAR-7 exhibited a relatively high maximum void swelling of approx. 6% at 520(0)C while V-15Cr-5Ti and V-3Ti-1Si had values of less than 0.3% at all three temperatures. The V-3Ti-1Si clearly outperformed the other two vanadium alloys in resisting the effects of neutron irradiation. DOE

N86-31717# Oak Ridge National Lab., Tenn.
ION DAMAGE MICROSTRUCTURES IN A Fe-10Cr-6Mo-0.5Nb
K. Farrell and E. H. Lee 1986 20 p Presented at the 13th International Symposium on the Effects of Radiation on Materials, Seattle, Wash., 23 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008500; CONF-860605-11) Avail: NTIS HC A02/MF A01

An annealed-and-aged ferritic steel containing fine NbC precipitates and relatively coarse particles of Laves phase was bombarded with 4-MeV iron ions to 100 displacements per atom (dpa) at 400 to 600(0)C. Much of the damage structure consisted of dislocation tangles that coarsened with increasing temperature. Cavity formation began at 450(0)C, peaked at 500 to 550(0)C and was absent at 600(0)C. Maximum swelling was only 0.2%. The Laves particles exhibited recoil dissolution and restructuring. Bombardments with Fe + He + D or Fe + He beams at ratios of 10 atomic parts per million (appM) He/dpa and 45 appM D/dpa introduced high concentrations of very small bubbles and comparatively few larger, bias-driven cavities. The latter were initiated at bubble clusters on NbC particles. Maximum swelling of 0.75% occurred at 550(0)C. Recoil dissolution of the Laves phase was retarded by the gases. Large critical cavity sizesand unbalanced dislocation and cavity sink strengths contribute to low swelling of this alloy. DOE

N86-31718# California Univ., Berkeley. Lawrence Berkeley Lab.
DESIGN OF TOUGH FERRITIC STEELS FOR CRYOGENIC USE
J. W. Morris, Jr. Oct. 1985 39 p Presented at the Symposium on Structure/Property Relationships, New Orleans, La., 3 Mar. 1986
(Contract DE-AC03-76SF-00098)
(DE86-009361; LBL-20485; CONF-8603110-1) Avail: NTIS HC A03/MF A01

This paper describes the design of ferritic steels and weldments that combine strength and toughness at cryogenic temperatures. The alloy must have a ductile-brittle transition temperature below the intended service temperature and a high fracture toughness in the ductile mode. Its systematic design uses the microstructure-property relations that govern the transition temperature and fracture toughness to identify a suitable microstructure, and then employs the microstructure-processing relations that govern its thermal response to manipulate the microstructure into the appropriate form. The procedure is illustrated by describing the heat treatments, microstructures and properties of a variety of laboratory and commercial alloys, including conventional 9Ni steel, the low-Ni and Fe-Mn ferritic steels that have been developed as

an alternative to 9Ni, the 12Ni steels that are promising for use at 4K, and the welding procedures and ferritic filler metals that are useful for ferritic cryogenic steels. DOE

N86-31719# Hanford Engineering Development Lab., Richland, Wash.
INSIGHTS INTO THE FRACTURE TOUGHNESS OF MARTENSITIC STAINLESS STEELS USING STEREOSCOPIC FRACTOGRAPHIC MEASUREMENTS
D. S. Gelles Aug. 1985 5 p Presented at the Fundamental Aspects of Fracture, Gatlinburg, Tenn., 4 Nov. 1985
(Contract DE-AC06-76FF-02170)
(DE86-009415; HEDL-SA-3291; CONF-851104-2) Avail: NTIS HC A02/MF A01

Stereoscopic fractographs of precracked compact tension and precracked miniature Charpy specimens can provide critical crack opening displacements (delta/sub c/) on a microstructural scale. The critical crack opening displacement can be related to the critical crack extension force (G/sub c/) by the Wells relationship G/sub c/ = n sigma/sub y/ delta/sub c/ where n is the plastic stress intensity factor and sigma/sub y/ is the yield stress. This approach has been used to examine the fracture behavior of two martensitic stainless steels. Examinations on a microstructural scale were compared with J/sub Ic/ measurements in order to assess the validity of the Wells relationship. It was found that the two modes of crack extension, stretching and crack propagation, were clearly defined but that an intermediate stage also occurred. This intermediate stage was a precursor to crack propagation but differed from crack propagation in that crack tip blunting eventually slowed propagation and returned extension to the stretching mode. This intermediate stage is very localized, creates a unique fracture appearance and produces uncertainty in the determination of a precise value for J/subIc/. DOE

N86-31720# Oak Ridge National Lab., Tenn.
INFLUENCE OF RADIATION-INDUCED SEGREGATION ON DUCTILITY OF A NICKEL-SILICON ALLOY
N. H. Packan, H. Schroeder, and W. Kesternich 1986 17 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986 Prepared in cooperation with Kernforschungsanlage Juelich G.m.b.H., West Germany
(Contract DE-AC05-84OR-21400)
(DE86-009500; CONF-860421-26) Avail: NTIS HC A02/MF A01

Flat tensile specimens 60 microns thick of Ni-8 at. % Si were irradiated to bulk damage levels of 0.1 to 0.3 dpa with either 7 MeV protons or 28 MeV alpha particles at 750 K. The alpha bombarded specimens incurred 750 at. ppM He per 0.1 dpa in the course of their damage-generating irradiation. Radiation-induced silicon segregation gave rise to Ni3Si layers at internal and external surfaces. Postirradiation tensile tests conducted either at 300 K or 720 K revealed fully ductile (chisel-edged) transgranular fracture profiles. There were no significant differences between the proton-bombarded specimens and the unbombarded controls, both exhibiting greater than 25% total elongations, while the alpha-bombarded specimens showed ductile fractures with somewhat lower (17 to 18%) elongation values probably due to hardening caused by small helium bubbles. Certain specimens that were preimplanted with 250 to 1000 at. ppM He at 970 K to encourage intergranular failure and expose grain boundaries did fail intergranularly. It is concluded that radiation-induced silicon segregation does not cause intrinsic embrittlement. DOE

N86-31721# Oak Ridge National Lab., Tenn.
POSTIRRADIATION TENSILE BEHAVIOR OF NICKEL-DOPED FERRITIC STEELS
R. L. Klueh, P. J. Maziasz, and J. M. Vitek 1986 19 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009502; CONF-860421-25) Avail: NTIS HC A02/MF A01

Tensile specimens of normalized-and-tempered 9Cr-1MoVNb, 9Cr-1MoVNb-2Ni, 12Cr-1MoVW, 12Cr-1MoVW-1Ni, and 12Cr-1MoVW-2Ni were irradiated in the Experimental Breeder Reactor at 390, 450, 500, and 550(0)C to displacement-damage levels of approximately 16 dpa. The only difference in the effect of irradiation on the tensile behavior of the nickel-doped and undoped steels was attributed to the difference in tempering treatments the two types of steels received. The nickel-doped steels were stronger prior to irradiation due to a lower tempering temperature. After irradiation, the properties of the steels with and without nickel were similar, indicating that the presence of nickel did not affect the behavior of the steels during irradiation. Nickel was added to the steels to study the effect of helium on the properties of these steels. Helium can be formed in an alloy containing nickel by irradiating in a mixed-spectrum reactor. To help determine the effect of helium on properties, these steels are also being irradiated in fast reactors, where little helium is formed. The present fast-reactor results indicate that it is feasible to use the nickel-doped ferritic steels to study helium effects. DOE

N86-31722# Argonne National Lab., Ill.
EFFECT OF HEAT TREATMENT AND IMPURITY CONCENTRATION ON SOME MECHANICAL PROPERTIES V-15Cr-5Ti ALLOY
B. A. Loomis, B. J. Kestel, and D. R. Diercks Mar. 1986 15 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract W-31-109-eng-38)
(DE86-010498; CONF-860421-36) Avail: NTIS HC A02/MF A01

The effects of heat treatment and O, N, C, Si, and S impurity level on the yield strength, ductility, and fracture mode for specimens from four different heats of the V-15Cr-5Ti alloy are presented. The heat treatments for the alloy consisted of annealing as-rolled material for one hour at either 950, 1050, 1125, or 1200C. The total oxygen, nitrogen, and carbon impurity concentration ranged from 400 to 1200 wppm. The Si concentration ranged from 300 to 1050 wppm, and the S concentration ranged from 440 to 1100 wppm. The yield strength and ductility for the alloy, regardless of impurity concentration, exhibited minimum and maximum values, respectively, for the 1125C anneal. The primary mode of failure for the tensile specimens was transgranular fracture. DOE

N86-31723# Argonne National Lab., Ill.
EFFECT OF HELIUM ON SWELLING AND MICROSTRUCTURAL EVOLUTION IN ION-IRRADIATED V-15Cr-5Ti ALLOY
B. A. Loomis, B. J. Kestel, S. B. Gerber, and G. Ayrault Mar. 1986 29 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract W-31-109-eng-38)
(DE86-010510; CONF-860421-34) Avail: NTIS HC A03/MF A01

An investigation was made on the effects of implanted helium on the swelling and microstructural evolution that results from energetic single- and dual-ion irradiation of the V-15Cr-5Ti alloy. Single-ion irradiations were utilized for a simulated production of the irradiation damage that might be expected from neutron irradiation of the alloy in a reactor with a fast neutron energy spectrum (E > 0.1 MeV). Dual-ion irradiations were utilized for a simulated production of the simultaneous creation of helium atoms and irradiation damage in the alloy in the MFR environment. Experimental results are also presented on the radiation-induced segregation of the constituent atoms in the single- and dual-ion irradiated alloy. DOE

N86-31724# Argonne National Lab., Ill.
OVERVIEW OF TRANSPORT MECHANISMS IN BETA-LITHIUM/ALUMINUM
S. Susman, T. O. Brun, and K. J. Volin Mar. 1986 6 p Presented at the International Workshop on High Temperature Molten Salt Batteries, Argonne, Ill., 16 Apr. 1986
(Contract W-31-109-eng-38)
(DE86-010522; CONF-8604116-2) Avail: NTIS HC A02/MF A01

A systematic study over a period of years has resulted in identifying: (1) constitutional defects in -LiAl at room temperature, and (2) defects created at elevated temperatures. The relationship

between these defects and charge and mass transport is discussed. The results bear upon the use of LiAl as the negative electrode both in room-temperature and solid state batteries and in high-temperature, molten-salt electrochemical cells. The key to unravelling the Li-conduction mechanism has been the recognition that there is a critical composition within the -phase domain corresponding to 50.7 at. % lithium. Free Li vacancies, bound Li vacancies, and reciprocal antisite defects contribute to the transport processes depending on temperature and composition. An understanding of these microscopic mechanisms has been used to remedy the loss of capacity with cycling of high temperature electrochemical cells. DOE

N86-31725# European Space Agency, Paris (France).
CORRELATION BETWEEN MICROSTRUCTURE AND FORGING CONDITIONS OF COMBINED DIE-FORGED (CDF) TI-6AI-4V POWDER
Wilfried Smarsly May 1986 154 p
(ESA-TT-952; DFVLR-FB-85-29; ESA-86-98076) Avail: NTIS HC A08/MF A01; German version available from DFVLR, Cologne, West Germany DM 47.50

Titanium-6Al-4V alloy powder in a steel can and a copper fluid die was compacted and forged and annealed at 950 C in an extrusion container by a hydraulic press and high velocity hammer using the combined die forging process to investigate its effects on the material porosity and morphology, on the powder alloy texture, and on the microstructure of the forged material. The results are required for development and optimization of a one-operation production procedure for components made of powder materials. The CDF process improves the fatigue properties and is adequate for the manufacturing of thick powder materials with optimal metallurgical microstructure and mechanical properties. Investigations of the ductility, strength and fatigue properties of the powder materials under the combined die forging conditions are recommended. ESA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-31726*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AMINE TERMINATED BISASPARTIMIDE POLYMER Patent
Devendra Kumar, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, D. C.), George M. Fohlen, inventor (to NASA), and John A. Parker, inventor (to NASA) Issued 15 Jul. 1986 8 p Filed: May 31, 1985
(NASA-Case-ARC-11421-2; US-Patent-4,600,769; US-Patent-Appl-SN-739760; US-Patent-Class-528-322; US-Patent-Class-428-473.5; US-Patent-Class-528-170; US-Patent-Class-528-220; US-Patent-Class-528-321) Avail: US Patent and Trademark Office CSCL 11B

Novel amine terminated bisaspartimides are prepared by a Michael-type reaction of an aromatic bismaleimide and an aromatic diamine in an aprotic solvent. These bisaspartimides are thermally polymerized to yield tough, resinous polymers cross-lined through -NH- groups. Such polymers are useful in applications requiring materials with resistance to change at elevated temperatures, e.g., as lightweight laminates with graphite cloth, molding material prepregs, adhesives and insulating material. Author

N86-31727* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCESS FOR PREPARING HIGHLY OPTICALLY TRANSPARENT/COLORLESS AROMATIC POLYIMIDE FILM Patent
Anne K. St.Clair, inventor (to NASA) and Terry L. St.Clair, inventor (to NASA) Issued 29 Jul. 1986 9 p Filed 23 Aug. 1984
Supersedes N85-21360 (23 - 12, p 1811)
(NASA-Case-LAR-13351-1; US-Patent-4,603,061; US-Patent-Appl-SN-643589; US-Patent-Class-427-162; US-Patent-Class-264-212; US-Patent-Class-264-236; US-Patent-Class-427-164; US-Patent-Class-427-165; US-Patent-Class-428-336; US-Patent-Class-428-473.5) Avail: US Patent and Trademark Office CSCL 11B

An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the process for preparing same are disclosed. A feature to achieve maximum optical transparency films requires the utilization of recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and the introduction of bulky electron withdrawing groups and separator groups into the polymer molecular structure. NASA

N86-31728*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF CRYSTALLOGRAPHICAL AND GEOMETRICAL CHANGES OF A FERRITE HEAD ON MAGNETIC SIGNALS DURING THE SLIDING PROCESS WITH MAGNETIC TAPE
Kazuhisa Miyoshi, Donald H. Buckley, and Kyuichiro Tanaka (Kanazawa Univ., Japan) 1986 26 p Presented at the Joint Tribology Conference, Pittsburgh, Pa., 19-22 Oct. 1986; sponsored by ASLE and ASME
(NASA-TM-87277; E-2955; NAS 1.15:87277) Avail: NTIS HC A03/MF A01 CSCL 14E

This paper reviews changes in the crystalline structure and geometry of lapped Mn-Zn ferrite heads in sliding contact with magnetic tape and the effects of these changes on magnetic signals. A highly textured, polycrystalline structure was produced on the surface of a single-crystal Mn-Zn ferrite head when it was finished with an aluminum oxide lapping tape. Sliding this lapped surface against a magnetic tape produced a nearly amorphous structure. The sliding process led to a degradation in readback signal of 1 to 2 dB (short-wavelength recording). Furthermore, wear of the magnetic head caused geometrical changes in the head surface. The signal read back with the worn magnetic head was sensitive to operating parameters such as head displacement and tape tension. A change in operating parameters created head-to-tape spacings and, consequently, excessive gains or losses in the readback signal. Author

N86-31729*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CORRELATION OF PROCESSING AND SINTERING VARIABLES WITH THE STRENGTH AND RADIOGRAPHY OF SILICON NITRIDE
William A. Sanders and George Y. Baaklini (Cleveland State Univ., Ohio) 1986 37 p Presented at the Tenth Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., 19-24 Jan. 1986; sponsored by the American Ceramic Society
(NASA-TM-87251; E-2934; NAS 1.15:87251) Avail: NTIS HC A03/MF A01 CSCL 11G

A sintered Si3N4-SiO2-Y2O3 composition, NASA 6Y, was developed that reached four-point flexural average strength/standard deviation values of 857/36, 544/33, and 462/59 MPa at room temperature, 1200 and 1370 C respectively. These strengths represented improvements of 56, 38, and 21 percent over baseline properties at the three test temperatures. At room temperature the standard deviation was reduced by over a factor of three. These accomplishments were realized by the iterative utilization of conventional x-radiography to characterize structural (density) uniformity as affected by systematic changes in powder processing and sintering parameters. Accompanying the improvement in mechanical properties was a change in the type of flaw causing failure from a pore to a large columnar beta- Si3N4 grain typically 40 to 80 microns long, 10 to 30 microns wide, and with an aspect ratio of 5:1. Author

N86-31730*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LUBRICATION HANDBOOK FOR THE SPACE INDUSTRY. PART A: SOLID LUBRICANTS. PART B: LIQUID LUBRICANTS

Ernest L. McMurtrey Dec. 1985 419 p
(NASA-TM-86556; NAS 1.15:86556) Avail: NTIS HC A18/MF A01 CSCL 11H

This handbook is intended to provide a ready reference for many of the solid and liquid lubricants used in the space industry. Lubricants and lubricant properties are arranged systematically so that designers, engineers, and maintenance personnel can conveniently locate data needed for their work. This handbook is divided into two major parts (A and B). Part A is a compilation of solid lubricant suppliers information on chemical and physical property of data of more than 250 solid lubricants, bonded solid lubricants, dispersions, and composites. Part B is a compilation of chemical and physical porperty data of more then 250 liquid lubricants, greases, oils, compounds, and fluids. The listed materials cover a broad spectrum from manufacturing and ground support to hardware applications of spacecraft. Author

N86-31731# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
NOVEL MACROMOLECULAR STRUCTURES AND COMPOSITES Final Report, 1 Aug. 1983 - 31 Jul. 1984
Frank E. Karasz Jun. 1985 12 p
(Grant AF-AFOSR-0341-83)
(AD-A166243; AFOSR-86-0143TR) Avail: NTIS HC A02/MF A01 CSCL 11/4

The Dynastat mechanical testing instrument purchased under the URIP Grant is now fully operational. It is presently being used to a large extent for research involving the Farris research group. The projects primarily influenced and which constitute about 90% of the time on the instrument are the AFML, Molecular Composites Program and a DOD LOVA program. The instrument is sufficiently versatile that it can be used for a multitude of materials and is especially useful for very stiff materials, a region where most instruments fail. As an example of the type of data that can be taken we have included some recent data. Illustrated is the in-phase modulus in uniaxial compression of a polyacetal-polyurethane thermoplastic elastomer as a function of frequency at several temperatures. Also shown is the master curve for this material using the computerized timer-temperature/frequency-temperature shifted data. Also included are reduced data at 40% and 60% filler content. Finally, the curing of a graphite-epoxy prepreg in shear during cure is shown. In this experiment the sample is being increased in temperature linearly with time. The prepreg softens at about 50 C and little happens until 160 C where reaction commences, as illustrated by a drop in the loss factor and an increase in the stiffness. It is currently being used to develop a new Impulse Method of Viscoelastic characterization which related time-integrals of stress to time integrals of strain for pulse. GRA

N86-31732# GTE Sylvania, Inc., Waltham, Mass.
ELECTRICAL AND ENVIRONMENTAL STUDIES OF CONDUCTION POLYMERS Final Report, 14 Sep. 1984 - 14 Oct. 1985
Mark A. Druy 17 Jan. 1986 63 p
(Contract N62269-84-C-0274)
(AD-A167737; NADC-86020-60) Avail: NTIS HC A04/MF A01 CSCL 11/9

The objective of this research was to present a clear and defined strategy toward the synthesis of environmentally stable conducting polymers, paying particular attention to the influence of the dopant on the electrical conductivity, environmental stability, and the dielectric properties. This involves a fundamental understanding of the molecular basis for the electrical properties and the interaction of the dopant with the polymer backbone. On the basis of an investigation into the kinetics of the degradation of electrical conductivity in two conducting polymer systems, it was identified which is thermally stable in an inert atmosphere and whose degradation of conductivity when exposed to air follows first order kinetics. Specific examples are polypyrrole/toluene sulfonate and multicomponent system comprising polypyrrole, toluene sulfonate, and a processible polymeric component. The capability to predict adequately the environment stability of a conducting polymer on the basis of a kinetic treatment of accelerated life tests was also demonstrated for the first time. Another conducting polymer system, namely multicomponent polythiophene/poly THF was found to be less stable with respect to polyprrole and it follows a multi-order degradation process in laboratory air. The dielectric properties of the above materials were investigated over the frequency rate from 1-100 GHZ. GRA

N86-31733# National Bureau of Standards, Gaithersburg, Md. Polymers Div.
EXPLORATION OF ADVANCED CHARACTERIZATION TECHNIQUES FOR MOLECULAR COMPOSITES Final Report, Feb. 1984 - Jan. 198
D. L. VanderHart, F. W. Wang, R. K. Eby, B. M. Fanconi, and K. L. DeVries Feb. 1986 183 p
(Contract MIPR-FY1457-84-N-5019; AF Proj. ILI-R)
(AD-A168102; AFWAL-TR-85-4137) Avail: NTIS HC A09/MF A01 CSCL 07/4

The techniques of solid state nuclear magnetic resonance, fluorescence spectroscopy, electron spin resonance, and X-ray diffraction were applied to characterize aspects of the solid state structures of rigid rod polymers and their blends with flexible polymers. NMR and fluorescence spectroscopies were used to investigate the degree to which the rigid rod - flexible polymer blends exist as phase separated systems. It was found that these materials form primarily phase segregated structures, a condition which limits the reinforcing potential of rigid rod polymers in molecular composites. Most specimens exhibited NMR signals indicative of mobile, and presumably lower molecular weight, species. It is postulated that these mobile species are either water or residual acid from which the materials are processed. Information regarding the location of the mobile species in the structures exhibited by rigid rod polymers and their blends with flexible polymers is deduced from NMR. Electron spin resonance measurements confirmed that free radicals are generated while mechanically stressing rigid rod polymer fibers. The as-processed fibers contained appreciable levels of free radicals and annealing at elevated temperatures caused a decrease in the free radical concentration by a factor of three. X-ray diffraction experiments were conducted at elevated pressure in a diamond anvil cell. GRA

N86-31734# Oak Ridge National Lab., Tenn.
EVIDENCE FOR THE FORMATION OF A METASTABLE CRYSTALLINE PHASE DURING CRYSTALLIZATION OF Zr-Ni METALLIC GLASSES OF APPROXIMATELY 57 TO 63.2 AT. % Zr
C. G. McKamey, D. S. Easton, and D. M. Kroeger 1985 7 p
Presented at the Materials Research Society Meeting, Boston, Mass., 2 Dec. 1985
(Contract DE-AC05-84OR-21400)
(DE86-005031; CONF-851217-25) Avail: NTIS HC A02/MF A01

The crystallization of rapidly solidified Zr-Ni metallic glasses has been studied by differential scanning calorimetry (DSC), X-ray diffraction (XRD), and transmission electron microscopy (TEM). Evidence has been found for a metastable phase which is the first crystalline phase to form upon heating in compositions of 57 to 63.2 at. % Zr. This phase seems to be more easily formed and is most stable in the region of 58 to 59 at. % Zr. Upon subsequent heating to higher temperatures, the metastable phase transforms to the equilibrium phases ZrNi and Zr2Ni. The relationship of this new phase to phase separation at the eutectic composition of 63.5 at. % Zr is discussed in support of the conclusions drawn from low temperature specific heat studies reported previously. DOE

N86-31735# Oak Ridge National Lab., Tenn.
CHEMICAL VAPOR INFILTRATION OF FIBER-REINFORCED CERAMIC COMPOSITES
D. P. Stinton, A. J. Caputo, R. A. Lowden, and T. M. Besmann 1986 8 p Presented at the 2nd International Sympoisum on Ceramic Materials and Components for Engines, Luebeck-Travemuende, West Germany, 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009513; CONF-860413-1) Avail: NTIS HC A02/MF A01

A process has been developed for the fabrication of fiber-

reinforced SiC composites by chemical vapor infiltration. Infiltration times for the low-density fibrous structures were reduced significantly from previous processes by simultaneously utilizing a thermal gradient and forced gas flow. Uniform matrix deposition occurred throughout unidirectional-fiber, cloth, or random chopped-fiber preforms to produce composites with densities approaching 90% of theoretical. Fabrication of composites in this fashion produced specimens with high flexural strengths and with a strain at maximum load which significantly exceeded those of conventional SiC bodies. DOE

N86-31736# Sandia National Labs., Albuquerque, N. Mex.
ANALYSIS OF S-GLASS CERAMIC LOT NO. 84-132 FOR USE AS A STANDARD REFERENCE MATERIAL
R. M. Merrill, J. P. McCarthy, and R. J. Antepenko Apr. 1986 43 p Prepared in cooperation with Mound Lab., Miamisburg, Ohio and General Electric Co., Largo, Fla.
(Contract DE-AC04-76DP-00789)
(DE86-010309; SAND-86-0065) Avail: NTIS HC A03/MF A01

Silicate glass properties such as thermal coefficient of expansion, and molten viscosity can be altered by changing the formulation. One glass, called S-glass ceramic, and hereafter denoted simply as S-glass, has been specifically designed to be crystallized to a glass ceramic with a coefficient of expansion that matches Inconel 718, and has a molten viscosity low enough to flow into tight configurations without the formation of voids or bubbles. Since the glass must meet rigorous chemical and mechanical specifications, samples from each batch or lot have been chemically analyzed. A major difficulty in these analyses has arisen from a lack of suitable standards. NBS has several silicate glasses certified as standard reference materials; however, none of them contains all of the constituents present in S-glass, and for some of the constituents no standard exists which has a certified value close to the levels present in S-glass. For these reasons, it was decided that one complete melt of S-glass would be extensively analyzed by several different laboratories and dedicated for use as a reference standard. The batch's melting history was closely monitored, and the starting materials were well characterized. DOE

N86-31737# Pennsylvania State Univ., University Park.
LASER PROCESSING OF CERAMICS Final Technical Report, 1 Jun. 1981 - 30 Nov. 1985
G. L. Messing, J. P. Pollinger, R. Geary, and R. Shelleman May 1986 10 p
(Contract DE-AC02-81ER-10949)
(DE86-011954; DOE/ER-10949/T2) Avail: NTIS HC A02/MF A01

Progress towards understanding the nature of laser-ceramic interactions and their utilization for ceramic processing has been made. Correlations between observations on laser scanned ceramic substrates have been made to the laser-metal interaction literature. Correlations with melt solidification of metals, although a considerably different material system, have proven fruitful and have led to more insights about the thermodynamic and mechanistic nature of ceramic melt solidification. The original purpose of this study was to exclusively use a CO laser for ceramic melting and specifically to prepare ceramic powders. Unfortunately, it has not been possible to satisfactorily investigate powder preparation per se. Therefore, the results reported are primarily concerned with investigations of laser-ceramic interactions which involve rapid solidification of surfaces at cooling rates of 10^4 to 10^6 K/s. Because of the continuing interest in powder synthesis a plasma vaporization of solutions technique was investigated. The vapor synthesis method was adapted because of its potential utility for a wide range of material compositions. DOE

N86-31738# British Petroleum Co. Ltd., Sunbury-on-Thames (England).
MOLECULAR WEIGHT DISTRIBUTIONS OF DURHAM POLYACETYLENE PRECURSOR POLYMERS
Kevin Harper and Peter G. James 1985 4 p
(ESA-86-97254) Avail: NTIS HC A02/MF A01

A low temperature gel permeation chromatography system was developed and used to obtain the molecular weight distributions of Durham polyacetylene precursor polymers. A concurrent light-scattering experiment indicates that the true weight-average molecular weights of the Durham-type polymers are approximately twice the polystyrene-equivalent molecular weights. Durham precursor polymers are genuine high molecular weight polymers, producing initially cis polyacetylene with up to 7,500 double bonds. ESA

N86-31739# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
HIGH TEMPERATURE ADHESIVES [LES ADHESIVES HAUTES TEMPERATURES]
P. Hebrard 1986 14 p In FRENCH Presented at GAMNI Assemblage par Collage dans l'Ind., Senlis, France, 8-9 Oct. 1985
(SNIAS-861-422-113; ESA-86-97603) Avail: NTIS HC A02/MF A01

The analysis of four adhesive systems capable of operation over 200 C is presented. Differential thermal analysis, thermogravimetric tests and dynamic viscoelastic analysis were carried out. Samples of epoxy-phenolic, polyimidic, and bismaleicimide adhesives were studied. The optimum polymerization cycles deduced from the tests are described. All the four systems are superior to epoxy adhesives and may work up to near 400 C. Polyimides are the most promising. ESA

N86-31740# European Space Agency, Paris (France).
DIFFUSION OF WATER VAPOR IN CFRP. MEASUREMENT OF THE DIFFUSION COEFFICIENT UNDER INFLUENCE OF CONCENTRATION
Harald Twardy Sep. 1985 70 p Original language document was announced as N85-24018
(ESA-TT-911; DFVLR-FB-84-41; ESA-86-97568) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne, West Germany DM 23

The diffusion coefficient of water vapor in CFRP was measured as a function of moisture content for epoxy resins Code 69 and BSL 914, and their carbon fiber laminates. In sorption and desorption mode, tested materials show considerable variation of the diffusion coefficient with moisture content. Time-dependent influences, which cannot be separated, appear in this dependency. An example with a varying and an equivalent constant diffusion coefficient is calculated and demonstrates differences of calculated moisture profiles in a CFRP laminate. ESA

N86-31741# Societe Nationale Industrielle Aerospatiale, Paris (France).
DESIGN OF ADHESIVE BONDED STRUCTURES FOR SPACECRAFT [CALCUL DE LIAISONS COLLEES STRUCTURALES DANS LES VEHICULES SPATIAUX]
Maigret and Martin 1986 15 p In FRENCH; ENGLISH summary Presented at ADHECOM, Bordeaux, France, 15 Apr. 1986
(SNIAS-861-430-114; ESA-86-97608) Avail: NTIS HC A02/MF A01

Computation tools and test procedures for spaceborne bonded structures are discussed. Standardized breaking strength and shear strain tests are described. The computation programs are verified by comparison between the predicted values and the experimental results. The described methods are shown to be appropriate to predict and characterize the behavior of bonded structures for space environments. ESA

N86-31742# Construcciones Aeronauticas S.A., Madrid (Spain).
MEASUREMENT OF THE GLASS TRANSITION TEMPERATURE (Tg) OF THE Z-14.203 MATERIAL (PARASOL C-212) [MEDIDA DE TG EN EL MATERIAL Z-14.203 (PARASOL C-212)]
E. Garate 7 Apr. 1985 7 p In SPANISH
(I-111/85; ESA-86-97661) Avail: NTIS HC A02/MF A01

The loss of stiffness of parasols manufactured with an acrylic resin was studied. Thermal analysis and torsion pendulum tests were performed. The results show a transition lower than specified

(75 C).A change of material to polycarbonates or higher transition acrylates is recommended. ESA

N86-31743# Construcciones Aeronauticas S.A., Madrid (Spain).
CERTIFICATION OF THE ZIRSHOT Z-600 AND Z-150 CERAMIC SHOT [HOMOLOGACION DE LOS PERDIGONES CERAMICOS ZIRSHOT Z600 Y Z150]
L. E. Lopez 14 Apr. 1985 7 p In SPANISH
(I-112/85; ESA-86-97662) Avail: NTIS HC A02/MF A01

The chemical, crystallographic, physical, and dimensional characteristics of ceramic shot are given. Performance tests were carried out in dry and wet conditions using standard machines for surface treatment. The analysis of the results shows that surface abrasion is less than the abrasion obtained using steel shot at the same air pressure, due to the lower density of the zirconium ceramic shot. It is concluded that these ceramic shots are interesting for low intensity operations. ESA

N86-31744# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Werkstoffe und Bauweisen.
DETERMINATION OF THE FRACTURE TOUGHNESS OF CERAMIC MATERIALS ON BENDING SAMPLES WITH DIFFERENT NOTCH TYPES, AT ROOM TEMPERATURE AND HIGH TEMPERATURE Ph.D. Thesis - Karlsruhe Univ., West Germany
Guenther Himsolt Dec. 1985 255 p In GERMAN; ENGLISH summary
(DFVLR-FB-85-67; ISSN-0171-1342; ESA-86-97585) Avail: NTIS HC A12/MF A01; DFVLR, Cologne, West Germany DM 113.50

A method which permits the determination of the crack length using simple relations from the corresponding compliance of a bending specimen was developed. Investigations on hot-pressed silicon nitride reaction-bonded SN and HPSiC show that the microstructural parameters and their dependence on the testing temperature mainly control the fracture toughness. Specimens with a straight-through notch show a dependence on the notch radius, and chevron-notched specimens reveal deteriorated crack initiation which can lead to a failure of the method. Materials can show an increase in fracture toughness with increasing crack length. Fractographic investigations indicate that the test method must be adapted to specific materials problems. Because of the difficulties with both notch types, a modified chevron notch is suggested. ESA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-31745# Materials Research Labs., Ascot Vale (Australia).
A REVIEW OF METHODS TO DETERMINE THE IGNITABILITY OF PYROTECHNIC COMPOSITIONS
Leo V. DeYong Feb. 1986 24 p
(AD-A167429; MRL-R-989) Avail: NTIS HC A02/MF A01 CSCL 21/2

Ignition of pyrotechnic materials is a problem that has had relatively little attention over the years. However, many tests have been developed in an attempt to measure the ability of an energetic material to ignite from various sources. These tests range from the simple sensitivity/safety type tests (spark and impact sensitivity, ignition temperature, etc.) to the more complex techniques which measure the energy required for ignition (hot wire, laser, arc-image furnace, spark). These tests are examined in this report and comments on each of their advantages/disadvantages and their applicability to studying pyrotechnic ignition are made.
Author (GRA)

N86-31746# Materials Research Labs., Ascot Vale (Australia).
PREDICTION OF IGNITION TRANSFER RELIABILITY IN PYROTECHNIC SYSTEMS USING THE VARICOMP TECHNIQUE
Leo V. DeYong Feb. 1986 18 p
(AD-A167430; MRL-R-898) Avail: NTIS HC A02/MF A01 CSCL 21/2

The reliability of transfer of ignition between two elements in an explosive train is of paramount importance to proper functioning of a device. Prediction of this reliability is therefore necessary in designing ignition systems. To overcome testing prohibitively large numbers of samples, penalty testing was developed. The VARICOMP technique is one such penalty test developed for explosive trains. This report examines the theory of the VARICOMP technique and applies it to predicting ignition reliability in pyrotechnic trains. This study shows that a modified VARICOMP technique can be used in conjunction with small sample theory to predict the available stimulus from an igniter in a pyrotechnic system and the ignition reliability of the acceptor pyrotechnic. The use of the Bruceton calibration technique can provide adequate precision and makes elaborate and expensive calibration experiments unnecessary. However, for reliable predictions to be obtained, care must be taken to design the experiment to simulate the actual design hardware as closely as possible. GRA

N86-31747# Naval Postgraduate School, Monterey, Calif.
AN EXPERIMENTAL INVESTIGATION OF VARIOUS METALLIC/POLYMER FUELS IN A TWO-DIMENSIONAL SOLID FUEL RAMJET M.S. Thesis
Charles K. Scott, III Mar. 1986 62 p
(AD-A167889) Avail: NTIS HC A04/MF A01 CSCL 21/5

An experimental investigation was conducted of highly metallized (approximately 70% by weight) solid fuels burned in a two-dimensional solid fuel ramjet (SFRJ). High speed motion pictures were taken of the combustion process through viewing windows located at two locations along the fuel slab length. Films revealed various ejection events ranging from small particle ejections to large flakes of burning and non-burning material leaving the surface. Nine different fuels were tested at air mass fluxes of 0.2 and 0.5 pounds mass per inch squared per second and pressures ranging from 35 to 200 psia. There was evidence that both minor binder ingredient changes (polymer and curative) and the inclusion of magnesium resulted in larger required inlet step heights to sustain combustion. Most of the metallized fuels did not burn well at pressures below approximately 40 psia. Low air mass fluxes generally resulted in larger metallic surface agglomerations, larger particles in the gas phase and more dominant shedding of surface layers. GRA

N86-31748# Allied Corp., Morristown, N.J. Corporate Technology.
ADVANCED HYDROGEN STORAGE: MODIFIED VANADIUM HYDRIDES Final Report
G. G. Libowitz Aug. 1985 33 p
(Contract DE-AC02-76CH-00016)
(DE86-009916; BNL-37866) Avail: NTIS HC A03/MF A01

Body centered solid solution alloys of general composition V-Ti-M (where M = Fe, Mn, Cr, Al) were investigated for use as hydrogen storage materials. Phase relations and thermodynamic properties of the V-Ti-M-H systems were determined. It was found that the enthalpies and entropies of hydride formation were significantly higher (absolute values) than those of most intermetallic compounds. Because of their thermodynamic properties it was concluded that these alloy hydrides are not particularly suitable for hydrogen storage, but that the thermodynamic properties are most favorable for their use as hydrogen compressors or in hydride heat pumps. DOE

N86-31749# Los Alamos National Lab., N. Mex.
EFFECTS OF PHYSICAL PROPERTIES ON THE INITIATION BEHAVIORS OF HETEROGENEOUS HIGH EXPLOSIVES
P. K. Tang, C. A. Forest, J. N. Johnson, and W. L. Seitz 1986 7 p Presented at the International Symposium on Intense Dynamic Loading and its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-000807; LA-UR-85-3375; CONF-860616-2) Avail: NTIS

HC A02/MF A01

Results are presented of an investigation into the shock initiation of high explosives with respect to the effects of density and grain sizes. The investigators used a model of treating high-explosive reaction with a multistep process which includes the hot-spot excitation, decomposition, and the propagation of reaction into the region outside the hot spots. The roles of various parameters are discussed; in particular, the hot-spot mass fraction, the reference hot-spot temperature, and the temperature sensitivity parameter are cited as the key factors in the observed behaviors. DOE

N86-31750# Los Alamos National Lab., N. Mex.
RADIAL BUILDUP TO DETONATION IN PENTAERYTHRITOL TETRANITRATE (PETN)
R. H. Dinegar Oct. 1985 9 p Presented at the International Symposium on Intense Dynamic Loading and its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-002383; LA-UR-85-3554; CONF-860616-6) Avail: NTIS HC A02/MF A01

Purified PETN was pressed to a density of 0.95 g/cc in Lucite cylinders of 2.54-cm diameter and 0.76-cm length. These charges were initiated by means of an exploding bridgewire located in the center of one face of the pressing. The firing capacitance and inductance were held constant. The energy delivered to the explosive charge was changed by varying the condenser voltage. The radial buildup to detonation was recorded by a rotating mirror camera with the slit perpendicular to the bridgewire. Results are discussed. The conclusion is that the deflagration to detonation development is not perfectly spherical from the initiation source but more ellipsoidal with the highest rate oriented along the charge length. DOE

N86-31751# Sandia National Labs., Albuquerque, N. Mex.
EFFECTS OF WELLBORE LIQUIDS IN PROPELLANT-BASED FRACTURING
J. F. Cuderman 1986 8 p Presented at the 27th US Symposium on Rock Mechanics, Tuscaloosa, Ala., 23 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007832; SAND-85-2075C; CONF-860609-8) Avail: NTIS HC A02/MF A01

In situ experiments at the Department of Energy's Nevada Test Site (NTS) have extended the technology of propellant-based fracturing to include liquid-filled, uncased boreholes. Previous work had developed the technology for liquid-free, uncased wellbores. Test results show tha fracturing behavior is considerably more complex in liquid-filled boreholes than in the liquid-free case. Compared to liquid-free boreholes, liquid-filled boreholes have faster pressure risetimes and lower peak pressures, large hydraulic-type fractures propagating several meters beyond the end of the test zone, numerous oscillations in the pressure history, and variable types of fracturing within a single test region. Multiple fracturing is initiated in the wellbore of a fluid-filled borehole when the proper propellant mixture is used but, unlike fluid-free wellbores where up to eight fractures propagate, only one to three hydraulic- and/or shear-type fractures propagate. Hydrodynamic effects involving liquid compression during borehole pressurization appear to be responsible for the differing phenomena observed in fluid-filled boreholes. DOE

N86-31752# Sandia National Labs., Albuquerque, N. Mex.
OPTICAL STUDIES OF CHEMICAL ENERGY RELEASE DURING SHOCK INITIATION OF GRANULAR EXPLOSIVES
R. E. Setchell 1985 33 p Presented at the 10th International Colloquium on Dynamics of Explosions and Reactive Systems, Berkeley, Calif., 4 Aug. 1985
(Contract DE-AC04-76DP-00789)
(DE86-010469; SAND-85-0760C; CONF-850830-9) Avail: NTIS HC A03/MF A01

Achieving a predictive understanding of shock growth to detonation in granular explosives requires an accurate description of the temporal and spatial behavior or chemical energy release following shock compression. Direct experimental observations of the complex mechanisms involved are very difficult, and global reaction rates are typically inferred from pressure or particle velocity measurements. In the present study, visible emission from an explosive/window interface is examined using instrumentation that provides spectral, temporal, and spatial resolution. This instrumentation includes an image-converter streak camera to record histories of emission intensities dispersed by a 0.25 m specrometer, an image-converter framing camera to record multiple images of a highly magnified area of the explosive surface, and a channel intensifier tube to greatly enhance the sensitivity of either camera. Planar impact experiments were conducted on a compressed-gas gun facility using samples of the explosives hexanitrostilbene and PBX-904. The streak emission records show a distinct structure within the earliest observable emission. DOE

N86-31753# Lawrence Livermore National Lab., Calif.
STUDY ON THE RHEOLOGY OF RX-08-FK LLNL'S PASTE EXPLOSIVE
E. vonHoltz Apr. 1986 30 p
(Contract W-7405-eng-48)
(DE86-010781; UCID-20737) Avail: NTIS HC A03/MF A01

Understanding the rheological properties of paste explosives (PEX) is vital to utilizing this technology in any application. We recently completed testing our current paste candidate, RX-08-FK. This PEX exhibited non-Newtonian flow properties, and could be analyzed via use of power law curves. Neglecting yield stress, the PEX data followed power law behavior, with the exponents (n) being in the region of 0.3 to 0.6 (expected region was 0.35 to 0.65). This classifies the PEX as having strongly pseudoplastic behavior (decreasing apparent viscosity with increasing shear rate). Using information extracted from this data, we were able to conclude that pressure transfer of this material from one configuration to another is a highly feasible concept. We estimate that to transfer 60 lb of our PEX through 4 feet of 1 inch ID tubing at 50°F, we would need a driving pressure of only 500 psi to accomplish the extrusion in less than 20 seconds. DOE

N86-31754# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PYROTECHNIC VALVES AND MINIATURE DEVICES [VANNES PYROTECHNIQUES, PYROMECANISMES MINIATURES ET ECROUS PYROTECHNIQUES]
J. C. Slama 1986 6 p In FRENCH Presented at 2nd ESA Symposium European sur les Mecanismis Spatiaux, Schloss Merrsburg, West Germany, 9-11 Oct. 1985
(SNIAS-861-422-112; ESA-86-97599) Avail: NTIS HC A02/MF A01

Devices developed for ballistic missiles and the Ariane launcher are described, including a normally closed valve, a normally open valve, miniature hydraulic pistons, and pyrotechnical stage separation devices. Most of the devices are manufactured in titanium alloy and their mass is of the order of a few hundred grams. The performance tests and the specifications are detailed. ESA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-31755# Department of the Air Force, Washington, D.C.
NON-CONTACT POLISHING Patent Application
Brian S. Ahern, inventor (to Air Force) Filed 15 Jan. 1986 10 p
(AD-D012210; US-Patent-Appl-SN-818944) Avail: NTIS HC A02/MF A01 CSCL 20/12

A non-contact polishing apparatus is used for polishing semiconductor planar substrates. The substrate is set back from any surface and is held by a chuck fixed within a collar. This substrate holder assembly is placed within an enclosed container that has a non-abrasive solution therein. The container is mounted

to a high speed nutating table that provides random motion to the holder assembly. This action provides isotropic polishing with no polishing created defects on the substrate surface. GRA

N86-31756# Department of the Air Force, Washington, D.C.
LASER INDUCED SELECTIVE ELECTROLESS PLATING Patent Application
Michael J. Halliwell, inventor (to Air Force) Filed 17 Jan. 1986 14 p
(AD-D012223; US-Patent-Appl-SN-819558) Avail: NTIS HC A02/MF A01 CSCL 13/8

It is an object of the present invention to provide a novel method for selective maskless electroless plating. In accordance with the present invention there is provided a method for selectively plating a metal onto a workpiece which comprises, in combination, the steps of applying a sensitizing solution to the workpiece, directing a laser beam onto the workpiece in the area which is not to be plated, and thereafter contacting the workpiece with an electroless plating solution to achieve plating thereon. GRA

N86-31757# Sandia National Labs., Albuquerque, N. Mex.
CONTROL OF PRECIOUS METAL PLATING BATHS USING ELECTROGRAVIMETRIC ANALYSIS
W. G. Yelton 1986 13 p Presented at the 10th International Conference on Precious Metals, Lake Tahoe, Nev., 8 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-005435; SAND-85-2550C; CONF-860677-1) Avail: NTIS HC A02/MF A01

This paper is an outline of an electrogravimetric method for inventory control of precious metal plating baths. The procedure is meant to be applicable to a plating shop environment to provide in-process control. A short review of procedural techniques for sample preparation and analysis are included. The paper deals with the basic how to approach for developing a practical system of analytical control of precious metal electroplating baths permitting accountability of 99% or greater. DOE

N86-31758# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Sciences.
SEMIMANUFACTURED PRODUCTS MADE OF COPPER AND COPPER ALLOYS: AN ANALYSIS OF PRODUCTION AND SALE IN A WORLD PERSPECTIVE [HALFFABRIKATEN VAN KOPER EN KOPERLEGERINGEN: EEN ANALYSE VAN PRODUKTIE EN AFZET IN MONDIAAL PERSPEKTIEF]
Ad Sannen 1984 69 p In DUTCH
(EUT/BDK/15; ISBN-90-6757-015-X; ESA-86-97687) Avail: NTIS HC A04/MF A01

Semimanufactured products based on copper or copper alloys were investigated with a view to an economical and technically justified production in copper-exporting developing countries. The structure of the world copper industry is presented. The recycling of copper for industrial applications is discussed. The market for semimanufactured products and the copper market in developing countries is presented. ESA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-31759 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
AN INTRODUCTION TO THE OPTICAL HETERODYNE RECEIVER
R. H. Bradsell Feb. 1986 16 p
(NPL-QU-77; ISSN-0309-3050; ESA-86-97265) Copyright. Avail: Issuing Activity

A theoretical model for the direct optical video detector and the optical heterodyne mixer is developed. The advantages of the latter are enumerated and the performance of a typical system is analyzed. ESA

N86-31760*# Ford Aerospace and Communications Corp., Palo Alto, Calif. Western Development Labs. Div.
SPACECRAFT MULTIBEAM ANTENNA SYSTEM FOR 30/20 GHz Final Report
T. E. Roberts and W. F. Scott 10 Jan. 1984 70 p
(Contract NAS3-22498)
(NASA-CR-174654; NASA4-1-5-Z-F; NAS 1.26:174654; WDL-TR-10138) Avail: NTIS HC A04/MF A01 CSCL 17B

The major technical tasks that led to the definitions of operational and demonstration multiple beam antenna (MBA) flight systems and a proof of concept model (POC) are described. Features of the POC Model and its measured performance are presented in detail. Similar MBA's are proposed for transmitting and receiving with the POC Model representing the 20 GHz transmitting antenna. This POC MBA is a dual shaped-surface reflector system utilizing a movable free array to simulate complete CONUS coverage. The beam forming network utilizes ferrite components for switching from one beam to another. Measured results for components, subsystems and the complete MBA confirm the feasibility of the approach and also show excellent correlation with calculated values. Author

N86-31761# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
SIMULATION STUDY SYNTHETIC APERTURE RADAR IMAGERY (SIMSAR) [SIMULATIESTUDIE SAR-BEELDVORMING (SIMSAR)]
Apr. 1984 15 p In DUTCH
(ESA-86-97554) Avail: NTIS HC A02/MF A01

Investigations into the numerical simulation of a SAR system are presented. A quasi two-dimensional model for a collection of point objects was extended to three dimensions. Software for calculating the rough radar signal via the frequence domain was derived. Existing software was extended with the implementation of a SAR-processor. Multilook SAR was simulated and its transfer functions were determined. The power density spectrum (PDS) of the theoretical model was compared with the PDS of the simulated data and the real SAR-data. For individual titles, see N86-31762 through N86-31763.

N86-31762# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
SIMSAR STUDY, SECTION 1 Progress Report, Jun. 1983 - Dec. 1983 [SIMULATIESTUDIE SAR-BEELDVORMING (SIMSAR)]
In its Simulation Study Synthetic Aperture Radar Imagery (SIMSAR) Apr. 1984 3 p In DUTCH (For primary document see N86-31761 23-32)
Avail: NTIS HC A02/MF A01

Investigations into the numerical simulation of a SAR system are presented. Software for calculating the rough radar signal (RRS) via the frequency-domain, was derived. The RRS was calculated in a 1024 point-objects area (with mutual 10 wavelengths distance) in flight direction. Existing software was extended with the implementation of a SAR-processor, consisting of a matched filter from which the transfer-function is anew to be determined for each distance. Part of the Doppler-spectrum was selected by filtering. Speckle was reduced counting subspectra signals on power base. Transfer functions were determined using Gauss functions in the frequency and time-domain. The power density spectrum (PDS) of the theoretical model was compared with the PDS of the simulated data and the real SAR-data. ESA

N86-31763# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgolftechniek.
SIMSAR STUDY, SECTION 2 Progress Report, Dec. 1982 - Jun. 1983 [SIMULATIESTUDIE SAR-BEELDVORMING (SIMSAR)]
In its Simulation Study Synthetic Aperture Radar Imagery (SIMSAR) Apr. 1984 4 p In DUTCH (For primary document see N86-31761

23-32)
Avail: NTIS HC A02/MF A01

Investigations into the numerical simulation of a SAR-system are presented. A quasi two-dimensional model for a Collection of Point Objects (CPO) was extended to three dimensions. Assuming an isotropic dispersion of reflecting electromagnetic waves, every point object is described by strength and random phase. The radar platform is introduced and an expression for the voltage received (i.e., echo of the CPO) was derived. Necessary software, i.e., (1) the mixing of the rough signal of a Gaussic pulse radar, (2) the implementation of the SAR-processor, and (3) the generation of images which can be elaborated, was briefly described. Matrix multiplication and time-frequency domain transformations were carried out on an array-processor. ESA

N86-31764# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
SCATTERING FROM A PLANAR EQUIANGULAR SPIRAL ANTENNA M.S. Thesis
Stephen C. Moraites Dec. 1985 68 p
(AD-A167068; AFIT/GE/ENG/85D-27) Avail: NTIS HC A04/MF A01 CSCL 09/5

This thesis presents analytical and numerical techniques for analyzing the scattering from a planar equiangular spiral antenna loaded at its terminals. The scattering matrix for the loaded antenna is derived as a function of the antenna load impedance. This derivation is the result of an analytical study of the voltage/current relationship at the antenna terminals along with an application of a multiport analysis of the scattering problem. A numerical technique is also developed that utilizes at different wavelengths common elements of the generalized impedance matrix of the moment method solution. This technique provides for rapid computation of the scattering properties of the spiral antenna across a band of frequencies. Author (GRA)

N86-31765# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A KERNEL DECISION SUPPORT SYSTEM FOR CANADIAN MILITARY SATELLITE COMMUNICATIONS SYSTEM PLANNING M.S. Thesis
James R. Leitch Dec. 1985 148 p
(AD-A167122; AFIT/GSO/ENS/85D-11) Avail: NTIS HC A07/MF A01 CSCL 17/2

The kernel requirements for a DSS to plan technically feasible SATCOM systems is developed. The literature review focuses on understanding the decision process and a search for a suitable analytic tool for SATCOM system design. A model of the decision process is developed. The model is found to be a semi-structured task as the management control level. The process involves independent and interdependent decisions at all levels of management. The decision process contains elements of the rational, satisfying, organizational procedures, political and individual differences perspectives of decision making. Link analyses is developed as the analytic tool to support the decision process. The initial equation is developed and the effects of multiple users and multiple access are added. Link analysis provides a straight forward method of determining technical feasibility. A set of parameters for link analysis and the attendant equations are developed. The representations, operations, memory aids, and control mechanisms necessary to implement the kernel DSS are determined. Two linkages for future modules were identified: the Analytic Hierarchy Process as a module to determine the SATCOM user's evaluation criteria and a cost module. The research concludes that a DSS is well suited to the SATCOM planning process. GRA

N86-31766# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
FIELDS IN THE FOCAL REGION OF PARABOLOID AND OFFSET PARABOLOID REFLECTORS
R. H. Ott and R. B. Dybdal 31 Mar. 1986 91 p
(Contract F04701-85-C-0086)
(AD-A167419; TR-0086(6925-05)-4; SD-TR-86-16) Avail: NTIS HC A05/MF A01 CSCL 09/5

While much development has been accomplished for reflector antenna technology, a need still exists in evaluating the impacts of design parameters. One such area is included in the design tradeoffs associated with the beam-scanning performance of reflector designs. A surface current integration analysis is derived which is exact to the order of physical optics. This analysis is applied to both circular and offset reflectors for on-axis and off-axis illumination for parameters which span the cases for which both substantial and minimal degradation with beam scan occur. The output of the analysis is cast in the form of contour plots defining the field structure in the focal region of the reflector. The results of the analyses compare favorably with data previously obtained for specialized parameters. GRA

N86-31767# Rome Air Development Center, Griffiss AFB, N.Y.
ROME AIR DEVELOPMENT CENTER AIR FORCE TECHNICAL OBJECTIVE DOCUMENT FISCAL YEAR 1987
Dec. 1985 65 p
(AD-A167425; RADC-TR-85-282; RADC-TOD-85-11) Avail: NTIS HC A04/MF A01 CSCL 17/2

This TOD describes the RADC technical programs in support of the Air Force Command, Control, Communications, and Intelligence (C3I) mission. The technical objectives have been aligned with the VANGUARD mission areas of Command, Control, and Communications (C3), Reconnaissance and Intelligence, Strategic Systems (Defense) and Technology as a means of focusing the RADC support of VANGUARD. This document is prepared to provide industry and universities with the midterm technical objectives in these areas. GRA

N86-31768# Naval Ocean Systems Center, San Diego, Calif.
MICROCOMPUTER OPTIMIZATION OF FEED EXCITATION VOLTAGES TO OBTAIN DESIRED ANTENNA RADIATION PATTERNS Final Report
John W. Rockway, James C. Logan, and Peder M. Hansen Feb. 1986 25 p
(AD-A167560; NOSC/TD-866) Avail: NTIS HC A02/MF A01 CSCL 09/5

Recently a computer program, MININEC, has become available that can be used to calculate antenna characteristics, including the actual current distribution on the array elements. This program is generally available and can run on various microcomputers. A design procedure for broadcast array antennas has been developed which uses this computer program to calculate antenna characteristics for a specified array geometry. These results are then used by a separate routine that optimizes the excitation voltages, by gradient search, in order to achieve, as nearly as possible, a specified pattern. GRA

N86-31769# Applied Physics, Inc., Albuquerque, N. Mex.
RADAR CROSS-SECTION OF DAMPED CYLINDERS AND ANISOTROPIC CYLINDERS Technical Progress Report
Richard Holland 17 Mar. 1986 25 p
(Contract N00014-85-C-0852; ARPA Order 4946)
(AD-A167773) Avail: NTIS HC A02/MF A01 CSCL 17/9

This quarter, we have generalized the TDFD RCS code to handle materials characterized by: (1) Lossy, frequency-dependent dielectrics, (2) Magnetic loss and conductivity, (3) Anisotropy in the xy plane, and (4) Embedded resistive or reactive sheets. Our treatment of frequency dependence goes beyond what had been the state of the art in TDFD codes; the frequency dependence here may be anisotropic and may extend across a molecular resonance. The techniques for doing this are documented in the attached article, Time-domain treatment of Maxwell's equations in frequency dependent media. This article was written for the March conference in Monterey and represents work entirely inspired by the present contract. GRA

N86-31770# Lawrence Livermore National Lab., Calif.
WIDE SPECTRUM MICROWAVE PULSE MEASUREMENT
R. J. King Jan. 1986 21 p
(Contract W-7405-eng-48)
(DE86-006662; UCID-20647) Avail: NTIS HC A02/MF A01

Various techniques are postulated as diagnostics for wide band microwave pulses. The diagnostics include determinations of both the instantaneous amplitude and the frequency content of one-shot pulses. DOE

N86-31771# Lawrence Livermore National Lab., Calif.
PROPAGATION OF LONG, HIGH-POWER MICROWAVE PULSES THROUGH THE AIR
G. H. Khanaka and J. H. Yee Mar. 1986 11 p
(Contract W-7405-eng-48)
(DE86-009619; UCID-20616) Avail: NTIS HC A02/MF A01

The passage of long, high-power microwave pulses in the atmosphere was studied using a one-dimensional computer code. The objective of this study was to obtain a time history of the electron conductivity and peak density, as well as the peak plasma density. The results are summarized as follows: (1) the threshold level depends on pulse frequency and length; (2) electron avalanche occurs only when the pulse intensity exceeds the threshold level for air break-down, and this results in tail erosion; (3) for higher pulse intensities, it requires less time to initiate electron avalanche, which results in transmitting smaller portions of the pulse; (4) the general characteristics of the electron density, conductivity, and plasma frequency are quite similar for both cases; and (5) as the pulse amplitude rises, the electron conductivity and density and the plasma frequency also rise. DOE

N86-31772# Lawrence Livermore National Lab., Calif.
SIG: A GENERAL-PURPOSE SIGNAL PROCESSING PROGRAM
D. Lager and S. Azevedo Feb. 1986 6 p Presented at the Institute for Electrical and Electronics Engineers International Conference on Circuits and Systems, San Jose, Calif., 5 May 1986
(Contract W-7405-eng-48)
(DE86-009725; UCRL-94111; CONF-860589-2) Avail: NTIS HC A02/MF A01

SIG is a general-purpose signal processing, analysis, and display program. Its main purpose is to perform manipulations on time- and frequency-domain signals. It also accommodates other representations for data such as transfer function polynomials. Signal processing operations include digital filtering, auto/cross spectral density, transfer function/impulse response, convolution, Fourier transform, and inverse Fourier transform. Graphical operations provide display of signals and spectra, including plotting, cursor zoom, families of curves, and multiple viewport plots. SIG provides two user interfaces with a menu mode for occasional users and a command mode for more experienced users. Capability exits for multiple commands per line, command files with arguments, commenting lines, defining commands, automatic execution for each item in a repeat sequence, etc. SIG is presently available for VAX(VMS), VAX (BERKELEY 4.2 UNIX), SUN (BERKELEY 4.2 UNIX), DEC-20 (TOPS-20), LSI-11/23 (TSX), and DEC PRO 350 (TSX). DOE

N86-31773# Brookhaven National Lab., Upton, N. Y.
MICROWAVE UNDULATOR
K. Batchelor Mar. 1986 22 p
(Contract DE-AC02-76CH-00016)
(DE86-009810; BNL-37817) Avail: NTIS HC A02/MF A01

The theory of a microwave undulator utilizing a plane rectangular waveguide operating in the TE(sub 10n) mode and other higher order modes is presented. Based on this, a possible undulator configuration is analyzed, leading to the conclusion that the microwave undulator represents a viable option for undulator wavelength down to about 1 cm where peak voltage and available microwave power considerations limit effectiveness. DOE

N86-31774# Kansas Univ., Lawrence. Dept. of Electrical and Computer Engineering.
EVOLVING DIRECTIONS OF PC APPLICATIONS IN ELECTROMAGNETICS ANALYSIS AND DESIGN
E. K. Miller and F. J. Deadrick 25 Mar. 1986 7 p Presented at the Tactical Communication Conference, Fort Wayne, Ind., 22 Apr. 1986 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-009695; UCRL-94310; CONF-8604170-1) Avail: NTIS HC A02/MF A01

This paper serves as both an introduction to electromagnetic analysis and design software for the personal computer, and also as a short introduction to the evolution of computer technology which has made such analysis possible. Progress in microprocessor technology, memory devices, mass storage devices, and software are outlined. The increasing availability and capabilities of modeling software now provides in a micro- or personal computer environment some modeling procedures formerly limited to mini- or mainframe computers. These and other aspects of the present status and anticipated future directions of PC applications in electromagnetics are discussed in the paper. DOE

N86-31775# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
COMPARISON OF CLIFFORD AND GRASSMANN ALGEBRAS IN APPLICATIONS TO ELECTROMAGNETICS, REVISION 1
G. A. Deschamps and R. W. Ziolkowski Feb. 1986 17 p Presented at the Advanced Research Workshop: Clifford Algebras and Their Applications To Mathematical Physics, Canterbury, England, 15 Sep. 1985 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-009716; UCRL-92562-Rev-1; CONF-8509246-1-Rev-1) Avail: NTIS HC A02/MF A01

Grassmann and Clifford algebras are compared as to their applications to electromagnetics. The Grassmann algebra applies directly to (exterior) differential forms leading to Cartan's calculus. Forms of various degrees correspond most naturally to electromagnetic quantities and their relations are expressed by means of the exterior differential operator d. These relations are conveniently represented either in space or space-time by flow diagrams. They reveal the existence of potentials (Poincare's Lemma), the independence from coordinate systems, and the role of the metric. All of these properties are briefly reviewed. A calculus for functions having their values in a Clifford algebra can also be developed based on the Dirac operator D, whose square is a generalized Laplacian. Besides its role in Dirac's theory of the electron, this Clifford calculus can also be adapted to electromagnetics, although less directly than with Cartan's calculus. The point of departure is the role of a metric in a Clifford algebra. This can be remedied by introducing the Hodge star operator in the Grassmann algebra, an operation that is needed to express the property of matter usually represented by means of epsilon and (MU). DOE

N86-31776# Los Alamos National Lab., N. Mex.
NUMERICS FOR THE SIMULATION OF ELECTROMAGNETIC-FIELD PROPAGATION IN NONIONIZED AND PLASMA MEDIA
J. E. Borovsky Mar. 1986 19 p
(Contract W-7405-eng-36)
(DE86-009798; LA-10627-MS) Avail: NTIS HC A02/MF A01

The numerical techniques used to simulate the propagation of low-frequency electromagnetic disturbances in Ohmic media and in collisional and collisionless plasmas are discussed. The scheme is based upon a multimedia propagation equation that is derived from Maxwell's equations. DOE

N86-31777# Oak Ridge National Lab., Tenn.
STANDARD GENERALIZED MARKUP LANGUAGE: A TECHNIQUE FOR DOCUMENT INTERCHANGE
J. D. Mason 1985 6 p
(Contract DE-AC05-84OR-21400)
(DE86-011504; DOE/OR-21400/T265) Avail: NTIS HC A02/MF A01

Technical communicators find themselves increasingly in need of communicating text electronically. Efforts were directed to providing a standardized mechanism for doing generic coding. The Standard Generalized Markup Language (SGML) has been developed for document interchange. It is a Drift International Standard and should become a full standard in 1986. SGML

provides not only a basis for coding and interchange, but also a means for complete descriptions of documents to support other processes. DOE

N86-31778# Research Inst. of National Defence, Linkoeping (Sweden). Applied Electronics Dept.
SAPIENS MEMO 11. ELECTROMAGNETIC CHARACTERISTICS OF THE CONICAL TRANSMISSION-LINE EMP SIMULATOR SAPIENS
Sven Garmland Feb. 1986 53 p
(FOA-C-30415-A3; ISSN-0347-3708; ESA-86-97240) Avail: NTIS HC A04/MF A01; Research Inst. of National Defense, Stockholm, Sweden

A bounded wave electromagnetic pulse simulator was tested. Electric field measurements reveal deviations from an ideal curve shape. The largest deviation is traced to the termination of the simulator antenna. High-frequency components radiate through the termination and low-frequency ones are terminated by a resistive load. The space in between, where the wavelength is equal to the dimension of the termination, presents difficulties. Here, the inductance of the termination is crucial. By increasing the diameter of the wires connecting the resistors of the termination, the inductance may be reduced. It is shown how TEM-reflections from the termination can be diminished from 10% to 2% by replacing the wires with cylinders made of chicken-wire. The electric and the magnetic fields measured inside and outside the simulator confirm the good qualities of the simulator design regarding the antenna bandwidth, the field impedance, homogeneity, and polarization. ESA

N86-31779# Siemens A.G., Munich (West Germany). Informationstechnische Grundlagen.
AUTOMATIC SPEECH RECOGNITION FOR LARGE VOCABULARIES Final Report, Dec. 1984
Abdulmesih Aktas, Bernhard Kaemmerer, Wolfgang Kuepper, and Helmut Lagger Bonn, West Germany BMFT Dec. 1985 128 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-DV-85-003; ISSN-0170-9011; ESA-86-97434) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

An isolated word recognition system for large vocabularies (1000 to 5000 words) with 98% recognition performance was developed. It was implemented on an array processor for real time requirements. The speech signal is described by short time autocorrelation functions. Short response times as well as high recognition accuracies are achieved by means of a hierarchical classification scheme. A fast preselection stage yields a small number of suitable word candidates to be considered for further classification. To that end a linear segmentation or a segmentation based on acoustic or phonetic cues was performed. High selectivity is obtained by using fine temporal resolution and nonlinear time alignment in the final classification step. By taking into account phonetically identical fragments of words, a distinction between highly confusable words can be made. Speaker adaptation for new system users is performed within a relatively short training phase. ESA

N86-31780# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Hauptabt. Raumfahrtprogramme.
FEASIBILITY STUDY FOR A SAR TEST MONITOR Final Report, Dec. 1983
Wolfgang Gieraths, Paul Stuerzenhofaecker, and Joachim Flacke Bonn, West Germany BMFT Dec. 1985 119 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-013; ISSN-0170-1339; ESA-86-97457) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

An SAR test configuration including test equipment, SAR sensor, and a graphical/digital test monitor was investigated to evaluate the signal quality regarding test costs and test duration. The various tests and interfaces and related accuracy values are reviewed. The combination of a computer and a visual display unit allows processing of the test instrument readings and calculation and display of statistical parameters and histograms. The test implementation costs for an SAR specific measuring facility are twice as high as those for a layout with commercially available laboratory measuring instruments. ESA

N86-31781# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
TIME SYNCHRONIZATION VIA SYMPHONIE HIGH ACCURACY LOW COST (HALO) Final Report, Nov. 1983
Hans-Martin Sylwasschy Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 71 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-021; ISSN-0170-1339; ESA-86-97465) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

The High Accuracy-Low cost (HALO) sidetone method, a modulation emitter, and a demodulation receiver were developed to meet accuracy and narrow band width requirements. The functional principle of HALO is described. Field measurements were performed with one modem and time comparative measurements with the two HALO modems. Compact arrangement, simple control of the station periods, and optimization of time signals regarding emission efficiency and band width are required. The HALO is an interface between comparative normal and link signals and produces an HF transfer signal from the comparative normal signals. The accuracy of 1 ns for time synchronization can be improved. The components developed for HALO can be applied to phase-sensitive systems. ESA

N86-31782# Technische Hogeschool Twente, Enschede (Netherlands). Afdeling der Technische Natuurkunde.
TRAVELING WAVES IN A ONE-DIMENSIONAL CHAIN WITH NONHARMONIC RECIPROCITY [LOPENDE GOLVEN IN EEN-DIMENSIONALE KETEN MET NIET-HARMONISCHE WISSELWERKING]
J. H. Wortel Jun. 1984 114 p In DUTCH
(ESA-86-97379) Avail: NTIS HC A06/MF A01

Traveling waves in a one-dimensional Lennard-Jones chain were studied by resolving a variance problem numerically. By integrating the motion equation numerically, the apporach was improved using the Poincare surface of section. Deviations were interpreted with the Floquet theory. Calculations were carried out for 3 and 12 particles. Up to a certain energy the waves are linearly stable; above this level they are linearly unstable (for three particles). ESA

N86-31783# European Space Agency, Paris (France).
EXPERIMENTAL INVESTIGATIONS OF PULSE-PULSE INTERFERENCE IN HETERODYNE DETECTION
Friedrich Malota Dec. 1985 22 p Original language document was announced as N86-10544
(ESA-TT-949; DFVLR-FB-85-26; ESA-86-97582) Avail: NTIS HC A02/MF A01; original German version available from DFVLR, Cologne, West Germany DM 10

The interference of two laser pulses originating from the same source and thus having a constant frequency difference was investigated. The calculation of the heterodyne currents in the interference of two pulses is described. It is shown that a coherent pulse-pulse interference is possible in a pulse heterodyne system. Experimental data are in good agreement with theoretical predictions, especially the determination of the intermediate frequency. ESA

N86-31784# Technische Hogeschool, Delft (Netherlands). Vakgroep Microgoltechniek.
ANALYSIS OF A COMBINED FMCW PULSE RADAR SYSTEM FOR SIDE LOOKING AIRBORNE RADAR (SLAR) APPLICATIONS [ANALYSE VAN EEN GECOMBINEERD FMCW-PULS RADAR SYSTEEM VOOR SLAR TOEPASSINGEN]
Roger Timmerman Jan. 1985 79 p In DUTCH; ENGLISH summary
(Rept-05-1-533-A106-85; ESA-86-97707) Avail: NTIS

HC A05/MF A01

A theoretical and practical feasibility study for the development of an FMCW radar, combining features of FMCW and pulse radars was performed for application as SLAR for Earth observation. Design approaches were compared. Simulations with a network analyzer and an intermediate frequency system are presented. The simulation results are similar to a FMCW processed radar signal. A method to simulate the radar system at microwave frequencies is discussed. A block diagram of the final system is given. Noise behavior and transmitter power are discussed. ESA

N86-31785# Ecole Nationale Superieure des Telecommunications, Paris (France).
ADAPTIVE CONTROL OF THE ALOHA PROTOCOL IN A MOBILE RADIO CELLULAR SYSTEM Ph.D. Thesis [CONTROLE ADAPTATIF DU PROTOCOLE ALOHA DANS UN SYSTEME RADIOMOBILE CELLULAIRE]
Rasoamihamina RazananoelyRejo Jul. 1985 105 p In FRENCH
(ENST-85E013; ISSN-0751-1353; ESA-86-97634) Avail: NTIS HC A06/MF A01

Simple retransmission strategies are adopted to allow for the utilization of the ALOHA synchronous random access protocol. Numerical simulations were performed using a model representing the set of mobiles and the base station of a cell. The main propagation problems are progressively incorporated in the simulation, showing that the adaptive policy is always the best. Controlled ALOHA and a traditional protocol such as AMRT are compared, defining for each case the limiting rate below which the proposed system is preferable. ESA

N86-31786# Societe Nationale Industrielle Aerospatiale, Cannes (France). Dept. of Electrical Engineering.
OPTICAL FIBER TRANSMISSION ON SATELLITES AND ORBITAL STATIONS
C. Lopez and J. M. Nakache 1986 7 p
(SNIAS-861-440-108; ESA-86-97616) Avail: NTIS HC A02/MF A01

The possibilities and advantages offered by optical fiber transmission are explored. The analysis includes performance requirements, candidate link solutions, and laboratory implementation. The results of experiments carried out in laboratory are given, including behavior under radiated electromagnetic disturbances, comparison of detection device efficiencies, transmission of CCD video signals, and high rate digital transmission by optical slip ring. The laboratory experiments show compatibility of achieved performances with future needs. ESA

N86-31787# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
VULNERABILITY OF LOW REDUNDANCY IMAGE DATA AND TEXT TRANSMISSION OVER SATELLITE COMMUNICATION LINKS Final Report
H. J. Simons Paris ESA 10 Jul. 1985 76 p
(Contract ESTEC-6235/85-NL-JS)
(NLR-TR-85100-L; ESA-CR(P)-2185; ESA-86-97785) Avail: NTIS HC A05/MF A01

The effect of transmission errors on satellite communication links on uncompressed and compressed Earth observation image data and on compressed facsimile data are described. The error statistics on the ECS/SMS channel are studied. Because of the high level data link control transmission protocol, several types of errors are introduced. The effects of these errors on user data are evaluated qualitatively and quantitatively. ESA

N86-31788# Fondazione Ugo Bordoni, Rome (Italy).
LONGTERM SPEECH SPECTRA OF NONSTATIONARY AUTOREGRESSIVE MODELS
Giuseppe Martinelli, Gianni Orlandi, and Lucio PrinaRicotti Jun. 1985 7 p
(FUB-8-1985; ESA-86-97884) Avail: NTIS HC A02/MF A01

Long term time-frequency spectra of words were obtained using autoregressive methods to characterize complete words without segmentation. The resulting spectra and the time dependent coefficients of the AR filter are compared with the short term stationary case. Examples show a better accuracy given by discussed method, in spite of the reduced number of parameters involved in the proposed representation. ESA

N86-31789# Fondazione Ugo Bordoni, Rome (Italy).
PHYSICAL SIGNIFICANCE OF LEAST MEAN SQUARES CRITERION IN NONSTATIONARY LATTICE PREDICTORS
Giuseppe Martinelli, Gianni Orlandi, Lucio PrinaRicotti, and Susanna Ragazzini Jun. 1985 10 p
(FUB-9-1985; ESA-86-97885) Avail: NTIS HC A02/MF A01

An acoustical nonstationary model of the vocal tract is discussed. The effectiveness of the nonstationary lattice predictor in recovering the model is illustrated. The reflection coefficients are linearly decomposed on a function basis and the weights of the linear combinations are the new parameters of the model. Parameters are determined by an algorithm similar to Burg's by minimizing the sum of the variances of the forward and backward residuals. Synthetic signals of good approximation are obtained in two examples. ESA

N86-31790# Fondazione Ugo Bordoni, Rome (Italy).
INTERCONNECTION BETWEEN PACKET SWITCHING NATIONAL NETWORKS AND LOCAL PACKET RADIO COMMUNICATION NETWORKS [INTERFUNZIONAMENTO RETE NAZIONALE A COMMUTAZIONE DI PACCHETTO E RETI DI RADIOCOMUNICAZIONE A PACCHETTO]
Paolo Talone and Sebastiano Trigila Jul. 1985 17 p In ITALIAN
Presented at 33rd Congresso Internazionale delle Comunicazioni, Genoa, Italy, Oct. 1985
(FUB-24-1985; ESA-86-97887) Avail: NTIS HC A02/MF A01

Multipoint topology networks based on a single statistically distributed radiocommunication channel are considered, referring only to restricted area networks with line of sight type links. The architecture and protocols of such networks are reviewed. The problems related to the interconnection of such networks with large public packet switching communication networks are examined. Several hypothesis are studied concluding that mainly in the case of emergencies or catastrophic events these networks are an extremely useful resource. ESA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N86-31791 Portsmouth Polytechnic (England). Dept. of Electrical and Electronic Engineering.
THE EFFECT OF PIGTAILING BRAIDED SCREENS ON THE TRANSFER IMPEDANCE OF SINGLE-ENDED AND BALANCED INTERFACE CIRCUITS
J. W. E. Jones, C. J. Lines, and J. S. Jahns Jan. 1985 17 p
(EMCR-5/85; BR97103; ESA-86-97259) Avail: Issuing Activity

The effects of short pigtails on the transfer impedance of 1 m lengths of screened cables were measured. Comparisons with a simple theory of the effect of pigtails show reasonable agreement. Measurements on twin cables are included. Results show that pigtails reduce shielding effectiveness at higher frequencies. The frequency at which this deterioration sets in is a function of cable length, cable transfer impedance, and pigtail length and spacing. ESA

N86-31792*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A SENSOR FAILURE SIMULATOR FOR CONTROL SYSTEM RELIABILITY STUDIES
Kevin J. Melcher, John C. Delaat, Walter C. Merrill, Lawrence G.

Oberle, Gerald G. Sadler, and Joseph H. Schaefer 1986 43 p (NASA-TM-87271; E-3137; NAS 1.15:87271) Avail: NTIS HC A03/MF A01 CSCL 09A

A real-time Sensor Failure Simulator (SFS) was designed and assembled for the Advanced Detection, Isolation, and Accommodation (ADIA) program. Various designs were considered. The design chosen features an IBM-PC/XT. The PC is used to drive analog circuitry for simulating sensor failures in real-time. A user defined scenario describes the failure simulation for each of the five incoming sensor signals. Capabilities exist for editing, saving, and retrieving the failure scenarios. The SFS has been tested closed-loop with the Controls Interface and Monitoring (CIM) unit, the ADiA control, and a real-time F100 hybrid simulation. From a productivity viewpoint, the menu driven user interface has proven to be efficient and easy to use. From a real-time viewpoint, the software controlling the simulation loop executes at greater than 100 cycles/sec. Author

N86-31793*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPACE SOLAR CELL RESEARCH: PROBLEMS AND POTENTIAL
Dennis J. Flood 1986 13 p Presented at the Conference on Photovoltaics for Commercial Solar Power, Cambridge, Mass., 15-19 Sep. 1986; sponsored by the Society of Photo-Optical Instrumentation Engineers
(NASA-TM-88833; E-3212; NAS 1.15:88833) Avail: NTIS HC A02/MF A01 CSCL 10A

The value of a passive, maintenance-free, renewable energy source was apparent in the early days of the space program, and the silicon solar cell was pressed into service. Efficiencies of those early space solar arrays were low, and lifetimes shorter than hoped for, but within a decade significant advances had been made in both areas. Better performance was achieved through improvements in silicon single crystal material, better device designs, and a better understanding of the factors that affect the performance of a solar cell in space. Chief among the latter, particularly for the mid-to-high altitude (HEO) and geosynchronous (GEO) orbits, are the effects of the naturally occurring particulate radiation environment. Although not as broadly important to the photovoltaic community at large as increased efficiency, the topic of radiation damage is critically important to use of solar cells in space, and is a major component of the NASA research program in space photovoltaics. A brief overview of some of the opportunities and challenges for space photovoltaic applications is given, and some of the current research directed at achieving high efficiency and controlling radiation damage in space solar cells is discussed. Author

N86-31794# Department of the Army, Washington, D. C.
SELECTIVELY ETCHING MICROSTRUCTURES IN A GLOW DISCHARGE PLASMA Patent Application
Edward J. Staples, inventor (to Army) Filed 17 Mar. 1986 12 p (AD-D012206; US-Patent-Appl-SN-845671) Avail: NTIS HC A02/MF A01 CSCL 13/8

Selective etching of microelectronic devices comprising crystal substrates is achieved by electrically masking conductive areas thereon which are not to be etched by ionic bombardment. The electrical masking is accomplished by biasing the selected areas with a bias voltage which will repel the ions, which are attracted to all of the unbiased portions of the microelectronic device. GRA

N86-31795# Department of the Navy, Washington, D. C.
APPARATUS AND METHOD FOR ALIGNING A MASK AND WAFER IN THE FABRICATION OF INTEGRATED CIRCUITS Patent
John F. Bass, Nelson Saks, and Martin Peckerar, inventors (to Navy) Issued 4 Feb. 1986 8 p Supersedes AD-D010595
(AD-D012208; US-Patent-Appl-SN-536125;
US-Patent-Class-356-401) Avail: US Patent and Trademark Office CSCL 20/12

An apparatus and method for aligning a mask and wafer in the fabrication of integrated circuits utilizing alignment patterns on the mask and wafer is discussed. Each alignment pattern comprises a plurality of parallel alignment marks which are spaced from one another such that the patterns may be superimposed so that the marks of one pattern are positioned between marks of the other pattern. When the patterns are misaligned, a moire pattern is produced which disappears on alignment. The marks of each pattern are also disparately spaced from one another, permitting a gross to fine alignment. In aligning the patterns, each mark of one pattern is positioned between pairs of marks of the other pattern in an order corresponding to the widths of spaces defined between marks of the other pattern, progressing from the largest space width, giving gross alignment, to the smallest, giving fine alignment. Author (GRA)

N86-31796# Department of the Air Force, Washington, D.C.
HIGH POWER HIGH VOLTAGE LINEAR AMPLIFIER APPARATUS Patent
Walter E. Milberger, inventor (to Air Force) Issued 11 Feb. 1986 7 p Supersedes AD-D011028
(AD-D012244; US-Patent-4,570,129; US-Patent-Appl-SN-586955;
US-Patent-Class-330-277) Avail: US Patent and Trademark Office CSCL 09/5

A high power, high voltage linear field effect transistor amplifier apparatus utilizing an automatic gate biasing network to normalize the gate threshold voltages of a plurality of field effect transistors which are in either series of parallel is discussed. Thus, these series or parallel combinations of field effect transistors may be operated as linear devices. A high-voltage, high power, wide-band carrier controlled linear amplifier is provided by utilizing an oscillator as a driver. Author (GRA)

N86-31797# Department of the Air Force, Washington, D.C.
MULTILAYER CERAMIC CAPACITOR ON PRINTED CIRCUIT Patent
Robert D. Larowe, inventor (to Air Force) Issued 4 Feb. 1986 6 p Supersedes AD-D011166
(AD-D012246; US-Patent-4,568,999; US-Patent-Appl-SN-617666;
US-Patent-Class-361-306) Avail: US Patent and Trademark Office CSCL 09/1

The multilayer capacitor has the plates arranged vertically, which allows planar attachment with conductive epoxy to a substrate such as a thick film conductor on alumina. The top termination may use wire bonding. The capacitor has the same form factor and size as prior capacitors of the same electrical ratings. Author (GRA)

N86-31798# Aerospace Corp., El Segundo, Calif. Materials Sciences Lab.
FOURIER TRANSFORM INFRARED SPECTROSCOPIC STUDY OF AGING IN COMMERCIAL POLYURETHANE
Robert S. Bretzlaff, Sherrie L. Zacharius, Stephen L. Sandlin, and Gail A. Cagle 28 Apr. 1986 22 p
(Contract F04701-85-C-0086)
(AD-A167418; TR-0086(6925-08)-3; SD-TR-86-22) Avail: NTIS HC A02/MF A01 CSCL 09/1

Satellite electronics systems may function for years before failing as a result of a shorted-out component. If the insulation is considered to be perfectly inert, then such failures would be inexplicable in terms of events intrinsic to the material. However, many physical and chemical changes may occur in the dielectric prior to breakdown. Hence, a polymer dielectric is not inert and may be more accurately thought of as a seething molecular and electronic cauldron, which gradually drifts in the direction of diminished resistance to applied electrical stress. After a time, which appears indefinite only because we have not adequately characterized the system, the constant electrical stress shorts out the degraded insulation. A correlation between decreases in infrared absorbance, molecular motion, electronic energy transfer, and increasing susceptibility to electric stress is supported by the data presented here. It is suggested that the development of new, voltage-stabilized materials can be greatly facilitated by using Fourier transform infrared spectroscopy (FTIR) as a diagnostic tool, and thermal aging as an accelerated aging test. GRA

N86-31799# Maryland Univ., College Park. Lab. for Plasma and Fusion Energy Studies.
DESIGN AND COLD TESTING OF A HIGH PEAK POWER X-BAND GYROKLYSTRON
W. Lawson, J. Calame, V. L. Granatstein, P. E. Latham, J. McAdoo, G. S. Park, C. D. Striffler, F. J. Williams, K. R. Chu, and J. L. Seftor 1985 3 p Presented at the International Conference on Infrared and Millimeter Waves, Lake Buena Vista, Fla., 8 Dec. 1985 Prepared in cooperation with Science Applications International Corp., McLean, Va.
(Contract DE-AC05-85ER-40216)
(DE86-006898; CONF-851238-5) Avail: NTIS HC A02/MF A01

The main goal of the University of Maryland's gyroklystron project is to develop an efficient, high power, high gain, phase controllable amplifier at 10 GHz. While peak powers of several hundred megawatts are ultimately of interest, our initial experimental design values include 30 MW of output power in 1 microsec pulses with a gain in excess of 50 dB. The 30 MW power level represents an enhancement of almost three orders of magnitude over the current state-of-the-art in gyroklystron amplifiers. This enhancement will be achieved by going to high beam energies (gamma approx. =2) and overmoded cavities (TE sup o sub 01). Outlined in this report are the steps being taken to realize this goal. DOE

N86-31800# Sandia National Labs., Albuquerque, N. Mex.
ACCESSIBILITY OF APPLICATIONS SPECIFIC INTEGRATED CIRCUITS
D. R. Strip Mar. 1986 16 p
(Contract DE-AC04-76DP-00789)
(DE86-009561; SAND-86-0514) Avail: NTIS HC A02/MF A01

Applications specific integrated circuits (ASICs) open new design opportunities in Sandia component applications. ASICs can be used to overcome many of the constraints that reduce system functionality in Sandia systems. Key constraints in our environment are power consumption, volume, weight, speed, and radiation-hardness. In addition, use of ASICs may reduce the costs of system design, acquisition, and life-cycle maintenance. Design tools for integrated circuits are rapidly simplifying the design of integrated circuits. Just as high level computer languages enabled applications-oriented computer users to take control of their own code development after assembly coding had limited the practicality of user design, in ICC design tools and approaches are enabling the applications-oriented user to design an ASIC with modest training and in a short time period. In order to demonstrate the state of the design systems, we have selected a representative application and, without any formal training or experience in IC design, have designed and fabricated an ASIC. This report details the steps that were followed and the time they took. It is important to emphasize that this project was the first chip designed start-to-finish on the Mentor design stations in Organization 2110; therefore most of the problems encountered were typical of a first pass through a new system. Most of the problems were quickly wrung out by the CAD tools staff; future users of the system should not expect to have the problems recur. DOE

N86-31801# Allied Bendix Corp., Kansas City, Mo.
EVALUATION OF HIGH TEMPERATURE ACCELERATED AGING TESTS USED ON INTEGRATED CIRCUITS Final Report
J. P. Gracey Apr. 1986 35 p
(Contract DE-AC04-76DP-00613)
(DE86-009615; BDX-613-3419) Avail: NTIS HC A03/MF A01

Accelerated aging tests such as high temperature burn-in, which are in current use on Bendix Kansas City Division's (BKC) purchased small and medium scale integrated circuits, were evaluated to determine if they are effective and necessary to ensure the required reliability. A theoretical analysis, a literature search, and a study of lot acceptance results were used to assess the value of integrated circuit burn-in. DOE

N86-31802# Oak Ridge National Lab., Tenn.
LIGHT EMISSION FROM METAL-INSULATOR-METAL STRUCTURES BIASED NEAR BREAKDOWN VOLTAGES
M. J. Bloemer, J. P. Goudonnet, D. R. James, R. J. Warmack, T. L. Ferrell, E. T. Arakawa, and T. A. Callcott 1986 4 p Presented at the International Symposium on Electrical Insulation, Washington, D.C., 8 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008505; CONF-860693-1) Avail: NTIS HC A02/MF A01

Optical emission is observed at prebreakdown voltages in thin film metal-insulator-metal (MIM) structures. Subsequent examination of the junction in a scanning electron microscope (SEM) reveals filamentary growth through the insulator. These tunnel junctions consist of Al-Al2O3-Ag or Al-Al2O3-Au with a variety of microstructures incorporated in the junction. The emission spectrum is found to be dependent on the geometry of the MIM structure. Comparison of theory and experiment suggests the emission results from the radiative decay of collective electronic excitations (surface plasmons) initiated by electrons tunneling through the insulator. DOE

N86-31803# California Univ., Berkeley. Lawrence Berkeley Lab.
SOLID ELECTROLYTE FOR HIGH ENERGY DENSITY BATTERIES
L. C. DeJonghe Dec. 1985 13 p Presented at the Japan Ceramic Society Meeting, Sendai, Japan, 24 Jan. 1986
(Contract DE-AC03-76SF-00098)
(DE86-009358; LBL-20816; CONF-860172-1) Avail: NTIS HC A02/MF A01

High energy density batteries, consisting of sodium/sodium polysulfide electrochemical couples, separated by the ion conducting ceramic electrolyte sodium beta- alumina, are now at the stage where commercialization is realistic. The detailed study of the various degradation processes occurring in the solid electrolytes have been shown to be avoidable by microstructural control of the electrolytes, limiting the grain size to below 50 micron everywhere by controlling the contamination levels of the system during operation, and by proper cell design that avoids current heterogeneity. DOE

N86-31804# Missouri Univ., Rolla.
CHARACTERIZATION OF THE REDOX BEHAVIOR AND STABILITY OF CONDUCTING OXIDES
H. U. Anderson, S. A. Howard, and D. M. Sparlin Jan. 1986 164 p
(Contract DE-FG02-85ER-45219)
(DE86-009871; DOE/ER-45219/T1) Avail: NTIS HC A08/MF A01

The goal of this study was to examine the relation between electrical conductivity, oxidation-reduction kinetics, defect structure, and composition of n- and p-type binary and ternary transition metal oxides. The experimental part included, thermogravimetry, X-ray diffraction, thermally stimulated current, oxygen diffusion, optical absorption, transmission electron microscopy, electrical conductivity, and Seebeck measurements. The oxide systems studied were La-doped SrTiO3, Mg-doped LaCrO3, Mg-doped LaMnO3, Sr-doped LaMnO3, and Nb-doped LaCrO3. Results show that at low oxygen activity donor doped LaCrO3 is n-type but becomes p-type as oxidation occurs; substitution of 50% Mn into LaCrO3 enables the compound to be sintered to high density in air at 1500 C; LaMnO3 tends to decompose as reduction occurs with Mg-doped LaMnO3 being more stable than Sr-doped LaMnO3; LaMnO3 decreases its conductivity at oxygen activities 10 to the third power to 10 to the fifth power times higher than for LaCrO3; and upon reduction Mg and Sr-doped LaCrO3 expands about 0.04% and 0.4% respectively. DOE

N86-31805# Northwestern Univ., Evanston, Ill.
INTERFACIAL ELECTROCHEMICAL TRANSPORT IN BATTERIES EMPLOYING SOLID ELECTROLYTES Annual Report
M. A. Ratner and D. F. Shriver 1986 14 p
(Contract DE-FG02-85ER-45220)
(DE86-010107; DOE/ER-45220/T1) Avail: NTIS HC A02/MF A01

This research project involves a multi-disciplinary investigation of ionic transport along and through interfaces, both within a solid electrolyte and at the electrode/electrolyte contact. The aim is to

gain mechanistic understanding of the processes which produce over-potentials and limit mobility at these interfaces, and thereby to suggest design steps for improved-performance of solid-state batteries. DOE

N86-31806# Technische Univ., Aachen (West Germany). Inst. fuer Theoretische Elektrotechnik.
ELECTRON-BEAM PROGRAMMABLE CONFIGURATION CIRCUITS Final Report, Sep. 1984
Reinhard Brock and Ulrich Theus Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 55 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-163; ISSN-0340-7606; ESA-86-97442) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11.50

The feasibility of direct-write electron beam lithographic systems for wafer scale integration was investigated. Electron-beam induced conductivity of silicon dioxide can be used to charge polysilicon floating gates in integrated circuits; a high programming voltage on the chip is not required. The information stored as a charge is nonvolatile and can be used to activate spare modules during a configuration process of a wafer scale system. Direct-write electron beam exposure systems are most suited for this programming. Electron-beam programmable cells were designed using a standard polygate CMOS-process. ESA

N86-31807# Institut National Polytechnique, Grenoble (France).
THE FUNCTIONAL TEST OF COMPLEX INTEGRATED CIRCUITS Ph.D. Thesis [LE TEST FONCTIONNEL DE CIRCUITS INTEGRES COMPLEXES]
Catherine Bellon 1984 293 p In FRENCH
(ESA-86-97289) Avail: NTIS HC A13/MF A01

A multilevel automatic generation of test sequences is proposed. The procedure starts by considering the set of functional parameters and the fine structure of the electronic modules composing the circuit. The method may be considered related to automatic software testing or automata identification methods. A functional microprocessor test procedure is described. The method takes into account the synchronous input signals and allows the automatic generation of test programs. A specific high level computer language was developed for that purpose and is described. The 68000 microprocessor was described in that language and its test programs generated. The elements implementing the system are detailed. ESA

N86-31808# Institut National Polytechnique, Grenoble (France).
SPECIFICATION AND FUNCTIONAL SIMULATION OF COMPLEX CIRCUITS: THE CADOC SYSTEM Ph.D. Thesis [SPECIFICATION ET SIMULATION FONCTIONNELLES DE CIRCUITS COMPLEXES: LE SYSTEME CADOC]
Michel CrastesdePaulet 1985 324 p In FRENCH
(ESA-86-97296) Avail: NTIS HC A14/MF A01

The CADOC language, a multilevel functional language able to manage the specification, tests, descriptions or simulation of VLSI integrated circuits is described. It is used in a computer aided design system. The application to the functional description of MOS technology devices is detailed. ESA

N86-31809# Institut National Polytechnique, Grenoble (France).
PROCESSING AND CORRECTION OF VLSI CIRCUIT IMAGES OBTAINED WITH A SCANNING ELECTRONIC MICROSCOPE Ph.D. Thesis [CORRECTION AND TRAITEMENT D'IMAGES DES CIRCUITS VLSI ISSUES D'UN MICROSCOPE ELECTRONIQUE A BALAYAGE]
Alireza Zolghadrasli 1985 120 p In FRENCH
(ESA-86-97297) Avail: NTIS HC A06/MF A01

A computer system for visualizing the evolution of the internal potentials of working integrated circuits, and the details of the image processing to obtain useful images are presented. The program developed for a digital Minc microcomputer is given. It is shown that this technique is especially adapted to development work for VLSI prototypes. ESA

N86-31810# Institut National Polytechnique, Grenoble (France).
FUNCTIONAL TESTS OF DIGITAL INTEGRATED CIRCUITS Ph.D. Thesis [TEST FONCTIONNEL DES CIRCUITS INTEGRES DIGITAUX]
Eric Archambeau 1985 249 p In FRENCH
(ESA-86-97301) Avail: NTIS HC A11/MF A01

Methods to generate test vectors for large scale integration circuits are presented. The rules of testable circuit design are discussed. Heuristic rules are introduced to apply the general testability theory to generate test vectors. Following the definition of pseudo-exhaustive tests, the difficulties of the optimal partition problem are evaluated and an efficient partition method is proposed. The potential increase in test rapidity and efficiency is discussed. ESA

N86-31811# Technische Hogeschool, Delft (Netherlands). Lab. voor Informatietheorie.
LINEAR FILTER THEORY Annual Report, 1984-1985 [LINEAIRE FILTERTHEORIE]
J. Biemond 1985 65 p In DUTCH
(ESA-86-97391) Avail: NTIS HC A04/MF A01

The linear least squares estimating theory for statistical signal processing is discussed. Concepts of system theory necessary for filter derivations, e.g., impulse response, convolution integrals, state equations, and spectral factorization are considered. Signal estimating with Wiener and Kalman filters and an optimal filter variant, i.e., adaptive noise cancelling is described. ESA

N86-31812# Conradty (C.) G.m.b.H. und Co. K.G., Nuernberg (West Germany).
DIMENSIONALLY STABLE ELECTRODES FOR USED SALT ELECTROLYSIS (SUBSTITUTE FOR PETROLEUM COKE) Final Report, Dec. 1984
Christine Zoellner and Klaus Kahl Bonn, West Germany BMFT Dec. 1985 106 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-T-85-186; ISSN-0340-7608; ESA-86-97450) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22.50

An electrode system for anodes in aluminum fused salt electrolysis was developed and tested as regards electrochemical efficiency, corrosion resistance, possible design of large-scale anodes, and production costs. The anode, a water-cooled combination electrode, consists of a metal upper section incorporating a cooling system and serving as a current carrier and distributor, with refractory graphite protective elements, and a ceramic active lower section. The electrode system allows savings of raw materials of 0.655 ton of fuel per ton of aluminum produced. Operation of the aluminum electrolysis with inert anodes improves working conditions and environmental quality. The interpolation distance can be reduced with inert cathodes. ESA

N86-31813# AEG-Telefunken, Backnang (West Germany). Weitverkehr und Kabeltechnik Fachbereich Raumfahrt.
HIGH VOLTAGE TECHNOLOGY FOR A TRAVELING WAVE TUBE ELECTRONIC POWER CONDITIONER (TWT-EPC) FOR A SYNTHETIC APERTURE RADAR (SAR) Final Report, Dec. 1981
Klaus-Heinrich Geissler, Rolf Bernhard, and Reinhard Seeliger Bonn, West Germany BMFT Dec. 1985 129 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-015; ISSN-0170-1339; ESA-86-97459) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

A satellite-borne synthetic aperture radar system with an output power of 5 to 20 kW was studied to determine electronic power conditioning (EPC) requirements. The EPC technology is described. The selection of the insulating materials, the test procedures, and switching principles for an emitting amplifier tube are reviewed. The electrical and mechanical load limits and the thermal criteria relative to the aperture width and voltage are presented. The insulating systems and partial discharge in ac and dc were tested, and acceleration tests performed. A power section comprising an

inverter, a high voltage transformer and rectifier and a capacitor bank was built and tested in thermal vacuum under various operating conditions. It confirms the reliability of the high voltage technology and its applicability in the design of flight hardware. ESA

N86-31814# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep der Directe Energieomzetting.
A NEW MODEL FOR THE RELATION BETWEEN CONDUCTIVITY AND CURRENT IN AN MHD GENERATOR [EEN NIEUW MODEL VOOR HET VERBAND TUSSEN HET GELEIDINGSVERMOGEN EN DE STROOM IN EEN MHD GENERATOR]
J. C. W. Sars Nov. 1984 117 p In DUTCH
(EG/84/373; ESA-86-97527) Avail: NTIS HC A06/MF A01

A model for the calculation of the induced current in an MHD generator was derived. Starting from voltage probe measurements, relations between conductivity and current, and voltage drop and current were derived and inserted in the Kirchhof law. For certain values of velocity, the magnetic field, and the load resistance, the impossibility of a certain segment to conduct current despite an induced voltage greater than 0 is predicted. The whole voltage falls over the internal resistance. The whole generator channel in X-direction was calculated with a correction for the Hall Short Circuit (HSC), measured and calculated values agree well. The HSC also explains the current reduction in the second half of the generator. ESA

N86-31815# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
A 2 MBIT/SEC MODEM AT 70 MHz BASED ON THE TAMED FREQUENCY MODULATION (TFM) PRINCIPLE [EEN 2 MBIT/S MODEM OP 70 MHLCZ VOLGENS HET TAMED FREQUENCY MODULATION PRINCIPLE]
M. J. Verhaegh May 1984 102 p In DUTCH
(ESA-86-97537) Avail: NTIS HC A06/MF A01

A tamed frequency modulation (TFM) digital phase modulation method modem was designed and realized for satellite communication experiments. The method offers possibilities for bandwidth and power efficiency, and the use of nonlinear amplifiers, which makes it apt for satellite and mobile radio communication. Normal and coherent quadrature modulators are described. The carrier wave regain, necessary for coherent detection, is achieved with a heterodyne phase locked loop. Measured bit error rate as a function of the signal to noise ratio is given. ESA

N86-31816# European Space Agency, Paris (France).
EXPERIMENTAL AND THEORETICAL RESEARCH ON OPEN RESONATORS
Erich Kemptner Nov. 1985 134 p Original language document was announced as N85-31414
(ESA-TT-931; DFVLR-FB-85-12; ESA-86-97574) Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 35.50

The scalar integral equations for open resonators are derived. The complex eigenvalue determines power loss and phase shift per transit. The eigenfunction represents the field distribution on a reflector. This distribution is used to calculate the field inside the resonant volume. An experimental setup to measure the resonant frequencies and the quality factors was designed. The field was scanned with small spheres. The quality, the resonant frequency and the amplitude of the signal were recorded simultaneously. Data agree with the theoretical ones. ESA

N86-31817# European Space Agency, Paris (France).
DIRECT-COUPLED CAVITY FILTERS WITH IRISES OF ARBITRARY THICKNESS
Manfred Weisser and Karl Hans Waegel Oct. 1985 69 p Original language document was announced as N86-10412
(ESA-TT-939; DFVLR-FB-85-14; ESA-86-97576) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne, West Germany DM 21

The transmission characteristics of symmetrical waveguide filters were investigated. The thickness of the irises is taken into account. The calculations are based on an exact mode matching method. In the frequency range of the X-band one, two, three, four, and six-cavity filters are analyzed and parameters such as aperture, thickness of irises, and cavity length are changed. The results of the measurements are in good agreement with the computed transmission characteristics. ESA

N86-31818# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Automatisch Systeem Ontwerpen (ES).
FLOOR PLANNING AND NET ASSIGNMENT IN LAYOUT COMPILATION
Lukas vanGinneken 18 Mar. 1985 35 p
(ESA-86-97530) Avail: NTIS HC A03/MF A01

The layout design of a silicon compiler is reviewed. The environment in terms of input, output and data bases is discussed. A complete design process is outlined and interpretated as an application of the principles of stepwise refinement to the design of complex integrated circuits. The rationale behind the chosen system decomposition, accepted restraints, and methods for cell assembling is emphasized. An annealing algorithm is summarized. The use of the algorithm for floor plan design, used state spaces and moves, and the way the score function is computed are described. An automatic control schedule is described. A method for the global wiring of custom layout of ICs is given. ESA

N86-31819# Institut Franco-Allemand de Recherches, St. Louis (France).
MULTIPLE PSEUDOSPARK SWITCH (MUPS) [MULTI-PSEUDOFUNKENSCHALTER (MUPS)]
G. Mechtersheimer and R. Kohler 28 Jun. 1986 14 p In GERMAN
(ISL-R-110/85; ESA-86-97624) Avail: NTIS HC A02/MF A01

A multiple pseudospark commutator was developed. Several pseudospark gaps in parallel can be synchronously ignited via triggering by a pulsed gaseous discharge with low intensity. A multiple pseudospark commutator consisting of 10 linearly disposed pseudospark gaps was integrated in a capacitor with low-inductance plates. The capacitance to be switched was 5 nF; the inductance of the circuit was 1.65 nH, the contribution of the MUPS was less than 0.5 nH. The repartition of the current among the 10 discharge channels allows a current increase rate of 2.4 times 10 to the 12th power A/s at a switched voltage of 15 kV. This is a significant improvement compared to the value of 5 times 10 to the 11th power A/s obtained with a single pseudospark gap. The current capacity of the switch increases with the number of pseudospark gaps ignited in parallel. ESA

N86-31820# Technische Hogeschool, Delft (Netherlands). Laboratory for Pulse and Digital Electronics.
AN NMOS EVALUATION CIRCUIT
J. H. A. deRijk Jun. 1985 88 p
(Rept-IR-01; ESA-86-98040) Avail: NTIS HC A05/MF A01

An electrical evaluation circuit was designed for the 700 Angstrom LOCOS N-MOS E-D process. The smallest structure in the circuit was 6 micron. Two runs were made, the first having the code IC370, and the second IC372. A 4 micron (IC377) type was developed. The IC370 and the IC372 are 3.3 asterisk 3.3 um circumflex 2. The IC377 is 2.2 asterisk 2.2 um circumflex 2. The circuit extracts electrical and process-parameters. Both types of parameters can be used for circuit simulation, while the extracted process-parameters can be used to evaluate the process. ESA

N86-31821# Kema N.V., Arnhem (Netherlands). Dept. of Physical Research.
A CONSERVATIVE RATING PROCEDURE FOR CYCLICALLY LOADED, BURIED CABLES
G. Koopmans and A. J. vanLoon, ed. 1985 10 p
(S/T-Rept-Vol-3-No-9; ISBN-90-353-0032-7; ISSN-0167-8590; B8665325; ESA-86-98063) Avail: NTIS HC A02/MF A01

A conservative and simple current-rating algorithm for buried power cables subjected to a cyclically varying load is presented. The algorithm is based on the assumption that the moisture distribution in the soil is stationary during load variations and that

it is determined by the spatial distribution of the maximum heat flux. This assumption is reasonable in view of the hysteretic nature of moisture retention by soils. Only one Fourier component of the heat-loss variation is considered in the algorithm. Applications where adapted equations of Philip and De Vries are used to describe heat and moisture transfer are shown. The critical temperatures found for drying-out of the soil hardly differ for stationary and cyclic loads. The maximum allowed average load decreases with increasing load variation. At maximum load, the maximum current occurring during a cycle is higher than the maximum stationary load allowed. ESA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-31822 Societe Nationale Industrielle Aerospatiale, Cannes (France).
VAPOR CONTROLLED HEAT PIPE (VCHP) TELECOMMUNICATIONS PANEL. PERFORMANCES EVOLUTION AFTER FOUR YEARS OF LIFE TESTING
B. Moschetti 1986 7 p
(SNIAS-861-440-106; ESA-86-97614) Avail: NTIS HC A02

Endurance tests were carried out to verify the long term performance of a spacecraft heat pipe based thermal control prototype unit. Thermal regulation was measured periodically under space vacuum conditions. Passive and active feedback loops were verified. The prototype and the test procedures are described. After 7 years of testing no degradation or performance losses are found. ESA

N86-31823*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL SIMULATION OF BOUNDARY LAYERS. PART 2: RIBBON-INDUCED TRANSITION IN BLASIUS FLOW
Philippe Spalart and Kyung-Soo Yang (Stanford Univ., Calif.) Feb. 1986 27 p
(NASA-TM-88221; A-86072; NAS 1.15:88221) Avail: NTIS HC A03/MF A01 CSCL 20D

The early three-dimensional stages of transition in Blasius boundary layers are studied by numerical solution of the Navier-Stokes equations. A finite-amplitude two-dimensional wave and random low-amplitude three-dimensional disturbances are introduced. Rapid amplification of the three-dimensional components is observed and leads to transition. For intermediate amplitudes of the two-dimensional wave the breakdown is of subharmonic type, and the dominant spanwise wave number increases with the amplitude. For high amplitudes the energy of the fundamental mode is comparable to the energy of the subharmonic mode, but never dominates it; the breakdown is of mixed type. Visualizations, energy histories, and spectra are presented. The sensitivity of the results to various physical and numerical parameters is studied. Agreement with experimental and theoretical results is discussed. Author

N86-31824*# Stanford Univ., Calif.
A 3-COMPONENT LASER-DOPPLER VELOCIMETER DATA ACQUISITION AND REDUCTION SYSTEM
L. C. Rodman, J. H. Bell, and R. D. Mehta Jan. 1986 82 p
(Contract NCC2-294)
(NASA-CR-177390; NAS 1.26:177390) Avail: NTIS HC A05/MF A01 CSCL 20D

This report describes a laser Doppler velocimeter capable of measuring all three components of velocity simultaneously in low-speed flows. All the mean velocities, Reynolds stresses, and higher-order products can then be evaluated. The approach followed is to split one of the colors used in a 2-D system, thus creating a third set of beams which is then focused in the flow from an off-axis direction. The third velocity component is computed from the known geometry of the system. In this report, the laser optical hardware and the data acquisition electronics are described in detail. In addition, full operating procedures and listings of the software (written in BASIC and assembly languages) are also included. Some typical measurements obtained with this system in a vortex/mixing layer interaction are presented and compared directly to those obtained with a cross-wire system. Author

N86-31825*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CALCULATIONS OF THE STABILITY OF SOME AXISYMMETRIC FLOWS PROPOSED AS A MODEL OF VORTEX BREAKDOWN Final Report
Nessan Mac Giolla Mhuiris May 1986 37 p Submitted for publication
(NASA-CR-178124; NAS 1.26:178124; ICASE-86-34) Avail: NTIS HC A03/MF A01 CSCL 20D

The term vortex breakdown refers to the abrupt and drastic changes of structure that can sometimes occur in swirling flows. It was conjectured that the bubble type of breakdown can be viewed as an axisymmetric wave traveling upstream in a primarily columnar vortex flow. In this scenario the wave's upstream progress is impeded only when it reaches a critical amplitude and it loses stability to some nonaxisymmetric disturbance. The stability of some axisymmetric wavy flows to three dimensional disturbances, viewing the amplitude of the wave as a bifurcation parameter is examined. The stability of a set of related columnar vortex flows, constructed by taking the two dimensional flow at a single axial location and extending it throughout the domain without variation, is investigated. The method used will be to expand the perturbation velocity in a series of divergence free vectors which ensures that the continuity equation for the incompressible fluid is satisfied exactly by the computed velocity field. Projections of the stability equation onto the space of inviscid vector fields eliminated the pressure term from the equation and reduces the differential eigen problem to a generalized matrix eigen problem. Results are presented both for the one dimensional, columnar vortex flows and also for the wavy bubble flow. Author

N86-31826*# Michigan Univ., Ann Arbor. Heat Transfer Lab.
MODELING OF ZERO GRAVITY VENTING: STUDIES OF TWO-PHASE HEAT TRANSFER UNDER REDUCED GRAVITY Final Report
Herman Merte, Jr. Aug. 1986 66 p
(Grant NAG3-403)
(NASA-CR-179662; NAS 1.26:179662) Avail: NTIS HC A04/MF A01 CSCL 20D

The objective is to predict the pressure response of a saturated liquid-vapor system when undergoing a venting or depressurization process in zero gravity at low vent rates. An experimental investigation of the venting of cylindrical containers partially filled with initially saturated liquids was previously conducted under zero-gravity conditions and compared with an analytical model which incorporated the effect of interfacial mass transfer on the ullage pressure response during venting. A new model is presented to improve the estimation of the interfacial mass transfer. Duhammel's superposition integral is incorporated to approximate the transient temperature response of the interface, treating the liquid as a semi-infinite solid with conduction heat transfer. Account is also taken of the condensation taking place within the bulk of a saturated vapor as isentropic expansion takes place. Computational results are presented for the venting of R-11 from a given vessel and initial state for five different venting rates over a period of three seconds, and compared to prior NASA experiments. An improvement in the prediction of the final pressure takes place, but is still considerably below the measurements. Author

N86-31827*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
HIGH SPEED VISCOUS FLOW CALCULATIONS ABOUT COMPLEX CONFIGURATIONS

Denny S. Chaussee Apr. 1986 21 p
(NASA-TM-88237; A-86199; NAS 1.15:88237) Avail: NTIS HC A02/MF A01 CSCL 20D

Applications of the NASA Ames Parabolized Navier-Stokes (PNS) code to a variety of complex generic configurations is presented. The algorithm, boundary conditions, initial conditions, and grid generators are discussed as applied to these configurations. The PNS code was used as the mainline procedure to numerically simulate the viscous supersonic flow over these generic configurations. The turbulence model that was used in this study is the Baldwin-Lomax model. The boundary conditions are the usual viscous no slip at the wall, and a characteristic procedure is used to fit the bow shock wave which is the outermost boundary. An elliptic grid generator is employed to discretize the flow domain. In addition, an equilibrium air capability has been incorporated into the code. It uses the curve fits of Tannehill, et al. The flow regimes vary from a Mach number of 2 up to 25. Both laminar and turbulent flow are considered. Varying angles of attack have also been computed. Configurations vary from simple cone-type bodies to lifting winged bodies, such as the space shuttle or the generic supersonic cruise fighter. Author

N86-31828*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUMERICAL QUADRATURE METHODS FOR INTEGRALS OF SINGULAR PERIODIC FUNCTIONS AND THEIR APPLICATION TO SINGULAR AND WEAKLY SINGULAR INTEGRAL EQUATIONS Final Report
Avram Sidi (Technion - Israel Inst. of Tech., Haifa) and Moshe Israeli Jul. 1986 36 p Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178151; ICASE-86-50; NAS 1.26:178151) Avail: NTIS HC A03/MF A01 CSCL 20D

High accuracy numerical quadrature methods for integrals of singular periodic functions are proposed. These methods are based on the appropriate Euler-Maclaurin expansions of trapezoidal rule approximations and their extrapolations. They are used to obtain accurate quadrature methods for the solution of singular and weakly singular Fredholm integral equations. Such periodic equations are used in the solution of planar elliptic boundary value problems, elasticity, potential theory, conformal mapping, boundary element methods, free surface flows, etc. The use of the quadrature methods is demonstrated with numerical examples. Author

N86-31829# Wisconsin Univ., Madison. Mathematics Research Center.
INFLOW BOUNDARY CONDITIONS FOR STEADY FLOWS OF VISCOELASTIC FLUIDS WITH DIFFERENTIAL CONSTITUTIVE LAWS Technical Summary Report
Michael Renardy Feb. 1986 10 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-84-51761)
(AD-A167452; MRC-TSR-2916) Avail: NTIS HC A02/MF A01 CSCL 20/4

Steady flows of viscoelastic fluids can not be uniquely determined by imposing boundary conditions only for the velocities as in the Newtonian case. The reason for this is that the fluids have memory, and therefore the flow inside the domain is affected by what happened before the fluid entered the domain. This leads to the need for extra boundary conditions at an inflow boundary. The nature of these inflow boundary conditions has not been analyzed previously, and it is certainly dependent on the constitutive law. In this paper, we look at the special case of differential constitutive relations with a single relaxation mode. We consider steady transverse flows across a strip which are small perturbations of a flow with constant velocity. It turns out that in this case two extra inflow boundary conditions are required in two dimensions, and four in three dimensions. This is what would be expected from an analysis of characteristics, but it contradicts the belief of many rheologists that it is possible to prescribe the extra stress at an inflow boundary. The problem studied here is of potential relevance for numerical simulations of steady flows. Many of the flows currently simulated are on infinite domains. Numerically, these domains are truncated, and on the inflow boundary of the truncated domain people usually prescribe the extra stress. According to the analysis in this paper, this is an overdetermined problem, and therefore errors must be expected from this procedure. GRA

N86-31830# Wisconsin Univ., Madison. Mathematics Research Center.
ON TRAVELLING-WAVE SOLUTIONS TO SYSTEMS OF CONSERVATION LAWS WITH SINGULAR VISCOSITY Technical Summary Report
Howard Prue and Richard Sanders Jan. 1986 34 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-00676)
(AD-A167518; MRC-TSR-2906) Avail: NTIS HC A03/MF A01 CSCL 20/4

The method of vanishing artificial viscosity is used to obtain smooth, large data travelling wave solutions to a class of conservation laws with semidefinite viscosity. The one dimensional Navier Stokes equations serve as an illustrating example. GRA

N86-31831# Wisconsin Univ., Madison.
STEEP GRAVITY WAVES: HAVELOCK'S METHOD REVISITED Summary Report
Jean-Marc Vanden-Broeck Apr. 1986 11 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-80-01960)
(AD-A167520; MRC-TSR-2933) Avail: NTIS HC A02/MF A01 CSCL 20/4

Gravity waves propagating at the surface of a fluid of infinite depth are considered. The problem is formulated in terms of a series expansion due to Havelock. The series is truncated after a finite number of terms and the unknown coefficients are found by collocation. It is shown that this simple numerical procedure yields accurate results for waves of arbitrary steepness. GRA

N86-31832# Wisconsin Univ., Madison.
A FREE STREAMLINE MODEL FOR A RISING BUBBLE Summary Report
Jean-Marc Vanden-Broeck Mar. 1986 19 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-80-01960)
(AD-A167535; MRC-TSR-2921) Avail: NTIS HC A02/MF A01 CSCL 20/4

The motion of a two dimensional bubble rising at a constant velocity in an unbounded fluid is solved by series truncation. It is assumed there is a wake of stagnant liquid extending to infinity below the bubble. Both the effects of gravity g and surface tension T are taken into account. It is shown that the problem is characterized by a continuum of solutions for T = 0 and by a discrete set of solutions when T is greater than 0. In addition a unique solution is obtained in the limit as the surface tension approaches zero. The corresponding profile of the bubble is found to be in good agreement with experimental data. The present paper describes example of such flow. Consider the motion of a two dimensional bubble rising at a constant velocity in an unbounded fluid. It is assumed there is a wake of stagnant liquid extending to infinity below the bubble. Both the effects of gravity and surface tension are taken into account. It is found that this problem is also characterized by a continuum of solutions when surface tension is neglected and by a discrete set of solutions when surface tension is taken into account. Moreover it is shown that a unique solution is obtained in the limit as the surface tension tends to zero. The corresponding profile of the bubble is found to be in good agreement with experimental data. GRA

N86-31833# Wisconsin Univ., Madison. Mathematics Research Center.
SOLITARY AND PERIODIC WAVES IN SWIRLING FLOW Summary Report
Scott A. Markel Mar. 1986 30 p
(Contract DAAG29-80-C-0041)
(AD-A167538; MRC-TSR-2922) Avail: NTIS HC A03/MF A01 CSCL 20/4

The study of vortex breakdown gives rise to an interest in waves in swirling flow. Our interest is centered on the existence of both solitary and periodic internal waves. In this report a model physical problem is studied in a mathematically exact formulation.

We restrict our attention to an incompressible, inviscid fluid swirling through a right cylinder of infinite length and finite radius. Our theory, which is not restricted to small amplitudes, predicts both waves of elevation and depression, depending on the angular velocity (swirl) distribution and the velocity distribution at infinity. Just as for the classical surface solitary waves, these internal solitary waves are single crested, symmetric, and decay exponentially away from the crest. Hence they represent disturbances of essentially finite extent. Variational techniques and the theory of rearrangements are used to demonstrate these qualitative features. Moreover, we show that the solitary internal wave arises as a limit of periodic internal waves of increasing wave lengths. Variational techniques are used to demonstrate that the Euler equations possess solutions that represent progressing waves of permanent form. Moreover, internal solitary wave solutions are shown to arise as the limiting forms of internal periodic waves as the period length becomes unbounded. GRA

N86-31834# Purdue Univ., West Lafayette, Ind. School of Mechanical Engineering.
LASER VELOCIMETER MEASUREMENTS AND ANALYSIS IN TURBULENT FLOWS WITH COMBUSTION. PART 4: TWO-COMPONENT COLD-FLOW MEASUREMENTS Final Report, 1 Jan. 1981 - 2 Oct. 1984
H. D. Thompson, Warren H. Stevenson, and R. D. Gould Mar. 1986 36 p
(Contract F33615-81-K-2003)
(AD-A167554; AFWAL-TR-82-2076-Pt-4) Avail: NTIS HC A03/MF A01 CSCL 20/4

A unique two component, two color Laser doppler Velocimeter (LDV) has been designed and built. The system includes Bragg cell modulators in all four beams, and a correction lens system to correct for the aberration induced by the cylindrical quartz test section. A dedicated PDP 11/40 mini-computer with DMA capability is used for data collection, storage, and processing. Two component (axial and radial) velocity measurements have been made in the turbulent flow field following an axisymmetric sudden expansion. Mean streamwise and radial velocity and turbulence intensity measurements were made. Reynolds stresses were computed. GRA

N86-31835# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF VARIABLE PROPERTIES IN FILM COOLED TURBULENT BOUNDARY LAYERS M.S. Thesis
Alfred F. Walz, Jr. Mar. 1986 76 p
(AD-A167716) Avail: NTIS HC A05/MF A01 CSCL 20/4

The effects of variable properties on heat transfer in a film-cooled turbulent boundary layer were investigated. A new procedure was developed to deduce adiabatic effectiveness from heat transfer coefficients based on the wall to freestream temperature difference, where both are representative of variable property flow conditions. The new technique was shown to be valid using data from the literature for injection into a turbulent boundary layer from one and two rows of injection holes. From these results, the variation of the coolant to mainstream density ratio was shown to have a significantly greater effect on heat transfer than variations of viscosity and thermal conductivity. GRA

N86-31836# Texas A&M Univ., College Station.
FORMULATION OF NUMERICAL METHODS USED IN THE XYZ THREE-DIMENSIONAL POTENTIAL FLOW PROGRAM M.S. Thesis
William J. Beary, Jr. May 1986 96 p
(Contract N00228-85-G-3303)
(AD-A168167) Avail: NTIS HC A05/MF A01 CSCL 20/4

The calculation of non-lifting potential flow about arbitrary three dimensional bodies is examined in detail with specific interest in the XYZ Potential Flow program. The program uses a surface singularity distribution to solve the Neumann boundary value problem by means of a source panel method assuming a flat element with a constant source density over the area of the element. Boundary conditions are applied at control points on the elements producing a system of linear equations for the source density. When the source density is known, velocities and pressure coefficients may be calculated. The main purpose of this paper is to present the details of the approximation of an arbitrary three dimensional body using quadrilateral elements, and to provide a detailed derivation of the exact source panel integrations in order to gain insight for future research at Texas A&M University. A variation of the Hess method of surface discretization using quadrilateral source panels is described in detail as it is used in the XYZ Potential Flow program. The exact source panel integrations are derived in detail. GRA

N86-31837# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
DIFFUSION OF GASES IN POROUS SOLIDS: SIMULATION AND MEASUREMENT Final Technical Report
J. W. Evans Jan. 1986 47 p
(Contract DE-FG22-82PC-50796)
(DE86-005380; DOE/PC-50796/T9) Avail: NTIS HC A03/MF A01

The theoretical part of this investigation has achieved its objective. By means of the Monte Carlo simulation the Knudsen diffusion of gases in Swiss cheese solid has been studied and shown to yield results similar to studies on the cannonball solids that were the subject of a prior investigation at Berkeley. A correlation was developed that permits a prediction of the Knudsen diffusion coefficient of any gas in any porous solid with a monodisperse pore size distribution. The Monte Carlo technique has also been used to simulate ordinary diffusion in porous solids of both Swiss cheese and cannonball types, and a predictive correlation developed for this regime also. An unanticipated result of this study was the recognition of the analogy between diffusion of a gas in a porous solid and other transport phenomena in heterogeneous media. The Berkeley investigation has drawn together data from the Monte Carlo simulation, empirical predictive equations from the diffusion literature and classical results from theoretical physics on conduction in hetergeneous media. Finally the Monte Carlo technique was extended to porous solids with a bidisperse pore structure and it was again shown that the results are consistent with expectations. The experimental phase of this investigation has been successful in measuring the viscosities and diffusivities of a number of gases over a wide range of temperature of practical interest. The experimental results have been in agreement with the experimental data of others (mostly at lower temperature) and with theoretical predictions, in most instances. DOE

N86-31838# Dynatech R/D Co., Cambridge, Mass.
PLASTIC FILM HEAT EXCHANGER DEVELOPMENT PROJECT
E. C. Guyer, D. L. Brownell, and M. K. Gollin 14 Apr. 1986 30 p
(Contract DE-AC07-84ID-12550)
(DE86-009258; DOE/ID-12550/T1) Avail: NTIS HC A03/MF A01

This report presents the progress that has been achieved in the development of the plastic film heat exchanger system (PFHX). An earlier report presented the general performance and design characteristics of a steam recovery PFHX. This report reviews some additional material selection possibilities for the film surfaces and describes a prototype design of a plastic film heat exchange element. Also the facility for the elevated temperature testing of this element design is described and the test plan is presented. DOE

N86-31839# Lawrence Livermore National Lab., Calif.
PREDICTABILITY OF RAYLEIGH-TAYLOR INSTABILITY
J. A. Viecelli 27 Mar. 1986 19 p
(Contract W-7405-eng-48)
(DE86-009932; UCID-20739) Avail: NTIS HC A02/MF A01

Numerical experiments modeling the Rayleigh Taylor instability are carried out using a two-dimensional incompressible Eulerian hydrodynamic code VFTS. The method of integrating the Navier-Stokes equations including the viscous terms is similar to that described in Kim and Moin, except that Lagrange particles have been added and provision for body forces is given. The Eulerian method is 2nd order accurate in both space and time, and the

Poisson equation for the effective pressure field is solved exactly at each time step using a cyclic reduction method. DOE

N86-31840# Lawrence Livermore National Lab., Calif.
EULERIAN TRANSPORT IN GENERAL ORTHOGONAL CURVILINEAR COORDINATES
K. Sinz Oct. 1985 15 p
(Contract W-7405-eng-48)
(DE86-010266; UCRL-53683) Avail: NTIS HC A02/MF A01

Eulerian fluid transport in general orthogonal curvilinear coordinates is calculated in the KEYSTONE code. Prescriptions are given for the volume and area calculations that allow for the curvature of the zones, as well as the complications introduced by extreme aspect ratios of the zone sizes. Singularities in the mesh are considered, and metrics are obtained from a numerically specified mesh. Many of the demonstrated techniques are independent of the coordinate system and could be used in standard Lagrangian codes. DOE

N86-31841# Oak Ridge Gaseous Diffusion Plant, Tenn.
CALCULATION OF HEAT FLUX THROUGH A WALL CONTAINING A CAVITY: COMPARISON OF SEVERAL MODELS
J. E. Park, J. R. Kirkpatrick, J. N. Tunstall, and K. W. Childs Feb. 1986 30 p
(Contract DE-AC05-84OT-21400)
(DE86-010348; K/CSD/TM-59) Avail: NTIS HC A03/MF A01

This paper describes the calculation of the heat transfer through the standard stud wall structure of a residential building. The wall cavity contains no insulation. Results from five test cases are presented. The first four represent progressively more complicated approximations to the heat transfer through and within a hollow wall structure. The fifth adds the model components necessary to severely inhibit the radiative energy transport across the empty cavity. Flow within the wall cavity is calculated from the Navier-Stokes equations and the energy conservation equation for an ideal gas using an improvement to the Implicit-Compressible Eulerian (ICE) algorithm of Harlow and Amsden. An algorithm is described to efficiently couple the fluid flow calculations to the radiation-conduction model for the solid portions of the system. Results indicate that conduction through still plates contributes less than 2% of the total heat transferred through a composite wall. All of the other elements (conduction through wall board, sheathing, and siding; convection from siding and wallboard to am bients; and radiation across the wall cavity) are required to accurately predict the heat transfer through a wall. Addition of a foil liner on one inner surface of the wall cavity reduces the total heat transferred by almost 50%. DOE

N86-31842# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
CRITICAL FLOW THROUGH SMALL PIPE BREAKS Final Report
J. L. Anderson and R. L. Benedetti May 1986 169 p
(Contract DE-AC07-76ID-01570)
(DE86-010907; EPRI-NP-4532) Avail: NTIS HC A08/MF A01

A series of experiments have been performed investigating the phenomena of liquid entrainment and vapor pull-through at a tee junction between a horizontal pipe and a small branchline. These experiments were performed under conditions of stratified steam-water flow at 3.4, 4.4, and 6.2 MPa in the 28.4 cm diameter mainline, and critical flow through a nozzle installed in the branchline. Two orientations of the branchline were investigated: horizontal and vertical downflow. This report documents the experimental program, presents the data obtained, and discusses correlations for predicting the levels at which the onset of vapor pull-through and liquid entrainment occur and correlations for predicting the flow quality into the branchline. DOE

N86-31843# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF ADVANCED THERMAL INSULATION FOR APPLIANCES Progress Report, Jul. 1984 - Jun. 1985
D. W. Yarbrough, F. J. Weaver, R. S. Graves, and D. L. McElroy May 1986 50 p
(Contract DE-AC05-84OR-21400)
(DE86-011357; ORNL/CON-199) Avail: NTIS HC A03/MF A01

Numerical simulations of the radial heat flow apparatus used to measure the apparent thermal conductivity (k sub a) of powders with high thermal resistance (R) showed that heat losses from the ends of the cylindrical specimen and core heater cause the k sub a of the specimen to be greater than the true value. This effect is large when high-R powders are tested. A radial apparatus 91 cm in length, ORNL-5, was constructed and used to reduce uncertainties introduced by end losses. ORNL-5 was used to test mixtures of low-cost coarse fumed-silica particles and relatively uniform, but expensive, fine fumed-silica particles. R-values per inch (2.54 cm) in air near 7 have been measured for pure fumed-silica powders. The thermal resistances of mixtures of coarse and fine powders were determined in the range 290 to 340°K at atmospheric pressure. Results show that R per inch depends on density and that R-values per inch greater than 5 can be achieved with such mixtures. R-values for a mixture of nominal 7-nm fine silica and coarse silica have been measured as a function of pressure near 300°K , and R per inch greater than 40 has been achieved in vacuum (<10 Pa). Linear heat flow measurements on evacuated rectangular panels showed that R per inch for the panels dropped from 16.8 to 15.9 in two years. DOE

N86-31844# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Warmte- en Stromingsleer.
DAMPING FORCE EXERTED BY A VISCOUS MEDIUM UPON AN OSCILLATING CYLINDER [DEMPINGSKRACHT UITGEOEFEND DOOR EEN VISCEUS MEDIUM OP EEN OSCILLERENDE CYLINDER]
Thomas E. M. Meijssen Jul. 1984 73 p In DUTCH Sponsored by Koninklijke/Shell Exploratie en Produktie Lab., Rijswijk, Netherlands
(ESA-86-97374) Avail: NTIS HC A04/MF A01

The damping force which an unlimited, homogenous, incompressible, and viscous medium of certain density and kinematic viscosity exerts on an oscillating, infinitely long, stiff, circular cylinder was determined for offshore purposes. The oscillation amplitude is supposed much smaller than the cylinder radius. Three fields, characterized by order magnitudes of the so-called flow Reynolds number Rs, were distinguished: Rs much less than 1, Rs = 0(1), and Rs much greater than 1. Solutions for the related flow functions and corresponding expressions for the damping force are discussed. ESA

N86-31845# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
REENTRY BODY THREE-DIMENSIONAL FLOW COMPUTATION. (EULER AND PARABOLIZED NAVIER-STOKES) [CALCULS D'ECOULEMENT AUTOUR DE CORPS DE RENTREE (EULER ET NAVIER-STOKES PARABOLISE)]
Moules and Bourg 1986 29 p In FRENCH Presented at 22nd AAAF Colloque dAerodynamique Appliquee Lille, 13-15 Nov. 1985
(SNIAS-861-422-107; ESA-86-97595) Avail: NTIS HC A03/MF A01

The steady flow Navier-Stokes equations are written in nonorthogonal curvilinear coordinates where one of them is the general flow direction. The shock layer is completely viscous, considering a body at hypersonic velocity, at high altitude, with an incidence angle. Wind tunnel tests with helium and air were used to validate the method. The computation time for an axisymmetric body without incidence is 1 to 3 min using an IBM 3081 computer. Bodies with incidence require times of up to 1 hr. ESA

N86-31846# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
QUASI-SIMULTANEOUS CALCULATION OF STRONGLY INTERACTING VISCOUS FLOW
A. E. P. Veldman and J. P. F. Lindhout 21 Dec. 1984 13 p Presented at 3rd Symposium on Numerical and Physical Aspects of Aerodynamic Flows, Long Beach, Calif., 21-24 Jan. 1985
(Contract NIVR-1865)
(NLR-MP-84095-U; B8664361; ESA-86-97667) Avail: NTIS

HC A02/MF A01

The VISIAN analysis system for viscous-inviscid strong interaction is presented. The code is based on a quasi-simultaneous solution procedure for viscous and inviscid parts of the flow field. The viscous region is calculated with an extension of the classical boundary layer equations, featuring effects of normal pressure gradients and wake curvature. Results for separated laminar and turbulent flow past lifting Joukovsky airfoils are shown. ESA

N86-31847# National Aerospace Lab., Amsterdam (Netherlands). Theoretical Aerodynamics Dept.

ON WINGS AND KEELS (2)

J. W. Slooff May 1985 23 p Presented at 12th AIAA Ann. Symposium on Sailing (The Ancient Interface XIL), Seattle, Wash., 21-22 Sept. 1985

(NLR-MP-85048-U; B8664739; ESA-86-97679) Avail: NTIS HC A02/MF A01

The physical mechanisms governing the hydrodynamics of sailing yacht keels and the parameters that, through these mechanisms, determine keel performance are discussed. It is concluded that due to the presence of the free water surface optimum keel shapes differ from optimum shapes for aircraft wings. Utilizing computational fluid dynamics analysis and optimization it is found that the performance of conventional keels can be improved significantly by reducing taper or even applying inverse taper (upside-down keel) and that decisive improvements in performance can be realized through keels with winglets. ESA

N86-31848# National Aerospace Lab., Amsterdam (Netherlands). Aerodynamics Div.

HYDRODYNAMIC INSTABILITIES AND SURFACE WAVES IN A FLOW OVER AN IMPEDANCE WALL

S. W. Rienstra 20 Jun. 1985 12 p Presented at IUTAM Symposium on Aero and Hydroacoustics, Lyon, 3-6 Jul. 1986 Submitted for publication

(NLR-MP-85053-U; B8664360; ESA-86-97680) Avail: NTIS HC A02/MF A01

A two dimensional analysis of the surface waves in a subsonic compressible uniform mean flow along an impedance wall is made. It is found that a maximum of four surface waves is possible. The regions of existence in complex impedance and wave number planes are given. One wave is found to travel upstream, while the others, one of which is an instability, propagate downstream. A Wiener-Hopf solution of plane wave scattering at a hard/soft discontinuity of the wall impedance in which the instability wave provides the additional degree of freedom to satisfy the Kutta condition at the impedance jump is constructed. The waves are limiting forms of irregular acoustic duct modes. ESA

N86-31849# European Space Agency, Paris (France).

INVESTIGATION OF DENSITY GRADIENT FLUCTUATIONS IN A TURBULENT JET BY MEANS OF THE LASER SCHLIEREN CROSSED-BEAM METHOD

Juergen Kompenhans, Hans R. Hoefer, and Sabine Rannenberg Oct. 1985 94 p Original language document was announced as N86-10027

(ESA-TT-942; DFVLR-FB-85-19; ESA-86-97578) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne, West Germany DM 25.50

Density gradient fluctuations within a round, turbulent jet were investigated at Mach numbers of 0.62 and 0.95 by laser Schlieren photography. Cross spectral density, coherence function, and phase velocity of the density gradient fluctuations were obtained using an arrangement of two crossed laser beams at various distances from the nozzle. Information on coherent structures in a jet was obtained, even at high Mach numbers. ESA

N86-31850# Technische Hogeschool, Delft (Netherlands). Afdeling der Werktuigbouwkunde.

CONDITIONED HOT-WIRE ANEMOMETER MEASUREMENTS AND STRUCTURAL ANALYSIS OF A TURBULENT SPOT IN A LAMINAR BOUNDARY LAYER [GECONDITIONEERDE SLOEIDRAADANEMOMETERMETINGEN EN STRUCTUURANALYSE VAN EEN TURBULENT SPOT OPGEWEKT IN EEN LAMINAIRE GRENSLAAG]

J. A. J. Martens Dec. 1985 101 p In DUTCH; ENGLISH summary

(MEAH-63; ESA-86-97712) Avail: NTIS HC A06/MF A01

The downstream development of a turbulent spot generated by a tripping wire in a laminar boundary layer was investigated in wind tunnel tests. Spot shape, vertical and lateral growth, ensemble-averaged structure, and isovelocity contours look similar to those of earlier experiments. The correlation coefficient in a turbulent spot is in good agreement with that in a turbulent boundary layer. A quadrant analysis of the product of the fluctuation velocity components in both directions shows that the second and fourth quadrant are the main contributors; their average fractional contributions are 80% and 75% respectively, while the first and third quadrant give a contribution of -30% and -25% respectively. The second quadrant does not dominate the fourth in a spot in contrast with a turbulent boundary layer. ESA

N86-31851# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Abteilung Turbulenzforschung.

COHERENT VORTEX STRUCTURES IN THE WAKE OF A RIGID AND AN EXTERNALLY DRIVEN DISK Ph.D. Thesis - Technische Univ., Berlin, West Germany

Dietmar Scholz Dec. 1985 177 p In GERMAN; ENGLISH summary

(DFVLR-FB-86-04; ISSN-0171-1342; ESA-86-97587) Avail: NTIS HC A09/MF A01; DFVLR, Cologne, West Germany DM 46

Coherent vortex structures were studied by comparing the large scale coherent flow structure in the wake of a rigid vertical circular disk with the turbulent structures behind the externally driven disk. The periodic vortex structures in these wakes can be decomposed via cross-correlation measurements with hot wires and microphones, particularly by using representations of coherences, phase relations, and azimuthal modes. In the very near wake, coherent periodic pressure oscillations due to pulsing of the recirculation bubble are superposed onto pressure fluctuations of the naturally occurring helical vortex structures which dominates in the entire flow region outside the recirculation bubble. ESA

N86-31852# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.

NUMERICAL SIMULATION OF THE ACTIVE CONTROL OF LAMINAR-TURBULENT TRANSITION IN THE FLAT-PLATE BOUNDARY LAYER Ph.D. Thesis - Karlsruhe Univ., West Germany

Eckart Laurien Jan. 1986 121 p In GERMAN; ENGLISH summary

(DFVLR-FB-86-05; ISSN-0171-1342; ESA-86-97588) Avail: NTIS HC A06/MF A01; DFVLR, Cologne, West Germany DM 36

Laminar-turbulent transition in the flat-plate boundary layer was simulated starting from Tollmein-Schlichting waves. Using the spatially periodic simulation model, the three-dimensional incompressible Navier-Stokes equations were solved by a spectral method. For the direction normal to the wall a Chebyshev collocation method was developed. The classical Klebanoff type and the subharmonic type were simulated. Up to the spike stage the results agree well with hot-wire measurements. The transition can be actively delayed by local two-dimensional suction blowing, if it is applied in the early stages. ESA

N86-31853# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abteilung Turbulenzforschung.

EXPERIMENTAL INVESTIGATION OF NOISE GENERATED BY TURBULENCE IN A PIPE FLOW BEHIND A DISCONTINUOUS AREA ENLARGEMENT Ph.D. Thesis - Technische Univ., Berlin, West Germany

Bernhard Stahl Nov. 1985 172 p In GERMAN; ENGLISH summary Sponsored by Deutschen Forschungsgemeinschaft

(DFVLR-FB-86-06; ISSN-0171-1342; ESA-86-97589) Avail: NTIS

HC A08/MF A01; DFVLR, Cologne, West Germany DM 36.50

Plane sound waves and higher acoustic modes, generated by turbulence occurring in the flow separation region downstream of a discontinuous enlargement in the circular cross-sectional area of a pipe, were investigated. Measurements of the axial phase velocity of pressure fluctuations show that turbulence fluctuations dominate in the region of flow separation just behind the jump in cross-sectional area, whereas further downstream the field is primarily determined by fluctuations of the aerodynamically generated sound waves. A decomposition of the pressure fluctuations shows that in the mixing region of the jet, the fluctuation energy is primarily distributed among several azimuthal components, while further downstream almost all the energy in the frequency range below the cut-off frequency of the first higher-order mode is concentrated in the axially symmetric component. ESA

N86-31854# Karlsruhe Univ. (West Germany). Sonderforschungsbereich 210.

TURBULENCE MODELING FOR INCOMPRESSIBLE FLOWS: A REPORT ON THE EUROMECH 180 COLLOQUIUM

W. Rodi Dec. 1985 53 p Colloquium held in Karlsruhe, West Germany, 4-6 Jul. 1984; sponsored by Deutsche Forschungsgemeinschaft, the State of Baden-Wuerttemberg, West Germany, A. S. Veritas Research, Daimler-Benz AG and Motoren-und Turbinen Union Muenchen GmbH

(KU-SFB-210/T/22; ESA-86-97832) Avail: NTIS HC A04/MF A01

Two-equation turbulence models and applications; higher-order models and implications for conventional closures; second-order closures and applications; low Reynolds number models and boundary layer calculations; and effects of buoyancy and rotation were discussed. ESA

N86-31855# Rome Univ. (Italy). Dipt. di Fisica.

INTEGRABLE SYSTEMS IN THE DESCRIPTION OF WAVES IN STRAITS AND CHANNELS OF VARIABLE WIDTH AND DEPTH [SISTEMI INTEGRABILI NELLA DESCRIZIONE DI ONDE IN STRETTI O CANALI DI PROFONDITA' E LARGHEZZA VARIABILI]

Decio Levi 19 Dec. 1985 8 p In ITALIAN

(Preprint-493; ESA-86-97926) Avail: NTIS HC A02/MF A01

A theoretical model to explain data about the initiation and propagation of solitary waves in presented. Starting with the Euler equation for frictionless incompressible homogeneous fluids, and using an approximation considering almost one dimensional long waves and shallow water, a partial differential nonlinear equation of the Kadomstev-Petviashivili type is obtained, characterized by variable coefficients and boundary conditions. Once the vorticity is specified, and for given contour conditions, the equation can be exactly integrated. ESA

N86-31856# Netherlands Energy Research Foundation, Petten.

FINITE ELEMENT, STREAM FUNCTION-VORTICITY SOLUTION OF SECONDARY FLOW IN THE CROSS-PLANE OF NONCIRCULAR CHANNELS

W. Slagter and H. Koning Dec. 1985 67 p

(ECN-175; B8665001; ESA-86-98065) Avail: NTIS HC A04/MF A01

A finite element method was applied to predict features of the fully developed turbulent flow in noncircular passages. The primary, axial flow, and turbulent kinetic energy distributions were predicted for fully developed turbulent flow conditions up to the wall. The secondary velocity is represented by the stream function-vorticity formulation and the no-slip boundary conditions are explicitly introduced in the nonlinear equations by a boundary vorticity formula. The Newton-Raphson method is applied to the stream function-vorticity equations and the resulting set of equations is solved simultaneously by the frontal solution technique. A one-equation eddy viscosity model of turbulence and an algebraic stress transport model were used to predict primary axial velocity, secondary velocities, and turbulent kinetic energy. The predictions obtained for a central subchannel of an equilateral triangular rod array with p/d = 1.3 are in reasonable agreement with experimental data. ESA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-31857*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PARAMETRIC STUDY OF BEAM REFRACTION PROBLEMS ACROSS LASER ANEMOMETER WINDOWS

Albert K. Owen Jun. 1986 33 p Presented at the Third International Symposim on Applications of Laser Anemometry to Fluid Mechanics, Lisbon, Portugal, 7-9 Jul. 1986; sponsored by the Instituto Superior Tecnico

(NASA-TM-87350; E-3064; NAS 1.15:87350; USAAVSCOM-TR-86-C-16) Avail: NTIS HC A03/MF A01 CSCL 14B

The experimenter is often required to view flows through a window with a different index of refraction than either the medium being observed or the medium that the laser anemometer is immersed in. The refraction that occurs at the window surfaces may lead to undesirable changes in probe volume position or beam crossing angle and can lead to partial or complete beam uncrossing. This report describes the results of a parametric study of this problem using a ray tracing technique to predict these changes. The windows studied were a flat plate and a simple cyclinder. For the flat-plate study: (1) surface thickness, (2) beam crossing angle, (3) bisecting line - surface normal angle, and (4) incoming beam plane surface orientation were varied. For the cylindrical window additional parameters were also varied: (1) probe volume immersion, (2) probe volume off-radial position, and (3) probe volume position out of the R-theta plane of the lens. A number of empirical correlations were deduced to aid the interested reader in determining the movement, uncrossing, and change in crossing angle for a particular situation. Author

N86-31858*# Morgan State Univ., Baltimore, Md.

A DENSITOMETRIC ANALYSIS OF IIaO FILM FLOWN ABOARD THE SPACE SHUTTLE TRANSPORTATION SYSTEM STS-3, STS-6, AND STS-7 Semiannual Report, Dec. 1986

Ernest C. Hammond, Jr., Kevin A. Peters, and Pamela F. Atkinson 1986 23 p

(Contract NsG-5074)

(NASA-CR-176864; NAS 1.26:176864) Avail: NTIS HC A02/MF A01 CSCL 14E

Three canisters of IIaO film were prepared along with packets of color film from the National Geographic Society, which were then placed on the Space Shuttle #3. The ultimate goal was to obtain reasonably accurate data concerning the background fogging effects on IIaO film as it relates to the film's total environmental experience. This includes: the ground based packing, and loading of the film from Goddard Space Flight Center to Cape Kennedy; the effects of the solar wind, humidity, and cosmic rays; the Van Allen Belt radiation exposure; various thermal effect; reentry and off-loading of the film during take off, and 8 day, 3 hour 15 minutes orbits. The total densitometric change caused by all of the above factors were examined. The results of these studies have implications for the utilization of IIaO spectroscopic film on the future shuttle and space lab missions. These responses to standard photonic energy sources will have immediate application for the uneven responses of the film photographing a star field in a terrestrial or extraterrestrial environment with associated digital imaging equipment. B.G.

N86-31859*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED OPTICAL MEASURING SYSTEMS FOR MEASURING THE PROPERTIES OF FLUIDS AND STRUCTURES
Arthur J. Decker 1986 37 p Presented at the Symposium on Propulsion Instrumentation, Jiangyou, China, 6-10 Oct. 1986; sponsored by NASA and the Chinese Aeronautical Establishment
(NASA-TM-88829; E-3204; NAS 1.15:88829) Avail: NTIS HC A03/MF A01 CSCL 20F

Four advanced optical models are reviewed for the measurement of visualization of flow and structural properties. Double-exposure, diffuse-illumination, holographic interferometry can be used for three-dimensional flow visualization. When this method is combined with optical heterodyning, precise measurements of structural displacements or fluid density are possible. Time-average holography is well known as a method for displaying vibrational mode shapes, but it also can be used for flow visualization and flow measurements. Deflectometry is used to measure or visualize the deflection of light rays from collimation. Said deflection occurs because of refraction in a fluid or because of reflection from a tilted surface. The moire technique for deflectometry, when combined with optical heterodyning, permits very precise measurements of these quantities. The rainbow schlieren method of deflectometry allows varying deflection angles to be encoded with colors for visualization. Author

N86-31860# Department of the Air Force, Washington, D.C.
MULTIPLE THERMOCOUPLE TESTING DEVICE Patent
James R. Hildebrand and Kurt J. Sobanski, inventors (to Air Force) Issued 18 Feb. 1986 11 p Supersedes AD-D009951
(AD-D012276; US-Patent-4,571,689; US-Patent-Appl-SN-435515; US-Patent-Class-364-481) Avail: NTIS Avail: US Patent and Trademark Office CSCL 09/5

An automated multiple thermocouple testing device determines short and open circuits in a thermocouple system. The thermocouple system that has a plurality of temperature probes, each probe has a first thermocouple. The device applies a direct current voltage to the first thermocouple to cause heating in the second thermocouple and a second thermocouple and then reads the temperature response of the second thermocouple. The first thermocouples have a common lead and the second thermocouples are connected in two parallel groups. The temperature output of the second thermocouple is digitized and read by a computer. These readings are compared to criteria which determine if there is an open circuit. Before the open circuit test is applied, the device also determines which thermocouple probe has a possible short circuit. This device can automatically test for short and open circuits in a thermocouple system within a few minutes without the necessity of removing the probes from their installed position. This device was adapted to perform the above testing on a F100 fan turbine inlet temperature (FTIT) system. GRA

N86-31861# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
ANALYSIS OF HIGH POWER RF WINDOWS FOR GYROTRONS Final Report, Sep. 1982 - Sep. 1985
Anton G. Krycuk Jan. 1986 54 p
(Contract F30602-82-C-0161)
(AD-A167424; UTEC-85-080; RADC-TR-85-254) Avail: NTIS HC A04/MF A01 CSCL 09/5

The project was undertaken to simplify the multidisk dielectric window design process for gyrotrons. The response of many discrete combinations of high power radiofrequency window thicknesses is analyzed in an effort to locate the optimum configurations. This report presents a method of numerically optimizing the design procedure. The window region of the gyrotron is severely overmoded, so care must be taken that the window be able to pass the energy contained in the high power modes to avoid overheating or reflection. To this end, the first part of this paper deals with a numerical solution of Solimar's modified telegraphist equation, which allows for the mode content intercepting upon the window to be found. The actual window design optimization is accomplished through the use of an n dimensional simplex method, where n is the number of window elements. Criteria delineating the search region are presented as well as typical problems which could be encountered during the optimization process. Results are given for both the mode content and the optimization. Mode content was compared against results given by a comparable proven algorithm, while window parameters were checked against existing designs with good correlation. GRA

N86-31862# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CHINESE JOURNAL OF LASERS (SELECTED ARTICLES)
Fuxi Gan and Yinxia Zhang 22 Apr. 1986 54 p Transl. into ENGLISH from Zhong Guo Jiguang (China), v. 11, no. 8, 1984 p 449-463
(AD-A167846; FTD-ID(RS)T-0004-86) Avail: NTIS HC A04/MF A01 CSCL 20/5

A general review is made on the past and future of the research progress on laser crystals in China. Some proposals are offered in order to open up a new prospect for the development of laser crystals. Various methods for measuring different kinds of physical properties of laser glasses also have been investigated and the corresponding apparatus have been installed. Emphasis is laid on the inspection of optical quality of large size glass products, and a laser holographic interferometer for optical homogeneity measurement has been developed. This paper also reports some fundamental research results on laser glasses. By using laser glass spectroscopy, the special properties and structural state of rare earth ions in inorganic glasses were investigated before. The study of spectral and luminescent properties of Nd doped glasses was emphasized. Further detailed studies of the influence of the glass bases on spectral properties of Nd ion and the energy transfer process of Nd ions in glasses were made. GRA

N86-31863# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
RADIAL VELOCITY SPECTROMETERS. WHAT THEY MEASURE
Laurence G. Taff 24 Mar. 1986 24 p
(Contract F19628-85-C-0002)
(AD-A167986; TR-738; ESD-TR-85-304) Avail: NTIS HC A02/MF A01 CSCL 17/8

This report provides the theoretical analysis, within the framework of special relativity, for the information content of a radial velocity spectrometer. This device is an automated telescope photometer spectrometer combination. It measures the displacement between a Doppler shifted set of spectral lines and its at-rest version. Thus, it provides a measurement of radial velocity. Exactly what kinematical content is revealed by such a measurement within the solar system is brought out herein. The discussion is couched in terms of a satellite-based sensor observing another orbiting body. Both objects are presumed to orbit about the Earth. Sufficient generality is presented to treat any other case also. In the specific case of interest, both the topocentric distance and the topocentric radial velocity are present in the measured quality. GRA

N86-31864# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DEVELOPMENT OF AN IMAGING FOURIER TRANSFORM SPECTROMETER Final Report, Oct. 1980 - Sep. 1985
Charles W. Pender, Jr. (Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.) May 1986 93 p Prepared in cooperation with Sverdrup Technology
(AD-A168172; AEDC-TR-86-17) Avail: NTIS HC A05/MF A01 CSCL 14/2

This study established the feasibility of an Infrared Imaging Fourier Transform Spectrometer (IRIFTS), and the development of a working prototype is described herein. The IRIFTS is a measurement system that can simultaneously acquire spatial, spectral, and temporal IR radiance information. The theory of the components is presented, a more general half-angle obliquity limit is derived for the Fourier Transform Spectrometer (FTS), and the theoretical feasibility of the concept is shown. Commercially available components were acquired, interfaces were constructed,

and a one dimensional (spatial) imaging FTS system prototype was assembled. Results are presented for the operation of the system. GRA

N86-31865# Rochester Univ., N. Y. School of Medicine and Dentistry.
APPLICATION OF NEW TECHNOLOGIES TO RADIATION BIODOSIMETRY IN MAMMALIAN SYSTEMS Final Report, 3 Jan. - 31 Dec. 1984
Robert M. Sutherland, Edith M. Lord, and Peter C. Keng Feb. 1986 33 p
(Contract F33615-84-C-0603)
(AD-A168176; USAFSAM-TR-85-66) Avail: NTIS HC A03/MF A01 CSCL 06/18

Mononuclear cells from peripheral blood are presently the best candidates for a space radiation biodosimeter for man because they are easily obtained, and are among the most radiosensitive cells in the body. They are, however, members of a highly heterogeneous population of cell subtypes potentially differing in radiosensitivities. To study the cell subpopulation holding the greatest potential for use as a biodosimeter, the cell types must be uniquely identified, and/or separated so that subtle effects on radiosensitive cells are not masked by non-effects on relatively radioresistant cells present in a mixed population. Flow cytometry and centrifugal elutriation are proving to be useful for identifying and separating individual subpopulations from heterogeneous mixtures of cells. Flow cytometry uses fluorescent antibodies to label and sort the cells of interest, while centrifugal elutriation utilizes counterbalanced centrifugal and fluid flow forces to separate cells by size. In combination with two analytical procedures (premature chromosome condensation (PCC) and alkaline elution), these two techniques have been applied to study radiation effects on mononuclear cells from mouse peripheral blood irradiated in vivo, and cell cycle phase specific repair of single-strand breaks in cellular deoxyribonucleic acid (DNA) of the Chinese hamster ovary (CHO) fibroblast cell line irradiated in vitro. GRA

N86-31866# Los Alamos National Lab., N. Mex.
WORKSHOP ON STANDARDS FOR PHOTONIC STREAK CAMERA CHARACTERIZATION
G. L. Stradling 1985 6 p Presented at the SPIE International Technical Symposium on Optical and Electro-Optical Engineers, San Diego, Calif. 18 Aug. 1985
(Contract W-7405-eng-36)
(DE86-002430; LA-UR-85-3834; CONF-850887-41) Avail: NTIS HC A02/MF A01

A summary paper proposing standardization of definitions and parameter measurements related to photonic streak cameras was generated at the 16th International Congress of High Speed Photography and Photonics at Strasborg, France (August 1984). An international committee appointed by the general Workshop on Picosecond Streak Cameras met and discussed the areas appropriate for standardization and proposed specific definitions, measurements and complementary parameter sets to be used in characterizing photonic streak cameras. These proposals were compiled into a summary paper by the committee co-chairmen, Noel Fleurot (CEA-Limeil) and Gary L. Stradling (Los Alamos National Laboratory), with the intent that it be distributed to interested streak camera users and manufacturers and that appropriate improvements and additions be solicited. DOE

N86-31867# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems.
MULTICHANNEL AUTOMATIC DEVICE FOR MEASURING ULTRALOW TEMPERATURES
A. B. Neganov 1985 5 p In RUSSIAN
(DE86-701438; JINR-8-85-291) Avail: NTIS (US Sales Only) HC A02/MF A01

A 16-channel automatic device for carbonic termistor resistance measurements is described. It provides the measurement of 20 Ohm up to 200 kohm resistances in four automatically selected subranges at heat release in the termistor of 10(-12) 10(-15)W. The data from 6 thermometers are recorded onto self-recorder tape and put out on digital display. Resistance measurement accuracy is not worse than 0.5%. The device has remote control and parallel interfaces. DOE

N86-31868# Army Research and Development Command, Dover, N.J.
OPTICAL PROFILING INSTRUMENT FOR THE MEASUREMENT OF THE FIGURE AND FINISH OF OPTICAL QUALITY SURFACES
E. L. Church and P. Z. Takacs Sep. 1985 36 p Presented at the 3rd International Conference on the Properties and Metrology of Engineering Surfaces, Middlesborough, England, 10 Apr. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE86-009433; BNL-37880; CONF-8504226-1) Avail: NTIS HC A03/MF A01

This paper discusses the use of WYKO non-contracting optical profiling microscope for the measurement of the figure and finish of optical-quality surfaces. THe original instrument and our hardware and software modifications are described along with recent and current studies making use of this facility. DOE

N86-31869# Heimann G.m.b.H., Wiesbaden (West Germany).
SOLID STATE IMAGE SENSOR WITH AN AMORPHOUS PHOTOCONVERSION LAYER Final Report, Feb. 1984
Bernd Heimann, Ulrich Traupe, Heiner Herbst, and Karl Kempter Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 76 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-164; ISSN-0340-7608; ESA-86-97443) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

A solid state image sensor using an amorphous silicon layer (a-Si:H) on top of a 100x100 pixel readout matrix was developed. The sensor features a linear signal characteristic at low illumination levels and a nonlinear one at high illumination levels; it is thus capable of transferring a higher dynamic range. Blooming was suppressed to a value one fifth of that of monolithic MOS-sensors. The sensor is suitable for color television applications. The sensitivity is a little low compared to monolithic image sensors; the cause of the sensitivity decay and measures to improve the value are discussed. Based on results of sandwich-structure a-Si depositions on glass substrates and a-Si photolayers incorporated in vidicon tubes, the structure of the sensor image part was determined to be Al(a-Si:H)ITO. Test equipment was designed and installed to check sensor data. ESA

N86-31870# AEG-Telefunken, Frankfurt am Main (West Germany). Forschungsinst.
OPTOELECTRONIC CURRENT TRANSDUCER Final Report, May 1984
Klaus Hoffman Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 87 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-165; ISSN-0340-7608; ESA-86-97444) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18.50

A current transducer which permits the measurement of high currents in high voltage substations by means of the Faraday effect in optical monomode fibers was developed. The measuring system has a large bandwidth and a linear signal-to-current characteristic up to high currents without saturation. High voltage insulation presents no serious problems. A V-grooved semiconductor laser is used as light source and is installed in a solid case which also houses the detection unit. The monomode fiber is placed in a teflon hose, loosely and sufficiently twisted to avoid birefringence. The fiber is coupled to the laser by gradient index lenses. Astigmatism is reduced by ellipsoidal shaping and etching of the fiber end to form a lens-like element. Part of the device was tested in the laboratory. With a 62- turn primary fiber coil,

the minimum detectable signal is 0.15 Amp-turns. It is shown that the magnetooptical transducer can be improved. Measurements in a high power bus and a comparison with simultaneous conventional current measurements are planned. ESA

N86-31871# Intermetall, Freiburg (West Germany). Hableiterwerk der Deutsche ITT Industries GmbH.
DEVELOPMENT OF A DIGITAL SIGNAL PROCESSOR Final Report, Apr. 1985
Peter Anders, Klaus Herberle, Bernhard Schmid, Arnold Uhlenhoff, Manfred Ulrich, Martin Winterer, Edmund Zaehringer, Mandred Immendoerfer (Standard Elektrik Lorenz A.G., Stuttgart, West Germany), Siegbert Hentschke, Dieter Kopp et al Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 254 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-181; ISSN-0340-7608; ESA-86-97449) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 42

A digital signal processor whose architecture was optimized for signal processing algorithms was developed. The processor has a multibus structure, distributed memories, and uses pipelined program execution. The basic arithmetic instruction is multiply and add, carried out within 2 instruction cycles of 100 msec each. Development tools such as cross-assembler, simulator (debugger), and in-circuit emulator are provided for the design of consumer applications. Due to its high computing speed and low power dissipation, the digital signal processor has a wide range of possible applications. ESA

N86-31872# Institut Franco-Allemand de Recherches, St. Louis (France).
INTERFEROMETRIC HOLOGRAPHIC CINEMATOGRAPHY [CINEHOLOGRAPHIE INTERFEROMETRIQUE]
H. Fagot 12 Jul. 1985 17 p In FRENCH Presented at HOLOPRO 85 Conference, Belfort, France, 21 Jun. 1985
(ISL-CO-219/85; ESA-86-97628) Avail: NTIS HC A02/MF A01

Double exposition holographic interferometry was employed to obtain a 35 mm scientific film. The deformations and deplacements of a loudspeaker were visualized at 20 to 70 Hz vibration frequencies. A 30 mJ YAG laser was used. The two successive pulses of each hologram are produced at 4 ms interval by the same laser beam. The 35 mm camera operates at 10 Hz. The device is limited to low frequency phenomena. The development of higher frequency systems is discussed with a view to nondestructive control of vibration in aircraft structures. ESA

N86-31873# Netherlands Energy Research Foundation, Petten.
A REMOTE CONTROLLED CALIBRATION DEVICE FOR DISPLACEMENT TRANSDUCERS
G. L. Tjoa and R. denBoef Nov. 1985 23 p
(ECN-173; B8577864; ESA-86-97732) Avail: NTIS HC A02/MF A01

A mechanical system to calibrate extensometer transducers at ambient temperature in a shielded facility for examining mechanical properties (especially creep) of irradiated materials is described. The system consists of a piezoelectric translator including a microprocessor-based controller in a calibration rig. Two transducers can be verified simultaneously. The equipment was integrated into a computer controlled data acquisition system to provide for the required data processing and analysis. The system functions satisfactorily, showing high resolution and accuracy, and is easy to operate remotely. ESA

N86-31874# Netherlands Energy Research Foundation, Petten.
INTERNATIONAL COMPARISON OF INTERPOLATION PROCEDURES FOR THE EFFICIENCY OF GERMANIUM GAMMA-RAY SPECTROMETERS (GAM83 EXERCISE)
Willem Zijp, Adelbertus N. Polle, and Henk J. Nolthenius Jan. 1986 83 p
(ECN-181; ICRM-S-13; B8661179; ESA-86-97737) Avail: NTIS HC A05/MF A01

Forty-one laboratories determined full energy peak efficiencies and activities of a gamma of ray spectrometer by their own procedures, starting from supplied peak-efficiency data. Four data sets for four different conditions of germanium detectors were distributed. The great variety of fitting functions combined with the calculated large standard deviation of the parameters (709) and the strong correlations which are observed, indicates that no single physical acceptable function can be recommended as a general purpose model for describing the efficiency curve of a semiconductor gamma ray spectrometer. ESA

N86-31875# Institut Franco-Allemand de Recherches, St. Louis (France).
COMPUTER ASSISTED MEASUREMENT TECHNIQUES IN LASER DOPPLER ANEMOMETRY (LDA). PART 1: DATA ACQUISITION. PART 2: DATA REDUCTION
H. J. Pfeifer 15 May 1985 50 p Presented at Von Karman Inst. for Fluid Dynamics Lectures Series on the Computer in Experimental Fluid Dynamics, Rhode Saint Genese, Belgium, 6-10 May 1985
(ISL-CO-210/85-Pt-1-Pt-2; ESA-86-97625-Pt-1-Pt-2) Avail: NTIS HC A03/MF A01

The role of computers as part of the instrumentation in laser Doppler anemometry is reviewed. It is shown that no useful configuration of such an anemometer can be set up without powerful computer assistance. Computer utilization in data acquisition with counter processors, transient recorders and photon correlators is examined. The optimum use of the anemometer requires also computerized control of various parts of the system, such as filter banks and traverse systems. ESA

N86-31876# Institut Franco-Allemand de Recherches, St. Louis (France).
USE OF AN ENDOSCOPE FOR OPTICAL FIBER HOLOGRAPHY
F. Albe, H. Fagot, and P. Smigielski 11 Oct. 1985 8 p Presented at Second International Technical Symposium on Optical and Electrooptical Science and Engineering and Instrument Display, Cannes, France, 2-6 Dec. 1985 Submitted for publication
(Contract DRET-83-1160)
(ISL-CO-224/85; ESA-86-97629) Avail: NTIS HC A02/MF A01

The problems of recording holograms through optical fibers are discussed. Tests made using a holographic arrangement are described. The experimental set up includes a continuous wave or pulsed laser, one or several multimode fibers, an imaging fiber bundle for the object beam and a monomode fiber for the reference beam. Various holograms of a small object were recorded and reconstructed images are shown. ESA

N86-31877# Institut Franco-Allemand de Recherches, St. Louis (France).
A SINGLE SIDEBAND SUPPRESSED CARRIER (SSBSC) INTERFEROMETER FOR THE MEASUREMENT OF DIELECTRIC PROPERTIES OF LASER HEATED MATERIALS
J. Pierson 22 Oct. 1985 10 p Presented at 15th European Microwave 85 Conference, Paris, France, 9-13 Sep. 1985
(ISL-CO-228/85; ESA-86-97630) Avail: NTIS HC A02/MF A01

A method to measure the dielectric properties of ceramic materials at high temperatures is described. The device is a Ka band microwave bridge which uses a single sideband suppressed carrier signal as reference. A carrier modulated by ferrite modulator around its maximum insertion loss gives a double sideband suppressed carrier signal. By addition of two such signals the SSBSC is obtained. The high rejection of the carrier and the other sideband gives results with the required accuracy. By this method the temperature range of dielectric measurements is extended to 2500 K. ESA

N86-31878# Societe Europeenne de Propulsion, Puteaux (France). Space Dept.
GAS FLOWMETER FOR A SPACE CRYOSTAT Final Report [DEBITMETRE A GAZ POUR CRYOSTAT SPATIAL]
R. Petit Paris ESA 28 Jun. 1985 142 p In FRENCH; ENGLISH summary

(Contract ESTEC-5486/83)
(SEP-TS/SE/BT/10.289/85; ESA-CR(P)-2189; ESA-86-97786) Avail: NTIS HC A07/MF A01

A flowmeter for hydrogen and helium fluid loops was designed for the Infrared Space Observatory. The design is based on a commercial thermal mass analyzer (temperature, pressure, flow). Main modifications concern the electronic parts. A test program including functional tests down to 100 K, and vibration tests at qualification level were carried out. The tests fulfill all the specifications. ESA

N86-31879# Rome Univ. (Italy). Dipt. di Fisica.
EVOLUTION OF NUCLEAR EMULSION TECHNIQUES IN THE FIRST HALF OF THIS CENTURY [EVOLUZIONE TECHNICA DELLE EMULSIONI NUCLEARI NELLA PRIMA META'DEL 1900(I)]
M. Grilli 22 Jan. 1986 51 p In ITALIAN
(Nota-Interna-860; ESA-86-97894) Avail: NTIS HC A04/MF A01

The history of the discovery and developing of photographic techniques to detect and record elementary particle signatures is reviewed. Results of Kinoshita on alpha particles interaction with photographic emulsions, Mayer and Sahmi scattering chamber, thick emulsion for neutron detection, chemical sensitivation of neutron detecting emulsions, proton sensitive plates, and modern nuclear application photographic plates are discussed. ESA

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-31880# Tacan Aerospace Corp., Carlsbad, Calif.
NONLINEAR OPTICAL INTERACTIONS IN SEMICONDUCTORS Final Report, 10 Aug. 1983 - 31 Dec. 1985
Michael M. Salour 10 Dec. 1985 16 p
(Contract F49620-83-C-0147)
(AD-A166182; AFOSR-86-0089TR) Avail: NTIS HC A02/MF A01 CSCL 20/5

The optical pumping technique in GaAs has led to the development of a novel and highly sensitive optical temperature sensor. Completed is the experiment on two photon optical pumping in ZnO. An external cavity semiconductor laser involving ZnO as a gain medium was demonstrated under two-photon excitation. This laser should have a major impact on the development of tunable blue green radiation for submarine communication. Completed is a paper on heat buildup in semiconductor platelets. New lasers are used to explore elementary excitation in optical thin film layers of semiconductors. This has led to the first demonstration of the feasibility of room temperature operation of a tunable coherent source involving multiple quantum well material. Completed is the construction of a simple remote (non-contact) temperature sensor to directly measure heat buildup in semiconductor materials as a result of high power optical laser excitation. Finally, an experiment involving optical frequency mixing to probe electrodynamics in the GaAlAs multiple quantumwell and superlattice structures, utilizing two recently constructed tunabel laser systems,has been successful. Attempts were focused on observing a number of new optical effects including nonlinear absorption and transmission phenomena, enhanced spontaneous and stimulated light scattering processes, etc. The construction of an external cavity semiconductor HgCdTe has been successful. GRA

N86-31881# Lawrence Livermore National Lab., Calif.
NOVA PERFORMANCE AT ULTRA HIGH FLUENCE LEVELS
J. T. Hunt 1986 9 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-Optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-006724; UCRL-93886; CONF-860117-3) Avail: NTIS HC A02/MF A01

Nova is a ten beam high power Nd:glass laser used for inertial confinement fusion research. It was operated in the high power high energy regime following the completion of construction in December 1984. During this period several interesting nonlinear optical phenomena were observed. These phenomena are discussed in the text. DOE

N86-31882# Lawrence Livermore National Lab., Calif.
CURRENT STATUS IN DEVELOPMENT OF AVERAGING LASER STRAINOMETER AND TESTING SYSTEM
R. L. Brady 19 Jun. 1986 14 p Presented at the 41st Meeting of the IMOG Subgroup on Environmental Testing, Miamisburg, Ohio, 18 Jun. 1985
(Contract W-7405-eng-48)
(DE86-006727; UCRL-92746; CONF-8506117-4) Avail: NTIS HC A02/MF A01

The advent of a new method of sweeping a laser beam to accurately measure a shadow image offers unique applications to mechanical testing. A new commercial low power continuous wave laser system designed for metrological applications is being applied to the testing of a delicate, brittle, notch sensitive, hygroscopic material requiring dry box enclosure. An integrated testing system is being developed to provide remote strain sensing of minimum, maximum, and average surface strains on the cylindrical portion of a compression specimen. The system additionally provides the means to compensate for bending strains observed in pretest alignment evaulation. The results of the development of the testing fixture to date are discussed. DOE

N86-31883# Joint Inst. for Lab. Astrophysics, Boulder, Colo.
EXPERIMENTAL INVESTIGATIONS OF THE ROLE OF LASER FIELD FLUCTUATIONS IN NON-LINEAR OPTICAL ABSORPTION PROCESSES
S. J. Smith 1985 11 p Presented at the 6th International Conference on Coherent Optics, Ustron, Poland, 19 Sep. 1985
(Contract DE-AC02-80ER-10736)
(DE86-006919; CONF-8509245-1) Avail: NTIS HC A02/MF A01

In the experimental program described, a well-stabilized single mode laser beam was deliberately broadened by introducing fluctuations to the laser frequency in order to synthesize laser power spectra for which the fluctuations are well-characterized to all orders in a statistical sense. This technique produces single mode laser fields which have nearly Lorentzian power spectra at one limit, essentially Gaussian power spectra at the other limit, and which may be varied continuously between these two limits. DOE

N86-31884# Lawrence Livermore National Lab., Calif.
COATINGS FOR HIGH ENERGY APPLICATIONS. THE NOVA LASER
G. R. Wirtenson 1986 35 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-48)
(DE86-009407; UCRL-93950; CONF-860117-8) Avail: NTIS HC A03/MF A01

The combined requirements of energy density, multiple wavelength, and aperture make the coatings for the Nova Inertial Confinement Fusion (ICF) laser unique. This ten beam neodymium glass laser system, built at the Lawrence Livermore National Laboratory (LLNL), has over a thousand major optical components; some larger than one meter in diameter and weighing 380 Kg. The laser operates at 1054 nm and can be frequency doubled to 527 nm or tripled to 351 nm by means of full aperture potassium dihydrogen phosphate (KDP) crystal arrays. The 1.0 nsec fluence varies along the laser chain, sometimes reaching values as high as 16 J/cm(2) at the input lens to one of the spatial filters. The design specifications of this massive optical system were changed several times as the state-of-the-art advanced. Each change required redesign of the optical coatings even as vendors were preparing for production runs. Frequency conversion to include shorter wavelengths mandated the first major coating redesign and was followed almost immediately by a second redesign to reduce solarization effects in borosilicate crown glass. The conventional thermal evaporation process although successful

for the deposition of mirror coatings, was not able to produce antireflection coatings able to survive the locally high chain fluences. As a consequence it became necessary to develop another technique. Solution produced coatings were developed having transmissions exceeding 99% per part and damage threshold values equal to the bare substrate. The unique requirement of the Nova laser necessitated special deposition and metrology equipment. These programmatic developments will be reviewed in the context of the cooperative working relationship developed between LLNL and its vendors. It was this excellent relationship which has enabled LLNL to obtain these highly specialized coatings for the Nova laser. DOE

N86-31885# Lawrence Livermore National Lab., Calif.
TIME AND SPACE RESOLVED SPECTROSCOPY OF X-RAY LASER EXPERIMENTS
N. M. Ceglio 1 Apr. 1986 23 p Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
(Contract W-7405-eng-48)
(DE86-009403; UCRL-94257; CONF-851053-12) Avail: NTIS HC A02/MF A01

We report experimental data from one of the first of this new generation of instruments designed specifically for laboratory X-ray laser diagnosis. Representative TGSS-EM data are presented from three different X-ray laser inversion schemes: collisional excitation of neon-like selenium (lambda approx. = 206, 209A); resonant photoexcitation of hydrogen-like fluorine (lambda = 81A); and recombination of hydrogen-like magnesium (lambda approx. = 130A). The data illustrate the measurement capabilities of the TGSS-EM and provide insight to the dynamics and emission characteristics of this new class of laser produced plasmas. DOE

N86-31886# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
COMPETITION NOISE IN AN OPTICAL DIVIDER [KOMPETITIERUIS BIJ EEN OPTISCHE VERDELER]
G. J. A. M. vanLaarhoven May 1984 86 p In DUTCH
(ESA-86-97538) Avail: NTIS HC A05/MF A01

A model to determine the impact of competition noise on an optical communication system was set up. An optical divider based on the spatial wave front division principle and consisting of five fibers located in the radiation field of a laser diode without the use of optical devices was developed. Random fluctuations of the power of the laser causes competition noise. The theory was verified using random error measurements on the system. It is concluded that competition noise in an optical communication system can be neglected; the divider is recommended. ESA

N86-31887# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Kreiselgeraete und Traegheitsnavigation.
INVESTIGATIONS OF LASER MIRRORS WITH DIFFERENT DESIGN
Rolf Gauert and Helmut Rosteck Dec. 1985 42 p In GERMAN; ENGLISH summary
(DFVLR-FB-85-65; ISSN-0171-1342; ESA-86-97584) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 17

Laser mirror reflectivity and integral backscattering were investigated. Mirrors were industrially fabricated, or were developed at DFVLR and have ZnS/MgF2 or Ag/ZnS/MgF2 interference coatings. The experimental mirror-coating machine was modified to get reproducible mirrors. The substrate holder was reconstructed so that privileged directions in the layer combination are suppressed. The measurement of the transmissibility during the coating process was carried out at an angle of incidence of 30 deg with a built-in deflection device. An IR heating device mounted into the machine enabled temperature of the substrates and the substrate holder to rise to 130 C. The effects limiting the mirror parameters, such as substrate temperature, impurities on the substrate surfaces, and evaporation speed, are discussed. The measurements show that substrate heating of ZnS/MF2 coatings provide hard and stable layers; the use of Ag/ZnS/MgF2 layer combinations increases the reflectivity by 0.1%. ESA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-31888 Societe Europeenne de Propulsion, Vernon (France).
STUDY OF TEST BENCH DANGERS IN VULCAN ENGINE TURBOPUMP TESTS. (A COMPONENT OF ARIANE 5 LAUNCHER) [ETUDE DES DANGERS DU BANC D'ESSAI DES TURBOPOMPES DU MOTEUR VULCAIN (DESTINE AU FUTUR LANCEUR EUROPEEN ARIANE 5)]
Herve Montalva, Olivier Creignou, and Guy Corteel 1986 30 p In FRENCH Presented at 4th Seminaire Europeen pour la Securite des Systemes, Deauville, France, 4-6 Jun. 1986
(ESA-86-97632) Avail: NTIS HC A03

The method employed for risk analysis and safety goals verification when designing a test bench for cryogenic turbopumps is discussed. During the tests, the oxygen is transfered to another tank while the hydrogen is burned in a specially designed water pond. The explosion risk is analyzed as a function of the mass of fuel involved, the instantaneous overpressure, thermal effects, and debris projection. The accident probability is estimated at 1 in 5000, for 100 tests in 1 yr. ESA

N86-31889*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SURFACE FATIGUE AND FAILURE CHARACTERISTICS OF HOT FORGED POWDER METAL AISI 4620, AISI 4640, AND MACHINED AISI 4340 STEEL SPUR GEARS
Dennis P. Townsend 1986 34 p Presented at the Annual Meeting of the American Society of Lubrication Engineers, Toronto, Ontario, 12-15 May 1986
(NASA-TM-87330; E-3024; NAS 1.15:87330) Avail: NTIS HC A03/MF A01 CSCL 13I

Spur gear surface fatigue endurance tests were conducted to investigate hot forged powder metal AISI 4620 and 4640 steel for use as a gear material, to determine endurance characteristics and to compare the results with machined AISI 4340 and 9310 steel gear materials. The as-forged and unground SISI 4620 gear exhibited a 10 percent fatigue life that was approximately one-fourth of that for AISI 9310 and less than one-half that for the AISI 4340 gears. The forged and finish ground AISI 4620 gears exhibited a 10 percent life, approximately 70 percent that of AISI 9310 and slightly better than that of AISI 4340. The AISI 4640 hot forged gears had less fracture toughness and slightly less fatigue life than the AISI 4620 test gears. Author

N86-31890*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LIQUID HELIUM PUMPS FOR IN-ORBIT TRANSFER
Peter Kittel Apr. 1986 36 p
(NASA-TM-88239; A-86201; NAS 1.15:88239) Avail: NTIS HC A03/MF A01 CSCL 13K

Both mechanical and fountain-effect pumps are being considered for use in the in-orbit resupply of superfluid helium to a number of scientific instrument systems. This paper presents a review of the operating characteristics of these pumps. Particular emphasis will be given to the different methods of evaluating the efficiency of these pumps and their effectiveness in a transfer system. Author

N86-31891# Department of the Navy, Washington, D. C.
MECHANICAL RELOCKER FOR LOCKING BOLTS Patent
Teddy L. Pickett and Henry L. Self, inventors (to Navy) Issued 7 Jan. 1986 6 p Supersedes AD-D010900
(AD-D012209; US-Patent-4,562,706; US-Patent-Appl-SN-577100; US-Patent-Class-70-1.5) Avail: US Patent and Trademark Office CSCL 13/5

This patent discloses a torsion spring which longitudinally

rotates a locking bolt when the bolt actuating linkages is severed. A woodruff key or the like is upstanding from a surface of the bolt. When the linkage is undamaged, the key slides with the bolt through a slot on the lock frame. When the bolt is rotated by the spring, it is locked in the rotated position by a locking pawl. In the rotated position, the key is out of registry with the slot and the bolt cannot be withdrawn from its extended, locking position. A second embodiment replaces the key with a recess in the bolt into which a locking pawl engages to prevent movement of the locking bolt. GRA

N86-31892# Department of the Air Force, Washington, D.C.
IMPROVED ROBOTIC KITTING STATION Patent Application
Howard A. Reuter, inventor (to Air Force) Filed 15 Jan. 1986 23 p
(AD-D012238; US-Patent-Appl-SN-819185) Avail: NTIS HC A02/MF A01 CSCL 15/5

The assembly of electrical components into kits is accomplished by: a computer controlled robot; rotary rack carousel; a work station; an elevator; and a system controller. The carousel houses a systematically stored supply of electrical components in trays. The elevator has a rotating turntable with two oppositely oriented motor driven tray inserting and extracting grippers which supply the trays to the work station so that the robot can assemble the kits. The work station has two tray receiving tables which are alternately shuttled side-to-side to supply the kitting robot with trays of components from the carousel via the elevator. In operation, the robot arm picks parts from tray 1 with the dual indexing table in a first predetermined position. During this time empty tray 2 is returned to the carousel or storage. When the turntable rotates, tray 3 is slid in position on the empty indexing table. After tray 1 is emptied the tables shuttle sideward and tray 1 is returned to the elevator turntable while tray 3 is emptied. The cycle is then repeated. GRA

N86-31893# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
IMPROVEMENT OF THE CORROSION RESISTANCE OF TURBINE ENGINE BEARINGS Final Report, Aug. 1981 - Aug. 1985
J. H. Mohn, H. M. Hodgens, II, H. E. Munson, and W. E. Poole Apr. 1986 207 p
(Contract F33615-81-C-2023)
(AD-A167355; PWA/GPD-FR-18566; AFWAL-TR-85-2097) Avail: NTIS HC A10/MF A01 CSCL 11/6

Improved bearing corrosion resistance can be achieved with either the use of a new corrosion resistant alloy, or by surface treating, or coating state-of-the-art M50 with a protective covering. This two-phase program investigated all three methods; alloys, coatings, and surface treatments. Appropriate bearing materials, surface treatments, and coatings were identified. Screening tests were performed on the most promising candidates. Candidates with potential for improving bearing corrosion resistance included corrosion resistant alloys such as CRB7 (AMS5900), and BG42 (AMS5749), coatings such as the proprietary chrome plating process called Armoloy, and surface treatments such as nickel sputter-coated M50. This program was aimed at developing an alternate material, fabrication technique, or material treatment of turbine engine mainshaft bearings with improved corrosion resistance compared to state-of-the-art VIM-VAR-M50. During Phase I, five corrosion-resistance bearing candidates (Armoloy-coated M50, nickel sputter-coated M50, wrought CRB7, RSR565, and MRC2001) were identified as the most promising. These were subjected to rolling contact fatigue, corrosion, hot hardness, and wear screening tests. GRA

N86-31894# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
A CLOSED-FORM SOLUTION FOR INVERSE KINEMATICS OF ROBOT MANIPULATOR WITH REDUNDANCY
Pyung H. Chang 31 Mar. 1986 27 p
(Contract N00014-85-K-0124)
(AD-A167850; AI-M-854) Avail: NTIS HC A03/MF A01 CSCL 13/9

A closed-form equation for inverse kinematics of robot manipulators with redundancy is derived, using the Lagrangian multiplier method. The proposed equation is proved to provide the exact equilibrium state of the resolved motion method, and is shown to be a general expression that yields the extended Jacobian method. The repeatability problem in the resolved motion method does not exist in the proposed equation. The equation is demonstrated to give more accurate trajectories than the resolved motion method. Author (GRA)

N86-31895# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
REDUNDANCY RESOLUTION OF MANIPULATORS THROUGH TORQUE OPTIMIZATION
John M. Hollerbach and Ki C. Suh Jan. 1986 18 p
(Contracts F33615-83-C-5115; N00014-77-C-0389)
(AD-A167851; AI-M-882) Avail: NTIS HC A02/MF A01 CSCL 13/9

Methods for resolving kinematic redundancies of manipulators by the effect on joint torque are examined. When the generalized inverse is formulated in terms of accelerations and incorporated into the dynamics, the effect of redundancy resolution on joint torque can be directly reflected. One method chooses the joint acceleration null-space vector to minimize joint torque in a least squares sense; when the least squares is weighted by allowable torque range, the joint torques tend to be kept within their limits. Contrasting methods employing only the pseudoinverse with and without weighting by the inertia matrix are presented. The results show an unexpected stability problem during long trajectories for the null-space methods and for the inertia-weighted pseudoinverse method, but rarely for the unweighted pseudoinverse method. Evidently a whiplash action develops over time that thrusts the endpoint off the intended path, and extremely high torques are required to overcome these natural movement dynamics. Author (GRA)

N86-31896# Department of the Air Force, Washington, D.C.
SAFE-ARM EXPLOSIVE TRANSFER MECHANISM Patent Application
Jensen, inventor (to Air Force) Filed 25 Feb. 1986 24 p
(AD-D012333; US-Patent-Appl-SN-833640) Avail: NTIS HC A02/MF A01 CSCL 19/1

A safe-arm mechanism for an air-delivered explosive device uses a slider containing explosive leads as the means of interrupting the explosive train. The slider is locked in the safe position such that the explosive leads are out-of-line with respect to the detonator. The slider is attached directly to the main parachute such that when two locks are removed the parachute deployment forces can overcome a shear pin lock and move the slider to an in-line or armed position where it is positively retained. In this position, initiation of the detonator will allow the explosive output of the detonator to be transferred to its associated explosive device and provide a dual point radial initiation of its booster charge. GRA

N86-31897# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
AUTOMATED VALVE EXPERTISE CAPTURE
D. L. Crandall 1985 6 p Presented at the Applications of Artificial Intelligence to Engineering Problems, Southampton, Engl., 15 Apr. 1985
(Contract DE-AC07-76ID-01570)
(DE86-004127; EGG-M-26885; CONF-8504204-1) Avail: NTIS HC A02/MF A01

Many experimental systems designed for energy research and development require the control of fluid flows. Selecting the appropriate valves for such systems is complicated not only by the uniqueness of the systems designed, but also by the availability of a variety of valves from a multitude of valve manufacturers. Individuals in large mechanical engineering organizations that design these experimental systems require comprehensive expert knowledge of valve selection but possess only limited portions of this experience based knowledge. Even though these organizations

have the expertise among their engineers, it is not consistently available to the right individual at the time of design. Expert systems (programs that solve problems by logical inference based on a store of knowledge) may eventually improve valve selection in mechanical design firms, but only if the problem of extracting and accumulating the expertise in the organization can be solved. This paper describes a computerized prototype titled VALVEFIND designed to accumulate specialized expertise in valve selection. DOE

N86-31898# SKF Industries, Inc., King of Prussia, Pa.
MECHANICAL INTERACTIONS OF ROUGH SURFACES Quarterly Progress Report, 31 Dec. 1985 - 31 Mar. 1986
J. T. McCool Apr. 1986 9 p
(Contract DE-AC02-84ER-13163)
(DE86-009161; DOE/ER-13163/10) Avail: NTIS HC A02/MF A01

An approach is described for estimating the shape of a roughness profile spectrum based on two parameters normally output by a stylus profile device. The validity of the approach is assessed for twelve distinct surfaces. An experimental approach to studying microfracture in ceramics is described. DOE

N86-31899# Sandia National Labs., Albuquerque, N. Mex.
CALORIMETRY OF THE ARC WELDING PROCESS
P. W. Fuerschbach and G. A. Knorovsky 1986 5 p Presented at the 2nd General Meeting on Calibration of Welding Systems, Livermore, Calif., 26 Feb. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009280; SAND-86-0817C; CONF-860283-1) Avail: NTIS HC A02/MF A01

Minimizing the total heat input in arc welding is not usually a critical consideration when the size of the fusion zone and the weldment are very large. At SNLA, however, most welding can usually be described as microwelding. The depth of penetration is typically only 0.8 mm and hermeticity rather than mechanical strength is the primary joining requirement. For these type welds, minimizing heat input becomes a major process requirement since distortion of small components and damage to heat sensitive parts may result from large increases in the bulk temperature. In conclusion, we have found calorimetry to be a useful technique to determine the effect of arc welding process variables on heat input and melting efficiency and also to better select the required welding process for our weld geometries. DOE

N86-31900# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
FINITE-ELEMENT MODELING OF PINCH WELDS
K. E. Kain Mar. 1986 30 p
(Contract DE-AC09-76SR-00001)
(DE86-009573; DP-1715) Avail: NTIS HC A03/MF A01

Finite-element modeling was performed on pinch welds used to seal deuterium-tritium reservoirs at SRP. The analysis examined two of the possible failure mechanisms in these welds - service stresses and hydrogen/helium embrittlement. Both confined and unconfined weld geometries were considered. Service stresses due to the internal pressure of the deuterium-tritium gas mixture were modeled. Stress concentrations arising from an elastic material were examined along with those resulting from plastically deforming alloys. In addition, the analysis included deuterium and tritium diffusion along with radioactive decay of tritium to helium. Results show that the presence of embrittling species, in combination with large stress concentrations, would cause fracture if it occurred, to initiate preferentially in the corner regions of the tube. Comparisons of pinch weld geometries suggest that controlling weld contour will have minimal effect on resistance to crack growth. DOE

N86-31901# Sandia National Labs., Albuquerque, N. Mex.
SENSOR-DRIVEN, FAULT-TOLERANT CONTROL OF A MAINTENANCE ROBOT
M. M. Moya and W. M. Davidson 1986 23 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-002118; SAND-85-2152C; CONF-860434-3) Avail: NTIS HC A02/MF A01

A robot system has been designed which will perform routine maintenance tasks on the Sandia Pulsed Reactor (SPR). The use of this Remote Maintenance Robot (RMR) is expected to significantly reduce the occupational radiation exposure of the reactor operators. Reactor safety was a key issue in the design of the robot maintenance system. Using sensors to detect error conditions and intelligent control to recover from the errors, the RMR is capable of responding to error conditions without creating a hazard. This paper describes the design features and implementation methods used to create sensor-driven, fault-tolerant control of the RMR. Features which make the system more tolerant to error conditions include the following: mechanical tolerances, continuous monitoring of force sensors, monitoring of verification switches, index point referencing, spiral searching with force feedback, and operator supervision. The paper also describes the mechanisms for error recovery. Error recovery is not automatic; it does rely on operator assistance. However, a key feature of the error recovery proce dure is that the operator is allowed to reenter the programmed operation after the error has been corrected. The recovery procedure guarantees that the moving components of the system will not collide with the reactor during recovery. DOE

N86-31902# Lawrence Livermore National Lab., Calif.
VIBRATION DAMPING IN EXTERNALLY PRESSURIZED GAS BEARINGS
J. W. Roblee and C. D. Mote, Jr. Jun. 1986 7 p Presented at the International Conference on Vibration Problems in Engineering, Xian, China, 17 Jun. 1986 Prepared in cooperation with California Univ., Berkeley
(Contract W-7405-eng-48)
(DE86-003470; UCRL-93600; CONF-860651-1) Avail: NTIS HC A02/MF A01

The damping mechanisms in externally-pressurized gas bearings are investigated. A single-pole, single-zero transfer function is used to describe the dynamic stiffness of these bearings. The benefits of tuning their frequency-dependent damping are discussed and demonstrated experimentally. A type of auxiliary compensation is also shown to alter the dynamic stiffness of these bearings. DOE

N86-31903# Oak Ridge National Lab., Tenn.
STIRLING MACHINES: ADIABATIC TO ISOTHERMAL
C. D. West 1986 19 p Presented at the 3rd International Stirling Engine Conference, Rome, Italy, 1 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-005407; CONF-860676-1) Avail: NTIS HC A02/MF A01

In most real Stirling engines the gas behavior in the cylinder is almost adiabatic, in contrast to the ideal Stirling engine in which all processes are isothermal. The combination of nearly adiabatic cylinders and nearly isothermal heat exchangers found in most Stirling engines leads to irreversibilities and loss of efficiency. Still worse, in many cases, is the performance of cylinders with a finite heat transfer intermediate between a near-adiabatic and near-isothermal behavior. Because of this behavior and because of the low thermal diffusivity of high-pressure gases, there is little hope of sufficiently enhancing the heat transfer within the cylinder of a conventional Stirling engine to increase the efficiency - in most cases, a decrease is more likely to result. DOE

N86-31904# Helsinki Univ. Technology, Otaniemi (Finland). Internal Combustion Engine Lab.
ALCOHOL AS A FUEL IN A HIGH SPEED DIESEL ENGINE WITH DOUBLE INJECTION SYSTEM
J. Laurikko and J. Pitkaenen 1985 133 p In FINNISH
(DE86-751653; TKK-KO/PM-47) Avail: NTIS (US Sales Only) HC A07/MF A01

This report describes the results of tests carried out on a diesel engine equipped with two separate fuel injection systems and using alcohol as the main fuel. There is the possibility of

using pure alcohol as the main fuel in a diesel engine equipped with two fuel injection systems where ordinary diesel oil is used as ignition fuel. The advantages of this method are the large proportion of alcohol in the total amount of fuel and the possibility of using pure alcohol without the expensive ignition improving additive. The drawback is the high cost due to the complicated construction of the system, which is partly compensated by the cheaper fuel. The operation of a diesel engine with double injection systems is studied and the main parameters that control the combustion are compared to the data from similar tests given in the literature. The test results showed that from the parameters controlling the combustion the type of the auxiliary nozzle (i.e., the direction of the ignition fuel spray) had the strongest effect on engine performance. The B-type nozzle with fuel spray directed across the swirl in the combustion chamber gave better performance than the A-type, where ignition fuel was injected to the direction of the swirl. The B-type nozzle gave also better distribution and mixing of the ignition fuel, therefore the ignition lag of the main fuel was shorter and the brake thermal efficiency slightly better than with the A-type nozzle. DOE

N86-31905# Oak Ridge Gaseous Diffusion Plant, Tenn.
MAGNETIC BEARINGS: AN ADAPTIVE SOLUTION TO MOTION-CONTROL PROBLEMS
M. B. Scudiere and G. T. Gillies Mar. 1986 33 p
(Contract DE-AC05-84OT-21400)
(DE86-010615; K/TS-11780) Avail: NTIS HC A03/MF A01

High-precision rotating machinery often employs sophisticated motion-control systems. Typical of such systems are magnetic bearings. In this paper, the operational principles of feedback systems for magnetically suspended rotors are explored, with special emphasis on the rotor position sensors, servo circuits, and sources of magnetomotive force. Several applications for these systems are identified, and some important design characteristics in magnetic bearing technology are reviewed. The role played by Martin Marietta Energy Systems, Inc., and the University of Virginia in research and development of new suspension/bearing technologies is discussed, and their most recent contributions to this field are presented. DOE

N86-31906# GA Technologies, Inc., San Diego, Calif.
THERMAL HISTORY OF HT-9 WELDMENT HEAT-AFFECTED ZONES DURING WELDING
J. R. Foulds Apr. 1986 22 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract DE-AC03-84ER-53158)
(DE86-010684; GA-A-18430; CONF-860421-48) Avail: NTIS HC A02/MF A01

HT-9, a commercial 12Cr-1Mo ferritic steel, is a candidate structural material for fusion reactor first walls. The microstructure in weldments of this material has been observed to vary over short distances as a function of the varying thermal history during welding. An example is the observation of several heat-affected zones over less than a 2.5 mm (0.1 in.) distance from the weld/base metal interface. The mechanical behavior response of local weldment microstructures can be characterized by simulation of the structure over larger usable volumes of material. This requires precise knowledge of the local thermal history during welding. An empirical equation for describing the thermal history of HT-9 weldment heat-affected zones during gas tungsten-arc welding is presented in this paper. Both peak temperatures and cool-down cycles, are predictable at any location in the base metal heat-affected zone for welding of plate under heat flow conditions similar to those anticipated for first wall component fabrication, i.e., two-dimensional heat flow. Power input and preheat effects are included in the equation. DOE

N86-31907# Argonne National Lab., Ill.
LEAKAGE FLOW-INDUCED VIBRATIONS FOR VARIATIONS OF A TUBE-IN-TUBE SLIP JOINT
T. M. Mulcahy Jan. 1986 39 p
(Contract W-31-109-eng-38)
(DE86-010765; ANL-86-11) Avail: NTIS HC A03/MF A01

Variations in the design of a specific slip joint separating two cantilevered, telescoping tubes conveying water were studied to determine their effect upon the leakage flow-induced vibration self-excitation mechanism known to exist for the original slip joint geometry. The important parameters controlling the self-excitation mechanism were identified, which, along with previous results, allowed the determination of a comprehensive set of design rules to avoid unstable vibrations. This was possible even though a new self-excitation mechanism was found when the engagement of the two tubes was small. DOE

N86-31908# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna.
DETERMINATION OF THE WEAR OF THERMOPLASTIC JOURNAL BEARINGS IN THE INITIAL STRAIN
Erich Frevert, Friedrich Franek, Robert Piringer, and Andreas Suschnig Jan. 1986 37 p In GERMAN; ENGLISH summary Presented at Seminar on Elektromechanische Konstruktionen, Vienna, Austria
(OEFZS-4345; IA-146/86; ESA-86-97247) Avail: NTIS HC A03/MF A01

The measurement of the wear of thermoplastic journal bearings using the radionuclide technique was investigated. The activation of the bearings can lead to changes in the molecular structure if it lasts too long. The wear of six activated bearings of one type was obtained in a fixed sequence and for given peripheries of the shaft. The amount of wear was calculated by comparing the radiation intensity of the wear probes with that of a standard specimen. The detection limit is 2 microg. In spite of the deviations of the single values caused by unequal loads on axis, the mean values show an indication of a bedding-in process up to 4000 m operating length followed by relatively constant wear. The simultaneous activation analysis of the probes shows that the proportionate distribution of the trace elements in the wear and thus in the surface layer of the bearings is different from the average distribution in the whole bearings. ESA

N86-31909# Optische Werke G. Rodenstock, Munich (West Germany).
NONCONTACT MEASUREMENT OF ROUGHNESS OF GROUND AND POLISHED METAL SURFACES Final Report, Oct. 1983
Rainer Brodmann Bonn, West Germany BMFT Dec. 1985 26 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-T-85-150; ISSN-0340-7608; ESA-86-97438) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5.50

An optical roughness measuring instrument consisting of a diode array and an optical system was used for noncontact roughness measurement based on the light scattering method. A microcomputer gives the roughness value, the intensity on the array, and the intensity distributions from the measured intensity values. The measurements can be performed on a static or mobile surface. The characteristics of the instrument are reviewed. Its applications to metal, semiconductor, ceramic, and plastic surfaces are presented. The optical roughness measuring instrument can be used as an automatic measuring station in mass production with synchronous parts feed and measurement recording. ESA

N86-31910# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
SEMIACTIVE MAGNETIC BEARINGS FOR SPACE APPLICATION
M. Gauthier and C. Rouyer 1986 7 p Presented at Second ESA European Symposium on Space Mechanisms and Tribology, Schloss Meersburg, West Germany, 9-11 Oct. 1985
(SNIAS-861-422-120; ESA-86-97605) Avail: NTIS HC A02/MF A01

Magnetic bearings developed for space application are compared to ball bearings. The design principles of one axis and two axis systems included in the SPOT satellite design are examined. The function of complementary active centering controls are explained. It is shown that magnetic bearings are advantageous

for high kinetic moment momentum wheels (150 Nms and over) or when redundancy can be avoided due to a better relaibility. ESA

N86-31911# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Mechanical Engineering.
RESIDUAL STRESS AND DEFORMATION ENERGY UNDER GROUND SURFACES OF BRITTLE SOLIDS
O. Podzimek 23 Apr. 1986 124 p
(WB-85-16; B8664575; ESA-86-98068) Avail: NTIS HC A06/MF A01

Deformation energy accumulated under the surface of brittle solids, especially those of optical glass, during the free abrasive grinding process was analyzed. The distribution of deformation energy density in depth under the ground surface was investigated. A model for the free abrasive grinding process was derived using the deformation energy density experimentally determined in relation to the abrasive size, grinding rate, and input power. The model was validated against a series of relations between process parameters from the literature. ESA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-31912*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FACTORS THAT AFFECT RELIABILITY OF NONDESTRUCTIVE DETECTION OF FLAWS IN STRUCTURAL CERAMICS
S. J. Klima, G. Y. Baaklini (Cleveland State Univ., Ohio), and D. J. Roth 1986 11 p Presented at the 2nd International Symposium on Ceramic Materials and Components for Engines, Luebeck-Travemuende, West Germany, 14-17 Apr. 1986; sponsored by the German Ceramic Society and the American Ceramic Society
(NASA-TM-87348; E-3096; NAS 1.15:87348) Avail: NTIS HC A02/MF A01 CSCL 14D

The factors that affect reliability of nondestructive detection of flaws in structural ceramics by microfocus radiography and scanning laser acoustic microscopy (SLAM) were investigated. Reliability of void detection in silicon nitride and silicon carbide by microfocus X-rays was affected by photon energy level, material chemistry in the immediate vicinity of the void, and the presence of loose powder aggregates inside the void cavity. The sensitivity of SLAM to voids was affected by material microstructure, the level of porosity, and the condition of the specimen surfaces. Statistical results are presented in the form of probability of detection as a function of void diameter for green compacts and sintered materials. Author

N86-31913*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
QUANTITATIVE VOID CHARACTERIZATION IN STRUCTURAL CERAMICS USING SCANNING LASER ACOUSTIC MICROSCOPY
Don J. Roth, Edward R. Generazio, and George Y. Baaklini (Cleveland State Univ., Ohio) 1986 23 p Proposed for presentation at the Basic Science, Electronics and Glass Divisions Joint Meeting, New Orleans, La., 2-5 Nov. 1986; sponsored by American Ceramic Society
(NASA-TM-88797; E-3166; NAS 1.15:88797) Avail: NTIS HC A02/MF A01 CSCL 14D

The ability of scanning laser acoustic microscopy (SLAM) to characterize artificially seeded voids in sintered silicon nitride structural ceramic specimens was investigated. Using trigonometric relationships and Airy's diffraction theory, predictions of internal void depth and size were obtained from acoustic diffraction patterns produced by the voids. Agreement was observed between actual and predicted void depths. However, predicted void diameters were generally much greater than actual diameters. Precise diameter predictions are difficult to obtain due to measurement uncertainty and the limitations of 100 MHz SLAM applied to typical ceramic specimens. Author

N86-31914# Advanced Research and Applications Corp., Sunnyvale, Calif.
A NEW RADIOGRAPHIC CORROSION INSPECTION CAPABILITY Final Report, 2 Jul. 1984 - 2 Jan. 1985
J. H. Stanley and J. J. LePage Jan. 1986 53 p
(Contract F33615-84-C-5089)
(AD-A167270; FR85-352-1; AFWAL-TR-85-4130) Avail: NTIS HC A04/MF A01 CSCL 14/5

A dual-energy radiographic technique is reported which could significantly enhance the corrosion detection and damage assessment capabilities of any radiometric system. Digital radiographs taken at two different effective energies are manipulated in such a way as to greatly improve the conspicuity of detail in the image by reducing the amount of structural noise present. The improved sensitivity offered by the method can be traded for an equivalent detectability at a much lower dose level, an important consideration for on-board or in-situ inspections. In addition, an important consideration when foreign material is present. Results indicate that the effective atomic number of unknown contaminants can be determined to better than 3% absolute error. GRA

N86-31915# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ULTRASONIC INSPECTION OF PARTIALLY COMPLETED WELDS USING PATTERN RECOGNITION TECHNIQUES
N. M. Carlson and J. A. Johnson 1986 8 p Presented at the Quantitative NDE, Williamsburg, Va., 24 Jun. 1986
(Contract DE-AC07-76ID-01570)
(DE86-003227; EGG-M-27784; CONF-860639-1) Avail: NTIS HC A02/MF A01

The feasibility of using automated ultrasonic examination with computer-based pattern-recognition techniques to inspect partially completed welds on a pass-by-pass basis is investigated. In these tests welds are inspected, as they are being made, by an automated ultrasonic search unit attached to the weld head. Flaws are intentionally made in the weld. An analysis of the ultrasonic data collected during this process shows that the flaws can be reliably distinguished from good welds and, further, that two different types of flaws can be differentiated from each other. From this analysis a practical concurrent inspection system is shown to be feasible. DOE

N86-31916# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Computer Sciences.
CUMULATIVE SUM CHARTS [CUMULATIEVE-SOM KAARTEN]
J. Praagman Apr. 1984 23 p In DUTCH
(ARW-03-THE-BDK/ORS/84/13; ESA-86-97701) Avail: NTIS HC A02/MF A01

The concept of statistical process control is presented. The cumulative sum (cusum) techniques are explained. The choice of a reference value and a scale in order to quickly visualize possible changes is discussed. The decision rules required for an efficient use of the cusum chart are outlined. The relation between the choice parameters and the performance of the procedure is discussed. The determination of the average run length is explained. It is concluded that cusum charts can be used on a wider industrial scale. ESA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-31917 Westland Helicopters Ltd., Yeovil (England). Dynamics Dept.

DYNAMIC ANALYSIS: CORRELATION OF THEORY WITH EXPERIMENT Final Report
A. McLaughlin Jun. 1983 94 p
(Contract MODA26B/10)
(RP661; DYN/83/10; BR97157; ESA-86-97258) Avail: Issuing Activity

The NASTRAN finite element system with superelements was used to compute the normal modes of vibration and transfer functions of a helicopter. Using measured model damping factors, transfer functions in the cockpit and cabin areas for main rotor head shear and moment input were synthesized. Fair agreement in mode shape is obtained for the two NASTRAN analyses, but the correlation between the shake test modes and those from the WHL NASTRAN analysis is disappointing. The transfer function correlation is also poor, though better agreement with direct measurement is obtained for the transfer function synthesis from the WHL NASTRAN modes than for the corresponding synthesis from the measured mode shapes. The measured transfer functions could not be synthesized from the measured mode shapes. The aims of the study were not realized in full due to the poor quality of the results from the shake tests. ESA

N86-31918 Instituut TNO voor Bouwmaterialen en Bouwconstructies, Delft (Netherlands).
THE DYNAMIC BEHAVIOR OF WIND TURBINE MASTS (IN THE FRAMEWORK OF WIND TURBINE DESIGN CRITERIA) [ONDERZOEK NAAR HET DYNAMISCH GEDRAG VAN WINDTURBINEMASTEN (IN HET KADER VAN ONTWERPCRITERIA WINDTURBINES)]
J. J. M. Albert, A. Waaldijk, and P. J. vanBrederode Oct. 1985 91 p In DUTCH Prepared for Nationaal Lucht- en Ruimtevaart Lab., Marknesse, Netherlands
(B-85-324; ESA-86-97771) Copyright. Avail: Issuing Activity

The dynamic behavior of wind turbine masts was measured and studied with a model in order to determine the eigenfrequencies. Measurements were performed on a wind turbine on a steel base (i.e., not on piles) and one on piles. The first is a Polenko windmill (type WPS16A60) with a height of 20m and a diameter of 16 m; the second is a Bouma windmill with a height of 25 m and a rotor diameter of 16 m. For the Polenko mill the measured values of the lowest eigenfrequency do not agree with the values predicted in the design; for the Bouma mill no prediction was available. The developed calculation model allows a good prediction of the lowest eigenfrequency for both types of wind turbine assemblies. The rotation spring constant of the foundation strongly effects the lowest eigenfrequency. ESA

N86-31919 Instituut TNO voor Bouwmaterialen en Bouwconstructies, Delft (Netherlands).
MASTS FOR SMALL WIND TURBINES [MASTLICHAMEN VOOR KLEINE WINDTURBINES]
O. D. Dijkstra Nov. 1985 24 p In DUTCH Prepared for NLR, Emmeloord, Netherlands
(B-85-583; ESA-86-97772) Copyright. Avail: Issuing Activity

Construction types of mast bodies for wind turbines are presented. The most frequently used construction material is steel; concrete is a good alternative for higher towers; brickwork is not so suited due to the dynamic behavior of the wind turbine. The different types of global steel mast forms (free tube, supported tube, case, network of bars) are discussed. The connections between the different parts of a steel mast (welding, bolt, flange plates) and their characteristics are discussed. ESA

N86-31920*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INFLUENCE OF THIRD-DEGREE GEOMETRIC NONLINEARITIES ON THE VIBRATION AND STABILITY OF PRETWISTED, PRECONED, ROTATING BLADES
K. B. Subrahmanyam and K. R. V. Kaza May 1986 43 p
(NASA-TM-87307; E-2988; NAS 1.15:87307) Avail: NTIS HC A03/MF A01 CSCL 20K

The governing coupled flapwise bending, edgewise bending, and torsional equations are derived including third-degree geometric nonlinear elastic terms by making use of the geometric nonlinear theory of elasticity in which the elongations and shears are negligible compared to unity. These equations are specialized for blades of doubly symmetric cross section with linear variation of pretwist over the blade length. The nonlinear steady state equations and the linearized perturbation equations are solved by using the Galerkin method, and by utilizing the nonrotating normal modes for the shape functions. Parametric results obtained for various cases of rotating blades from the present theoretical formulation are compared to those produced from the finite element code MSC/NASTRAN, and also to those produced from an in-house experimental test rig. It is shown that the spurious instabilities, observed for thin, rotating blades when second degree geometric nonlinearities are used, can be eliminated by including the third-degree elastic nonlinear terms. Furthermore, inclusion of third degree terms improves the correlation between the theory and experiment. M.G.

N86-31921*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
LARGE DEFORMATION DYNAMIC BENDING OF COMPOSITE BEAMS Interim Report, Sep. 1983 - Apr. 1986
E. J. Derian (Global Analytics, Inc., San Diego, Calif.) and M. W. Hyer (Maryland Univ., College Park) Washington NASA Aug. 1986 218 p
(Grant NAG1-343)
(NASA-CR-4006; NAS 1.26:4006) Avail: NTIS HC A10/MF A01 CSCL 20K

Studies were conducted on the large deformation response of composite beams subjected to a dynamic axial load. The beams were loaded with a moderate eccentricity to promote bending. The study was primarily experimental but some finite element results were obtained. Both the deformation and the failure of the beams were of interest. The static response of the beams was also studied to determine potential differences between the static and dynamic failure. Twelve different laminate types were tested. The beams were loaded dynamically with a gravity driven impactor traveling at 19.6 ft/sec and quasi-static tests were conducted on identical beams in a displacement controlled manner. For laminates of practical interest, the failure modes under static and dynamic loadings were identical. Failure in most of the laminate types occurred in a single event involving 40% to 50% of the plies. However, failure in laminates with 30 deg or 15 deg off-axis plies occured in several events. All laminates exhibited bimodular elastic properties. Using empirically determined flexural properties, a finite element analysis was reasonably accurate in predicting the static and dynamic deformation response. Author

N86-31922# Wisconsin Univ., Madison. Mathematics Research Center.
ZERO AND NEGATIVE MASSES IN FINITE ELEMENT VIBRATION AND TRANSIENT ANALYSIS Technical Summary Report
David S. Malkus and Michael E. Plesha Feb. 1986 31 p
(Contract DAAG29-80-C-0041)
(AD-A167489; MRC-TSR-2915) Avail: NTIS HC A03/MF A01 CSCL 12/1

Mass matrix lumping by quadrature is considered. Accuracy requirements seem to dictate the use of zero negative masses for multi-dimensional higher-order elements. It is shown that the zero and/or negative masses do not destroy the essential algebraic properties of the discrete eigen problems, in spite of the negative or infinite eigenvalues which may result. Explicit transient methods require positive definite lumping which, for some elements, may only be achieved by sacrificing accuracy to avoid the negative or zero masses that would render the lumping indefinite. An implicit-explicit time integration method based on quadratic triangles with optimal lumping is devised, analysed, and tested. It treats the nodes with nonzero masses explicitly and the nodes with zero masses implicitly. Analysis and numerical tests show that this

formulation is optimally accurate and less costly than a similar method with nonzero masses, based on optimally lumped biquadratic rectangles. The method is also found to be substantially more accurate than the fully explicit method based on lumping the triangular elements in an ad-hoc fashion to retain non-zero masses. Author (GRA)

N86-31923# Naval Postgraduate School, Monterey, Calif.
AN INVESTIGATION INTO THE TRIPPING BEHAVIOR OF LONGITUDINALLY T-STIFFENED RECTANGULAR FLAT PLATES LOADED STATICALLY AND IMPULSIVELY M.S. Thesis
Howard L. Budweg Mar. 1986 101 p
(AD-A167718) Avail: NTIS HC A06/MF A01 CSCL 13/13

An experimental investigation was conducted to determine the static and dynamic responses of a specific stiffened flat plate design. The air-backed rectangular flat plates of 6061-T6 aluminum with an externally machine longitudinal narrow-flanged T-stiffener and clamped boundary conditions were subjected to static loading by water hydropump pressure and shock loading from and eight pound TNT charge detonated underwater. The dynamic test plate was instrumented to measure transient strains and free-field pressure. The static test plate was instrumented to measure transient strains, plate deflection, and pressure. Emphasis was placed upon forcing static and dynamic stiffener tripping, obtaining relevant strain and pressure data, and studying the associated plate-stiffener behavior. Author (GRA)

N86-31924# Naval Postgraduate School, Monterey, Calif.
COMPOSITE STRUCTURAL RELIABILITY CALCULATION BY FINITE ELEMENT AND STATISTICAL STRENGTH THEORY M.S. Thesis
Pattama Suttisornyotin Mar. 1986 86 p
(AD-A167890) Avail: NTIS HC A05/MF A01 CSCL 20/11

The reliability of the structure can be calculated by combining the non-uniform stress distribution of a structure from finite element analysis with the statistical strength theory under two dimensional nonhomogeneous, uniaxial stress limitations. The specimen models with and without notch are the sample structures to illustrate the calculations. The statistical strength of the structure is cast in the standard Weibull form characterized by the structural scale parameter, Beta E and shape parameter, Alpha E which are functions of the material scale shape parameters (Alpha and Beta.) Therefore, this thesis demonstrated that the scale parameter of the structure remains constant for different load magnitude, only the structural geometry and loading condition cause the change of material scale parameter, Beta to the structural scale parameter, Beta E. The results also shows that the degree of uniformity of stress within structural element and the linearity of the load magnitude and stress distribution within the structure affect the accuracy for the calculation. GRA

N86-31925# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.
STUDIES OF STRESS AND FATIGUE INDUCED DEFECTS USING SMALL ANGLE NEUTRON SCATTERING
J. R. Weertman 1985 11 p Presented at the Workshop on Atomic Transport and Defects in Metals By Neutron Scattering, Julich, West Germany, 2 Oct. 1985
(Contract DE-AC02-81ER-10960)
(DE86-004985; CONF-8510279-1) Avail: NTIS HC A02/MF A01

The technique of small angle neutron scattering (SANS) is proving to be of great value in the study of deformation-induced defects in various materials. Frequently SANS is the only practicable method for obtaining detailed, quantitative information on the kinetics of defect production. In crystalline material, the following defects produced by deformation are most amenable to study by SANS: bulk microcracking in brittle material; voids, bubbles and vacancy clusters; dislocations. If a broad definition is adopted for the types of defects to be considered, we can include the accelerated coarsening of particles and precipitates produced by high temperature deformation. To date the greatest success with SANS in the study of defects associated with stress has been achieved with cavities (voids, etc.) and microcracks. The presence of dislocations can be detected by neutron scattering, but more extensive data on their nature, disposition and density usually can be obtained readily by TEM examination of thin foils. Accordingly, emphasis in this review is on those defects for which neutron scattering has yielded detailed information not readily available by other methods. DOE

N86-31926# Sandia National Labs., Albuquerque, N. Mex.
SWAY85: A COMPUTER PROGRAM FOR CALCULATING LUG AND SWAY BRACE LOADS
R. P. Rechard and P. K. Metzler Mar. 1986 88 p
(Contract DE-AC04-76DP-00789)
(DE86-009550; SAND-85-2178) Avail: NTIS HC A05/MF A01

The computer program, SWAY85, evaluates the lug and case loads on airborne stores (bombs, missiles, drop tanks) resulting from aircraft maneuvers and aerodynamic forces during flight according to the procedure suggested in the US military specification, MIL-A-8591G. This report describes the input and relations solved. SWAY85 uses input features (for example, control keywords along with a free-field reader) to make the code user-friendly and, consequently, less prone to input errors. In addition several data preparation aids are used. These aids include calculation of the dynamic pressure, interpolation of aerodynamic data, calculation of margins of safety if failure envelopes are supplied, and tabulation of up to 25 lowest margins of safety (or alternatively largest forces) for the sway braces and the forward and aft lugs. Furthermore, SWAY85 handles both large and small groups of data gracefully by permitting both ASCII and binary file input. DOE

N86-31927# Allied Bendix Corp., Kansas City, Mo.
INVESTIGATION OF ULTRASONIC METHODS FOR RESIDUAL STRESS MEASUREMENT
G. D. Swanson Apr. 1986 44 p
(Contract DE-AC04-76DP-00613)
(DE86-009614; BDX-613-3490) Avail: NTIS HC A03/MF A01

Three ultrasonic methods were investigated for nondestructively measuring residual stress in metals. Shear wave birefringence using a multiarticulated sample positioner and motorized transducer rotator was found to be very sensitive, but the results strongly depend on the matrial texture. Rayleigh wave measurements using a corner reflector and motorized goniometer have marginal sensitivity, but alternate methods using wedge, knife edge, or needle point contacts have sensitivity comparable to shear wave birefringence. The use of wave-propagation coefficients in conjunction with combinations of measurement methods appears to be at least as promising a technique as use of shear horizontal waves and promises to require much smaller transducers. DOE

N86-31928# Sandia National Labs., Albuquerque, N. Mex.
SNLL MATERIALS TESTING COMPRESSION FACILITY
W. A. Kawahara, S. L. Brandon, and J. S. Korellis Apr. 1986 25 p
(Contract DE-AC04-76DP-00789)
(DE86-009984; SAND-86-8219) Avail: NTIS HC A02/MF A01

This report explains software enhancements and fixture modifications which expand the capabilities of a servo-hydraulic test system to include static computer-controlled constant true strain rate compression testing on cylindrical specimens. True strains in excess of -1.0 are accessible. Special software features include schemes to correct for system compliance and the ability to perform strain-rate changes; all software for test control and data acquisition/reduction is documented. DOE

N86-31929# Los Alamos National Lab., N. Mex.
FOUNDATIONS OF STATISTICAL CRACK MECHANICS
J. K. Dienes 1986 7 p Presented at the International Symposium on Intense Dynamic Loading and Its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-000764; LA-UR-85-3264; CONF-860616-5) Avail: NTIS HC A02/MF A01

The principle of superposition of elastic and plastic strain rates

in regions of plastic flow was hypothesized by Reuss in order to provide a smooth transition of the stresses between regions of elastic and elastic-plastic deformation. In this paper a generalization of this hypothesis is derived which allows for the formulation of more complex constitutive laws that can account for simultaneous plastic flow, fracture, fragmentation, and changes in porosity. Such processes can occur during impact, explosions and earthquakes. The possibility of analyzing such processes by finite element methods has been made possible by the advent of large scale computers, but most practioners agree that more general constitutive laws are required to account adequately for the complex flow processes involved. DOE

N86-31930# Los Alamos National Lab., N. Mex.
TECHNIQUE FOR MEGABAR CONTROLLED STRAIN EXPERIMENTS
K. P. Staudhammer and K. A. Johnson 1986 7 p Presented at the International Symposium on Intense Dynamic Loading and its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-000805; LA-UR-85-3389; CONF-860616-4) Avail: NTIS HC A02/MF A01

This design allows in one shot one experiment a range of pressures from 12 to 170 GPa and a selectable strain range (0 to 55%) in 304 stainless steel with 100% recovery. Development of the application of griding has enabled correlation, locally, of pressure and strain with structure and properties at a strain rate of 10(6)/s. Appropriate variations in momentum trap design can control strain in cylindrical implosion shock experiments. Pedestal type traps have shown significant improvement in the reduction of strain in cylindrical implosion experiments. Such design would seem to be appropriate for experiments on brittle and ceramic materials. In cylindrical designs the degree of macro-strain is a function of trapping and is the result of reflected waves not the primary shock pulse. DOE

N86-31931# Sandia National Labs., Albuquerque, N. Mex.
MICROSCOPIC IMAGE ANALYSIS OF SLOW CRACK GROWTH IN VITREOUS MATERIALS
W. L. Smith Apr. 1986 7 p Presented at the 88th Annual Meeting of the American Ceramic Society, Chicago, Ill., 27 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009850; SAND-86-1024C; CONF-860418-3) Avail: NTIS HC A02/MF A01

Automated computer control, advanced video techniques, and digital image processing have been integrated into a servo-hydraulic testing system to produce a state-of-the-art testing environment. This system, in combination with an ultra high vacuum controlled environmental chamber, is used to produce high accuracy, subcritical slow crack growth data in vitreous materials. This video presentation is a review of the technologies used to extract data from the double cleavage drilled compression (DCDC) sample geometry. DOE

N86-31932# Sandia National Labs., Albuquerque, N. Mex.
X-RAY LINE PROFILE ANALYSIS OF SHOCK-MODIFIED COMPOUNDS
B. Morosin, R. A. Graham, Y. Zhang, and J. M. Stewart 1986 8 p Presented at the International Symposium on Intense Dynamic Loading and its Effects, Beijing, China, 3 Jun. 1986 Prepared in cooperation with Maryland Univ., College Park
(Contract DE-AC04-76DP-00789)
(DE86-003454; SAND-85-2412C; CONF-860616-7) Avail: NTIS HC A02/MF A01

The overall assessment revealed by the extensive studies show that large plastic deformation as evidenced by residual lattice strain is introduced at peak pressures of 7.5 GPa or lower. For various refractory materials, both coherent domain size and residual lattice strain depend strongly on shock conditions (pressure and temperature) and on specific material properties. There is evidence for defect configurations which differ from those produced by more conventional methods. The high residual strain values resulting from the large intense plastic deformation on these normally brittle refractory materials are more typical of those determined in heavily cold worked metals. The behavior is consistent with the unusual nature of the shock deformation process. Such shock-modified materials have been shown to exhibit increased chemical reactivity in a manner that should influence material processing procedures. DOE

N86-31933# Argonne National Lab., Ill.
ANALYSIS OF THE FELIX EXPERIMENTS WITH CANTILEVERED BEAMS AND HOLLOW CYLINDERS
L. R. Turner, T. Q. Hua, and S. Y. Lee 1986 44 p Presented at the 4th Eddy Current Seminar, Chilton, England, 24 Mar. 1986
(Contract W-31-109-eng-38)
(DE86-010528; CONF-8603116-1) Avail: NTIS HC A03/MF A01

Experiments have been performed with the FELIX facility at Argonne National Laboratory to study the coupling between eddy currents and deflections and to provide data for validating eddy current computer programs. Experiments with cantilevered beams in crossed steady and decaying magnetic fields verify that coupling effects act to alleviate the large currents, deflections, and stresses predicted by uncoupled analyses. Measurements of magnetic fields induced in conducting hollow cylinders are analyzed by exponential fitting and by transfer functions. Spatial variation in the parameters of the exponential fit and in those of the one- and two-pole transfer functions suggests that several eddy current modes are acting in the cylinder test pieces. DOE

N86-31934# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Anlagentechnik.
FINITE ELEMENT ANALYSIS TO EVALUATE THE STRESS DISTRIBUTION AND THE ENERGY RELEASE RATE AT THE CRACKING FRONT OF A FRACTURE MECHANICS SPECIMEN FOR LINEAR AND NONLINEAR MATERIAL BEHAVIOR [FINITE-ELEMENT-ANALYSE ZUR BEURTEILUNG DER SPANNUNGSVERTEILUNG UND ENERGIEFREISETZUNGSRATE AN DER RISSSPITZE EINER BRUCHMECHANIKPROBE BEI LINEAREM UND NICHTLINEAREM MATERIALVERHALTEN]
R. Dietrich 2 Dec. 1985 63 p In GERMAN; ENGLISH summary
(GKSS-85/E/54; ISSN-0344-9629; ESA-86-97410) Avail: NTIS HC A04/MF A01

The distribution of stresses and the energy release rate near the cracking front of specimen and component welded underwater were analyzed using a finite element method in order to predict their loading capacity. The incremental continuum mechanics equations of motion are formulated. The finite element discretization and the numerical solution of the finite element equations (modified Newton-Raphson iteration and Broyden-Fletscher-Goldbard-Shanno method) are explained. The linear and nonlinear material behavior of a fracture mechanics specimen was investigated. It is shown that theory and calculation programs provide information about the structural-mechanics behavior of the specimen if, in the presence of welding internal stresses and loading stresses, statements about stress intensity factors calculated from the J-integral have to be taken into account. ESA

N86-31935# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
SOLUTION OF THE PROBLEM OF ELASTOPLASTIC TORSION WITH A FINITE ELEMENT METHOD [OPLOSSING VAN HET PROBLEEM VAN DE ELASTOPLASTISCHE TORSIE MET EEN EINDIGE ELEMENTEN METHODE]
J. M. F. Peters Aug. 1984 119 p In DUTCH
(ESA-86-97546) Avail: NTIS HC A06/MF A01

The problem of the elastoplastic torsion of a cylindrical bar made of an ideal-plastic, homogenous, isotropic material, was solved using a numerical method. A variational formulation was applied to eliminate the interface between the elastic and plastic area. Only the gradient of the stress function, i.e., the sectional shear stress, occurs as a variable in this formulation, introducing a divergence freedom condition. Using a finite element method, stress components were approximated by constant functions. The obtained convex minimization problem was solved with a saddle

point algorithm for an appropriate Lagrangian, in which only the inequality limitations were accounted for. Numerical results show a very slow convergence of the optimization algorithm (especially for the finer distributions). A more efficient solution for a bar with certain symmetry characteristics is discussed. ESA

N86-31936# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
USE OF A SPECIAL FINITE ELEMENT FOR THE STATIC ANALYSIS OF NORMAL INTERFACIAL STRESSES
Gilles Bourdeau 1986 18 p In FRENCH; ENGLISH summary Presented at DRET Conference at Tendances Actuelles en Calcul des Structures, Bastia, France, 6-8 Nov. 1985
(SNIAS-861-422-109; ESA-86-97597) Avail: NTIS HC A02/MF A01

A finite element is defined following Hellinger-Reissner's variational principle and Verchery's idea. The normal interface stresses become nodal unknowns, which supplies a better estimation of their value. A function is obtained and applied to axisymmetric problems and orthotropic materials. For the partition in finite elements, an isoparametric element is used. The meridian line is an eight node quadrilateral. Two computations having a known analytical solution are used to test the method. It is shown that the proposed element is very helpful when a displacement method is used. ESA

N86-31937# Technische Hogeschool, Eindhoven (Netherlands). Onderafdel. der Wiskunde en Informatica.
ELASTOPLASTIC TORSION OF A CYLINDRICAL BEAM, DESCRIBED BY VARIATIONAL INEQUALITIES [ELASTOPLASTISCHE TORSIE VAN EEN CYLINDRISCHE BALK, BESCHREVEN MET BEHULP VAN VARIATIONELE ONGELIJKHEDEN]
J. J. E. IndenKleef Apr. 1984 103 p In DUTCH
(ESA-86-97704) Avail: NTIS HC A06/MF A01

The elastoplastic torsion problem of a cylindrical beam was investigated. The method of variational inequalities was applied to solve this minimalization free boundary problem. The problem was discretized to allow a numerical solution using the finite element method. The numerical solution is based on the method of (over) relaxation with projection. One variational inequality contains simple constraints, the other inequality contains difficult constraints, so-called gradient constraints. Due to these conditions existing finite element packages could not be used; the method had to be implemented using simple elements and linear approximations. Estimates for the discretization errors due to the approximations are given. The numerical solution shows that theoretically deduced error estimates are not optimal. ESA

N86-31938# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
STRESSES IN THE REGION OF ROUNDED CORNERS
J. P. Benthem May 1985 28 p
(WTHD-174; Rept-808; ESA-86-97710) Avail: NTIS HC A03/MF A01

The stress fields in the neighborhood of corners rounded by a small radius, if only the participation factor of the dominant eigenstate of the nonrounded sharp corner is computed, are derived. Results for wedges of arbitrary angles between pi and 2 pi for modes 1, 2, and 3 are given. The method was verified by comparison with the exact solution for mode 3. Such an exact solution is not possible for modes 1 and 2. ESA

N86-31939# Technische Hogeschool, Delft (Netherlands). Lab. of Engineering Mechanics.
STABILITY OF A RUBBER HALF-SPACE, PART 2
P. Meijers Jul. 1985 60 p
(WTHD-176-Pt-2; Rept-793-Pt-2; ESA-86-97711-Pt-2) Avail: NTIS HC A04/MF A01

The effect of buckling modes on the buckling behavior of a rubber half space in the neighborhood of the bifurcation point was studied. It turns out that the line of steepest descent in the postbuckling behavior becomes increasingly steeper as an increasing number of buckling modes are added. This suggests that the retaining of third order terms of the potential energy function alone yields solutions which are valid only in a very small neighborhood of the bifurcation point. Fourth order terms in the asymptotic expansion are needed to extend the region where the solution yields a sufficiently accurate approximation. But routine inclusion of the fourth order terms leads to singular solutions at the critical load owing to the contributions of the remaining buckling modes. A way to get around this difficulty is indicated. ESA

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-31940* National Aeronautics and Space Administration, Washington, D.C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES, ISSUE 50
1986 146 p
(NASA-SP-7041(50); NAS 1.21:7041(50)) Avail: NTIS HC A07 CSCL 05B

This bibliography lists 523 reports, articles and other documents introduced into the NASA scientific and technical information system between April 1 and June 30, 1986. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

N86-31941*# California Univ., Santa Barbara. Dept. of Geography.
COVER PROJECT AND EARTH RESOURCES RESEARCH TRANSITION Final Technical Report
Daniel B. Botkin and John E. Estes, principal investigators 1986 46 p
(Contract NCC9-13)
(NASA-CR-177176; NAS 1.26:177176) Avail: NTIS HC A03/MF A01 CSCL 05B

Results of research in the remote sensing of natural boreal forest vegetation (the COVER project) are summarized. The study objectives were to establish a baseline forest test site; develop transforms of LANDSAT MSS and TM data for forest composition, biomass, leaf area index, and net primary productivity; and perform tasks required for testing hypotheses regarding observed spectral responses to changes in leaf area index in aspen. In addition, the transfer and documentation of data collected in the COVER project (removed from the Johnson Space Center following the discontinuation of Earth resources research at that facility) is described. M.G.

N86-31942*# Oklahoma Univ., Norman. Cooperative Inst. for Mesoscale Meteorolog. Study.
DEVELOPMENT OF A VARIATIONAL SEASAT DATA ANALYSIS TECHNIQUE Final Report
Yoshi K. Sasaki, Lang-Ping Chang, and James S. Goerss (Naval

Environmental Prediction Research Facility, Monterey, Calif.) Apr. 1986 50 p
(Grant NAG5-289)
(NASA-CR-177175; NAS 1.26:177175) Avail: NTIS HC A03/MF A01 CSCL 05B

Oceans are data-sparse areas in terms of conventional weather observations. The surface pressure field obtained solely by analyzing the conventional weather data is not expected to possess high accuracy. On the other hand, in entering asynoptic data such as satellite-derived temperature soundings into an atmospheric prediction system, an improved surface analysis is crucial for obtaining more accurate weather predictions because the mass distribution of the entire atmosphere will be better represented in the system as a result of the more accurate surface pressure field. In order to obtain improved surface pressure analyses over the oceans, a variational adjustment technique was developed to help blend the densely distributed surface wind data derived from the SEASAT-A radar observations into the sparsely distributed conventional pressure data. A simple marine boundary layer scheme employed in the adjustment technique was discussed. In addition, a few aspects of the current technique were determined by numerical experiments. Author

N86-31943*# National Marine Fisheries Service, Miami, Fla.
UTILIZING REMOTE SENSING OF THEMATIC MAPPER DATA TO IMPROVE OUR UNDERSTANDING OF ESTUARINE PROCESSES AND THEIR INFLUENCE ON THE PRODUCTIVITY OF ESTUARINE-DEPENDENT FISHERIES Semiannual Progress Report
Joan A. Browder, L. Nelson May, Jr. (Louisiana State Univ., Baton Rouge), Alan Rosenthal, Robert H. Baumann, and James G. Gosselink 10 Jun. 1986 66 p Sponsored by NASA
(NASA-CR-177177; NAS 1.26:177177; SAPR-2) Avail: NTIS HC A04/MF A01 CSCL 08G

LANDSAT thematic mapper (TM) data are being used to refine and validate a stochastic spatial computer model to be applied to coastal resource management problems in Louisiana. Two major aspects of the research are: (1) the measurement of area of land (or emergent vegetation) and water and the length of the interface between land and water in TM imagery of selected coastal wetlands (sample marshes); and (2) the comparison of spatial patterns of land and water in the sample marshes of the imagery to that in marshes simulated by a computer model. In addition to activities in these two areas, the potential use of a published autocorrelation statistic is analyzed. Author

N86-31944*# Rochester Inst. of Tech., N. Y. School of Photographic Arts and Sciences.
LANDSAT 4 BAND 6 DATA EVALUATION Quarterly Report
15 Sep. 1984 6 p
(Contract NAS5-27323)
(NASA-CR-177173; NAS 1.26:177173; QR-8) Avail: NTIS HC A02/MF A01 CSCL 05B

The objectives of this investigation are to evaluate and monitor the radiometric integrity of the LANDSAT-D Thematic Mapper (TM) thermal infrared channel (Band 6) data to develop improved radiometric preprocessing calibration techniques for removal of atmospheric effects. Efforts this period have concentrated on underflight data collection. Two successful flights were made on September 18 and October 6. The radiosonde data for these flights have been obtained. Author

N86-31945*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-4 AND LANDSAT-5 MULTISPECTRAL SCANNER COHERENT NOISE CHARACTERIZATION AND REMOVAL
James C. Tilton and William L. Alford, principal investigators (Defense Mapping Agency, Washington, D.C.) May 1986 46 p Original contains color illustrations
(NASA-TP-2595; Rept-86B0040; NAS 1.60:2595) Avail: NTIS HC A03/MF A01 CSCL 14B

A technique for characterizing the coherent noise found in LANDSAT-4 and LANDSAT-5 multispectral scanner (MSS) data is described along with a companion technique for filtering out the coherent noise. The techniques are demonstrated on LANDSAT-4 and LANDSAT-5 MSS data sets, and explanations of the noise pattern are suggested. A cookbook procedure of characterizing and filtering the coherent noise using special NASA/Goddard IDIMS functions is included. Also presented are analysis results from the retrofitted LANDSAT-5 MSS sensor which shows that the coherent noise has been substantially reduced. Author

N86-31946# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPORTS ON CARTOGRAPHY AND GEODESY. SERIES 1: ORIGINAL REPORTS, NUMBER 95 [NACHRICHTEN AUS DEM KARTEN- UND VERMESSUNGSWESEN. REIHE 1: HEFT NR. 95]
1985 200 p in GERMAN; ENGLISH summary Original contains color illustrations Document contains maps as supplement
(ISSN-0469-4236; ESA-86-97479) Avail: NTIS HC A09/MF A01

Research on automated cartography (data acquisition, processing and retrieval) with economical use and feasibility analyses is reported. Development of data bases, user interfaces and interactive graphical systems is described. Image processing and resolution are improved. For individual titles, see N86-31947 through N86-31962.

N86-31947# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ON DATA INTEGRITY OF CAD APPLICATIONS IN CARTOGRAPHY: CONCEPT OF AN INFORMATION SYSTEM WITH SIEMENS COMPUTER AIDED DESIGN (SICAD) [ZUR DATENHALTUNG VON CAD-ANWENDUNGEN IN DER KARTOGRAPHIE. KONZEPT EINES INFORMATIONSSYSTEMS MIT SICAD]
Martin Baumann *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 7-27 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The Geographic Data Base, a building block of the interactive graphic system Siemens Computer Aided Design (SICAD) which facilitates the establishment of information systems is presented. The connection between factual data and graphical components is discussed. The SICAD software structure includes modules for cadastral, ground cleaning, supply network, and planning applications. ESA

N86-31948# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
GEOSCIENTIFIC REQUIREMENTS ON A GRAPHICAL DATA BASE [GEOWISSENSCHAFTLICHE ANFORDERUNGEN AN EINE GRAPHISCHE DATENBANK]
Juergen Bollmann *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 29-42 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

Design of a graphical data bank interface, storage procedures, and organization of spatial data are studied. The graphical data bank function and elements, and the structure of an object field are described. The relationship between objects and operations with objects are presented. The geoscientific requirements on a graphical data bank are reviewed. ESA

N86-31949# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
TOPOGRAPHIC-CARTOGRAPHIC DATA BASE IN STANDARDIZATION [DIE TOPOGRAPHISCH-KARTOGRAPHISCHE DATENBANK IN DER STANDARDISIERUNG]
Heinz Brueggemann *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 43-54 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

Standardization for data structure management and transfer based on standardized terminology and taxonomy is studied to develop a national information system. The topographic cartographic data base, automated cartographic production and

communication are described as well as applications on an interactive graphical work station. Operational user's interface to the data base, standard data format and language are mentioned for standardization. ESA

N86-31950# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A PROPOSAL FOR THE DEVELOPMENT OF A LARGE-SCALE TOPOGRAPHIC-CARTOGRAPHIC DATA BASE TAKING THE PLANIMETRIC DATA OF AUTOMATED CADASTRAL MAP (ALK) SYSTEM INTO ACCOUNT [EIN VORSCHLAG ZUM AUFBAU EINER GROSSMASSTAEBIGEN TOPOGRAPHISCH-KARTOGRAPHISCHEN DATENBANK UNTER BESONDERER BERUECKSICHTIGUNG DER GRUNDRISSDATEI DES ALK-SYSTEMS]
Dietmar Gruenreich *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 55-70 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The database system developed in computer-assisted production, revision and use of cadastral maps in digital form is used to establish a large-scale topographic-cartographic data base (1:5,000). Cadastral maps with 70% of the planimetric information of topographic maps are one of the most important sources for the conventional production and revision of the German Basic Map 1:5,000 (DGK 5). A digital data interconnection system between digital cadastral maps (ALK) and the Digital Landscape Model 1:5,000 (DLM 5) is proposed. A graph theory-based procedure for automatic generalization of digital cadastral maps is described. Topographic information which can not be derived from cadastral maps is to be gained using digital photogrammetric procedures and linked to the ALK data. Applications in geosciences, spatial planning, and cartographic generalization for small-scale DLM are shown. ESA

N86-31951# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
HARDWARE FOR DATA BANKS IN CARTOGRAPHY: CONCEPTS [HARDWARE FUER DATENBANKEN IN DER KARTOGRAPHIE: KONZEPTE]
Horst Kremers *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 71-89 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

Computer architectures suitable for work with data bank systems are presented. Hardware and software aspects are treated together in large systems for application of special processors and memories which can increase the system efficiency. Concepts applicable in design and function of modules of a data base computer for cartographic applications are reviewed. The use of dedicated hardware components can contribute to system optimization. Mutual software and hardware dependencies lead to feedback in design. Expert systems and ergonomical applications supported by subject-related artificial intelligence can be created by applying such special data bank computers in cartography. ESA

N86-31952# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
AUTOMATIC INTERPOLATION OF ISOLINES FROM AN IRREGULAR WATERLINE DIGITAL TERRAIN MODEL (DGM) THROUGH TRIANGULATION NETWORK [AUTOMATISCHE ABLEITUNG VON ISOLINIEN AUS EINEM UNREGELMAESSIGEN WASSERLINIEN-DGM UEBER DREIECKSVERMASCHUNG]
Ingo Kruse *In its* Reports on Cartography and Geodesy. Series 1. Original Reports, No. 95 1985 p 91-99 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

A computer-based waterline procedure was extended to represent drying tidal flat area aerial photographs in digital and analog forms. The triangulation network transforms waterlines into isolines after data homogeneization. The procedure can be applied to process and represent digitized elevation lines. ESA

N86-31953# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
NEW ARRAY PROCESSORS OF FLOATING POINT SYSTEMS [NEUE ARRAY-PROZESSOREN VON FLOATING POINT SYSTEMS] c60
Bernd Lauer *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 101-105 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The array processor series FPS-5000 increases the computation capacity required for digital signal and image processing at low cost. It is used for demodulation/signal analysis, CT processing, multispectral classification, 2D complex Fast Fourier Transformation (FFT), matrix multiply. The array processor of floating point systems is made of a concentration of VLSI circuits and can be connected to a host computer. A typical FPS-5000 system consists of a control processor, arithmetic coprocessors, a system common memory and input/output processors. It allows a computation capacity of up to 62 million floating point operations/sec. ESA

N86-31954# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
REPRODUCTION OF TOPOGRAPHIC MAP 1:200000 IN DIGITAL RASTER MODE [REPRODUKTION DER TOPOGRAPHISCHEN UEBERSICHSTKARTE 1:200000 IM DIGITALEN RASTERMODUS]
Heinz Meurisch and Wigand Weber *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 107-114 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

Reproduction of a photographic map 1:200,000 in primary and mixed color print by digital raster techniques is reported. Digital raster technique is based on transformation of a map into a matrix of quadratic raster points or pixels using an electronic data processing system. The operational steps of data acquisition, preparation of printing and production of printing film in digital raster mode are explained and time requirements are given. Results show improvement compared to the conventional photomechanical process. Digital raster mode can not be applied economically for reproduction of mixed and primary color printing due to high time requirements. ESA

N86-31955# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INTRODUCTION TO THE PROJECT DESIGN OF A USER'S INTERFACE FOR GRAPHIC-ALPHANUMERICAL DATA BANKS [EINFUEHRUNG IN DAS PROJEKT ENTWURF EINER BENUTZERSCHNITTSTELLE FUER EINE GRAPHISCH-ALPHANUMERISCHE DATENBANK] c82
Isa Ramm and Hans-Dieter Ehrich *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 115-123 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The advantages of a data bank system application in digital geoscientific map production and management are studied to develop a graphic-alphanumerical data bank meeting the users requirements. The efficiency, portability, adaptability and capacity of the data bank as well as the graphic data bank layout are described. The work schedule for geo data bank design is sketched. ESA

N86-31956# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
CALCULATION AND REPRESENTATIONS OF ELEVATION CHANGES IN A TIDAL FLAT AREA FROM DIGITAL TERRAIN MODELS [BERECHNUNG UND DARSTELLUNG VON HOEHENVERAENDERUNGEN IM WATT AUS DIGITALEN GELAENDEMODELLEN]

Hartmut Rosengarten *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 125-133 In GERMAN; ENGLISH summary Original contains color illustrations (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The tidal flat areas along the German North Sea coast subjected to large changes by the influence of tide and extreme meteorological conditions are studied to protect man against sea intrusions and hazards. The tidal flat areas are studied using electronic tachymetry, photogrammetry with water line procedures, hydrographic measurements and through aerial photograhy. The data are stored in a data bank and used to calculate elevation changes in tidal flat areas and improve the information on topographic maps. The cartographic representation of elevation changes is described. Map production through increased automation of the partial processes in map design and in reproduction can be economically applied. ESA

N86-31957# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
BRIEF REPORT ON DESIGN AND IMPLEMENTATION OF A DATA BANK CORE SYSTEM [KURZBERICH UEBER ENTWURF UND IMPLEMENTIERUNG EINES DATENBANKKERN-SYSTEMS] c82
Hans-Joerg Schek *In its* Reports on Cartography and Geodesy. Series 1: Original reports, No. 95 1985 p 135-141 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

The applicability of a modular data bank system to digital geoscientific mapping is studied. The data bank components forming the cartography interface basis have a layered architecture. The architecture of a geodatabank core system consists of a catalog manager, a geodata manager, data recovery, a version manager, a complex record manager, a permanent storage unit and a buffer. The modular data bank core system can be used for geoscientific applications. ESA

N86-31958# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DIGITAL ELEVATION FOR THE BADEN-WURTTEMBURG LAND (WEST GERMANY) [DAS DIGITALE HOEHENMODELL FUER DAS LAND BADEN-WUERTTEMBERG]
Manfred Sigle *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 143-154 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

For an area covering 36,000 sqkm, vertical profiles are recorded analogously, 80 m apart, on storage plates for orthoprojector operation. The profiles are digitized and used for the interpolation of a digital elevation model in the form of a 50 m grid. Interpolation, storage and application of the digital elevation model are achieved through program SCOP allowing a processing capacity of 100,000 terrain points. Processing of the 16 million profile points with correction of systematic data errors is described. The computation cost of the digital elevation model is discussed. ESA

N86-31959# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A SOFTWARE CONCEPT FOR INTERACTIVE LETTER LOCATION THROUGH DIGITAL IMAGE PROCESSING [EIN SOFTWAREKONZEPT ZUR INTERAKTIVEN SCHRIFTPLAZIERUNG MITTELS DIGITALER BILDVERARBEITUNG] c61
Ulrich Theissing *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 155-162 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

A system which allows the interactive location of letters and meets cartographic requirements is presented. For representation of the letter on the screen an image resolution of two lines per millimeter is applied. An example is produced with a system core already implemented to study its feasibility. Results show good quality of the letter and that the program should be improved by progressive integration of signature location and map frame and map boundary representation. ESA

N86-31960# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
DIGITAL GEOSCIENTIFIC CARTOGRAPHY: A LEADING PROGRAM OF THE GERMAN RESEARCH COMMUNITY [DIGITALE GEOWISSENSCHAFTLICHE KARTENWERKE - EIN NEUES SCHWERPUNKTPROGRAMM DER DEUTSCHEN FORSCHUNGSGEMEINSCHAFT]
Renier Vinken *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 163-173 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

Computer techniques for the survey, design, production and evaluation of geoscientific maps are presented. Preparation and utilization of the terrain data, laboratory and remote sensing data, the development of geoscientific basic maps and evaluation maps, updating of the basic data and continuity of geoscientific cartography are included. Data acquisition and preparation, data transfer, storage and management, data processing and data retrieval and automated cartography are included. Economical application of graphical interactive screens, control and processing computers and image machines in geoscientific mapping are discussed. ESA

N86-31961# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
THREE-DIMENSIONAL VIEWS OF CARTOGRAMS IN DIGITAL RASTER MODE [SCHEINPLASTISCHE DARSTELLUNGEN VON KARTOGRAMMEN IN DIGITALEN RASTERMODUS]
Wigand Weber *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 175-189 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

A digital raster method for producing three-dimensional views of cartograms (choropleth maps) and layered maps of real or thematic mountainous regions (continuous phenomena) is outlined. The three-dimensional view is achieved either by (a) oblique parallel projections of imagined prisms (cylinders) or stepped cones of different height onto a vertical plane taking hidden areas into consideration (hidden-surface removal) or (b) by producing a stereo mate to the parallel projection from (a). System (a) consists in successively moving up the thematic areas or hypsometric layers to their final level while erasing previously generated elements of representation. In this procedure an algorithm operating on a hierarchic basis can save much computing time. The stereo mate according to (b) is formed by repeating the process after slightly changing the given direction of view. ESA

N86-31962# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A RECENT CONCEPT FOR APPLICATION OF INTERACTIVE GRAPHICAL DATA PROCESSING IN CADASTRAL MAP REVISIONS [EIN AKTUELLES KONZEPT ZUM EINSATZ DER INTERAKTIVEN GRAPHISCHEN DATENVERARBEITUNG BEI DER FLURKARTENERNEUERUNG]
Hans Wiens *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 191-200 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

A computer aided revision of cadastral maps is developed and tested to assess its feasibility. Map acquisition procedure through digitizing and map connection procedure are presented. Results show the precision of the maps and the advantages of the modular layout of the program system. Numerical processing and operation at a graphical interactive work station improve the map image. The program system is the basis for interpolation of heterogeneous, analog cartography into a homogeneous digitally stored cadastral mapping. ESA

N86-31963# Army Engineer Topographic Labs., Fort Belvoir, Va.
CAPIR/DEM: A COLLECTION SYSTEM FOR GEOGRAPHICALLY BASED DIGITAL ELEVATION DATA

J. Hutchings, B. Kiracofe, G. Nash, H. Niedzwiadek, and Dan Edwards Dec. 1985 20 p
(AD-A167471; ETL-R-088) Avail: NTIS HC A02/MF A01 CSCL 08/2

Digital grid-point elevation models are a widely distributed and applied source of digital topographic data. DEMs are commonly used to generate planimetric contour, slope, or aspect maps and are often merged with other sources of data for sophisticated modeling and systems applications. DEMs cover either large land areas at a course resolution or very limited sites at high resolution. Emerging technology in such diverse areas as robotics, computer image generation, and computer simulation will require timely, cost effective custom DEM data. This paper details a system designed to meet these impending future requirements for DEM (Digital Elevation Models). A collection system for DEMs using an adaptive spacing grid is used to optimize resources when collecting DEMs in areas that have wide variations in relief. Future enhancements are proposed to provide adjustments between data collected during separate sessions and to densify existing DEM data to a higher resolution. GRA

N86-31964# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
INVESTIGATION OF POLAR MOTION FROM DOPPLER TRACKING OF THE NNSS (NAVY NAVIGATION SATELLITE SYSTEM) DURING THE MERIT CAMPAIGN Final Report
William H. Wooden, John A. Bangert, and J. M. Robinson Apr. 1986 18 p Presented at the 4th International Geodetic Symposium on Satellite Positioning, Austin, Tex., 23 Apr. - 2 May 1986
(AD-A167565) Avail: NTIS HC A02/MF A01 CSCL 03/1

For more than a dozen years, Doppler tracking of the Navy Navigation Satellite System (NNSS) has demonstrated the ability to give solutions for polar motion as a byproduct of precise ephemerides generation. This paper reviews the polar motion estimation process at the Defense Mapping Agency from Doppler measurements of the NNSS and gives comparisons to polar motion series from newer observational techniques and to the Bureau International del'Heure Circular-D series. The different techniques are compared for the period of the MERIT Main Campaign. In addition to comparing results for the Nova and Oscar NNSS satellites, comparisons are done utilizing the WGS 84 and the NWL 9Z2 gravitational fields in the precise ephemerides generation process. GRA

N86-31965# Naval Ocean Research and Development Activity, Bay St. Louis, Miss.
NORDA ARCTIC DATA COLLECTION, PROCESSING AND INTERPRETATION CAPABILITIES Final Report
Duane T. Eppler and Jeffrey D. Hawkins Sep. 1985 26 p
(AD-A167797; NORDA-129) Avail: NTIS HC A03/MF A01 CSCL 08/12

The Special Sensor Microwave/Imager (SSM/I) will provide the Navy with the global capability to measure sea ice, wind speed, water vapor, rain rate, and several other atmospheric parameters. The sea ice retrievals will go a long way toward filling a present gap in analysis data sets. Thus, proper validation of this sensor's abilities is required if the full potential is to be achieved. Naval Ocean Research and Development Activity (NORDA) personnel have access to a number of ground, aircraft, and spaceborne instruments that can contribute to SSM/I sea ice validation efforts. Ice camps, the K-band Radiometric Mapping System (KRMS), and satellite visible and infrared data can all provide a piece of the puzzle when addressing the issue of algorithm performance. It is essential to include ground, air, and spaceborne resources to tackle the task of validating the sea ice information retrieved from SSM/I data. Not only must we cover large geographic regions synoptically, but we must also be able to discern smaller irregularities found within the SSM/I cell footprints. Only then can we push algorithms to their required limits. GRA

N86-31966# Naval Postgraduate School, Monterey, Calif.
APPLICATION OF MULTIPLE LINES OF POSITION FOR HYDROGRAPHY M.S. Thesis
Samuel P. DeBow, Jr. Mar. 1986 124 p
(AD-A167884) Avail: NTIS HC A06/MF A01 CSCL 17/7

Conventional near-shore large-scale hydrographic surveys use only two lines of position (LOPs) for position fixing. Previous works have proved that accuracies needed to meet the present International Hydrographic Organization standards are frequently not achieved using conventional surveying methods. The concept of using multiple lines of position (MLOP) adjusted by the least squares method was described. Actual field measurements acquired in the autumn of 1984 were processed to ascertain the increase in accuracy using MLOP versus conventional two LOPs on each hydrographic position. Recommendations are to use a four-range fully automated position-fixing method to increase production, improve data quality, and have better control of the survey operations. GRA

N86-31967# Environmental Research Inst. of Michigan, Ann Arbor. Radar Div.
THE USGS (US GEOLOGICAL SURVEY) X-, C-, AND L- BAND SAR DATA COLLECTION PROGRAM Topic Report, Nov. 1983 - Aug. 1985
Eric S. Kasischke Aug. 1985 121 p
(Contract DI-14-08-0001-21748)
(AD-A168173; ERIM-173000-4-T) Avail: NTIS HC A06/MF A01 CSCL 17/9

This report presents the results of data collection program performed for the U.S. Geological Survey. Twenty-two passes of high resolution (3m), multifrequency (X-, C- and L-band) and multipolarization (VV and VH) imagery were collected over five test sites within the North Carolina Digital Project Area. The SAR used for this program was the ERIM/CCRS CV-580 SAR System. This report presents diagrams of the ground swath of each SAR pass, along with representative SAR imagery which illustrates the high quality of the data set. The engineering assessment performed on the SAR imagery is discussed. The optical and digital SAR data products generated for this program are summarized, including the first-order geometric and radiometric corrections applied to the digital data. GRA

N86-31968# Geological Survey, Sioux Falls, S. Dak.
DIGITAL PROCESSING OF LANDSAT TM IMAGES FOR LINEAMENT OCCURRENCE AND SPATIAL FREQUENCY IN SEDIMENTARY ROCKS
G. K. Moore and D. A. Hastings 1986 33 p
(Contract DE-AI05-85OR-21552)
(DE86-009834; DOE/OR-21552/1) Avail: NTIS HC A03/MF A01

This report describes and evaluates procedures for the enhancement and extraction of lineament segments by computer processing of digital Landsat Thematic Mapper data. Nearly all results were obtained by convolution of filter windows in the spatial domain. During the course of the study several new procedures were developed for image enhancement, directional enhancement, and the extraction of edge and line segments from directionally-filtered images. The standard procedure proved satisfactory for an extraction of prominent edges and lines in the Landsat images. Part of the problem is caused by the landscape and illumination characteristics of the selected images, but another part is caused by the fact that many boundaries are gradational and do not fit a simple mathematical description of edges and lines. Because of this problem, extraced segments in shale outcrop areas were not compared with those in other types of sedimentary rocks, and measurements of the spatial frequency of occurrence of these segments have a questionable value. A possible solution to the problems found by this study would be: (1) to use a combination of digital elevation data and digital remotely-sensed data of the same area; and (2) to combine directional enhancement and lineament segment extraction with visual detection, screening, and editing. DOE

N86-31969# World Meteorological Organization, Geneva (Switzerland).
LEVEL AND DISCHARGE MEASUREMENTS UNDER DIFFICULT

CONDITIONS
O. A. Tilrem 1986 50 p
(WMO-650; ISBN-92-63-10650-9; ESA-86-97249) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland SWFR 7

The measurement of water levels and river discharge in unstable stream channels, flash floods, variable backwater, unsteady flow, bank overflow, large interchange between surface water groundwater, arid areas, and channels affected by tides, winds, ice, and aquatic growth is discussed. The hydrological cases which might occur; technical problems which may arise; and operational solutions to the problems are considered. Measurement methods applicable in these situations are tabulated. ESA

N86-31970# Begeleidingscommissie Remote Sensing, Delft (Netherlands).
[ACTIVITIES REPORT IN REMOTE SENSING SUPERVISION] Annual Report, 1983 [JAARVERSLAG 1983]
1984 52 p In DUTCH
(ESA-86-97383) Avail: NTIS HC A04/MF A01

Remote sensing application to sea surface investigations (ship microwave radar systems for wave observation, spectrophotometry of surface water, and oil detection using multispectral scanners, laser fluoro sensors, and high frequency radar techniques); agriculture and nature protection (field spectrometer measurements to determine biomass, thermal images and false color photographs to determine the hydrological soil condition, detection of crop damage and illness caused by pollution and/or heat, and cadastral mapping); and town and country planning are discussed. Processing of remote sensing data is considered. ESA

N86-31971# European Space Agency, Paris (France).
CALIBRATION OF MULTISPECTRAL SCANNER (MSS) SATELLITE DATA TO EVALUATE CHANGE IN THE REFLECTION OF CONIFEROUS STOCKS
Gerd-Peter Fehlert Nov. 1985 180 p Original language document was announced as N86-10636
(ESA-TT-938; DFVLR-FB-84-44; ESA-86-97575) Avail: NTIS HC A09/MF A01; original German version available from DFVLR, Cologne, West Germany DM 71

A relative calibration was performed in order to allow a comparative, multitemporal analysis of MSS satellite data and hence the detection of reflectory changes with regard to selected object classes. By applying the method to the class wood, the age of a coniferous stock can be determined, and during the stage of growth distinct age groups show locally differing reflection properties. The latter suggests disorders of the proliferation of young sprouts. This method can be an early indicator for the detection of damaged forest areas. The atmospheric influence on satellite data was determined by a multilayer atmospheric model. ESA

N86-31972# Institut National Polytechnique, Toulouse (France).
INTEGRATION OF THE TOPOGRAPHY IN TELEDETECTION IMAGE DATA PROCESSING Ph.D. Thesis [INTEGRATION DU RELIEF AU TRAITEMENT D'IMAGES DE TELEDETECTION]
Catherine Proy 1986 188 p In FRENCH
(Contract ATP-84/CNES/1259)
(ESA-86-97652) Avail: NTIS HC A09/MF A01

A method of topographic data acquisition from charts and the analysis of the signal produced by a target in mountainous country are discussed. A simulation procedure was carried out and applied to two Pyrenees regions. In the processed data a better equilibrium of shadow and light is found. It is shown that additional corrections related to aerosols in the atmosphere and surface characteristics are necessary. ESA

N86-31973# Physics and Electronics Lab. TNO, The Hague (Netherlands).
MOISTURE DETERMINATIONS IN AND UNDER VEGETATION CANOPIES
G. P. deLoor Jul. 1985 50 p Sponsored by Dutch Remote Sensing Board
(FEL-1985-52; ESA-86-97770) Avail: NTIS HC A03/MF A01

Using the vegetation model of Attema and Ulaby (1978) the possibilities of moisture determinations in a canopy, and of the soil under it, with radars of different frequencies are investigated. The moisture determinations require lower frequencies (C-band and lower). Soil moisture and vegetation moisture determinations require different incidence angles (10 to 20 deg, and > 30 deg respectively). For frequencies in the X-band and higher, the canopy becomes opaque for the radar waves and the backscatter becomes dependent on the moisture distribution in the canopy (plant architecture). This makes classification (incidence angles 40 deg) easier and possibly also the detection of changes in plant architecture due to stress. ESA

N86-31974# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
IMAGE QUALITY CRITERIA WITH EMPHASIS ON CRITERIA FOR REMOTE SENSING IMAGERY
J. C. A. vanderLubbe 1 Mar. 1984 94 p Sponsored by Netherlands Agency for Aerospace Programs
(NLR-TR-84040-U; ESA-86-98034) Avail: NTIS HC A05/MF A01

A guide for the measurement of image quality is presented. Common approaches to image quality assessment plus less considered aspects of image quality texture and edge quality are treated. ESA

N86-31975# Rome Univ. (Italy). Dipt. di Fisica.
THE RESULTS OF HYDROLOGICAL MEASUREMENTS IN THE SOUTHERN ADRIATIC, THE WEST COAST OF SICILY AND THE VATICAN CAPE, PRELIMINARY REPORT [RAPPORTO PRELIMINARE SUI RISULTATI DELLE MISURE IDROLOGICHE NELL'ADRIATICO MERIDIONALE, NEL GOLFO DI TARANTO, AL LARGO DELLA COSTA ORIENTALE DELLA SICILIA E A CAPO VATICANO]
Francesco Bignami, Guido Didonfrancesco, Letizia Pampaloni, and Paola Sbriccoli 28 Mar. 1986 92 p In ITALIAN
(Preprint-502; ESA-86-97933) Avail: NTIS HC A05/MF A01

A hydrological campaign was carried out in order to study the deep waters of the Adriatic and Ionic seas. Satellite data indicating the presence of turbulence were to be verified. The vertical profiles of temperatures, salinity, and density were obtained. Ship position was estimated using the Loran C method. The instruments included echo sounding equipment and bathymeters. The detailed data is presented. ESA

N86-31976# International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
[ACTIVITIES REPORT IN AEROSPACE SURVEY AND SPACE SCIENCES] Annual Report, 1984
1984 38 p
(ESA-86-98042) Avail: NTIS HC A04/MF A01

Education and research programs in photogrammetry, aerial photography and remote sensing, cartography, land resource surveys and rural development, Earth resources surveys, urban survey, and human settlement analysis are described. ESA

N86-31977# Wageningen Agricultural Univ. (Netherlands). Dept. of Soil Science and Geology.
INTRODUCTION TO THE INTERPRETATION OF REMOTE SENSING DATA
M. A. Mulders and D. Legger Jan. 1985 27 p
(ESA-86-98067) Avail: NTIS HC A03/MF A01

Aerial photography and other remote sensing techniques; true and false color photography; photointerpretation; map legends; and derivation of soil maps from aerial photointerpretation maps are introduced ESA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-31978 Technische Hogeschool Twente, Enschede (Netherlands). Technology and Development Group.
PROSPECTS FOR SMALL AND MARGINAL FARMERS IN TRICHY DISTRICT (TAMIL NADU, INDIA) TO USE WATER PUMPING WINDMILLS FOR IRRIGATION
Peter Goedhart May 1984 136 p Sponsored by Humanistic Institute for Cooperation with Developing Countries
(ESA-86-97721) Avail: Issuing Activity

The economic, technical, and agricultural aspects of equiping poor farmers in India with windpowered pumps were analyzed. It is concluded that the prospects for a market for windmills among nontarget group farmers (especially big farmers with diesel pumps) are better than the prospects among the target group farmers. Continuation of the project might lead to an improvement of the situation for the richer farmers, which would in turn lead to a decline in the situation of the original target group of the project, the small and marginal farmers. ESA

N86-31979*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PARAMETRIC AND CYCLE TESTS OF A 40-A-HR BIPOLAR NICKEL-HYDROGEN BATTERY
Robert L. Cataldo 1986 12 p Presented at the 21st Intersociety Energy Conversion Engineering Conference (IECEC), San Diego, Calif., 25-29 Aug. 1986; sponsored by ACS, SAE, ANS, ASME, IEEE, AIAA and AIChE
(NASA-TM-88793; E-3102; NAS 1.15:88793) Avail: NTIS HC A02/MF A01 CSCL 10C

A series of tests was performed to characterize battery performance relating to certain operating parameters which included charge current, discharge current, temperature and pressure. The parameters were varied to confirm battery design concepts and to determine optimal operating conditions. Spacecraft power requirements are constantly increasing. Special spacecraft such as the Space Station and platforms will require energy storage systems of 130 and 25 kWh, respectively. The complexity of these high power systems will demand high reliability, and reduced mass and volume. A system that uses batteries for storage will require a cell count in excess of 400 units. These cell units must then be assembled into several batteries with over 100 cells in a series connected string. In an attempt to simplify the construction of conventional cells and batteries, the NASA Lewis Research Center battery systems group initiated work on a nickel-hydrogen battery in a bipolar configuration in early 1981. Features of the battery with this bipolar construction show promise in improving both volumetric and gravimetric energy densities as well as thermal management. Bipolar construction allows cooling in closer proximity to the cell components, thus heat removal can be accomplished at a higher rejection temperature than conventional cell designs. Also, higher current densities are achievable because of low cell impedance. Lower cell impedance is achieved via current flow perpendicular to the electrode face, thus reducing voltage drops in the electrode grid and electrode terminals tabs. Author

N86-31980*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF IMPREGNATION METHOD ON CYCLE LIFE OF THE NICKEL ELECTRODE
John J. Smithrick 1986 9 p Presented at the 21st Intersociety Energy Conversion Engineering Conference (IECEC), San Diego, Calif., 25-29 Aug. 1986; sponsored by ACS, SAE, ANS, ASME, IEEE, AIAA and AIChE
(NASA-TM-87326; E-3037; NAS 1.15:87326) Avail: NTIS HC A02/MF A01 CSCL 10C

The nickel electrode has been identified as the life limiting component for individual pressure vessel (IPV) nickel-hydrogen cells when cycled under a low earth orbit (LEO) cycle regime at deep depths of discharge. As a part of an overall program to develop a long life nickel electrode for nickel-hydrogen cells, the effect of two different methods of electrochemical impregnation on the cycle life of the nickel electrode was investigated. One method was the Pickett (aqueous/ethanolic) process. The other was the modified Bell (aqueous) process. The plaques for both impregnation methods were made by sintering dry carbonyl nickel powder in a reducing atmosphere. The plaques contain a nickel screen substrate. Electrodes made from both processes were cycle tested in Air Force design IPV nickel-hydrogen cells. The only factor different for this test was the method of plaque impregnation; all other factors were the same. The cells were cycled to failure under a 90 min LEO cycle regime at a deep depth of discharge (80 percent DOD). Failure for this test was defined to occur when the cell voltage degraded to 1.0 V prior to the completion of the 35 min discharge. Author

N86-31981*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN CONSIDERATIONS FOR ADVANCED BATTERY CONCEPTS
Harold F. Leibecki and Lawrence H. Thaller 1986 16 p Presented at the 3rd Space Systems Technology Conference, San Diego, Calif., 9-12 Jun. 1986; sponsored by the American Institute of Aeronautics and Astronautics Previously announced in IAA as A86-40579
(NASA-TM-87319; E-3055; NAS 1.15:87319) Avail: NTIS HC A02/MF A01 CSCL 10C

A mathematical representation for the charge and discharge of a sodium-sulfur cell is developed. These equations are then used as the basis for a computerized model to examine the effects of cell arrangement in the design of a large multi-kilowatt battery from a group of hypothetical individual cells with known variations in their ampere hour capacity and internal resistance. The cycling characteristics of 216 individual cells arranged in six different configurations are evaluated with the view towards minimizing the adverse effects that are introduced due to the stoichastic aspects of groupings of cells, as well as the possibility of cell failures in both the open and shorted mode. Although battery systems based on sodium-sulfur cells are described in this example, any of the newer electrochemical systems can be fitted into this framework by making appropriate modifications to the basic equations. Author

N86-31982*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ESTIMATED HEATS OF FUSION OF FLUORIDE SALT MIXTURES SUITABLE FOR THERMAL ENERGY STORAGE APPLICATIONS
Ajay K. Misra (Case Western Reserve Univ., Cleveland, Ohio.) and John D. Whittenberger May 1986 26 p
(NASA-TM-87320; E-3057; NAS 1.15:87320) Avail: NTIS HC A03/MF A01 CSCL 10A

The heats of fusion of several fluoride salt mixtures with melting points greater than 973 K were estimated from a coupled analysis of the available thermodynamic data and phase diagrams. Simple binary eutectic systems with and without terminal solid solutions, binary eutectics with congruent melting intermediate phases, and ternary eutectic systems were considered. Several combinations of salts were identified, most notable the eutectics LiF-22CaF2 and NaF-60MgF2 which melt at 1039 and 1273 K respectively which posses relatively high heats of fusion/gm (greater than 0.7 kJ/g). Such systems would seemingly be ideal candidates for the light weight, high energy storage media required by the thermal energy storage unit in advanced solar dynamic power systems envisioned for the future space missions. M.G.

N86-31983*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SUMMARY OF NASA/DOE AILERON-CONTROL DEVELOPMENT PROGRAM FOR WIND TURBINES Final Report
Dean R. Miller 1986 26 p Presented at the Energy-Sources Technology Conference and Exhibition, New Orleans, La., 23-28 Feb. 1986; sponsored by American Society for Mechanical Engineers
(Contract DE-AI01-76ET-20320)
(NASA-TM-88811; DOE/NASA-20320/71; E-3163; NAS 1.15:88811) Avail: NTIS HC A03/MF A01 CSCL 10A

The development of aileron-control for wind turbines is discussed. Selected wind tunnel test results and full-scale rotor test results are presented for various types of ailerons. Finally, the current status of aileron-control development is discussed. Aileron-control was considered as a method of rotor control for use on wind turbines based on its potential to reduce rotor weight and cost. Following an initial feasibility study, a 20 percent chord aileron-control rotor was fabricated and tested on the NASA/DOE Mod-0 experimental wind turbine. Results from these tests indicated that the 20 percent chord ailerons regulated power and provided overspeed protection, but only over a very limited windspeed range. The next aileron-control rotor to be tested on the Mod-0 had 38 percent chord ailerons and test results showed these ailerons provided overspeed protection and power regulation over the Mod-0's entire operational windspeed range. Author

N86-31984*# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Energy Systems Div.
GAS COOLED FUEL CELL SYSTEMS TECHNOLOGY DEVELOPMENT Final Report, May 1983 - May 1984
J. M. Feret Aug. 1986 282 p
(Contracts DEN3-290; DE-AI01-80ET-17088)
(NASA-CR-175047; DOE/NASA/0290-02; NAS 1.26:175047; WAESD-TR-85-0030) Avail: NTIS HC A13/MF A01 CSCL 10A

The work performed during the Second Logical Unit of Work of a multi-year program designed to develop a phosphoric acid fuel cell (PAFC) for electric utility power plant application is discussed. The Second Logical Unit of Work, which covers the period May 14, 1983 through May 13, 1984, was funded by the U.S. Department of Energy, Office of Fossil Energy, Morgantown Energy Technology Center, and managed by the NASA Lewis Research Center. Author

N86-31985# Intersol Power Corp., Lakewood, Colo.
INSTALLATION OF A MODULAR BUILDING BLOCK PHOTOVOLTAIC CONCENTRATOR ARRAY FIELD
J. A. Sanders, D. C. Cass, and S. Broadbent Jun. 1985 81 p
(Contract DE-AC04-76DP-00789)
(DE85-016032; SAND-84-7022) Avail: NTIS HC A05/MF A01

A building block array field nominally rated at 25 kW has been installed in Albuquerque, New Mexico. The building block is a single source electrical circuit of six center pedestal two-axis tracking arrays connected in parallel and having a nominal operating voltage of 420 volts DC. Each array contains 60 point-focusing Fresnel lens photovoltaic concentrator modules connected in series for a nominal power output of 4.2 kW per array. The structural design uses a center pedestal two-axis cantilevered support tube with a closed loop sun sensor electronic control system. A master control provides manual override of the array field. The installation was accomplished without difficulty and demonstrated the ease of turnkey building block installation. The costs of 1 MW size fields is estimated to be $6.99 per watt installed based on the building block installation. Author

N86-31986# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
PHOTOVOLTAICS: ELECTRICITY FROM SUNLIGHT, FY 1985 ACCOMPLISHMENTS
Mar. 1986 121 p
(Contract DE-AC02-83CH-10093)
(DE86-004429; SERI/SP-216-2890) Avail: NTIS HC A06/MF A01

This summary of FY 1985 accomplishments contains the technical highlights of SERI's program in photovoltaic research and development and a bibliography of technical publications. Also included are several management highlights. Selected accomplishments are categorized according to research tasks identified in the DOE National PV Program's Five-Year Research Plan. The DOE task areas appearing here are Single-Junction Thin Films, High-Efficiency Multijunction Concepts, Innovative Concepts, Flat-Plate Collectors, and System Experiments. Subcontract program categories include amorphous thin films, high-efficiency concepts, polycrystalline thin films, crystalline silicon, and innovative concepts, which are further subdivided into new ideas, the University Participation Program, and photoelectrochemical cells. SERI's internal PV task areas are PV Devices and Measurements, Solid State Research, Insolation Resource Assessment, Advanced PV Systems Research, and solar electric research activities. The bibliography is a compilation of the technical publications resulting from all of SERI's research during FY 1984 and FY 1985. The entries are listed alphabetically by author. DOE

N86-31987# Sanders Associates, Inc., Nashua, N. H. Defense and Information Systems Div.
PARABOLIC DISH MODULE EXPERIMENT Final Test Report
Mar. 1986 206 p
(Contract DE-AC04-76DP-00789)
(DE86-009819; SAND-85-7007) Avail: NTIS HC A10/MF A01

A development test model of the 8-meter Solar Brayton Parabolic Dish Module has been designed, fabricated, and tested. The test model consists of five major subsystems: Sanders ceramic honeycomb solar receiver; LaJet LEC460 solar concentrator; AiRsearch SABC MKIIIA engine, Abacus 8 kW ac inverter; and a Sanders designed and built system controller. Goals of the tests were to integrate subsystem components into a working module, demonstrate the concept, and generate 5 kWe (hybrid) and 4.7 kWe (solar only) input. All subsystem integration goals were successfully achieved, but system performance efficiency was lower than expected. Contributing causes of the lower performance efficiencies have been identified. Modifications needed to restore performance to the required levels and improve the system life cycle cost have been addressed and are the subject of this final report. DOE

N86-31988# Sandia National Labs., Albuquerque, N. Mex.
EVALUATION OF HELIOSTAT FIELD-RECEIVER CONFIGURATIONS
S. E. Faas and W. S. Winters Mar. 1986 75 p
(Contract DE-AC04-76DR-00789)
(DE86-009875; SAND-86-8007) Avail: NTIS HC A04/MF A01

This report evaluates and compares north heliostat field/cavity receiver configurations and surround heliostat field/external receiver configurations. The receiver coolants are molten nitrate salts and liquid sodium. Both field/receiver configurations use molten salt thermal storage; the sodium receiver is thermally connected to thermal storage by a sodium-to-salt heat exchanger. The heliostat field size is fixed at 1,000,000 square meters of reflective area, and the delivered molten salt temperature is fixed at 566 C. The delivered thermal power varies from 500 to 600 MW(sub t), depending on the overall system efficiency. The generic north heliostat field/cavity receiver configurations were found to be 6 to 10 percent efficient than a generic surround field/external receiver configuration. There was little or no difference found in the transient performance of a molten salt receiver compared to a sodium receiver connected to a sodium-to-salt heat exchanger. Four configurations were of particular interest: (1) a north heliostat field/single cavity molten salt receiver, (2) a surround heliostat field/external cylinder molten salt receiver, (3) a surround heliostat field/external cylinder liquid sodium receiver, and (4) a north heliostat field/single cavity liquid sodium receiver. It was found that the surround field/liquid sodium external receiver configuration may provide energy at a 14 percent lower levelized energy cost than a north field/molten salt cavity receiver configuration. However, the cost advantage of the surround field/liquid

sodium external receiver is not conclusive because of uncertainties in system component costs. DOE

N86-31989# Sandia National Labs., Albuquerque, N. Mex.
AEROELASTIC EFFECTS IN THE STRUCTURAL DYNAMIC ANALYSIS OF VERTICAL AXIS WIND TURBINES
D. W. Lobitz and T. D. Ashwill Apr. 1986 23 p
(Contract DE-AC04-76DP-00789)
(DE86-009542; SAND-85-0957) Avail: NTIS HC A02/MF A01

Aeroelastic effects impact the structural dynamic behavior of vertical axis wind turbines (VAWRs) in two major ways. First, the stability phenomena of flutter and divergence are direct results of the aeroelasticity of the structure. Secondly, aerodynamic damping can be important for predicting response levels, particularly near resonance, but also for off-resonance conditions. The inclusion of the aeroelasticity is carried out by modifying the damping and stiffness matrices in the NASTRAN finite element code. Through the use of a specially designed preprocessor, which reads the usual NASTRAN input deck and adds appropriate cards to it, the incorporation of the aeroelastic effects has been made relatively transparent to the user. NASTRAN flutter predictions are validated using field measurements and the effect of aerodynamic damping is demonstrated through an application to the Test Bed VAWT being designed at Sandia. DOE

N86-31990# National Bureau of Standards, Washington, D.C.
INORGANIC COMPOUNDS FOR PASSIVE SOLAR ENERGY STORAGE: SOLID-STATE DEHYDRATION MATERIALS AND HIGH SPECIFIC HEAT MATERIALS Progress Report
L. J. Struble and P. W. Brown Apr. 1986 60 p
(Contract DE-AI01-76PR-06010)
(DE86-010214; NBSIR-86-3325) Avail: NTIS HC A04/MF A01

Two classes of hydrated inorganic salts have been studied to assess their potential as materials for passive solar energy storage. The materials are part of the quaternary system CaO-Al2O3-SO3-H2O and related chemical systems, and the two classes are typified by ettringite, a trisubstituted salt, and Friedel's salt, a monosubstituted salt. The trisubstituted salts were studied for their possible application in latent heat storage, utilizing a low-temperature dehydration reaction, and both classes were studies for their application in sensible heat storage. In order to assess their potential for energy storage, the salts have been synthesized, characterized by several analytical techniques, and thermal properties measured. The dehydration data of that the trisubstituted salts vary somewhat with chemical composition, with the temperature of the onset of dehydration ranging from 6(0)C to 33(0)C, and enthalpy changes on dehydration ranging from 60 to 200 cal/g. Heat capacity is less variable with composition; values for the trisubstituted phases are 30 cal/g/(0)C and for the monosubstituted phases between 0.23 and 0.28 cal/g/(0)C. Preliminary experiments indicate that the dehydration is reversible, and suggest that the materials might have additional potential as solar desiccant materials. These thermal data demonstrate the trisubstituted salts have potential as latent heat storage materials, and that both classes of salts have potential as sensible heat storage materials. DOE

N86-31991# Los Alamos National Lab., N. Mex.
PROGRESS IN FUEL CELLS FOR TRANSPORTATION APPLICATIONS
H. S. Murray 1986 20 p Presented at the 3rd International Symposium on Hydrogen Produced from Renewable Energy, Manoa, Hawaii, 22 May 1986
(Contract W-7405-eng-36)
(DE86-010206; LA-UR-86-1476; CONF-8605109-1) Avail: NTIS HC A02/MF A01

The current and projected states of development of fuel cells are described in terms of availability, performance, and cost. The applicability of various fuel cell types to the transportation application is discussed, and projections of power densities, weights, and volumes of fuel cell systems are made into the early 1990s. Research currently being done to advance fuel cells for vehicular application is described. A summary of near-term design parameters for a fuel cell transit line is given, including bus performance requirements, fuel cell power plant configuration, and battery peaking requirements. The objective of this paper is to determine a fuel cell technology suitable for near-term use as a vehicular power plant. The emphasis of the study is on indirect methanol fuel cell systems. DOE

N86-31992# British Petroleum Co. Ltd., Sunbury-on-Thames (England).
PHOTOVOLTAIC POWER SYSTEM DESIGN FOR TELECOMMUNICATIONS
Iain F. Garner 1985 9 p
(ESA-86-97255) Avail: NTIS HC A02/MF A01

The use of photovoltaic power systems for telecommunications, particularly in rural areas, is reviewed. Operating costs and maintenance are discussed. System design, including the collection of insolation data and the calculation of system capacity, is treated. Increasing reliability of photovoltaic modules and storage batteries is noted. The advantages of relay switching over solid state are outlined. Array mountings are described. ESA

N86-31993# Societe Nationale Industrielle Aerospatiale, Cannes (France). Dept. Generateurs Solaires.
PHOTOVOLTAIC SOLAR GENERATORS: FROM SATELLITES TO A SPACE STATION [LES GENERATEURS SOLAIRES PHOTOVOLTAIQUES: DU SATELLITE A LA STATION SPATIALE]
M. A. Ziliani 17 Feb. 1986 21 p In FRENCH
(SNIAS-861-440-112; ESA-86-97620) Avail: NTIS HC A02/MF A01

Ways to generate power for spacecraft operation are presented and the design of a 30 kW solar generator for the Columbus platform is described. The generator is specified for 10 yr life, 30 kW continuous power, low atmospheric drag, H shape deployment and 1992 launching target. A GaAs option is included, as the anticipated performance is better that of silicon cells. It is shown that the generator design is characterized by high reliability, low cost, and good adaptability (15 to 60 kW). ESA

N86-31994# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
ROTOR AERODYNAMICS OF HORIZONTAL AXIS WIND TURBINES. SUMMARY OF LECTURES AND DISCUSSIONS. PRESENTATION OF RESULTS OF CALCULATION METHODS [ROTORAERODYNAMICA VAN HORIZONTALE-AS WINDTURBINES NEWIN-WORKSHOP D.D. 16-4-1985. SAMENVATTING VAN DE LEZINGEN EN DISCUSSIES. PRESENTATIE VAN RESULTATEN UIT BEREKENINGSMETHODEN]
G. J. W. vanBussel and G. A. M. vanKuik Sep. 1985 39 p In DUTCH Proceedings of NEWIN Workshop, Delft, Netherlands, 4 Apr. 1985
(THD-IW-R505; THE-R-738-D; ESA-86-97706) Avail: NTIS HC A03/MF A01

Models for the calculation of the aerodynamic performances of horizontal-axis wind turbines under uniform straight flow were evaluated. The axial momentum theory was revised. The blade-element momentum method PHATAS and its Viterna-Corrigan correction are presented. The lifting line methods PREDICHAT and HELIX are explained. The results of the calculation methods for a reference rotor configuration were compared with measurements. Large discrepancies between the methods are found. Theory and experiment differ too much to allow a reliable prediction of the performance of designs. The measurements were not good enough for a correct evaluation of the theoretical models. The very large deviations of the results of PHATAS compared to other methods cannot be explained. ESA

N86-31995# Technische Hogeschool, Delft (Netherlands). Vakgroep Elektriciteitsvoorziening.
OPTICAL POWER FLOW WITH SEQUENTIAL QUADRATIC PROGRAMMING [OPTIMAL POWER FLOW MET SEQUENTIAL QUADRATIC PROGRAMMING]
R. A. M. vanAmerongen 31 Jan. 1985 75 p In DUTCH

(ESA-86-97708) Avail: NTIS HC A04/MF A01

Newton's method as an approach to solve the optimal power flow problem in electric power plants is presented. A general formulation of the optimal flow problem is given. Newton's method is applied to solve the nonlinear Kuhn-Tucker conditions by iteration. Every Newton step is calculated by solving a quadratic programming problem. Variations of the sequential quadratic programming method are presented. Byproducts of the optimization, namely the Lagrange multipliers and their interpretation as marginal costs and shadow prices, are outlined. The most important computer programs are enclosed. ESA

N86-31996# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. des Systemes Balistiques et Spatiaux.

LOW FREQUENCY NOISE AS A CONTROL TEST FOR SPACE SOLAR PANELS

B. Crsal, R. Alabedra, and R. Ruas 1986 25 p

(SNIAS-861-440-109; ESA-86-97617) Avail: NTIS HC A02/MF A01

The use of low frequency noise as a nondestructive test of forward biased solar panels is studied. It is shown that by this method one cell with a given defect can be detected in a solar panel under dark condition. The theoretical analysis indicates that the electrical cell characteristics I-V are unchanged when a small defect is introduced while the noise of the cell with a defect is 10 to 15 times higher than that of a good cell. Experiments with a 5 x 5 panel shows that when a good cell is replaced with another with a defect the overall panel noise response increases by 30%. ESA

N86-31997# Societe Nationale Industrielle Aerospatiale, Cannes (France).

HIGH POWER RIGID SOLAR ARRAY

Marcel A. Ziliani and Lionel Pelenc 1986 7 p

(SNIAS-861-440-110; ESA-86-97618) Avail: NTIS HC A02/MF A01

The design of a solar array providing 30 kW is described. Main specifications are compatibility with the European Columbus platform and resource module, low life cycle cost, reliability, multideployment-retraction ability and low development risk. The design is based on interchangeable rigid panels with silicon cells and proved pantograph mechanisms. The advantages of this concept include modularity at elementary panel (0.5 kW) level, capability of providing power while partially retracted, and of withstanding high levels of in-orbit loads ESA

N86-31998# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost. Space Div.

HIGH POWER SOLAR ARRAY (HPSA) STUDY Final Report

G. J. Hegemans Paris ESA Jun. 1985 110 p

(Contract ESTEC-6063/84-NL-PB(SC))

(Fok-TR-R-85-068; ESA-CR(P)-2182; ESA-86-97795) Avail: NTIS HC A06/MF A01

The design of a 30 kW planar Si-cell solar array for space shuttle payloads along with a GaAs-concentrator array are presented. Both arrays consist of blankets supported by a central, coplanar telescopic mast. Analysis results describing the array performances are summarized. A design and development philosophy is presented, critical design areas are pinpointed, and descoping/growth capability, orbital replacement units, and extravehicular servicing are discussed. ESA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-31999# Sandia National Labs., Albuquerque, N. Mex.

BALLOON TRACER FOR ATMOSPHERIC POLLUTANTS

E. W. Lichfield, M. D. Ivey, B. D. Zak, and H. W. Church 1985 11 p Presented at the ARGOS Users Conference, New Orleans, La., 23 Sep. 1985 Prepared in cooperation with Technadyne Engineering Consultants, Albuquerque, N. Mex. and Telemetrics Southwest, Alguquerque, N. Mex.

(Contract DE-AC04-76DP-00789)

(DE86-007144; SAND-86-0221C; CONF-8509254-1) Avail: NTIS HC A02/MF A01

An operational prototype of the Balloon Tracer was developed and described. This prototype was designed to be capable of meeting all of the desired specifications for the Balloon Tracer. Its buoyancy adjustment subsystem is shown. Three Gillian instrument pumps operating in parallel provide a flow of about 12 liters per minute, depending upon backpressure. The miniature Klippard mechanical valves are actuated by a servo mechanism which only requires power when the state of the valves is being changed. The balloon itself for the operational prototype is just under 3 meters in diameter. A block diagram of the operational prototype payload measures ambient pressure, temperature, and humidity obtained from AIR which outputs its data in ASCII format. The vertical anemometerhas a measured starting speed of under 2 cm/s, which has a Gill styrofoam propeller and a Spaulding Instruments rotation sendor. The command decoder is built around a chip developed originaly for remote control television tuners. The command receiver operating on 13.8935 MHz was developed and built by Hock Enginffering. The Argos transmitter is a Tectonic platform transmitter. The heart of the control both random access both and read only memory. DOE

N86-32000# Oak Ridge National Lab., Tenn.

APPLICATION OF A GEOGRAPHIC INFORMATION SYSTEM IN THE STUDY OF ACIDIC DEPOSITION

R. J. Olson 22 Jan. 1986 18 p Presented at the Geographic Information Systems for Environmental Protection, Las Vegas, Nev., 22 Jan. 1986

(Contract DE-AC05-84OR-21400)

(DE86-008220; CONF-860161-1) Avail: NTIS HC A02/MF A01

The Oak Ridge National Laboratory (ORNL) Geographic Information System (GIS) is a primary tool for data base management, analysis, and graphic display in the assessment of acidic deposition affects on aquatic resources in the Adirondack Mountains of New York State. Functions of the ORNL GIS include: (1) data input and digitizing; (2) data transformation and manipulation; (3) data management and extraction; (4) integration and analysis; and (5) output and display. The GIS utilized watershed units, defined by digitizing boundaries drawn on large-scale topographic maps, to serve as common spatial units for integrating over 200 thematic variables for 463 headwater lakes. Many of the thematic variables used in the assessment involved manipulating several spatial data sets with specific algorithms to calculate levels of stress or natural conditions that could affect the aquatic resources. For example, precipitation amount and pollutant ionic concentrations were merged to estimate deposition values for each lake. Central to the GIS work is a data base management and statistical package to use with the thematic data base to develop multiple linear regression models for lake pH and alkalinity with watershed variables. Communication of the results of the assessment with computer-generated maps facilitated the understanding of complex spatial patterns. DOE

N86-32001# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Strahlenschutz.

ENVIRONMENTAL GAMMA RADIATION MONITORING SYSTEM WITH A LARGE VOLUME AIR IONIZATION CHAMBER

Klaus E. Duftschmid, Christian Strachotinsky, and Josef Witzani Jan. 1986 10 p Presented at Hungarian-Austrian-Yugoslavian Health Physicists Meeting on Computer Aided Methods in Radiation Protection, Budapest, Hungary, 22-25 Oct. 1985

(OEFZS-4344; ST-136/86; ESA-86-97246) Avail: NTIS HC A02/MF A01

An envionmental monitoring system consisting of an ionization chamber with 120l sensitive volume, operated at atmospheric pressure, and a commercial electrometer amplifier with digital voltmeter were designed and built. The system is controlled by a desk calculator with printer for automated operation and calculation of dose and dose rate. The ionization chamber provides superior

dosimetric performance as compared to usual Geiger counters and high pressure chambers. The system was field-tested during the European Intercomparison Program for Environmental Monitoring Instruments. ESA

N86-32002# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
INVESTIVATIONS OF DEPTH-RESOLVED LASER REMOTE MEASUREMENT OF NO2 AND SO2 IN THE VISIBLE AND UV SPECTRAL DOMAINS Thesis - Hamburg Univ. [UNTERSUCHUNGEN ZUR ORTSAUFLOESENDEN LASER-FERNMESSUNG VON NO2 UND SO2 IM SICHTBAREN UND ULTRAVIOLETTEN SPEKTRALBEREICH]
W. Staehr 28 Aug. 1985 126 p In GERMAN; ENGLISH summary
(GKSS-85/E/48; ISSN-0344-9629; ESA-86-97407) Avail: NTIS HC A07/MF A01

A lidar system was used for the depth-resolved remote measurement of the gaseous atmospheric polluants NO2 and SO2 by the differential absorption and scattering technique. The system was used to measure atmospheric extinction and backscattering coefficients under varying visibility conditions. The results of a detailed analysis of statistical and systematic errors of the trace gas detection were confirmed by experiment. For NO2 the sentitivity and data range are 10 ppb and 6 km, respectively; for SO2 15 ppb and 3 km. Field tests demonstrate the capabilities of the system to monitor ambient level concentrations as well as to determine quantitatively emissions from individual sources. ESA

N86-32003# Gesamthochschule, Wuppertal (West Germany). Fachbereich 8 - Physik.
AN ANALYSIS OF MEASUREMENTS OF ATMOSPHERIC TRACE GAS INFRARED EMISSIONS Final Report, Oct. 1984
Klaus Ulrich Grossmann, Peter Barthol, Wolfgang Frings, Reiner Hennig, and Dirk Offermann Bonn, West Germany BMFT Dec. 1985 144 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-016; ISSN-0170-1339; ESA-86-97460) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 30.50

The results of rocket-launched experiments in the mesosphere and the thermosphere to measure CO2, O3, H2O and O(3p) infrared emissions using liquid helium cooled spectrometers aboard Skylark 7 during the Energy Budget Campaign 1980/81 are compared to predictions. A computer program was developed to solve the radiation transport equation and is used to determine mesospheric temperature profiles, ozone, and water vapor density. Ozone varies in winter at high altitudes by + or - 30%. Anticorrelation in ozone and water vapor profiles in the mesosphere is noted. The water vapor distribution is inhomogeneous vertically and horizontally. Measurements of atomic oxygen fine structure radiation at 63 microns are compared to model calculations and show a consistent image due to reduced atomic transition or to reduced impact excitation cross sections. ESA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-32004 Institut d'Aeronomie Spatiale de Belgique, Brussels.
ATMOSPHERIC MOLECULES
C. Muller 1985 39 p Presented at International Center for Theoretical Physics Session, Trieste, Italy, 21 Jan - 22 Mar. 1985 (Aeronomica-Acta-F-38-1985; ESA-86-97485) Avail: Issuing Activity

The relevance of molecular physics to atmospheric physics is discussed. The composition and formation and physical properties of the Earth's atmosphere are explained. Penetration of solar radiation is considered. Infrared spectroscopy of the atmosphere is introduced. Observation techniques are outlined. ESA

N86-32005*# Little (Arthur D.), Inc., Cambridge, Mass.
SYSTEM STUDY OF THE UTILIZATION OF SPACE FOR CARBON DIOXIDE RESEARCH
Peter E. Glaser and Robert Vranka Oct. 1985 526 p
(Contract NAS8-35357)
(NASA-CR-3923; NAS 1.26:3923) Avail: NTIS HC A23/MF A01 CSCL 04A

The objectives included: compiling and selecting the Scientific Data Requirements (SDRs) pertinent to the CO2 Research Program that have the potential to be more successfully achieved by utilizing space-based sensor systems; assessment of potential space technology in monitoring those parameters which may be important first indicators of climate change due to increasing atmospheric CO2, including the behavior of the West Antarctic ice sheet; and determine the potential of space technology for monitoring those parameters to improve understanding of the coupling between CO2 and cloud cover. For individual titles, see N86-32006 through N86-32010.

N86-32006*# Little (Arthur D.), Inc., Cambridge, Mass.
SPACE SYSTEMS REQUIREMENTS DEFINITION c47
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 p 112 (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 04B

The compilation of Scientific Data Requirements (SDRs) were based on discussions with a representative cross section of the scientific community and a selected survey of the extensive literature dealing with the measurement of CO2-induced climatic changes. This approach resulted in a baseline set of SDRs to determine what could be accomplished with space-based sensors. Twenty-three SDRs emerged as the basis for the investigation of space systems. B.G.

N86-32007*# Little (Arthur D.), Inc., Cambridge, Mass.
SCIENTIFIC DATA REQUIREMENTS
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 50 p (For primary document see N86-32005 23-46)
(ADL-C-89230) Avail: NTIS HC A23/MF A01 CSCL 04A

Each Scientific Data Requirement (SDR) is summarized in terms of professional discipline, research program, technical description, related parameters, geographical extent, resolution, error tolerance, space-based sensors systems, personnel, implementation expert, notes, and references. B.G.

N86-32008*# Little (Arthur D.), Inc., Cambridge, Mass.
MEASURES OF MEASUREMENT ADEQUACY c64
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 14 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 12A

The adequacy of a measurement instrument is often characterized in terms of the precision, accuracy, and confidence that can be assigned to the measurements that it produces. The accuracy of the measurement may be defined as the size of the difference between the true and measured values. The precision of the system over a large number of measurements may be defined in terms of the sample standarad deviation. The confidence in an interval-values measurement may be defined as the probability that this interval contains the true value. These concepts are discussed in terms of their mathematical solutions. B.G.

N86-32009*# Little (Arthur D.), Inc., Cambridge, Mass.
A PROCEDURE FOR SPACE SDR PRIORITIZATION c47
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 12 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 04B

It was first necessary to arrive at a common set of attributes

which described the relative importance of each Scientific Data Requirement (SDR) to the DOE CO2 Research Program. Many attributes were considered. Some were rejected because they related more to engineering considerations than to scientific ones. Finally four were selected: importance for early detection of CO2-induced effects; need for additional measurements; importance for model inputs; and importance for model outputs. Each SDR was scored on these attributes. These scores were categorical (for example, low, medium, and high) and formed the basis for assigning a relative value to each SDR. For this ranking a methodology based on dominance theory was used. The methodology and the selected SDRs are discussed. Author

N86-32010*# Ball Aerospace Systems Div., Boulder, Colo.
SUBSYSTEM FACT SHEETS FOR NASA CO2 PROJECT, REVISION 3 **c19**
Tom Lookabaugh *In* Little (Arthur D.), Inc. System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 212 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 14B

The twenty-seven subsystem fact sheets produced by Ball Aerospace Systems Division are presented. Each instrument is summarized with a description; physical characteristics; data; orbit requirements; sensor; implementation schedule; and experience, problems, modifications. B.G.

N86-32011*# Old Dominion Univ., Norfolk, Va. Dept. of Geology.
THEORY AND OPERATION OF THE GOULD 32/27 PROGRAMS ABLE-2A AND EBLE FOR THE TROPOSPHERIC AIR MOTION MEASUREMENT SYSTEM Final Report, 1 Jan. - 31 Dec. 1985
Carolyn Butler Jun. 1986 102 p
(Contract NCC1-28)
(NASA-CR-176856; NAS 1.26:176856; GSTR-86-3) Avail: NTIS HC A06/MF A01 CSCL 04A

Software development for the Trospheric Air Motion Measurement Systems (TAMMS) is documented. In July/August the TAMMS was flown on the NASA/Goddard Flight Center Electra aircraft for 19 mission for the ABLE-2A (Amazon Boundary Layer Experiment) in Brazil. In December 1985, several flights were performed to assess the contamination and boundary layer of the Electra. Position data, flow angles, pressure transducer measurements were recorded. The programs written for the ABLE-2A were modified due to timing considerations for this particular program. The 3-step programs written for EBLE (Electra Boundary Layer Experiment) are described. Power up and log-on procedures are discussed. A few editing techniques are described for modification of the programs. B.G.

N86-32012*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTRAPLATE DEFORMATION DUE TO CONTINENTAL COLLISIONS: A NUMERICAL STUDY OF DEFORMATION IN A THIN VISCOUS SHEET
Steven C. Cohen and Richard C. Morgan Oct. 1985 27 p
(NASA-TM-86235; Rept-86B0019; NAS 1.15:86235) Avail: NTIS HC A03/MF A01 CSCL 08E

A model of crustal deformation from continental collision that involves the penetration of a rigid punch into a deformable sheet is investigated. A linear viscous flow law is used to compute the magnitude and rate of change of crustal thickness, the velocity of mass points, strain rates and their principal axes, modes of deformation, areal changes, and stress. In general, a free lateral boundary reduces the magnitude of changes in crustal thickening by allowing material to more readily escape the advancing punch. The shearing that occurs diagonally in front of the punch terminates in compression or extension depending on whether the lateral boundary is fixed or free. When the ratio of the diameter of the punch to that of the sheet exceeds one-third, the deformation is insensitive to the choice of lateral boundary conditions. When the punch is rigid with sharply defined edges, deformation is concentrated near the punch corners. With non-rigid punches, shearing results in deformation being concentrated near the center of the punch. Variations with respect to linearity and nonlinearity of flow are discussed. Author

N86-32013# SRI International Corp., Menlo Park, Calif.
MODEL FOR THE STEADY-STATE ROTATIONAL STIMULATED RAMAN GAIN COEFFICIENTS IN THE ATMOSPHERE
G. C. Herring, William K. Bischel, M. J. Dyer, and D. L. Huestis 21 Apr. 1986 78 p
(Contract N00014-84-C-0256)
(AD-A167469; SRI-MP-85-217; TR-1) Avail: NTIS HC A05/MF A01 CSCL 07/4

A model for stimulated Raman scattering in the atmosphere is described for the pure rotational transitions in N2. An empirical formula for the wavelength dependence of the Molecular Nitrogen polarizability anisotropy is derived from published measurements. The temperature and density dependence of the Raman linewidths were also measured in the laboratory. These results were then used to calculate the steady-state, plane wave Raman gain coefficient over the lower 100 km of the atmosphere. At sea level, the strongest lines have gain coefficients of 0.7 cc/km-MW for a Stokes laser wavelength of 350 nm. GRA

N86-32014# Naval Postgraduate School, Monterey, Calif.
DETERMINATION OF THE ATMOSPHERIC AEROSOL DISTRIBUTION BY MULTI-CHANNEL REMOTE SENSING TECHNIQUES M.S. Thesis
Scott R. Bulfinch Mar. 1986 88 p
(AD-A167885) Avail: NTIS HC A05/MF A01 CSCL 04/1

A simple image processing technique applied to channel 1 and channel 2 of the NOAA AVHRR sensor may be used to discern variations in aerosol particle size distribution. Ratios of the channel 1 albedo to the channel 2 albedo are calculated and displayed as an image. High ratio values are shown to indicate increased levels of submicron aerosols, while low ratio values indicate increased levels of supermicron aerosols. Horizontal variations in aerosol distributions may be observed directly by noting variations in ratio values, and vertical distributions may be inferred through the application of appropriate regional models of aerosol transport. A model of offshore advection of urban particles within the marine boundary layer is presented. Interpreting ratio values in light of this model, the offshore transport of urban aerosol particles is observed in AVHRR imagery of Southern California during the period 17-25 October 1984. Author (GRA)

N86-32015# SRI International Corp., Menlo Park, Calif.
THE SRI IONOSPHERIC STRUCTURE AND DYNAMICS PROGRAM, 1985 RESULTS Technical Report, 3 Jan. 1983 - 29 Jun. 1985
James F. Vickrey, Robert C. Livingston, Roland T. Tsunoda, Charles L. Rino, and Nancy B. Walker 30 Jun. 1985 219 p
(Contract DNA001-83-C-0034; DNA Proj. I25-AMXI)
(AD-A168115; DNA-TR-85-85) Avail: NTIS HC A10/MF A01 CSCL 20/14

This report describes recent observations of high latitude ionospheric structure and dynamics from the HILAT satellite and the Sondrestrom and EISCAT incoherent scatter radars. Plasma turbulence theory and ionospheric plasma diffusion processes are also described. Measured variations in latitude and local time of total electron content, levels of radio wave scintillation, and magnetospheric electrodynamics are presented for the northern polar regions. Seasonal and solar cycle variations of these phenomena are examined. Magnetic flux tube interchange produced by magnetospheric electrostatic turbulence (rather than local instability polarization fields) is suggested as an important source of high latitude ionospheric structure. The large scale magnetospheric potential field is also shown to be capable of steepening and structuring plasma gradients. These processes would certainly structure late time nuclear produced plasma. GRA

N86-32016# Fraunhofer-Inst. fuer Atmosphaerische Umweltforschung, Garmisch-Partenkirchen (West Germany).
BALANCE OF THE TROPOSPHERIC OZONE AND ITS RELATION TO STRATOSPHERIC INTRUSIONS INDICATED BY

COSMOGENIC RADIONUCLIDES, PART 13 Annual Report, 1 Feb. 1982 - 31 Jan. 1983
R. Reiter, H. J. Kanter, H. Jaeger, and K. Munzert Jun. 1985 118 p
(Contract DE-AC02-76EV-03425)
(DE85-015560; DOE/EV-03425/27-Pt-13) Avail: NTIS HC A06/MF A01

The results of the statistical evaluation of the recording series of the tropospheric ozone concentrations in the air obtained at 3 different levels are presented. Data from the period 1977 to 1984 have been examined for this purpose. The mean annual variation of the ozone concentration and interannual variations are discussed. Using the annual means, it is attempted to make a trend analysis. To clarify the climatology of the stratospheric exchange, the measuring series of cosmogenic radionuclide Be-7, P-32, P-33 covering the period 1970 through 1981 are statistically analyzed with regard to the ozone concentration recorded on the Zugspitze. The statistics of stratospheric intrusions are shown and the stratospheric residence time is estimated. Effects of the eruption of volcano El Chichon in April 1982 on the concentration of the stratospheric aerosol are documented. The time variation of the concentration of the stratospheric aerosol is studied with consideration of the stratospheric circulation. The noted effects are weighted by a comparison with earlier volcanic eruptions. Author

N86-32017# Los Alamos National Lab., N. Mex.
E-LAYER IONOSPHERIC DISTURBANCES FOLLOWING THE COALINGA EARTHQUAKE
T. J. Fitzgerald and J. H. Wolcott Nov. 1985 39 p
(Contract W-7405-eng-36)
(DE86-008588; LA-10607-MS) Avail: NTIS HC A03/MF A01

A bistatic HF Doppler network in California recorded ionospheric disturbances after the Coalinga, California, earthquake of May 2, 1983. The ionospheric disturbances appear to be associated with acoustic waves launched vertically into the atmosphere from the ground motion caused by radially propagating surface seismic (Rayleigh) waves. The ionospheric disturbances were detected by variations in the frequency of the received transmissions (Doppler shifts); such disturbances have been observed in association with a number of previous earthquakes. The Doppler shifts were caused by phase path changes induced by the motion of the neutral atmosphere at the reflection height of the radio wave (200 km). We have also detected changes in the spectrum of the received transmissions following the Coalinga earthquake at the time of the passage of the acoustic waves through the E-layer. We interpret these spectral changes as an indication of specular reflection of the radio waves from index of refraction gradients induced by the acoustic waves, which have undergone significant nonlinear steepening during their propagation to 100 km. Since the acoustic waves were propagating upwards, the reflections had negative Doppler shifts. DOE

N86-32018# Los Alamos National Lab., N. Mex.
HOSTILE ENERGETIC PARTICLE RADIATION ENVIRONMENTS IN EARTH'S OUTER MAGNETOSPHERE
D. N. Baker, R. D. Belian, P. R. Higbie, R. W. Klebesadel, and J. B. Blake 1986 15 p Presented at the AGARD Symposium, Hague, Netherlands, 2 Jun. 1986 Prepared in cooperation with Aerospace Corp., El Segundo, Calif.
(Contract W-7405-eng-36)
(DE86-005752; LA-UR-86-1011; CONF-8606108-1) Avail: NTIS HC A02/MF A01

Many spacecraft operational problems in Earth's outer magnetosphere appear to be due to intense, transient radiation phenomena. Three types of naturally-occurring, and highly variable, hostile particle radiation environments are encountered at, or near, the geostationary orbit: (1) high-energy protons due to solar flares; (2) energetic ions and electrons produced by magnetospheric substorms; and (3) very high energy electrons of uncertain origin. Present particle sensor systems provide energetic particle detection and assessment capabilities during these kinds of high-energy radiation events. In this paper, particular emphasis is given to highly relativistic electrons (3 approx. 10 MeV). Electron fluxes and energy spectra are shown which were measured by two high-energy electron sensor systems at 6.6 R sub E from 1979 through 1984. Large, persistent increases in this population were found to be relatively infrequent and sporadic in 1979-81 around solar maximum. During the approach to solar minimum (1981 to present) it is observed that the highly relativistic electrons occur with a regular 27-day periodicity, and are well associated with the re-established solar wind stream structures. The present analysis suggests that the Jovian magnetosphere is a recurrent source of this significant electron population in the outer terrestrial magnetosphere and that these electrons have a very deleterious influence on spacecraft systems due to deep dielectric charging and low-dose susceptibility effects. DOE

N86-32019# Sandia National Labs., Albuquerque, N. Mex.
ESTIMATES OF AVAILABLE SOLAR RADIATION AND PHOTOVOLTAIC ENERGY PRODUCTION FOR VARIOUS TILTED AND TRACKING SURFACES THROUGHOUT THE US BASED ON PVFORM, A COMPUTERIZED PERFORMANCE MODEL
D. F. Menicucci and J. P. Fernandez Mar. 1986 97 p Prepared in cooperation with New Mexico Univ., Albuquerque
(Contract DE-AC04-76DP-00789)
(DE86-009549; SAND-85-2775) Avail: NTIS HC A05/MF A01

An improved photovoltaic performance model called PVFORM has been developed at Sandia National Laboratories. This new model incorporates the latest improvements in solar modelling techniques including the Perez anisotropic solar diffuse model. The PVFORM model has been used to produce tables of average solar radiation availabilities and corresponding direct current energy performance for a photovoltaic module mounted in various tilted and tracking configurations. Solar availabilities are also computed for some vertical and 45 deg. tilted wall surfaces for use in passive solar design. The tables contain average daily solar availabilities and PV energy production for 38 sites throughout the US. Each table contains four average daily values representing the four seasons of the year along with an annual average. Typical weather conditions are also presented for each of the 38 sites. This new model and the set of tables presented in this report are of special importance to solar energy system designers because they provide more accurate estimates of insolation availability on fixed and tracking surfaces by as much as 20%, PVFORM has been shown to be accurate to within 5% to 7% with no observable prediction bias. Use of the PVFORM model or the tabulated data found in this report will enable the architect or engineer to design more cost effective solar energy systems. DOE

N86-32020# Oregon Univ., Eugene. Solar Monitoring Lab.
PACIFIC NORTHWEST SOLAR RADIATION DATA
1 Apr. 1986 264 p
(Contract DE-AC79-81BP-24574)
(DE86-009635; DOE/BP-24574/2) Avail: NTIS HC A12/MF A01

The University of Oregon (UO) Solar Monitoring Laboratory has been making solar radiation measurements since 1975. Principal support for this work comes from the Bonneville Power Administration (BPA), along with the Eugene Water and Electric Board (EWEB) for the Eugene station, Washington Water Power (through a subcontract from the University of Idaho) for the Coeur d'Alene site and Pacific Power and Light (PP and L) for the Hood River site. This booklet is the final solar radiation report published under the auspices of BPA and contains all data gathered through December 31, 1985. Discussion of the data handling procedures and the accuracy of the data are included in the overview of the solar radiation network at the beginning of this booklet. A summary of the data follows in the form of monthly averaged and long term hourly averaged tables for each site. A comprehensive listing of the daily data is given at the end of the book. Hourly data for all direct monitoring sites are available from BPA except for Eugene, Coeur d'Alene, and Hood River. The hourly Eugene data are available from the University of Idaho. Fifteen minute Hood River data are available from PP and L. DOE

N86-32021# Ohmstede (William D.), Las Cruces, N. Mex.
CONTRIBUTIONS TO LARGE-EDDY SIMULATION, PART 1
W. D. Ohmstede Dec. 1985 29 p
(Contract W-7405-eng-48)
(DE86-009710; UCRL-15755-Pt-1) Avail: NTIS HC A03/MF A01

The purpose of this report is to bring to a close the contributions in support of the Large-Eddy Simulation (LES) project. Major progress has been made. The report UCRL-92457 entitled Planetary Boundary Layer Structure Derived from Large-Eddy Simulation for Benchmark Stability Categories (Coderwall, et al (1985)), and the presentation of this material at the Seventh Symposium on Turbulence and Diffusion, 12-15 November 1985 at Boulder, Colorado, constitute completion of major milestones. This report now looks to the future and recommends the next actions which should be taken to promote orderly progress within the project. DOE

N86-32022# Chalmers Univ. of Technology, Goeteborg (Sweden). Research Lab. of Electronics.
SATELLITE-EARTH RANGE MEASUREMENTS. PART 1: CORRECTION OF THE EXCESS PATH LENGTH DUE TO ATMOSPHERIC WATER VAPOR BY GROUND BASED MICROWAVE RADIOMETRY
Gunnar Elgered, Bernt Roennaeng, Erik Winberg, and Jan Askne Paris ESA Apr. 1985 115 p
(Contract ESTEC-5910/84-NL-MD)
(CTH-RR-147-Pt-1; ESA-CR(P)-2176-Pt-1; ESA-86-97221) Avail: NTIS HC A06/MF A01

The excess delay of radio waves penetrating the neutral atmosphere of the Earth, especially the delay due to water vapor, is discussed. The state of the art of sounding techniques and instrumentation, in particular microwave radiometry is reviewed. The physical background of the water vapor radiometer (WVR) method is presented and seven types of WVR are described. The expected accuracies of wet path delays vary with the local climate as well as with instrumental errors and the operating frequencies of the WVR. It is shown that errors in the wet path delay for zenith observations range from 0.4 to 0.9 cm rms for optimum WVR frequencies and instrumental errors of 0.5 K rms. Two WVR designs, one with high accuracy and one with low cost (but less accurate) are proposed for the ESA POPSAT system. ESA

N86-32023# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
SOUNDING ROCKET PROGRAM MAGNETOSPHERE PAYLOAD CAESAR. REPORT ON SYSTEMS DEVELOPMENT, INTEGRATION, TESTING AND FLIGHT Final Report, Jul. 1985
Walter Schrieder and Walter Schnattinger Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 155 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-023; ISSN-0170-1339; ESA-86-97467) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32

Experiments in the payload CAESAR aboard sounding rockets were carried out to determine the interactions between the magnetosphere and the ionospheric plasma during dawn arc phenomena and to study the energy transfer from the magnetosphere to the ionosphere and the related transformation processes. The field and ion distributions within and in the vicinity of a dawn arc and the arc formation are studied. The pulsative dawn activities during the relief phase of a magnetospheric substorm are investigated. The carrier system Skylark 12 and the rocket payload structure are described. ESA

N86-32024# Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
MIXING LENGTH AND TURBULENT DIFFUSION COEFFICIENT IN ATMOSPHERIC SIMULATION MODELS [MISCHUNGSWEG UND TURBULENTER DIFFUSIONSKOEFFIZIENT IN ATMOSPHAERISCHEN SIMULATIONSMODELLEN]
Heinrich Wilhelm Detering 1985 119 p In GERMAN
(Rept-25; ISBN-3-923624-03-4; ISSN-0440-2820; ESA-86-97478) Avail: NTIS HC A06/MF A01

The significance of parameterization of turbulent flows in comparison with other model suppositions, as well as the effects of several parameterization methods on the results of numerical models were investigated. For measured and hypothetical flows, the differences in the results obtained with different mixing length suppositions in a one and two-dimensional numerical model with a first kind equation closure are shown. The effect of parameterization of turbulent flows on the interpretation of numerically simulated mesoscale phenomena is discussed. It is shown that the closure which is presently mainly used for strong shear flow, provides realistic results for atmospheric flows (even under diabatic conditions) by a modification of the prognostic energy dissipation equation. For stable lamination a functional dependence of the ratio of heat and momentum diffusion coefficient on the Richardson number which improves the model results is given. It is explained which complex equation structure is required to obtain an approximate value of the turbulent diffusion coefficients. ESA

N86-32364*# Department of Energy, New York. Environmental Measurements Lab.
CALCULATIONS OF COSMOGENIC NUCLIDE PRODUCTION RATES IN THE EARTH'S ATMOSPHERE AND THEIR INVENTORIES
Keran OBrien *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-32025# World Climate Programme, Geneva (Switzerland).
REPORT OF THE JSC/CAS WORKSHOP ON MODELING OF CLOUD TOPPED BOUNDARY LAYER
1985 294 p Workshop held in Fort Collins, Colo., 22-26 Apr. 1986
(WCP-106; WMO/TD-75; ESA-86-97251) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Modeling and parametrization of boundary layer cloud systems are discussed. Studies of radiation budgets, and simulation experiments are included. For individual titles, see N86-32026 through N86-32041. ESA

N86-32026# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.
EXTRATROPICAL CLOUD-TOPPED BOUNDARY LAYERS OVER THE OCEANS
Ernest E. Agee *In* World Climate Programme Report of the JSC/CAS Workshop on Modeling of Cloud Topped Boundary Layer 1985 12 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Air-sea interactions occurring when cold air moves over warmer water (type one interaction) or when warm air moves over colder water (type two interaction) are described and modeled. Examples of type one occurring to the east of continents and type two to the west are presented showing the open or closed mesoscale cellular convection patterns. The primitive equation model and the turbulence model are discussed showing their inability to simulate the horizontal planform of the convection cell as well as the circulation direction. Suggestions for a comprehensive model are given. ESA

N86-32027# Institute of Ocean Sciences, Sidney (British Columbia).
THE CLOUD-TOPPED BOUNDARY LAYER
Gordon McBean *In* World Climate Programme Report of the JSC/CAS Workshop on Modeling of Cloud Topped Boundary Layer 1985 8 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Results from studies of marine stratocumulus, midlatitude

weather systems and Arctic stratus are examined to identify the main features of the physical processes contributing to the development and evolution of the cloud-topped boundary layer. Previous studies are discussed showing the limitations of global circulation models. The international satellite cloud climatology project, a part of the world climate research program, is described, showing that Arctic stratus layer modeling continues to be a problem. ESA

N86-32028# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
RADIATION IN BOUNDARY LAYER CLOUDS
Y. Fouquart *In* World Climate Programme Report of the JSC/CAS Workshop on Modeling of Cloud Topped Boundary Layer 1985 40 p Sponsored by Programme National d'Etudes de la Dynamique du Climat (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The impact of radiation on boundary layer clouds and its influence on planetary radiation budget are discussed. The studies of the localization of the radiative divergence and its influence upon the entrainment rate are reviewed. The parametrization of the optical properties of boundary layer clouds, the short wave spectral range and the long wave optical properties are also examined. Results of field experiments are used to validate short wave parameterizations, and stratocumulus reflectivity observations are employed to validate satellite data. It is shown that the infrared optical properties of the boundary layer clouds can be adequately modeled in terms of an infrared window emissivity, the influence of scattering being weak. It is recommended that models of the boundary layer include a representation of the radiative processes allowing for horizontal inhomogeneities. ESA

N86-32029# Tartu State Univ. (USSR). Dept. of Geophysics.
PHYSICAL PROPERTIES OF STRATIFORM CLOUDS AND THEIR PARAMETRIZATION
O. A. Avaste *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer (WCP-106) 1985 17 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The properties of stratiform clouds are studied in order to analyze the type and number of parameters needed for calculation of radiative fluxes and flux divergences with adequate accuracy. It is shown that the accuracy of calculations depends greatly on the accuracy of the integral transmittance function, which changes considerably when vapor concentration in the atmosphere is large. It is suggested that satellite measurements reveal climatic signals after statistical data processing even if the accuracy of a single temperature measurement is 1.5 to 2 C. ESA

N86-32030# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
THEORY AND OBSERVATION OF CLOUD-TOPPED BOUNDARY LAYER PROCESSES
Wayne H. Schubert *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 11 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The motion field of a convective element is analyzed showing that the updraft has positive buoyancy in the cloud layer and negative buoyancy below. Under the inelastic approximation the nonhydrostatic pressure field can be computed from a diagnostic equation if the temperature and motion fields are known. It is shown that the work done on the subcloud layer by the cloud layer maintains the convective motions of the subcloud layer. Observation data are presented to illustrate the described model. ESA

N86-32031# Colorado State Univ., Fort Collins.
SATELLITE OBSERVATIONS OF THE CLOUD-TOPPED BOUNDARY LAYER
Thomas H. VonderHaar *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 12 p (For primary document see N86-32025 23-47)
(Contracts NAG1-449; N66001-84-C-0186; Grant NSF ATM-84-01229)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The information obtained by satellites about the extent and interannual variability of the stratus clouds near the top of the boundary layer is reviewed. Observations from satellites of the Earth radiation budget are examined. The development of remote sensing methods is discussed. It is shown that satellite observations allow better understanding of the climate impact of these clouds and that a better phenomenology is obtained by these observations. ESA

N86-32032# Research Inst. of Colorado, Fort Collins.
USE OF EXISTING AND SUGGESTED SATELLITE OBSERVATIONS OF REFLECTED SPECTRAL RADIANCE TO ESTIMATE PROPERTIES OF STRATIFORM CLOUDS
Melanie Wetzel and Thomas H. VonderHaar *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 6 p (For primary document see N86-32025 23-47)
(Contract N6601-84-C-0186)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The addition of short wave and infrared channels to meteorological satellites such as CZCS, Nimbus and NOAA series is discussed. The value of the new channels is analyzed for the case of NOAA-6. The infrared observations will show cold cloud surfaces bright and warm surfaces dark, will detect cloud droplets scattering as water vapor absorbed in 2 narrow bands (0.85 and 0.93 micron), and will use another infrared band which makes droplet absorption large and vapor absorption small. ESA

N86-32033# Royal Netherlands Meteorological Inst., De Bilt.
MODELING AND OBSERVATIONS OF THE STRATOCUMULUS-TOPPED ATMOSPHERIC BOUNDARY LAYER
A. G. M. Driedonks *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 24 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Simulations of the dry atmospheric boundary layer with a positive surface heat flux are discussed. They show that its structure is governed by a simple scaling law, while the cloud topped boundary layer depends on a multitude of parameters. It is shown that the turbulent structure of the cloudy layer differs drastically from one case to another. In mixed layer models the basic problem is the formulation of the entrainment rate at the top. The problems found in multilevel models with higher order turbulence closure schemes are also discussed. ESA

N86-32034# National Center for Atmospheric Research, Boulder, Colo.
THE STRUCTURE OF A STRATUS-TOPPED PLANETARY BOUNDARY LAYER AS SEEN THROUGH A LARGE-EDDY SIMULATION
Chin-Hoh Moeng and John C. Wyngaard *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 11 p Sponsored by NSF (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

A planetary boundary layer model which includes turbulence, long wave radiation, and condensation processes is described. The statistics derived from the model-generated data indicate that the contribution of the resolvable scale eddies to the turbulence energy and vertical fluxes of buoyancy and moisture is much larger than that of the subgrid eddies. The analysis of this data set shows implications concerning boundary layer models. It is shown that the ratio of turbulence energy production and consumption rates is 0.04 for Eulerian partitioning and 0.27 for Lagrangian partitioning on mixed layer models. In the case of second order closure models the buoyancy contribution to the pressure gradient temperature covariance is one half of the direct buoyancy production term in the vertical flux equation. ESA

N86-32035# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
KEY PROBLEMS OF PARAMETERIZATION FOR SIMPLE CLOUD-TOPPED BOUNDARY LAYER MODELS
David A. Randall *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 17 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Fractional cloudiness, mesoscale cellular convection, and detached cloud layers and diurnal cycle are discussed. A parameterization for any of the three would find immediate application in atmospheric models. ESA

N86-32036# Meteorological Office, Bracknell (England). Cloud Physics Branch.
NOTES ON MODELING THE CLOUD TOPPED BOUNDARY LAYER
S. Nicholls *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 11 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Aspects of boundary layer models concerning unbroken, nonfreezing stratiform cloud layers are discussed. Evidence from observation data is reviewed. The current state of models is examined. A mixed layer model is described, and the results of a 24 hr integration with this model are given. It is shown that more data are needed to assess when and where model concepts are valid and, if necessary, how new models can be formulated. ESA

N86-32037# National Center for Atmospheric Research, Boulder, Colo.
BOUNDARY LAYER AND CLOUD PARAMETERIZATION IN THE NCAR COMMUNITY CLIMATE MODEL
R. E. Dickinson *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 3 p Sponsored by NSF (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Modifications of the Community Climate Model are made and a set of parameters chosen in order to describe cloud-topped boundary layer phenomena. A layer structure treatment is adopted. It is suggested that a useful focus to validate models is the fluxes of heat, moisture, momentum and radiation from and to the surface and their redistribution within atmospheric layers. ESA

N86-32038# European Centre for Medium-Range Weather Forecasts, Reading (England).
PARAMETERIZATION OF THE CLOUD-TOPPED BOUNDARY LAYER IN A GLOBAL FORECAST MODEL
G. Sommeria, J. Slingo, and M. Tiedtke *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 20 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The formulation of turbulent transports associated with shallow convection, the effect of its introduction in a global circulation model, and the impact of the associated cloud cover are discussed. Different cloud types resulting from the presented equations are almost mutually exclusive and may be combined without difficulty. The cloud distributions produced by the scheme compare well with Meteosat images. ESA

N86-32039# Meteorological Office, Bracknell (England).
SIMULATION OF CLOUDINESS WITH THE UK METEOROLOGICAL OFFICE 11-LAYER AGCM
A. Slingo and R. C. Wilderspin *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 13 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The ability of AGCM type models to represent the global distribution of cloudiness is assessed. Errors in the low cloud field over the subtropical oceans are of particular concern as the model is being coupled to an ocean model for long-range climate sensitivity experiments. The reason for errors and proposed changes to the model are discussed. Results from an integration with model predicted cloudiness are presented. In spite of the errors discussed, the results are encouraging. ESA

N86-32040# Princeton Univ., N. J. Geophysical Fluid Dynamics Lab.
THE SENSITIVITY OF ONE MONTH GCM FORECASTS AT GFDL TO ZONALLY SYMMETRIC CLOUDS, QUASI-REALISTIC SPECIFIED CLOUDS, AND MODEL-PREDICTED CLOUDS
C. T. Gordon *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 21 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

A scheme to generate radiatively constrained low and high cloud fields of specified sigma levels is described. The procedure is carried out at each model grid point. It entails representing the local grid point values of observed short wave and long wave radiation as Taylor series of model diagnosed radiative flux with respect to low and high effective cloud amount, plus a residual. Analyses of Nimbus 7 narrow field of view Earth radiation budget broad band radiative fluxes were used. It is shown that quasi-realistic cloud radiation forcing appears to have a favorable impact on the 5 day mean predicted atmospheric circulation. The results underscore the importance of developing improved cloud prediction schemes and subgrid scale parametrizations of turbulent transport in the planetary boundary layer in the presence of clouds. ESA

N86-32041# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
BOUNDARY LAYER CLOUDS IN THE ISCCP DATA SETS
Ehrhard Raschke *In* World Climate Programme Report of the JSC/CAS Worskshop on Modeling of Cloud Topped Boundary Layer 1985 23 p (For primary document see N86-32025 23-47)
Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

The possibilities to map boundary layer clouds with operational satellite imagery are reviewed. The data consist of images of the Earth within spectral regions of reflected solar and emitted thermal radiation, limited to atmospheric windows. The data are additionally degraded in their spatial resolution to pixels of 10 to 15 km in size and sampled at distances from 30 to 50 km. It is concluded that from the ISCCP reduced radiance data sets, the boundary layer clouds can be mapped with restrictions which are discussed. ESA

N86-32042# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ON THE EVOLUTION OF PRECIPITATION ASSOCIATED WITH A WINTERTIME EAST COAST CYCLONE: A GALE PRELIMINARY STUDY M.S. Thesis
Robert D. Bievins 1985 112 p
(AD-A166375; AFIT/CI/NR-86-17T) Avail: NTIS HC A06/MF A01

This thesis analyzes and explains the precipitation structure of the 10-12 February 1983 east cost cyclone, which is typical of the type the GALE 1986 field project hopes to study. Careful hourly analysis of surface weather and precipitation were conducted using all available data obtained from the National Climatic Data Center at Asheville, N.C. Surface kinematic calculations were accomplished and compared to the observed precipitation pattern. Vorticity and divergence patterns were found to correlate well with the cold-air damming and the coastal front associated with the cyclone studied, but failed to correlate well with the observed precipitation structure. Adiabatic and kinematic vertical motion profiles were better correlated with the observed precipition, but failed to adequately explain the observed movement of precipitation. Subsequent insentropic analysis, similiar to that of the British researchers, allowed for the three dimensional analysis of air flow. Cross sections were analyzed for potential temperature, mixing ratio, and wind. These analyses revealed a warm conveyor belt and cold conveyor belt similiar to the Carlson (1980) model for midwest cylcones. GRA

N86-32043# Air Command and Staff Coll., Maxwell AFB, Ala.
SECULAR CLIMATIC PATTERNS OF THE NORTH CENTRAL GREAT PLAINS AND THE CONTINENTAL US M.S. Thesis
Karen Jean Praner 1985 173 p
(AD-A166743; AFIT/CI/NR-86-51T) Avail: NTIS
HC A08/MF A01 CSCL 04/2

Monthly mean maximum temperatures and total precipitation data (1900-1970) were compiled for 144 carefully selected stations in the continental U.S. The north central great plains (NCGP) was divided into regions of similar temperature and precipitation patterns using 39 stations representative of the NCGP. In a like manner, the 144 U.S. stations were grouped into regions with similar patterns of mean annual temperature and total annual precipitation; weighted mean annual temperature and total precipitation series were derived by area-weighting the regional series. Comparison of regional and mean series revealed marked differences between series. Tests of normality and homogeneity of means were conducted for the mean annual temperature and total annual precipitation series; it was determined that several distinctly different periods of temperature and precipitation existed between 1910 and 1970 for both series. The presence of consecutive periods of dissimilar climatic patterns within the 70-year series of climatic elements implies that climate exhibits jump discontinuities which must be explored.
Author (GRA)

N86-32044# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
CONTINENTALITY: ITS ESTIMATION AND PHYSICAL SIGNIFICANCE M.S. Thesis
Juan M. YeeFong Dec. 1985 73 p
(AD-A167111; AFIT/CI/NR-86-61T) Avail: NTIS
HC A04/MF A01 CSCL 04/2

An attempt has been made to quantify continentality better than exists in current indexes. Conventional indexes of continentality were examined and their deficiencies noted. Several different approaches were taken to develop alternative continentality indexes. These approaches were: dividing annual temperature range by the difference between summer and winter isolation, regressing annual temperature range on latitude and isolating the residuals such that positive ones represent continental locations and negative ones indicate maritime, or less continental, locations; and finding the summer and winter lag of temperature behind radiation with the cubic spline interpolation technique. All three approaches were used to examine the North American continent as a whole. In addition, the Rocky Mountain and Great Lakes-Appalachia regions were chosen for mesoscale analysis in order to determine what effect elevation and large water bodies have on lag. Isopleth analyses of the plotted values of the proposed alternative indexes were compared with conventional index patterns for North America and with each other. Each newly developed index was evaluated as an appropriate measure of continentality and a physical (meteorological) explanation attempted for the patterns.
Author (GRA)

N86-32045# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
DESIGN WIND ANALYSIS
Robert D. LaFebre Mar. 1986 20 p
(AD-A167576; USAFETAC/PR-86/001) Avail: NTIS
HC A02/MF A01 CSCL 04/2

A comprehensive literature review on methods of design wind analysis is given. The report notes that there is no best way to raise winds from one level to another, pointing out that meteorologists and engineers have separate preferences. While one method may work well for one investigation, it may result in false conclusions when used for another.
GRA

N86-32046# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
KOLN BONN, WEST GERMANY LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Sep. 1975 - May 1985
14 Nov. 1985 287 p
(AD-A167649; USAFETAC/DS-85/058-Pt-A-c,f) Avail: NTIS
HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Koln Bonn West Germany is given. This summary is similar to the Revised Uniform Summary of surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use.
GRA

N86-32047# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: PETERSON AFB, COLORADO SPRINGS, COLORADO Data Summary Report, Sep. 1942 - Mar. 1948; Jul. 1948 - Mar. 1985
14 Nov. 1985 306 p
(AD-A167650; USAFETAC/DS-85/059-Pt-A-F) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations is given for Peterson AFB, Colorado Springs CO. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries.
GRA

N86-32048# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: MACDILL AFB, FLORIDA Data Summary Report, May 1941 - Jun. 1947; Aug. 1947 - Aug. 1985
19 Nov. 1985 305 p
(AD-A167651; USAFETAC/DS-85/060-Pt-A-F) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations is given for Macdill AFB, FL. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132 186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use.
Author (GRA)

N86-32049# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: CAPE NEWENHAM, ALASKA Data Summary Report, Aug. 1953 - Nov. 1984
29 Nov. 1985 307 p
(AD-A167652; USAFETAC/DS-85/061-Pt-A-F) Avail: NTIS
HC A14/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations is given for Cape Newenham, Alaska. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries.
Author (GRA)

N86-32050# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: GEORGE AFB, CALIFORNIA Data Summary Report, Feb. 1942 - Dec. 1985
21 Apr. 1986 300 p
(AD-A167653; USAFETAC/DS-86/016-Pt-A-F) Avail: NTIS

HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations is given for: George AFB CA. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-32051# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: WHITE SANDS MR, NEW MEXICO Data Summary Report, Aug. 1947 - Dec. 1962

22 Apr. 1986 287 p

(AD-A167654; USAFETAC/DS-86/017-Pt-A-F) Avail: NTIS HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for White Sands MR NM is given. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-32052# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

MISAWA AB, JAPAN LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Mar. 1975 - Feb. 1986

22 Apr. 1986 274 p

(AD-A167655; USAFETAC/DS-86/018-Pt-A-c,f) Avail: NTIS HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Misawa AB Japan is given. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-32053# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

CAMP PAGE, SOUTH KOREA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Dec. 1974 - Dec. 1980

29 Apr. 1986 194 p

(AD-A167656; USAFETAC/DS-86/019-Pt-A-c,f) Avail: NTIS HC A09/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Camp Page South Korea is given. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-32054# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F: CASTLE AFB, CALIFORNIA Data Summary Report, Jan. 1942 - Dec. 1970; Jan. 1973 - Feb. 1986

29 Apr. 1986 296 p

(AD-A167657; USAFETAC/DS-86/020-Pt-A-F) Avail: NTIS HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Castle AFB CA is given. The summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. GRA

N86-32055# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

KWANG JU AB, SOUTH KOREA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Jan. 1975 - Dec. 1984

2 May 1986 256 p

(AD-A167659; USAFETAC/DS-86/022-Pt-A-c,f) Avail: NTIS HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Kwang JU AB South Korea is given. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-32056# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

PATRICK AFB, FLORIDA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Mar. 1976 - Feb. 1986

2 May 1986 248 p

(AD-A167660; USAFETAC/DS-86/023-Pt-A-c,f) Avail: NTIS HC A11/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for: Patrick AFB FL is given. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-32057# Naval Postgraduate School, Monterey, Calif.

A LINEAR STABILITY ANALYSIS OF THE RAPID DEVELOPMENT OF AN EXTRATROPICAL CYCLONE M.S. Thesis

Raymond F. Toll, Jr. Mar. 1986 112 p

(AD-A167808) Avail: NTIS HC A06/MF A01 CSCL 04/2

The phenomenon of the rapid growth and development of an extratropical cyclone over the east coast of the United States (the Carolinas storm of March 1984) is studied through a linear stability analysis. Analyses of the cyclone structure suggest barotropic and baroclinic instabilities may be important. A linear stability model is used to investigate the roles and relative importance of shortwave baroclinic instability and barotropic instability in the growth and development of the storm. The growth rates, phase speeds and structure obtained from the linear model are consistent with those derived from observations. Energy budget results indicate that the vertical and horizontal barotropic terms are at least as important as the baroclinic term. It appears that the early growth and development of the cyclone can be explained through the contributions of barotropic and baroclinic instabilities without including convection. GRA

N86-32058# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF STORM-RELATED PARAMETERS ON THE ACCURACY OF THE NESTED TROPICAL CYCLONE MODEL M.S. Thesis
Brian J. Williams Mar. 1986 108 p
(AD-A167809) Avail: NTIS HC A06/MF A01 CSCL 04/2

The performance of the Nested Tropical Cyclone Model (NTCM) for 542 track forecasts in the western North Pacific is evaluated with respect to five storm-related parameters: intensity, 12-h change in intensity, latitude, longitude and size. This study is intended to aid the operational forecaster in deciding when to use the NTCM-based storm-related parameters at the forecast time. The storm-related parameters are divided into three subsamples (about 180 in each) and the forecasts are evaluated in terms of the mean forecast error, median forecast error and systematic (zonal and meridional) error. Cross-track (CT) and along-track (AT) components are computed relative to a Climatory and Persistence (CLIPER) track. A scoring system (M) that assesses penalty points for forecasts in incorrect terciles is used to compare the accuracy of the NTCM and CLIPER forecasts within the subsamples. For the entire sample, the NTCM has a slow bias, especially at the 12- through 36-h forecast periods. It also performs better for storms with initial latitudes south of 13 N and initial longitudes west of 129E. For very large storms, the NTCM forecasts have both left-of-track and westward biases which indicate problems of the NTCM in predicting recurvature of such systems. The NTCM (which has a 60-kt bogus) forecasts for storms with initial intensities between 50 and 75 kt have much lower CT/AT M scores and smaller forecast errors than the subsamples with initial intensities less than 50 kt. GRA

N86-32059# Naval Postgraduate School, Monterey, Calif.
A DIAGNOSTIC INVESTIGATION OF EXPLOSIVE MARITIME CYCLOGENESIS DURING FGGE M.S. Thesis
Darrell H. Smith Mar. 1986 55 p
(AD-A167810) Avail: NTIS HC A04/MF A01 CSCL 04/2

A collection of explosive and non-explosive storm groups is selected from the western North Atlantic Ocean and western North Pacific Ocean. Explosive cyclogenesis is defined as having a mean sea level pressure fall of 1 mb h for 24 h. Using ECMWF (European Center for Medium Range Forecasts) analyses with FGGE SOP-1 data, the storm environment properties of both storm types are analyzed and compared. Storm environment properties include static stability, layer averaged potential temperature, low level vorticity, vorticity advection, mean and eddy modes of vorticity transport, divergence and kinematic vertical velocities. These properties are compared between the cyclone types at 0 h, 12 h and 24 h periods as well as the overall 24 h average. The largest differences between the explosive group and the non-explosive group are found in the upper level divergence and vorticity advection. The explosive systems are warmer; however, static stabilities of the two groups are quite similar. GRA

N86-32060# Naval Air Systems Command, Washington, D. C.
GUIDE TO STANDARD WEATHER SUMMARIES AND CLIMATIC SERVICES
Apr. 1986 188 p
(AD-A168099; NAVAIR-50-1C-534) Avail: NTIS HC A09/MF A01 CSCL 04/2

Part 1 of this publication provides a description of published and unpublished climatological summaries. A list of major climatic publications produced by NOCD Asheville (with instructions for obtaining copies) has been included following the Introduction. Part II of this publication is a catalogue of published and unpublished climatological summaries in continent-country-station order. There are twenty-three columns headed by a particular climatic summary or group of summaries. The availability of a climatic summary for a specific station is indicated by a number (the number of years of data used for that summary) under the summary heading. The availability of a World-wide Airfield Summary is indicated by an alphabetic character. GRA

N86-32061# Department of Energy, Washington, D. C. Carbon Dioxide Research Div.
PROJECTING THE CLIMATIC EFFECTS OF INCREASING CARBON DIOXIDE
M. C. MacCracken, ed. and F. M. Luther, ed. Dec. 1985 394 p Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(DE86-008810; DOE/ER-0237) Avail: NTIS HC A17/MF A01

This report presents the current knowns, unknowns, and uncertainties regarding the projected climate changes that might occur as a result of an increasing atmospheric CO2 concentration. Further, the volume describes what research is required to estimate the magnitude and rate of a CO2-induced climate change with regional and seasonal resolution. Separate abstracts have been prepared for the individual papers. DOE

N86-32062# East Anglia Univ., Norwich (England). School of Environmental Sciences.
VALIDATION OF GENERAL CIRCULATION MODEL (GCM) CONTROL RUNS
B. D. Santer and T. M. L. Wigley Jan. 1986 136 p
(Contract W-7405-eng-48)
(DE86-009697; UCRL-15789) Avail: NTIS HC A07/MF A01

The simulation performance of three General Circulation Models (GCMs) is examined in a North American/European study area (20°N-85°N; 180°W-60°E). Mean sea level (m.s.l.) pressure fields simulated by the OSU two-layer AGCM (fixed SST experiment), the GISS nine-layer AGCM, and the synchronously-coupled OSU CGCM are compared with observed data, and the significance of differences between observed and simulated m.s.l. pressure distributions is assessed using simple grid-point t-tests and spatial field correlations. Objective indices have been developed which are physically relatable to the properties of quasi-stationary surface ridges and trough. These indices have been used to test whether the models are capable of reproducing important features of the observed seasonal cycles of Iceland Low and Azores High intensity and position. Such objective diagnostic tests enable quantitative analysis of inter-model differences in center of action intensity and location, and are also useful in evaluating the effects of changes in grid resolution, ocean representation, or parameterizations on stationary wave properties at the surface. It is demonstrated that detailed regional examination of model performance is justifiable, even given the spatial resolution of currently operational models, and may provide important diagnostic information for modeling groups. DOE

N86-32063# Regensburg Univ. (West Germany). Inst. fuer Festkoerperphysik.
MEASUREMENT OF THE WIND FIELD. SIMULTANEOUS WIND VELOCITY MEASUREMENTS AT DIFFERENT ALTITUDES WITH HIGH TIME RESOLUTION FOR THE SPECIFICATION OF WIND ENERGY CONVERTERS Final Report, Mar. 1983
Gustav Obermair, Klaus Berberich, Rainer Obermair, and Lorenz Jarass Bonn, West Germany BMFT Dec. 1985 154 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-T-85-141; ISSN-0340-7608; ESA-86-97437) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32

Two cylindrical high radio towers, 1.50 m in diameter, were used to study the dynamic behavior of wind energy converters and the central and adjusting systems with a time resolution of 1 sec at different altitudes at a coastal station and at an inland station. Models and criteria were developed to produce statistical data on the spacetime structure of the horizontal wind field and to evaluate one-point measurements corresponding to wind velocity, direction, acceleration and direction changes; and multiple-point measurements of gust factors, autocorrelations, velocity and direction gradients, and statistical distributions. The results are used to describe the simulation of a real wind power plant. ESA

N86-32064# Technische Univ., Berlin (West Germany). Fachbereich Informatik.
LOCAL JARGON IN WEATHER PEPORTS [LOKALE DEIXIE IN WETTERBERICHTEN]
Artrid Jasse May 1984 8 p In GERMAN Submitted for publication Sponsored by Bundesministerium fuer Forschung und Technologie
(KIT-18; ESA-86-97429) Avail: NTIS HC A02/MF A01

Local jargon used in weather reports was studied because of its requirements for the imaginative faculty and hence faculty of text understanding. It is known that local jargon is not solely a case for linguists. It has also to be treated with a view to the structure of knowledge which serves as its basis. Further knowledge of the processes of spatial imaginative faculty can substantially contribute to the description of local jargon. ESA

N86-32065# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Instrumentele.
ERROR CONTROL OF METEOROLOGICAL MEASUREMENTS [FOUTENCONTROLE BIJ METEOROLOGISCHE METINGEN]
J. J. M. vanGorp and H. M. vanderKolk 1985 73 p In DUTCH
(KNMI-TR-76; B8661060; ISSN-0169-1708; ESA-86-97728) Avail: NTIS HC A04/MF A01

A method of automatic control of measurements was developed for the automation of measurements of meteorological parameters. The detection of defects and disturbances by pattern recognition is discussed. It is explained which characteristics of the measuring signal are used to detect situations differing from the expected normal situation. The spectrum is analyzed in order to find these characteristics. This spectrum can be estimated by using the calculation of the discrete spectrum via fast Fourier transformation. ESA

N86-32066# World Meteorological Organization, Geneva (Switzerland).
MONSOONS
P. K. Das 1986 177 p
(WMO-613; ISBN-92-63-10613-4; ESA-86-97657) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Planetary and regional aspects of monsoons are introduced. Barotropic and baroclinic instability; numerical simulation; monsoons and orographic barriers; oceanic response to monsoon winds; and long range prediction are discussed. ESA

N86-32067# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysisch Meteorologisch.
CLIMATOLOGICAL RESEARCH IN THE PERIOD 1962-1978 IN THE DELTA REGION, SOUTH FLEVOLAND, AND LAUWERS REGION; DUTCH WATER TEMPERATURES IN THE PERIOD 1860 TO 1985 Final Report [KLIMATOLOGISCH ONDERZOEK IN HET TIJDVAK 1962-1978 IN DELTAGEBIED, ZUIDFLEVOLAND EN LAUWERSGEBIED, EN NEDERLANDSE WATERTEMPERATUREN 1860-1985]
P. C. T. vanderHoeven and G. vanVliet 1986 132 p In DUTCH; ENGLISH summary
(KNMI-169; B8664064; ESA-86-97722) Avail: NTIS HC A07/MF A01

Observations of the heat balance of sea arms, mesoclimatological mapping, and climatological variations at dams and reclaimings are reported on. The results of climatological measurements, the observation of the evolution of climatological variations in Lauwers sea and Grevelingen, and the measurement of water temperatures in the Netherlands since 1860 are presented. ESA

N86-32068# Royal Netherlands Meteorological Inst., De Bilt.
CLIMATOLOGICAL DATA OF STATIONS IN THE NETHERLANDS. NO. 25: A CLIMATOLOGY OF THE MAIN OBSERVATORY AT DE BILT FOR THE PERIOD 1901-1984
1985 71 p In ENGLISH and DUTCH
(KNMI-150-25; ISSN-0169-3581; ESA-86-97723) Avail: NTIS HC A04/MF A01

Meteorological observations concerning temperature, precipitation, sunshine, and pressure during 1 January 1901 through 31 December 1984 are presented. Monthly and decadal means and absolutes of highest and lowest temperatures were calculated, along with seasonal and annual data. ESA

N86-32069# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Centrale Weerdienst.
METEOROLOGICAL WORK STATION METIS: A GLANCE AT THE FUTURE [METEOROLOGISCH WERKSTATION METIS: EEN BLIK IN DE TOEKOMST]
G. D. G. Folkers and J. M. Terpstra Apr. 1984 50 p In DUTCH
(KNMI-TR-74; B8662755; ISSN-0169-1708; ESA-86-97726) Avail: NTIS HC A03/MF A01

The functions of a meteorological work station were analyzed. The situation of the meteorological sites De Bilt, Schiphol and Rotterdam is summarized. ESA

N86-32070# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
OBSERVATIONS OF SURFACE WATER TEMPERATURE IN THE NETHERLANDS FROM 1860: DESCRIPTION OF THE DATA FILE
P. C. T. vanderHoeven 1985 26 p In DUTCH; ENGLISH summary
(KNMI-TR-75; B8661059; ISSN-0169-1708; ESA-86-97727) Avail: NTIS HC A03/MF A01

Files of monthly averages of all available observations of water temperature in the Netherlands since 1860 were made. Files of background data such as river discharges, precipitation, salinity, and air temperature are available. The available files are listed. ESA

N86-32071# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
OBSERVATIONS OF SURFACE WATER TEMPERATURE IN THE NETHERLANDS FROM 1860: THE TEMPERATURE REGIME AND THE CHANGES IN IT
P. C. T. vanderHoeven 1985 114 p In DUTCH; ENGLISH summary
(KNMI-WR-85-6; B8662754; ISSN-0169-1651; ESA-86-97731) Avail: NTIS HC A06/MF A01

The results of different analyses of water temperature observations in the Netherlands covering 2500 station-years are presented. The winter water temperature was observed by IR satellite photos. The history of the station network is depicted. The water movements which are essential to understand the regime of water temperatures are discussed. The relation between all available 10 yr water temperature averages is described. Peculiarities of the annual water temperature are shown by Lissajous figures. Annual averages were analyzed by comparing their deviations with respect to the standard. ESA

N86-32072# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
A BISPECTRAL METHOD FOR THE HEIGHT DETERMINATION OF ICE CLOUDS
Werner Pollinger and Peter Wendling Dec. 1985 52 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-03; ISSN-0171-1342; ESA-86-97586) Avail: NTIS HC A04/MF A01; DFVLR, Cologn, West Germany DM 36.50

A bispectral method for the height determination of optically thin ice clouds from satellite measurements at two adjacent points of an ice cloud layer was developed. Using 2 wavelengths in the spectral range of the water vapor band at 6.3 microns and in the window range at 11 microns, a transcendental equation was derived under the assumption that both points of the cloud have the same temperature but different optical thickness. The solution of the transcendental equation yields the cloud temperature, and the height via the temperature profile which must be known. The effect of the water vapor above the cloud is corrected for using a radiation transfer model.
ESA

N86-32073*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Physical Sciences, Mathematics and Research.
NATIONAL CLIMATE PROGRAM: EARLY ACHIEVEMENTS AND FUTURE DIRECTIONS Final Report
May 1986 67 p Proceedings of the Workshop held at Woods Hole, Massachusetts, 15-19 Jul. 1985; sponsored by NASA, NSF, NOAA and DOE
(Contract NA79RA-C-000104)
(NASA-CR-177153; NAS 1.26:177153; PB86-198975) Avail: NTIS HC A04/MF A01 CSCL 04B

Activities of the National Climate Program since 1978 are reviewed, and outlines new directions which should be emphasized over the next five years or so. These are discussed under the subentities of climate system research; climate impacts; and climatic data, information, and services.
GRA

N86-32006*# Little (Arthur D.), Inc., Cambridge, Mass.
SPACE SYSTEMS REQUIREMENTS DEFINITION
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 p 112 (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 04B

N86-32009*# Little (Arthur D.), Inc., Cambridge, Mass.
A PROCEDURE FOR SPACE SDR PRIORITIZATION
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 12 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-32074# Naval Underwater Systems Center, Newport, R.I.
ACOUSTIC DESCRIPTION OF SOUTH ATLANTIC OCEAN WARM CORE EDDY
Linda S. Petitpas and David G. Browning 10 Mar. 1986 17 p
(AD-A166323; NUSC-TD-7615) Avail: NTIS HC A02/MF A01 CSCL 20/1

This document contains the viewgraph presentation which investigates the thermohaline/baroclinic scales of the meso-scale eddies associated within the Brazil Malvinas (Falkland) Confluence. One of the eddies investigated was a warm core anti-cyclonic eddy centered about 43 deg 50 min S and 54 deg 15 min W (18-19 October) with a diameter of 125 km. The XBT's and CTD's taken through the eddy were used with a range dependent acoustic prediction ray model (GRASS) to model a cross section of the eddy at 50 Hz comparing propagation loss with source depths of 25, 150, and 500 m and receiver depths of 25, 150, and 500 m. Comparisons were done propagating through the eddy, from the outer edge to the eddy interior, and from the interior to the outer edge. The results were compared with a no eddy, range independent situation. Results showed that due to the presence of a surface duct in the warm core eddy the greatest impact was found propagating a shallow source with a shallow receiver. No effects were seen below 300 m, similar to the North Pacific and Greenland Sea eddies.
GRA

N86-32075# Army Engineer District, Los Angeles, Calif. Coastal Resources Branch.
GEOTECHNICAL DATA INVENTORY, SOUTHERN CALIFORNIA COASTAL ZONE, CAPE SAN MARTIN (MONTEREY COUNTY) TO MEXICAN BORDER
Dec. 1985 191 p
(AD-A167734; CCSTWS-85-5) Avail: NTIS HC A09/MF A01 CSCL 08/6

The data inventoried in this report covers geotechnical subjects such as the physical properties of the sediment, the presence of landslides in the drainage basin, the productivity of the drainage basin, as well as data on the rate of cliff erosion. Information on geological processes such as the loss of sand to sinks such as submarine canyons, or beach sand-dune build up is also given. The data on the physical properties of the sediments includes texture and petrographic information on samples that were collected from submarine canyons, the continental shelf, the littoral zone, lagoons and dunes, as well as cliffs and drainges. The data is presented both as tabular information and as map indexes. The map indexes show the aerial coverage of the reports from which the data was abstracted.
Author (GRA)

N86-32076# Scripps Institution of Oceanography, La Jolla, Calif. Ocean Engineering Research Group.
COAST OF CALIFORNIA STORM AND TIDAL WAVES STUDY: NEARSHORE BATHYMETRIC SURVEY REPORT, SAN DIEGO REGION Interim Data Report, Nov. 1983 - Feb. 1985
C. Gable, J. Wanetick, S. Schuette, J. DeGraff, and J. Thomas
Dec. 1985 569 p
(Contract DACW09-83-C-0045)
(AD-A168119; CCSTWS-85-3) Avail: NTIS HC A24/MF A01 CSCL 08/10

The purpose of report is to present the results of bathymetric surveys of the nearshore region to a depth of 6 meters relative to mean lower low water (MLLW) at approximately one hundred (100) selected profile stations between Dana Point and the United States/Mexican border. Sediment sampling and measurement of offshore survey stakes/reference rods at specified ranges and depths were also conducted to complement these nearshore bathymetric surveys. The first nearshore bathymetric survey report (CCSTWS, 84-2, April 1984) discussed in detail the surveying techniques and methodologies used to accomplish the goals of this study and provided nearshore profile, sediment sample and reference rod data for Survey 1 (October 1983 to January 1984). This report will supplement and supersede Survey Report no. 1 by providing an updated discussion on profiler system modifications, correcting euoneous survey and sediment sample data entries for Survey No. 1 and provide all additional survey and sediment sample data for Survey 2 (February 1984 to July 1984) and Survey 3 (October 1984 to February 19 85). It is recommended that Survey 1 Data not be used as the baseline survey until a larger survey data base is obtained for comparative analysis.
Author (GRA)

N86-32077# World Climate Programme, Geneva (Switzerland). Scientific Committee for Oceanic Research.
WORLD CLIMATE RESEARCH PROGRAM. GENERAL CIRCULATION OF THE SOUTHERN OCEAN: STATUS AND RECOMMENDATIONS FOR RESEARCH, A REPORT BY SCOR WORKING GROUP 74
Oct. 1985 65 p
(WCP-108; WMO/TD-86; ESA-86-97252) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

Major gaps in the knowledge of the general circulation of the Southern Ocean, bearing in mind its relevance to biology and climate were identified. Physical and chemical programs to investigate these problems were outlined. Interactions between the Southern Ocean and the subtropics; the Antarctic circumpolar current; the subpolar zone; shelf-slope processes and deep water formation; sea level observations; and air sea ice interaction were discussed.
ESA

READEX FICHE best copy available

N86-32078# Institute of Oceanographic Sciences, Wormley (England).
THE CTD DATA FROM THE MADEIRA ABYSSAL PLAIN. CHARLES DARWIN CRUISE 1/85
P. M. Saunders 1985 79 p Sponsored by UK Dept. of the Environment
(IOS-217; DoE/RW/85.181; PECD7/9/216; ESA-86-97266) Avail: NTIS HC A05/MF A01

Lists and graphs of conductivity-temperature-depth (CTD) data taken aboard RRS Charles Darwin during February 1985 for sites considered for high level radioactive waste disposal are presented. The majority of the lowerings were made in support of the development of deep SOFAR floats near 32 N 24 W and of moorings near 31 30 N 25 W (Great Meteor East site). Others were made on a basin-wide section along 32 N. All CTD data is compared with reversing thermometer observations and with measurements of salinity and dissolved oxygen derived from samples. ESA

N86-32079# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Oceanografisch Onderzoek.
EVALUATION OF WAVE CALCULATIONS USING THE MODEL GONO, IN THE PERIOD OCTOBER 1983 - APRIL 1984 [EVALUATIE VAN DE GOLFBEREKENINGEN MET GONO OVER DE PERIODE OKTOBER 1983 - APRIL 1984]
E. Bouws, G. J. Komen, R. A. vanMoerkerken, H. H. Peeck, and M. J. M. Saraber 1984 53 p In DUTCH; ENGLISH summary
(KNMI-TR-56; ISSN-0169-1708; ESA-86-97724) Avail: NTIS HC A04/MF A01

Results of the wave model GONO on sea wave height, low frequency wave height, wind speed, and wind direction are given. The evaluation is made by a comparison with observations at Euro, Ymuiden, and Pennzoil in the southern North Sea, and Auk and Brent in the northern North Sea. The differences in wind velocity and wave results are small. The results demonstrate the quality of analyses and prognoses. ESA

N86-32080# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Oceanographisch Onderzoek.
TIME SEQUENCE OF THE ROYAL DUTCH METEORLOGICAL INSTITUTE'S OPERATIONAL WAVE MODEL GONO, OCTOBER 1983 - APRIL 1984. SUPPLEMENT [TIJDREEKSEN VAN HET KNMI OPERATIONELE GOLFMODEL GONO, OKTOBER 1983 - APRIL 1984]
E. Bouws, G. J. Komen, R. A. vanMoerkerken, H. H. Peeck, and M. J. M. Saraber 1984 38 p In DUTCH
(KNMI-TR-56-Suppl; ESA-86-97725) Avail: NTIS HC A03/MF A01

Time sequences (October 1983 to April 1984) of wave height, wind speed, and wind directions calculated by the wave model GONO for the locations Euro, Ymuiden, and Pennzoil in the southern North Sea, and Auk and Brent in the Northern North Sea are given. ESA

N86-32081# Rome Univ. (Italy). Dipt. di Fisica.
PRELIMINARY REPORT ON THE HYDROLOGICAL MEASUREMENTS CARRIED OUT IN THE SOUTHERN TYRRHENIAN SEA AND IN THE MESSINA STRAIT [RAPPORTO PRELIMINAIRE SUI RISULTTATI DELLE MISURE IDROLOGICHE ESEGUITE NEL TIRRENO MERIDIONALE E NELLO STRETTO DI MESSINA]
Luciano Capitanio, Roberto Dorazio, Guardiani Pino, Lama Federico, Manuella Palelli, Andrea Pace, Ettore Salusti, Juana SanEmeterio, Enrico Siesni, and Enrico Zambianchi 16 Dec. 1985 43 p In ITALIAN
(Preprint-489; ESA-86-97923) Avail: NTIS HC A03/MF A01

An oceanographic campaign was carried out to verify satellite observation data. The measurements include temperature, salinity and density profiles. The detailed data is presented. Computer processed data analysis is also presented. ESA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-32082# Defence Research Information Centre, Orpington (England).
EXTERNAL RESPIRATION, GAS EXCHANGE, AND BLOOD OXYGEN PARAMETERS IN ACUTE METHEMOGLOBINEMIA
M. M. Seredenko, V. P. Pozharov, and N. G. Sidoryak Dec. 1985 13 p Transl. into ENGLISH from Fiziologicheskii Zhurnal (Kiev, USSR), v. 31, no. 3, 1985 p 262-266
(DRIC-T-7663; BR98339; ESA-86-97263) Avail: Issuing Activity

Hemic hypoxia in rats was studied. Subcutaneous injection of sodium nitrite into rats leads to development of pronounced hemic hypoxia, accompanied by inhibition of the external respiratory function, decrease in oxygen consumption, and development of arterial hypoxemia. ESA

N86-32083*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 7
Lydia Razran Hooke, ed., Mike Radtke, ed., Victoria Garshnek, ed., Ronald Teeter, ed., and Joseph E. Rowe, ed. (Library of Congress, Washington, D. C.) Washington NASA Aug. 1986 113 p
(Contract NASw-3676)
(NASA-CR-3922(08); NAS 1.26:3922(08)) Avail: NTIS HC A06/MF A01 CSCL 06B

This is the seventh issue of NASA's USSR Space Life Sciences Digest. It contains abstracts of 29 papers recently published in Russian language periodicals and bound collections and of 8 new Soviet monographs. Selected abstracts are illustrated with figures and tables from the original. Additional features include two interviews with the Soviet Union's cosmonaut physicians and others knowledgable of the Soviet space program. The topics discussed at a Soviet conference on problems in space psychology are summarized. Information about English translations of Soviet materials available to readers is provided. The topics covered in this issue have been identified as relevant to 29 areas of aerospace medicine and space biology. These areas are adaptation, biospherics, body fluids, botany, cardiovascular and respiratory systems, developmental biology, endocrinology, enzymology, exobiology, genetics, habitability and environment effects, hematology, human performance, immunology, life support systems, mathematical modeling, metabolism, microbiology, morphology and cytology, musculoskeletal system, neurophysiology, nutrition, perception, personnel selection, psychology, radiobiology, and space medicine. Author

N86-32084# Texas Univ., Dallas. Center for communication Disorders.
A CHINCHILLA RESTRAINT SYSTEM
C. E. Hargett, Jr., James H. Patterson, Jr., Dennis L. Curd, Melvin Carrier, Jr., and Ilia M. L. Gautier Jan. 1986 25 p
(Contracts DAMD17-80-C-0109; DA Proj. 3M6-1102-BS-10)
(AD-A167408; USAARL-86-1) Avail: NTIS HC A02/MF A01 CSCL 06/10

In studies of noise-induced hearing loss in chinchillas, it is necessary to restrain the animal in a known noise field for the duration of the exposure. In studies of continuous noise effects, a small cage in which the subject is free to move about has been used. The orientation of the subject due to the omnidirectional nature of continuous noise effects is not critical due to the omnidirectional nature of the exposure. In contrast, freefield impulse noise is a highly directional sound field by its essential nature. The need to restrain the research subject and fix its orientation relative to the source of the impulse is critical in impulse noise exposures. Only three references were found in the literature about chinchilla restraining devices. These devices were applicable more for routine clinical procedures, administering medication, detecting motion, and collecting motion, and collecting semen for reproduction studies. None were suited for auditory research. This led us to develop the chinchilla restraint system (CRSS). The function of

the CRS is to maintain a chinchilla in a stable, immobile position which can be standardized for all subjects during studies of noise-induced hearing loss. The CRS accomplishes this using the chinchilla's own natural tendencies as a burrowing creature. The CRS provides an artificial burrow in which a chinchilla seems content to remain quiet for extended periods. This report details the design and use of the CRS. GRA

N86-32085# Nevada Univ., Reno. Desert Research Inst.
GAS EXCHANGE CHARACTERISTICS OF LEAVES AS INDICATORS OF THE BASIC LIMITATIONS TO THE RATE OF PHOTOSYNTHESIS Annual Report, 1 Jun. 1985 - 31 May 1986
T. D. Sharkey 1986 4 p
(Contract DE-FG08-84ER-13234)
(DE86-009632; DOE/ER-13234/2; AR-2) Avail: NTIS HC A02/MF A01

The response of photosynthesis to light, CO2 and O2 is studied by measuring the exchange of gases (water vapor and CO2) between the atmosphere and the leaf. These measurements are combined with measurements of metabolite levels and enzyme activities which can disclose the molecular events which limit or regulate the rate of photosynthesis. The purpose of this research is to identify the underlying molecular events which give rise to easily measured photosynthetic characteristics so that those processes which are most important in regulating or limiting photosynthesis in leaves can be identified. A significant result of this research has been the identification of the cause of O2 insensitive photosynthesis in C3 plants. It has been determined that this anomalous behavior is caused by deactivation of the primary carboxylating enzyme, RuBP carboxylase, in low O2. It is believed that this deactivation occurs because the plant is unable to use all of the products of photosynthesis that could be made if deactivation did not occur. Current efforts are directed toward understanding how this deactivation may be advantageous to the plant and how rapidly it can occur. DOE

N86-32086# Florida State Univ., Tallahassee.
GUARD CELL BIOCHEMISTRY: RESPONSE TO ENVIRONMENTAL STIMULI CAUSING CHANGES IN GAS EXCHANGE
W. H. Outlaw, Jr. 1986 24 p
(Contract DE-AS05-81ER-10803)
(DE86-010287; DOE/ER-10803/5) Avail: NTIS HC A02/MF A01

Our understanding of how the light reactions of photosynthesis influence carbon metabolism in guard cells is rudimentary. This state of affairs is understandable; reliable reports of PS II in guard cells were published only two years ago. At this point, I wish to warn against complacency in drawing strict analogies between guard cell chloroplast function and that in other cells. In general, guard cell chloroplasts and their mesophyll counterparts differ in morphology, for example, the guard cell organelles are smaller, less abundant, and paler, have fewer thylakoids/granna, have areas of peripheral reticulum, and contain relatively more starch. One biochemical difference underlying these morphological ones has already been identified (fluorescence kinetics). DOE

N86-32087# European Space Agency, Paris (France).
INFLUENCE OF GRAVITY ON STRUCTURE AND BEHAVIOR OF PARAMECIUM CAUDATUM
Ruth Hemmersbach Mar. 1986 69 p
(ESA-TT-963; DFVLR-FB-85-40; ESA-86-98077) Avail: NTIS HC A04/MF A01; German version avail. from DFVLR, Cologne, West Germany DM 27

Paramecium caudatum was used to study the behavior of the contractile vacuolar system, the nutrient uptake, cyclose, multiplication rate, and ultrastructure under simulated weightlessness using a fast-running clinostat and a modified agar method. In comparing 0 and 1 g behavior, no modification is detected, except for the vacuolar system. The slowed and irregular functioning behavior of the contractile vacuolar system due to an inner timing modification is influenced by gravity. Negative geotaxis of Paramecium caudatum is not confirmed. The effects of gravity on the vacuole formation, situation, and number cannot be determined. ESA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-32088* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 288)
1986 69 p
(NASA-SP-7011(288); NAS 1.21:7011(288)) Avail: NTIS HC A05 CSCL 06E

This bibliography lists 190 reports, articles and other documents introduced into the NASA scientific and technical information system in August 1986. Author

N86-32089# Technion - Israel Inst. of Tech., Haifa.
A 24-HOUR STRUCTURE OF VIGILANCE UNDER PROLONGED SLEEP DEPRIVATION: RELATIONSHIP WITH PERFORMANCE Final Report, Feb. 1983 - Feb. 1984
Peretz Lavie Mar. 1986 72 p
(Contracts DAJA45-83-C-0047; DA Proj. 2Q1-61102-B-74-D)
(AD-A167399; ARI-RN-86-32) Avail: NTIS HC A04/MF A01 CSCL 06/19

The present study investigated the 36h structure of sleepiness and its relationship with psychomotor performance after 28h of sleep deprivation. Eight subjects, aged 19 to 25 years, participated after spending two adaptation nights in the sleep lab at 2300 and remained deprived of sleep until 1100. At 1100 a schedule of either 7 min sleep attemp in bed, 13 min awake outside the bedroom, or 7 min resisting sleep in bed, 13 min awake outside the bedroom, was begun and maintained for 36h until 23h on the next day. The order of the two experimental conditions, which were separated by two weeks, was counterbalanced. Polyhypnographic recordings were carried out during the 7-min in bed periods, and psychomotor testing (one and two-handed reaction time tasks) was conducted in the middle of the 13-min wake periods. Significant circadian effects were found for the two components of the psychomotor performance: reaction time and movement time. In spite of the great similarity between the circadian variations in sleepiness and the circadian variations in performance, correlating these two variables for 12h blocks revealed random and nonsignificant correlations. This negated a causal relationship between the amount of sleepiness and performance, and suggests that both are modulated by a common underlying circadian oscillator. GRA

N86-32090# Aerospace Medical Div., Brooks AFB, Tex.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT, AEROSPACE MEDICAL DIVISION, FY 1987 Annual Report, Jun. 1985 - Jan. 1986
Jan. 1986 25 p
(AD-A167422; AMD-TR-86-001) Avail: NTIS HC A02/MF A01 CSCL 05/8

This TOD describes the planning methodology used within two of AMD's laboratories to achieve our technical goals. Specifically, efforts are directed in the biotechnology program to man's adaptability, survivability, and performance capabilities within his operational environment. This research and development of AMD's functions is accomplished as interdisciplinary work by teams of biomedical scientists, engineers, and physical scientists within the Air Force laboratories and the industrial and academic communities. GRA

N86-32091# Army Research Inst. of Environmental Medicine, Natick, Mass.
ALTITUDE ACCLIMATIZATION (VENTILATION AND CHEMORESPONSIVENESS) DURING WAKEFULNESS AND SLEEP
David P. White, Kevin Gleeson, Cheryl K. Pickett, John T. Reeves, and Anne M. Rannels Apr. 1986 29 p
(AD-A167738; USARIEM-M-28/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

Although the influence of altitude acclimatization on respiration has been carefully studied, the associated changes in hypoxic

and hypercapnic ventilatory responses are the subject of controversy and neither response has been carefully evaluated during sleep at altitude. To answer these questions, six healthy males were studied at sea level and on nights 1, 4, and 7 following arrival at altitude (14,110 ft). During wakefulness ventilation and the ventilatory responses to hypoxia and hypercapnia were determined on each occasion. During both NREM and REM sleep at sea level and on all three nights at altitude, ventilation and the hypercapnic ventilatory response were measured. With acclimatization to high altitude, ventilation increased during both wakefulness and sleep which reflected primarily increasing respiratory frequency. The slope of the hypercapnic response did not rise further with acclimatization although the position of this response shifted significantly to the left during wakefulness and sleep. Finally, sleep induced similar decrements in both ventilation and hypercapnic responsiveness at altitude to those seen at sea level. GRA

N86-32092# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPECIAL FEATURES OF SURGICAL INTERVENTION UNDER CONDITIONS OF WEIGHTLESSNESS
G. L. Yaroshenko, V. G. Terentyev, and M. N. Mokrov 7 May 1986 11 p Transl. into ENGLISH from Voyenno-Meditsinskiy Zhurnal (USSR), no. 10, Oct. 1967 p 69-70
(AD-A167916; FTD-ID(RS)T-0294-86) Avail: NTIS HC A02/MF A01 CSCL 22/1

At present questions of medical support of prolonged space flights acquire fundamental importance. Among these questions together with forecasting of the probable morbidity of cosmonauts urgent/actual is the determination of the possibility of executing of medical manipulations, including surgical intervention under the conditions of weightlessness. It is possible to make following conclusions: Execution of surgical intervention under conditions of weightlessness is possible and is not connected with great difficulties; The probability of pulverizing/atomizing biological fluids, which are located under relatively greater pressure (for example, arterial blood) should be considered; For preventing the pollution/contamination of the atmosphere of the cab during the dissection of tissues, rich in vessels, it is desirable to use hemostatic forceps. Local anesthesia in null gravity is shown. With autopsy of peritoneum strengthening of eventration of intestine is observed. Therefore the autopsy of peritoneum should be conducted step by step, minimally limiting the length of section/cut. With the filling of a syringe with medical solutions, intended for intravenous introduction, one should thoroughly track so that together with solution the air would not fall. GRA

N86-32093# National Aerospace Medical Centre, Soesterberg (Netherlands).
[ACTIVITIES REPORT ON PHYSICAL AND PSYCHOLOGICAL HEALTH OF FLYING PERSONNEL] Annual Report, 1983 [JAARVERSLAG 1983]
1984 45 p In DUTCH
(ESA-86-97385) Avail: NTIS HC A03/MF A01

Activities concerning the physical and psychological health of flying personnel are summarized. A human centrifuge; anthropometric measurements on adolescents; F-16 pilot EEG's; and motion perception sensations with peripherically offered visual stimuli are discussed. Research was done on Meniere patients and rheoencephalographics. Computerized psychodiagnostic methods for pilot and driver aptitude judgements were developed. Airbus cockpit certification methods were evaluated. ESA

N86-32094# National Aerospace Medical Centre, Soesterberg (Netherlands).
[ACTIVITIES REPORT ON PHYSICAL AND PSYCHOLOGICAL HEALTH OF FLYING PERSONNEL] Annual Report, 1984 [JAARVERSLAG 1984]
1985 39 p In DUTCH
(ESA-86-97386) Avail: NTIS HC A03/MF A01

Activities concerning the physical and psychological health of flying personnel are summarized. A hybobaric chamber and human centrifuge are described. Prevention of blood pressure increase of pilots was examined. Possibilities of the body to increase acceleration tolerance, and relevant training mechanisms, were studied. Studies on vision and hearing were carried out. A psychodiagnostical investigation and test method useful for drivers was developed. ESA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-32095# Shape Technical Center, The Hague (Netherlands). Operations Research Div.
USE OF ARTIFICIAL INTELLIGENCE AND PSYCHOLOGY IN THE ANALYSIS OF COMMAND AND CONTROL
J. T. Dockery and J. vandenDriessche Feb. 1985 272 p
(Contract STC-80-5/I)
(STC-TM-749; ESA-86-97393) Avail: NTIS HC A12/MF A01

The psychological profile and behavior of a military decision maker under stress were studied. Use of a systems simulation language to study reactions in air defense situations was assessed. For individual titles, see N86-32096 through N86-32097.

N86-32096# Shape Technical Center, The Hague (Netherlands). Operations Research Div.
THE PSYCHOLOGY OF DECISION MAKING
In its Use of Artificial Intelligence and Psychology in the Analysis of Command and Control Feb. 1985 p 1-61 (For primary document see N86-32095 23-53)
Avail: NTIS HC A12/MF A01

A psychological profile of a military commander under stress is outlined. Information processing states for a decision-maker under stress are introduced. Bias and processing of information are discussed. Descriptive decision-making rather than normative decision making is used to describe the commander. ESA

N86-32097# Shape Technical Center, The Hague (Netherlands). Operations Research Div.
ARTIFICIAL INTELLIGENCE AND THE RULE ORIENTED SYSTEM SIMULATION (ROSS) LANGUAGE
In its Use of Artificial Intelligence and Psychology in the Analysis of Command and Control Feb. 1985 p 62-262 (For primary document see N86-32095 23-53)
Avail: NTIS HC A12/MF A01

The use of the Rule Oriented System Simulation language (which unites concepts of artificial intelligence and event step simulation in an object oriented simulation language) in an air defense simulation; a purely psychological experiment on the computer; and a simulation of engagement decision logic in an air defense battalion operations center with a fuzzy set logic program is described. Ideas on joining artificial intelligence and catastrophe theory are discussed. The latter is used as a source of decision rules. The classical ambush situation is analyzed. ESA

N86-32098# Rochester Inst. of Tech., N.Y. Dept. of Electrical Engineering.
SPEECH ANALYSIS BASED ON A MODEL OF THE AUDITORY SYSTEM Final Report, Oct. 1983 - Sep. 1985
Harvey E. Rhody, Robert A. Houde, Charles W. Parkins, and Sohiel Dianat Feb. 1986 54 p
(Contract F30602-81-C-0169)
(AD-A167426; RADC-TR-85-265) Avail: NTIS HC A04/MF A01 CSCL 20/1

This report describes a signal processing technique for speech signals based on a model of the processing done in the auditory system. It has been found that the click response of the auditory system is an exponential function. The spectrogram produced by a speech waveform that has been windowed by the same function possesses excellent resolution of both time and frequency parameters of the signal. It is expected that this analysis method will improve the discrimination of phonemic elements, and will

prove useful in such applications as speech recognition and speech compression. GRA

N86-32099# European Space Agency, Paris (France).
SPEED OF WORK AND ERROR RATE: ANALYSES OF INDIVIDUAL DIFFERENCES IN A CHOICE REACTION SERIES WITH A COGNITIVE COMPONENT
Klaus-Martin Goeters Dec. 1985 23 p Original language document was announced as N86-10781
(ESA-TT-944; DFVLR-FB-85-21; ESA-86-97579) Avail: NTIS HC A02/MF A01; original German version available from DFVLR, Cologne, West Germany DM 10.50

A visual choice reaction test with a cognitive component was introduced to measure response processes in more detail than is possible with summarizing scoring of paper pencil tests. For each reaction the following information was registered: stimulus (light) reaction (right/wrong), reaction time, and omission (yes/no). Each subject had to react on 320 successive signals without pause. From the reaction protocol of each subject indices for speed of work, oscillation of performance, error disposition, and reaction inhibition were computed. The main results is that in this reaction test speed of work and error disposition are not coupled. Errors are not a consequence of quick reactions. The observed errors seem to be the expression of an increased variation in performance. The results are discussed with a view to a psychophysiological model of activation. ESA

N86-32100# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group.
AUDITORY VERSUS VISUAL SELECTIVE-ATTENTION TASKS
L. C. Boer and M. H. B. Ruzius Oct. 1985 27 p
(Contract A83/K/045)
(IZF-1985-19; TDCK-93575; ESA-86-98043) Avail: NTIS HC A03/MF A01

The Dichotic Listening Task (DLT) of Gopher and Kahnemann (1971), which requires subjects to detect targets occurring in one of two messages while ignoring the other, was compared with the Rapid Serial Visual Presentation (RSVP) based on a paradigm of Sperling and Reeves (1980). Subjects were required to detect targets occurring in one of two letter streams while ignoring the other. The performance on DLT and RSVP correlate, but not beyond the basic level between any pair of information processing tasks. Suggestions for RSVP modifications emphasizing selective-attention requirements are considered. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-32101*# Wisconsin Univ., Madison. Dept. of Horticulture.
CONTROLLED ENVIRONMENT LIFE SUPPORT SYSTEM: GROWTH STUDIES WITH POTATOES
T. W. Tibbitts and R. M. Wheeler Mar. 1986 52 p
(Contract NCC2-301)
(NASA-CR-177400; NAS 1.26:177400) Avail: NTIS HC A04/MF A01 CSCL 05H

Results of experiments conducted to maximize the productivity of potatoes grown under controlled environmental conditions are discussed. A variety of parameters is examined which affect potato growth, specifically, photoperiod, light intensity, temperature, nitrogen nutrition, carbon dioxide concentration and culture techniques. These experiments were conducted using five different cultivars, Russet Burbank, Norchip, Superior, Kennebec and Norland. To achieve high productivity, three specific objectives were explored: (1) to develop effective cultural procedures, (2) to determine the most effective photoperiod and (3) to develop a mist culture system. It is felt that the productivity obtained in this study is below the maximum that can be obtained. High irradiance levels coupled with tuber-promoting conditions such as cooler temperatures, increased CO_2 levels and lowered nitrogen concentrations should allow increases in tuber production. Tuberization appears to be accelerated by short daylengths although final yields are not increased. Mist culture techniques have not yet produced fully developed tubers. The use of supporting media and alteration of the nitrogen content of the mist solution are being explored as a way to allow tubers to develop to maturity. Author

N86-32102*# National Aeronautics and Space Administration, Washington, D.C.
NASA FACTS: SPACE SHUTTLE FOOD SYSTEMS
1986 15 p
(NF-150/1-86) Avail: Issuing Activity CSCL 06H

On the Space Shuttle, the food is prepared at a galley installed on the Orbiter's mid-deck. The galley is a modular unit that can be removed for special weight-critical missions or missions that require extra interior space. It contains a personal hygiene station, a water dispenser, an oven, condiment and meal tray stowage, and a food preparation area. Foods are individually packaged and stowed for easy handling in the zero gravity of space. All food is precooked or processed so it requires no refrigeration and is either ready to eat or can be prepared simply by adding water or heating. The only exception is the fresh fruit and vegetables stowed in the fresh food locker. The supplies consist of rehydratable food and beverages, thermostabilized food, intermediate moisture foods, natural form foods, irradiated meats, and condiments. A sample menu is also included. B.G.

N86-32103# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ABSOLUTE JUDGMENT VERSUS ABSOLUTE MAGNITUDE ESTIMATION TO CONVEY INFORMATION THROUGH SYMBOL MAGNITUDE CHANGES IN CRT DISPLAYS M.S. Thesis
Bernard Asiu Dec. 1985 75 p
(AD-A167059; AFIT/CI/NR-86-38T) Avail: NTIS HC A04/MF A01 CSCL 09/4

Psychophysical scaling of symbol magnitude to convey information through CRT displays was evaluated in terms of information theory. Series of lines and ellipses each with four, eight and twelve intermediate sizes were presented to twelve subjects under absolute judgment scaling and to an additional twelve subjects under absolute magnitude estimation scaling. Under absolute judgment, information transmission is higher and equivocation and ambiguity measures are lower than those obtained under absolute magnitude estimation. The difference in information transmission represents an increase of about one stimulus alternative under absolute judgement scaling and in itself does not preclude the practical application of absolute magnitude estimation to encode information. Rather it is the wide variability in median magnitude estimations that makes it difficult to reach any common ground for symbol interpretation. Author (GRA)

N86-32104# Georgia Inst. of Tech., Atlanta. Center for Man-Machine Systems Research.
HUMAN PROBLEM SOLVING IN FAULT DIAGNOSIS TASKS Final Report, Jul. 1979 - Jul. 1982
William B. Rouse and Ruston M. Hunt Apr. 1986 55 p
(Contracts MDA903-79-C-0421; DA Proj. 2Q1-61102-B-74-F)
(AD-A167397; ARI-RN-86-33) Avail: NTIS HC A04/MF A01 CSCL 05/10

This report evaluates the nature of human problem solving abilities specifically related to fault diagnosis situations. Three types of fault diagnosis were analysed involving diagnosis utilizing both real equipment and computer simulated equipment failures. In addition, the investigators experimented with computer generated problem solving aids to supplement human decision making capacities in diagnostic tasks. Results of the initial investigation indicate that human problem solving tends to be highly context-specific but that pattern recognition capabilities are exceptional allowing for a high degree of accuracy in ambiguous problem solving situations. Both structured-oriented and strategy-oriented problem solving aids were analysed. Structured-oriented bookkeeping aids clearly improved performance, while strategy-oriented aids actually had a negative effect on transfer of training. This research

effort is clearly relevant to military interests in effective training of optimal decision making in sub-optimal conditions. The results strongly support further research into the nature and training of effective solving. GRA

N86-32105# Lawrence Livermore National Lab., Calif.
STRIVING FOR NATURAL USAGE
N. A. Storch 1986 9 p Presented at the ACM/SIGCHI '86: Human Factors in Computing Systems, Boston, Mass., 16 Apr. 1986
(Contract W-7405-eng-48)
(DE86-009402; UCRL-94415; CONF-8604159-1) Avail: NTIS HC A02/MF A01

During the past year, the Non-Destructive Evaluation Section has supported developing a user environment for their technicians and scientists who do image processing and analysis of images obtained from various sources. In particular, this has involved bringing together certain software tools which already existed into a prototype, trying to understand user needs by observation, discussion, insightful guessing, and then continuing on to build something better. One of the primary goals has been to achieve a natural user interface. The efforts have required internal complexity in handling: pointing of the user to the image or screen and resultant actions, device independent graphics and raster operations, application menus, working image data base and command recognition. These are, for the most part, independent of the image processing functions. Starting from broad, not very well defined requirements, it has become an on-going effort to checkout both interactive and image processing operations. A framework was developed to allow for flexibility in image processing operations and their integration into work-related applications. The results indicate that success in accomplishing an easy, natural usage is due to: commitment and concentration on usage, continual reevaluation during development, and allowance for the overhead of tidying up to maintain internal order and clarity. DOE

N86-32106# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
CONTROL THEORETIC ANALYSIS OF HUMAN OPERATOR MEDIATED RENDEZVOUS AND DOCKING
P. Milgram and P. H. Wewerinke 26 Feb. 1985 10 p Presented at 2nd IFAC/IFIP/IFORS/IEA Conf. on Analysis, Design and Evaluation of Man-Machine Systems, Varese, Italy, 10-12 Sep. 1985
(NLR-MP-85020-U; B8661085; ESA-86-97669) Avail: NTIS HC A02/MF A01

A model based analysis of manual control of space rendezvous and docking in the presence of transmission time delays (nominal case: human operator (HO) on the ground) is presented. The variables studied are time delay, human induced motor noise levels, rotational and translational control and the effect of display prediction. An envelope of performance is estimated, bounded by performance with optimal prediction and performance with no prediction at all. Nominal performance for a simple second order Taylor predictor display is estimated. An HO imperfect internal representation of the system is used to model the no-predictor and predictor display cases. ESA

N86-32107# National Aerospace Lab., Amsterdam (Netherlands). Space Flight Div.
CONTROL LOOPS WITH HUMAN OPERATORS IN SPACE OPERATIONS. PART 1: HUMAN ENGINEERING ANALYSIS, SYNTHESIS AND EVALUATION TECHNIQUES Final Report
P. Milgram, R. C. vandeGraaff, and P. H. Wewerinke Paris ESA 17 May 1985 280 p
(Contract ESA-5594/83)
(NLR-TR-84116-L-Pt-1; ESA-CR(P)-2190-Pt-1; ESA-86-97787-Pt-1)
Avail: NTIS HC A13/MF A01

Human engineering approaches and methodologies applicable for analysis of performance of human-machine systems, particularly space teleoperator applications, are reviewed. Motivated by the presumed active role of the human operator in future space teleoperation missions, the application of human engineering within the various stages of system development is discussed, emphasizing the impact on the development cycle of being able to analyze various aspects of human-in-the-loop system performance. Experimental and theoretical approaches to human performance analysis are identified. Fundamental and practical aspects of each approach are outlined. A modeling approach for the analysis of a specific class of supervisory space teleoperator missions is proposed. Human-computer task allocation for such missions is considered. ESA

N86-32108# National Aerospace Lab., Amsterdam (Netherlands). Space Flight Div.
CONTROL LOOPS WITH HUMAN OPERATORS IN SPACE OPERATIONS. PART 3: RENDEZVOUS AND DOCKING OPERATIONS AND MODEL ANALYSIS OF PERFORMANCE WITH HUMAN-IN-THE-LOOP Final Report
P. Milgram, P. Th. L. M. vanWoerkom, and P. H. Wewerinke Paris ESA 7 Dec. 1984 192 p
(Contract ESA-5594/83)
(NLR-TR-84116-L-Pt-3; ESA-CR(P)-2190-Pt-3; ESA-86-97789-Pt-3)
Avail: NTIS HC A09/MF A01

Human-in-the-loop rendezvous and docking (RVD) performance was analyzed to demonstrate the practicality of applying engineering methods and techniques to the analysis of control loops with human operators in space operations. The RVD space segment and the related autonomous operations are described. Model analyses of RVD performance in the final approach phase, for the case in which the human operator is involved in manual control of RVD, and for the case in which the human operator is monitoring an automated RVD for the occurrence of failures are given. ESA

N86-32109# National Aerospace Lab., Amsterdam (Netherlands). Space Flight Div.
CONTROL LOOPS WITH HUMAN OPERATORS IN SPACE OPERATIONS. PART 4: RESEARCH REQUIREMENTS FOR HUMAN-IN-THE-LOOP SPACE TELEOPERATOR DEVELOPMENT Final Report
P. Milgram Paris ESA 17 May 1985 62 p
(Contract ESA-5594/83)
(NLR-TR-84116-L-Pt-4; ESA-CR(P)-2190-Pt-4; ESA-86-97790-Pt-4)
Avail: NTIS HC A04/MF A01

Short-term human engineering research requirements for developing rendezvous and docking and space telemanipulation capabilities are presented. A catalog of research topics related to human-in-the-loop teleoperation performance is given. Available resources for model analytical investigation of these research topics and resources for the establishment of an initial human performance research laboratory for carrying out such investigations and for testing proposed design concepts by ESA are reviewed. ESA

N86-32110# National Aerospace Lab., Amsterdam (Netherlands). Space Flight Div.
CONTROL LOOPS WITH HUMAN OPERATORS IN SPACE OPERATIONS. PART 5: EXECUTIVE SUMMARY Final Report
Paul Milgram Paris ESA 17 May 1985 157 p
(Contract ESA-5594/83)
(NLR-TR-84116-L-Pt-5; ESA-CR(P)-2190-Pt-5; ESA-86-97791-Pt-5)
Avail: NTIS HC A08/MF A01

Human engineering analysis, synthesis, and evaluation techniques; robotics operations and manual control experiments; spacecraft rendezvous and docking operations and model analysis of performance with human-in-the-loop; and ESA research requirements for human-in-the-loop space teleoperator development are discussed. ESA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

N86-32111*# State Univ. of New York, Binghamton. Dept. of Biological Sciences.

EVALUATION OF THE NEED FOR A LARGE PRIMATE RESEARCH FACILITY IN SPACE
Frank M. Sulzman 198[illegible] 50 p
(Grant NAG2-232)
(NASA-CR-179661; NAS 1.26:179661) Avail: NTIS HC A03/MF A01 CSCL 06B

In the summer of 1983, an advisory committe was organized that would be able to evaluate NASA's current and future capabilities for nonhuman primate research in space. Individuals were chosen who had experience in four key research areas: cardiovascular physiology, vestibular neurophysiology, musculoskeletal physiology, and fluid and electrolyte balance. Recommendations of the committee to NASA are discussed. B.G.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-32112*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MULTIPLE GRID PROBLEMS ON CONCURRENT-PROCESSING COMPUTERS
D. Scott Eberhardt (Stanford Univ., Calif.) and Donald Baganoff Feb. 1986 114 p
(NASA-TM-86675; A-85103; NAS 1.15:86675) Avail: NTIS HC A06/MF A01 CSCL 09B

Three computer codes were studied which make use of concurrent processing computer architectures in computational fluid dynamics (CFD). The three parallel codes were tested on a two processor multiple-instruction/multiple-data (MIMD) facility at NASA Ames Research Center, and are suggested for efficient parallel computations. The first code is a well-known program which makes use of the Beam and Warming, implicit, approximate factored algorithm. This study demonstrates the parallelism found in a well-known scheme and it achieved speedups exceeding 1.9 on the two processor MIMD test facility. The second code studied made use of an embedded grid scheme which is used to solve problems having complex geometries. The particular application for this study considered an airfoil/flap geometry in an incompressible flow. The scheme eliminates some of the inherent difficulties found in adapting approximate factorization techniques onto MIMD machines and allows the use of chaotic relaxation and asynchronous iteration techniques. The third code studied is an application of overset grids to a supersonic blunt body problem. The code addresses the difficulties encountered when using embedded grids on a compressible, and therefore nonlinear, problem. The complex numerical boundary system associated with overset grids is discussed and several boundary schemes are suggested. A boundary scheme based on the method of characteristics achieved the best results. M.G.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering.*

N86-32113# Information Systems and Technology Center, Wright-Patterson AFB, Ohio. Ada Validation Facility.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: VERDIX CORPORATION VERDIX ADA DEVELOPMENT SYSTEM, VERSION 5.2 FOR THE TEKTRONIX 6130 UNDER UTEK, RELEASE 2.1.1 Report for 16 Nov. 1985 - 16 Nov. 1986
16 Nov. 1985 76 p
(AD-A166872; AVF-VSR-16.0286) Avail: NTIS HC A05/MF A01 CSCL 09/2

The Validation Summary Report presents the results and conculsions of testing performed on the Verdi Ada Development System (VADS), Version 5.2. Standardized tests serve as input to an Ada (trade name) compiler, producing results which are evaluated by the validation team. This summary briefly states the highlights of the VADS, Version 5.2, validation. On-site testing was performed on 14 Nov 1985 through 16 Nov 1985 at Verdix Corporation in Aloha, Oregon under the auspices of the Ada Validation Facility (AVF), according to Ada Validation Office (AVO) policies and procedures. The VADS, Version 5.2, is hosted on a Tektronix 6130 operating under UTek Operating System, Release 2.1.1. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC is used to validate conformance for a compiler to ANSI/MIL-STD-1815A Ada. The purpose of testing is to ensure that a compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation dependent but permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, or during execution. GRA

N86-32114# Information Systems and Technology Center, Wright-Patterson AFB, Ohio.
ADA (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: TELESOFT, INC. TELESOFT ADA, VERSION 2.39 GOULD PS3000 HOST, GOULD CONCEPT/32 (TRADE NAME) MODEL 6750 TARGET Report, 8 Nov. 1985 - 8 Nov. 1986
8 Nov. 1985 70 p
(AD-A167470; AVF-VSR-13.0386) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Validation Summary Report presents the results and conclusions of testing performed on the TeleSoft Ada compiler, Version 2.39. Standardized tests serve as input to an Ada compiler, producing results which are evaluated by the validation team. This summary briefly states the highlights of the TeleSoft Ada Compiler, Version 2.39 validation. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC is used to validate conformance of a compiler to ANSI/MIL-STD-1815A Ada. The purpose of testing is to ensure that a compiler properly implements legal language constructs and that it identifies and rejects illegal language constructs. The testing also identifies behavior that is implementation dependent but permitted by the Ada Standard. Six classes of tests are used. These tests are designed to perform checks at compile time, at link time, or during execution. GRA

N86-32115# Naval Postgraduate School, Monterey, Calif.
THE RISC (REDUCED INSTRUCTION SET COMPUTER) ARCHITECTURE AND COMPUTER PERFORMANCE EVALUATION M.S. Thesis
Manuel F. P. deBarros Mar. 1986 97 p
(AD-A167873) Avail: NTIS HC A05/MF A01 CSCL 09/2

A definition of Reduced Instruction Set Computers is developed. A computer performance model which allows the evaluation of architectural alternatives is presented. An example on the use of the model to compute the performance altenatives for a given application is presented to study the effect of the addition of an instruction to a processor instruction set. Author (GRA)

N86-32116# Naval Postgraduate School, Monterey, Calif.
A 32-BIT MICROPROCESSOR BASED SOLID STATE DATA RECORDER FOR SPACE BASED APPLICATIONS M.S. Thesis
Thomas J. Frey, Jr. Mar. 1986 76 p
(AD-A167887) Avail: NTIS HC A05/MF A01 CSCL 14/3

A need exists for non-volatile, reliable and radiation hardened mass data storage devices for space applications. Tape recorders modified for use in the space environment have proven both expensive and unreliable. The use of magnetic bubble memory as a recording medium in recent space projects offers a promising

alternative to tape recorders. This thesis develops the design of a 32-bit microprocessor based advanced solid state data recorder for space based applications utilizing two-megabyte magnetic bubble memory boards and the storage medium. GRA

N86-32117# Lanchester Polytechnic, Coventry (England). Dept. of Systems and Control.
STABILITY CONSIDERATIONS IN THE DESIGN OF SIGMA-DELTA MODULATORS
C. P. Lewis, M. I. Mathew, and A. M. Zikic 1985 10 p
(S-and-C.85-1; ESA-86-97257) Avail: NTIS HC A02/MF A01

A design technique based on the use of z-transform modeling of nonlinear elements transformed into the w-domain was applied to the study of sigma-delta modulators, used in the generation of tracking analog to digital converters. Results show that the w-domain techniques allied to the use of suitable describing function models facilitate the design of sigma-delta modulators. To assist in the maximization of the yield of a system when fabricated, it is essential to use computer design aids for the easy identification of important system parameters and the effect of their variation on system performance. A computer aided design package for this procedure was written. ESA

N86-32118# Institut National Polytechnique, Grenoble (France).
TOP-DOWN DESIGN OF VLSI MICROPROCESSORS Ph.D. Thesis [CONCEPTION DESCENDANTE APPLIQUEE AUX MICROPROCESSEURS VLSI]
Francois Bertrand 1985 246 p In FRENCH; ENGLISH summary
(ESA-86-97299) Avail: NTIS HC A11/MF A01

An approach based on classical specification and refinement methods to minimize the probability of VLSI design error and to optimize the design choice is presented. The study is supported by the design and implementation of the 80C48 VLSI microprocessor. The main design steps considered include choice of the computation algorithm, choice of the data path, and choice of the control structure. Analysis and simulation are used to validate the design steps. The optimization of the design is partially based on a predictive evaluation. It is shown that a design based on rather large building blocks is advantageous. These functional blocks can be developed, implemented and tested by automatic procedures. ESA

N86-32119# Amsterdam Univ. (Netherlands). Dept. of Mathematics and Computer Science.
THE SECOND MACHINE CLASS 2: AN ENCYCLOPEDIC VIEW OF THE PARALLEL COMPUTATION THESIS
Peter vanEmdeBoas Dec. 1985 27 p Presented at Stefan Banach International Mathematical Center 26th Semester on Mathematical Problems in Computation Theory, Warsaw, Poland, 16 Sep.-14 Dec. 1985
(FVI-85-14; ESA-86-98070) Avail: NTIS HC A03/MF A01

The parallel computation thesis, which states that polynomial time on a parallel machine equals polynomial space on a sequential device is discussed. This thesis is not an absolute truth for parallel models. It characterizes a specific, frequently observed species of parallelism. The thesis is illustrated by explaining why it holds for a number of models, and by presenting models for which the thesis is likely to fail. ESA

N86-31953# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
NEW ARRAY PROCESSORS OF FLOATING POINT SYSTEMS [NEUE ARRAY-PROZESSOREN VON FLOATING POINT SYSTEMS]
Bernd Lauer *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 101-105 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

N86-32131# Technische Univ., Berlin (West Germany).
MACHINE LEARNING IN METAXA [MASCHINELLES LERNEN IN METAXA]
Werner Emde *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 87-115 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-32120 CIAD, Zoetermeer (Netherlands).
TEST OF THE SYSTEM MICRO AIDED ENGINEERING (MAE) CAD/CAM [SYSTEEMTEST MAE CAD/CAM]
B. G. Luttikhuizen and J. J. Duivenvoorden 1985 37 p In DUTCH
(A-15; ISBN-90-6818-021-5; ESA-86-97765) Copyright. Avail: Issuing Activity

A computer aided design (CAD) - computer aided manufacturing (CAM) modular package was tested. The system is suited for mechanical engineering applications. The hardware and software test configurations are described. After base-figure construction, two-dimensional design manipulations, transformations, reflections, rotations, reductions, and rescalings were executed. Line-strings, edgings, parameterized forms, accuracy, design speed, data storage efficiency, coupling possibilities with FORTRAN programs, and data base management system performance were investigated. An engine, a T-piece with flanges, and a ship's plating were modeled in three dimensions and combined. The two and three-dimensional integration was examined. For numerical control, pump-cylinder elaborations were executed. The package is attractive for a large number of mechanical engineering applications, with certain restrictions. ESA

N86-32121# Center for Mathematics and Computer Science, Amsterdam (Netherlands).
CWI NEWSLETTER, NO. 8 Quarterly Issue, Sep. 1985
Arjeh M. Cohen, ed., Richard D. Gill, ed., and Jo C. Ebergen, ed. Sep. 1985 53 p
(CWI-Newsletter-Issue-8; ISSN-0168-826X; ESA-86-97382) Avail: NTIS HC A04/MF A01

Karmarkars(1984) linear programming method and an algorithm for the factorization of polynomials are discussed. For individual titles, see N86-32122 through N86-32123.

N86-32122# Tilburg Univ. (Netherlands). Dept. of Econometrics.
THE NEW LINEAR PROGRAMMING METHOD OF KARMARKAR
A. Schrijver *In* Center for Mathematics and Computer Science CWI Newsletter, No. 8 Sep. 1985 p 2-14 (For primary document see N86-32121 23-61)
Avail: NTIS HC A04/MF A01

The Karmarkar (1984) polynomial time algorithm for linear programming, claimed to be 50 times faster than the simplex method, is discussed. It is shown that the method has polynomially bound run time. ESA

N86-32123# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
A RECENT ALGORITHM FOR THE FACTORIZATION OF POLYNOMIALS
Arjen K. Lenstra *In its* CWI Newsletter, No. 8 Sep. 1985 p 15-20 (For primary document see N86-32121 23-61)
Avail: NTIS HC A04/MF A01

A polynomial-time factoring algorithm is presented. Its run time, when applied to a polynomial f in Z(X), is always bounded by a fixed polynomial function of the degree and the coefficient-size of f. The irreducible factors in Z(X) of f can be regarded as the minimal polynomials (in Z(X)) of its roots. Therefore, to find an irreducible factor of f, it suffices to determine the minimal polynomial of one of its roots. The minimal polynomial of a root a of f

immediately follows from an integral linear combination of minimal degree among the powers of a. It is shown that the problem of finding such a relation among the powers of a can be reduced to the problem of finding a relatively short vector in a subset of a real vector space. Such a short vector can then be found by the basis reduction algorithm. ESA

N86-32124# Technische Univ., Berlin (West Germany). Fachbereich Informatik.
TEXT UNDERSTANDING: INTERESTINGNESS AS A BASIS FOR THE VARIATION OF THE ANALYSIS DEPTH Final Report, Dec. 1984
Hans-Jochen Schneider, Werner Emde, Michael Fuernsinn, Siegfried Guenther, Mohammed Khenkhar, James Kilbury, Kai vonLuck, Claus-Rainer Rollinger, Bernd Ruschkowski, and Albrecht Schmiedel Bonn, West Germany BMFT Dec. 1985 120 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-ID-85-001; ISSN-0170-8996; ESA-86-97435) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

Fundamental methods and procedures which enable computers to understand texts were investigated and developed. Aspects of the representation formalism in which natural language knowledge formulated as texts is to be represented were studied. This involved the representation of temporal and uncertain knowledge. The subsequent processing of the representations derived from texts as well as the dynamic construction of knowledge bases were investigaged in the framework of machine learning and nonmonotic deduction. The translation process that assigns a semantic representation to natural language utterances was treated using the Generalized Phrase Structure Grammar formalism. The relation between propositional versus analogical representation was investigated with respect to the solution of spatial problems in a geographical question-answering system. For individual titles, see N86-32125 through N86-32131.

N86-32125# Technische Univ., Berlin (West Germany).
THE SIMULATION OF NATURAL KNOWLEDGE SYSTEMS [ZUR SIMULATION NATUERLICHER WISSENSSYSTEME] c63
Claus-Rainer Rollinger *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 13-21 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

The representation formalism in which natural language knowledge is to be represented is discussed. The starting point of artificial intelligence is that intelligent behavior has to be knowledge-based behavior; the central questions are the representation or utilization of knowledge. Natural knowledge systems can be characterized via the human cognitive capabilities. Operational simulation models can be developed to formally represent knowledge, and to verify theories and hypotheses. The difficulties involved in the study of knowledge systems are outlined. The models are always defective since they do not adequately describe reality; therefore they have to be regularly corrected. Essential in the analysis of concrete knowledge systems is the structuring of knowledge into levels of different generality. ESA

N86-32126# Technische Univ., Berlin (West Germany).
TEXT UNDERSTANDING: INTERESTINGNESS AS A BASIS FOR THE VARIATION OF THE ANALYSIS DEPTH [TEXTVERSTEHEN: INTERESSENSGESTEUERTE VARIATION DER ANALYSETIEFE] c63
Claus-Rainer Rollinger and Hans-Jochen Schneider *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 23-30 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

Fundamental methods and procedures which enable computers to understand texts are reviewed The purpose of text understanding is to process the information by means of formal, operational methods and procedures and provide it to users or other processes. Methods must guarantee that the user only gets information which is relevant; the methods have to take into account users interest profiles. The status of science and research in the fields of text understanding and modeling of interest profiles is depicted. ESA

N86-32127# Technische Univ., Berlin (West Germany).
DIRECT PARSING USING IMMEDIATE DOMINANCE/LINEAR PRECEDENCE (ID/LP) GRAMMARS [DIREKTES PARSEN MIT ID/LP-GRAMMATIKEN]
James Kilbury *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 31-52 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

The utilization of ID/LP grammars for parsing as a linguistic process is discussed. The ID/LP grammar, a formalism developed in the framework of the Generalized Phrase Structure Grammar (GPSG), as well as the GPSG are introduced. The indirect parsing of ID/LP's whereby the external grammar is transformed into another kind of grammar, using Definite Clause Grammars is explained. The algorithms of Early and Shieber for recognition and parsing are presented. Open problems related to these algorithms are discussed. ESA

N86-32128# Technische Univ., Berlin (West Germany).
THE REPRESENTATION OF KNOWLEDGE FOR SITUATIONS AND EVENTS IN A DYNAMIC WORLD [WISSENSREPRAESENTATION FUER ZUSTAENDE UND EREIGNISSE IN EINER DYNAMISCHEN WELT] c63
Albrecht Schmiedel and Kai vonLuck *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 53-65 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

The representation of conceptual knowledge in order to construct an artificial epistemic subject using artificial intelligence is discussed. The emphasis is on a theoretical foundation for artificial systems which allow information exchange with a human user. The requirements for such a system are given. Formalisms for the representation of partial knowledge using abstract concepts and the dynamic construction of knowledge bases are presented. ESA

N86-32129# Technische Univ., Berlin (West Germany).
THE TEMPORAL ASPECT OF TEXT REPRESENTATION [ZUM ZEITLICHEN ASPEKT DER REPRAESENTATION VON TEXTEN]
Siegfried Guenther *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 67-66 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

The formal representation of natural language texts, and the summarizing and extraction procedure of this representation are discussed. This representation aims at weather report texts in which time plays an important role. Problems occurring in the representation are clarified by examples. A unified formalism using the concept of a time grid to solve these problems is presented. Other formalisms, starting from a set of temporal relations, are given. ESA

N86-32130# Technische Univ., Berlin (West Germany).
GEOSYS: A QUESTION-ANSWER SYSTEM WITH SPATIAL IMAGINATIVE FACULTY [GEOSYS: EIN FRAGE-ANTWORT-SYSTEM MIT RAEUMLICHEM VORSTELLUNGSVERMOEGEN]
Michael Fuernsinn, Mohammed Khenkhar, and Bernd Ruschkowski *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 79-86 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

The relation between propositional versus analogical representation was investigated with respect to the solution of spatial problems in a geographical question-answer system. It explained what spatial problems mean and which concepts were used to solve the problems. The system GEOSYS has a problem solving strategy which uses propositional and (quasi) analogical representation of spatial knowledge whereby relations are obtained by a searching which alternates between both representations. The algorithm which describes the searching principle is presented.
ESA

N86-32131# Technische Univ., Berlin (West Germany).
MACHINE LEARNING IN METAXA [MASCHINELLES LERNEN IN METAXA] c60
Werner Emde *in its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 87-115 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

A machine learning model for the acquisition of inferential knowledge on the basis of higher concepts is presented. The emphasis is on problems of incremental knowledge acquisition and hence on the concept of validity domains as a basis for machine learning. A model-controlled procedure, METAXA, characterized by the fact that control models in the knowledge acquisition process are heuristically generated is presented. The declarative representation of inferential knowledge as metaknowledge is shown to be an advantage for all the steps in the knowledge acquisition process. Difficulties occurring in the process of (quasi) cumulative knowledge acquisition are treated.
ESA

N86-32132*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE NATURE AND EVALUATION OF COMMERCIAL EXPERT SYSTEM BUILDING TOOLS
William B. Gevarter Jun. 1986 27 p
(NASA-TM-88331; A-86321; NAS 1.15:88331) Avail: NTIS HC A03/MF A01 CSCL 09B

This memorandum reviews the factors that constitute an Expert System Building Tool (ESBT) and evaluates current tools in terms of these factors. Evaluation of these tools is based on their structure and their alternative forms of knowledge representation, inference mechanisms and developer/end-user interfaces. Next, functional capabilities, such as diagnosis and design, are related to alternative forms of mechanization. The characteristics and capabilities of existing commercial tools are then reviewed in terms of these criteria.
Author

N86-32133*# Maryland Univ., College Park.
RESEARCH RELATED TO IMPROVED COMPUTER AIDED DESIGN SOFTWARE PACKAGE Semiannual Status Report, 1 Apr. - 1 Oct. 1986
William H. Walston, Jr. 1986 33 p
(Contract NCC5-33)
(NASA-CR-179668; NAS 1.26:179668) Avail: NTIS HC A03/MF A01 CSCL 09B

The comparative computational efficiencies of the finite element (FEM), boundary element (BEM), and hybrid boundary element-finite element (HVFEM) analysis techniques are evaluated for representative bounded domain interior and unbounded domain exterior problems in elastostatics. Computational efficiency is carefully defined in this study as the computer time required to attain a specified level of solution accuracy. The study found the FEM superior to the BEM for the interior problem, while the reverse was true for the exterior problem. The hybrid analysis technique was found to be comparable or superior to both the FEM and BEM for both the interior and exterior problems.
Author

N86-32134# Wisconsin Univ., Madison. Mathematics Research Center.
TREE-STRUCTURED CLASSIFICATION VIA GENERALIZED DISCRIMINANT ANALYSIS Technical Summary Report
Wei-Yin Loh and N. Vanichsetakul Jan. 1986 35 p
(Contract DAAG29-80-C-0041; Grants NSF MCS-83-00140; NSF DMS-85-02303)
(AD-A167453; MRC-TSR-2902) Avail: NTIS HC A03/MF A01 CSCL 09/2

Linear techniques are used recursively to construct classification rules which can be represented as k-nary decision trees. The method has been implemented in a computer program called FACT. It can handle ordered and unordered variables, unequal priors, variable misclassification costs, and missing observations. Besides the tree structure, it also yields an importance ranking of the variables and a cross-validation estimate of error. FACT is compared with CART (a procedure proposed recently by Breiman et al., which gives a binary tree) in a series of examples. The conclusion is that FACT and CART are usually comparable in terms of classification accuracy and interpretative capability, but FACT runs many times faster.
Author (GRA)

N86-32135# Wisconsin Univ., Madison. Mathematics Research Center.
COMPUTING NARROW INCLUSIONS FOR DEFINITE INTEGRALS Technical Summary Report
George F. Corliss Feb. 1986 31 p
(Contract DAAG29-80-C-0041)
(AD-A167491; MRC-TSR-2913) Avail: NTIS HC A03/MF A01 CSCL 09/2

The ACRITH computer program is used to implement algorithms which give narrow inclusions for definite integrals. Inclusions are obtained from familiar numerical quadrature formulas such as Gaussian or Newton-Cotes with remainder terms, or from the term-by-term integration of Taylor polynomials with remainder terms. Inclusions for the remainder terms are computed using automatic differentiation. The inclusions for the remainder terms are computed using automatic differentiation. The inclusions are valid if the integrand or the endpoints of the interval of integration are real-or interval-valued. Interval inclusions which contain only a few machine numbers are achieved by using ACRITH's accurate scalar product, by using order and subinterval adaptation, and by using special devices such as intersection of several estimates. Numerical examples show that such narrow, guaranteed bounds require about four times as long to compute as the estimates computed by the routine QAGS from QUADPACK.
Author (GRA)

N86-32136# Wisconsin Univ., Madison. Mathematics Research Center.
A NEW RESULT IN THE THEORY AND COMPUTATION OF THE LEAST NORM SOLUTION OF A LINEAR PROGRAM Technical Summary Report
Stefano Lucidi Feb. 1986 25 p
(Contract DAAG29-80-C-0041; Grant NSF DCR-84-20963)
(AD-A167515; MRC-TSR-2910) Avail: NTIS HC A02/MF A01 CSCL 09/2

By perturbing properly a linear program to a separable quadratic program it is possible to solve the latter in its dual variable space by iterative techniques such as sparsity-preserving SOR (successive overrelaxation) algorithms. The main result of this paper gives an effective computational criterion to check whether the solutions of the perturbed quadratic programs provide the least 2-norm solution of the original linear program.
Author (GRA)

N86-32137# Wisconsin Univ., Madison.
ERROR BOUNDS FOR STRONGLY CONVEX PROGRAMS AND (SUPER)LINEARLY CONVERGENT ITERATIVE SCHEMES FOR THE LEAST 2-NORM SOLUTION OF LINEAR PROGRAMS Summary Report
O. L. Mangasarian and R. DeLeone Mar. 1986 21 p
(Contract DAAG29-80-C-0041; Grants NSF DCR-84-20963; AFOSR-ISSA-85-00080)
(AD-A167536; MRC-TSR-2924) Avail: NTIS HC A02/MF A01 CSCL 12/1

We derive bounds on the distance between an arbitrary point and the unique solution of a strongly convex constrained optimization problem in terms of known violations of the optimality conditions of the problem. These bounds are then used to construct

effective schemes for finding the unique smallest solution of very large sparse linear programs. Given an arbitrary point (x,u) in R superscript n x R sub + superscript m, we give bounds on the Euclidean distance between x and the unique solution x-bar to a strongly convex program in terms of the violations of the Karush Kuhn Tucker conditions by the arbitrary point (x, u). These bounds are then used to derive linearly and superlinearly convergent iterative schemes for obtaining the unique least 2-norm solution of a linear program. These schemes can be used effectively in conjunction with the successive overrelaxation methods for solving very large sparse linear programs. GRA

N86-32138# Naval Postgraduate School, Monterey, Calif.
KALMAN FILTER REAL TIME TRACKING USING MICROPROCESSORS AND A NEW LANGUAGE FOR MILITARY SOFTWARE M.S. Thesis
Jose A. F. Ferreira 27 Mar. 1986 244 p
(AD-A167871) Avail: NTIS HC A11/MF A01 CSCL 09/2

A sequential Extended Kalman filter routine, implemented in the C language, is developed for an embedded computer application. The design takes into account the real time constraints imposed by the sampling time of the data. Filter measurements consist of four (4) transit times generated by torpedo instrumentation in a TEST RANGE facility, and they are nonlinear functions of the coordinates of the torpedo. Memory, speed efficiency, and portability are emphasized in the software design. The program was tested, using simulated trajectories, in an IBM-PC and in a CIE 680/30 microcomputers. Limitations in handling small floating point numbers degraded the performance of the algorithm in the CIE machine which could not track 1/4-G maneuvers. GRA

N86-32139# Naval Postgraduate School, Monterey, Calif.
AIDING COMPUTER APPLICATION PROGRAMMERS AND USERS WITH THE TOOLS OF THE VISUAL INTERFACE M.S. Thesis
Michael N. Fredericksen Mar. 1986 61 p
(AD-A167886) Avail: NTIS HC A04/MF A01 CSCL 09/2

The purpose of this thesis is to explicate the benefits of the computer visual interface by identifying the functional capabilities of some of the visual devices made possible by such an interface, and by examining the ways in which these visual devices can provide tools to aid the programmer in writting, debugging, and unit testing application programs, and the user in learning and using applications. This thesis should give the reader some insight into how current visual technology is being used (or can be used in the furture) to aid the applications programmer and application user. The focus will primarily be on the programmers and users of applications for low-cost desktop computers. Author (GRA)

N86-32140# Royal Signals and Radar Establishment, Malvern (England).
FLEX PASCAL: AN IMPLEMENTATION OF THE ISO-PASCAL PROGRAMMING LANGUAGE
K. Curtis, P. D. Hammond, and P. D. Taylor Dec. 1985 27 p
(AD-A168105; RSRE-MEMO-3908; DRIC-BR-99099) Avail: NTIS HC A03/MF A01 CSCL 09/2

The Flex-Pascal compiler runs on the RSRE Flex computer architecture, which is currently available on the ICL Perq 2 workstation. Flex-Pascal conforms to the ISO 7185 (BS 6192) standard for Pascal and provides (as one extension) a separate-compilation facility. This paper discusses the use of ISO 7185 and the BSI Pascal Validation Suite, and criticises areas of Pascal, which, by their nature, have proved particularly difficult to implement. GRA

N86-32141# Los Alamos National Lab., N. Mex.
TEXT AND GRAPHICS AT LOS ALAMOS: A SYSTEM VIEWPOINT
M. Vigil and S. C. Bouchier 1986 8 p Presented at the ACM Mountain Regional Conference, Santa Fe, N. Mex., 11 Apr. 1986
(Contract W-7405-eng-36)
(DE86-010169; LA-UR-86-1176; CONF-8604177-1) Avail: NTIS HC A02/MF A01

At Los Alamos National Laboratory, a computerized document preparation system is being developed to produce publication-quality documents integrating text and graphics. Mixing text and graphics involves a combination of two different technologies; thus the project has presented numerous and interesting challenges. The requirements, issues, solutions, and continuing concerns of the system development are described. The particular challenges encountered in fitting the document system into the Laboratory's diverse computing network are explained. The paper itself is an example of the type of document the system can produce. DOE

N86-32142# Los Alamos National Lab., N. Mex.
PROGRAMMING A MASSIVELY PARALLEL, COMPUTATION UNIVERSAL SYSTEM: STATIC BEHAVIOR
A. Lapedes and R. Farber 1986 26 p Presented at the Neural Nets and Computation Conference, Snowbird, Utah, 1 Apr. 1986
(Contract W-7405-eng-36)
(DE86-010171; LA-UR-86-1179; CONF-8604173-1) Avail: NTIS HC A03/MF A01

In previous work by the authors, the optimum finding properties of Hopfield neural nets were applied to the nets themselves to create a neural compiler. This was done in such a way that the problem of programming the attractors of one neural net (called the Slave net) was expressed as an optimization problem that was in turn solved by a second neural net (the Master net). In this series of papers that approach is extended to programming nets that contain interneurons (sometimes called hidden neurons), and thus deals with nets capable of universal computation. DOE

N86-32143# Lawrence Livermore National Lab., Calif.
HISTORY OF THE WILSON-FOWLER SPLINE
F. N. Fritsch Apr. 1986 16 p
(Contract W-7405-eng-48)
(DE86-010264; UCID-20746) Avail: NTIS HC A02/MF A01

The Wilson-Fowler spline (WF-spline) was introduced in the early 1960's as a means for drawing a smooth curve through a planar set of data. It has been used as the spline entity in the APT system's TABCYL since its inception. The history of the WF-spline is briefly described and a chronologically arranged annotated bibliography of all known references to it. DOE

N86-32144# Grenoble-1 Univ. (France).
MODELS FOR PROGRAM RELIABILITY: APPLICATION TO A CRITICAL COMPUTER SYSTEM VALIDATION TEST Ph.D. Thesis [LES MODELES DE FIABILITE DU LOGICIEL: APPLICATION AUX ESSAIS DE VALIDATION D'UN SYSTEME INFORMATIQUE CRITIQUE]
Edmond Felix Kouka 1985 262 p In FRENCH
(ESA-86-97283) Avail: NTIS HC A12/MF A01

The rules to stop software design tests in a very high reliability context are investigated. The reference is taken from a railroad microcomputer control system where the reliability requirement is 1 fault for 10 billion hr. Models of computer software reliability are examined including those of Iclinsky and Moranda, Littlewood, and Littlewood and Verral. No sure way is found to make a favorable decision in a time shorter than the reliability requirement. A rule to reject a very high reliability system program is deduced demonstrating the advantage of redesigning rather than continue testing. ESA

N86-32145# Institut National Polytechnique, Grenoble (France). Lab. de Genie Informatique.
MODEL AND FUNCTIONAL DESIGN OF A DATA BASE FOR COMPUTER AIDED DESIGN APPLICATIONS Ph.D. Thesis [MODELE ET FONCTIONNALITES D'UN SGBD POUR LES APPLICATIONS CAO]
Dominique Rieu 1985 246 p In FRENCH
(Contracts AI-84061; CNET-843B061)
(ESA-86-97288) Avail: NTIS HC A11/MF A01

The system described is implemented by modules which are specialized data bases. The data flow is managed by semantic and logical criteria which characterize each of the data bases. The model allows the description of the structures and their

relationship. It also includes the management of the coherence of those relations with the design specifications. A prototype is being made in order to validate the model and to study a cooperative approach between a data base management system and a logic programming system. ESA

N86-32146# Institut National Polytechnique, Grenoble (France).
A RELATIONAL APPROACH TO COMPUTER PROGRAMMING Ph.D. Thesis [UNE PERSPECTIVE RELATIONNELLE DE LA PROGRAMMATION]
Ali Mili 1985 147 p In FRENCH
(ESA-86-97290) Avail: NTIS HC A07/MF A01

Tarski's relational algebra is used to analyze and resolve programming problems such as program specifications, functional analysis of computer programs, program verification and validation, program design and program error treatment. The approach is justified by the fact that the programs are specified with the help of relations, that functional analysis is made by function composition and that program design is made by decomposition of relations. Programming mechanisms are shown by this method that are not easily described otherwise. ESA

N86-32147# Institut National Polytechnique, Grenoble (France).
INTELLIGENT DATA ANALYSIS (INDA) SOFTWARE FOR DATA ANALYSIS Ph.D. Thesis [PROGICIEL INDA POUR L'ANALYSE DES DONNEES: INTELLIGENT DATA ANALYSIS]
Djamel Belaid 1985 88 p In FRENCH Sponsored by Numerical Algorithms Ltd.
(ESA-86-97291) Avail: NTIS HC A05/MF A01

A microcomputer program for the analysis of data by factorial methods is presented. The program is highly interactive and is implemented by separate modules including the assistance to the user to choose one of the proposed methods, the data acquisition module, the execution of the method, results visualization and the overall management. The program is designed for the IBM-PC microcomputer and is written in Pascal language. Up to 100 variables can be processed. The matrix computation uses a Jacobi method. Other algorithms are discussed. A comparison with another program shows an important reduction of the execution time. ESA

N86-32148# Institut National Polytechnique, Grenoble (France).
PAOLA: TOPOLOGICAL OPTIMIZATION SYSTEM FOR PROGRAMMABLE LOGICAL ARRAYS (PLA) Ph.D. Thesis [PAOLA: UN SYSTEME D'OPTIMISATION TOPOLOGIQUE DE PLA]
Tomas PerezSegovia 1985 108 p In FRENCH
(ESA-86-97294) Avail: NTIS HC A06/MF A01

Programmable logic arrays (PLA) are investigated in order to optimize the automatic design of masks for VLSI integrated circuit manufacturing made from the logic description of the circuit. The possible representations of PLA are examined and the methods for topological optimization are presented. The broken lines method is described. The choice of heuristics is discussed as well as the interactions between the optimization stage and the design of the internal connexions. An overall description of the topological optimization PAOLA system is given. It was tested in industrial processes, is written in Pascal language, and is presented in versions adapted to many computers. ESA

N86-32149# Institut National Polytechnique, Grenoble (France).
PROGRAMMING ALGEBRA IN A DATA TYPE VARIANCE Ph.D. Thesis [ALGEBRE DE PROGRAMMES DANS UN UNIVERS TYPE]
Saddek Bensalem 1985 124 p In FRENCH
(ESA-86-97300) Avail: NTIS HC A06/MF A01

A programming algebra based on an abstract data type language is developed. The method features generic operators that can be defined by the user. The result is a large expression power for equivalence rules. The structure of abstract types is contained in generic operators such as homomorphism and inverse homomorphism. The applications of the programming algebra include the test of program without explicit induction, and program transformation methods such as folding-unfolding. ESA

N86-32150# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
RATE DISTORTION CHARACTERISTICS OF TWO ADAPTIVE DATA COMPRESSION ALGORITHMS
W. C. Huisman 15 Mar. 1985 14 p Presented at 4th Symposium on Information Theory in the Benelux, Aalten, Netherlands, 24-25 May 1984
(Contract ESTEC-5047/82-NL-HP)
(NLR-MP-85024-U; B8664740; ESA-86-97671) Avail: NTIS HC A02/MF A01

Two adaptive data compression algorithms easily implemented in a spaceborne micro programmable processor are applied to the compression of simulated image data with Markov properties. The rate distortion characteristics obtained are compared with theoretically attainable bounds. For compression on a block by block basis, the maximum deviation from these bounds is 0.55 to 0.70 bits per pixel respectively. ESA

N86-32151# Nijmegen Univ. (Netherlands). Dept. of Computer Science.
THE COOPERATION TEST: A SYNTAX-DIRECTED VERIFICATION METHOD
Willem P. deRoever, Jr. Feb. 1985 47 p
(Rept-62; ESA-86-97714) Avail: NTIS HC A03/MF A01

The cooperation test, conceived to capture the proof theoretical analog of a distributed message passing between disjoint processes, as opposed to the interference test, the proof theoretical analog of concurrency based on interference by jointly shared variables, is reviewed. The cooperation test was applied to characterize concurrent communication in Hoare's communicating sequential processes, Ichbiah's ADA, and Brinch Hansen's distributed processes, supported by soundness and completeness proofs. The rationale underlying this characterization, culminating in the development of proof systems for monitor based programming languages for concurrency which combine distributed message passing between processes with interference through local variables of a process which are shared between its subprocesses, is given. ESA

N86-32152# Nijmegen Univ. (Netherlands). Dept. of Informatics.
AVOIDING REDEX COPYING IN LAMBDA REDUCTION
M. C. J. D. vanEekelen and M. J. Plasmeijer Mar. 1985 16 p
(Rept-63; ESA-86-97715) Avail: NTIS HC A02/MF A01

A graph reduction strategy for lambda calculus which avoids copying of redexes and hence reduces the number of reduction steps is given. This strategy appears to be optimal. An algorithm for this strategy is outlined. ESA

N86-32153# Nijmegen Univ. (Netherlands), Dept. of Informatics.
INTERACTIVE PROGRAMS IN A FUNCTIONAL LANGUAGE. A FUNCTIONAL IMPLEMENTATION OF AN EDITOR
Pieter Koopmann 1985 12 p
(Rept-65; ESA-86-97716) Avail: NTIS HC A02/MF A01

Ease of programming in a functional language was assessed by writing a UNIX-like text editor in SASL. The result is very satisfactory. Once used to the functional style, programming is quite easy. The program itself is significantly more elegant than a program written in an imperative style, while being 10 times as compact. ESA

N86-32154# Nijmegen Univ. (Netherlands). Dept. of Informatics.
TRACING AND DEBUGGING IN SASL
Th. G. A. vanderLee and H. Oolman Apr. 1985 11 p
(Rept-66; ESA-86-97717) Avail: NTIS HC A02/MF A01

A tracer and a debugger for the SASL programming language are presented. The tracing of the functions makes it possible to check the progress of an evaluation. The evaluation order requires adaptation on the part of the programmer. Programmers are so used to applicative order evaluation that the trace of lazy evaluation in normal order combined with call by need appears unexpected

at first. However this adaptation requires little time. The breakpoint mechanism allows inspection of arguments of a function or, if the result is a list, the elements of that list. ESA

N86-32155# Nijmegen Univ. (Netherlands). Dept. of Informatics.
PRODUCTION OF CODICOLOGICAL CATALOGS USING COMPUTERS (PCC PROJECT) [PRODUCTIE VAN CODICOLOGISCHE CATALOGI MET BEHULP VAN COMPUTERS (PPC-PROJECT)]
P. F. Beinema, A. J. Geurts, A. Gruijs, C. H. A. Koster, and J. vanKrieken Apr. 1985 76 p In DUTCH
(Rept-67; ESA-86-97718) Avail: NTIS HC A05/MF A01

The possibilities of fast and efficient production of handwriting catalogs using computers were investigated. The description scheme for codices and the description activities are presented. The programming package developed for codicological application is described. An evaluation of the project shows negative results: the programming interface technique, the poor flexibility of PCC-scheme and programming, the required time, the printing facilities, and the poor after-care. Positive results are: codicological innovation, interface diagrams, portability of the programming language to other machines, and two flexible programs. ESA

N86-32156# Nijmegen Univ. (Netherlands). Dept. of Informatics.
SYSTEM SEMANTICS AND FORMAL CIRCUIT DESCRIPTION
Raymond T. Boute Aug. 1985 39 p Supersedes Rept-56
(Rept-69; ESA-86-97719) Avail: NTIS HC A03/MF A01

The concept of system semantics, an extension of the denotational theory of programming languages to the description of arbitrary systems is introduced. Application to analog circuits is described. Instead of reasoning on the basis of schematic diagrams, one directly manipulates the circuit descriptions themselves as formulas for various purposes such as correctness proving and the derivation of properties. Properties may range from general theorems of circuit theory, expressed as conversion rules in the language, to special conditions for particular circuits, expressed as equations in the metalanguage. The fact that a single functional language can be used as the metalanguage and at the same time provide the syntax for system description indicates a coherent way for practical implementation. ESA

N86-32157# Groningen Rijksuniversiteit (Netherlands). Computing Science Section.
ALGORITHMS FOR ON-THE-FLY GARBAGE COLLECTION REVISTED
Jan L. A. vandeSnepscheut 1985 11 p
(CS-8507; ESA-86-97741) Avail: NTIS HC A02/MF A01

A proof of Dijkstra et al's (1978) on-the-fly garbage collection algorithm is presented. It is argued that the reasoning about invariants, especially the distinction between P0 and P1, more clearly captures the quintessence, and more clearly exposes the beauty of the algorithm, than the original presentation. ESA

N86-32158# Amsterdam Univ. (Netherlands). Dept. of Computer Science.
THE ALGEBRA OF COMMUNICATING PROCESSES WITH EMPTY PROCESS
J. L. M. Vrancken Jan. 1986 60 p Submitted for publication Sponsored by European Economic Commission
(FVI-86-01; B8664355; ESA-86-97745) Avail: NTIS HC A04/MF A01

Axiom systems which are the systems BPA, PA, and ACP extended with the empty process are presented. For the system ACP extension, which contains the other three systems, the most basic supplementary axioms are given, and adapted such that they can deal with the empty process, and a graph model is constructed. The validity of the supplementary axioms is proved in the closed term model and the graph model. ESA

N86-32159# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
TRANSITION SYSTEMS, METRIC SPACES AND READY SETS IN THE SEMANTICS OF UNIFORM CONCURRENCY
J. W. deBakker, J.-J. Ch. Meyer (Vrije Universiteit, Amsterdam (Netherlands).), E.-R. Olderog (Kiel Univ. (West Germany).), and J. I. Zucker (State Univ. of New York, Buffalo.) Jan. 1986 109 p Submitted for publication Sponsored in part by European Economic Commission
(Grant NSF MCS-80-10728)
(CWI-CS-R8601; B8664600; ESA-86-97751) Avail: NTIS HC A06/MF A01

Transition systems as proposed by Hennessy and Plotkin (1979) are defined for three languages featuring concurrency. The first has shuffle and local nondeterminacy, the second synchronization merge and local nondeterminacy, and the third synchronization merge and global nondeterminacy. The languages are all uniform in the sense that the elementary actions are uninterpreted. Infinte behavior is taken into account and modeled with infinitary languages in the sense of Nivat. A comparison with denotational semantics is provided. For the first two languages, a linear time model suffices; for the third language a branching time model with processes in the sense of De Bakker and Zucker is described. In the comparison an important role is played by an intermediate semantics in the style of Hoare and Olderog's specification oriented semantics. A variant on the notion of ready set is employed here. Precise statements relating the various semantics in terms of abstraction operators are given. ESA

N86-32160# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
PATTERN REPRESENTATION
P. J. W. tenHagen and C. G. Trienekens Jan. 1986 28 p Sponsored by Netherlands Technology Foundation
(CWI-CS-R8602; B8664601; ESA-86-97752) Avail: NTIS HC A03/MF A01

A method of representing area oriented picture primitives is introduced. The representation aims at efficient conversion of these primitives to frame buffers for raster displays. The representation and the conversion to raster can be the basis for area generators comparable in speed to vector generators used in conventional vector displays. The representation is independent of the type and resolution of raster hardware. As a result interactive graphics on raster display can be of higher quality because of fast responses involving picture change without compromising picture quality. ESA

N86-32161# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
CONTRASTING THEMES IN THE SEMANTICS OF IMPERATIVE CONCURRENCY
J. W. deBakker, J. N. Kok, J.-J. Ch Meyer, E.-R. Olderog, and J. I. Zucker Jan. 1986 61 p Submitted for publication Sponsored in part by European Economic Commission
(Grants ZWO-125-20-04; NSF MCS-80-10728)
(CWI-CS-R8603; B8664602; ESA-86-97753) Avail: NTIS HC A04/MF A01

Four sample languages for which operational and denotational semantic models are developed are presented. All languages have parallel execution through interleaving, and three have a form of synchronization. Three languages are uniform, i.e., they have uninterpreted elementary actions; the fourth is nonuniform and has assignment, tests and value-passing communication. The operational models build on Hennessy-Plotkin transition systems; as denotational structures both metric spaces and cpo domains are employed. Two forms of nondeterminacy are distinguished, the local and global variety. Linear time versus branching time is investigated. In the former, streams, i.e., finite or infinite sequences of actions; in the latter the (metrically based) notion of process is introduced. Ready sets are used to compare semantics. ESA

N86-32162# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
EXTENDED GENERAL DESIGN THEORY
Tetsuo Tomiyama and Hiroyuki Yoshikawa (Tokyo Univ. (Japan).) Jan. 1986 32 p Presented at IFIP Working Group 5.2 Working

Conference on Design Theory for CAD, Tokyo, Japan, 1-3 Oct. 1985 Revised Submitted for publication
(CWI-CS-R8604; B8664603; ESA-86-97754) Avail: NTIS HC A03/MF A01

A hypothesis concerning the physical aspects of designing is introduced to general design theory, and from it theorems useful for computer aided design (CAD) are deduced. In the real knowledge, the design solution is obtained as a cluster point. In the real knowledge, the concept of metamodel which is defined by a set of a finite number of attributes is useful, and it leads to a design process model called evolution model. This design process model can give a reasonable explanation on real design processes. It is possible to give metric to the attribute space in the real knowledge. From general design theory, it is deduced that an extensional description method is more suitable for CAD systems than an intensional one, theoretically, but practically both of them should be combined. ESA

N86-32163# Centre National d'Etudes Spatiales, Toulouse (France).
QUALITY CONTROL OF FILED SUBROUTINES. LEAST SQUARES METHOD. DEVELOPMENT AND VALIDATION OF SOME ALGORITHMS
J. C. Berges, C. Philips, and B. Henninger 6 Jun. 1984 110 p In FRENCH; ENGLISH summary
(CNES-CT/DTI/MS/MN/132; ESA-86-97645) Avail: NTIS HC A06/MF A01

The parameter estimation of nonlinear functions is studied to optimize a differential correction procedure based on maximum likelihood estimates. The work is a contribution to improve the quality of a mathematical software library for satellite programs and Solar computers. The Bulirsch and Stoer method and the Levenberg-Marquardt steepest descent algorithm were adapted to Solar computers. The theoretical analysis shows that the residual sum function must be convex in relation to the investigated parameter. ESA

N86-32164# Centre National d'Etudes Spatiales, Toulouse (France).
LANCELOT: LONG TERM DISTANCE COMPUTATION AND ANALYSIS SOFTWARE
SaintPe Jun. 1984 113 p In FRENCH; ENGLISH summary
(CNES-CT/DI/MS/MS/080; ESA-86-97647) Avail: NTIS HC A06/MF A01

A computer program to compute the distances of different payloads in Ariane multiple launch during the first orbits is presented. The program input is given by mission data and user instructions. The results, available in file or in listings, can be used for supplementary data processing. The memory employed is 120,000 bytes. The simulations give computation times varying from 28 to 44 sec. ESA

N86-32165# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
REDUCE: A COMPUTER ALGEBRA SYSTEM
J. C. Agnese 24 Sep. 1984 37 p In FRENCH; ENGLISH summary Presented at a Colloquium on Applied Algebra, Algorithmic, Error Correcting Codes
(CNES-CT/DTI/MS/MN/201; ESA-86-97653) Avail: NTIS HC A03/MF A01

The REDUCE algebra is reviewed. The system may be implemented with many computers such as PDP 10 (60,000 bytes) or IBM 360/370 (30,000 bytes memory utilization). The language is based on Lisp. ESA

N86-32166# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
MUMATH COMPUTER ALGEBRA SYSTEM FOR MICROCOMPUTERS
J. C. Agnese 14 Oct. 1985 58 p Partly in ENGLISH and FRENCH
(CNES-CT/DTI/MS/MN/311; ESA-86-97655) Avail: NTIS HC A04/MF A01

The characteristics of the MUMATH-83 program are reviewed. It is designed for IBM/PC compatible microcomputers. Examples of applications are given. The details of the utilization are explained. ESA

N86-32167# Centre National d'Etudes Spatiales, Toulouse (France). Dept. Mathematiques Spatiales.
THE MSTN SOFTWARE. TRIGONOMETRIC SERIES MANIPULATOR
J.-C. Agnese 13 Nov. 1984 60 p In FRENCH; ENGLISH summary
(CNES-CT/DTI/MS/MN/262; ESA-86-97656) Avail: NTIS HC A04/MF A01

A computer program for symbolic manipulation of trigonometric series, often used in space mechanics, is presented. A thematic classification of 14 modules is given. A user's manual and a theoretical description are included for each module. ESA

N86-32168# Kernforschungszentrum, Karlsruhe (West Germany).
ESPRIT PROJECT 322: COMPUTER AIDED DESIGN (CAD) DESIGN INTERFACES Status Report
I. Bey, ed. and J. Leuridan, ed. Mar. 1986 183 p
(KfK-PFT-121; ESA-86-98741; SR-2) Avail: NTIS HC A09/MF A01

The most important interfaces in CAD/CAM systems for data exchange, data base, finite element analysis, experimental analysis, and advanced modeling were defined. The definitions of these interfaces are being elaborated in harmony with international standardization efforts. Wire frames, solids, free form surfaces, and geometric aspects were examined. ESA

N86-32169# Fondazione Ugo Bordoni, Rome (Italy).
A QUANTITATIVE APPROACH TO COMPUTER SYSTEMS ENGINEERING [UN APPROCCIO QUANTITATIVO ALL'INGEGNERIA DEI SISTEMI INFORMATICI]
Giuseppe Iazeolla Jan. 1985 29 p In ITALIAN
(FUB-5-1985; ESA-86-97883) Avail: NTIS HC A03/MF A01

The importance of quantification to derive clear computer specifications and design parameters is emphasized. The need to proceed by developing and solving mathematical models is asserted, showing the limitations of an artificial intelligence approach. The goals are discussed in terms of performance, reliability and availability. Data transmission networks are taken as examples of the design development progress. It is concluded that simulation and mathematical techniques are the best way to develop quantitative methods for the analysis and synthesis of computer systems. ESA

N86-31959# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
A SOFTWARE CONCEPT FOR INTERACTIVE LETTER LOCATION THROUGH DIGITAL IMAGE PROCESSING [EIN SOFTWAREKONZEPT ZUR INTERAKTIVEN SCHRIFTPLAZIERUNG MITTELS DIGITALER BILDVERARBEITUNG]
Ulrich Theissing *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 155-162 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

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Includes computer networks.

N86-32170# Lawrence Livermore National Lab., Calif.
PHYSICS CODES ON PARALLEL COMPUTERS
P. G. Eltgroth Dec. 1985 10 p Presented at the Parallel Computing Conference, West Berlin, West Germany, 23 Sep. 1985
(Contract W-7405-eng-48)
(DE86-006712; UCRL-93712; CONF-8509200-3) Avail: NTIS HC A02/MF A01

An effort is under way to develop physics codes which realize the potential of parallel machines. A new explicit algorithm for the

computation of hydrodynamics has been developed which avoids global synchronization entirely. The approach, called the Independent Time Step Method (ITSM), allows each zone to advance at its own pace, determined by local information. The method, coded in FORTRAN, has demonstrated parallelism of greater than 20 on the Denelcor HEP machine. ITSM can also be used to replace current implicit treatments of problems involving diffusion and heat conduction. Four different approaches toward work distribution have been investigated and implemented for the one-dimensional code on the Denelcor HEP. They are self-scheduled, an ASKFOR monitor, a queue of queues monitor, and a distributed ASKFOR monitor. The self-scheduled approach shows the lowest overhead but the poorest speedup. The distributed ASKFOR monitor shows the best speedup and the lowest execution times on the tested problems. DOE

N86-32171# Argonne National Lab., Ill.
PERFORMANCE MODELLING OF LARGE-GRAINED PARALLELISM
R. L. Crane, M. Minkoff, K. E. Hillstrom, and S. D. King Mar. 1986 32 p
(Contract W-31-109-eng-38)
(DE86-009664; ANL/MCS-TM-63) Avail: NTIS HC A03/MF A01

Mathematical modelling, computer simulation, and graphical methods are used to analyze the performance of parallel computers. Speedup is used as a performance measure. Large-grained parallel computation is considered, i.e., the case in which multiple tasks each involving substantial computation are executed concurrently. A variable-length task involving the solution of a set of ordinary differential equations is defined and used to validate the performance models that are developed. Experimental results are shown for two machines, a Denelcor HEP with a single process execution module, and an Alliant FX/8. DOE

N86-32172# Sandia National Labs., Albuquerque, N. Mex.
PRACTICAL PARADIGM FOR PARALLEL PROCESSING PROBLEMS
G. S. Davidson Mar. 1986 16 p
(Contract DE-AC04-76DP-00789)
(DE86-009274; SAND-85-2389) Avail: NTIS HC A02/MF A01

Data flow computers achieve high performance by keeping as many processing elements busy as possible for a given algorithm. However, without specialized architectures, the synchronization overhead of data-driven computations can prevent significant speedup. To address this problem, the concept of task flow is developed for more general purpose multiprocessors. Task flow differs from data flow in the amount of computation between synchronizations (at the expense of some parallelism). A software technique is described that implements task flow for general purpose multiprocessors with local and shared memories. A SANDAC-IV multiprocessor example of this technique is given, together with timing results. DOE

N86-32173# Oak Ridge National Lab., Tenn.
SPARSE CHOLESKY FACTORIZATION ON A LOCAL-MEMORY MULTIPROCESSOR
A. George, M. T. Heath, J. Liu, and E. Ng Apr. 1986 22 p
(Contract DE-AC05-84OR-21400)
(DE86-010082; ORNL/TM-9962) Avail: NTIS HC A02/MF A01

The problem of factoring a large sparse positive definite matrix is implemented on a multiprocessor system. The processors are assumed to have substantial local memory but no globally shared memory. They communicate among themselves and with a host processor through message passing. The primary interest is in designing an algorithm which exploits parallelism, rather than in exploiting features of the underlying topology of the hardware. However, part of the study is aimed at determining, for certain sparse matrix problems, whether hardware based on the binary hypercube topology adequately supports the communication requirements for such problems. Numerical results from experiments running on a multiprocessor simulator are included. DOE

N86-32174# Los Alamos National Lab., N. Mex.
HYPERCUBE PROJECT AND A SIMULATOR FOR A HYPERCUBE OF COMPUTERS
J. P. Hong, R. D. Tomlinson, N. Patel, and L. H. Pollard 1985 9 p Presented at the Conference on Hypercube Microprocessors, Knoxville, Tenn., 1 Aug. 1985
(Contract W-7405-eng-36)
(DE86-010164; LA-UR-86-1151; CONF-8508173-1) Avail: NTIS HC A02/MF A01

The Los Alamos National Laboratory and the University of New Mexico are working on HC, a hypercube project for large problems. A hypercube of 1024 nodes is being designed; implementation of a machine of at least 16 nodes is underway. The nodes of the machine are complete computer systems, including mass storage and a large main memory. The computational abilities of each node are enhanced by using a detached instruction fetch-execute-store organization. This allows the execution rate to achieve a consistently high level, approaching 90% of optimum. Trade-offs in the implementation methods indicate the speeds available with acceptable hardware investments. A simulator has been written which allows execution of high level programs on a hypercube organization. The simulator has shown that programs prepared for execution on a single stream machine can be easily modified to use the resources of a parallel machine, and that the results are identical to previous executions. DOE

N86-32175# Technische Hogeschool Twente, Enschede (Netherlands). Interface, Protocol en Service Systemen Vakgroep.
DESIGN AND IMPLEMENTATION OF A DRIVER AND INITIALIZATION PROGRAM FOR THE LOCAL AREA NETWORK (LAN) TWENTENET Ph.D. Thesis [ONTWERP EN IMPLEMENTATIE VAN EEN DRIVER EN EEN INITIALISATIE PROGRAMMA VOOR HET TWENTENET]
A. vanLeussen Mar. 1984 156 p In DUTCH; ENGLISH summary
(INF83/IPS/044; ESA-86-97370) Avail: NTIS HC A08/MF A01

A driver and initialization program for the Channel, the second layer of TWENTENET, were designed, constituting the data-link layer of the OSI-ISO reference model. Bus and ring topologies, as well as different access mechanisms were provided. The initialization consists of a self-test and the loading of system relevant parameters like the own address. By transmitting messages to itself the Channel is tested for a number of errors. In principle it is possible to obtain the system parameters from another (supervisor) station. A provisional implementation of the Channel driver and initialization program was realized in language C for UNIX V7 running on a PDP 11/45 machine. ESA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-32176# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
DISCOVERY SYSTEMS
Kenneth W. Haase, Jr. Apr. 1986 20 p
(Contracts N00014-80 C 0505; N00014-79-C-0260)
(AD-A167852; AI-M-898) Avail: NTIS HC A02/MF A01 CSCL 09/2

Cyrano is a thoughtful reimplementation of Lenat's controversial Eurisko computer program, designed to perform automated discovery and concept formation in a variety of technical fields. The thought in the reimplementation has come from several directions: and appeal to basic principles, which led to identifying constraints of modularity and consistency on the design of discovery systems; an appeal to transparency, which led to collapsing more and more of the control structure into the representation; and an appeal to accountability, which led to the explicit specification of dependencies in the concept formation

process. The process of reimplementing Lenat's work has already revealed several insights in the nature of Eurisko-like systems in general these insights are incorporated into the design of Cyrano. Foremost among these new insights is the characterization of Eurisko-like systems (which I call inquisitive systems) as search processes which dynamically reconfigure their search space by the formation of new concepts and representations. This insight reveals requirements for modularity and consistency in the definition of new concepts and representations. Author (GRA)

N86-32177# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
PERFORMANCE ANALYSIS OF A MICROCOMPUTER-BASED SINGLE-LOOP DIGITAL CONTROL SYSTEM Final Technical Report, Aug. 1982 - Aug. 1984
Michael J. Gauder Apr. 1986 81 p
(AD-A167914; AFWAL-TR-85-2074) Avail: NTIS HC A05/MF A01 CSCL 09/5

Digital control system design has been popular in the aerospace and process control industries. Advances in microprocessor technologies have added new growth to this popularity. The use of microprocessor-based systems for control purpose places demands on digital control theory. Since microprocessors are relatively slow digital machines and usually have small work lengthe, it is necessary to place importance on the effects of time delays and amplitude quantization with respect to the control system. The wind length and speed of the signal processing components; Analog-to-Digital (A/D) and Digital-to-Analog (D/A) converters placed additional constraints on the digital control system performance. In order to be able to analyze the effects of constraints that are involved in microprocessor-based control system design, it will be necessary to develop a basic system and a set of procedures that are modifiable to a variety of control configurations. The subject of this thesis is the design, development, and analysis of a 16-bit microprocessor based digital control system. The purpose of the study is threefold: (1) To show that a hybrid computer system, consisting of 16-bit single board microcomputer and an analog computer, can be used effectively for digital control studies; (2) To evaluate the frequency response of the hybrid system; and (3) To identify and evaluate the error contributors which can effect the performance of digital control systems. GRA

N86-32178# Sandia National Labs., Albuquerque, N. Mex.
REMOTE MAINTENANCE ROBOT SYSTEM FOR A PULSED NUCLEAR REACTOR
S. Thunborg Sep. 1985 23 p Presented at the IEEE International Conference on Robotics and Automation, San Francisco, Calif., 14 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-000206; SAND-85-2103C; CONF-860434-4) Avail: NTIS HC A02/MF A01

This paper presents a remote maintenance robot system for use in a hazardous environment. The system consists of turntable, robot and hoist subsystems which operate under the control of a supervisory computer to perform coordinated programmed maintenance operations on a pulsed nuclear reactor. The system is operational and the oral presentation will include a videotape of the system in operation. DOE

N86-32179# Oak Ridge National Lab., Tenn.
STATE AND DATA TECHNIQUES FOR CONTROL OF DISCONTINUOUS SYSTEMS
R. A. Kisner 1986 21 p Presented at the 6th Power Plant Dynamics, Control and Testing Symposium, Knoxville, Tenn., 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-007240; CONF-860414-2) Avail: NTIS HC A02/MF A01

This paper describes a technique for structured analysis and design of automated control systems. The technique integrates control of continuous and discontinuous nuclear power plant subsystems and components. A hierarchical control system with distributed intelligence follows from applying the technique. Further, it can be applied to all phases of control system design. For simplicity, the example used in the paper is limited to phase 1 design (basic automatic control action), in which no maintenance, testing, or contingency capability is attempted. DOE

N86-32180# Brookhaven National Lab., Upton, N. Y.
COMPARISON OF THE DOMAIN AND FREQUENCY DOMAIN STATE FEEDBACKS
S. Y. Zhang 1986 3 p Presented at the American Control Conference, Seattle, Wash., 18 Jun. 1986
(Contract DE-AC02-76CH-00016)
(DE86-009429; BNL-37844; CONF-860638-2) Avail: NTIS HC A02/MF A01

In this paper, we present explicitly the equivalence of the time domain and frequency domain state feedbacks, as well as the dynamic state feedback and a modified frequency domain state feedback, from the closed-loop transfer function point of view. The difference of the two approaches is also shown. DOE

N86-32181# Brookhaven National Lab., Upton, N. Y.
ZERO MODELS AND POLE MODELS FOR MULTIVARIABLE SYSTEMS
S. Y. Zhang 1986 5 p Presented at the American Control Conference, Seattle, Wash., 18 Jun. 1986
(Contract DE-AC02-76CH-00016)
(DE86-009442; BNL-37846; CONF-860638-3) Avail: NTIS HC A02/MF A01

In this paper, the concepts of zero models and pole models are introduced for the multivariable systems. The definitions are different from the existing definitions of poles and zeros for multivariable systems they reflect more structural informations for the systems, and can be used to study the external properties of the systems. The pole models and zero models in the closed-loops are also discussed. It will be shown that the zero models of the closed loop systems play a key role in the tracking and rejection problem. DOE

N86-32182# International Centre for Theoretical Physics, Trieste (Italy).
OPTIMAL CONTROL FOR PARABOLIC-HYPERBOLIC SYSTEM WITH TIME DELAY
A. Kowalewski Jul. 1985 16 p
(DE86-701709; IC-85/70) Avail: NTIS (US Sales Only) HC A02/MF A01

In this paper we consider an optimal control problem for a system described by a linear partial differential equation of the parabolic-hyperbolic type with time delay in the state. The right-hand side of this equation and the initial conditions are not continuous functions usually, but they are measurable functions belonging to L(2) or Lsup(infinity) spaces. Therefore, the solution of this equation is given by a certain Sobolev space. The time delay in the state is constant, but it can also be a function of time. The control time T is fixed in our problem. Making use of the Milutin-Dubovicki theorem, necessary and sufficient conditions of optimality with the quadratic performance functional and constrained control are derived for the Dirichlet problem. The flow chart of the algorithm which can be used in the numerical solving of certain optimization problems for distributed systems is also presented. DOE

N86-32183# Lanchester Polytechnic, Coventry (England). Dept. of Systems and Control.
SELF-TUNING CONTROL PRINCIPLES APPLIED TO BILINEAR SYSTEMS
K. J. Burnham, D. J. G. James, and D. N. Shields 1985 15 p
(IR-SC-85-2; ESA-86-97261) Avail: NTIS HC A02/MF A01

A quasi-linear self-tuning control algorithm for a class of single input single output bilinear systems is derived. It involves an extended statespace pole-assignment approach which is applied to a linearized model of the bilinear system, updated at each sample point. The extended approach uses an adaptive steady state Kalman filter for state estimation, and an adaptive least squares scheme, employing a variable forgetting factor, for parameter estimation. ESA

N86-32184# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
THE SIMPLE PLANT LOCATION PROBLEM. A PLEA FOR BALINSKI'S CONJECTURE M.S. Thesis
C. A. J. Hurkens Apr. 1984 34 p
(ESA-86-97304) Avail: NTIS HC A03/MF A01

The simple plant location (SPL) problem (uncapacitated facility location problem) is studied. The fact that SPL can be considered as a special case of the set partitioning problem is presented. The fact that the linear programming solutions of SPL can be integer solutions (Balinski's conjecture) is discussed. Experiment results are given. ESA

N86-32185# Amsterdam Univ. (Netherlands). Dept. of Computer Science.
MULTISENSOR SYSTEMS SEEN FROM DIFFERENT POINTS OF VIEW
Ed Kuijpers Jan. 1986 21 p
(FVI-86-02; B8664356; ESA-86-97746) Avail: NTIS HC A02/MF A01

Examples of problems and solutions for multisensor systems are given to show different aspects of these systems which need further theoretical and experimental research. The examples are grouped in modeling for sensors, reasoning with sensors, classification and sensors, interaction between sensors, learning and testing for sensors, and architectures for sensors. ESA

N86-32125# Technische Univ., Berlin (West Germany).
THE SIMULATION OF NATURAL KNOWLEDGE SYSTEMS [ZUR SIMULATION NATUERLICHER WISSENSSYSTEME]
Claus-Rainer Rollinger *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 13-21 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

N86-32126# Technische Univ., Berlin (West Germany).
TEXT UNDERSTANDING: INTERESTINGNESS AS A BASIS FOR THE VARIATION OF THE ANALYSIS DEPTH [TEXTVERSTEHEN: INTERESSENSGESTEUERTE VARIATION DER ANALYSETIEFE]
Claus-Rainer Rollinger and Hans-Jochen Schneider *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 23-30 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

N86-32128# Technische Univ., Berlin (West Germany).
THE REPRESENTATION OF KNOWLEDGE FOR SITUATIONS AND EVENTS IN A DYNAMIC WORLD [WISSENSREPRAESENTATION FUER ZUSTAENDE UND EREIGNISSE IN EINER DYNAMISCHEN WELT]
Albrecht Schmiedel and Kai vonLuck *In its* Text Understanding: Interestingness as a Basis for the Variation of the Analysis Depth Dec. 1985 p 53-65 In GERMAN (For primary document see N86-32124 23-61)
Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-32186 Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
TWO ALGORITHMS FOR THE CONSTRUCTION OF GREATEST RIGHT DIVISORS OF A POLYNOMIAL MATRIX M.S. Thesis
G. Zwaan May 1984 97 p
(ESA-86-97302) Avail: Issuing Activity

A linear system of ordinary differential equations over a frequency domain is considered. Two algorithms (Silverman-Van Dooren algorithm and Emre algorithm) for the construction of greatest right divisor (GRD) of polynomial matrix to the system taking the Laplace transformation are studied. Numerical results for the construction of right matrix-fraction description (MFD) and left MFD for the transfer function matrix (rational matrix), are given. ESA

N86-32187 Gesellschaft fuer Mathematik und Datenverarbeitung, Bonn (West Germany). Inst. fuer Methodische Grundlagen.
EFFICIENT HIGH ORDER ALGORITHMS FOR ELLIPTIC BOUNDARY VALUE PROBLEMS USING FULL MULTIGRID TECHNIQUES TOGETHER WITH EXTRAPOLATION METHODS
Anton Schueller and Qun Lin Dec. 1985 17 p
(GMD-192; ISSN-0723-0508; ESA-86-97475) Copyright. Avail: Issuing Activity

Three efficient algorithms for accelerating the convergence of linear elliptic second order differential operator in boundary value problems using multigrid techniques (nested iteration), are presented. The extrapolation techniques are applied to finite difference methods. The Ricard extrapolation, splitting extrapolation and local discretization error extrapolation are compared. Numerical tests for two examples are given. ESA

N86-32188*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LEAST SQUARES FINITE ELEMENT SIMULATION OF TRANSONIC FLOWS Final Report
T. F. Chen and G. J. Fix May 1986 29 p Submitted for publication
(Contract NAS1-17070)
(NASA-CR-178121; NAS 1.26:178121; ICASE-86-27) Avail: NTIS HC A03/MF A01 CSCL 12A

Finite difference approximation of transonic flow problems is a well-developed and largely successful approach. Nevertheless, there is still a real need to develop finite element methods for applications arising from fluid-structure interactions and problems with complicated boundaries. In this paper a least squares based finite element scheme is introduced. It is shown that, if suitably formulated, such an approach can lead to physically meaningful results. Bottlenecks that arise from such schemes are also discussed. Author

N86-32189*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STABILITY ANALYSIS OF INTERMEDIATE BOUNDARY CONDITIONS IN APPROXIMATE FACTORIZATION SCHEMES Final Report
Jerry C. South, Jr., Mohammed M. Hafez (California Univ., Davis.), and David Gottlieb (Brown Univ., Providence, R. I.) May 1986 28 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107; Grant AF-AFOSR-0303-85)
(NASA-CR-178126; ICASE-86-36; NAS 1.26:178126) Avail: NTIS HC A03/MF A01 CSCL 12A

The paper discusses the role of the intermediate boundary condition in the AF2 scheme used by Holst for simulation of the transonic full potential equation. It is shown that the treatment suggested by Holst led to a restriction on the time step and ways to overcome this restriction are suggested. The discussion is based on the theory developed by Gustafsson, Kreiss, and Sundstrom and also on the von Neumann method. Author

N86-32190# Wisconsin Univ., Madison.
THE EVALUATION OF INNER PRODUCTS OF MULTIVARIATE SIMPLEX SPLINES Technical Summary Report
Thomas A. Grandine Feb. 1986 14 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A167485; MRC-TSR-2909) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper gives a general method for the stable evaluation of inner products of multivariate simplex splines. The method is based on a recurrence relation for these inner products. The

base cases for this recurrence relation are handled by triangulating certain simploids into simplices. Author (GRA)

N86-32191# Wisconsin Univ., Madison.
ORBITAL COMPACTNESS AND ASYMPTOTIC BEHAVIOR OF NON-LINEAR PARABOLIC SYSTEMS WITH FUNCTIONALS Technical Summary Report
Reinhard Redlinger Jan. 1986 29 p
(Contract DAAG29-80-C-0041)
(AD-A167486; MRC-TSR-2897) Avail: NTIS HC A03/MF A01 CSCL 12/1

In recent years, reaction-diffusion systems have become widely used as models in biology, chemistry and population dynamics. A major point of interest is the long-time behavior of the solutions. For systems governed by ordinary differential equations the asymptotic behavior is usually investigated using Liapunov functionals in conjunction with an invariance principle. The purpose of this paper is to extend these methods to a general class of distributed systems that admit possible hysteresis effects in the reaction mechanism. GRA

N86-32192# Wisconsin Univ., Madison. Mathematics Research Center.
ON THE THEOREM OF WEINSTEIN Summary Report
Paul H. Rabinowitz Feb. 1986 18 p
(Contract DAAG29-80-C-0041; Grant NSF MCS81-10556)
(AD-A167492; MRC-TSR-2912) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper contains an existence theorem for a special class of periodic solutions of Hamiltonian systems and generalizes an earlier result of the same nature due to Weinstein. He studied a general class of mechanical systems and established the existence of special kinds of periodic solutions which he called brake orbits. Roughly speaking these solutions start at the boundary of a potential well with 0 velocity and return to the edge of the well, again with 0 velocity, a half period later. This paper contains a generalization of his results using minimax methods form the calculus of variations as the existence tool. GRA

N86-32193# Wisconsin Univ., Madison.
OPTIMAL IMPLEMENTATION OF DIFFERENTIATION ARITHMETIC Summary Report
L. B. Rall Mar. 1986 18 p
(Contract DAAG29-80-C-0041)
(AD-A167494; MRC-TSR-2920) Avail: NTIS HC A02/MF A01 CSCL 12/1

Differentiation arithmetic is an ordered-pair arithmetic which evaluates both the value and derivative of functions defined by formulas or subroutines, without symbolics or approximations. As in the case of complex arithmetic, multiplication and division are defined in terms of several real operations. Algorithms are given for evaluation of these operations with the same accuracy as real multiplication and division, that is, to the closest floating-point number. The same kind of optimal implementation is described for Taylor arithmetic, which permits calculation of Taylor coefficients of arbitrary order for functions defined by formulas or subroutines. Author (GRA)

N86-32194# Wisconsin Univ., Madison.
FINITE DIFFERENCE METHODS FOR POLAR COORDINATE SYSTEMS Technical Summary Report
John C. Strikwerda and Yvonne Nagel Apr. 1986 21 p
(Contracts DAAG29-80-C-0041; N00014-84-K-0454)
(AD-A167512; MRC-TSR-2934) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document discusses finite difference methods for partial differential equations on polar and spherical coordinate systems. The distinctive feature of these coordinate systems is the coordinate system singularity at the origin. The authors show how to accurately and conveniently determine the solution at the origin for both scalar and vector fields. They also discuss the Fourier method to approximate derivatives with respect to the angular variable in polar coordinates. Computational examples are presented illustrating the accuracy and efficiency of the method for hyperbolic and elliptic equations, and also for the computation of vector fields at the origin. GRA

N86-32195# Wisconsin Univ., Madison.
THE COMPUTATIONAL COST OF SIMPLEX SPLINE FUNCTIONS Technical Summary Report
Thomas A. Grandine Mar. 1986 12 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-82-10950)
(AD-A167513; MRC-TSR-2926) Avail: NTIS HC A02/MF A01 CSCL 12/1

All computational schemes for simplex spline functions to date rely both on the recurrence relation for these functions and the standard construction of the simplex spline basis. Under these conditions, for numerical methods for computing simplex spline functions to be a useful as possible, it is necessary to find ways of implementing the recurrence relation as efficiently as possible. This paper shows that as efficiently as possible is still not very efficient. This implies that truly fast algorithms (which have not yet been developed) will have to either abandon the recurrence relation or the standard construction of the simplex spline basis. GRA

N86-32196# Wisconsin Univ., Madison. Mathematics Research Center.
MINIMAL SUPPORT FOR BIVARIATE SPLINES Technical Summary Report
Carl DeBoor and Klaus Hollig Feb. 1986 21 p
(Contract DAAG29-80-C-0041; Grant NSF DMS-83-51187)
(AD-A167519; MRC-TSR-2918) Avail: NTIS HC A02/MF A01 CSCL 12/1

In earlier works the authors applied their results on box-splines to analyze the approximation properties of bivariate smooth piecewise polynomials on the three direction mesh. In this report they obtain similar results for the other natural triangulation of R sub 2 which is generated by four directions. In particular they extend their results of minimality of support which are useful for constructing bases with good computational properties. GRA

N86-32197# Wisconsin Univ., Madison. Mathematics Research Center.
ITERATIVE REFINEMENT OF THE METHOD OF MOMENTS Summary Report
George Miel Mar. 1986 7 p
(Contract DAAG29-80-C-0041)
(AD-A167537; MRC-TSR-2923) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is observed that Vorobyev's method of moments, because it is a specialized form of Galerkin's method, is easily accelerated by the use of Sloan's trick of taking first iterates. The improvement, which is nearly costless since it requires no new quantities, is illustrated in a numerical example. GRA

N86-32198# Wisconsin Univ., Madison. Mathematics Research Center.
POINTWISE A-PRIORI BOUNDS FOR STRONGLY COUPLED SEMILINEAR PARABOLIC SYSTEMS Summary Report
Reinhard Redlinger Mar. 1986 13 p
(Contract DAAG29-80-C-0041)
(AD-A167539; MRC-TSR-2925) Avail: NTIS HC A02/MF A01 CSCL 20/13

The prototype parabolic partial differential equation is the heat conduction equation. This paper deals with systems of parabolic equations. Such systems occur in many contexts in addition to heat conduction, e.g., biology, in nuclear reactor techniques, in economics, etc. Let the n-vector u denote the (unknown) solution of a system of n parabolic partial differential equations. An important question in the study of these systems is the boundedness of u. Many techniques and criteria have been developed to solve this problem if the system is weakly coupled, i.e., if the k sub th equation contains second order space derivatives of only u sub k, the k sub th component of u. If this is not the case, the system is said to be strongly coupled. This paper for a broad class of strongly

coupled parabolic systems pointwise boundedness of the solution u is established. GRA

N86-32199# International Centre for Theoretical Physics, Trieste (Italy).
PAINLEVE TEST FOR THE COMPLETE INTEGRABILITY OF BOGOMOLNY'S MONOPOLE EQUATION
A. RoyChowdhury and P. K. Chanda Sep. 1984 7 p
(DE85-703173; IC-84/176) Avail: NTIS (US Sales Only) HC A02/MF A01

We have made an analysis of the monopole equation of Bogomolny from the standpoint of Painleve test. The idea that any nonlinear partial differential equation admitting a Lax representation should conform to the criterion of the Painleve analysis seems to hold well in case of the Bogomolny equation. We have determined the position for resonances and have proved that at each of these the coefficients in the Forbenius type expansion of the gauge potentials do become arbitrary signalling the complete integrability of the system. DOE

N86-32200# Colorado Univ., Colorado Springs. Dept. of Computer Science.
INVESTIGATION OF THE MOVING FINITE ELEMENT METHOD AS PROPOSED BY A.J. WATHEN
R. F. Sincovec and S. Aslam 26 Feb. 1986 69 p Prepared for Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-009685; UCRL-15793) Avail: NTIS HC A04/MF A01

The Moving Finite Element (MFE) method is investigated for solving non-linear Partial Differential Equations (PDE's) in one dimension with particular emphasis on equations that develop steep fronts and shocks. The MFE method allows the computational finite element mesh to continuously move and adjust with time in order to be able to resolve such sharp features. Degeneracies arising from lack of curvature and element folding can lead to an indeterminate system of MFE equations. Two methods for handling these degeneracies are explored. One requires the use of penalty functions while the other provides a simple scheme for treating such degeneracies. Implicit and explicit time stepping procedures for solving the MFE equations are investigated. For systems of equations, use of one moving mesh for all components and separate moving mesh for each component is explored. DOE

N86-32201# Sandia National Labs., Albuquerque, N. Mex.
SOME EXPERIMENTS WITH NUMERICAL PIVOTING IN A CODE FOR SOLVING LARGE SPARSE STIFF SYSTEMS OF ODES
D. E. Salane Apr. 1986 17 p
(Contract DE-AC04-76DP-00789)
(DE86-010305; SAND-86-0716) Avail: NTIS HC A02/MF A01

The effect of pivoting in a code is examined for the solution of large sparse stiff systems of odes. Experiments with a recent code (DEBDFS) are presented. These experiments indicate that some pivoting for numerical stability is essential in these codes. DOE

N86-32202# Paraiba Univ., Joao Pessoa (Brazil). Dept. de Fisica.
EQUIVALENCE BETWEEN THE METHODS INVOLVING FOURIER SERIES AND THE POISSON'S SUMMATION FORMULA AND EVALUATION OF A CLASS OF LATTICE SUMS IN ARBITRARY DIMENSIONS
M. Dias and A. N. Chaba 1985 9 p
(DE86-701919; UFPB-DF-10/85) Avail: NTIS (US Sales Only) HC A02/MF A01

The similarities between the Fourier series method and the Poisson's summation formula method are brought out by evaluating the lattice sum g(vector r) is the definitonal identity of the summation of vector tau exp(-lambda times the absolute value of vector r - vector tau)/the absolute value of vector r - vector tau over a Bravois lattice /vector tau/ in three dimensions, lambda and vector r being independent of vector tau. It is shown that the two approaches are actually equivalent by proving that the Poisson's summation formula (in any dimensionality) can, itself, be derived from the Fourier series method. An expression is also presented, ready for quick use, for a class of lattice sums, the summation of vector tau F(the absolute value of vector r - vector tau) over a Bravois lattice /vector tau/ in arbitrary dimensions. DOE

N86-32203# Paraiba Univ., Joao Pessoa (Brazil). Dept. de Fisica.
ON THE GENERATION OF EQUIVALENT HAMILTONIANS
O. Espindola, N. L. Teixeira, and M. L. Espindola 1985 4 p
(DE86-701920; UFPB-DF-12/85) Avail: NTIS (US Sales Only) HC A02/MF A01

A new approach to the equivalence problem (in phase space) is presented. Given a Hamiltonian describing a system of particles with two degrees of freedom (and the corresponding Hamilton-Jacobi equation), it is shown how to find the most general new Hamilton-Jacobi equation with the following (and essential) characteristic, here defined as equivalence: every new solution is also a solution of the original Hamilton-Jacobi equations and vice-versa. DOE

N86-32204# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
ONE-PARAMETER FAMILIES OF OPTIMIZATION PROBLEMS: EQUALITY CONSTRAINTS, 2
H. Th. Jongen, P. Jonker, and F. Twilt 1984 25 p Extended version
(Memo-420; ESA-86-97359) Avail: NTIS HC A02/MF A01

A differentiable optimization problem under generic regularity conditions is studied. The critical points in parametric optimization are generalized. This method can be extended to problems with inequality constraints. ESA

N86-32205# Grenoble-1 Univ. (France).
TRUNCATED CARDINAL SPLINE FUNCTIONS Ph.D. Thesis [FONCTIONS SPLINE CARDINALES TRONQUEES]
Rekha Panditrao Kulkarni 1985 162 p In FRENCH
(ESA-86-97284) Avail: NTIS HC A08/MF A01

The development of an optimal algorithm, in the sense of minimal cost and memory occupation, which has at the same time a high order of convergence, is investigated. It is shown that boundary conditions can be chosen to obtain such an algorithm. The boundary conditions proposed by Laurent are discussed. By choice of parameters the inverse of the Toplitz three diagonal matrix is reduced to a simple form. The truncation of the infinite sums leaves a truncated cardinal spline function, and the way to compensate for the truncation error is described. The technique used is applicable to polynomial spline functions of any degree. ESA

N86-32206# Grenoble-1 Univ. (France).
FLOW AND CYCLE COVERING IN GRAPHS AND MATROIDS Ph.D. Thesis [FLOTS ET COUVERTURES PAR DES CYCLES DANS LES GRAPHES ET LES MATROIDES]
Andre Raspaud 1985 120 p In FRENCH
(ESA-86-97285) Avail: NTIS HC A06/MF A01

Given a graph without isthmuses, the problem of finding the shortest length of cycle covering is studied. The Tarsi generalization of cycle covering to regular matroids is reviewed. The existence of non zero flows in a graph allows the improvement of the computation of a minimum length of cycle covering. Non zero flows are defined in binary spaces, for which the improvement is computed without reference to the orientation concept. The general problem of the existance of non zero flows is approached without using the maximum tree concept. The existence for the case of a four edges connected graph is proved. ESA

N86-32207# Grenoble-1 Univ. (France).
SPLINE FUNCTIONS WITH FORM CONDITIONS Ph.D. Thesis [FONCTIONS SPLINES AVEC CONDITIONS DE FORME]
Julio Medina 1985 277 p In FRENCH
(ESA-86-97286) Avail: NTIS HC A13/MF A01

The data interpolation and data smoothing problems are studied

for the case where form conditions are imposed, including positivity, monotony and convexity. The investigated methods include polynomial splines, rational splines, splines under tension, mathematical programming and splines with a rejection device. The smoothing problem is treated using a variational approach. The advantages offered by selected spline functions are shown. ESA

N86-32208# Institut National Polytechnique, Grenoble (France).
NETWORK IMPROVING BY SUBGRADIENT METHODS Ph.D. Thesis [AMELIORATION DE MAILLAGES PAR DES METHODES DE SOUS-GRADIENT]
Charles Cua 1985 143 p In FRENCH
(ESA-86-97293) Avail: NTIS HC A07/MF A01

Finite element network definition is studied to improve an existing network without changing the actual tetrahedron topology. The classical operations research optimization approach is proposed, using a set of general and algorithmic methods known as subgradient method. The resulting algorithm is tested on real cases from the aerospace industry. It is shown that the method has advantages over other algorithms for convex programming. ESA

N86-32209# Institut National Polytechnique, Grenoble (France). Lab. TIM 3.
ELEMENTARY FUNCTIONS COMPUTING METHODOLOGY Ph.D. Thesis [METHODOLOGIES DE CALCUL DES FONCTIONS ELEMENTAIRES]
Jean-Michel Muller 1985 171 p In FRENCH
(ESA-86-97298) Avail: NTIS HC A08/MF A01

A general computing theory valid for any number base is presented. The discrete base theory allows the construction of algorithms using addition, subtraction, and number shifts only, in any number base, to compute any elementary function such as log exp or cos. The Volder and Walther algorithms are reduced to a particular case of this generalization. Argument reduction techniques are also discussed. The method is used in the implementation of the FELIN (Integrated Elementary Functions) coprocessor being developed to work with the Motorola 68000 microprocessor. ESA

N86-32210# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
NOTE ON THE FACTORIZATION OF A SQUARE MATRIX INTO TWO HERMITIAN OR SYMMETRIC MATRICES
A. J. Bosch Apr. 1984 7 p
(ESA-86-97306) Avail: NTIS HC A02/MF A01

Seven properties of the factorization of a square matrix into two (Hermitian or symmetric) matrices are presented. An example in differential equations is given. ESA

N86-32211# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
POLYNOMIAL MATRICES AND FEEDBACK
Rikus Eising Mar. 1984 21 p
(Memo-COSOR-84-01; ESA-86-97308) Avail: NTIS HC A02/MF A01

A numerically reliable method for the construction of a feedback matrix solving the generalized deadbeat control problem is presented. The method of total unimodularity of the corresponding technology matrix, which implies integer solution, is used. The use of feedback with respect to polynomial matrix constructions is described. Good and bad solutions with respect to singular values are discussed. ESA

N86-32212# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computer Science.
AN ALGORITHM FOR THE EVALUATION OF PERFORMANCE MEASURES IN A CP-TERMINAL SYSTEM
J. B. M. vanDoremalen Nov. 1984 20 p
(Memo-COSOR-84-07; ESA-86-97310) Avail: NTIS HC A02/MF A01

The measures in a CP-terminal with stochastically independent thinktimes which are negative exponentially distributed, and the service times for jobs stochastically independent are considered. An algorithm for evaluation of performance measures in a CP-terminal system with preemptive resume priorities is discussed. The recursive scheme is used. ESA

N86-32213# Technische Hogeschool Twente, Enschede (Netherlands). Center for Theoretical Physics.
BREAK-UP OF INVARIANT CIRCLES FOR A MAPPING WITH A CUBIC NONLINEARITY
Cornelis Huiszoon Jul. 1984 21 p Sponsored by Stichting Hogeschoolfonds Twente, The Netherlands, K.I.V.I., and Physical Dynamics Inc., San Diego, Calif.
(Contract DE-AC03-77ER0153S)
(ESA-86-97378) Avail: NTIS HC A02/MF A01

The Poincare surface of section map (PSSM) for an energy conserving system with two degrees of freedom is considered. A constant value C, which a particular invariant circle of PSSM breaks, is determined. The symmetry properties of PSSM are given. A FORTRAN-77 code for estimating C values is listed. ESA

N86-32214# Fraunhofer-Inst. fuer Betriebsfestigkeit, Darmstadt (West Germany).
SEPARATION OF SUPPOSED STRESS-TIME FUNCTIONS BY FILTERING WITH VARIABLE CRITICAL FREQUENCY [TRENNUNG UEBERLAGERTER BEANSPRUCHUNGS-ZEIT-FUNKTIONEN DURCH FILTERUNG MIT VARIABLE GRENZ-FREQUENZ]
H. Klaetschke and H. Steinhilber 10 May 1985 34 p In GERMAN
(LBF-TB-174; ISSN-0721-5320; ESA-86-97414) Avail: NTIS HC A03/MF A01

A digital filter whose critical frequency can be controlled by the evolution of the stress within limits given by the user was developed and tested to separate the parts of stress-time functions according to their origin. The development of methods for the systematic generation of control signals for strength tests with servohydraulic machines using frequency filtering is discussed. The realization of variable critical frequencies is presented. Signal separation is explained by low and high pass filtering. Tests show that good results can be obtained with this method, even in difficult cases such as stepwise stress changes. ESA

N86-32215# Technische Hochschule, Darmstadt (West Germany). Fachbereich Mathematik.
ON ASYMPTOTIC ERROR ESTIMATES FOR THE COMBINED BOUNDARY AND FINITE ELEMENT METHOD
Wolfgang L. Wendland Sep. 1985 16 p Submitted for publication
(Preprint-929; ESA-86-97427) Avail: NTIS HC A02/MF A01

The asymptotic error estimates for combined finite element method (FEM) and boundary element method (BEM) are considered. This approach is applied to general equations and other problems when the coupling operator between FEM and BEM is the identity modulo of compact perturbations. ESA

N86-32216# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
WHY THE STRAIGHTFORWARD METHOD OF ANTITHETIC VARIATES IS SO DISAPPOINTING IN PRACTICE
Johannes H. J. Geurts Mar. 1985 18 p
(ESA-86-97694) Avail: NTIS HC A02/MF A01

The effect of stochastic variables on systems simulation models (e.g., time between failures of a machine in a job shop) is discussed. Examples where the response consists of a number that is the direct result of passing a single random number through a sequence of monotonic transformations (the simulation model) are analyzed. Results show that the success of the straightforward application of the antithetic method depends on how well the initial pairwise symmetry of antithetic uniform random variables survives the concatenation of transformations that constitute a simulation model. Even in simple examples results are less than hoped for. In realistic simulation models straightforward application of the antithetic method cannot guarantee an appreciable reduction of the variance

of the estimate of the mean response. Whether a reduction can be achieved at all has to be determined experimentally in each individual case. ESA

N86-32217# Nijmegen Univ. (Netherlands). Dept. of Informatics.
FUNCTIONAL TEMPORAL CALCULUS VERSUS TEMPORAL LOGIC: AN ENGINEERING APPROACH
Raymond T. Boute Mar. 1985 29 p
(Rept-59; ESA-86-97713) Avail: NTIS HC A03/MF A01

It is demonstrated that functional temporal calculus directly merges with the formalisms used in system theory, communication theory, stochastic processes, and concurrent programming. Functions, predicates, and logical operators are defined by natural extension from mappings between value domains to mappings between so-called temporal domains. The modal operators of temporal logic are replaced by temporal combinators (second-order functions) defined directly as mappings between temporal domains. With this semantic formulation, the usual model-theoretic arguments and the distinction between validity and provability are replaced by arguments in standard (nonmodal) logic, while retaining all advantages of temporal logic, particularly the possibility of dealing with time implicity. The demonstration of this correspondence leads to redefinitions of concepts from temporal logic, constituting a nontrivial generalization of their syntactic counterparts. The flexibility of the semantic formulation leads to extensions such as continuous-time temporal calculus. ESA

N86-32218# Amsterdam Univ. (Netherlands). Faculteit Vakgroep Informatica.
READY TRACE SEMANTICS FOR PROCESS ALGEBRA WITH PRIORITY OPERATOR [READY TRACE SEMANTIEK VOOR PROCESALGEBRA MET PRIORITEITSOPERATOR]
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop Dec. 1985 12 p In DUTCH Submitted for publication Sponsored by European Economics Commission ESPRIT Project 432
(FVI-85-15; B8660719; ESA-86-97744) Avail: NTIS HC A02/MF A01

A semantics for processes between bisimulation semantics and ready semantics is presented. The advantage of this semantics, while still being as simple as ready semantics, is that it allows the user to define the mechanism in which atomic actions have priority. It is shown that in ready semantics (and a fortiori in failure semantics) such an extension is not possible. Only ready trace semantics in concrete process algebra are considered, and thus not abstractness and quiet step. Only finite processes are considered. A complete axiomatization of ready trace semantics is given. ESA

N86-32219# Fondazione Ugo Bordoni, Rome (Italy).
EVALUATION OF SOME FIBONACCI AND LUCAS SERIES VIA CERTAIN FUNCTIONS OF THE Q MATRIX
Piero Filipponi Oct. 1985 12 p
(FUB-23-1985; ESA-86-97886) Avail: NTIS HC A02/MF A01

The analysis supposes a two by two matrix X, the entries of the successive powers of which are related to certain Fibonnaci or Lucas numbers. The X matrix is strictly related to the well known Q matrix. The functions exp X, sin X, cos X, sinh X, cosh X, inverse X and ln X are considered. The polynomial representation of function of two by two matrices with distinct eigenvalues is examined. The results obtained for each case are presented. ESA

N86-32220# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
ELEMENTARY SYMMETRIC POLYNOMIALS OF INCREASING ORDER
A. J. vanEs and R. Helmers Jan. 1986 13 p
(CWI-MS-R8601; B8664687; ESA-86-98053) Avail: NTIS HC A02/MF A01

The asymptotic behavior of elementary symmetric polynomials Sn of order k, based on n independent and identically distributed random variables X1, ..., Xn, is investigated for the case that both k and n get large. If k = Omicron (sq root n) the distribution function of a suitably normalized Sn of order k is shown to converge to a standard normal limit. The speed of this convergence to normality is of order 0 (k sq root n) if k = O (log (-1) n log2 (-1) n sq root n) and natural moment assumptions are imposed. This order bound is sharp, and cannot be inferred from one of the existing Berry-Esseen bounds for U-statistics. If k tends to infinity at the rate sq root n, then a non-normal weak limit appears, if the Xj's are positive and Sn(k) is standardized appropriately. If k tends to infinity at a rate faster than sq root n, it is shown that for positive Xj's there exists no linear norming which causes Sn(k) to converge weakly to a nondegenerate weak limit. ESA

N86-32008*# Little (Arthur D.), Inc., Cambridge, Mass.
MEASURES OF MEASUREMENT ADEQUACY
In its System Study of the Utilization of Space for Carbon Dioxide Research Oct. 1985 14 p (For primary document see N86-32005 23-46)
Avail: NTIS HC A23/MF A01 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-32221# Grenoble-1 Univ. (France).
STATISTICAL ANALYSIS OF NONHOMOGENEOUS POISSON PROCESSES. STATISTICAL TREATMENT OF A PARTICLE MULTIDETECTOR Ph.D. Thesis [ANALYSE STATISTIQUE DE PROCESSUS DE POISSON SPATIAUX ET NON HOMOGENE. TRAITEMENT STATISTIQUE D'UN MULTIDETECTEUR DE PARTICULES]
Jean-Pierre Lacombe 1985 143 p In FRENCH
(ESA-86-97281) Avail: NTIS HC A07/MF A01

A procedure to test the intensity of nonhomogeneous Poisson processes is presented. The diffracted neutron intensities obtained in monocrystal diffraction using a two dimensional neutron multidetector are estimated using the mentioned statistical tools. For individual titles, see N86-32222 through N86-32223.

N86-32222# Grenoble-1 Univ. (France).
STATISTICAL ANALYSIS OF NONHOMOGENEOUS POISSON PROCESSES Ph.D. Thesis [ANALYSE STATISTIQUE DE PROCESSUS DE POISSON SPATIAUX ET NON HOMOGENE]
In its Statistical Analysis of Nonhomogeneous Poisson Processes. Statistical Treatment of a Particle Multidetector 1985 p 1-47 In FRENCH (For primary document see N86-32221 23-65)
Avail: NTIS HC A07/MF A01

A procedure to test the intensity of nonhomogeneous Poisson processes is presented. The test defined by Mark Brown is generalized to the set of Radon measures. The necessary and sufficient conditions for the existence of the Radon-Nikodym derivative of one or another Poisson law are investigated. The Neyman-Pearson theorem provides a solution to the hypothses test problem. It is proved that a multiple hypothesis test can be defined, and the conditions for which the test statistics are normal asymptotic are established. ESA

N86-32223# Grenoble-1 Univ. (France).
STATISTICAL TREATMENT OF A PARTICLE MULTIDETECTOR Ph.D. Thesis [TRAITEMENT STATISTIQUE D'UN MULTIDETECTEUR DE PARTICULES]
In its Statistical Analysis of Nonhomogeneous Poisson Processes. Statistical Treatment of a Particle Multidetector 1985 p 48-135 In FRENCH (For primary document see N86-32221 23-65)
Avail: NTIS HC A07/MF A01

The estimation of diffracted intensities from the diagrams obtained using a neutron diffractometer for monocrystals is studied. The instrument is gas filled, multifilament, with 64 anodes and 16 cathodes. The diffraction diagram is two dimensional over 1024 measuring points. The procedures to test the homogeneity and stability of the counting process are developed using a homogeneous flow of particles. The computation of the diffracted intensities

is done using two different methods depending on the background noise level. A nonhomogeneous Poisson process model is adopted. The computer program and the numerical results are included.
ESA

N86-32224# Wisconsin Univ., Madison. Mathematics Research Center.
UPPER BOUNDS ON POISSON TAIL PROBABILITIES Summary Report
Peter W. Glynn Apr. 1986 13 p
(Contract DAAG29-80-C-0041; Grants NSF ECS-84-04809; NSF DMS-82-10950)
(AD-A167531; MRC-TSR-2931) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let p(k) = exp(-lambda) lamda sub k/k (k= 0,1,...) be the Poisson mass function. In a variety of application contexts, it is necessary to computer infinite sums involving these probabilities. For example, such sums occur naturally in numerical algorithms developed for Poisson variate generation purposes and for computing terminal rewards of uniformizable continuous-time Markov chains. From a practical standpoint, it is necessary to truncate these infinite sums after a finite number of terms. Development of a priori error bounds on the error incurred by this kind of truncation requires bounds on the left and right tails of the Poisson distribution; such bounds are given here. These bounds are easily computable in a numerically stable way, even when the Poisson parameter lambda is large.
GRA

N86-32225# Wisconsin Univ., Madison. Mathematics Research Center.
THE CENTRAL LIMIT THEOREM AND POINCARE-TYPE INEQUALITIES Summary Report
Louis H. Y. Chen Apr. 1986 13 p
(Contract DAAG29-80-C-0041)
(AD-A167534; MRC-TSR-2929) Avail: NTIS HC A02/MF A01 CSCL 12/1

We use Poincare type inequalities to prove the sufficiency and necessity of the Lindeberg condition in the central limit theorem. The central limit theorem is a fundamental theorem in probability and statistics. It states that the probability distribution of the sum of a large number of small and mutually independent random numerical observations approaches a normal distribution as the number of observations increases. The Lindeberg condition is a condition for which the central limit theorem holds. It has been proved to be both necessary and sufficient. A Poincare type inequality is an inequality which relates the integral of the square of a function to the integral of the square of its derivative. In this report we give a new proof of the central limit theorem by using Poincare type inequalities to prove both the necessity and sufficiency of the Lindeberg condition.
GRA

N86-32226# Oak Ridge National Lab., Tenn.
FOUNDATIONS OF O-THEORY 1: THE INTERSECTION RULE
E. M. Oblow Mar. 1986 32 p
(Contract DE-AC05-84OR-21400)
(DE86-008565; ORNL/TM-9983) Avail: NTIS HC A03/MF A01

O-theory (OT) is a hybrid uncertainty theory which has been proposed for dealing with problems of uncertainty in logical inference. The foundations of one of the concepts of OT, the OT intersection operator, are explored in this paper. It is shown that a more fundamental basis for the OT rule is classical probability theory. Mass assignments in the Dempster-Shafer theory (DST) formalism are first reevaluated yielding a more basic relationship between masses and probabilities. These results are then used to show that the OT intersection rule can be derived from first principles in probability theory. A simpler axiomatic basis can then be used to establish this rule. It can, therefore, be used as alternative to Bayes' theorem for combining probabilistic belief consistently. Dempsters' rule will be shown to be a special case of the OT result. It too will be derived from probability theory axioms.
DOE

N86-32227# Grenoble-1 Univ. (France).
METHODS FOR THE DETECTION AND ESTIMATION OF MULTIPHASE REGRESSION MODELS Ph.D. Thesis [METHODES APPLIQUEES DE DETECTION ET D'ESTIMATION DE RUPTURE DANS DES MODELES DE REGRESSION]
Yacine Saidi 1986 108 p In FRENCH
(ESA-86-97282) Avail: NTIS HC A06/MF A01

The detection of the existance of change points and parameter identification in multiphase regressions are studied. With the help of simulations the boundary function is determined to define the sum test critical region. The empirical study of the test power is done by varying the two parameters which characterize the phase change: the location of the change point and the amplitude of the change. The test of the maximum likehood rate is then studied. It is shown by means of a simple regression model how to compute the law of the test statistics. The Hinkley estimation techniques are discussed and developed. A case study is presented to show the application of both methods. The example analyzes the multiphase correlation between depth and flow of a river. ESA

N86-32228# Grenoble-1 Univ. (France).
ESTIMATING PROBLEMS IN STATIONARY TIME SERIES WITH MISSING DATA Ph.D. Thesis [PROBLEMES D'ESTIMATION DANS LES SERIES TEMPORELLES STATIONNAIRES AVEC DONNEES MANQUANTES]
Salim Ladjouze 1986 131 p In FRENCH
(ESA-86-97287) Avail: NTIS HC A07/MF A01

The problem is approached introducing amplitude modulated processes. The ergodic properties are studied in the frame of stationary asymptotic processes. The consistance of two estimators of the covariance function and the asymptotic variance are studied in the nonparametric domain. A general estimation method of the spectral density function is presented. The bias and the maximum likelihood of the estimating procedure are discussed. Parametric estimation methods based on spectra and maximum likelihood are also presented.
ESA

N86-32229# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
A COMPARISON OF PLOTTING POSITIONS ON WEIBULL PROBABILITY PAPER FOR SMALL RANDOMLY CENSORED SAMPLES
Johannes H. J. Geurts Jan. 1985 38 p
(ESA-86-97695) Avail: NTIS HC A03/MF A01

Methods to calculate probability plotting positions from randomly censored samples are compared: Herd's (1960) expected rank method, Nelson's (1969) hazard method and a method described by Chambers et al (1983). Though the average differences between the methods appear to be small compared to the sampling fluctuations, they are persistent enough to recommend Herd's or Nelson's method for use with Weibull probability paper.
ESA

N86-32230# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
CHAINS WITH INFINITE CONNECTIONS: UNIQUENESS AND MARKOV REPRESENTATION
H. C. P. Berbee Nov. 1985 12 p Submitted for publication
(CWI-MS-R8509; B8664688; ESA-86-98052) Avail: NTIS HC A02/MF A01

Under a well-known continuity condition on the conditional distribution, the chain with infinite connections is shown to be distributed as an instantaneous function of a countable state Markov chain. Under a certain weaker continuity condition, uniqueness of the distributions of the stationarry chains is obtained.
ESA

N86-32231# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
ON DELTA BETA AND THE SEARCH FOR ASYMPTOTIC SCALING IN LATTICE GAUGE THEORY
D. Petcher Jan. 1986 25 p
(NIKHEF-H/86-6; B8665342; ESA-86-98057) Avail: NTIS

HC A02/MF A01

An ansatz for the Beta function of SU(3) lattice gauge theory in 4 dimensions whose parameters are determined by Monte Carlo data is used to compare different sets of data for Delta Beta and to study systematic errors. The data for Delta Beta obtained from different values of the block spin renormalization group scaling factor are shown to be compatible within statistical errors. However the data is easily consistent with sizeable deviations (30% or more) from the two loop approximation to the renormalization group scaling formula for physical quantities in the region of coupling for which Delta Beta essentially takes on its asymptotic value. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N86-32232*# Mississippi State Univ., Mississippi State.
SYSTEM ANALYSIS FOR THE HUNTSVILLE OPERATION SUPPORT CENTER DISTRIBUTED COMPUTER SYSTEM Final Report
F. M. Ingels Jun. 1986 115 p
(Contract NAS8-34906)
(NASA-CR-178890; NAS 1.26:178890) Avail: NTIS HC A06/MF A01 CSCL 12B

A simulation model of the NASA Huntsville Operational Support Center (HOSC) was developed. This simulation model emulates the HYPERchannel Local Area Network (LAN) that ties together the various computers of HOSC. The HOSC system is a large installation of mainframe computers such as the Perkin Elmer 3200 series and the Dec VAX series. A series of six simulation exercises of the HOSC model is described using data sets provided by NASA. The analytical analysis of the ETHERNET LAN and the video terminals (VTs) distribution system are presented. An interface analysis of the smart terminal network model which allows the data flow requirements due to VTs on the ETHERNET LAN to be estimated, is presented. B.G.

N86-32233# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
MONOTONICALLY IMPROVING LIMIT-OPTIMAL STRATEGIES IN FINITE STATE DECISION PROCESSES
Theodore P. Hill and Jan vanderWal Dec. 1984 26 p Sponsored in part by NATO
(Grant NSF DMS-84-01604)
(Memo-COSOR-84-15; ESA-86-97312) Avail: NTIS HC A03/MF A01

The Markov strategy associated with the finite-state leavable gambling problem and the finite state Markov decision process with discontinued reward criteria are considered. An example to show that for positive and gambling cases such strategies cannot be constructed by simply switching to a better action or gamble at each successive return to a state is given. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-32234# Wisconsin Univ., Madison. Mathematics Research Center.
A CONVERGENCE THEOREM FOR NEWTON-LIKE METHODS IN BANACH SPACES Technical Summary Report
Tetsuro Yamamoto Jan. 1986 19 p
(Contract DAAG29-80-C-0041)
(AD-A167455; MRC-TSR-2904) Avail: NTIS HC A02/MF A01 CSCL 12/1

A convergence theorem for Newton-like methods in Banach spaces is given, which improves results of Rheinboldt, Dennis, Miel and Moret and includes as a special case an updated version of the Kantorovich theorem for the Newton method given in previous papers. Error bounds obtained previously are also improved. This paper unifies the study of finding sharp error bounds for Newton-like methods under Kantorovich type assumptions. Author (GRA)

N86-32235# Wisconsin Univ., Madison. Mathematics Research Center.
THE NEUMANN PROBLEM FOR NONLINEAR SECOND ORDER SINGULAR PERTURBATION PROBLEMS Technical Summary Report
Benoit Perthame and Richard Sanders Jan. 1986 33 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-82-00676)
(AD-A167456; MRC-TSR-2905) Avail: NTIS HC A03/MF A01 CSCL 20/4

Singularly perturbed second order elliptic partial differential equations with Neumann boundary conditions arise in many areas of application. These problems rarely have smooth limit solutions. In this paper, the author characterize the limit solution for a wide class of such problems. They also give an abstract rate of convergence theorem and apply the abstract theorem to certain finite difference approximations. GRA

N86-32236# Wisconsin Univ., Madison. Mathematics Research center.
HAMILTON-JACOBI EQUATIONS IN INFINITE DIMENSIONS, PART 3 Summary Report
Michael G. Crandall and Pierre-Louis Lions Feb. 1986 47 p
(Contract DAAG29-80-C-0041)
(AD-A167521; MRC-TSR-2907) Avail: NTIS HC A03/MF A01 CSCL 20/4

This paper is concerned with a number of topics in the theory of viscosity solutions of Hamilton Jacobi equations in infinite dimensional spaces. The development of the theory in the generality in which the space or state variable lies in an infinite dimensional space is partly motivated by the hope of eventual applications to the theory of control of partial differential equations or control under partial observation. Among the results presented are: The existence and uniqueness theory previously discussed in spaces with the Radon Nikodym property is extended beyond this class; examples are given which show that Galerkin approximation arguments in their naive forms cannot be made the basis of an existence theory; some equations with unbounded terms of the sort that arise in control of pde's are treated by means of a change of variables reducing the problem to the previously studied cases. GRA

N86-32237# Wisconsin Univ., Madison. Mathematics Research Center.
THE HAMILTON-JACOBI-BELLMAN EQUATION WITH A GRADIENT CONSTRAINT Summary Report
Naoki Yamada Mar. 1986 24 p
(Contract DAAG29-80-C-0041)
(AD-A167532; MRC-TSR-2927) Avail: NTIS HC A02/MF A01 CSCL 12/1

As the first order Hamilton Jacobi equation is related to a control problem associated with ordinary differential equations, the Hamilton Jacobi Bellman (HJB) equation arises from a control problem with random noise. In the stationary problem, the HJB equation has the form sup when alpha is an element of A of (L(sup alpha)u - f(sup alpha)) = 0 where L superscript alpha are second order linear elliptic operators with parameter alpha an element of A. In this paper, we are concerned with the HJB equation of the form max(L(sup 1)u - f(sup 1),...,L(sup m) -f(sup m), the absolute value of Du - g) = 0. We prove the existence of solutions which satisfy the equation almost everywhere. Using the notion of weak solution (so called viscosity solution) we prove the uniqueness of the solution in the class of continuously differentiable functions. The method of the uniqueness proof is also applicable to other obstacle problems. We prove uniqueness results in the class of continuous functions for two model problems. GRA

N86-32238# International Centre for Theoretical Physics, Trieste (Italy).

MAPPINGS WITH CLOSED RANGE AND FINITE DIMENSIONAL LINEAR SPACES
S. O. Iyahen Sep. 1984 17 p
(DE85-703172; IC-84/167) Avail: NTIS (US Sales Only) HC A02/MF A01

This paper looks at two settings, each of continuous linear mappings of linear topological spaces. In one setting, the domain space is fixed while the range space varies over a class of linear topological spaces. In the second setting, the range space is fixed while the domain space similarly varies. The interest is in the requirement that the mappings have a closed range implies that the domain or range space is finite dimensional. Positive results are obtained for metrizable spaces. DOE

N86-32239# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
QUASI-PERIODIC SOLUTIONS OF THE BOOMERON EQUATION
R. Martini and W. Wesselius May 1984 15 p
(Memo-436; ESA-86-97362) Avail: NTIS HC A02/MF A01

The quasi-periodic solution of the Boomeron equation (a nonlinear differential equation) is considered. The representations of Lax of the Boomeron equation are discussed. The theta function over Riemann surfaces is used. ESA

N86-32240# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
QUASI-PERIODIC SOLUTIONS OF THE BOOMERON EQUATION, 2
R. Martini and W. Wesselius May 1984 22 p
(Memo-472; ESA-86-97367) Avail: NTIS HC A02/MF A01

The quasi-periodic solutions of the Boomeron equation (a nonlinear differential equation) are determined by means of function-theoretical methods related to Riemann surfaces and Theta-functions. Also determined are the so-called boomerons as degenerations of the quasi-periodic solutions. Moreover it is indicated that there are no higher order Boomeron equations other than the second order one. M.G.

N86-32241# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
AN INTERATIVE APPROXIMATION METHOD FOR THE CALCULATION OF THE BALANCE DISTRIBUTION FOR A FINITE MARKOV CHAIN Thesis [EEN ITERATIEVE BENADERINGSMETHODE VOOR DE BEREKENING VAN DE EVENWICHTSVERDELING BIJ EEN EINDIGE MARKOV-KETEN]
M. F. L. vanNielen Nov. 1984 82 p In DUTCH
(ESA-86-97303) Avail: NTIS HC A05/MF A01

Two iteration methods to approximate the balance distribution of irreducible aperiodic Markov chains with a successive approximation technique were developed. The balance distribution is important for the solution of problems concerning communication and computer networks. The advantage of the pre-Jacobi and Gauss-Seifdel iteration methods is the possibility to calculate lower and upper limits of the balance distribution. The techniques were numericaly tested with queueing problems. The Gauss-Seidel method is faster for the calculation of converging limits than the pre-Jacobi or vector iteration method. ESA

N86-32242*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHIMERA: A GRID-EMBEDDING TECHNIQUE Final Report, 1 Nov. 1980 - 1 Oct. 1985
J. A. Benek (Calspan Advanced Technology Center, Buffalo, N.Y.), J. L. Steger, F. C. Dougherty, and P. G. Buning Apr. 1986 112 p Prepared in cooperation with AEDC
(NASA-TM-89246; NAS 1.15:89246; AD-A167466; AEDC-TR-85-64) Avail: NTIS HC A06/MF A01 CSCL 09/2

A three-dimensional chimera grid-embedding technique is described. The technique simplifies the construction of computational grids about complex geometries. The method subdivides the physical domain into regions which can accommodate easily generated grids. Communication among the grids is accomplished by interpolation of the dependent variables at grid boundaries. The procedures for constructing the composite mesh and the associated data structures are described. The method is demonstrated by solution of the Euler equations for transonic flow about three ellipsoid bodies in close proximity, a wing/body, and a wing/body/tail. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-32243# Wisconsin Univ., Madison. Mathematics Research Center.
STEADY-STATE PROBLEMS OF NONLINEAR ELECTRO-MAGNETO-THERMO-ELASTICITY Technical Summary Report
Robert C. Rogers and Stuart S. Antman Jan. 1986 70 p
(Contract DAAG29-80-C-0041; Grants NSF DMS-85-03317; NSF dMS-82-10950)
(AD-A167454; MRC-TSR-2903) Avail: NTIS HC A04/MF A01 CSCL 20/11

This paper studies the steady-state behavior of solids that can sustain mechanical, electromagnetic, and thermal effects. The authors examine a class of boundary-value problems for a quasilinear system of functional differential equations that is derived from a very general model for such materials. They propose a physically reasonable constitutive theory which leaves this system amenable to modern methods of partial differential equations. The principal assumption is a modified version of the strong ellipticity condition. Part I proves existence results for the general system under some special physical assumptions (rigidity and hyperelasticity). The formulation admits non-local interactions caused by the magnetic self-field generated by the deformed, conducting body. Part II shows the existence and regularity of solutions of a system of functional ordinary differential equations arising from a semi-inverse problem in a more comprehensive physical situation. Author (GRA)

N86-32244# Wisconsin Univ., Madison.
ON L SUB 1-CONTRACTION FOR SYSTEMS OF CONSERVATION LAWS Technical Summary Report
Jorge G. S. Patino Feb. 1986 11 p
(Contract DAAG29-80-C-0041)
(AD-A167484; MRC-TSR-2917) Avail: NTIS HC A02/MF A01 CSCL 12/1

The Cauchy problem for a 2 x 2 system of conservation laws in one dimension is u sub t + (f(u)) sub x = 0, x epsilon R, t greater than 0 u(x,0) = u sub 0 where u = (u sub 1, u sub 2), f = (f1 (u), f sub (u)). Such systems of equations usually come from the application of the laws of conservation for physical quantities like mass, momentum and energy, and arise in problems of gas dynamics, elasticity, oil reservoir simulation and other areas of engineering. The questions of decay and continuous dependence with respect to the initial data are central issues in the study of the problem above. The result proved here rules out the use of certain functionals to study the decay of solutions and is relevant to the issue of L sub 1 continuity with respect to the data. GRA

N86-32245# International Atomic Energy Agency, Vienna (Austria).
INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS: SCIENTIFIC ACTIVITIES IN 1984
Sep. 1985 93 p
(DE86-701454; IAEA-TECDOC-353) Avail: NTIS (US Sales Only) HC A05/MF A01

A review of the scientific activities of the Centre, including workshops, research, and training-for-research is presented. The scientific program consists of seven main fields, Physics and Energy, Fundamental Physics, Physics and Technology, Physics of the Living State, Physics of the Environment, Physics and Development, and Mathematics. In addition to a brief description

of each workshop, symposium, college, and meeting, tables summarizing the participation at ICTP activities are given. A list of preprints and internal reports issued in 1984 is included. DOE

N86-32246# Stichting voor Fundamenteel Onderzoek der Materie, Utrecht (Netherlands).
[ACTIVITIES REPORT IN FUNDAMENTAL RESEARCH ON MATTER] Annual Report, 1984 [JAARBOEK 84]
1985 155 p In DUTCH; ENGLISH summary
(ESA-86-97778) Avail: NTIS HC A08/MF A01

The activity reports in the fields of nuclear physics, atomic and molecular physics, physical and chemical properties of metals, solid state, thermonuclear fusion and plasmaphysics, theoretical high energy physics and semiconductors are presented. ESA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N86-32247*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF TRIANGULAR ELEMENT ORIENTATION ON FINITE ELEMENT SOLUTIONS OF THE HELMHOLTZ EQUATION
Kenneth J. Baumeister 1986 23 p Proposed for presentation at the 1986 Winter Annual Meeting of the American Society of Mechanical Engineers, Anaheim, Calif., 7-12 Dec. 1986
(NASA-TM-87351; E-2734; NAS 1.15:87351) Avail: NTIS HC A02/MF A01 CSCL 20A

The Galerkin finite element solutions for the scalar homogeneous Helmholtz equation are presented for no reflection, hard wall, and potential relief exit terminations with a variety of triangular element orientations. For this group of problems, the correlation between the accuracy of the solution and the orientation of the linear triangle is examined. Nonsymmetric element patterns are found to give generally poor results in the model problems investigated, particularly for cases where standing waves exist. For a fixed number of vertical elements, the results showed that symmetric element patterns give much better agreement with corresponding exact analytical results. In laminated wave guide application, the symmetric pyramid pattern is convenient to use and is shown to give excellent results. Author

N86-32248*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
SOUND PROPAGATION OVER UNEVEN GROUND AND IRREGULAR TOPOGRAPHY Semiannual Status Report
Allan D. Pierce, Geoffrey L. Main, James A. Kearns, Daniel R. Benator, and James R. Parish, Jr. Feb. 1986 58 p
(Grant NAG1-566)
(NASA-CR-179673; NAS 1.26:179673) Avail: NTIS HC A04/MF A01 CSCL 20A

The development of theoretical, computational, and experimental techniques for predicting the effects of irregular topography on long range sound propagation in the atmosphere is discussed. Irregular topography here is understood to imply a ground surface that (1) is not idealizable as being perfectly flat or (2) that is not idealizable as having a constant specific acoustic impedance. The study focuses on circumstances where the propagation is similar to what might be expected for noise from low-altitude air vehicles flying over suburban or rural terrain, such that rays from the source arrive at angles close to grazing incidence. Author

N86-32249# Naval Underwater Systems Center, New London, Conn.
MEASUREMENT AND EXTRACTION OF RECURRING WAVEFORMS: FOR APPLICATIONS TO ACTIVE TRANSMISSIONS, FLOW-NOISE, AND HELICOPTER-RADIATED NOISE PROBLEMS
Roger F. Dwyer 24 Mar. 1986 39 p
(AD-A167400; NUSC-TM-861043) Avail: NTIS HC A03/MF A01 CSCL 20/1

Physical acoustic sources that radiate transient waveforms represent a large class of noise generators. Active transmissions, flow-noise, and helicopter-radiated noise under certain flight situations depending on the source-observer orientation are members of this class. The objective of this paper is to present a signal processing methodology to extract time domain recurring waveforms from data. The recurring waveforms, on the one hand, may represent a source of interference that is to be eliminated as much as possible. But, on the other hand, these recurring waveforms may represent a desired signal that is to be extracted from a background of undesired noise. Both cases are shown in the paper to be different aspects of the same problem. Initially, the methodology is based on a physical property of equally spaced and identical recurring waveforms. These results are then generalized, because in practice, either by design or by other causes, the recurring waveforms may not be equally spaced and identical. The method is then applied to extract equally spaced and nearly identical waveforms which were produced by an approaching helicopter. Author (GRA)

N86-32250# Scripps Institution of Oceanography, La Jolla, Calif. Marine Physical Lab.
VERTICAL DIRECTIONALITY OF AMBIENT NOISE: 150-300 Hz
W. S. Hodgkiss and F. H. Fisher 7 Feb. 1986 74 p
(Contract N00014-84-K-0097)
(AD-A167421; MPL-TM-381; MPL-U-7/86) Avail: NTIS HC A04/MF A01 CSCL 17/1

Measurements of the vertical directionality of ambient noise in the 150-300 Hz region have been reported. The 48 element NORDA VEKA array cut for 300 Hz and centered on the sound axis (750 m) was used to collect the data. Three features of the data are striking: (1) short term stability and long term fluctuations of the vertical structure, (2) asymmetry in the levels observed by the upward and downward looking beams, and (3) the existence of an underlying boxcar characteristic to the vertical structure on top of which are substantial fluctuations often taking the form of horns at + or - 10-14 degrees with a significant notch in the + or - 9-10 degrees region. GRA

N86-32251# Cambridge Collaborative, Inc., Mass.
COMPENDIUM OF METHODS FOR APPLYING MEASURED DATA TO VIBRATION AND ACOUSTIC PROBLEMS Final Report, Aug. 1980 - Jul. 1985
R. G. DeJong Oct. 1985 564 p
(Contract F33615-80-C-3200)
(AD-A168174; Rept-23016-85-1; AFWL-TR-85-3080) Avail: NTIS HC A24/MF A01 CSCL 01/1

The scope of this report includes the measurement, analysis and use of vibration and acoustic data. The purpose of this report is then two-fold. First, it provides introductory material in an easily understood manner to engineers, technicians, and their managers in areas other than their specialties relating to the measurement, analysis and use of vibration and acoustic data. Second, it provides a quick reference source for engineers, technicians and their managers in the areas of their specialties relating to the measurement, analysis and use of vibration and acoustic data. GRA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-32252# Netherlands Energy Research Foundation, Petten.
ON THE STATISTICAL EVALUATION OF INCONSISTENT MEASUREMENT RESULTS ILLUSTRATED ON THE EXAMPLE OF THE Sr 90 HALF LIFE
Willem L. Zijp Dec. 1985 29 p
(ECN-179; B8660552; ESA-86-97735) Avail: NTIS HC A03/MF A01

Evaluation of inconsistent numerical observations made by different authors or laboratories on the same physical quantity is treated. It is argued that the weighted mean based on conventional

weighting is heavily influenced by the value of the extremely small standard deviation stated by the experimenter. The method of Gray (1985) based on adjustment of relative information gives a value close to the unweighted mean, and a standard deviation which is smaller than for the unweighted case. The approach of limitation of statistical weights gives smaller values. The extended variance weighting and its improvement in the form of iterative weighting give results close to the results for the unweighted mean. ESA

N86-32253# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
HIGH STATISTICS INCLUSIVE PHI MESON PRODUCTION AT SP3 ENERGIES
H. Dijkstra, R. Bailey (Science Research Council, Chilton (England).), E. Belau (Max-Planck-Inst. fuer Physik und Astrophysik, Munich (West Germany).), T. Roehringer (European Organization for Nuclear Research, Geneva (Switzerland).), M. Bosman, V. Chabaud, C. Damerell (Science Research Council, Chilton (England).), C. Daum, G. deRijk, S. Gill et al 1986 26 p Submitted for publication
(NIKHEF-H/86-1; B8665339; ESA-86-98054) Avail: NTIS HC A03/MF A01

Inclusive phi meson production was measured for 100 GeV/c and 200 GeV/c incident pi(-) pbar and K (-), and for 120 GeV/c and 200 GeV/c incident pi (+), p and K (+), using a Be target. A total of 630,000 phi mesons were recorded in the kinematic range 0 less than x sub F less than 0.4. The differential cross sections d sigma/dx sub F and d sigma/dp sub T sq are presented. The longitudinal momentum distributions show that the strange valence quarks of the incident K mesons play an important role in phi meson production even at small sub f. The decay angular distribution of the phi meson is evaluated in the Gottfried-Jackson frame and is expressed in the elements of the density matrix. There is a small but significant cos sq theta Gottfried-Jackson dependence for small p sub T, which decreases for increasing P sub T. ESA

N86-32254# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
INCLUSIVE PHI MESON PRODUCTION, THE PARTON FUSION MODEL AND STRANGE QUARK STRUCTURE FUNCTIONS
H. Dijkstra, R. Bailey (Science Research Council, Chilton (England).), E. Belau (Max-Planck-Inst. fuer Physik und Astrophysik, Munich (West Germany).), T. Bohringer (European Organization for Nuclear Research, Geneva (Switzerland).), M. Bosman, V. Chabaud, C. Damerell (Science Research Council, Chilton (England).), C. Daum, G. deRijk, S. Gill et al 1986 14 p Submitted for publication
(NIKHEF-H/86-3; B8665340; ESA-86-98055) Avail: NTIS HC A02/MF A01

The parton fusion model is used to describe the longitudinal differential cross section of hadronic phi production. The cross section for phi production in pi (+or-) p, p (-) p, and K (+or-) p interactions is evaluated in the model by using structure functions for the constituents of the interacting particles. A comparison between the model and high statistics data in the Feynman x range 0 less than x sub F (phi) less than 0.4 allows the determination of the strange valence quark distribution in pi mesons, which appears to be harder than the light sea quark distribution. The comparison also shows that a significant part of inclusive phi production is due to the OZI allowed fusion of strange quarks, while the OZI inhibited fusion diagrams are strongly suppressed. ESA

N86-32255# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
HADRONIC PHI PRODUCTION AND THE LUND MODEL FOR LOW p SUB T INTERACTIONS
H. Dijkstra, R. Bailey, E. Belau, T. Boehringer, M. Bosman, V. Chabaud, C. Damerell, C. Daum, G. deRijk, S. Gill et al 1986 9 p Submitted for publication
(NIKHEF-H/86-4; B8665341; ESA-86-98056) Avail: NTIS HC A09/MF A01

Experimental results on inclusive phi production are compared with the Lund model for low p sub T hadronic interactions. The data is based on a sample of 600,000 phi mesons in the kinematic range p sub T less than 1.0 (GeV/c) sq and 0.0 less than x sub F less than 0.4, produced in pi (+or-), k (+or-) p and p Be interactions at 100 GeV/c and 120 GeV/c incident momentum. The Lund model reproduces the shapes of the longitudinal differential cross sections reasonably well, but the relative cross sections for incident pi, K and p show a discrepancy with the data. ESA

N86-32256# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
DEUTERON PROPERTIES STUDIED IN NEUTRINO AND ANTINEUTRINO INTERACTIONS
A. G. Tenner 1986 32 p
(NIKHER-H/86-7; B8664354; ESA-86-98058) Avail: NTIS HC A03/MF A01

Interactions of neutrinos and antineutrinos were studied in a deuterium bubble chamber. The spectrum of proton spectators was studied and compared with the predictions of different deuterium models. Rescattering was investigated. The spectrum of spectator protons may be explained from current deuteron models. To obtain agreement between the theory and the data, kinematical effects of the neutrino interactions have to be included. The results then show evidence for a diffractive component in deuteron rescattering. The slow protons produced in nu root nu/deuteron interactions can be separated into prompt protons, rescattering protons, and spectators. There is quantitative agreement with the predictions. No other sources of protons need to be considered. Results partly agree with the additive quark model of rescattering. No evidence is found for the excitation of a Delta (1236) resonance through pi (+) p rescattering. No evidence is found for the existence of a Delta-Delta structure of the deuteron. No evidence is found for deuterons in the final state of nu root nu deuteron interactions. ESA

N86-32257# Amsterdam Univ. (Netherlands). Faculteit der Wiskunde en Natuurwetenschappen.
A STUDY OF THE INTERACTIONS OF HIGH ENERGY ELECTRON-NEUTRINOS Ph.D. Thesis
Cornelis Hermanus Maria Nieuwenhuis 1986 100 p Sponsored by Stichting voor Fundamenteel Onderzoek der Materie
(ESA-86-98072) Avail: NTIS HC A05/MF A01

Data on electron-neutrino and antineutrino interactions with nuclei were collected with a calorimeter in a beam dump exposure to 400 GeV/c protons, to verify if the ratio of the flux of prompt electron-neutrinos and muon-neutrinos may deviate from unity. The cross-section ratio for NC/CC interactions of nue + nu bar e, Re = 0.40 +or- 0.12 (+or- 0.08 syst) is found in agreement with the known cross-section ratio R mu = 0.330 +or- 0.01 for nu mu + nu bar mu. This equality is predicted by the Standard Model of electroweak interactions. The prompt CC (nu (nu bar) e)/CC (nu (nu bar) mu) flux ratio is not in bad disagreement (1.8 standard deviations) with the Standard Model predictions under assumption of equal fluxes for nu e and nu bar e. The energy dependence of the prompt electron-neutrino flux agrees with a Monte Carlo prediction simulating DD bar production and semileptonic decay. The calculated DD bar cross-section times semileptonic branching ratio agrees with the results of other measurements of this quantity. ESA

N86-32352*# Rochester Univ., N. Y. Nuclear Structure Research Lab.
DETERMINATION OF CA-41, I-129 AND OS-187 IN THE ROCHESTER TANDEM ACCELERATOR AND SOME APPLICATIONS OF THESE ISOTOPES
U. Fehn, D. Elmore, H. E. Gove, P. Kubik, R. Teng, and L. Tubbs *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 20H

N86-32359*# California Univ., San Diego, La Jolla.
LIVE 129I-129Xe DATING
Kurt Marti *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 20H

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N86-32258# Maryland Univ., College Park. Inst. for Physical Science and Technology.
ACCELERATION OF IONS AND ELECTRONS BY WAVE-PARTICLE INTERACTIONS Annual Summary Report, 1 Apr. - 30 Nov. 1985
C. S. Wu and John D. Gaffey, Jr. 30 Nov. 1985 10 p
(Contract N00014-85-K-0436)
(AD-A167631) Avail: NTIS HC A02/MF A01 CSCL 20/7

The research program is divided into four tasks; (1) Application of kinetic cross-field streaming instabilities to laboratory experiments; (2) Electromagnetic electron-cyclotron instability excited by hot electrons with a loss-cone distribution; (3) Induced emission of electromagnetic radiation near the second harmonic of the plasma frequency; (4) Effects of an electrostatic instability on the induced emission of electromagnetic radiation near 2 omega sub e. GRA

N86-32259# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
FOCUSED ION BEAM TECHNOLOGY
John Melngailis Oct. 1985 15 p
(Contracts MDA903-85-C-0215; DAAG29-83-K-0003)
(AD-A167762; VLSI-MEMO-85-275) Avail: NTIS HC A02/MF A01 CSCL 20/7

The finely focused ion beam is a new instrument with many uses. It can focus a beam of any one of many species of ions at energies up to 200 kV to dimensions below 0.1 micrometers. This capability can be used: to implant dopants in semiconductors in a maskless process, to mill away material and repair masks or circuits, to deposit material with submicron resolution if an appropriate local gas ambient is present, to perform lithography by exposing resist, and to analyze and examine specimens. There are about 30 sophisticated systems in operation world wide, about two thirds of them in Japan. The field is still in its infancy, and one can expect both improvements in machinery and many new applications to develop particularly in the area of custom semiconductor devices. GRA

N86-32260# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Sep. 1984
T. G. George, comp. Feb. 1986 14 p
(Contract W-7405-eng-36)
(DE86-008579; LA-10630-PR) Avail: NTIS HC A02/MF A01

This technical monthly report covers studies related to the use of (238)PuO2 in radioisotope power systems conducted for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Most of the studies discussed are ongoing; the results and conclusions described may change as the work progresses. DOE

N86-32261# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Chemie.
CARBON MONOXIDE FORMATION IN UO2 KERNELED HTR FUEL PARTICLES CONTAINING OXYGEN GETTERS
Emil Proksch, Anton Strigl, and Heinz Nabielek Jan. 1986 25 p Submitted for publication
(OEFZS-4348; CH-358/86; ESA-86-97248) Avail: NTIS HC A02/MF A01

Mass spectrometric measurements of CO in irradiated UO2 fuel particles containing oxygen getters are summarized. Uranium carbide addition in the 3% to 15% range reduces the CO release by factors between 25 and 80, up to burn-up levels as high as 70% FIMA. Unintentional gettering by SiC in TRISO coated particles with failed inner pyrocarbon layers results in CO reduction factors between 15 and 110. For ZrC, ambiguous results are obtained; ZrC probably results in CO reduction by a factor of 40; Ce2O3 and La2O3 seem less effective than the carbides; for Ce2O3, reduction factors between 3 and 15 are found. However, the results are possibly incorrect due to premature oxidation of the getter already during fabrication. Addition of SiO2 + Al2O3 has no influence on CO release. ESA

N86-32262# British Petroleum Co. Ltd., Sunbury-on-Thames (England).
PETROPHYSICAL QUANTITIES FROM HIGH RESOLUTION GAMMA-RAY SPECTRA ARISING FROM ENERGETIC NEUTRON BOMBARDMENT
D. W. Mellor and M. C. Underwood 1985 27 p Presented at the 26th Annual Logging Symposium, Dallas, Tex., 17-20 Jun. 1985
(ESA-86-97256) Avail: NTIS HC A03/MF A01

A logging tool comprising a 5 Curie Am241-Be neutron source and n-type intrinsic germanium gamma ray detector was developed. A large calibration tank, in simulated well-bore geometry, comprising oil and water saturated sand, was constructed and was interrogated using the tool. In a separate experiment, oil zone material was irradiated using 14 MeV neutrons. An interpretational model that allows the porosity, oil and water saturation, matrix composition, and water salinity to be inferred is presented. This confirms that under strictly controlled experimental conditions, major petrophysical properties can be inferred from high resolution gamma ray spectra. ESA

N86-32263# Netherlands Energy Research Foundation, Petten.
INTEGRAL-DATA TEST OF JEF-1 FISSION-PRODUCT CROSS SECTIONS
A. J. Janssen, H. Gruppelaar, R. J. Heijboer, N. Karouby-Cohen, L. Martin-Deidier, G. Rimpault, and M. Salvatores Nov. 1985 145 p
(ECN-176; B8577863; ESA-86-97734) Avail: NTIS HC A07/MF A01

Integral data from STEK (5 cores), CFRMF, ZONA-1, RONA-3, and PHENIX were used to test the fast-capture fission product cross section evaluations of 60 materials. Experimental and calculated capture reactivity values in the five STEK cores for most of these nuclides are given. A correction for scattering based upon the original evaluation was made. There are indications that this correction is too small for even-mass isotopes due to the neglect of direct-collective effects in the inelastic scattering evaluations. This also follows from comparison with activation and irradiation measurements performed in CFRMF, ZONA-1, RONA-3, and PHENIX. A survey of all the results, expressed by the ratio of experimental to calculated values as a function of the relative response above 1 keV in the various assemblies, is presented. ESA

N86-32264# Netherlands Energy Research Foundation, Petten.
ON THE GLOBAL BEHAVIOR OF A CYLINDRICAL SALT DOME WITH A HLW REPOSITORY
J. Prij and J. Klok Dec. 1985 52 p
(ECN-180; B8660553; ESA-86-97736) Avail: NTIS HC A04/MF A01

The influence of the thermomechanical properties of the rock salt and the surrounding rocks on the thermal stresses and surface rise is discussed, based on finite element creep analyses of a homogeneous cylindrical salt dome. The parameters are constants in the thermomechanical constitutive behavior of salt and rocks and increase the thermal loading. It is shown that variations in the creep properties, which result in differences in creep strain rate of a factor 100, have only a very limited influence on the

thermal stresses and surface rise. More important is the elastic stiffness of the materials. In all creep analyses thermal stresses in the salt are compressive, and shear stresses reach values < 2 MPa. It is concluded that thermal stresses do not influence the isolation capability of homogeneous salt dome negatively. ESA

N86-32265# Interuniversitair Reactor Instituut, Delft (Netherlands).
[ACTIVITIES REPORT OF THE INTERUNIVERSITY REACTOR INSTITUTE] Annual Report, 1984 [INTERUNIVERSITAIR REACTOR INSTITUUT, JAARVERSLAG 1984]
1984 140 p In DUTCH
(ESA-86-97769) Avail: NTIS HC A07/MF A01

Radiation measurement and data processing, nuclear biomedical studies, and radioisotope applications are described. Radiochemistry excitation and ionization, charge migration in polymers and semiconductors, charge separation in excited molecules, radiation damage, and instrumentation were studied. Investigations in the fields of molecular physics, neutron depolarization, Mossbauer spectrometry, and instrumentation and software are summarized. Reactor physics statics, dynamics and noise of nuclear reactors, and radiation damage in materials were examined. ESA

74 OPTICS

Includes light phenomena.

N86-32266* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OPTICAL DISTANCE MEASURING INSTRUMENT
James B. Abshire, inventor (to NASA) 15 Jul. 1986 10 p Filed 10 Aug. 1982 Supersedes N83-13982 (21 - 04, p 600)
(NASA-Case-GSC-12761-1; US-Patent-4,600,299; US-Patent-Appl-SN-406820; US-Patent-Class-356-5; US-Patent-Class-356-4.5) Avail: US Patent and Trademark Office CSCL 20F

An optical instrument, such as a stability monitor or a target range finder, uses an unstabilized laser to project a composite optical signal of coherent light having two naturally occurring longitudinal mode components. A beamsplitter divides the signal into a reference beam which is directed toward one photodetector and a transmitted beam which illuminates and is reflected from a distant target onto a second photodetector optically isolated from the first photodetector. Both photodetectors are operated on the square law principle to provide electrical signals modulated at a frequency equal to the separation between the frequencies of the two longitudinal mode components of the optical signal projected by the laser. Slight movement of the target may be detected and measured by electrically monitoring the phase difference between the two signals provided by the photodetectors and the range of the target measured with the aid of a microprocessor by changing the separation between the longitudinal modes by shifting the length of the resonator cavity in an iterative series of increments. Author

N86-32267 Fondazione Ugo Bordoni, Rome (Italy).
DIRECT MEASUREMENT OF THE NONLINEAR PHASE SHIFT BETWEEN THE ORTHOGONALLY POLARIZED STATES OF A SINGLE-MODE FIBER
Bruno Crosignani, Salvatore Piazzolla, Paolo Spano, and Paolo DiPorto Sep. 1984 5 p
(FUB-36-1984; ESA-86-97882) Copyright. Avail: Issuing Activity

The noise associated with the optical Kerr effect, which is a frequent cause of frequency broadening and pulse reshaping was studied. The light from a continuous wave linearly polarized argon laser was coupled to a polarization maintaining birefringent fiber. The excitation conditions are such as to provide single mode operation. The 2 polarization states have a power ratio of 25 to 1. The nonlinear effect is observed through the beat signal between the two orthogonal fields. The mathematical analysis shows that the model equation contains a nonlinear term following the time fluctuations of the polarization power in the first state. For a long fiber it can become relevant even at low power. The noise described is analogous to the phase noise generated in angle modulated fiber communication systems by power fluctuations of the source. ESA

N86-32268*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INFRARED ATTENUATION OF THALLIUM BROMO-IODIDE FIBERS
Beryl Magilavy (Informatics, Inc., Palo Alto, Calif.) and John Goebel Feb. 1986 27 p
(NASA-TM-86817; A-85370; NAS 1.15:86817) Avail: NTIS HC A03/MF A01 CSCL 20F

Analysis of attenuation measurements in the near infrared of an unclad fiber of Thallium Bromo-Iodide (Th(Br,I)), a polycrystalline thallium halide, is presented. A general overview is given of the properties of fiber optics. Two groups of attenuation measurements, for the region 1.2 to 3.4 and for 3 to 11 microns, respectively, are presented, analyzed, and compared with those of two other groups of researchers. Author

N86-32269*# Rhode Island Univ., Kingston. Dept. of Physics.
FIBER OPTIC PRESSURE SENSORS IN SKIN-FRICTION MEASUREMENTS Progress Report, 1 Oct. 1985 - 30 Jun. 1986
Frank W. Cuomo 4 Aug. 1986 10 p
(Grant NAG1-519)
(NASA-CR-176861; NAS 1.26:176861; PR-2) Avail: NTIS HC A02/MF A01 CSCL 20F

A fiber optic lever sensing technique that can be used to measure normal pressure as well as shear stresses is discussed. This method uses three unequal fibers combining small size and good sensitivity. Static measurements appear to confirm the theoretical models predicted by geometrical optics and dynamic tests performed at frequencies up to 10 kHz indicate a flat response within this frequency range. These sensors are intended for use in a low speed wind tunnel environment. Author

N86-32270# State Univ. of New York, Buffalo. Dept. of Chemistry.
LIGHT SCATTERING FROM A DEEP METALLIC GRATING Interim Technical Report
Dan Agassi and Thomas F. George Apr. 1986 12 p
(Contract N00014-86-K-0043)
(AD-A166319; UBUFFALO/DC/86/TR-7) Avail: NTIS HC A02/MF A01 CSCL 20/6

The conditions under which the Rayleigh hypothesis is exact and the convergence properties of the Rayleigh expansion are considered. The identification of the cause of the deficiency of this expansion suggests an alternative dressed expansion with presumably simpler convergence properties. This proposition is checked for a sinusoidal grating (SG), for which convergence is found for an arbitrary value of beta = (2pi) g/d, where g and d denote the height and periodicity of the SG, respectively. The dressed expansion is used to analyze the surface plasmon dispersion and local field enhancement distribution pertaining to the SG in the limit as beta goes to infinity. The dispersion relation is comprised of two bands. The local field enhancement predicts stronger fields at the bottoms of the troughs than at the peaks of the SG. GRA

N86-32271# Department of the Navy, Washington, D. C.
BROADBAND UNPOLARIZED LIGHT SOURCE Patent
William K. Burns and Robert P. Moeller, inventors (to Navy) Issued 3 Dec. 1985 5 p Supersedes AD-D010334
(AD-D012201; US-Patent-4,556,293; US-Patent-Appl-SN-490892; US-Patent-Class-350-400) Avail: NTIS US Patent and Trademark Office CSCL 20/6

Broadband, unpolarized light is produced by coupling a birefrigent optical fiber to a light emitting device, such as a superluminescent diode, which is capable of emitting broadband, partially polarized light. The optical fiber is made sufficiently long to provide an optical differential path length between its birefringent

axes which is longer than the coherence length of the light emitting device. GRA

N86-32272# Department of the Navy, Washington, D. C.
OPTICAL MATRIX-MATRIX MULTIPLIER BASED ON OUTER PRODUCT DECOMPOSITION Patent
William C. Collins, P. D. Stilwell, Jr., and Ravindra A. Athale, inventors (to Navy) Issued 4 Feb. 1986 7 p Supersedes AD-D010477
(AD-D012207; US-Patent-4,569,033; US-Patent-Appl-SN-504331; US-Patent-Class-364-845) Avail: US Patent and Trademark Office CSCL 20/6

An optical matrix multiplier using two linear modulating arrays in which the columns of the first matrix to be multiplied control the modulation of one array and the rows of the second matrix control the other array. Light is directed through all combinations of elements on the two arrays and the resultant beams measured by individual elements of a two-dimensional detector array. The detecting elements integrate the intensity of light falling on each of them, which value corresponds to an element of the product of the two matrices. The invention may be implemented among other ways with two linear electrooptical arrays, a linear array of light emitting diodes and a linear electrooptical array, or two Bragg cells and a pulsed light source. Author (GRA)

N86-32273# Army Night Vision Lab., Fort Belvoir, Va.
ON THE STABILITY OF THE PROBLEM OF TARGET TRACKING WITH THE FLIR Final Report, 1984 - 1985
David S. Anker Jan. 1986 5 p
(AD-A167721) Avail: NTIS HC A02/MF A01 CSCL 17/5

This document considers stochastic differential equations of Ito type. This problem is a fundamental one in the field of stochastic control. The theory of stochastic control has been successfully applied to a wide variety of practical problems as demonstrated in Maybeck, including problems involving the tracking of objects with imaging sensors. The problem of tracking aircraft with infrared sensors has been addressed in this mathematical framework by Kendrick, Maybeck, and Reid and by Maybeck, Jensen, and Harnley. The specific problem which gave impetus to this research involves real time control of the orientation of the optical axis of an infrared imaging sensor. The problem of choosing a good control for a system modeled in this framework involves the property of stability of solutions of the stochastic differential equation representing the system. Stability of these solutions is established by constructing a Liapunov function for the equation. In this way, the construction of a Liapuinov function for the equation is of great value in choosing controls. This and other background material are explained in Kushner. In his recent monograph, Mees remarked that there is no good general method for constructing Liapunov functions for systems represented by ordinary differential equations. GRA

N86-32274# Army Research Inst. of Environmental Medicine, Natick, Mass.
A PORTABLE SUBJECT CONTROLLED NIGHT VISION ADAPTOMETER
John L. Kobrick, Calvin Witt, and Jose Miletti Nov. 1985 15 p
(AD-A167848; USARIEM-T-1/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

This report describes a new adaptometer which was designed at this Institute for assessing night vision parameters of the military population at field sites, and to quantify the effects of extended exposure to high altitude. The instrument is based on a previously developed concept of dark adaptation measurement in which the subject continually adjusts the threshold luminance of a recurrently flashing stimulus. This device, however, represents a modernized version of the technique which employs computerized data translation. It also offers the advantages of rugged construction and field portability. The instrument has functioned reliably in field conditions, and has generated valid dark adaptation functions on soldier test subjects in use at the USARIEM High Altitude Test Facility, Pikes Peak, Colorado. GRA

N86-32275# Office of Naval Research, London (England).
CURRENT GERMAN LASER AND QUANTUM OPTICS RESEARCH REVIEWED AT THE 50TH ANNUAL MEETING OF THE PHYSIKALISCHE GESELLSCHAFT
Paul Roman 23 Apr. 1986 9 p Meeting held at Heidelberg, West Germany, 17-21 Mar. 1986
(AD-A167895) Avail: NTIS HC A02/MF A01 CSCL 20/5

Advanced research at West German universities and research institutes in the general area of quantum optics was well represented at a large meeting in Heidelberg, March 1986. This report focuses on describing results in the areas of gas lasers, integrated optics, nonlinear processes, and novel solid-state lasers - with emphasis on the last. Author (GRA)

N86-32276# Georgia Inst. of Tech., Atlanta.
REAL TIME MATH MODEL FOR INFRARED Final Technical Report, Jun. 1983 - Sep. 1985
David R. Hertling and R. C. Rearick Jan. 1986 59 p
(Contract F30602-81-C-0185)
(AD-A168133; GIT/E4857A-85; RADC-TR-85-247) Avail: NTIS HC A04/MF A01 CSCL 17/5

The main objective of this work was to access the feasibility of developing a real time math model which could be used to process infrared imagery with current real-time stereo compilation equipment. A survey of existing infrared sensors, imaging sensors, photogrammetric techniques and procedures for stereo viewing and plotting are pesented. A flexible system model was developed which can be adapted to various types of infrared imaging systems. Investigations revealed that the photogrammetric techniques accurate enough for mapping and targeting applications require accurate flight dynamics data which must be simultaneously recorded with the imagery. It is theoretically possible to process certain images which contain known or analytically solvable ground information; however, such procedures would depend upon the image itself and would not be amenable to evolving into a generalized math model. GRA

N86-32277# Hughes Research Labs., Malibu, Calif. Optical Physics Dept.
OPTICAL CHARACTERIZATION OF NONLINEAR CRYSTALS
L. G. DeShazer and C. S. Hoefer Aug. 1985 18 p
(Contract W-7405-eng-48)
(DE86-006694; UCRL-15707-Pt-2) Avail: NTIS HC A02/MF A01

The final report on Optical Characterization of Nonlinear Crystals recorded the measurements of refractive indices and their thermal variations for thirteen nonlinear crystals isomorphic to KDP. This report is an Addendum to that report correcting some values reported for three crystals (AD*P, RD*P, KDA) and adding new data for three others (ADP, KDP, KD*P). The discrepancies in the final report resulted from crystals having either improper composition (AD*P) or wrong crystallographic orientation (RD*P, KDA). Six additional crystal prisms and slabs supplied by Interactive Radiation Inc. were used to obtain the corrected data reported here. Also, two crystals not measured before (RD*A, KDP:Rb) were measured and are described in this addendum. DOE

N86-32278# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
FIBER OPTIC MODIFICATION OF A DIODE ARRAY SPECTROPHOTOMETER
D. R. VanHare and W. S. Prather Jan. 1986 19 p
(Contract DE-AC09-76SR-00001)
(DE86-009572; DP-1714) Avail: NTIS HC A02/MF A01

Fiber optics were adapted to a Hewlett-Packard diode array spectrophotometer to permit the analysis of radioactive samples without risking contamination of the instrument. Instrument performance was not compromised by the fiber optics. The instrument is in routine use at the Savannah River Plant control laboratories. DOE

N86-32279# Stanford Univ., Calif.
MEASUREMENT TECHNIQUES USING ULTRASHORT OPTICAL PULSES Final Technical Report, 1 Oct. 1984 - 30 Sep. 1985

A. E. Siegman Feb. 1986 8 p
(Contract W-7405-eng-48)
(DE86-009691; UCRL-15792) Avail: NTIS HC A02/MF A01

The diffusion-driven detector uses gratings from crossed optical beams and diffusion to produce a very fast photodetector. Analysis of this instrument has been extended to the high level injection regime, indicating that the observed impulse response will be a single exponential rather than a double exponential. Also reported are laboratory renovations, in particular the installation of a cw mode-locked YAG laser and a sync-pumped dye laser. DOE

N86-32280# Los Alamos National Lab., N. Mex.
EXTREME ULTRAVIOLET MULTILAYER REFLECTORS
M. L. Scott, P. N. Arendt, B. J. Cameron, B. E. Newman, D. Windt, and W. Cash 1986 10 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986 Prepared in cooperation with Colorado Univ., Boulder
(Contract W-7405-eng-36)
(DE86-010194; LA-UR-86-1378; CONF-860316-5) Avail: NTIS HC A02/MF A01

We have investigated the design, fabrication, and reflectance measurements of a multilayer silver/silicon reflector for use at 58.4 nm. Our results indicate that reflectors in the extreme ultraviolet do not perform as well as predicted due to the presence of surface oxides and other surface contamination layers. In addition, we have found that the correct optical constants for silver have now been published. We find also that these multilayer coatings can be utilized as reflective polarizers in the EUV with an extinction ratio of 75:1 and a throughput of 28% for the s-polarized component of the beam. DOE

N86-32281# Lawrence Livermore National Lab., Calif. Optical Sciences and Engineering Group.
FUNDAMENTALS OF THIN LENS OPTICAL SYSTEMS, LECTURES 1, 2 AND 3
L. Seppala Apr. 1986 69 p Presented at the Technology Series, Livermore, Calif., 1985
(Contract W-7405-eng-48)
(DE86-010642; UCID-20727) Avail: NTIS HC A04/MF A01

Viewgraphs are presented on the topics of: the physical properties of a thin lens - principal planes, focal points - and the imaging properties of a thin lens - object and image planes and magnification; the Y-Nu method for tracing paraxial rays through a thin lens optical system; and derivation of some of the fundamental relationships in a thin lens system. DOE

N86-32282# Institut National Polytechnique, Grenoble (France).
STUDY AND IMPLEMENTATION OF AN IMAGE SYNTHESIZER BASED ON A MODULAR ARCHITECTURE Ph.D. Thesis [ETUDE ET REALISATION D'UN SYNTHETISEUR D'IMAGES BASE SUR UNE ARCHITECTURE BANALISEE]
Victor Hugo ZarateSilva 1985 179 p In FRENCH Sponsored by Consejo Nacional de Ciencia y Technologia
(ESA-86-97295) Avail: NTIS HC A09/MF A01

Image synthesis operators adapted to a modules structure are studied. The goal is to allow for system reconfiguration depending on user requirements and application. Wired operators working in real time, such as image illumination computing or texture superposition are obtained. The system allows the simulation of four different light sources and the independent modeling of the reflection of each primary color on each object of the scene. ESA

N86-32283# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
SECOND GENERATION METEOSAT: INFRARED ATMOSPHERIC SOUNDER DESIGN
G. Chalon 4 Mar. 1985 22 p In FRENCH; ENGLISH summary
(CNES-T-85/CT/DRT/TIT/IO-046; ESA-86-97650) Avail: NTIS HC A02/MF A01

The design of optical remote sensors is discussed, including a system with gratings and a second with filters. In both cases the sensors use the available telescope. It is shown that the filtered sensor has a better performance and is to be preferred in spite of higher complexity. ESA

N86-32284# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
SECOND GENERATION METEOSAT IMAGER DESIGN
G. Chalon 11 Mar. 1985 29 p In FRENCH; ENGLISH summary
(CNES-T-85/052-DRT/TIT/IO; ESA-86-97651) Avail: NTIS HC A03/MF A01

An infrared imager for a spin stabilized Meteosat satellite is described. Infrared focal plane matrix arrays and long life mechanical coolers are required to satisfy the functional specifications. The performance of the different channels is discussed, showing that adopting a reasonable compromise only the night channel would remain below specifications. ESA

N86-32285# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Kreiselgeraete und Traegheitsnavigation.
SETUP FOR THE DETERMINATION OF THE REFLECTIVITY OF INTERFERENCE COATINGS
Rolf Gauert and Joachim Bode Dec. 1985 25 p In GERMAN; ENGLISH summary
(DFVLR-Mitt-85-18; ISSN-0176-7739; ESA-86-97590) Avail: NTIS HC A02/MF A01

A setup for measuring the reflectivity of evaporated interference coatings of laser mirrors is described. The coatings can be characterized by their reflectivity, which is determined by a compensation method. The setup is calibrated by a mirror of known reflectance. The system can determine the reflectivity with an accuracy of 0.1%. ESA

N86-32286# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
FIBER OPTIC SENSORS
Jan-Peter Bengtsson Mar. 1986 63 p In SWEDISH; ENGLISH summary
(FOA-C-30416-E1; ISSN-0347-3708; ESA-86-97862) Avail: NTIS HC A04/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR. 50

Fiber sensors are surveyed, and basic fiber theory is treated, as well as numerous sensor principles. These sensors can be made completely nonmetallic and without any electrical signals. Two acoustic sensor types are reviewed: the microbendsensor and the Mach-Lehnder interferometer. A fiber optical reflection sensor for acoustic detection is described; this device is not fully developed, technical problems appeared with the end diaphragm. ESA

N86-32287# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
STUDY OF OPTICAL COMPUTING
Vojin Plavsic Mar. 1986 43 p In SWEDISH; ENGLISH summary
(FOA-C-30416-E1; ISSN-0347-3708; ESA-86-97863) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR. 50

The capabilities of optics to complement or replace electronics in the implementation of digital data processing is investigated. The inherent features of optics such as: multiple 2-D (parallel) broad band channels, higher switching speed, simplicity and flexibility in interconnection of arbitrary complex digital optical circuits, and power consumption are described. Practical results are rather modest; one explanation of this situation is the lack of clear architectural concepts for utilizing the benefits of optics. ESA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-32288 Institut d'Aeronomie Spatiale de Belgique, Brussels.
FRONTIERS OF THE PLASMASPHERE (THEORETICAL AS-

PECTS) Thesis
J. Lemaire 1985 283 p
(Aeronomica-Acta-A-298-1985; ESA-86-97483) Avail: Issuing Activity

The formation of the light ion trough, i.e., the depression of the ion densities H(+) and He(+), observed in the midlatitude ionosphere, is explained by two different mechanisms. The variations of the equatorial density of the total content and of the temperatures inside a plasma element are derived. The historical context within which experimental and theoretical understanding of the plasmasphere and of its equatorial limit the plasmapause developed since 1963 is described. ESA

N86-32289*# Alabama Univ., Huntsville. School of Science.
SPACE PLASMA RESEARCH Quarterly Progress Report, Apr. - Jun. 1986
Richard H. Comfort and James L. Horwitz Jul. 1986 14 p
(Contract NAS8-33982)
(NASA-CR-178898; NAS 1.26:178898) Avail: NTIS HC A02/MF A01 CSCL 20I

Temperature and density analysis in the Automated Analysis Program (for the global empirical model) were modified to use flow velocities produced by the flow velocity analysis. Revisions were started to construct an interactive version of the technique for temperature and density analysis used in the automated analysis program. A sutdy of ion and electron heating at high altitudes in the outer plasmasphere was initiated. Also the analysis of the electron gun experiments on SCATHA were extended to include eclipse operations in order to test a hypothesis that there are interactions between the 50 to 100 eV beam and spacecraft generated photoelectrons. The MASSCOMP software to be used in taking and displaying data in the two-ion plasma experiment was tested and is now working satisfactorily. Papers published during the report period are listed. B.G.

N86-32290# International Centre for Theoretical Physics, Trieste (Italy).
NON-LINEAR OPTICAL EXCITATION AND DETECTION OF THE PLASMON IN TWO-DIMENSIONAL ELECTRON GAS
Shi-Jie Gu Sep. 1984 8 p
(DE85-703230; IC-84/154) Avail: NTIS (US Sales Only) HC A02/MF A01

The theoretical calculation indicates that one can use the nonlinear difference-frequency mixing of two infrared beams to excite and detect the plasmon in the inversion layer without grating structure. The numerical estimation shows that the detection has enough sensitivity. DOE

N86-32291# Wisconsin Univ., Madison. Fusion Technology Inst.
ESTIMATES OF MAXIMUM TRAPPABLE ION BEAM POWER IN PLASMA CHANNELS
J. J. Watrous and R. E. Olson 1986 6 p Presented at the 7th Topical Meeting on the Technology of Fusion Energy, Reno, Nev., 15 Jun. 1986 Prepared in coöperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-006472; SAND-86-0283; CONF-860652-2) Avail: NTIS HC A02/MF A01

Conservation laws and solutions to the equations of motion for single particles have been used to obtained greatest lower bounds on the ion beam power that can be injected into and confined within plasma channels. These bounds are use in the evaluation of proposed light ion driven ICF experiments and reactor concepts. Simple estimates of trappable power based on conservation laws will be compared with estimates based on solutions to the equation of motion. Consequences of the results of these calculations to current design studies will be discussed. DOE

N86-32292# United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
PLASMA AND ION ETCHING FOR FAILURE ANALYSIS. PART 1: REVIEW OF CURRENT THEORY AND TECHNIQUES
M. Hardman, D. Mapper, J. Farren, and J. H. Stephen Paris ESA Jul. 1985 65 p
(Contract ESA-AO/5796/04-NL-AB)
(AERE-R-11907-Pt-1; HL85/1549-Pt-1; ESA-CR(P)-2177-Pt-1; ESA-86-97222) Avail: NTIS HC A04/MF A01

The state-of-the-art for the etching of semiconductor device materials, as applied to failure analysis, is reviewed. The basic mechanisms and techniques of dry etching were studied. Process parameters, such as rf power, gas mixture, pressure, and temperature and their effect on the etch process are reported. The Giga-Etch 100 E method of dry etching is recommended. Equipment available on the market is listed. ESA

N86-32293# Institut Franco-Allemand de Recherches, St. Louis (France).
STATIONARY, ONE-DIMENSIONAL MODELS FOR LASER-PRODUCED PLASMAS [STATIONAERE, EINDIMENSIONALE MODELLE FUER LASERERZEUGTE PLASMEN]
K. Daree 18 Jun. 1985 134 p In GERMAN
(ISL-R-107/85; ESA-86-97623) Avail: NTIS HC A07/MF A01

One-dimensional, stationary models for laser-produced plasmas were compared. The most interesting models seem to be those with the assumption of a self regulation of the plasma, i.e., based on the defined geometrical dimensions of the plasma. Such a model was numerically evaluated for a parallel flow, whereby the physical effects partial ionization, laser light absorption, and heat conduction were taken into account. The effect of several parameters (e.g., laser beam intensity, laser wavelength) on the calculation results is discussed. The calculation results agree very satisfactorily with experimental results. ESA

N86-32294# FOM-Inst. voor Plasmafysica, Rijnhuizen, Jutphaas (Netherlands).
THE DEVELOPMENT OF A MAGNETOOPTIC CURRENT MEASUREMENT SYSTEM FOR HIGH, PULSED CURRENTS
H. S. Lassing Dec. 1985 49 p Sponsored by Euratom, Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek and Stichting voor de Technische Wetenschappen
(Rept-85-161; ESA-86-98045) Avail: NTIS HC A03/MF A01

A current-measurement system based on the Faraday rotation in a single-mode fiber for a screw pinch experiment is described. It is shown that an ultra low birefringence spun single-mode fiber is extremely suitable for use in a magneto-optic current-meter. The properties of this fiber were investigated. Measurements of high, pulsed currents (Imax = 1 MA: f = 25 kHz) with good accuracy and in accord with theory are presented. In order to calculate the current unambiguously and more accurately from the signals of the current-meter, a system with a double detector (to measure sin2 phi and cos2 phi simultaneously) was constructed. Measurements of high, pulsed currents with this system are also presented. It is concluded that a beam splitter prism is not the correct instrument for double detector measurements. A 50% transparant mirror and a double lens are suggested. ESA

N86-32295# FOM-Inst. voor Plasmafysica, Rijnhuizen, Jutphaas (Netherlands).
ION TEMPERATURE IN TORTUR 3
F. B. Hendriks and H. J. B. M. Brocken Dec. 1985 36 p Sponsored by Euratom and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek
(Rept-85-162; ESA-86-98046) Avail: NTIS HC A03/MF A01

Spatially resolved ion-energy distributions for discharges in the TORTUR 3 tokamak are presented. The measurements were performed in an active method, using a neutral hydrogen probing beam of 20 to 30 keV, to enhance charge-exchange processes along its path, as well as by the usual passive method. Ion temperatures can amount to 1 keV. ESA

N86-32296# FOM-Inst. voor Plasmafysica, Rijnhuizen, Jutphaas (Netherlands).
OPTIMIZATION STUDY FOR ION TEMPERATURE MEASUREMENTS BY MEANS OF RUTHERFORD SCATTERING
A. J. H. Donne and E. P. Barbian Mar. 1986 41 p Sponsored by Euratom and Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek
(Rept-86-164; ESA-86-98047) Avail: NTIS HC A03/MF A01

A feasibility study to optimize the parameters when the Rutherford-scattering technique is applied to ion temperature measurement in a medium sized tokamak experiment was performed. Together with a time-of-flight analyzer with energy resolution of 100, a 20 keV helium probing beam with a neutral current density of 10 A/msq can provide a detailed spectrum within 3 msq, from which the ion temperature can be extracted with an accuracy of better than 10%. The influence of plasma impurities and resonant charge exchange on the scattering process is discussed. The good spatial resolution makes the method very suitable to investigate energy deposition profiles in ion-cyclotron radiation applied to the plasma for plasma heating. ESA

N86-32297# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
MODELS OF TWO QUEUES: A FEW NEW VIEWS
O. J. Boxma Jan. 1986 27 p Submitted for publication
(CWI-OS-R8603; B8664686; ESA-86-98051) Avail: NTIS HC A03/MF A01

Results for models of two queues, emphasizing mathematical analysis techniques are reviewed. Two classes of models are investigated: two parallel queues attended by a single server, and two queues in series. ESA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N86-32298 National Physical Lab., Teddington (England). Div. of Quantum Metrology.
PROPERTIES OF IMPURITY DOPED INFRARED PHOTOCONDUCTIVE DETECTORS UNDER CONDITIONS OF LOW BACKGROUND PHOTON FLUX
R. H. Bradsell Feb. 1986 14 p
(NPL-QU-76; ISSN-0309-3050; ESA-86-97264) Copyright. Avail: Issuing Activity

The performance of infrared impurity doped photoconductive detectors is evaluated under the conditions of low background photon flux encountered in space remote sensing applications. Detector cooling requirements; cryogenic preamplifiers; quantum efficiency; and photoconductive gain are discussed. ESA

N86-32299# Department of the Air Force, Washington, D.C.
SELECTIVE ANODIC OXIDATION OF SEMICONDUCTORS FOR PATTERN GENERATION Patent
Bijan Davari and Pankaj K. Das, inventors (to Air Force) Issued 11 Feb. 1986 11 p Supersedes AD-D011889
(AD-D012245; US-Patent-4,569,728; US-Patent-Appl-SN-667306; US-Patent-Class-204-15) Avail: US Patent and Trademark Office CSCL 20/12

The present invention relates to GaAs integrated circuit technology, and in particular, to a novel means of controlling oxidation growth rate on anodically oxidized GaAs samples. This abstract discloses an apparatus and a method for selectively controlling anodic oxide growth on semiconductors for controlled electrochemical pattern generation incorporating use of a writing beam of a wavelength which encourages oxide growth and a bias beam at a wavelength which discourages oxide growth. The bias beam is projected on the semiconductor in electrolytic environment to prevent or retard oxide growth while oxide growth is accelerated at points of illumination by means of writing beam. GRA

N86-32300# Auburn Univ., Ala.
SEMICONDUCTOR ALLOY THEORY Annual Report, 1 Sep. 1984 - 31 Aug. 1985
An-Ban Chen 27 Sep. 1985 58 p
(Grant AF-AFOSR-0282-84)
(AD-A166995; AFOSR-86-0159TR) Avail: NTIS HC A04/MF A01 CSCL 20/12

Investigated are many topics in the theory of semiconductors and alloys including (1) Generalized Brooks' formula and the electron mobility in SiGe Alloys, (2) bond-length distribution, lattice relaxation, bond energies and mixing enthalpies in alloys, (3) hardness and dislocation energy, (4) SiGe alloys band structures and core exciton binding energy and linewidth, (5) alloy statistics and microclustering and (6) sensitivity of deep levels to band structure and potential. The important results are outlined and the details are discussed in eight publications enclosed with the report. GRA

N86-32301# Cincinnati Univ., Ohio. Solid State Electronics Lab.
RAMAN SPECTROMETER WITH MICROPROBE CAPABILITY Final Report, 15 Jul. 1984 - 15 Jul. 1985
J. T. Boyd and H. E. Jackson 15 Jan. 1986 13 p
(Grant AF-AFOSR-0287-84)
(AD-A167008; AFOSR-86-0156TR) Avail: NTIS HC A02/MF A01 CSCL 14/2

This report describes the results of this equipment grant funded as a part of the Department of Defense (DOD) University Research Instrumentation Program. This grant funded the purchase of a Raman spectrometer with microprobe capability having resolution of 1.0 micron. This report describes the equipment selecting decision, the configuration of the instrument selected, and some experimental results. The experimental results include Raman spectra used in characterization of laser recrystallized silicon and ion implanted regions in semi-insulating GaAs. The Raman microprobe can be used to characterize the effects of substrate temperature, beam power density and shape, beam scan speed and direction, deposition rate, substrate seeding, and polysilicon encapsulation schemes both near and away from grain boundaries. The frequency shift and the peak width of the Raman scattering from the triply degenerate zone center phonon in Si allow determination of the strain in the grains of laser recrystallized polysilicon. Reducing these strains will allow us to achieve large single grains of device quality. GRA

N86-32302# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN IMPROVED MODEL OF THIN FILM GROWTH M.S. Thesis
David J. Doryland Dec. 1985 133 p
(AD-A167147; AFIT/GEP/ENP/85D-2) Avail: NTIS HC A07/MF A01 CSCL 07/4

A VAX-11/785 computer was used to simulate the two dimensional growth of thin films produced by vapor deposition. In this model molecules and impurities were represented by three different sized disks. In order to simulate varying deposition conditions and evaporants, several variable parameters were introduced. Among these parameters were the variation of the deposition angle about some main angle, the mobility of the disks upon collision, the ability to introduce impurities into the microstructure, the simulation of multilayered coatings and the ability to introduce imperfections into the substrate. The results obtained by this model show that disks can be used to simulate some of the main features exhibited by vapor deposited films. Among these features are the formation of columns and their compliance with the tangent rule, and the disappearance of this structure in the case of large disk mobility. Another feature found to be exhibited in the modeled films is that under certain conditions impurities and substrate imperfections can produce large voids and/or nodules. Other characteristics found in the simulated films include pores which could allow water absorption, and increased packing

density for films produced with angle variations along with a moderate amount of disk mobility. GRA

N86-32303# Wales Univ. Inst. of Science and Technology, Cardiff.
OPTIMIZATION OF THE THERMOELECTRIC FIGURE OF MERIT OF FINE-GRAINED SEMICONDUCTOR MATERIALS BASED UPON LEAD TELLURIDE Final Technical Report, 31 Aug. 1984 - 30 Mar. 1986
D. M. Rowe Feb. 1986 41 p
(Contracts DAJA45-84-C-0029; DA Proj. 1T1-61102-BH-57)
(AD-A167647) Avail: NTIS HC A03/MF A01 CSCL 20/12

Lead telluride type semiconductors are used in the fabrication of thermoelectric modules. This report covers the programme to produce materials based upon lead telluride with improved figures of merit and hence greater thermoelectric conversion efficiency. One way of improving the figure of merit is by reducing the lattice thermal conductivity of the material. This can be achieved by increasing phonon grain boundary scattering. A realistic theoretical model has been developed for lead telluride and used to investigate the lattice thermal conductivity as a function of grain size and level of doping. In optimally doped material with a grain size of 1 micrometer, the reduction in lattice thermal conductivity was predicted to be 4-6 percent compared with equivalent single crystal. Thermal diffusivity measurements on small grained compacts supported this prediction. Phonon grain boundary scattering is enhanced in semiconductor alloys because of the presence of disorder scattering and the theoretical model was extended to take this factor into account. PbSnTe and PbGeTe were identified as alloys whose lattice thermal conductivity could be significantly decreased by a reduction in grain size and in optimally doped compacted material with a grain size of 0.5 micrometer the reduction compared to equivalent single crystal material was estimated to be 11 and 14 percent respectively. GRA

N86-32304# Eltron Research, Inc., Aurora, Ill.
CHARACTERIZATION OF ILLUMINATED SEMICONDUCTOR/SOLID-ELECTROLYTE JUNCTIONS. SEMICONDUCTOR REDOX POLYMER DETECTOR JUNCTIONS Interim Technical Report
Sharon K. Schmidt, Ronald L. Cook, and Anthony F. Sammells 15 Sep. 1985 25 p
(Contract N00014-84-C-0723)
(AD-A167665) Avail: NTIS HC A02/MF A01 CSCL 20/12

The dependency of n-TiO2 flatband potential (V sub fb) for cells of the general configuration: n-TiO2/Nafion 117, Redox species/SnO2 conducting glass, was systematically studied for the redox species Ru(bpy)32+, Fe(bpy)32+ and Ru(NH3)63+ as a function of their concentration within the polymer. The linear relationship V sub fb = M (1/concentration) + b, was found to hold for all cells. The slope (M) was found dependent upon metal complex used and its oxidation state. The sensitivity of n-TiO2, V sub fb to its immediate chemical environment at its interface with the redox polymer can be a strategy pursued for chemical detection. GRA

N86-32305# Eltron Research, Inc., Aurora, Ill.
SEMICONDUCTOR/SOLID ELECTROLYTE JUNCTIONS FOR OPTICAL INFORMATION STORAGE. ELECTROCHROMIC EFFECTS ON HEPTYL VIOLOGEN INCORPORATED WITHIN A SOLID POLYMER ELECTROLYTE CELL Interim Technical Report
Anthony F. Sammells and Nirupama U. Pujare 15 May 1986 17 p
(Contract N00014-84-C-0723)
(AD-A167638) Avail: NTIS HC A02/MF A01 CSCL 07/4

Solid state electrochromic cells of the configuration SnO2 Glass; poly(AMPS) + HV(2+) + NaPF6; Nafion 117; poly(AMPS) + CeC13 + NaPF6; SnO2 Glass were prepared. Upon subjecting the Heptyl Viologen (HV(2+)) working electrode compartment to a cathodic scan, two distinct reduction peaks were observed at respectively -1.74 and -1.90V versus the Cec13/SnO2 reference counter electrode. This corresponded to the formation of respectively, the radical and diradical cation species of HV(2+). This electrochromic cell was found to be highly electrochemically reversible as monitored by a He/Ne laser beam (583nm) transmitted through the bulk of this semitransparent thin film solid-state cell. Cells were also prepared using n-TiO2 as the working electrode in contact with the HV(2+) compartment. A progressive trend to more negative n-TiO2 flat band potentials (V sub FB) was observed between the initially prepared cell and the first and second electrochemically formed HV(2+) radical cation species. GRA

N86-32306# Cornell Univ., Ithaca, N.Y.
EXPERIMENTAL STUDY OF ELECTRONIC STATES AT METAL-DIELECTRIC INTERFACES Interim Technical Report, 2 Feb. 1983 - 31 May 1984
A. J. Sievers 23 Dec. 1985 16 p
(Grant AF-AFOSR-0121-81)
(AD-A167724; AFOSR-86-0075TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

The method of attenuated total reflection has been used in the visible region to obtain precise values of the dielectric function of Ag films in contact with different dielectric media. By measuring, at eight visible laser wavelengths, the surface-plasmon resonance of an Ag film against air and then against an organic liquid, we show that for both cases the dielectric function can be described by the Drude model with the well-known frequency-dependent relaxation time. The observed change in the frequency dependent parameters appears to eliminate all previous models which have been proposed to describe this frequency dependent relaxation time. The observed changes are consistent with the idea of a complex relaxation time whose real and imaginary parts are connected in a casual way. The index-of-refraction dependence of the Drude parameters demonstrates that surface electrodynamics must play an important role. Author (GRA)

N86-32307# Eltron Research, Inc., Aurora, Ill.
SEMICONDUCTOR/SOLID ELECTROLYTE JUNCTIONS FOR OPTICAL INFORMATION STORAGE. SOLID-STATE ELECTROCHROMIC CELL USING LUTECIUM DIPHTHALOCYANINE Interim Technical Report, 15 Sep. 1985 - 15 Jan. 1986
Anthony F. Sammells and Nirupama U. Pujare 15 Jan. 1986 13 p
(Contract N00014-84-C-0723)
(AD-A167869) Avail: NTIS HC A02/MF A01 CSCL 20/12

The overall program goal is to perform a basic investigation of photoelectrochemical and electrochemical effects by electrochromic materials in solid polymer electrolyte (SPE) containing solid-state cells. Initial investigations have been directed towards reversible electrochromic behavior at the interface between lutecium diphthalocyanine deposited onto electronically conducting glass, and the homopolymer poly-2-acrylamido -2-methylpropane sulfonic acid (poly(Amps)). We wish to report here some recent work on solid-state electrochromic cells in which ionic mediation to thin-film deposits of lutecium diphthalocyanine is via the homopolymer poly-2-acrylamido-2-methyl propane sulfonic acid (poly-Amps). Separation between the working (LuH(Pc)2 deposited onto SnO2 conducting glass) and counter (CeCl3 in poly (Amps)) electrodes in these solid-state cells was realized by the use of the insoluble copolymer perfluorosulfonic acid (Nafion). Solid-state electrochromic cells were prepared using the supporting electrolytes (SEs) 0.1M Na2SO4 and 0.1M KCl. Upon subjecting the cell to anodic and cathodic voltage scans, up to four distinct color changes were observed varying from red (at anodic potentials) to violet (at cathodic potentials). Formation of the violet lutecium diphthalocyanine reduction product was not found contingent upon the absence of alkali cations as reported by others. GRA

N86-32308# California Inst. of Tech., Pasadena. Dept. of Applied Physics.
OPTOELECTRONIC DEVICES AND RELATED PHYSICAL PHENOMENA IN THIN FILM SEMICONDUCTOR CONFIGURATIONS Final Report
C. Lindsey, J. Salzman, K. Vahala, and Amnon Yariv 1 May 1986 28 p
(Contract N00014-76-C-0322)
(AD-A167983) Avail: NTIS HC A03/MF A01 CSCL 20/12

A research program in semiconductor lasers and related phenomena resulted in new understanding relating to coherent single lobe laser arrays and to structures displaying near-diffraction-limited output. Using our molecular beam epitaxial reactor, we have demonstrated new unstable resonator geometry of semiconductor laser which potentially are capable of producing large aperture high power without the need for arrays. Typical powers of approx. 0.4 Watt were demonstrated in a single mode. Basic theoretical analysis and experiments on noise in semiconductor lasers has resulted in a new quantum formulation which takes into account the amplitude to phase coupling. This coupling is characterized by a new dispersive parameter alpha. Direct measurement of alpha were performed. GRA

N86-32309# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
SINGLE-CRYSTAL NEUTRON DIFFRACTION STUDY OF THE DISTRIBUTION AND THERMAL MOTION OF SILVER IONS IN ALPHA- AND BETA-Ag SI
J. J. Didisheim, R. K. McMullan, and B. J. Wuensch 1985 14 p Presented at the 5th International Conference on Solid-State Ionics, Lake Tahoe, Calif., 18 Aug. 1985 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC02-76CH-00016)
(DE86-005056; BNL-37301; CONF-850870-5) Avail: NTIS HC A02/MF A01

Single-crystal neutron diffraction data have been used to examine the distribution of mobile Ag ions in anion-ordered -Ag Si (space group Pm3m) and anion-disordered -Ag Si (space group Im3m) at 8 temperatures in the overall range 23 to 475 C. The Ag density in the phase is confined to a cluster of four tetrahedral sites grouped at the centers of the cell faces, closely spaced as a result of the different distances between Ag and the two species of anion. The individual sites are not resolved in Fourier syntheses because of large thermal displacements within a flat potential well, but the refinements permit rejection of occupancy of the octahedral site. The Ag distribution in -Ag Si displays a 2-coordinated site on the body diagonal of the cell and density delocalized in (100) bands which display fine structure not present in -AgI or -AgS. This feature may be qualitatively interpreted as an average over positional disorder of the equilibrium position within the tetrahedral interstice, the location depending on the short-range configuration of anions about the site. Models employing partial Ag occupancy of the 2-coordinated position plus either octahedral or tetrahedral site occupancy involve the same number of structural parameters and refined to comparable levels. Tetrahedral site occupancy is judged to be somewhat more likely on the basis of agreement for the higher temperature data sets and physical criteria. DOE

N86-32310# Oak Ridge National Lab., Tenn.
MICROCRYSTALLINE GROWTH STUDIES IN MODEL OXIDE BY DYNAMIC LASER-LIGHT SCATTERING METHODS
C. H. Byers and M. T. Harris 1986 6 p Presented at the 4th Contractors' Workshop on Advanced Laser Technology for Chemical Measurements, Seattle, Wash., 29 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-007300; CONF-8604130-1) Avail: NTIS HC A02/MF A01

A state-of-the-art laser light scattering facility has been developed for determining the average size of a seed material. The homogeneous nucleation technique has been used to study tetraethoxy orthosilane (TEOS), which hydrolyzes to produce silica. The titanium analog of TEOS is also being studied. DOE

N86-32311# Allied-Signal, Inc., Morristown, N.J. Electronic Materials and Devices Lab.
UNIFORMLY-DOPED Cr, Nd:GGG CRYSTALS Final Report, 1 Jan. 1985 - 31 Dec. 1985
E. W. ODell 11 Apr. 1986 21 p
(Contract W-7405-eng-48)
(DE86-009692; UCRL-15784) Avail: NTIS HC A02/MF A01

It has been demonstrated that the pellet feed technique can achieve leveling of chromium concentration in Czochralski growth of Cr, Nd:GGG crystals, but there are serious problems. The most serious one is the presence of iridium inclusions from using the leveling technique. It would be best to attack the problem by preheating the feed material. Observed local variations in refractive index are attributed to variation in chromium concentration. Stress birefringence has varied somewhat in degree and distribution from run to run, but has generally been rather strong in spite of the use of extended necking before starting the cone, efforts to achieve smooth control, etc. DOE

N86-32312# North Carolina Univ., Chapel Hill. Dept. of Physics and Astronomy.
ION BEAM CHANNELING IN SUPERLATTICES
W. K. Chu, W. R. Allen, S. T. Picraux, and J. A. Ellison 1986 5 p Presented at the Materials Research Society Spring Meeting, Palo Alto, Calif., 15 Apr. 1986 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex. and New Mexico Univ., Albuquerque
(Contract DE-AC04-76DP-00789)
(DE86-010094; SAND-85-2388C; CONF-860445-9) Avail: NTIS HC A02/MF A01

Ion beam channeling analysis has recently been applied to lattice strain measurements on strained-layer superlattices (SLS). In this review talk, we outline three different methods of strain measurement: axial dechanneling, angular scans, and planar resonance. We describe the principles and illustrate them with examples; we also give a detailed theoretical treatment of the planar resonance effect in SLS's. DOE

N86-32313# Fraunhofer-Inst. fuer Solare Energiesysteme, Freiburg (West Germany).
DEPOSITION OF CRYSTALLINE SEMICONDUCTOR LAYERS ON AMORPHOUS SUBSTRATES (GRAPHOEPITAXY) Final Report, Jun. 1984
Armin Raeuber and Helmut Hirth Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 66 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-160; ISSN-0340-7608; ESA-86-97441) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

Oriented monocrystalline GaAs layers were prepared on insulating substrates. Oxidized silicon wafers served as substrates because of their excellent surface quality and the possibility of developing Si/SiO2/GaAs sandwich structures. The GaAs was deposited by chemical vapor deposition techniques. Nucleation and overgrowth experiments were performed using etched or deposited structures with dimensions of a few microns as nucleation activators. The selectivity of nucleation is very high, surfaces without activation staying completely free of deposition. Nucleated crystals are in many cases uniform in orientation but not in diameter. Overgrowth experiments were successful when growth was started on a GaAs substrate but were difficult with nucleated crystals. ESA

N86-32314# Technische Univ., Berlin (West Germany). Inst. fuer Werkstoffe der Elektrotechnik.
DEVELOPMENT OF MODELS FOR THE SIMULATION OF THE TEMPERATURE BEHAVIOR OF MOSFETS IN ANALOG AND DIGITAL CIRCUITS IN THE TEMPERATURE RANGE BETWEEN MINUS 55 DEG C TO PLUS 150 DEG C Final Report, Jul. 1984
Juergen Koettnitz, Wolfgang Krautschneider, and Hans-Guenther Wagemann Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 101 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-167; ISSN-0340-7608; ESA-86-97445) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21.50

The semiconductor fundamentals responsible for the temperature behavior of MOS transistors (intrinsic density, carrier mobility, interface state charge, oxide charge, difference of work functions)

were investigated and used for the development of simulation models. Methods to extract model parameters from measured characteristics (e.g., threshold voltage, inversion layer mobility, mobility reduction factor, parasitic series resistance, electrical length of the channel) are presented. Parameters obtained with a physical approach supply indications for further improvement of the models and provide a quality control for the semiconductor technology. ESA

N86-32315# Stuttgart Univ. (West Germany). Inst. fuer Netzwerk- und Systemtheorie.
DEVELOPMENT OF HUMIDITY SENSORS IN TANTALUM THIN FILM TECHNOLOGY Final Report, Dec. 1983
Christian Borgwardt, Traugott Kallfass, and Ernest Lueder Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 129 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-175; ISSN-0340-7608; ESA-86-97447) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27

Dielectric humidity sensors using tantalum thin film technology were manufactured. Tantalum oxide, formed by anodization of sputtered, M-doped, low density tantalum, was used as a porous dielectric layer sensitive to humidity. Among different structures investigated for the electrodes, the best performance was achieved by comb-like, selfaligned electrodes. Capacitance of the dry sensor is between 700 and 1000 pF, tangent of the loss angle at 1 kHz between 10% and 30%; sensitivity 0.5% to 1.5% per % relative humidity (RH) at 50 c and 1kHz; temperature coefficient 5%o/K (temperature between 10 and 50 C, RH 50%, 1 kHz); time characteristics for a change in humidity from 5% to 90% at 20 C are time constant i.e., less than 10 sec, rise time 90% about 45 sec. Simple measuring circuits were developed for the evaluation of the sensor signals. The comb-like sensor was integrated in a thin film hybrid circuit. ESA

N86-32316# Consortium fuer Elektrochemische Industrie G.m.b.H., Munich (West Germany).
THE BEHAVIOR OF NONROTATIONAL STRIATIONS IN SILICON Final Report, Dec. 1981
Helmut Koehler Bonn, West Germany BMFT Dec. 1985 44 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-014; ISSN-0170-1339; ESA-86-97458) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.50

Striations in silicon were studied to determine the effects of gravity and the gradients of surface strain (Marangoni effect). Crystallization of silicon melts in quartz and borum nitride containers of Si melting drops with free surface were studied under gravity and weightlessness. Under destabilizing temperature gradients, nonrotational striations are observed and can be correlated to cellular convection theory. The transition from striated to homogeneous material is described by the critical Rayleigh number. Silicon melts with free surface (molten tip of Si rod) show extended striations due to time-dependent surface driven flow (Marangoni effect). In a Spacelab experiment a molten silicon drop with a free surface slowly crystallized under zero gravity confirms the existence of the Marangoni effect under weightlessness. ESA

N86-32317# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Lage Temperaturen.
MAGNETIC PROPERTIES IN THE PARAMAGNETIC AREA OF TWO FERROMAGNETIC SUPERCONDUCTORS Ph.D. Thesis [MAGNETISCHE EIGENSCHAPPEN, IN HET PARAMAGNETISCHE GEBIED, VAN TWEE FERROMAGNETISCHE SUPERGELEIDERS]
Armand Pruijmboom May 1984 77 p In DUTCH
(ESA-86-97377) Avail: NTIS HC A05/MF A01

Susceptibility measurements in the temperature range 1.5 to 4.2 K were carried out on an Ho1,2Mo6S8 preparation and ErRh1,1Sn3,6 monocrystals using a SQUID and a 10T (i.e., a 0 to 10 Telsa magnetic field variability) susceptometer. A reliable value for the Curie-constant was found while calibrating the 10T disposition. Measurements at H=0 field strength yield an effective ground state moment of 10.16 muB/atom and a 0.11 K paramagnetic Weiss temperature dependance of the Curie-constant which corresponds to the existence of a still lower situated doublet with smaller effective moment is found. A model for the exchange of energy between the spin system, and the conduction electron system and the grid system (in which the conduction electrons exchange energy with the liquid He via the grid) was developed to explain the behavior of the relaxation time above lambda temperature. ESA

N86-32318# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Lage Temperaturen.
INVESTIGATION OF THREE FERROMAGNETIC SUPERCONDUCTORS IN THE MILLI-KELVIN AREA Ph.D. Thesis [ONDERZOEK AAN DRIE FERROMAGNETISCHE SUPERGELEIDERS IN HET MILLIKELVINGEBIED]
Eric Gerritsen May 1984 98 p In DUTCH
(ESA-86-97380) Avail: NTIS HC A05/MF A01

The ternary bonds Ho12Mo6S8 (1), ErRh4Sn3,6 (2), and ErRh4B4 (3), were prepared and investigated, using a 3He-4He mix-cooling machine to create a 100 mK temperature area in which superconductivity and ferromagnetic order can coexist. Direct Current Magnetization (DCMM's) and Resistance Measurements (RM's), were carried out using a SQUID. Crystals of (2) were prepared from Er:Rh melt ratios of 1:1 (a), and 1:2 (b). The DCMM's show ferromagnetic order at temperatures Tc2 of 0,75 K, and 0.52 K. The RM's show superconductivity for only a small part of the (a)-crystals at a temperature Tc1=0.5 K, but a complete superconductivity for the (b)-crystals at Tc1=1.07 K. Temperatures for which the crystals become normal again are 0.66 K (a), and 0.38 K (RM) and 0.52 K (DCMM) for (b). A method to reduce magnetization changes to absolute values for susceptibility was determined. For preparation (3) a Tc1=8.7 K is found. ESA

N86-32319# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Lage Temperaturen.
DYNAMIC SUSCEPTIBILITY ON TWO FIRST-ORDER PHASE TRANSFORMATIONS Ph.D. Thesis [DE DYNAMISCHE SUSCEPTIBILITEIT OP TWEE EERSTE ORDE FASE OVERGANGEN]
J. L. Top May 1984 100 p In DUTCH
(ESA-86-97381) Avail: NTIS HC A05/MF A01

The differential susceptibility of monocrystals in liquid He was measured at 1.64 to 4.2 K with varying magnetic background, magnetic frequency, and the angle in one crystal plane. Anisotropy and critical field strength of the spinflop system CsMnBr3.2H2O were determined as a function of temperature. Assuming a dependence of the activating energy upon the strong coupling in the chains, the relaxation time of the phase transformation was measured (which confirmed the nucleation theory). The axis of preferance in the ac-plane of the metamagnet RbCoCl3.2H2O was unequivocally determined. The angle dependent susceptibility in the phase transformation was explained by the strong anisotropy of the system. The demagnetization factor of an almost ideal spherule was obtained by grinding a crystal. The domain wall relaxation in the phase transformation as a function of the field was investigated. The relaxation time appears minimal in the middle of the transformation and increases when one phase prevails. ESA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-32320# California Univ., Los Angeles. Dept. of Physics.
THEORIES AT 10 SUP (-17) AND 10 SUP (-33) cm

I. Bars 1985 17 p
(Contract DE-FG03-84ER-40168)
(DE86-006870; DOE/ER-40168/T1) Avail: NTIS
HC A02/MF A01

Rapid progress is reported in the areas of Superstring Theory, Composite Quarks and Leptons, Supergravity and Kaluza-Klein Theories. We have shifted our interest heavily toward the Superstring Theory since it has become the most promising unified theory for solving the fundamental questions in the standard model as well as quantum gravity. DOE

N86-32321# International Centre for Theoretical Physics, Trieste (Italy).
SOME FEATURES OF SUSY BREAKING IN N=2 SUPERGRAVITY
S. Cecotti, L. Giradello, and M. Porrati Aug. 1984 11 p
(DE85-703198; IC-84/115) Avail: NTIS (US Sales Only)
HC A02/MF A01

We discuss some features of SUSY breaking in N=2 supergravity. Firstly, we show that in a general N=2 Sugra model (constructed according to the tensor calculus) all stationary points of the potential, at (LAMBDA)=0, are fully supersymmetric if the compensating multiplet is not gauged. Thus a viable super-Higgs effect in N=2 supergravity can occur only in the presence of a Fayet-Iliopoulos term. Then we present an explicit model with two scales of breaking in anti-de Sitter space. Moreover, the ratio of the two gravitino masses is sliding i.e., not determined by the classical potential. In the extreme situation one of the gravitino mass equals (RADICAL)-(LAMBDA)/3, and thus we have partial super-Higgs (in AdS space). The cosmological constant may be arranged to an arbitrary small value while keeping the mass of the heavy gravitino constant. DOE

N86-32322# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
SCHEME TO UNIFY GRAVITY AND ELECTRO-WEAK INTERACTIONS
M. Novello and H. Heintzmann 1985 20 p Prepared in cooperation with Cologne Univ., West Germany
(DE86-701921; CBPF-NF-058/85) Avail: NTIS (US Sales Only)
HC A02/MF A01

The theory of electro-weak interactions and Jordan's description of Einstein's Theory of gravity are unified in a unique scheme. A short-range counterpart of gravity, involving massive tensor bosons of masses 365 GeV and 520.3 GeV, is obtained within the new scheme. DOE

N86-32323# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
STRUCTURE OF SUPERSYMMETRIC THEORIES
J. W. vanHolten Mar. 1986 14 p Presented at Second Hellenic School on Elementary Particle Physics Conference, Corfu, Greece, Sep. 1985
(NIKHEF-H/86-8; B8665343; ESA-86-98059) Avail: NTIS
HC A02/MF A01

The classical structure of globally supersymmetric field theories is introduced. The geometrical interpretation in terms of Kahler manifolds is reviewed. Internal symmetries and their gauging are described. Elementary aspects of quantum supersymmetry and their effects on the particle spectrum are explained. ESA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-32324# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
CALENDAR OF SELECTED AERONAUTICAL AND SPACE MEETINGS
Jul. 1986 142 p In FRENCH and ENGLISH
(AGARD-CAL-86/1; ISBN92-835-0398-8) Avail: NTIS
HC A07/MF A01

Three kinds of events are covered by this calendar: technical meetings, conferences, and symposia, held in all parts of the world, in the field of Aerospace Research and Development as well as in other directly related scientific fields, such as energy, geophysics, and acoustics; exhibitions and technical displays covering the same fields of interest; and educational courses, short or long, given by certain specialized institutions. For each meeting, exhibition, or course, the following information is given: reference number, date, location, title and sponsor, keywords indicating main topics covered; and contact code for inquiries. A subject index in the form of keywords is given. B.G.

N86-32325# Maryland Univ., College Park. Center for Productivity and Quality of Working Life.
METHODOLOGY FOR GENERATING EFFICIENCY AND EFFECTIVENESS MEASURES (MGEEM): A GUIDE FOR COMMANDERS, MANAGERS AND SUPERVISORS Final Report, 1 Jul. 1984 - 31 Jan. 1986
Thomas C. Tuttle and Charles N. Weaver May 1986 28 p
(Contract F33615-83-C-0030)
(AD-A167503; AFHRL-TP-86-26) Avail: NTIS HC A03/MF A01
CSCL 05/1

MGEEM is a multi-step procedure which permits the creation in any organization of a complete productivity measurement system. It provides an overview of the MGEEM process and identifies anticipated benefits, costs, and risks for the Air Force commander, manager, or supervisor contemplating its use. The companion TP, Implementing MGEEM: A Manual for Air Force Measurement Facilitators, provides sufficient technical detail to guide a measurement facilitator through the operational use of the procedure. In a target organization, the MGEEM process begins when a measurement facilitator uses a structured group technique to bring about consensus among the commander (manager or supervisor) and his/her immediate subordinates concerning the organization's principal intended accomplishments, called Key Result Areas (KRAs). In the second step, the facilitator again uses a structured group technique to bring about consensus among another group, the commander's immediate subordinates and selected members of their immediate subordinates, on the question of what the commander needs to know how well the organization is doing on each KRA. GRA

N86-32326# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
AN ANALYSIS OF THE DEFENSE SPACECRAFT MARKET M.S. Thesis
Brad S. Bigelow Dec. 1985 174 p
(AD-A167602; AFIT/GSO/ENS/85D-2) Avail: NTIS
HC A08/MF A01 CSCL 05/3

This study examines the defense spacecraft market in the context of the classical industrial organization paradigm. It takes as the basis for its evaluation of the market the concept of effective competition, using the criteria proposed by Stephen Sosnick in his article, Toward a Concrete Concept of Effective Competition. The thesis begins by briefly describing the origin and evolution of the military space program. It then addresses the structure of the market, outlining the composition and concentration of the industry, the nature of the product, the extent of demand, and the conditions of supply. It discusses the particular structural features of the Department of Defense market. It shows how the conduct of the

market is predominantly influenced by the DOD acquisition process for space systems. The examination of market performance focuses on internal and allocative efficiency, revealing a dramatic decline in productivity since the mid-1960s, due in large part to the increase in the unit cost of materials. It concludes by highlighting the links between the structure, conduct, and performance and shows how deviations for effective competition in the market result from these interactions. GRA

N86-32327# Air Force Systems Command, Bolling AFB, Washington, D.C.
GUIDE TO CANADIAN AEROSPACE RELATED INDUSTRIES
Donald J. Pearson and John R. Niles 28 Feb. 1986 131 p
(AD-A167794; AFSC-TR-86-001) Avail: NTIS HC A07/MF A01 CSCL 05/3

Ths guide is a contracting source list of Canadian aerospace related industries to be used by USAF procurement offices, program managerss, project engineers, and scientists. It provides company profiles, a company keyword index, and contact points for each company. GRA

N86-32328# Technische Hogeschool, Einhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
PRODUCTION AND INVENTORY CONTROL WITH THE BASE STOCK SYSTEM
J. P. J. Timmer, W. Monhemius, and J. W. M. Bertrand May 1984 39 p
(EUT/BDK/12; ISBN-90-6757-012-5; ESA-86-97686) Avail: NTIS HC A03/MF A01

Base stock control (BSC), of safety stocks in a multiproduct multiphase production system is compared with techniques such as master product scheduling. It is shown that BSC results in good control with a low level of safety stocks and reduced control effort. ESA

N86-32329# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
BALANCING PRODUCTION LEVEL VARIATIONS AND INVENTORY VARIATIONS IN COMPLEX PRODUCTION SYSTEMS
J. W. M. Bertrand Apr. 1984 18 p
(THE/BDK/84; ESA-86-97688) Avail: NTIS HC A02/MF A01

The behavior of production levels and stocks in an integrally controlled multiproduct multiphase production system is analyzed. It is shown that certain types of variations in the master production schedule (MPS) may lead to large short term variations in production. To reduce the costs of these variations production smoothing is introduced; a modification of well-known integral production decision rules is derived to realize smoothed production behavior. The quantitative effects of the production smoothing rule on the variations in stocks and production levels are demonstrated. A cost model to determine appropriate values for the smoothing parameters, given a specific production structure, a given capacity structure, and a given variability of the MPS is outlined. ESA

N86-32330# Technische Hogeschool, Eindhoven (Netherlands).
CALCULATING WORKLOAD NORMS FOR JOB SHOPS
J. W. M. Bertrand Apr. 1984 5 p
(BDK/KBS/84-04; ESA-86-97689) Avail: NTIS HC A02/MF A01

A job scheduling and due date assignment rule that adapts the flow time allowance per operation to the time-aggregated remaining workload per work center is described. The method is valid for jobs requiring a linear sequence of operations as well as for single and multilevel assembly types of jobs. Flow time allowances are based on the remaining workload for the work center where the operation is to be performed. To determine an initial schedule, each operation of a job is given an operation due date, which is equal to the maximum operation due date of the previous operation(s), plus the flow time allowance. ESA

N86-32331# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
THE TRADE-OFF MODULE: AN AID TO BALANCE LOGISTICALLY RELATED COSTS [DE TRADE - OFF - MODULE: EEN HULPMIDDEL BIJ HET BALANCEREN VAN LOGISTIEK GERELATEERDE KOSTEN]
P. Durlinger Dec. 1984 20 p In DUTCH
(BDK/KBS/84-06; ESA-86-97690) Avail: NTIS HC A02/MF A01

A model, called the Trade-off Module (TOM), was developed in order to assist in the balancing of the costs between the different divisions in an industry. The model calculates the logistic and economic consequences of decisions concerning delivery times, delivery reliability, size of production series, and production packages. The TOM can be applied on assembly line level. A production unit model, simplified to such an extent that big mistakes on a lower level are excluded, is described. The position of the TOM within the decision hierarchy is outlined. The gray box method used for the application of the TOM in practice is explained. The passage time in a production unit was calculated. The dual constraint (man and machine) problem is explained. ESA

N86-32332# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
THE STRUCTURING OF PRODUCTION CONTROL SYSTEMS
J. W. M. Bertrand and J. Wijngaard May 1984 46 p
(THE/BDK/ORS/84/10; ESA-86-97691) Avail: NTIS HC A03/MF A01

A qualitative methodology for designing hierarchically structured production control systems for complex production situations is presented. The methodology is based on the assumption that complexity should be reduced by defining self-contained subsystems with clear and well-defined operational characteristics. Interactions between the subsystems should be simple and restricted. The production unit (PU) is introduced as a basic control entity. From the perspective of goods flow control the PU's are black boxes having certain operational characteristics. The objective of goods flow control is to realize a delivery performance, taking into account the PU-operational constraints. The main elements in the goods flow control structure developed are master planning, material coordination, workload control and work order release. ESA

N86-32333# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
DUE-DATE RELIABILITY IN A REPAIR SHOP: IMPLICATIONS FOR ORGANIZATIONAL AND WORK DESIGN
H. Kuipers, P. Reinking, and J. C. Wortmann Jul. 1984 29 p
(THE/BDK/KBS/84-14; ESA-86-97692) Avail: NTIS HC A03/MF A01

The design and introduction of a work-order control system in a repair shop to increase the shop's due-date reliability under conditions of uncertainty are discussed. The consequences of the control system for organizational structure and work design are illustrated. The system has far reaching implications for the responsibilities and tasks of employees at each level. Organizational changes, based on notions of the contingency approach are described. Task-design and group-design theory is used to analyze the task-content implications. ESA

N86-32334# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
STRUCTURING THE PRODUCTION CONTROL PROBLEM IN A REPAIR SHOP
J. C. Wortmann and K. Tol Aug. 1984 9 p
(THE/BDK/KBS/84-16; ESA-86-97693) Avail: NTIS HC A02/MF A01

The production control system in a repair shop was improved by structuring the control problem, i.e., decomposing the problem into a number of weakly interdependent subproblems. The proposed control structure distinguishes a master planning level, that sets due-dates for major phases of a repair order; a materials coordination level, that coordinates suborders; and a departmental control level to deal with suborders. A decomposition of the information system into a master planning system and a detailed planning system follow from the control structure. ESA

N86-32335# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Industrial Engineering and Management Science.
A COMPARISON OF CAPACITY ORIENTED AND PRODUCT ORIENTED APPROACHES TO GOODS FLOW CONTROL
Roland Bemelmans and Jacob Wijngaard Apr. 1984 20 p
(ARW-03-THE-BDK/ORS/84/11; ESA-86-97700) Avail: NTIS HC A02/MF A01

The product oriented and the capacity oriented approaches to goods flow control in a multiproduct multistage make-to-stock situation are compared. No clear superiority of either approach is revealed, but the capacity oriented approach makes the relationship to higher levels of control easier. It is possible to combine capacity adjustment decisions with capacity usage decisions. The product oriented approach needs a separate (aggregate) model to make the capacity adjustment decision and it is not always easy to couple this level of decision making properly to the (detailed) product oriented approach of the goods flow control level. ESA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-32336*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BIBLIOGRAPHY OF LEWIS RESEARCH CENTER TECHNICAL PUBLICATIONS ANNOUNCED IN 1985
May 1986 307 p
(NASA-TM-87263; E-2960; NAS 1.15:87263) Avail: NTIS HC A14/MF A01 CSCL 05B

This compilation of abstracts describes and indexes the technical reporting that resulted from the scientific and engineering work performed and managed by the Lewis Research Center in 1985. All the publications were announced in the 1985 issues of STAR (Scientific and Technical Aerospace Reports) and/or IAA (International Aerospace Abstracts). Included are research reports, journal articles, conference presentations, patents and patent applications, and theses. Author

N86-32337# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY. VOLUME 2: REPORT BIBLIOGRAPHY Report, 31 Dec. 1984 - 31 Dec. 1985
31 Dec. 1985 61 p
(Contract F19628-85-C-0002)
(AD-A167987; ESD-TR-85-320-Vol-2) Avail: NTIS HC A04/MF A01 CSCL 09/5

This bibliography lists reports published from 31 December 1984 to 31 December 1985, as well as updated information on earlier publications. Author and subject index are provided as well as DTIC AD-number when available. GRA

N86-32338# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
DATABASE CAPACITY PLANNING AND MANAGEMENT
K. Linsenmann 1986 24 p Presented at the 15th International Software AG Users Conference, San Diego, Calif., 11 May 1986
(Contract DE-AC07-76ID-01570)
(DE86-009076; EGG-M-03286; CONF-860593-1) Avail: NTIS HC A02/MF A01

The DATABASE ADMINISTRATION (DBA) has developed a utility process that performs three functions utilizing the ADABAS general control block (GCB) and the ADABAS file control block (FCB). The three functions are file space management, automated file unload/load and physical file placement and management. ADABAS cost per command, ADABAS command durations and labor cost have been examined. DOE

N86-32339# Oak Ridge National Lab., Tenn.
CARBON DIOXIDE INFORMATION CENTER THESAURUS
R. E. Millemann and R. M. Cushman Apr. 1986 62 p
(Contract DE-AC05-84OR-21400)
(DE86-009013; ORNL/CDIC-5) Avail: NTIS HC A04/MF A01

This thesaurus lists the keywords (including narrower, broader, and related terms, as well as forbidden terms) used by the Carbon Dioxide Information Center for the input and retrieval of records for its Bibliographic Information System (BIS). BIS is a specialized bibliographic data base on carbon dioxide and climate. It is being merged into the Department of Energy's Energy Data Base (EDB). The keywords used in the BIS Thesaurus are also used in the much larger EDB thesaurus so EDB may be searched for CO_2 records. DOE

N86-32340# Argonne National Lab., Ill.
COMPUTING SERVICES SOFTWARE LIBRARY
L. M. Clark and W. H. Jones Mar. 1986 52 p
(Contract W-31-109-eng-38)
(DE86-009491; ANL/TM-436) Avail: NTIS HC A04/MF A01

This technical memorandum serves as a practical guide for managers, supervisors, programmers, analysts, and other data processing personnel who need to consult the documentation or use the software available in the Software Library. Policies and procedures necessary to preserve the software documentation and protect the Laboratory's investment in software are presented. Included are sections on responsibilities of the Software Librarian and Software Coordinators, software change control policy, systems programming section software maintenance tools, information systems section software maintenance tools and use of the LIBRARY exec. The LIBRARY exec, which serves as the Master Index, provides on-line information about documents. DOE

N86-32341# Research Inst. of National Defence, Linkoeping (Sweden). Lab. for Information Systems.
[ACTIVITIES REPORT OF THE LABORATORY FOR INFORMATION SYSTEMS] Annual Report, 1985
Jan. 1986 50 p
(FOA-C-30410-E1; ISSN-0347-3708; ESA-86-97239) Avail: NTIS HC A03/MF A01; Research Inst. of National Defense, Stockholm, Sweden KR 50

Research activities concerning computer vision; a geographical information system; knowledge engineering; space information systems; and computer techniques are summarized. Associated activities include image processing, mathematical software in Ada, and instrumentation and data acquisition. ESA

N86-32342# Institut National Polytechnique, Grenoble (France).
COHERENCE MAINTENANCE IN DISTRIBUTED DATABASE SYSTEMS Ph.D. Thesis [MAINTIEN DE LA COHERENCE DANS LES SYSTEMES D'INFORMATION REPARTIS]
Roland Balter 1985 186 p In FRENCH
(ESA-86-97292) Avail: NTIS HC A09/MF A01

Coherence control in distributed systems is studied. The coherence, transaction and atomization concepts are discussed. The properties of coherence control mechanisms are analyzed. The solutions found in the development of the SCOT project are recalled. The definition of a transactional base adapted to the SCOT functional requirements is presented. Errors and faults management is discussed. A comparative analysis of lock-out mechanisms allows the identification of access synchronization techniques. The results are used in distributed database systems design. ESA

N86-31955# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
INTRODUCTION TO THE PROJECT DESIGN OF A USER'S INTERFACE FOR GRAPHIC-ALPHANUMERICAL DATA BANKS [EINFUEHRUNG IN DAS PROJEKT ENTWURF EINER BENUTZERSCHNITTSTELLE FUER EINE GRAPHISCH-ALPHANUMERISCHE DATENBANK]
Isa Ramm and Hans-Dieter Ehrich *In its* Reports on Cartography and Geodesy. Series 1: Original Reports, No. 95 1985 p 115-123

In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

N86-31957# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
BRIEF REPORT ON DESIGN AND IMPLEMENTATION OF A DATA BANK CORE SYSTEM [KURZBERICH UEBER ENTWURF UND IMPLEMENTIERUNG EINES DATENBANKKERN-SYSTEMS]
Hans-Joerg Schek *In its* Reports on Cartography and Geodesy. Series 1: Original reports, No. 95 1985 p 135-141 In GERMAN; ENGLISH summary (For primary document see N86-31946 23-43)
Avail: NTIS HC A09/MF A01

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N86-32343# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France). Div. Systemes Balistiques et Spatiaux.
LEGISLATION FOR SOFTWARE RIGHTS PROTECTION AT LAST [ENFIN UN STATUT POUR LA PROTECTION DES LOGICIELS]
Olivier Brun and Marie-France Murphy 1986 5 p
(SNIAS-861-422-114; ESA-86-97601) Avail: NTIS HC A02/MF A01

The deficiencies of French jurisprudence and the content of a law to protect the rights for the exploitation of computer programs are discussed. The positive aspects of the law are shown. ESA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-32344 Bundesministerium fuer Forschung und Technologie, Bonn (West Germany).
[RESEARCH ACTIVITIES REPORT OF THE GERMAN FEDERAL GOVERNMENT] Annual Report, 1984 [BUNDESBERICHT FORSCHUNG 1984]
1984 432 p In GERMAN
(ISSN-0722-8333; ESA-86-97413) Avail: Issuing Activity

The orientation and perspectives of the research and technology policy of the West German government are presented. The resources for science, research and development are given. The main Federal requirements for research and technology are explained. The research and technology policy of the States is presented. International cooperation in the field of research and technology is listed. Production and research organizations in the Federal Republic of Germany are presented. ESA

N86-32345# B-K Dynamics, Inc., Rockville, Md.
IDENTIFICATION OF AIR FORCE EMERGING TECHNOLOGIES AND MILITARILY SIGNIFICANT EMERGING TECHNOLOGIES Final Report, 1 Sep. 1984 - 31 Aug. 1985
Patrick P. McDermott 31 Aug. 1985 136 p
(Contract F49620-84-C-0099)
(AD-A167088; BKD-TR-5-763; AFOSR-86-0230TR) Avail: NTIS HC A07/MF A01 CSCL 05/1

The objective of this effort was to review Air Force research and existing emerging technologies lists, to conduct interviews and analyze data in order to identify likely candidates for a Military Emerging Technologies Awareness List (METAL). A METAL was constructed, in consultation with AFOSR, based on original research and interview data. The contract effort consisted of 3 stages: 1) Preparation of a Preliminary Militarily Significant Emerging Technologies List (MSET) from 3 existing Air Force emerging technologies lists. 2) In-depth interviews at 6 Air Force Laboratories covering 70 topical areas. Technologies were identified, based on criteria outlined in Stage 1, as Mature Technologies, Emerging Technologies, or MSETs. If technologies could be correlated to those in the Militarily Critical Technologies List (MCTL), they were designated as Militarily Critical Technologies (MCTs). Interviews provided discussion of a technology's military significance and sensitivity to public release, and 3) Assessment of Interview Results identified the preliminary METAL, and identified the importance of the interview process in ultimately determining the MSETs. Further efforts are to continue to identify, review, and finalize the Air Force METAL. GRA

N86-32346# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 40, NUMBER 6 Monthly Report
C. J. Fox Jun. 1986 34 p
(AD-A167501; ESN-40-6-Vol-40-No-6) Avail: NTIS HC A03/MF A01 CSCL 05/2

ESN is a monthly publication with brief articles on recent developments in European scientific research. Topics in this issue include: Acoustics Research at the Inst. for Sound and Vibration Research, Univ. of Southhampton, UK; Biological Science performed at TNO--The Netherlands and the Center of Immunology, Marseille-Luminy, France; Composite Materials Research in Two French Universities; Fracture Mechanics and Welding Research at the Technical Research Center of Finland; Charge-Density Wave Studies in Natural Low Dimensional Materials at Bristol Univ.; and UK Pulsed-Power Group Formed. GRA

N86-32347# European Space Agency, Paris (France).
PREPARING FOR THE FUTURE: THE ESA TECHNOLOGICAL RESEARCH AND DEVELOPMENT PROGRAM 1986-1988 Executive Summary
Norman Longdon, ed. Dec. 1985 55 p Original document contains color illustrations
(ESA-SP-1079; ISSN-0250-1589; ESA-86-97566) Avail: NTIS HC A04/MF A01

European Space Agency work on Earth-space telematics; space communications; infrastructure; global Earth monitoring; deep space and observatory facilities; microgravity utilization; space platforms; in-orbit operations; and maintenance of European competitiveness is outlined. ESA

88 SPACE SCIENCES (GENERAL)

N86-32348*# Lunar and Planetary Inst., Houston, Tex.
WORKSHOP ON COSMOGENIC NUCLIDES
Robert C. Reedy, ed. and Peter Englert, ed. 1986 82 p Workshop held in Los Alamos, N. Mex., 26-27 Jul. 1984; sponsored by LPI and LANL
(Contract NASw-4066)
(NASA-CR-176886; NAS 1.26:176886; LPI-TR-86-06) Avail: NTIS

HC A05/MF A01 CSCL 03B

Abstracts of papers presented at the Workshop on Cosmogenic Nuclides are compiled. The major topic areas covered include: new techniques for measuring nuclides such as tandem accelerator and resonance mass spectrometry; solar modulation of cosmic rays; pre-irradiation histories of extraterrestrial materials; terrestrial studies; simulations and cross sections; nuclide production rate calculations; and meteoritic nuclides. For individual titles, see N86-32349 through N86-32371.

N86-32349*# California Univ., San Diego. Dept. of Chemistry.
NUCLIDE PRODUCTION IN (VERY) SMALL METEORITES c90
James R. Arnold and Kunihiko Nishiizumi *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

One of the most interesting open questions in the study of cosmic-ray effects in meteorites is the expected behavior of objects which are very small compared to the mean interaction length of primary galactic cosmic ray (GCR) particles. A reasonable limit might be a pre-atmospheric radius of 5 gram/cm(2), or 1.5 cm for chondrites. These are interesting for at least three reasons: (1) this is a limiting case for large objects, and can help us make better models; (2) this size is intermediate between usual meteorites and irradiated grams (spherules); and (3) these are the most likely objects to show solar cosmic ray (SCR) effects. Reedy (1984) has recently proposed a model for production by GCR of radioactive and stable nuclides in spherical meteorites. Very small objects are expected to deviate from this model in the direction of fewer secondary particles (larger spectral shape parameter), at all depths. The net effect will be significantly lower production of such low-energy products as Mn-53 and Al-26. The SCR production of these and other nuclides will be lower, too, because meteorite orbits extend typically out into the asteroid belt, and the mean SCR flux must fall off approximately as r(-2) with distance from the Sun. Kepler's laws insure that for such orbits most of the exposure time is spent near aphelion. None the less the equivalent mean exposure distance, R(exp), is slightly less than the semimajor axis A because of the weighting by R(-2). For the three meteorite orbits we have, R(exp) has a narrow range, from about 1.6 to 2.1 a.u. This is probably true for the great majority of meteorites. M.G.

N86-32350*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
SIMULATION EXPERIMENTS FOR GAMMA-RAY MAPPING OF PLANETARY SURFACES: SCATTERING OF HIGH-ENERGY NEUTRONS c91
J. Brueckner, P. Englert (Cologne Univ. (West Germany).), R. C. Reedy (Los Alamos National Lab., N. Mex.), and H. Waenke *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

The concentration and distribution of certain elements in surface layers of planetary objects specify constraints on models of their origin and evolution. This information can be obtained by means of remote sensing gamma-ray spectroscopy, as planned for a number of future space missions, i.e., Mars, Moon, asteroids, and comets. To investigate the gamma-rays made by interactions of neutrons with matter, thin targets of different composition were placed between a neutron-source and a high-resolution germanium spectrometer. Gamma-rays in the range of 0.1 to 8 MeV were accumulated. In one set of experiments a 14-MeV neutron generator using the T(d,n) reaction as neutron-source was placed in a small room. Scattering in surrounding walls produced a spectrum of neutron energies from 14 MeV down to thermal. This complex neutron-source induced mainly neutron-capture lines and only a few scattering lines. As a result of the set-up, there was a considerable background of discrete lines from surrounding materials. A similar situation exists under planetary exploration conditions: gamma-rays are induced in the planetary surface as well as in the spacecraft. To investigate the contribution of neutrons with higher energies, an experiment for the measurement of prompt gamma radiation was set up at the end of a beam-line of an isochronous cyclotron. M.G.

N86-32351*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
PRECOMPACTION IRRADIATION EFFECTS: PARTICLES FROM AN EARLY ACTIVE SUN? c92
M. W. Caffee, J. N. Goswami (Physical Research Lab., Ahmedabad (India).), C. M. Hohenberg, and T. D. Swindle *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

Two recent studies have shown that solar flare irradiated grains from Murchison and Kapoeta have excess spallogenic Ne-21 compared to unirradiated grains, indicating large precompaction particle irradiation effects. The quantity of cosmogenic neon in these grains presents serious difficulties for either galactic cosmic ray or normal solar flare sources. In the first study it was suggested that the effect might be the result of exposure to an early active sun. The more recent experiment both confirms the earlier results and provides constraints on the characteristic energy spectrum on the irradiation. The first results were obtained from Murchison olivines and Kapoeta pyroxenes by mass spectrometric analysis of sets of grains selected on the basis of the presence or absence of solar flare particle tracks. In the second work plagioclase feldspar grains from Kapoeta were studied. M.G.

N86-32352*# Rochester Univ., N. Y. Nuclear Structure Research Lab.
DETERMINATION OF CA-41, I-129 AND OS-187 IN THE ROCHESTER TANDEM ACCELERATOR AND SOME APPLICATIONS OF THESE ISOTOPES c72
U. Fehn, D. Elmore, H. E. Gove, P. Kubik, R. Teng, and L. Tubbs *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 20H

The measurement of Ca-41 and I-129 utilizing the Rochester Tanden Accelerator Mass Spectrometer (TAMS) is discussed. Ca-41, having a half-life of 100,000 yrs., is of potential use for the dating of ground water as well as of bones in the age range between 50,000 and 1 million yrs. A major problem for the measurement of Ca-41 with TAMS is the fact that calcium does not readily form negative atomic ions. It does, however, form negative molecular ions. The production of CaO ions from compounds such as CaO and CaCO3 and from free Ca molecules sprayed with oxygen gas was studied. A project to utilize I-129 as a tracer for hydrothermal convection in sediment-covered oceanic crust is also briefly described. Finally, plans to use the Os-187/Os-186 ratio for the determination of extraterrestrial material in the Ries crater in Germany are summarized. M.G.

N86-32353*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.
SOLAR MODULATION OF GALACTIC COSMIC RAYS: CONTEMPORARY OBSERVATIONS AND THEORIES c92
M. A. Forman *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

The flux of galactic cosmic rays inside the solar system is modulated by the action of the complex magnetic fields carried from the Sun by the solar wind. This is apparent from the recurrent decrease of about 20% in the intensity of relativistic cosmic rays during sunspot maximum compared to sunspot minimum, from transient decreases due to solar flares and many other more subtle effects observed by ground stations for the last 50 years. Spacecraft observations of the spatial and temporal variations of cosmic ray flux during the last ten years have shown that the solar wind and cosmic-ray modulation extend to at least 30 astronomical units in the ecliptic plane. Present best guesses are that it goes out to 100 or 200 AU, perhaps less over the poles. Theories describing the mechanism of solar modulation are outlined

and the importance of having a firm understanding of this mechanism to the study of other astrophysical phenomena is discussed. M.G.

N86-32354*# Physical Research Lab., Ahmedabad (India).
EVOLUTION OF GAS-RICH METEORITES: CLUES FROM COSMOGENIC NUCLIDES c90
J. N. Goswami *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

The evolution of gas-rich meteorites in general, and the setting in which the observed solar-wind, solar-flare irradiation records were imprinted in individual components of these meteorites are understood only in qualitative terms, although contrary viewpoints do exist. The regolith irradiation hypothesis, bolstered by the observations of irradiation features in lunar regolith materials, similar to those observed in gas-rich meteorites, is accepted by many workers in this field. However, a close analysis of the problem suggests that the regolith irradiation may not be the dominant mode in producing the observed precompaction irradiation features in the gas-rich meteorites. M.G.

N86-32355*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
THE EXPOSURE HISTORY OF JILIN AND PRODUCTION RATES OF COSMOGENIC NUCLIDES c90
G. Heusser *In* Lunar and Planetary Inst. Workshop on cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

Jilin, the largest known story meteorite, is a very suitable object for studying the systematics of cosmic ray produced nuclides in stony meteorites. Its well established two stage exposure history even permits to gain information about two different irradiation geometries (2pi and 4pi). All stable and long-lived cosmogenic nuclides measured in Jilin so far correlate well with each other. An example is shown where the Al-26 activities are plotted vs. the spallogenic Ne-21 concentration. These records of cosmic-ray interaction in Jilin can be used both to determine the history of the target and to study the nature of production rate profiles. This is unavoidably a bootstrap process, involving studying one with assumption about the other. Production rate equations are presented and discussed. M.G.

N86-32356*# Arizona Univ., Tucson. NSF Accelerator Facility for Radioisotope Analysis
RADIONUCLIDE MEASUREMENTS BY ACCELERATOR MASS SPECTROMETRY AT ARIZONA c90
A. J. T. Jull, D. J. Donahue, and T. H. Zabel *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

Over the past years, Tandem Accelerator Mass Spectrometry (TAMS) has become established as an important method for radionuclide analysis. In the Arizona system the accelerator is operated at a thermal voltage of 1.8MV for C-14 analysis, and 1.6 to 2MV for Be-10. Samples are inserted into a cesium sputter ion source in solid form. Negative ions sputtered from the target are accelerated to about 25kV, and the injection magnet selects ions of a particular mass. Ions of the 3+ charge state, having an energy of about 9MeV are selected by an electrostatic deflector, surviving ions pass through two magnets, where only ions of the desired mass-energy product are selected. The final detector is a combination ionization chamber to measure energy loss (and hence, Z), and a silicon surface-barrier detector which measures residual energy. After counting the trace isotope for a fixed time, the injected ions are switched to the major isotope used for normalization. These ions are deflected into a Faraday cup after the first high-energy magnet. Repeated measurements of the isotope ratio of both sample and standards results in a measurement of the concentration of the radionuclide. Recent improvements in sample preparation for C-14 make preparation of high-beam current graphite targets directly from CO2 feasible. Except for some measurements of standards and backgrounds for Be-10 measurements to date have been on C-14. Although most results have been in archaeology and quaternary geology, studies have been expanded to include cosmogenic C-14 in meteorites. The data obtained so far tend to confirm the antiquity of Antarctic meteorites from the Allan Hills site. Data on three samples of Yamato meteorites gave terrestrial ages of between about 3 and 22 thousand years. M.G.

N86-32357*# Scripps Institution of Oceanography, La Jolla, Calif. Geological Research Div.
COSMIC RAY INTERACTIONS IN THE GROUND: TEMPORAL VARIATIONS IN COSMIC RAY INTENSITIES AND GEOPHYSICAL STUDIES c93
D. Lal *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

Temporal variations in cosmic ray intensity have been deduced from observations of products of interactions of cosmic ray particles in the Moon, meteorites, and the Earth. Of particular interest is a comparison between the information based on Earth and that based on other samples. Differences are expected at least due to: (1) differences in the extent of cosmic ray modulation, and (2) changes in the geomagnetic dipole field. Any information on the global changes in the terrestrial cosmic ray intensity is therefore of importance. In this paper a possible technique for detecting changes in cosmic ray intensity is presented. The method involves human intervention and is applicable for the past 10,000 yrs. Studies of changes over longer periods of time are possible if supplementary data on age and history of the sample are available using other methods. Also discussed are the possibilities of studying certain geophysical processes, e.g., erosion, weathering, tectonic events based on studies of certain cosmic ray-produced isotopes for the past several million years. M.G.

N86-32358*# Lawrence Livermore National Lab., Calif.
PRODUCTION RATES OF NEON XENON ISOTOPES BY ENERGETIC NEUTRONS c25
D. A. Leich, R. J. Borg, and V. B. Lanier *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 07D

As a first step in an experimental program to study the behavior of noble gases produced in situ in minerals, a suite of minerals and pure chemicals were irradiated with 14.5 MeV neutrons at LLNL's Rotating Target Neutron Source (RTNS-II) and production rates for noble gases were determined. While neutron effects in meteorites and lunar samples are dominated by low-energy neutron capture, more energetic cosmic-ray secondary neutrons can provide significant depth-dependent contributions to production of cosmogenic nuclides through endothermic reactions such as (n,2n), (n,np), (n,d) and (n,alpha). Production rates for nuclides produced by cosmic-ray secondary neutrons are therefore useful in interpreting shielding histories from the relative abundances of cosmogenic nuclides. Absolute production cross sections were calculated from isotope dilution analyses of NaCl, Mg, CsCl, and Ba(NO3)2 samples, assuming purity, stoichiometry, and quantitative noble gas retention and extraction. Relative production cross sections determined from neon isotopic ratios in the mineral samples were also considered in evaluating the neon production cross sections. Results are presented. M.G.

N86-32359*# California Univ., San Diego, La Jolla.
LIVE 129I-129Xe DATING c72
Kurt Marti *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 20H

A technique of cosmic ray exposure age dating using cosmic ray produced I-129 and Xe-129 components is discussed. The live I-129 - Xe-129 method provides an ideal monitor for cosmic ray flux variations on the 10(7)y - 10(8)y time-scale. It is based on low-energy neutron reactions on Te, and these data, when

coupled to those from other methods, may facilitate the detection of complex exposure histories. M.G.

N86-32360*# Cologne Univ. (West Germany). Inst. for Kernchemie.
PRODUCTION OF RADIONUCLIDES IN ARTIFICIAL METEORITES IRRADIATED ISOTROPICALLY WITH 600 MeV PROTONS **c90**
R. Michel, P. Dragovitsch, P. Englert, and U. Herpers *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 4 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

The understanding of the production of cosmogenic nuclides in small meteorites (R is less than 40 cm) still is not satisfactory. The existing models for the calculation of depth dependent production rates do not distinguish between the different types of nucleons reacting in a meteorite. They rather use general depth dependent particle fluxes to which cross sections have to be adjusted to fit the measured radionuclide concentrations. Some of these models can not even be extended to zero meteorite sizes without logical contradictions. Therefore, a series of three thick target irradiations was started at the 600 MeV proton beam of the CERN isochronuous cyclotron in order to study the interactions of small stony meteorites with galactic protons. The homogeneous 4 pi irradiation technique used provides a realistic meteorite model which allows a direct comparison of the measured depth profiles with those in real meteorites. Moreover, by the simultaneous measurement of thin target production cross sections one can differentiate between the contributions of primary and secondary nucleons over the entire volume of the artificial meteorite. M.G.

N86-32361*# Los Alamos National Lab., N. Mex.
RESONANCE IONIZATION MASS SPECTROMETRY FOR ISOTOPIC ABUNDANCE MEASUREMENTS **c25**
C. M. Miller *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 07D

Resonance ionization mass spectrometry (RIMS) is a relatively new laser-based technique for the determination of isotopic abundances. The resonance ionization process depends upon the stepwise absorption of photons from the laser, promoting atoms of the element of interest through progressively higher electronic states until an ion is formed. Sensitivity arises from the efficiency of the resonant absorption process when coupled with the power available from commercial laser sources. Selectivity derives naturally from the distinct electronic structure of different elements. This isobaric discrimination has provided the major impetus for development of the technique. Resonance ionization mass spectrometry was used for analysis of the isotopic abundances of the rare earth lutetium. Isobaric interferences from ytterbium severely effect the ability to measure small amounts of the neutron-deficient Lu isotopes by conventional mass spectrometric techniques. Resonance ionization for lutetium is performed using a continuous-wave laser operating at 452 nm, through a sequential two-photon process, with one photon exciting the intermediate resonance and the second photon causing ionization. Ion yields for microgram-sized quantities of lutetium lie between 10(6) and 10(7) ions per second, at overall ionization efficiencies approaching 10(-4). Discrimination factors against ytterbium greater than 10(6) have been measured. Resonance ionization for technetium is also being explored, again in response to an isobaric interference, molybdenum. Because of the relatively high ionization potential for Tc, three-photon, two-color RIMS processes are being developed. M.G.

N86-32362*# California Univ., San Diego. Dept. of Chemistry.
COMPILATION OF COSMOGENIC RADIONUCLIDES IN METEORITES **c90**
Kunihiko Nishiizumi *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

All available data for the concentration of cosmogenic nuclides Mn-53(t(1/2) = 3.7 x 10(6) years), Al-26 (7.05 x 10(5) years), Be-10 (1.6 x 10(6) years), Cl-36 (3.0 x 10(5) years) and Ne-21, and Ne-22/Ne-21 ratios in stony, iron, and stony-iron meteorites were compiled. For iron meteorites, the He-4/Ne-21 ratio was adopted instead of Ne-22/Ne-21 ratio, because the He-4/Ne-21 ratio in iron meteorites indicates the shielding condition of the sample. The compilation contains over 2000 different analyses for four cosmogenic radionuclides. Author

N86-32363*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
REDETERMINATION OF PARAMETERS FOR SEMI-EMPIRICAL MODEL FOR SPALLOGENIC He AND Ne IN CHONDRITES **c90**
L. E. Nyquist and A. F. McDowell (Lunar and Planetary Inst., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

A semi-empirical model described previously satisfactorily reproduced a number of shielding-dependent variations in the relative production rates of spallogenic He and Ne in chondrites. However, data for cores of the Keyes and St. Severin meteorites showed a subsurface build-up in He-3 which was not predicted with the original model parameters and the model was not pursued. Renewed interest in the preatmospheric size of meteorites, spurred in part by the desirability of understanding the exposure history of the SNC meteorites, justifies redetermination of model parameters. M.G.

N86-32364*# Department of Energy, New York. Environmental Measurements Lab.
CALCULATIONS OF COSMOGENIC NUCLIDE PRODUCTION RATES IN THE EARTH'S ATMOSPHERE AND THEIR INVENTORIES **c46**
Keran OBrien *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 04A

The production rates of cosmogenic isotopes in the Earth's atmosphere and their resulting terrestrial abundances have been calculated, taking into account both geomagnetic and solar-modulatory effects. The local interstellar flux was assumed to be that of Garcia-Munoz, et al. Solar modulation was accounted for using the heliocentric potential model and expressed in terms of the Deep River neutron monitor count rates. The geomagnetic field was presented by vertical cutoffs calculated by Shea and Smart and the non-vertical cutoffs calculated using ANGRI. The local interstellar particle flux was first modulated using the heliocentric potential field. The modulated cosmic-ray fluxes reaching the earth's orbit then interacted with the geomagnetic field as though it were a high-pass filter. The interaction of the cosmic radiation with the Earth's atmosphere was calculated utilizing the Bolztmann transport equation. Spallation cross sections for isotope production were calculated using the formalism of Silberberg and Tsao and other cross sections were taken from standard sources. Inventories were calculated by accounting from the variation in solar modulation and geomagnetic field strength with time. Results for many isotope, including C-14, Be-7 and Be-10 are in generally good agreement with existing data. The C-14 inventory, for instance, amounts to 1.75/sq cm(e)/s, in excellent agreement with direct estimates. M.G.

N86-32365*# Rutgers Univ., New Brunswick, N. J. Dept. of Chemistry.
THE 10Be CONTENTS OF SNC METEORITES **c90**
D. K. Pal, C. Tuniz (Istituto Nazionale di Fisica Nucleare, Trieste (Italy).), R. K. Moniot (Fordham Univ., New York, N.Y.), W. Savin (New Jersey Inst. of Tech., Newark.), S. Vajda, T. Kruse, and G. F. Herzog *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

Several authors have explored the possibility that the Shergot-

tites, Nakhlites, and Chassigny (SNC) came from Mars. The spallogenic gas contents of the SNC meteorites have been used to: constrain the sizes of the SNC's during the last few million years; to establish groupings independent of the geochemical ones; and to estimate the likelihood of certain entries in the catalog of all conceivable passages from Mars to Earth. The particular shielding dependence of Be-10 makes the isotope a good probe of the irradiation conditions experienced by the SNC meteorites. The Be-10 contents of nine members of the group were measured using the technique of accelerator mass spectrometry. The Be-10 contents of Nakhla, Governador Valadares, Chassigny, and probably Lafayette, about 20 dpm/kg, exceed the values expected from irradiation of the surface of a large body. The Be-10 data therfore do not support scenario III of Bogard et al., one in which most of the Be-10 in the SNC meteorites would have formed on the Martian surface; they resemble rather the Be-10 contents found in many ordinary chondrites subjected to 4 Pi exposures. The uncertainties of the Be-10 contents lead to appreciable errors in the Be-10 ages, t(1) = -1/lambda ln(1 Be-10/Be-10). Nonetheless, the Be-10 ages are consistent with the Ne-21 ages calculated assuming conventional, small-body production rates and short terrestrial ages for the finds. It is believed that this concordance strengthens the case for at least 3 different irradiation ages for the SNC meteorites. Given the similar half-thicknesses of the Be-10 and Ne-21 production rates, the ratios of the Be-10 and Ne-21 contents do not appear consistent with common ages for any of the groups. In view of the general agreement between the Be-10 and Ne-21 ages it does not seem useful at this time to construct multiple-stage irradiation histories for the SNC meteorites. M.G.

N86-32366*# Cologne Univ. (West Germany). Inst. fuer Kernchemie.

STUDIES ON COSMOGENIC NUCLIDES IN METEORITES WITH REGARD TO AN APPLICATION AS POTENTIAL DEPTH INDICATORS c90

R. Sarafin, U. Herpers, P. Englert, R. Wieler (Eidgenoessische Technische Hochschule, Zurich (Switzerland).), P. Signer, G. Bonani, H. J. Hofmann, E. Morenzoni, M. Nessi, M. Suter et al *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)

Avail: NTIS HC A05/MF A01 CSCL 03B

Measurements of stable and radioactive spallation products in meteorites allow to investigate their histories, especially with respect to the exposure to galactic cosmic ray particles and the pre-atmospheric size of the object. While the concentrations of spallation products lead to the determination of exposure and terrestrial ages, production rate ratios are characteristic for the location of the sample in the meteorite. So, one of the aims of this investigation on meteorites is to obtain depth indicators from suitable pairs of cosmogenic nuclides. Because of the different depth profiles for nuclide productions it is necessary to determine the concentrations of a larger number of spallation products in aliquots of a single small sample. Such same sample measurements of Be-10 and light noble gases were performed on 15 ordinary chondrites (7 H- and 8 L-chondrites. Be-10 was determined by accelerator mass spectrometry and the noble gases were measured by static mass spectrometry. The results are summarized and discussed. Author

N86-32367*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).

THE PRODUCTION RATE OF COSMOGENIC 21-Ne IN CHONDRITES DEDUCED FROM 81-Kr MEASUREMENTS c90

L. Schultz and M. Freundel *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)

Avail: NTIS HC A05/MF A01 CSCL 03B

Cosmogenic Ne-21 is used widely to calculate exposure ages of stone meteorites. In order to do so, the production rate P(21) must be known. This rate, however, is dependent on the chemical composition of the meteorite as well as the mass of, and position within, the meteoroid during its exposure to the cosmic radiation. Even for a mean shielding the production rates determined from measurments of different radionuclides vary by a factor of two. A method that can be used to determine exposure ages of meteorites that avoids shielding and chemical composition corrections is the -81-Kr-Kr-method. However, for chondrites, in many cases, the direct determination of production rates for the Kr isotopes is prevented by the trapped gases and the neutron effects on bromine. Therefore, this method was applied to four eucrite falls and then their 81-Kr-83-Kr-ages were compared to their cosmogenic Ne-21 and Ar-38 concentrations. The eucrites Bouvante-le-Haut, Juvinas, Sioux County, and Stannern were chosen for these measurements because of their similar chemical composition regarding the major elements. Author

N86-32368*# Arizona Univ., Tucson. Dept. of Planetary Sciences.

A DIRECT TIME SERIES COMPARISON BETWEEN THE LA JOLLA AND BELFAST RADIOCARBON RECORDS c90

C. P. Sonett and H. E. Suess (California Univ., San Diego.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)

Avail: NTIS HC A05/MF A01 CSCL 03B

For many years it has been widely assumed that the variations in the level of atmospheric carbon-14 were due to statistical fluctuations arising from experimental error. This is understandable since the signal/noise ratio is very low and the time sequences representing the variations are strongly stochastic. Interlaboratory comparisons show that baseline variations in the absolute value of the carbon-14 concentration do exist. However, assuming linearity, the delta 14C values are independent of these. The importance of assessing the quantitive reality of the delta 14C values is based upon their expression of the interplanetary cosmic ray source function, because in the range of 100 to 1000 year periods, there appears to be no evidence that the Earth's magnetic field is the source modulating function. Therefore the modulation is either due to changes in the solar atmosphere propagated out into the solar wind, or extra-heliospheric pressure effects, but these appear to be unlikely for the periods noted here. The recent availability of the new high quality Belfast time sequence of delta 14C now permits a simple mutual assessment of the several sequences which are available. Since the La Jolla record has been a standard for many years , these two were chosen for a simple comparison. Although differences exist, the close agreement between these two sequences, one carried out on White mountain Bristlecone pines, and the other done using Irish peat bog wood, is striking. This correlation between the two strongly reinforces the statistical view that the delta 14C record is that of real interplanetary modulation of the cosmic ray source leading to the generation of atmospheric 14C. M.G.

N86-32369*# York Coll., Jamaica, N. Y.

NEUTRON CAPTURE PRODUCTION RATES OF COSMOGENIC 60Co, 59NI AND 36CI IN STONY METEORITES c90

M. S. Spergel, R. C. Reedy (Los Alamos National Lab., N. Mex.), O. W. Lazareth (Brookhaven National Lab., Upton, N. Y.), and P. W. Levy *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)

Avail: NTIS HC A05/MF A01 CSCL 03B

Results for neutron flux calculations in stony meteoroids (of various radii and compositions) and production rates for Cl-36, Ni-59, and Co-60 are reported. The Ni-59/Co-60 ratio is nearly constant with depth in most meteorites: this effect is consistent with the neutron flux and capture cross section properties. The shape of the neutron flux energy spectrum, varies little with depth in a meteorite. The size of the parent meteorite can be determined from one of its fragments, using the Ni-59/Co-60 ratios, if the parent meteorite was less than 75 g/cm(2) in radius. If the parent meteorite was larger, a lower limit on the size of the parent meteorite can be determined from a fragment. In C3 chondrites this is not possible. In stony meteorites with R less than 50 g/cm(2) the calculated Co-60 production rates (mass less than 4 kg), are below 1 atom/min g-Co. The highest Co-60 production rates occur in stony meteorites with radius about 250 g/cm(2) (1.4 m across). In meteorites with radii greater than 400 g/cm(2), the maximum

Co-60 production rate occurs at a depth of about 175 g/cm(2) in L-chondrite, 125 g/cm(2) in C3 chrondrite, and 190 g/cm(2) in aubrites. M.G.

N86-32370*# Cologne Univ. (West Germany). Inst. fuer Kernchemie.
SIMULATION OF COSMIC IRRADIATION CONDITIONS IN THICK TARGET ARRANGEMENTS **c93**
S. Theis, P. Englert, R. C. Reedy (Los Alamos National Lab., N. Mex.), and J. R. Arnold (California Univ., San Diego.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

One approach to simulate 2-pi irradiation conditions of planetary surfaces which has been widely applied in the past are bombardments of so called thick targets. A very large thick target was exposed recently to 2.1 GeV protons at the Bevatron-Bevalac in Berkeley. In a 100x100x160 cm steel-surrounded granodiorite target radioactive medium and high energy spallation products of the incident primary and of secondary particles were analyzed along the beam axis down to depths of 140 g/cm(2) in targets such as Cu, Ni, Co, Fe, T, Si, SiO2 and Al. Activities of these nuclides were exclusively determined via instrumental gamma-ray spectroscopy. Relative yields of neutron capture and spallation products induced in Co and Cu targets during the thick target bombardment are shown as a function of depth. The majority of the medium energy products such as Co-58 from Co targets exhibit a maximum at shallow depths of 40-60 g/cm(2) and then decrease exponentially. In a comparable 600 MeV proton bombarded thick target such a slight maximum for medium energy products was not observed. Rather, Co-58 activities in Co decreased steadily with the highest activity at the surface. The activities of the n-capture product Co-60 increase steadily starting at the surface. This indicates the rapidly growing flux of low energy neutrons within the target. M.G.

N86-32371*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
COSMOGENIC RARE GASES AND 10-Be IN A CROSS SECTION OF KNYAHINYA **c90**
R. Wieler, P. Signer, U. Herpers (Cologne Univ. (West Germany).), R. Sarafin, G. Bonani, H. J. Hofmann, E. Morenzoni, M. Nessi, M. Suter, and W. Woelfli *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

The concentrations of cosmogenic nuclides were studied as a function of shielding on samples from a cross section of the 293 kg main fragment of the L5 chondrite Knyahinya. The stone broke into two nearly symmetrical parts upon its fall in 1866. The planar cross section has diameters between 40 and 55 cm. He, Ne, and Ar were measured on about 20 samples by mass spectrometry and the 10-Be activities on aliquots of 10 selected samples were determined by AMS. The 10-Be data are presented and the abundances of spallogenic nuclides are compared with the model calculations reported by Reedy for spherical L chondrites. The 10-Be production rates in Knyahinya are shown versus the shielding parameter 22-Ne/21-Ne. M.G.

N86-32372# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
[ACTIVITIES REPORT OF THE INSTITUTE OF EXTRATERRESTRIAL PHYSICS] Progress Report, 1985 [TAETIGKEITSBERICHT 1985]
Jan. 1986 122 p In GERMAN Original document contains color illustrations
(MPE-194; ISSN-0173-699X; ESA-86-97476) Avail: NTIS HC A06/MF A01

Reconnection in magnetized plasmas, pickup ions in the solar wind, and quasiperiodic oscillations are discussed. The Active Magnetospheric Particle Tracer Explorer experiment; magnetospheric plasma; energetic ions and electrons in the magnetosphere; and interplanetary space are treated. X-ray and IR astronomy observation systems and theoretical work; and gamma astronomy flare and burst phenomena are treated. In laboratory astrophysics, molecular spectroscopical and theoretical research was performed, and the dynamics of multimode lasers was investigated. ESA

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-32373*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A DIGITAL IMAGING PHOTOMETRY SYSTEM FOR COMETARY DATA ACQUISITION Center Director's Discretionary Fund Final Report
K. S. Clifton, C. M. Benson, and G. A. Gary Jul. 1986 28 p
(NASA-TM-86554; NAS 1.15:86554) Avail: NTIS HC A03/MF A01 CSCL 03A

This report describes a digital imaging photometry system developed in the Space Science Laboratory at the Marshall Space Flight center. The photometric system used for cometary data acquisition is based on an intensified secondary electron conduction (ISEC) vidicon coupled to a versatile data acquisition system which allows real-time interactive operation. Field tests on the Orion and Rosette nebulas indicate a limiting magnitude of approximately m sub v = 14 over the 40 arcmin field-of-view. Observations were conducted of Comet Giacobini-Zinner in August 1985. The resulting data are discussed in relation to the capabilities of the digital analysis system. The development program concluded on August 31, 1985. Author

N86-32374*# Massachusetts Univ., Amherst. Dept. of Physics and Astronomy.
BOUNDARY CONDITIONS FOR THE PALEOENVIRONMENT: CHEMICAL AND PHYSICAL PROCESSES IN THE PRE-SOLAR NEBULA Semiannual Status Report, 16 Feb. - 15 Aug. 1986
William M. Irvine and F. Peter Schloerb 1986 11 p
(Grant NAGw-436)
(NASA-CR-176870; NAS 1.26:176870; SASR-7) Avail: NTIS HC A02/MF A01 CSCL 03A

The first interstellar hydrocarbon ring, cyclopropenylidene (C3H2) is being studied. Both a survey of galactic sources in several C3H2 transitions and a more detailed study of a subset of these sources are under way. In the latter category is a study of the nearby cold dark cloud TMC-1, which is a potential formation site for solar type stars. A spectra is shown of seven rotational transitions which have been observed at the Five College Radio Astronomy Observatory. Three of these were detected for the first time in any astronomical source: the 3 sub 30 to 2 sub 21 transition at 216 GHz, the 2 sub 21 to 1 sub 10 transition at 122 GHz, and the 1 sub 11 to 0 sub 00 transition at 52 GHz. From the data it is apparent that C3H2 is quite spacially extended in typical interstellar molecular clouds, and that at least in TMC-1 it is one of the most abundant organic molecules. E.R.

N86-32375*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXTREME LIMB PROFILES OF THE SUN AT FAR-INFRARED AND SUBMILLIMETER WAVELENGTHS
C. Lindsey (Hawaii Univ., Honolulu.), E. E. Becklin, F. Q. Orrall, M. W. Werner, J. T. Jefferies (National Optical Astronomy Lab. Tucson, Ariz.), and I. Gatley (United Kingdom Infrared Telescope Unit, Hilo, Hawaii.) Jun. 1986 41 p
(NASA-TM-88251; A-86236; NAS 1.15:88251) Avail: NTIS HC A03/MF A01 CSCL 03A

Thirty, 50, 100, and 200 microns solar limb intensity profiles determined with arcsecond resolution from airborne observations of the occultation of the solar limb during the total eclipse of 1981 July 31 are presented. Two points of particular importance emerge: (1) the longer-wavelength (100 and 200 micron) limbs are significantly brighter than disk center. At 200 microns the

extreme limb is about 1.22 times the brightness of disk center. This is consistent with the 6000 K temperature-plateau structure of the model chromospheres of Vernazza, Avrett, and Loeser (1973, Ap. J., 184, 605; 1981; Ap. J. Suppl., 45, 635;) and (2) the longer wavelength limbs are extended significantly further above the visible limb than Vernazza, Avrett, and Loeser predict. These results provide a strong basis for modeling of the solar chromosphere free from the assumption of gravitational-hydrostatic equilibrium.
Author

N86-32376*# Delaware Univ., Newark.
ULTRAVIOLET OBSERVATIONS OF ASTRONOMICAL PHENOMENA Final Report
Dermott J. Mullan 9 Sep. 1986 26 p
(Grant NAG5-556)
(NASA-CR-176859; NAS 1.26:176859) Avail: NTIS HC A03/MF A01 CSCL 03A

The purpose was to study various aspects of mass loss in stars of different types. The observational part of the research was directed at three Cepheid variables; the archival part of the research was directed at hot stars (for information on corotating interaction regions) and at cool giants (for study of variability in the mass losing part of the atmosphere).
Author

N86-32377*# National Bureau of Standards, Boulder, Colo. Joint Inst. for Lab. Astrophysics
DEFINITION AND EMPIRICAL STRUCTURE OF THE RANGE OF STELLAR CHROMOSPHERES-CORONAE ACROSS THE H-R DIAGRAM: COOL STARS
Jeffrey L. Linsky 23 Sep. 1986 34 p
(Grants NGL-06-003-057; NAG5-82)
(NASA-CR-176863; NAS 1.26:176863) Avail: NTIS HC A03/MF A01 CSCL 03A

Major advances in our understanding of non-radiative heating and other activity in stars cooler than T sub eff = 10,000K has occured in the last few years. This observational evidence is reviewed and the trends that are now becoming apparent are discussed. The evidence for non-radiatively heated outer atmospheric layers (chromospheres, transition regions, and coronae) in dwarf stars cooler than spectral type A7, in F and G giants, pre-main sequence stars, and close bindary systems is unambiguous, as is the evidence for chromospheres in the K and M giants and supergiants. The existence of non-radiative heating in the outer layers of the A stars remains undetermined despite repeated searches at all wavelengths. Two important trends in the data are the decrease in plasma emission measure with age on the main sequence and decreasing rotational velocity. Variability and atmospheric inhomogeneity are commonly seen, and there is considerable evidence that magnetic fields define the geometry and control the energy balance in the outer atmospheric layers. In addition, the microwave observations imply that non-thermal electrons are confined in coronal magnetic flux tubes in at least the cool dwarfs and RS CVn systems. The chromospheres in the K and M giants and supergiants are geometrically extended, as are the coronae in the RS CVn systems and probably also in other stars.
Author

N86-32378*# Texas Univ., Austin. Dept. of Astronomy.
[ACTIVITIES OF THE DEPARTMENT OF ASTRONOMY AND MCDONALD OBSERVATORY OF THE UNIVERSITY OF TEXAS AT AUSTIN] Semiannual Report, 1 Jan. - 30 Jun. 1986
Harlan J. Smith 1986 12 p
(Grant NGR-44-012-152)
(NASA-CR-179667; NAS 1.26:179667; SAR-25) Avail: NTIS HC A02/MF A01 CSCL 03A

McDonald Observatory of the University of Texas at Austin reports on its activities during the period 1 Jan. 1986 to 30 June 1986. Extensive observations of Halley's Comet were obtained. The comet exhibited large variability; moreover, its variability was much more rapid than can be accounted for by water vaporization as the sole controller of activity. Jupiter satellite Io's atmosphere was found to be distended by more than the equilibrium scale height but less than for unimpeded streaming into space. The atmosphere is at least temporarily bound to IO. Uranus' (3-0) H2 quadrupole line shapes require a modification of Baines and Bergstralh's standard model which incorporates at high altitude absorbing haze in addition to the lower haze layer. A fraction of normal H2 equal to 0.25 + or 0.10 is derived, in good agreement with the standard model. This result is unchanged when the preliminary temperature structure derived by the Voyager Radio Occultation Experiment is used instead of Appleby's model c. Out of the six Pluto-Charon mutual events observed this year, data were obtained on four. Preliminary analysis is yielding improved estimates for the diameters, masses, densities, and albedos of these objects.
Author

N86-32379# Max-Planck-Inst. fuer Astronomie, Heidelberg (West Germany).
THE PHOTOPOLARIMETER OF THE INFRARED SPACE TELESCOPE GIRL: MECHANICAL AND ELECTRICAL COMPONENTS FOR CRYOVACUUM Final Report, Jun. 1985
Wilhelm Martin, Dietrich Lemke, Horst Bauer, Heinrich Bellmann, and Alfred Krabbe Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 50 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-026; ISSN-0170-1339; ESA-86-97468) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany, DM 10.50

A ratchet was developed for photopolarimeter filters, apertures, and polarizers for operation at cryogenic temperatures. It allows accurate discrete positioning in space applications. Hall probes used for position recognition were studied as regards sensitivity, reproducibility, and reliability. Point contacts for filter and aperture wheel, and cooling in liquid helium were tested, to achieve high sensitivity and photometric accuracy of the photopolarimeter and to protect it against thermal interference radiation. Capacitors, displacement transducers, photodetectors, and light emitting diodes were tested for application at low temperatures. These mechanical and electrical components can be integrated in the GIRL photopolarimeter consisting of 2 identical photometers covering the 3 to 30 and 30 to 200 micron ranges to be applied in cryovacuum.
ESA

N86-32380# European Southern Observatory, Munich (West Germany).
[ACTIVITIES REPORT IN ASTRONOMY] Annual Report, 1985
L. Woltjer 1985 91 p In ENGLISH, GERMAN and FRENCH
(ISSN-0531-4496; ESA-86-97551) Avail: NTIS HC A05/MF A01

Ground based astronomical research concerning galaxies, quasars, the Magellanic clouds, interstellar matter, clusters and galactic structure, X-ray sources, stars, and the solar system is summarized.
ESA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-32381*# California Inst. of Tech., Pasadena.
REDUCTION AND ANALYSIS OF DATA FROM EXPERIMENT CAI ON THE IMP-8 MISSION Final Report, 24 Mar. 1980 - 31 Dec. 1984
E. C. Stone and R. A. Mewaldt 1984 10 p
(Contract NAS5-25789)
(NASA-CR-177891; NAS 1.26:177891) Avail: NTIS HC A02/MF A01 CSCL 03B

The Caltech Electron/Isotope Spectrometer (EIS) on the Interplanetary Monitoring Platform 8 (IMP-8) has provided precise measurements of the energy spectra and time variations of low energy electrons (0.16 to 6 MeV), the isotopes of hydrogen and helium (approximately 2 to 40 MeV/nucleon), and the elements from lithium through oxygen (approximately 5 to 50 MeV/nucleon) in energetic particle fluxes of solar, galactic, interplanetary, and

magnetospheric origin since 1973. The accomplishments that have resulted from EIS measurements during the period March 24, 1980 to December 31, 1984 are summarized. Author

N86-32382*# California Univ., Los Angeles. Dept. of Astronomy.
A SIRTF INTERDICIPLINARY SCIENTIST PROPOSAL Semiannual Technical Report, 1 Apr. - 12 Sep. 1986
Edward L. Wright 12 Sep. 1986 60 p
(Grant NAG2-315)
(NASA-CR-176862; NAS 1.26:176862) Avail: NTIS HC A04/MF A01 CSCL 03B

Segal's chronometric cosmology provides an adequate fit to the radio source counts only for an unrealistic choice of spectral index. Since the typical observed spectral index of 0.75 gives a completely unacceptable X squared = 136 with 24 (or fewer) degrees of freedom, it is concluded that the actual Universe does not fit the chronometric model. Counts of ultraviolet excess quasistellar objects also show a steep N(S) curve that the chronometric cosmology cannot explain. Claims to the contrary by Segal, Loncaric, and Segal (1980) and Segal and Nicoll (1986) depend on a seemingly innocuous assumption that in fact destroys the power of the N(S) test. Even though the chronometric model gives a better fit that other non-evolving models it must be ruled out along with all non-evolving cosmologies. Author

N86-32383# Fermi National Accelerator Lab., Batavia, Ill.
GAUGE ANOMALIES, GRAVITATIONAL ANOMALIES AND SUPERSTRINGS
W. A. Bardeen Aug. 1985 17 p Presented at the INS International Symposium on Composite Models of Quarks and Leptons, Tokyo, Japan, 13 Aug. 1985
(Contract DE-AC02-76CH-03000)
(DE86-005489; FNAL/C-85/110-T; CONF-8508151-2) Avail: NTIS HC A02/MF A01

The structure of gauge and gravitational anomalies are reviewed. The impact of these anomalies on the construction, consistency, and application of the new superstring theories will be discussed. DOE

N86-32384# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
STUDY BY SYNCHROTRON RADIATION OF THE SUPERSTRUCTURE OF TETRATAENITE FROM THE SAINT-SEVERIN METEORITE
T. Tagai, H. Takeda, M. Tokinami, and J. Danon 1985 3 p
(DE86-701971; CBPF-NF-059/85) Avail: NTIS (US Sales Only) HC A02/MF A01

Tetrataenite is one of the FeNi minerals which is found in meteorite. The ordering state of Fe/Ni atoms in tetrataenite is determined, because it is closely connected with the thermal history of meteorites. DOE

N86-32385# Tuebingen Univ. (West Germany). Astronomisches Inst.
RESONANCE SCATTERING OF SOLAR RADIATION BY THE INTERPLANETARY MEDIUM Final Report, Dec. 1980
Carsten Wulf-Mathies Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 130 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-032; ISSN-0170-1339; ESA-86-97473) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27.50

The interplanetary resonance radiation of neutral hydrogen and helium at 121.6 nm and 58.4 nm was observed to analyze the temperature and the density of the interstellar medium in the vicinity of the Sun. The interstellar wind theory and solar line emissions are presented. The thermal effects on H density and He density are analyzed. The profile of the 58.4 nm line is calculated to determine the radiation distribution. The complete frequency redistribution is a good approximation of the resonance scattering process. The total intensity of the 58.4 nm line is calculated by a fourfold integration of a function including velocity distribution, frequency redistribution, and line shape. Results show differences < 10% between calculations and the approximate method. The method is sufficient to evaluate the 58.4 nm background measurements. ESA

N86-32349*# California Univ., San Diego. Dept. of Chemistry.
NUCLIDE PRODUCTION IN (VERY) SMALL METEORITES
James R. Arnold and Kunihiko Nishiizumi *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32354*# Physical Research Lab., Ahmedabad (India).
EVOLUTION OF GAS-RICH METEORITES: CLUES FROM COSMOGENIC NUCLIDES
J. N. Goswami *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32355*# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
THE EXPOSURE HISTORY OF JILIN AND PRODUCTION RATES OF COSMOGENIC NUCLIDES
G. Heusser *In* Lunar and Planetary Inst. Workshop on cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32356*# Arizona Univ., Tucson. NSF Accelerator Facility for Radioisotope Analysis
RADIONUCLIDE MEASUREMENTS BY ACCELERATOR MASS SPECTROMETRY AT ARIZONA
A. J. T. Jull, D. J. Donahue, and T. H. Zabel *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32360*# Cologne Univ. (West Germany). Inst. for Kernchemie.
PRODUCTION OF RADIONUCLIDES IN ARTIFICIAL METEORITES IRRADIATED ISOTROPICALLY WITH 600 MeV PROTONS
R. Michel, P. Dragovitsch, P. Englert, and U. Herpers *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 4 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32362*# California Univ., San Diego. Dept. of Chemistry.
COMPILATION OF COSMOGENIC RADIONUCLIDES IN METEORITES
Kunihiko Nishiizumi *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32363*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
REDETERMINATION OF PARAMETERS FOR SEMI-EMPIRICAL MODEL FOR SPALLOGENIC He AND Ne IN CHONDRITES
L. E. Nyquist and A. F. McDowell (Lunar and Planetary Inst., Houston, Tex.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32365*# Rutgers Univ., New Brunswick, N. J. Dept. of Chemistry.
THE 10Be CONTENTS OF SNC METEORITES
D. K. Pal, C. Tuniz (Istituto Nazionale di Fisica Nucleare, Trieste (Italy).), R. K. Moniot (Fordham Univ., New York, N.Y.), W. Savin (New Jersey Inst. of Tech., Newark.), S. Vajda, T. Kruse, and G. F. Herzog *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32366*# Cologne Univ. (West Germany). Inst. fuer Kernchemie.
STUDIES ON COSMOGENIC NUCLIDES IN METEORITES WITH REGARD TO AN APPLICATION AS POTENTIAL DEPTH INDICATORS
R. Sarafin, U. Herpers, P. Englert, R. Wieler (Eidgenoessische Technische Hochschule, Zurich (Switzerland).), P. Signer, G. Bonani, H. J. Hofmann, E. Morenzoni, M. Nessi, M. Suter et al *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32367*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
THE PRODUCTION RATE OF COSMOGENIC 21-Ne IN CHONDRITES DEDUCED FROM 81-Kr MEASUREMENTS
L. Schultz and M. Freundel *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32368*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
A DIRECT TIME SERIES COMPARISON BETWEEN THE LA JOLLA AND BELFAST RADIOCARBON RECORDS
C. P. Sonett and H. E. Suess (California Univ., San Diego.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32369*# York Coll., Jamaica, N. Y.
NEUTRON CAPTURE PRODUCTION RATES OF COSMOGENIC 60Co, 59NI AND 36Cl IN STONY METEORITES
M. S. Spergel, R. C. Reedy (Los Alamos National Lab., N. Mex.), O. W. Lazareth (Brookhaven National Lab., Upton, N. Y.), and P. W. Levy *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32371*# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
COSMOGENIC RARE GASES AND 10-Be IN A CROSS SECTION OF KNYAHINYA
R. Wieler, P. Signer, U. Herpers (Cologne Univ. (West Germany).), R. Sarafin, G. Bonani, H. J. Hofmann, E. Morenzoni, M. Nessi, M. Suter, and W. Woelfli *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 1 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N86-32386*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIORS OF THE GIANT PLANETS Semiannual Report, 1 Oct. 1985 - 1 Apr. 1986
W. B. Hubbard 18 Sep. 1986 7 p
(Grant NsG-7045)
(NASA-CR-177154; NAS 1.26:177154; SAR-24) Avail: NTIS HC A02/MF A01 CSCL 03B

The Neptune central flash data obtained from the August 20, 1985 occultation was analyzed. The three main objectives of the analysis, which combined the study of the CTIO data with the ESO data obtained by the Meudon groups were: deduce the oblateness, equatorial radius, and pole positon angle of Neptune from a combined analysis of the limb-occultation and central-flash data; determine the temperature/absorption profile in Neptune's atmosphere in the region probed by the occultation data (from 1 microbar to about 0.2 mbar), as well as atmospheric distortions produced by waves or turbulence; and search for additional Neptune ring arcs. Results were discussed in terms of the three main objectives. B.G.

N86-32387# Michigan Univ., Ann Arbor. Dept. of Physics.
A SENSITIVE RADAR SEARCH FOR SMALL NATURAL SATELLITES OF THE EARTH Final Report, 15 May 1983 - 14 Jul. 1985
Michael J. Longo 30 Sep. 1985 17 p
(Grant AF-AFOSR-0128-83)
(AD-A167777; AFOSR-86-0238TR) Avail: NTIS HC A02/MF A01 CSCL 03/3

We have used radar tracking data from NORAD to perform a sensitive search for small natural satellites of the Earth. This search would be sensitive to satellites ranging from 5 cm in diameter with perigee heights 400 km to about 40 cm with perigees 10000 km. While a few unidentified objects were found, these were all near transfer orbits likely to contain debris from satellite launches. No objects that are unlikely to be manmade were seen. GRA

N86-32388# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
SOLID STATE TRANSFORMATIONS IN Fe-NI ALLOYS FROM METEORITES IN POWDER FORM
R. B. Scorzelli, J. Danon, and E. G. da Silva 1985 14 p Prepared in cooperation with Minas Gerais Univ., Belo Horizonte, Brazil
(DE86-701936; CBPF-NF-066/85) Avail: NTIS (US Sales Only) HC A02/MF A01

Moessbauer studies by transmission and back-scattering techniques with Cape York and Santa Catharina meteorites in powder form are reported. Martensitic transformation from gamma-phase to alpha-phase is induced by mechanical treatment and long-range order is affected. DOE

N86-32350*# Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
SIMULATION EXPERIMENTS FOR GAMMA-RAY MAPPING OF PLANETARY SURFACES: SCATTERING OF HIGH-ENERGY NEUTRONS
J. Brueckner, P. Englert (Cologne Univ. (West Germany).), R. C. Reedy (Los Alamos National Lab., N. Mex.), and H. Waenke *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-32351*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
PRECOMPACTION IRRADIATION EFFECTS: PARTICLES FROM AN EARLY ACTIVE SUN?
M. W. Caffee, J. N. Goswami (Physical Research Lab., Ahmedabad (India).), C. M. Hohenberg, and T. D. Swindle *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32353*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.
SOLAR MODULATION OF GALACTIC COSMIC RAYS: CONTEMPORARY OBSERVATIONS AND THEORIES
M. A. Forman *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 2 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-32357*# Scripps Institution of Oceanography, La Jolla, Calif. Geological Research Div.
COSMIC RAY INTERACTIONS IN THE GROUND: TEMPORAL VARIATIONS IN COSMIC RAY INTENSITIES AND GEOPHYSICAL STUDIES
D. Lal *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

N86-32370*# Cologne Univ. (West Germany). Inst. fuer Kernchemie.
SIMULATION OF COSMIC IRRADIATION CONDITIONS IN THICK TARGET ARRANGEMENTS
S. Theis, P. Englert, R. C. Reedy (Los Alamos National Lab., N. Mex.), and J. R. Arnold (California Univ., San Diego.) *In* Lunar and Planetary Inst. Workshop on Cosmogenic Nuclides 1986 3 p (For primary document see N86-32348 23-88)
Avail: NTIS HC A05/MF A01 CSCL 03B

99 GENERAL

No abstracts in this category.

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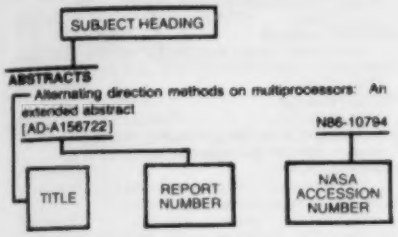

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[NLR-MP-85053-U] N86-31848

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Aeronautical engineering: A continuing bibliography with indexes (supplement 202)
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Aeronautical engineering: A continuing bibliography with indexes (supplement 203)
[NASA-SP-7037(203)] N86-31526
Earth resources: A continuing bibliography with indexes, issue 50
[NASA-SP-7041(50)] N86-31940
Photovoltaics: Electricity from sunlight, FY 1985 accomplishments
[DE86-004429] N86-31986
USSR Space Life Sciences Digest, issue 7
[NASA-CR-3922(08)] N86-32083
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 288)
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USSR Space Life Sciences Digest, issue 7
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External respiration, gas exchange, and blood oxygen parameters in acute methemoglobinemia
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Guard cell biochemistry: Response to environmental stimuli causing changes in gas exchange
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Aerospace medicine and biology: A continuing bibliography with indexes (supplement 288)
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Evaluation of the need for a large primate research facility in space
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Air Force technical objective document, Aerospace Medical Division, FY 1987
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Wall shear stress measurements on a prolate spheroid at zero incidence in the German-Netherlands Wind (DNW) Tunnel — boundary layer transition
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Numerical simulation of boundary layers. Part 2: Ribbon-induced transition in Blasius flow
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Conditioned hot-wire anemometer measurements and structural analysis of a turbulent spot in a laminar boundary layer
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Theory and operation of the Gould 32/27 programs ABLE-2A and EBLE for the tropospheric air motion measurement system
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Inflow boundary conditions for steady flows of viscoelastic fluids with differential constitutive laws
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Efficient high order algorithms for elliptic boundary value problems using full multigrid techniques together with extrapolation methods
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Pointwise a-priori bounds for strongly coupled semilinear parabolic systems
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On asymptotic error estimates for the combined boundary and finite element method
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The Hamilton-Jacobi-Bellman equation with a gradient constraint
[AD-A167532] N86-32237
Effect of triangular element orientation on finite element solutions of the Helmholtz equation
[NASA-TM-87351] N86-32247
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Calendar of selected aeronautical and space meetings
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Standard calibration procedure for pencil beam infrared sensors on spinning satellites, volume 1
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Standard calibration procedure for pencil beam infrared sensors on spinning satellites. Volume 2: Applicable software and user manuals
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A remote controlled calibration device for displacement transducers
[ECN-173] N86-31873
International comparison of interpolation procedures for the efficiency of germanium gamma-ray spectrometers (GAM83 exercise)
[ECN-181] N86-31874
LANDSAT 4 band 6 data evaluation
[NASA-CR-177173] N86-31944

Calibration of multispectral scanner (MSS) satellite data to evaluate change in the reflection of coniferous stocks
[ESA-TT-938] N86-31971
CALIFORNIA
Coast of California storm and tidal waves study: Nearshore bathymetric survey report, San Diego region
[AD-A168119] N86-32076
CAMBERED WINGS
Mission adaptive wing soars at NASA Facility
[P86-10182] N86-31563
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Moisture determinations in and under vegetation canopies
[FEL-1985-52] N86-31973
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System study of the utilization of space for carbon dioxide research
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Carbon Dioxide Information Center thesaurus
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Koln Bonn, West Germany limited surface observations climatic summary (LISOCS), parts A, c-f
[AD-A167649] N86-32046
Revised Uniform Summary of Surface Weather Observations (RUSSWO). Parts A-F: Peterson AFB, Colorado Springs, Colorado
[AD-A167650] N86-32047
Revised Uniform Summary of Surface Weather Observations (RUSSWO). Parts A-F: Macdill AFB, Florida
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Revised Uniform Summary of Surface Weather Observations (RUSSWO). Parts A-F: Cape Newenham, Alaska
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[AD-A168173] N86-31967
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Image quality criteria with emphasis on criteria for remote sensing imagery
[NLR-TR-84040-U] N86-31974
Activities report in aerospace survey and space sciences
[ESA-86-98042] N86-31976
Introduction to the interpretation of remote sensing data
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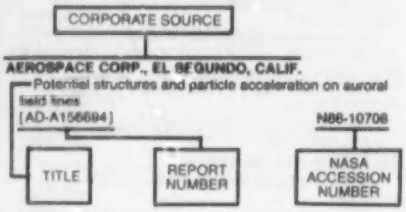

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Remote gas analysis with lasers. Analytic laboratory investigations in the 3.4 to 4.2 microns range
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Research activities report of the German Federal Government
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CENTER FOR MATHEMATICS AND COMPUTER SCIENCE, AMSTERDAM (NETHERLANDS).
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A bispectral method for the height determination of ice clouds
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DIRECTION DES RECHERCHES ETUDES ET TECHNIQUES, PARIS (FRANCE).
Space and defense
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Moisture measurement in solids
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The USGS (US Geological Survey) X-, C-, and L- band SAR data collection program
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EUROPEAN SOUTHERN OBSERVATORY, MUNICH (WEST GERMANY).
Activities report in astronomy
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EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Design of a basic profile for a slightly swept wing. Part 2: Experimental investigation on the airfoil DFVLR-W1 in the Brunswick Transonic Wind Tunnel (TWB)
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FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Advisory Circular: Design considerations to protect fuel systems during a wheels-up landing
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Characteristics of altitude error at reduced quantization
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FONDAZIONE UGO BORDONI, ROME (ITALY).
Longterm speech spectra of nonstationary autoregressive models
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Physical significance of least mean squares criterion in nonstationary lattice predictors
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FRAUNHOFER-INST. FUER ATMOSPHAERISCHE UMWELTFORSCHUNG, GARMISCH-PARTENKIRCHEN (WEST GERMANY).
Balance of the tropospheric ozone and its relation to stratospheric intrusions indicated by cosmogenic radionuclides, part 13
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GKSS-FORSCHUNGSZENTRUM GEESTHACHT (WEST GERMANY).
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Flow and cycle covering in graphs and matroids
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Electrical and environmental studies of conduction polymers
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System design and integration of the large-scale advanced prop-fan
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Insights into the fracture toughness of martensitic stainless steels using stereoscopic fractographic measurements
[DE86-009415] N86-31719
HATFIELD POLYTECHNIC (ENGLAND).
Start solution for interplanetary low thrust trajectory optimization and model refinement, volume 1
[ESA-CR(P)-2175-VOL-1] N86-31612
Start solution for interplanetary low thrust trajectory optimisation and model refinement. Volume 2: User's guide to the software for low thrust orbit optimization for interplanetary missions using a linear model
[ESA-CR(P)-2175-VOL-2] N86-31613
Start solution for interplanetary low thrust trajectory optimization and model refinement. Volume 3: Low thrust orbit optimization for interplanetary missions using a Pontryagin/Lambert approach
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[BMFT-FB-T-85-164] N86-31869
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Alcohol as a fuel in a high speed diesel engine with double injection system
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Comparison of Clifford and Grassmann algebras in applications to electromagnetics, revision 1
[DE86-009716] N86-31775

INFORMATION SYSTEMS AND TECHNOLOGY CENTER, WRIGHT-PATTERSON AFB, OHIO.
Ada (trade name) compiler validation summary report: Verdix Corporation Verdix Ada Development System, version 5.2 for the Tektronix 6130 under UTek, release 2.1.1
[AD-A166872] N86-32113
Ada (trade name) compiler validation summary report: TeleSoft, Inc. TeleSoft Ada, version 2.39 Gould PS3000 host, Gould CONCEPT/32 (trade name) model 6750 target
[AD-A167470] N86-32114
INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Atmospheric molecules
[AERONOMICA-ACTA-F-39-1985] N86-32004
Frontiers of the plasmasphere (theoretical aspects)
[AERONOMICA-ACTA-A-296-1985] N86-32288
INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS (FRANCE).
Theoretical study of the Bernard-Karman vortex path. Application to the experimental study of the flow around a thick obstacle
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Application of an inviscid multivortex model to the calculation of the vortex flow behind an airfoil profile with spoiler
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INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
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Integration of the topography in teledetection image data processing
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INSTITUTE FOR PERCEPTION RVO-TNO, SOESTERBERG (NETHERLANDS).
Auditory versus visual selective-attention tasks
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INSTITUTO NACIONAL DE TECNICA AERODESPACIAL, ESTEBAN TERRADAS, TORREJON DE ARDOZ (SPAIN).
Liquid chromatography analysis of ester type synthetic lubricants
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INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA (AUSTRIA).
International Centre for Theoretical Physics: Scientific activities in 1984
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Installation of a modular building block photovoltaic concentrator array field
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INTERUNIVERSITAIR REACTOR INSTITUUT, DELFT (NETHERLANDS).
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Mechanical properties testing of several 800 MeV proton irradiated BCC metals and alloys
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Experimental investigations of the role of laser field fluctuations in non-linear optical absorption processes
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Multichannel automatic device for measuring ultralow temperatures
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A conservative rating procedure for cyclically loaded, buried cables
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Influence of radiation-induced segregation on ductility of a nickel-silicon alloy
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Flight data recorders (FDR) and/or cockpit Voice Recorders (CVR) in the Lockheed Orion P-3C Update 2
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Unclassified publications of Lincoln Laboratory. Volume 2: Report bibliography
[AD-A167987] N86-32337

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MAX-PLANCK-INST. FUER PHYSIK UND ASTROPHYSIK, GARCHING (WEST GERMANY).
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Notes on modeling the cloud topped boundary layer N86-32036
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MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.

Low-speed aerodynamic characteristics of a 1/8-scale X-29A airplane model at high angles of attack and sideslip
[NASA-TM-87722] N86-31532
User's manual for XTRAN2L (version 1.2): A program for solving the general-frequency unsteady transonic small-disturbance equation
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Stability analysis of intermediate boundary conditions in approximate factorization schemes
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

Comparison of analytical and experimental performance of a wind-tunnel diffuser section
[NASA-TM-86795] N86-31537
NASA's Aircraft Icing Analysis Program
[NASA-TM-88791] N86-31548
In-flight photogrammetric measurement of wing ice accretions
[NASA-TM-87191] N86-31562
Small gas turbine combustor experimental study: Compliant metal/ceramic liner and performance evaluation
[NASA-TM-87304] N86-31582
Visualization of flows in a motored rotary combustion engine using holographic interferometry
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[NASA-TM-88808] N86-31586
An overview of the Small Engine Component Technology (SECT) studies
[NASA-TM-88796] N86-31587
Turbulent dispersion of the icing cloud from spray nozzles used in icing tunnels
[NASA-TM-87316] N86-31588
Centaur engine gimbal friction characteristics under simulated thrust load
[NASA-TM-87335] N86-31621
ACTS Experiments Program
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Test program to provide confidence in liquid oxygen cooling of hydrocarbon fueled rocket thrust chambers
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Evaluation of a hybrid hydrostatic bearing for cryogenic turbopump application
[NASA-TM-87255] N86-31649
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Analysis of the Gas Particle Radiator (GPR)
[NASA-TM-88786] N86-31652
Fiber composite sandwich thermostructural behavior: Computational simulation
[NASA-TM-88787] N86-31663
ICAN: A versatile code for predicting composite properties
[NASA-TM-87334] N86-31664
A mathematical approach for evaluating nickel-hydrogen cells
[NASA-TM-88803] N86-31680
The low cycle fatigue behavior of a plasma-sprayed coating material
[NASA-TM-87318] N86-31699
Microstructure-property relationships in directionally solidified single cr[illegible] nickel-base superalloys
[NASA-TM-88786] N86-31700
The continuing battle against defects in nickel-base superalloys
[NASA-TM-87343] N86-31701
The effect of variations of cobalt content on the cyclic oxidation resistance of selected Ni-base superalloys
[NASA-TM-87297] N86-31702
Effect of crystallographical and geometrical changes of a ferrite head on magnetic signals during the sliding process with magnetic tape
[NASA-TM-87277] N86-31728
Correlation of processing and sintering variables with the strength and radiography of silicon nitride
[NASA-TM-87251] N86-31729
A sensor failure simulator for control system reliability studies
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[NASA-TM-87350] N86-31857
Advanced optical measuring systems for measuring the properties of fluids and structures
[NASA-TM-88829] N86-31859
Surface fatigue and failure characteristics of hot forged powder metal AISI 4620, AISI 4640, and machined AISI 4340 steel spur gears
[NASA-TM-87330] N86-31889
Factors that affect reliability of nondestructive detection of flaws in structural ceramics
[NASA-TM-87348] N86-31912
Quantitative void characterization in structural ceramics using scanning laser acoustic microscopy
[NASA-TM-88797] N86-31913
Influence of third-degree geometric nonlinearities on the vibration and stability of prelwisted, preconed, rotating blades
[NASA-TM-87307] N86-31920
Parametric and cycle tests of a 40-A-hr bipolar nickel-hydrogen battery
[NASA-TM-88793] N86-31979
Effect of impregnation method on cycle life of the nickel electrode
[NASA-TM-87326] N86-31980
Design considerations for advanced battery concepts
[NASA-TM-87319] N86-31981
Estimated heats of fusion of fluoride salt mixtures suitable for thermal energy storage applications
[NASA-TM-87320] N86-31982
Summary of NASA/DOE Aileron-Control Development Program for Wind Turbines
[NASA-TM-88811] N86-31983
Effect of triangular element orientation on finite element solutions of the Helmholtz equation
[NASA-TM-87351] N86-32247
Bibliography of Lewis Research Center technical publications announced in 1985
[NASA-TM-87263] N86-32336

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Evaluation of solar array flight experiment response during flight for extension/retraction phase
[NASA-TM-86551] N86-31606
Determination of Solid Rocket Motor (SRM) case segment growth
[NASA-TM-86557] N86-31653
Lubrication handbook for the space industry. Part A: Solid lubricants. Part B: Liquid lubricants
[NASA-TM-86556] N86-31730
A digital imaging photometry system for cometary data acquisition
[NASA-TM-86554] N86-32373

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).

Computations of separated subsonic and transonic flow about airfoils in unsteady motion
[NLR-MP-84094-U] N86-31541
Solicited proposal for a Navsat control segment harmonization study
[NLR-MEMO-RS-85-020-L] N86-31628
Attitude control of spacecraft: An overview of recent developments and research
[NLR-MP-85055-U] N86-31636
In-flight attitude estimation and control experiments with IRAS based on modern control theory
[NLR-TR-84029-U] N86-31642
Dynamics of flexible spacecraft: An analysis of approaches towards mathematical model order reduction
[NLR-TR-85066-U] N86-31643
Vulnerability of low redundancy image data and text transmission over satellite communication links
[NLR-TR-85100-L] N86-31787
Quasi-simultaneous calculation of strongly interacting viscous flow
[NLR-MP-84095-U] N86-31846
On wings and keels (2)
[NLR-MP-85048-U] N86-31847
Hydrodynamic instabilities and surface waves in a flow over an impedance wall
[NLR-MP-85053-U] N86-31848
Image quality criteria with emphasis on criteria for remote sensing imagery
[NLR-TR-84040-U] N86-31974
Control theoretic analysis of human operator mediated rendezvous and docking
[NLR-MP-85020-U] N86-32106
Control loops with human operators in space operations. Part 1: Human engineering analysis, synthesis and evaluation techniques
[NLR-TR-84116-L-PT-1] N86-32107
Control loops with human operators in space operations. Part 3: Rendezvous and docking operations and model analysis of performance with human-in-the-loop
[NLR-TR-84116-L-PT-3] N86-32108

Control loops with human operators in space operations. Part 4: Research requirements for human-in-the-loop space teleoperator development
[NLR-TR-84116-L-PT-4] N86-32109

Control loops with human operators in space operations. Part 5: Executive summary
[NLR-TR-84116-L-PT-5] N86-32110

Rate distortion characteristics of two adaptive data compression algorithms
[NLR-MP-85024-U] N86-32150

NATIONAL AEROSPACE MEDICAL CENTRE, SOESTERBERG (NETHERLANDS).

Activities report on physical and psychological health of flying personnel
[ESA-86-97385] N86-32093

Activities report on physical and psychological health of flying personnel
[ESA-86-97386] N86-32094

NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.

Definition and empirical structure of the range of stellar chromospheres-coronae across the H-R diagram: Cool stars
[NASA-CR-176863] N86-32377

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.

Exploration of advanced characterization techniques for molecular composites
[AD-A168102] N86-31733

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

Inorganic compounds for passive solar energy storage: Solid-state dehydration materials and high specific heat materials
[DE86-010214] N86-31990

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.

The structure of a stratus-topped planetary boundary layer as seen through a large-eddy simulation
N86-32034

Boundary layer and cloud parameterization in the NCAR community climate model N86-32037

NATIONAL MARINE FISHERIES SERVICE, MIAMI, FLA.

Utilizing remote sensing of Thematic Mapper data to improve our understanding of estuarine processes and their influence on the productivity of estuarine-dependent fisheries
[NASA-CR-177177] N86-31943

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).

An introduction to the optical heterodyne receiver
[NPL-QU-77] N86-31759

Properties of impurity doped infrared photoconductive detectors under conditions of low background photon flux
[NPL-QU-76] N86-32298

NAVAL AIR SYSTEMS COMMAND, WASHINGTON, D. C.

Guide to standard weather summaries and climatic services
[AD-A168099] N86-32080

NAVAL OCEAN RESEARCH AND DEVELOPMENT ACTIVITY, BAY ST. LOUIS, MISS.

NORDA Arctic data collection, processing and interpretation capabilities
[AD-A167797] N86-31965

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.

Microcomputer optimization of feed excitation voltages to obtain desired antenna radiation patterns
[AD-A167560] N86-31768

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.

Development of a data acquisition system to aid in the aerodynamic study of various helicopter configurations
[AD-A167717] N86-31539

A trade-off study of tilt rotor aircraft versus helicopters using VASCOMP 2 and HESCOMP
[AD-A167719] N86-31575

Design of a vertical thrust stand for a remotely piloted model helicopter
[AD-A167811] N86-31598

Applications of infrared thermography in convective heat transfer
[AD-A167872] N86-31599

The variation of the dislocation density in aluminum deformed to large steady-state creep strains
[AD-A167715] N86-31708

An experimental investigation of various metallic/polymer fuels in a two-dimensional solid fuel ramjet
[AD-A167889] N86-31747

Effects of variable properties in film cooled turbulent boundary layers
[AD-A167716] N86-31835

An investigation into the tripping behavior of longitudinally T-stiffened rectangular flat plates loaded statically and impulsively
[AD-A167718] N86-31923

Composite structural reliability calculation by finite element and statistical strength theory
[AD-A167890] N86-31924

Application of multiple lines of position for hydrography
[AD-A167884] N86-31966

Determination of the atmospheric aerosol distribution by multi-channel remote sensing techniques
[AD-A167885] N86-32014

A linear stability analysis of the rapid development of an extratropical cyclone
[AD-A167808] N86-32057

Effects of storm-related parameters on the accuracy of the nested tropical cyclone model
[AD-A167809] N86-32058

A diagnostic investigation of explosive maritime cyclogenesis during FGGE
[AD-A167810] N86-32059

The RISC (Reduced Instruction Set Computer) architecture and computer performance evaluation
[AD-A167873] N86-32115

A 32-bit microprocessor based solid state data recorder for space based applications
[AD-A167887] N86-32116

Kalman filter real time tracking using microprocessors and a new language for military software
[AD-A167871] N86-32138

Aiding computer application programmers and users with the tools of the visual interface
[AD-A167886] N86-32139

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, ANNAPOLIS, MD.

The influence of incubation time on the passive film breakdown of aluminum alloys in seawater
[AD-A167398] N86-31705

NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.

Measurement and extraction of recurring waveforms: For applications to active transmissions, flow-noise, and helicopter-radiated noise problems
[AD-A167400] N86-32249

NAVAL UNDERWATER SYSTEMS CENTER, NEWPORT, R.I.

Acoustic description of south Atlantic Ocean warm core eddy
[AD-A166323] N86-32074

NETHERLANDS ENERGY RESEARCH FOUNDATION, PETTEN.

Finite element, stream function-vorticity solution of secondary flow in the cross-plane of noncircular channels
[ECN-175] N86-31856

A remote controlled calibration device for displacement transducers
[ECN-173] N86-31873

International comparison of interpolation procedures for the efficiency of germanium gamma-ray spectrometers (GAM83 exercise)
[ECN-181] N86-31874

On the statistical evaluation of inconsistent measurement results illustrated on the example of the Sr 90 half life
[ECN-179] N86-32252

Integral-data test of JEF-1 fission-product cross sections
[ECN-178] N86-32263

On the global behavior of a cylindrical salt dome with a HLW repository
[ECN-180] N86-32264

NEVADA UNIV., RENO.

Gas exchange characteristics of leaves as indicators of the basic limitations to the rate of photosynthesis
[DE86-009632] N86-32085

NEW MEXICO UNIV., ALBUQUERQUE.

Estimates of available solar radiation and photovoltaic energy production for various tilted and tracking surfaces throughout the US based on PVFORM, a computerized performance model
[DE86-009549] N86-32019

Ion beam channeling in superlattices
[DE86-010094] N86-32312

NIJMEGEN UNIV. (NETHERLANDS).

The cooperation test: A syntax-directed verification method
[REPT-62] N86-32151

Avoiding redex copying in lambda reduction
[REPT-63] N86-32152

Interactive programs in a functional language. A functional implementation of an editor
[REPT-65] N86-32153

Tracing and debugging in SASL
[REPT-66] N86-32154

Production of codicological catalogs using computers (PCC project)
[REPT-67] N86-32155

System semantics and formal circuit description
[REPT-69] N86-32156

Functional temporal calculus versus temporal logic: An engineering approach
[REPT-59] N86-32217

NORTH CAROLINA UNIV., CHAPEL HILL.

Ion beam channeling in superlattices
[DE86-010094] N86-32312

NORTHWESTERN UNIV., EVANSTON, ILL.

Interfacial electrochemical transport in batteries employing solid electrolytes
[DE86-010107] N86-31805

Studies of stress and fatigue induced defects using small angle neutron scattering
[DE86-004985] N86-31925

O

OAK RIDGE GASEOUS DIFFUSION PLANT, TENN.

Calculation of heat flux through a wall containing a cavity: Comparison of several models
[DE86-010348] N86-31841

Magnetic bearings: An adaptive solution to motion-control problems
[DE86-010615] N86-31906

OAK RIDGE NATIONAL LAB., TENN.

Degradation of materials in combustion environments
[DE86-011771] N86-31691

Analysis of heat-affected zone cracking in Ni3Al alloys
[DE86-009449] N86-31712

In-vacuum cyclic fatigue behavior of Vanstar-7 at elevated temperatures
[DE86-007322] N86-31713

Effect of neutron irradiation on the tensile properties and microstructure of several vanadium alloys
[DE86-008234] N86-31716

Ion damage microstructures in a Fe-10Cr-6Mo-0.5Nb
[DE86-008500] N86-31717

Influence of radiation-induced segregation on ductility of a nickel-silicon alloy
[DE86-009500] N86-31720

Postirradiation tensile behavior of nickel-doped ferritic steels
[DE86-009502] N86-31721

Evidence for the formation of a metastable crystalline phase during crystallization of Zr-Ni metallic glasses of approximately 57 to 63.2 at. % Zr
[DE86-005031] N86-31734

Chemical vapor infiltration of fiber-reinforced ceramic composites
[DE86-009513] N86-31735

Standard generalized markup language: A technique for document interchange
[DE86-011504] N86-31777

Light emission from metal-insulator-metal structures biased near breakdown voltages
[DE86-008505] N86-31802

Development of advanced thermal insulation for appliances
[DE86-011357] N86-31843

Stirling machines: Adiabatic to isothermal
[DE86-005407] N86-31903

Application of a geographic information system in the study of acidic deposition
[DE86-008220] N86-32000

Sparse Cholesky factorization on a local-memory multiprocessor
[DE86-010082] N86-32173

State and data techniques for control of discontinuous systems
[DE86-007240] N86-32179

Foundations of O-Theory 1: The intersection rule
[DE86-008565] N86-32226

Microcrystalline growth studies in model oxide by dynamic laser-light scattering methods
[DE86-007300] N86-32310

Carbon Dioxide Information Center thesaurus
[DE86-009013] N86-32339

OESTERREICHISCHES FORSCHUNGSZENTRUM SEIBERSDORF G.M.B.H., VIENNA.

Determination of the wear of thermoplastic journal bearings in the initial strain
[OEFZS-4345] N86-31908

Environmental gamma radiation monitoring system with a large volume air ionization chamber
[OEFZS-4344] N86-32001

Carbon monoxide formation in UO2 kerneled HTR fuel particles containing oxygen getters
[OEFZS-4348] N86-32261

OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
Current German laser and quantum optics research reviewed at the 50th Annual Meeting of the Physikalische Gesellschaft
[AD-A167895] N86-32275
European Science Notes, volume 40, number 6
[AD-A167501] N86-32346

OFFICINE GALILEO S.P.A., FLORENCE (ITALY).
Standard calibration procedure for pencil beam infrared sensors on spinning satellites, volume 1
[REPT-209-DT-54-VOL-1] N86-31644
Standard calibration procedure for pencil beam infrared sensors on spinning satellites. Volume 2: Applicable software and user manuals
[REPT-209-DT-55-VOL-2] N86-31645

OHMSTEDE (WILLIAM D.), LAS CRUCES, N. MEX.
Contributions to large-eddy simulation, part 1
[DE86-009710] N86-32021

OKLAHOMA UNIV., NORMAN.
Development of a variational SEASAT data analysis technique
[NASA-CR-177175] N86-31942

OLD DOMINION UNIV., NORFOLK, VA.
Effect of aspect ratio on sidewall boundary-layer influence in two-dimensional airfoil testing
[NASA-CR-4008] N86-31534
Theory and operation of the Gould 32/27 programs ABLE-2A and EBLE for the tropospheric air motion measurement system
[NASA-CR-176856] N86-32011

OPTISCHE WERKE G. RODENSTOCK, MUNICH (WEST GERMANY).
Noncontact measurement of roughness of ground and polished metal surfaces
[BMFT-FB-T-85-150] N86-31909

OREGON UNIV., EUGENE.
Pacific Northwest solar radiation data
[DE86-009635] N86-32020

P

PAGE (R. J.) CO., SANTA ANA, CALIF.
Slip casting and extruding shapes of rhenium with metal oxide additives. 1: Feasibility demonstration
[NASA-CR-174970] N86-31646

PARAIBA UNIV., JOAO PESSOA (BRAZIL).
Equivalence between the methods involving Fourier series and the Poisson's summation formula and evaluation of a class of lattice sums in arbitrary dimensions
[DE86-701919] N86-32202
On the generation of equivalent Hamiltonians
[DE86-701920] N86-32203

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Laser processing of ceramics
[DE86-011954] N86-31737

PHYSICAL RESEARCH LAB., AHMEDABAD (INDIA).
Evolution of gas-rich meteorites: Clues from cosmogenic nuclides N86-32354

PHYSICS AND ELECTRONICS LAB. TNO, THE HAGUE (NETHERLANDS).
Moisture determinations in and under vegetation canopies
[FEL-1985-52] N86-31973

PORTSMOUTH POLYTECHNIC (ENGLAND).
The effect of pigtailing braided screens on the transfer impedance of single-ended and balanced interface circuits
[EMCR-5/85] N86-31791

PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Improvement of the corrosion resistance of turbine engine bearings
[AD-A167355] N86-31593

PRINCETON UNIV., N. J.
The sensitivity of one month GCM forecasts at GFDL to zonally symmetric clouds, quasi-realistic specified clouds, and model-predicted clouds N86-32040

PURDUE UNIV., WEST LAFAYETTE, IND.
Flight control synthesis for flexible aircraft using Eigenspace assignment
[NASA-CR-178184] N86-31590
Laser velocimeter measurements and analysis in turbulent flows with combustion. Part 4: Two-component cold-flow measurements
[AD-A167554] N86-31834
Extratropical cloud-topped boundary layers over the oceans N86-32026

R

REGENSBURG UNIV. (WEST GERMANY).
Measurement of the wind field. Simultaneous wind velocity measurements at different altitudes with high time resolution for the specification of wind energy converters
[BMFT-FB-T-85-141] N86-32063

RENSSELAER POLYTECHNIC INST., TROY, N.Y.
Composite structural materials
[NASA-CR-179659] N86-31665

RESEARCH INST. OF COLORADO, FORT COLLINS.
Use of existing and suggested satellite observations of reflected spectral radiance to estimate properties of stratiform clouds N86-32032

RESEARCH INST. OF NATIONAL DEFENCE, LINKOEPING (SWEDEN).
SAPIENS Memo 11. Electromagnetic characteristics of the conical transmission-line EMP simulator SAPIENS
[FOA-C-30415-A3] N86-31776
Fiber optic sensors
[FOA-C-30416-E1] N86-32286
Study of optical computing
[FOA-C-30418-E1] N86-32287
Activities report of the Laboratory for Information Systems
[FOA-C-30410-E1] N86-32341

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
Characterization of cellulose nitrate with liquid chromatography and membrane osmometry
[FOA-C-20602-D1] N86-31597

RHODE ISLAND UNIV., KINGSTON.
Fiber optic pressure sensors in skin-friction measurements
[NASA-CR-176861] N86-32269

ROCHESTER INST. OF TECH., N. Y.
LANDSAT 4 band 6 data evaluation
[NASA-CR-177173] N86-31944
Speech analysis based on a model of the auditory system
[AD-A167426] N86-32098

ROCHESTER UNIV., N. Y.
Application of new technologies to radiation biodosimetry in mammalian systems
[AD-A168176] N86-31865
Determination of CA-41, I-129 and OS-187 in the Rochester tandem accelerator and some applications of these isotopes N86-32352

ROCKWELL INTERNATIONAL CORP., CANOGA PARK, CALIF.
Space station propulsion technology
[NASA-CR-178897] N86-31647

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Rome Air Development Center Air Force technical objective document fiscal year 1987
[AD-A167425] N86-31767

ROME UNIV. (ITALY).
Integrable systems in the description of waves in straits and channels of variable width and depth
[PREPRINT-493] N86-31855
Evolution of nuclear emulsion techniques in the first half of this century
[NOTA-INTERNA-860] N86-31879
The results of hydrological measurements in the southern Adriatic, the west coast of Sicily and the Vatican Cape, preliminary report
[PREPRINT-502] N86-31975
Preliminary report on the hydrological measurements carried out in the southern Tyrrhenian sea and in the Messina strait
[PREPRINT-489] N86-32081

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
Autoclave moulding of carbon fibre reinforced plastics
[RAE-TR-85039] N86-31662

ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, SCHIPHOL-OOST.
High Power Solar Array (HPSA) study
[FOK-TR-R-85-068] N86-31998

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Modeling and observations of the stratocumulus-topped atmospheric boundary layer N86-32033
Error control of meteorological measurements
[KNMI-TR-76] N86-32065
Climatological research in the period 1962-1978 in the delta region, south Flevoland, and Lauwers region; Dutch water temperatures in the period 1860 to 1985
[KNMI-169] N86-32067
Climatological data of stations in the Netherlands. No. 25: A climatology of the main observatory at De Bilt for the period 1901-1984
[KNMI-150-25] N86-32068
Meteorological work station METIS: A glance at the future
[KNMI-TR-74] N86-32069
Observations of surface water temperature in the Netherlands from 1860: Description of the data file
[KNMI-TR-75] N86-32070
Observations of surface water temperature in the Netherlands from 1860: The temperature regime and the changes in it
[KNMI-WR-85-6] N86-32071
Evaluation of wave calculations using the model GONO, in the period October 1983 - April 1984
[KNMI-TR-56] N86-32079
Time sequence of the Royal Dutch Meteorological Institute's operational wave model GONO, October 1983 - April 1984. Supplement
[KNMI-TR-56-SUPPL] N86-32080

ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Flex Pascal: An implementation of the ISO-Pascal programming language
[AD-A168105] N86-32140

RUTGERS UNIV., NEW BRUNSWICK, N. J.
The 10Be contents of SNC meteorites N86-32365

S

SANDERS ASSOCIATES, INC., NASHUA, N. H.
Parabolic dish module experiment
[DE86-009819] N86-31987

SANDIA NATIONAL LABS., ALBUQUERQUE, N. MEX.
Airborne intruder detection considerations
[DE86-006462] N86-31576
Point-mass simulation tool (PMAST) user's manual
[DE86-009547] N86-31611
Mechanical testing of graphite-epoxy composite tubes
[DE86-009608] N86-31674
Raman spectra of rings in silicate material
[DE86-009629] N86-31685
Analysis of S-glass ceramic lot no. 84-132 for use as a standard reference material
[DE86-010309] N86-31736
Effects of wellbore liquids in propellant-based fracturing
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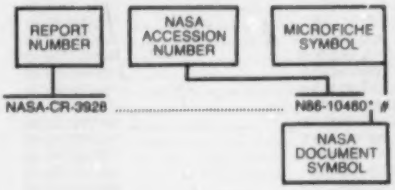

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ARL-STRUC-TM-424 ..... N86-31538 #

ARL/SYS-TM-86 ..... N86-31556 #

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ARW-03-THE-BDK/ORS/84/13 ..... N86-31916 #

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BMFT-FB-T-85-150 ..... N86-31909 #
BMFT-FB-T-85-160 ..... N86-32313 #
BMFT-FB-T-85-163 ..... N86-31806 #
BMFT-FB-T-85-164 ..... N86-31869 #
BMFT-FB-T-85-165 ..... N86-31870 #
BMFT-FB-T-85-167 ..... N86-32314 #
BMFT-FB-T-85-174 ..... N86-31693 #
BMFT-FB-T-85-175 ..... N86-32315 #
BMFT-FB-T-85-181 ..... N86-31871 #
BMFT-FB-T-85-186 ..... N86-31812 #

BMFT-FB-W-85-013 ..... N86-31760 #
BMFT-FB-W-85-014 ..... N86-32316 #
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BMFT-FB-W-85-016 ..... N86-32003 #
BMFT-FB-W-85-017 ..... N86-31609 #
BMFT-FB-W-85-020 ..... N86-31694 #
BMFT-FB-W-85-021 ..... N86-31781 #
BMFT-FB-W-85-022 ..... N86-31577 #
BMFT-FB-W-85-023 ..... N86-32023 #
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BMFT-FB-W-85-029 ..... N86-31604 #
BMFT-FB-W-85-031 ..... N86-31589 #
BMFT-FB-W-85-032 ..... N86-32385 #
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BNL-37844 ..... N86-32180 #
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BR97103 ..... N86-31791
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B8665339 ..... N86-32253 #
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CBPF-NF-059/85 ..... N86-32384 #
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CCSTWS-85-3 ..... N86-32076 #
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CNES-CT/DTI/MS/MN/201 ..... N86-32165 #
CNES-CT/DTI/MS/MN/240-VOL-1 ..... N86-31616 #
CNES-CT/DTI/MS/MN/262 ..... N86-32167 #
CNES-CT/DTI/MS/MN/311 ..... N86-32166 #

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CONF-860609-8 ..... N86-31751 #
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CWI-CS-R8602 ..... N86-32160 #
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CWI-MS-R8509 ..... N86-32230 #
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DE86-009513 ..... N86-31735 #
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DE86-009871 ..... N86-31804 #
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DE86-701454 ..... N86-32245 #
DE86-701575 ..... N86-31711 #
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DE86-701919 ..... N86-32202 #
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DOE/ER-10803/5 ..... N86-32086 #
DOE/ER-10900/T3 ..... N86-31686 #
DOE/ER-10949/T2 ..... N86-31737 #
DOE/ER-13163/10 ..... N86-31898 #
DOE/ER-13234/2 ..... N86-32085 #
DOE/ER-13282/2 ..... N86-31690 #
DOE/ER-40168/T1 ..... N86-32320 #
DOE/ER-45116/9 ..... N86-31710 #
DOE/ER-45219/T1 ..... N86-31804 #
DOE/ER-45220/T1 ..... N86-31805 #

DOE/EV-03425/27-PT-13 ..... N86-32016 #

DOE/ID-12550/T1 ..... N86-31838 #

DOE/NASA-20320/71 ..... N86-31983* #

DOE/NASA/0290-02 ..... N86-31984* #

DOE/OR-21400/T265 ..... N86-31777 #
DOE/OR-21552/1 ..... N86-31968 #

DOE/PC-50798/T9 ..... N86-31837 #
DOE/PC-80912/T2 ..... N86-31689 #

DOE/RW/85.181 ..... N86-32078 #

DOT/FAA/CT-TN86/10 ..... N86-31555 #

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DPD-665 ..... N86-31632* #

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DRIC-BR-99099 ..... N86-32140 #

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D180-28861-1 ..... N86-31570 #
D180-28862-VOL-2-PT-2 ..... N86-31572 #

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E-3016 ..... N86-31562* #
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E-3037 ..... N86-31980* #
E-3047 ..... N86-31588* #
E-3050 ..... N86-31699* #
E-3055 ..... N86-31981* #
E-3057 ..... N86-31982* #
E-3064 ..... N86-31857* #
E-3080 ..... N86-31621* #
E-3085 ..... N86-31650* #
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E-3163 ..... N86-31983* #
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E-3212 ..... N86-31793* #
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ECN-173 ..... N86-31873 #
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EGG-M-03286 ..... N86-32338 #
EGG-M-26885 ..... N86-31897 #
EGG-M-27784 ..... N86-31915 #

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ESA-CR(P)-2155-VOL-2 ..... N86-31645 #
ESA-CR(P)-2175-VOL-1 ..... N86-31612 #
ESA-CR(P)-2175-VOL-2 ..... N86-31613 #
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Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*

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05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 3686

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Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

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For related information see also *14 Ground Support Systems and Facilities (Space)*.

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Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

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18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 3700

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For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics.*

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GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
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Includes weather forecasting and modification.

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Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

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54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **3770**
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY **N.A.**
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

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81 ADMINISTRATION AND MANAGEMENT **3803**
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84 LAW AND POLITICAL SCIENCE **N.A.**
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION **3805**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

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90 ASTROPHYSICS **3810**
Includes cosmology; and interstellar and interplanetary gases and dust.

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Includes solar activity, solar flares, solar radiation and sunspots.

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Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

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Note: N.A. means that no abstracts were assigned to this category for this issue.

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NASA ACCESSION NUMBER

N86-10462*# National Academy of Sciences - National Research Council, Washington, D. C. Systems Dynamics Lab.

CORPORATE SOURCE

TITLE

CONFINED SWIRLING JET PREDICTIONS USING A MULTIPLE-SCALE TURBULENCE MODEL

AUTHOR

C. P. Chen Aug. 1985 22 p refs

PUBLICATION DATE

CONTRACT OR GRANT

(Contract NASw-3458)

REPORT NUMBER

(NASA-CR-178484; NAS 1.26:178484) Avail: NTIS

AVAILABILITY SOURCE

HC A02/MF A01 CSCL 20D

COSATI CODE

A recently developed multiple scale turbulence model is used for the numerical prediction of isothermal, confined turbulent swirling flows. Because of the streamline curvature and nonequilibrium spectral energy transfer nature of the swirling flow, the utilized multiple scale turbulence model includes a different set of response equations for each of the large scale energetic eddies and the small scale transfer eddies. Predictions are made of a confined coaxial swirling jet in a sudden expansion and comparisons are made with experimental data and with the conventional single scale two equation model. The multiple scale model shows significant improvement of predictions of swirling flows over the single scale k epsilon model. The sensitivity study of the effect of prescribed inlet turbulence levels on the flow fields is also included.

Author

VOLUME 24 NUMBER 24 / DECEMBER 23, 1986

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N86-32389* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 204)
Sep. 1986 122 p
(NASA-SP-7037(204); NAS 1.21:7037(204)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 419 reports, articles, and other documents introduced into the NASA scientific and technical information system in August 1986. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N86-32390 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ASPECT RATIO EFFECTS ON WINGS AT LOW REYNOLDS NUMBERS Ph.D. Thesis
Ali A. Abtahi 1985 194 p
Avail: Univ. Microfilms Order No. DA8600358

The effect of the aspect ratio on the performance of wings at chord based Reynolds numbers in the range from 50,000 to 500,000 was studied. The methods used for measurement were the strain gauge method, the momentum deficit method, and the surface pressure integration method. A computer program for the solution of flow over a 2-D airfoil was used to computationally determine lift, drag, and pitching moment behavior. This program uses a panel method calculation to determine the inviscid flowfield which serves as an input for a boundary layer circulation. After the displacement thickness is determined by the boundary layer calculations it is added to the airfoil shape to give new displacement body and the procedure is repeated. The computational results for lift agree well with the experimental data as long as a high Reynolds number was chosen. This indicated that the theoretical model is inadequate to cope with the phenomena occurring at low Reynolds. Agreement was adequate for drag results but pitching moment results showed poor agreement with experimental data. Dissert. Abstr.

N86-32391*# Notre Dame Univ., Ind. Dept. of Aerospace and Mechanical Engineering.
THE STRUCTURE OF SEPARATED FLOW REGIONS OCCURRING NEAR THE LEADING EDGE OF AIRFOILS INCLUDING TRANSITION Semiannual Status Report. Feb. - Jul. 1986
Thomas J. Mueller Jul. 1986 37 p
(Grant NsG-1419)
(NASA-CR-176857; NAS 1.26:176857) Avail: NTIS HC A03/MF A01 CSCL 01A

A semi-empirical method for predicting separation bubble characteristics was evaluated using low Reynolds number test data. On the basis of this data, several observations were made. First, a sizable growth in the momentum thickness can occur in the laminar portion of a separation bubble. This is in direct contrast to the theory and is apparently due to low Reynolds number effects. Secondly, the transition Reynolds number (R sub l sub 1) which governs the extent of a bubble's laminar region, was found to be much lower than that used in the method. At present, there does not seem to be any evidence supporting a single value for R sub l sub 1. Apparently, R sub l sub 1 is affected by the freestream disturbance environment, and airfoil's pressure distribution, and possibly the chord Reynolds number as well. Thirdly, the growth in momentum thickness over a bubble's turbulent region was predicted reasonably well by the method, provided that Roberts' suggested value for the mean dissipation coefficient was used. Finally, the present data does not substantiate the universality of the velocity profile at reattachment. However, measurement error may be responsible for this result. Author

N86-32392*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSONIC NAVIER-STOKES WING SOLUTIONS USING A ZONAL APPROACH. PART 2: HIGH ANGLE-OF-ATTACK SIMULATION
Neal M. Chaderjian Apr. 1986 12 p
(NASA-TM-88248-PT-2; A-86222; NAS 1.15:88248-PT-2) Avail: NTIS HC A02/MF A01 CSCL 01A

A computer code is under development whereby the thin-layer Reynolds-averaged Navier-Stokes equations are to be applied to realistic fighter-aircraft configurations. This transonic Navier-Stokes code (TNS) utilizes a zonal approach in order to treat complex geometries and satisfy in-core computer memory constraints. The zonal approach has been applied to isolated wing geometries in order to facilitate code development. Part 1 of this paper addresses the TNS finite-difference algorithm, zonal methodology, and code validation with experimental data. Part 2 of this paper addresses some numerical issues such as code robustness, efficiency, and accuracy at high angles of attack. Special free-stream-preserving metrics proved an effective way to treat H-mesh singularities over a large range of severe flow conditions, including strong leading-edge flow gradients, massive shock-induced separation, and stall. Furthermore, lift and drag coefficients have been computed for a wing up through CLmax. Numerical oil flow patterns and particle trajectories are presented both for subcritical and transonic flow. These flow simulations are rich with complex separated flow physics and demonstrate the efficiency and robustness of the zonal approach. Author

N86-32393# National Aeronautical Lab., Bangalore (India). Systems Engineering Div.
A LOW SPEED TUNNEL SEMI-FREE DYNAMIC FLYING STUDY OF THE HIGH ANGLE OF ATTACK PITCH DERIVATIVES OF

HF-24 USING MLE PROCEDURE
S. Balakrishna, T. Niranjana, and S. R. Rajan Aug. 1983 57 p
(NAL-TRM-SE-8603) Avail: NTIS HC A04/MF A01

The high angle of attack pitch stability and control derivatives of a 1/13 model of the HF-24 are generated using a semi-free flying technique. The model is similarity scaled and is flown in a single degree of freedom with a pitch gimble at its center of gravity. The fully instrumented model with its servoed elevator is initially trimmed to the desired angle of attack and is disturbed by a doublet elevator pulse. The model responses are analyzed using a Maximum Likelihood parameter estimation procedure. The results indicate that the semi-free dynamic flying and analysis of the associated motion responses using inertial sensors can provide derivative data which compare well with derivatives generated by traditional methods in wind tunnels. Static stability, pitch damping, control derivatives with the trim data are presented a functions of angle of attack from -10 deg to +25 deg with flaps set at -10, 0, 10, 20 and 30 deg and side slip settings of -10, 0 and 10 deg. The capability of semi-free flying to generate high angle of attack pitch derivatives is demonstrated. Author

N86-32394# National Aeronautical Lab., Bangalore (India). Fluid Mechanics Div.
COMPUTATION OF PLANE JET IMPINGEMENT ON A PLATE
R. Ravi and M. D. Deshpande May 1986 52 p
(NAL-TM-FM-8602) Avail: NTIS HC A04/MF A01

The problem of normal impingement of a laminar plane jet on a plate has been studied by solving the Navier-Stokes equations numerically. The study was undertaken to make a comparative study between the plane and axisymmetric jet impingements. The computer program available for axisymmetric cases was extended for the present case. Computations have been done keeping the jet exit plane above the target plate at a distance of two channelwidths and for several values of Reynolds number (Re). The presence of a pair of line eddies on either side of the jet exit at low Re was similar to the presence of a toroidal eddy in the case of an axisymmetric jet impingement. Quantitative differences were observed between the present results and those for an axisymmetric case even though there were qualitative similarities in the two cases. Author

N86-32395# National Aeronautical Lab., Bangalore (India). Fluid Mechanics Div.
AXISYMMETRIC TURBULENT BOUNDARY LAYER ON THE CYLINDRICAL PORTION OF AN AFTERBODY TEST MODEL
V. Krishnan Sep. 1985 63 p
(NAL-TM-FM-8505) Avail: NTIS HC A04/MF A01

Experiments were conducted to study the characteristics and the growth of an axisymmetric turbulent boundary layer on the central cylindrical portion of a model in the presence of a circular arc forebody, an afterbody and a high pressure cold air jet issuing from the base. An 80mm Max. dia model was tested at the freestream velocities of 12.8 and 21.5 m/sec and at jet pressure ratios of 1.0 (jet-off), 1.26 and 1.54. The results of the experimental study are described. Author

N86-32396# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
WALL INTERFERENCE STUDIES IN 3-D FLOWS
R. Gopinath Dec. 1985 52 p
(NAL-TM-AE-8508) Avail: NTIS HC A04/MF A01

A study of Wall Interference in 3-D flows at compressible speeds is made. Two methods, one due to Mokry and the other to Capelier, Chevallier and Bouniol (CCB) are chosen to evaluate the corrections due to wall interference from pressure measurements on a control surface. The former is applicable to tunnels whose test sections are either square, circular, or octagonal in cross section and the latter to rectangular test sections having solid side walls. Codes have been developed to evaluate the corrections and are validated against a test case for which both exact and numerical solutions are available. Listings and sample input/outputs for the two codes are appended. Author

N86-32397# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
VEHICLE AERODYNAMICS
1986 480 p Partly in ENGLISH and FRENCH Lecture series held in Rhode Saint Genese, Belgium, 17-21 Mar. 1986
(VKI-LS-1986-05; ETN-86-98081) Avail: NTIS HC A21/MF A01

Wind tunnel tests in vehicle aerodynamics; aerodynamic studies on a formula 1 racing car; a computational method for the determination of the flow field around vehicles; moving ground effect and speed interaction on cars; wind induced interior and far field radiated exterior noise from automobiles; optimization of radiator internal flow; and the relationship between aerodynamics and style in the car industry were discussed. For individual titles, see N86-32398 through N86-32406.

N86-32398# Conservatoire National des Arts et Metiers, Paris (France).
REVIEW OF THEORETICAL AND EXPERIMENTAL APPROACHES TO PROBLEMS OF AUTOMOBILE EXTERNAL AERODYNAMICS [REVUE DES APPROCHES THEORIQUES ET EXPERIMENTALES DES PROBLEMES D'AERODYNAMIQUE AUTOMOBILE EXTERNE]
F. Chometon and J. Laurent *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 34 p In FRENCH (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

Experimental techniques used in automobile design to reduce energy consumption and to improve acoustic qualities and ride through better aerodynamics are described. Wind tunnels, aerodynamic balances, wake analysis, and flow visualization are introduced. Results from tests on simple bodies and on simplified vehicle shapes are given. Theoretical studies involving the solution of the Navier-Stokes and Euler equations, and potential flow are introduced. ESA

N86-32399# Technische Hochschule, Aachen (West Germany).
WIND TUNNEL TEST IN VEHICLE AERODYNAMICS
Carl Kramer *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 48 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

The design of vehicle aerodynamic wind tunnels is discussed. The smallest possible cross section and therefore the most economical wind tunnel for car aerodynamics is a wind tunnel with an open jet test section. The length of the test section, the dimensions of the plenum surrounding the open jet, and the corresponding collector dimensions can be estimated by the open jet calculation of Regenscheit (1981). Open jet stability for large models and asymmetric flow conditions are determined by the intake radius of the collector. A radius too large, however, causes a static pressure increase at the test section end. If such an optimal open jet test section is compared with other test sections it has the smallest possible cross section and is therefore the most economical wind tunnel for aerodynamic testing. ESA

N86-32400# Technische Hochschule, Aachen (West Germany).
AERODYNAMIC STUDIES ON A FORMULA RACING CAR
H. J. Gerhardt and C. Kramer *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 19 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

The aerodynamic optimization of a formula 1 racing car is described, using the Zakspeed model. Front, center, and rear parts were redesigned to reduce aerodynamic drag and increase road holding. The car qualified for all races in the 1985 season but only finished 2, because of engine problems. ESA

N86-32401# Electricite de France, Paris. Lab. National d'Hydraulique.
A COMPUTATIONAL METHOD FOR THE DETERMINATION OF THE FLOW FIELD AROUND VEHICLES
D. Laurence *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 40 p (For primary document see N86-32397

24-02)
Avail: NTIS HC A21/MF A01

A numerical code for solving fluid dynamics equations (Navier Stokes), including an elaborate turbulence model, was applied to the simulation of air flows around three cars. Computations give qualitative results with sufficient accuracy to allow comparison between different models and thus reduce the number of experiments to a small set of versions from which the less efficient ones are excluded. By giving a global view of the flow they help the designer to modify the shape to obtain an optimum between aerodynamics, aesthetics, and cost. Finer grids are required to improve the results, but computational power is wasted with rectangular grids since extra nodes are also added in distant regions where they are not required. Alternative approaches which permit sprinkling precision only where it is needed can be found by including vortex methods, or changing to curvilinear 3D meshes or finite elements. ESA

N86-32402# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
THEORETICAL AND EXPERIMENTAL METHODS IN GROUND VEHICLE AERODYNAMICS
S. R. Ahmed *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 97 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

Inviscid flow methods, coupled inviscid flow - boundary layer methods, and methods based on the solution of the Navier-Stokes equations for studying ground vehicle aerodynamics are introduced. Wind tunnel tests and flow visualization are described. ESA

N86-32403# Sardou R.D.I., Montreuil (France).
MOVING GROUND EFFECT AND SPEED (UP TO 50 m/sec) INTERACTION ON SEDAN AND STATION WAGON CARS (23 CONFIGURATIONS RANGING BETWEEN Cd=0.19 AND 0.35) AND ON RACING CAR (1 CONFIGURATION Cd=0.39; Cl=2.15)
M. Sardou *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 80 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

Ground motion effect and Reynolds effect; reptation between wind and ground speed; and stability derivatives in heaving, pitching, and yawing on 24 car configurations were studied in a moving belt wind tunnel. There is no simple correlation between belt on and belt off results, nor between results obtained below (25 m/sec) and over (50 m/sec) the critic Reynolds speed. There is a consistent difference between belt on, top speed, and other testing solution; stability derivatives also depend strongly on testing conditions. Reptation tests suggest that in-line wind on the real road does not just add or substract its speed to the speed of the vehicle, it changes the Cd, Cl, and Clr coefficients values, and probably Cyf and Cyr values too. If this is confirmed it means that relative longitudinal wind is important for stability analyses. Ground motion effect and Reynolds effect; reptation between wind and ground speed; and stability derivatives in heaving, pitching and yawing on 24 car configurations were studied in a moving belt wind tunnel. There is no simple correlation between belt on and belt off results, nor beweeen results obtained below (25 m/sec) and over (50 m/sec) the critical Reynolds speed. There is a consistent difference between belt on, top speed, and other testing solution; stability derivatives also depend strongly on testing conditions. Reptation tests suggest that in-line wind on the real road does not just add to or subtract its speed from the speed of the vehicle, it changes the Cd, C1, and C1r coefficients values, and probably Cyf and Cyr values too. If this is confirmed it means that relative longitudinal wind is important for stability analysis. ESA

N86-32404# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
WIND INDUCED INTERIOR AND FAR FIELD RADIATED EXTERIOR NOISE FROM AUTOMOBILES c71
Werner Dobrzynski *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 34 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

Aerodynamically induced interior noise in passenger cars was investigated. Surface pressure and resulting interior noise were measured on a full-scale automobile in wind tunnel tests. Both quantities are interrelated theoretically; corresponding interior noise predictions are compared to measured data. Results show that high surface-pressure originating even from highly localized flow separations on the car-body tend to dominate interior noise. Far field noise radiation from exterior flow/car-body interaction is predicted and compared to measured data. ESA

N86-32405# Audi A.G., Ingolstadt (West Germany).
THEORETICAL AND EXPERIMENTAL OPTIMIZATION OF THE ROAD-VEHICLE INTERNAL FLOW c34
Jochen Wiedemann *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 8 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

By applying the conservation equations for mass, momentum, and energy a simple theory for optimization of radiator flow is obtained. It can be seen that for any given radiator with the total-pressure-loss-coefficient JR there is an optimal value for the ratio of exit to radiator area (AE/AR) where the aerodynamic down-force attains a maximum. If internal flows have to be studied experimentally on small scale models this can be done easily with radiator simulators by adjusting the parameter J bar R = JR(AE/AR) sq derived from the theory. ESA

N86-32406# Fiat Research Center, Orbassano, Turin (Italy).
THE RELATIONSHIP BETWEEN AERODYNAMICS AND STYLE IN THE CAR INDUSTRY
M. Maioli *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 40 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

The impact of aerodynamic considerations on the engineering and style of cars is illustrated using a small passenger vehicle and an upmarket vehicle. ESA

N86-32407# Cranfield Inst. of Tech., Bedford (England). Coll. of Aeronautics.
PRELIMINARY WIND TUNNEL TESTS ON THE INFLUENCE OF GROUND BOARD LENGTH ON THE AERODYNAMIC DRAG OF SIMPLE COMMERCIAL VEHICLE MODELS
K. P. Garry Jun. 1986 73 p
(CAR-8619; ISBN-0-947767-47-9) Avail: NTIS HC A04/MF A01

Preliminary results are presented following a series of tests in a closed working section, open return wind tunnel on eight simple rectangular block models mounted above a full span ground board. Measurements of body axis drag, sideforce and yawing moment were made on each vehicle in the yaw angle range 6 to + 20 degrees. The ground board is fitted with removable sections such that its overall length, and consequently, the position of its trailing edge downstream of the model base, can be varied. Tests were carried out with ground board trailing edge positions in the range 3.2 to 0.2 w downstream, where w is the width of the body under test. Variations in drag coefficient are considered with respect to changes in model geometry, yaw angle, and ground board length. Explanations of the influence of ground board length on the flowfield and the mechanisms involved are limited by the data available from these simple tests. It is however, apparent that ground board length can have a considerable effect on measured aerodynamic drag and recommendations are made for further tests. Author

N86-32408# Dynetics, Inc., Huntsville, Ala.
AERODYNAMICS OF AIRCRAFT AFTERBODY: REPORT OF THE WORKING GROUP ON AERODYNAMICS OF AIRCRAFT AFTERBODY
1986 348 p
(AGARD-AR-226) Avail: NTIS HC A15/MF A01

Aircraft afterbody design is still one of the most critical problems for industry, especially in fighter aircraft development. The flow around the rear part of the fuselage is characterized by the simultaneous occurrence of interfering physical phenomena such as thick turbulent boundary layers, viscous flow separation, hot jet interference at the base and the boat tail, and jet plume expansion in three-dimensional transonic and supersonic flow. Even experimental techniques hardly fulfill requirements for correct wind tunnel simulation of all effects. Drag prediction and drag minimization procedures for complex configurations are strongly dependent on the reliability of numerical and experimental flowfield simulation. This publication reports on the progress which has been made by AGARD-FDP Working Croup WG08, established to evaluate the state-of-the-art in experimental and computational techniques for aircraft afterbodies. Author

N86-32409# Naval Postgraduate School, Monterey, Calif.
INVESTIGATION OF A MACH 1.4 COMPRESSOR CASCADE WITH VARIABLE BACK PRESSURE USING FLOW VISUALIZATION M.S. Thesis
Michael G. Hegland Mar. 1986 115 p
(AD-A168647) Avail: NTIS HC A06/MF A01 CSCL 20/4

Flow through a transonic compressor cascade model was investigated at M = 1.4 using flow visualization and pressure measurements. Shock patterns for two different blade incidences were documented at increasing back pressures. Data were taken up to a maximum pressure ratio of 1.53 at estimated minimum loss incidence conditions. An oblique shock system persisted, producing large flow turning (6.8 deg) and a slightly supersonic exit Mach number (1.02). Losses and blade pressure loading were calculated using a combination of test data and computational approximations. Failure of blade retaining tabs occurred with both aluminum and steel cascade blades. Failures were attributed to fatigue from high oscillatory stress levels and redesigned blade mounts were proposed. Author (GRA)

N86-32410# European Space Agency, Paris (France).
INVESTIGATIONS ON A SUPERCRITICAL AIRFOIL WITH BOUNDARY LAYER SUCTION THROUGH A PERFORATED STRIP IN THE SHOCK REGION
Paul Krogmann Sep. 1985 55 p Original language document was announced as N86-10025
(ESA-TT-940; DFVLR-FB-85-15; ETN-86-97577) Avail: NTIS HC A04/MF A01; original German version available from DFVLR, Cologne, West Germany DM 16.50

The effect of local boundary layer suction through a perforated strip on the flow development and aerodynamic characteristics of a transonic airfoil was investigated in a 1m x 1m transonic wind tunnel. In comparison with reference measurements on the same model with a solid surface, the results show that, aside from the improvements due to suction, the flow development in the nonsuction case is most favorably affected by the arrangement of the perforation and cavity, caused by the strong adverse pressure gradients occurring at higher angles of attack; the shock location as well as the flow field downstream of the shock are affected. Thus, considerable gain in maximum lift and drag reductions can be achieved. ESA

N86-32411# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
STEADY AND UNSTEADY PRESSURE MEASUREMENTS ON A PITCHING NACELLE Final Report [MESURES DE PRESSION STATIONNAIRE ET INSTATIONNAIRE SUR UNE NACELLE EN TANGAGE]
A. Gravelle Jan. 1986 43 p In FRENCH
(Contract STPA-84-95-015)
(ONERA-RT-25/3064-RY-047-R; ETN-86-97637) Avail: NTIS HC A03/MF A01

Local measurements were carried out on a pitching nacelle in wind tunnel tests at several incidences and Mach numbers. Comparison of the experimental data with numerical methods shows that in real flight conditions the aerodynamic forces are a function of the incidence and cannot be treated by linear computation. ESA

N86-32412# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE SHOCK REFLECTION IN THREE-DIMENSIONAL STEADY, CONICAL SUPERSONIC FLOWS Ph.D. Thesis - Karlsruhe University, West Germany
Reinhard Niehuis Dec. 1985 127 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-07; ISSN-0171-1342; ETN-86-97817) Avail: NTIS HC A07/MF A01; DFVLR, Cologne, West Germany, DM 34

Transition from regular to Mach reflection of shock waves for a three-dimensional, steady, conical, supersonic flow is investigated. For corner flows it is shown that transition is described by the von Neumann criterion as in two-dimensional steady flows, if the shock waves are sufficiently strong. Only Mach reflections were observed in corner flows. Applying the criterion, corner configurations in which the conditions for the occurrence of regular shock reflections are fulfilled were found. Experiments verify this, but indicate that the shock reflection is influenced by the downstream boundary condition, if it is not sufficiently free. The shock structure in the corner was determined by optical and tomographical techniques allowing nonintrusive measurements. ESA

N86-32413# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
THREE-DIMENSIONAL NUMERICAL MODEL OF A SCHEMATIZED PRIMARY ZONE [MODELE NUMERIQUE TRIDIMENSIONNEL DE ZONE PRIMAIRE SCHEMATISEE]
Helene Tichtinsky 26 Nov. 1985 44 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RTS-24/3256-EY; ETN-86-97871) Avail: NTIS HC A03/MF A01

A computerized simulation of the cold inlet flows to a turbojet, either air or a mixture fuel/air is described. The initiation and propagation of combustion is simulated in cases where the local fuel concentration is equal to or lower than the stoichiometric values. The results were compared with experimental data obtained by laser velocimetry. The comparison confirms the validity of the simulation to study local phenomena. ESA

N86-32414# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Aerodynamique.
FUNDAMENTAL RESEARCH ON COMPUTATIONAL METHODS FOR SUPERSONIC AND HYPERSONIC FLOW Final Report [RECHERCHES FONDAMENTALES SUR DES METHODES DE CALCUL POUR DES ECOULEMENTS SUPERSONIQUES ET HYPERSONIQUES]
J. L. Montagne Dec. 1985 40 p In FRENCH
(Contract DRET-85-34-001)
(ONERA-RSF-23/1285-AY; ETN-86-97872) Avail: NTIS HC A03/MF A01

Methods for the numerical solution of the dynamic equations of hypersonic flow; the analysis of robustness of the noncentered scheme; and the computation of noncentered flow in the case of real gas in equilibrium were reviewed. It is concluded that noncentered schemes offer stability and accuracy. Possible orientations of the fundamental research in this field are discussed. ESA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N86-32415 Schreiner Luchtvaart Groep B.V., Leiden (Netherlands).
SCHREINER 1945 - 1985

Sep. 1985 58 p In ENGLISH and DUTCH Original document contains color illustrations
(ETN-86-97773) Copyright. Avail: Issuing Activity
The history of the Schreiner airline company is summarized.
ESA

N86-32416# Lockheed-California Co., Burbank.
KRASH 85 USER'S GUIDE: INPUT/OUTPUT FORMAT, REVISION Final Report, Jan. - Sep. 1984
M. A. Gamon, Gil Wittlin, and Bill L. LaBarge Mar. 1986 237 p
(Contract DTFA03-84-C-0004)
(AD-A168846; LR-30777-Rev; DOT/FAA/CT-85/10-Rev) Avail: NTIS HC A11/MF A01 CSCL 09/2
Program KRASH, originally developed under Federal Aviation Administration sponsorship for predicting the response of general aviation airplanes to an impact environment, has been enhanced to include features that would facilitate the modeling of transport category airplanes. This document is the User's Guide which defines the input and output formats appropriate for this new version of Program KRASH known as KRASH 85. GRA

N86-32417# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 1 OF 1985 ACCIDENTS
14 Apr. 1986 418 p
(PB86-916915; NTSB-AAB-86-15) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent HC $185.00/year; all others write for quote CSCL 01B
The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1985. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

N86-32418# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
AIR SAFETY: FEDERAL AVIATION ADMINISTRATION'S ROLE IN DEVELOPING MID-AIR COLLISION AVOIDANCE BACK-UP SYSTEMS
Apr. 1986 19 p
(PB86-197506; GAO/RCED-86-105FS; B-222851) Avail: NTIS HC A02/MF A01 CSCL 01B
This FAA report on the development of mid-air collision avoidance back-up systems contains the following: Airborne collision avoidance system availability; Difference between the traffic alert and collision avoidance system and the beacon collision avoidance system; Traffic alert and collision avoidance system projected commercial availability date; Airborne collision avoidance system and threat alert and collision avoidance system cost and effectiveness. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications.*

N86-32419 National Aerospace Lab., Amsterdam (Netherlands). Afdeling Vliegtuigen.
PRELIMINARY DESIGN OF AN AUTOMATED AIR TRAFFIC CONTROL (ATC) RADAR EVALUATION SYSTEM [VOORONTWERP VOOR EEN GEAUTOMATISEERD ATC-RADAR EVALUATIE SYSTEEM]
J. vanKasteel 27 Apr. 1984 21 p In DUTCH
(Contract RB-RLD-1984-3.1)
(NPL-VG-84-009-L; ETN-86-97779) Avail: Issuing Activity
An automated system to support regular evaluations of radar systems of the government aviation service is presented. The system provides the quality parameters for the combination of sensor and extractor and for the tracker. It determines these parameters from plot and track information and from external reference information if necessary. Simulated plot information can also be used for tracker evaluation. The system consists of subsystems for radar data recording and selection, path reconstruction, sensor/extractor evaluation, and tracker evaluation. The definitions of the quality parameters to be calculated are given.
ESA

N86-32420 Royal Signals and Radar Establishment, Malvern (England).
THE REPLAY TECHNIQUE: THE CONCEPT, INITIAL EXPERIENCE AND PROPOSED DEVELOPMENTS
Alistair Jackson and George J. Onslow Nov. 1985 29 p
(RSRE-Memo-3827; BR98915; ETN-86-98001) Avail: Issuing Activity
A system for capturing activity at the human-computer interface in complex systems is described. This system, implemented in a simulated air traffic control environment, allows for the subsequent replay of all task related audio and visual inputs to the controller, synchronized with a record of his own manual and spoken system inputs. Potential applications for such a facility are discussed and three pilot studies considering the tool's usefulness in examining operator workload and assisting in system development are reported. A revised version of the facility, for use in an enhanced simulation environment, is also described. ESA

N86-32421# Department of the Air Force, Washington, D.C.
DIRECT VIEW HELMET MOUNTED TELESCOPE Patent
Thomas R. Connon, inventor (to Air Force) Issued 25 Mar. 1986 4 p Supersedes AD-D011291
(AD-D012257; US-Patent-4,577,347; US-Patent-Appl-SN-634247; US-Patent-Class-2-6) Avail: US Patent and Trademark Office CSCL 06/17
This patent is an improved helmet including an optical system whereby the wearer may telescopically acquire an image of a field of view, which comprises a telescope retractably mounted to the helmet by means of a two-part hinged boom, one end of which is pivotaly attached to the side of the helmet, and the other end of which supports the telescope via a rotatable and adjustable mounting whereby the telescope may be conveniently moved from a stored position beside the helmet to an operative position in front of the wearer's eye, and aligned and focused in the operative position. GRA

N86-32422# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
GLOBAL RADIO NAVIGATION SYSTEM (GRANAS) SIMULATION Final Report, Apr. 1985
Helmut Euler, Karl Kohler, Ger Ploeger, and Kurt Taenzer Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 107 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-028; ISSN-0170-1339; ETN-86-97470) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22.50
The accuracy of the satellite position, of the clock synchronization and of the user's position are calculated using statistical evaluation procedures to simulate GRANAS navigation principles and operation. The satellite position is determined by numerical tests and parameters derived from a Kalman filter. The satellite motion is simulated using physical boundary conditions. The quartz clock inaccuracy is assessed and included in the one-way remote measurement inaccuracy. A nonlinear Kalman filter is produced to determine the user's dynamic behavior. The simulation shows a

position inaccuracy of Circular Error Probability (CEP) < 14 m during a uniform motion and of CEP < 30 m in the acceleration phase. The 3D errors amount to spherical error probability < 17 m or 36 m. The method can be further optimized. ESA

N86-32423# European Space Agency, Paris (France).
CONSTRUCTION OF A JOB-ORIENTED TEST FOR THE SELECTION OF AIR TRAFFIC CONTROLLERS
Thomas Spohrer Oct. 1985 46 p
(ESA-TT-921; DFVLR-FB-84-51; ETN-86-97799) Avail: NTIS HC A03/MF A01; German version available from DFVLR, Cologne, West Germany DM 17.50

The Approach Control Test (ACT) simulating air traffic control operations is a paper-pencil group test involving the collision-free landing of two to three aircraft over check points in the approach control area. The test requires the use of a test map representing the approach control area, a tape or cassette recorder, and a blackboard for occasional explanations. The test results prove the validity of the ACT used as a part of the psychological selection program for air traffic controllers. ESA

N86-32424# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
THEORETICAL AND COMPUTATIONAL ASPECTS OF ADAPTIVELY CONTROLLED NAVSTAR ANTENNAS
O. B. M. Pietersen, F. Klinker, H. F. A. Roefs, and A. M. G. M. Lucas 1 Jan. 1984 91 p Sponsored by NATO
(NLR-TR-84004-U; B8665726; ETN-86-98033) Avail: NTIS HC A05/MF A01

Jamming suppression antennas used by military users of Navstar Global Positioning System were studied. Literature on adaptive null-steering antennas was reviewed and a computer program was designed as a tool for the evaluation of antenna choices. The program is used to determine the requirements for threat suppression and compute the performance of null or beam-steering antennas in electronic warfare. ESA

N86-32820# High Arctic Consulting Ltd., Raahe (Finland).
USE OF AN ARGOS PLATFORM ON AN EXPEDITION TO THE NORTH POLE 1984
Matti Tervaskanto *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32822# Norwegian Defence Research Establishment, Kjeller.
DESCRIPTION OF THE NORWEGIAN DOPPLER POSITIONING PROGRAM
Per Helge Andersen, K. Aksnes, and Einar Haugen (Royal Norwegian Council for Scientific and Industrial Research, Oslo) *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N86-32425# Aeronautical Research Labs., Melbourne (Australia).
A MATHEMATICAL MODEL OF THE SEA KING Mk.50 HELICOPTER AERODYNAMICS AND KINEMATICS
M. J. Williams and A. M. Arney 1986 63 p
(ARL-AERO-TM-379; AR-004-467) Avail: NTIS HC A04/MF A01

Details are given of the expressions used to describe the aerodynamics and kinematics of the Sea King Mk.50 helicopter during steady flight and low rate maneuvers up to an advance ratio of 0.3. The aerodynamics/kinematics formulation is a major component of the Sea King mathematical model developed by Aeronautical Research Laboratories (ARL) for flight simulation of this anti-submarine warfare helicopter. Author

N86-32426# Department of the Air Force, Washington, D.C.
REMOTELY CONTROLLED AIRCRAFT TIRE INFLATION/DEFLATION VALVE Patent Application
Donald E. Williams, inventor (to Air Force) Filed 4 Oct. 1985 14 p
(AD-D012294; US-Patent-Appl-SN-784128) Avail: NTIS HC A02/MF A01 CSCL 01/3

A novel inflation/deflation system for the pneumatic tires of a vehicle, and particularly of an aircraft, is described, which comprises a housing on the vehicle, such as in the form of a fixed axle housing, on which the tire and wheel are mounted for rotation, and defining a cavity coaxial with the axis of rotation of the wheel for housing the valve and related components; a manifold within the housing defines a manifold chamber containing and supporting an axially movable poppet valve; a remotely controllable solenoid is mounted within the axle housing coaxially with the manifold and poppet valve, the plunger of the solenoid being operatively connected to the poppet valve for axial movement of the latter between open and closed positions in response to operation of the solenoid, whereby pneumatic pressure may be selectively supplied from a pneumatic source to the manifold and to the tire through pneumatic lines connected to it. GRA

N86-32427# Naval Ship Research and Development Center, Bethesda, Md.
EVALUATION OF FULL-SCALE HOVERCRAFT LIFT SYSTEMS Final Report
David D. Moran, R. T. Waters, and Alan N. Jennings Mar. 1986 24 p
(AD-A167939; DTNSRDC-86/016) Avail: NTIS HC A02/MF A01 CSCL 01/3

Design of a hovercraft lift system is normally based upon fairly simple hydraulic models of the lift system components. Lift system loss coefficients and fan efficiencies are determined from prior experience, empirical data bases and components or system model studies. Prediction of full-scale performance is complicated by the difficulty of establishing correspondence between model-scale and full-scale values of Reynolds number, Mach number and Euler number. Full-scale verification of the lift system design process is an essential part of hovercraft development. This paper presents results of a full-scale evaluation of the performance of a hovercraft lift system, and performance characteristics are compared with model-scale results. Comparisons of lift system loss coefficients show good correlation, but lift system efficiencies are shown to be significantly higher in full-scale results than from model-scale predictions. Three lift-fan designs are discussed and an increase in lift system efficiency of 10% to 15% is observed for a mixed-flow fan over a centrifugal-flow fan design. GRA

N86-32428# Naval Postgraduate School, Monterey, Calif.
SURVIVABILITY CONSIDERATIONS DURING AIRCRAFT CONCEPTUAL DESIGN M.S. Thesis
Robert J. Gilman Mar. 1986 100 p
(AD-A168555) Avail: NTIS HC A05/MF A01 CSCL 01/3

Survivability, capability, maintainability, and reliability will establish the effectiveness of a combat aircraft. Considerations for the ilities must take place during the conceptual design phase. Retrofit of survivability enhancement has historically increased weight, drag, and cost, while decreasing capability and performance. Proper application of the six susceptibility reduction concepts and the six vulnerability reduction concepts must take place before the design is established to maximize effectiveness and minimize penalties. In this thesis, the application of survivability enhancement techniques to the conceptual design is presented in general and also specifically applied to the design of a long range Strike Fighter aircraft. General guidelines for susceptibility and vulnerability reduction for any aircraft are also presented.
Author (GRA)

N86-32429# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DYNAMIC IDENTIFICATION PROCEDURE AND LIFT CERTIFICATION OF LIGHT AIRCRAFT AND GLIDERS Final Report [PROCEDURE D'IDENTIFICATION DYNAMIQUE ET DE CERTIFICATION AU FLOTTEMENT DES AVIONS LEGERS ET PLANEURS]
G. Piazzoli Jan. 1986 37 p In FRENCH
(Contract STPA-83-95-019)
(ONERA-RT-12/1677-RY-090-R; ETN-86-97641) Avail: NTIS HC A03/MF A01

The problems found in certification testing of light aircraft are examined in order to make choices compatible with time and cost constraints. The description of test procedures includes experimental methods to characterize the modal behavior of the structure in the presence of weak nonlinear effects, mixed methods to compute the dynamic behavior of the flight controls, and numerical methods to determine the aeroelastic coupling and the critical velocities. It is shown that a detailed analysis is required and that the described procedures allow a fast, low cost, and safe characterization. ESA

N86-32430# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
THE GENERATION OF EQUAL PROBABILITY DESIGN LOAD CONDITIONS, USING POWER SPECTRAL DENSITY (PSD) TECHNIQUES
R. Noback 23 Jan. 1986 66 p
(Contract NIVR-1995)
(NLR-TR-85014-U; B8665725; ETN-86-98036) Avail: NTIS HC A04/MF A01

A method to generate consistent sets of design load conditions of aircraft design loads determined using the design envelope criterion of the power spectral density (PSD) method is derived. The method is based on the use of the correlation coefficients between the loads. Two sets of design load conditions have special properties and are proposed for practical use. Approximations to the proposed methods are given for the case that the design loads are determined with the Mission Analysis criterion of the PSD method. ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N86-32431# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
FLIGHT TEST INSTRUMENTATION USED IN THE FOKKER F27 AND F28 DEVELOPMENT AND CERTIFICATION FLIGHT PROGRAM
J. T. M. vanDoorn Sep. 1984 56 p Lecture presented at AGARD Consultancy Mission, Lisbon, Portugal, 10 Apr. 1984
(NLR-MP-84023-U; B8661087; ETN-86-97665) Avail: NTIS HC A04/MF A01

The development of the Fokker F27 turboprop and F28 turbofan short-haul airliners and the flight test programs for these two aircraft types are reviewed. The flight test instrumentation systems designed to meet the requirements of these programs and which were used throughout the years of F27 and F28 development are described. ESA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-32432*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERSPECTIVES ON DILUTION JET MIXING
J. D. Holdeman and R. Srinivasan (Garrett Turbine Engine Co., Phoenix, Ariz.) Mar. 1986 32 p Presented at the Spring Meeting of the Central States Section of the Combustion Inst., Cleveland, Ohio, 5-6 May 1986 and the 22nd Joint Propulsion Conference, Huntsville, Ala., 16-18 Jun. 1986; sponsored by AIAA, ASME, SAE, and ASEE
(NASA-TM-87294; E-2975; NAS 1.15:87294; AIAA-86-1611) Avail: NTIS HC A03/MF A01 CSCL 21E

A microcomputer code which displays 3-D oblique and 2-D plots of the temperature distribution downstream of jets mixing with a confined crossflow has been used to investigate the effects of varying the several independent flow and geometric parameters on the mixing. Temperature profiles calculated with this empirical model are presented to show the effects of orifice size and spacing, momentum flux ratio, density ratio, variable temperature mainstream, flow area convergence, orifice aspect ratio, and opposed and axially staged rows of jets. Author

N86-32433*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRUCTURAL DYNAMIC MEASUREMENT PRACTICES FOR TURBOMACHINERY AT THE NASA LEWIS RESEARCH CENTER
Louis J. Kiraly 1986 30 p Presented at the Symposium on Propulsion Instrumentation, Jiangyou, China, 6-10 Oct. 1986; sponsored by NASA and Chinese Aeronautical Establishment
(NASA-TM-88857; E-3245; NAS 1.15:88857) Avail: NTIS HC A03/MF A01 CSCL 51C

Methods developed for measuring blade and rotor-shaft system response include optical systems, transient instruments, and special digital data processing equipment. Optical methods offer some distinct benefits for blade vibration measurement. Transient and steady state measurements of the response of rotor-shaft systems strongly affect analytical methods development. Digital computing systems allow processing of large volumes of high speed data from rotating blade sets. Also, digital systems develop useful vibration response signatures from randomly excited systems. Research facilities include the spin rig facility and the transient rotor response lab. Author

N86-32434# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AN INTRODUCTION OF THE POWER ENGINEERING RESEARCH AT NANJING AERONAUTICAL INSTITUTE
14 May 1986 15 p Transl. into ENGLISH from Guoji Hanghong (China), no. 11(272), Nov. 1985 p 31-33
(AD-A168639; FTD-ID(RS)T-0070-86) Avail: NTIS HC A02/MF A01 CSCL 21/5

In order to improve the performance of aircraft, it is required that the power plant have good technical specifications such as high ratio of thrust to weight, high efficiency, long service life, etc. Therefore, new progress should be made in the research of power plant; that is, on the one hand, paying attention to improving the quality of parts and components and to improving the match between them; on the other hand, solving the technical problems of the systematic control of the power systems. In order to achieve these goals, the scope of research should delve further enlarged, and the content of research should be deepened into the fields of interdisciplinary science and technology. GRA

N86-32435# Oak Ridge National Lab., Tenn.
CONCEPT FOR THE QUALITY ASSURANCE OF COMPONENTS OF THE CERAMIC GAS TURBINE BY NONDESTRUCTIVE TESTING
K. Goebbels, H. Reiter, W. Arnold, and S. Hirsekorn 1986 55 p Prepared in cooperation with Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Saarbruecken (West Germany)
(Contract DE-AC05-84OR-21400)
(DE86-011474; ORNL/tr-86/19) Avail: NTIS HC A04/MF A01

This work to develop nondestructive testing (NDT) methods for components made from high temperature and high strength ceramics was sponsored during the years 1977 to 1983 by the BMFT in a ceramic gas turbine program. The central task was to make available NDT methods for the detection of defects with linear dimensions between 10 and 100 microns. The presented final report demonstrates the elaborated concept for the quality assurance. For the surface and volume defects and the structure and stress measurement three methods are well to the fore: high resolution radiography, filmless with microfocal X-ray tubes and projection technique. This kind of testing is accomplished by cross section images of the computer tomography with reduced resolution; ultrasonic testing and ultrasonic microscopy with frequencies between 5 and 200 MHz: structure characterization (homogeneity) and stress measurement by low frequency (less than or equal to 20 MHz) velocity measurements. Detection of surface defects with surface waves. A detection and characterization of volume defects is possible with high frequency ultrasound; and vibration analysis (resonance frequency) for large sample series, qualitative and integral characterization of components. DOE

N86-32436# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
TURBISTAN: A STANDARD LOAD SEQUENCE FOR AIRCRAFT ENGINE DISKS
A. J. A. Mom, W. J. Evans, and A. A. tenHave 19 Mar. 1985 15 p Presented at AGARD Structures and Materials Specialists' Meeting on Damage Tolerance Concepts for Critical Engine Components, San Antonio, Tex., Apr. 1985
(NLR-MP-85033-U; B8665117; ETN-86-97676) Avail: NTIS HC A02/MF A01

The development of TURBISTAN, an international loading standard representative for fighter engine disk usage is described. The compilation of operational flight data, their analysis, and the generation of a preliminary TURBISTAN sequence for cold compressor disks are outlined. The sequence contains 8000 cycles which represent 100 flights. A materials testing program to assess the effectiveness of the standard and to explore the validity of the assumptions made in its derivation is discussed. ESA

N86-32437# National Aerospace Lab., Amsterdam (Netherlands). Aerodynamics Div.
RECENT DEVELOPMENTS IN PROPULSION AERODYNAMICS
W. B. deWolf 29 Mar. 1985 13 p in DUTCH; ENGLISH summary Presented at the NVvL-VSV Symposium on Recent Developments in Aerodynamics, Delft, Netherlands, 26 Apr. 1986
(NLR-MP-85031-U; B8664743; ETN-86-97675) Avail: NTIS HC A02/MF A01

Developments in propulsion aerodynamics relevant to the aerodynamic design of civil aircraft are discussed. The striving for fuel economy resulted for turbofan engines in refinement of the nacelle configuration, including the exhaust nozzle system and the lowest possible interference drag. As a fuel saving alternative to the turbufan engine, the advanced propeller for cruise Mach numbers between 0.7 and 0.8 was investigated; fuel savings between 20% and 30% seem feasible. The conventional propeller was improved with respect to aerodynamics (blade airfoils), acoustics, and weight (composite materials). ESA

N86-32438# National Aerospace Lab., Amsterdam (Netherlands).
COST REDUCTIONS FROM INTRODUCTION OF NEW LIFE PHILOSOPHIES FOR AIRCRAFT ENGINE DISCS
A. J. A. Mom 23 Sep. 1985 17 p Presented at the 25th SAE Symposium E-32 Committee Meeting, Amsterdam, Netherlands, 21 Oct. 1985
(NLR-MP-85076-U; B8665116; ETN-86-97685) Avail: NTIS HC A02/MF A01

Turbine disk lifing procedures are discussed. The damage tolerance approach for disk lifing as well as a modified safe-life philosophy, the so-called refined cycle counting method, result in a considerable life extension in relation to the current safe-life approach. ESA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N86-32439 Purdue Univ., West Lafayette, Ind.
AN APPROACH TO INTEGRATED AEROSERVOELASTIC TAILORING FOR STABILITY Ph.D. Thesis
Thomas A. Zeiler 1985 123 p
Avail: Univ. Microfilms Order No. DA8529352

A fundamental study of the problem of combined structural and control design for aeroelastic behavioral objectives, called integrated aeroservoelastic tailoring, is conducted. First, behavioral characteristics of two idealized aeroservoelastic models are studied. These models are a 3 degree-of-freedom airfoil and a 4 degree-of-freedom aircraft idealization, the latter incorporating the 3 degree-of-freedom airfoil elastically attached to a fuselage with freedom in body pitch. Structural design parameters are the shear center and airfoil position, control synthesis is accomplished with optimal steady-state linear quadratic regulator theory. Control design parameters include the control design speed and elements of the output weighting matrix in the quadratic cost function used in the control synthesis. Second, aeroservoelastic tailoring is posed as a multi-disciplinary optimization problem to which is applied multilevel linear decomposition, breaking the aeroservoelastic system down into structural and control subsystems. For the present study, the design objective is a maximized stable airspeed envelope with the subsystem designs constrained to be optimal in some way. The control subsystem is the optimal steady-state linear quadratic regulator. The structural subsystem is not modeled in detail. An iterative design technique is then applied to the two models. Results show that the technique yields optimally controlled configurations with superior stability boundaries. The technique also provides a rational means for determining changes in structural and control design parameters to effect desired changes in system performance. Dissert. Abstr.

N86-32440*# Kansas Univ. Center for Research, Inc., Lawrence.
PRELIMINARY CONTROL LAW AND HARDWARE DESIGNS FOR A RIDE QUALITY AUGMENTATION SYSTEM FOR COMMUTER AIRCRAFT. PHASE 2
Donald J. Davis, Dennis J. Linse, Reiner Suikat, and David P. Entz Sep. 1986 261 p
(Grant NAG1-345)
(NASA-CR-4014; NAS 1.26:4014; KU-FRL-6132-2) Avail: NTIS HC A12/MF A01 CSCL 01C

The continued investigation of the design of Ride Quality Augmentation Systems (RQAS) for commuter aircraft is described. The purpose of these RQAS is the reduction of the vertical and lateral acceleration response of the aircraft due to atmospheric turbulence by the application of active control. The current investigations include the refinement of the sample data feedback control laws based on the control-rate-weighting and output-weighting optimal control design techniqes. These control designs were evaluated using aircraft time simulations driven by Dryden spectra turbulence. Fixed gain controllers were tested throughout the aircrft operating envelope. The preliminary design of the hardware modifications necessary to implement and test the RQAS on a commuter aircraft is included. These include a separate surface elevator and the flap modifications to provide

both direct lift and roll control. A preliminary failure mode investigation was made for the proposed configuration. The results indicate that vertical acceleration reductions of 45% and lateral reductions of more than 50% are possible. A fixed gain controller appears to be feasible with only minor response degradation.
Author

N86-32441# Department of the Air Force, Washington, D.C.
CENTRIFUGALLY OPERATED MOVING-MASS ROLL CONTROL SYSTEM Patent
Daniel H. Piatus, inventor (to Air Force) Issued 25 Mar. 1986 5 p
(AD-D012272; US-Patent-4,577,812; US-Patent-Appl-SN-398281; US-Patent-Class-244-3.21) Avail: US Patent and Trademark Office CSCL 16/3

This patent discloses a roll control system for a reentry vehicle having the pay load positioned within the vehicle so as to offset the center of gravity from the aerodynamic axis of the vehicle. A radial mass unbalance is created in the aft end of the vehicle to create a trim angle of attack dependent upon the vehicle roll rate which provides a source of roll torque with the out-of-plane radial center of mass offset. With the use of a mass and spring arrangement, the mass unbalance is controlled by centrifugal force to terminate the roll torque at the prescribed design rate. GRA

N86-32442# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
INVESTIGATION OF AN ASYMPTOTIC EXPANSION TECHNIQUE TO ANALYZE LIMIT CYCLE RESPONSE OF AERODYNAMIC SURFACES WITH STRUCTURAL NONLINEARITIES Final Report, 13 Sep. 1984 - 13 Jul. 1985
Anthony J. Hauenstein, Robert M. Laurenson, and John L. Gubser 8 Jul. 1985 56 p
(Contract F49620-84-C-0123)
(AD-A168491; AFOSR-86-0288TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

Defining the flutter and divergence characteristics of aerodynamic surfaces is a basic requirement in assuring structural and performance integrity of a given design for its operational environment. Divergence and flutter phenomena are unstable motions with increasing amplitude. For systems containing structural nonlinearities, another mode of aeroelastic response limit cycle oscillation may be present. The potential of limit cycle response is important since these oscillations may occur within the aerodynamic surface flutter and divergence flight envelope and may lead to fatigue damage of the system even through aeroelastic instability is not encountered. The objective of this thesis is to evaluate, on a comparative basis, different numerical simulation approaches for predicting limit cycle response of aerodynamic surfaces containing discrete structural nonlinearities. Results from such simulations are needed to compare and evaluate approximate solutions for the limit cycle response of nonlinear systems. In addition, these simulation results provide information concerning the nature of the nonlinear system response which may be used to aid in understanding the mechanism of the aerodynamic surface dynamics and in understanding the response of nonlinear systems in general. The numerical integration techniques selected for evaluation were: fourth-order Runge-Kutta, eighth-order Shanks, and fourth-order Adams-Moulton predictor-corrector. Results of the three simulation techniques compare well with each other. GRA

N86-32443# National Aerospace Lab., Amsterdam (Netherlands). Dept. of Aeroelasticity.
NLR EXPERIENCE IN THE APPLICATION OF ACTIVE FLUTTER SUPPRESSION AND GUST LOAD ALLEVIATION, APPLIED TO A WIND TUNNEL MODEL
P. A. vanGelder 19 Mar. 1985 14 p Presented at the 2nd International Symposium on Aeroelasticity and Structural Dynamics, Aachen, West Germany, 1-3 Apr. 1985 Sponsored by Netherlands Agency for Aerospace Programs and NLR
(NLR-MP-85027-U; B8664359; ETN-86-97673) Avail: NTIS HC A02/MF A01

Control laws for flutter suppression and gust load alleviation systems were developed and tested using an aeroelastic wind tunnel model in a subsonic wind tunnel with the capability to simulate discrete or random gusts. Flutter suppression up to the maximum wind-tunnel speed (1.4 Vf) is achieved, while the gust load alleviation system reduces the wing root bending moment by 25% at 0.9 Vf for simulated gusts with a Dryden spectrum. ESA

N86-32444# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. Helicopters.
ACTIVE CONTROL OF HELICOPTER VIBRATIONS. FLIGHT EVALUATION OF A VIBRATION REDUCTION SYSTEM ON A GAZELLE SA 349 HELICOPTER [CONTROLE ACTIF DES VIBRATIONS SUR HELICOPTERE. EVALUATION EN VOL D'UN SYSTEME PROBATOIRE SUR GAZELLE SA 349]
Michel Polychroniadis and Marc Achache 1986 28 p In FRENCH Presented at 42nd Forum AHS, Jun. 1986
(SNIAS-861-210-108; ETN-86-97593) Avail: NTIS HC A03/MF A01

A multicyclic vibration reduction system was tested in real helicopter flight. The self-adapting system is composed of a digital computer, an analog computer, a vibration measuring system composed of accelerometers placed in the cabin, and three electrohydraulic output devices which can modify the wing incidence angle by up to 1.6 deg. The computing algorithms estimate the optimum command function. Adaptive deterministic or stochastic algorithms were tested. Vibration reductions of 80% are obtained. ESA

N86-32445# European Space Agency, Paris (France).
IDENTIFICATION OF GUST INPUT AND GUST RESPONSE CHARACTERISTICS FROM DO 28 TNT FLIGHT TEST DATA
Detlef Rohlf Dec. 1985 65 p Transl. into ENGLISH from "Ermittlung der Boe und des Boeenstoerverhaltens aus Flugversuchsdaten am Beispiel Do 28 TNT" Brunswick, West Germany Original report in German previously announced as N85-27881
(ESA-TT-919; DFVLR-FB-84-48; ETN-86-98075) Avail: NTIS HC A04/MF A01; original German version available. from DFVLR, Cologne, West Germany DM.21

A method to determine gust response characteristics and simultaneously estimate the discrete gust input from flight test data using system identification techniques is presented. The method is restricted to longitudinal motion of aircraft with separated wing and tail surfaces at low Mach numbers. The applicability of the method is demonstrated by analyzing free flight catapult tests and dynamic wind-tunnel tests with models of the Do 28 TNT aircraft. A good fit of the measured and identified time histories is achieved by considering the dynamic terms which are important for angles of attack varying rapidly due to gusts. ESA

N86-32446# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Regelung.
SERVO-ACTUATOR FOR SAMPLED-DATA FEEDBACK DISTURBANCE REJECTION Ph.D. Thesis - Ruhr University
Josef Petry Jan. 1986 199 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-08; ISSN-0171-1342; ETN-86-97818) Avail: NTIS HC A09/MF A01; DFVLR, Cologne, West Germany DM 57.50

Based on a helicopter it is demonstrated why discrete feedback control for disturbance rejection using a pulse-amplitude-modulated control signal can cause undesired disturbing effects. This analysis is done in the frequency domain by frequency responses, and by spectral decompositions of the signals concerned. The results provide recommendations for a controller design. A continuous minor-loop feedback control which allows the continuous plant to be appropriately adjusted to the characteristics of discrete disturbance rejection is proposed. The efficiency of this approach is confirmed by design examples and simulations. ESA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N86-32447* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATOR SCENE DISPLAY EVALUATION DEVICE Patent
Richard F. Haines, inventor (to NASA) Issued 12 Aug. 1986 8 p Filed 22 Dec. 1983 Supersedes N84-16221 (22 - 07, p 960
(NASA-Case-ARC-11504-1; US-Patent-4,605,303; US-Patent-Appl-SN-565481; US-Patent-Class-356-73) Avail: US Patent and Trademark Office CSCL 14B

An apparatus for aligning and calibrating scene displays in an aircraft simulator has a base on which all of the instruments for the aligning and calibrating are mounted. Laser directs beam at double right prism which is attached to pivoting support on base. The pivot point of the prism is located at the design eye point (DEP) of simulator during the aligning and calibrating. The objective lens in the base is movable on a track to follow the laser beam at different angles within the field of vision at the DEP. An eyepiece and a precision diopter are movable into a position behind the prism during the scene evaluation. A photometer or illuminometer is pivotable about the pivot into and out of position behind the eyepiece. NASA

N86-32448 Carville Ltd., Dorking (England).
AN IMPROVED OPTICAL VIEWING SYSTEM FOR A FLIGHT SIMULATOR
K. J. Gibson and I. M. Wells Aug. 1985 26 p
(Contract MOD-85a/431)
(MS-8025; BR96992; ETN-86-96555) Copyright. Avail: Issuing Activity

A large compound lens to be used to collimate the scene displayed on a 26in diagonal television monitor was developed. The development was undertaken for a flight simulator but is applicable in other areas whenever collimation of a relatively wide angle scene is required. A field of view of nominally 47 deg horizontally by 36 deg vertically is available with an eye relief of 560mm (22in). The prototype lens shows the design to be totally free of any chromatic abberations. Geometric distortions are acceptable for most applications. ESA

N86-32449# Technische Univ., Berlin (West Germany).
NUMERICAL METHODS FOR ADAPTING WIND TUNNEL WALLS
Rainer Rebstock 1984 23 p Presented at the Euromech Coloquium 187 on Adaptive Wall Wind Tunnels and Wall Interference Correction Methods, Goettingen, West Germany, 15-17 Oct. 1984
(ILR-Mitt-144(1984)) Avail: NTIS HC A02/MF A01

The numerical methods that have been developed for the TU-Berlin 3D-adaptive wall test section are discussed. Particular emphasis is placed on the description of a recently established method to calculate the adapted wall shape in one step, i.e., by using the measured velocity components from only one tunnel run. In this context a new design-program to solve the inverse problem for the exterior flow field is presented. A comparison between pressure distributions calculated with the TSP and the Panel method for prescribed wall contours confirms the applicability of the latter scheme for high subsonic Mach numbers. Author

N86-32450# Stichting Geluidshinder Schiphol, Harlem (Netherlands).
[ACTIVITIES REPORT IN NOISE DISTURBANCE AT SCHIPHOL (NETHERLANDS)] Annual Report, 1984 [JAARVERSLAG 1984]
1985 82 p In DUTCH
(ETN-86-97776) Avail: NTIS HC A05/MF A01

The policy with respect to noise complaints at Schiphol International airport (Netherlands) is explained. The preferential use of runways, the upkeep of runways, and the intensity of the use of runways are discussed. Night flight, training flights, helicopter flight, and test flights are treated. Starting and takeoff procedures, radar control, and measurements and calculation of noise are outlined. Urban planning problems related to the construction of a new runway are discussed. Noise zones, noise disturbance standards, noise situation calculation and control, noise reduction measures, policy with respect to new buildings, and noise optimization study for the new runway are presented. ESA

N86-32451# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de la Physique Generale.
MICROPHONE PROBE TESTS IN THE S3CH WIND TUNNEL FOR TRANSONIC PROPELLER MEASUREMENTS IN S1MA [ESSAI DE SONDES MICROPHONIQUES DANS LA SOUFFLERIE S3CH EN VUE DES MESURES SUR HELICE TRANSSONIQUE DANS S1MA]
H. Gounet and J. Lambourion Feb. 1985 35 p In FRENCH Sponsored by Direction des Recherches Etudes et Techniques
(ONERA-RT-19/3463-AYP; ETN-86-97873) Avail: NTIS HC A03/MF A01

Acoustic measurements were carried out in order to test modifications of radial microphone wind tunnel sensors and to verify the influence of the model support. The tests were made at Mach numbers from 0.3 to 0.85 and several configurations of the distribution of acoustic sensors. Spectra up to 5000 Hz were obtained. It is shown that 1000 Hz, which is the fundamental transonic propeller frequency, is well detected by the system. No interference due to the model support is found. ESA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N86-32452# European Space Agency, Paris (France). Space Science Dept.
SPACE MISSIONS TO HALLEY'S COMET
R. Reinhard, B. Battrick, and Erica Rolfe, ed. Mar. 1986 269 p Original contains color illustrations
(ESA-SP-1066; ISSN-0379-6566; ETN-86-97564) Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Giotto, Vega, and Planet-A/MS-T5 missions are introduced. Impact-induced spacecraft charging and related effects during the Halley-encounters; The International Cometary Explorer (ICE) mission to Comets Giacobini-Zinner and Halley; Astro-1; IUE; Solar Maximum Mission; the Spartan Mission; NASA-supported smaller programs to observe Comet Halley; International Halley Watch and its observing nets; Comet Halley ephemeris; the Inter-Agency Consultative Group (IACG) and its associated working groups; Halley dust and gas environment; coordinated multispacecraft plasma science in the solar-wind and comet-plasma environments; and the pathfinder concept are discussed. For individual titles, see N86-32453 through N86-32470.

N86-32453# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
HALLEY'S COMET AS AN OUTSTANDING TARGET **c90**
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p vii-xvi (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Reasons for selecting Halley's Comet for a flyby mission are outlined. Halley is the most outstanding target for a cometary mission as it is the only comet that has a well-known orbit and a high gas and dust production rate, comparable to that of new

comets. A mission to Halley requires very little launch energy and the comet can also be observed from the Earth during the flybys. Because of its predictability and brightness Halley is also the most famous comet. ESA

N86-32454# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HALLEY'S COMET IN HISTORY **c90**
D. K. Yeomans, J. Rahe (Remeis Sternwarte, Bamberg, West Germany), and R. Freitag (Library of Congress, Washington, D. C.) *In* ESA Space Missions to Halley's Comet Mar. 1986 p 1-24 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Observations of Halley's Comet from Chinese observatories in 240 BC until the present are described. ESA

N86-32455# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE GIOTTO PROJECT
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p 25-48 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Giotto Mission to Halley's Comet is a fast flyby at 00 UT on 14 March 1986, 4 weeks after the comet's perihelion passage, when it is most active. The scientific payload is made up of 10 experiments with a total mass of 60 kg: a camera for imaging the comet nucleus, 3 mass spectrometers for analyzing the elemental and isotopic composition of the cometary dust and gas environment, dust impact detectors, a photopolarimeter for measuring the coma's brightness, and a set of plasma instruments for studying the solar-wind/comet interaction. In view of the high flyby velocity of 68 km/sec, the active experiment time is very short (of the order of 4 hr) and all data are transmitted back to Earth in real time, at a rate of 40 kbit/sec. The Giotto spacecraft is spin-stabilized and has a despun, high-gain parabolic dish antenna inclined at 44.3 deg which points towards Earth during the cometary encounter. A shield protects the front end of the spacecraft from being destroyed by hypervelocity dust impacts. The Giotto spacecraft passes the nucleus 50 km on the sunward side. ESA

N86-32456# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE VEGA MISSIONS
R. Grard, T. I. Gombosi (Hungarian Academy of Sciences, Budapest), and R. Z. Sagdeev (Academy of Sciences (USSR), Moscow) *In* ESA Space Missions to Halley's Comet Mar. 1986 p 49-70 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Vega Halley's Comet flyby mission is described. The scientific objectives of the Vega cometary investigation are: determination of the physical parameters of the nucleus: dimensions, shape, temperature and surface properties; study of the structure and dynamics of the coma; definition of the gas composition in the close vicinity of the nucleus and the nature of the parent molecules; study of dust particle composition and mass distribution as functions of the distance to the nucleus; and study of the interaction of the solar wind with the atmosphere and ionosphere of the comet. The Halley probes are three-axis-stabilized and their orientation is defined with an accuracy of 1 deg during Halley flyby. The optical instruments can track the nucleus with an angular accuracy of the order of 5 arcmin. ESA

N86-32457# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
THE SUISEI/SAKIGAKE (PLANET-A/MS-T5) MISSIONS
K. Hirao *In* ESA Space Missions to Halley's Comet Mar. 1986 p 71-84 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Experiments on the Japanese Halley's Comet spacecraft Planet-A and MS-T5 are outlined. Planet-A objectives are: to study the growth and the decay of the comet's hydrogen corona and to determine the total hydrogen production rate by taking UV images of the corona over an extended period; and to study the interaction of the solar wind with the cometary ionosphere by measuring the three-dimensional distributions of ions and electrons (energy range 30 eV to 16 keV). The MS-T5 objective is to study the solar-wind plasma and determine the signatures of the solar-wind/comet interaction at large distances from the comet. ESA

N86-32458# Los Alamos National Lab., N. Mex. Space Plasma Physics Group.
IMPACT-INDUCED SPACECRAFT CHARGING AND RELATED EFFECTS DURING THE HALLEY ENCOUNTERS **c18**
D. T. Young *In* ESA Space Missions to Halley's Comet Mar. 1986 p 85-98 Sponsored by DOE (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Halley gas, dust, and plasma environment is recalled and plasma induced by hypervelocity impact of gas and dust on the forward surfaces of the Giotto and other spacecraft is discussed. Four types of experiment interference may be caused by the plasma and neutral-gas environment around the spacecraft: Electrostatic charging and related space charging, which alter the velocity distributions of incident ions and electrons spurious plasma created on the forward surfaces at energies from a few eV up to a few hundred eV; charge exchange of a fraction of the incoming cometary neutral gas flux will take place as the incident molecules ram through the cloud of neutral molecular debris ejected by dust and gas impact from spacecraft surfaces; and high-voltage power supplies may be loaded by secondary-charged-particle fluxes around instrument apertures. ESA

N86-32459# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE INTERNATIONAL COMETARY EXPLORER (ICE) MISSION TO COMETS GIACOBINI-ZINNER AND HALLEY
J. C. Brandt *In* ESA Space Missions to Halley's Comet Mar. 1986 p 99-115 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Use of the ISEE-3 satellite (renamed ICE) to study the interaction between the solar wind and a cometary atmosphere by passing through the plasma tail by intercepting Comet Giacobini-Zinner on 11 September 1985 is described. Details of the targeting strategy are discussed. Additional scientific objectives following the tail intercept of Comet Giacobini-Zinner include the support of Comet Halley studies through the measurement of solar-wind conditions upstream of P/Halley in October 1985 and March 1986. ESA

N86-32460# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ASTRO-1 MISSION
J. C. Brandt and M. B. Niedner *In* ESA Space Missions to Halley's Comet Mar. 1986 p 117-127 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Astro-1 mission was to be launched in March 1986 for an effective duration of 7 days, chosen to overlap spacecraft encounters with Halley's Comet, i.e., Vega-2 (on 9 March) and Giotto (on 13/14 March). The ultraviolet instrument complement while not designed with cometary research as the prime objective, was well suited to the study of comets. The opportunity of an extended mission during the time of the spacecraft encounters of Halley's Comet offered an extraordinary opportunity for a synergistic interaction between the intercept spacecraft, the Earth-orbital Astro-1 mission, and ground-based observations.

The addition of visual-wavelength, wide-field cameras would enhance the scientific return of the mission. Loss of Challenger cancelled the mission. ESA

N86-32461# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERNATIONAL ULTRAVIOLET EXPLORER (IUE) OBSERVATION OF HALLEY'S COMET
Y. Kondo and J. C. Brandt *In* ESA Space Missions to Halley's Comet Mar. 1986 p 129-133 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The main objectives of the IUE Halley's Comet program are: study of the physical and chemical properties of a comet clearly different from those observed previously with IUE; study of the long-term evolution of the gas and dust coma and the ion and dust tails, by combining IUE data with UV and in-situ observations obtained by other spacecraft; and assessment of the gas and dust environment of Halley in terms of its possible impact on the trajectories of the flyby spacecraft. Another program investigates the CS scale length, and the rotational profile of CS in order to test and calibrate dynamic-flow models of comets. These observations will begin in August 1985 when the heliocentric distance of the comet is 2.8 AU and its total visual magnitude + 13. They will continue into the ninth IUE observing period, through mid-1986. ESA

N86-32462# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF HALLEY'S COMET BY THE SOLAR MAXIMUM MISSION (SMM) **c89**
M. B. Niedner *In* ESA Space Missions to Halley's Comet Mar. 1986 p 135-143 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Solar Maximum Mission coronagraph/polarimeter observations of large scale phenomena in Halley's Comet are discussed. Observations of the hydrogen coma with the UV spectrometer are considered. It is concluded that coronograph/polarimeter observations of the disconnection event, in which the entire plasma tail uproots itself from the head of the comet, is convected away in the solar wind at speeds in the 50 to 100 km/sec range (relative to the head), and is replaced by a plasma tail constructed from folding ion-tail rays, are the most interesting. ESA

N86-32463# Colorado Univ., Boulder. Lab. for Atmospheric and Space Physics.
THE SPARTAN MISSION
C. A. Barth, S. A. Stern, and A. Stewart *In* ESA Space Missions to Halley's Comet Mar. 1986 p 145-150 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Spartan mission was intended to make observations of the ultraviolet spectrum of Comet Halley from Earth orbit in January 1986, near the time of perihelion, when the comet activity was high. The scientific objectives of the Spartan Halley mission were: to observe the ultraviolet spectrum of the coma and tail in the wavelength region 1280 to 3400 A, at a resolution of 2 A; to determine the amount of hydroxyl radicals and atomic oxygen in the coma and relate the production of these species to the photodissociation of water; and to search for carbon atoms and carbon-containing molecules, and sulfur atoms and sulfur-containing molecules. Spartan was on Challenger when the latter exploded. ESA

N86-32464# Universities Space Research Association, Washington, D.C. Cometary Science Program.
NASA-SUPPORTED SMALLER PROGRAMMES TO OBSERVE COMET HALLEY
W. Brunk *In* ESA Space Missions to Halley's Comet Mar. 1986 p 151-159 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Rocket-borne ultraviolet telescope observations of Halley's comet are proposed. Solar wind-comet interaction observations by Pioneer-7 are suggested. Shuttle-borne ultraviolet and visible spectra photography of comet activity is described. ESA

N86-32465# International Halley Watch, Pasadena, Calif.
THE INTERNATIONAL HALLEY WATCH (IHW) AND ITS OBSERVING NETS **c89**
In ESA Space Missions to Halley's Comet Mar. 1986 p 161-178 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Observations of Halley's Comet in 1910 are discussed and the organization of international efforts for 1986 is outlined. Infrared spectroscopy and radiometry; large scale phenomena; near-nucleus studies; photometry and polarimetry; radio astronomy; spectroscopy and spectrophotometry; meteor streams; amateur observations; and a trial run with P/Crommelin are described. The data rights and Halley archive are mentioned. ESA

N86-32466# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE COMET HALLEY EPHEMERIS DEVELOPMENT EFFORT **c90**
D. K. Yeomans *In* ESA Space Missions to Halley's Comet Mar. 1986 p 179-197 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Nongravitational forces affecting Comet Halley's motion are discussed. Analysis of the comet's orbit since 1982 is described. The astrometry network of the International Halley Watch is introduced. Ephemeris (with perturbations) from 1 January 1985 through 30 June 1986 are listed. ESA

N86-32467# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE INTER-AGENCY CONSULTATIVE GROUP (IACG) AND ITS ASSOCIATED WORKING GROUPS
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p 199-215 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The Soviet and Japanese space agencies, ESA, and NASA set up a group to coordinate Halley's Comet missions. Working groups to deal with plasma science, Halley environment, and spacecraft navigation and mission optimization were formed. Near real time exchange of scientific data, use of common coordinate systems, exchange of spacecraft orbital data, and post encounter data exchange were studied. ESA

N86-32468# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE HALLEY DUST AND GAS ENVIRONMENT (IACG WG-1) **c90**
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p 217-231 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

A dust model for the ambient Halley coma assuming homogeneous dust emission from the nucleus surface, including the proper mathematical description of all known major effects was derived. The model was based on 1910 observations of Halley's Comet, updated with observational data from the 1986 appearance. The dust-model computer program was distributed to scientists and spacecraft engineers, while dust-model tables for the Giotto, Vega-1, Vega-2 and Suisei flyby times/distances were distributed to the flight projects to calculate survival probabilities and optimal apertures. Based on the model it was suggested that the Suisei spacecraft, which carries no dust protection shield, could be safely

targeted to pass the comet nucleus at a distance of less than 200 000 km and still avoid dust impacts completely. ESA

N86-32469# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
COORDINATED MULTISPACECRAFT PLASMA SCIENCE IN THE SOLAR WIND AND COMET-PLASMA ENVIRONMENTS (IACG WG-2)
A. A. Galeev and F. L. Scarf *In* ESA Space Missions to Halley's Comet Mar. 1986 p 233-243 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

Plasma physical processes resulting from the solar-wind/comet interaction relevant to Halley flybys were studied. Ways of optimizing the scientific return from the cruise phase by making use of the exceptional close coexistence of seven spacecraft in interplanetary space, and characterizing the interplanetary medium during the various flybys were examined. The effects of the impact-generated plasma around the spacecraft were investigated. ESA

N86-32470# European Space Agency. European Space Operations Center, Darmstadt (West Germany). Orbit Attitude Div.
THE PATHFINDER CONCEPT
R. E. Muench *In* ESA Space Missions to Halley's Comet Mar. 1986 p 245-253 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

The pathfinder concept which allows Giotto to be targeted more precisely by using Comet Halley nucleus position data provided by the Vega Project of Intercosmos is introduced. In the concept, NASA determines the positions of the two Vega spacecraft very accurately using the Deep Space Network (DSN) and very long baseline interferometry techniques. ESA

N86-32471*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
HISTORICAL DATA AND ANALYSIS FOR THE FIRST FIVE YEARS OF KSC STS PAYLOAD PROCESSING
James M. Ragusa Sep. 1986 124 p
(NASA-TM-83105; NAS 1.15:83105) Avail: NTIS HC A06/MF A01 CSCL 22A

General and specific quantitative and qualitative results were identified from a study of actual operational experience while processing 186 science, applications, and commercial payloads for the first 5 years of Space Transportation System (STS) operations at the National Aeronautics and Space Administration's (NASA) John F. Kennedy Space Center (KSC). All non-Department of Defense payloads from STS-2 through STS-33 were part of the study. Historical data and cumulative program experiences from key personnel were used extensively. Emphasis was placed on various program planning and events that affected KSC processing, payload experiences and improvements, payload hardware condition after arrival, services to customers, and the impact of STS operations and delays. From these initial considerations, operational drivers were identified, data for selected processing parameters collected and analyzed, processing criteria and options determined, and STS payload results and conclusions reached. The study showed a significant reduction in time and effort needed by STS customers and KSC to process a wide variety of payload configurations. Also of significance is the fact that even the simplest payloads required more processing resources than were initially assumed. The success to date of payload integration, testing, and mission operations, however, indicates the soundness of the approach taken and the methods used. Author

N86-32472*# Johns Hopkins Univ., Baltimore, Md. Center for Astrophysical Sciences.
STUDIES OF THE ULTRAVIOLET SPECTRA OF ASTRONOMICAL SOURCES Semiannual Progress Report, 1 Feb. - 31 Jul. 1986
Jul. 1986 4 p
(Grant NsG-5393)
(NASA-CR-176865; NAS 1.26:176865) Avail: NTIS HC A02/MF A01 CSCL 22A

An intensive program of observations of the Comet Halley during the week of the Vega 2 and Giotto encounters was carried out by the International Ultraviolet Explorer (IUE) satellite observatory. The IUE Fine Error Sensor, normally used for target acquisition and tracking, was used in a photometer mode to provide nealy continuous light curves over an 8 hour observing shift, a unique capability relative to ground-bases observers. The ultraviolet data can be used to derive an estimate of the total gas production rate even though the models generally used for this purpose assume a steady-state gas production which is clearly not the case for Halley. Additionally, the IUE data provide column abundances of carbon, oxygen, sulfur, OH, CO, CS, C2, and CO2 to compare with the in-situ measurements of these species by Vega 2 and Giotto. B.G.

N86-32473# European Space Agency, Paris (France). Space Science Dept.
THE GIOTTO MISSION: ITS SCIENTIFIC INVESTIGATIONS
R. Reinhard, B. Battrick, and Erica Rolfe, ed. Mar. 1986 217 p Original contains color illustrations
(ESA-SP-1077; ISSN-0379-6566; ETN-86-97565) Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto mission plasma, dust, coma chemistry and imaging experiments are presented. Magnetic field investigations; particulate impact studies; spectrometers; and probes are described. For individual titles, see N86-32474 through N86-32485.

N86-32474# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE GIOTTO PROJECT
R. Reinhard *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p xi-xxv (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto mission to Halley's Comet is a fast flyby in March 1986, 4 weeks after the comet's perihelion passage, when it is most active. The scientific payload consists of a camera for imaging the comet nucleus, three mass spectrometers for analysis of the elemental and isotopic composition of the cometary gas and dust environment, dust impact detectors, a photopolarimeter for measurements of the coma brightness, and plasma instruments for studies of the solar-wind/comet interaction. In view of the high flyby velocity of 68 km/sec, the experiment active time is only 4 hr and all data are transmitted back to Earth in real time at a rate of 40 kbit/sec. The spacecraft in spin-stabilized with a despun, high-gain parabolic dish antenna inclines to point at the Earth during the encounter. A shield protects the forward end of the spacecraft from being destroyed by hypervelocity dust impacts. The spacecraft is targeted to pass the comet nucleus 500 km on the sunward side. ESA

N86-32475# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GIOTTO MAGNETIC-FIELD INVESTIGATION
F. M. Neubauer (Cologne Univ., West Germany), M. H. Acuna, L. F. Burlaga, B. Franke (Technische Univ., Brunswick, West Germany), B. Gramkow, F. Mariani (Rome Univ., Italy), G. Musmann (Technische Univ., Brunswick, West Germany), N. F. Ness, H. U. Schmidt (Max-Planck-Inst. fuer Physik und Astrophysik, Garching, West Germany), T. Terenzi (Consiglio Nazionale delle Ricerche, Frascati, Italy) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 1-14 (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The objectives of the Giotto magnetometer experiment are the investigation of the interaction between Comet Halley and the

solar wind 0.9 AU from the Sun, to within 500 km of the cometary nucleus, and the study of the interplanetary magnetic field. The instrumentation consists of a triaxial and a separate biaxial system of fluxgate sensors of the ring-core type, the associated analog electronics and a digital processor. The measuring ranges of + or 1 16 up to + or - 65536 nT are digitized by a 12-bit analog-to-digital converter. Memory modes allow the bridging of gaps in telemetry coverage of up to 10 days. Because of the dust hazard near closest approach, a magnetometer boom could not be included in the spacecraft design. The magnetic contamination problem was attacked by the use of two magnetometers and by a magnetic-cleanliness program. In-flight results show that the instrument is working flawlessly, though magnetic-contamination problems remain. ESA

N86-32476# Mullard Space Science Lab., Dorking (England).
THE GIOTTO THREE-DIMENSIONAL POSITIVE ION ANALYSER c19
A. Johnstone, J. A. Bowles, A. J. Coates, A. J. Coker, S. J. Kellock, J. Raymont, B. Wilken (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau West Germany), W. Studemann, W. Weiss, R. Cerulli-Irelli (Consiglio Nazionale delle Ricerche, Frascati, Italy) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 15-32 Sponsored by UK Science and Engineering Research Council, Max-Planck Gesellschaft zur Forderung der Wissenschaften, Swedish Board for Space Activities, and CNR (For primary document see N86-32473 24-12)
(Contract NAS5-27442; Grant BMFT-01-OF-112-4)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

An instrument to measure the three-dimensional energy distribution of positive ions in order to study the interaction between the solar wind and ionized Halley cometary particles was designed. Two sensors measure the distribution from 10 eV to 20 keV once per spacecraft spin and the distribution from 90 eV to 90 keV, with coarse mass discrimination, once every 32 spins. The instrument was turned on on 8 September 1985. The performance throughout all testing was nominal. The spacecraft was greater than 10 million km from the Earth in the solar wind. The only population identified is the solar wind. The Fast Ion Sensor follows solar wind variations with its autoranging capability. The Implanted Ion Sensor identifies higher mass ions such as O(6+) and O(5+) in the solar wind. ESA

N86-32477# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
THE GIOTTO RPA-COPERNIC PLASMA EXPERIMENT c19
H. Reme, F. Cotin, A. Cros, J. L. Medale, J. A. Sauvaud, C. Duston, A. Korth (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), A. K. Richter, A. Loidl, K. A. Anderson (California Univ., Berkeley) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 33-52 Original contains color illustrations (For primary document see N86-32473 24-12)
(Contract NASw-3575; Grants CNES-1212; BMFT-01-OF-052)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The RPS-Copernic plasma experiment for the Giotto mission consists of the RPA1-EESA spectrometer and the RPA2-PICCA electrostatic mass analyzer. The RPA1-EESA measures the three-dimensional distributions of electrons between 10 eV and 30 keV. The electron measurements should contribute to defining the properties of the cometary plasma and its interaction with the solar wind. The RPA2-PICCA is designed to measure the composition and the distribution of thermal cometary positive ion, including clathrate hydrates in the mass range 10 to 203 amu. This instrument should probe the interaction processes producing these ions, and provide information on the spatial distribution and chemical composition of the solid, gas, and plasma components of the cometary environment. Such information should allow identification of parent molecule and hence give knowledge of the composition of the cometary nucleus. ESA

N86-32478# Saint Patrick's Coll., Maynooth (Ireland).
THE GIOTTO ENERGETIC PARTICLE EXPERIMENT c19
S. McKenna-Lawlor, A. Thompson (Dublin Inst. for Advanced Studies, Ireland), D. Sullivan, E. Kirsch (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), D. Melrose (Sydney Univ., Australia), and K.-P. Wenzel (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 53-65 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Energetic Particle Experiment (EPA) onboard Giotto will measure the energy distribution of electrons, protons, and heavier nuclei (E is greater than 20 keV) during the cruise phase and in the cometary environment during the Halley encounter. The detector system consists of three particle telescopes each incorporating totally depleted silicon surface barrier layer detectors, and employing active and passive background shielding. In-situ measurements will be made of the flux and spatial distribution of energetic electrons and cometary ions in the Halley environment. Particle acceleration due to magnetic-field-line reconnection processes will, if present, be detected. The occurrence of a solar-particle event during the encounter would provide special opportunities to study the comet/solar-wind interaction and dust distribution around the comet, while the EPA would act as a reference for onboard instruments that are sensitive to particle radiation. Cruise-phase studies provide interplanetary particle flux levels since switch-on, and flare-related particle enhancements are detected. ESA

N86-32479# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
THE GIOTTO PARTICULATE IMPACT ANALYZER c19
J. Kissel *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 67-83 Original contains color illustrations (For primary document see N86-32473 24-12)
(Grants BMFT-01-OF-021-4; BMFT-01-OF-022-5; BMFT-01-OF-850-70)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto Particulate Impact Analyzer will provide information on the composition of individual dust particles and the average composition and mass distribution of cometary matter released by Comet Halley. Knowledge of the material's composition and isotopic ratios will significantly increase understanding of the status and the genesis of comets. The instrument is derived from the dust experiment flown onboard the Helios-1 and 2 satellites, but mass resolution was improved to separate adjacent mass lines over the complete mass range of 1 to 110 mu. Variations in particle type or mean composition as a function of distance from the comet will yield information on the release mechaniam. The instument is sensitive to particles ranging in size from 3 times 10 to the minus 16th to 5 times 10 to the minus 10th power g, with impact rates of up to 100/sec. Data on 1000 to 5000 cometary particles should be gathered. The instrument is performing flawlessly. ESA

N86-32480# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE GIOTTO DUST IMPACT DETECTION SYSTEM c19
J. A. M. McDonnell (Kent Univ., Canterbury, England), W. M. Alexander (Baylor Univ., Waco, Tex.), W. M. Burton (Rutherford High Energy Lab., Chilton, England), E. Bussoletti (Lecce Univ., Italy,), D. H. Clark, G. C. Evans (Kent Univ., Canterbury, England), S. T. Evans, J. G. Firth (Rutherford High Energy Lab., Chilton, England), R. J. L. Grard (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands), E. Gruen (Max-Planck-Inst. fuer Kernphysik, Heidelberg, West Germany) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 85-107 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto Dust Impact Detection System (DIDSY) consists of six independent subsystems to register the impact of all particulates of significant mass incident on the probe during the post-perihelion encounter with Comet Halley. Mounted on Giotto's front dust shield, the detectors will determine the mass spectrum of the dust, with a limiting sensitivity of 10 to the minus 17th power f, increasing to the largest grain masses encountered along Giotto's trajectory throught the cometary environment with an ultimate spatial resolution of 70 km. An additional detector is located on the rear shield to monitor dust particles that penetrate the from dust shield. An ambient plasma monitor measures the impact plasma generated by dust and gass impacts on the spacecraft. ESA

N86-32481# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).

THE GIOTTO NEUTRAL MASS SPECTROMETER

D. Krankowsky, P. Laemmerzahl, D. Doerflinger, I. Herrwerth, U. Stubbemann, J. Woweries, P. Eberhardt (Bern Univ., Switzerlan), U. Dolder, J. Fischer, U. Herrmann et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 109-128 Original contains color illustrations (For primary document see N86-32473 24-12)

(Contract NASw-3576; Grants BMFT-01-OF-0519; BMFT-01-OF-0628; BMFT-01-OF-85-120; SNSF-2.034-0.81; SNSF-2.007-0.83; CNES-81,82-244; CNES-83-211; CNES-84-1211)

Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto neutral mass spectrometer experiment consists of a double-focusing mass spectrometer and an electrostatic energy analyzers, covering a mass range up to 36 amu and an energy range up to 2180 eV (corresponding to 86 amu mass equivalent for thermal species) respectively. Both analyzers have focal-plane configurations allowing simultaneous measurements of a mass and energy range to cope with the high flyby velocity. The detectors, which employ microchannel plates and multiple discrete electron collectors, have a dynamic range of 10 to the 12th power. Coma gases are ionized by electron impact using two different electron energies. Autonomous control of the measurement program ensures optimum time sharing of gas and ion measurements, with a capability for adaption to the densities being measured. ESA

N86-32482# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE GIOTTO ION MASS SPECTROMETER c19

H. Balsiger (Bern Univ., Switzerland), K. Altwegg, F. Buehler, J. Fischer, J. Geiss, A. Meier, U. Rettenmund, H. Rosenbauer (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), R. Schwenn, M. Neugebauer et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 129-148 Sponsored by Max-Planck Gesellschaft, the State of Bern, and DOE Original contains color illustrations (For primary document see N86-32473 24-12)

(Contracts NASw-3572; NASw-3729; Grants BMFT-01-OF-032-3; SNSF-2.034.81; SNSF-2.007.83)

Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Giotto Ion Mass Spectrometer (IMS) consists of two sensors: one optimized for the outer and the other for the inner coma, with each obtaining complementary information in the region for which it is not optimized. The outer coma is characterized by the interaction between solar wind and comentary plasmas, the inner coma by the outflow of cometary neutrals and their ionization products. Both sensors feature mass imaging characteristics, permitting simultaneous measurements of several ion species by multidetector arrays. Resultant mass-per-charge resolution is greater than or = 20. Energy per charge, and the elevation and aximuth of incident ions are measured. Calibration and in-flight solar-wind data show that the IMS will meet its scientific goals for the Halley encounter. ESA

N86-32483# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).

THE GIOTTO HALLEY MULTICOLOR CAMERA c35

W. K. H. Schmidt, H. U. Keller, K. Wilhelm, C. Arpigny (Liege Univ., Belgium), C. Barbieri (Padua Univ., Italy), L. Biermann (Max-Planck-Inst. fuer Physik und Astrophysik, Munich (West Germany), R. M. Bonnet (Liege Univ., Belgium), S. Cazes (Centre National de la Recherche Scientifique, Verrieres-Le Buisson, France), C. B. Cosmovici (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), W. A. Delamere (Ball Aerospace Systems Div., Boulder, Colo.) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 149-172 Original contains color illustrations (For primary document see N86-32473 24-12)

Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Halley Multicolor Camera (HMC) is a Ritchey-Chretien type Cassegrain telescope (1000 mm focal length) with CCD imagers in the focal plane. It is suspended in a revolving mount so that the center of its field of view can be moved freely in a half plane that contains the spin axis of the spacecraft. Together with the spinning motion of the spacecraft, this mobility enables the HMC to image any part of the whole 4 pi solid angle of the sky. The line-scan imaging technique uses the spacecraft/s spin for one dimension and the length of the line for the other dimension of the image. Four line sensors with filters of different color bands take images almost simultaneously. Onboard electronics controlled by three microprocessors operate the camera almost autonomously. The image of the comet will be sought at the beginning of the encounter operations. Having found it, the camera will switch to the imaging mode. The contents of the images are to be telemetered to ground in sections and at the same time used onboard to update the parameters that describe the spacecraft/s trajectory relative to the cometary nucleus. With this information, the HMC/s field of view will be able to track the center of the comet/s image. ESA

N86-32484# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE GIOTTO RADIO-SCIENCE EXPERIMENT c19

P. Edenhofer (Bochum Univ., West Germany), M. K. Bird (Bonn Univ., West Germany), H. Buschert (Bochum Univ., West Germany), P. B. Esposito, H. Porsche (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), and H. Volland (Bonn Univ., West Germany) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 173-186 Original contains color illustrations (For primary document see N86-32473 24-12)

Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The scientific objectives of the Giotto Radio Science Experiment (GRE) are to determine the columnar electron content of Comet Halley/s ionosphere and the cometary mass fluence from atmospheric drag by using the radio signals from Giotto during the Halley encounter. The radio science data (S and X-band Doppler and range measurements) will be collected at NASA/s deep-space 64 m tracking antenna at Tidbinbilla near Canberra, in Australia. In order to separate the effects of the terrestrial ionosphere and the interplanetary plasma, S-band Doppler measurements will also be taken at Tidbinbilla along the line-of-sight of Japan/s cometary probe Sakigake during the Giotto-Halley Encounter. The measurements of cometary electron content and mass fluence will be inverted to derive the spatial distribution of the electron and mass (dust and gas) density within Halley/s coma. The GRE is the only experiment on Giotto capable of measuring the low-energy (10 eV) electron bulk population of Halley/s ionosphere and the total cometary mass flow impacting upon the spacecraft. ESA

N86-32485# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.

THE GIOTTO OPTICAL PROBE EXPERIMENT c19

A. C. Levasseur-Regourd, J. L. Bertaux, R. Dumont (Bordeaux 2 Univ., France), M. Festou (Observatoire de Besancon, France), R.

H. Giese (Ruhr Univ., Bochum, West Germany), F. Giovane (Florida Univ., Gainesville), P. Lamy (Laboratoire d'Astronomie Spatiale, Marseille, France), A. Liebaria, and J. L. Weinberg (Florida Univ., Gainesville) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 187-193 Sponsored by CNES Original contains color illustrations (For primary document see N86-32473 24-12) (Contract NASw-3578)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

The Halley Optical Probe Experiment (HOPE) was designed to provide in-situ photopolarimetric data on the dust cloud and the gaseous atmosphere in Halley/s coma. The probe concept, instrumentation, and possibilities for cross-correlation between the HOPE results and those of other space and ground-based experiments are presented. The instrument was turned on successfully on 13 September 1985. ESA

N86-32486# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE DEVELOPMENT OF SPACE SCIENCE AND TECHNOLOGY IN CHINA
Yung-An Liu 22 May 1986 23 p
(AD-A168368; FTD-ID(RS)T-0282-86) Avail: NTIS HC A02/MF A01 CSCL 22/2

Since satellites can be used for communication, electronic detecting, resource exploration, navigation and orientation and collecting meteorological information, most of the countries in the world have invested intensively in the development of satellites so that they can be used as military reconnaissance satellites as well as offensive and defensive weapons. After the People's Republic of China took over the mainland, it founded the Academia Sinica and the other research institutes for the research and development in advanced science and technology. In 1968, the Research Institute of Space Science was founded in order to accelerate research and development in space technology. The first satellite of China was launched successfully on April 24, 1970. Since then 16 satellites have been launched. It is important for us to investigate space program development in China. GRA

N86-32487# Brunel Univ., Uxbridge (England). Inst. of Bioengineering.
THE HANDLING AND PRESERVATION OF BIOSAMPLES IN MICROGRAVITY CONDITIONS
Debra S. Ramsden and H. S. Wolff Paris ESA 1 Sep. 1985 89 p
(Contract ESA-5180/82-NL-HP(SC))
(ESA-CR(P)-2193; ETN-86-97793) Avail: NTIS HC A05/MF A01

Life support conditions required by small plants and animals living in orbiting facilities for long periods of time, and methods to preserve specimens for study on Earth are defined. It is stressed that perspex, particularly perspex glues (di or trichloromethane) are highly toxic to plants; RTV silicone compounds until fully cured are liable to give off cyclohexylamine, which is toxic to animals (including humans) and plants. When fully cured it is not harmful. Phthalene plasticizers are reported to be toxic to plants. They are used in so many materials that it may prove necessary to check all plastic materials to be flown on a mission for possible harm to plants. Sterilizing polystyrene containers by ethylene oxide prevents the growth of any plants in them. Sterilization by gamma radiation for 2 hr at 40 Gray/min produces no hindrance to plant growth. ESA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N86-32488 Illinois Univ., Urbana-Champaign.
OPTIMAL, IMPULSIVE, DIRECT ASCENT, TIME-FIXED ORBITAL INTERCEPTION Ph.D. Thesis
William Gary Heckathorn 1985 113 p
Avail: Univ. Microfilms Order No. DA8600206

A method of determining optimal impulsive trajectories is applied to minimum fuel, direct ascent, time-fixed intercept trajectories. The optimal trajectory is obtained by satisfying Lawden's necessary conditions expressed in terms of the primer vector. The vehicle is initially at rest on the surface of a spherical planet and the target is assumed to be in a circular, equatorial orbit around the planet. Results are presented and compared for two planetary models: a non-rotating planet, and one rotating with an angular velocity approximating that of the Earth. Each model is investigated for transfers in which the launch point is in the same plane as the target orbit (coplanar) and in which the launch point is not in the target orbit plane (noncoplanar). Parameters varied during the analysis include transfer time, target radius, initial position of the target in relation to the launch point, and the direction of the transfer trajectory, i.e., posigrade or retrograde. Cost comparisons are made between the various cases, and generalizations indicated. Dissert. Abstr.

N86-32489 Michigan Univ., Ann Arbor.
OPTIMAL AEROASSISTED ORBITAL TRANSFER INVOLVING ELLIPTICAL ORBITS Ph.D. Thesis
Jennie Rae Freeland Johannesen 1985 168 p
Avail: Univ. Microfilms Order No. DA8600465

Minimum-fuel orbital transfer between elliptical orbits is studied by first analyzing separately the three phases of aeroassisted orbital transfer (deorbit, atmospheric fly-through and post atmospheric maneuvers). For the atmospheric fly-through of a ballistic vehicle, second-order analytical solutions for the altitude and flight path angle are obtained using Poincare's method of small parameters. Expressions for the speed, time of flight, longitudinal deceleration, and critical entry angle are also derived. For a vehicle whose coefficient of drag can be modulated between a maximum and a minimum value, an explicit self-correcting guidance law is derived to achieve the targeted exit speed with small flight path angle. For a vehicle with lifting capability, a near optimal control with constant normalized lift coefficient and explicit bank modulation is obtained to maximize the atmospheric plane change. The influence of maximum lift-to-drag ratio on the atmospheric plane change is also assessed. Regions of optimality for deorbit to a prescribed entry angle are obtained and the post atmospheric maneuvers necessary to achieve the target final orbit are derived. The problem of transfer between coplanar elliptic orbits is studied. The two impulse transfer is obtained by solving three equations for three unknowns. Dissert. Abstr.

N86-32490# European Space Agency, Paris (France).
PROCEEDINGS OF AN ESA WORKSHOP ON REENTRY OF SPACE DEBRIS
Norman Longdon, comp. 1986 89 p Workshop held in Darmstadt, West Germany, 24-25 Sep. 1985
(ESA-SP-246; ISSN-0379-6566; ETN-86-97562) Avail: NTIS HC A05/MF A01

Models used to predict uncontrolled reentry of spacecraft were discussed. The experience gained in tracking Skylab and Cosmos 954/1402 reentries was analyzed. For individual titles, see N86-32491 through N86-32501.

N86-32491# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
COMPARISON OF RECENT EMPIRICAL MODELS OF THE THERMOSPHERE c46
G. W. Proelss and P. W. Blum *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 3-11 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

To evaluate the accuracy of thermospheric models, predictions of the C and MSIS-83 models were compared. The local time and seasonal variation of the predicted N2 density were subjected to a Fourier analysis, and the amplitude and phase coefficients of the first four terms were represented as a function of latitude. A separate comparison of the model predictions was performed for each of these coefficients. Large differences of up to several

100% were observed, especially for the higher harmonics. However, these large discrepancies lead to only moderate uncertainties in the predicted N2 density. Maximum deviations are of the order of 12% to 33%, depending on the components considered. ESA

N86-32492# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
COMPARISON OF THE ESRO 4 THERMOSPHERE MODEL WITH ESRO 4 DATA DURING MAGNETICALLY QUIET CONDITIONS **c46**
G. W. Proelss and M. Roemer *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 13-17 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

Using ESRO 4 data obtained during 10 geomagnetically quiet time intervals, the accuracy of the ESRO 4 model is tested. A graphical comparison and a statistical analysis indicate that the overall agreement is good and that mean deviations are of the order of 13% for O and 20% for N2 and He. Larger differences are observed only locally, with maximum deviations typically of the order of 30%, 55%, and 40% for O, N2, and He, respectively. ESA

N86-32493# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
SATELLITE OBSERVATIONS WITH A SINGLE RADAR TRACKING STATION **c32**
D. Mehrhoiz *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 19-24 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

Handicaps in observations due to the relative motion between a satellite and the radar station are highlighted. It is shown that decaying high-risk space objects can be observed by a single radar tracking station. But less than 10% of an orbit and 50% of all orbits per day are within line-of-sight of the radar station. Breaks of 14 hr between 2 consecutive passages are possible. This can cause total target loss because of outdated orbit data. Cooperation with observation stations in other parts of the world is therefore desirable. In order to fit the observation requirements the radar should deliver angular direction, range, and at least echo amplitude measurements. ESA

N86-32494# Kettering Group (England).
DETECTION OF THE MALFUNCTION OF COSMOS 954 AND COSMOS 1402 AND THE SUBSEQUENT PREDICTIONS OF THEIR REENTRIES
G. E. Perry *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 25-28 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

The graphical detection of the malfunction and natural decay of Cosmos 954 is described. The Cosmos 1402 incident and the techniques employed to follow the decays of its fragments are reported as extracts from a personal diary. ESA

N86-32495# Royal Aircraft Establishment, Farnborough (England).
LIFETIME PREDICTIONS FOR THE RAE TABLE OF SATELLITES
D. M. C. Walker and D. G. King-Hele *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 29-37 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

After studies of Earth satellites in 1955 to 1956, we operated the UK satellite prediction service in 1958 and began a Table of satellites in response to requests. This has now grown to the 770-page RAE Table of Earth Satellites 1957 to 1982, which includes lifetime estimates for all satellites still in orbit, excluding fragments. We have made about 10,000 such lifetime predictions and in this paper we describe the methods of calculation. For most low-eccentricity satellites decaying under the influence of air drag, we use a simple graphical method, and an accuracy of + or - 10% is about the best that can be achieved because of the unpredictable variations in air density. For high-eccentricity satellites we have a graphical method for transfer orbits at inclinations between 0 and 30 deg and otherwise we rely on two computer programs, PROD and PTDEC, where the limits are on computer time and cost. ESA

N86-32496# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Earth Observation Program Dept.
LONGTERM ANALYTICAL ORBIT DECAY AND REENTRY PREDICTION
H. H. Klinkrad *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 39-48 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

An analytical approach to the prediction of close-Earth satellite orbits of moderate eccentricities is outlined. Based on the method of general averaging and on the principle of separation of perturbations, known results for the averaged time rates of change of the mean orbital elements due to J2, J3, and J4 are superimposed with results of the averaged air drag perturbation equations to obtain the total rates, which are then used to propagate the mean Kepler state in step-sizes of 1 to 15 orbits. The improved air drag model incorporates, in an analytically integrable representation, a rotating atmosphere, a variable aerodynamically effective satellite cross section, and a state-of-the-art MSIS'77 derived air density model as function of all major atmospheric parameters. ESA

N86-32497# Consiglio Nazionale delle Ricerche, Pisa (Italy).
COSMOS 1402 REENTRY PREDICTIONS: A RETROSPECTIVE ANALYSIS
L. Anselmo *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 49-54 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

Orbit decay computations made to predict the reentry of Cosmos 1402/A and C were analyzed to assess the ballistic coefficient variations, the force model appropriateness, and the atmospheric model accuracy. Indications on short-term predictions of spacecraft natural reentry were deduced. The results of a radar tracking network simulation are presented with proposals for European involvement in this field. ESA

N86-32498# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany).
ANOMALOUS PERIGEE SHIFT AND ECCENTRICITY VARIATION DUE TO AIR DRAG IN THE REENTRY PHASE
K. G. H. Schuchardt, W. Priester (Bonn Univ., West Germany), P. W. Blum (Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven, West Germany), and H. G. Peters *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 55-59 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

A method of analysis which is able to supply large amounts of lower thermospheric total density information with very little technical effort is demonstrated. This is achieved by an extension of drag analysis to the orbital parameters eccentricity and argument of perigee. Decay of Skylab 1 and Cosmos 1402 orbits is discussed. ESA

N86-32499# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
METHODS FOR ORBIT DECAY PREDICTIONS USED AT THE RESEARCH ESTABLISHMENT FOR APPLIED SCIENCE (FGAN)-RESEARCH INSTITUTE FOR HIGH FREQUENCY PHYSICS (FHP)
H. G. Peters *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 61-62 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

The lifetime of the decaying satellite Cosmos 954 was predicted

using the graphical version of King-Hele's method, chosen because it is very easy to use and needs no computer assistance. The results are very good. For the short-time predictions (on the order of a few days) the accuracy is better than 10% of the remaining lifetime, a limit given by King-Hele. However, since a graphical procedure can cause uncertainties and reading a graph is tiring, the equations on which the graphical method is based were used to write a computer program for the King-Hele method. ESA

N86-32500# Centre National d'Etudes Spatiales, Toulouse (France).
ORGANIZATION OF THE ORBIT AND REENTRY PREDICTION COMPUTATIONS AT CNES FOR SKYLAB AND COSMOS 1402
F. Nouel *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 63-73 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

Orbital predictions for information purposes and antenna pointing, orbit improvement with tracking data, and computations of reentry windows of Skylab 1 and Cosmos 1402 are described. Optical and radar tracking is outlined. ESA

N86-32501# European Space Agency. European Space Operations Center, Darmstadt (West Germany).
DECAY OF ESA SPACE OBJECTS
G. Janin and J. deLeeuw *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 75-79 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

Methods for orbital lifetime predictions are reviewed and the set up of the orbit generation software used at ESOC for lifetime estimation is outlined. The limitations in accuracy of lifetime predictions are discussed. All ESRO/ESA objects launched are listed, together with their actual or predicted decay dates. ESA

N86-32502*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSPAS-SARSAT SATELLITE ORBIT PREDICTOR, VOLUME 7
Morton L. Friedman Apr. 1986 124 p
(NASA-TM-85015-VOL-7; NAS 1.15:85015-VOL-7) Avail: NTIS HC A06/MF A01 CSCL 03C

The satellite orbit predictor, a graphical aid for determining the relationship between the satellite (SARSAT or COSPAS) orbit, antenna coverage of the spacecraft and coverage of the local user terminals (LUT), is discussed. The predictor allows the user to quickly visualize if a selected position will probably be detected and is composed of a base map and a satellite track overlay for each satellite. Additionally, a table of equator crossings for each satellite is included. In order for a LUT to receive emergency locator transmitter (ELT)/emergency position indicating radio beacon (EPIRB) information from a satellite, mutual visibility between the satellite, LUT and ELT/EPIRB must occur. Mutual visibility requires two simultaneous conditions: (1) the satellite subtrack or ground track must lie within a LUT coverage circle for a least 4 minutes; and (2) and the suspected ELT/EPIRB must lie within the satellite antenna coverage swath during the 4 minute period. The base map is a polar stereographic projection of the Northern Hemisphere. The LUT coverage circles are based on the LUT seeing the satellite at the horizon. On projections of this type, equal increments of latitude are not equidistant. Therefore, the map includes a dot matrix in the ocean area with dots printed as a one degree latitude by one degree longitude field. Another property of the projection is that the center of the LUT coverage does not coincide with the actual geographical position of the LUT. Author

N86-32503# Centre National d'Etudes Spatiales, Toulouse (France). Centre Spatial.
ANALYSIS OF THE MULTISTEP METHOD FOR LONGTERM ORBIT PREDICTION
V. Meilhat 13 Jan. 1984 163 p In FRENCH; ENGLISH summary
(CNES-84/CT/DTI/MS/MN/011; ETN-86-97648) Avail: NTIS HC A08/MF A01

A method to estimate the value of any orbital parameter, given a number of previous data at equally spaced intervals is presented. The differential equation describing satellite orbits and its mathematical treatment are discussed. The method requires relatively small function variations. A combination with the stroboscopic method adapted to integration in one orbit produces a valuable prediction tool. The limits of applicability are discussed. ESA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air).*

N86-32504*# Boeing Aerospace Co., Kennedy Space Center, Fla.
ORBITAL TRANSFER VEHICLE LAUNCH OPERATIONS STUDY: MANPOWER SUMMARY AND FACILITY REQUIREMENTS, VOLUME 5 Final Report
7 Mar. 1986 36 p
(Contract NAS10-11165)
(NASA-CR-179705; NAS 1.26:179705) Avail: NTIS HC A03/MF A01 CSCL 22D

All manpower numbers, number of heads (by skill), serial time and manhours have been accumulated and compiled on a per subtask basis in spreadsheet format for both the ground based and the space based data flows. To aid in identifying the facility resources required to process the Ground Based Orbital Transfer Vehicle (GBOTV) and/or the space based orbital transfer vehicle (SBOTV) through the ground facilities at Kennedy Space Center (KSC), a software application package was developed using a general purpose data base management system known as Data Flex. The facility requirements are used as the basic input to this software application. The resources of the KSC facility that could be used by orbital transfer vehicle program were digitized in the same format used to identify facility requirements. The facility capabilities were digitized in this format for subsequent, automated comparative analyses. Composite facility requirements are compared to each of the baseline facility capabilities and the system generates a relative score that indicates how each facility weighs against the composite requirements in relation to the other facilities in the set. Author

N86-32505*# Boeing Aerospace Co., Kennedy Space Center, Fla.
ORBITAL TRANSFER VEHICLE LAUNCH OPERATIONS STUDY. PROCESSING FLOWS. VOLUME 3 Final Report
7 Mar. 1986 230 p
(Contract NAS10-11165)
(NASA-CR-179766; NAS 1.26:179766) Avail: NTIS HC A11/MF A01 CSCL 22D

The Orbit Transfer Vehicle (OTV) processing flow and Resource Identification Sheets (RISs) for the ground based orbit transfer vehicle and for the space based orbit transfer vehicle are the primary source of information for the rest of the Kennedy Space Center (KSC) OTV Launch Operations Study. Work is presented which identifies KSC facility requirements for the OTV Program, simplifies or automates either flow though the application technology, revises test practices and identifies crew sizes or skills used. These flows were used as the primary point of departure from current operations and practices. Analyses results were documented by revising the appropriate RIS page. B.G.

N86-32506# Los Alamos National Lab., N. Mex.
LETHALITY TEST SYSTEM
W. M. Parsons, J. R. Sims, and J. V. Parker 1986 5 p Presented

at the 3rd Symposium on Electromagnetic Launch Technology, Austin, Tex., 20 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008733; LA-UR-86-922; CONF-8604147-5) Avail: NTIS HC A02/MF A01

The Lethality Test System (LTS), presently under construction at Los Alamos, is an electromagnetic launcher facility designed to perform impact experiments at velocities up to 15 km/s. The launcher is a 25 mm round bore, plasma armature railgun extending 22 m in length. Preinjection is accomplished with a two-stage gas gun capable of 7 km/s. The railgun power supply utilizes traction motors, vacuum interrupters, and pulse transformers. An assembly of 28 traction motors, equipped with flywheels, stores approximately 80 MJ at 92% of full speed and energizes the primary windings of three pulse transformers at a current of 50 kA. At peak current an array of vacuum interrupters disconnects the transformer primary windings and forces the current to flow in the secondary windings. The secondary windings are connected to the railgun, and by staging the vacuum interrupter openings, a 1 MA to 1.3 MA ramped current waveform will be delivered to the railgun. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N86-32507*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SYSTEM IMPACTS OF SOLAR DYNAMIC AND GROWTH POWER SYSTEMS ON SPACE STATION
J. T. Farmer, W. F. Cuddihy, U. M. Lovelace, and D. M. Badi Jul. 1986 47 p
(NASA-TM-87667; NAS 1.15:87667) Avail: NTIS HC A03/MF A01 CSCL 22B

Concepts for the 1990's space station envision an initial operational capability with electrical power output requirements of approximately 75 kW and growth power requirements in the range of 300 kW over a period of a few years. Photovoltaic and solar dynamic power generation techniques are contenders for supplying this power to the space station. A study was performed to identify growth power subsystem impacts on other space station subsystems. Subsystem interactions that might suggest early design changes for the space station were emphasized. Quantitative analyses of the effects of power subsystem mass and projected area on space station controllability and reboost requirements were conducted for a range of growth station configurations. Impacts on space station structural dynamics as a function of power subsystem growth were also considered. Author

N86-32508# Department of the Air Force, Washington, D.C.
MISSILE CONTROL SYSTEM TEST APPARATUS HAVING VIDEO SIGNAL ADAPTER Patent
John P. Tomany, inventor (to Air Force) Issued 22 Apr. 1986 10 p Supersedes AD-D010538
(AD-D012323; US-Patent-4,584,524; US-Patent-Appl-SN-520386; US-Patent-Class-324-73R) Avail: US Patent and Trademark Office CSCL 14/2

An apparatus for testing the performance of an airborne missile control system is described. Said apparatus includes a video signal adapter providing a prescribed video display, which is interposed between a programmable test set and the host aircraft.
Author (GRA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N86-32509*# Dynatics, Inc., Huntsville, Ala.
ASCENT TRAJECTORY DISPERSION ANALYSIS FOR WTR HEADS-UP SPACE SHUTTLE TRAJECTORY Final Technical Report
May 1986 158 p
(Contract NAS8-36196)
(NASA-CR-178894; TR-86-MSFC-36196-059; NAS 1.26:178894) Avail: NTIS HC A08/MF A01 CSCL 22A

The results of a Space Transportation System ascent trajectory dispersion analysis are discussed. The purpose is to provide critical trajectory parameter values for assessing the Space Shuttle in a heads-up configuration launched from the Western Test Range (STR). This analysis was conducted using a trajectory profile based on a launch from the WTR in December. The analysis consisted of the following steps: (1) nominal trajectories were simulated under the conditions as specified by baseline reference mission guidelines; (2) dispersion trajectories were simulated using predetermined parametric variations; (3) requirements for a system-related composite trajectory were determined by a root-sum-square (RSS) analysis of the positive deviations between values of the aerodynamic heating indicator (AHI) generated by the dispersion and nominal trajectories; (4) using the RSS assessment as a guideline, the system related composite trajectory was simulated by combinations of dispersion parameters which represented major contributors; (5) an assessment of environmental perturbations via a RSS analysis was made by the combination of plus or minus 2 sigma atmospheric density variation and 95% directional design wind dispersions; (6) maximum aerodynamic heating trajectories were simulated by variation of dispersion parameters which would emulate the summation of the system-related RSS and environmental RSS values of AHI. The maximum aerodynamic heating trajectories were simulated consistent with the directional winds used in the environmental analysis. Author

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

N86-32804 Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherche de Geodesie Spatiale.
UTILIZATION OF SPACE TECHNIQUES FOR ACCURATE POSITIONING IN GEOPHYSICS [UTILISATION DES TECHNIQUES SPATIALES DE POSITIONNEMENT PRECIS EN GEOPHYSIQUE]
Michel Lefebvre *In its* International Geophysics and Space 1985 p 599-614 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N86-32510 National Aerospace Lab., Amsterdam (Netherlands). Spaceflight Div.
PROPOSAL FOR NLR ACTIVITIES IN THE TROPICAL EARTH RESOURCES SATELLITE (TERS) SYSTEM DEFINITION
H. F. A. Roefs 1984 69 p
(Contract NIVR-1013)
(NLR-Memo-RS-84-019-L; ETN-86-97780) Avail: Issuing Activity

Technical, work planning, and financial aspects of Dutch participation in the Tropical Earth Resources Satellite project are summarized. Mission requirements, data handling and processing, and satellite operations are emphasized. ESA

N86-32511*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ANALYSIS OF THE EFFECTS OF FIRING ORBITER PRIMARY REACTION CONTROL SYSTEM JETS WITH AN ATTACHED TRUSS STRUCTURE
M. Kaszubowski (PRC Kentron, Inc., Hampton, Va.) and J. P. Raney Aug. 1986 24 p
(NASA-TM-89031; NAS 1.15:89031) Avail: NTIS HC A02/MF A01 CSCL 22B

A study was conducted to determine the dynamic effects of firing the orbiter primary reaction control jets during assembly of protoflight space station structure. Maximum longeron compressive load was calculated as a function of jet pulse time length, number of jet pulses, and total torque imposed by the reaction control jets. The study shows that it is possible to fire selected jets to achieve a pitch maneuver without causing failure of the attached structure. Author

N86-32512*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
RELIABILITY ISSUES IN ACTIVE CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES Semiannual Status Report, 16 May - 15 Nov. 1985
W. E. VanderVelde 4 Feb. 1986 14 p
(Grant NAG1-126)
(NASA-CR-179758; NAS 1.26:179758) Avail: NTIS HC A02/MF A01 CSCL 22B

Efforts in this reporting period were centered on four research tasks: design of failure detection filters for robust performance in the presence of modeling errors, design of generalized parity relations for robust performance in the presence of modeling errors, design of failure sensitive observers using the geometric system theory of Wonham, and computational techniques for evaluation of the performance of control systems with fault tolerance and redundancy management features. Author

N86-32513*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL INVESTIGATION OF THE DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT, PHASE 2
Enrico C. Lorenzini Jul. 1986 59 p
(Contract NAS8-36606)
(NASA-CR-178901; NAS 1.26:178901; QR-5) Avail: NTIS HC A04/MF A01 CSCL 22A

The analytical model and software implementation of n-mass, three dimensional tethered systems are discussed. The newly developed computer code is then used for simulating the 3-dimensional dynamics of a 4-mass tethered system. The 4-mass tethered system is designed in order to provide a micro-g environment on board the space station while variable-g experiments are performed on a laboratory moving along the upward tether segment. Extensive simulation runs illustrate both the undamped, free response and the damped dynamics response of the system. Passive longitudinal dampers and subsequently active damping algorithms, effective against the in-plane dynamics, are added to the system. Their separate effects upon the various vibrational modes are clearly shown by relevant simulation runs. Author

N86-32514# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Bereichsgruppe Raumfahrt und Elektronik.
COMMAND AND DATA MANAGEMENT FOR A HIGHLY INTEGRATED PAYLOAD ON THE INTERFACE PROGRAM SYSTEM (IPS) (GIRL) Final Report, Jul. 1983
Juergen Richter and Hans Eichel Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 164 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-018; ISSN-0170-1339; ETN-86-97462) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

The onboard/ground interfaces between GIRL computer (GC) and Experiment processor, between GC and Command and Data Management system of the Spacelab, between the GIRL ground computer (GGC) and the Mission Operation and Control Center, and between GGC and Experiment terminals and system terminals are described. Systems synchronization, test configurations, the interface dialog/polling protocols and test aids are presented. The interfaces are selected for payload integration on the Interface Program System and for remote acquisition of data in astronomy and aeronomy. ESA

N86-32515# IFC Research, Claygate (England).
STUDY OF INFORMATION DISSEMINATION BY SATELLITE, RIDER 2: CULTURAL SATELLITE CONSORTIUM: WIDENING THE SCOPE Final Report
Brian G. Champness Paris ESA Aug. 1985 54 p
(Contract ESA-5820/84-NL-DG)
(ESA-CR(P)-2171-Vol-2; ETN-86-97489-Vol-2) Avail: NTIS HC A04/MF A01

The need for a European Cultural Satellite Consortium to manage the participation of educational and cultural organizations in ESA's Olympus satellite program was established. The feasibility of widening its scope, by bringing in medical, health and other public service bodies was examined. Guidelines for its planning and development, drawing on the experience of the Public Service Satellite Consortium, Washington, were drawn up. Ways of strengthening its economic and entrepreneurial base were considered. A set of objectives, a list of major functions, a suggested structure, and suggestions for its management are given. ESA

N86-32516# Societe Nationale Industrielle Aerospatiale, Cannes (France).
INFLUENCE OF STRUCTURAL PARAMETER UNCERTAINTIES ON FLEXIBLE SPACE STRUCTURAL CONTROL PERFORMANCES
L. Passeron 1986 29 p Presented at American Control Conference Workshop on Identification and Control of Flexible Space Structures, San Diego, Calif., 4-8 Jun. 1984
(SNIAS-861-440-104; ETN-86-97613) Avail: NTIS HC A03/MF A01

A geometric approach to check controllability and observability properties of light flexible space structures is presented. A matrix model of general autonomous linear systems is described. The system properties are decoupled on each characteristic subspace of the respective matrices. Straightforward criteria expressions are given. A quantitative analysis of the system properties versus parametric uncertainties is given. The results are applied to large flexible space structures. It is shown that the method enables a thorough investigation of structural parameter uncertainties on observability and controllability properties. ESA

N86-32517# MATRA Espace, Toulouse (France). Direction Etudes Systemes Spatiaux et Charges Utiles.

ESABASE EXTENSION TO SPACECRAFT CHARGING Final Report
M. Frezet Paris ESA 17 Jun. 1986 125 p
(Contract ESTEC-3-5632/83-NL-PP)
(MATRA-CMT-TS101/RT/16.85; ESA-CR(P)-2191; ETN-86-97792)
Avail: NTIS HC A06/MF A01

A system level tool, ESABASE/CHARGING, to simulate spacecraft charging in space conditions (geosynchronous) and test tank environment is described. The software results from the coupling of NASCAP with ESABASE/MATVIEW. It offers an integrated framework with automatic file management. Up to 30 different files are generated during a typical simulation. A high-level input langauge is automatically interpreted to generate the rigid NASCAP inputs. A 3-D preprocessor sets up the NASCAP model. A fully 3-D postprocessor allows the visualization of user-defined parameters for a selected cycle on the spacecraft. The 3-D postprocessor is easy to use and fast. Improved NASCAP auxiliary codes plot colored equipotentials or various graphics with UDISP. ESA

N86-32458# Los Alamos National Lab., N. Mex. Space Plasma Physics Group.
IMPACT-INDUCED SPACECRAFT CHARGING AND RELATED EFFECTS DURING THE HALLEY ENCOUNTERS
D. T. Young *In* ESA Space Missions to Halley's Comet Mar. 1986 p 85-98 Sponsored by DOE (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N86-32518# Officine Galileo S.p.A., Florence (Italy).
STANDARD CALIBRATION PROCEDURE FOR IR SENSORS ON SPINNING SATELLITES. VOLUME 3: OTS AND GEOS-2 IN FLIGHT DATA ANALYSIS Final Report
Roberta Baldassini Fontana and Lido Cecconi Paris, France ESA Jun. 1981 344 p
(Contract ESTEC-3843/79-NL-DG(SC))
(Rept-209-DT-58-Vol-3; ESA-CR(CP)-2155-Vol-3; ETN-86-97488)
Avail: NTIS HC A15/MF A01

An Earth radiance seasonal model derived from an infrared experiment flown on the ESRO 4 satellite in 1974 was verified using flight data from OTS and GEOS-2 satellites. The model, deduced by analysis of in flight measurements is compared with the NASA model based upon experiments and theoretical studies. The comparison between in flight and simulated data does not reveal a best model, but forms a basis for qualifying both IR Earth radiance representations for describing the long term variations which may affect IR pencil beam measurements. The tests show that visualizing the flight residuals is a very useful check for validating the in flight attitude estimate. Anomalies in the preflight calibration can be detected a posteriori. ESA

N86-32519# Officine Galileo S.p.A., Florence (Italy).
ASSEMBLY AND EVALUATION OF A LOW ORBIT EARTH SENSOR UNIT Final Report
R. Casini, G. DeVidi, and I. Varano Paris ESA Oct. 1982 179 p
(Contract ESTEC-4047/79-NL-HP(SC))
(Rept-390-DT-14; ESA-CR(P)-2183; ETN-86-97783) Avail: NTIS HC A09/MF A01

Tests performed on a low altitude infrared Earth sensor are listed. Performance evaluation in standard low orbit environmental conditions, and mechanical capability of the sensor to withstand launch are covered. The sensor complies with specifications except for random error of the pitch and roll functional outputs; overall accuracy in null attitude conditions; and presence of spurious signals outside the nominal fields of view. ESA

N86-32476# Mullard Space Science Lab., Dorking (England).
THE GIOTTO THREE-DIMENSIONAL POSITIVE ION ANALYSER
A. Johnstone, J. A. Bowles, A. J. Coates, A. J. Coker, S. J. Kellock, J. Raymont, B. Wilken (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau West Germany), W. Studemann, W. Weiss, R. Cerulli-Irelli (Consiglio Nazionale delle Ricerche, Frascati, Italy) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 15-32 Sponsored by UK Science and Engineering Research Council, Max-Planck Gesellschaft zur Forderung der Wissenschaften, Swedish Board for Space Activities, and CNR (For primary document see N86-32473 24-12)
(Contract NAS5-27442; Grant BMFT-01-OF-112-4)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32477# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
THE GIOTTO RPA-COPERNIC PLASMA EXPERIMENT
H. Reme, F. Cotin, A. Cros, J. L. Medale, J. A. Sauvaud, C. Duston, A. Korth (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), A. K. Richter, A. Loidl, K. A. Anderson (California Univ., Berkeley) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 33-52 Original contains color illustrations (For primary document see N86-32473 24-12)
(Contract NASw-3575; Grants CNES-1212; BMFT-01-OF-052)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32478# Saint Patrick's Coll., Maynooth (Ireland).
THE GIOTTO ENERGETIC PARTICLE EXPERIMENT
S. McKenna-Lawlor, A. Thompson (Dublin Inst. for Advanced Studies, Ireland), D. Sullivan, E. Kirsch (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), D. Melrose (Sydney Univ., Australia), and K.-P. Wenzel (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 53-65 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32479# Max-Planck-Inst. fuer Kernphysik, Heidelberg (West Germany).
THE GIOTTO PARTICULATE IMPACT ANALYZER
J. Kissel *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 67-83 Original contains color illustrations (For primary document see N86-32473 24-12)
(Grants BMFT-01-OF-021-4, BMFT-01-OF-022-5; BMFT-01-OF-850-70)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32480# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE GIOTTO DUST IMPACT DETECTION SYSTEM
J. A. M. McDonnell (Kent Univ., Canterbury, England), W. M. Alexander (Baylor Univ., Waco, Tex.), W. M. Burton (Rutherford High Energy Lab., Chilton, England), E. Bussoletti (Lecce Univ., Italy,), D. H. Clark, G. C. Evans (Kent Univ., Canterbury, England), S. T. Evans, J. G. Firth (Rutherford High Energy Lab., Chilton, England), R. J. L. Grard (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands), E. Gruen (Max-Planck-Inst. fuer Kernphysik, Heidelberg, West Germany) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 85-107 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32482# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE GIOTTO ION MASS SPECTROMETER
H. Balsiger (Bern Univ., Switzerland), K. Altwegg, F. Buehler, J. Fischer, J. Geiss, A. Meier, U. Rettenmund, H. Rosenbauer (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), R. Schwenn, M. Neugebauer et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 129-148 Sponsored by Max-Planck Gesellschaft, the State of Bern, and DOE Original contains color illustrations (For primary document see N86-32473 24-12)
(Contracts NASw-3572; NASw-3729; Grants BMFT-01-OF-032-3; SNSF-2.034.81; SNSF-2.007.83)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32484# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE GIOTTO RADIO-SCIENCE EXPERIMENT
P. Edenhofer (Bochum Univ., West Germany), M. K. Bird (Bonn Univ., West Germany), H. Buschert (Bochum Univ., West Germany), P. B. Esposito, H. Porsche (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), and H. Volland (Bonn Univ., West Germany) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 173-186 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32485# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France). Service d'Aeronomie.
THE GIOTTO OPTICAL PROBE EXPERIMENT
A. C. Levasseur-Regourd, J. L. Bertaux, R. Dumont (Bordeaux 2 Univ., France), M. Festou (Observatoire de Besancon, France), R. H. Giese (Ruhr Univ., Bochum, West Germany), F. Giovane (Florida Univ., Gainesville), P. Lamy (Laboratoire d'Astronomie Spatiale, Marseille, France), A. Llebaria, and J. L. Weinberg (Florida Univ., Gainesville) *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 187-193 Sponsored by CNES Original contains color illustrations (For primary document see N86-32473 24-12)
(Contract NASw-3578)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N86-32520*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTRICAL POWER SYSTEM FOR THE U.S. SPACE STATION
Donald L. Nored and George J. Hallinan (Rockwell International Corp., Canoga Park, Calif.) 1986 12 p Presented at the 37th Congress of the International Astronautical Federation, Innsbruck, Austria, 4-11 Oct. 1986
(NASA-TM-88856; E-3249; NAS 1.15:88856; IAF-86-37) Avail: NTIS HC A02/MF A01 CSCL 04O

The Space Station Electrical Power System presents many interesting challenges. It will be much larger than previous space power systems, and it must be designed for on-orbit maintenance and replacement, along with having a growth capability. The power generation, energy storage, and power management and distribution (PMAD) subsystems comprise the primary elements of the overall system. Each was analyzed by NASA Lewis Research Center and its two contractors -- Rocketdyne and TRW -- in the definition studies of the program to determine the optimum approach to minimize initial costs and life cycle costs. For the PMAD subsystem, a ring bus architecture operating at 440 V, 20 kHz, single phase, was selected. Photovoltaic and solar dynamic power generation subsystems were both studied. Major tradeoffs were made for each subsystem and for the overall system, and a hybrid system (both photovoltaic and solar dynamic) was selected. Author

N86-32521*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE SPACE STATION POWER SYSTEM
Cosmo R. Baraona 1986 12 p Presented at the Fifth Conference on Photovoltaic Generators in Space, Noordwijk, Netherlands, 30 Sep. - 4 Oct. 1986; sponsored by ESA
(NASA-TM-88847; E-3237; NAS 1.15:88847) Avail: NTIS HC A02/MF A01 CSCL 22B

The manned space station is the next major NASA program. It presents many challenges to the power system designers. The power system in turn is a major driver on the overall configuration. In this paper, the major requirements and guidelines that affect the station configuration and the power system are explained. The evolution of the space station power system from the NASA program development-feasibility phase through the current preliminary design phase is described. Several early station concepts, both fanciful and feasible, are described and linked to the present concept. The recently completed Phase B trade study selections of photovoltaic system technologies are described in detail. A summary of the present solar dynamic and power management and distribution systems is also given for completeness. Author

N86-32522*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PROVEN, LONG-LIFE HYDROGEN/OXYGEN THRUST CHAMBERS FOR SPACE STATION PROPULSION
G. Paul Richter and Harold G. Price 1986 20 p Presented at the 1986 JANNAF Propulsion Meeting, New Orleans, La., 26-28 Aug. 1986; sponsored by JANNAF Interagency Propulsion Committee
(NASA-TM-88822; E-3171; NAS 1.15:88822) Avail: NTIS HC A02/MF A01 CSCL 21H

The development of the manned space station has necessitated the development of technology related to an onboard auxiliary propulsion system (APS) required to provide for various space station attitude contr orbit positioning, and docking maneuvers. A key componen of this onboard APS is the thrust chamber design. To develop the required thrust chamber technology to support the Space Station Program, the NASA Lewis Research Center has sponsored development programs under contracts with Aerojet TechSystems Company and with Bell Aerospace Textron Division of Textron, Inc. During the NASA Lewis sponsored program with Aerojet TechSystems, a 25 lb sub f hydrogen/oxygen thruster has been developed and proven as a viable candidate to meet the needs of the Space Station Program. Likewise, during the development program with Bell Aerospace, a 50 lb sub f hydrogen/oxygen Thrust Chamber has been developed and has demonstrated reliable, long-life expectancy at anticipated space station operating conditions. Both these thrust chambers were based on design criteria developed in previous thruster programs and successfully verified in experimental test programs. Extensive thermal analyses and models were used to design the thrusters to achieve total impulse goals of 2 x 10 to the 6th power lb sub f-sec. Test data for each thruster will be compared to the analytical predictions for the performance and heat transfer characteristics. Also, the results of thrust chamber life verification tests will be presented. Author

N86-32523# Naval Postgraduate School, Monterey, Calif.
HEAT TRANSFER MODELLING OF THRUST VECTOR CONTROL SYSTEMS M.S. Thesis
Alp Yukselen Mar. 1986 199 p
(AD-A167933) Avail: NTIS HC A09/MF A01 CSCL 20/13

A model of heat transfer phenomenon in thrust vector control systems is presented, using the PHOENICS computer code. To simplify the problem of heat transfer to solid objects in rocket exhaust, simple wedge bodies have been examined in supersonic gas flow for both turbulent and laminar flow cases. The study gives an estimate of skin friction coefficient, surface heat flux, heat transfer coefficient, Stanton number distributions, and computer run times. GRA

N86-32524# Department of the Air Force, Washington, D.C.
SOLID FUEL BURN ENHANCER Patent Application
Nagy, inventor (to Air Force) Filed 17 Mar. 1986 20 p
(AD-D012331; US-Patent-Appl-SN-840619) Avail: NTIS
HC A02/MF A01 CSCL 21/9

This patent application relates generally to solid fuel ramjet engines, and more specifically to a solid rocket motor construction which allows the burn rate to be controlled by variations in the oxidizer content. A solid rocket motor grain construction is disclosed for use in a ramjet to improve performance. The solid fuel burn enhancer adds oxidizer for burn rate control. Two constructions are disclosed. The inlaid approach places cores of solid low-oxidizer fuel within solid unoxidized fuel and the integrated approach provides shells of low-oxidizer around the solid unoxidized fuel. The low-oxidizer fuel has a faster burn rate and smaller burn area requirements than the unoxidized fuel. During initial ramjet operation, when the burn area is constrained, the low oxidizer fuel burns initially with its smaller burn area requirements. Subsequently, the conventional unoxidized fuel burns when larger burn areas are available. GRA

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N86-32525* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
POLYMER OF PHOSPHONYLMETHYL-2,4- AND -2,6-DIAMINO BENZENE AND POLYFUNCTIONAL MONOMER Patent
John A. Mikroyannidis (National Academy of Sciences - National Research Council, Washington, D. C.) and Demetrius A. Kourtides, inventors (to NASA) Issued 6 May 1986 6 p Filed 16 Aug. 1984
(NASA-Case-ARC-11506; US-Patent-4,587,324;
US-Patent-Appl-SN-641142; US-Patent-Class-528-108;
US-Patent-Class-528-124; US-Patent-Class-528-337;
US-Patent-Class-528-352; US-Patent-Class-528-399;
US-Patent-Class-528-406; US-Patent-Class-528-407) Avail: US Patent and Trademark Office CSCL 07A

A phosphonyl methyl benzene is prepared by nitration to produce a 2,4-dinitro phosphonyl methyl benzene, which is then reduced to a diamino compound. The diamino compound is then used to cure a polymerizable monomer. The diamino compound may be polymerized with polyfunctional epoxides to produce heat and fire resistant polymer structures for making flame and fire resistant polymer structures such as for aircraft secondary structures. B.G.

N86-32526*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POLYARYLENE ETHERS WITH IMPROVED PROPERTIES Patent Application
Paul M. Hergenrother, inventor (to NASA), Brian J. Jensen, inventor (to NASA), and Stephen J. Havens, inventor (to NASA) (PRC Kentron, Inc., Hampton, Va.) 5 Jun. 1986 18 p
(NASA-Case-LAR-13555-1; US-Patent-Appl-SN-871207) Avail: NTIS HC A02/MF A01 CSCL 07A

This invention relates to novel polyarylene ethers which possess the combination of high strength, toughness, and high use temperature with ease of extrusion and formation into complex objects. These polyarylene ethers are suitable for use in adhesives, coatings, films, membranes, and composite matrices. The polyarylene ethers of this invention are the polycondensation products from the reaction of either 1,3-bis (4-chloro or fluorobenzoyl) benzene with any one of the following bisphenolic compounds: bis (3-hydroxyphenyl) methane; bis (4-hydroxyphenyl) methane; 1,1-dimethyl-bis (4-hydroxyphenyl)methane, or 9,9-bis (4-hydroxyphenyl) fluorene. Random and block copolymers are also comprehended. NASA

24 COMPOSITE MATERIALS

Includes laminates.

N86-32527 Purdue Univ., West Lafayette, Ind.
IMPACT DAMAGE CHARACTERIZATION IN LAMINATED COMPOSITES Ph.D. Thesis
Shiv Prakash Joshi 1985 159 p
Avail: Univ. Microfilms Order No. DA8529286

Comprehensive studies of impact induced fracture in laminated composites are lacking, largely because of the complexity of the problem. An effort is made to provide a starting point for a simple working model for an impact induced fracture. An interactive study which uses a finite element numerical analysis together with experimental observations is done. A three layer cross ply graphite epoxy laminate is initially chosen for both experimental and numerical studies. The studies done on cross ply laminates are extended to quasi isotropic laminates. Experimental data for the three dimensional problem of impact of a flat strip by a spherical impactor are presented and interpreted qualitatively by comparison with a plane strain numerical analysis of an infinitely wide plate impacted by a cylindrical impactor. The role of transverse shear stress and flexural stress in damage initiation is established. A detailed presentation of damage is provided with exact delamination zones. Strain responses, using a plate finite element, are correlated with the experimental observations to provide a simple model for damage initiation in laminated composites. The results established that the crack in the distal ply (opposite to the impact side) is produced when the transverse flexural strain in the ply reaches 9000 micro strain in the impact zone. Dissert. Abstr.

N86-32528*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EFFECTS OF EXTERNAL ENVIRONMENTS ON THE SHORT BEAM SHEAR STRENGTH OF FILAMENT WOUND GRAPHITE/EPOXY Center Director's Discretionary Fund Final Report
B. G. Penn and J. M. Clemons Jul. 1986 14 p
(NASA-TM-86553; NAS 1.15:86553) Avail: NTIS
HC A02/MF A01 CSCL 11D

Filament wound graphite/epoxy samples were immersed in seawater, deionized water, and toluene at room temperature and 80 deg C for 5, 15, and 43 days, and in methanol at room temperature for 15 and 43 days. The percent weight gains and short beam shear strengths were determined after environmental exposure. Samples immersed in deionized water and seawater had higher percent weight gains than those immersed in toluene at room temperature and 80 deg C. The percent weight gains for samples immersed in methanol at room temperature were comparable to those of deionized water and seawater immersed samples. A comparison of percent decreases in short beam shear strengths could not be made due to a large scatter in data. This may indicate defects in samples due to machining or variations in material properties due to processing. Author

N86-32529*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FRACTURE MECHANICS OF MATRIX CRACKING AND DELAMINATION IN GLASS/EPOXY LAMINATES
M. Caslini, C. Zanotti, and T. K. OBrien Sep. 1986 42 p Prepared in cooperation with Army Aviation Systems Command, St. Louis, Mo.
(DA Proj. 1L1-61102-8-H45)

(NASA-TM-89007; NAS 1.15:89007; AVSCOM-TR-86-B-3) Avail: NTIS HC A03/MF A01 CSCL 11D

This study focused on characterizing matrix cracking and delamination behavior in multidirectional laminates. Static tension and tension-tension fatigue tests were conducted on two different layups. Damage onset, accumulation, and residual properties were measured. Matrix cracking was shown to have a considerable influence on residual stiffness of glass epoxy laminates, and could be predicted reasonably well for cracks in 90 deg piles using a simple shear lag analysis. A fracture mechanics analysis for the strain energy release rate associated with 90 deg ply-matrix crack formation was developed and was shown to correlate the onset of 90 deg ply cracks in different laminates. The linear degradation of laminate modulus with delamination area, previously observed for graphite epoxy laminates, was predicted for glass epoxy laminates using a simple rule of mixtures analysis. The strain energy release rate associated with edge delamination formation under static and cyclic loading was difficult to analyze because of the presence of several contemporary damage phenomena. Author

N86-32530# Army Materials Technology Lab., Watertown, Mass.
THERMAL ANALYSIS OF VARIOUS EPOXY MIXTURES Final Report
Bernard R. LaLiberte and Robert E. Sacher Mar. 1986 16 p
(AD-A167609; MTL-TR-86-8) Avail: NTIS HC A02/MF A01 CSCL 11/9

There are three distinct types of epoxides in the SP-250 system. The epoxides were individually mixed with monuron. Also, three-component mixtures, epoxide + Dicy/Monuron, were prepared with dicyandiamide. The mixtures were cured by differential scanning calorimetry. It was found that the isothermal heat of reactions of the two- and three-component systems were in reasonable agreement with the respective dynamic reactions, consequently, the extent of isothermal cures could be determined from the two heating modes. The synergistic effect of dicyandiamide and monuron, on the curing process, was simulated by the isothermal reaction of two mixtures. A type of reaction kinetics having the dimensions of temperature per time was evaluated i. this report. GRA

N86-32531# Army Materials Technology Lab., Watertown, Mass.
TENSILE AND FATIGUE BEHAVIOR OF ALUMINA FIBER REINFORCED MAGNESIUM COMPOSITES
John Nunes, Ernest S. C. Chin, John M. Slepetz, and Nikolaos Tsangarakis Mar. 1986 33 p
(AD-A167725; MTL-TR-86-7) Avail: NTIS HC A03/MF A01 CSCL 11/4

Tensile and fatigue properties of as-cast polycrystalline alumina fiber reinforced magnesium (ZE41A) composites were determined as a function of fiber orientation and fiber content. Fiber dominant properties were studied on four fiber volume fractions of 35, 40, 45 and 55 percent at 24 C and 200 C testing temperatures. Off-axis, matrix dominant properties were investigated at a constant fiber volume fraction (55 percent) at 24 C. An attempt was also made to identify the effects of the fiber/matrix interface, matrix chemistry and residual stresses on the resultant mechanical behavior of these composites. GRA

N86-32532# Wyoming Univ., Laramie.
FINITE ELEMENT MICROMECHANICS AND MINIMECHANICS MODELING OF A THREE-DIMENSIONAL CARBON-CARBON COMPOSITE MATERIAL Final Report, Sep. 1984 - Dec. 1985
David E. Walrath and Donald F. Adams Dec. 1985 154 p
(Contract N00014-77-C-0503)
(AD-A168050; UWME-DR-501-106-1) Avail: NTIS HC A08/MF A01 CSCL 20/13

Emphasis of this work is to develop finite element micromechanics models to predict the thermomechanical material properties for unidirectional carbon-carbon composite materials. These properties are then used to define the fiber bundle properties in a finite element minimechanics analysis of a three-dimensional rectangular weave carbon-carbon unit cell. The objective of the present work was to analytically model a three-dimensionally reinforced carbon-carbon composite material in order to better understand previously obtained experimental results. Analysis of carbon-carbon materials may be conducted at three geometric levels, typically referred to as micromechanics, minimechanics, and macromechanics. Features of these analyses include capabilities to model nonlinear temperature-dependent constituent material behavior and procedures to predict damage initiation and crack propagation. GRA

N86-32533# Princeton Univ., N. J. Dept. of Chemical Engineering.
EFFECT OF TIME-TEMPERATURE PATH OF CURE ON THE WATER ABSORPTION OF HIGH T SUB g EPOXY RESINS Technical Report, 1 Jul. 1984 - 1 May 1986
M. T. Aronhime, John K. Gillham, and R. D. Small May 1986 88 p Prepared in cooperation with AT and T Technologies, Princeton, N. J.
(Contract N00014-84-K-0021)
(AD-A168106; TR-8) Avail: NTIS HC A05/MF A01 CSCL 11/9

The effect of different time-temperature paths of cure on the water absorption of high t sub g epoxy resins has been investigated. The resins were cured isothermally at elevated temperatures for different times, with the following results: as extent of cure increased, the glass transition temperature (t sub g) increased, the room temperature (RT) modulus decreased, the RT density decreased, the RT diffusion coefficient appeared to decrease, and RT equilibrium absorption of water increased. The decrease in RT density is related to an increase in volume, which controls the amount of water absorbed. A qualitative model accounts for the increase in RT volume with increasing cure. The model is based on a restricted decrease of free volume on cure due to rigid molecular segments in the cured resin systems. A thermodynamic approach, independent of the absorption mocel, can correlate sorption data at different temperatures. The diglycidyl resin was also cured for extended times at three temperatures in an effort to achieve full cure at each temperature. Their equilibrium water absorption increased with increasing cure temperature, consistent with the decrease in RT density. The systems studies were a diglycidyl ether of bisphenol A cured with an aromatic tetrafunctional diamine, trimethylene glycol di-p-aminobenzoate (T sub g infinity = 156 C), and a triglycidyl ether of tris(hydroxyphenyl)methane cured with the same amine (T sub g infinity = 268 C). GRA

N86-32534# Idaho Univ., Moscow. Dept. of Mechanical Engineering.
IMPROVEMENT AND OPTIMIZATION OF INTERNAL DAMPING IN FIBER REINFORCED COMPOSITE MATERIALS Final Report, Jun. 1983 - Nov. 1985
R. F. Gibson and S. A. Suarez 3 Mar. 1986 225 p
(Grant AF-AFOSR-0156-83)
(AD-A168576; AFOSR-86-0330TR) Avail: NTIS HC A10/MF A01 CSCL 11/4

The objective of this research were to study the effects of such parameters as fiber aspect ratio, fiber orientation and fiber/matrix properties on damping in fiber reinforced polymer composites. These objectives were to be met by using both experimental and analytical approaches. The development of improved techniques for fabrication and testing of specimens and the development of relatively simple design equations for prediction of damping were desirable goals which were also met. Two new computer-aided testing techniques based on the impulse frequency response approach were developed. Specimens of graphite/epoxy, boron/epoxy and Kevlar aramid/epoxy were fabricated by using an autoclave-style press cure which was developed specifically for this program. Although a number of parameters were studied, the emphasis was on the influence of fiber length, fiber orientation and fiber material on damping of polymer composites. The experimental results show that, as predicted, very low fiber aspect ratios are required to produce significant improvements in damping. Of the three fiber types tested, the Kevlar aramid fiber composite was found to have much better damping than graphite or boron fiber composites. Measurements and predictions also indicate that the control of fiber orientation in a continuous fiber reinforced

laminate may be a better approach to the improvement of damping than the control of fiber aspect ratio. GRA

N86-32535# Aerospace Corp., El Segundo, Calif. Materials Sciences Lab.
FIBER COATINGS FOR THE FABRICATION OF GRAPHITE-REINFORCED MAGNESIUM COMPOSITES
Howard A. Katzman 15 May 1986 29 p
(Contract F04701-85-C-0086)
(AD-A168805; TR-0086(6935-14)-2; SD-TR-86-23) Avail: NTIS HC A03/MF A01 CSCL 11/3

A new fabrication technique for graphite-fiber-reinforced magnesium is presented. An air-stable silicon-dioxide coating is deposited on the fiber surfaces from an organometallic precursor solution. The fibers are passed through this solution followed by hydrolysis or pyrolysis of the organometallic compound to form silicon dioxide on the fiber surfaces. The silicon-dioxide coating facilitates wetting and bonding when the fibers are immersed in molten magnesium. A modification of this coating technique was developed for coating fibers with amorphous carbon, which was found to improve the adhesion between the graphite fibers and the silicon-dioxide coating. Composites containing either T300, P55, or P100 graphite fibers in pure magnesium - 1% silicon, and magnesium alloy AZ91 have been fabricated. Preliminary mechanical property data are presented. GRA

N86-32536# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
STUDY OF DAMAGE IN A PERFORATED CARBON-EPOXY COMPOSITE PLATE UNDER BIAXIAL CYCLIC FORCES Final Report [ETUDE DE L'ENDOMMAGEMENT D'UNE PLAQUE TROUEE EN CARBONE-EPOXY SOUS SOLLICITATIONS BIAXIALES CYCLIQUES]
G. Inizan and L. Anquez Dec. 1985 46 p In FRENCH
(Contract MRT-83-P-0532)
(ONERA-RT-8/3542-RY-022-R; ETN-86-97638) Avail: NTIS HC A03/MF A01

The biaxial stress condition is obtained by flat loading in two perpendicular directions. The specimens are square plates with a central hole. The experimental results are compared with a finite element two dimensional computation. The damage was studied by X-ray photography. It is found that the computation model is in good agreement with the observed facts in spite of its simplicity. ESA

N86-32537# Societe Nationale Industrielle Aerospatiale, Paris (France).
DEPLOYABLE ANTENNA REFLECTOR [REFLECTEUR D'ANTENNE DEPLOYABLE]
C. Labruyere 1986 6 p In FRENCH Presented at Journees Industrielles France-Canada, Ottawa, Ontario, 10-12 Sep. 1985
(SNIAS-861-422-117; ETN-86-97602) Avail: NTIS HC A02/MF A01

Carbon fiber structures for space operating deployable reflectors 4 to 40 m diameter for frequencies between 1 and 30 GHz are discussed. The reflector should be compatible with Ariane launcher transportation. The reflecting skin is gold plated molybdenum knitted wire. The computation software is operational, and deployment tests were carried out. ESA

N86-32538# Nederlanse Federatie voor Kunstoffen, Woerden.
FIBER REINFORCED PLASTICS: POSSIBILITIES, EXPECTATIONS, TECHNOLOGY AND APPLICATION [VEZELVERSTERKTE KUNSTSTOFFEN MOGELIJKHEDEN, TOEKOMSTVERWACHTINGEN TECHNOLOGIE EN TOEPASSINGEN]
R. J. Schliekelmann 1985 6 p In DUTCH Presented at Symposium, Woerden, Netherlands, 19 Nov. 1985 Submitted for publication
(ETN-86-97777) Avail: NTIS HC A02/MF A01

The development of plastics and fiber reinforced plastics since 1907 is presented. The properties of boron and carbon fiber reinforced plastics are discussed. The technology and market situation in the field of fiber reinforced plastics is depicted. ESA

N86-32539# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique des Materiaux.
RELATION BETWEEN CONSTITUENTS AND PERFORMANCE IN COMPOSITE MATERIALS. PART 2: MATRIX SYSTEMS NARMCO 5208 AND NARMCO 5245 [RELATIONS ENTRE CONSTITUANTS ET PERFORMANCES DES MATERIAUX COMPOSITES. PARTIE 2: SYSTEMES A MATRICE NARMCO 5208 ET NARMCO 5245]
C. Belinski, C. Cavalli, M. C. Merienne, B. Bloch, F. X. Lalau-Keraly, C. Marais, and P. Sigety Feb. 1986 56 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RT-2/3636-M; ETN-86-97875) Avail: NTIS HC A04/MF A01

An experimental evaluation of epoxy matrix composition and characteristics is presented. The raw data include chromatographic and spectrographic analysis, chemical identification of the major constituents, evolution of the polymerization at 180 C, and detection of minor constituants and additives. No conclusions are included. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N86-32540*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ISOTOPE EXCHANGE IN OXIDE-CONTAINING CATALYST Patent Application
Robert V. Hess, inventor (to NASA), Billy T. Upchurch, inventor (to NASA), Kenneth G. Brown, inventor (to NASA) (Old Dominion Univ., Norfolk, Va.), Irvin M. Miller, inventor (to NASA), David R. Schryer, inventor (to NASA), Barry D. Sidney, inventor (to NASA), George M. Wood, inventor (to NASA), and Ronald F. Hoyt, inventor (to NASA) Filed 12 Jun. 1986 11 p
(Contracts NASA-Order L-79510-B; NASA-Order L-83135-B; NAS1-17993)
(NASA-Case-LAR-13542; US-Patent-Appl-SN-874304) Avail: NTIS HC A02/MF A01 CSCL 07D

A method of exchanging rare-isotope oxygen for common-isotope oxygen in the top several layers of an oxide-containing catalyst is disclosed. A sample of an oxide-containing catalyst is exposed to a flowing stream of reducing gas in an inert carrier gas at a temperature suitable for the removal of the reactive common-isotope oxygen atoms from the surface layer or layers of the catalyst without damaging the catalyst structure. The reduction temperature must be higher than any at which the catalyst will subsequently operate. Sufficient reducing gas is used to allow removal of all of the reactive common-isotope oxygen atoms in the top several layers of the catalyst. The catalyst is then reoxidized with the desired rare-isotope oxygen in sufficient quantity to replace all of the common-isotope oxygen that was removed. NASA

N86-32541*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRETREATMENT AND REACTIVATION OF AN OXIDE-CONTAINING CATALYST Patent Application
Billy T. Upchurch, inventor (to NASA), Irvin M. Miller, inventor (to NASA), Kenneth G. Brown, inventor (to NASA), Robert V. Hess, inventor (to NASA), David R. Schryer, inventor (to NASA), Barry D. Sidney, inventor (to NASA), George M. Wood, inventor (to NASA), and Patricia A. Paulin, inventor (to NASA) Filed 12 Jun. 1986 9 p
(Contracts NASA Order-L-79510B; NASA Order-L-83135B; NAS1-17099)

(NASA-Case-LAR-13540-1; US-Patent-Appl-SN-874320) Avail: NTIS HC A02/MF A01 CSCL 07D

A pretreatment and reactivation process for enhancing the recombination activity of an oxide-containing catalyst is disclosed. Pretreatment is achieved by first exposing the catalyst to a flowing stream of a reducing agent in an inert carrier gas while the catalyst is heated to a temperature greater than its operating temperature. The catalyst is then exposed to a flowing stream of the inert carrier gas in pure form at the same temperature. Finally, the catalyst is cooled to its operating temperature in a flowing stream of the inert carrier gas in pure form. Reactivation is achieved by merely reheating the catalyst, in the presence of CO-containing recombining gases, to a temperature greater than its operating temperature and then recooling the catalyst to its operating temperature. NASA

N86-32542# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
SINGLE-SHOT H(2) CARS SPECTROSCOPY OF PROPELLANT IGNITION AND COMBUSTION UNDER PRESSURE Final Report, Oct. 1984 - Oct. 1985
T. E. Haw, S. Darrah, and L. E. Harris May 1986 37 p
(Contracts DAAK10-81-C-0265; DAAA21-85-C-0139)
(AD-A168054; ARAED-TR-85006) Avail: NTIS HC A03/MF A01 CSCL 21/2

A single-shot H(2) CARS spectrometer was developed, and experimental considerations for accurate thermometry were examined. The spectrometer is capable of synchronization with external events such as laser-initiated propellant ignition or ballistic compression, given an inherent delay time of 250 microseconds and a predetermined diagnostic time window approaching 1 second. Additional capability to operate in a double Q-switched mode (two diagnostic probes 60 to 90 microseconds apart) has been demonstrated, with inherent delay time of 190 microseconds. Application to static samples of H(2) and to an H(2)/0(2) flame reveal unreferrence errors approaching 10% or more in temperature determination, and indicate the necessity for simultaneous standardization in accurate thermometry. Intensity determination in an unreferrenced fashion reveals fluctuations of 30%, with contributions from YAG and dye laser intensity and phase fluctuations. Q-branch lines from the first vibrational state (beta = 1) of hydrogen were observed for the first time in the H(2)/0(2) flame using this apparatus. Facilities have been established with which to perform single-shot H(2) CARS diagnostics on propellant ignition and flame under pressure. Preliminary experiments indicate the choice of background gas, flow rates through the pressure cell, YAG laser fluence, and dye laser spectral width are critical factors in the development of a working protocol. GRA

N86-32543# California Univ., Berkeley. Lawrence Berkeley Lab. Applied Science Div.
NEAR- AND SUPER-CRITICAL DROPLET COMBUSTION
R. H. Rangel, A. C. Fernandez-Pello, and A. K. Oppenheim Nov. 1985 24 p
(Contracts DE-AC03-76SF-00098; DAAED7-85-C-R025)
(DE86-009215; LBL-20711) Avail: NTIS HC A02/MF A01

A review is presented of theoretical and experimental studies carried out over the last 25 years on the problem of droplet heating, vaporization, and combustion at near- and super-critical conditions. Following a detailed description of the classical quasi-steady theory, particular attention is given to major departures from it, that must be considered in a super-critical droplet combustion model. This includes unsteady heating and gas-phase diffusion, as well as the influence of ambient conditions, fuel-vapor accumulations, convective heat transfer and gas solubility. DOE

N86-32544# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Mechanical Engineering.
FUEL INJECTION SYSTEM FOR SHOCK TUBE STUDIES OF THE IGNITION OF PREHEATED FUELS
M. D. Forsha, R. F. Sawyer, and A. K. Oppenheim Feb. 1986 21 p
(Contract DE-AC03-76SF-00098)
(DE86-009219; LBL-21103) Avail: NTIS HC A02/MF A01

An electrically actuated fuel injection system has been developed for shock tube ignition studies of preheated fuel jets. The injection system is capable of heating the fuel to 760 K prior to injection. Injection timing may be controlled to .1 ms. The mass of fuel injected can be varied between 10 mg and 60 mg. Measurement of the mass of fuel injected is possible at all operating temperatures. DOE

N86-32545# California Univ., Berkeley. Lawrence Berkeley Lab.
IGNITION AND COMBUSTION OF FUEL DROPLETS AND THE IGNITION OF PREMIXED FUELS BY HOT CYLINDRICAL SURFACES
R. H. Rangel, A. C. Fernandez-Pello, and A. K. Oppenheim Nov. 1985 131 p
(Contract DE-AC03-76SF-00098)
(DE86-009262; LBL-20712) Avail: NTIS HC A07/MF A01

Two types of combustion problems relevant to the gasification, ignition and combustion of fuels in combustion chambers using sprays are theoretically analyzed using mathematical and numerical techniques. The problem of the vaporization, ignition and subsequent combustion of a fuel droplet in a hot convective flow at atmospheric or moderately elevated pressures is analyzed using boundary layer theory around a spherical fuel droplet. The preliminary stages leading to the onset of ignition are treated as a perturbation of the boundary-layer non-reacting flow using the method of matched asymptotic expansions. The quasi-steady laminar combustion regime of the fuel droplet is analyzed using the flame-sheet approximation. The internal circulation of the liquid phase is also included in the analysis. The results show that ignition occurs towards the rear of the droplet where the residence time is longer. The droplet burning rate, however, is maximum at the forward stagnation point where the boundary layer is thinner. Liquid internal motion has only a minor influence on the burning characteristics of the droplet. A second group of problems studied is the quasi-steady thermal ignition of a premixed combustible gas flowing in mixed-convective conditions past a hot cylindrical, inert or catalytic, surface. The laminar boundary-layer equations including finite-rate kinetics are solved and the location of the ignition region is determined using the method of matched asymptotic expansions for large activation energies. Ignition is shown to occur very close to the surface where the temperatures are higher and downstream of the forward stagnation point where the heat losses are smaller. DOE

N86-32546# Lawrence Livermore National Lab., Calif.
USE OF GAS IMAGING AS A MEANS OF LOCATING LEAKS AND TRACKING GAS CLOUDS
T. McRae and J. Stahovec Apr. 1986 20 p Presented at the American Institute of Chemical Engineers Spring National Meeting, New Orleans, La., 6 Apr. 1986 Prepared in cooperation with Naval Sea Systems Command, Washington, D.C.
(Contract W-7405-eng-48)
(DE86-010786; UCRL-93783; CONF-860447-4) Avail: NTIS HC A02/MF A01

A new concept for the detection and tracking of toxic or flammable gases resulting from accidental spills or leaks is presented. The Backscatter/Absorption Gas Imaging (BAGI) technique is based on the optical radiation augmentation of the field of view of an imaging device by laser radiation corresponding to an absorption line of the gas species to be detected. The laser power requirements are greatly reduced by synchronizing the unexpanded laser beam with the raster-like, scanning field of view of a flying-spot imaging system. Several different configurations of possible BAGI systems are presented. In addition, a list of detectability limits for toxic and flammable materials that absorb carbon dioxide (CO) laser radiation is included. The current status and future plans of the NAVSEA BAGI development program are explained. DOE

N86-32547# Princeton Univ., N. J. Dept. of Chemistry.
DYNAMICAL STUDIES OF MOLECULAR SYSTEMS Final Progress Report, 1 Feb. 1985 - 31 Jan. 1986

1986 10 p
(Contract DE-AC02-76ER-02542)
(DE86-010340; DOE/ER-02542/4) Avail: NTIS HC A02/MF A01

Research was carried out in the general areas of collision dynamics and chemical kinetics. In summary, research on the following topics was pursued: The Use of Filtering Theory for the Inversion of Temporal Physical Systems; A Comprehensive Reaction Mechanism For Carbon Monoxide/Hydrogen/Oxygen Kinetics; Determining Important Aspects of Trajectory Design Problems; Sensitivity Analysis of Boundary Value Problems; Local and Global Parametric Analysis of Reacting Flows; Parametric Sensitivity of System Stability in Chemical Dynamics; Understanding the Relationship Between the Potential Surface and Observable in Classical Dynamics; Sensitivity Analysis of Steady State, Pre-Mixed Laminar Flames Using Newton's Method; An Analytical Preaveraging Approximation for the Numerical Evaluation of Matrix Elements Having Phase Sensitive Integrands. This work is reviewed in this report. DOE

N86-32548# Allied Bendix Corp., Kansas City, Mo.
SAMPLING MANIFOLD FOR GAS ANALYSIS Final Report
E. N. Fuller May 1986 18 p
(Contract DE-AC04-76DP-00613)
(DE86-010775; BDX-613-3426) Avail: NTIS HC A02/MF A01

A design concept for a sampling manifold system for gas analysis has been developed and tested. The design provides for elimination of repeated manual cylinder-to-instrument connections and for concurrent testing with multiple instruments without interference or cross-contamination. A prototype manifold incorporating these design features has been built and performance tested. The manifold, while not a complete system, represents a major building block in a complete system. The tests and actual operating experience demonstrate that the approach is a valid one which allows the instruments used in gas analysis to be incorporated into a unified system achieving increased ease of analysis and a substantial reduction in labor. DOE

N86-32549# Battelle Inst., Frankfurt am Main (West Germany).
REMOTE SENSING OF GASES BY LASER TECHNIQUES: DEVELOPMENT OF A SPACEWORTHY, LINE TUNABLE, CO2-LASER Final Report, Jun. 183
Wolf Wiesemann, Wolfgang Englisch, Martin Endemann, Werner Reiland, Michael Rother, and Wolfgang Diehl Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 139 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-027; ISSN-0170-1339; ETN-86-97469) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29

Functional tests and checks of the specification compliance as well as tests under simulated space conditions were performed to determine CO2 laser adaptability to remote gas analysis and to space communications. Mechanical and life limit measurements were performed. The test program for the CO2 laser is presented. The life of CO2 lasers with a closed gas system was studied. Acceleration and vibratory loads, temperature, humidity, thermal vacuum, and storage function were examined. Mechanical and magnetic measurements, EMC, and life tests were performed. A production model with a BeO laser tube was developed. Vibration tests do not reveal any visible damage or impairement of the vacuum tightness. ESA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N86-32550* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
METHOD OF COATING A SUBSTRATE WITH A RAPIDLY SOLIDIFIED METAL Patent
Huai-Pu Chu, inventor (to NASA) and Charles L. Staugaitis, inventor (to NASA) Issued 12 Nov. 1985 5 p Filed 19 Mar. 1984 Supersedes N84-20670 (22 - 11, p 1632)
(NASA-Case-12880-1; US-Patent-4,552,784; US-Patent-Appl-SN-590925; US-Patent-Class-427-192; US-Patent-Class-427-191; US-Patent-Class-427-421; US-Patent-Class-427-427) Avail: US Patent and Trademark Office CSCL 11F

A method for coating a substrate with rapidly solidified metal is described which comprises spraying a mixture of rapidly solidified (RS) metal powder and small peening particles at high velocity against a substrate. The velocity is sufficient for the rapidly solidified metal powder and peening particles to impact the substrate and simultaneously bond the metal powder to the substrate. If the substrate is metallic, the method may provide the simultaneous mechanical working of the substrate surface. NASA

N86-32551* National Aeronautics and Space Administration. Pasadena Office, Calif.
APPARATUS FOR PRODUCTION OF ULTRAPURE AMORPHOUS METALS UTILIZING ACOUSTIC COOLING Patent
Mark C. Lee, inventor (to NASA) Issued 19 Nov. 1985 8 p Filed 21 Dec. 1982 Supersedes N83-19890 (21 - 10, p 1486)
(NASA-Case-NPO-15658-1; US-Patent-4,553,917; US-Patent-Appl-SN-451896; US-Patent-Class-425-6; US-Patent-Class-65-21.2; US-Patent-Class-65-142; US-Patent-Class-73-505; US-Patent-Class-219-121LE; US-Patent-Class-219-121LY; US-Patent-Class-264-5) Avail: US Patent and Trademark Office CSCL 11F

Amorphous metals are produced by forming a molten unit of metal and deploying the unit into a bidirectional acoustical levitating field or by dropping the unit through a spheroidizing zone, a slow quenching zone, and a fast quenching zone in which the sphere is rapidly cooled by a bidirectional jet stream created in the standing acoustic wave field produced between a half cylindrical acoustic driver and a focal reflector or a curved driver and a reflector. The cooling rate can be further augmented first by a cryogenic liquid collar and secondly by a cryogenic liquid jacket surrounding a drop tower. The molten unit is quenched to an amorphous solid which can survive impact in a unit collector or is retrieved by a vacuum chuck. NASA

N86-32552 British Library Lending Div., Boston Spa (England).
INVESTIGATION OF CERTAIN CHARACTERISTICS OF ACOUSTIC EMISSION DURING DEFORMATION OF MATERIALS
V. I. Petrov, V. V. Kazakov, and N. A. Chelyshev 1986 4 p Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 2, 1986 p 151-152
(BLL-M-Trans-36869-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The data obtained from experimental research provide the conclusion that it is important to study the amplitude distributions of the acoustic emission signals as well as the frequency with which they are selected. Specific deformation mechanisms obviously give rise to the occurrence of acoustic emission signals with characteristic frequencies peculiar to these mechanisms. It is also pointed out that for detailed examination of this question the results obtained by methods employing the recording of audible emission signals must be correlated with the metallographic changes taking place in the structure of the material during deformation. Author

N86-32553 British Library Lending Div., Boston Spa (England).
INFLUENCE OF ARSENIC ON CORROSION RESISTANCE OF LOW-CARBON, LOW-ALLOY STEELS
M. A. Shumilov, L. N. Kudryavtseva, and G. V. Samokhvalov 1986 6 p Transl. into ENGLISH from Izvestia VUZ (USSR), no. 2, 1986 p 63-65
(BLL-M-Trans-36857-(5828.4)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of arsenic on the corrosion rate of eight low-carbon, low-alloy steels from laboratory and industrial heats was investigated based on Kerch arsenic-bearing iron ore. The environments

tested were the atmosphere, sea water, and soil. Results are tabulated. Addition of up to 0.2% arsenic was found to reduce the corrosion rate to these steels in all three media. Author

N86-32554 British Library Lending Div., Boston Spa (England).
ASSIMILATION OF PRODUCTION OF WELDED CORROSION-RESISTANT NICKEL-FREE STEEL TUBES
G. I. Gulyaev, E. P. Petrunin, I. Z. Mashinson, I. G. Barantsov, E. G. Lisovoi, L. A. Makarov, A. K. Taradaiko, and Yu. G. Krupman 1986 8 p Transl. into ENGLISH from Stal (USSR), no. 1, 1986 p 60-62
(BLL-M-Trans-36809-(5828.4)) Avail: British Library Lending Div., Boston Spa, Eng.

A technology aimed at overcoming the lack of ductility in the weld metal as compared with that of the weld joint of welded, corrosion-resistant, chrome-nickel, austenitic class steel tubes through the use of additional inert-gas protection of the inside and outside surfaces of the weld pool and partially cooling weld seam, was developed for the production of welded, corrosion-resistance, nickel-free, ferrite-class steel tubes. A specialized shop was constructed in the New-Moscow Tube Works and the production of welded small diameter 08Kh18T1 steel tubes assimilated for the first time in this country. The tubes can also be used in other braches of industry as a substitute for chrome-nickel and brass steels. The ductility properties of the resultant welded tubes are higher than these indices for seamless tubes of the same steels. Author

N86-32555 British Library Lending Div., Boston Spa (England).
EFFECTS OF HYDROGEN ON THE MELTING POINTS OF VANADIUM AND ZIRCONIUM
V. I. Shapovalov and Yu. M. Dukelskii 1986 5 p Transl. into ENGLISH from Iz. VUZ. (USSR), no. 1, 1986 p 154-155
(BLL-M-Trans-36834-(5828.4)) Avail: British Library Lending Div., Boston Spa., Eng.

Research into interaction between hydrogen and vanadium and zirconium at high temperatures has proved that there may be gas eutectic equilibrium with hydrogen at these temperatures. Although the solubility of hydrogen in these metals is high, porosity may develop. Author

N86-32556*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ION-BEAM NITRIDING OF STEELS Patent Application
Joshua Salik, inventor (to NASA) and Theodore E. Hubbell, Jr., inventor (to NASA) Filed 29 Jan. 1986 11 p
(NASA-Case-LEW-14104-2; US-Patent-Appl-SN-823713) Avail: NTIS HC A02/MF A01 CSCL 11F

A surface of a steel substrate is nitrided without external heating by exposing it to a beam of nitrogen ions under a low pressure. The pressure is much lower than that employed for ion-nitriding, and an ion source is used instead of a glow discharge. Both of these features reduce the introduction of impurities into the substrate surface. NASA

N86-32557*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CREEP PROPERTIES OF PWC-11 BASE METAL AND WELDMENTS AS AFFECTED BY HEAT TREATMENT
R. H. Titran, T. J. Moore, and T. L. Grobstein 1986 19 p Presented at the 115th TMS Annual Meeting, New Orleans, La., 2-6 Mar. 1986; sponsored by AIME
(NASA-TM-88842; E-3227; NAS 1.15:88842) Avail: NTIS HC A02/MF A01 CSCL 11F

In a preliminary study using single specimens for each condition, PWC-11 (a niobium-base alloy with a nominal composition of Nb-1%Zr-0.1%C) was creep tested at 1350 K and 40 MPa. Base metal specimens and specimens with transverse electron beam welds were tested with and without a 1000 hr, 1350 K aging treatment prior to testing. In the annealed condition (1 hr at 1755 K + 2 hr at 1475 K), the base metal exhibited superior creep strength compared to the nonaged condition, reaching 1 percent strain in 3480 hr. A 1000 hr, 1350 K aging treatment prior to creep testing had a severe detrimental effect on creep strength of the base metal and transverse electron beam weldments, reducing the time to attain 1 percent strain by an order of magnitude. Extrapolated temperature compensated creep rates indicate that the present heat of PWC-11 may be four times as creep resistant as similarly tested Nb-1%Zr. The extrapolated stress to achieve 1 percent creep strain in 7 yr at 1350 K is 2.7 MPa for annealed Nb-1%Zr and 12 MPa for annealed and aged PWC-11 base metal with and without a transverse electron beam weld. Author

N86-32558# Sandia National Labs., Albuquerque, N. Mex.
VARIATIONS IN THE MICROSTRUCTURE OF NICKEL-BASED ALLOY COATINGS WITH THE METALLOIDS BORON AND SILICON AS A FUNCTION OF DEPOSITION PARAMETERS IN A DUAL BEAM ION SYSTEM
J. K. G. Panitz 1986 18 p Presented at the International Conference on Metallurgical Coatings, San Diego, Calif., 7 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009283; SAND-86-0763C; CONF-860495-4) Avail: NTIS HC A02/MF A01

Coatings have been deposited using a dual beam ion source system with two different targets as sputtering sources: (1) a predominantly amorphous Ni sub 63.5 Cr sub 12.3 Fe sub 3.5 Si sub 7.9 B sub 12.8 foil, and (2) a crystalline Ni sub 55.3 Cr sub 16.9 Si sub 7.2 B sub 21.6 slab from a casting. Amorphous coatings were produced by the foil for all conditions studied. The coatings that were deposited from the slab target that were less than 400 nm in thickness which were deposited at rates from 8 to 50 nm/min appeared to be amorphous. The thicker (greater than 400 nm) coatings and the extremely low deposition rate (2 nm/min) coatings produced by the slab comprised both partially polycrystalline and amorphous material. All of the coatings studied exhibited inferior wear and erosion resistance properties compared to iron-based amorphous metal coatings containing Ti, C, or N. However, the corrosion resistance to 4 N HCl is good, ranging from less than 0.01 mm/y to 0.22 mm/y as a function of deposition rate, concurrent ion bombardment conditions and coating thickness. DOE

N86-32559# Argonne National Lab., Ill.
SOLUTE SEGREGATION AND MICROSTRUCTURAL EVOLUTION IN ION-IRRADIATED VANADIUM-BASE ALLOYS
B. A. Loomis, B. J. Kestel, and S. B. Gerber Feb. 1986 26 p Presented at the 13th International Symposium on the Effects of Radiation on Materials, Seattle, Wash., 23 Jun. 1986
(Contract W-31-109-eng-38)
(DE86-007513; CONF-860605-8) Avail: NTIS HC A03/MF A01

The microstructural evolution in V+14.7 a/o Cr, V+2.5 a/o Mo, V+2.5 a/o W, V+8.0 a/o Ni, V+5.3 a/o Ti, V+14.7 a/o Cr + 5.2 a/o Ti, V+9.6 a/o Cr + 3.1 a/o Fe+0.7 a/o Zr, and V+3.2 a/o Ti + 1.8 a/o Si alloys, and unalloyed V was determined from observations of specimens by TEM following 4.0-MeV (51)V(++) ion irradiation at 900 to 970 K to 50 dpa. The RIS of solutes in the ion-irradiated alloys was investigated by AES, EDXS, and EELS analyses. The RIS of solutes and microstructural evolution in the irradiated alloys were correlated with the solute diffusivity and the relative chemical affinity of the substitutional solutes for oxygen. DOE

N86-32560# Georgia Inst. of Tech., Atlanta. School of Engineering Science and Mechanics.
STRAIN ANALYSIS FOR EXTRUSION OF POWDER METALS
D. G. Berghaus, R. J. Primas, and H. B. Peacock 1986 27 p Presented at the SEM Spring Conference on Experimental Mechanics, New Orleans, La., 8 Jun. 1986 Prepared in cooperation with Du Pont de Nemours (E.I.) and Co., Aiken, S.C.
(Contract DE-AC09-76SR-00001)
(DE86-007167; DP-MS-85-130; CONF-860682-1) Avail: NTIS HC A03/MF A01

This paper describes an experimental-numerical method for determining the strain distribution during axisymmetric extrusion of

powder metals (P/M). The visioplastic method is modified to include variable density. The method is applied to extrusion of a powder aluminum billet. It was found that the smoothed-spline approximation functions did not permit sufficiently good fits adjacent to the boundaries of the approximation intervals due to the prescribed zero values of the second derivatives at the spline boundaries. The smoothed-spline was modified to permit specified boundary second derivatives. DOE

N86-32561# Oak Ridge National Lab., Tenn.
COMPLEMENTARY AES AND AEM OF GRAIN BOUNDARY REGIONS IN IRRADIATED GAMMA-STRENGTHENED ALLOYS
K. Farrell, N. Kishimoto, R. E. Clausing, L. Heatherly, and G. L. Lehman 1986 18 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986 Prepared in cooperation with National Research Inst. for Metals, Ibaraki, Japan
(Contract DE-AC05-84OR-21400)
(DE86-010397; CONF-860421-33) Avail: NTIS HC A02/MF A01

Two microchemical analysis techniques are used to measure solute segregation at grain boundaries in two gamma'-strengthened, fcc Fe-Ni-Cr alloys that display radiation-induced intergranular fracture. Scanning Auger electron spectroscopy (AES) of grain boundary fracture surfaces and analytical electron microscopy (AEM) of intact grain boundaries using energy-dispersive x-ray spectroscopy show good agreement on the nature and extent of segregation. The elements Ni, Si, Ti, and Mo are found to accumulate in G, Laves and gamma' phases on the grain boundaries. Segregation of P is detected by AES. The complementary features of the two analytical techniques are discussed briefly. DOE

N86-32562# Sandia National Labs., Albuquerque, N. Mex.
WELDABILITY, MICROSTRUCTURE AND PROPERTIES OF PRECIPITATION STRENGHTENED MARTENSITIC STAINLESS STEELS
J. A. Brooks, W. R. Cieslak, and W. M. Garrison, Jr. 1986 25 p Presented at the ASM International Trends in Welding Research Meeting, Gatlinburg, Tenn., 18 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-010955; SAND-85-2521C; CONF-860594-2) Avail: NTIS HC A02/MF A01

The influence of welding on the mechanical properties and corrosion resistance of two precipitation strengthened martensitic stainless steels: Custom 450 and PH 13-8 Mo are investigated. The two alloys exhibited very good weld cracking resistance, although the formation of a low melting NbC eutectic constituent did cause some solidification cracking in Custom 450. The effects of aging temperature on tensile and impact properties were similar in the base metal and Gas-Tungsten-Arc (GTA) weldment for both alloys. The similarity of weld and base metal properties is attributed to the uniform precipitate distribution throughout the weld, as shown by Transmission Electron Microscopy (TEM) and electron microprobe analyses. The susceptibility to pitting corrosion was not impaired by aging or by welding, with the possible exception of a narrow band in the heat-affected zone (HAZ), and both materials were more resistant than 304 stainless steel. The narrow band is identified by electrochemical reactivation testing as a region of increased matrix activity likely caused by localized Cr and/or Mo depletion. DOE

N86-32563# Virginia Univ., Charlottesville. Dept. of Materials Science.
MICROSTRUCTURAL EFFECTS ON THE FATIGUE BEHAVIOR OF Fe-C-X ALLOYS Summary Progress Report
G. J. Shiflet Apr. 1986 68 p
(Contract DE-FG05-85ER-45181)
(DE86-010918; DOE/ER-45181/2; UVA-527315/MS86/101) Avail: NTIS HC A04/MF A01

This document reports on an Fe-C-Mn steel similar to the one examined by Suzuki and McEvily. This alloy was used to investigate the interaction between phase continuity and deformation behavior, with special interest on dislocation interactions. The microstructural variations examined were also used to test the model of fatigue crack growth rates developed by Chakrabortty. Two Fe-C-Mo alloys are also reported on. In these steels the relationship between ferrite, martensite and carbides is carefully controlled. As Mo has a large negative Wagner interaction parameter, copious amounts of MoC carbides in conjunction with ferrite are produced. By controlling temperature, the carbide morphology in these alloys can be altered and by controlling composition, the density of Mo2C can be changed. DOE

N86-32564# Knolls Atomic Power Lab., Schenectady, N. Y.
MECHANICAL BEHAVIOR OF SUPERALLOYS
S. Floreen Apr. 1986 37 p
(Contract DE-AC12-76SN-00052)
(DE86-010353; KAPL-4192) Avail: NTIS HC A03/MF A01

Recent developments affecting the mechanical behavior of superalloys over three ranges of operating temperatures are reviewed. At lower temperatures, activity has been focused on stress corrosion cracking susceptibility in light water reactor and sour gas well environments. The susceptibility to intergranular crack growth is critically dependent upon the grain boundary chemistry, and a method of minimizing the sensitivity of the boundaries to attack has been pursued. At intermediate temperatures, considerable effort has been directed toward increasing the tensile and fatigue strengths. The higher strength materials, however, show increased fracture sensitivity. In particular, embrittlement due to diffusion into the grain boundaries of aggressive species, such as oxygen or sulfur from the environments, becomes a problem. Minor element alloying additions of boron, zirconium, magnesium, etc., are helpful in retarding the degradation caused by the environment. At higher temperatures, the major thrust is toward improving the creep strength. The weak link in the materials, which is the transverse grain boundaries, has been eliminated by the use of specialized processing steps to produce either directionally solidified materials with minimum transverse grain boundaries, or single crystal materials. Single crystal materials permit alloying and heat treating modifications that further enhance the creep strength. The materials are very anisotropic in properties, but are successfully used in turbine blades and could be useful in other special applications. DOE

N86-32565# General Electric Co., Schenectady, N. Y. Research and Development Center.
METAL-BINDING PROTEINS FOR STRATEGIC METAL RECOVERY AND METAL DETOXIFICATION
T. K. Leib, T. M. Su, and D. S. Holmes 1986 11 p
(Contract DE-FG02-84ER-13278)
(DE86-010776; DOE/ER-13278/2) Avail: NTIS HC A02/MF A01

Some naturally occurring proteins bind metals with remarkable specificity and affinity. These properties could be useful for recovering valuable metals from dilute solution or for removal of toxic metals from waste-water. We discuss the chemical syntheses and properties of several model peptides which are based on the sequence of metal-binding protein metallothionein. Also, we describe novel techniques for determining the metal-binding properties of these synthetic peptides. These techniques are also applicable to the evaluation of naturally occurring metal-binding proteins. DOE

N86-32566# Wisconsin Univ., Madison.
THE STABILITY OF AMORPHOUS METAL FILMS ON SEMICONDUCTOR SUBSTRATES Progress Report, Jan. - Dec. 1985
J. D. Wiley and J. H Perepezko 15 Jan. 1986 9 p
(Contract DE-FG02-84ER-45096)
(DE86-010362; DOE/ER-45096/T2) Avail: NTIS HC A02/MF A01

Two amorphous alloy systems were studied: the Ni-Nb system (a transition metal-transition metal system) and the W-Si system (a metal-metalloid system). Considerable progress was made in the identification of reactive overlayer/amorphous alloy/substrate combinations and in understanding the reaction paths and mechanisms of specific systems. B.G.

N86-32567# Ecole Nationale Superieure des Telecommunications, Paris (France).
STUDY OF THE THERMAL EVOLUTION OF CHROME-TUNGSTEN DEPOSITS ON SILICON MONOCRYSTALS Ph.D. Thesis [ETUDE DE LEVOLUTION THERMIQUE DE DEPOTS CHROME/TU NGSTENE SUR SILICIUM MONOCRIST-ALLIN]
Pascale Garcin Jan. 1986 204 p In FRENCH
(ENST-86E004; ISSN-0751-1353; ETN-86-97870) Avail: NTIS HC A10/MF A01

The thermal evolution of double metallic layers (chrome and tungsten) deposited on silicon monocrystals was studied to determine the effects of the temperature and the concentration of impurities in the metallic or interface layer. The procedure has a potential to improve the performance of VLSI circuits by reducing the interconnection length. A transmission electron microscope was used to measure the morphology and crystalographic evolution of the interfaces. Models of interaction at the layer interfaces are proposed. A model describing the typical crystal defects of the Si2Cr formed at the interface is also presented. ESA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N86-32568*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE RESISTANT POLYAMIDE BASED ON 1-[(DIORGANOOXYPHOSPHONYL)METHYL]-2,4- AND -2,6DIAMINO BENZENE Patent
John A. Mikroyannidis, inventor (to NASA) and Demetrius A. Kourtides, inventor (to NASA) Issued 22 Jul. 1986 8 p Filed 16 Aug. 1984 Supersedes N85-21362 (24 - 11, p 1872)
(NASA-Case-ARC-11512-2; US-Patent-4,602,081;
US-Patent-Class-528-337; US-Patent-Class-528-336;
US-Patent-Class-528-340; US-Patent-Class-528-347;
US-Patent-Class-564-15; US-Patent-Class-568-14) Avail: US Patent and Trademark Office CSCL 11B

1-[(Diorganooxyphosphonyl)methyl]2,4- and-2,6diamino benzenes are reacted with polyacylhalides and optionally comonomers to produce polyamides which have desirable heat and fire resistance properties. These polymers are used to form fibers and fabrics where fire resistance properties are important, e.g., aircraft equipment and structures. Author

N86-32569* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPARATUS FOR PRODUCING OXIDATION PROTECTION COATINGS FOR POLYMERS Patent
Michael J. Mirtich, inventor (to NASA), James S. Sovey, inventor (to NASA), and A. Banks, inventor (to NASA) Issued 5 Aug. 1986 7 p Division of US-Patent-Appl-SN-649330, 14 Sep. 1984, US-Patent-4,560,577 Filed 31 Jul. 1985 Supersedes N86-19463 (24 - 10, p 1560)
(NASA-Case-LEW-14072-2; US-Patent-4,604,181;
US-Patent-Appl-SN-761235; US-Patent-Class-204-298;
US-Patent-Class-204-192C; US-Patent-Class-204-192D) Avail: US Patent and Trademark Office CSCL 11B

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about 4 volume percent polymer to provide flexibility. A coil of polymer materials moves through an ion beam as it is fed between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface. NASA

N86-32570*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CELLULAR THERMOSETTING FLUOROPOLYMERS AND PROCESS FOR MAKING THEM Patent Application
Sheng Yen Lee Filed 29 May 1986 12 p
(NASA-Case-GSC-13008-1; US-Patent-Appl-SN-867987) Avail: NTIS HC A02/MF A01 CSCL 11B

Thermosetting fluoropolymer foams are made by mixing fluid form thermosetting fluoropolymer components having a substantial fluorine content, placing the mixture in a pressure tight chamber, filling the chamber with a gas, at relatively low pressure, that is unreactive with the fluoropolymer components, allowing the mixture to gel, removing the gelled fluoropolymer from the chamber and thereafter heating the fluoropolymer at a relatively low temperature to simultaneously cure and foam the fluoropolymer. The resulting fluoropolymer product is closed celled with the cells storing the gas employed for foaming. The fluoropolymer resins employed may be any thermosetting fluoropolymer including fluoroepoxies, fluoropolyurethanes and fluoroacrylates. NASA

N86-32571# National Aeronautical Lab., Bangalore (India). Materials Science Div.
HIGH PRESSURE STUDIES ON MAGNETIC AND NONMAGNETIC METALLIC GLASSES
T. G. Ramesh and V. Shubha Aug. 1986 15 p
(NAL-TM-MT-8609) Avail: NTIS HC A02/MF A01

The effect of pressure on the transport properties viz. thermopower and resistivity of magnetic and non-magnetic metallic glasses is discussed. The absolute thermo-power (TEP) of Fe sub 80 B sub 20, a ferromagnetic metallic glass, has been measured as a function of temperature between 300 K and 1000 K upto 30 Kbar pressure. A previous study on this system at ambient pressure revealed no change in TEP at the crystallization temperature, T sub x, while the resistivity showed a sudden decrease at the same temperature. The present experimental work which employs the differential method for TEP measurement shows a distinct anomaly at T sub x even at ambient pressure and this anomaly gets enhanced under pressure. High pressure studies on the non-magnetic Ti sub 50 Be sub 40 40 Zr sub 10 system indicate that while TEP exhibits marked anomalies near the glass transition temperature and the two crystallization temperatures, the resistivity shows no perceptible anomaly near the second crystallization temperature. These experimental results have been analyzed on the basis of some current theoretical models for electron transport in glassy metals. Author

N86-32572# United Kingdom Atomic Energy Authority, Harwell (England). Instrumentation and Applied Physics Div.
BORON DIFFUSION: A FEASIBILITY STUDY FOR THE DIFFUSION OF BORON FROM BORON TRIBROMIDE
D. Berridge Jan. 1986 32 p
(AERE-M-3535) Avail: NTIS HC A03/MF A01

The commissioning of a boron diffusion facility in the device processing laboratory is described. Aspects of the process schedules and the applicability of this technology to the fabrication of diffused junction semiconductor radiation detectors are discussed. Author

N86-32573*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE MILLING OF PRISTINE AND BROMINATED P-100 GRAPHITE FIBERS
Michael E. Dillehay (Cleveland State Univ., Ohio) and James R. Gaier Sep. 1986 12 p
(NASA-TM-88828; E-3203; NAS 1.15:88828) Avail: NTIS HC A02/MF A01 CSCL 11G

Techniques were developed for the ball milling of pristine and brominated P-100 graphite fibers. Because of the lubrication properties of graphite, large ball loads (50 percent by volume) were required. Use of 2-propanol as a milling medium enhanced the efficiency of the process. Milled brominated P-100 fibers had resistivities which were indistinguishable from milled pristine P-100 fibers. Apparent loss of bromine from the brominated fibers suggests that bromine would not be the intercalate of choice in applications where milled fibers of this type are required. Other intercalates which do not degas may be more appropriate for a

milled fiber application. These same results, however, do provide evidence that bromine molecules leave the fiber surface when removed from overpressure of bromine. While exploring possible solvent media for milling purposes, it was found that brominated fibers are stable in a wide variety of organic solvents. Author

N86-32574# Department of the Air Force, Washington, D.C.
POLYMER BLENDS FOR USE IN PHOTOELECTROCHEMICAL CELLS FOR CONVERSION OF SOLAR ENERGY TO ELECTRICITY Patent
Terje Skotheim, inventor (to Air Force) Issued 29 Apr. 1986 6 p
(AD-D012350; US-Patent-4,585,581; US-Patent-Appl-SN-655489; US-Patent-Class-252-518) Avail: US Patent and Trademark Office CSCL 11/9

In the patent applications, there is provided a device having a first layer of semiconductive material having a first gap; and a second layer of material having a different band gap; a layer of dry solid polymer electrolyte between said first and second layers; and a layer of a polymer blend of a highly conductive polymer and a solid polymer electrolyte between said dry solid polymer electrolyte and said semiconductor layer. There is also provided a thin film which contributes improved electric charge transfer across said film. This film is comprised of a polymer blend of a highly conductive polymer and a solid polymer electrolyte, said blend being the major component of said film at one face thereof, and a dry solid polymer electrolyte being the major component of said film at another face thereof. The parent applications describe in at least one embodiment photovoltaic cells having a dry solid polymer electrolyte and adjacent semiconductor layer. In this embodiment in the parent applications there is described, in one aspect, an improved contact between said solid polymer electrolyte and the semiconductor. This improved contact uses a polymer blend of a highly conductive polymer, preferably polypyrrole, and a solid polymer electrolyte, preferably polyethylene oxide complexed with potassium iodide. GRA

N86-32575# Department of the Air Force, Washington, D.C.
METHOD FOR PREPARING Pb-BETA"-ALUMINA CERAMIC Patent
Eric E. Hellstrom, inventor (to Air Force) Issued 29 Apr. 1986 4 p
(AD-D012352; US-Patent-4,585,635; US-Patent-Appl-SN-645651; US-Patent-Class-423-263) Avail: US Patent and Trademark Office CSCL 11/2

A process is disclosed for preparing impermeable, polycrystalline samples of Pb-beta-alumina ceramic from Na-beta-alumina ceramic by ion exchange. The process comprises two steps. The first step is a high-temperature vapor phase exchange of Na by K, followed by substitution of Pb for K by immersing the sample in a molten Pb salt bath. The result is a polycrystalline Pb-beta-alumina ceramic that is substantially crack-free. GRA

N86-32576# Brown Univ., Providence, R. I. Div. of Engineering.
A CONTINUUM THEORY OF CRACK SHIELDING IN CERAMICS
M. Ortiz 22 May 1986 20 p
(Contract N00014-85-K-0720)
(AD-A168599) Avail: NTIS HC A02/MF A01 CSCL 11/2

A phenomenological constitutive model is proposed which aims at describing the overall effect of microfracture in ceramics. Based on this model, the asymptotic stress, strain and displacement fields at the tip of a stationary macroscopic crack are determined in closed form. The near-tip stress-intensity factor is computed and observed to be significantly smaller than the applied stress-intensity factor even for moderate amounts of damage. Author (GRA)

N86-32577# Harvard Univ., Cambridge, Mass. Dept. of Chemistry.
IMPROVED ADHESION OF THIN CONFORMAL FILMS TO METAL SURFACES
Kevin R. Steward, George M. Whitesides, Herman P. Godfried, and Isaac F. Silvera May 1986 15 p
(Contract N00014-83-K-0142)
(AD-A168616; TR-85-3) Avail: NTIS HC A02/MF A01 CSCL 11/1

A technique is described for attaching thin, conformal, pin-hole free electrically insulating polyethylene films to flat gold surfaces (previously modified by adsorption of a monolayer of an organic disulfide) by plasma polymerization. These polyethylene films are tough enough to support the attachment of gold electrodes. The adhesion of plasma polymerized polyethylene (PPE) thin films to a gold surface can be dramatically improved by coupling the synthesis of the FPE thin film with the prior assembly of an organic monolayer chemisorbed to the metal surface. These thin film assemblies have good physical characteristics and are stable to the ambient environment for long intervals. This method should be applicable to other systems with appropriate modifications. GRA

N86-32578# Oak Ridge National Lab., Tenn.
CERAMIC TRIBOLOGY: ASSESSMENT OF NEEDS IN MEASUREMENT METHODS AND STANDARDS
C. S. Yust, S. M. Hsu, and T. M. Levinson Feb. 1986 81 p
(Contract DE-AC05-84OR-21400)
(DE86-008948; ORNL/TM-9921) Avail: NTIS HC A05/MF A01

This report is a summary of discussions held at the Workshop on Tribological Test Devices and Procedures for Ceramics, which was convened to review ceramic wear test practices and to assess the prospects for agreement on standardized wear test methods and test machines. The workshop was held within a framework of six presentations intended to focus the discussion on specific wear testing issues. Wide-ranging views on wear testing and standardized wear tests were expressed and are presented in this report. Both positive and negative aspects of wear test standardization were discussed. By the close of the discussion a consensus developed that recognized the need for a feasibility of standardized wear tests but that also recognized a continued necessity for the use of nonstandard tests and test systems for research on fundamental wear mechanisms. The nonstandard test arrangements, however, should be well defined and the test conditions closely controlled. The suggestion was made that a small group initiate efforts to prepare test procedures and standards for review by the wear community. DOE

N86-32579# Oak Ridge National Lab., Tenn.
INITIAL RESULTS OF A HIGH-POWER MICROWAVE SINTERING EXPERIMENT AT ORNL
H. D. Kimrey, T. L. White, T. S. Bigelow, and P. F. Becher 1986 4 p Presented at the 21st Microwave Power Symposium, Memphis, Tenn., 28 Jul. 1986
(Contract DE-AC05-84OR-21400)
(DE86-010041; CONF-860743-1) Avail: NTIS HC A02/MF A01

Experiments have recently begun at Oak Ridge National Laboratory to develop microwave sintering techniques suitable for large ceramic parts. Microwave sintering offers the advantages of faster heating rates, more uniform heating, and greater energy efficiency than conventional sintering techniques. We are using 28-GHz, 200-kW CW gyrotrons as the heating source. An untuned cavity is used as the applicator to eliminate geometry sensitivity in coupling efficiency. DOE

N86-32580# Cornell Univ., Ithaca, N.Y. Dept. of Materials Science and Engineering.
MIGRATION OF GRAIN BOUNDARIES IN CERAMIC MATERIALS WITH PARTICULAR REFERENCE TO THE SINTERING PROCESS Progress Report, 1 Oct. 1985 - 30 Apr. 1986
C. B. Carter 30 Apr. 1986 18 p
(Contract DE-FG02-84ER-45092)
(DE86-011710; DOE/ER-45092/T2) Avail: NTIS HC A02/MF A01

The progress made during the past 7 months of a program to study the migration of grain boundaries in ceramic oxides is reported. Results of the program are presented which relate to the structure of grain boundaries in alpha-Al2O3, with important new information discussed for grain boundaries in spinels and

germanium. Attention is focused on the analysis of grain boundaries in polycrystalline alpha-Al2O3 compacts, with particular attention being paid to questions relating to the identification of amorphous thin films along interfaces in these materials. It has been found that the techniques used in the past to identify and characterize such films may give misleading or ambiguous results. Analysis of the first-order (sigma = 3) twin interface in spinel have been extended with the development of models for the computer simulation of high resolution transmission electron microscopy (TEM) images of these interfaces. Grain boundaries in covalent materials are also discussed. The characterization of surface structures using both imaging and diffraction techniques in the TEM alpha-Al2O3. DOE

N86-32581# Tennessee Univ., Knoxville. Dept. of Chemistry.
STATISTICAL MECHANICS OF POLYMER SYSTEMS Progress Report, 1 Sep. 1985 - 31 Aug. 1986
J. Kovac 1 May 1986 6 p
(Contract DE-FG05-84ER-45114)
(DE86-010292; DOE/ER-45114/2) Avail: NTIS HC A02/MF A01

In the original proposal, three areas of research were outlined: (1) development of reasonable, but mathematically tractable models for isolated polymer chain dynamics using projection operator techniques; (2) study of the effect of entanglements on the dynamics of polymer chains by means of computer simulation; and (3) nonequilibrium thermodynamic and statistical mechanical theories of the glass transition. In the second year of the grant we have again focussed almost all our efforts on the computer simulation work. This effort has been rewarded by a major advance, the inclusion of nearest neighbor interactions in the dynamic simulation algorithm. This has allowed us to study solvent effects on single chain dynamics. A wide range of interestig problems in concentrated polymer systems, such as mutual diffusion, polymer-polymer welding and phase separation in block copolymers can be studied using this model. Results of the computer simulation studies of the previous year are summarized. DOE

N86-32582# Washington Univ., Seattle. Dept. of Chemistry.
FUNDAMENTAL STUDIES OF ELASTOMERS Annual Progress Report, 15 Jun. 1985 - 21 Mar. 1986
B. E. Eichinger 1986 9 p
(Contract DE-FG06-84ER-45123)
(DE86-010438; DOE/ER-45123/2) Avail: NTIS HC A02/MF A01

The progress report for the first year of this grant described computer simulations on random networks, shape distributions, synthesis of chelation networks, and coordination polymers. Work has continued in all four of these areas in the past year. Highlighted here is the work that we have been doing on computer simulations of random cross-linking, wherein radiation damage is a very important feature of the chemical reactions that occur. Furthermore, we have made a coordination compound which looks quite encouraging at the present time. Our efforts on chelation networks are proceeding and we are developing very promising methods for creating the polymers that we need for these studies. DOE

N86-32583# Instituto Nacional de Tecnica Aeroespacial, Esteban Terradas, Torrejon de Ardoz (Spain). Dept. de Petroleo, Materiales Funcionales y Protectivos.
BEHAVIOR OF LUBRICANT GREASES AT HIGH TEMPERATURES: THIN FILM AND LIQUID CHROMATOGRAPHY TECHNIQUES [COMPORTAMIENTO DE GRASAS LUBRICANTES A ALTA TEMPERATURA. ENSAYO DE PELICULA FINA - CROMATOGRAFIA LIQUIDA]
L. M. Peloche, M. C. Utierrez, and L. Aliste 25 Nov. 1985 16 p In SPANISH
(ETN-86-97810) Avail: NTIS HC A02/MF A01

A laboratory study on five commercial greases combined with three kinds of additives was made. Each test was performed keeping a thin grease film at 125 C for 250 hr and determining weight loss, chromatographic analysis before and after the thermal treatment, and complementary infrared spectrum analysis. It is shown that this combination of methods is efficient to evaluate greases and additives behavior. ESA

N86-32584# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
DATA FOR SELECTION OF SPACE MATERIALS
Nov. 1985 211 p
(ESA-PSS-01-701-Issue-1; ISSN-0379-4059; ETN-86-97796) Avail: NTIS HC A10/MF A01

Data on adhesives, adhesive tapes, coatings and varnishes, glasses, lubricants, metals, paints, plastic films, potting compounds, reinforced and thermosetting resins, rubbers, and thermoplastics for space applications are presented. The materials were used by ESA. ESA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N86-32585# Sandia National Labs., Albuquerque, N. Mex.
IMPROVED HIGH-TEMPERATURE PERCUSSION PRIMER
N. A. Durand, R. R. Weinmaster, T. M. Massis, and W. Fleming 1986 16 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986 Prepared in cooperation with Unidynamics, Phoenix, Ariz.
(Contract DE-AC04-76DP-00789)
(DE86-009855; CONF-860739-1) Avail: NTIS HC A02/MF A01

A study was conducted to develop a percussion primer mix that would be capable of functioning after a 20-hour exposure at 200 C. A total of 16 mixes were studied, of whihc 6 were chosen for basic thermal and chemical properties. All mixtures were thermally evaluated with the differential scanning calorimeter (DSC) and showed no exothermic activity below 250 C. The mixtures were further evaluated by impact and friction sensitivity. Two of the candidate mixtures were selected for further development of a high-temperature, hermetically sealed percussion primer. These were KClO /Sb S /CaSi and KClO /Sb S /CaSi /HNS. The primer mixes were loaded into conventional hardware and subjected to ball-drop sensitivity testing. These two mixes have similar mean sensitivity of approximately 30 in. oz. which are well within the design requirements of 60 in. oz. The hermetically sealed primer that is being developed uses a stainless steel cup, anvil, and sealing ring with a glass-to-metal seal in the output hole. This primer has no reconsolidation requirements, and the sensitivity of this percussion primer is comparable with other commercial primers which are not hermetically sealed. DOE

N86-32586# Sandia National Labs., Albuquerque, N. Mex.
PERCUSSION PRIMER/DDT DETONATOR
M. R. Kopczewski and R. R. Weinmaster May 1986 30 p
(Contract DE-AC04-76DP-00789)
(DE86-011998; SAND-85-2864) Avail: NTIS HC A03/MF A01

A detonator has been designed and tested using a commercial percussion primer as the input stimulus. The detonator uses a secondary DDT explosive to provide a detonation output. The detonator can be tailored to initiate with a range of mechanical input levels. DOE

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N86-32587* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEXTURED CARBON SURFACES ON COPPER BY SPUTTERING Patent
Arthur N. Curren, inventor (to NASA), Kenneth A. Jensen, inventor

(to NASA), and Robert F. Roman, inventor (to NASA) Issued 19 Aug. 1986 8 p Filed 10 Oct. 1984 Supersedes N85-20151 (23 - 11, p 1615)
(NASA-Case-LEW-14130-1; US-Patent-4,607,193; US-Patent-Appl-SN-659475; US-Patent-Class-315-5.38; US-Patent-Class-204-192C; US-Patent-Class-204-192D; US-Patent-Class-204-298; US-Patent-Class-313-106; US-Patent-Class-313-107; US-Patent-Class-427-39) Avail: US Patent and Trademark Office CSCL 13H

A very thin layer of highly textured carbon is applied to a copper surface by a triode sputtering process. A carbon target and a copper substrate are simultaneously exposed to an argon plasma in a vacuum chamber. The resulting carbon surface is characterized by a dense, random array of needle like spires or peaks which extend perpendicularly from the copper surface. The coated copper is especially useful for electrode plates in multistage depressed collectors. NASA

N86-32588 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
A SURVEY OF COMPUTER-AIDED DIMENSIONAL METROLOGY
G. T. Anthony, K. G. Birch, M. G. Cox, and K. Jackson Jun. 1985 19 p
(NPL-MOM-76; ISSN-0309-3069; ETN-86-97988) Copyright. Avail: Issuing Activity

Responses to a questionnaire distributed to industrial, government, and academic establishments in the UK to determine the types of tasks performed and desired to be performed in computer aided metrology are discussed. The questionnaire also covered computers, computer languages, and test equipment. ESA

N86-32589*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REMOTELY CONTROLLABLE MIXING SYSTEM Patent Application
Robert R. Belew, inventor (to NASA) Filed 18 Jun. 1986 19 p
(NASA-Case-MFS-28153-1; US-Patent-Appl-SN-875891) Avail: NTIS HC A02/MF A01 CSCL 13H

This invention relates to a remotely controllable mixing system in which a plurality of mixing assemblies are arranged in an annular configuration, and wherein each assembly employs a central chamber and two outer, upper and lower chambers. Valves are positioned between chambers, and these valves for a given mixing assembly are operated by upper and lower control rotors, which in turn are driven by upper and lower drive rotors. Additionally, a hoop is compressed around upper control rotors and a hoop is compressed around lower control rotors to thus insure constant frictional engagement between all control rotors and drive rotors. The drive rollers are driven by a motor. NASA

N86-32590# Southampton Univ. (England). Inst. of Sound and Vibration Research.
ON THE PREDICTION OF OIL LAYER DAMPING ON PLATES
L. C. Chow and R. J. Pinnington May 1986 125 p
(ISVR-TR-137) Avail: NTIS HC A06/MF A01

High damping of machinery panels can be achieved using a sandwich construction consisting of an attached plate sandwiching a layer of fluid filled porous material. The vibration of the plate pumps the fluid laterally at high velocities, resulting in energy loss due to the fluid viscosity. Loss factors greater than 0.1 can be achieved with this layered configuration. However, if the gap is filled with the high viscosity fluid alone, the losses are very low. The ratio of the fluid dynamic viscosity and its density is the controlling parameter on the level of the losses. High loss factors are possible only if the fluid viscosity can be increased by many orders of magnitude for liquids. The damping over the whole frequency range above and below the excited plate critical frequency is measured and compared with prediction. The agreement in results is good. The layered configurations are so strongly coupled that the loss factor measured on both the excited and the attached plates are the same. Author

N86-32591# Department of the Air Force, Washington, D.C.
HIGH THERMAL CAPACITANCE MULTILAYER THERMAL INSULATION Patent
Edward T. Mahefkey, Jr., inventor (to Air Force) Issued 8 Apr. 1986 5 p Supersedes AD-D010357
(AD-D012343; US-Patent-4,581,285; US-Patent-Appl-SN-501944; US-Patent-Class-428-285) Avail: US Patent and Trademark Office CSCL 13/1

A high thermal capacitance multilayer thermal insulation structure is described, which is of particular utility for thermal protection against exposure to alternate high and low radiant heat flux levels, and which comprises a laminate of alternate metal foil or metallized plastic foil layers and layers of material which are characterized by phase change upon the absorption of heat, the foil layers providing high reflectance and reradiation of the heat flux, and the phase change layers providing for absorption and storage of heat during periods of heat flux for reradiation during periods of heat flux. GRA

N86-32592# Sandia National Labs., Albuquerque, N. Mex.
OPTIMIZING HEADER STRENGTH UTILIZING FINITE ELEMENT ANALYSES
S. N. Burchett 1986 22 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010476; SAND-86-2075C; CONF-860739-5) Avail: NTIS HC A02/MF A01

Finite element techniques have been successfully applied as a design tool in the optimization of high strength headers for pyrotechnic-driven actuators. These techniques have been applied to three aspects of the design process of a high strength header. The design process was a joint effort of experts from several disciplines including design engineers, material scientists, test engineers, manufacturing engineers, and structural analysts. Following material selection, finite element techniques were applied to evaluate the residual stresses due to manufacturing which were developed in the high strength glass ceramic-to-metal seal headers. Results from these finite element analyses were used to identify header designs which were manufacturable and had a minimum residual stress state. Finite element techniques were than applied to obtain the response of the header due to pyrotechnic burn. The results provided realistic upper bounds on the pressure containment ability of various preliminary header designs and provided a quick and inexpensive method of strengthening and refining the designs. Since testing of the headers was difficult and sometimes destructive, results of the analyses were also used to interpret test results and identify failure modes. In this paper, details of the finite element element techniques including the models used, material properties, material failure models, and loading will be presented. Results from the analyses showing the header failure process will also be presented. This paper will show that significant gains in capability and understanding can result when finite element techniques are included as an integral part of the design process of complicated high strength headers. DOE

N86-32593# Societe Nationale Industrielle Aerospatiale, Paris (France). Div. Engins Tactiques.
INFLUENCE OF THE EDGE EFFECTS ON THE INITIAL VELOCITY OF FRAGMENTS FROM A WARHEAD
E. Hennequin 1986 10 p
(SNIAS-861-320-104; ETN-86-97594) Avail: NTIS HC A02/MF A01

Warhead explosion computer simulations were carried out using the Hemp code, a two dimensional finite difference model. Several parameters were studied, including length to diameter ratio, metal/explosive weight ratio and the weight of closures. Each simulation provided information on isochrones, velocity of casing points versus radial displacement and the distribution of velocities along a warhead generatrix at casing rupture. A comparison with experimental results is given. The model predicts accurately the distribution of velocities of the fragments from a cylindrical warhead. An improvement of the Randers-Pherson model is proposed, as

well as a further application to a warhead having closing plates at the ends. ESA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N86-32594 British Broadcasting Corp., Kingswood (England).
THE MEASUREMENT OF LARGE VALUES OF AIRBORNE SOUND INSULATION
R. Walker Aug. 1986 18 p
(BBC-RD-1986/8) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

The requirements for and the measurement of airborne sound insulation between areas in a broadcasting center are discussed. In particular, the high values of insulation required in some cases and the difficulties of measurement are described. One method which has been used for such measurements, using explosive charges, has been investigated in detail. Some of the results obtained in the past using this method have been questionable and the possible reasons for errors are reported. It is concluded that the high peak level of sound pressure generated by the explosion, measured at 160 dB re 20 uPa at a distance of 6 m from the explosion, has been responsible for overloading the measuring instrumentation. In recovering from this short-lived but serious overloading, the instrumentation has sometimes given erroneous results. The non-linearity of sound propagation at these sound pressure levels may also be theoretically significant although, in practice, no such effects have been positively identified. An alternative method of measuring high values of sound insulation without requiring such high sound pressure levels is described and the results of an evaluation are given. This method however, in exchanging high sound pressure levels for measurement duration, may take much longer to carry out than the older method. Author

N86-32595 British Broadcasting Corp., Kingswood (England). Engineering Div.
HDTV MOTION ADAPTIVE BANDWIDTH REDUCTION USING DATV
R. Storey Jun. 1986 12 p
(BBC-RD-1986/5) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

High Definition Television (HDTV) brings with it the problems of an equally high signal bandwidth. This bandwidth will cause problems for all methods of signal dissemination, so some form of bandwidth reduction is required. Some years ago the BBC successfully developed sub-Nyquist sampling bandwidth reduction techniques. More recently, some promising bandwidth reduction schemes using adaptive filtering followed by sub-sampling were proposed by other. The results of an investigation into the likely performance of such schemes when fully developed are presented. It appears that some of the inevitable impairments caused by bandwidth reduction, although not initially significant, will become more noticable as the performances of sources and displays improve. A logical progression is proposed which, by way of a transmitted digital control channel, allows the performance of a 4:1 bandwidth reduced television system to be improved through a series of compatible steps. This Digitally Assisted Television (DATV) progression begins with an interlaced system and finishes with a system which offers all the advantages of a sequential source and display. Author

N86-32596 British Broadcasting Corp., London (England). Engineering Div.
THE DESIGN OF A PROTOTYPE MOVING-COIL HIGH-FREQUENCY LOUDSPEAKER DRIVE UNIT
K. E. Randall Jun. 1986 16 p
(BBC-RD-1986/3; PH-265) Avail: Issuing Activity

A high-frequency loudspeaker drive unit (tweeter) suitable for use in a high-quality studio monitoring loudspeaker is described and the necessary manufacturing information provided. Design considerations are outlined and development problems discussed. Performance is assessed and possible improvements are suggested. Author

N86-32597*# University of Central Florida, Orlando. Engineering and Industrial Experiment Station.
LARGE REFLECTOR ANTENNA STUDY Final Report
Christos G. Christodoulou Aug. 1986 123 p
(Grant NAG1-615)
(NASA-CR-176852; NAS 1.26:176852) Avail: NTIS
HC A06/MF A01 CSCL 20N

In some applications, the wires used to construct the grids are plated over with highly conducting materials such as gold or silver. In those cases, depending on the frequency of operation, the coating may not be thick enough to prevent currents from flowing in the substrate. The conjugate gradient method, in conjunction with the fast Fourier transform is employed to solve the problem of scattering from such rectangular grids. An internal impedance is utilized to account for the effects of the substrate conductivity on the induced current densities. Calculated values of the reflection coefficient and induced currents from different coating thicknesses, angles of incidence and polarizations are presented and discussed. Author

N86-32598*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NEAR-FIELD SPILLOVER FROM A SUBREFLECTOR: THEORY AND EXPERIMENT
S. W. Lee (Illinois Univ., Urbana), R. Acosta, A. R. Cherrette, and P. T. Lam (Lockheed Missiles and Space Co., Sunnyvale, Calif.)
Sep. 1986 20 p
(Grant NAG-419)
(NASA-TM-88818; E-3178; NAS 1.15:88818) Avail: NTIS
HC A02/MF A01 CSCL 20N

In a dual reflector antenna, the spillover from the subreflector is important in determining the accuracy of near-field measurements. This is especially so when some of the feed elements are placed far away from the focus. In this paper, we present a high-frequency GTD analysis of the spillover field over a plane just behind the subreflector. Special attention is given to the field near the incident shadow boundary and the role played by the slope diffraction term. Our computations are in excellent agreement with experimental results. Author

N86-32599 Royal Signals and Radar Establishment, Malvern (England).
LEAST SQUARES SOLUTIONS IN SIGNAL PROCESSING USING THE SINGULAR VALUE DECOMPOSITION
John L. Mather Jan. 1986 81 p
(RSRE-Memo-3864; BR98993; ETN-86-98003) Avail: Issuing Activity

Antenna array and time series signal processing techniques which utilize singular value decomposition, or may be profitably interpreted in terms of it are compared. Computer simulations of these techniques acting on spatiotemporal data from linear, conformal circular, and focal plane arrays are presented. Means of introducing prior knowledge are described, and lead to the suggestion of a computationally efficient processing approach. It is shown that extensive use of a sequential processing strategy for multiple domain data potentially allows detection and classification of additional emitters. ESA

N86-32600*# Ohio State Univ., Columbus. ElectroScience Lab.
A HIGH FREQUENCY ANALYSIS OF ELECTROMAGNETIC PLANE WAVE SCATTERING BY PERFECTLY-CONDUCTING SEMI-INFINITE PARALLEL PLATE AND RECTANGULAR WAVEGUIDES WITH ABSORBER COATED INNER WALLS
Hoon Myung Noh and Prabhakar H. Pathak Sep. 1986 218 p

(Grant NAG3-476)
(NASA-CR-179759; NAS 1.26:179759; TR-715723-1) Avail: NTIS HC A10/MF A01 CSCL 20N

An approximate but sufficiently accurate high frequency solution which combines the uniform geometrical theory of diffraction (UTD) and the aperture integration (AI) method is developed for analyzing the problem of electromagnetic (EM) plane wave scattering by an open-ended, perfectly-conducting, semi-infinite hollow rectangular waveguide (or duct) with a thin, uniform layer of lossy or absorbing material on its inner wall, and with a planar termination inside. In addition, a high frequency solution for the EM scattering by a two dimensional (2-D), semi-infinite parallel plate waveguide with a absorber coating on the inner walls is also developed as a first step before analyzing the open-ended semi-infinite three dimensional (3-D) rectangular waveguide geometry. The total field scattered by the semi-infinite waveguide consists firstly of the fields scattered from the edges of the aperture at the open-end, and secondly of the fields which are coupled into the waveguide from the open-end and then reflected back from the interior termination to radiate out of the open-end. The first contribution to the scattered field can be found directly via the UTD ray method. The second contribution is found via the AI method which employs rays to describe the fields in the aperture that arrive there after reflecting from the interior termination. It is assumed that the direction of the incident plane wave and the direction of observation lie well inside the forward half space tht exists outside the half space containing the semi-infinite waveguide geometry. Also, the medium exterior to the waveguide is assumed to be free space.
Author

N86-32601*# Southwest Research Inst., San Antonio, Tex.
THE RELATIONSHIP OF STORM SEVERITY TO DIRECTIONALLY RESOLVED RADIO EMISSIONS Final Report
R. L. Johnson 30 Apr. 1986 25 p
(Contract NAS8-33371)
(NASA-CR-178916; NAS 1.26:178916) Avail: NTIS HC A02/MF A01 CSCL 20N

The objective was to provide continuous observation of atmospheric electrical activity occurring in association with tropical storms in the Gulf of Mexico. The observations were to include the location of all detected intracloud and cloud-to-ground lightning activity occurring in the storm. To provide synoptic scale coverage, a phase linear interferometer high frequency direction finder (HFDF) system was constructed and developed at Marshall Space Flight Center (MSFC). This was used in concert with the existing HFDF interferometer at the southwest research institute to provide lightning location data through triangulation. Atmospheric electrical events were synchronized through the use of satellite receivers at each site. The intent of the data analysis was to correlate the location of electrical centers of activity with radar and satellite imagry to identify areas of intense convection within the tropical storm system. Analysis of the hurricane Alicia data indicate a center of atmospheric electrical activity associated with the vortex of the storm. The center appears to rotate from the Northern side of the vortex to the Southern side during the period of observation. An analysis of the atmospheric electrical burst rates associated with hurrican Alicia indicates that the electrical activity appears to maximize at the time of greatest storm intensity, i.e., maximum winds and lowest central pressure.
Author

N86-32602# Department of the Air Force, Washington, D.C.
PARALLEL PROCESSOR CONFIGURATION FOR ADAPTIVE ANTENNA ARRAYS Patent
Alan I. Wiener, inventor (to Air Force) Issued 11 Mar. 1986 21 p Supersedes AD-D011347
(AD-D012253; US-Patent-4,575,724; US-Patent-Appl-SN-640904; US-Patent-Class-343-383) Avail: US Patent and Trademark Office CSCL 09/5

A signal processing system, which operates in parallel with the outputs of sensors of an adaptive array, for quickly nulling multiple jammers is described. The processing system includes a set of parallel combiners and an apparatus for updating a signal weight which is applied to sensor outputs. The parallel combiners mix a weighing function with each sensor output and provide a resultant output signal which has been cleared of interference from jamming. Part of the resultant signal is fed to the apparatus for updating the signal weighing function for further mixing with sensor outputs. The parallel operation of the combiners with each sensor output provides fast nulling effects.
Author (GRA)

N86-32603# Department of the Air Force, Washington, D.C.
SURVIVABLE LOCAL AREA NETWORK Patent
Joseph L. Katz, Edward C. Grund, Richard P. Cope, and Alvin L. Glick, inventors (to Air Force) Issued 11 Mar. 1986 9 p Supersedes AD-D011453
(AD-D012258; US-Patent-4,575,842; US-Patent-Appl-SN-610148; US-Patent-Class-370-16) Avail: US Patent and Trademark Office CSCL 17/2

Enhanced availability and survivability of communications between geographically remote locations with a minimum of redundancy of transmission facilities and media is provided by a survivable bus network capable of providing continued interprocessor or other communications in the event of multiple bus outages. It consists of multiple busses, bus isolation device (BIDs) and two types of network interface processors (NIPs). The BIDs electrically isolate bus segements on either side of a connection so that if a fault occurs only the segment containing the fault will be affected. The first type of NIP connects to one bus and performs the usual functions of providing an electrical and software interface between the network and one or more subscriber processors. The second type is a bridge which performs these same functions but connects to two busses and has the capability to transfer traffic as it appears on either bus to the other. The network provides increased survivability in the event of failed segments but does not entail the expense of a fully redundant system.
Author (GRA)

N86-32604# Department of the Air Force, Washington, D.C.
DIRECTIONAL ANTENNA SYSTEM HAVING SIDELOBE SUPPRESSION Patent
Randy L. Haupt, inventor (to Air Force) Issued 18 Feb. 1986 5 p Supersedes AD-D010556
(AD-D012268; US-Patent-4,571,594; US-Patent-Appl-SN-529078; US-Patent-Class-343-840) Avail: US Patent and Trademark Office CSCL 09/5

An electrostatically figured directional antenna array for deployment in outer space having means for suppressing sidelobe responses. A portion of the reflector surface symmetric about its center is vibrated by electrostatic controls to change the amplitude and phase of the sidelobe signals whereby the latter can be eliminated by passive filters or time averaging circuitry.
Author (GRA)

N86-32605# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
CORRECTION FOR PROBE-POSITION ERRORS IN PLANAR, NEAR-FIELD SCANNING M.S. Thesis
David R. Reddy Dec. 1985 67 p
(AD-A167072; AFIT/GE/ENG/85D-34) Avail: NTIS HC A04/MF A01 CSCL 14/2

In recent years, near-field antenna measurement techniques have gained a good deal of acceptance. There are several errors in the computed far-field patterns caused by measurement inaccuracies in the near-field data. This paper deals with deterministic errors introduced by probe-positioning errors in planar, near-field scanning. By utilizing basic near-field theory, as well as a knowledge of the positioning errors, it is possible to estimate the fields at the correct probe position. A computer program which lessens the effect of probe positioning errors by means of a truncated Taylor series expansion is used to demonstrate this improvement. To simulate inaccurate probe positioning, a database of calculated near-field values for a linearly polarized, uniformly illuminated, circular aperture was used. Next, the position correction program was applied to computer generated inaccurate data. Finally, far-field patterns were calculated, and compared using both the corrected and uncorrected data. Results of the comparisons are presented.

Limitations, and areas of application of this routine are discussed. GRA

N86-32606# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
NEW NON-LINEAR FM PULSE-COMPRESSION TECHNIQUE FOR RADAR APPLICATIONS5 M.S. Thesis
Ronald A. Booher Dec. 1985 63 p
(AD-A167110; AFIT-CI-NR-86-62T) Avail: NTIS HC A04/MF A01 CSCL 17/9

The development of pulsed type radar signals is examined, with a brief review of matched filtering. Gated RF, linear and nonlinear FM pulse-compression (chirp) and matched filtering of radar signals is reviewed in depth. Emphasis is given to identifying the desirable properties of each method. A new method of non-linear FM pulse-compression is introduced; it utilizes the Eigen Function (a form of the raised-cosine family of functions) as its modulating term. Its properties are then compared to those of the linear and nonlinear systems reviewed in the preceding sections. Design considerations for implementations on a surface acoustic wave device are presented. Author (GRA)

N86-32607# Department of the Air Force, Washington, D.C.
ACTIVE MATCHING TRANSMIT/RECEIVE MODULE Patent Application
Edward J. Jones, inventor (to Air Force) Filed 12 Mar. 1986 21 p
(AD-D012287; US-Patent-Appl-SN-838970) Avail: NTIS HC A02/MF A01 CSCL 17/9

A transmit/receive module is disclosed that provides selectable impedance matching between: a power amplifier and the antenna of a phased array when the radar is transmitting, and selectable impedance matching between the antenna and a low noise amplifier when the radar is receiving. The transmit/receive module replaces the conventional fixed impedance matching system with a microprocessor, a plurality of switches and sets of pairs of electrical capacitors, resistors, and inductors. Since the antenna impedance characteristics change with changes of beam angles, the microprocessor directs the switches to configure the electrical components into any one of a number of impedance matching circuits. The microprocessor selects an optimum impedance matching circuit for the power amplifier to maintain maximum power transfer for radar transmission and another optimum impedance matching circuit for the low noise amplifier for minimum noise upon radar signal reception. GRA

N86-32608# Department of the Air Force, Washington, D.C.
FLEXIBLE (MULTI-MODE) WAVEFORM GENERATOR Patent Application
Paul W. Goetz, inventor (to Air Force) Filed 12 Mar. 1986 20 p
(AD-D012297; US-Patent-Appl-SN-838855) Avail: NTIS HC A02/MF A01 CSCL 14/2

The present invention is a waveform generator for a radar system which produces a variety of waveforms by combining biphase modulation to a modulated signal from a single sideband (SSB) or other modulator. Waveform generation is accomplished using a digital computer connected through a random access memory (RAM), a digital-to-analog converter (DAC), a single sideband modulator (SSB-MOD), a times four multiplier, and a biphase modulator. The computer is also connected through a second random access memory (RAM) directly to the biphase modulator. The digital computer controls the waveform generator and is used to input the digital equivalent of selected waveforms into the first RAM. Upon a command from this computer, the first RAM outputs the digital equivalent signals to the DAC where desired analog waveforms are produced. These analog waveforms are used to modulate a carrier by the SSB modulator and produce a first modulated signal. GRA

N86-32609# Department of the Navy, Washington, D. C.
PORTABLE RADAR SIMULATOR WITH ADJUSTABLE SIDE LOBE GENERATOR Patent Application
William P. Huntley, inventor (to Navy) Filed 12 Apr. 1985 11 p
(AD-D012301; US-Patent-Appl-SN-722542) Avail: NTIS HC A02/MF A01

The present invention has the ability to simulate radar signals for the testing of Submarine Periscope Direction Finding Systems in the field. It provides an output signal that has a main lobe and side lobes that are generated at predetermined intervals. A scan oscillator provides a signal that is operated upon to determine the magnitude ot the main and side lobes and is also operated on to determine the frequency with which this output signal is generated. The output signals are in the form of pulsed signals which are provided by a Pulse Repetition Frequency generator. GRA

N86-32610# Naval Underwater Systems Center, New London, Conn.
COMPARISONS OF 76 Hz VERTICAL ELECTRIC AND HORIZONTAL MAGNETIC FIELD STRENGTHS RECEIVED IN CONNECTICUT
Peter R. Bannister 6 Mar. 1986 77 p
(AD-A167606; NUSC-TR-7369) Avail: NTIS HC A05/MF A01 CSCL 20/14

The results of 60 days of selected whip antenna measurements are discussed in this report. The main result is that the Connecticut vertical electric field strength behavior is usually very similar to the transverse-horizontal magnetic field strength behavior (in both amplitude and relative phase) during both normal and disturbed propagation conditions. GRA

N86-32611# Department of the Navy, Washington, D. C.
FIXED APERTURE, ROTATING FEED, BEAM SCANNING ANTENNA SYSTEM Patent
William M. Waters, inventor (to Navy) Issued 4 Mar. 1986 8 p Supersedes AD-D010182
(AD-D012312; US-Patent-4,574,287; US-Patent-Appl-SN-472330; US-Patent-Class-343-756) Avail: US Patent and Trademark Office CSCL 09/5

A beam scanning antenna system that uses a small, rapidly rotatable feed antenna to illuminate a large, fixed secondary collimating device, such as a reflector or electromagnetic lens, which in turn illuminates a large, fixed primary collimating device is presented. The primary collimating device forms a narrow collimating beam that is reflected or transmitted into space. Rotation of the small feed antenna causes the beam to scan.Author (GRA)

N86-32612# Department of the Navy, Washington, D. C.
THREE DIMENSIONAL, ORTHOGONAL DELAY LINE BOOTLACE LENS ANTENNA Patent
Pasquale A. Valentino, John J. Stangel, and Dwayne D. Donelin, inventors (to Navy) Issued 18 Feb. 1986 6 p Supersedes AD-D011020
(AD-D012315; US-Patent-4,571,591; US-Patent-Appl-SN-562336; US-Patent-Class-343-754) Avail: US Patent and Trademark Office CSCL 09/5

A bootlace microwave lens antenna has orthogonal delay lines for reducing quadratic phase errors to improve focusing capability. The collector and radiator elements consists of mutually orthogonal pairs of subelements with one of the subelements oriented radially and the other oriented tangentially on the respective collector and radiator surfaces. Individual delay lines interconnect corresponding radial and tangential subelements on each surface thus allowing for phase corrections in the axial planes parallel to and perpendicular to the plane of scan by the introduction of an appropriate phase delay in each delay line. Author (GRA)

N86-32613# Department of the Air Force, Washington, D.C.
MEDIUM PRF PULSE DOPPLER RADAR PROCESSOR FOR DENSE TARGET ENVIRONMENTS Patent
Edward L. Frost and Leslie Lawrence, inventors (to Air Force) Issued 22 Apr. 1986 8 p
(AD-D012344; US-Patent-4,584,579; US-Patent-Appl-SN-547609; US-Patent-Class-343-17.1) Avail: US Patent and Trademark Office CSCL 17/9

This patent is a modification to the ABC range correlators used in medium PRF radars. It extends the functioning of the range correlators to not only derive target unambiguous range

while suppressing detections of clutter discretes but also to reduce the occurrence of false target reports (range ghosts) and blanking of true targets that would otherwise occur when the radar is operated in dense target environments. The specific point of novelty in this design is the operation of two sets of correlators, designated ABC and A'B'C', each with a different M of N detection criterion. GRA

N86-32614# Department of the Navy, Washington, D. C.
SATELLITE MOUNTED SYSTEM FOR TRANSFERRING INFORMATION USING MODULATED SUNLIGHT Patent
Gregory C. Mooradian, inventor (to Navy) Issued 25 Feb. 1986 7 p Supersedes AD-D008839
(AD-D012345; US-Patent-4,573,214; US-Patent-Appl-SN-234059; US-Patent-Class-455-605) Avail: US Patent and Trademark Office CSCL 17/2

A method and apparatus for broadcasting, transferring and disbursing information from space to Earth uses sunlight as the carrier. An orbiting platform receives sunlight and modulates it with electromagnetic signals carrying the information beamed up from an Earth station, communications satellite or aircraft. The modulated sunlight is directed to a designated area on Earth from the orbiting platform where it penetrates clouds as well as seawater to reach surface and submerged receiving stations including submarines. Author (GRA)

N86-32615# EOS Technologies, Inc., Santa Monica, Calif.
LASERCOM MITIGATION PROGRAM Final Technical Report, 29 Nov. 1983 - 1 Nov. 1984
R. E. LeLevier and N. Jensen 1 Jun. 1985 40 p
(Contract DNA001-84-C-0023; DNA Proj. S99-QMXB)
(AD-A168111; EOS-TR-50100-001; DNA-TR-85-134) Avail: NTIS HC A03/MF A01 CSCL 17/2

The effects of nuclear explosions on the propagation of laser link communications systems is treated. Estimates are provided for attenuation by the smoke and soot generated by nuclear weapon induced fires for a series of laser wavelengths. Atmospheric turbulence affecting laser beam coherence is investigated, the enhanced atmospheric brightness from the visible thermal pulse of a low altitude explosion is estimated and preliminary work on the refraction effects through shock fronts is presented. GRA

N86-32616# Southern Methodist Univ., Dallas, Tex. Dept. of Electrical Engineering.
SPREAD SPECTRUM MOBILE RADIO COMMUNICATIONS Interim Report, 1 Sep. 1984 - 31 Mar. 1986
S. C. Gupta 31 Mar. 1986 108 p
(Grant AF-AFOSR-0309-82)
(AD-A168484; AFOSR-86-0323TR) Avail: NTIS HC A06/MF A01 CSCL 17/2

In this report we present some additional results on the performance of carrier sense multiple access (CSMA) protocol for mobile packet radio networks (MPRNET). This is followed by a review of bandwidth efficient digital modulation for mobile radios and some results on a speech transmission scheme and an analysis of mismatched continuous phase FSK (CPFSK) receivers. Carrier sense multiple access protocol has been analyzed in detail for mobile radio channel. Throughput and delay expression are derived to include the effects of fading. The performance degradation due to hidden terminal problems is analyzed. This is followed by an evaluation of the performance of CSMA with collision detection (CSMA-CD) for FH-FSK spread spectrum mobile packet radio networks. A class of spectrally efficient modulation has been reviewed for application to mobile radio systems. A speech transmission scheme using DPCM coding and these spectrally efficient modulation is seen to compete with existing schemes. Mismatched CPFSK receivers have been analyzed to understand how time and phase synchronization errors influence the performance. A set of curves is provided to demonstrate the degradation due to imperfect carrier phase of symbol time synchronization error for both low and high SNR. GRA

N86-32617# Advanced Decision Systems, Mountain View, Calif.
SCIENCE AND TECHNOLOGY ANALYST'S ASSISTANT, REVISION Final Technical Report, 20 Aug. 1982 - 1 Jan. 1986
Andrew S. Cromaty, Thomas L. Adams, James F. Cunningham, and Carl J. Tollander Jan. 1986 168 p
(Contract N00014-82-C-0602)
(AD-A168552; TR-1035-01) Avail: NTIS HC A08/MF A01 CSCL 09/2

We describe a research prototype software system named ASTA (Assistant for Science and Technology Analysis) that employs artificial intelligence technology to interpret radar signals and infer the probable nature of the radar system that produces them. Such analyses are of interest, for example, to engineers who wish to reverse-engineer an electronic system. Architecturally, ASTA is a multiple-process consulting expert system operating in a personal workstation environment. It comprises two principal components: an expert system that reasons using knowledge of electronic system design, radar physics, and signal analysis techniques, and a multiform-based user interface that maintains a separate database describing the complete state of interaction with the user, including a simplified user preference model, an interactive help subsystem, and a database of prior (completed or partial) analyses. These two processes are loosely coupled; that is, they operate in strictly separated namespaces, and they communicate using a mixture of synchronous (remote procedure call) and asynchronous (true) message passing. Message-based synchronization techniques are employed to assist in maintaining consistency between the two processes. GRA

N86-32618# Naval Postgraduate School, Monterey, Calif.
MEASURED NOISE PERFORMANCE OF A POST-DETECTION LIMITER CIRCUIT IN THE RECEIVER OF A BINARY DATA TRANSMISSION SYSTEM M.S. Thesis
William J. Luk Mar. 1986 83 p
(AD-A168554) Avail: NTIS HC A05/MF A01 CSCL 17/2

Binary phase shift keying is a common modulation method for transmitting binary data because of its superior noise performance. A proposed alternative to the common BPSK receiver is use of three parallel post-detection circuits and majority decision logic to reduce errors, improving the overall performance of the BPSK system. The noise performance of each of two parallel circuits were measured and compared. The first circuit is a conventional BPSK receiver using an integrate and dump circuit. The second circuit incorporates a limiter after the demodulator and prior to the integrate and dump circuit. The conventional circuit is found to provide the same error probability at a 0.2 dB smaller signal to noise ratio. The probability density function of the voltage at various nodes in the post-detection circuits are measured and included in the report along with curves of probability of error versus SNR for the two post-detection circuits. GRA

N86-32619# Stanford Univ., Calif. Dept. of Electrical Engineering.
LATTICE PARAMETER MODELING OF STOCHASTIC SIGNALS: SOME FUNDAMENTAL CONCEPTS
S. R. Parker 1986 54 p
(Contract W-7405-eng-48)
(DE86-010552; UCRL-15802) Avail: NTIS HC A04/MF A01

The literature on linear estimation of stationary random processes has undergone a vast expansion in the last decade. One of the foremost areas is that of lattice parameter modeling which has been used most successfully for the modeling of speech and various geophysical phenomena. One particular motivation for these new algorithms is the reduction in the number of numerical operations (from order N(3) to order N log N or possibly order N). In addition, these algorithms have provided some important insights into the physics of the process being modeled, and finally many of the algorithms have the potential of direct efficient implementation on VLSI chips. In this report, some of the basic theoretical aspects of lattice parameter theory are presented. As is often the case in an expanding area, the literature is vast and it is difficult to extract the essential ideas from all that is available. It is the purpose of this report to distill the basic concepts

of lattice modeling theory and provide the reader with some essential insight and background for approaching the literature which spans a variety of disciplines including time series analysis, signal processing, estimation theory, stochastic signals and processes, speech, geophysical data analysis, to name a few.
DOE

N86-32620# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
INTERACTIVE FULL CHANNEL TELETEXT SYSTEM FOR CABLE TELEVISION NETS [INTERAKTIEF FULL CHANNEL TELETEKSTSYSTEEM VOOR KABELTELEVISIENETTEN]
H. P. A. vandenBoom Aug. 1984 143 p In DUTCH
(ETN-86-97541) Avail: NTIS HC A07/MF A01

A demonstration set-up of an interactive full channel teletext (FCT) system for cable TV networks with two-way data communication possibilities was designed and realized. In FCT all image lines are used for teletext data lines. The FCT decoder was placed in the mini-star, and the FCT encoder which provides the FCT signal was placed in the local center. From the FCT signal a number of data lines are selected using an extra FCT decoder. They are placed on the image lines reserved for teletext so that a normal TV receiver equipped with a teletext decoder, can process the selected data lines. For texts not on hand in the FCT signal, a command can be sent to the local center via the data communication path. A cheap and simple system is offered in which the number of commanded pages or books is in principle unlimited, while the used waiting time and channel capacity is limited. ESA

N86-32621# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
OVERLOAD CONTROL FOR SWITCHES OF COMMUNICATION SYSTEMS: A TWO-PHASE MODEL FOR CALL REQUEST PROCESSING
R. K. Boel and J. H. vanSchuppen Jan. 1986 19 p Submitted for publication
(CWI-OS-R8601; B8664684; ETN-86-97763) Avail: NTIS HC A02/MF A01

The role of stochastic optimal control methods in designing a control gate in order to prevent congestion in a computer controlled telephone switch is shown. A model of the switch in which the delay in processing a call request is modelled by two phases is proposed. From this a simplified model consisting of a series connection of three random delays is deduced. The problem of overload control is then formulated as a stochastic control problem. The solution is a bang-bang control, meaning that a customer is either admitted or not admitted to the switch without randomization.
ESA

N86-32622# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Div.
OFFSET UNFURLABLE ANTENNA, PHASE 1 Final Report
Paris ESA Mar. 1984 570 p Prepared in cooperation with TICRA Engineering Consultants
(Contract ESTEC-5206/82-NL-PB(SC))
(MBB-RX11; ESA-CR(P)-2180; ETN-86-97782) Avail: NTIS HC A24/MF A01

The configuration, technology requirements, development aspects, and experimental activities for satellite reflectors for fixed and mobile communications and television broadcasting are outlined. A 4.5 m antenna for 4 GHz, and an 8 m antenna for 1.6 GHz were studied, assuming an L-Sat type satellite. A radial rib concept with auxiliary adjustment ribs, and a three dimensional scissors concept (spatial framework) with mesh adjustment elements were compared concerning mass, stowage, volume, development risk, and reliability. For antennas of diameter from 3.6 to 12 m (12 GHz to 800 MHz) the radial rib reflector is preferred. Main advantages (with rib folding for larger reflector diameters) are: lower costs; less critical technology problems; lower development risks; high deployment reliability; lightweight intermediate ribs can adapt surface accuracy to higher frequency requirements (high application flexibility); and folded main ribs provide high package capability at larger diameters. The scissors concept is advantageous for applications requiring reflectors from 12 m diameter onwards.
ESA

N86-32623# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Hauptabteilung Programmplanung.
PACKETIZED VOICE TRANSMISSION
Peter Noll, Volker Leesemann, and Guenter Wessels 21 Nov. 1984 235 p In GERMAN; ENGLISH summary Report will also be announced as ESA-TT-1006
(Contract DFVLR-30211-4301/83)
(DFVLR-Mitt-86-05; ISSN-0176-7739; ETN-86-97815) Avail: NTIS HC A11/MF A01; DFVLR, Cologne, West Germany DM 59

The problems of transmitting packetized voice signals are reviewed and the distortions resulting from digitization, speech detection, channel errors, and constant and stochastic transmission delays are analyzed. Measures to overcome distortions, and progress and goals in experimental networks which include satellite-based experiments are discussed. ESA

N86-32493# Forschungsinstitut fuer Hochfrequenzphysik, Werthoven (West Germany).
SATELLITE OBSERVATIONS WITH A SINGLE RADAR TRACKING STATION
D. Mehrholz *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 19-24 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

N86-32821# Societe Nationale Elf Acquitaine, Paris (France).
ENVIRONMENTAL AND METEOROLOGICAL DATA ACQUISITION SYSTEM WITH INTEGRATED ARGOS TRANSMITTER: IMPROVEMENT IN SEA STATE FORECAST FOR CRITICAL OFFSHORE OPERATIONS
R. Carton, Stephanie Antalovsky (SYMINEX, Marseille, France), and D. Sembresq *In* CNES The 10th ARGOS Users Conference 1985 12 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32823# Oregon State Univ., Newport. Hatfield Marine Science Center.
PRELIMINARY TECHNICAL EVALUATION OF AN ARGOS-MONITORED RADIO TAG FOR TRACKING MANATEES
Bruce Mate, Gaylen Rathbun (Fish and Wildlife Service, San Simeon, Calif.), Richard Merrick, and James Reed (Fish and Wildlife Service, Gainesville, Fla.) *In* CNES The 10th ARGOS Users Conference 1985 5 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32825# National Museum of Natural History, Marseille (France).
BEHAVIOR OF DERMOCHELYS CORIACEA IN CAPTIVITY (ANIMAL CARRYING DUMMY PTT IN PRELIMINARY PHASE OF AN ARGOS EXPERIMENT)
Michele Duron-Dufrenne *In* CNES The 10th ARGOS Users Conference 1985 15 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N86-32624* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

TEMPERATURE SENSITIVE OSCILLATOR Patent
Leonard L. Kleinberg, inventor (to NASA) Issued 29 Jul. 1986 7 p Filed 25 Apr. 1985 Supersedes N85-30201 (23 - 19, p 3258) (NASA-Case-GSC-12958-1; US-Patent-4,603,306; US-Patent-Appl-SN-727035; US-Patent-Class-331-66; US-Patent-Class-331-108D; US-Patent-Class-331-116R; US-Patent-Class-374-183) Avail: US Patent and Trademark Office CSCL 09A

An oscillator circuit for sensing and indicating temperature by changing oscillator frequency with temperature comprises a programmable operational amplifier which is operated on the roll-off portion of its gain versus frequency curve and has its output directly connected to the inverting input to place the amplifier in a follower configuration. Its output is also connected to the non-inverting input by a capacitor with a crystal or other tuned circuit also being connected to the non-inverting input. A resistor is connected to the program input of the amplifier to produce a given set current at a given temperature, the set current varying with temperature. As the set current changes, the gain-bandwidth of the amplifier changes and, in turn, the reflected capacitance across the crystal changes, thereby providing the desired change in oscillator frequency by pulling the crystal. There is no requirement that a crystal employed with this circuit display either a linear frequency change with temperature or a substantial frequency change with temperature. M.G.

N86-32625 Technische Hogeschool, Eindhoven (Netherlands).
METHODS TO CHARACTERIZE CHARGING EFFECTS Thesis
Har Slots 10 Aug. 1984 46 p
(TR-KYES-84-178; ETN-86-97705) Copyright. Avail: Issuing Activity

Methods to characterize charging in insulating material under high voltage dc stress, leading to electrical breakdown, are reviewed. The behavior of the charges can be studied by ac loss angle measurements after application or removal of dc bias. Measurements were performed on oil-paper and oil-Mylar systems. The poor reproducibility of the measurements makes it impossible to draw more than qualitative conclusions about the charging effects. With an ultrasound pressure wave the electric field distribution in a material can be determined. An alternative derivation for the transient response of a system which elucidates the influence of several parameters in a simple way is given. ESA

N86-32626*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ARC LAMP POWER SUPPLY Patent Application
Bradley D. Leighty, inventor (to NASA) Filed 26 Jun. 1986 11 p (NASA-Case-LAR-13202-1; US-Patent-Appl-SN-879758) Avail: NTIS HC A02/MF A01 CSCL 09A

A power supply is provided for an arc discharge lamp which includes a relatively low voltage high current power supply section and a high voltage starter circuit. The low voltage section includes a transformer, rectifier, variable resistor and a bank of capacitors, while the starter circuit comprises a plurality of diodes and capacitors connected as a Cockcroft-Walton multiplier. The starting circuit is effectively bypassed when the lamp arc is established and serves to automatically provide a high starting voltage to re-strike the lamp arc if the arc is extinguished by a power interruption. NASA

N86-32627*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POTENTIAL HIGH EFFICIENCY SOLAR CELLS: APPLICATIONS FROM SPACE PHOTOVOLTAIC RESEARCH
Dennis J. Flood 1986 15 p Presented at the Winter Annual Meeting of the American Inst. of Chemical Engineers, Miami Beach, Fla., 2-7 Nov. 1986
(NASA-TM-88832; E-3194; NAS 1.15:88832) Avail: NTIS HC A02/MF A01 CSCL 09C

NASA involvement in photovoltaic energy conversion research development and applications spans over two decades of continuous progress. Solar cell research and development programs conducted by the Lewis Research Center's Photovoltaic Branch have produced a sound technology base not only for the space program, but for terrestrial applications as well. The fundamental goals which have guided the NASA photovoltaic program are to improve the efficiency and lifetime, and to reduce the mass and cost of photovoltaic energy conversion devices and arrays for use in space. The major efforts in the current Lewis program are on high efficiency, single crystal GaAs planar and concentrator cells, radiation hard InP cells, and superlattice solar cells. A brief historical perspective of accomplishments in high efficiency space solar cells will be given, and current work in all of the above categories will be described. The applicability of space cell research and technology to terrestrial photovoltaics will be discussed. Author

N86-32628# Southampton Univ. (England). Inst. of Sound and Vibration Research.
THE APPLICATION OF ADAPTIVE FILTERING TO THE ACTIVE CONTROL OF SOUND AND VIBRATION
S. J. Elliott and P. A. Nelson Sep. 1985 58 p
(ISVR-TR-136) Avail: NTIS HC A04/MF A01

The results of a preliminary investigation into the application of adaptive filtering to such multichannel active control systems are given. A review of the techniques used for single channel cancellation and their application to active control are presented. An algorithm which was developed to extend such methods into multichannel applications is introduced and some of its properties are discussed. It was concluded that the careful application of adaptive filtering concepts to the problems of active control can be very fruitful. Author

N86-32629*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SECONDARY-ELECTRON-EMISSION LOSSES IN MULTISTAGE DEPRESSED COLLECTORS AND TRAVELING-WAVE-TUBE EFFICIENCY IMPROVEMENTS WITH CARBON COLLECTOR ELECTRODE SURFACES
Peter Ramins and Ben T. Ebihara Sep. 1986 23 p
(NASA-TP-2622; E-3062; NAS 1.60:2622) Avail: NTIS HC A02/MF A01 CSCL 09C

Secondary-electron-emission losses in multistage depressed collectors (MDC's) and their effects on overall traveling-wave-tube (TWT) efficiency were investigated. Two representative TWT's and several computer-modeled MDC's were used. The experimental techniques provide the measurement of both the TWT overall and the collector efficiencies. The TWT-MDC performance was optimized and measured over a wide range of operating conditions, with geometrically identical collectors, which utilized different electrode surface materials. Comparisons of the performance of copper electrodes to that of various forms of carbon, including pyrolytic and isotropic graphites, were stressed. The results indicate that: (1) a significant improvement in the TWT overall efficiency was obtained in all cases by the use of carbon, rather than copper electrodes, and (2) that the extent of this efficiency enhancement depended on the characteristics of the TWT, the TWT operating point, the MDC design, and collector voltages. Ion textured graphite was found to be particularly effective in minimizing the secondary-electron-emission losses. Experimental and analytical results, however, indicate that it is at least as important to provide a maximum amount of electrostatic suppression of secondary electrons by proper MDC design. Such suppression, which is obtained by ensuring that a substantial suppressing electric field exists over the regions of the electrodes where most of the current is incident, was found to be very effective. Experimental results indicate that, with proper MDC design and the use of electrode surfaces with low secondary-electron yield, degradation of the collector efficiency can be limited to a few percent. Author

N86-32630# Department of the Air Force, Washington, D.C.
MICROWAVE DISCHARGE APPARATUS AND METHOD WITH DUAL FUNCTION PRIMING RESONATOR Patent

Harry Goldie, inventor (to Air Force) Issued 11 Mar. 1986 8 p Supersedes AD-D011202
(AD-D012252; US-Patent-4,575,692; US-Patent-Appl-SN-601515; US-Patent-Class-333-13) Avail: US Patent and Trademark Office CSCL 09/1

A microwave gas discharge apparatus for use as a limiter or TR device or the like is discussed. It employs a primary discharge arrangement which has a single resonator used for priming the discharge device and determining the priming energy frequency.
Author (GRA)

N86-32631# Department of the Air Force, Washington, D.C.
PSK MODULATION BY TEMPORARILY INCREASING FREQUENCY TO ACHIEVE PHASE CHANGE Patent
Joanne B. Dow, inventor (to Air Force) Issued 11 Mar. 1986 7 p Supersedes AD-D011119
(AD-D012254; US-Patent-4,575,858; US-Patent-Appl-SN-601198; US-Patent-Class-375-53) Avail: US Patent and Trademark Office CSCL 09/5

A phase modulation low power integrated circuit communications arrangement which employs a frequency shift oscillator is disclosed. The frequency shift oscillator operates normally at a first frequency and is keyed to a second frequency for brief intervals to introduce cumulative first frequency phase change in an output signal. Subquadrature and larger increments of phase shift, spurious frequency component rejection with wave filters, and low power amplification of the modulated signal are also disclosed. Specifically, transitions in either (or both) of a pair of binary input signals cause a 45-degree (or 90-degree) phase shift in the phase-modulated carrier, unlike standard DQPSK modulation.
Author (GRA)

N86-32632# Department of the Air Force, Washington, D.C.
BI-DIRECTIONAL CURRENT DIFFERENCER FOR COMPLEMENTARY CHARGE COUPLED DEVICE (CCD) OUTPUTS Patent
Kenneth J. Petrosky, inventor (to Air Force) Issued 25 Feb. 1986 7 p Supersedes AD-D010979
(AD-D012262; US-Patent-4,573,177; US-Patent-Appl-SN-577392; US-Patent-Class-377-60) Avail: US Patent and Trademark Office CSCL 09/5

D.C. reconstruction of sampled CCD output signals is achieved by subtracting the output current pulses of two CCDS (or subtracting parallel outputs of the same CCD) with a differencing circuit containing two biasing current mirrors, a current sink device and an output capacitor. The two current mirrors are used with each biasing the output of a complementary CCD to positive and acting to mirror the CCD output current. A third current mirror converts the output of one of the CCDs into a current sink. An output capacitor performs subtracting by converting all outputs to voltage and combining the positive biased output of one CCD with the current said output of the second CCD. Author (GRA)

N86-32633# Department of the Air Force, Washington, D.C.
CONNECTING COAXIAL CABLES TO SHIELDED ELECTRONIC DEVICE Patent
Henry M. deRonde, inventor (to Air Force) Issued 18 Mar. 1986 5 p Supersedes AD-D010884
(AD-D012267; US-Patent-4,577,054; US-Patent-Appl-SN-569640; US-Patent-Class-174-35C) Avail: US Patent and Trademark Office CSCL 09/1

A coaxial cable feedthrough reduces the required cable trough width to about 0.400 inches. A feedthrough body has a flange and a threaded tube for holding the coaxial cables as it passes without electrical interruption from the trough to a shielded RF device. A nut is placed on the threaded tube which in inserted through a slot in the trough wall. The feedthrough flange is compressed against the wall closing the slot when the nut on the opposite side of the wall has been torqued. GRA

N86-32634# Department of the Air Force, Washington, D.C.
LOW NOISE MULTIPLE CRYSTAL-CONTROLLED OSCILLATOR Patent
Michael M. Driscoll, inventor (to Air Force) Issued 11 Feb. 1986 9 p Supersedes AD-D011401
(AD-D012282; US-Patent-4,570,132; US-Patent-Appl-SN-645468; US-Patent-Class-331-56) Avail: US Patent and Trademark Office CSCL 09/5

An oscillator circuit utilizing multiple (two) quartz crystal resonators as the frequency controlling elements in a novel circuit arrangement is presented. The use of two crystal units increases the oscillator circuit signal transmission group delay by a factor of 2 to 3 and effects an estimated 6 dB reduction in oscillator output signal phase noise sideband level at carrier offset frequencies less than the resonator half-bandwidths. The degree of resonator tracking required is made practical with the use of temperature controlled SC-cut resonators. In addition, the oscillator circuit is configured so that equal, correlated output signal currents can be extracted from each resonator through individual load circuits, thereby increasing available oscillator output signal amplitude by 2:1 and reducing the net effect of uncorrelated load circuit additive noise by 3 dB. Author (GRA)

N86-32635# Department of the Air Force, Washington, D.C.
CCD GATE DEFINITION PROCESS Patent Application
Bluzer, inventor (to Air Force) et al Filed 24 Feb. 1986 15 p
(AD-D012298; US-Patent-Appl-SN-831908) Avail: NTIS HC A02/MF A01 CSCL 09/5

The present invention utilizes a double masking step in a CCD gate definition process to eliminate the re-entrant oxide by using a thin film layer other than photoresist to define the polysilicon gates used by defining the thin film layer with a double masking process before any of the polysilicon gate layer is etched. It is one object of the present invention, therefore, to provide an improved process for CCD gate definition. It is another object of the invention to provide an improved CCD gate definition process wherein a profiled oxide layer is produced over a polysilicon layer without re-entrant oxide regions. It is another object of the invention to provide an improved CCD gate definition process wherein a thin film layer is utilized to define the polysilicon gate layers. It is another object of the invention to provide an improved CCD gate definition process wherein the thin film layer is defined by a double masking process before any polysilicon layer is etched. GRA

N86-32636# Department of the Navy, Washington, D. C.
FILM CHIP CAPACITOR Patent Application
William L. Robbins, inventor (to Navy) Filed 4 Nov. 1985 10 p
(AD-D012300; US-Patent-Appl-SN-794984) Avail: NTIS HC A02/MF A01 CSCL 09/1

A chip capacitor comprising a plurality of parallel plastic organic film layers or organically bonded ceramic particles, interleaved with multiple thin parallel nonprecious metal electrode film layers of aluminum, copper or the like, the capacitor further comprising suitable nonprecious metal end caps and connector means.
Author (GRA)

N86-32637# Department of the Navy, Washington, D. C.
CO-SPUTTERED THERMIONIC CATHODES AND FABRICATION THEREOF Patent Application
Richard E. Thomas and Victor H. Ritz, inventors (to Navy) Filed 16 Apr. 1986 20 p
(AD-D012304; US-Patent-Appl-SN-852601) Avail: NTIS HC A02/MF A01 CSCL 09/1

This invention relates to the fabrication of thermionic cathodes and to resultant cathode structures, and more particularly to the fabrication of themionic cathodes via sputtering technology. A thermionic cathode is fabricated by cosputtering alkaline earth oxide and metal powders under temperature and pressure conditions that ensure a metal particle size in a preferred range. GRA

N86-32638# Northeastern Univ., Boston, Mass.
INVESTIGATION OF CHARACTERISTICS AND APPLICATION OF NEW CCD (CHARGE COUPLED DEVICES) SIGNAL PROCESSING DEVICES Final Technical Report, Jan. 1982 - Jul. 1985
Basil L. Cochrun and John G. Proakis Dec. 1985 75 p
(Contract F19628-82-C-0053)
(AD-A167929; RADC-TR-85-257) Avail: NTIS HC A04/MF A01

CSCL 09/5

Described is the work done to develop interface and support circuitry for additional PTF, ABC and RSAM modules and the use of a Z80 microprocessor in controlling the interconnection of these modules in various systems. In an attempt to increase the flexibility and range of applications, emphasis has been directed to architectural additions, modification of existing hardware, new algorithm development and new software development. GRA

N86-32639# Naval Postgraduate School, Monterey, Calif.
TESTING METHODS FOR INTEGRATED CIRCUIT CHIPS M.S. Thesis
Zafer Betoner 27 Mar. 1986 84 p
(AD-A167932) Avail: NTIS HC A05/MF A01 CSCL 09/5

Provision for the functional testing of fabricated VLSI chips frequently involves as much design effort as the original chip design itself. Often the hardware requirements for testing involve a large expense. This research investigates the logical and functional requirements for chip testing. Available approaches are examined and their capabilities noted. Methods of communication between the test controller and the device under test are examined as well as logical structure of the test controller. Two candidate approaches are selected for comparison: (1) a standard general-purpose processor with standard bus interface serves as the test controller, and (2) a custom VLSI test controller interfacing directly to the device under test. As a result, a test system architecture is proposed. GRA

N86-32640# Department of the Navy, Washington, D. C.
ULTRA-FAST FIELD EMITTER ARRAY VACUUM INTEGRATED CIRCUIT SWITCHING DEVICE Patent
Henry F. Gray and Richard F. Greene, inventors (to Navy) Issued 25 Mar. 1986 4 p Supersedes AD-D009746
(AD-D012317; US-Patent-4,578,614; US-Patent-Appl-SN-401277; US-Patent-Class-313-309) Avail: US Patent and Trademark Office CSCL 09/5

A field-emitter switching device wherein a positive pulse is applied to a gate (which is held at a bias potential V1 just below turn-on). A collector is held at a potential higher than the gate in order to collect emitted electrons from a field emitter source. As the voltage is applied to the gate, electrons are emitted immediately from the source and travel to the most positive potential at the collector. Because of the field emitter geometry, such electron transport is extremely fast. The ultra-fast switching speed is attained because the electrons reach near-maximum velocity within a few field tip diameters of the source. Author (GRA)

N86-32641# Department of the Navy, Washington, D. C.
CONSTANT RISE AGC (AUTOMATIC GAIN CONTROL) DEVICE Patent
Robert A. Slack, inventor (to Navy) Issued 4 Mar. 1986 10 p Supersedes AD-D011744
(AD-D012327; US-Patent-4,574,252; US-Patent-Appl-SN-715992; US-Patent-Class-330-281) Avail: US Patent and Trademark Office CSCL 09/5

The invented device provides automatic gain control (AGC) of incoming signals over a large dynamic range of input levels with a constant rise time. The constant rise AGC device includes a primary AGC loop for receiving the incoming or input signal and splitting the input signal to input and output components of the primary AGC loop. The input signal to the input component is processed within the primary AGC loop to control the gain of the input signal at the output component of the primary AGC loop. The primary AGC loop has a slow detector. A secondary AGC loop is provided within the primary AGC loop, and this secondary AGC loop includes the aforementioned input component and has its output connected to the slow detector. The secondary AGC loop has a fast detector for preventing self-imposed saturation. With this arrangement the secondary AGC loop can be utilized to provide a constant AGC buildup signal for any input signal which is greater than a predetermined dB range, and the remainder of the primary AGC loop, which receives the constant AGC buildup signal from the secondary AGC loop, can be optimized for desired rise and fall times so that the latter's output signal can be relatively unaffected by interference bursts, signal gaps, and fading in the input signal. Author (GRA)

N86-32642# Department of the Air Force, Washington, D.C.
SWEPT ACQUISITION FOR PULSED RADIO FREQUENCY (RF) PHASE LOCK LOOP Patent Application
John T. Campbell, inventor (to Air Force) Filed 12 Mar. 1986 38 p
(AD-D012332; US-Patent-Appl-SN-838971) Avail: NTIS HC A03/MF A01 CSCL 09/5

Swept acquisition of reference signals, including pulsed radio frequency radar waveforms, is achieved using sample-and-hold circuitry to track and hold in-phase and quadrature error signals (E1 and Eq) from a voltage controlled oscillator which is swept by a sweep generator. This presents a constant in-phase error signal to the integrator is the loop so that the phase lock loop may be implemented by conventional means. The quadrature error signal is filtered and compared with a threshold to determine when frequency lock has been obtained when the voltage control oscillator is swept at high speed. Then the voltage controlled oscillator is swept at a lower speed to distinguish the center lobe of the reference signal and attain phase lock. Finally, the voltage controlled oscillator is swept only while sampling the reference signal by gating the sweep rate signal with a sampling signal. This method enables one to acquire a pulsed radio frequency signal with jittered pulse repetition intervals while preventing locking on before or after the center frequency of the main lobe of the reference signal. GRA

N86-32643# Department of the Air Force, Washington, D.C.
PHASE LOCK ACQUISITION SYSTEM HAVING FLL FOR COARSE TUNING AND PLL FOR FINE TUNING Patent
Stephen P. Caldwell, Martin J. Decker, and Robert A. Jelen, inventors (to Air Force) Issued 1 Apr. 1986 7 p Supersedes AD-D011804
(AD-D012340; US-Patent-4,580,107; US-Patent-Appl-SN-617668; US-Patent-Class-331-10) Avail: US Patent and Trademark Office CSCL 09/5

The acquisition of phase lock to a reference frequency by a signal acquisition system is accomplished using a voltage controlled oscillator, a wideband frequency discriminator, a prepositioning circuit, and a phase lock loop. The voltage controlled oscillator is prepositioned within a loop bandwidth of the reference frequency by the prepositioning circuit and the wide band frequency discriminator which provide coarse tuning. The voltage controlled oscillator achieves phase lock with the reference frequency when it receives the fine tune signal from the phase lock loop. Using both the discriminator and the phase lock loop allows fast acquisition without the need to calibrate the voltage controlled oscillator. Since the discriminator pull-in range is much larger than the phase-lock loop bandwidth, the number of bits can be much smaller than in acquisition circuit using a digital prepositioning circuit alone. Author (GRA)

N86-32644# Department of the Air Force, Washington, D.C.
CAPACITOR CHARGING FET SWITCHER WITH CONTROLLER TO ADJUST PULSE WIDTH Patent
Alex M. Mihalka, inventor (to Air Force) Issued 29 Apr. 1986 16 p
(AD-D012347; US-Patent-4,586,118; US-Patent-Appl-SN-617651; US-Patent-Class-363-17) Avail: US Patent and Trademark Office CSCL 10/2

A switching power supply includes an FET full bridge, a controller to drive the FETs, a programmable controller to dynamically control final output current by adjusting pulse width, and a variety of protective systems, including an overcurrent latch for current control. Power MOSFETS are switched at a variable frequency from 20 to 50 kHz to charge a capacitor load from 0 to 6 kV. A ferrite transformer steps up the dc input. The transformer primary is a full bridge configuration with the FET switches and the secondary is fed into a high voltage full wave rectifier whose output is connected directly to the energy storage capacitor. The

peak current is held constant by varying the pulse width using predetermined timing resistors and counting pulses. The pulse width is increased as the capacitor charges to maintain peak current. A digital ripple counter counts pulses, and after the desired number is reached, an up-counter is clocked. The up-counter output is decoded to choose among different resistors used to discharge a timing capacitor, thereby determining the pulse width. A current latch shuts down the supply on overcurrent due to either excessive pulse width causing transformer saturation or a major bridge fault, i.e., FET or transformer failure, or failure of the drive circuitry.
Author (GRA)

N86-32645# Department of the Air Force, Washington, D.C.
A dc SWITCHING REGULATED POWER SUPPLY FOR DRIVING AN INDUCTIVE LOAD Patent
George R. Dyer, inventor (to Air Force) Issued 29 Apr. 1986 8 p
(AD-D012349; US-Patent-4,585,986; US-Patent-Appl-SN-555915; US-Patent-Class-323-271) Avail: US Patent and Trademark Office CSCL 10/2

A power supply for driving an inductive load current from a dc power supply through a regulator circuit including a bridge arrangement of diodes and switching transistors controlled by a servo controller which regulates switching in response to the load current to maintain a selected load current. First and second opposite legs of the bridge are formed by first and second parallel-connected transistor arrays, respectively, while the third and fourth legs of the bridge are formed by appropriately connected first and second parallel connected diode arrays, respectively. The regulator may be operated in two stages or modes: (1) For current runup in the load, both first and second transistor switch arrays are turned on and current is supplied to the load through both transistor arrays. (2) When load current reaches the desired level, the first switch is turned off, and load current fly wheels through the second switch array and the fourth leg diode array connecting the second switch array in series with the load. GRA

N86-32646# Optical Society of America, Washington, D. C.
PICOSECOND ELECTRONICS AND OPTOELECTRONICS HELD AT INCLINE VILLAGE, NEVADA ON 13-15 MARCH 1985 Final Report, 1 Feb. 1985 - 4 Feb. 1986
Jarus W. Quinn 4 Feb. 1986 138 p
(Grant AF-AFOSR-0105-85)
(AD-A168685; AFOSR-86-0157TR) Avail: NTIS HC A07/MF A01 CSCL 09/3

The purpose of the meeting was to provide a forum for people working in the different areas of ultrafast electronics and optoelectronics and sharing a common interest in the understanding and improvements of the electronic properties of semiconductors and superconductors, the physics of ultrafast devices, their applications and methods of measurements. Author (GRA)

N86-32647# Sandia National Labs., Albuquerque, N. Mex.
EVALUATION OF EXTRINSIC GETTERING TECHNIQUES
J. W. Medernach, V. A. Wells, and L. Witherspoon 1985 6 p
Presented at the 169th Meeting of the Electrochemical Society, Boston, Mass., 4 May 1986 Prepared in cooperation with Sperry Univac, Eagan, Minn.; KMI Inc., Albuquerque, New Mex.
(Contract DE-AC04-76DP-00789)
(DE86-003583; SAND-85-1728C; CONF-860540-2) Avail: NTIS HC A02/MF A01

Nitride (N-EG); poly-nitride (PN-EG), and poly (P-EG) extrinsic gettering techniques were evaluated using a 3.0 micron P-well CMOS process with N/N+ substrates. The devices used for this evaluation were a 2K SRAM and a N+ to P-well test diode. All gettering was applied as a post-epitaxial process except the P-EG material. Results showed that the N-EG material had lower defect surface densities and superior diode characteristics when compared to the P-EG and epitaxial control Epi-C without gettering. Test diode characteristics showed the PN-EG and the N-EG samples having very low leakage currents compared to the P-EG and EPI-C samples. Similar findings also were obtained for the leakage current of the 2K SRAM. A graphical correlation between the leakage currents of the 2K SRAM and the test diode is established. This demonstrates how effective the N-EG and PN-EG gettering ability is for COMS processing. All devices receiving the nitride or the polynitride gettering showed improved device performance. DOE

N86-32648# Argonne National Lab., Ill.
EFFECT OF DEPTH OF DISCHARGE ON LEAD-ACID BATTERY OVERCHARGE REQUIREMENTS
W. H. DeLuca and A. F. Tummillo Feb. 1986 21 p
(Contract W-31-109-eng-38)
(DE86-008945; ANL-85-68) Avail: NTIS HC A02/MF A01

The develop an optimal charge procedure, the relation between battery available capacity, applied overcharge, and the depth-of-discharge (DOD) level prior to charging needed to be established. Therefore, a series of parametric tests was conducted to measure the charge acceptance of lead-acid batteries from initial DOD levels of 25, 50, 75, and 100%. Because the available capacity and charge acceptance of the lead-acid battery are dependent on operating temperature, all the charges and discharges were initiated at a fixed temperature. Also because of the typical variation in available capacity of the lead-acid battery with age, baseline performance measurements were periodically acquired for normalization of the charge acceptance test data. The results from these tests show that the amount of overcharge needed to obtain the maximum available capacity from an EV-3000 improved lead-acid battery (which uses electrolyte mixing) is greatly reduced from that needed for commercially available golf-car lead-acid batteries. This was true for all initial DOD levels. The overcharges needed by the EV-3000 battery was a function of the DOD level prior to charging, but the overcharge needed for the golf-car battery was independent of DOD level. The acquired data can be used to derive an optium charge algorithm that relates capacity, overcharge, and DOD level. Applying only the minimum overcharge level needed for full capacity offers advantages of: (1) reduced generation of gases, (2) reduced water consumption, (3) cleaner battery containers, (4) reduced maintenance, and (5) increased battery life. DOE

N86-32649# Stanford Univ., Calif.
OPTIMIZATION OF A LASERTRON DOUBLE OUTPUT CAVITY
K. R. Eppley Feb. 1986 18 p
(Contract DE-AC03-76SF-00515)
(DE86-009176; SLAC/AP-48) Avail: NTIS HC A02/MF A01

Double output cavities have been used experimentally to increase the efficiency of high-power klystrons. We have used particle-in-cell simulations with the 2 + 1/2 dimensional code MASK to optimize the design of double output cavities for the lasertron under development at SLAC. We discuss design considerations for double output cavities (e.g., optimum choice of voltages and phases, efficiency, wall interception, breakdown). We describe how one calculates the cavity impedance matrix from the gap voltages and phases. Some results of the effect of varying voltage, perveance, and pulse are reported. DOE

N86-32650# Pinnacle Research Inst., Cupertino, Calif.
RESEARCH ON SEPARATORS FOR ALKALINE ZINC BATTERIES Final Report
R. S. Yeo Dec. 1985 73 p
(Contract DE-AC03-76SF-00098)
(DE86-009261; LBL-20766) Avail: NTIS HC A04/MF A01

This project is concerned with the research and development of a hybrid separator as an improved battery separator in alkaline zinc secondary batteries. Particular emphasis has been directed toward increasing the cycle life of zinc electrodes by controlling the permselectivity of the separator. DOE

N86-32651# Gosudarstvennyi Komitet po Ispolzovaniyu Atomnoi Energii, Moscow (USSR).
STABILIZED PULSE-WIDTH MODULATION POWER SUPPLIES
A. I. Belkov, A. N. Bryukhanov, I. I. Kakunov, S. T. Latushkin, V. A. Rezvov, and L. I. Yudin 1984 16 p In RUSSIAN
(DE86-702042; IAE-4024/14) Avail: NTIS (US Sales Only) HC A02/MF A01

Described are current and voltage sources based on all-purpose semiconductor transducers with pulse-width modulation and a stability of from 10 to the -3 to 10 to the -4. The power is controlled from tenths of watts to a few kilowatts; the current range is 5 mA-100 A, voltage range - 20-80 kV. DOE

N86-32652# Los Alamos National Lab., N. Mex.
ANALYSIS OF EQUIVALENT CAPACITANCES BETWEEN MUTUALLY COUPLED WINDINGS
P. Chowdhuri 1986 6 p Presented at the IEEE Power Engineering Society Summer Meeting, Mexico City, Mexico, 20 Jul. 1986
(Contract W-7405-eng-36)
(DE86-006019; LA-UR-86-188; CONF-860705-1) Avail: NTIS HC A02/MF A01

The interwinding capacitance between mutually coupled windings may play a significant role in the transient analysis of these windings. Neglecting this capacitance or dividing it equally among the interwinding node pairs would then result in considerable inaccuracy in the analysis. A method is proposed to calculate equivalent interwinding capacitances which will reduce this inaccuracy. It is illustrated by simple winding models. DOE

N86-32653# California Univ., Berkeley. Lawrence Berkeley Lab.
PERFORMANCE OF ELECTRONIC BALLASTS AND OTHER NEW LIGHTING EQUIPMENT Final Report
R. R. Verderber and O. Morse Mar. 1986 73 p
(Contract DE-AC03-76SF-00096)
(DE86-009589; EPRI-EM-4510) Avail: NTIS HC A04/MF A01

This study discusses parameters for selecting the most suitable auxiliary lighting device to operate and control gas-discharge lamps. The devices tested in this study include solid-state fluorescent and high-intensity discharge (HID) ballasts; current limiters; and dynamic lighting controls. They have been evaluated in combination with the standard 40-W, F-40, T-12, rapid-start, cool-white fluorescent lamps. Solid-state ballast performance varied widely-from 68 to 79 lumens per watt (lm/W) in efficacy and from 0.83 to 0.98 in ballast factor. System efficacy was up to 26% higher than standard core-coil ballast efficacy. Current limiters used with standard core-coil ballast reduce light output and input power by 30 to 50% and may be suitable as retrofit devices to reduce light in overilluminated spaces. When operated at a constant lamp wall temperature, these devices either maintain or reduce system efficacy. DOE

N86-32654# Lawrence Livermore National Lab., Calif.
TRANSMISSION OF A MODULATED MICROWAVE ACROSS A DIODE
W. J. Orvis, J. H. Yee, and G. H. Khanaka Jan. 1986 22 p
(Contract W-7405-eng-48)
(DE86-010262; UCID-20728) Avail: NTIS HC A02/MF A01

Using the one-dimensional, solid state device model, BURN42, we have modeled the transmission of microwaves in the 3 Gigahertz (GHz) range, modulated with lower frequency RF in the 50 Megahertz (MHz) range past a small signal diode. The results indicate that no matter what the state of the diode (avalanching - not avalanching; switching - not switching) that energy is transferred from the low frequency modulation to a distinct, low frequency signal in the diode voltage. The diode voltage also contains a number of harmonics of the high frequency. DOE

N86-32655# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Technieken van de Energievoorziening.
COMPARISON OF TWO VOLTAGE DIVIDERS FOR THE MEASUREMENT OF TRANSIENT VOLTAGES IN CLOSED SWITCH GEAR [VERGELIJKING VAN TWEE SPANNINGSDELERS VOOR HET METEN VAN TRANSIENTE SPANNINGEN IN GESLOTEN SCHAKELMATERIAAL]
H. J. A. deVet Dec. 1984 75 p In DUTCH; ENGLISH summary
(EH-84-A-82; ETN-86-97528) Avail: NTIS HC A04/MF A01

Two measuring systems for the insulation coordination of high-voltage insulated substations were developed. One is based on the principle of consecutive differentiation and integration and has a frequency range up to 200 MHz. The high-voltage capacitance acts as differentiating part with a 50 Ohm resistor which terminates a long measuring cable; the voltage across the resistor is integrated. Measuring surface of this divider is connected to the measuring cable by a conducting cone to avoid stray capacitance and inductance. The other one is a capacitive divider with a frequency range up to 300 MHz. Attention was paid to the construction of the low voltage capacitance to avoid internal resonance and to obtain a constant divider ratio over a wide frequency range. ESA

N86-32656# Technische Hogeschool, Eindhoven (Netherlands).
PARAMETERIZATION OF SYSTEM DESCRIPTIONS FOR A HIERARCHICAL CIRCUIT SIMULATOR [PARAMETERISATIE VAN SYSTEEM BESCHIJVINGEN VOOR EEN HIERARCHISCHE CIRCUITSIMULATOR]
M. M. Berkens Dec. 1984 80 p In DUTCH
(ETN-86-97535) Avail: NTIS HC A05/MF A01

The processing of parameters for a hierarchical circuit simulator, and their implementation in a simulation project consisting of a large number of computer aided design programs are discussed. The program PLIN, used for the interactive input of circuits, is treated. A compiler for the input of circuit models and a description language for the models are described. The program PLCONV, which provides the generation of system equations and the calculation of the final parameter values, is outlined. A total parameterization processing packet in which a good synthesis between complexity and user possibilities is offered, is derived. ESA

N86-32657# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
DESIGN AND REALIZATION OF A C-MAC/PACKET (CMP) DATA DEMODULATOR (DD) [ONTWERP EN REALISATIE VAN EEN C-MAC/PACKET DATA-DEMODULATOR]
H. L. H. M. Castermans Jun. 1984 94 p In DUTCH
(ETN-86-97539) Avail: NTIS HC A05/MF A01

A data demodulator (DD) for the European Broadcasting Union standard CMP for a television satellite frequency band was designed and realized. The standard combines analog and digital modulation in time division multiplexing. The analog modulation method (frequency modulation) and the digital method, 2-Quadra Phase Shift Keying (2-4PSK), are described. A block diagram for a possible CMP modulator was drawn. Criteria for a CMP DD were derived to read the data sent via the CMP signal by means of 2-4PSK. ESA

N86-32658# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
SOME CONSIDERATIONS ON THE APPLICATION OF HYBRID CIRCUITS AT THE NLR
A. Monkel, F. H. vanVegten, and J. G. Koning 8 May 1985 12 p Presented at Centrum voor Micro-Elektron. Delft TNO Hybriede Schakelingen, Delft, Netherlands, 12 Jun. 1985
(NLR-MP-85046-U; B8664741; ETN-86-97678) Avail: NTIS HC A02/MF A01

Volume reduction of hybrid circuits used in aerospace applications is discussed. Examples show that nonstandard component assembly techniques are feasible, and often required, to accommodate the electronics in small lightweight assemblies. The quality obtained with hybrid circuits and with LCC's mounted on ceramic substrates can be as high as with packaging techniques normally used. When the series of hybrids or LCC's on substrates is large enough, these techniques may even be profitable from a cost point of view. With polyimide board material, high density LCC assemblies are possible. The thermal design however, can limit full profit, particularly with bipolar logic. With CMOS logic, full benefit of the possibilities is expected. ESA

N86-32659# Technische Hogeschool, Eindhoven (Netherlands). Computing Center.
AN EXTRACTOR FOR HIERARCHIAL SYMBOLIC LAYOUTS
T. Bidlot and M. vanderWoude Dec. 1984 17 p
(THE-RC-59994; Rept-23; ETN-86-97703) Avail: NTIS

HC A22/MF A01

A circuit extractor for extracting VLSI circuits from a hierarchical symbolic layout description is proposed. An interface file stores the interface between layout and circuit description for each hierarchical building block. The hierarchy of the circuit description can be expanded partially or wholly to let the extracted circuit description have the hierarchy as required by the user. The algorithm on which the extractor is based is discussed. Results of a preliminary version are presented. ESA

N86-32660# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.

THE QUALIFICATION AND PROCUREMENT OF TWO-SIDED PRINTED CIRCUIT BOARDS (FUSED TIN-LEAD OR GOLD PLATED FINISH)

Oct. 1985 81 p

(ESA-PSS-01-710-Issue-1; ISSN-0379-4059; ETN-86-97797) Avail: NTIS HC A05/MF A01

Requirements for evaluation, qualification, and procurement of two-sided printed-circuit boards with fused tin-lead or gold-plated finish by ESA are defined. The mandatory test methods are described, and details of accept/reject criteria are given. ESA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N86-32661*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

MONOGROOVE COLD PLATE Patent Application

Fred Edelstein, inventor (to NASA) (Grumman Aerospace Corp., Bethpage, N.Y.) and Richard F. Brown, inventor (to NASA) Filed 18 Jun. 1986 14 p Sponsored by NASA

(NASA-Case-MSC-20946-1; US-Patent-Appl-SN-875799) Avail: NTIS HC A02/MF A01 CSCL 20D

The coolant fluid evaporated in a compact heat absorbing panel utilizing monogroove heat pipes in a pumped two-phase system is replenished through a liquid inlet control valve under the control of an ultrasonic liquid presence detector which is connected to the panel. The detector maintains the desired liquid quantity in the panel's liquid coolant channels, thereby dynamically responding to varying heat loads. NASA

N86-32662# Royal Aircraft Establishment, Farnborough (England).

A COLLECTION OF DATA ON THE NORMAL-STRESS INTEGRAL TERM OCCURRING IN THE MOMENTUM EQUATION OF TURBULENT BOUNDARY LAYERS

K. G. Winter Nov. 1985 32 p

(RAE-TR-85097; BR99466) Avail: NTIS HC A03/MF A01

The normal-stress integral is evaluated from available experimental results. A modification is suggested to the existing empirical expression obtained for equilibrium flows which may extend its applicability to more general flows. It is noted that the value of the integral increases rapidly with the onset of separation. Author

N86-32663# National Aeronautical Lab., Bangalore (India). Director's Unit.

ORDER AND CHAOS IN FLUID FLOWS

R. Narasimha Jun. 1986 44 p Presented at the 4th Raman Memorial Lecture, Bangalore, India, 3 Mar. 1986

(NAL-TM-DU-8602) Avail: NTIS HC A03/MF A01

This document is a slightly extended version of the fourth C V Raman Memorial Lecture given at the Indian Institute of Science on 3 March 1986. The chief aim of the Lecture was to discuss the role that order and chaos play in the dynamics of fluid motion. After briefly reviewing the major features of transitions from order to chaos and back that have emerged from observations over several decades, their possible relations with more recent work on dynamical systems exhibiting chaotic behavior is discussed. It is concluded that certain basic features characteristic of turbulence, such as the appearance of high frequency chaos during transition, the persistence of chaos as nonlinearity increases, and the strong influence of external perturbations on the onset of chaos, are not yet within the scope of the new theories. However, these recent developments have highlighted a significant and fascinating question, which is whether all transitions from order to chaos would follow only a finite number of possible fundamental modes. The answer to this question is not yet clear, but if it is yes, it certainly seems all possible modes have not yet been discovered. However, the question raised is extremely important and should be exciting and rewarding to pursue. Author

N86-32664# National Aeronautical Lab., Bangalore (India). Director's Unit.

THE INFINITELY STRONG SHOCK

R. Narasimha and P. Das (Indian Inst. of Science, Bangalore) Aug. 1986 18 p Presented at the 15th International Symposium on Rarefield Gas Dynamics, Grado, Italy, 16-20 Jun. 1986

(NAL-TM-DU-8604) Avail: NTIS HC A02/MF A01

A scheme for obtaining an exact solution of the Boltzmann equation for an infinitely strong shock has been formulated, in terms of inner and outer limits in velocity space as Mach number tends to infinity. Using a complete expansion for the outer solution, an infinite set of ordinary nonlinear differential equations is obtained. A solution of the first seven equations of this set yields a shock thickness of 6.7 hot-side mean free paths, nearly 20 per cent higher than the value quoted by Sakurai for a hard sphere gas. Author

N86-32665# National Aeronautical Lab., Bangalore (India). Structures Div.

WHAT ARE THE TRUE BOUNDARY CONDITIONS ON THE EDGE OF A THIN PLATE: POISSON'S OR KIRCHHOFF'S

G. Prathap and C. Ramesh Babu Mar. 1986 12 p

(NAL-TM-ST-8603) Avail: NTIS HC A02/MF A01

This report offers an answer to the question, what are the simply supported boundary conditions when using Mindlin or isoparametric plate bending elements?. The answer is based on the investigations carried out by the authors in their earlier numerical experiments using a field-consistent QUAD4 plate/shell element. It is concluded that the SS2 or the hard boundary condition is the appropriate condition when Mindlin or isoparametric plate bending elements are used to analyze very thin plates. Author

N86-32666# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).

COMPUTATIONAL FLUID DYNAMICS, VOLUME 1

1986 274 p Lecture Series held in Rhode Saint Genese, Belgium, 3-7 Mar. 1986

(VKI-LS-1986-04-Vol-1; ETN-86-97812) Avail: NTIS HC A12/MF A01

Finite element, finite volume, and spectral methods used in computational fluid dynamics are introduced. The Navier-Stokes and Euler equations, and grid generation are treated. For individual titles, see N86-32667 through N86-32674.

N86-32667# Nice Univ. (France).

FINITE-DIFFERENCE AND FINITE-VOLUME METHODS FOR THE COMPUTATION OF COMPRESSIBLE VISCOUS FLOWS

Roger Peyret *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 46 p (For primary document see N86-32666 24-34)

Avail: NTIS HC A12/MF A01

The basic principles of finite difference and finite-volume methods for solving the Navier-Stokes equations, and approximations of them are presented. Each approach is illustrated by applying it to two and three-dimensional flow examples. Only the laminar case is considered. ESA

N86-32668# Nice Univ. (France).
INTRODUCTION TO SPECTRAL METHODS WITH APPLICATION TO FLUID MECHANICS
R. Peyret *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 46 p (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

The bases of spectral methods (weighted residuals, collocation) using Fourier and Chebyshev approximation are introduced. Applications to the solution of simple partial differential equations are described. Methods for solving the Navier-Stokes equations are presented. ESA

N86-32669# Nice Univ. (France). Dept. de Mathematiques.
STABILITY OF COLLOCATION-CHEBYSHEV SCHEMES WITH APPLICATION TO THE NAVIER-STOKES EQUATIONS
J. Ouazzani, R. Peyret, and A. Zakaria *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 9 p Presented at Sixth GAMM Conference on Numerical Methods in Fluid Mechanics, Goettingen, West Germany, 25-27 Sep. 1985 (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

The stability of time-discretization schemes associated with the collocation-Chebyshev method is studied for the advection-diffusion equation. These schemes are applied to the Burgers equation and to the Navier-Stokes equations solved by psuedo-unsteady methods. Convergence and accuracy of finite difference, spectral, and hybrid methods are listed. The CPU time on a Cray-1 in seconds per time step for each scheme is tabulated. ESA

N86-32670# Nice Univ. (France). Dept. de Mathematiques.
A PSEUDO-SPECTRAL SOLUTION OF BINARY MIXTURE FLOWS
J. Ouazzani and R. Peyret *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 9 p Presented at Fifth GAMM Conference on Numerical Methods in Fluid Mechanics, Rome, Italy, 5-7 Oct. 1983 (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

A pseudo-spectral method for the calculation of steady binary gas mixture flows found in vapor crystal growth is presented. The method uses a pseudo-unsteady approach. The scheme is implicit for the diffusion terms and mainly explicit for the other terms. The spatial approximation uses Chebyshev polynomial expansions with a collocation technique. This reduces the computational effort to matrix-vector products and fast Fourier transforms. These operations are efficiently performed on a vector computer (Cray 1). ESA

N86-32671# Nice Univ. (France). Dept. de Mathematiques.
A PSEUDO-SPECTRAL SOLUTION OF VORTICITY-STREAM FUNCTION EQUATIONS USING THE INFLUENCE MATRIX TECHNIQUE
J. M. Vanel, R. Peyret, and P. Bontoux (Aix-Marseilles Univ., France) *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 11 p Presented at Conference on Numerical Methods for Fluid Dynamics, Reading, England, 1-4 Apr. 1986 (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

A method for computing unsteady two dimensional incompressible flows, using the vorticity and the stream function as dependent variables approximated by Chebyshev polynomial expansions is presented. Boundary conditions for the vorticity are derived by the influence matrix technique. The theoretical and numerical difficulties associated with the two-dimensional formulation of the method are discussed. Numerical results illustrate the properties of the method. ESA

N86-32672# Stanford Univ., Calif.
FINITE ELEMENT ANALYSIS OF THE INCOMPRESSIBLE NAVIER-STOKES EQUATIONS: A SYNOPSIS OF THE STREAM-LINE-UPWIND/PETROV-GALERKIN FORMULATION
Thomas J. R. Hughes *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 11 p (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

Finite element procedures for the calculation of incompressible viscous flows are treated. The streamline-upwind/Petrov-Galerkin formulation for the incompressible Navier-Stokes equations is reviewed. Accurate and stable spatial discretization are embodied by this approach. ESA

N86-32673# Stanford Univ., Calif.
NEW FINITE ELEMENT METHODS FOR THE COMPRESSIBLE EULER AND NAVIER-STOKES EQUATIONS
Thomas J. R. Hughes, M. Mallet, and L. P. Franca *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 22 p (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

Efforts in developing finite element methods for the compressible Euler and Navier-Stokes equations are reviewed. A class of Petrov-Galerkin methods for symmetric multidimensional advective-diffusive systems is described. The weighting functions for these methods involves a Galerkin term, generalized streamline term, and discontinuity-capturing term. It is shown that the compressible Navier-Stokes equations can be cast as a symmetric advective-diffusive system through the use of entropy variables. Numerical examples of high Mach number flows exhibit the good behavior of the method. ESA

N86-32674# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PATCHED-GRID CALCULATIONS WITH THE EULER AND NAVIER-STOKES EQUATIONS: THEORY AND APPLICATION
Man Mohan Rai (Informatics General Corp., Palo Alto, Calif.) *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 1 1986 102 p (For primary document see N86-32666 24-34)
Avail: NTIS HC A12/MF A01

The Rai (1984,85) patch-boundary scheme for the Euler equations is described. The integration methods used to update the interior grid points are are discussed. Stability of patch-boundary schemes and the use of these schemes in Navier-Stokes calculations are mentioned. Results for inviscid, supersonic flow over a cylinder, blast wave diffraction by ramp, and the motion of a vortex in a freestream are presented. These test cases demonstrate the quality of solutions possible with the scheme. ESA

N86-32675*# Technion - Israel Inst. of Tech., Haifa.
A NUMERICAL STUDY OF SEPARATION ON A SPHEROID AT INCIDENCE
M. Rosenfeld, M. Israeli, and M. Wolfshtein Jul. 1986 36 p
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178167; ICASE-86-49; NAS 1.26:178167) Avail: NTIS HC A03/MF A01 CSCL 20D

The three-dimensional incompressible, steady and laminar flow field around a prolate spheroid at incidence is considered. The parabolized Navier-Stokes equations are solved numerically. The method can handle vortex types as well as bubble type flow separation because the pressure is one of the dependent variables. Here, the distribution of the skin friction is reported for two test cases. The first test case is a prolate spheroid of aspect ratio of 4:1 at 6 degrees incidence and Reynolds number of 1 million (based on half the major axis). The second case is a spheroid with a 6:1 aspect ratio at 10 degrees incidence and Reynolds number of 0.8 x 1 million. The properties of the flow field near the body are discussed on the basis of the pattern of the skin friction lines, and the shape of the separation lines. Favorable agreement with experimental results is obtained. Author

N86-32676# Iowa Univ., Iowa City. Inst. of Hydraulic Research.
VISCOUS-INVISCID INTERACTION WITH HIGHER-ORDER VISCOUS-FLOW EQUATIONS Technical Report, Sep. 1983 - Aug. 1986
Frederick Stern, Sungyul Yoo, and Virendra C. Patel Aug. 1986 151 p
(Contracts N00014-83-K-0136; NR Proj. 655-002)

(IIHR-304) Avail: NTIS HC A08/MF A01

The partially-parabolic, or parabolized, Navier-Stokes equations for laminar flow, and the corresponding Reynolds equations for turbulent flow, are coupled with an inviscid-flow solution procedure to develop a viscous-inviscid interaction method which can be used in three-dimensional flows which cannot be treated by means of the classical boundary-layer equations. Potential applications of such a higher-order matching procedure are, for example: thick boundary layers on ship sterns and bodies at incidence, interacting shear layers (wakes, wall jets), solid-solid and solid-fluid corners. Author

N86-32677# Naval Ship Research and Development Center, Annapolis, Md.

FLOW VISUALIZATION AND VELOCITY MEASUREMENTS IN THE SEPARATED REGION OF AN APPENDAGE-FLAT PLATE JUNCTION

Stuart C. Dickinson Mar. 1986 16 p

(AD-A167611; DTNSRDC-86/020) Avail: NTIS HC A02/MF A01 CSCL 20/4

A root vortex forms at the junction of a flat plate and an appendage, creating a three-dimensional separated flow. Time dependent oil film and oil dot visualizations of this turbulent flow have revealed the vortex system and have provided quantitative information on the direction and the magnitude of the shear stress. Two-dimensional LDV (Laser Doppler Velocimetry) mean velocity measurements were made in the separated flow region around the leading edge of the appendage, and these measurements are compared here with the flow visualization results. GRA

N86-32678# Wisconsin Univ., Madison.

LINEAR STABILITY OF PLANE COUETTE FLOW OF AN UPPER CONVECTED MAXWELL FLUID Summary Report

Michael Renardy and Yuriko Renardy Feb. 1986 14 p

(Contract DAAG29-80-C-0041; Grants NSF MCS-82-15064; NSF DMS-84-51761)

(AD-A167927; MRC-TSR-2911) Avail: NTIS HC A02/MF A01 CSCL 20/4

Investigated is the linear stability of plane Couette flow of an upper convected Maxwell fluid using a spectral method to compute the eigenvalues. No instabilities are found. This is in agreement with the results of Ho and Denn and Lee and Finlayson, but contradicts proofs of instability given by Gorodtsov and Leonov and Akbay and Frischmann. The errors in those arguments are pointed out. The authors also find that the numerical discretization can generate artificial instabilities. The qualitative behavior of the eigenvalue spectrum as well as the artificial instabilities is discussed. GRA

N86-32679# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STUDIES ON TRANSONIC DOUBLE CIRCULAR ARC (DCA) PROFILES OF AXIAL FLOW COMPRESSOR CALCULATIONS OF PROFILE DESIGN

Y. Rugun and Q. Zhaoyan 19 May 1986 8 p Transl. into ENGLISH from Gongcheng Rewali Xuebao (China), v. 5, no. 4, Nov. 1984 p 342-344

(AD-A168638; FTD-ID(RS)T-0266-86) Avail: NTIS HC A02/MF A01 CSCL 20/4

In this paper, the concepts and methods for design of high-Mach-number airfoils of axial flow compressor are described. The correlation-equations of main parameters such as geometries of airfoil and cascade, stream parameters and wake characteristic parameters of compressor are provided. For obtaining the total pressure loss coefficients of cascade and adopting the simplified calculating method, several curves and charts are provided by authors. The testing results and calculating values are compared, and both the results are in better agreement. Author (GRA)

N86-32680# Maryland Univ., Baltimore. Dept. of Mathematics.

HYPERBOLIC STEFAN PROBLEM WITH DISCONTINUOUS TEMPERATURE

A. D. Solomon, V. Alexiades, D. G. Wilson, and J. Greenberg Mar. 1986 22 p Prepared in cooperation with Oak Ridge National Lab., Tenn.

(Contract DE-AC05-84OR-21400)

(DE86-010069; ORNL-6216) Avail: NTIS HC A02/MF A01

In an earlier paper a Stefan problem for hyperbolic heat transfer was formulated under the condition of continuity of the temperature at the moving front. In this paper this assumption is examined and an alternative model is presented in which continuity is not imposed. For this case, a problem with an explicit solution is presented, as are some qualitative properties of solutions to some similar problems. In addition, quasi-steady approximate solutions to certain other benchmark problems are derived. DOE

N86-32681# Illinois Univ., Urbana. Dept. of Chemistry.

TRANSPORT AND RELAXATION PPOCESSES IN SUPERCRITICAL FLUIDS Final Technical Report, 1 Oct. 1982 - 31 Mar. 1986

J. Jonas 18 Mar. 1986 56 p

(Contract DE-FG22-82PC-50800)

(DE86-007930; DOE/PC-50800/T14) Avail: NTIS HC A04/MF A01

The main goal of the research supported by this grant has been the advancement of our fundamental understanding of transport and relaxation behavior of compressed supercritical fluids and binary supercritical fluid systems. An important aspect of our work was the development of new experimental techniques for the atomic and molecular level investigations of supercritical fluids. In our NMR studies we developed a novel in-situ NMR method for the measurements of solubilities of solids in compressed supercritical fluids. This method also yields phase information on the system. The solubility of solid naphthalene in supercritical carbon dioxide was measured. The P-T trace of the S-L-G phase lines was also determined. In the area of transport in supercritical fluids we developed NMR instrumentation using fixed field gradient spin-echo technique to measure self-diffusion coefficients in supercritical fluids. The self-diffusion in supercritical ethylene and supercritical toluene was measured. In addition to the NMR method, we also developed and evaluated an FTIR technique to measure solubil ities of solids in supercritical fluids. The system anthracene-carbon dioxide was investigated. Our preliminary lase Rayleigh and Raman experiments on collision induced scattering in supercritical fluids opened a new area of investigations of intermolecular interactions in supercritical fluids. The NO and CO fluids were studied. DOE

N86-32682# Dynatech R/D Co., Cambridge, Mass.

DESIGN STUDY OF PLASTIC FILM HEAT EXCHANGER Final Report

E. C. Guyer and D. L. Brownell 19 Feb. 1986 105 p

(Contract DE-AC07-84ID-12550)

(DE86-011040; DOE/ID-12550/1) Avail: NTIS HC A06/MF A01

This report presents the results of an effort to develop and design a unique thermoplastic film heat exchanger for use in an industrial heat pump evaporator system and other energy recovery applications. The concept for the exchanger is that of individual heat exchange elements formed by two adjoining and freely hanging plastic films. Liquid flows downward in a regulated fashion between the films due to the balance of hydrostatic and frictional forces. The fluid stream on the outside of film may be a free-falling liquid film, a condensing gas, or a noncondensing gas. The flow and structural principles are similar to those embodied in an earlier heat exchange system developed for use in waste water treatment systems (Sanderson). The design allows for high heat transfer rates while working within the thermal and structural limitations of thermoplastic materials. The potential of this new heat exchanger design lies in the relatively low cost of plastic film and the high inherent corrosion and fouling resistance. This report addresses the selection of materials, the potential heat transf er performance, the mechanical design and operation of a unit applied in a low pressure steam recovery system, and the expected selling price in comparison to conventional metallic shell and tube heat exchangers. DOE

N86-32683# Oak Ridge Y-12 Plant, Tenn.
THERMOPERVAPORATION SYSTEM
Takashi Kimura and Takeshi Nomura 1986 13 p Transl. into ENGLISH from Japanese Patent Application No. 5983-58,227,626
(Contract DE-AC05-84OS-21400)
(DE86-011152; Y/TR-86/5) Avail: NTIS HC A02/MF A01

This invention relates to the thermopervaporation system. Thermopervaporation has been generally known as a method of conducting a separate condensation of a liquid, in which the raw liquid or hot liquid to be processed. For example, hot sea water is allowed to pass through the primary side of a porous polymeric membrane that permits liquid vapor to permeate but does not allow the liquid itself to permeate. The vapor which was produced from the raw liquid is condensed and passes through the above-mentioned porous membrane in the secondary side by cooling. In this manner the raw liquid is condensed in the primary side and the condensed water is collected in the secondary side. Various systems have been also proposed in the past for such purposes. The purpose here is to offer a tube-type thermopervaporation system which has a greater effective membrane area per unit volume and offers an excellent process efficiency. DOE

N86-32684# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
METHOD OF OPERATOR SPLITTING OR FRACTIONAL STEPS AND ITS APPLICATIONS TO FLUID DYNAMIC MODELLING. REVISION 1
R. A. Berry Apr. 1986 32 p
(Contract DE-AC07-76ID-01570)
(DE86-011035; EGG-SAAM-6398-Rev-1) Avail: NTIS HC A03/MF A01

The basic method of operator splitting or the fractional step method is explained in tutorial fashion. Simple applications are given to illustrate the versatility of the method. The applications are representations of the type of terms which could be encountered in complicated fluid dynamic problems, notably, the equations of chemically reacting flow or multiphase flow. DOE

N86-32685# Argonne National Lab., Ill.
SHELLSIDE FLOW-INDUCED TUBE VIBRATION IN TYPICAL HEAT EXCHANGER CONFIGURATIONS: OVERVIEW OF A RESEARCH PROGRAM
H. Halle, J. M. Chenoweth (Heat Transfer Research, Inc., Alhambra, Calif.), and M. W. Wambsganss 1986 27 p Presented at the ASME Pressure Vessel and Piping Conference and Exhibit, Chicago, Ill., 20 Jul. 1986 Prepared in cooperation with Heat Transfer Research, Inc., Alhambra, Calif.
(Contract W-31-109-eng-38)
(DE86-005549; CONF-860722-1) Avail: NTIS HC A03/MF A01

A comprehensive research program is being conducted to develop the necessary criteria to assist designers and operators of shell-and-tube heat exchangers to avoid detrimental flow-induced tube vibration. This paper presents an overview of the insights gained from shellside water-flow testing on a horizontal, industrial-sized test exchanger that can be configured in many ways using interchangeable tube bundles and replaceable nozzles. Nearly 50 different configurations have been tested representing various combinations of triangular, square, rotated-triangular, and rotated-square tubefield layouts; odd and even numbers of crosspasses; and both single- and double-segmental baffles with different cut sizes and orientations. The results are generally consistent with analytical relationships that predict tube vibration response by the combined reinforcing effect of the vibration mode shape and flow velocity distribution. An understanding of the vibration and instability performance is facilitated by recognizing that the excitation is induced by three separate, though sometimes interacting, flow conditions. These are the crossflows that generate classic fluidelastic instabilities in the interior of the tube bundle, the entrance and exit bundle flow from and into the shell nozzles, and the localized high velocity bypass and leakage stream flows. The implications to design and/or possible field remedies to avoid vibration problems are discussed. DOE

N86-32686# Clemson Univ., S.C. Dept. of Mechanical Engineering.
BLOCKAGE OF NATURAL CONVECTION BOUNDARY LAYER FLOW IN A MULTIZONE ENCLOSURE
D. Scott, R. Anderson, and R. S. Figliola Feb. 1986 9 p Presented at the 4th AIAA/ASME Thermophysics and Heat Transfer Conference, Boston, Mass., 2 Jun. 1986 Prepared in cooperation with Midwest Research Inst., Golden, Colo.
(Contract DE-AC02-83CH-10093)
(DE86-004430; SERI/TP-252-2847; CONF-860612-1) Avail: NTIS HC A02/MF A01

This paper reports the results of an experimental study that examines the transition between flow regimes, as a function of aperture size, in a two-zone enclosure with heated and cooled end walls. A constant heat flux boundary condition was maintained on one vertical end wall, and an isothermal cold temperature sink was maintained on the opposite vertical end wall. All of the remaining surfaces were highly insulated. The transition between the boundary layer driven regime and the bulk density driven regime was established as a function of the geometry of the aperture in the partition that separated the hot and cold zones. The results demonstrate that transition from the boundary layer driven regime to the bulk density driven regime is caused by blockage of the boundary layer flow, when the area of the flow aperture is reduced below a critical value. A simple flow model has been developed which predicts that the critical aperture area for the onset of flow blockage is directly proportional to the number of active heat transfer surfaces and inversely proportional to the Rayleigh number which characterizes the level of heating and cooling provided to the active heat transfer surfaces. DOE

N86-32687# Lawrence Livermore National Lab., Calif.
MONTE CARLO SIMULATION OF FREE JET FLOW FROM A SLIT
J. B. Anderson, J. D. Foch, M. J. Shaw, R. C. Stern, and B. J. Wu Sep. 1985 24 p Presented at the 15th International Symposium on Rarefied Gas Dynamics, Grado, Italy, 16 Jun. 1986 Prepared in cooperation with Pennsylvania State Univ., University Park
(Contract W-7405-eng-48)
(DE86-006705; UCRL-93788; CONF-860636-1) Avail: NTIS HC A02/MF A01

The expansion of a free jet from a slit source into a vacuum has been simulated using the Monte Carlo procedures developed by Bird. The calculations were made for hard-sphere molecules ((GAMMA) = 5/3) at several densities to examine the departures from translational equilibrium in the flow field. Results are compared with the predictions of a method-of-characteristics calculation for continuum inviscid flow. The variations of the three components of the kinetic temperature are similar to those of a cylindrical source expansion. Molecular velocities perpendicular to the flow are found to depart from Maxwellian distributions at large distances from the slit. DOE

N86-32688# New Mexico Univ., Albuquerque. Dept. of Chemical and Nuclear Engineering.
RESEARCH PROGRAM: THE INVESTIGATION OF HEAT TRANSFER AND FLUID FLOW AT LOW PRESSURE
M. S. El-Genk, J. S. Philbin, and F. C. Foushee 1986 20 p Presented at the 10th US TRIGA User's Conference, College Station, Tex., 7 Apr. 1986 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex. and GA Technologies, Inc., San Diego, Calif.
(Contract DE-AC04-76DP-00789)
(DE86-009379; SAND-86-0255C; CONF-8604117-3) Avail: NTIS HC A02/MF A01

This paper gives an overview of a multiyear joint research program being conducted at the University of New Mexico (UNM) with support from Sandia National Laboratories and GA Technologies. This research focuses on heat removal and fluid dynamics in flow regimes characterized by low pressure and low Reynolds number. The program was motivated by a desire to characterize and analyze cooling in a broad class of TRIGA-type reactors under:

(1) typical operating conditions, (2) anticipated, new operating regimes, and (3) postulated accident conditions. It has also provided experimental verification of analytical tools used in design analysis. The paper includes descriptions of the UNM thermal-hydraulics test facility and the experimental test sections. During the first two years experiments were conducted using single, electrically heated rod in water and air annuli. This configuration provides an observable and serviceable simulation of a fuel rod and its coolant channel. DOE

N86-32689# Los Alamos National Lab., N. Mex.
MEASUREMENT OF PERFORMANCE LIMITS IN CRYOGENIC HEAT PIPES
F. Haug, F. C. Prenger, and R. H. Chrisman 1986 9 p Presented at the 4th AIAA/ASME Thermophysics and Heat Transfer Conference, Boston, Mass., 2 Jun. 1986 Prepared in cooperation with Astronautics Technology Center, Madison, Wis.
(Contract W-7405-eng-36)
(DE86-010208; LA-UR-86-1490; CONF-860612-5) Avail: NTIS HC A02/MF A01

This paper describes the results of an experimental study designed to investigate the fabrication and operation of gravity-assist cryogenic heat pipes. Two heat pipes were built, the first having no formal wick but a roughened internal surface, the second having spiral grooves machined with a specially developed tool. The wall material of the heat pipes was brass and hydrogen was used as the working fluid. The wicked heat pipe became operational over the entire temperature range from the triple-point to the critical point. The performance limitation depended on the operating temperature and the tilt angle. Axial heat flux densities of up to 50W/cm(2) were obtained. DOE

N86-32690# Lawrence Livermore National Lab., Calif.
ERRORS FOR CALCULATIONS OF STRONG SHOCKS USING AN ARTIFICIAL VISCOSITY AND AN ARTIFICIAL HEAT FLUX
W. F. Noh Dec. 1985 68 p
(Contract W-7405-eng-48)
(DE86-010230; UCRL-53669) Avail: NTIS HC A04/MF A01

The artificial viscosity (Q) method of von Neumann-Richtmyer is a tremendously useful numerical technique for following shocks wherever and whenever they appear in the flow. We show that it must be used with some caution, however, as serious Q-induced errors (on the order of 100%) can occur in some strong shock calculations. Three types of Q errors are investigated: (1) Excess Q heating, of which there are two types: (a) excess wall heating on shock formation, and (b) shockless Q heating; (2) Q errors when shocks are propagated over a non-uniform mesh; and (3) Q error in propagating shocks in spherical geometry. As a basis of comparison the Lagrangian formulation of von Neumann-Richtmyer with Q = C0(2) rho l(2)(u sub x)(2) is used as the standard. Comparisons are made with other formulations. DOE

N86-32691# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
MAIN TYPES OF FREE SEPARATION IN MODEL ELLIPSOIDS
Henri Werle 1985 79 p In FRENCH; ENGLISH summary
(ONERA-NT-1985-7; ISSN-0078-3781; ETN-86-97591) Avail: NTIS HC A05/MF A01

Hydrodynamic visualization tests were performed to study free three dimensional separation at high angles of attack in turbulent flow. A hydraulic tunnel was used. The variation of separation with Reynolds number and incidence are shown, as well as the effect of the model shape parameters such as aspect ratio, relative thickness, and symmetry. ESA

N86-32692# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction de l'Energetique.
NUMERICAL MATHEMATICAL METHODS FOR UNSTEADY PROBLEMS Final Report [METHODES MATHEMATIQUES NUMERIQUES APPLICABLES AUX PROBLEMES INSTATIONNAIRES]
Pierre Laval and Germain Billet 12 Nov. 1985 63 p In FRENCH
(Contract DRET-84-34-001)
(ONERA-RTS-5/3446-EY; ETN-86-97639) Avail: NTIS HC A04/MF A01

An explicit disintegration method was developed and applied to two dimensional transonic flow with shock and to heterogeneous three dimensional unsteady flow. Numerical solutions developed for the Navier-Stokes equation in turbulent transonic flow are reviewed. Examples of computation from turbomachinery flow cases are given. Satisfactory results are reported. ESA

N86-32693# Netherlands Energy Research Foundation, Petten.
EXPERIMENTAL INVESTIGATION OF SECONDARY FLOW VORTICES IN A ROD CLUSTER
V. Vonka, J. Hoornstra, and P. Boersma Dec. 1985 119 p
(ECN-174; B8660551; ETN-86-97733) Avail: NTIS HC A06/MF A01

Secondary flow vortices were measured in 2 regular subchannels of a triangularly arranged bare rod bundle with pitch-to-diameter ratio = 1.3 at Reynolds numbers Re = 60,000 and 175,000. A laser Doppler anemometer measured total time average velocity vectors in the central subchannels of a four rod bundle. Results show that half the momentum transport in the circumferential direction is due to the secondary flow vortex convection. In nonisothermal situations the secondary vortices contribute to heat transport in radial and circumferential directions. In radial direction, the contribution can improve the heat transfer coefficient and contribute to better economy of heat transfer installations. In circumferential direction, the contribution helps to smooth out circumferential temperature differences, improves the heat removal from heated surfaces thus decreasing the maximum surface temperature, and contributes to passive safety of heat transfer installations. ESA

N86-32694# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Antriebstechnik.
INSTATIONARY FLOW EFFECTS IN THE ROTOR OF A TURBINE Ph.D. Thesis - Technische Hochschule, Aachen, West Germany
Anton Binder Jan. 1986 160 p In GERMAN; ENGLISH summary
Report will also be announced as ESA-TT-1001
(DFVLR-FB-85-66; ISSN-0171-1342; ETN-86-97816) Avail: NTIS HC A08/MF A01; DFVLR, Cologne, West Germany, DM 51

Instationary turbine rotor flow effects caused by interactions between rotor and stator rows are analyzed. Measurements were carried out on a single-stage, high-pressure turbine, using conventional probes and the noninterfering laser-two-focus anemometer. The investigation of the instationary rotor flow begins with its source: the nonuniform stator exit flow. It is shown that the individual stator exit flow regions, such as the wakes and secondary vortices, are chopped up by the rotor. Because of this chopping, instationary flow phenomena appear in the rotor, leading to elevated turbulence levels and higher losses, and causing a transport of mass transverse to the flow direction. ESA

N86-32405# Audi A.G., Ingolstadt (West Germany).
THEORETICAL AND EXPERIMENTAL OPTIMIZATION OF THE ROAD-VEHICLE INTERNAL FLOW
Jochen Wiedemann *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 8 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N86-32695*# National Aeronautics and Space Administration. Pasadena Office, Calif.
FLUIDIC ANGULAR VELOCITY SENSOR Patent
C. Martin Berdahl, inventor (to NASA) Issued 29 Jul. 1986 9 p Filed 4 Apr. 1985 Supersedes N85-29219 (23 - 18, p 3104)
(NASA-Case-NPO-16479-ICU: US-Patent-4,602,509;
US-Patent-Appl-SN-719794; US-Patent-Class-73-502;
US-Patent-Class-73-521) Avail: US Patent and Trademark Office CSCL 14B

A fluidic sensor providing a differential pressure signal proportional to the angular velocity of a rotary input is described. In one embodiment the sensor includes a fluid pump having an impeller coupled to a rotary input. A housing forming a constricting fluid flow chamber is connected to the fluid input of the pump. The housing is provided with a fluid flow restrictive input to the flow chamber and a port communicating with the interior of the flow chamber. The differential pressure signal measured across the flow restrictive input is relatively noise free and proportional to the square of the angular velocity of the impeller. In an alternative embodiment, the flow chamber has a generally cylindrical configuration and plates having flow restrictive apertures are disposed within the chamber downstream from the housing port. In this embodiment, the differential pressure signal is found to be approximately linear with the angular velocity of the impeller. M.G.

N86-32696* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-AXIS, SELF-NULLING SKIN FRICTION BALANCE Patent
Tcheng Ping, inventor (to NASA) and Frank H. Supplee, Jr., inventor (to NASA) Issued 12 Aug. 1986 5 p Filed 28 Feb. 1985 Supersedes N85-21610 (23 - 12, p 1851)
(NASA-Case-LAR-13294-1; US-Patent-4,604,903;
US-Patent-Appl-SN-706681; US-Patent-Class-73-862.04;
US-Patent-Class-73-147; US-Patent-Class-73-862.61) Avail: US Patent and Trademark Office CSCL 14B

A skin friction force measuring device is described which is comprised of a first pivoted L shaped arm, a second arm pivoted on one end of the L shaped arm with a sensing element attached to an end of the second arm. In response to skin friction forces on the sensing element the arms are pivoted about the two pivots and two nulling means force the pivots back to their zero position. The outputs of the two nulling means are indicative of the skin friction forces along two perpendicular axes in the plane of the sensing element. NASA

N86-32697* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SPINNING DISK CALIBRATION METHOD AND APPARATUS FOR LASER DOPPLER VELOCIMETER Patent
Philip K. Snyder, inventor (to NASA) Issued 15 Jul. 1986 8 p Filed 19 Apr. 1984 Supersedes N84-25015 (22 - 15, p 2335)
(NASA-Case-ARC-11510-1; US-Patent-4,600,301;
US-Patent-Appl-SN-602049; US-Patent-Class-356-28.5;
US-Patent-Class-356-72; US-Patent-Class-356-73;
US-Patent-Class-434-4) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus for calibrating laser Doppler velocimeters having one or more intersecting beam pairs are described. These velocimeters measure fluid velocity by observing the light scattered by particles in the fluid stream. Moving fluid particulates are simulated by fine taut wires that are radially mounted on a disk that is rotated at a known velocity. The laser beam intersection locus is first aimed at the very center of the disk and then the disk is translated so that the locus is swept by the rotating wires. The radial distance traversed is precisely measured so that the velocity of the wires (pseudo particles) may be calculated. NASA

N86-32698* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
APPARATUS AND METHOD FOR INSPECTING A BEARING BALL Patent
Benjamin F. Bankston, inventor (to NASA) Issued 5 Nov. 1985 7 p Filed 09 Mar. 1983 Supersedes N83-21316 (21 - 11, p 1699)
(NASA-Case-MFS-25833-1; US-Patent-4,551,677;
US-Patent-Appl-SN-473827; US-Patent-Class-324-226;
US-Patent-Class-324-238; US-Patent-Class-324-240;
US-Patent-Class-324-262; US-Patent-Class-73-37.5) Avail: US Patent and Trademark Office CSCL 14B

A method and apparatus for inspecting the surface of a ball bearing is disclosed which includes a base having a high friction non-abrasive base scanning surface. A holding device includes a cone-shaped cup recess in which a ball element is received. Air is introduced through a passage to relieve friction between the wall of the recess and the ball element and facilitate rolling of the ball over the high friction base surface. The holding device is moved over the base scanning surface in a predetermined pattern such that the entire surface of the ball element is inspected byan eddy current probe which detects any surface defects. NASA

N86-32699 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
PERFORMANCE PREDICTIONS FOR ROCKWELL INDENTERS
Jill G. Wood and June Cotter May 1985 42 p
(NPL-MOM-73; ISSN-0309-3069; ETN-86-97987) Copyright. Avail: Issuing Activity

The performance in Rockwell HRC, HRA, and HR30N scales of selected standardizing indenters is predicted from precision measurements of their geometric forms. The performances of standardizing indenters are established with respect to the ideal performance of a nominally dimensioned indenter. For commercially produced test indenters, errors in hardness corresponding to the tolerances for angle and radius are predicted over the full ranges of the three Rockwell scales. It is shown that a form of indenter with a flattened tip, typical of commercial production, can give a nominal performance in spite of having an average radius on the top limit of the permitted test tolerance. ESA

N86-32700*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ULTRASONIC DEPTH GAUGE FOR LIQUIDS UNDER HIGH PRESSURE Patent Application
Allan J. Zuckerwar and David S. Mazel, inventors (to NASA) (Old Dominion Univ., Norfolk, Va.) Filed 13 Feb. 1986 11 p
(NASA-Case-LAR-13300-CU; NAS 1.71:LAR-13300-CU;
US-Patent-Appl-SN-829042) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention relates to an ultrasonic depth gauge for liquids under high pressure and is particularly useful in the space industry where it is necessary to use a pressurized gas to transfer a liquid from one location to another. Conventional liquid depth gauges do not have the capability to operate under extreme high pressures (i.e.: exceeding 300 p.s.i.). An ultrasonic depth gauge capable of withstanding high pressure according to the present invention is comprised of a transducer assembly and a supporting electronics unit. The transducer assembly is mounted into the bottom wall of a storage vessel with its resonating surface directly exposed to the highly pressurized liquid in the vessel. In operation, the ultrasonic pulse propagates upward through the liquid to the liquid-gas interface in the storage vessel. When the ultrasonic echo returns from the liquid-gas interface, it re-excites the composite resonator into vibration. The supporting electronics unit measures the round-trip transmit time for the ultrasonic pulse and its return echo to traverse the depth of the highly pressurized liquid. The novelty of this invention resides in the use of a

conventional transducer rigidly bonded to the inside wall of a bored out conventional high-pressure plug to form a composite resonator capable of withstanding extremely high pressure. Author

N86-32701*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPROVED FLUX-GATE MAGNETOMETER Patent Application
H. Douglas Garner, inventor (to NASA) Filed 16 Jul. 1986 16 p (NASA-Case-13560-1; US-Patent-Appl-SN-886123) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention relates to a fluxgate magnetometer type device in which the directions and relative magnitudes of the components of the Earth's magnetic field, lying parallel to the longitudinal and to the transverse axes of the vehicle in which the device is mounted, are measured and used to calculate the heading of the vehicle with respect to magnetic north. The manner in which the components of the Earth's magnetic field are measured and the computing process used makes the device simple, inexpensive to manufacture and easy to calibrate. NASA

N86-32702*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESEARCH INSTRUMENTATION FOR HOT SECTION COMPONENTS OF TURBINE ENGINES
David R. Englund 1986 22 p Presented at the Symposium on Propulsion Instrumentation, Jiangyou, China, 6-10 Oct. 1986; sponsored by NASA and Chinese Aeronautical Establishment (NASA-TM-88851; E-3241; NAS 1.15:88851) Avail: NTIS HC A02/MF A01 CSCL 02B

Programs to develop research instrumentation for use on hot section components of turbine engines are discussed. These programs can be separated into two categories: one category includes instruments which can measure the environment within the combustor and turbine components, the other includes instruments which measure the response of engine components to the imposed environment. Included in the first category are instruments to measure total heat flux and fluctuating gas temperature. High temperature strain measuring systems, thin film sensors (e.g., turbine blade thermocouples) and a system to view the interior of a combustor during engine operation are programs which comprise the second category. The paper will describe the state of development of these sensors and measuring systems and, in some cases, show examples of measurements made with this instrumentation. The discussion will cover work done at NASA Lewis and at various contractor facilities. Author

N86-32703*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED INSTRUMENTATION FOR AERONAUTICAL PROPULSION RESEARCH
Melvin J. Hartmann 1986 23 p Presented at the Symposium on Propulsion Instrumentation, Jiangyou, China, 6-10 Oct. 1986; sponsored by NASA and Chinese Aeronautical Establishment (NASA-TM-88853; E-3244; NAS 1.15:88853) Avail: NTIS HC A02/MF A01 CSCL 14B

The development and use of advanced instrumentation and measurement systems are key to extending the understanding of the physical phenomena that limit the advancement of aeropropulsion systems. The data collected by using these systems are necessary to verify numerical models and to increase the technologists' intuition into the physical phenomena. The systems must be versatile enough to allow their use with older technology measurement systems, with computer-based data reduction systems, and with existing test facilities. Researchers in all aeropropulsion fields contribute to the development of these systems. Author

N86-32704# Department of the Air Force, Washington, D.C.
RADIATION MEASURING SYSTEM USING TRANSISTOR FLUX SENSORS Patent
Vernal Josephson and Edmond L. Greenberg, inventors (to Air Force) Issued 25 Feb. 1986 11 p Supersedes AD-D011239 (AD-D012255; US-Patent-4,572,954; US-Patent-Appl-SN-619240; US-Patent-Class-250-370) Avail: US Patent and Trademark Office CSCL 14/2

An ionizing radiation intensity dosimeter apparatus and method is based on carrier recombination saturation times for irradiated PN junction semiconductor devices following termination of a radiation pulse. Normally-on quiescent condition, moderate radiation doses at relatively high dose rates, and a read-out arrangement employing gated burst counting are included. Author (GRA)

N86-32705# Department of the Air Force, Washington, D.C.
DYNAMIC POLYMER PRESSURE TRANSDUCER WITH TEMPERATURE COMPENSATION Patent
Anthony J. Bur and Steven C. Roth, inventors (to Air Force) Issued 25 Mar. 1986 6 p Supersedes AD-D011373 (AD-D012285; US-Patent-4,577,510; US-Patent-Appl-SN-647782; US-Patent-Class-73-708) Avail: US Patent and Trademark Office CSCL 14/2

Accurate dynamic pressure data in a changing thermal environment is obtained through the use of a pressure gage formed from polyvinylidene fluoride (PVDF) polymer material. The temperature compensation pressure gage has three major elements: an active PVDF transducer which obtains remote pressure readings which are uncorrected for thermal effects; a thermocouple having a short rise time allowing an output thermal signal which dynamically responds to changing thermal conditions; and a compensation amplifier circuit receiving uncorrected pressure readings and the dynamic thermal signal and producing on output signal representing accurate pressure data which is corrected for changing thermal conditions. Also disclosed are the details of making an active PVDF transducer. GRA

N86-32706# Department of the Air Force, Washington, D.C.
FEED DISPLACEMENT CORRECTION IN A SPACE FED LENS ANTENNA Patent
Randy L. Haupt, inventor (to Air Force) Issued 25 Mar. 1986 12 p Supersedes AD-D011155 (AD-D012286; US-Patent-4,578,680; US-Patent-Appl-SN-606325; US-Patent-Class-343-703) Avail: US Patent and Trademark Office CSCL 09/5

A space fed microwave lens antenna for deployment in outer space or other remote, hazardous or unattended location is presented. Electronic means are provided for compensating for errors in the mechanical displacement of the phased array feed elements from the phased array lens elements. Author (GRA)

N86-32707# Department of the Air Force, Washington, D.C.
AUTOMATIC LOADING OF COMPOSITE TAPE USING CASSETTES Patent Application
Samuel I. Hailey, inventor (to Air Force) Filed 3 Feb. 1986 21 p (AD-D012338; US-Patent-Appl-SN-825113) Avail: NTIS HC A02/MF A01 CSCL 14/3

This patent application relates generally to laminating and tape-laying systems, and more specifically to a system of automatically loading composite tape onto tape-laying machine using cassettes. Automated composite laminating work centers reduce manufacturing costs and provide for high rates of production. A system for the automatic and continuous loading of composite tape into a tape-laying machine is disclosed. The system provides composite tape from a plurality of cassettes which are held in the magazine of a tape loading system. The tape loading system has a tape drive which feeds tape from a cassette in an active position to the tape-laying system in controlled amounts. The tape loading system also has a cassette transfer system which pushes a full cassette from a standby position into the active position when the cassette in the active position exhausts its supply of tape. GRA

N86-32708# Department of the Air Force, Washington, D.C.
POCKET SIZE ANTENNA MATCH INDICATOR FOR VSWR (VOLTAGE STANDING WAVE RATIO) MEASUREMENT Patent
Gerald K. Squire, inventor (to Air Force) Issued 1 Apr. 1986 8 p Supersedes AD-D010493 (AD-D012341; US-Patent-4,580,092; US-Patent-Appl-SN-506919; US-Patent-Class-324-57R) Avail: US Patent and Trademark

Office CSCL 14/2

A pocket size antenna match indicator is described having a self contained modulated low level RF signal source which is applied to an antenna or other load under test through a dual directional coupler. Sampled RF reflected signals are detected, filtered and amplified to provide a dc voltage directly proportional to antenna mismatch. Easy to read measurement of VSWR is derived from the dc voltage by means of a dot display driver connected to a LED display. Author (GRA)

N86-32709# Department of the Air Force, Washington, D.C.
TRANSCEIVER TEST DEVICE Patent
Warren H. Debany, Jr., Mark S. Zemgulis, and Norman J. Sturdevant, Jr., inventors (to Air Force) Issued 1 Apr. 1986 18 p Supersedes AD-D011728
(AD-D012342; US-Patent-4,580,274; US-Patent-Appl-SN-657092; US-Patent-Class-375-10) Avail: US Patent and Trademark Office CSCL 14/2

This patent discloses a device for testing the digital waveforms in a special purpose multi-channel transceiver system designed to operate in a tactical environment. As selected waveforms are presented to the test device, they are randomized over a fixed time period creating a unique signature for comparison with a prestored signature at the end of period. Uniquely assigned light emitting diodes identify which, if any, of the sequentially examined waveforms are incorrect. Provisions are included for latching the light emitting diodes in their illuminated state in order to detect non-recurrent fault conditions. GRA

N86-32710# Pennsylvania State Univ., University Park.
COMPUTATIONAL METHODS IN NEARFIELD ACOUSTIC HOLOGRAPHY (NAH), APPENDIX Ph.D. Thesis
William A. Veronesi May 1986 173 p
(Contract N00014-82-K-0610)
(AD-A168064) Avail: NTIS HC A08/MF A01 CSCL 20/1

The continuous integrals and integral equations which form the theory of Nearfield Acoustic Holography for planar and odd-shaped source boundary surfaces are reviewed, and the approximations and assumptions necessary to reduce these equations to a set of finite and discrete operations suitable for computation are developed. These equations represent the solution of the Helmholtz equation with specified boundary conditions by Green's function methods. Two computational methods for reconstructing planar source boundary fields from planar holograms are developed. The first method is an approximation of the continuous solution method which the convolution theorem of Fourier Transforms provides. As an alternative to this reconstruction method, a conjugate gradient descent method is developed based on the finite and discrete propagation method discussed. The reduction to finite and discrete form, by a Finite Element technique, of the relationship between the Dirichlet and Neumann boundary conditions for an odd shaped surface is reviewed. A technique for reconstructing the odd-shaped surface boundary conditions from a hologram of general two-dimensional shape is proposed. GRA

N86-32711# Lawrence Livermore National Lab., Calif.
ANALYSIS OF ELASTIC-PLASTIC RESISTANCE MATERIAL RESPONSE FOR STRESS GAGE DESIGN
R. B. Stout Apr. 1986 45 p
(Contract W-7405-eng-48)
(DE86-010777; UCID-20760) Avail: NTIS HC A03/MF A01

A deformation dependent model is developed for the resistivity changes of materials. The resistance response is represented as a functional that depends on measures of relative deformation between atoms and on dislocation density. Deformation dependent mechanisms of intrinsic resistivity are changes in the electronic band configurations, changes in the electron-phonon interaction cross-sections, and changes in the density of defect structures. The deformation dependent model for electronic band configurations is to represent changes in the number density of mobile electrons. The deformation dependent model for electron-phonon interaction and the density of defect structures is to represent changes in the scattering mechanisms that impede electron transport through a material. It is only after intrinsic resistivity is formulated in terms of recoverable and nonrecoverable deformation measures that a portion of a materials' resistance change can be isolated and explicitly identified as stress tensor dependent. This stress dependent part of the intrinsic resistivity response is referred to as the idealized piezoresistivity of a material. This idealized piezoresistivity is the change that depends on recoverable strains, which in the idealized case are elastic. In order to analyze and design reliable stress gages it is necessary to understand this idealized piezoresistance response, as well as other recoverable and nonrecoverable deformation dependent contributions to resistivity. Finally, an analysis is presented to demonstrate that a resistivity measurement for a single piezoresistance foil gage is not uniquely related to only one stress tensor applied to the gage. This analysis sugggests a new design for a triple material piezoresistance gage package to provide three independent and simultaneous resistivity measurements that are uniquely related to the three normal components of the stress tensor. DOE

N86-32712# Sandia National Labs., Albuquerque, N. Mex.
DEVELOPMENT OF AN ULTRA-LOW-LOAD MICROHARDNESS INDENTATION TEST MACHINE
D. T. Schmale, R. J. Bourcier, and E. Martinez Apr. 1986 25 p
(Contract DE-AC04-76DP-00789)
(DE86-011150; SAND-86-0509) Avail: NTIS HC A02/MF A01

As part of a program to characterize the mechanical response of surface modified materials, a microhardness indentation test machine has been developed. An electromagnetic drive system controls a diamond indenter which is suspended on a low friction ball slide. The test specimen is mounted on a cantilevered arm in a vertical plane perpendicular to the indentation direction on an X-Y micrometer translation system. Tests are controlled with a 16-bit A/D closed loop digital controller/function generator designed for this system. Load is monitored with a strain gage load cell while displacement is measured with a set of capacitance probes. Load/depth/time data are stored on a digital oscilloscope which is linked to a DEC LSI 11/23 for subsequent processing. The system allows indentation loading up to 1 kg with load resolutions of 5 mg and a depth resolution of 10 nm. DOE

N86-32713# Manville Service Corp., Denver, Colo.
HIGH TEMPERATURE CALORIMETER PERFORMANCE VARIABLE STUDY
R. Troyer Apr. 1986 96 p
(Contract DE-AC05-84OR-21400)
(DE86-010074; ORNL/Sub-84-19712/1) Avail: NTIS HC A05/MF A01

Oak Ridge National Laboratory with funding supplied by the Department of Energy sponsored the evaluation of a water calorimeter for thermal transmission testing of refractory fiber insulation using a ruggedness test. The specimens tested were low density refractory fiber flexible blanket insulation. The factors evaluated included: (1) emissivity of copper plate; (2) calorimeter to guard balance; (3) calorimeter to room temperature balance; (4) calorimeter water flow rate; (5) perimeter insulation; (6) type of hot side thermocouple, and (7) type of cold side thermocouple. A ruggedness test is a statistical method of evaluating step changes making multiple changes with each test. Five of the seven factors were found to be significant at a minimum of one temperature. One plate versus three plates, two inch thick specimen versus three inch thick specimen and a release agent were three factors that were tested independently of the ruggedness test. The specimens were also tested in a guarded hot plate for comparison purposes. Recommendations are given to improve the design and operation of the calorimeter. DOE

N86-32714# Los Alamos National Lab., N. Mex.
SPHERICITY MEASUREMENTS OF FULL SPHERES USING SUBAPERTURE OPTICAL TESTING TECHNIQUES
Robert D. Day, Thomas A. Beery, and George N. Lawrence 1986 9 p Presented at the SPIE International Symposium on Optical and Optoelectronic Applied Sciences and Engineering, Quebec

City, Ontario, 2-6 Jun. 1986 Submitted for publication
(Contract W-7405-ENG-36)
(DE86-011255; LA-UR-86-1617; CONF-860620-2) Avail: NTIS HC A02/MF A01

The progress being made on the development of applying subaperture interferometric testing techniques to make sphericity measurements on the entire surface of a full sphere is discussed. Author

N86-32715# Sandia National Labs., Albuquerque, N. Mex.
METHODS FOR VERIFYING STRAIN GAGE INSTALLATIONS
V. I. Bateman, R. A. May, and R. T. Reese 1986 7 p
(DE86-009286; SAND-85-1804C) Avail: NTIS HC A02/MF A01

Methods for verifying strain gage installations were developed for instrumented test structures subjected to hostile environments including high speed entry into water and earth. The methods include the comparison of the results of multiple state load tests with appropriate analytical predictions and the use of dynamic signature analysis to identify the mode shapes and frequencies of the test structures which are compared with predictions. These methods are used prior to and after the completion of an individual test or test series involving the instrumented test structure. Two examples are shown which describe the approach used and the results obtained. B.G.

N86-32716# European Space Agency, Paris (France).
MEASUREMENTS OF LASER GYRO ERRORS AS A FUNCTION OF BEAM PATH GEOMETRY
Ruediger Rodolff, Wolfgang Burchardt, and Werner Jungbluth Sep. 1985 42 p Original language document was announced as N85-28336
(ESA-TT-922; DFVLR-FB-85-02; ETN-86-97570) Avail: NTIS HC A03/MF A01; original German version available from DFVLR, Cologne, West Germany DM 16.50

A ring laser system with adjustable beam path was tested. The characteristics of the ring laser used as a laser gyro are influenced by the beam geometry. The lock-in threshold, the scale factor and the gyro drift are influenced by the mirror backscattering, the gas discharge parameters, the resonator losses, and by the beampath position within the resonator. ESA

N86-32483# Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
THE GIOTTO HALLEY MULTICOLOR CAMERA
W. K. H. Schmidt, H. U. Keller, K. Wilhelm, C. Arpigny (Liege Univ., Belgium), C. Barbieri (Padua Univ., Italy), L. Biermann (Max-Planck-Inst. fuer Physik und Astrophysik, Munich (West Germany), R. M. Bonnet (Liege Univ., Belgium), S. Cazes (Centre National de la Recherche Scientifique, Verrieres-Le Buisson, France), C. B. Cosmovici (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany), W. A. Delamere (Ball Aerospace Systems Div., Boulder, Colo.) et al *In* ESA The Giotto Mission: Its Scientific Investigations Mar. 1986 p 149-172 Original contains color illustrations (For primary document see N86-32473 24-12)
Avail: NTIS HC A10/MF A01; ESA, Paris, France, FF 200 Member States, AU, CN, and NO (+20% others)

N86-32809# Oceanor, Trondheim (Norway).
TECHNICAL EXPERIENCE WITH THE ARGOS SYSTEM FOR TRANSMISSION OF OCEANOGRAPHICAL DATA
Svein Erling Hansen *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.

N86-32717*# Brown Univ., Providence, R. I. Div. of Engineering.
THEORETICAL STUDIES OF RESONANCE ENHANCED STIMULATED RAMAN SCATTERING (RESRS) OF FREQUENCY DOUBLED ALEXANDRITE LASER WAVELENGTHS IN CESIUM VAPOR Progress Report
Nabil M. Lawandy 7 Oct. 1986 16 p
(Grant NAG5-526)
(NASA-CR-179768; NAS 1.26:179768) Avail: NTIS HC A02/MF A01 CSCL 20E

This work focused on understanding the effects of arbitrary transverse and longitudinal relaxation rates on the susceptibilities of coherently driven three-level systems. The approximation of a single relaxation rate often made in previous work is strongly invalidated by the variation in the spontaneous emission lifetime between various atomic level pairs in systems such as cesium. It is of great importance to the problem of nonlinear infrared generation to determine the dependence of both real and imaginary susceptibility on relaxation rates. The imaginary susceptibility on the pump transition determines the absorption of pump photons and the imaginary susceptibility on the laser transition determines the spectral dependence of the gain. This is of particular importance for pure Raman emission (i.e., absorption at linecenter of the gain transition) as it determines the tunability characteristics we are aiming to predict. The real susceptibility is important when cavities are used at the signal field as this will determine the loaded resonance of the Raman oscillator. Researchers show that in some cases which result from having different relaxation rates mode splitting may result, allowing more than one frequency to have the same Raman wavelength, possibly resulting in a temporal instability. Author

N86-32718# Department of the Air Force, Washington, D.C.
PHASE-CONJUGATE RESONATOR WITH A DOUBLE SBS (STIMULATED BRILLOUIN SCATTERING) MIRROR Patent
Thomas R. OMeara, inventor (to Air Force) Issued 25 Feb. 1986 5 p Supersedes AD-D010783
(AD-D012261; US-Patent-4,573,157; US-Patent-Appl-SN-559613; US-Patent-Class-372-19) Avail: US Patent and Trademark Office CSCL 20/6

A laser using a stimulated Brillouin scattering (SBS) mirror and a moving grating eliminates frequency walk-off of the reflected beams. A laser using a double-SBS mirror prevents frequency walkoff by having the other side of the SBS mirror as a conjugate moving grating. Author (GRA)

N86-32719# Department of the Air Force, Washington, D.C.
MONOLITHIC AREA ARRAY FOR LASER RANGING APPLICATION Patent Application
James Halvis, inventor (to Air Force) Filed 24 Feb. 1986 15 p
(AD-D012296; US-Patent-Appl-SN-831897) Avail: NTIS HC A02/MF A01 CSCL 20/5

Laser ranging in volume of interest is accomplished using a laser transmitter, a planar matrix of photosensitive optical elements, a memory, a display, and a mechanical or electronic shutter. The laser transmitter directs a pulsed laser towards the volume of interest. The mechanical or electronic shutter shields all light from the planar matrix of photosensitive optical elements except during an interval occuring between times corresponding to the minimum range and maximum range of this laser rangefinder. The photosensitive optical elements each produce an output signal to the memory when receiving target echo return signals from objects in the volume of interest. When the memory is plurality of charge coupled device storage registers integral to the optical elements, then the receiver array has its own internal memory, which may be accessed to indicate the range values of object within the volume of interest. GRA

N86-32720# Litton Systems, Inc., Morris Plains, N. J. Airtron Div.
INVESTIGATION OF SINGLE CRYSTAL SILICATES FOR BLUE TUNABLE LASERS Quarterly Progress Report, 1 Sep. - 30 Nov. 1985
R. F. Belt and J. A. Catalano Jan. 1986 37 p
(Contract N00014-85-C-0823)
(AD-A167613; QPR-1) Avail: NTIS HC A03/MF A01 CSCL 20/5

The single crystal growth of rare earth silicates was investigated for the purpose of tunable laser hosts. Silicates of the type R2SiO5, where R = La, Gd, Y, Lu, were prepared from stoichiometric melts and doped with Ce(3+) activators. Seed crystals were obtained from crystallized melt sections or by growth on an iridium wire. These seeds were utilized in standard Czochralski type growth to obtain larger single crystals. Cathodoluminescence experiments on both powders and single crystals showed wavelength shifts with different rare earth ions. The Gd, Y, and mixed crystals of Gd-Y silicates gave good bright emission with Ce(3+). The emission is broad band and covers the wavelength range of 370 to 525 nm. The peak emission can be centered near 450 to 460 nm by other compositions. Larger single crystals for laser hosts are under development. GRA

N86-32721# Materials Research Labs., Ascot Vale (Australia).
STATISTICAL MODEL FOR LASER SAFETY ANALYSIS
J. A. Hermann Jan. 1986 25 p
(AD-A167937; MRL-R-983) Avail: NTIS HC A02/MF A01 CSCL 20/6

A statistically-based model describing the effects of scintillations upon laser-beam propagation within the atmosphere has been investigated and has been applied to an analysis of laser safety. GRA

N86-32722# Department of the Navy, Washington, D. C.
RANGE DOPPLER COUPLING MAGNIFIER Patent
Bernard L. Lewis, inventor (to Navy) Issued 25 Mar. 1986 9 p Supersedes AD-D010594
(AD-D012316; US-Patent-4,578,677; US-Patent-Appl-SN-535085; US-Patent-Class-343-17.2PC) Avail: US Patent and Trademark Office CSCL 17/9

A pulse expander-compressor for magnifying the range-Doppler-coupling effects that accompany the use of frequency-modulation derived phase coded pulse compressors in order to accentuate the Doppler-coupling velocity effects on target echoes. The foregoing magnification is accomplished by generating a Doppler tolerant polyphase coded waveform with equal time spaces inserted between successive code elements in order to make the time difference between the first and last code elements independent of the number of code elements involved. These equal spaces may be variable in order to allow any desired target radial velocity to produce a phase difference between the first and last code elements of 2 pi. The foregoing may be implemented in a pulse expander-compressor by replacing each delay tc in the compressor input-signal expansion circuit by a set of N delay elements tc, and a set of N associated switches, the switches permitting each element in the set to be connected or bypassed, as desired. The time-dispersion circuit for the compressor is likewise modified by replacing each of its Mtc delays by a set of N delay elements Mtc, each of which is independently connectable or bypassable. GRA

N86-32723# Department of the Air Force, Washington, D.C.
SCANNING SYSTEM FOR MAPPING GAS FLOW UNIFORMITY IN A LASER Patent
David K. Neumann and Nicholas R. Pchelkin, inventors (to Air Force) Issued 15 Apr. 1986 6 p Supersedes AD-D010174
(AD-D012324; US-Patent-4,583,001; US-Patent-Appl-SN-475436; US-Patent-Class-250-573) Avail: US Patent and Trademark Office CSCL 17/5

A scanning system for mapping the degree of uniformity of gas flow in the cavity of a laser includes a carriage mounted for movement along a set of parallel tracks disposed along the side of a laser cavity. The carriage mounts an infrared detector in radiation receiving relationship with the laser cavity. A screw drive mechanism is coupled to the carriage for moving it in opposite directions on the tracks. Spaced windows along the side of the laser cavity allows passage of radiation from the laser cavity to the detector. Because of the alternating relationship between transmissive windows and non-transmissive plates which define the windows, successive portions of a voltage signal generated by the detector representing separate measurements can be easily identified with successive positions of the carriage along the laser cavity, and thus with particular successive portions of the laser cavity where measurement was taken. GRA

N86-32724# Department of the Air Force, Washington, D.C.
OPTICALLY PUMPED CW (CONTINUOUS WAVE) SEMICONDUCTOR RING LASER Patent
Michael M. Salour, Adrian Fuchs, and Dick Bebelaar, inventors (to Air Force) Issued 1 Apr. 1986 10 p Supersedes AD-D010977
(AD-D012326; US-Patent-4,580,269; US-Patent-Appl-SN-552554; US-Patent-Class-372-94) Avail: US Patent and Trademark Office CSCL 20/5

This patent discloses an optically pumped semiconductor ring laser having a plurality of reflective elements optically aligned with one another to form a ring-shaped resonant cavity. A semiconductor lasing medium is mounted within the ring-shaped resonant cavity by a transparent, heat conductive mount located within a vacuum/cooling chamber of the type which allows the passage of a laser beam therethrough. A pump beam initiates a lasing action within the ring-shaped resonant cavity to produce said laser beam and said laser beam exits the resonant cavity as a pair of outputs. An alternate embodiment of the above described semiconductor ring laser provides a semblance of unidirectional lasing operation. GRA

N86-32725# Department of the Air Force, Washington, D.C.
TWO-DIMENSIONAL PHASE LOCKED SEMICONDUCTOR LASER ARRAY Patent Application
Weng W. Chow, inventor (to Air Force) Filed 17 Mar. 1986 14 p
(AD-D012330; US-Patent-Appl-SN-840620) Avail: NTIS HC A02/MF A01 CSCL 20/5

A phase locked two-dimensional semiconductor laser array is disclosed that emits a unified wavefront using columns of individual lasers, each laser having a slant mirror between it and the other lasers in its column. The individual lasers are all evanescently coupled to the neighboring lasers. The slant mirrors reflect the light from the lasers next to it upwards out of the face of the array. The phase locking is accomplished by the evanescent wave coupling. The plane (uniform) wavefront is accomplished by the design of the array in which: each laser in an ith column forms an optical path length of x sub i with the slant mirror adjacent to it; and the optical path length between mirrors and lasers in the (i + 1) th column is given by: x sub i = x sub i(+1) + or - n (lambda/2) where lambda equals a measure of wavelength of the light transmitted out of the array, and n is an odd integer. GRA

N86-32726# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
GAIN ANISOTROPY IN LOW PRESSURE CHEMICAL LASERS
Harold Mirels 15 Apr. 1986 20 p
(Contract F04701-85-C-0086)
(AD-A168125; TR-0086(6060)-4; SD-TR-86-21) Avail: NTIS HC A02/MF A01 CSCL 20/5

Continuous-wave (CW) chemical lasers are frequently operated at pressures of the order of 1 Torr to achieve efficient lasing. At these pressures, the medium is inhomogeneously (Doppler) broadened, and the line shape (gain coefficient versus frequency), under power on operation, is a function of the viewing angle. For example, when viewed along the optical resonator axis, the line shape may have holes because of the radiation field; when viewed from a direction orthogonal to the resonator axis, it is free of holes. This anisotropy of the gain medium is the subject of the present study. The purpose is to aid in the experimental validation of numerical CW chemical laser codes wherein the line shape, as viewed along the resonator axis, is predicted, and experimental measurements of power on gain are made from an orthogonal direction. In the first portion of this study, general expressions for line shape are deduced. These expressions are then applied to determine both the axial and orthogonal gain distribution in a low pressure multimode CW chemical laser with a Fabry-Perot (F-P) resonator. GRA

N86-32727# Illinois Univ., Chicago. Dept. of Physics.
EQUIPMENT FOR SUBPICOSECOND EXTREME ULTRAVIOLET FACILITY Final Report, 15 Jul. 1984 - 14 Jul. 1985
Charles K. Rhodes, Keith Boyer, and Tsing Shan Luk 5 Feb. 1986 141 p
(Grant AF-AFOSR-0289-84)
(AD-A168263; AFOSR-86-0281TR) Avail: NTIS HC A07/MF A01 CSCL 20/5

The research program underway at the University of Illinois at Chicago, whose main goal is the development of coherent X-ray sources in the kilovolt range, is described. The new femtosecond source developed under the equipment grant provided by the Air Force has been placed in operation. GRA

N86-32728# Sandia National Labs., Albuquerque, N. Mex.
SANDIA X-RAY LASER PROGRAM
E. J. McGuire, M. K. Matzen, R. B. Spielman, M. A. Palmer, B. A. Hammel, D. L. Hanson, T. W. Hussey, W. W. Hsing, and R. J. Dukart 1985 12 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985
(Contract DE-AC04-76DP-00789)
(DE86-009282; SAND-85-2017C; CONF-851185-18) Avail: NTIS HC A02/MF A01

The Sandia X-ray Laser Program is based on the use of intense keV radiation produced by gas puff, Z-pinch implosions to photoionize Ne-like ions to F-like ions. A 3p-3s population inversion is generated by electron recombination processes. An annular stagnation shell is used to separate the imploding pump source from the lasant. We are also developing a converter technology for examing a Na-Ne line matching scheme. Experimental and computational results and comparisons will be presented. DOE

N86-32729# Paraiba Univ., Joao Pessoa (Brazil). Dept. de Fisica.
INTERACTING COLLECTIVE MODES IN A LASER CAVITY
E. L. Graca, A. L. de Brito, and B. Baseia 1985 10 p
(DE86-701945; UFPB-DF-09/85) Avail: NTIS (US Sales Only) HC A02/MF A01

Collective operators are defined for the quantized radiation field in a one-dimensional laser cavity coupled to a semi-infinite outside region and the overlaps of neighbouring collective modes are considered to show how they modify, in the linear appoximation, the time evolution of the radiation field below threshold. The model and procedure work directly within a continuous spectrum of modes and allow us to get an improved insight on the prescription for the laser field in single-mode operation. DOE

N86-32730# Lawrence Livermore National Lab., Calif.
MEASUREMENTS OF LASER GENERATED IMPULSE
T. King, D. Barrus, R. Dingus, Z. Osborne, and C. Phipps 1986 8 p Presented at the International Symposium on Intense Dynamic Loading and Its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-007378; LA-UR-86-634; CONF-860616-10) Avail: NTIS HC A02/MF A01

A summary of results obtained when the total impulse delivered by pulsed-laser illumination of planar targets in vacuum are studied. Data are presented for several target materials (aluminum and some of its alloys, titanium, and kevlar/epoxy structural composite) as a function of incident fluence for laser wavelengths of 248 nm, 2.8 (MU)m, and 10.6 (MU)m. DOE

N86-32731# Los Alamos National Lab., N. Mex.
GAIN PHYSICS OF RF-LINAC-DRIVEN XUV FREE-ELECTRON LASERS
J. C. Goldstein, B. D. McVey, and B. E. Newnam 1986 22 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986
(Contract W-7405-eng-36)
(DE86-010201; LA-UR-86-1420; CONF-860316-6) Avail: NTIS HC A02/MF A01

In an RF-linac-driven XUV free-electron laser oscillator, the gain depends on the details of the shape of the electron beam's phase-space distribution, particularly the distribution of electrons in the transverse (to the direction of propagation) position and velocity coordinates. This strong dependence occurs because the gain in this device is inhomogeneously broadened. Our previous theoretical studies have assumed that the transverse phase space distribution is a product of uncorrelated Gaussian functions. In the present work, we shall present the results of a theoretical study of the gain for non-Gaussian phase-space distributions. Such distributions arise either from a better representation of the electron beam from an RF-linac or from an emittance filter applied to the beam after the linac. DOE

N86-32732# Allied Bendix Corp., Kansas City, Mo.
YAG LASER MONITORING Final Report
L. D. Wonnell Apr. 1986 31 p
(Contract DE-AC04-76DP-00613)
(DE86-010301; BDX-613-3425) Avail: NTIS HC A03/MF A01

A program has been initiated to characterize, calibrate, and monitor the output of high power Nd:YAG lasers at Allied Corporation, Bendix Kansas City Division (BKC). This program was developed to aid in maintaining product quality in the application of these lasers during manufacturing processes. Reference standards have been established, a basic calibration procedure outlined, critical laser output parameters identified, and recommendations made on instrumentation for in-process monitoring of Nd:YAG lasers. Success was related to the design and construction of two major items, a reference sensor assembly for characterizing and calibrating the direct output of a laser and a laser output monitor for continuous monitoring of a laser's output. DOE

N86-32733# Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Quantum Electronica.
MARX GENERATOR: KrF LASER Ph.D. Thesis [MARX-GENERATOR. KrF LASER]
J. P. H. Rijntjes Apr. 1984 45 p In DUTCH
(ETN-86-97375) Avail: NTIS HC A03/MF A01

The impact of dimensioning and material choice upon a vacuum diode, consisting of a cathode with a hollow coaxial anode inside, was investigated using an optically triggered Marx generator with a 120 J maximum power capacity and a 50 nsec pulse length. The effects of different division pressure of Ar, Kr, and Fl upon the output power of the laser were examined in this set-up, in which accelerated electrons were provided in the anode for excitation or ionization of the Ar-gas. Measurements to determine the effects of different diode impedances upon the output power were carried out. ESA

N86-32734# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung fuer Optoelektronik.
CONSIDERATIONS AND CALCULATIONS FOR APPLICATION OF AN OPTICAL AMPLIFIER AS AN END AND PREAMPLIFIER
Friedrich Malota Jan. 1986 41 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-11; ISSN-0171-1342; ETN-86-97820) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 13

The simultaneous application of an optical amplifier for outgoing laser pulses and as a preamplifier for such pulses, which are reflected from a target are discussed. The calculations show that such application is possible, when definite time differences between outgoing pulses and reflected ones are kept. Calculations for the signal to noise ratio of preamplifiers are given. ESA

N86-32735# Paris-Sud Univ., Orsay (France). Lab. de Physique des Gaz et des Plasmas.
MODEL OF THE X-RAY INDUCTION OF A HIGH PRESSURE ARGON DISCHARGE [MODELISATION DU PHOTODECLENCHEMENT PAR RAYONS X D UNE DECHARGE DARGON HAUTE PRESSION]
Y. Louvet and J. Bretagne Apr. 1986 85 p In FRENCH
(LP-217; ETN-86-97879) Avail: NTIS HC A05/MF A01

The determination of the electron distribution function in the preionization phase of a laser discharge, the Boltzmann equations,

the equation describing the elastic and inelastic collisions, the effects of external fields, the analysis of the photoionization contribution, and the numerical solution of the Boltzmann equation are reviewed. The data acquisition problems are discussed, including the measurement of X ray conversion and the determination of the spectral distribution. Experimental and theoretical data are presented. ESA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N86-32736*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD OF REPAIRING HIDDEN LEAKS IN TUBES Patent
Joseph D. Duesberg, inventor (to NASA) and Raymond C. Mills, Sr., inventor (to NASA) Issued 12 Aug. 1986 5 p Filed 30 Aug. 1985 Supersedes N86-20802 (24 - 11, p 1783)
(NASA-Case-MFS-19796-1; US-Patent-4,605,155;
US-Patent-Appl-SN-770920; US-Patent-Class-228-119;
US-Patent-Class-138-97; US-Patent-Class-165-76;
US-Patent-Class-29-402.16) Avail: US Patent and Trademark Office CSCL 13I

A method of repairing a tubular assembly in which access to a defect in the tube is limited includes the steps of cutting an opening in the tube on the side opposite the defect so as to expose the defect from the inside of the tube. A tubular insert is inserted into the tube to cover the defect and is secured in place by means of brazing or welding. The remaining space between the opening and insert is closed by means of close-out patches which are welded or brazed to both the insert and the tube. The result is a permanent repair having great structural integrity. NASA

N86-32737* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEPLOYABLE M-BRACED TRUSS STRUCTURE Patent
Martin M. Mikulas, Jr., inventor (to NASA) and Marvin D. Rhodes, inventor (to NASA) Issued 12 Aug. 1986 8 p Filed 30 Jul. 1985 Supersedes N86-20799 (24 - 11, p 1783)
(NASA-Case-LAR-13081-1; US-Patent-4,604,844;
US-Patent-Appl-SN-760378; US-Patent-Class-52-632;
US-Patent-Class-52-111; US-Patent-Class-52-645;
US-Patent-Class-52-646) Avail: US Patent and Trademark Office CSCL 13I

A deployable M-braced truss structure, efficiently packaged into a compact stowed position and expandable to an operative position at the use site is described. The M-braced configuration effectively separates tension compression and shear in the structure and permits efficient structural design. Both diagonals and longerons telescope from an M-braced base unit and deploy either pneumatically, mechanically by springs or cables, or by powered reciprocating mechanisms. Upon full deployment, the diagonals and longerons lock into place with a simple latch mechanism. NASA

N86-32738* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REMOTELY OPERABLE PERISTALTIC PUMP Patent
Robert R. Belew, inventor (to NASA) Issued 5 Aug. 1986 11 p Filed 08 Mar. 1985 Supersedes N85-29288 (23 - 18, p 3116)
(NASA-Case-MFS-28059-1; US-Patent-4,604,038;
US-Patent-Appl-SN-709255; US-Patent-Class-417-475) Avail: US Patent and Trademark Office CSCL 13K

A peristaltic pump is disclosed which includes a roller assembly on which is mounted a series of pump rollers. As the roller assembly is rotated by a drive gear the pump rollers are driven in reverse rotation by means of a stationary ring gear and pump roller gears. An upper pressure shoe plate and a lower pressure shoe plate are positioned above sets of flexible tubing. The tubing is sandwiched between the pressure shoe plates and the pump rollers. A highly compact pump is provided having twice as many fluid channel lines as is conventional. The peristaltic pump device may be remotely operated by means of a rotary actuator which rotates a driving hub to move the shoe plates by means of eccentrically mounted links. The pressure shoe plates may be moved by the rotary actuator to a loaded position in which the fluid lines are pinched by the pump rollers and fluid is pumped to an unloaded position in which the fluid lines are maintained in an undeformed, uncrimped configuration so that no creases or crimps are set into the fluid lines during periods of prolonged nonuse. NASA

N86-32739 Michigan Univ., Ann Arbor.
MINIMUM-COST CONTROL OF ROBOTIC MANIPULATORS WITH GEOMETRIC PATH CONSTRAINTS Ph.D. Thesis
Neil David McKay 1985 311 p
Avail: Univ. Microfilms Order No. DA8600499

A variety of control schemes for industrial robots has been described in the literature, which usually divides control into three levels. The upper level is a task planner, which generates a geometric path which the robot follows in order to accomplish a task. The middle level is a trajectory planner, which assigns timing information to the geometric path. This typically is done so as to minimize some cost function while meeting the constraints imposed by the robot's dynamics and actuator characteristics. The lower level consists of a tracker, which tries to make the robot's actual behavior match the desired behavior. The middle level of the control process, trajectory planning is discussed here. Three methods for solving the trajectory planning problem are presented. Two of these apply only to minimum time trajectory planning, while the third can minimize a wide variety of cost functions. Usually the dynamics of the robot are assumed to be known during trajectory planning. However, if the dynamics are not known exactly, the nominal trajectory produced by the trajectory planner may not be realizable. To solve this problem, one of the trajectory planning methods has been extended so that rather than producing a minimum-time trajectory for a given nominal payload, it will produce that trajectory which has the shortest possible traversal time given that the trajectory must meet the actuator constraints for all payloads which fall into a given range. The technique can easily be extended to other sources of dynamic variations.Dissert. Abstr.

N86-32740*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL STRESS MINIMIZED, TWO COMPONENT, TURBINE SHROUD SEAL Patent Application
Robert F. Handschuh, inventor (to NASA) Filed 18 Jun. 1986 17 p
(NASA-Case-LEW-14212-1; US-Patent-Appl-SN-875798) Avail: NTIS HC A02/MF A01 CSCL 11A

In a turbine machine, a two component shroud seal which maximizes insulation and sealing around the rotating turbine blades and made by independently fabricating each of the two components then joining them together is disclosed. The two components may be joined together at room temperature. The resulting shroud seal provides greater engine efficiency and thrust. NASA

N86-32741*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
SMALL CENTRIFUGAL PUMPS FOR LOW-THRUST ROCKET ENGINES Interim Report
R. B. Furst 21 Mar. 1986 114 p
(Contract NAS3-23164)
(NASA-CR-174913; NAS 1.26:174913; RI/RD85-183) Avail: NTIS HC A06/MF A01 CSCL 13K

Six small, low specific speed centrifugal pump configurations were designed, fabricated, and tested. The configurations included shrouded, and 25 and 100% admission open face impellers with 2 inch tip diameters; 25, 50, and 100% emission vaned diffusers; and volutes with conical exits. Impeller tip widths varied from 0.030 inch to 0.052 inch. Design specific speeds (N sub s = RPM*GPM**0.5.FT**0.75) were 430 (four configurations) and 215 (two configurations). The six configurations were tested with water

as the pumped fluid. Noncavitating performance results are presented for the design speed of 24,500 rpm over a flowrate range from 1 to 6 gpm for the N sub s = 430 configurations and test speeds up to 29,000 rpm over a flowrate range from 0.3 to 1.2 gpm for the N sub s = 215 configurations. Cavitating performance results are presented over a flowrate range from 60 to 120% of design flow. Fabrication of the small pump conponents is also discussed. Author

N86-32742*# Texas A&M Univ., College Station.
A COMPARISON OF EXPERIMENTAL AND THEORETICAL RESULTS FOR LEAKAGE, PRESSURE GRADIENTS, AND ROTORDYNAMIC COEFFICIENTS FOR TAPERED ANNULAR GAS SEAL Progress Report
David Alan Elrod and Dara W. Childs Sep. 1986 128 p
(Grant NAG3-181)
(NASA-CR-179709; NAS 1.26:179709; TRC-SEAL-4-86) Avail: NTIS HC A07/MF A01 CSCL 11A

A brief review of current annular seal theory and a discussion of the predicted effect on stiffness of tapering the seal stator are presented. An outline of Nelson's analytical-computational method for determining rotordynamic coefficients for annular compressible-flow seals is included. Modifications to increase the maximum rotor speed of an existing air-seal test apparatus at Texas A&M University are described. Experimental results, including leakage, entrance-loss coefficients, pressure distributions, and normalized rotordynamic coefficients, are presented for four convergent-tapered, smooth-rotor, smooth-stator seals. A comparison of the test results shows that an inlet-to-exit clearance ratio of 1.5 to 2.0 provides the maximum direct stiffness, a clearance ratio of 2.5 provides the greatest stability, and a clearance ratio of 1.0 provides the least stability. The experimental results are compared to theoretical results from Nelson's analysis with good agreement. Test results for cross-coupled stiffness show less sensitivity of fluid prerotation than predicted. Author

N86-32743*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
IMPROVED FRACTURE TOUGHNESS CORROSION-RESISTANT BEARING MATERIAL Final Report, 1981-1984
E. N. Bamberger and A. H. Nahm Jan. 1986 81 p
(Contract NAS3-22508)
(NASA-CR-174990; NAS 1.26:174990; R86AEB104) Avail: NTIS HC A05/MF A01 CSCL 13I

A development program was performed to establish whether a corrosion-resistant bearing material, such as a 14Cr steel, could be modified to allow carburization, thereby providing the excellent fracture toughness characteristics feasible with this process. The alloy selected for investigation was AMS 5749. Several modifications were made including the addition of a small amount of nickel for austenite stabilization. While some promising results were achieved, the primary objective of an acceptable combination of case hardness and microstructure was not attained. Because the high chromium content presents a serious problem in achieving a viable carburizing cycle, a number of experimental steels having lower chromium contents (8 to 12%) were produced in laboratory quantities and evaluated. The results were basically the same as those initially obtained with the modified AMS 5749. Corrosion tests were performed on AMS 5749, AISI M50, and 52100 bearing steels as well as some of the lower chromium steels. These tests showed that a reduced chromium level (10 to 12%) provided essentially the same corrosion protection as the 14Cr steels. Author

N86-32744# Department of the Air Force, Washington, D.C.
CONSTANT SPEED DRIVE WITH COMPENSATION USING DIFFERENTIAL GEARS Patent
William U. Borger, inventor (to Air Force) Issued 25 Feb. 1986 13 p Supersedes AD-D011156
(AD-D012256; US-Patent-4,572,961; US-Patent-Appl-SN-601514; US-Patent-Class-290-4) Avail: US Patent and Trademark Office CSCL 01/3

The electrical supply system on aircraft may employ a constant speed drive to convert variable engine speed to constant speed for operation of synchronous 400 Hz electrical generators. The heart of these devices is a differential which mechanically sums the input of two shafts and outputs this sum to a third shaft. Connected to this third shaft is a constant speed synchronous generator. Connected to one of the input shafts is the turbine generator. The second input shaft is connected to a speed compensating drive which accounts for engine speed changes. The speed compensating device disclosed in this patent is an electrically compensating motor/generator arrangement. Bidirectional power flow in the electric compensation link uses two high-speed, permanent-magnet, three-phase machines interconnected by a power conditioning network. One machine is operated as a brushless dc machine, while the other functions as a variable speed synchronous machine. Steady-state performance of two types of power conditioning are presented-a dc link inverter and a cycloconverter link. GRA

N86-32745# Department of the Air Force, Washington, D.C.
TORQUE LIMITING COLLAR Patent
Lawrence E. Fielding, inventor (to Air Force) Issued 25 Mar. 1986 5 p
(AD-D012275; US-Patent-4,577,891; US-Patent-Appl-SN-546222; US-Patent-Class-285-62) Avail: US Patent and Trademark Office CSCL 13/5

A torque limiting collar includes a support plate attached to a stationary support adjacent a fitting and a locking plate engaged with a nonmovable part of the fitting and bolted to the support plate. When the rotatable portion of the fitting is tightened against the nonmovable part, the torque is transmitted through the locking and support plates to the stationary support instead of being transmitted into the conduit connected to the nonmovable or rigid part of the fitting. The locking plate has an edge defined in the configuration of a segment of a socket pattern which matches and mates with the profile of the rigid part of the fitting. GRA

N86-32746# Department of the Air Force, Washington, D.C.
LOW MASS DIFFUSION BONDING TOOLS Patent Application
Wallace R. MacKenzie, inventor (to Air Force) Filed 24 Feb. 1986 27 p
(AD-D012295; US-Patent-Appl-SN-832114) Avail: NTIS HC A03/MF A01 CSCL 13/9

This invention relates to the field of tooling spacer blocks or mandrels enabling fabrication of complex structures from individual component elements using diffusion bonding and similar element integrating techniques. This patent application describes diffusion bonding spacer block tooling or mandrels having low physical mass and low thermal mass and specially adapted to the fabrication of airframe component elements such as titanium structures. Alternate uses for the disclosed structure and a plurality of spacer block example configurations and preferred stainless steel mandrel material are included, along with a sequence for using the disclosed spacer blocks. GRA

N86-32747# Massachusetts Inst. of Tech., Cambridge.
ESTIMATION OF INERTIAL PARAMETERS OF RIGID BODY LINKS OF MANIPULATORS
Chae H. An, Christopher G. Atkeson, and John M. Hollerbach Feb. 1986 20 p
(Contracts N0014-80-C-0505; N00014-82-K-0334)
(AD-A167930; AI-M-887) Avail: NTIS HC A02/MF A01 CSCL 13/13

A method of estimating the mass, the location of center of mass, and the moments of inertia of each rigid body link of a robot during general manipulator movement is presented. The algorithm is derived from the Newton-Euler equations, and uses measurements of the joint torques as well as the measurement and calculation of the kinematics of the manipulator while it is moving. The identification equations are linear in the desired unknown parameters, and a modified least squares algorithm is used to obtain estimates of these parameters. Some of the parameters, however, are not identifiable due to the restricted motion of proximal links and the lack of full force/torque sensing.

The algorithm was implemented on the MIT Serial Link Direct Drive Arm. A good match was obtained between joint torques predicted from the estimated parameters and the joint torques computed from motor currents. GRA

N86-32748# Department of the Navy, Washington, D. C.
LEAK FREE FLOATING PACKING SHAFT SEAL Patent
John D. Spargo, A. B. Neild, and Martha M. Phillips, inventors (to Navy) Issued 25 Feb. 1986 11 p
(AD-D012311; US-Patent-4,572,518; US-Patent-Appl-SN-666938; US-Patent-Class-277-75) Avail: US Patent and Trademark Office CSCL 13/10

A leak free floating packing shaft seal is provided for a rotatable shaft and a supporting annular structure has a high pressure upstream side and a low pressure downstream side. The floating seal includes and annular holder which is slidably mounted in the supporting structure for radial movement therein. A ring of packing material is mounted in a recess in the inner circumferential side of the holder. A first O-ring arrangement is mounted between the supporting structure and the upstream side of the holder for effecting a seal from the high pressure environment, and second O-ring arrangement is mounted between the supporting structure and the downstream side of the holder. At least one passageway is provided for communicating the upstream and downstream side of the holder. A least one passageway is provided for communicating the upstream and downstream size of the holder. At least one passageway is provided for communicating the upstream and downstream size of the holder for balancing the pressures therebetween. With this arrangement the holder is free to undergo the radial movement without leakage and the detriment of lateral forces thereon. GRA

N86-32749# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
AND/OR GRAPH REPRESENTATION OF ASSEMBLY PLANS Interim Report
Luiz S. H. de Mello and Arthur C. Sanderson Apr. 1986 26 p Sponsored in part by Conselho Nacional de Desenvolvimento Cientifico e Technologico
(AD-A168036; CMU-RI-TR-86-8) Avail: NTIS HC A03/MF A01 CSCL 13/9

Presented is a compact representation of all possible assembly plans of a given product using AND/OR graphs. Such a representation forms the basis for efficient planning algorithms which permit an increase in assembly system flexibility by allowing an intelligent robot to pick a course of action according to instantaneous conditions. Two applications are discussed: the selection of the best assembly plan (off-line planning), land opportunistic scheduling (on-line planning). An example of an assembly with four parts illustrates the use of the AND/OR graph representation to find the best assembly plan based on weighing of operations according to complexity of manipulation and stability of subassemblies. In practice, a generic search algorithm, such as the AO may be used to fine this plan. The scheduling efficiency using this representation is compared to fixed sequence and precedence graph representations. The AND/OR graph consistently reduces the average number of operations. GRA

N86-32750# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
A COMPARISON OF A MANUAL AND COMPUTER-INTEGRATED PRODUCTION PROCESS IN TERMS OF PROCESS CONTROL DECISION-MAKING Interim Report
Steven M. Miller and Susan R. Bereiter Mar. 1986 50 p
(AD-A168037; CMU-RI-TR-86-6) Avail: NTIS HC A03/MF A01 CSCL 13/8

This report is an investigation into the changes in process control that took place in the body shop of a vehicle assembly plant that was modernized from a principally manual process to one that extensively uses programmable automation. In this study, process control is defined as the information flow and decision-making required to perform basic process operations. We investigate affects of the implementation of a computer-integrated production system on the amount of process control decision-making, the types of process control decisions being made, and the distribution process control decision-making between humans and machines. We found that as a result of the modernization, the amount of process control decision-making nearly tripled, the emphasis on decisions to meet product quality specifications increased, and the emphasis on decisions related to flexibility in handling a variety of product options decreased. Decisions relating to meeting product quality specifications and to timing and synchronization of tasks were mostly taken on by the automated equipment, while decisions relating to the flexibility of the process remained to a large extent under manual control. Whereas humans made nearly 75 percent of the decisions required to assemble and weld a vehicle body in the principally manual system, humans made fewer than ten percent of the comparable decisions in the automated system. GRA

N86-32751# Virginia Univ., Charlottesville. Dept. of Electrical Engineering.
BIOLOGICAL VISUAL SYSTEMS STRUCTURES FOR MACHINE VISION APPLIED TO ROBOTICS Final Report, 15 Sep. 1984 - 31 Jan. 1986
Rafael M. Inigo, Chen H. Hsin, Chiewdarn Narathong, Eugene S. McVey, and Jay I. Minnix Feb. 1986 333 p
(Grant AF-AFOSR-0349-84)
(AD-A168521; UVA/525647/EE86/101; AFOSR-86-0282TR) Avail: NTIS HC A15/MF A01 CSCL 06/4

This report describes the research on a biological visual system (BVS) based sensor with possible applications to robotics and automation. The report covers the following subjects: sensor configuration; edge detection modeling for the human visual system and edge detection using the BVS sensor. qualitative motion detection using the BVS; target tracking algorithms for the BVS; and microsaccadic eye movement in the human visual system (HVS). GRA

N86-32752# Michigan Univ., Ann Arbor. Robot Systems Div.
COORDINATED RESEARCH IN ROBOTICS AND INTEGRATED MANUFACTURING Final Report, 1 Aug. 1984 - 30 Oct. 1985
D. E. Atkins, R. A. Volz, Elmer E. Gilbert, Robert M. Howe, and Keki B. Irani Nov. 1985 126 p
(Contract F49620-82-C-0089)
(AD-A168524; RSD-TR-15-85; AFOSR-86-0322TR) Avail: NTIS HC A07/MF A01 CSCL 13/9

The research procured under this contract is oriented toward the understanding and development of the flexible robot based manufacturing cells or islands which will increasingly become basic blocks for the building of modern parts production and assembly facilities. Present work spans a hierarchy of sub-systems oriented toward the development and integration of high performance manipulators into flexible manufacturing cells. The research topics being pursued range from highly sophisticated and accurate control algorithms for robot arm control, new types of sensors, analysis and use of advanced sensors information, to higher level languages for robot control, integration of robot systems with CAD databases, and heuristic problem solving techniques. GRA

N86-32753# Lawrence Livermore National Lab., Calif.
OPERATING EFFICIENCIES OF A LYSHOLM HELICAL EXPANDER FOR BRAYTON-CYCLE HEAT ENGINES
B. Myers, G. Deis, and T. Shell Jan. 1986 10 p Presented at the 31st International Gas Turbine Conference and Exhibit, Dusseldorf, West Germany, 8 Jun. 1986
(Contract W-7405-eng-48)
(DE86-007178; UCRL-94019; CONF-860635-3) Avail: NTIS HC A02/MF A01

Operating tests on a Lysholm helical expander have been done to develop a data base for comparing the performance of helical expanders with turbine expanders by using simple scaling arguments. The eventual goal of such work would be to develop a rugged and reliable ceramic helical expander for operating at temperatures up to 1300 C (2400 F). We used a 127.5 mm (5.020 in.) metal expander on which we measured seven perfor-

mance variables against applied pressure ratio at six shaft speeds and an inlet gas temperature of 100 C (212 F). Our data system included: a torque and angular-speed cell to measure power; flow, pressure, and temperature instrumentation; and a data reduction program. Test results are presented in seven data plots; equations for computing the performance variables are tabulated. Adiabatic efficiency was found to be at least 85% in the pressure ratio range of 2.75 to 5.00. Performance is strongly influenced by gas leakage. Large machines with clearance ratios the same as smaller machines would benefit by size scaling effects. It is expected that ceramic helical expanders for 1300 C service would be able to operate at adiabatic efficiencies higher than 85%. DOE

N86-32754# Helsinki Univ. Technology, Otaniemi (Finland). Internal Combustion Engine Lab.
EXHAUST GAS ANALYSIS OF A DIESEL ENGINE USING ALCOHOL AS A FUEL
R. Turunen 1985 43 p In FINNISH
(DE86-751654; TKK-KO/PM-46) Avail: NTIS (US Sales Only) HC A03/MF A01

Described is the exhaust emission test equipment used in Helsinki University of Technology at the Laboratory of Internal Combustion. The test equipment consists of CO2- and O2-analyzers and the analysis systems for CH-, NOsub(x)- and CO-emissions. The equipment is intended for measurements in diesel engines and is to a great extent constructed according to the new ECE 49 regulation proposal. DOE

N86-32755# Helsinki Univ. Technology, Otaniemi (Finland). Internal Combustion Engine Lab.
PRACTICAL PROPERTIES OF ETHANOL USED AS A FUEL IN DIESEL ENGINE SUPERCHARGED IN DIFFERENT WAYS
J. Kivijaervi 1984 145 p In FINNISH
(DE86-751656; TKK-KO/PM-45) Avail: NTIS (US Sales Only) HC A07/MF A01

This report describes the practical properties of ethanol mixtures containing one ignition improver (octyl nitrate) when the alcohol is used as a fuel in a high speed direct injection diesel engine supercharged in different ways. Diesel oil was used as a reference fuel, and as supercharging methods, turbocharging, comprexcharging, and combined supercharging were employed. DOE

N86-32756# Michigan Univ., Ann Arbor. Dept. of Nuclear Engineering.
LASER DRIVEN MICRO-EXPLOSIVE BONDING
D. Alexander Feb. 1986 52 p
(Contract DE-AC05-76OR-00033)
(DE86-010837; DOE/OR-00033/T178) Avail: NTIS HC A04/MF A01

This experiment demonstrated the ability of the LEM process to bond micron thick films of Al to both Cu and Si substrates. Bonding was observed for laser intensities ranging from 1.0 - 9.0 x 10 W cm. DOE

N86-32757# State Univ. of New York, Buffalo. Dept. of Mechanical and Aerospace Engineering.
AIR FLOW INSIDE A PNEUMATIC TIRE Final Report
W. J. Rae Aug. 1985 25 p
(Contract DE-FG02-84ER-13239)
(DE86-007850; DOE/ER-13239/1) Avail: NTIS HC A02/MF A01

This document contains a final report on all technical activity on Contract No. DE-FG02-84ER13239. This work involved a one-year theoretical study of the airflow that takes place inside a rolling pneumatic tire. Analytical and numerical studies of the flow are reported, which show details of the velocity, pressure and temperature fields that are generated at low forward speed. These results are found to be consistent with velocity-field measurements taken under a previous Department of Energy study. DOE

N86-32758# Oak Ridge National Lab., Tenn.
PULSATILE FLUIDIC PUMP DEMONSTRATION AND PREDICTIVE MODEL APPLICATION
J. G. Morgan and W. D. Holland Apr. 1986 36 p
(Contract DE-AC05-84OR-21400)
(DE86-010078; ORNL/TM-9913) Avail: NTIS HC A03/MF A01

Pulsatile fluidic pumps were developed as a remotely controlled method of transferring or mixing feed solutions. A test in the Integrated Equipment Test facility demonstrated the performance of a critically safe geometry pump suitable for use in a 0.1-ton/d heavy metal (HM) fuel reprocessing plant. A predictive model was developed to calculate output flows under a wide range of external system conditions. Predictive and experimental flow rates are compared for both submerged and unsubmerged fluidic pump cases. DOE

N86-32759# Ohio State Univ., Columbus. Dept. of Welding Engineering.
THE 400 Hz WELDING TRANSFORMER GUN ASSEMBLY EVALUATION Final Report
D. G. Kasten and W. Penix Apr. 1986 71 p
(Contract DE-FG01-84CE-15192)
(DE86-010211; DOE/CE-15192/T2) Avail: NTIS HC A04/MF A01

This project deals with the experimental evaluation of resistance welding transformer and gun assemblies used for high frequency (400 Hz) operation. DOE

N86-32760# Ohio State Univ., Columbus. Dept. of Welding Engineering.
THE 400 Hz WELDING TRANSFORMER GUN ASSEMBLY EVALUATION Final Report
Donald G. Kasten and Wayne Penix 13 Mar. 1986 51 p
(Contract DE-FG01-84CE-15192)
(DE86-009973; DOE/CE-15192/T1) Avail: NTIS HC A04/MF A01

A transformer was evaluated under higher frequency operations (approximately 400 Hz). This evaluation was facilitated by the monitoring of the instantaneous transformer voltages and currents. In addition winding temperature can be monitored using the cooling water. Author

N86-32761# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Telecommunicatie EC.
INVESTIGATION FOR DISTURBANCES OF THE INDEX PROFILE IN JOINTS OF ARC WELDED GLASS FIBERS [ONDERZOEK NAAR VERSTORING VAN HET INDEXPROFIEL IN LASSEN VAN VLAMBOOGGELASTE GLASVEZELS]
P. P. vandeMortel Mar. 1984 51 p In DUTCH
(ETN-86-97536) Avail: NTIS HC A04/MF A01

The course of the index profile in a welded joint was investigated using a reflectometric method. Arc welding usually disturbs the profile and causes extra damping. The surfaces to be measured were prepared by polishing. In order to remove the evenly spread material and stabilize the profile, the surface was etched and passivated. Results show a maximum index value of 0.0005. Because of hindering effects, i.e., the time dependent index profile of the polished fiber, the impossibility to measure the surface etched, disturbance susceptibility, and roundabout preparations, the method is not recommended. ESA

N86-32762# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
EVALUATION OF DIFFUSION DENSIFICATION HEALING (DDH) AND WELD REPAIRED F100 TURBINE VANES UNDER SIMULATED SERVICE CONDITIONS
A. J. A. Mom, N. M. Madhava, G. A. Kool, and M. Dean 19 Aug. 1985 13 p Presented at AGARD Structures and Materials Specialists Meeting on Advanced Joining of Metallic Materials, Oberammergau, West Germany, Sep. 1985
(NLR-MP-85065-U; B8664044; ETN-86-97682) Avail: NTIS HC A02/MF A01

The diffusion densification healing (DDH) process as applied to repair of cracked and unserviceable F100 turbine vanes was evaluated under simulated service test conditions with respect to

the conventional weld/patch coat repair procedure. The evaluation shows that the DDH process is a remarkably effective restoration process, resulting in strongly improved test behavior in relation to the original weld/patch coat procedure. Additional advantages are that scrap rates during repair are considerably reduced and that relaxation of current repair limits might be considered. ESA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N86-32763*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A METHOD FOR DEVELOPING DESIGN DIAGRAMS FOR CERAMIC AND GLASS MATERIALS USING FATIGUE DATA
T. M. Heslin, M. B. Magida, and K. A. Forrest Sep. 1986 55 p
(NASA-RP-1174; NAS 1.61:1174) Avail: NTIS HC A04/MF A01 CSCL 14D

The service lifetime of glass and ceramic materials can be expressed as a plot of time-to-failure versus applied stress whose plot is parametric in percent probability of failure. This type of plot is called a design diagram. Confidence interval estimates for such plots depend on the type of test that is used to generate the data, on assumptions made concerning the statistical distribution of the test results, and on the type of analysis used. This report outlines the development of design diagrams for glass and ceramic materials in engineering terms using static or dynamic fatigue tests, assuming either no particular statistical distribution of test results or a Weibull distribution and using either median value or homologous ratio analysis of the test results. Author

N86-32764*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ACOUSTO-ULTRASONIC VERIFICATION OF THE STRENGTH OF FILAMENT WOUND COMPOSITE MATERIAL
Harold E. Kautz 1986 24 p Presented at the Pressure Vessel Conference, Chicago, Ill., 21-24 Jul. 1986; sponsored by the American Society of Mechanical Engineers
(NASA-TM-88827; E-3201; NAS 1.15:88827) Avail: NTIS HC A02/MF A01 CSCL 14D

The concept of acousto-ultrasonic (AU) waveform partitioning was applied to nondestructive evaluation of mechanical properties in filament wound composites (FWC). A series of FWC test specimens were subjected to AU analysis and the results were compared with destructively measured interlaminar shear strengths (ISS). AU stress-wave factor (SWF) measurements gave greater than 90 percent correlation coefficient upon regression against the ISS. This high correlation was achieved by employing the appropriate time and frequency domain partitioning as dictated by wave propagation path analysis. There is indication that different SWF frequency partitions are sensitive to ISS at different depths below the surface. Author

N86-32765# South Carolina Univ., Columbia. Dept. of Mathematics and Statistics.
NONPARAMETRIC ESTIMATION OF QUANTILES AND OF DENSITY FUNCTIONS UNDER CENSORING, DISCRETE FAILURE MODELS AND MULTIPLE COMPARISONS Annual Technical Report, 1 Jun. 1984 - 31 May 1985
W. J. Padgett and J. D. Spurrier 14 Jun. 1985 13 p
(Grant AF-AFOSR-0156-84)
(AD-A167584; AFOSR-86-0174TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Major results have been obtained in the areas of nonparametric estimation of quantiles and of density functions under censoring, discrete failure models, and multiple comparisons. In particular, smooth nonparametric estimators of quantile functions from censored data were developed which give better estimates of percentiles of the lifetime distribution than the usual product-limit quantile function. Also, smooth density estimators from censored data were investigated using maximum penalized likelihood procedures. Several parametric models were proposed for the case of discrete failure data. These models provide a better fit to such data than some previously used discrete models. Finally, new methods of constructing simultaneous confidence intervals for pairwise differences of means of normal populations were developed, and the problem of selecting an asymptotically optimal design for comparing several new treatments with a control was solved. Work is continuing on the study of properties of kernel type quantile function estimators and development of goodness-of-fit tests for the model assumptions in accelerated life testing. GRA

N86-32766# Stanford Univ., Calif. Dept. of Statistics.
SURVEY OF SOVIET WORK IN RELIABILITY
Andrew L. Rukhin 29 Apr. 1986 21 p
(Contract N00014-76-C-0475)
(AD-A167607; TR-373) Avail: NTIS HC A02/MF A01 CSCL 14/4

We review the research of the Soviet school in reliability theory for the last twenty years. The main subjects under review are complex systems and their reliability, families with monotone failure rate, optimal maintenance and control, and statistical problems of reliability theory (121 defs.). GRA

N86-32767# Allied Bendix Corp., Kansas City, Mo.
CHARACTERIZATION OF RADIO FREQUENCY HMC MANUFACTURING PROCESSES Final Report
K. A. Buckholz and J. L. Taylor Apr. 1986 27 p
(Contract DE-AC04-76DP-00613)
(DE86-010300; BDX-613-3475) Avail: NTIS HC A03/MF A01

A nondestructive inspection method for screening alumina substrates for proper values of dielectric constant and loss tangent was investigated. The method involves measuring the characteristics of a microstrip filter made with the substrate on a screening fixture. Acceptable accuracy was achieved when a relative determination approach to finding the dielectric constant was used; however, use of the screening fixture to test for values of loss tangent requires further study. DOE

N86-32768# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des Structures.
DESCRIPTION OF AN ULTRASONIC SYSTEM FOR IN SITU FAULT DETECTION Final Report
J. Devoucoux, H. Kaczmarek, and J. Renard Jan. 1986 19 p In FRENCH
(Contract STPA-84-95-006)
(ONERA-RT-10/3542/RY-042-R; ETN-86-97640) Avail: NTIS HC A02/MF A01

An experimental device was developed to verify the damage in a carbon fiber-expoxy composite specimen. The goal is to develop a test system for composite aircraft construction materials. The tests were carried out using a 4000 daN tensile test machine and a scanning ultrasonic system working under water with three axis mobility. Results show the feasibility of the method. ESA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N86-32769 British Library Lending Div., Boston Spa (England).
SERIES-FORM SOLUTION OF PROBLEM OF COMPRESSION OF RIGID-PLASTIC LAYER BY ROUGH PLATES
A. A. Myasishchev 1986 8 p Transl. into ENGLISH from Izv. VUZ Chernaya Metall. (USSR), no. 1, 1986 p 73-77
(BLL-M-Trans-36820-(5828.4)) Avail: British Library Lending Div.,

Boston Spa, Engl.

A series-form solution is obtained to the problem of the compression of a rigid-plastic layer of any extent by two parallel plates The effectiveness of the use of exponential series to solve such problems is demonstrated. A comparison of the accurate solution given by this method and the solution obtained with the approximated Prandtl cycloidal solution enabled it to be established that the error of determination of the forces by the Prandtl method is less than 1% for a width-to-thickness ratio of the layer not exceeding 6:1. A series-form solution is obtained to the problem of the compression of a rigid-plastic layer of any extent by two parallel plates. The effectiveness of the use of exponential series to solve such problems is demonstrated. A comparison of the accurate solution given by this method and the solution obtained with the approximated Prandtl cycloidal solution enabled it to be established that the error of determination of the forces by the Prandtl method is less than 1% for the width-to-thickness ratio of the layer not exceeding 6:1. Author

N86-32770*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

FATIGUE TESTING A PLURALITY OF TEST SPECIMENS AND METHOD Patent Application

James D. Hodo, inventor (to NASA), Dennis R. Moore, inventor (to NASA), Thomas F. Morris, inventor (to NASA), and Newton G. Tiller, inventor (to NASA) Filed 16 Jul. 1986 12 p

(NASA-Case-MFS-28118-1; US-Patent-Appl-SN-886121) Avail: NTIS HC A02/MF A01 CSCL 20K

This invention relates to a fatigue testing apparatus for simultaneously subjecting a plurality of material test specimens to cyclical tension loading to determine the fatigue strength of the material. The fatigue testing apparatus includes a pulling head having cylinders defined therein which carry reciprocating pistons. The reciprocation of the pistons is determined by cyclical supplies of pressurized fluid to the cylinders. Piston rods extend from the pistons through the pulling head and are attachable to one end of test specimens, the other end of the test specimens being attachable to a fixed base, causing test specimens attached between the piston rods and the base to be subjected to cyclical tension loading. Because all of the cylinders share a common pressurized fluid supply, the breaking of a test specimen does not substantially effect the pressure of the fluid supplied to the other cylinders nor the tension applied to the other test specimens. NASA

N86-32771*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VERTICAL DROP TEST OF A TRANSPORT FUSELAGE SECTION LOCATED AFT OF THE WING

Edwin L. Fasanella and Emilio Alfaro-Bou Sep. 1986 26 p

(NASA-TM-89025; NAS 1.15:89025) Avail: NTIS HC A03/MF A01 CSCL 20K

A 12-foot long Boeing 707 aft fuselage section with a tapering cross section was drop tested at the NASA Langley Research Center to measure structural, seat, and occupant response to vertical crash laods and to provide data for nonlinear finite element modeling. This was the final test in a series of three different transport fuselage sections tested under identical conditions. The test parameters at impact were: 20 ft/s velocity, and zero pitch, roll, and yaw. In addition, the test was an operational shock test of the data acquisition system used for the Controlled Impact Demonstration (CID) of a remotely piloted Boeing 720 that was crash tested at NASA Ames Dryden Flight Research Facility on December 1, 1984. Post-test measurements of the crush showed that the front of the section (with larger diameter) crushed vertically approximately 14 inches while the rear crushed 18 inches. Analysis of the data traces indicate the maximum peak normal (vertical) accelerations at the bottom of the frames were approximately 109 G at body station 1040 and 64 G at body station 1120. The peak floor acceleration varied from 14 G near the wall to 25 G near the center where high frequency oscillations of the floor were evident. The peak anthropomorphic dummy pelvis normal (vertical) acceleration was 19 G's. Author

N86-32772# National Aeronautical Lab., Bangalore (India). Structures Div.

VIBRATION OF BEAMS ON INTERMEDIATE ELASTIC SUPPORTS

A. Joshi and A. R. Upadhya Jul. 1986 54 p

(NAL-TM-ST-8608) Avail: NTIS HC A04/MF A01

The problem of free vibration of a beam on intermediate elastic supports is studied. The beam represents an idealized model of a launch vehicle whose dynamic characteristics are to be studied when mounted on an elastic support system. The support system consists of a pair of translational springs, a pair of rotational springs and a cantilevered beam. This configuration of the support system is normally used for mounting the aeroelastic buffet models inside the wind tunnel. Numerical results are obtained for the frequencies and mode shapes of this elastically coupled system, for a range of values of the spring constants and cantilevered beam stiffness and inertia values. The study shows that when the springs are supported at the nodal points corresponding to the first free-free beam mode, the linear spring stiffness has no effect on the first model mode and marginal effect on subsequent model modes. However, the rotational stiffness has a significant effect on all the model modes. The study also shows that though the variations in the stiffness or the inertia values of the cantilever beam affect only the predominantly cantilever modes, these variations become important because of the fact that the cantilever frequencies may come close to or even cross over, the model frequencies. Author

N86-32773*# Auburn Univ., Ala. Dept. of Civil Engineering.

FRACTURE ANALYSIS OF RADIAL SCIENTIFIC INSTRUMENT MODULE REGISTRATION FITTINGS OF THE SPACE TELESCOPE Final Report, 15 Jan. 1985 - 15 Jul. 1986

C. W. Springfield, Jr. 10 Sep. 1986 81 p

(Contract NAS8-36287)

(NASA-CR-178932; NAS 1.26:178932) Avail: NTIS HC A05/MF A01 CSCL 20K

Various pieces of the registration fittings for the Radial Scientific instrument (SI) module of the Space Telescope were examined from a fracture mechanics point of view and deemed to be fail-safe or else have had maximum allowable flaw sizes specified for them. The results of these analyses are summarized in tabular form. In many instances the applied stress levels were so low that the threshold stress intensity factor range was never reached. In most of the others the allowable flaw sizes were large enough to be detected by visual inspection. However, for some parts, such as the flexures connecting the aluminum cover to the ball retainer in the fitting at point A, the flaw sizes were rather small. Eddy current tests are capable of detecting flaws of this size (0.022 inches x 0.1 inches), so for those which have been so tested these small flaws should represent no danger of going undetected. In every instance approximations were made to err on the conservative side. These were pointed out in the discussions of the analyses for each fitting. One conservative approximation that was not mentioned, however, is the fact that retardation was not included in the crack propagation computations. Author

N86-32774# Idaho National Engineering Lab., Idaho Falls.

DIFFRACTION MOIRE OF DYNAMIC EVENTS

V. A. Deason, J. E. Epstein, and W. G. Reuter 1985 10 p Presented at the International Conference and Exhibition on Fatigue, Corrosion Cracking, Fracture Mechanic and Failure Analysis, Salt Lake City, Utah, 2 Dec. 1985

(Contract DE-AC07-76ID-01570)

(DE86-007635; EGG-M-05585; CONF-851203-5) Avail: NTIS HC A02/MF A01

A system using diffraction moire to study dynamic loading events in opaque specimens is described. 150 1/mm diffraction gratings were replicated onto pre-notched steel bars and illuminated by a pulsed ruby laser during impulse loading. Details of the technique and equipment as well as typical data are presented. A similar experiment with a graphite/epoxy specimen and 1200 1/mm grating is briefly discussed. DOE

N86-32775# Sandia National Labs., Albuquerque, N. Mex.
MODAL TEST STRUCTURE PROJECT Status Report
D. O. Smallwood and D. L. Gregory 1986 28 p Presented at the 32nd Annual Institute of Environmental Sciences Technical Meeting, Dallas, Tex., 6 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-010100; SAND-86-2065C; CONF-8605105-2) Avail: NTIS HC A03/MF A01

The objectives of the study were to develop a simple test structure which could be used to compare modal systems and modal methods. A secondary objective would be to develop a structure which could be used to train newcomers to modal testing. We wanted a structure which would be easy to analyze, have well defined properties, be easy to fabricate, and have both widely spaced and closely coupled modes. The widely spaced modes could test the single degree of freedom methods and the closely coupled modes could test the multiple degree of freedom methods. Most test structures have very low damping, while most real structures have significant damping. Each range of damping presents its own problems for modal extraction. We wanted to find a mateial with a moderate amount of damping to more closely model the kinds of structures frequently tested. DOE

N86-32776# Lawrence Livermore National Lab., Calif.
DYNA3D USER'S MANUAL (NONLINEAR DYNAMIC ANALYSIS OF STRUCTURES IN THREE DIMENSIONS), REVISION 2
J. O. Hallquist and D. J. Benson Mar. 1986 138 p
(Contract W-7405-eng-48)
(DE86-010256; UCID-19592-Rev-2) Avail: NTIS HC A07/MF A01

The user's manual for DYNA3D, an explicit three-dimensional finite element code for analyzing the large deformation dynamic response of inelastic solids and structures is updated. A contact-impact algorithm permits gaps and sliding along material interfaces with friction. By a specialization of this algorithm, such interfaces can be rigidly tied to admit variable zoning without the need of transition regions. Spatial discretization is achieved by the use of 8-node solid elements, 2-node beam elements, 4-node shell elements, 8-node solid shell elements, and rigid bodies. The equations-of-motion are integrated in time by the central difference method. DYNA3D contains sixteen material models and nine equations of state to cover a wide range of material behavior. DOE

N86-32777# California Univ., Davis. Div. of Materials Science and Engineering.
CORRELATION OF ACOUSTIC EMISSION TO MICROSTRUCTURAL SOURCES Final Technical Report
J. Mohr and A. K. Mukherjee 26 Feb. 1986 34 p
(Contract W-7405-eng-48)
(DE86-010558; UCRL-15799) Avail: NTIS HC A03/MF A01

Tensile tests were conducted on Fe-21Ni-.6C alloy to determine the relation between true strain and acoustic emission, magnetic susceptibility, and true stress. Results, presented as graphs, show cyclic behavior characteristic of serrated yielding. The magnetic and acoustic emission monitors were designed to be used during the deformation and hence they depicted the changes that occurred during the deformation. DOE

N86-32778# Sandia National Labs., Albuquerque, N. Mex.
TAPE JOINT STIFFNESS
R. P. Rechard Apr. 1986 46 p
(Contract DE-AC04-76DP-00789)
(DE86-010626; SAND-86-0022) Avail: NTIS HC A03/MF A01

This report evaluates the stiffness for a standard tape-joint structural connection. This stiffness is frequently necessary when modeling a structure (e.g., a shock model). In general, for a standard cylindrical tape joint, the stiffness is 1.2 times greater in compression and 0.67 smaller in tension than the mating shell material. The stiffness of a special-purpose planar and development cylindrical tape joint is also evaluated. Joint stiffness must usually be determined experimentally because standard connections are difficult and/or time consuming to analyze in depth. However, the simple design of the tape permitted a detailed finite-element analysis. The finite-element results on a developmental joint deviated less than 2% from the experimental values in compression and less than 25% in tension. DOE

N86-32779# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
REVIEW OF AERONAUTICAL FATIGUE INVESTIGATIONS IN THE NETHERLANDS DURING THE PERIOD MARCH 1983 - FEBRUARY 1985
J. B. deJonge Mar. 1985 32 p Presented at 19th ICAF Conference, Pisa, Italy, 20-21 May 1985
(NLR-MP-85025-U; B8664738; ETN-86-97672) Avail: NTIS HC A03/MF A01

Over 40 abstracts and references from studies of flight simulation, loads, crack propagation, joint fatigue, metallic materials, manufacturing effects, corrosion fatigue, composite fatigue, and nondestructive inspection connected to aeronautical fatigue are presented. ESA

N86-32780# European Space Agency, Paris (France).
INFLUENCE OF CONSTANT AMPLITUDE AND VARIABLE AMPLITUDE LOADING ON CRACK INITIATION AND MICROCRACK PROPAGATION IN Al 2024-T3
Joachim Foth Nov. 1985 143 p Original language document was announced as N85-16220
(ESA-TT-900; DFVLR-FB-84-29; ETN-86-97567) Avail: NTIS HC A07/MF A01; original German version available from DFVLR, Cologne, West Germany DM 41

The influence of constant amplitude and variable amplitude loading on the formation and on the propagation characteristics of microcracks was studied. The fatigue life of notched and unnotched specimens was compared. A concept based on fracture mechanics and taking into account the crack geometry and stress distributions was elaborated to describe the propagation characteristics of the microcracks. Up to the time of crack initiation, the microscopic plastic deformations occurring within a low-amplitude fatigue cycle are increased if preceded by large-amplitude fatigue cycles. The effect on the crack opening behavior is decisive for crack propagation. ESA

N86-32781# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
SHORT CRACKS IN AEROSPACE STRUCTURES
R. J. H. Wanhill Jul. 1985 18 p Presented at Symposium on the Behavior of Short Fatigue Cracks, Sheffield, England, 26-28 Sep. 1985
(NLR-MP-85054-U; B8665499; ETN-86-98032) Avail: NTIS HC A02/MF A01

The engineering significance of short fatigue cracks in aerospace structures is examined with respect to the design and operating requirements of safety and durability. It is shown that this significance is limited to the safety of engine parts, notably disks and blades, and the durability of metallic airframe structures. ESA

N86-32782# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
HARMONIC AND TRANSIENT PROBLEMS RELATED TO SUBMERGED STRUCTURES Final Report
B. Nicolas-Vullierme Sep. 1985 57 p
(Contract DRET-84-1395)
(ETN-86-97874) Avail: NTIS HC A04/MF A01

The numerical results of the elastic response of a structure subjected to harmonic excitation in an unbounded compressible fluid are presented. The structure is a tabular beam provided with circumferential stiffness. The doubly asymptotic approximations method was employed, adopting the Sweaps computer program. The model predicts accurately the strong resonances found in the experimental trials, but pressures and displacements are largely overestimated. ESA

N86-32783# Office National d'Etudes et de Recherches Aerospatiales, Paris (France). Direction Scientifique de la Resistance des

Structures.

CONTRIBUTIONS TO THE ONERA LIFE PREDICTION MODEL (FATIGUE CRACKING UNDER REAL LOADING) Final Report [ACTIVITES DEVELOPPEES A PROPOS DU MODELE ONERA DE PREVISION DE DUREE DE VIE EN FISSURATION DE FATIGUE SOUS CHARGEMENT REEL]

G. Baudin, M. Robert, A. Monthulet, and H. Kaczmarek Nov. 1985 63 p In FRENCH

(Contract STPA-84-95-015)

(ONERA-RT-25/7169-RY-048-R; ETN-86-97876) Avail: NTIS HC A04/MF A01

A fatigue crack prediction model was improved by enlarging the available data banks by 120 prediction-experiment comparisons and by the study of crack propagation under variable load. Life predictions are in a ratio prediction/experiment from 0.5 to 2. ESA

N86-32784# Societe Nationale Industrielle Aerospatiale, Toulouse (France).

COMPUTATION OF THE STRESS INTENSITY FACTOR IN STIFFENED PANELS (BUILT IN OR ADHESIVE BONDED STIFFENERS) Final Report [CALCUL DU FACTEUR DINTENSITE DE CONTRAINTE DANS L ES PANNEAUX RAIDIS: RAIDISSEURS INTEGRES OU COLLES]

B. Lachaud 2 Sep. 1985 47 p In FRENCH

(Contract DRET-83-34-355)

(SNIAS-436.021/85; ETN-86-97877) Avail: NTIS HC A03/MF A01

A theoretical study of crack propagation in stiffened panels is presented. The application of the superposition principle and analytical techniques allow the development of a method called displacement compatibility analysis. The procedure may be applied to fundamental parametric studies in aircraft design. A computer program was prepared to compare the results obtained with this method with other methods. The procedure is shown to be efficient in accuracy and computer time cost. ESA

N86-32785# Ecole Nationale Superieure des Arts et Metiers, Bordeaux (France). Lab. Arts et Metiers d'Etude de la Fatigue.

FATIGUE RESISTANCE OF HIGH QUALITY STEELS UNDER MULTIAXIAL LOAD Thesis [RESISTANCE A LA FATIGUE DES ACIERS A HAUTES CARACTERISTIQUES EN CHARGEMENT MULTIAXIAL]

Catherine Froustey Oct. 1985 54 p In FRENCH

(Contract DRET-84-1214)

(ETN-86-97878) Avail: NTIS HC A04/MF A01

The measurement procedures and the computation techniques for simultaneous torsion and flexion loads were studied to improve design procedures of helicopter rotating parts. The study includes the performance tests of a hydraulic multiaxial fatigue test machine and a bibliographic analysis of multiaxial fatigue design criteria. It is shown that the test machine is operational and that the three design criteria methods studied give slightly different results in combined flexion and torsion, and that the Dang Van critical point position differs from the results derived from Sines or Grossland. ESA

42 GEOSCIENCES (GENERAL)

N86-32786 Centre National d'Etudes Spatiales, Toulouse (France).

INTERNATIONAL GEOPHYSICS AND SPACE

1985 615 p Partly in ENGLISH and FRENCH Lectures presented at CNES Summer School, Toulouse, France, 2-27 Jul. 1984

(ISBN-2-85428-132-2; ISSN-0766-1002; ETN-86-97644)

Copyright. Avail: CEPADUES, Toulouse, France

Space techniques used in solid Earth studies were discussed. Shape, gravity and magnetic fields, and surface and internal deformation were considered. For individual titles, see N86-32787 through N86-32804.

N86-32787 Institut de Physique du Globe, Paris (France).

THE GEOMAGNETIC FIELD: DESCRIPTION AND ANALYSIS [LE CHAMP GEOMAGNETIQUE: DESCRIPTION ET ANALYSE] c46

J. L. LeMouel *In* CNES International Geophysics and Space 1985 p 17-60 In FRENCH (For primary document see N86-32786 24-42)

Avail: CEPADUES, Toulouse, France

Measurements and models of the Earth's magnetic field using spaceborne and ground based techniques are introduced. Crustal anomalies are discussed. Large wavelength anomalies are illustrated. The Magsat satellite system is presented. ESA

N86-32788 Cambridge Univ. (England). Dept. of Earth Sciences.

THE INTERNAL MAGNETIC FIELD AND ITS ORIGIN c46

D. Gubbins *In* CNES International Geophysics and Space 1985 p 61-83 (For primary document see N86-32786 24-42)

Avail: CEPADUES, Toulouse, France

Measurement of the Earth's magnetic field is introduced. The properties of the Earth's interior are outlined. Basic equations of fluid mechanics and magnetohydrodynamics are presented. The thermal history of the Earth's core is summarized. Convection in the core; kinematic dynamo theory; dynamical dynamo theory; and kinematics of the secular variations are treated. ESA

N86-32789 Institut de Physique du Globe, Paris (France).

ENERGY SOURCES AND THE THERMAL HISTORY OF THE EARTH [SOURCES D'ENERGIE ET HISTOIRE THERMIQUE DE LA TERRE] c43

Claude Jaupart *In* CNES International Geophysics and Space 1985 p 85-109 In FRENCH (For primary document see N86-32786 24-42)

Avail: CEPADUES, Toulouse, France

The heat flux of the Earth is introduced and conductive flow and flow through the ocean crust are discussed. Measurement methods, including bathymetry, are explained, and heat transfer traced. The radioactivity of rocks is considered and the concentrations of radioactivity in the mantles are summarized. The thermal balance of the Earth and the thermal evolution of the planet are considered. ESA

N86-32790 Massachusetts Inst. of Tech., Cambridge.

MANTLE CONVECTION AND THE EARTH'S GRAVITY FIELD c46

Barry Parsons *In* CNES International Geophysics and Space 1985 p 111-158 (For primary document see N86-32786 24-42)

Avail: CEPADUES, Toulouse, France

Observational constraints in geophysics are discussed, and depth extent of convection, and small-scale convection are considered. Laboratory and numerical experiments (planform of convection; stability considerations; aspect ratios; influence of shear flows) are described. The variation of geoid height and ocean floor bathymetry with age (thermal models; isostatic compensation; the depth-age and geoid-age relationships) are introduced. Geoid and depth anomalies and convection (integral expressions; dynamic compensation; effective temperatures; relationship between depth and geoid anomalies) are treated. Small-scale convection (satellite altimetry and bathymetry; instabilities beneath cooling oceanic lithosphere; midocean swells; connection with depth-age and geoid-age relationships) is summarized. ESA

N86-32791 Centre National d'Etudes Spatiales, Toulouse (France).

SATELLITE TRACKING: ITS FIRST CONTRIBUTIONS TO THE KNOWLEDGE OF THE EARTH'S GRAVITATIONAL FIELD AND TO GEOPHYSICS [LA POURSUITE DES SATELLITES; SES PREMIERS APPORTS A LA CONNAISSANCE DU CHAMP GRAVIMETRIQUE TERRESTRE ET A LA GEOPHYSIQUE] c46

B. Lago *In its* International Geophysics and Space 1985 p 159-199 In FRENCH (For primary document see N86-32786 24-42)

Avail: CEPADUES, Toulouse, France

The contribution of techniques developed for tracking satellites to detect discrepancies in the Earth's hydrostatic balance is recalled. Static and dynamic explanations for the imbalance are

considered. The flattenning of the geoid detected by satellite geodesy is discussed. Global models of Earth gravitation are introduced. Laboratory experiments; convection equations; and convection in the Earth's mantle are described. ESA

N86-32792 Paris VII Univ. (France). Lab. de Geochimie et Cosmochimie.
STRUCTURE AND EVOLUTION OF THE EARTH MANTLE STUDIED USING PAIRED ISOTOPIC TRACERS: Pb-Sr-Nd [STRUCTURE ET EVOLUTION DU MANTEAU TERRESTRE ETUDIEES A L'AIDE DES TRACEURS ISOTOPIQUES COUPLES: PLCB-SLCR-NLCD] **c46**
Bernard Dupre *In* CNES International Geophysics and Space 1985 p 213-236 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The use of lead and strontium isotopes to study the structure and chemical evolution of the Earth is introduced. Isotopic mapping is explained. Oceanic and continental basalts are compared. Geochemical modeling is outlined. ESA

N86-32793 Lamont-Doherty Geological Observatory, Palisades, N. Y.
GRAVITY, GEOID AND THE OCEANIC LITHOSPHERE **c46**
A. B. Watts *In* CNES International Geophysics and Space 1985 p 237-339 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The contributions of studies of the Earth's gravitational field to understanding of the oceanic lithosphere are reviewed. The concept of isostasy is introduced and the Airy and Pratt models are presented. The strong lithosphere concept is discussed, and the theory of flexure of elastic plates is outlined. The flexure model of isostasy is shown to be consistent with extrapolations from experimental rock mechanics. The role of flexure in geological features on the ocean floor, such as isolated seamounts, aseismic ridges, midocean ridges, large fracture zone offsets, and sedimentary basins, are examined. The importance of flexure for bathymetric prediction and studies of small scale mantle convection is emphasized. ESA

N86-32794 Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
THE OCEANIC LITHOSPHERE: SEISMOLOGY AND TECTONICS **c46**
Emile A. Okal *In* CNES International Geophysics and Space 1985 p 341-368 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The history of plate tectonics and the contribution of seismology to it are summarized. Seismology and the structure of the oceanic plates; intraplate earthquakes and the state of stress of the oceanic lithosphere; and active tectonism on the oceanic plates are discussed. ESA

N86-32795 Institut de Physique du Globe, Paris (France).
LONG PERIOD SEISMOLOGY **c46**
Barbara Romanowicz *In* CNES International Geophysics and Space 1985 p 369-395 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Methods for the study of deep structure of the Earth using long period seismic waves are reviewed. The domain of surface waves is distinguished from that of mantle waves and free oscillations, the latter corresponding to periods greater than 150 sec. Ways to obtain information from surface and mantle wave data for the study of seismic sources are described. ESA

N86-32796 Institut de Physique du Globe, Strasbourg (France)
DENSITY AND ELASTIC PARAMETERS OF THE UPPER MANTLE FROM REGIONAL MULTIMODE DATA **c46**
M. Cara *In* CNES International Geophysics and Space 1985 p 397-401 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Properties of surface waves relevant to seismology are recalled. Details on their sensitivity to upper mantle parameters are given. Inferences concerning the density variation with depth and upper mantle anisotropy are presented. ESA

N86-32797 Durham Univ. (England).
CONTINENTAL TECTONICS: A QUANTITATIVE VIEW OF THE THERMAL AND MECHANICAL PROPERTIES OF THE CONTINENTAL LITHOSPHERE IN COMPRESSIONAL AND EXTENSIONAL STRESS REGIMES **c46**
G. D. Karner *In* CNES International Geophysics and Space 1985 p 403-464 Sponsored by Durnham Univ. Research Foundation and Society of Fellows (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The study of the spatial and temporal response of the continental lithosphere to applied geologic loads is introduced. This is achieved by determining the thermal and mechanical properties of the lithosphere during continental collisions (compressional regimes) and intracratonic sedimentary basin formation (tensional regimes). An iterative philosophy using analytical and numerical modelling of the flexural properties of the continents and common geological observations from many compressive and tensive regimes leads to an increased geological understanding and appreciation of these regimes and models, respectively. ESA

N86-32798 Cornell Univ., Ithaca, N.Y.
DEFORMATION MECHANISMS IN THE CONTINENTS **c46**
D. L. Turcotte *In* CNES International Geophysics and Space 1985 p 465-486 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Continental tectonics are introduced. Rheology of the continental lithosphere; sources of stress in the continental lithosphere; crustal and lithospheric thinning factors; and the San Andreas fault are discussed. ESA

N86-32799 Observatoire de Paris-Meudon (France).
MAGNETOSPHERES [LES MAGNETOSPHERES] **c46**
A. Boishot *In* CNES International Geophysics and Space 1985 p 491-497 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The Earth's magnetosphere and the magnetosphere of other planets are discussed. Observation of the magnetospheres is described. The influence of the solar wind is outlined. ESA

N86-32800 Bureau Gravimetrique International, Toulouse (France).
POTENTIAL MODELS [MODELES DE POTENTIEL] **c46**
G. Balmino *In* CNES International Geophysics and Space 1985 p 499-526 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Global models of the Earth's gravitational field based on spherical harmonics, such as GEM, GRIM, SAO, and NWL, are introduced. Analysis of orbit perturbation and surface data is outlined. The data used and their processing are discussed. It is concluded that knowledge of geopotential is insufficient for accurate satellite trajectory determination, for ocean geoid determination, and for regional geophysical investigations where gravity is only known through trajectory analysis. The situation can be improved by using very low orbit, drag free satellites; by improving satellite altimetry; and by using onboard gravity gradiometers. ESA

N86-32801 Bureau Gravimetrique International, Toulouse (France).
STRUCTURE OF THE TELLURIC PLANETS [STRUCTURE DES PLANETES TELLURIQUES] **c91**
G. Balmino *In* CNES International Geophysics and Space 1985 p 527-570 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Data on telluric planet gravitational fields, surface topography and shape, and rotation are used to deduce constraints on internal structure. Radial models, including those using seismic and petrological information, are presented. Methods using lateral density variations (thick plate, flexural models) are applied to Mars.

The behavior of the topographical spectra of the planets according to geometrical and physical models is discussed. It is concluded that radial models give only very rough approximations and require the installation of seismic networks on the planets. Lateral variation models can explain 50% of the observed gravitational fields. ESA

N86-32802 Mainz Univ. (West Germany). Inst. fuer Geowissenschaften.
DRIVING MECHANISMS OF PLATES c46
Wolfgang R. Jacoby *In* CNES International Geophysics and Space 1985 p 571-589 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Models of buoyancy forces driving tectonic plates, and application of the laws of statics to plates are discussed. Model results are criticized because of the difference in basal drag present and past, and problems with continental push. Most of the force parameterizations are at best crude approximations based on plausible guesses. Models assuming zero net torque on the whole lithosphere avoid problems of force parametrization inherent in models with torque equilibrium at each plate, but cannot resolve the driving mechanism. Stress in the plates seems to be one of the best indicators for the driving mechanism, but unfortunately it is only a very crude one. The fair consistency in the results of so many models lends them credibility. Full solution of the thermal convection problem for the whole mantle is needed, but this cannot yet be handled. ESA

N86-32803 Centre National de la Recherche Scientifique, Grenoble (France).
SEISMOLOGICAL DATA ACQUISITION BY SATELLITE [COLLECTE DE DONNEES SISMOLOGIQUES PAR SATELLITE] c46
G. Poupinet *In its* International Geophysics and Space 1985 p 591-598 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

The use of the INTELSAT, GOES, GMS, ARGOS, and Meteosat networks for geophysical data transmission is discussed. The needs of seismological stations incorporated in satellite networks, are assessed, and the SEISPACE network, which transmits seismological data by satellites, is presented. ESA

N86-32804 Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherche de Geodesie Spatiale.
UTILIZATION OF SPACE TECHNIQUES FOR ACCURATE POSITIONING IN GEOPHYSICS [UTILISATION DES TECHNIQUES SPATIALES DE POSITIONNEMENT PRECIS EN GEOPHYSIQUE] c17
Michel Lefebvre *In its* International Geophysics and Space 1985 p 599-614 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

Radio, laser, Doppler, and interferometric space-based positioning techniques are reviewed. Links between measurement errors and errors in significant physical parameters are discussed. Choice criteria for a system for geophysics are given. ESA

N86-32805# Centre National d'Etudes Spatiales, Toulouse (France). Service ARGOS.
THE 10TH ARGOS USERS CONFERENCE
1985 301 p Conference held in Kiel, West Germany, 21-23 May 1985; sponsored in cooperation with Intergovernmental Oceanographic Commission, WMO and Kiel Univ.
(ETN-86-97267) Avail: NTIS HC A14/MF A01

Uses of the ARGOS system in oceanography, meteorology, polar regions, and environmental studies was discussed. For individual titles, see N86-32806 through N86-32827.

N86-32806# British Columbia Univ., Vancouver. Dept. of Oceanography.
ON THE RELATIONSHIP BETWEEN LONG-TERM DRIFTER TRAJECTORIES AND MEAN SEASONAL DISTRIBUTIONS OF GEOSTROPHIC WIND AND BAROCLINIC OCEAN CURRENT IN THE EASTERN NORTH ATLANTIC c48
William J. Emery, Juergen Stahlmann (Kiel Univ., West Germany), and Wolfgang Krauss *In* CNES The 10th ARGOS Users Conference 1985 27 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

A 4 yr collection of trajectories from 100 satellite tracked drifting buoys in the North Atlantic is analyzed to determine the correspondence of buoy trajectories with mean seasonal distributions of geostrophic wind (sea level atmospheric pressure) and baroclinic ocean current (0/1500 db dynamic topography). Buoy positions were interpolated to 3 hr intervals then averaged over 60 hr and smoothed with a 3-month running mean and separated into winter and summer seasons. Visual comparison between smooth trajectories and winter/summer averages of atmospheric pressure and baroclinic ocean current suggests the stronger influence of the wind field upon the character of long term trajectories compared to that of the baroclinic current. Statistical comparisons between buoy and geostrophic wind speed and direction reveal strong correlations only in the south (10 to 30 N) where seasonal variations of atmospheric pressure are small. In the north (40 to 50 N) overall mean directions agree well, while low correlations are due to interannual changes in the winter sea-level pressure distributions. ESA

N86-32807# Dundee Univ. (Scotland). Physics Lab.
SYSTEM ARGOS, SEA SURFACE TEMPERATURES AND CIRCULATION PATTERNS IN THE NORTHERN ATLANTIC c48
A. P. Cracknell and R. D. Callison *In* CNES The 10th ARGOS Users Conference 1985 9 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The accuracy of TIROS-N satellites AVHRR-derived sea surface temperatures (SST) is discussed. The possibility of using thermal infrared scanner data for studying ocean currents and circulation patterns, with data obtained via System ARGOS, for the North Atlantic is considered. Differences between measured and satellite derived SST are 0.3 to 0.4 K. ESA

N86-32808# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
ON THE CORRELATION OF WIND AND THE TRAJECTORIES OF DROGUED DRIFTING BUOYS c48
Juergen Stahlmann *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

Average values of the deviation angle between the heading of the wind and the heading of the drift current, and the quotient between the speed of the current and the wind stress were obtained. They are found to be dependent on the depth of the buoy's drogue and on the force of the wind. These current parameters can be used to separate the wind-induced part from observed drifting buoy current measurements and therefore help modelers of eddy-resolving models in comparing their results with observations. ESA

N86-32809# Oceanor, Trondheim (Norway).
TECHNICAL EXPERIENCE WITH THE ARGOS SYSTEM FOR TRANSMISSION OF OCEANOGRAPHICAL DATA c35
Svein Erling Hansen *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

Oceanographical instruments and moorings equipped with ARGOS systems are described. Current meters, waveriders, buoys, and thermistor/salinity strings are presented. Problems with access to the ARGOS data center, and the limited data storage facilities (only 24 hr data are buffered) are mentioned. ESA

N86-32810# Oceanor, Trondheim (Norway).
THE IMPORTANCE OF MEASURING CURRENT, WAVES AND OTHER ENVIRONMENTAL PARAMETERS IN ORDER TO IMPROVE THE CURRENT FORECAST SERVICE c47
Svein Erling Hansen *In* CNES The 10th ARGOS Users Conference 1985 15 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

A current forecasting service to predict occurrences of high velocity current whirls in the Norwegian coastal current was established. It is relatively successful, but has difficulties due to lack of data in real time. Further observation has to be supplied in real time along the Skagerrak coast, and NW of Stavanger. ESA

N86-32811# Kiel Univ. (West Germany). Inst. fuer Meereskunde.

THE CURRENT SYSTEM OF THE NORTH ATLANTIC AS DEDUCED FROM DRIFTING BUOYS c48

Wolfgang Krauss *In* CNES The 10th ARGOS Users Conference 1985 24 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

More than 100 buoys were launched in the North Atlantic to analyze the large-scale circulation and the eddy intensities in the northern and eastern part of the North Atlantic. Results reveal a current system which predominantly transports water masses from the area southeast of Flemish Cap to the northeastern North Atlantic. A broad band (1500 km) of eddies is associated with the current; they exchange water masses across the Subarctic Front and yield intensive mixing of subtropical and polar waters. The subtropical anticyclonic gyre appears as an almost separate circulation system. The eastern recirculation of this gyre, however, receives a distinct amount of water from the area between the Azores and the Bay of Biscay. ESA

N86-32812# Continental Shelf Inst., Trondheim (Norway).

A NEW WAVE DIRECTION BUOY ALLOWS PRESENTATION OF WAVE DIRECTION DATA IN NEAR REAL TIME c48

G. Ueland and S. F. Barstow *In* CNES The 10th ARGOS Users Conference 1985 15 p Sponsored by Norske Shell A/S, Norsk Hydro A/S, Statoil, Royal Norwegian Council for Scientific and Industrial Research (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

The onboard data acquisition and processing system of a wave direction buoy compatible with the ARGOS system is described. It consists of a single board CMOS microcomputer with 192 KB memory; 12 bit CMOS analog to digital converter with 32 input channels; digital input channels; watchdog logic; power save logic; power supply with subsystem on/off switching; ARGOS PTT; sea data tape recorder; and field and lab test terminal. Field tests show that wave direction measurements are available onshore in near real time. ESA

N86-32813# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).

ON BOARD SPECTRAL SEA-STATE: THE SPEAR F BUOY INPUTS TO ERS-1 CALIBRATION AND VALIDATION PHASE c48

R. Ezraty and G. Ayela *In* CNES The 10th ARGOS Users Conference 1985 16 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

Sea-state measuring buoys built from a waverider sensor and hull into which a dedicated onboard microprocessor computes the omnidirectional sea state spectrum and transmits the results through the ARGOS system are presented. Field tests show that this system of on-board spectral analysis works correctly and can discriminate complex sea state conditions. It can be mounted by any user, with no buoy modification, on existing waveriders. Although developed for a calibration experiment for satellite altimeters, it can be used in coastal areas where the 27 MHz Citizen Band is overcrowded, solving the problem of radio interferences and data integrity. Using the ARGOS system, a high cost dedicated receiving station and a data acquisition and processing systems are no longer needed. ESA

N86-32814# Etablissement d'Etudes et de Recherches Meteorologiques, Brest (France).

THE USE OF SPATIAL TECHNIQUES FOR A BETTER CURRENT SURFACE KNOWLEDGE, WITH APPLICATION TO THE SOUTHERN OCEAN c48

Nathalie Daniault and Yves Menard (Centre National d'Etudes Spatiales, Toulouse, France) *In* CNES The 10th ARGOS Users Conference 1985 19 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

The eddy kinetic energy distribution in the Southern Ocean was estimated from SEASAT altimeter data and from 192 free drifting buoy trajectories. The ARGOS system was used for positioning of the buoys. A good spatial coherence is found between the results of the two methods. The distribution shows strong eddy kinetic activity near the western boundaries and near topographic features. The ratio between both estimates was very high, with kinetic energy distribution from drifters being three times larger than from the altimeter. The drifters eddy kinetic energy distribution was recomputed and processed through a bandpass filter, giving a better match. Remaining differences are attributed to nonsimultaneity of the two data bases. ESA

N86-32815# Norwegian Meteorological Inst., Blindern.

THE NORWEGIAN METEOROLOGICAL INSTITUTE'S USE OF THE ARGOS SYSTEM c47

Carl Kolderup Jensen *In* CNES The 10th ARGOS Users Conference 1985 12 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

The use of the ARGOS system technical equipment; the location of stations; advantages and disadvantages of using a local user terminal station, and the collection and control of data are discussed. ESA

N86-32816# Direction de la Meteorologie Nationale, Brest (France).

A DRIFTING BUOY EXPERIMENT AS PART OF COST-43 c48

Pierre Blouch and Thor Kvinge (COST-43 Technical Secretariat, Bergen, Norway) *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

The System of Operational Buoys in the Atlantic program is described. A zone with few observations from ships was chosen. At least two buoys must be maintained drifting at sea and operational in the area at all times throughout a period of at least 3 yr. The buoys must provide meteorological, oceanographic and position data via the ARGOS system. As with FGGE, the observations must include at least air pressure and sea surface temperature. The date must be available in real-time via the Global Telecommunication System of the World Meteorological Organization in the DRIBU code and/or SHIP code. Archived data must be retrievable through ARGOS Service and must be available on request to other COST-43 members. There are no plans to recover the buoys. ESA

N86-32817# Christian Michelsens Institutt for Videnskap og Andsfrihet, Bergen (Norway). Dept. of Science and Technology.

REPORT ON ICE BUOYS IN THE ARCTIC AND THE ANTARCTIC c48

Niels S. Nergaard *In* CNES The 10th ARGOS Users Conference 1985 19 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

The status of over 20 buoys dropped by parachute onto polar ice is reported. Data from the buoys suggest an average export speed for ice conveyed from the Arctic Ocean by the Transpolar Drift Stream through the Fram Strait of 10 cm/sec, with a variation in the central area of 5 to 70 cm/sec. The buoys are tracked by the ARGOS system. ESA

N86-32818# Bergen Univ. (Norway).

EXPERIENCE AND RESULTS FROM USE OF ARGOS TRACKED BUOYS DURING MIZEX 83 AND 84 c48

Brian A. Farrelly *In* CNES The 10th ARGOS Users Conference 1985 13 p (For primary document see N86-32805 24-42)

Avail: NTIS HC A14/MF A01

During the Marginal Ice Zone Experiment, ships, aircraft, and satellites tracked ARGOS buoys on the ice and in the open sea in the Fram Strait. Buoy positions and other information were

relayed to the field coordinator to update experiment plans. This proved invaluable for buoy recovery and for giving details of ice movement and ocean currents. Ice kinematics derived from ARGOS buoys and from aircraft remote sensing are presented. Since several of the ice platforms acquiring meteorological and oceanographic data were tracked by ARGOS, the balance of forces on the ice could be estimated. ESA

N86-32819# Danish Meteorological Inst., Copenhagen.
OPERATIONAL EXPERIENCES WITH THE ARGOS SYSTEM IN GREENLAND **c47**
Fleming Jensen *In* CNES The 10th ARGOS Users Conference 1985 14 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The ARGOS system was deployed as a primary communication system for automatic weather stations distributed along the coast of Greenland. Operational experience with ARGOS is good and, for the northernmost stations, this system is considered to provide the best and the most simple means of data communication. Since Greenland is located in the polar region the ARGOS system gives nearly consecutive coverage as regards synoptic measurements if the system comprises two satellites with orbits reasonably well separated. ESA

N86-32820# High Arctic Consulting Ltd., Raahe (Finland).
USE OF AN ARGOS PLATFORM ON AN EXPEDITION TO THE NORTH POLE 1984 **c04**
Matti Tervaskanto *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

Use of an ARGOS platform for location, data transfer, and emergency communication during a polar expedition is described. The equipment withstood the rough handling and low temperatures (down to minus 56 C) well mechanically, but displays froze and the PTT occasionally changed all the data bits to ones. ESA

N86-32821# Societe Nationale Elf Acquitaine, Paris (France).
ENVIRONMENTAL AND METEOROLOGICAL DATA ACQUISITION SYSTEM WITH INTEGRATED ARGOS TRANSMITTER: IMPROVEMENT IN SEA STATE FORECAST FOR CRITICAL OFFSHORE OPERATIONS **c32**
R. Carton, Stephanie Antalovsky (SYMINEX, Marseille, France), and D. Sembresq *In* CNES The 10th ARGOS Users Conference 1985 12 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The use of the Environmental and Meteorological Data Acquisition Systems (EMDAS) equipped with an ARGOS link to increase the reliability of seastate forecasts in offshore areas, thus optimizing the cost and safety of offshore operations is described. In spite of the relatively small amount of information transmitted by ARGOS, several months experience confirms the operational value of the EMDAS-ARGOS system and proves that extensions to other fields (in-service monitoring and others) are possible. However, hardware and software improvements are needed to improve data recovery. ESA

N86-32822# Norwegian Defence Research Establishment, Kjeller.
DESCRIPTION OF THE NORWEGIAN DOPPLER POSITIONING PROGRAM **c04**
Per Helge Andersen, K. Aksnes, and Einar Haugen (Royal Norwegian Council for Scientific and Industrial Research, Oslo) *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

A satellite Doppler positioning program was developed. The sequential version of the program updates the satellite parameters and then performs the transmitter positioning. A version which utilizes Doppler data over several passes for the updating of orbital elements and estimation of unknown positions in a simultaneous manner was written. Results indicate that this procedure gives more accurate estimates of the positions than the sequential method. ESA

N86-32823# Oregon State Univ., Newport. Hatfield Marine Science Center.
PRELIMINARY TECHNICAL EVALUATION OF AN ARGOS-MONITORED RADIO TAG FOR TRACKING MANATEES **c32**
Bruce Mate, Gaylen Rathbun (Fish and Wildlife Service, San Simeon, Calif.), Richard Merrick, and James Reed (Fish and Wildlife Service, Gainesville, Fla.) *In* CNES The 10th ARGOS Users Conference 1985 5 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

A radio tagged manatee was released into a river leading to subtropical waters and tracked by satellite. Up to 8 locations a day are reported. The manatee remained in the river system, but is expected to head for the Gulf of Mexico. ESA

N86-32824# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Applied Data Systems Div.
UTILIZATION OF ARGOS FOR OZONE MEASUREMENT STATIONS **c45**
W. Balzer and K. Reiniger *In* CNES The 10th ARGOS Users Conference 1985 14 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The data collection and transmission requirements of an autonomous ozone measurement station are described. The data preprocessing strategy for application of ARGOS are shown for a prototype station. Experience in application, achieved data quality, and scientific results achieved during a measurement campaign in Greece are demonstrated. ESA

N86-32825# National Museum of Natural History, Marseille (France).
BEHAVIOR OF DERMOCHELYS CORIACEA IN CAPTIVITY (ANIMAL CARRYING DUMMY PTT IN PRELIMINARY PHASE OF AN ARGOS EXPERIMENT) **c32**
Michele Duron-Dufrenne *In* CNES The 10th ARGOS Users Conference 1985 15 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The degree to which a turtle would accept the Transat-type ARGOS PTT, and the reliability of the harness securing it to the carapace were tested, using an adult kept in a swimming pool for 36 hr. Its pelagic behavior turns out to be comparable to that in the open sea, the animal appearing unperturbed by the equipment. ESA

N86-32826# Institut Francais de Recherche pour l'Exploitation de la Mer, Nantes (France).
ARGOS AND FISHING **c48**
Claude Leroy, Claude Leroy, and Loic Mercier (CEIS-Espace, Toulouse, France) *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

The ARGOS system contributions to tuna finding in the NE Atlantic, and shrimp trawling on the Continental Shelf off French Guiana are described. Tuna catch data and environmental measurements transmitted from a shipboard keypad terminal are integrated in a wider aid-to-fish-finding strategy centered on the generation of sea surface temperature maps using thermal infrared imagery. Useful data are then retransmitted to the tuna boats by facsimile. The program to aid shrimp trawling includes use of onboard PTT, and a microcomputer to generate the catch and environment message. ESA

N86-32827# South African Weather Bureau, Pretoria.
THE SOUTH AFRICAN CONTRIBUTION TO TOGA **c47**
Piet leRoux *In* CNES The 10th ARGOS Users Conference 1985 3 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

Drifting buoys and automatic weather stations were used in the Tropical Ocean Global Atmosphere program. Information on

oceanographic parameters in the South Atlantic and Southern Indian Ocean, and surface and upper air data are collected. ESA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N86-32828*# Environmental Research Inst. of Michigan, Ann Arbor. Applications Div.
A FUELWOOD PLANTATION SITE SELECTION PROCEDURE USING GEOGRAPHIC INFORMATION SYSTEM TECHNOLOGY: A CASE STUDY IN SUPPORT OF THE NASA GLOBAL HABITABILITY PROGRAM Final Report, 1 Feb. 1985 - 30 Jun. 1985
N. E. G. Roller, J. E. Colwell, and A. N. Sellman Jul. 1985 39 p (Contract NASw-3852)
(NASA-CR-179704; NAS 1.26:179704; ERIM-173900-2-F) Avail: NTIS HC A03/MF A01 CSCL 02F

A study undertaken in support of NASA's Global Habitability Program is described. A demonstration of geographic information system (GIS) technology for site evaluation and selection is given. The objective was to locate potential fuelwood plantations within a 50 km radius of Nairobi, Kenya. A model was developed to evaluate site potential based on capability and suitability criteria and implemented using the Environmental Research Institute of Michigan's geographic information system. Author

N86-32829*# Delaware Univ., Newark. College of Marine Studies.
EVALUATION OF SPATIAL, RADIOMETRIC AND SPECTRAL THEMATIC MAPPER PERFORMANCE FOR COASTAL STUDIES Quarterly Status and Technical Progress Report, 1 Jul. - 30 Sep. 1984
V. Klemas 1985 4 p
(Contract NAS5-27580)
(NASA-CR-177149; NAS 1.26:177149) Avail: NTIS HC A02/MF A01 CSCL 08B

The main emphasis of the research was to determine what effect different wetland plant canopies would have upon observed reflectance in Thematic Mapper bands. The three major vegetation canopy types (broadleaf, gramineous and leafless) produce unique spectral responses for a similar quantity of live biomass. Biomass estimates computed from spectral data were most similar to biomass estimates determined from harvest data when models developed for a specific canopy were used. In other words, the spectral biomass estimate of a broadleaf canopy was most similar to the harvest biomass estimate when a broadleaf canopy radiance model was used. Work is continuing to more precisely determine regression coefficients for each canopy type and to model the change in the coefficients with various combinations of canopy types. Researchers suspect that textural and spatial considerations can be used to identify canopy types and improve biomass estimates from Thematic Mapper data. Author

N86-32830# European Space Agency, Paris (France).
MICROWAVE REMOTE SENSING APPLIED TO VEGETATION
W. R. Burke, comp. Jan. 1985 159 p EARSeL Workshop held in Amsterdam, Netherlands, 10-12 Dec. 1984
(ESA-SP-227; ISSN-0379-6566; ETN-86-95054) Avail: NTIS HC A08/MF A01

Two approaches to radar signal processing for remote sensing are reviewed. The first considers the microwave region as just another window to be used in combination with the ones already existing in other wavelength regions. The second tries to solve the problem by fundamental investigations in the interaction between microwaves and remote sensing objects. For individual titles, see N86-32831 through N86-32844.

N86-32831# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
MICROWAVE REMOTE SENSING AND VEGETATION; PROBLEMS AND SOLUTIONS, A REVIEW
L. Krul *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 3-9 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Semiempirical calibration models for radar remote sensing of vegetation are reviewed. Measurement of the physical parameters for interaction models by ground based and airborne scatterometers is discussed. ESA

N86-32832# Sheffield Univ. (England). Dept. of Geography.
ACTIVE MICROWAVE MAPPING OF VEGETATION
G. M. Foody *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 15-23 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Per pixel and per field sampling methodologies for land cover mapping are compared. As a result of the changing viewing geometry, land cover map accuracy is found to be low and spatially variable. In an area of flat terrain land cover map accuracy is increased by allowing for the variations in viewing geometry by dividing the image into sectors defined by range distance and treating each sector independently. Using SAR 580 data, it is found that the use of tonal and textural information collected on a per field basis for a sectored image gives the highest land cover map accuracy. However, land cover map accuracy remains spatially variable. ESA

N86-32833# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
A REVIEW OF RADAR ANALYSIS OF WOODLAND
P. N. Churchill, A. I. D. Horne (Forestry Commission, Farnham (England).), and R. Kessler (Freiburg Univ. (West Germany).) *In* ESA Microwave Remote Sensing Applied to Vegatation Jan. 1985 p 25-32 (For primary document see N86-32830 24-43)
(Contract ESTEC-5778/83/NS-MS)
Avail: NTIS HC A08/MF A01

The ability of satellite imaging radar to make woodland determination is assessed, and the optimum radar parameters required are reviewed. Imagery and methods used in the analysis of imaging radar data of woodland are discussed. Imaging radar demonstrates great potential in making woodland determinations, but insufficient data exists to ascertain its full potential and to fully define optimum system parameters for the analysis of woodland. More work is needed to eliminate speckle and to incorporate texture or pattern measures in machine classification. ESA

N86-32834# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
MULTIPLE-INPUT SEGMENTATION ALGORITHM FOR SLAR-IMAGERY
Jan J. Gerbrands *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 35-39 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

An algorithm for automated segmentation of radar imagery of crops is outlined. The procedure is based on a sequential split-and-merge approach which allows for the simultaneous segmentation of multitemporal or multiangular views of the same scene, yielding one segmentation plan. The criteria for merging, splitting or grouping the tentative regions are based on the random scatterer model for natural backgrounds. Results are acceptable, but interactive tuning of the parameters requires considerable experience and run time for a 512 x 256 pixel scene is 50 min. ESA

N86-32835# Physics Lab. RVO-TNO, The Hague (Netherlands).
OPTIMIZATION OF AGRICULTURAL CROP IDENTIFICATION IN SLAR IMAGES: HIERARCHIC CLASSIFICATION AND TEXTURE ANALYSIS
Peter Hoogeboom *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 41-48 Sponsored by National Remote

Sensing Steering Committee (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

A SLAR flight program was carried out over an agricultural area. A classification study showed that high accuracies are obtained from a simultaneous classification of three flights, so in order to obtain the best possible classification result in the earliest possible stage of the growing season, flights from April, May, June, and July were analyzed. The hierarchic classifier is introduced. Very satisfying results are obtained from a combination of one flight in May and two in July at different incidence angles. Texture measures were determined from the gray level cooccurrence matrix. Within field variations do not contribute substantially to a classification process. ESA

N86-32836# Consiglio Nazionale delle Ricerche, Florence (Italy).
MICROWAVE EMISSION FROM VEGETATION: GENERAL ASPECTS AND EXPERIMENTAL RESULTS
P. Pampaloni and S. Paloscia *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 53-60 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Microwave radiometry applications to soil moisture content measurement is discussed. Vegetation cover reduces sensitivity for wavelengths less than 20 cm. The effect of vegetation can be studied by refering to radiative transfer theory and considering the canopy cover as uniform absorbent and scattering medium. At wavelengths less than 3 cm, most emission comes from the plants and can give information on vegetation type and conditions. Measurements show that the difference between Ka and X band brightness temperatures depends on the crop leaf area index. A sensitivity of the Ka band polarization index to plant water content was determined for corn and a linear relationship between this parameter and the leaf water potential is found. The relative roles of absorption and scattering, and the contributions of stalks, leaves, and fruits to the emitted power are unclear. ESA

N86-32837# Physics Lab. RVO-TNO, The Hague (Netherlands).
VARIATION OF THE RADAR BACKSCATTER OF VEGETATION THROUGH THE GROWING SEASON
G. P. deLoor *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 63-67 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Radar backscattering by crops through the growing season was measured. The backscatter shows typical temporal patterns depending on species. The place and length in time of this temporal signature can vary with latitude (climate). A model in which vegetation is modeled as a water cloud proves to be useful to obtain information about the vegetation canopy and the underlying soil. ESA

N86-32838# Institute of Hydrology, Wallingford (England).
ANALYSIS OF DIGITAL RADAR DATA FROM SAR-580 IN RELATION TO SOIL/VEGETATION MOISTURE AND ROUGHNESS
K. Blyth *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 71-83 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Soil and vegetation characteristics were surveyed in two test areas to evaluate the capabilities of digitally processed X and L band SAR to detect spatial and temporal variations in soil and vegetation moisture. One test area lay on homogeneous clay soils where local variations in soil moisture were minimized to simplify the study of vegetation effects. The other areas were of mixed soils and varying subsurface permeability where local variations in soil moisture were maximized. Here, flat, bare-earth sites were preferred to simplify the study of soil moisture effects. Field sampling methodology, digital data extraction techniques, radiometric balancing of digital data, and the effects of soil and vegetation moisture and roughness on radar relative backscatter are discussed. Results show no consistent relationship between surface soil moisture or vegetation moisture and radar backscatter. ESA

N86-32839# Freiburg Univ. (West Germany). Abt. Luftbildmessung und Fernerkundung.
SOME PRELIMINARY RESULTS ON LAND USE EVALUATIONS BY TEXTURE ANALYSIS OF SAR-580 DATA OVER THE TEST SITE FREIBURG (WEST GERMANY)
R. Kessler and R. Waltenspiel *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 85-91 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Texture investigations of digital SAR-50 data in X-HH are described. Forest and agricultural sites were tested with a texture analysis program which informs about the statistical distribution of radar reflection intensities. The results show textural properties of the sites by demonstrating the statistical variations of backscatter intensity graphs along an adjustable boundary, which is located parallel to the mean intensity value. ESA

N86-32840# Royal Aircraft Establishment, Farnborough (England). National Remote Sensing Centre.
SAR IMAGE SEGMENTATION USING DIGITISED FIELD BOUNDARIES FOR CROP MAPPING AND MONITORING APPLICATIONS
M. G. Wooding *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 93-98 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

The use of digitized field boundary data to segment images into fields which are treated as separate units for backscatter measurement and image classification in SAR surveys of agricultural regions is discussed. The technique is demonstrated with the analysis of SAR 580 data for the GB6 test site in England. Digitized field boundaries are overlain on SAR 580 images geometrically corrected to fit the UK National Grid. Image analysis includes the preparation of images showing mean backscatter values for individual fields, the measurement of backscatter for different crop types, and the analysis of changes in backscatter on different imaging dates. Relationships between backscatter and ground data are examined in the context of crop mapping and monitoring crop growth. ESA

N86-32841# Wageningen Agricultural Univ. (Netherlands). Dept. of Land Surveying and Remote Sensing.
TEXTURE ANALYSIS OF SLAR IMAGES AS AN AID IN AUTOMATED CLASSIFICATION OF FORESTED AREAS
Dirk H. Hoekman *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 99-109 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Experiments to elucidate the usefulness and behavior of statistical texture measures derived from gray level co-occurence and gray level difference counts in forest classification from SLAR imagery were performed. A fine resolution SLAR image of a forest with stands of tree species in the pole phase together with mature beach forests occurring in various spatial structures related to canopy roughness was analyzed. The measures reveal the potential to discriminate these forest structures. An integral classification approach for forests is suggested. ESA

N86-32842# Canada Centre for Remote Sensing, Ottawa (Ontario).
MICROWAVE REMOTE SENSING OF AGRICULTURAL CROPS IN CANADA
J. Cihlar, R. J. Brown, and B. Guindon *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 113-120 (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Crop classification accuracies achieved with SAR, visible, and IR data; crop and soil parameters affecting SAR images; the procedures for digital SAR image analysis; and the relationship between airborne SAR data and satellite SAR data are discussed. Developments in ground and airborne microwave instrumentation for agricultural studies are presented, and research activities are outlined. ESA

N86-32843# Technische Hogeschool, Delft (Netherlands). Microwave Lab.
THE DELFT UNIVERSITY OF TECHNOLOGY SCATTEROMETER (DUTSCAT): A SIX-FREQUENCY AIRBORNE SCATTEROMETER
E. P. W. Attema and P. Snoeij *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 127-129 Sponsored by Delft University and Netherlands Remote Sensing Board (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

The Delft University of Technology Scatterometer is a multiband coherent pulse scatterometer installed in a Beechcraft Queen Air research aircraft. The radar system uses a 0.9 m diameter dual polarized parabolic dish antenna mounted on a support structure and protected by a radome. In the support structure the RF parts of the radar are mounted. This whole system can be tilted between 0 and 80 deg incidence angle, looking to the left. The incidence angle and polarization are selected by the operator inside the aircraft. Frequencies are between 1.2 and 17.25 GHz. It is used for vegetation studies. ESA

N86-32844# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
HUMAN AND AUTOMATIC INTERPRETATION OF RADAR IMAGES OF LAND COVER
P. Churchill and A. Wright (GEC-Marconi Electronics Ltd., Chelmsford (England).) *In* ESA Microwave Remote Sensing Applied to Vegetation Jan. 1985 p 131-140 Sponsored by ESA (For primary document see N86-32830 24-43)
Avail: NTIS HC A08/MF A01

Methods used in the manual interpretation of SAR imagery of agricultural and woodland areas are reviewed. A 10 class categorization based on visual tone and texture as seen in XHV, XHH, CHV and CHH imagery is described. A selection of the different classes was analyzed using simple statistics and the spatial gray level dependency matrix method for measuring texture. Results indicate that for all classes, apart from rough, the regions have a pixel intensity variation compatible with the speckle expected in a homogeneous area. It is believed that the different visual texture is the effect of the increased pixel variation (speckle) with mean intensity. The studies show that the same classification can be achieved using computed measures as is defined manually. ESA

N86-32845# European Space Agency, Paris (France).
REMOTE SENSING APPLICATIONS IN CIVIL ENGINEERING
Norman Longdon, comp. Mar. 1985 107 p Postgraduate Summer School held in Dundee, Scotland, 19 Aug. - 8 Sep. 1984; sponsored by Science andEngineering Research Council, ESA, Council of Europe and European Association of Remote Sensing Labs.
(ESA-SP-216; ISSN-0379-6566; ETN-86-95251) Avail: NTIS HC A06/MF A01

The physical basis of remote sensing; data reception; ESA Earth observation programs; the UK National Remote sensing Center; digital image processing; space cartography; land use applications of remote sensing; remote sensing for highway engineers; geological surveys for nuclear plant location; estuary observations; snow and ice monitoring; and coastal zone monitoring were discussed. For individual titles, see N86-32846 through N86-32861.

N86-32846# Dundee Univ. (Scotland). Lab. of Physics.
THE PHYSICAL BASIS OF REMOTE SENSING
J. M. Anderson *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 1-7 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Remote sensing by passive methods, whereby the surface of interest is the source of the radiation reaching the detector; passive methods whereby the Sun or other natural source provides the radiation reflected towards the detector; and active methods, whereby a magnetron, laser, or other man-made source provides the radiation reflected towards the detector is introduced. The theory of electromagnetic radiation in the visible/near infrared, and thermal infrared regions necessary for passive methods is outlined. Surface effects and detection systems are discussed. ESA

N86-32847# Stirling Univ. (Scotland).
THE PHYSICAL BASIS OF REMOTE SENSING
A. I. Watson *In* ESA Remote Sensing Applications in Civil Engineerig Mar. 1985 p 9-13 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The changes that occur in electromagnetic radiation and matter when they interact, exploited in remote sensing, are described. Emission sources, transmission, reflectance, detectors, remote sensing systems, and system assessment criteria are discussed. ESA

N86-32848# Dundee Univ. (Scotland).
DATA RECEPTION
P. E. Baylis *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 15-18 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Principles of remote sensing satellite image data acquisition, transmission, ground reception, and archiving are summarized. Satellite orbits, Earth scanning techniques, data rates, data frames, codes and bandwidth, radio links, telemetry receivers, data storage, and hard copy production are discussed. ESA

N86-32849# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ESA AND ITS EARTH OBSERVATION PROGRAMS
J. N. deVilliers *In its* Remote Sensing Applications in Civil Engineering Mar. 1985 p 19-28 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The ESA Earth Observation Programs in meteorology (Meteosat) precise time transfer (LASSO), remote sensing of the oceans (ERS-1), and cartographic mapping from Spacelab are described. Reception, processing and distribution of satellite remote sensing data are outlined. The requirements for advanced satellite missions in land observation and solid Earth physics, and studies undertaken to define and determine the feasibility of such missions are summarized. ESA

N86-32850# Royal Aircraft Establishment, Farnborough (England). National Remote Sensing Centre.
THE UK NATIONAL REMOTE SENSING CENTRE
P. Vass and M. Elkington *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 29-33 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The UK National Remote Sensing Centre, including its organization and terms of reference; data reception facilities; data services and products; image processing facilities and major operations; and main fields of application are described. Domains covered include: coastal processes; oceanography and marine applications; land applications; information handling techniques; education and training; hydrology and water resources; and geological applications. Satellites and sensors, including ERS-1, and geographic information systems are discussed. ESA

N86-32851# Fachhochschule, Munich (West Germany). Fachbereich 07: Informatik, Mathematik.
DIGITAL IMAGE PROCESSING
Peter Haberaecker *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 35-90 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Hardware and software for a remote sensing digital image processing system are described. Algorithms, including local operations applied prior to further processing steps are discussed. The moving average, Laplacian, and Sobel operator are shown.

Since local operations are special applications of digital filters in the spatial domain, the basic ideas of Fourier transform and digital filtering are summarized. The theoretical background of the orthonormal expansion of two dimensional functions is given, including the Fourier expansion and the Karhunen-Loewe transformation. Geometrical transformations of digital images are discussed. Scene analysis and segmentation (thresholding, multivariate classification, contour following, region growing) are covered. Image interpretation is mentioned. ESA

N86-32852# Dundee Univ. (Scotland). Carnegie Lab. of Physics.
OPTICAL IMAGE PROCESSING
P. Tollin *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 91-96 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Ways in which optical image processing can complement and supplement digital image processing techniques in remote sensing are indicated. Optical methods provide a fast, cheap and convenient way of performing Fourier image processing methods since the Fraunhofer diffraction pattern found in the back focal plane of a lens is just the Fourier transform of the scattering object. Applications to the detection of periodicities, noise removal, the use of amplitude, phase and complex filters are discussed and pattern recognition is considered. ESA

N86-32853# University Coll., London (England).
SPACE CARTOGRAPHY
I. J. Dowman *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 97-121 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Means whereby information on a satellite image can be transferred to a map at a suitable scale so that the size or area of the features can be determined; the relative position of the features can be found; information obtained at different times and with different sensors can be compared; and the position of features in a national reference system can be found are discussed. Image rectification is explained using Landsat scanner imagery and radar. Height measurement is shown using space photography and SPOT imagery. ESA

N86-32854# North East London Polytechnic, Dagenham (England). Dept. of Land Surveying.
OPTICAL AND INFRARED MULTISPECTRAL IMAGERY LAND USE APPLICATIONS 2
R. K. Bullard *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 123-127 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Applications of visible and infrared remote sensors for land use studies are discussed. Methods of obtaining imagery, need for ground data, establishing the classification, sampling, and reliability are considered. Agricultural land use and its encroachment by urban development are commented upon as are the need to monitor changes including those brought about by civil engineering projects. Derelict land and pollution monitoring by remote sensing are mentioned. ESA

N86-32855# Transport and Road Research Lab., Crowthorne (England). Overseas Unit.
REMOTE SENSING FOR HIGHWAY ENGINEERS
P. J. Beaven *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 129-137 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

It is shown how highway engineers can interpret remotely sensed imagery for all scales of survey. At reconnaissance scale satellite photographic products are appropriate; for more detailed studies image processors must be used, but for the greatest detail, stereoscopic aerial photographs are essential. Advice on the choice of the appropriate imagery for different surveys and on how the interpretation should be organized is given. The emphasis for highway engineering is on visual interpretation, and it is shown that there are economical ways of obtaining a high quality image using low cost equipment. ESA

N86-32856# Strathclyde Univ., Glasgow (Scotland). Dept. of Applied Geology.
REMOTE SENSING OF NATURAL GEOLOGICAL HAZARDS IN THE SITING OF ENGINEERING FACILITIES
C. A. Davenport *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 139-142 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

Hazards to civil engineering facilities produced by active surface faulting and volcanism are reviewed, emphasizing site selection and design criteria in nuclear power plant safety studies. Phenomena sought during regional and local site investigations are described and remotely sensed data which can be applied to these investigations are grouped to provide an optimum-input scheme for siting studies. Lineaments, morphotectonics, geological offsets, fault traces, deformation zones and appurtenant landslides are illustrated to provide details of important geological hazards and to document satellite and aerial imagery and photography, radiometry, moving and time-lapse film techniques, and seismological records. ESA

N86-32857# Dundee Univ. (Scotland). Dept. of Geology.
GRADIENTS OF CHANGE IN THE ESTUARINE ENVIRONMENTS OF THE TAY
John McManus *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 143-149 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The hydrology and structure of the Tay estuary (Scotland) were studied to assess remote sensing methods and technology. Results show that estuarine waters provide gradients of water surface, salinity, temperature and suspended sediment concentrations. Intertidal flats show systematic variations of grain size with coarse sands in channel margins and fine muds beside marshes. ESA

N86-32858# Norwegian Water Resources and Electricity Board, Oslo.
SNOW AND ICE
Gunnar Oestrem *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 151-163 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

A method which uses data from polar orbiting satellites to monitor snow cover in Norway was developed. Winter snow cover is of great economic importance in Norway because the meltwater accounts for a substantial part or annual inflow into reservoirs for hydroelectric power production(more than 99% of all electricity production). Snow surveys made by traditional methods are costly and labor intensive. Airborne gamma methods are also used, and a radio-echo method proves useful for glacier thickness measurements. A snow stick can be used for monitoring snowpack variations, and real-time data transmission can be made in the ARGOS system. General sea ice conditions can be reported by the NIMBUS microwave radiometer, whereas more detailed ice-edge mapping can be made from NOAA-IR data. ESA

N86-32859# Royal Aircraft Establishment, Farnborough (England).
MONITORING ICEBERG PRODUCTION USING LANDSAT DATA
R. V. Birnie (MacAulay Inst. for Soil Research, Aberdeen (Scotland).) and J. M. Williams *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 165-167 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The use of Landsat MSS data to monitor iceberg production from west Greenland glaciers was studied. The importance of such data to iceberg management in oilfields off Labrador and Newfoundland is underlined. Most of the freshwater icebergs

found off eastern Canada originate from west Greenland glacier sources and it is known that on average it takes 2 to 3 yr for icebergs to drift, first north in the west Greenland current, then south through the Davis Straight in the Labrador current. The study suggests that it is possible to do an annual census of iceberg production from the major west Greenland glacier sources to predict ice conditions around drilling sites up to 3 years in advance. ESA

N86-32860# National Remote Sensing Agency, Hyderabad (India).
APPLICATION POTENTIAL OF REMOTE SENSING: A CASE FOR NATURAL RESOURCES MANAGEMENT SYSTEM
I. V. Murali krishna *In* ESA Remote Sensing Applications in Civil Engineering Mar. 1985 p 169-174 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF A01

The Indian Remote Sensing satellite (IRS-1) program is outlined. A long program of IRS utilization is expected to provide a basic input to technology operationalization. The natural resources management system conceived under IRS utilization is expected to create demand for remotely sensed data and promote acceptance of the technology as a basic tool for resource monitoring and management. The information system required, and application to coastal erosion and environmental monitoring are discussed. ESA

N86-32861# National Remote Sensing Agency, Hyderabad (India).
OPTICAL REMOTE SENSING FOR COASTAL ZONE MANAGEMENT
I. V. Murali krishna *In* ESA Remote Sensing Appl. in Civil Eng. Mar. 1985 p 175-191 (For primary document see N86-32845 24-43)
Avail: NTIS HC A06/MF a01

Remote sensing application to engineering problems in coastal zone management in intertropical regions is discussed. Studies of aquatic suspended sediment patchiness and tidal vortices are described. The capability of remotely sensed satellite data to monitor the effects of littoral processes is shown. The utility of proposed sensors is assessed. ESA

N86-32862# National Oceanic and Atmospheric Administration, Washington, D. C. Satellite Applications Lab.
AN EXPERIMENTAL TECHNIQUE FOR PRODUCING MOISTURE CORRECTED IMAGERY FROM 1 km ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) DATA
Eileen Maturi, John Pritchard, and Pablo Clemente-Colon Jun. 1986 34 p
(NOAA-TM-NESDIS-15) Avail: NTIS HC A03/MF A01

Removal of atmospheric moisture from infrared measurements of the sea surface, allows for better detection of sea surface temperature gradients. A multispectral processing technique is applied to 1 km AVHRR data to correct for moisture. The resulting data is then feature enhanced and converted to imagery. This process and the applications of the moisture corrected imagery are presented. Author

N86-32863*# California Univ., Santa Barbara.
REMOTE SENSING INFORMATION SCIENCES RESEARCH GROUP, SANTA BARBARA INFORMATION SCIENCES RESEARCH GROUP, YEAR 3 Final Report
John E. Estes, Terence Smith, and Jeffrey L. Star 5 Jan. 1986 87 p
(Grant NAGw-455)
(NASA-CR-179769; NAS 1.26:179769) Avail: NTIS HC A05/MF A01 CSCL 05B

Research continues to focus on improving the type, quantity, and quality of information which can be derived from remotely sensed data. The focus is on remote sensing and application for the Earth Observing System (Eos) and Space Station, including associated polar and co-orbiting platforms. The remote sensing research activities are being expanded, integrated, and extended into the areas of global science, georeferenced information systems, machine assisted information extraction from image data, and artificial intelligence. The accomplishments in these areas are examined. For individual titles, see N86-32864 through N86-32867.

N86-32864*# California Univ., Santa Barbara.
SUPPORT FOR GLOBAL SCIENCE: REMOTE SENSING'S CHALLENGE
John E. Estes and Jeffrey L. Star *In its* Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 5 Jan. 1986 13 p (For primary document see N86-32863 24-43)
Avail: NTIS HC A05/MF A01 CSCL 05B

Remote sensing uses a wide variety of techniques and methods. Resulting data are analyzed by man and machine, using both analog and digital technology. The newest and most important initiatives in the U. S. civilian space program currently revolve around the space station complex, which includes the core station as well as co-orbiting and polar satellite platforms. This proposed suite of platforms and support systems offers a unique potential for facilitating long term, multidisciplinary scientific investigations on a truly global scale. Unlike previous generations of satellites, designed for relatively limited constituencies, the space station offers the potential to provide an integrated source of information which recognizes the scientific interest in investigating the dynamic coupling between the oceans, land surface, and atmosphere. Earth scientist already face problems that are truly global in extent. Problems such as the global carbon balance, regional deforestation, and desertification require new approaches, which combine multidisciplinary, multinational research teams, employing advanced technologies to produce a type, quantity, and quality of data not previously available. The challenge before the international scientific community is to continue to develop both the infrastructure and expertise to, on the one hand, develop the science and technology of remote sensing, while on the other hand, develop an integrated understanding of global life support systems, and work toward a quantiative science of the biosphere. Author

N86-32865*# California Univ., Santa Barbara.
KBGIS-2: A KNOWLEDGE-BASED GEOGRAPHIC INFORMATION SYSTEM
Terence Smith, Donna Peuquet, Sudhakar Menon, and Pankaj Agarwal *In its* Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 5 Jan. 1986 43 p (For primary document see N86-32863 24-43)
Avail: NTIS HC A05/MF A01 CSCL 05B

The architecture and working of a recently implemented knowledge-based geographic information system (KBGIS-2) that was designed to satisfy several general criteria for the geographic information system are described. The system has four major functions that include query-answering, learning, and editing. The main query finds constrained locations for spatial objects that are describable in a predicate-calculus based spatial objects language. The main search procedures include a family of constraint-satisfaction procedures that use a spatial object knowledge base to search efficiently for complex spatial objects in large, multilayered spatial data bases. These data bases are represented in quadtree form. The search strategy is designed to reduce the computational cost of search in the average case. The learning capabilities of the system include the addition of new locations of complex spatial objects to the knowledge base as queries are answered, and the ability to learn inductively definitions of new spatial objects from examples. The new definitions are added to the knowledge base by the system. The system is currently performing all its designated tasks successfully, although currently implemented on inadequate hardware. Future reports will detail the performance characteristics of the system, and various new extensions are planned in order to enhance the power of KBGIS-2. Author

N86-32866*# California Univ., Santa Barbara.
PILOT LAND DATA SYSTEM
Jeffrey L. Star and John E. Estes *In its* Remote Sensing Information

Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 5 Jan. 1986 4 p (For primary document see N86-32863 24-43)
Avail: NTIS HC A05/MF A01 CSCL 05B

The Pilot Land Data System (PLDS) is a multi-institutional effort directed towards solving the data access and management needs of scientists studying the land surface. Some of the hardware and software, which are now available, are reviewed. B.G.

N86-32867*# California Univ., Santa Barbara.
[RESEARCH UNDERTAKEN AND PROPOSED DIRECTIONS FOR THE COMING YEAR OF THE INFORMATION SYSTEM RESEARCH GROUP] Final Summary Report, 1 May 1985 - 30 Apr. 1986
John E. Estes and Jeffrey L. Star *In its* Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 5 Jan. 1986 43 p (For primary document see N86-32863 24-43)
Avail: NTIS HC A05/MF A01 CSCL 05B

The basic understanding of the role of information systems technologies and artificial intelligence techniques in the integration, manipulation, and analysis of remotely sensed data for global scale studies is examined. B.G.

N86-32868# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MCT/INPE LANDSAT SYSTEM: REPORT OF ACTIVITIES FROM SEPTEMBER 1, 1985 TO MARCH 31, 1986
Jose Luis deBarrosAguirre and Sergio dePaulaPereira Jun. 1986 24 p Presented at the LGSOWG and LDDMWG Meetings, Rome, Italy, Jun. 1986
(INPE-3927-PRE/960) Avail: NTIS HC A02/MF A01

The current status of the Brazilian LANDSAT facilities operated by INPE and the results achieved during the period from September 1, 1985 to March 31, 1986 are described. Author

N86-32869# Los Alamos National Lab., N. Mex.
NON-ENDING HELIUM STORY
E. F. Hammel, M. C. Krupka, and K. D. Williamson, Jr. 1986 15 p Presented at the 11th International Cryogenic Engineering Conference, Berlin, West Germany, 22 Apr. 1986
(Contract W-7405-eng-36)
(DE86-010192; LA-UR-86-1363; CONF-860437-1) Avail: NTIS HC A02/MF A01

Why an adequate supply of helium is of importance to cryoengineering is obvious to everyone present at this conference. Why there is a non-ending helium problem - or more specifically why helium supply problems have arisen in the past, why they may arise again in the future, what are those problems and what solutions appear to exist - is more complicated. To answer these questions this paper is divided into three sections: resource availability, the demand for helium and the supply of helium. DOE

N86-32870# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
SEMI-OPERATIONAL IDENTIFICATION OF AGRICULTURAL CROPS FROM AIRBORNE SLAR DATA
P. Binnenkade, H. W. J. vanKasteren, and D. Uenk 26 Mar. 1985 11 p Presented at 11th Intern. Symposium on Machine Processing of Remotely Sensed Data, West Lafayette, Ind., 25-27 Jun. 1985 Previously announced in IAA as A86-37025
(NLR-MP-85030-U; B8665118; ETN-86-97674) Avail: NTIS HC A02/MF A01

Preprocessing, segmentation, and pseudo-hierarchical classification of a multitemporal data set of three test sites for identification of potatoes and other agricultural crops is described. Good discrimination capabilities between crop types, especially potatoes, is achieved. Unique identification of the three major crop types (sugar beets, potatoes and winter wheat) with an accuracy greater than 90% is possible. In one area, this accuracy is obtained when using only the July data set. It appears possible to identify more than one species of winter wheat and potatoes. Oats and barley are difficult to distinguish from other crop types. It is possible to obtain the required results with a high and a low track in July and one other run in May. ESA

N86-32871# Rijkswaterstaat, The Hague (Netherlands). Projectgroep Remote Sensing IJsselmeergebied.
REMOTE SENSING AND WATER QUALITY IN THE IJSSELMEER (NETHERLANDS) AREA [REMOTE SENSING EN WATERKWALITEIT IN HET IJSSELMEERGEBIED]
Jan. 1985 25 p In DUTCH
(MDLK-R-8537; ETN-86-97493) Avail: NTIS HC A02/MF A01

Possible contributions of Landsat multispectral scanner recording to the determination of a quantitatively spatial image of algae and silt, and relations between these and other parameters (e.g., transparence) were investigated. The relation between the feeding behavior of cormorants and RS observable differences of the water surface were examined as the birds seem to choose their feeding areas on the basis of optical water information. Valuable information concerning the spatial variation of optically observable matters and processes, e.g., chlorophyl, suspending dust, humus acids, transparence, temperature, and stream phenomena can be obtained. The results offer sufficient perspectives for further water quality investigations. ESA

N86-32872# Instituut voor Culturtechniek en Waterhuishouding, Wageningen (Netherlands).
REMOTE SENSING STUDY PROJECT IN OOST-GELDERLANDS (NETHERLANDS) Final Report [REMOTE SENSING STUDIEPROJECT COST GELDERLAND]
Sep. 1985 65 p In DUTCH
(Nota-1641; ETN-86-97495) Avail: NTIS HC A04/MF A01

Possibilities of operational applications of remote sensing (RS) recording and processing techniques for agriculture and nature areas were investigated. Information about water consumption of vegetation covering, soil moisture supply, crop production, the composition of natural vegetation, and the occurrence of agricultural crops was obtained in rural areas and peat colonies in the summer. Scanner recorded reflection and heat images and false color photographs were used. A vegetational description and an evapotranspiration map were composed using the automatic processing of digital reflection and heat images. The application of a combination of RS and conventional techniques leads to better results than the separate use of one of the techniques. ESA

N86-32873# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
ASTRONOMICAL GEODETIC ESTIMATES OF AZIMUTH IN THE WEST GERMAN MAIN TRIANGULATION NETWORK [DIE ASTRONOMISCH-GEODAETISCH BESTIMMTEN AZIMUTE IM WESTDEUTSCHEN HAUPTDREIECKSNETZ]
Dieter Ehlert and Elfriede Karn 1985 340 p In GERMAN; ENGLISH summary
(Ser-B-274-Mitt-171; ISSN-0071-9196; ETN-86-97830) Avail: NTIS HC A15/MF A01

The azimuths determined in the Federal Republic of Germany by astronomic-geodetical means were examined, in part newly reduced and, as far as possible and necessary, tranferred to sides of the German Primary Triangulation Network. ESA

N86-32874# World Climate Programme, Geneva (Switzerland).
THIRD PLANNING MEETING ON WORLD CLIMATE PROGRAM: WATER
1985 63 p Meeting held in Geneva, Switzerland, 18-22 Nov. 1985
(WCP-114; WMO/TD-106; ETN-86-97809) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Implementation of World Climate Program water projects was discussed. The program includes studies of hydrological data in the context of climate variability and change; modeling of the hydrological cycle for climate study purposes; application of climate information to hydrological forecasts in the operation of water-resource systems; studies of the influence of climate variations on water resources; impact of climate on society through water

resources; and influence of human activity on climate through the hydrological regime. ESA

N86-32789 Institut de Physique du Globe, Paris (France).
ENERGY SOURCES AND THE THERMAL HISTORY OF THE EARTH [SOURCES D'ENERGIE ET HISTOIRE THERMIQUE DE LA TERRE]
Claude Jaupart *In* CNES International Geophysics and Space 1985 p 85-109 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N86-32875* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LITHIUM COUNTERDOPED SILICON SOLAR CELL Patent
Irving Weinberg, inventor (to NASA) and Henry W. Brandhorst, Jr., inventor (to NASA) Issued 26 Aug. 1986 7 p Filed 07 Nov. 1984 Supersedes N85-20535 (23 - 11, p 1672)
(NASA-Case-LEW-14177-1; US-Patent-4,608,452;
US-Patent-Appl-SN-669140; US-Patent-Class-136-261;
US-Patent-Class-29-572; US-Patent-Class-29-576B;
US-Patent-Class-148-1.5; US-Patent-Class-357-30;
US-Patent-Class-357-91) Avail: US Patent and Trademark Office CSCL 10A

The resistance to radiation damage of an n(+)p boron doped silicon solar cell is improved by lithium counterdoping. Even though lithium is an n-dopant in silicon, the lithium is introduced in small enough quantities so that the cell base remains p-type. The lithium is introduced into the solar cell wafer by implantation of lithium ions whose energy is about 50 keV. After this lithium implantation, the wafer is annealed in a nitrogen atmosphere at 375 C for two hours. NASA

N86-32876*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PHOTOVOLTAIC CONVERSION OF LASER POWER TO ELECTRICAL POWER
Gilbert H. Walker and John H. Heinbockel (Old Dominion Univ., Norfolk, Va.) Sep. 1986 18 p
(NASA-TM-89041; NAS 1.15:89041) Avail: NTIS HC A02/MF A01 CSCL 10A

Photovoltaic laser to electric converters are attractive for use with a space-based laser power station. This paper presents the results of modeling studies for a silicon vertical junction converter used with a Nd laser. A computer code was developed for the model and this code was used to conduct a parametric study for a Si vertical junction converter consisting of one p-n junction irradiated with a Nd laser. These calculations predict an efficiency over 50 percent for an optimized converter. Author

N86-32877*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ECUT (ENERGY CONVERSION AND UTILIZATION TECHNOLOGIES PROGRAM). BIOCATALYSIS PROJECT Annual Report, FY 1985
30 Jul. 1986 45 p
(Contracts NAS7-918; DE-AI01-81CS-66001)
(NASA-CR-179754; JPL-Pub-86-32; NAS 1.26:179754;
DOE/CS-66001-9) Avail: NTIS HC A03/MF A01 CSCL 10A

Presented are the FY 1985 accomplishments, activities, and planned research efforts of the Biocatalysis Project of the U.S. Department of Energy, Energy Conversion and Utilization Technologies (ECUT) Program. The Project's technical activities were organized as follows: In the Molecular Modeling and Applied Genetics work element, research focused on (1) modeling and simulation studies to establish the physiological basis of high temperature tolerance in a selected enzyme and the catalytic mechanisms of three species of another enzyme, and (2) determining the degree of plasmid amplification and stability of several DNA bacterial strains. In the Bioprocess Engineering work element, research focused on (1) studies of plasmid propagation and the generation of models, (2) developing methods for preparing immobilized biocatalyst beads, and (3) developing an enzyme encapsulation method. In the Process Design and Analysis work element, research focused on (1) further refinement of a test case simulation of the economics and energy efficiency of alternative biocatalyzed production processes, (2) developing a candidate bioprocess to determine the potential for reduced energy consumption and facility/operating costs, and (3) a techno-economic assessment of potential advancements in microbial ammonia production. Author

N86-32878# Naval Civil Engineering Lab., Port Hueneme, Calif.
WIND ENERGY CONVERSION SYSTEMS: EVALUATION OF RELIABILITY, AVAILABILITY, AND MAINTAINABILITY AT VARIOUS LOCATIONS Interim Report, Sep. 1981 - Sep. 1984
Dharam Pal Mar. 1986 34 p
(AD-A168272; NCEL-TN-1748) Avail: NTIS HC A03/MF A01 CSCL 10/1

This report describes the results of long-term field evaluation of four horizontal-axis, upwind, small wind energy conversion systems (SWECS) configured in an application mode. The long-term field evaluation of these SWECS covers performance, reliability, maintenance, maintainability, and availability data. Results of these evaluations have proven SWECS to be a viable source of alternative energy, but they must be properly designed and maintained to operate in a highly corrosive marine environment. The SWECS require frequent preventive maintenance, depending on design and location, including corrosion control at least every 3 months. The following recommendations resulted from the field evaluations: (1) do not use sliprings and bearings, if at all possible; (2) use sealed and self-lubricating bearings; (3) ensure that the tower is guyed and hinged for easy maintenance; (4) as much as possible enclose all components exposed directly to the marine environment; (5) ensure that all controls are passive and fail safe; and (6) improve the programming of the synchronous inverter so that it matches generator impedance at all wind speeds. GRA

N86-32879# Washington Consulting Group, Inc., Washington, D.C.
WIND TURBINE AERODYNAMICS RESEARCH NEEDS ASSESSMENT
F. S. Stoddard and B. K. Porter Jan. 1986 143 p
(Contract DE-AC01-85ER-30075)
(DE86-009189; DOE/ER-30075/H1) Avail: NTIS HC A07/MF A01

A prioritized list is developed for wind turbine aerodynamic research needs and opportunities which could be used by the Department of Energy program management team in detailing the DOE Five-Year Wind Turbine Research Plan. The focus of the Assessment was the basic science of aerodynamics as applied to wind turbines, including all relevant phenomena, such as turbulence, dynamic stall, three-dimensional effects, viscosity, wake geometry, and others which influence aerodynamic understanding and design. The study was restricted to wind turbines that provide electrical energy compatible with the utility grid, and included both horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Also, no economic constraints were imposed on the design concepts or recommendations since the focus of the investigation was purely scientific. DOE

N86-32880# Sandia National Labs., Albuquerque, N. Mex.
SOLAR THERMAL ENERGY SYSTEMS. PROGRAM SUMMARY,

FISCAL YEAR 1985
Apr. 1986 159 p Prepared in cooperation with Sandia National Labs., Livermore, Calif. and Midwest Research Inst., Golden, Colo.
(Contracts DE-AC02-83CH10093; DE-AC04-76DR00789; DE-AC04-76DP-00789)
(DE86-004441; SERI/SP-273-2938) Avail: NTIS HC A08/MF A01

The research and development (R and D) described in this document was conducted within the US Department of Energy's (DOE) Solar Thermal Technology Program. The goal of the Solar Thermal Technology Program is to advance the engineering and scientific understanding of solar thermal technology, and to establish the technology base from which private industry can develop solar thermal power production options for introduction into the competitive energy market. Research areas emphasized include central receivers, distributed receivers and solar thermal materials. This program summary highlights tasks conducted by the participating national laboratories under contract by industrial, academic, or other research institutions. This summary covers activities initiated, renewed, or completed during Fiscal Year 1985 (October 1, 1984 through September 30, 1985). This document includes introductory information, a list of directing organizations, a list of acronyms and abbreviations, and an index of current contractors. It also includes individual activity summary sheets, grouped by directing organizations and a list of FY 1985 publications. DOE

N86-32881# Sandia National Labs., Albuquerque, N. Mex.
OVERVIEW OF SANDIA'S STORAGE BATTERY PROGRAM
R. P. Clark and K. R. Grothaus 1986 10 p Presented at the 32nd NASA/US Army International Power Sources Symposium, Cherry Hill, N.J., 8 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010956; SAND-86-2092C; CONF-860688-1) Avail: NTIS HC A02/MF A01

The primary mission of Sandia National Laboratories is the design and development of the non-nuclear components and systems for nuclear weapons. To a lesser degree, Sandia is also involved in a variety of other programs; such as, energy projects with the Department of Energy, conventional military projects with the Department of Defense, and nuclear waste management and reactor safety with the Nuclear Regulatory Commission. Over the years, Sandia has evolved a considerable expertise in the areas of specialty primary, reserve, and more recently, secondary battery systems. This paper focuses on the status of the storage or secondary battery programs. These programs are divided into those battery systems being developed for energy applications and those being developed for military applications. DOE

N86-32882# Sandia National Labs., Albuquerque, N. Mex.
NEW TECHNIQUE FOR IMPROVING VOLTAGE REGULATION IN Li/FeS THERMAL BATTERIES
N. A. Godshall and A. R. Baldwin 1986 10 p Presented at the 32nd NASA/US Army International Power Sources Symposium, Cherry Hill, N.J., 8 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010962; SAND-85-2284C; CONF-860688-2) Avail: NTIS HC A02/MF A01

Lithiation of the FeS cathode material lowers the voltage of the initial discharge (which is often too high for many applications) and raises the voltage of the battery at the end of discharge (which is often too low due to a second voltage plateau). In the example of the Sandia ten-cell Li(Si)/FeS long-life thermal battery, lithiating the cathode improves the voltage regulation from 12.8 to 0.5% during the initial 5 minutes of discharge and from 38 to 12% over the entire 60 minute discharge time. Batteries employing the new lithiated cathode material were also subjected to dynamic mechanical environments, both before and during electrochemical discharge. No adverse changes in either the electrical or mechanical properties of these batteries were observed, relative to standard composition batteries. DOE

N86-32883# International Planning Associates, Beltsville, Md.
IEA SOLAR: WORKING TOWARD GREATER COST-EFFECTIVENESS, REPORT OF THE INTERNATIONAL ENERGY AGENCY SOLAR HEATING AND COOLING PROGRAMME Annual Report, 1985
S. Blum, ed. Feb. 1986 55 p
(Contract DE-AC03-83SF-11918)
(DE86-011521; IEA/SHC/AR-85) Avail: NTIS HC A04/MF A01

This is the 1985 Annual Report of the International Energy Agency Solar Heating and Cooling (SHC) Program. The format of the report has been changed substantially from that of previous years. In addition, the report has been given a special theme: Working Toward Greater Cost-Effectiveness. Section 2 of this report, the special theme chapter, discusses the contributions of each of the cooperative activities to achieving more cost-effective solar heating and cooling systems. A report on the progress and accomplishments during 1985 of the current tasks is found in Section 3. Section 4, Appendix, contains a description of each of the tasks as background information for those unfamiliar with all or parts of the program. Finally, the Appendix also contains information on IEA SHC reports, meetings, Executive Committee Members and task technical participants. DOE

N86-32884# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
US PHOTOVOLTAIC PATENTS, 1951-1983
Apr. 1986 197 p
(Contract DE-AC02-83CH-10093)
(DE86-004431; SERI/SP-271-2763) Avail: NTIS HC A09/MF A01

This document comprises citations of 1,487 US patents on terrestrial power photovoltaic applications, systems, components, materials, manufacturing and support functions. Specifically excluded are patents on space photovoltaic technology, use of the photovoltaic effect for detectors, and subjects only peripherally concerned with photovoltaics. Citations are indexed by inventor, assignee, and subject. DOE

N86-32885# Sandia National Labs., Albuquerque, N. Mex.
DESIGN OF AN INTERMEDIATE-SIZED, AUTONOMOUS PHOTOVOLTAIC-DIESEL POWER PLANT
T. M. Calloway Apr. 1986 27 p
(Contract DE-AC04-76DP-00789)
(DE86-010629; SAND-85-2136) Avail: NTIS HC A03/MF A01

A method is presented for designing an intermediate-sized, autonomous photovoltaic power plant with a diesel-electric generator and a battery bank. Energy output from the photovoltaic array first satisfies any load demand then charges the batteries. Diesel-electric generators periodically equalize battery charge and occasionally supply load demand when array output is insufficient and battery state of charge is too low to provide supplemental energy. Given hourly load demand and annual fuel consumption, battery capacity is functionally related to array size. Subsequently, a model predicts battery life by deducting the fraction of total life consumed each day. An economic model then computes life-cycle system cost. Repeating this process for different combinations of array area and battery capacity produces a curve that identifies the minimum-cost system design. DOE

N86-32886# Projectbeheerbureau Energieonderzoek, Utrecht (Netherlands).
EVALUATION OF THE NATIONAL WIND ENERGY DEVELOPMENT PROGRAM NOW-2, PHASE 1 [EVALUATIE NATIONAAL ONTWIKKELINGSPROGRAMMA WINDENERGIE NOW-2, FASE 1]
Sep. 1985 73 p In DUTCH
(Rept-1-4098-39-05; ETN-86-97774) Avail: NTIS HC A04/MF A01

The situation in the field of wind energy in the Netherlands is depicted for the years 1980 and 1985. Central wind energy production projects (horizontal-axis turbines, offshore applications, multiple wind turbines, system studies), decentralized wind energy production projects (testing projects, test facilities, development

of small and medium turbines, autonomous wind-diesel system, feasibility studies, cost-effective wind turbine), and the investigation of the effects of tip vanes on turbines are presented. Opinions of representatives from involved sectors are given. ESA

N86-32887# Projectbeheerbureau Energieonderzoek, Utrecht (Netherlands).
THE NATIONAL WIND ENERGY DEVELOPMENT PROGRAM 1981-1984. INVENTORY OF EXECUTED PROJECTS AND RESULTS [HET NATIONAAL ONTWIKKELINGSPROGRAMMA WINDENERGIE 1981-1984. EEN INVENTARISATIE VAN UITGEVOERDE PROJECTEN EN RESULTATEN]
H. J. M. Beurskens Oct. 1985 243 p In DUTCH
(ETN-86-97775) Avail: NTIS HC A11/MF A01

An inventory of the Dutch wind energy development program was made in order to prepare the next phase of the program. Centralized wind energy production, decentralized wind energy production, and general supporting subjects are overviewed. The transfer of knowhow to users is discussed. ESA

N86-32888# National Aerospace Lab., Amsterdam (Netherlands).
ATTEMPT TO EVALUATE THE TIP VANE CONCEPT WITH A LIFTING-LINE MODEL
O. deVries Sep. 1985 25 p In DUTCH; ENGLISH summary
(NLR-MP-85071-U; B8664364; ETN-86-97684) Avail: NTIS HC A02/MF A01

A nonlinear vortex model based on a lifting-line approximation (code HELIX) was developed to estimate the aerodynamic performance of the tip vane wind turbine. Application of the code reveals a strong dependence of the performance on the tip-speed ratio lambda. Though a power coefficient Cp-1 can be obtained for lambda between 3 and 4, the power is scarcely in excess of that of a conventional turbine (Cp between 0.40 and 0.45) for lambda between 10 and 11. The costs of rotor, gear box, and tower increase so strongly at low lambda, that the cost effectiveness of a tip vane wind turbine is only slightly better than for a conventional high lambda wind turbine. The perspectives of the tip vane concept are therefore more limited than originally expected. ESA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N86-32889# Army War Coll., Carlisle Barracks, Pa.
WATER: A STRATEGIC RESOURCE?
Robert E. Thornton 15 Apr. 1986 30 p
(AD-A168470) Avail: NTIS HC A03/MF A01 CSCL 13/2

Availability of fresh water has been taken for granted throughout our history. In fact, the United States has been blessed with what was once thought to be a limitless natural resource, fresh water. The sources for this fresh water are precipitation, surface water and ground water. Today, these sources are under relentless pressure from chronic pollution and over-usage. The federal government has begun the process of studying and doumenting the problems associated with our water supply but to date its efforts are far to little, too late. Budget constraints and funding projections only add to the already bleak picture. We are learning that water problems can't be contained and that they cross state, local and private boundaries. This problem of area pollution has drawn considerable concern within the Department of Defense (DOD) as more and more of our installations are finding their water environment jeopardized. Solutions for the preservation, cleansing, and protection of our fresh water systems are going to be expensive and technically complicated to accomplish and administer. Action is needed now. GRA

N86-32890# World Meteorological Organization, Geneva (Switzerland).
REPORT OF THE INTERNATIONAL CONFERENCE ON THE ASSESSMENT OF THE ROLE OF CARBON DIOXIDE AND OF OTHER GREENHOUSE GASES IN CLIMATE VARIATIONS AND ASSOCIATED IMPACTS
1986 83 p Conference held in Villach, Austria, 9-15 Oct. 1985 Prepared in cooperation with ICSU, Rome, Italy
(WMO-661; ISBN-92-63-10661-4; ETN-86-97660) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The contributions to and environmental, social, and economic impact of the greenhouse effect were discussed. It was concluded that it is a matter of urgency to refine estimates of future climate conditions to improve planning decisions. Climate change and sea level rises due to greenhouse gases are closely linked with other major environmental issues, such as acid deposition and threats to the Earth's ozone shield, mostly due to changes in the composition of the atmosphere by man's activities. While warming of climate appears inevitable due to past actions, the rate and degree of future warming could be profoundly affected by governmental policies on energy conservation, use of fossil fuels, and the emission of greenhouse gases. ESA

N86-32824# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Applied Data Systems Div.
UTILIZATION OF ARGOS FOR OZONE MEASUREMENT STATIONS
W. Balzer and K. Reiniger *In* CNES The 10th ARGOS Users Conference 1985 14 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N86-32891 Johns Hopkins Univ., Baltimore, Md.
SPECTROSCOPY OF THE FAR AND EXTREME ULTRAVIOLET DAYGLOW Ph. D. Thesis
Charles W. Bowers 1985 155 p
Avail: Univ. Microfilms Order No. DA8601246

Researchers have designed, built and flown in a sounding rocket payload, a spectrograph with approx. 2 angstrom resolution from 850 angstroms to 1850 angstroms obtaining the highest resolution, broad wavelength coverage UV dayglow spectrum to date. This instrument utilizes a newly developed photon counting detector consisting of an ultraviolet-to-visible-light image intensifier with two microchannel plates in a tandem arrangement followed by a phosphor coated on the face of a fiber optics output bundle. Light generated in the phosphor by electron pulses produced by the MCP stack is transmitted to photodiode array with 1024 independent photodiodes. The broad light pulses generated by the intensifier were detected by the photodiode array. This flight data was transmitted to the ground and centroided, recovering the spectrograph resolution of approx. 2 angstroms. The vacuum spectrograph contains an osmium coated holographic f/2 concave diffraction grating, baffled to f/4 for flight. A movable slit wheel mechanism provides a vacuum seal, which is broken during flight as the entrance slit is moved into position. The UV dayglow spectrum obtained is presented and tentative identification of most of the emission features is made. Dissert. Abstr.

N86-32892*# National Aeronautics and Space Administration, Washington, D.C.
ATMOSPHERIC OZONE 1985. ASSESSMENT OF OUR UNDERSTANDING OF THE PROCESSES CONTROLLING ITS PRESENT DISTRIBUTION AND CHANGE, VOLUME 2 Global Ozone Research and Monitoring Project
1985 356 p Prepared in cooperation with FAA, Washington, D.C., NOAA, Washington, D.C., United Nations Environment Program, Nairobi, Kenya, WMO, Geneva, Switzerland, Commission

of the European Communities, Brussels, Belgium, and BMFT, Bonn, West Germany Original contains color illustrations
(NASA-TM-89238; NAS 1.15:89238; WMO-Rept-16-Vol-2) Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A16/MF A01 CSCL 04A

Observations and interpretation of oxygen, hydrogen, nitrogen, and halogenated species are discussed. For individual titles, see N86-32893 through N86-32896.

N86-32893*# National Aeronautics and Space Administration, Washington, D.C.
OXYGEN SPECIES
G. Brasseur, A. J. Miller, P. K. Bhartia, A. Fleig, L. Froidevaux, D. Heath, E. Hilsenrath, J. A. Logan, P. McCormick, G. Megie et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 2 1985 42 p (For primary document see N86-32892 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A16/MF A01 CSCL 04A

The spatial distribution of ozone, as predicted by numerical models, is compared with observations. A set of reference ozone profiles was developed against which to compare current numerical calculations. Most of the analyses will focus on ozone between 30 and 70 km altitude. B.G.

N86-32894*# National Aeronautics and Space Administration, Washington, D.C.
HYDROGEN SPECIES
H. I. Schiff, C. Burnett, B. Carli, R. deZafra, W. F. J. Evans, P. D. Guthrie, R. F. Hampson, W. Heaps, R. Jones, D. Kley et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 2 1985 58 p (For primary document see N86-32892 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A16/MF A01 CSCL 04A

Measurements of the members of the HO(x) family (OH, HO2, and H2O2) and their major source gases, H2O, and CH4 are discussed. Emphasis is placed on measurements which were made since the 1982 World Meteorologic Organization (WMO) report. Measurement techniques, available data, an assessment of data reliability, and a comparison of the data with theoretical distributions of stratospheric HO(x) species predicted from one and two dimensional photochemical models are discussed. B.G.

N86-32895*# National Aeronautics and Space Administration, Washington, D.C.
NITROGEN SPECIES
J. E. Harries, G. Brasseur, M. T. Coffey, H. Fischer, J. Gille, R. Jones, N. Louisnard, M. P. McCormick, J. Noxon, A. J. Owens et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 2 1985 110 p (For primary document see N86-32892 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A16/MF A01 CSCL 04A

Total odd nitrogen, NO(y), may be defined as the sum of all active nitrogen species that interchange photochemically with one another on a time scale of the order of weeks or less. As noted, NO + NO2 reactions dominate the processes controlling the ozone balance in the contemporary stratosphere. The observational data from non-satellite platforms are reviewed. The growth in available satellite data in the past four years is considered. Some of the most important scientific issues are discussed, taking into account new results from atmospheric models (mainly 2-D). The model results are compared with the observational data. B.G.

N86-32896*# National Aeronautics and Space Administration, Washington, D.C.
HALOGENTATED SPECIES
M. J. Molina, R. deZafra, P. Fabian, C. B. Farmer, W. G. Mankin, N. D. Sze, J. Waters, and R. J. Zander *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 2 1985 47 p (For primary document see N86-32892 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A16/MF A01 CSCL 04A

Stratospheric measurements of halogen containing species are reviewed and compared with model predictions. Halocarbons, HCl, HF, ClONO2, and ClO are discussed. B.G.

N86-32897*# National Aeronautics and Space Administration, Washington, D.C.
ATMOSPHERIC OZONE 1985. ASSESSMENT OF OUR UNDERSTANDING OF THE PROCESSES CONTROLLING ITS PRESENT DISTRIBUTION AND CHANGE, VOLUME 3 Global Ozone Research and Monitoring Project
1985 535 p Prepared in cooperation with FAA, Washington, D.C., NOAA, Washington, D.C., United Nations Environment Program, Nairobi, Kenya, WMO, Geneva, Switzerland, Commission of the European Communities, Brussels, Belgium, BMFT, Bonn, West Germany Original contains color illustrations
(NASA-TM-89236; NAS 1.15:89236; WMO-Rept-16-Vol-3) Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

Topics addressed include: assessment models; model predictions of ozone changes; ozone and temperature trends; trace gas effects on climate; kinetics and photchemical data base; spectroscopic data base (infrared to microwave); instrument intercomparisons and assessments; and monthly mean distribution of ozone and temperature. For individual titles, see N86-32898 through N86-32905.

N86-32898*# National Aeronautics and Space Administration, Washington, D.C.
ASSESSMENT MODELS
J. A. Pyle, D. M. Butler, D. Cariolle, R. R. Garcia, W. L. Grose, P. D. Guthrie, M. Ko, A. J. Owens, R. A. Plumb, M. J. Prather et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Pre sent Distribution and Change, Volume 3 1985 74 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

The types of models used in assessment of possible chemical perturbations to the stratosphere are reviewed. The statue of one and two dimensional models are discussed. The problem of model validation is covered before the status of photochemical modeling efforts is discussed. A hierarchy of tests for photochemical models is presented. B.G.

N86-32899*# National Aeronautics and Space Administration, Washington, D.C.
MODEL PREDICTIONS OF OZONE CHANGES
H. S. Johnston, F. Kaufman, R. J. Cicerone, C. E. Kolb, M. Prather, U. Schmailzl, S. Solomon, N. D. Sze, and D. J. Wuebbles *In* Its Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Pre sent Distribution and Change, Volume 3 1985 70 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

The predictions of several one-dimensional models were examined for a number of prescribed scenarios in steady-state or time-dependent approximations. A small number of two-dimensional steady-state calculations for a limited number of scenarios were compared with the results of one-dimensional models. The sensitivity of the calculated predictions to the values of input parameters were examined in order to assess recognized uncertainties in these predictions. B.G.

N86-32900*# National Aeronautics and Space Administration, Washington, D.C.
OZONE AND TEMPERATURE TRENDS
K. Labitzke, A. J. Miller, J. Angell, J. DeLuisi, J. Frederick, J.

Logan, C. Mateer, B. Naujokat, G. Reinsel, and G. Tiao *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Pre sent Distribution and Change, Volume 3 1985 34 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

The measurement of temporal changes in ozone and temperature are discussed. The data are examined within the context of natural atmospheric variability and data problems. The results are compared to numerical model calculations. The major issues are defined in terms of goal achievement. Each parameter is considered in terms of instrument type, long term effects, and altitude. B.G.

N86-32901*# National Aeronautics and Space Administration, Washington, D.C.
TRACE GAS EFFECTS ON CLIMATE
V. Ramanathan, L. B. Callis, Jr., R. D. Cess, J. E. Hansen, I. S. A. Isaksen, W. R. Kuhn, A. Lacis, F. M. Luther, J. D. Mahlman, R. A. Reck et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 3 1985 76 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

The two primary objectives are to describe the new scientific challenges posed by the trace gas-climate problem and to summarize current strategies, and to make an assessment of the trace gas effects on troposphere-stratosphere temperature trends. Numerous reports on CO2-climate problems are examined with respect to climate modeling issues. The role of the oceans in governing the transient climate response to time varying CO2 concentrations is discussed. B.G.

N86-32902*# National Aeronautics and Space Administration, Washington, D.C.
KINETICS AND PHOTOCHEMISTRY GOLDEN, D. M.
W. B. DeMore, R. F. Golden, C. J. Howard, M. J. Kurylo, J. J. Margitan, M. J. Molina, A. R. Ravishankara, R. T. Watson, and R. F. Hampson *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 3 1985 16 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

The data for chemical kinetics rate constants and photochemical cross sections taken from a compilation prepared in early 1985, entitled Chemical Kinetics and Photochemical Data for Use in Stratospheric Modeling, is presented. B.G.

N86-32903*# National Aeronautics and Space Administration, Washington, D.C.
SPECTROSCOPIC DATABASE
N. Husson, A. Barbe, L. R. Brown, B. Carli, A. Goldman, H. M. Pickett, A. E. Roche, L. S. Rothman, and M. A. H. Smith *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 3 1985 41 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

Several aspects of quantitative atmospheric spectroscopy are considered, using a classification of the molecules according to the gas amounts in the stratosphere and upper troposphere, and reviews of quantitative atmospheric high-resolution spectroscopic measurements and field measurements systems are given. Laboratory spectroscopy and spectral analysis and prediction are presented with a summary of current laboratory spectroscopy capabilities. Spectroscopic data requirements for accurate derivation of atmospheric composition are discussed, where examples are given for space-based remote sensing experiments of the atmosphere: the ATMOS (Atmospheric Trace Molecule) and UARS (Upper Atmosphere Research Satellite) experiment. A review of the basic parameters involved in the data compilations; a summary of information on line parameter compilations already in existence; and a summary of current laboratory spectroscopy studies are used to assess the data base. B.G.

N86-32904*# National Aeronautics and Space Administration, Washington, D.C.
INSTRUMENT INTERCOMPARISONS AND ASSESSMENTS
D. L. Albritton, R. J. Zander, C. B. Farmer, E. Hilsenrath, W. G. Mankin, D. G. Murcray, S. Pollitt, D. E. Robbins, and H. Roscoe *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 3 1985 31 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

Over the past few years, several field campaigns were devoted to the goal of assessing instrument reliability, as opposed to solely obtaining data to answer a geophysical question. Some examples of the formal instrument intercomparisons that have occurred in the past decade and those that are planned for the very near future are listed chronologically. Balloon-borne techniques and instruments that address the height profiles of the trace species in the lower stratosphere are emphasized. Beginning with the most extensively studied trace constituent, the approach taken and the results obtained, are described. The current status of the measurement capabilities are summarized, and the needs for future intercomparisons and assessments are listed. B.G.

N86-32905*# National Aeronautics and Space Administration, Washington, D.C.
MONTHLY MEAN DISTRIBUTION OF OZONE AND TEMPERATURE
K. Labitzke, J. K. Angell, J. J. Barnett, P. Bowman, M. Corney, G. M. Keating, A. J. Krueger, A. J. Miller, and R. M. Nagatani *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 3 1985 54 p (For primary document see N86-32897 24-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A23/MF A01 CSCL 04A

Global monthly mean charts for both hemispheres are given for four mid-season months, and for the pressure levels 30, 10, 1, and 0.1 mbar for temperature and 0.4 mbar for ozone. Charts of total ozone are provided separately. This set of charts shows clearly the very close coupling between the temperature and ozone distributions and demonstrates the influence of the large-scale planetary waves which give rise to very large longitudinal variations. The regular and interannual variability of temperature and ozone are discussed. B.G.

N86-32906*# Johns Hopkins Univ., Baltimore, Md.
ROCKET AND LABORATORY STUDIES IN AERONOMY AND ASTROPHYSICS Status Report, 1 Mar. - 31 Aug. 1986
P. D. Feldman Aug. 1986 28 p
(Grant NAG5-619)
(NASA-CR-179708; NAS 1.26:179708) Avail: NTIS HC A03/MF A01 CSCL 04A

Progress from March 1, 1986 to August 31, 1986 is covered and includes the work performed in response to a proposal entitled A Spartan Payload for Spatially Resolved Spectroscopy of Extended Faint Sources in the Extreme Ultraviolet (EUV). During this period, one rocket was launched, the reflight of the payload to observe Halley's comet on March 13, 1986. Most of the effort during this period was concentrated on detailed mechanical and electronic design of a Spartan payload and on the reduction and analysis of the data from the two Halley rocket flights and from the UVX experiment which flew on STS-61C in January 1986. Author

N86-32907# Danish Meteorological Inst., Copenhagen. Geofysisk Afdeling.
BRORFELDE GEOMAGNETIC OBSERVATORY MAGNETIC

RESULTS, 1984, INCLUDING A DESCRIPTION OF THE OBSERVATORY
1985 56 p
(ISBN-87-7478-268-1) Avail: NTIS HC A04/MF A01

A general description of the Brorfelde Geomagnetic Observatory is given. The following paramenters are tabularized: hourly means of magnetic declination, horizontal intensity, vertical intensity, diurnal inequatities, magnetic elements, and magnetic declination. B.G.

N86-32908# Danish Meteorological Inst., Copenhagen. Div. of Geophysics.
BRORFELDE: MAGNETIC RESULTS, 1983
1985 36 p
(ISBN-87-7478-267-3) Avail: NTIS HC A03/MF A01

A general description of the Brorfelde Geomagnetic Observatory is presented. The measuring instruments are described. The following parameters are listed: hourly means of magnetic declination, vertical intensity, horizontal intensity, diurnal inequalities, and magnetic elements. B.G.

N86-32909*# California Univ., Santa Cruz. Earth Science Board.
VISCOELASTIC DEFORMATION NEAR ACTIVE PLATE BOUNDARIES Semiannual Status Report
Steven N. Ward 3 Oct. 1986 8 p
(Grant NAG5-750)
(NASA-CR-179726; NAS 1.26:179726) Avail: NTIS HC A02/MF A01 CSCL 08G

Model deformations near the active plate boundaries of Western North America using space-based geodetic measurements as constraints are discussed. The first six months of this project were spent gaining familarity with space-based measurements, accessing the Crustal Dynamics Data Information Computer, and building time independent deformation models. The initial goal was to see how well the simplest elastic models can reproduce very long base interferometry (VLBI) baseline data. From the Crustal Dynamics Data Information Service, a total of 18 VLBI baselines are available which have been surveyed on four or more occasions. These data were fed into weighted and unweighted inversions to obtain baseline closure rates. Four of the better quality lines are illustrated. The deformation model assumes that the observed baseline rates result from a combination of rigid plate tectonic motions plus a component resulting from elastic strain build up due to a failure of the plate boundary to slip at the full plate tectonic rate. The elastic deformation resulting from the locked plate boundary is meant to portray interseismic strain accumulation. During and shortly after a large interplate earthquake, these strains are largely released, and points near the fault which were previously retarded suddenly catch up to the positions predicted by rigid plate models. Researchers judge the quality of fit by the sum squares of weighted residuals, termed total variance. The observed baseline closures have a total variance of 99 (cm/y)squared. When the RM2 velocities are assumed to model the data, the total variance increases to 154 (cm/y)squared. Author

N86-32910*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A PORTABLE SPECTROMETER FOR USE FROM 5 TO 15 MICROMETERS
Gordon Hoover and Anne B. Kahle 1 Jul. 1986 56 p
(Contract NAS7-918)
(NASA-CR-179751; JPL-Pub-86-19; NAS 1.26:179751) Avail: NTIS HC A04/MF A01 CSCL 08G

A field portable spectrometer suitable for collecting data relevant to remote sensing applications in the 8 to 12 micrometer atmospheric window has been built at the Jet Propulsion Laboratory. The instrument employs a single cooled HgCdTe detector and a continuously variable filter wheel analyzer. The spectral range covered is 5 to 14.5 micrometers and the resolution is approximately 1.5 percent of the wavelength. A description of the hardware is followed by a discussion of the analysis of the spectral data leading to finished emissivity and radiance spectra. A section is devoted to the evaluation of the instrument performance with respect to spectral resolution, radiometric precision, and accuracy. Several examples of spectra acquired in the field are included. Author

N86-32911*# Maryland Univ., College Park. Inst. for Physical Science and Technology.
RESONANCE FLUORESCENCE IN ATMOSPHERIC GASES Semiannual Progress Report, 16 Sep. 1985 - 15 Mar. 1986
Thomas J. McIlrath Mar. 1986 13 p
(Grant NsG-5313)
(NASA-CR-179767; NAS 1.26:179767) Avail: NTIS HC A02/MF A01 CSCL 04A

This program exists to provide support for the balloon stratospheric remote sensing program. Its purpose is to provide laboratory data and engineering support for the remote sensing effort. The goals and efforts are chosen in reponse to both short term and long term needs of the lidar effort. Progress was made on interfacing a Fizeau wave meter to a microcomputer in a way that is compatible with the electronics of the stratospheric balloon system. Installation was begun on a low divergence excimer laser system. B.G.

N86-32912*# Texas Univ., Austin. Center for Space Research.
ALTIMETER MEASUREMENTS FOR THE DETERMINATION OF THE EARTH'S GRAVITY FIELD Semiannual Research Progress/Status Report, 18 Mar. - 14 Sep. 1986
B. D. Tapley, B. E. Schutz, and C. K. Shum 25 Sep. 1986 9 p
(Grant NAG5-746)
(NASA-CR-176893; NAS 1.26:176893) Avail: NTIS HC A02/MF A01 CSCL 08N

Progress in the following areas is described: refining altimeter and altimeter crossover measurement models for precise orbit determination and for the solution of the earth's gravity field; performing experiments using altimeter data for the improvement of precise satellite ephemerides; and analyzing an optimal relative data weighting algorithm to combine various data types in the solution of the gravity field. B.G.

N86-32913# Ohio State Univ., Columbus. Dept. of Geodetic Science and Surveying.
DISTURBANCE VECTOR IN SPACE FROM SURFACE GRAVITY ANOMALIES USING COMPLEMENTARY MODELS
Jaime Y. Cruz Aug. 1985 155 p
(Contract F19628-82-K-0022)
(AD-A166730; OSU/DGSS-366; AFGL-TR-85-0209; SR-10) Avail: NTIS HC A08/MF A01 CSCL 08/5

The modeling of the external disturbance vector of the Earth from surface gravity anomaly data is discussed. The low frequency features of the signal are represented in spherical harmonic series. The recovery of the coefficients of the series from the given gravity anomalies is discussed focusing on the use of analytical continuation and ellipsoidal corrections to account for the Earth's topography and ellipticity. The spectrum and data response of the spatial disturbance vector are studied to aid the design of models and experiments. The local models studied to complement the globally valid spherical harmonic model are the residual topographic model (RTM); the classical integral model; three versions of the Dirac approach to collocation; and two versions of the least squares collocation (l.s.c.) approach. Results indicate that the RTM itself should be used to model the high frequency signal variations whenever detailed (e.g., 1km x 1km) height data is available. The residual signal not already modeled by the RTM and spherical harmonic model can in most cases be accurately modeled by the integral model with meantopography accounted for. For high accuracies in mountainous areas, however, a collocation model should be used to account for the full variations of the topography, not just mean topography. Matrix conditioning problems with the l.s.c. approach support preference to the Dirac systems for rigorous treatment of the topography at detailed (5' x 5') resolutions. GRA

N86-32914# Air Force Geophysics Lab., Hanscom AFB, Mass.
HANDBOOK OF GEOPHYSICS AND THE SPACE ENVIRON-

MENT, 4TH EDITION Final Report
Adolph S. Jursa 5 Dec. 1985 65 p
(AD-A167000; AFGL-TR-85-0315; AFGL-SR-253) Avail: NTIS HC A04/MF A03 CSCL 04/1

This fourth edition of the Air Force Handbook of Geophysics and the Space Environment has been completely revised. It begins with chapters on the sun and its emissions, then treats the Earth's magnetic field and the radiation belts, and follows with chapters on the ionosphere and the aurora. The subject of electrical charging of space vehicles has been of special concern to the Air Force and has been included to aid the designers interested in that problem. The next group of chapters deals with properties of the atmosphere, and the handbook concludes with chapters on the earth sciences and infrared astronomy. GRA

N86-32915# Mission Research Corp., Santa Barbara, Calif.
INFRARED ISSUES FOR THE NUCLEAR WINTER PHENOMENON Technical Report, 17 Jul. 1984 - 30 Sep. 1985
G. McCartor, D. Archer, W. Wortman, and T. Old 3 Oct. 1985 128 p
(Contract DNA001-84-C-0319; DNA Proj. S99-QMXB)
(AD-A168717; MRC-R-955; DNA-TR-85-312) Avail: NTIS HC A07/MF A01 CSCL 04/1

Simple models of the nuclear winter phenomenon are used to study the possibility that the infrared radiators: hydrocarbons, carbon dioxide, nitrogen dioxide, H2O or condensed water (clouds), might have important effects. Most of these substances are found to be unimportant but water clouds, if they are present and it appears they might be, are found to be of great potential significance. GRA

N86-32916# Naval Research Lab., Washington, D. C.
MAGNETIC RECONNECTION IN A NON-MAXWELLIAN NEUTRAL SHEET Interim Report
J. Chen, P. J. Palmadesso, and Y. C. Lee 30 May 1986 15 p
(AD-A168858; NRL-MR-5787) Avail: NTIS HC A02/MF A01 CSCL 04/1

The collisionless tearing-mode instability is believed to play an important role in magnetospheric reconnection processes. It has been found that the linear growth rate for a non-Maxwellian neutral sheet can be enhanced by a few orders of magnitude in comparison with the conventional isotropic case and that the short wavelength perturbations (k delta is greater than 1) are strongly favored, where delta is the characteristic half-width of the neutral sheet. For typical magnetotail parameters, it is found that the linear e-folding time can be reduced to a small function of a minute. The resulting small scale islands are expected to coalesce rapidly. The additional free-energy is the particle energy in the form of non-Maxwellian distribution. Differential equation analysis and full integro-differential analysis using exact unperturbed orbits are discussed. Physically, if non-Maxwellian features are generated in the plasma distribution by changes in external conditions such as the solar wind conditions, then the magnetotail may become strongly unstable, resulting in rapid development of small scale islands, coalescence and reconnection. This process may manifest itself as triggering of substorms following such changes. Author (GRA)

N86-32917# Fraunhofer Inst. fuer Physikalische Messtechnik, Freiburg (West Germany).
THE THERMAL PLASMA EXPERIMENT IN THE UPPER-AIR SOUNDING ROCKET PROGRAM HEATING, PROJECT HERO Final Report, Dec. 1983
Wolfgang Ott Bonn, West Germany Bundesministerium fuer Forschung und Technologie Dec. 1985 67 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-019; ISSN-0170-1339; ETN-86-97463) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

A thermal plasma experiment was performed to demonstrate the existence of ionospheric modifications. A retarding potential analyzer was developed to determine the electron temperature and the suprathermal electron flows, and to measure the electric field strength of the electromagnetic thermal wave and of electron plasma oscillations, electron density, electrostatic plasma waves and airglows in situ. The measurements were performed during rocket flights. Langmuir waves are produced with heat wave energy. Modifications are observed during ascent and within the thermal wave reflection height only. Neither increase nor decrease of density are shown in modified ionospheric heights. Density structurations of less than 8% are recorded. ESA

N86-32918# Ecole Nationale Superieure des Telecommunications, Paris (France).
IONOSPHERIC SOUNDING BY MEANS OF LINEAR FREQUENCY MODULATION Ph.D. Thesis [SONDAGES IONOSPHERIQUES PAR MODULATION LINEAIRE DE FREQUENCE]
Marie-Noelle Basselier-Bauchot Dec. 1984 313 p In FRENCH
(ENST-84E022; ISSN-0751-1353; ETN-86-97868) Avail: NTIS HC A14/MF A01

An ionospheric sounding system is described. The linear frequency modulated transmitter is operated in on-off pulses. The receiver is active when the transmitter is off. An analysis of the design of the system shows that after a low-pass filter, the blind zones can be eliminated without changing the allowed frequency band. The implementation of the emitter-receiver system and the data processing, including an algorithm for automatic curve computation, are described. The use of positive and negative frequency gradients to compute a Doppler component is discussed. The experimental results confirming the system capabilities are included. ESA

N86-32491# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
COMPARISON OF RECENT EMPIRICAL MODELS OF THE THERMOSPHERE
G. W. Proelss and P. W. Blum *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 3-11 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

N86-32492# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
COMPARISON OF THE ESRO 4 THERMOSPHERE MODEL WITH ESRO 4 DATA DURING MAGNETICALLY QUIET CONDITIONS
G. W. Proelss and M. Roemer *In* ESA Proceedings of an ESA Workshop on Reentry of Space Debris 1986 p 13-17 (For primary document see N86-32490 24-13)
Avail: NTIS HC A05/MF A01

N86-32787 Institut de Physique du Globe, Paris (France).
THE GEOMAGNETIC FIELD: DESCRIPTION AND ANALYSIS [LE CHAMP GEOMAGNETIQUE: DESCRIPTION ET ANALYSE]
J. L. LeMouel *In* CNES International Geophysics and Space 1985 p 17-60 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32788 Cambridge Univ. (England). Dept. of Earth Sciences.
THE INTERNAL MAGNETIC FIELD AND ITS ORIGIN
D. Gubbins *In* CNES International Geophysics and Space 1985 p 61-83 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32790 Massachusetts Inst. of Tech., Cambridge.
MANTLE CONVECTION AND THE EARTH'S GRAVITY FIELD
Barry Parsons *In* CNES International Geophysics and Space 1985 p 111-158 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32791 Centre National d'Etudes Spatiales, Toulouse (France).
SATELLITE TRACKING: ITS FIRST CONTRIBUTIONS TO THE KNOWLEDGE OF THE EARTH'S GRAVITATIONAL FIELD AND TO GEOPHYSICS [LA POURSUITE DES SATELLITES; SES PREMIERS APPORTS A LA CONNAISSANCE DU CHAMP GRAVIMETRIQUE TERRESTRE ET A LA GEOPHYSIQUE]

B. Lago *In its* International Geophysics and Space 1985 p 159-199 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32792 Paris VII Univ. (France). Lab. de Geochimie et Cosmochimie.
STRUCTURE AND EVOLUTION OF THE EARTH MANTLE STUDIED USING PAIRED ISOTOPIC TRACERS: Pb-Sr-Nd [STRUCTURE ET EVOLUTION DU MANTEAU TERRESTRE ETUDIEES A L'AIDE DES TRACEURS ISOTOPIQUES COUPLES: PLCB-SLCR-NLCD]
Bernard Dupre *In* CNES International Geophysics and Space 1985 p 213-236 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32793 Lamont-Doherty Geological Observatory, Palisades, N. Y.
GRAVITY, GEOID AND THE OCEANIC LITHOSPHERE
A. B. Watts *In* CNES International Geophysics and Space 1985 p 237-339 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32794 Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
THE OCEANIC LITHOSPHERE: SEISMOLOGY AND TECTONICS
Emile A. Okal *In* CNES International Geophysics and Space 1985 p 341-368 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32795 Institut de Physique du Globe, Paris (France).
LONG PERIOD SEISMOLOGY
Barbara Romanowicz *In* CNES International Geophysics and Space 1985 p 369-395 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32796 Institut de Physique du Globe, Strasbourg (France).
DENSITY AND ELASTIC PARAMETERS OF THE UPPER MANTLE FROM REGIONAL MULTIMODE DATA
M. Cara *In* CNES International Geophysics and Space 1985 p 397-401 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32797 Durham Univ. (England).
CONTINENTAL TECTONICS: A QUANTITATIVE VIEW OF THE THERMAL AND MECHANICAL PROPERTIES OF THE CONTINENTAL LITHOSPHERE IN COMPRESSIONAL AND EXTENSIONAL STRESS REGIMES
G. D. Karner *In* CNES International Geophysics and Space 1985 p 403-464 Sponsored by Durnham Univ. Research Foundation and Society of Fellows (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32798 Cornell Univ., Ithaca, N.Y.
DEFORMATION MECHANISMS IN THE CONTINENTS
D. L. Turcotte *In* CNES International Geophysics and Space 1985 p 465-486 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32799 Observatoire de Paris-Meudon (France).
MAGNETOSPHERES [LES MAGNETOSPHERES]
A. Boishot *In* CNES International Geophysics and Space 1985 p 491-497 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32800 Bureau Gravimetrique International, Toulouse (France).
POTENTIAL MODELS [MODELES DE POTENTIEL]
G. Balmino *In* CNES International Geophysics and Space 1985 p 499-526 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32802 Mainz Univ. (West Germany). Inst. fuer Geowissenschaften.
DRIVING MECHANISMS OF PLATES
Wolfgang R. Jacoby *In* CNES International Geophysics and Space 1985 p 571-589 (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-32803 Centre National de la Recherche Scientifique, Grenoble (France).
SEISMOLOGICAL DATA ACQUISITION BY SATELLITE [COLLECTE DE DONNEES SISMOLOGIQUES PAR SATELLITE]
G. Poupinet *In its* International Geophysics and Space 1985 p 591-598 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N86-32919 Deutscher Wetterdienst, Offenbach am Main (West Germany).
CONTRIBUTION TO THE PHENOLOGY OF EUROPE 5 LONG PHENOLOGICAL SERIES OF EUROPE AND THEIR RELATIONS TO TEMPERATURE [BERICHTE DES DEUTSCHEN WETTERDIENSTE NR. 169: BEITRAEGE ZUR PHAENOLOGIE EUROPAS 5 LANGE PHAENOLOGISCHE REIHEN EUROPAS UND IHRE BEZIEHUNGEN ZUR TEMPERATUR]
Friedrich Lauscher and Fritz Schnelle 1986 28 p In GERMAN; ENGLISH summary
(BDW-169; ISSN-0072-4130; ISBN3-88148-224-5; ETN-86-97829)
Copyright. Avail: Issuing Activity

All individual data of 11 long phenological data sets of Europe were analyzed with respect to average value, trend, standard deviation and extreme values. Correlations with monthly averages of the temperature show that the heat of the third month preceding the beginning of the phases has a certain influence. Tests were made to estimate on the basis of the normal monthly averages, average temperatures for a period of 30 days preceding the beginning of the phases. These estimated values are in general significant for the phase data, however, there are different deviations which have to be attributed to anomalous weather sequences. ESA

N86-32920 Illinois Univ., Urbana-Champaign.
THE NUMERICAL SIMULATION OF THUNDERSTORM OUTFLOW DYNAMICS Ph. D. Thesis
Kelvin Kay Droegemeier 1985 708 p
Avail: Univ. Microfilms Order No. DA8600166

Two high-resolution, two-dimensional numerical models are developed and used to investigate the dynamics of thunderstorm outflows. The first model employs the set of unapproximated, inviscid, fully compressible hydrodynamical equations, while the second, more economical model is based on a simplified set of inviscid, quasi-compressible equations. Neither model includes moist microphysical processes. The outflow models are designed with the flexibility needed to address many aspects of outflow dynamics with a high degree of physical realism. Turbulent mixing in outflows, manifest as Kelvin-Helmholtz shearing instability, is successfully simulated with the outflow models. This is the first time it has ever been reproduced in modeled outflows. The characteristics of the Kelvin-Helmholtz instability are compared with linear theory and laboratory results, and the sensitivity of the associated turbulent mixing to several physical and computational parameters is discussed. The characteristics of the ambient environment are found to play key roles in the dynamics of simulated outflows. Several vertical wind shear and static stability profiles are examined in the model, and their influence on outflow behavior is addressed. Dissert. Abstr.

N86-32921 Missouri Univ., Columbia.
ENERGETICS OF CYCLONIC DEVELOPMENT IN THE ASIAN WINTER MONSOON SYSTEM Ph.D. Thesis
Stephen Edward Masters 1985 111 p
Avail: Univ. Microfilms Order No. DA8529674

The storm development and the kinetic energy budget in the Asian winter monsoon is studied with the GFDL version of the FGGE III-b data set. Energetics for fixed sub-regions of the winter monsoon area and a moving area encompassing the primary monsoon storm system are computed. The synoptic low region budgets are averaged according to the development stage of the storm system to derive a composite view of a developing storm. Five individual cyclonic systems are examined closely with respect to their synoptic low region energetics and surface development. Finally, the spatial energetics patterns of two storms and the hemispheric spectral energy flow are examined. The 1978-79 winter monsoon circulation was anomalously weak, with few strong synoptic-scale storms and accompanying cold air outbreaks. The field of motion and regional kinetic energy transformations were nevertheless quite strong. The composite budget of the synoptic low region had the classical cyclonic generation and dissipation profiles. In contrast with previous studies of North American systems, the cyclones of the Asian winter monsoon are found to be net exporters of kinetic energy. Two distinctly different cyclone development sequences are apparent: one a classical synoptic development and the other characterized by a weaker, more disorganized structure. Composite budgets of these two storm types are consistently found to show distinct differences. These contrasts, which are very clear at the regional scale are also reflected in the Northern Hemisphere spectral energy flow. Dissert. Abstr.

N86-32922 Arizona Univ., Tucson.
EXTINCTION OF NEAR INFRARED SOLAR RADIATION AS A MEANS FOR REMOTE DETERMINATION OF ATMOSPHERIC WATER VAPOR Ph.D. Thesis
Larry Willis Thomason 1985 134 p
Avail: Univ. Microfilms Order No. DA8529410

A computationally efficient and accurate model is derived for the calculation of the atmospheric transmittance along inhomogeneous paths and within spectral bands dominated by molecular line absorption. It is a Stieltjes integration of transmission weighted by the frequency of occurrence of absorption coefficient within the band. Path inhomogeneitites are accounted for by assuming that the rank of absorption coefficient at any wavenumber is independent of temperature and pressure. The technique is then applied to the ground based radiometric determination of precipitable water. It is found that the techique predicts the behavior of the rho sigma tau water vapor absorption band very well. An RMS disagreement of 11% is found when the model predictions are compared to radiosonde determinations of precipitable water. The model is also applied to the determination of vertical water vapor distributions in the stratosphere given measured effective optical depths as a function of tangent height from a limb scanning satellite. A new iterative reduction technique is introduced which incorporates the transmission model and it is shown to be both numerically stable and rapidly convergent. A comparison of the results with an independent reduction technique shows good overall agreement with a small systematic difference above 20 km. The uncertainty in the measurements, which yields solution uncertainties on the order of 30%, renders this systematic difference unimportant. Dissert. Abstr.

N86-32923# National Weather Service, Honolulu, Hawaii.
TROPICAL CYCLONES, 1985: CENTRAL NORTH PACIFIC
W. Au, A. Chun, L. Iwai, H. Rosendal, and T. Yamashiroya May 1986 54 p
(PB86-202215; NOAA-TM-NWSTM-PR-31) Avail: NTIS HC A04/MF A01 CSCL 04B

Tropical Depression ENRIQUE moved into the CPHC area at 1200 GMT on July 1 after having been a minimal tropical storm near 13N 130W for approximately 24 hours on June 29. ENRIQUE moved slightly north of west from near 14N 140W on July 1 to 16N 150W on July 4 at an average speed of a little less than 10 knots. Maximum sustained winds were estimated to be about 25 knots with weak southwesterlies to the south of the center. Moisture carried along by ENRIQUE caused a few localized heavy showers on the windward side of the Big Island of Hawaii on July 5. GRA

N86-32924# World Climate Programme, Geneva (Switzerland).
POSSIBLE CLIMATIC CONSEQUENCES OF A MAJOR NUCLEAR WAR
G. S. Golitsyn and N. A. Phillips Feb. 1986 28 p
(WCP-113; WMO/TD-99; ETN-86-97808) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The atmospheric consequences of nuclear war are discussed. Fires set off by nuclear explosions can produce large amounts of highly absorbing smoke, and if the amount of smoke is as much as 10 or 2 times 10 to the 14th power grams, temperature decreases of 10 to 30 C are likely to occur in the interior of continents during several weeks after the nuclear explosions. Dust raised by near-surface explosions would induce additional cooling. Increase in the amount of smoke above the value indicated above would increase the duration and the areal extent of the cooling, but the cooling intensity would not increase proportionally to the amount of smoke. At the same time, the upper troposphere would be warm because of the absorption of solar radiation. Uncertainties exist in the calculations, for example as to the hypothetical distribution of nuclear exlosions and the details of smoke generation and its physical properties. ESA

N86-32925*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ICE NUCLEUS ACTIVITY MEASUREMENTS OF SOLID ROCKET MOTOR EXHAUST PARTICLES
Vernon W. Keller, comp. Sep. 1986 22 p
(NASA-TM-86555; NAS 1.15:86555) Avail: NTIS HC A02/MF A01 CSCL 04B

The ice Nucleus activity of exhaust particles generated from combustion of Space Shuttle propellant in small rocket motors has been measured. The activity at -20 C was substantially lower than that of aerosols generated by unpressurized combustion of propellant samples in previous studies. The activity decays rapidly with time and is decreased further in the presence of moist air. These tests corroborate the low effectivity ice nucleus measurement results obtained in the exhaust ground cloud of the Space Shuttle. Such low ice nucleus activity implies that Space Shuttle induced inadvertent weather modification via an ice phase process is extremely unlikely. Author

N86-32926# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.
VERY SHORT RANGE STATISTICAL FORECASTING OF AUTOMATED WEATHER OBSERVATIONS Interim Report, Oct. 1984 - Sep. 1985
Robert G. Miller Mar. 1986 97 p
(Contract DTFA01-83-Y-20625)
(AD-A167049; DOT/FAA/PM-86/10) Avail: NTIS HC A05/MF A01 CSCL 04/2

A procedure is developed for providing weather forecasting guidance over the short period of 10, 20, 30, ... 60 minutes. It uses automated surface observation elements as predictors and predictands. The model is founded on Markov assumption and uses multivariate linear regression as the statistical operator. Details are given on how the Generalized Equivalent Markov (GEM) model is constructed and how it compares with other objective methods such as climatology and persistence. Tests are performed on an independent data sample. Overall, GEM succeeds in bettering persistence and does so uniformly over the 6 projection periods of 10, 20, 30,....60 minutes. GRA

N86-32927# DMA Consulting Engineers, Marina del Rey, Calif.
METEOROLOGICAL DATA INVENTORY, SOUTHERN CALIFORNIA, COASTAL ZONE, RAGGED POINT (SAN LUIS OBISPO COUNTY) TO MEXICAN BORDER
Dec. 1985 282 p
(Contract DACW09-85-D-0010)

(AD-A167645; COE/SPLPD/C-CCSTWS-85-7) Avail: NTIS HC A13/MF A01 CSCL 04/2

This report details the results of a data search on the meteorology of the coastal watersheds between Ragged Point, San Luis Obispo County and the U.S.-Mexican Border. Included in this report are general meteorological descriptions of the drainage areas, for the purpose of providing background information. These sections are followed by detailed accounts of the sources of meteorological data which are available. Data of interest include precipitation patterns, historical hyetographs, wind patterns, and general weather patterns responsible for the wind and precipitation. Also of interest are data on Pacific storms and storm patterns. Included in the discussion are the location of data, data formats available and indications of the quality of the data. Data gaps and limitations are noted, and suggestions are made for reducing these limitations. GRA

N86-32928# Air Force Environmental Technical Applications Center, Scott AFB, Ill.

SEOUL AB, SOUTH KOREA LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS A, C-F Data Summary Report, Jan. 1974 - Feb. 1986

30 Apr. 1986 265 p

(AD-A167658; USAFETAC/DS-86/021-Pt-A-c,f) Avail: NTIS HC A12/MF A01 CSCL 04/2

A statistical data summary of surface weather observation climatology for Seoul AB South Korea is presented. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: PART A, Weather Conditions and Atmospheric Phenomena; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; and PART F, Pressure Summaries. Note that PART B, Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. GRA

N86-32929# Naval Oceanography Command Center/Joint Typhoon Warning Center, FPO San Francisco, Calif.

FORECAST VERIFICATION AND RECONNAISSANCE DATA FOR SOUTHERN HEMISPHERE TROPICAL CYCLONES Technical Note, 1 Jul. 1982 - 30 Jun. 1984

W. P. Wirfel and S. A. Sandgathe Feb. 1986 106 p

(AD-A168274; NOCC/JTWC-TN-86-1) Avail: NTIS HC A06/MF A01 CSCL 04/2

This report documents tropical cyclones which developed in the South Indian Ocean and South Pacific Ocean from 1 July 1982 to 30 June 1984. It provides composite storm best-tracks, a brief summary of each year's tropical cyclone season, and detailed position and reconnaissance fix data. In addition, this report contains forecast accuracy statistics for Southern Hemisphere tropical cyclones. A total of 55 tropical cyclones reached warning status in the combined Joint Typhoon Warning Center and Naval Western Oceanography Center area of responsibilty between 1 July 1982 and 30 June 1984. Twenty-five attained warning status in the 1982 to 1983 season, with thirty reaching warning status in the 1983 to 1984 season. Intensity estimates for Southern Hemisphere tropical cyclones are derived primarily from satellite imagery evaluation (Dvorak, 1973) and from intensity estimates reported by other regional warning centers. In very rare instances, the intensity estimates are based on surface observational data. Estimates of the minimum sea-level pressure are usually derived from the Atkinson and Holliday (1977) realtionship between the maximum sustained 1-min. surface wind and the minimum sea-level pressure. GRA

N86-32930# Iowa State Univ. of Science and Technology, Ames.

ANALYSIS OF WIND SPEEDS AT THE SPACE SHUTTLE LAUNCH SITE, VANDENBERG AIR FORCE BASE

Eugene S. Takle and Joseph D. Griffin 3 Apr. 1986 91 p

(AD-A168565; BLMRP86-01) Avail: NTIS HC A05/MF A01 CSCL 04/2

Wind speeds at the launch complex may be a factor to be considered in ensuring safe and flawless shuttle launch. High wind speeds may lead to unacceptably large horizontal forces at vulnerable times in the launch process. Low wind speeds will reduce the capability of the atmospheric boundary layer to disperse residual HC acid vapor from the solid rocket boosters. In this analysis, we computed and presented wind-speed distributions for multiple-hr as well as 1-hr averaging periods for guidance in determining the probability that a given wind condition will persist beyond 1 hr. High wind speeds at tower level tend to arise from strong coupling of the low level flow to high speed flow aloft resulting from large pressure gradients on the synoptic-scale. Under these conditions, wind direction tends to be more uniform with height than under weak synoptic-scale forcing, so the tower level wind direction can usually be approximated from the conventional synoptic analysis or forecast maps. Low wind speeds at the launch site for brief or extended periods could lead to hazards resulting from the acid cloud lingering in the near vicinity. Even though the cloud may attain a stabilized height well above the surface, if it rains out, revolatilized acid vapor could lead to high HC vapor concentrations in the surrounding air. Since revolatilized HC vapor concentrations are inversely proportional to wind speed, extended periods of low wind speeds would result in high acid vapor densities for correspondingly long periods. GRA

N86-32931# Naval Postgraduate School, Monterey, Calif.

MONTHLY AND SEASONAL CLIMATOLOGY OF THE NORTHERN WINTER OVER THE GLOBAL TROPICS AND SUBTROPICS FOR THE PERIOD 1974 TO 1983. VOLUME 3: SURFACE WINDS Technical Report, May 1985 - May 1986

James S. Boyle and C. P. Chang May 1986 147 p

(AD-A168852; NPS-63-86-002-Vol-3) Avail: NTIS HC A07/MF A01 CSCL 04/2

This atlas of the surface circulation field contains northern winter monthly and seasonal mean wind analyses, velocity potential and streamfunction from 40 deg S to 60 deg N over a global belt for the period 1974 through 1983. In addition, the deviations of the individual annual seasonal and monthly means from their respective nine-year means are presented for the same variables. The basic wind data used are the operational Global Band Analyses of the United States Navy's Fleet Numerical Oceanography Center. Author (GRA)

N86-32932# Lawrence Livermore National Lab., Calif.

COMPARISONS OF METEOROLOGICAL AND STRUCTURE PARAMETERS IN COMPLEX TERRAIN

W. Porch, L. Rosen, and W. Neff Nov. 1985 7 p Presented at the International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere, Florence, Italy, 27 May 1986 Prepared in cooperation with National Oceanic and Atmospheric Administration, Boulder, Colo.

(Contract W-7405-eng-48)

(DE86-006713; UCRL-93771; CONF-860565-1) Avail: NTIS HC A02/MF A01

Measurements of the temperature and index-of-refraction structure parameters are presented using a variety of instruments with different spatial averaging characteristics in complex terrain nocturnal drainage wind conditions. DOE

N86-32933# Oregon State Univ., Corvallis. Climatic Research Inst.

MODELING AS A MEANS OF STUDYING THE CLIMATE SYSTEM

W. L. Gates 1986 24 p

(Contract W-7405-eng-48)

(DE86-009702; UCRL-15783) Avail: NTIS HC A02/MF A01

This report on climate modeling includes the following areas of discussion: (1) the climate system and climate change; (2) the physical basis of climate models; (3) general circulation models of the atmosphere; (4) models of the ocean, ice, and land surface; (5) climate simulation with atmospheric general circulation models;

and (6) critical modeling problems and recommended research.
DOE

N86-32934# Oregon State Univ., Corvallis.
ANALYSIS OF RESULTS FROM ENERGY BALANCE AND RADIATIVE-CONVECTIVE MODELS, APPENDIX A
M. E. Schlesinger 1986 40 p
(Contract W-7405-eng-48)
(DE86-010554; UCRL-15808-App-A) Avail: NTIS HC A03/MF A01

Three different types of climate models have been used to simulate the change in the equilibrium climate resulting from an increase in the carbon dioxide (CO) concentration: energy balance models (EBMs), radiative-convective models (RCMs), and general circulation models (GCMs). This appendix presents a detailed analysis of the results from EBMs and RCMs. The discussion places emphasis on the quantitative understanding of climate feedback processes. For this reason, the discussion necessarily involves a highly mathematical approach. This approach is helpful for analyzing the differences in sensitivity among climate models.
DOE

N86-32935# Colorado Univ., Boulder. Cooperative Inst. for Res. in Environmental Sci.
LAKE ICE OCCURRENCE AS AN EARLY DETECTOR OF CLIMATE PERTURBATIONS: THE POTENTIAL FOR MONITORING Progress Report, Mar. 1985 - Mar. 1986
R. G. Barry Apr. 1986 10 p
(Contract DE-AC02-83ER-60106)
(DE86-010583; DOE/ER-60106/4) Avail: NTIS HC A02/MF A01

Studies of lake ice freeze-up/break-up dates as a proxy for estimating transition season temperatures over data-sparse areas were continued. Previous analyses were extended to the records available for Finland. The practicality of monitoring lake ice conditions routinely using operational meteorological satellite data was assessed.
DOE

N86-32936# Brookhaven National Lab., Upton, N. Y.
EFFECTS OF ENERGY TECHNOLOGY ON GLOBAL CO2 EMISSIONS
H. C. Cheng, M. Steinberg, and M. Beller Apr. 1986 98 p
(Contract DE-AC02-76CH-00016)
(DE86-010257; DOE/NBB-0076) Avail: NTIS HC A05/MF A01

The increase in atmospheric CO2, which results primarily from combustion of fossil fuels for energy, may alter the radiative balance on the earth and thus raise the global temperature. This so-called greenhouse effect could cause dramatic global climatic and environmental changes. This study explores the potential for more effective use of energy through improvements in energy technology and determines the consequent reduction in future buildup of atmospheric CO2 (which would mitigate the expected climatic and environmental changes). The study was done from the perspective of the physical sciences rather than the social and political sciences, i.e., it focused on how energy is consumed for a specific energy service rather than on technical tradeoffs such as use of mass transit instead of automobiles. Calculations showed that an overall reduction of 10 petagrams (10(15) g) of carbon emission (i.e., reduction of carbon emission from 17 petagrams without improvement to 7 petagrams with improvement) could be achieved in 2050 in the technology improvements discussed in this study were implemented.
DOE

N86-32937# Scripps Institution of Oceanography, San Diego, Calif.
LONG-TERM CHANGES IN PRECIPITATION PATTERNS, PART 7
T. P. Barnett 1986 14 p
(DE86-009705; UCRL-15776; DR-1805-8) Avail: NTIS HC A02/MF A01

The large-scale patterns of precipitation are summarized. No attempt is made to detect a CO2 signal. Available precipitation data and some of the associated measurement problems are briefly described. Selected studies of regional precipitation changes since the turn of the century will then be reviewed. These summaries are sugmented, whenever necessary, by a set of new regional studies. The possibilities of a coherent precipitation signal in the set of regional averages are investigated. B.G.

N86-32938# World Climate Programme, Geneva (Switzerland).
GUIDELINES ON THE STRUCTURE, MANAGEMENT, AND OPERATION OF CLIMATE DATA CENTERS
1986 74 p Presented at Inter-Commission Meeting on Climate Data Centre Design and Operations, Atmospheric Environment Service, Downsview, Ontario, 29 Oct. - 2 Nov. 1984
(WCP-99; WMO/TD-48; ETN-86-97250) Avail: NTIS MF A01; HC at WMO, Geneva, Switzerland

World Meteorological Organization climate data center functions and structure are outlined. Data collection and communication; data quality control and processing; data base management and structure; data base services and access; and data security are discussed.
ESA

N86-32939# World Meteorological Organization, Geneva (Switzerland).
[ACTIVITIES REPORT IN METEOROLOGY] Annual Report, 1985
1986 247 p
(WMO-656; ISBN-92-63-10656-8; ETN-86-97659) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The status of the world Weather Watch; World Climate; Research and Development; Applications of Meteorology; Hydrology and Water Resources; Education and Training; Technical cooperation; and Regional activities programs of the WMO is summarized. Technical and supporting activities; external relations; and legal and administrative matters are discussed. ESA

N86-32940# Royal Netherlands Meteorological Inst., De Bilt.
A COMPUTER PROGRAM TO PROCESS VAISALA RS 21-12 C RADIOSONDE DATA
W. A. A. Monna and J. J. M. denBraber 1985 35 p
(KNMI-TR-77; B8661061; ISSN-0169-1708; ETN-86-97729) Avail: NTIS HC A03/MF A01

A program to process data from a radiosonde used for boundary layer research is described. Pressure, temperature, and wind data are stored on paper tape. A self reading theodolite determines the wind profile. Subprograms handle conversion of the raw data to meteorological parameters; interpolation of the parameters to successive 2mb levels, and calculation of derived parameters; matching of the wind data to the radiosonde data; and quality check of the data.
ESA

N86-32941# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysisch Meteorologisch Onderzoek.
DESCRIPTION OF THE EELDEL (NETHERLANDS) WIND OBSERVATION STATION (PERIOD 1945 TO 1980)
B. Oemraw 1985 53 p In DUTCH; ENGLISH summary
(KNMI-TR-78; B8663488; ISSN-0169-1708; ETN-86-97730) Avail: NTIS HC A04/MF A01

The location of anemometers at Eelde (Netherlands) and the various types of wind meters and recorders are described. Corrections for sheltering effects from the surroundings are given. Corrected wind data summaries for the period 1961 to 1980 above open terrain are tabulated. The tables cover the diurnal and annual course, various frequency distributions, and for each two-month season the highest observed values of the hourly average wind speed per 30 deg azimuth sector. It is concluded that the wind data, after objective correction for sheltering effects, are reasonably dependable and homogeneous from January 1961 on. ESA

N86-32942# World Climate Programme, Geneva (Switzerland).
REVIEW OF CLIMATE DATA MANAGEMENT IN AFRICA
1986 57 p Presented at Consultation Meeting on Climate Data Management in Africa, Niamey, Nigeria, Dec. 1984
(WCP-109; WMO/TD-98; ETN-86-97804) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Deficiencies in climate data management procedures in Africa are identified. National actions and international assistance to

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remedy deficiencies are discussed. A plan for the regional implementation of the objectives of the World Climate Data Program was considered. ESA

N86-32943# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
RELATIONSHIP OF TEMPERATURE AND VELOCITY VARIANCE TO ATMOSPHERIC THERMAL STABILITY
E. E. Gossard and A. S. Frisch Mar. 1986 35 p
(PB86-199809; NOAA-TM-ERL-WPL-134) Avail: NTIS HC A03/MF A01 CSCL 04B

The relationship between the variances of temperature and vertical velocity fluctuations is examined theoretically and experimentally. It is concluded that the remotely sensed ratio of these quantities offers hope of measuring gradients of temperature and radio refractive index from clear-air radar soundings. Theoretical aspects of the problem are first examined, and the conclusions are then compared with mean gradient and variance data recorded on the 300 m tower at the Boulder Atmospheric Observatory, in Colorado, USA. GRA

N86-32944# National Center for Atmospheric Research, Boulder, Colo.
MULTIPARAMETER RADAR MEASUREMENTS IN COLORADO CONVECTIVE STORMS Ph.D. Thesis
J. Vivekanandan 1986 195 p
(Grant NSF ATM-82-17015)
(PB86-199528; NCAR/CT-98) Avail: NTIS HC A09/MF A01 CSCL 04B

A comprehensive investigation is conducted in which radar observations are integrated with model results to develop inverse scattering methods for the determination of some key microphysical characteristics of precipitation particles in convective storms. A generalized electromagnetic backscatter-cum-propagation model was developed for quantitative investigation of multiparameter radar observables in convective storms. Detailed calculations of multiparameter observables for rain, graupel, and hail media were performed, and the results were compared with radar measurements. GRA

N86-32945# National Center for Atmospheric Research, Boulder, Colo.
INFLUENCE OF SURFACE HEAT AND MOISTURE FLUXES ON EXPLOSIVE MARINE CYCLOGENESIS Ph.D. Thesis
W. A. Nuss 1986 192 p Prepared in cooperation with Washington Univ., Seattle
(Grant NSF ATM-82-17015)
(PB86-199346; NCAR/CT-101) Avail: NTIS HC A09/MF A01 CSCL 04B

The influence of surface heat and moisture fluxes on cyclogenesis was tested using a mesoscale model. Initial conditions were derived from baroclinic instability theory, case studies, and a composite analysis of explosive cyclones. Experiments with and without the effects of surface heat and moisture fluxes and latent heating were performed. Test of the sensitivity of development to the initial static stability and baroclinicity were also done. A downward surface moisture flux and significant initial moisture resulted in less latent heating and an insignificant increase in the development of the model cyclone compared to other studies. GRA

N86-32946# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
DOCUMENTATION OF PROGRAMS TO COMPUTE SPECTRA FROM PROFILER RADIOMETRIC OBSERVATIONS
P. Ciotti Apr. 1986 32 p
(PB86-199023; NOAA-TM-ERL-WPL-132) Avail: NTIS HC A03/MF A01 CSCL 04B

The use of FORTRAN programs that derive spectra from Profiler and dual-channel radiometric data are described. For example, time series and spectra of geopotential heights, geopotential, surface pressure, precipitable water vapor, and brightness temperatures themselves, can be derived using these programs. GRA

N86-32947# National Weather Service, Garden City, N.Y.
CONVECTIVE PARAMETERS AND HOLOGRAPH PROGRAM: CONVECT
H. M. Stone Apr. 1986 82 p
(PB86-197225; NOAA-NWS-ERCP-37) Avail: NTIS HC A05/MF A01 CSCL 04B

The CONVECT hodograph program computes many parameters which are useful in forecasting convection, such as several stability indices, including the energy index (EI), height of the equilibrium level (EL), maximum parcel level (MPL), etc. CONVECT is similar to the RANP program and many parameters computed by RANP are also output from CONVECT. CONVECT also provides wind hodographs to 6 kilometers above ground level for selected upper air stations. GRA

N86-32810# Oceanor, Trondheim (Norway).
THE IMPORTANCE OF MEASURING CURRENT, WAVES AND OTHER ENVIRONMENTAL PARAMETERS IN ORDER TO IMPROVE THE CURRENT FORECAST SERVICE
Svein Erling Hansen *In* CNES The 10th ARGOS Users Conference 1985 15 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32815# Norwegian Meteorological Inst., Blindern.
THE NORWEGIAN METEOROLOGICAL INSTITUTE'S USE OF THE ARGOS SYSTEM
Carl Kolderup Jensen *In* CNES The 10th ARGOS Users Conference 1985 12 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32819# Danish Meteorological Inst., Copenhagen.
OPERATIONAL EXPERIENCES WITH THE ARGOS SYSTEM IN GREENLAND
Fleming Jensen *In* CNES The 10th ARGOS Users Conference 1985 14 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32827# South African Weather Bureau, Pretoria.
THE SOUTH AFRICAN CONTRIBUTION TO TOGA
Piet leRoux *In* CNES The 10th ARGOS Users Conference 1985 3 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N86-32948# Aerojet Electrosystems Co., Azusa, Calif.
AN ANALYSIS OF THE TENSOR DIELECTRIC CONSTANT OF SEA ICE AT MICROWAVE FREQUENCIES Final Report
A. Stogryn Oct. 1985 40 p
(Contract N00014-83-C-0726)
(AD-A168015; AESC-7975) Avail: NTIS HC A03/MF A01 CSCL 08/12

This study has concentrated on deriving equations for computing the tensor dielectric constant of sea ice and making comparisons of the computations with published measurements on various components of the dielectric tensor (as well as attenuation coefficients, which are closely related to the dielectric constant). The theory is shown to be able to account quantitatively for large parts of the published experimental data on a variety of ice types in the frequency range 0.1 to 40 GHz and temperatures from -5 to -30 C. A few discrepancies, however, are noted. It is not known whether further development of the theory will be required to resolve these difference between theory and experiment or whether the experiments themselves must be refined. It is well known that accurate dielectric constant measurements on sea ice present some rather difficult experimental problems. Some inconsistencies

within the existing body of experimental data itself are pointed out in this work. GRA

N86-32949# Rome Univ. (Italy). Dipt. di Fisica.
INTEGRAL NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS IN THE DESCRIPTION OF WATER FLOW IN CHANNELS OR STRAITS OF VARIABLE WIDTH AND DEPTH
D. Levi 6 Dec. 1985 9 p
(Preprint-485; ETN-86-97919) Avail: NTIS HC A02/MF A01

Starting from the Euler equations for a three-dimensional homogeneous incompressible inviscid fluid, a generalized Kadomtsev-Petviashvili equation (GKP), together with its appropriate boundary conditions are derived in the quasi one-dimensional long wave and shallow water approximation. The coefficients of this equation depend on the form of the bottom and on the vorticity; the sides of the straits figure only in the boundary conditions. Under certain restrictions on the vorticity and the geometry of the straits, the GKP is reduced to one of several completely integrable partial differential equations, in order to study the evolution of solitons which originate in the strait. ESA

N86-32806# British Columbia Univ., Vancouver. Dept. of Oceanography.
ON THE RELATIONSHIP BETWEEN LONG-TERM DRIFTER TRAJECTORIES AND MEAN SEASONAL DISTRIBUTIONS OF GEOSTROPHIC WIND AND BAROCLINIC OCEAN CURRENT IN THE EASTERN NORTH ATLANTIC
William J. Emery, Juergen Stahlmann (Kiel Univ., West Germany), and Wolfgang Krauss *In* CNES The 10th ARGOS Users Conference 1985 27 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32807# Dundee Univ. (Scotland). Physics Lab.
SYSTEM ARGOS, SEA SURFACE TEMPERATURES AND CIRCULATION PATTERNS IN THE NORTHERN ATLANTIC
A. P. Cracknell and R. D. Callison *In* CNES The 10th ARGOS Users Conference 1985 9 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32808# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
ON THE CORRELATION OF WIND AND THE TRAJECTORIES OF DROGUED DRIFTING BUOYS
Juergen Stahlmann *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32811# Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE CURRENT SYSTEM OF THE NORTH ATLANTIC AS DEDUCED FROM DRIFTING BUOYS
Wolfgang Krauss *In* CNES The 10th ARGOS Users Conference 1985 24 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32812# Continental Shelf Inst., Trondheim (Norway).
A NEW WAVE DIRECTION BUOY ALLOWS PRESENTATION OF WAVE DIRECTION DATA IN NEAR REAL TIME
G. Ueland and S. F. Barstow *In* CNES The 10th ARGOS Users Conference 1985 15 p Sponsored by Norske Shell A/S, Norsk Hydro A/S, Statoil, Royal Norwegian Council for Scientific and Industrial Research (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32813# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
ON BOARD SPECTRAL SEA-STATE: THE SPEAR F BUOY INPUTS TO ERS-1 CALIBRATION AND VALIDATION PHASE
R. Ezraty and G. Ayela *In* CNES The 10th ARGOS Users Conference 1985 16 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32814# Etablissement d'Etudes et de Recherches Meteorologiques, Brest (France).
THE USE OF SPATIAL TECHNIQUES FOR A BETTER CURRENT SURFACE KNOWLEDGE, WITH APPLICATION TO THE SOUTHERN OCEAN
Nathalie Daniault and Yves Menard (Centre National d'Etudes Spatiales, Toulouse, France) *In* CNES The 10th ARGOS Users Conference 1985 19 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32816# Direction de la Meteorologie Nationale, Brest (France).
A DRIFTING BUOY EXPERIMENT AS PART OF COST-43
Pierre Blouch and Thor Kvinge (COST-43 Technical Secretariat, Bergen, Norway) *In* CNES The 10th ARGOS Users Conference 1985 11 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32817# Christian Michelsens Institutt for Videnskap og Andsfrihet, Bergen (Norway). Dept. of Science and Technology.
REPORT ON ICE BUOYS IN THE ARCTIC AND THE ANTARCTIC
Niels S. Nergaard *In* CNES The 10th ARGOS Users Conference 1985 19 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32818# Bergen Univ. (Norway).
EXPERIENCE AND RESULTS FROM USE OF ARGOS TRACKED BUOYS DURING MIZEX 83 AND 84
Brian A. Farrelly *In* CNES The 10th ARGOS Users Conference 1985 13 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

N86-32826# Institut Francais de Recherche pour l'Exploitation de la Mer, Nantes (France).
ARGOS AND FISHING
Claude Leroy, Claude Leroy, and Loic Mercier (CEIS-Espace, Toulouse, France) *In* CNES The 10th ARGOS Users Conference 1985 10 p (For primary document see N86-32805 24-42)
Avail: NTIS HC A14/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N86-32950*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA WORKSHOP ON ANIMAL GRAVITY-SENSING SYSTEMS
Meryl Lee Corcoran, ed. Aug. 1986 52 p Held at Pacific Grove, Calif., Feb. 1985
(NASA-TM-88249; A-86233; NAS 1.15:88249) Avail: NTIS HC A04/MF A01 CSCL 06C

The opportunity for space flight has brought about the need for well-planned research programs that recognize the significance of space flight as a scientific research tool for advancing knowledge of life on Earth, and that utilize each flight opportunity to its fullest. For the first time in history, gravity can be almost completely eliminated. Thus, studies can be undertaken that will help to elucidate the importance of gravity to the normal functioning of living organisms, and to determine the effects microgravity may have on an organism. This workshop was convened to organize a plan for space research on animal gravity-sensing systems and the role that gravity plays in the development and normal functioning of these systems. Scientists working in the field of animal gravity-sensing systems use a wide variety of organisms in their research. The workshop presentations dealt with topics which ranged from the indirect gravity receptor of the water flea, Daphnia (whose antennal setae apparently act as current-sensing receptors as the animal moves up and down in water), through specialized statocyst structures found in jellyfish and gastropods, to the more

complex vestibular systems that are characteristic of amphibians, avians, and mammals. Author

N86-32951# Department of the Air Force, Washington, D.C.
IN VIVO DERMAL ABSORPTION METHOD AND SYSTEM FOR LABORATORY ANIMALS Patent
James N. McDougal, Michael L. Gargas, Robert A. Strohaver, Gary W. Jepson, and Kenneth R. Thimling, inventors (to Air Force) Issued 15 Apr. 1986 8 p Supersedes AD-D011231
(AD-D012325; US-Patent-4,582,055; US-Patent-Appl-SN-612776; US-Patent-Class-128-202.12) Avail: US Patent and Trademark Office CSCL 06/11

A method and system for in vivo dermal absorption testing of a laboratory animal uses a mask and harness for protecting the respiratory tract of the animal when the animal is housed within a sealed chamber with a hazardous test vapor introduced in the chamber. Because of the difficulty of getting a good seal with a protective mask on a laboratory animal, this system is designed with an air leak from inside the mask into the chamber. To ensure that the test vapor does not infiltrate the mask nor leak from the chamber, the vapor is maintained at a negative pressure within the chamber as compared to the external atmospheric pressure and air is supplied to the mask for the animal to breathe at a positive pressure and at a greater rate than that needed by the animal. GRA

N86-32952# Brown Univ., Providence, R. I. Center for Neural Science.
PERIPHERAL NERVE INJURY IN DEVELOPING RATS REORGANIZES MOTOR CORTEX
John P. Donoghue and Jerome N. Sanes 19 May 1986 14 p
(Contracts N00014-81-K-0136; PHS-1-R01-NS22517-01)
(AD-A168019; TR-29) Avail: NTIS HC A02/MF A01 CSCL 06/5

The effect of neonatal nerve lesions on cerebral motor cortex organization was investigated by comparing the cortical motor representation of normal adult rats with adult rats that had one forelimb removed on the day of birth. Mapping of cerebral neocortex with electrical simulation revealed an altered relationship between the motor cortex and the remaining muscles. While distal forelimb movements are normally elicited at the lowest threshold in the motor cortex forelimb area, the same stimuli activated shoulder and trunk muscles in experimental animals. In addition an expanded cortical representation of intact body parts was present and there was an absence of a distinct portion of motor cortex. These data demonstrate that representation patterns in motor cortex are subject to environmental events that occur during development. GRA

N86-32953# Naval Aerospace Medical Research Lab., Pensacola, Fla.
GROWTH AND DEVELOPMENT OF RHESUS MONKEYS EXPOSED TO ELF (EXTREMELY LOW FREQUENCY) ELECTRIC AND MAGNETIC FIELDS DURING THE FIRST 54 MONTHS OF LIFE Final Report, Oct. 1979 - Sep. 1984
W. G. Lotz, Jack L. Saxton, Toby A. Griner, and James D. Grissett May 1986 62 p
(AD-A168733; NAMRL-1318) Avail: NTIS HC A04/MF A01 CSCL 06/19

Thirty rhesus monkeys (Macaca mulatta), 17 males and 13 females, were exposed to 22 hours per day, 7 days per week, from 1 to 54 months of age to extremely low frequency (ELF) electric and magnetic fields. A second group of 30 animals served as controls. The project was designed to produce fields similar to, but stronger than those associated with the Navy's ELF communications system. The field parameters (0.2mT and 20 V/m at a frequency modulated between 72 and 80 Hz) were the same as those used in an earlier study in which enhanced growth rate occurred in pubescent male rhesus monkeys. The biological endpoints measured included body weight, bone growth, steroid hormones, hematology, and menstrual cycle data. No differences between exposed and control groups were observed prior to puberty. During puberty, body weight, bone growth, the age at which menarche was observed, and the progressive development of the mature endocrine rhythms of the menstrual cycle were all similar for both the exposed and control female monkeys. Body weight curves of the exposed and control males began to grow faster than the controls, and continued to diverge slowly through approximately 42 months of age. The growth curve separation narrowed, however, in the last 12 months of the study. The differences in growth were not statistically significant. No significant differences in mean testosterone levels of male monkeys were observed. GRA

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

N86-32954 Groningen Rijksuniversiteit (Netherlands). Traffic Research Center.
ZOPICLONE'S RESIDUAL EFFECT UPON ACTUAL DRIVING PERFORMANCE VERSUS THOSE OF NITRAZEPAM AND FLUNITRAZEPAM
E. R. Volkwerts, J. W. Louwerens, A. B. M. Gloerich, K. A. Brookhuis, and J. F. OHanlon Apr. 1986 56 p Partly in ENGLISH and DUTCH Sponsored by Rhone-Poulenc Sante
(VK-84-10; ISBN-90-6807-016-9; ETN-86-97768) Copyright. Avail: Issuing Activity

It is shown that a patient possessing normal sensitivity to hypnotic drugs should be able to operate an automobile, in relative safety, 10 hr after ingesting nitrazepam 5 mg, flurazepam 2 mg, or zopiclone 7.5 mg. Residual driving performance impairment is expected during the morning following short-term, nocturnal use of flunitrazepam 2 mg, or zopiclone 7.5 mg, but not nitrazepam 5 mg. Residual impairment is expected in the afternoon following short-term, nocturnal use of flunitrazepam 2 mg, but not zopiclone 7.5 mg or nitrazepam 5 mg. Sleep quality is much improved by flunitrazepam 2 mg and zopiclone 7.5 mg, but less by nitrazepam 5 mg. Feelings of mental activation during the day following short term, nocturnal use of zopiclone 7.5 mg are initially (morning) less than normal, but eventually (afternoon) greater than normal. ESA

N86-32955# Department of the Air Force, Washington, D.C.
VARIABLE CONTRAST DIRECT READ-OUT VISION TESTER Patent
Harry L. Task and Louis V. Genco, inventors (to Air Force) Issued 25 Feb. 1986 6 p
(AD-D012273; US-Patent-4,572,630; US-Patent-Appl-SN-585092; US-Patent-Class-351-243) Avail: US Patent and Trademark Office CSCL 06/12

A novel vision tester and vision testing method is described which comprises a pair of translucent displays, each transilluminated by electroluminescent lighting panels, the images of two patterns being superimposed to provide a combined image characterized by a pattern of variable contrast. Light sensors near each light panel provide a measure of the relative intensities of the two images, which provides a measure of the contrast of each combined image. Contrast may be directly read out by processing the signals from the light sensors. The tester may be battery powered for portability. Author (GRA)

N86-32956# National Maritime Research Center, Kings Point, N.Y. Computer Aided Operations Research Facility.
A SIMULATION STUDY OF THE EFFECTS OF SLEEP DEPRIVATION, TIME OF WATCH AND LENGTH OF TIME ON WATCH ON WATCHSTANDING EFFECTIVENESS
Anita D. DAmico, Edmund Kaufman, and Christine Saxe Jan. 1986 138 p
(AD-A167729; CAORF-16-8122-02) Avail: NTIS HC A07/MF A01 CSCL 06/19

Watchstander's work performance and physiological measures were studied in a simulated open-sea watch. A second purpose was to evaluate marine simulation as a method for studying

the effects of such variables on mariner performance. Sleep deprivation is a common problem among mariners and was the primary variable of interest. Time of watch and length of time on watch were examined because of their interrelationship with the fatiguing effects of sleep deprivation. The standard work schedule of watch officers - four hours on and eight hours off work - is discordant with the typical work/rest schedules and accompanying circadian rhythm of most people. Thus, this watch schedule was expected to mediate the effects of sleep deprivation on watch standing. The length of time which a watch officer has stood a relatively uneventual watch was also expected to interact with the effects of sleep deprivation, such that the deleterous effects of sleep deprivation would be exacerbated as time on watch increased. Twenty-five watchstanding mates were assigned to one of four experimental groups: Group 1 slept for 7.5 hours, then stood a morning watch; Group 2 slept for 7.5 hours, then stood an afternoon watch; Group 3 received no sleep before standing a morning watch; Group 4 received no sleep before standing an afternoon watch. All watches were stood on the bridge of a full-scale full-mission shiphandling simulator. Dependent measures were collected before, during and after a four-hour watch. GRA

N86-32957# Hershey (Milton S.) Medical Center, Hershey, Pa.
PREDICTORS OF PERIODIC BREATHING AT ALTITUDE
David P. White, Kevin Gleeson, John T. Reeves, Cheryl K. Pickett, Anne M. Rannels, Allen Cymerman (Army Research Inst. of Environmental Medicine, Natick, Mass.), and John V. Weil Apr. 1986 31 p
(AD-A167947; USARIEM-M27/86) Avail: NTIS HC A03/MF A01 CSCL 06/16

Periodic breathing is commonly seen during sleep in healthy humans following ascent to high altitude. The hyperventilation induced by hypoxia at altitude leads to hypocapnia which can, during sleep, inhibit respiration yielding apnea. The subsequent fall in P02 and rise in PC02 could then trigger hyperventilation and perpetuate the cycle. This cycling requires sufficient hyperventilation in response to hypoxia and rising PC02 to produce the necessary level of hypocapnia. As a result, these events may be influenced by inter-individual variability in the hypoxic and hypercapnic ventilatory response. To test this theory, we measured hypoxic (HVR) and hypercapnic (HCVR) ventilatory responses awake and NREM sleep both at sea level and on nights 1, 4, and 7 following arrival at altitude (14,110 ft) in six healthy males. Ventilatory pattern and PC02 were also determined on these nights. On night 1 at altitude, periodic breathing developed in three of the six subjects and correlated significantly with the sea level NREM HVR ($r=.86$, $P=.02$), and near-significantly with both the sea level awake HVR ($r=.83$, $P=.08$), and sea level NREM HCVR ($r=.76$, $P=.08$). Periodic breathing decreased on nights 4 and 7, but an association persisted between the number of respiratory oscillations and the NREM hypercapnic response determined on the respective night (night 4, $r=.93$, $P=.02$; night 7, $r=.89$, $P=.04$). GRA

N86-32958# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
INHALATION TOXICOLOGY. PART 6: EVALUATION OF THE RELATIVE TOXICITY OF THERMAL DECOMPOSITION PRODUCTS FROM 9 AIRCRAFT PANEL MATERIALS Final Report
Charles R. Crane, Donald C. Sanders, Boyd R. Endecott, and John K. Abbott Feb. 1986 17 p
(AD-A168250; FAA/AM-86/3-Pt-6) Avail: NTIS HC A02/MF A01 CSCL 06/20

The purpose of this study was to determine the relative toxicity of the combustion products from aircraft cabin panels, representing both composite and homogeneous construction, that were being tested concurrently for flammability and smoke production at the FAA Technical Center. A combustion/exposure assembly was designed and constructed in which panel sections were pyrolyzed by radiant head directed on the upper surface only; the relative toxicity of the evolved gases was measured by determining the effect (time-to-incapacitation) on the laboratory rat. Also determined was the realtive toxicity of gases from the same nine panels when pyrolyzed in the older (and smaller) combustion tube assembly in order to compare the effects of the different pyrolysis modes. GRA

N86-32959# Association of American Ultima Thule, Issaquah, Wash.
EFFECTS OF HIGH ALTITUDE ON NEUROLOGICAL AND PULMONARY FUNCTION: THE EFFECT OF HIGH ALTITUDE ON VISUAL EVOKED POTENTIALS IN HUMANS ON MT. EVEREST Final Report, 15 Apr. 1984 - 14 Jul. 1985
Michael R. Colpitts, Richard N. Wohns, Yoko Colpitts, Tom Clement, and W. B. Blackett 25 Jul. 1985 26 p
(Grant DAMD17-84-G-4023; DA Proj. 3E1-62777-A-879)
(AD-A168335) Avail: NTIS HC A03/MF A01 CSCL 06/19

The goal of the Ultima Thule Everest Expedition was to investigate the effects of high altitude on cerebral function. We were interested in noninvasive methods of assessing cerebral function at altitude and thus used electrophysiological tests involving cortical evoked potential studies and a drug study using Dilantin and placebo in a double blind randomized fashion. The subjects were climbers and support members of the expedition. Our hypothesis was that acute mountain sickness was a form of cerebral edema and could be objectively assessed with visual evoked potential measurements. Visual evoked potentials were chosen since it has been shown that these wave forms are directly altered by raised intracranial pressure. Dilantin was chosen as a drug that works in the CNS and stabilizes brain function. We hypothesized that Dilantin might prevent some of the symptoms of acute mountain sickness. Our studies revealed that exposure to high altitude, both with and without the symptoms of acute mountain sickness, altered the evoked potential patterns in a significant fashion. With comparison of baseline measurements to high altitude measurements it was seen that certain individuals had objective evidence of transient raised intracranial pressure. The Dilantin study was minimally conclusive based on lack of symptoms of altitude sickness, thus making comparison of the effects of Dilantin to placebo very difficult. However, it was seen that the subjects taking Dilantin had fewer and less headaches than the placebo group. GRA

N86-32960# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A COMPARISON OF THE SPECIFIC ABSORPTION RATE IN A HOMOGENEOUS MAN MODEL AND A MAN MODEL CONTAINING REALISTIC MODEL BONES
Toby A. Griner and Richard G. Olsen 6 Jan. 1986 14 p
(AD-A168547; NAMRL-1315) Avail: NTIS HC A02/MF A01 CSCL 06/18

As part of a study of far-field microwave dosimetry in the human body, local and average specific absorption rates (SARs) in a homogeneous full-size muscle-equivalent upper-body man model were compared with measurements in an upper-body man model also containing simulated skull, brain material, oral and throat cavities, and vertebrae. The measurements were made in the torso and head region at 2.0 GHz with e-polarized irradiation. Qualitative comparisons of front surface temperature were obtained with a thermographic camera. Whole-body SAR was measured with a gradient-layer calorimeter while SAR profiles at the eye and neck locations were measured using a nonperturbing temperature probe. The result of these comparisons showed minor differences in radio frequency (RF) absorption. At this frequency, the freespace wavelength (15 cm) is less than the major body dimensions, and the energy absorption ocurred primarily at the front surface of the model in a fairly uniform pattern. We conclude that the interior composition of our man model does not significant affect the over-all absorption characteristics at frequencies where the body dimensions are greater than the irradiation wavelength. GRA

N86-32961# Anco Engineers, Inc., Culver City, Calif.
RADIOGRAPHIC DETERMINATION OF MASS OF INERTIAL TENSORS OF ANATOMICAL SEGMENTS Progress Report
Paul Ibanez 3 Jan. 1986 13 p
(Contract N00014-85-C-0594)

(AD-A168581) Avail: NTIS HC A02/MF A01 CSCL 06/5

ANCO is investigating the use of radiographic techniques to determine properties of anatomical segments - mass, center of gravity, and the inertial tensor. Three orthogonal projections (X-ray photographs) through the segment will determine these properties if sufficiently high energy X-rays are used so that attenuation is independent of atomic number and just dependent on mass density. This occurs above a few hundred keV energy. The intent of this study is to investigate the practicality and potential accuracy of the method. Progress to date is described herein. GRA

N86-32962# Army Research Inst. of Environmental Medicine, Natick, Mass.

ALTITUDE ACCLIMATIZATION ATTENTUATES PLASMA AMMONIA DURING SUBMAXIMAL EXERCISE

Particia M. Young, Paul B. Rock, Charles S. Fulco, Laurie A. Trad, and Vincent A. Forte, Jr. May 1986 27 p

(AD-A168630; USARIEM-M33/86) Avail: NTIS HC A03/MF A01 CSCL 07/2

This study examined the effects of acclimatization to 4300 m altitude on changes in plasma ammonia concentrations with 30-min submaximal (75% VO2 max) cycle exercise. Human test subjects were divided into a sedentary (n=6) and active group (n=5). Maximal oxygen uptake (VO2 max) was determined at sea level, after acute HA (t24h) and chronic HA (t=13d), exposure to 4300 m altitude. The VO2 max of both groups decreased 32% with acute HA when compared to sea level. In the sedentary group, VO2 max was decreased an additional 16% following 13-days continuous residence at 4300 m, while VO2 max in the active group showed no further change. Plasma ammonia concentration increased (P0.05) over resting levels immediately following submaximal exercise during sea-level and acute HA exposure in both groups. Immediately following submaximal exercise at chronic HA, the active group showed no increased plasma ammonia accumulation, whereas the post-exercise ammonia in the sedentary group was elevated but to a lesser ex tent than sea level or acute HA. Thus, post-exercise plasma ammonia concentration is decreased with altitude acclimatization when compared to exercise performed at the same relative intensity at sea level or acute HA. This decrease in ammonia levels may contribute to enhanced performance and altered substrate utilization with exercise following acclimatization to altitude. GRA

N86-32963# Army Research Inst. of Environmental Medicine, Natick, Mass.

EFFECT OF DEXAMETHASONE ON SYMPTOMS OF ACUTE MOUNTAIN SICKNESS AT PIKES PEAK, COLORADO (4300m)

Paul B. Rock, T. S. Johnson, Allen Cymerman, Richard L. Burse, and Leo J. Falk May 1986 22 p

(AD-A168662; USARIEM-M-32/86) Avail: NTIS HC A02/MF A01 CSCL 06/15

In a previous controlled study, dexamethasone (DEX) was shown to prevent acute mountain sickness (AMS) during exposure to simulated high altitude. To determine the effect of DEX during actual altitude exposure, sixteen young men were treated with either DEX (4 mg every 6h) or placebo for 48 h prior to and 48 h after being rapidly transported from sea level to the summit of Pikes Peak, CO (4300m). Symptoms of AMS were evaluated twice daily at Pikes Peak using the Environmental Symptoms Questionnaire and a clinical assessment. During treatment the mean symptom scores were higher for subjects taking placebo in 18 out of 20 comparisons. On an individual basis, 60% of the subjects receiving placebo met the criteria of being sick compared to 31% of subjects receiving DEX. Beginning 24 h after cessation of treatment, DEX subjects experienced a progressive increase in symptom scores which lasted through the end of the altitude sojourn (day 6). The results indicate that DEX is an effective prophylactic treatment for AMS in an actual mountain environment, but the AMS symptoms can occur if the drug is stopped abruptly. drug is stopped abruptly. GRA

N86-32964# Brookhaven National Lab., Upton, N. Y.

PROPOSAL FOR A NEW TOMOGRAPHIC DEVICE PROVIDING INFORMATION ON THE CHEMICAL PROPERTIES OF A BODY SECTION

E. Gatti, P. Rehak, and J. Kemmer (Technische Univ., Munich (West Germany).) 27 Feb. 1986 68 p Presented at the 4th European Symposium on Semiconductor Detectors, Munich, West Germany, 3 Mar. 1986 Prepared in cooperation with Beschleuniger-laboratorium der Univ. und Technischen Univ. Muenchen, Garching (Germany, F.R.).

(Contract DE-AC02-76CH-00016)

(DE86-010547; BNL-37795; CONF-8603109-3) Avail: NTIS HC A04/MF A01

A system to analyze the chemical properties of a region of tissue located deep inside the human body without having to access it is proposed. The method is based on a high precision detection of X-rays or (GAMMA)-rays (photons) from an external source Compton scattered from the tissue under inspection. The method provides chemical information of plane regions lying not too deep inside the body (<6 cm). The amount of radiation absorbed by the body is about the same as needed for a standard X-ray tomography. The exposure time is estimated to be shorter than 10 minutes. DOE

N86-32965# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.

IMPLEMENTATION OF MODELS FOR THE TRANSIENT DIVISION SYSTEM OF SPATIO-TEMPORAL VISUAL PERCEPTION [IMPLEMENTATIE VAN MODELLEN VOOR HET TRANSIENTE DEELSYSTEEM VAN DE SPATIO-TEMPORELE VISUELE WAARNEMING]

A. C. denBrinker May 1984 124 p In DUTCH

(ETN-86-97533) Avail: NTIS HC A06/MF A01

Three adaptive filter based models for the mathematical description of a spatial two-dimensional choroid membrane placed inside the transient system of visual perception were derived. Via estimate procedures applied to psychophysical impulse responses (IR) the model parameters for different subjects were determined. One model in which the temporary system as estimated from measurement results was placed in series with the membrane leads to the conclusion that membrane currency effects are no longer essential. A model in which the lateral membrane was identified with a second filter from the adaptive filter model, predicts an IR with more than 3 phases, for simulation with a 1 deg field without environment. Later phases are big enough to be measured by the model. A third model in which part of the estimated IR is identified with the membrane action was tested. ESA

N86-32966# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.

A MODEL OF THE TRANSIENT PART OF THE SPATIO-TEMPORAL PERCEPTION, CONTAINING A TWO-DIMENSIONAL LONG FIBER [EEN MODEL VAN HET TRANSIENTE DEEL VAN DE SPATIO-TEMPORELE VISUELE PERCEPTIE, BEVATTENDE EEN TWEE-DIMENSIONALE LANGE LEIDING]

A. C. denBrinker and Th. J. P. vanAalst May 1984 34 p In DUTCH

(ETN-86-97540) Avail: NTIS HC A03/MF A01

A Griffith visual perception model containing a lateral (choroid) membrane for extension and coupling of signals in the spatial domain was developed. The membrane was mathematically described using the long fiber analogy of nerve fibers. Propagation velocity (v) and damping (beta) were included. The parameters were assumed to be independent of the average luminance via adaptive processes to calculate luminous pattern discontinuities into discontinuities of beta and v. A linear Partial Differential Equation (PDE) was found; the appropriate Green function was derived. Starting from a membrane excitation by a disk direct-impulse superposed on a continously present luminance profile, PDE solutions were obtained for profiles from which the luminance is equally distributed, and constantly distributed inside the disk and zero outside, or tending to infinity outside. ESA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N86-32967# Anacapa Sciences, Inc., Fort Rucker, Ala.
HUMAN FACTORS RESEARCH IN AIRCREW PERFORMANCE AND TRAINING Annual Summary Report, Sep. 1981 - Aug. 1982
Kenneth D. Cross Dec. 1985 77 p
(Contracts MDA903-81-C-0504; DA Proj. 2Q2-63743-A-792; DA Proj. 2Q2-63743-A-793)
(AD-A167740; ASI-479-19-2; ARI-RN-85-103) Avail: NTIS HC A05/MF A01 CSCL 05/9

This report presents Human Factors Research in Aircrew Performance and Training, for the Army Research Institute Field Unit at Fort Rucker, Ala. The report contains summary descriptions for each of the eleven projects on which contractor personnel worked during the first contract year. Each summary description contains: (1) a background section that describes the rationale for the research need and the project objectives, (2) a research project that describes the tasks and activities required to fulfill the project objectives, and (3) a project status section that describes the work completed, preliminary findings (if available) and the anticipated project completion date. GRA

N86-32968# Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.
PERSPECTIVE PROJECTION INVARIANTS
Alessandro Verri and Alan Yuille Feb. 1986 17 p
(Contract N00014-80-C-0505)
(AD-A167783; AI-M-832) Avail: NTIS HC A02/MF A01 CSCL 12/1

An important part of stereo vision consists of finding and matching points in two images which correspond to the same physical element in the scene. This document shows that zeros of curvature of curves are perspective invariants and can therefore be used to find corresponding points. These can be used to help solve the registration problem and to obtain the correct depth when a curve enters the forbidden zone. These are also relevant to theories for representing image curves. The stability of these zeros of curvature are considered. Author (GRA)

N86-32969# Hershey (Milton S.) Medical Center, Hershey, Pa.
DATA COLLECTION VIA A QUASI-EXPERIMENTAL SIMULATION TECHNOLOGY. PART 1: MULTIPLE MEASUREMENT OF PERFORMANCE EXCELLENCE IN COMPLEX AND UNCERTAIN MANAGERIAL TASKS Interim Report
Siegfried Streufert, Rosanne M. Pogash, and Mary T. Piasecki Apr. 1986 74 p
(Contracts MDA903-83-C-0106; DA Proj. 2Q1-61102-B-74-F)
(AD-A167949; ARI-RN-86-41) Avail: NTIS HC A04/MF A01 CSCL 05/1

A simulation technique is used to determine whether complexity (multidimensionality) of task performance in complex managerial tasks is trainable. The present report is specifically concerned with measurement. Previous simulation based measurement, which had included sixteen measures was extended to thirty-seven primary measures and twelve derived measures. Information is provided on the characteristics and purpose of each of those measures. In addition formulas or related statements that allow calculation of performance scores by other researchers and/or in other settings is provided. Further, this report considers the Time-Event Matrix on which measurement is based. GRA

N86-32970# School of Aerospace Medicine, Brooks AFB, Tex.
THE STARTLE REFLEX AS A LEARNING TASK: APPARATUS AND TEST PARAMETERS Interim Technical Paper Jun. - Sep. 1985
Darrell G. Evans, Linda B. Anderson, Sandra Z. Brothers, Stuart L. Hutchinson, and Thomas G. Wheeler Mar. 1986 12 p
(AD-A167958; USAFSAM-TP-85-6) Avail: NTIS HC A02/MF A01 CSCL 06/16

The objective of this report is to define the startle reflex inhibition learning task and to present results of a pilot study designed to determine the experimental conditions which produce the most consistent learning curves. The startle response (muscle flinch) to each tone stimulus was recorded via an accelerator voltage output. The three primary task parameters--tone intensity, interstimulus interval (ISI), and adaptation period-were evaluated to determine which parameters were important in producing consistent learning curves. The results indicate that ISI and adaptation period have little effect on the inhibition learning curves and tone intensity proved to be the primary variable for the range of conditions used in this study. GRA

N86-32971# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
COMPLEX MONITORING PERFORMANCE AND THE CORONARY-PRONE TYPE A BEHAVIOR PATTERN Final Report
Richard I. Thackray and R. M. Touchstone Mar. 1986 15 p
(AD-A168240; AD-E900565; FAA/AM-86/4) Avail: NTIS HC A02/MF A01 CSCL 05/10

The present study examined the possible relationship of the coronary-prone Type A behavior pattern to performance of a complex monitoring task. The task was designed to functionally simulate the general task characteristics of future, highly automated air traffic control systems in which passive monitoring is expected to be a principal job requirement. Thirty-six male subjects, half classified as Type A and half as Type B, monitored the simulated radar display over a 2-hour session for infrequent critical changes in alphanumeric targets. In addition to performance, physiological changes and subjective reactions were also assessed. Type A individuals were found not to differ from Type B individuals in either task performance or in subjective reaction to the task. Task-related changes in heart rate, blood pressure, and general restlessness failed also to provide any evidence of greater arousal in Type A's than in Type B's. The findings are discussed relative to other studies of Type A behavior and performance and to the specific problem of finding useful predictors of performance in operational monitoring situations. GRA

N86-32972# Naval Aerospace Medical Research Lab., Pensacola, Fla.
MULTITASK PERFORMANCE: PREDICTING SUCCESS IN NAVAL AVIATION PRIMARY FLIGHT TRAINING Interim Report
G. R. Griffin and D. K. McBride Mar. 1986 20 p
(AD-A168246; NAMRL-1316) Avail: NTIS HC A02/MF A01 CSCL 05/9

A multitask experiment simulating certain motor control and communication requirements characteristics of flight was conducted to determine relative strengths of several performance measures as predictors of primary flight training success. A Psychomotor Task (PMT) and a Dichotic Listening Task (DLT) performed under single-task conditions were found to be significantly related (p less .05) to a primary flight training pass/fail criterion. Two separate multitask DLT measures also correlated with the pass/fail criterion and at higher levels of statistical significance (p less than .01) than the single-task measures. The results indicate that various single- and multitask measures are significantly related to primary flight performance, and further reveal that the component test measures may be better predictors under multitask than under single-task conditions. Additional research using larger samples and additional multitask tests is indicated. GRA

N86-32973# Perceptronics, Inc., Woodland Hills, Calif.
OPERATOR ALERTNESS/WORKLOAD ASSESSMENT USING STOCHASTIC MODEL-BASED ANALYSIS OF MYOELECTRIC SIGNALS Final Report, Apr. 1984 - Oct. 1985
Azad Madni, Carla Conaway, Shirley Otsubu, and Yee-Yeen Chu Nov. 1985 130 p
(Contract F49620-83-C-0001)
(AD-A168567; PFTR-1126-85-11; AFOSR-86-0325TR) Avail: NTIS HC A07/MF A01 CSCL 05/9

This report summarizes the research conducted in the second

phase of this three-year research and development program directed toward the analysis and evaluation of myoelectric signals (MES) as indicators of operator alertness and piloting workload. The purpose of the study was to investigate the efficiency of stochastic models such as autoregressive (AR), autoregressive-moving-average (ARMA), and autoregressive integrated moving average (ARIMA) models in characterizing the MES under different levels of task-imposed burden. The implications from this three-year research program are two-fold. Surface myoelectric activity is not a reliable measure of operator alertness. During Phase 1, the first autoregressive coefficient of the ARIMA model revealed a significant correlation with task difficulty level. During Phase 3, the pi weights did not show the same trend. Intramuscular electrodes, on the other hand, that do pick up more reliable signatures have obvious drawbacks. Post hoc analysis of the experimental data revealed that the total number of experimental subjects which were constrained by program scope and size were inadequate in terms of producing a statistically significant difference in perceived stress between the single and dual-task groups. GRA

N86-32974# Perceptronics, Inc., Woodland Hills, Calif.
OPERATOR ALERTNESS/WORKLOAD ASSESSMENT USING STOCHASTIC MODEL-BASED ANALYSIS OF MYOELECTRIC SIGNALS Interim Report, Apr. 1983 - Oct. 1985
Azad Madni, Carla Conaway, Shirley Otsubu, Yee-Yeen Chu, and Denis Purcell Nov. 1985 83 p
(Contract F49620-83-C-0001)
(AD-A168568; PIR-1126-85-4; AFOSR-86-0317TR) Avail: NTIS HC A05/MF A01 CSCL 05/9

This report summarizes the activities in the second phase of a three-year program of research and development directed toward the analysis and evaluation of myoelectric signals (MES) as indicators of operator alertness, and potentially workload in aircraft piloting tasks. The purpose of the study is to investigate the efficiency of stochastic models such as autoregressive (AR), autoregressive-moving-average (ARMA) and autoregressive integrated moving average (ARIMA) models in characterizing the MES under different levels of task imposed burden. The specific objectives of this effort are: (1) to develop/adapt state-of-the-art stochastic models for characterizing myoelectric signal patterns; (2) To investigate under controlled experimental conditions if meaningful repeatable quantitative relationships can be identified between MES patterns and operator loading; (3) To experimentally identify muscle sites that provide reliable MES signatures; (4) To develop methods and procedures for tuning the models and possibly filtering out pattern variations due to variables in electrode locations and individual biases; and (5) To develop guidelines for automatically assessing operator alertness level from the MES temporal signature in piloting tasks. Author (GRA)

N86-32975# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Flaechenflugzeuge.
INVESTIGATION OF PILOT BEHAVIOR WITHIN THE SCOPE OF A TRAINING PROGRAM FOR HANDLING QUALITIES RATING IN A GROUND SIMULATOR
Dietrich Altenkirch May 1985 41 p In GERMAN; ENGLISH summary
(DFVLR-Mitt-86-01; ISSN-0176-7739; ETN-86-97814) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 15.50

A pilot training session for rating handling qualities of transport aircraft was conducted with four test pilots by using a moving cockpit ground simulator. Each pilot flew three tasks: take-off/climb, cruise/landing, approach/touchdown. In addition to the basic version of the aircraft, the pilots rated the handling qualities of two configurations differing in dynamics and control modes. Cooper-Harper pilot ratings and special effort ratings, as well as statistical values computed from measured performance data of the pilot/aircraft system are presented as a function of the configuration and turbulence levels. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N86-32976*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TWENTY-FIRST ANNUAL CONFERENCE ON MANUAL CONTROL
Richard A. Miller, comp. (Ohio State Univ., Columbus.) and Richard J. Jagacinski, comp. May 1986 504 p Conference held in Columbus, Ohio, 17-19 Jun. 1985
(Grant NAG2-195)
(NASA-CP-2428; A-86218; NAS 1.55:2428) Avail: NTIS HC A22/MF A01 CSCL 05H

The proceedings of the entitled conference are presented. Twenty-nine manuscripts and eight abstracts pertaining to workload, attention and errors, controller evaluation, movement skills, coordination and decision making, display evaluation and human operator modeling and manual control. For individual titles, see N86-32977 through N86-33013.

N86-32977*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
DESCRIPTIVE LINEAR MODELING OF STEADY-STATE VISUAL EVOKED RESPONSE
William H. Levison, Andrew M. Junker (Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.), and Kevin Kenner (Synergy, Inc., Washington, D. C.) *In* NASA. Ames Research Center 21st Annual Conference on Manual Control May 1986 16 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

A study is being conducted to explore use of the steady state visual-evoke electrocortical response as an indicator of cognitive task loading. Application of linear descriptive modeling to steady state Visual Evoked Response (VER) data is summarized. Two aspects of linear modeling are reviewed: (1) unwrapping the phase-shift portion of the frequency response, and (2) parsimonious characterization of task-loading effects in terms of changes in model parameters. Model-based phase unwrapping appears to be most reliable in applications, such as manual control, where theoretical models are available. Linear descriptive modeling of the VER has not yet been shown to provide consistent and readily interpretable results. Author

N86-32978*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
ANALYTICAL COMPARISON OF TRANSIENT AND STEADY STATE VISUAL EVOKED CORTICAL POTENTIALS
Andrew M. Junker, Kevin M. Kenner, David L. Kleinman, and Terrence D. McClurg *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 14 p (For primary document see N86-32976 24-54)
(Grant AF-AFOSR-2312-V2)
Avail: NTIS HC A22/MF A01 CSCL 05H

To better describe the linear-dynamic properties of the human visual-cortical response system, transient and steady state Visual Evoked Response Potentials (VERP) were observed. The stimulus presentation device provided both the evoking stimulus (flickering or pulsing lights) and a video task display. The steady state stimulus was modulated by a complex, ten frequency, sum-of-sines, wave. The transient VERP was the time-locked average of the EEG to a series of narrow light pulses (pulse width of 10 msec). The Fourier transform of the averaged pulses had properties that approximate band limited white noise, i.e., a flat spectrum over the frequency region spanned by the 10 summed sines. The Fourier transform of both the steady state and the transient evoked potentials resulted in transfer that are equivalent and therefore comparable. To investigate the effects of task loading on evoked potentials, a grammatical reasoning task was provided. Results support the relevancy of continued application of a systems engineering approach for describing neurosensory functioning. Author

N86-32979*# California Univ., Los Angeles.
MODIFIED PETRI NET MODEL SENSITIVITY TO WORKLOAD MANIPULATIONS
Stephen A. White, David P. MacKinnon, and John Lyman *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 17 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Modified Petri Nets (MPNs) are investigated as a workload modeling tool. The results of an exploratory study of the sensitivity of MPNs to work load manipulations in a dual task are described. Petri nets have been used to represent systems with asynchronous, concurrent and parallel activities (Peterson, 1981). These characteristics led some researchers to suggest the use of Petri nets in workload modeling where concurrent and parallel activities are common. Petri nets are represented by places and transitions. In the workload application, places represent operator activities and transitions represent events. MPNs have been used to formally represent task events and activities of a human operator in a man-machine system. Some descriptive applications demonstrate the usefulness of MPNs in the formal representation of systems. It is the general hypothesis herein that in addition to descriptive applications, MPNs may be useful for workload estimation and prediction. The results are reported of the first of a series of experiments designed to develop and test a MPN system of workload estimation and prediction. This first experiment is a screening test of MPN model general sensitivity to changes in workload. Positive results from this experiment will justify the more complicated analyses and techniques necessary for developing a workload prediction system. E.R.

N86-32980*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LEVELS OF INFORMATION PROCESSING IN A FITTS LAW TASK (LIPFITTS)
Kathleen L. Mosier (California Univ., Berkeley.) and Sandra G. Hart *In its* 21st Conference on Manual Control May 1986 15 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

State-of-the-art flight technology has restructured the task of human operators, decreasing the need for physical and sensory resources, and increasing the quantity of cognitive effort required, changing it qualitatively. Recent technological advances have the most potential for impacting a pilot in two areas: performance and mental workload. In an environment in which timing is critical, additional cognitive processing can cause performance decrements, and increase a pilot's perception of the mental workload involved. The effects of stimulus processing demands on motor response performance and subjective mental workload are examined, using different combinations of response selection and target acquisition tasks. The information processing demands of the response selection were varied (e.g., Sternberg memory set tasks, math equations, pattern matching), as was the difficulty of the response execution. Response latency as well as subjective workload ratings varied in accordance with the cognitive complexity of the task. Movement times varied according to the difficulty of the response execution task. Implications in terms of real-world flight situations are discussed. Author

N86-32981*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE EFFECTS OF STIMULUS MODALITY AND TASK INTEGRALITY: PREDICTING DUAL-TASK PERFORMANCE AND WORKLOAD FROM SINGLE-TASK LEVELS
Sandra G. Hart, Robert J. Shively, Michael A. Vidulich, and Ronald C. Miller (Informatics General Corp., Palo Alto, Calif.) *In its* 21st Annual Conference on Manual Contol May 1986 15 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

The influence of stimulus modality and task difficulty on workload and performance was investigated. The goal was to quantify the cost (in terms of response time and experienced workload) incurred when essentially serial task components shared common elements (e.g., the response to one initiated the other) which could be accomplished in parallel. The experimental tasks were based on the Fittsberg paradigm; the solution to a SternBERG-type memory task determines which of two identical FITTS targets are acquired. Previous research suggested that such functionally integrated dual tasks are performed with substantially less workload and faster response times than would be predicted by suming single-task components when both are presented in the same stimulus modality (visual). The physical integration of task elements was varied (although their functional relationship remained the same) to determine whether dual-task facilitation would persist if task components were presented in different sensory modalities. Again, it was found that the cost of performing the two-stage task was considerably less than the sum of component single-task levels when both were presented visually. Less facilitation was found when task elements were presented in different sensory modalities. These results suggest the importance of distinguishing between concurrent tasks that complete for limited resources from those that beneficially share common resources when selecting the stimulus modalities for information displays. Author

N86-32982*# Massachusetts Inst. of Tech., Cambridge. Man-Machine Systems Lab.
THE IMPACT OF PHYSICAL AND MENTAL TASKS ON PILOT MENTAL WORKOAD
Scott L. Berg and Thomas B. Sheridan *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 26 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Seven instrument-rated pilots with a wide range of backgrounds and experience levels flew four different scenarios on a fixed-base simulator. The Baseline scenario was the simplest of the four and had few mental and physical tasks. An activity scenario had many physical but few mental tasks. The Planning scenario had few physical and many mental taks. A Combined scenario had high mental and physical task loads. The magnitude of each pilot's altitude and airspeed deviations was measured, subjective workload ratings were recorded, and the degree of pilot compliance with assigned memory/planning tasks was noted. Mental and physical performance was a strong function of the manual activity level, but not influenced by the mental task load. High manual task loads resulted in a large percentage of mental errors even under low mental task loads. Although all the pilots gave similar subjective ratings when the manual task load was high, subjective ratings showed greater individual differences with high mental task loads. Altitude or airspeed deviations and subjective ratings were most correlated when the total task load was very high. Although airspeed deviations, altitude deviations, and subjective workload ratings were similar for both low experience and high experience pilots, at very high total task loads, mental performance was much lower for the low experience pilots. Author

N86-32983*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MEMORY AND SUBJECTIVE WORKLOAD ASSESSMENT
Lowell Staveland (San Jose State Univ., Calif.), Sandra Hart, and Yei-Yu Yeh (Illinois Univ., Urbana-Champaign.) *In its* 21st Annual Conference on Manual Control May 1986 13 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Recent research suggested subjective introspection of workload is not based upon specific retrieval of information from long term memory, and only reflects the average workload that is imposed upon the human operator by a particular task. These findings are based upon global ratings of workload for the overall task, suggesting that subjective ratings are limited in ability to retrieve specific details of a task from long term memory. To clarify the limits memory imposes on subjective workload assessment, the difficulty of task segments was varied and the workload of specified segments was retrospectively rated. The ratings were retrospectively collected on the manipulations of three levels of segment difficulty. Subjects were assigned to one of two memory

groups. In the Before group, subjects knew before performing a block of trials which segment to rate. In the After group, subjects did not know which segment to rate until after performing the block of trials. The subjective ratings, RTs (reaction times) and MTs (movement times) were compared within group, and between group differences. Performance measures and subjective evaluations of workload reflected the experimental manipulations. Subjects were sensitive to different difficulty levels, and recalled the average workload of task components. Cueing did not appear to help recall, and memory group differences possibly reflected variations in the groups of subjects, or an additional memory task. Author

N86-32984*# Idaho Univ., Moscow. Dept. of Engineering Sciences.

THE EFFECTS OF ACCELERATION STRESS ON HUMAN WORKLOAD AND MANUAL CONTROL

Richard T. Gill, William B. Albery (Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.), and Sharon L. Ward *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 15 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

The effects of +Gz stress on operator task performance and workload were assessed. Subjects were presented a two dimensional maze and were required to solve it as rapidly as possible (by moving a light dot through it via a trim switch on a control stick) while under G-stress at levels from +1 Gz to +6 Gz. The G-stress was provided by a human centrifuge. The effects of this stress were assessed by two techniques; (1) objective performance measures on the primary maze-solving task, and (2) subjective workload measures obtained using the subjective workload assessment technique (SWAT). It was found that while neither moderate (+3 Gz) nor high (+5 Gz and +6 Gz) levels of G-stress affected maze solving performance, the high G levels did increase significantly the subjective workload of the maze task. Author

N86-32985*# California Univ., Los Angeles. Dept. of Safety Science and Human Factors.

KNOWLEDGE-BASED LOAD LEVELING AND TASK ALLOCATION IN HUMAN-MACHINE SYSTEMS

M. H. Chignell and P. A. Hancock *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 11 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Conventional human-machine systems use task allocation policies which are based on the premise of a flexible human operator. This individual is most often required to compensate for and augment the capabilities of the machine. The development of artificial intelligence and improved technologies have allowed for a wider range of task allocation strategies. In response to these issues a Knowledge Based Adaptive Mechanism (KBAM) is proposed for assigning tasks to human and machine in real time, using a load leveling policy. This mechanism employs an online workload assessment and compensation system which is responsive to variations in load through an intelligent interface. This interface consists of a loading strategy reasoner which has access to information about the current status of the human-machine system as well as a database of admissible human/machine loading strategies. Difficulties standing in the way of successful implementation of the load leveling strategy are examined. Author

N86-32986*# California Univ., Los Angeles. Dept. of Safety Science and Human Factors.

THE EFFECTS OF STRESS ON ATTENTIONAL RESOURCES Abstract Only

P. A. Hancock and M. H. Chignell *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

A new perspective is presented from which to view the action of stress on human behavior. At a behavioral level, the action of stress is related to notions of human attention and an indication of an isomorphic relationship between modes of control at a physiological and behavioral level is presented. Examples of this phenomenon are extracted from performance under heat stress, since this is one of the most simple stress circumstances. It is suggested that stress sufficient to overcome adaptive capability, that is efficient homeostasis, acts to drain attentional resources. The manner in which such resources fail approximates that function typical of a positive feedback system, which also characterizes the breakdown of physiological response under severe environmental stress. The end point of this draining sequence is the absence of all attentional resources, which is taken to be unconsciousness, to be rapidly followed by the failure of physiological adaptability upon which life sustaining functions depend. This overall picture preserves the inverted-U shaped relationship between stress and performance, yet is in distinct contrast to the traditional arousal account of such behavior. The theoretical and practical ramifications of these observations are explored. Author

N86-32987*# Illinois Univ., Savoy. Inst. for Aviation.

THE EFFECTS OF VOICE AND MANUAL CONTROL MODE ON DUAL TASK PERFORMANCE

Christopher D. Wickens, John Zenyuh, Victor Culp, and William Marshak *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Two fundamental principles of human performance, compatibility and resource competition, are combined with two structural dichotomies in the human information processing system, manual versus voice output, and left versus right cerebral hemisphere, in order to predict the optimum combination of voice and manual control with either hand, for time-sharing performance of a dicrete and continuous task. Eight right handed male subjected performed a discrete first-order tracking task, time-shared with an auditorily presented Sternberg Memory Search Task. Each task could be controlled by voice, or by the left or right hand, in all possible combinations except for a dual voice mode. When performance was analyzed in terms of a dual-task decrement from single task control conditions, the following variables influenced time-sharing efficiency in diminishing order of magnitude, (1) the modality of control, (discrete manual control of tracking was superior to discrete voice control of tracking and the converse was true with the memory search task), (2) response competition, (performance was degraded when both tasks were responded manually), (3) hemispheric competition, (performance degraded whenever two tasks were controlled by the left hemisphere) (i.e., voice or right handed control). The results confirm the value of predictive models invoice control implementation. Author

N86-32988*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EVALUATION OF 2 COGNITIVE ABILITIES TESTS IN A DUAL-TASK ENVIRONMENT

Michael A. Vidulich and Pamela S. Tsang *In its* 21st Annual Conference on Manual Control May 1986 10 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Most real world operators are required to perform multiple tasks simultaneously. In some cases, such as flying a high performance aircraft or trouble shooting a failing nuclear power plant, the operator's ability to time share or process in parallel can be driven to extremes. This has created interest in selection tests of cognitive abilities. Two tests that have been suggested are the Dichotic Listening Task and the Cognitive Failures Questionnaire. Correlations between these test results and time sharing performance were obtained and the validity of these tests were examined. The primary task was a tracking task with dynamically varying bandwidth. This was performed either alone or concurrently with either another tracking task or a spatial transformation task. The results were: (1) An unexpected negative correlation was detected between the two tests; (2) The lack of correlation between either test and task performance made the predictive utility of the tests scores appear questionable; (3) Pilots

made more errors on the Dichotic Listening Task than college students. Author

N86-32989*# Toronto Univ. (Ontario). Dept. of Industrial Engineering.
AT LEAST SOME ERRORS ARE RANDOMLY GENERATED (FREUD WAS WRONG)
Abigail J. Sellen and John W. Senders *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

An experiment was carried out to expose something about human error generating mechanisms. In the context of the experiment, an error was made when a subject pressed the wrong key on a computer keyboard or pressed no key at all in the time allotted. These might be considered, respectively, errors of substitution and errors of omission. Each of seven subjects saw a sequence of three digital numbers, made an easily learned binary judgement about each, and was to press the appropriate one of two keys. Each session consisted of 1,000 presentations of randomly permuted, fixed numbers broken into 10 blocks of 100. One of two keys should have been pressed within one second of the onset of each stimulus. These data were subjected to statistical analyses in order to probe the nature of the error generating mechanisms. Goodness of fit tests for a Poisson distribution for the number of errors per 50 trial interval and for an exponential distribution of the length of the intervals between errors were carried out. There is evidence for an endogenous mechanism that may best be described as a random error generator. Furthermore, an item analysis of the number of errors produced per stimulus suggests the existence of a second mechanism operating on task driven factors producing exogenous errors. Some errors, at least, are the result of constant probability generating mechanisms with error rate idiosyncratically determined for each subject. Author

N86-32990*# Air Line Pilots Association, International, Denison, Tex.
PILOT INTERFACE WITH FLY BY WIRE CONTROL SYSTEMS
William W. Melvin *In* NASA. Ames Research Center 21st Annual Conference on Manual Control May 1986 7 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Aircraft designers are rapidly moving toward full fly by wire control systems for transport aircraft. Aside from pilot interface considerations such as location of the control input device and its basic design such as side stick, there appears to be a desire to change the fundamental way in which a pilot applies manual control. A typical design would have the lowest order of manual control be a control wheel steering mode in which the pilot is controlling an autopilot. This deprives the pilot of the tactile sense of angle of attack which is inherent in present aircraft by virtue of certification requirements for static longitudinal stability whereby a pilot must either force the aircraft away from its trim angle of attack or trim to a new angle of attack. Whether or not an aircraft actually has positive stability, it can be made to feel to a pilot as though it does by artificial feel. Artificial feel systems which interpret pilot input as pitch rate or G rate with automatic trim have proven useful in certain military combat maneuvers, but their transposition to other more normal types of manual control may not be justified. Author

N86-32991*# Systems Technology, Inc., Hawthorne, Calif.
INVESTIGATION OF LIMB-SIDESTICK DYNAMIC INTERACTION WITH ROLL CONTROL
Donald E. Johnston and Duane T. McRuer *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 29 p (For primary document see N86-32976 24-54)
(Contract NAS2-11454)
Avail: NTIS HC A22/MF A01 CSCL 05H

A fixed-base simulation was performed to identify and quantify interactions between the pilot's hand/arm neuromuscular subsystem and such features of typical modern fighter aircraft roll rate command control system mechanization as: (1) force sensing side-stick type manipulator; (2) vehicle effective roll time constant; and (3) flight control system effective time delay. The simulation results provide insight to high frequency pilot induced oscillations (PIO) (roll ratchet), low frequency PIO, and roll-to-right control and handling problems previously observed in experimental and production fly-by-wire control systems. The simulation configurations encompass and/or duplicate several actual flight situations, reproduce control problems observed in flight, and validate the concept that the high frequency nuisance mode known as roll ratchet derives primarily from the pilot's neuromuscular subsystem. The simulations show that force-sensing side-stick manipulator force/displacement/command gradients, command prefilters, and flight control system time delays need to be carefully adjusted to minimize neuromuscular mode amplitude peaking (roll ratchet tendency) without restricting roll control bandwidth (with resulting sluggish or PIO prone control). Author

N86-32992*# CAE Electronics Ltd., St. Laurent (Quebec).
FLIGHT TEST OF A DISPLACEMENT SIDEARM CONTROLLER
Andrew L. Lippay, Ronald Kruk, Michael King, and Murray Morgan (National Aeronautical Establishment, Ottawa (Ontario).) *In* NASA. Ames Research Center 21st Annual Conference on Manual Control May 1986 23 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

A six-axis displacement-stick sidearm controller was developed to enable single-handed control of remote manipulator operations in space. With a working model available, piloted evaluation became possible in a fly-by-computer variable-stability research aircraft, originally a Bell 205 helicopter. The original mechanization was limited to three rotational axes and a linear one, analogous to the collective stick. A newly designed short stickgrip was mounted and the spring force pattern adjusted to suit the helicopter flight control environment. A standard set of test maneuvers was flown by four experimental pilots with conventional helicopter flight controls and with sidearm controllers equipped with two different handgrips. Existing data from flight tests with an isometric-stick controller were added to complete the comparison. The displacement controller consistently achieved a rating of 3.0 to 3.5 on the Cooper-Harper scale, on par with the conventional controls. The same basic controller design was tested in spacecraft and remote manipulator simulations with very promising results. In each application operator/system integration was rapid and positive. The results demonstrate feasibility and support the design philosophy of using deflection as well as force to generate proprioceptive feedback. Author

N86-32993*# Human Engineering Labs., Aberdeen Proving Ground, Md.
ANTHROPOMETRIC CONSIDERATIONS FOR A 4-AXIS SIDE-ARM FLIGHT CONTROLLER
William B. DeBellis *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 14 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

A data base on multiaxis side-arm flight controls was generated. The rapid advances in fly-by-light technology, automatic stability systems, and onboard computers have combined to create flexible flight control systems which could reduce the workload imposed on the operator by complex new equipment. This side-arm flight controller combines four controls into one unit and should simplify the pilot's task. However, the use of a multiaxis side-arm flight controller without complete cockpit integration may tend to increase the pilot's workload. Author

N86-32994*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
ACTIVE CONTROLLERS AND THE TIME DURATION TO LEARN A TASK
D. W. Repperger and C. Goodyear (Systems Research Labs., Inc., Dayton, Ohio.) *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 12 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

An active controller was used to help train naive subjects involved in a compensatory tracking task. The controller is called active in this context because it moves the subject's hand in a direction to improve tracking. It is of interest here to question whether the active controller helps the subject to learn a task more rapidly than the passive controller. Six subjects, inexperienced to compensatory tracking, were run to asymptote root mean square error tracking levels with an active controller or a passive controller. The time required to learn the task was defined several different ways. The results of the different measures of learning were examined across pools of subjects and across controllers using statistical tests. The comparison between the active controller and the passive controller as to their ability to accelerate the learning process as well as reduce levels of asymptotic tracking error is reported here. Author

N86-32995*# California State Univ., Hayward.

HESITATION IN TRACKING INDUCED BY A CONCURRENT MANUAL TASK

Patricia A. Kelly and Stuart T. Klapp *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 3 p (For primary document see N86-32976 24-54)

(Contract NCC2-223)

Avail: NTIS HC A22/MF A01 CSCL 05H

When people are required to track with one hand and perform occasional discrete responses with the other hand, there is a strong possibility that errors will be induced in tracking attributable to the simultaneous action by the other. This problem was investigated by pairing pursuit tracking (right hand) with a handle movement response (left hand) guided by an auditory stimulus. Tracking is assumed to represent flight control and the left hand response to represent other aspects of aircraft system management. The general goal of this research is to identify the types of errors induced into tracking by the requirement of a secondary response with the other hand. An attempt is reported to determine if hesitations can be reduced further by combining tracking emphasis with a higher degree of practice. It is concluded that there is a tendency to freeze the tracking response when a discrete simultaneous response is required of the other hand. By contrast, practice seems to reduce hesitations while also improving left hand reaction time. Thus there appears to be a mode of control which permits tracking and discrete simultaneous responses to occur together. Author

N86-32996*# Ohio State Univ., Columbus. Dept. of Psychology.

PROGRESSION-REGRESSION EFFECTS IN TRACKING REPEATED PATTERNS Abstract Only

Richard J. Jagacinski and Sehchang Hah *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Subjects used a position control system to perform compensatory tracking of a repeated input pattern. The input pattern was 20 seconds in duration and was either an arctangent function or the sum of two sine waves. Tracking error decreased with practice and increased with the addition of a concurrent memory task. The shape of the ensemble-average tracking error resembled the shape of the input velocity signal throughout these changes in performance. Regression analyses were used to parameterize these effects and compare these results with the predictions of several conceptualizations of perceptual-motor learning. Author

N86-32997*# Illinois Univ., Urbana. Biomechanics Lab.

THE ROLE OF IMPULSE PARAMETERS IN FORCE VARIABILITY

Les. G. Carlton and K. M. Newell (Illinois Univ., Urbana-Champaign.) *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 9 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

One of the principle limitations of the human motor system is the ability to produce consistent motor responses. When asked to repeatedly make the same movement, performance outcomes are characterized by a considerable amount of variability. This occurs whether variability is expressed in terms of kinetics or kinematics. Variability in performance is of considerable importance because for tasks requiring accuracy it is a critical variable in determining the skill of the performer. What has long been sought is a description of the parameter or parameters that determine the degree of variability. Two general experimental protocals were used. One protocal is to use dynamic actions and record variability in kinematic parameters such as spatial or temporal error. A second strategy was to use isometric actions and record kinetic variables such as peak force produced. What might be the important force related factors affecting variability is examined and an experimental approach to examine the influence of each of these variables is provided. E.R.

N86-32998*# Toronto Univ. (Ontario). Dept. of Industrial Engineering.

HITTS LAW? A TEST OF THE RELATIONSHIP BETWEEN INFORMATION LOAD AND MOVEMENT PRECISION

Mathew Zaleski and Neville Moray *In* NASA. Ames Research Center 21st Annual Conference on Manual Control May 1986 21 p (For primary document see N86-32976 24-54)

(Grant NAGw-429)

Avail: NTIS HC A22/MF A01 CSCL 05H

Recent technological developments have made viable a man-machine interface heavily dependent on graphics and pointing devices. This has led to new interest in classical reaction and movement time work by Human Factors specialists. Two experiments were designed and run to test the dependence of target capture time on information load (Hitt's Law) and movement precision (Fitts' Law). The proposed model linearly combines Hitt's and Fitts' results into a combination law which then might be called Hitts' Law. Subjects were required to react to stimuli by manipulating a joystick so as to cause a cursor to capture a target on a CRT screen. Response entropy and the relative precision of the capture movement were crossed in a factorial design and data obtained that were found to support the model. Author

N86-32999*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AIRCREW COORDINATION AND DECISIONMAKING: PEER RATINGS OF VIDEO TAPES MADE DURING A FULL MISSION SIMULATION

Miles R. Murphy and Cynthia A. Awe (San Jose State Univ., Calif.) *In its* 21st Annual Conference on Manual Control May 1986 33 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Six professionally active, retired captains rated the coordination and decisionmaking performances of sixteen aircrews while viewing videotapes of a simulated commercial air transport operation. The scenario featured a required diversion and a probable minimum fuel situation. Seven point Likert-type scales were used in rating variables on the basis of a model of crew coordination and decisionmaking. The variables were based on concepts of, for example, decision difficulty, efficiency, and outcome quality; and leader-subordin ate concepts such as person and task-oriented leader behavior, and competency motivation of subordinate crewmembers. Five-front-end variables of the model were in turn dependent variables for a hierarchical regression procedure. The variance in safety performance was explained 46%, by decision efficiency, command reversal, and decision quality. The variance of decision quality, an alternative substantive dependent variable to safety performance, was explained 60% by decision efficiency and the captain's quality of within-crew communications. The variance of decision efficiency, crew coordination, and command reversal were in turn explained 78%, 80%, and 60% by small numbers of preceding independent variables. A principle component, varimax factor analysis supported the model structure suggested by regression analyses. Author

N86-33000*# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Scien

AN EXPERIMENTAL PARADIGM FOR TEAM DECISION PROCESSES

Daniel Serfaty and David L. Kleinman *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 2en1] p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

The study of distributed information processing and decision making is presently hampered by two factors: (1) The inherent complexity of the mathematical formulation of decentralized problems has prevented the development of models that could be used to predict performance in a distributed environment; and (2) The lack of comprehensive scientific empirical data on human team decision making has hindered the development of significant descriptive models. As a part of a comprehensive effort to find a new framework for multihuman decision making problems, a novel experimental research paradigm was developed involving human terms in decision making tasks. Attempts to construct parts of an integrated model with ideas from queueing networks, team theory, distributed estimation and decentralized resource management are described. Author

N86-33001*# Ohio State Univ., Columbus. Dept. of Industrial and Systems Engineering.

INVESTIGATION OF CREW PERFORMANCE IN A MULTI-VEHICLE SUPERVISORY CONTROL TASK Abstract Only

Richard A. Miller, Brian D. Plamondon, Richard J. Jagacinski, and Alex C. Kirlik *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Crew information processing and decision making in a supervisory control task which is loosely based on the mission of future generation helicopters is measured and represented. Subjects control the motion and activities of their own vehicle and direct the activities of four additional craft. The task involves searching an uncertain environment for cargo and enemies, returning cargo to home base and destroying enemies while attempting to avoid destruction of the scout and the supervised vehicles. A series of experiments with two-person crews and one-person crews were performed. Resulting crew performance was modeled with the objective of describing and understanding the information processing strategies utilized. Of particular interest are problem simplification strategies under time stress and high work load, simplification and compensation in the one-person cases, crew coordination in the two-person cases, and the relationship between strategy and errors in all cases. The results should provide some insight into the effective use of aids, particularly aids based on artificial intelligence, for similar tasks. The simulation is described which is used for the study and some preliminary results from the first two-person crew study are discussed. Author

N86-33002*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

FORCE/TORQUE DISPLAY FOR SPACE TELEOPERATION CONTROL EXPERIMENTS AND EVALUATION

Kevin Corker (Bolt, Beranek, and Newman, Inc., Cambridge, Mass.), Antal Bejczy, and Barry Rappaport *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 24 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

Experiments were performed at the Johnson Space Center (JSC), Manipulator Development Facility using the full scale Shuttle Remote Manipulator System (SRMS) to evaluate the effect of visual presentation through perspective display of the orthogonal forces and torques sensed at the manipulator end effector. The experiments investigated the effect of the display information on the management of forces and torques generated during payload berthing and deployment, as well as simulated satellite module change-out operations. The evaluation also addressed (1) issues of display format, including: force/torque scaling, point of resolution, and display mixing with video generated imagery, and (20) task related variables of payload size, alternative sources of guidance information, and control mode. The results are presented of a first-pass informal anlaysis of the analog, strip chart-recorded data from these evaluation tests. The results provide a relative measure of improvement in force management through the use of such a display, as well as information regarding the impact of display variables and task demands on operator performance. Author

N86-33003*# National Aerospace Lab., Amsterdam (Netherlands).

MODEL ANALYSIS OF REMOTELY CONTROLLED RENDEZVOUS AND DOCKING WITH DISPLAY PREDICTION

Paul Milgram and Paul H. Wewerinke *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 18 p (For primary document see N86-32976 24-54)

(Contract ESA-5594/83/NL/AN(SC))

Avail: NTIS HC A22/MF A01 CSCL 05H

Manual control of rendezvous and docking (RVD) of two spacecraft in low earth orbit by a remote human operator is discussed. Experimental evidence has shown that control performance degradation for large transmission delays (between spacecraft and operations control center) can be substantially improved by the introduction of predictor displays. An intial Optimal Control Model (OCM) analysis of RVD translational and rotational perturbation control was performed, with emphasis placed on the predictive capabilities of the combined Kalman estimator/optimal predictor with respect to control performance, for a range of time delays, motor noise levels and tracking axes. OCM predictions are then used as a reference for comparing tracking performance with a simple predictor display, as well as with no display prediction at all. Use is made here of an imperfect internal model formulation, whereby it is assumed that the human operator has no knowledge of the system transmission delay. Author

N86-33004*# California Univ., Davis. Dept. of Mechanical Engineering.

A MODEL FOR THE HUMAN'S USE OF VISUAL FIELD CUES IN NAP-OF-THE-EARTH FLIGHT Abstract Only

Ronald A. Hess and Kam Chan *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 1 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

A simple model is developed which describes the manner in which the human pilot may use visual field cues in controlling a vehicle in nap-of-the earth flight. The model is based upon the feedforward of information obtained from streamer patterns in the visual field to the inner-most loop of a multi-loop pilot/vehicle model. In this framework, the model is a logical extension of pursuit and preview models of the human operator which have appeared in the literature. Simulation and flight test data involving low-level helicopter flight tasks are applied to model development and validation. Author

N86-33005*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

VIRTUAL SPACE AND 2-DIMENSIONAL EFFECTS IN PERSPECTIVE DISPLAYS

Michael Wallace McGreevy, Cordell R. Ratzlaff (San Jose State Univ., Calif.), and Stephen R. Ellis *In its* 21st Annual Conference on Manual Control May 1986 14 p (For primary document see N86-32976 24-54)

Avail: NTIS HC A22/MF A01 CSCL 05H

When interpreting three dimensional spatial relationships presented on a two dimensional display surface, the viewer is required to mentally reconstruct the original information. This reconstruction is influenced by both the perspective geometry of the displayed image and the viewer's eye position relative to the display. In a study which manipulated these variables, subjects judged the azimuth direction of a target object relative to a reference object fixed in the center of a perspective display. The results support a previously developed model which predicted that the azimuth judgement error would be a sinusoidal function of stimulus azimuth. The amplitude of this function was correctly predicted to be systematically modulated by both the perspective

geometry of the image and the viewer's eye position relative to the screen. Interaction of the two components of the model, the virtual space effect and the 3D-to-2D projection effect, predicted the relative amplitudes of the sinusoidal azimuth error functions for the various conditions of the experiment. Mean azimuth judgements in some directions differed by as much as 25 degrees as a result of different combinations of eye position and image geometry. The results illustrate the need to consider the effects of perspective geometry when designing spatial information instruments, and show the model to be a reliable predictor of average performance. Author

N86-33006*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
OPTIMAL COOPERATIVE CONTROL SYNTHESIS OF ACTIVE DISPLAYS
Sanjay Garg and David K. Schmidt *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 18 p (For primary document see N86-32976 24-54)
(Grant NAG2-228)
Avail: NTIS HC A22/MF A01 CSCL 05H

The utility of augmenting displays to aid the human operator in controlling high order complex systems is well known. Analytical evaluation of various display designs for a simple k/s sup 2 plant in a compensatory tracking task using an optimal Control Model (OCM) of human behavior is carried out. This analysis reveals that significant improvement in performance should be obtained by skillful integration of key information into the display dynamics. The cooperative control synthesis technique previously developed to design pilot-optimal control augmentation is extended to incorporate the simultaneous design of performance enhancing augmented displays. The application of the cooperative control synthesis technique to the design of augmented displays is discussed for the simple k/s sup 2 plant. This technique is intended to provide a systematic approach to design optimally augmented displays tailored for specific tasks. Author

N86-33007*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SOME COMPUTATIONAL TECHNIQUES FOR ESTIMATING HUMAN OPERATOR DESCRIBING FUNCTIONS
William H. Levison *In* NASA. Ames Research Center 21st Annual Conference on Manual Control May 1986 21 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Computational procedures for improving the reliability of human operator describing functions are described. Special attention is given to the estimation of standard errors associated with mean operator gain and phase shift as computed from an ensemble of experimental trials. This analysis pertains to experiments using sum-of-sines forcing functions. Both open-loop and closed-loop measurement environments are considered. Author

N86-33008*# Systems Technology, Inc., Hawthorne, Calif.
MANUAL CONTROL OF UNSTABLE SYSTEMS
R. Wade Allen, Jeffrey R. Hogue, and Zareh Parseghian *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 18 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Under certain operational regimes and failure modes, air and ground vehicles can present the human operator with a dynamically unstable or divergent control task. Research conducted over the last two decades has explored the ability of the human operator to control unstable systems under a variety of circumstances. Past research is reviewed and human operator control capabilities are summarized. A current example of automobile directional control under rear brake lockup conditions is also reviewed. A control system model analysis of the driver's steering control task is summarized, based on a generic driver/vehicle model presented at last year's Annual Manual. Results from closed course braking tests are presented that confirm the difficulty the average driver has in controlling the unstable directional dynamics arising from rear wheel lockup. Author

N86-33009*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
MODIFIED SUPERPOSITION: A SIMPLE TIME SERIES APPROACH TO CLOSED-LOOP MANUAL CONTROLLER IDENTIFICATION
Daniel J. Biezad, David K. Schmidt, Frank Leban, and Susan Mashiko *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 30 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

Single-channel pilot manual control output in closed-tracking tasks is modeled in terms of linear discrete transfer functions which are parsimonious and guaranteed stable. The transfer functions are found by applying a modified super-position time series generation technique. A Levinson-Durbin algorithm is used to determine the filter which prewhitens the input and a projective (least squares) fit of pulse response estimates is used to guarantee indentified model stability. Results from two case studies are compared to previous findings, where the source of data are relatively short data records, approximately 25 seconds long. Time delay effects and pilot seasonalities are discussed and analyzed. It is concluded that single-channel time series controller modeling is feasible on short records, and that it is important for the analyst to determine a criterion for best time domain fit which allows association of model parameter values, such as pure time delay, with actual physical and physiological constraints. The purpose of the modeling is thus paramount. Author

N86-33010*# Systems Technology, Inc., Hawthorne, Calif.
COMPARISON OF THE STI NIPIP TRACKING DYNAMICS IDENTIFICATION WITH THE ON-LINE FOURIER ANALYZER DFA RESULTS INCLUDING A TIME VARYING CASE
Henry R. Jex and Greg Hanson *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 7 p (For primary document see N86-32976 24-54)
(Contract F33615-82-C-0629)
Avail: NTIS HC A22/MF A01 CSCL 05H

The Non-Intrusive Pilot Identification Procedure (NIPIP) recently developed at STI and described at the 1981 Annual Manual was used to identify operators who were compensatory tracking a sub-critical-instability task. NIPIP uses a time domain least squares procedure converting to frequency domain coefficients. The forcing function was a sum of sinusoids supplied by the STI Mark II Describing Function Analyzer, which computes on-line Fourier coefficients of the operator's error/input describing function. The resulting open-loop and operator dynamics computed by each procedure are compared, and they are shown to be reasonably close when there is reasonable power in the error signal at the measurement frequencies. A special run was made in which the operator abruptly reduced gain within 1 sec, and the ability of the NIPIP to identify this step time variation in the operator is illustrated. Author

N86-33011*# Institut fuer Flugmechanik, Brunswick (West Germany).
A FLIGHT TEST METHOD FOR PILOT/AIRCRAFT ANALYSIS
Ruthard Koehler and Ernst Buchacker *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 14 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

In high precision flight maneuvres a pilot is a part of a closed loop pilot/aircraft system. The assessment of the flying qualities is highly dependent on the closed loop characteristics related to precision maneuvres like approach, landing, air-to-air tracking, air-to-ground tracking, close formation flying and air-to air refueling of the receiver. The object of a research program at DFVLR is the final flight phase of an air to ground mission. In this flight phase the pilot has to align the aircraft with the target, correct small deviations from the target direction and keep the target in his sights for a specific time period. To investigate the dynamic behavior of the pilot-aircraft system a special ground attack flight test technique with a prolonged tracking maneuvres was developed. By changing the targets during the attack the pilot is forced to

react continously on aiming errors in his sights. Thus the closed loop pilot/aircraft system is excited over a wide frequency range of interest, the pilot gets more information about mission oriented aircraft dynamics and suitable flight test data for a pilot/aircraft analysis can be generated. Author

N86-33012*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
MAXIMUM NORMALIZED ACCELERATION AS A FLYING QUALITIES PARAMETER
Joel S. Warner and Edward D. Onstott *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 11 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

In 1984, Maximum Normalized Rate (MNR) was presented as a Flying Qualities parameter. Subsequent analysis of data from ground based simulation and flight test revealed the utility of a companion parameter, Maximum Normalized Acceleration (MNA). MNR and MNA profiles reveal the presence of both continuous and pulsed compensation strategies during discrete attitude tracking. In addition, MNR appears to be a suitable metric for pilot opinion in the LATHOS data base, while the MNR/MNA relationship is sensitive to pilot-induced-oscillation (PIO) and roll ratcheting problems. As part of an investigation of this problem, Northrop has developed an analysis technique known as the Step Target Method. The Step Target method is essentially a one degree-of-freedom simulation, where an attitude command in the form of a step function is presented to a closed-loop pilot/aircraft model. The two parameters MNR and MNA were shown to be useful in Flying Qualities analysis. MNR was shown to correlate with Pilot Opinion Rating in the LATHOS data base, while MNA reflects PIO and roll ratcheting. Profiles of MNR versus MNA reveal the presence of pulsed compensation strategies in both ground based and in-flight simulation. Furthermore, comparison of continuous and discrete attitude tracking simulation data reveals that these two tracking tasks exhibit independent sensitivities to aircraft characteristics. E.R.

N86-33013*# Purdue Univ., West Lafayette, Ind. School of Aeronautics and Astronautics.
CLOSED-LOOP, PILOT/VEHICLE ANALYSIS OF THE APPROACH AND LANDING TASK
Mark R. Anderson and David K. Schmidt *In* NASA. Ames Research Center, 21st Annual Conference on Manual Control May 1986 5 p (For primary document see N86-32976 24-54)
Avail: NTIS HC A22/MF A01 CSCL 05H

In the case of approach and landing, it is universally accepted that the pilot uses more than one vehicle response, or output, to close his control loops. Therefore, to model this task, a multi-loop analysis technique is required. The analysis problem has been in obtaining reasonable analytic estimates of the describing functions representing the pilot's loop compensation. Once these pilot describing functions are obtained, appropriate performance and workload metrics must then be developed for the landing task. The optimal control approach provides a powerful technique for obtaining the necessary describing functions, once the appropriate task objective is defined in terms of a quadratic objective function. An approach is presented through the use of a simple, reasonable objective function and model-based metrics to evaluate loop performance and pilot workload. The results of an analysis of the LAHOS (Landing and Approach of Higher Order Systems) study performed by R.E. Smith is also presented. Author

N86-33014# Southampton Univ. (England). Inst. of Sound and Vibration Research.
A DESIGN GUIDE FOR VISUAL DISPLAYS AND MANUAL TASKS IN VIBRATION ENVIRONMENTS. PART 1: VISUAL DISPLAYS
M. J. Moseley and M. J. Griffin May 1986 34 p
(ISVR-TR-133-Pt-1) Avail: NTIS HC A03/MF A01

Design guidance relevant to the effects of vibration on visual tasks is provided. The vibration shows how effects are related to characteristics of the vibration, the display, and other aspects of the environment. Published experimental studies are used as the basis of a series of design recommendations which may be used to minimize the influence of vibration on visual tasks. Author

N86-33015# Southampton Univ. (England). Inst. of Sound and Vibration Research.
A DESIGN GUIDE FOR VISUAL DISPLAYS AND MANUAL TASKS IN VIBRATION ENVIRONMENTS. PART 2: MANUAL TASKS
R. W. McLeod and M. J. Griffin May 1986 36 p
(ISVR-TR-134) Avail: NTIS HC A03/MF A01

Design guidance relevant to the effects of vibration on manual activities is provided. The information describes the mechanisms by which vibration may affect task performance and shows how effects are dependent upon characteristics of both the vibration environment and the task. Data from published experimental studies are used as the basis of a series of design recommendations which may be used to minimize the influence of vibration on manual tasks. Author

N86-33016*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
CONTROL OF A FREE-FLYING ROBOT MANIPULATOR SYSTEM Semiannual Report, Feb. - Jul. 1985
Harold Alexander and Robert H. Cannon, Jr. Jul. 1985 8 p
(Contract NCC2-333)
(NASA-CR-179717; NAS 1.26:179717; SAR-1) Avail: NTIS HC A02/MF A01 CSCL 05H

The goal of the research is to develop and test control strategies for a self-contained, free flying space robot. Such a robot would perform operations in space similar to those currently handled by astronauts during extravehicular activity (EVA). The focus of the work is to develop and carry out a program of research with a series of physical Satellite Robot Simulator Vehicles (SRSV's), two-dimensionally freely mobile laboratory models of autonomous free-flying space robots such as might perform extravehicular functions associated with operation of a space station or repair of orbiting satellites. The development of the SRSV and of some of the controller subsystems are discribed. The two-link arm was fitted to the SRSV base, and researchers explored the open-loop characteristics of the arm and thruster actuators. Work began on building the software foundation necessary for use of the on-board computer, as well as hardware and software for a local vision system for target identification and tracking. Author

N86-33017# Department of the Navy, Washington, D. C.
AUTOMATED ANTHROPOMETRIC DATA MEASUREMENT SYSTEM Patent Application
W. F. Moroney, J. C. Bartholomew, C. Cagle, and R. E. Hughes, inventors (to Navy) Filed 17 Oct. 1985 20 p
(AD-D012299; US-Patent-Appl-SN-788371) Avail: NTIS HC A02/MF A01 CSCL 06/14

An automated anthropometric data measurement system includes a standing measuring assembly and a seated measuring assembly to determine pertinent anthropometric features of aviators being screened for assignment to particularly suitable aircraft. Both assemblies have a plurality of position sensors and measuring probes which are selectively placed by an operator upon the aviator, each mesuring probe producing a digital data signal indicative of the particular feature measured when selective position sensors indicate body contact. The signals are then collected by a microcomputer which compares them to a predetermined population and outputs the compared data to magnetic storage media. GRA

N86-33018# Department of the Air Force, Washington, D.C.
NIGHT VISION COMPATIBLE ILLUMINATION FOR VEHICLE CREWMEMBER WORKSPACE Patent
Harry L. Task, inventor (to Air Force) Issued 1 Apr. 1986 8 p
Supersedes AD-D011636
(AD-D012339; US-Patent-4,580,196; US-Patent-Appl-SN-688944; US-Patent-Class-362-62) Avail: US Patent and Trademark Office CSCL 13/1

This patent discloses an arrangement for conveniently changing the illumination in an aircraft cockpit or other enclosure to a spectrum compatible with night vision infrared equipment including provision for easy return to the original illumination source. Selected light emitting diode elements are employed in multiple element arrays using a tether connected package that can be excited directly from existing wiring in fixtures. GRA

N86-33019# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
A COLLATION OF UNITED STATES AIR FORCE ANTHROPOMETRY
Kenneth W. Kennedy 14 Jan. 1986 92 p
(AD-A168485; AAMRL-TR-85-062) Avail: NTIS HC A05/MF A01 CSCL 06/14

Four major anthropometric surveys of United States Air Force personnel have been conducted since the end of World War II: that of male rated and non-rated flying personnel in 1950, of male recruits, enlisted and non-rated officers in 1965, of male rated officers and cadets in 1967, and of female officers and enlisted in 1968. Only two surveys have been adequately published: those of 1950 and 1968. For the purposes of this collation, four USAF subpopulations have been distinguished: (1) non-rated male officers and enlisted (2) rated male officers and cadets, (3) non-rated female officers and enlisted personnel, and (4) rated female officers and cadets. The latter is an artificial subset of women taken form the 1968 survey and who meet the Air Force body-size criteria for entry into Undergraduate Pilot Training and retention as a rated officer. Dimension titles and descriptions are listed alphabetically and cross referenced such that the user can be quickly directed to the desired or to related body size data. Summary statistics consists of the number of subjects measured, the Mean, Standard Deviation, and the 1st, 5th, 50th, 95th, and 99th percentile values for each dimension. GRA

N86-33020# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
THE DEVELOPMENT AND EVALUATION OF COLOR SYSTEMS FOR AIRBORNE APPLICATIONS: FUNDAMENTAL VISUAL, PERCEPTUAL AND DISPLAY SYSTEMS CONSIDERATIONS Final Report, Oct. 1984 - Feb. 1986
Robin M. Merrifield and Louis D. Silverstein Feb. 1986 333 p
(AD-A168563; NADC-86011-60) Avail: NTIS HC A15/MF A01 CSCL 05/8

The objectives of the study were to review the current philosophy and standards on the airborne applications of electronic color display systems, develop guidelines for specifying and measuring color CRT display performance parameters, conduct a survey of currently available color systems, review and evaluate existing system capabilities, and predict future trends and applications in color display systems and componentry. Partial Contents are: Analysis of the Current Philosophy and Standards on the Application of Color in Electronic Display Systems (Principal Factors Determining Color Display Effectiveness; Color Display Specification, Measurement, and Calibration Techniques; Impact of the Operational Lighting Environment on Color Display Requirements; Unresolved Issues and Future Color Display Research Requirements); Survey and Evaluation of Currently Available Color Display Systems (Technical Evaluation of Hardware Characteristics and Visual Parameters; Summary Recommendations; Prediction of Future Trends and Development in Color Display Technology). GRA

N86-33021# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF OXYGEN FLOW ON PASSENGER FACE MASK PERFORMANCE Final Report, Jan. 1984 - May 1985
Ronald D. Holden, M. S. Haswell, and Estrella M. Forster Apr. 1986 23 p
(AD-A168832; USAFSAM-TR-85-102) Avail: NTIS HC A02/MF A01 CSCL 06/11

The passenger emergency oxygen system presently used onboard USAF transort aircraft is a phase dilution continuous flow system, and is similar to that on commercial aircraft. The mask is certified for emergency use up to 40,000 ft, when provided with an oxygen flow in accord with military specifications (MIL-D-19326F). We have evaluated the effect on arterial hemoglobin saturation (SaO2), of reductions in oxygen flow (below those specified) to the emergency mask; the volunteer subjects were exposed to simulated altitudes of 40, 35, 30 and 25 thousand feet. At reduced oxygen flows to the emergency pasenger mask, SaO2, was: 68 + or - 2.8%, 92 + or - 3.5%, 98 + or - 1.2%, and 97 + or - 1.0%; at 40, 35, 30, and 25 thousand ft respectively. Although halving the oxygen flow to the mask at 25,000 ft and 30,000 ft resulted in acceptable levels of SaO2, reductions in flow--at 35,000 ft and, especially, at 40,000 ft--were not as well tolerated. at 40,000 ft and, to a lesser extent, 35,000 ft, inboard leakage of ambient air around the face and through the anti-suffocation valve seriously compromised SaO2, Because passengers suddenly exposed to a 40,000-ft cabin altitude would undoubtedly suffer from anxiety and would tend to hyperventilate, and because of limitations inherent in continuous flow oxygen systems, we recommend that oxygen flow to the passenger mask (as specified in MIL-D-19326F) be reduced with great caution. GRA

N86-33022# Naval Coastal Systems Center, Panama City, Fla.
ELEMENTARY DESIGN GUIDELINES FOR CO2 SCRUBBING WITH LiOH, TECHNICAL MANUAL
Daniel B. Post Dec. 1985 22 p
(AD-A168850; NCSC-TM-4110-2-85) Avail: NTIS HC A02/MF A01 CSCL 06/11

The removal of carbon dioxide from closed-cycle gaseous environments is essential to keeping people alive in an environment such as a submarine, a gas saturation habitat on the floor of the ocean, or a diver using closed-circuit UBAs. If the CO2 were not removed from these environments, its concentration would soon rise to toxic and lethal proportions. The removal of CO2 from these environments is commonly referred to as CO2 scrubbing and its purpose is to lower the CO2 concentrations to physiologically acceptable levels. This technical manual contains a brief outline of preliminary laboratory work leading up to NAVCOASTSYSCEN's investigation of LiOH for scrubbing CO2, theoretical considerations of the reaction of CO2 with LiOH, a description of the procedure and apparatus used to collect the LiOH-CO2 scrubber data, elementary design equations to predict canister efficiency, an example problem using results presented earlier in the manual, and practical considerations concerning the theoretical design of CO2 scrubbers. GRA

N86-33023# Lawrence Livermore National Lab., Calif.
HUMAN FACTORS REVIEW PLAN
B. Paramore, ed. and L. R. Peterson, ed. Dec. 1985 261 p
Prepared in cooperation with Essex Corp., Alexandria, Va.
(Contract W-7405-eng-48)
(DE86-010561; UCRL-15688) Avail: NTIS HC A12/MF A01

Human Factors is concerned with the incorporation of human user considerations into a system in order to maximize human reliability and reduce errors. This review plan is intended to assist in the assessment of human factors conditions in existing DOE facilities. In addition to specifying assessment methodologies, the plan describes techniques for improving conditions which are found to not adequately support reliable human performance. The following topics are addressed: (1) selection of areas for review describes techniques for needs assessment to assist in selecting and prioritizing areas for review; (2) human factors engineering review is concerned with optimizing the interfaces between people and equipment and people and their work environment; (3) procedures review evaluates completeness and accuracy of procedures, as well as their usability and management; (4) organizational interface review is concerned with communication and coordination between all levels of an organization; and (5) training review evaluates training program criteria such as those involving: trainee selection, qualification of training staff, content and conduct of training, requalification training, and program management. DOE

N86-33024# National Aerospace Lab., Amsterdam (Netherlands). Space Div.
CONTROL LOOPS WITH HUMAN OPERATORS IN SPACE OPERATIONS. PART 2: ROBOTICS OPERATIONS AND MANUAL CONTROL EXPERIMENT Final Report
C. M. vanSwieten and Sytze Kampen Paris ESA 5 Sep. 1985 140 p Prepared in cooperation with Royal Netherlands Aircraft Factories Fokker, Amsterdam
(Contract ESA-5594/83)
(NLR-TR-84116-L-Pt-2; Fok-TR-R-84-CHO-131-Pt-2; ESA-CR(P)-2190-Pt-2; ETN-86-97788-Pt-2) Avail: NTIS HC A07/MF A01

Servicing of satellites and assembly of space structures via robotic operations controlled from the ground by human operators are discussed. Five operational modes for the combined space and ground segment are defined: high level manipulation; manual augmented; preprogrammed; single joint (emergency mode); and direct drive (emergency mode). The main difficulty in the manual modes is the presence of time delay in the control loop and the way the operator can cope with it. Human operator performance was assessed for the direct drive mode, in which the system provides the least support. A simple model for this mode shows essentially nonlinear actuator behavior, which makes results from the literature not applicable. Therefore experiments were done. The experiments show that the operator can control the system, but a lot of overshooting responses are observed. Possibly, these overshoots can be eliminated by different instructions to the operator, who was instructed in the experiments to be as fast as possible. ESA

55 PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

N86-33025*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF THERMAL EXPANSION ON THE STABILITY OF TWO-REACTANT FLAMES
T. L. Jackson Aug. 1986 14 p
(Contract NAS1-18107)
(NASA-CR-178168; ICASE-86-56; NAS 1.26:178168) Avail: NTIS HC A02/MF A01 CSCL 12A

The full problem of flame stability for the two-reactant model, which takes into account thermal expansion effects for all disturbance wave lengths, is examined. It is found that the stability problem for the class of two-reactant flames is equivalent to the stability problem for the class of one-reactant flames with an appropriate interpretation of Lewis numbers. Author

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N86-33026 Royal Signals and Radar Establishment, Malvern (England).
PERQFLEX FIRMWARE
I. F. Currie, J. M. Foster, and P. W. Edwards Dec. 1985 42 p
(RSRE-85015; BR98725; ETN-86-97999) Avail: Issuing Activity

The instruction set and firmware architecture of the Flex computer as implemented on the ICL Perq workstation are described. Data in Flex; program in Flex; procedures; exceptions; storage allocation; interrupts; external capabilities; Flex instruction set; and formats of data, blocks, and exceptions are covered. ESA

N86-33027 Royal Signals and Radar Establishment, Malvern (England).
HARDWARE PROOFS USING LCF-LSM AND ELLA
W. J. Cullyer and C. H. Pygott Sep. 1985 47 p
(RSRE-Memo-3832; BR99176; ETN-86-98002) Avail: Issuing Activity

A method for writing the formal specification for a digital system, a high level design which satisfies this requirement, and a gate level realization, using the languages LCF-LSM and ELLA is described. It is shown how to carry out mathematical proofs to establish that the high level design respects the specification and the gate level design agrees precisely with the high level design. A chain of correspondence proof is created from specification to the ultimate realization, as required during the development of safety critical and security critical hardware. The methods were used to develop formal proofs for the VIPER 32 bit microprocessor. ESA

N86-33028 Royal Signals and Radar Establishment, Malvern (England).
REUSUABLE SOFTWARE
L. N. Simcox and R. G. Ball 1985 60 p Sponsored by UK Civil Aviation Authority
(RSRE-Memo-3884; BR99098; ETN-86-98005) Avail: Issuing Activity

The issues involved in reusing software in a general context and in a research environment are examined. In the general context, the characteristics of reusable software are discussed and the views of the potential developer and those seeking to reuse existing software are considered. Reuseable software is assessed using the concept of the life cycle model, the economic aspects being based on the COCOMO parametric software cost model. Recommendations for procuring, developing, and researching software are made. ESA

N86-33029*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ANALYZING THE SECURITY OF AN EXISTING COMPUTER SYSTEM
Matt Bishop May 1986 20 p
(Contract NAS2-11530)
(NASA-TM-89205; RIACS-TR-86.13; NAS 1.15:89205) Avail: NTIS HC A02/MF A01 CSCL 09B

Most work concerning secure computer systems has dealt with the design, verification, and implementation of provably secure computer systems, or has explored ways of making existing computer systems more secure. The problem of locating security holes in existing systems has received considerably less attention; methods generally rely on thought experiments as a critical step in the procedure. The difficulty is that such experiments require that a large amount of information be available in a format that makes correlating the details of various programs straightforward. This paper describes a method of providing such a basis for the thought experiment by writing a special manual for parts of the operating system, system programs, and library subroutines. Author

N86-33030*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A VIEW OF KANERVA'S SPARSE DISTRIBUTED MEMORY
Peter J. Denning 4 Jun. 1986 16 p
(Contract NCC2-387)
(NASA-TM-89206; RIACS-TR-86.14; NAS 1.15:89206) Avail: NTIS HC A02/MF A01 CSCL 09B

Pentti Kanerva is working on a new class of computers, which are called pattern computers. Pattern computers may close the gap between capabilities of biological organisms to recognize and act on patterns (visual, auditory, tactile, or olfactory) and capabilities of modern computers. Combinations of numeric, symbolic, and pattern computers may one day be capable of sustaining robots. The overview of the requirements for a pattern computer, a summary of Kanerva's Sparse Distributed Memory (SDM), and examples of tasks this computer can be expected to perform well are given. Author

N86-33031*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NOTES ON IMPLEMENTATION OF SPARSELY DISTRIBUTED MEMORY
James D. Keeler and Peter J. Denning 7 Aug. 1986 31 p
(Contract NCC2-387)
(NASA-TM-89254; RIACS-TR-86.15; NAS 1.15:89254) Avail: NTIS HC A03/MF A01 CSCL 09B

The Sparsely Distributed Memory (SDM) developed by Kanerva is an unconventional memory design with very interesting and desirable properties. The memory works in a manner that is closely related to modern theories of human memory. The SDM model is discussed in terms of its implementation in hardware. Two appendices discuss the unconventional approaches of the SDM: Appendix A treats a resistive circuit for fast, parallel address decoding; and Appendix B treats a systolic array for high throughput read and write operations. Author

N86-33032*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRST 3 YEARS OF OPERATION OF RIACS (RESEARCH INSTITUTE FOR ADVANCED COMPUTER SCIENCE) (1983-1985) Final Report
Peter J. Denning 15 Apr. 1986 8 p
(Contracts NCC2-387; NAS2-11530)
(NASA-CR-179699; RIACS-TR-86.11; NAS 1.26:179699) Avail: NTIS HC A02/MF A01 CSCL 09B

The focus of the Research Institute for Advanced Computer Science (RIACS) is to explore matches between advanced computing architectures and the processes of scientific research. An architecture evaluation of the MIT static dataflow machine, specification of a graphical language for expressing distributed computations, and specification of an expert system for aiding in grid generation for two-dimensional flow problems was initiated. Research projects for 1984 and 1985 are summarized. B.G.

N86-33033# Softech, Inc., Fairborn, Ohio.
Ada (TRADE NAME) COMPILER VALIDATION SUMMARY REPORT: DDC Ada COMPILER SYSTEM VERSION 3.1 FOR DEC VAX-11/785 Final Report
27 Dec. 1985 48 p
(Contract F33600-84-D-0280)
(AD-A166817; Rept-3285-2-15.2) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this Validation Summary Report is to present the results and conclusions of performing standardized tests on the Dansk Datamatik Center (DDC) International Ada Compiler System. On-site testing was performed 23 to 27 Sep. 1985 at DDC International in Copenhagen, Denmark under the auspices of the Ada Validation Facility (AVF), according to the Ada Validation Office policies and procedures. The DDC Ada Compiler (Version 3.1) is hosted on the DEC VAX-11/785 operating under VMS 4.1. The suite of tests known as the Ada Compiler Validation Capability (ACVC), Version 1.6, was used. The ACVC suite of tests is used to validate conformance of the compiler to ANSI/MIL-STD-1815A (Ada). Not all tests in the ACVC test suite are applicable to a specific implementation. Also, known test errors in Version 1.6 are present in some tests; these tests were withdrawn. The purpose of the testing is to ensure that the compiler properly implements legal language constructs and that it identifies, rejects from processing, and labels illegal language constructs. The testing also identifies implentation-dependent behavior permitted by the standard. Author (GRA)

N86-33034# Department of the Navy, Washington, D. C.
ADAPTIVE ASSOCIATIVE-PROCESSING OPTICAL COMPUTING ARCHITECTURES Patent Application
Arthur D. Fisher, inventor (to Navy) Filed 29 Jan. 1986 40 p
(AD-D012305; US-Patent-Appl-SN-823719) Avail: NTIS HC A03/MF A01 CSCL 09/2

This invention relates to optical associative parallel computing configurations. More specifically it relates to implementation of general associative processing modules which adapt in real time as they are exposed to associated information patterns, (u,v), so at a later time presentation of one pattern, u, results in recall of the other, v. GRA

N86-33035# Naval Postgraduate School, Monterey, Calif.
A LANGUAGE CAPABLE OF DESCRIBING COMPUTER ARCHITECTURE M.S. Thesis
Luis M. Machado Mar. 1986 110 p
(AD-A168553) Avail: NTIS HC A06/MF A01 CSCL 09/2

A fully automated and effective aid for computer system design is of great interest in increasing designers efficiency and reduce costs. Such a system, which requires unified and compatible tools for designing and analyzing computer architectures is still missing. Inserted in a research program by Professor Rigas to develop a complete automated design system, this thesis focuses on designing a formal language capable of describing the data flow of a computer. The language is capable of describing the interconnections between the major data flow components and the control of the flow of information. Using this language, several decompositions of the intended system can be specified and studied to find the optimal one. Author (GRA)

N86-33036# Los Alamos National Lab., N. Mex.
ETHERNET DATA-ACQUISITION AND CONTROL SYSTEM
E. P. Elkins 1985 7 p Presented at the US DECIS Symposium, Anaheim, Calif., 9 Dec. 1985
(Contract W-7405-eng-36)
(DE86-006018; LA-UR-86-180; CONF-851264-2) Avail: NTIS HC A02/MF A01

An ETHERNET data-acquisition and control system has been developed for use on the RSX operating system. This system supports supervisory control, closed-loop control, data monitoring, and data recording. An RSX driver has been written for the DEQNA ETHERNET controller for use with this system. DOE

N86-33037# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Informatique.
STUDY OF THE ARCHITECTURE OF A PARALLEL COMPUTER ADAPTED TO RAY CASTING 3-D DIMENSIONAL IMAGE SYNTHESIS Ph.D. Thesis [ETUDE DARCHITECTURE DE CALCULATEUR PARALLELE ADAPTEE A LA SYNTHESE DIMAGE 3D PAR LANCER DE RAYON]
Mohammed Quali Madani Jan. 1986 167 p In FRENCH
(ENST-86E003; ISSN-0751-1353; ETN-86-097636) Avail: NTIS HC A08/MF A01

A pixel calculator of multiprocessing type is specified. The computer system is defined by a multi-micro processing architecture with multiple pixel computers. A computing time of 1 to 10 min per image is accepted. Only computers of the CRAY-1 type can do the same within these time limits. A base microcomputer using the 32 bits NS-32032 microprocessor is described. A statistical analysis of the synthesis algorithm, a model implementation and a simulation of the system were carried out. It is shown that the proposed architecture is feasible. ESA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N86-33038 Amsterdam Univ. (Netherlands). Centrum voor Onderzoek van het Wetenschappelijk.

LEARNING TO PROGRAM METHODICALLY. PART 3: RENOVATION OF THE ELEMENTARY PROGRAMMING INSTRUCTION 1984-1986 [METHODISH LEREN PROGRAMMEREN. 3: DE VERNIEUWING VAN HET ELEMENTAIRE PROGRAMMEERONDERWIJS 1984-86]
Dick Tromp Feb. 1986 50 p In DUTCH; ENGLISH summary
(FVI-86-04-Pt-3; B8664358-Pt-3; ETN-86-97748-Pt-3) Copyright. Avail: Issuing Activity

The notion of the explicit procedural metaknowledge, necessary to solve programming problems, combined with the knowledge of a programming language, is taken as a starting point to consider issues including educational objectives, existing courses, the domain concerned, and the functions of problem-solving instruction. ESA

N86-33039 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
A SURVEY OF RESTRICTIONS IN PASCAL IMPLEMENTATIONS
R. S. Smith and B. A. Wichmann Apr. 1986 20 p
(NPL-DITC-72/86; ISSN-0262-5369; ETN-86-97985) Copyright. Avail: Issuing Activity

Thirty-seven implementations of the Pascal programming language and their restrictions considered for inclusion in an ISO standard are listed. ESA

N86-33040 Center for Mathematics and Computer Science, Amsterdam (Netherlands).
ANALYTIC SPACES AND DYNAMIC PROGRAMMING: A MEASURE-THEORETIC APPROACH, REVISION Ph.D. Thesis - Technische Hogeschool, Eindhoven, Netherlands
J. G. F. Thiemann 1985 108 p
(CWI-Tract-14; B8561791; ISBN-90-6196-285-4; ETN-86-97749) Avail: Issuing Activity

Measure theory (universal measurability and Souslin operation) for analytic spaces which can be used in dynamic programming is presented. A decision model for analytic measurable spaces is defined. The fact that there exists a uniformly optimal strategy over analytic measurable spaces is proved. ESA

N86-33041 Royal Signals and Radar Establishment, Malvern (England).
A GUIDE TO SID FOR USERS OF THE FLEX COMPUTER
S. J. Goodenough, P. D. Taylor, and G. D. Whitaker Nov. 1985 35 p
(RSRE-Memo-3768; BR99097; ETN-86-98000) Avail: Issuing Activity

A utility known as SID available on the Flex computer, which accepts a syntax with embedded actions, transforms it, and produces an Algol 68 RS module (suitable for any RS system) that contains an analyzer procedure is described. This analyzer checks whether an input conforms to the given syntax and, while doing so, initiates calls to the embedded actions which take the form of user-defined procedures that operate on stacks managed by the analyzer. By combining the analyzer module with other user-defined modules to form a complete program, syntax-directed utilities such as compilers, interpreters and translators may be constructed; SID was written using itself. ESA

N86-33042# National Aeronautical Lab., Bangalore (India). Systems Engineering Div.
SIX DEGREE OF FREEDOM SIMULATION SOFTWARE
K. S. Govindaraj, J. K. Sridhar, Padma Madhuranath, and B. S. Bhagawan Jul. 1986 37 p
(NAL-PD-SE-8614) Avail: NTIS HC A03/MF A01

The methodology for realizing a general six degree of freedom aircraft simulation on UNIVAC was documented by taking CESSNA 172 as an example. The software package was designed, developed, and validated by making the program trim the aircraft for a flight condition and then exciting the longitudinal and lateral modes. The results compare well with those reported in literature. The software structure is designed to simulate any known aircraft and enables modular addition of complex flight control systems, turbulence and landing gear dynamics. Author

N86-33043*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering.
SUPERCOMPUTER IMPLEMENTATION OF FINITE ELEMENT ALGORITHMS FOR HIGH SPEED COMPRESSIBLE FLOWS Progress Report, period ending 30 Jun. 1986
Earl A. Thornton and R. Ramakrishnan Jun. 1986 170 p (Grant NsG-1321)
(NASA-CR-177065; NAS 1.26:177065) Avail: NTIS HC A08/MF A01 CSCL 09B

Prediction of compressible flow phenomena using the finite element method is of recent origin and considerable interest. Two shock capturing finite element formulations for high speed compressible flows are described. A Taylor-Galerkin formulation uses a Taylor series expansion in time coupled with a Galerkin weighted residual statement. The Taylor-Galerkin algorithms use explicit artificial dissipation, and the performance of three dissipation models are compared. A Petrov-Galerkin algorithm has as its basis the concepts of streamline upwinding. Vectorization strategies are developed to implement the finite element formulations on the NASA Langley VPS-32. The vectorization scheme results in finite element programs that use vectors of length of the order of the number of nodes or elements. The use of the vectorization procedure speeds up processing rates by over two orders of magnitude. The Taylor-Galerkin and Petrov-Galerkin algorithms are evaluated for 2D inviscid flows on criteria such as solution accuracy, shock resolution, computational speed and storage requirements. The convergence rates for both algorithms are enhanced by local time-stepping schemes. Extension of the vectorization procedure for predicting 2D viscous and 3D inviscid flows are demonstrated. Conclusions are drawn regarding the applicability of the finite element procedures for realistic problems that require hundreds of thousands of nodes. Author

N86-33044# Department of the Army, Washington, D. C.
A LINEAR ALGORITHM FOR NON-LINEAR INTERPOLATION FOR COMPUTER AIDED DESIGNS Patent Application
Stuart H. Rubin, inventor (to Army) Filed 4 Apr. 1986 14 p
(AD-D012271; US-Patent-Appl-SN-848416) Avail: NTIS HC A02/MF A01 CSCL 09/2

This invention (patent application) relates to computer aided intelligence design and, more particularly, to an artificial intelligence program for use wherever very fast, interpolating learning algorithms are required. The linear algorithm of the present invention is a deterministic algorithm, which permits a user to store any MP2D run, and retrieve any of the run's statistics, inclusive of run time. When written in Fortran, it is such a learning base which permits a user to predict such statistics in 0 (N) time – i.e., linear time, along with a measurement of reliability, and for any or all of the maximum 961 runs permitted with the MP2D computer. Although, in a preferred embodiment of the invention, a cell counter interface to the MP2D input was employed of a 0 (N**2) process, in operation this would still be considered as a O (N) process with but little loss in performance if some 3,000 cells were exceeded – and, for the reason that any standby on a computer just to count cells does not establish any substantial problem as it takes many orders of magnitude more time to establish the existing MP2D input form (and, since the cell count is only performed once, never for the re-run modifications). As will be seen from the description that follows, the linear algorithm of the invention will be seen to operate utilizing three of the basic statistics from the MP2D input base – namely, (1) the number of cells; (2) the number of basic wires required; and (3) the estimated placement complexity. GRA

N86-33045# Maryland Univ., College Park. Dept. of Computer Science.
PARALLEL LOGIC PROGRAMMING AND ZMOB AND PARALLEL SYSTEMS SOFTWARE AND HARDWARE Final Report,

10 Oct. 1984 - 11 Jan. 1985
Jack Minker and Mark Weiser 30 Dec. 1985 12 p
(Grant AF-AFOSR-0303-82)
(AD-A168127; AFOSR-86-0220TR) Avail: NTIS HC A02/MF A01
CSCL 09/2

The initial version of PRISM uses a simulation of the ZMOB hardware, and has been fully tested and debugged. In addition, several enhancements were made to PRISM to permit experimental analyses to be made, and to incorporate additional features to take full advantage of parallelism in a problem solving environment. Tracing and a statistical gathering package were added to permit experimental analysis. An AND-parallelism capability was added to achieve a second version of the PRISM system, and other features were added to the system to more fully exploit parallelism. Preliminary application and evaluation studies were performed. In the area of systems hardware and software, the ZMOB processor is now fully functional and in everyday use with 128 processors. Work is continuing on an experimental upgrade of some of ZMOB's processors to 68000s. Basic system software for multiprocessing on ZMOB is becoming more robust and performance studies now pinpoint areas for improvement. Studies of parallel software debugging continue to prove the value of multiple program views, and in particular the dicing approach was verified in a controlled experiment. We have also constructed an interactive visual slicer. Studies of the automatic parallelization of programs continues. We can now slice/splice arbitrarily structured programs and have techniques that significantly reduce information overhead between the slices and the splicer. Author (GRA)

N86-33046# LSS Consulting, Saratoga, Calif.
ESTIMATION AND CONTROL OF SPARSE DYNAMIC SYSTEMS
M. I. Hodzic and D. D. Siljak Jun. 1985 137 p
(Contract W-7405-eng-48)
(DE86-008135; UCRL-15768-Pt-2) Avail: NTIS HC A07/MF A01

In this report, a piece-by-piece scheme is proposed for a hierarchical LQG design of estimators and controllers for sparse large-scale systems. Advantage is taken of the special lower-block triangular structure of the system matrices resulting from the application of a graph-theoretic decomposition algorithm. We consider any number of subsystems in the hierarchy, and build the overall system estimator and controller as a union of locally optimal, subsystem estimators and controllers. Due to the hierarchical structure of the decomposed system, the overall closed-loop system is stable and suboptimal. DOE

N86-33047# Los Alamos National Lab., N. Mex.
MODULAR, AUTOMATED SOFTWARE TESTING ENVIRONMENT
G. Cort and R. O. Nelson 1986 10 p Presented at the Softool Users' Group Meeting, Culver City, Calif., 14 Apr. 1986
(Contract W-7405-eng-36)
(DE86-008743; LA-UR-86-964; CONF-8604151-1) Avail: NTIS HC A02/MF A01

A software development methodology has been developed with Softool's Change and Configuration Control (CCC) environment. Fundamental to this approach is the exclusion of all development activities from the CCC data base. The contents of the CCC data base are restricted to software which has passed appropriate reviews. Development activities are performed in the host operating system account of various programmers. A set of CCC macros and VUS command files support this methodology, thereby allowing the configuration manager to transfer files between the development and configuration management environments. DOE

N86-33048# Lawrence Livermore National Lab., Calif.
USER SYSTEMS GUIDELINES FOR SOFTWARE PROJECTS
L. Abrahamson, ed. 1 Apr. 1986 157 p
(Contract W-7405-eng-48)
(DE86-010490; UCID-20643) Avail: NTIS HC A08/MF A01

This manual presents guidelines for software standards which were developed so that software project development teams and management involved in approving the software could have a generalized view of all phases in the software production procedure and the steps involved in completing each phase. Guidelines are presented for six phases of software development: project definition, building a user interface, designing software, writing code, testing code, and preparing software documentation. The discussions for each phase include examples illustrating the recommended guidelines. DOE

N86-33049# Lawrence Livermore National Lab., Calif.
COMPUTER SCIENCE RESEARCH. COMPUTATION AND INFORMATION SERVICES DIRECTORATE
J. R. McGraw, ed. and P. T. VanDyke, ed. 1985 58 p
(Contract W-7405-eng-48)
(DE86-010492; UCID-20664) Avail: NTIS HC A04/MF A01

Research activities in computer science and numerical analysis carried out within the Computation and Information Services Directorate of Lawrence Livermore National Laboratory are highlighted. A technical introduction to current areas of study is given, and recent progress is reported. Current research features a heavy emphasis on multiprocessing, which plays a major role in nearly every proposed new supercomputer system. In addition to multiprocessing, strong efforts continue in some of the more traditional areas of computer science, particularly numerical methods. Specific content of the report includes chapters on numerical algorithms, software interfaces, architectures and networks, future directions, project funding, and project contacts. DOE

N86-33050# Stanford Univ., Calif. Systems Optimization Lab.
SOME THEORETICAL PROPERTIES OF AN AUGMENTED LAGRANGIAN MERIT FUNCTION
P. E. Gill, W. Murray, M. A. Saunders, and M. H. Wright Apr. 1986 26 p
(Contract DE-AS03-76ER-72018)
(DE86-011330; SOL-86-6) Avail: NTIS HC A03/MF A01

Sequential quadratic programming (SQP) methods for nonlinearly constrained optimization typically use a merit function to enforce convergence from an arbitrary starting point. We define a smooth augmented Lagrangian merit function in which the Lagrange multiplier estimate is treated as a separate variable, and inequality constraints are handled by means of non-negative slack variables that included in the linesearch. Global convergence is proved of an SQP algorithm that uses the merit function. It is also proved that steps of unity are accepted in a neighborhood of the solution when this merit function is used in a suitable superlinearly convergent algorithm. Finally, a selection of numerical results is presented to illustrate the performance of the associated SQP method. DOE

N86-33051# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
SOFTWARE RELIABILITY MODELS ON TRIAL: SELECTION, IMPROVED ESTIMATION AND PRACTICAL RESULTS
G. Moek Sep. 1984 43 p Presented at ESA/ESTEC Software Engineering Seminar, Noordwijk, Netherlands, 11-14 Oct. 1983 Submitted for publication
(Contract NIVR-1909)
(NLR-MP-83059-U; B8665119; ETN-86-97663) Avail: NTIS HC A03/MF A01

Four software reliability models were selected for application to software failure data obtained in practice. Unknown model parameters were estimated by the maximum likelihood method. Criteria on the data that have to be satisfied in order that bounded estimates for the model parameters exist are presented. A simple averaging approach to combine the results of the individual models into one reliability estimate is proposed. Estimation results at failure times as well as between failure times were obtained for two software projects. The results, although based on the same number of data, are different for the two projects. The background of the poor performance for one of the projects is analyzed. ESA

N86-33052# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
CONCEPT OF AN APPLICATION-INDEPENDENT SYSTEM FOR COMPUTER AIDED ORDER PROCESSING
J. T. vandenHoven and H. F. Weesing 1 Feb. 1985 21 p In DUTCH; ENGLISH summary Presented at 1st National Conference on Computer Applications in Production and Engineering CAPE '85, Amsterdam, Netherlands 1-3 May 1985
(NLR-MP-85009-U; B8664047; ETN-86-97668) Avail: NTIS HC A02/MF A01

A system that enables the user to define the information sets required in the processing of an order for aircraft transport is described. Order processing can be divided into different steps. Decisions to be taken in each step need information which may differ in structure and content. The steps are not necessarily carried out at the same location. The required information sets can be used in an operational environment without any programming effort. The system is implemented in a network of seven minicomputers. A distributed data base management system takes care of the automatic distribution of changes in the data to all related data bases in the network. Special measures were taken to prevent unauthorized use of the data, and to guarantee that all displayed information is kept up to date if changes occur. ESA

N86-33053# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
SIMULATION AND OPTIMIZATION TECHNIQUES IN COMPUTER AIDED DESIGN
R. F. vandenDam 22 Feb. 1985 50 p In DUTCH; ENGLISH summary
(NLR-MP-85022-U; B8665120; ETN-86-97670) Avail: NTIS HC A03/MF A01

The place and the potential of numerical simulation and optimization techniques in engineering design processes, as well as their use by the designer are discussed. The principles underlying these techniques are outlined and the various methods are reviewed. Examples of applications are presented in order to illustrate their usefulnes in design processes. Attention was paid to the integration of these techniques into structured systems for computer aided design, and to the implementation of these systems in the organization infrastructure. ESA

N86-33054# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
AN INFRASTRUCTURE FOR INFORMATION PROCESSING FOR COMPUTER AIDED DESIGN
W. Loeve May 1985 24 p In DUTCH; ENGLISH summary Presented at Colloquium Toepassingsgerichte Informatica, Leiden, Netherlands, 24 Apr. 1985
(NLR-MP-85038-U; B8664046; ETN-86-97677) Avail: NTIS HC A02/MF A01

An infrastructure for computer aided design in industry is described. A central engineering data base management system was introduced for information safeguarding and as a means for information exchange between different processes applied to information. Technical and organizational aspects are discussed. The infrastructure has to be developed stepwise. For economic reasons software must be reusable during the development process of the infrastructure. ESA

N86-33055# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
USER MANUAL FOR THE SIMULATION PACKAGE THE/ES [HANDLEIDING VOOR HET GEBRUIK VAN HET SIMULATIEPAKKET]
G. L. J. M. Janssen Oct. 1984 48 p In DUTCH
(ETN-86-97696) Avail: NTIS HC A03/MF A01

A user manual for CAD of VLSI circuits is presented. ESA

N86-33056# Groningen Rijksuniversiteit (Netherlands). Computing Science Section.
A DERIVATION OF A DISTRIBUTED IMPLEMENTATION OF WARSHALL'S ALGORITHM
Jan L. A. vandeSnepscheut 1985 10 p
(CS-8505; ETN-86-97739) Avail: NTIS HC A02/MF A01

A distributed implementation of an algorithm for computing the transitive closure of a binary relation is derived. The boolean matrix is distributed over a network of cells. Execution of one phase of the algorithm is made possible by routing the matrix elements involved through the network. The proof obligation to avoid multiple messages on a connection leads to the timing of successive phases. The resulting program is very similar to, although an order of magnitude shorter than, the cellular automaton described in Scoy (1980) and very different from the systolic array described in Guidas et al (1979). ESA

N86-33057# Groningen Rijksuniversiteit (Netherlands). Computer Science Section.
NONDETERMINISM IN DATA TYPES, A MATHEMATICAL APPROACH
Wim H. Hesselink Sep. 1985 40 p
(CS-8506; ETN-86-97740) Avail: NTIS HC A03/MF A01

The theory of abstract data types is generalized to the case of nondeterministic operations (set-valued functions). Since the nondeterminism of operations may be coupled, signatures are extended so that operations can have results in cartesian products. Input-output behavior is used to characterize implementation of one model by another. It is described by accumulated arrows, which form a variation of the term algebra. Morphisms of nondeterministic models are introduced. Both innovations prove to be powerful tools in the analysis of input-output behavior. Extraction equivalence and observable equivalence of values are investigated. Quotient models for equivalence relations are constructed. The equivalence relations are compared with each other, with separation of values, and with the separation property that characterizes a terminal model. Examples show that the four concepts are different. In deterministic models the concepts coincide. ESA

N86-33058# Amsterdam Univ. (Netherlands). Dept. of Computer Science.
TERM REWRITING SYSTEMS WITH PRIORITIES
J. C. M. Baeten, J. A. Bergstra, and J. W. Klop Feb. 1986 22 p Submitted for publication Sponsored by European Economic Commission
(FVI-86-03; V8664357; ETN-86-97747) Avail: NTIS HC A02/MF A01

A term rewriting system with priorities, called a priority rewrite system (PRS) is treated. The effect of such a priority assignment to rules, without imposing further restrictions such as choosing a certain reduction strategy in combination with rule priorities is studied. In the executability of the specification given by a PRS, this is a drawback: a PRS alone is not be an executable specification. It is problematic whether a pure PRS has a well-defined semantics at all (i.e., does determine an actual rewrite relation). A priority rewrite system is well-defined when there is a unique sound and complete rewrite set associated with it. It is shown that bounded PRS's are always well-defined. A stabilization lemma, which gives a different way of showing well-definedness, and a confluency result for left-linear PRS's are proved. ESA

N86-33059# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
DENOTATIONAL SEMANTICS OF NETS WITH NONDETERMINISM
J. N. Kok Jan. 1986 15 p Submitted for publication
(Grant ZWO-125-20-04)
(CWI-CS-R8605; B8664604; ETN-86-97755) Avail: NTIS HC A02/MF A01

A topological framework for streams of traces, in which Kahn's method generalizes to nets with bounded nondeterminism is defined. Fixpoints of multivalued functions are considered. A standard fixed point theorem can be used to model feedback loops, as can iteration. A general syntax of nets is used to analyze them in the stream framework. It is shown how to avoid the Brock-Ackerman and Keller anomalies. The fair merge, which is a continuous function in the framework, and delay along lines are

modeled. A lemma which says that the order in which nodes are connected does not matter is proved. For nodes with unbounded nondeterminism, fixpoints can be employed without losing the iteration theorem in the topological framework. ESA

N86-33060# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Computer Science/Department of Software Technology.
FAILURE SEMANTICS WITH FAIR ABSTRACTION
J. A. Bergstra, J. W. Klop, and E.-R. Olderog Jan. 1986 72 p Submitted for publication Sponsored by European Economic Commission
(CWI-CS-R8609; B8664608; ETN-86-97759) Avail: NTIS HC A04/MF A01

Countably branching processes subject to alternative composition, sequential composition, and abstraction are considered. Axiom systems are given for such processes which contain deadlock, empty process, silent move, and delay. Axiomatizing divergence via delay in the context of bisimulation semantics and failure semantics is emphasized. A process model which is intermediate between bisimulation semantics with fair abstraction and failure semantics with catastrophic divergence is found. ESA

N86-33061# Centre National d'Etudes Spatiales, Toulouse (France).
ANALYSIS OF A DATA COMPRESSION FOR SPACECRAFT OBSERVATION
J. C. Berges and M. Orlando 4 Apr. 1984 24 p In FRENCH; ENGLISH summary
(CNES-CT/DTI/MS/MN/088; ETN-86-97646) Avail: NTIS HC A02/MF A01

A method to reduce the data to be processed to determine a satellite orbit is presented. The goal is to be able to use a minicomputer with a sequential estimating algorithm (Kalman filters). Several cases of data weighting and consecutive data spacing are considered. Simplified equations are discussed. A general description of the compression algorithm is presented. It is shown that the procedure efficiency increases when the data presents either uniform weighting functions or equal spacing. ESA

N86-33062# Societe Nationale Industrielle Aerospatiale, Cannes (France). Computer Science Dept.
A LINEAR TIME IMPLEMENTATION OF FRONTAL INCREASE MINIMIZATION (FIM) STRATEGY ALGORITHMS FOR THE PROFILE REDUCTION OF SPARSE MATRICES
L. Marro 1986 49 p
(SNIAS-861-440-107; ETN-86-97615) Avail: NTIS HC A03/MF A01

An improved implementation of Frontal Increase Minimization strategy is described. The aim is to reduce computer time utilization, which is a major drawback of this type of algorithm. An insight into the numbering process and best appropriate data structures is found. It is shown that the time complexity of this implementation is linear with respect to the number of nonzero elements for all algorithms of this type. Numerical results highlight the improvement and the efficiency of the method for small problems. ESA

N86-33063# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
FAST TRANSVERSAL RECURSIVE IDENTIFICATION ALGORITHMS AND METHODS TO MODEL THE ASSOCIATED COMPLEX PULSE REPONSE. APPLICATION TO VOICE SIGNALS Ph.D. Thesis [ALGORITHMES TRANSVERSAUX RAPIDES D'IDENTIFICATION RECURSIVE ET METHODES DE MODELISATION DES REPONSES IMPULSIONNELLES COMPLEXES ASSOCIEES. APPLICATION AU SIGNAL DE PAROLE]
Philippe Fabre Jan. 1986 257 p In FRENCH Sponsored by Ministere de la Recherche et de la Technologie, et l'Association pour le Developpement de l'Enseignement des Communications
(ENST-86E002; ISSN-0751-1353; ETN-86-97869) Avail: NTIS HC A12/MF A01

Fast transversal algorithms are studied, presenting their fundamental equations and pointing out the importance of the pseudo-likelihood parameter. The properties of the normalized algorithm are detailed. A method to stabilize the algorithm against long-term divergence is presented. For voice signal applications, a recursive method to compute the autoregressive model by a fast recursive algorithm is outlined. The implementation of the multi-impulse classical method is studied by a deconvolution method. ESA

62 COMPUTER SYSTEMS

Includes computer networks.

N86-33064 National Physical Lab., Teddington (England). Div. of Information Technology and Computing.
SURVEY OF KEY MANAGEMENT FOR DATA ENCIPHERMENT
W. L. Price Mar. 1986 19 p
(NPL-DITC-70/86; ISSN-0262-5369; ETN-86-97984) Copyright. Avail: Issuing Activity

The secure generation of encipherment keys for symmetric and public key ciphers, transport of keys to user locations, protection of installed keys, and destruction of expired keys are discussed. The role of a central key server is considered. Key management in Open Systems Interconnection and in point-of-sale applications is discussed. ESA

N86-33065# Notre Dame Univ., Ind. Dept. of Electrical Engineering.
ANALYTICAL MODELS FOR PARALLEL PROCESSING SYSTEMS
H. Ammar, Y. F. Huang, and R. Liu May 1986 168 p
(Contract N00014-84-K-0482)
(AD-A168678; EE-TR-861) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report proposes to use generalized stochastic Petri nets (GSPN) in reliability, maintainability, and availability studies. The novelty of this modeling approach lies on the ground of the following distinctive reasons: (1) The GSPN offers a precise description of system activities and conditions while involves less complexity, comparing to other modeling techniques. Specifically, it is an inherently effective bookkeeping for conditions and activities; (2) it provides a clairvoyant insight of the key parameters that effect RMA analysis. Causes and results of events can be easily tracked by executing the GSPN; and (3) it takes the advantage of the existence of concurrency and timing of events, thus describes accurately the sequence of events. GRA

N86-33066# Sandia National Labs., Albuquerque, N. Mex.
SET OF FORTRAN ROUTINES FOR MULTITASK TIMING ANALYSIS ON SHARED MEMORY MACHINES
G. R. Montry 31 Mar. 1986 43 p
(Contract DE-AC04-76DP-00789)
(DE86-010310; SAND-86-0037) Avail: NTIS HC A03/MF A01

A set of FORTRAN-based timing routines has been written for shared memory parallel processors. These routines are designed to measure the performance of multitasking codes on machines with different hardware configurations. Complete run-time histories of all executing tasks are provided in a postmortem summary. The package is able to provide both processing time and elapsed time statistics for each task subject to functional hardware constraints. Source code for the ELXSI 6400 version of the package is included in an Appendix. DOE

N86-33067# Argonne National Lab., Ill.
FORMAL VERIFICATION OF PROPERTIES OF DIGITAL SYSTEMS USING AN AUTOMATED REASONING SYSTEM
J. Kljaich, A. S. Wojcik, and B. T. Smith 1986 15 p Presented at the Design Automation Conference, Las Vegas, Nev., 29 Jun. 1986 Prepared in cooperation with Michigan State Univ., East Lansing
(Contract W-31-109-eng-38)
(DE86-005552; CONF-860678-1) Avail: NTIS HC A02/MF A01

This paper describes a part of an ongoing research project

whose goal is to develop a formal design verification system based on the use of ITP, an LMA (Logic Machine Architecture) based Interactive Theorem Prover developed at Argonne National Laboratory. Specifically, a Petri net representation for systems is described together with the ITP implementation of a rule-based system for the manipulation of system descriptions. To illustrate the representation and the capabilities of the system under development, the Draper Laboratories Fault-Tolerant Processor is used as an example. Results concerning the formal verification of the fault-tolerant properties of this system are described. DOE

N86-33068# Oak Ridge National Lab., Tenn.
APPROACH TO THE NAVY'S SHIPBOARD NONTACTICAL ADP PROGRAM (SNAP) DATA COMMUNICATIONS NEEDS
C. E. Hammons and C. R. Stewart May 1986 25 p
(Contract DE-AC05-84OR-21400)
(DE86-011340; ORNL-6269) Avail: NTIS HC A02/MF A01

The ARPANET/MILNET Defense Data Network (DDN) communications link with the Shipboard Nontactical ADP Program (SNAP) computers is a research project being conducted by ORNL in support of the Navy's nontactical computing efforts. The purpose of the project is to investigate the feasibility of application of state-of-the-art (SOA) data communications techniques to the SNAP systems as deployed on board Navy ships. (Two systems have been approved - the Honeywell DPS6 family of processors known as SNAP-I and the Harris 300 series systems known as SNAP-II.) The installation of high-speed electronic computer networking capabilities has traditionally had a synergistic effect on the processing of data because operations that were previously not feasible due to data transfer logistics have become feasible. The most desirable situation would be one in which the computer networking speed and flexibility rivaled that of local computer operations. While networking of this caliber has not yet been achieved in a practical way, the advances that have been made more than offset the effort required to bring this desirable capability to SNAP. DOE

N86-33069# Oak Ridge National Lab., Tenn.
ROSES: AN EFFICIENT SCHEDULER FOR PRECEDENCE - CONSTRAINED TASKS ON CONCURRENT MULTIPROCESSORS
J. Barhen and E. C. Halbert 1985 26 p Presented at the Conference on Hypercube Microprocessors, Knoxville, Tenn., 1 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-011083; CONF-8508173-2) Avail: NTIS HC A03/MF A01

One of the first steps in attempting to solve a problem on a concurrent computation ensemble is its decomposition into a set of tasks (or processes). Problem decomposition often induces precedence constraints among the tasks, which the distributed nature of the computational system translates into message passing requirements. The efficient scheduling of sets of tasks among which complex interrelationships (such as precedence constraints) may exist is essential for achieving optimal performance from the new generation of concurrent supercomputers. This paper focuses on the ROSES system, which is being developed to schedule precedence-constrained tasks for computation by an ensemble of concurrent processors. This endeavor is particularly difficult when the number of tasks required exceeds the number of available processors, or when the interconnection topology of the task graph differs from the interconnection topology of the computation ensemble. The ROSES approach seeks near-optimal solutions by combining heuristic techniques to minimize scheduling time as a function of the number and relationship of tasks, with sophisticated data structures to most efficiently utilize available computer memory, and algorithms to control search and eliminate dead ends. The methodology is applied to the solution of the inverse dynamics equations of a robot manipulator and benchmark results are included. DOE

N86-33070# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
EXPERIMENTS WITH PARALLEL ALGORITHMS FOR COMBINATORIAL PROBLEMS
G. A. P. Kindervater and H. W. J. M. Trienekens Nov. 1985 22 p Submitted for publication
(CWI-OS-R8512; B8664681; ETN-86-97761) Avail: NTIS HC A02/MF A01

Results concerning the solution of knapsack, shortest paths, and change-making problems by branch and bound, dynamic programming, and divide and conquer algorithms on the ICL-DAP SIMD computer, Manchester dataflow machine, and the CDC-CYBER 205, a pipeline computer, are presented. Results show that the ICL-DAP and CDC-CYBER-205 are very well suited for performing regular and relatively simple computations in a fast way, due to their SIMD-type parallelism. They are inefficient if the behavior of the algorithm is irregular or cannot be predicted in advance. The problems solvable on the Manchester dataflow machine are still very small. However, the computational results indicate that this machine captures all sorts of parallelism. ESA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N86-33071*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WILL MACHINES EVER THINK
Peter J. Denning 16 May 1986 15 p Submitted for publication
(Contract NCC2-387)
(NASA-TM-89244; RIACS-TR-86.12; NAS 1.15:89244) Avail: NTIS HC A02/MF A01 CSCL 09B

Artificial Intelligence research has come under fire for failing to fulfill its promises. A growing number of AI researchers are reexamining the bases of AI research and are challenging the assumption that intelligent behavior can be fully explained as manipulation of symbols by algorithms. Three recent books -- Mind over Machine (H. Dreyfus and S. Dreyfus), Understanding Computers and Cognition (T. Winograd and F. Flores), and Brains, Behavior, and Robots (J. Albus) -- explore alternatives and open the door to new architectures that may be able to learn skills. Author

N86-33072# Scientific Systems, Inc., Cambridge, Mass.
BASIC RESEARCH ON ADAPTIVE MODEL ALGORITHMIC CONTROL Final Report, Feb. 1982 - Jun. 1985
Wallace E. Larimore and Shahjahan Mahmood Dec. 1985 206 p
(Contract F33615-82-C-3600)
(AD-A168016; AFWAL-TR-85-3113) Avail: NTIS HC A10/MF A01 CSCL 12/1

The Model Algorithmic Control (MAC) method is investigated in terms of robustness and adaption to unknown or changing plants. The adaption method used is Canonical Variate Analysis (CVA) system identification. CVA is shown to provide system identification accuracy comparable to maximum likelihood and to provide an optimal selection of instrumental variables. Computationally CVA is a noniterative procedure that gives a numerically and statistically well conditioned solution to the system identification problem. A one-step-ahead MAC is explained using the classical root locus techniques. Conditions are developed for robustness of the controller to perturbations in the plant due to error in plant identification. Selection of an optimal sampling rate is based upon the control-ability and observability matrices. Simulations illustrating the above theory are presented using a Multi-Input Multi-Output (MIMO) missile aerodynamic model. GRA

N86-33073# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
AN ARCHITECTURE FOR SENSOR FUSION IN A MOBILE ROBOT Interim Report
Steven A. Shafer, Anthony Stentz, and Charles E. Thorpe Apr.

1986 28 p
(Contract DACA76-85-C-0003; ARPA Order 5351)
(AD-A168075; CMU-RI-TR-86-9) Avail: NTIS HC A03/MF A01 CSCL 09/2

This paper describes sensor fusion in the context of an autonomous mobile robot, the NAVLAB system, based on a commercial truck with computer controls and studded with cameras and other sensors. This paper describes the software architecture of the NAVLAB, consisting of two parts; a whiteboard system called CODGER that is similar to a blackboard but supports parallelism in the knowledge source modules, and an organized collection of perceptual and navigational modules tied together by the CODGER database/communication system. The NAVLAB vehicle is a commercial truck modified by adding sensors, electronic controls, and on-board computers and power generators. It will be completely self-contained, requiring neither a cable tethering it to an off-board mainframe computer, nor an electronic telecommunications tether. Telecommunications gear is present for data recording and tele-operation, but is not required for computer control of the vehicle. The control systems of the vehicle include computer control of a hydraulic drive/braking system computer control of the steering wheel, and processors to monitor and control engine functions. A global system clock and a processor maintain a primitive vehicle position estimate based on dead reckoning. An inertial navigation system is also on-board. GRA

N86-33074# System Development Corp., Paoli, Pa.
INTEGRATING SYNTAX, SEMANTICS AND DISCOURSE DARPA NATURAL LANGUAGE UNDERSTANDING PROGRAM Quarterly Research and Development Report, 1 Feb.
Lynette Hirschman 15 May 1986 70 p
(Contract N00014-85-C-0012; ARPA Order 5262)
(AD-A168341) Avail: NTIS HC A04/MF A01 CSCL 05/7

The use of focusing in the PUNDIT text processing system is described. Focusing provides a powerful tool for pronoun resolution. However, its range of application is actually much more general, in that it can be used for several problems in reference resolution. Specifically, in the PUNDIT system, focusing is used for one-anaphora, elided noun phrases, and certain types of definite and indefinite noun phrases, in addition to its use for pronouns. Another important feature in the PUNDIT reference resolution system is that the focusing algorithm is based on syntactic constituents, rather than on thematic roles. This feature is based on considerations arising from the extension of focusing to cover one-anaphora. These considerations make syntactic focusing a more accurate predictor of the interpretation of one-anaphora noun phrases without decreasing the accuracy for definite pronouns. GRA

N86-33075# SRI International Corp., Menlo Park, Calif.
DEVELOPMENT SYSTEM FOR FLEXIBLE ASSEMBLY SYSTEM Annual Report, 1 Feb. 1984 - 31 Jan. 1985
Randall C. Smith Feb. 1986 70 p
(Contract F49620-84-K-0007)
(AD-A168499; AFOSR-86-0329TR) Avail: NTIS HC A04/MF A01 CSCL 13/9

We have developed theoretical methods for improving the ability of a computer to estimate spatial relationships among objects when the relationships are uncertain; we have developed a very fast method for determining collisions between a robot and its environment in simulation, suitable for hardware implementation; we are developing a method for estimating the location of a workpiece in a manipulator's hand, by measuring forces and torques on the hand as it moves the object; and we are developing an interactive-graphic, off-line robot workcell programming, modeling, and simulation system, called WORKMATE. WORKMATE has been used to generate a demonstration pick and place task incorporating vision, executed in our laboratory workcell. This document includes the following papers: (1) On the Representation and Estimation of Spatial Uncertainty; (2) Fast Robot Collision Detection using Graphics Hardware. GRA

N86-33076# Idaho National Engineering Lab., Idaho Falls.
COMMENTS ON ACHIEVABLE EIGENVECTORS
J. Griffith 1986 14 p Presented at the American Control Conference, Seattle, Wash., 18 Jun. 1986
(Contract DE-AC07-76ID-01570)
(DE86-003228; EGG-M-26585; CONF-860638-1) Avail: NTIS HC A02/MF A01

Eigenstructure control concepts work well if the feedback designer possesses a deep understanding of the physical system to be controlled. With other systems the designer may have some difficulty in selecting appropriate desired eigenvectors. Physical system characteristics may place constraints on the achievable eigenvectors which are not obvious to the control system designer; these constraints can complicate the design process. However, achievable eigenvectors must lie within the column space of an easily computed matrix. It is found that examining the singular value decomposition of this matrix helps one understand a physical system and appreciate what can be accomplished with feedback control. An example problem illustrates the idea and shows that the decomposition may broaden the range of control systems which are easily designed with the eigenstructure approach. DOE

N86-33077# Argonne National Lab., Ill.
PATHS TO HIGH-PERFORMANCE AUTOMATED THEOREM PROVING
R. Butler, E. Lusk, W. McCune, and R. Overbeek Apr. 1986 12 p
(Contract W-31-109-eng-38)
(DE86-011003; ANL/MCS-TM-71) Avail: NTIS HC A02/MF A01

Four components of a strategy for the implementation of high-performance automated theorem proving systems are presented. These are: (1) clause compilation, (2) multiprocessing, (3) database indexing, and (4) clause-set compaction. Each of these techniques are described and it is shown how they can be integrated into a coherent system with significantly higher performance than traditional systems. The strategy described has been implemented, and results are presented showing the effects of these techniques on Sam's Lemma, a relatively difficult theorem-proving problem. DOE

N86-33078# Technische Hogeschool, Eindhoven (Netherlands). Vakgroep Meten en Regelen.
DEVELOPMENT OF A SELF-TUNING ALGORITHM FOR A DISCRETE ADAPTIVE RPM CONTROL [ONTWIKKELING VAN EEN SELF-TUNING ALGORITHME VOOR EEN DISCRETE ADAPTIEVE TOERENTAL-REGELING]
A. P. A. M. Sprangers May 1984 98 p In DUTCH; ENGLISH summary
(ETN-86-97534) Avail: NTIS HC A05/MF A01

A self-tuning algorithm for adaptive motor speed control was developed. The process under control, a thyristor controlled direct current motor with variable shaft load, is described. An encoder interface circuit to transpose the encoder pulses into a (9 bits) parallel speed sample, a clock circuit which sends at the sample moments an interrupt pulse to the processor, and a circuit to display the number of revolutions (rpm) of the motorshaft, were designed and tested. The algorithm was written in real time Micropower/Pascal and implemented on a Falcon single board SBC/11/21 computer. Tests were done with various setpoints and changing motor shaft loads. Results show that the algorithm is easily implemented and good adaptive control can be realized. ESA

N86-33079# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.
ON THE NECESSITY OF IDENTIFYING THE TRUE PARAMETER IN ADAPTIVE LINEAR QUADRATIC (LQ) CONTROL
J. W. Polderman Jan. 1986 8 p Submitted for publication
(CWI-OS-R8602; B8664685; ETN-86-97764) Avail: NTIS HC A02/MF A01

The fact that in linear quadratic control identification takes place in closed loop which makes it hard or even impossible to identify the real system is considered. The real system is assumed

to be deterministic, linear, time invariant, of known dimensions. The state is assumed to be observed. The control objective is the minimization of a quadratic cost functional. It is shown that among those parameters which correspond to the true optimal control law, the true one is the only one that can be identified in closed loop. Therefore dropping the requirement of identifying the true system does not simplify the control problem. ESA

N86-33080# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Regelung.
PARTIAL DISTURBANCE DECOUPLING WITH CONSTANT STATE FEEDBACK: APPLICATION TO THE REGULATOR PROBLEM
Reinhold Steinhauser Jan. 1986 40 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-09; ISSN-0171-1342; ETN-86-97819) Avail: NTIS HC A03/MF A01; DFVLR Cologne, West Germany DM 14.50

The geometrical approach to control theory is demonstrated for the simple disturbance decoupling problem. From the known conditions for the solution of the disturbance decoupling problem (without and with internal stability) necessary and sufficient conditions for the solution of problems of partial disturbance decoupling are deduced. It is shown that the regulator problem can be simplified if partial disturbance decoupling is possible. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N86-33081# National Aeronautical Lab., Bangalore (India). Structures Div.
FIELD-CONSISTENCY: TOWARD A SCIENCE OF CONSTRAINED MULTI-STRAIN-FIELD FINITE ELEMENT FORMULATIONS
G. Prathap Feb. 1986 62 p
(NAL-TM-ST-8602) Avail: NTIS HC A04/MF A01

The finite element method has progressed rapidly from simple engineering principles through rigorous mathematical formalizations to become a body of engineering knowledge incorporating well defined conceptual schemes and operational procedures. However, it still lacks the self-criticality needed for a falsifiable scientific basis. In this paper, we describe an additional conceptual scheme called field-consistency, and demonstrate new methodology and terminology that helps to clear up an area of the finite element method that had remained difficult to understand for some time, and which enhances the predictive capabilities of error analyses of the method. This paper is also in a limited sense, an essay on how the processes of the method of Science are seen to work in this area of engineering know-how. Author

N86-33082# National Aeronautical Lab., Bangalore (India). Fluid Mechanics Div.
ESTIMATION AND IMPROVEMENT OF ERROR IN DIFFERENCE SCHEMES WITH ALGEBRAIC TRANSFORMATION
M. D. Deshpande and T. K. Sen Gupta May 1986 23 p
(NAL-TM-FM-8601) Avail: NTIS HC A02/MF A01

From an analysis of the truncation errors of finite difference schemes when a coordinate transformation is made conditions are derived to retain the order of accuracy. If the computational domain is segmented into subdomains, problems of accuracy may specially arise at the subdomain boundaries where the derivatives of transformation function are discontinuous. The conditions derived are on the continuity of higher order derivatives of the transformation function. Correction factors are developed to retain the second order accuracy and/or to minimise the truncation errors of certain central difference schemes when such conditions on transformation function are not met. Elimination of the need to satisfy these conditions greatly improves the flexibility on the choice of transformation functions. The effectiveness of the corrections is evaluated through a test case of numerical solution of Laplace equation on a square domain. Author

N86-33083# Loughborough Univ. of Technology (England). Dept. of Mathematics.
SOLUTION OF NON-LINEAR FREDHOLME INTEGRAL EQUATIONS BY A VARIATIONAL APPROACH
G. A. Evans, R. C. Forbes, and J. Hyslop Dec. 1985 15 p
(LUT-MR-186) Avail: NTIS HC A02/MF A01

A method for the numerical solution of nonlinear Fredholme integral equations based on a suitable variational principle is considered. The relation between the suggested method and existing methods is investigated in terms of the variational principle, and a measure of the convergence rate is obtained. All inner products were computed by Clenshaw Curtis quadrature except in the case of singular integrals where the transformation methods of Evans, Forbes, and Hyslop are used. The method was tested on a number of examples including a particularly difficult one due to Cohen. The method demonstrates robustness without loss of speed compared with previous techniques. Author

N86-33084# Loughborough Univ. of Technology (England).
A SIMPLE CONDITION FOR COMPOSITE SYSTEM PROPERNESS
A. C. Pugh and A. Kafai Jun. 1986 17 p
(LUT-MR-192) Avail: NTIS HC A02/MF A01

A simple sufficient condition for a general composite system to be proper is derived. Although apparently highly conservative it produces surprisingly good results with two commonly considered composite systems. Author

N86-33085# Loughborough Univ. of Technology (England). Dept. of Mathematics.
ON TRANSFORMATIONS OF MATRIX PENCILS AND IMPLICATIONS IN LINEAR SYSTEMS THEORY
A. C. Pugh, G. E. Hayton (Hull Univ. (England).), and P. Fretwell Feb. 1986 37 p
(LUT-MR-188) Avail: NTIS HC A03/MF A01

A new transformation of matrix pencils is proposed and its theory formally developed. Its restriction to generalized state space system matrix pencils is shown to be an appropriate generalization of the usual state space transformation and to represent a closed form expression in system matrix terms of Verghese's concept of strong equivalence of such pencils. Author

N86-33086*# Mississippi State Univ., Mississippi State. Dept. of Aerospace Engineering.
IMPLICIT MULTIGRID ALGORITHMS FOR THE THREE-DIMENSIONAL FLUX SPLIT EULER EQUATIONS Ph.D. Thesis
William Kyle Anderson Aug. 1986 98 p
(NASA-CR-179742; NAS 1.26:179742) Avail: NTIS HC A05/MF A01 CSCL 12A

The full approximation scheme multigrid method is applied to several implicit flux-split algorithms for solving the three-dimensional Euler equations in a body fitted coordinate system. Each uses a variation of approximate factorization and is implemented in a finite volume formulation. The algorithms are all vectorizable with little or no scalar computations required. The flux vectors are split into upwind components using both the splittings of Steger-Warming and Van Leer. Results comparing pressure distributions with experimental data using both splitting types are shown. The stability and smoothing rate of each of the schemes are examined using a Fourier analysis of the complete system of equations. Results are presented for three-dimensional subsonic, transonic, and supersonic flows which demonstrate substantially improved convergence rates with the multigrid algorithm. The influence of using both a V-cycle and a W-cycle on the convergence is examined. Using the multigrid method on both subsonic and transonic wing calculations, the final lift coefficient is obtained to within 0.1 percent of its final value in a few as 15 cycles for a mesh with over 210,000 points. A spectral radius of 0.89 is achieved for both subsonic and transonic flow over the ONERA M6 wing while a spectral radius of 0.83 is obtained for supersonic flow

over an analytically defined forebody. Results compared with experiment for all cases show good agreement. Author

N86-33087*# Texas A&M Univ., College Station. Dept. of Mathematics.
PROCEEDINGS OF THE THIRD ANNUAL SYMPOSIUM ON MATHEMATICAL PATTERN RECOGNITION AND IMAGE ANALYSIS Final Report, 16 Jul. 1984 - 15 Jul. 1985
L. F. Guseman, Jr. 15 Jul. 1985 535 p Symposium held in College Station, Tex., 10-11 Jun. 1985
(Contract NAS9-16664)
(NASA-CR-171925; NAS 1.26:171925) Avail: NTIS HC A23/MF A01 CSCL 12A

Topics addressed include: multivariate spline method; normal mixture analysis applied to remote sensing; image data analysis; classifications in spatially correlated environments; probability density functions; graphical nonparametric methods; subpixel registration analysis; hypothesis integration in image understanding systems; rectification of satellite scanner imagery; spatial variation in remotely sensed images; smooth multidimensional interpolation; and optimal frequency domain textural edge detection filters. B.G.

N86-33088# Wisconsin Univ., Madison.
ON THE EXISTENCE OF PERIODIC SOLUTIONS FOR A CLASS OF SYMMETRIC HAMILTONIAN SYSTEMS Technical Summary Report
Paul H. Rabinowitz Jan. 1986 25 p
(Contract DAAG29-80-C-0041; Grant NSF MCS-81-10556)
(AD-A167487; MRC-TSR-2901) Avail: NTIS HC A02/MF A01 CSCL 12/1

Hamiltonian systems are used to model the motion of discrete mechanical systems. This paper establishes the existence of periodic solutions for a class of such systems. The method developed to prove existence should be useful for other such problems. GRA

N86-33089# Wisconsin Univ., Madison. Mathematics Research Center.
THE POLYNOMIALS IN THE LINEAR SPAN OF INTEGER TRANSLATES OF A COMPACTLY SUPPORTED FUNCTION Summary Report
Carl DeBoor Apr. 1986 16 p
(Contract DAAG29-80-C-0041)
(AD-A167530; MRC-TSR-2930) Avail: NTIS HC A02/MF A01 CSCL 12/1

The linear span of integer translates of a fixed compactly supported function phi provides a particularly simple model of an approximating family of the finite element type. The approximating power of such a span (or, more precisely, of its scaled versions) has been known for some time to be characterizable in terms of the space pi phi of polynomials it contains. Recent work on box splines has provided concrete examples of interest in a multivariate settings and so rekindled interest in the space pi phi. The report derives and extends specific information about pi phi contained in recent work by Dahmen and Micchelli, and by Chui, Diamond, Jetter, Lai and Ward, but does so without reference to specific properties (such as piecewise polynomiality, or factorizablity of the Fourier transform) of phi. Understanding, in the simplest possible and most efficient terms, of the approximation power of such spaces may provide the necessary insight into approximation by smooth piecewise polynomials on regular, and perhaps even not so regular, partitions. GRA

N86-33090# Vista Research Corp., Tucson, Ariz.
IMPROVED ALGORITHMS FOR ESTIMATION, PREDICTION AND CONTROL Final Report
J. G. Caldwell 26 Jan. 1986 152 p
(Contract N00014-85-C-0814)
(AD-A167601) Avail: NTIS HC A08/MF A01 CSCL 09/2

This report describes the results of a study to examine the feasibility of developing fast algorithms for estimation, prediction and control. The objective of the study was to assess the likelihood of finding procedures which could be faster, in terms of computer running time, than the classifcal least-squares method of parameter estimation, used extensively to develop models of stochastic phenomena. While the least-squares method has proved its worth in over a century of use, it has some serious drawbacks, stemming from the fact that it requires the inversion of matrices. For large problems such as the problem of tracking many missiles or processing data from multiple intelligence sensors in real-time, the computational burden of the least-squares method can overwhelm even today's powerful computing systems. Previous attempts to solve this problem have centered on the development of faster computers (e.g., array processors), the improvement of algorithm for matrix inversion, or the simplification of the model to produce a matrix that is easier to invert. In general, these approaches have not been successful in solving the problem. Modern sensor exploitation systems, for example, still cannot operate in real-time or even near real-time. GRA

N86-33091# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ESTIMATING WEIGHTS IN HETEROSCEDASTIC REGRESSION MODELS BY APPLYING LEAST SQUARES TO SQUARED OR ABSOLUTE RESIDUALS Technical Report, Aug. 1985 - Aug. 1986
Raymond J. Carroll, Marie Davidian, and David Ruppert Oct. 1985 40 p
(Contract F49620-82-C-0009)
(AD-A168487; MIMEO-SER-1584; AFOSR-86-0318TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document considers a nonlinear regression model for which the variances depend on a parametric function of known variables. The authors focus on estimating the variance function, after what it is typical to estimate the mean function by weighted least squares. Most often, squared residuals from an unweighted least squares fit are compared to their expectations and used to estimate the variance function. If properly weighted such methods are asymptotically equivalent to normal-theory maximum likelihood. Instead, one could use the deviations of the absolute residuals from their expectations. Constructed is such an estimator of the variance function based on absolute residuals whose asymptotic efficiency relative to maximum likelihood is precisely the same for symmetric errors as the asymptotic efficiency in the one-sample problem of the mean absolute deviation relative to the sample variance. The estimators are computable using nonlinear least squares software. The results hold with minimal distributional assumptions. Author (GRA)

N86-33092# Indiana Univ., Bloomington. Dept. of Computer Science.
PROBABILISTIC ANALYSIS OF ALGORITHMS FOR NP-COMPLETE PROBLEMS Final Annual Scientific Report, 30 Sep. 1984 - 29 Sep. 1985
John Franco 12 Dec. 1985 8 p
(Grant AF-AFOSR-0372-84)
(AD-A168617; AFOSR-86-0310TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The goal of this research is to develop and analyze algorithms which can, in some practical sense, solve certain NP-complete problems efficiently. By solve we mean determine whether a solution to a given instance of an NP-complete problem exists where, for the problems we have considered, a solution is an assignment of values to a list of variables which cause some predicate to be true. We do not consider actually finding solutions when they exist since doing so adds unnecessary complexity to the statement of the algorithms: the algorithms we consider can all be modified to find solutions without significantly altering performance. NP-complete problems are found in Crytology, Operations Research, Artificial Intelligence, Computer System Design and many other areas. There is no known algorithm for an NP-complete problem which runs in time bounded by a polynomial on the length of the input (polynomial time) in the worst case nor is one likely to be found. We seek algorithms which solve nearly every instance of specific NP-complete problems in polynomial time. GRA

N86-33093# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
AN ERROR DETECTION AND SMOOTHING ALGORITHM FOR INFRARED DATA
R. A. Steinberg and M. J. McHugh Apr. 1986 47 p
(Contract N00024-85-C-5301)
(AD-A168628; JHU/APL/TG-1355) Avail: NTIS HC A03/MF A01 CSCL 17/5

A new algorithm for error detection and smoothing, EDS, has been developed for infrared image data. Numerical validation indicates that EDS detects more than 99% of all significant errors. Operating in the time domain, EDS exploits smoothness criteria calculated from laboratory point source measurements, and isolates error bursts via a region-growing approach. EDS is applicable to data from any optical scanner whose output is sampled digitally multiple times per dwell. Author (GRA)

N86-33094# Oak Ridge National Lab., Tenn.
ALGORITHMS FOR BAYESIAN VARIABLE SELECTION IN REGRESSION
T. J. Mitchell and J. J. Beauchamp 1986 5 p Presented at the 18th Symposium on the Interface of Computer Science and Statistics, Fort Collins, Colo., 20 Mar. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008884; CONF-8603103-1) Avail: NTIS HC A02/MF A01

We have developed a Bayesian approach to the problem of deciding which subset of a proposed set of k predictor variables to include in a linear regression model that is to be used for prediction. The direct implementation of this method requires the computation of the usual regression statistics for each of the 2/sup k/ possible submodels. We present here a branch-and-bound method which yields the same results much more quickly by eliminating from consideration those submodels which are destined to have negligible posterior probability. Implementation of the algorithm on the Cray X-MP supercomputer is discussed. DOE

N86-33095# Lawrence Livermore National Lab., Calif.
MODELING MULTIVARIATE COVARIANCE NONSTATIONARY TIME SERIES AND THEIR DEPENDENCY STRUCTURE
W. Gersch Aug. 1985 38 p
(Contract W-7405-eng-48)
(DE86-010052; UCID-20625) Avail: NTIS HC A03/MF A01

The parametric modeling of covariance nonstationary time series and the computation of their changing interdependency structure from the fitted model are treated. The nonstationary time series are modeled by a multivariate time varying autoregressive (AR) model. The time evolution of the AR parameters is expressed as linear combinations of discrete Legendre orthogonal polynomial functions of time. The model is fitted by a Householder transformation-AIC order determination, regression subset selection method. The computation of the instantaneous dependence, feedback and causality structure of the time series from the fitted model, is discussed. An example of the modeling and determination of instantaneous causality in a human implanted electrode seizure event EEG is shown. DOE

N86-33096# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
ON GELFAND TRIPLES ORIGINATING FROM ALGEBRAS OF UNBOUNDED OPERATORS
S. J. L. vanEijndhoven and P. Kruszynski May 1984 93 p
(EUT-84-WSK-02; ISSN-0167-9708; ETN-86-97544) Avail: NTIS HC A05/MF A01

The locally convex topological vector space which contains a Hilbert space X which contains also a dense subspace S (Gelfand's triple) is considered. The existence of a Gelfand triple for a family of bounded Borel functions and a positive adjoint operator A in X is discussed. The fact that the family of bounded Borel functions and the analytic domain of the operator A are related with the locally connex topological GB*-algebras of unbounded operators, given the commutant and its bicommutant of closable operators, is proved. The inductive limit topology for S is given in terms of explicit seminorms. ESA

N86-33097# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computer Science.
ALGEBRAS OF EXTENDABLE UNBOUNDED OPERATORS
Pawel Kruszynski Dec. 1984 70 p
(EUT-84-WSK-04; ISSN-0167-9708; ETN-86-97545) Avail: NTIS HC A04/MF A01

The topological algebras of operators and the algebra of extendable maps are discussed. The fact that the generalized function theory appears by means of the existence of positive embedding (extendable maps) between two spaces (analytic space and trajectory space) with identical topological properties, is reported. The fact that over the space of all finite sequences of complex numbers the usual spectral theory of Hilbert spaces gives the same spectra of bounded normal operators as the spectral theory for extendable maps is proved. ESA

N86-33098# Technische Hogeschool, Eindhoven (Netherlands). Computing Center.
AN EXTREME-VALUE RESISTANT PROCEDURE FOR SINGULAR CLASSICAL VARIANCE ANALYSIS [EEN UITSCHIETER-RESISTENTE PROCEDURE VOOR ENKELVOUDIGE KLASSIEK VARIANTIE-ANALYSE]
Jan Hontelez Oct. 1984 23 p In DUTCH
(THE-RC-62627; Rept-21; ETN-86-97702) Avail: NTIS HC A02/MF A01

The robustness of a procedure for singular classical variance analysis was investigated. The simulation test performed to study the behavior of the method is presented. It is shown that the method is reliable for 10% or less extreme value cases in a population; it is not important how large the deviations are. ESA

N86-33099# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Computer Science.
READIES AND FAILURES IN THE ALGEBRA OF COMMUNICATING PROCESSES
J. A. Bergstra, J. W. Klop, and E.-R. Olderog Sep. 1985 41 p Submitted for publication Sponsored by European Economic Commission
(CWI-CS-R8523; B8664599; ETN-86-97750) Avail: NTIS HC A03/MF A01

Readiness and failure semantics are studied in the setting of algebra of communicating processes (ACP). A model of process graphs modulo readiness and failure equivalence is constructed, and an equational axiom system which is complete for this graph model is presented. An explicit representation of the graph model is given: the failure model, whose elements are failure sets. A characterization of failure equivalence is obtained as the maximal congruence which is consistent with trace semantics. By restricting the communication format in ACP, this result is shown to carry over to Milner's CCS and Hoare's CSP. It is shown that failure semantics is incompatible with Koomen's fair abstraction rule, a proof principle based on the notion of bisimulation. ESA

N86-33100# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Computer Science/Dept. of Algorithmics and Architecture.
FIXED POINT EQUATIONS WITH PARAMETERS IN THE PROJECTIVE MODEL
E. Kranakis Jan. 1986 27 p Submitted for publication Sponsored by European Economic Commission
(CWI-CS-R8606; B8664605; ETN-86-97756) Avail: NTIS HC A03/MF A01

Existence and uniqueness theorems for solving infinite and finite systems of fixed point equations with parameters in the projective model are given. The three main methods discussed depend on the topological properties of the projective model and include: compactness argument, density argument, and Banach's contraction principle. As a converse to the uniqueness theorem it is shown that in certain signatures guarded equations are the only ones that have unique fixed points. ESA

N86-33101# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Computer Science/Dept. of Algorithms

and Architect.

APPROXIMATING THE PROJECTIVE MODEL

E. Kranakis Jan. 1986 19 p Submitted for publication Sponsored by European Economic Commission

(CWI-CS-R8607; B8664606; ETN-86-97757) Avail: NTIS HC A02/MF A01

An approximation principle for the projective model which makes it possible to prove assertions in this model by proving them in an infinite sequence of finite process algebras is given. A model for process algebras is defined and its relationship to the projective model is studied. ESA

N86-33102# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.

A QUEUEING MODEL OF FINITE AND INFINITE SOURCE INTERACTION

O. J. Boxma Oct. 1985 14 p Submitted for publication

(CWI-OS-R8511; B8664682; ETN-86-97760) Avail: NTIS HC A02/MF A01

An M/M/1 service system which also serves one finite source is considered. The joint distribution of queue length at the M/M/1 queue and position of the finite source customer in the system is determined. This leads to exact expressions for performance measures; such expressions yield insight into the interaction of finite and infinite sources. ESA

N86-33103# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Operations Research and System Theory.

RECURSIVE PARAMETER ESTIMATION FOR COUNTING PROCESSES WITH LINEAR INTENSITY

P. J. C. Spreij Nov. 1985 26 p Submitted for publication

(CWI-OS-R8513; B8664683; ETN-86-97762) Avail: NTIS HC A03/MF A01

Recursively estimating a d-dimensional parameter that occurs in the intensity process of a counting process is considered. Two algorithms that generate recursive estimates are presented and their asymptotic behavior is analyzed. Almost sure convergence and the asymptotic distribution of the estimators are treated. The first is attacked by a stochastic Lyapunov technique; for the second central limit theorems for Martingales is used. Strong consistency and asymptotic normality of the estimators generated by the algorithms are proved. ESA

N86-33104# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.

ON A PROBLEM OF J. DE GRAAF CONNECTED WITH ALGEBRAS OF UNBOUNDED OPERATORS

N. G. deBruijn Apr. 1984 5 p

(Memo-84-02; ETN-86-97697) Avail: NTIS HC A02/MF A01

A negative answer is given to an open question of a paper of de Graaf (no reference) concerning algebras of unbounded operators. The fact that a series is convergent is proved. This series is the product of two positive coefficients when one coefficient is the exponential of a sequence and the other coefficient has a technical hypothesis. ESA

N86-33105# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.

THE MATRICES OF THE DIFFERENTIAL D/DX AND X(D/DX) WITH RESPECT TO ORTHONORMAL BASES OF JACOBI POLYNOMIALS

S. J. L. vanEijndhoven Jul. 1984 14 p

(Memo-84-05; ETN-86-97698) Avail: NTIS HC A02/MF A01

The normalized eigenvectors which are the normalized Jacobi's polynomials R, of the second order linear differential Jacobi's operator, positive and self-adjoint, acting over Hilbert Space X of square integrable functions, are considered. The differential operator D (derivative with respect to X) and L (x times D) acting over R, are discussed. Matrix entries of inner product of the action of L and D over R by the normalized eigenvectors R, are calculated. ESA

N86-33106# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.

SYMMETRICALLY POSITIVE MAPS

Pawel Kruszynski May 1984 13 p

(Memo-84-14; ETN-86-97699) Avail: NTIS HC A02/MF A01

The class of symmetrically linear positive maps of C*-algebras from the standpoint of the theory of non-extendible maps, is presented. The method used is inspired by Stinespring-Stormer's ideas. ESA

N86-33107# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.

AN ALTERNATIVE IMPLEMENTATION OF COMMUNICATION PRIMITIVES

Jan Tijmen Udding and Jan L. A. vandeSnepscheut 1985 13 p

(CS-8504; ETN-86-97738) Avail: NTIS HC A02/MF A01

The synchronous communication actions (communication primitives) and the probes (Boolean functions) are considered. An alternative implementation (restricted version) of communication primitives is presented. The fact that four directed wires for transmitting integer values are more efficient in time in the restricted version than in complete implementation is proved. The four-phase handshaking method is used. ESA

N86-33108# Rome Univ. (Italy). Dipt. di Fisica.

THE EVOLUTION PARTIAL DIFFERENTIAL EQUATION (PDE) U SUB T = U SUB XXX + 3 (U SUB XX U SQ + 3 U SUB X SQ U) + 3 U SUB X U TO THE 4TH POWER

F. Calogero 18 Nov. 1985 36 p

(Prepint-480; ETN-86-97915) Avail: NTIS HC A03/MF A01

It is shown that the evolution equation u sub t = u sub xxx + 3(u sub xx usq + 3 u sub x sq u) + 3 u sub x u to the 4th power, where u = u(x,t) is integrable. It can be (exactly) linearized by an appropriate change of (dependent) variable. Hence, several explicit solutions of this partial differential equation can be exhibited. They can display a remarkable solitronic phenomenology. ESA

N86-33109# Rome Univ. (Italy). Dipt. di Fisica.

ALGEBRAIC PROPERTIES OF THE THREE-STATE VECTOR POTTS MODEL

A. K. Kwasniowski 6 Dec. 1985 3 p

(Preprint-487; ETN-86-97921) Avail: NTIS HC A02/MF A01

The algebraic approach to Potts models is treated. The generalized hyperbolic functions are shown to be a structural ingredient of these models. ESA

N86-33110# Rome Univ. (Italy). Dipt. di Fisica.

AN EXAMPLE OF DELTA-PROBLEM ARISING IN A FINITE DIFFERENCE CONTEXT: DIRECT AND INVERSE PROBLEM FOR THE DISCRETE ANALOG OF THE EQUATION Psi + UPSILON Psi = SIGMA Psi SUB GAMMA

O. Ragnisco, P. M. Santini, S. Chitlaru Briggs, and M. J. Ablowitz 10 Dec. 1985 11 p

(Preprint-488; ETN-86-97922) Avail: NTIS HC A02/MF A01

The direct and inverse spectral problem for the discrete analog of the equation Psi sub xx + upsilon Psi = delta Psi gamma is solved in the framework of delta bar theory. The time evolution of the spectral data for the simplest nonlinear differential-difference equations associated to this linear problem is derived. ESA

N86-33111# Rome Univ. (Italy). Dipt. di Fisica.

NONLINEAR INTEGRAL EVOLUTION EQUATIONS ASSOCIATED WITH A RIEMANN-HILBERT SCATTERING PROBLEM. ASPECTS OF THE INITIAL VALUE PROBLEM FOR THE SINE-HILBERT CLASS

Paolo Maria Santini 18 Dec. 1985 16 p Presented at Seminaire de Mathematique Superieure on Systemes Dynamique non Lineaires: Integrabilite et Comportement Qualitatif, Montreal, Canada, 1985

(Preprint-491; ETN-86-97925) Avail: NTIS HC A02/MF A01

Results on a class of nonlinear evolution equations purely integral in space and solvable via the inverse scattering transform method are reviewed. The direct linearization for this class of

equations is obtained together with a multisoliton solution. Properties of the linear problem, a matrix homogeneous Riemann-Hilbert boundary value problem, are obtained and aspects of the associated scattering theory are presented. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N86-33112# Loughborough Univ. of Technology (England). Dept. of Mathematics.
VARIOUS ESTIMATES FOR A REGRESSION PARAMETER USING RANKS
A. N. Pettitt Apr. 1986 31 p
(LUT-MR-191) Avail: NTIS HC A03/MF A01

The estimation of a regression parameter is considered in a partially specified model where, after an unknown monotone increasing transformation, the response is normally distributed and related to an explanatory variable by a linear model. A Monte Carlo resampling technique due to Doksum and various modification of it are also considered. In addition a simple estimate based on a modification of Fisher and Yates' normal scores method and an estimate using the means of ranks are considered. The estimates are compared using simulation and data analysis. Author

N86-33113# North Carolina Univ., Chapel Hill. Dept. of Statistics.
A NOTE ON ADAPTING FOR HETEROSCEDASTICITY WHEN THE VARIANCES DEPEND ON THE MEAN
Raymond J. Carroll, David Ruppert, and Leonard A. Stefanski Oct. 1985 20 p
(Contract F49620-82-C-0009)
(AD-A168481; MMS-1583; AFOSR-86-0316TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document considers the normal-theory regression model when the error disturbances are heteroscedastic, i.e., have non-constant variances. The author distinguishes two cases: (1) predictor heteroscedasticity, where the variances depend on a function g of known quantities, and (2) mean heteroscedasticity, where the variances depend on a function g of the means. For the case where g is unknown, Carroll showed by construction that, in certain cases, it is possible to estimate the regression parameter asymptotically as well as if g were known and weighted least squares applied. This document reconsiders this problem from the information bound theory of Begun, Hall, Huang & Wellner. For mean heteroscedasticity, a rather surprising result is obtained. If g were known in this case, Jobson & Fuller showed that the maximum likelihood estimate is asymptotically more efficient than weighted least squares with known weights. When g is unknown the full Jobson & Fuller improvements are not possible; however, we show that one can, in theory, attain asymptotically better performance than weighted least squares with known weights. GRA

N86-33114# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
THOROUGH APPROACH TO MEASUREMENT UNCERTAINTY ANALYSIS APPLIED TO IMMERSED HEAT EXCHANGER TESTING
R. B. Farrington and C. V. Wells Apr. 1986 7 p Presented at the ASME Solar Energy Division Conference, Anaheim, Calif., 14 Apr. 1986
(Contract DE-AC02-83CH-10093)
(DE86-004445; SERI/TP-253-2862; CONF-860406-7) Avail: NTIS HC A02/MF A01

This paper discusses the value of an uncertainty analysis, discusses how to determine measurement uncertainty, and then details the sources of error in instrument calibration, data acquisition, and data reduction for a particular experiment. Methods are discussed to determine both the systematic (or bias) error in an experiment as well as to determine the random (or precision) error in the experiment. The detailed analysis is applied to two sets of conditions in measuring the effectiveness of an immersed coil heat exchanger. It shows the value of such analysis as well as an approach to reduce overall measurement uncertainty and to improve the experiment. This paper outlines how to perform an uncertainty analysis and then provides a detailed example of how to apply the methods discussed in the paper. The authors hope this paper will encourage researchers and others to become more concerned with their measurement processes and to report measurement uncertainty with all of their test results. DOE

N86-33115# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
METHODS FOR RISK DETERMINATION AND EVALUATION
G. Moek May 1984 69 p In DUTCH; ENGLISH summary Sponsored by Ministerie van Onderwijs en Wetenschappen
(NLR-MP-84019-U; B8661088; ETN-86-97664) Avail: NTIS HC A04/MF A01

Background information about the technical-scientific aspects of risk is presented. The concepts risk determination and risk evaluation are defined. The methods and techniques which play a role in the analysis of risks are surveyed. Problems occurring during such analyses are explained. Details and limitations of the different methods for risk determination and evaluation are discussed. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N86-33116# Stanford Linear Accelerator Center, Calif.
SUPERWORLDS/HYPERWORLDS
M. E. Peskin Mar. 1986 31 p Presented at the SLAC Summer Institute on Particle Physics, Stanford, Calif., 29 Jul. 1986
(Contract DE-AC03-76SF-00515)
(DE86-009780; SLAC-PUB-3909; CONF-860736-4) Avail: NTIS HC A03/MF A01

Some simple exercises are carried out which clarify the physics of a 5-dimensional world in which one dimension is curled up to a radius R. A technical problem necessary to generalize this discussion to d dimensions is considered - the determination of the sizes of spinors in higher dimensions. The origin of eigenmodes of a higher-dimensional field with exactly zero energy is explored, using as examples conventional models of field theory. General relativity is then reviewed, formulated as a gauge theory. The conditions for the appearance of zero modes in space-time geometries with compactified dimensions are discussed. The physics of these zero modes are illustrated in a series of examples ranging from the original construction of Kaluza and Klein to the superstring theory. DOE

N86-33117# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mathematics and Computing Science.
ON DISTRIBUTION SPACES BASED ON JACOBI POLYNOMIALS
S. J. L. vanEijndhoven and J. deGraaf Mar. 1984 140 p
(EUT-84-WSK-01; ISSN-0167-9708; ETN-86-97543) Avail: NTIS HC A07/MF A01

The linear differential operator of Jacobi of second order A positive and self-adjoint over the Hilbert space X of square

integrable functions is considered. The test spaces in which the Jacobi polynomials are a basis are presented. The fact that the test spaces can be characterized as classes of analytic functions with specific growth conditions is proved. The expansion of distribution in Jacobi polynomials and functions of the second kind are reported. The fact that groups of analytic functions are reported as (extendable) linear operators on the ultra-trajectory spaces is also proved. ESA

N86-33118# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands).
SIGMA MODELS ON QUATERNIONIC MANIFOLDS AND ANOMALIES
S. Aoyama (Wuppertal Univ. (West Germany).) and J. W. vanHolten Oct. 1985 12 p
(NIKHEF-H/85-11; ETN-86-97766) Avail: NTIS HC A02/MF A01

Sigma models on quaternionic manifolds are defined. Aspects of their geometry and quantization, particularly anomalies, are discussed. ESA

N86-33119# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.
MEASURE AND CATEGORY
Floris Takens 1985 15 p
(ZW-8506; B8572182; ETN-86-97742) Avail: NTIS HC A02/MF A01

Various notions of small sets (measure zero, full measure, Fubini property and mapping property) of the space of diffeomorphisms of class r, over Banach-manifolds to itself, are considered. The fact that there exists a set N (depending on a finite sequence) of functions k-continuous differentiables which is of first category (Lebesque sense) such that their generic map space has measure zero or full measure, provided dependence over finite sequence, is proved. This result is extended to manifolds with strong and weak topologies and is also extended to manifolds with Whitney topology which describes families of dynamical systems. The Fubini property does not generalize to the infinite dimensional case for null sets. ESA

N86-33120# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics and Computing Science.
QUASI-PERIODIC HOPF-BIFURCATIONS IN FORCED OSCILLATORS
H. W. Broer Jul. 1985 15 p Submitted for publication
(ZW-8507; B8574080; ETN-86-97743) Avail: NTIS HC A02/MF A01

The modified differential equation of Deffing-Van der Pol for nonlinear vibrations (Stoker's problem) is studied as an autonomous system or as a vector field over a certain phase-space (one forced oscillator over the product of n-dimensional real torus by the complex numbers system). The solution of the Stoker problem, provided a hypothesis of coefficients over forced oscillator is given, when the quasi-periodic Hopf-bifurcations are studied over Stoker's tori, is discussed. ESA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N86-33121*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
APPROXIMATIONS USEFUL FOR THE PREDICTION OF ELECTROSTATIC DISCHARGES FOR SIMPLE ELECTRODE GEOMETRIES
Larry Edmonds 15 Aug. 1986 88 p
(Contract NAS7-918)
(NASA-CR-179748; JPL-Pub-86-36; NAS 1.26:179748) Avail: NTIS HC A05/MF A01 CSCL 20C

The report provides approximations for estimating the capacitance and the ratio of electric field strength to potential for a certain class of electrode geometries. The geometry consists of an electrode near a grounded plane, with the electrode being a surface of revolution about the perpendicular to the plane. Some examples which show the accuracy of the capacitance estimate and the accuracy of the estimate of electric field over potential can be found in the appendix. When it is possible to estimate the potential of the electrode, knowing the ratio of electric field to potential will help to determine if an electrostatic discharge is likely to occur. Knowing the capacitance will help to determine the strength of the discharge (the energy released by it) if it does occur. A brief discussion of discharge mechanisms is given. The medium between the electrode and the grounded plane may be a neutral gas, a vacuum, or an unchanged homogeneous isotropic dielectric. Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N86-33122# Department of the Air Force, Washington, D.C.
BULK ACOUSTIC RESONATOR TRACKING FILTER Patent
Michael S. Buchalter, Francis W. Hopwood, and James T. Haynes, inventors (to Air Force) Issued 25 Feb. 1986 8 p Supersedes AD-D011159
(AD-D012280; US-Patent-4,573,027; US-Patent-Appl-SN-615502; US-Patent-Class-333-I7R) Avail: US Patent and Trademark Office CSCL 17/9

This invention is directed to a narrow band filter for eliminating out-of-band noise in the oscillator signal of a doppler radar system. It provides a very high Q filter derived from a Bulk Acoustic Resonator's (BAR) high Q, L-Band response and uses thermal feedback to lock the BAR's response band onto the input frequency. The BAR is a very narrow band filter with a Q near 40,000 and a comblike frequency response having passbands occurring every 5 MHz, approximately. The comblike response of the BAR shifts down 60 KHz for every 1 deg C. rise in temperature. In this invention a frequency sensitive heater is used to move the response comb of the BAR up or down in accordance with changes in the frequency of the incoming signal. The input frequency can be allowed to drift and the heat source will produce more heat or less heat, keeping the response right at the input frequency. Author (GRA)

N86-33123# Allied Bendix Corp., Kansas City, Mo.
INVESTIGATION OF DRY-CONTACT ULTRASONIC GAGING
J. A. Brunk Mar. 1986 11 p
(Contract DE-AC04-76DP-00613)
(DE86-009185; BDX-613-3421) Avail: NTIS HC A02/MF A01

Ultrasonic thickness gaging often can be accomplished without using a liquid coolant. By this method a transducer with a solid compliant membrane instead of the usual hard face or hard plastic delay line is employed. The primary advantage is elimination of the time required to apply and remove couplant, typically more than half the total testing time. The dry technique also makes it practical to gage where intrusion of the liquid couplant must be avoided because of possible damage to electronic circuits or components. For possible applications of robotic ultrasonic gaging, the dry technique would avoid the substantial complication of providing a suitable flow of couplant. The disadvantages are the inability of dry contact transducers to make adequate contact with rough or concave surfaces. These limitations depend on the consistency of the material used for the compliant membrane. The minimum thickness which can be measured generally increases when no couplant is used. The method would appear to be particularly well suited for gaging plastics and measuring machined metal parts by contacting convex surfaces. Accuracy and repeatability are comparable to that obtained with conventional transducers using the same instrumentation. DOE

N86-33124# Lawrence Livermore National Lab., Calif.
EVALUATED RAYLEIGH INTEGRALS FOR PULSED PLANAR

EXPANDING RING SOURCES
S. I. Warshaw 20 Dec. 1985 13 p Presented at the 12th International Congress on Acoustics, Toronto, Ontario, 24 Jul. 1986
(Contract W-7405-eng-48)
(DE86-006701; UCRL-93820; CONF-860742-1) Avail: NTIS HC A02/MF A01

Time-domain analytic and semianalytic pressure fields acoustically radiated from expanding pulsed ring sources imbedded in a planar rigid baffle have been calculated. The source functions are radially symmetric delta-function distributions whose amplitude and argument have simple functional dependencies on radius and time. Certain cases yield closed analytic results, while others result in elliptic integrals, which are evaluated to high accuracy by Gauss-Chebyshev and modified Gauss-Legendre quadrature. These results are of value for calibrating computer simulations and convolution procedures, and estimating fields from more complex planar radiators. DOE

N85-33125# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
A COMPARISON BETWEEN ACOUSTIC MODE MEASUREMENTS AND ACOUSTIC FINITE ELEMENT ANALYSIS PERFORMED FOR SAAB SF 340
P. Goeransson and I. Green Mar. 1986 17 p Sponsored by Swedish Board for Technical Development
(FFA-TN-1986-22; ETN-86-97234) Avail: NTIS HC A02/MF A01

In order to verify an acoustic finite element package, measured and calculated eigenmodes and eigenfrequencies for Saab SF 340 cabin acoustics were compared. The measurements were performed in an acoustic mockup. For the analysis, a two dimensional model of the cross section of the fuselage was used. The comparison shows quite good agreement, the discrepancies being due to the representation of the flexible wall of the fuselage as rigid in the analysis. ESA

N86-33126# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.
ON THE WAY TO EXTENDED NOISE REDUCTIONS IN PROPELLER AIRCRAFT [OP WEG NAAR GROTERE GELUIDSREDUCTIES IN PROPELLER-VLIEGTUIGEN]
R. F. C. Kiers Aug. 1984 9 p In DUTCH; ENGLISH summary Presented at NLR Conference, Noordoostpolder, Netherlands, 6 Oct. 1983 Submitted for publication
(B8573697; ETN-86-97502) Avail: NTIS HC A02/MF A01

Origins of cabin noise in propeller driven aircraft (PDE) and the importance of further reductions are described. Trends in propeller technology and fuselage construction are aimed at the development of extremely fuel-efficient PDE. However, the related increase of cabin noise levels urges the extension of noise reduction in PDE. Fokker noise reduction methodology for meeting the challenge of maintaining and improving noise levels in future PDE is discussed. Additional noise reduction is hard to obtain. Sophisticated techniques were used to acquire the necessary data and take effective noise reduction measures. ESA

N86-32404# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany).
WIND INDUCED INTERIOR AND FAR FIELD RADIATED EXTERIOR NOISE FROM AUTOMOBILES
Werner Dobrzynski *In* Von Karman Inst. for Fluid Dynamics Vehicle Aerodynamics 1986 34 p (For primary document see N86-32397 24-02)
Avail: NTIS HC A21/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N86-33127* National Aeronautics and Space Administration. Pasadena Office, Calif.
DOUBLE PHOTON EXCITATION OF HIGH-RYDBERG ATOMS AS A LONG-LIVED SUBMILLIMETER DETECTOR Patent
Ara N. Chutjian, inventor (to NASA) Issued 15 Jul. 1986 8 p Filed 21 Feb. 1985 Supersedes N85-30779 (23 - 19, p 3352)
(NASA-Case-NPO-16372-1; US-Patent-4,600,640;
US-Patent-Appl-SN-703847; US-Patent-Class-250-338;
US-Patent-Class-250-336.1; US-Patent-Class-250-340) Avail: US Patent and Trademark Office CSCL 20H

A method and apparatus for detecting submillimeter or IR radiation is disclosed. A rare gas, such as xenon, is supplied at its ground state via a pressurized cylinder and an adjustable leak valve into a cryogenically cooled detection area. The ground state of xenon is double photon excited to a particularized level of the Rydberg series by a resonance lamp and a laser. The doubly excited gas is then further excited by the radiation to be measured. A field ionization and an ion measurement indicative of the radiation intensity is achieved. NASA

N86-33128*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THEORETICAL DISSOCIATION ENERGIES FOR IONIC MOLECULES
Stephen R. Langhoff, Charles W. Bauschlicher, Jr., and Harry Partridge 1986 64 p
(NASA-TM-88776; NAS 1.15:88776) Avail: NTIS HC A04/MF A01 CSCL 20H

Ab initio calculations at the self-consistent-field and singles plus doubles configuration-interaction level are used to determine accurate spectroscopic parameters for most of the alkali and alkaline-earth fluorides, chlorides, oxides, sulfides, hydroxides, and isocyanides. Numerical Hartree-Fock (NHF) calculations are performed on selected systems to ensure that the extended Slater basis sets employed for the diatomic systems are near the Hartree-Fock limit. Extended Gaussian basis sets of at least triple-zeta plus double polarization equality are employed for the triatomic system. With this model, correlation effects are relatively small, but invariably increase the theoretical dissociation energies. The importance of correlating the electrons on both the anion and the metal is discussed. The theoretical dissociation energies are critically compared with the literature to rule out disparate experimental values. Theoretical (sup 2)Pi - (sup 2)Sigma (sup +) energy separations are presented for the alkali oxides and sulfides. Author

N86-33129*# Maryland Univ., College Park. Dept. of Physics and Astronomy.
THE JOINT NASA/GODDARD-UNIVERSITY OF MARYLAND RESEARCH PROGRAM IN CHARGED PARTICLE AND HIGH ENERGY PHOTON DETECTOR TECHNOLOGY Progress Report, Oct. 1982 - Aug. 1986
10 Oct. 1986 29 p
(Grant NGR21-002-316)
(NASA-CR-177062; NAS 1.26:177062) Avail: NTIS HC A03/MF A01 CSCL 20H

Progress made in the following areas is discussed: low energy ion and electron experiments; instrument design for current experiments; magnetospheric measurement of particles; ion measurement in the earth plasma sheet; abundance measurement; X-ray data acquisition; high energy physics; extragalactic astronomy; compact object astrophysics; planetology; and high energy photon detector technology. B.G.

N86-33130# Department of the Navy, Washington, D. C.
RAPID ELECTRON BEAM ACCELERATOR (REBA-TRON) Patent Application
Christos A. Kapetanakos, Phillip A. Sprangle, and Demonsthenes Dialetis, inventors (to Navy) Filed 5 Mar. 1986 16 p
(AD-D012303; US-Patent-Appl-SN-836652) Avail: NTIS HC A02/MF A01 CSCL 20/7

The invention comprises a particle accelerator with a toroidal vacuum chamber, an injector for injecting a charged particle beam into the chamber and an exit port to extract the accelerated particle beam. A toroidal magnetic field to confine the beam in the chamber is generated by a set of coils with their axis along the minor axis

of the chamber and by two twisted wires that carry current in the same direction wrapped around the chamber. The two twisted wires also generate a torsatron magnetic field that controls the minor radius of the beam. A time varying magnetic field is generated by two concentric cylindrical plates surrounding the chamber. A convoluted transmission line generates a localized electric field in the chamber to accelerate the beam. GRA

N86-33131# Panametrics, Inc., Waltham, Mass.
FABRICATE, CALIBRATE AND TEST A DOSIMETER FOR INTEGRATION INTO THE CRRES (COMBINED RELEASE AND RADIATION EFFECTS SATELLITE) SATELLITE Technical Report, 1 Sep. 1984 - 31 Aug. 1985
Paul R. Morel, Frederick A. Hanser, and Bach Sellers Dec. 1985 26 p
(Contract F19628-82-C-0090)
(AD-A168566; AFGL-TR-86-0001; SR-3) Avail: NTIS HC A03/MF A01 CSCL 22/2

A space-radiation dosimeter is being fabricated, calibrated, tested, and integrated into the CRRES satellite. This Dosimeter is essentially identical to that previously designed, fabricated, calibrated, tested and integrated into the DMSP F7 satellite. These dosimeters are primarily designed to measure the dose from electrons of greater than 1 MeV to greater than 10 MeV in four channels. Each channel has a different thickness aluminum dome. The solid state detector outputs are processed to provide the dose from electrons (low energy loss), the dose from protons (high energy loss), the flux of electrons, the flux of protons, and the rate of high energy loss nuclear star events. The dosimeter also has a calibration mode in which the alpha particles from a weak source behind each detector are used to check for total detector depletion and property operation of the electronics. Author (GRA)

N86-33132# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-H.
ON THE QCD EFFECTIVE ACTION FOR PIONS AND VECTOR MESONS
Maarten F. L. Golterman and N. D. Hari Dass 1985 33 p
Sponsored by Stichting voor Fundamenteel Onderzoek der Materie
(NIKHEF-H/85-13; ITFA-85-19; ETN-86-97767) Avail: NTIS HC A03/MF A01

A parametrization of the effective action for the system of pi, rho, A1, and omega mesons is given in a manner that makes explicit the contact with the QCD generating functional and its symmetries. The presence of chiral anomalies is taken into account to yield the anomalous part of the effective action. The effective action is organized in increasing order of derivatives and the first nontrivial terms in such a series are presented. The effective action is extended to include the couplings to the weak and electromagnetic sector of the standard model. Experimental consequences of anomalous effective action, as applied, e.g., to meson decay rates, are discussed. ESA

N86-33133# Rome Univ. (Italy). Dipt. di Fisica.
POTENTIAL SCATTERING [DIFFUSION DA POTENZIALE]
Francesco Calogero 21 Apr. 1986 17 p In ITALIAN Submitted for publication
(Preprint-504; ETN-86-97935) Avail: NTIS HC A02/MF A01

A uniform energy particle beam scattered elastically by a force represented as the gradient of a potential is studied. The situation is described by the stationary Schrodinger equation and given asymptotic boundary conditions. The analysis includes discussion of cross section, scattering amplitude, decomposition partial waves, Levinson theorem, representation of the scattering amplitude, the Regge theorem and the scattering inverse problem. An overview of the progress made in developing this approach is given. ESA

N86-33134# Rome Univ. (Italy). Dipt. di Fisica.
MAGIC ANGLE AND NUCLEAR MAGNETIC RESONANCE (NMR) IMAGING IN SOLIDS
F. Deluca and B. Maraviglia 15 Oct. 1985 8 p
(Preprint-478; ETN-86-97913) Avail: NTIS HC A02/MF A01

An imaging method for solids, which combines the line narrowing at the magic angle in the rotating frame with the full rotating frame NMR imaging technique is proposed. All imaging and spectroscopic methods can be used within the framework of the technique. It can provide an imaging contrast or a spatial map of relaxation times in RF or of relaxation times in the doubly rotating frame. These parameters are sensitive to slow and ultra slow molecular motion. Hence their spatial measurement can be of interest in any system with a critical slow molecular dynamic range as for example in polymers, in the molecular glassy state, and in the in vitro and in vivo study of the proteic part of biological tissues. The exploration of two (or three) spatial dimension can be performed by means of two (or three) RF gradients in two (or three) LF directions. ESA

N86-33135# Rome Univ. (Italy). Dipt. di Fisica.
CONSTRAINTS ON COMPOSITE MODELS FROM LEPTONIC FLAVOR CHANGING DECAYS
P. G. Esposito 18 Nov. 1985 14 p
(Preprint-479; ETN-86-97914) Avail: NTIS HC A02/MF A01

A composite model of leptons based on the inclusion of heavy vector weak isodoublets is analyzed. Diagonalization of the mass matrix produces flavor changing processes and contributions to anomalous magnetic moments. Non observation of such processes can give constraints on compositeness energy scale. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles, and reactor theory.

For space radiation see *93 Space Radiation.*

No abstracts in this category.

74 OPTICS

Includes light phenomena.

N86-33136 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
COMMENT ON THE SIGNIFICANCE OF INDIVIDUAL ABERRATIONS IN WAVEFRONT FITTING BY ABERRATION POLYNOMIALS
Ruixiang Liu and K. G. Birch Nov. 1984 13 p
(NPL-MOM-71; ISSN-0309-3069; ETN-86-97986) Copyright. Avail: Issuing Activity

The possibility of separately identifying individual Seidel type aberrations from the Zernike aberration polynomials used in the analysis of lens interferograms was investigated. Results show that it is not expedient to calculate values for the individual Seidel type aberration terms from the Zernike polynomials fitted to interferograms. The results of such calculations are neither consistent nor do they agree with theoretical Seidel aberration values derived at the lens design stage. The results confirm that an aberration polynomial should only be used in its entirity to represent the wave front. ESA

N86-33137*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PHOTODETECTOR ARRAY WITH IMAGE PLANE PROCESSING Patent Application
Daniel J. Jobson, inventor (to NASA) Filed 16 Jul. 1986 11 p
(NASA-Case-LAR-13391-1; US-Patent-Appl-SN-886133) Avail: NTIS HC A02/MF A01 CSCL 20F

An apparatus is provided for merging image detection provided

by an array of photodetector elements and local neighborhood processing of the outputs of photodetector elements which is useful in applications requiring high speed extraction of meaningful information from raw detector signals. The apparatus combines relatively large photodetector elements with small electronic processing elements located between the photodetector elements on the same chip. The close proximity of the photodetector and signal processing elements increases the speed of information acquisition and minimizes undesirable signal noise. NASA

N86-33138*# National Aeronautics and Space Administration. Pasadena Office, Calif.
COMPENSATION FOR PRIMARY REFLECTOR WAVEFRONT ERROR Patent Application
Aden B. Meinel, inventor (to NASA), Marjorie P. Meinel, inventor (to NASA), and John E. Stacy, inventor (to NASA) Filed 29 May 1986 16 p
(Contract NAS7-918)
(NASA-Case-NPO-16869; US-Patent-Appl-SN-867986) Avail: NTIS HC A02/MF A01 CSCL 20F

The object of the invention is to compensate for errors in a large telescope primary reflector by making certain compensating deviations in a smaller, auxiliary reflector of the telescope. At least one intermediate element forms an image of the primary surface onto the secondary surface, so each point on the secondary surface corresponds to a point on the primary surface. The secondary surface is formed with a deviation from an ideal secondary surface, with the piston distance of each point on the actual secondary surface equal to the piston distance of a corresponding piston on the actual primary surface from the ideal primary surface. It is found that this results in electromagnetic (e.g., light) rays which strike a deviating area of the actual primary surface being brought to the same focus as if the actual primary surface did not have a diviation from an ideal primary surface. NASA

N86-33139# Royal Aircraft Establishment, Farnborough (England).
SPECIAL FEATURES OF IMAGE FORMATION IN THE SCANNING OPTICAL MICROSCOPE
S. A. Belyaev, V. G. Dyukov, and Yu. A. Kudeyarov Oct. 1985 12 p Transl. into ENGLISH from Izv vus Priborostr. (USSR), v. 26, no. 8, 1983 p 77-82
(RAE-Trans-2126; BR99706) Avail: NTIS HC A02/MF A01

The image obtained in the scanning optical microscope is calculated for the case where a light probe scans across the boundary of an opaque screen. Analytical expressions are presented for the definition of the region of diffusion of the image and for the resolution of the apparatus. Author

N86-33140*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CENTROID TRACKING WITH AREA ARRAY DETECTORS
T. A. Glavich 1 Jun. 1986 108 p
(Contract NAS7-918)
(NASA-CR-179750; JPL-Pub-86-21; NAS 1.26:179750) Avail: NTIS HC A06/MF A01 CSCL 20F

A computer program (ALGEVAL) has been developed to simulate the position estimating behavior of a centroid estimator algorithm using data typical of optical point spread function data recorded by an area array detector. Typical results are shown of varying detector properties and optical point spread function types. The detector parameters currently available for study include read noise mean value, dark current mean value and spatial variation, charge transfer efficiency and point spread function location, saturation level, signal level and pixel size. The program is capable of calculating any order centroid using an array size from 2 x 2 to 15 x 15 pixels. The output of the program is either a performance map, histogram data or tabluar data. A number of further developments are recommended. Author

N86-33141# Department of the Air Force, Washington, D.C.
FIBER OPTIC CABLE CONNECTOR Patent
Jacques E. Ludman, Joseph L. Horner, and Henry J. Caulfield, inventors (to Air Force) Issued 7 Jan. 1986 9 p Supersedes AD-D010782
(AD-D012270; US-Patent-4,563,057; US-Patent-Appl-SN-413295; US-Patent-Class-350-96.18) Avail: US Patent and Trademark Office CSCL 20/6

A fiber optic cable connector for coupling together a pair of optical fibers having a pair of fixtures, each of the fixtures securing therein a respective optical fiber and having magnification lens optically aligned with the end of the optical fiber. The lens and fibers are so positioned relative to each other so as to focus a magnified or enlarged image of the end of each of the fibers to a predetermined position. A fastening means is utilized to attach the fixtures together in such a manner that the positions of the enlarged images of the fibers overlap thereby achieving excellent coupling of the adjacent fiber optic ends. Author (GRA)

N86-33142# Department of the Navy, Washington, D. C.
INTEGRATED OPTICAL SIGNAL PROCESSOR USING DIFFRACTION OF LIGHT BY MAGNETOSTATIC WAVES Patent
John N. Lee and Arthur D. Fisher, inventors (to Navy) Issued 11 Mar. 1986 12 p Supersedes AD-D010750
(AD-D012319; US-Patent-4,575,179; US-Patent-Appl-SN-546757) Avail: US Patent and Trademark Office CSCL 20/6

This patent discloses an integrated optical signal processor which includes a thin film of yttrium iron garnet substrate. A guided optical beam in a first polarization mode is directed through the thin film. A stripline antenna formed on the surface of the thin film is coupled to receive a microwave RF input signal. Under the influence of a bias magnetic field, the RF input signal excites a magnetostatic wave in the thin film. By means of Bragg diffraction, the magnetostatic wave diffracts the guided optical beam and thereby converts a portion of the beam into a second orthogonal polarization mode in response to the RF input signal. The guided optical beam is thereby modulated by the RF input signal. A preferred embodiment is disclosed which can be configured to form a spectrum analyzer, a time integrating correlator, and a space integrating convolver. GRA

N86-33143# Department of the Air Force, Washington, D.C.
TEST TARGET FOR ADAPTIVE OPTICS Patent
Richard A. Hutchin, inventor (to Air Force) Issued 15 Apr. 1986 7 p Supersedes AD-D011754
(AD-D012321; US-Patent-4,582,427; US-Patent-Appl-SN-541594; US-Patent-Class-356-124.5) Avail: US Patent and Trademark Office CSCL 14/2

A test target for adaptive optics comprising, in the preferred embodiment, a plurality of nine adjacent, stacked, and aligned rows of a multiplicity of alternate opaque sections and transparent sections in a repeating bar pattern, with all sections being positioned on a flat transparent medium (such as film or glass), and with each opaque section being an opaque bar and with each transparent section being a transparent bar is presented. Each row has a different spatial frequency than any other of the nine rows, with the spatial frequency of any one row being of a different multiple of the row having the lowest spatial frequency. As a matter of preference, the nine adjacent, stacked, and aligned rows are stacked with the first and lowermost row having the lowest spatial frequency, and with the ninth and uppermost row having the highest spatial frequency. Author (GRA)

N86-33144# Department of the Air Force, Washington, D.C.
FIBER OPTIC DATA DISTRIBUTION FOR PHASED ARRAY ANTENNA Patent
Brian M. Bellman and Ronald G. Kraus, inventors (to Air Force) Issued 15 Apr. 1986 5 p Supersedes AD-D010305
(AD-D012322; US-Patent-4,583,096; US-Patent-Appl-SN-497444; US-Patent-Class-343-368) Avail: US Patent and Trademark Office CSCL 09/5

A fiber optic data distribution system is disclosed for distribution of the phase shift commands to an electronically steered antenna array. Novelties include the fan-out of a single bundle to multiple receptors, equalization of optical path for precise synchronization, the use of the RF active side of the antenna for data distribution,

the use of the antenna radome as support structure for the fiber optics, and an optical reflector to divert light from the plane of the radome to the transmit/receive element. GRA

N86-33145# Department of the Navy, Washington, D. C.
AUTOMATIC CHARACTER RECOGNITION SYSTEM Patent
Travis W. Metcalf, inventor (to Navy) Issued 28 Jan. 1986 27 p Supersedes AD-D010669
(AD-D012328; US-Patent-4,567,609; US-Patent-Appl-SN-479372; US-Patent-Class-382-9) Avail: US Patent and Trademark Office CSCL 20/6

An apparatus and method for automatic character recognition is presented which automatically locates and recognizes alphanumeric characters in a scene viewed by a raster-scan type of sensor. By this method the apparatus can search the entire scene and recognize up to seven alphanumeric characters in a bounded area of known size by the correlation technique in less than 1.5 seconds. The technique used first locates the bounded area and alphanumeric characters and then performs the recognition. Two different feature extraction methods are used to locate the characters in the scene. The recognition function is performed by correlation using an incoherent electrooptical processor. Author (GRA)

N86-33146# Department of the Navy, Washington, D. C.
METHOD OF WAVELENGTH MULTIPLEXING IN FUSED SINGLE-MODE FIBER COUPLERS Patent
Matthew N. McLandrich, inventor (to Navy) Issued 10 Dec. 1985 5 p Supersedes AD-D009070
(AD-D012329; US-Patent-4,557,553; US-Patent-Appl-SN-317682; US-Patent-Class-350-96-15) Avail: US Patent and Trademark Office CSCL 20/6

An apparatus and method of entering and extracting a discrete wavelength of optical data in a single-mode duplex optical data transmission system relies on a selective evanescent field coupling. A continuous single-mode fiber transmits the two wavelengths in opposite directions with respect to each other. A length of a like single-mode fiber is fused to the continuous single-mode fiber such that the product of the fused length and the coupling coefficient of the fiber pairs equals pi/2 at one of the optical frequencies to effect one-hundred percent evanescent field coupling to and from the continuous fiber. The product of the coupling coefficient and the fused length equals pi at the other optical wavelength to effect a zero percent evanescent field coupling. The other wavelength travels the length of the continuous single-mode fiber uninterrupted while the first wavelength is selectively coupled and decoupled from the fiber as desired. Author (GRA)

N86-33147# Department of the Air Force, Washington, D.C.
OPTICALLY CONTROLLED INTEGRATED OPTICAL SWITCH Patent Application
Richard A. Soref, inventor (to Air Force) Filed 24 Feb. 1986 25 p
(AD-D012334; US-Patent-Appl-SN-831910) Avail: NTIS HC A02/MF A01 CSCL 20/6

This invention relates to an optically controlled integrated optical switch having a body made up of entirely crystalline silicon. More specifically, the body has a pair of channel waveguides intersecting at an X-like configuration forming therein an intersection crossover region. An electrically controlled optical source is positioned over the crossover region to shine intense, short-wave light on the crossover region in order to generate numerous electron-hole pairs in the waveguide material. These charge carriers alter the refractive index of the intersection region. A controllable current source is used to adjust the optical output power of the optical source. This, in turn, changes the amount of optical cross coupling of light between the intersecting waveguides. GRA

N86-33148# Department of the Air Force, Washington, D.C.
GLARE SUSCEPTIBILITY TESTER Patent Application
Harry L. Task, inventor (to Air Force) Filed 24 Feb. 1986 24 p
(AD-D012335; US-Patent-Appl-SN-831909) Avail: NTIS HC A02/MF A01 CSCL 20/6

An optical instrument and method for measuring susceptibility to glare of a human vision system is described which comprises a glare light source of preselected intensity sufficient to generate glare in the vision system of a subject, an acuity target having first opaque or partially transparent areas and second translucent areas defining a pattern of recognizable indicia on the target, a housing supporting target and source side-by-side for simultaneous viewing by the subject, and a reflective surface within the housing for directing light from the source onto the back surface of the target for substantially uniform transillumination of the target with the light from the source. Optional optical filters may be placed between the source and subject, target and subject, or source and reflective surfaces, for selectively filtering light viewed by the subject. A movable cover plate may be included for selectively exposing the source to the subject in certain glare susceptibility measurements. GRA

N86-33149# Department of the Air Force, Washington, D.C.
A GUIDED-WAVE OPTICAL POWER DIVIDER Patent Application
Joseph P. Lorenzo, inventor (to Air Force) Filed 24 Feb. 1986 17 p
(AD-D012336; US-Patent-Appl-SN-831902) Avail: NTIS HC A02/MF A01 CSCL 20/6

A guided-wave optical power divider having a body made entirely of crystalline silicon and wherein the crossover region of intersecting light guiding channels is doped with a predetermined amount of impurities. By appropriate use of impurities it is possible to create permanent optical power dividers in which a light beam is preselectively directed to follow a preselected path. GRA

N86-33150# Department of the Air Force, Washington, D.C.
ELECTRICALLY CONTROLLED INTEGRATED OPTICAL SWITCH Patent Application
Richard A. Soref, inventor (to Air Force) Filed 24 Feb. 1986 20 p
(AD-D012337; US-Patent-Appl-SN-831895) Avail: NTIS HC A02/MF A01 CSCL 20/6

An electrically controlled integrated optical switch having a body made up entirely of crystalline silicon. More specifically, the body has a pair of channel waveguides intersecting in an X-like configuration forming therein an intersection crossover region. A first electrode is positioned on the intersection crossover region. And a second electrode is positioned on the bottom of the body opposite the intersection crossover region a controllable current/voltage source is electrically connected to the electrodes in order to alter the index of refraction of the intersection crossover region in order to change the amount of optical cross coupling of light between the intersecting waveguides. GRA

N86-33151# Michigan Univ., Ann Arbor. Dept. of Electrical and Computer Engineering.
HOLOGRAPHIC OPTICAL ELEMENTS FORMED IN LIGHT OF REDUCED COHERENCE Annual Report, 30 Nov. 1984 - 30 Nov. 1985
E. Leith 27 Feb. 1986 38 p
(Grant AF-AFOSR-0012-85)
(AD-A168498; AFOSR-86-0324TR; UMICH-AR-7) Avail: NTIS HC A03/MF A01 CSCL 14/5

The theory of holographic optical elements (HOE) made with light of reduced coherence is developed. Both reduced spatial coherence and temporal coherence methods are considered. A theory of broad source fringe formation based on source image distortion is developed. The theory of HOE formation with two zone plates in tandem and under reduced temporal coherence is developed. A new technique of spatial filtering with spatially incoherent light was developed in which the optical system behaves as if the light were coherent (i.e., linear in amplitude and phase preserved) even though the light is spatially incoherent. A technique for obtaining resolution beyond the classical limit (superresolution) was discovered, based on the principle of incoherent to coherent conversion. GRA

N86-33152# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
SCINTILLATION EFFECTS ON CENTROID ANISOPLANATISM
Michael T. Tavis and Hal T. Yura 15 May 1986 15 p
(Contract F04701-85-C-0086)
(AD-A168551; TR-0086(6019)-1; SD-TR-86-24) Avail: NTIS HC A02/MF A01 CSCL 20/5

The effect of scintillation on turbulence induced centroid anisoplanatism is discussed. It is shown that this effect has negligible impact on the resulting Strehl ratio for D/r sub o > or = 100, where D is the optics aperture diameter and r sub o is the turbulence induced lateral coherence length. GRA

N86-33153# Korea Advanced Energy Research Inst., Seoul.
DEVELOPMENT OF APPLIED OPTICAL TECHNIQUES USING LASERS
Cheol-Jung Kim, Doo-Huan Shu, Tae-Soo Kim, Jang-Soo Shin, Dong-Hyun Kim, Yung-Shik Choi, and Jung-Mook Kim Mar. 1985 99 p In KOREAN
(DE86-701692; KAERI/RR-437/84) Avail: NTIS HC A05/MF A01

Research on laser isotope separation of deuterium using Infrared Multi-photon Absorption/Dissociation (IR MPA/D) and UV predissociation was reviewed and several kinds of lasers were built for this purpose. A tunable TEA CO2 laser with power of about 10 MW was assembled and a HF chemical laser with output energy of 300 mJ was built. These lasers are not ready to be used as sources for IR MPA/D experiment yet. The TEA CO2 laser needs modification for more stable output and higher repetition rate and the HF chemical laser needs improvement for more output energy and tunability. Also, a KrF excimer laser was built for UV predissociation experiments, but requires modification for stable output. Furthermore, laser welding of Zr was surveyed and a few samples were welded using an Nd:YAG laser. Finally, a remote inspection instrument was designed using a He-Ne laser and a CCD array. DOE

N86-33154# Lawrence Livermore National Lab., Calif.
SYSTEMATIC PARAMETER STUDY OF OPTICAL DIRECTIONAL COUPLER ANALOG MODULATORS DESIGNED TO OPERATE AT 810 nm: CHARACTERIZATION TECHNIQUES AND PRELIMINARY RESULTS
M. Lowry, F. Roeske, D. Jander, G. McWright, J. Koo, and V. Slivinsky Jan. 1986 10 p Presented at the OSA/IEEE Conference on Lasers and Electro-optics, San Francisco, Calif., 9 Jun. 1986
(Contract W-7405-eng-48)
(DE86-006729; UCRL-93991; CONF-860622-2) Avail: NTIS HC A02/MF A01

Measurements are presented of the crossover length, electro-optical transfer function, pulsed electrical response, and single-shot pulsed electro-optic response with streak camera recording. Measurements of a bulk and surface photorefractive effect are presented. All measurements were performed at 810 nm. DOE

N86-33155# Los Alamos National Lab., N. Mex.
FIBER OPTICS APPLICATIONS IN HOSTILE ENVIRONMENTS
P. B. Lyons 1986 6 p Presented at the OPTO '86 Conference, Paris, France, 13 May 1986
(Contract W-7405-eng-36)
(DE86-010190; LA-UR-86-1249; CONF-8605110-1) Avail: NTIS HC A02/MF A01

This Conference focuses on applications of optical fibers in hostile environments. As the introductory paper in this Conference, this communication will trace the evolution of applications of fibers in hostile environments and explore some of the motivations for these applications. A few key examples will be used. DOE

N86-33156# Lawrence Livermore National Lab., Calif.
ON 3(OMEGA)0 FIBER OPTIC DISPERSION AND TRANSMISSION MEASUREMENTS
C. E. Thompson and H. T. Powell 17 Apr. 1986 26 p
(Contract W-7405-eng-48)
(DE86-010640; UCID-20753) Avail: NTIS HC A03/MF A01

We have measured the dispersion and transmission of the standard Nova optical fiber used for transporting beam samples to a streak camera and an experimental fiber at 350 nm. These data indicate that the experimental fiber, provided by Bell Laboratories, can be used on Nova for 3(LC OMEGA)0 signal transmission at lengths up to 20 m with negligible pulse broadening at 100 ps while the standard Nova fiber contributes approximately 120 ps pulse-broadening (i.e., FWHM = 160 ps). However, the Bell fiber exhibits considerably more attenuation than previously encountered at 3(LC OMEGA)0. We are obtaining several hundred meters of the Bell fiber for potential near-term use on Nova and will be testing slightly modified designs which should have less attenuation. DOE

N86-33157# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung fuer Optoelektronik.
CALCULATIONS OF THE SNR OF A LASER DOPPLER ANEMOMETER WITH A CASSEGRAIN LENS
Friedrich Malota Jan. 1986 92 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-12; ISSN-0171-1342; ETN-86-97821) Avail: NTIS HC A05/MF A01; DFVLR, Cologne, West Germany DM 22.50

The signal to noise ratios for laser Doppler anemometers are calculated. The backscatter volume for various diameters of lenses and for various intensity distributions is given. The interference for various waveforms and the resulting signal to noise ratios are calculated. ESA

N86-33158# Technische Univ., Vienna (Austria). Inst. fuer Nachrichtentechnik.
COHERENT INFRARED DETECTION, VOLUME C Final Report
Andreas G. Ullrich, Walter R. Leeb, and Arpad L. Scholtz Paris ESA 31 Aug. 1985 77 p
(Contract ESTEC-5584/83-NL-PR)
(ESA-CR(P)-2184; ETN-86-97784) Avail: NTIS HC A05/MF A01

A diode laser heterodyne/homodyne receiver for optical detection of infrared radiation is discussed. The influence of finite laser linewidth caused by optical phase noise on coherent receivers is treated. For a homodyne receiver based on an optical phase-locked loop, the achievable bit-error-rate is calculated, with the phase noise and the shot noise as parameters. Electronics for GaAlAs laser diode temperature and current control were built, resulting in laser frequency long-term stability on the order of 10 MHz. An arrangement for external phase modulation was set up. Experiments reducing the solitary laser linewidth of 8 MHz to 200 kHz in a 3 mirror cavity were performed, and a criterion for controlling the position of the external mirror was found. It is concluded that the relatively large linewidth of solitary diode lasers and the complexity of linewidth reduction concepts outweigh the inherent advantages of homodyne reception. ESA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N86-33159 Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.
PUBLICATIONS FROM THE DEPARTMENT OF PLASMA PHYSICS AND THE UNIT OF ACCELERATOR TECHNOLOGY, INDEX AND ABSTRACTS 1985 Abstracts Only
1985 15 p
(TRITA-EPP-85-09; ISSN-0348-7539; ETN-86-97233) Avail: Issuing Activity

Twenty five publications on plasma physics are listed. Specific subject areas include plasma diagnostics, plasma control, ionospheric and magnetospheric plasmas, cosmogonic theory and the Saturnian rings, and space plasmas. ESA

N86-33160 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.

ANOMALOUS DIFFUSION ACROSS THE MAGNETIC FIELD PLASMA BOUNDARY: THE PORCUPINE ARTIFICIAL PLASMA JET

E. V. Mishin, V. Ya. Kapitanov, and R. A. Treumann Feb. 1986 20 p Sponsored in part by Deutschen Forschungsgemeinschaft and DFVLR

(Contracts BMFT-01D0074A; BMFT-RV14B7/74)

(MPE-Preprint-47; ETN-86-98208) Copyright. Avail: Issuing Activity

Observations of nearly undisturbed penetration of the PORCUPINE dense and fast heavy ion beam into the magnetized ionospheric plasma after termination of the short adiabatic phase are discussed. Very fast magnetic field diffusion into the beam is required. Collisional diffusion and instability of a sharp boundary between magnetic field and plasma yield diffusion times too long to account for the observations. The diffusion is therefore attributed to a transverse electron drift current driven electrostatic instability excited by the diamagnetic current flowing in the boundary layer between the injected beam and the ambient field. ESA

N86-33161# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ANALYSIS ON IMPURITY CONTROL EFFECT OF SCRAPE-OFF LAYERS GENERATED BY A PUMP LIMITER AND AN ERGODIC MAGNETIC LIMITER

T. Kawamura, T. Ono, S. Takamura, and A. Miyahara Jul. 1986 15 p

(IPPJ-783; ISSN-0469-4732) Avail: NTIS HC A02/MF A01

The results of theoretical analysis on impurity control effects of a scrape-off layer in a toroidal system are reported, where the two types of limiter systems are presumed, that is, a pump limiter and an ergodic magnetic limiter. Carbon is assumed as representative low Z material. The screening efficency of a scrape-off layer for main plasma contamination and the redeposition effect to the first wall and limiter sides are analyzed in relation to the scrap-off plasma parameters such as density profiles, temperature profiles, and diffusion coefficients. Author

N86-33162# Nagoya Univ. (Japan). Inst. of Plasma Physics.
NUMERICAL BGK-SOLUTIONS OF LARGE SCALE ELECTROSTATIC POTENTIAL IN AURORAL PLASMAS

Haruichi Washimi and Isao Katanuma Jul. 1986 20 p

(IPPJ-782; ISSN-0469-4732) Avail: NTIS HC A02/MF A01

Formation of large scale and large amplitude electrostatic potential along magnetic field lines due to a high-speed plasma flow in auroral plasma is discussed. It is shown that the potential profile which is consistent with observations, i.e., which increases very slowly near the plasmasheet and abruptly near the topside ionosphere, can be obtained by introducing a population of electrons which are trapped between the magnetic mirror and the electrostatic potentials. Author

N86-33163# Nagoya Univ. (Japan). Inst. of Plasma Physics.
FAST WAVE HEATING IN A MAGNETIC MIRROR

Yoshimitsu Amagishi May 1986 13 p

(IPPJ-777) Avail: NTIS HC A02/MF A01

Signals due to the change of diamagnetic pressure of the plasma were measured to demonstrate the plasma heating by the axisymmetric fast (compressional) wave, which is launched toward a region of increasing magnetic field. As expected from the previous experiment concerning the conversion of the fast wave in to the ion cyclotron wave in a cylindrical plasa. A remarkable increment of the diamagnetism has been observed for the first time near the ion cyclotron resonance area. Author

N86-33164# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MEASUREMENT OF LOCALIZED ELECTROSTATIC OSCILLATIONS EXCITED BY LOW-POWER MICROWAVES IN A PLASMA WAVEGUIDE

Kazuo Minami, Koichi Izawa, Masanobu Kaminaga, and Kazushige Ishii Jun. 1986 29 p

(IPPJ-778; ISSN-0469-4732) Avail: NTIS HC A03/MF A01

Localized electron plasma oscillations excited at the resonant surface by low-power microwaves incident obliquely on an inhomogeneous unmagnetized plasma in a cylindrical waveguide are measured by a receiving antenna. The disturbance by the antenna on the electrostatic fields is significantly reduced in the condition with a steep density gradient and large angles of incidence. As a result, patterns of large and broad resonance field including phase information are observed. The peak values of the resonantly excited field are compared with numerical analyses. Author

N86-33165# Nagoya Univ. (Japan). Inst. of Plasma Physics.
NUMERICAL CALCULATIONS FOR THE ELECTRODE DESIGN OF A RELATIVISTIC ELECTRON BEAM DIODE

Naiyan Wang, T. Ono, T. Kawamura, and A. Miyahara Jun. 1986 22 p

(IPPJ-780) Avail: NTIS HC A02/MF A01

An optimized design for diode construction is presented. An electron beam with energy of 350 KeV, current of 50 kA was extracted sucessfully from the fabricated diode. The voltage and current waveforms are shown. No breakdown was observed inside the diode. It was also proved that the diode works stably. This confirms in turn the reliability and usefulness of the numerical calculations done for the optimization of the diode design. B.G.

N86-33166# Nagoya Univ. (Japan). Inst. of Plasma Physics.
UNLIMITED ACCELERATION OF A CHARGED PARTICLE BY AN ELECTROMAGNETIC WAVE: RELATIVISTIC THEORY

Satoshi Takeuchi, Kazuo Sakai, Michio Matsumoto, and Ryo Sugihara Jul. 1986 18 p

(IPPJ-781; ISSN-0469-4732) Avail: NTIS HC A02/MF A01

It is shown that a charged particle can be trapped in a magnetic neutral sheet produced by a static magnetic fields vector B (sub O) and an electromagnetic wave propagating perpendicularly to vector B (sub O). The neutral sheet as well as the trapped particle moves with the phase velocity V (sub p) and the trapped particle feels a constant force q rho(sub p) V(sub p) B(sub O)/c along the neutral sheet, q, c, and rho(sub p) being the charge, the velocity of light and (1 - V(sup 2)(sub p)/c(sub 2)) (sup -1/2). Once the particle is trapped it never detraps and then the acceleration continues unlimitedly. A brief discussion is given on how to realize such a slow electromagnetic wave which can interact with the particle. Author

N86-33167# Nagoya Univ. (Japan). Inst. of Plasma Physics.
IRRADIATION EFFECTS ON PLASMA DIAGNOSTIC EQUIPMENT

Jun. 1986 71 p Proceedings of US-Japan Workshop A-56, Nagoya, Japan, 28-30 Jan. 1986

(IPPJ-779; ISSN-0469-4732) Avail: NTIS HC A04/MF A01

A collection of abstracts and papers for the US-Japan Workshop A-56 on Irradiation Effects on Plasma Diagnostic Equipments held at the Institute of Plasma Physics, Nagoya University, on January 28 through 30, 1986 is given. The topics presented at the workshop are classified as follows: (1) definition of the problems and general views; (2) radiation levels estimated from recent experiments and analysis on large tokamaks; (3) radiation sensitivities of diagnostic components; (4) neutron sources for irradiation testing and (5) a discussion of suggested experiments on radiation hardening. Author

N86-33168# Nagoya Univ. (Japan). Inst. of Plasma Physics.
TOKAMAK PLASMA MODELLING AND ATOMIC PROCESSES

Takaichi Kawamura, ed. Jun. 1986 104 p Presented at a Co-Operative Workshop, Nagoya, Japan, 8-9 Jul. 1985

(IPPJ-AM-44) Avail: NTIS HC A06/MF A01

Topics addressed include: particle control in a tokomak device; ionizing and recombining plasmas; effects of data accuracy on tokamak impurity transport modeling; plasma modeling of tokamaks; and ultraviolet and X-ray spectroscopy of tokamak plasmas. B.G.

N86-33169# Nagoya Univ. (Japan). Inst. of Plasma Physics.
BIBLIOGRAPHY OF ELECTRON TRANSFER IN ION-ATOM COLLISIONS

H. Tawara, N. Shimakura, N. Toshima, and T. Watanabe Jun.

1986 142 p
(IPPJ-AM-45) Avail: NTIS HC A07/MF A01

A bibliographic compilation is given of theoretical and experimental investigations on electron transfer involving multiply charged ions with the emphasis on their final state (n,l) distribution. The references are surveyed up to mid-1986. Each reference is accompanied with a short description of the collision partners, their charge states, their energy range, and some important results. Author

N86-33170*# Alabama Univ., Huntsville. School of Science.
INVESTIGATION OF LOW ENERGY SPACE PLASMA Semiannual Progress Report, Apr. - Sep. 1986
Richard H. Comfort and James L. Horwitz Sep. 1986 17 p
(Grant NAG8-58)
(NASA-CR-179745; NAS 1.26:179745) Avail: NTIS HC A02/MF A01 CSCL 20I

A statistical study of 1982 data for occurrences of equatorially trapped plasma has been extended. The previous survey, which utilized only the MSFC summary fiche, has been supplemented with the GSFC summary fiche, which has had the effect of substantially improving the late 1982 coverage. It was found that in the post midnight region (1 - 3 LT), the trapped plasma is limited to + or - 5 degrees magnetic latitude, while in the early afternoon (13-15 LT), latitude ranges as high as + or 30 degrees are found. This survey has provided a link to earlier ATS-6 and ISEE studies of pancake distributions. Although the most energetic, and most anisotopic plasmas are trapped within a few degrees of the equator, the results of these equatorial interactions extend substantially along the magnetic field line in the afternoon and dusk region and these high latitude extensions were previously studied by the Huntsville group. Results of this study were incorporated into a revision of the equatorial ion paper, which has been resubmitted and accepted for publication. Author

N86-33171# Naval Research Lab., Washington, D. C.
MAGNETIC RECONNECTION IN LASER-PLASMA INTERACTIONS IN A BACKGROUND MAGNETIC FIELD
M. J. Keskinen 9 May 1986 27 p
(AD-A168024; NRL-MR-5766) Avail: NTIS HC A03/MF A01 CSCL 20/9

For laser irradiances (I) in the ablative regime (I < or = 10 to the 14th power w/sq cm, focused on a small solid target) it is shown that magnetic field-reversed configuration, defined by the laser-produced self-generated magnetic field an externally applied magnetic field perpendicular to the laser axis, is possible near the laser-target interaction region. Approximate conditions under which these field-reversed regions undergo driven reconnection are investigated. Magnetic reconnection of the background magnetic field with the laser-induced spontaneous magnetic field can lead to distortion and dissipation of the background magnetic field near the laser-target interaction region. GRA

N86-33172# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
OBSERVATIONS OF PLASMA DISTRIBUTIONS DURING THE CDAW SUBSTORMS OF 31 MARCH - 1 APRIL 1979
C. Y. Huang, L. A. Frank, and T. E. Eastman Feb. 1986 30 p
(Contract N00014-76-C-0016)
(AD-A168580; U-OF-IOWA-86-12) Avail: NTIS HC A03/MF A01 CSCL 04/1

On 31 March and 1 April 1979 a sequence of substorms was recorded on the ground. During the entire active period the ISEE-1 and -2 satellites were located in the magnetotail, between 22 and 12 Earth radii from the Earth. Observations of plasma distributions made at varying levels of activity during these substorms provide good examples of typical magnetotail responses. These measurements were obtained with the Lepedea on board the ISEE-1 spacecraft. The observations show that the main response of the magnetotail during active periods is primarily spatial. The central plasma sheet contracts at substorm onset and expands during the recovery phase. This motion causes the ISEE-1 and -2 spacecraft to move from one plasma regime to another, e.g., from the central plasma sheet to the plasma sheet boundary layer. Further these regions can be characterized by their plasma distributions which retain their essential signatures even under substorm conditions. At times when accelerated plasma is observed the source of the energetic particles appears to be located tailward of the satellite. This is generally true of the plasma sheet boundary layer in which net earthward streaming is detected on most crossings in this region. GRA

N86-33173# Los Alamos National Lab., N. Mex.
ANALYSIS, MODELING, AND DESIGN OF SHORT-WAVELENGTH LASER-PLASMA EXPERIMENTS
W. C. Mead, S. V. Coggeshall, S. R. Goldman, E. K. Stover, P. D. Goldstone, A. Hauer, J. M. Kindel, and L. Montierth 1985 35 p
Presented at the 7th International Workshop on Laser Interaction and Related Plasma Phenomena, Monterey, Calif., 28 Oct. 1985
Prepared in cooperation with Arizona Univ., Tucson
(Contract W-7405-eng-36)
(DE86-006033; LA-UR-86-300; CONF-851053-9) Avail: NTIS HC A03/MF A01

Analysis and LASNEX modeling of teo experiments designed to explore the mechanisms and scaling of laser-plasma coupling in high-Z plasmas are presented. The first used layered Au-on-CH spheres irradiated symmetrically using the Omega (Laboratory for Laser Energetics) 0.35 micron laser to observe the X-ray emission and energy penetration in gold plasmas. Measurements of the subkilovolt and kilovolt emission from targets with varying Au-coating thicknesses were made using diagnostics of varying spectral, temporal, and spatial resolution. The results indicate that the X-ray conversion efficiency is a function of target size, with larger targets yielding X-ray emission in excellent agreement with calculations. The X-ray emission fall-off with decreasing gold thickness agrees well with predictions. The second experiment used the Novette (Lawrence Livermore National Laboratory) laser to irradiate solid gold disk targets, examining wavelength scaling to 0.26 microns. The measured subkilovolt X-ray emission is in good agreement with calculations using mildly inhibited thermal electron transport, indicating enhanced target coupling, compared with previous experiments using smaller spot sizes. The experiment also indicates very low suprathennal electron populations, on the order of 0.1% at about 30 keV effective temperature. Finally, we present preliminary plans and designs for experiments which will use the Aurora 5 kJ, 5 ns, 0.25 (MU)m KrF laser now being constructed at Los Alamos. electron populations, on the order of 0.1% at about 30 keV effective temperature. Finally, preliminary plans and designs are presented for experiments which will use the Aurora 5 Kj, 5 ns, 0.25 micron KrF laser now being constructed at Los Alamos. DOE

N86-33174# Los Alamos National Lab., N. Mex.
DENSITY EFFECTS ON SAWTOOTH OSCILLATIONS FOR HIGH-THETA 120 kA DISCHARGES IN ZT-40M
R. A. Nebel, K. A. Werley, and M. M. Pickrell Feb. 1986 22 p
(Contract W-7405-eng-36)
(DE86-008585; LA-10653-MS) Avail: NTIS HC A02/MF A01

The effects of using pulse discharge cleaning and neutral gas refueling to increase the plasma density for 120 kA high-theta discharges on ZT-40M have been studied. Experimentally, increasing the plasma density quenches the sawtooth oscillations. Theoretical analysis indicates that the likely reason for this observation is that increasing the plasma density lowers the on-axis streaming parameter which in turn flattens the effective resistivity profiles leading to smaller (or nonexistent) sawtooth excursions. DOE

N86-33175# International Thermal Plasma Engineering, Inc., St. Paul, Minn.
DIAGNOSTIC TECHNIQUES IN THERMAL PLASMA PROCESSING, PART 1, VOLUME 1
M. Boulos, P. Fauchais, and E. Pfender Feb. 1986 197 p
(Contract DE-AC02-83ER-13056)
(DE86-011737; DOE/ER-0270-Pt-1-Vol-1) Avail: NTIS HC A09/MF A01

Diagnostic methods developed for determining properties of thermal plasmas are discussed. In addition, specific methods developed over the past years for determining the behavior and the effects of particulate matter in thermal plasmas are included. DOE

N86-33176# International Thermal Plasma Engineering, Inc., St. Paul, Minn.
DIAGNOSTIC TECHNIQUES IN THERMAL PLASMA PROCESSING, PART 2, VOLUME 2
M. Boulos, P. Fauchais, and E. Pfender Feb. 1986 250 p
(Contract DE-AC02-83ER-13056)
(DE86-011738; DOE/ER-0270-Pt-2-Vol-2) Avail: NTIS HC A11/MF A01

Techniques for diagnostics for thermal plasmas are discussed. These include both optical techniques and in-flight measurements of particulate matter. In the core of the plasma, collisional excitation of the various chemical species is so strong that the population of the corresponding quantum levels becomes high enough for net emission from the plasma. In that case, the classical methods of emission spectroscopy may be applied. But in the regions where the temperatures are below 4000°K (these regions are of primary importance for plasma processing), the emission from the plasma is no longer sufficient for emission spectroscopy. In this situation, the population of excited levels must be increased by the absorption of the light from an external source. Such sources, as for example pulsed tunable dye lasers, are now commercially available. The use of such new devices leads to various techniques such as laser induced fluorescence (LIF) or Coherent Anti Stockes Raman Spectroscopy (CARS) that can be used for analyzing plasmas. Particle velocity measurements can be achieved by photography and laser Doppler anemometry. Particle flux measurements are typically achieved by collecting particles on a substrate. Particle size measurements are based on intensity of scattered light. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N86-33177*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TOTAL-DOSE RADIATION EFFECTS DATA FOR SEMICONDUCTOR DEVICES. 1985 SUPPLEMENT. VOLUME 2, PART A
Keith E. Martin, Michael K. Gauthier, James R. Coss, Armando R. V. Dantas, and William E. Price 15 May 1986 579 p
(Contract NAS7-100)
(NASA-CR-179746; JPL-Pub-85-43-Vol-2-Pt-A; NAS 1.26:179746) Avail: NTIS HC A25/MF A01 CSCL 20L

Steady-state, total-dose radiation test data, are provided in graphic format for use by electronic designers and other personnel using semiconductor devices in a radiation environment. The data were generated by JPL for various NASA space programs. This volume provides data on integrated circuits. The data are presented in graphic, tabular, and/or narrative format, depending on the complexity of the integrated circuit. Most tests were done using the JPL or Boeing electron accelerator (Dynamitron) which provides a steady-state 2.5 MeV electron beam. However, some radiation exposures were made with a Cobalt-60 gamma ray source, the results of which should be regarded as only an approximate measure of the radiation damage that would be incurred by an equivalent electron dose. Author

N86-33178# Duke Univ., Durham, N. C. Dept. of Chemistry.
SYNTHESIS AND CRYSTAL STRUCTURE OF TRIS (DIMESITYLARSINO)GALLANE, A MONOMERIC TRICOORDINATE GALLIUM-ARSENIC COMPOUND
C. G. Pitt, K. T. Higa, A. T. McPhail, and R. L. Wells 21 May 1986 13 p
(Contract N00014-83-K-0572)
(AD-A168020; DU/DC/TR-04) Avail: NTIS HC A02/MF A01 CSCL 07/4

The gallium-arsenic bond, in polymeric form is expected to exhibit anisotropic conductivity by virtue of an extended p-pi system, isoelectronic with polyacetylene. Four mono-, bis-, and trisarsinogallanes were prepared from the reaction of lithium dimesitylarsenide with gallium chlorides. One of these, tris(dimesitylarsino) gallane, (Mes2As)3Ga(1), was characterized by single crystal X-ray analysis and shown to be the first example of a monomeric tricoordinate gallium-arsenic compound. Orange crystals of 1 belong to the triclinic system space group P1. The gallium atom is bonded to the three arsenic atoms in a trigonal planar configuration. The color of 1 is the result of tailing of a 276 nm CT band into the visible. GRA

N86-33179# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
SOLID STATE RESEARCH Quarterly Technical Report, 1 May - 31 Jul. 1985
Alan L. McWhorter 15 Aug. 1985 83 p
(Contract F19628-85-C-0002)
(AD-A168053; Rept-1985:; Rept-3; ESD-TR-85-241) Avail: NTIS HC A04/MF A01 CSCL 09/3

The topics covered are Solid State Device Research, Quantum Electronics, Materials Research, Microelectronics, and Analog Device Technology. GRA

N86-33180# Maine Univ., Orono. Dept. of Physics and Astronomy.
SPECIFIC HEAT ANOMALY OF AU(110)(1 x 2) STUDIED BY LOW-ENERGY ELECTRON DIFFRACTION
D. E. Clark, W. N. Unertl, and P. H. Kleban May 1986 12 p
(Contract N00014-79-C-0441)
(AD-A168626; TR-12) Avail: NTIS HC A02/MF A01 CSCL 07/4

The specific heat critical exponent alpha has been measured for the Gold (110) (1x2) order disorder phase transition using partially integrated Low Energy Electron Diffraction (LEED) intensities. The resulting value, alpha = 0.02 + or - 0.05, is consistent with the predicted using universality class of this transition. Evidence for a reduction in the effective critical temperature due to finite size effects is also presented. GRA

N86-33181# Maine Univ., Orono. Dept. of Physics and Astronomy.
SOME EXPERIMENTAL ARTIFACTS IN LEED STUDIES OF PHASE TRANSITIONS
W. N. Unertl, D. E. Clark, and C. S. Shern May 1986 15 p
(Contract N00014-79-C-0441)
(AD-A168646; TR-11) Avail: NTIS HC A02/MF A01 CSCL 20/2

Low energy electron diffraction, LEED, is an important experimental technique for the study of continuous order disorder phase transitions. Extraction of the critical exponents and their associated amplitudes requires an accurate determination of the single scattering intensity vs. parallel component of the scattering vector. Interpretation of measured intensities is complicated by multiple scattering, variation of the scattering factor, and thermal vibrations. These can cause the measured intensity profiles to be skewed and can add substantial intensity which is peaked at the Brillouin zone center. An example of subsidiary structure induced by multiple scattering is given for Gold(110). The effects on the measured critical exponents beta, gamma, and nu are shown to be small in most cases. However, the amplitudes associated with these exponents, such as the correlation length xi, can be seriously affected. Some of these effects also occur in other diffraction methods. GRA

N86-33182# South African Inst. of Physics, Faure.
DEFECT SOLID STATE '84, PROGRAMME AND ABSTRACT BOOKLET
1984 41 p Presented at the 19th Annual Seminar on Theoretical Physics, Cape Town, South Africa, 9 Jul. 1984 Prepared in cooperation with South African Chemical Inst., Johannesburg
(DE86-780445; INIS-mf-10098; CONF-8407145-Absts) Avail: NTIS

(US Sales Only) HC A03/MF A01

Separate abstracts were prepared for each of the included papers. Topics addressed included: surface coatings; crystal structure; diffusion in amorphous alloys; properties of ferroelectric ceramics; surface deformation; work hardening; work softening; gallium arsenides; crystal defects; ion plating; mossbauer effect; phase transformation; activation energy; gettering; amd internal stresses. DOE

N86-33183# Virginia Univ., Charlottesville. Dept. of Physics.
MAGNETIC IMPURITIES IN SUPERCONDUCTORS Performance Report, 1 Jul. 1985 - 30 Jun. 1986
J. Ruvalds 1986 26 p
(Contract DE-FG05-84ER-45113)
(DE86-010283; DOE/ER-45113/2) Avail: NTIS HC A03/MF A01

During the first nineteen months of this grant period we have investigated seven primary subjects and have achieved success in completing certain projects and advancing the others toward the goals originally envisaged. Our research has resulted in the publication of eight manuscripts which involved the participation of graduate students, Research Associates and visiting faculty members in our group. In addition, we have submitted four manuscripts for publication, and two of these have been accepted for publication. Our primary efforts in the investigation of critical fields of superconductors have benefited from research in areas with analogous characteristics such as the metals with charge and spin density waves. Recently, the intense experimental efforts in the study of Heavy Fermion superconductors have revealed evidence for a charge density wave in certain alloys, and thus the close relation between these phenomena fits in nicely with our fields of interest. A very interesting observation of antiferromagnetic order and superconductivity in CePb3 induced by an applied magnetic field is another challenge for our investigation which follows naturally from our research on coupled magnetic impurities in superconductors. Representative examples of our results are presented below, and details may be found in the accompanying manuscript reprints and preprints. DOE

N86-33184# Massachusetts Inst. of Tech., Cambridge. National Magnet Lab.
CRITICAL FIELD MEASUREMENTS ON VERY THIN FILMS OF V-Ga SUPERCONDUCTORS
J. E. Tkaczyk and P. M. Tedrow 1985 7 p
(Contract DE-FG02-84ER-45094)
(DE86-010772; DOE/ER-45094/T1) Avail: NTIS HC A02/MF A01

V Ga thin films, 500, 20, 10 and 8 nm thick have been made for the purpose of studying the role of spin-orbit scattering in the theory of high field superconductivity. Either 1% dopings or thin layers of high-atomic-number elements have been added to these samples in an attempt to increase the spin-orbit scattering rate in this paramagnetically limited material. Critical fields are presented and material parameters are obtained by fitting to a modified Werthamer-Helfand-Hohenberg (WHH) theory. The uniqueness of the parameters obtained in this manner is discussed in light of Fermi-liquid effects. Comparisons are drawn with bulk V Ga. DOE

N86-33185# Sandia National Labs., Albuquerque, N. Mex.
MICROSCOPIC CALCULATION OF CRITICAL LAYER THICKNESS FOR COHERENTLY STRAINED SILICON-LIKE STRUCTURES
B. W. Dodson 1986 8 p Presented at the Northeast Regional Meeting on Semiconductor-based Heterostructure Interfacial Structure and Stability, Murray Hill, N.J., 1 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-009853; SAND-86-0031C; CONF-8605111-1) Avail: NTIS HC A02/MF A01

Monte Carlo based microscopic techniques were used to study the stability of thin coherently strained layers of mismatched silicon-like semiconductor material grown on the (111) silicon surface. The atomic interaction used for this study is the Stillinger-Weber potential, modified to allow modelling of mismatched materials. Mismatched layers from 3 to 80 A thickness were considered. For layers greater than about 20 A thickness, the critical layer thickness is accurately described by the continuum theory of Matthews and Blakeslee. For thinner layers, however, the strain energy associated with misfit dislocations becomes greater than the continuum value, resulting in smaller critical layer thickness, to the extent that critical mismatch as a function of layer thickness becomes non-monotonic for the thinnest films considered. DOE

N86-33186# Sandia National Labs., Albuquerque, N. Mex.
COMPOUND SEMICONDUCTOR STRAINED-LAYER SUPERLATTICES
L. R. Dawson 1986 7 p Presented at the OSA/IEEE Conference on Lasers and Electro-optics, San Francisco, Calif., 9 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007145; SAND-86-0323C; CONF-860622-3) Avail: NTIS HC A02/MF A01

Strained-layer superlattice structures allow a much wider range of semiconductor device structures, as well as the opportunity to tailor materials and device properties in unique ways. Various device applications will be discussed. DOE

N86-33187# Technische Hogeschool Twente, Enschede (Netherlands). Afdeling der Technische Natuurkunde.
DOMAIN CONFIGURATION IN THIN MAGNETIC FILMS, MEASUREMENTS AND CALCULATIONS [DOMEINVORMING IN MAGNETISCHE DUNNE FILMS, METINGEN EN BEREKENINGEN]
Kees Riesebos Apr. 1984 61 p In DUTCH
(ETN-86-97376) Avail: NTIS HC A04/MF A01

Material parameters of thin magnetic films, i.e., magnetization, domain period, anisotropy constant, wall energy, and the field strength at which microwave power is absorbed, were studied with models in which the impact of the domain structure is taken into account. Four films were measured using the vibrating sample magnetometer, electron spin resonance, and Kerr microscope methods. High Q factor films show totally different resonance and magnetization characteristics than those with a low Q, although both have strip domains for a field H=0. A minimal Q (with and without mu-effect) for which a stable perpendicular magnetization is possible, was calculated. A proof for the existence of domains owing to the mu-effect was found. A model in which the domain period can be described up to an H-value for which the domains are contracted to bubbles, was confirmed. ESA

N86-33188# Ecole Nationale Superieure des Telecommunications, Paris (France).
LOCATION AND MEASUREMENT TIME PHENOMENA IN TWO DIMENSIONAL METALLIC (Nb AND Mo) FILMS Ph.D. Thesis [PHENOMENES DE LOCALISATION ET TEMPS MICROSCOPIQUES DANS LES FILMS METALLIQUES (NLCB ET MLCO) BIDIMENSIONNELS]
Samir Khanfir Dec. 1985 118 p In FRENCH Sponsored by Ecole Polytechnique
(ENST-85E014; ISSN-0751-1353; ETN-86-97635) Avail: NTIS HC A06/MF A01

Extremely thin metallic film specimens were obtained and studied. The films presented three conduction varieties: metallic conduction, weak location and strong location. The films were produced by sputtering under extremely high vacuum over a sapphire substrate. The relaxation time of the electronic gas is determined after a very short laser excitation. The electron-phonon time was measured dynamically in the superconductive state. It is shown that time is not responsible for the frequencies of inelastic collisions. The magnetic resistance of Ni shows that it is not controlled by the electron-electron interactions. ESA

N86-33189# Ecole Nationale Superieure des Telecommunications, Paris (France). Lab. de Physique.
OPTICAL PROPERTIES AND INTERFACES OF GaAs/GaAlAs QUANTIC SINKS Ph.D. Thesis [PROPRIETES OPTIQUES ET INTERFACES DES PUITS QUANTIQUES GLCAALCS/GLCAALCLALCS]

Marie-Helene Meynadier Dec. 1985 131 p In FRENCH
(ENST-85E012; ISSN-0751-1353; ETN-86-97633) Avail: NTIS HC A07/MF A01

Phenomena linked to the nature of the interfaces of GaA/GaAlAs quantic sinks in extremely thin layer superlattice structures are studied. The experimental analysis of photoluminescence and excitation spectroscopy was carried out using a Kr laser, a double network monochromotor, a cryostat, and optical equipment. The band discontinuities for several specimens is determined experimentally, showing that the inclusion of acceptors in the interfaces is better explained by a solubility difference than by lattice configurations. Acceptors are found in the barrier, probably due to exodiffusion phenomena. Optical relaxation phenomena are interpreted. ESA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N86-33190 Wisconsin Univ., Madison.
GRAVITATIONAL CONSTANTS AND THE EFFECTIVE ACTION IN CURVED SPACES Ph.D. Thesis
Esteban Adolfo Calzetta 1985 183 p
Avail: Univ. Microfilms Order No. D8601510

Questions related to the computation of the effective action of a classical gravitational field and a system of quantized matter and radiation fields are addressed. The effective action is an extension of the classical action which incorporates quantum effects. Variation of the effective action generates the dynamics of the gravitational field and also that of the expectation values of the quantum fields. In special circumstances the effective action takes the form of the classical action but with space and time dependent constants. In particular we will consider as quantum fields first a broken SU(5) Grand Unified Theory and then a pure non abelian gauge theory in the limit of large curvature. In this second case Renormalization Group methods are used to give the limit form of the effective action in closed form. In the last section of this work (Chapter IV) a thought experiment which challenges the usual interpretation of the energy-time uncertainty relation is considered. The issues raised by this experiment are closely related to the problem of the definition of particles in dynamical space-times. Dissert. Abstr.

N86-33191# Hiroshima Univ., Takehara (Japan). Research Inst. for Theoretical Physics.
COMMENT ON GRAVITATIONAL ANOMALIES
Kazuo Fujikawa, Mitsuyoshi Tomiya, and Osamu Yasuda Nov. 1984 14 p
(DE86-701720; RRK-84-13a) Avail: NTIS (US Sales Only) HC A02/MF A01

It is shown by the path integral method that the general coordinate and local Lorentz anomalies satisfy certain relations between them. The physical meaning of the cancellation of those two anomalies is clarified and it is illustrated for the fields (psi, psi sub((mu)), Fsub(a)) in d = 2. We show that the use of local counter terms can be avoided if one adopts a non-linear realization of general coordinate transformations. The field representation (such as psi sub(mu)) and psi sub(a) dependence of the local Lorentz anomaly is also noted. DOE

N86-33192# Oak Ridge National Lab., Tenn.
ENTHALPY METHOD FOR THE SOLIDIFICATION OF A SUPERCOOLED LIQUID
A. D. Solomon, V. Alexiades, D. G. Wilson, G. Geist, and J. Kerper Mar. 1986 19 p
(Contract DE-AC05-84OR-21400)
(DE86-010073; ORNL-6217) Avail: NTIS HC A02/MF A01

The classical enthalpy formulation of phase change processes does not permit modeling solidification of supercooled liquids. This report describes an enthalpy-based method for simulating a freezing process involving a planar front moving into a supercooled but not hypercooled liquid. The method is applicable when the liquid is initially below its equilibrium freezing temperature, T/sub cr/, but above T/sub cr/ - H/c/sub L/. Here H and c/sub L/ are the latent heat of solidification and the specific heat of the liquid respectively. The report also discusses a computer implementation of the method in one-dimension and results of its application to a particular problem with an explicit solution. DOE

N86-33193# Rome Univ. (Italy). Dipt. di Fisica.
QCD AND EXPERIMENT
G. Altarelli 30 Oct. 1985 30 p Presented at EPS International Europhysics Conference on High Energy Physics, Bari, Italy, 18-24 Jul. 1985 Sponsored by Italian Ministero della Pubblica Istruzione
(Preprint-477; ETN-86-97912) Avail: NTIS HC A03/MF A01

Experimental tests of quantum chromodynamics are reviewed. Purely topological tests; lowest order (but leading log resummed) predictions of rates and distributions; and completely quantitative tests are considered. ESA

N86-33194# Rome Univ. (Italy). Dipt. di Fisica.
A CONSTANT CHROMOMAGNETIC FIELD LEADS NOWHERE
L. Maiani, G. Martinelli, G. C. Rossi, and M. Testa 26 Nov. 1985 37 p Sponsored by Italian Ministero della Pubblica Istruzione
(Preprint-481; ETN-86-97916) Avail: NTIS HC A03/MF A01

The computation of the effective action for classically unstable field configurations, such as a constant chromomagnetic field, is shown to be a completely nonperturbative problem. It is shown that such configurations do not dominate in any sense the functional integral. Ultraviolet properties of the effective action are examined. No anomalous scaling behavior is found. ESA

N86-33195# Rome Univ. (Italy). Dipt. di Fisica.
RENORMALIZATION OF FLUCTUATION EFFECTS IN THE A+A YIELDS A REACTION
L. Peliti 16 Dec. 1985 7 p
(Preprint-490; ETN-86-97924) Avail: NTIS HC A02/MF A01

The field theoretical description of the A+A yields A reaction is exactly renormalized to all orders in perturbation theory. It is confirmed that it belongs to the same universality class as the A+A yields 0 reaction, and that the concentration decay like t sup - d/2 for space dimensionality d <2 and like (ln t/t) for d=2 are exact results. ESA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N86-33196*# California Inst. of Tech., Pasadena.
NEAR-INFRARED OBSERVATIONS OF IRAS MINISURVEY GALAXIES
David P. Carico, B. T. Soifer, J. H. Elias, K. Matthews, G. Neugebauer, and C. Beichman 1986 25 p
(NASA-CR-179707; NAS 1.26:179707) Avail: NTIS HC A02/MF A01 CSCL 03A

Near-infrared photometry was obtained for 82 galaxies from the Infrared Astronomy Satellite (IRAS) minisurvey, a sample of infrared selected galaxies. The near-infrared colors of these galaxies are similar to those of normal field spiral galaxies, but cover a larger range in J - H and H - K. There is evidence of a tighter correlation between the near and far infrared emission than exists between far-infrared and the visible emission. These results suggest that hot dust emission contributes to the 2.2 micron luminosity, and extinction by dust affects both the near-infrared colors and the visible luminosities. In addition, there is an indication that the far-infrared emission in many of the minisurvey galaxies is coming from a strong nuclear component. Author

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N86-33197# California State Univ., Hayward. Dept. of Psychology.
MEMORY AND PROCESSING LIMITS IN DECISION-MAKING Final Report, Jul. 1983 - Sep. 1985
Stuart T. Klapp May 1986 47 p
(Contract F33615-83-K-0039)
(AD-A168559; AFHRL-TR-85-60) Avail: NTIS HC A03/MF A01 CSCL 05/10

According to the classical working memory perspective, tasks such as command and control decision-making should be performed less effectively if extraneous material must be retained in short-term memory. Only marginal support for this prediction was obtained for a simulation involving scheduling trucking and transportation missions (experiments 3 and 4), although robust memory loading did occur in the case of more abstract tasks (Experiments 1 and 2). This pattern of results is not consistent with the classical single system view of working memory, and suggests that working memory may have multiple subsystems. Apparently, some memory demands can be isolated from the memory system used to accomplish the trucking and transportation task. Increased understanding of the nature of working memory subsystems and of isolation of task components into separate subsystems should aid in design of command and control task environments.
Author (GRA)

N86-33198# Department of Energy, Washington, D. C. Office of Project and Facilities Management.
COST AND SCHEDULE CONTROL SYSTEMS CRITERIA FOR CONTRACT PERFORMANCE MEASUREMENT. DATA ANALYSIS GUIDE
Mar. 1986 128 p
(DE86-010796; DOE/MA-0221) Avail: NTIS HC A07/MF A01

The Data Analysis Guide has been prepared to aid both DOE and industry personnel in the effective use of contract performance measurement data. It suggests techniques for analyzing contractor cost and schedule data to give insight into current contract performance status and help validate contractor estimates of future contract performance. The techniques contained herein should be modified and tailored to fit particular project and special needs.
DOE

N86-33199# Argonne National Lab., Ill.
OVERVIEW OF THE NON-PROGRAMMATIC COST PROJECTION PROTOTYPE
D. N. Keto Apr. 1986 57 p
(Contract W-31-109-eng-38)
(DE86-010965; ANL/TM-440) Avail: NTIS HC A04/MF A01

CostPro is a locally-developed computerized system that provides uniform planning and tracking tools for the Argonne National Laboratory. CostPro is designed to accomplish the following tasks: simplified storing of large amounts of data, high speed processing for reports, and easy interfacing to other laboratory business systems. CostPro also has the capability to transfer data among a number of personal computer-based software products. Background information on the Non-Programmatic Cost Projection System is provided. Budgeting and tracking requirements of the Laboratory's Budget Office, how the Cost Projection System meets those requirements, the additional requirements defined by the Computerized Non-Programmatic Planning Model Working Group, and how the Cost Projection System satisfies those additional requirements are described. The concepts and functions of the Cost Projection System are explained. Examples are provided of how to use the Cost Projection System to prepare the data and documents for a fiscal year budget, track actual cost against the budget and revise the fiscal year budget during the year.
DOE

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software.*

N86-33200# Texas A&M Univ., College Station. College of Business Administration.
ORGANIZATION AS INFORMATION PROCESSING SYSTEMS: TOWARD A MODEL OF THE RESEARCH FACTORS ASSOCIATED WITH SIGNIFICANT RESEARCH OUTCOMES
Richard L. Daft, Ricky W. Griffin, and Valerie Yates Apr. 1986 59 p
(Contract N00014-83-C-0025)
(AD-A168018; TR-DG-19-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/2

Three models with the potential to explain significant organizational research outcomes were proposed and tested. Fifty-six organizational scholars were surveyed about one significant and one not-so-significant research project. The findings identified several reported factors that occurred prior to and during research projects that were related to research outcomes. The Ambidextrous model, which includes both organic and mechanistic research characteristics, differentiated significant from not-so-significant research better than the Davis and Antecedents models.
Author (GRA)

N86-33201# Texas A&M Univ., College Station. Dept. of Management.
ORGANIZATIONS AS INFORMATION PROCESSING SYSTEMS: ENVIRONMENTAL CHARACTERISTICS, COMPANY PERFORMANCE AND CHIEF EXECUTIVE SCANNING, AN EMPIRICAL STUDY
Richard Daft, Juhani Sormunen, and Don Parks Apr. 1986 59 p
(Contract N00014-83-C-0025)
(AD-A168035; TR-DG-20-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/2

Chief executives in fifty manufacturing companies were interviewed about the perceived strategic uncertainty in six environmental sectors, and the frequency and mode of scanning used for each sector. The findings suggest customer, economic, and competitor sectors generated greater strategic uncertainty than technological, regulatory, and socio-cultural sectors. When sector uncertainty was high, executives reported greater frequency of scanning and greater use of personnal information sources. Chief executives in high performing companies scanned more frequently and more broadly in response to strategic uncertainty than their counterparts in low performing companies.
GRA

N86-33202# Datalogics, Inc., Chicago, Ill.
TEXT STANDARD GENERALIZED MARKUP LANGUAGE. AUTOMATED TECHNICAL ORDER SYSTEM (ATOS)
23 May 1986 187 p
(Contract F42650-85-C-3410)
(AD-A168137) Avail: NTIS HC A09/MF A01 CSCL 05/2

A tagging scheme generally conforming to the standard Generalized Markup Language was developed to identify the data elements which direct text data formats for publications being processed through automated text processing systems. Subsequently, the tagging scheme was minimized and tailored for processing through the Automated Technical Order System (ATOS). The markup tags described herein are based on rules outlined in the Information Processing - Text and Office Systems - Standard Generalized Markup Language (SGML) Standard -ISO/DIS 8879. In addition, processing of these tags produces technical publications that conform to the format requirements detailed in various military specifications. This report discusses, in detail, each markup tag as well as provides sample input text files and composed output. SMGL outlines a metalanguage for use in document structure identification. The standard is not in itself a

tagging scheme, but rather a methodology for creating tagging schemes suited to individual applications. It was this standard which guided the creation of a tagging scheme to identify the elements in specific military documents. The tags were chosen on the basis of familiarity to the end user, based upon standard military abbreviations. The main result which: (1) brings concepts through a content analysis to determine their structure; (2) identifies them with an organized tagging scheme; (3) provides a metalanguage for tagging interpretation; and (4) govern data exchange. GRA

N86-33203# Presearch, Inc., Fairfax, Va.
ANALYSIS OF THE USE OF DEFENSE TECHNICAL INFORMATION CENTER RESOURCES BY RESEARCH AND DEVELOPMENT CENTERS AND LABORATORIES IN THE US ARMY Final Report, Sep. 1984 - Sep. 1985
Robert V. Hubbard and Kathleen F. Zaccardo 8 Nov. 1985 247 p
(Contract DAAD05-84-C-0189)
(AD-A168441; TR-694) Avail: NTIS HC A11/MF A01 CSCL 05/2

This report describes the methodology, findings, and recommendations of a study of the use of Defense Technical Information Center (DTIC) resources and services by organizations in the Army Research and Development (R&D) Community. The purpose of the study was to investigate Army R&D use of and contribution to DTIC information resources and services, assess the benefits that the availability and use of DTIC resources provides to Army R&D, and develop recommendations for actions the Army might take to use and support DTIC more effectively. Author (GRA)

N86-33204# General Accounting Office, Washington, D. C. General Government Div.
FREEDOM OF INFORMATION ACT: NONCOMPLIANCE WITH AFFIRMATIVE DISCLOSURE PROVISIONS
Apr. 1986 36 p
(AD-A168589; GAO/GGD-86-68) Avail: NTIS HC A03/MF A01 CSCL 05/1

To determine whether federal agencies were complying with the Freedom of Information Act's (FOIA) affirmative disclosure requirements, we interviewed officials of component organizations of the 13 cabinet-level departments and the Veterans Administration and evaluated their procedures. Our review was designed to assess compliance efforts at these organizations only, and the results can not be projected to the departments as a whole or to other organizations subject to FOIA requirements. At the 14 organizations we found that: in 13 instances, the U.S. Government organizations did not publish or keep current information on their central and field organizations; in six instances, organizations' published statements on where the public could obtain information were out of date; and one organization did not publish procedural information on its system of hearings and appeals. Officials in the 14 organizations attributed noncompliance with subsection (a)(1) to such reasons as delays in internal rules clearance processes, frequent agency reorganizations, and administrative error. Officials in some organizations also felt that publication of organization material in The United States Government Manual was sufficient compliance. In 20 instances, 60% of the organizations were not in full compliance with subsection (a)(2) requirements. Thus, these organizations did not provide members of the public the means to routinely identify and inspect all materials they might require in dealing with the organizations. GRA

N86-33205# Department of Energy, Oak Ridge, Tenn. Office of Scientific and Technical Information.
CORPORATE AUTHOR ENTRIES, REVISION 5
P. L. Hendricks, ed. May 1986 973 p
(DE86 007602; DOE/TIC-4585-R5) Avail: NTIS HC A99/MF A01

This reference authority has been created and is maintained to provide standard forms for recording the names of organizations consistently in bibliographic citations. This revision includes approximately 42,000 entries established since 1973. DOE

N86-33206# Department of Energy, Washington, D. C. Office of Computer Ser. and Telecommunications.
INFORMATION TECHNOLOGY RESOURCES LONG-RANGE PLAN, FY 1987-FY 1991
Dec. 1985 228 p
(DE86-010457; DOE/MA-0048-4) Avail: NTIS HC A11/MF A01

The objective of this plan is to describe the information technology resources and capabilities of the Department, the future requirements, and the strategies and plans to satisfy the identified requirements. The long-range planning process provides the systematic means to meet this objective and assists the Department in assuring that information technology support is provided in an efficient, effective, and timely manner so that the programmatic missions can be accomplished. Another objective of the Plan is to promote better understanding, both within and external to the Department, of its information technology environment, requirements, problems, and recommended solutions. The Plan covers the five-year period from fiscal year 1987 through 1991. It takes into consideration the information technology resource requirements of more than 52 different Departmental components and contractors. The IS section and resource identification is limited to business and project management type applications used by Departmental components. DOE

N86-33207# Sandia National Labs., Albuquerque, N. Mex.
STATE OF THE ART OF GEOSCIENCE LIBRARIES AND INFORMATION SERVICES
N. J. Pruett 1986 16 p Presented at the 3rd International Conference on Geoscience Information, Adelaide, Australia, 1 Jun., 1986
(Contract DE-AC04-76DP-00789)
(DE86-011188; SAND-86-1284C; CONF-8606122-1) Avail: NTIS HC A02/MF A01

Geoscience libraries and geoscience information services are closely related. Both are trying to meet the needs of the geoscientists for information and data. Both are also being affected by many trends: increased availability of personal computers; decreased costs of machine readable storage; increased availability of maps in digital format (Pallatto, 1986); progress in graphic displays and in developing Geographic Information System, (GIS) (Kelly and Phillips, 1986); development in artificial intelligence; and the availability of new formats (e.g., CD-ROM). Some additional factors are at work at changing the role of libraries: libraries are coming to recognize the impossibility of collecting everything and the validity of Bradford's Law. Unobtrusive studies of library reference services have pointed out that only 50% of the questions are answered correctly. It is clear that the number of databases is increasing although good figures for specifically geoscience databases are not available; lists of numeric database are beginning to appear; evaluative (as opposed to purely descriptive) reviews of available bibliographic databases are beginning to appear; more and more libraries are getting online catalogs. DOE

N86-33208*# National Aeronautics and Space Administration, Washington, D.C.
PROTOTYPE MATERIAL PROPERTIES DATA NETWORK
C. J. M. Northrup, Jr. (Sandia National Labs., Albuquerque, N. Mex.), J. L. McCarthy (California Univ., Berkeley. Lawrence Berkeley Lab.), J. H. Westbrook (Sci-Tech Knowledge Systems, Scotia, N.Y.), and W. Grattidge 1986 10 p Presented at the ASME Pressure Vessel and Piping Conference and Exhibit, Chicago, Ill., 20 Jul. 1986 Sponsored by NASA
(Contract DE-AC04-76DP-00789)
(NASA-TM-89243; NAS 1.15:89243; DE86-007821; SAND-86-0499C; CONF-860722-7) Avail: NTIS HC A02/MF A01 CSCL 05B

The Scientific Information Research Program (SIRP) is a cooperative program initiated by the National Bureau of Standards and the Department of Energy to develop a prototype, computerized information network. Subsequent support has been provided by the National Aeronautical and Space Administration and the Department of Defense. A group of engineers and scientists were selected from Lawrence Livermore National Laboratory, Los

Alamos National Laboratory and Sandia National Laboratories to form an initial user group and provide guidance in the development of the system. After an intensive analysis, it was determined that the information the Group used most frequently was the physical properties of metal alloys. This data is the focus for the database system, Materials Information for Science and Technology (MIST), being developed for the network. DOE

N86-33209*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
USERS GUIDE TO THE JPL DOPPLER GRAVITY DATABASE
P. M. Muller and W. L. Sjogren 1 Aug. 1986 36 p
(NASA-CR-179749; JPL-Pub-86-16; NAS 1.26:179749) Avail: NTIS HC A03/MF A01 CSCL 05B

Local gravity accelerations and gravimetry have been determined directly from spacecraft Doppler tracking data near the Moon and various planets by the Jet Propulsion Laboratory. Researchers in many fields have an interest in planet-wide global gravimetric mapping and its applications. Many of them use their own computers in support of their studies and would benefit from being able to directly manipulate these gravity data for inclusion in their own modeling computations. Pubication of some 150 Apollo 15 subsatellite low-altitude, high-resolution, single-orbit data sets is covered. The doppler residuals with a determination of the derivative function providing line-of-sight-gravity are both listed and plotted (on microfilm), and can be ordered in computer readable forms (tape and floppy disk). The form and format of this database as well as the methods of data reduction are explained and referenced. A skeleton computer program is provided which can be modified to support re-reductions and re-formatted presentations suitable to a wide variety of research needs undertaken on mainframe or PC class microcomputers. Author

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N86-33210*# Washington Univ., Seattle. Coll. of Architecture and Urban Planning.
THE QUANTITATIVE MODELLING OF HUMAN SPATIAL HABITABILITY Final Report, Feb. - Dec. 1985
James A. Wise 1985 154 p
(Grant NAG2-346)
(NASA-CR-179716; NAS 1.26:179716) Avail: NTIS HC A08/MF A01 CSCL 05K

A model for the quantitative assessment of human spatial habitability is presented in the space station context. The visual aspect assesses how interior spaces appear to the inhabitants. This aspect concerns criteria such as sensed spaciousness and the affective (emotional) connotations of settings' appearances. The kinesthetic aspect evaluates the available space in terms of its suitability to accommodate human movement patterns, as well as the postural and anthrometric changes due to microgravity. Finally, social logic concerns how the volume and geometry of available space either affirms or contravenes established social and organizational expectations for spatial arrangements. Here, the criteria include privacy, status, social power, and proxemics (the uses of space as a medium of social communication). B.G.

N86-33211*# Garrett Turbine Engine Co., Phoenix, Ariz.
ADVANCED GAS TURBINE (AGT) TECHNOLOGY DEVELOPMENT PROJECT ANNUAL REPORT Interim Progress Report, Jul. 1984 - Jun. 1985
Jul. 1986 175 p
(Contract DEN3-167)
(NASA-CR-179485; NAS 1.26:179485; DOE/NASA/0167-10; GARRETT-31-3725(10)) Avail: NTIS HC A08/MF A01 CSCL 20A

This report is the tenth in a series of Technical Summary reports for the Advanced Gas Turbine (AGT) Technology Development Project, authorized under NASA Contract DEN3-167, and sponsored by the Department of Energy (DOE). This report was prepared by Garrett Turbine Engine Company, A Division of the Garrett Corporation, and includes information provided by Ford Motor Company, the Carborundum Company, and AiResearch Casting Company. The Project is administered by Mr. Thomas N. Strom, Project Manager, NASA-Lewis Research Center, Cleveland, Ohio. This report covers plans and progress for the period July 1, 1984 through June 30, 1985. Author

N86-33212# General Accounting Office, Washington, D. C. Resources Community and Economic Development Div.
UNIVERSITY FUNDING: FEDERAL FUNDING MECHANISMS IN SUPPORT OF UNIVERSITY RESEARCH
Feb. 1986 187 p
(AD-A168023; GAO/RCED-86-53) Avail: NTIS HC A09/MF A01 CSCL 05/1

The nation's universities play a vital role in advancing U.S. economic health by performing nearly half of its basic research that provides the foundation for technological progress. Federal funds support approximately two-thirds of this university-based basic research. As reported by the National Science Foundation, the federal government, in fiscal year 1984, expended approximately $5.5 billion at universities for research and development, of which approximately $4 billion was for basic research. The federal government transfer funds to universities and colleges through various funding mechanisms support both research and the infrastructure of research (major equipment and facilities, special training needs, and institutional support). A funding mechanism is a category of federal financial support or scientific research performed at and by U.S. universities. With the last decade concern has grown that the current array of funding mechanisms may not adequately provide for the continuity and stability of research, the modernized equipment, and the human resourcs needed to maintain the vital role the universities play in the nation's research effort. This report provides information on federal funding of university research by presenting the array of funding mechanisms used by Federal agencies in funding such research. GRA

N86-33213# Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH, AIR FORCE SYSTEMS COMMAND TECHNICAL REPORT SUMMARIES, FIRST QUARTER 1986 Quarterly Report, Jan. - Mar. 1986
Barbara J. Wert Mar. 1986 267 p
(AD-A168619; AFOSR-TR-86-0311) Avail: NTIS HC A12/MF A01 CSCL 05/2

The AFOSR Technical Report Summaries are published

quarterly by the Air Force Office of Scientific Research (AFOSR) of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for that quarter.
GRA

N86-33214# Department of Energy, Washington, D. C. Office of Transportation Systems.
ELECTRIC AND HYBRID VEHICLES PROGRAM: REPORT TO THE CONGRESS Annual Report, fiscal year 1985
Mar. 1986 37 p
(DE86-009607; DOE/CE-0146; AR-9) Avail: NTIS HC A03/MF A01

The ninth annual report on the implementation of the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976 (Public Law 94-413, as amended by Public Law 95-238, and Public Law 96-185) referred to as the Act, complies with the reporting requirements established in Section 14 of the Act. In addition to informing Congress of the progress and plans of the Department of Energy Electric and Hybrid Vehicles Program, this report is intended to serve as a communication link between the Department and all of the public and private interests involved in making the program a success. During FY 1985, significant progress was made toward fulfilling the intent of the Congress in the Act. There has been continuing interest shown by both the automobile manufacturing and supply sectors of our economy in electric and hybrid vehicles. Research and development efforts in batteries and propulsion components continue to achieve significant progress in providing industry with technology options that will result in vehicles that will be more economically competitive and more acceptable.
DOE

N86-33215# Central Lab. TNO, Delft (Netherlands).
[ACTIVITIES REPORT IN ENERGY TECHNOLOGY] Annual Report, 1983 [JAARVERSLAG 1983]
1984 91 p In DUTCH
(ETN-86-97384) Avail: NTIS HC A05/MF A01

Research in industrial technology (robotics, biotechnology, hyperfiltration membranes, plastics recycling, pipe laying ship motion measurements); energy (heat pumps, energy saving); computer aided manufacturing; quality control; and speech intelligibility is summarized. Other activities reported include fire security; environment protection; health; man machine systems; nutrition and food; defense; management; and knowledge transfer.
ESA

88 SPACE SCIENCES (GENERAL)

N86-33216 Centre National d'Etudes Spatiales, Toulouse (France).
ISOTOPIC RATIOS IN THE SOLAR SYSTEM
1985 304 p Partly in ENGLISH and FRENCH Conference held in Paris, France, 19-22 Jun. 1984
(ISBN-2-85428-133-0; ISSN-0766-1002; ETN-86-97642) Copyright. Avail: CEPADUES, Toulouse, France

The complementarity of isotopic ratio measurements made in situ by space means or in laboratories using meteorites, Moon samples, or interplanetary dust, or else based on the analysis of spectra emitted by the giant planets and comets was discussed. The implications of the results for the formation of planets from the primary solar nebula, and for Universe formation according to the Big Bang theory, were considered. For individual titles, see N86-33217 through N86-33245.
ESA

N86-33217 California Univ., La Jolla.
EXPOSURE AGES OF IRON METEORITES: COMPLEX HISTORIES AND THE CONSTANCY OF GALACTIC COSMIC RAYS **c93**
B. Lavielle, K. Marti, and S. Regnier *In* CNES Isotopic Ratios in the Solar System 1985 p 15-20 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Starting from a compilation of measured cosmogenic He, Ne, Ar, and K isotopes in iron meteorites, an exposure age T38 is defined. This age is found useful to study the exposure history of iron meteorites in terms of complex history, age distribution versus time and group, and galactic cosmic ray constancy or not. Exposure ages of less than 200 million yr can be determined.
ESA

N86-33218 Institut de Physique du Globe, Paris (France).
ISOTOPES PRODUCED BY GALACTIC COSMIC RAYS IN IRON METEORITES **c90**
J. L. Birck and C. J. Allegre *In* CNES Isotopic Ratios in the Solar System 1985 p 21-25 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The elements Li, Mg, K, Ca, Ti, V, and Cr were investigated in the iron meteorites Grant and Carbo. Their isotopic ratios show clearly the effects of spallation by galactic cosmic rays. The experimental technique can determine the concentration of spallation products with a precision close to 1 per mil for a number of isotopes. The effects of shielding are clearly shown in the calcium data and the exposure ages are calculated by using the K40 measurements.
ESA

N86-33219 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
ON THE PRODUCTION RATE OF Ne-21 IN ORDINARY CHONDRITES **c90**
Ludolf Schultz and Manfred Freundel *In* CNES Isotopic Ratios in the Solar System 1985 p 27-33 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Four eucrites were analyzed for cosmogenic Ar and Kr. From their Kr81 exposure ages, production rates of Ar38 and Ne21 in this group of achondrites were determined as P (38) E = (0.139 +or- 0.005) x 10 to the minus 8th power ccSTP/gMa, and P (21) E = (0.185 +or- 0.013) x 10 to the minus 8th power ccSTP/gMa, respectively. Taking into account differences in chemical composition between eucrites and ordinary chondrites, the production rate of Ne21 in L-group chondrites is P (21) L = (0.32 +or- 0.04) x 10 to the minus 8th power ccSTP/gMa. This value agrees with published production rates deduced from other cosmogenic radionuclides except Al26.
ESA

N86-33220 Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
LONG-LIVED ISOTOPES AS INDICATORS OF THE NATURE OF THE CRETACEOUS-TERTIARY EVENT: EXPERIMENTAL RESULTS ON THE URANIUM ISOTOPIC COMPOSITION **c90**
R. Rocchia, D. Boclet, Ph. Bonte, Ph. Holliger, and C. Jehanno *In* CNES Isotopic Ratios in the Solar System 1985 p 35-42 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The encounter of the solar system with one of the dense interstellar clouds which populate galactic arms, and the accretion by the Earth of interstellar dust, during the Cretaceous-Tertiary (K-T) event is discussed. The presence of interstellar matter, a significant fraction of which was synthetized after the birth of the solar system, could be identified by a rather high concentration of long lived isotopes, in particular Pu244, U235, and Re187. It is shown that the absence of anomalies on Pu and U is not conclusive and that the hypothesis of a nonsolar origin for the K-T event cannot be rejected.
ESA

N86-33221 Paris VI Univ. (France). Lab. de Mineralogie-Cristallographie.
EXTREME MAGNESIUM ISOTOPE FRACTIONATION IN THE LEOVILLE METEORITE **c90**
J. C. Lorin and A. Havette (Paris II Univ., Orsay (France).) *In* CNES Isotopic Ratios in the Solar System 1985 p 43-69 (For primary document see N86-33216 24-88)
(Grant INAG-47-84)
Avail: CEPADUES, Toulouse, France

The fine-scale composition of magnesium in an inclusion from

the Leoville (CV3) meteorite was studied. Results show that magnesium in spinels is heavier than terrestrial by 8 per mil per amu; that Mg26 excesses are found in anorthite; and that these excesses are inversely correlated to magnesium concentration. No Mg26 excesses are found in the soda-rich phase(s), suggesting formation of these phases at least 3 Myr after anorthite. Extreme mass-dependent isotope fractionation is observed in a few areas of magnesium-poor phases, indicating the presence of two closely associated components, one very heavy and the other very light. These components may be carried by grains or aggregates not yet identified, either early condensates or presolar grains. Another possibility is that this pattern was established by condensation in the solar nebula. ESA

N86-33222 Lawrence Livermore National Lab., Calif.
IMPLICATIONS OF Ti ISOTOPIC ANOMALIES IN METEORITES **c90**
S. Niemeyer and G. W. Lugmair *In* CNES Isotopic Ratios in the Solar System 1985 p 71-75 (For primary document see N86-33216 24-88)
(Contract DOE-W-7405-Eng-48)
Avail: CEPADUES, Toulouse, France

Observations of Ti isotopic anomalies in Allende inclusions, matrix separates of C2 chondrites, and a bulk sample of a C1 chondrite are reviewed. Results place Ti alongside oxygen as the only known non-noble gas elements which show widespread nuclear isotopic anomalies. At least four distinct isotopic components of Ti are required to account for the observed isotopic variations. The Ti data cannot be plausibly explained in terms of an early solar-system particle irradiation. It is suggested that the Ti anomalies are linked to a diversity of stellar nucleosynthetic sources for Ti isotopes and the refractory behavior of Ti. Therefore a chemical memory from the interstellar medium, rather than late-stage supernova injection, is most likely responsible for the preservation of observed isotopic heterogeneities. ESA

N86-33223 California Inst. of Tech., Pasadena.
SHORT-LIVED NUCLIDES IN THE EARLY SOLAR SYSTEM AND GENERAL ISOTOPIC ANOMALIES IN METEORITES **c90**
D. A. Papanastassiou *In* CNES Isotopic Ratios in the Solar System 1985 p 77-88 Sponsored by NASA and NSF (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Evidence for short-lived nuclides in the early solar system is reviewed. The presence of these nuclides requires the addition to the interstellar medium, from which the solar system formed, of freshly synthesized materials just prior to the formation of the solar system. The best evidence is obtained for Al26. The time scale implied by the Al26 effects is equated with the free-fall time for the collapse of the protosolar cloud. From the observation of ratios of short-lived parent to stable isotopes for nuclides with different half-lives, it is apparent that addition of exotic material to the solar system occurred just prior to its formation. Evidence for a diffuse galactic gamma-ray line emission attributed to Al26 provides support for the existence of Al26 in the protosolar cloud. The time scale for isolation of the protosolar cloud would still be restricted on a timescale comparable to tau 1/2 (Al26). ESA

N86-33224 Open Univ., Milton (England). Dept. of Earth Sciences.
ISOTOPE ABUNDANCE MEASUREMENTS OF CARBON, NITROGEN AND HYDROGEN IN METEORITES **c90**
I. P. Wright and C. T. Pillinger *In* CNES Isotopic Ratios in the Solar System 1985 p 89-94 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

It is argued that by making light element stable isotope measurements of meteorite fractions, distinctive isotopic signatures frozen-in at some point in the meteorite's history can be found, giving valuable information on the evolution of the solar system. There are vestiges of deuterium-enriched interstellar molecules within the bulk of the organic fractions from C1, C2 and unequilibrated ordinary chondrites. If these isotopically anomalous compounds were admixed with relatively homogenous solar system materials at a late stage in the solar nebula then by default presolar carbon and nitrogen must also survive. The nitrogen in primitive meteorites exhibits large variations in isotopic composition and this may reflect something of the variability of the precursor materials. The carbon isotopic compositions, however, seem relatively uniform implying that presolar carbon had a similar 12C/13C ratio to that of the bulk of the solar system material. Noble gases suggest a variety of origins, including red giant stars and supernovae. ESA

N86-33225 Open Univ., Milton (England). Dept. of Earth Sciences.
THE DISTRIBUTION AND ISOTOPIC COMPOSITION OF GRAPHITE CARBON IN THE EARLY SOLAR SYSTEM **c90**
M. M. Grady and C. T. Pillinger *In* CNES Isotopic Ratios in the Solar System 1985 p 95-105 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Isotopic data from graphitic carbon in the early solar system is summarized. There is a greater spread in values of delta C13 for graphite from the oxidized meteorites (ordinary chondrites) than in the reduced specimens (enstatite chondrites and irons). This is presumably a reflection of different production mechanisms and formation localities of the graphite; ordinary chondrites and ureilites, along with interplanetary dust particles, exhibit characteristics of formation via the catalytic decomposition of CO gas, whereas graphite in enstatite chondrites and irons appears more likely to be exsolved from carbon-rich Fe-Ni metal. The isotopic composition of carbon in the ureilites is close to that of the reduced meteorite classes, possibly indicating that the ureilites were accreted in a locality nearer to that where the highly reduced specimens formed than the ordinary chondrites. ESA

N86-33226 Vrije Universiteit, Brussels (Belgium). Dept. de Chimie Organique.
THE C12/C13 ISOTOPIC EFFECT IN CARBONACEOUS CHONDRITES: SIZE AND IMPORTANCE OF THE MAGNETIC ISOTOPE EFFECT **c90**
J. Reisse and F. Mullie *In* CNES Isotopic Ratios in the Solar System 1985 p 107-116 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Variations in the C12/C13 isotopic ratios measured for chondritic organic molecules or chondritic samples are discusssed. The broad variations are traditionally explained by taking into account either the difference in mass between the two isotopes or the isotopic inhomogeneities of the protosolar nebula. It is shown that a magnetic isotope effect associated with the difference between the nuclear magnetic moments of different nuclei must also be taken into account because this magnetic effect may, under certain circumstances, be much larger than the massic isotope effect, and indeed may be as large as the effects traditionally interpreted in terms of protosolar nebula inhomogeneities. ESA

N86-33227 Bern Univ. (Switzerland). Inst. fuer Physik.
NOBLE GAS ANOMALIES IN METEORITIC AND LUNAR SAMPLES AND THEIR CHRONOLOGICAL INTERPRETATION **c91**
O. Eugster *In* CNES Isotopic Ratios in the Solar System 1985 p 117-128 Sponsored by Swiss National Science Foundation (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The time scales stored in the isotopic signatures of the noble gases in extraterrestrial matter are discussed. It is shown that neon greatly enriched in Ne22(Ne-E) could form in stars from the decay of Na22. If Ne-E found in meteorites originates from in situ decay of Na22 it might be possible to use Ne-E as a chronometer for the formation time of its carrier grains. Based on Xe129 and fission Xe from the decay of extinct I129 and Pu244, respectively, a temporal framework for the formation and earliest evolution of planetary bodies could be established. Absolute formation ages were obtained from the K40-Ar40 dating scheme and from the

Ar39-Ar40 method applied to date the gas retention ages of meteorites and to define the time scales of rock formation on the Moon. The history of meteoritic and lunar matter after its formation can be unraveled in terms of shielding and duration of exposure to galactic cosmic rays. This permits determination of the time which a meteorite travelled in free space and to derive the formation time of lunar surface features such as meteorite impact craters on the Moon.
ESA

N86-33228 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
TRAPPED NEON IN UREILITES: A NEW COMPONENT c90
U. Ott, H. P. Loehr, and F. Begemann *In* CNES Isotopic Ratios in the Solar System 1985 p 129-136 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Noble gases in five ureilites were analyzed by conventional noble gas mass spectrometry and, in one case, by closed-system combustion mass spectrometry of an acid-resistant residue. From analyses of the Hajmah ureilite a composition for trapped neon of Ne20/Ne22 = 10.4 +or- 0.3 is derived. This differs from all other known components of trapped neon. Its composition is compatible both with being fractionated solar Ne and being a mixture of solar Ne and Ne-E. The associated He has an He3/He4 ratio within the range of other trapped He compositions. Closed-system combustion data demonstrate the presence of an easily combustible fraction with low Ar36/Xe132 ratio, in accordance with the existence of a second gas component in addition to that residing in diamonds. Attempts to characterize this phase in the Nilpena ureilite reported to be diamond-free met with little success, because diamonds are present.
ESA

N86-33229 Eidgenoessische Technische Hochschule, Zurich (Switzerland).
THE ISOTOPIC COMPOSITION OF NEON EMITTED IN SOLAR FLARES AND TRAPPED IN LUNAR SOIL MINERALS c92
Rainer Wieler, Heinrich Baur, and Peter Signer *In* CNES Isotopic Ratios in the Solar System 1985 p 137-146 (For primary document see N86-33216 24-88)
(Grant SNSF-2.443.-0.82)
Avail: CEPADUES, Toulouse, France

Closed system etching of lunar soil samples and stepwise mass spectrometric analysis of the He, Ne, and Ar released was developed. This noble gas release technique prevents isotopic and elemental fractionation occurring in stepwise heating. Measurements on one pyroxene and two plagioclase separates reveal the presence of trapped noble gases emitted during solar flares (SEP Ne) besides the solar wind, confirming earlier indications for such a component. Solar wind Ne and SEP Ne are isotopically different. The best estimate for the composition of SEP Ne is: Ne20/Ne22 = 11.1 +or- 0.2; Ne21/Ne22 less than or = 0.029. The Ne20/Ne22 ratio is within error limits equal to Ne-C found in meteorites but agrees at best marginally with the respective value measured by satellite borne instruments. The SEP Ne in lunar soils is not identical with planetary Ne. Only weak evidence that SEP Ar may be isotopically different from solar wind Ar is found.
ESA

N86-33230 Academy of Sciences (USSR), Moscow. Inst. of Geochemistry and Analytical Chemistry.
ON THE XENON IN ACID-RESISTANT RESIDUES OF THE EFREMOVKA CV AND ALLENDE CV CHONDRITES c90
A. V. Fisenko, D. VuMinh, L. F. Semjonova, A. K. Lavrukhina, and Ju. A. Shukolyukov *In* CNES Isotopic Ratios in the Solar System 1985 p 147-154 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The analysis of Xe isotopic composition was carried out in Hfm HCl-insoluble residues before and after etching with NaOH-H2O2, HNO3, H3PO4, HCLO4, H3PO4 + H2SO4 + HClO4 of the CV chondrite Efremovka. Maximum values of the ratios Xe136/Xe130 and Xe124/Xe130 were measured for residues after etching with mixture H3PO4 + H2SO4 + HClO4. Based on Xe data in different acid resistant residues of the Efremovka CV and Allende CV chondrites excesses for iXe isotopes (i = 129, 131, 132, 136) relative to Xe solar were calculated. The analysis of excesses shows that in Xe-X component the excesses 129, 131, 132Xe isotopes are due to two or more Xe components which must be strongly interrelated, while Xe136, Xe134 excesses are due to another Xe component not connected with previous components.
ESA

N86-33231 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
THE Ar36/Ar38 RATIOS IN SELECTED METEORITES c90
A. Burghele *In* CNES Isotopic Ratios in the Solar System 1985 p 155-161 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Three eucrites (Sioux County, Stannern, Yamato 74450); 2 diogenites (Yamato 74013, Johnstown); 1 howardite (Yamato 7308); 1 4A-iron meteorite with abnormal structure (Steinbach); 1 LL6-amphoterite (St. Severin) and 1 L4-Olivine-Hypersthene-Chondrite (Bjurbole) were analyzed using the Ar36/Ar38 ratios. Measured ratios are in good agreement with those theoretically calculated by Hohenberg et al (1978) for Moon material. For all the temperature steps of the separated feldspar of Bjurbole, these ratios have values around 1. The same value of 1 is obtained at the lower temperature steps for meteorites like Steinbach, St. Severin, Yamato 74013, and Johnstown, where the degassing of at least 2 distinct mineral phases can be obseved. Values of 0.65 are obtained for these meteorites at higher temperature steps. For the calcium-rich eucrites: Sioux County, Stannern, and Yamato 74450, the Ar ratios are 0.68 at practically all temperature steps. The degassing patterns of these meteorites show no differentiation between calcium-rich and calcium-poor mineral components. The same is valid for Yamato 7308: a value of 0.80 is obtained for almost all temperature steps.
ESA

N86-33232 Tata Inst. of Fundamental Research, Bombay (India). Astrophysics Group.
ORIGIN OF NEON-E c90
S. Ramadurai and O. K. Manuel *In* CNES Isotopic Ratios in the Solar System 1985 p 167-170 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The experimental data on the Orgueil meteorite of Eberhardt et al. (1981) is reanalyzed to delineate the various components of neon isotopes and their correlation with other elements and isotopes. The results indicate that there is a good correlation of Ne22 with trapped Ar in high density samples. This correlation indicates the presence of an Ne22-free component of neon. The possibility of mass fractionation is suggested for an earlier experiment on diffusion through a membrane of Vycor.
ESA

N86-33233 Observatoire de Paris-Meudon (France).
ISOTOPIC RATIOS IN COMETS c90
Therese Encrenaz *In* CNES Isotopic Ratios in the Solar System 1985 p 173-180 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The use of isotopic ratios in comets to study solar system history is discussed. The only isotopic ratio measured in comets is the C12/C13 ratio, derived from the (1-0) C2 bands in the visible range. Results were obtained for 5 comets; although the error bars are large, there may be an indication for a C12 enrichment relative to the mean solar system value. If this effect is real, a possible explanation is a fractionation process in the gaseous phase before the accretion in the cometary nucleus. As the reaction is very temperature dependent, this effect could be a powerful test for determining the temperature of the formation medium. For D/H, several fractionation processes could lead to a strong deuterium enrichment. Knowledge of cometary isotopic ratios should improve significantly with measurements of the Vega and Giotto neutral mass spectrometers during the Halley flyby missions. Estimates of D/H on bright comets are feasible with the Space Telescope.
ESA

N86-33234 Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
ISOTOPIC RATIOS IN GIANT PLANETS c90
Daniel Gautier *In* CNES Isotopic Ratios in the Solar System 1985

p 181-190 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The accuracy of spectrometric measurements of isotopic ratios in giant planets, and implications on the formation of giant planets are discussed. Derivations of D/H in Jupiter and Saturn form CH3D conflict with derivations from HD. Uncertainties in the interpretation come from the difficulty in estimating the fractionation factor between CH3D and CH4, and from scattering effects in the radiative transfer within HD and H2 absorption lines. However, deuterium abundance in the primordial solar nebula 4.6 billion yr ago can be estimated. Data suggest that D/H is enhanced in Uranus compared to Jupiter and Saturn, in agreement with a scenario of inhomogeneous formation of giant planets. The C12/C13 value in Jupiter from Voyager measurements suggests a value significantly higher than the terrestrial value, but conflicts with the value derived from ground based measurements, which agrees with the terrestrial value. The N14/N15 value is compatible with the terrestrial value. ESA

N86-33235 Montreal Univ. (Quebec). Dept. de Physique.
GRAVITATIONAL SETTLING IN THE JOVIAN ATMOSPHERE **c91**
Georges Michaud, Daniel Gautier (Observatoire de Paris-Meudon (France).), and Hubert Reeves (Commissariat a l'Energie Atomique, Saclay (France).) *In* CNES Isotopic Ratios in the Solar System 1985 p 191-194 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

It would appear very unlikely that chemical separation by gravitational settling affected the helium in Jupiter. The line forming region, relevant to the observations, is centered around P = 300 mb while the convective zone is believed to start around P = 1b downward. To obtain a depletion of 20% in He requires Y (0.3b) x 0.9. It is expected that CH4 and NH3 be reduced by a factor of 2.5 while PH3 should be down by a factor of 5. There is no evidence for such molecular depletions at high altitude. At 1 mb, carbon (in CH4) is twice solar, leading to a discrepancy of a factor of 5 between the observations and the expectation of the model. Nitrogen and phosphorus are reported to be solar at 1 bar. It is concluded that Y (0.3b) greater than 0.9, equivalent to DT > or = 30/sqcm/sec. For the carbon isotopic ratio, to account for a factor 2 between the level at P = 1mb and P = 1mb requires Y = 0.16, implying a reduction of a factor of 10 in the He/H2 ratio and of greater than 1000 in the CH4/H2 ratio. ESA

N86-33236 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE D/H RATIO IN SATURN'S ATMOSPHERE FROM VOYAGER IRIS SPECTRA **c91**
R. Courtin (Observatoire de Paris-Meudon (France).), D. Gautier, A. Marten, B. Bezard, and R. Hanel *In* CNES Isotopic Ratios in the Solar System 1985 p 201-204 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

A selection of 1656 spectra recorded between 180 and 2300 mm in the 20 to 40 N latitude range by the Voyager interferometer IRIS were analyzed. The CH3D/H2 and CH4/H2 ratios are determined from a best fit of the radiances measured in the nu6 and nu4 fundamental bands, respectively centered at 1161 and 1304 mm. Results are CH3D/H2 = 3.9 + or - 2.5 times 10 to the minus 7th power and CH4/H2 = 4.5 + 2.4, -1.9 x 0.001. The uncertainty includes random errors due to instrumental noise and possible systematic errors in the assumed temperature profile and spectroscopic parameters. The D/H isotopic ratio is determined from abundance ratios from the expression D/H = 1/4f (CH3D/H2)/(CH4/H2) where f accounts for equilibrium deuterium fractionation between the molecular hydrogen and methane phases. Beer and Taylor (1973, 1978) estimated f = 1.37 + or - 0.07 for Jupiter assuming a wide range of convective velocities and neglecting catalytic effects from dust particles. The same value was adopted for Saturn and yields D/H = 1.6 +1.3, -1.2 times 10 to the minus 5th power. ESA

N86-33237 Observatoire de Paris-Meudon (France).
THE N14/N15 RATIO IN THE ATMOSPHERE OF JUPITER **c91**
Pierre Drossart, Therese Encrenaz, and Michel Combes *In* CNES Isotopic Ratios in the Solar System 1985 p 205-212 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Infrared spectra of Jupiter recorded at the European Southern Observatory are discussed. They show evidence of 15NH3 lines; compared with synthetic spectra, other jovian spectra published by Tokunaga et al (1979 and 1980) and IRIS Voyager spectra, the value of the N14/N15 ratio = 270, is close to the solar value. Interpretation problems coming from the absorption by an ammonia cloud on Jupiter with a variable depth, and from the variability of the jovian atmospheric parameters, which are spatially averaged by each Earth recorded spectrum, are emphasized. ESA

N86-33238 Bern Univ. (Switzerland). Inst. de Physique.
ION COMPOSITION IN THE SOLAR WIND IN RELATION TO SOLAR ABUNDANCES **c92**
Johannes Geiss and Peter Bochsler *In* CNES Isotopic Ratios in the Solar System 1985 p 213-228 Sponsored by Swiss National Foundation (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Processes affecting the composition of the solar wind are reviewed. A process operating in or directly above the chromosphere has to be invoked to explain the observed dependency on the first ionization potential of corona, solar energetic particle, and solar wind abundances relative to the photospheric composition. The critical velocity process, that would lead to this type of element fractionation, was proposed by Alfven (1960). The possibility of explaining the evidence by a diffusive ion-atom separation process in a solar plasma under non-LTE condition is discussed. Element and isotope abundance measurements in the solar wind are summarized. ESA

N86-33239 Tata Inst. of Fundamental Research, Bombay (India).
METEORITES AND COMETS: A STUDY IN RELATION TO C12/C13 RATIOS **c90**
S. Ramadurai and K. S. KrishnaSwamy *In* CNES Isotopic Ratios in the Solar System 1985 p 229-232 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Evidence in meteoritic inclusions for an enrichment of C13 is compared with results of the line profile analysis of the high resolution (0-0) Swan band observations by Lambert and Danks (1983). Results for Comet West indicate a ratio of C12/C13 = 50. It is concluded that the close agreement of this ratio with the ratio of carbon associated with S process xenon indicates a common origin for both. ESA

N86-33240 Institut d'Astrophysique, Paris (France).
SOLAR ISOTOPIC RATIOS, CHEMICAL EVOLUTION OF GALAXIES AND COSMOLOGY **c90**
Jean Audouze *In* CNES Isotopic Ratios in the Solar System 1985 p 235-249 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Use of solar isotopic ratios as tools in building up models of chemical evolution of galaxies is discussed. The relevance of these models (in which the evolution of D, He3 and He4 is analyzed) concerns the primordial nucleosynthesis: standard Big Bang nucleosynthesis constraining the baryon density and the number of neutrino flavors works only in a quite restricted set of models of galactic evolution. Infall or inflow of external material are necessary to provide a consistent picture between the standard Big Bang nucleosynthesis and the solar isotopic ratios. Results allowing a comparison between stellar and solar Mg ratios are presented. ESA

N86-33241 Institut d'Astrophysique, Paris (France).
THE INTERSTELLAR LITHIUM ABUNDANCE AND THE LI6/LI RATIO **c90**
R. Ferlat and M. Dennefeld *In* CNES Isotopic Ratios in the Solar System 1985 p 251-255 In FRENCH; ENGLISH summary (For

primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The lambda 6708 doublet of interstellar Li I was observed at high spectral resolution (3 km/sec) and very good signal to noise ratio (4000) towards delta Sco and zeta Oph. Using a profile fitting method, an Li71Li6 ratio of 38 for a diffuse cloud in front of zeta Oph is derived. Even the lower limit of the error bar (25) is incompatible with the ratio measured in meteorites and is not explained by models of galactic evolution. The existence of a local inhomogeneity is suggested. As for other alkalis, lithium is depleted onto dust grains in the diffuse interstellar medium. ESA

N86-33242 National Observatory, Rio de Janeiro (Brazil).
METAL ENRICHMENT OF STARS IN THE ORION COMPLEX AND ITS RELATION WITH THE FORMATION OF THE SOLAR SYSTEM: PRELIMINARY RESULTS **c90**
Katia Cunha and Ramiro delaReza *In* CNES Isotopic Ratios in the Solar System 1985 p 257-265 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The possibility of the formation of the solar system in an OB association similar to those existing in the Orion Complex is considered. Metal enrichment by supernova contamination, in the gas forming successive young stars in Orion OB associations, is examined. Ultraviolet high resolution resonance lines of Al III, and subordinate lines of Mg II were measured. These lines correspond to OB stars belonging to associations of different ages in Orion. Abundance results indicate a positive enrichment in stellar photosphere with time. ESA

N86-33243 Institut d'Astrophysique, Paris (France).
THERMAL NUCLEAR DESTRUCTION OF LITHIUM, BERYLLIUM AND BORON INSIDE A 1 SOLAR MASS STAR **c90**
Pascale Delbourgo-Salvador, Guy Malinie, and Jean Audouze *In* CNES Isotopic Ratios in the Solar System 1985 p 267-272 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The destruction rates of lithium, beryllium and boron inside a 1 solar mass star are calculated using nuclear reaction rates updated by Harris et al (1983). The isotopic and elemental composition of the material ejected by the star inside the interstellar medium at the end of its life is determined, in order to evaluate its influence on the galactic evolution of the ratios Li7/Li6, B11/B10, and Li/B. The isotopic ratio B11/B10 is not influenced by stellar nucleosynthesis, these two elements are destroyed in the same proportions. The Li6 is completly destroyed in stars, so the interstellar medium is depleted in this element. The elemental ratio Li/B is affected because boron is less destroyed than lithium in this star. Stellar evolution decreases this ratio. ESA

N86-33244 Vrije Universiteit, Brussels (Belgium). Inst. d'Astronomie, d'Astrophysique et de Geophysi
ISOTOPIC ANOMALIES IN METEORITES AND NUCLEOSYNTHESIS (1): A REVIEW OF THE NONRADIOGENIC CASES BETWEEN CARBON AND SILICON **c90**
M. Arnould *In* CNES Isotopic Ratios in the Solar System 1985 p 283-294 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

The stellar synthesis of the isotopes of carbon, nitrogen, oxygen, magnesium, and silicon is reviewed in relation with the anomalous isotopic components of those elements found in primitive meteorites. Nuclear production mechanisms are outlined. No conclusions as to the origins of isotopic anomalies are drawn. ESA

N86-33245 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ELEMENT AND ISOTOPE FRACTIONATION IN PREPLANETARY NEBULA **c90**
G. E. Morfill *In* CNES Isotopic Ratios in the Solar System 1985 p 295-302 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

Theoretical work on chemical and isotopic fractionation in the solar system is reviewed. A possible evolutionary stage of the presolar cloud is that of a turbulent accretion disk which is continuously fed from a surrounding envelope, contains dust and gas, is hot in the center (a few 1000 K) and the temperature decreases with distance from the rotation axis. Dust particles initially contain an admixture of chemical components, from volatile ices to refractory oxides. Transport within the disk leads to a systematic spatial chemical fractionation by selective sublimation and condensation of the various components in different regions. Physicochemical processes, which in general are mass-dependent, lead to a spatial isotope fractionation. It is possible that these macroscopic structures imprinted on the presolar cloud may be preserved in solid solar system matter today. The consequences of the theory are compared with measurements in the solar system. ESA

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N86-33246# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
THE COMPLETION OF A STAR CATALOG FOR THE OPTICAL AIRCRAFT MEASUREMENTS PROGRAM
Laurence G. Taff 7 Apr. 1986 12 p
(Contract F19628-85-C-0002)
(AD-A168017; TR-751; ESD-TR-86-004) Avail: NTIS HC A02/MF A01 CSCL 03/1

This report summarizes the construction of a combined astrometric-photometric, all-sky, star catalog for the Optical Aircraft Measurements Program (OAMP). In addition to discussing the sources and handling of the astrometric and photometric data, the format of the catalog, its completeness, its precision and its accuracy, the author also discusses the problem of updating Besselian 1950.0 locations and velocities to J2000.0 in veiw of the new (1984) International Astronomical Union recommendations GRA

N86-32462# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OBSERVATIONS OF HALLEY'S COMET BY THE SOLAR MAXIMUM MISSION (SMM)
M. B. Niedner *In* ESA Space Missions to Halley's Comet Mar. 1986 p 135-143 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

N86-32465# International Halley Watch, Pasadena, Calif.
THE INTERNATIONAL HALLEY WATCH (IHW) AND ITS OBSERVING NETS
In ESA Space Missions to Halley's Comet Mar. 1986 p 161-178 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N86-33247 North Carolina Univ., Chapel Hill.
INITIAL DATA FOR BLACK HOLE COLLISIONS **Ph.D. Thesis**
Joel David Rauber 1985 143 p
Avail: Univ. Microfilms Order No. DA8527224

A problem of considerable interest in relativistic astrophysics is to determine the gravitational radiation produced by collisions of compact objects, such as black holes. Such collisions may occur, for example, in the nuclei of galaxies. This problem requires that one solve the Einstein equation without limiting approximations,

for example, as a Cauchy problem. Therefore, one must first construct the initial data. The extrinsic curvature on an initial spacelike hypersurface of two black holes with asisymmetric parallel spins is derived in terms of an analytic infinite series. Other two body configurations are also considered. The extrinsic curvature is constructed so that the resulting spacetime will have the topology of two Einstein-Rosen bridges; a physical equivalence of the top and bottom sheets of the initial hypersurface is also built in. It is shown that one may a priori specify the spins of the two black holes. The extrinsic curvature, so constructed, is not derivable from a potential. An appropriate numerical problem for the conformal factor is posed and examined in the above configurations. Efforts at using multi-grid differencing schemes for solving the differential equations are discussed. In order to time evolve ablack hole interaction or collision, the extrinsic curvature and conformal factor must be completely specified on an initial slice of spacetime. Dissert. Abstr.

N86-33248 Illinois Univ., Urbana-Champaign.
THE EVOLUTION OF PLANETARY NEBULA NUCLEI (PNN) Ph.D. Thesis
Richard Allen Shaw 1985 154 p
Avail: Univ. Microfilms Order No. DA8600311

The evolution of planetary nebula nuclei (PNNs) is examined with the aid of the most recent available stellar evolution calculations and new observations of these objects. Their expected distribution in the log L-log T plane is calculated. The distribution is found to be insensitive both to the assumed range of main-sequence progenitor mass and to reasonable variations in the age and the star forming history of the galactic disk. Rather the distribution is determined by the strong dependence of the rate of stellar evolution upon core mass, the steepness of the initial mass function, and to a lesser extent the finite lifetime of an observable planetary nebula. An extensive photometric and smaller photographic survey of southern hemisphere planetary nebulae (PNs) is presented. Seven new PNs were discovered in or near Baade's Window, and total fluxes in several nebular lines, relative to H beta, are presented for 134 southern PNs. New B and/or V magnitudes for the nuclei of 117 PNs are presented, and are combined with 54 magnitudes (as well as limits for ten others) from absolute photometry of northern PNNs. A superior method of extracting stellar continuum fluxes from a bright nebular background is developed. The continuum measurements are compared with the widely circulated list of preliminary central star magnitudes by Shao and Litter, which are shown to suffer frequently from severe contamination from the nebular continuum.
Dissert. Abstr.

N86-33249 North Carolina Univ., Chapel Hill.
THE QUANTUM ERGOSPHERE AND DYNAMICAL TEMPERATURE OF THE REISSNER-NORDSTROM BLACK HOLE Ph.D. Thesis
Billy Ray Smith, Jr. 1985 84 p
Avail: Univ. Microfilms Order No. DA8527323

The techniques pioneered by York (1983) are used to calculate the mass of the quantum ergosphere and the dynamical temperature for the Reissner-Nordstrom black hole. York found that for uncharged black holes, the dynamical temperature and the Hawking temperature agreed within two per cent. The researcher found that the dynamical temperature and Hawking temperature continue to agree for charged black holes, provided that the charge-to-mass ratio is small. From the work of Carter (1974) and Gibbons (1975), the researcher knew that Reissner-Nordstrom black holes will quickly discharge, so that only black holes with a very small charge-to-mass ratio need be examined. Dissert. Abstr.

N86-33250 Ohio State Univ., Columbus.
Q-NUCLEOSYNTHESIS: IMPLICATIONS FOR STELLAR EVOLUTION Ph.D. Thesis
Craig Leslie Joseph 1985 186 p
Avail: Univ. Microfilms Order No. DA8518969

The effects on stellar burning of anomalous nuclei (Q-nuclei) containing an extra embedded quark were investigated using a modified version of the Paczynski stellar evolution code. A series of solar models were constructed for a range in Q-nuclear abundance and the results were compared with the predictions of the standard solar model and observed solar parameters. In an attempt to ascertain whether or not the abundance of Q-nuclei suggested by solar model calculations is compatible with the observed properties of main sequence stars, zero age main sequence models were constructed with and without Q-nuclear burning. The published observations of the Pleiades was compared with the predicted location of the Q-nuclear burning main sequence. Dissert. Abstr.

N86-33251 Oklahoma Univ., Norman.
PROBING THE LARGE-SCALE STRUCTURE OF THE UNIVERSE: AN ANALYSIS OF 55 BRIGHT SOUTHERN CLUSTERS OF GALAXIES Ph. D. Thesis
Ronald Paul Olowin 1985 562 p
Avail: Univ. Microfilms Order No. DA8603517

Presented is the description of 55 bright close (z less than or equal to 0.1) clusters of galaxies as a homogeneous sample taken from a new effort to catalog galaxy clusters in the Southern Hemisphere. The positions of some 21,000 galaxies in clusters have been catalogued along with visual magnitudes, morphological types, position angles of extended objects and pertinent remarks. For all of the clusters, various cluster parameters have been determined and form the basis of comparative studies for these fundamental aggregates of matter in the universe. The aims of this study are to produce a homogeneous sample of galaxy clusters measured to a uniform limiting magnitude m sub v = 19.0 by means of a calibrated stepscale; catalogued with accurate positions relative to nearby astrometric standard stars; morphologically classified and population typed; and statistically analyzed in a uniform fashion to deduce certain cluster parameters. The cluster parameters of interest include an estimate of cluster distance, cluster center and cluster richness, galaxy distributions as a function of morphological type, magnitude distribution and core radius as determined by an isothermal gas sphere model. Dissert. Abstr.

N86-33252 Case Western Reserve Univ., Cleveland, Ohio.
ON THE SOURCE OF THE VIOLET DEPRESSION IN CARBON STARS (A STUDY OF THE BALMER DECREMENT IN CARBON L. P. V.S) Ph. D. Thesis
Maria-Antonietta Orlati 1985 71 p
Avail: Univ. Microfilms Order No. DA8601957

In an effort to determine the nature of the agent(s) of the violet depression in N type stars through the behaviour of their Balmer decrement, slit spectrograms of two C, one CS, two S(all reported to have the violet depression) and one M type L.P.V.s were repeatedly taken between May 1983 and November 1984. The observed phase related changes in the Balmer decrement exclude the possibility that the absorbers are circumstellar because the emission region in the best-observed star is seen to rise through the opacity source. The exact nature and number of kinds of absorbers remains to be determined. Dissert. Abstr.

N86-33253# Instituto de Fisica Teorica, Sao Paulo (Brazil).
MULTIPLE IMAGES OF OUR GALAXY IN CLOSED, MULTIPLY CONNECTED COSMOLOGIES
H. V. Fagundes 1985 3 p
(DE86-701777; IFT-P-14/85) Avail: NTIS (US Sales Only) HC A02/MF A01

Friedmanian cosmology with multiply connected spatial sections allows multiple images of cosmic sources, in particular of the galaxy itself. This is illustrated with a specific example of a closed hyperbolic model and a brief mention of a spherical model. Such images may eventually become observable (or recognized as such), thus providing a new test of relativistic cosmology. DOE

N86-33254# Hiroshima Univ. (Japan). Research Inst. for Theoretical Physics.
ON A QUANTIZED SCALAR FIELD IN THE COMBINED DE SITTER-NARIAI UNIVERSE
Hidekazu Nariai Sep. 1984 13 p

(DE86-701778; RRK-84-24) Avail: NTIS (US Sales Only) HC A02/MF A01

As a sequel to the previous paper on quantizing a massive or massless scalar field in the de Sitter and Nariai universes, the scalar field in the combined de Sitter-Narial universe (with a 6-dimensional metric) is canonically quantized. Various bi-scalar propagators are derived and, especially in the massless case, their structures are examined in comparison with those in the de Sitter universe. DOE

N86-33255# Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro.
WEYL (INTEGRABLE) SPACETIMES AS A MODEL FOR OUR COSMOS
L. A. R. de Oliveira 1985 8 p
(DE86-701953; CBPF-NF-063/85) Avail: NTIS (US Sales Only) HC A02/MF A01

A discussion on Weyl (integrable) spacetimes as a viable model for our cosmos, and on the physical implications for systems non-minimally coupled to gravity is presented. DOE

N86-32453# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
HALLEY'S COMET AS AN OUTSTANDING TARGET
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p vii-xvi (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

N86-32454# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HALLEY'S COMET IN HISTORY
D. K. Yoemans, J. Rahe (Remeis Sternwarte, Bamberg, West Germany), and R. Freitag (Library of Congress, Washington, D. C.) *In* ESA Space Missions to Halley's Comet Mar. 1986 p 1-24 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

N86-32466# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE COMET HALLEY EPHEMERIS DEVELOPMENT EFFORT
D. K. Yeomans *In* ESA Space Missions to Halley's Comet Mar. 1986 p 179-197 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

N86-32468# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
THE HALLEY DUST AND GAS ENVIRONMENT (IACG WG-1)
R. Reinhard *In* ESA Space Missions to Halley's Comet Mar. 1986 p 217-231 (For primary document see N86-32452 24-12)
Avail: NTIS HC A12/MF A01; ESA, Paris, France, FF 200 member states, AU, CN and NO (+20% others)

N86-33218 Institut de Physique du Globe, Paris (France).
ISOTOPES PRODUCED BY GALACTIC COSMIC RAYS IN IRON METEORITES
J. L. Birck and C. J. Allegre *In* CNES Isotopic Ratios in the Solar System 1985 p 21-25 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33219 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
ON THE PRODUCTION RATE OF Ne-21 IN ORDINARY CHONDRITES
Ludolf Schultz and Manfred Freundel *In* CNES Isotopic Ratios in the Solar System 1985 p 27-33 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33220 Commissariat a l'Energie Atomique, Saclay (France). Service d'Astrophysique.
LONG-LIVED ISOTOPES AS INDICATORS OF THE NATURE OF THE CRETACEOUS-TERTIARY EVENT: EXPERIMENTAL RESULTS ON THE URANIUM ISOTOPIC COMPOSITION
R. Rocchia, D. Boclet, Ph. Bonte, Ph. Holliger, and C. Jehanno *In* CNES Isotopic Ratios in the Solar System 1985 p 35-42 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33221 Paris VI Univ. (France). Lab. de Mineralogie-Cristallographie.
EXTREME MAGNESIUM ISOTOPE FRACTIONATION IN THE LEOVILLE METEORITE
J. C. Lorin and A. Havette (Paris II Univ., Orsay (France).) *In* CNES Isotopic Ratios in the Solar System 1985 p 43-69 (For primary document see N86-33216 24-88)
(Grant INAG-47-84)
Avail: CEPADUES, Toulouse, France

N86-33222 Lawrence Livermore National Lab., Calif.
IMPLICATIONS OF Ti ISOTOPIC ANOMALIES IN METEORITES
S. Niemeyer and G. W. Lugmair *In* CNES Isotopic Ratios in the Solar System 1985 p 71-75 (For primary document see N86-33216 24-88)
(Contract DOE-W-7405-Eng-48)
Avail: CEPADUES, Toulouse, France

N86-33223 California Inst. of Tech., Pasadena.
SHORT-LIVED NUCLIDES IN THE EARLY SOLAR SYSTEM AND GENERAL ISOTOPIC ANOMALIES IN METEORITES
D. A. Papanastassiou *In* CNES Isotopic Ratios in the Solar System 1985 p 77-88 Sponsored by NASA and NSF (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33224 Open Univ., Milton (England). Dept. of Earth Sciences.
ISOTOPE ABUNDANCE MEASUREMENTS OF CARBON, NITROGEN AND HYDROGEN IN METEORITES
I. P. Wright and C. T. Pillinger *In* CNES Isotopic Ratios in the Solar System 1985 p 89-94 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33225 Open Univ., Milton (England). Dept. of Earth Sciences.
THE DISTRIBUTION AND ISOTOPIC COMPOSITION OF GRAPHITE CARBON IN THE EARLY SOLAR SYSTEM
M. M. Grady and C. T. Pillinger *In* CNES Isotopic Ratios in the Solar System 1985 p 95-105 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33226 Vrije Universiteit, Brussels (Belgium). Dept. de Chimie Organique.
THE C12/C13 ISOTOPIC EFFECT IN CARBONACEOUS CHONDRITES: SIZE AND IMPORTANCE OF THE MAGNETIC ISOTOPE EFFECT
J. Reisse and F. Mullie *In* CNES Isotopic Ratios in the Solar System 1985 p 107-116 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33228 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
TRAPPED NEON IN UREILITES: A NEW COMPONENT
U. Ott, H. P. Loehr, and F. Begemann *In* CNES Isotopic Ratios in the Solar System 1985 p 129-136 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33230 Academy of Sciences (USSR), Moscow. Inst. of Geochemistry and Analytical Chemistry.
ON THE XENON IN ACID-RESISTANT RESIDUES OF THE

EFREMOVKA CV AND ALLENDE CV CHONDRITES
A. V. Fisenko, D. VuMinh, L. F. Semjonova, A. K. Lavrukhina, and Ju. A. Shukolyukov *In* CNES Isotopic Ratios in the Solar System 1985 p 147-154 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33231 Max-Planck-Inst. fuer Chemie, Mainz (West Germany).
THE Ar36/Ar38 RATIOS IN SELECTED METEORITES
A. Burghele *In* CNES Isotopic Ratios in the Solar System 1985 p 155-161 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33232 Tata Inst. of Fundamental Research, Bombay (India). Astrophysics Group.
ORIGIN OF NEON-E
S. Ramadurai and O. K. Manuel *In* CNES Isotopic Ratios in the Solar System 1985 p 167-170 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33233 Observatoire de Paris-Meudon (France).
ISOTOPIC RATIOS IN COMETS
Therese Encrenaz *In* CNES Isotopic Ratios in the Solar System 1985 p 173-180 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33234 Observatoire de Paris-Meudon (France). Lab. d'Astronomie Infrarouge.
ISOTOPIC RATIOS IN GIANT PLANETS
Daniel Gautier *In* CNES Isotopic Ratios in the Solar System 1985 p 181-190 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33239 Tata Inst. of Fundamental Research, Bombay (India).
METEORITES AND COMETS: A STUDY IN RELATION TO C12/C13 RATIOS
S. Ramadurai and K. S. KrishnaSwamy *In* CNES Isotopic Ratios in the Solar System 1985 p 229-232 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33240 Institut d'Astrophysique, Paris (France).
SOLAR ISOTOPIC RATIOS, CHEMICAL EVOLUTION OF GALAXIES AND COSMOLOGY
Jean Audouze *In* CNES Isotopic Ratios in the Solar System 1985 p 235-249 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33241 Institut d'Astrophysique, Paris (France).
THE INTERSTELLAR LITHIUM ABUNDANCE AND THE LI6/LI RATIO
R. Ferlat and M. Dennefeld *In* CNES Isotopic Ratios in the Solar System 1985 p 251-255 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33242 National Observatory, Rio de Janeiro (Brazil).
METAL ENRICHMENT OF STARS IN THE ORION COMPLEX AND ITS RELATION WITH THE FORMATION OF THE SOLAR SYSTEM: PRELIMINARY RESULTS
Katia Cunha and Ramiro delaReza *In* CNES Isotopic Ratios in the Solar System 1985 p 257-265 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33243 Institut d'Astrophysique, Paris (France).
THERMAL NUCLEAR DESTRUCTION OF LITHIUM, BERYLLIUM AND BORON INSIDE A 1 SOLAR MASS STAR
Pascale Delbourgo-Salvador, Guy Malinie, and Jean Audouze *In* CNES Isotopic Ratios in the Solar System 1985 p 267-272 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33244 Vrije Universiteit, Brussels (Belgium). Inst. d'Astronomie, d'Astrophysique et de Geophysi
ISOTOPIC ANOMALIES IN METEORITES AND NUCLEOSYNTHESIS (1): A REVIEW OF THE NONRADIOGENIC CASES BETWEEN CARBON AND SILICON
M. Arnould *In* CNES Isotopic Ratios in the Solar System 1985 p 283-294 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33245 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ELEMENT AND ISOTOPE FRACTIONATION IN PREPLANETARY NEBULA
G. E. Morfill *In* CNES Isotopic Ratios in the Solar System 1985 p 295-302 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design see *18 Spacecraft Design Testing, and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

N86-33256 Brown Univ., Providence, R. I.
ANALYSIS OF TOPOGRAPHY AND IMPLICATIONS FOR THE TECTONIC EVOLUTION OF THE MOON AND VENUS. PART 1: LUNAR SUBSTRUCTURE, MARE RIDGES AND THE TECTONIC EVOLUTION OF MARE BASINS. PART 2: A COMPARISON OF THE REGIONAL SLOPE CHARACTERISTICS OF VENUS AND EARTH Ph.D. Thesis
Virgil LeRoy Sharpton 1985 187 p
Avail: Univ. Microfilms Order No. DA8519903

Subsurface information gathered by the Apollo Lunar Sounder Experiment was combined with surface observations to examine the stratigraphy and tectonic evolution of a typical lunar mare basin, Mare Serenitatis, and to assess the origin and implications of lunar mare ridges. The regional slope characteristics of Venus and Earth were assessed and compared. Dissert. Abstr.

N86-33257*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
V-GRAM. A NEWSLETTER FOR PERSONS INTERESTED IN THE EXPLORATION OF VENUS, NO. 8, 24 MARCH 1986 Magellan update
Warren W. James 24 Mar. 1986 14 p
(NASA-CR-177286; JPL-410-11-3; NAS 1.26:177286) Avail: NTIS HC A02/MF A01 CSCL 03B

The status of the Magellan (MGN) Project (formerly the Venus Radar Mapper Project) is outlined and the impact of the Challenger accident on the planned mission launch date and use of residual Galileo hardware is discussed. The responsibilities and planned scientific studies of the Magellan Radar Investigation Group (RADIG) and Gravity Investigation Group (GRAVIG) are described. Team members and their affiliations are listed. M.G.

N86-33258*# Georgia Inst. of Tech., Atlanta. School of Electrical Engineering.
LABORATORY EVALUATION AND APPLICATION OF MICROWAVE ABSORPTION PROPERTIES UNDER SIMULATED CONDITIONS FOR PLANETARY ATMOSPHERES Annual Status Report, 1 Feb. 1986 - 31 Jan. 1987
Paul G. Steffes 1986 64 p
(Grant NAGw-533)
(NASA-CR-179713; NAS 1.26:179713; SASR-6) Avail: NTIS HC A04/MF A01 CSCL 03B

After long arduous work with the simulator, measurements of the refractivity and absorptivity of nitrogen under conditions similar to those for Titan were completed. The most significant measurements, however, were those of the microwave absorption from

gaseous ammonia under simulated conditions for the Jovian atmospheres over wavelengths from 1.3 to 22 cm. The results of these measurements are critical in that they confirm the theoretical calculation of the ammonia opacity using the Ben-Reuven lineshape. The application of both these results, and results obtained previously, to planetary observations at microwave frequencies were especially rewarding. Applications of the results for ammonia to radio astronomical observations of Jupiter in the 1.3 to 20 cm wavelength range and the application of results for gaseous H2SO4 under simulated Venus conditions are discussed. B.G.

N86-33259*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
RADIOACTIVITIES IN RETURNED LUNAR MATERIALS AND IN METEORITES Semiannual Progress Report, 1 Aug. 1985 - 31 Jul. 1986
Edward L. Fireman Aug. 1986 18 p
(Grant NAG9-42)
(NASA-CR-179743; NAS 1.26:179743; SAPR-6; SAPR-7) Avail: NTIS HC A02/MF A01 CSCL 03B

A preliminary C-14 study on lunar soil was carried out with the University of Toronto Iso Trace accelerator mass spectrometer. This accelerator was recommended for C-14 work by Dr. R. Schneider of A.S. and E., who was the field engineer during the assemblage and start-up operation of the accelerator. After the preliminary study using CO2 from 10084,937 soil, which had previously been counted with low-level mini-proportional counters, it became clear that the Toronto accelerator could carry out C-14/C-13/C-12 ratio measurements on 1 gram meteorite and lunar samples and that the C-14 measurements are done with higher precision and better reliability than elsewhere. A collaborative program with the University of Toronto Iso Trace accelerator group, which is expected to be scientifically fruitful. Arrangements have been made for Dr. R.P. Beukens of the Toronto Accelerator Group to extract the carbon compounds from Antarctic meteorite and lunar samples and to convert the compounds to CO2. During the past two years, a uranium-series dating method was developed for polar ice, which method is being applied to ice from the Allan Hills site, Byrd core, and the Beardsmore glacier. Author

N86-32801 Bureau Gravimetrique International, Toulouse (France).
STRUCTURE OF THE TELLURIC PLANETS [STRUCTURE DES PLANETES TELLURIQUES]
G. Balmino *In* CNES International Geophysics and Space 1985 p 527-570 In FRENCH (For primary document see N86-32786 24-42)
Avail: CEPADUES, Toulouse, France

N86-33227 Bern Univ. (Switzerland). Inst. fuer Physik.
NOBLE GAS ANOMALIES IN METEORITIC AND LUNAR SAMPLES AND THEIR CHRONOLOGICAL INTERPRETATION
O. Eugster *In* CNES Isotopic Ratios in the Solar System 1985 p 117-128 Sponsored by Swiss National Science Foundation (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33235 Montreal Univ. (Quebec). Dept. de Physique.
GRAVITATIONAL SETTLING IN THE JOVIAN ATMOSPHERE
Georges Michaud, Daniel Gautier (Observatoire de Paris-Meudon (France).), and Hubert Reeves (Commissariat a l'Energie Atomique, Saclay (France).) *In* CNES Isotopic Ratios in the Solar System 1985 p 191-194 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33236 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE D/H RATIO IN SATURN'S ATMOSPHERE FROM VOYAGER IRIS SPECTRA
R. Courtin (Observatoire de Paris-Meudon (France).), D. Gautier, A. Marten, B. Bezard, and R. Hanel *In* CNES Isotopic Ratios in the Solar System 1985 p 201-204 (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

N86-33237 Observatoire de Paris-Meudon (France).
THE N14/N15 RATIO IN THE ATMOSPHERE OF JUPITER
Pierre Drossart, Therese Encrenaz, and Michel Combes *In* CNES Isotopic Ratios in the Solar System 1985 p 205-212 In FRENCH; ENGLISH summary (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N86-33229 Eidgenoessische Technische Hochschule, Zurich (Switzerland).
THE ISOTOPIC COMPOSITION OF NEON EMITTED IN SOLAR FLARES AND TRAPPED IN LUNAR SOIL MINERALS
Rainer Wieler, Heinrich Baur, and Peter Signer *In* CNES Isotopic Ratios in the Solar System 1985 p 137-146 (For primary document see N86-33216 24-88)
(Grant SNSF-2.443.-0.82)
Avail: CEPADUES, Toulouse, France

N86-33238 Bern Univ. (Switzerland). Inst. de Physique.
ION COMPOSITION IN THE SOLAR WIND IN RELATION TO SOLAR ABUNDANCES
Johannes Geiss and Peter Bochsler *In* CNES Isotopic Ratios in the Solar System 1985 p 213-228 Sponsored by Swiss National Foundation (For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N86-33260*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CROSS SECTIONS FOR PRODUCTION OF THE 15.10 MeV AND OTHER ASTROPHYSICALLY SIGNIFICANT GAMMA-RAY LINES THROUGH EXCITATION AND SPALLATION OF SUP 12 C AND SUP 16 O WITH PROTONS
F. L. Lang (Catholic Univ. of America, Washington, D.C.), C. W. Werntz, C. J. Crannell, J. I. Trombka, and C. C. Chang (Maryland Univ., College Park.) Washington Sep. 1986 43 p
(Grant NsG-5066)
(NASA-TM-87787; Rept-86B0418; NAS 1.15:87787) Avail: NTIS HC A03/MF A01 CSCL 03B

The ratio of the flux of 15.10-MeV gamma rays to the flux of 4.438-MeV gamma rays resulting from excitation of the corresponding states in C-12 as a sensitive measure of the spectrum of the exciting particles produced in solar flares and other cosmic sources. These gamma rays are produced predominantly by interactions with C-12 and O-16, both of which are relatively abundant in the solar photosphere. Gamma ray production cross sections for proton interactions have been reported previously for all important channels except for the production of 15.10-MeV gamma rays from O-16. The first reported measurement of the 15.10-MeV gamma ray production cross section from p + O-16 is presented here. The University of Maryland cyclotron was employed to produce 40-, 65-, and 86-MeV protons which interacted with CH2 and BeO targets. The resultant gamma ray spectra were measured with a high-purity germanium semiconductor detector at 70, 90, 110, 125, and 140 degrees relative to the direction of the incident beam for each proton energy. Other gamma ray lines resulting from direct excitation and spallation reactions with C-12

and 0-16 were observed as well, and their gamma ray production cross sections described.

N86-33261# Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Reactions.
SEARCH FOR THE TRACKS OF HEAVY AND SUPERHEAVY COSMIC RAY NUCLEI IN OLIVINES FROM METEORITES
V. P. Perelygin, S. G. Stetsenko, and G. N. Flerov 1985 7 p
(DE86-701120; JINR-E-7-85-245) Avail: (US Sales only) NTIS HC A02/MF A01

The results of investigating the tracks of cosmic nuclei with > = 50 in olivine crystals from meteorites are presented. The obtained spectrum of track lengths for the Z > = 50 nuclei exhibits two pronounced groups of tracks: 190-230 (MU)m tracks, attributed to nuclei ranging from Th to U, and abnormally long 310-360 (MU)m tracks. The hypothesis that the nuclei of superheavy elements with Z > = 110 may be present in cosmic rays is discussed.
DOE

N86-33262# Rome Univ. (Italy). Dipt. di Fisica.
CAN A LIGHT GLUINO SOLVE THE CYG X3 PUZZLE
G. Auriemma, L. Maiani, and S. Petrarca 6 Dec. 1985 12 p
Submitted for publication
(Preprint-486; ETN-86-97920) Avail: NTIS HC A02/MF A01

Production of underground muons by the binary X-ray star Cyg X3, known to be source of high energy particles which produce air showers, is discussed. It is proposed that air showers and underground muons are produced by the interaction in the atmosphere of a neutral, light, and long lived hadron. This hadron could be the lightest of the R-hadrons, composed by a gluino and one or more gluons, with a mass near 1 GeV. It is shown that this particle could easily justify the muon excess observed in the air showers > 10 to the 15th power eV associated with Cyg X3, but it is difficult to explain the large flux of underground muons.
ESA

N86-33217 California Univ., La Jolla.
EXPOSURE AGES OF IRON METEORITES: COMPLEX HISTORIES AND THE CONSTANCY OF GALACTIC COSMIC RAYS
B. Lavielle, K. Marti, and S. Regnier *In* CNES Isotopic Ratios in the Solar System 1985 p 15-20 In FRENCH; ENGLISH summary
(For primary document see N86-33216 24-88)
Avail: CEPADUES, Toulouse, France

99 GENERAL

No abstracts in this category.

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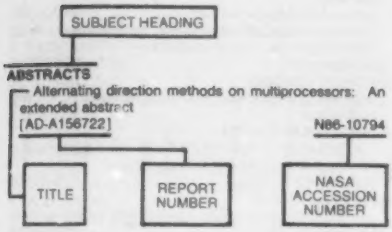

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BIBLIOGRAPHIES
Aeronautical engineering: A continuing bibliography with indexes (supplement 204)
[NASA-SP-7037(204)] N86-32389
US photovoltaic patents, 1951-1983
[DE86-004431] N86-32684
Publications from the Department of Plasma Physics and the Unit of Accelerator Technology, index and abstracts 1985
[TRITA-EPP-85-09] N86-33159
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Corporate author entries, revision 5
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[PREPRINT-491] N86-33111
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Orbital transfer vehicle launch operations study. Processing flows. Volume 3
[NASA-CR-179786] N86-32505
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Textured carbon surfaces on copper by sputtering
[NASA-CASE-LEW-14130-1] N86-32587
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Report of the International Conference on the Assessment of the Role of Carbon Dioxide and of other Greenhouse Gases in Climate Variations and Associated Impacts
[WMO-661] N86-32890
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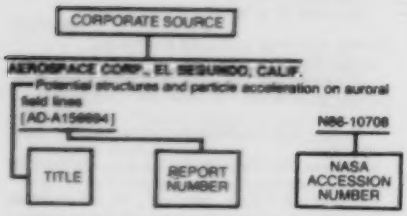

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Brorfelde: Magnetic results, 1983
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DATALOGICS, INC., CHICAGO, ILL.
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Contribution to the phenology of Europe 5 long phenological series of Europe and their relations to temperature
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A drifting buoy experiment as part of COST-43
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DMA CONSULTING ENGINEERS, MARINA DEL REY, CALIF.
Meteorological data inventory, southern California, coastal zone, Ragged Point (San Luis Obispo County) to Mexican border
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DORNIER-WERKE G.M.B.H., FRIEDRICHSHAFEN (WEST GERMANY).
Command and data management for a highly integrated payload on the Interface Program System (IPS) (GIRL)
[BMFT-FB-W-85-018] N86-32514
DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, S.C.
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Continental tectonics: A quantitative view of the thermal and mechanical properties of the continental lithosphere in compressional and extensional stress regimes N86-32797
DYNATECH R/D CO., CAMBRIDGE, MASS.
Design study of plastic film heat exchanger
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DYNETICS, INC., HUNTSVILLE, ALA.
Aerodynamics of aircraft afterbody: Report of the working group on aerodynamics of aircraft afterbody
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Ascent trajectory dispersion analysis for WTR heads-up space shuttle trajectory
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ECOLE NATIONALE SUPERIEURE DES ARTS ET METIERS, BORDEAUX (FRANCE).
Fatigue resistance of high quality steels under multiaxial load
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ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
Study of the thermal evolution of chrome-tungsten deposits on silicon monocrystals
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Method of operator splitting or fractional steps and its applications to fluid dynamic modelling, Revision 1
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A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
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Investigations on a supercritical airfoil with boundary layer suction through a perforated strip in the shock region
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Atmospheric Ozone 1985. Assessment of our understanding of the processes controlling its present distribution and change, volume 2
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Very short range statistical forecasting of automated weather observations
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The thermal plasma experiment in the Upper-Air Sounding Rocket Program HEATING, Project HERO
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Advanced Gas Turbine (AGT) Technology Development Project annual report
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Zopiclone's residual effect upon actual driving performance versus those of nitrazepam and flunitrazepam
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Use of an ARGOS platform on an expedition to the North Pole 1984 N86-32820
HIROSHIMA UNIV. (JAPAN).
On a quantized scalar field in the combined de Sitter-Narai universe
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HIROSHIMA UNIV., TAKEHARA (JAPAN).
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A review of radar analysis of woodland N86-32833
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IFC RESEARCH, CLAYGATE (ENGLAND).
Study of information dissemination by satellite, rider 2: Cultural satellite consortium: Widening the scope
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Anomalous perigee shift and eccentricity variation due to air drag in the reentry phase N86-32498
INSTITUT D'ASTROPHYSIQUE, PARIS (FRANCE).
Solar isotopic ratios, chemical evolution of galaxies and cosmology N86-33240
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The geomagnetic field: Description and analysis N86-32787
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INSTITUT DE PHYSIQUE DU GLOBE, STRASBOURG (FRANCE).
Density and elastic parameters of the upper mantle from regional multimode data N86-32798
INSTITUT FRANCAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER, BREST (FRANCE).
On board spectral sea-state: The spear F buoy inputs to ERS-1 calibration and validation phase N86-32813
INSTITUT FRANCAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER, NANTES (FRANCE).
ARGOS and fishing N86-32826
INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
Astronomical geodetic estimates of azimuth in the West German main triangulation network
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INSTITUT FUER FLUGMECHANIK, BRUNSWICK (WEST GERMANY).
A flight test method for pilot/aircraft analysis N86-33011
INSTITUTE OF HYDROLOGY, WALLINGFORD (ENGLAND).
Analysis of digital radar data from SAR-580 in relation to soil/vegetation moisture and roughness N86-32839
INSTITUTO DE FISICA TEORICA, SAO PAULO (BRAZIL).
Multiple images of our galaxy in closed, multiply connected cosmologies
[DE86-701777] N86-33253
INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
MCT/INPE LANDSAT system: Report of activities from September 1, 1985 to March 31, 1986
[INPE-3927-PRE/960] N86-32868
INSTITUTO NACIONAL DE TECNICA AEROESPACIAL, ESTEBAN TERRADAS, TORREJON DE ARDOZ (SPAIN).
Behavior of lubricant greases at high temperatures: Thin film and liquid chromatography techniques
[ETN-86-97810] N86-32583
INSTITUUT VOOR CULTURRTECHNIEK EN WATERHUISHOUDING, WAGENINGEN (NETHERLANDS).
Remote sensing study project in Oost-Gelderlands (Netherlands)
[NOTA-1641] N86-32872
INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, ROME (ITALY).
Report of the International Conference on the Assessment of the Role of Carbon Dioxide and of other Greenhouse Gases in Climate Variations and Associated Impacts
[WMO-661] N86-32890
INTERNATIONAL HALLEY WATCH, PASADENA, CALIF.
The International Halley Watch (IHW) and its observing nets N86-32465
INTERNATIONAL PLANNING ASSOCIATES, BELTSVILLE, MD.
IEA solar: Working toward greater cost-effectiveness, report of the International Energy Agency Solar Heating and Cooling Programme
[DE86-011521] N86-32883
INTERNATIONAL THERMAL PLASMA ENGINEERING, INC., ST. PAUL, MINN.
Diagnostic techniques in thermal plasma processing, part 1, volume 1
[DE86-011737] N86-33175
Diagnostic techniques in thermal plasma processing, part 2, volume 2
[DE86-011738] N86-33176
IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Analysis of wind speeds at the space shuttle launch site, Vandenberg Air Force Base
[AD-A168565] N86-32930
IOWA UNIV., IOWA CITY.
Viscous-inviscid interaction with higher-order viscous-flow equations
[IIHR-304] N86-32676
Observations of plasma distributions during the CDAW substorms of 31 March - 1 April 1979
[AD-A168580] N86-33172

J

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
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Total-dose radiation effects data for semiconductor devices, 1985 supplement. Volume 2, part A
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V-gram. A Newsletter for Persons Interested in the Exploration of Venus, No. 8, 24 March 1986
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JOHNS HOPKINS UNIV., BALTIMORE, MD.
Studies of the ultraviolet spectra of astronomical sources
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MATERIALS RESEARCH LABS., ASCOT VALE (AUSTRALIA).
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
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Solar thermal energy systems. Program summary, fiscal year 1985
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MISSION RESEARCH CORP., SANTA BARBARA, CALIF.
Infrared issues for the nuclear winter phenomenon
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MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
Implicit multigrid algorithms for the three-dimensional flux split Euler equations
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MISSOURI UNIV., COLUMBIA.
Energetics of cyclonic development in the Asian winter monsoon system N86-32921

MONTREAL UNIV. (QUEBEC).
Gravitational settling in the Jovian atmosphere
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MULLARD SPACE SCIENCE LAB., DORKING (ENGLAND).
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NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
Sigma models on quaternionic manifolds and anomalies
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On the QCD effective action for pions and vector mesons
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[NAL-TM-FM-8601] N86-33062

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical engineering: A continuing bibliography with indexes (supplement 204)
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Atmospheric Ozone 1985. Assessment of our understanding of the processes controlling its present distribution and change, volume 2
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Monthly mean distribution of ozone and temperature
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[NASA-TM-89243] N86-33208

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Transonic Navier-Stokes wing solutions using a zonal approach. Part 2: High angle-of-attack simulation
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

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[NASA-TM-88857] N86-32433
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Research instrumentation for hot section components of turbine engines
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Acousto-ultrasonic verification of the strength of filament wound composite material
[NASA-TM-88827] N86-32764
Lithium counterdoped silicon solar cell
[NASA-CASE-LEW-14177-1] N86-32875

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

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NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).

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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 1 of 1985 accidents
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Convective Parameters and Holograph Program: CONVECT
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NATIONAL WEATHER SERVICE, HONOLULU, HAWAII.
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Experimental investigation of secondary flow vortices in a rod cluster
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OFFICINE GALILEO S.P.A., FLORENCE (ITALY).
Standard calibration procedure for IR sensors on spinning satellites. Volume 3: OTS and GEOS-2 in flight data analysis
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Modeling as a means of studying the climate system
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PARIS-SUD UNIV., ORSAY (FRANCE).
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PARIS VI UNIV. (FRANCE).
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PARIS VII UNIV. (FRANCE).
Structure and evolution of the Earth mantle studied using paired isotopic tracers: Pb-Sr-Nd N86-32792

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Evaluation of the national wind energy development program NOW-2, phase 1
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ROYAL INST. OF TECH., STOCKHOLM (SWEDEN).
Publications from the Department of Plasma Physics and the Unit of Accelerator Technology, index and abstracts 1985
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ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, AMSTERDAM.
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ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, SCHIPHOL-OOST.
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ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
A computer program to process Vaisala RS 21-12 C radiosonde data
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Description of the Eeldei (Netherlands) wind observation station (period 1945 to 1980)
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ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
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SANDIA NATIONAL LABS., LIVERMORE, CALIF.
Solar thermal energy systems. Program summary, fiscal year 1985
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Moving ground effect and speed (up to 50 m/sec) interaction on sedan and station wagon cars (23 configurations ranging between Cd=0.19 and 0.35) and on racing car (1 configuration Cd=0.39; Cl=2.15)
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SCHREINER LUCHTVAART GROEP B.V., LEIDEN (NETHERLANDS).
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[ETN-86-97773] N86-32415
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SOFTECH, INC., FAIRBORN, OHIO.
Ada (trade name) compiler validation summary report: DDC Ada compiler system version 3.1 for DEC VAX-11/785
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SOUTH AFRICAN CHEMICAL INST., JOHANNESBURG.
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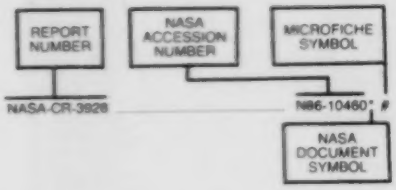

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Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

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ACCESSION NUMBER → **N87-10065*#** General Dynamics Corp., Fort Worth, Tex. ← CORPORATE SOURCE

TITLE → **DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT Final Report, Jan. 1982 - Aug. 1983**

AUTHORS → J. D. Clayton, R. L. Haller, and J. M. Hassler, Jr. Jan. 1985 ← PUBLICATION DATE

204 p

CONTRACT OR GRANT → (Contract NAS1-16879)

REPORT NUMBER → (NASA-CR-172354; NAS 1.26:172354) Avail: NTIS ← AVAILABILITY SOURCE

PRICE CODE → HC A10/MF A01 CSCL 01C ← COSATI CODE

The NASA Decoupler Pylon is a passive means of suppressing wing-store flutter. The feasibility of demonstrating this concept on the F-16 aircraft was established through model wind tunnel tests and analyses. As a result of these tests and studies a ship set of Decoupler Pylons was designed and fabricated for a flight test demonstration on the F-16 aircraft. Basic design criteria were developed during the analysis study pertaining to pylon pitch stiffness, alignment system requirements, and damping requirements. A design was developed which utilized an electrical motor for the pylon alignment system. The design uses a four pin, two link pivot design which results in a remote pivot located at the center of gravity of the store when the store is in the aligned position. The pitch spring was fabricated from a tapered constant stress cantilevered beam. The pylon has the same external lines as the existing production pylon and is designed to use a MAU-12 ejection rack which is the same as the one used with the production pylon. The detailed design and fabrication was supported with a complete ground test of the pylon prior to shipment to NASA.

Author

VOLUME 25 NUMBER 1 / JANUARY 8, 1987

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N87-10001* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 287)
Aug. 1986 107 p
(NASA-SP-7011(287); NAS 1.21:7011(287)) Avail: NTIS HC A06 CSCL 01A

This bibliography lists 346 reports, articles and other documents introduced into the NASA scientific and technical information system in July 1986. Author

N87-10002# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
HELICOPTER MLS FLIGHT INSPECTION PROJECT Final Report
Scott B. Shollenberger and Barry R. Billmann Apr. 1986 251 p
(DOT/FAA/CT-86/14) Avail: NTIS HC A12/MF A01

The results of tests designed to formalize microwave landing system (MLS) heliport flight inspection procedures are described. The tests, conducted in November 1985, demonstrated the feasibility of using a helicopter to perform some portion of the flight inspection of the MLS at heliports. Significant findings included the fact that radio theodolite techniques could be used for tracking a helicopter not equipped with stability augmentation equipment. Constituent parts of a portable flight inspection package were also identified and tested. Author

N87-10003*# Nielsen Engineering and Research, Inc., Mountain View, Calif.
DEVELOPMENT OF A TURBOMACHINERY DESIGN OPTIMIZATION PROCEDURE USING A MULTIPLE-PARAMETER NONLINEAR PERTURBATION METHOD Final Report
Stephen S. Stahara Sep. 1984 260 p
(Contract NAS3-20836)
(NASA-CR-3831; NAS 1.26:3831; NEAR-TR-295) Avail: NTIS HC A12/MF A01 CSCL 01B

An investigation was carried out to complete the preliminary development of a combined perturbation/optimization procedure and associated computational code for designing optimized blade-to-blade profiles of turbomachinery blades. The overall purpose of the procedures developed is to provide demonstration of a rapid nonlinear perturbation method for minimizing the computational requirements associated with parametric design studies of turbomachinery flows. The method combines the multiple parameter nonlinear perturbation method, successfully developed in previous phases of this study, with the NASA TSONIC blade-to-blade turbomachinery flow solver, and the COPES-CONMIN optimization procedure into a user's code for designing optimized blade-to-blade surface profiles of turbomachinery blades. Results of several design applications and a documented version of the code together with a user's manual are provided. Author

N87-10004# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERONAUTICA ET ASTRONAUTICA SINICA (SELECTED ARTICLES)
Hanxin Zhang, Shilu Chen, Xingjian Chen, Hengyuan Yan, and Xiufang Huo 9 May 1986 94 p Transl. into ENGLISH from Hangkong Xuebao (China), v. 6, no. 4, 1985 p 301-312; 321-334; 362-370; 379-384; 393-404
(AD-A167918; FTD-ID(RS)T-0109-86) Avail: NTIS HC A05/MF A01 CSCL 20/4

The following articles are from Acta Aeronautica et Astronautica Sinica, vol.6, no. 4, 1985: Advances in the Study of Separated Flows; Longitudinal Stability Analysis of Elastic Vehicles; Numerical Computation of Two Phase Turbulent Combustion Processes; Gust Alleviation Using Combined Control Laws; Calculation of Supersonic Flows around a Three-dimensional Wing and a Waisted Body with Characteristic Method in Stream Surface Coordinates; and Thermodynamic Analysis of Turbofan Engines. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N87-10005 Georgia Inst. of Tech., Atlanta.
NUMERICAL SOLUTION OF THE 3-DIMENSIONAL BOUNDARY LAYER EQUATIONS IN THE INVERSE MODE USING FINITE DIFFERENCES Ph.D. Thesis
Samir Farid Radwan 1985 248 p
Avail: Univ. Microfilms Order No. DA8604015

A numerical formulation that uses a finite-difference method has been developed to solve the full three-dimensional boundary layer equations in inverse and direct modes. It is a implicit scheme and uses central differences in the direction normal to the wall, and weighted upwinding with three points in the plane parallel to the wall. The developed method has the following new features: (1) the formulation is done for non-orthogonal curvilinear coordinates; and (2) the developed scheme uses variable grid step size along all coordinates, and it preserves second-order accuracy if needed. The accuracy in the marching direction parallel to the wall can be of any order between first and second through input control. This makes the scheme stable and robust in the reversed flow regions. These features make the present numerical method more general and flexible than any of previous methods. The capability of the method in the inverse mode to march into the flow regions inaccessible to the direct mode calculations has been demonstrated for the following cases; (1) separated two-dimensional turbulent flow; (2) separated turbulent flow over an

infinite swept wing and (3) laminar and turbulent flows over a prolate spheroid at low incidence. The principal achievement is the demonstration of the validity of the developed numerical inverse mode method to march into the regions of reversed flow which are inaccessible to the direct mode procedures. Dissert. Abstr.

N87-10006 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ANALYSIS OF THE VORTICAL FLOW AROUND A 60 DEG DELTA WING WITH VORTEX FLAP Ph.D. Thesis
Bongzoo Sung 1985 260 p
Avail: Univ. Microfilms Order No. DA8605468

Subsonic wind tunnel investigations were conducted on a 60 deg. swept, flat plate, delta wing with a leading edge vortex flap. The pressure distributions were measured over a range of angles of attack starting from zero to 40 deg. to 5 deg. interval and flap deflection angles from zero to 45 deg. with 5 deg. increments at a Reynolds number of about 2.14 x 1 million based on the root chord. The flow visualization experiments were performed from zero degree to the stall angle, with ten different flap defection angles at the same Reynolds number. The mean flow field was measured at angles of attack 10 deg. and 15 deg. with the flap deflection angles of 10 deg. and 30 deg. at a Reynolds number of about 1.50 x 1 million. The experimental results show that the leading edge vortex flap is an effective means to control the vortex flow over a delta wing. The optimimum flap deflection angles were found where the primary vortex was confined to the leading edge vortex flap, thus producing a thrust on the flap. It was found that flap deflection could be used to restore a vortex flow from burst vortex condition. A non-linear vortex lattice code with a new velocity jump formula was developed to predict the aerodynamic characteristics of plain and vortex flapped delta wings including the pressure distributions.
Dissert. Abstr.

N87-10007 Virginia Polytechnic Inst. and State Univ., Blacksburg.
THE EFFECT OF FREE STREAM DISTURBANCES AND CONTROL SURFACE DEFLECTIONS ON THE PERFORMANCE OF THE WORTMANN AIRFOIL AT LOW REYNOLDS NUMBERS Ph.D. Thesis
V. Sumantran 1985 249 p
Avail: Univ. Microfilms Order No. DA8605467

A wing with a Wortmann FX-63-137-ESM airfoil section has been used to study some unique problems encountered in wing aerodynamics in the range of Reynolds numbers between 50,000 and 500,000. The wind-tunnel testing conducted in the 6' x 6' Stability tunnel included strain-gauge data, pressure data and flow-visualization studies. The laminar separation bubble which frequently occurs on the upper surface of the wing is found to dominate its performance and gives rise to a hysteresis loop for lift and drag. Changes in airfoil performance due to positive flap or control surface deflections resemble changes witnessed at higher Reynolds numbers. Negative deflections are seen to considerably change the stall behavior and the flow over the airfoil. This is due to the considerably greater effect on the separation bubble for negative flap deflections. The structure and mechanism of the laminar separation bubble can also be altered by the introduction of selected acoustic disturbances and increased free-stream turbulence. The wind-tunnel test-section environment is, therefore, capable of considerably altering wing performance in this regime. Dissert. Abstr.

N87-10008 Virginia Polytechnic Inst. and State Univ., Blacksburg.
SEPARATION AND WAKES OVER 3-DIMENSIONAL BODIES Ph.D. Thesis
Christopher E. Costis 1985 163 p
Avail: Univ. Microfilms Order No. DA8605437

The laminar flow over a prolate spheroid was investigated via flow visualization and Laser-Doppler Velocimetry. Experiments were conducted in a water tunnel and the flow was visualized with dyes. The measurement of three-dimensional boundary layers required a special design of the laser optics. Attention was focused in the neighborhood of three-dimensional separation. The Vortex-Lattice method was employed to calculate the inviscid flow and the development of separated vortex sheets over a prolate spheroid. An approximate-method based on the assumption of local similarity was used to solve the boundary layer equations and calculate the line of open separation. A condition of vortex shedding along separation is proposed. The two schemes, viscous and inviscid, interact through the line of separation which is allowed to displace as the wake grows. Results are compared with flow visualization data for laminar separation and pressure data for turbulent separation. Dissert. Abstr.

N87-10009 Tennessee Univ., Knoxville.
A STUDY OF THE FLOW FIELD ABOUT AN UPPER SURFACE BLOWN WING AND ITS EFFECTS ON LONGITUDINAL STATIC STABILITY OF A SMALL JET AIRPLANE Ph.D. Thesis
Uwe Peter Solies 1985 149 p
Avail: Univ. Microfilms Order No. DA8608294

The effects of powered lift technology on the longitudinal stability characteristics of an upper surface blown (USB) jet-flapped aircraft have been studied. Both theoretical and experimental methods were employed to investigate the flow field in the vicinity of the lifting wing and its influence on pitching moments of the aircraft in motion. A nonlinear vortex-lattice theory was used to model the lift induced airflow in the near flow field about the wing. Comparison with literature data showed excellent agreement, giving confidence in the method used. Flight tests were conducted with the Ball-Bartoe Jetwing technology demonstration aircraft to visualize flow angles on the fuselage surface and at selected points in the flow field near the horizontal tail. To save cost, simple data acquiring techniques were used. Also, the theoretical flow computations were restricted to a simplified Jetwing model with a relatively small number of panels. Still, there was fair agreement between theoretically and experimentally determined flow angles at the tail of the Jetwing aircraft. The vortex-lattice routine was then used for a parametrical study of flow angles and longitudinal stability parameters. The results show that the powered lift strongly affects the flow field about the wing. Dissert. Abstr.

N87-10010 Colorado Univ., Boulder.
AN ASYMPTOTIC THEORY OF SUPERSONIC TURBULENT INTERACTIONS IN A COMPRESSION CORNER Ph.D. Thesis
Rodney Lee Cusic 1985 146 p
Avail: Univ. Microfilms Order No. DA8606595

The shock-boundary layer interaction is a phenomenon which occurs in a wide range of aerodynamic flows of practical importance. When a supersonic turbulent boundary layer encounters a compression corner, a continuous band of compressions is generated that coalesce into a shock wave. The undisturbed sonic height and the shock formation process occur deep inside the boundary layer on a scale typically two or three orders of magnitude smaller than one boundary layer thickness. The interaction flow field is determined by both the boundary layer profile and the compression corner angle. The inner region boundary value problem is scaled by sonic height, includes nonlinear transonic effects and must be solved by a conservative finite difference numerical scheme that captures the upstream influence, shock formation process, and abrupt pressure rise upstream of the vertex. The outer limit of the inner region solution is asymptotically matched to the inner limit of the existing outer region solution in some intermediate region. The result is a composite solution valid in both regions, which is analyzed by comparison to experimental data. Dissert. Abstr.

N87-10011# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
PROCEEDINGS OF THE SYMPOSIUM ON MECHANICS FOR SPACE FLIGHT, 1985
Minoru Oda 1985 266 p The 15th Symposium was held in Tokyo, Japan, 7-8 Nov. 1985
(ISAS-SP-4) Avail: NTIS HC A12/MF A01

This 15th symposium was held on November 7 and 8, 1985 at the Japanese Institute of Space and Astronautical Science. The symposium program consisted of seven oral sessions: Vortical Flow; Flow around Flight Vehicles; Computational Fluid

Dynamics; Space Environment Control; Elementary Processes in Heat Pipes; Analysis of Heat Pipe Systems; Applications of Heat Pipes; and one panel discussion on Research and Development of Total Energy Systems for Space. During the Computational Fluid Dynamics Session, a report on the International Symposium on Computational Fluid Dynamics in Tokyo was presented. Eighteen papers of the 30 presented are included. For individual titles, see N87-10012 through N87-10038.

N87-10012# Tokyo Univ. (Japan).
THEORETICAL STUDY OF STRONG INTERACTION OF VORTEX FILAMENTS
Ryuji Takaki and A. K. M. F. Hussain *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 8 p Sponsored by Japan Society for the Promotion of Science (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The recent analysis on the recombination of two vortex filaments in a viscous incompressible fluid is reported. The analysis is confined to a local flow field where this interaction occurs, and is based on the vorticity equation with the viscous term along with several assumptions, including fluid impulse conservation and spatial symmetry of the flow field. The flow field is expanded into polynomials of coordinates and the coefficient, which are functions of time, are obtained by substituting the expansions into the vorticity equation. It is proved that this process is completed within a short time t*=0(sigma sq. 2/gamma), where sigma and gamma are the size and the circulation of the vortex filaments respectively, and that the viscous effect is necessary for occurrence of the process. Author

N87-10013# Tokyo Univ. (Japan).
STUDIES ON VORTEX MOTION BASED ON THE DIVIDING VORTON MODEL
Sinzi Kuwabara *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 11 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The basic equations and the division condition for dividing vortons in the incompressible, inviscid fluid are derived. Numerical analysis based on the dividing vorton model is applied to the evolution of the linked two vortex rings. The deformation of the rings at different times and the enstrophy, helicity, energy, momentum etc. of this system vs. time are calculated. Numerical results show that the invariance of the constants of motion of this system, the energy, momentum, angular momentum and total vorticity, except helicity, is satisfactory, and the helicity is constant in the initial stage but oscillates thereafter. As the two rings go close to each other and the interaction between them becomes stronger, the forms of vortex lines are so complicated, that they seem to develop to fractal curves. Author

N87-10014# Mitsubishi Heavy-Industries Ltd., Tokyo (Japan).
A DESCRIPTION OF A TURBULENT FLOW PAST A CIRCULAR CYLINDER BY A DISCRETE VORTEX METHOD
Hiroshi Nakajima and Yoshimasa Yoshizawa (Tsukuba Univ. (Japan).) *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flighy, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Discrete vortex methods were often used to describe unsteady incompressible flows at high Reynolds numbers. Most studies already existing are concerned with large scale structures of the interested flows and integrated properties, that is, lift and drag coefficients of bodies. In order to examine potential abilities of the vortex methods in describing more detailed information, a correlation function in a wake of a circular cylinder is measured by a discrete vortex method and also an experiment of an actual flow. Comparisons between them show that turbulent structures also could be well described by the discrete vortex method. Author

N87-10015# Tokyo Univ. (Japan). Dept. of Physics.
ACOUSTIC WAVES EMITTED BY VORTEX-BODY INTERACTION c71
T. Kambe, T. Minota (Kyushu Univ., Fukuoka (Japan).), and Y. Ikushima *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Acoustic emission by a vortex ring moving near a solid body is investigated both experimentally and theoreticlly for three typical configurations of the vortex-body system. In the first case, a vortex ring passes near by a circular clinder whose axis is set at right angles to the vortex motion. In the remaining two cases, a vortex ring passes by a sharp edge of a flat plate, its width being comparable with the vortex size for the one case and semi-infinite for the others. A basis of comparison between the observations and the theoretical predictions is presented. Author

N87-10016# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
STUDY OF THREE-DIMENSIONAL SEPARATION ON A SPHEROID AT INCIDENCE c34
Yoshio Ishu and Yuko Oshima (Ochanomizu Women's Univ., Tokyo (Japan).) *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Experimental observation of flow separation on a spheroid at various angles of attack was carried out in low Reynolds number flow using a water channel by flow visualization method. Color oil method was adapted to make the surface separation pattern visible, and hydrogen bubble method was effective for visualization of the flow field around the model. The results support the three-dimensional separation criteria proposed by Maskell, Wang, and Han and Patel, and mechanism of the flow interaction with the longitudinal vortices along the body surface is made clear. Author

N87-10017# Chiba Univ. (Japan). Faculty of Engineering.
IMAGES OF THREE DIMENSIONAL FLOWS IN COMPUTER GRAPHICS c61
Nobuhide Nishikawa, Akira Suzuki, and Satoshi Akiyama *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 11 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The numerical results are shown in graphic images for three dimensional boundary-layer flows. It is shown that the presentation of images, especially in solid model graphics, allows the utilization of the widest band width sense in an effective manner to create physical or geometrical models and to understand their behavior in simulated environments. As the results, external streamlines and limiting streamlines obtained with finite difference calculations are given for paraboloid, and for the front half region of wing-ellipsoid combination. Author

N87-10018# Yamagata Univ. (Japan). Faculty of Engineering.
ON ACCURATE NUMERICAL SOLUTIONS OF FALKNER-SKAN EQUATION c34
Masakazu Katagiri *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 6 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Accurate numerical solutions of the Falkner-Skan equation are obtained by a numerical method of quasi-linear approximation. For various values of a parameter which measures the pressure gradient, solutions of ten decimal accuracy are obtained. For the case of a boundary layer flow along a semi-infinite flat plate, twelve decimal accuracy can be obtained. Author

N87-10019# IBM Japan. Science Inst.
NUMERICAL STUDY OF THE ENTRANCE FLOW AND ITS TRANSITION OF A CIRCULAR PIPE c34
H. Kanda and K. Oshima *In* Tokyo Univ. Proceedings of the

Symposium on Mechanics for Space Flight, 1985 1985 17 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The dimensional, time-dependent computational scheme was devised for determining the flow development and the corresponding pressure drop in the entrance region of a circular pipe at the Reynolds numbers based on the pipe diameter of 10, 100, 2000, and 10000. An iterative, stream function-vorticity formulation was applied, utilizing a mesh system in which the axial grid size is nearly proportional to the Reynolds number. The velocity field, the pressure drop, and the convective and the viscous terms are compared with the experimental results and also with the previous analysis. Moreover, the effects of the Reynolds number and the superposed disturbances on the transition from laminar to turbulent flow were numerically simulated. Author

N87-10020# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL SIMULATION OF TWO-DIMENSIONAL FREEJET FLOW-FIELDS **c34**
Koji Teshima and Hiroyuki Nakatsuji *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p Sponsored in part by the Data Processing Center (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Supersonic jet flow fields from a two dimensional sonic nozzle are computed using the piecewise linear method. The sonic radius for a two dimensional source flow is estimated using the numerical results. It is shown that the flow properties on the jet axis can be approximated by the two dimensional source flow at large distances from the nozzle. The distance of the normal shock from the nozzle increases with the stagnation to ambient pressure ratio, but is somewhat larger than experiments. Author

N87-10021# Tokyo Univ. (Japan).
TECHNICAL OVERVIEW OF PLUME RADIATION FROM A SOLID ROCKET MOTOR **c20**
Yasushi Sakurai and Hiroshi Kimura *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 14 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Current technology for calculation of plume radiation from a solid rocket motor is overviewed and a useful engineering model is reviewed and recommended for design purposes. A solid rocket motor plume is a conical cloud which contains cold scattering particles and hot emitting-absorbing particles. Radiation to aft-end equipment of spacecraft is a major concern of thermal design engineers. Radiative properties of the plume totally depends on the particle behavior in the flow field and the analysis requires numerious efforts. A simple Bobco model which starts without flow field analysis, is discussed. Author

N87-10022# Tokyo Univ. (Japan).
TWO DIMENSIONAL ANALYSIS OF HIGH VOLTAGE SOLAR ARRAY INTERFERING WITH IONOSPHERIC PLASMA **c44**
Hitoshi Kuninaka and Kyoichi Kuriki *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The spacecraft which flies in Low Earth Orbit being biased at high voltage is affected by undesirable interference with the ionospheric plasma. Two dimensional analysis was performed about the solar array which has 10 m span and is biased at 1 kV. For the standard ionospheric conditions the drain power assumes about 0.25% of the generated power, which is rather insignificant. On the other hand, the ion drag amounts to about 130% of the neutral particles collision drag, which represents drastic increase of the satellite drag. Author

N87-10023# Miyazaki Univ. (Japan). Dept. of Applied Physics.
ANALYSIS ON GRAVITATIONAL EFFECT TO NONLINEAR DIFFUSION SYSTEM OF VAPOR MOLECULES IN A HEAT PIPE **c34**
Kanji Etori *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 12 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

A nonlinear diffusion equation with a diffusion coefficient depending on number density of diffusing particles affected by gravity is approximately solved in a steady state. Characteristic properties of vapor molecules in a heat pipe are analyzed as a diffusion process of Brownian particles. In order to explain the nonlinear shifts from a linear diffusion system in conventional theories, the expectation values and the variance of number density of vapor molecules are calculated by using the theory of stochastic processes. As a result, a diffusion thermal resistance of a heat flow in a heat pipe is estimated by taking an average value of the diffusion coefficient in a nonlinear system. Author

N87-10024# Nippon Inst. of Tech. (Japan).
EFFECT OF SURPLUS STANDING LIQUID ON HEAT TRANSFER RESISTANCE IN THE HEAT PIPE (WITH MESH WICK IN A HORIZONTAL MODE) **c34**
Makoto Kamata and Yoshio Ikeda *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

It is an engineering practice to fill a heat pipe with working fluid of a quantity a little larger than the clearance volume of the screen wick as the most desirable volume of working fluid is unknown. However, it is foreseeable that excessive volume of working fluid deteriorates the performance of the heat pipe. A new method is discussed of computation for heat flow and temperature distribution in a heat pipe with the assumptions that the depth of working fluid in the heat pipe can be calculated from the pressure losses in the evaporation and condensation zones, that surplus fluid adheres to the inner wall of the screen wick forming a cylindrical layer of liquid, and that the heat transfer resistance of the container, screen wick and cylindrical layer of working fluid are connected in series. To validate the computation, experiments were performed and good agreement was obtained. Author

N87-10025# Osaka Univ. (Japan). Dept. of Aeronautical Engineering.
DYNAMIC HEAT TRANSFER MECHANISM OF TWO-PHASE CLOSED THERMOSYPHON **c34**
Kanji Negishi, Ken-ichi Kaneko, and Fusao Kusumoto *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The heat transfer mechanism of a two phase closed thermosyphon was dynamically analysed in the periodically motive behavior of working fluid with boiling. It is an important problem in order to obtain high heat transfer performance, how the liquid film of the working fluid can be held for longer time on the wider area of the evaporator heating wall, and how the active evaporation can be kept there. Author

N87-10026# National Research Inst. for Pollution and Resources, Tokyo (Japan).
A TRIAL ON PERFORMANCE TEST METHOD FOR Cu-WATER HEAT PIPE **c34**
Yoshio Tanaka and Tadashi Yamamoto *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 8 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Because of the increase demand for heat pipes, the establishment of standard methods for the performance test and the performance expression of the heat pipe was requested. Generally, the measurement method for the heat transfer rate of heat pipes is divided into two categories. That is, the heat transfer rate of heat pipe is measured by heat input to the evaporator surface or the quantity of heat removed from the condenser zone. The heat loss to each method described must be determined by circulating

some kind of fluid such as water in same size pipe located in the heating unit instead of the heat pipe under actual operating condition before use. The heat transfer rate of Cu-Water heat pipe is measured by means of the measurement method based on the principle of bomb calorimeter. The obtained measuring accuracy may be lower. E.R.

N87-10027# Toshiba Corp., Tokyo (Japan).
HIGH CAPACITY HEAT PIPE WITH AXIAL GROOVES c34
Yoshiro Miyazaki and Yuji Ido *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 5 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

A new type of high capacity heat pipe for spacecraft use was fabricated and tested. The heat pipe consists of an outer pipe and an inner pipe. The outer pipe is a container and it has two channels, one for liquid and one for vapor. The inner pipe is provided with axial grooves and circumferential slits, and it is inserted into the vapor channel of the outer pipe. The circumferential slits connect the liquid channel and the axial grooves. Preliminary test results for the first 1 m long development model are presented and discussed, relating to its heat transport capacity. Author

N87-10028# Tokyo Electric Power Co., Inc. (Japan).
OPERATING CHARACTERISTICS OF COOLING UNDERGROUND POWER CABLES USING UP SLOPED LONG HEAT PIPES IN CONDUIT c34
Keisuke Oka, Hachiro Tsuchihashi, Yoichi Nishimura, Tsuneaki Mohtai (Fujikura Ltd., Sakura (Japan).), Masataka Mochizuki, Koichi Mashiko, and Hiroshi Yamanouchi *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Long heat pipes for cooling electric power cables in conduit pipe are required to operate not only in the down slope but also in the up slope. The stable operation of the heat pipe is attained by separating the vapor flow path and the liquid flow path completely, and returning the working fluid condensed by the radiator to the evaporation section end by utilizing a difference in the pressure head. Evaporating section consisting of corrugated metallic pipes and carbon fiber wicks were employed for liquid film evaporation and holding liquid uniformly along an axial length of the pipe. Long heat pipes with a length 100 m, outside diameter 70 mm, and up slope 1/100 were made experimentally and tested. They operated in the normal heat pipe mode, carrying heat 9kW. Further the heat pipes were layed in some cable conduits providing adequate cooling effect. Author

N87-10029# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
REPORT OF THE INTERNATIONAL SYMPOSIUM ON COMPUTATIONAL FLUID DYNAMICS, TOKYO c34
Koichi Oshima *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 8 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The International Symposium on Computational Fluid Dynamics-Tokyo was held on Sept. 9 thru 12, 1985 at Kenchiku Kaikan of Tokyo. Based on the recommendation given by the International Advisory Committee Members a few distinguished CFD scientists were asked to present a review paper on each specialized field, and 23 out of them were able to accept the invitation. They were noted as INVITED on the Program. Total of 97 abstracts of contributed papers were submitted, and, based on referee reports made by all the International Advisory Committee Members, 75 of them were accepted for presentation. Out of these 98 papers including the invited ones, 35 came from USA, 28 from Japan and 35 from rest of the world. All of these papers are listed. E.R.

N87-10030# Academy of Sciences (USSR), Moscow. Computing Center.
COMPUTATIONAL AERODYNAMICS OF SUPERSONIC LIFTING VEHICLES
P. I. Chushkin and G. P. Voskresensky *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 13 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

A review of investigations on numerical modelling of supersonic three dimensional steady flows about lifting vehicles and their elements carried out in the Soviet Union during the last five years is given. An inviscid gas, both perfect and high-temperature, is considered. A number of characteristic examples are presented. Author

N87-10031# Akademiya Nauk SSSR, Novosibirsk. Inst. of Theoretifcal and Applied Mechanics.
NUMERICAL MODELING OF SPATIAL FLOWS ON THE BASIS OF SPLITTING UP METHOD c34
V. M. Kovenya, G. A. Tarnavsky, and S. G. Cherny *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The study of flows near the bodies of three dimensional, spatial configuration is one of the problems of paramount importance in computational aerodynamics. The difficulties of studying the spatial flows are conditioned by the presence of zones of sharp inhomogeneities of the shock wave type, boundary layer, separation regions and of other peculiarities in the field near a body and in the wake behind it, parallel with the regions of a smooth flow. The study requires the application of different physico-mathematical models which are valid for description of flows in different subregions. The stationary supersonic flows of a viscous gas near the bodies in the approximation of complete and simplified Navier-Stokes equations are examined. The parabolic approximation of Navier-Stokes equations (PNS) was taken as a simplified model. The PNS model is obtained by elimination from the complete equations of the second derivatives (repreated or repeated and mixed) along the one coordinate (marching) direction. It incorporates the models of viscous and thin shock wave and holds for description of the flows with the presence of transversal separations. A wide application of the PNS model is conditioned by a decrease in the problem dimension as well as in the possibility of finding the stationary solution by the marching method for supersonic flows. At the same time a class of problems for which the PNS approximation holds is wide enough. E.R.

N87-10032# Academy of Sciences (USSR), Moscow. Computing Center.
THE THIRD ORDER COMPACT SCHEMES FOR FLUID DYNAMIC PROBLEMS c34
A. I. Tolstykh *In* Tokyo Univ. Proceedings of the Symposium on Mechnics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The algorithms for viscous flows computations should meet higher requirements to such kinds of properties as stability, the absence of scheme oscillations, etc. The first of these properties makes preferable implict schemes, the second one leads to the odd order of approximation. Computational practice has shown that from this point of view the three-point (compact) third order schemes proposed and investigated are efficient. Those are actually high accuracy schemes when supplemented with grid points condensing in the computational regions with strong gradients. The discription of the third order compact schemes and of some of their applications to fluid dynamic problems is given. Author

N87-10033# Academy of Sciences (USSR), Moscow. Inst. of Applied Mathematics.
SUPERSONIC FLOW AROUND TIP SIDES OF WINGS
G. P. Voskresensky *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The problem of supersonic flow around the tip sides of wings with swept or unswept leading edges and an attached shock wave is presented. The solution of the problem is based on the assumption that the surface of a rounded tip side of a wing is conical and the flow around it is self-similar. This fact makes it possible to use the self-similar stationing principle for the solution of the problem. The realization of this principle is carried out with the help of the finite-difference second-order algorithm. Author

N87-10034# Technical Univ. of Opole (Poland).
AN IMPROVED PSI-CELL METHOD FOR TURBULENT MULTI-PHASE FLOWS **c34**
B. Dobrowolski and Z. Kabza *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight 1985 6 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The rapidly increasing capability of computers has led to the development of numerical models for two-phase flows. There are basically two schemes that have been used in literature to model two-dimensional subsonic gas-particle or gas-droplet flows; the two fluid methods and the trajectory method. The average equations which treat the conveying gas and the particle cloud as two interactive fluids are the basis of the two-fluid method. The other apporach to modelling gas particle flows is the trajectory approach. This approach, called PSI cell model is based on treating the droplets or particles as sources of mass, momentum and energy to the gaseous phase. The presented modifications of the PSI-cell method allows the computation, in an economic way, of complicated turbulent polydispersive(polyphase) flows. Some additional terms in the turbulence model equations are introduced in a theoretical manner. The results of numerical calculations point at the dissipative character of turbulent interphase interactions and the considerable dependence of macrostructure of the two-phase stream on the structure of turbulence. E.R.

N87-10035# Bulgarian Academy of Science, Sofia. Inst. of Mechanics and Biomechanics.
HYDRODYNAMIC AND THERMAL INTERACTION BETWEEN TWO SPHERES IN A STEADY VISCOUS FLOW **c34**
Z. D. Zapryanov and E. T. Toshev *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The investigation of the hydrodynamic and thermal interaction between two spheres moving in a viscous fluid is very important from a practical and fundamental point of view. This problem is topical in modeling of suspensions, emulsions and many chemical technologies. An extension of the method of fractional steps to study the hydrodynamic and thermal interaction between two spherical particles in a steady viscous flow is presented. This numerical method yields good results from low to reasonably high Reynolds and Prandtl numbers. Author

N87-10036# Academy of Sciences (USSR), Moscow. Inst. of Applied Mathematics.
MATHEMATICAL AND COMPUTATIONAL MODELS OF PLASMA FLOWS **c75**
K. V. Brushlinsky *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Investigations of plasma flows are of interest, firstly, due to numerous applications, and secondly, because of their general principles, which form a special branch of physics: the plasma dynamics. Numerical simulation and computation, together with theoretic and experimental methods, play an important part in these investigations. Speaking on flows, a relatively dense plasma is mentioned, so its mathematical models appertain to the fluid mechanics, i.e., they are based on the magnetohydrodynamic description of plasma. Time dependent two dimensional models of plasma flows of two wide-spread types are considered: the flows across the magnetic field and those in the magnetic field plane. Author

N87-10037# Academy of Sciences (USSR), Moscow. Computing Center.
THE NUMERICAL METHOD OF CALCULATION OF TWO-DIMENSIONAL STATIONARY ELECTRO-GASDYNAMIC INTERNAL FLOWS **c34**
V. V. Zhurin and A. V. Shipilin *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

The suggested numerical method is meant for computations of two dimensional stationary internal nonviscous gas flows in a presence of a heat supply at expense of Joule heating. Such flows and processes take place in the plasma thrusters and in the working regions of the electro-ionizing lasers. The numerical solution of the Euler equations for subsonic and transonic regimes are considered. For computations of supersonic internal flows the method of characteristics is a very effective method. The method suggested allows an easy connection with the method of characteristics. Author

N87-10038# Academy of Sciences (USSR), Moscow.
COMPUTER SIMULATION IN ENGINEERING HYDRODYNAMICS **c61**
A. A. Samarskii, B. P. Gerasimov, T. G. Elizarova, I. S. Kalachinskaya, A. B. Karagichev, A. V. Lesunovsky, S. A. Semushin, B. I. Chetversushkin, and A. G. Churbanov *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 4 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

Computer simulation becomes a major research tool in science and technology. The fluid flow is the most common transport mechanism in technical devices and technological processes. It gave rise to a new scientific field-computational engineering hydrodynamics, which implies special demands to the computer simulation software. Appropriate applied code packages (ACP) involve comprehensive physical and mathematical models, while allowing their implementation and modification by various users who do not specialize in computational mathematics. This is possible due to the modular standard structure of codes, simplicity and reliability of numerical techniques involved. The program complexes, NEPTUN and EOL, cover a wide subject area of engineering hydrodynamics. Experience gained in exploitation of these codes showed that it takes only 2 to 3 months to master them. Additional modules developed by users are included in ACP and become available to others. Such an approach considerably enhances the labor efficiency of mathematicians, programmers and users. Author

N87-10039*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION OF THE FLIGHT CHARACTERISTICS OF A CANARD GENERAL-AVIATION AIRPLANE CONFIGURATION
Dale R. Satran Oct. 1986 60 p
(NASA-TP-2623; L-15929; NAS 1.60:2623) Avail: NTIS HC A04/MF A01 CSCL 01A

A 0.36-scale model of a canard general-aviation airplane with a single pusher propeller and winglets was tested in the Langley 30- by 60-Foot Wind Tunnel to determine the static and dynamic stability and control and free-flight behavior of the configuration. Model variables made testing of the model possible with the canard in high and low positions, with increased winglet area, with outboard wing leading-edge droop, with fuselage-mounted vertical fin and rudder, with enlarged rudders, with dual deflecting rudders, and with ailerons mounted closer to the wing tips. The basic model exhibited generally good longitudinal and lateral stability and control characteristics. The removal of an outboard leading-edge droop degraded roll damping and produced lightly damped roll (wing rock) oscillations. In general, the model exhibited very stable dihedral effect but weak directional stability. Rudder and aileron control power were sufficiently adequate for control of most flight conditions, but appeared to be relatively weak for maneuvering

compared with those of more conventionally configured models. Author

N87-10040*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Engineering Mec
ANALYSIS OF TWO-DIMENSIONAL INCOMPRESSIBLE FLOW PAST AIRFOILS USING UNSTEADY NAVIER-STOKES EQUATIONS
K. N. Ghia, G. A. Osswald, and U. Ghia 1986 15 p Previously announced in IAA as A85-42975
(Grants NAG1-465; AF-AFOSR-0160-80)
(NASA-CR-179823; NAS 1.26:179823) Avail: NTIS HC A02/MF A01 CSCL 01A

The conservative form of the unsteady Navier-Stokes equations in terms of vorticity and stream function in generalized curvilinear coordinates are used to analyze the flow structure of steady separation and unsteady flow with massive separation. The numerical method solves the discretized equations using an ADI-BGE method. The method is applied to a symmetric 12 percent thick Joukowski airfoil. A conformal clustered grid is generated; several 1-D stretching transformations are used to obtain a grid that attempts to resolve many of the multiple scales of the unsteady flow with massive separation, while maintaining the transformation metrics to be smooth and continuous in the entire flow field. Detailed numerical results are obtained for three flow configurations (1) Re = 1000, alpha = 5 deg., (2) Re =1000, alpha = 15 deg., (3) Re = 10,000, alpha = 5 deg. No artificial dissipation was added; however, lack of a fine grid in the normal direction has presently led to results which are considered qualitative, especially for case (3). Author

N87-10041*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPIN-TUNNEL INVESTIGATION OF A 1/25-SCALE MODEL OF THE GENERAL DYNAMICS F-16XL AIRPLANE
Raymond D. Whipple and William L. White Oct. 1984 51 p
(NASA-TM-85660; L-15616; NAS 1.15:85660) Avail: NTIS HC A04/MF A01 CSCL 01A

A spin-tunnel investigation of the spin and recovery characteristics of a 1/25-scale model to the General Dynamics F-16XL aircraft was conducted in the Langley Spin Tunnel. Tests included erect and inverted spins at various symmetric and asymmetric loading conditions. The required size of an emergency spin-recovery parachute was determined. Author

N87-10042*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUPERSONIC, NONLINEAR, ATTACHED-FLOW WING DESIGN FOR HIGH LIFT WITH EXPERIMENTAL VALIDATION
James L. Pittman, David S. Miller, and William H. Mason (Grumman Aerospace Corp., Bethpage, N.Y.) Aug. 1984 221 p
(NASA-TP-2336; L-15787; NAS 1.60:2336) Avail: NTIS HC A10/MF A01 CSCL 01A

Results of the experimental validation are presented for the three dimensional cambered wing which was designed to achieve attached supercritical cross flow for lifting conditions typical of supersonic maneuver. The design point was a lift coefficient of 0.4 at Mach 1.62 and 12 deg angle of attack. Results from the nonlinear full potential method are presented to show the validity of the design process along with results from linear theory codes. Longitudinal force and moment data and static pressure data were obtained in the Langley Unitary Plan Wind Tunnel at Mach numbers of 1.58, 1.62, 1.66, 1.70, and 2.00 over an angle of attack range of 0 to 14 deg at a Reynolds number of 2.0 x 10 to the 6th power per foot. Oil flow photographs of the upper surface were obtained at M = 1.62 for alpha approx. = 8, 10, 12, and 14 deg. E.R.

N87-10043*# Grumman Aerospace Corp., Bethpage, N.Y.
VISCOUS WING THEORY DEVELOPMENT. VOLUME 1: ANALYSIS, METHOD AND RESULTS Final Report
R. R. Chow, R. E. Melnik, F. Marconi, and J. Steinhoff Oct. 1986 127 p
(Contract NAS1-16858)
(NASA-CR-178156; NAS 1.26:178156; RE-725-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 01A

Viscous transonic flows at large Reynolds numbers over 3-D wings were analyzed using a zonal viscid-inviscid interaction approach. A new numerical AFZ scheme was developed in conjunction with the finite volume formulation for the solution of the inviscid full-potential equation. A special far-field asymptotic boundary condition was developed and a second-order artificial viscosity included for an improved inviscid solution methodology. The integral method was used for the laminar/turbulent boundary layer and 3-D viscous wake calculation. The interaction calculation included the coupling conditions of the source flux due to the wing surface boundary layer, the flux jump due to the viscous wake, and the wake curvature effect. A method was also devised incorporating the 2-D trailing edge strong interaction solution for the normal pressure correction near the trailing edge region. A fully automated computer program was developed to perform the proposed method with one scalar version to be used on an IBM-3081 and two vectorized versions on Cray-1 and Cyber-205 computers.

N87-10044*# Grumman Aerospace Corp., Bethpage, N.Y.
VISCOUS WING THEORY DEVELOPMENT. VOLUME 2: GRUMWING COMPUTER PROGRAM USER'S MANUAL Final Report
R. R. Chow and P. L. Ogilvie Oct. 1986 117 p
(Contract NAS1-16858)
(NASA-CR-178157; NAS 1.26:178157; RE-726-Vol-2) Avail: NTIS HC A06/MF A01 CSCL 01A

This report is a user's manual which describes the operation of the computer program, GRUMWING. The program computes the viscous transonic flow over three-dimensional wings using a boundary layer type viscid-inviscid interaction approach. The inviscid solution is obtained by an approximate factorization (AFZ)method for the full potential equation. The boundary layer solution is based on integral entrainment methods. Author

N87-10045# Goldschmied (Fabio R.), Monroeville, Pa.
WIND TUNNEL TEST OF THE MODIFIED GOLDSCHMIED MODEL WITH PROPULSION AND EMPENNAGE: ANALYSIS OF TEST RESULTS Final Report, 3 Mar. 1981 - 30 Nov. 1982
Fabio R. Goldschmied 1 Feb. 1986 115 p
(Contract N00167-81-C-0075)
(AD-A167360; FRG-82-1; DTNSRDC/ASED-CR-02-86) Avail: NTIS HC A06/MF A01 CSCL 20/4

An extensive test program was carried out in DTNSRDC's 8x10 low-speed wind-tunnel for experimental verification of the integrated hull boundary-layer control/propulsion lighter-than-air design. The 1957 Goldschmied wind-tunnel model was overhauled with a new suction-slot inlet configuration, a suction/propulsion fan, a new aftbody and a tailboom/empennage assembly. The fan air power coefficient of the operational model with empennage ranged in steady flight from 0.0130 (free transition) to 0.0155 (transition tripped at 10% length) at the volume Reynolds number of two millions. Considerable excess thrust could be generated with an average incremental propulsive efficiency of 72%. As compared to wind-tunnel tests of conventional streamlined bodies with empennage at exactly the same volume Reynolds number, the integrated design offers 50% less equivalent drag for both free and tripped transitions. The empennage provided neutral static stability over the complete test range of 8 degrees; the ratio of total fin planform over volume equivalent was 0.404. It was found that efficient and stable BLC could be achieved only by the combination of Ringloeb cusp at the slot's leading-edge with suction flow and with the presence of the tailboom. The fan (or pump) design is an essential part of the system design: a procedure was developed for determining the optimum fan design parameters from the vehicle's wind-tunnel test data. GRA

N87-10046# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
APPLICATION OF BIFURCATION AND CATASTROPHE THEORIES TO NEAR STALL FLIGHT MECHANICS M.S. Thesis

Carl A. Hawkins 1985 247 p
(AD-A167697; AFIT/CI/NR-86-54T) Avail: NTIS HC A11/MF A01 CSCL 01/1

This thesis sought to develop nonlinear systems analysis techniques capable of analyzing and predicting the complex behavior found in high-angle-of-attack flight. The primary research method involved calculation of equilibrium surfaces where the time rate of change of each of the state variables is set to zero in the aircraft equations of motion, and the states that will satisfy that condition are found for various control deflections. The equilibrium surfaces were calculated numerically through use of continuation methods. An equilibrium trajectory analysis of a fifth order model of the aircraft showed significant adverse yaw problems at high AOA as well as the presence of roll coupling. Bifurcational behavior was found in the same fifth order model and verified by previous research. A mechanism for transfer of kinetic energy during the catastrophic behavior shown is hypothesized. A spin equilibrium surface for the aircraft was determined from an eighth order model and, from that surface, possible control deflections for recovery from the spin were obtained. GRA

N87-10047# Nielsen Engineering and Research, Inc., Mountain View, Calif.
PREDICTION OF GUST LOADINGS AND ALLEVIATION AT TRANSONIC SPEEDS Final Report, 20 Sep. 1983 - 20 Jul. 1985
David Nixon and Keh L. Tzuoo Mar. 1986 43 p
(Contract N00167-83-C-0114)
(AD-A167748; NEAR-TR-352; DTNSRDC/ASED-CR-01-86) Avail: NTIS HC A03/MF A01 CSCL 20/4

The transonic indicial theory is used to predict the effect of a gust on an airfoil at transonic speeds. The effect of operating two control surfaces is also modeled by the indicial method. The transonic indicial method is linear in a strained coordinate system and superposition can be used. This allows the effects of an arbitrary gust and control surface deflection to be modeled simply if the indicial responses for the gust and each control surface are known. The computation time is small and, therefore, an optimization technique can be used to determine the best control surface deflections to alleviate the gust loading. GRA

N87-10048# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
VORTEX SHEDDING OF A SQUARE CYLINDER IN FRONT OF A SLENDER AIRFOIL AT HIGH REYNOLDS NUMBERS. PART 1: SPACING EFFECT
Takeo Nakagawa, Gerd E. A. Meier, Rainer Timm, and Hans-M. Lent Oct. 1985 34 p Sponsored by Minna-James-Heinemann Foundation, Hannover, West Germany
(MPIS-23/1985; ISSN-0436-1199; ETN-86-98221) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

The spacing effect on vortex shedding of a square cylinder in front of a NACA 0018 airfoil at high Reynolds numbers was visualized in wind tunnel tests. When the free stream velocity is constant, the amplitude of the pressure fluctuations at a point in the test section is of comparable order irrespective of the spacing between a square cylinder and an airfoil. When the separating shear layers from the upstream square cylinder reattach to the downstream airfoil, the pressure signal is most regular and the vortex shedding frequency is minimum. The airfoil can stabilize the vortex shedding process behind the upstream square cylinder. The Strouhal number of the square cylinder depends upon the nondimensional spacing normalized by the characteristic length of the cylinder. Once the spacing between the square cylinder and the airfoil becomes greater than the critical value, the airfoil does not provide any significant effect on the vortex shedding process behind the upstream cylinder. ESA

N87-10049 Syracuse Univ., N. Y.
FAR FIELD NOISE STUDIES OF CONTOURED AND SOLID/POROUS CONICAL PLUG-NOZZLE JET FLOWS Ph.D. Thesis
Indu Shekher Das 1985 215 p
Avail: Univ. Microfilms Order No. DA8603754

The effectiveness of short porous/nonporous plug-nozzles in shock noise suppression of supersonic jet flows was examined. Experimental investigations of the far field noise characteristics are reported for model baseline convergent nozzle, contoured plug-nozzle and solid/porous conical plug-nozzles. Extensive shadowgraphic recordings of the jet flows are also presented to help understand the shock associated noise generation and suppression mechanisms in solid/porous plug-nozzle jets. The contoured plug-nozzle has been designed to give a shockless flow at the design Mach number 1.5. Noise suppression characteristics of such a contoured plug-nozzle presented herein, provide an ideal to be approached through the use of an optimised short conical plug-nozzle with/without porosity of the plug surface. Noise studies of such optimised solid/porous conical plug-nozzles are reported. All the test plug-nozzles have the same annual radius ratio 0.43 and the same throat area. Porosity of 10% distributed over the whole surface and porosity of 4% distributed over the middle-third of the conical plug surface have been investigated. Shadowgraphic records of the jet flows indicate that the presence of a solid contoured/conical plug results in favorable modifications of the repetitive shock structures in an otherwise convergent nozzle jet flow, and the porosity of the plug surface results in further weakening of the shock structure in the solid conical plug-nozzle jet flow. Dissert. Abstr.

N87-10050 Stanford Univ., Calif.
EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF THE FLOW FIELD OF AN AIRFOIL WITH A DEFLECTED SPOILER Ph.D. Thesis
Chyang Sheng Johnson Lee 1985 140 p
Avail: Univ. Microfilms Order No. DA8602499

Experimental and theoretical investigations were undertaken in the Stanford low-speed wind tunnel to study the flow fields of an airfoil with a deflected spoiler. The numerical simulations were performed by the two dimensional vortex tracing method. Surface pressure distributions, boundary layer and wake profiles were measured systematically to evaluate the effects of the airfoil incidence and spoiler deflection on the means and fluctuating quantities of the flow fields. The development of the wake with airfoil incidence is hypothesized by the variation of the base pressure. The location of the hinge bubble depends on the boundary layer characteristics. The wake is self-preserved if a virtual origin is introduced. A modified vortex tracing method is developed to simulate this unsteady flow field. The surface pressure distributions, mean velocity profiles and turbulent stresses in the wake, and Strouhal number are calculated and compared with the experimental results for various angles of attack and spoiler deflections. Good agreement between the computational predictions and experimental results is found for large spoiler deflections. However, the agreement is not as good for small spoiler deflections. The reason for this deviation is believed to be the strong viscous interaction of the counter rotating vortices in the near wake, which is not included in the present model. Dissert. Abstr.

N87-10051 Texas Univ., Austin.
UNSTEADY FLOW OVER AN AIRFOIL INSIDE A WIND TUNNEL WITH AND WITHOUT TRANSPIRATION Ph.D. Thesis
William John Tedeschi 1985 205 p
Avail: Univ. Microfilms Order No. DA8609435

This research uses the viscous/inviscid interaction model to calculate the lift and drag characteristics of a two-dimensional airfoil inside two types of wind tunnels. The first is a conventional solid-wall wind tunnel with an airfoil oscillating transversely to the freestream. In the second wind tunnel, an unsteady transverse flow field is produced by a time-varying fluid transpiration of the wind tunnel walls. Subsonic flows in the one to five million Reynolds number range are considered. A computer code based on the theoretical model formulated in this study is used to predict the unsteady flow field around the airfoil. The nonlinear inviscid flow problem is solved analytically for the disturbance velocity potential using a unqiue for Fourier transform method. The bounded influence coefficients which explicitly contain the airfoil thickness

distribution and wind tunnel geometry provide an advantage over traditional Panel methods. The viscous flow problem utilizes a finite-difference numerical formulation to solve the unsteady boundary layer equations. Dissert. Abstr.

N87-10052 Notre Dame Univ., Ind.
EXPERIMENTAL STUDY OF THE BOUNDARY LAYER ON A LOW REYNOLDS NUMBER AIRFOIL IN STEADY AND UNSTEADY FLOW Ph.D. Thesis
Michael Brendel 1986 413 p
Avail: Univ. Microfilms Order No. DA8612989

An experimental study of the boundary layer on a Wortman FX63-137 airfoil at a Reynolds number of 100,000 and several angles of attack was conducted for steady and unsteady incompressibile flow. Pressure distributions and single-element hot-wire boundary layer surveys were obtained. A significant portion of the work consisted of the design, fabrication, and testing of an unsteady flow facility. Additionally, the design of data acquisition and data processing techniques for unsteady flow experiments were investigated. A benchmark test was conducted to validate the techniques and the test facility by studying the response of a laminar boundary layer to a periodic unsteady freestream. Results were found to agree with existing analytical and experimental data. The same techniques were then employed in the study of the airfoil boundary layer. Characteristics of the pressure distributions, boundary layer velocity profiles, integrated boundary layer thicknesses, and shape parameters were documented. Criteria for locating laminar separation, transition, and reattachment were developed and compared with flow visualization. These criteria were used to study the behavior of the separation bubble in unsteady flow. Dissert. Abstr.

N87-10330*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany).
EXPERIMENTAL AND THEORETICAL DOPPLER-LIDAR SIGNATURES OF AIRCRAFT WAKE VORTICES
F. Koepp and W. A. Krichbaumer *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N87-10053# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT REEPORT, DELTA AIR LINES, INC., LOCKHEED L-1011-385-1, N726DA, DALLAS/FORT WORTH INTERNATIONAL AIRPORT, TEXAS, AUGUST 2, 1985 Aircraft Accident Report, 2 Aug. 1985
15 Aug. 1986 169 p
(PB86-910406; NTSB/AAR-86/05) Avail: NTIS HC A08/MF A01

On August 2, 1985, at 1805:52 central daylight time, Delta Air Lines flight 191, a Lockheed L-1011-385-1, N726DA, crashed while approaching to land on runway 17L at the Dallas Fort Worth International Airport, Texas. While passing through the rain shaft beneath a thunderstorm flight 191 entered a microburst which the pilot was unable to traverse successfully. The airplane struck the ground about 6,300 feet north of the approach end of runway 17L, hit a car on a highway north of the runway killing the driver, struck two water tanks on the airport, and broke apart. Except for a section of the airplane containing the aft fuselage and empennage, the remainder of the airplane disintegrated during the impact sequence, and a severe fire erupted immediately. Of the 163 persons aboard, 134 passengers and crewmembers were killed, 24 passengers and 3 cabin attendants survived. The National Transportation Safety Board determines that the probable causes of the accident were the flightcrew's decision to initiate and continue the approach into a cumulonimbus cloud which they observed to contain visible lightning; the lack of specific guidelines, procedures, and training for avoiding and escaping from low-altitude wind shear; and the lack of definitive, real-time wind shear hazard information. This resulted in the aircraft's encounter at low altitude with a microburst-induced, severe wind shear from a rapidly developing thunderstorm located on the final approach course. Author

N87-10054*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DOPPLER RADAR DETECTION OF WIND SHEAR
V. E. Delnore, Comp. (PRC Kentron, Inc., Hampton, Va.) and V. A. McClellan (Research Triangle Inst., Research Triangle Park, N.C.) Sep. 1985 118 p Presented at a Meeting, Hampton, Va., 24-25 Sep., 1985; sponsored in part by FAA
(NASA-CP-2435; NAS 1.55:2435; FAA/PM-86/31) Avail: NTIS HC A06/MF A01 CSCL 01C

In response to the Nation's needs for decreasing the threat of violent weather phenomena to aviation, a two-day meeting was held. This meeting, which brought together representatives from NASA, the Federal Aviation Administration, and the avionics industry, focused on the applicability of Doppler radar techniques to the detection of low-level wind shear. B.G.

N87-10055# Federal Aviation Administration, Atlantic City, N.J.
CRASHWORTHINESS EXPERIMENT SUMMARY FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM Final Report
D. Johnson and L. Garodz Jun. 1986 629 p
(DOT/FAA/CT-85/20) Avail: NTIS HC A99/MF A01

On December 1, 1984, the Federal Aviation Adminstration (FAA), and NASA, conducted an air-to-ground impact test demonstration with a remotely piloted jet transport category aircraft. This demonstration, identified as the Full-Scale Transport Controlled Impact Demonstration (CID) Program, was the culmination of four years of effort by the two agencies. The major FAA objectives included the demonstration of antimisting fuel and a series of fire safety and structural type crashworithness experiments. The NASA demonstrated objectives also extended to the crashworthiness experiment area. A summary of the FAA structural experiments is provided which included an instrumented fuselage structure and an associated analytical KRASH model, on-board seat/cabin restraint and flight data recorder system installations, and a post-impact accident investigation exercise. The summary contains a description of each experiment, related pre and post test activities, and resulting data. Author

N87-10056# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 2 OF 1985 ACCIDENTS
7 May 1986 404 p
(PB86-916916; NTSB/AAB-86/16) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent HC $185.00/year; all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in brief format occurring in U. S. civil and foreign aviation operations during calendar year 1985. Approximately 200 general aviatiion and air carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The brief format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

N87-10057 Southern Methodist Univ., Dallas, Tex.
A DECENTRALIZED FAULT-TOLERANT APPROACH TO ESTIMATION IN MULTI-SENSOR NAVIGATION SYSTEMS Ph.D. Thesis
Brian David Brumback 1985 139 p
Avail: Univ. Microfilms Order No. DA8604722

This investigation considers the problem of designing estimation algorithms for aided-inertial navigation in which both global accuracy and reliability in the presence of soft sensor failures is required. The approach is to correlate subsets of available sensor data to create multiple estimates of the aircraft navigation state. A two-ellipsoid overlap test is used to determine which local estimates agree and which disagree. Knowledge of the underlying sensor set then provides information to determine which estimates are correct, and which sensors have failed. The estimates that are based on the unfailed sensors are then combined to obtain the global estimate. Monte Carlo simulation results are presented for a system composed of two inertial navigation systems and a Doppler radar. The soft failure considered in this application is an accelerometer bias shift. False alarm and detection probabilities, mean detection-time, and the estimation error of the fault-tolerant system are determined numerically. It is shown that the fault-tolerant approach yields improved performance, compared to a global filter, in the presence of the soft failure. Dissert. Abstr.

N87-10058# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
DMAHTC (DEFENSE MAPPING AGENCY HYDROGRAPHIC/TOPOGRAPHIC CENTER) GPS POINT POSITIONING SOFTWARE: INITIAL RESULTS Final Report
Theodore E. Meyer, George T. Tennis, James A. Slater, and Barbara J. DeNoyer 28 Apr. 1986 18 p Presented at the 4th International Geodetic Symposium on Satellite Positioning, Austin, Tex., 28 Apr. - 2 May 1986
(AD-A167566) Avail: NTIS HC A02/MF A01 CSCL 17/7

Absolute positioning software written at the Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC) was designed to process Texas Instruments 4100 (TI 4100) geodetic receiver phase and range observations. This paper describes absolute positioning solutions obtained by processing data collected during the Spring 1985 High Precision Baseline Test. The positioning software can accept phase or range observations and treat them as either pseudoranges or range differences, thus allowing four different processing modes. The software estimates receiver position, scaling for the tropospheric correction, clock bias, drift, and aging parameters, and biases to the scaled phase measurement. Data from the Spring Baseline Test have been reduced and position offsets relative to given reference positions have been tabulated. Comparisons have been made between solutions computed using different ephemerides, processing methods, observation types, clock treatments, and initial station offsets. Means and standard deviations of the differences between the position solutions and the reference positions are presented. Results show that the positioning software is computationally stable but that significant day to day variations of the solution are present due to the data. Author (GRA)

N87-10059# Transportation Systems Center, Cambridge, Mass.
TERRESTRIAL EVALUATION OF THE GLOBAL POSITIONING SYSTEM (GPS) STANDARD POSITIONING SERVICE (SPS) Final Report, Jan. - Aug. 1985
F. W. Mooney, J. A. Stickler, R. Depaolis, and A. D. Frost Apr. 1986 64 p
(PB86-219599; DOT-TSC-RSPA-86-1) Avail: NTIS HC A04/MF A01 CSCL 17G

The results of static and navigation tests conducted in the Boston, Massachusetts area during the period of January through April 1985 and also in August 1985 were summarized. The objective of these tests was to gather data to determine the viability of the Global Positioning System (GPS), and Standard Positioning Service (SPS) as a stand alone terrestrial radionavigation reference. Companion LORAN-C data were obtained to provide an evaluation of comparative system performance. The study concludes the GPS cannot serve as a stand alone radionavigation system in urban environments characterized by multiple highrise buildings. In less hostile environments, GPS was observed to be an effective radionavigation system with position accuracies exceeding those obtained with LORAN-C. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

N87-10060 Maryland Univ., College Park.
AEROELASTIC STABILITY OF COMPOSITE ROTOR BLADES IN HOVER Ph.D. Thesis
Chang Ho Hong 1985 144 p
Avail: Univ. Microfilms Order No. DA8608813

The aeroelastic stability of flap bending, lead-lag bending, and torsion of hingeless and bearingless composite blades in hover are investigated using a finite element theory based on Hamilton's principle. The hingeless blade is treated as a single cell laminated shell beam. Bearingless blade configuration is assumed as the one consisting of a single flexbeam with a wrap-around type torque tube and the pitch links located at the leading edge and the trailing edge of the torque tube. For analysis, the outboard main blade and the torque tube are assumed to be made of metals (isotroic materials), and the flexbeam is assumed to be a laminated I-section beam. The energy expressions and governing differential equations are derived for moderately large deflections. Quasisteady strip theory is used to evaluate the aerodynamic forces and the unsteady aerodynamic effects are introduced approximately through dynamic inflow modeling. Numerical results are calculated for the selected various hingeless and bearingless blade configurations, categorized as symmetric and antisymmetric, based on the lay-up in the laminates. For both the hingeless and bearingless blade configurations, systematic studies are made to identify the importance of the stiffness coupling terms on blade stability with changing fibers orientation and for different configurations. Dissert. Abstr.

N87-10061# Aeronautical Research Labs., Melbourne (Australia).
ANALYSIS OF THE VIBRATION OF THE INPUT BEVEL PINION IN RAN WESSEX HELICOPTER MAIN ROTOR GEARBOX WAK143 PRIOR TO FAILURE
P. D. McFadden Sep. 1985 51 p
(ARL-AERO-PROP-R-169; AR-004-049) Avail: NTIS HC A04/MF A01

Following the crash of an RAN Wessex helicopter caused by the catastrophic fatigue failure of the input spiral bevel pinion in the main rotor gearbox, routine recordings of the gearbox vibration have been analyzed by ARL. It has been shown that conventional spectral analysis of the vibration is unable to give adequate indication of the presence of the fatigue crack but that an alternative technique of vibration analysis called signal averaging can give warning of the crack 42 hours before failure. Enhancement of the signal average using a computer enables detection of the crack as early as 103 hours before failure. Author

N87-10062# National Aeronautical Lab., Bangalore (India). Systems Engineering Div.
EFFECTS OF FLAP POSITION ON LONGITUDINAL PARAMETERS OF HFB-320
R. V. Jategaonkar and S. Balakrishna Feb. 1986 77 p
(NAL-TM-SE-8602) Avail: NTIS HC A05/MF A01

Parameter estimation results to evaluate the effects of small changes in flap position on the longitudinal derivatives of HFB-320 aircraft are presented. Maximum likelihood estimation procedure is used for kinematic consistency checking of flight test data and also for estimation of aerodynamic derivatives. Linear and nonlinear models are used to estimate dimensional and non-dimensional derivatives directly. Author

N87-10063*# Florida Atlantic Univ., Boca Raton. Dept. of Mechanical Engineering.
TOWARD COMPARING EXPERIMENT AND THEORY FOR CORROBORATIVE RESEARCH ON HINGELESS ROTOR STABILITY IN FORWARD FLIGHT (AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF ISOLATED ROTOR-FLAP-LAG STABILITY IN FORWARD FLIGHT) Annual Report
G. Gaonkar Aug. 1986 33 p Prepared for Army Aviation Research and Development Command, Moffett Field, Calif.
(Contract NCC2-361)
(NASA-CR-179711; NAS 1.26:179711) Avail: NTIS HC A03/MF A01 CSCL 01C

For flap-lag stability of isolated rotors, experimental and analytical investigations are conducted in hover and forward flight on the adequacy of a linear quasisteady aerodynamics theory with dynamic inflow. Forward flight effects on lag regressing mode are emphasized. Accordingly, a soft inplane hingeless rotor with three blades is tested at advance ratios as high as 0.55 and at shaft angles as high as 20 degrees. The 1.62 m model rotor is untrimmed with an essentially unrestricted tilt of the tip path plane. In combination with lag natural frequencies, collective pitch settings and flap-lag coupling parameters, the data base comprises nearly 1200 test points (damping and frequency) in forward flight and 200 test points in hover. By computerized symbolic manipulation, a linear analytical model is developed in substall to predict stability margins with mode identificaton. To help explain the correlation between theory and data it also predicts substall and stall regions of the rotor disk from equilibrium values. The correlation shows both the strengthts and weaknesses of the theory in substall. Author

N87-10064# Army Aviation Systems Command, St. Louis, Mo.
SUMMARY OF ARTIFICIAL AND NATURAL ICING TESTS CONDUCTED ON US ARMY AIRCRAFT FROM 1974 TO 1985 Final Report
Harry W. Chambers and John Y. Adams Jul. 1986 223 p
(Contract DTFA03-80-A-00199)
(FAA/CT-85/26; TR-85-F-11) Avail: NTIS HC A10/MF A01

The U.S. Army Aviation Systems Command conducts airworthiness qualification testing on aircraft under artificial and natural icing conditions. A JCH-47C helicopter with a Helicopter Icing Spray System (HISS) installed is used for generating a simulated natural icing environment. The artificial icing tests are followed by natural icing tests to assure a wide variety of flight conditions are tested and to verify artificial icing test results. Also discussed is the use of deicb and anti-ice systems; the impact of ice accretion and shedding characteristics, performance considerations, stability and control, and vibration characteristics; and the cloud parameters measurement equipment and test aircraft instrumentation used for documenting test data. The test methodology and requirements used for qualifying aircraft for flight into icing conditions, instrumentation, and special equipment are summarized, and the details for tests conducted are contained in the references. The report documents in part 14 years of U.S. Army experience in conducting inflight aircraft icing tests and is provided to the FAA under interagency agreement in the preparation of manuals and other documents relative to the certification of civil aircraft as appropriate. Author

N87-10065*# General Dynamics Corp., Fort Worth, Tex.
DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT Final Report, Jan. 1982 - Aug. 1983
J. D. Clayton, R. L. Haller, and J. M. Hassler, Jr. Jan. 1985 204 p
(Contract NAS1-16879)
(NASA-CR-172354; NAS 1.26:172354) Avail: NTIS HC A10/MF A01 CSCL 01C

The NASA Decoupler Pylon is a passive means of suppressing wing-store flutter. The feasibility of demonstrating this concept on the F-16 aircraft was established through model wind tunnel tests and analyses. As a result of these tests and studies a ship set of Decoupler Pylons was designed and fabricated for a flight test demonstration on the F-16 aircraft. Basic design criteria were developed during the analysis study pertaining to pylon pitch stiffness, alignment system requirements, and damping requirements. A design was developed which utilized an electrical motor for the pylon alignment system. The design uses a four pin, two link pivot design which results in a remote pivot located at the center of gravity of the store when the store is in the aligned position. The pitch spring was fabricated from a tapered constant stress cantilevered beam. The pylon has the same external lines as the existing production pylon and is designed to use a MAU-12 ejection rack which is the same as the one used with the production pylon. The detailed design and fabrication was supported with a complete ground test of the pylon prior to shipment to NASA. Author

N87-10066# Boeing Military Airplane Development, Seattle, Wash.
VULNERABILITY METHODOLOGY AND PROTECTIVE MEASURES FOR AIRCRAFT FIRE AND EXPLOSION HAZARDS. VOLUME 3: ON-BOARD INERT GAS GENERATOR SYSTEM (OBIGGS) STUDIES. PART 1: OBIGGS GROUND PERFORMANCE TESTS Final Report, Aug. 1982 -Jul. 1984
C. L. Anderson Jan. 1986 200 p
(Contract F33615-78-C-2063)
(AD-A167357; D180-28862-Vol-3-Pt-1;
AFWAL-TR-85-2060-V-3-Pt-1) Avail: NTIS HC A09/MF A01 CSCL 01/3

Results of performance evaluation tests of a molecular sieve (MSIGG) and a permeable membrane inert gas generator (PMIGG) system for airplane fuel tank inerting are presented. The IGG units, sized to inert the wing tanks of a KC-135, and the test facilities at Wright-Patterson AFB are described. Steady state performance envelope, endurance, and KC-135 mission simulation tests are conducted. The weight and fuel penalties of the MSIGG and the PMIGG installed in a KC-135 are compared. GRA

N87-10067# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Propulsion and Energetics Panel.
ENGINE-AIRFRAME INTEGRATION FOR ROTORCRAFT
Loughton, England May 1986 154 p Lecture Series held in St. Louis, Mo., 2-3 Jun. 1986, in Rome, Italy, 9-10 Jun. 1986, and in Marseilles, France, 12-13 Jun. 1986
(AGARD-LS-148; ISBN-92-835-1529-3) Avail: NTIS HC A08/MF A01

Topics addressed include numerous airframe integration aspects relating to rotor wing aircraft. Various areas of engine airframe integration, including the impact of advanced engine design variables to specific propulsion subsystems, will be discussed. Other propulsion system integration aspects such as engine/rotor/drive system torsional stability and transient response will also be discussed. Additional areas considering the specification and qualification requirements of propulsion items will be examined. For individual titles, see N87-10068 through N87-10074.

N87-10068# Sikorsky Aircraft, Stratford, Conn. Propulsion Systems.
ENGINE-AIRFRAME INTEGRATION CONSIDERATIONS FOR PRELIMINARY AIR VEHICLE PERFORMANCE ANALYSIS
R. C. Frawley and H. N. Shohet *In* AGARD Engine-Airframe

Integration for Rotorcraft May 1986 21 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

Helicopter engine/airframe integration issues are examined from a preliminary design viewpoint with emphasis on those areas where an impact on aircraft power available and/or aerodynamics is involved. The areas of the helicopter propulsion system specifically addressed include: the engine air induction system considering aerodynamic performance, anti-icing, exhaust gas re-ingestion, and inlet particle separation; the engine exhaust system considering aerodynamic performance, engine compartment cooling, and exhaust ejector system; and lastly, engine bleed air extraction as it relates to environmental control systems and the trade studies associated with same. These subsystems are discussed in terms of basic design guidelines, interaction with other helicopter subsystems, system trade studies, and first order analytical design approaches adequate for preliminary design purposes. Author

N87-10069# Pisa Univ. (Italy). Dipt. de Energetica.
ENGINE-TRANSMISSION-STRUCTURAL AIRFRAME MEMBERS COMPATIBILITY
Dino Dini *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 33 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

The sophistication of current turbine-powered helicopters have introduced many new problems involving the compatibility of the major multidegree of freedom systems: rotor, control, airframe, drive train, and powerplant. The solutions to the various problems were obtained from the application of basic engineering principles. Engine installation is described in the helicopter, particularly the A-129, i.e., power plant attachment, oil cooling system, engine control and monitoring, electric starting system, location of components and leading particulars, and anti-vibration devices. The design of the transmission system is dictated by the configuration of the helicopter. An aerodynamic analysis is conducted on the helicopter mission in order to obtain complete spectra of the rotor loads and moments as well as the maneuver loads and transient for maximum transmission reliability. The application of fiber reinforced resin composites to selected areas of the helicopter drive system will produce weight and cost savings as well as improvements in reliability and safety. These improvements which were demonstrated in airframe applications can be transferred to structural components in the drive system, with high weight saving. Author

N87-10070# Rolls-Royce Ltd., Watford (England).
IMPACT OF IPS AND IRS CONFIGURATIONS ON ENGINE INSTALLATION DESIGN
J. R. Ballard *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 14 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

Helicopters operate in a variety of roles many of which pose severe problems to the engine due to ingestion of sand, ice, salt, and other foreign objects. It is possible to design a compromise engine intake which combats all these hazards to a limited degree. Engine design should be coordinated with both engine and airframe mounted separator performance characteristics to ensure that optimized designs can be offered to customers with very different operational requirements. A design method was outlined which would allow the erosion reduction characteristics of engine and airframe Intake Protection System (IPS) designs to be taken into account during engine design. The Infrared Suppression (IRS) designs can be integrated with IPS scavenge requirements to produce a low signature engine installation. B.G.

N87-10071# Army Aviation Systems Command, St. Louis, Mo. Engineering Dept.
ENGINE-AIRFRAME INTEGRATION FOR ROTORCRAFT: COMPONENT SPECIFICATIONS AND QUALIFICATION
James A. Ray *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 10 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

Both past history and current principles associated with engine-airframe integration for rotorcraft are provided as related to component specification requirements and their individual qualification assurance. Component specification and qualification requirements have tended to be generic and standardized without consideration of actual usage, location, and exposure. As such, overall requirements have had problems of being overly restrictive in some cases and not exacting enough in others. The current trend in tailoring for specific applications as well as insuring system performance requirements by conducting early component/bench level tests will be discussed along with lessons learned from past efforts. Components involved in the overall engine-airframe integration effort such as pumps, fans, starter, valves, sensors, infrared suppressors, inlet particle separators, and fuel cells will be discussed. Author

N87-10072# Garrett Turbine Engine Co., Phoenix, Ariz.
INFLUENCE OF ENGINE VARIABLES ON FUTURE HELICOPTER SYSTEMS
Michael L. Early and Peter K. Zeiner *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 24 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

A helicopter system defined for the year 2000 must make numerous assumptions about future technology and system requirements. In the case of propulsion system options, the required 5 to 15 year development cycle (from preliminary engine cycle studies through engine development to production) complicates the process of optimizing the engine/rotorcraft system. A well-disciplined approach to engine definiton studies to yield engine candidates that best use emerging technologies is illustrated. An advanced, single-engine helicopter requiring a 2000-shp powerplant was used a a base-line vehicle. Both simple and heat-recovery cycles were evaluated, using trade factors to establish engine effects on helicopter direct operating cost (DOC), the optimization parameter assumed for purposes of illustration. Author

N87-10073# Societe Nationale Industrielle Aerospatiale, Marignane (France). Helicopter Div.
HELICOPTER AIR INTAKE PROTECTION SYSTEMS
X. DelaServette and P. Cabrit *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 20 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

The primary function of an engine air intake is to provide air supply with minimum pressure drop and distortion. Static or dynamic air intakes are selected according to both the type of engine air intake and the helicopter missions envisaged. The other function of an engine air intake is to protect the engine against foreign object ingestion, sand erosion, and the various atmospheric agents such as rain, snow, and ice. As a general rule, the air intake protection systems are all the more penalizing as regards performance as they are efficient. The best tradeoff is therefore between both functions. The dimensioning and test criteria for each function of an air intake is examined and then the various development stages are given for the SA 366 G1 Dauphin air intake as an example. Author

N87-10074# Army Aviation Systems Command, St. Louis, Mo. Engineering Dept.
ENGINE-AIRFRAME INTEGRATION FOR ROTORCRAFT: SYSTEM SPECIFICATIONS AND QUALIFICATION
James A. Ray *In* AGARD Engine-Airframe Integration for Rotorcraft May 1986 10 p (For primary document see N87-10067 01-05)
Avail: NTIS HC A08/MF A01

Both past history and current principles associated with engine-airframe integration for rotorcraft are provided as related to system specification requirements and the resulting qualification assurance. System specification requirements have evolved through periods of few details and lack of definitive requirements to the opposite extreme of exacting details and extremely specific requirements. The current trend of performance related specifications is intended to enhance the freedom of design while meeting

the essential mission related requirements. This has required a revised qualification program effort to insure essential requirements are being met throughout the develpment effort. Lessons learned in this evaluation as well as current methods will be discussed for overall engine-airframe integration system requirement. In particular, system qualification will be addressed for such areas as adverse environment requirements for icing, cold/hot temperatures and sand/dust; mission related requirements for engine response, infrared signature reduction, and crashworthiness; and basic engine integration requirements for torsional stability, vibration, and cooling.
Author

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N87-10075# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugfuehrung.
PROCEEDINGS OF THE 13TH SYMPOSIUM ON AIRCRAFT INTEGRATED DATA SYSTEMS
Feb. 1986 586 p Symposium held in Hamburg, West Germany, 17-19 Sep. 1985
(DFVLR-Mitt-86-04; ISSN-0176-7739; ETN-86-98176) Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The application of aircraft integrated data systems for monitoring and recording flight and aircraft condition and performance, to improve safety, reliability, and economy of aircraft operation was discussed. For individual titles, see N87-10076 through N87-10099.

N87-10076# Messerschmitt-Boelkow-Blohm G.m.b.H., Hamburg (West Germany).
A-310 AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS) DESIGN PHILOSOPHY
H. Kalbe *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 9-28 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The A-310 air data system customer requirements and integration problems were examined. The repercussions of these aspects on the system architecture are discussed, and a solution which covers the problems is presented.
ESA

N87-10077# Hamilton Standard, Farmington, Conn.
AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS): EVOLUTION AND REVOLUTION
C. F. Bukowski *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 29-45 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Development of aircraft integrated data systems (AIDS) from 1970 to the present is discussed. User desirable features are considered. Present and perceived AIDS integration/relationships with other aircraft systems, and the tools and resources necessary for implementation are treated.
ESA

N87-10078# Nord-Micro Elektronic Feinmechanik G.m.b.H., Frankfort (West Germany).
MODERN AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS) TECHNOLOGY EXEMPLIFIED ON THE A-320
D. Waldmann and K. Wnuk *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 47-74 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The hardware design, software organization, and data processing of the flight data interface unit (FDIU) and the data management unit (DMU) for the A-320 aircraft are described. The DMU and FDIU provide high flexibility and expansion capability to keep pace with airline requirements. For example, the units are equipped with EEPROM's of size 8 k by 8, but footprint, wiring, and memory management are provided for memory chips with higher capacity. In the DMU prewired spare board slots are provided for future air data system applications as there is the supervision of the structural health of aircraft components. Technologies like gate arrays and surface mounted devices are used so that the equipment shows important reduction in physical size, weight, and power consumption compared to the predecessor.
ESA

N87-10079# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
EXPERIENCE WITH THE ONBOARD CHECKOUT AND MONITORING SYSTEM (OCAMS) OF A MILITARY AIRCRAFT RESULTING IMPROVEMENTS AND THE CONSEQUENCE FOR FUTURE DESIGN
K. Numberger and K. Probst *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 75-92 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The Onboard Checkout and Monitoring System was designed to provide for test and diagnosis of defects to avionic and certain nonavionic equipments. Experience showed what could be improved. Engine and structure monitoring must be improved, still more information would be useful to store, and it was realized that the high sensitivity of the BIT detected also very transient faults. In order to cover these problems, the data acquisition unit of the crash recorder system will be extended with an engine and structural life monitoring system. Using the opportunity of introducing a data communication bus into the avionic system, facilities for data collection, correlation, and event monitoring will be initiated. Based on this the principal structure of the monitoring and test systems of future aircraft can be designed.
ESA

N87-10080# Plessey Co. Ltd., Havant (England).
INTEGRATED MONITORING SYSTEMS FOR TACTICAL AIRCRAFT
P. J. D. Bristowe and R. L. Thompson *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 93-124 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

An aircraft integrated monitoring system integrating previously stand alone avionic boxes in military aircraft, with consequent savings in equipment cost, weight, and volume is described. The crash-protected accident data recorder combines digital data recordings with 3 channels of voice. The data acquisition and processing unit combines the acquisition of accident data, and engine and structural parameters with the real-time implementation of engine and structural algorithms to determine component fatigue life. Other facilities include parameter exceedance monitoring, trend monitoring and event snapshots with simple latched displays for maintenance purposes.
ESA

N87-10081# Civil Aviation Authority, Redhill (England). Airworthiness Div.
APPLICATION OF OPERATIONAL FLIGHT RECORDING TO HELICOPTERS
H. D. Ruben *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 125-138 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Operational flight data recording tests were carried using helicopters. One helicopter carries a data recorder running continuously, and a second helicopter of a different type is being similarly equipped. The objective of the exercise is to establish real time utilization of the helicopter so that design assumptions,

particularly with respect to fatigue, can be validated. It is too early to draw conclusions. ESA

N87-10082# Societe de Fabrication d'Instruments de Mesure, Massy (France).
THE AIRBORNE INTEGRATED DATA SYSTEM (AIDS) FOR THE AIRBUS A-310 ENGINE CONDITION MONITORING
C. Jouvenot *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 139-160 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The A-310 aircraft integrated data system (AIDS) is developed in a single six modular common unit combining flight data acquisition unit and Data Management Unit (DMU) with no possible interaction between the two units. The system is controlled through a Central Data Unit (CDU) and programmed through a removable electrical module plugged in the CDU. A mass memory stores the data for immediate use after the flight. Outputs of DMU are to printer and digital AIDS recorder. Long term analysis reports for engine monitoring are engine cruise, and engine take-off trend reports as well as auxiliary power unit report. Short term analysis is done through engine real time, engine gas path limit exceedance, engine stall, engine divergence, engine start, and engine mechanical limit exceedance report. A prehistory of the data is printed or recorded after the report of the exceeded limit. ESA

N87-10083# British Airways, Heathrow (England).
CHOOSING AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS) ARCHITECTURE SUITABLE FOR ENGINE HEALTH MONITORING (EHM) ON FUTURE GENERATION ENGINES
Donald E. Foxley *In* DFVLR Proceedings of the 13 Symposium on Aircraft Integrated Data Systems Feb. 1986 p 161-176 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Airborne engine monitoring system architectures including air and ground elements are assessed. It is very desirable to perform the analysis function in the airborne computer, but it requires considerable effort to achieve, and it is probably unrealistic to expect an engine manufacturer to provide such a system to a diversity of airlines, many of whom do not wish to utilize it. What is important is that what they provide should not preclude incorporating it in an airborne computer. The approach for the V2500 engine is to provide only an analysis module and a plot module, leaving the airline to embed these into their system, whether it be a mainframe or dedicated one. Important interfaces such as file structure have not yet been defined. Even so, it is clear their system will need a mainframe or large minicomputer to run on, so perhaps the ultimate in transportable software will have to wait for another generation of equipment. ESA

N87-10084# Deutsche Lufthansa A.G., Hamburg (West Germany). Power Plant Engineering Div.
LUFTHANSA'S AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS) BASED A-310 ENGINE CONDITION MONITORING SYSTEM: PROGRESS ACHIEVED BETWEEN THE 12TH AND 13TH AIDS SYMPOSIUMS
G. Dienger *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 177-205 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The A-310 aircraft integrated data system which acquires, monitors, records, and prints data for aircraft/engine condition monitoring and trouble shooting is discussed. The data is fed-in and processed on-line by a comprehensive ground based diagnosis information system. Operational experience based on regular and ad hoc system reports, and development status are described. ESA

N87-10085# Philips Zentrallaboratorium G.m.b.H., Hamburg (West Germany).
A SYSTEM THEORETICAL BASED METHOD FOR MODULE FAILURE DIAGNOSTIC OF TURBINE ENGINES c07
M. Roesnick *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 207-233 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

A method for module failure diagnostic of turbine engines based on gas path analysis is presented. An effective failure diagnostic of all main modules is possible by a system theoretical based method. The basis of the method is a reduced model, gained by a degree of observability. The application of the state estimation and analytical redundancy guarantees that the failure diagnostic method is applicable even if the measurements are disturbed by random and systematic errors. Simulation results of the JT9D engine are presented. ESA

N87-10086# Technische Hochschule, Aachen (West Germany). Dept. of Aerospace Engineering.
WIND SHEAR MEASUREMENT ON BOARD A MORANE 893
H. Nelles *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 235-266 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

To investigate wind shear during flight, a pneumatic sensing device was developed and installed on board a single engine light aircraft. The device measures the difference in total pressure between two positions vertically displaced from the airplane. The mass flow rate created by the difference in pressure is measured by a hot-wire probe. The signal of this probe is a function of the wind shear. Results collected by this system compare favorably with those of a ground based sensing system and of a research aircraft. ESA

N87-10087# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Forschungszentrum.
PERFORMANCE MONITORING OF SENSORS IN HIGH RELIABLE FLIGHT CONTROL SYSTEMS USING DETERMINISTIC OBSERVERS
Norbert Stuckenberg *In its* Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 261-284 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The output vector of a sensor set used in a flight control system of a transport aircraft was monitored by an observer. Since the observer includes a mathematical model of the aircraft, dynamic deviations in the sensor performance due to failures can be detected. This idea is used in a sensor concept which achieves a high reliability with less sensor hardware than conventional redundancy concepts. Flight test results show the feasibility of the concept under the constraint of disturbances and model inaccuracies. ESA

N87-10088# Flight Data Co., London (England).
THE IMPACT OF FLIGHT DATA ON AN AIRLINE: A CASE STUDY
P. Waller *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 285-307 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

A medium size airline acquired a flight data recorder playback and analysis facility for three aircraft fleets. The effects on the user department are examined in relation to system accessibility. Analysis program developments resulting from the user becoming more aware of the possibilities are presented. Comparisons between this new user airline and others that have exploited flight recorder data over many years are drawn. ESA

N87-10089# Sundstrand Data Control, Inc., Redmond, Wash. Avionics System Div.
DATA RECOVERY TECHNIQUES, AN UPDATE
G. S. L. Benn *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 309-328 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Innovations in flight data recovery techniques are reviewed. Data presentation methods designed to offer the data specialist rapid acess and greater understanding of data are included. Hardware used to manipulate data, and use of personal computers to access and examine flight recorded information are described. Techniques resulting from improvements in flight and ground hardware and application software are proposed, including the use of artificial intelligence and three dimensional display technology. ESA

N87-10090# Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany). Abteilung Flugbetriebstechnik.
SOFTWARE FOR FLIGHT RECORDER DATA PROCESSING DEVELOPED BY LUFTHANSA
Hans-Armin Kaiser *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 329-348 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Computer software to evaluate flight recorder data is described. Software to transcribe raw data to magnetic tape, to perform quality checks of the recorded data, to evaluate selectable parameters and their subsequent graphical display, and to display aircraft movement three dimensionally is available. ESA

N87-10091# Eurocontrol Agency, Brussels (Belgium).
THE AIR/GROUND TRANSFER OF AIRCRAFT INTEGRATED DATA SYSTEMS (AIDS) FOR AIR TRAFFIC CONTROL (ATC) PURPOSES: PRESENT EXPERIMENTS AND POSSIBLE FUTURE INTENTIONS
M. E. Cox *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 349-372 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Use of SSR Mode S links for air traffic control (ATC) is discussed. Experiments indicate that data derived from aircraft in real time via the Mode S link can be very helpful in ATC related applications, including the enhancement of short-term meteorological forecast data. The work shows that digital aircraft can provide a range of potentially useful parameters that can be accessed via an ARINC 429 data port associated with the flight data acquisition system. It is believed that European ATC system requirements for aircraft data will expand rapidly with the implementation of Mode S, in the mid 1990's. By that date, however, there are likely to be applications which have yet to be evaluated to support dependent surveillance and approach and departure control. There may also be air/ground data channels, e.g., ACARS, ASDAR plus other satellite systems stemming from the PROSAT experiments. ESA

N87-10092# Trans World Airlines, Inc., Kansas City, Mo.
AIRLINE DATA ACQUISITION IN AN ACARS ENVIRONMENT
Todd R. Degner *In* DFVLR Proceedings of te 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 373-390 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The data acquisition system on TWA aircraft is described. It combines a tape-based system and an ACARS-based system. The tape-based system is plagued by low reliability, large data volume, long delays between events and analysis, and poor flexibility. An ACARS only system will allow removal of the airborne tape recorders and ground tape transmission units. The ACARS-based system allows real-time on-line data collection. This provides the user with a high-integrity system with great flexibility. The system design is being driven by user needs and the expected benefits. ESA

N87-10093# National Transportation Safety Board, Washington, D. C.
FLIGHT RECORDERS: NEW US REGULATIONS AND NEW INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) STANDARDS
C. A. Roberts and D. R. Grossi *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 391-417 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

On January 8, 1985, the U.S. Federal Aviation Administration issued a Notice of Proposed Rulemaking regarding improved flight recorders. It called for: expanded-parameter digital recorders on new air carrier airplanes manufactured 2 yr after the rule is adopted, regardless of the date of original type certificate; digital recorders to replace foil recorders within 2 yr of the rule change, and 5 additional parameters within 7 yr; and voice recorders on certain commuter airplanes. The International Civil Aviation Organization (ICAO) recorder amendments were adopted in March 1985, and became effective on July 29, 1985. The upgraded U.S. recorder requirements and the ICAO amendments are assessed. ESA

N87-10094# Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
DATA COMPRESSION TECHNIQUES FOR MULTIFUNCTION FLIGHT DATA RECORDERS
F. Saggio, III *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 419-443 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Basic principles of data compression systems are discussed, emphasizing multifunction flight data recording applications. The categorization of data compression methods is discussed, and reversible and irreversible compression techniques are described. Algorithm selection and development, and optimization of data labeling and formatting techniques are considered. Data decompression principles are introduced, and multifunction flight data recording applications which embody data compression techniques are highlighted. By using the spare computing capability of the onboard microprocessor, more functions may be added, or new applications may be possible. ESA

N87-10095# Fairchild Weston Systems, Inc., Sarasota, Fla.
THE FAIRCHILD CVDR: A NEW COMBINATION VOICE AND DATA RECORDER
Hans F. Napfel and Barry J. Hawkins *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 445-474 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

The Fairchild cockpit voice and data recorder developed to meet the SAE Aerospace Standard 8039 for Type 3 recorders for general aviation is described. It is designed to meet or exceed TSO C-51a and DO160B environment and survivability requirements. It records data and voice simultaneously. Calibration data and time are stored on recording medium for life for later data verification. Microprocessor circuitry provides exceptional flexibility and reliability of data storage. It features automatic test of voice recorder function at power-up and continuous verification of flight data recording function during operation. No manual testing is required. It uses internal GMT for data/voice correlation. The tape stops automatically after detection of nonflying status. It has complete ARINC 542 and ARINC 542 expanded parameter compatibility. It records last 33 min of each flight for voice and data, and last 8 hr of excerpted data for previous flight correlation. ESA

N87-10096# Federal Aviation Administration, Atlantic City, N.J.
THE BOEING B 720 AIRCRAFT CONTROLLED IMPACT DEMONSTRATION (CID): FLIGHT DATA RECORDER/COCKPIT VOICE RECORDER EXPERIMENT
Leo J. Garodz and Graham G. LeRoy (Lockheed Aircraft Service, Inc., Ontario, Calif.) *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 475-507 (For primary document see N87-10075 01-06)
(Contract DOT/FAA/CT-85/28P)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

A controlled crash was used to evaluate the adequacy and usefulness of state-of-the-art Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) recorded data in postcrash aircraft accident investigation and analysis, particularly in human factors/crashworthiness. The crash shows a gross design deficiency in TSO-C51a specification, regarding recorder performance when recording data under relatively low g-loads, well within human tolerance limits, which may be experienced in unusual attitude flight. The experiment reveals that sampling rates are too low for certain aircraft performance parameter signals, particularly aircraft linear accelerations and pitch and roll attitude. Either the sampling rates should be increased or the attitude information pitch rate and roll-rate signals should be recorded. It is proved that a separate power supply (battery pack and static inverter) can properly operate an FDAU and three DFDR's even after basic aircraft electrical power is no longer available. ESA

N87-10097# Naval Air Test Center, Patuxent River, Md.
UNITED STATES NAVY - CANADIAN FORCES SOLID STATE FLIGHT DATA RECORDER/CRASH POSITION LOCATOR EXPERIMENT ON THE B-720 CONTROLLED IMPACT DEMONSTRATION
D. M. Watters *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 509-530 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

A solid state flight data recorder/crash position locator (SSFDR/CPL) was developed, configured for and crash tested in the FAA/NASA Boeing B-720. The SSFDR/CPL system contains nonvolatile memory and a CPL radio beacon airfoil. The CPL/RBA provides a selectable overt and covert locating capability. The SSFDR/CPL was ejected from the B-720 upon crash and radiated the overt emergency signals for 5 to 10 sec before silenced by a fuel induced short in the transmitter. The SSFDR was subjected to the worst case fuel fire from the crash, but no data were lost. ESA

N87-10098# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
COMPARATIVE EVALUATION OF REDUNDANT FLIGHT DATA RECORDED BY A DIGITAL AIRCRAFT INTEGRATED DATA SYSTEM RECORDER (DAR) ON BOARD AN AIRBUS A-310 AIRCRAFT
O. Weber and G. Rosenau *In its* Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 531-567 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

Flight data collected during two A-310 flights by a digital AIDS recorder were analyzed. Sixty-four standard data words and 137 data words which could be selected from the ARINC 429 bus as desired were recorded per second. From a flight-mechanical standpoint, redundant data from different sources are analyzed for take-off, landing, and en route. The characteristics of the standard A-310 AIDS are compared to those of the A-300 AIDS and the potential benefit of additional data to a reliable reconstruction of a flight is shown. The reconstruction of the motion state of the aircraft is more complete than with the older equipment; a completely satisfactory reconstruction of the flying motion, however, is not possible in cases where measured values of the flow angles are required. ESA

N87-10099# Technische Univ., Brunswick (West Germany).
INVESTIGATIONS ON A DIGITAL BIT SYNCHRONIZER FOR A DETAILED FLIGHT DATA RECOVERY
H.-D. vonLaue *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 569-584 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

A flight recorder digital bit synchronizer to process (with cross correlation considering several bits) even distorted signals as occur after aircraft crashes, was developed. Reliability of the recovered bits was measured. Results show that bit synchronization based on correlation permits a more reliable bit recognition in critical cases than previous procedures. One disadvantage of the procedure is the large amount of calculation involved. The hardware developed, however, achieves a processing speed of 20 k baud. ESA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N87-10100*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RESPONSE OF A SMALL-TURBOSHAFT-ENGINE COMPRESSION SYSTEM TO INLET TEMPERATURE DISTORTION
Thomas J. Biesiadny, Gary A. Klann (Army Research and Technology Labs., Cleveland, Ohio.), and Jeffery K. Little Sep. 1984 28 p
(NASA-TM-83765; E-2198; NAS 1.26:83765; USAAVSCOM-TR-84-C-13) Avail: NTIS HC A03/MF A01 CSCL 21E

An experimental investigation was conducted into the response of a small-turboshaft-engine compression system to steady-state and transient inlet temperature distortions. Transient temperature ramps range from less than 100 K/sec to above 610 K/sec and generated instantaneous temperatures to 420 K above ambient. Steady-state temperature distortion levels were limited by the engine hardware temperature list. Simple analysis of the steady-state distortion data indicated that a particle separator at the engine inlet permitted higher levels of temperature distortion before onset of compressor surge than would be expected without the separator. Author

N87-10085# Philips Zentrallaboratorium G.m.b.H., Hamburg (West Germany).
A SYSTEM THEORETICAL BASED METHOD FOR MODULE FAILURE DIAGNOSTIC OF TURBINE ENGINES
M. Roesnick *In* DFVLR Proceedings of the 13th Symposium on Aircraft Integrated Data Systems Feb. 1986 p 207-233 (For primary document see N87-10075 01-06)
Avail: NTIS HC A25/MF A01; DFVLR, Cologne, West Germany, DM 150

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N87-10101*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SUMMARY OF LONGITUDINAL STABILITY AND CONTROL PARAMETERS AS DETERMINED FROM SPACE SHUTTLE COLUMBIA FLIGHT TEST DATA
William T. Suit Aug. 1986 25 p
(NASA-TM-87768; NAS 1.15:87768) Avail: NTIS HC A02/MF A01 CSCL 01C

Extensive wind tunnel tests were conducted to establish the preflight aerodynamics of the Shuttle vehicle. This paper presents the longitudinal, short-period aerodynamics of the space shuttle Columbia as determined from flight test data. These flight-determined results are compared with the preflight predictions, and areas of agreement or disagreement are noted. In addition to the short-period aerodynamics, the pitch RCS effectiveness was determined. Author

N87-10102*# Textron, Inc., Irvine, Calif.
TECHNOLOGY REVIEW OF FLIGHT CRUCIAL FLIGHT CONTROL SYSTEMS (APPLICATION OF OPTICAL TECHNOLOGY)
H. A. Rediess and E. C. Buckley Sep. 1984 48 p
(Contract NAS1-17403)
(NASA-CR-172332; NAS 1.26:172332) Avail: NTIS HC A03/MF A01 CSCL 01C

The survery covers the various optical elements that are considered in a fly-by-light flight control system including optical sensors and transducers, optical data links, so-called optical actuators, and optical/electro-optical processing. It also addresses airframe installation, maintenance, and repair issues. Rather than an in-depth treatment of optical technology, the survey concentrates on technology readiness and the potential advantages/disadvantages of applying the technology. The information was assembeld from open literature, personal interviews, and responses to a questionnaire distributed specifically for this survey. Not all of the information obtained was consistent, particularly with respect to technology readiness. The synthesis of information into the perception of the state-of-technology is presented. Author

N87-10103*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IN-FLIGHT TOTAL FORCES, MOMENTS AND STATIC AEROELASTIC CHARACTERISTICS OF AN OBLIQUE-WING RESEARCH AIRPLANE
Robert E. Curry and Alex G. Sim Oct. 1984 30 p
(NASA-TP-2224; H-1181; NAS 1.60:2224) Avail: NTIS HC A03/MF A01 CSCL 01C

A low-speed flight investigation has provided total force and moment coefficients and aeroelastic effects for the AD-1 oblique-wing research airplane. The results were interpreted and compared with predictions that were based on wind tunnel data. An assessment has been made of the aeroelastic wing bending design criteria. Lateral-directional trim requirements caused by asymmetry were determined. At angles of attack near stall, flow visualization indicated viscous flow separation and spanwise vortex flow. These effects were also apparent in the force and moment data. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N87-10104# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
TUNNEL INTERFERENCE FROM PRESSURE MEASUREMENTS ON CONTROL SURFACES
R. Gopinath Aug. 1983 27 p
(AE-TM-8-83) Avail: NTIS HC A03/MF A01

Interference due to tunnel walls has been evaluated from pressure measurements on control surfaces by a method due to Capelier, Chevallier and Bouniod, using a simple exponential type of decay for extrapolating the pressure coefficients beyond the measurement stations to + or - infinity, respectively. The method has been validated against data presented at an AGARD meeting on Transonic Test Sections at NASA Langley, which discussed the merits of the various methods for evaluating the wall interference from pressure measurements. Author

N87-10105# Naval Ocean Systems Center, San Diego, Calif.
PRESSURE-RESISTANT PLANE DISC VIEWPORTS FROM ALLYL DIGLYCOL CARBONATE PLASTIC FOR HYPERBARIC CHAMBERS Research Report, Oct. 1984 - Sep. 1985
J. D. Stachiw Sep. 1985 81 p
(AD-A168007; NOSC/TR-1080) Avail: NTIS HC A05/MF A01 CSCL 11/9

Acrylic plastic viewports have been used for over 40 years in pressure vessels for human occupancy without any catastrophic failure resulting in a loss of life. However, there are special applications, such as hyperbaric chambers for medical purposes, in which the susceptibility of flex-stressed acrylic plastic to surface crazing and cracking in the presence of common organic solvents contained in antibacterial sprays is a distinct disadvantage. To solve this problem, a search has been initiated for transparent plastics that are not attacked by organic solvents and can be cast economically in thick sections. Allyl diglycol carbonate plastic appears not only to satisfy the above requirement, but also to provide better resistance to abrasion, pitting, and X-ray or gamma irradiation than acrylic plastic. Short-term, long-term, and cyclic pressure testing has been conducted on over one hundred allyl diglycol carbonate plane disc viewports with t/d sub o ratio in the 0.06 to 0.4 range and at temperatures in the +40 to +125 F range. It appears that plane discs cast from allyl diglycol carbonate plastic can perform safely as pressure-resistant viewports in pressure vessels for human occupancy. GRA

N87-10106 Stanford Univ., Calif.
ENERGY DELIVERY PROCESSES IN SHOCK TUBES Ph.D. Thesis
Dan Omry 1986 275 p
Avail: Univ. Microfilms Order No. DA8608202

Gas accleration in a shock tube is analyzed. Three topics are discussed: a general review of shock tube basic principles and an extensive survey of the state of the art; a methodology for comparative analysis of the impact of energy delivery configuration on shock tube performance and its application; and a mathematical model of a specific energy delivery process (Joule heating) in a particular geometric configuration (flowing gas heater). Understanding the inherent limitations can be gained by means of comparative analysis. The process of energy transfer is separated into states. The efficiency of each stage indiates the system's performance at that stage. A study of the pre-heated gas driver (energy is deposited in the driver gas prior to the initiation of the shock wave) and the flowing gas heater (energy transfer process starts simultaneously with shock initiation and the energy is deposited in the gas already in motion) shows the latter to be inherently more

efficient in energy delivery when maximum driver temperatures are comparable. A mathematical model of the latter configuration, for the specific case where the energy depostion is Joule heating, is constructed by a synthesis of approximate ideal processes.
Dissert. Abstr.

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N87-10107# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
STRATEGIC DEFENSE INITIATIVE PROGRAM: STATUS OF AIRBORNE OPTICAL ADJUNCT AND TERMINAL IMAGING RADAR
Jun. 1986 24 p
(P86-221132; GAO/NSIAD-86-153; B-223094) Avail: NTIS HC A02/MF A01 CSCL 15C

Information on the status of the Strategic Defence Initiative Organization's technology validation experiments on the Airborne Optical Adjunct (AOA) and Terminal Imaging Radar (TIR) is provided. These experiments, being managed by the Army's Strategic Defense Command, are designed to demonstrate that technology is available to develop effective sensors for a terminal phase ballistic missile defense system. The AOA consists of a Boeing 767 airplane, a long wave infrared sensor with a signal processor, data processor, and other components. GRA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

N87-10108# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
DMA (DEFENSE MAPPING AGENCY) ORBIT DETERMINATION FOR TRANSIT SATELLITES: 1985 Final Report
Jesse K. Murphy and Patrick J. Fell 30 Apr. 1986 15 p Presented at the 4th International Geodetic Symposium on Satellite Positioning, Austin, Tex., 28 Apr. - 2 May 1986
(AD-A167567) Avail: NTIS HC A02/MF A01 CSCL 22/3

Since 1975, the Defense Mapping Agency (DMA) has been computing precise orbits for the Navy navigation satellites, OSCAR series. In mid-1981, DMA began computing precise orbits for the NOVA-1 satellite and, in early 1985, for the NOVA-3 satellite. Currently, DMA determines precise orbits for the three OSCAR and two NOVA satellites which comprise the TRANSIT System. This paper presents a comparison of computational results for these satellites with regard to orbit accuracy, time (oscillator) stability, and polar motion. The comparison is made for results obtained for 1985. Author (GRA)

N87-10109# Sandia National Labs., Albuquerque, N. Mex.
TRAJECTORY SCORING IN GEODETIC COORDINATES USING TRANSPONDER-INTERROGATOR RANGE DATA
T. E. Owen Mar. 1986 75 p
(Contract DE-AC04-76DP-00789)
(DE86-009554; SAND-85-2360) Avail: NTIS HC A04/MF A01

Range measurements taken from a transponder-interrogator ranging system are processed via an extended Kalman filter to provide an accurate time-position history of a vehicle's trajectory by estimating the errors in the vehicle's inertial navigation system. The range and Kalman filter equations are derived in geodetic coordinates to allow for coverage over a large geographic area. The equations are then verified by processing data from flight tests at Edwards Air Force Base, producing position accuracies of 3 to 4 meters 1sigma. DOE

N87-10114 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TRANSFER ORBIT OPTIMIZATION FOR DUAL LAUNCHES
A. G. Bird, D. Plummer (British Aerospace Dynamics Group, Stevenage (England).), and M. J. Smalley *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 17-35 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10115 Arianespace, Evry (France).
ANALYSIS OF THE PROBLEM OF SATELLITE LAUNCH WINDOWS FOR ARIANE DUAL LAUNCHES [ANALYSE DU PROBLEME DES FENETRES DE LANCEMENT SATELLITE POUR LES LANCEMENTS DOUBLES SUR ARIANE]
Philippe Boland *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 37-52 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10116 Communications Satellite Corp., Washington, D.C.
ORBIT GEOMETRY FOR CALIBRATION AND LAUNCH OPERATIONS OF A THREE-AXIS CONTROLLED SATELLITE WITH INERTIAL REFERENCE
David R. Brown *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 53-70 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10117 Telesat Canada, Ottawa (Ontario).
OPTIMAL TRANSFER TO INCLINED GEOSYNCHRONOUS ORBITS
J. Kerry Skipper *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 71-81 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10118 Rome Univ. (Italy). Dept. of Aerospace.
AN INVESTIGATION ON PASSIVELY CONTROLLED GEOSYNCHRONOUS ORBITS
C. Ulivieri, A. Agneni, A. Foni (Consiglio Nazionale delle Ricerche, Pisa (Italy).), and S. Trumpy *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 85-92 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10120 Escuela Tecnica Superior de Ingenieros Aeronauticos, Madrid (Spain).
OPTIMAL TRACKING STRATEGY DETERMINATION
J. J. Martinez-Garcia, C. Bachmaier, T. Prieto, S. Pallaschke (European Space Agency. European Space Operations Center, Darmstadt (West Germany).), and W. Peterhaensel (Mathematischer Beratungs- und Programmierungsdienst G.m.b.H. Dortmund (West Germany).) *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 101-118 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10121 Centre National d'Etudes Spatiales, Toulouse (France).
ACCURACY OF GOESTATIONARY ORBIT DETERMINATION [PRECISION DE LA RESTITUTION D'UNE ORBITE GEOSTATIONNAIRE]
O. Zarrouati *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 119-147 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10123 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE (GOES) MISSION PROFILE
William C. Bryant, Robert L. DeFazio, and Judith A. Sauter *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 169-193 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10124 National Space Development Agency, Ibaraki (Japan). Tsukuba Space Center.
ATTITUDE DETERMINATIONS FOR GEOSTATIONARY SATELLITES OF THE NATIONAL SPACE DEVELOPMENT AGENCY (NASDA)
M. Horii *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 197-206 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10127 Indian Space Research Organization, Bangalore.
PRELIMINARY ORBIT DETERMINATION BY STATIC MULTIVARIATE SEARCH
P. RajendraPrasad, N. S. Gopinath, and R. S. Bhat *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 229-247 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10128 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
EARLY ORBIT DETERMINATION
S. Pallaschke *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 249-261 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10129 National Space Development Agency, Tokyo (Japan). Satellite Development Dept.
STATE/ORBIT ESTIMATION FROM REAL DOPPLER DATA FOR SOLID APOGEE MOTOR BURNING PHASE OF GEOSTATIONARY SATELLITE
Shuji Ono *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 263-288 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10130 Centre National d'Etudes Spatiales, Toulouse (France).
REAL TIME ORBIT DETERMINATION DURING APOGEE MANEUVERS
B. Belon *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 289-300 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10131 Porto Univ. (Portugal). Observatorio Astronomico.
INITIAL ORBIT DETERMINATION FOR GEOSTATIONARY SATELLITES
I. Couto and J. Osorio *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 301-313 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10132 Indian Space Research Organization, Bangalore.
REAL TIME ORBIT AND DYNAMIC SEARCH ZONE COMPUTATIONS TO AID SATELLITE ACQUISITION IN S-BAND DURING THE LAUNCH PHASE OF GEOSYNCHRONOUS TRANSFER ORBIT (GTO)
V. S. Iyengar and P. Soma *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 315-340 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10134 Consiglio Nazionale delle Ricerche, Pisa (Italy).
OPTICAL TRACKING OF THE SIRIO SATELLITE
L. Anselmo and S. Trumpy *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 353-361 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10135 Centre National d'Etudes Spatiales, Toulouse (France).
VERY FIRST ORBIT DETERMINATION AFTER LAUNCH OR MAIN MANEUVERS. APPLICATIONS TO GEOSTATIONARY TELECOM 1A AND 1B
F. Nouel, P. Broca, A. Guitart, R. Mesnard, and D. Zobler *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 363-374 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10137 Centre National d'Etudes Spatiales, Toulouse (France).
SYNCHRONOUS TRANSFER ORBIT OPERATION UNDER THREE-AXIS CONTROL
John V. Brown *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 395-403 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10148 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
OPERATIONAL IMPLEMENTATION OF DEORBITING MANEUVERS
Jozef vanderHa *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 553-562 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10149 Centre National d'Etudes Spatiales, Toulouse (France).
APPLICATION OF LINEAR PROGRAMMING TO FINAL POSITIONING (DRIFT ORBIT) OF A GEOSTATIONARY SATELLITE [APPLICATION DE LA PROGRAMMATION LINEAIRE A LA MISE A POSTE FINALE (ORBITE DE DERIVE) D'UN SATELLITE GEOSTATIONNAIRE]
D. Blumstein *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 563-572 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

N87-10162 Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
CONSTRAINTS IMPOSED BY AN INTERSATELLITE COMMUNICATION LINK UPON STATIONKEEPING OF TWO CLOSE GEOSTATIONARY SATELLITES
V. Guermonprez *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 811-823 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N87-10110*# Boeing Aerospace Co., Kennedy Space Center, Fla.
ORBITAL TRANSFER VEHICLE LAUNCH OPERATIONS STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report
7 Mar. 1986 12 p
(Contract NAS10-11165)
(NASA-CR-179701; NAS 1.26:179701) Avail: NTIS HC A02/MF A01 CSCL 22D

The purpose was to use the operational experience at the launch site to identify, describe and quantify the operational impacts of the various configurations on the Kennedy Space Center (KSC) and/or space station launch sites. Orbital Transfer Vehicle (OTV) configurations are being developed/defined by contractor teams. Lacking an approved configuration, the KSC Study Team defined a Reference Configuration to be used for this study. This configuration then become the baseline for the identification of the facilities, personnel and crew skills required for processing the OTV in a realistic manner that would help NASA achieve the lowest possible OTV life cycle costs. As the study progressed, researchers' initial apraisal that the vehicle, when delivered, would be a sophisticated, state-of-the-art vehicle was reinforced. It would be recovered and reused many times so the primary savings to be gained would be in the recurring-cycle of the vehicle operations--even to the point where it would be beneficial to break from tradition and make a significant expenditure in the development of processing facilities at the beginning of the program. Author

N87-10111*# Boeing Aerospace Co., Kennedy Space Center, Fla.
ORBITAL TRANSFER VEHICLE LAUNCH OPERATIONS STUDY. VOLUME 2: DETAILED SUMMARY
7 Mar. 1986 181 p
(Contract NAS10-11165)
(NASA-CR-179791; NAS 1.26:179791) Avail: NTIS HC A09/MF A01 CSCL 22D

A series of Operational Design Drivers were identified. Several of these could have significant impact(s) on program costs. These recommendations, for example, include such items as: complete factory assembly and checkout prior to shipment to the ground launch site to make significant reductions in time required at the launch site as well as overall manpower required to do this work; minimize use of nonstandard equipment when orbiter provided equipment is available; and require commonality (or interchangeability) of subsystem equipment elements that are common to the space station, Orbit Maneuvering Vehicles, and/or Orbit Transfer Vehicles. Several additional items were identified that will require a significant amount of management attention (and direction) to resolve. Key elements of the space based processing plans are discussed. B.G.

N87-10498*# Uppsala Ionospheric Observatory (Sweden).
HISCAT: A PROPOSED NEW SCATTER FACILITY IN NORTHERN SCANDINAVIA
R. Bostrom and B. Thide *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 14B

N87-10133 Aerospace Corp., El Segundo, Calif.
ORBIT DETERMINATION OF GEOSTATIONARY SATELLITES USING THE GLOBAL POSITIONING SYSTEM
M. P. Ananda and P. S. Jorgensen *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 341-352 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

No abstracts in this category.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

No abstracts in this category.

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

N87-10112# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Inst. fuer Fernmeldetechnik.
METHODS AND STANDARDS FOR ENCRYPTION OF SPACECRAFT TELEMETRY AND TELECOMMAND LINKS Final Report
R. A. Rueppel and H. P. Bader Paris ESA Mar. 1985 253 p Prepared in cooperation with Borer Electronics AG
(Contract ESTEC-5815/84-NL-BI(SC))
(RPT/ENC/62359/BO; ESA-CR(P)-2194; ETN-86-97794) Avail: NTIS HC A12/MF A01

Spacecraft telemetry and telecommand link transmission requirements were analyzed in order to define the best encryption technique. Implementation feasibility of the proposed telecommand authentication system was analyzed. The authentication system was simulated on a computer to verify the predicted system characteristics. A draft encryption guideline was produced. ESA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics*, and *16 Space Transportation*.

N87-10113 Centre National d'Etudes Spatiales, Toulouse (France).
PROCEEDINGS OF AN INTERNATIONAL CONFERENCE ON SPACE DYNAMICS FOR GEOSTATIONARY SATELLITES
1986 869 p In ENGLISH and FRENCH Conference held in Toulouse, France, Oct. 1985
(ISBN-2-85428-149-7; ETN-86-98079) Copyright. Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Geostationary satellite mission analysis, attitude determination, orbit determination, (onboard technology, low-thrust techniques, station acquisition, stationkeeping) ground segments, and future developments were discussed. For individual titles, see N87-10114 through N87-10165.

N87-10114 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TRANSFER ORBIT OPTIMIZATION FOR DUAL LAUNCHES c13
A. G. Bird, D. Plummer (British Aerospace Dynamics Group, Stevenage (England).), and M. J. Smalley *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 17-35 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The dual launch configuration is shown to have design implications for missions with inclined geosynchronous orbits. Design objectives with respect to propellant tank and apogee boost motor size, launch mass, and launch window may be affected. Propellant requirements are a function of launch window, and it is advantageous to base the mission on minimum launch window requirements. It appears that considerable propellant savings can be made for dual launches, if the transfer orbit is optimized under the constraints of both missions. The combined optimization also tends to extend the launch window. To be effective, however, there must either be some commonality of mission requirements or additional launcher potential made available. ESA

N87-10115 Arianespace, Evry (France).
ANALYSIS OF THE PROBLEM OF SATELLITE LAUNCH WINDOWS FOR ARIANE DUAL LAUNCHES [ANALYSE DU PROBLEME DES FENETRES DE LANCEMENT SATELLITE POUR LES LANCEMENTS DOUBLES SUR ARIANE] c13
Philippe Boland *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 37-52 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Determination of launch windows for Ariane dual launches of geostationary satellites is described. First, the present situation is presented on the basis of the information provided by satellite projects. Then, solutions to reduce window incompatibilities are examined, such as: choice of compatible copassengers, relaxation of satellite constraints, extra satellite propellant consumption, and modification of satellite flight operations in transfer orbit. Finally, a universal launch window is proposed, the definition of which is independent of the launch vehicle trajectory. This launch window may be introduced in the short term in the Ariane User's Manual. ESA

N87-10116 Communications Satellite Corp., Washington, D.C.
ORBIT GEOMETRY FOR CALIBRATION AND LAUNCH OPERATIONS OF A THREE-AXIS CONTROLLED SATELLITE WITH INERTIAL REFERENCE c13
David R. Brown *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 53-70 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A method for determining the spacecraft, Sun, Earth geometry for a three-axis controlled satellite with inertial reference in transfer orbit is presented. Using the spacecraft as the origin of the reference system, two orientation modes are considered: the Sun-Earth plane mode, in which the X axis is pointed along the sunline, the Z axis lies in the Sun-Earth plane, and the Y axis completes the right-hand triad; and the orbit plane mode, in which X is pointed along the projection of the Sun vector in the orbit plane, Z lies in the orbit plane, and Y completes the right-hand triad. The method is applied to key events, while the spacecraft is under Earth sensor control, leading up to apogee-motor-fire to determine control parameters. Flight results from the Arabsat program are presented. The dependence of window durations on spacecraft characteristics (e.g., Earth sensor field of view) and orbital characteristics (e.g., injection time within the launch window and orbit parameters) are discussed. A method to handle real-time changes that can occur due to launch delays and delays in the launch operations timeline is outlined. ESA

N87-10117 Telesat Canada, Ottawa (Ontario).
OPTIMAL TRANSFER TO INCLINED GEOSYNCHRONOUS ORBITS c13
J. Kerry Skipper *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 71-81 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The concept of placing a communication satellite in an inclined geosynchronous orbit, or storage orbit, is introduced. The target orbit is determined by analyzing the secular motion of the orbit normal vector. The optimal transfer is obtained by modifying the generalized Hohmann ellipse (the optimal transfer between circular noncoplanar orbits) to account for the effects of perturbations and mission constraints. Maneuvers are planned by locating the impulses, and determining the resulting transfer orbit. The results of the analysis are applied to missions in which Canadian satellites were placed in 2 and 3 yr storage orbits. ESA

N87-10118 Rome Univ. (Italy). Dept. of Aerospace.
AN INVESTIGATION ON PASSIVELY CONTROLLED GEOSYNCHRONOUS ORBITS c13
C. Ulivieri, A. Agneni, A. Foni (Consiglio Nazionale delle Ricerche, Pisa (Italy).), and S. Trumpy *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 85-92 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The long-term orbital pole evolution for geosynchronous circular uncontrolled satellites was analyzed to identify the initial conditions which allow the orbital plane to remain within a given tolerance, without any active control over the estimated lifetime of the satellite. A mission target compatible with a 7 yr spacecraft operational life and a tolerance of 0.3 deg with respect to the initial orbit inclination value was selected. Apogee motor requirements for positioning a satellite in an orbit having these characteristics were compared with requirements for the geostationary orbit. The fuel budget for the target mission was computed for 2 different satellites by assuming Ariane 44p and STS-PAM-D2 launch vehicles. The peculiarity of the orbit selected with respect to the geostationary one is discussed. ESA

N87-10119 National Space Development Agency, Ibaraki (Japan). Tsukuba Space Center.
OPERATIONAL CRITERIA FOR GEOSTATIONARY SATELLITES

IN NATIONAL SPACE DEVELOPMENT AGENCY (NASDA)
A. Tanaka, M. Utashima, M. Yambe (Fujitsu Ltd., Tokyo (Japan).), and M. Hasegawa *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 93-100 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The criteria of orbit and attitude maneuver strategies during transfer orbit and near-synchronous orbit phase operations adopted by the National Space Development Agency of Japan (NASDA) are introduced. Following the criteria adopted by NASDA, attitude maneuvers are planned in the beginning of each revolution. In order to keep to the station acquisition maneuver schedule, a set of basic station acquisition maneuvers is divided into several small ones, and a strategy is prepared so that a precedent maneuver error can be compensated by the following ones without any change of maneuver time. Such a strategy contains a few small maneuvers to calibrate the thruster performance data, and maneuver magnitudes are equalized to get better calibration results. ESA

N87-10120 Escuela Tecnica Superior de Ingenieros Aeronauticos, Madrid (Spain).
OPTIMAL TRACKING STRATEGY DETERMINATION c13
J. J. Martinez-Garcia, C. Bachmaier, T. Prieto, S. Pallaschke (European Space Agency. European Space Operations Center, Darmstadt (West Germany).), and W. Peterhaensel (Mathematischer Beratungs- und Programmierungsdienst G.m.b.H. Dortmund (West Germany).) *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 101-118 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A satellite tracking method is outlined. The approach consists in selecting a tracking sequence from a given set of possible measurement instants so as to minimize a given linear function of the covariance matrix of the error in the final satellite state. The estimated covariance matrix on the final error is obtained through a Kalman-Bucy or Kalman-Schmidt filter algorithm. Bias terms in the observations and in the dynamic parameters can be handled. By introducing a control variable associated to each measurement which can take the binary values 0 or 1 (1 means to consider that observation, 0 to ignore it) the task is formulated as a constrained binary parameter optimization problem. An algorithm to determine a subset of given possible measurement instants and which constitutes the optimal tracking strategy to be used was derived. A computer program consisting of a data generator computing the required input data such as observations, partials, and statistics of observations and system noise, and an optimization program using the data to solve the problem considered was written. Results for geostationary orbits are presented. ESA

N87-10121 Centre National d'Etudes Spatiales, Toulouse (France).
ACCURACY OF GOESTATIONARY ORBIT DETERMINATION [PRECISION DE LA RESTITUTION D'UNE ORBITE GEOSTATIONNAIRE] c13
O. Zarrouati *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 119-147 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A method to evaluate the performance of a global network for the localization of a geosynchronous satellite, given the distribution over the world of a set of ground stations and the individual performance of each ground station (distance or angular measurements) is outlined. Under very realistic assumptions, an analytical formulation of the errors in the computation of the satellite position is obtained. The shape and size of the error domain are discussed with observability arguments. The method can be very helpful in mission analysis for the optimal dimensionning of a radiolocalization system. ESA

N87-10122 RCA Astro-Electronics Div., Princeton, N. J.
ORBIT ACHIEVEMENT OF RCA COMMUNICATION SATELLITES
S. Parvez and S. Fox *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 149-168 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Attitude determination and control techniques for 12 satellites are treated. Post-flight analyses to verify the ABM pointing and performance are presented. Targeting strategies for Ariane, Delta, and STS launches are compared. The extra complexity of planning for STS launches is discussed. Statistics (predicted vs actual) of transfer orbit parameters and station acquisition propellant requirements are included. In the transfer orbit, the spacecraft are spin stabilized. Attitude data provided by a Sun sensor and an Earth horizon sensor are used to determine the inertial attitude of the satellite spin axis. The orientation of the satellite is changed through a series of precession maneuvers to point the thrust vector of the ABM to the target attitude. The orbit determination, attitude determination, and attitude control provide all 12 satellites with an expected mission lifetime that meets or exceeds prelaunch nominal values. ESA

N87-10123 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE (GOES) MISSION PROFILE c13
William C. Bryant, Robert L. DeFazio, and Judith A. Sauter *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 169-193 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The GOES mission profile used to achieve geostationary orbit following separation from the Delta launch vehicle is described. The mission profile was constrained by the solid-propellant apogee kick motor which was undersized relative to the spacecraft weight. The resulting deficiency in delivered delta-V had to be made up by the spacecraft hydrazine propulsion system. The mission profile which best utilizes the on-board hydrazine requires that the transfer orbit apogee height be biased 13,800 km above geosynchronous altitude. This maximizes the effectiveness of the apogee motor in performing the plane change necessary to achieve near-equatorial orbit. The highly eccentric drift orbit which results from the apogee motor firing has an average drift rate of 60 deg/day. Circularizing this orbit requires maneuvers designed to achieve geostationary position within a tightly constrained hydrazine allocation. The sequence takes advantage of the orbit changes resulting from attitude maneuvers and combined inplane/out-of-plane maneuvers to achieve hydrazine savings. ESA

N87-10124 National Space Development Agency, Ibaraki (Japan). Tsukuba Space Center.
ATTITUDE DETERMINATIONS FOR GEOSTATIONARY SATELLITES OF THE NATIONAL SPACE DEVELOPMENT AGENCY (NASDA) c13
M. Horii *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 197-206 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The attitude determination for the final attitude maneuver planning to establish apogee motor firing of Japanese spacecraft in transfer orbit was scheduled using the horizon sensor data of a full orbital revolution. The software system is connected to the worldwide telemetry on-line system, and it can estimate the attitude in semi real time. The attitude estimation procedure and the software system work well. ESA

N87-10125 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
COVERAGE TRANSITION TIMES OF IR PENCIL BEAM

SENSORS c19

W. Meyer, L. Fraiture, and N. Wiengarn *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 207-218 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

It is shown that coverage start and stop events of IR-pencil beam sensors (OG, SODERN) show repeatable biases. They are equivalent to augmentations delta rho to be added to the apparent Earth radius of an oblate Earth. The SODERN augmentations are: delta rho = 0.065 deg at start of coverage, and 0.205 deg at end of coverage; for OG devices delta rho = 0.514 deg at start and stop of coverage, all valid for sensing above 25000 km distance from the Earth center. The accuracy of the delta rho's is better than 0.1 deg (worst case). Results at low altitude were only obtained for OG-sensors. For the latter, larger dispersions are observed. It is best not to utilize start and stop of coverage for attitude reconstitution with perigee data for which the error context is usually not favorable. ESA

N87-10126 VEGA Space Systems Engineering, Saint-Albans (England).

APPLICATION OF SIMPLIFIED SPIN AXIS ATTITUDE DETERMINATION TECHNIQUES TO ESA TELECOM SATELLITES

A. S. Fagg and L. vanHoltz (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).) *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 219-226 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Simplified spin axis attitude determination techniques for satellites in the spin phase in geostationary transfer orbit were developed. The techniques are applicable to cases when geometric solutions to the spherical triangle equations are sufficiently accurate, and no hardware failures prevent the use of both pencil beams of the infrared Earth elevation sensors. On all ESA telecommunication spacecraft launched to-date, these conditions were always met, and satisfactory results obtained. ESA

N87-10127 Indian Space Research Organization, Bangalore.

PRELIMINARY ORBIT DETERMINATION BY STATIC MULTIVARIATE SEARCH c13

P. RajendraPrasad, N. S. Gopinath, and R. S. Bhat *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 229-247 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A static multivariate search algorithm based on the Gram-Schmidt method is used for the problem of preliminary orbit determination using tracking data covering a very short arc of the orbit and very approximate initial estimate. The method is based on orthogonalization to find the primary and secondary search directions. No partial derivatives are needed. The extremum is found by parabolic extrapolation or interpolation of the function values. The suitability and effectiveness of the method for the problem of preliminary orbit determination is demonstrated. The approach yields desirable accuracies in simulated tracking data and application to actual tracking data of Indian satellites BHASKARA-2 APPLE and INSAT 1-A. ESA

N87-10128 European Space Agency. European Space Operations Center, Darmstadt (West Germany).

EARLY ORBIT DETERMINATION c13

S. Pallaschke *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 249-261 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Orbit determination for near real time monitoring of satellite movement based on limited observations is discussed. For geostationary satellites this early orbit determination requirement arises after injection into geostationary transfer orbit, apogee motor firing, and larger orbit maneuvers during the on-station phase. Early orbit determination is hampered by the limited amount of data caused by nonavailability of the tracking system. Experience with the injection of nine satellites was used to derive procedures for observation scheduling, orbit determination, and estimation of achieved orbit determination accuracy. Orbit determination is performed after each new measurement in order to obtain a series of solutions which can be checked for convergence. The mode of operations is illustrated using ECS-2 tracking data. ESA

N87-10129 National Space Development Agency, Tokyo (Japan). Satellite Development Dept.

STATE/ORBIT ESTIMATION FROM REAL DOPPLER DATA FOR SOLID APOGEE MOTOR BURNING PHASE OF GEOSTATIONARY SATELLITE c13

Shuji Ono *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 263-288 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Methods for the state/orbit sequential estimation from real Doppler data for the solid ABM burning phase are presented. The estimations were performed for Engineering Test Satellite 2, and for 2 satellites which both failed during this ABM phase. The state estimations were performed by deterministic and stochastic methods using real Doppler data intermittently acquired at the neighboring tracking stations. The deterministic method conquers this intermittence and estimates well the motor acceleration, but the attitude change is strongly influenced by the neighboring geometry. The stochastic Kalman sequential filter, constructed with spin dynamics considerations, conquers the intermittence and the neighboring geometry and excellently estimates the acceleration and the attitude drift due to an unbalance with reasonably converging variances. The estimated state/orbit at ABM burn out agrees well with the drift orbit and the attitude independently determined by the batch method. ESA

N87-10130 Centre National d'Etudes Spatiales, Toulouse (France).

REAL TIME ORBIT DETERMINATION DURING APOGEE MANEUVERS c13

B. Belon *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 289-300 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The use of bi-propellant thrusters, of low thrust level, for apogee boost maneuvers to determine, in real time during the thrust, the instantaneously obtained orbits is described. The accuracy of the orbit determination is sufficient to predict the optimum date of the cut off of the thruster, in order to minimize errors due to the thrust inaccuracy. The expected accuracy of such a procedure could simplify greatly the station acquisition phase, by shorter station acquisition duration; and all the maneuvers could be achieved in sight of the same stations, so the number of necessary stations could be reduced. ESA

N87-10131 Porto Univ. (Portugal). Observatorio Astronomico.

INITIAL ORBIT DETERMINATION FOR GEOSTATIONARY SATELLITES c13

I. Couto and J. Osorio *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 301-313 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The efficiency of Laplace and Gauss methods for initial orbit determination is analyzed. To avoid errors in the observed directions, fictitious observational data are used and the corresponding orbit generation procedure is described. ESA

N87-10132 Indian Space Research Organization, Bangalore.
REAL TIME ORBIT AND DYNAMIC SEARCH ZONE COMPUTATIONS TO AID SATELLITE ACQUISITION IN S-BAND DURING THE LAUNCH PHASE OF GEOSYNCHRONOUS TRANSFER ORBIT (GTO) **c13**
V. S. Iyengar and P. Soma *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 315-340 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Software for an orbit and search zone generator embedded in the antenna controller of ground stations to aid real time tracking was developed. The orbit generator was synthesized from the Unified System of Orbit Computation developed at ESOC. The search zone for the spacecraft is obtained by propagating the error covariance at initial epoch by computing the partial derivatives for a Kepler orbit. Results show that the technique is suitable for all elliptic orbits. ESA

N87-10133 Aerospace Corp., El Segundo, Calif.
ORBIT DETERMINATION OF GEOSTATIONARY SATELLITES USING THE GLOBAL POSITIONING SYSTEM **c14**
M. P. Ananda and P. S. Jorgensen *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 341-352 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Analyses showing how the Navstar Global Positioning System (GPS) can be used to achieve accurate orbit determination of geostationary satellites are presented. Since Block 2 satellites radiate the PRN radio signals towards the Earth, for a geostationary satellite which is above the GPS satellite altitude, the GPS satellites are visible only when they are on the opposite side of the Earth. For this reason, the geostationary satellites can track only one or two GPS satellites, and on rare occasions three. Analysis show that the GPS signal, even with significant transmission loss, can be acquired with a relatively simple antenna placed on the geostationary satellite. Navigation accuracy analysis shows that the orbit determination accuracy (rms position accuracy) is in the range 100 m with 2 days of tracking. Position accuracy improves to 20 m if the geostationary satellite has a rubidium atomic clock. ESA

N87-10134 Consiglio Nazionale delle Ricerche, Pisa (Italy).
OPTICAL TRACKING OF THE SIRIO SATELLITE **c13**
L. Anselmo and S. Trumpy *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 353-361 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The possibility to obtain a useful orbit determination for SIRIO geosynchronous satellite by optical tracking was analyzed. Accuracy achievable with one or more observatories, depending on observation precision, number, and time distribution was studied. More interesting results are attainable with optical observations massed around the equinoxes, when the Sun-Earth-spacecraft geometry allows the observation of SIRIO in reflected light, and not in diffused light as in the rest of the year. It is shown that an orbit determination accuracy comparable with that obtained during the operative life of the spacecraft is possible with a cheap observation strategy. ESA

N87-10135 Centre National d'Etudes Spatiales, Toulouse (France).
VERY FIRST ORBIT DETERMINATION AFTER LAUNCH OR MAIN MANEUVERS. APPLICATIONS TO GEOSTATIONARY TELECOM 1A AND 1B **c13**
F. Nouel, P. Broca, A. Guitart, R. Mesnard, and D. Zobler *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 363-374 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The strategies adopted for estimating Telecom 1A and 1B orbit, and the accuracy reached at different epochs with various models are described. Correlations between orbit determination anomalies and events in the satellite life are shown. Results indicate that the S-band network can provide distance measurements of a precision within 10 m. But, in operation, strategies cannot be set up for reaching such a precision. A posteriori evaluations can come to that level, but after a few guesses. The needs, when operating, are not difficult to reach, given good data sets. It is always safe to rely on comparisons when estimates have to be made during the operations. ESA

N87-10136 National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRACKING AND DATA RELAY SATELLITE (TDRS) TRACKING AND ORBIT DETERMINATION
J. Teles, M. Samii, and Y. Nakai *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 375-391 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Analysis results were derived using the Goddard Trajectory Determination System to determine the orbit of TDRS-East. A batch weighted least-squares algorithm is used to fit the Bilateration Ranging Transponder system tracking measurements. Six state parameters (position and velocity components) and the solar radiation pressure coefficient are estimated. The solutions are obtained by fitting the data over 34 hr arcs that overlap by 10 hr. Ephemerides are generated over the 34 hr arcs and then compared over the overlapping regions. The position differences indicate the consistency of the solutions and give a measure of their accuracy. The effect of the modeling of perturbative forces (solar radiation pressure, nonspherical geopotential field) on these results are studied. Error analysis is performed using the ORAN program to estimate the effect of force-model errors and measurement-related errors on the TDRS-East ephemeris. ESA

N87-10137 Centre National d'Etudes Spatiales, Toulouse (France).
SYNCHRONOUS TRANSFER ORBIT OPERATION UNDER THREE-AXIS CONTROL **c13**
John V. Brown *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 395-403 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A mode of attitude control during the transfer orbit phase of a synchronous satellite mission was successfully demonstrated on the INSAT-1 and Arabsat missions. Three-axis attitude control during the transfer orbit and integral bipropellant propulsion were flight proven. Design considerations that lead to the approach, the sequence of events, and experience gained during the missions are described. ESA

N87-10138 Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PARAMETER OPTIMIZATION AND ATTITUDE STABILIZATION OF A FLEXIBLE SPACECRAFT
Decio Castilho Ceballos *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 405-412 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The synthesis and analysis of a control law for a flexible spacecraft are described. The control law is considered a simple proportional, integral, and derivative law together with a second order structural filter. Parameter optimization is applied for finding the controller parameters, to optimize behavior when applied to the high order model. Frequency and Laplace domain analysis which indicate the satisfactory behavior of the proposed controller are shown. ESA

N87-10139 MATRA Espace, Paris-Velizy (France).
A NEW THREE-AXIS CONTROL SYSTEM FOR A GEOSYNCHRONOUS SATELLITE IN TRANSFER ORBIT
A. Benoit *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 413-421 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A strategy for apogee motor reorientation maneuvers was developed for Italsat. It produced an attractive attitude and orbit control system configuration: to the operational 2-axis Earth sensor and yaw rate integrating gyrometer are only added a roll gyrometer and a 2-axis digital Sun sensor. No calibration of the gyro scale factors is required but only the compensation of their drifts, achieved through an algorithm which is presented. ESA

N87-10140 National Space Development Agency, Tokyo (Japan). Satellite Development Dept.
SPIN DYNAMICS WITH SLOSHING EFFECTS FOR SOLID MOTOR BURNING PHASE
Shuji Ono *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 423-443 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The dynamics of a spinning satellite during a solid motor burn including the sloshing effects of liquid fuel within spherical tanks on board is discussed. A general equation of motion for this unsteady nonlinear phase was formulated, assuming a spherical pendulum as a sloshing model, from the development of Thomson's equation with jet damping of combustion gases. The simulated motion of the spherical pendulum shows a reasonable swirling, conjectured for the liquid motion under these circumstances. Simulations show that bad effects are non-negligible and remarkable against the spin stability and the orbit injection, in a case of moment of inertia ratio close to 1.0. ESA

N87-10141 British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.
OPERATIONAL STRATEGIES FOR MULTI-BURN APOGEE MANEUVERS OF GEOSTATIONARY SPACECRAFT
J. J. Pocha and M. C. Webber *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 447-455 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Sensitivity of the apogee burn optimization strategy to launch vehicle injection dispersions; sensitivity of the design of subsequent burns to the execution errors of previous burns; and target orbits to be used for maneuver optimization are discussed. Simulations of operational scenarios indicate that the ground control center must reoptimize each maneuver in the light of on-orbit conditions to achieve the maximum spacecraft beginning-of-life mass. ESA

N87-10142 MATRA Espace, Toulouse (France).
GEOSTATIONARY SATELLITE POSITIONING WITH A RESTARTABLE MOTOR
J. Boissieres *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 457-474 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The positioning of a geostationary satellite with a biliquid motor is examined in a simplified manner using the impulsive approximation whose validity for the utilized low thrust level is checked. The simplified study allows the consideration of operational constraints. The obtained solution is used to initialize a numerical optimization which improves the solution locally. Optimization is done with a second order method allowing the dispersion computation around the optimal solution by covariance matrices propagation. ESA

N87-10143 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
OLYMPUS: APOGEE ENGINE FIRING
R. Mugellesi and W. Flury *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 475-491 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The apogee engine firing of OLYMPUS is analyzed taking into account the positioning at the on-station longitude in the geostationary orbit. One and two-burn strategies are considered for two thrust steering policies: inertially fixed thrust direction, and constant rotation of the thrust vector around a fixed axis. It is shown that the mass loss with two burns stays below 0.06% (reference = impulsive transfer). Constant rotation of the thrust vector leads to a slightly better performance than an inertially fixed thrust direction. ESA

N87-10144 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
OPTIMAL INJECTION OF TV SAT WITH MULTI-IMPULSE APOGEE MANEUVERS WITH MISSION CONSTRAINTS AND THRUST UNCERTAINTIES
C. K. Rajasingh and A. F. Leibold *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 493-510 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The method of injecting TV-SAT from an elliptical transfer orbit into a near-synchronous orbit by a liquid fuel apogee boost motor is presented. The apogee maneuver is split into three, in order to satisfy solar constraints, to reduce the long arc burning losses, and to minimize the fuel required to compensate the thrust errors (magnitude and direction). The optimal thrust direction and firing times are computed taking into consideration the finite burning times and mission constraints. The orbit resulting from the execution of three impulses, even with execution errors in thrust magnitude and direction, must lie in the optimal acquisition range, defined by a combination of deviations in longitude, apogee height and perigee heights, which require minimum fuel for fine correction maneuvers. The problem is formulated as a nonlinear optimization problem with equality and inequality constraints, and solved by a standard nonlinear parameter optimization algorithm. ESA

N87-10145 Centre National d'Etudes Spatiales, Toulouse (France).
DEFINITION OF A STRUCTURE FOR THE APOGEE THRUSTS FOR GEOSTATIONARY SATELLITE POSITIONING: APPLICATION TO TDF-1 [DEFINITION D'UNE STRUCTURE POUR LES POUSSEES D'APOGEE D'UNE MISE A POSTE D'UN SATELLITE GEOSTATIONNAIRE: APPLICATION A TDF1]
Ph. Escudier *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 511-522 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A simplified analytical formulation of the propellant cost associated with a strategy of maneuver for the station acquisition phase of a geostationary satellite is presented. This is used to select the minimum cost strategy which satisfies every possible constraint on the satellite or ground network. ESA

N87-10146 Communications Satellite Corp., Washington, D.C.
TARGETING MULTIBURN, LONG DURATION APOGEE BURST MANEUVERS
Peter C. Kammeyer *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 523-531 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A method for targeting multiburn, long duration apogee boost maneuvers used during the launch of Arabsat spacecraft and

proposed for spin-stabilized spacecraft is discussed. Apogee boost equations of motion give the derivatives of position, velocity, unit thrust vector, spacecraft weight, and time with respect to a function of energy. Given a starting trajectory and a firing time, the method determines a single impulse apogee boost resulting in a specified drift rate and a velocity vector with zero radial component, lying in the plane of a circular synchronous target orbit. The time and the unit thrust vector at the start of a burn are calculated by integrating backwards from the position, unit thrust vector, and time of the single impulse apogee boost originating on the preburn trajectory. Burn duration is determined by integrating forward, from the position, velocity, and weight at the starting time on the preburn trajectory, until the drift rate equals a specified value. Test cases demonstrate the effectiveness of the method. ESA

N87-10147 Centre National d'Etudes Spatiales, Toulouse (France).
ORBIT AND ATTITUDE OPERATIONS DURING THE TELECOM 1B TRANSFER PHASE
B. Belon, J. C. Berges, G. Campan, H. Donat, J. Foliard, and P. Legendre *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 535-551 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Orbit and attitude operations performed by the Maneuver Determination Center during the transfer phase of TELECOM 1-B station acquisition are summarized. Improvements for future missions, especially for TELECOM 1-C station acquisition are suggested. ESA

N87-10148 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
OPERATIONAL IMPLEMENTATION OF DEORBITING MANEUVERS **c13**
Jozef vanderHa *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 553-562 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The problem of determining the number and timing of GEOS-2 deorbiting maneuvers is addressed. Assessment of worst-case spin rate and attitude changes during the thrust periods, and the consequences thereof are stressed. Results of a semianalytical model for the long-term orbit drift motion after deorbiting are presented. ESA

N87-10149 Centre National d'Etudes Spatiales, Toulouse (France).
APPLICATION OF LINEAR PROGRAMMING TO FINAL POSITIONING (DRIFT ORBIT) OF A GEOSTATIONARY SATELLITE [APPLICATION DE LA PROGRAMMATION LINEAIRE A LA MISE A POSTE FINALE (ORBITE DE DERIVE) D'UN SATELLITE GEOSTATIONNAIRE] **c13**
D. Blumstein *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 563-572 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Utilization of linear programming to optimize the fuel consumption of station acquisition while taking sensor visibilities into account is illustrated using TDF-1. The satellite uses solar measurement during orbit maneuvers which forbids thrust at some periods (sensor visibility). Linear programming allows changes in one type of constraint to be taken into account by modifying a general algorithm which describes all possible corrections. This flexibility has no effect on rapidity of calculation. ESA

N87-10150 Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TV-SAT FINAL ORBIT ACQUISITION OPTIMIZATION STRATEGY
Valder MatosdeMedeiros *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 573-586 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A strategy for the final station acquisition for three-axis stabilized geostationary satellites with solar constraints, that affect the allowed regions where maneuvers might be performed is described. Linear programming methods to compute optimal velocity increments, times, and true longitudes for a prescribed maximum number of impulses outside the forbidden regions were developed. A strategy to get initial guesses for the position of the maneuvers is outlined. Results obtained for TV-SAT simulation are included. ESA

N87-10151 Communications Satellite Corp., Washington, D.C.
EFFICIENCY ECCENTRICITY CONTROL USING CONTINUOUS, VECTORED THRUSTING FOR SATELLITES WITH LARGE AREA/MASS RATIOS
Victor J. Slabinski *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 589-613 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

It is shown that varying geostationary satellite thrust direction so as to counteract only the secular perturbations from the force can reduce the impulse requirement by 6.6%. For thrusting in the orbit plane, an analytic calculus-of-variations minimization shows that the thrust direction should vary + or 19.5 deg at twice the orbit frequency, about the Sun's projection onto the orbit plane. The thrust direction then lies between the Sun's projection and the orbit tangent at the satellite. If the thrust can be vectored out of the orbit plane, the secular rotation of the orbit plane due to Sun and Moon gravity can also be countered. Minimization for this case shows that the thrust direction must oscillate approximatively + or - 26 deg about the orbit plane with the orbit frequency, in addition to the in-plane oscillation. The impulse must also be increased by a m/sec/yr, but this eliminates the need for 46 m/sec/yr of separate thrusting normal to the orbit plane for orbit plane control. ESA

N87-10152 Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (West Germany).
STATIONKEEPING FOR DFS-KOPERNIKUS
H. Klotz and R. Prigge *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 615-630 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The DFS-Kopernikus satellite's mission and the attitude and orbit control sybsystem (AOCS) are described, particularly constraints imposed by the AOCS hardware on orbit correction maneuvers. The perturbation analysis includes external disturbances as well as coupling effects from north-south (NS) maneuvers into the east-west (EW) direction. Strategies are developed separately for NS and EW stationkeeping. It is shown that for DFS a one-impulse strategy can be applied for EW station keeping. The overall maneuver sequence is based on a weekly control cycle for EW maneuver and a bi-weekly cycle for NS correction. ESA

N87-10153 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
STATIONKEEPING STRATEGY TEST, DESIGN AND OPTIMIZATION BY COMPUTER SIMULATION
M. C. Eckstein *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 631-677 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A computer simulation method of stationkeeping strategy design and optimization in which orbital motion, orbital maneuvers, and all significant error types are approximated by simplified models and random generation for the entire lifetime of the satellite is

described. Certain strategy parameters are iteratively optimized. Thus the simulation program allows realistic testing and optimization of proposed stationkeeping strategies. Simulation examples and results are presented. ESA

N87-10154 Centre National d'Etudes Spatiales, Toulouse (France).
STATIONKEEPING STRATEGY FOR TDF 1 SATELLITE
Fernand Alby *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 679-691 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The method used to keep TDF-1 in a + or - 0.1 deg window around the stationkeeping point located at 19 deg West longitude for 7 yr is described. Main characteristics of the satellite and constraints; tracking data; expected orbit determination accuracy; North-South stationkeeping strategy; East-West stationkeeping strategy; and cycles organization are described. ESA

N87-10155 Telesat Canada, Ottawa (Ontario).
ECCENTRICITY CONTROL STRATEGY FOR GEOSYNCHRONOUS COMMUNICATIONS SATELLITES
Dale J. Gantous *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 693-706 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A method of defining a complete eccentricity control strategy for a geosynchronous communications satellite is presented. Factors affecting satellite longitude stationkeeping are defined, and eccentricity control requirements are derived. Long-term eccentricity vector motion is analyzed. The inputs required for the control strategy development are specified, including spacecraft dependent parameters, celestial forces, and their interaction. The control strategy parameters are defined, and their effects on satellite stationkeeping are illustrated. For satellites with large steady-state eccentricity motion, sun-synchronous strategy is amended to control secular growth of the eccentricity vector as well. For satellites with relatively small steady-state eccentricity motion, a separate strategy is recommended. ESA

N87-10156 Communications Satellite Corp., Washington, D.C.
LONGITUDINAL ORBIT CONTROL FROM INTELSAT 5 INCLINATION STATIONKEEPING MANEUVERS
M. P. Arluk and L. Virdee (International Telecommunications Satellite Organization, Washington, D. C.) *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 707-735 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A strategy for the geosynchronous three-axis stabilized INTELSAT 5 satellite whereby the pitch attitude control thruster firings during inclination stationkeeping maneuvers are used for East-West orbit control was developed. Utilizing this strategy, longitudinal drift rate changes introduced by roll attitude control thruster firings, thruster plume impingement forces, and yaw attitude errors can be overcome to permit sufficient time for proper evaluation of the inclination maneuver before an East-West stationkeeping maneuver is required. In many instances one can achieve a significant portion of an East-West stationkeeping maneuver with these firings and decrease the number of explicit East-West stationkeeping maneuvers required for the satellite. Sources contributing to the drift rate change, the manner in which the attitude control system is configured to obtain East-West orbit control, considerations in determining the velocity change to be introduced by the attitude control thrusters, and results on INTELSAT 5 satellites are described. ESA

N87-10157 Aeroformation Blagnac (France).
ORBITOGRAPHY COURSE FOR GROUND OPERATORS
M. F. Beaudet *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 739-742 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The need for computer assisted instruction of geostationary satellite ground controllers is outlined. ESA

N87-10158 Centre National d'Etudes Spatiales, Toulouse (France).
OPERATIONAL PERFORMANCE OF THE INTELSAT 5 ATTITUDE DETERMINATION AND CONTROL SYSTEM
L. Virdee *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 743-764 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The operational aspects of INTELSAT 5 attitude determination and control subsystem are presented using in-flight data obtained during the launch, the postlaunch checkout, and in-orbit phases of the mission. The in-flight data is compared with the prelaunch prediction and design data. The subsystem performs to or exceeds the requirements on all spacecraft during the transfer and geostationary operations. Significant improvements were made in the launch operations and operational on-orbit phases, where multipart stationkeeping operations are routinely carried out. ESA

N87-10159 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
UPDATES TO OPERATIONAL PROCEDURES AS A RESULT OF IN-ORBIT EXPERIENCE WITH SYMPHONIE SPACECRAFT
H. Wobbe, P. Brittinger, and S. Arnold *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 765-779 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Attitude and orbit control of SYMPHONIE satellites is described. Stability and control around the pitch axis was achieved by a fixed momentum wheel with a momentum vector parallel to the pitch axis which was the main axis of moments of inertia. A hot gas system with seven 10N thrusters (H1 to H7) was used for orbit control, H1-H4 for inclination and H5, H6 for East-West corrections. Both cold and hot gas systems consisted of 2 separate branches for redundancy purposes (H7 was only used for positioning phase). Two redundant static infrared sensors with a linear range of + or - 0.75 deg were used for nominal attitude reference measurements in roll and pitch. Three Sun sensors with + or - 60 deg field of view provided yaw reference during stationkeeping maneuvers as well as roll/yaw information in case of loss of attitude. ESA

N87-10160 MATRA Espace, Toulouse (France).
TELECOM-1 DYNAMIC SIMULATOR [SIMULATEUR DYNAMIQUE TELECOM 1]
G. Mace *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 781-797 In FRENCH (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The role of satellite dynamic simulators during the various stages of the satellite's life are recalled. While the benefits in terms of flight safety and personnel training are difficult to quantify, it is clear that simulation activities constitute a considerable part of satellite program budgets. It is therefore essential to ensure that the simulator chosen meets needs as regards training in procedures, understanding of operations, and validation of operations. ESA

N87-10161 MATRA Espace, Toulouse (France).
SEAGOS: A PROTOTYPE EXPERT SYSTEM TO AID GROUND OPERATORS IN SATELLITE COMMAND AND CONTROL TASKS
J. M. Darroy and C. Tessier (Office National d'Etudes et de

Recherches Aerospatiales, Toulouse (France).) *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 799-808 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

A prototype expert system, called SEAGOS was designed to help in the management of the operational life of a geostationary telecommunication satellite TELECOM 1. A second generation SEAGOS system is under development to improve knowledge transfer from the expert designers to the satellite operators. ESA

N87-10162 Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Grasse (France).
CONSTRAINTS IMPOSED BY AN INTERSATELLITE COMMUNICATION LINK UPON STATIONKEEPING OF TWO CLOSE GEOSTATIONARY SATELLITES **c13**
V. Guermonprez *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 811-823 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Stationkeeping by two satellites located at a mean distance of 50 km from each other, with linkage antenna or telescope angular moves within + or - 11 deg maximum is examined. Procedures implemented in this particular case could be used in the resolution of other clusters. The procedures involve the translation of the constraints imposed by the intersatellite link into terms of acceptable deltas between orbital elements; and the determination of stationkeeping cycles with implementation inaccuracies staying within the acceptable deltas. ESA

N87-10163 MATRA Espace, Paris-Velizy (France).
COMPARISON OF DIFFERENT AUTONOMOUS STATIONKEEPING SYSTEMS FOR GEOSTATIONARY SATELLITES
P. Riant *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 825-836 In FRENCH; ENGLISH summary (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Systems for autonomous stationkeeping of geosynchronous satellites are evaluated in terms of orbit estimation accuracy, autonomy duration, and complexity of hardware and software. The navigation system uses a Kalman filter updated by optical measurements. The onboard control laws can use conventional or suboptimal station keeping strategies according to the estimation accuracy of orbital parameters. An accuracy of 10 to 20 km can be obtained simply, using a classical infrared Earth sensor and measurement of other celestial objects. The simplest solution of this type allows the estimation of the longitude only, and thus the autonomy duration is limited. To allow stationkeeping within 0.1 deg tolerance, and to control the eccentricity to a constant value of 0.0003, estimation accuracy must be reduced to a few kilometers. Two solutions are proposed. The first analyzes the whole image of the Earth. The other measures the refraction angle of light coming from known stars, and crossing Earth atmosphere. This is a more accurate way of sensing the Earth horizon. ESA

N87-10164 Societe Nationale Industrielle Aerospatiale, Cannes (France).
GEOSTATIONARY SATELLITES AUTONOMOUS STATIONKEEPING
P. Maute and F. Porte *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 837-862 (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

Stationkeeping of a three axis stabilized satellite with conventional thrusters is described. Hardware consists of one Earth sensor, four Sun sensors, one polaris sensor, and on-board clock and computer. Software comprises one orbit determination module and a maneuver execution module. Orbit determination is performed by Kalman filtering of sensor data. The measurement vector consists of two navigation angles: Sun-S/C Earth angle (in plane information) and polaris-S/C earth angle (out of plane information). The state vector comprises the six orbit parameters and three bias parameters which need to be identified during a ground assisted calibration phase for system good performance. A control strategy to maintain the satellite within a 0.05 deg deadband was defined. Realistic execution maneuvers and orbit determination errors were considered. System performance was assessed in simulations consisting of a numerical integration orbit program generating the actual orbit and of a sensor measurements generator. ESA

N87-10165 Centre National d'Etudes Spatiales, Toulouse (France).
GEOSTATIONARY SATELLITES: THEIR MARKET, THEIR EVOLUTION IN THE 1990S [LES SATELLITES GEOSTATIONNAIRES: LEUR MARCHE, LEUR EVOLUTION DANS LA DECENNIE 90]
M. Clautrier *In its* Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 863-869 In FRENCH (For primary document see N87-10113 01-18)
Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

The trend towards more sophisticated geostationary satellites, e.g., featuring increased use of onboard data processing is noted. Key dates for geostationary satellite users in the 1990's, such as the introduction of new telemetry standards and the advent of Ariane 5 and the replacement for STS are discussed. The impact of fiber optics on the satellite communication market is assessed. The outlook remains optimistic, in spite of increasing competition and the worsening economic climate. ESA

N87-10166 Virginia Polytechnic Inst. and State Univ., Blacksburg.
MANEUVER AND CONTROL OF FLEXIBLE SPACECRAFT Ph.D. Thesis
Roger Dennis Quinn 1985 171 p
Avail: Univ. Microfilms Order No. DA8605456

The problem of slewing large flexible structures in space and simultaneously suppressing vibrations is considered. The equations of motion for a three-dimensional spacecraft undergoing large rigid-body maneuvers are derived. The elastic motions are assumed to remain in the linear range. A method of substructures synthesis is presented which spatially discretizes the equations of motion. A perturbation approach is used to solve the equations of motion. The zero-order equations describing the rigid-body maneuver are independent of the first-order vibration problem which includes small rigid-body motions. The vibrational problem is described by linear nonself-adjoint equations with time dependent coefficients. Minimum-time, single-axis rotational maneuvers are considered. The axis of rotation is not necessarily a principal axis. The optimal maneuver force distribution is proportional to the corresponding rigid-body modes with the mass acting as the control gain. The premaneuver eigenvectors are used as admissible vectors to reduce the degree of freedom describing the vibration of the spacecraft during the maneuver. Natural control and uniform damping control are used to suppress the vibrations during the maneuver. Actuator dynamics cause a degradation of control performance. The inclusion of the actuator dynamics in the control formulation partially offsets this effect. The performance of these control techniques is adversely affected by actuator saturation but they remain effective. Numerical results are presented for a spacecraft in orbit and in an earth-based laboratory. Dissert. Abstr.

N87-10167*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
RELIABILITY ISSUES IN ACTIVE CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES Semiannual Status Report, 16 May - 15 Nov. 1984
W. E. VanderVelde 15 Nov. 1984 12 p
(Grant NAG1-126)
(NASA-CR-179785; NAS 1.26:179785) Avail: NTIS

HC A02/MF A01 CSCL 22B

Progress in robust failure detection and isolation, control system reconfiguration, and performance evaluation of systems having redundancy management features is briefly summarized. B.G.

N87-10168*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.

CONTROL OF LARGE FLEXIBLE SPACE STRUCTURES Semiannual Status Report, 16 Nov. 1985 - 15 May 1986

W. E. VanderVelde 23 Jul. 1986 11 p

(Grant NAG1-126)

(NASA-CR-177063; NAS 1.26:177063) Avail: NTIS HC A02/MF A01 CSCL 22B

Progress in robust design of generalized parity relations, design of failure sensitive observers using the geometric system theory of Wonham, computational techniques for evaluation of the performance of control systems with fault tolerance and redundancy management features, and the design and evaluation od control systems for structures having nonlinear joints are described. B.G.

N87-10169*# Energy Science Labs., Inc., San Diego, Calif.

GUIDEBOOK FOR ANALYSIS OF TETHER APPLICATIONS Final Report

Joseph A. Carroll Mar. 1985 47 p

(Contract NAS8-35499)

(NASA-CR-178904; NAS 1.26:178904) Avail: NTIS HC A03/MF A01 CSCL 22A

This guidebook is intended as a tool to facilitate initial analyses of proposed tether applications in space. The guiding philosophy is that a brief analysis of all the common problem areas is far more useful than a detailed study in any one area. Such analyses can minimize the waste of resources on elegant but fatally flawed concepts, and can identify the areas where more effort is needed on concepts which do survive the initial analyses. The simplified formulas, approximations, and analytical tools included should be used only for preliminary analyses. For detailed analyses, the references with each topic and in the bibliography may be useful. B.G.

N87-10170*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A SPACE STATION STRUCTURES AND ASSEMBLY VERIFICATION EXPERIMENT, SAVE

Richard A. Russell, J. P. Raney, and L. J. DeRyder Aug. 1986 376 p

(NASA-TM-89004; NAS 1.15:89004) Avail: NTIS HC A17/MF A01 CSCL 22B

The Space Station structure has been baselined to be a 5 M (16.4 ft) erectable truss. This structure will provide the overall framework to attach laboratory modules and other systems, subsystems and utilities. The assembly of this structure represents a formidable EVA challenge. To validate this capability the Space Station Structures/Dynamics Technical Integration Panel (TIP) met to develop the necessary data for an integrated STS structures flight experiment. As a result of this meeting, the Langley Research Center initiated a joint Langley/Boeing Aerospace Company study which supported the structures/dynamics TIP in developing the preliminary definition and design of a 5 M erectable space station truss and the resources required for a proposed flight experiment. The purpose of the study was to: (1) devise methods of truss assembly by astronauts; (2) define a specific test matrix for dynamic characterization; (3) identify instrumentation and data system requirements; (4) determine the power, propulsion and control requirements for the truss on-orbit for 3 years; (5) study the packaging of the experiment in the orbiter cargo bay; (6) prepare a preliminary cost estimate and schedule for the experiment; and (7) provide a list of potential follow-on experiments using the structure as a free flyer. The results of this three month study are presented. M.G.

N87-10171*# National Aeronautics and Space Administration, Washington, D.C.

THE NEW SPACE NETWORK: THE TRACKING AND DATA RELAY SATELLITE SYSTEM

Walter Froehlich 1986 32 p Original contains color illustrations

(NASA-EP-251; NAS 1.19:251) Avail: NTIS HC A03/MF A01 CSCL 22B

When the Tracking and Data Relay Satellite System (TDRSS) is completed, the system, together with its various NASA support elements will be known simply as the Space Networks. It will substantially increase information exchanges between low-orbiting spacecraft and the ground. The structural design, functions, earth-based links, and present and future use are discussed. B.G.

N87-10172*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechancis.

IDENTIFICATION AND CONTROL OF STRUCTURES IN SPACE Progress Report, 1 Jul. - 31 Dec. 1985

Leonard Meirovitch 1985 42 p

(Grant NAG1-225)

(NASA-CR-179811; NAS 1.26:179811) Avail: NTIS HC A03/MF A01 CSCL 22B

Work during the period July 1 - December 31, 1985, has concentrated on the application of the equations derived in the preceding period to the maneuvering and vibration suppression of the Spacecraft Control Laboratory Experiment (SCOLE) model. Two different situations have been considered: (1) a space environment and (2) a laboratory environment. This report covers the first case and consists of a paper entitled Maneuvering and Vibration Control of Flexible Spacecraft, presented at the Workshop on Structural Dynamics and Control Interaction of Flexible Structures, Marshall Space Flight Center, Huntsville, AL, April 22 to 24, 1986. The second case will be covered in the report for the next period. Author

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N87-10125 European Space Agency. European Space Operations Center, Darmstadt (West Germany).

COVERAGE TRANSITION TIMES OF IR PENCIL BEAM SENSORS

W. Meyer, L. Fraiture, and N. Wiengarn *In* CNES Proceedings of an International Conference on Space Dynamics for Geostationary Satellites 1986 p 207-218 (For primary document see N87-10113 01-18)

Avail: CEPADUES-Editions, 111 rue Nicolas-Vauquelin, 31100 Toulouse, France

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N87-10173 Virginia Polytechnic Inst. and State Univ., Blacksburg.

MODELING AND ANALYSIS OF SPACECRAFT POWER SYSTEMS Ph.D. Thesis

Bo Hyung Cho 1985 187 p

Avail: Univ. Microfilms Order No. DA8605436

A Comprehensive large-scale power system modeling is developed to facilitate the design and analysis of present and future spacecraft power systems. A two-port coupling method is utilized to provide a modularity in model building and analysis of the system. The modular approach allows the model to be flexible, verifiable and computationally efficient. A methodology for the

system level analysis is presented with the ability to focus on the performance characteristics of an arbitrary component or subsystem. The system performance parameters are derived explicitly in terms of the two-port hybrid g-parameter representation of the component or system, and impedances of its terminating subsystems. For this, the stability of the system is analytically determined and the subsystem interaction criteria is observed. Also presented is a model development from the empirical data employing the curve fitting technique. The technique is especially powerful for large scale system modeling and analysis where certain components and subsystems are viewed as black boxes with measurable terminal characteristics. The technique can also be used to realize a reduced order model of a complex subsystem. The Direct Energy Transfer (DET) spacecraft power system is modeled to demonstrate the versatility of the comprehensive system model by performing various D.C. small-signal and large-signal analyses. Dissert. Abstr.

N87-10174*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COAXIAL TUBE TETHER/TRANSMISSION LINE FOR MANNED NUCLEAR SPACE POWER Patent Application
David J. Bents, inventor (to NASA) Filed 18 Aug. 1986 15 p
(NASA-Case-LEW-14338-1; US-Patent-Appl-SN-897239) Avail: NTIS HC A02/MF A01 CSCL 10B

A spacecraft comprising a platform, a power system and a power transmission line adapted to transmitting high voltage electrical power in a space environment is disclosed. The transmission power line tethers the suborbiting platform to the power system located in a superorbital position relative to the platform. NASA

N87-10175*# Aerojet Techsystems Co., Sacramento, Calif.
MAIN CHAMBER COMBUSTION AND COOLING TECHNOLOGY STUDY Monthly Progress Report, 3 Mar. - 6 Apr. 1986
J. VanKleeck Apr. 1986 45 p
(Contract NAS8-36167)
(NASA-CR-178853; NAS 1.26:178853; MPR-1370-M-9) Avail: NTIS HC A03/MF A01 CSCL 21H

The general objective is to evaluate and extend technology relating to the Main Combustion Assembly (MCA) of a high pressure staged combustion rocket engine operating with O2/H2 propellants. Three specific technology areas are addressed: main injector chamber improvements, main chamber blanching, and combustion stability rating techniques. B.G.

N87-10176*# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
COMPOSITE LOAD SPECTRA FOR SELECT SPACE PROPULSION STRUCTURAL COMPONENTS Annual Report
J. F. Newell, R. E. Kurth, and H. Ho Mar. 1986 365 p
(Contract NAS3-24382)
(NASA-CR-179496; NAS 1.26:179496; RI/RD86-123; AR-1) Avail: NTIS HC A16/MF A01 CSCL 21H

A multiyear program is performed with the objective to develop generic load models with multiple levels of progressive sophistication to simulate the composite (combined) load spectra that are induced in space propulsion system components, representative of Space Shuttle Main Engines (SSME), such as transfer ducts, turbine blades, and liquid oxygen (LOX) posts. Progress of the first year's effort includes completion of a sufficient portion of each task -- probabilistic models, code development, validation, and an initial operational code. This code has from its inception an expert system philosophy that could be added to throughout the program and in the future. The initial operational code is only applicable to turbine blade type loadings. The probabilistic model included in the operational code has fitting routines for loads that utilize a modified Discrete Probabilistic Distribution termed RASCAL, a barrier crossing method and a Monte Carlo method. An initial load model was developed by Battelle that is currently used for the slowly varying duty cycle type loading. The intent is to use the model and related codes essentially in the current form for all loads that are based on measured or calculated data that have followed a slowly varying profile. Author

N87-10021# Tokyo Univ. (Japan).
TECHNICAL OVERVIEW OF PLUME RADIATION FROM A SOLID ROCKET MOTOR
Yasushi Sakurai and Hiroshi Kimura *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 14 p
(For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

23 CHEMISTRY AND MATERIALS (GENERAL)

N87-10177*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BLACK-AND-WHITE PHOTOGRAPHIC CHEMISTRY: A REFERENCE
Ernie D. Walker, comp. Jun. 1986 164 p
(NASA-TM-87296; E-3006; NAS 1.15:87296) Avail: NTIS HC A08/MF A01 CSCL 14E

This work is intended as a reference of black-and-white photographic chemistry. Included is a basic history of the photographic processes and a complete description of all chemicals used, formulas for the development and fixation process, and associated formulas such as cleaners, hardeners, and toners. The work contains a complete glossary of photographic terms, a troubleshooting section listing causes and effects regarding photographic film and papers, and various conversion charts. Author

N87-10178# Lawrence Livermore National Lab., Calif.
CHEMISTRY RESEARCH RESOURCE Progress Report, Mar. 1986
Apr. 1986 87 p
(Contract W-7405-eng-48)
(DE86-009891; UCID-20622-86-3) Avail: NTIS HC A05/MF A01

Summaries are presented of projects in the following areas: synthesis of new materials, development of analytical techniques, chemical kinetics and transport processes, cryogenic and other physical properties of H isotopes, artificial intelligence, development of characterization techniques, materials modeling analysis, mechanical properties of polymers, physical metallurgy (mechanical properties, phase transformations), surface modification and surface studies, and new materials development and properties. DOE

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

For ceramic materials see *27 Nonmetallic Materials*.

N87-10179*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CARBIDE/FLUORIDE/SILVER SELF-LUBRICATING COMPOSITE Patent Application
Harold E. Sliney, inventor (to NASA) Filed 5 May 1986 12 p
(NASA-Case-LEW-14196-1; US-Patent-Appl-SN-859688) Avail: NTIS HC A02/MF A01 CSCL 11D

This invention relates to a self-lubricating, friction and wear reducing composite material for use over a wide temperature spectrum from cryogenic temperature to about 900 C in a chemically reactive environment. The composites are comprised of silver, barium fluoride/calcium fluoride eutectic, and bonded chromium carbide. NASA

N87-10180# British Aerospace Aircraft Group, Weybridge (England).
INVESTIGATION INTO THE ATTENUATION AND VELOCITY OF ACOUSTIC EMISSIONS IN CARBON FIBER COMPOSITE AIR-

CRAFT STRUCTURES
R. F. C. Hall Sep. 1985 99 p
(Contract A93B/1362)
(BAe-KGT-R-GEN-01349; BR97843; ETN-86-97947) Avail: NTIS HC A05/MF A01

The attenuation and propagation velocity of acoustic emission signals in carbon fiber composite honeycomb, monolithic multispar, and integral stringer type constructions were investigated. Very high attenuations are found. Variations in velocity depend on ply orientation, and the substructure arrangement. Metal substructures reduce the measured velocity compared with carbon fiber substructures. Studies which introduced a pointed brass probe used as a source of simulated emission result in a considerable decrease in the overall velocities measured. This phenomenon applies particularly to the flat plate specimens and, to a lesser extent, to the honeycomb type of structure. ESA

N87-10181# Virginia Polytechnic Inst. and State Univ., Blacksburg.
STRUCTURAL OPTIMIZATION FOR CONTROL OF STIFFENED LAMINATED COMPOSITE PLATES USING NONLINEAR MIXED INTEGER PROGRAMMING Ph.D. Thesis
Luis Clemente Mesquita 1985 150 p
Avail: Univ. Microfilms Order No. DA8605352

The effect of structural optimization on control of stiffened laminated composite structures is considered, i.e., the maximization of structural frequencies subject to maximum weight and frequency separation constraints and an upper bound on weight. The number of plies with a given orientation and the stiffener areas form the two sets of design variables. As the number of plies is restricted to integer values, the optimization problem considered belongs to the class of nonlinear mixed integer problems (NMIP). Several efficiency measures are proposed to reduce the computational cost for solution of the optimization problem. Savings in computer time is discussed. The control problem is solved using independent modal space control techniques. The latter greatly simplifies the evaluation of the sensitivity of the performance index with respect to the individual frequencies. The effect of different optimization schemes on control performance is considered. To reduce the probability that conclusions drawn from numerical results are purely coincidental, a large number of cases has been studied. Control performance improvement can be achieved via structural optimization.

N87-10182*# Sikorsky Aircraft, Stratford, Conn.
FLIGHT SERVICE EVALUATION OF COMPOSITE HELICOPTER COMPONENTS Annual Report, Oct. 1983 - Dec. 1985
George H. Mardoian and Maureen B. Ezzo Sep. 1986 66 p
(NASA-CR-178149; NAS 1.26:178149; SER-510237; AR-3) Avail: NTIS HC A04/MF A01 CSCL 11D

This report presents an assessment of composite helicopter tail rotor spars and horizontal stabilizers, exposed to the effects of the environment, after up to five and a half years of commercial service. This evaluation is supported by test results of helicopter components and panels which have been exposed to outdoor environmental effects since September 1979. Full scale static and fatigue tests have been conducted on graphite/epoxy and Kevlar/epoxy composite components obtained from Sikorsky Model S-76 helicopters in commercial operations in the Gulf Coast region of Louisiana. Small scale static and fatigue tests are being conducted on coupons obtained from panels under exposure to outdoor conditions in Stratford, Connecticut and West Palm, Florida. The panel layups are representative of the S-76 components. Additionally, this report discusses the results of moisture absorption evaluations and strength tests on the S-76 components and composite panels with up to five years of outdoor exposure. Author

N87-10183*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Materials Response Group.
FATIGUE RESPONSE OF NOTCHED LAMINATES SUBJECTED TO TENSION-COMPRESSION CYCLIC LOADS Interim Report
C. E. Bakis and W. W. Stinchcomb Jun. 1986 201 p
(Grant NAG1-343)
(NASA-CR-179904; NAS 1.26:179804; CCMS-86-04) Avail: NTIS HC A10/MF A01 CSCL 11D

The fatigue response of a ((0/45/90/-45)(sub s))(sub 4) T300-5208 graphite-epoxy laminate with a drilled center-hole subjected to various components of tensile and compressive cyclic loads was investigated. Damage evaluation techniques such as stiffness monitoring, penetrant-enhanced X-ray radiography, C-scan, laminate deply and residual strength measurement were used to establish the mechanisms of damage development as well as the effect of such damage on the laminate strength, stiffness and life. Damage modes consisted of transverse matrix cracks, initiating at the hole, in all plies, followed by delamination between plies of different orientation. A characteristic stiffness repsonse during cyclic loading at two load levels was identified and utilized a more reliable indicator of material and residual properties than accumulated cycles. For the load ratios of tension-compression loading, residual tensile strength increased significantly above the virgin strength early in the fatigue life and remained approximately constant to near the end of life. A technique developed for predicting delamination initiation sites along the hole boundary correlated well with experimental evidence. Author

N87-10184*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF THERMAL CYCLING ON GRAPHIE-FIBER-REINFORCED 6061 ALUMINUM
Gregory A. Dries (PRC Kentron, Inc., Hampton, Va.) and Stephen S. Tompkins Oct. 1986 29 p
(NASA-TP-2612; L-16139; NAS 1.60:2612) Avail: NTIS HC A03/MF A01 CSCL 11D

Graphite-reinforced aluminum alloy metal-matrix composites are among materials being considered for structural components in dimensionally stable space structures. This application requires materials with low values of thermal expansions and high specific stiffnesses. They must remain stable during exposures to the space environment for periods extending to 20 years. The effects of thermal cycling on the thermal expansion behavior and mechanical properties of Thornel P100 graphite 6061 aluminum composites, as fabricated and after thermal processing to eliminate thermal strain hysteresis, have been investigated. Two groups of composites were studied: one was fabricated by hot roll bonding and the other by diffusion bonding. Processing significantly reduced strain hysteresis during thermal cycling in both groups and improved the ultimate tensile strength and modulus in the diffusion-bonded composites. Thermal cycling stabilized the as-fabricated composites by reducing the residual fabrication stress and increased the matrix strength by metallurgical aging. Thermal expansion behavior of both groups after processing was insensitive to thermal cycling. Data scatter was too large to determine effects of thermal cycling on the mechanical properties. The primary effects of processing and thermal cycling can be attributed to changes in the metallurgical condition and stress state of the matrix. Author

N87-10185# Sabbagh Associates, Inc., Bloomington, Ind.
AN EDDY-CURRENT MODEL FOR THREE-DIMENSIONAL NON-DESTRUCTIVE EVALUATION OF ADVANCED COMPOSITES Final Report, 28 Nov. 1984 - 28 Jul. 1985
Harold A. Sabbagh, L. David Sabbagh, and Thomas M. Roberts 28 Jul. 1985 64 p
(Contract N60921-85-C-0046)
(AD-A167688; SA/TR-1/85; NSWC-TR-85-304) Avail: NTIS HC A04/MF A01 CSCL 11/4

The research problem is to deviop a model and an inversion algorithm suitable for the three-dimensional quantitative nondestructive evaluation (NDE) of advanced composite materials by using eddy currents. The technical objectives are to determine the feasibility of using multifrequencies for this job, to determine in localized regions the fiber-resin ratio in graphite epoxy, and to determine more precisely the types of anomalies, whether flaws, delaminations, broken fibers, etc., that can be reconstructed by the inversion method. These objectives are met by: (1) applying rigorous electromagnatic theory to determine a Green's function for a slab of anisotropic composite material, (2) determining the

integral relations for the direct and inverse problems using the Green's function just derived, (3) determining suitable numerical algorithms for solving the inverse problem, and (4) writing a computer program to execute the model. These objectives have been met; in addition we illustrate some interesting electromagnetic phenomena in composite materials. GRA

N87-10186# Naval Postgraduate School, Monterey, Calif.
EXPERIMENTAL PROCEDURE FOR LIFETIME TESTING OF GRAPHITE BUNDLES UNDER CONSTANT LOAD M.S. Thesis
Fred D. Carozzo, Jr. Mar. 1986 50 p
(AD-A167714) Avail: NTIS HC A03/MF A01 CSCL 11/4

An experimental procedure is presented for lifetime testing of graphite bundles under constant load. The attributes of the experiment are expedience in implementation and a substantial accumulation of information equivalent to a large number of single filament tests. To achieve the objectives of the experiment a specially adapted Instron machine was used with a digital process/controller. Two trial experiments were conducted using Hercules high strength graphite. The preliminary results are presented and the effects of inter-fiber friction evaluated. GRA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N87-10187*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering.
NUMERICAL STUDY OF HYDROGEN-AIR SUPERSONIC COMBUSTION BY USING ELLIPTIC AND PARABOLIZED EQUATIONS Progress Report, 1 Dec. 1985 - 31 May 1986
31 May 1986
Tawit Chitsomboon and Surendra N. Tiwari Aug. 1986 115 p
(Grant NAG1-423)
(NASA-CR-179800; NAS 1.26:179800) Avail: NTIS HC A06/MF A01 CSCL 21B

The two-dimensional Navier-Stokes and species continuity equations are used to investigate supersonic chemically reacting flow problems which are related to scramjet-engine configurations. A global two-step finite-rate chemistry model is employed to represent the hydrogen-air combustion in the flow. An algebraic turbulent model is adopted for turbulent flow calculations. The explicit unsplit MacCormack finite-difference algorithm is used to develop a computer program suitable for a vector processing computer. The computer program developed is then used to integrate the system of the governing equations in time until convergence is attained. The chemistry source terms in the species continuity equations are evaluated implicitly to alleviate stiffness associated with fast chemical reactions. The problems solved by the elliptic code are re-investigated by using a set of two-dimensional parabolized Navier-Stokes and species equations. A linearized fully-coupled fully-implicit finite difference algorithm is used to develop a second computer code which solves the governing equations by marching in spce rather than time, resulting in a considerable saving in computer resources. Results obtained by using the parabolized formulation are compared with the results obtained by using the fully-elliptic equations. The comparisons indicate fairly good agreement of the results of the two formulations. Author

N87-10188# Los Alamos National Lab., N. Mex.
DEVELOPING SIMPLIFIED MODELS OF COMBUSTION CHEMISTRY BY SIMULATION WITH DETAILED CHEMICAL KINETICS MODELS
J. R. Creighton 13 Mar. 1986 9 p Presented at the Summer Computer Simulation Conference, Reno, Nev., 28 Jul. 1986
(Contract W-7405-eng-48)
(DE86-008381; UCRL-93614; CONF-860729-2) Avail: NTIS HC A02/MF A01

Simulations with detailed chemical kinetics mechanisms were used to develop simplified models for the oxidation of simple fuels, with emphasis on methane. The first simplification was based on the observation that the concentrations of several radical species were in steady state so that they formed a radical pool where the concentrations of pool species track one another. During the induction period these concentrations grow exponentially. Simulations showed that as concentrations grow, non-linear terms due to specific reaction steps bring the entire radical pool to steady state and that thereafter the radical pool concentration is determined by the temperature. Simulations also show that all reactions with the same initial reactant concentrations reach the same steady state regardless of initial temperature or initial radical concentration. Because the rate of heat release is a function of the radical pool concentration, the rate of temperature increase during this steady state is a function only of temperature with initial reactant concentrations as parameters. A model based on these simplifications reproduces much of the behavior of the detailed kinetics model in simulations of explosions and flames. DOE

N87-10189# Sandia National Labs., Albuquerque, N. Mex.
NUMERICAL MODEL OF THE THERMAL PROCESSES LEADING TO IGNITION IN A PYROTECHNIC DEVICE
K. G. Pierce and J. R. Leith 1986 14 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986 Prepared in cooperation with New Mexico Univ., Albuquerque.
(Contract DE-AC04-76DP-00789)
(DE86-009626; SAND-85-2798C; CONF-860739-2) Avail: NTIS HC A02/MF A01

The predicted ignition behavior of a hot-wire initiated pyrotechnic device, as obtained from simple numerical models, is presented. The models are based on the heat diffusion equation with temperature dependent properties. The predictions of the model for the short-term responses of a specific pyrotechnic device are consistent with experimental results. The predictions of the long-term response differ significantly from experimental data. The causes of this difference are discussed, and a parametric study of the variables which have an effect on the ignition process is presented. DOE

N87-10190# Mississippi State Univ., Mississippi State. MHD Energy Center.
DIFFERENTIAL OPTICAL ABSORPTION TECHNIQUES FOR DIAGNOSTICS OF FOSSIL FUEL COMBUSTION Final Report, Oct. 1982 - Mar. 1986
Mar. 1986 18 p
(Contract DE-AC21-82MC-19314)
(DE86-010084; DOE/MC-19314/2046) Avail: NTIS HC A02/MF A01

The application of differential optical absorption (DOA) techniques for the in-situ determination of the chemical composition of fossil fuel combustion streams is investigated. Absorption spectra of relevant molecular species and the temperature and pressure effects on DOA-determined spectral characteristics of these species will be determined and catalogued. A system will be configured, assembled, and tested. DOE

N87-10191# Lawrence Livermore National Lab., Calif.
MICRO-TOMOGRAPHY USING SYNCHROTRON RADIATION
Q. C. Johnson, J. H. Kinney, U. Bonse, M. C. Nichols, R. Nusshardt, and J. M. Brase Apr. 1986 8 p Presented at the Materials Research Society Spring Meeting, Palo Alto, Calif., 15 Apr. 1986 Prepared in cooperation with Dortmund Univ., West Germany and Sandia National Labs., Livermore, Calif.
(Contract W-7405-eng-48)
(DE86-010982; UCRL-93538; CONF-860445-13) Avail: NTIS HC A02/MF A01

This paper discusses the results of recent experiments at Stanford Synchrotron Radiation Laboratory (SSRL) and Hamburger Synchrotronstrahlungslabor (HASYLAB) which were designed to explore the feasibility of using synchrotron radiation in high-

resolution, computerized, critical-absorption tomography. The results demonstrate that it is possible, using absorption-edge differencing, to identify adjacent elements in the periodic table with high sensitivity. Furthermore, by using the fine structure in the absorption spectra, it is possible to distinguish between regions of different chemical states. Methods of using synchrotron radiation for high-resolution, three-dimensional chemical-state mapping in small samples are discussed. DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-10192*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CASTABLE HOT CORROSION RESISTANT ALLOY Patent Application
Charles A. Barrett, inventor (to NASA) and William H. Holt, inventor (to NASA) Filed 30 Jul. 1986 8 p
(NASA-Case-LEW-14134-1; US-Patent-Appl-SN-890584) Avail: NTIS HC A02/MF A01 CSCL 11F

About ten weight percent nickel is added to a Fe-base ferritic alloy to improve the high temperature castability and crack resistance while about 0.2 weight percent zirconium is added for improved high temperature cyclic oxidation and corrosion resistance. The basic material is a high temperature FeCrAl heater alloy, and the addition provides a material suitable for burner rig nozzles. NASA

N87-10193# Amalgamated Technologies, Inc., Scottsdale, Ariz.
SURFACE ATTACK ON METALS IN THE PRESENCE OF LIQUID METALS Final Report
Roy E. Beal 10 Apr. 1986 132 p
(Contract N00014-85-C-0848)
(AD-A167403) Avail: NTIS HC A07/MF A01 CSCL 11/6

A study has been undertaken to evaluate liquid metals as electrical collectors in contact with solid metal alloys. Surface attack of the liquid metal on the solid metal is expected to be a major challenge to the development of a credible system. Low melting temperature metals and alloys of the fusible type are to be utilized for a collector that will operate in the 200-500 F range, with emphasis towards the lower end. Solid metals have been selected for experimental work based on their electrical properties and minimal potential reaction with the candidate liquid metal alloys. Material properties of both liquid and solid metals were reviewed to identify initial material combinations for evaluation. Thorough literature searches were conducted to obtain as much pertinent physical property and metallurgical data as possible, prior to actual experimental work. Process and material modelling was adopted to select candidate materials for both solids and liquids. Consideration of practical requirements for the eventual collectors is an integral part of the study. Work effort has concentrated on apparatus construction, evaluation and a program of testing to obtain screening data on materials selected and the chosen test method. Results have identified limitations of the test unit design and maximum current loads under test conditions with experimental current, collectors. Candidate electrode materials have been exposed in low melting fusible alloys for direct dissolution data. GRA

N87-10194# TRW Materials and Mfg. Center, Euclid, Ohio.
DEVELOPMENT OF IRON ALUMINIDES Final Report, Sep. 1 981 - Nov. 1985
G. C. Culbertson and C. S. Kortovich Mar. 1986 186 p Prepared in cooperation with Systems Research Labs
(Contract F33615-81-C-5155)
(AD-A168578; ER-8215-6; AFWAL-TR-85-4155) Avail: NTIS HC A09/MF A01 CSCL 11/6

A program was conducted to develop improved iron-aluminide alloys with higher elevated temperature strength and room temperature ductility compared to the baseline Fe3Al alloy. The technical approach involved the screening evaluation of two experimental series of alloys which then formed the basis for the selection of a single alloy composition for more complete properties testing. The screening studies involved the evaluation of precipitation strengthening as well as solid solution strengthening alloy additions to the Fe3Al system. The most optimum of the precipitation strengthened alloys contained 2 a/o Nb and in the fully solution heat treated and aged condition exhibited 4 times the 600 C (1112 F) yield strength of Fe3Al, with about 60% the room temperature elongation. A negative feature of the two-phase alloys, however, was the occurrence of quench cracking, discovered during heat treatment of isothermally forged material. The most optimum of the solid solution strengthened alloys contained 3.5 Cr + 0.5 Mo (atomic percent) and exhibited 1.3 times the 600 C (1112 F) yield strength of Fe3Al, with equivalent room temperature ductility (4.8 percent elongation). Additional positive features of all the alloys were the attractive oxidation resistance compared to the Fe3Al baseline and the high degree of workability demonstrated during upset isothermal forging studies. Final alloy evaluation was conducted on Fe-35Al-4Cr-2Mo. GRA

N87-10195# Pacific Northwest Labs., Richland, Wash.
GRAIN BOUNDARY SEGREGATION AND ENVIRONMENTALLY-INDUCED FRACTURE OF MATERIALS
R. H. Jones Aug. 1985 24 p Presented at the 115th American Institute of Minining, Metallurgical and Petroleum Engineers Annual Meeting, New Orleans, La., 2 Mar. 1986
(Contract DE-AC06-76RL-01830)
(DE86-010219; PNL-SA-13067; CONF-860340-4) Avail: NTIS HC A02/MF A01

Segregation of metalloid impurities such as S, P, and Sb to grain boundaries can induce hydrogen embrittlement (HE) and intergranular stress corrosion cracking (IGSCC) of materials. Hydrogen-induced intergranular subcritical crack growth is affected by metalloid segregation with a combined impurity-hydrogen effect which follows the embrittling trend for impurity segregation in the absence of hydrogen. In Fe, S is more effective than Sb which is more effective than P. A similar relationship has been demonstrated for Ni. The role of metalloid impurity segregation in IGSCC may differ significantly from HE such that an impurity which has a small effect in HE can have a large effect in IGSCC. Sulfur and P in Ni are examples where this role reversal is observed. DOE

N87-10196# Pacific Northwest Labs., Richland, Wash.
REVIEW OF EMBRITTLEMENT MECHANISMS IN TUNGSTEN HEAVY ALLOYS
W. E. Gurwell Apr. 1986 24 p Presented at the Annual Powder Metallurgy Conference and Exhibition, Boston, Mss., 18 May 1986
(Contract DE-AC06-76RL-01830)
(DE86-011114; PNL-SA-13645; CONF-8605116-1) Avail: NTIS HC A02/MF A01

Tungsten heavy alloys compete directly with depleted uranium for applications requiring a high-density material. In some applications, such as armor-piercing projectiles, where high toughness is required, tungsten heavy alloys are perceived to suffer from generally low or inconsistent toughness. Commercial tungsten heavy alloys containing 90% to 97% tungsten are therefore liquid-phase sintered in hydrogen to full density and then annealed to reduce hydrogen embrittlement. This paper reviews published investigations of the embrittling mechanisms responsible for toughness variations in W-Ni-Fe alloys. These mechanisms include: (1) incomplete oxide reduction, (2) residual porosity, (3) increased contiguity, (4) hydrogen embrittlement, (5) impurity segregation, (6) variation in ductile-to-brittle transition temperature, (7) tungsten precipitation in the matrix, and (8) mechanical working and annealing. The general properties and fracture behavior of the alloys are outlined. Published information on embrittling mechanisms is then reviewed and integrated into a single picture. DOE

N87-10197# Sandia National Labs., Livermore, Calif.
COMPOSITIONAL AND MICROSTRUCTURAL EFFECTS ON HYDROGEN EMBRITTLEMENT OF ASTM GRADE 12 TITANIUM

(Ti 0.3 Mo - 0.8 Ni)
N. R. Moody and S. L. Robinson May 1986 41 p
(Contract DE-AC04-76DR-00789)
(DE86-011379; SAND-85-8247) Avail: NTIS HC A03/MF A01

This study characterized the effects of alloy composition, microstructure, and hydrogen on ASTM grade 12 titanium tensile properties and fracture. The effect of alloy composition on the tensile properties agreed with previous studies. Mo, Fe, and O each increased the yield and ultimate tensile strengths and the fracture stress in all heats studied. Ni had little effect on the yield and ultimate strengths but decreased the fracture stress. Mo and Fe increased ductility, whereas, Ni and O decreased it. In contrast, hydrogen increased the ultimate tensile strength but decreased the yield strength, fracture stress and ductility. The decrease in properties was independent of alloy composition. However, the amount of hydrogen-induced secondary cracking exhibited significant heat-to-heat variation which was directly related to the microstructure. These results showed that grade 12 titanium used for high-level nuclear waste storage applications should have the lowest total concentration of alloying elements required to provide adequate toughness and corrosion resistance. The alloy should also be fully annealed. The low concentration of alloying elements and a full anneal will reduce susceptibility to hydrogen embrittlement. DOE

N87-10198# Sandia National Labs., Albuquerque, N. Mex.
TRANSFORMATIONS AND NEW PHACOMP ANALYSIS IN WELD METAL OF HASTELLOY C-TYPE ALLOYS
M. J. Cieslak, T. J. Headley, and A. D. Romig, Jr. 1986 7 p Presented at the ASM International Trends in Welding Research Meeting, Gatlinburg, Tenn., 18 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-011422; SAND-85-1586C; CONF-860594-5) Avail: NTIS HC A02/MF A01

The sequence of phase transformations occurring during solidification and cooling of weld metals in the Hastelloy C family (C-4, C-22, C-276) has been determined. An equivalent component chemistry model has been defined for these alloys which allows existing Ni-Cr-Mo ternary phase diagrams to be used to predict the transformation sequence (both liquid solid and solid solid) in these complex alloys. In the cases of Alloys C-22 and C-276, the solidification events terminate with the formation of a constituent containing a topologically-close-packed (TCP) phase (sigma in C-22; P in C-276). The New PHACOMP formalism developed by Morinaga et al. for predicting TCP phase precipitation by solid state transformation in superalloys is applied for the first time to measured weld solidification segregation profiles. This formalism correctly predicts the occurrence of terminal solidification TCP phases in Alloys C-22 and C-276 and correctly predicts the absence of such phases as terminal solidification products in Alloy C-4. Implications to analysis of other nickel alloy weld metals are suggested. DOE

N87-10199# Oak Ridge National Lab., Tenn.
WELDABILITY OF AN NIAI ALLOY
M. L. Santella, S. A. David, and J. A. Horton 1986 16 p Presented at the ASM International Trends in Welding Research Meeting, Gatlinburg, Tenn., 18 May 1986
(Contract DE-AC05-84OR-21400)
(DE86-011510; CONF-860594-4) Avail: NTIS HC A02/MF A01

Since joining by conventional welding processes is an important means of fabricating structural components, weldability has become a key issue in the development of these new Ni/Al alloys. Results of an initial evaluation of the weldability of Ni/Al containing 0.1 at. % B and 0.5 at. % Hf are reported. Plates were prepared by conventional methods and used to make full penetration electron beam and gas tungsten arc welds. Initial results indicate that hafnium improves the weldability of Ni/Al alloys, although they are still susceptible to cracking. Examination of microstructures indicated that a distinct microsegregation pattern developed in the welds and affected the ordering behavior of fusion zones. Room temperature tensile testing suggested that welds can have strength and ductility values comparable to base materials, and that postweld heat treatment can improve tensile properties. DOE

N87-10200# Rheinisch Westfaelische Elektrizitaetswerke A.G., Essen (West Germany).
PROCESS FOR PREPARING NICKEL COATINGS IN CONDUCTING, POROUS BODIES, ESPECIALLY FOR BATTERY ELECTRODES
P. Faber 1986 9 p
(DE86-901439; NP-tr-6901439) Avail: NTIS HC A02/MF A01

This patent pertains to a process for preparing nickel coatings in conducting, porous bodies, especially for battery electrodes. In the process, a nickel layer is first galvanically applied on the body, characterized in that the body with its galvanic nickel layer is heated to a temperature above 200 C on the inside and a temperature below 200 C in peripheral zones by ohmic heat in a carbon monoxide atmosphere, whereby nickel is introduced as a coating from the nickel layer into the body. An electrical current is sent through the body for the ohmic heating in the direction of a longitudinal axis or a thickness axis. The body is heated under pressure. The carbon monoxide atmosphere is pressed through the body. Up to 50% hydrogen is mixed into the carbon monoxide atmosphere. Up to 10% nickel tetracarbonyl is mixed into the carbon monoxide atmosphere. DOE

N87-10201# Oak Ridge National Lab., Tenn.
DEFORMATION BEHAVIOR OF POWDER METALLURGY NI AI-Hf-B
V. K. Sikka and E. A. Loria 1986 25 p Presented at the 25th Annual Conference on Metallurgists, Toronto, Ontario, 17 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-011508; CONF-860876-1) Avail: NTIS HC A02/MF A01

Boron-doped NiAl-Hf processed by powder metallurgy technology exhibits superplastic behavior within certain strain rates of isothermal tension and compression. A fine, equiaxed grain size provided the optimum conditions. In this investigation, that grain size was 6 m in as-extruded bar stock. The strain rate dependence of flow stress in tensile testing at 950 to 1150°C confirmed the limitations for hot working as opposed to cold working. As in other products, the P/M product shows intergranular fracture and limited ductility above 800°C under conventional strain rates. However, the results on the P/M product exhibit superplasticity (greater than 100%) in tensile testing at strain rates below 10^{-4}/s. These results provided the opportunity for fabrication by hot isothermal forging. In two different press operations, isothermal forging of small cylinders cut from as-extruded bar stock revealed no peripheral cracking via 60% compression tests at strain rates of 0.5 and 0.1/min at 1100°C. In some tests, the cylinders were compressed without cracking at a strain rate of 2 x 10-3/s, one order of magnitude faster than the optimum strain rate in tensile testing. Even though isothermal forging is possible at a strain rate as high as 1.0/min at 1100°C, both forging sources prefer a strain rate of 0.5/min for overall performance on a commercial-scale press. DOE

N87-10202# Oak Ridge National Lab., Tenn.
MODIFICATION OF THE GRAIN BOUNDARY MICROSTRUCTURE OF THE AUSTENITIC PCA STAINLESS STEEL TO IMPROVE HELIUM EMBRITTLEMENT RESISTANCE
P. J. Maziasz and D. N. Braski 1986 16 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-010396; CONF-860421-31) Avail: NTIS HC A02/MF A01

Grain boundary MC precipitation was produced by a modified thermal-mechanical pretreatment in 25% cold worked (CW) austenitic prime candidate alloy (PCA) stainless steel prior to HFIR irradiation. Postirradiation tensile results and fracture analysis showed that the modified material (B3) resisted helium embrittlement better than either solution annealed (SA) or 25% CW PCA irradiated at 500 to 600(0)C to approx. 21 dpa and 1370 at. ppM He. PCA SA and 25% CW were not embrittled at 300 to 400(0)C.

Grain boundary MC survives in PCA-B3 during HFIR irradiation at 500(0)C but dissolves at 600(0)C; it does not form in either SA or 25% CW PCA during similar irradiation. The grain boundary MC appears to play an important role in the helium embrittlement resistance of PCA-B3. DOE

N87-10203# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Abteilung EGT 2.
INVESTIGATIONS ON THE PARAMETERS FOR LASER SURFACE TREATMENT BY CLADDING AND ALLOYING Final Report, Dec. 1983
Wolf Amende Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 85 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-85-183; ISSN-0340-7608; ETN-86-97842) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18

Processing of metallic surfaces with a laser beam with a power up to 5 kW was investigated. By remelting of technical alloys a remarkable grain refining is achieved. With adding alloying elements such as chromium or nickel, dense alloyed layers which are strongly connected with the bulk material are produced. At cladding the component is coated with a nonidentical material. The results for the remelting and alloying of steels, gray cast iron and aluminum are described. The cladding was performed mainly with satellite alloys. The maximum thickness of the layers is 1 mm. Special components for beam handling were developed. The technology is considered suitable for application in production lines. ESA

N87-10204*# National Academy of Sciences - National Research Council, Washington, D. C.
MICROGRAVITY SCIENCE AND APPLICATIONS Final Report
Feb. 1986 292 p Workshop held at Pasadena, Calif., 3-4 Dec. 1984 Sponsored by NASA
(Grant NSF DMR-81-19500)
(NASA-CR-179793; NAS 1.26:179793; PB86-202736) Avail: NTIS HC A13/MF A01 CSCL 11F

The report presents fifteen papers from a workshop on microgravity science and applications held at the Jet Propulsion Laboratory in Pasadena, California, on December 3 to 4, 1984. The workshop and panel were formed by the Solid State Sciences Committee of the Board on Physics and Astronomy of the National Research Council in response to a request from the Office of Science and Technology Policy. The goal was to review the microgravity science and applications (MSA) program of NASA and to evaluate the quality of the program. The topics for the papers are metals and alloys, electronic materials, ceramics and glasses, biotechnology, combustion science, and fluid dynamics. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials*.

N87-10205*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BORON-CONTAINING ORGANOSILANE POLYMERS AND CERAMIC MATERIALS THEREOF Patent Application
Salvatore R. Riccitiello, inventor (to NASA), Ming-ta S. Hsu, inventor (to NASA) (Chem (H. C.) Research and Service Corp., San Jose, Calif.), and Timothy S. Chan, inventor (to NASA) Filed 30 Jul. 1986 20 p
(NASA-Case-ARC-11649-1-SB; US-Patent-Appl-SN-890577) Avail: NTIS HC A02/MF A01 CSCL 11B

The present invention relates to organic silicon-boron polymers which upon pyrolysis produce high-temperature ceramic materials. More particularly, it relates to the polyorganoborosilanes containing -Si-B- bonds which generate high-temperature ceramic materials (e.g., SiC, SiB4, SiB6, B3C) upon thermal degradation. The processs for preparing these organic silicon-boron polymer precursors are also a part of this invention. M.G.

N87-10206*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A METHOD OF ESTIMATING THE MOLECULAR WEIGHT OF POLYMERIC MATERIALS Patent Application
James R. Tyeryar, inventor (to NASA), Brian J. Jensen, inventor (to NASA), and Robert L. Fox, inventor (to NASA) Filed 22 Aug. 1986 14 p
(NASA-Case-LAR-13212-1; US-Patent-Appl-SN-898986) Avail: NTIS HC A02/MF A01 CSCL 11B

A rapid method to estimate the molecular weight of polymers by forming a film from the polymeric material and subjecting the newly formed film to a crease test to estimate molecular weight is disclosed. An induction heating apparatus, essentially as disclosed in U.S. Patent No. 4,521,659, is mounted in a hydraulic press. The polymeric material to be tested is placed between two sheets of high-temperature release film, which is placed between two conductive plates, which is placed between two layers of insulation to form a sandwich specimen fixture. Heat is applied rapidly to the fixture by the induction heating apparatus until a temperature above the melting point of the polymer is reached, while pressure is applied simultaneously by means of the hydraulic press. The temperature of the fixture is held constant for between one and five minutes, after which the fixture is cooled to a temperature below the glass transition temperature of the polymer, and the pressure is then released. The newly formed film is then subjected to a crease test. If the film is creaseable and not brittle, the polymer is determined to be of sufficiently high molecular weight. NASA

N87-10207# Army Natick Labs., Mass.
THE FUNGAL RESISTANCE OR SUSCEPTIBILITY OF RESINS, PLASTICIZERS, AND OTHER CONSTITUENTS OF ADHESIVE FORMULATIONS Final Report, Oct. 1983 - Sep. 1985
B. J. Wiley, D. L. Kaplan, and A. M. Kaplan Oct. 1985 52 p
(AD-A166930; NATICK/TR-86/023) Avail: NTIS HC A04/MF A01 CSCL 11/1

Studies were performed to develop a database for the microbial resistance or susceptibility of adhesives used by the military. Commercial and GSA formulations and bases were evaluated by plate testing, and this report identifies those adhesives and constituents that were resistant or susceptible within the categories that were used to classify these materials. Adhesive components were identified by the type of resin used, that is, elastomeric, thermoplastic or thermosetting, natural, etc., or as a constituent such as a plasticizer or filler, etc. Additionally, a list of biocides used for adhesives has been provided. GRA

N87-10208# Materials Research Labs., Ascot Vale (Australia).
COMPUTER ASSISTED GAS CHROMATOGRAPHY FOR THERMODYNAMIC MEASUREMENTS OF POLYMER SURFACES
P. J. C. Chappell Dec. 1985 33 p
(AD-A167450; MRL-R-982) Avail: NTIS HC A03/MF A01 CSCL 07/4

Accurate measurement of the surface thermodynamics of polymers is essential if one is to understand how polymeric fibers such as Kevlar interact with the matrix in fiber reinforced composites. The term surface thermodynamics includes quantities such as enthalpies of adsorption, entropies of absorption, absorption isotherms, surface areas and spreading pressures. Gas chromatography lends itself to the determination of these quantities because it can be carried out at low concentrations of absorbate (the infinite dilution regime), it does not need to be carried out under a vacuum, and its accuracy is as good as, or better than, the accuracy of alternate methods, e.g., calorimetry. This report documents the development of a system, based on an existing gas chromatograph and multichannel analyser, for digital acquisition and analysis of chromatographic data. A brief outline of the theory is followed by a section detailing specific requirements. The bulk of the report,

describing the development of the system, follows with some results illustrating its capabilities. Finally, an extensive set of appendices gives technical details. GRA

N87-10209# Products Research and Chemical Corp., Glendale, Calif. Research and Development Lab.
POLYMER SYSTEMS FOR RAPID SEALING OF AIRCRAFT STRUCTURES AT LOW TEMPERATURE Final Report, Sep. 1981 - Aug. 1983
Lester Morris, Morris Williams, and Nicholas Champlin 1 Nov. 1985 40 p
(Contract N62269-81-C-0741; F61-542)
(AD-A167667; NADC-85158-60) Avail: NTIS HC A03/MF A01 CSCL 11/1

Materials examined for low temperature, rapid curing, fuel and water resistant sealants included hot melts, UV activated, moisture curing, and anaerobic polymers. Two component polymers utilizing urethane cures, oxidation, and mercaptan-epoxy additions were evaluated. Epoxy cures of mercaptan terminated polythioethers gave excellent low temperature cures along with practical application times. Physical and chemical properties were examined and found to essentially meet requirements of MIL-S-85420 (AS). Storage stability was excellent. GRA

N87-10210# Oak Ridge Gaseous Diffusion Plant, Tenn.
SYNTHETIC CARBON PRECURSOR MATERIALS
B. J. Frame Mar. 1986 28 p
(Contract DE-AC05-84OT-21400)
(DE86-011584; K/TS-11-796) Avail: NTIS HC A03/MF A01

Synthetic carbon precursor systems offer advantages over natural petroleum and coal-tar pitch precursors in that they can reproducibly provide a material with a known and uniform composition. They also permit controlled modifications of the derived carbon's properties through variations in the precursor's properties and processing conditions. Extensive research efforts at Oak Ridge have been directed toward the production and characterization of synthetic carbon precursors and the correlations that exist between carbon precursor properties and the properties of the ultimate carbon. This report describes how synthetic carbon precursors can be used to tailor and develop reproducible carbon structures for advanced materials applications. The potential and capability for performing carbon material development at Oak Ridge is also described. DOE

N87-10211# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
POLYMER REFLECTORS RESEARCH DURING FISCAL YEAR 1985
P. Schissel, H. H. Neidlinger, and A. W. Czanderna May 1986 113 p
(Contract DE-AC02-83CH-10093)
(DE86-010697; SERI/PR-255-2835) Avail: NTIS HC A06/MF A01

The long-term objective of the Silvered Polymer Reflectors subtask within the SERI Solar Thermal Program is to develop silvered polymers that have a high specular reflectance, and to develop modifications of polymers that will protect the silver and maintain the reflectance in outdoor service environments for many years. The specific goals for FY 1985 were to achieve 90% specular reflectance within 7 mrad acceptance angle and to achieve ultraviolet radiation resistance that prevents detectable degradation during short-term accelerated laboratory tests. These goals set as intermediate checkpoints have been accomplished toward the long-term targets of a solar-weighted hemispherical reflectance of at least 90%, a specularity resulting 90% of the solar flux being contained within a cone angle of 4 to 10 mrad, and a useful life of at least 5 years. This document reports the progress accomplished during FY 1985. DOE

N87-10212# Missouri Univ., Kansas City.
THEORETICAL STUDIES ON THE STRUCTURES OF INSULATING AND METALLIC GLASSES Annual Progress Report, 1 Jul. 1985 - 30 Jun. 1986
W. Y. Ching Jan. 1986 14 p
(Contract DE-FG02-84ER-45170)
(DE86-011484; DOE/ER-45170/T1) Avail: NTIS HC A02/MF A01

This is the second year of a three-year project to study the electronic and structural properties of glassy systems by means of large scale theoretical calculations. The major accomplishments covered in this report are: completion of study of electronic structures of Ni sub x P sub 1-x metallic glasses; completion of the construction of periodic structural models for (NaO)(SiO) insulating glass; construction of the cannonical potentials for all the metallic elements in the periodic table with atomic number Z up to 55; initiation of electronic and magnetic property studies of some intermetallic compounds with complex structures; and implementation of a newly developed orbital-charge self-consistent procedure into the OLCAO calculation and the successful extension of the OLCAO codes to f-electron systems. DOE

N87-10213# Brookhaven National Lab., Upton, N. Y.
CHEMISORPTION MECHANISM AND EFFECT OF POLYACRYLIC ACID ON THE IMPROVEMENT IN BOND DURABILITY OF ZINC PHOSPHATE-TO-POLYMER ADHESIVE JOINTS
T. Sugama, L. E. Kukacka, N. Carciello, and J. B. Warren Jan. 1986 46 p
(Contract DE-AC02-76CH-00016)
(DE86-011535; BNL-37808) Avail: NTIS HC A03/MF A01

It has been found that the outermost surface sites of polyacrylic acid-complexed crystalline Zn x Ph layers precipitated on cold-rolled steel surfaces act significantly to promote interfacial adhesive bonding to polymeric topcoats. This is the result of electrostatic internal diffusion and segmental chemisorption mechanisms of polyelectrolyte macromolecules either on newly precipitated crystal nuclei or on crystal growth sites during the primary zinc phosphate (Zn x Ph) conversion process. The nature of the polymer-to-polymer chemical bond produced at the polymer-to-complex Zn x Ph precoat interfacial joints plays the key role in the achievement of long-term bond durability upon exposure to chemically corrosive environments. The locus of adhesive loss at the polymer-to-complex Zn x Ph joints after exposure to a hot acid solution was clearly identified to be cohesive failure in the crystalline precoat layers. A stable bond resulted from the formation of an interfacially produced hydrophobic structure by interactions between the polymer and the functional organic species existing on the complex precoat surfaces. The chemisorbed polyelectrolytes also served to chemically couple the organic coating and the inorganic Zn x Ph conversion layer. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N87-10214# Naval Surface Weapons Center, Silver Spring, Md.
SYNTHESIS OF ENERGETIC MATERIALS Anual Progress Report, 1 Jan. - 31 Dec. 1985
H. G. Adolph, M. Chaykovsky, J. M. Goldwasser, and W. M. Koppes 31 Mar. 1986 48 p
(AD-A167787) Avail: NTIS HC A03/MF A01 CSCL 07/3

Investigation of the synthesis of polyformals from several nitro- and fluorodiols was continued. A new fluoropolyformal derived from 2,4,4,5,5,6,6-heptafluoro 2-trifluoromethyl 3-oxaheptane 1,7-diol was obtained. Formation of the homopolyformal of 4,4-dinitroheptane 1,7-diol was studied to assess effects of changing reaction parameters on molecular weight. Copolyformal formation was studied for several monomer (diol) pairs, especially DINOL/4,4-dinitroheptane 1,7-diol, and was demonstrated by GPC and H NMR analysis of the polymer products. Effects of varying reaction parameters and monomer ratios were investigated qualitatively.

The synthesis of the trifluoromethyl stabilized ring system of bicyclo-HMX (2,4,5,8-tetraza-bicyclooctane) was investigated and the di-, tri-, and tetranitro derivatives were prepared and characterized. The chemistry of the 2,6-diazabicyclooctane ring system was studied toward the synthesis of tetra- and hexa-substituted nitro derivatives. Several dinitro derivatives were prepared. A new reduction of nitroamides to nitramino alcohols was discovered.
Author (GRA)

N87-10215# Oak Ridge National Lab., Tenn.
PHOTOSYNTHETIC WATER SPLITTING Annual Report, 1 Mar. 1985 - 28 Feb. 1986
E. Greenbaum May 1986 27 p
(Contract DE-AC05-84OR-21400)
(DE86-010269; ORNL/TM-10018; GRI-86/0087) Avail: NTIS HC A03/MF A01

This document is an annual report prepared for the Gas Research Institute dealing with two key advances which have been made during the current reporting period. First, net thermodynamic efficiencies of the conversion of light energy into a gaseous fuel via photobiological water splitting have been measured. Based on the Gibbs free energy of hydrogen production by intact microalgae, conversion efficiencies of approx.10% have been measured in the linear, low-intensity region of the light saturation curve of photosynthesis. These are, by far, the highest conversion efficiencies reported for photobiological hydrogen production. Success in this measurement was based, in part, on a recognition of the physiological state of the algae with respect to the number of monolayers used for the measurement. Second, a key advance in biotechnology methodology has been made in the area of rapid assay and screening techniques for gaseous fuel synthesis of microalgae. Working with isolated colonies cultured on specially formulated, optically black, solid-growth media, hydrogen production by individual colonies of algae irradiated with an X-Y translatable helium-neon laser has been quantitatively measured. It is believed that this newly developed methodology represents an important instrumentational advance for applying modern techniques of genetics and molecular biology to the problem of gaseous fuel synthesis from renewable inorganic resources via microalgal water splitting.
DOE

N87-10216# Los Alamos National Lab., N. Mex.
RE-EXAMINATION OF THE NEPTUNIUM-HYDROGEN SYSTEM
J. W. Ward, W. Bartscher, and J. Rebizant 1986 15 p Presented at the Properties and Applications of Metal Hydrides, Maubuisson, France, 25 May 1986 Prepared in cooperation with Commission of the European Communities, Karlsruhe, West Germany
(Contract W-7405-eng-36)
(DE86-010197; LA-UR-86-1401; CONF-8605114-1) Avail: NTIS HC A02/MF A01

New P-C-T studies have been made on the Np + H system, using ultrapure double-electrorefined metal. Measurements were carried out over six orders of magnitude in pressure, from 0.0005 to 70 bar. The solubility of hydrogen was found to be very low. Metal-dihydride plateaus were flat, the two-phase boundary extremely sharp; this occurred at the unusual value H/Np approx. = 2.13. The dihydride lattice expanded upon addition of hydrogen, also in contrast to other trivalent rare-earth and actinide hydrides. A rather narrow cubic/hexagonal two-phase region was found (only on dehydriding), together with an even narrower hexagonal phase region. The effect of the beta-gamma transition at 576°C could be seen both in the curvature of the phase boundary and the partial molal enthalpy values. Entropies of formation were found to be nearly constant. The data below 576°C can be described by the equation ln P(bar) = 13.297 - 13233/T(K), giving values, adjusted for the reaction 0.93 Np + H = 0.93 NpH/sub 2.13/: H/sub f/(NpH/sub 2.13/) = 118.3 kJ/mol (28.27 kcal/mol), and S/sub f/(NpH/sub 2.13/) = 118.4 J/mol-K (28.3 cal/mol/-K). Integral heats and entropies are calculated for the entire system, and the unusual phase behavior is discussed in terms of the electronic structure.
DOE

N87-10217# Sandia National Labs., Albuquerque, N. Mex.
PERCUSSION PRIMER/DDT DETONATOR
M. R. Kopczewski and R. R. Weinmaster 1986 16 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010477; SAND-85-2864C; CONF-860739-4) Avail: NTIS HC A02/MF A01

A detonator has been designed and tested using a commercial percussion primer as the input stimulus. The detonator uses a secondary DDT explosive to provide a detonation output. The detonator can be tailored to initiate with a range of mechanical input levels.
DOE

N87-10218# Sandia National Labs., Albuquerque, N. Mex.
TITANIUM OXIDATION KINETICS AND THE MECHANISM FOR THERMAL IGNITION OF TITANIUM-BASED PYROTECHNICS
K. L. Erickson, J. W. Rogers, Jr., and S. J. Ward 1986 19 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010987; SAND-85-2872C; CONF-860739-6) Avail: NTIS HC A02/MF A01

Previously published experimental studies proposed that thermal ignition of titanium-based pyrotechnics is controlled by the rate at which an initial oxide coating dissolves into the bulk metal as a result of molecular diffusion. The proposed dissolution mechanism was based primarily on the exotherms and ignition temperatures, which were about 793°K, observed using differential thermal methods involving heating rates of 0.33 K/s. Data from a more recent investigation of titanium oxidation kinetics at temperatures between 473 and 773°K showed that, for time scales on the order of minutes and temperatures near 773°K, pyrotechnic ignition are determined by diffusion-controlled growth of a TiO (rutile) layer adjacent to the gas-solid interface. They are not controlled by oxygen dissolution into the bulk metal. This result was based primarily on Auger depth profiles from isothermally oxidized titanium single crystals. It is further supported by the present work, in which a model for pyrotechnic response during differential thermal analysis experiments was derived using an oxidation rate expression based on growth of a TiO layer. The model predicts exotherms which are consistent with those reported in the previously published experimental studies.
DOE

N87-10219# Sandia National Labs., Albuquerque, N. Mex.
CP DDT DETONATORS. 5: OUTPUT PERFORMANCE AND ANALYSIS OF MULTIPLE-OUT DEVICES
M. L. Lieberman, R. L. Hughes, and L. E. Hearnes 1986 22 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010995; SAND-85-2814C; CONF-860739-7) Avail: NTIS HC A02/MF A01

The effects on device output of corner turning in pre- and post-detonation conditions have been evaluated via several experimental and analytical procedures for CP-loaded devices. The results imply that multiple-output detonators with designed differences in output and/or relative timing can be achieved. It has also been established that corner turning in the pre-detonation condition can be implemented in detonator designs.
DOE

N87-10220# Lawrence Livermore National Lab., Calif.
CHEMISTRY AND SHOCK INITIATION OF INTERMETALLIC REACTIONS
A. P. Hardt (Lockheed Missiles and Space Co., Palo Alto, Calif.), S. L. McHugh, and S. L. Weinland 27 Mar. 1986 24 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986 Prepared in cooperation with Lockheed Palo Alto Research Labs., CA.
(Contract W-7405-eng-48)
(DE86-009694; UCRL-94351; CONF-860739-3) Avail: NTIS HC A02/MF A01

Shock initiation of pyrotechnic mixtures is a relatively new

discipline. In earlier studies, the estimation of the Hugoniots of porous mixtures had been described and application of experimental results to pyrotechnic mixtures was reported. In this investigation the shocked reaction mixture was recovered in order to determine whether or not reaction took place. The mixture hafnium-platinum was chosen for its low thermal initiation threshold and highly exothermic reaction. Specimens were subjected to shock in a gas gun using aluminum fliers. The product was recovered from a steel catcher and examined by metallography. The initiation threshold in terms of flier velocity was predicted from the Herrmann P- model and the initiation enthalpy. Whereas there was a distinct difference between reacted and unreacted material, it was not possible to observe a narrow initiation threshold. The reaction product was characterized by spherical micropores. DOE

N87-10221# Lawrence Livermore National Lab., Calif.
CHEMISTRY AND SHOCK INITIATION OF INTERMETALLIC REACTIONS
A. P. Hardt (Lockheed Missiles and Space Co., Palo Alto, Calif.), S. L. McHugh, and S. L. Weinland 22 Apr. 1986 22 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo., 7 Jul. 1986 Prepared in cooperation with Lawrence Livermore National Lab., CA.
(Contract W-7405-eng-48)
(DE86-010549; UCRL-94351-Rev-1; CONF-860739-3-Rev-1) Avail: NTIS HC A02/MF A01

Shock initiation of pyrotechnic mixtures is a relatively new discipline. In earlier studies, the estimation of the Hugoniots of porous mixtures had been described and application of experimental results to pyrotechnic mixtures was reported. In this investigation, the shocked reaction mixture was recovered in order to demonstrate that reaction took place. The mixture hafnium-platinum was chosen for its low thermal initiation threshold and highly exothermic reaction. Specimens were subjected to shock in a gas gun using aluminum fliers. The product was recovered from a steel catcher and examined by metallography. The initiation threshold in terms of flier velocity was predicted from the Herrmann P- model and the initiation enthalpy. Although reacted material was clearly identified, the initiation threshold was not bracketed. The reaction product, Pt Hf, was characterized by density and metallography. Although shock was shown to compact the starting mixture, the product, after melting, contained a uniform distribution of micropores. DOE

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

For biological materials see *55 Space Biology*.

No abstracts in this category.

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

No abstracts in this category.

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking*. For search and rescue see *03 Air Transportation and Safety*, and *16 Space Transportation*.

N87-10222 British Broadcasting Corp., Kingswood (England). Engineering Div.
VSB 2-PSK: A MODULATION SYSTEM FOR DIGITAL SOUND WITH TELEVISION
P. Shelswell, A. P. Robinson, R. P. Ritchie, and P. R. Durrant Aug. 1986 22 p
(BBC-RD-1986/7) Avail: BBC, Kingswood Warren, Tadworth, Surrey, Engl.

The VSB2-PSK, a modulation system suitable for the transmission of digital sound and data associated with a television signal is described. This modulation system shows good spectral efficiency and little sensitivity to the type of channel imperfections associated with typical television transmission channels. Author

N87-10223 British Broadcasting Corp., Kingswood (England). Engineering Div.
REVIEW OF VHF BAND 1 FIELD STRENGTH PREDICTION
R. S. Sandell, R. W. Lee, and J. Malcolm-Coe Jun. 1986 25 p
(BBC-RD-1986/4) Avail: BBC, Kingswood Warren, Tadworth, Surrey, England

The results of a review of Very High Frequency (VHF) Band I field strength measurements and prediction methods are described. Most of the measurements were made by the British Broadcasting Company (BBC) and many were used in the early 1960s to prepare CCIR propagation curves. Modern computational methods have permitted a fuller analysis of the data than was possible previously. This led to conculsions about the accuracy of the CCIR prediction method, how it should best be used, and the extent of discrepancies in the existing procedures. In addition, this review examines the BBC's more detailed path loss computerized prediction method. This has the potential to give more accurate results than the CCIR curves, although the program is not yet developed for operations at Band I frequencies. Finally the report makes proposals for future improvements to these prediction techniques, and considers the possibility of developing a harmonized approach. Author

N87-10224# Atomic Weapons Research Establishment, Aldermaston (England).
THEORY OF WIRE-GRID MODELLING: CRITERIA FOR HIGHLY CONDUCTING SURFACES
J. Moore Apr. 1986 36 p
(AWRE-O-20/85; BR99172; ETN-86-97997) Avail: NTIS HC A03/MF A01

The simulation of a plane solid highly conducting surface by a wire grid or mesh is considered for scattering of an electromagnetic plane wave. Mathematical conditions for equivalence are derived. Analysis relevance to the modeling of solid surfaces in any wire grid method-of-moments treatment is emphasized. ESA

N87-10225*# Illinois Univ., Urbana-Champaign. Electromagnetics Lab.
THE STUDY OF MICROSTRIP ANTENNA ARRAYS AND RELATED PROBLEMS Semiannual Report, 20 May 1985 - 25 Sep. 1986
Y. T. Lo 3 Oct. 1986 61 p
(Grant NAG3-418)
(NASA-CR-179714; NAS 1.26:179714) Avail: NTIS HC A04/MF A01 CSCL 20N

In February, an initial computer program to be used in analyzing the four-element array module was completed. This program performs the analysis of modules composed of four rectangular patches which are corporately fed by a microstrip line network

terminated in four identical load impedances. Currently, a rigorous full-wave analysis of various types of microstrip line feed structures and patches is being performed. These tests include the microstrip line feed between layers of different electrical parameters. A method of moments was implemented for the case of a single dielectric layer and microstrip line fed rectangular patches in which the primary source is assumed to be a magnetic current ribbon across the line some distance from the patch. Measured values are compared with those computed by the program. B.G.

N87-10226# Martin Marietta Aerospace, Orlando, Fla. Technical Computational Center.
MODTEQ (MODULATION TECHNIQUES), AN/FRC-170(V), EQUALIZATION, AND CHANNEL MEDIUM SIMULATIONS Interim Report, 1 Dec. 1984 - 1 Dec. 1985
C. R. Gardner, Jerome J. Viviano, Randall Walker, Constance Norris, and Vince Costanza Jan. 1986 186 p
(Grant DCA100-81-G-0001)
(AD-A167965) Avail: NTIS HC A09/MF A01 CSCL 17/2

This report documents the hybrid simulations of LOS Selective Fading Channel Model, AN/FRC-170(V), Modulation Techniques and Hybrid Equalization, designed and maintained by Martin Marietta Aerospace in Orlando, Florida. Areas of special interest to this report are tasks 1 through 4 outlined in statement of work R220-85-011 as part of contract number DCA 100-81 G-0001. Those tasks include maintenance and modification to the existing hybrid simulation of the AN/FRC-170(V) DRAMA radio, modifications, additions, and enhancements to the Advanced Modulation Techniques simulation study, and development of software systems to control and monitor the various simulation models. GRA

N87-10227# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
CRAMER-RAO BOUND ANALYSIS FOR FREQUENCY ESTIMATION OF SINUSOIDS IN NOISE
Joy M. Skon 24 Mar. 1986 24 p
(Contract F19628-85-C-0002)
(AD-A167992; TR-727; ESD-TR-85-323) Avail: NTIS HC A02/MF A01 CSCL 09/3

The Cramer-Rao inequality is used to determine a lower bound on the variance with which a sinusoidal frequency can be estimated in the presence of Gaussian white noise. A parametric study has elucidated the influence of number of samples (N), sampling frequency (1/delta), phase (phi), and signal to noise ratio on the Cramer-Rao bound. A closed form expression for the asymptotic level to which the Cramer-Rao bound decays is characterized and, for low frequencies, the bound is determined analytically and graphically. The form of the Cramer-Rao bound is linked to resolution in the sampling problem. Identification of trade-offs characterizing the sensitivity of the bound and parameters associated with it are discussed. GRA

N87-10228# Los Alamos National Lab., N. Mex.
DIFFUSION APPROXIMATION FOR MODELING OF 3-D RADIATION DISTRIBUTIONS
A. Zardecki, S. A.W. Gerstl, and R. E. DeKinder, Jr. 1985 10 p Presented at the CRDC Conference, Aberdeen, Md., 17 Jun. 1985
(Contract W-7405-eng-36)
(DE86-000810; LA-UR-85-3347; CONF-8506217-2) Avail: NTIS HC A02/MF A01

A three-dimensional transport code DIF3D, based on the diffusion approximation, is used to model the spatial distribution of radiation energy arising from volumetric isotropic sources. Future work will be concerned with the determination of irradiances and modeling of realistic scenarios, relevant to the battlefield conditions. DOE

N87-10229# Oak Ridge National Lab., Tenn.
NEW SOLUTION OF THE PROBLEM OF EMP COUPLING ON CABLES OVER GROUND OF FINITE CONDUCTIVITY
D. C. Agouridis 1986 5 p Presented at the 23rd Annual Conference on Nuclear and Space Radiation Effects, Providence, R.I., 20 Jul. 1986
(Contract DE-AC05-84OR-21400)
(DE86-006078; CONF-860706-2) Avail: NTIS HC A02/MF A01

This new solution replaces Dawson's Integral, in the old solution, by an infinite series. For typical EMP parameters, the solution is approximated by a double exponential function whose numerical constants are derived. Both forms of the new solution are convenient for the calculation of the transient. DOE

N87-10230# Forschungsinstitut der Deutschen Bundespost, Darmstadt (West Germany).
HIGH SPEED DIGITAL SIGNAL TRANSMISSION OVER COAXIAL PAIRS BETWEEN NETWORK TERMINATION AND SEVERAL TERMINALS WITHOUT VARIABLE EQUALIZATION
Manfred Bertelsmeier Sep. 1985 46 p In GERMAN; ENGLISH summary
(FI-44-TBr-101; ETN-86-97825) Avail: NTIS HC A03/MF A01

It is analyzed how digital signals with a bit rate of the order of 140 Mbit/sec can be transmitted over coaxial pair cables at the subscriber's premises between the network termination and several terminals. It is assumed that variable linear filters which can be adapted to the effective line length cannot be used. This is important for a simple passive bus system. It is shown that if a receive eye opening loss of 50% is tolerated it is possible to transit 140 Mbit/sec over CCITT small coaxial pairs of lengths from 0 to 228 m. As it can be important for channel access control, the detection of superimposed pulses from different transmitters which arrive at a receiver simultaneously is also analyzed. It is proposed to lower momentarily the bit rate of the time division multiplex signal and to transmit ternary pulses. ESA

N87-10274*# Ludwig-Maximilians-Universitaet, Munich (West Germany). Meteorological Inst.
THE USEFULNESS OF KLETT'S INVERSION ALGORTHMS TO SIMULATED SATELLITE LIDAR RETURNS
M. Kastner and H. Quenzel *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

N87-10275*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WAVELENGTH DEPENDENCE OF AEROSOL BACKSCATTER COEFFICIENTS OBTAINED BY MULTIPLE WAVELENGTH LIDAR MEASUREMENTS
Yasuhiro Sasano (Old Dominion Univ., Norfolk, Va.) and Edward V. Browell *In its* 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

N87-10276*# Research Inst. of National Defence, Linkoeping (Sweden).
EXTINCTION AND VISIBILITY MEASUREMENTS IN THE LOWER ATMOSPHERE WITH UV-YAG-LIDAR
Arne Hagard *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

N87-10277*# Defence Research Establishment Valcartier (Quebec).
SENSITIVITY OF THE LIDAR RATIO TO CHANGES IN SIZE DISTRIBUTION AND INDEX OF REFRACTION
B. T. N. Evans *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

N87-10287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INFLUENCE OF RAYLEIGH-DOPPLER BROADENING ON THE SELECTION OF H2O DIAL SYSTEM PARAMETERS
Syed Ismail and Edward V. Browell *In its* 13th International Laser

Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10288*# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
CORRECTION OF DOPPLER-BROADENED RAYLEIGH BACKSCATTERING EFFECTS IN H2O DIAL MEASUREMENTS
A. Ansmann and J. Bosenberg *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10294*# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
EFFECT OF BACKSCATTER-TO-EXTINCTION RATIO ON LIDAR INVERSIONS
Edward M. Measure *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 6 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10295*# Optech, Inc., Downsview (Ontario).
LABORATORY MEASUREMENTS OF FORWARD AND BACKWARD SCATTERING OF LASER BEAMS IN WATER DROPLET CLOUDS
R. B. Smith, J. D. Houston, A. Ulitsky, and A. I. Carswell (York Univ., Downsview (Ontario).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10296*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REAL-TIME ATMOSPHERIC ABSORPTION SPECTRA FOR IN-FLIGHT TUNING OF AN AIRBORNE DIAL SYSTEM
M. Dombrowski, H. Walden, G. K. Schwemmer, J. Milrod, and C. L. Korb *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10310*# Fraunhofer-Inst. fuer Atmosphaerische Umweltforschung, Garmisch-Partenkirchen (West Germany).
IMPROVED SOLUTION OF THE LIDAR EQUATION UTILIZING PARTICLE COUNTER MEASUREMENTS
H. Jaeger, M. Littfass, D. J. Hofmann (Wyoming Univ., Laramie.), and J. M. Rosen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10315*# Florence Univ. (Italy). Dept. of Physics.
MULTIPLE SCATTERING MEASUREMENTS IN LABORATORY AND FOGGY ATMOSPHERE
P. Bruscaglioni, E. Battistelli, P. Pili, and C. Zaccanti *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10316*# Los Alamos National Lab., N. Mex.
MULTIPLE SCATTERING OF LASER BEAMS IN DENSE HYDROSOLS
A. Zardecki, S. A. W. Gerstl, Wesley P. Unruh, Grant H. Stokes, David M. Stupin, Norman E. Elliott, and J. A. Weinman (Wisconsin Univ., Madison.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10328*# Israel Atomic Energy Commission, Yavneh. Dept. of Atmospheric Optics.
THE EFFECT OF TURBULENCE ON LIDAR BACKSCATTERED SIGNAL FLUCTUATIONS
S. Fastig and A. Choen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10350*# Utah Univ., Salt Lake City. Dept. of Meteorology.
MULTIPLE SCATTERING DEPOLARIZATION IN MARINE STRATUS CLOUDS: LIDAR EXPERIMENTS
Kenneth Sassen and Richard L. Petrilla *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10351*# Harry Diamond Labs., Adelphi, Md.
NEAR-IR EXTINCTION AND BACKSCATTER COEFFICIENT MEASUREMENTS IN LOW- AND MID-ALTITUDE CLOUDS
Z. G. Sztankay *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 6 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10352*# University Coll., Galway (Ireland). Dept. of Experimental Physics.
BACKSCATTER AND EXTINCTION MEASUREMENTS IN CLOUD AND DRIZZLE AT CO2 LASER WAVELENGTHS
S. G. Jennings *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10370*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LINEWIDTH CHARACTERISTICS OF RAMAN-SHIFTED DYE LASER OUTPUT AT 720 AND 940 nm
B. E. Grossman, U. N. Singh (Maryland Univ. College Park), N. S. Higdon, L. J. Cotnoir, T. D. Wilkerson, and E. V. Browell *In its* 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

N87-10482*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE PROPOSED FLATLAND RADAR
J. L. Green, K. S. Gage, T. E. VanZandt, and G. D. Nastrom *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10483*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CURRENT STATUS OF THE POKER FLAT MST RADAR
B. B. Balsley *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10485*# Illinois Univ., Urbana. Aeronomy Lab.
RECENT PROGRESS IN THE URBANA MST RADAR
S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10489*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE PENN STATE DOPPLER NETWORK PROGRESS REPORT

S. R. Williams and R. Peters *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10490*# Adelaide Univ. (Australia). Dept. of Physics.
THE ADELAIDE MF PARTIAL-REFLECTION RADAR AND VHF ST RADAR Progress Report
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10491*# Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
THE PROUST RADAR
F. Bertin, M. Glass, R. Ney, and M. Petitdidier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10492*# Toulon Univ. (France). Lab. de Sondages Electromagnetiques.
THE PROVENCE ST RADAR
M. Crochet *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10493*# CNRM, Toulouse (France).
THE INSU AND DMN NETWORK OF ST RADARS
M. Petitdidier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), V. Klaus, F. Baudin (Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux, France), M. Crochet (Toulon Univ., France), G. Penazzi (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), and P. Quinty *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10495*# National Central Univ., Chung-Li (Taiwan).
THE FIRST OPERATION AND RESULTS OF THE CHUNG-LI VHF RADAR
J. K. Chao, F. S. Kuo, Y. S. Chu, I. J. Fu, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), and C. H. Liu (Illinois Univ., Urbana) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10496*# Saskatchewan Univ., Saskatoon. Dept. of Physics.
PROGRESS IN THE MF RADAR SYSTEM AT SASKATOON
C. E. Meek and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10497*# Indian Space Research Organization, Bangalore.
SYSTEM ASPECTS OF THE INDIAN MST RADAR FACILITY
G. Viswanathan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10499*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
PHASED-ARRAY DESIGN FOR MST AND ST RADARS
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10500*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE NOAA TOGA ANTENNA ARRAY
W. L. Ecklund, D. A. Carter, and B. B. Balsley *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10501*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
BEAM STEERING SYSTEM
S. A. Bowhill and K. O. Merewether *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10503*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A 405-MHz, 5-BEAM PHASED ARRAY ANTENNA
Daniel C. Law *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10504*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
LOW-ALTITUDE COVERAGE OF ST RADARS
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10505*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE GRID ARRAY ANTENNA
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10507*# Adelaide Univ. (Australia). Dept. of Physics.
MEASUREMENTS OF ANTENNA POLAR DIAGRAMS AND EFFICIENCIES USING A PHASE-SWITCHED INTERFEROME-

TER
R. A. Vincent, B. Candy, and B. H. Briggs *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10508*# Colorado Univ., Boulder. Cooperative Inst. for Research in Environ. Sci.
USE OF THE SUN TO DETERMINE POINTING OF ST RADAR BEAMS
A. C. Riddle *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10509*# Kyoto Univ., Uji (Japan). Radio Atmospheric Science Center.
MONITORING OF THE MU RADAR ANTENNA PATTERN BY SATELLITE OHZORA (EXOS-C)
Toru Sato, Yasuhiro Inooka, Shoichiro Fukao (Kyoto Univ., Japan), and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10510*# Arecibo Ionospheric Observatory, Puerto Rico.
METHOD TO DETERMINE THE OPTIMAL PARAMETERS OF THE ARECIBO 46.8-MHz ANTENNA SYSTEM
H. M. Ierkic, J. Rottger, J. B. Hagen, and R. K. Zimmerman *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10511*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE ELIMINATION OF A CLASS OF PSEUDO ECHOES BY AN IMPROVED T/R SWITCH TECHNIQUE
J. L. Green and W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10512*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Electrical Engineering and Appl. Physics.
AN OVERVIEW OF DATA ACQUISITION, SIGNAL CODING AND DATA ANALYSIS TECHNIQUES FOR MST RADARS
P. K. Rastogi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10513*# Arecibo Ionospheric Observatory, Puerto Rico.
OPTIMUM CODING TECHNIQUES FOR MST RADARS
Michael P. Sulzer and Ronald F. Woodman (Instituto Geofisico del Peru, Lima) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10514*# Illinois Univ., Urbana. Aeronomy Lab.
IMPROVING RANGE RESOLUTION WITH A FREQUENCY-HOPPING TECHNIQUE
G. R. Stitt and S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10518*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A MICROPROGRAMMABLE RADAR CONTROLLER
Daniel C. Law *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10520*# Case Western Reserve Univ., Cleveland, Ohio. Electrical Engineering and Applied Physics.
INTERFERENCE DETECTION AND CORRECTION APPLIED TO INCOHERENT-SCATTER RADAR POWER SPECTRUM MEASUREMENT
W. P. Ying, J. D. Mathews, and P. K. Rastogi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10521*# Illinois Univ., Urbana. Aeronomy Lab.
THE TUKEY ALGORITHM FOR ENHANCING MST RADAR DATA
S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10523*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
DATA COMMUNICATIONS AND MONITOR FOR THE PENN STATE UNIVERSITY PROFILER NETWORK
Robert M. Peters *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10524*# Colorado Univ., Boulder. Cooperative Inst. for Res. in the Environ. Sci.
ARCHIVAL OF POKER FLAT MST RADAR DATA
A. C. Riddle, B. B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.), and K. S. Gage *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10525*# National Center for Atmospheric Research, Boulder, Colo.
MST DATA EXCHANGE THROUGH THE NCAR INCOHERENT-SCATTER RADAR DATA BASE
A. D. Richmond *In* International Council of Scientific Unions, Middle

Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

N87-10570 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
ATTENUATION BANDS AND CUT-OFF FREQUENCIES FOR ELF ELECTROMAGNETIC WAVES
J. L. Rauch, J. C. Cerisier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses France), J. J. Berthelier, F. Lefeuvre, N. Boudko (Academy of Sciences (USSR), Moscow), G. Michailova, and O. Kapustina *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 465-484 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10571 Academy of Sciences (USSR), Moscow.
POLARIZATION OF ELECTROMAGNETIC WAVES RECORDED ON BOARD THE AUREOL-3 SATELLITE
F. Lefeuvre (Centre National de la Recherche Scientifique, Orleans, France), J. L. Rauch, L. V. Volkomiskaya, and B. Lundin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 485-498 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10572 Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.
THE DIRECTION FINDING ABOARD AUREOL-3 OF ELF WAVES AT FREQUENCY ABOVE AND BELOW THE PROTON GYROFREQUENCY
M. Hayakawa, F. Lefeuvre (Centre National de la Recherche Scientifique, Orleans, France), and J. L. Rauch *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 499-507 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10573 Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
DENSITY GRADIENT INSTABILITY IN THE HIGH LATITUDE IONOSPHERE. RELATION WITH THE ELECTROSTATIC TURBULENCE AND CONVECTION
J. C. Cerisier, J. J. Berthelier, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), and D. Roux *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 509-516 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10575 Poitiers Univ. (France). Lab. de Physique de la Haute Atmosphere.
VERY LOW FREQUENCY SAUCERS WITH ATTENUATION BANDS
Y. Corcuff and M. Tixier *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 529-535 Sponsored by Administration du Territoire des Terres Australes et Antarctique Francaises (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10577 Ecole Polytechnique, Palaiseau (France). Centre de Physique Theorique.
SCENARIOS FOR THE GENERATION OF AURORAL KILOMETRIC RADIATION
D. LeQueau, R. Pellat, and A. Roux (Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 547-557 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10578 Maryland Univ., College Park. Inst. for Physical Science and Technology
THE CYCLOTRON MASER THEORY OF AKR AND Z-MODE RADIATION
C. S. Wu *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 559-570 (For primary document see N87-10541 01-46)
(Grant NGL-21-002-005)
Avail: CEPADUES, Toulouse

N87-10579 British Antarctic Survey, Cambridge (England). Space Plasma Physics Section.
NONTHERMAL CONTINUUM-TERRESTRIAL MYRIAMETRIC RADIATION NARROWBAND ELECTROMAGNETIC EMISSION
Dyfrig Jones *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 571-577 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10580 Academy of Sciences (USSR), Troitsk.
MECHANISM OF LOW-FREQUENCY WAVE PROPAGATION IN THE MAGNETOSPHERE
O. A. Molchanov, O. A. Maltseva (Rostov State Univ., Rostov-on-Don, USSR), and E. E. Titova *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 579-598 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10583 Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.
STUDY OF THE MIDDLE LATITUDE BROADENING OF THE SPECTRUM OF THE WAVES EMITTED FROM GROUND
Y. Tanaka, M. Hayakawa, D. Lagoutte (Centre National de la Recherche Scientifique, Orleans, France), and F. Lefeuvre *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 621-626 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10584 Academy of Sciences (USSR), Apatity. Polar Geophysical Inst.
ON THE SPECTRAL BROADENING OF THE GROUND-BASED VLF TRANSMITTER SIGNALS IN THE HIGH-LATITUDE IONOSPHERE OBSERVED FROM INTERCOSMOS-19 AND AUREOL-3 SATELLITES
E. E. Titova, A. M. Perlikov, V. E. Yurov, I. V. Lychkina, O. M. Raspopov, V. Yu. Trakhtengertz, O. A. Molchanov, O. A. Maltseve (Rostov State Univ., Rostov-on-Don, USSR), and Yu. I. Galperin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 627-644 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10586 Stanford Univ., Palo Alto, Calif. STAR Lab.
DE-1/SIPLE VLF WAVE-INJECTION EXPERIMENTS
U. S. Inan *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 655-659 (For primary document see N87-10541 01-46)
(Contract NAS5-25688; Grants DPP80-22282; DPP80-22540)
Avail: CEPADUES, Toulouse

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N87-10231*# National Aeronautics and Space Administration. Pasadena Office, Calif.

CROSS-CONTACT CHAIN Patent Application
Udo Lieneweg, inventor (to NASA) Filed 26 Jun. 1986 16 p
(Contract NAS7-918)
(NASA-Case-NPO-16784-1; US-Patent-Appl-SN-879757) Avail: NTIS HC A02/MF A01 CSCL 09A

A system is provided for use with wafers that include multiple integrated circuits that include two conductive layers in contact at multiple interfaces. Contact chains are formed beside the integrated circuits, each contact chain formed of the same two layers as the circuits, in the form of conductive segments alternating between the upper and lower layers and with the ends of the segments connected in series through interfaces. A current source passes a current through the series-connected segments, by way of a pair of current tabs connected to opposite ends of the series of segments. While the current flows, voltage measurements are taken between each of a plurality of pairs of voltage tabs, the two tabs of each pair connected to opposite ends of an interface that lies along the series-connected segments. A plot of interface conductances on normal probability chart enables prediction of the yield of good integrated circuits from the wafer. NASA

N87-10232*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPTICALLY CONTROLLED GaAs DUAL-GATE MESFET AND PERMEABLE BASE TRANSISTORS
R. N. Simons and K. B. Bhasin 1986 7 p Presented at the Conference on Lasers and Electro-Optics (CLEO), San Francisco, Calif., 9-13 Jun. 1986; sponsored by IEEE and Optical Society of America
(NASA-TM-88823; E-3183-1; NAS 1.15:88823) Avail: NTIS HC A02/MF A01 CSCL 09A

Optically induced voltage and dc characteristics of the GaAs Dual-gate MESFET and the Permeable Base Transistor (PBT) with optical illumination at wavelength below 0.87 microns were obtained and compared with GaAs MESFET. It was observed that PBT can handle higher current density when illuminated. Author

N87-10233 Defence Research Information Centre, Orpington (England).
AN ALGORITHM FOR THE DETECTION OF SIGNALS BY COLOUR CONTRAST ON THE SCREEN OF A COLOUR CATHODE RAY TUBE (COLOUR DISPLAY)
S. I. Pozdnyak, P. A. Pozin, and A. K. Senatorov Jan. 1986 12 p Transl. into ENGLISH from Izvestiya Vuzov SSSR: Radioelektronika (USSR), v. 17, no. 10, 1974 p 37-40
(DRIC-T-7655; BR99447; ETN-86-97992) Avail: NTIS HC A02/MF A01

A rule for decision taking in signal detection by color contrast is formulated on the basis of MacAdam's uniform chromaticity diagram taking into account the threshold sensitivity of the operator's eye. Two and three-color displays are considered. ESA

N87-10234# Atomic Weapons Research Establishment, Aldermaston (England).
EXTENSION OF THE ELECTROMAGNETIC METHOD OF MOMENTS CODE CHAOS TO TREAT CONFIGURATIONS OF DIELECTRIC-COATED WIRES
J. Moore Feb. 1986 19 p
(AWRE-O-18/85; BR98864; ETN-86-97995) Avail: NTIS HC A02/MF A01

The development and use of CHAOS 6, an extension of the method of moments code CHAOS (5), to calculate radiation and scattering by an arbitrary configuration of dielectric-coated wires, assumed thin, and either joined or unjoined are described. Radar cross sections of coated dipoles and the current distribution on a coated monopole calculated by the code are compared with experimental data. It is shown how magnetic-coated wires and wires having mixed coatings can be transformed to purely dielectric-coated wires for treatment by the program. There is excellent agreement between the predictions of the code and experimental data for glass-coated copper dipoles. ESA

N87-10235# Atomic Weapons Research Establishment, Aldermaston (England).
WIRE DIPOLES AND ANTENNAS WITH DIELECTRIC OR MAGNETIC COATINGS
J. Moore and Alison C. Scrimgeour Mar. 1980 25 p
(AWRE-O-19/85; BR99171; ETN-86-97996) Avail: NTIS HC A02/MF A01

A prescription which enables any theoretical formulation for scattering and radiation by an arbitrary bare wire antenna of circular cross section to be extended to antennas having a thin coating of dielectric or magnetic material is derived. The prescription is applied to the Harrison and Heinz (1963) treatment of a bare half-wave dipole to extend that theory to treat dielectric-coated dipoles. There is excellent agreement between the resulting theoretical predictions and measurements for the radar cross section of glass-coated copper dipoles. ESA

N87-10236*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
THE DEVELOPMENT AND TEST OF MULTI-ANODE MICROCHANNEL ARRAY DETECTOR SYSTEMS. PART 2: SOFT X-RAY DETECTORS Progress Report, 1 Feb. - 31 Jul. 1986
J. G. Timothy Jul. 1986 18 p
(Grant NAG5-622)
(NASA-CR-177066; NAS 1.26:177066) Avail: NTIS HC A02/MF A01 CSCL 09A

Multi-Anode Microchannel Array (MAMA) detector systems with formats of 256 x 1024 pixels and active areas of 6 x 26 square mm are now under evaluation at visible, ultraviolet and soft x-ray wavelengths. Very-large-format versions of the MAMA detectors with formats of 2048 x 2048 pixels and active areas of 52 x 52 square mm are under development for use in the NASA Goddard Space Flight Center's Space Telescope Imaging Spectrograph (STIS). Open-structure versions of these detectors with CsI photocathodes can provide a high-resolution imaging capability at extreme ultraviolet (EUV) and soft x-ray wavelengths and can deliver a maximum count rate from each array in excess of 1 million counts s-1. In addition, these detector systems have the unique capability to determine the arrival time of a detected photon to an accuracy of 100 ns or better. The construction, mode-of-operation and performance characteristics of the MAMA detectors are described and the program for the development of the very-large-format detectors is outlined. Author

N87-10237*# Watkins-Johnson Co., Palo Alto, Calif.
DESIGN, CONSTRUCTION AND LONG LIFE ENDURANCE TESTING OF CATHODE ASSEMBLIES FOR USE IN MICROWAVE HIGH-POWER TRANSMITTING TUBES Final Report
R. Batra and D. Marino Sep. 1986 99 p
(Contract NAS3-23346)
(NASA-CR-175116; NAS 1.26:175116) Avail: NTIS HC A05/MF A01 CSCL 09A

The cathode life test program sponsored by NASA Lewis Research Center at Watkins-Johnson Company has been in continuous operation since 1972. Its primary objective has been to evaluate the long life capability of barium dispenser cathodes to produce emission current densities of 2 A sq. cm. or more in an operational environment simulating that of a highpower microwave tube. The life test vehicles were equipped with convergent flow electron guns, drift space tubes with solenoid magnets for electron beam confinement and water-cooled depressed collectors. A variety of cathode types has been tested, including GE Tungstate, Litton Impregnated, Philips Type B and M, Semicon types S and M, and Spectra-Mat Type M. Recent emphasis has been on monitoring the performance of Philips Type M cathodes at 2 A sq. cm. and Sprectra-Mat and Semicon Type M cathodes at 4 A sq. cm. These cathodes have been operated at a constant current of 616 mA and a cathode anode voltage on the order of 10 kV. Cathode temperatures were maintained at

1010 C true as measured from black body holes in the backs of the cathodes. This report presents results of the cathode life test program from July 1982 through April 1986. The results include hours of operation and performance data in the form of normalized emission current density versus temperature curves (Miram plots). NASA

N87-10238# California Univ., Berkeley. Lawrence Berkeley Lab.
RELATIONSHIP BETWEEN CRITICAL CURRENT AND MICROSTRUCTURE OF INTERNAL TIN WIRE
D. R. Dietderich, W. V. Hassenzahl, and J. W. Morris, Jr. Aug. 1985 14 p Presented at the Cryogenic Engineering Conference and International Cryogenic Materials Conference, Boston, Mass., 12 Aug. 1985
(Contract DE-AC03-76SF-00098)
(DE86-009922; LBL-19406; CONF-850814-39) Avail: NTIS HC A02/MF A01

Prior work on internal tin wire has shown that an increase in critical current results when the Nb3Sn reaction temperatures (650 to 730 C) are preceded by low temperature diffusion heat treatments that distribute the tin. These heat treatments produce a more uniform tin distribution through the niobium filament array before substantial Nb3Sn formation has occurred. Heat treatments as long as 19 days have been proposed as the optimal heat treatment for the conductor. However, it is possible to substantially reduce the low temperature heat treatment time while retaining the same high critical current. The success of shortened heat treatments may be interpreted on the basis of the Cu-Sn reaction, diffusion kinetics and the Nb3Sn growth kinetics. DOE

N87-10239# Los Alamos National Lab., N. Mex.
THERMIONIC INTEGRATED CIRCUITS
M. MacRoberts, D. R. Brown, R. Dooley, R. Lemons, D. Lynn, B. McCormick, C. Mombourquette, and D. Sinah 1986 5 p Presented at the 23d Annual Conference on Nuclear and Space Radiation Effects, Providence, R.I., 20 Jul. 1986
(Contract W-7405-eng-36)
(DE86-005849; LA-UR-86-428; CONF-860706-1) Avail: NTIS HC A02/MF A01

Thermionic integrated circuits combine vacuum-tube technology with integrated-circuit techniques to form integrated vacuum circuits. These circuits are capable of extended operation in both high-temperature and high-radiation environments. DOE

N87-10240# Wisconsin Univ., Madison.
ELECTRICAL CIRCUIT MODELING OF CONDUCTORS WITH SKIN EFFECT
D. W. Kerst and J. C. Sprott Mar. 1986 40 p
(Contract DE-FG02-85ER-53198)
(DE86-011085; DOE/ER-53198/90) Avail: NTIS HC A03/MF A01

The electrical impedance of a lossy conductor is a complicated function of time (or frequency) because of the skin effect. By solving the diffusion equation for magnetic fields in conductors of several prototypical shapes, the impedance can be calculated as a function of time for a step function of current. The solution suggests an electrical circuit representation that allows calculation of time-dependent voltages and currents of arbitrary waveforms. A technique using an operational amplifier to determine the current in such a conductor by measuring some external voltage is described. Useful analytical approximations to the results are derived. DOE

N87-10241# Lawrence Livermore National Lab., Calif.
ELECTRONICS ENGINEERING DEPARTMENT TECHNICAL REVIEW
Apr. 1986 41 p
(Contract W-7405-eng-48)
(DE86-011371; UCRL-50025-86-1) Avail: NTIS HC A03/MF A01

The EE Technical Review has two purposes - to inform readers of various activities within the Electronics Engineering Department and to promote the exchange of ideas. The articles, by design, are brief summaries of EE work. For further details on a subject covered, please contact one of the authors. The authors are primarily responsible for the content of their articles. Inasmuch as most projects are the result of the cooperative efforts of many individuals, the person you contact will either provide the requested information directly or refer you to the appropriate person to answer your question. DOE

N87-10242# Office of Technology Assessment, Washington, D.C.
MICROELECTRONICS RESEARCH AND DEVELOPMENT BACKGROUND PAPER
Mar. 1986 47 p
(PB86-205200; OTA-BP-CIT-40) Avail: NTIS HC A03/MF A01 CSCL 09C

Microelectronics has progressed at a tremendous rate over the last few decades and has become a vital part of US commerce and defense. Federal participation in microelectronic research and development is two fold: the government directly funds a significant fraction of the activities and several Federal policies indirectly affect private support of research and development. GRA

N87-10515*# Illinois Univ., Urbana. Aeronomy Lab.
A VARIABLE-FREQUENCY LOCAL OSCILLATOR FOR THE FREQUENCY-HOPPING TECHNIQUE
G. R. Stitt and L. J. Johnson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09C

N87-10517*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A SINGLE-BOARD PREPROCESSOR AND PULSE GENERATOR
D. A. Carter, A. E. Ayers, and R. P. Schneider *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09A

N87-10519*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
AN EXAMPLE OF SCALING MST DOPPLER SPECTRA USING MEDIAN SPECTRA, SPECTRAL SMOOTHING, AND VELOCITY TRACING
J. L. Green *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N87-10243 Michigan Univ., Ann Arbor.
NUMERICAL STUDIES OF A TUBULENT JET IN CROSSFLOW Ph.D. Thesis
Pei Yuan Tzeng 1985 110 p
Avail: Univ. Microfilms Order No. DA8600562

The application of an improved finite-difference solution procedure to the analysis of the flow field due to a turbulent jet in crossflow is presented. The governing time-averaged differential

equations are solved by means of an efficient SIMPLEC algorithm. Two difference schemes, namely, power law and second order upwind, for approximating the convection terms are used and compared. Reynolds stresses are calculated by solving the modelled transport equations for the turbulent kinetic energy and its viscous rate of dissipation. Attention is focused on the cases of high and moderate jet-to-crossflow velocity ratio R. This range of conditions is of direct relevance to the studies of VSTOL in transition flight and the dilution zone mixing in gas turbine combustors. Two-dimensional computations of the plane jet case are performed for the flow geometry corresponding to the experiment of Stek and Brandt (1976). The reattachment length and streamline patterns obtained from the calculations agree very well with the experimental data. Three-dimensional computations of the round jet case are made for the flow geometry associated with the recent measurement of Andropoulos and Rodi (1984). The calculated results are presented with the aid of computer graphics. Flow patterns emerging from various profile, contour, and vector plots indicate that the general features of this complex flow situation are well predicted by the present numerical method. The possible causes of quantitiave discrepancies between computed and measured data are discussed. It appears that further refinements of the turbulence model and grid system are most desirable. Dissert. Abstr.

N87-10244 Pennsylvania State Univ., University Park.
AN EXPERIMENTAL INVESTIGATION OF END-WALL FLOWFIELD OF A COMPRESSOR ROTOR Ph.D. Thesis
K. N. SachidanandaMurthy 1985 266 p
Avail: Univ. Microfilms Order No. DA8606379

An investigation of the end-wall flowfield in a single-stage compressor rotor is presented. The main emphasis of the investigation was to measure the flowfield in detail in a low-speed compressor rotor. A single-channel laser Doppler velocimeter (LDV) was used to measure the flowfield in the tip clearance region. The investigation was carried out for two tip clearances (clearance/chord = 1.78 and 3.4 percent). In addition, the relative stagnation pressure field, corresponding to a tip clearance of 1.78 percent, was also measured using a Kiel probe to supplement the LDV measurement. The measurements showed that the leakage flow originated at about one-quarter-chord location. Past quarter-chord location, the inteaction between the leakage flow and the annulus-wall boundary layer resulted in unconventional and skewed boundary layer profiles. Inside the rotor passage, the leakage flow effects were augmented by the leakage flow emanating from the entire blade chord length. Downstream of the rotor, the interaction between the leakage flow and the rotor wake resulted in rapid wake decay at higher radii. The leakage flow which was intense at larger clearance might have rapidly smoothed the irregularities downstream of the rotor. Dissert. Abstr.

N87-10245 Georgia Inst. of Tech., Atlanta.
ORDERED AND RANDOM STRUCTURES IN PULSATILE FLOW THROUGH CONSTRICTED TUBES Ph.D. Thesis
Baruch Barry Lieber 1985 185 p
Avail: Univ. Microfilms Order No. DA8605427

The poststenotic flow field in a rigid tube was investigated under pulsatile conditions. The waveform employed in the present experiment was sinusoidal and three contoured constrictions with 50, 75, and 90% area reduction were investigated. The fluid dynamic similarity parameters were chosen to represent conditions found in large arteries of humans and of experimental animals, using a Reynolds number range of 200 to 1000 and a frequency parameter value of 5.3. The analysis techniques of autoregressive modeling, correlation methods, and phase-shift averaging were employed in order to extract the maximum information about flow behavior. Analysis focuses on identification and representation of coherent flow disturbances, and examination of the influence of core flow behavior on the cyclic wall shear stress. Dissert. Abstr.

N87-10246 Virginia Polytechnic Inst. and State Univ., Blacksburg.
TRANSIENT BEHAVIOR OF LIQUID JETS INJECTED NORMAL TO A HIGH VELOCITY GAS STREAM Ph.D. Thesis
David Matthew Less 1985 222 p
Avail: Univ. Microfilms Order No. DA8605348

The transient effects of the breakup and atomization of liquid jets in a crossflow on the size of droplets within the spray plume was experimentally determined. Water and water/methanol mixtures were injected normal to a high velocity air stream at Mach numbers of 0.48 and 3.0 with ambient stagnation temperature and respective stagnation pressures of 1.4 and 4.3 atm. The liquids were injected at liquid-to-gas momentum flux ratios ranging from 4 to 12. Droplet size distributions were obtained using a Fraunhofer diffraction technique at sampling rates of up to 9 kHz. Liquid mass flow rates were inferred from measurements of the extinction of a laser beam traversing the plume. The droplet sizes were found to fluctuate with frequencies of the order of 1 to 10 kHz. The fluctuations were characterized by a sudden and relatively brief increase in the mean diameter of the droplets caused by the passage of fractured clumps through the spray plume. Also evident in the droplet size distributions was the very small size of the droplets that had been sheared off the windward surfaces of the jet. The jet fracture frequency was related to the frequency of waves propagating along the initial jet column. The column waves are postulated to have been caused by jet perturbations created by vortices in the air flow around the jet column. Dissert. Abstr.

N87-10247 Cincinnati Univ., Ohio.
GLOBAL PRESSURE RELAXATION PROCEDURE WITH APPLICATION TO VISCOUS AND INVISCID FLOWS Ph.D. Thesis
Hien The Lai 1985 201 p
Avail: Univ. Microfilms Order No. DA8605502

Compressible, mostly transonic, flows involving strong viscous inviscid interactions at high Reynolds numbers were studied. The governing equations employed are known as the Reduced Navier-Stokes (RNS) equations. The RNS equations are formulated to include the inviscid normal momentum equation, and an unknown streamwise pressure gradient term. This single RNS system is valid in both the viscous layer and the inviscid flow field. The numerical method follows the global pressure relaxation procedure. Extension to transonic flows with the global procedure is presented. Applications to the RNS as well as Euler equations are considered. All Shock waves are captured. Computed results are presented for a number of complex flow field structures in the transonic regime. These flows include shock-wave/boundary-layer interaction flow fields, large recirculation regions (base flows) and mixing shear layers (jet flows). Laminar and turbulent flows are considered for axisymmetric bodies. Simple algebraic models are employed in the turbulence computations. Inviscid solutions in subsonic, transonic, and supersonic regimes are investigated in two dimensional and axisymmetric cases. Inviscid and turbulent results are compared with data obtained from other numerical methods or experiments. Global convergence behavior is also assessed. Dissert. Abs

N87-10248*# Continuum, Inc., Huntsville, Ala.
COMPUTATIONAL FLUID MECHANICS UTILIZING THE VARIATIONAL PRINCIPLE OF MODELING DAMPING SEALS Final Report
J. Michael Abernathy 1 May 1986 35 p
(Contract NAS8-35508)
(NASA-CR-178902; NAS 1.26:178902; CI-FR-0088) Avail: NTIS HC A03/MF A01 CSCL 20D

A computational fluid dynamics code for application to traditional incompressible flow problems has been developed. The method is actually a slight compressibility approach which takes advantage of the bulk modulus and finite sound speed of all real fluids. The finite element numerical analog uses a dynamic differencing scheme based, in part, on a variational principle for computational fluid dynamics. The code was developed in order to study the feasibility of damping seals for high speed turbomachinery. Preliminary seal analyses have been performed. Auth

N87-10249*# University of Southern California, Los Angeles.
NEAR FIELD PRESSURE FLUCTUATIONS IN A CIRCULAR J

Final Report, 4 Nov. 1983 - 3 Nov. 1985
Chih-Ming Ho 1985 16 p
(Grant NAG1-420)
(NASA-CR-179847; NAS 1.26:179847) Avail: NTIS HC A02/MF A01 CSCL 20D

The vortical structures in shear layers govern many dynamic aspects of the jet, including entrainment of mass, transfer of momentum and noise generation. These structures develop from instability waves and undergo a merging process. Vortex merging reduces the time scale and increases the length scale of the shear layer. At the same time pressure fluctuations are induced by the unsteady motion. These pressure perturbations can exert high level dynamic loading on nearby structures, and radiate to the far field as noise. In this study, the generation mechanism of the pressure fluctuations and the radiation process are examined. Author

N87-10250# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF THE PERFORMANCE OF A VERTICALLY ORIENTED, GAS LOADED, VARIABLE CONDUCTANCE HEAT PIPE M.S. Thesis
Grey A. Glover, Sr. Mar. 1986 54 p
(AD-A167874) Avail: NTIS HC A04/MF A01 CSCL 20/13

An analysis of steady state operation of a vertically oriented, variable conductance heat pipe is presented. The effects of binary mass diffusion, axial pipe wall conduction, and gravitational effects, caused by the difference in molecular weight of the non-condensible gas and the working fluid are incorporated. Analytical expressions for the conservation of mass, momentum, and energy are combined along with equations of state to describe steady state operation of the heat pipe. These expressions are combined to form a system of three differential equations with three unknowns; working fluid vapor velocity, mass fraction, and temperature. These equations are nondimensionalized and an iteration scheme for numerical solution of the equations is presented. GRA

N87-10251# Michigan Technological Univ., Houghton. Dept. of Chemistry and Chemical Engineering.
FREE SURFACE TURBULENCE Annual Report, 1 Mar. 1985 - 28 Feb. 1986
D. W. Hubbard and G. Trevino 28 Feb. 1986 49 p
(Contract N00014-85-K-0236)
(AD-A168013) Avail: NTIS HC A03/MF A01 CSCL 20/4

When turbulent jets or wakes interact with a free surface, the turbulent eddies are apparently damped in the vertical direction and extended in the horizontal direction. Turbulent velocities are being measured for this zone of interaction to enable verifying turbulence modelling techniques. A two-dimensional jet is formed by pumping water through a rectangular slit into a channel filled with still water. Hot-film anemometry techniques measure velocity fluctuations in the jet and in the immediate neighborhood outside the jet. Some effects of jet flow rate and jet submergence have been studied. The raw data are sampled time records of the anemometer output voltages obtained at different positions in the jet. These time records together with the sensor calibration information are analyzed using digital signal processing techniques. The mean velocities, turbulence intensities, and velocity correlation functions are being calculated, and the results used to develop a two-point closure scheme and a mathematical model for jet flow turbulence. GRA

N87-10252# Argonne National Lab., Ill.
ANALYSIS OF HEAT-PIPE ABSORBERS IN EVACUATED-TUBE SOLAR COLLECTORS
J. R. Hull, W. W. Schertz, and J. W. Allen Feb. 1986 46 p
(Contract W-31-109-eng-38)
(DE86-010764; ANL-86-16) Avail: NTIS HC A03/MF A01

Heat transfer in evacuated-tube solar collectors with heat-pipe absorbers is compared with that for similar collectors with flow-through absorbers. In systems that produce hot water or other heated fluids, the heat-pipe absorber suffers a heat transfer penalty compared with the flow-through absorber, but in many cases the penalty can be minimized by proper design at the heat-pipe condenser and system manifold. The heat transfer penalty decreases with decreasing collector heat loss coefficient, suggesting that evacuated tubes with optical concentration are more appropriate for use with heat pipes than evacuated or nonevacuated flat-plate collectors. When the solar collector is used to drive an absorption chiller, the heat-pipe absorber has better heat transfer characteristics than the flow-through absorbers. DOE

N87-10253# Sandia National Labs., Albuquerque, N. Mex.
NONREACTING TURBULENT MIXING FLOWS: A LITERATURE SURVEY AND DATA BASE
R. W. Schefer, S. C. Johnston, R. W. Dibble, F. C. Gouldin, and W. Kollmann Apr. 1986 222 p Prepared in cooperation with Cornell Univ., Ithaca, N.Y. and California Univ., Davis
(Contract DE-AC04-76DR-00789)
(DE86-010864; SAND-86-8217) Avail: NTIS HC A10/MF A01

The objective of this report is to provide a comprehensive review of available data on turbulent nonreacting flows. This review is limited to parabolic, stationary shear flows with well defined boundary conditions; these flows have many of the characteristics found in combustion devices and are typical of laboratory flames for which model evaluation data are most likely to be available. This report is an outgrowth of a more extensive study conducted under the direction of the Air Force Office of Scientific Research. A bound volume containing the results of that study will be available in the near future. Our purpose in compiling the data presented here is to provide a more comprehensive tabulation of nonreacting flow measurements than was possible to include in the Air Force report. DOE

N87-10254# Oak Ridge Y-12 Plant, Tenn.
PERMEATION MEMBRANE-TYPE DISTILLER
K. Fujita 1986 8 p Transl. into ENGLISH of Japanese Patent Application No. 60-187305, 24 Sep. 1985
(Contract DE-AC05-84OS-21400)
(DE86-011153; Y/TR-86/3) Avail: NTIS HC A02/MF A01

The permeation membrane-type distiller is characterized by and is comprised of a condensed liquid channel positioned parallel to and between a permeation membrane that borders a high-temperature raw liquid channel and a condensed heat transfer plate that borders a cooling liquid channel, wherein said condensed heat transfer plate has a wavelike cross section whose ridges come close to said permeation membrane and, at the same time, a screen is positioned between said condensed heat transfer plate and said permeation membrane in such a way that it comes in contact with said membrane. DOE

N87-10255# Oak Ridge Gaseous Diffusion Plant, Tenn.
THERMOPERVAPORATION DEVICE
Takashi Kimura, Takeshi Nomura (Tokyo Univ. (Japan).), Shunichi Shimatani, and Atsunari Yoshimura 1986 9 p Transl. into ENGLISH of Japanese Patent Application No. 60-118205 (25 Jun. 1985) Prepared in cooperation with Nitto Electric Industrial Co. Ltd., Ibaraki, Osaka (Japan).
(Contract DE-AC05-84OS-21400)
(DE86-011151; Y/TR-86/4) Avail: NTIS HC A02/MF A01

A thermopervaporation device consists of (1) a shell and (2) one or more tubular membranes, which are made of polymer-porous membranes, which allow liquid vapor to permeate, but does not allow the liquid itself to permeate, and which are contained in the above-mentioned shell and form a liquid channel between themselves and the shell. The characteristic feature of the thermopervaporation apparatus is that it allows high-temperature liquid to flow through the above tubular membrane of the liquid channel, while low-temperature liquid passes through the other, then the vapor which is produced from the high-temperature liquid and permeates the tubular membrane will be cooled and condensed by the low-temperature liquid and then will be collected in the low-temperature liquid. DOE

N87-10256# Technion - Israel Inst. of Tech., Haifa.
ABSORPTION HEAT PUMP SIMULATION AND STUDIES: A MODULAR COMPUTER SIMULATION OF ABSORPTION SYS-

TEMS Final Report
G. Grossman and E. Michelson Apr. 1986 83 p
(Contract DE-AC05-84OR-21400)
(DE86-011206; ORNL/Sub-83-43337/2) Avail: NTIS
HC A05/MF A01

A computer simulation program for absorption systems has been developed in a flexible and modular form, which makes it possible to simulate various configurations with different working fluids. The user supplies input containing information about given flow rates and temperatures, as well as characteristics of the various subunits of the system. In addition, the user must convey to the computer an image of the cycle in question. The program calculates the temperature, composition, flow rate, and pressure at each state point of the system and the heat quantities at each unit, from which the coefficient of performance may be determined. The program has been tested on single- and double-stage absorption heat pumps and heat transformers with lithium bromide-water and water-ammonia as the working fluids. Results have been compared with experimental data from tests of a lithium bromide-water heat transformer, giving good agreement. DOE

N87-10257# Costello (Frederick A.), Inc., Herndon, Va.
DETAILED TRANSIENT MODEL OF A LIQUID-METAL HEAT PIPE
Frederick A. Costello, A. F. Montague, and M. A. Merrigan 1986 6 p Presented at the 4th AIAA/ASME Thermophysics and Heat Transfer Conference, Boston, Mass., 2 Jun. 1986 Prepared in cooperation with Los Alamos National Lab., NM.; General Electric Co., Philadelphia, PA.
(Contract W-7405-eng-36)
(DE86-011212; LA-UR-86-1707; CONF-860612-7) Avail: NTIS
HC A02/MF A01

A detailed transient model of a liquid-metal heat pipe is being developed. The model includes start from the frozen state, with provision for free-molecule flow, and proceeds through the steady-state operating conditions. The KACHINA method was selected for simulating the compressible flow in the core. The SIMPLER method was selected for simulating the liquid flow in the wicks and grooves. The computational methods have been demonstrated on a Compaq Deskpro II. The FORTRAN cove is currently being converted to the IBM 3033 and Cray I. Based on the ratio of Cray to Compaq speeds, the Cray computation times are estimated to be 30 minutes per hour simulated. DOE

N87-10258# Little (Arthur D.), Inc., Cambridge, Mass.
SUMMARY AND EVALUATION OF FIELD PERFORMANCE DATA ON UNITARY HEAT PUMPS
J. C. Burke, K. F. Fitzgerald, and L. Frantzis Apr. 1986 126 p
(Contract DE-AC05-84OR-21400)
(DE86-011289; ORNL/Sub-85-00219/1) Avail: NTIS
HC A07/MF A01

Thirty-eight programs involving over 700 heat pump units were categorized in three levels: Level I programs measured energy input normally using utility load research methods, to obtain semi-quantitative performance information and hands on operating experience. In Level II programs (almost 150 units) both energy input and output were obtained allowing estimation of HSPF. Level III programs involved measurement of input, output and at least some isolation of dynamic losses due to part load cycling and frost/defrost. Energy input data is abundant and frequently reliable but the results are seldom either statically valid or easily generalized. A considerable amount of HSPF (and much less SEER) data is also available. Certain comparisons of these experimental performance factors with ARI 240-81 predictions have indicated good apparent agreement. Dynamic losses can degrade seasonal performance by over 20% in some instances. Unresolved experimental problems include optimization of flip-flop techniques, practical field measurement of cooling load and means of detecting performance degradation Also very few programs presented error analyses. DOE

N87-10259# Kentucky Univ., Lexington. Dept. of Mechanical Engineering.
TRANSIENT HEAT TRANSFER ANALYSIS AND RADIATIVE PROPERTIES MEASUREMENTS OF POROUS THERMAL INSULATION
T. W. Tong May 1986 83 p
(Contract DE-AC05-84OR-21400)
(DE86-011296; ORNL/Sub-84-43366/2) Avail: NTIS
HC A05/MF A01

A combined radiative and conductive heat transfer model that uses the two-flux equations for radiation exchange has been applied to analyze the transient heat transfer data obtained with the flat-screen tester at ORNL. The data included those for the National Bureau of Standards (NBS) transfer standard and the NBS 1450b fiberglass board. Predictions that deviated by no more than 0.2°C of the measured screen temperature rise were obtained. Results indicate that the model can be used in conjunction with the transient data to determine the thermophysical properties of porous insulations. Transient heat transfer through porous insulations with one diurnal temperature boundary condition has been investigated using the same combined heat transfer model. By comparing the accumulated heat flow at the boundaries to those predicted using a purely conductive model, differences as large as 40% were found for some conditions. Results for a thermal resistance defined in terms of time-integrated quantities were also obtained and compared with that defined for steady-state conditions. Radiative properties for the NBS transfer standard, NBS 1450b, Cab-O-Sil S-17 and the Degussa R-974 have been measured. Properties reported included the extinction coefficient, single scattering albedo and the back-scattered fraction for the former two materials and the extinction coefficient for the latter two materials. DOE

N87-10260# Laboratorio de Computacao Cientifica, Rio de Janeiro (Brazil).
MODELLING OF THE FILLING UP OF A POROUS PLATE
R. Sampaio and R. M. S. da Gama 1985 7 p In POLISH
(DE86-702033; LCC-021/85) Avail: NTIS (US Sales Only)
HC A02/MF A01

A generalization of Darcy's law is constructed using mixture theory to describe the transient flow of an incompressible fluid through a rigid solid porous matrix. The model is used to study the process of filling-up of an one dimensionall unsaturated porous medium that is mathematically described by a system of nonlinear hyperbolic equations which is nonhomogeneous due to the drag force between the fluid and the solid matrix. The system is analysed throughly and solved numerically using the Glimm-Chorin method with a splitting to treat the non-homogeneous term. The results are discussed and shown to describe well the filling-up process. DOE

N87-10261# Laboratorio de Computacao Cientifica, Rio de Janeiro (Brazil).
CONSTITUTIVE RELATIONS FOR FLOW OF A NON-NEWTONIAN FLUID THROUGH SATURATED POROUS MEDIA
R. M. S. daGama and R. Sampaio 1985 16 p In POLISH
(DE86-702035; LCC-023/85) Avail: NTIS (US Sales Only)
HC A02/MF A01

The behavior of two types of non-newtonian incompressible fluids, flowing through a porous medium which is assumed to be composed by several plane plates separated by a constant distance, is analysed. With the obtained results, constitutive relations are proposed for calculating the solid-fluid interaction force, that appears in the equations of the Continuum Theory of Mixtures, when the fluid and the solid (porous medium) are assumed continuous constituents of a binary mixture. DOE

N87-10262 Iowa State Univ. of Science and Technology, Ames.
APPLICATION OF A POTENTIAL CODE TO GENERAL STEADY FLOWS IN THREE DIMENSIONS Ph.D. Thesis
Akil Abbas Rangwalla 1986 88 p
Avail: Univ. Microfilms Order No. DA8615078

A low order panel method is described for the calculation of incompressible unsteady inviscid flow over general configurations The numerical method is based upon piecewise constant double and source distributions. The wake and the geometry of the bod

are made to evolve with time. The unperturbed flow is chosen as the internal Dirichlet boundary condition and the source distribution is determined by the external Neumann boundary condition. The application of the Kutta condition for this formulation is straightforward. Two cases are examined. One is the impulsive start of a finite rectangular wing and the other is the interference between a propeller and a wing. The development of the circulation near the root for the first case is compared with the theoretical solution of an impulsively started two dimensional flat plate. The numerical results are very well behaved. The results for the interference between a propeller and a wing did conform with physical expectations. Also, this case is sufficiently general and has many aerodynamic features that either have not been solved or were solved for special cases. Dissert. Abstr.

N87-10016# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
STUDY OF THREE-DIMENSIONAL SEPARATION ON A SPHEROID AT INCIDENCE
Yoshio Ishu and Yuko Oshima (Ochanomizu Women's Univ., Tokyo (Japan).) *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10018# Yamagata Univ. (Japan). Faculty of Engineering.
ON ACCURATE NUMERICAL SOLUTIONS OF FALKNER-SKAN EQUATION
Masakazu Katagiri *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 6 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10019# IBM Japan. Science Inst.
NUMERICAL STUDY OF THE ENTRANCE FLOW AND ITS TRANSITION OF A CIRCULAR PIPE
H. Kanda and K. Oshima *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 17 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10020# Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
NUMERICAL SIMULATION OF TWO-DIMENSIONAL FREEJET FLOW-FIELDS
Koji Teshima and Hiroyuki Nakatsuji *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p Sponsored in part by the Data Processing Center (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10023# Miyazaki Univ. (Japan). Dept. of Applied Physics.
ANALYSIS ON GRAVITATIONAL EFFECT TO NONLINEAR DIFFUSION SYSTEM OF VAPOR MOLECULES IN A HEAT PIPE
Kanji Etori *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 12 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10024# Nippon Inst. of Tech. (Japan).
EFFECT OF SURPLUS STANDING LIQUID ON HEAT TRANSFER RESISTANCE IN THE HEAT PIPE (WITH MESH WICK IN A HORIZONTAL MODE)
Makoto Kamata and Yoshio Ikeda *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10025# Osaka Univ. (Japan). Dept. of Aeronautical Engineering.
DYNAMIC HEAT TRANSFER MECHANISM OF TWO-PHASE CLOSED THERMOSYPHON
Kanji Negishi, Ken-ichi Kaneko, and Fusao Kusumoto *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10026# National Research Inst. for Pollution and Resources, Tokyo (Japan).
A TRIAL ON PERFORMANCE TEST METHOD FOR Cu-WATER HEAT PIPE
Yoshio Tanaka and Tadashi Yamamoto *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 8 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10027# Toshiba Corp., Tokyo (Japan).
HIGH CAPACITY HEAT PIPE WITH AXIAL GROOVES
Yoshiro Miyazaki and Yuji Ido *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 5 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10028# Tokyo Electric Power Co., Inc. (Japan).
OPERATING CHARACTERISTICS OF COOLING UNDERGROUND POWER CABLES USING UP SLOPED LONG HEAT PIPES IN CONDUIT
Keisuke Oka, Hachiro Tsuchihashi, Yoichi Nishimura, Tsuneaki Mohtai (Fujikura Ltd., Sakura (Japan).), Masataka Mochizuki, Koichi Mashiko, and Hiroshi Yamanouchi *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10029# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
REPORT OF THE INTERNATIONAL SYMPOSIUM ON COMPUTATIONAL FLUID DYNAMICS, TOKYO
Koichi Oshima *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 8 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10031# Akademiya Nauk SSSR, Novosibirsk. Inst. of Theoretifcal and Applied Mechanics.
NUMERICAL MODELING OF SPATIAL FLOWS ON THE BASIS OF SPLITTING UP METHOD
V. M. Kovenya, G. A. Tarnavsky, and S. G. Cherny *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10032# Academy of Sciences (USSR), Moscow. Computing Center.
THE THIRD ORDER COMPACT SCHEMES FOR FLUID DYNAMIC PROBLEMS
A. I. Tolstykh *In* Tokyo Univ. Proceedings of the Symposium on Mechnics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10034# Technical Univ. of Opole (Poland).
AN IMPROVED PSI-CELL METHOD FOR TURBULENT MULTIPHASE FLOWS
B. Dobrowolski and Z. Kabza *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight 1985 6 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10035# Bulgarian Academy of Science, Sofia. Inst. of Mechanics and Biomechanics.
HYDRODYNAMIC AND THERMAL INTERACTION BETWEEN TWO SPHERES IN A STEADY VISCOUS FLOW
Z. D. Zapryanov and E. T. Toshev *In* Tokyo Univ. Proceedings of tha Symposium on Mechanics for Space Flight, 1985 1985 7 p

(For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10037# Academy of Sciences (USSR), Moscow. Computing Center.
THE NUMERICAL METHOD OF CALCULATION OF TWO-DIMENSIONAL STATIONARY ELECTRO-GASDYNAMIC INTERNAL FLOWS
V. V. Zhurin and A. V. Shipilin *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 7 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N87-10263*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THIRTEENTH INTERNATIONAL LASER RADAR CONFERENCE
Aug. 1986 335 p Conference held in Toronto, Ontario, 11-15 Aug. 1986; sponsored by NASA, Washington, D.C., Atmospheric Environment Service, and York Univ.
(NASA-CP-2431; L-16201; NAS 1.55:2431) Avail: NTIS HC A15/MF A01 CSCL 20E

One hundred fifteen papers were presented in both oral and poster sessions. The topics of the conference sessions were: spaceborne lidar applications; extinction/visibility; differential absorption lidar; winds and tropospheric studies; middle atmosphere; clouds and multiple scattering; pollution studies; and new systems. For individual titles, see N87-10264 through N87-10375.

N87-10264*# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ESA ACTIVITIES IN SPACE LASER SOUNDING AND RANGING c36
H. Lutz *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

Laser remote sensing from space is undoubtedly one of the most promising means to obtain essential atmospheric and geophysical parameters on a global scale. Efforts including feasibility assessments, technology developments, and mission definition studies are in progress at the European Space Agency (ESA) to prepare for the prospective use of laser remote sensing systems in space. An overview of the programs under way is presented and the perspectives of laser remote sensing in the context of ESA's Long-Term European Space Plan are discussed. Author

N87-10265*# National Aeronautics and Space Administration, Washington, D.C.
LIDAR REMOTE SENSING FROM SPACE: NASA'S PLANS IN THE EARTH SCIENCES c43
Robert J. Curran *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A multidisciplinary study of the Earth System to provide a better understanding of the complex interrelated processes involved in the system, the Earth Observing System (EOS), is being developed. Capabilities of the Space Station, both the polar orbiting platform and the lower inclination platforms, will be used to accommodate a number of large active and/or passive sensors. Two lidar instruments being considered as part of the Eos payload are the Lidar Atmospheric Sounder and Altimeter (LASA) and the Laser Atmospheric Wind Sounder (LAWS). The LASA instrument is separable into two portions: the atmospheric sounder component and the retroranging component. The LASA atmospheric sounder will sample the spatial distribution of several atmospheric parameters. The retroranging component will be used to determine the precise three-dimensional position of specifically placed retro-reflectors and to sense how these retro-reflectors change position over monthly to yearly time periods. The LAWS utilizes a lidar system capable of measuring the Doppler shift in the backscattered intensity to determine the wind velocity profile. B.G.

N87-10266*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TUNABLE SOLID-STATE LASER TECHNOLOGY FOR APPLICATIONS TO SCIENTIFIC AND TECHNOLOGICAL EXPERIMENTS FROM SPACE c36
F. Allario and L. V. Taylor *In its* 13th International Laser Radar Conferance Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

Current plans for the Earth Observing System (EOS) include development of a lidar facility to conduct scientific experiments from a polar orbiting platforms. A recommended set of experiments were scoped, which includes techniques of atmospheric backscatter (Lidar), Differential Absorption Lidar (DIAL), altimetry, and retroranging. Preliminary assessments of the resources (power, weight, volume) required by the Eos Lidar Facility were conducted. A research program in tunable solid state laser technology was developed, which includes laser materials development, modeling and experiments on the physics of solid state laser materials, and development of solid state laser transmitters with a strong focus on Eos scientific investigations. Some of the system studies that were conducted which highlight the payoff of solid state laser technology for the Eos scientific investigations will be discussed. Additionally, a summary of some promising research results which have recently emerged from the research program will be presented. B.G.

N87-10267*# Coherent Technologies, Inc., Boulder, Colo.
COHERENT LIDAR TECHNOLOGY FOR GLOBAL WIND PROFILING c47
R. Milton Huffaker *In* NASA. Langley Research center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

Current lidar systems are proven sensors for atmospheric wind measurement. Ground-based and airborne continuous wave and pulsed CO2 systems were developed and applied to several wind measuring applications. Analytical and hardware feasibility studies indicte the feasibility of measuring the global wind field from a space splatform. A Global Backscater Experiment is planned by NASA to develop a global model of aerosol backscatter using a CO2 laser. Ground-based aerosol backscatter profiles will also be obtained using a ruby and a pulsed CO2 lidar. B.G.

N87-10268*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A HIGH-ALTITUDE AIRBORNE DIAL SYSTEM: THE LIDAR ATMOSPHERIC SENSING EXPERIMENT (LASE) c48
E. V. Browell, W. R. Vaughan, W. M. Hall, J. J. Degnan, R. D. Averill, J. G. Wells, D. E. Hinton, and J. H. Goad *In its* 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The ability of a Differential Absorption Lidar (DIAL) system to measure vertical profiles of H2O in the lower atmosphere was demonstrated both in ground-based and airborne experiments. In these experiments, tunable lasers were used that required real-time experimenter control to locate and lock onto the atmospheric H2O

absorption line for the DIAL measurements. The Lidar Atmospheric Sensing Experiment (LASE) is the first step in a long-range effort to develop and demonstrate an autonomous DIAL system for airborne and spaceborne flight experiments. The LASE instrument is being developed to measure H2O, aerosol, and cloud profiles from a high-altitude ER-2 (extended range U-2) aircraft. The science of the LASE program, the LASE system design, and the expected measurement capability of the system are discussed. Author

N87-10269*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. for Atmospheric Physics.

MIE LIDAR PROPOSED FOR THE GERMAN SPACE SHUTTLE MISSION D2 c36

W. Renger, M. Endemann (Battelle Inst., Frankfurt am Main (West Germany).), H. Quenzel (Ludwig-Maximilians-Universitaet, Munich (West Germany).), and Ch. Werner *In* NASA. Langley Research center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20E

Firm plans for a second German Spacelab mission (D2-mission), originally scheduled for late 1988 is basically a zero-g mission, but will also include earth observation experiments. On board the D2-facility will allow performance of a number of different measurements with the goal to obtain performance data (cloud top heights, height of the planetary boundary layer, optical thickness, and cloud base height of thin and medium thick clouds, ice/water phase discriminatin for clouds, tropopause height, tropaspheric height, tropospheric aerosols, and stratospheric aerosols. B.G.

N87-10270*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

THE LIDAR IN-SPACE TECHNOLOGY EXPERIMENT (LITE) c36

M. P. McCormick *In its* 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20E

A spaceborne lidar system is presently being constructed for flight aboard the U. S. Space Shuttle in early 1991. The experiment, Lidar In Space Technology Experiment (LITE), utilizes a neodymium: YAG laser and 0.85 meter effective diameter Cassegranian-configured telescope receiver for making elastic backscatter measurements. The laser will be frequency doubled and tripled simulataneously producing a 10 Hz rate of 200 mJ at 1064 nm, 400 mJ at 532 nm, and 150 mJ at 355 nm. The technological objectives of LITE are to evaluate lidar system operations in space, lidar techniques in space, and to provide a test bed for new lidar technologies in later flights. The measurement objectives include the determination of cloud top and planetary boundary layer heights, the measurement of tropospheric and stratospheric aerosols, and the measurement of temperature and density between 10 to 40 km altitude. Detailed simulations will be presented showing the errors associated with each of these measurement objectives. In addition, the experiment scenario will be described including measurement times, data flow, processing and archival, and initial plans for validation of the LITE data set with correlative measurements. B.G.

N87-10271*# University of Western Australia, Perth. School of Physics and Geoscience.

AEROSOL STUDIES IN MID-LATITUDE COASTAL ENVIRONMENTS IN AUSTRALIA c45

S. A. Young, D. Cutten (Electronics Research Lab., Adelaide (Australia).), M. J. Lynch, and J. E. Davies *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 13B

The results of the evaluation of several inversion procedures that were used to select one which provides the most accurate atmospheric extinction profiles for small aerosol extinction coefficients (that often predominate in the maritime airmass) are presented. Height profiles of atmospheric extinction calculated by a two component atmospheric solution to the LIDAR equation will be compared with corresponding in-situ extinction profiles based on the size distribution profiles obtained in Western Australia. Values of the aerosol backscatter to extinction ratio obtained from multi-angle LIDAR measurements will be used in this solution. B.G.

N87-10272*# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

VISIBILITY RELATED TO BACKSCATTER AT 1.54 MICRON c45

T. L. Barber and D. R. Larson (New Mexico State Univ., Las Cruces.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 13B

The lidar process was shown to have the necessary potential to fulfill the need for a remote measurement of visibility. Visibility can be inferred from a lidar return optical extinction. The wavelength 1.54 micron was chosen, being near the visible wavelength region and having a high eye safety threshol, 200,000 times higher than 1.06 micron; 1.54 is the erbium laser wavelength. This research utilized 105 measured height profiles of natural droplet size distributions data, taken in clouds, fog, and haze. These profiles were examined to determine the completeness of the droplet counting data. It was found that the particle spectrometer data were incomplete in the very light ford and haze so this portion of the data was eliminated. Utilizing the Mie theory, these droplet size distribution profiles were converted to backscatter at 1.54 micron and extinction in the visible region, 0.55 micron. Using Koschmeider's relationship, the extinction profiles were converted to visibility. The visibility and backscatter profiles were compared to develop a relationship between visibility and backscatter at 1.54 micron. B.G.

N87-10273*# York Univ., Downsview (Ontario). Dept. of Physics.

INVERSION OF 2 WAVELENGTH LIDAR DATA FOR CLOUD PROPERTIES c47

S. R. Pal and A. I. Carswell *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04B

The inversion of the lidar equation to derive quantitative properties of the atmosphere has continued to present considerable difficulty. The results of a study in which Klett's procedure was utilized for the analysis of cloud backscatter measurements made simulataneously at two ruby lidar wavelengths (694nm,347nmm) are presented. With one lidar system a cloud is probed at the two wavelength and the backscatter measured simulataneously by separate receivers. As a result two sigma profiles which should differ only because the wavlength dependence of the scattering. Experimental data presented to demonstrate the effects and the implications of the applications of the inversion method will be discussed. B.G.

N87-10274*# Ludwig-Maximilians-Universitaet, Munich (West Germany). Meteorological Inst.

THE USEFULNESS OF KLETT'S INVERSION ALGORTHMS TO SIMULATED SATELLITE LIDAR RETURNS c32

M. Kastner and H. Quenzel *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 17I

The lidar equation is a special form of the radiative transport equation in single scattering approximation and describes the return signal of a lidar. Klett's algorithm for retrieving the total extinction coefficient profile was developed for application to ground-based lidar returns by a backward integration from the far end to the near end, the range where the incident and backscattered pulse overlap totally. The applicability of Klett's algorithm to satellite backscatter lidar returns was assessed. The simulated data of a

1 J Alexandrite laser operated at about 0.7 micron and at a satellite flight level of 840 km. B.G.

N87-10275*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WAVELENGTH DEPENDENCE OF AEROSOL BACKSCATTER COEFFICIENTS OBTAINED BY MULTIPLE WAVELENGTH LIDAR MEASUREMENTS c32
Yasuhiro Sasano (Old Dominion Univ., Norfolk, Va.) and Edward V. Browell *In its* 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

Aerosols are often classified into several general types according to their origins and composition, such as maritime, continental, and stratospheric aerosols, and these aerosol types generally have different characteristics in chemical and physical properties. The present study aims at demonstrating the potential for distinguishing these aerosol types by the wavelength dependence of their backscatter coefficients obtained from quantitative analyses of multiple wavelength lidar signals. Data from the NASA Airborne Differential Abosrption lidar (DIAL) S ystems, which can measure aerosol backscatter profiles at wavelenghts of 300, 600, and 1064 nm and ozone profiles of backscatter coefficients for these three wavelength were derived from the observations of aerosols of different types. Observations were performed over the Atlantic Ocean, the Southwestern United States, and French Guyana. B.G.

N87-10276*# Research Inst. of National Defence, Linkoeping (Sweden).
EXTINCTION AND VISIBILITY MEASUREMENTS IN THE LOWER ATMOSPHERE WITH UV-YAG-LIDAR c32
Arne Hagard *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

With the intention to investigate methods for slant path visibiltiy measurements and to develop information for modelling of extinction profiles in the atmospheric boundary layer, measurements were performed with a lidar based on a YAG-laser. The third harmonic at 355 nm in the ultraviolet was used and thus eye safety problems are avoided. At this wavelength the lens of the human eye is not transparent and the safety distance for the laser is a 50 meters as compared to several km for a corresponding green laser. The lidar is a coaxial system with a turnable mirror system for beam steering. The extinction coefficient at both 355 and 532 nm was measured and the ratio determined. Provided that the wavelength dependence of the aerosol extinction is range independent, the measured extinction profile at 355 nm can be converted to a corresponding profile at 532 nm, which is more relevant for visibility. In order to calculate the extinction profile the lidar equation is inverted by a method, which is based on Klett's method. B.G.

N87-10277*# Defence Research Establishment Valcartier (Quebec).
SENSITIVITY OF THE LIDAR RATIO TO CHANGES IN SIZE DISTRIBUTION AND INDEX OF REFRACTION c32
B. T. N. Evans *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 17I

In order to invert lidar signals to obtain reliable extinction coefficients, sigma, a relationship between sigma and the backscatter coefficient, beta, must be given. These two coefficients are linearly related if the complex index of refraction, m, particle shape size distribution, N, does not change along the path illuminated by the laser beam. This, however, is generally not the case. An extensive Mie computation of the lidar ratio R = beta/sigma and the sensitivity of R to the changes in a parametric space defined by N and m were examined. B.G.

N87-10278*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
LIDAR MEASUREMENTS OF SLANT VISUAL RANGE c36
Yu. S. Balin, S. I. Kavkyanov, G. M. Krekov, and I. A. Razenkov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

When converting the lidar equation relative to the extinction coefficient and, correspondingly, the visual range, the instability of the solution at the increase of the optical density of the sounding path is encountered. The search for a stable solution has resulted in the appearance of a set of inversion algorithms differing mainly in the manner of assigning the a priori information on the profile sought. A stable algorithm of inversion is suggested and a comparative analysis and experimental verification of some methods of processing the signals at sounding the optically dense atmospheric formations are given. B.G.

N87-10279*# National Inst. for Environmental Studies, Tsukuba (Japan).
VISIBILITY AND AEROSOL MEASUREMENT BY DIODE-LASER RANDOM-MODULATION CW LIDAR c36
N. Takeuchi, H. Baba (Tokyo Univ. (Japan).), K. Sakurai, T. Ueno (Chiba Univ. (Japan).), and N. Ishikawa *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

Examples of diode laser (DL) random-modulation continuous wave (RM-CW) lidar measurements are reported. The ability of the measurement of the visibility, vertical aerosol profile, and the cloud ceiling height is demonstrated. Although the data shown here were all measured at night time, the daytime measurement is, of course, possible. For that purpose, accurate control of the laser frequency to the center frequency of a narrow band filter is required. Now a new system with a frequency control is under construction. B.G.

N87-10280*# Arizona Univ., Tucson. Inst. of Atmospheric Physics.
CORRECTION FUNCTION IN THE LIDAR EQUATION AND THE SOLUTION TECHNIQUES FOR CO2 LIDAR DATE REDUCTION c36
Yanzeng Zhao, Ting Kaung Lea, and Richard M. Schotland *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

For lidar systems with long laser pulses the unusual behavior of the near-range signals causes serious difficulties and large errors in reduction. The commonly used lidar equation is no longer applicable since the convolution of the laser pulse with the atmospheric parameter distributions should be taken into account. It is important to give more insight into this problem and find the solution techniques. Starting from the original equation, a general form is suggested for the single scattering lidar equation where a correction function Cr is introduced. The correction Function Cr(R) derived from the original equation indicates the departure from the normal lidar equation. Examples of Cr(R) for a coaxial CO2 lidar system are presented. The Differential Absorption Lidar (DIAL) errors caused by the differences of Cr(R) for H2O measurements are plotted against height. B.G.

N87-10281*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ASSESSMENT OF DIAL DATA COLLECTION AND ANALYSIS TECHNIQUES c36
E. V. Browell and P. T. Woods (National Physical Lab., Teddington (England).) *In its* 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The key issues in all areas of Differential Absorption Lidar (DIAL) data collection and analysis techniques were examined

This included consideration of the practical and theoretical limitations of DIAL and the range of possible DIAL measurements. B.G.

N87-10282*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AIRBORNE LIDAR MEASUREMENTS OF THE ATMOSPHERIC PRESSURE PROFILE WITH TUNABLE ALEXANDRITE LASERS c36
C. L. Korb, G. K. Schwemmer, M. Dombrowski, J. Milrod, and H. Walden *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The first remote measurements of the atmospheric pressure profile made from an airborne platform are described. The measurements utilize a differential absorption lidar and tunable solid state Alexandrite lasers. The pressure measurement technique uses a high resolution oxygen A band where the absorption is highly pressure sensitive due to collision broadening. Absorption troughs and regions of minimum absorption were used between pairs of stongly absorption lines for these measurements. The trough technique allows the measurement to be greatly desensitized to the effects of laser frequency instabilities. The lidar system was set up to measure pressure with the on-line laser tuned to the absorption trough at 13147.3/cm and with the reference laser tuned to a nonabsorbing frequency near 13170.0/cm. The lidar signal returns were sampled with a 200 range gate (30 vertical resolution) and averaged over 100 shots. B.G.

N87-10283*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEASUREMENTS OF THE EFFECT OF HORIZONTAL VARIABILITY OF ATMOSPHERIC BACKSCATTER ON DIAL MEASUREMENTS c46
G. K. Schwemmer, C. L. Korb, M. Dombrowski, and C. Y. Weng (Science Systems and Applications, Inc., Seabrook, Md.) *In its* 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The horizontal variability of atmospheric backscatter may have a substantial effect on how Differential Absorption Lidar (DIAL) data must be taken and analyzed. To minimize errors, lidar pulse pairs are taken with time separations which are short compared to the time scales associated with variations in atmospheric backscatter. To assess the atmospheric variability for time scales which are long compared to the lidar pulse repetition rate, the variance of the lidar return signal in a given channel can be computed. The variances of the on-line, off-line, and ration of the on-line to off-line signals at given altitudes obtained with the dual solid-state Alexandrite laser system were calculated. These evaluations were made for both down-looking aircraft and up-looking ground-based lidar data. Data were taken with 200 microsecond separation between on-line and off-line laser pulses, 30 m altitude resolution, 5 Hz repetition rate, and the signal were normalized for outgoing laser energy. B.G.

N87-10284*# Radio Research Labs., Tokyo (Japan). Ministry of Posts and Telecommunications.
FLIGHT TESTS OF A RANGE-RESOLVED AIRBORNE DIAL WITH TWO MIN-TEA CO2 LASERS c36
T. Itabe, M. Ishizu, T. Aruga, T. Igarashi, and K. Asai (Tohoku Univ., Sendai (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

It is important to measure regional distributions of ozone concentrations in a short time for understanding a mechanism of photo-chemical smog development. An airborne Differential Absorption Lidar (DIAL) system with two low-power mini-TEA CO2 lasers was developed for measuring three-dimensional distributions of ozone in the lower troposphere. The CO2 DIAL is a nadir-looking system and is designed to measure ozone profiles between ground and airplane by using atmospheric aerosols as a distributed radar target. First flight test with a single laser were conducted in February 1985 over the Tokyo area. The system was operated at an altitude of 5000 ft. Results of the first flight tests show that the height profiles of the received power in the boundary layer were different between over land and ocean. The received power has to be inverted to an expression of a single optical parameter to see real aerosol distributions. Inversion of the lidar signal to the aerosol extinction was performed by using Klett's solution. B.G.

N87-10285*# RCA Astro-Electronics Div., Princeton, N. J.
Nd:GLASS-RAMAN LASER FOR WATER VAPOR DIAL c36
R. H. Kagann, J. C. Petheram, and A. Rosenberg *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A tunable solid-state Raman shifted laser which was used in a water vapor Differential Absorption Lidar (DIAL) system at 9400 A is described. The DIAL transmitter is based on a tunable glass laser operating at 1.06 microns, a hydrogen Raman cell to shift the radiation to 1.88 microns, and a frequency doubling crystal. The results of measurements which characterize the output of the laser with respect to optimization of optical configuration and of Raman parameters were reported. The DIAL system was also described and preliminary atmospheric returns shown. B.G.

N87-10286*# Electricite de France, Chatou.
A METEOROLOGICAL (HUMIDITY, TEMPERATURE, AEROSOLS)) MOBILE DIAL SYSTEM: CONCEPTS AND DESIGN c47
Cl. Cahen, J. L. Lesne, J. Benard, and P. Ponsardin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

Since 1982 a program was conducted to develop a mobile meteorological (humidity, temperature, aerosols) Differential Absorption Lidar (DIAL) devoted to the studies of the nuclear power plant atmospheric surroundings. The measurement objectives are defined according to the user needs and the lidar feasibility. The concepts and design adopted to meet both the requirement and the measurement objectives are described. Each sub-system is addressed sequentially: transmitting system, receiving system, detection system, and post detection. B.G.

N87-10287*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INFLUENCE OF RAYLEIGH-DOPPLER BROADENING ON THE SELECTION OF H2O DIAL SYSTEM PARAMETERS c32
Syed Ismail and Edward V. Browell *In its* 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Computer simulations have enabled the performance of a H2O Differential Absorption Lidar (DIAL) system to be studied by spectrally analyzing the forward propagating and backscattered laser energy. The simulations were done for a high altitude (21 km) DIAL system operating in a nadir-viewing mode. The influence of Rayleigh Doppler broadening on DIAL measurement accuracies were evaluated and show that the Rayleigh broadening influence, which can be corrected to first order in regions free of large aerosol gradients, reduces the sensitivity of DIAL H2O measurement errors in the upper tropospheric region. The ability to correct the Rayleigh broadening and the selection of H2O DIAL parameters when all the systematic effects are combined, were discussed. B.G.

N87-10288*# Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
CORRECTION OF DOPPLER-BROADENED RAYLEIGH BACKSCATTERING EFFECTS IN H2O DIAL MEASUREMENTS c32
A. Ansmann and J. Bosenberg *In* NASA. Langley Research Center

13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

A general method of solutions for treating effects of Doppler-broadened Rayleigh backscattering in H2O Differential Absorption Lidar (DIAL) measurements are described and discussed. Errors in vertical DIAL measurements caused by this laser line broadening effect can be very large and, therefore, this effect has to be accounted for accurately. To analyze and correct effects of Doppler-broadened Rayleigh backscattering in DIAL experiments, a generalized DIAL approximation was derived starting from a lidar equation, which includes Doppler broadening. To evaluate the accuracy of H2O DIAL measurements, computer simulations were performed. It was concluded that correction of Doppler broadened Rayleigh backscattering is possible with good accuracy in most cases of tropospheric H2O DIAL measurements, but great care has to be taken when layers with steep gradients of Mie backscattering like clouds or inversion layers are present. B.G.

N87-10289*# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
ATMOSPHERIC CONTRIBUTIONS TO THE COLUMN VARIANCE IN DIRECT-DETECTION DIAL c36
M. J. T. Milton and P. T. Woods *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

One of the most important parameters of a Differential Absorption Lidar (DIAL) system is the delay time between the on and off resonant pulses. It is important that this delay time is sufficiently small to ensure that the atmosphere is effectively frozen between the pulses. Therefore, most Dial systems were designed with two lasers firing alternately less than 1 msec apart. Despite the importance of this parameter in the design of DIAL systems and its contribution to the overall error of a column measurement, very little is known about the size of the error for the case of a direct-detection system using atmospheric backscatter. The ultraviolet DIAL system uses two independent YAG/dye lasers and is therefore suitable for measuring the effects of different pulse delays on the variance of column measurements for a variety of atmospheric conditions. A set of DIAL returns were acquired with the two lasers tuned to the same wavelength and with a range of pulse delay times between 250 microseconds and several minutes. This data set was recorded in full on a computer and was used both to test different averaging techniques and also to evaluate atmospheric contributions to DIAL columns. B.G.

N87-10290*# Maryland Univ., College Park. Inst. for Physical Science.
HIGH SPECTRAL PURITY, NARROW LINEWIDTH LASER TRANSMITTER FOR DIAL MEASUREMENTS c36
U. N. Singh and P. H. Flamant (Laboratoire de Meteorologie Dynamique du CNRS, Palaiseau (France).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A laser transmission with very high degree of spectral purity was described. Amplified Spontaneous Emission (ASE) dependence on the oscillator energy and the detuning away from the gain curve center are demonstrated. The effects of both finite laser linewidth and spectral purity on humidity measurements are experimentally demonstrated. B.G.

N87-10291*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE MEASUREMENT OF ATMOSPHERIC DENSITY USING DIAL IN THE O2 A-BAND (770 nm) c46
T. D. Wilkerson (Maryland Univ., College Park.), G. K. Schwemmer, L. J. Cotnoir, and U. N. Singh *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
(Contracts NCC1-25; DAAG29-81-D-0100; Grant NA83-AA-A-00036)
Avail: NTIS HC A15/MF A01 CSCL 04A

Differential Absorption Lidar (DIAL) measurements in the A-band of molecular oxygen were suggested as a means of profiling atmospheric density. Progress towards this capability is reported. B.G.

N87-10292*# Naval Research Lab., Washington, D.C. Atmospheric Physics Branch.
USING A LASER AUREOLE TO INVERT LIDAR RETURN c36
William P. Hooper and H. Gerber *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

An aureole generated by a laser beam was studied. The strength of the signal redirected towards a sensor high above the surface by a combination of one scattering event in the marine boundary layer (mbl) and one single reflection event from the ocean surface was estimated. A model of mbl aerosol size distributions was used to estimate Mie scattering for a wide range of meteorolocial conditions. The sea surface reflection was determined from a Gaussian model of the wave slopes. These laser aureoles which were estimated over the wide range of conditions and were normalized by the reflected laser light were found to be highly correlated with the optical depth of the boundary layer. By estimating optical depth from the aureole, the Bernoulli-Riccati inversion of lidar return could be constrained and the inversion accuracy improved. A Monte Carlo program was developed to study the laser aureole generated by up to 8 orders of reflection and scattering. The aureole was generated by a narrow, 10 nsec laser pulse at 1.06 microns and measured by a receiver 10 km above the ocean surface. The original theoretical computation compared well with the Monte Carlo method. When multiple scattereffects were included, the normalized aureole was still highly correlated with the mbl optical depth over the range of conditions. B.G.

N87-10293*# York Univ., Downsview (Ontario). Dept. of Physics.
DETERMINATION OF CLOUD MICROPHYSICAL PROPERTIES BY LASER BACKSCATTERING AND EXTINCTION MEASUREMENTS c47
R. N. Dubinsky, A. I. Carswell, and S. R. Pal *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

The extinction and backscattering of 514 nm laser radiation in polydisperse water droplet clouds was studied in the laboratory. Three cloud size distributions with modal diameters of 0.02, 5.0, and 12.0 microns were investigated. The relationships between the cloud optical parameters (attentuation coefficient, sigma and volume backscattering coefficient, Beta (sub pi)) and the cloud water content, C, were measured for each size distribution. It was found that a linear relationship exists between sigma and C and between beta (sub pi) and C for cloud water content values up to 3gm/cubic m. The linear relationships obtained, however, have slopes which depend on the droplet size distribution. For a given water content both sigma and beta (sub pi) increase as the modal diameter decreases. The measured data are compared with existing theoretical analyses and discussed in terms of thie application to lidar measurements of atmospheric clouds. It is concluded that the empirical information obtained can serve as a basis for quantitative lidar measurements. Author

N87-10294*# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
EFFECT OF BACKSCATTER-TO-EXTINCTION RATIO ON LIDAR INVERSIONS c32
Edward M. Measure *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 6 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

One way of deriving the atmospheric extinction coefficient from lidar measurements is to start from the single scattering lidar

equation. Simulations of lidar experiments and extinction coefficient calculation were conducted and the resulting errors examined. In order to make the simulation realistic, the volume backscatter coefficients and extinction coefficients used in the simulation were based on measured particle distributions, in this case on the particle size distributions measured in Meppen, Germany in the fall of 1980. In that experiment particle size distributions were measured with a balloon-borne particle spectrometer during balloon descents from about 600 meters above ground to the surface. Each particle spectrum represented a layer of at most a few meter thickness, so an altitude resolved profile of particle size spectra is measured. A Mie code was used to compute linear extinction coefficient and volume backscatter coefficient profiles from the particle size spectra for each balloon sounding. B.G.

N87-10295*# Optech, Inc., Downsview (Ontario).
LABORATORY MEASUREMENTS OF FORWARD AND BACKWARD SCATTERING OF LASER BEAMS IN WATER DROPLET CLOUDS **c32**
R. B. Smith, J. D. Houston, A. Ulitsky, and A. I. Carswell (York Univ., Downsview (Ontario).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Many aspects of the forward and backward scattering in dense water droplet clouds were studied using a laboratory scattering facility. This system is configured in a lidar geometry to facilitate comparison of the laboratory results to current lidar oriented theory and measurements. The backscatter measurements are supported with simultaneous measurements of the optical density, mass concentration, and droplet size distribution of the clouds. Measurements of the extinction and backscatter coefficients at several important laser wavelength have provided data on the relationship between these quantities for laboratory clouds at .633, 1.06, and 10.6 microns. The polarization characteristics of the backscatter of 1.06 microns were studied using several different types of clouds. More recently, the laboratory facility was modified to allow range-resolved backscatter measurements at 1.06 microns. Clouds made up of 3 layers, each with its own density, can be constructed. This allows the study of the effect of cloud inhomogeneity on the forward and backscatter. B.G.

N87-10296*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REAL-TIME ATMOSPHERIC ABSORPTION SPECTRA FOR IN-FLIGHT TUNING OF AN AIRBORNE DIAL SYSTEM **c32**
M. Dombrowski, H. Walden, G. K. Schwemmer, J. Milrod, and C. L. Korb *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Real-time measurements of atmospheric absorption spectra are displayed and used to precisely calibrate and fix the frequency of an Alexandrite laser to specific oxygen absorption features for airborne Differential Absorption Lidar (DIAL) measurements of atmospheric pressure and temperature. The DIAL system used contains two narrowband tunable Alexandrite lasers: one is electronically scanned to tune to oxygen absorption features for on-line signals while the second is used to obtain off-line (nonabsorbed) atmospheric return signals. The lidar operator may select the number of shots to be averaged, the altitude, and altitude interval over which the signals are averaged using single key stroke commands. The operator also determines exactly which oxygen absorption lines are scanned by comparing the line spacings and relative strengths with known line parameters, thus calibrating the laser wavelength readout. The system was used successfully to measure the atmospheric pressure profile on the first flights of this lidar, November 20, and December 9, 1985, aboard the NASA Wallops Electra aircraft. B.G.

N87-10297*# Kyushu Univ., Fukuoka (Japan). Dept. of Electrical Engineering.
OBSERVATION OF ATMOSPHERIC OZONE BY DIAL WITH RAMAN LASERS PUMPED BY A KrF LASER **c46**
M. Maeda and T. Shibata *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

Since the XeCl excimer laser (308 nm) was first used in Differential Absorption Lidar (DIAL) for stratospheric ozone detection, the XeCl ozone lidar became a useful tool for the monitoring of the stratospheric ozone concentration. Shorter wavelength lasers are needed for the observation of ozone in the troposphere where the ozone concentration is about one order of magnitude smaller than in the stratosphere. In 1983, tropospheric ozone was observed with the combination of the second Stokes line (290.4 nm) of stimulated Raman scattering from methane pumped by a KrF laser and the XeCl laser line. The measurement of the ozone distribution from ground to 30 km was reported, using three Stokes lines of Raman lasers pumped by a KrF laser. At wavelengths shorter than 295 nm, the background solar radiation is effectively suppressed by atmospheric ozone. Such a solar-blind effect can be expected when two wavelengths 277 and 290.4 nm are used for DIAL ozone detection. A preliminary measurement of the day time ozone distribution in the troposphere is presented using these wavelengths generated by a KrF laser with a Raman shifter. Analysis using the lidar equation predicts the maximum detectable range is 7 km. B.G.

N87-10298*# Maryland Univ., College Park. Inst. for Physical Science and Technology.
STRENGTH, WIDTH, AND PRESSURE SHIFT MEASUREMENTS OF 54 LINES IN THE OXYGEN A-BAND **c46**
K. J. Ritter and T. D. Wilkerson *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The absorption band of molecular oxygen, centered at 760 nm, is the atmospheric absorber for the Differential Absorption Lidar (DIAL) systems used to measure atmospheric temperature, pressure, and density. To provide accurate line parameters for such systems, a careful spectroscopic study was made of the A-band, with measurements of line strengths, widths, pressure-induced frequency shifts, and collisional narrowing effects. The width and shift parameters were measured over a temperature range of -20 to 100 C so that the temperature dependence of these parameters can also be determined. To analyze the results, a least-squares fiting routine was written to fit standard line profiles to the observed profiles. These measurements, which include the first observations of pressure shifts and collisional narrowing in the band, are an important contribution to lidar system utilizing the A-band. B.G.

N87-10299*# National Oceanic and Atmospheric Administration, Washington, D. C.
AN ALL-PURPOSE COMPUTER PROGRAM FOR LIDAR SIMULATIONS AND REDUCTION OF LIDAR DATA **c61**
Charles Braun *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 09B

A general computer program was written for the dual purpose of simulating lidar return signals and extracting H2O vapor and temperature (T) profiles from actual lidar returns. This program will be used to retrieve H2O vapor and T profiles from data obtained with the University of Maryland ground-based lidar systems. The program is designed to simulate and to analyze lidar returns from a monostatic system for two cases: when the output laser pulse is monochromatic, and when the pulse has a known wavelength spectrum. The simulation part of the program has several model H2O vapor, T, and aerosol profiles which can be combined to form different model atmospheres. The simulation program also permits the testing of different methods of numerical filtering to suppress noise, and testing the accuracy of different methods of numerical integration. B.G.

N87-10300*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONVECTIVE STRUCTURE OF THE PLANETARY BOUNDARY LAYER OF THE OCEAN DURING GALE c46
S. H. Melfi and R. Boers *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The structure of the Planetary Boundary Layer (PBL) was measured, using an airborne lidar, over the Atlantic Ocean during several intensive observation periods of the Genesis of Atlantic Lows Experiment (GALE). Primary emphasis is on the understanding of the convective structure within the PBL during cold air outbreaks. Cold outbreaks generally occur in between the development of coastal storms; and behind a cold front sweeping down from Canada out across the Atlantic. As the cold dry air moves over the relatively warm ocean, it is heated and moistened. The transfer of latent and sensible heat during these events accounts for most of the heat transfer between the ocean and atmosphere during winter. Moistening of the PBL during these eventsis believed to be an important factor in determining the strength of development of the storm system which follows. In general, the more PBL moisture available as latent heat the higher the probability the storm will intensify. The major mechanism for vertical mixing of heat and mositure within the PBL is cellular convection. Knowlede of the organization and structure of the convection is important for understanding the process. Author

N87-10301*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
METHODS FOR ESTIMATING THE OPTICAL CONSTANTS OF ATMOSPHERIC HAZES BASED ON COMPLEX OPTICAL MEASUREMENTS c74
V. E. Zuev, B. S. Kostin, and I. E. Naats *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20F

The methods of multifrequency laser sounding (MLS) are the most effective remote methods for investigating the atmospheric aerosols, since it is possible to obtain complete information on aerosol microstructure and the effective methods for estimating the aerosol optical constants can be developed. The MLS data interpretation consists in the solution of the set of equations containing those of laser sounding and equations for polydispersed optical characteristics. As a rule, the laser sounding equation is written in the approximation of single scattering and the equations for optical characteristics are written assuming that the atmospheric aerosol is formed by spherical and homogeneous particles. To remove the indeterminacy of equations, the method of optical sounding of atmospheric aerosol, consisting in a joint use of a mutifrequency lidar and a spectral photometer in common geometrical scheme of the optical experiment was suggested. The method is used for investigating aerosols in the cases when absorption by particles is small and indicates the minimum necessary for interpretation of a series of measurements. B.G.

N87-10302*# Academy of Sciences (USSR), Tomsk.
MULTIFREQUENCY DIAL SENSING OF THE ATMOSPHERIC GASEOUS CONSTITUENTS USING THE FIRST AND SECOND HARMONICS OF A TUNABLE CO2 LASER RADIATION c46
V. E. Zuev, Yu. M. Andreev, V. G. Voevodin, A. I. Gribenyukov, V. A. Kapitanov, A. V. Sosnin, G. A. Stuchebrov, and G. S. Khmelnitskii *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The results of field measurements of concentration of some gaseous components of the atmosphere along the paths, in Sofia, Bulgaria, using a gas analyzer based on the use of a CO2 laser radiation frequency-doubled with ZnGeP2 monocrystals are presented. The gas analyzer is a traditional long path absorption meter. Radiation from the tunable CO2 laser of low pressure and from an additional He-Ne laser is directed to a colliminating hundredfold Gregori telescope with a 300 mm diameter of the principal mirror. The dimensions of the mirrors of a retroreflector 500 x 500 mm and a receiving telescope allow one to totally intercept the beam passed through the atmospheric layer under study and back. B.G.

N87-10303*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
REMOTE EXPRESS ANALYSIS OF GROUND-LAYER AEROSOL BASED ON LASER-INDUCED SPARK SPECTRA c46
V. E. Zuev, Yu. D. Kopytin, V. A. Korolkov, M. E. Levitskii, M. F. Nebolsin, B. G. Sidorov, and N. P. Soldatkin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The creation of high-power pulsed CO2 and Nd-glass lasers enables the realization of the method for remote spectrochemical analysis of atmospheric aerosols based on excitation of the emission spectrum of the aerosol particle atoms. A description of construction and characteristics of a spectrochemical lidar based on both Nd-glass and CO2 lasers is presented. B.G.

N87-10304*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
LASER SOUNDING OF INSTANTANEOUS AND MEAN SPEED OF WIND USING CORRELATION METHOD c47
V. E. Zuev, I. V. Samokhvalov, G. G. Matvienko, I. N. Kolev (Academy of Sciences, Sofia (Bulgaria).), and O. P. Prvanov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

The correlation methods for laser sounding of wind speed are based on mutual processing of lidar signals scattered from several spatially separated volumes at each altitude investigated. The time of atmospheric aerosol transport between the scattering volumes estimated by the position of maximum of the mutual correlation function is the measure of corresponding wind speed. In this case the distance between the scattering volumes (the measuring base), defining the time of aerosol movement through the measuring base also determines the lidar possibilities for measuring the instantaneous (during the time interval of several seconds) or the mean wind speed (some minutes). Based on the experimental investigations performed using two lidars, these possibilites are analyzed. B.G.

N87-10305*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
OPTIMAL FILTRATION OF THE ATMOSPHERIC PARAMETERS PROFILES c46
V. E. Zuev, G. N. Glazov, and G. M. Igonin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The idea of optimal Marcovian filtration of fluctuating profiles from lidar signals is developed but as applied to a double-frequency sounding which allows the use of large cross sections of elastic scattering and correct separation of the contributions due to aerosol and Rayleigh scatterings from the total lidar return. The filtration efficiency is shown under different conditions of sounding using a computer model. The accuracy of restituted profiles (temperature, pressure, density) is determined by the elements of a posteriori matrix K. The results obtained allow the determination of the lidar power required for providing the necessary accuracy of restitution of the atmospheric parameter profiles at chosen wavelengths of sounding in the ultraviolet and visible range. B.G.

N87-10306*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
OPTICAL MODELS OF THE MOLECULAR ATMOSPHERE c46
V. E. Zuev, Yu. S. Makushkin, A. A. Mitsel, Yu. N. Ponomarev, V. P. Rudenko, and K. M. Firsov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For

primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The use of optical and laser methods for performing atmospheric investigations has stimulated the development of the optical models of the atmosphere. The principles of constructing the optical models of molecular atmosphere for radiation with different spectral composition (wideband, narrowband, and monochromatic) are considered in the case of linear and nonlinear absorptions. The example of the development of a system which provides for the modeling of the processes of optical-wave energy transfer in the atmosphere is presented. Its physical foundations, structure, programming software, and functioning were considered. B.G.

N87-10307*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
THE INFLURENCE OF AN OPTICAL RECEIVING SYSTEM ON STATISTICAL CHARACTERISTICS OF A LIDAR SIGNAL c36
A. E. Zuev, V. A. Banakh, and V. L. Mironov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The effects connected with correlation of direct and backward waves propagating through the same randomly inhomogeneous media can be observed along the path with refection in a turbulent atmosphere. In particular, the mean intensity of the reflected wave can increase in comparison with the wave propagating in the forward direction at a doubled distance; the intensity fluctuations can become stronger. These effects depend on the strength of optical turbulence, as well as on the diffraction sizes of the exit apertures of the source and the reflector. However, the focusing of radiation reflected with a receiving telescope leads, in some cases, to the fact that the dependence of amplification effects on the parameters becomes essentially different. This should be taken into account when alayzing the lidar signals. The effect of backscattering amplification and amplification of the intensity fluctuations is discussed. B.G.

N87-10308*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
COHERENT LIDARS BASED ON INTRACAVITY HETERODYNING OF ECHO SIGNALS c36
V. E. Zuev, S. D. Burakov, A. P. Godlevskii, Yu. D. Kopytin, S. V. Lazarev, S. A. Ostanin, and P. O. Sharin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The development and technical realization of the method of laser sounding of the atmosphere based on the effects of mixing of reference and external fields of scattering inside a laser cavity are presented. An approximate theory of the method was developed on the basis of the investigations using the model of a three-mirror laser. The nonlinear effect of a wideband laser on frequency-dependent external influences of the atmosphere was investigated. The field measurements of gaseous composition of the atmosphere were performed on the basis of a given method of coherent reception using a tunable CO2 laser. B.G.

N87-10309*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics
THE INFLUENCE OF SCATTERING PARTICLES MORPHOLOGY ON THE CHARACTERISTICS OF LIDAR SIGNALS c36
V. E. Zuev, I. E. Naats, and A. A. Popov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The characteristics of light scattering by a separate spherical particle are used as a priori information when interpreting the data on laser sounding of atmospheric aerosols. Analogously, it is necessary to have a priori information on the characteristics of light scattering by a single crystals in order to restitute the microstructure of crystal formation in the atmosphere. In contrast to the aerosol particles the crystals are of different shapes. On the one hand, this complicates the solution of electrodynamic problems on light scattering by such crystals. On the other hand, if obtaining such a solution is possible, one can determine the morphology of scattering particles accoring to the sounding data and this enables additonal information to be obtained on such meteorological parameters as temperature, pressure, and humidity. Using the geometric-wave approach the problem of scattering of plane electromagnetic wave on convex polyhedrons of arbitrary form was solved. As a result, the expressions were obtained for electric field components of perpendicular and parallel polarizations scattered in any given direction. B.G.

N87-10310*# Fraunhofer-Inst. fuer Atmosphaerische Umweltforschung, Garmisch-Partenkirchen (West Germany).
IMPROVED SOLUTION OF THE LIDAR EQUATION UTILIZING PARTICLE COUNTER MEASUREMENTS c32
H. Jaeger, M. Littfass, D. J. Hofmann (Wyoming Univ., Laramie.), and J. M. Rosen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

The extraction of particle backscattering from incoherent lidar measurements poses some problems. In the case of measurements of the stratospheric aerosol layer the solution of the lidar equation is based on two assumptions which are necessary to normalize the measured signal and to correct it with the two-way transmission of the laser pulse. Normalization and transmission are tackled by adding the information contained in aerosol particle counter measurements of the University of Wyoming to the ruby lidar measurements at Garmisch-Partenkirchen. Calculated backscattering from height levels above 25 km for the El Chichon period will be compared with lidar measurements and necessary corrections. The calculated backscatter-to-extinction ratios are compared to those, which were derived from a comparison of published extinction values to measured lidar backscattering at Garmisch. These ratios were used to calculate the Garmisch lidar returns. For the period 4 to 12 months after the El Chichon eruption a backscater-to-extinction ratio of 0.026 1/sr was applied with smaller values before and after that time. B.G.

N87-10311*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPROVEMENTS IN THE GODDARD BALLOON-BORNE LIDAR c36
William S. Heaps *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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The Goddard balloon-borne lidar system for the measurement of stratospheric ozone and the hydroxyl radical has made three additional flights since the last laser radar conference. On September 27, 1984, a flight was made from Palestine, Texas obtaining a measurement of hydroxyl diurnal variation at 36 km. These data are presented on the plot which shows hydroxyl concentration as a function of GMT for the range cell closest to the instrument. Local noon corresponds to 18 hours on the plot. The rapid drop in concentration after noon is not predicted by models of stratospheric chemistry. It may represent the effects of contamination of the sample volume by hydrocarbons outgassed from the balloon. The more recent flights on June 30, 1985, and December 6, 1985, focussed on measurements of concentration in the lower stratosphere (less than 30 km). The June flight succeeded in obtaining an average concentration measurement (1.8 + or - 0.0000018 molecules/cubic cm) over the altitude range 21 to 26 km. The December flight obtained measurements down to 24 km with a better signal-to-noise ratio than that obtained in June. Prospects for further improvement in sensitivity and absolute calibration will be discussed. Author

N87-10312*# National Oceanic and Atmospheric Administration, Boulder, Colo.
FEATURES OF STRATOSPHERIC AEROSOL LIDAR OBSERVATIONS AT MAUNA LOA, 1974 - 1985 c46
J. J. DeLusi, T. DeFoor, and D. U. Longenecker *In* NASA. Langley

Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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Lidar observations of the stratospheric aerosol over Mauna Loa were begun in the fall of 1974 and have continued to the present. An analysis of these observations has yielded interesting features of the stratospheric aerosol profile that change according to perturbed (from volcanic activity) and quiescent conditions. In the Mauna Loa lidar record there are two major perturbations that are contrasted, Fuego and El Chichon. The variations in relative aerosol cloud thickness, altitude of the maximum concentration and nonsymmetry are compared for the quiescent and perturbed time periods. Also, a climatology of annual average aerosol profiles is descrbied. A brief description will be given of procedures used to validate the lidar optical thickness information. Author

N87-10313*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.
EL CHICHON AEROSOLS IN THE STRATOSPHERE: ANALYSES OF LIDAR DATA AND CALCULATIONS OF RADIATION BUDGET c46
M. Fujiwara, H. Akiyoshi, and N. Otsuka *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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Lidar observation at Fukuoka has provided over four years the data of ElChichon aerosols in the stratosphere. Analyses of the data show that an enormous amount of volcanic aerosols has continuously decreased since the beginning of 1983 with significant fluctuations. These fluctuations reveal themselves as a seasonal variation of aerosol content with a maximum in winter-spring and a minimum in summer. The vertical structure of the aerosol layer also shows the seasonal variation. Although the height of a peak around 18 km in the vertical profile of scattering ratio show littel variation, the higher second peak appears frequently from late fall and the lower third peak from late winter to late spring just as two and more tropopauses appear in these periods. The mechanism which causes the seasonal variation will be discussed in terms of the transport by the atmospheric circulation and the removal through the tropopause gap. Radiation budget in the atmosphere was calculated taking into account the large amount of aerosols observed in the early stages of the El Chichon event. The heating rate of the atmosphere is more than 1 K in the bottom region of the stratosphere even in the nighttime. The possible effect of the volcanic aerosols on the other geophysical phenomena will be discussed using the calculated values of the heating rate. Author

N87-10314*# Nagoya Univ. (Japan). Water Research Inst.
LIDAR MEASUREMENT OF STRATOSPHERIC AEROSOL AT SYOWA STATION, ANTARCTICA c46
Y. Iwasaka, T. Hirasawa (National Inst. of Polar Research, Tokyo (Japan).), H. Fukunishi, T. Ono, and A. Nomura *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

Lidar measurement on Antarctic aerosols were made during the Antarctic Middle Atmosphere (AMA) period, 1983 to 1985, at Syowa Station. Topics measured are winter enhancement aerosol layer and volcanic effect of El Chichon on the Antarctic stratosphere aerosols. The large depolarization ratio (maximum value was about 0.8) seems to support sublimation growth of ice crystals. The lidar measurements showed a meaningful time lag between aerosol content increase and depolarization ratio increase. Considering the balloon observations made in early winter, it was speculated that an increase in large particle number concentration also contributed to the winter enhancement. The El Chichon cloud spread to the Antarctic region by the beginning of 1983. The temporal change of integrated backscatter coefficient shows a clear decay pattern, although strong winter enhancement superposes. B.G.

N87-10315*# Florence Univ. (Italy). Dept. of Physics.
MULTIPLE SCATTERING MEASUREMENTS IN LABORATORY AND FOGGY ATMOSPHERE c32
P. Bruscaglioni, E. Battistelli, P. Pili, and C. Zaccanti *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Multiple scattering affects propagation of light beams in turbid media. Backscattering or forward scattering based measurements of atmospheric parameters are influenced by this effect. Although largely studied theoretically, the effect needs measurements in control of situations due to the large variety of situations of practical importance. The results of laboratory measurements pertaining to the transmission of a collimated light beam (Helium-Neon souce, 10 mW) through suspensions of latex spheres in water are presented and a comparison was made with the predictions of calculation in a foggy atmosphere will also be presented. B.G.

N87-10316*# Los Alamos National Lab., N. Mex.
MULTIPLE SCATTERING OF LASER BEAMS IN DENSE HYDROSOLS c32
A. Zardecki, S. A. W. Gerstl, Wesley P. Unruh, Grant H. Stokes, David M. Stupin, Norman E. Elliott, and J. A. Weinman (Wisconsin Univ., Madison.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

The multiple scattering of laser beams is usually described within the framework of small-angle scattering theory. The validity of this approximation as well as improvements due to the incorporation of diffusion theory in the calculations were studied. B.G.

N87-10317*# Centro Informazioni Studi Esperienze, Milan (Italy).
TIME-RESOLVED LIDAR FLUOROSENSOR FOR SEA POLLUTION DETECTION c46
A. Ferrario, P. L. Pizzolati, and E. Zanzottera *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

A contemporary time and spectral analysis of oil fluorescence is useful for the detection and the characterization of oil spills on the sea surface. Nevertheless the fluorosensor lidars, which were realized up to now, have only partial capability to perform this double analysis. The main difficulties are the high resolution required (of the order of 1 nanosecond) and the complexity of the detection system for the recording of a two-dimensional matrix of data for each laser pulse. An airborne system whose major specifications were: time range, 30 to 75 ns; time resolution, 1 ns; spectral range, 350 to 700 nm; and spectral resolution, 10 nm was designed and constructed. The designed system of a short pulse ultraviolet laser source and a streak camera based detector are described. B.G.

N87-10318*# Lund Inst. of Tech. (Sweden). Dept. of Physics.
VARIATION OF THE URBAN NO2 CONCENTRATION DURING A GROUND INVERSION SITUATION c45
A. Sunesson, W. Wendt, and B. Galle (Swedish Water and Air Pollution Research Lab., Goeteborg.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

In February 1985 the NO2 concentration over Goeteborg, a major Swedish city, was monitored during two inversion situations. The differential absorption technique was employed and the results show the build-up of the concentration. In this experiment the laser beam was scanned horizontally over Goeteborg. The results were presented as maps over the NO2 concentration distribution. For security reasons the beam was not parallel to the ground, which gives a height gradient in some measurements. During the measurement period the NO2 concentration variation build-up from the morning to the afternoon was monitored. Great concentration variations were seen. Later the mixing below the inversion layer, resulting in a more uniform, high concentration was seen. The

breakdown of the inversion when stronger winds start was also seen. Comparisons with a traditional point-measuring chemiluminiscence instrument and an optical method DOAS (Differential Optical Absorption Spectroscopy), were made. The results are discussed. Strong spatial concentration variations are shown by the lidar measurements. For a point-measuring system, the instrument must be very carefully placed since its location will strongly influence the values it gives. B.G.

N87-10319*# Keio Univ., Yokahama (Japan). Dept. of Physics.
AN INTENSITY-MODULATED DUAL-WAVELENGTH He-Ne LASER FOR REMOTE SENSING OF METHANE c45
Kiyoji Uehara and Fujitaka Taguchi (Tokyo Gas Co. Ltd. (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p -CP-2431 (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

A new type of dual wavelength He-Ne laser is described in which the output power at each of the two wavelengths is modulated with equal amplitude and opposite phase to each other. This laser source can greatly simplify the setup and improve the sensitivity of the differential absorption measurements for the methane detection, as verified by a preliminary experiment. A simple scheme to measure the concentration of methane is also proposed. E.R.

N87-10320*# Israel Inst. for Biological Research, Ness-Ziona.
LIDAR MAPPING OF A MIXTURE OF AEROSOL CONCENTRATIONS IN A VARYING ATMOSPHERE c45
Moshe Kleiman, Smadar Egert, and Ariel Cohen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

In several recent applications dealing with lidar measurement of atmospheric pollution, two basic assumptions are made: (1)The investigated aerosol layer is the only particulate material within the scattering volume; and (2)The contribution of the gaseous atmosphere to the lidar backscattering signals can be estimated and deducted from the total backscattering measurements. In the method discussed a generalized method which allows the elimination of the above mentioned assumptions was developed using multiparameter lidar measurements. The different parameters can be several wavelengths, polarization of the scattered light, scattering angles, or any combination of these parameters. The basic requirements are given. The detailed derivations are presented and discussed. E.R.

N87-10321*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
THREE ATMOSPHERIC DISPERSION EXPERIMENTS INVOLVING OIL FOG PLUMES MEASURED BY LIDAR c46
W. L. Eberhard, G. T. McNice, and S. W. Troxel *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The Wave Propagation Lab. participated with the U.S. Environmental Protection Agency in a series of experiments with the goal of developing and validating dispersion models that perform substantially better that models currently available. The lidar systems deployed and the data processing procedures used in these experiments are briefly described. Highlights are presented of conclusions drawn thus far from the lidar data. E.R.

N87-10322*# Joint Research Centre of the European Communities, Ispra (Italy).
FEASIBILITY EXPERIMENTS ON TIME-RESOLVED FLUOROSENSING APPLIED TO OIL SLICKS c45
P. Camagni, G. Colombo, C. Koechler, A. Pedrini, N. Omenetto, and G. Rossi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

The introduction of time resolved observations can provide a very penetrating tool in the practice of laser fluorosensing. The investigations have demonstrated a relevance of multispectral, time resolved analysis for oil fingerprinting. By comparative studies on a variety of crude oils and their most significant fractions, it was found that the process of time decay in a composite oil is characterized by a few steps, which are associated with specific components in the medium light range. The average decay times of these pure fractions are markedly differentiated as to absolute values and spectral spread; as a consequence, the corresponding parameters in the resultant crude are quite sensitive to the particular mixture of these components. Measurements of the time response give then a finer discrimination between oil classes, depending on the relative content of certain fractions. Experiments were pursued with an improved fluorosensor facility, in order to test the application of time resolved fluorosensing to remote samples on water. E.R.

N87-10323*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ROTATIONALLY RESOLVED COLLISIONAL TRANSFER RATES IN OH c36
Thomas J. McGee, James Butler, John Burris, and William Heaps *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

Fluorescence lidar measurements of the hydroxyl radical require detailed information concerning collision induced processes in order to deduce the radical number density from a lidar return. The Goddard SFC OH lidar currently utilizes a broadband detector which precludes the necessity of fully understanding collisional redistribution of rotational energy within the excited state. Numerous advantages result however from the inclusion of a detector with a bandpass only slightly larger that the Doppler width of a rotational line. This however places more stringent requirements on the spectroscopy. Measurements were accordingly made of rotationally resolved quenching rates for collisions with O2, N2, and H2O. Rotational transfer rates were also measured for the same colliders. Quenching rates were measured using a Nd-YAG pumped Rh6G dye laser doubled into the UV. The OH lifetimes were measured as a function of pressure of quenching gas at total pressures of between 50 and 250 microns. Rotational transfer rates were measured by recording the emission spectrum on an intensified diode array and integrating over 10.000 laser shots. E.R.

N87-10324*# Okayama Univ. (Japan).
TIME-DOMAIN SENSITIVITY ENHANCEMENT IN PULSED Pb-TDL GAS MONITORS c36
R. Koga, M. Kosaka, and H. Sano *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A Pb-salt tunable diode laser (TDL) has found many applications in the field of atmospheric gas analysis. Its continuous tunablility and fine spectral purity in the mid infrared region are outstanding from other lasers. The only shortcoming is that it requires cryogenic operating temperatures, though, it is improved year by year towards the room temperature operation. A repeated pulse operation of Pb salt diode lasers is possible with a thermoelectric cooling device, which allows an instrument a portable geometry disusing a heavy, bulky and power consuming mechanical refrigerator. A derivative spectrometry was exploiting the quick tunability of Pb salt diode lasers, though they are continuous wave (cw) operated with refrigerator or liquid nitrogen so far. A new system for derivative spectrometry with a pulsed diode laser will extend its field of applications because of reduced weights and size of measuring instruments. A preliminary results is shown that demonstrates the feasibility of an attempt to implement the derivative spectrometry with repeatedly pulse driven diode lasers. Atmospheric methane was measured with 8 ppm/m sensitivity. Further results of parametric optimization for the best signal to noise ratios under any given device characteristics as well as for available real devices is given. E.R.

N87-10325*# University of the West Indies, Mona (Jamaica). Dept. of Physics.

PERFORMANCE TESTING OF LIDAR RECEIVERS c36

M. Y. Shams *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

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In addition to the considerations about the different types of noise sources, dynamic range, and linearity of a lidar receiver, one requires information about the pulse shape retaining capabilities of the receiver. For this purpose, relatively precise information about the height resolution as well as the recovery time of the receiver, due both to large transients and to fast changes in the received signal, is required. As more and more analog receivers using fast analog to digital converters and transient recorders will be used in the future lidar systems, methods to test these devices are essential. The method proposed for this purpose is shown. Tests were carried out using LCW-10, LT-20, and FTVR-2 as optical parts of the optical pulse generator circuits. A commercial optical receiver, LNOR, and a transient recorder, VK 220-4, were parts of the receiver system. E.R.

N87-10326*# Royal Signals and Radar Establishment, Malvern (England).

PROGRESS IN COHERENT LASER RADAR c36

J. M. Vaughan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20E

Considerable progress with coherent laser radar has been made over the last few years, most notably perhaps in the available range of high performance devices and components and the confidence with which systems may now be taken into the field for prolonged periods of operation. Some of this increasing maturity was evident at the 3rd Topical Meeting on Coherent Laser Radar: Technology and Applications. Topics included in discussions were: mesoscale wind fields, nocturnal valley drainage and clear air down bursts; airborne Doppler lidar studies and comparison of ground and airborne wind measurement; wind measurement over the sea for comparison with satellite borne microwave sensors; transport of wake vortices at airfield; coherent DIAL methods; a newly assembled Nd-YAG coherent lidar system; backscatter profiles in the atmosphere and wavelength dependence over the 9 to 11 micrometer region; beam propagation; rock and soil classification with an airborne 4-laser system; technology of a global wind profiling system; target calibration; ranging and imaging with coherent pulsed and CW system; signal fluctuations and speckle. Some of these activities are briefly reviewed. E.R.

N87-10327*# National Oceanic and Atmospheric Administration, Boulder, Colo.

DOPPLER LIDAR STUDIES OF ATMOSPHERIC WIND FIELD DYNAMICS c47

R. M. Hardesty, M. J. Post, T. R. Lawrence, and F. F. Hall, Jr. *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04B

For the past 5 years the Wave Propagation Lab. has operated a pulsed CO2 Doppler lidar system to evaluate coherent laser radar technology and to investigate applications of the technique in atmospheric research. The capability of the system to provide measurements of atmospheric winds, backscatter, and water vapor has been extensively studied over this period. Because Doppler lidar can measure atmospheric wind structure in the clear air without degradation by terrain features, it offers a unique capability as a research tool for studies of many transient or local scale atmospheric events. This capability was demonstrated in recent field experiments near Boulder, Colo. and Midland, Tex., in which the lidar clearly depicted the wind field structure associated with several types of phenomena, including thunderstorm microbursts, valley drainage flow, and passage of a dryline front. To improve sensitivity during the periods of low aerosol backscatter, the system has recently been upgraded with new transmitter/receiver hardware. The upgraded system, which transmit 2 J per pulse of output energy at a rate of 50 Hz and incorporates computer control for automated operation, underwent calibration testing during the spring of 1986. E.R.

N87-10328*# Israel Atomic Energy Commission, Yavneh. Dept. of Atmospheric Optics.

THE EFFECT OF TURBULENCE ON LIDAR BACKSCATTERED SIGNAL FLUCTUATIONS c32

S. Fastig and A. Choen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20N

CO2 lidar measurements being subjected to uncertainties caused by strong fluctuations were explained to appear primarily due to speckle effects whereas turbulence was to be negligible. Spectral cross correlation measurements performed in the near IR and in the visible show that the main contribution to the fluctuation for the above lidar wavelengths originates from the atmospheric turbulence. The standard deviation of the fluctuation signal was measured for the two wavelengths simultaneously. A typical curve representing mid-summer day changes in the value of sigma as a function of time is shown. The results, indicating the strong dependence on the turbulence, is analyzed and discussed. Author

N87-10329*# Oregon Graduate Center for Study and Research, Beaverton. Dept. of Applied Physics and Electrical Engineering.

REMOTE SENSING OF ATMOSPHERIC WINDS USING A COHERENT, CW LIDAR AND SPECKLE-TURBULENCE INTERACTION c47

J. Fred Holmes, Farzin Amzajerdian, V. S. Rao Gudimetla, and John M. Hunt *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04B

Speckle turbulence interaction has the potential for allowing single ended remote sensing of the path averaged vector crosswind in a plane perpendicular to the line of sight to a target. If a laser transmitter is used to illuminate a target, the resultant speckle field generated by the target is randomly perturbed by the atmospheric turbulence as it propagates back to the location of the transmitter-receiver. When a cross wind is present, this scintillation pattern will move with time across the receiver. A continuous wave (cw) laser transmitter of modest power level in conjunction with optical heterodyne detection was used to exploit the speckel turbulence interaction and measure the crosswind. The use of a cw transmitter at 10.6 microns and optical heterodyne detection has many advantages over direct detection and a double pulsed source in the visible or near infrared. These advantages include the availability of compact, reliable and inexpensive transmitters, better penetration of smoke, dust and fog; stable output power; low beam pointing jitter; and considerably reduced complexity in the receiver electronics. E.R.

N87-10330*# Deutsche Forschungs- und Versuchsanstalt fue Luft- und Raumfahrt, Wesseling (West Germany).

EXPERIMENTAL AND THEORETICAL DOPPLER-LIDAR SIGNATURES OF AIRCRAFT WAKE VORTICES c0

F. Koepp and W. A. Krichbaumer *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 01A

The DFVLR laser Doppler anemometer is a CO2 continuous wave homodyne system designed for boundary layer wind measurements. During the last three years, it was mainly used in the wake-vortex program at Frankfurt airport for determination of vortex strength, transport, and lifetime. The strategy for that special type of measurement was previously reported in detail along with single experimental results. Therefore, herein is given a short summary of the data concerning questions of air traffic control. In addition to the experimental activities a computer model describing

wake-vortex behavior was installed. It allows the comparison of the measured data with the hydrodynamically predicted quantities. On the other hand, it leads to an improved procedure for future wake-vortex measurements. E.R.

N87-10331*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOWER ATMOSPHERIC TEMPERATURE PROFILE MEASUREMENTS USING A RAMAN LIDAR **c47**
S. H. Melfi and D. Whiteman *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

A Raman lidar system was used to measure the temperature profile of the upper troposphere and lower stratosphere. The system consists of a tripled Nd-YAG laser and a 1.5 meter diameter telescope. Two photomultipliers are used at the output of the telescope to allow for measurements at both the laser wavelength and at the Raman shifted wavelength due to atmospheric nitrogen. The signal from the photomultipliers is recorded as photon counts in 1 microsec bins. The results of a number of laser shots are summed together to provide atmospheric returns which have acceptable signal to noise characteristics. Measurements of the Raman nitrogen return were acquired up to an altitude in excess of 20 km. Temperature profiles were retrieved from the attenuation corrected Raman nitrogen return assuming the atmosphere to be in hydrostatic equilibrium and using the ideal gas law. Retrieved temperature profiles are shown compared with independent temperature measurements. Author

N87-10332*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optica.
A COMBINED RAMAN LIDAR FOR LOW TROPOSPHERIC STUDIES **c46**
Yu. F. Arshinov, S. M. Bobrovnikov, V. E. Zuev, A. I. Nadeev, and K. D. Shelevoy *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

One of the main goals of laser sensing of the atmosphere was the development of techniques and facilities for remote determination of atmospheric meteorological and optical parameters. Of lidar techniques known at present the Raman-lidar technique occupies a specific place. On the one hand Raman lidar returns due to scattering on different molecular species are very simple for interpretation and for extracting the information on the atmospheric parameters sought, but, on the other hand, the performance of these techniques in a lidar facility is overburdened with some serious technical difficulties due to extremely low cross sections of Raman effect. Some results of investigations into this problem is presented which enables the construction of a combined Raman lidar capable of acquiring simultaneously the profiles of atmospheric temperature, humidity, and some optical characteristics in the ground atmospheric layer up to 1 km height. The operation of this system is briefly discussed. E.R.

N87-10333*# Naval Air Development Center, Warminster, Pa.
INTERCOMPARISONS OF HIGH-RESOLUTION SOLAR BLIND RAMAN LIDAR ATMOSPHERIC PROFILES OF WATER VAPOR WITH RADIOSONDES AND KYTOON **c46**
K. Petri, A. Salik, and J. Cooney (Drexel Univ., Philadelphia, Pa.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

A report is given of measurements of atmospheric profiles of water vapor in the boundary layer by use of solar blind Raman lidar. These measurement episodes, occuring twice a day over a two week period, were accompanied by a dense net of supporting measurements. The support included two radiosonde launches per measurement episodes as well as a kytoon support measurement of water vapor using a wet bulb-dry bulb instrument. The kytoon strategy included ten minute stops at strategic altitudes. Additional kytoon measurements included ozone profiles and nephelometric extinction profiles in the visible. Typically, six or seven 1000 shot lidar profile averages were collected during a measurement episode. Overall performance comparisons are provided and intercomparisons between auxiliary measurement devices are presented. Data on the accuracy of the lidar water vapor profiles are presented. Author

N87-10334*# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Sciences.
LIDAR METHOD OF MEASUREMENT OF ATMOSPHERIC EXTINCTION AND OZONE PROFILES **c46**
John A. Cooney *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

A description of a method of measurement of atmospheric extinction and of ozone profiles by use of the backscatter signal from a monostatic lidar is given. The central feature of the procedure involves a measurement of the ratio of the Raman backscatter returns of both the oxygen and nitrogen atmospheric content. Because the ratio of the number density of both species is known to high accuracy, the measurement itself becomes a measure of the ratio of two transmissions to altitude along with a ratio of the two system constants. The calibration measurement for determining the value of the ratio of the two system constants or electro-optical conversion constants is accomplished by a lidar measurement of identical atmospheric targets while at the same time interchanging the two optical filters in the two optical channels of the receiver. More details of the procedure are discussed. Factoring this calibrated value into the measured O2/N2 profile ratio provides a measured value of the ratio of the two transmissions. Or equivalently, it provides a measurement of the difference of the two extinction coefficients at the O2 and N2 Raman wavelengths as a function of the height. E.R.

N87-10335*# Atmospheric Environment Service, Downsview (Ontario).
VERTICAL STRUCTURE OF ARCTIC HAZE OBSERVED BY LIDAR **c47**
R. M. Hoff *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

In the study of the Arctic Haze phenomenon, understanding the vertical structure of the haze aerosol is crucial in defining mechanisms of haze transport. Questions have also arisen concerning the representativeness of surface observations of Arctic Haze. Due to the strongly stratified nature of the Arctic troposphere, the mechanisms which transport aerosol to the surface from the transport altitudes of the lower troposphere are not obvious. In order to examine these questions, a Mie scattering lidar was installed at Alert, NWT, Canada. Lidar observes atmospheric aerosols and hydrymeteors as they appear in nature, unmodified by sampling effects. As such the results obtained are more realistic of the light scattering characteristics of the in situ aerosol than are those obtained by integrating nephelometers, for example, which heat the aerosol and dry it before measurement. With this lidar, a pulse was transmitted vetically through an evacuated tube in the roof of a building at Alert. The receiver consisted of a 20cm diameter Fresnel telescope, neutral density and polarizing filters, and RCA C31000A PMT, Analog Modules LA-90-P logarithmic amplifier and a Lecroy TR8827 32 MHz digitizer. The lidar equation was solved for the backscattering coefficient of the aerosol assuming no two way transmission losses in the signal. The lidar results have shown that intercomparison between lidar obtained visibilities and observer visibilities are in much better agreement than for other optical or aerosol monitors. Three new effects were identified in the lidar profiles which contribute to the vertical transport of haze. These effects are briefly discussed. E.R.

N87-10336*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

LIDAR OBSERVATIONS AND MODELING OF COLD AIR OUTBREAKS DURING MASEX AND GALE c47

R. Boers and S. H. Melfi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04B

As part of MASEX and GALE a number of research flights were carried out over the Marine Boundary Layer (MBL) during periods when extremely cold and dry continental air was flowing out over the warm coastal waters at the east coast of the U.S. Such periods, which are named cold air outbreaks are characterized by massive warming and moistening of the MBL resulting in rapid entrainment conditions. As the MBL deepens as a function of fetch over the ocean, clouds develop. The line of cloud formation typically follows the coast line closely as has been observed many times from satellite imagery. The backscatter data from the NASA Goddard airborne lidar, which was used to measure the depth of the MBL in great detail, is ideally suited to verify parametrized models of boundary layer growth rate. The data indicates that the deepening MBL gradually develops clouds at its top. Those clouds form an integral part of the MBL and exercise an important influence on the energy cycle within the MBL. It is suggested that the rapid entrainment observed during overcast conditions represent an increase in efficiency of conversion of available turbulence kinetic energy into entrainment energy. E.R.

N87-10337*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

THE APPLICATION OF LIDAR TO STRATOSPHERIC AEROSOL STUDIES c46

M. P. McCormick *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

The global climatology and understanding of stratospheric aerosols evolving primarily from lidar and satellite measurements is presented. The importance of validation of these remotely sensed data with in situ measurements is also discussed. The advantage of lidar for providing high vertical and horizontal resolution and its independence from a remote source for measurement will become evident with examples of long term lidar data sets at fixed sites and the use of lidar on airborne platforms. Volcanic impacts of the last 20 years are described with emphasis on the last 8 years where satellite data are available. With satellite and high resolution lidar measurements, an understanding of the global circulation of volcanic material is attempted along with the temporal change of aerosol physical parameters and the stratospheric cleansing or decay times associated with these eruptions. E.R.

N87-10338*# National Inst. for Environmental Studies, Tsukuba (Japan).

VOLCANIC ERUPTIONS AND THE INCREASES IN THE STRATOSPHERIC AEROSOL CONTENT: LIDAR MEASUREMENTS FROM 1982 TO 1986 c46

S. Hayashida, Y. Iikura, H. Shimizu, Y. Sasano, H. Nakane, N. Sugimoto, I. Matsui, and N. Takeuchi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

The results of the observation for stratospheric aerosols which were carried out since the autumn of 1982 by using the NIES large lidar are described. Specifications of the lidar system are shown. The lidar has two wavelenghts of 1.06 and 0.53 micrometers. The 0.53 micrometer is mainly used for the stratospheric aerosols, because the PMT for 0.53 micrometers has higher sensitivity that that for 1.06 micrometers and the total efficiency is higher in the former. A switching circuit is used to control the PMT gain for avoiding signal induced noise in PMT. For the last four years, the stratospheric aerosol layer which was significantly perturbed by the El Chichon volcanic eruption was observed. The scattering ratio profiles observed from 1982 through 1983 are given. E.R.

N87-10339*# University Coll. of Wales, Aberystwyth.

OBSERVATIONS OF STRATOSPHERIC AEROSOLS ASSOCIATED WITH THE EL CHICHON ERUPTION c46

L. Thomas, G. Vaughan, D. B. Jenkins, D. Wareing, and M. Farrington *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

Lidar observations of aerosols were carried out at Aberystwyth between Nov. 1982 and Dec. 1985 using a frequency doubled and frequency tripled Nd/Yag laser and a receiver incorporating a 1 m diameter in a Newtonian telescope configuration. In analyses of the experimental data attention is paid to the magnitude of the coefficient relating extinction and backscatter, the choice being related to the possible presence of aerosols in the upper troposphere and the atmospheric densities employed in the normalisation procedure. The aerosol loading showed marked day to day changes in early months and an overall decay was apparent only after April 1983, this decay being consistent with an e sup -1 time of about 7 months. The general decay was accompanied by a lowering of the layer but layers of aerosols were shown intermittently at heights above the main layer in winter months. The height variations of photon counts corrected for range, or of aerosol backscatter ratio, showed clear signatures of the tropopause. A strong correlation was found between the heights of the tropopause identified from the lidar measurements and from radiosonde-borne temperature measurements. A notable feature of the observations is the appearance of very sharp height gradients of backscatter ratio which seem to be produced by differential advection. Author

N87-10340*# Fraunhofer-Inst. fuer Atmosphaerische Umweltforschung, Garmisch-Partenkirchen (West Germany).

LIDAR OBSERVATIONS OF THE DECLINE OF THE EL CHICHON STRATOSPHERIC LOAD c46

H. Jaeger and W. Carnuth *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

The eruption of the Mexican volcano El Chichon in Apr. 1982 enhanced the stratospheric aerosol load to a level which so far has not been observed by remote sensing techniques. The ruby lidar system at Garmisch-Partenkirchen recorded an increase of about two orders of magnitude above the background level of the years 1977/78. At northern midlatitudes backscattering was peaking in Jan./Feb. 1983, as illustrated. The decline of the El Chichon stratospheric perturbation is discussed. The decay of the El Chichon stratospheric cloud is characterized by an overall 1/e lifetime of about 12 months. The El Chichon decay is further characterized by seasonal variations of the integral backscattering coefficient, which exhibit a winter maximum and a summer minimum. These variations are inversely correlated with the seasonal mean movement of the tropopause height indicating transport processes. E.R.

N87-10341*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AIRBORNE LIDAR OBSERVATIONS OF ARCTIC POLAR STRATOSPHERIC CLOUDS c46

L. R. Poole and G. S. Kent *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

Polar stratospheric clouds (PSC's) have been detected repeatedly during Arctic and Antarctic winters since 1978/1979 by the SAM II (Stratospheric Aerosol Measurement II) instrument aboard the NIMBUS-7 satellite. PSC's are believed to form when supercooled sulfuric acid droplets freeze, and subsequently grow by deposition of ambient water vapor as the local stratospheric temperature falls below the frost point. In order to study the characteristics of PSC's at higher spatial and temporal resolution than that possible from the satellite observations, aircraft missions were conducted within the Arctic polar night vortex in Jan. 1984 and Jan. 1986 using the NASA Langley Research Center airborne

dual polarization ruby lidar system. A synopsis of the 1984 and 1986 PSC observations is presented illustrating short range spatial changes in cloud structure, the variation of backscatter ratio with temperature, and the depolarization characterics of cloud layers. Implications are noted with regard to PSC particle characteristics and the physical process by which the clouds are thougth to form. Author

N87-10342*# Kyushu Univ., Fukuoka (Japan). Dept. of Electronical Engineering.
XeF LIDAR MEASUREMENTS OF DENSITY AND TEMPERATURE IN THE MIDDLE ATMOSPHERE c47
T. Shibata and M. Maeda *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

In recent years, it has been widely recognized that vertically propagating internal gravity waves in the middle atmosphere play an important role in determining the large scale wind field by their momentum transport and deposition. However, very little is known about them in the upper stratosphere and lower mesosphere because of the lack of adequate techinques to observe small scale motions. A XeF excimer laser was used for the Rayleigh lidar observation. The characteristics of the XeF lidar system are given. The wavelength of the XeF laser is in the region that is ozone absorption free, and the Rayleigh scattering cross section is 5 times larger than in 532 nm. The advantages of using the XeF laser as against the YAG laser have been discussed in detail. The density and temperature profiles between the altitude range of 30 and 70 km measured with this lidar system are illustrated. The accuracy is less than + or - 3% and 10k at 60 km for an observation time of 15 min. The results on the gravity waves by the observation through about one year since Apr. 1985 is presented. E.R.

N87-10343*# University Coll. of Wales, Aberystwyth. Dept. of Physics.
LIDAR MEASUREMENTS OF THERMAL STRUCTURE c46
D. B. Jenkins, D. P. Wareing, L. Thomas, and G. Vaughan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

Rayleigh backscatter observations at 532 nm and 355 nm of relative atmospheric density above Aberystwyth on a total of 93 nights between Dec. 1982 and Feb. 1985 were used to derive the height variation of temperature in the upper stratosphere and mesosphere. Preliminary results for height up to about 25 km were also obtained from observations of Raman backscattering from nitrogen molecules. Comparisons were carried out for stratospheric heights with satellite borne measurements; good agreement was found between equivalent black body temperatures derived from the lidar observations and those obtained from nadir measurements in three channels of the stratosphere sounder units on NOAA satellites; the lidar based atmospheric temperatures have shown general agreement with but a greater degree of structure than the limb sounding measurements obtained using the SAMS experiment on the NOAA-7 satellite. In summer, stratospheric and mesospheric temperatures showed a smooth height variation similar to that of the CIRA model atmosphere. In contrast, the winter data showed a great variability with height, and marked temperature changes both from night to night and within a given night. Author

N87-10344*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
LIDAR STRATOSPHERIC OZONE MEASUREMENTS AT THE OBSERVATOIRE DE HAUTE PROVENCE (FRANCE) c46
S. Godin, J. Pelon, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

Strastospheric ozone monitoring is of particular importance to confirm present day theories predicting a maximal ozone depletion, due to chlorofluorocarbon emission, in the 35 to 45 km altitude range. Measurements presently rely on both ground based and satellite-borne passive experiments. Such systems have been recently shown to have intrinsic limitations mainly due to atmospheric aerosol presence and calibration problems. During the last few years, active lidar profiling of the ozone vertical distribution by the Differential Absorption Laser technique (DIAL) in the UV wavelength range has been developed using two different laser sources: a Nd-YAG pumped dye laser which enables a large tuning range of the UV emitted wavelengths; and exciplex laser sources using xenon chloride as an active medium and emitting at 308 nm, the off wavelength being usually generated by Raman shifting techniques. Advantages and limitations of using both of these systems are briefly discussed. E.R.

N87-10345*# Shinshu Univ., Nagano (Japan). Faculty of Engineering.
LIDAR OBSERVATION OF THE MESOSPHERIC SODIUM LAYER IN ANTARCTICA c46
A. Nomura, Y. Iwasaka (Nagoya Univ. (Japan).), H. Fukunishi (National Inst. of Polar Research, Tokyo (Japan).), T. Hirasawa, S. Kawaguchi (Nagoya Univ. (Japan).), and T. Kano (Shinshu Univ., Nagano (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The mesospheric sodium layer has been observed at Syowa Station in Antarctica during the wintering period of the 26th Japanese Antarctic Research Expedition. A lidar observation of the polar middle atmosphere at the station has been performed as a part of the Middle Atmosphere Program since 1983. At first stratospheric aerosols have been observed by the system based on a ruby laser. In 1985 a new transmitting system consisting of a tunable dye laser was added to that system to observe the sodium layer, too. The characteristics of the lidar system are given. The results of the mesospheric sodium layer observed on 42 nights during the period from March to October, 1985 are also given. Author

N87-10346*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
LIDAR DETECTION OF METALLIC SPECIES AT THE MESOPAUSE LEVEL c46
C. Granier, J. P. Jegou, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The measurement alkali species present in the atomic form at the mesopause level has been performed by lidar for more than ten years. Atomic and ionic calcium density profiles are obtained for 3 years by the same technique in the visible range, at 423 nm for atomic calcium, and 393 nm for ionic calcium Ca(+). The experimental set-up and the preliminary results have been presented elsewhere. The 423 nm wavelength is directly obtained by the emission of a dye laser pumped by the third harmonic of a Nd-YAG laser. For the generation of the 393 nm wavelength, frequency mixing was used: the emission at 624 nm of a dye laser pumped by the 2nd harmonic of a Nd-Yag laser is mixed with the fundamental infrared emission (remaining after frequency doubling), in a non-linear KDP crystal, which gives the 393 nm emission. The behavior of the two atomic species, calcium and sodium, which are in the same altitude range are compared. For 45% of the observations, no ionic calcium was detected: the ionic calcium abundance was thus below the detection threshold. Contrasting with the density profiles of the atomic species, sodium and calcium, the ionic calcium profile present important variations on small time scales. The main characteristics of theatomic and ionic calcium behaviors that can be deduced from the measurements made are given. Author

N87-10347*# Illinois Univ., Urbana.
DAYTIME LIDAR MEASUREMENTS OF TIDAL WINDS IN THE

MESOSPHERIC SODIUM LAYER AT URBANA, ILLINOIS c46
K. H. Kwon, D. C. Senft, C. S. Gardner, D. G. Voelz, C. F. Sechrist, Jr., and F. L. Roesler (Wisconsin Univ., Madison.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

For more than 15 years lidar systems have been used to study the chemistry and dynamics of the mesospheric sodium layer. Because the layer is an excellent tracer of atmospheric wave motions, sodium lidar has proven to be particularly useful for studying the influence of gravity waves and tides on mesospheric dynamics. These waves, which originate in the troposphere and stratosphere, propagate through the mesosphere and dissipate their energy near the mesopause making important contributions to the momentum and turbulence budget in this region of the atmosphere. Recently, the sodium lidar was modified for daytime operation so that wave phenomena and chemical effects could be monitored throughout the complete diurnal cycle. The results of continuous 24 hour lidar observations of the sodium layer structure are presented alond with measurement of the semidiurnal tidal winds. Author

N87-10348*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LIDAR STUDY OF STORM TOPS c47
J. D. Spinhirne and W. D. Hart *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

Satellite thermal and visible observations are routinely used for storm tracking and diagnostics. In recent years attempts have also been made to apply satellite measurements to the study of evolutional factors for storms such as divergence and subsidence mechanisms. These studies involve analysis of the thermal height structure of the storm tops as obtained from the satellite observations. An outstanding problem is the importance of emissivity effects for the interpretation of the storm top thermal radiance measurements. In part to understand the correct interpretation of satellite observations, a storm top observation experiment involving advanced instrumentation on board a high altitude NASA aircraft has been in progress. A downlooking lidar system is an important part of the instrument complement. A combined analysis of the lidar return data and thermal radiance measurements was developed to study cloud top emissivity effects and their relation to satellite observations. Some preliminary conclusions are given. Author

N87-10349*# Academy of Sciences, Sofia (Bulgaria). Inst. of Electronics.
INVESTIGATION OF CLOUDS SPATIAL DISTRIBUTION USING GROUND-BASED LIDAR c47
I. N. Kolev, O. P. Parvanov, B. K. Kaprielov, and I. K. Ilev *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

Certain investigations of spatial distribution of clouds by employing ground based lidar are presented. The great changeability is one of the main properties of the clouds in the boundary layer. As a result, their optical properties change rapidly which complicates the modeling of cloud evolution. Suitable equipped lidars are widely used for diagnostics of the clouds via a number of scattering and absorption processes. In particular, lidar can provide information on the distribution of meteorological parameters and of the other important cloud characteristics both in vertical and horizontal directions. Herein the time and spatial distribution of the aerosol backscattering coefficient of S sub t and S sub c type clouds are investigated by means of a correlation analysis of the lidar obtained data provided from several arbitrary directions and heights. Author

N87-10350*# Utah Univ., Salt Lake City. Dept. of Meteorology.
MULTIPLE SCATTERING DEPOLARIZATION IN MARINE STRATUS CLOUDS: LIDAR EXPERIMENTS c32
Kenneth Sassen and Richard L. Petrilla *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

The depolarization of ruby lidar backscattering caused by multiple scattering in marine stratus clouds was examined systematically from a field site on the southern California coast. Investigated were the effects on the linear depolarization (delta) of lidar receiver field of view (FOV), elevation angle and laser beam pointing errors. An approximately linear increase in maximum delta values was observed with increasing receiver FOV, and the importance of accurate transmitter/receiver beam alignment was demonstrated during experiments in which the laser axis was deliberately misaligned. An elevation angle dependence to the delta values was observed as a consequence of the natural vertical inhomogeneity of water cloud content above the cloud base. Time histories of the depolarization characteristics of dissipating stratus clouds revealed significant spatial and temporal variability in delta values attributed to cloud composition variations. Employing a 1 mrad transmitter FOV, maximum delta values of 0.21 nd 0.33 were observed with 1 and 3 mrad receiver FOVs, respectively, from the low stratus clouds. The fundamental causes and effects on the lidar equation of multiple scattering are also discussed. Author

N87-10351*# Harry Diamond Labs., Adelphi, Md.
NEAR-IR EXTINCTION AND BACKSCATTER COEFFICIENT MEASUREMENTS IN LOW- AND MID-ALTITUDE CLOUDS c32
Z. G. Sztankay *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 6 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Knowledge of the attenuation and backscattering properties of clouds is required to high resolution for several types of optical sensing systems. Such data was obtained in about 15 hours of flights through clouds in the vicinity of Washington, D.C. The flights were mainly through stratocumulus, altocumulus, stratus, and stratus fractus clouds and covered an altitude and temperature range of 300 to 3200 m and -13 to 17 C. Two instruments were flown, each of which measured the backscatter from close range in two range bins to independently determine both the extinction and backscatter coefficients. The extinction and backscatter coefficients can be obtained from the signals in the two channels of each instrument, provided that the aerosol is uniform over the measurement region. When this assumptions holds, the extinction coefficient is derived basically from the ratio of the signal in the two channels; the backscatter coefficient can then be obtained from the signal in either channel. E.R.

N87-10352*# University Coll., Galway (Ireland). Dept. of Experimental Physics.
BACKSCATTER AND EXTINCTION MEASUREMENTS IN CLOUD AND DRIZZLE AT CO2 LASER WAVELENGTHS c32
S. G. Jennings *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

The backscatter and extinction of laboratory generated cloud and drizzle sized water drops were measured at carbon dioxide laser wavelengths (predominately at lambda = 10.591 micrometers). Two distinctly different drop size regimes were studied: one which covers the range normally encompassed by natural cloud droplets and the other representative of mist or drizzle sized drops. The derivation and verification of the relation between extinction and backscatter at carbon dioxide laser wavelengths should allow the determination of large cloud drop and drizzle extinction coefficient solely from a lidar return signal without requiring knowledge of the drop size distribution. This result will also apply to precipitation sized drops so long as they are spherical. Author

N87-10353*# Naval Postgraduate School, Monterey, Calif. Dept. of Physics.
CLOUD DETECTION BY LIDAR EXTINCTION CALCULATIONS

c47

W. J. Lentz *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04B

A new lidar method of measuring cloud ceiling height using the Klett solution to the lidar equation was developed. This simple technique will find cloud ceiling height for clouds that rangefinder-like lidars cannot theoretically detect. In addition, the noise signals that do not correspond to clouds removed by using the convergence of the Klett solution to discriminate between signal changes and broader signal changes due to clouds. Clouds above rain or light fog can be detected without error, and it is possible to discriminate against haze layers by the magnitude of their maximum extinction. Author

N87-10354*# Tohoku Univ., Sendai (Japan). Research Inst. of Electrical Communication.

WIDE-AREA REMOTE-SENSING SYSTEM OF POLLUTION AND GAS DISPERSAL BY NEAR-INFRARED ABSORPTION BASED ON LOW-LOSS OPTICAL FIBER NETWORK c45

Humio Inaba *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 13B

An all optical remote sensing system utilizing long distance, ultralow loss optical fiber networks is studied and discussed for near infrared absorption measurements of combustible and/or explosive gases such as CH4 and C3H8 in our environment, including experimental results achieved in a diameter more than 20 km. The use of a near infrared wavelength range is emphasized. Author

N87-10355*# Lund Inst. of Tech. (Sweden). Dept. of Physics.

A MOBILE SYSTEM FOR ACTIVE OTPICAL POLLUTION MONITORING c45

A. Sunesson, H. Edner, S. Svanberg, L. Uneus, W. Wendt, and K. Fredriksson (National Swedish Environment Protection Board, Stockholm.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 13B

The remote monitoring of atmospheric pollutants can now be performed in several ways. Laser radar techniques have proven their ability to reveal the spatial distribution of different species or particles. Classical optical techniques can also be used, but yield the average concentration over a given path and hence no range resolution. One such technique is Differential Optical Absorption Spectroscopy, DOAS. Such schemes can be used to monitor paths that a preliminary lidar investigation has shown to be of interest. Having previously had access to a mobile lidar system, a new system has been completed. The construction builds on experience from using the other system and it is meant to be more of a mobile optical laboratory than just a lidar system. A complete system description is given along with some preliminary usage. Future uses are contemplated. E.R.

N87-10356*# Centro Informazioni Studi Esperienze, Milan (Italy).

GAS CORRELATION LIDAR FOR METHANE DETECTION c46

E. Galletti, E. Zanzottera, S. Draghi, M. Garbi, and R. Petroni *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

A new type of DIAL system for the detection of methane in the atmosphere is being developed. The main feature of this lidar is the use of a gas correlation technique to obtain the reference signal by means of a single laser pulse, instead of two shots at different wavelengths. This fact is useful to make measurements on fast moving platforms. To meet the infrared absorption band of methane an optical parametric oscillator (OPO) was used with a LiNbO3 crystal as active element, and a tuning range between 1.5 divided by 4 microns. As known, the major problem to overcome in parametric oscillators are the pump beam quality and the difficulty in reducing the linewidth. The first requirement is met by using, as a pump, a Nd-YAG laser based on a new type of resonator cavity, named SFUR (Self Filtering Unstable Resonator). The laser emits, with high efficiency, near diffraction limited pulsed beams of about 250 mJ of energy, 20 ns of duration at 10 pps of frequency repetition rate. On the other hand, the gas correlation technique allows the operation with a bandwidth as large as 1/cm, which is obtainable using only a diffraction grating as a dispersive element in the OPO cavity. Author

N87-10357*# Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.

DETECTION OF NO SUB X,C2H4 CONCENTRATIONS BY USING CO AND CO2 LASERS c46

Wang Gengchen and Kong Qinxin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

A laser, especially the infrared line tunable laser, opens up a new way to monitor the atmospheric environment, and already has gotten effective practical application. One of the most serious problems in open path remote measurement at atmospheric pressure is the broadening effect which leads to increased linewidths, spectral interferences, and, as a result, tends to reduce detection sensitivity, so measuring laser wavelengths should be selected carefully, and interaction between the measuring wavelength and gas to be measured must be known very well. Therefore, N2O, No, NO2, CH4, NH3 and C2H4 absorption properties at some lines of CO and CO2 line tunable lasers were studied. The absorption coefficients of NO, NO2, and C2H4; some results on detection of NO sub x, C2H4 concentrations in both laboratory and field; and selection of measuring wavelengths and error analysis are discussed. Author

N87-10358*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

MAPM: A COHERENT DUAL CO2 LASER DIAL SYSTEM c46

William B. Grant and James R. Bogan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p Sponsored in part by AF (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

The Mobile Atmospheric Pollutant Mapping System (MAPM) is a dual CO2 laser DIAL system with heterodyne detection that is being developed for large distance range resolved measurement of organic solvent vapors and aerosol clouds. The components have been chosen to allow measurements to be made to distances of 6 to 7 km in a period of 20 to 30 s. The major components of the system are listed. MAPM is being integrated into a system and will be tested with several organic solvent gases and vapors in a remotely positioned sample chamber and with a free release of ethylene. Experimental results and system performance are discussed. Author

N87-10359*# National Physical Lab., New Delhi (India). Radio Science Div.

LASER HETERODYNE SYSTEM FOR OBTAINING HEIGHT PROFILES OF MINOR SPECIES IN THE ATMOSPHERE c46

S. L. Jain and A. K. Saha *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 04A

An infrared laser heterodyne system for obtaining height profiles of minor constituents of the atmosphere was developed and erected. A brief discription of the system is given. The system consists of a tunable CO2 waveguide laser in the 9 to 11 micrometer band, that is used as a local oscillator and a heliostat that follows the sun and brings in solar radiation, that is mixed with the laser beam in a high speed liquid nitrogen cooled mercury cadmium telluride detector. The detected signal is analysed in a RF spectrum analyser that allows tracing absorption line profiles. Absorption lines of a number of minor constituents in the troposphere and

stratosphere, such as O3, NH3, H2O, SO2, ClO, N2O, are in the 9 to 11 micrometer band and overlap with that of CO2 laser range. The experimental system has been made operational and trial observations taken. Current measurements are limited to ozone height profiles. Results are presented. Author

N87-10360*# Arizona Univ., Tucson.
COHERENT LIDAR SIGNAL FLUCTUATION REDUCTION BY MEANS OF FREQUENCY DIVERSITY TECHNIQUE c36
R. M. Schotland, P. Vujkovic Cvijin, and Yan-Zeng Zhao *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

The atmospheric return measured by a coherent lidar is typically characterized by rapid and deep fluctuations in signal strength. These fluctuations result from the interference of the fields backscattered to the lidar from randomly located aerosol particles which move relative to the lidar pulse. In many applications, it is necessary to determine the average value of the lidar signal intensity at some range. A new method utilizes frequency diversity initially suggested by Goldstein and subsequently studied in the microwave radar domain by others. It is expected that the application of the frequency diversity method in the coherent lidar domain will eventually provide greater efficiency and speed in the return signal averaging needed to obtain accurate intensity estimates. The frequency diversity method recognizes that the transmitted lidar pulse is very long compared to a wavelength and consequently a given phase, theta sub i, is repeated many times within the pulse. In order to test this concept, a fairly simple laboratory experiment was designed which simulates scattering of a lidar pulse from atmospheric aerosol. The testing of the frequency diversity method is discussed. E.R.

N87-10361*# Coherent Technologies, Inc., Boulder, Colo.
WAVELENGTH DEPENDENCE OF COHERENT AND INCOHERENT SATELLITE-BASED LIDAR MEASUREMENTS OF WIND VELOCITY AND AEROSOL BACKSCATTER c47
Michael J. Kavaya and R. Milton Huffaker *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

The results are presented of a capability study of Earth orbiting lidar systems, at various wavelengths from 1.06 to 10.6 microns, for the measurement of wind velocity and aerosol backscatter, and for the detection of clouds. Both coherent and incoherent lidar systems were modeled and compared for the aerosol backscatter and cloud detection applications. E.R.

N87-10362*# National Center for Atmospheric Research, Boulder, Colo. Research Aviation Facility.
THE NCAR AIRBORNE INFRARED LIDAR SYSTEM (NAILS) c36
R. L. Schwiesow and P. A. Lightsey *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A planned airborne lidar system is presented which is intended to provide a remote sensing facility for a variety of applications. The eventual goal of the system development is a Doppler wind measurement capability for boundary layer dynamics and cloud physics applications. The first stage of development is focused initially on a direct detection lidar to measure aerosol profiles and depolarization from cloud backscatter. Because of the Doppler goal, interest in larger particles to define the top of the mixed layer, and eye safety, the first stage of the system is based on a pulsed CO2 laser. A compact, relatively simple and inexpensive system that achieves flexibility to meet the data requirements of a variety of investigators by being easily modified rather than having many different capabilities built in is the goal. Although the direct detection sensitivity is less than that for heterodyne detection, the simpler system allows the achievement of useful scientific results and operating experience towards more complex lidars while staying within budget and time constraints. Author

N87-10363*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ATMOSPHERIC CORRELATION TIME MEASUREMENTS USING COHERENT CO2 LIDAR c46
G. M. Ancellet and R. T. Menzies *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

A pulsed TEA-CO2 lidar with coherent detection was used to measure the correlation time of backscatter from an ensemble of atmospheric aerosol particles which are illuminated by the pulsed radiation. The correlation time of the backscatter return signal is important in studies of atmospheric turbulence and its effects on optical propagation and backscatter. If the temporal coherence of the pulse is large enough, then the temporal coherence of the return signal is dominated by the turbulence and shear for a variety of interesting atmospheric conditions. Various techniques for correlation time measurement are discussed and evaluated. Author

N87-10364*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
PULSED MONONODE DYE LASER DEVELOPED FOR A GEOPHYSICAL APPLICATION c36
J. P. Jegou, T. Pain, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

Following the extension of the lidar technique in the study of the atmosphere, the necessity of having a high power pulsed laser beam with a narrowed bandwidth and the possibility of selecting a particular wavelength within a certain spectral region arises. With the collaboration of others, a laser cavity using the multiwave Fizeau wedge (MWFW) was developed. Using the classical method of beam amplification with the aid of different stages, a new pulsed dye laser device was designed. The originality resides in the use of reflecting properties of the MFWF. Locally a plan wave coming with a particular angular incidence is reflected with a greater than unity coefficient; this is the consequence of the wedge angle which doubles the participation of every ray in the interferometric process. This dye laser operation and advantages are discussed. The feasibility of different geophysical applications envisageable with this laser is discussed. Author

N87-10365*# RCA Astro-Electronics Div., Princeton, N. J.
CALIBRATION AND ANALYSIS FOR A 0.53 MICRON INCOHERENT DOPPLER LIDAR c36
J. Sroga and A. Rosenberg *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

A ground based, prototype Doppler lidar is being developed to demonstrate the feasibility of an incoherent detection technique to remotely measure winds in the atmosphere. This prototype system consists of a narrow band, single frequency laser transmitter, a high resolution, Fabry-Perot Interferometer utilizing a multichannel image plane detector and a data acquisition system. A description of the prototype Doppler lidar hardware is given in Rosenberg and Sroga, 1985. The calibration and analysis procedures for this system is described. Preliminary results from data obtained with the system pointed vertically is presented. Author

N87-10366*# European Nuclear Energy Agency, Frascati (Italy). Div. Fisica Applicata.
CO2 LIDAR SYSTEM FOR ATMOSPHERIC STUDIES c46
R. Barbini, A. Ghigo, M. Giorgi, K. N. Iyer, A. Palucci, and S. Ribezzo *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

A lidar facility using a TEA CO2 laser source is being developed at the ENEA Laboratories for Atmospheric Studies. The different subsystems and the proposed experimental activities are described. Author

N87-10367*# Wisconsin Univ., Madison. Dept. of Meteorology.
GENERATION OF ATTENUATION CORRECTED IMAGES FROM LIDAR DATA
Edwin W. Eloranta and Daniel K. Forrest *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 05B

The interpretation of data generated by aerosol backscatter lidars is often facilitated by presentation of RHI and PPI images. These pictures are especially useful in studies of atmospheric boundary layer structure where convective elements, stratifications and aerosol laden plumes can be easily delineated. Procedures used at the University of Wisconsin to generate lidar images on a color enhanced raster scan display are described. Author

N87-10368*# Optech, Inc., Downsview (Ontario).
GAS DISPERSION MEASUREMENTS USING A MOBILE RAMAN LIDAR SYSTEM c43
J. D. Houston and D. R. Brown *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

The exploitation of natural gas resources to supply energy demands has resulted in the need to engineer pipelines and plants capable of handling extremely high pressures and throughputs. Consequently, more attention has been directed to evaluating the consequences of releases of material whether accidental or deliberate in nature. An important aspect of assessing the consequences of a release is an understanding of how gas disperses in the atmosphere over a wide range of release and atmospheric conditions. The most cost effective way of providing such information is through the development and use of reliable theoretical prediction methods. The need for some form of remote sensing device was identified. The various possibilities studied led to the conclusion that LIDAR (Light Detection And Ranging) offered the most suitable method. The system designed and built is described, and its recent use in monitoring operational ventings from a high pressure transmission system is discussed. E.R.

N87-10369*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
SPECTROSCOPIC ASPECTS OF DIFFERENTIAL METHOD FOR SOUNDING GAS COMPOSITION OF THE ATMOSPHERE c46
V. V. Zuev, I. I. Ippolitov, and Yu. N. Ponomarev *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

The problems concerning the dynamics of populations of the sounded atmospheric gas molecule levels taking into account the nonmonochromatic character of radiation, durations of exciting and sounding pulses, rates of relaxation of excited vibration-rotation states population along different channels in a natural multicomponent mixture of gases and air were investigated. The problems of spectroscopic software, completeness and accuracy of the initial spectroscopic information, information on channels and rates of relaxation from the viewpoint of developing specific schemes of sounding are discussed. The values of deviations of vibration-rotation level populations of some atmospheric molecules from their equilibrium value at simultaneous action of double frequency radiation on the sounding path and the corresponding dynamic variation of lidar return amplitude were estimated. The importance of nonlinear spectrosopic effects in the lidar return value variation at sounding radiation frequency equaling the resonance frequency of vibration-rotation transition in the problem on sounding the humidity profiles and concentrations of gaseous pollutants was also estimated. Author

N87-10370*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LINEWIDTH CHARACTERISTICS OF RAMAN-SHIFTED DYE LASER OUTPUT AT 720 AND 940 nm c32
B. E. Grossmann, U. N. Singh (Maryland Univ., College Park.), N. S. Higdon, L. J. Cotnoir, T. D. Wilkerson, and E. V. Browell *In its* 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20N

Existing DIAL systems for water vapor measurements in the troposphere operate at wavelengths near 720 nm. The use of stronger water vapor absorption lines in the range 930 to 960 nm will significantly improve DIAL measurements in the upper troposphere and lower stratosphere where water vapor concentrations are low. The generation of light at 940 nm using a frequency doubled Nd:YAG pumped dye laser is inefficient due to the small absorption if infrared dyes at the pump wavelength. However, 940 nm generation utilizing stimulated Raman scattering of dye lasers is attractive because of a potentially high conversion efficiency plus the possibility of retaining the narrow linewidth available from some dye lasers. The Raman conversion efficiency and line broadening are presented for first Stokes operation at 720 and 940 nm using hydrogen and deuterium as the Raman media. E.R.

N87-10371*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GSFC GOUND-BASED LIDAR FOR THE MEASUREMENT OF STRATOSPHERIC OZONE c46
Thomas J. McGee *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

Concern has risen over the last decade concerning the release of gases into the atmosphere which when photolyzed in the stratosphere can catalyze the destruction of ozone. Although the expected change is only on the order of 5%, significant changes in the vertical profile are anticipated. Predictions at 40 km run as high as a 60% change in the next 50 to 100 years. Because of the importance of ozone in the thermal budget of the atmosphere, such a change will have a direct impact on the earth's climate. Long term monitoring of stratospheric ozone is required to validate the predictions and Differential Absorption Lidar is particularly well suited to this measurement. GSFC is currently constructing a mobile lidar system based on a high powered XeCl excimer laser. The system is expected to be operating by fall 1986 and a campaign to compare the lidar results with a series of ROCOZ flights is planned. Author

N87-10372*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LINEWIDTH CHARACTERISTICS OF RAMAN-SHIFTED DYE LASER OUTPUT AT 720 AND 940 nm c36
B. E. Grossmann, U. N. Singh (Maryland Univ., College Park.), N. S. Higdon, L. J. Cotnoir, T. D. Wilkerson, and E. V. Browell *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
(Contract NCCI-32)
Avail: NTIS HC A15/MF A01 CSCL 20E

A compact and simple simultaneous multi-wavelength dye laser cavity was developed for a differential absorption technique. Dielectric multilayer interference filters were inserted inside the cavities as tuning elements, and two types of a DIAL system were constucted by using the dye laser tuned with dielectric multilayer filters to measure NO2 concentration. The usefulness of this dye laser was clarified for the differential absoroption technique in outdoor experiments. Some basic designs of the laser cavity with these filters to get simultaneously multi-wavelength output are summarized. E.R.

N87-10373*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).

ALEXANDRITE LASER SOURCE FOR ATMOSPHERIC LIDAR MEASUREMENTS c36

J. Pelon, C. Loth, P. Flamant, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20E

During the past years, there has been a marked increase in interest in the applications of vibronic solid state lasers to meteorology and atmospheric physics. Two airborne lidar programs are now under development in France. The differential absorption lidar (DIAL) method with vibronic solid state lasers is very attractive for water vapor, temperature and pressure measurements. Alexandrite laser and titanium-sapphire are both suitable for these applications. However, only alexandrite rods are commercially available. The requirements on the laser source for airborne dial applications are two fold: (1) a restriction on laser linewidth and a requirement on stability and tunability with a good spectral purity; and (2) a requirement on the time separation between the two pulses. These constraints are summarized. Author

N87-10374*# National Inst. for Environmental Studies, Tsukuba (Japan).

THE TFP AND A PULSED LD: NEW LIDAR COMPONENTS c36

Hiroshi Shimizu, Ichiro Matsui, and Kazuhiro Asai (Tohoku Univ., Sendai (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20E

One of the large problems of lidar in practical use is that the price and the weight of a laser and a receiving telescope is too high. To solve this problem, many trials have been made. The system with the TFP (thin film paraboloid) for a receiving telescope and a pulsed LD (laser diode) for a laser source is proposed. It is hoped that as a consequence the lidar system will become very lightweight and inexpensive. Author

N87-10375*# Army Chemical Research and Development Center, Aberdeen Proving Ground, Md.

CHEMICAL CONTAMINATION REMOTE SENSING c45

John P. Carrico, Kirkman R. Phelps, Ernest N. Webb, Raymond A. Mackay, and E. R. Murray (SRI International Corp., Menlo Park, Calif.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 13B

A ground mobile laser test bed system was assembled to assess the feasibility of detection of various types of chemical contamination using Differential Scattering (DISC) and Differential Absorption (DIAL) Lidar techniques. Field experiments with the test bed system using chemical simulants were performed. Topographic reflection and range resolved DIAL detection of vapors as well as DISC detection of aerosols and surface contamination were achieved. Review of detection principles, design of the test bed system, and results of the experiments are discussed. Author

N87-10376*# Smithsonian Astrophysical Observatory, Cambridge, Mass.

RESEARCH RELATIVE TO HIGH RESOLUTION CAMERA ON THE ADVANCED X-RAY ASTROPHYSICS FACILITY Final Report, 13 May 1985 - 15 Mar. 1986

Sep. 1986 14 p

(Grant NAG8-527)

(NASA-CR-179757; NAS 1.26:179757) Avail: NTIS HC A02/MF A01 CSCL 14E

The HRC (High Resolution Camera) is a photon counting instrument to be flown on the Advanced X-Ray Astrophysics Facility (AXAF). It is a large field of view, high angular resolution, detector for the x-ray telescope. The HRC consists of a CsI coated microchannel plate (MCP) acting as a soft x-ray photocathode, followed by a second MCP for high electronic gain. The MCPs are readout by a crossed grid of resistively coupled wires to provide high spatial resolution along with timing and pulse height data. The instrument will be used in two modes, as a direct imaging detector with a limiting sensitivity of 10 to the -15 ergs sq cm sec in a 10 to the 5th second exposure, and as a readout for an objective transmission grating providing spectral resolution of several hundreds to thousands. Autho

N87-10377*# United Technologies Corp., East Hartford, Conn.

DEMONSTRATION OF LASER SPECKLE SYSTEM ON BURNER LINER CYCLIC RIG Final Report

Karl A. Stetson Jun. 1986 28 p

(Contract NAS3-24615)

(NASA-CR-179509; NAS 1.26:179509; R86-927298-10) Avail: NTIS HC A03/MF A01 CSCL 14B

A demonstration test was conducted to apply speckle photogrammetry to the measurement of strains on a sample of combustor liner material in a cyclic fatigue rig. A system for recording specklegrams was assembled and shipped to the NASA Lewis Research Center, where it was set up and operated during rig tests. Data in the form of recorded specklegrams were sent back to United Technologies Research Center for processing to extract strains. Difficulties were found in the form of warping and bowing of the sample during the tests which degraded the data. Steps were taken by NASA personnel to correct this problem and further tests were run. Final data processing indicated erratic patterns of strain on the burner liner sample. Autho

N87-10378# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.

INTEGRATED-OPTICAL COMPONENTS FOR FIBER GYROSCOPES

Leonard M. Johnson 1985 4 p

(Contract F19628-80-C-0002)

(AD-A167624; MS-6890; ESD-TR-86-011) Avail: NTIS HC A02/MF A01 CSCL 14/2

Progress in developing a fiber-gyroscope integrated-optical chip is reviewed. Two LiNbO3 channel-waveguide components are described. Excess insertion loss as low as 5.5 dB has been obtained in a double-Y branch and 40 dB sideband suppression has been achieved in a serrodyne frequency translator. Integrated optical circuits which can perform the function of a combination of bulk optical components are of considerable interest for fiber-gyroscope systems. These circuits could be utilized to reduce both system size and complexity as well as to improve system performance. Integrated-optical circuits could include components such as beam splitters, polarizers, intensity modulators, phase modulators and frequency shifters. Here we review recent progress in realizing a fiber-gyroscope integrated-optical chip, including the design and performance of two LiNb03 channel-waveguide components, a double-Y branch and a serrodyne frequency translator. GR

N87-10379# Los Alamos National Lab., N. Mex.

ATTEMPTS TO CHARACTERIZE MICROBALLOON SENSORS FOR SHOCK VELOCITY AND MATERIAL MOTION STUDIES

H. W. Kruse, L. D. Looney, R. C. Taylor, R. S. Medina, J. S. Baumgart (Edgerton, Germeshausen and Grier, Inc., Los Alamos N. Mex.), G. T. Baca, and D. E. Dominguez 1986 15 p Presented at the 11th International Pyrotechnics Seminar, Vail, Colo, 7 Jul 1986

(Contract W-7405-eng-36)

(DE86-011210; LA-UR-86-1704; CONF-860739-12) Avail: NTIS HC A02/MF A01

Optimization of performance of gas filled microballoons mounted on optical fibers as sensors for shock and material motion studies, was attempted by variation of several parameters. In some cases, results were not predictable and, in general, results were not as reproducible as desired. Change of some parameters caused little effect but effects of the sleeve size and sleeve material seem to be significant. Recorded shape of optical spectra matched black-body temperature of 8000 K when argon filled balloons were impacted with projectiles with velocity of 1 km/s, in close agreement with expected values based on ideal gas calculations. DO

N87-10474*# Saskatchewan Univ., Saskatoon. Inst. of Space and Atmospheric Studies.
COMPARISON OF MEDIUM FREQUENCY PULSED RADAR INTERFEROMETER AND CORRELATION ANALYSIS WINDS, PART 1
C. E. Meek, I. M. Reid, and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 14B

N87-10475*# Saskatchewan Univ., Saskatoon. Inst. of Space and Atmospheric Studies.
COMPARISON OF MEDIUM FREQUENCY PULSED RADAR INTERFEROMETER AND CORRELATION ANALYSIS WINDS, PART 2
C. E. Meek, I. M. Reid, and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.
For related information see also *76 Solid-State Physics.*

N87-10380# Brookhaven National Lab., Upton, N. Y.
TRANSVERSE CORRELATIONS IN START-UP OF A FREE ELECTRON LASER FROM NOISE
L. H. Yu and S. Krinsky Mar. 1986 12 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986
(Contract DE-AC02-76CH-00016)
(DE86-009917; BNL-37898; CONF-860316-4) Avail: NTIS HC A02/MF A01

Linearized Vlasov-Maxwell equations are used to derive a partial differential equation determining the 3-dimensional slowly varying envelope function of the radiated electric field. The equation is solved analytically. From the correlation function <E(z,r,t) E*(z',r',t)> of the electric field averaged over the stochastic ensemble describing the initial shot noise in the beam, the longitudinal and transverse correlation lengths sigma(sub L) and sigma(sub T) are computed. The radiated power S per unit cross-sectional area of the the electron beam is determined. Our analysis is applicable for wiggler length L = N(sub w)lambda(sub w) long enough for the exponential regime to be researched, but short enough so that L sigma(sub theta) is less than or equal to a, the electron beam radius. DOE

N87-10381# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
POSSIBILITY OF OBTAINING COHERENT SHORT WAVE RADIATION FROM A SOLID STATE FREE ELECTRON LASER
S. A. Bogacz and J. B. Ketterson Mar. 1986 9 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986 Prepared in cooperation with Argonne National Lab., Ill.
(Contract W-31-109-eng-38)
(DE86-010525; CONF-860316-7) Avail: NTIS HC A02/MF A01

The idea of using a crystal lattice or a superlattice as an undulator for a free electron laser is explored. A purely classical treatment of relativistic positrons channeling through the proposed structure involving a self consistent solution of the wave equation for the radiating electromagnetic field and the kinetic equation for the positron distribution function leads to a positive gain coefficient for a forward radiating field. Matching the Kumakhov resonance to the undulator frequency further enhances the gain. This result, combined with a feedback mechanism arising from Bragg diffraction within the basic crystal lattice, leads to an instability of the radiation inside the crystal. Finally a numerical estimate of the Kumakhov-enhanced gain coefficient is made for the (110) planar channeling in a strain modulated Si superlattice. DOE

N87-10382# Rochester Univ., N. Y. Inst. of Optics.
NONLINEAR OPTICS WITH BROAD-BAND LASERS Progress Report, 15 Jul. 1985 - Jul. 1986
M. G. Raymer Mar. 1986 9 p
(Contract DE-AC02-81ER-10979)
(DE86-011286; DOE/ER-10979/12) Avail: NTIS HC A02/MF A01

Progress has been made in the studies of both stimulated Raman scattering (SRS) with pulsed broad-band lasers and the statistical behavior of multimode cw dye lasers. It has been observed that in pumping SRS by a broad-band dye laser intensity fluctuations in the pump laser are transferred to some extent to the generated Stokes light. The intensity cross-correlation function between the pump and Stokes were directly measured and its form was found to be influenced by the medium's relaxation time. The statistical properties of a cw dye laser are being studied by observing its intensity autocorrelation function and corresponding power spectrum. DOE

N87-10383# Los Alamos National Lab., N. Mex.
OVERTONE PRODUCTION OF SOFT X-RAYS WITH FREE-ELECTRON LASERS
M. J. Schmitt, C. J. Elliott, K. Lee, and B. D. McVey 1986 8 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986
(Contract W-7405-eng-36)
(DE86-011248; LA-UR-86-1682; CONF-860316-8) Avail: NTIS HC A02/MF A01

Two one-dimensional free-electron laser codes have recently been written that include harmonic generation. A comparison of the results of these codes shows that a self-consistent treatment of the harmonic interaction is not required in the presence of a strong fundamental field. Use of these codes to predict the effects of emittance on harmonic production have been conducted. The effects of wiggler-field amplitude fluctuations and odd-harmonic wiggler-field components on the harmonic-radiation production are also discussed. DOE

N87-10384# Los Alamos National Lab., N. Mex.
LONG-PULSE EXCIMER LASERS FOR MATERIALS PROCESSING AND MEDICAL APPLICATIONS
Robert Chia-Ting Sze 1986 17 p Presented at the OPTO '86 Conference, Paris, France, 13 May 1986
(Contract W-7405-eng-36)
(DE86-011267; LA-UR-86-1525; CONF-8605110-2) Avail: NTIS HC A02/MF A01

This report discusses a passive stabilization technique that not only allows long pulse laser operation, but allows for a much slower charging circuit as well as a factor of 10 gain in pulse repetition rate per given gas flow compared with more conventional excimer laser systems. The slower charging circuit greatly eases the stress on the pulse power components such as thyrations and capacitors and should be an important factor contributing to dependable industrial excimer laser systems. The gain of a factor of 10 in pulse repetition rate per unit gas flow results in extremely high pulse repetition rate laser systems in a very compact package; such lasers should find a place in a number of industrial and medical applications. DOE

N87-10385# Chicago Univ., Ill.
LASER INDUCED CHEMICAL REACTIONS AND LASER-COLLISION PROCESSES Final Technical Report, 1 May 1978 - 30 Apr. 1986
J. C. Light May 1986 5 p
(Contract DE-AC02-78ER-04908)
(DE86-011459; DOE/ER-04908/T1) Avail: NTIS

HC A02/MF A01

Theoretical investigations into the dynamics of atoms and molecules in strong radiation (laser) fields and under electron impact have been carried out. The studies were carried out using quantum mechanics and new approaches were developed for six major areas. First, a new and much more efficient method of solving the time independent quantum scattering equations was developed (VIVAS) and has been disseminated. Second, laser-collision processes were investigated and a negative result was determined. Only under very special circumstances and very strong laser fields can the field affect the course of a collision process (versus affecting the states of reactants before collisions). Third, methods for calculating multiphoton absorption by diatomic and polyatomic molecules were developed and applied. Fourth, methods of calculating the final states from single photon photodissociation of triatomic molecules were developed and applied. Analogous methods were developed and applied to electron-molecule collisions which result in either vibrational excitation or dissociative attachment. The first accurate calculations of dissociative-attachment of a triatomic molecule (CO) were made. Finally, the distributed Gaussian basis was developed as a general basis for the quantum calculations of vibrational states of polyatomic molecules. DOE

N87-10386# Los Alamos National Lab., N. Mex.
SCATTERED RADIATION FIELD OF A LASER BEAM PROPAGATING THROUGH TURBID MEDIA
S. A. W. Gerstl, S. M. Chitanvis, and A. Zardecki 1986 9 p Presented at the 10th Smoke-Obscurants Symposium, Adelphi, Md., 22 Apr. 1986
(Contract W-7405-eng-36)
(DE86-010188; LA-UR-86-1332; CONF-8604181-1) Avail: NTIS HC A02/MF A01

A combination of the small-angle approximation and the diffusion approximation is used to study the propagation of laser beams through dense scattering media. DOE

N87-10387# Los Alamos National Lab., N. Mex.
SUBPICOSECOND HIGH-BRIGHTNESS UV LASER SYSTEM
R. B. Gibson 1986 5 p Presented at the Society of Photo-Optical Instrumentation Engineers International Symposium: Topics in Optical and Optoelectronic Applied Sciences and Engineering, Quebec City, Canada, 2 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011271; LA-UR-86-1499; CONF-860620-3) Avail: NTIS HC A02/MF A01

A laser system that produces intense subpicosecond pulses of 248 nm light is under development. Ultrashort pulses are generated in the visible in a synchronously-pumped mode-locked dye oscillator, heterodyned into the uv by two KDP crystals, and amplified in a chain of KrF* amplifiers. Front end output of 5 micro-J is amplified to 20 mJ and focused to peak intensities of order 10 to the 17th power W/cm. Additional amplification is expected to permit experiments at intensities >10 to the 20th power W/cm. DOE

N87-10388# Los Alamos National Lab., N. Mex.
LASER-INITIATED CHAIN REACTIONS IN THE PARTIAL OXIDATION OF METHANE
S. L. Baughcum, R. C. Oldenborg, W. C. Danen, G. E. Streit, and C. Rofer 1986 28 p Presented at the Society of Photo-Optical Instrumentation Engineers International Symposium: Topics in Optical and Optoelectronic Applied Sciences and Engineering, Quebec City, Canada, 2 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011272; LA-UR-86-1483; CONF-860620-4) Avail: NTIS HC A03/MF A01

Using laser photolysis of suitable precursor molecules to produce gas-phase free radicals, we have been studying important kinetic processes in the partial oxidation of methane. Prompt production of a relatively high concentration of free radicals via laser photolysis makes it possible to separate the thermal initiation step from the subsequent chain propagation steps. Since the conditions (temperature, pressure, and mixture composition) for rapid thermal initiation and optimum production may differ, this provides an exciting potential application for laser-induced chemistry where the laser acts as the initiation source. We report our results on the partial oxidation of methane by oxygen at moderate temperatures. A trace amount of acetone is photolyzed at 193 nm a prompt source of methyl radicals in methane-oxygen mixtures. Details of the proposed mechanism are discussed as well as application of the technique to technologies for methane conversion to transportable fuels such as methanol. DOE

N87-10389# Virginia Univ., Charlottesville.
HIGH PRECISION ABSOLUTE LASER POWER MEASUREMENTS USING A MAGNETICALLY SUSPENDED ROTOR
G. T. Gillies and S. W. Allison 1985 3 p Presented at the International Laser Science Conference, Dallas, Tex., 18 Nov. 1985 Prepared in cooperation with Oak Ridge Gaseous Diffusion Plant, Tenn.
(Contract DE-AC05-84OT-21400)
(DE86-011585; K/TS-11-704; CONF-851185-20) Avail: NTIS HC A02/MF A01

Improvements to a torsion pendulum technique for making radiation pressure based measurements of laser power absolutely are presented. By replacing torsion fiber suspensions with magnetic suspensions, increases in sensitivity and reduced systematic drift are possible. DOE

N87-10264*# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
ESA ACTIVITIES IN SPACE LASER SOUNDING AND RANGING
H. Lutz *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10266*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TUNABLE SOLID-STATE LASER TECHNOLOGY FOR APPLICATIONS TO SCIENTIFIC AND TECHNOLOGICAL EXPERIMENTS FROM SPACE
F. Allario and L. V. Taylor *In its* 13th International Laser Radar Conferance Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10269*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. for Atmospheric Physics.
MIE LIDAR PROPOSED FOR THE GERMAN SPACE SHUTTLE MISSION D2
W. Renger, M. Endemann (Battelle Inst., Frankfurt am Main (West Germany).), H. Quenzel (Ludwig-Maximilians-Universitaet, Munich (West Germany).), and Ch. Werner *In* NASA. Langley Research center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10270*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE LIDAR IN-SPACE TECHNOLOGY EXPERIMENT (LITE)
M. P. McCormick *In its* 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10278*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
LIDAR MEASUREMENTS OF SLANT VISUAL RANGE
Yu. S. Balin, S. I. Kavkyanov, G. M. Krekov, and I. A. Razenkov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10279*# National Inst. for Environmental Studies, Tsukuba (Japan).
VISIBILITY AND AEROSOL MEASUREMENT BY DIODE-LASER RANDOM-MODULATION CW LIDAR
N. Takeuchi, H. Baba (Tokyo Univ. (Japan).), K. Sakurai, T. Ueno (Chiba Univ. (Japan).), and N. Ishikawa *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10280*# Arizona Univ., Tucson. Inst. of Atmospheric Physics.
CORRECTION FUNCTION IN THE LIDAR EQUATION AND THE SOLUTION TECHNIQUES FOR CO2 LIDAR DATE REDUCTION
Yanzeng Zhao, Ting Kaung Lea, and Richard M. Schotland *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10281*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ASSESSMENT OF DIAL DATA COLLECTION AND ANALYSIS TECHNIQUES
E. V. Browell and P. T. Woods (National Physical Lab., Teddington (England).) *In its* 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10282*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AIRBORNE LIDAR MEASUREMENTS OF THE ATMOSPHERIC PRESSURE PROFILE WITH TUNABLE ALEXANDRITE LASERS
C. L. Korb, G. K. Schwemmer, M. Dombrowski, J. Milrod, and H. Walden *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10284*# Radio Research Labs., Tokyo (Japan). Ministry of Posts and Telecommunications.
FLIGHT TESTS OF A RANGE-RESOLVED AIRBORNE DIAL WITH TWO MIN-TEA CO2 LASERS
T. Itabe, M. Ishizu, T. Aruga, T. Igarashi, and K. Asai (Tohoku Univ., Sendai (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10285*# RCA Astro-Electronics Div., Princeton, N. J.
Nd:GLASS-RAMAN LASER FOR WATER VAPOR DIAL
R. H. Kagann, J. C. Petheram, and A. Rosenberg *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10289*# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
ATMOSPHERIC CONTRIBUTIONS TO THE COLUMN VARIANCE IN DIRECT-DETECTION DIAL
M. J. T. Milton and P. T. Woods *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10290*# Maryland Univ., College Park. Inst. for Physical Science.
HIGH SPECTRAL PURITY, NARROW LINEWIDTH LASER TRANSMITTER FOR DIAL MEASUREMENTS
U. N. Singh and P. H. Flamant (Laboratoire de Meteorologie Dynamique du CNRS, Palaiseau (France).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10292*# Naval Research Lab., Washington, D. C. Atmospheric Physics Branch.
USING A LASER AUREOLE TO INVERT LIDAR RETURN
William P. Hooper and H. Gerber *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10307*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
THE INFLURENCE OF AN OPTICAL RECEIVING SYSTEM ON STATISTICAL CHARACTERISTICS OF A LIDAR SIGNAL
A. E. Zuev, V. A. Banakh, and V. L. Mironov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10308*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
COHERENT LIDARS BASED ON INTRACAVITY HETERODYNING OF ECHO SIGNALS
V. E. Zuev, S. D. Burakov, A. P. Godlevskii, Yu. D. Kopytin, S. V. Lazarev, S. A. Ostanin, and P. O. Sharin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10309*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics
THE INFLUENCE OF SCATTERING PARTICLES MORPHOLOGY ON THE CHARACTERISTICS OF LIDAR SIGNALS
V. E. Zuev, I. E. Naats, and A. A. Popov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10311*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMPPOVEMENTS IN THE GODDARD BALLOON-BORNE LIDAR
William S. Heaps *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10323*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ROTATIONALLY RESOLVED COLLISIONAL TRANSFER RATES IN OH
Thomas J. McGee, James Butler, John Burris, and William Heaps *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10324*# Okayama Univ. (Japan).
TIME-DOMAIN SENSITIVITY ENHANCEMENT IN PULSED Pb-TDL GAS MONITORS
R. Koga, M. Kosaka, and H. Sano *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10325*# University of the West Indies, Mona (Jamaica). Dept. of Physics.
PERFORMANCE TESTING OF LIDAR RECEIVERS
M. Y. Shams *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10326*# Royal Signals and Radar Establishment, Malvern (England).
PROGRESS IN COHERENT LASER RADAR
J. M. Vaughan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10360*# Arizona Univ., Tucson.
COHERENT LIDAR SIGNAL FLUCTUATION REDUCTION BY MEANS OF FREQUENCY DIVERSITY TECHNIQUE
R. M. Schotland, P. Vujkovic Cvijin, and Yan-Zeng Zhao *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10362*# National Center for Atmospheric Research, Boulder, Colo. Research Aviation Facility.
THE NCAR AIRBORNE INFRARED LIDAR SYSTEM (NAILS)
R. L. Schwiesow and P. A. Lightsey *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10364*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
PULSED MONONODE DYE LASER DEVELOPED FOR A GEOPHYSICAL APPLICATION
J. P. Jegou, T. Pain, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10365*# RCA Astro-Electronics Div., Princeton, N. J.
CALIBRATION AND ANALYSIS FOR A 0.53 MICRON INCOHERENT DOPPLER LIDAR
J. Sroga and A. Rosenberg *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10372*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LINEWIDTH CHARACTERISTICS OF RAMAN-SHIFTED DYE LASER OUTPUT AT 720 AND 940 nm
B. E. Grossmann, U. N. Singh (Maryland Univ., College Park.), N. S. Higdon, L. J. Cotnoir, T. D. Wilkerson, and E. V. Browell *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
(Contract NCCI-32)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10373*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
ALEXANDRITE LASER SOURCE FOR ATMOSPHERIC LIDAR MEASUREMENTS
J. Pelon, C. Loth, P. Flamant, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10374*# National Inst. for Environmental Studies, Tsukuba (Japan).
THE TFP AND A PULSED LD: NEW LIDAR COMPONENTS
Hiroshi Shimizu, Ichiro Matsui, and Kazuhiro Asai (Tohoku Univ., Sendai (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N87-10390 Carnegie-Mellon Univ., Pittsburgh, Pa.
DYNAMIC MODELING AND CONTROL OF ROBOTIC MANIPULATORS Ph.D. Thesis
Vassilios Dimitrios Tourassis 1985 255 p
Avail: Univ. Microfilms Order No. DA8601197

The objective of this dissertation is to advance the state of the art in the dynamic modeling and feedback control robotic manipulators with rigid links. The dissertation revolves around three complementary themes: robot dynamics, discrete-time dynamic robot modeling, and nonlinear feedback robot control. Controller design for manipulators requires a fundamental physical understanding of the properties and structure of robot dynamics. Robot dynamics are embedded in the mathematical foundations of classical mechanics to introduce novel physical interpretations and structural characteristics of the closed-form dynamic robot model. This approach reinforces the need to integrate the mechanical and controller designs of robotic manipulators. An inherently discrete-time dynamic robot model, which is compact and designed for computer-control of robots, is then introduced. The model guarantees conservation of energy (and momentum, if appropriate) over each sampling period. This discrete-time dynamic robot model is acceleration-free and is attractive for both forward and inverse dynamics applications in trajectory planning and dynamic feedback control. A review of the fundamental principles of nonlinear feedback robot control algorithms leads to an outline of the practical problems introduced by modeling inaccuracies, unmodeled dynamics and parameter errors. The alpha-computed-torque nonlinear feedback control algorithm, which is robust in the presence of these modeling errors is then introduced. Dissert. Abstr.

N87-10391*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TESTING OF UH-60A HELICOPTER TRANSMISSION IN NASA LEWIS 2240-kW (3000-HP) FACILITY
Andrew M. Mitchell, Fred B. Oswald, and Harold H. Coe Aug. 1986 30 p
(NASA-TP-2626; E-2941; NAS 1.60:2626) Avail: NTIS HC A03/MF A01 CSCL 13I

The U.S. Army's UH-60A Black Hawk 2240-kW (3000-hp) class, twin-engine helicopter transmission was tested at the NASA Lewis Research Center. The vibration and efficiency test results will be used to enhance the data base for similar-class helicopters. Most of the data were obtained for a matrix of test conditions of 50 to 100 percent of rated rotor speed and 20 to 100 percent of rated input power. The transmission's mechanical efficiency at 100 percent of rated power was 97.3 and 97.5 percent with its inlet oil maintained at 355 and 372 K (180 and 210 F), respectively. The highest vibration reading was 72 g's rms at the upper housing side wall. Other vibration levels measured near the gear meshes are reported. Author

N87-10392# Helsinki Univ. Technology, Otaniemi (Finland). Internal Combustion Engine Lab.
COLD-START TESTS WITH SPEED DIESEL ENGINES USING ALCOHOL AS MAIN FUEL
J. Laurikko and J. Pitkaenen 1985 72 p In FINNISH
(DE86-751651; TKK-KO/PM-49) Avail: NTIS (US Sales Only) HC A04/MF A01

This report describes the cold-startability of alcohol powered diesel engines and the results of tests carried out on two test engines based on different application methods. In cold-start tests carried out under laboratory conditions two direct injection alcohol powered diesel engines based on different application methods were evaluated. On the other engine alcohol mixture with ignition improving additive was used as main fuel and the other was equipped with two separate fuel systems using pure alcohol as main fuel and ordinary diesel oil as ignition fuel. The aim was to determine the temperature limit of cold-startability and find the

methods and devices which guarantee adequate startability. Test were made within the temperature range of +20 deg C to -30 deg C and during the start-up the engine speed, cylinder pressure, intake air and exhaust gas temperatures plus needle lift of fuel injectors in the dual-fuel engine were recorded in addition to the test conditions. In the tests the startability of the alcohol mixture engine was found superior to the dual-fuel engine. The startability of the mixture-fuel engine was satisfactory until -15 deg C without any auxiliary devices but with the dual-fuel engine intake air preheating was necessary already at 0 deg C. Using intake air p reheating both engines could be started at -30 deg. DOE

N87-10393# Oak Ridge National Lab., Tenn.
DESIGN RULE FOR FATIGUE OF WELDED JOINTS IN ELEVATED-TEMPERATURE NUCLEAR COMPONENTS
D. G. OConnor and J. M. Corum 1986 21 p Presented at the ASME Pressure Vessel and Piping Conference and Exhibit, Chicago, Ill., 20 Jul. 1986
(Contract DE-AC05-84OR-21400)
(DE86-007569; CONF-860722-6) Avail: NTIS HC A02/MF A01

Elevated-temperature weldment fatigue failures have occurred in several operating liquid-metal reactor plants. Yet, ASME Code Case N-47, which governs the design of such plants in the United States, does not currently address the Code Subgroup on Elevated Temperature Design recently proposed a fatigue strength reduction factor for austenitic and ferritic steel weldments. The factor is based on a variety of weld metal and weldment fatigue data generated in the United States, Europe, and Japan. This paper describes the factor and its bases, and it presents the results of confirmatory fatigue tests conducted at Oak Ridge National Laboratory on 316 stainless steel tubes with axial and circumferential welds of 16-8-2 filler metal. These test results confirm the suitability of the design factor, and they support the premise that the metallurgical notch effect produced by yield strength variations across a weldment is largely responsible for the observed elevated-temperature fatigue strength reduction. DOE

N87-10394# Comissao Nacional de Energia Nuclear de Brasil, Rio de Janeiro.
STUDY ABOUT THE STRUCTURAL BEHAVIOR OF WStE-36N STEEL
M. dosSantosPinto and M. B. Trindade 1985 89 p In POLISH
(DE86-702011; CNEN-DR-130/85) Avail: NTIS (US Sales Only) HC A05/MF A01

The influence of a stress relaxation heat treatment in welding done by submerged arc welding is studied. This influence was studied in a structural steel, WStE-36N, niobium alloy, made in Brazil, through Charpy V test, hardness measurements, microstructural aspects and X ray diffraction. DOE

N87-10395# Kernforschungszentrum, Karlsruhe (West Germany).
PROCESS CONTROL IN ARC WELDING
P. Drews and K. Mages Feb. 1986 147 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(KfK-PFT-105; ETN-86-97838) Avail: NTIS HC A07/MF A01

Improvement of the automation of arc welding processes is discussed. Controlable and programmable welding power sources were developed. An inverter power source which, based on its transfer frequency, is distinguished by economy and less noise emission at the work place was realized. For the reproducability of the process parameters, preprogramming units were developed, which are integrated in the power source, and control the power source externally by developed interfaces. Production welding multiple-axis handling units with electrical and hydraulic motors were built and strategies for seam-tracking were developed. For the supervision of welding processes a measurement unit which enables a comprehensive, flexible and intelligent supervision and documentation was built. Opto-electronic sensors which guarantee an exact seam-tracking and positioning of the torch at the beginning of the joint as well as the analysis of the joint geometry were developed. ESA

N87-10396# Kernforschungszentrum, Karlsruhe (West Germany).
PROGRAMMING OF SENSOR BASED ASSEMBLY ROBOTS
C. Blume, B. Frommherz, and K. Hoermann Feb. 1986 42 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(KfK-PFT-120; ETN-86-97840) Avail: NTIS HC A03/MF A01

Research developments of the AL and SRL Robot Programming systems are reviewed. Based on experience with the AL-System, SRL-System was designed and implemented. The language SRL incorporates most of the concepts of robot programming and concepts of structured computer programming languages. The components of these programming systems are treated. ESA

N87-10397 California Univ., Berkeley.
EXPERIMENTAL IDENTIFICATION AND CONTROL OF THE TIP POSITION OF A FLEXIBLE, SINGLE LINK MANIPULATOR Ph.D. Thesis
Srinivasan Ramakrishnan 1985 160 p
Avail: Univ. Microfilms Order No. DA8610175

Vibration control of light, flexible links is important for the design of fast and precise robots. A closed loop control system for damping such vibrations is studied. The objective of this study is defined as follows: Consider a beam of finite flexibility and unknown parameters, with one end fixed to the shaft of a motor with finite torque capability. Assume that the beam is free to rotate in the horizontal plane only, with no torsional or vertical plane deflection. The objective is to control the position of the free end of the beam in any horizontal trajectory within the range of motion of the system, while minimizing the time integral of the sum of the square of the deviations of the tip position from the reference and the weighted square of the control effort. An anlytical model is derived for the flexible beam and motor system, and validated by experiment using a new sensor developed for tip postion measurement. The model is then used to simulate adaptive tip position control. The system parameters are estimeted using a model reference adaptive scheme. The estimated parameters are used to design an optimal controller, and tip position control of the flexible beam and motor system is demonstrated. It is shown that the closed loop scheme increases the speed of response and reduces the steady state error compared to an open loop sheme. Dissert. Abstr.

N87-10398 Stanford Univ., Calif.
RAPID PRECISE END POINT CONTROL OF A WRIST CARRIED BY A FLEXIBLE MANIPULATOR Ph.D. Thesis
Wen-Wei Chiang 1986 141 p
Avail: Univ. Microfilms Order No. DA8612724

The speed and accuracy of a robot manipulator can be increased by using end-point sensors for motion measurement and control, along with an accurate dynamic model of the mechanical system in the control algorithm. However, the closed-loop control bandwidth of a robot manipulator is still physically limited ultimately by its structural flexibility, since the end effector and the actuator are separated. Analyses were performed to study the dynamic interaction between the motion of a mini-manipulator and the structural flexibility of the main robot arm. A plane-motion mechanical system was built to demonstrate several fast maneuvers of such a mini-macro manipulator system. A frequency identification scheme was also developed and implemented successfully in a closed-loop adaptive control on a separate mechanical laboratory system consisting of two inertia disks connected by a torsional rod. It is believed that the same frequency identification scheme can be used to improve further the performance of the mini-macro manipulator system when adaptive control is employed. Dissert. Abstr.

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N87-10399*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ULTRASONIC DETERMINATION OF RECRYSTALLIZATION
Edward R. Generazio 1986 15 p Presented at the Review of Progress in Quantitative NDE, La Jolla, Calif. 3-8 Aug. 1986; sponsored by Ames Lab. and Iowa State Univ.
(NASA-TM-88855; E-3248; NAS 1.15:88855) Avail: NTIS HC A02/MF A01 CSCL 14D

Ultrasonic attenuation was measured for cold worked Nickel 200 samples annealed at increasing temperatures. Localized dislocation density variations, crystalline order and colume percent of recrystallized phase were determined over the anneal temperature range using transmission electron microscopy, X-ray diffraction, and metallurgy. The exponent of the frequency dependence of the attenuation was found to be a key variable relating ultrasonic attenuation to the thermal kinetics of the recrystallization process. Identification of this key variable allows for the ultrasonic determination of onset, degree, and completion of recrystallization. B.G.

N87-10400*# Boeing Commercial Airplane Co., Seattle, Wash.
FAULT TOLERANT CONTROL LAWS Final Report
Uy-Loi Ly and John K. Ho 1986 113 p
(Contract NAS1-17635)
(NASA-CR-178094; NAS 1.26:178094) Avail: NTIS HC A06/MF A01 CSCL 14D

A systematic procedure for the synthesis of fault tolerant control laws to actuator failure has been presented. Two design methods were used to synthesize fault tolerant controllers: the conventional LQ design method and a direct feedback controller design method SANDY. The latter method is used primarily to streamline the full-state Q feedback design into a practical implementable output feedback controller structure. To achieve robustness to control actuator failure, the redundant surfaces are properly balanced according to their control effectiveness. A simple gain schedule based on the landing gear up/down logic involving only three gains was developed to handle three design flight conditions: Mach .25 and Mach .60 at 5000 ft and Mach .90 at 20,000 ft. The fault tolerant control law developed in this study provides good stability augmentation and performance for the relaxed static stability aircraft. The augmented aircraft responses are found to be invariant to the presence of a failure. Furthermore, single-loop stability margins of +6 dB in gain and +30 deg in phase were achieved along with -40 dB/decade rolloff at high frequency. Author

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N87-10401 Purdue Univ., West Lafayette, Ind.
GEOMETRIC AND MATERIAL NONLINEAR DYNAMIC ANALYSIS OF COMPLEX SHELLS Ph.D. Thesis
Sunil Saigal 1985 169 p
Avail: Univ. Microfilms Order No. DA8606610

A 48 degree-of-freedom doubly curved quadrilateral thin shell element, including the effect of both material and geometric nonlinearities, is formulated and appropriate numerical procedures are adopted for the development of a systematic and efficient approach for static and dynamic nonlinear analysis of general shell structures. The Cartesian displacement functions are described by bicubic Hermitian polynomials in curvilinear coordinates. The geometry of the shell surface is modeled using variable-order polynomials. This may allow the stiffness formulation of the shell element to be linked to the geometric data bases created by the computer aided design systems. The geometric formulations employ the Lagrangian mode for description of motion. A systematic choice of examples is solved and compared with available solutions to evaluate the formulations and procedures recommended. As an application of the present element, a detailed study of the static contact of an inflated radial automotive tire with rigid surface is conducted. An inflation analysis of the tire is first performed and then the results for footprint areas at different stages of contact; and the resulting redistribution of stress and moments resultants, all of practical significance to the tire industry are obtained.
Dissert. Abstr.

N87-10402 Purdue Univ., West Lafayette, Ind.
DYNAMIC DELAMINATION CRACK PROPAGATION IN A GRAPHITE/EPOXY LAMINATE Ph.D. Thesis
Joseph Edward Grady 1985 165 p
Avail: Univ. Microfilms Order No. DA8606544

Impact tests of (90/0) sub 5 s T-300/934 graphite/epoxy laminates of beam-like dimension with embedded delamination cracks were conducted. High speed photography (16000 frames/sec) was used to record the impact response and subsequent crack propagation. From the photographic data, impact characteristics such as the contact duration and the dynamic response of the impact specimen were measured. In addition, the time of initiation of crack propagation and measurements of the subsequent crack length versus time were obtained. By changing the location of the embedded delamination in the specimens relative to the impact point, additional results were obtained on the variation of the threshold impact velocity necessary to cause crack propagation in the different specimen configurations. A further series of impact tests with instrumented targets was used to characterize the dynamic force history resulting from the high speed impact of a rubber ball. A finite element analysis was performed to calculate the dynamic strain energy release rate prior to the onset of delamination. The critical value of the strain energy release rate necessary to initate propagation of a delamination in this material was investigated.
Dissert. Abstr.

N87-10403 Delaware Univ., Newark.
SHORT-WAVELENGTH BUCKLING AND SHEAR FAILURES FOR COMPRESSION-LOADED COMPOSITE LAMINATES
Mark James Shuart 1985 231 p
Avail: Univ. Microfilms Order No. DA8609058

This investigation studies the short-wavelength buckling (or the microbuckling) and the interlaminar and inplane shear failures of multi-directional composite laminates loaded in uniaxial compression. A laminate model is presented that idealizes each lamina. The fibers in the lamina are modeled as a plate, and the matrix in the lamina is modeled as an elastic foundation. The out-of-plane w displacement for each plate is expressed as a trigonometric series in the half-wavelength of the mode shape for laminate short-wavelength buckling. Nonlinear strain-displacement ralations are used. The model is applied to symmetric laminates having linear material behavior. The laminates are loaded in uniform end shortening and are simply supported. A linear analysis is used to determine the laminate stress strain, and mode shape when short-wavelength buckling occurs. The equations for the laminate compressive stress at short-wavelength buckling are dominated by matrix contributions. The effects of fiber volume fraction on the compressive stress at short-wavelength buckling is reported for a laminate with any stacking sequence and any thickness. The laminate mode shape at short-wavelength buckling is discussed. A nonlinear analysis for laminae with initial imperfections is used to determine laminate stresses and interlaminar strains.

N87-10404# National Aeronautical Lab., Bangalore (India). Structures Div.
EFFECT OF STATIC INPLANE LOADS AND BOUNDARY CONDITIONS ON THE FLUTTER OF FLAT RECTANGULAR PANELS
A. Joshi and B. R. Somashekar Feb. 1986 38 p
(NAL-TM-ST-8604) Avail: NTIS HC A03/MF A01

Presented are investigations of the problem of flutter of initially stressed rectangular panels having various types of boundary conditions including the elastic end restraint. Using the Galerkins modal analysis technique the solutions are obtained for various cases of panel aspect ratio, thickness ratio, and elastic stiffness of the support. The results show that the flutter mode is primarily

determined by the first and the second vibration modes. The results also show that the effect of elastic end can be reasonably accurately modelled by simple closed form analytical expressions. Author

N87-10405# British Aerospace Aircraft Group, Weybridge (England). Structures Dept.
THE EFFECTS OF TEMPERATURE AND LOADING RATE ON R-CURVES USING THE CLWL TECHNIQUES
S. Nowak Jul. 1985 66 p
(Contract A93B/1391)
(BAe-MSM-R-GEN-0544; BR97093; ETN-86-97946) Avail: NTIS HC A04/MF A01

The effects on crack growth resistance curves of typical aircraft temperature and loading rate variations were investigated. The crack line wedge loaded specimen was used and 2 aluminum alloys, specifications 7475T761 and BSL72 were considered. It is found that at low temperature or high strain rates the resistance to crack growth of 7475T61 is considerably reduced, whereas that of BSL72 benefits slightly. The combined effect of low temperature and high strain rates is shown to further increase the difference between the two alloys. ESA

N87-10406*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
A TAYLOR-GALERKIN FINITE ELEMENT ALGORITHM FOR TRANSIENT NONLINEAR THERMAL-STRUCTURAL ANALYSIS Progress Report, period ending 1 Jan. 1986
Earl A. Thornton and Pramote Dechaumphai Apr. 1986 12 p
Previously announced in IAA as A86-38823
(Grant NsG-1321)
(NASA-CR-177064; NAS 1.26:177064) Avail: NTIS HC A02/MF A01 CSCL 20K

A Taylor-Galerkin finite element method for solving large, nonlinear thermal-structural problems is presented. The algorithm is formulated for coupled transient and uncoupled quasistatic thermal-structural problems. Vectorizing strategies ensure computational efficiency. Two applications demonstrate the validity of the approach for analyzing transient and quasistatic thermal-structural problems. Author

N87-10407*# Auburn Univ., Ala. Dept. of Computer Science and Engineering.
NONLINEAR ROTORDYNAMICS ANALYSIS Progress Report, 1 Jun. 1985 - 15 Jun. 1985
William B. Day and Richard A. Zalik 1986 66 p
(Contract NAS8-36475)
(NASA-CR-178931; NAS 1.26:178931) Avail: NTIS HC A04/MF A01 CSCL 20K

Three analytic consequences of the nonlinear Jeffcott equations are examined. The primary application of these analyses is directed toward understanding the excessive vibrations recorded in the Liquid Oxygen (LOX) pump of the Space Shuttle Main Engine (SSME) during hot firing ground testing. The first task is to provide bounds on the coefficients of the equations which delimit the two cases of numerical solution as a circle or an annulus. The second task examines the mathematical generalization to multiple forcing functions, which includes the special problems of mass imbalance, side force, rubbing, and combination of these forces. Finally, stability and boundedness of the steady-state solutions is discussed and related to the corresponding linear problem. Author

N87-10408*# Drexel Univ., Philadelphia, Pa. Dept. of Mechanical Engineering and Mechanics.
CONTROLLER DESIGN VIA STRUCTURAL REDUCED MODELING BY FETM Semiannual Report
Ajmal Yousuff 13 Oct. 1986 25 p
(Grant NAG1-622)
(NASA-CR-179838; NAS 1.26:179838) Avail: NTIS HC A02/MF A01 CSCL 20K

The Finite Element - Transfer Matrix (FETM) method has been developed to reduce the computations involved in analysis of structures. This widely accepted method, however, has certain limitations, and does not directly produce reduced models for control design. To overcome these shortcomings, a modification of FETM method has been developed. The modified FETM method easily produces reduced models that are tailored toward subsequent control design. Other features of this method are its ability to: (1) extract open loop frequencies and mode shapes with less computations, (2) overcome limitations of the original FETM method, and (3) simplify the procedures for output feedback, constrained compensation, and decentralized control. This semi annual report presents the development of the modified FETM, and through an example, illustrates its applicability to an output feedback and a decentralized control design. Author

N87-10409*# Tuskegee Inst., Ala. School of Engineering and Architecture.
MODE 1 DELAMINATION GROWTH IN ADHESIVELY BONDED JOINTS UNDER STATIC AND FATIGUE LOADS Semiannual Report
Subodh C. Biswas and Shaik Jeelani 1986 17 p
(Grant NAG1-447)
(NASA-CR-179812; NAS 1.26:179812) Avail: NTIS HC A02/MF A01 CSCL 20K

The objective of this investigation was to characterize the pure mode 1 delamination growth in metal to metal adhesively bonded joints under static and fatigue loading conditions, using FM 73 adhesive. Double cantilever beam specimens (DCB) were used for pure mode 1 tests. Aluminum 2024-T3 adherends were bonded with FM 73 adhesive. Delamination was introduced during fabrication by inserting a Teflon film between the two adherends. The mode 1 strain energy release rate G sub I sub c was obtained directly from static DCB tests conducted in accordance with the ASTM designation D1876-12. Constant amplitude fatigue tests on DCB specimens were conducted to determine the relationship between delamination growth rate da/dN and strain energy release rate G sub I sub c for a pure mode 1 delamination growth. It is found that the debond propagation rate in adhesive joints using FM 73 is more sensitive to errors in design load than is typical crack growth rate in metallic structures. Author

N87-10410*# North Carolina Agricultural and Technical State Univ., Greensboro.
DYNAMICS AND CONTROL OF ORBITING GRID AND THE SYNCHRONOUSLY DEPLOYABLE BEAM Semiannual Report
Elias G. Abu-Saba Jul. 1985 19 p
(Grant NAG1-405)
(NASA-CR-179808; NAS 1.26:179808) Avail: NTIS HC A02/MF A01 CSCL 20K

The dynamic analysis of a grid structure hung from the ceiling by two steel wires is described. The method of approach uses the discrete mass model system. The concept of the bifilar pendulum is used in writing the equation of motion. Assumptions are made with regard to the bar stiffnesses in the vertical and horizontal planes. The discrete mases are assumed to be connected by inextensible massless strings that do not provide any torsion or bending. The modal frequencies obtained by this method are compared with those obtained from the finite element model. Author

N87-10411# Alabama Univ., University.
FOUNDATION INTERACTION PROBLEMS INVOLVING AN ELASTIC HALF-PLANE Final Report
Howard B. Wilson and Louis H. Turcotte Mar. 1986 76 p
(Contract DACW39-83-M-2630)
(AD-A167925; BER-319-241; WES/TR/ATC-86-1) Avail: NTIS HC A05/MF A01 CSCL 13/13

Stress analysis problems involving interaction between a structure and its foundation often lead to extensive computational effort. This fact becomes obvious when finite-element methods are used to study problems where the foundation is idealized as an infinite elastic half-plane. Attempts to represent the half-plane by a finite size structure using many elements entail solving large systems of simultaneous equations at a considerable computational cost. This report presents a more computationally efficient

procedure which employs the exact solution of the equations of elasticity for an elastic half-plane subjected to arbitrary surface loading. Complex variable formulations are shown to yield a compact solution for the stresses and displacements in a half-plane supporting several concentrated loads. This solution is also employed to compute flexibility and stiffness matrices relating the concentrated loads and the displacements at the points of application of the loads. The stiffness matrix derived in this manner is then employed to investigate a simple type of interaction problem where an Euler beam rests on an elastic half-plane and is subjected to external loading. The foundation interaction forces, as well as other quantities such as beam shear and moment, are also computed. GRA

N87-10412# Ballistic Research Labs., Aberdeen Proving Ground, Md.
FURTHER RESULTS ON THE INITIATION AND GROWTH OF ADIABATIC SHEAR BANDS
Thomas W. Wright and Romesh C. Batra Apr. 1986 30 p
(AD-A168012; BRL-MR-3508) Avail: NTIS HC A03/MF A01 CSCL 20/11

Growth of perturbations in the simple shearing deformation of a softening thermo-visco-plastic solid have been examined by means of a finite element technique. It has been found that very small perturbations grow slowly at first, even though the underlying homogeneous stress strain response has passed peak stress, but that eventually explosive growth occurs. During the slow growth phase, the stress follows the homogeneous response quite closely, but in the explosive phase, the stress drops precipitously. Large perturbations grow at a larger initial rate, and accelerate rapidly even before peak homogeneous stress. Inclusion of a dipolar plastic effect appears to be stabilizing. GRA

N87-10413# Northwestern Univ., Evanston, Ill. Structural Mechanics Lab.
CRACK-TIP FIELDS IN A VISCOPLASTIC MATERIAL Interim Report
J. D. Achenbach, N. Nishimura, and J. C. Sung Apr. 1986 41 p
(Contract N00014-76-C-0063)
(AD-A168014; NU-SML-TR-86-1) Avail: NTIS HC A03/MF A01 CSCL 20/11

An integral representation for the particle velocity in terms of a Green's function and certain linear combinations of the inelastic strain rates was used in this study, both for a numerical method to compute full field solutions and to develop unequivocal asymptotic expressions for the near-tip fields. Specific results have been obtained for a stationary crack in a solid whose constitutive behavior is represented by the Bodner Partom model. It is shown that the leading term of the near-tip particle velocity is of order r to the 1/2 power, and the higher-order terms are of the forms r logr and r. Expressions were derived for the angular variations and for the multiplying time-dependent intensity factors. The r logr term is absent for the Mode-II case. Two questions were addressed in further detail: the dependence of the multiplying terms on time and the importance of the higher-order terms. The numerical results show a stress intensity factor which decays with time. At a small distance from the crack tip the numerically computed normalized opening stress was compared with a one-term asymptotic representation. The two curves diverge at very small values of time. Inclusion of a second term in the asymptotic expression for the stress gives very acceptable agreement as time increases. GRA

N87-10414# Los Alamos National Lab., N. Mex.
SIMPLE BLAST MODEL FOR STRUCTURAL DESIGN
T. R. Neal 1985 7 p Presented at the International Symposium on Intense Dynamic Loading and its Effects, Beijing, China, 3 Jun. 1986
(Contract W-7405-eng-36)
(DE86-000802; LA-UR-85-3420; CONF-860616-3) Avail: NTIS HC A02/MF A01

Structures capable of either containing or surviving nearby detonating explosive are useful research tools for investigating properties of materials. Our particular interest is in spherical steel vessels that are only stressed elastically. Although there is a large amount of data describing blast waves in air, it is mostly for the farfield region R > 1 where R is the reduced radius - that is, the distance from the charge center divided by the cube root of the change mass - expressed here in m/kg/(1)/(3). Our region of investigation was the range 0.3 < R < 0.7. For these distances the blast effect is mainly impulsive, and normally less than 1% of the explosive energy is coupled into kinetic energy of the vessel. The response of vessels to spherical changes of the HMX-based explosive PBX 9501 has been investigated both for vessels filled with ambient air and evacuated. A simple scaling model is used to correlate the data for various size vessels and to describe the impulse on structures. This model is then applied to one test of the TATB-based explosive PBX 9502. Finally, the immediate residual pressure in the vessels was measured to show the degree of short-term overpressure in evacuated structures. DOE

N87-10415# Sandia National Labs., Albuquerque, N. Mex.
RESPONSE OF A 3-LAYERED RING TO AN AXISYMMETRIC IMPULSE
M. J. Sagartz May 1986 35 p
(Contract DE-AC04-76DP-00789)
(DE86-011016; SAND-85-2403) Avail: NTIS HC A03/MF A01

A modal solution for the axisymmetric response of a three-layered shell to an impulse load is derived. The outer and inner layers are each assumed to be thin and are seperated by a relatively soft middle or core layer. Elasticity theory is used to treat the core layer while the inner and outer layers are governed by shell theory. Formulas for the circumferential stresses in the inner and outer layers and for the radial stress in the core are presented. A limited parameter study is included to demonstrate the use of the solution. Comments about the convergence of the series solution and its range of applicability are included. A listing of a computer program used to evaluate the series solutions is included in an Appendix. DOE

N87-10416# Brown Univ., Providence, R. I. Div. of Engineering.
GROWTH OF CRACKS UNDER FAR-FIELD CYCLIC COMPRESSIVE LOADS: NUMERICAL AND EXPERIMENTAL RESULTS
D. K. Holm, A. F. Blom, and S. Suresh Jun. 1985 26 p Prepared in cooperation with Royal Inst. of Tech., Stockholm, Sweden and Aeronautical Research Inst. of Sweden, Bromma
(Contract DE-FG02-84ER-45167)
(DE86-010279; DOE/ER-45167/3) Avail: NTIS HC A03/MF A01

Crack growth from a notch-tip, under the influence of fully compressive far-field cyclic loads, is investigated both numerically and experimentally in notched specimens of a lower strength steel and an aluminum alloy. Such cracks, emanating from the root of the notch, progressively decelerate until complete crack arrest occurs. Analyses of the stress state along the crack plane indicate that while the extent of the residual tensile stress field diminishes with an increase in crack length, there is a progressive increase in crack closure during crack advance. Approximate numerical calculations of the crack closure loads are in reasonable agreement with experimental results. DOE

N87-10417# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorentwicklung.
CONCENTRATIONS OF PLASTIC STRAINS IN THE CLAMPING REGION OF CYLINDRICAL SHELLS UNDER EXCESSIVE LOADING Thesis - Karlsruhe University, West Germany
M. Geiss Feb. 1986 94 p In GERMAN; ENGLISH summary
(KfK-3915; ISSN-0303-4003; ETN-86-97833) Avail: NTIS HC A05/MF A01

The behavior of cylindrical shells under overload is investigated. Different clamping conditions and variations of the material behavior are considered. Plastic strain concentrations at the shell clamping are determined. The analyses were carried out with a finite-element code. The results show that only minor plastic strain concentrations have to be expected for a rigidly clamped shell loaded by internal pressure. Considerable plastic strain concentrations have to be expected at a flange type clamping loaded by axial stresses in the shell. Comparison of these analyses with standard stress

analysis procedures shows that these procedures are conservative. The structural integrity of the core barrel clamping of a pressurized water reactor under blowdown loading was assessed. Even in case of a sudden and complete pipe break the structure can withstand blowdown loading. ESA

N87-10418 Iowa State Univ. of Science and Technology, Ames.
APPLICATION OF GRAPH THEORY TO THE NONLINEAR ANALYSIS OF LARGE SPACE STRUCTURES Ph.D. Thesis
Magdy Ibrahim Hindawy 1986 100 p
Avail: Univ. Microfilms Order No. DA8615055

A new graph representation of nonlinear large space structures is introduced. During the loading process the structural graph changes its levels as the nonlinear regions in the large space structure change configuration. This variable structured graph is used to order the nodes and members of the discretized nonlinear structural model. A new algorithm is used to change the established order of the nonlinear model and updates the condensed nonlinear stiffness matrix equation for the structure. In addition to accounting for structural nonlinearities the algorithm can take into consideration plastic hinge formation and fracture of members in large space structures. Dissert. Abstr.

42 GEOSCIENCES (GENERAL)

N87-10419*# International Council of Scientific Unions, Urbana, Ill.
MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP, VOLUME 20
S. A. Bowhill, ed. and Belva Edwards, ed. Jun. 1986 519 p
Presented at the URSI/SCOSTEP Workshop on Technical and Scientific Aspects of MST Radar, Aguadilla, Puerto Rico, 21-25 Oct. 1985 Sponsored by NASA and UNESCO
(NASA-CR-176882; NAS 1.26:176882; MAP-HANDBOOK-20)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Various topics related to investigations of the middle atmosphere are discussed. Numerical weather prediction, performance characteristics of weather profiling radars, determination of gravity wave and turbulence parameters, case studies of gravity-wave propagation, turbulence and diffusion due to gravity waves, the climatology of gravity waves, mesosphere-stratosphere-troposphere radar, antenna arrays, and data management techniques are among the topics discussed. For individual titles, see N87-10420 through N87-10525.

N87-10420*# National Meteorological Center, Washington, D.C.
ON THE POTENTIAL USE OF RADAR-DERIVED INFORMATION IN OPERATIONAL NUMERICAL WEATHER PREDICTION c47
Ronald D. McPherson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Estimates of requirements likely to be levied on a new observing system for mesoscale meteonology are given. Potential observing systems for mesoscale numerical weather prediction are discussed. Thermodynamic profiler radiometers, infrared radiometer atmospheric sounders, Doppler radar wind profilers and surveillance radar, and moisture profilers are among the instruments described. R.J.F.

N87-10421*# Oklahoma Univ., Norman. School of Meteorology.
A THEORY FOR THE RETRIEVAL OF VIRTUAL TEMPERATURE FROM WINDS, RADIANCES AND THE EQUATIONS OF FLUID DYNAMICS c47
Gal-Chen Tzvi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 12 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

A technique to deduce the virtual temperature from the combined use of the equations of fluid dynamics, observed wind and observed radiances is described. The wind information could come from ground-based sensitivity very high frequency (VHF) Doppler radars and/or from space-borne Doppler lidars. The radiometers are also assumed to be either space-borne and/or ground-based. From traditional radiometric techniques the vertical structure of the temperature can be estimated only crudely. While it has been known for quite some time that the virtual temperature could be deduced from wind information only, such techniques had to assume the infallibility of certain diagnostic relations. The proposed technique is an extension of the Gal-Chen technique. It is assumed that due to modeling uncertainties the equations of fluid dynamics are satisfied only in the least square sense. The retrieved temperature, however, is constrained to reproduce the observed radiances. It is shown that the combined use of the three sources of information (wind, radiances and fluid dynamical equations) can result in a unique determination of the vertical temperature structure with spatial and temporal resolution comparable to that of the observed wind.

N87-10422*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
EXAMPLES OF MESOSCALE STRUCTURES AND SHORT-TERM WIND VARIATIONS DETECTED BY VHF DOPPLER RADAR c47
G. S. Forbes *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 13 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The first of three wind profilers planned for operation in central and western Pennsylvania began full-time, high-quality operation during July 1985. It is located about 20 km south-southeast of University Park and operates at 50 MHz. Another 50-MHz radar and a 400-MHz radar are to be installed over the next few months, to complete a mesoscale triangle with sides of 120 to 160 km. During the period since early July, a number of weather systems have passed over the wind profiler. Those accompanied by thunderstorms caused data losses either because the Department computer system lost power or because power went out at the profiler site. A backup power supply and an automatic re-start program will be added to the profiler system to minimize such future losses. Data have normally been averaged over a one-hour period, although there have been some investigations of shorter-period averaging. In each case, preliminary examinations reveal that the profiler winds are indicative of meteorological phenomena. The only occasions of bad or missing data are obtained when airplane noise is occasionally experienced and when the returned power is nearly at the noise level, at the upper few gates, where a consensus wind cannot be determined. Jets streams, clouds, and diurnal variations of winds are discussed. Author

N87-10423*# National Center for Atmospheric Research, Boulder, Colo.
WIND PROFILER DATA IN A MESOSCALE EXPERIMENT FROM A METEOROLOGICAL PERSPECTIVE c47
Edward J. Zipser, John Augustine (National Oceanic and Atmospheric Administration, Boulder, Colo.), and John Cunning *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p Sponsored in part by NSF (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

During May and June of 1985, the Oklahoma-Kansas Preliminary Regional Experiment of STORM-Central (OK PRE-STORM)

was carried out, with the major objectives of learning more about mesoscale convective systems (MCSs) and gaining experience in the use of new sensing systems and measurement strategies that will improve the design of STORM-Central. Three 50-MHz wind profilers were employed in a triangular array with sides about 275 km. It is far too soon to report any results of this effort, for it has barely begun. The purpose here is to show some examples of the data, some of the surrounding conventional data, and to discuss some of the issues important to meteorologists in evaluating the contribution of the profiler data. The case of 10 to 11 June 1985, featuring a major squall line system which crossed the dense observing network from northwest to southeast, passing the Liberal site about 2230 GMT/10 June, the McPherson site about 0100 GMT/11 June, and Wichita about 0300 GMT/11 June is discussed. Radar and satellite data show that the system was growing rapidly when it passed Liberal, and was large and mature when it passed through McPherson and Wichita. The radar depiction of the system during this stage is given, with the McPherson site in the intense convective echoes near the leading edge at 01 GMT and in the stratiform precipitation at 03 GMT. The profiler wind data for a 9-hour period encompassing the squall line passage at each site are given. Author

N87-10424*# Clemson Univ., S.C. Dept. of Physics.
OBSERVATIONS OF MESOSCALE VERTICAL VELOCITIES AROUND FRONTAL ZONES c47
T. S. Dennis, M. F. Larsen, and J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Vertical velocity and reflectivity data obtained with a VHF Doppler radar over a 15-day period in October and November of 1981 are analyzed. Standard radiosonde data and surface observations were used to locate two occluded fronts, two warm fronts, and a cold front that passed the radar site. These fronts are also evident in the radar reflectivity data. Most studies of the vertical circulation patterns associated with mososcale systems have used precipitation and cloud formations as tracers. Unlike other observational techniques, the VHF radar permits the continuous measurement of the three-dimensional air velocity vector in time and height from a fixed location. With the beam in a vertically pointing position, signals are scattered from turbulent variations in the refractive index with half the scale of the radar wavelength and by regions with sudden changes in the refractive index associated with horizontally stratified layers. Generally, the strongest echoes occur at the maximum in the vertical gradient of refractivity, usually at the base of a temperature inversion, such as the tropopause. VHF radars can also be used to locate atmospheric fronts, which are characterized by static stability, large horizontal temperature gradients, large vorticities, and vertical wind shears. These radars can provide the velocity field data needed to study wave motions associated with fronts and compare the actual vertical circulation to theoretical predictions. Author

N87-10425*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
COMPARISON OF VERTICAL VELOCITIES ANALYZED BY A NUMERICAL MODEL AND MEASURED BY A VHF WIND PROFILER c47
M. F. Larsen, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), and T. S. Dennis *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The use of wind profilers for measuring vertical velocities in the troposphere and lower stratosphere is potentially of great interest for verification of forecasts, diagnosis of mesoscale circulations, and studies of wave motions. The studies of profiler vertical velocities to date have shown that the observed patterns of ascent and subsidence are reasonable when compared to the synoptic conditions. However, difficulties arise when a direct verification of the profiler vertical winds is sought. Since no other technique can measure the vertical velocities over the same height range and with the same claimed accuracy as the profilers, direct comparisons are impossible. The only alternative is to compare the measurements to analyzed vertical velocity fields. Here, researchers compare vertical measurements made with the SOUSY VHF radar over a period of 11 days at the beginning of November 1981 to the analyzed vertical velocities produced by the European Center for Medium-range Weather Forecasting (ECMWF) model for grid points near the radar site. Author

N87-10426*# Kyoto Inst. of Tech. (Japan). Dept. of Electrical Engineering.
MEASUREMENTS OF PRECIPITATING ATMOSPHERE BY THE MU RADAR c47
Koichiro Wakasugi, Shoichiro Fukao (Kyoto Univ., Japan), and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Sensitive VHF Doppler radars have the capability to detect echoes from precipitation particles as well as refractive index irregularities. Researchers used the middle and upper (MU) atmosphere radar at Shigaraki, Japan for tropospheric observations of precipitating atmosphere. They detected precipitation motions simultaneously with the ambient air motion and showed the capabilities of the MU radar in investigating mesoscale structures of meteorological phenomena such as air precipitation motions within a cold frontal system. More recently, a direct method for deducing the drop size distribution of precipitation particles was developed using Doppler spectra of the MU radar. This method is free from errors inherent in conventional measurements using microwave Doppler spectra. Meteorological microwave radar data are also utilized for monitoring vertical and horizontal structures of precipitation. Author

N87-10427*# National Oceanic and Atmospheric Administration, Boulder, Colo.
THE REAL-TIME USE OF WIND PROFILERS IN NOWCASTING c47
Tracy Lorraine Smith and Thomas W. Schlatter *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The program for Regional Observing and Forecasting Services (PROFS) has been using wind profile data in experimental forecast applications for over two years, mostly in the form of real-time color displays on the PROFS forecast workstation. The most ambitious test of the workstation to date, the 1985 PROFS Real-Time Experiment (RT-85), ran from 15 May to 23 August, 1985. The use of wind profiler products during this and previous experiments is described. Data from the experimental profiler network in Colorado and from the profiler in Oklahoma are in the form of hourly averages. Arriving data frequently contain errors whose origins range from interference by aircraft in the beams to highway truck traffic. Most of the irregularities are apparent through visual inspection of profiler wind observations plotted on a time-height cross section, but this method of quality control is inadequate if the intended uses of the data involve numerical calculations. Author

N87-10428*# Arecibo Ionospheric Observatory, Puerto Rico.
THE INFLUENCE OF VELOCITY VARIABILITY ON THE DETERMINATION OF WIND PROFILES c47
Jurgen Rottger *In* International Council of Scientific Unions, Middle

Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

High sensitivity radars allow the determination of velocity estimates at time resolutions down to one minute or better. Because of the variability introduced to the mean wind due to turbulence and waves, the high resolution profiles may not be too useful for forecasting applications, although they yield the most realistic estimate of the instantaneous wind profile. Profiles of wind speed and direction, vertical velocity and echo power, which were deduced in real-time on 23 August 1981 with the spaced antenna drift mode of the SOUSY-VHF-Radar are shown. Whereas these profiles were measured within 1 minute, the operating routine allowed the selection of variable (longer) measuring periods, and one has to search for the optimum duration of the data averaging period. A high time resolution wind vector diagram is given which gives an idea of the temporal variability. The data were obtained with the spaced antenna technique, which allows a good estimate of the horizontal wind without having to correct for the vertical velocity component. The wind vectors specifically indicate a quasi-periodic variation in direction. This is assumed to be due to gravity waves since the vertical velocity also shows periodical variations with the same period. The consistency of these spaced-antenna VHF radar results along with the radiosonde data convinced researchers that the method is quite suitable for wind profiling applications.
Author

N87-10429*# National Oceanic and Atmospheric Administration, Boulder, Colo.
PERFORMANCE CHARACTERISTICS OF WIND PROFILING RADARS **c47**
R. G. Strauch, A. S. Frisch, and B. L. Weber *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Doppler radars used to measure winds in the troposphere and lower stratosphere for weather analysis and forecasting are lower-sensitivity versions of mesosphere-stratosphere-troposphere radars widely used for research. The term wind profiler is used to denote these radars because measurements of vertical profiles of horizontal and vertical wind are their primary function. It is clear that wind profilers will be in widespread use within five years: procurement of a network of 30 wind profilers is underway. The Wave Propagation Laboratory (WPL) has operated a small research network of radar wind profilers in Colorado for about two and one-half years. The transmitted power and antenna aperture for these radars is given. Data archiving procedures have been in place for about one year, and this data base is used to evaluate the performance of the radars. One of the prime concerns of potential wind profilers users is how often and how long wind measurements are lacking at a given height. Since these outages constitute an important part of the performance of the wind profilers, they are calculated at three radar frequencies, 50-, 405-, and 915-MHz, (wavelengths of 6-, 0.74-, and 0.33-m) at monthly intervals to determine both the number of outages at each frequency and annual variations in outages.
Author

N87-10430*# National Severe Storms Lab., Norman, Okla.
A LOOK AT PROFILER PERFORMANCE **c47**
Edwin Kessler, Michael Eilts, and Kevin Thomas (Oklahoma Univ., Norman) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 13 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Since about 1974, Doppler radars operating in UHF and VHF ranges have been used increasingly to study atmospheric winds. Historically, large systems capable of obtaining data from high altitudes have focused attention on the mesosphere and stratosphere, rather than on the troposphere wherein abides most of the weather considered by most meteorologists. Research address some questions the meteorologist must logically ask first, viz., what is the actual performance capability of these systems, how accurate is the wind data of interest to meteorologists, and from what altitudes in the troposphere are the data reliably obtained.
Author

N87-10431*# Adelaide Univ. (Australia). Dept. of Physics.
HARDWARE REQUIREMENTS: A NEW GENERATION PARTIAL REFLECTION RADAR FOR STUDIES OF THE EQUATORIAL MESOSPHERE **c47**
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

A new partial reflection (PR) radar is being developed for operation at the proposed Equatorial Observatory. The system is being designed to make maximum use of recent advances in solid-state technology in order to minimize the power requirements. In particular, it is planned to use a solid-state transmitter in place of the tube transmitters previously used in PR systems. Solid-state transmitters have the advantages that they do not need high voltage supplies, they do not require cathode heaters with a corresponding saving in power consumption and parts are readily available and inexpensive. It should be possible to achieve 15 kW peak powers with recently announced fast switching transistors. Since high mean powers are desirable for obtaining good signal-to-noise ratios, it is also planned to phase code the transmitted pulses and decode after coherent integration. All decoding and signal processing will be carried out in dedicated microprocessors before the signals are passed to a microcomputer for on-line analysis. Recent tests have shown that an Olivetti M24 micro (an IBM compatible) running an 8-MHz clock with a 8087 coprocessor can analyze data at least as fast as the minicomputers presently being used with the Adelaide PR rad ar and at a significantly lower cost. The processed winds data will be stored in nonvolatile CMOS RAM modules; about 0.5 to 1 Mbyte is required to store one week's information.
Author

N87-10432*# Arecibo Ionospheric Observatory, Puerto Rico.
NEED FOR A SUBTROPICAL WIND PROFILING SYSTEM **c47**
J. Rottger, M. F. Larsen (Clemson Univ., S.C.), H. M. Ierkic, and T. Hagfors *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
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The purpose is to point out the need for, and the benefit that can be derived from, a national wind profiling facility located in the subtropics. At present no such facility exists. There are several advantages associated with a low-latitude location. The first is that wave motions and large-scale circulations unique to the tropics can be studied. The second is that the relatively steady mean flows in the subtropical belt may provide a cleaner environment for studies of waves common at all latitudes. Researchers suggest the Arecibo Observatory as an ideal site for a wind profiling facility since the land and much of the computing, technical, and scientific support is already available.
Author

N87-10433*# Alaska Univ., Fairbanks. Geophysical Inst.
GRAVITY WAVES IN THE MIDDLE ATMOSPHERE: RECENT PROGRESS AND NEEDED STUDIES **c46**
David C. Fritts *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
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61801 CSCL 04A

The recent recognition of the important role played by gravity waves in the large-scale circulation and thermal structure of the mesosphere and lower thermosphere has stimulated considerable research on their properties and their middle atmosphere effects. For example, these studies have begun to provide important information on gravity wave scales, propagation, filtering, and the processes responsible for saturation and turbulent diffusion. There remain, however, many areas in which our current understanding of middle atmosphere gravity waves is deficient. The purpose here is to review the progress that has been made to date and to suggest areas in which additional studies are most needed. Gravity wave scales, gravity wave saturation mechanisms, turbulence production and turbulent diffusion, and distribution of gravity wave energies and momentum fluxes with height and time are discussed. Author

N87-10434*# National Oceanic and Atmospheric Administration, Boulder, Colo.

A MODEL FOR GRAVITY-WAVE SPECTRA OBSERVED BY DOPPLER SOUNDING SYSTEMS c46

T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)

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A model for Mesosphere - Stratosphere - Troposphere (MST) radar spectra is developed following the formalism presented by Pinkel (1981). Expressions for the one-dimensional spectra of radial velocity versus frequency and versus radial wave number are presented. Their dependence on the parameters of the gravity-wave spectrum and on the experimental parameters, radar zenith angle and averaging time are described and the conditions for critical tests of the gravity-wave hypothesis are discussed. The model spectra is compared with spectra observed in the Arctic summer mesosphere by the Poker Flat radar. This model applies to any monostatic Doppler sounding system, including MST radar, Doppler lidar and Doppler sonar in the atmosphere, and Doppler sonar in the ocean. Author

N87-10435*# Arecibo Ionospheric Observatory, Puerto Rico.

HALF-DAY AND FOUR-DAY WAVES IN THE STATOSPHERE c46

Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)

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Further analysis of spaced-antenna measurements of 3-dimensional velocity in the stratosphere was performed over a period of 10 days and compared with meteorological observations. A quasi-four-day wave in the lower stratosphere can be shown to originate in planetary wave/synoptic scale disturbances in the troposphere. Its phase propagates downwards and its amplitude decreases strongly with height n the lower stratosphere. The wave features are most pronounced in the meridional wind component, but they show up also in the vertical component. A 12-h oscillation with downward phase progression and about 1.5 ms-1 velocity amplitude is also detected in the meridional component above 18 km, but there is no comparable feature seen in the troposphere. Author

N87-10436*# Kyoto Univ., Uji (Japan). Radio Atmospheric Science Center

TROPOSPHERIC TURBULENCE PARAMETERS MEASURED BY USING THE MU RADAR c46

Toru Sato, Hiromasa Matsumoto (Kyoto Univ., Japan), Shoichiro Fukao, and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)

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The spectral width of the Doppler radar echo has been used to estimate the atmospheric turbulence parameters because it is directly related to the kinetic energy contained in the turbulence. However, sufficient care must be taken in deriving the turbulence parameters since the measured spectral width can be easily affected by undesired factors such as beam broadening, shear broadening, and the temporal variation of the wind field. Here researchers examine these factors in the case of the MU radar observation of the upper troposphere, and present preliminary results. Author

N87-10437*# Case Western Reserve Univ., Cleveland, Ohio.

SIMULTANEOUS VHF AND UHF RADAR OBSERVATION OF THE MESOSPHERE AT ARECIBO DURING A SOLAR FLARE: A CHECK ON THE GRADIENT-MIXING HYPOTHESIS c46

P. K. Rastogi, J. D. Mathews, and J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)

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The results of a two wavelength (VHF and UHF) mesosphere experiment performed at the Arecibo Observatory on January 5, 1981 are discussed. The 46.8-MHz VHF radar (3.21 m Bragg scale) was operated to provide spectral measurements of signals scattered from refractivity fluctuations due to turbulence. Other physical parameters such as radial velocities, scattered signal power, and Doppler spread due to turbulence can be derived from signal spectra. The 430-MHz UHF radar (0.36 m Bragg scale) was used for D-region electron-density measurements using the incoherent scatter technique with a comparable height resolution. The radars were pointed symmetrically about the vertical with a beam spacing of 5.5 degree in the meridional plane. Occurrence of a type 4 solar flare during the experiment produced enhanced D-region electron-density gradients. This was a unique circumstance that provided the possibility of testing the basic premises of the turbulent gradient-mixing hypothesis. Author

N87-10438*# Air Force Geophysics Lab., Hanscom AFB, Mass.

EVIDENCE OF ATMOSPHERIC GRAVITY WAVE PERTURBATIONS OF THE BRUNT-VAISALA FREQUENCY IN THE ATMOSPHERE c46

R. E. Good, R. W. Beland, J. H. Brown, and E. M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)

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A series of high altitude, medium resolution, measurements of temperature, pressure and turbulence have been performed by the Air Force Geophysics Laboratory. These measurements were conducted using the VIZ Manufacturing Co. microsondes with attached micro-thermal probes measuring the temperature structure coefficient. A typical atmospheric temperature measurement is given. Several small temperature inversions are evident in the troposphere. The stratosphere is marked with numerous fluctuations in the temperature profile. Microsondes provide temperature and pressure measurements every 4 seconds up to a maximum altitude of 30 km (MSL). Since the average ascent rate is 5 m/s, the altitude interval between the measurement reports is 20 m. The potential temperature is calculated from the temperature and pressure. Spectral analysis of atmospheric Brunt-Vaisala frequencies reveal spectra similiar to the velocity spectra of Dewan et al. (1984), Daniels (1982), and Endlich and Singleton (1969). The Brunt-Vaisala spectra indicate the existence of separate, distinguishable wave modes. R.J.F.

N87-10439*# Air Force Geophysics Lab., Hanscom AFB, Mass.

ATMOSPHERIC WAVES AND THE NATURE OF BUOYANCY

TURBULENCE IN THE CONTEXT OF THE WAVES VS 2D-TURBULENCE DEBATE c46

Edmond M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The problem of how to empirically distinguish between velocity fluctuations due to turbulence and those due to atmospheric waves is addressed. The physical differences between waves and turbulence are reviewed. New theoretical ideas on the subject of bouyancy range turbulence are presented. A unique scale K sub B is given that allows one to differentiate between waves and turbulence for the special case of theta = 0 (i.e., horizontal propagating waves). R.J.F.

N87-10440*# Air Force Geophysics Lab., Hanscom AFB, Mass.

A PROPOSED EXPERIMENTAL TEST TO DISTINGUISH WAVES FROM 2-D TURBULENCE c46

Edmond M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A theory of buoyancy range turbulence that leads to a unique scale, K sub B, that allows one to differentiate between waves and turbulence for the special case of theta = 0 (i.e., horizontally propagating waves) is discussed. The theory does not seem to lead to a practical empirical distinction for the general situation. This is due to the fact that, as theta is increased, one has the ever-increasing presence of BRT for longer wavelengths. The fact that the numerical values of epsilon prime are not yet available compounds the difficulty. In addition, it does not appear possible to encompass true 2-D turbulence in the theory. We are thus driven to a test which circumvents all these difficulties. A proposed test is based on the idea that waves are coherent and propagate, while in turbulence we have the opposite situation. In particular, the test is suggested by the following quotation from MULLER (1984), on the nature of such turbulence: The turbulence in each horizontal plane is independent from the turbulence in the other planes. If this statement were to be taken literally, it would imply that the temporal coherence between horizontal speeds, separated only in altitude, would be zero. Any vertical separation would be forced to take into account the effects of viscosity: that is to say, a specific finite vertical separation would be needed to destroy coherence. In order to estimate this distance, L, one can use L = C(v/S) (1/2) were v is the kinematic viscosity, S is the shear scale, and C is a constant of order unity. Author

N87-10441*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.

PROPAGATING TIDES IN THE MESOSPHERE c46

S. A. Bowhill and K. O. Merewether *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)

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A preliminary search has begun for evidence of tides in the 1-hr average line-of-sight mesospheric velocity data from the Urbana radar in the period 1978 to 1982, inclusive. Observations are restricted to the southeasterly component of those velocities. Since observations are only available for a fraction of a day due to the absence of night-time ionization in the Urbana mesosphere, it was decided to adopt an unusual procedure in the search; namely, to perform a Fourier analysis in the vertical direction and look for rotation in phase of vectors representing spatial frequency components. Propagating tidal modes would then show as vectors with a net rotation corresponding to their downward phase velocity. Five year monthly averages of hourly mean horizontal velocities inferred from the Urbana data are given. Consistent diurnal variation is seen for a number of months. These data were analyzed for vertical spatial periods of 3, 4.5, 6, 9, 12, and 24 km. When plotted as a function of time of day, many of the phasors tended to show a net rotation. The sense of rotation of a spinning vector in the complex plane can be determined objectively by computing the signed area swept out by the vector in saving from point to point. This calculation, indicated downward motion in 8 out of 12 months for the 9-km component and in 11 out of 12 months for the 24-km component. A comparison of the magnitudes of the 6 modes showed that the primary component was the 24-km component, a result confirmed by the tidal models of Forbes. Author

N87-10442*# Illinois Univ., Urbana. Aeronomy Lab.

GRAVITY WAVES IN SEVERE WEATHER c46

S. A. Bowhill and S. Gnanalingam *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)

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With a view to determining the role of severe weather in producing gravity waves, two tests were made. In the first, the wind speed measured at two nearby radiosonde stations, Peoria and Salem, was correlated with the stratosphere gravity-wave intensity at Urbana. Although the gravity-wave intensity fluctuated greatly from day to day, these is little if any correlation with the stratospheric wind speed. This suggests that orographic forcing is not a factor in generating gravity waves in Urbana. On the other hand, a clear correlation is found between cloud to heights exceeding 20,000 ft and an increased gravity-wave amplitude in the stratosphere. Author

N87-10443*# Alaska Univ., Fairbanks. Dept. of Physics.

SIMULTANEOUS ROCKET AND MST RADAR OBSERVATION OF AN INTERNAL GRAVITY WAVE BREAKING IN THE MESOSPHERE c46

Steven A. Smith, David C. Fritts, Ben B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.), and C. Russell Philbrick (Air Force Geophysics Lab., Hanscom AFB, Mass.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 11 p (For primary document see N87-10419 01-42)

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In June, 1983, the Structure and Atmospheric Turbulence Environment (STATE) rocket and Poker Flat Mesosphere-Stratosphere-Troposphere radar campaign was conducted to measure the interaction between turbulence, electron density and electron density gradient that has produced unusually strong MST radar echoes from the summer mesosphere over Poker Flat, Alaska. Analysis or radar wind measurements and a concurrent wind and temperature profile obtained from a rocket probe carrying a three-axis accelerometer are given. The two data sets provide a fairly complete (and in some cases, redundant) picture of the breaking (or more correctly, the saturation) of a large-amplitude, low-frequency, long-wavelength internal gravity wave. The data show that small-scale turbulence and small-scale wave intensity is greatest at those altitudes where the large-scale wave-induced temperature lapse rate is most negative or most nearly unstable, but the wind shear due to the large-scale wave is a minimum. A brief review of linear gravity-wave theory is presented as an aid to the identification of the gravity-wave signature in the radar and rocket data. Analysis of the time and height cross sections of wind speed and turbulence intensity observed by the Poker Flat MST radar follows. Then, the vertical profile of temperature and winds measured by a rocket probe examined. Finally, the use of the independent data sets provided by the rocket and the radar are discussed and implications for theories of wave saturation are presented. Author

N87-10444*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
OBSERVATIONS OF THUNDER WITH THE ARECIBO VHF RADAR c46
D. N. Holden and M. F. Larsen *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
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An experiment was carried out at the Arecibo Observatory in Puerto Rico in August 1985 to study Doppler velocities in a thunderstorm environment with a beam pointed 2.5 degrees off-vertical. Researchers detected two types of echoes associated with lightning. The first was associated with scattering from the lightning channel itself and had characteristics similar to those observed previously with meteorological radars. The second appeared to be due to scattering from the turbulence organized by phase fronts of an acoustic wave generated by lightning. The observations were consistent with a wave traveling at a velocity near the speed of sound and having a vertical phase velocity component of 40 m/s. Author

N87-10445*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
THE PROUST RADAR: FIRST RESULTS c47
F. Bertin, A. Cremieu, M. Glass, M. Massebeuf, and M. Petitdidier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
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Two campaigns took place in 1984 with the PROUST Radar operating in a bistatic mode, the transmitting antenna pointing at the vertical and the receiving one, 1 deg. off the vertical axis. The antenna beam intersection covers an altitude range between 3 and 9 km. The first of these campaigns are analyzed. The results analyzed show the capability of the PROUST Radar to measure the turbulent parameters and study the turbulence-wave interaction. In its present configuration (bistatic mode and 600 m vertical resolution), it has been necessary to make some assumptions that are known not to be truly fulfilled: homogeneous turbulence and constant vertical wind intensity over a 600-m thickness. It is clear that a more detailed study of the interaction between wave and turbulence will be possible with the next version of PROUST Radar (30-m altitude resolution and monostatic mode) that will soon be achieved. Author

N87-10446*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
SIMULTANEOUS FINE STRUCTURE OBSERVATION OF WIND AND TEMPERATURE PROFILES BY THE ARECIBO 430-MHz RADAR AND IN SITU MEASUREMENTS c47
D. Thomas, F. Bertin, M. Petitdidier, H. Teitelbaum (Ecole Polytechnique, Palaiseau, France), and R. F. Woodman (Instituto Geofisico del Peru, Lima) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
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A simultaneous campaign of balloon and radar measurements took place on March 14 to 16, 1984, above the Arecibo 430-MHz radar. This radar was operating with a vertical resolution of 150 m following two antenna beam directions: 15 deg. from the zenith, respectively, in the N-S and E-W directions. The main results concerning the comparison between the flight and simultaneous radar measurements obtained on March 15, 1984 are analyzed. The radar return power profile (S/N ratio in dB) exhibits maxima which are generally well correlated with step-like structures in the potential temperature profile. These structures are generally considered as the consequence of the mixing processes induced by the turbulence. A good correlation appears in the altitude range 12.5 to 19 km between wind shears induced by a wave structure observed in the meridional wind and the radar echo power maxima. This wave structure is characterized by a vertical wavelength of about 2.5 km, and a period in the range 30 to 40 hours. These characteristics are deduced from the twice daily rawinsonde data launched from the San Juan Airport by the National Weather Service. These results pointed out an example of the interaction between wave and turbulence in the upper troposphere and lower stratosphere. Turbulent layers are observed at locations where wind shears related to an internal inertia-gravity wave are maxima. Author

N87-10447*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
COMPARISON BETWEEN S. T. RADAR AND IN SITU BALLOON MEASUREMENTS c46
F. Dalaudier, J. Barat, F. Bertin (Centre National d'Etudes des Telecommunications, Saint Maur des Fosses, France), E. Brun (Toulon Univ., France), M. Crochet, and F. Cuq *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
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A campaign for simultaneous in situ and remote observation of both troposphere and stratosphere took place near Aire-sur-l'Adour (in southeastern France) on May 4, 1984. The aim of this campaign was a better understanding of the physics of radar echoes. The backscattered signal obtained with a stratosphere-troposphere radar both at the vertical and 15 deg. off vertical is compared with the velocity and temperature measurements made in the same region (about 10 km north of the radar site) by balloon-borne ionic anenometers and temperature sensors. In situ measurements clearly indicate that the temperature fluctuations are not always consistent with the standard turbulent theory. Nevertheless, the assumptions generally made (isotropy and turbulent field in k) and the classical formulation so derived for radar reflectivity are able to reproduce the shape of the radar return power profiles in oblique directions. Another significant result is the confirmation of the role played by the atmospheric stratification in the vertical echo power. It is important to develop these simultaneous in situ and remote experiments for a better description of the dynamical and thermal structure of the atmosphere and for a better understanding of the mechanisms governing clear-air radar reflectivity. Author

N87-10448*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A STATISTICAL MODEL TO ESTIMATE REFRACTIVITY TURBULENCE STRUCTURE CONSTANT C SUB n SUP 2 IN THE FREE ATMOSPHERE c46
J. M. Warnock and T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
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A computer program has been tested and documented (Warnock and VanZandt, 1985) that estimates mean values of the refractivity turbulence structure constant in the stable free atmosphere from standard National Weather Service balloon data or an equivalent data set. The program is based on the statistical model for the occurrence of turbulence developed by VanZandt et al. (1981). Height profiles of the estimated refractivity turbulence structure constant agree well with profiles measured by the Sunset radar with a height resolution of about 1 km. The program also estimates the energy dissipation rate (epsilon), but because of the lack of suitable observations of epsilon, the model for epsilon has not yet been evaluated sufficiently to be used in routine applications. Vertical profiles of the refractivity turbulence structure

constant were compared with profiles measured by both radar and optical remote sensors and good agreement was found. However, at times the scintillometer measurements were less than both the radar and model values. Author

N87-10449*# Arecibo Ionospheric Observatory, Puerto Rico. Arecibo Observatory.
DETERMINATION OF THE BRUNT-VAISALA FREQUENCY FROM VERTICAL VELOCITY SPECTRA c46
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Recent work on the spectra of vertical velocity oscillations due to gravity waves in the troposphere, stratosphere and the mesosphere has revealed a typical feature which we call the Brunt-Vaisala cutoff. Several observers noticed a spectral peak near the Brunt-Vaisala frequency. This peak often is characterized by a very steep slope at the high frequency part, but a fairly shallow slope towards lower frequencies. Some example spectra of stratosphere observations are given. This distinct spectral shape (most clear at the upper height 22.5 km) can be explained by the fact that the vertical velocity amplitudes of atmospheric gravity waves increase with frequency up to their natural cutoff at the Brunt-Vaisala frequency. The measurement of the frequency of the peak in a vertical velocity spectrum was found to yield most directly the Brunt-Vaisala-frequency profile. Knowing the Brunt-Vaisala frequency profile, one can deduce the potential temperature profile, if one has a calibration temperature at one height. However, even the uncalibrated profile will be quite useful, e.g., to determine fronts (defined by temperature inversions) and the tropopause height. This method fails for superadiabatic lapse rates when the Brunt-Viasala frequency is imaginary. The application of this method will also be difficult when the wind velocity is too high, causing the Doppler effect to smear out the total spectrum and blur the Brunt-Vaisala cutoff. A similar deficiency will also appear if the gravity-wave distribution has a maximum in wind direction. Author

N87-10450*# Arecibo Ionospheric Observatory, Puerto Rico.
THE USE OF THE EXPERIMENTALLY DEDUCED BRUNT-VAISALA FREQUENCY AND TURBULENT VELOCITY FLUCTUATIONS TO ESTIMATE THE EDDY DIFFUSION COEFFICIENT c46
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
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The determination of the turbulent energy dissipation rate or the eddy diffusion coefficient from radar observations can be done through the turbulence refractive index structure constant, deduced from calibrated echo power measurements, or through the turbulent velocity fluctuations, deduced from the echo spectrum width. Besides the radar parameters, power and spectrum width, the first approach needs knowledge of profiles of temperature and electron density in the mesosphere and the fraction of the radar volume filled with turbulence. The latter approach needs knowledge of the temperature profile, namely, the Brunt-Vaisala frequency. The use of this latter approach is demonstrated. Author

N87-10451*# Arecibo Ionospheric Observatory, Puerto Rico.
THE RELATION OF GRAVITY WAVES AND TURBULENCE IN THE MESOSPHERE c46
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
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Since researchers couldn't prove that the mesospheric turbulence layers are generated by the simultaneously existing short-period gravity waves, they invoked other generation mechanisms than wave breaking. Possible mechanisms like lateral convection (Rottger 1980a), quasi-geostrophic flows at mesoscales (Lilly, 1983) or vertical modes of motion as seen in the ocean (Muller and Pujalet, 1984) could be candidates. Researchers are inclined to see a connection of these layers or laminae with very-long-period internal waves because of the periodicity in their vertical structure and their long mean persistency. Rottger (1980b) had proposed that such structures are due the modulation of the me an temperature and wind profiles by internal waves. The superposition of random or short-term wave-induced wind and temperature fluctuations with the background profile, modulated by very-long-period waves (quasi-inertia waves) then would yield the observed effects, and could explain the vertical periodicity, the long-term mean persistency as well as some short-term variability of their intensity. Author

N87-10452*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CAN STOCHASTIC, DISSIPATIVE WAVE FIELDS BE TREATED AS RANDOM WALK GENERATORS c46
J. Weinstock *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
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A suggestion by Meek et al. (1985) that the gravity wave field be viewed as stochastic, with significant nonlinearities, is applied to calculate diffusivities. The purpose here is to calculate the diffusivity for stochastic wave model and compare it with previous diffusivity estimates. The researchers do this for an idealized case in which the wind velocity changes but slowly, and for which saturation is the principal mechanism by which wave energy is lost. A related calculation was given in a very brief way (Weinstock, 1976), but the approximations were not fully justified, nor were the physical pre-suppositions clearly explained. The observations of Meek et al. (1985) have clarified the pre-suppositions for the researchers and provided a rationalization and improvement of the approximations employed. Author

N87-10453*# Alaska Univ., Fairbanks. Geophysical Inst.
OBSERVATIONS AND A MODEL OF GRAVITY-WAVE VARIABILITY IN THE MIDDLE ATMOSPHERE c46
David C. Fritts and Robert A. Vincent (Adelaide Univ., Australia) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
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A major goal was to determine what portion of the gravity-wave frequency spectrum accounted for the majority of the momentum flux and divergence, as this has important implications for the middle atmosphere response. It was found that approx. 70% of the total flux and divergence was due to wave motions with observed periods less than 1 hour, consistent with expectations based on the shape of the observed gravity-wave spectrum (Fritts, 1984). This dominance of the momentum flux and divergence by high-frequency motions implies a potential for the modulation of those quantities by large-amplitude motions at lower frequencies. A second, striking aspect of the velocity and momentum flux data is its dramatic diurnal variability, particularly at certain levels. This variability is illustrated with the momentum flux, computed in 8-hr blocks. The dominant contributions here are due to waves with periods less than 1 hr. The variability with height and size of the mean square velocity in the west beam and the momentum flux, energed over the 3-day period. A detailed analysis of the various tidal motions present during this data interval was performed, and it was determined that variations in the zontal wind profile imposed by the diurnal tidal motion are

probably responsible for the modulation of the gravity-wave amplitudes and momentum fluxes. Author

N87-10454*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.

CLIMATOLOGY OF GRAVITY WAVES OVER POKER FLAT, ALASKA FOR 1983 **c47**

Ben B. Balsley and Rene Garello (Ecole Nationale Superieure de Techniques Avancees, Paris, France) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)

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An analysis of short-period wind fluctuations over Poker Flat, Alaska, obtained using the Poker Flat mesosphere-stratosphere-troposphere radar is presented. Results are shown for the troposphere and lower stratosphere as well as for the upper mesosphere and lower thermosphere. Contours depict various levels of wind variance (m2s-2). These results pertain only to wind fluctuation periods lying between one and six hours. These particular fluctuations are generally considered to arise primarily from atmospheric gravity waves. Insofar as this is true, the figure thus describes a general climatology of gravity waves at high latitudes. Author

N87-10455*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.

CLIMATOLOGY OF TROPOSPHERIC VERTICAL VELOCITY SPECTRA **c47**

W. L. Ecklund, K. S. Gage, B. B. Balsley, and D. A. Carter *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)

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Vertical velocity power spectra obtained from Poker Flat, Alaska; Platteville, Colorado; Rhone Delta, France; and Ponape, East Caroline Islands using 50-MHz clear-air radars with vertical beams are given. The spectra were obtained by analyzing the quietest periods from the one-minute-resolution time series for each site. The lengths of available vertical records ranged from as long as 6 months at Poker Flat to about 1 month at Platteville. The quiet-time vertical velocity spectra are shown. Spectral period ranging from 2 minutes to 4 hours is shown on the abscissa and power spectral density is given on the ordinate. The Brunt-Vaisala (B-V) periods (determined from nearby sounding balloons) are indicated. All spectra (except the one from Platteville) exhibit a peak at periods slightly longer than the B-V period, are flat at longer periods, and fall rapidly at periods less than the B-V period. This behavior is expected for a spectrum of internal waves and is very similar to what is observed in the ocean (Eriksen, 1978). The spectral amplitudes vary by only a factor of 2 or 3 about the mean, and show that under quiet conditions vertical velocity spectra from the troposphere are very similar at widely different locations. Author

N87-10456*# Adelaide Univ. (Australia). Dept. of Physics

MESOSPHERIC GRAVITY-WAVE CLIMATOLOGY AT ADELAIDE **c46**

R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)

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The MF Adelaide partial-reflection radar has been operating continuously since November 1983. This has enabled a climatology of gravity-wave activity to be constructed for the mesosphere. The data have been analyzed for a medium-period range of 1 to 8 hr. and a longer period range between 8 and 24 hr. covering the inertio-period waves. The tidal motions have been filtered out prior to analysis. For the data analyses so far (Nov. 1983 to Dec. 1984), a number of interesting features emerged. Firstly, the wave activity at heights above 80 km shows a small seimannual variation with season with the activity being strongest in summer and winter. At heights below 80 km however, there is a similar but more marked variation with the weakest amplitudes occurring at the time of the changeovers in the prevailing circulation. If breaking gravity waves are responsible for much of the turbulence in the mesosphere, then the periods March to April and September to October might also be expected to be periods of weak turbulence. The wave field appears to be partially polarized. The meridional amplitudes are larger than the zonal amplitudes, especially in water. It is found that the degree of polarization is about 15% in summer and 30% in winter. The polarized component is found to propagate in the opposite direction to the background flow in the stratosphere, which suggests that the polarization arises through directional filtering of the waves as they propagate up from below. Author

N87-10457*# Cologne Univ. (West Germany). Inst. for Geophysik und Meteorologie.

HORIZONTAL WIND PERTURBATIONS AND THEIR RELATION TO TRANSIENT INTERNAL GRAVITY WAVES **c46**

A. Ebel, A. H. Manson (Saskatchewan Univ., Saskatoon), and C. E. Meek *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Horizontal winds as measured with the Saskatoon MF radar exhibit wind fluctuations which have preferred directions toward north or south in the period range 0 to 60 min at heights between about 60 and 110 km. Longer period perturbations (approx 1-6 h) tend to have an additional maximum of direction frequencies in the E-W sector.The polarization effect analyzed for more than 6 years shows regular changes with season. The main features of the seasonal variations of the direction distributions can be explained by directional filtering of vertically propagating nonstationary gravity waves and appropriate changes of the wave source strength and position in the troposphere. The N-S polarization of the gravity-wave field appears to result in meridional wind reversals with height above the mesopause. Author

N87-10458*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.

POSSIBILITY OF MEASURING GRAVITY-WAVE MOMENTUM FLUX BY SINGLE BEAM OBSERVATION OF MST RADAR **c46**

C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)

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Vincent and Reid (1983) proposed a technique to measure gravity-wave momentum fluxes in the atmosphere by mesosphere-stratosphere-troposphere (MST) radars using two or more radar beams. Since the vertical momentum fluxes are assumed to be due to gravity waves, it appears possible to make use of the dispersion and polarization relations for gravity waves in extracting useful information from the radar data. In particular, for an oblique radar beam, information about both the vertical and the horizontal velocities associated with the waves are contained in the measured Doppler data. Therefore, it should be possible to extract both V sub Z and V sub h from a single beam observational configuration. A procedure is proposed to perform such an analysis. The basic assumptions are: the measured velocity fluctuations are due to gravity waves and a separable model gravity-wave spectrum of the Garrett-Munk type that is statistically homogeneous in the horizontal plane. Analytical expressions can be derived that relate the observed velocity fluctuations to the wave momentum flux at each range gate. In practice, the uncertainties related to the model

parameters and measurement accuracy will affect the results. A MST radar configuration is considered. Author

N87-10459*# Control Data Corp., Minneapolis, Minn.
PRELIMINARY ESTIMATES OF VERTICAL MOMENTUM FLUX **c46**
G. D. Nastrom and J. L. Green (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Preliminary results of themomentum flux and flux divergence during a transient episode, as a jet stream moved over the radar are given. The zonal and meridional momentum flux and flux divergences displayed remarkable continuity with altitude in time, increasing in intensity as lee waves and other gravity-wave activity developed while the jet stream approached. The momentum flux values observed compare favorably with aircraft measurements made over similar topography, at least during the early part of the day. The accelerations due to the momentum flux divergence seem rather large at first glance, especially for the late part of the day. However, there may be compensating forces due to effects not considered here, such as transverse circulations or, scales of motion to small to be resolved by these data. Author

N87-10460*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.
EFFECTS OF ANISOTROPY ON THE FREQUENCY SPECTRUM OF GRAVITY WAVES OBSERVED BY MST RADAR **c46**
C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

In the investigation of gravity waves using mesosphere-stratosphere-troposphere radar data, model gravity-wave spectra have been used. In these model spectra, one usually assumes azimuthal symmetry. The effect of spectral anisotropy on the observed spectrum is studied here. It is shown that for a general Garrett-Munk-type spectrum, the anisotropy does not affect the frequency spectrum observed by the vertically beamed radar. For the oblique beam, however, the observed frequency spectrum is changed. A general gravity wave spectrum including azimuthal anisotropy is considered. Author

N87-10461*# Control Data Corp., Minneapolis, Minn.
THE FREQUENCY SPECTRUM OF C SUB n SUP 2 FROM MST RADAR DATA **c46**
G. D. Nastrom *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

In a recent study (Nastrom et al., 1986), the variability of the refractivity turbulence structure constant, C sub n(2), was examined using observations from the stratosphere troposphere/mesosphere stratosphere troposphere (ST/MST) radar at Poker Flat, Alaska, and Platteville, Colorado. Variations of C2 with height, season, and weather conditions were examined. Also, the autocorrelation function and the frequency distribution of C sub n(2) were studied, and it was shown that C sub n(2), follows a log-normal frequency distribution. One of the more tentative results given in that paper is a first look at the spectrum of log C sub n(2), as a function of frequency at Poker Flat. This spectrum appears to obey a power law relation with frequency, P(F) approx. F(k), with k near -5/3 at periods between about 4 hours and 6 days, and with k near -1 at shorter periods. Power law behavior of a spectrum often helps us to infer the underlying dynamics which give rise to this spectrum, and it is thus of some concern to establish further confidence in the spectral shape. The purpose here is to address these questions. Author

N87-10462*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Elec. Engineering and Applied Physics.
A STUDY OF GRAVITY-WAVE SPECTRA IN THE TROPOSPHERE AND STRATOSPHERE AT 5-MIN TO 5-DAY PERIODS WITH THE POKER FLAT MST RADAR **c46**
R. S. Bemra, P. K. Rastogi, and B. B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

An analysis of frequency spectra at periods of about 5 days to 5 min from two 20-day sets of velocity measurements in the stratosphere and troposphere region obtained with the Poker Flat mesosphere-stratosphere-troposphere (MST) radar during January and June, 1984 is presented. A technique based on median filtering and averaged order statistics for automatic editing, smoothing and spectral analysis of velocity time series contaminated with spurious data points or outliers is outlined. The validity of this technique and its effects on the inferred spectral index was tested through simulation. Spectra obtained with this technique are discussed. The measured spectral indices show variability with season and height, especially across the tropopause. The discussion briefly outlines the need for obtaining better climatologies of velocity spectra and for the refinements of the existing theories to explain their behavior. Author

N87-10463*# Arecibo Ionospheric Observatory, Puerto Rico.
ON THE VARYING SLOPE OF VELOCITY SPECTRA **c46**
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Spectra of zonal, meridional and vertical wind velocity, measured during a 24 hour period with the spaced-antenna technique indicate quite a variable slope as a function of height. It is found that the spectral slope (1h to 24h) of all three components correlates with the mean horizontal wind velocity. A possible conclusion is that the frequency dependence of power density of horizontal and vertical fluctuation component apparently depends on the mean wind velocity. However, the vertical spectra at periods larger than about 1 hour can also be influenced by spillover (due to finite radar antenna beam width) from the horizontal fluctuation component or by a Doppler shift. Author

N87-10464*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
DOPPLER EFFECTS ON VELOCITY SPECTRA OBSERVED BY MST RADARS **c46**
A. O. Scheffler and C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Recently, wind data from mesosphere-stratosphere-troposphere (MST) radars have been used to study the spectra of gravity waves in the atmosphere (Scheffler and Liu, 1985; VanZandt et al., 1985). Since MST radar measures the line-of-sight Doppler velocities, it senses the components of the wave-associated velocities along its beam directions. These components are related through the polarization relations which depend on the frequency and wave number of the wave. Therfore, the radar-observed velocity spectrum will be different from the original gravity-wave spectrum. Their relationship depends on the frequency and wave number of the wave as well as the propagation geometry.

This relation can be used to interpret the observed data. It can also be used to test the assumption of gravity-wave spectrum (Scheffler and Liu, 1985). In deriving this relation, the background atmosphere has been assumed to be motionless. Obviously, the Doppler shift due to the background wind will change the shape of the gravity-wave power spectrum as well as its relation with the radar-observed spectrum. Here, researcher's investigate these changes. Author

N87-10465*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
OBSERVATIONS OF VERTICAL VELOCITY POWER SPECTRA WITH THE SOUSY VHF RADAR c46
M. F. Larsen, J. Rottger, and D. N. Holden *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
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A data set taken with the SOUSY VHF radar from October 28 to November 13, 1981 was used to calculate the power spectrum of the vertical velocities directly from the vertical beam measurements. The spectral slopes for the frequency spectra have been determined out to periods of several days and have been found to have values near -1 in the troposphere and shallower slopes in the lower stratosphere. The value of -1 is in agreement with the value found by Larsen et al. (1985) and Balsley and Carter (1982) in the range from a few minutes to 1 hr. Author

N87-10466*# Alaska Univ., Fairbanks. Geophysical Inst.
MESOSPHERIC WAVE NUMBER SPECTRA FROM POKER FLAT MST RADAR MEASUREMENTS COMPARED WITH GRAVITY-WAVE MODEL c46
Steven A. Smith, David C. Fritts, and Thomas E. VanZandt (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
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The results of a comparison of mesospheric wind fluctuation spectra computed from radial wind velocity estimates made by the Poker Flat mesosphere-stratosphere-troposphere (MST) radar are compared with a gravity-wave model developed by VanZandt (1982, 1985). The principal conclusion of this comparison is that gravity waves can account for 80% of the mesospheric power spectral density. Author

N87-10467*# Alaska Univ., Fairbanks. Geophysical Inst.
EVIDENCE OF A SATURATED GRAVITY-WAVE SPECTRUM THROUGHOUT THE ATMOSPHERE c46
David C. Fritts and Steven A. Smith (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The view adapted here is that the dominant mesoscale motions are due to internal gravity waves and show that previous and new vertical wave number spectra of horizontal winds are consistent with the notion of a saturation limit on wave amplitudes. It is also proposed that, at any height, only those vertical wave numbers m less than m sub asterisk are at saturation amplitudes, where m sub asterisk is the vertical wave number of the dominant energy-containing scale. Wave numbers m less than m sub asterisk are unsaturated, but experience growth with height due to the decrease of atmospheric density. The result is a saturated spectrum of gravity waves with both m sub asterisk decreasing and wave energy increasing with height. This saturation theory is consistent with a variety of atmospheric spectral observations and provides a basis for the notion of a universal spectrum of atmospheric gravity waves. Author

N87-10468*# Adelaide Univ. (Australia). Dept. of Physics.
INTERCOMPARISON AND CALIBRATION OF WIND AND WAVE MEASUREMENTS AT VARIOUS FREQUENCIES c47
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
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Radars are increasingly being used for determinations of the small-scale wave and turbulence fields of the atmosphere. It is important to understand as fully as possible the likely sources of error or bias in radar velocity determinations. This is especially true for the determination of wave and turbulence parameters which often rely on the measurement of first or second order deviations from the prevailing wind and therefore require better precision and time resolution than is usually required for measurements of the mean winds alone. The intercomparison of velocity measurements made with different techniques (e.g., radar and balloon) can be expected to help determine not only the relative effectiveness of the different methods, but also the degree of reliability. Author

N87-10469*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
AN EVALUATION OF ERRORS OBSERVED IN THE MEASUREMENT OF LOW WIND VELOCITIES c47
S. R. Williams and D. W. Thomson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Measurements of low wind velocities (the absolute value of V sub H is approx. equal to 6 m/s) with a VHF wind profiler can be difficult if ground clutter or other biases in the system dominate in altering the position of the perceived peak in the calculated power spectrum. A variety of methods for ground clutter suppression are used in profiler systems today (Cornish, 1983). An editing method called zero suppression takes the spectral value of selectable number of points (N) on each side of 0 velocity (one point on either side, in this study) and sets them equal to the mean value of the points exterior to the specified N points on either side of 0. Analysis done with the PSU VHF(1) radar, shows that this zero-suppression method can systematically bias horizontal winds V sub H below 6 m/s. With the zero suppression, an artificial increase in absolute wind velocities occurs when the spectral peaks fall within the plus or minus N points of the FFT (personal communication, Strauch, 1985). It was also established that the method artificially decreases the absolute wind velocities inferred from spectral peaks that are outside but near the suppressed region. Comparisons of wind profiles observed with and without zero suppression are given. The range of the biased velocities extends to about plus or minus 6 m/s. Biases have been deduced to be as much as 2 m/s, but more commonly they are on the order of 1.0 m/s. Author

N87-10470*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A COMPARISON OF VERTICAL VELOCITIES MEASURED FROM SPECULAR AND NONSPECULAR ECHOES BY A VHF RADAR c48
J. L. Green, W. L. Clark, J. M. Warnock, and G. D. Nastrom (Control Data Corp., Minneapolis, Minn.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
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For a number of years, there have been doubts about the accuracy of vertical wind velocities measured with quasi-specular reflections from mesosphere-stratosphere-troposphere (MST) radar. The concern has been that the layers producing the quasi-specular reflection process this hypothetical tilt. Because of the quasi-specular reflection process, this hypothetical tilt would control the effective zenith angle of the radar antenna beam so that a small component of the horizontal velocity would be included in what was assumed to be a truly vertical beam. The purpose here is to test the hypothesis that there is an effect on the wind velocities measured on a vertical antenna beam due to a long-term tilting of the stable atmospheric layers that cause quasi-specular reflection. Gravity waves have been observed to cause short-term tilting of turbulent layers and specularly reflecting layers. In both cases, the effect was a wave-like deformation atmospheric layers with a period of a few minutes. This geometry is shown. Because of this influence of gravity waves, it was expected that there would be short-term variations in the vertical velocity. Author

N87-10471*# National Oceanic and Atmospheric Administration, Boulder, Colo.

METHODS FOR VERIFYING THE ACCURACY OF WIND PROFILES **c47**

R. C. Strauch *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)

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Comparisons of radar-measured winds have been made with several types of measurements not only to verify radar data but also to seek a satisfactory comparison method. Three of the comparisons that have been made with Colorado Profiler radars are summarized. Radar measurements were compared with radiosonde measurements. Infrared lidar and 915 MHz radar were compared with radiosondes. A brief radar/radar comparison was made using the 50-MHz radar and a 3-cm wavelength meteorological Doppler radar during precipitation. R.J.F.

N87-10472*# Clemson Univ., S.C. Dept. of Physics and Astronomy.

A COMPARISON OF THUNDERSTORM REFLECTIVITIES MEASURED AT THE VHF AND UHF **c47**

M. F. Larsen and J. Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)

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Observations of thunderstorms made with two radars operating at different wavelengths of 70 cm and 5.67 m are compared. The first set of observations was made with the UHF radar at the Arecibo Observatory in Puerto Rico, and the second set was made with the Max-Planck-Institut fur Aeronomie VHF radar in the Harz Mountains in West Germany. Both sets of observations show large echo strengths in the convective region above the -10 C isotherm. At UHF, there appears to be a contribution from both the precipitation echoes and the normal echoes due to scatter from turbulent variations in the refractive index. Author

N87-10473*# Clemson Univ., S.C. Dept. of Physics and Astronomy.

UHF AND VHF RADAR OBSERVATIONS OF THUNDERSTORMS **c47**

D. N. Holden, C. W. Ulbrich, M. F. Larsen, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), H. M. Ierkic, and W. Swartz (Cornell Univ., Ithaca, N.Y.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)

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A study of thunderstorms was made in the Summer of 1985 with the 430-MHz and 50-MHz radars at the Arecibo Observatory in Puerto Rico. Both radars use the 300-meter dish, which gives a beam width of less than 2 degrees even at these long wavelengths. Though the radars are steerable, only vertical beams were used in this experiment. The height resolution was 300 and 150 meters for the UHF and VHF, respectively. Lightning echoes, as well as returns from precipitation and clear-air turbulence were detected with both wavelengths. Large increases in the returned power were found to be coincident with increasing downward vertical velocities at UHF, whereas at VHF the total power returned was relatively constant during the life of a storm. This was attributed to the fact that the VHF is more sensitive to scattering from the turbulence-induced inhomogeneities in the refractive index and less sensitive to scatter from precipitation particles. On occasion, the shape of the Doppler spectra was observed to change with the occurrence of a lightning discharge in the pulse volume. Though the total power and mean reflectivity weighted Doppler velocity changed little during these events, the power is Doppler frequency bins near that corresponding to the updraft did increase substantially within a fraction of a second after a discharge was detected in the beam. This suggests some interaction between precipitation and lightning. Author

N87-10474*# Saskatchewan Univ., Saskatoon. Inst. of Space and Atmospheric Studies.

COMPARISON OF MEDIUM FREQUENCY PULSED RADAR INTERFEROMETER AND CORRELATION ANALYSIS WINDS, PART 1 **c35**

C. E. Meek, I. M. Reid, and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)

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In principle, the interferometer analysis determines the radial velocity and direction of single scatterers provided that each has a sufficiently different Doppler frequency to permit separation by spectral analysis. In fact, scatterers will not have constant radial velocity, and their Doppler frequencies as well as their directions will be modulated by their horizontal motion. Thus, there is a tradeoff between the poorer resolution but less smeared scatterers on shorter records and the higher resolution (longer) records. Three or more non-collinear scatterers are sufficient to determine the wind. It appears that the velocity found from the combined interferometer peaks agrees well with the apparent velocity from correlation methods, but the true velocity is a factor of 2 smaller. This difference might be resolved by searching for scatters showing regular movement between adjacent records. Author

N87-10475*# Saskatchewan Univ., Saskatoon. Inst. of Space and Atmospheric Studies.

COMPARISON OF MEDIUM FREQUENCY PULSED RADAR INTERFEROMETER AND CORRELATION ANALYSIS WINDS, PART 2 **c35**

C. E. Meek, I. M. Reid, and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 14B

In order to test whether the chosen Doppler peaks represent localized scatters in motion, as opposed to some sort of integrated composite, an attempt was made to determine the change in position of single scatterers over a series of sequential records. A four-antenna system was employed which had 1 degree of freedom in phase. Due to limitations N-S linear transmission and E-W linear reception were used. The Doppler frequency peak selection criteria were that at least two of the four power spectra should have a local peak, and that normalized phase discrepancy, should be

less than 0.3. The lack of success in tracking individual scatters seems to suggest a short lifetime. If this is the case, then the present experiment is not able to resolve the difference found between the correlation analysis true velocity and the interferometer value. On the other hand, it appears that the interferometer may be of some use in tracking waves. B.G.

N87-10476*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.

MESOSPHERIC WIND MEASUREMENTS USING A MEDIUM-FREQUENCY IMAGING DOPPLER INTERFEROMETER c46

G. W. Adams and J. W. Brosnahan (Tycho Technology, Inc., Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Wind results from a medium-frequency radar operated as an imaging Doppler interferometer are presented. Ten independent antennas, together with mesospheric wind motions, were used to Doppler-sort and then echo-locate individual scattering points. The three-dimensional location and radial velocity of each discrete scattering point was determined. Mean winds were then determined by a least squares fit to the radial velocities of the ensemble of scatterers. B.G.

N87-10477*# Arecibo Ionospheric Observatory, Puerto Rico.

COMPARISON OF REFLECTIVITY AND WIND PROFILES MEASURED ON 46.8 MHz AND 430 MHz AT THE ARECIBO OBSERVATORY c47

Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Comparisons of troposphere and stratosphere radar experiments at ultrahigh frequency (UHF) and very high frequency (VHF) were done at the Arecibo Observatory in April 1980 with the 430 MHz and 46.8 MHz radar. The velocity profiles measured on both frequencies with the Doppler beam swinging mode were compared. In general, the velocity profiles were equivalent. The VHF profile, however, shows more fluctuations with height than the UHF profile, although the latter was recorded with 150 m resolution instead of 300 m resolution on VHF. B.G.

N87-10478*# Arecibo Ionospheric Observatory, Puerto Rico.

MST RADAR NETWORKS AND CAMPAIGNS SESSION SUMMARY AND RECOMMENDATIONS c46

Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Topics addressed included: determination of sources of propagation and dissipation of atmospheric disturbances and waves; measurement parameters; comparison of different method and instruments; suitable combinations of instruments; information exchange; and training courses. B.G.

N87-10479*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.

AN ANALYSIS AT MESOSPHERIC COHERENT-SCATTER POWER ENHANCEMENTS DURING SOLAR FLARE EVENTS c92

J. Parker and S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 03B

Solar flares produce increases in coherent-scatter power from the mesosphere due to the increase in free electrons produced by X-ray photoionization. Thirteen such power enhancements were observed at Urbana. When such an enhancement occurs at an altitude containing a turbulence layer with constant strength the relative enhancement of electon density is estimated from the enhancement in power. Such estimates of enchanced electron density are compared with estimates of the X-ray photoionization at that altitude, deduced from geostationary satellite measurements. It is found that possible types ion-chemical reaction scheme may be distinguished, and the nonflare ion-pair production function may be estimated. The type of ion-chemical scheme and the nonflare ion-production function are shown to depend on the solar zenith angle. Author

N87-10480*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).

SCIENTIFIC REASONS FOR A NETWORK OF ST RADARS AND COOPERATIVE CAMPAIGNS c46

M. Petitdidier and M. Crochet (Toulon Univ., France) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Due to their capabilities of measuring wind profiles in the troposphere and stratosphere with good time and height resolution, whatever the weather conditions, stratosphere-troposphere (ST) radars are well adapted to carry out atmospheric research in many fields as well as to fulfill the meteorological forecasting needs. Examples are presented from previous and future national or international campaigns planned in France. The ST radars were used first by themselves with the adjunction of radiosonde data. Then networks were built and used to get horizontal parameters. It appears that ST radar networks should naturally be included in cooperative campaigns. B.G.

N87-10481*# National Oceanic and Atmospheric Administration, Boulder, Colo.

PROGRESS IN EXISTING AND PLANNED MST RADARS c46

T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Radar systems are described which use two different wind measuring techniques: the partial-reflection drift technique and the mesosphere-stratosphere-troposphere (MST) or Doppler beam-swing radar technique. The advantages and disadvantages of each technique are discussed. B.G.

N87-10482*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.

THE PROPOSED FLATLAND RADAR c32

J. L. Green, K. S. Gage, T. E. VanZandt, and G. D. Nastrom *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

A flexible very high frequency (VHF) stratosphere-troposphere (ST) radar configured for meteorological research is to be constructed near Urbana, Illinois. Measurement of small vertical velocities associated with synoptic-scale meteorology can be performed. A large Doppler microwave radar (CHILL) is located a few km from the site of the proposed ST radar. Since the microwave radar can measure the location and velocity of hydrometeors and the VHF ST radar can measure clear (or cloudy) air velocities, simultaneous observations by these two radars of stratiform or

convective weather systems would provide valuable meteorological information. B.G.

N87-10483*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CURRENT STATUS OF THE POKER FLAT MST RADAR c32
B. B. Balsley *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The change of the Poker Flat, Alaska, Mesosphere-Stratosphere (MST) radar to a configuration to measure gravity-wave momentum flux is discussed. B.G.

N87-10484*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CONTINUOUS WIND MEASUREMENT IN THE TROPICAL PACIFIC USING VHF RADARS c47
B. B. Balsley, W. L. Ecklund, and D. A. Carter *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Very High Frequency (VHF) Radar Wind Profilers are being installed on Ponape, East Caroline Islands and Christmas Island, Republic of Kiribati to continuously monitor winds aloft. The purpose of this experiment is to study wind fluctuations on time scales between minutes and days, to determine the longitudinal character of these fluctuations, and to examine their relationship to climate variability. Six-hourly wind profiles will be provided via satellite to the scientific community for Project TOGA (Tropical Ocean Global Atmosphere). B.G.

N87-10485*# Illinois Univ., Urbana. Aeronomy Lab.
RECENT PROGRESS IN THE URBANA MST RADAR c32
S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Urbana radar, which operates at 40.92 MHz with a peak power of about 1.2 MW into a 100 x 120 m phased array antenna was improved. An accelerated data-acquisition system, a beam-steering system, and a transmit/receive switch were installed. With these changes, the radar is in regular operations for two hours every day around local noon gathering stratospheric and mesospheric data. Special campaigns are mounted in addition under severe weather conditions. B.G.

N87-10486*# National Oceanic and Atmospheric Administration, Boulder, Colo.
COLORADO WIND PROFILERS c47
R. G. Strauch *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The Wave Propagation Laboratory (WPL) has operated a network of wind profiling radars in Colorado. The current configuration of the network is described. All radars operate continuously and unattended to supply hourly-averaged wind profiles to a central computer in Boulder in real time. The hardware and software changes made to improve reliability are discussed. This research network will continue to be used to provide wind profiles for operational and research meteorologists and the performance of various wavelength systems will be evaluated. B.G.

N87-10487*# National Oceanic and Atmospheric Administration, Boulder, Colo.
WIND PROFILER DEMONSTRATION SYSTEM c47
R. B. Chadwick *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The National Oceanic and Atmospheric Administration (NOAA) has started procurement of a 30-station demonstration network of Doppler radar wind profilers to be deployed in the central United States by 1989. The purposes of this demonstration network are: (1) to assess the impact of a large wind profiler network on meteorological forecasting; (2) to test wind profiler hardware designed specifically for commercial production and widespread deployment; and (3) to provide wind data for research programs involving weather phenomena in the central United States. B.G.

N87-10488*# Radio Research Labs., Tokyo (Japan).
REMOTE TEMPERATURE PROFILING IN THE TROPOSPHERE AND STRATOSPHERE BY THE RADIO-ACOUSTIC SOUNDING TECHNIQUE c46
Nobuo Matuura, Yoshihisa Masuda, and Hisao Inuki *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Radar application of the radio-acoustic sounding technique uses the Doppler frequency shift of radar echoes returning from the atmospheric wave structure, in association with a traveling acoustic pulse transmitted from the ground, to determine the speed of sound, and hence the atmospheric temperature, as a function of altitude. Temperature measurement in the troposphere and stratosphere were determined using the radio-acoustic sounding technique with the Radio-Acoustic Sounding System (RASS). Successful experiments were performed in March 1985, and in August 1985. B.G.

N87-10489*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE PENN STATE DOPPLER NETWORK PROGRESS REPORT c32
S. R. Williams and R. Peters *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The software and hardware implementation for the Penn State University network were discussed. Delayed delivery of radio frequency equipment and signal processing components resulted in modification of the original timetables. It was determined that the best approach for implementing the second very high frequency (VHF) would be when the VHF radar was in reliable and unattended operation. A short summary of the specifications for the three radars is presented. B.G.

N87-10490*# Adelaide Univ. (Australia). Dept. of Physics.
THE ADELAIDE MF PARTIAL-REFLECTION RADAR AND VHF ST RADAR Progress Report c32
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The microwave frequency (MF) partial-reflection radar ran continuously since November 1983, with data being analyzed in real time. The spaced antenna technique was used routinely to

produce a climatology of the mean circulation, atmospheric tides, and gravity waves. Since the beginning of 1985, the system was also used as a Doppler radar to measure the spectral widths of the mesospheric echoes. This has enabled the turbulence dissipation rates to be determined. The Stratosphere-Troposphere (ST) radar was operated in the spaced antenna mode to measure winds in November 1984, in conjunction with a cooperative campaign to study the propagation of cold fronts across SE Australia. Observations were also performed to study the structure of the more intense and deeper cold fronts, which occur in late winter. B.G.

N87-10491*# Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
THE PROUST RADAR c32
F. Bertin, M. Glass, R. Ney, and M. Petitdidier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Stratosphere-Troposphere (ST) radar called PROUST works at 935 MHz using the same klystron and antenna as the coherent-scatter radar. The use of this equipment for ST work has required some important modifications of the transmitting system and the development of receiving, data processing and acquisition (1984,1985) equipment. The modifications are discussed. B.G.

N87-10492*# Toulon Univ. (France). Lab. de Sondages Electromagnetiques.
THE PROVENCE ST RADAR c32
M. Crochet *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Since the Alpex Campaign, when 3 Stratosphere-Troposphere (ST) radar operated in Camarque as a cooperative effort of the Aeronomy Laboratory of NOAA, CO, and LSEET from Toulon, a 50 MHz Very High Frequency (VHF) ST radar was developed, improved, and tested. The operating characteristics, main objectives, preliminary results, and future experiment costs of the VHF ST radar are discussed. B.G.

N87-10493*# CNRM, Toulouse (France).
THE INSU AND DMN NETWORK OF ST RADARS c32
M. Petitdidier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), V. Klaus, F. Baudin (Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux, France), M. Crochet (Toulon Univ., France), G. Penazzi (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), and P. Quinty *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Due to their capabilities of measuring wind profiles with good time and height resolution, Stratosphere-Troposphere (ST) are well adapted to carry out atmospheric research. In France, a Very High Frequency (VHF) and an Ultrahigh Frequency (UHF) ST radar are working for research purposes. The INSU (Institut National des Sciences de l'Univers) and the DMN (Direction de la Meteorologie Nationale) networks are discussed. B.G.

N87-10494*# Arecibo Ionospheric Observatory, Puerto Rico.
INVESTIGATIONS OF THE LOWER AND MIDDLE ATMOSPHERE AT THE ARECIBO OBSERVATORY AND A DESCRIPTION OF THE NEW VHF RADAR PROJECT c46
J. Rottger, H. M. Ierkic, R. K. Zimmerman, and J. Hagen *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The atmospheric science research at the Arecibo Observatory is performed by means of (active) radar methods and (passive) optical methods. The active methods utilize the 430 NHz radar, the S-band radar on 2380 MHz, and a recently constructed Very High Frequency (VHF) radar. The passive methods include measurements of the mesopause temperature by observing the rotational emissions from OH-bands. The VHF radar design is discussed. B.G.

N87-10495*# National Central Univ., Chung-Li (Taiwan).
THE FIRST OPERATION AND RESULTS OF THE CHUNG-LI VHF RADAR c32
J. K. Chao, F. S. Kuo, Y. S. Chu, I. J. Fu, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), and C. H. Liu (Illinois Univ., Urbana) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Chung-Li Very High Frequency (VHF) radar is used in the dual-mode operations, applying Doppler beam-swinging as well as the spaced-antenna-drift method. The design of the VHF radar is examined. Results of performance tests are discussed. B.G.

N87-10496*# Saskatchewan Univ., Saskatoon. Dept. of Physics.
PROGRESS IN THE MF RADAR SYSTEM AT SASKATOON c32
C. E. Meek and A. H. Manson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Two improvements were made to the radar system in the last year, one was the addition of O/X mode capability to the full antenna array used in the real-time wind system, and the other was the development of a coherent receiver. The design of the transmitter antenna is examined. The proposed coherent real-time wind system is also discussed. B.G.

N87-10497*# Indian Space Research Organization, Bangalore.
SYSTEM ASPECTS OF THE INDIAN MST RADAR FACILITY c32
G. Viswanathan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

One of the major objectives of the Indian Middle Atmosphere Program is to investigate the motions of the middle atmosphere on temporal and spatial scales and the interaction between the three height regions of the middle atmosphere. Realizing the fact that radar technique has proven to be a very powerful tool for the study of Earth atmosphere, the Indian Middle Atmosphere Program has recommended establishing a mesosphere-stratosphere-troposphere (MST) radar as a national facility for atmospheric research. The major landmarks in this attempt to setup the MST radar as a national facility are described. Author

N87-10498*# Uppsala Ionospheric Observatory (Sweden).
HISCAT: A PROPOSED NEW SCATTER FACILITY IN NORTHERN SCANDINAVIA c14
R. Bostrom and B. Thide *In* International Council of Scientific

Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 14B

It is proposed that a new versatile ionospheric and atmospheric scatter radar be constructed in northern Scandavia through a multinational collaborative effort. The new facility tentatively named HISCAT (High frequency, High power, High latitude, Heating and Ionospheric Scatter facility), should be used for scientific investigations of: the physics of the neutral (middle) atmosphere; fundamental plasma phenomena, natural or artificially induced in the ionosphere; electrodynamic conditions at high altitudes above the auroral region and in the polar cap ionosphere; plasma waves in the solar atmosphere. The system should thus be able to operate as a mesosphere-stratosphere-troposphere (MST) radar, a so-called ionospheric modification facility, incoherent-scatter radar, coherent-scatter radar, and solar radar. Basically, the new facility should be a device that can operate simultaneously on several frequencies in the frequency range 5 to 50 MHz not covered by other instruments. It should comprise: powerful transmitters, capable of delivering a total average power of several megawatts; an advanced phased antenna array of high gain forming one or two steerable and well collimated beams; and an advanced data collection and analysis system. Author

N87-10499*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
PHASED-ARRAY DESIGN FOR MST AND ST RADARS c32
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

All of the existing radar systems fully dedicated to clear-air radar studies use some type of phased-array antennas. The effects of beam-steering techniques including feed networks and phase shifters; sidelobe control; ground-clutter suppression; low altitude coverage; arrays with integrated radiating elements and feed networks; analysis of coaxial-collinear antennas; use of arrays with multiple beams; and array testing and measure on structural design of the antenna are discussed. B.G.

N87-10500*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE NOAA TOGA ANTENNA ARRAY c32
W. L. Ecklund, D. A. Carter, and B. B. Balsley *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Aeronomy Laboratory recently installed a 100 x 100 meter array antenna with limited beam steering on Christmas Island as a part of the TOGA (Tropical Ocean and Global Atmosphere) program. The array and the associated beam steering and indicating hardware are described. Author

N87-10501*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
BEAM STEERING SYSTEM c32
S. A. Bowhill and K. O. Merewether *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

A simple technique for steering the beam of a multimodule phased array MST (mesosphere, stratosphere, troposphere) radar antenna is described. It is desirable to be able to point the antenna in multiple directions, so as to derive all components of the horizontal velocity. This was done on an experimental basis by adding parallel wire line to the feed and achieving a southward tilt of the antenna. It is proved possible to steer the beam through most of the available range without adversely affecting the VSWR seen from the transmitter. Calibrating the antenna direction can be accomplished by observing radio sources, though there are an inadequate number to cover all directions. For various assumed values of the aspect sensitivity in dB/deg, and the calculated antenna pattern, it is possible to calculate the effective pointing angle of the antenna, defined as that angle which would give an identical location for the centroid of the power spectrum if aspect sensitivity were absent. Using averaged apparent steering directions, eastward and northward winds were calculated for special radar runs simultaneous with 14 balloon launches at Peoria and results are presented. E.R.

N87-10502*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
DETERMINATION OF U, V, AND W FROM SINGLE STATION DOPPLER RADAR RADIAL VELOCITIES c47
W. L. Clark, J. L. Green, and J. M. Warnock *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

The ST/MST (stratosphere troposphere/mesosphere stratosphere troposphere) clear air Doppler radar, or wind profiler, is an important tool in observational meteorology because of its capability to remote observe dynamic parameters of the atmosphere. There are difficulties in transforming the observed radial velocities into meteorological wind components. How this problem has been treated in the past is reviewed, and some of the analysis is recast to a form more suited to the high diagnostic abilities of a number of fixed beam configurations with reference to a linear wind field. The results, in conjunction with other works which treats problems such as the effects of finite sample volumes in the presence of nonhomogeneous atmospheric reflectivity, have implications important to the design of both individual MST/ST radars and MST/ST radar networks. The key parameters to uncoupling terms in the scaling equations are w sub x and w sub y. Whenever the stratiform condition, which states that these two parameters are negligible, is satisfied, a five beam ST radar may determine unbiased values of u, v, and w for sample volumes directly above the radar. The divergence and partial deformation of the flow may also be determined. Three beam systems can determine w and w sub z, but are unable to obtain u and v wind components uncontaminated by vertical sheer terms, even when the stratiform condition is satisfied. E.R.

N87-10503*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A 405-MHz, 5-BEAM PHASED ARRAY ANTENNA c32
Daniel C. Law *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Wave Propagation Lab. has completed the design and construction of a phased array antenna for use at 405.25 MHz for atmospheric wind profiling. The steering geometry of the sequentially switched beam is shown. The Yagi-Uda antenna elements are arranged on a square grid whose axes are 45 deg with respect to the cardinal directions. By constraining the phase difference between rows of identically phased elements to an even, integral submultiple of 360 deg, symmetries appear in the phasing maps which reduce the switching hardware. The vertical beam is generated by switching around the four beam circuitry which results in identical phasing on all of the elements. After the 18 signals are synthesized they are split and distributed about the array while

maintaining proper phasing because of the symmetries. Computer simulations were employed in the design process. E.R.

N87-10504*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
LOW-ALTITUDE COVERAGE OF ST RADARS c32
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Clear air ST (stratosphere troposphere) radars are now widely used for atmospheric research and wind profiling. Most attention to date has been directed toward extending the altitude coverage as high as possible. It is also desirable to extend the coverage as low as possible. Any improvement in the low altitude coverage of existing wind profiling radars would be useful. The approximate lower limits of some existing ST radars are listed and what set these limits are briefly examined. E.R.

N87-10505*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE GRID ARRAY ANTENNA c32
W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Attention is called to the grid array as a possible useful antenna design for UHF clear air radars. This type of antenna integrates radiating elements and the feed network into a single structure so that a fairly large array can be driven from a single feed point. Figures are given which demonstrate the basic principle of the grid array, which are adapted from Conti et al. (1981). Conductors are arranged above a ground plane in a repeating, staggered array of connected rectangles. Each rectangular element is approximately one by one-half wavelength in size. The currents on the conductors at resonance is indicated. The grid array illustrated can be expanded in both vertical and horizontal directions about the feed point by adding additional rectangular conductors. The design eliminates the feed network and would provide a thin, panel-like antenna that could be easily built and transported. E.R.

N87-10506*# Toulon Univ. (France).
SIMULTANEOUS MULTIBEAM SOUNDING OF WIND AND TURBULENCE c47
E. Brun, M. Crochet, and W. L. Ecklund (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

Most clear air radars use an antenna with either a few fixed beam positions or one that can be steered to a number of beam positions, one position at a time. For spatial studies of parameters that can change rapidly these conventional radar may be severely limited. The problem is that the fixed beam radars do not cover enough positions and the steerable radars may not be able to cover the entire field of interest in a short enough time period. Preliminary results are presented from a brief experiment that suggests a way to overcome some of these space-time problems in clear air radar research. A typical clear air radar antenna located in France was modified in a simple way to produce a number of beam simultaneouly. The radar, the modifications and the resulting beam patterns are described. Spectra is then shown obtained with the multibeam array and some results are presented on the spatial variations of reflectivity. Both the positive and negative aspects of using a multibeam antenna array for clear air radar studies are summarized. E.R.

N87-10507*# Adelaide Univ. (Australia). Dept. of Physics.
MEASUREMENTS OF ANTENNA POLAR DIAGRAMS AND EFFICIENCIES USING A PHASE-SWITCHED INTERFEROMETER c32
R. A. Vincent, B. Candy, and B. H. Briggs *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

It is desirable to know antenna polar patterns and efficiencies accurately. In the past, calibration measurements have been made using balloons and aircraft and more recently satellites. These techniques are usually very expensive. It is shown that under certain circumstances it is possible to use a simpler and inexpensive technique by connecting together the antenna under test with another antenna to form a phase switched interferometer as first described by Ryle (1952). The technique does require a suitable radio source which gives measurable powers when using small antennas and since dipoles have broad patterns, radio sources with similar right ascensions but different declinations to the primary source can be a problem. These problems can partly be overcome by filtering the interference pattern. E.R.

N87-10508*# Colorado Univ., Boulder. Cooperative Inst. for Research in Environ. Sci.
USE OF THE SUN TO DETERMINE POINTING OF ST RADAR BEAMS c32
A. C. Riddle *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Verification of the beam pointing direction for ST (stratosphere troposphere) radars is a technically difficult problem. Consequently it is not usually done. For measurement of horizontal wind, the lack of precise knowledge of the beam pointing direction is usually of little consequence as any errors cause only a small uncertainty in the measured velocity. However, instantaneous vertical velocities are typically more than an order of magnitude less than horizontal velocities and average vertical velocities are more than two orders of magnitude less than average horizontal velocities. Hence small pointing errors for vertical beams can result in large errors due to contamination by horizontal winds. Experimental confirmation of pointing accuracy using the measured winds is difficult but has been achieved where horizontal and vertical winds are measured at the same site. Using the techniques described by Balsley and Riddle, 1984 and Riddle and Balsley, 1985, pointing accuracy was measured at Ponape, Federated States of Micronesia. The experiment is described in detail. E.R.

N87-10509*# Kyoto Univ., Uji (Japan). Radio Atmospheric Science Center.
MONITORING OF THE MU RADAR ANTENNA PATTERN BY SATELLITE OHZORA (EXOS-C) c32
Toru Sato, Yasuhiro Inooka, Shoichiro Fukao (Kyoto Univ., Japan), and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

As the first attempt among MST (mesosphere stratosphere troposphere) type radars, the MU (middle and upper atmosphere) radar features an active phased array system. Unlike the conventional large VHF radars, in which output power of a large vacuum tube is distributed to individual antenna elements, each of 475 solid state power amplifier feeds each antenna element. This system configuration enables very fast beam steering as well as various flexible operations by dividing the antenna into independent subarrays, because phase shift and signal division/combination

are performed at a low signal level using electronic devices under control of a computer network. The antenna beam can be switched within 10 microsec to any direction within the zenith angle of 30 deg. Since a precise phase alignment of each element is crucial to realize the excellent performance of this system, careful calibration of the output phase of each power amplifier and antenna element was carried out. Among various aircraft which may be used for this purpose artificial satellites have an advantage of being able to make a long term monitoring with the same system. An antenna pattern monitoring system for the MU radar was developed using the scientific satellite OHZORA (EXOS-C). A receiver named MUM (MU radar antenna Monitor) on board the satellite measures a CW signal of 100 to 400 watts transmitted from the MU radar. The principle of the measurement and results are discussed. E.R.

N87-10510*# Arecibo Ionospheric Observatory, Puerto Rico.
METHOD TO DETERMINE THE OPTIMAL PARAMETERS OF THE ARECIBO 46.8-MHz ANTENNA SYSTEM **c32**
H. M. Ierkic, J. Rottger, J. B. Hagen, and R. K. Zimmerman *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The spherical reflector at the Arecibo Observatory (AO) offers great advantages for the design of simple and inexpensive high performance steerable antennas at VHF. Light and small feeds have the added benefit that they can be quickly installed in the Arecibo platform. It is important to evaluate the performance of any given feed including the effects of the spherical reflector. The optimization is emphasized of two parameters, namely, the distance below the focal point of the reflector and the beam width of a point feed. For the design of the feed at 46.8 MHz at the AO there were other requirements independent of MST (mesosphere stratosphere troposphere) work. The design of the primary array is discussed along with its performance with the AO spherical reflector. E.R.

N87-10511*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
THE ELIMINATION OF A CLASS OF PSEUDO ECHOES BY AN IMPROVED T/R SWITCH TECHNIQUE **c32**
J. L. Green and W. L. Ecklund *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

An annoying class of pseudo echoes are described that evidently occur occasionally in a number of ST (stratosphere troposphere) radars. The origin of these signals are located in the output circuitry of the radar transmitter. Two methods for the elimination of the radar echoes are suggested and briefly described. E.R.

N87-10512*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Electrical Engineering and Appl. Physics.
AN OVERVIEW OF DATA ACQUISITION, SIGNAL CODING AND DATA ANALYSIS TECHNIQUES FOR MST RADARS **c32**
P. K. Rastogi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

An overview is given of the data acquisition, signal processing, and data analysis techniques that are currently in use with high power MST/ST (mesosphere stratosphere troposphere/ stratosphere troposphere) radars. This review supplements the works of Rastogi (1983) and Farley (1984) presented at previous MAP workshops. A general description is given of data acquisition and signal processing operations and they are characterized on the basis of their disparate time scales. Then signal coding, a brief description of frequently used codes, and their limitations are discussed, and finally, several aspects of statistical data processing such as signal statistics, power spectrum and autocovariance analysis, outlier removal techniques are discussed. E.R.

N87-10513*# Arecibo Ionospheric Observatory, Puerto Rico.
OPTIMUM CODING TECHNIQUES FOR MST RADARS **c32**
Michael P. Sulzer and Ronald F. Woodman (Instituto Geofisico del Peru, Lima) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The optimum coding technique for MST (mesosphere stratosphere troposphere) radars is that which gives the lowest possible sidelobes in practice and can be implemented without too much computing power. Coding techniques are described in Farley (1985). A technique mentioned briefly there but not fully developed and not in general use is discussed here. This is decoding by means of a filter which is not matched to the transmitted waveform, in order to reduce sidelobes below the level obtained with a matched filter. This is the first part of the technique discussed here; the second part consists of measuring the transmitted waveform and using it as the basis for the decoding filter, thus reducing errors due to imperfections in the transmitter. There are two limitations to this technique. The first is a small loss in signal to noise ratio (SNR), which usually is not significant. The second problem is related to incomplete information received at the lowest ranges. An appendix shows a technique for handling this problem. Finally, it is shown that the use of complementary codes on transmission and nonmatched decoding gives the lowest possible sidelobe level and the minimum loss in SNR due to mismatch. E.R.

N87-10514*# Illinois Univ., Urbana. Aeronomy Lab.
IMPROVING RANGE RESOLUTION WITH A FREQUENCY-HOPPING TECHNIQUE **c32**
G. R. Stitt and S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

Range resolution of a conventional pulsed Doppler radar is determined by the scattering volume defined by the transmitted pulse shape. To increase the resolution, the length of the pulse must be reduced. Reducing the pulse length also reduces the transmitted power and hense the signal to noise ratio unless the peak power capability of the transmitter is greatly increased. Improved range resolution may also be attained through the use of various pulse coding methods, but such methods are sometimes difficult to implement from a hardware standpoint. The frequency-hopping (F-H) technique described increases the range resolution of pulse Doppler MST (mesosphere stratosphere troposphere) radar without the need for extensive modifications to the radar transmitter. This technique consists of sending a repeated sequence of pulses, each pulse in the sequence being transmitted at a unique radio frequency that is under the control of a microcomputer. This technique is discussed along with other radar parameters. E.R.

N87-10515*# Illinois Univ., Urbana. Aeronomy Lab.
A VARIABLE-FREQUENCY LOCAL OSCILLATOR FOR THE FREQUENCY-HOPPING TECHNIQUE **c33**
G. R. Stitt and L. J. Johnson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09C

The frequency hopping technique described elsewhere re-

quires the use of a local oscillator whose output frequency may be rapidly and accurately changed by a fixed frequency increment. Such a device, capable of producing 16 different frequencies separated by 50 kHz over the range of 35.02 to 35.77 MHz, has been built for the Urbana MST (mesosphere stratosphere troposphere) radar facility. The design and construction of that device is described and illustrated. E.R.

N87-10516*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
AN ACCELERATED FORTH DATA-ACQUISITION SYSTEM c82
S. A. Bowhill and A. D. Rennier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 05B

A new data acquisition system was put into operation at Urbana in August 1984. It uses a standard Apple 2 microcomputer with 48 k RAM and a standard 5 1/4 inch floppy disk. Design criteria for the system is given. The system was implemented using fig-FORTH, a threaded interpretive language which permits easy interfacing to machine code. The throughput of this system is better by a factor of 6 than the PDP-15 minicomputer system previously used, and it has the real time display feature and provides the data in much more convenient form. The features which contribute to this improved performance is listed. E.R.

N87-10517*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A SINGLE-BOARD PREPROCESSOR AND PULSE GENERATOR c33
D. A. Carter, A. E. Ayers, and R. P. Schneider *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09A

The Aeronomy Lab. of NOAA has designed and built a single board, programmable radar controller for use with VHF ST (stratosphere troposphere) radars. The controller consists of a coherent integrator preprocessor and a radar pulse generator, both of which are described, as well as interfaces to an antenna beam switch and a receiver bandwidth switch. The controller occupies a single slot in a Data General Nova of Eclipse computer. The integrator and pulse generator take advantage of high density, dual port FIFO chips such as the 512 x 9 Mostek MK 4501. These FIFOs have separate input and output ports and independent read and write cycles with cycle times of less than 200 ns, making them very fast and easy to interface. A simple block diagram of the coherent integrator is shown. The integrator is designed to handle inputs from one receiver (2 channels) with 1 sec sample spacing. The pulse generator is based on controllers designed by R. F. Woodman for the Arecibo and SOUSY radars us a recirculating memory scheme. E.R.

N87-10518*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A MICROPROGRAMMABLE RADAR CONTROLLER c32
Daniel C. Law *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Wave Propagation Lab. has completed the design and construction of a microprogrammable radar controller for atmospheric wind profiling. Unlike some radar controllers using state machines or hardwired logic for radar timing, this design is a high speed programmable sequencer with signal processing resources. A block diagram of the device is shown. The device is a single 8 1/2 inch by 10 1/2 inch printed circuit board and consists of three main subsections: (1) the host computer interface; (2) the microprogram sequencer; and (3) the signal processing circuitry. Each of these subsections are described in detail. E.R.

N87-10519*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
AN EXAMPLE OF SCALING MST DOPPLER SPECTRA USING MEDIAN SPECTRA, SPECTRAL SMOOTHING, AND VELOCITY TRACING c33
J. L. Green *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 09C

Although automatic, computer scaling methods appeared at the start of the MST (mesosphere stratosphere troposphere) radar technique, there is a continuing need for scaling algorithms that perform editing functions and increase the sensitivity of radar by post processing. The scaling method presented is an adaptation of the method of scaling MST Doppler spectra presented by Rastogi (1984). A brief overview of this method is as follows: a median spectrum is calculated from several sequential spectra; the median noise value is subtracted from this derived spectrum; the median spectrum is smoothed; the detection/nondetection decision is made by comparing the smoothed spectrum to the variance of the smoothed noise; and if a signal is detected, then the half-power points of the smoothed echo spectrum are used to place limits on the evaluation of the first two moments of the unsmoothed median spectrum. In all of the above steps, the algorithm is guided by tracing the expected velocity range upward from the lowest range as far as possible. The method is discussed in more detail. E.R.

N87-10520*# Case Western Reserve Univ., Cleveland, Ohio. Electrical Engineering and Applied Physics.
INTERFERENCE DETECTION AND CORRECTION APPLIED TO INCOHERENT-SCATTER RADAR POWER SPECTRUM MEASUREMENT c32
W. P. Ying, J. D. Mathews, and P. K. Rastogi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

A median filter based interference detection and correction technique is evaluated and the method applied to the Arecibo incoherent scatter radar D-region ionospheric power spectrum is discussed. The method can be extended to other kinds of data when the statistics involved in the process are still valid. Author

N87-10521*# Illinois Univ., Urbana. Aeronomy Lab.
THE TUKEY ALGORITHM FOR ENHANCING MST RADAR DATA c32
S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

One of the most troublesome features in MSR (mesosphere stratosphere troposphere) velocity measurements is the determination of unwanted scatterer whose velocity is different from that of the surrounding atmosphere. Aircraft seen in the sidelobes of the antenna are the principal problem. Because coherent integration essentially eliminates echoes with line of sight velocities greater than 10 or 20 m/s, aircraft are seen only when their flight path is almost perpendicular to the line of sight. Then, they give large returns whose velocities may be positive or negative, and certainly different from that of the surrounding air. The glitches in the minute by minute velocity records are quite troublesome in that they may distort the statistics of the velocity. An objective way is therefore

needed to remove sporadic points of this kind. For this purpose, the Tukey algorithm is appropriate and has some advantages over averaging. The Tukey algorithm, applied to a data array, uses for each data point the median of it and the two points surrounding it. If the three points form a monotonically increasing or decreasing sequence, the original point is copied with change. However, if the central point is remote from the other two, it is replaced by whichever of the two surrounding points is closest in value. The greatest effect of the Tukey algorithm is on data where the successive points are uncorrelated. Examples are given. E.R.

N87-10522*# Arecibo Ionospheric Observatory, Puerto Rico.
ON THE USE OF COLOUR REFLECTIVITY PLOTS TO MONITOR THE STRUCTURE OF THE TROPOSPHERE AND STRATOSPHERE **c46**
J. Rottger, I. J. Fu (National Central Univ., Chung-Li Taiwan), F. S. Kuo, C. H. Liu (Illinois Univ., Urbana), and J. K. Chao (National Central Univ., Chung-Li Taiwan) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The radar reflectivity, defined as the range squared corrected power of VHF radar echoes, can be used to monitor and study the temporal development of inversion layer, frontal boundaries and convective turbulence. From typical featurs of upward or downward motion of reflectivity structures, the advection/convection of cold and warm air can be predicted. High resolution color plots appear to be useful to trace and to study the life history of these structures, particularly their persistency, descent and ascent. These displays allow an immediate determination of the tropopause height as well as the determination of the tropopause structure. The life history of warm fronts, cold fronts, and occlusions can be traced, and these reflectivity plots allow detection of even very weak events which cannot be seen in the traditional meteorological data sets. The life history of convective turbulence, particular evolving from the planetary boundary layer, can be tracked quite easily. Its development into strong convection reaching the middle troposphere can be followed and predicted. E.R.

N87-10523*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
DATA COMMUNICATIONS AND MONITOR FOR THE PENN STATE UNIVERSITY PROFILER NETWORK **c32**
Robert M. Peters *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The profiler network installed by the Department of Meteorology at Penn State University utilizes a microcomputer for network monitoring and control. The network consists of two VHF and one UHF wind profiling Doppler radars. Additional measurement systems added to the network include temperature and humidity profiling radiometers, sodar for boundary layer wind profiling and selected surface based baseline systems. Remote diagnostic capabilities were also implemented in the Penn State network. It is possible to remotely analyze many specific malfunctions of the transmitter or signal processor. E.R.

N87-10524*# Colorado Univ., Boulder. Cooperative Inst. for Res. in the Environ. Sci.
ARCHIVAL OF POKER FLAT MST RADAR DATA **c32**
A. C. Riddle, B. B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.), and K. S. Gage *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

The Poker Flat MST (mesosphere stratosphere troposphere) radar has operated from early 1979 to 1985. The data recorded during that time resides on some 1100 magnetic tapes. A second set containing only the derived parameters of velocity, width and signal to noise of the primary echo at each height, plus the noise spectra, occupies another 250 tapes. While processing to generate the compressed data set does correct some known errors, no attempt has been made to identify or remove spurious echoes. Because the Poker Flat data set is such a unique and valuable resource, a proposal is made to archive the data in forms more useful for analysis. The archived data set would contain only the parameters for significant echoes with contamination from airplanes, unwanted ionospheric returns, frequently aliased Doppler signals and other sources removed. The archived set should be as good or better than the example shown and may occupy only 25 to 50 tapes. E.R.

N87-10525*# National Center for Atmospheric Research, Boulder, Colo.
MST DATA EXCHANGE THROUGH THE NCAR INCOHERENT-SCATTER RADAR DATA BASE **c32**
A. D. Richmond *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 17I

One means of making MST (mesosphere stratosphere troposphere) radar data more easily accessible for scientific research by the general scientific community is through a centralized data base. Such a data base can be designed to readily provide information on data availability and quality, and to provide copies of data from any radar in a common format to the user. The ionospheric incoherent scatter community has established a centralized data base at NCAR that may serve not only as a model for a possible MST data base, but also as a catalyst for getting an MST data base started. (Some key elements of the NCAR data base are given.) The NCAR data base can include MST data in the same framework with relatively little extra effort. They are willing to handle MST data on a limited basis in order to permit assessment of community interest and in order to provide some experience with a centralized data base for MST data. E.R.

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N87-10526*# Lunar and Planetary Inst., Houston, Tex.
LANDSAT IMAGERY OF THE CENTRAL ANDES Progress Report, 22 Oct. 1986
Catherine A. Komer and Paul Morgan 29 Aug. 1986 1 p (Contract NASw-4066)
(NASA-CR-179852; NAS 1.26:179852) Avail: NTIS HC A02/MF A01 CSCL 08B

The central Andes of South America extend from approximately 14 deg. S to 28 deg. S as an unbroken chain of mountains and volcanoes over 2000 km long. It is here that the Nazca plate dives under the South American plate at angles varying from 10 deg to 30 deg. Very little is known about the volcanoes comprising this classic, subduction-type plate margin. A catalogue of the volcanoes in the central Andes is being prepared by Dr. P.W. Francis and Dr. C.A. Wood at the NASA Lunar and Planetary Institute. At present, more than 800 volcanoes of Cenozoic age have been recognized in the chain, with an estimated 75-80 major, active Quarternary volcanoes. Approximately one hundred 1536 x

1536 pixel color composite Optronics positives were produced from six full LANDSAT Thermatic Mapper scenes and three partial TM scenes. These positives cover a large portion of the central Andes. The positives were produced from LANDSAT data using the VAX imaging package, LIPS. The scenes were first transferred from magnetic tape to disk. The LIPS package was then used to select volcanically interesting areas which were then electronically enhanced. Finally, the selected areas were transferred back to tape and printed on the Optronics equipment. The pictures are color composites using LANDSAT TM bands 7,4, and 2 in the red, green, and blue filters, respectively. Author

N87-10527# Defense Mapping Agency Aerospace Center, St. Louis, Mo.
WORLD GEODETIC SYSTEM 1984
B. L. Decker Apr. 1986 27 p Presented at the 4th International Geodetic Symposium on Satellite Positioning, Austin, Tex., 28 Apr. - 2 May 1986
(AD-A167570) Avail: NTIS HC A03/MF A01 CSCL 08/5

The Defense Mapping Agency (DMA) has developed World Geodetic System 1984 (WGS 84) as a replacement for WGS 72. The defining parameters and reference frame orientation of the WGS 84 Ellipsoid, and the WGS 84 ellipsoidal gravity formula, are those of the internationally-sanctioned Geodetic Reference System 1980. The WGS 84 Earth Gravitational Model (EGM), complete through degree (n) and order (m) 180, was developed using various types of data. The low degree and order portion of the WGS 84 EBM (through n=m=41) was developed from a weighted least squares solution based on use of surface gravity data, satellite radar altimetry, laser and Doppler satellite tracking data, range difference data (from NAVASTAR satellites), and lumped coefficient data. The WGS 84 EGM coefficients above n=m=41 were determined from a spherical harmonic analysis of a worldwide residual 1 deg x 1 deg mean free-air gravity anomaly field from which the effect of the coefficients through n=m=41 had been removed. The WGS 84 Geoid was formed using a spherical harmonic expansion and the WGS 84 EGM (through n=m=180). Local Geodetic System-to-WGS 84 datum shifts are available for converting geodetic coordinates of approximately 80 local geodetic systems to WGS 84. GRA

N87-10528# Defense Mapping Agency, Washington, D.C.
DIGITAL MAPPING: FACT OR FICTION Final Report
Dennis P. Franklin Apr. 1986 11 p
(AD-A167571) Avail: NTIS HC A02/MF A01 CSCL 08/2

The Defense Mapping Agency has passed the point where we provide only the traditional paper maps and charts used by the Armed Forces. Many of the traditional, manual, labor intensive production processes currently in use are no longer cost effective in supporting present readiness requirements. DMA is now heavily into the production of digital data to support the navigation and guidance requirements of new advanced systems. To meet the ever increasing sophistication of these new systems, as well as updating our capability to support our traditional products, DMA is in the midst of the most ambitious modernization in the history of cartography. While the all digital softcopy production system is today still a fiction, the Defense Mapping Agency has committed itself to make this fiction a fact by the early 1990's. GRA

N87-10529# Technische Univ., Clausthal-Zellerfeld (West Germany). Inst. fuer Geologie und Palaeontologie.
SPACE IMAGING RADAR FOR REMOTE SENSING OF THE EARTH: AN EVALUATION Final Report, Dec. 1984
Peter Kronberg and Barbara Theilen-Willige Bonn Bundesministerium fuer Forschung und Technologie Dec. 1985 131 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-85-024; ISSN-0170-1339; ETN-86-97843) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 27.50

The usefulness of SIR A-type imagery for thematic inventories and mapping of land use, geomorphology, hydrology, and geology was evaluated by comparing data contents of SIR A, LANDSAT MSS, and Metric Camera imagery from test sites in various parts of the world. Results indicate that spaceborne SAR (synthetic aperture radar) sensors (as well as spaceborne optical sensors) provide useful information only under specific surface conditions (morphology, surface cover, geological setting, climate). Possibilities and limitations in the use of spaceborne SAR-imagery for inventories and mapping projects are discussed. Correlative evaluations of spaceborne SAR and optical sensor imagery (providing surface roughness and spectral reflectance information for the area covered) are recommended. ESA

N87-10530 Arizona Univ., Tucson.
IN-FLIGHT ABSOLUTE RADIOMETRIC CALIBRATION OF THE LANDSAT THEMATIC MAPPER Ph.D. Thesis
Carol Jane Kastner 1985 212 p
Avail: Univ. Microfilms Order No. DA8603342

The inflight absolute radiometric calibration of the Thematic Mapper (TM) is being conducted using the results of field measurements at White Sands, New Mexico. These measurements are made to characterize the ground and atmosphere at the time the TM is acquiring an image of White Sands. The data are used as input to a radiative transfer code that computes the radiance at the entrance pupil of the TM. The calibration is obtained by comparing the digital counts associated with the TM image of the measured ground site with the radiative transfer code result. The calibrations discussed here are for the first four visible and near-infrared band of the TM. Dissert. Abstr.

N87-10265*# National Aeronautics and Space Administration, Washington, D.C.
LIDAR REMOTE SENSING FROM SPACE: NASA'S PLANS IN THE EARTH SCIENCES
Robert J. Curran *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 20E

N87-10368*# Optech, Inc., Downsview (Ontario).
GAS DISPERSION MEASUREMENTS USING A MOBILE RAMAN LIDAR SYSTEM
J. D. Houston and D. R. Brown *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N87-10531*# Paragon Pacific, Inc., Torrance, Calif.
WEST-3 WIND TURBINE SIMULATOR DEVELOPMENT. VOLUME 2: VERIFICATION Final Report
S. Sridhar Jul. 1985 31 p
(Contracts DEN3-247; DE-AI01-76ET-20320)
(NASA-CR-174982; DOE/NASA-0247/2; NAS 1.26:174982; PPI-FID-300102-Vol-2) Avail: NTIS HC A03/MF A01 CSCL 10A

The details of a study to validate WEST-3, a new time wind turbine simulator developed by Paragib Pacific Inc., are presented in this report. For the validation, the MOD-0 wind turbine was simulated on WEST-3. The simulation results were compared with those obtained from previous MOD-0 simulations, and with test data measured during MOD-0 operations. The study was successful in achieving the major objective of proving that WEST-3 yields results which can be used to support a wind turbine development

process. The blade bending moments, peak and cyclic, from the WEST-3 simulation correlated reasonably well with the available MOD-0 data. The simulation was also able to predict the resonance phenomena observed during MOD-0 operations. Also presented in the report is a description and solution of a serious numerical instability problem encountered during the study. The problem was caused by the coupling of the rotor and the power train models. The results of the study indicate that some parts of the existing WEST-3 simulation model may have to be refined for future work; specifically, the aerodynamics and procedure used to couple the rotor model with the tower and the power train models. Author

N87-10532# Solarex Corp., Gaithersburg, Md. Aerospace Div.
VERTICAL JUNCTION SOLAR CELLS Final Report
20 Dec. 1985 64 p
(Contract N00014-83-C-2340)
(AD-A167757) Avail: NTIS HC A04/MF A01 CSCL 10/2

The goal of this program was to develop and evaluate an acceptable coversliding technology for vertical junction solar cells. The technical program was divided into the following sub-tasks: 1.0. to fabricate 80 vertical junction cells of most recent configuration for evaluation as individual samples and for test module assembly. 2.1. to develop a satisfactory method for coversliding V.J. cells to withstand deep thermal cycle in space. 2.2. to establish welding parameters for V.J. cells and evaluate their weldability. 3.0. Using techniques from 2.1 and 2.2 four modules (4 cell each) to be fabricated and thermal cycled in dry nitrogen (115 c to +125 c 25 cycles) and thermal vacuum tested at 135 c. 4.0. based on results of tasks 2 and 3, two six cell modules to be designed: 1 soldered, 1 welded, and design to be discussed with COTR prior to finalization, and 5.0. final design to be fabricated subjected to a thermal vacuum test at +135 c, thermal cycled -115 c to + 125 c, and characterized by I-V measurements and delivered to NRL for testing and evaluation. GRA

N87-10533# Ashrae, Inc., Atlanta, Ga.
METHODS OF TESTING TO DETERMINE THE THERMAL PERFORMANCE OF SOLAR COLLECTORS
1985 93 p
(Contract DE-FG03-81SF-08392)
(DE86-009311; DOE/SF-08392/T1) Avail: NTIS HC A05/MF A01

This Standard has been prepared by a committee drawn primarily from the membership of ASHRAE. The Committee's objective was to formulate a test procedure whereby solar energy collectors can be tested both indoors and outdoors, to rate the collectors in accordance with their thermal performance, and to determine their time constant and the variation of their efficiency with changes in the angle of incidence between the Sun's direct rays and the normal to the collector aperture. DOE

N87-10534# Naval Weapons Support Center, Crane, Ind.
EVALUATION OF A NEW TYPE STABLE NICKEL-ZINC BATTERY FOR ELECTRIC VEHICLE APPLICATION Final Report
26 Jul. 1985 23 p
(Contract DE-AI01-83CE-90038)
(DE86-010895; DOE/CE-90038/T1) Avail: NTIS HC A02/MF A01

This report describes discharge-recharge cycle testing of 14 nickel-zinc storage battery cells of a proprietary design. This testing was to obtain performance data on new types of stabilized nickel-zinc battery cells for possible electric vehicle applications. The test sample cells were manufactured by Electrochimica Corporation (ELCA) in two sizes (15 ampere-hours and 225 ampere-hours) with a total of seven different internal combinations. The cells completed up to 470 cycles when testing was halted due to funding limitations. Near the end of testing, the cells were providing 40% of nominal capacity when discharged to 1.2 volts and 58 to 73% when discharged in two steps to 1.0 volt. DOE

N87-10535# Sandia National Labs., Albuquerque, N. Mex.
EXPERIENCE WITH THE APPLICATION OF PHOTOVOLTAICS DEVICES
G. J. Jones 1986 15 p Presented at the American Solar Energy Society Annual Meeting and at the 11th National Passive Solar Conference, Boulder, Colo., 8 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010472; SAND-86-2034C; CONF-860655-10) Avail: NTIS HC A02/MF A01

Photovoltaic systems have been the subject of a large research and development activity for the last decade. Hundreds of studies have addressed the question of optimal system and subsystem design. Field experiments have tested the resulting concepts and verified the reliability of the technology. As a result of these efforts, system design has reached a state of maturity in all application classes. Configurations are simple, with the photovoltaic system viewed as an electricity source. This paper reviews the evolution of system understanding to the present and provides a summary of the current design approach for each of the application types. DOE

N87-10536# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
ADVANCED DESICCANT MATERIALS RESEARCH
A. W. Czanderna and T. M. Thomas May 1986 38 p
(Contract DE-AC02-83CH-10093)
(DE86-010695; SERI/PR-255-2887) Avail: NTIS HC A03/MF A01

The long-range goal of this task is to understand the role of surface phenomena in desiccant cooling materials. The background information includes a brief introduction to desiccant cooling systems (DCS) and the role of the desiccant as a system component. The purpose, background, rationale, and long-term technical approach for studying advanced desiccant materials are then treated. Experimental methods for measuring water vapor sorption by desiccants are described, and the rationale is then given for choosing a quartz crystal microbalance (QCM) for measuring sorption isotherms, rates, and cyclic stability. Background information is given about the QCM, including the quartz crystal resonator itself, the support structure for the quartz crystal, and the advantages and limitations of a QCM. The apparatus assembled and placed into operation during CY 1985 is described. The functions of the principal components of the equipment, i.e., the QCM, vacuum system, pressure gauges, residual gas analyzer, constant temperature bath, and data acquisition system, are described as they relate to the water vapor sorption measurements now under way. The criteria for narrowing the potential candidates as advanced desiccant materials for the initial studies are given. Also given is a list of 20 principal candidate materials identified based on the criteria and data available in the literature. DOE

N87-10537# Pacific Northwest Labs., Richland, Wash.
REVIEW OF STORAGE BATTERY SYSTEM COST ESTIMATES
D. R. Brown and J. A. Russell Apr. 1986 175 p
(Contract DE-AC06-76RL-01830)
(DE86-011182; PNL-5741) Avail: NTIS HC A08/MF A01

Cost analyses for zinc bromine, sodium sulfur, and lead acid batteries were reviewed. Zinc bromine and sodium sulfur batteries were selected because of their advanced design nature and the high level of interest in these two technologies. Lead acid batteries were included to establish a baseline representative of a more mature technology. DOE

N87-10022# Tokyo Univ. (Japan).
TWO DIMENSIONAL ANALYSIS OF HIGH VOLTAGE SOLAR ARRAY INTERFERING WITH IONOSPHERIC PLASMA
Hitoshi Kuninaka and Kyoichi Kuriki *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 10 p
(For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N87-10538 Prins Maurits Lab. TNO, Rijswijk (Netherlands).
LABORATORY EVALUATION OF THREE PASSIVE CO CONCENTRATION MONITORS [LABORATORIUM-EVALUATIE VAN 3 PASSIEVE KOOLMONOXIDE-CONCENTRATIEMETERS]
A. Kaaijk Jan. 1985 22 p In DUTCH; ENGLISH summary
(Contract A82/KL/118)
(PML-1985-13; TDCK-93539; ETN-86-98044) Copyright. Avail: Issuing Activity

The precision of commercial CO monitors was determined. The effects of air velocity and interfering compounds were analyzed. The response time (1 to 3 min) and the recovery time (3 to 12 min) are long and can cause errors in case of fast fluctuating CO-concentrations. Accuracy is within 5%. ESA

N87-10539# Argonne National Lab., Ill.
BIOCONVERSION: A NEW TECHNOLOGY FOR WASTE AND SLUDGE DISPOSAL. WORKSHOP PROCEEDINGS
C. Brooks, comp. Feb. 1986 117 p Workshop held at Fort Lauderdale, Fla., 22 May 1985
(Contract W-31-109-eng-38)
(DE86-009668; ANL/CNSV-TM-174; CONF-850539) Avail: NTIS HC A06/MF A01

Anaerobic digestion of biomass offers a solution to the disposal of sewage sludge, municipal wastes, and other organic materials (agricultural and industrial residue, as well as terrestrial and marine energy crops) and produces a methane-rich gas. These proceedings are the result of a bioconversion workshop that was held to introduce the technology that results in bioconversion of these wastes to gas. The technology is based on bacterial decomposition of organic material into simpler compounds. The principal products of this process are methane and carbon dioxide. The workshop agenda included discussions of the anaerobic technology and presentations of operating data and economic forecasts developed at RefCoM (refuse conversion to methane), an experimental plant operating in Pompano Beach, Florida. DOE

N87-10540# California State Dept. of Transportation, Sacramento. Office of Transportation Lab.
DEVELOPMENT OF WORST CASE METEOROLOGY CRITERIA Final Report
W. A. Nokes and P. E. Benson Nov. 1985 90 p Sponsored by Federal Highway Administration
(PB86-215993; TL-604196; FHWA/CA/TL-85/14) Avail: NTIS HC A05/MF A01 CSCL 13B

A meteorological severity index (MSI) representing the relationship between meteorological paramenters that contribute to worst case carbon monoxide concentrations near roadways is described. The MSI is based on sensitivity studies of the California Lines Source Dispersion Model, CALINE4. Meteorological data collected at several monitoring sites throughout California are described. Probabilistic analysis of the monitoring data (stratified by geography and time-of-day) is combined with the MSI to develop worst case meteorology inputs for estimation 1-hour CO levels using CALINE4. Guidelines are presented to help CALINE4 users develop or estimate an appropriate persistent factor for a project location. The probabilistic method described can be used to establish new worst case meteorology criteria in the event of changes in the number of exceedances allowed by the National Ambient Air Quality Standards. The variety of locations studied in California should make results of the study useable by other states. GRA

N87-10271*# University of Western Australia, Perth. School of Physics and Geoscience.
AEROSOL STUDIES IN MID-LATITUDE COASTAL ENVIRONMENTS IN AUSTRALIA
S. A. Young, D. Cutten (Electronics Research Lab., Adelaide (Australia).), M. J. Lynch, and J. E. Davies *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10272*# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
VISIBILITY RELATED TO BACKSCATTER AT 1.54 MICRON
T. L. Barber and D. R. Larson (New Mexico State Univ., Las Cruces.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10317*# Centro Informazioni Studi Esperienze, Milan (Italy).
TIME-RESOLVED LIDAR FLUOROSENSOR FOR SEA POLLUTION DETECTION
A. Ferrario, P. L. Pizzolati, and E. Zanzottera *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10318*# Lund Inst. of Tech. (Sweden). Dept. of Physics.
VARIATION OF THE URBAN NO2 CONCENTRATION DURING A GROUND INVERSION SITUATION
A. Sunesson, W. Wendt, and B. Galle (Swedish Water and Air Pollution Research Lab., Goeteborg.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10319*# Keio Univ., Yokahama (Japan). Dept. of Physics.
AN INTENSITY-MODULATED DUAL-WAVELENGTH He-Ne LASER FOR REMOTE SENSING OF METHANE
Kiyoji Uehara and Fujitaka Taguchi (Tokyo Gas Co. Ltd. (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p -CP-2431 (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10320*# Israel Inst. for Biological Research, Ness-Ziona.
LIDAR MAPPING OF A MIXTURE OF AEROSOL CONCENTRATIONS IN A VARYING ATMOSPHERE
Moshe Kleiman, Smadar Egert, and Ariel Cohen *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10322*# Joint Research Centre of the European Communities, Ispra (Italy).
FEASIBILITY EXPERIMENTS ON TIME-RESOLVED FLUOROSENSING APPLIED TO OIL SLICKS
P. Camagni, G. Colombo, C. Koechler, A. Pedrini, N. Omenetto, and G. Rossi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 5 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10354*# Tohoku Univ., Sendai (Japan). Research Inst. of Electrical Communication.
WIDE-AREA REMOTE-SENSING SYSTEM OF POLLUTION AND GAS DISPERSAL BY NEAR-INFRARED ABSORPTION BASED ON LOW-LOSS OPTICAL FIBER NETWORK
Humio Inaba *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10355*# Lund Inst. of Tech. (Sweden). Dept. of Physics.
A MOBILE SYSTEM FOR ACTIVE OTPICAL POLLUTION MONITORING
A. Sunesson, H. Edner, S. Svanberg, L. Uneus, W. Wendt, and K. Fredriksson (National Swedish Environment Protection Board, Stockholm.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document

see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10375*# Army Chemical Research and Development Center, Aberdeen Proving Ground, Md.
CHEMICAL CONTAMINATION REMOTE SENSING
John P. Carrico, Kirkman R. Phelps, Ernest N. Webb, Raymond A. Mackay, and E. R. Murray (SRI International Corp., Menlo Park, Calif.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 13B

N87-10639# Tsukuba Univ. (Japan). Inst. of Geoscience.
AIR QUALITY IN TROPICAL CITIES
T. Kawamura *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 46-62 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N87-10541 Centre National d'Etudes Spatiales, Toulouse (France).
RESULTS OF THE ARCAD 3 PROJECT AND OF RECENT PROGRAMS IN MAGNETOSPHERIC AND IONOSPHERIC PHYSICS
1985 976 p International Conference held in Toulouse, France, May 1984
(ISBN-2-85428-126-8; ETN-86-94737) Copyright. Avail: CEPADUES, Toulouse

Magnetosphere-ionosphere coupling; auroral electrodynamics; particle precipitation; high latitude ionosphere; interplanetary magnetic field; wave generation; ionospheric and magnetospheric instabilities; active experiments; and coordinated measurements were discussed. For individual titles, see N87-10542 through N87-10607.

N87-10542 California Univ., Berkeley. Space Sciences Lab.
MAGNETIC FIELD-ALIGNED PARTICLE PRECIPITATION
Charles W. Carlson *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 37-48 (For primary document see N87-10541 01-46)
(Grant NAG6-10)
Avail: CEPADUES, Toulouse

Magnetic field-aligned auroral particle fluxes are discussed. Precipitating field-aligned electrons are seen in the vicinity of auroral arcs as suprathermal bursts, as well as superimposed on the more isotropic inverted V electron precipitation. Electron distribution functions reveal two distinct source populations for the inverted V and field-aligned electron components, and suggest possible acceleration mechanisms. The inverted V electrons are a hot, boundary plasma sheet population that gains the full parallel acceleration. The field-aligned component appears to originate from cold ionospheric electrons that may be distributed throughout the acceleration region. A turbulent parallel field might explain the apparent lifetime of cold electrons in the acceleration region. ESA

N87-10543 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
STATISTICAL STUDY OF AURORAL ELECTRON PRECIPITATION STRUCTURES DETECTED BY THE AUREOL-3 SATELLITE
J. M. Bosqued, C. Maurel, J. A. Sauvaud, R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), and Yu. I. Galperin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 49-59 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The distribution of the inverted-V electron precipitation detected in the 500 to 2000 km altitude range aboard the AUREOL-3 satellite was studied. Structured precipitations are statistically observed inside the auroral oval with a maximum occurrence in the evening-midnight sector. They correspond to primary electron fluxes peaked at energies of less than 10 keV and precipitating in large-scale structures (50 to 100 km in latitudinal width). It is shown that, as predicted by collisionless kinetic theories, most inverted-V structures present a clear relationship between the field-aligned current density carried by the 1 to 20 keV primary electrons and the potential drop inferred from particle distribution functions. The study demonstrates the existence of strong electron heating inside the acceleration region. ESA

N87-10544 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
SIMULTANEOUS MEASUREMENTS OF THERMAL ELECTRON DENSITY-TEMPERATURE AND LOW ENERGY PRECIPITATING ELECTRON FLUXES IN TOPSIDE IONOSPHERE
C. Beghin, J. M. Bosqued (Toulon Univ., France).), R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), J. A. Sauvaud (Toulon Univ., France), C. Maurel, N. V. Jorjio (Academy of Sciences (USSR), Moscow), and R. Debrie *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 61-75 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Topside F-region nearly horizontal profiles of electron density and temperature, as measured on board AUREOL 3 satellite by the mutual impedance probes, at different local times from the plasmasphere latitudes up to the polar cap, for scales ranging from thousands of km down to a few tens of meters are presented. Simultaneous measurements of low energy precipitating electron fluxes with good time resolution show that one to one correlations in space between those fluxes and electron density and temperature structures are rare. When they occur, if they are not pure accident, they are thought to correspond with very stable, steady arcs. Data support ideas on production, lifetime, and convection-type transport of the topside F-region electron density irregularities. ESA

N87-10545 California Univ., Berkeley. Space Sciences Lab.
MAGNETIC FIELD-ALIGNED POTENTIAL DROPS
Michael A. Temerin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 77-92 (For primary document see N87-10541 01-46)
(Contract N00014-81-C-0006)
Avail: CEPADUES, Toulouse

Discrete aurora genesis is discussed. Regions of large field-aligned potential drops can occur without electrostatic shocks, and regions of small parallel field-aligned potential drops usually occur without such shocks. This suggests that a varying portion of the magnetic field-aligned potential drop is widely distributed along the magnetic field line. Some of this potential may be confined to a series of small-scale, small-amplitude double layers. Such double layers typically occur along with electrostatic ion cyclotron waves in regions of upflowing ion beams. While the potential through each double layer is only a few volts, a series of such double layers along the magnetic field line can produce potential drops of several hundred volts. Some of the potential drop may be more continuously distributed along the magnetic field line. This small, continuously distributed electric field is the most difficult to measure and its contribution to the total potential drop along auroral magnetic field lines is unclear. ESA

N87-10546 Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
SMALL SCALE AND INTENSE FIELD-ALIGNED CURRENTS

DETECTED BY THEIR MAGNETIC SIGNATURE
C. Machard, A. Berthelier, J. J. Berthelier, J. C. Cerisier, Y. I. Galperin (Academy of Sciences (USSR), Moscow), and M. M. Mogilevsky *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 93-97 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

From the simultaneous measurements of three components of the magnetic field, DC and in the ELF range, on board the satellite AUREOL-3, small scale field aligned currents with a horizontal scale ranging from a few hundred meters to a few km were deduced. The intensity can be as large as 100 micro A/sqm or more. The currents, which are a frequent feature of the high latitude ionosphere, are mainly observed in the evening and morning sectors, but also in the polar cusps. ESA

N87-10547 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
POSITIVE ION DISTRIBUTIONS IN THE MORNING AURORAL ZONE: LOCAL ACCELERATION AND DRIFT EFFECTS
J. A. Sauvaud, J. M. Bosqued, R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), J. J. Berthelier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses France), A. Berthelier, and Yu. I. Galperin (Academy of Sciences (USSR), Moscow) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 99-105 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The structure of the large scale ion precipitation and field aligned currents in the morning sector of the auroral zone is discussed, using data obtained during near radial passes of the AUREOL-3 satellite. Poleward, the latitudinal variation of the average energy of precipitated ions (H+) indicates that they are adiabatically accelerated in the outer magnetosphere. This high energy precipitation is associated with a low energy upward flowing component. Near the boundary between discrete and diffuse electron aurorae the flux of energetic precipitated H(+) ions is sharply reduced, due to formation of Alfven layers. Intense fluxes of precipitated ions with energies of less than 2 keV are observed equatorward of the Alfven layers, in coincidence with the diffuse aurora. As the characteristic convection and bounce times of the energy upward flowing heavy ion component are comparable, the precipitation of ionospheric ions inside the diffuse aurora may result from convection and corotation of the ions accelerated to suprathermal energies at higher latitudes. Low energy H(+) precipitation is due to a solar and an ionospheric source. ESA

N87-10548 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
PLASMA SHEET BOUNDARY ELECTRIC FIELDS DURING SUBSTORMS c75
Arne Pedersen *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 107-121 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Electric field data from the ISEE-1 and GEOS-2 satellites on substorms when ISEE-1 was in the magnetotail and GEOS-2 in the afternoon/evening sector of the geostationary orbit are discussed. In one case GEOS-2, in the afternoon sector, detected an increase of the dawn-to-dusk electric field during plasma sheet thinning 10 min prior to a substorm expansion. At the time of this expansion ISEE-1 was near an X-line, on the Earthward side and detected Earthward E x B velocities greater than 500 km/sec. Once ISEE-1 was near an X-line, on the tailward side, and observed tailward E x B velocities, which were followed 5 to 20 min later, by characteristic oscillating electric fields on GEOS-2. Such signatures are connected with observations of westward traveling surges. The ISEE-1 observations of large dawn-to-dusk electric fields were concentrated on the outer boundary of the plasma sheet, and for the westward traveling surge, GEOS-2 was at the inner, Earthward edge of the sheet. Time delays between ISEE-1 and GEOS-2 indicate a propagation velocity comparable to the E x B velocity. ESA

N87-10549 Alaska Univ., Fairbanks. Inst. of Geophysics.
CONSEQUENCES OF IMPERFECT MAGNETOSPHERE-IONOSPHERE COUPLING
J. R. Kan *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 123-142 (For primary document see N87-10541 01-46)
(Grant NSF ATM-83-17456)
Avail: CEPADUES, Toulouse

Imperfect magnetosphere-ionosphere coupling, defined by the existence of an aurora-producing electric potential drop along field lines, is used as a theoretical framework for the substorm phenomena. The source of the field-aligned potential is believed to be the enhanced convection electric field in the plasma sheet being partially short-circuited by the conducting ionosphere. The mechanism which maintains the auroral potential and the process which controls its field-aligned scale-length are summarized. In addition to causing the brightening of discrete auroras, the imperfect magnetosphere-ionosphere coupling also leads to the Pi2 magnetic pulsations and the westward traveling surge which are manifestations of a substorm. The generation of Pi2 pulsations and the distortion of the convection pattern associated with the westward traveling surge are shown to result from the transient ionospheric response to an enhanced magnetospheric convection. Conductivity enhancement due to auroral electron precipitation is shown to play a crucial role in all aspects of substorm phenomena. ESA

N87-10550 Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).
MAGNETOSPHERIC-IONOSPHERIC COUPLING DEDUCED FROM MEASUREMENTS ABOVE A DISCRETE AURORAL ARC
K. Broening and C. K. Goertz (Iowa Univ., Iowa City) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 145-151 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The perpendicular electric field, the height integrated conductivities, and the field-aligned currents above and at the edge of a discrete auroral arc in the local post midnight sector were deduced from rocket measurements. Above the arc, an upward field-aligned current is carried by energetic electrons. At the edge of the arc, stronger field-aligned currents flow. Above the arc, a polarization electric field is generated. At the edge of the arc, the strong enhancement of the perpendicular electric field generated in the magnetosphere and propagated to the ionosphere, creates a strong field-aligned current. Above the arc, the results of j'(V') and for n, T0, B1/B0 agree with the stationary model of single particle description. At the edge of the arc, these descriptions work only if the electron density increases by a factor of 10. Above the arc, equilibrium between the electric field in the magnetosphere and ionosphere has time to establish itself. Therefore the stationary model is reasonable. At the edge of a moving arc, this equilibrium is not reached. ESA

N87-10551 Academy of Sciences (USSR), Moscow. Inst. of Space Science.
MODELS OF ELECTRIC POTENTIAL AND CURRENT DISTRIBUTION IN STABLE DISCRETE AURORAL FORMS
Yu. I. Galperin, E. E. Timofeev, M. A. Volkov, and A. V. Volosevich *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 153-175 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

A simplified stationary model for calculations of magnetospheric Alfven layer effects on the auroral ionosphere is described. The model computes the profile of particle density across the L-shells at ionospheric level. The model for a generation of the V-shaped potential structure takes into account the mirror force, and the nonadiabatic cross-L motion of ionospheric ions in a sharply inhomogeneous electric field. With very low current density it is shown to be significant for scales of an arc as providing a partial

closure when integrated along the field tube. Examples of calculations are given for L0=7. The model results can be fitted to agree with data for a sharp jump of plasma density radial profile from 1.0/cc on one side to 0.4/cc on the other side of an Alfven layer inside the main (closed) equatorial nightside plasmasheet, giving the scale = 10 km at ionospheric altitudes. ESA

N87-10552 Kiruna Geophysical Inst. (Sweden).
THE HOT ION COMPOSITION IN THE MAGNETOSPHERE
Bengt Hultqvist *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 177-217 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Hot ion composition measurements on board S3-3, GEOS-1, 2, ISEE-1, PROGNOZ-7, SCATHA, and Dynamics Explorer-1 in the low and high latitude boundary layers, the lobes, plasma sheet, and ring current regions are discussed. Observations of individual flow vectors of different ion species in the low latitude boundary layer are described. The PROGNOZ-7 measurements in the mantle are reviewed. Results of DE-1 observations in the lobes and ISEE-1 data in the plasma sheet and in the ring current region are presented. The GEOS-1, 2 and PROGNOZ-7 measurements of ring current ions are summarized. ESA

N87-10553 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
INJECTION OF LOW-ENERGY IONS DURING GEOMAGNETIC STORMS
J. M. Bosqued, D. Delcourt, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), V. L. Khalipov, J. J. Berthelier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), H. Reme, and V. D. Maslov (Academy of Sciences (USSR), Moscow) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 219-232 (For primary document see N87-10541 01-46)
(Grant CNES-84-1212)
Avail: CEPADUES, Toulouse

Suprathermal ion composition measurements as a function of latitude and local time taken at ionospheric altitudes by the ion spectrometers aboard the AUREOL-3 satellite during magnetically disturbed periods are presented. Although H(+) is the most abundant ion during quiet periods, the hot plasma ion composition is variable and depends strongly on magnetic activity. The importance of the low-altitude ionospheric source is stressed particularly at low latitudes (L = 3 to 4) in the outer plasmasphere when upflowing O(+) ion fluxes appear over large regions during the magnetic storm recovery phase. These low-energy intense fluxes can contribute after a period of enhanced activity to the refilling of the depleted plasmasphere. ESA

N87-10554 Academy of Sciences (USSR), Moscow. Inst. of Space Research.
DETECTION OF SUPRATHERMAL O(+) IONS INSIDE THE PLASMASPHERE
N. V. Jorjio, J. M. Bosqued (Centre d'Etude Spatiale des Rayonnements, Toulouse, France), J. A. Sauvaud, D. Delcourt, R. A. Kovrazhkin, M. Monchant, V. D. Maslov, V. M. Pokras, M. M. Mogilevsky, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France) et al *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 233-237 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The plasma diagnostic experiments on the AUREOL-3 satellite revealed flows of low energy O(+) ions deep inside the night plasmasphere during a large substorm. Flux gradients of the O(+) ions were accompanied by enhancements of ELF electric field noise. The appearance of suprathermal ions at L = 2.5 to 3 is interpreted in the framework of electrostatic ion-cyclotron acceleration of ionospheric ions in the diffuse auroral zone followed by a radial displacement of these ions inside the plasmasphere driven by azimuthal electric fields during substorm activity. Electrostatic oscillations observed inside the plasmasphere are associated with gradient instability at the sharp boundaries of suprathermal ion flows. ESA

N87-10555 Institut d'Aeronomie Spatiale de Belgique, Brussels.
FORMATION AND DEFORMATION OF THE PLASMAPAUSE DURING A SUBSTORM EVENT c75
J. Lemaire *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 239-260 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Plasmapause deformation during a magnetic storm was observed and simulated. When the electric field varies in time with the geomagnetic activity index, the plasmapause deforms and reforms in the midnight sector at decreasing distances where the convection electric field is important. It is shown that the formation of multiple plasmapauses is the result of the filling in of the intermediary region between an old plasmapause and a new one being formed after a reduction of the geomagnetic activity. It is shown that the quick decrease (in a few hours) of the density gradient at the plasmapause is a consequence of the plasma element exchange under the influence of the gravitational force. ESA

N87-10556 Academy of Sciences (USSR), Moscow. Inst. of Space Research.
OBSERVATIONS OF LOW INTENSITY PARTICLE FLUXES INSIDE THE REGION OF THE IONOSPHERIC MAIN TROUGH AND THEIR VARIABILITY
Yu. V. Lissakov, N. V. Jorjio, L. M. Nikolaenko, and M. R. Ainbund *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 261-274 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The AUREOL-3 satellite spectrometer recorded very weak intensities of precipitating electrons during ionospheric disturbances at latitudes corresponding to main ionospheric F-region trough (MIT) minimum. The precipitations are detected at the equator by a sharp jump of the electron intensity at soft electron boundary (SEB). The electron fluxes lead to weak ionization enhancements in the F and E-regions, and to decrease of MIT depth. With increased geomagnetic activity level, the SEB displaces equatorward, filling the region of previous low-intensity precipitation of low energy electrons; electron intensity profile and MIT polar wall can become stepped. Dynamics of the form of the latitudinal profile of precipitating electron intensity under increased perturbation can be explained by the diffusive mechanism of low-energy electron penetration through the plasmapause into the plasmasphere via small-scale nonstationary electric fields at this boundary, and proves the convection boundary nature of the SEB. ESA

N87-10557 California Univ., San Diego. Dept. of Physics.
EQUATORIAL MAGNETOSPHERIC PARTICLES AND AURORAL PRECIPITATIONS
C. E. McIlwain *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 275-280 (For primary document see N87-10541 01-46)
(Grants NGL-05-005-007; NSF INT-8119963)
Avail: CEPADUES, Toulouse

The injection boundary beyond which fresh h plasma appears each magnetospheric substorm is generalized and extended to circle the Earth. The concept of an auroral shell representing the inner limit of active auroral processes is introduced. It is proposed that at low altitudes, this shell marks the equatorward edge of the auroral ovals, and that at high altitudes, it marks the injection boundary. The auroral ring is defined as the intersection of the auroral shell with the magnetic equator. A simple equation for computing the expected location of the auroral ring as a function of local time and magnetic disturbance level is obtained. Tests indicate that the model is valid and reasonably accurate. ESA

N87-10558 Texas Univ. at Dallas, Richardson. Center for Space Sciences.

THE DISTANT MAGNETOTAIL

Walter J. Heikkila and J.-P. Treilhou (Centre d'Etude Spatiale des Rayonnements, Toulouse, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 281-288 (For primary document see N87-10541 01-46)

(Grants NsG-5085; CNES-73-212)

Avail: CEPADUES, Toulouse

Satellite, balloon, aircraft, and ground-based data for a night when variations in the interplanetary magnetic field caused a series of small substorms are presented. The data indicate that a series of small plasmoids was formed in the magnetotail, travelled tailward rubbing on closed field lines, and produced poleward traveling auroral features as the ionospheric footprint of the plasmoids. When the plasmoids cross the X-line and magnetopause onto interplanetary magnetic field lines, they lose connection with the Earth and the auroral features disappear. In this instance, the closed field line portion reached up to 80 deg geomagnetic latitude, over 10 deg poleward from the auroral oval. ESA

N87-10559 Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.

DYNAMIC VARIATIONS OF THE AURORAL PRECIPITATION AND THE POLAR CAP

Ching-I. Meng *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 289-309 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Satellite observations of polar region precipitations are discussed. The morphology of auroral electron precipitation and its variations with the interplanetary magnetic field (IMF) and substorm activity are presented. Implications for magnetospheric configuration and solar-terrestrial interaction are considered. Results indicate that the unusually high latitude of the precipitation poleward boundary is due to a very small number of geomagnetic flux lines interconnected with the IMF during a northward IMF condition. The size of the polar cap is inversely controlled by the magnitude of the northward Bz component. The insensitivity of the equatorward precipitation boundary to the northward IMF Bz means that its dynamics is dominated by internal magnetospheric processes and not by direct solar-magnetospheric interactions. The dawn-dusk and noon-midnight dimensions of the polar cap vary in harmony with the AE index. ESA

N87-10560 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

POLAR CAP PARTICLE PRECIPITATION AS MEASURED BY THE AUREOL-3 AND INTERCOSMOS-19 SATELLITES

F. K. Shuiskaya, A. D. Boljunova, J. M. Bosqued (Centre d'Etude Spatiale des Rayonnements, Toulouse, France), H. Reme, and J. Cuvilo *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 313-329 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Polar cap measurements of low energy charged particles by AUREOL-3 and Intercosmos-19 satellites are discussed. Polar cap arcs are detected by the plasma experiments at latitudes greater than 78 deg during periods of moderate geomagnetic activity and northward directed interplanetary magnetic field Bz component. They correspond to intense electron precipitation with energies less than 0.5 to 1 kev with Maxwellian distributions. Analysis of anticorrelations between electron and ion precipitation fluxes and the detection of energy-peaked distributions can indicate electron acceleration by a field-aligned potential drop. During the recovery phase of a substorm, precipitating electrons were recorded with energies of 5 kev with intensity of 10 million el/sqcm/s sr kev at 87 deg. ESA

N87-10561 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).

EVIDENCE FOR ION ENERGY DISPERSION IN THE POLAR CUSP RELATED TO A NORTHWARD DIRECTED INTERPLANETARY MAGNETIC FIELD (IMF)

J. M. Bosqued, J. A. Sauvaud, H. Reme, J. Crasnier, D. Roux (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses France), Yu. I. Galperin (Academy of Sciences (USSR), Moscow), T. M. Muliarchik, and V. A. Gladyshev *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 331-341 (For primary document see N87-10541 01-46)

(Grant CNES-212)

Avail: CEPADUES, Toulouse

Mechanisms of energy, momentum, and particle transfer from the solar wind to the Earth magnetosphere are discussed. Data from the particle experiment aboard the AUREOL-3 polar satellite show that 30% of the summer cusp crossings are characterized by a clear latitudinal energy dispersion of the solar wind ions. This energy-latitude correlation is observed at very high latitudes (80 deg to 85 deg) near the polar boundary of the cusp, as an increase of the ion average energy with latitude. These structures have a typical latitude extent of 1 to 2 deg at ionospheric heights and correspond to a northward-directed interplanetary magnetic field. The observations are consistent with a sunward convection of the foot of the magnetic flux tubes recently merged with a northward directed interplanetary magnetic field. ESA

N87-10562 Danish Meteorological Inst., Copenhagen. Div. of Geophysics.

POLAR CAP/POLAR CUSP STUDIES USING INCOHERENT SCATTER RADAR FACILITIES

T. S. Joergensen *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 343-351 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

The application of incoherent scatter radar for polar cap and cusp studies is discussed and investigations of plasma convection in the very high latitude ionosphere are reported. Results show that the sunward convection at auroral latitudes turns antisunward toward high polar latitudes over a considerable range of local time around noon, and that there is little evidence of a narrow throat through which the bulk of sunward plasma convection is channeled into the polar cusp. It is found that the predominant east-west convection poleward of the dayside convection reversal region depends on the interplanetary magnetic field (IMF) By component, and that the IMF Bz component affects convection in a wide latitude range in all local time sectors. The time lag between the occurrence of an IMF change at the front of the magnetopause and the corresponding change in the convection is at the most 15 to 20 min. ESA

N87-10563 SRI International Corp., Menlo Park, Calif.

OBSERVATIONS OF POLAR-CAP IONOSPHERIC SIGNATURES OF POLAR WIND/MAGNETOSPHERE COUPLING

O. delaBeujardiere, V. B. Wickwar, and J. D. Kelly *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 353-365 (For primary document see N87-10541 01-46)

(Grants NSF ATM-80-24889; NSF ATM-81-21671)

Avail: CEPADUES, Toulouse

The influence of the interplanetary magnetic field (IMF) on plasma convection, density, and temperature was examined using 24 hr incoherent scatter radar observations. While the radar was in the noon sector the IMF Bz was north and the By component changed direction around local noon. The convection reversal from sunward to antisunward occurred along a latitude that smoothly increased on either side of noon. The F-region densities were the largest in the westward drifting part of the afternoon convection cell. At 1900 MLT (2100 UT) the IMF direction reversed and its magnitude increased. The plasma convection pattern became sunward within the entire radar field of view. This sunward convection, in the polar cap, persisted as long as By remained positive, regardless of the sign of Bz. The observations indicate that the By component is significant in controlling ion drift, even in the night side of the convection. ESA

N87-10564 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
EVIDENCE FOR HIGH LATITUDE IONOSPHERIC ION ACCELERATION
H. Reme, J. M. Bosqued, J. A. Sauvaud, D. Roux (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses France), R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), and F. K. Shuiskaya *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 367-379 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The SPECTRO experiment energetic ion composition spectrometers on AUREOL-3 satellite measured ion features in the ranges 0.01 to 14 keV/Q and 1 to 32 amu. At high latitude the spectrometers analyzed upflowing and downflowing nearly transverse ion streams. Inside the auroral oval, transversely accelerated ions (TAI) associated with electron precipitation are relatively frequent. Above the polar cap, TAI are observed at AUREOL-3 altitudes. The ions are mainly O(+), observed in all MLT sectors and in the 400 to 2000 km altitude range of the satellite, showing that the acceleration mechanisms are efficient at very low altitude and can operate on a broad scale. In the auroral region TAI are interpreted as the result of a strong heating by electrostatic ion cyclotron waves. Ionospheric ions accelerated above the polar cap with an energy between 10 and 200 eV are not consistent with predictions and observations of polar wind composition. All the ions constitute an important source of energetic magnetospheric plasma. ESA

N87-10565 Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
VERTICAL TRANSPORT OF O(+) IONS AT HIGH LATITUDES
D. Roux, J. J. Berthelier, V. A. Gladyshev (Academy of Sciences (USSR), Moscow), L. V. Zinnie, V. D. Maslov, and Pivovarov *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 381-390 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The ion mass spectrometer on AUREOL-3 measured the angular and energy distribution for each thermal ion species in order to determine ion concentration, temperature, and three dimensional velocity vector. Data obtained in the auroral zones and polar cap reveal a significant component along the magnetic field lines. A downward flow of O(+) in the noon sector of the polar cap, and a reversal of the O(+) flow along B from upward to downward, associated with changes in the structure and intensity of energetic electron precipitations are discussed. The first observation agrees with a model proposed by Whitteker (1977) to determine the ionospheric perturbations induced by soft particle precipitations. The second indicates that heating processes act with different time constants upon the vertical velocity and temperature of ionospheric ions. ESA

N87-10566 Academy of Sciences (USSR), Moscow. Inst. of Space Research.
NONSTATIONARY FIELD-ALIGNED FLUXES OF THERMAL IONS O(+) AND H(+) OUTSIDE THE PLASMAPAUSE: REFINEMENT OF THE POLAR WIND THEORY
L. V. Zinin, Yu. I. Galperin, K. S. Latyshev (Kalingrad State Univ., USSR), and S. A. Grigoriev *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 391-408 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

A nonstationary model of polar wind was constructed for the night-latitude ionosphere, consisting of ions O(+), H(+), O2(+) and NO(+). Calculations show that for an initial O(+) density altitude profile which sufficiently differs from a stationary profile, the O(+) ion velocities can reach 2 km/sec in the magnetosphere. The stationary O(+) altitude profile restores density in 1 to 1.5 hr, and velocity in 2.0 to 2.5 hr. This suggests that altitude distributions of thermal ions convecting across the polar cap have no time to reach an equilibrium distribution. Hence in the polar upper ionosphere the considerable velocities of field-aligned motions of O(+) ions are expected at high altitudes, and increase at dayside cusp and at polar cap boundary where auroral heating and ionization disturb altitude profiles of the thermal plasma. ESA

N87-10567 Academy of Sciences (USSR), Moscow. Inst. of Space Research.
FIELD-ALIGNED MOTIONS OF O(+) AND H(+) THERMAL IONS IN A MAGNETIC FIELD TUBE CONVECTED ACROSS THE DAYSIDE POLAR CUSP: MODEL CALCULATIONS
L. V. Zinin, Yu. I. Galperin, and K. S. Latyshev (Kalingrad State Univ., USSR) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 409-416 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

A nonstationary hydrodynamic model of thermal ion motion and density in the magnetospheric field tube shows that ion heating and ionization in the polar cusp strongly affect the field-aligned velocities of O(+) ions, while H(+) velocities reach equilibrium much faster and so are less sensitive to disturbances experienced by a tube during cusp crossing. Differential fluxes of O(+) ions become 10 times greater than for the stationary profile. The total escape ion flux after cusp crossing by a field tube is greater than 50% O(+) ions. The O(+) velocity at great altitudes in a tube which crossed the cusp reaches 3 km/sec. The O(+) ions are predominant in density in all the altitude range and their flux to the magnetosphere is a very important source of magnetospheric ions during quiet times. At disturbed times, the integral flux of O(+) ions greatly increases. ESA

N87-10568 Academy of Sciences (USSR), Moscow. Inst. of Space Research.
FINE STRUCTURE OF FIELDS AND PLASMA IN THE FIELD-ALIGNED CURRENT REGION ON THE INTERCOSMOS-BULGARIA-1300 SATELLITE DATA
V. M. Balebanov, E. M. Dubinin, and I. M. Podgorny *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 422-446 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Electric and magnetic field fine structures, plasma density and velocity, and precipitating particle fluxes in electromagnetic shocks in the auroral regions at altitude 850 km observed by the Intercosmos-1300 satellite are discussed. Typical values of the transverse electric field component are 200 mV/m. Field aligned current densities reach hundreds micro A/sqm. The strong plasma density fluctuations of several tens percent are usually observed in the microstructures. The data are discussed in terms of electromagnetic models with effects of anomalous resistivity. ESA

N87-10569 Academy of Sciences (USSR), Apatity. Polar Geophysical Inst.
SMALL SCALE STRUCTURES OF ELECTRIC FIELD VARIATIONS AND PARTICLE PRECIPITATIONS AS OBSERVED ONBOARD AUREOL-3 SATELLITE
E. E. Titova, V. E. Yurov, M. M. Mogilevsky, O. A. Molchanov, I. G. Shibaev, A. A. Galeev, Yu. I. Galperin, N. V. Jorjio, R. A. Kovrazhkin, V. V. Krasnoselskikh et al *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 447-464 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

From AUREOL-3 satellite VLF-measurements in the multicomponent waveform VLF-data transmission mode, strong low-frequency electric field variations with amplitudes up to 50 to 200 mV/m are studied. The variations can have bipolar impulses with duration less than or = 0.1 sec, but usually have more complex and/or short duration waveforms. In the second case the frequency spectrum decreases at frequencies less than 50 to 200 Hz. The ratio of the field aligned to the perpendicular component is variable, but with statistical predominance of perpendicular component. The regions of such electric field variations and energetic particle fluxes are well correlated, but their detailed correspondence is not always

present. The electric field variations can be generated as a result of an initial nonstationarity of particle fluxes, in the nonlinear stage of the ion-cyclotron instability, or due to current-driven instability of downward hot electron beams and upward cold (or suprathermal) ion fluxes. ESA

N87-10570 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
ATTENUATION BANDS AND CUT-OFF FREQUENCIES FOR ELF ELECTROMAGNETIC WAVES c32
J. L. Rauch, J. C. Cerisier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses France), J. J. Berthelier, F. Lefeuvre, N. Boudko (Academy of Sciences (USSR), Moscow), G. Michailova, and O. Kapustina *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 465-484 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The propagation characteristic of ELF (10 to 1500 Hz) electromagnetic waves observed on ARCAD 3, in 3 different zones: low L value (L less than 4), medium L values (4 less than L less than 6) and high L values (L less than 6) are discussed. Unambiguous determinations of the wave normal directions are obtained from the interpretations of the measurements of four (three magnetic, one electric) wave field components. The analysis is based on the Means method for highly polarized waves and on the Storey and Lefeuvre method in the other cases. The propagation characteristics of the waves in a multiple ion plasma, and the cut-off frequencies at and below the local proton gyrofrequency are discussed. ESA

N87-10571 Academy of Sciences (USSR), Moscow.
POLARIZATION OF ELECTROMAGNETIC WAVES RECORDED ON BOARD THE AUREOL-3 SATELLITE c32
F. Lefeuvre (Centre National de la Recherche Scientifique, Orleans, France), J. L. Rauch, L. V. Volkomiskaya, and B. Lundin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 485-498 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The detection, on board AUREOL-3 satellite, of left magnetoplasma waves in a frequency range where only right waves are predicted by the magnetoionic theory is discussed. The validity of the methods used to determine the sense of polarization of electromagnetic emissions, which assume that the wave is a plane wave, is questioned. A method based on the sign of the imaginary part of the cross-spectrum between two magnetic wave field components is discussed. It is valid for non-plane waves as well as for plane waves. Abnormal polarizations are shown to be correlated with scintillations in the telemetry signal. ESA

N87-10572 Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.
THE DIRECTION FINDING ABOARD AUREOL-3 OF ELF WAVES AT FREQUENCY ABOVE AND BELOW THE PROTON GYROFREQUENCY c32
M. Hayakawa, F. Lefeuvre (Centre National de la Recherche Scientifique, Orleans, France), and J. L. Rauch *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 499-507 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The systematic direction finding system developed for the analyses of the ELF waves (mode C1) on the AUREOL-3 satellite is described. It is based on the use of one and two plane wave models. Sensor outputs are fast Fourier transformed every 80 msec with a frequency resolution of 12.5 Hz. Averaged spectral matrices are estimated at 120 frequencies, using 9 successive spectral matrices over the period of 0.72 sec (=80 msec x 9). The averaged spectral matrices are used to estimate the frequency dependence of the degree of polarization of the coherence function and of the refractive index deduced from the wave data. For simplicity, direction finding is done at 8 specific frequencies only (175 to 1275 Hz) lower frequencies falling below the local proton gyrofrequency, fH (H+). Direction finding for the frequency above fH (H+) with only one whistler mode, and below fH (H+) where two modes are possible are covered. ESA

N87-10573 Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).
DENSITY GRADIENT INSTABILITY IN THE HIGH LATITUDE IONOSPHERE. RELATION WITH THE ELECTROSTATIC TURBULENCE AND CONVECTION c32
J. C. Cerisier, J. J. Berthelier, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), and D. Roux *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 509-516 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Electron density irregularities at medium scale (from a few to a few tens of kilometers) observed in the high latitude topside ionosphere by the satellite AUREOL-3 are described. The irregularities are characterized by a large extension along the magnetic field, revealed by their ducting effect on the ELF down-going hiss; and an asymmetrical structure in the direction perpendicular to the magnetic field. On one side of the density enhancement, an intense electrostatic turbulence is observed, the other side is steeper and appears stable. The observations suggest that the density irregularities are convected by the DC electric field and that the instabilities are of the gradient drift type. ESA

N87-10574 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
EXPERIMENTAL EVIDENCE OF FIELD-ALIGNED ELF PLASMA DUCTS IN THE IONOSPHERIC TROUGH AND IN THE AURORAL ZONE c75
C. Beghin, J. C. Cerisier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), J. L. Rauch, J. J. Berthelier, F. Lefeuvre, R. Debrie, O. A. Maltseva (Rostov State Univ., Rostov-on-Don, USSR), and N. I. Massevitch (Academy of Sciences (USSR), Moscow) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 517-527 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The fine structure of the topside F-region electron density and the ELF hiss wave characteristics were measured simultaneously by the AUREOL/ARCAD 3 satellite. They suggest an efficient ducting mechanism by crests of ionization. Typical horizontal size of the plasma ducts lies in a range 5 to 50 km. The shape of the density structures and wave propagation characteristics exhibit a well marked difference between the inner and outer sides of the equatorward boundary of the midlatitude ionospheric through. Observation of small scale plasma instabilities and electrostatic turbulence occurring usually on the flanks of density enhancements strongly suggests that the ducts are convecting structures, assumed to be created in the auroral zone. ESA

N87-10575 Poitiers Univ. (France). Lab. de Physique de la Haute Atmosphere.
VERY LOW FREQUENCY SAUCERS WITH ATTENUATION BANDS c32
Y. Corcuff and M. Tixier *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 529-535 Sponsored by Administration du Territoire des Terres Australes et Antarctique Francaises (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Forty-three VLF saucers exhibiting attenuation bands related to the proton gyrofrequency were observed on the ISIS satellites over the Antarctic in local winter. It is deduced that the generation/interaction region is located very near the satellite at distances often less than 50 km, either below or above it. It is found that saucers with attenuation bands are observed in the 2000 to 0500 local time sector, between 60 and 70 deg geomagnetic latitude, in an auroral region closely correlated to the plasmapause.

It is inferred that the equatorward edges of the saucers region and the plasma sheet are closely related. ESA

N87-10576 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
INSTABILITIES ASSOCIATED WITH THE EQUATORIAL SPREAD-F PHENOMENON AND THEIR NORTH-SOUTH ASYMMETRY
C. Beghin, R. Pandey (Indian Space Research Organization, Ahmedabad), and D. Roux (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 537-546 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Six north to south passes of AUREOL/ARCAD 3 satellite through the equatorial electron density depletion at variable altitude between 400 and 550 km, at night, during a 2 wk period are discussed. They exhibit a similar feature in plasma density irregularities thought to be associated with spread F phenomenon. The irregularities are found to be quasi-sinusoidal with a scale size of 2 km along the satellite trajectory and occur only on the northern edge of the equatorial electron density depletion. This implies a violation of the principle of conjugate mapping for those wavelengths. The observations are analyzed in terms of generation mechanisms. ESA

N87-10577 Ecole Polytechnique, Palaiseau (France). Centre de Physique Theorique.
SCENARIOS FOR THE GENERATION OF AURORAL KILOMETRIC RADIATION **c32**
D. LeQueau, R. Pellat, and A. Roux (Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 547-557 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The maser synchrotron instability process is used to model auroral kilometric radiation (AKR) generation. The role of inhomogeneities in or near the source region is emphasized. The strong inhomogeneity of the geomagnetic field allows a description of the sources, a determination of the emission beam, and an explanation of observed AKR features (spectral bandwidth structures of the dynamical spectrum including the presence of harmonic emission). This inhomogeneous theory also predicts necessary conditions for the generation of the fundamental emission, that could be of observational significance and lead to experimental test of the theory. The role of density gradients is discussed. Nonlinear mechanisms leading to a limitation of the emitted intensity are presented. ESA

N87-10578 Maryland Univ., College Park. Inst. for Physical Science and Technology.
THE CYCLOTRON MASER THEORY OF AKR AND Z-MODE RADIATION **c32**
C. S. Wu *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 559-570 (For primary document see N87-10541 01-46)
(Grant NGL-21-002-005)
Avail: CEPADUES, Toulouse

The cyclotron maser mechanism which may be responsible for the generation of auroral kilometric radiation and Z-mode radiation is discussed. The relativistic effect of the cyclotron resonance is considered. A computer simulation which elucidates the nonlinear saturation of the maser instability is summarized. ESA

N87-10579 British Antarctic Survey, Cambridge (England). Space Plasma Physics Section.
NONTHERMAL CONTINUUM-TERRESTRIAL MYRIAMETRIC RADIATION NARROWBAND ELECTROMAGNETIC EMISSION **c32**
Dyfrig Jones *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 571-577 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Theories for the generation of terrestrial myriametric radiation are reviewed. Gyrosynchrotron emission, linear mode-conversion of upper-hybrid to L-O mode waves, and nonlinear interaction of upper-hybrid and lower-hybrid waves are considered. Observations support best the linear mode-conversion theory where the L-O radiation is emitted in a density gradient at frequencies near the plasma frequency. Thus the emission is inherently narrow-banded. The continuum is formed by multiple reflections within the magnetospheric cavity of radiation of different frequencies from different sources. Observations of narrowband emissions from density gradients at the plasmapause and magnetosheath and of analogous radiation from the Io plasma torus and magnetosheath at Jupiter support the linear theory. No observational evidence for the coexistence in source regions of upper hybrid and lower hybrid waves as required by the nonlinear theory is reported. ESA

N87-10580 Academy of Sciences (USSR), Troitsk.
MECHANISM OF LOW-FREQUENCY WAVE PROPAGATION IN THE MAGNETOSPHERE **c32**
O. A. Molchanov, O. A. Maltseva (Rostov State Univ., Rostov-on-Don, USSR), and E. E. Titova *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 579-598 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Resonant scattering and channeling of VLF waves due to the small-scale plasma density irregularities caused by ion cyclotron waves near the equatorial plane is considered. This process leads to simultaneous existence of quasi-longitudinal and of quasi-resonant propagation modes and to diffusion of wave vector directions. It is shown that resonant scattering by wave irregularities is similar to optical scattering by diffraction gratings. ESA

N87-10581 Stanford Univ., Palo Alto, Calif. STAR Lab.
ACTIVE EXPERIMENTS FROM GROUND
U. S. Inan and R. A. Helliwell *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 599-607 (For primary document see N87-10541 01-46)
(Contract NAS5-25688; Grant NGL-05-020-008; Contract N00014-82-K-0489; Grants DPP80-22282; DPP80-22540)
Avail: CEPADUES, Toulouse

Active experiments using ground based wave sources to study ionospheric and magnetospheric phenomena are summarized. Amplification of and emission generation by coherent ducted whistler mode signals in the magnetosphere; precipitation of radiation belt particles by controled injection of VLF waves from ground based sources; spectral broadening of VLF transmitter signals during transionospheric propagation; and generation of ELF/VLF signals by HF heating of the auroral electrojet are discussed. ESA

N87-10582 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
DETECTION FROM AUREOL-3 OF THE MODULATION OF AURORAL ELECTROJET BY HF-HEATING FROM ELF SIGNALS IN THE UPPER IONOSPHERE ABOVE TROMSOE (NORWAY)
F. Lefeuvre, J. L. Rauch, V. I. Dee (Academy of Sciences (USSR), Apatity), E. E. Titova, V. E. Yurov, O. A. Molchanov (Academy of Sciences (USSR), Troitsk), M. M. Mogilevsky, O. A. Maltseva (Rostov State Univ., Rostov-on-Don USSR), L. V. Zinin (Academy of Sciences (USSR), Moscow) 10(Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), H. Kopka et al *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 609-619 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Extremely low frequency waves generated by artificial modulation of the auroral electrojet were detected on the AUREOL-3

satellite. The emission is seen on the EH electric antenna at all the modulation frequencies (525, 825, 1125, 1425 Hz) except at 15 Hz where the level of the natural emissions is too high. The amplitude, which increases with the frequency, reaches 5 microV/m at 1425 Hz. From time to time, a weak signal (0.1 mgamma) is detected on the magnetic BX and BZ antennas. The region of observations is very localized, but is 3 deg south of the L shell that crosses the expected heating zone. ESA

N87-10583 Nagoya Univ., Toyokawa (Japan). Research Inst. of Atmospherics.

STUDY OF THE MIDDLE LATITUDE BROADENING OF THE SPECTRUM OF THE WAVES EMITTED FROM GROUND c32

Y. Tanaka, M. Hayakawa, D. Lagoutte (Centre National de la Recherche Scientifique, Orleans, France), and F. Lefeuvre *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 621-626 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Spectral broadening in VLF wave field data acquired on AUREOL 3 satellite at middle latitudes is discussed. Broadening can be as high as 10% of the transmitter frequency, and it occurs only in ionospheric disturbed conditions. Spectrally broadened components are observed on EH antenna. The broadening may be interpreted as a doppler shift effect on the satellite in which the transmitter signals scatter from field-aligned irregularities in the F region and couple into quasi-electrostatic modes of small group velocity. Spectral broadening phenomena show side bands at a frequency interval centered on transmitter frequency. Bicoherence calculations demonstrate that they result from a nonlinear wave interaction between the transmitter signal and a natural emission occurring just above the local proton gyrofrequency. ESA

N87-10584 Academy of Sciences (USSR), Apatity. Polar Geophysical Inst.

ON THE SPECTRAL BROADENING OF THE GROUND-BASED VLF TRANSMITTER SIGNALS IN THE HIGH-LATITUDE IONOSPHERE OBSERVED FROM INTERCOSMOS-19 AND AUREOL-3 SATELLITES c32

E. E. Titova, A. M. Perlikov, V. E. Yurov, I. V. Lychkina, O. M. Raspopov, V. Yu. Trakhtengertz, O. A. Molchanov, O. A. Maltseve (Rostov State Univ., Rostov-on-Don, USSR), and Yu. I. Galperin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 627-644 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

The effect of spectral broadening of VLF signals propagating through the turbulent polar ionosphere (300 to 500 Hz) is discussed. Two-satellite observation results show that the electric component prevails in a broadened signal (BS); the effect is independent of transmitter power; and BS is in a good correlation with the appearance of ELF electrostatic noise. Digital processing of BS reveals 20 to 50 msec temporal variations and harmonic components at 30 to 40 recurrence frequency. At altitudes greater than 700 km the characteristic rate of frequency variation is 3000 to 30,000/sec/sec. Results indicate scattering of whistler waves by ion cyclotron turbulence near the oxygen ion gyrofrequency involving the transformation of an initial wave into the electrostatic plasma mode in the upper ionosphere. ESA

N87-10585 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

PRECIPITATION OF ELECTRONS AND PROTONS IN THE SUBAURORAL ZONE STIMULATED BY GROUND-BASED VLF EMITTER

R. A. Kovrazhkin, M. M. Mogilevsky, O. A. Molchanov, Yu. I. Galperin, N. V. Jorjio, Yu. V. Lisakov, J. M. Bosqued, and H. Reme (Centre d'Etude Spatiale des Rayonnements, Toulouse, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 645-653 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Electron and proton precipitation artificially stimulated by a groundbased VLF-emitter (F = 19.1 kHz, L = 4.0), were detected in the subauroral zone by the AUREOL-3 satellite at altitudes of 1500 to 2000 km in the MLT morning sector. The precipitation zone corresponds to the projection on the ionosphere of the ring current region (L = 2.8 to 3.6) and shifts equatorward with respect to the location of the VLF transmitter. The intensities of the artificial 0.1 to 2 keV electron fluxes range from 10,000 to 100,000 (sqcm sec ster/keV) those of the 60 to 220 keV protons from 1 to 100 (sqcm sec ster/keV). The 1.8 keV electron bursts are delayed by 1 sec with respect to the VLF pulses, and the 110 keV proton fluxes by 3 to 5 sec. Comparison of experimental results with theoretical estimates shows that Cerenkov and cyclotron interaction mechanisms between ring current particles and VLF waves can account for the precipitating particles. ESA

N87-10586 Stanford Univ., Palo Alto, Calif. STAR Lab.

DE-1/SIPLE VLF WAVE-INJECTION EXPERIMENTS c32

U. S. Inan *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 655-659 (For primary document see N87-10541 01-46)

(Contract NAS5-25688; Grants DPP80-22282; DPP80-22540)

Avail: CEPADUES, Toulouse

Very low frequency (1 to 6 kHz) waves from Siple (Antarctica) were detected by the Dynamics Explorer 1 satellite in an almost field aligned orbit with apogee (4.6 Re) close to the geomagnetic equator. Results indicate that the injected signals, while propagating in the magnetosphere in the nonducted mode, are amplified, generate sidebands, and trigger VLF emissions. The propagation paths include direct nonducted paths and reflected modes involving propagation initially in a duct followed by a reflected nonducted path up to the satellite. Calibrated measurements of the wave magnetic and electric intensities are used to estimate the local refractive index. ESA

N87-10587 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

VERY LOW FREQUENCY AND ELF EFFECTS IN THE UPPER IONOSPHERE CAUSED BY LARGE-SCALE ACOUSTIC WAVES IN THE LOWER IONOSPHERE OBSERVED FROM AUREOL-3 SATELLITE

Yu. I. Galperin, V. A. Gladyshev, N. V. Jorjio, R. A. Kovrazhkin, Yu. V. Lissakov, V. D. Maslov, L. M. Nikolaenko, R. Z. Sagdeev, O. A. Molchanov, M. M. Mogilevsky et al *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 661-684 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

The active MASSA experiment studied the effects generated in the upper atmosphere and in the magnetosphere by a large-scale acoustic wave from a chemical explosion reaching ionospheric altitudes. The AUREOL-3 satellite crossed the corresponding magnetic force tubes by the time of the development of the electromagnetic processes expected in the lower ionosphere E-region above the explosion. Measurements reveal electromagnetic effects in the ionospheric and magnetospheric plasmas. Effects include nearly electrostatic ELF and VLF noises in the magnetic force tube based on the E-layer ionosphere above the explosion. Their area expands with a velocity of 0.6 km/sec, i.e., as of an acoustic wave in the lower ionosphere. An intense MHD wave is detected at L = 1.31, equatorwards from the explosion L-shell (L = 1.5). ESA

N87-10588 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

EARTHQUAKE EFFECTS IN THE IONOSPHERE ACCORDING TO INTERCOSMOS-19 AND AUREOL-3 SATELLITE DATA

V. I. Larkina, V. V. Migulin, M. M. Mogilevsky, O. A. Molchanov, Yu. I. Galperin, N. V. Jorjio, M. B. Gokhberg, and F. Lefeuvre (Centre National de la Recherche Scientifique, Orleans, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 685-698 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

During low frequency electromagnetic noise observations from the Intercosmos-19 and OGO-6 satellites, bursts of ELF and VLF noises were found on passes nearly above the epicenters of earthquakes during the preseismic phase (up to several hours before the main shock) and also after the main shocks. Bursts of VLF noise are registered in a wide band centered on the L-shell of the future earthquake epicenter. A tendency for an activation of the VLF and ELF emissions with the approaching main shock is suggested by the data samples and by a change in the characteristics of the VLF emissions after an earthquake main shock. Probably the source of the VLF emissions connected with the earthquakes lies in the magnetosphere. ESA

N87-10589 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.

STUDY OF VLF EMISSIONS APPARENTLY ASSOCIATED WITH EARTHQUAKES FROM GROUND-BASED AND GEOS SATELLITES DATA

M. Parrot and F. Lefeuvre *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 701-711 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Very low frequency emissions associated with earthquakes were independently observed at the Kerguelen station and on the GEOS-1 and GEOS-2 satellites, at frequencies less than 10 kHz. Kerguelen observations were made on magnetic antennas, in a period when earthquakes of moderate intensity (M = 4.7) took place near the station. The GEOS observations were made from magnetic and electric antennas. The analysis used cases for which intense earthquakes (M greater than 5) occurred in regions close to the satellite longitude (GEOS-2 is geostationary and its geographical longitude is 22 E) with the satellite operating in a VLF mode. Methods of distinguishing between correlations and coincidences are discussed. ESA

N87-10590 Minnesota Univ., Minneapolis. School of Physics and Astronomy.

OBJECTIVES AND DESIGN OF THE ECHO 6 ELECTRON BEAM EXPERIMENT: LARGE IONOSPHERIC PERTURBATIONS AND ENERGETIC PARTICLE PATTERNS

J. R. Winckler, J. E. Steffen, P. R. Malcolm, K. N. Erickson, Y. Abe, and R. L. Swanson *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 713-727 Sponsored by Minnesota Univ. Graduate Research Fund (For primary document see N87-10541 01-46) (Grant NsG-5068)

Avail: CEPADUES, Toulouse

The ECHO 6 sounding rocket was launched to detect and analyze conjugate electron echoes using duplex accelerators on the main payload and throwaway detectors separated in a pattern to cover the echo region. Although the system operated as expected, model calculations show that the absence of echoes is due to a greatly extended tail field, which increased bounce times and placed the echoes out of range. Electron beam interactions with the ionospheric plasma were studied. Electron gun pulses produced large electric probe signals covering the entire frequency range between DC and the system Nyquist frequency of 1250 Hz. A signal driven at the 1 kHz gun frequency and a naturally occurring resonance at 840 Hz near the 799 Hz proton gyrofrequency were studied. The 1 kHz signal response confirms that pulsed electron beams may serve as ELF wave sources in space. ESA

N87-10591 Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses (France).

ARTIFICIAL ION BEAM INTERACTION WITH THE AURORAL PLASMA

R. Pottelette, R. Treumann (Max-Planck-Inst. fuer Extraterrestrische Physik, Garching, West Germany), O. H. Bauer, and J. P. Lebreton (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk Netherlands) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 729-734 Sponsored by CNES (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Results obtained during the PORCUPINE experiment on the interaction of an artificial conical beam with the background auroral plasma are presented. The results are compared to the measurements performed by the S3-3 satellite when natural ion conics are present. The comparison shows that conical ion beams can induce the same kind of electrostatic shocks and electrostatic turbulences as those recorded by S3-3. ESA

N87-10592 Bulgarian Academy of Science, Sofia. Central Lab. for Space Research.

INTERCOSMOS-BULGARIA-1300 SATELLITE: LARGE-SCALE STRUCTURE AND DYNAMICS OF THE POLAR IONOSPHERE DURING GEOMAGNETIC STORMS

K. Serafimov and I. Kutiev *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 735-745 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

To analyze the auroral F-region dynamics during a geomagnetic storm, data from simultaneous measurements of electron precipitation fluxes in the energy range 0.2 to 15 kev, emission intensity of 6300 A, 5577 A and 4278 A, field aligned currents, ion drift, and density and temperature of the cold plasma around the midnight sector of the auroral oval, and data from ground based magnetometers were used. It is shown that the main structure characteristics have different inertia to the changes of the intensity of the auroral electrojet. ESA

N87-10593 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

SOME RESULTS OF SCANNER SPECTROPHOTOMETRIC MEASUREMENTS OF AURORA AND AIRGLOW FROM IK-BULGARIA-1300 SATELLITE AND PROSPECTS OF SIMILAR MEASUREMENTS

V. M. Balebanov, A. K. Kuzmin, M. M. Gogoshev (Bulgarian Academy of Science, Sofia), Ts. N. Gogosheva, N. P. Petkov, and K. Kinev *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 747-764 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Magnetosphere-ionosphere scanner photometric observations from Intercosmos 1300 satellite are considered. For the onboard plasma measurement analysis continuous onboard spectrophotometric measurements of aurora and airglow in the subsatellite area are performed simultaneously with the measurements of the plasma characteristics on the satellite. Delineation of the physical processes in the underlying ionosphere is facilitated by combined analysis of the scanner data and the fixed vertical direction multifilter intensity-latitude profiles of the main auroral emissions. Study of small-scale auroral discrete forms from near-Earth satellites with imagers is discussed. ESA

N87-10594 Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).

CONNECTION BETWEEN PARTICLE PRECIPITATIONS AND THE PLASMA SHEET DURING SUBSTORMS

G. Kremser *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 765-774 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

The relationship between particle precipitation and the plasma sheet was studied using simultaneous measurements from balloons and a geostationary satellite during a substorm. Impulsive precipitation of electrons near earthward moving injection fronts, and interaction of hot unstably distributed plasma sheet electrons with whistler mode electromagnetic waves are directly related to plasma sheet dynamics. Impulsive precipitation is related to field aligned electron beams generated by local acceleration by magnetic field aligned electric fields. Electron distribution during wave particle interaction can be described by a bi-Maxwellian distribution function

at energies between 3 and 70 keV and a power law function at higher energies. Both components are anisotropically distributed. Numerical calculations of the anisotropy and the wave growth rate agree with wave observations. Wave particle interaction generates strong pitch angle diffusion responsible for the precipitation. ESA

N87-10595 Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
A MULTIPOINT STUDY OF A SUBSTORM ON 4 MARCH 1979
J. A. Sauvaud, J. P. Treilhou, A. Saint-Marc, H. Reme, J. Dandouras, A. Korth (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau West Germany), G. Kremser, G. K. Parks (Washington Univ., Seattle), A. N. Zaitzev (Academy of Sciences (USSR), Troitsk), V. Petrov et al *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 775-796 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Coordinated measurements performed in the solar wind (ISEE-3, IMP-8), at geostationary orbit (GEOS-2), in the tail (ISEE-1 and 2), at ionospheric level (SAMBO-79), and on the ground were used to study the magnetospheric response to a southward turning of the interplanetary magnetic field (IMF). The change of the IMF is immediately associated with an increase of the eastward and westward electrojets and the beginning of a tail-like deformation of the B-field geometry at geostationary orbit near midnight. After IMF reversal and before main substorm onset, the electrojets move southward in the night and day sectors. Results indicate that the bulk of the energy dissipated inside the magnetosphere during the 2 hr of southward IMF is directly extracted from the solar wind. Explosive energy release during the two last substorms is problematical. Storage of excess energy during the southward IMF episode cannot be excluded. Results support a model in which there is simultaneous storage and dissipation of the incoming energy. ESA

N87-10596 Kiruna Geophysical Inst. (Sweden).
OBSERVATIONS OF AURORAL ELECTRONS WITH SOUNDING ROCKETS AND THE GEOS-2 GEOSTATIONARY SATELLITE
Lars Eliasson, Ingrid Sandahl, and Rickard Lundin *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 797-802 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Electron energy distributions observed during sounding rocket campaigns are presented. Many properties of the distributions during discrete auroral events can be explained if an electric field parallel to the magnetic field lines exists. A discrete arc constitutes a temperature and density boundary in the magnetosphere. The acceleration region is calculated to have its lower border at 0.5 to 2 Re. During discrete auroras in the evening local time sector the Birkeland current can be carried by the energetic electrons. In that case the parallel electric field is a consequence of a magnetospheric dynamo requiring a current to flow along the magnetic field lines. ESA

N87-10597 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
SIMULTANEOUS OBSERVATIONS OF Pc4 AND Pc5 ELECTRIC FIELDS IN THE NOON SECTOR WITH GEOS-1 AND GEOS-2
Rejean Grard and John Matthews *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 803-816 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Hydromagnetic oscillations were observed simultaneously by GEOS-1 and 2, with GEOS-1 at apogee close to GEOS-2, and identical double probe electric field detectors in operation on both spacecraft. Two periods of wave activity with markedly different characteristics are compared. The first period is a second harmonic resonance of the local geomagnetic field line. A magnetic oscillation with a typical rms amplitude of 2 nT and an electric field node are observed near the geomagnetic equator, but an electric field of the order of 2 mV/m is measured at geomagnetic latitude minus 12 deg. The average frequency of the wave is 10 mHz. The second event is an odd harmonic because the transverse wave magnetic field is vanishingly small near the equator while the electric field remains finite; electric field magnitude is comparable at larger magnetic latitude. This 5 mHz oscillation can be associated with the fundamental mode. Neither source is monochromatic. ESA

N87-10598 Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux (France).
ENERGY SPECTRA OF ELECTRONS PRECIPITATING ABOVE THE EISCAT AREA. COMPARISON WITH ARCAD MEASUREMENTS
S. Perraut, D. Fontaine, N. Cornilleau-Wehrlin, J. M. Bosquet (Centre d'Etude Spatiale des Rayonnements, Toulouse, France), D. Alcayde, R. A. Kovrazhkin (Academy of Sciences (USSR), Moscow), A. Korth (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau West Germany), G. Kremser, and W. Kofman (Grenoble Univ., France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 819-829 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

The energy distribution function of precipitating electrons directly measured by ARCAD 3 was computed from EISCAT measurements by the UNTANGLE method, which inverts a height profile of the ionospheric electron density into an incident energy spectrum, using a library of ionization production profiles for monoenergetic electrons. The excellent agreement confirms the validity of the method in the energy range from 1 to 10 keV. Results show that in the morning sector the spectra are very flat with an important high energy component; in the evening sector this component is absent. Energy peaks around 3 keV are observed during short time intervals. The results differentiate auroral forms: diffuse auroras or intense localized structures. ESA

N87-10599 Hydrometeorological Service of the USSR.
THE E REGION INSTABILITIES IN THE POLAR IONOSPHERE
Cl. Renard (Institut Univ. de Technologie, Bourges, France), S. I. Avdiuchine, and A. A. Pokhunkov *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 831-840 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Polar ionospheric electron density profiles obtained by sounding rockets are presented. Instabilities in horizontal and vertical density gradients are analyzed. ESA

N87-10600 Toulon Univ., La Garde (France).
THE ARCAD 3-SAFARI COORDINATED STUDY OF AURORAL AND POLAR F-REGION IONOSPHERIC IRREGULARITIES
J. P. Villain, C. Beghin (Centre National de la Recherche Scientifique, Orleans, France), and C. Hanuise *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 841-853 Sponsored by Inst. National d'Astronomie et de Geophysique (For primary document see N87-10541 01-46)
(Contract CNRS-ERA-668)
Avail: CEPADUES, Toulouse

Ionospheric F-region irregularities were observed simultaneously with the SAFARI ground based HF radars and the ISOPROBE experiment on the AUREOL-3 satellite. Spectral power of electron density variations was calculated for wavelengths between 20 m and 1 km from ISOPROBE high time resolution thermal plasma measurements. One spectrum is obtained every 1.2 sec (= 10 km along the satellite trajectory). The SAFARI radars are sensitive to F-region ionospheric irregularities of 10 m wavelength in the polar and auroral ionosphere. The phase velocity of the irregularities obtained from the Doppler spectrum is related to the ambient plasma drift. Echoes observed with SAFARI are compared with the spectral power of electron density variations deduced from the ISOPROBE measurements. Good agreement is

found, and a numerical value of the spectral power corresponding to detection of echoes by the radar is given. The event is interpreted according to theories on plasma irregularities. ESA

N87-10601 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

TWO-DIMENSIONAL SNAPSHOTS OF ELECTRON DENSITY IN THE MAIN TROUGH AND DIFFUSE AURORAL ZONE FROM A CLOSE NETWORK OF IONOSONDES: COMPARISON WITH MEASUREMENTS FROM AUREOL-3 SATELLITE

N. P. Benkova, E. F. Kozlov, N. I. Samorokin, Yu. I. Galperin, and C. Beghin (Centre National de la Recherche Scientifique, Orleans, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 855-884 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Coordinated ground and satellite F-region observations are used to construct two-dimensional height-latitude plots using the N-h profiles deduced from subauroral ionograms. Results show that oblique reflections from sharp latitudinal density gradients (and/or from curtains of inhomogeneities at these density gradients) constitute the main part of strong traces on the ionograms. The soft electron precipitation boundary (SEB) oval shape and positions agree with a quantitative SEB-position model as a function of Kp and MLT. As well as the main SEB, which marks the transition to high precipitation intensity in the diffuse auroral zone, one or more smaller steps at much lower particle intensities are observed at lower latitudes, inside the nightside main trough. ESA

N87-10602 National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

COMPARATIVE MAGNETOSPHERIC/IONOSPHERIC STUDIES USING DYNAMICS EXPLORER SPACECRAFT AND GROUND-BASED RADARS

James L. Green, M. O. Chandler, and C. R. Chappell *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 884-894 Sponsored by NASA Office of Space Science and Applications and SPAN Pilot Project (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Coincident magnetosphere-ionosphere observations between the Dynamics Explorer 1 and 2 spacecraft with ground-based radar are reviewed. Ionospheric-magnetospheric coupling processes in the plasmasphere, main trough, auroral zone, and polar cap are inferred from the density, temperature, composition, and angular distributions of the low-energy plasma observed from the E-region ionosphere out into the magnetosphere to an altitude of 2.5 Re. From the polar cap to the inner plasmasphere, parallel and perpendicular electric fields, polar wind flow, and equilibrium diffusion appear to be involved in the ionospheric-magnetospheric coupling of the low energy plasma. ESA

N87-10603 Academy of Sciences (USSR), Yakutsk. Inst. of Cosmophysical Research and Aeronomy.

STEP-LIKE PROFILES OF ELECTRON DENSITY IN THE SUB-AURORAL LOWER F-REGION IN THE MORNING SECTOR AND POSSIBLE MECHANISMS OF THEIR FORMATION DURING SUBSTORMS: THE COMPARISON OF DATA OF GROUND-BASED IONOSONDES WITH THE AUREOL-3 SATELLITE MEASUREMENTS

V. L. Khalipov, L. D. Sivtseva, V. M. Filippov, L. M. Nikolaenko, A. E. Stepanov, J. M. Bosqued (Centre d'Etude Spatiale des Rayonnements, Toulouse, France), and C. Beghin (Centre National de la Recherche Scientifique, Orleans, France) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 895-916 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Latitudinal profiles of electron density in the subauroral lower F-region are considered for the morning sector, from the data of a meridional chain of vertical and oblique sounding ionosphere stations. It is shown that during substorms the electron density on the polar wall of the main ionosphere trough can attain a step-like structure. Step-like density profiles at the polar edge of the ionospheric main trough were compared with simultaneous measurements of soft electron precipitations from the AUREOL satellites. It is shown that in the morning sector during a substorm the most equatorward step of the electron density increase, at the trough polar edge, coincides with the equatorial boundary of precipitations of soft electrons. In the morning sector it is displaced equatorward in respect to the soft auroral diffuse boundary. ESA

N87-10604 Kiruna Geophysical Inst. (Sweden).

GROWING ELECTROSTATIC WAVES WITH A WAVELENGTH OF 67 cm IN THE UPPER IONOSPHERE

Bengt Hultqvist *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 917-936 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Electrostatic waves of wavelength half of that of the EISCAT VHF radar (67 cm) generated by auroral electrons precipitating into the auroral zone ionosphere were studied. Wave frequency, growth rate, and beam flow velocity are estimated as function of propagation direction, beam density, and temperature and ionospheric density for situations in and near the auroral zone. Results show only a small dependence on propagation angle less than 80 deg of field line direction. Growth rate is proportional to beam density, except where it goes negative. Flow velocity can be well above 10,000 km/sec. ESA

N87-10605 Goettingen Univ. (West Germany). Inst. fuer Geophysik.

GENERATION OF Pc2 PULSATIONS BY ENERGETIC O(+) IONS

B. Inhester, U. Wedeken, A. Korth (Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau, West Germany), S. Perraut (Centre de Recherches en Physique de l'Environnement, Issy-les-Moulineaux, France), and M. Stokholm (Bern Univ., Switzerland) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 937-942 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

Observational evidence that Pc2 pulsations with an amplitude of several nT on the ground are destabilized by energetic O(+) ions in the magnetospheric equatorial plane is presented. The Pc1 pulsations simultaneously observed on board GEOS-2 were not detected on the ground, which indicates that heavy ions were also present in the cold magnetospheric plasma. ESA

N87-10606 Max-Planck-Inst. fuer Aeronomie, Katlenburg-Lindau (West Germany).

SELF-CONSISTENT ANALYSIS OF HIGH DRIFT VELOCITY MEASUREMENTS WITH THE SCANDINAVIAN TWIN AURORAL RADAR EXPERIMENT (STARE) SYSTEM

L. A. Reinleitner and E. Nielsen *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 943-947 (For primary document see N87-10541 01-46)

Avail: CEPADUES, Toulouse

The use of the STARE and SABRE coherent radar systems in geophysical research with the superimposed grid point method is discussed. The method permits an analysis of E-layer plasma irregularity phase velocity versus flow angle utilizing only STARE or SABRE data. Analysis confirms that the cosine law assumption breaks down for velocities near and exceeding the local ion acoustic velocities. The method improves understanding of naturally-occurring plasma irregularities in the E-layer. ESA

N87-10607 Academy of Sciences (USSR), Moscow. Inst. of Space Research.

COORDINATED DATA ON AURORAL ELECTRODYNAMICS FROM GROUND BASED RADAR DIAGNOSTICS AND AUREOL-3 SATELLITE

E. E. Timofeev, V. M. Smyshliaev, N. V. Jorjio, Yu. I. Galperin, J. M. Bosqued, J. J. Berthelier, M. K. Vallinkoski, and R. J. Pellinen

In CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 949-971 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

Coordinated ground-satellite measurements of VHF radar arcs, magnetic variations, and all-sky auroral imagery were performed with particle and field measurements from AUREOL-3 satellite. Analysis of two satellite passes in the evening (midnight) MLT sector in the conditions of predominantly northward (westward) ionospheric electric field show that inverted V-associated electrodynamical pattern is the same in both events. Model calculations show that meridional ionospheric (Hall-Pedersen) closing current direction is a decisive factor controling the direction of currents in the meridianal Birkeland current loop of the inverted V. An interpretative scheme of the hierarchy of meridional Birkeland current loops is proposed: zone 2 / zone 1 large-scale current loop, inverted V current loops, and auroral arc-associated current loops, all with the same direction of the ionospheric closing current, northward in the evening and southward in the morning. ESA

N87-10608 North Carolina State Univ., Raleigh.
A MODEL FOR THE EVOLVING STABLY STRATIFIED NOCTURNAL BOUNDARY LAYER BASED ON THE TURBULENT KINETIC ENERGY EQUATION Ph.D. Thesis
Avraham Lacser 1985 249 p
Avail: Univ. Microfilms Order No. DA8529444

A numerical and observational study of the nocturnal boundary layer (NBL) overlying a relatively flat terrain is described. The numerical model is one-dimensional (1-D), based on the equations of mean momentum, thermodynamic energy and turbulent kinetic energy with a mixing length closure scheme, and includes a predictive equation for the surface temperature and in-situ longwave radiational cooling. A large number of mixing length formulations were examined and compared for their effects on the predicted mean profiles as well as on the turbulent flux profiles. It was found that different mixing length schemes produce much greater differences in the profiles of the turbulent variances and covariances than in those of mean wind and temperature. A detailed comparison of model predictions and the Cabauw data (few nights) shows that the Delage (1974) mixing length formulation with the appropriate choice of the empirical constant beta predicted the vertical turbulent flux profiles and their temporal evolutions better than the other mixing length schemes. The recommended mixing length scheme predicts the Monin-Obukhov surface layer similarity functions in good agreement with their observed form. The turbulent fluxes can be represented well by scaling them with surface values and scaling the height with the NBL height. The ability of a 1-D model to predict some features in the real NBL was shown, but counter-gradient heat fluxes and full advection effects cannot be predicted by the current model. Dissert. Abstr.

N87-10609 Stanford Univ., Calif.
CRYOGENIC RESONANT-MASS GRAVITATIONAL WAVE DETECTORS Ph.D. Thesis
Massimo Bassan 1985 176 p
Avail: Univ. Microfilms Order No. DA8602453

Gravitational radiation was postulated by Einstein in 1916 as a direct consequence of general relativity. It is generated by dramatic astrophysical events, and the information it carries might have paramount astrophysical relevance. The effect of such waves on matter can be represented with a tidal force; however this effect on the Earth is so small that no direct experimental evidence of their discovery has yet been produced. Twenty five years after J. Weber's pioneering experiments, as many as 14 groups around the world are developing more and more sensitive detectors for gravitational waves. Many, including the one at Standard University, use Weber's original approach of a resonant mass antenna. The state of the art of this program is reviewed, with particular attention to experimental problems involved and the best strategies available today to overcome them. An analysis of the problem of sensitivity and bandwidth of resonant antennae is then given and an explicit algorithm is presented. A detailed description of the Standard detector is given. Improvements and modifications done after the last period of operation are described, as well as the calibration procedures used. Some preliminary data are reported about the current observation with the antenna, which is now operating with a noise temperature for pulse detection of 20 milliKelvin. Dissert. Abstr.

N87-10610 California Univ., Santa Barbara.
A COMPONENT DECOMPOSITION MODEL FOR EVALUATING ATMOSPHERIC EFFECTS IN REMOTE SENSING Ph.D. Thesis
Shusun Li 1985 151 p
Avail: Univ. Microfilms Order No. DA8609703

A radiance value of a target pixel recorded by a remote sensor can be decomposed into three components: attenuated target signature, pure atmospheric radiation, and the contribution made by the ground through the atmospheric scattering process. Given the meteorological and optical parameters of a layer-structured atmosphere, its transmittance and radiance distribution can be accurately calculated with a plane-parallel radiative transfer model. By applying the component decomposition model in an atmosphere with an underlying homogeneous Lambertian surface, the band-averaged pure atmospheric radiance and the downward and upward direct, diffuse, and total transmittances are calculated for the six reflective wavelength bands of the LANDSAT Thematic Mapper. By applying the component decomposition model in an atmosphere-snow system, the band-averaged upward atmospheric transmittances from an anisotropic snow surface are calculated and compared with their counterparts for Lambertian surfaces of the same albedo. Knowing the pattern of the surface anisotropic reflectance factor, an adjusted band-averaged point spread function can be calculated and be used to retrieve the upwelling radiance from an inhomogeneous surface with a stable anisotropic reflectance pattern. Dissert. Abstr.

N87-10611 California Univ., Davis.
A HIGH RESOLUTION ENTRAINMENT MODEL FOR THE CONVECTIVE PLANETARY BOUNDARY LAYER Ph.D. Thesis
Ray Francis Kamada 1985 193 p
Avail: Univ. Microfilms Order No. DA8607596

A theory for a high resolution model day-time growth or entrainment of the convective planetary boundary layer is developed. It is similar to other entrainment models in that it is based upon a parameterized form of the turbulent kinetic energy equation. It differs from other models in that it takes an ensemble averaged view of the actual, convoluted, inversion interface which tops the well-mixed region, rather than a lower resolution, spatially averaged view of the capping inversion and/or mixed layer regions. The theory uses a fractal method to estimate the enhancement of the surface area for an irregularly convoluted, discontinuous interface, while a mixed Lagrangian-Eulerian technique (virtual particle analysis) is developed to determine the thickness. The outcome is a fractal interfacial entrainment (FIE) model which predicts the time evolutions of the mixed layer height, its vertically averaged potential temperature, and the magnitude of the temperature jump across the inversion. The resulting mixed layer growth predictions are consistent with measurements under convective conditions observed during day 33 of the Wangara experiment. Dissert. Abstr.

N87-10612*# National Aeronautics and Space Administration, Washington, D.C.
ATMOSPHERIC OZONE 1985. ASSESSMENT OF OUR UNDERSTANDING OF THE PROCESSES CONTROLLING ITS PRESENT DISTRIBUTION AND CHANGE, VOLUME 1 Global Ozone Research and Monitoring Project
1985 505 p Prepared in cooperation with FAA, Washington, D.C., NOAA, Washington, D.C., United Nations Environment Program, Nairobi, Kenya, WMO, Geneva, Switzerland, Commission of the European Communities, Brussels, Belgium, and BMFT, Bonn (West Germany) Original contains color illustrations
(NASA-TM-89237; NAS 1.15:89237; WMO-Rept-16-Vol-1) Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

Topics addressed include: stratospheric chemistry; tropospheric

trace gas (sources, distributions, and trends); tropospheric chemistry (processes, controlling the ozone and hydroxyl radicals); stratosphere-troposphere exchange; dynamic processes; and radiative processes (solar and terrestrial). For individual titles, see N87-10613 through N87-10618.

N87-10613*# National Aeronautics and Space Administration, Washington, D.C.
STRATOSPHERIC CHEMISTRY
R. A. Cox, W. B. DeMore, E. E. Ferguson, R. Lesclaux, A. R. Ravishankara, S. P. Sander, N. D. Sze, and R. Zellner *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 32 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

Recent improvements in the data base for the currently identified reactions describing the chemistry of the major families of trace gas species, HO(x), NO(x), ClO(x), and hydrocarbons are assessed. The important coupling reactions between the families are introduced progressively. Chemical aspects such as heterogeneous reactions and reactions of sodium species, the importance of which are not yet completely established, are discussed. Recent attempts to reconcile some of the more unexpected kinetic behavior which has emerged from the extensive experimental studies of key reactions with current reaction rate theory are also examined. The uncertainties in the current kinetic and photochemical data base is given. The prospects for improvement of data for known reactions of atmospheric importance as well as for the identification of gaps in the chemical description of the atmosphere. B.G.

N87-10614*# National Aeronautics and Space Administration, Washington, D.C.
TROPOSPHERIC TRACE GASES
R. Gammon, S. C. Wofsy, R. J. Cicerone, A. C. Delany, R. T. Harriss, M. A. K. Khalil, J. A. Logan, P. Midgley, and M. Prather *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 62 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

Trace gas concentrations in the atmosphere reflect in part the overall metabolism of the biosphere, and in part the broad range of human activities such as agriculture, production of industrial chemicals, and combustion of fossil fuels and biomass. There is compelling evidence that the composition of the atmosphere is now changing. Observed trends in trace gas levels are reviewed and implications for the chemistry of the atmosphere are discussed. Throughout the discussion, particular emphasis is given to those species which are now increasing in the atmosphere. B.G.

N87-10615*# National Aeronautics and Space Administration, Washington, D.C.
TROPOSPHERIC CHEMISTRY
V. A. Mohnen, W. Chameides, K. L. Demerjian, D. H. Lenschow, J. A. Logan, R. J. McNeal, S. A. Penkett, U. Platt, U. Schurath, and P. daSilva Dias *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 36 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

The chemistry of the background troposphere, the source region, and the transition regions are discussed. The troposphere is governed by heterogeneous chemistry far more so than the stratosphere. Heterogeneous processes of interest involve scavenging of trace gases by aerosols, cloud and precipitation elements leading to aqueous phase chemical reactions and to temporary and permanent removal of material from the gas phase. Dry deposition is a major removal process for ozone, as well as for other gases of importance in tropospheric photochemistry. These processes are also discussed. B.G.

N87-10616*# National Aeronautics and Space Administration, Washington, D.C.
STRAT-TROP EXCHANGE
A. F. Tuck, E. V. Browell, E. F. Danielsen, J. R. Holton, D. Kley, A. J. Krueger, G. Megie, R. E. Newell, G. Vaughan, B. J. Hoskins et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 92 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

Exchange between the stratosphere and troposphere is important to the chemical composition of both regions. The export of ozone from the stratosphere provides the troposphere with a means of initiating photochemistry. The precursor molecules originating from the planetary surface provide the stratosphere with its chemical feedstock from which the ozone-controlling HO(x), NO(x), and Cl(x) photochemistries are driven. The tropopause is defined both statistically and in a local, synoptic sense by the value P(sub theta) = .000016 K sq m/kg/s, taken from an objective analysis of 8 years of zonal, temporal mean cross sections of potential temperature, wind and potential vorticity. B.G.

N87-10617*# National Aeronautics and Space Administration, Washington, D.C.
DYNAMICAL PROCESSES
R. A. Plumb, D. G. Andrews, M. A. Geller, W. L. Grose, A. ONeill, M. Salby, and R. A. Vincent *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 110 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

The techniques used to observe the middle atmosphere; the zonally-averaged and eddy structure of the middle atmosphere; seasonal variations and interannual variability; theoretical understanding of the middle atmospheric circulation are discussed. Recent satellite-based observational studies of stratospheric transport process, as revealed by the behavior of constituents and of potential vorticity (a dynamical tracer) are reviewed. The theory of global transport and its representation in transport models is discussed. B.G.

N87-10618*# National Aeronautics and Space Administration, Washington, D.C.
RADIATIVE PROCESSES
J. E. Frederick, C. Leovy, D. E. Anderson, Jr., G. P. Anderson, R. E. Dickinson, S. R. Drayson, S. Fels, L. A. Hall, J. Kiehl, J. E. Mentall et al *In its* Atmospheric Ozone 1985. Assessment of our Understanding of the Processes Controlling its Present Distribution and Change, Volume 1 1985 46 p (For primary document see N87-10612 01-46)
Avail: NASA, Goddard Space Flight Center, Code 610, Greenbelt, Md. 20770 HC free; NTIS HC A22/MF A01 CSCL 04A

Solar radiation and the processes that control its deposition in the Earth atmosphere are considered. The published data obtained since 1978 define a reference solar spectral irradiance for use in atmospheric chemical and dynamical studies, while long term satellite measurements are now providing information on variations in the output of the Sun over a range of time scales. As concerns absorption of solar radiation in the atmosphere, new cross section data for molecular oxygen and ozone are now available. Line-by-line calculations used to predict infrared flux divergences, both as regards assumptions made in radiative transfer calculations and in the spectroscopic parameters used as inputs are examined. Also examined are the influence of radiative processes on planetary scale wave activity, photochemical acceleration of radiative damping, and the breakdown of local thermodynamic equilibrium at mesospheric altitudes. B.G.

N87-10619# Atomic Weapons Research Establishment, Aldermaston (England).
SOME SEISMIC RESULTS OF AN UNDERGROUND EXPLOSION AT THE MURUROA TEST SITE (SHOT REPORT NO. 6)
R. C. Stewart and Penelope J. Warburton Mar. 1986 20 p
(AWRE-O-17/85; BR99175; ETN-86-97994) Avail: NTIS HC A02/MF A01

Data from an underground explosion at the Pacific test site at Mururoa recorded by seismological arrays in Australia, Brazil, Canada, India, and the UK are presented. Data include SP and BB results. ESA

N87-10620*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DIRECT COMPUTATION OF ORBITAL SUNRISE OR SUNSET EVENT PARAMETERS
James J. Buglia Oct. 1986 37 p
(NASA-TM-87717; L-16155; NAS 1.15:87717) Avail: NTIS HC A03/MF A01 CSCL 04A

An analytical method is developed for determining the geometrical parameters which are needed to describe the viewing angles of the Sun relative to an orbiting spacecraft when the Sun rises or sets with respect to the spacecraft. These equations are rigorous and are frequently used for parametric studies relative to mission planning and for determining instrument parameters. The text is wholly self-contained in that no external reference to ephemerides or other astronomical tables is needed. Equations are presented which allow the computation of Greenwich sidereal time and right ascension and declination of the Sun generally to within a few seconds of arc, or a few tenths of a second in time. Author

N87-10621# National Oceanic and Atmospheric Administration, Boulder, Colo. Space Environment Lab.
SPACE ENVIRONMENT LABORATORY, FY 1985 Annual Report, 1 Oct. 1984 - 30 Sep. 1985
H. Leinbach 1985 49 p
(PB86-218567) Avail: NTIS HC A03/MF A01 CSCL 04A

Topics covered include: space environment services (space environment products and services, projects, equipment, and systems); systems support (operational satellite instrumentation, Space Environment Laboratory Solar Imaging System, scientific workstation system); research (solar physics, interplanetary physics, magnetospheric physics, atmospheric-ionosphere-magnetosphere interactions); staff; publications; and talks. GRA

N87-10622# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 501, MAY 1986. PART 2: (COMPREHENSIVE REPORTS). DATA FOR NOVEMBER 1985 AND MISCELLANEA
H. E. Coffey, ed. May 1986 41 p
(PB86-218047; SGD-501-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Topics covered include: detailed index for 1985 to 1986; data for November 1985 (Meudon carte synoptique, solar flares, solar radio bursts at fixed frequencies, solar X-ray radiation from GOES satellite, and active prominences and filaments); and miscellaneus data (IAU quarterly bulletin on solar activity, Meudon observatory carte sypnotiques de la chromosphere solaire et catalogues des filaments et des centres d'activite). GRA

N87-10623# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 501, MAY 1986. PART 1: (PROMPT REPORTS). DATA FOR APRIL 1986, MARCH 1986 AND LATE DATA
H. E. Coffey, ed. May 1986 143 p
(PB86-218039; SGD-501-Pt-1) Avail: NTIS HC A07/MF A01 CSCL 03B

Topics covered include: detailed index for 1985 to 1986; data for April 1986 (advance and worldwide IUWDS alert periods, solar activity indices, solar flares, solar radio emission, VOSTOK inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field); data for March 1986 (solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, radio propagation indices); and late data (solar radio spectral observations Culgoora February 1986, geomagnetic indices, calcium plage data, and daily maps June to October 1985). GRA

N87-10624*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 499, MARCH 1986, SUPPLEMENT
Mar. 1986 87 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-179797; NAS 1.26:179797; PB86-196102;
SGD-499-Suppl) Avail: NTIS HC A05/MF A01 CSCL 03B

This supplement contains the description and explanation of the data in the monthly publication Solar-Geophysical Data, compiled by the National Geophysical Data Center (NGDC) in Boulder, Colo., USA. Solar-Geophysical Data is intended to keep research workers informed on a timely schedule of the major events of solar activity and the associated interplanetary, ionospheric, radio propagation and other geophysical effects. GRA

N87-10625*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 499, MARCH 1986. PART 2: (COMPREHENSIVE REPORTS). DATA FOR SEPTEMBER 1986 AND MISCELLANEA
H. E. Coffey, ed. Mar. 1986 36 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-179796; NAS 1.26:179796; PB86-196094;
SGD-499-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

Solar-Geophysical Data Number 499, March 1986, Part 2 (Comprehensive Reports); Data for September 1985, and Miscellanea, contains the following: Detailed index for 1985 to 1986; Data for September 1985--(Solar flares, Solar radio bursts at fixed frequencies; Solar X-ray radiation from GOES satellite; Mass ejections from the Sun; Active prominences and filaments); (Meudon carte synoptique 7 July - 26 September 1985, Solar irradiance). GRA

N87-10626*# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 499, MARCH 1986. PART 1: (PROMPT REPORTS). DATA FOR FEBRUARY 1986, JANUARY 1986 AND LATE DATA
H. E. Coffey, ed. Mar. 1986 175 p
(NASA Order W-15519; Grant NSF ATM-83-18491)
(NASA-CR-179795; NAS 1.26:179795; PB86-196086;
SGD-499-Pt-1) Avail: NTIS HC A08/MF A01 CSCL 03B

Solar-Geophysical Data Number 499, March 1986, Part 1 (Prompt Reports); Data for February 1986, January 1986 and Late Data, contains the following: Detailed index for 1985 to 1986; Data for February 1986--(IUWDS alert periods (Advance and worldwide), Solar activity indices, Solar flares, Solar radio emission, Vostok inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field); data for January 1986--(Solar active regions, Sudden ionospheric disturbances, Solar radio spectral observations, Cosmic ray measurements by neutron monitor, Geomagnetic indices, Radio propagation indices); Late data-(Solar active regions, Solar radio spectral observations Culgoora, Cosmic ray measurements by neutron monitor, Calcium plage data). GRA

N87-10627 Wisconsin Univ., Madison.
CASE STUDIES OF THE STRUCTURE OF THE ATMOSPHERIC BOUNDARY LAYER ENTRAINMENT ZONE Ph.D. Thesis
Timothy D. Crum 1985 267 p
Avail: Univ. Microfilms Order No. DA8524260

The structure of the atmospheric entrainment zone, an interfacial layer between the convective boundary layer and the stable air aloft, was studied using data obtained during the Boundary Layer Experiment 1983 in Oklahoma. Coincident high resolution aircraft and lidar observations provided a picture of the daytime continental entrainment zone. Fast-response Lyman alpha hygrometer output voltages from the aircraft were calculated to yield meteorological units of humidity. These humidity measurements compare well with those made by ground-based sensors. Selection

of specific humidity as a conditional sampling criteria for surface layer air in the entrainment zone results from a comparison of coincident aircraft data traces and ground-based lidar range height indicator scans. Using these conditional sampling criteria, two approaches were taken to describe the humidity structure of the entrainment zone. The first uses the linear mixing character of specific humidity. The second approach models frequency distributions of three types of air in the entrainment zone: unmixed free atmosphere (dry); unmixed surface layer air (moist); and a mixture of these two.

Dissert. Abstr.

N87-10628 Washington Univ., Seattle.
A PHOTOMETRIC AND IN SITU STUDY OF STABLE AURORAL RED ARCS Ph.D. Thesis
Donald Wayne Slater 1985 162 p
Avail: Univ. Microfilms Order No. DA8603126

A history of the study of Stable Auroral Red (SAR) Arc occurrences between 1967 and 1984 (including the period of the international Magnetospheric Study) reveals 383 features that are interpreted to be SAR arcs; a listing is presented. A strong correlation of SAR arc occurrence frequency with the solar cycle is demonstrated, though with a two to three year phase lag. The large number of events available to this study has confirmed the direct association of SAR are occurrences with enhanced ring current fluxes. Clear evidence has demonstrated the consistent presence of precipitating low energy electrons into SAR arc locations identified by the Battelle operated MASP network. A search for electric currents resulting from this precipitation revealed no magnetic field fluctuations as expected to be associated with these fluxes. For the first time, atmospheric composition within SAR arcs is reported. Although there is evidence of significant compositional perturbation, the region over which this occurs is found to be considerably more extensive than the SAR arc itself. Auroral precipitation may be the primary cause of this perturbation. Calculations of the expected 6300 A volume emission rates and energy loss rates from the heated ionospheric electrons for a variety of neutral atmospheric compositions demonstrate the importance of recognizing these compositional perturbations. It is shown that molecular nitrogen becomes increasingly important as an energy sink as exospheric temperature is increased.

Dissert. Abstr.

N87-10629 Harvard Univ., Cambridge, Mass.
MILLIMETER-WAVE SPECTROMETRY OF OZONE IN THE MIDDLE ATMOSPHERE Ph.D. Thesis
Brian Joseph Connor 1985 163 p
Avail: Univ. Microfilms Order No. DA8602204

Pressure broadened linewidths of the rotational transitions of ozone were measured, for the foreign gases N2 and O2, over a pressure range of 200 to 1000 mTorr. The temperature dependence of the broadening was measured over the range 195 to 320 K. The air broadened lindewidth of the 6 (sub15)-6 (sub06) transition, was measured at 294 K, and is readily calculated, for other temperatures and transitions, from the N2 and O2 results. The results are compared with recent theoretical calculations, and also with previous measurements, where these are available. The measurements have direct application to the interpretation of observations of microwave emission of middle atmosphere ozone. The results also serve as reference points for theoretical linewidth calculations applicable from the microwave to the infrared spectral regions.

Dissert. Abstr.

N87-10630 Colorado State Univ., Fort Collins.
NUMERICAL STUDIES OF THERMALLY AND MECHANICALLY FORCED CIRCULATIONS OVER COMPLEX TERRAIN Ph.D. Thesis
Raymond W. Arritt 1985 215 p
Avail: Univ. Microfilms Order No. DA8607627

Thermally and mechanically forced circulations over complex terrain are studied using one and two dimensional numerical simulations. Particular emphasis is placed on nocturnal katabatic winds (slope flows) and on upstream blocking of stratified flow. These phenomena are first examined independently, and then are combined so that their interactions can be evaluated. Upstream blocking in the absence of thermal forcing is found to be reasonably well described for air quality assessment purposes by the critical dividing streamline hypothesis. It is found that the highest pollutant concentrations are obtained on the windward side of the topography for contaminant sources within the blocked region and on the lee side for sources above the blocked region. Sensitivity experiments indicate that nocturnal slope flows decrease in intensity as the ambient thermal stratification increases. It is also found that slope winds can lead to high pollutant concentrations on windward slopes even when the Froude number is well above the range where upstream blocking is expected. Reasons why this behavior was not observed in previous studies of tracer flow around small hills are discussed.

Dissert. Abstr.

N87-10631 Alaska Univ., Fairbanks.
GRAVITY WAVE DYNAMICS NEAR THE MESOPAUSE OVER POKER FLAT, ALASKA Ph.D. Thesis
Steven Andrews Smith 1985 206 p
Avail: Univ. Microfilms Order No. DA8612264

The characteristics of mesospheric gravity waves are studied using rocket and radar soundings. The soundings are examined in two different approaches: identification of individual, nearly monochromatic waves, and through the statistical view offered by spectral analysis of wind velocity fluctuations. Simultaneous rocket and radar data have provided a complete overview of the saturation of a large scale inertio-gravity wave near the summer mesopause. A comparison of vertical wavenumber spectra, of high spatial resolution of radar measurements, with a gravity wave model demonstrates that gravity waves dominate the mesospheric wind spectrum. The mesospheric spectra agree in shape and amplitude with similar spectra obtained in the stratosphere and troposphere. It is concluded that small scale gravity waves are saturated throughout the lower and middle atmosphere. Observations of the growth of wave amplitudes with height as seen in frequency spectral studies are compatible with the conclusion that the small scale waves are saturated since the vertical wavelengths of the largest saturing wave increases with height.

Dissert. Abstr.

N87-10632 Michigan Univ., Ann Arbor.
OBSERVATIONAL AND THEORETICAL INVESTIGATION OF STABLE AURORAL RED ARCS AND THEIR MAGNETOSPHERIC ENERGY SOURCE, VOLUMES 1 AND 2 Ph.D. Thesis
Janet Urbanski Kozyra 1986 484 p
Avail: Univ. Microfilms Order No. DA8612558

The Stable Auroral Red (SAR) arc's nearly monochromatic emission at 6300 A is the ionospheric signature of an energy transfer process spanning tens of thousands of kilometers (the energy source being in the equatorial plasmasphere and the ultimate energy sink being in the F region). Thirty one coordinated data sets were compiled during which Dynamics Explorer-1 was at high altitudes and Dynamics Explorer-2 was at the F region heights during traversals of SAR arc field lines on dates identified by ground based photometry. The conclusions drawn from theoretical and statistical investigations are discussed.

Dissert. Abstr.

N87-10268*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A HIGH-ALTITUDE AIRBORNE DIAL SYSTEM: THE LIDAR ATMOSPHERIC SENSING EXPERIMENT (LASE)
E. V. Browell, W. R. Vaughan, W. M. Hall, J. J. Degnan, R. D. Averill, J. G. Wells, D. E. Hinton, and J. H. Goad *In its* 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10283*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MEASUREMENTS OF THE EFFECT OF HORIZONTAL VARIABILITY OF ATMOSPHERIC BACKSCATTER ON DIAL MEASURE-

MENTS
G. K. Schwemmer, C. L. Korb, M. Dombrowski, and C. Y. Weng (Science Systems and Applications, Inc., Seabrook, Md.) *In its* 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10291*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE MEASUREMENT OF ATMOSPHERIC DENSITY USING DIAL IN THE O2 A-BAND (770 nm)
T. D. Wilkerson (Maryland Univ., College Park.), G. K. Schwemmer, L. J. Cotnoir, and U. N. Singh *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
(Contracts NCC1-25; DAAG29-81-D-0100; Grant NA83-AA-A-00036)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10297*# Kyushu Univ., Fukuoka (Japan). Dept. of Electrical Engineering.
OBSERVATION OF ATMOSPHERIC OZONE BY DIAL WITH RAMAN LASERS PUMPED BY A KrF LASER
M. Maeda and T. Shibata *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10298*# Maryland Univ., College Park. Inst. for Physical Science and Technology.
STRENGTH, WIDTH, AND PRESSURE SHIFT MEASUREMENTS OF 54 LINES IN THE OXYGEN A-BAND
K. J. Ritter and T. D. Wilkerson *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10300*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONVECTIVE STRUCTURE OF THE PLANETARY BOUNDARY LAYER OF THE OCEAN DURING GALE
S. H. Melfi and R. Boers *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10302*# Academy of Sciences (USSR), Tomsk.
MULTIFREQUENCY DIAL SENSING OF THE ATMOSPHERIC GASEOUS CONSTITUENTS USING THE FIRST AND SECOND HARMONICS OF A TUNABLE CO2 LASER RADIATION
V. E. Zuev, Yu. M. Andreev, V. G. Voevodin, A. I. Gribenyukov, V. A. Kapitanov, A. V. Sosnin, G. A. Stuchebrov, and G. S. Khmelnitskii *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10303*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
REMOTE EXPRESS ANALYSIS OF GROUND-LAYER AEROSOL BASED ON LASER-INDUCED SPARK SPECTRA
V. E. Zuev, Yu. D. Kopytin, V. A. Korolkov, M. E. Levitskii, M. F. Nebolsin, B. G. Sidorov, and N. P. Soldatkin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10305*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
OPTIMAL FILTRATION OF THE ATMOSPHERIC PARAMETERS PROFILES
V. E. Zuev, G. N. Glazov, and G. M. Igonin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10306*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
OPTICAL MODELS OF THE MOLECULAR ATMOSPHERE
V. E. Zuev, Yu. S. Makushkin, A. A. Mitsel, Yu. N. Ponomarev, V. P. Rudenko, and K. M. Firsov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10312*# National Oceanic and Atmospheric Administration, Boulder, Colo.
FEATURES OF STRATOSPHERIC AEROSOL LIDAR OBSERVATIONS AT MAUNA LOA, 1974 - 1985
J. J. DeLusi, T. DeFoor, and D. U. Longenecker *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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N87-10313*# Kyushu Univ., Fukuoka (Japan). Dept. of Physics.
EL CHICHON AEROSOLS IN THE STRATOSPHERE: ANALYSES OF LIDAR DATA AND CALCULATIONS OF RADIATION BUDGET
M. Fujiwara, H. Akiyoshi, and N. Otsuka *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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N87-10314*# Nagoya Univ. (Japan). Water Research Inst.
LIDAR MEASUREMENT OF STRATOSPHERIC AEROSOL AT SYOWA STATION, ANTARCTICA
Y. Iwasaka, T. Hirasawa (National Inst. of Polar Research, Tokyo (Japan).), H. Fukunishi, T. Ono, and A. Nomura *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
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N87-10321*# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
THREE ATMOSPHERIC DISPERSION EXPERIMENTS INVOLVING OIL FOG PLUMES MEASURED BY LIDAR
W. L. Eberhard, G. T. McNice, and S. W. Troxel *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10332*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
A COMBINED RAMAN LIDAR FOR LOW TROPOSPHERIC STUDIES
Yu. F. Arshinov, S. M. Bobrovnikov, V. E. Zuev, A. I. Nadeev, and K. D. Shelevoy *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10333*# Naval Air Development Center, Warminster, Pa.
INTERCOMPARISONS OF HIGH-RESOLUTION SOLAR BLIND RAMAN LIDAR ATMOSPHERIC PROFILES OF WATER VAPOR WITH RADIOSONDES AND KYTOON
K. Petri, A. Salik, and J. Cooney (Drexel Univ., Philadelphia, Pa.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10334*# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Sciences.
LIDAR METHOD OF MEASUREMENT OF ATMOSPHERIC EXTINCTION AND OZONE PROFILES
John A. Cooney *In* NASA. Langley Research Center 13th

International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10337*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE APPLICATION OF LIDAR TO STRATOSPHERIC AEROSOL STUDIES
M. P. McCormick *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10338*# National Inst. for Environmental Studies, Tsukuba (Japan).
VOLCANIC ERUPTIONS AND THE INCREASES IN THE STRATOSPHERIC AEROSOL CONTENT: LIDAR MEASUREMENTS FROM 1982 TO 1986
S. Hayashida, Y. Ikura, H. Shimizu, Y. Sasano, H. Nakane, N. Sugimoto, I. Matsui, and N. Takeuchi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
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N87-10339*# University Coll. of Wales, Aberystwyth.
OBSERVATIONS OF STRATOSPHERIC AEROSOLS ASSOCIATED WITH THE EL CHICHON ERUPTION
L. Thomas, G. Vaughan, D. B. Jenkins, D. Wareing, and M. Farrington *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10340*# Fraunhofer-Inst. fuer Atmosphaerische Umweltforschung, Garmisch-Partenkirchen (West Germany).
LIDAR OBSERVATIONS OF THE DECLINE OF THE EL CHICHON STRATOSPHERIC LOAD
H. Jaeger and W. Carnuth *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
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N87-10341*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRBORNE LIDAR OBSERVATIONS OF ARCTIC POLAR STRATOSPHERIC CLOUDS
L. R. Poole and G. S. Kent *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
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N87-10343*# University Coll. of Wales, Aberystwyth. Dept. of Physics.
LIDAR MEASUREMENTS OF THERMAL STRUCTURE
D. B. Jenkins, D. P. Wareing, L. Thomas, and G. Vaughan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10344*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
LIDAR STRATOSPHERIC OZONE MEASUREMENTS AT THE OBSERVATOIRE DE HAUTE PROVENCE (FRANCE)
J. Godin, J. Pelon, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
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N87-10345*# Shinshu Univ., Nagano (Japan). Faculty of Engineering.
LIDAR OBSERVATION OF THE MESOSPHERIC SODIUM LAYER IN ANTARCTICA
T. Nomura, Y. Iwasaka (Nagoya Univ. (Japan).), H. Fukunishi (National Inst. of Polar Research, Tokyo (Japan).), T. Hirasawa, S. Kawaguchi (Nagoya Univ. (Japan).), and T. Kano (Shinshu Univ., Nagano (Japan).) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10346*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
LIDAR DETECTION OF METALLIC SPECIES AT THE MESOPAUSE LEVEL
C. Granier, J. P. Jegou, and G. Megie *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10347*# Illinois Univ., Urbana.
DAYTIME LIDAR MEASUREMENTS OF TIDAL WINDS IN THE MESOSPHERIC SODIUM LAYER AT URBANA, ILLINOIS
K. H. Kwon, D. C. Senft, C. S. Gardner, D. G. Voelz, C. F. Sechrist, Jr., and F. L. Roesler (Wisconsin Univ., Madison.) *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10356*# Centro Informazioni Studi Esperienze, Milan (Italy).
GAS CORRELATION LIDAR FOR METHANE DETECTION
E. Galletti, E. Zanzottera, S. Draghi, M. Garbi, and R. Petroni *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10357*# Academia Sinica, Beijing (China). Inst. of Atmospheric Physics.
DETECTION OF NO SUB X,C2H4 CONCENTRATIONS BY USING CO AND CO2 LASERS
Wang Gengchen and Kong Qinxin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10358*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MAPM: A COHERENT DUAL CO2 LASER DIAL SYSTEM
William B. Grant and James R. Bogan *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p Sponsored in part by AF (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10359*# National Physical Lab., New Delhi (India). Radio Science Div.
LASER HETERODYNE SYSTEM FOR OBTAINING HEIGHT PROFILES OF MINOR SPECIES IN THE ATMOSPHERE
S. L. Jain and A. K. Saha *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10363*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ATMOSPHERIC CORRELATION TIME MEASUREMENTS USING COHERENT CO2 LIDAR
G. M. Ancellet and R. T. Menzies *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10366*# European Nuclear Energy Agency, Frascati (Italy). Div. Fisica Applicata.
CO2 LIDAR SYSTEM FOR ATMOSPHERIC STUDIES
R. Barbini, A. Ghigo, M. Giorgi, K. N. Iyer, A. Palucci, and S. Ribezzo *In* NASA. Langley Research Center 13th International

Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10369*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
SPECTROSCOPIC ASPECTS OF DIFFERENTIAL METHOD FOR SOUNDING GAS COMPOSITION OF THE ATMOSPHERE
V. V. Zuev, I. I. Ippolitov, and Yu. N. Ponomarev *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10371*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GSFC GOUND-BASED LIDAR FOR THE MEASUREMENT OF STRATOSPHERIC OZONE
Thomas J. McGee *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04A

N87-10433*# Alaska Univ., Fairbanks. Geophysical Inst.
GRAVITY WAVES IN THE MIDDLE ATMOSPHERE: RECENT PROGRESS AND NEEDED STUDIES
David C. Fritts *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10434*# National Oceanic and Atmospheric Administration, Boulder, Colo.
A MODEL FOR GRAVITY-WAVE SPECTRA OBSERVED BY DOPPLER SOUNDING SYSTEMS
T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10435*# Arecibo Ionospheric Observatory, Puerto Rico.
HALF-DAY AND FOUR-DAY WAVES IN THE STATOSPHERE
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10436*# Kyoto Univ., Uji (Japan). Radio Atmospheric Science Center.
TROPOSPHERIC TURBULENCE PARAMETERS MEASURED BY USING THE MU RADAR
Toru Sato, Hiromasa Matsumoto (Kyoto Univ., Japan), Shoichiro Fukao, and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10437*# Case Western Reserve Univ., Cleveland, Ohio.
SIMULTANEOUS VHF AND UHF RADAR OBSERVATION OF THE MESOSPHERE AT ARECIBO DURING A SOLAR FLARE: A CHECK ON THE GRADIENT-MIXING HYPOTHESIS
P. K. Rastogi, J. D. Mathews, and J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10438*# Air Force Geophysics Lab., Hanscom AFB, Mass.
EVIDENCE OF ATMOSPHERIC GRAVITY WAVE PERTURBATIONS OF THE BRUNT-VAISALA FREQUENCY IN THE ATMOSPHERE
R. E. Good, R. W. Beland, J. H. Brown, and E. M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10439*# Air Force Geophysics Lab., Hanscom AFB, Mass.
ATMOSPHERIC WAVES AND THE NATURE OF BUOYANCY TURBULENCE IN THE CONTEXT OF THE WAVES VS 2D-TURBULENCE DEBATE
Edmond M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10440*# Air Force Geophysics Lab., Hanscom AFB, Mass.
A PROPOSED EXPERIMENTAL TEST TO DISTINGUISH WAVES FROM 2-D TURBULENCE
Edmond M. Dewan *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10441*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
PROPAGATING TIDES IN THE MESOSPHERE
S. A. Bowhill and K. O. Merewether *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10442*# Illinois Univ., Urbana. Aeronomy Lab.
GRAVITY WAVES IN SEVERE WEATHER
S. A. Bowhill and S. Gnanalingam *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10443*# Alaska Univ., Fairbanks. Dept. of Physics.
SIMULTANEOUS ROCKET AND MST RADAR OBSERVATION OF AN INTERNAL GRAVITY WAVE BREAKING IN THE MESOSPHERE
Steven A. Smith, David C. Fritts, Ben B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.), and C. Russell Philbrick (Air Force Geophysics Lab., Hanscom AFB, Mass.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 11 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10444*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
OBSERVATIONS OF THUNDER WITH THE ARECIBO VHF RADAR
D. N. Holden and M. F. Larsen *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20

Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10447*# Centre National de la Recherche Scientifique, Verrieres-Le Buisson (France).
COMPARISON BETWEEN S. T. RADAR AND IN SITU BALLOON MEASUREMENTS
F. Dalaudier, J. Barat, F. Bertin (Centre National d'Etudes des Telecommunications, Saint Maur des Fosses, France), E. Brun (Toulon Univ., France), M. Crochet, and F. Cuq *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10448*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A STATISTICAL MODEL TO ESTIMATE REFRACTIVITY TURBULENCE STRUCTURE CONSTANT C SUB n SUP 2 IN THE FREE ATMOSPHERE
J. M. Warnock and T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10449*# Arecibo Ionospheric Observatory, Puerto Rico. Arecibo Observatory.
DETERMINATION OF THE BRUNT-VAISALA FREQUENCY FROM VERTICAL VELOCITY SPECTRA
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10450*# Arecibo Ionospheric Observatory, Puerto Rico.
THE USE OF THE EXPERIMENTALLY DEDUCED BRUNT-VAISALA FREQUENCY AND TURBULENT VELOCITY FLUCTUATIONS TO ESTIMATE THE EDDY DIFFUSION COEFFICIENT
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10451*# Arecibo Ionospheric Observatory, Puerto Rico.
THE RELATION OF GRAVITY WAVES AND TURBULENCE IN THE MESOSPHERE
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10452*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CAN STOCHASTIC, DISSIPATIVE WAVE FIELDS BE TREATED AS RANDOM WALK GENERATORS
J. Weinstock *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10453*# Alaska Univ., Fairbanks. Geophysical Inst.
OBSERVATIONS AND A MODEL OF GRAVITY-WAVE VARIABILITY IN THE MIDDLE ATMOSPHERE
David C. Fritts and Robert A. Vincent (Adelaide Univ., Australia) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10456*# Adelaide Univ. (Australia). Dept. of Physics
MESOSPHERIC GRAVITY-WAVE CLIMATOLOGY AT ADELAIDE
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10457*# Cologne Univ. (West Germany). Inst. for Geophysik und Meteorologie.
HORIZONTAL WIND PERTURBATIONS AND THEIR RELATION TO TRANSIENT INTERNAL GRAVITY WAVES
A. Ebel, A. H. Manson (Saskatchewan Univ., Saskatoon), and C. E. Meek *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10458*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.
POSSIBILITY OF MEASURING GRAVITY-WAVE MOMENTUM FLUX BY SINGLE BEAM OBSERVATION OF MST RADAR
C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10459*# Control Data Corp., Minneapolis, Minn.
PRELIMINARY ESTIMATES OF VERTICAL MOMENTUM FLUX
G. D. Nastrom and J. L. Green (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10460*# Illinois Univ., Urbana-Champaign. Dept. of Electrical and Computer Engineering.
EFFECTS OF ANISOTROPY ON THE FREQUENCY SPECTRUM OF GRAVITY WAVES OBSERVED BY MST RADAR
C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10461*# Control Data Corp., Minneapolis, Minn.
THE FREQUENCY SPECTRUM OF C SUB n SUP 2 FROM MST RADAR DATA
G. D. Nastrom *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)

Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10462*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Elec. Engineering and Applied Physics.
A STUDY OF GRAVITY-WAVE SPECTRA IN THE TROPOSPHERE AND STRATOSPHERE AT 5-MIN TO 5-DAY PERIODS WITH THE POKER FLAT MST RADAR
R. S. Bemra, P. K. Rastogi, and B. B. Balsley (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10463*# Arecibo Ionospheric Observatory, Puerto Rico.
ON THE VARYING SLOPE OF VELOCITY SPECTRA
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10464*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
DOPPLER EFFECTS ON VELOCITY SPECTRA OBSERVED BY MST RADARS
A. O. Scheffler and C. H. Liu *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10465*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
OBSERVATIONS OF VERTICAL VELOCITY POWER SPECTRA WITH THE SOUSY VHF RADAR
M. F. Larsen, J. Rottger, and D. N. Holden *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10466*# Alaska Univ., Fairbanks. Geophysical Inst.
MESOSPHERIC WAVE NUMBER SPECTRA FROM POKER FLAT MST RADAR MEASUREMENTS COMPARED WITH GRAVITY-WAVE MODEL
Steven A. Smith, David C. Fritts, and Thomas E. VanZandt (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10467*# Alaska Univ., Fairbanks. Geophysical Inst.
EVIDENCE OF A SATURATED GRAVITY-WAVE SPECTRUM THROUGHOUT THE ATMOSPHERE
David C. Fritts and Steven A. Smith (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10470*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
A COMPARISON OF VERTICAL VELOCITIES MEASURED FROM SPECULAR AND NONSPECULAR ECHOES BY A VHF RADAR
J. L. Green, W. L. Clark, J. M. Warnock, and G. D. Nastrom (Control Data Corp., Minneapolis, Minn.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10476*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
MESOSPHERIC WIND MEASUREMENTS USING A MEDIUM-FREQUENCY IMAGING DOPPLER INTERFEROMETER
G. W. Adams and J. W. Brosnahan (Tycho Technology, Inc., Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10478*# Arecibo Ionospheric Observatory, Puerto Rico.
MST RADAR NETWORKS AND CAMPAIGNS SESSION SUMMARY AND RECOMMENDATIONS
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10480*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
SCIENTIFIC REASONS FOR A NETWORK OF ST RADARS AND COOPERATIVE CAMPAIGNS
M. Petitdidier and M. Crochet (Toulon Univ., France) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10481*# National Oceanic and Atmospheric Administration, Boulder, Colo.
PROGRESS IN EXISTING AND PLANNED MST RADARS
T. E. VanZandt *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10488*# Radio Research Labs., Tokyo (Japan).
REMOTE TEMPERATURE PROFILING IN THE TROPOSPHERE AND STRATOSPHERE BY THE RADIO-ACOUSTIC SOUNDING TECHNIQUE
Nobuo Matuura, Yoshihisa Masuda, and Hisao Inuki *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10494*# Arecibo Ionospheric Observatory, Puerto Rico.
INVESTIGATIONS OF THE LOWER AND MIDDLE ATMOSPHERE AT THE ARECIBO OBSERVATORY AND A DESCRIPTION OF THE NEW VHF RADAR PROJECT

J. Rottger, H. M. Ierkic, R. K. Zimmerman, and J. Hagen *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 10 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

N87-10522*# Arecibo Ionospheric Observatory, Puerto Rico.
ON THE USE OF COLOUR REFLECTIVITY PLOTS TO MONITOR THE STRUCTURE OF THE TROPOSPHERE AND STRATOSPHERE
J. Rottger, I. J. Fu (National Central Univ., Chung-Li Taiwan), F. S. Kuo, C. H. Liu (Illinois Univ., Urbana), and J. K. Chao (National Central Univ., Chung-Li Taiwan) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N87-10633 Michigan Univ., Ann Arbor.
VERTICAL MODES AND ENERGETICS OF GRAVITATIONAL AND ROTATIONAL MODES IN A MULTILEVEL GLOBAL SPECTRAL MODEL Ph.D. Thesis
Shun Der Ko 1985 245 p
Avail: Univ. Microfilms Order No. DA8600474

The energetics analysis is made based on the NCAR Community Climate Model. As usual, the normal modes of the model are computed through the method of separation of variables. One difficulty, which is studied here for the first time, is that the discrete vertical structure equation is not unique. For some typical vertical profiles of temperature and pressure, the solutions of the discrete differential and integral vertical equations are compared. The difference between these solutions is smaller for lower baroclinic modes but larger for higher modes. Moreover, the eigenfrequencies of the gravity waves, and thus their energy, will be effected by the choice of different vertical equation. Available potential energy and divergent and nondivergent kinetic energy are investigated both globally and in the tropics. Gravity waves play a more important role in the tropics than globally. To retain the strength of tropical circulations in the forecast, researchers recommend that the gravity waves corresponding to the internal modes 3-5 and zonal wave numbers 1 to 6 with frequency lower than 1.07 x 0.0001 sec-1 (or period longer than 16 hr.) not be adjusted by the initialization. New concepts of the balanced energy (BE), transient energy (TE), and balanced gravitational energy (BGE) are introduced. Author

N87-10634 Illinois Univ., Urbana-Champaign.
OBSERVATIONAL STUDIES OF WAVE DISTURBANCES IN THE TROPICAL PACIFIC AND THEIR RELATIONSHIP WITH DEEP CLOUD ACTIVITY Ph.D. Thesis
King-Sheng Tai 1985 240 p
Avail: Univ. Microfilms Order No. DA8600329

First Global Atmospheric Research Program (GARP) Global Experiment, Level III-b data and the outgoing longwave radiation data are used to investigate relationships between deep cloud activity and large-scale meteorological fields from May to September in 1979. Discussion is focused on the situations in the eastern Pacific for the following reasons: (1) this is the area where strong deep convection frequently develops in the northern summer, (2) it is also an area which has been least explored meteorologically. A power spectrum analysis using Maximum Entropy Method is made for the meridional wind component at 850 mb from May through August. The waves with a period of 4 to 6 days are stronger in July and August than in other months, also they are active in the regions of 100 to 130 E and 130 to 160 E within the zone of 5 to 15 N. A cross-spectrum analysis between the deep cloud activity and the meridional wind indicates that deep convection occurs at or slightly behind the wave trough axis. The structure of easterly waves, obtained by a composite technique is similar to those of African waves observed in GATE (GARP Atlantic Tropical Experiment) Phase III and easterly waves in the western Pacific determined by Reed and Recker (1971). Author

N87-10635 Colorado State Univ., Fort Collins.
ENVIRONMENTAL INFLUENCES ON HURRICANE INTENSIFICATION Ph.D. Thesis
Robert T. Merrill 1985 158 p
Avail: Univ. Microfilms Order No. DA8607660

Though qualitatively similar in structure, different hurricanes can attain different peak intensities during their lifetimes. Forecasters and empiricists relate the intensity to the sea surface temperature and the effectiveness of the upper tropospheric outflow, but offer no clear explanation of how the latter operates. The observed upper tropospheric environment flow differences between hurricanes which intensify and those which fail to do so are examined and then combined with previously published empirical and modeling results into a general conceptual mode of environmental influences on hurricane intensification. Several observational and numerical tests for this conceptual model are then proposed. Dissert. Abstr.

N87-10636# World Meteorological Organization, Geneva (Switzerland).
PROCEEDINGS OF THE TECHNICAL CONFERENCE ON URBAN CLIMATOLOGY AND ITS APPLICATIONS WITH SPECIAL REGARD TO TROPICAL AREAS
T. R. Oke, ed. Geneva, Switzerland 1986 559 p Conference held in Mexico, 26-30 Nov. 1984; sponsored by WMO and WHO (WMO-652; ETN-86-97658) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Climate of tropical cities; air quality in tropical cities; regional planning; urban architectural and environmental design; human comfort; urban hydrology; life expectancy; and risk analysis were discussed. For individual titles, see N87-10637 through N87-10656.

N87-10637# British Columbia Univ., Vancouver. Dept. of Geography.
URBAN CLIMATOLOGY AND THE TROPICAL CITY: AN INTRODUCTION
T. R. Oke *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 1-25 Sponsored by Canadian Natural Sciences and Engineering Research Council (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The role of urban climatology in tropical city planning is discussed and guidelines on practical procedures and applications are given. The sequence of decisions to be made by an urban planner when incorporating climatic information into a design are detailed. It is shown that urban population growth in 21st century tropical cities is going to be a major problem, and climatic studies are a valid contribution to anticipate aspects of the difficulties to be found. ESA

N87-10638# Universidad Nacional de Mexico, Mexico City. Inst. de Geografia.
TROPICAL URBAN CLIMATES: REVIEW AND ASSESSMENT
Ernesto Jauregui *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 26-45 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The main characteristics of the urban heat island effect are reviewed. The differences between midlatitude and tropical in regard to thermal inertia and the configuration of urban canyons

are discussed. The seasonal variations of the heat island intensity are illustrated by data from Mexico and South America cities. The climatic factors which are affected by urbanization are examined. It is shown that surveys leading to description of features are necessary in tropical areas until sufficient knowledge is available for generalization. ESA

N87-10639# Tsukuba Univ. (Japan). Inst. of Geoscience.
AIR QUALITY IN TROPICAL CITIES c45
T. Kawamura *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 46-62 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The causes of urban air pollution in tropical cities are examined. Climatic factors such as inversions and pollution sources are discussed. It is shown that high temperature exerts an active photochemical role when nitrogen oxides and hydrocarbons are mixed. Schematic representations of the diurnal changes of local wind and the temporal changes in the concentration of oxidants around Tokyo are given. ESA

N87-10640# Universidad Nacional de Mexico, Mexico City. Inst. de Geografia.
THE URBAN CLIMATE OF MEXICO CITY
Ernesto Jauregui *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 63-86 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Empirical evidence concerning urban effects of Mexico City on the local climate of the valley where the city lies is presented, and physical examinations to account for the city's climatic regime particularities in comparison with those of midlatitude cities are offered. Detailed monthly variation data are presented. Heat island intensity, surface temperature inversions, and urban/rural temperature differences are discussed. It is shown that the cool island seems to be a characteristic daytime phenomenon and that the urban area of Mexico City enhances the intensity of afternoon showers downwind from the center of the city during the wet season. ESA

N87-10641# Shanghai Normal Univ. (China). Dept. of Geography.
SOME ASPECTS OF THE URBAN CLIMATE OF SHANGHAI
Shu Djen Chow *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 87-109 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The urban climate of Shanghai is discussed using meteorological data covering a period of 100 yr. The evolution of the population density from 1865 to 1982 is detailed. The annual temperature averages, minimum and maximum of urban center, urban areas, and rural areas are compared. Urban wind and humidity fields are described. It is concluded that the urban influence of Shanghai on temperature, wind, humidity, and precipitation are very pronounced. The long term trend of temperature is towards greater warmth, weaker winds and humidity decreases. ESA

N87-10642# Ibadan Univ. (Nigeria). Dept. of Geography.
SOME ASPECTS OF THE URBAN CLIMATES OF TROPICAL AFRICA
J. S. Oguntoyinbo *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 110-135 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

African city case studies are presented in order to highlight urban climate characteristics, to outline the limitations of the studies already carried out, and to suggest areas of further research. The spatial and temporal variation of radiation, albedo, temperature, and pollutant concentration in the urban atmosphere are analyzed for Lagos, Ibadan, and Nairobi. The results show that the urban heat island phenomenon is well established but it is not as pronounced as in temperate latitude cities. There is no conclusive evidence to show the impact of the city on precipitation. ESA

N87-10643# Indian Meteorological Dept., New Delhi.
SOME ASPECTS OF THE URBAN CLIMATES OF INDIA
B. Padmanabhamurty *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 136-165 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The parameters which characterize the urban heat islands of several Indian cities are studied, including spatial and temporal distribution of temperature, dew point, relative humidity, wind speed and direction, cooling rates, and thermal radial emittance. The vertical structure of heat islands, air pollution, and water balance are also studied. It is concluded that urban complexes, even in the tropics, are likely to result in significant changes of meteorological parameters. ESA

N87-10644# Sao Paulo Univ. (Brazil). Dept. of Geography.
SOME ASPECTS OF THE URBAN CLIMATES OF TROPICAL SOUTH AMERICA: THE BRAZILIAN CONTRIBUTION
Carlos Augustos deFigueiredoMonteiro *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 166-198 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Information on the urban climates of Brazil is presented. The physical settings of the large metropolitan areas are described and heat island effects in large, medium, and small cities are examined. The application of urban climate knowledge in planning is discussed. It is shown that medium size cities, with a population between 150.000 and 200.000 inhabitants, present a clear heat island effect. The analysis indicates that the physical setting plays the leading role in determining the urban thermal structure. ESA

N87-10645# Swedish Meteorological and Hydrological Inst., Norkoeping.
URBAN CLIMATOLOGICAL METHODS AND DATA
Roger Taesler *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 199-236 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The methodology for quantitative assessments using input-output models incorporating the urban climate and the system affected by this climate is discussed. The analysis includes synoptic controls, scales associated with urban effects, conceptual models of the urban atmosphere, experimental methods, and model simulations and applications. It is shown that the basic challenge for urban climatology is to develop methods for accurate local predictions of climatic parameters, which are relevant to a particular planning aspect. ESA

N87-10646# San Jose State Univ., Calif. Dept. of Meteorology.
URBAN CLIMATE MODELS: NATURE, LIMITATIONS AND APPLICATIONS
R. D. Bornstein *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 237-267 (For primary document see N87-10636 01-47)
(Grant RP-1630-13)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Atmospheric models of the microscale climate within the urban canopy layer and the mesoscale variations within the urban boundary layer (above-roof level) are reviewed. The basic workings of each type of model are examined with respect to assumptions, equations, parameterizations, boundary conditions, mimerics, grids, and initial conditions. Outputs produced, evaluation techniques, and limitations associated with each type are also discussed. The role of such models in city planning is evaluated. Possible developments in urban climate modeling are explored. The most useful of the numerical urban models in increasing order of computer power requirements, are the advective integral power, one dimensional energy balance models, and the two and three dimensional dynamic differential models. ESA

N87-10647# Oxford Polytechnic (England). Dept. of Architecture.
THE PLANNING AND MAINTENANCE OF URBAN SETTLEMENTS TO RESIST EXTREME CLIMATIC FORCES **c85**
Ian R. Davis *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 277-312 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

City planning to reduce vulnerability to high winds, flooding, and drought is discussed. The arms and sectors of mitigation planning are examined. The study of risk includes hazard mapping, vulnerability analysis, and risk assessment. A balanced protective strategy involving the raising of public awareness, legislation, training and education, and physical measures is suggested. Warning systems are also discussed. The establishment of a panel on risk reduction in hazard prone areas is shown to be an encouraging step towards international cooperation in this field. ESA

N87-10648# Zurich Univ. (Switzerland). Central Biological Lab.
LIFE EXPECTANCY IN TROPICAL CLIMATES AND URBANIZATION **c54**
W. H. Weihe *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 313-353 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Demographic data, mortality levels, and trends are studied analyzing urban-rural and latitudinal gradient situations. The distribution of the causes of death and its correlation with climatic factors are examined. Heat tolerance levels suggest tropical cities as death islands when they are too large, dense, with short distances between buildings, and little green land. The build-up of heat islands becomes a threat in tropical climates. ESA

N87-10649# World Meteorological Organization, Geneva (Switzerland).
HUMAN COMFORT IN THE URBAN TROPICS **c54**
Luis SanchezdeCarmona *In its* Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 354-404 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Factors dictating thermal and climatic well being in tropical regions are analyzed. Measurements are mainly made in cities outside the tropics but the findings may be applied to cities in the tropics by careful transposition. Environmental pollution is studied as a factor which threatens the well being of urban populations. Specific possibilities and measures for improving thermal comfort in the urban humid tropics are suggested. It is shown that the climate may be controlled using the elements of nature (wind, radiation, vegetation), thus avoiding the use of costly technology-intensive devices. ESA

N87-10650# Washington Univ., Seattle. Dept. of Geological Sciences.
URBAN HYDROLOGY IN THE TROPICS: PROBLEMS, SOLUTIONS, DATA COLLECTION AND ANALYSIS **c85**
Thomas Dunne *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 405-434 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The impact of urbanization on the type and magnitude of the runoff processes is discussed. The changes in speed and volume of flood discharge, pollutant washoff, soil water content, and evaporation are examined. Flood control solutions in small urban catchments are described. The probability analysis of floods, hydrographic measurement methods, and the prediction of storm runoff volume and timing are also discussed. It is shown that the usefulness of strategies for reducing or delaying storm runoff varies with local conditions. The basis of any plan for controlling urban storm runoff must be the obtaining of data on rainfall, runoff and the hydrologically relevant aspects of urban land use. ESA

N87-10651# Sheffield Univ. (England).
ENERGY RELATED ISSUES **c85**
John K. Page *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 435-450 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The patterns of energy consumption in tropical cities are examined in order to assess the potential contributions of energy issues to city planning. Bioclimatic analysis in urban energy studies, energy analysis of urban climates, natural climatic resources available to reduce fossil fuel demand, climatic planning, seasonal storage of coolness, transportation and energy use, and techniques of urban climatic energy analysis are treated. It is shown that significant energy savings and increased comfort can be achieved by climatic planning. ESA

N87-10652# Office for Chemical Analyses, Stuttgart (West Germany). Dept. of Climatology.
THE INTRODUCTION OF CLIMATOLOGY INTO THE ADMINISTRATION AND DEVELOPMENT OF PLANNING IN THE CITY OF STUTTGART **c85**
J. Baumueller *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 451-460 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The activities of the Stuttgart department of climatology are described pointing out the interactions with city planning activities and the study of air pollution over the city. The spatial and temporal variations of pollutants such as SO2, NO and O3 are discussed, giving the approximate empirical expressions and the results of wind tunnel simulations. It is shown that the fact that the urban climate of Stuttgart is acceptable is thanks to an order issued in 1951, that climatologists must be consulted by all agencies whose actions can affect the city's climate. ESA

N87-10653# Maryland Univ., College Park. Inst. for Physical Science and Technology.
PROBLEMS OF DESIGN FOR CITIES IN THE TROPICS **c85**
H. E. Landsberg *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 461-472 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The design problems found in planning tropical cities are discussed. Tropical urban climates are surveyed, including typical problems such as heat islands, air pollution, ventilation, and floods

in the rainy zones. An ideal tropical city design is given. The energy aspects are highlighted, mainly the utilization of solar energy to cover electric or water supply needs and protection against excessive radiation absorption. It is shown that modern cities in many respects deviate from the ideal design. ESA

N87-10654# Murdoch Univ. (Australia). School of Environmental and Life Sciences.
CLIMATIC FACTORS IN THE SITING OF NEW TOWNS AND SPECIALIZED URBAN FACILITIES c85
T. J. Lyons *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 473-486 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

The meteorological input to the city planning process is highlighted in terms of initial location, overall structure, and location of additional facilities within an existing city that may impact on air quality. The importance of relevant variables according to scale of interest and elevation of emission source is estimated. The typical applications of direct sensors are detailed. The development of air quality models using meteorological and on-site tracer experiments data is discussed. It is concluded that urban planners must be aware of climatic constraints on the siting of new towns, including energy and water requirements, mitigation of environmental hazards, and maintenance of urban air quality. ESA

N87-10655# Ben Gurion Univ. of the Negev, Sede Boqer (Israel). Blaustein Inst. for Desert Research.
DESIGN FOR CLIMATE IN HOT, DRY CITIES c85
Baruch Givoni *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 487-513 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Human thermal comfort requirements are analyzed showing the relationship between heat sensation and sensible perspiration. Daytime and night-time requirements and ventilation requirements are considered. The theoretical possibilities to reverse the heat island phenomenon, the relationship of building height to ventilation, urban solar control, reducing dust by proper planning, the vegetation as microclimate control, and building design guidelines are considered. It is shown that many options which imply the use of natural resources only are available to designers. ESA

N87-10656# World Meteorological Organization, Geneva (Switzerland).
DESIGN FOR CLIMATE IN HOT, HUMID CITIES c85
S. Nieuwolt *In its* Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 514-534 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

Ways for urban planners and architects to reduce climatic discomfort in hot humid cities are indicated. Climatic information to be supplied, determination of the microclimate, prevention of floods, natural ventilation, protection from solar radiation, and architectural design factors are discussed. It is shown that high buildings, houses on stilts, continuous ventilation, better protection against solar radiation, and low heat storage capacity are design possibilities to increase human comfort. ESA

N87-10657# World Climate Programme, Geneva (Switzerland).
A PRELIMINARY CLOUDLESS STANDARD ATMOSPHERE FOR RADIATION COMPUTATION
Mar. 1986 65 p Presented at International Association for Meteorology and Atmospheric Physics Radiation Commission, Boulder, Colo., 1984
(WCP-112; WMO/TD-24; ETN-86-97807) Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

A cloudfree standard atmosphere to compute the radiation terms for sensitivity studies in climate research is presented. The models presented can be used in first approximation sensitivity studies. They cover atmospheric temperature and humidity, aerosols, and the vertical distribution of radiatively active trace gases. ESA

N87-10658*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
REVIEW OF MEASUREMENTS OF THE RF SPECTRUM OF RADIATION FROM LIGHTNING
David M. LeVine Mar. 1986 20 p
(NASA-TM-87788; NAS 1.15:87788) Avail: NTIS HC A02/MF A01 CSCL 04B

Measurements reported in the literature of the spectrum of electromagnetic radiation from lightning in the frequency range from 1 kHz to 1 GHz are reviewed. Measurements have been made either by monitoring the power received at individual frequencies using a narrow bandwidth recording device tuned to the frequencies under investigation or by recording the transient (time dependent) radiation with a wide bandwidth device and then Fourier transforming the waveform to obtain a spectrum. Measurements of the first type were made extensively in the 1950's and 1960's and several composite spectra have been deduced by normalizing the data of different investigators to common units of bandwidth and distance. The composite spectra tend to peak near 5 kHz and then decrease roughly as (frequency) to the -1, up to nearly 100 MHz where scatter in the data make the behavior uncertain. Measurements of the second type have been reported for return strokes, the stepped leader and for some intracloud processes. The spectrum of first return strokes obtained in this manner is very similar to the composite spectra obtained from the narrow-band measurements. M.G.

N87-10659*# National Aeronautics and Space Administration, Washington, D.C.
NASA AND FAA LAUNCH WIND SHEAR RESEARCH PROJECT
Debra J. Rahn 9 Oct. 1986 2 p
(NASA-News-Rel-86-143) Avail: NTIS HC A02 CSCL 04B

The National Aeronautics and Space Administration and the Federal Aviation Administration have signed a memorandum of agreement calling for a joint 5-year, $24 million research project to develop technology for airborne wind-shear detection and avoidance. The most dangerous type of wind shear, the microburst, is a small intense downdraft which, upon striking the ground, spreads out into a circular vortex radiating in all directions. When encountered at low levels on approach or takeoff, the pilot usually has little time to react correctly to maintain the desired flight path or even react enough to survive. Between 1964 and 1985, there were at least 26 accidents and 3 incidents involving 626 fatalities and 235 injuries where wind shear was the direct cause or a contributing factor. The NASA/FAA research project will cover five major areas: technology assessment, present position sensor integration, hazard characterization, pilot factors in wind shear and effects of heavy rain. This represents a consensus approach among the aviation community. Researchers will thoroughly assess the application of technologies such as Doppler and laser radar for airborne equipment to detect the wind-shear danger with the intent of avoiding it. They also will look at the current reactive systems that tell a pilot he is in wind shear and offer the crew guidance information to facilitate a safe exit from wind shear. Another goal is to develop a better understanding of the complex wind structure of a microburst. Author

N87-10660*# Oklahoma Univ., Norman. Cooperative Inst. for Mesoscale Meteorological Studies.
FURTHER STUDIES WITH DATA COLLECTED BY NASA'S AIRBORNE DOPPLER LIDAR IN OKLAHOMA IN 1981 Final Technical Report, Sep. 1985 - Aug. 1986
Howard B. Bluestein and Eugene W. McCaul, Jr. Oct. 1986 38 p
(NASA Order H-78746B)

(NASA-CR-179779; NAS 1.26:179779) Avail: NTIS HC A03/MF A01 CSCL 04B

Continued study of the lidar data collected in 1981 has resulted in significant new improvements in the analysis techniques reported by Bluestein et al. (1985) and McCaul (1985). Through comparison of fore- and aft-derived scalar fields of intensity and spectral width, the self-consistency of the lidar moment estimates was assessed. Reflectivity estimates were found to be quite stable and reliable, while spectral widths were prone to become noisy if signal to noise ratio (SNR) fell below 12 dB. In addition, spectral widths contained a significant component due to radial velocity gradients in areas along gust fronts, and these components were different along the fore and aft lines of sight. Significant improvement in agreement between the fore and aft fields of spectral width was obtained by estimating the radial velocity gradient component and then removing it from the raw measured widths to yield only the turbulent portion of the contribution to width. Additional analyses showed that lidar-derived vorticity estimates were consistent with several approximate models of vorticity growth along gust front zones, and with the hypothesis that Helmholtz instability could have been responsible for vortices seen along part of the gust front of 30 June 1981. Computations of divergence transverse to axes through an isolated cumulus congestus indicated that the strongest convergence tended to lie along an axis parallel to the congestus. This and the results of other additional analyses seem to suggest that the lidar winds do indeed accurately reflected the basic features of the real wind field. M.G.

N87-10661# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

AN OBSERVATIONAL STUDY OF TROPICAL CLOUD CLUSTER EVOLUTION AND CYCLOGENESIS IN THE WESTERN NORTH PACIFIC

Cheng Shang Lee and William M. Gray Sep. 1986 261 p

(Grant NSF ATM-84-19116)

(CSU-ASP-403) Avail: NTIS HC A12/MF A01

A combination of rawinsonde composite and individual case analyses using First GARP Global Experiment (FGGE) III-b data was used to study the evolution of precyclone tropical cloud clusters and those prominent cloud clusters which do not develop into tropical cyclones in the western North Pacific. These two types of cloud clusters are defined as genesis and nongenesis cases. The individual FGGE analyses indicate three possible large scale surges: the cross-equatorial surges, trade wind surges, or summer monsoon surges within the North Indian Ocean. A convection burst and a low-level vorticity buildup are generally found to be associated with these surges. Tropical cyclone formation generally occurs when these surges reach the inner region of the pre-cyclone cloud cluster. The results also indicate large variations between different individual formation cases.

Author

N87-10662*# Analytical Mechanics Associates, Inc., Hampton, Va.

SHUTTLE DERIVED ATMOSPHERIC DENSITY MODEL. PART 1: COMPARISONS OF THE VARIOUS AMBIENT ATMOSPHERIC SOURCE DATA WITH DERIVED PARAMETERS FROM THE FIRST TWELVE STS ENTRY FLIGHTS, A DATA PACKAGE FOR AOTV ATMOSPHERIC DEVELOPMENT Final Report

John T. Findlay, G. Mel Kelly, and Patrick A. Troutman Dec. 1984 51 p

(Contract NAS9-17158)

(NASA-CR-171824; NAS 1.26:171824; AMA-84-16) Avail: NTIS HC A04/MF A01 CSCL 04B

The ambient atmospheric parameter comparisons versus derived values from the first twelve Space Shuttle Orbiter entry flights are presented. Available flights, flight data products, and data sources utilized are reviewed. Comparisons are presented based on remote meteorological measurements as well as two comprehensive models which incorporate latitudinal and seasonal effects. These are the Air Force 1978 Reference Atmosphere and the Marshall Space Flight Center Global Reference Model (GRAM). Atmospheric structure sensible in the Shuttle flight data is shown and discussed. A model for consideration in Aero-assisted Orbital Transfer Vehicle (AOTV) trajectory analysis, proposed to modify the GRAM data to emulate Shuttle experiments. B.G.

N87-10663*# Analytical Mechanics Associates, Inc., Hampton, Va.

SHUTTLE DERIVED ATMOSPHERIC DENSITY MODEL. PART 2: STS ATMOSPHERIC IMPLICATIONS FOR AOTV TRAJECTORY ANALYSIS, A PROPOSED GRAM PERTURBATION DENSITY MODEL Final Report

John T. Findlay, G. Mel Kelly, and Patrick A. Troutman Dec. 1984 28 p

(Contract NAS9-17158)

(NASA-CR-171824; NAS 1.26:171824) Avail: NTIS HC A03/MF A01 CSCL 04B

A perturbation model to the Marshall Space Flight Center (MSFC) Global Reference Atmosphere Model (GRAM) was developed for use in the Aeroassist Orbital Transfer Vehicle (AOTV) trajectory and analysis. The model reflects NASA Space Shuttle experience over the first twelve entry flights. The GRAM was selected over the Air Force 1978 Reference Model because of its more general formulation and wider use throughout NASA. The add-on model, a simple scaling with altitude to reflect density structure encountered by the Shuttle Orbiter was selected principally to simplify implementation. Perturbations, by season, can be utilized to minimize the number of required simulations, however, exact Shuttle flight history can be exercised using the same model if desired. Such a perturbation model, though not meteorologically motivated, enables inclusion of High Resolution Accelerometer Package (HiRAP) results in the thermosphere. Provision is made to incorporate differing perturbations during the AOTV entry and exit phases of the aero-asist maneuver to account for trajectory displacement (geographic) along the ground track.

Author

N87-10664# National Weather Service, Washington, D.C. Climate Analysis Center.

MONTHLY AND SEASONAL WEATHER OUTLOOK FOR MID-MAY TO MID-JUNE 1986, VOLUME 40, NUMBER 10, MAY 14, 1986

May 1986 10 p

(PB86-199825) Avail: NTIS HC A02/MF A01 CSCL 04B

This long range weather report gives temperature and precipitation probabilities for the Northern Hemisphere on a periodic and seasonal basis. GRA

N87-10665# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

SURFACE MEASUREMENTS OF GUST FRONTS AND MICROBURSTS DURING THE JAWS (JOINT AIRPORT WEATHER STUDIES) PROJECT: STATISTICAL RESULTS AND IMPLICATIONS FOR WIND SHEAR DETECTION, PREDICTION AND MODELING

A. J. Bedard and J. LeFebvre Apr. 1986 123 p

(PB86-200847; NOAA-TM-ERL-WPL-135) Avail: NTIS HC A06/MF A01 CSCL 04B

During the 1982 Joint Airport Weather Studies Project (JAWS), the authors identified 168 microbursts, 20 macrobursts, and 99 gust fronts using surface sensors in the vicinity of Denver's Stapleton Airport. The report reviews aspects of these measurements important to the problem of understanding and detecting wind shear hazardous to aircraft. GRA

N87-10666 Oklahoma Univ., Norman.

THE ASSESSMENT OF CLIMATOLOGICAL IMPACTS ON AGRICULTURAL PRODUCTION AND RESIDENTIAL ENERGY DEMAND Ph.D. Thesis

Ellen Jean Cooter 1985 552 p

Avail: Univ. Microfilms Order No. DA8603508

The assessment of climatological impacts on selected economic activities is presented as a multi-step, inter-disciplinary problem. The assessment process focuses on: (1) user identification, (2) direct impact model selection, (3) methodological develop-

ment, (4) product development, and (5) product-communication. Two user groups of major economic importance were selected for study; agriculture and gas utilities. The broad agricultural sector is further defined as U.S.A. corn production. The general category of utilities is narrowed to Oklahoma residential gas heating demand. The CERES physiological growth model was selected as the process model for corn production. The statistical analysis for corn production suggests that: (1) although this is a statistically complex model, it can yield useful impact information, (2) as a result of output distributional biases, traditional statistical techniques are not adequate analytical tools, (3) the model yield distribution as a whole is probably non-Gaussian, and (4) there appears to be identifiable weekly patterns of forecasted yields throughout the growing season. The NBSLD energy load model was selected to represent residential gas heating consumption. A cursory statistical analysis suggests relationships among weather variables across the Oklahoma study sites. No linear trend in technology-free modeled energy demand or input weather variables which would correspond to that contained in observed state-level residential energy use was detected. Dissert. Abstr.

N87-10667 Washington Univ., Seattle.
TURBULENT MIXING, DROPLET SPECTRAL EVOLUTION AND DYNAMICS OF WARM CUMULUS CLOUDS Ph.D. Thesis
Jorgen Bjornevad Jensen 1985 212 p
Avail: Univ. Microfilms Order No. DA8603107

The microphysical and dynamical effects of turbulent mixing between a cumulus cloud and its environment are investigated experimentally and theoretically. Conservation principles are applied to determine the composition of the cloudy air, and to discuss microphysical properties in mixed parcels of cloud base air and entrained air using the properties of unmixed parcels as a reference. Comparison of theoretical predictions with observations are performed using 26 cumulus cloud (moderate congestus to supercell thunderstorms) observed during the 1981 Cooperative Convective Precipitation Experiment (CCOPE) in eastern Montana. The source of the entrained air is found by using Paluch's (1979) thermodynamical method on observations from three aircraft. The mixing between cloudy and clear air high above cloud base is investigated with a simple one-dimensional model of turbulent filiments near the interface separating the two air masses. The model incorporates: (1) turbulent deformation, (2) molecular diffusion across the interface, (3) sedimentation of droplets across the interface, and (4) droplet evaporation in the changing humidity field. The model is based on recent mechanical studies of turbulent mixing; it predicts droplet distributions after the homogenization of two air masses (cloudy and clear air). Dissert. Abstr.

N87-10668 Wisconsin Univ., Madison.
RELATIONSHIPS BETWEEN AVAILABLE POTENTIAL ENERGY, KINETIC ENERGY AND EXTRATROPICAL CYCLONES WITHIN LIMITED REGIONS OF THE NORTHERN HEMISPHERE DURING THE FGGE YEAR Ph.D. Thesis
John Victor Zapotocny 1985 176 p
Avail: Univ. Microfilms Order No. DA8524303

Interrelationships between available potential energy and kinetic energy associated with extratropical cyclones are examined for portions of the First GARP (Global Atmospheric Research Program) Global Experiment (FGGE) year. The study is confined to the cyclogenetically active regions encompassing the eastern coasts of Asia (ECA) and North America (NA). Calculations of twice daily regional total values of available potential energy and kinetic energy, and vertically integrated contributions to the totals by individual grid point subvolumes, are done using gridded isentropic data produced from the Level IIIa data set for an active late winter period and a relatively inactive summer period. Dissert. Abstr.

N87-10669 Georgia Inst. of Tech., Atlanta.
FLOW DYNAMICS AND STABILITY IN SEVERE RAINBANDS Ph.D. Thesis
George Basil Kallos 1985 136 p
Avail: Univ. Microfilms Order No. DA8605277

Cold frontal rainbands consist of a quasi-two-dimensional line of strong, but shallow, convection. A relatively cold air-mass at the ground moves through a region with a deep, almost saturated, boundary layer. The air at the inflow location above the saturated boundary layer is relatively dry. In this thesis, the flow dynamics and stability characteristics in a cold frontal rainband are presented. A two-dimensional steady-state model is developed to examine the mechanism by which the cold air-mass at the surface of a cold frontal rainband modifies local stability as it moves through the deep, almost saturated boundary layer. The potential instability evident in the moist stratification ahead of the system is activated by dynamic lifting of boundary-layer air. A dynamic or convective overturning is also observed in the mid-troposphere. This effect results from the intense lee-wave response of the flow in the mid-troposphere. The overturning appears to provide the forcing mechanism for severe convection, and defines the rainband's vertical extent. Cold frontal rainbands exhibit similar characteristics to some squall lines. Thus, the technique developed here would be appropriate to the flow in some squall-line cases. Dissert. Abstr.

N87-10670 Wisconsin Univ., Madison.
ADVECTIVE INFLUENCES ON STEADY AND TRANSIENT FORCED TROPICAL MOTIONS Ph.D. Thesis
Andrew Hugh VanTuyl 1986 184 p
Avail: Univ. Microfilms Order No. DA8605724

The nonlinear response to idealized low-latitude heating is examined and compared with the linear response using a spectral, equatorial Beta-plane shallow-water model for large scale motions. Here the linear solution contains no advections. The differential heating, which may be either steady state or periodic in time, is modeled by a mass source term. Three categories of forcing patterns are considered: wave-only forcing, wave plus latitudinally symmetric Hadley zonal forcing centered on the equator, and wave plus latitudinally antisymmetric monsoonal zonal forcing. The forced zonal wavenumber index may be M = 1, 2, 5, or 8; nonlinear effects scatter energy into harmonics 0 and 2M. Dissert. Abstr.

N87-10267*# Coherent Technologies, Inc., Boulder, Colo.
COHERENT LIDAR TECHNOLOGY FOR GLOBAL WIND PROFILING
R. Milton Huffaker *In* NASA. Langley Research center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10273*# York Univ., Downsview (Ontario). Dept. of Physics.
INVERSION OF 2 WAVELENGTH LIDAR DATA FOR CLOUD PROPERTIES
S. R. Pal and A. I. Carswell *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10286*# Electricite de France, Chatou.
A METEOROLOGICAL (HUMIDITY, TEMPERATURE, AEROSOLS)) MOBILE DIAL SYSTEM: CONCEPTS AND DESIGN
Cl. Cahen, J. L. Lesne, J. Benard, and P. Ponsardin *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10293*# York Univ., Downsview (Ontario). Dept. of Physics.
DETERMINATION OF CLOUD MICROPHYSICAL PROPERTIES BY LASER BACKSCATTERING AND EXTINCTION MEASUREMENTS
R. N. Dubinsky, A. I. Carswell, and S. R. Pal *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10304*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.
LASER SOUNDING OF INSTANTANEOUS AND MEAN SPEED OF WIND USING CORRELATION METHOD
V. E. Zuev, I. V. Samokhvalov, G. G. Matvienko, I. N. Kolev (Academy of Sciences, Sofia (Bulgaria).), and O. P. Prvanov *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10327*# National Oceanic and Atmospheric Administration, Boulder, Colo.
DOPPLER LIDAR STUDIES OF ATMOSPHERIC WIND FIELD DYNAMICS
R. M. Hardesty, M. J. Post, T. R. Lawrence, and F. F. Hall, Jr. *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10329*# Oregon Graduate Center for Study and Research, Beaverton. Dept. of Applied Physics and Electrical Engineering.
REMOTE SENSING OF ATMOSPHERIC WINDS USING A COHERENT, CW LIDAR AND SPECKLE-TURBULENCE INTERACTION
J. Fred Holmes, Farzin Amzajerdian, V. S. Rao Gudimetla, and John M. Hunt *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10331*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOWER ATMOSPHERIC TEMPERATURE PROFILE MEASUREMENTS USING A RAMAN LIDAR
S. H. Melfi and D. Whiteman *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 1 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10335*# Atmospheric Environment Service, Downsview (Ontario).
VERTICAL STRUCTURE OF ARCTIC HAZE OBSERVED BY LIDAR
R. M. Hoff *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10336*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LIDAR OBSERVATIONS AND MODELING OF COLD AIR OUTBREAKS DURING MASEX AND GALE
R. Boers and S. H. Melfi *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10342*# Kyushu Univ., Fukuoka (Japan). Dept. of Electronical Engineering.
XeF LIDAR MEASUREMENTS OF DENSITY AND TEMPERATURE IN THE MIDDLE ATMOSPHERE
T. Shibata and M. Maeda *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10348*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LIDAR STUDY OF STORM TOPS
J. D. Spinhirne and W. D. Hart *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10349*# Academy of Sciences, Sofia (Bulgaria). Inst. of Electronics.
INVESTIGATION OF CLOUDS SPATIAL DISTRIBUTION USING GROUND-BASED LIDAR
I. N. Kolev, O. P. Parvanov, B. K. Kaprielov, and I. K. Ilev *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10353*# Naval Postgraduate School, Monterey, Calif. Dept. of Physics.
CLOUD DETECTION BY LIDAR EXTINCTION CALCULATIONS
W. J. Lentz *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10361*# Coherent Technologies, Inc., Boulder, Colo.
WAVELENGTH DEPENDENCE OF COHERENT AND INCOHERENT SATELLITE-BASED LIDAR MEASUREMENTS OF WIND VELOCITY AND AEROSOL BACKSCATTER
Michael J. Kavaya and R. Milton Huffaker *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 4 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 04B

N87-10420*# National Meteorological Center, Washington, D.C.
ON THE POTENTIAL USE OF RADAR-DERIVED INFORMATION IN OPERATIONAL NUMERICAL WEATHER PREDICTION
Ronald D. McPherson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10421*# Oklahoma Univ., Norman. School of Meteorology.
A THEORY FOR THE RETRIEVAL OF VIRTUAL TEMPERATURE FROM WINDS, RADIANCES AND THE EQUATIONS OF FLUID DYNAMICS
Gal-Chen Tzvi *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 12 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10422*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
EXAMPLES OF MESOSCALE STRUCTURES AND SHORT-TERM WIND VARIATIONS DETECTED BY VHF DOPPLER RADAR
G. S. Forbes *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 13 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10423*# National Center for Atmospheric Research, Boulder, Colo.
WIND PROFILER DATA IN A MESOSCALE EXPERIMENT FROM A METEOROLOGICAL PERSPECTIVE
Edward J. Zipser, John Augustine (National Oceanic and Atmospheric Administration, Boulder, Colo.), and John Cunning *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p Sponsored in part by NSF (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP

Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10424*# Clemson Univ., S.C. Dept. of Physics.
OBSERVATIONS OF MESOSCALE VERTICAL VELOCITIES AROUND FRONTAL ZONES
T. S. Dennis, M. F. Larsen, and J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10425*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
COMPARISON OF VERTICAL VELOCITIES ANALYZED BY A NUMERICAL MODEL AND MEASURED BY A VHF WIND PROFILER
M. F. Larsen, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), and T. S. Dennis *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10426*# Kyoto Inst. of Tech. (Japan). Dept. of Electrical Engineering.
MEASUREMENTS OF PRECIPITATING ATMOSPHERE BY THE MU RADAR
Koichiro Wakasugi, Shoichiro Fukao (Kyoto Univ., Japan), and Susumu Kato *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10427*# National Oceanic and Atmospheric Administration, Boulder, Colo.
THE REAL-TIME USE OF WIND PROFILERS IN NOWCASTING
Tracy Lorraine Smith and Thomas W. Schlatter *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10428*# Arecibo Ionospheric Observatory, Puerto Rico.
THE INFLUENCE OF VELOCITY VARIABILITY ON THE DETERMINATION OF WIND PROFILES
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10429*# National Oceanic and Atmospheric Administration, Boulder, Colo.
PERFORMANCE CHARACTERISTICS OF WIND PROFILING RADARS
R. G. Strauch, A. S. Frisch, and B. L. Weber *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10430*# National Severe Storms Lab., Norman, Okla.
A LOOK AT PROFILER PERFORMANCE
Edwin Kessler, Michael Eilts, and Kevin Thomas (Oklahoma Univ., Norman) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 13 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10431*# Adelaide Univ. (Australia). Dept. of Physics.
HARDWARE REQUIREMENTS: A NEW GENERATION PARTIAL REFLECTION RADAR FOR STUDIES OF THE EQUATORIAL MESOSPHERE
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10432*# Arecibo Ionospheric Observatory, Puerto Rico.
NEED FOR A SUBTROPICAL WIND PROFILING SYSTEM
J. Rottger, M. F. Larsen (Clemson Univ., S.C.), H. M. Ierkic, and T. Hagfors *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10445*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
THE PROUST RADAR: FIRST RESULTS
F. Bertin, A. Cremieu, M. Glass, M. Massebeuf, and M. Petitdidier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 4 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10446*# Centre National d'Etudes des Telecommunications, Saint Maur des Fosses (France).
SIMULTANEOUS FINE STRUCTURE OBSERVATION OF WIND AND TEMPERATURE PROFILES BY THE ARECIBO 430-MHz RADAR AND IN SITU MEASUREMENTS
D. Thomas, F. Bertin, M. Petitdidier, H. Teitelbaum (Ecole Polytechnique, Palaiseau, France), and R. F. Woodman (Instituto Geofisico del Peru, Lima) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 3 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10454*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CLIMATOLOGY OF GRAVITY WAVES OVER POKER FLAT, ALASKA FOR 1983
Ben B. Balsley and Rene Garello (Ecole Nationale Superieure de Techniques Avancees, Paris, France) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10455*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CLIMATOLOGY OF TROPOSPHERIC VERTICAL VELOCITY SPECTRA
W. L. Ecklund, K. S. Gage, B. B. Balsley, and D. A. Carter *In*

International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10468*# Adelaide Univ. (Australia). Dept. of Physics.
INTERCOMPARISON AND CALIBRATION OF WIND AND WAVE MEASUREMENTS AT VARIOUS FREQUENCIES
R. A. Vincent *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10469*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
AN EVALUATION OF ERRORS OBSERVED IN THE MEASUREMENT OF LOW WIND VELOCITIES
S. R. Williams and D. W. Thomson *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10471*# National Oceanic and Atmospheric Administration, Boulder, Colo.
METHODS FOR VERIFYING THE ACCURACY OF WIND PROFILES
R. C. Strauch *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 6 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10472*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
A COMPARISON OF THUNDERSTORM REFLECTIVITIES MEASURED AT THE VHF AND UHF
M. F. Larsen and J. Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 9 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10473*# Clemson Univ., S.C. Dept. of Physics and Astronomy.
UHF AND VHF RADAR OBSERVATIONS OF THUNDERSTORMS
D. N. Holden, C. W. Ulbrich, M. F. Larsen, J. Rottger (Arecibo Ionospheric Observatory, Puerto Rico), H. M. Ierkic, and W. Swartz (Cornell Univ., Ithaca, N.Y.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 5 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10477*# Arecibo Ionospheric Observatory, Puerto Rico.
COMPARISON OF REFLECTIVITY AND WIND PROFILES MEASURED ON 46.8 MHz AND 430 MHz AT THE ARECIBO OBSERVATORY
Jurgen Rottger *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10484*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
CONTINUOUS WIND MEASUREMENT IN THE TROPICAL PACIFIC USING VHF RADARS
B. B. Balsley, W. L. Ecklund, and D. A. Carter *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 1 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10486*# National Oceanic and Atmospheric Administration, Boulder, Colo.
COLORADO WIND PROFILERS
R. G. Strauch *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10487*# National Oceanic and Atmospheric Administration, Boulder, Colo.
WIND PROFILER DEMONSTRATION SYSTEM
R. B. Chadwick *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10502*# National Oceanic and Atmospheric Administration, Boulder, Colo. Aeronomy Lab.
DETERMINATION OF U, V, AND W FROM SINGLE STATION DOPPLER RADAR RADIAL VELOCITIES
W. L. Clark, J. L. Green, and J. M. Warnock *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 8 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

N87-10506*# Toulon Univ. (France).
SIMULTANEOUS MULTIBEAM SOUNDING OF WIND AND TURBULENCE
E. Brun, M. Crochet, and W. L. Ecklund (National Oceanic and Atmospheric Administration, Boulder, Colo.) *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04B

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N87-10671*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SCIENCE OPPORTUNITIES FROM THE TOPEX/POSEIDON MISSION
R. Stewart, L.-L. Fu, and M. Lefebvre 15 Jul. 1986 68 p (Contract NAS7-918)
(NASA-CR-179752; JPL-Pub-86-18; NAS 1.26:179752) Avail: NTIS HC A04/MF A01 CSCL 08C

The U.S. National Aeronautics and Space Administration (NASA) and the French Centre National d'Etudes Spatiales (CNES) propose to conduct a Topex/Poseidon Mission for studying the global ocean circulation from space. The mission will use the techniques of satellite altimetry to make precise and accurate measurements of sea level for several years. The measurements will then be used by Principal Investigators (selected by NASA and CNES) and by the wider oceanographic community working closely with large international programs for observing the Earth, on studies leading to an improved understanding of global ocean dynamics and the interaction of the ocean with other processes influencing life on Earth. The major elements of the mission include a satellite carrying an altimetric system for measuring the height of the satellite above the sea surface; a precision orbit determination system for referring the altimetric measurements to geodetic coordinates; a data analysis and distribution system for processing the satellite data, verifying their accuracy, and making them available to the scientific community; and a principal investigator program for scientific studies based on the satellite observations. This document describes the satellite, its sensors, its orbit, the data analysis system, and plans for verifying and distributing the data. It then discusses the expected accuracy of the satellite's measurements and their usefulness to oceanographic, geophysical, and other scientific studies. Finally, it outlines the relationship of the Topex/Poseidon mission to other large programs, including the World Climate Research Program, the U.S. Navy's Remote Ocean Sensing System satellite program and the European Space Agency's ERS-1 satellite program. Author

N87-10672# Scripps Institution of Oceanography, La Jolla, Calif. Marine Physical Lab.
THE INTERNAL TIDE OFF SOUTHERN CALIFORNIA Summary Report
Robin G. Williams Jan. 1986 176 p
(Contract N00014-79-C-0472)
(AD-A167722; MPL-U-34/85; S10-REF-86-1) Avail: NTIS HC A09/MF A01 CSCL 08/10

The internal tide may well form an important link in the chain of events between the forcing of the surface tide and the eventual dissipation of internal waves by viscous forces. Two issues related to this chain of events are addressed. One is the directionality of the internal tide off the coast of California and the other is the widespread occurrence of semi-diurnal tidal harmonics in internal wave spectra. It is commonly accepted that the internal tide derives its energy from the forcing of isopycnal surfaces over topographic features by the surface tide. Accordingly, steep continental slopes like the Patton escarpment should be important generation regions. The directionality of the internal tide off California and hence the importance of the Patton escarpment as a source are assessed by analyzing data collected by the R/P FLIP. The results indicate that the direction of propagation of the internal tide is variable and that the majority of its energy does not appear to originate at the escarpment. GRA

N87-10673 North Carolina State Univ., Raleigh.
MODELING THE EFFECTS OF THE SPATIALLY VARYING SEA SURFACE TEMPERATURE ON THE MARINE ATMOSPHERIC BOUNDARY LAYER Ph.D. Thesis
Mickey Man-Kui Wai 1986 248 p
Avail: Univ. Microfilms Order No. DA8610713

A model for numerical simulation of the marine boundary layer was constructed. The model consists of three parts: a planetary boundary layer model using primitive equations with the Boussinesq approximation; a longwave thermal radiative transfer model using flux method and mixed emissivity; and a second-order turbulent closure model which allows water vapor condensation. In the one-dimensional case for the daytime convection boundary layer, the predicted mean fields agree well with the observations, and the turbulent fields are similar to those obtained by large-eddy simulation model and the third-order closure model. For the quasi-steady state of one-dimensional simulation for the marine stratocumulus-capped mixed layer, the turbulent warming effect approximately balances the radiative effects in the moist static energy equation. For the case with no background flow, the two-dimensional simulation of a cold anomaly reproduces symmetric direct circulation cells. For the case of a finite background flow, the cold anomaly sets up an asymmetric perturbation pressure which induces a system of horizontal divergence and convergence in the boundary layer which gives rise to vertical motion and the subsequent modification of thermal and moisture fields. Dissert. Abstr.

51 LIFE SCIENCES (GENERAL)

N87-10686# Institute of Biomedical Problems, Moscow (USSR).
FUNCTIONS OF SKELETAL MUSCLES OF RATS AND MONKEYS AFTER 5-DAY SPACE FLIGHT (ON COSMOS 1514)
V. S. Oganov, A. S. Rakhmanov, S. A. Skuratova, M. A. Shirvinskaya, and V. S. Magedov *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 89-93 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10687# Centre National de la Recherche Scientifique, Lyon (France). Lab. de Physiologie.
HINDLIMB SUSPENSION EFFECTS ON RAT SKELETAL MUSCLE RESPONSE
D. Desplanches, M. H. Mayet, B. Sempore, M. Grandmontagne, J. Frutoso, and R. Flandrois *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 95-98 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10704# National Aeronautics and Space Administration, Washington, D.C.
ANIMAL STUDIES ON SPACELAB-3
C. Schatte, R. Grindeland, P. Callahan, W. Berry, G. Funk (Management and Technical Services Co., Philadelphia, Pa.), and W. Lencki *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 233-244 Previously announced as N86-16889 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10705# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
ANIMAL MODELS IN SPACE PHYSIOLOGY [MODELES ANIMAUX EN PHYSIOLOGIE SPATIALE]
C. L. Milhaud *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 203-209 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10706# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
CONTRIBUTION OF ANIMAL MODELS TO THE INVESTIGATION OF BONE CHANGES IN WEIGHTLESSNESS
C. Nogues, C. Milhaud, P. Pesquies, and V. S. Oganov (Institute of Biomedical Problems, Moscow, USSR) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 211-215 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10707# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
COSMOS 1514 FLIGHT: STUDY OF RHESUS MONKEY ECG
R. Blostin, C. Milhaud, B. Cailler, P. Pesquies, V. Melnitchenko (Institute of Biomedical Problems, Moscow, USSR), B. Kulaev, V. Magedoc, and G. Tchamurliev *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 217-223 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

N87-10708# Institute of Biomedical Problems, Moscow (USSR).
THE STATE OF BONES OF PREGNANT RATS DURING AN ACUTE STAGE OF ADAPTATION TO WEIGHTLESSNESS
A. V. Bakulin, E. A. Ilyan, V. S. Oganov, and V. I. Lebedev *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 225-228 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N87-10674* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Oct. 1986 76 p
(NASA-SP-7011(289); NAS 1.21:7011(289)) Avail: Issuing Activity CSCL 06E

This bibliography lists 210 reports, articles and other documents introduced into the NASA scientific and information system in September 1986. Author

N87-10675# European Space Agency, Paris (France).
PROCEEDINGS OF 2ND INTERNATIONAL CONFERENCE ON SPACE PHYSIOLOGY
J. J. Hunt, ed. Feb. 1986 259 p Partly in ENGLISH and FRENCH Conference held in Toulouse, France, 20-22 Nov. 1985; sponsored by ESA and CNES
(ESA-SP-237; ISSN-0379-6566; ETN-86-97561) Avail: NTIS HC A12/MF A01

The effects of space flight on the cardiovascular system, fluid and electrolyte regulations, bones and muscles, neurovestibular system, and motion sickness were discussed. Ground based weightlessness simulation, animal models, and mathematical models were reviewed. For individual titles, see N87-10676 through N87-10709.

N87-10676# Copenhagen Univ. (Denmark). August Krogh Inst.
CARDIOVASCULAR MEASUREMENTS IN MICROGRAVITY
P. Norsk and F. Bonde-Petersen *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 9-12 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Skylab and Biosatellite 3 cardiovascular measurements are discussed. During microgravity the volume of the lower extremities decreases while the intrathoracic blood volume increases. This is indicated by the decrease in calf girth measured during the Skylab missions and the increase in central venous pressure measured in a monkey on Biosatellite 3 and in human subjects during short periods of microgravity in a parabolic flight. An increase in left ventricle diastolic volume, cardiac output, and stroke volume supports this. Probably due to this translocation of extracellular fluid, cardiovascular reflexes are elicited inducing increased peripheral blood flow and decreased venous compliance with a decrease in orthostatic tolerance. Changes in electrocardiographic measurements indicate a prolonged PR-interval and an increase in QRS maximum vector magnitude. ESA

N87-10677# Centre Hospitalier Univ. Rangueil, Toulouse (France). Service Neurologie.
CARDIOVASCULAR EXAMINATION DURING STS 51 G MISSION JUNE (1985)
L. Pourcelot (Hopital Bretonneau, Tours, France), Ph. Arbeille, J.-M. Pottier, L. Patat, M. Berson, A. Roncin, Ch. leToullec, A. Guell, and C. Gharib (Lyon-1 Univ., France) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 13-17 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Cardiovascular examination was performed on two astronauts during STS 51 G. The ultrasound based device used for the study was designed for multimode operation: real time imaging, time-motion, Doppler, and duplex B-Doppler. Cardiac function and volume changes, blood flow volume in carotid and femoral arteries, transit time of pressure waves, and venous circulation were studied preflight, inflight and postflight. The dynamic response of the cardiovascular system was measured inflight and during ground simulation. Results show a decrease of cardiac output stroke volume and left ventricular diastolic volume; a decrease in cerebral circulatory resistance, and variations in peripheral resistance and vascular stiffness of the lower limbs in accordance with orthostatic disturbances during the recovery period. ESA

N87-10678# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
THE INTEREST OF CENTRIFUGE TESTS FOR THE SELECTION OF FRENCH COSMONAUTS [INTERET DES EPREUVES EN CENTRIFUGEUSE POUR LA SELECTION DES COSMONAUTES FRANCAIS]
J. M. Clere, B. Agin, Y. Guezennec, J. L. Poirier, and H. Vieillefond *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 21-27 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Human centrifuge tests for space flight crew selection are reviewed. The tests examine cardiovascular response to gravitational stresses equivalent to those encountered during launch and reentry. They include electrocardiograms, heart rate, blood pressure, central and peripheral vision, and arterial oxygen saturation. Results led to the elimination of 2 payload specialists (from 13 candidates) even though they have no functions to execute under hypergravity. ESA

N87-10679# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE REGULATION OF FLUID AND ELECTROLYTE METABOLISM IN WEIGHTLESSNESS
C. S. Leach, P. C. Johnson, and N. M. Cintron *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 31-36 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Endocrine and biochemical changes in astronauts caused by weightlessness are discussed. Translocation of fluid from the extremities to the head and chest at the onset of weightlessness is thought to lead to the establishment of a lower blood volume as an adaptation to microgravity. Results of Skylab experiments indicate that several other regulatory systems have lower homeostatic set points during space flight. Inflight blood samples from three Spacelab flights show increased antidiuretic hormone throughout these short flights and decreased aldosterone and cortisol after 3 days. Results help to explain blood hypoosmolality and hyponatremia but do not explain what happens between the onset of weightlessness and hormone changes. Other factors such as natriuretic peptides and changes in renal function are being studied to elucidate the physiologic adaptation mechanisms. ESA

N87-10680# Hopital Lariboisiere, Paris (France).
ANTICORTISOL MONOCLONAL ANTIBODIES: CHARACTERIZATION OF THEIR SPECIFICITY [ANTICORPS MONOCLONAUX ANTI-CORTISOL: CARACTERISATION DE LEUR SPECIFICITE]
P. J. Birkui, Ph. Pouletty (CLONATEC, Paris, France), Ch. Rebollo, and M. Leroy (Hopital Saint Louis, Paris, France) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 37-39 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Four anticortisol monoclonal antibodies from a group of nine developed by cell fusion were studied. Their constant of affinity was investigated by radioimmunological dosing in competition. Cross reactivity was evaluated on a panel of 10 structural analogs of cortisol by the same technique. The molar concentrations used for each analog corresponded to 5000 times (or more) the concentration of plasma in human physiology. The antibodies can

be used to specify the structure/antigen relation of steroids and to fix a dose of cortisol by competition. ESA

N87-10681# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
BONES AND WEIGHTLESSNESS [OS ET APESANTEUR]
C. Alexandre *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 45-52 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The effects of weightlessness on the phosphorus and calcium metabolisms and on bone remodeling are reviewed. The difficulties of extrapolating data from ground based studies to space conditions are discussed, and contradictions in results from space flights are noted. Weightlessness appears to affect load bearing and non load bearing bones differently. During the first two weeks in space, bone demineralization occurs, but the process stabilizes afterwards. The old bone ages through reduced turnover, while the new bone is immature and is quickly eliminated. These phenomena are completely reversible after a few weeks, but only partially reversible after two or three months. ESA

N87-10682# European Space Agency, Paris (France).
THE MUSCULAR SYSTEM IN WEIGHTLESSNESS [LE SYSTEME MUSCULAIRE EN APESANTEUR]
Yvonne Mounier *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 53-59 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Muscular atrophy, especially in the legs, after a period of weightlessness is discussed. The drop in muscular strength may be due to a decrease in the calcium affinity of the contractile proteins. The muscles acquire kinetic functions opposite those characteristic of the functions normally found on the ground. The proportions of slow and fast fibers of each muscle are modified. These phenomena can be interpretated via a purely muscular theory of molecular rearrangement and/or by considering changes in nerve control of muscle commands after a stay in space. ESA

N87-10683# Universite des Sciences et Techniques de Lille (France).
MICROGRAVITY EFFECTS ON THE CONTRACTILE PROTEINS OF RAT MUSCLES
X. Holy, Y. Mounier, and C. Goblet *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 61-64 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Tensions activated by calcium concentrations on chemically skinned fibers of rat muscles were used to study the effect of microgravity on contractile protein activity. Three muscles (gastrocnemius, plantaris, and diaphragm) and three groups (vivarium, synchronous, and flight rats) were tested. The muscle function criteria studied were the maximum mechanical activity, the cross-bridge cycling speed, and calcium binding affinity. Microgravity induces a decrease of maximum mechanical activity on gastrocnemius and plantaris; no modification is observed on diaphragm. Cross-bridge cycling speed and calcium binding affinity are reduced on gastrocnemius; plantaris muscle only exhibits a reduction in cross-bridge activity. ESA

N87-10684# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
WEIGHTLESSNESS EFFECTS ON THE BONE TISSUE OF RATS AFTER A 5 DAY SPACE FLIGHT (COSMOS 1514) [EFFETS DE L'APESANTEUR SUR LE TISSU OSSEUX DE RAT APRES UN VOL SPATIAL DE CINQ JOURS (COSMOS 1514)]
L. Vico, D. Chappard, C. Alexandre, S. Palle, P. Minaire, G. Riffat, A. I. Grigoriev, and V. S. Oganov *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 67-78 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Five pregnant female rats (rapid growth phase) were exposed to weightlessness in a Cosmos satellite. Two other groups of five (vivarium, synchronous) were also studied. Histomorphometric analyses were performed to study: early effects on bone mass of load bearing (tibia-femur) and non load bearing bones (dorsal and lumbar vertebrae); and osteoblast and osteoclast activity. Short stays in weightlessness appear to have no effect on bone mass and bone structure. Vertebrate osteoblasts are also unaffected. Osteoclasts/cumm do not vary, but an increase per sqmm on the bone surface is noted. Bone formation of non bearers is unaffected after 5 days, but absorption increases. ESA

N87-10685# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
BONE TISSUE AND MUSCULAR PERFORMANCE IN A POPULATION OF ELDERLY MEN AS A FUNCTION OF PHYSICAL EXERCISE [TISSU OSSEUX ET PERFORMANCES MUSCULAIRES DANS UNE POPULATION D'HOMMES SAINS AGES, EN FONCTION DE LEUR NIVEAU D'EXERCICE PHYSIQUE]
L. Vico, D. Chappard, C. Alexandre, S. Palle, J. C. Chatard, J. R. Lacour, and G. Riffat *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 79-88 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Muscular performance of 20 male volunteers aged between 61 and 77 (3 sedentary; 6 doing less than 3 hr sport/week; 5 doing 3 to 6 hr; 6 doing less than 6 hr) was studied. Results show that less than 6 hr sport/week maintains bone mass and stimulates bone cell activity. Over 6 hr, stimulated bone remodeling leads to thinning of the corticals. ESA

N87-10686# Institute of Biomedical Problems, Moscow (USSR).
FUNCTIONS OF SKELETAL MUSCLES OF RATS AND MONKEYS AFTER 5-DAY SPACE FLIGHT (ON COSMOS 1514) c51
V. S. Oganov, A. S. Rakhmanov, S. A. Skuratova, M. A. Shirvinskaya, and V. S. Magedov *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 89-93 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Contractile properties of skeletal muscles were investigated using glycerinated myofibers of pregnant rats. The soleus muscle of a rhesus monkey was examined using electromyograms and mechanograms of leg movements recorded in vivo. It is found that the contraction strength of myofibers of predominantly postural muscles of rats decrease. The decline of the electromechanical efficiency of the monkey soleus muscle can also be associated with a decrease of strength properties of motor units. It is assumed that mechanisms of regulation of muscle contraction in rats and monkeys may change at early flight stages. It is also assumed that the response of the monkey soleus muscle at that stage may reflect changes in the central components of movement coordination. ESA

N87-10687# Centre National de la Recherche Scientifique, Lyon (France). Lab. de Physiologie.
HINDLIMB SUSPENSION EFFECTS ON RAT SKELETAL MUSCLE RESPONSE c51
D. Desplanches, M. H. Mayet, B. Sempore, M. Grandmontagne, J. Frutoso, and R. Flandrois *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 95-98 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The effects of hindlimb tail suspension on histochemical and biochemical properties of rat skeletal muscle were evaluated. Five weeks of suspension result in a significant atrophy (60% and 19%) in soleus (SOL) and extensor digitorum longus (EDL) respectively. The myosine ATPase method reveals a significant change in fiber repartition with an increase of intermediate fiber subgroups (IAB, IB in soleus, IIAB in EDL). Citrate synthase and 3 hydroxyacyl CoA dehydrogenase activities decrease significantly in SOL but are not affected in EDL. Lactate dehydrogenase activity is unchanged in SOL and EDL. It appears that muscle response to hindlimb suspension is greater in slow twitch muscle than in fast twitch ones. ESA

N87-10688# Institute of Biomedical Problems, Moscow (USSR).
BONE EXAMINATION BY NONINVASIVE TECHNIQUES IN A 120-DAY HEAD-DOWN TILT TEST
A. I. Grigoriev, V. S. Oganov, A. S. Rakhmanov, B. V. Morukov, H. A. Janson (Polytechnic Inst., Riga, USSR), V. V. Dzenis, and V. E. Zaichick (Institute of Medical Radiology, Moscow, USSR) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 99-103 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The effect of 120-day head-down tilt (-5 deg) on bones was investigated using gamma-photon absorptiometry, ultrasonic introscopy, and neutro-activation analyses. The study was carried out on 15 test subjects divided into a control group and 3 groups that used various countermeasures (drugs, exercises, or a combination of drugs and exercises). No strict correlation is established between the negative calcium balance and the variation of photon absorptiometry and neutron-activation data. The mineral content of leg bones is best in the drug groups. The noninvasive methods of mineral measurement and mechanical properties of bones are compared from the point of view of their diagnostic and prognostic significance. ESA

N87-10689# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
HISTOMORPHOMETRIC STUDY OF BONE CELL MASS AND ACTIVITY IN MAN CAUSED BY A 120 DAY DECUBITUS. TEST OF PREVENTIVE PROTOCOLS [ETUDE HISTOMORPHOMETRIQUE DES MODIFICATIONS DE LA MASSE ET DES ACTIVITES CELLULAIRES OSSEUSES INDUITE PAR UN DECUBITUS DE 120 JOURS CHEZ L'HOMME. ESSAI DE PROTOCOLES PREVENTIFS]
L. Vico, D. Chappard, C. Alexandre, S. Palle, P. Minaire, and G. Riffat *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 105-114 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The effects of 120 days immobilization on bones was studied using 20 healthy male volunteers divided into: (1) 5 ambulant subjects (control); (2) 3 strictly immobilized; (3) 4 hypokinetic receiving a diphosphonate; (4) 4 hypokinetic taking exercise; and (5) 4 hypokinetic taking exercise plus diphosphonate. Results show that for (3) bone formation and absorption diminish; for (4) they increase; for (5) they diminish, but less than for (3). No bone loss is noted for (2). Results show the difficulties of extrapolating findings of weightlessness simulation to space conditions, although exercise seems to have the greatest effect in both cases. ESA

N87-10690# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
AMPUTATION-INDUCED OSTEOPOROSIS: A NEW MODEL TO EXPLORE THE EFFECTS OF WEIGHTLESSNESS ON THE HUMAN SKELETON
D. Chappard, C. Alexandre, L. Vico, S. Palle, and G. Riffat *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 115-118 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Leg amputees were used to explore the absence of load bearing and muscle activity on the homolateral pelvis. Amputation induces a localized form of osteoporosis of the hemipelvis on the affected side. A histomorphometric analysis indicates that cortical and trabecular bones rarefy with a marked thinning of the trabeculae, while the trabecular number is less affected. Amputation realizes a unique form of microgravity with muscular ineffectiveness and provides a better human model than bed-rest immobilization of spinal injured patients since neurovascular changes are not present. ESA

N87-10691# Hopital Nord, Saint-Priest-en-Jarez (France). Lab. de Biologie du Tissu Osseux.
WEIGHTLESSNESS EFFECTS ON THE PHOSPHORUS-CALCIUM BALANCE AND ITS HORMONAL REGULATION IN MAN DURING STS FLIGHT 51-G [EFFETS DE L'APESANTEUR SUR LE BILAN PHOSPHO-CALCIQUE ET SA REGULATION HORMONALE CHEZ L'HOMME AU COURS DU VOL SPATIAL 51 G]
C. Alexandre, G. Pilonchery, C. Chapuy, and P. Delmas *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 119-124 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Blood and urine minerals were measured in STS 51-G astronauts (1 man, 1 woman) 30, 7, and 4 days preflight, on return, and 2 and 4 days postflight. Results confirm bone demineralization and bone matrix atrophy at the start of the flight. They are well correlated with osteoclast increases observed in rats during a 5 day flight. However, bone formation problems in rats after 20 days in space can be retarded in man. The variations do not depend on the hormone control system, and are an adaptation of the bone to weightlessness. ESA

N87-10692# Centre National de la Recherche Scientifique, Paris (France). Lab. de Physiologie Neurosensorielle.
PRELIMINARY RESULTS ON THE EQUILIBRIUM AND VERTIGO EXPERIMENT PERFORMED DURING STS 51-G SHUTTLE FLIGHT
G. Clement, T. Vieville, F. Lestienne, and A. Berthoz *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 129135 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The Equilibrium and Vertigo experiment on STS 51-G studied the motor strategies underlying the adaptation of sensorimotor systems to microgravity. Using data from Salyut-7 and Spacelab-1, interaction between posture and movement, role of vision in postural control, modifications of the optokinetic nystagmus, and the vestibulo-ocular reflex were investigated. Results suggest a general downward drive exerted by the otoliths on the first exposure to microgravity, and an upward drive on the first days of return. In microgravity the antigravity tonic influence exerted by the sacculus (which tends on Earth to lift upward the body, the limbs, and the eyeball) is suppressed in order to compensate for the downward pull of gravity. Downward eye movements and activity of flexor muscles are enhanced. On return, gravity is perceived as an upward linear acceleration, inducing an upward drive opposite to the downward inertial force vector. Consequently, upward eye movements and activity of extensor muscles are facilitated. ESA

N87-10693# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE MOTION SICKNESS
J. M. Vanderploeg, D. F. Stewart, and J. R. Davis *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 137-142 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Space motion sickness clinical characteristics, time course, prediction of susceptibility, and effectiveness of countermeasures were evaluated. Although there is wide individual variability, there appear to be typical patterns of symptom development. The duration of symptoms ranges from several hours to four days with the majority of individuals being symptom free by the end of third day. The etiology of this malady remains uncertain but evidence points to reinterpretation of otolith inputs as being a key factor in the response of the neurovestibular system. Prediction of susceptibility and severity remains unsatisfactory. Countermeasures tried include medications, preflight adaptation, and autogenic feedback training. No countermeasure is entirely successful in eliminating or alleviating symptoms. ESA

N87-10694# Centre d'Essais en Vol, Bretigny-sur-Orge (France). Lab. de Medecine Aerospatiale.
VESTIBULAR TESTS IN COSMONAUT SELECTION AND TRAINING [LES TESTS VESTIBULAIRES DANS LA SELECTION ET L'ENTRAINEMENT DES COSMONAUTES]
A. Leger, D. Lejeune, F. Midy, and M. Kerguelen *In* ESA Proceedings of 2nd International Conference on Space Physiology

Feb. 1986 p 143-148 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Experiment designs used in cosmonaut selection vestibular tests are described. The tests include a questionnaire used for preselection and Coriolis acceleration tests at 90 and 180 deg/sec for 4 min. Differences between American and Soviet training methods are discussed. ESA

N87-10695# Centre National d'Etudes Spatiales, Toulouse (France).
INFRARED MEASUREMENT OF EYE MOVEMENT. PRESENTATION OF THE EYE MOVEMENT IN INFRARED AND ANGULAR TORSION (EMIRAT) EXPERIMENT [MESURE DU MOUVEMENT DE L'OEIL EN INFRAROUGE. PRESENTATION DE L'EXPERIENCE EMIRAT ET DES TRAITEMENTS TEMPS DIFFERE]
A. L. Camus *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 149-152 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

A system to measure eye movements of subjects in weightlessness was flown on Spacelab D1 mission. A helmet mounted infrared camera films the eye at 60 frames/sec. The image signal is transmitted to the ground in digital form. Ground equipment calculates the horizontal and vertical position of the center of the pupil and torsion angle in real time. Complete data processing off-line reconstructs eye movement around the X, Y, and Z axes, and derives the stimulus-eye response correlation. ESA

N87-10696# Groupe d'Etude en Medecine et Physiologie Spatiales, Toulouse (France).
GROUND BASED SIMULATION TECHNIQUES FOR CARDIOVASCULAR AND HORMONAL CHANGES OBSERVED IN MAN IN WEIGHTLESSNESS [LES TECHNIQUES DE SIMULATION AU SOL DES MODIFICATIONS CARDIO-VASCULAIRES ET HORMONALES OBSERVEES CHEZ L'HOMME EN IMPESANTEUR]
A. Guell, Cl. Gharib, J. L. Mauroux, J. M. Pottier, Ph. Arbeille, L. Pourcelot, and A. Bes *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 157-162 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Immersion and bed rest techniques used to simulate weightlessness effects on body fluid flow, and thus cardiovascular and hormonal responses, are reviewed. Applications to spaceborne experiment design and to studies of microgravity adaptation are discussed. ESA

N87-10697# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE USE OF DECOMPRESSION TO SIMULATE THE EFFECT OF EXTRAVEHICULAR ACTIVITY ON HUMAN LYMPHOCYTE TRANSFORMATION
R. T. Meehan (Texas A&M Univ., Galveston), U. Duncan, L. Neale, J. Waligora, and G. R. Taylor *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 163-166 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Lymphocytes from 35 subjects participating in a chamber study simulating extravehicular activity (EVA) conditions were studied. No significant differences in H3 thymidine uptake between pre chamber and post chamber response to any mitogens autologous plasma, or among circulating mononuclear cells by flow cytometry are observed. The studies could not identify the subjects who developed venous bubbles. Data from eight subjects suggests that acute stress associated with participating in the study augments in vitro lymphocyte proliferation. Results indicate EVA exposure does not greatly influence space-flight induced alterations in immune effector cell function. ESA

N87-10698# Institute of Biomedical Problems, Moscow (USSR).
METABOLIC CHANGES DURING PROLONGED ANTIORTHOSTATIC HYPOKINESIA
I. A. Popova, B. V. Morukov, and A. S. Ushakov *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 167-172 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Variations of biochemical parameters of blood and urine of the normal man during a 120-day head-down tilt test were studied. A test of 9 healthy male volunteers, aged 25 to 44, led to a negative balance of water and electrolytes with calcium losses of 5 g per month. Changes in the ionic composition of blood include a decrease of potassium and an increase of total calcium and its ionized fraction. Weight losses average 1.8 kg, primarily due to muscle losses responsible for changes in protein homeostasis. The content of free amino acids increases, total protein decreases (mainly due to the decrease of albumins), the content of nitrogen products of protein metabolism increases although their renal excretion remains unchanged. The prolonged antiorthostatic exposure changes the level of tissue metabolism as indicated by a change in the activity of blood enzymes. The isoenzymic specificity suggests that metabolic changes occur primarily in bones and muscles. ESA

N87-10699# Lyon-1 Univ. (France). Faculte de Medecine Grange Blanche.
LEVELS OF PLASMA ATRIAL NATRIURETIC FACTOR (ALPHA h ANF) DURING ACUTE SIMULATED WEIGHTLESSNESS
C. Gharib, G. Gauquelin, G. Geelin, M. Vincent, F. Ghaemmaghami, Ch. Grange, M. Cantin (Institut Recherches Cliniques, Montreal, Quebec), J. Gutkovska, and A. Guell (Centre Hospitalier Univ. Rangueil, Toulouose, France) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 173-178 Sponsored by CNES (For primary document see N87-10675 01-52)
(Grant DRET-50-85-26)
Avail: NTIS HC A12/MF A01

Head-down tilt at -9 deg (n = 3) and head-out water immersion (n = 2) were used to study the variations of the atrial natriuretic factor (alphahANF). Data show a rapid elevation of alphahANF during the first 60 min of head-down tilt, accompanied by a decrease in plasma renin activity (PRA) plasma osmolality and protein concentration. The same results along with a decrease in PRA and vasopressin are obtained for immersion, but the curve of alphahANF is blunted and the level of alphahANF remains increased during the 2 hr of the experiment. The known actions of ANF on GFR, FF, renin and aldosterone could explain data obtained during simulated weightlessness. ESA

N87-10700# Lyon-1 Univ. (France). Faculte de Medecine Grande Blanche.
VOLUME REGULATING HORMONES DURING A 5 HOUR HEAD-DOWN TILT AT -10 DEG. PART 1: EPINEPHRINE, NOREPINEPHRINE AND DOPAMINE
A. Guell (Centre Hospitalier Univ. Rangueil, Toulouse, France), J. M. Pequignot, G. Gauquelin, J. L. Bascands, G. Geelen, A. M. Allevard, G. Annat, L. Pourcelot (Hopital Bretonneau, Tours, France), L. Peyrin, A. Bes (Centre Hospitalier Univ. Rangueil, Toulouse, France) et al *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 177-179 Sponsored by CNES and DIGITAL France (For primary document see N87-10675 01-52)
(Grant DRET-50-85-26)
Avail: NTIS HC A12/MF A01

In order to determine the short term effects of weightlessness simulation on plasma catecholamines (epinephrine) (E), norepinephrine (NE) and dopamine (DA) and to compare the results with the supine position taken as control for simulation studies, 10 young healthy volunteers were submitted to 3 postural tests. Tests were: day 1: 7 hr sitting; day 2: 1 hr sitting, then 5 hr horizontal supine and 1 hr sitting; day 3: 1 hr sitting, then 5 hr head-down tilt -10 deg, and 1 hr sitting. The results show that a 5 hr head-down tilt or bed rest induce an early decrease in NE compared to the seated position; E decreases in head-down tilt only. During such maneuvers there is decrease in the sympathoadrenal activity which could explain the decrease in plasma renin activity. ESA

N87-10701# Institute of Biomedical Problems, Moscow (USSR).
RELATIONSHIP BETWEEN CARDIOVASCULAR FUNCTIONS AND FLUID-ELECTROLYTE METABOLISM DURING ANTI-ORTHOSTATIC HYPOKINESIA
A. A. Savilov, V. M. Mikkailov, and A. I. Grigoriev *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 181-186 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The cardiovascular function and fluid-electrolyte metabolism in healthy men exposed to head-down tilt tests of 7 days to 6 months were investigated. During the first hours and days of exposure the cardiovascular changes are associated with hemodynamic shifts typical of this simulation procedure, while fluid-electrolyte changes are manifestations of the compensatory-adaptive reactions aimed at maintaining an adequate circulatory homoestasis. As the exposure continued for several months, the cardiovascular changes, particularly cardiovascular deconditioning, are produced by the effect of hypokinesia as such. In this situation changes in fluid-electrolyte balance are one of the major factors responsible for cardiovascular disorders. Water-salt supplements combined with other countermeasures may help to decrease significantly the adverse effects of antiorthostatic hypokinesia and weightlessness on the human body. ESA

N87-10702# Erlangen-Nuremberg Univ. (West Germany). Med. Poliklinik.
EXERCISE-INDUCED MYOCARDIAL ISCHEMIA AT HIGH ALTITUDE SIMULATED IN A NEGATIVE PRESSURE CHAMBER
H. J. Deuber, A. Wortman, and K. Bachmann *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 187-190 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The influence of high altitude hypoxia on myocardial ischemia in 15 patients aged 48 to 73 with coronary heart disease was studied during rest and during bicycle ergometry at simulated altitudes of 1000 and 9000ft above sea level. At high altitude the working capacity is significantly reduced due to an earlier onset of angina pectoris and ST-segment depressions. Without labor there is no angina pectoris or ST-segment depression. ESA

N87-10703# Lyon-1 Univ. (France). Faculte de Medecine Grande Blanche.
VOLUME REGULATING HORMONES DURING A 5-HOUR HEAD-DOWN TILT AT -10 DEG. PART 2: PLASMA RENIN ACTIVITY AND ALDOSTERONE
G. Gauquelin, A. Guell (Centre Hospitalier Univ. Rangueil, Toulouse, France), J. L. Mauroux, G. Geelen, G. Annat, M. Vincent, A. M. Allevard, A. Sassolas, C. A. Bizollon, and C. Gharib *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 191-193 Sponsored by CNES and DIGITAL France (For primary document see N87-10675 01-52)
(Grant DRET-50-85-26)
Avail: NTIS HC A12/MF A01

Head-down tilt experiments were conducted to simulate the cardiovascular and hormonal modifications occurring during space flight. The short term effects of weightlessness simulations on the hormones controlling volume homoestasis were observed. Ten young healthy volunteers were submitted to 3 postural tests: day 1: 7 hr sitting; day 2: 1 hr sitting, then 5 hr horizontal supine and 1 hr sitting; day 3: 1 hr sitting, then 5 hr head down tilt, and 1 hr sitting. The results show that a 5 hour horizontal bed rest or head-down tilt induce an early and progressive decline of PRA and aldosterone which is comparable to that observed during immersion. The study also shows that posture during the control period is critical. ESA

N87-10704# National Aeronautics and Space Administration, Washington, D.C.
ANIMAL STUDIES ON SPACELAB-3 c51
C. Schatte, R. Grindeland, P. Callahan, W. Berry, G. Funk (Management and Technical Services Co., Philadelphia, Pa.), and W. Lencki *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 233-244 Previously announced as N86-16889 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Two squirrel monkeys and 24 rats were flown on Spacelab-3 to provide hands-on maintenance of animals in a laboratory environment. With few exceptions, the animals grew and behaved normally, were free of chronic stress, and differed from ground controls only for gravity-dependent parameters. One of the monkeys exhibited symptoms of space sickness similar to those observed in humans, which suggests squirrel monkeys may be good models for studying the space-adaptation syndrome. Among parameters measured in the rats, most notable is the dramatic loss of muscle mass and increased fragility of long bones. Other rat findings include suppressed interferon production by spleen cells, defective release of growth hormone by somatrophs, possible dissociation of circadian pacemakers, changes in hepatic lipid and carbohydrate metabolism, and hypersensitivity of marrow cells to erythropoietin. ESA

N87-10705# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
ANIMAL MODELS IN SPACE PHYSIOLOGY [MODELES ANIMAUX EN PHYSIOLOGIE SPATIALE] c51
C. L. Milhaud *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 203-209 In FRENCH (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The moral, scientific, and operational reasons for animal experiments in space physiology are reviewed. Choice of animal is discussed. Bioinstrumentation and weightlessness simulation facilities are described. Space flight experiment design is considered. ESA

N87-10706# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
CONTRIBUTION OF ANIMAL MODELS TO THE INVESTIGATION OF BONE CHANGES IN WEIGHTLESSNESS c51
C. Nogues, C. Milhaud, P. Pesquies, and V. S. Oganov (Institute of Biomedical Problems, Moscow, USSR) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 211-215 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Bone change space flight results obtained on rats and on a rhesus monkey are compared with those obtained in bedresting primates or hypokinetic rats. A change in cell systems responsible for bone remodeling is revealed by the morphometric method. Bed rest produces stress in the monkey and is not recommended. Hypokinesis can be used with rats. ESA

N87-10707# Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris (France).
COSMOS 1514 FLIGHT: STUDY OF RHESUS MONKEY ECG c51
R. Blostin, C. Milhaud, B. Cailler, P. Pesquies, V. Melnitchenko (Institute of Biomedical Problems, Moscow, USSR), B. Kulaev, V. Magedoc, and G. Tchamurliev *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 217-223 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

The electrocardiogram of 2 rhesus monkeys flown aboard Cosmos 1514 satellite (9 day flight) was analyzed in order to monitor the animals' health, and evaluate the validity of the rhesus monkey in cardiovascular physiology in space. The analysis of morphology long and short term changes in heart rate suggests that no serious pathological phenomenon occurred during flight. The neurovegetative reactivity of the rhesus model in space seems close to man's. ESA

N87-10708# Institute of Biomedical Problems, Moscow (USSR).
THE STATE OF BONES OF PREGNANT RATS DURING AN ACUTE STAGE OF ADAPTATION TO WEIGHTLESSNESS c51
A. V. Bakulin, E. A. Ilyan, V. S. Oganov, and V. I. Lebedev *In* ESA Proceedings of 2nd International Conference on Space

Physiology Feb. 1986 p 225-228 (For primary document see N87-10675 01-52)
Avail: NTIS HC A12/MF A01

Integrated mineralization parameters, biomechanical characteristics and elemental composition of spongy bones of the proximal epiphysis of the humerus in pregnant rats flown on Cosmos-1514 for 5 days were investigated. Results suggest that bone resorption is activated but does not lead to noticeable osteoporosis, probably due to the short flight duration, but could produce bone destructuring accompanied by deterioration of bone mechanical properties. This is paralleled by physico-chemical changes in the mineral component, responsible for a decline of the strength parameters of bones with their density remaining unaltered. It is suggested that bone variations in the weightless state may develop in a phaselike manner. ESA

N87-10709# National Aeronautics and Space Administration, Washington, D.C.
MATH MODELLING AS A COMPLEMENT TO THE SCIENTIFIC INQUIRY OF PHYSIOLOGICAL ADAPTATION TO SPACE FLIGHT: FLUID, ENDOCRINE AND CIRCULATORY REGULATION
J. I. Leonard (General Electric Co., Washington, D. C.), R. J. White, and J. A. Rummel (MAP, Inc., Houston, Tex.) *In* ESA Proceedings of 2nd International Conference on Space Physiology Feb. 1986 p 233-244 (For primary document see N87-10675 01-52)
(Contracts NAS9-15487; NAS9-16328; NAS9-15850; NAS9-17151)
Avail: NTIS HC A12/MF A01 CSCL 06P

The contribution of mathematical modeling and computer simulation to the understanding of problems arising during weightless space flight is reviewed. Examples from fluid, endocrine, and circulatory regulation are provided to illustrate the utility of modeling as an adjunct to the process of scientific inquiry, especially in the development and theoretical testing of hypotheses. The models were used to examine the acute and chronic phases of space flight. Paradoxial results appear when data obtained during chronic adaptation is interpreted using theories which pertain to acute adjustments. The modeling process provides a means of developing a theoretical basis for interpreting the chronic adaptive phase of flight. ESA

N87-10710# Army Research Inst. of Environmental Medicine, Natick, Mass.
UPPER AND LOWER BODY ANAEROBIC POWER COMPARISON BETWEEN BIATHLETES AND CONTROL SUBJECTS
J. F. Patton and A. Duggan Apr. 1986 21 p
(AD-A167636; USARIEM-M25/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

This study compared power outputs (PO) from both the upper body (UB) and lower body (LB) Wingate tests of anaerobic power between biathletes and control subjects. Ten biathletes (B) selected by the British Ski Federation for potential assignment to the British team and 13 control (C) subjects cranked or pedalled the same Bodyguard ergometer at maximal RPM's for 30s against resistances of 2.94 and 4.41 joules/rev/kg body weight (BW), respectively. PO's were calculated in watts (W) and expressed as peak power (PP, highest 5s interval), mean power (MP, the mean for 30s), and power decrease (PD, difference between PP and lowest 5s PO divided by time). Absolute PP and MP for both UB and LB did not differ between groups. A comparison of PO's made relative to BW showed B to have higher values than C: 11.25 vs 10.25 W/kg for LB PP ($p<.01$) and 9.21 vs 7.96 W/kg for LB MP ($p<.001$). Similar PO relationships were found for the UB where PP and MP values were higher for B than C: 7.61 vs 6.76 W/kg ($p<.01$) and 6.07 vs 4.95 W/kg ($p<.001$), respectively. Concomitantly, PD was lower in B than C for both the UB ($p<.01$) and Lb ($p<.001$). These data show that significant differences exist in the anaerobic performance of aerobically trained athletes compared to subjects who are not highly trained and that these differences are reflected in the musculature of the Ub as well as the legs. GRA

N87-10711# School of Aerospace Medicine, Brooks AFB, Tex.
RADIATION DOSES FROM FLYING THROUGH NUCLEAR DEBRIS CLOUDS Final Report, 2-10 Jan. 1985
Peter M. VandenBosch and Arthur Woodrum Apr. 1986 20 p
(AD-A167959; USAFSAM-TR-85-86) Avail: NTIS HC A02/MF A01 CSCL 15/6

Taboada et al. have recently developed a computer model to predict gamma radiation doses to aircrews flying through nuclear debris clouds. Although the model has the advantages of taking a large number of parameters into account and using the benchmark DELFIC code to model cloud dynamics, it takes up to 20 min for a single run on a mainframe computer. Results from a number of runs have been generalized into empirical formulae. From these results it is possible to estimate worst case gamma radiation doses for complex scenarios using a hand calculator. GRA

N87-10712# Army Research Inst. of Environmental Medicine, Natick, Mass.
A SYSTEM FOR CONTROLLED PRESENTATION OF THE ARDEN CONTRAST SENSITIVITY TEST
John L. Kobrick, Harry I. Zeltzer, and Stephen Mullen Dec. 1985 14 p
(AD-A167969; USARIEM-T-3/86) Avail: NTIS HC A02/MF A01 CSCL 06/5

Contrast sensitivity has been identified as a significant index of visual function, and as an indicator of visual disorders. The Arden test of contrast sensitivity has been recognized as a simple and easily administered technique for measurement of this process. However, this test involves manual manipulation and considerable individual subjectivity. The instrument described in this report was designed and developed to eliminate variability in the testing procedure due to differences in individual testing techniques, and to standardize testing conditions, ambient illumination, viewing distance and presentation rates. GRA

N87-10713# Pacific Northwest Labs., Richland, Wash.
COMPARISON OF THE COUPLING OF GROUNDED AND UNGROUNDED HUMANS TO VERTICAL 60-Hz ELECTRIC FIELDS
W. T. Kaune, L. M. Kistler, and M. C. Miller Dec. 1985 26 p
Presented at the 24th Hanford Life Sciences Symposium on Health and Environmental Research on Complex Organic Mixtures, Richland, Wash., 21 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-011140; PNL-SA-13600; CONF-851027-11) Avail: NTIS HC A03/MF A01

Total induced currents and average induced axial current densities have been published in the literature for human models exposed to 60-Hz electric fields. The results of these studies have been quite useful, but they deal with a somewhat idealized exposure situation that ignores the insulating effects of most types of footwear. This paper describes a new laboratory technique for studying the relationship between grounded and ungrounded exposure of humans. A conducting model of the body 40-cm-tall man was electrically divided into seven segments. Wires connected to the conducting surfaces of these segments were routed horizontally through shielded cable to remote, battery-powered electronics. The common potential of the electronics was biased to the electric-field-induced potential of the model, allowing us to accurately measure the current induced in each body segment of the model. The method was tested by measuring the current induced in the upper hemisphere of a ungrounded sphere. Agreement between theory and measurement was excellent. Measurements were made with the human mod el located at 15 positions, ranging from touching ground to remote from ground (i.e., in free space). The ratios of free-space to grounded currents crossing horizontal sections through the body were: neck, 0.58; chest, 0.40; abdomen, 0.39; thigh, 0.36; ankle, 0.17. DOE

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

No abstracts in this category.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N87-10714# Anacapa Sciences, Inc., Fort Rucker, Ala.
HUMAN FACTORS RESEARCH IN AIRCREW PERFORMANCE AND TRAINING Annual Summary Report, 1 Sep. 1982 - 31 Aug. 1983
Kenneth D. Cross Dec. 1985 135 p
(Contracts MDA903-81-C-0504; DA Proj. 2Q2-63731-A-792; DA Proj. 2Q2-63731-A-793)
(AD-A167950; ASI-479-19-1; ARI-RN-85-104) Avail: NTIS HC A07/MF A01 CSCL 05/5

This report presents Human Factors Research in Aircrew Performance and Training for the Army Research Institute Field Unit at Fort Rucker, Ala. The report contains summary descriptions for each of the 19 projects on which the ASI personnel worked during the second contract year. Each summary description contains: (1) a background section that describes the rationale for the research need and the project objectives, (2) a research approach section that describes the tasks and activities required to fulfill the project objectives, and (3) a project status section that describes the work completed, preliminary findings (if available), and the anticipated project completion date. GRA

N87-10648# Zurich Univ. (Switzerland). Central Biological Lab.
LIFE EXPECTANCY IN TROPICAL CLIMATES AND URBANIZATION
W. H. Weihe *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 313-353 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10649# World Meteorological Organization, Geneva (Switzerland).
HUMAN COMFORT IN THE URBAN TROPICS
Luis SanchezdeCarmona *In its* Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 354-404 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N87-10715# Sandia National Labs., Albuquerque, N. Mex.
FACTORS CONTRIBUTING TO STATIC RAM CELL TRANSIENT UPSET
M. R. Ackermann and R. E. Mikawa 1986 5 p Presented at the 23rd Annual Conference on Nuclear and Space Radiation Effects, Providence, R.I., 20 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007710; SAND-86-0341C; CONF-860706-9) Avail: NTIS HC A02/MF A01

Rail Span Collapse is proposed to be the dominant transient upset mechanism in CMOS static random access memories. This paper examines the many factors contributing to RAM cell upset and comments on the strengths and weaknesses of the rail span model. DOE

N87-10716*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTELLIGENT COMPUTER ASSISTED INSTRUCTION (ICAI): FORMATIVE EVALUATION OF TWO SYSTEMS Final Report, Apr. 1984 - Aug. 1985
Mar. 1986 356 p
(Contract NAS7-918; DA Proj. 2Q2-63743-A-794)
(NASA-CR-176873; NAS 1.26:176873; AD-A167910; ARI-RN-86-29) Avail: NTIS HC A16/MF A01 CSCL 09/2

This report reviews major components of an 18 month evaluation of Intelligent Computer Assisted Instruction (ICAI), and emerging field of Artificial Intelligence that draws on computer technologies and cognitive science in an attempt to build more powerful instructional programs. The primary goals of this effort were to develop an increased understanding of the state of the art of ICAI for the purposes of: (1) identifying strategies to enhance the general usefulness of ICAI technology for Army training problems, and (2) developing concepts for efficiently and effectively managing military ICAI projects. The approach taken to accomplish these goals was to intensively examine two selected ICAI systems using a formative evaluation methodology. The two systems selected were: (1) PROUST, a system designed by Soloway and Johnson for analyzing bugs in novice programmers' PASCAL programs, using a top-down approach which attempts to infer the intentions and plans of the programmer, and (2) WEST, a system designed by Burton and Brown to teach basic mathematics and strategic thinking skills, based on the premise that students can learn from their mistakes or bugs. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

N87-10717*# Harvey Mudd Coll., Claremont, Calif.
FREE VIBRATION AND DYNAMIC RESPONSE ANALYSIS OF

SPINNING STRUCTURES Final Report
1986 11 p
(NASA-CR-179672; NAS 1.26:179672) Avail: NTIS HC A02/MF A01 CSCL 09B

The proposed effort involved development of numerical procedures for efficient solution of free vibration problems of spinning structures. An eigenproblem solution procedure, based on a Lanczos method employing complex arithmetic, was successfully developed. This task involved formulation of the numerical procedure, FORTRAN coding of the algorithm, checking and debugging of software, and implementation of the routine in the STARS program. A graphics package for the E/S PS 300 as well as for the Tektronix terminals was successfully generated and consists of the following special capabilities: (1) a dynamic response plot for the stresses and displacements as functions of time; and (2) a menu driven command module enabling input of data on an interactive basis. Finally, the STARS analysis capability was further improved by implementing the dynamic response analysis package that provides information on nodal deformations and element stresses as a function of time. A number of test cases were run utilizing the currently developed algorithm implemented in the STARS program and such results indicate that the newly generated solution technique is significantly more efficient than other existing similar procedures. M.G.

N87-10718# National Aeronautical Lab., Bangalore (India). Aerodynamics Div.
ADAPTATION OF TSFOIL FOR UNIVAC 1100/60H COMPUTER AT NAL, BANGALORE
R. Gopinath and V. Kanagarajan Sep. 1983 56 p
(AE-TB-9-83) Avail: NTIS HC A04/MF A01

The TSFOIL code has been adapted for operation on the Univac 1100/60-H computer at NAL, Bangalore. The code has been validated for the Free-Air case, for the Korn airfoil, for which results are available. Also three additional cases for which data is available have been analyzed using this code. Author

N87-10719*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DYNAMIC REMAPPING DECISIONS IN MULTI-PHASE PARALLEL COMPUTATIONS Final Report
David M. Nicol and Paul F. Reynolds, Jr. Sep. 1986 48 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178174; NAS 1.26:178174; ICASE-86-58) Avail: NTIS HC A03/MF A01 CSCL 09B

The effectiveness of any given mapping of workload to processors in a parallel system is dependent on the stochastic behavior of the workload. Program behavior is often characterized by a sequence of phases, with phase changes occurring unpredictably. During a phase, the behavior is fairly stable, but may become quite different during the next phase. Thus a workload assignment generated for one phase may hinder performance during the next phase. We consider the problem of deciding whether to remap a parallel computation in the face of uncertainty in remapping's utility. Fundamentally, it is necessary to balance the expected remapping performance gain against the delay cost of remapping. This paper treats this problem formally by constructing a probabilistic model of a computation with at most two phases. We use stochastic dynamic programming to show that the remapping decision policy which minimizes the expected running time of the computation has an extremely simple structure: the optimal decision at any step is followed by comparing the probability of remapping gain against a threshold. This theoretical result stresses the importance of detecting a phase change, and assessing the possibility of gain from remapping. We also empirically study the sensitivity of optimal performance to imprecise decision threshold. Under a wide range of model parameter values, we find nearly optimal performance if remapping is chosen simply when the gain probability is high. These results strongly suggest that except in extreme cases, the remapping decision problem is essentially that of dynamically determining whether gain can be achieved by remapping after a phase change; precise quantification of the decision model parameters is not necessary. Author

N87-10720*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PROCEEDINGS OF THE 5TH ANNUAL USERS' CONFERENCE
Martha Szczur, ed. and Elfrieda Harris, ed. 1985 400 p Conference held at Greenbelt, Md., 4-6 Jun. 1985
(NASA-CP-2399; NAS 1.55:2399) Avail: NTIS HC A17/MF A01 CSCL 09B

The Transportable Applications Executive (TAE) was conceived in 1979. It was proposed to be a general purpose software executive that could be applied in various systems. The success of this concept and of TAE was demonstrated. Topics included: TAE current status; TAE development; TAE applications; and UNIX emphasis. B.G.

N87-10721*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A RULE BASED COMPUTER AIDED DESIGN SYSTEM
Timothy Premack Oct. 1986 59 p
(NASA-TM-86241; Rept-86B0078; NAS 1.15:86241) Avail: NTIS HC A04/MF A01 CSCL 09B

A Computer Aided Design (CAD) system is presented which supports the iterative process of design, the dimensional continuity between mating parts, and the hierarchical structure of the parts in their assembled configuration. Prolog, an interactive logic programming language, is used to represent and interpret the data base. The solid geometry representing the parts is defined in parameterized form using the swept volume method. The system is demonstrated with a design of a spring piston. Author

N87-10722# Sandia National Labs., Albuquerque, N. Mex.
GRAPH 3: A DIGITIZING AND GRAPH PLOTTING PROGRAM
C. B. Selleck Mar. 1986 59 p
(Contract DE-AC04-76DP-00789)
(DE86-010628; SAND-86-0525) Avail: NTIS HC A04/MF A01

GRAPH is an interactive program that allows the user to perform two functions. The first is to plot two dimensional graphs and the second is to digitize graphs or plots to create data files of points. The program is designed to allow the user to get results quickly and easily. It is written in RATIV (a FORTRAN preprocessor) and is currently in use at Sandia under VMS on a VAX computer and CTSS on a Cray supercomputer. The program provides graphical output through all of the Sandia Virtual Device Interface (VDI) graphics devices. DOE

N87-10723# Colorado Univ., Boulder.
INTEGRATED TESTING AND ANALYSIS OF MATHEMATICAL SOFTWARE TOOLS. SUMMARY OF RESEARCH ACTIVITIES, 1 AUGUST 1985-1 MAY 1986
L. Osterweil 1986 10 p
(Contract DE-FG02-84ER-13283)
(DE86-010882; DOE/ER-13283/4) Avail: NTIS HC A02/MF A01

Work in each of the three main thrusts which have been pursued during the past year is addressed: (1) the large scale integration of software tools into effective software environments, (2) the effective integration of debugging, testing and analysis tools and aids, and (3) the creation of effective user interfaces to testing, debugging and analysis tools exploiting high resolution interactive graphics workstations. DOE

N87-10724# Los Alamos National Lab., N. Mex.
DATABASE ALGORITHMS FOR MULTIPROCESSOR AND VERY LARGE MEMORY SYSTEMS
W. C. Thompson, III 18 Mar. 1986 26 p Presented at the Syracuse University Minnowbrook Workshop on Data Base Machines, Blue Mountain Lake, N.Y., 22 Jul. 1986
(Contract W-7405-eng-48)
(DE86-009406; UCRL-94333; CONF-860740-1) Avail: NTIS HC A03/MF A01

Many recent computer designs exhibit two features which have been too expensive to exploit previously. The first, very large main memories, may allow significant portions of databases to be kept in main memory. The second, parallel processing, provides multiple processors to speed the operations on databases in memory. A recent paper by DeWitt, et al discusses the effect of providing a very large main memory in a computer for database operations. This paper explores the algorithms appropriate for relational operations when large main memories and parallel processors are provided. DOE

N87-10725# Colorado Univ., Boulder. Dept. of Computer Science.
SOFTWARE PROCESS INTERPRETATION AND SOFTWARE ENVIRONMENTS
L. Osterweil Apr. 1986 58 p
(Contract DE-FG02-84ER-13283)
(DE86-010881; DOE/ER-13283/5; CU-CS-324-86) Avail: NTIS HC A04/MF A01

This paper suggests that software engineering must become the study of how to formalize, specify, and automate the complex processes by which software products are synthesized. The author believes that software systems are most profitably thought of as products of large and complex manufacturing and fabrication processes which can be described, automated, and controlled by familiar algorithmic programming techniques. Included in this paper are discussions of programming software engineering processes, the relations of the author's research to other computer science research areas, and the design of a software engineering language. DOE

N87-10726# Argonne National Lab., Ill.
PARALLEL LOGIC PROGRAMMING FOR NUMERIC APPLICATIONS
R. Butler, E. Lusk, W. McCune, and R. Overbeek Apr. 1986 18 p
(Contract W-31-109-eng-38)
(DE86-011004; ANL/MCS-TM-72) Avail: NTIS HC A02/MF A01

This paper reports on a series of experiments involving the use of various dialects of parallel logic programming to express and control parallelism. The central goal of these experiments was to explore the possibility of writing numeric code for multiprocessors while expressing the synchronization requirements using logic programming. Three dialects of parallel logic programming are considered: Parlog, Delta-Prolog, and Flat Concurrent Prolog. The experiments involved the formulation of a well-known, highly-parallel algorithm in each of the three languages. In one case (Parlog, semi-manually compiled code for an implementation of an extended Warren Abstract Machine), a comparison is made of the performance of the resulting program with that of the same problem expressed in C, with monitors as the added parallelism construct. Speedups obtained for the C and Parlog versions are presented. The experiments illustrate the effect of granularity size on attainable degrees of parallelism. Based on the limited evidence from these experiments, conclusions are offered on the suitability of logic programming languages for programming multiprocessors. DOE

N87-10727# Los Alamos National Lab., N. Mex.
PULSE FORMING NETWORK DESIGN PROGRAM FOR LINEAR AND TIME-VARYING LOADS FOR THE IBM PERSONAL COMPUTER
G. G. McDuff and B. D. Nelson 1986 4 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011209; LA-UR-86-1703; CONF-860674-2) Avail: NTIS HC A02/MF A01

A design aid program written to perform pulse forming network calculations is described. The program will perform calculations for either linear, time-varying, or near linear loads. The program is described as user-friendly and is written in BASIC language for the IBM PC. DOE

N87-10728# Sandia National Labs., Albuquerque, N. Mex.
DESIGN GUIDELINES FOR HUMAN-COMPUTER DIALOGUES
B. P. Chao May 1986 40 p
(Contract DE-AC04-76DP-00789)
(DE86-011543; SAND-86-0259) Avail: NTIS HC A03/MF A01

This report presents a set of guidelines for designing human-computer dialogues. User requirements, dialogue modes, entry devices, error management and recovery, and data loss protection and disaster prevention are discussed, and a checklist for dialogue design is provided. DOE

N87-10729# Los Alamos National Lab., N. Mex.
IMPLEMENTATION AND OPTIMIZATION OF PORTABLE STANDARD LISP FOR THE CRAY
J. W. Anderson, R. R. Kessler (Utah Univ., Salt Lake City), and W. F. Galway 1986 10 p Presented at the European Conference on Artificial Intelligence, Brighton, England, 21 Jul. 1986 Prepared in cooperation with Utah Univ., Salt Lake City
(Contract W-7405-eng-36)
(DE86-008717; LA-UR-86-831; CONF-860733-1) Avail: NTIS HC A02/MF A01

Portable Standard LISP (PSL), a dialect of LISP developed at the University of Utah, has been implemented on the CRAY-1s and CRAY X-MPs at the Los Alamos National Laboratory and at the National Magnetic Fusion Energy Computer Center at Lawrence Livermore National Laboratory. This implementation was developed using a highly portable model and then tuned for the Cray architecture. The speed of the resulting system is quite impressive, and the environment is very good for symbolic processing. DOE

N87-10730# Bhabha Atomic Research Centre, Bombay (India).
PLOT 3D: A MULTIPURPOSE, INTERACTIVE PROGRAM FOR PLOTTING THREE DIMENSIONAL GRAPHS
B. Jayaswal 1985 56 p
(DE86-702101; BARC-1274) Avail: NTIS (US Sales Only) HC A04/MF A01

PLOT3D is a general purpose, interactive, three dimensional display and plotter program. Written in FORTRAN-77, it uses a two dimensional plotter software (PLOT-10) to draw orthographic axonometric projections of a three dimensional graph comprising a smooth surface or cubical histogram, in any desired orientation, magnification and window, employing throughout highly accurate hidden lines removal techniques. The figure, so generated, can optionally be clipped, smoothed by interpolation, or shaded selectively to distinguish among its different faces. The program accepts data from an external file, or generates them through built-in functions. It can be used for graphical representation of data such as neutron flux, theta(x,y) in form of smooth surface, even if available data are very few in number. It is also capable of drawing histograms of quantities such as fuel power in a reactor lattice. Listing of the program is given. DOE

N87-10017# Chiba Univ. (Japan). Faculty of Engineering.
IMAGES OF THREE DIMENSIONAL FLOWS IN COMPUTER GRAPHICS
Nobuhide Nishikawa, Akira Suzuki, and Satoshi Akiyama *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 11 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10038# Academy of Sciences (USSR), Moscow.
COMPUTER SIMULATION IN ENGINEERING HYDRODYNAMICS
A. A. Samarskh, B. P. Gerasimov, T. G. Elizarova, I. S. Kalachinskaya, A. B. Karagichev, A. V. Lesunovsky, S. A. Semushin, B. I. Chetversushkin, and A. G. Churbanov *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 4 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10299*# National Oceanic and Atmospheric Administration, Washington, D. C.
AN ALL-PURPOSE COMPUTER PROGRAM FOR LIDAR SIMULATIONS AND REDUCTION OF LIDAR DATA
Charles Braun *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 2 p (For primary document see N87-10263 01-35)
Avail: NTIS HC A15/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N87-10731*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FTMP (FAULT TOLERANT MULTIPROCESSOR) PROGRAMMER'S MANUAL
Frank E. Feather, Carlos A. Liceaga, and Peter A. Padilla Sep. 1986 43 p
(NASA-TM-89015; NAS 1.15:89015) Avail: NTIS HC A03/MF A01 CSCL 09B

The Fault Tolerant Multiprocessor (FTMP) computer system was constructed using the Rockwell/Collins CAPS-6 processor. It is installed in the Avionics Integration Research Laboratory (AIRLAB) of NASA Langley Research Center. It is hosted by AIRLAB's System 10, a VAX 11/750, for the loading of programs and experimentation. The FTMP support software includes a cross compiler for a high level language called Automated Engineering Design (AED) System, an assembler for the CAPS-6 processor assembly language, and a linker. Access to this support software is through an automated remote access facility on the VAX which relieves the user of the burden of learning how to use the IBM 4381. This manual is a compilation of information about the FTMP support environment. It explains the FTMP software and support environment along many of the finer points of running programs on FTMP. This will be helpful to the researcher trying to run an experiment on FTMP and even to the person probing FTMP with fault injections. Much of the information in this manual can be found in other sources; we are only attempting to bring together the basic points in a single source. If the reader should need points clarified, there is a list of support documentation in the back of this manual. Author

N87-10732# Royal Signals and Radar Establishment, Malvern (England).
REMOTE CAPABILITIES IN COMPUTER NETWORKS
J. M. Foster and I. F. Currie 1986 21 p
(RSRE-3947; BR100129) Avail: NTIS HC A02/MF A01

System-wide types, capabilities and procedure values can be used in computer networks to improve control of access and flexibility. This paper describes a network system based on these ideas. They provide a standard, uniform way of referring to data and using procedures in remote computers, with control over access and system type-checking. A working experimental version of the system exists, implemented on Flex computers, which provide microcoded support of capabilities. The mechanisms are such that normal programs written in terms of procedures, even those using procedure parameters, can be converted into network services without change. A possible way of implementing a similar scheme on conventional hardware is discussed. Author

N87-10733*# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.
FAULT AND ERROR LATENCY UNDER REAL WORKLOAD: AN EXPERIMENTAL STUDY Ph.D. Thesis
Ram Chillarege 1986 100 p
(Grant NAG1-613; Contract N00014-84-C-0149)
(NASA-CR-179802; NAS 1.26:179802; UILU-ENG-86-2230; CSG-55) Avail: NTIS HC A05/MF A01 CSCL 09B

A practical methodology for the study of fault and error latency is demonstrated under a real workload. This is the first study that measures and quantifies the latency under real workload and fills a major gap in the current understanding of workload-failure relationships. The methodology is based on low level data gathered on a VAX 11/780 during the normal workload conditions of the installation. Fault occurrence is simulated on the data, and the error generation and discovery process is reconstructed to determine latency. The analysis proceeds to combine the low level activity data with high level machine performance data to yield a better understanding of the phenomena. A strong relationship exists between latency and workload and that relationship is quantified. The sampling and reconstruction techniques used are also validated. Error latency in the memory where the operating system resides was studied using data on the physical memory access. Fault latency in the paged section of memory was determined using data from physical memory scans. Error latency in the microcontrol store was studied using data on the microcode access and usage. Author

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N87-10734# Illinois Univ., Urbana.
FORPS: A FORTH-BASED PRODUCTION SYSTEM AND ITS APPLICATION TO A REAL-TIME ROBOT CONTROL PROBLEM
C. J. Matheus and H. L. Martin (Oak Ridge National Lab., Tenn.) Jan. 1986 24 p Presented at the ASME Pressure Vessel and Piping Conference and Exhibit, Chicago, Ill., 20 Jul. 1986 Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract DE-AC05-84OR-21400)
(DE86-005426; CONF-860722-14) Avail: NTIS HC A02/MF A01

A simple yet very powerful system has been developed that merges the artificial intelligence qualities of a production system with the real-time control capabilities of FORTH. FORPS (FORTH-based Production System) offers the advantages of intelligent, rule-based control in a small package offering high speed, extensibility, and simplicity. A practical example of the system is presented in the development of an obstacle avoidance program to aid in controlling an overhead manipulator transport system. Several other potential applications to the area of control are discussed. DOE

N87-10735# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
ISSUES IN EXPERT SYSTEM AIDS FOR A LARGE ENGINEERING SIMULATION CODE
R. K. Fink, R. A. Callow, and V. H. Ransom 1986 6 p Presented at the Summer Computer Simulation Conference, Reno, Nev., 28 Jul. 1986
(Contract DE-AC07-76ID-01570)
(DE86-009098; EGG-M-29885; CONF-860729-5) Avail: NTIS HC A02/MF A01

Coupling expert systems with existing engineering analysis codes is a promising area for artificial intelligence applications. An expert system can provide ready access to a knowledge base larger than most individual analysts would possess and thus can provide for easier and less costly use of the code and also reduce the potential for code misuse. The functions appropriate for expert system assistance and some of the issues that arise in developing such systems that have been identified through experimentation with the ATHENA code, a large digital simulation code for analysis of thermal-hydraulic energy networks, are discussed. The use of an expert system as a front-end user interface to analysis codes is conceptually appealing and with obvious benefits. Expert systems can play a substantial role in the execution and output analysis phases of simulation code usage. The integration of these roles leads to the concept of an intelligent environment for simulation code usage. The knowledge specific to the particular system

being modeled, including modeling abstraction decisions, and specific knowledge about the numerical solution methods of the code can be used for more effective code execution control and output diagnosis. Expected benefits are improved quality of results and/or reduced execution cost. The methods for using this knowledge in an intelligent environment are discussed, with applications to current codes as well as implications for architecture of future large engineering simulation codes. DOE

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N87-10736# Universitaet der Bundeswehr, Neubiberg (West Germany).
SEMINAR ON FINITE ELEMENTS IN UNSTEADY PROBLEMS [SEMINAR UEBER FINITE ELEMENTE BEI INSTATIONAEREN PROBLEMEN]
K. J. Schwenzfeger, ed. Jan. 1986 92 p Partly in GERMAN and ENGLISH Seminar held in Neubiberg, West Germany, 1985 (ETN-86-97824) Avail: NTIS HC A05/MF A01

The influence of nonlinearities on the local convergence of Ritz and Galerkin approximation methods, and asymptotic error expansions of finite element solutions of parabolic equations are treated. The unsteady calculation of ground water problems using the finite element method; and the properties of adaptive finite element methods are discussed. Mixed finite element methods used in flow mechanics are reviewed. Hierarchical bases for the solution of plane elliptic boundary value problems are presented. For individual titles, see N87-10737 through N87-10742.

N87-10737# Universitaet der Bundeswehr, Neubiberg (West Germany).
THE LOCAL CONVERGENCE OF RITZ AND GALERKIN METHODS FOR NONLINEAR PROBLEMS [ZUR LOKALEN KONVERGENZ VON RITZ- UND GALERKIN-VERFAHREN BEI NICHTLINEAREN PROBLEMEN]
J. A. Nitsche *In its* Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 1-12 In GERMAN (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

The influence of nonlinearities on the local convergence behavior of Ritz and Galerkin approximation methods is treated. The local convergence problem treatment using one-dimensional finite elements is explained. The local convergence of the approximation methods depends on the local regularity of the solution which has to be approximated, and on global characteristics of the problem. An irregularity at the boundary can decisively determine the local convergence. ESA

N87-10738# Bonn Univ. (West Germany).
ASYMPTOTIC ERROR EXPANSIONS OF FINITE ELEMENT SOLUTIONS OF PARABOLIC EQUATIONS [ASYMPTOTISCHE FEHLERENTWICKLUNGEN VON FINITE ELEMENTE LOESUNGEN PARABOLISCHER GLEICHUNGEN]
Hans-Peter Helfrich *In* Universitaet der Bundeswehr Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 13-26 In GERMAN (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

Asymptotic error expansions for finite element solutions of linear initial and boundary value problems, assuming that such expansions are known for the corresponding stationary problems, are presented. Asymptotic expansions for a semidiscrete Galerkin method and for the implicit Euler method are given. The comparison of the results with numerical results for the one-dimensional heat transfer equation shows that the asymptotic expansion represents well the error behavior. ESA

N87-10739# Universitaet der Bundeswehr, Neubiberg (West Germany).
UNSTEADY CALCULATIONS OF GROUND WATER PROBLEMS [INSTATIONAERE BERECHNUNG VON GRUNDWASSERPROBLEMEN]
Casimir Katz *In its* Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 28-40 In GERMAN (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

Models for ground water calculations using the finite element method were made. The basic laws, equations, and boundary conditions for ground water problems are presented. The soil-mechanical and mathematical assumptions for the application of the method are explained. Examples demonstrate the possibilities of the calculation using a large programming package. ESA

N87-10740# Technische Univ., Munich (West Germany). Fachgebiet Elektronisches Rechen im Konstruktiven Ingenieurbau.
ADAPTIVE FINITE ELEMENT METHODS [ADPATIVE FINITE-ELEMENT-VERFAHREN]
Ernst Rank *In* Universitaet der Bundeswehr Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 41-59 In GERMAN (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

The a posteriori error estimates which allow statements about the magnitude and distribution of the global error in finite element (FE) meshes are presented. Knowledge of the error estimates is used to control an adaptive FE mesh adaptation, whereby there is an essential difference between the mesh refinement (h-version) and the local enhancement of the degree of the starting functions (p-version). Examples explain the properties of an adaptive FE program for potential and elasticity problems. It is shown that the results for stationary problems can also be applied to unsteady cases. ESA

N87-10741# Universitaet der Bundeswehr, Neubiberg (West Germany).
MIXED FINITE ELEMENT METHODS IN FLOW MECHANICS [GEMISCHTE FINITE ELEMENT VERFAHREN IN DER STROEMUNGSMECHANIK]
R. Verfuerth *In its* Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 60-61 In GERMAN (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

Finite element methods used in flow mechanics are introduced via the finite element approximation of the Stokes problem. The results can be transferred to the stationary Navier-Stokes equations. Finite element spaces which fulfill the so-called inf-sup condition are presented. The simplest starting points for the Stokes problem are steady, piecewise linear functions for the velocity, and piecewise constant functions for the pressure. ESA

N87-10742# Technische Hochschule, Aachen (West Germany). Inst. fuer Geometrie und Praktische Mathematik.
HIERARCHICAL BASES FOR THE SOLUTION OF PLANE ELLIPTIC BOUNDARY VALUE PROBLEMS
Harry Yserentant *In* Universitaet der Bundeswehr Seminar on Finite Elements in Unsteady Problems Jan. 1986 p 73-86 (For primary document see N87-10736 01-64)
Avail: NTIS HC A05/MF A01

A method to solve the large systems of linear equations arising from the approximate solution of linear elliptic boundary value problems using finite element or finite difference methods is presented. The method has nearly the same optimal computational complexity as the conventional multigrid methods but is free of many of their restrictions. Especially its speed of convergence does not depend on the regularity properties of the boundary value problem to be solved. The method replaces the usual nodal bases of the finite element spaces by hierarchical bases which originate in a very natural way if one starts with a coarse initial triangulation of the considered domain and refines it several times to get to final triangulation. ESA

N87-10743*# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Electrical and Computer Engineering.
NOVEL PARALLEL ARCHITECTURES AND ALGORITHMS FOR

LINEAR ALGEBRA PROCESSING Semiannual Report
David Casasent Oct. 1986 12 p
(Grant NAG1-575)
(NASA-CR-179826; NAS 1.26:179826) Avail: NTIS HC A02/MF A01 CSCL 12A

Advanced problems in computational fluid dynamics, finite element structural analysis, and related areas require the solution of large partial differential equations and matrices of large size and dynamic range. This project considers an advanced parallel linear algebra processor and associated novel parallel algorithms for such applications. Research on system fabrication, quantitative performance evaluation and new parallel algorithms are described and considered. Case studies in structural mechanics, dynamics and nonlinear systems, finite element methods, computational fluid dynamics, and partial differential equations are included. The novel utilization of an optical processor for the processing of such problems is the major research given attention. Author

N87-10744*# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
FINITE VOLUME SOLUTION OF THE COMPRESSIBLE BOUNDARY-LAYER EQUATIONS
Bernard Loyd and Earll M. Murman Washington NASA Oct. 1986 81 p
(Grant NAG1-507)
(NASA-CR-4013; NAS 1.26:4013; CFDL-TR-86-1) Avail: NTIS HC A05/MF A01 CSCL 12A

A box-type finite volume discretization is applied to the integral form of the compressible boundary layer equations. Boundary layer scaling is introduced through the grid construction: streamwise grid lines follow eta = y/h = const., where y is the normal coordinate and h(x) is a scale factor proportional to the boundary layer thickness. With this grid, similarity can be applied explicity to calculate initial conditions. The finite volume method preserves the physical transparency of the integral equations in the discrete approximation. The resulting scheme is accurate, efficient, and conceptually simple. Computations for similar and non-similar flows show excellent agreement with tabulated results, solutions computed with Keller's Box scheme, and experimental data. Author

N87-10745*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GLOBAL COLLOCATION METHODS FOR APPROXIMATION AND THE SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Final Report
A. Solomonoff and E. Turkel Sep. 1986 68 p Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178179; ICASE-86-60; NAS 1.26:178179) Avail: NTIS HC A04/MF A01 CSCL 12A

Polynomial interpolation methods are applied both to the approximation of functions and to the numerical solutions of hyperbolic and elliptic partial differential equations. The derivative matrix for a general sequence of the collocation points is constructed. The approximate derivative is then found by a matrix times vector multiply. The effects of several factors on the performance of these methods including the effect of different collocation points are then explored. The resolution of the schemes for both smooth functions and functions with steep gradients or discontinuities in some derivative are also studied. The accuracy when the gradients occur both near the center of the region and in the vicinity of the boundary is investigated. The importance of the aliasing limit on the resolution of the approximation is investigated in detail. Also examined is the effect of boundary treatment on the stability and accuracy of the scheme. Author

N87-10746# Illinois Univ., Urbana. Dept. of Computer Science.
COMPUTATIONAL METHODS AND SOFTWARE FOR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS Annual Report, 16 Nov. 1985 - 15 Nov. 1986
1986 23 p
(Contract DE-AC02-76ER-02383)
(DE86-010231; DOE/ER-02383/0122; COO-2383-0122) Avail: NTIS HC A02/MF A01

Research efforts in algorithms, numerical software, and support software are described. The theory and implementation of adaptive methods for differential equations in various forms have been studied. The use of iterative methods in this environment and parallel techniques for ordinary differential equations have also been investigated. An introduction to the design and development of three tools to aid in scientific software development are presented. These tools are Polylith, a system which permits rapid prototyping of interconnected software modules; Fred, a syntax-directed, screen-oriented editor that can be used for any textual objects (programs, documentation, etc.); and a mathematical expression editor which permits easy modification of expressions in graphic form while retaining an internal structure that permits translation of other useful forms such as a computer language. DOE

N87-10747# Purdue Univ., West Lafayette, Ind. Joint Highway Research Project.
USE OF FUZZY SETS MATHEMATICS TO ASSIST PAVEMENT EVALUATION AND MANAGEMENT (REVISED MARCH 18, 1986) Final Report
M. Andonyadis, A. G. Altschaeffl, and J. L. Chameau Jul. 1985 290 p Sponsored by FHWA and Indiana Dept. of Highways
(PB86-214798; JHRP-85-14-Rev; FHWA/IN/JHRP-85/14-Rev) Avail: NTIS HC A13/MF A01 CSCL 13B

The mathematics of fuzzy sets that was created in the companion Interim Report by Gunaratne are applied. The new scheme being suggested for pavement management is predicated on the presence of uncertainty at various stages in pavement management which requires that judgment be used in the process. The fuzzy sets mathematics can methodically combine subjective information and crisp measurement data. Fuzzy sets are used to represent the subjectivity in pavement serviceability ratings and distress surveys, and the variability in Roadmeter, Skid-Tester, and Dynaflect readings. The ranking of pavement is formulated using fuzzy multi-attribute decision-making concepts using an expert knowledge base. To use the new scheme required the one-time development of the knowledge base. GRA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

No abstracts in this category.

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

No abstracts in this category.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N87-10748# Tokyo Univ. (Japan). Inst. of Space and Astronautical Science.
NUMERICAL AND EXPERIMENTAL STUDY OF DYNAMICS OF TWO-DIMENSIONAL BODY
Naoki Izutsu Mar. 1986 67 p
(ISAS-619; ISSN-0285-6808) Avail: NTIS HC A04/MF A01

Autorotation of a two-dimensional elliptic cylinder around its spanwise axis fixed perpendicularly to a uniform flow was numerically simulated by means of a discrete vortex-blob method. The results were compared with those of the experiments by a wind tunnel and a water channel, which were carried out in both the autorotating state and the forced rotating state with constant angular velocities driven by a stepping motor. The behavior and the interaction of the vortices shed behind the rotating elliptic cylinder were studied, making use of visualization of the numerical simulation results. Moreover, animation of the displayed image was made to illustrate the vortex interaction processes. Based on the moment of inertia and the thickness ratio of the cylinder, the starting condition of the autorotation was determined based on the mechanism of the autorotation. The driving force is produced by eliminating the vortex created behind the retreating edge. By means of graphic simulation utilizing a color coded vorticity display and animation, processes of the merging, rearrangement, interaction and splitting of the vortices in the wake of the rotating wing were visualized making these processes clearly understandable.
Author

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N87-10749*# Bionetics Corp., Hampton, Va.
THE HELMHOLTZ RESONANCE BEHAVIOR OF SINGLE AND MULTIPLE ROOMS
Harvey H. Hubbard and Kevin P. Shepherd Sep. 1986 27 p
(Contract NAS1-16978)
(NASA-CR-178173; NAS 1.26:178173) Avail: NTIS HC A03/MF A01 CSCL 20A

The results of exploratory measurements of the noise fields inside rooms which are excited to resonance either acoustically or mechanically are presented. The data illustrate the nature and extent of the sound pressure level enhancements in single rooms and also how multiple rooms may resonate by means of either acoustic or mechanical coupling. Sound pressure level enhancements of about 5 dB were measured during resonance of rooms having flexible walls. For such conditions the sound pressure levels in the room were essentially uniform and in phase. Variability of up to 20 dB was measured in a room hallway complex having significant acoustic interactions. Resonant frequency prediction methods which work well at model scale, give only fair results for rooms.
Author

N87-10750*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PREDICTION OF HELICOPTER ROTOR DISCRETE FREQUENCY NOISE: A COMPUTER PROGRAM INCORPORATING REALISTIC BLADE MOTIONS AND ADVANCED ACOUSTIC FORMULATION
Kenneth S. Brentner Oct. 1986 94 p
(NASA-TM-87721; L-16130; NAS 1.15:87721) Avail: NTIS HC A05/MF A01 CSCL 20A

A computer program has been developed at the Langley Research Center to predict the discrete frequency noise of conventional and advanced helicopter rotors. The program, called WOPWOP, uses the most advanced subsonic formulation of Farassat that is less sensitive to errors and is valid for nearly all helicopter rotor geometries and flight conditions. A brief derivation of the acoustic formulation is presented along with a discussion of the numerical implementation of the formulation. The computer program uses realistic helicopter blade motion and aerodynamic loadings, input by the user, for noise calculation in the time domain. A detailed definition of all the input variables, default values, and output data is included. A comparison with experimental data shows good agreement between prediction and experiment; however, accurate aerodynamic loading is needed.
Author

N87-10751*# Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
FUNDAMENTAL INVESTIGATIONS OF THE FINITE ELEMENT SOLUTIONS FOR ACOUSTIC PROPAGATION IN DUCTS Final Report
N. J. Walkington, T. W. Wicks, and W. Eversman 1986 86 p
(Grant NAG1-198)
(NASA-CR-179845; NAS 1.26:179845) Avail: NTIS HC A05/MF A01 CSCL 20A

The question of convergence of three finite element algorithms for the modelling of acoustic transmission in ducts carrying a nonuniform mean flow is addressed. The details of each algorithm are stated and example calculations in uniform and nonuniform ducts are made and assessed for accuracy and convergence. The algorithm based on the assumption of irrotationality is found to be highly convergent. This algorithm is the one used in current turbo-fan inlet acoustic radiation codes. A theoretical analysis indicating convergence is supported by example calculations. Two additional algorithms which do not require irrotationality are found to be less convergent, and perhaps not convergent at all for certain severely sheared velocity profiles. No theoretical convergence criteria can presently be established for these algorithms and convergence difficulties are shown here by example. Included in this class of algorithms is the duct analysis program ADAM which is known to display apparently nonconvergent solutions in certain cases.
Author

N87-10752*# General Electric Co., Cincinnati, Ohio.
FREE JET FEASIBILITY STUDY OF A THERMAL ACOUSTIC SHIELD CONCEPT FOR AST/VCE APPLICATION: DUAL STREAM NOZZLES Final Report
B. A. Janardan, J. F. Brausch, and R. K. Majjigi Washington NASA Mar. 1985 203 p
(Contract NAS3-22137)
(NASA-CR-3867; E-2392; NAS 1.26:3867) Avail: NTIS HC A10/MF A01 CSCL 20A

The influence of selected geometric and aerodynamic flow variables of an unsuppressed coannular plug nozzle and a coannular plug nozzle with a 20-chute outer stream suppressor were experimentally determined. A total of 136 static and simulated flight acoustic test points were conducted with 9 scale model nozzles. Also, aerodynamic measurements of four selected plumes were made with a laser velocimeter. The presence of the 180 deg shield produced different mixing characteristics on the shield side compared to the unshield side because of the reduced mixing with ambient air on the shielded side. This resulted in a stretching of the jet, yielding a higher peak mean velocity up to a length of 10 equivalent diameters from the nozzle exit. The 180 deg shield in community orientation around the suppressed coannular plug nozzle yielded acoustic benefit at all observer angles for a simulated takeoff. While the effect of shield-to-outer stream velocity ratio was small at angles up to 120 deg, beyond this angle significant acoustic benefit was realized with a shield-to-outer stream velocity ratio of 0.64.
Author

N87-10753*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Business Group.
FREE-JET ACOUSTIC INVESTIGATION OF HIGH-RADIUS-RATIO COANNULAR PLUG NOZZLES Final Report
P. R. Knott, B. A. Janardan, R. K. Majjigi, P. K. Bhutiani, and P.

G. Vogt Washington NASA Oct. 1984 218 p
(Contract NAS3-20619)
(NASA-CR-3818; E-2177; NAS 1.26:3818; R83AEB574) Avail: NTIS HC A10/MF A01 CSCL 20A

The experimental and analytical results of a scale model simulated flight acoustic exploratory investigation of high radius ratio coannular plug nozzles with inverted velocity and temperature profiles are summarized. Six coannular plug nozzle configurations and a baseline convergent conical nozzle were tested for simulated flight acoustic evaluation. The nozzles were tested over a range of test conditions that are typical of a Variable Cycle Engine for application to advanced high speed aircraft. It was found that in simulate flight, the high radius ratio coannular plug nozzles maintain their jet noise and shock noise reduction features previously observed in static testing. The presence of nozzle bypass struts will not significantly affect the acoustic noise reduction features of a General Electric type nozzle design. A unique coannular plug nozzle flight acoustic spectral prediction method was identified and found to predict the measured results quite well. Special laser velocimeter and acoustic measurements were performed which have given new insights into the jet and shock noise reduction mechanisms of coannular plug nozzles with regard to identifying further benificial research efforts. Author

N87-10015# Tokyo Univ. (Japan). Dept. of Physics.
ACOUSTIC WAVES EMITTED BY VORTEX-BODY INTERACTION
T. Kambe, T. Minota (Kyushu Univ., Fukuoka (Japan).), and Y. Ikushima *In its* Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N87-10754# Technische Hochschule, Aachen (West Germany). Physikalisches Inst.
PROMPT NEUTRINO PRODUCTION IN 400 GeV PROTON COPPER INTERACTIONS
H. Graessler, W. Droege (Bonn Univ., West Germany), U. Idschok, H. Kreutzmann, B. Nellen, B. Wuensch, A. M. Cooper-Sarkar (European Organization for Nuclear Research, Geneva, Switzerland), D. C. Cundy, H. Foeth, A. Grant et al Stockholm, Sweden Stockholm Univ. Feb. 1986 32 p Submitted for publication
(USIP-86-02; ETN-86-97232) Avail: NTIS HC A03/MF A01

The prompt electron neutrino and muon neutrino fluxes from proton copper interactions at 400 GeV/c proton momentum were measured. The asymmetry between the prompt electron (anti) neutrino and the prompt muon (anti)neutrino event rates above 20 GeV is 0.07 + or - 0.08 corresponding to an Ne/Nmn ratio of 1.14 (+0.19, -0.16). The cross section weighted charge asymmetry for electrons and muons combined is 0.15 + or - 0.08. The number of D(-)decays into nu(-)e or nu(-)mu is (4.1 + or - 0.9) times 0.0001 per incident proton. No evidence for nu/tan interactions is found. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N87-10755# Naval Research Lab., Washington, D. C.
CURRENT ENHANCEMENT FOR HOSE-UNSTABLE ELECTRON BEAMS
R. F. Fernsler, R. F. Hubbard, B. Hui, G. Joyce, and M. Lampe 24 Apr. 1986 74 p
(AD-A167804; NRL-MR-5769) Avail: NTIS HC A04/MF A01 CSCL 20/7

An electron beam injected into a conducting medium produces inductive electric fields. These fields drive conduction currents which, for stable beams, oppose the beam current and thereby reduce the total (net) current. For unstable beams which undergo large transverse displacements, the inductive field can reverse direction and drive conduction current parallel to the beam current. An analytic and numerical treatment of the latter effect is presented to explain current enhancement as observed for electron beams propagating in gases at pressures above 10 torr. GRA

N87-10756# Lawrence Livermore National Lab., Calif.
ELECTRICAL MEASUREMENT TECHNIQUES FOR PULSED HIGH CURRENT ELECTRON BEAMS
K. W. Struve 1 Apr. 1986 10 p Presented at the Conference on Measurement of Electrical Quantities in Pulse Power Systems-2, Gaithersburg, Md., 5 Mar. 1986
(Contract W-7405-eng-48)
(DE86-010980; UCRL-93261; CONF-860384-8) Avail: NTIS HC A02/MF A01

The advent of high current (1 to 100 kA), moderate energy (greater than 10 MeV), short pulse (1 to 100 ns) electron accelerators used for charged particle beam research has motivated a need to complement standard diagnostics with development of new diagnostic techniques to measure electron beam parameters. A brief survey is given of the diagnostics for measuring beam current, position, size, energy, and emittance. While a broad scope of diagnostics will be discussed, this survey will emphasize diagnostics used on the Experimental Test Accelerator (ETA) and Advanced Test Accelerator (ATA). Focus is placed on diagnostics measuring beam current, position and size. Among the diagnostics discussed are resistive wall current monitors, B sub theta loops, Rogowski coils, Faraday cups, and X-ray wire diagnostics. Operation at higher current levels also increases radiation and electromagnetic pulse interference. These difficulties and methods for circumventing them are also discussed. DOE

N87-10757# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorbauelemente.
LINEARIZED MODEL FOR THE HYDRODYNAMIC STABILITY INVESTIGATION OF MOLTEN FUEL JETS INTO THE COOLANT OF A LIQUID METAL FAST BREEDER REACTOR (LMFBR)
Karel Hartel Feb. 1986 33 p In GERMAN; ENGLISH summary
(KfK-3978; ISSN-0303-4003; ETN-86-97834) Avail: NTIS HC A03/MF A01

The hydrodynamic stability of liquid jets in a liquid continuum, both characterized by low viscosity was analyzed. A linearized mathematical model was developed. This model enables the length necessary for fragmentation of a vertical, symmetric jet of molten fuel by hydraulic forces in the coolant of a liquid metal fast breeder reactor to be evaluated. On the basis of this model the FRAG code for numerical calculation of the hydrodynamic fragmentation mechanism was developed. ESA

74 OPTICS

Includes light phenomena; and optical devices.

For lasers see *36 Lasers and Masers.*

N87-10758*# California Univ., San Diego. Center for Astrophysics and Space Sciences.
[DESIGN SUPPORT OF THE BURST AND TRANSIENT SOURCE EXPERIMENT (BATSE) OF THE GAMMA RAY OBSERVATORY (GRO) MISSION] Final Technical Report
Edwin A. Stephan, Jr. 12 Sep. 1986 6 p
(Contract NAS8-35012)
(NASA-CR-178920; NAS 1.26:178920) Avail: NTIS

HC A02/MF A01 CSCL 20F

Engineering design specifications and development of the large area detector and photomultiplier tube assemblies for the Burst and Transient Source Experiment (BATSE) of the Gamma Ray Observatory (GRO) mission are examined. B.G.

N87-10759# Letterman Army Inst. of Research, San Francisco, Calif.

FLASH/CRAZING EFFECTS ON SIMULATOR PURSUIT TRACKING PERFORMANCE Final Report, Mar. - Sep. 1983

David A. Stamper, David J. Lund, Richard R. Levine, Jerome W. Molchany, and Paul Best Mar. 1986 26 p

(AD-A167689; LAIR-214) Avail: NTIS HC A03/MF A01 CSCL 19/5

Day sights which are purposefully or inadvertently irradiated with laser radiation may become nonfunctional due to cracking or crazing of the optical glass. The degree of performance degradation may be related to the amount of damage to the glass and possible flash blindness from reradiation. Thirty-two male enlisted men and officers tracked a scale model tank through a constant arc at a simulated distance of 1 km, using a laboratory constructed viscous-damped tracking device. There were four crazing groups (4 men/group) under bright and dim ambient light conditions for a total of eight groups. Each man tracked the target during three flash/crazing and three crazing only trials, which were randomly presented during 30 trials. The simulated countermeasure which included the flash and crazing had dramatic effects on tracking performance, even under daylight conditions. Under the most severe degree of crazing, tracking performance was not possible under either ambient light condition. The relatively small amounts of laser radiation used to craze the BK-7 glass used in this study, which lead to significant performance decrements, demonstrates the potential impact of flash/crazing effects on operators of day sights. GRA

N87-10760# Lawrence Livermore National Lab., Calif.

EXTREME ULTRAVIOLET EXPLORER: MIRROR OPTICAL TESTS AND RESULTS

C. H. Gillespie, D. F. Edwards, M. A. Nichols, and D. S. Finley (California Univ., Berkeley) 31 Mar. 1986 8 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. 1986

(Contract W-7405-eng-48)

(DE86-010560; UCRL-94362; CONF-860366-8) Avail: NTIS HC A02/MF A01

The optical tests described here were performed after each step in the fabrication process of three Extreme Ultraviolet Explorer (EUVE) Type 1 telescope mirrors. The surface finish and irregularity was determined by image analysis and the geometrical figure was tested interferometrically. Images of a collimated point source were relayed to obtain magnifications and photographic exposures were adjusted to include all the scattered light while still resolving the smallest bright image core. By linearizing film sensitivity and taking digitized lineouts of the photographed image, less than 1 arc second full width half maximum (FWHM) intensities were measured. The integrated energy density was measured photometrically, and diffraction limited curves of 5 arc second half energy widths (HEW) were obtained. The test purpose, instruments employed, alignment methods, and test results are detailed. DOE

N87-10761# California Univ., Berkeley. Lawrence Berkeley Lab.

OPTICAL SYSTEMS FOR SYNCHROTRON RADIATION. LECTURE 4: SOFT X-RAY IMAGING SYSTEMS

J. R. Howells Apr. 1986 32 p Presented at the Synchrotron Radiation Sources and their Applications Conference, Aberdeen, Scotland, 14 Sep. 1985

(Contract DE-AC03-76SF-00098)

(DE86-011567; LBL-21365; CONF-8509255-4) Avail: NTIS HC A03/MF A01

The history and present techniques of soft X-ray imaging are reviewed briefly. The physics of X-ray imaging is described, including the temporal and spatial coherence of X-ray sources. Particular technologies described are: contact X-ray microscopy, zone plate imaging, scanned image zone plate microscopy, scanned image reflection microscopy, and soft X-ray holography and diffraction. DOE

N87-10301*# Academy of Sciences (USSR), Tomsk. Inst. of Atmospheric Optics.

METHODS FOR ESTIMATING THE OPTICAL CONSTANTS OF ATMOSPHERIC HAZES BASED ON COMPLEX OPTICAL MEASUREMENTS

V. E. Zuev, B. S. Kostin, and I. E. Naats *In* NASA. Langley Research Center 13th International Laser Radar Conference Aug. 1986 3 p (For primary document see N87-10263 01-35)

Avail: NTIS HC A15/MF A01 CSCL 20F

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N87-10762 Maryland Univ., College Park.

THE ONSET OF ALFVENIC TURBULENCE Ph.D. Thesis

Sanjoy Ghosh 1985 220 p

Avail: Univ. Microfilms Order No. DA8528974

The onset of turbulence in a magnetized plasma is of considerable importance in both the laboratory and in astrophysics. Recent theoretical work has focused on the turbulent behavior of high frequency Langmuir waves. This dissertation investigates how low frequency omega less than or equal to OMEGA sub i, magnetohydrodynamic (MHD) oscillations in a warm plasma may undergo a transition from a coherent state to one of turbulence. A nonlinear (DNLS) equation describing the evolution of Alfven and magnetosonic waves is derived from the fluid equations. Propagation angles slightly oblique to the ambient magnetic field are considered, and a linear operator which includes kinetic effects is incorporated. The time evolution of an arbitrary spectrum of waves is analyzed in the case where one k-mode is unstable, with the rest damped. Growth is due to the presence of a warm low-density ion beam. Landau effects from background ions provide the major source of damping. It is found that breathing solitons arise in the system from any arbitrary initial spectrum. The energy of the nonlinear wave can undergo a transition to turbulence when the growth rate of the unstable mode exceeds the average damping rate of the damped modes. The observed MHD turbulence upstream of the quasi-parallel region of the Earth's bow shock is modelled according to the above results. Shocklet formation and particle trapping effects as predicted by the driven/dissipative DNLS equation are also discussed. Dissert. Abstr.

N87-10763# Nagoya Univ. (Japan). Inst. of Plasma Physics.

PLASMA CONFINEMENT BY A RADIO FREQUENCY PLUGGING POTENTIAL IN AN AXISYMMETRIC MIRROR-CUSP DEVICE

R. Kumazawa, S. Okamura, K. Adati, T. Aoki, H. Fujita, K. Hattori, S. Hidekuma, T. Kawamoto, Y. Okubo, T. Sato et al Jul. 1986 20 p

(IPPJ-784; ISSN-0469-4732) Avail: NTIS HC A02/MF A01

The RFC-XX-M is a magnetohydrodynamic (MHD) stable and axisymmetric mirror-cusp device with radio frequency (RF) plugging. The plasma is produced by ion cyclotron resonant heating (ICRH) with gas puffing at the central mirror. The total ion energy confinement time including axial loss, electron drag, and charge exchange is improved by a factor of three by the RF plugging and reaches 1 ms. The energy confinement time due to axial particle loss is estimated to be 7.5 ms from a detailed analysis of ion energy loss channels. An RF plugging potential is measured from the energy analysis of the escaping ions. It is determined that the RF plugging potential is proportional to the square of an applied RF voltage and the maximum value reaches 250 V. This value agrees with a plugging potential deduced from the Pastuknov formula within a factor of 2. Author

N87-10764*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LASER-POWERED MHD GENERATORS FOR SPACE APPLICATION
N. W. Jalufka Oct. 1986 15 p
(NASA-TP-2621; NAS 1.60:2621) Avail: NTIS HC A02/MF A01 CSCL 20I

Magnetohydrodynamic (MHD) energy conversion systems of the pulsed laser-supported detonation (LSD) wave, plasma MHD, and liquid-metal MHD (LMMHD) types are assessed for their potential as space-based laser-to-electrical power converters. These systems offer several advantages as energy converters relative to the present chemical, nuclear, and solar devices, including high conversion efficiency, simple design, high-temperature operation, high power density, and high reliability. Of these systems, the Brayton cycle liquid-metal MHD system appears to be the most attractive. The LMMHD technology base is well established for terrestrial applications, particularly with regard to the generator, mixer, and other system components. However, further research is required to extend this technology base to space applications and to establish the technology required to couple the laser energy into the system most efficiently. Continued research on each of the three system types is recommended. Author

N87-10036# Academy of Sciences (USSR), Moscow. Inst. of Applied Mathematics.
MATHEMATICAL AND COMPUTATIONAL MODELS OF PLASMA FLOWS
K. V. Brushlinsky *In* Tokyo Univ. Proceedings of the Symposium on Mechanics for Space Flight, 1985 1985 9 p (For primary document see N87-10011 01-02)
Avail: NTIS HC A12/MF A01

N87-10548 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Space Science Dept.
PLASMA SHEET BOUNDARY ELECTRIC FIELDS DURING SUBSTORMS
Arne Pedersen *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 107-121 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10555 Institut d'Aeronomie Spatiale de Belgique, Brussels.
FORMATION AND DEFORMATION OF THE PLASMAPAUSE DURING A SUBSTORM EVENT
J. Lemaire *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 239-260 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

N87-10574 Centre National de la Recherche Scientifique, Orleans (France). Lab. de Physique et Chimie de l'Environnement.
EXPERIMENTAL EVIDENCE OF FIELD-ALIGNED ELF PLASMA DUCTS IN THE IONOSPHERIC TROUGH AND IN THE AURORAL ZONE
C. Beghin, J. C. Cerisier (Centre de Recherches en Physique de l'Environnement, Saint Maur des Fosses, France), J. L. Rauch, J. J. Berthelier, F. Lefeuvre, R. Debrie, O. A. Maltseva (Rostov State Univ., Rostov-on-Don, USSR), and N. I. Massevitch (Academy of Sciences (USSR), Moscow) *In* CNES Results of the ARCAD 3 Project and of Recent Programs in Magnetospheric and Ionospheric Physics 1985 p 517-527 (For primary document see N87-10541 01-46)
Avail: CEPADUES, Toulouse

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N87-10765*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TOTAL-DOSE RADIATION EFFECTS DATA FOR SEMICONDUCTOR DEVICES. 1985 SUPPLEMENT. VOLUME 2, PART B
Keith E. Martin, Michael K. Gauthier, James R. Coss, Armando R. V. Dantas, and William E. Price 15 May 1986 421 p
(Contract NAS7-100)
(NASA-CR-179741; JPL-Pub-85-43-Vol-2-Pt-B; NAS 1.26:179741) Avail: NTIS HC A18/MF A01 CSCL 20L

Steady-state, total-dose radiation test data are provided in graphic format, for use by electronic designers and other personnel using semiconductor devices in a radiation environment. The data were generated by JPL for various NASA space programs. The document is in two volumes: Volume 1 provides data on diodes, bipolar transistors, field effect transistors, and miscellaneous semiconductor types, and Volume 2 (Parts A and B) provides data on integrated circuits. The data are presented in graphic, tabular, and/or narrative format, depending on the complexity of the integrated circuit. Most tests were done steady-state 2.5-MeV electron beam. However, some radiation exposures were made with a Cobalt-60 gamma ray source, the results of which should be regarded as only an approximate measure of the radiation damage that would be incurred by an equivalent electron dose. All data were generated in support of NASA space programs by the JPL Radiation Effects and Testing Group (514). Author

N87-10766*# Roberts Associates, Inc., Vienna, Va.
MATHEMATICAL MODEL FOR THE BRIDGMAN-STOCKBARGER CRYSTAL GROWING SYSTEM Final Report, 20 Aug. 1984 - 19 Sep. 1986
Glyn O. Roberts 19 Sep. 1986 200 p
(Contract NAS8-36190)
(NASA-CR-178921; NAS 1.26:178921; RAI-86-B-1) Avail: NTIS HC A09/MF A01 CSCL 20B

In a major technical breakthrough, a computer model for Bridgman-Stockbarger crystal growth was developed. The model includes melt convection, solute effects, thermal conduction in the ampule, melt, and crystal, and the determination of the curved moving crystal-melt interface. The key to the numerical method is the use of a nonuniform computational mesh which moves with the interface, so that the interface is a mesh surface. In addition, implicit methods are used for advection and diffusion of heat, concentration, and vorticity, for interface movement, and for internal gracity waves. This allows large time-steps without loss of stability or accuracy. Numerical results are presented for the interface shape, temperature distribution, and concentration distribution, in steady-state crystl growth. Solutions are presented for two test cases using water, with two different salts in solution. The two diffusivities differ by a factor of ten, and the concentrations differ by a factor of twenty. Author

N87-10767# State Univ. of New York, Stony Brook. Dept. of Materials Science.
INTERFACE PROPERTIES AND CRYSTAL-GROWTH MECHANISMS Progress Report, Jul. 1985 - Jan. 1986
J. Q. Broughton 13 Jan. 1986 5 p
(Contract DE-FG02-85ER-45218)
(DE86-010846; DOE/ER-45218/1) Avail: NTIS HC A02/MF A01

The pulsed heating of Si-vapor interfaces has been modelled for the close-packed (111) and open (100) faces. A Si (111)-melt interface has been quenched. Grain-boundary interfaces with melt have also been studied, along with properties of Si liquid. Pseudopotentials have been obtained for the electron-argon system. DOE

N87-10768# Argonne National Lab., Ill.
SULFUR-BASED SYNTHETIC METAL SUPERCONDUCTORS
J. M. Williams, M. A. Beno, K. D. Carlson, T. J. Emge, U. Geiser, A. J. Schultz, H. H. Wang, and M. H. Whangbo 1986 16 p
Presented at the Conference on Fine Chemicals for the Electronics Industry, London, England, 2 Apr. 1986 Prepared in cooperation with North Carolina State Univ., Raleigh
(Contract W-31-109-eng-38)

(DE86-010512; CONF-8604192-1) Avail: NTIS HC A02/MF A01

Although organic synthetic metals (synmetals) are composed of nonmetallic elements, they frequently exhibit novel electrical and magnetic properties. Their electrical conductivities range from insulating, to semiconducting, to even superconducting. Through imaginative synthetic organic chemistry, it should be possible to prepare a steadily rising number of systems with very high superconducting transition temperatures, T/sub c/. In fact, T/sub c/'s have risen from approx. 1 K in the early 1980's in the TMTSF systems to approx. 8 K in the ET (BEDT-TTF) materials, but T/sub c/'s still remain low. However, the steadily rising T/sub c/'s lend credence to the likelihood that higher values can be achieved. This paper summarizes the current status and findings regarding the ET based synmetal superconductors. Within a few years of the synthesis of the ET donor molecule, it was discovered that (ET)2(ClO4)(C2H3Cl3)/sub 0.5/ exhibited metallic conductivity down to 1.4 K, and then, that (ET)2ReO4 became superconducting (T/sub c/ approx. = 2 K) under an applied pressure of 4 kbar (1 kbar = 14,505 psi). Then, in early 1984, ambient pressure superconductivity was reported in Beta-(ET)2I3 (T/sub c/ approx. = 1.4 K), followed by Beta-(ET)2IBr2 (T/sub c/ approx. = 2.8 K) and Beta-(ET)2AuI2 (T/sub c/ approx. = 5 K), respectively. Results of our rf penetration depth studies of these 3 systems are summarized. Superconductivity at ambient pressure has also been reported for certain non-Beta phases. DOE

N87-10769# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerperforschung.

MICROSTRUCTURE, GRAIN BOUNDARIES AND PROPERTIES OF SINTERED AND ISOTATICALLY HOT PRESSED SiC MATERIALS Thesis - Karlsruhe University, West Germany

Rainer Hamminger Feb. 1986 141 p In GERMAN; ENGLISH summary

(KfK-4063; ISSN-0303-4003; ETN-86-97837) Avail: NTIS HC A07/MF A01

A microstructural characterization of pressureless sintered and isostatically hot pressed SiC-materials was elaborated by microchemical and microanalytical methods. Grain boundary analyses were conducted by high resolution Auger electron spectroscopy. The materials studied contain inclusions of the sintering additives and agglomerates of the impurity elements. Characteristic distinctions between the different types of materials occur mainly in the region of grain boundaries. It is proved that (Al, C)-doped materials produce Al-rich segregation films at the grain boundaries; (B,C)-doped materials are characterized by grain boundaries of high purity without any layers of doping or impurity elements. Grain boundary films rich in O, which occur in isostatically hot pressed SiC, are responsible for the pronounced time dependancy of strength of this material. The pure grain boundaries of (B,C)-doped materials have a positive impact on creep resistance, while the segregation films of (Al,C)-doped qualities result in a tendency of increasing creep rates. ESA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N87-10770 North Carolina Univ., Chapel Hill.

HULL SURFACE DYNAMICS Ph.D. Thesis

Charles Gregory Torre 1985 138 p

Avail: Univ. Microfilms Order No. DA8527239

The dynamical structure of Einstein's theory of gravity is investigated using a time parameter whose level surfaces are null hypersurfaces in spacetime. A spacelike foliation of codimension two is used in order to give an invariant kinematic description. Dynamics are analyzed via a constrained Hamiltonian formalism. As preliminary examples the classical and quantum formulations of a self interacting scalar field and a genetic non-Abelian gauge theory are studied. In the gravitational case it is found that the Hamiltonian formulation includes both first and second class constraints. The first class constraints are associated with the invariance of the theory under diffeomorphisms of the null hypersurfaces. The second class constraints are direct consequences of the fact that the equal time surfaces are null. Our results suggest that the central dynamical role is played by the conformal 2-geometry of the null hypersurfaces, or equivalently, the shear of the null congruence which generates a given equal time surface. Dissert. Abstr.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

No abstracts in this category.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N87-10771# Oak Ridge National Lab., Tenn.

STUDY OF UNIX AND ITS SUITABILITY FOR THE AIR FORCE'S WWMCCS INFORMATION SYSTEM

R. S. Loffman Apr. 1986 22 p

(Contract DE-AC05-84OR-21400)

(DE86-011293; ORNL/TM-9901) Avail: NTIS HC A02/MF A01

The US Department of Defense is in the process of modernizing its Worldwide Military Command and Control System (WWMCCS) Automatic Data Processing (ADP) system. This modernization will include a new ADP system: WWMCCS Information System (WIS). The need for modernization results from a rapid growth in technology and an increased dependency on ADP support. The Air Force's role in this effort is the modernization of the Air Force WIS (AFWIS). The Air Force requested the assistance of Oak Ridge National Laboratory (ORNL) in investigating UNIX as a possible operating system for its new WIS ADP environment. ORNL reviewed and analyzed: (1) WWMCCS documentation for system requirements, (2) technical materials for information about UNIX, and (3) business sources for indications about UNIX's future in a commercial market. This analysis concluded that there are some features required by AFWIS that currently only UNIX can provide; however, its place in the future marketplace is still uncertain. DOE

N87-10772# Oak Ridge National Lab., Tenn.

COMPUTER SOFTWARE EVALUATION METHODOLOGY AND DATA BASE MANAGEMENT SYSTEM SELECTION

A. F. Huntley Apr. 1986 45 p

(Contract DE-AC05-84OR-21400)

(DE86-011343; ORNL-6260) Avail: NTIS HC A03/MF A01

This document presents a Data Base Management System (DBMS) evaluation methodology that has been developed under the sponsorship of the Department of the Navy, Naval Management Systems Support Office (NAVMASSO), Norfolk, Virginia. NAVMASSO has recognized the need for a DBMS to support the Shipboard Nontactical Automated Data Processing Program (SNAP) and has tasked Oak Ridge National Laboratory (ORNL) with evaluating DBMSes that are available for the SNAP-I computer system - a Honeywell DPS-6 minicomputer - and the SNAP-II computer system a Harris 300 minicomputer. In preparation for the SNAP-I/SNAP-II DBMS evaluation, ORNL has developed the DBMS evaluation methodology presented in this document. First, a discussion of the traditional computer software evaluation methodology is provided, with identification of aspects of the methodology that may cause the resulting evaluation to be deficient. A DBMS evaluation methodology that stresses the layered functionality of the software is then presented. The methodology requires a large amount of hands-on testing and allows evaluation team members to evaluate the software from the perspective of application developers and end-users who will use the system on a day-to-day basis. The document contains a discussion of several general considerations that must be evaluated. These are items that form a supportive environment and enhance the usability of the software, even though they may not affect the intrinsic functionality of the software. The technical facilities that define the limits of functionality of the software are then presented for evaluation. Areas where these facilities may not meet the desired functionality are identified. DOE

N87-10516*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
AN ACCELERATED FORTH DATA-ACQUISITION SYSTEM
S. A. Bowhill and A. D. Rennier *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 2 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

N87-10773# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION BILL, 1987
J. Garn Washington GPO 1986 111 p Report to accompany H.R. 5313 presented by the Committee on Appropriations, 99th Congr., 2nd Sess., 25 Sep. 1986
(S-Rept-99-487) Avail: US Capitol, Senate Document Room
Appropriations for the Department of Housing and Urban Development, and for sundry agencies, boards, commissions, corporations, and offices were discussed for the fiscal year ending September 30, 1987. For individual titles, see N87-10774 through N87-10774.

N87-10774# Committee on Appropriations (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Department of Housing and Urban Development-Independent Agencies Appropriation Bill, 1987 1986 p 64-70 (For primary document see N87-10773 01-84)
Avail: US Capitol, Senate Document Room
The appropriations for research, development, and procurement activities of NASA are discussed. B.G.

N87-10775# Committee on Science and Technology (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1987
Washington GPO 1986 37 p An act, H.R. 5495, referred to the Committee on Commerce, Science and Transportation, 99th Congress, 2d Session, 30 Sep. 1986
Avail: US Capitol, House Document Room
Appropriations are discussed for research and development; space flight, control, and data communication; construction of facilities; and research and program management by NASA. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N87-10776# National Physical Lab., Teddington (England).
[PROGRESS MADE DURING 1985 IN THE SCIENTIFIC AND TECHNICAL PROGRAM OF NATIONAL PHYSICAL LABORATORY'S DIVISION OF RADIATION SCIENCE AND ACOUSTICS]
Feb. 1986 81 p
Avail: NTIS HC A05/MF A01
The progress made during 1985 in the scientific and technical program of the Division of Radiation Science and Acoustics (DRSA) is discussed. Topics addressed include: dosimetry; radioactivity and neutron measurements; acoustical standards; noise and speech technology; and ultrasonics and underwater acoustical standards. B.G.

N87-10777*# Argonne National Lab., Ill.
ANL/RBC: A COMPUTER CODE FOR THE ANALYSIS OF RANKINE BOTTOMING CYCLES, INCLUDING SYSTEM COST EVALUATION AND OFF-DESIGN PERFORMANCE Final Report
G. A. McLennan May 1986 68 p
(NASA Order C-80002-E; Contract DE-AI01-86CE-50162)
(NASA-CR-179462; NAS 1.26:179462; DOE/NASA/80002-1; ANL/CT-86-3) Avail: NTIS HC A04/MF A01 CSCL 10B
This report describes, and is a User's Manual for, a computer code (ANL/RBC) which calculates cycle performance for Rankine bottoming cycles extracting heat from a specified source gas stream. The code calculates cycle power and efficiency and the sizes for the heat exchangers, using tabular input of the properties of the cycle working fluid. An option is provided to calculate the costs of system components from user defined input cost functions. These cost functions may be defined in equation form or by numerical tabular data. A variety of functional forms have been included for these functions and they may be combined to create very general cost functions. An optional calculation mode can be used to determine the off-design performance of a system when operated away from the design-point, using the heat exchanger areas calculated for the design-point. Author

N87-10778# Massachusetts Inst. of Tech., Cambridge.
RLE PROGRESS REPORT
J. Allen and R. Birgeneau Jan. 1986 287 p
(MIT-PR-128) Avail: NTIS HC A13/MF A01
Topics addressed include: submicron structures; kinetic phenomena in thin film electronic materials; focused ion beams; surface chemical reactions; quantum electronics; nonlinear optics;

X-ray diffused scattering; semiconductor surfaces; custom integrated circuits; speech communication; communications biophysics; physiology; molecule microscopy; quantum optics; atomic resonance and scattering; plasma dynamics; digital signal processing; information processing; microwave and quantum magnetics; radio astronomy; and electromagnetic wave theory. B.G.

N87-10779# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT FISCAL YEAR 1987
William E. Berner and Alan M. Salus Dec. 1985 77 p Supersedes AFWAL-TR-84-4000
(AD-A167324; AFWAL-TR-85-4000; AFWAL-TR-84-4000) Avail: NTIS HC A05/MF A01 CSCL 01/3

This technical objective document describes the technical program in materials to meet future Air Force operational needs. The technology program is divided into ten focal areas which encompass the full spectrum of materials capabilities required for future aircraft, missile, space and electronic systems. These ten areas are: Thermal Protection Materials and Structures; Metallic Structural Materials; Nonmetallic Structural Materials; Nondestructive Evaluation; Aerospace Propulsion Materials; Nonstructural Materials; Electromagnetic Windows and Electronic Materials; Laser Hardened Materials; Computer Aided Manufacturing/Manufacturing R&D; and Systems Support. GRA

N87-10780# Naval Postgraduate School, Monterey, Calif.
A SUMMARY OF THE FOUNDATION RESEARCH PROGRAM, FISCAL YEAR 1985 Summary Report, 1 Oct. 1984 - 30 Sep. 1985
G. T. Howard 12 May 1986 63 p
(AD-A168009; NPS-012-86-002PR) Avail: NTIS HC A04/MF A01 CSCL 05/1

Thirty projects of Independent Research/Independent Exploratory Development were funded by the Naval Postgraduate School Foundation Research Program. This research was in the areas of: Computer science, Administrative sciences, Operations research, National security affairs, Physics, Electrical and computer engineering, Meteorology, Aeronautics, Oceanography, and Mechanical engineering. A tabulation in the Appendix identifies the area of research and the investigator(s). Summaries of each project are provided together with a list of publications and theses. GRA

N87-10781# Bhabha Atomic Research Centre, Bombay (India). Spectroscopy Div.
[RESEARCH AND DEVELOPMENT ACTIVITIES OF THE SPECTROSCOPY DIVISION OF THE BHABHA ATOMIC RESEARCH CENTRE] Progress Report, Jan. 1983 - Dec. 1984
R. M. Dixit, ed. 1985 233 p
(DE86-702154; BARC-1269) Avail: (US Sales Only) NTIS HC A11/MF A01

The Research abd Development (R and D) activities of the Spectroscopy Division of the Bhabha Atomic Research Center, Bombay, during the period from January 1983 to December 1984 are reported. The main thrust of the activites of the Division is directed towards meeting the spectrochemical analytical requirements of the nuclear energy programs and the related R and D projects of the Department of Atomic Energy. These activities are described in the form of summaries grouped under the headings: (1) analyses by optical emission, X-ray fluorescence, X-ray excited optical luminescence and other techniques, (2) atomic, molecular, and solid state spectroscopy. (3) optics and thin films, and (4) electronic instrumentation. Two feature articles which are included in the report bring out the salient features of X-ray absorption fine structure spectroscopy (EXFAS) and laser spectroscopic techniques for trace analysis and describe the Division's efforts in setting up facilities to carry out work in these emerging fields. Other activities of the Division are teaching trainees and guiding research leading to M.Sc. and Ph.D. degrees. A list of papers published in journals and papers presented at conferences, symposia etc. by tge staff-members of the Division is given. A divisional staff chart is also given. DOE

N87-10782# California Univ., Berkeley. Lawrence Berkeley Lab.
LAWRENCE BERKELEY LABORATORY RECENT PAPERS SUBMITTED AND REPORTS ISSUED, FEBRUARY 1986
Feb. 1986 17 p
(Contract DE-AC03-76SF-00098)
(DE86-011319; LBL-PUB-445) Avail: NTIS HC A02/MF A01

One-hundred thirty-two references are arranged under the following headings: accelerator and fusion research, applied science, biology and medicine, Center for Advanced Materials, chemical biodynamics, earth sciences, engineering, materials and molecular research, nuclear science, and physics. DOE

N87-10647# Oxford Polytechnic (England). Dept. of Architecture.
THE PLANNING AND MAINTENANCE OF URBAN SETTLEMENTS TO RESIST EXTREME CLIMATIC FORCES
Ian R. Davis *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 277-312 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10650# Washington Univ., Seattle. Dept. of Geological Sciences.
URBAN HYDROLOGY IN THE TROPICS: PROBLEMS, SOLUTIONS, DATA COLLECTION AND ANALYSIS
Thomas Dunne *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 405-434 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10651# Sheffield Univ. (England).
ENERGY RELATED ISSUES
John K. Page *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 435-450 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10652# Office for Chemical Analyses, Stuttgart (West Germany). Dept. of Climatology.
THE INTRODUCTION OF CLIMATOLOGY INTO THE ADMINISTRATION AND DEVELOPMENT OF PLANNING IN THE CITY OF STUTTGART
J. Baumueller *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 451-460 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10653# Maryland Univ., College Park. Inst. for Physical Science and Technology.
PROBLEMS OF DESIGN FOR CITIES IN THE TROPICS
H. E. Landsberg *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 461-472 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10654# Murdoch Univ. (Australia). School of Environmental and Life Sciences.
CLIMATIC FACTORS IN THE SITING OF NEW TOWNS AND SPECIALIZED URBAN FACILITIES
T. J. Lyons *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 473-486 (For primary document see N87-10636 01-47)

Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10655# Ben Gurion Univ. of the Negev, Sede Boqer (Israel). Blaustein Inst. for Desert Research.
DESIGN FOR CLIMATE IN HOT, DRY CITIES
Baruch Givoni *In* WMO Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 487-513 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

N87-10656# World Meteorological Organization, Geneva (Switzerland).
DESIGN FOR CLIMATE IN HOT, HUMID CITIES
S. Nieuwolt *In its* Proceedings of the Technical Conference on Urban Climatology and its Applications with Special Regard to Tropical Areas 1986 p 514-534 (For primary document see N87-10636 01-47)
Avail: NTIS MF A01; print copy available at WMO, Geneva, Switzerland

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N87-10783 Dartmouth Coll., Hanover, N.H.
THE ULTRAVIOLET SPECTRA OF DA WHITE DWARFS Ph.D. Thesis
Edmund Paul Nelan 1985 213 p
Avail: Univ. Microfilms Order No. DA8601400

Using the International Ultraviolet Explorer (IUE) satellite, observations of cool to moderately warm DA white dwarfs have shown the presence of broad absorption features at wavelength 1400 and 1600. The wavelength 1600 feature is prominent for T (sub eff) is less than 13000 K and the wavelength 1400 feature is visible up to about T (sub eff) = 18000 K. It is proposed that the absorption in both cases is due to perturbations of the energy level structure of neutral hydrogen atoms undergoing collisions. Model atmospheres were constructed using the computer program LUCIFER assuming a pure hydrogen composition. With the addition of these Ly alpha satellite lines at 1400 and 1600 to the usual hydrogen continuum and line opacities, all of the observed spectral energy distributions of DA white dwarf stars can be explained. Further investigations have shown that the strength of these features is far more sensitive to gravity and temperature than the Balmer line profiles and continuum slopes; thus even at low resolution, the absorption at 1400 and 1600 promise to be an excellent indicator of these fundamental stellar parameters.

Dissert. Abstr.

N87-10784 Washington Univ., Seattle.
THE X-RAY PROPERTIES OF HIGH REDSHIFT, OPTICALLY SELECTED QSOS Ph.D. Thesis
Scott Frederick Anderson 1985 173 p
Avail: Univ. Microfilms Order No. DA8603097

In order to study the X-ray properties of high redshift QSOs, grism/grens plates covering 17 deg (2) of sky previously imaged to very sensitive X-ray flux levels with the Einstein Observatory were used. Following optical selection of the QSO, the archived X-ray image is examined to extract an X-ray flux detection or a sensitive upper limit. Two samples of grism/grens selected QSOs are emphasized. The first, sample C, is an approximately 80% complete sample of 37 QSOs with 1.8 less than or = z lese than or = 3.0, and B less than or = 19.5. Using two statistical approaches that also incorporate information contained in X-ray non-detections, it is inferred from sample C data that such QSOs contribute less than 3% to the diffuse X-ray background (XRB). The contribution of all QSOs with B less than or = 19.5 to the XRB is found to be 21 +/- 8%. Through the use of complete samples, very few uncertain parameters or extrapolations are used in these determinations. The second sample, sample N, includes 78 QSOs that occupy a narrow region of redshift, z, and optical luminosity, L(opt), space. The X-ray to optical luminosity ratio is parameterized by a hypothetical power law slope, a(ox), connecting the two wavebands, and is thought to depend on L(opt) and/or z. Sample N occupies a sufficiently narrow region of L(opt)-Z space that ensemble mean parameters such as a(ox)eff can be directly determined without the need to correct for such dependences. For sample N QSOs it was found that a(ox)eff = 1.50 +/- 0.03 in excellent agreement with the model of Avni and Tananbaum (A-T) for the evolution of a(ox)eff. However, the width found here for the a(ox) distribution is narrower than that found by A-T.

Dissert. Abstr.

N87-10785 Arizona Univ., Tucson.
HIGH RESOLUTION SPECTROSCOPY OF QUASAR ABSORPTION LINES Ph.D. Thesis
Jill Eleanor Bechtold 1985 342 p
Avail: Univ. Microfilms Order No. DA8603142

This dissertation investigates the properties of the metal-containing absorption lines seen in quasar spectra which have Z(abs) much less then Z(em). These systems, which probably originate in the halos of galaxies at high redshift, are then compared to observations of the halo and interstellar medium of the Milky Way. Echelle spectra were obtained at the Multiple Mirror Telescope (MMT) of the Z = 1.79 absorption system of the quasar B2 1225 + 317. The velocity profiles showed complex structure which varied from ion to ion, with ionization and column densities varying from component to component. The relative columns were consistent with the expectations for approximately interstellar abundance, low density material, in equilibrium with the ultraviolet radiation field of a spiral galaxy for lambda greater than 912 A, and the integrated light from QSOs at Z = 1.79 for lambda less than 912 A. The aggregate C IV profile has a width of about 450 km/sec, larger than that expected for a single galaxy halo, however. With the MMT spectrograph and echellette grating, and MMT echelle, we studied the properties of three other redshift systems of B2 1225+317, which are optically thin at the Ly man limit, but have saturated Lyman alpha. We calculated the contribution of quasars to the UV radiation field as a function of redshift. The calculated field depends on a number of uncertain assumptions, which were varied in order to estimate their effect on the result. Finally, we discuss an important input into these calculations, the continuum spectral energy distribution for quasars, with particular attention to the extreme ultraviolet. Dissert. Abstr.

N87-10786*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York.
MOLECULAR CLOUDS IN THE CARINA ARM
David Andrew Grabelsky (Columbia Univ., New York.) Sep. 1986 358 p
(NASA-TM-87798; NAS 1.15:87798) Avail: NTIS HC A16/MF A01 CSCL 03A

Results from the first large-scale survey in the CO(J = 1 to 0) line of the Vela-Carina-Centaurus region of the Southern Milky Way are reported. The observations, made with the Columbia University 1.2 m millimeter-wave telescope at Cerro Tololo, were spaced every beamwidth (0.125 deg) in the range 270 deg is less than or = l is less than or = 300 deg and -1 deg less than or = b less then or = 1 deg, with latitude extensions to cover all Carina arm emission beyond absolute b = 1 deg. In a concurrent survey made with the same telescope, every half-degree in latitude

and longitude was sampled. Both surveys had a spectral coverage of 330 km/s with a resolution of 1.3 km/s. The Carina arm is the dominant feature in the data. Its abrupt tangent at l is approx. = 280 deg and characteristic loop in the l,v diagram are unmistakable evidence for CO spiral structure. When the emission is integrated over velocity and latitude, the height of the step seen in the tangent direction suggests that the arm-interarm contrast is at least 13:1. Comparison of the CO and H I data shows close agreement between these two species in a segment of the arm lying outside the solar circle. The distribution of the molecular layer about the galactic plane in the outer Galaxy is determined. Between R = 10.5 and 12.5 kpc, the average CO midplane dips from z = -48 to -167 pc below the b = 0 deg plane, following a similar well-known warping of the H I layer. In the same range of radii the half-thickness of the CO layer increases from 112 to 182 pc. Between l = 270 deg and 300 deg, 27 molecular clouds are identified and cataloged along with heliocentric distances and masses. An additional 16 clouds beyond 300 deg are cataloged from an adjoining CO survey made with the same telescope. The average mass for the Carina arm clouds is 1.4x 10(6)M (solar), and the average intercloud spacing along the arm is 700 pc. Comparison of the distribution of the Carina arm clouds with that of similarly massive molecular clouds in the first and second quadrants strongly suggests that the Carine and Sagittarius arms form a single spiral arm approx. 40 kpc long wrapping two-thirds of the way around the Galaxy. Author

N87-10787*# National Aeronautics and Space Administration, Washington, D.C.
NASA STUDYING CONCEPT TO MEASURE DISTANCE BETWEEN STARS, GALAXIES
Jim Kukowski and Frank Bristow 15 Sep. 1986 3 p
(NASA-News-Rel-86-133) Avail: NTIS HC A02 CSCL 03A

NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif., is studying the possibility of sending a spacecraft millions of miles beyond the planets at speeds of more than a quarter million miles an hour to directly measure the distance to stars in our galaxy and to neighboring glaxies. The 21st Century project, Thousand Astronomical Units (TAU), was conceived by JPL Director Dr. Lew Allen. An astronomical unit (AU) is the average distance between the Earth and the Sun, or 93 million miles. The TAU voyage may signal the beginning of deep space exploration. The project would use a 50,000 pound, 131 feet long ion (electric) propulsion system to boost the 11,000 pound science spacecraft to about 225, 000 mph by the time it is twice the distance of Pluto, about 6 billion miles from Earth. Astronomy would begin during the voyage past the planets, using a 1.5 meter telescope. For instance, the spacecraft could return high resolution pictures of Saturn's rings and of the small planet Pluto with its moon Charon. About 10 years after launch, the spacecraft could begin taking measurements of star distances as far away as the center of our galaxy. One of TAU's astonomic objectives would be to do precision astrometry from a very long baseline, 1,000 AU. But before reaching that distance, TAU will have increased that baseline from the present 2 AU limitation of the Earth's orbit, and therefore, increased the ability to directly measure stellar distances while enroute. Author

N87-10788*# National Aeronautics and Space Administration, Washington, D.C.
NEW SPACE ASTRONOMY TECHNIQUE DEVELOPED TO STUDY CELESTIAL BODIES
Leon Perry and Franklin ODonnell 3 Oct. 1986 2 p
(NASA-News-Rel-86-140) Avail: NTIS HC A02

A new space radio-astronomy technique, using an orbiting satellite to study celestial objects, has been successfully tested by scientists at NASA'S Jet Propulsion Laboratory, Pasadena, Calif. An international team of scientists conducted experiments during July and August employing a new space technique called very long baseline interferometry (VLBI). They combined data from radio telescopes on the ground with data from an antenna on NASA's Tracking and Data Relay Satellite System (TDRSS) spacecraft. Investigators obtained better resolution of three quasars than is possible in ground-based radio studies at the same wavelength. Quasars, or quasi-stellar objects, are among the most distant objects known. The resolution obtained from the orbiting VLBI experiment was equivalent to that of a radio telescope with a size of 1.4 Earth diameters. The quasars studied are designated 1730-130, 1741-038 and 1510-089. For the first time, a VLBI experiment used an orbiting satellite as one of its radio telescopes. Previously, scientists linked widely separated antennae on the ground with VLBI techniques to produce high-resolution radio astronomy studies of celestial objects. Author

N87-10789*# Washington Univ., Seattle.
HIGH RESOLUTION CCD SPECTRA OF STARS IN GLOBULAR CLUSTERS. PART 2: METALS AND CNO IN M71
E. Myckky Leep, J. B. Oke, and George Wallerstein 1986 24 p
(Grants NGL05-002-134; NSF 84-15353)
(NASA-CR-179853; NAS 1.26:179853) Avail: NTIS HC A02/MF A01 CSCL 03A

Palomar coude CCD spectra of resolution 0.3 and 0.6 has been used to redetermine abundances in five stars of the relatively metal rich globular cluster M71. The (Fe/H) value is restricted to the limits of -0.6 to -1.0. The largest source of uncertainty is a systematic difference in f-values between those derived via the Holweger-Muller (1974) solar model and the Bell et al. (1976) solar model. If we use absolute f-values measured by the Oxford group (Blackwell et al. 1982) we find [Fe/H] to lie in the range of -0.6 to -0.75, i.e., as given by using the Bell et al. solar model. The relative abundances of the light elements, i.e., Na through Ca and probably including Ti show an average excess relative to iron of 0.4 dex. The effect of this difference on metal indices derived from broad- and narrow- band photometry is discussed. For three stars we find [O/H] = -0.6 using absolute f-values. For CN an analysis of individual rotational lines of the 2-0 band of the red system yields lines in the (C/H,N/H) plane that are consistent with either an original [C/Fe] = [N/Fe] = 0 or a modest increase in N relative to C due to CN burning and mixing. A search for C-13N was not successful and an uncertain lower limit of C-12/C-13 near 10 was obtained. Author

N87-10790*# California Inst. of Tech., Pasadena.
SPECTROSCOPY OF THE GLOBULAR CLUSTERS IN M87
J. R. Mould, J. B. Oke, and J. M. Nemec 18 Jul. 1986 26 p
(Grant NGL05-002-134)
(NASA-CR-179854; NAS 1.26:179854) Avail: NTIS HC A03/MF A01 CSCL 03A

With a velocity dispersion of 370 + or - 50 km/sec the globular cluster system of M87 is kinematically hotter than the stars in the giant elliptical itself. This is consistent with the clusters' shallower density distribution for isotropic orbits. The mean metallicity of the 27 clusters in the sample analyzed here is no more than a factor of 2 more metal rich than the cluster system of the Milky Way, but considerably more metal poowr than the integrated starlight in the field at a radius of 1' from the center of M87. There is no evidence for the existence of young clusters in the system. The mass-radius relation between 1' and 5' required to contain the globular clusters joins on to that required to contain the hot gas around M87. Author

N87-10791 Cornell Univ., Ithaca, N.Y.
INFRARED EMISSION LINES FROM PLANETARY NEBULAE Ph.D. Thesis
Mark Alan Shure 1985 156 p
Avail: Univ. Microfilms Order No. DA8525805

The ionic abundances and electron temperatures in the central regions of a number of planetary nebulae were determined using infrared fine-structure lines in the 15 to 40 micron range. The 91 cm telescope of the NASA Kuiper Airborne Observatory was used to measure the following lines: (S III) 18.71, (Ar III) 21.83, (Ne V) 24.28, (O IV) 25.87, (S III) 33.47, and Ne (III) 36.02 microns. Line emission was integrated over the entire emitting region in a total of twenty-two planetary nebulae, ranging from medium to high excitation. All except the (Ar III) line were detected at greater than 3 sigma. Although optical emission lines were used for decades to derive both abundances and temperatures, use of the

infrared lines offer two distinct advantages over the optical lines: infrared line emission is insensitive to temperature; and the high excitation ions O(IV) and Ne(V) prove regions closer to the central star than do the bright optical lines. As a consequence, abundances derived from infrared lines do not require accurate temperatures for nebulae, in contrast to the case for temperature-sensitive optical lines. Infrared ionic abundances are therefore potentially much more accurate than the optical abundances. By comparing integrated radio free-free emissions to the infrared line fluxes, abundances were determined for nineteen nebulae. Dissert. Abstr.

N87-10792 Wyoming Univ., Laramie.
LIGHT SCATTERING IN RESONANCE REGION FROM POLYDISPERSE NON-SPHERICAL PARTICLES Ph.D. Thesis
Joseph Stanley Mentek 1985 205 p
Avail: Univ. Microfilms Order No. DA8606183

Angular light intensity scattering patterns for particles with equivalent sphere radii approximately equal to the wavelength of the light source have been investigated in both experimental and analytic senses. Experimental measurements of the Mie scattering matrix elements M sub 1 and M sub 2 were performed for polydisperse samples of high irregularly shaped particles of SiO2. Experiments show that, at backscattering angles, the Mie theory for equivalent spheres overestimates the scattered intensities for M sub 1 and M sub 2. A model was developed to attempt to remove the surface wave contribution to the backscattering. The least squares parameter estimation technique that was applied does provide a satisfactory backscatter correction while maintaining the use of the Mie calculation that is applicable to spheres.
Dissert. Abstr.

N87-10793# Harvard Univ., Cambridge, Mass.
OBSERVATIONS OF NON-THERMAL RADIATION FROM LATE-TYPE STARS Ph.D. Thesis
Jay Aaron Bookbinder 1985 223 p
Avail: Univ. Microfilms Order No. DA8602193

The statistical properties of the X-ray and radio emission from the coronae of a sample of late-type stars are studied. The sample consists of a large, nearly volume-limited, propulation of K and M dwarfs. From these analyses we draw conclusions regarding stellar dynamos, the evolution of low-mass binary systems, and the nature of the coronal heating mechanism in low mass stars. We first examine the statistical behavior of the x-ray emission from the complete Einstein survey 243 late-type stars within 25 pc, focusing on the stellar age and color dependences. Optically selected, nearly volume limited subsamples which are reasonably free of known biases are used to show that, relative to the ucung disk stars, old disk stars have levels of coronal emission almost an order of magnitude smaller. There is also a steady, but small, decrease of coronal activity with decreasing mass. Furthermore, though we find that stars later than M5 are strongly under-represented in our X-ray survey, we are able to show that this is a direct result of their lower activity levels and cannot be due to a bias in the sample. A subset of these stars present in the X-ray survey was selected for observations at radio wavelengths. Combined with previously reported radio observations of M dwarfs and the X-ray date, it is shown that these observations can provide a new characterization of the coronal activity of late-type stars. The basic result is that the quiescent X-ray and radio emissions are strongly correlated, and that both show similar dependences on the stellar population. The high brightness temperatures inferred for the quiescent radio emission argues that a non-maxwellian distribution of electrons is responsible for the radio emission. Dissert. Abstr.

N87-10794 Wisconsin Univ., Madison.
OBSERVATIONS OF MOLECULAR CLOUDS IN THE DIRECTION OF GALACTIC AND EXTRAGALACTIV RADIO SOURCES Ph.D. Thesis
Ana Gomes Nash 1986 145 p
Avail: Univ. Microfilms Order No. DA8605704

The (1,1) and (2,2) inversion transitions of NH3 and the (1(sub 11)-1(sub 10)) K-doublet of H2CO were observed toward 3 extragalactic sources (NRA0150, 3C123, and 3C111) and 3 galactic H II regions (G24.8+0.1, G25.4-0.2, and G37.8-0.2). The OH absorption at 18 cm was observed toward NRA0150. The emission/absorption technique was employed in order to reduce the number of assumptions and, therefore, uncertainties involved in determining excitation temperature and optical depths. Kinetic temperatures were found from the NH3(1,1) and (2,2) data. A range in molecular hydrogen density was found from model curves of Stutzki and Winnewisser (1985). Dissert. Abstr.

N87-10795 California Univ., Berkeley.
SURFACE PHOTOMETRY OF EARLY-TYPE GALAXIES Ph.D. Thesis
Stanislav Bratislav Djorgovski 1985 635 p
Avail: Univ. Microfilms Order No. DA8609999

The results of a Charge Coupled Device (CCD) surface photometry survey of 262 elliptical and lenticular galaxies are presented. The original data set consists of some 720 CCD exposures of galaxies, and a large number of calibration exposures. All data were obtained in red bandpasses indigenous to Lick Observatory. The survey, the sample of galaxies covered, the methods of surface photometry, calibration procedures, and comparisons with other, published work by other authors are described. The survey results and some simple applications are then presented. The results are presented in the form of semimajor axis profiles of surface brightness, ellipticity, position angle, elliptical aperture magnitude, circular aperture magnitude, and residual Fourier amplitudes. Error-bars are evaluated for all quantities.
Dissert. Abstr.

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

For related information see also *75 Plasma Physics*.

N87-10796 Michigan Univ., Ann Arbor.
COMPUTATIONAL HYDRODYNAMICS IN ASTROPHYSICAL STUDIES: HIGHLY SHOCKED FLOWS IN 3 DIMENSIONS Ph.D. Thesis
Clifford Nicholas Arnold 1985 217 p
Avail: Univ. Microfilms Order No. DA8600402

A second order alternating direction implicit/explicit computer code (SADIE) was designed to model supersonic gas dynamics in one, two, or three dimensions. SADIE uses van Leer's Vector-Flux Splitting technique to track strong shocks accurately. On a Cyber 205, SADIE evolves 70,000 grid points per time step per second for three dimensional flows. Using this computational tool, several complicated flow problems were studied. The results of several test problems used to verify the code are reported. The simulation of a pressure matched supersonic jet (Mach 3 and Mach 6) propagating into a quiet medium was also presented. These simulations are done in hopes of gaining insight to some of the perplexing questions of extragalactic jets. Dissert. Abstr.

N87-10797 Pittsburgh Univ., Pa.
THE EFFECT OF A QUASI-STELLAR OBJECT ON ITS HOST GALAXY: DYNAMICAL AND PHYSICAL PROCESSES IN THE INTERSTELLAR MEDIUM AROUND A QSO Ph.D. Thesis
Chong-An Chang 1985 144 p
Avail: Univ. Microfilms Order No. DA8600621

The dynamical and physical processes in the interstellar medium around a quasi-stellar object (QSO) were calculated for the purpose of understanding the effects of QSO radiation on its host galaxy. Numerical hydrodynamical solutions were calculated for both one-dimensional and two-dimensional cases. Shock wave driven QSO radiation was simulated and followed under a MacCormmack differencing scheme to understand the density, pressure, temperature and velocity components of the gas. Physical processes and their effects on the dynamics are calculated, including the change of the size of a dust grain due to ion sputtering, ion-field emission, the change of dust grain surface charge, charge

equilibrium, ionization equilibrium, thermal equilibrium and the coupling between the dust grain and the interstellar gas ions and atoms. Results are obtained under different initial conditions and different physical parameters. It is shown that dust grains play an important role in determining the dynamics of the ISM around a QSO. Since they are destroyed by ion-field emission and sputtering when the shock passes through that region. The electric potential on a grain surface can be as high as thousands of Volts near the QSO prior to grain destruction. However, a high voltage induces ion-field emission and rapid destruction of the grain. Dissert. Abstr.

N87-10798 Boston Univ., Mass.
ELECTRON-POSITRON PAIR PRODUCTION BY ULTRARELATIVISTIC ELECTRONS IN A SOFT PHOTON FIELD Ph.D. Thesis
Ph.D. Thesis
Apostolos Mastichiadis 1985 92 p
Avail: Univ. Microfilms Order No. DA8601362

The fully differential cross section for photon-electron pair production is integrated numerically over phase space. Results were obtained for the astrophysically interesting case in which the interaction between an ultrarelativistic electron and a soft photon results in e-e+ pair production. The positron spectrum is a function of the energies of both the photon and the electron, as well as the angle of interaction. The energy at which the positron distribution peak is inversely proportional to the photon energy and independent of the electron energy. The positron spectrum is integrated once more over initial electron energies for a power law energy distribution depends linearly on the energy of the primary electron. Finally, semi-analytical expressions are obtained for the energy losses of the primary electrons. Dissert. Abstr.

N87-10799 Illinois Univ., Urbana-Champaign.
PULSE TIMING AND NEUTRON STAR STRUCTURE Ph.D. Thesis
Radha Nandkumar 1985 134 p
Avail: Univ. Microfilms Order No. DA8600274

Pulsar glitches, postglitch behavior, and timing noise are examined in terms of dynamical processes associated with the pinned crustal superfluid in neutron stars. The vortex creep theory satisfactorily explains the postglitch behaviour and pulsar glitches. Models for pulsar timing noise, which are based on the vortex creep theory, are considered. The noise power spectrum was evaluated in each case and compared to the theoretical models with the observed noise power spectra of some two dozen pulsars. The electrical and thermal conductivities and the shear viscosity are calculated. The effects of ionic correlations are taken into account by using the results of liquid structure factor of the one component plasma obtained from numerical simulations, as well as the effects of screening of the electron-ion interaction. Dissert. Abstr.

N87-10800 Washington Univ., Seattle.
GAS AND DUST IN REGIONS OF RECENT STAR FORMATION Ph.D. Thesis
Jason A. Cardelli 1985 305 p
Avail: Univ. Microfilms Order No. DA8529890

A variety of observations of gas and dust have been obtained in two regions of recent star formation for the purpose of determining basic physical properties. The analyses center on extinction and scattering in the Orion complex and extinction and atomic and molecular absorption near the center of rho Oph molecular cloud. In Orion, the visual extinction towards theta(1,2) Ori indicates that, for the grains responsible for the visual extinction, the average size has increased on the order of 20 to 30%. The subsequent increase in absolute visual extinction has resulted in an apparent lowering of the UV extinction via normalization in the visual. Analysis of small angle scattering in NGC 1999 in the UV indicates the phase function (g) changes from about 0.60 near lambda 4000 A to about 0.25 near lambda 1400 A. This seems to imply that the observed continua of H-H 1 and 2 cannot be the result of small angle scattering from imbedded T Tauri stars. For four lines of sight near the center of the rho Oph molecular cloud, the determined column densities of CH extend the relation N(CH) alpha N(H2)3 is extended to log N(H2) approx.=21. For three lines of sight with log N(H2) greater than 21, N(CN) falls well below this relation and consequently indicates that gas-phase reactions like C(+) + CH dominate over photodestruction at the higher densities appropriate for these three lines of sight. Depletions determined from atomic absorption lines are also discussed. Dissert. Abstr.

N87-10801# Fermi National Accelerator Lab., Batavia, Ill.
POSSIBLE SIGNIFICANCE OF A NEW DIMENSIONLESS RATIO IN COSMOLOGY
M. S. Turner and B. J. Carr May 1986 11 p Prepared in cooperation with Chicago Univ., Ill. and London Univ., England
(Contract DE-AC02-76CH-03000)
(DE86-011026; FNAL/Pub-86/66-A) Avail: NTIS
HC A02/MF A01

Observations suggest that the mass density of the Universe is dominated, not by ordinary matter, but by exotic particles which are a relic of the Big Bang. In this case, a new dimensionless cosmological ratio arises, the ratio of the mass density in ordinary matter to that in exotic matter, whose value is about 0.1. A priori it might seem remarkable that this ratio should be so close to unity. However, we point out that, for many exotic dark matter candidates, the ratio is related to the fundamental scales of particle physics. A value of order unity arises naturally providing rather simple relationships exist between these scales. DOE

N87-10802# Delaware Univ., Newark. Research Foundation.
PARTICLE THEORY AND COSMOLOGY Final Report, 16 Jul. 1984 - 31 Mar. 1986
Q. Shafi 17 Apr. 1986 8 p
(Contract DE-FG02-84ER-40176)
(DE86-010366; DOE/ER-40176/02) Avail: NTIS
HC A02/MF A01

The major thrust of the research reported was in the area of unified theories, in particular in grand unified and higher dimensional superstring theories. The problems that were addressed included: (1) the construction of realistic low energy (four dimensional) gauge models motivated from the ten-dimensional E8 x E8 superstring theory; (2) a study of the phenomenological and cosmological implications of such models; (3) implementation of the inflationary scenario in the context of higher dimensional theories of gravity; and (4) clarification of the role of extended structures such as strings, monopoles and domain walls in a cosmological setting, particularly in an inflationary cosmology. DOE

N87-10803 Wisconsin Univ., Madison.
CONDITIONS FOR THE FORMATION OF MASSIVE STARS Ph.D. Thesis
Mark Guy Wolfire 1985 184 p
Avail: Univ. Microfilms Order No. DA8601133

Upper limits on the masses of stars that can form are reinvestigated and models for the inflow of matter through cocoons around stars of 60, 100, and 100 solar mass are calculated. Radiative forces on dust play a crucial role in halting an accretion inflow. Rather general conditions that must hold at the inner and outer boundaries of a protostellar cocoon are considered. Limits are derived on the dust to gas ratios and mass inflow rates that will permit inflow onto very massive stars. It is found that the ISM dust mixture of Mathis, Rumpl, and Nordsieck would not allow an inflow to occur. It is necessary that the standard Galactic gas to dust ratio by reduced by a factor four or more and the larger graphite grains be missing from the dust size distribution function. The inflows also require mass accretion rates of about 10 to the-3 solar mass/yr or more for there to be sufficiently strong ram-pressure to overcome the strong radiative deceleration that occurs at the inner boundary of the shell. For the model calculations, radiative deceleration of grains and grain destruction processes are explicitly accounted for in an iterative solution of the radiation-hydrodynamic equations. Inflow can occur if intermediate sized grains (0.05-0.25 microns) are missing from the initial gas/dust mixture. Very small grains or very large grains greater than 100 microns allow infall to proceed. The existence of massive

stars in certain locations in galaxies suggest that preconditioning of the interstellar medium by shocks or by turbulence is required for massive star formation. Dissert. Abstr.

N87-10804 Columbia Univ., New York.
BRIGHT GALACTIC X-RAY BINARY SOURCES: TEMPORAL AND SPECTRAL STUDIES Ph.D. Thesis
Saeqa Dil Vrtilek 1985 143 p
Avail: Univ. Microfilms Order No. DA8604685

A detailed analysis of the time-dependent X-ray spectra of five bright binary sources were performed: Cygnus X-2, GX9 + 9, 1820-30 (a globular cluster burst source), Serpens X-1 (also a burster), and Hercules X-1. The observations were taken with the Einstein Monitor Proportional Counter and Objective Grating Spectrometer. Dissert. Abstr.

N87-10805 Pennsylvania State Univ., University Park.
ON THE STABILITY OF ACCRETION DISKS AROUND BLACK HOLES Ph.D. Thesis
M. Randall McKee 1985 116 p
Avail: Univ. Microfilms Order No. DA8607186

A stability analysis of the accretion process around a black hole is presented within the context of a thin alpha-disk model. The analysis includes azimuthal as well as radial perturbations. All terms resulting from the dispersion relation are retained. For the purely radial analysis, a viscous and a thermal instability arise in the inner region of the accretion disk. A phase velocity is present over all radial perturbation wavelengths and pure standing waves do not result. The viscous instability is found to arise only in the purely radial mode. When azimuthal perturbations are included, the thermal instability behaves radially like a standing wave upon which is superposed an azimuthal mode with constant phase velocity. Hot spots may therefore develop, whose Keplerian rotation may account for the rapid fluctuations observed from accreting systems. Due to the inherent shearing of the hot spots, a duration time of the oscillations is predicted. The results are applied to several types of accreting objects where this analysis is thought to be relevant, such as the galactic black hole candidate source Cyg X-1, active galactic nuclei, and nonmagnetic neutron star systems. date source Cyg X-1, active galactic nuclei, and non-magnetic neutron star systems. Dissert. Abstr.

N87-10806 California Univ., Berkeley.
A STUDY OF HIERARCHICAL CLUSTERING OF GALAXIES IN AN EXPANDING UNIVERSE Ph.D. Thesis
David Henry Porter 1985 152 p
Avail: Univ. Microfilms Order No. DA861173

The nonlinear hierarchical clustering of galaxies in an Einstein-deSitter (Omega = 1), initially white noise mass fluctuations (n = 0) model universe is investigated and shown to be in contradiction with previous results. The model is done in terms of an 11,000-body numerical simulation. The independent statics of 0.72 million particles are used to simulte the boundary conditions. A new method for integrating the Newtonian N-body gravity equations, which has controllable accuracy, incorporates a recursive center of mass reduction, and regularizes two body encounters is used to do the simulation. The coordinate system used here is well suited for the investigation of galaxy clustering, incorporating the independent positions and velocities of an arbitrary number of particles are used to simulate the boundary conditions. A new method for integrating the Newtonian N-body gravity equations, to map the independent statics of 0.72 million particles into just 4,000 particles. This method for simulating the boundary conditions also has controllable accuracy. Dissert. Abstr.

N87-10807 Michigan Univ., Ann Arbor.
EMISSION-LINE GALAXIES TOWARD THE BOOTES VOID Ph.D. Thesis
Joseph Ward Moody 1986 181 p
Avail: Univ. Microfilms Order No. DA8612585

Galaxies with strong emission are potentially useful as probes of the large-scale galaxian distribution. However, to serve as probes their relative frequency and clustering properties must be known. A study of these properties for field galaxies having (OIII)wavelength 5007 emission equivalent widths greater than 10 A and reports on a search for galaxies (OIII)wavelength 5007 in the direction of the Bootes void is presented. The study of field emission-line galaxies was done in two magnitude limited surveys consisting of 341 galaxies from both the north and south galactic caps having previously published red shifts and photometry. A search for emission-line galaxies toward the Bootes void was undertaken using the Burrell Schmidt telescope and and objective prism giving a reciprocal dispersion of 900 A/mm at H beta. A spectral survey was also done of galaxies from an independent, low-dispersion objective prism of the southern portion of the void. A comparison with previous work finds tentative but not conclusive evidence that emission-line galaxies have a higher relative abundance in voids that in the field. Dissert. Abstr.

N87-10808 California Univ., Berkeley.
PHYSICAL PROCESSES IN COLLAPSE DRIVEN SUPERNOVA Ph.D. Thesis
Ronald William Mayle 1985 233 p
Avail: Univ. Microfilms Order No. DA8610131

Supernova are believed to occur when a massive star, unable to continue burning nuclear fuel in its interior, collapses, and subsequently produces a spectacular explosion. The explosive mechanism relies on the fact that the central part of these massive stars evolve into neutron stars. Late time supernovae are examined. The method of neutrino transport being used in a numerical simulation is very important in the study of late time supernovae, as the explosive mechanism depends on neutrino heating of the material behind the shock. Neutrino transport is discussed, and results are presented that indicate flux limited neutrino transport does an adequate job of following neutrino evolution. An approximate method of incorporating convection is described, and some results of including convection in a computer model are presented. Another phenomena seen in computer simulations of supernovae are oscillations in the neutrino luminosity and mass accretion rate onto the proto-neutron star. An attempt is made to understand this oscillation by perturbation of the steady state solution to equations approximating the complex physical processes occurring in the late time supernovae. Dissert. Abstr.

N87-10809 Columbia Univ., New York.
MOLECULAR CLOUDS IN ORION AND MONOCEROS Ph.D. Thesis
Ronald Joseph Maddalena 1986 212 p
Avail: Univ. Microfilms Order No. DA8610791

About one-eighth of a well-sampled 850 square degree region of Orion and Monoceros, extending from the Taurus dark cloud complex to the CMa OB 1 association, shows emission at the frequency of the J =1 0 transition of CO coming from either local clouds (d < 1 kpc) lying as much as 25% from the galactic plane or from more distant objects located within a few degrees of the plane and well outside the solar circle. Cloud masses derived from CO luminosity are as reliable as others determined with more difficulty. Local giant molecular clouds associated with Orion A and B have enhanced temperatures and densities near their western edges possibly due to compression of molecular gas by a high pressure region created by the cumulative effects of approx. 10 supernovae that occurred in the Orion OB association. Another gain molecular cloud found to be associated with Mon R2 may be related to the Orion clouds. Two filamentary clouds (one possible 300 pc long but only 3- 10 pc wide) were found which may represent a new class of object. Magnetic fields probably play a role in confining these filaments. An expanding ring of clouds concentric with the H 11 region S 264 and its ionizing 08 star, Lambda Ori, was also investigated, and a possible evolutionary sequence for the ring is given in detail. The clouds probably constitute fragments of the original cloud from which lambda Ori formed. Dissert. Abstr.

N87-10810 California Univ., Berkeley.
ON THE TIDAL INTERACTION BETWEEN SPHERICAL GALAXIES Ph.D. Thesis
Luis Alberto Aguilar-Chiu 1985 96 p

Avail: Univ. Microfilms Order No. DA8609915

The effects of tidal forces on the internal structure of non-rotating spherical galaxies that undergo a hyperbolic encounter are investigated using the impulse approximation and N-body experiments. The simulations use models with King and de Vaucouleurs surface-density profiles and radial, tangential and isotropic velocity distributions. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N87-10811*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.

A MODELING ANALYSIS PROGRAM FOR THE JPL TABLE MOUNTAIN Io SODIUM CLOUD DATA Annual Report, 1 Jun. 1986 - 31 May 1986

William H. Smyth and Bruce A. Goldberg (Jet Propulsion Lab., California Inst. of Tech., Pasadena) Aug. 1986 77 p

(Contract NASw-3949)

(NASA-CR-179671; NAS 1.26:179671) Avail: NTIS HC A05/MF A01 CSCL 03B

Progress and achievements in the second year are discussed in three main areas: (1) data quality review of the 1981 Region B/C images; (2) data processing activities; and (3) modeling activities. The data quality review revealed that almost all 1981 Region B/C images are of sufficient quality to be valuable in the analyses of the JPL data set. In the second area, the major milestone reached was the successful development and application of complex image-processing software required to render the original image data suitable for modeling analysis studies. In the third area, the lifetime description of sodium atoms in the planet magnetosphere was improved in the model to include the offset dipole nature of the magnetic field as well as an east-west electric field. These improvements are important in properly representing the basic morphology as well as the east-west asymmetries of the sodium cloud. Author

N87-10812*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

THE CASE FOR MARS: CONCEPT DEVELOPMENT FOR A MARS RESEARCH STATION

S. M. Welch, ed. and C. R. Stoker, ed. 15 Apr. 1986 139 p

(Contract NAS7-918)

(NASA-CR-179753; JPL-Pub-86-26; NAS 1.26:179753) Avail: NTIS HC A07/MF A01 CSCL 03B

A program to establish a permanent scientific research base on Mars is described. A Mars base as the much needed long-term focus for the space program is presented. A permanent base was chosen rather than the more conventional concept of a series of individual missions to different sites because the permanent base offers much greater scientific return plus greater crew safety and the potential for eventual growth into a settlement. The Mars base will strive for self-sufficiency and autonomy from Earth. Martian resources will be used to provide life support materials and consumables. The Martian atmosphere will provide a convenient source of volatiles: CO_2, N_2, and water. Rocket propellant (for returning vehicles), fuels, breathable air, and fertilizers will be manufactured from Mars air. Food will be grown on Mars using Martian materials as plant nutrients. A permanent human presence will be maintained on Mars beginning with the first manned landing via a strategy of crew overlap. This permanent presence will ensure safety and reliability of systems through continuous tending, maintenance, and expansion of the base's equipment and systems. A permanent base will allow the development of a substantial facility on Mars for the same cost (in terms of Earth departure mass) as a series of temporary camps. A base equipped with surface rovers, airplanes, and the ability to manufacture consumables and return propellant will allow far more extensive planetary exploration over a given period of years than would approaches featuring a series of short exploration missions such as the Apollo Moon program. Author

N87-10813*# Iowa Univ., Iowa City.

PERIODIC AMPLITUDE VARIATIONS IN JOVIAN CONTINUUM RADIATION Progress Report, Period Ending Feb. 1986

W. S. Kurth, D. A. Gurnett, and F. L. Scarf (TRW Space Technology Labs., Redondo Beach, Calif.) 2 Apr. 1986 31 p Sponsored in part by NASA Prepared in cooperation with JPL

(Contract N00014-82-K-0183)

(NASA-CR-177070; NAS 1.26:177070; AD-A167923; U-of-Iowa-86-17) Avail: NTIS HC A03/MF A01 CSCL 03B

An analysis of periodic variations in the amplitude of continuum radiation trapped in the Jovian magnetosphere shows structure with periods near both five and ten hours. Contrary to a plausible initial idea, the continuum amplitudes are not organized by position of the observer relative to the dense plasma sheet. Instead, there seem to be preferred orientations of system III longitude with respect to the direction to the Sun which account for the peaks. This implies a clock-like modulation of the continuum radiation intensity as opposed to a searchlight effect. The importance of the dipole longitude-solar wind alignment to the amplitude of the continuum radiation implies the source region of the radiation is near the magnetopause and may tie the generation of the radio waves to the clock like modulation of energetic electron fluxes from Jupiter. GRA

N87-10814*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PLASMA WAVE OBSERVATIONS AT URANUS FROM VOYAGER 2 Progress Report, period ending Feb. 1986

D. A. Gurnett (Iowa Univ., Iowa City), W. S. Kurth, F. L. Scarf (TRW Space Technology Labs., Redondo Beach, Calif.), and R. L. Poynter 26 Mar. 1986 21 p Sponsored by NASA

(Contract N00014-85-K-0404)

(NASA-CR-177069; NAS 1.26:177069; AD-A167924; U-OF-IOWA-86-16) Avail: NTIS HC A02/MF A01 CSCL 03B

Radio emissions from Uranus were detected by the Voyager 2 plasma wave instrument about 5 days before closest approach at frequencies of 31.1 and 56.2 khz. The bow shock was identified by an abrupt broadband burst of electrostatic turbulence about 10 hours before closest approach at a radial distance of 23.5 ru. Once inside of the magnetosphere strong whistler mode hiss and chorus emissions were observed at radial distances less than about 8 R sub u, in the same region where the energetic particle instruments detected intense fluxes of energetic electrons. A variety of other plasma waves, such as (f sub c) electron cyclotron waves, were also observed in this same region. At the ring plane crossing the plasma wave instrument detected a large number of impulsive events that are interpreted as impacts of micron sized dust particles on the spacecraft. The maximum impact rate was about 20 to 30 impacts/sec, and the north-south thickness of the impact region was about 4,000 km. This paper presents an overview of the principal results from the plasma wave instrument, starting with the first detection of radio emissions from Uranus, and ending a few days after closest approach. GRA

N87-10815 Michigan Univ., Ann Arbor.

CLOUDS AND METHANE PHOTOCHEMICAL HAZES ON THE OUTER PLANETS Ph.D. Thesis

Paul Nichols Romani 1986 208 p

Avail: Univ. Microfilms Order No. DA8612612

A numerical model which uses thermodynamic and hydrostatic equilibrium was developed to study the cloud structure of the outer planets: Jupiter, Saturn, Uranus, and Neptune. The model calculates cloud locations, cloud densities, the mixing ratio profiles of the condensates, and the thermal structure from the appropriate wet/dry adiabatic lapse rate. The effects of ortho-to-para H_2 conversion (latent heat release and change in heat capacity of H_2) are also considered. The outer planets are predicted to have a multilayered cloud structure consisting of one or more

of the following clouds: NH3-H2O solution; H2O-ice; NH3-ice; NH4SH-solid; H2S-ice; or CH4-ice. Model predictions are compared to relevant observations. Dissert. Abstr.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N87-10816*# Alaska Univ., Fairbanks.
A STUDY OF DISTURBED SOLAR WIND AND MAGNETOTAIL BASED ON ISEE-3 DATA Semiannual Status Report, 1 Jan. - 31 Jul. 1986
S.-I. Akasofu 1986 45 p
(Grant NAG5-571)
(NASA-CR-177060; NAS 1.26:177060) Avail: NTIS HC A03/MF A01 CSCL 03B

Images of auroral emissions observed with the Dynamics Explorer 1 are used to calculate ionospheric conductivities over the polar region. The combination of ground-based magnetometer data and the inferred conductivities enable the estimation on a global scale of the distributions of ionospheric electric fields and currents and field-aligned currents, as well as, the Joule heating production rate, with a time resolution of 12 min. Although the inference of the conductivity distribution requires further improvements, the following conclusions may be drawn: The westward electrojet is, in general, collocated with the region of high auroral luminoisty, while the region of relatively low luminosity in the evening section is collocated with the eastward electrojet. The upward field-aligned currents exist in the brightest auroral region on the poleward side of the evening auroral oval and on the equatorward side of the morning oval. A significant amount of ionospheric currents can flow in regions where there are no bright auroral emissions. The distribution of calculated field-aligned currents displays many localized structures which characterize the development of the substorm current system. Author

N87-10817# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
WORKSHOP ON THE PHYSICS AND CHEMISTRY OF SOLAR-FLUX EFFECTS ON CONDENSED PHASE/GAS INTERFACES
G. E. Gross and H. Harris May 1986 36 p Workshop held in Golden, Colo., 30 Jul. 1985
(Contract DE-AC02-83CH-10093)
(DE86-004460; SERI/CP-255-2908; CONF-8507124-Summs) Avail: NTIS HC A03/MF A01

Notes transcribed from a workshop on effects of high intensity visible radiation (high solar flux) on materials are presented with comments by the workshop chairman and participants. Discussions presented include laser damage, photochemical effects, crystal defects, high temperature effects, and testing of materials in large solar concentrators. Contrasts are observed between highly concentrated solar radiation and equivalent power levels of coherent radiation from monochromatic lasers. The discussions suggest a lack of nonlinear or multiphoton optical effects to be expected from solar radiation even at the theoretical maximum of concentration (some 60,000 times normal sun light). DOE

N87-10818 Alaska Univ., Fairbanks.
THREE-DIMENSIONAL STRUCTUPE OF THE HELIOSPHERE: QUIET-TIME AND DISTURBED PERIODS Ph.D. Thesis
Craig Daniel Fry 1985 371 p
Avail: Univ. Microfilms Order No. DA8612261

An improved kinematic method is used to perform simulation studies of temporal and spatial variations of solar wind speed and interplanetary magnetic field during periods when the sun is quiet and when it is active. The procedure of Hakamada and Akasofu (1982) is imporved and calibrated with a one-dimensional magnetohydrodynamic solution of solar wind flow. The solar-cycle evolution of solar wind velocity is studied using the data sets of King (1979,1983) and Hoeksema (1982,1983) for the period 1976 to 1982. The background solar wind velocity and magnetic field are simulated and compared to observations near the Earth. Three-dimensional representations ofthe heliospheric current sheet (HCS) are displayed out to 5 AU for idealized dipole and quadrupole cases, and for observed source field configurations. The propagation of solar wind disturbances in the solar equatorial plane to 30 Au is simulated. Two major disturbance event periods are simulated, and it is seen how a series of solar flares can greatly disrupt both the inner and outer heliosphere. Visual representations of the distorted HCS due to a series of hypothetical solar flares are presented. Dissert. Abstr.

N87-10479*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
AN ANALYSIS AT MESOSPHERIC COHERENT-SCATTER POWER ENHANCEMENTS DURING SOLAR FLARE EVENTS
J. Parker and S. A. Bowhill *In* International Council of Scientific Unions, Middle Atmosphere Program. Handbook for MAP, Vol. 20 Jun. 1986 7 p (For primary document see N87-10419 01-42)
Avail: NTIS HC A22/MF A01; also available from SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 03B

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

N87-10819# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
AMPLITUDE DISTRIBUTION OF COSMIC RAY EVENTS IN EXTRINSIC IR DETECTORS
L. Aukerman 15 Mar. 1986 23 p
(Contract F04701-85-C-0086)
(AD-A167692; TR-0086(6427-01)-1; SD-TR-86-17) Avail: NTIS HC A02/MF A01 CSCL 17/5

A method of calculating the amplitude distribution of cosmic ray events in IR detectors utilizing known range energy relationships for the various cosmic particles (mostly protons and helium nuclei) and published cosmic ray energy spectra is described. Good agreement is obtained between the calculated amplitude distribution and the spurious events observed in an extrinsic detector during a flight test. GRA

N87-10820# Los Alamos National Lab., N. Mex.
INTENSE SOFT X-RAYS FROM RS OPHIUCHI DURING THE 1985 OUTBURST
K. O. Mason, F. A. Cordova, M. F. Bode, and P. Barr 1985 11 p Presented at the Conference on RS Ophiuchi and the Recurrent Nova Phenomenon, Manchester, England, 1 Dec. 1985 Prepared in cooperation with Mullard Space Science Lab., Dorking, England, Preston Polytechnic, England European Space Agency European Space Operations Centre, Darmstadt, West Germany
(Contract W-7405-eng-36)
(DE86-010175; LA-UR-86-1216; CONF-851272-2) Avail: NTIS HC A02/MF A01

Intense soft X ray emission with a characteristic temperature of a few million degrees has been detected from the recurrent nova RS Oph approximately two months after its January 1985 optical outburst. This is the first detection of X rays from such a system at outburst. The X radiation is interpreted as emission from circumstellar gas that is shock heated by the passage of the blast wave from the nova explosion. The rapid decline of the X ray flux between about 60 and 90 days after the outburst probably occurs because the blast wave has reached the edge of the volume filled, between outbursts, by the stellar wind of the red giant component of the binary system. Residual X ray emission detected

from RS Oph 250 days after the outburst is interpreted as coming from the surface of a white dwarf, at a temperature of approx 300,000K, where thermonuclear burning is persisting. DOE

N87-10821# Los Alamos National Lab., N. Mex.
NUCLIDE PRODUCTION BY PRIMARY COSMIC-RAY PROTONS
R. C. Reedy 1986 18 p Presented at the Lunar and Planetary Science Conference, Houston, Tex., 17 Mar. 1986
(Contract W-7405-eng-36)
(DE86-011268; LA-UR-86-1524; CONF-860375-2) Avail: NTIS HC A02/MF A01

The production rates of cosmogenic nuclides in the solar system and in interstellar space were calculated for the primary protons in the galactic and solar cosmic rays. At 1 AU, the long-term average fluxes of solar protons usually produce many more atoms of a cosmogenic nuclide than the primary protons in the galactic cosmic rays (GCR), the exceptions being nuclides made only by high-energy reactions (like ^{10}Be). Because the particle fluxes inside meteorites and other large objects in space include many secondary neutrons, the production rates are much higher. The production rates of cosmogenic nuclides are calculated to vary by about factors of 2.5 during at typical 11-year solar cycle, in agreement with measurements of short-lived radionuclides in recently fallen meteorites. The production of cosmogenic nuclides by the GCR particles outside the heliosphere is higher than that by the modulated GCR primaries normally in the solar system. However, there is considerable uncertainty in the fluxes of interstellar protons and, therefore, in the production rates of cosmogenic nuclides in interstellar space. Production rates and ratios for cosmogenic nuclides would be able to identify particles that were small in space or that were exposed to an unmodulated spectrum of GCR particles. DOE

N87-10822# Department of Energy, New York. Environmental Measurements Lab.
COSMIC-RAY HADRONS UNDERGROUND
K. OBrien Dec. 1985 20 p
(DE86-011334; EML-447) Avail: NTIS HC A02/MF A01

Hadron fluxes and star densities in volcanic material have been calculated down to a depth of 6000 g/cm to supply a data base for use in calculating cosmogenic isotopes production. It is hoped to be able to use these isotopes to determine the age of the volcanic material. Some curves of star density with depth and of hadron spectra for various depths in basalt are presented. DOE

N87-10823# Los Alamos National Lab., N. Mex.
INTERPRETATION OF EXTRAGALACTIC JETS
M. L. Norman 1985 16 p Presented at the International Astronomical Union (IAU) Colloquium, Copenhagen, Denmark, 11 Jun. 1985
(Contract W-7405-eng-36)
(DE86-011211; LA-UR-86-1705; CONF-8506205-4) Avail: NTIS HC A02/MF A01

The nature of extragalatic radio jets is modeled. The basic hypothesis of these models is that extragalatic jets are outflows of matter which can be described within the framework of fluid dynamics and that the outflows are essentially continuous. The discussion is limited to the interpretation of large-scale (i.e., kiloparsec-scale) jets. The central problem is to infer the physical parameters of the jets from observed distributions of total and polarized intensity and angle of polarization as a function of frequency. DOE

N87-10824 California Inst. of Tech., Pasadena.
INVESTIGATIONS OF RADIO JETS IN M87, 3C273 AND 3C345 Ph.D. Thesis
John Anthony Biretta 1986 155 p
Avail: Univ. Microfilms Order No. DA8605393

Observational studies of extra-galactic radio jets in M87,3C273, and 3C345 are presented. Observations of the M87 jet were made at 15 GHz with 0.12" resolution. All of the knots are clearly resolved both along and across the jet. Most of the knots are found to be smooth in appearance with no evidence of shocklike discontinuities. The brightest knot and the innermost knot are exceptions to this. The brightest knot (knot A) seems consistent with a shock caused by unsteady flow in the jet. Models for this feature are discussed. Combining our data with X-ray data suggests that the jet is neither freely expanding, thermally confined, nor ram pressure confined. The jet may, however, be magnetically confined. Observations of 3C273 at 10.7 GHz VLBI with high northsouth resolution are presented. A strong, non-monotonic curvature is found in the jet at projected radii less than or equal to 5 pc. It is unlikely that this curvature can be caused by precession. Measurements of the core size show that bulk relativistic motion in the core is not required for consistency with the observed X-ray flux.
Dissert. Abstr.

N87-10825 Texas Univ., Austin.
GAUGE INVARIANT PERTURBATION THEORY PREDICTION OF THE SENSITIVITY REQUIRED FOR EXPERIMENTAL MEASUREMENT OF QUADRUPOLE AND HIGHER MOMENTS OF THE COSMIC MICROWAVE BACKGROUND RADIATION Ph.D. Thesis
Kenneth Earl Wilson 1985 429 p
Avail: Univ. Microfilms Order No. DA8609611

The temperature variation of the cosmic microwave background radiation is computed in a spherical harmonic expansion for a 4 million term sum of perturbations. Each term has a different direction and a randomly chosen path. The computation was performed by starting with the model for gauge invariant cosmological perturbations. This model does linear perturbatin theory against a background Friedmann-Robertson-Walker general relativistic cosmological model. The Bardeen model was recomputed for a cosmological-time metric, then solved for zero curvature and zero cosmological constant in the background for radiation and dust equations of state. The model was solved for zero curvature, cosmological constant, and pressure in perturbation order. These solution were used to compute the redshift equation, and then the temperature variation equation. Analytical equations are obtained for the temperature variation caused by an isothermal or adiabatic perturbatin of a single mode (amplitude, wavelength, phase, and direction). A Fourier series is formulated with short wavelength cutoff set by acoustic damping, and long wavelength cuttoff set by the perturbation assumption. The temperature variation was predicted for ten cases: adiabatic and isothermal perturbations with power law exponents of 0 through 4.
Dissert. Abstr.

N87-10826 Iowa Univ., Iowa City.
A STUDY OF THE GROUND STATE HYDROXYL MASER EMISSIONS ASSOCIATED WITH ELEVEN REGIONS OF STAR FORMATION Ph.D. Thesis
Ralph A. Gaume, Jr. 1985 186 p
Avail: Univ. Microfilms Order No. DA8611089

Arcsecond resolution maps were obtained for the ground state hydroxyl maser and 15 GHz continuum emissions associated with eleven regions of star formation. Within these regions over 30 individual sites of maser emission were identified. Main line transitions occurred most frequently and were usually the strongest features. It was found that 20% of the maser clusters do not appear closely associated with 15 Ghz continuum sources. The data does not support the idea that hydroxyl masers are uniformly distributed in a thin or thick shell surrounding a central star, or that continuum background photons play a significant part in determining the output intensities of hydroxyl masers. Five of the continuum sources appear to be the cometary class of H II regions, whose structure suggest relative motion between the region and surrounding neutral material. In four of the five regions it is found that the strongest hydroxyl maser emission are projected onto the upstream leading edge of the ionized hydrogen regions, suggesting that the masers form in the interaction region between the neutral material and H II complex. The maser emission in four of the five regions exhibit velocity structure, indicating existence of ordered velocity fields.
Dissert. Abstr.

99 GENERAL

N87-10827*# National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICS AND SPACE REPORT OF THE PRESIDENT
1985 148 p
(NASA-TM-89239; NAS 1.15:89239; GPO-495-812) Avail: NTIS HC A07/MF A01 CSCL 05B

The achievements and activities of the United States aeronautics and space programs for 1985 are examined. The activities are listed by the sponsoring government agency. B.G.

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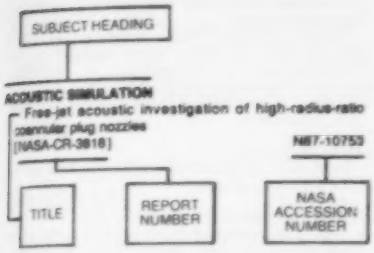

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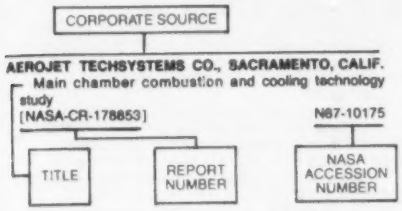

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COMISSAO NACIONAL DE ENERGIA NUCLEAR DE BRASIL, RIO DE JANEIRO.
Study about the structural behavior of WSIE-36N steel
[DE86-702011] N87-10394

COMMISSION OF THE EUROPEAN COMMUNITIES, BRUSSELS (BELGIUM).
Atmospheric Ozone 1985. Assessment of our understanding of the processes controlling its present distribution and change, volume 1
[NASA-TM-89237] N87-10612

COMMISSION OF THE EUROPEAN COMMUNITIES, KARLSRUHE (WEST GERMANY).
Re-examination of the neptunium-hydrogen system
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COMMITTEE ON APPROPRIATIONS (U. S. SENATE).
Department of Housing and Urban Development-Independent Agencies Appropriation Bill, 1987
[S-REPT-99-487] N87-10773
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COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
National Aeronautics and Space Administration Authorization Act, 1987 N87-10775

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An algorithm for the detection of signals by colour contrast on the screen of a colour cathode ray tube (colour display)
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Digital mapping: Fact or fiction
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DEFENSE MAPPING AGENCY AEROSPACE CENTER, ST. LOUIS, MO.
World geodetic system 1984
[AD-A167570] N87-10527
DEFENSE MAPPING AGENCY HYDROGRAPHIC AND TOPOGRAPHIC CENTER, WASHINGTON, D.C.
DMAHTC (Defense Mapping Agency Hydrographic/Topographic Center) GPS point positioning software: Initial results
[AD-A167566] N87-10058
DMA (Defense Mapping Agency) orbit determination for transit satellites: 1985
[AD-A167567] N87-10108
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DEPARTMENT OF ENERGY, NEW YORK.
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).
Proceedings of the 13th Symposium on Aircraft Integrated Data Systems
[DFVLR-MITT-86-04] N87-10075
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Methods and standards for encryption of spacecraft telemetry and telecommand links
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ELECTRICITE DE FRANCE, CHATOU.
A Meteorological (humidity, temperature, aerosols) mobile dial system: Concepts and design N87-10298
ENERGY SCIENCE LABS., INC., SAN DIEGO, CALIF.
Guidebook for analysis of tether applications
[NASA-CR-178904] N87-10189
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ESCUELA TECNICA SUPERIOR DE INGENIEROS AERONAUTICOS, MADRID (SPAIN).
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EUROCONTROL AGENCY, BRUSSELS (BELGIUM).
The air/ground transfer of aircraft integrated data systems (AIDS) for Air Traffic Control (ATC) purposes: Present experiments and possible future intentions
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CO2 lidar system for atmospheric studies N87-10366
EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Proceedings of 2nd International Conference on Space Physiology
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EUROPEAN SPACE AGENCY. EUROPEAN SPACE OPERATIONS CENTER, DARMSTADT (WEST GERMANY).
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EUROPEAN SPACE AGENCY. EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, ESTEC, NOORDWIJK (NETHERLANDS).
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[DOT/FAA/CT-85/20] N87-10055
The Boeing B 720 aircraft Controlled Impact Demonstration (CID): Flight data recorder/cockpit voice recorder experiment N87-10096
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Atmospheric Ozone 1985. Assessment of our understanding of the processes controlling its present distribution and change, volume 1
[NASA-TM-88237] N87-10612
FERMI NATIONAL ACCELERATOR LAB., BATAVIA, ILL.
Possible significance of a new dimensionless ratio in cosmology
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Multiple scattering measurements in laboratory and foggy atmosphere N87-10315
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[NASA-CR-179711] N87-10063
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FRAUNHOFER-INST. FUER ATMOSPHAERISCHE UMWELTFORSCHUNG, GARMISCH-PARTENKIRCHEN (WEST GERMANY).
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Strategic Defense Initiative Program: Status of airborne optical adjunct and terminal imaging radar
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Free jet feasibility study of a thermal acoustic shield concept for AST/VCE application: Dual stream nozzles
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GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Detailed transient model of a liquid-metal heat pipe
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Wind tunnel test of the modified goldschmied model with propulsion and empennage: Analysis of test results
[AD-A167360] N87-10045
GROUPE D'ETUDE EN MEDECINE ET PHYSIOLOGIE SPATIALES, TOULOUSE (FRANCE).
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GRUMMAN AEROSPACE CORP., BETHPAGE, N.Y.
Viscous wing theory development. Volume 1: Analysis, method and results
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Viscous wing theory development. Volume 2: GRUMWING computer program user's manual
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IBM JAPAN.
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INDIAN SPACE RESEARCH ORGANIZATION, BANGALORE.
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INSTITUTE OF BIOMEDICAL PROBLEMS, MOSCOW (USSR).
Functions of skeletal muscles of rats and monkeys after 5-day space flight (on Cosmos 1514) N87-10686
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Parameter optimization and attitude stabilization of a flexible spacecraft N87-10138
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INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, URBANA, ILL.
Middle Atmosphere Program. Handbook for MAP, volume 20
[NASA-CR-178882] N87-10419
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ISRAEL ATOMIC ENERGY COMMISSION, YAVNEH.
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MAPM: A coherent dual CO2 laser DIAL system N87-10358
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Total-dose radiation effects data for semiconductor devices, 1985 Supplement. Volume 2, part B
[NASA-CR-179741] N87-10765
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[NASA-CR-177070] N87-10813
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JOINT RESEARCH CENTRE OF THE EUROPEAN COMMUNITIES, ISPRA (ITALY).
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KEIO UNIV., YOKAHAMA (JAPAN).
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Transient heat transfer analysis and radiative properties measurements of porous thermal insulation
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Measurements of precipitating atmosphere by the MU radar N87-10426
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Tropospheric turbulence parameters measured by using the MU radar N87-10436
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
In-flight total forces, moments and static aeroelastic characteristics of an oblique-wing research airplane
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD INST. FOR SPACE STUDIES, NEW YORK.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
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NATIONAL CENTRAL UNIV., CHUNG-LI (TAIWAN).
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NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.
Solar-geophysical data number 501, May 1986. Part 2: (Comprehensive reports). Data for November 1985 and miscellanea
[PB86-218047] N87-10622
Solar-geophysical data number 501, May 1986. Part 1: (Prompt reports). Data for April 1986, March 1986 and late data
[PB86-218039] N87-10623
Solar-geophysical data number 499, March 1986, supplement
[NASA-CR-179797] N87-10624
Solar-geophysical data number 499, March 1986. Part 2: (Comprehensive reports). Data for September 1986 and miscellanea
[NASA-CR-179796] N87-10625
Solar-geophysical data number 499, March 1986. Part 1: (Prompt reports). Data for February 1986, January 1986 and late data
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NATIONAL INST. FOR ENVIRONMENTAL STUDIES, TSUKUBA (JAPAN).
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
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[PB86-200647] N87-10665

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
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Atmospheric Ozone 1985. Assessment of our understanding of the processes controlling its present distribution and change, volume 1
[NASA-TM-89237] N87-10612
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NATIONAL SPACE DEVELOPMENT AGENCY, TOKYO (JAPAN).
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report, Delta Air Lines, Inc., Lockheed L-1011-385-1, N726DA, Dallas/Fort Worth International Airport, Texas, August 2, 1985
[PB86-910406] N87-10053
Aircraft accident reports: Brief format US civil and foreign aviation, issue number 2 of 1985 accidents
[PB86-916916] N87-10056
Flight recorders: New US regulations and new International Civil Aviation Organization (ICAO) standards N87-10093
NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Monthly and seasonal weather outlook for mid-May to mid-June 1986, volume 40, number 10, May 14, 1986
[PB86-199825] N87-10664
NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
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Thermopervaporation device
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OFFICE FOR CHEMICAL ANALYSES, STUTTGART (WEST GERMANY).
The introduction of climatology into the administration and development of planning in the city of Stuttgart N87-10652
OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
Microelectronics research and development background paper
[PB86-205200] N87-10942
OKAYAMA UNIV. (JAPAN).
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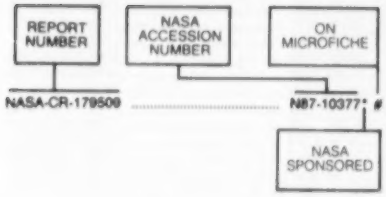

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AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 286
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 287
Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS 288
Includes cost effectiveness studies.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY 288
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 289
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 289
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

90 ASTROPHYSICS 292
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also *75 Plasma Physics.*

91 LUNAR AND PLANETARY EXPLORATION 293
Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

92 SOLAR PHYSICS 294
Includes solar activity, solar flares, solar radiation and sunspots.
For related information see *93 Space Radiation.*

93 SPACE RADIATION 295
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

99 GENERAL 295

Note: N.A. means that no abstracts were assigned to this category for this issue.

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TYPICAL CITATIONS AND ABSTRACTS

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ACCESSION NUMBER → **N87-10065*#** General Dynamics Corp., Fort Worth, Tex. ← CORPORATE SOURCE

TITLE → **DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT Final Report, Jan. 1982 - Aug. 1983**

AUTHORS → J. D. Clayton, R. L. Haller, and J. M. Hassler, Jr. Jan. 1985 ← PUBLICATION DATE

204 p

CONTRACT OR GRANT → (Contract NAS1-16879)

REPORT NUMBER → (NASA-CR-172354; NAS 1.26:172354) Avail: NTIS ← AVAILABILITY SOURCE

PRICE CODE → HC A10/MF A01 CSCL 01C ← COSATI CODE

The NASA Decoupler Pylon is a passive means of suppressing wing-store flutter. The feasibility of demonstrating this concept on the F-16 aircraft was established through model wind tunnel tests and analyses. As a result of these tests and studies a ship set of Decoupler Pylons was designed and fabricated for a flight test demonstration on the F-16 aircraft. Basic design criteria were developed during the analysis study pertaining to pylon pitch stiffness, alignment system requirements, and damping requirements. A design was developed which utilized an electrical motor for the pylon alignment system. The design uses a four pin, two link pivot design which results in a remote pivot located at the center of gravity of the store when the store is in the aligned position. The pitch spring was fabricated from a tapered constant stress cantilevered beam. The pylon has the same external lines as the existing production pylon and is designed to use a MAU-12 ejection rack which is the same as the one used with the production pylon. The detailed design and fabrication was supported with a complete ground test of the pylon prior to shipment to NASA.

Author

VOLUME 25 NUMBER 2 / JANUARY 23, 1987

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N87-10828*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
GRADUATE ENGINEERING RESEARCH PARTICIPATION IN AERONAUTICS Final Report, period ending 31 Aug. 1986
A. Sidney Roberts, Jr. Aug. 1986 80 p
(Grant NGR-47-003-052)
(NASA-CR-179798; NAS 1.26:179798) Avail: NTIS HC A05/MF A01 CSCL 01B

The Aeronautics Graduate Research Program commenced in 1971, with the primary goal of engaging students who qualified for regular admission to the Graduate School of Engineering at Old Dominion University in a graduate engineering research and study program in collaboration with NASA Langley Research Center, Hampton, Virginia. The format and purposes of this program are discussed. Student selection and program statistics are summarized. Abstracts are presented in the folowing areas: aircraft design, aerodynamics, lift/drag characteristics; avionics; fluid mechanics; solid mechanics; instrumentation and measurement techniques; thermophysical properties experiments; large space structures; earth orbital dynamics; and environmental engineering. B.G.

N87-10829*# Kentron International, Inc., Hampton, Va.
NUMERICAL METHODS AND A COMPUTER PROGRAM FOR SUBSONIC AND SUPERSONIC AERODYNAMIC DESIGN AND ANALYSIS OF WINGS WITH ATTAINABLE THRUST CONSIDERATIONS
Harry W. Carlson and Kenneth B. Walkley Washington NASA Aug. 1984 78 p
(Contract NAS1-16000)
(NASA-CR-3808; NAS 1.26:3808) Avail: NTIS HC A05/MF A01 CSCL 01B

This paper describes methodology and an associated computer program for the design of wing lifting surfaces with attainable thrust taken into consideration. The approach is based on the determination of an optimum combination of a series of candidate surfaces rather than the more commonly used candidate loadings. Special leading-edge surfaces are selected to provide distributed leading-edge thrust forces which compensate for any failure to achieve the full theoretical leading-edge thrust, and a second series of general candidate surfaces is selected to minimize drag subject to constraints on the lift coefficient and, if desired, on the pitching moment coefficient. A primary purpose of the design approach is the introduction of attainable leading-edge thrust considerations so that relatively mild camber surfaces may be employed in the achievement of aerodynamic efficiencies comparable to those attainable if full theoretical leading-edge thrust could be achieved. The program provides an analysis as well as a design capability and is applicable to both subsonic and supersonic flow. Author

N87-10830# Air Force Test Pilot School, Edwards AFB, Calif.
PERFORMANCE AND QUALITY FLIGHT TEST TEXTBOOK. VOLUME 2: FLYING QUALITIES
Apr. 1986 1640 p
(AD-A168124) Avail: NTIS HC A99/MF A06 CSCL 01/2

Flying qualities is that discipline in the aeronautical sciences that is concerned with basic aircraft stability and pilot-in-the-loop controllability. With the advent of sophisticated flight control systems, vectored thrust, forward-swept wings, and negative static margins, the concept of flying qualities takes on added dimensions. In aeronautical literature there are three terms bandied about which are generally considered synonymous. These terms are flying qualities, stability and control, and handling qualities. Among others, the textbook contains the following articles: Introduction to Flying Qualities; Vectors and Matrices; Differential Equations; Equations of Motion; Longitudinal Static Stability; Maneuvering Flight; Lateral-Directional Static Stability; Dynamic Stability; Roll Coupling; High Angle of Attack; Engine-Out Theory and Flight Testing; Aeroelasticity; Feedback Control Theory, and Flight Control Systems. GRA

N87-10831# Assistant Secretary of Defense (Acquisition and Logistics), Washington, D.C.
MODEL DESIGNATION OF MILITARY AEROSPACE VEHICLES
J. Nataro Jun. 1986 127 p
(PB86-222429; DOD-4120.15-L) Avail: NTIS HC A07/MF A01 CSCL 01C

All aircraft in the Department of Defense Inventory, Air Force, Army, Navy, Marines, and Coast Guard are listed by Mission Design Series (MDS) and popular names. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N87-10832 British Aerospace Aircraft Group, Bristol (England). Aerodynamics Research Dept.
A BIBLIOGRAPHY OF AERODYNAMIC HEATING REFERENCES
J. R. Deane and P. C. Dexter Jul. 1982 80 p
(BAe-BT-13481; BAe-Aero-Inform-33; ETN-86-97948) Copyright. Avail: Issuing Activity

Almost 600 references on aerodynamic heating are listed in this bibliography. ESA

N87-10833 Kansas Univ., Lawrence.
AN EXPERIMENTAL INVESTIGATION OF DYNAMIC GROUND EFFECT Ph.D. Thesis
Ray Chung Chang 1985 108 p
Avail: Univ. Microfilms Order No. DA8608382

A wind-tunnel investigation has been made at low speed to determine the dynamic ground effect for low-aspect-ratio wings with sharp leading edges at constant angles of attack. The three main purposes of this investigation were: (1) to develop a wind tunnel simulation method that could provide dynamic ground effect data, (2) to demonstrate that the dynamic ground effect wind-tunnel testing could produce data comparable to flight test data, and (3) to provide information on the physical mechanisms involved in dynamic ground effect for highly swept delta wings. The dynamic ground effect data obtained from the wind-tunnel simulation provided a closer approximation to the actual flight test data than do static test data. For highly swept (6 deg. to 75 deg.), low-aspect-ratio wings static ground effect data greatly overpredicted the increase in C sub L, C sub D and C sub M as height over the span decreased below .4. For low-swept (lambda sub LE less than 30 deg.) low-aspect-ratio wings the discrepancy was much less. The visual observations of the flow field confirmed that vortex lag existed for highly swept, low-aspect-ratio wings in dynamic ground effect. Dissert. Abstr.

N87-10834# Centre d'Etudes et de Recherches, Toulouse (France). Dept. dEtudes et de Recherches en Aerothermodynamique.

REPORT ON TESTS OF A CAST 10 AIRFOIL WITH FIXED TRANSITION IN THE T2 TRANSONIC CRYOGENIC WIND TUNNEL WITH SELF-ADAPTIVE WALLS

A. Seraudie, A. Blanchard, and J. F. Breil Aug. 1985 266 p
(RT-OA-63/1685; DERAT-6/5019-DN) Avail: NTIS HC A12/MF A01

Described are tests on the CAST 10 airfoil in tripped-transition, carried out in the cryogenic and transonic wind-tunnel T2 fitted with self-adaptive walls. These tests follow those which were performed in natural transition and were presented in a previous note. Firstly, a complement was realized to pinpoint the location of the natural transition on the upper surface of the airfoil; this was done by a longitudinal exploration in the boundary layer. Secondly, in a first stage, the transition was only tripped on the lower surface with a carborundum strip of 0.045 mm thickness, situated at 5% of chord (T 1/2 D). These tests were performed here to separate the phenomena in relation to the lower surface and those in relation to the upper surface which occur in natural transition (TN). In a second stage, the transition was normally tripped on both sides of the profile (TD), likewise at x/c = 5% and h = 0.045 mm. The test configurations of the previous serial were experimented again and results obtained in the three cases (TN), (T 1/2 N) and (TD) were compared, in particular those concerned with the effect of the Reynolds number on aerodynamic coefficients of the airfoil. The gathering of the experimental values around a Reynolds number of 20 millions is observed; but before this number, the evolutions of the curves in the three cases tested are different. Author

N87-10835*# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.

LARGE PERTURBATION FLOW FIELD ANALYSIS AND SIMULATION FOR SUPERSONIC INLETS Final Report

M. O. Varner, W. R. Martindale, W. J. Phares, K. R. Kneile, and J. C. Adams, Jr. Sep. 1984 126 p
(Contract NAS3-23682)
(NASA-CR-174676; NAS 1.26:174676) Avail: NTIS HC A07/MF A01 CSCL 01A

An analysis technique for simulation of supersonic mixed compression inlets with large flow field perturbations is presented. The approach is based upon a quasi-one-dimensional inviscid unsteady formulation which includes engineering models of unstart/restart, bleed, bypass, and geometry effects. Numerical solution of the governing time dependent equations of motion is accomplished through a shock capturing finite difference algorithm, of which five separate approaches are evaluated. Comparison with experimental supersonic wind tunnel data is presented to verify the present approach for a wide range of transient inlet flow conditions. Author

N87-10836*# Bihrle Applied Research, Inc., Jericho, N. Y.

LOW SPEED ROTARY AERODYNAMICS OF F-18 CONFIGURATION FOR 0 DEG TO 90 DEG ANGLE OF ATTACK: TEST RESULTS AND ANALYSIS

Randy Hultberg Washington NASA Aug. 1984 255 p
(Contract NAS1-16205)
(NASA-CR-3608; NAS 1.26:3608) Avail: NTIS HC A12/MF A01 CSCL 01A

Aerodynamic characteristics obtained in a rotational flow environment, utilizing a rotary balance located in the Langley Spin Tunnel, are discussed and presented in tabular form for a 1/10 scale F-18 airplane model. The rotational aerodynamic characteristics were established for the basic airplane, as well as the influence of control deflections and the contribution of airplane components, i.e., body, wing, leading edge extension, horizontal and vertical tails, on these characteristics up to 90 deg angle of attack. Spin equilibrium conditions predicted using the measured data are also presented and compared with spin model and full scale flight results. Author

N87-10837*# Bihrle Applied Research, Inc., Jericho, N. Y.

ROTARY BALANCE DATA AND ANALYSIS FOR THE X-29A AIRPLANE FOR AN ANGLE-OF-ATTACK RANGE OF 0 DEG TO 90 DEG

John N. Ralston Washington NASA Aug. 1984 215 p
(Contract NAS1-16205)
(NASA-CR-3747; NAS 1.26:3747) Avail: NTIS HC A10/MF A01 CSCL 01A

The rotational aerodynamic characteristics are discussed for a 1/8 scale model of the X-29A airplane. The effects of rotation on the aerodynamics of the basic model were determined, as well as the influence of airplane components, various control deflections, and several forebody modifications. These data were measured using a rotary balance, over an angle of attack range of 0 to 90 deg, for clockwise and counter clockwise rotations covering an omega b/2V range of 0 to 0.4. Author

N87-10838*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF TAIL SPAN AND EMPENNAGE ARRANGEMENT ON DRAG OF A TYPICAL SINGLE-ENGINE FIGHTER AFT END

James R. Burley, II and Bobby L. Berrier Sep. 1984 136 p
(NASA-TP-2352; L-15742; NAS 1.60:2352) Avail: NTIS HC A07/MF A01 CSCL 01A

An investigation was conducted in the Langley 16 foot Transonic Tunnel to determine the effects of tail span and empennage arrangement on drag of a single engine nozzle/afterbody model. Tests were conducted at Mach numbers from 0.50 to 1.20, nozzle pressures frm 1.0 (jet off) to 8.0, and angles of attack from -3 to 9 deg, depending upon Mach numbers. Three empennage arrangements (aft, staggered, and forward) were investigated with several different tail spans. The results of the investigation indicate that tail span and position have a significant effect on the drag at transonic speeds. Unfavorable tail interference was largely due to the outer portion of the tail surfaces. The inner portion near the nozzle and afterbody did little to increase drag other than surface skin friction. Tail positions forward of the nozzle generally had lower tail interference. Author

N87-10839*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

STATIC INTERNAL PERFORMANCE OF SINGLE-EXPANSION-RAMP NOZZLES WITH THRUST-VECTORING CAPABILITY UP TO 60 DEG

Bobby L. Berrier and Laurence D. Leavitt Oct. 1984 144 p
(NASA-TP-2364; L-15766; NAS 1.60:2364) Avail: NTIS HC A07/MF A01 CSCL 01A

An investigation has been conducted at static conditions (wind off) in the static-test facility of the Langley 16-Foot Transonic Tunnel. The effects of geometric thrust-vector angle, sidewall containment, ramp curvature, lower-flap lip angle, and ramp length on the internal performance of nonaxisymmetric single-expansion-ramp nozzles were investigated. Geometric thrust-vector angle was

varied from -20 deg. to 60 deg., and nozzle pressure ratio was varied from 1.0 (jet off) to approximately 10.0. Author

N87-10840*# Hamilton Standard, Windsor Locks, Conn.
EFFECT OF ANGULAR INFLOW ON THE VIBRATORY RESPONSE OF A COUNTER-ROTATING PROPELLER
J. E. Turnberg and P. C. Brown 15 Jan. 1985 75 p
(Contract NAS3-24222)
(NASA-CR-174819; NAS 1.26:174819) Avail: NTIS HC A04/MF A01 CSCL 01A

This report presents the results of a propeller vibratory stress survey on the Fairey Gannet aircraft aimed at giving an assessment of the difference in vibratory response between single and counter-rotating propeller operation in angular inflow. The survey showed that counter-rotating operation of the propeller had the effect of increasing the IP response of the rear propeller by approximately 25 percent over comparable single-rotation operation while counter-rotating operation did not significantly influence the IP response of the front propeller. Author

N87-10841*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRANSONIC FLOW ANALYSIS FOR ROTORS. PART 2: THREE-DIMENSIONAL, UNSTEADY, FULL-POTENTIAL CALCULATION
I-Chung Chang Jan. 1985 27 p
(NASA-TP-2375; A-9682; NAS 1.60:2375) Avail: NTIS HC A03/MF A01 CSCL 01A

A numerical method is presented for calculating the three-dimensional unsteady, transonic flow past a helicopter rotor blade of arbitrary geometry. The method solves the full-potential equations in a blade-fixed frame of reference by a time-marching implicit scheme. At the far-field, a set of first-order radiation conditions is imposed, thus minimizing the reflection of outgoing wavelets from computational boundaries. Computed results are presented to highlight radial flow effects in three dimensions, to compare surface pressure distributions to quasi-steady predictions, and to predict the flow field on a swept-tip blade. The results agree well with experimental data for both straight- and swept-tip blade geometries. Author

N87-10842*# Rockwell International Corp., Los Angeles, Calif.
SUPERSONIC SECOND ORDER ANALYSIS AND OPTIMIZATION PROGRAM USER'S MANUAL
W. C. Clever Sep. 1984 223 p
(Contract NAS1-15820)
(NASA-CR-172342; NAS 1.26:172342) Avail: NTIS HC A10/MF A01 CSCL 01A

Approximate nonlinear inviscid theoretical techniques for predicting aerodynamic characteristics and surface pressures for relatively slender vehicles at supersonic and moderate hypersonic speeds were developed. Emphasis was placed on approaches that would be responsive to conceptual configuration design level of effort. Second order small disturbance theory was utilized to meet this objective. Numerical codes were developed for analysis and design of relatively general three dimensional geometries. Results from the computations indicate good agreement with experimental results for a variety of wing, body, and wing-body shapes. Case computational time of one minute on a CDC 176 are typical for practical aircraft arrangement. Author

N87-10843*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PILOTED SIMULATION STUDY OF THE EFFECTS OF AN AUTOMATED TRIM SYSTEM ON FLIGHT CHARACTERISTICS OF A LIGHT TWIN-ENGINE AIRPLANE WITH ONE ENGINE INOPERATIVE
Eric C. Stewart, Philip W. Brown, and Kenneth R. Yenni Nov. 1986 41 p
(NASA-TP-2633; L-16147; NAS 1.60:2633) Avail: NTIS HC A03/MF A01 CSCL 01A

A simulation study was conducted to investigate the piloting problems associated with failure of an engine on a generic light twin-engine airplane. A primary piloting problem for a light twin-engine airplane after an engine failure is maintaining precise control of the airplane in the presence of large steady control forces. To address this problem, a simulated automatic trim system which drives the trim tabs as an open-loop function of propeller slipstream measurements was developed. The simulated automatic trim system was found to greatly increase the controllability in asymmetric powered flight without having to resort to complex control laws or an irreversible control system. However, the trim-tab control rates needed to produce the dramatic increase in controllability may require special design consideration for automatic trim system failures. Limited measurements obtained in full-scale flight tests confirmed the fundamental validity of the proposed control law. Author

N87-10844# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INFLUENCE OF SHAPE ON VORTEX SHEDDING FROM TWO-DIMENSIONAL CYLINDERS AT HIGH REYNOLDS NUMBER AND HIGH SUBSONIC MACH NUMBER
Takeo Nakagawa, Gerd E. A. Meier, Rainer Timm, and Hans-M. Lent Oct. 1985 27 p Sponsored by Minna-James-Heinemann Foundation, Hannover, West Germany
(MPIS-22/1985; ISSN-0436-1199; ETN-86-98220) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21

The influence of shape on vortex shedding from two-dimensional cylinders at high Reynolds number and high subsonic Mach number was studied in wind tunnel tests. It is found that the overall scale of the formation region, which is the region just behind a body enclosed by the upper and lower separating shear layers, governs the vortex shedding phenomena. As the scale of the formation region increases, the amplitude and shape of the pressure become larger and more regular, respectively, and the amplitude of the pressure spectra at the fundamental frequency becomes larger, but the fundamental frequency (or vortex shedding frequency) itself decreases. ESA

N87-10845# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
WIND TUNNEL EXPERIMENTS ON THE DIFFUSER CHARACTERISTICS OF A TIP VANE TURBINE
L. J. Vermeer Jul. 1985 33 p
(IW-R511; ETN-86-98483) Avail: NTIS HC A03/MF A01

Flow field measurements were done on a model of a tip vane turbine in a wind tunnel. The model consisted of two aerodynamic inactive extension rods with attached tip vanes. For better turbine simulation a circular gauze was mounted behind the rods. Using pitot tubes, static and total pressure measurements were carried out at several points along the radius of the model, for three different gauze porosities and several tip speed ratios. From these data the average values of the axial force coefficient and non-dimensional velocity through the rotor plane were calculated. Results were plotted in a so-called diffuser diagram and used for verification of a time averaged theory of the induction effect by tip vanes. ESA

N87-10846# National Aerospace Lab., Amsterdam (Netherlands). Fluid Dynamics Div.
UNSTEADY AIRLOAD COMPUTATIONS FOR AIRFOILS OSCILLATING IN ATTACHED AND SEPARATED COMPRESSIBLE FLOW
R. Houwink Apr. 1985 12 p Presented at joint AGARD FDP and FMP Symposium on Unsteady Aerodynamics: Fundamentals and Applications to Aircraft Dynamics, Goettingen, West Germany, 6-9 May 1985 Sponsored by Netherlands Agency for Aerospace Research
(NLR-MP-85040 B8668292; ETN-86-98491) Avail: NTIS HC A02/MF A01

Developments in coupled inviscid flow-boundary layer computations are discussed for airfoils in unsteady motion in attached and separated subsonic and transonic flow. The applicability of quasi-simultaneous strong interaction coupling procedures for transonic small perturbation theory and boundary layer integral

methods is illustrated for oscillating airfoils with shock-induced separation. The relevance of the predicted airloads for aeroelastic applications is illustrated using the analysis of an aeroelastic instability of a supercritical wing wind tunnel model. ESA

N87-10847# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
EULER FLOW SOLUTIONS FOR A TRANSONIC WIND TUNNEL SECTION
B. Koren Jan. 1986 18 p Submitted for publication Sponsored by Netherlands Technology Foundation
(CWI-NM-R8601; B8667670; ETN-86-98505) Avail: NTIS HC A02/MF A01

Two dimensional Euler flow computations were performed for a wind tunnel section, designed for research on transonic shock wave boundary layer interaction. For the discretization of the Euler equations, a finite volume Osher discretization was applied. The solution method is a nonlinear multigrid iteration with a symmetric point Gauss-Seidel relaxation method. Initial finest grid solutions are obtained by full multigrid. Grid adaptation was applied to obtain a sharp shock. The mathematical quality of four different boundary conditions for the oulet flow is indicated. The solutions of two transonic flows with shock are presented: a choked and a non-choked flow. Both flow solutions show good shock capturing. ESA

N87-10848 Notre Dame Univ., Ind.
THE TEMPORAL DEVELOPMENT OF A LOW-SPEED TWO-DIMENSIONAL JET IN A VISCOUS CROSS-FLOW Ph.D. Thesis
Joseph James Hoffman 1985 259 p
Avail: Univ. Microfilms Order No. DA8603598

The temporal development of a low speed, two-dimensional, viscous jet as it is ejected into a cross-flow is considered by means of a numerical integration of the Navier-Stokes equations and by an experimental investigation. The present analysis utilizes asymptotic expansions of the Navier-Stokes equations which are valid for small times after the start of the jet. These analytical solutions are used to initiate a numerical integration of the full Navier-Stokes equations. The experimental study considers the two-dimensional jet-in-cross-flow by ejecting fluid through a spanwise slot between two flat plates. Flow-visualization techniques were employed to photograph the temporal development of the flow-field. These results of the theoretical and experimental studies showed the formation of a recirculating region at the downstream edge of the jet. Results from both studies showed the recirculating region to expand in the streamwise and vertical direction with time. The ejection of the jet was terminated in the experimental studies, and the flow-visualization indicated that the fluid originating in the jet moved away from the wall and formed a vortex loop-like structure. The jet was not terminated in the numerical integration because of a discontinuity which would arise in the streamfunction field along the wall. Continuing the numerical integration with fluid being ejected from the slot, showed the separation streamline enclosing the recirculating region to detach from the slot edge at larger times and to convect along the wall. The numerical results at very large times suggest the possibility of the formation of a secondary recirculating region in the unseparated flow near the downstream slot edge, as well as the possibility of separation at the upstream edge of the slot. Dissert. Abstr.

N87-10849 Stanford Univ., Calif.
COMPUTATION OF TRANSONIC SEPARATED WING FLOWS USING AN EULER/NAVIER STOKES ZONAL APPROACH Ph.D. Thesis
Unver Kaynak 1986 186 p
Avail: Univ. Microfilms Order No. DA8612751

A computer program called Transonic Navier Stokes (TNS) has been developed which solves the Euler/Navier-Stokes equations around wings using a zonal grid approach. In the present zonal scheme, the physical domain of interest is divided into several subdomains called zones and the governing equations are solved interactively. The advantages of the Zonal Grid Approach are as follows: (1) the grid for any subdomain can be generated easily, (2) grids can be, in, in a sense, adapted to the solution, (3) different equation sets can be used in different zones, and (4) this approach allows for a convenient data base organization scheme. Using this code, separated flows on a NACA 0012 section wing and on the NASA Ames WING C have been computed. First, the effects of turbulence and artificial dissipation models incorporated into the code are assessed by comparing the TNS results with other CFD codes and experiments. Then a series of flow cases are described where data is available. The computed results, including cases with shock-induced separation, are in good agreement with experimental data. Finally, some futuristic cases are presented to demonstrate the abilities of the code for massively separated cases which do not have experimental data. Dissert. Abstr.

N87-10850 Michigan State Univ., East Lansing.
CHANGES IN THE TURBULENT BOUNDARY LAYER STRUCTURE ASSOCIATED WITH NET DRAG REDUCTION BY OUTER LAYER MANIPULATORS Ph.D. Thesis
Nasser Rashidnia 1986 253 p
Avail: Univ. Microfilms Order No. DA8613328

A specially designed wind tunnel was used to examine the effects of tandemly-arranged parallel plate manipulators (TAP-PMs) on turbulent boundary layer structure and the associated drag. Momentum balances and use of the velocity gradient near the wall were used to obtain the net drag and local skin friction changes. Measurements showed that local skin friction reductions were found from 20 delta sub 0 to as far as 120 delta sub 0. Two sets of plates, identical except for thickness were used. Results with .003' plates produced a maximum net drag reduction of 10% at 58 delta sub 0 using momentum balance. Downstream of this position the drag began to relax back to its unmanipulated level, and returned to normal by 100 delta sub 0. At 20 delta sub 0, simultaneous laser sheet flow visualization and hot-wire anemometry were used to conditionally sample the u prime, v prime, and u prime v prime information of the large eddies in both manipulated, and normal boundary layers at y/delta = .4 and .6. The frequency of occurrence of the footprints of the bursting process was also measured using flow visualization from a sublayer slit. The outward normal velocity of the inner region was significantly decreased at 20 delta sub 0 while the thickness of the sublayer increased by 10 to 20% throughout the 130 delta sub 0. Dissert. Abstr.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *65 Urban Technology and Transportation.*

N87-10851 Central Bureau of Statistics, Voorburg (Netherlands). Hoofafdeling Statistieken van Verkeer en Vervoer.
AVIATION STATISTICS, 1984 [STATISTIEK VAN DE LUCHTVAART]
1985 70 p Partly in DUTCH and ENGLISH Original contains color illustrations
(ISBN-90-357-0386-3; ISSN-0168-552X; ETN-86-98074)
Copyright. Avail: Issuing Activity

Statistics on world aviation and Dutch aviation are given. Graphs showing passenger transport and goods transport are presented. Data concerning commercial and noncommercial flights, passengers, and mail transport are tabulated. Flight and transport from Dutch airports are listed. ESA

N87-10852# National Transportation Safety Board, Washington, D. C.
NATIONAL TRANSPORTATION SAFETY BOARD SAFETY

RECOMMENDATION
11 Feb. 1986 17 p
Avail: NTIS HC A02/MF A01

Modifications were discussed for the following areas: detailed inspection of engine exhaust manifold assemblies, wye assemblies, turbo inlet elbow assemblies, and collector assemblies for cracks due to exhaust gas erosion in Cessna T310, 320, 340, 401, and 411 series aicraft and model 402, 402A, 402B, 414, 421, 421A, and 421B aircraft; fuel system contamination due to deteriorated sponge-filled fuel reservoir tanks; and weight calculation and balance for passenger loads that deviate from standard average weight. B.G.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

N87-10853# Radio Technical Commission for Aeronautics, Washington, D. C. Special Committee 153.
MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRBORNE ILS GLIDE SLOPE RECEIVING EQUIPMENT OPERATING WITHIN THE RADIO FREQUENCY RANGE OF 328.6-335.4 MHz
Jul. 1986 71 p Revised
(RTCA/DO-192; RTCA/DO-132A-Rev) Avail: NTIS HC A04/MF A01; also available from RTCA Secretariat $25.00

This document was prepared by Special Committee 153 of the Radio Technical Commission for Aeronautics. It was approved by RTCA on July 18, 1986, and supersedes RTCA/DO-132A, Performance Standards Airborne ILS Glide Slope Receiving Equipment, November 2, 1978. RTCA is an association of aeronautical organizations of the United States from both government and industry. Dedicated to the advancement of aeronautics, RTCA seeks sound technical solutions to problems involving the application of electronics and telecommunications to aeronautical operations. Its objective is the resolution of such problems by mutual agreement of its member organizations. The findings of RTCA are in the nature of recommendations to all organizations concerned. Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the Federal government organization or agency having statutory jurisdiction over matters to which the recommendations relate. In preparation of these standards RTCA SC-153 took into consideration comments received on behalf of the European Organization for Civil Aviation Electronics (EUROCAE) WG-5. Author

N87-10854*# Massachusetts Inst. of Tech., Cambridge. Flight Transportation Lab.
POTENTIAL IMPACTS OF ADVANCED TECHNOLOGIES ON THE ATC CAPACITY OF HIGH-DENSITY TERMINAL AREAS
Robert W. Simpson, Amedec R. Odoni, and Francisco Salas-Roche Oct. 1986 175 p
(Grant NAG1-472)
(NASA-CR-4024; NAS 1.26:4024) Avail: NTIS HC A08/MF A01 CSCL 17G

Advanced technologies for airborne systems (automatic flight control, flight displays, navigation) and for ground ATC systems (digital communications, improved surveillance and tracking, automated decision-making) create the possibility of advanced ATC operations and procedures which can bring increased capacity for runway systems. A systematic analysis is carried out to identify certain such advanced ATC operations, and then to evaluate the potential benefits occurring over time at typical US high-density airports (Denver and Boston). The study is divided into three parts: (1) A Critical Examination of Factors Which Determine Operational Capacity of Runway Systems at Major Airports, is an intensive review of current US separation criteria and terminal area ATC operations. It identifies 11 new methods to increase the capacity of landings and takeoffs for runway systems; (2) Development of Risk Based Separation Criteria is the development of a rational structure for establishing reduced ATC separation criteria which meet a consistent Target Level of Safety using advanced technology and operational procedures; and (3) Estimation of Capacity Benefits from Advanced Terminal Area Operations - Denver and Boston, provides an estimate of the overall annual improvement in runway capacity which might be expected at Denver and Boston from using some of the advanced ATC procedures developed in Part 1. Whereas Boston achieved a substantial 37% increase, Denver only achieved a 4.7% increase in its overall annual capacity. Author

N87-10855# Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
OPERATING AND SUPPORT HAZARD ANALYSIS FOR SELF-CONTAINED NAVIGATION SYSTEM LSI MODEL 6216A, B AND C, GROUP B
John T. Reeves 30 May 1986 20 p
(Contract F09603-85-C-1224)
(AD-A169381; Rept-6216-019) Avail: NTIS HC A02/MF A01 CSCL 17/7

This document constitutes the Operating and Support Hazard Analysis (OSHA) for the C-130 Self-Contained Navigation System (SCNS) Group LRUs. It provides a hazard assessment of use and maintenance of the individual LRUs provided by LSI. The purpose of an OSHA is to identify and control hazards to personnel and to the system, or related to production, installation, maintenance, test, operation, etc. This OSHA is limited to design of the Group B LRUs as the design affects operational use and maintenance safety of personnel working in or around the equipment, including ground and flight crews. The SCNS is comprised of a Doppler Velocity Sensor (DVS), Inertial Navigation System (INS), Integration Computation and Display System (ICDS), and the associated installation Group A kit to provide Doppler aided INS navigation, INS only, Doppler only and TAS/HDG navigation modes, and control of the various C-130 communication/navigation (comm/nav) systems. The SCNS ICDS consists of three Integrated Control Display Units (ICDU) and one Bus Integration Computer Unit (BICU) for all C-130 aircraft except that the HC-130H will have an additional ICDU for the radio control. GRA

N87-10856# Sandia National Labs., Albuquerque, N. Mex.
GLOBAL POSITIONING SYSTEM MISSILE TEST RANGE APPLICATIONS
M. E. Partridge Jun. 1986 16 p
(Contract DE-AC04-76DP-00789)
(DE86-011994; SAND-85-2764) Avail: NTIS HC A02/MF A01

Using the Global Positioning System (GPS), a missile under test could transmit its own position, reducing radar tracking requirements while still providing three-dimensional position and velocity data with the required accuracy. This study investigated minimum package size requirements for GPS implementation on the SRAM II missile as part of the joint test assembly telemetry system. Reported GPS missile test range applications are reviewed. The two missile tracking system implementations considered are a complete GPS package onboard the missile and onboard frequency translator that retransmits the GPS satellite signals. Accuracy and operation of the two methods are compared. A functional description of the GPS is provided. DOE

N87-10857# Standard Elektrik Lorenz A.G., Stuttgart (West Germany).
GRANAS: GLOBAL RADIO NAVIGATION SYSTEM Final Report, Apr. 1985
Hellmut Berner, Gerhard Brust, Helmut Euler, Joachim Nauck, and Klaus Plate Bonn, West Germany BMFT Dec. 1985 165 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-034; ISSN-0170-1339; ETN-86-97847) Avail: NTIS

HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

The costs of systems implementation, operation, and receiver of a navigation system of world-wide availability and high precision for general public users supplied by the global satellite-based navigation system Global Radio Navigation System are estimated. ESA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*. For land transportation vehicles see *85 Urban Technology and Transportation*.

N87-10858 Virginia Polytechnic Inst. and State Univ., Blacksburg.
ENERGY MANAGEMENT OF 3-DIMENSIONAL MINIMUM-TIME INTERCEPT Ph.D. Thesis
Hendrikus Gerrit Visser 1985 124 p
Avail: Univ. Microfilms Order No. DA8605366

A real-time computer algorithm to control and optimize aircraft flight profiles is described and applied to a three-dimensional minimum-time intercept mission. The proposed scheme has roots in two well-known techniques; singular perturbations and neighboring-optimal guidance. Use of singular-perturbation ideas is made in terms of the assumed trajectory-family structure. A heading/energy family of prestored point-mass-model state-Euler solutions is used as the baseline in this scheme. The next step is to generate a near-optimal guidance law that will transfer the aircraft to the vicinity of this reference family. The control commands fed to the autopilot consist of the reference controls plus correction terms which are linear combinations of the altitude and path-angle deviations from reference values, weighted by a set of precalculated gains. In this respect the proposed scheme resembles neighboring-optimal guidance. However, in contrast to the neighboring-optimal guidance scheme, the reference control and state variables as well as the feedback gains are stored as functions of energy and heading in the present approach. A detailed description of the feedback laws and of some of the mathematical tools used to construct the controller is presented. Numerical examples, comparing open-loop optimal and approximate feedback solutions for a sample high-performance fighter, illustrate the attractiveness of the guidance scheme. Optimal three-dimensional flight in the presence of a terrain limit is studied in some detail. Dissert. Abstr.

N87-10859*# General Dynamics Corp., Fort Worth, Tex.
DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT, ADDENDUM 2 Final Report, Jan. - Oct. 1984
J. D. Clayton, R. L. Haller, and J. M. Hassler, Jr. Feb. 1985 99 p
(Contract NAS1-16879)
(NASA-CR-172494; NAS 1.26:172494) Avail: NTIS
HC A05/MF A01 CSCL 01C

The decoupler pylons which were originally designed and assembled with bushings in the pivot joints were retrofitted with roller bearings. This retrofit, the supporting analyses and the fixture tests of the modified pylons are reported in this document. The loads and stress analysis was directed toward the redesigned parts which were the pylon links and pins. The loads and stress analysis indicates that the pylons with the bearing installation have reduced capacity with respect to the bushing design. Fixture tests of the redesigned pylons were conducted in the GD/FW facility. Breakout friction tests and vibration tests were conducted. The tests show that the joint friction is approximately one-half the level with bearings as compared with the bushing installation. The vibration test data was used to tune the pylon mathematical simulation and this revised pylon simulation was used to recompute airplane modes of vibration. These computed modes of vibration were used in complete airplane symmetric and antisymmetric flutter and aeroservoelastic analyses. Author

N87-10860*# General Dynamics Corp., Fort Worth, Tex.
DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT, ADDENDUM 1 Final Report, Aug. - Oct. 1983
J. D. Clayton and R. L. Haller Jan. 1985 70 p
(Contract NAS1-16879)
(NASA-CR-172355; NAS 1.26:172355) Avail: NTIS
HC A04/MF A01 CSCL 01C

The results of the final analyses which were conducted using a revised structural simulation of the Decoupler Pylon are reported in this addendum. The simulation incorporates the previously published results of ground tests performed on the flight Decoupler Pylons mounted in a test fixture at General Dynamic's Fort Worth facility. The analyses show that the Decoupler Pylon will suppress wing-store flutter for the GBU-8 flight test stores configuration on an F-16 airplane. The feasibility of carrying a B-61 on the pylons is also investigated with the conclusion that the pylons would need to be modified in order to demonstrate flutter suppression. The results of a ground vibration test performed on the 1/4 scale F-16 flutter model and a wind tunnel test with this model and a model Decoupler Pylon are given. Author

N87-10861*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
X-29A LONGITUDINAL AND DIRECTIONAL FORCE AND MOMENT SUPPLEMENTAL TRANSONIC WIND TUNNEL TEST RESULTS
Albion H. Bowers Aug. 1984 289 p
(NASA-TM-85909; H-1257; NAS 1.15:85909) Avail: NTIS
HC A13/MF A01 CSCL 01C

Aerodynamic data from NASA Ames Research Center's 11-Foot Transonic Wind Tunnel are plotted for the 1/8-scale X-29A forward-swept wing aircraft model. Eleven configurations were tested to provide supplemental data to investigate single surface failure modes, complex nonlinearities, and model buildup. These data can be used for control system refinements, pilot training, flight planning, and aerodynamic model validation. Data are presented as corrected wind tunnel data without analysis to document results that are being used for the aerodynamic model. Author

N87-10862*# Kansas Univ. Center for Research, Inc., Lawrence.
PARAMETRIC ANALYSIS OF A PASSIVE CYCLIC CONTROL DEVICE FOR HELICOPTERS
Hiroyuki Kumagai Oct. 1984 135 p
(Contract NCC2-175)
(NASA-CR-166608; NAS 1.26:166608; KU-FRL-568-1) Avail: NTIS
HC A07/MF A01 CSCL 01C

A parametric study of a passive device which provides a cyclic longitudinal control moment for a helicopter rotor was performed. It utilizes a rotor blade tip which is structurally decoupled from the blade inboard section. This rotor configuration is generally called the Free-Tip Rotor. A two dimensional numerical model was used to review the Constant Lift Tip Rotor, a predecessor of the current configuration, and then the same model was applied to the Passive Cyclic Control Device. The Constant Lift Tip was proven to have the ability to suppress the vibratory lift loading on the tip around the azimuth and to eliminate a significant negative lift peak on the advancing tip. The Passive Cyclic Control Device showed a once-per-revolution lift oscillation with a large amplitude, while minimizing the higher harmonic terms of the lift oscillation. This once-per-revolution oscillation results in the cyclic moment to trim the rotor longitudinally. A rotor performance analysis was performed by a three dimensional numerical model. It indicated that the vortices shed from the junction between the tip and the inboard section has a strong influence on the tip, and it may severely limit the tip performance. It was also shown that the Free-Tip allows the inboard section to have a larger twist, which results in a better performance. Author

N87-10863# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
CORRELATION BETWEEN FLIGHT SIMULATION AND PROCESSING OF FLIGHT TESTS BASED ON INERTIAL MEASUREMENTS
A. M. H. Nieuwpoort, J. H. Breeman, L. J. J. Erkelens, and P. J. J. vanderGeest 19 Jul. 1985 23 p Presented at AGARD Flight Mechanics Panel Symposium of Flight Simulation, Cambridge, England, 3 Sep. - 3 Oct. 1985
(NLR-MP-85058-U; B8667020; ETN-86-98493) Avail: NTIS HC A02/MF A01

Flight tests and simulations were performed using conventional and dynamic techniques based on inertial measurements. The use of inertial sensors in flight testing implies that specific forces and body rates are determined which are directly employed in the flight path reconstruction procedure. This procedure uses the equations of motion governing flight. After this step aerodynamics model identification can take place. In flight simulation, the opposite process occurs. From the available aerodynamic and engine model specific forces and angular accelerations can be computed. Then the equations of motion can be integrated in order to determine the flight path. Consequently there is a strong similarity in the way flight test results are processed and reduced in order to obtain aerodynamic information and the way simulations are executed using a given model. ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N87-10864*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GROUND-BASED TIME-GUIDANCE ALGORITHM FOR CONTROL OF AIRPLANES IN A TIME-METERED AIR TRAFFIC CONTROL ENVIRONMENT: A PILOTED SIMULATION STUDY
Charles E. Knox and Nicole Imbert (Office National d'Etudes et de Recherches Aerospatiales, Toulouse, France) Nov. 1986 36 p
(NASA-TP-2616; L-16116; NAS 1.60:2616) Avail: NTIS HC A03/MF A01 CSCL 01D

The rapidly increasing costs of flight operations and the requirement for increased fuel conservation have made it necessary to develop more efficient ways to operate airplanes and to control air traffic for arrivals and departures to the terminal area. One concept of controlling arrival traffic through time metering has been jointly studied and evaluated by NASA and ONERA/CERT in piloted simulation tests. From time errors attained at checkpoints, airspeed and heading commands issued by air traffic control were computed by a time-guidance algorithm for the pilot to follow that would cause the airplane to cross a metering fix at a preassigned time. These tests resulted in the simulated airplane crossing a metering fix with a mean time error of 1.0 sec and a standard deviation of 16.7 sec when the time-metering algorithm was used. With mismodeled winds representing the unknown in wind-aloft forecasts and modeling form, the mean time error attained when crossing the metering fix was increased and the standard deviation remained approximately the same. The subject pilots reported that the airspeed and heading commands computed in the guidance concept were easy to follow and did not increase their work load above normal levels. Author

N87-10865# Air Force Human Resources Lab., Brooks AFB, Tex.
LOW-COST AVIONICS SIMULATION FOR AIRCREW TRAINING Interim Report, Jan. 1984 - Jun. 1985
Bernell J. Edwards Jul. 1986 26 p
(AD-A169198; AFHRL-TR-85-48) Avail: NTIS HC A03/MF A01 CSCL 09/5

This report documents the evaluation of a low-cost microcomputer based avionics system trainer as a substitute for aircraft-based training. The training was provided to C-141 pilots to train them to perform several procedural tasks associated with the operation of the Fuel Savings Advisory System (FSAS). This system is being retrofitted on C-141 and C5A aircraft. Operational aircrews must be trained to operate the FSAS in order to be mission qualified. This report documents an experiment in which trainees learned to operate the FSAS, either in the aircraft or via the low-cost alternative. Results showed both groups required the same amount of training time to learn to perform the tasks. Thus, the low-cost alternative was shown to be an effective substitute for the aircraft for training the FSAS tasks. A cost analysis comparing the two training methods shows the low-cost trainer is capable of avoiding more than 8 million dollars in training costs if it is employed to train current C-141 and C-5A aircrews in the FSAS tasks. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N87-10866*# Lockheed-Georgia Co., Marietta.
PTA TEST BED AIRCRAFT ENGINE INLET MODEL TEST REPORT, REVISED
J. P. Hancock May 1985 81 p
(Contract NAS3-24339)
(NASA-CR-174845; NAS 1.26:174845; LG85ER0012-Rev) Avail: NTIS HC A05/MF A01 CSCL 21E

The inlet duct test for the Propfan Testbed Assessment (PTA) program was completed in November 1984. The basic test duct was designed using the Lockheed QUADPAN computational code. Test objectives were to experimentally evaluate, modify as required, and eventually verify satisfactory performance as well as duct/engine compatibility. Measured total pressure recovery for the basic duct was 0.993 with no swirl and 0.989 for inflow with a 30 degree simulated swirl angle. This compared to a predicted recovery of 0.979 with no swirl. Measured circumferential distortion with swirl, based on a least-square curve fit of the data, was 0.204 compared to a maximum allowable value of 0.550. Other measured distortion parameters did as well or better relative to their respective maximum allowable values. The basic duct configuration with no refinements is recommended for the PTA inlet as a minimum cost installation. Author

N87-10867# Rolls-Royce Ltd., Derby (England).
FUTURE AERO-ENGINE CONTROL SYSTEMS, WHY FADEC? COST, DESIGN CYCLE TIMESCALE, RELIABILITY, WEIGHT AND SIZE TARGETS
H. F. Cantwell 14 Feb. 1986 13 p
(PNR-90298; ETN-86-98015) Avail: NTIS HC A02/MF A01

The requirements for a civil aircraft gas turbine control system are summarized. The advantages of full authority digital electronic control over hydromechanical concepts are outlined. ESA

N87-10868# Rolls-Royce Ltd., Derby (England).
ENGINE PERFORMANCE MONITORING FOR AIRLINES
John A. Chantry 6 Mar. 1986 15 p
(PNR-90305; ETN-86-98016) Avail: NTIS HC A02/MF A01

The costs and benefits of engine performance monitoring are recalled. The Rolls Royce engine monitoring system is described. ESA

N87-11191*# Yale Univ., New Haven, Conn. High Temperature Chemical Reaction Engineering Lab.
TURBINE AIRFOIL DEPOSITION MODELS
Daniel E. Rosner *In* NASA. Lewis Research Center Turbine Engine

Hot Section Technology, 1984 Oct. 1984 22 p (For primary document see N87-11180 02-39)
(Grant NAG3-201)
Avail: NTIS HC A17/MF A01 CSCL 21E

N87-11196*# Cleveland State Univ., Ohio.
MECHANICAL BEHAVIOR OF THERMAL BARRIER COATINGS FOR GAS TURBINE BLADES
Christopher C. Berndt, Woraphat Phucharoen, and George C. Chang *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
(Contract NCC3-27)
Avail: NTIS HC A17/MF A01 CSCL 21E

N87-11200*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AEROTHERMAL MODELING PROGRAM, PHASE 2
Edward J. Mularz *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

N87-11203*# Oklahoma State Univ., Stillwater.
LATERAL JET INJECTION INTO TYPICAL COMBUSTOR FLOWFIELDS
David G. Lilley *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

N87-11205*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
BURNER LINER THERMAL/STRUCTURAL LOAD MODELLING
R. J. Maffeo *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 9 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

N87-11207*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
COMPONENT SPECIFIC MODELING
M. L. Roberts *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N87-10869*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROPOSED INPUT FOR DETERMINING LONGITUDINAL AERODYNAMIC PARAMETERS FOR THE SPACE SHUTTLE
William T. Suit Oct. 1984 33 p
(NASA-TM-85758; NAS 1.15:85758) Avail: NTIS HC A03/MF A01 CSCL 01C

A control input form to improve the identification of longitudinal aerodynamic parameters for the Space Shuttle, especially at low Mach numbers, has been proposed. This input combines features of several inputs currently used with the Shuttle to improve the response in angle-of-attack without exceeding pitch rate limits. The responses of the proposed input were generated using a simple three-degree-of-freedom simulation. An examination of the power spectral densities of these responses showed them to have more power near the vehicle natural frequency than doublet inputs previously used with the Shuttle. When the responses to the proposed input were corrupted with noise and processed using a maximum likelihood parameter extraction program, the identifiability of the parameters was improved over the identifiability of the same parameters using actual Shuttle responses from doublet input of a similar magnitude. This preliminary study indicates that the proposed input form should result in improved identifiability of longitudinal static and control parameters for the Shuttle vehicle. Author

N87-10870*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERFERENCE EFFECTS OF THRUST REVERSING ON HORIZONTAL TAIL EFFECTIVENESS OF TWIN-ENGINE FIGHTER AIRCRAFT AT MACH NUMBERS FROM 0.15 TO 0.90
Francis J. Capone and Mary L. Mason Oct. 1984 104 p
(NASA-TP-2350; L-15811; NAS 1.60:2350) Avail: NTIS HC A06/MF A01 CSCL 01C

An investigation was conducted in the Langley 16 foot Transonic Tunnel to determine the interference effects of thrust reversing on horizontal tail effectiveness of a twin engine, general research fighter model at approach and in-flight speeds. Twin vertical tails at three longitudinal locations were tested at a cant angle of 0 deg. One configuration was also tested at a cant angle of 20 deg. Two nonaxisymmetric nozzle reverser concepts were studied. Test data were obtained at Mach numbers of 0.15, 0.60, and 0.90 and at angles of attack from -3 to 9 deg. Nozzle pressure ratios varied from jet off to 7.0, depending upon Mach number. At landing approach speed (Mach number 0.15), thrust reverser operation usually resulted in large variations (up to 70% increase) in horizontal tail effectiveness as nozzle pressure ratio was varied at zero angle of attack or as angle of attack was varied at constant nozzle pressure ratio. There was always a decrease in effectiveness at Mach numbers of 0.60 and 0.90 as a result of reverser operation. Author

N87-10871*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT-DETERMINED AERODYNAMIC DERIVATIVES OF THE AD-1 OBLIQUE-WING RESEARCH AIRPLANE
Alex G. Sim and Robert E. Curry Oct. 1984 40 p
(NASA-TP-2222; H-1179; NAS 1.60:2222) Avail: NTIS HC A03/MF A01 CSCL 01C

The AD-1 is a variable-sweep oblique-wing research airplane that exhibits unconventional stability and control characteristics. In this report, flight-determined and predicted stability and control derivatives for the AD-1 airplane are compared. The predictions are based on both wind tunnel and computational results. A final best estimate of derivatives is presented. Author

N87-10872# Societe Nationale Industrielle Aerospatiale, Toulouse (France). Div. Avions.
EFFICIENCY OF VARIOUS CONTROL SURFACES IN STEADY AND UNSTEADY FLOW
R. Barreau, R. Destuynder, and G. Anders 2 Sep. 1985 71 p In FRENCH Presented at 61st AGARD Meeting on Structures and Materials Panel Subcommittee on Aeroelasticity, Oberammergau, West Germany, 9 Sep. 1985 Original language document was announced as A86-24633
(SNIAS-861-111-101; JBE/SB-443.524/85; ETN-86-97139) Avail: NTIS HC A04/MF A01

The three dimensional subsonic and transonic flow steady and unsteady effects associated with the action of control surfaces (ailerons, flaps and spoilers) were studied experimentally to improve the efficiency of aircraft control design. Large models provided with a large number of measuring points were tested in a wind tunnel. It is shown that the design of control surfaces applied to supercritical wings requires precautions. ESA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N87-10873 British Aerospace Aircraft Group, Warton (England).
DETAILS OF LOW SPEED INTAKE TEST FACILITY AT THE WARTON 2.7m X 2.1m WIND TUNNEL
30 Jan. 1986 9 p Original contains color illustrations
(BAe-AXM127; ETN-86-97942) Copyright. Avail: Issuing Activity

An intake/suction rig to assess inlet internal performance and engine face flow quality by simultaneous measurement of pressure recovery, time variant distortion, swirl and turbulence, for the full range of flight conditions from static/ground running to low speed, and the critical subsonic high incidence and sideslip combinations in wind tunnel tests was designed. Inlet duct performance and flow quality; ECS intake performance including simulation of the ECS duct, heat exchanger and ejector, with comprehensive diagnostic instrumentation; and air data system performance are also assessed. The rig consists of a twin compressed air powered ejector to power the two inlets; a strut mounted keelplate which can be adapted to carry various models (typically at 1/5th scale); and a comprehensive, 152mm dia, AIP rake. The 2.7m x 2.1m wind tunnel, using this rig, gives speeds from 0 to 45m/sec and a full range of alpha (-10 to +70 deg) and beta (-15 to +15 deg) to cover all flight conditions in one facility. ESA

N87-10874 British Aerospace Aircraft Group, Warton (England). Wind Tunnel Dept.
PRACTICAL EVALUATION OF WALL PRESSURE SIGNATURE CORRECTION METHODS IN THE 2.7m X 2.1m LOW SPEED WIND TUNNEL
J. G. Proctor Jan. 1986 69 p
(BAe-ARG-204; ETN-86-97943) Copyright. Avail: Issuing Activity

The chart and matrix methods of using wind tunnel wall static pressure distribution to calculate blockage and lift effects were assessed using pressure rails in a low speed wind tunnel. The use of tapped rails for pressure measurement proves suitable. Overall sampling rate is slow. Corrections for two larger flat plates agree well with published data. Conventional techniques are, however, as good. Compared to the standard, aircraft-model blockage corrections are lower than expected, possibly due to experimental technique. Incidence correction due to lift effect does not agree well with current methods, and care must be taken in the selection of singularity span. The methods cannot be considered as a viable replacement for current techniques. The results for the aircraft model at high incidence are disappointing, and the cause is not identified. ESA

N87-10875 British Aerospace Aircraft Group, Bristol (England). Civil Div.
PROP-FAN SLIPSTREAM EFFECTS USING STATIC SIMULATORS: LOW SPEED TASK, PHASE 1 Final Report
A. C. Willmes 5 Jul. 1985 49 p
(BAe-B59R/R-D/610/13498; RA/6/16/85; ETN-86-97944) Copyright. Avail: Issuing Activity

A device to produce a 14 inch diameter simulated prop fan slipstream was built and tested in a low speed wind tunnel. Tests were carried out with the simulator in front of a Vanguard model and an A320 model. Both models were tested with high lift systems deployed. Separate and combined effects of slipstream swirl and supervelocity components were investigated. The technique is considered to be established. Data for swept and straight wing aircraft at a variety of flap configurations is available. ESA

N87-10876*# National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL FACILITIES ASSESSMENT
Frank E. Panaranda, comp. Nov. 1985 204 p
(NASA-RP-1146; NAS 1.61:1146) Avail: NTIS HC A10/MF A01 CSCL 14B

A survey of the free world's aeronautical facilities was undertaken and an evaluation made on where the relative strengths and weaknesses exist. Special emphasis is given to NASA's own capabilities and needs. The types of facilities surveyed are: Wind Tunnels; Airbreathing Propulsion Facilities; and Flight Simulators Author

N87-10877# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
PAVEMENT RECYCLING: FACILITIES TECHNOLOGY APPLICATION TEST (FTAT) DEMONSTRATION, FY 84, FORT GILLEM, GEORGIA Final Report
Timothy Vollor May 1986 79 p
(AD-A169284; WES/TR/GL-86-4) Avail: NTIS HC A05/MF A01 CSCL 13/2

The objective of this project was to demonstrate and document the use of pavement recycling techniques. Most Army engineers at the working level have read about recycling but are hesitant to use recycling procedures because they do not have hands on experience. This pavement recycling demonstration was conducted at Fort Gillem, Ga., where both hot-mix and cold-mix recycling techniques were demonstrated. A four lane asphalt concrete pavement road serving as the main entrance to Fort Gillem was selected to demonstrate the hot-mix recycling technique. This road had been overlaid several times leaving the surface approximately 2 in. above the PCC curb and gutter. This caused a safety hazard and would have rendered the existing curbs and gutters useless if another overlay was done. Therefore, 4 in. of the pavement was removed using the cold milling process and a 2-in. hot-recycled mix was put back so that the pavement surface tied into the original curb. A two-lane asphalt concrete pavement road serving as the truck entrance to Fort Gillem was chosen to demonstrate cold recycling. This road had extensive alligator cracking which indicated a need to strengthen the existing pavement structure. The pavement structure was pulverized, an additional binder was added as an emulsion, and the material was compacted using a vibrator steel wheel roller and a 15-ton rubber tired roller. This produced an excellent base upon which a hot-mix recycle asphalt concrete wearing surface will be added. GRA

N87-10878# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Entwurfsaerodynamik.
THE HIGH SPEED CASCADE WIND TUNNEL: STILL AN IMPORTANT TEST FACILITY FOR INVESTIGATIONS ON TURBOMACHINERY BLADES
Heinz Hoheisel Mar. 1986 36 p In GERMAN; ENGLISH summary
(DFVLR-Mitt-86-11; ISSN-0176-7739; ETN-86-98179) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 14

The importance of the high speed cascade wind tunnel was demonstrated. Starting from the conception of this wind tunnel and the requirements for cascade wind tunnels in which compressible flows have to be studied, the usability and qualification of this test facility for research work is described with examples of turbine and compressor cascade investigations. Necessary additional equipment is discussed. ESA

N87-10879# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Regelung.
OPTIMAL CONTROL: A SYSTEMATIC AID FOR THE COMPUTER AIDED EXPLORATION OF THE DYNAMIC POSSIBILITIES OF A CRYOGENIC WIND TUNNEL Ph.D. Thesis - Ruhr Univ.
Dieter Kraft Jun. 1986 215 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-23; ISSN-0171-1342; ETN-86-98188) Avail: NTIS HC A10/MF A01; DFVLR, Cologne, West Germany DM 63

The dynamic systems behavior of a cryogenic wind tunnel was analyzed for an automatic control system which meets the

stringent safety requirements and operating specifications in a wide domain of operation. For cost, safety and availability reasons this analysis cannot be performed on the real tunnel, but must be conducted on a mathematical model. The dynamic behavior of the wind tunnel is characterized by strongly coupled nonlinear differential equations; therefore optimal control was applied for analysis. The boundary values of the system are the basis of comparison for the different steps of the analysis, while the control and state constraint and their variations resulting from the operating specifications represent systematic step sizes along which the dynamic spectrum was explored. This procedure yields statements about the robustness of nonlinear systems. Direct numerical methods for the solution of optimal control problems are described. ESA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N87-10880# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
EUROPEAN UTILIZATION ASPECTS OF LOW EARTH ORBIT SPACE STATION ELEMENTS, PHASE 3, VOLUME 2 Final Report
Paris ESA Oct. 1985 755 p Prepared in cooperation with Aeritalia S.p.A., Torino, Rome, British Aerospace Aircraft Group, Bristol, England, Dornier-Werke GmbH, Friedrichshafen, West Germany, Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost, Netherlands, Instituto Nac
(Contract ESA-5234/82-F-FC(SC))
(ESA-CR(P)-2219; ETN-86-98099) Avail: NTIS HC A99/MF E03

European utilization aspects of space station pressurized module, and co-orbiting, polar and free-flying platforms are summarized. Materials science; life sciences; Earth observation; technology and communication; user interfaces; payload handling; and user data bases are covered. ESA

N87-10881# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
STUDY ON A DROP AND BUBBLE UNIT. VOLUME 1: EXECUTIVE STUDY Final Report
G. Boerchers, R. Bohlen, J. Herzog, C. Milan, J. Schawer, W. Heide, D. Langbein, E. G. Lierke, G. Seger, and P.-O. Doittau Paris ESA Dec. 1983 66 p
(Contract ESA-5503/83-F-FC(SC))
(ESA-CR(P)-2256; ETN-86-98133) Avail: NTIS HC A04/MF A01

Equipment concepts for investigations on bubbles, drops and particles in liquid matrices in microgravity were studied. Experiments, proposed and/or performed with other facilities and available equipment were investigated. A concept for a drop and bubble unit (BDPU) consisting of modular elements which can be configured into a required facility was elaborated. Necessary subsystems were indentified and concepts were established. A BDPU configuration is proposed. Planning and cost estimation for development, manufacturing, and test of the BDPU were performed. ESA

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

N87-10882 Washington Univ., Seattle.
DESIGN OF CONTROL LAWS FOR ADAPTIVE SIGNAL TRACKING SYSTEMS Ph.D. Thesis
Jenq-Tzong H. Chan 1986 266 p
Avail: Univ. Microfilms Order No. DA8613150

This dissertation develops and analyzes a novel approach to the synthesis of adaptive controllers for single-input single-output systems with uncertain parameters operating in a stochastic disturbance environment. The proposed algorithm, formulated in discrete time domain, is based on the certainty-equivalence principle. It combines a recursive extended least squares parameter estimation algorithm with an optimal feedback regulator/feedforward signal tracking controller in an indirect model reference adaptive scheme. The control law synthesis is based on the discrete version of generalized singular linear quadratic control theory. In this approach, only the signal error is penalized in the controller performance index and naturally leads to the feedback/feedforward control structure. The stability and performance characteristics of the proposed algorithm are analyzed both analytically and via selected simulations. It is shown that the algorithm performs acceptably in situations where many current algorithms are known to fail. An instability mechanism for indirect adaptive schemes is identified and analyzed. As a result, an approach is suggested that could lead to improved robustness of this algorithm without impacting the performance of the system. Dissert. Abstr.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N87-10883*# Boeing Aerospace Co., Kennedy Space Center, Fla.
ORBITAL TRANSFER VEHICLE LAUNCH OPERATIONS STUDY: AUTOMATED TECHNOLOGY KNOWLEDGE BASE, VOLUME 4 Final Report
7 Mar. 1986 124 p
(Contract NAS10-11165)
(NASA-CR-179706; NAS 1.26:179706) Avail: NTIS HC A06/MF A01 CSCL 22D

A simplified retrieval strategy for compiling automation-related bibliographies from NASA/RECON is presented. Two subsets of NASA Thesaurus subject terms were extracted: a primary list, which is used to obtain an initial set of citations; and a secondary list, which is used to limit or further specify a large initial set of citations. These subject term lists are presented in Appendix A as the Automated Technology Knowledge Base (ATKB) Thesaurus. M.G.

N87-10918# Centre National d'Etudes Spatiales, Paris (France).
FEASIBILITY STUDY OF A LAUNCHER VIBRATION ENVIRONMENT SIMULATOR [ETUDE DE FAISABILITE D'UN SIMULATEUR D'AMBIANCE VIBRATOIRE DE LANCEUR]
H. J. P. Morand, B. Chemoul, F. Celle, J. P. Gauthier, F. Rouvrais (Intespace, Toulouse, France), and S. Michel *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 241-245 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-11042*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
UNATTENDED DEEP SPACE STATION TRACKING STATION DEVELOPMENT: MONITOR AND CONTROL TECHNOLOGY
C. Foster *In its* The Telecommunications and Data Acquisition Report (date] p 164 - 170 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 22D

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

N87-10900# Centre National d'Etudes Spatiales, Paris (France).
LAUNCHER-PAYLOAD DYNAMIC INTERACTION [INTERACTION DYNAMIQUE LANCEUR-CHARGE UTILE]
H. J.-P. Morand, B. Chemoul, and P. R. Bodagala *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 101-108 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10902# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
VERIFICATION OF THE MATHEMATICAL MODEL OF THE ARIANE 4 PAYLOAD FAIRING BY MEANS OF EXTENDED MODAL SURVEY TESTING
A. Bertram and P. Villalaz (Contraves Corp., Zurich, Switzerland) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 113-118 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10937# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
INVESTIGATION OF THE COUPLING OF THE HERMES VEHICLE TO THE ARIANE 5 LAUNCHER [ETUDE DE L'ACCROCHAGE DU VEHICULE HERMES SUR LE LANCEUR ARIANE 5]
M. Agrain *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 375-380 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance.* For space suits see *54 Man/System Technology and Life Support.*

N87-10884°# Analytical Mechanics Associates, Inc., Hampton, Va.
SUMMARY OF SHUTTLE DATA PROCESSING AND AERODYNAMIC PERFORMANCE COMPARISONS FOR THE FIRST 11 FLIGHTS Final Report
John T. Findlay, G. Mel Kelly, Michael L. Heck, and Judy G. McConnell Sep. 1984 126 p
(Contract NAS1-16087)
(NASA-CR-172440; NAS 1.26:172440; AMA-84-10) Avail: NTIS HC A07/MF A01 CSCL 22A

NASA Space Shuttle aerodynamic and aerothermodynamic research is but one part of the most comprehensive end-to-end flight test program ever undertaken considering: the extensive pre-flight experimental data base development; the multitude of spacecraft and remote measurements taken during entry flight; the complexity of the Orbiter aerodynamic configuration; the variety of flight conditions available across the entire speed regime; and the efforts devoted to flight data reduction throughout the aerospace community. Shuttle entry flights provide a wealth of research quality data, in essence a veritable flying wind tunnel, for use by researchers to verify and improve the operational capability of the Orbiter and provide data for evaluations of experimental facilities as well as computational methods. This final report merely summarizes the major activities conducted by the AMA, Inc. under NASA Contract NAS1-16087 as part of that interesting research. Investigators desiring more detailed information can refer to the glossary of AMA publications attached herein as Appendix A. Section I provides background discussion of software and methodology development to enable Best Estimate Trajectory (BET) generation. Actual products generated are summarized in Section II as tables which completely describe the post-flight products available from the first three-year Shuttle flight history. Summary results are presented in Section III, with longitudinal performance comparisons included as Appendices for each of the flights. Author

N87-10885# British Aerospace Public Ltd. Co., Stevenage (England). Space and Communications Div.
TECHNOLOGY DEMONSTRATION PROGRAMME, PHASE 2 STUDY Final Report
B. J. Emery, comp. Paris ESA Oct. 1985 214 p
(Contract ESA-5990/84-NL-PP(SC))
(BAe-TP-8207; ESA-CR(P)-2218; ETN-86-98098) Avail: NTIS HC A10/MF A01

The concept of a low cost flexible carrier based on the Spacelab Half Pallet was defined. Carrier subsystems, launch vehicle requirements and the program logistics using a generic primary payload were emphasized. The primary payload was selected from a list of experiments which represented the technology expected to be flown in future ESA programs. Results show that the Half Pallet is suitable as a low cost carrier for use with in orbit technology demonstration experiments. ESA

N87-10888# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE PAYLOAD DESIGN AND DEVELOPMENT
Donald C. Wade and David A. Hamilton *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 11-16 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10905# Astron Research and Engineering, Santa Monica, Calif.
ACOUSTIC LOAD CONSIDERATIONS FOR SPACECRAFT STRUCTURES
J. F. Wilby and A. G. Piersol *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 133-143 Sponsored by NASA (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar.*

N87-11039°# Jet Propulsion Lab., California Inst of Tech., Pasadena. Communications Systems Research Section.
ANTENNA ARRAYING OF VOYAGER TELEMETRY SIGNALS BY SYMBOL STREAM COMBINING
W. J. Hurd, J. Rabkin, M. D. Russell, B. Siev, H. W. Cooper, T. O. Anderson, and P. U. Winter *In its* The Telecommunications and Data Acquisition Report (date) p 131 - 142 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation.*

N87-10886# European Space Agency, Paris (France).
PROCEEDINGS OF AN INTERNATIONAL CONFERENCE ON SPACECRAFT STRUCTURES
W. R. Burke, comp. Apr. 1986 433 p In ENGLISH and FRENCH Conference held in Toulouse, France, 3-6 Dec. 1985
(ESA-SP-238; ISSN-0379-6566; ETN-86-98078) Avail: NTIS HC A19/MF A01

Spacecraft structural analysis, including dynamic analysis and tests, dynamical identification, and acoustics analysis; design engineering; and spacecraft construction materials were discussed. For individual titles, see N87-10887 through N87-10943.

N87-10887# Arianespace, Evry (France).
RESULTS OF ARIANE LAUNCH VEHICLE FLIGHTS AND THEIR EFFECTS ON THE SIZING OF SATELLITE STRUCTURES [RESULTATS DES VOLS DU LANCEUR ARIANE ET LEURS EFFETS SUR LE DIMENSIONNEMENT DES STRUCTURES DE SATELLITES]
M. Vedrenne, J. P. Dulout, and J. L. Caneilles *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 3-10 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Low frequency (up to 100 Hz) vibrations caused by transitory events during critical flight phases of Ariane, such as wind gusts at maximum dynamic pressure, and motor shutdown, are discussed. Frequency amplitude vibration measurements at satellite interfaces are compared with predictions from analyses of the coupled mode launcher-satellite system. Overall results are compared with the environment specified in the Ariane user guide for satellite dimensioning and testing. A simplification of the low frequency environment is proposed. ESA

N87-10888# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE PAYLOAD DESIGN AND DEVELOPMENT **c16**
Donald C. Wade and David A. Hamilton *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 11-16 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The structural design guidelines and requirements for payloads launched on the Space Shuttle are reviewed. Experience with scientific and commercial satellites and experiments is presented. Structural requirements for payloads are divided into the areas of mechanical interfaces, load environments, and materials. The mechanical interfaces include physical sizing allowables, attachment mechanisms, attach point locations, and remote manipulator system requirements. The structural loading environments include preliminary design load factors, random vibration, and acoustics. Coupled-loads analysis requirements and methodology are discussed along with payload math model characteristics. Frequency restrictions to avoid flight control interaction are defined. Requirements and options for strength certification, math model verification, and materials-related design requirements are discussed. ESA

N87-10889# Technische Hogeschool, Delft (Netherlands).
ABOUT THE DEVELOPMENT OF INTERACTIVE SHELL DESIGN CODES **c61**
Johann Arbocz *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 19-26 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The development of the Delft Interactive Shell Design Code is described. The purpose of this project is to make the accumulated theoretical, numerical and practical knowledge of the last 20 years readily accessible to users interested in the design of buckling sensitive thin-walled shell structures. With this open-ended, hierarchical, interactive computer code, the user can successively access from the workstation programs of different complexity. At every step of analysis the user can call upon extensive HELP files containing information about potential design solutions. ESA

N87-10890# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Mechanical Systems Div.
DESIGN AND VERIFICATION ACTIVITIES AND REQUIREMENTS FOR SPACECRAFT STRUCTURES
C. Stavrinidis *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 27-33 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The scope and associated cost related with spacecraft structures design and verification are discussed. These depend on such factors as the geometrical dimensions of the spacecraft, weight criticality and the degree of dynamic interaction of the spacecraft with the launch vehicle. For large complex spacecraft which often have significant dynamic interaction with the launch vehicle, structural design and verification usually require a combination of analysis, development testing, and qualification testing. ESA

N87-10891# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ON OPTIMAL PASSIVE AND ACTIVE CONTROL OF PRECISION SPACECRAFT STRUCTURES
H. Baier *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 35-39 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The application of structural optimization and control methods for precision spacecraft structures is discussed. The necessity of proper decomposition into subproblems is emphasized. The shape adjustment and control of an antenna reflector is considered and results are presented. In the dynamic regime, active isolation is applied for a sensitive payload and the benefit of such an approach is outlined. For passive design purposes a control forces approach which is numerically efficient but does not necessarily lead to an optimum is used. ESA

N87-10892# Societe Nationale Industrielle Aerospatiale, Cannes (France).
TRUSS STRUCTURE WITH GREAT DIMENSIONAL STABILITY: PRINCIPLE OF DESIGN, DEVELOPMENT, CERTIFICATION [STRUCTURE TREILLIS A GRANDE STABILITE DIMENSIONNELLE: PRINCIPE DE CONCEPTION - DEVELOPPEMENT - QUALIFICATION]
B. Verez and J. L. Devaux *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 41-49 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Carbon fiber composite trusses for space applications are discussed. Antenna supports and optical mountings are described. Design and verification principles are outlined. Dimensional stability problems due to the mechanical and thermal environments, and to desorption and humidity are stressed. ESA

N87-10893# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Mechanical Systems Div.
ESA FRACTURE CONTROL POLICY AND FRACTURE MECHANICS SPECTRA FOR STS PAYLOADS **c39**
G. G. Reibaldi, A. A. tenHave, A. U. deKoning, and J. Ph. vanHerwaarden (Royal Netherlands Aircraft Factories Fokker, Amsterdam) *In* ESA Proceedings of an International Conference

on Spacecraft Structures Apr. 1986 p 51-55 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

In order to standardize the fatigue load spectra used in the design of European payloads to be flown on the Space Shuttle, the European Space Agency evaluated acceleration flight data from several Space Shuttle missions. Data were derived from a variety of payload mass, size, location, and complexity to be as general as possible. Fracture mechanics loading spectra verification and correct prediction is considered very important for complex payloads and space station elements. Requirements for materials properties, stress intensity solutions, crack growth prediction algorithms, loading spectra, nondestructive inspection, fracture of composites, creep, and probabalistic fracture mechanics are discussed. ESA

N87-10894# Engineering System International, Rungis (France).
EQUIVALENT CONTINUUM ANALYSES OF LARGE SPACE TRUSSES
E. Haug, P. Dowlatyari, and J. Dubois *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 57-65 (For primary document see N87-10886 02-18)
(Contract ESTEC-5209/82-NL-PB(SC))
Avail: NTIS HC A19/MF A01

The techniques of discrete field methods, conventional equivalent continua, and micropolar equivalent continua are introduced, and their usefulness for the calculation of large space structures and their ease of numerical implementation are assessed. An example of a large space truss was run on the computer, using the full model, and several equivalent continuum finite element models. The full and equivalent continuum models of the chosen realistic sample space truss are loaded statically with mechanical load cases characteristic of orbital transfer conditions and with thermal gradients which might arise in operating conditions. Dynamic behavior is studied by extracting vibration frequencies and mode shapes. Results suggest that it is better to channel development efforts into an integrated sandwich finite element, uniting anisotropic membrane skins and an anisotropic brick or thick shell core into one element. This type of element is likely to be useful as an equivalent continuum finite element for most practical space trusses. ESA

N87-10895# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
ANALYSIS OF LONG THIN-WALLED TUBES
B. Geier and A. K. Rath (Indian Space Research Organization, Trivandrum) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 67-72 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Analysis of thin walled composite tubes for large space structures under buckling loads is discussed. Material law, nonlinear theory of anisotropic shells, computation of fundamental states, and computation of buckling loads are considered. ESA

N87-10896# Texas Univ., Austin.
A STUDY OF NODAL COUPLING METHODS **c39**
R. R. Craig *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 75-80 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Component mode synthesis time-domain methods for undamped structures are introduced. Component normal modes with fixed or free boundaries, constraint modes, and inertia-relief attachment modes are described. An inertia attachment mode is defined. System eigensolutions based on various component mode sets are compared. Work on the application of attachment modes to modal control of flexible structures is noted. ESA

N87-10897# Intespace, Toulouse (France).
EFFECTIVE MODAL PARAMETERS AND TRUNCATION EFFECTS IN STRUCTURAL DYNAMICS [PARAMETRES MODAUX EFFECTIFS ET EFFETS DE TRONCATURE EN DYNAMIQUE DES STRUCTURES] **c39**
A. Girard and J. F. Imbert *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 81-86 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Modal superposition techniques used to calculate the low frequency response of structures are discussed. A unified approach to the effective modal parameters method of interpreting eigenmodes is outlined. These parameters obey summation rules to reconstruct the corresponding static properties, enabling truncation effects to be estimated in terms of residual parameters representing the global contribution of higher modes. This reveals the role of flexibility, mass, transmissibility, and effective strains. ESA

N87-10898# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
DAMPING REPRESENTATION RELATED TO SPACECRAFT STRUCTURAL DESIGN
Eckhard Hilbrandt *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 87-92 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Analysis methods for damping representation and damping prediction and design measures to enhance damping properties of space structures are reviewed. Isolation (filtering) absorption, and discrete and continuous dampers (damping layers) are discussed. Test results on beam and plate structures are compared to analytical models. It is shown that a design for damping concepts in spacecraft structures may significantly reduce the response levels and thus have a beneficial effect on equipment design. ESA

N87-10899# Cisigraph, Rungis (France).
FLUID-STRUCTURE INTERACTION: MODAL SYNTHESIS METHOD [INTERACTION FLUIDE STRUCTURE: METHODE DE SYNTHESE MODALE] **c39**
R. Savouillan, F. Besnier, and G. Rozenblum *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 93-99 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Modal analysis of structures in the presence of compressible or incompressible fluids, with or without surface waves is discussed. The fluid is modeled using three dimensional or axysmmetric elements, the variables being the pressure within the fluid. Application of a modal synthesis method to incompressible, quasi compressible and highly compressible fluids is compared with a direct method as to accuracy and performance. Different choices of modal base are examined. The direct method is treated rigorously, particularly for the free surface case, with calculation of modal pressures. The integration of these developments in an industrial finite elements program is described. ESA

N87-10900# Centre National d'Etudes Spatiales, Paris (France).
LAUNCHER-PAYLOAD DYNAMIC INTERACTION [INTERACTION DYNAMIQUE LANCEUR-CHARGE UTILE] **c15**
H. J.-P. Morand, B. Chemoul, and P. R. Bodagala *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 101-108 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Dynamic calculation methods and tools developed for the Ariane program are described. Two methods to reduce to a minimum the calculation of the dynamic load transmitted to the satellite are summarized: an equivalent load method compatible with the usual transient response algorithms, and a transfer function coupling method, used in a dynamic coupling analysis program. ESA

N87-10901# Rome Univ. (Italy).
COMPUTATIONAL METHODS IN ELASTIC PERIODIC STRUCTURES ANALYSES **c39**

Filippo Graziani and Silvano Sgubini *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 109-112 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A method for decomposing an eigenvalue problem of N-bays dimensions into N problems of 1-bay dimensions is indicated. The results provide a contribution to obtain a recursive relationship in evaluating the eigenvalue equation and in computing the eigenvalues for axisymmetric and linear periodic structures. ESA

N87-10902# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
VERIFICATION OF THE MATHEMATICAL MODEL OF THE ARIANE 4 PAYLOAD FAIRING BY MEANS OF EXTENDED MODAL SURVEY TESTING c15
A. Bertram and P. Villalaz (Contraves Corp., Zurich, Switzerland) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 113-118 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Tests to gain insight into the geometric, nonlinear dynamic behavior of the Ariane half fairing were conducted. The static load test, and the modal survey tests in different predeformed states of the structure prove the important effect of geometric nonlinearities on the circumferential stiffness of the half shells. The results of the transient tests led to the use of the data obtained from the modal survey test on the undeformed structure as input for the finite element model adaptation. The reliability of the subsequent separation analyses were considerably improved by using the test data. ESA

N87-10903# Footscray Inst. of Tech. (Australia).
ON A SIMPLE VIBRATION CONTROL DESIGN FOR LARGE SPACE STRUCTURE MODELS WITH UNCERTAIN PARAMETERS
R. Licata *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 119-124 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The presence of unavoidable modeling errors and sizeable uncertainty in parameters of a reduced-order model of a large flexible space structure is addressed in relation to the controller design problem. Due mainly to limitations placed by on-board computers (which cause on-line adaptive or self-tuning control schemes to become unrealizable on flexible spacecraft) a controller design solution in the form of a simple to implement time-invariant feedback, obtained by considering constant and with known statistics the uncertain model parameters, is presented. The proposed stochastic optimal control scheme, more insensitive to parameter variation and spillover effects compared with that obtained by deterministic approach, may be used in the design of local or global controllers of a flexible spacecraft structure. ESA

N87-10904# London Univ. (England). Queen Mary Coll.
THE EFFECT OF THE NON-UNIFORM STRESS DISTRIBUTION IN THE BLANKETS OF SINGLE AND TWIN BOOM SOLAR ARRAY PANELS UPON THEIR MODAL CHARACTERISTICS c39
J. R. Wright *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 125-130 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The modal behavior of deployed flexible solar arrays of the single boom fold-out and twin boom roll-out types was studied with simple theoretical model configurations. The effect of the nonuniform stress distribution in the array blanket arising from flexible end members was investigated for out-of-plane/bending modes. It is found that the string-like modes important for control are hardly affected so a uniform tension analysis is adequate. However, other modes needed for response behavior are affected, particularly for the single boom array where buckling can occur. It is also found that bending stiffness in the blanket needs to be included to lead to a unique and complete set of array modes if uniform tension is assumed. ESA

N87-10905# Astron Research and Engineering, Santa Monica, Calif.
ACOUSTIC LOAD CONSIDERATIONS FOR SPACECRAFT STRUCTURES c16
J. F. Wilby and A. G. Piersol *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 133-143 Sponsored by NASA (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

An analytical model to predict the space averaged sound pressure levels in the payload bay of the Space Shuttle orbiter vehicle at lift-off was developed. A modified form of the model can also be used to predict vibration levels of the orbiter mid fuselage and to evaluate noise control concepts for the interior of the proposed Aft Cargo Carrier (ACC). The analytical model is presented and predicted payload bay sound pressure levels are compared with launch data for an empty bay. Estimated and measured sound pressure levels for regions above large diameter payloads are found to be significantly higher than those for the empty bay. The use of helium as a purge gas to reduce sound pressure levels in the ACC is proposed. ESA

N87-10906# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PREDICTION OF THE HIGH FREQUENCY RESPONSE OF SATELLITES TO DIFFUSE ACOUSTIC ENVIRONMENTS c39
B. Troclet, T. DangTrong, and C. Vidal *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 145-150 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The application of the LASCAR program to the analysis of the acoustical responses of the Ariane Sylda structure and the Arabsat satellite is described. The program, based on statistical analysis, provides the response of any aerospace structure including acoustical spaces and equipment boxes to a reverberant acoustic field. It is an improved version of the BRUIT program applied to the prediction of Ariane flight high frequency environments. The version is specially adapted to the response of a satellite submitted to a diffuse acoustic field. FORTRAN 77 was used as programming language. The LASCAR code is available on IBM and CDC computers. The predicted responses of structural configuration are compared to the measured responses. The program predictions show an excellent agreement with the measured response of complex structures and of equipment boxes attachment points. ESA

N87-10907# Centre National d'Etudes Spatiales, Toulouse (France).
PREDICTION AND CORRELATION OF STRUCTURAL RESPONSE IN ACOUSTIC CHAMBERS [PREVISION ET CORRELATION DE LA REPONSE DE STRUCTURES EN CHAMBRE ACOUSTIQUE] c39
F. Mercier and H. Defosse *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 151-156 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Vibro-acoustic prediction methods in random noise used for acoustic coupling analysis of large satellites are described. The first method is for low frequencies, using modal superposition. The second is a high frequency method using a statistical energy method via a comparison of calculations and tests of a honeycomb panel. Using both methods, the response throughout the entire acoustic frequency range can be calculated. ESA

N87-10908# Centre National d'Etudes Spatiales, Paris (France). Direction des Lanceurs.
LOW FREQUENCY RESPONSE OF AXISYMMETRIC STRUCTURES TO RANDOM NOISE [REPONSES BASEES DE STRUCTURES AXISYMMETRIQUES EN BRUIT DIFFUS] c39
G. Borello *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 157-162 In FRENCH (For

primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The axisymmetric properties of the Ariane 4 upper part are used to calculate the response of the equipment box to random noise. The response is compared to results of statistical energy analysis and of acoustic tests on Ariane. In order to improve predictions of the acoustic environment under the Ariane nose-cone at low frequencies, a method which extends the application limits of the SEA program towards lower frequencies is proposed. Test results show that utilization of the axisymmetric properties of the structure allows calculations to be extended upwards in frequency without losing accuracy and with moderate calculation costs. ESA

N87-10909# Southampton Univ. (England). Inst. of Sound and Vibration Research.
ACOUSTIC RADIATION AND INTERNAL DISSIPATION IN HONEYCOMB PANELS c39
K. T. Brown *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 163-168 Sponsored by British Aerospace, Filton, England (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A method of measuring internal loss factor and radiation loss factor directly on honeycomb panels in a reverberation room is described. The method has the advantage that measurements are made in a reverberation room with the same boundary conditions as the high intensity acoustic test. The resulting improvement in predicted levels is shown. ESA

N87-10910# Technische Hochschule, Aachen (West Germany). Inst. fuer Leichtbau.
TRANSIENT EXTERNAL LOADS OR INTERFACE FORCES RECONSTRUCTED FROM STRUCTURAL RESPONSE MEASUREMENTS c39
H. Oery, H. Glaser, and D. Hoizdeppe *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 171-177 Sponsored by Deutsche Forschungsgemeinschaft and MBB GmbH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The procedure for the reconstruction of transient forcing functions based on measured structural responses during former flights is described, i.e., the inverse problem of the dynamic response is investigated. The method is developed on the basis of the combination and inversion of the phase-plane-method, which delivers modal responses and the Williams method, which separates the pure dynamic and the quasistatic parts of structural responses. Criteria influencing the reconstruction of the impulsive active load and its time-history are discussed. For a spacecraft transported by a launcher the interface motion time-history must be defined. ESA

N87-10911# Kassel Univ. (West Germany).
STRUCTURAL SYSTEM IDENTIFICATION USING SINGLE AND MULTIAXIAL VIBRATION TEST DATA c39
M. Link *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 179-184 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A method allowing for the verification of the mathematical model of a structure in terms of its modal data and in terms of its physical mass, stiffness, and damping matrix is presented. Single and multiaxial shaking table excitation and the effect of incomplete excitation and response data, i.e., the effect that only a limited number of modes may be excited are stressed. The numerical results of a study using a mathematical spacecraft model for simulating test data from shaking table excitation are presented. ESA

N87-10912# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DEMONSTRATION OF MODAL SYNTHESIS ON AN EXPERIMENTAL STRUCTURE AND ITS APPLICATION TO LARGE SPACECRAFT c39
F. Charron, V. L. Jha, H. Lapierre, S. J. Sorocky, and F. R. Vigneron (Department of Communications, Ottawa, Ontario) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 185-190 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A substructural coupling method is demonstrated on an experimental structure. This method is used to compute the modal parameters of the structure. The substructures are defined using the modal parameters (natural frequencies, mode shapes and modal masses) measured from a modal survey or computed from a finite element model. Application of substructure coupling methods to large spacecraft is described. Results show inaccuracies (error in the natural frequency computation, inability to compute some modes) for the system results. ESA

N87-10913# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ANALYSIS/TEST CORRELATION AND UPDATE OF DYNAMIC MATHEMATICAL MODELS c39
Bernd Caesar *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 191-193 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Two methods of direct updating of mathematical models using modal test data are described. The minimum required constraints derived from eigendynamic and force equilibrium conditions are presented. The methods are used for generation of mass and stiffness matrices fitted exactly to test data. The applicability of the methods and improvements of test data which can be achieved with extensive analysis and test correlation on-line with the test performance are discussed. ESA

N87-10914# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
APPLYING MODAL SURVEY TEST RESULTS FOR UPDATING DYNAMIC MATHEMATICAL MODELS OF SPACECRAFT STRUCTURES c39
H. Hueners *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 195-201 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Update of the dynamic model used for coupled analysis and for dynamic qualification of spacecraft is reviewed, emphasizing the main problem areas which must be taken into account when using measured modal data of a complex structure to update a given finite element model. Tools which may help correlate experimental and analytical modal data, and proposals for a systematic model updating strategy, to supersede the trial-and-error approach, are discussed. ESA

N87-10915# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
A REVIEW OF TIME DOMAIN MODAL TEST METHODS AND APPLICATIONS c39
Samir R. Ibrahim *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 205-211 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Time domain modal testing techniques based on direct use of a structure's free decay time response functions are reviewed. They are economical and powerful tools for in-space, or in-orbit, identification of space structures. Even though meritorious in laboratory controlled modal tests, these techniques possess unique and useful qualities when the only available responses are those obtained while the structure is in operation or use. Application to solar array orbital dynamics is described. ESA

N87-10916# British Aircraft Corp., Filton (England). Space and Communications Div.
THE DESIGN ANALYSIS AND VERIFICATION OF A SATEL-

LITE
J. Reynolds, J. Keefe, and J. Matthews *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 213-232 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The design, analysis, test, and verification of a satellite structure is presented. A large finite element model, constructed to produce good static stress recovery was reduced via the Guyan reduction to formulate a dynamic model. Similar models modified to represent the modal survey, and static test models utilizing the same element topology were used for final correlation. Simplified versions using the same element topology were used for parameter studies. The solar array aerodynamic inertia coupling within itself and with the structure is significant in changing in vacuo structure resonances. It is essential to include effects of the seismic mass to obtain acceptable dynamic correlation. ESA

N87-10917# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
INITIAL RESULTS FROM MULTIAXES TRANSIENT TESTING
K. Eckhardt *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 233-239 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The qualification testing of spacecraft structures is considered and a methodology in which the various verification steps merge to a series of closely coordinated experimental and analytical activities is proposed. The concept means introducing multiaxes transient testing using hydraulic vibration systems for earthquake simulation to replace conventional single-axes sine testing on electrodynamic shakers. The idea is to cope with large flexible spacecraft structures and to realize a more realistic simulation of loads by imposing transient base excitation with up to six degrees of freedom simultaneously in order to achieve the correct load vector (phase information). It is demonstrated that the required environment can be simulated with sufficient accuracy. Results of the comparison of detailed test responses with applicable responses measured in a shaker test using only axial transient input are presented. ESA

N87-10918# Centre National d'Etudes Spatiales, Paris (France).
FEASIBILITY STUDY OF A LAUNCHER VIBRATION ENVIRONMENT SIMULATOR [ETUDE DE FAISABILITE D'UN SIMULATEUR D'AMBIANCE VIBRATOIRE DE LANCEUR] c14
H. J. P. Morand, B. Chemoul, F. Celle, J. P. Gauthier, F. Rouvrais (Intespace, Toulouse, France), and S. Michel *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 241-245 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A launcher mechanical environment simulator based on a closed loop technique is presented. It reproduces the dynamics of a launcher-satellite system excited by a transient input. The algorithm uses measurements, and an internal model of the test structure in real time. A real time identification process using the measurements enables a simple model of the satellite to be redefined. This model is coherent with the level of excitation and modifies the reference model and the internal model. ESA

N87-10919# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
EXPERIENCE ON THE OLYMPUS MODAL SURVEY TEST
M. Knorr and A. Bertram *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 247-252 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A modal survey test (MST) on two configurations of the large structure test model of the Olympus communications satellite is described: A configuration with the main tanks 2/3 full, the second with empty tanks. The complete MSTs were finished within 4 weeks, including installation and strip down of the test equipment. The spacecraft was mounted on a 40 t seismic block. The satellite is characterized by large dimensions, mass, and complexity. This made it necessary to install a number of exciters and accelerometers at inaccessible structural points several months prior to testing. The test was performed using a computer-supported classical phase resonance method. The day-by-day data transfer via data tape enabled the customer to correlate measured and calculated eigenmodes immediately and to perform orthogonality checks at the end of a working day. ESA

N87-10920# National Space Development Agency, Ibaraki (Japan). Tsukuba Space Center.
STRUCTURAL CONCEPT OF JAPANESE ADVANCED GEOSTATIONARY SPACECRAFT
Hidehiko Mitsuma *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 255-260 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A structural concept for a 2000 kg geostationary spacecraft bus for communication and broadcasting satellites was derived. Design trade-off results, basic configurations, and structures obtained from the conceptual design study are presented. Structural component development and test planning are discussed. ESA

N87-10921# Royal Netherlands Aircraft Factories Fokker, Amsterdam. Space Div.
RELIABILITY AND ECONOMICS OF SPACECRAFT STRUCTURE DEVELOPMENT
M. P. Nieuwenhuizen *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 261-269 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Changes to traditional spacecraft design and development plans are suggested. A full scale hardware structure model, which is nearly identical to the flight model, is deleted. A simple hardware model is used at the beginning of the project to establish load path and resonance frequencies and supply design information. The protoflight or flig ht model (PFM, FM) is designed such that a simple static test and vibration test can be performed. Verification calculation were performed after PFM and FM testing. The static test was simplified by testing only the global load. ESA

N87-10922# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACECRAFT LOAD, DESIGN AND TEST PHILOSOPHIES c38
Ben K. Wada *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 271-276 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The development of spacecraft loads, design and test philosophies at the Jet Propulsion Laboratory (JPL) during the past 25 years is presented. Examples from the JPL's Viking, Voyager and Galileo spacecraft are used to explain the changes in philosophy necessary to meet the program requirements with a reduction in cost and schedule. Approaches to validate mathematical models of large structures which can't be ground tested as an overall system because of size and/or adverse effects of terrestrial conditions such as gravity are presented. ESA

N87-10923# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVELOPMENT OF DEPLOYABLE TRUSS CONCEPT FOR SPACE STATION
H. S. Greenberg (Rockwell International Corp., Downey, Calif.) and E. E. Engler *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 277-282 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A single-fold, automatically deployable and retractable, square-shaped truss concept that is a candidate for the strongback of NASA's Space Station was developed. Compact stowage within a square-shaped housing is achieved by using folded longerons and telescoping diagonal members. Deployment or retraction is accomplished, bay by bay, in a controlled manner with root strength

maintained at all times. Control is accomplished by motor-driven jack-screws operated by a controller. Power, data, and fluid utility lines can be integrated onto trays that unfold with the truss. To verify performance a kinematically representative ground test article version is used. ESA

N87-10924# Saab-Scania, Linkoping (Sweden).
TELE-X ANTENNA MODULE STRUCTURE QUALIFICATION PROGRAM
Torbjoern Andersson *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 283-288 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The qualification program for the TELE-X Spacecraft Antenna Module Structure is presented. The CFRP structure is adapted to a Cassegrain system with extreme thermal stability requirements. Requirements constraining the design and the qualification program to verify the structure ability to meet these requirements are described. Analysis models used and experience from test predictions and model correlations are presented. ESA

N87-10925# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Group.
INFLUENCE OF FIBER ORIENTATION AND BOUNDARY CONDITIONS ON THE DYNAMIC BEHAVIOR OF A CYLINDRICALLY TELESCOPING SOLAR ARRAY (INTELSAT 6) c44
E. D. Sach, H. J. Huettmann, and E. Fritsche *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 289-292 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

To meet the strong frequency requirements in stowed configuration of the INTELSAT 6 solar array (2 central telescoping cylinders in sandwich design, the face sheets of which are made of aramid fiber fabric and carbon fiber fabric) analyses were performed to show the influence of fiber orientations, number of layers and stiffener rings and boundary conditions on the dynamic behavior. The investigations show that each reinforcement measure is effective only in a very limited range. To fulfill the frequency requirement with a minimum structural mass, a combination of several reinforcements is necessary. ESA

N87-10926# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LOADS ANALYSIS FOR THE GALILEO SPACECRAFT c39
Marc Trubert *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 293-298 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The loads analysis for the design of the Galileo structure was done by combining the transient analysis method with methods aimed at reducing cost and schedule impact while increasing confidence in the estimation of the loads. The preliminary sizing was done by the mass acceleration curve. The loads iterations were done by the generalized shock spectra method. Only a few critical subsystems required a coupled transient analysis to show positive margins. Dynamic coupling between the launch vehicle and the spacecraft was done by analytically removing and adding a spacecraft to a given launch vehicle at the modal level, without re-solving the eigenvalue problem. The modal response resulting from the dynamic coupling between the launch vehicle and the spacecraft was used only for the 28 Galileo modes below 40 Hz. In the absence of definition of the Shuttle/Centaur model and the forcing functions above 40 Hz, the mass acceleration curve was used to generate modal bounds between 40 and 80 Hz. ESA

N87-10927# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
DEVELOPMENT OF A LIGHTENED STRUCTURE FOR THE GSR3 SOLAR GENERATOR [DEVELOPPEMENT D'UNE STRUCTURE ALLEGEE DE GENERATEUR SOLAIRE GSR3]
A. Plagne and J. P. Reau *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 299-304 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Weight reduction techniques employed in the GSR3 solar generator (35W/kg end of life) are described. The surface mass of the structure is 900 to 1050 g/sqm depending on the degree of optimization of stacking points. The structure is highly versatile, and can be used fully or partly deployed. Carbon fiber composite was chosen to meet weight and sizing constraints. ESA

N87-10928# Royal Netherlands Aircraft Factories Fokker, Amsterdam. Space Div.
ENGINEERING AND SOFTWARE INTERFACING FOR THERMAL, STRUCTURAL AND ATTITUDE CONTROL RELATED WITH SPACECRAFT
J. J. Wijker, H. Geyselaers, and A. C. M. vanSwieten *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 305-313 (For primary document see N87-10886 02-18)
(Contract ESTEC-5158/82-NL-PB(SC))
Avail: NTIS HC A19/MF A01

The engineering and software interfaces between the finite element package ASKA, the dynamic and control analysis package DCAP, and the thermal analysis program SINDA are presented. The engineering background of interface programs IFDCAP and SINAS is discussed. ESA

N87-10929# MATRA Service Aerodynamique, Le Chesnay (France). Mechanical Engineering Dept.
STRUCTURAL DEVELOPMENT OF THE TELESCOPE STRUCTURE OF THE HIPPARCOS SATELLITE PAYLOAD c24
J. P. Allard *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 315-319 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The structural development of the graphite/epoxy telescope structure of the HIPPARCOS Satellite payload is presented. The structure is made of carbon fiber reinforced plastic surrounded by a computer controlled thermal enclosure. Ultrahigh modulus carbon fiber GY70 with the epoxy resin fiberite 934 are used. Internal baffles minimize stray light on the focal plane baffle. In order not to modify the reflective surface of the mirrors under mechanical loads or variation of temperature of telescope structure or mirrors, the mirrors are individually attached on mirror barrels. For stability requirements, the opto-electronic detection equipments are mounted on a very rigid dismountable focal plane assembly platform. ESA

N87-10930# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mathematics.
CRITICAL ELEMENT CONCEPTS FOR COMPOSITE STRUCTURES c39
Kenneth L. Reifsnider *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 323-328 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A critical element model approach to designing composite structures, e.g., for spacecraft, space platforms, launch vehicles and related equipment, is proposed. The modeling scheme combines mechanistic modeling of internal stress redistributions caused by damage with phenomenological (continuum) representations of property changes in critical elements to predict residual strength as a function of several types of loading. It utilizes a continuous summation scheme which is amenable to the automated computation of residual strength as a continuous function under cycle-dependent and time-dependent load environments which vary arbitrarily with time. The approach is successful for a wide variety of circumstances involving uniform stress fields. ESA

N87-10931# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
GRAZING-INCIDENCE MIRROR CARRIERS MADE OF CARBON FIBER REINFORCED EPOXY MATRIX SYSTEM c24
J. Klug *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 329-334 Sponsored by ESA

(For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A manufacturing technique study was carried out for the low energy telescopes for the X-ray Multi Mirror mission (XMM). X-ray parabolic mirror carriers were fabricated, onto which the reflecting X-ray surface was transferred by the replica method as developed for EXOSAT. Instead of using beryllium carriers, carbon fiber reinforced epoxy (CFRE) carriers were investigated. These would be of great advantage for the series production envisaged for the XMM mission. The theoretical investigations concerning the definition of laminate lay-ups of characteristics sufficient to the actual requirements were finished successfully. The diversity of laminate lay-up can be adapted to modified future needs. The geometrical quality of the CFRE carrier is as good as that of the filament winding and the machining jig. ESA

N87-10932# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Strukturmechanik.

THE K1-K2 INTERACTION FOR MATRIX SPLITTING IN UNIDIRECTIONAL LAMINATES OF CARBON FIBER REINFORCED EPOXY c24

H. Eggers and L. Kirschke *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 335-340 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Rectangular side-notched specimens of multilayered unidirectional off-axis laminates of carbon-fiber reinforced epoxy T300-914C were tested for matrix splitting. For quasi-static loads the notch opening displacements, specimen elongations and crack lengths were measured. A finite element technique combined with theoretical formulas for the straining of the material at the crack tip were used. Cracks always develop parallel to the fibers. Misaligned fibers or layers act as crack stoppers. In thin laminates the cracks initiate earlier but propagate with less speed than in thick ones. The energy release rate is not a material constant, suitable to describe the crack propagation uniquely. Cracks initiate by a critical combination of the stress intensity factors. Crack propagation depends predominatly on the crack opening mode 1 and very little on the shear mode 2. ESA

N87-10933# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Fachbereich Technische Mechanik.

DEBONDING ANALYSIS OF THERMALLY STRESSED FIBER-REINFORCED COMPOSITE MATERIALS c24

F.-G. Buchholz and K.-H. Senger *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 341-346 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The effects of two ways of micromechanical modeling on the debonding analysis of thermally stressed unidirectionally fiber-reinforced composite materials are investigated. The models are a simple single circular unit cell and a more complex hexagonal unit cell embedded in the surrounding compound, as different orders of approximation to a real composite material. Correlation between the thermally induced elastic strain energy and the energy release rate of a curved interface crack, debonding an individual fiber from the adherent matrix material in both models is studied. The influence of increasing fiber volume fractions on the debonding behavior is assessed. Results show that the elastic strain energies induced in the models nearly coincide, although they differ distinctly in their geometrical contours and boundary conditions. For fiber volume fractions $< 10\%$ it is shown that only the more complex model can deliver relevant results for the thermally induced plane strain debonding process in a real material. ESA

N87-10934# Societe Nationale Industrielle Aerospatiale, Cannes (France).

SPACE TECHNOLOGIES AND MATERIALS: A LOOK BACK AND FUTURE PERSPECTIVES [TECHNOLOGIES ET MATERIAUX SPATIAUX: RETROSPECTIVE ET PERSPECTIVES D'AVENIR] c23

J. A. Massoni and J. L. Cecconi *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 347-351 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The evolution in satellite construction materials from aluminum alloys to carbon-resin structures is discussed. Future applications of metal matrix composites, aluminum-lithium composites, and silicon carbide reinforced aluminum composites are examined. ESA

N87-10935# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.

PERFORMANCE CHARACTERISTICS OF COMPOSITE MATERIALS c24

H. W. Bergmann, M. Gaedke, and H. C. Goetting *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 353-359 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Allowable stresses for multidirectional laminates with arbitrary stacking orders are predicted analytically using the characteristics of unidirectional plies established by test. The forecast properties for static tension loading include first ply failure and ultimate strength and take into account the state of prestress induced by widely varying environmental conditions. In laminates mechanically fatigued at $R = 0.1$ the influences of temperature and moisture are shown to be moderate. In matrix-controlled laminates, elevated temperature and moisture saturation degrade the fatigue strength, while in fiber-controlled laminates the presence of moisture tends to be beneficial. In multidirectional laminates the slopes of the delta-N curves are essentially unaffected in various hot-wet conditions. Matrix-controlled laminates subjected to severe thermal cycling exhibit strength and stiffness degradations depending on the brittleness of the matrix systems. Moderate to severe matrix cracking is observed. ESA

N87-10936# Engineering System International, Rungis (France).

NUMERICAL CALCULATION OF DAMAGE TOLERANCE AND ADMISSABLE STRESS IN COMPONENTS MADE OF COMPOSITE MATERIALS USING THE PAM-FISS/BI-PHASE MATERIAL MODEL c24

E. Haug, P. Dowlatyari, and A. deRouvray *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 361-371 Sponsored by ESA (For primary document see N87-10886 02-18)
(Contract DRET-SDR-G8)
Avail: NTIS HC A19/MF A01

The tensile failure analysis of composites made of straight, long, fibers (carbon-epoxy) is described. The model is used to simulate matrix cracks via the fracture mechanics features built into the PAM-FISS computer code (matrix splitting, delamination, and ubiquitous matrix cracks). Fiber rupture is simulated in a double edge notched tensile multilayered test piece, after extensive matrix cracking occurs. The failure analysis of carbon-epoxy fabric test pieces, loaded in compression and in bending, where the nonlinear stress analysis features of the PAM-FISS code were used is outlined. The same material model (elastoplastic matrix/brittle fibers) as for the analysis of straight fiber composites is used. Fiber buckling in the compression zones, predicted as a consequence of prior matrix plastification, and fiber rupture in the tensile zones (bending test), lead to a correct prediction of the overall test piece failure. ESA

N87-10937# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).

INVESTIGATION OF THE COUPLING OF THE HERMES VEHICLE TO THE ARIANE 5 LAUNCHER [ETUDE DE L'ACCROCHAGE DU VEHICULE HERMES SUR LE LANCEUR ARIANE 5] c15

M. Agrain *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 375-380 In FRENCH (For primary document see N87-10886 02-18)

Avail: NTIS HC A19/MF A01

An interface for the Ariane-Hermes space shuttle system is proposed. A structure modifies the noncircular shape of the shuttle to enable it to meet constraints imposed by the multimission role of Ariane. This structure, a shell, is more effective as part of the glider rather than as part of the adapter, which is expendable. The structure is made of self stiffened carbon. The adapter is a simple tube. ESA

N87-10938# Societe Bertin et Cie, Plaisir (France).
DYNAMICS OF FLEXIBLE MECHANISMS [DYNAMIQUE DE MECANISMES FLEXIBLES] c39
G. Gallay, F. Girard, and J. M. Auclair *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 381-386 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A method for the automatic generation of the equations of motion of complex flexible mechanical systems such as large space structures is presented. The equations are derived using the method of virtual work of Kane (1901). The rigid body kinematics treatment uses relative coordinates. A model synthesis method is added to handle the problem of a deformable solid body. The method minimizes the number of equations, while being able to cope with complex topologies (closed chains). ESA

N87-10939# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Group.
ANALYTICAL PREDICTION OF CYLINDRICAL AND CASSINI-SHAPED SHELL CONTOURS AFTER PLASTIC STRETCHING c39
D. Hummel, J. Franz, and E. D. Sach *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 387-391 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Analysis of the aluminum pressure vessel of the anticoincidence subsystem of the EGRET instrument of the Gamma Ray Observatory satellite is described. The pressure vessel consists of a cylindrical shell (diameter 1463 (-1.0) mm, height 956.6 + or - 0.1 mm) with bottom ring and a Cassini-shaped dome (tolerance of Cassini contour -0.5 mm, height 552.5 + or - 1.5 mm) on its top. As no welding was permitted for this vessel it was spin formed from a flat circular plate (diameter 2000 mm, thickness 10 mm) and subsequently heat treated. After this procedure plastic oversize stretching by internal pressurizing the vessel and pressing it into a mold of concrete was required to remove bumps occurring during heat treatment and to bring the vessel into its final shape. The plastic stretching and spring-back behavior of the pressure vessel was analyzed with the NASTRAN finite element program using GAP-elements. The predictions are very satisfactory. ESA

N87-10940# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
A METHOD OF STUDYING THE BEHAVIOR OF COMPOSITE MATERIALS IN SIMULATED SPACE ENVIRONMENTS [MOYEN D'ETUDE DU COMPORTEMENT EN AMBIANCE SPATIALE SIMULEE DE MATERIAUX COMPOSITES] c24
F. Albugues, P. Plotard, M. F. Gomez (Office National d'Etudes et de Recherches Aerospatiales, Toulouse, France), A. Paillous, and M. D. Judd (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 393-397 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A method to evaluate the mechanical properties of composite spacecraft structural materials in simulated space vacuum, radiation, and thermal conditions was developed. It can irradiate in secondary vacuum a test batch of which a part is measured in situ and the rest afterwards. Different stages of aging due to UV and electron irradiation can be accounted for. ESA

N87-10941# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
KINEMATIC ANALYSIS OF A LARGE DEPLOYABLE TRUSS ANTENNA
G. Brazzini, Y. Broustet, C. Garnier, and P. Picard *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 399-405 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

A development program for the kinematic qualification of a large deployable spacecraft reflector is presented. The program relies upon ground deployment tests and numerical simulations. A general calculation code ADAMS was used. Satisfactory verifications for the elementary unit were completed. In-orbit predictions demonstrate concept validity and clarify the critical points with regard to kinematics. ESA

N87-10942# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Strukturmechanik.
OPTIMIZATION OF AXIALLY COMPRESSED CFRP CYLINDERS c39
R. Zimmermann *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 407-412 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

The mass minimization of axially compressed CFRP cylindrical shells which may fail due to buckling or loss of material strength, was replaced by a sequence of buckling load maximizations. The layer orientations are used as design variables to be changed both continously and discretely. The results show that the optimal orientations are practically independent of the parameters describing the cylinder. Further results are of use to gain experience about the properties of optimal structures made of fiber composites. They answer questions about the sensitivity of optimal fiber orientations to changes of ply stiffness, about the loss arising from discrete variation of the orientations compared with continuous variation, and about the gain from optimization. ESA

N87-10943# British Aircraft Corp., Filton (England).
SPACECRAFT STRUCTURAL ACOUSTICS: PROGRESS IN VIBRATION LEVEL PREDICTION c39
P. J. Williams, R. J. Cummins, and D. C. G. Eaton (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 415-428 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

Research to provide techniques compatible with engineering requirements for the prediction of launch induced high frequency vibration regimes in spacecraft is reviewed. Better understanding of response behavior leads to the analysis of less complex theoretical models and the specification of far simpler test configurations. Most of the work is based on statistical energy analysis, although scaling procedures and normal mode analyses are considered. ESA

N87-10944*# Energy Science Labs., Inc., San Diego, Calif.
GUIDEBOOK FOR ANALYSIS OF TETHER APPLICATIONS Final Report
Joseph A. Carroll Feb. 1985 47 p
(Contract NAS8-35499)
(NASA-CR-178903; NAS 1.26:178903) Avail: NTIS HC A03/MF A01 CSCL 22A

This guidebook is intended as a tool to facilitate initial analyses of proposed tether applications in space. Topics disscussed include: orbit and orbit transfer equations; orbital perturbations; aerodynamic drag; thermal balance; micrometeoroids; gravity gradient effects; tether control strategies; momentum transfer; orbit transfer by tethered release/rendezvous; impact hazards for tethers; electrodynamic tether principles; and electrodynamic libration control issues. B.G.

N87-10945*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PROCEEDINGS OF THE 2ND ANNUAL SCOLE WORKSHOP
Lawrence W. Taylor, Jr., comp. Oct. 1986 268 p Workshop held in Hampton, Va., 9-10 Dec. 1985
(NASA-TM-89048; NAS 1.15:89048) Avail: NTIS HC A12/MF A01 CSCL 22B

Proceedings of the Second Annual Spacecraft Control Laboratory Experiment (SCOLE) Workshop held at the NASA Langley Research Center, Hampton, Va., December 9 to 10, 1985 are presented. Author

N87-10946*# Hughes Aircraft Co., Los Angeles, Calif. Space and Communications Group.
ENVIRONMENTALLY-INDUCED DISCHARGE TRANSIENT COUPLING TO SPACECRAFT Final Report
R. Viswanathan, G. Barbay, and N. J. Stevens May 1985 92 p
(Contract NAS3-23869)
(NASA-CR-174922; NAS 1.26:174922) Avail: NTIS HC A05/MF A01 CSCL 22B

The Hughes SCREENS (Space Craft Response to Environments of Space) technique was applied to generic spin and 3-axis stabilized spacecraft models. It involved the NASCAP modeling for surface charging and lumped element modeling for transients coupling into a spacecraft. A differential voltage between antenna and spun shelf of approx. 400 V and current of 12 A resulted from discharge at antenna for the spinner and approx. 3 kv and 0.3 A from a discharge at solar panels for the 3-axis stabilized Spacecraft. A typical interface circuit response was analyzed to show that the transients would couple into the Spacecraft System through ground points, which are most vulnerable. A compilation and review was performed on 15 years of available data from electron and ion current collection phenomena. Empirical models were developed to match data and compared with flight data of Pix-1 and Pix-2 mission. It was found that large space power systems would float negative and discharge if operated at or above 300 V. Several recommendations are given to improve the models and to apply them to large space systems. Author

N87-10947# Oak Ridge National Lab., Tenn.
PROTECTION OF SPACECRAFT FROM METEOROIDS AND ORBITAL DEBRIS
A. P. Fraas Mar. 1986 66 p
(Contract DE-AC05-84OR-21400)
(DE86-009996; ORNL/TM-9904) Avail: NTIS HC A04/MF A01

This report presents a review of information on the incidence of meteoroids and solid debris in orbital space, the damaging effects of these materials, and the principles that may be used to design protective shields for orbiting spacecraft. The report was prepared as part of a current Oak Ridge National Laboratory effort to develop and evaluate conceptual designs of space power systems. DOE

N87-10948# ANT Nachrichtentechnik, Backnang (West Germany). Fachbereich Raumfahrt.
DEVELOPMENT OF EQUIPMENT FOR THE 20/30 GHz PAYLOAD OF A SATELLITE FOR PROPAGATION AND TRANSMISSION EXPERIMENTS Final Report, Jan. 1985
Dietmar Rosowsky Bonn, West Germany BMFT Dec. 1985 105 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-035; ISSN-0170-1339; ETN-86-97848) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22

Microwave bandpass filters in the 20/30 GHz frequency range were developed. These are TE011 and TE112-mode filters with Tschebyscheff and elliptic function characteristics. Test results obtained on a 30 GHz diplexer are reported. ESA

N87-10949# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Rech. en Technol. Spatiale.
DESIGN IMPROVEMENT AND RADIATION, CONTAMINATION TESTS. PRESTUDY 1: ULTRAVIOLET RADIATION ACCELERATION, VOLUME 1 Final Report [AMELIORATION ET ESSAIS: CONTAMINATION PLUS IRRADIATION. PREETUDE 1: ACCELERATION DES IRRADIATIONS ULTRAVIOLETTES. TOME 1: ESSAIS ET CONCLUSIONS]
J. Marco, Ph. Millan, A. Paillous, C. Sable, and J. Siffre Paris ESA Dec. 1985 92 p In FRENCH
(Contract ESTEC-5781/83-NL-AB)
(CERT-4193-Vol-1; CERT-419300/PR1/T01-DERTS; ESA-CR(P)-2227-Vol-1; ETN-86-98105) Avail: NTIS HC A05/MF A01

The influence of increasing the ultraviolet radiation intensity on the degradation of satellite thermal control surface coatings is studied. Several materials were insolated for the equivalent of 1000 solar hours with intensities 2 to 8 times stronger than the radiation of the Sun, at wavelengths under 400 nm. Visible light and infrared radiation were filtered out. The materials include white paints, aluminized kapton, black paints, aluminum paints, and silver coatings. The results are extremely variable, the absorption spectra vary with the degradation of the coating, and the degradation at the higher intensities is not always greater than at relatively low intensities. ESA

N87-10950# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Rech. en Technol. Spatiale.
DESIGN IMPROVEMENT AND RADIATION CONTAMINATION TESTS. PRESTUDY 1: ULTRAVIOLET RADIATION ACCELERATION. VOLUME 2: APPENDIX, DETAILED RESULTS Final Report [AMELIORATION ET ESSAIS: CONTAMINATION PLUS IRRADIATION. PREETUDE 1: ACCELERATION DES IRRADIATIONS ULTRAVIOLETTES. TOME 2: ANNEXES, RESULTATS DETAILLES]
J. Marco, Ph. Millan, A. Paillous, C. Sable, and J. Siffre Paris ESA Dec. 1985 200 p In FRENCH
(Contract ESTEC-5781/83-NL-AB)
(CERT-4193-Vol-2; ESA-CR(P)-2227-Vol-2; ETN-86-98106) Avail: NTIS HC A09/MF A01

The influence of increasing ultraviolet radiation intensity on the degradation of satellite thermal control surface coatings is studied. Several materials were insolated for the equivalent of 1000 hr with intensities 2 to 8 times stronger than the radiation of the Sun, at wavelengths under 400 nm. Visible light and infrared were filtered out. The materials included white paints, aluminized Kepton, black paints, alinum paints and silver coatings. The results are extremely variable, the absorption spectra vary with the degradation of the coating, and the degradation at the higher intensities is not always greater than at relatively low intensities. ESA

N87-10951# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Rech. en Technol. Spatiale.
IMPROVING THE IRRADIATION PLUS CONTAMINATION TESTS. PRESTUDY 2: SUCCESSIVE IRRADIATIONS AND SYNERGICS. VOLUME 1: TESTS AND CONCLUSIONS Final Report [AMELIORATION ET ESSAIS: CONTAMINATION PLUS IRRADIATION. PREETUDE 2: IRRADIATIONS SUCCESSIVES ET SYNERGIE. TOME 1: ESSAIS ET CONCLUSIONS]
J. Marco, Ph. Millan, A. Paillous, C. Sable, and J. Siffre Paris ESA Dec. 1985 65 p In FRENCH
(Contract ESTEC-5781/83-NL-AB)
(CERT-4193-Vol-3; CERT-419300/PR2/T01-DERTS; ESA-CR(P)-2227-Vol-3; ETN-86-98107) Avail: NTIS HC A04/MF A01

A simulation of 1 yr exposure to a geosynchronous orbit space environment was carried out. Ultraviolet radiation, protons, and electrons acted on surface coatings used on satellite thermal control equipment. The low sensitivity of the optical measurement prevents quantitative comparison. Nevertheless, observations regarding degradable materials are included. ESA

N87-10952# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Rech. en Technol. Spatiale.
IMPROVING RADIATION PLUS CONTAMINATION TESTS. PRESTUDY 2: SUCCESSIVE IRRADIATIONS AND SYNERGICS. VOLUME 2: ANNEXES. ANNEX 1: DETAILED RESULTS. ANNEX 2: CONTROL AND IMPROVEMENT OF OPTICAL MEASUREMENTS Final Report [AMELIORATION ET ESSAIS: CONTAMINATION PLUS IRRADIATION. PREETUDE 2: IRRADIATIONS SUCCESSIVES ET SYNERGIE. TOME 2: ANNEXES. ANNEXE 1: RESULTATS DETAILLES. ANNEXE 2: CONTROLE ET AMELIORATION DES MESURES OPTIQUES]
J. Marco, Ph. Millan, A. Paillous, C. Sable, and J. Siffre Paris ESA Dec. 1985 63 p In FRENCH
(Contract ESTEC-5781/83-NL-AB)
(CERT-4193-Vol-4; ESA-CR(P)-2227-Vol-4; ETN-86-98108) Avail: NTIS HC A04/MF A01

A simulation of 1 yr exposure to a geosynchronous orbit space environment was carried out. Ultraviolet radiation, protons and electrons were used on surface coatings employed on satellite thermal control equipment. The low sensitivity of the optical measurements precludes a quantitative comparison. Nevertheless, observations regarding degradable materials are included. ESA

N87-10953# MATRA Espace, Toulouse (France).
ELECTROSTATIC DISCHARGE EFFECTS ON SATELLITE ELECTRONIC DEVICES Final Report [EFFECTS DES DECHARGES ELECTROSTATIQUES SUR LES ELECTRONIQUES SATELLITES]
L. Brett, J. P. Estienne, J. G. Ferrante, M. Frezet, J. P. Granger, P. Noel, G. Labaune, L. Levy, and J. P. Catani Paris ESA 14 Jan. 1986 151 p In FRENCH
(Contract ESTEC-1-1553/83-NL-BI)
(Matra-CMT-138-JPG-078-85; ESA-CR(P)-2229; ETN-86-98110) Avail: NTIS HC A08/MF A01

The coupling mechanisms between an electrostatic discharge produced anywhere on the surface of a satellite and the electronic circuits contained in the satellite are analyzed and quantified. The study covers aspects of discharge physics and electromagnetic coupling including the impedance effect and its influence on scale laws, the incidence of the proportion between total ejected charge and satellite capacity, the concept of saturation current, and the modification of Bethe's model of electromagnetic coupling through satellite windows. Computer programs utilizing a model library to simulate and quantify electrostatic coupling are presented. ESA

N87-10954# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Rech. en Technol. Spatiales.
IMPROVING RADIATION/CONTAMINATION TESTS Final Report [AMELIORATION DES ESSAIS: CONTAMINATION PLUS IRRADIATION]
J. Marco and A. Paillous Paris ESA Jul. 1985 95 p In FRENCH
(Contract ESTEC-5781/83-NL-AB)
(CERT-419300/1-DERTS; ESA-CR(P)-2245; ETN-86-98123; PS-4) Avail: NTIS HC A05/MF A01

The characteristics of optical fibers in the wavelengths from 300 to 2500 nm are studied in order to define an improved optical spectral measuring instrument able to determine in situ the reflection factor of satellite coatings. The measuring system would have fixed samples and movable detector (optical fibers) in a high vacuum environment. A detailed study of optical fiber bundles is included. Energy balance of different systems using fibers is compared. Possible solutions are examined concluding that improved systems based on the use of optical fibers are feasible. ESA

N87-10955# Centre National d'Etudes Spatiales, Toulouse (France). Groupe de Recherche de Geodesie Spatiale.
STUDY OF THE PERFORMANCES OF SEASAT SATELLITE OVER ICE AND SEA ICE [ETUDE DU FONCTIONNEMENT DU SATELLITE SEASAT SUR LES GLACES ET GLACES DE MER]
C. Schgounn Paris ESA Nov. 1982 39 p In FRENCH
(Contract ESA-4751/81-F-DD-(SC))
(CNES-CS/MM/82/117/CT/GRGS; ESA-CR(P)-2248; ETN-86-98125) Avail: NTIS HC A03/MF A01

The conditions of utilization of an altimetric radar included in SEASAT satellite to study sea ice and the topography of the polar caps are studied. The Oakhanger raw data, produced at a rate of 10 points/sec are analyzed and the specific responses of ice and snow regions are compared. The physical properties of water, snow, ice, and sea ice are studied to determine the parameters affecting the return signal and to estimate the contribution of the volume echo of each to the signal power. It is shown that the SEASAT altimeter differentiates the snow of the polar caps and the sea ice. It allows the determination of the limits of the evolution of the sea ice, but it is not adapted to follow the variations of the surface of the snowpack. ESA

N87-10956# Marconi Space Systems Ltd., Portsmouth (England).
MODERN CONTROL OF LARGE FLEXIBLE SPACECRAFT, ESA ASTP STUDY Final Report
Paris ESA May 1985 272 p
(Contracts ESA-5664/83-NL-BI; ESTEC-5352/83-NL-HP(SC))
(BL-6206-Issue-2; ESA-CR(P)-2197; ETN-86-98083) Avail: NTIS HC A12/MF A01

Stability control of large flexible spacecraft using bang-bang nonlinear control based on Sturm's theorem was investigated. A canonical model for preliminary tuning of the Sturm control law was derived. The damping matrix for the control law was studied. Use with one and two flexure modes per array axis; state estimation; stationkeeping maneuver responses; effect of parameter mismatches; and effect of mode spillover were assessed. Comparisons with other techniques show that the Sturm controller is superior, particularly with respect to ability to reject orbital correction disturbance. ESA

N87-10957# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.
LARGE FLEXIBLE SPACE STRUCTURES: SOME SIMPLE MODELS
J. Bontsema 1986 27 p
(TW-269; B8666169; ETN-86-98503) Avail: NTIS HC A03/MF A01

Simple models of large flexible space structures are used to study the effect of flexibility and damping. The models are a one dimensional flexible beam (Euler-Bernouilli) and two flexible beams connected through a central disk, where for simplicity it is assumed that the thickness of the disk in the direction of the beams is zero. Partial differential equations are derived for these structures and it is proved that the equations are well posed. Equations for the eigenfrequencies and eigenmodes of the structures are given and the controls and observations are discussed. As an example for finite dimensional control design the method of Curtain (1983) is discussed. ESA

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N87-10958# Plessey Research (Caswell) Ltd., Towcester (England). Allan Clark Research Center.
SUB-MILLIMETRE (FAR-IR) HETERODYNE SPECTROMETER ASSEMBLY Final Report
C. J. Groves-Kirby Paris ESA Jun. 1984 112 p
(Contract ESA-4548/80-NL-HP)
(CD.6500689; ESA-CR(P)-2198; ETN-86-98084) Avail: NTIS HC A06/MF A01

The implementation of the IF amplifier, down converter, and Bragg cell processor in a 300 to 500 GHz heterodyne spectrometer assembly, incorporating a 1.3 GHz Bragg-cell back-end

spectrum analyzer with 3.7 to 4.2 GHZ input are described. Fabrication of the Bragg cells; tests on optical and radio frequency components; and output array tests are summarized. Commissioning test results are satisfactory. ESA

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N87-10959*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STATUS OF ADVANCED PROPULSION FOR SPACE BASED ORBITAL TRANSFER VEHICLE
Larry P. Cooper and Dean D. Scheer 1986 32 p Presented at the 37th Congress of the International Astronautical Federation, Innsbruck, Austria, 4-11 Oct. 1986
(NASA-TM-88848; E-3238; NAS 1.15:88848; IAF-86-183) Avail: NTIS HC A03/MF A01 CSCL 21H

A new Orbital Transfer Vehicle (OTV) propulsion system will be required to meet the needs of space missions beyond the mid-1990's. As envisioned, the advanced OTV will be used in conjunction with Earth-to-orbit vehicles, Space Station, and Orbit Maneuvering Vehicle. The OTV will transfer men, large space structures, and conventional payloads between low Earth and higher energy orbits. Space probes carried by the OTV will continue the exploration of the solar system. When lunar bases are established, the OTV will be their transportation link to Earth. NASA is currently funding the development of technology for advanced propulsion concepts for future Orbital Transfer Vehicles. Progress in key areas during 1986 is presented. Author

N87-10960*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OXIDATION-RESISTANT REFLECTIVE SURFACES FOR SOLAR DYNAMIC POWER GENERATION IN NEAR EARTH ORBIT
Daniel A. Gulino, Robert A. Egger (Cleveland State Univ., Ohio), and William F. Banholzer (General Electric Co., Schenectady, N. Y.) 1986 16 p Presented at the 33rd National Symposium of the National Vacuum Society, Baltimore, Md., 27-31 Oct. 1986
(NASA-TM-88865; E-3268; NAS 1.15:88865) Avail: NTIS HC A02/MF A01 CSCL 10B

Reflective surfaces for space station power generation systems are required to withstand the atomic oxygen-dominated environment of near Earth orbit. Thin films of platinum and rhodium, which are corrosion resistant reflective metals, have been deposited by ion beam sputter deposition onto various substrate materials. Solar reflectances were then measured as a function of time of exposure to a RF-generated air plasma. Similarly, various protective coating materials, including MgF2, SiO2, Al2O3, and Si3N4, were deposited onto silver-coated substrates and then exposed to the plasma. Analysis of the films both before and after exposure by both ESCA and Auger spectroscopy was also performed. The results indicate that Pt and Rh do not suffer any loss in reflectance over the duration of the tests. Also, each of the coating materials survived the plasma environment. The ESCA and Auger analyses are discussed as well. Author

N87-10961# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).
EXPERIMENTAL VERIFICATION OF ROCKET EXHAUST PLUMES AND IMPINGEMENT EFFECTS ON SPACECRAFT SURFACES Executive Summary
C. Dankert, G. Dettleff, G. Koppenwallner, and H. Legge Paris ESA Aug. 1985 70 p
(Contract ESA-5194/82-NL-PB(SC))
(DFVLR-IB-22-85-A-29; ESA-CR(P)-2240; ETN-86-98118) Avail: NTIS HC A04/MF A01

An experimental study to test and verify an existing plume flow and plume impingement model was performed. Different test gases, stagnation conditions, and nozzles were used as parameters. Real hydrazine thruster plumes were treated. The interaction of two plumes and the impingement effects on a plate were investigated. ESA

N87-10962# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
EVALUATION OF HEATER DESIGN CONCEPTS FOR HYDRAZINE DECOMPOSITION CHAMBERS Final Report
U. Renner, R. Tournier, H. D. Greif, and H. D. Schmitz Paris ESA 1986 143 p
(Contract ESTEC-3607/78-NL-AK)
(ESA-CR(P)-2239; ETN-86-98117) Avail: NTIS HC A07/MF A01

The requirements for heaters to be used for existing European hydrazine thrusters (catalytic) and on potential thrusters and gas generators (catalytic, electrothermal) were defined. Requirements of potential standardized heaters were derived as regards: electrical interfaces (power, voltage); heater life (total life of design or operating temperature, number of temperature cycles); and environmental conditions (vibration, shock, acceleration, ambient atmospheres, ambient temperature). The heater development was completed with hardware that was subjected to life testing with moderate success. Three of the six units tested survive the tests, but are degraded in element resistance more than is acceptable for flight hardware. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

N87-10963# Quality Assurance Directorate (Materials), London (England).
A SURVEY OF RECENT DEVELOPMENTS IN X-RAY DIFFRACTOMETRY
G. L. Marshall Dec. 1985 18 p
(MQAD-TR-910; BR98185; ETN-86-97982) Avail: NTIS HC A02/MF A01

The principles of powder X-ray diffractometry, including developments in computer control and peak identification routines are outlined. The use of specialist techniques, particularly the analysis of stress and texture is covered. Applications in metallurgy, polymer science, and ceramics are shown. ESA

N87-10964# California Univ., Berkeley. Lawrence Berkeley Lab.
CALCULATING AND PREDICTING THE PROPERTIES OF MATERIALS
S. G. Louie Apr. 1986 6 p Presented at the Workshop on Scientific Applications and Algorithm Design for High Speed Computing, Champaign, Ill., 7 Apr. 1986
(Contract DE-AC03-76SF-00098)
(DE86-011557; LBL-21470; CONF-8604176-2) Avail: NTIS HC A02/MF A01

Using microscopic theory, it is now possible to predict the structures and properties of real materials from first principles. This breakthrough was brought about by recent advances in the theory of the electronic structure of solids and by the availability of supercomputers. Many researchers in the field believe we are at the beginning of an era where we will be capable of designing materials with desirable properties using quantum theory and computers. DOE

N87-10934# Societe Nationale Industrielle Aerospatiale, Cannes (France).
SPACE TECHNOLOGIES AND MATERIALS: A LOOK BACK AND FUTURE PERSPECTIVES [TECHNOLOGIES ET MATERIAUX SPATIAUX: RETROSPECTIVE ET PERSPECTIVES D'AVENIR]

J. A. Massoni and J. L. Cecconi *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 347-351 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.
For ceramic materials see *27 Nonmetallic Materials.*

N87-10965# European Space Agency, Paris (France).
MATERIAL SELECTION FOR CARBON FIBER REINFORCED COMPOSITE STRUCTURES
Jan. 1986 174 p Transl. into ENGLISH of "Werkstoffauswahl fuer Verbundstrukturen aus CFK" Report DFVLR-Mitt-85-09, Jun. 1985 188 p Presented at Colloquium on Structural Mechanics, Brunswick, West Germany, 19 Jur. 1985 Original language document was announced as N86-14319
(ESA-TT-950; DFVLR-Mitt-85-09; ETN-86-98242) Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

Composite structures for light constructions; infuence of environmental conditions on carbon fiber reinforced plastics; carbon fiber reinforced plastic strength, and reaction to humidity and temperature; resin selection for application of specific carbon fiber types; fiber resin interface (chemical analysis); and the influence of various parameters on the microscopic fractograph of carbon fiber tensile test specimens were discussed. For individual titles, see N87-10966 through N87-10971.

N87-10966# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
ADVANCED COMPOSITES FOR LIGHTWEIGHT STRUCTURES
Guenther Niederstadt *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 7-20 Original language document was announced as N86-14320 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

The mechanical properties of composite structures were investigated regarding weight reduction for light construction, especially strength, stiffness and fracture strain behavior. Stress-strain diagrams for different composite structures are studied to obtain optimal fiber and resin matrix combinations with modified matrix ductility and data on the influence of environmental conditions on the composite structures. The time-dependent stress-strain behavior of conventional resin matrix composites can be described with isochronous stress-stress curves and depends on humidity, temperature and solar radiation. ESA

N87-10967# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
ENVIRONMENTAL INFLUENCES ON CFRP
Guenter Niederstadt *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 21-43 Original language document was announced as N86-14321 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

Responses of fiber and resin matrix in carbon fiber reinforced fibers to humidity, temperature, and solar radiation were studied. Responses to humidity include loss of mechanical properties (fracture strength and elasticity, deformability of the plastics) plus matrix swelling. Increased fracture strain leads to improved ductility of specific resin matrix systems. Responses to temperature rise include increased fracture strain, reduced strength and stiffness for plastics, and matrix thermal expansion. Responses to solar radiation include reduced molecular weight and mechanical strength, stress corrosion cracking for plastics, and matrix aging swelling. Coating of the carbon fiber structure surface with glass fibers or pure resin matrix systems is recommended to avoid strain corrosion due to the glass fiber laminate response to radiation. ESA

N87-10968# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
THE INFLUENCE OF MOISTURE AND TEMPERATURE ON THE STRENGTH BEHAVIOR OF CFRP
Michael Gaedke *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 44-90 Original language document was announced as N86-14322 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

The analytical prediction of material properties of multidirectional laminates at high or low temperatures in a matrix wet and dry state is discussed. The prediction is based on proven methods used for experimental determination of unidirectional ply properties. Prediction applicability is verified with results from tests on multidirectional laminates. The prediction and fiber composite material strength depend on the sorption and temperature-dependent internal stress. ESA

N87-10969# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
CHOICE OF RESIN WHEN USING DIFFERENT CARBON FIBER TYPES
Harald Twardy and Joachim Block *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 91-120 Original language document was announced as N86-14323 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

The effects of resin failure strain and of three different carbon fiber types on composite material behavior under tension load using rings were studied for crack-free laminate production. Measures using the acoustic energy method to detect fracture risk values confirm the influence of a flexible resin matrix on fracture occurrence. Yield limit points are determined for composite materials made of ST-3 and T-300 fibers. The effects of the matrix fracture propagation on the composite strength are studied. Further investigation of the applicability of high performance fibers with stretchable matrix resin is recommended. ESA

N87-10970# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
THE INTERFACE BETWEEN FIBER AND MATRIX RESIN FROM A CHEMICAL POINT OF VIEW
Helmut Greulich *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 121-145 Original language document was announced as N86-14324 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

The interface between fiber and resin was investigated for crack prevention along the fiber surface and composite early failure prevention due to a bad force transfer between fiber and resin consecutive to bad adhesion. Adhesion depends on the number of reactive carbonyl and carboxyl groups on the fiber surface and on the fiber preimpregnation with resin for reaction activation. A sizing material serves as an adhesion intermediate between fiber and resin. The structure of the sizing materials at the surface of commercial carbon fibers was examined using Auger electron spectroscopy and chromatographic methods. Electrochemical oxidation used to remove or modify the sizing material is recommended for an improved fiber integration to the resin matrix. The relationship between removed sizing degree and improved

fiber-resin adhesion was studied by measuring the interlaminar shear strength on unidirectional short bending test specimens and assessing the first ply failure point on tensile test specimens. A continued sizing removal applicance based on the results was developed. ESA

N87-10971# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
INFLUENCE OF VARIOUS PARAMETERS ON THE MICROSCOPIC FRACTURE PATTERN OF TENSILE TEST SPECIMENS OF CFRP
Paul Nitsch *In* ESA Material Selection for Carbon Fiber Reinforced Composite Structures Jan. 1986 p 146-173 Original language document was announced as N86-14325 (For primary document see N87-10965 02-24)
Avail: NTIS HC A08/MF A01; original German version available from DFVLR, Cologne, West Germany DM 50

The effects of water intake in the matrix, hardening and thermal cycling, temperature rise during loading, and increased resin ductility on the microscopic fractograph of carbon fiber reinforced plastics and pure epoxy resin under tension load were investigated regarding individual fiber fracture, adhesion failure, and microcrack formation in the matrix using a scanning electron microscope. Fiber/resin adhesion depends on the temperature and humidity content. Quantification of the fiber/resin adhesion with the mean fiber extension length shows a correlation with the residual tensile strength. ESA

N87-10972*# Christopher Newport Coll., Newport News, Va. Dept. of Physics.
DETERMINATION OF THE ULTRASONIC PROPERTIES OF COMPOSITES Annual Report, 5 Dec. 1983 - 5 Nov. 1984
B. T. Smith and A. M. Buoncristiani 1984 9 p
(Grant NAG1-431)
(NASA-CR-179799; NAS 1.26:179799) Avail: NTIS HC A02/MF A01 CSCL 11D

The research described encompasses two facets of the propagation of ultrasonic waves in composite structures: imaging of delaminations and the temperature dependence of the acoustical properties of composites. Progress in each area is summarized. B.G.

N87-10973*# Douglas Aircraft Co., Inc., Long Beach, Calif.
CRITICAL JOINTS IN LARGE COMPOSITE AIRCRAFT STRUCTURE Contractor Report, Nov. 1981 - Jan. 1983
Willard D. Nelson, Bruce L. Bunin, and Leonard John Hart-Smith Washington NASA Aug. 1983 41 p Presented at the 6th Conference on Fiberous Composites in Structural Design, New Orleans, La., 24-27 Jan. 1983
(Contract NAS1-16857)
(NASA-CR-3710; NAS 1.26:3710; DP-7266) Avail: NTIS HC A03/MF A01 CSCL 11D

A program was conducted at Douglas Aircraft Company to develop the technology for critical structural joints of composite wing structure that meets design requirements for a 1990 commercial transport aircraft. The prime objective of the program was to demonstrate the ability to reliably predict the strength of large bolted composite joints. Ancillary testing of 180 specimens generated data on strength and load-deflection characteristics which provided input to the joint analysis. Load-sharing between fasteners in multirow bolted joints was computed by the nonlinear analysis program A4EJ. This program was used to predict strengths of 20 additional large subcomponents representing strips from a wing root chordwise splice. In most cases, the predictions were accurate to within a few percent of the test results. In some cases, the observed mode of failure was different than anticipated. The highlight of the subcomponent testing was the consistent ability to achieve gross-section failure strains close to 0.005. That represents a considerable improvement over the state of the art. Author

N87-10974*# Douglas Aircraft Co., Inc., Long Beach, Calif.
DC-10 COMPOSITE VERTICAL STABILIZER GROUND TEST PROGRAM Contractor Report, Dec. 1980 - May 1982
J. M. Palmer, Jr., C. O. Stephens, and J. O. Sutton Washington NASA Aug. 1983 38 p Presented at the 6th Conference on Fiberous Composites in Structural Design, New Orleans, La., 24-27 Jan. 1983
(Contract NAS1-14869)
(NASA-CR-3715; NAS 1.26:3715; DP-7269) Avail: NTIS HC A03/MF A01 CSCL 11D

A review of the structural configuration and ground test program is presented. Particular emphasis is placed on the testing of a full-scale stub box test subcomponent and full span ground test unit. The stub box subcomponent was tested in an environmental chamber under ambient, cold/wet, and hot/wet conditions. The test program included design limit static loads, fatigue spectrum loading to approximately two service lifetimes (with and without damage), design limit damage tolerance tests, and a final residual strength test to a structural failure. The first full-scale ground test unit was tested under ambient conditions. The test unit was to have undergone static, fatigue, and damage tolerance tests but a premature structural failure occurred at design limit load during the third limit load test. A failure theory was developed which explains the similarity in types of failure and the large load discrepancy at failure between the two test articles. The theory attributes both failures to high stress concentrations at the edge of the lower rear spar access opening. A second full-scale ground test unit has been modified to incorporate the various changes resulting from the premature failure. The article has been assembled and is active in the test program. Author

N87-10975*# Douglas Aircraft Co., Inc., Long Beach, Calif.
CRITICAL COMPOSITE JOINT SUBCOMPONENTS: ANALYSIS AND TEST RESULTS
B. L. Bunin Washington NASA Sep. 1983 155 p
(Contract NAS1-16857)
(NASA-CR-3711; NAS 1.26:3711; ACEE-26-TR-3074) Avail: NTIS HC A08/MF A01 CSCL 11D

This program has been conducted to develop the technology for critical structural joints of a composite wing structure meeting design requirements for a 1990 commercial transport aircraft. A prime objective of the program was to demonstrate the ability to reliably predict the strength of large bolted composite joints. Load sharing between bolts in multirow joints was computed by a nonlinear analysis program (A4FJ) which was used both to assess the efficiency of different joint design concepts and to predict the strengths of large test articles representing a section from a wing root chord-wise splice. In most cases, the predictions were accurate to within a few percent of the test results. A highlight of these tests was the consistent ability to achieve gross-section failure strains on the order of 0.005 which represents a considerable improvement over the state of the art. The improvement was attained largely as the result of the better understanding of the load sharing in multirow joints provided by the analysis. The typical load intensity on the structural joints was about 40 to 45 thousand pound per inch in laminates having interspersed 37 1/2-percent 0-degree plies, 50-percent + or - 45-degrees plies and 12 1/2-percent 90-degrees plies. The composite material was Toray 300 fiber and Ciba-Geigy 914 resin, in the form of 0.010-inch thick unidirectional tape. Author

N87-10976*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
ANISAP: A THREE-DIMENSIONAL FINITE ELEMENT PROGRAM FOR LAMINATED COMPOSITES SUBJECTED TO MECHANICAL LOADING
Stephen W. Burns, Steven Mathison, and Carl T. Herakovich Jul. 1986 70 p
(Grant NAG1-343)
(NASA-CR-179867; NAS 1.26:179867; VPI-E-86-12; CCMS-86-03; IR-59) Avail: NTIS HC A04/MF A01 CSCL 11D

ANISAP is a 3-D finite element FORTRAN 77 computer code for linear elastic, small strain, analysis of laminated composites

with arbitrary geometry including free edges and holes. Individual layers may be isotropic or transversely isotropic in material principal coordinates; individual layers may be rotated off-axis about a global z-axis. The laminate may be a hybrid. Three different isoparametric elements, variable order of gaussian integration, calculation of stresses at element boundaries, and loading by either nodal displacement of forces are included in the program capability. Post processing capability includes failure analysis using the tensor polynominal failure criterion. Author

N87-10977*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE EFFECTS OF SPACE RADIATION ON A CHEMICALLY MODIFIED GRAPHITE-EPOXY COMPOSITE MATERIAL Interim Report
Susan M. Reed (Virginia Polytechnic Inst. and State Univ., Blacksburg), Carl T. Herakovich, and George F. Sykes Oct. 1986 97 p
(Grant NAG1-343)
(NASA-TM-89232; NAS 1.15:89232; CCMS-86-06; VPI-E-86-19; IR-60) Avail: NTIS HC A05/MF A01 CSCL 11D

The effects of the space environment on the engineering properties and chemistry of a chemically modified T300/934 graphite-epoxy composite system are characterized. The material was subjected to 1.0 x 10 to the 10th power rads of 1.0 MeV electron irradiation under vacuum to simulate 30 years in geosynchronous earth orbit. Monotonic tension tests were performed at room temperature (75 F/24 C) and elevated temperature (250 F/121 C) on 4-ply unidirectional laminates. From these tests, inplane engineering and strength properties (E sub 1, E sub 2, Nu sub 12, G sub 12, X sub T, Y sub T) were determined. Cyclic tests were also performed to characterize energy dissipation changes due to irradiation and elevated temperature. Large diameter graphite fibers were tested to determine the effects of radiation on their stiffness and strength. No significant changes were observed. Dynamic-mechanical analysis demonstrated that the glass transition temperature was reduced by 50 F(28 C) after irradiation. Thermomechanical analysis showed the occurrence of volatile products generated upon heating of the irradiated material. The chemical modification of the epoxy did not aid in producing a material which was more radiation resistant than the standard T300/934 graphite-epoxy system. Irradiation was found to cause crosslinking and chain scission in the polymer. The latter produced low molecular weight products which plasticize the material at elevated temperatures and cause apparent material stiffening at low stresses at room temperature. Author

N87-10978# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
RELAXATION PROPERTIES OF SOME SEGMENTED POLYURETHANE-CaCO3 COMPOSITES. A DIELECTRIC STUDY
James C. Chien, Gyorgy Banhegyi, Man-Khyun Rho, and Frank E. Karasz 8 May 1986 38 p
(Contract N00014-85-K-0880)
(AD-A169398; TR-14) Avail: NTIS HC A03/MF A01 CSCL 11/4

Dielectric relaxation in three segmented polyurethane CaCO3 composites was investigated between -70 C and +150 C in the 300 Hz to 100 kHz frequency range. Two of the polymers contained a polyacetal-polyester soft segment, while the soft component of the third polymer was polypropylene oxide. The hard segments consisted of 4,4' -diphenyl methane diisocyanate in two cases and toluene-2,4-diisocyanate in the third case. In parallel studies two calorimetric relaxations, designated alpha and alpha prime, were observed for each sample and were determined to be glass transitions of the soft and hard segments, respectively. In general, the transitions temperatures decrease with increasing filler content. High frequency, low temperature permittivities increase while low frequency, high temperature AC conductivities generally decrease with increasing filler content. The shift in the transition temperatures can be explained using the adsorption theory of filler-polymer interactions and the densities of the samples. The interfacial polarization mechanism becomes important only above the alpha and alpha prime transition temperature and below 1 kHz. GRA

N87-10979# Massachusetts Univ., Amherst. Dept. of Polymer Science and Engineering.
MODEL FOR PREDICTION OF THE ELASTIC RESPONSE OF COMPOSITE MATERIALS OVER WIDE RANGES OF CONCENTRATION
James C. Chien, Jorge N. Farber, and Richard J. Farris 8 May 1986 25 p
(Contract N00014-86-K-0880)
(AD-A169399; TR-15) Avail: NTIS HC A02/MF A01 CSCL 11/4

A model for the prediction of the elastic response of composite material over wide ranges of concentration is presented. The method is based on the mathematical analogy between the motion of particles suspended in viscous media and the elastic deformation of solids. The system is locally described by linearized forms of the elastic moduli. The validity of these relations is then extended to all concentrations under the assumption that any new portion of filler sees the existing composite as a non-interacting homogeneous matrix. The method predicts the behavior of composites with solid spherical inclusions and foams over wide ranges of concentration. The model, free from adjustable parameters, shows excellent agreement with existing experimental data. The extension of the method to other inclusion geometries is straightforward. GRA

N87-10980# Oak Ridge National Lab., Tenn.
WHISKER-REINFORCED CERAMIC COMPOSITES
T. N. Tiegs and P. F. Becher 1986 9 p Presented at the 2nd International Symposium on Ceramic Materials and Components for Engines, Luebeck-Travemuende, West Germany, 14 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-011058; CONF-860413-3) Avail: NTIS HC A02/MF A01

Substantial fracture toughness and strength improvements for alumina and mullite matrix composites have been demonstrated. Oxidation of the SiC whiskers in the alumina based composite is apparently by oxygen transport through the matrix and along grain boundaries. Densities of alumina-SiC whisker composites fabricated by pressureless sintering were a function of the whisker content. Densities greater than 95% of theoretical can be achieved with whisker contents of 10 vol %. The mechanical property gains of the whisker reinforced composites compared to monolithic ceramics are impressive. Even further improvements in mechanical properties can be attained by combining whisker reinforcement with addition of zirconia particles. DOE

N87-10981# Oak Ridge National Lab., Tenn.
STRAIN CONTRAST IN SiC WHISKER REINFORCED Al SUB 2 O SUB 3
P. Angelini and W. Mader (Max-Planck-Inst. fuer Metallforschung, Stuttgart, West Germany) 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
Prepared in cooperation with Max-Planck-Institut fuer Metallforschung, Stuttgart (Germany, F.R.); Max-Planck-Institut fuer Metallforschung, Stuttgart (Germany, F.R.); Inst. fuer Werkstoffwissenschaften
(Contract DE-AC05-84OR-21400)
(DE86-009537; CONF-860829-19) Avail: NTIS HC A02/MF A01

Whisker reinforced ceramic materials offer the potential for increased fracture toughness and fracture strength. Residual stresses resulting from differences in thermal expansion properties of the matrix and the whisker can develop during cooling and affect mechanical properties. TEM strain contrast of large inclusions has previously been observed for nearly spherical particles of ZrO2 in Al2O3 matrix grains. The formation of strain contrast oscillations was explained and a quantitative analysis of strains around ZrO2 inclusions in Al2O3 was performed. The present research is concerned with characterizing by TEM the strain field present in Al2O3 reinforced with SiC whiskers. DOE

N87-10982# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
COMPOSITES DESIGN HANDBOOK FOR SPACE STRUCTURE APPLICATIONS. EXECUTIVE SUMMARY Final Report
Paris ESA Sep. 1985 6 p
(Contract ESTEC-5816/84-NL-PB(SC))
(ESA-CR(P)-2196; ETN-86-98082) Avail: NTIS HC A02/MF A01

The ESA composites design handbook is divided into eight main chapters. These chapters are entitled: Handbook organization and user instructions; Material properties and applications; Calculation methods of laminates; General design aspects; Load transfer and design of joints; Structural design; Integrity control; and Verification guidelines. ESA

N87-10929# MATRA Service Aerodynamique, Le Chesnay (France). Mechanical Engineering Dept.
STRUCTURAL DEVELOPMENT OF THE TELESCOPE STRUCTURE OF THE HIPPARCOS SATELLITE PAYLOAD
J. P. Allard *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 315-319 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10931# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany).
GRAZING-INCIDENCE MIRROR CARRIERS MADE OF CARBON FIBER REINFORCED EPOXY MATRIX SYSTEM
J. Klug *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 329-334 Sponsored by ESA (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10932# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Strukturmechanik.
THE K1-K2 INTERACTION FOR MATRIX SPLITTING IN UNIDIRECTIONAL LAMINATES OF CARBON FIBER REINFORCED EPOXY
H. Eggers and L. Kirschke *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 335-340 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10933# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Fachbereich Technische Mechanik.
DEBONDING ANALYSIS OF THERMALLY STRESSED FIBER-REINFORCED COMPOSITE MATERIALS
F.-G. Buchholz and K.-H. Senger *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 341-346 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10935# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Structural Mechanics.
PERFORMANCE CHARACTERISTICS OF COMPOSITE MATERIALS
H. W. Bergmann, M. Gaedke, and H. C. Goetting *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 353-359 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10936# Engineering System International, Rungis (France).
NUMERICAL CALCULATION OF DAMAGE TOLERANCE AND ADMISSABLE STRESS IN COMPONENTS MADE OF COMPOSITE MATERIALS USING THE PAM-FISS/BI-PHASE MATERIAL MODEL
E. Haug, P. Dowlatyari, and A. deRouvray *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 361-371 Sponsored by ESA (For primary document see N87-10886 02-18)
(Contract DRET-SDR-G8)
Avail: NTIS HC A19/MF A01

N87-10940# Societe Nationale Industrielle Aerospatiale, Saint-Medard-en-Jalles (France).
A METHOD OF STUDYING THE BEHAVIOR OF COMPOSITE MATERIALS IN SIMULATED SPACE ENVIRONMENTS [MOYEN D'ETUDE DU COMPORTEMENT EN AMBIANCE SPATIALE SIMULEE DE MATERIAUX COMPOSITES]
F. Albugues, P. Plotard, M. F. Gomez (Office National d'Etudes et de Recherches Aerospatiales, Toulouse, France), A. Paillous, and M. D. Judd (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 393-397 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N87-10983 British Petroleum Co. Ltd., London (England).
CATALYTIC PRODUCTION OF CARBOXYLIC ACIDS OR ANHYDRIDES FROM OLEFINS Patent Application
John Cook Filed 21 Nov. 1984 3 p Filed 21 May 1983
(GB-PATENT-2-140-004-A; PATENT-APPL-8314139;
INT.CLASSC07C27/2253/1253/12;
DOMESTIC-CLASS-C2C20Y304-30Y;
DOMESTIC-CLASS-B1E-1143-1180;
DOMESTIC-CLASS-U1S-2420-B1E-; ETN-86-98024) Avail: UK Patent Office

A carboxylic acid or an anhydride is prepared by reacting, at elevated temperature and superatmospheric pressure, an olefin with carbon monoxide and a carboxylic acid in the liquid phase and in the presence of a supported Group 8 metal catalyst, preferably rhodium. The reaction using the heterogeneous catalyst can be performed in the liquid phase. It is relatively easy to recover and recycle the catalyst. ESA

N87-10984# Quality Assurance Directorate (Materials), London (England).
CORROSION BY POLYURETHANE ANTISTATIC FOAMS
V. M. Evans, A. J. Pidduck, and K. S. Smith Aug. 1984 22 p
(MQAD-R-343; BR95123; ETN-86-97981) Avail: NTIS HC A02/MF A01

Following a defect involving severe corrosion of foam-packaged microelectronic devices, commercially available conductive polyurethane foams were characterized using chemical tests. The results were used to devise a specification to prevent recurrence of such failures. Two of the foam types cause unacceptable corrosion of zinc test specimens. Mass spectrometry and other micro-analytical techniques were applied to investigate the origin of this. Corrosion was traced to poly (vinyl acetate) and polychloroprene, present as binders for the carbon black antistatic agent. There is little evidence for corrosion by the polyurethane itself, or by the acrylic-based binders used in most other foams. ESA

N87-10985# Federal Aviation Administration, Atlantic City, N.J.
AN INVESTIGATION OF THE FAA VERTICAL BUNSEN BURNER FLAMMABILITY TEST METHOD Final Report
Patricia Cahill Aug. 1986 15 p
(DOT/FAA/CT-86/22) Avail: NTIS HC A02/MF A01

The vertical Bunsen burner test method, as specified in appendix F of the Federal Aviation Regulations - Part 25, was evaluated in order to update and clarify certain problem areas. Burner fuel, flame temperature and flame placement were investi-

gated. It was determined that: (1) methane gas can be used as a replacement of alternative to B-gas, (2) a minimum flame temperature specification is meaningless without specifying thermocouple wire thickness, and (3) placing the flame at the midpoint of the lower edge of the front face results in a more realistic and severe evaluation of the specimen's flammability properties. Author

N87-10986# Ballistic Research Labs., Aberdeen Proving Ground, Md.
ELECTRICAL CONDUCTIVITY MEASUREMENTS OF HYDROXYLAMMONIUM NITRATE: DESIGN CONSIDERATIONS Final Report
John A. Vanderhoff and Steven W. Bunte Apr. 1986 26 p
(AD-A168138; BRL-MR-3511) Avail: NTIS HC A03/MF A01 CSCL 07/4

The phenomenon of electrical conductance in aqueous salt solutions is of great interest to both experimental and theoretical scientists alike. Electrical conductivity can be used as a tool for elucidating the dynamics of ions in solutions. Our interest lies in the liquid structure and transport properties in aqueous solutions of hydroxylammonium nitrate (HAN), a major component in candidate liquid gun propellants. This report reviews the experimental considerations in making electrical conductivity measurements on aqueous salt solutions, such as HAN. Conductance measurements as a function of HAN concentration are also reported; discussions as to the meaning of these curves and possible similarities with Raman spectra will be the subject of a future report. GRA

N87-10987# Virginia Univ., Charlottesville.
METAL ION-PROMOTED SYNTHESES OF BORANES AND CARBORANES Final Report, 1 Jan. 1983 - 14 Mar. 1986
Russell N. Grimes 2 Jun. 1986 10 p
(Contract DAAG29-83-K-0030)
(AD-A169189; ARO-19953.9-CH) Avail: NTIS HC A02/MF A01 CSCL 07/3

Controlled synthetic routes to new boron hydrides, carboranes, and metal-carborane complexes have been developed and a number of structurally novel species have been prepared and characterized. The oxidative fusion method for synthesis of boranes and carboranes has been further extended and its mechanism explored. The chemistry of small (7-vertex) metallacarboranes having reactive metal centers has been examined. Practical routes to metalarene-carborane sandwich complexes have been developed. GRA

N87-10988# California Univ., Berkeley. Lawrence Berkeley Lab.
HEAT TRANSFER DURING LAMINAR FLOW FLAME QUENCHING: EFFECT OF FUELS
W. M. Huang, S. R. Vosen, and R. Greif Dec. 1985 24 p Presented at the 21st International Symposium on Combustion, Munich, West Germany, 3 Aug. 1986
(Contract DE-AC03-76SF-00098)
(DE86-007490; LBL-20863; CONF-860804-9) Avail: NTIS HC A02/MF A01

Wall heat fluxes were obtained in a constant volume combustion chamber for methane-air, ethylene-air and propane-air mixtures. The experiments were performed at pressure near atmospheric over a range of equivalence ratios from 0.8 to 1.2. The unsteady heat fluxes for the three fuels were all correlated by using the heat release rates of the flames prior to quenching and the thermal diffusivity and the flame speed. The calculations were made using a finite difference method and an integral method. Two step chemical kinetics was used in the finite difference calculations and a simplified ignition temperature approach was employed in the integral method. The results from the finite difference calculation were in good agreement with the experimental data. In the integral method, choosing a single value for the dimensionless ignition temperature for all three fuels also yielded good agreement with the experimental data. The maximum wall heat flux accounts for one third of the steady laminar flame heat release rate for three fuels. DOE

N87-10989# Kiruna Geophysical Inst. (Sweden).
A NEW WAY OF ORGANIZING SPECTRAL LINE INTENSITY RATIO FLUCTUATIONS OF DIFFERENT ELEMENTS
B. Thelin Feb. 1986 23 p
(KGI-Preprint-088; ISSN-0349-2656; ETN-86-97850) Avail: NTIS HC A02/MF A01

An analysis method of organizing spectral line intensity ratio fluctuations for different elements was developed to see which line pair of analysis is more or less stable at repeated measurements. A linear graph was obtained for spectral lines from different elements when the spectral line ratio fluctuations were plotted versus the photon energies and the ionization energies of these lines. When these fluctuations were plotted versus the upper energies instead, no linear structure is obtained. This means that there is no linearity with the conventional intensity formula with the Boltzmann exponent, but there is if exp[(hnu [sub mn + J)kt] is used. ESA

N87-10990# European Space Agency, Paris (France).
RESULTS OF WIND TUNNEL TESTS ON EXTERNAL COMBUSTION
Berthold Schaefer Dec. 1985 52 p Transl. into ENGLISH from "Ergebnisse von Windkanalversuchen zur Aussenverbrennung" (Cologne, West Germany) Original language document was announced as N86-15643
(ESA-TT-959; DFVLR-FB-85-35; ETN-86-98245) Avail: NTIS HC A04/MF A01; original German version available at DFVLR, Cologne, West Germany DM 56

Wind tunnel tests on external combustion were carried out to study the flow distribution on a flat plate in a supersonic flow for spoiler optimization and combustion efficiency. The influence of spoiler geometry, mass flow rate and injection angle on flow distribution was studied. The separation area can be enlarged with the spoiler inclination against the flow. Resistance problems and mass flow rate against a split overture are reduced with a hole-line flow nozzle. The area of increased pressure is enlarged by injecting hydrogen in the recirculation area before the spoiler and by igniting the mixture. The cross force after ignition is five times as strong as the spoiler action. ESA

N87-10991# Renault Vehicles Industriels (France).
APPLICATIONS OF BASIC RESEARCH TO DIESEL COMBUSTION OPTIMIZATION
X. Lys, M. Bidault, and C. Henault 1986 10 p In FRENCH; ENGLISH summary Sponsored by French Ministere de la Recherche et de la Technologie, and Groupement Scientifique Moteurs
(ETN-86-98411) Avail: NTIS HC A02/MF A01

The rules and the process to set up diagnostics and laws of diesel combustion optimization are described. They are based on research conducted outside and inside the engine on aerodynamic field characterization and jet behavior. Models are compared with flow visualization and measurements, for the optimization of the combustion chamber of a single cylinder industrial vehicle engine. The results are extended to automotive diesel engines. ESA

N87-10992# California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
COMBUSTION IN TURBULENT JETS AND BUOYANT FLAMES Annual Report, 1 Dec. 1984 - 30 Nov. 1985
P. E. Dimotakis, J. E. Broadwell, and E. E. Zukoski 26 Dec. 1985 54 p
(Contract GRI-5083-260-0878)
(PB86-203205; GRI-86/0034) Avail: NTIS HC A04/MF A01 CSCL 21B

Results are reported from an ongoing investigation of the entrainment and mixing mechanisms in momentum-dominated turbulent jets, buoyancy-dominated turbulent plumes, and flows which undergo a transition between these two regimes. The investigation also addresses the effects of molecular diffusion rates (Schmidt number) and combustion heat release on these mechanisms and incorporates them into practical modeling and predic-

tive techniques for combustion in these flows. Laser soot-scattering measurements in a large buoyant diffusion flame have provided a detailed picture of the wrinkled, convoluted flamelet structure of the soot distribution. The full scale momentum-driven/transitional jet experimental facility has been completed and preliminary data have been collected. Fabrication of the high pressure reactant tank for turbulent reacting jet experiments has been completed and installation is underway. This study of the transition between momentum- and buoyancy-controlled jets allows one to make estimates in flows without combustion and this study has characterized several flow regimes in combusting flows and identified the important parameters relevant to the transition in combusting flows. The authors have developed a quantitative model for the effects of stoichiometric ratio, Reynolds number, Schmidt number, and Damkohler number in the turbulent shear layer and have compared this model with experiments. GRA

N87-11181*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBUSTION OVERVIEW
Donald F. Schultz *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21B

N87-11204*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FLAME RADIATION
J. D. Wear *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21B

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-10993 Central Electricity Generating Board, London (England). Translaton Section.
EFFECT OF CREEP DAMAGE ON FATIGUE LIFE OF Cr-Mo-V STEEL
Norio Shinya, Junro Kyono, Hideaki Kushima, and Shin Yokoi 1986 15 p Transl. into ENGLISH from Zairyo (Japan), v. 34, no. 379, 1985 p 436-441
(BLL-CE-Trans-8212-(9022.09)) Avail: British Library Lending Div., Boston Spa, Engl.

The effect of creep damage on high temperature low cycle fatigue endurance was investigated for the Cr-Mo-V steel used in steam turbine rotors. Creep damage was monitored by scanning electron microscopy and density change measurements for creep specimens withdrawn from testing at different stages of creep. Specimens with a predetermined amount of creep damage so estimated were then subjected to high temperature low cycle fatigue testing together with aged specimens and their fatigue fracture characteristics were identified. B.G.

N87-10994 British Aerospace Aircraft Group, Bristol (England). Advanced Manufacturing Research Dept.
INTERNATIONAL CONFERENCE - SUPERPLASTICITY IN AEROSPACE ALUMINIUM
K. S. Broad, comp. 23 Jul. 1985 12 p Conference held in Bedford, England, 12-15 Jul. 1985
(BAe-S85/AMR/0066; ETN-86-97945) Avail: Issuing Activity

The use of superplastic aluminum in aerospace was discussed. Superplastic forming to produce cost effective lightweight parts was considered. Limitations from microstructural fractures and resultant properties were covered, particularly the problem of cavitation. Special processing techniques and the evolution of alloys to overcome limitations were treated. ESA

N87-10995# Battelle Columbus Labs., Ohio.
CURRENT AWARENESS BULLETIN: METALS AND CERAMICS
Jun. 1986 8 p
(CAB-160) Avail: NTIS HC A02/MF A01

Topics addressed include: light metals, surface finishing, and ceramics. Upcoming meetings/symposia are listed. B.G.

N87-10996# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
DESIGN OF LOW ALLOY STEELS FOR THICK WALLED PRESSURE VESSELS Final Technical Report, 1 Feb. 1980 - 30 May 1985
R. O. Ritchie, J. A. Todd, P. N. Spencer, and E. R. Parker Jun. 1985 165 p
(Contract DE-AC05-84OR-21400)
(DE86-011748; ORNL/Sub-80-7843/01; UCB/RP-85/D1034)
Avail: NTIS HC A08/MF A01

This report presents results of the five year research program, Design of Low Alloy Steels for Thick Walled Pressure Vessels. The objective of the program was to modify existing commercial low alloy steels and to develop new alloys to satisfy the material requirements for thick section plate up to 400 mm (16 in.) to be used for construction of the large pressure vessels envisioned for second and third generation coal conversion systems. A new series of experimental 3Cr-Mo-Ni steels were produced and investigated for suitability as improved materials for large thick section coal conversion pressure vessels. These new steels rely on minor alloy modifications to commercial 2-1/4Cr-1Mo (ASTM A387 Grade 22 Class 2) steel. Hardenability, yield strength, tensile ductility, Charpy V-notch impact toughness, hydrogen attack resistance, and creep rupture and temper embrittlement resistance were investigated. Initial studies on fatigue crack propagation in hydrogen attacked steel, and fracture toughness (K/sub Ic/) studies were carried out. It was found that the new steels are superior to 2-1 /4Cr-1Mo steel with respect to hardenability, room temperature strength, impact toughness and resistance to hydrogen attack. Moreover, their mechanical properties compare very favorably with other 3Cr-Mo steels recently developed by Climax Molybdenum Company and the Japan Steel Works. DOE

N87-10997# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Materials Engineering.
COMPARISON OF THE EFFECTS OF ALLOYED MOLYBDENUM AND AQUEOUS MOLYBDATE ON THE PITTING RESISTANCE OF IRON-CHROMIUM ALLOYS Final Technical Report
R. E. Wistrom and D. J. Duquette 1985 21 p
(Contract DE-FG02-84ER-45101)
(DE86-011918; DOE/ER-45101/1) Avail: NTIS HC A02/MF A01

Electrochemical techniques were employed to compare and contrast the roles of alloyed Mo and aqueous MoO4(2-) in enhancing pitting resistance of ferritic stainless steels in neutral chloride solutions at 80 C. Results indicate that alloyed Mo inhibits pitting in 0.14N and 1N chloride solutions while aqueous moO4(2-) inhibits in the dilute Cl- solution only. Prepassivation experiments show that the major role of high Clconcentrations is to prevent MoO4(2-) from forming a passive film rather than in attacking the film after it has formed. Alloyed Mo and aqueous MoO4(2-) both inhibit pitting through incorporation into the passive film but incorporation from the solution is easily influenced by solution variables such as chloride concentration. DOE

N87-10998# Auburn Univ., Ala. Dept. of Mechanical Engineering.
EFFECT OF STRAIN RATE AND TEMPERATURE ON THE PROPERTIES OF (Fe,Ni) V LONG RANGE ORDERED ALLOYS Final Report
B. A. Chin, R. C. Wilcox, and H. T. Lin Dec. 1985 53 p
(Contract DE-AS05-82ER-52089)
(DE86-011967; DOE/ER-52089/T1) Avail: NTIS HC A04/MF A01

This final report describes the effects of strain rate, temperature and long-term thermal aging on the properties of the (Fe,Ni)V long range ordered (LRO) alloys. Tensile tests were performed at room and elevated temperature, and at different strain rates. The macroscopic and microscopic deformation and fracture characteris-

tics, along with controlling mechanisms, were examined using scanning electron microscopy techniques. The ordered alloys were found to have good high-temperature strength compared to conventional fusion alloys such as 316SS. Additionally, the mechanical properties were shown to be insensitive to strain rate and long-term thermal aging. Scanning electron microscopy analyses showed that the deformation and fracture mechanisms change as a function of strain rate, temperature and aging time. DOE

N87-10999# Sandia National Labs., Albuquerque, N. Mex.
PHYSICAL METALLURGY ISSUES IN SOLDER JOINT PERFORMANCE
J. J. Stephens, Jr. and R. J. Bourcier 1986 18 p Presented at the 14th Concentrator Photovoltaic Integration, Albuquerque, N. Mex., 10 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010961; SAND-86-2080C; CONF-8606123-1) Avail: NTIS HC A02/MF A01

In order to simulate solder fabrication, a simplified axisymmetric microcell model of the assembly was used. Results of constant temperature compressive creep experiments were fitted to the Sherby-Dorn steady state creep equation for use in the analyses. Experimental studies have been performed to evaluate the effect of material layup, solder joint thickness, and number of thermal cycles on the tensile strength of solder bonds. DOE

N87-11000# Oak Ridge National Lab., Tenn.
RELATIONSHIP OF AN ALLOY'S MECHANICAL PROPERTIES TO ITS RESPONSE TO INDIVIDUAL EROSIVE PARTICLE IMPACTS
J. R. Keiser 1986 16 p Presented at the 3rd Berkeley Conference on Elevated Temperature Corrosion-Erosion-Wear of Materials, Berkeley, Calif., 29 Jan. 1986
(Contract DE-AC05-84OR-21400)
(DE86-011778; CONF-860104-1) Avail: NTIS HC A02/MF A01

Deformation accompanying single-particle impacts was studied on selected ductile metals to gain insight into the mechanisms of erosion and erosion-corrosion damage. We examined the effects of heat treatment and prior cold work on crater volumes and geometries left by the impact of hard spherical particles traveling at known velocities. One material was further characterized by hardness measurements in and near impact craters. Individual impact tests were run on a material that had been exposed to multiple-particle impacts in a conventional erosion test apparatus. These test results were used to evaluate current theories on the effects of the properties of target materials on erosion behavior. DOE

N87-11001# Rolls-Royce Ltd., Derby (England).
THE GROWTH OF FATIGUE CRACKS IN A NICKEL BASE SINGLE CRYSTAL
C. Howland 5 Mar. 1986 24 p Presented at 2nd Symposium on Short Cracks, Sheffield, England, 25-28 Sep. 1985
(PNR-90310; ETN-86-98019) Avail: NTIS HC A02/MF A01

The growth of fatigue cracks in a precipitation strengthened single crystal superalloy was investigated using a specimen design with a unique crystallographic orientation. Testing was limited to room temperature, with peak and mean stress being the primary variables. The work provided data for component lifing purposes and information which can be used in modeling short fatigue crack growth in fcc materials which also occurs on specific slip planes. Fatigue crack growth at room temperature is observed to be exclusively crystallographic, occurring on 111 planes. Presentation of the data in terms of the alternating stress intensity, reveals a simple progression with data at R = 0.8 being fastest, and R = 0.1 being slowest. The observed trends in the data suggest the operation of a simple closure mechanism, although the inherent smoothness of the fracture surfaces tends not to support this. ESA

N87-11002# Utrecht State Univ. (Netherlands). Vakgroep Anorganische Chemie.
HIGH TEMPERATURE OXIDATION OF ALLOYS. OXIDATION MECHANISMS AND EXPERIMENTAL METHODS Ph.D. Thesis
Edward Willem Albert Young 1986 91 p Partly in ENGLISH and DUTCH
(ETN-86-98071) Avail: NTIS HC A05/MF A01

Investigation by X-ray photoelectron spectroscopy of the transient oxidation of NiAl; the application of Rutherford backscattering spectrometry on the study of high temperature corrosion processes emphasizing the oxidation of NiAl; Rutherford backscattering spectrometry as an experimental method to study the oxidation mechanism of NiAl3 alloy; the use of O18 tracer and Rutherford backscattering spectrometry to study the oxidation of NiAl; the use of markers and tracers to establish the growth mechanism of alumina scales during high temperature oxidation; an O18 tracer study on the growth mechanism of alumina scales on NiAl and NiAlY alloys; the relation between oxide structure and oxidation mchanism of alumina scales on NiAl; high temperature oxidation of IN617; n-type behavior of chromium (III) oxide; and the defect structure of chromium (III) oxide as a function of the oxygen partial pressure are discussed. The present work was undertaken to contribute to a better understanding of high temperature oxidation processes. Attention was focused on the transport properties of the oxides, since these have a major influence on the oxidation mechanisms of alloys. ESA

N87-11003# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Korrosion.
GALVANIC CORROSION BETWEEN CARBON FIBER REINFORCED PLASTICS AND METALLIC AERONAUTICAL MATERIALS
Thierry Fourrier and Horst Buhl Apr. 1986 86 p
(DFVLR-FB-86-16; ISSN-0171-1342; ETN-86-98184) Avail: NTIS HC A05/MF A01; DFVLR, Cologne, West Germany DM 27

The electrochemical behavior of carbon fiber reinforced plastics (CFRP) and the galvanic corrosion between CFRP and metallic aeronautical alloys were investigated. Rest potentials, mixed potentials, galvanic current densities, and polarization curves were measured. Influence of parameters such a pH-value, electrolyte agitation, distance between the samples, and area ratio was studied. Aluminium alloys (2024, 7010, 7050, 7075, 8090) show a high sensitivity to galvanic corrosion with CFRP; Ti-6A1-4V is the only alloy with uncritical galvanic corrosion behavior with CFRP. ESA

N87-11004# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
CORROSION AND CORROSION PREVENTION IN AIRCRAFT STRUCTURES
W. G. J. tHart Mar. 1985 25 p In DUTCH; ENGLISH summary Presented at PBNA Course on Corrosion Prevention, Utrecht, Netherlands, 16-23 Apr. and 7-14 May 1985
(NLR-MP-85029-U; B8667275; ETN-86-98490) Avail: NTIS HC A02/MF A01

Materials used in aircraft and the operational environments which cause the different kinds of corrosion are presented. The corrosion-sensitive parts of aircraft structures are discussed. Measures to provide optimal corrosion prevention (choice of materials, metallic coatings, surface treatment, painting) are reviewed. Measures to be taken during the design phase and during maintenance are outlined. ESA

N87-11005# Osaka Gas Co. Ltd. (Japan).
CRACK ARREST PROPERTIES OF 9 PERCENT NICKEL STEEL AND RELATION BETWEEN CRACK-INITIATION AND CRACK-ARREST TESTS Final Report, Nov. 1982 - Dec. 1985
28 Feb. 1986 142 p Sponsored by Gas Research Inst. Prepared in cooperation with Ishikawajima-Harima Heavy Industries Co. Ltd., Tokyo, Japan, Nippon Steel Corp, Tokyo, Japan and Sumitomo Metal Industries Ltd., Osaka, Japan
(PB86-213964; GRI-86/0007) Avail: NTIS HC A07/MF A01 CSCL 11F

Brittle fracture initiation and arrest properties of various 9% nickel steel plates and their weld joints were studied by means of

various fracture toughness test methods as the crack tip opening displacement, compact crack arrest, ESSO, short crack arrest and Wells wide plate tests. The results were analized by static and dynamic fracture mechanics and correlations between tests were established. GRA

N87-11182*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SURFACE PROTECTION
Stanley R. Levine *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11F

N87-11192*# Analex Corp., Dayton, Ohio.
EXPERIMENTAL VERIFICATION OF VAPOR DEPOSITION MODEL IN MACH 0.3 BURNER RIGS
Sueleyman A. Goekoglu *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 13 p (For primary document see N87-11180 02-39)
(Contract NAS3-23293)
Avail: NTIS HC A17/MF A01 CSCL 11F

N87-11193*# General Electric Co., Fairfield, Conn.
EFFECTS OF SURFACE CHEMISTRY ON HOT CORROSION LIFE
R. E. Fryxell and B. K. Gupta (TRW, Inc., Cleveland, Ohio) *In* NASA. Lewis Research Center Turbine Engine Hote Section Technology, 1984 Oct. 1984 14 p (For primary document see N87-11180 02-39)
(Contract NAS3-23926)
Avail: NTIS HC A17/MF A01 CSCL 11F

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials*.

N87-11006*# North Carolina State Univ., Raleigh. School of Textiles.
THE CRYSTALLIZATION OF TOUGH THERMOPLASTIC RESINS IN THE PRESENCE OF CARBON FIBERS Semiannual Progress Report, 1 Nov. 1985 - 1 May 1986
Michael H. Theil 1986 17 p
(Grant NAG1-525)
(NASA-CR-179810; NAS 1.26:179810) Avail: NTIS HC A02/MF A01 CSCL 11G

The crystallization kinetics of the thermoplastic resins poly (phenylene sulfide) (PPS) and poly(aryl-ether-ether-ketone) (PEEK) in the presence and in the abscence of carbon fibers was studied. How carbon fiber surfaces in composites affect the crystallization of tough thermoplastic polymers that may serve as matrix resins were determined. The crystallization kinetics of such substances can provide useful information about the crystallization mechanisms and, thus, indicate if the presence of carbon fibers cause any changes in such mechanisms. Author

N87-11007*# College of William and Mary, Williamsburg, Va.
CHARACTERIZATION OF THE RELATIONSHIP OF THE CURE CYCLE CHEMISTRY TO CURE CYCLE PROCESSING PROPERTIES Semiannual Report
David E. Kranbuehl 15 Aug. 1986 7 p
(Grant NAG1-237)
(NASA-CR-177058; NAS 1.26:177058) Avail: NTIS HC A02/MF A01 CSCL 11B

Dynamic Dielectric measurements made over a wide range of frequency provide a sensitive and convenient means for monitoring the cure process in thermosets and thermoplastics. The measurement of dielectric relaxation is one of only a few instrumental techniques available for studying molecular properties in both the liquid and solid states. Furthermore, it is probably the only convenient experimental technique for studying the polymerization process of going from a monomeric liquid of varying viscosity to a crosslinked, insoluble, high temperature solid. The objective of the research is to develop on-line dielectric instrumentation for quantitative nondestructive material evaluation and closed loop smart cure cycle control. The key is to relate the chemistry of the cure cycle process to the dielectric properties of the polymer system by correlating the time, temperature, and frequency dependent dielectric measurements with chemical characterization measurements. Measurement of the wide variation in magnitude of the complex permittivity with both frequency and state of cure, coupled with chemical characterization work, have been shown in the laboratory to have the potential to determine: resin quality, composition and age; cure cycle window boundaries; onset of flow and point of maximum flow; extent of and completion of reaction; evolution of volatiles; T sub g; and, crosslinking and molecular weight buildup. Author

N87-11008*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A NEW READILY PROCESSABLE POLYIMIDE
F. W. Harris (Akron Univ., Ohio), M. W. Beltz, and P. M. Hergenrother 1986 11 p
(NASA-TM-89253; NAS 1.15:89253) Avail: NTIS HC A02/MF A01 CSCL 11B

As part of an effort to develop tough solvent resistance thermoplastics for potential use as structural resins on aerospace vehicles, a new processable polyimide was evaluated. The synthesis involved the reaction of a new diamine, 1,3-bis 2-(3-aminophenoxy)ethyl ether, with 3,3',4,4'-benzophenonetetracarboxylic dianhydride to form the polyamic acid and subsequent conversion of it to the polyimide. Various physical properties such as thermal stability, solvent resistance, glass transition temperature, crystalline melt temperature, melt viscosity and mechanical properties such as fracture toughness, adhesive, film and composite properties are reported. Of particular interest is the extremely high titanium to titanium tensile shear strength obtained for this polyimide. Author

N87-11009*# Massachusetts Inst. of Tech., Cambridge. Energy Lab.
PROCESSING OF LASER FORMED SiC POWDER Final Report, 30 Jul. 1982 - 31 Dec. 1985
J. S. Haggerty and H. K. Bowen 31 Dec. 1985 85 p
(Grant NAG3-312)
(NASA-CR-179857; NAS 1.26:179857) Avail: NTIS HC A05/MF A01 CSCL 11G

Superior SiC characteristics can be achieved through the use of ideal constituent powders and careful post-synthesis processing steps. High purity SiC powders of approx. 1000 A uniform diameter, nonagglomerated and spherical were produced. This required major revision of the particle formation and growth model from one based on classical nucleation and growth to one based on collision and coalescence of Si particles followed by their carburization. Dispersions based on pure organic solvents as well as steric stabilization were investigated. Although stable dispersions were formed by both, subsequent part fabrication emphasized the pure solvents since fewer problems with drying and residuals of the high purity particles were anticipated. Test parts were made by the colloidal pressing technique; both liquid filtration and consolidation (rearrangement) stages were modeled. Green densities corresponding to a random close packed structure (approx. 63%) were achieved; this highly perfect structure has a high, uniform coordination number (greater than 11) approaching the quality of an ordered structure without introducing domain boundary effects. After drying, parts were densified at temperatures ranging from 1800 to 2100 C. Optimum densification temperatures will probably be in the 1900 to 2000 C range based on these preliminary results which showed that 2050 C samples had experienced substantial grain growth. Although overfired, the 2050 C samples exhibited excellent mechanical properties. Biaxial tensile strengths up to 714 MPa and Vickers hardness values of 2430 kg/sq mm 2

were both more typical of hot pressed than sintered SiC. Both result from the absence of large defects and the confinement of residual porosity (less than 2.5%) to small diameter, uniformly distributed pores. Author

N87-11010*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF Ti-6Al-4V SURFACE TREATMENTS FOR USE WITH A POLYPHENYLQUINOXALINE ADHESIVE
Donald J. Progar Oct. 1986 20 p
(NASA-TM-89045; NAS 1.15:89045) Avail: NTIS HC A02/MF A01 CSCL 11B

Three surface treatments for Ti-6Al-4V adherends were evaluated using a thermoplastic polymer monoether polyphenylquinoxaline, MEPPQ, which had been shown in previous studies to have good potential as a high temperature adhesive for aerospace applications. Initial results based on long term thermal exposure at 232 C (450 F) using the phosphate-fluoride (PF) and chromic acid anodized (CAA) treatments with MEPPQ adhesive were not encouraging. A significant improvement in strength retention and a change in failure mode (cohesive) at 232 C (450F) was found for the SHA treated specimens compared to the PF and CAA treatments. Although an improvement in long term thermal durability was obtained with the SHA treatment of Ti-6Al-4V, an improved surface treatment with better long term durability is still required for aerospace applications. Author

N87-11011# Massachusetts Inst. of Tech., Cambridge.
EFFECTIVE CONDUCTIVITY OF AGING POLYURETHANE FOAM
L. R. Glicksman, A. G. Ostrogorsky, and S. Chiappetta Mar. 1986 64 p
(Contract DE-AC05-84OR-21400)
(DE86-006939; ORNL/Sub-84-9009/1) Avail: NTIS HC A04/MF A01

An experimental technique was developed to measure the permeability of the cell walls to air components. Cell walls obtained from large bubbles were used as samples. The large bubbles are found on the surface of free rise foam. Once cell wall permeability and cell geometry are known, the foam effective diffusion coefficient can be computed from a model developed earlier. An experimental technique was also developed to measure the effective permeability of the foam. Data were taken with N2, O2 and CO2 at different temperatures. Two simple laboratory tests were developed to measure the effectiveness of the diffusion barriers. A test cell was designed to measure the leakage rate through the open paths at the foam-foil interface. To be able to detect the open paths a simple dye technique was developed. It was found that most of the tested samples with foil on both sides have open paths at only one interface. On the other interface an open shear layer 1 to 2 mm below the interface was detected. DOE

N87-11012# Sandia National Labs., Albuquerque, N. Mex.
FRACTAL ASPECTS OF CERAMIC SYNTHESIS
D. W. Schaefer and K. D. Keefer 1986 12 p Presented at the Materials Research Society Spring Meeting, Palo Alto, Calif., 15 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-011657; SAND-85-2455C; CONF-860445-14) Avail: NTIS HC A02/MF A01

The concept of fractal geometry is used to describe the structure of silica polymers, colloidal aggregates, and critical systems. We illustrate the interpretation of scattering curves (X-ray, neutron and light) for fractal systems and review simple growth models which generate fractal structures. We describe the polymerization of silica under various conditions and demonstrate that, depending on chemical conditions, polymerization maps onto simple fractal growth processes. The key factors which control growth are monomer-cluster vs cluster-cluster growth, and reaction-limited vs diffusion-limited growth. DOE

N87-11013# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Material- und Festkoerforschung.
STRAIN RATE DEPENDENCE OF THE DEFORMATION BEHAVIOR OF POLYMERS AT LOW TEMPERATURES Thesis - Karlsruhe University, West Germany
Karl Poehlmann Feb. 1986 104 p In GERMAN; ENGLISH summary
(KfK-4060; ISSN-0303-4003; ETN-86-97836) Avail: NTIS HC A06/MF A01

The fracture behavior under tension of polymers was investigated at 77, 4.2 K in a wide range of strain rates. The time dependence of the fracture properties determined (fracture stress and fracture strain) can be correlated with the molecular dynamics of the polymers within the whole range examined. At very high strain rates thermal effects in microscopic zones (crazes) are necessary. These effects are estimated on the basis of thermodynamics considerations of the deformation processes in the craze. This estimation supports the proposed theoretical concept of the rate dependence of the fracture behavior. Qualitative conclusions are drawn from investigations of the fracture surfaces by scanning electron microscopy. A device to perform short-time tests at low temperatures with low expenditure in terms of time and cryoengineering is presented. ESA

N87-11194*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COATING LIFE PREDICTION
James A. Nesbitt and Michael A. Gedwill *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11G

N87-11195*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTRODUCTION TO LIFE MODELING OF THERMAL BARRIER COATINGS
Robert A. Miller *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11G

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N87-11014# Federal Aviation Administration, Atlantic City, N.J.
AVGAS/AUTOGAS COMPARISON: WINTER FUELS Interim Report
Augusto M. Ferrara Jul. 1986 53 p
(DOT/FAA-CT-86/21) Avail: NTIS HC A04/MF A01

This report describes dynamometer tests which simulated conditions found in a general aviation aircraft. In these tests, automobile gasoline was tested and compared with aviation gasoline. The tendency for vapor lock and detonation was measured as a function of gasoline grade, Reid Vapor Pressure, and the age of the fuel. Author

N87-11015# Brookhaven National Lab., Upton, N. Y.
USE OF MOLTEN SALT ELECTROCHEMICAL TECHNIQUES TO STUDY AND CONTROL HYDROGEN STORAGE IN METAL HYDRIDES Final Report
R. A. Huggins, C. M. Luedecke, and G. Deublein Apr. 1986 25 p
(Contract DE-AC02-76CH-00016)
(DE86-011534; BNL-38057) Avail: NTIS HC A02/MF A01

The work during this year has both established and demonstrated the basic principles, both theoretical and experimental, involved in the proposed new approach to the understanding of the thermodynamic features underlying the pressures and capacities observed in the storage of hydrogen in ternary metal hydride

systems. These were demonstrated for three different magnesium alloy hydride families. DOE

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

For biological materials see *55 Space Biology*.

N87-11016# Aeritalia S.p.A., Torino (Italy). Space Systems Group.
BUBBLE DROP AND PARTICLE UNIT (BDPU) PROJECT Executive Summary Report
M. Briccarello Paris ESA 3 Oct. 1986 106 p
(Contract ESA-5968/84)
(BO-RP-AI-004; ESA-CR(P)-2220; ETN-86-98100) Avail: NTIS HC A06/MF A01

A modular facility for studying bubble, drop, and particle dynamics in liquid matrices in nonuniform fields of temperature and concentration; formation and dynamics of solidification fronts under the effect of temperature and concentration gradients; interaction between bubbles, drops and particles, and the advancing solidification front; and the fluid dynamics of levitated samples, solution growth, life science experiments, and electrophoresis is proposed. Design results, program aspects, and commercial factors are discussed. ESA

N87-11017# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
ADVANCED METHOD FOR COMPUTING THE FLOW AROUND WINGS WITH REAR SEPARATION AND GROUND EFFECT
Klaus Jacob Jan. 1986 65 p
(DFVLR-FB-86-17; ISSN-017-1342; ETN-86-98276) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 21.50

A method for computing the subsonic flow around wings with moderate to high aspect ratio and low sweep at high angles of attack was improved by introducing the curved basic flow concept. It was extended to include the ground effect by utilizing the reflected image concept. The state of the art is presented, and theoretical results are compared with measurements. Conclusions concerning the scope of the method are drawn. ESA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N87-11018# Army Lab. Command, Fort Monmouth, N.J. Electronics Technology and Devices Lab.
UV/OZONE CLEANING OF SURFACES Technical Progress Report
John R. Vig May 1986 50 p
(AD-A169024; SLCET-TR-86-6) Avail: NTIS HC A03/MF A01 CSCL 14/2

The UV/ozone methods, which is reviewed in this report, is an effective method of removing a variety of contaminants from surfaces. It is a simple-to-use dry process which is inexpensive to set up and operate. It can rapidly produce clean surfaces, in air or in a vacuum system, at ambient temperatures. Placing properly precleaned surface within a few millimeters of an ozone-producing UV source can produce clean surfaces in less than one minute. The technique can produce clean surfaces in less than one minute. The technique can produce near-atomically clean surfaces, as evidenced by Auger electron spectrosocpy (AES), electron spectroscopy for chemical analysis (ESCA), and ion scattering spectroscopy/secondary ion mass spectroscopy (ISS/SIMS) studies. Topics discussed include the variables of the process, the types for surfaces which have been cleaned successfully, the contaminants that can be removed, the construction of a UV ozone cleaning facility, the mechanism of the process, UV/ozone cleaning in vacuum systems, rate-enhancement techniques, safety consideration, effects of UV/ozone other than cleaning, and applications. GRA

N87-11019# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BIMONTHLY BULLETIN, NUMBER 1985-4, 227/JULY-AUGUST
Claude Sevestre, ed. ESA Feb. 1986 63 p Transl. into ENGLISH of "La Recherche Aerospatiale, Bulletin Bimestriel, no. 1985-4" Paris, France, ONERA, Jul. Aug. 1985
(ESA-TT-960; ETN-86-97802) Avail: NTIS HC A04/MF A01; HC in English and original report in French available at ONERA, Paris, France FF 70

Computation of internal separated flows and shock wave-boundary layer interactions by viscous-inviscid interaction, numerical simulation of the response of an axial compressor to nonhomogeneous flows, adaptation of Neuber's theory to stress concentration in viscoplasticity, and static and dynamic analysis of cyclically symmetric structures are discussed. Also discussed is the prediction of the unsteady aerodynamic field around a DARRIEUS - type windmill, unsteady stall modeling in three dimensional flow, and interactive graphic display software. ESA

N87-11020# Rolls-Royce Ltd., Derby (England).
NET SHAPE FORMING: THE ROUTE TO LOW COST COMPONENTS. THE VIEW POINT OF THE AEROSPACE INDUSTRY
J. A. Moore 6 Mar. 1986 25 p Presented at Institution of Production Engineers Seminar, London, England, 21 Nov. 1985
(PNR-90306; ETN-86-98017) Avail: NTIS HC A02/MF A01

Aerospace products which give the most benefit from Nett and near Nett purchases, and where it is recognised that even though their volume may be low their value is extremely light, are discussed Turbine blades, nozzle guide vanes, casings, rings, fabrications, and major rotating components are cited. ESA

N87-11021# National Bureau of Standards, Gaithersburg, Md.
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS, VOLUME 91, NUMBER 1, JANUARY-FEBRUARY 1986
Feb. 1986 44 p
(PB86-206364) Avail: NTIS HC A03/MF A01 CSCL 13B

The Journal of Research of the National Bureau of Standards, Volume 91, Number 1, January-February 1986 contains the following: Ruggedness Testing-Part I: Ignoring Interactions; Ruggedness Testing-Part II; Recognizing Interactions; Effect of Variables on pH Measurement in Acid-Rain-Like Solutions as Determined by Ruggedness Tests; An Interlaboratory Test of pH Measurements in Rainwater; Development of a Standard Reference Material for Rainwater Analysis. The Journal also advances features in measurement methodology and analyses consistent with the NBS responsibility as the nation's measurement science laboratory. It includes reports on instrumentation for making accurate and precise measurements in fields of physical science and engineering, as well as the mathematical models of phenomena which enable the predictive determination of information in regions where measurements may be absent. Papers on critical data, calibration techniques, quality assurance programs, and well characterized reference materials reflect NBS programs in these areas. GRA

N87-11028*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Ground Antennas and Facilities Engineering Section
STABILITY INVESTIGATION OF THE QUADRIPOD STRUCTURE FOR THE NASA/JPL 70-METER ANTENNA
C. T. Chian, J. J. Cucchissi, and R. Levy *In its* The Telecommunications and Data Acquisition Report (date] p 33 - 42 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

N87-11503# Soziologisches Forschungsinst. e.V., Goettingen (West Germany).
MANUFACTURING PLANNING IN MACHINE BUILDING FROM THE POINT OF VIEW OF MANAGEMENT AND WORKSHOP PERSONNEL [FERTIGUNGSSTEUERUNG IM MASCHINENBAU AUS DER PERSPEKTIVE VON UNTERNEHMENSLEITUNG UND WERKSTATTPERSONAL]
F. Manske *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 85-109 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

N87-11022 Royal Signals and Radar Establishment, Malvern (England).
SPECTRAL ANALYSIS FOR RADAR USING LINEAR PREDICTIVE FILTERING
J. F. Cross Nov. 1985 23 p
(RSRE-Memo-3896; BR98874; ETN-86-98006) Avail: NTIS HC A02

Spectral analysis (for pure sinusoids in white noise) using the covariance method of linear predictive filtering (LPF) was compared with discrete Fourier transformation (DFT). It is found to be advantageous to take the geometric mean of the power spectra produced from the forward and backward filters. Given this approach, the LPF method can match the detection performance of a windowed DFT for a single sinusoid in white noise. There is no evidence of spurious peak production, i.e., the false alarm probability does not increase above the noise-only case when signals are introduced. Above 10dB signal to noise ratio (SNR) improvements in resolution over a windowed DFT are observable and are small factor improvements rather than order of magnitude. At high SNR significant improvements in multiple signal detectability can be expected from the LPF method, with, however, a large computational increase over the DFT methods. ESA

N87-11023 Royal Signals and Radar Establishment, Malvern (England).
EXPERIMENTS ON THE ANNOTATION OF LARGE QUANTITIES OF SPEECH USING THE ZIP DYNAMIC TIME-WARPING ALGORITHM
S. M. Peeling Dec. 1985 22 p
(RSRE-Memo-3919; BR99177; ETN-86-98011) Avail: Issuing Activity

It is demonstrated that the ZIP algorithm is capable of perfect alignment of annotated and unannotated speech files in the majority of cases, even when the files are from different speakers. It can therefore form the basis of an automatic annotation system. It is unlikely that ZIP can completely remove the need for human inspection. However, in cases where misalignment occurs it frequently only affects a small portion of the two files so that a minimal amount of human correction is required. Experiments suggest that a reduced representation of two channels is adequate. For the particular 2 channel representation used, a beamwidth of 200 and deletion penalties of 15 are suitable parameters. By calculating the sum of the differences between the minimum scores in consecutive windows, and averaging this sum over the whole file it is possible to automatically determine the quality of the alignment. ESA

N87-11024*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE TELECOMMUNICATIONS AND DATA ACQUISITION REPORT Progress Report, Apr. - Jun. 1986
E. C. Posner, ed. 15 Aug. 1986 315 p
(Contract NAS7-918)
(NASA-CR-179715; JPL-TDA-PR-42-86; NAS 1.26:179715) Avail: NTIS HC A14/MF A01 CSCL 17B

This publication, one of a series formerly titled The Deep Space Network Progress Report, documents DSN progress in flight project support, tracking and data acquisition research and technology, network engineering, hardware and software implementation, and operations. In addition, developments in Earth-based radio technology as applied to geodynamics, astrophysics and the radio search for extraterrestrial intelligence are reported. For individual titles, see N87-11025 through N87-11055.

N87-11025*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
DSS 13 FREQUENCY STABILITY TESTS PERFORMED DURING MAY 1985 THROUGH MARCH 1986
T. Y. Otoshi and M. M. Franco *In its* The Telecommunications and Data Acquisition Report (date] p 1 - 14 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

Results of station frequency stability testing performed at DSS 13 (Deep Space Station) during May 1985 through March 1986 are presented. The testing was done on X-band uplink and X- and S-band downlink subsystems as well as on end-to-end systems. The subsystem test data are useful for assessing the frequency stability of various prototype X-band uplink or downlink subsystems for purposes of making design improvements. Information derived from extensive testing at DSS 13 will be useful in the preparation of an X-band Uplink Demonstration Experiment to be conducted at DSS 13, and will also be valuable in the preparations of gravity wave experiments to be conducted at other DSN stations in the future. Author

N87-11026*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Ground Antenna and Facilities Engineering Section.
NEW SHORT-TIME ALIGNMENT TECHNIQUE FOR 70-METER ANTENNA SURFACE PANELS
M. S. Katow *In its* The Telecommunications and Data Acquisition Report (date] p 15 - 25 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

With severely limited field modification time for upgrading the 64-m antenna to 70-m diameter, a new shorter time method for aligning the surface panels of the main reflector was needed. For each target on the surface panel, both distance (or range) and elevation angle measurements are made. A new technique for setting the surface panels at zenith look has been devised. This article describes the software required to convert the computed target distortions obtained from the JPL-IDEAS structural analysis computer program (defining the gravity load change from a 45-deg elevation angle to zenith look) into the theodolite reading at zenith look. The technique results in a perfectly shaped reflector at the 45-deg rigging elevation, with acceptable surface error tolerance. Author

N87-11027*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
A PROTOTYPE DSN X/S-BAND FEED: MODEL 3 DEVELOPMENT c33
D. A. Bathker and H. F. Reilly *In its* The Telecommunications and Data Acquisition Report (date] p 26 - 32 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

The development of a prototype X/S-band common aperture Cassegrain feedhorn for Deep Space Network (DSN) use is discussed. A Model 3 combiner has been developed to increase S-band bandwidth to include the Highly Elliptical Earth Orbiter band from 2025 to 2110 MHz, and to provide a 400-kW CW S-band uplink and a possible planetary radar band near 2320 MHz.

The combiner uses eight S-band waveguide injection slots arranged in four pairs. The problems of this design geometry associated with rejection filtering and X/S-band matching are discussed. M.G.

N87-11028*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Ground Antennas and Facilities Engineering Section
STABILITY INVESTIGATION OF THE QUADRIPOD STRUCTURE FOR THE NASA/JPL 70-METER ANTENNA c31
C. T. Chian, J. J. Cucchissi, and R. Levy *In its* The Telecommunications and Data Acquisition Report (date] p 33 - 42 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A new, slim-profiled, low-blockage quadripod structure was designed to support the 7.7-m-diameter subreflector for the 70-m antenna. Detailed analyses of quadripod structural stability (in frequency and buckling) are presented. The results indicate that the new quadripod design has an adequate safety margin for buckling, and its lowest natural frequency is above the control system bandwidth. The analytical design frequencies were confirmed by actual field measurements made in Spain in February 1986. Author

N87-11029*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
ARRAY FEED SYNTHESIS FOR CORRECTION OF REFLECTOR DISTORTION AND VERNIER BEAMSTEERING
S. J. Blank and W. A. Imbriale *In its* The Telecommunications and Data Acquisition Report (date] p 43 - 55 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

An algorithmic procedure for the synthesis of planar array feeds for paraboloidal reflectors is described which simultaneously provides electronic correction of systematic reflector surface distortions as well as a Vernier electronic beamsteering capability. Simple rules of thumb for the optimum choice of planar array feed configuration (i.e., number and type of elements) are derived from a parametric study made using the synthesis procedure. A number of f/D ratios and distortion models were examined that are typical of large paraboloidal reflectors. Numerical results are presented showing that, for the range of distortion models considered, good on-axis gain restoration can be achieved with as few as seven elements. For beamsteering to +/- 1 beamwidth (BW), 19 elements are required. For arrays with either 7 or 19 elements, the results indicate that the use of high-aperture-efficiency elements (e.g., disk-on-rod and short backfire) in the array yields higher system gain than can be obtained with elements having lower aperture efficiency (e.g., open-ended waveguides). With 37 elements, excellent gain and beamsteering performance to +/- 1.5 BW are obtained independent of the assumed effective aperture of the array element. An approximate expression is derived for the focal-plane field distribution of the distorted reflector. Contour plots of the focal-plane fields are also presented for various distortion and beam scan angle cases. The results obtained show the effectiveness of the array feed approach. Author

N87-11030*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
THE 1- TO 4-K REFRIGERATION TECHNIQUES FOR COOLING MASERS ON A BEAM WAVEGUIDE ANTENNA
D. L. Johnson *In its* The Telecommunications and Data Acquisition Report (date] p 56 - 65 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

The status of technology is reported for various 1- to 4-K commercially available refrigeration systems capable of producing 1.5-K refrigeration to cool masers and superconducting cavity oscillators on the proposed beam waveguide antenna. The design requirements for the refrigeration system and the cryostat are presented. A continuously operating evaporation refrigerator that uses capillary tubing to provide a continuous, self-regulating flow of helium at approximately 1.5 K has been selected as the first refrigerator design for the beam waveguide antenna. Author

N87-11031*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communication Systems Research Section.
SINGLE LONGITUDINAL MODE OPERATION OF SEMICONDUCTOR LASER ARRAYS WITH ETALON CONTROL c36
H. Hemmati *In its* The Telecommunications and Data Acquisition Report (date] p 66 - 69 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A simple method is devised to obtain a single longitudinal output beam from high-power multilongitudinal mode diode laser arrays. Mode control is achieved by simply placing a thin etalon in front of the laser. The three-cavity laser formed by addition of the etalon favors a single longitudinal mode. This technique is applicable to both continuous wave and pulsed laser modes of operation. Experimental results demonstrating the technique along with future work and possible applications are discussed. Author

N87-11032*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A RECURSIVE SOLUTION FOR A FADING MEMORY FILTER DERIVED FROM KALMAN FILTER THEORY c33
J. I. Statman *In its* The Telecommunications and Data Acquisition Report (date] p 70 - 76 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

A simple recursive solution for a class of fading memory tracking filters is presented. A fading memory filter provides estimates of filter states based on past measurements, similar to a traditional Kalman filter. Unlike a Kalman filter, an exponentially decaying weight is applied to older measurements, discounting their effect on present state estimates. It is shown that Kalman filters and fading memory filters are closely related solutions to a general least squares estimator problem. Closed form filter transfer functions are derived for a time invariant, steady state, fading memory filter. These can be applied in loop filter implementation of the Deep Space Network (DSN) Advanced Receiver carrier phase locked loop (PLL). Author

N87-11033*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
AN ESTIMATOR-PREDICTOR APPROACH TO PLL LOOP FILTER DESIGN c33
J. I. Statman and W. J. Hurd *In its* The Telecommunications and Data Acquisition Report (date] p 77 - 89 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

An approach to the design of digital phase locked loops (DPLLs), using estimation theory concepts in the selection of a loop filter, is presented. The key concept is that the DPLL closed-loop transfer function is decomposed into an estimator and a predictor. The estimator provides recursive estimates of phase, frequency, and higher order derivatives, while the predictor compensates for the transport lag inherent in the loop. This decomposition results in a straightforward loop filter design procedure, enabling use of techniques from optimal and sub-optimal estimation theory. A design example for a particular choice of estimator is presented, followed by analysis of the associated bandwidth, gain margin, and steady state errors caused by unmodeled dynamics. This approach is under consideration for the design of the Deep Space Network (DSN) Advanced Receiver Carrier DPLL. Author

N87-11034*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
CHOOSING CHANNEL QUANTIZATION LEVELS AND VITERBI DECODING FOR SPACE DIVERSITY RECEPTION OVER THE ADDITIVE WHITE GUASSIAN NOISE CHANNEL
S. Kalson *In its* The Telecommunications and Data Acquisition Report (date] p 90 - 94 (For primary document see N87-11024

02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

Previous work in the area of choosing channel quantization levels for a additive white Gaussian noise channel composed of one receiver-demodulator is reviewed, and how this applies to the Deep Space Network composed of several receiver-demodulators (space diversity reception) is shown. Viterbi decoding for the resulting quantized channel is discussed. Author

N87-11035*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
PHASE LOCK ACQUISITION FOR SAMPLED DATA PLLS USING THE SWEEP TECHNIQUE c33
S. Aguirre, D. H. Brown, and W. J. Hurd *In its* The Telecommunications and Data Acquisition Report (date) p 95 - 102 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

Simulation results of the swept-acquisition performance of residual carrier phase-locked loops (PLLs) are reported. The loops investigated are sampled data counterparts of the continuous time type II and III loops currently in use in Deep Space Network receivers. It was found that sweep rates of 0.2 B(sub L)(2) to 0.4 B(sub L)(2) Hz/s can be used, depending on the loop parameters and loop signal-to-noise ratio (SNR), where B(sub L) is the one-sided loop noise bandwidth. Type III loops are shown to be not as reliable as type II loops for acquisition using this technique, especially at low SNRs. Author

N87-11036*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A METHOD TO DRAMATICALLY IMPROVE SUBCARRIER TRACKING
W. J. Hurd and S. Aguirre *In its* The Telecommunications and Data Acquisition Report (date) p 103 - 110 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 20N

A method is presented for achieving a dramatic improvement in phase tracking of square wave subcarriers or other square waves. The method is to set the amplitude of the phase quadrature reference signal to zero except near the zero crossings of the input signal. Without changing the loop bandwidth, the variance of the phase error can be reduced to approximately W sigma(sub 0)(2), were sigma (sub 0)(2) is the phase error variance without windowing, and W is the fraction of cycle in which the reference signal has a nonzero value. Simulation results confirm the analysis and establish minimum W versus signal-to-noise ratio. Typically, the window can be made so narrow as to achieve a phase error variance of 1.5 sigma(sub 0)(4). Author

N87-11037*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A NEW METHOD FOR FRAME SYNCHRONIZATION
M. Shahshahani and L. Swanson *In its* The Telecommunications and Data Acquisition Report (date) p 111 - 123 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

A frame synchronization method based on an examination of the shortest bit length containing all error bursts is introduced. It is shown that the new method is more reliable and efficient than the commonly used one based on counting the number of errors for the convolutionally coded channel. Author

N87-11038*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
CRAMER-RAO BOUNDS FOR SIGNAL-TO-NOISE RATIO AND COMBINER WEIGHT ESTIMATION
S. J. Dolinar *In its* The Telecommunications and Data Acquisition Report (date) p 124 - 130 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

Cramer-Rao lower bounds on estimator variance are calculated for arbitrary unbiased estimates of signal-to-noise ratio and combiner weight parameters. Estimates are assumed to be based on a discrete set of observables obtained by matched filtering of a biphase modulated signal. The bounds are developed first for a problem model based on one observable per channel symbol period, and then extended to a more general problem in which subperiod observables are also available. Author

N87-11039*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
ANTENNA ARRAYING OF VOYAGER TELEMETRY SIGNALS BY SYMBOL STREAM COMBINING c17
W. J. Hurd, J. Rabkin, M. D. Russell, B. Siev, H. W. Cooper, T. O. Anderson, and P. U. Winter *In its* The Telecommunications and Data Acquisition Report (date) p 131 - 142 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09F

Telemetry signals received from the Voyager 2 spacecraft at Deep Space Stations at Parkes and Canberra, Australia, on February 6, 1986, were combined by the method of symbol stream combining. This second demonstration of symbol stream combining followed the International Cometary Explorer (ICE) demonstration at Giacobini-Zinner encounter in September 1985. The Voyager demonstration was at a symbol rate of 43.2 ksymb/s, compared to 2 ksymb/s for ICE. Recording, playback, and combining at this higher rate were demonstrated. The average symbol signal-to-noise ratio (SNR) of the combined data was 2.84 dB, or 0.23 dB less than the sum of the SNRs of the two imput symbol streams. This 0.23 loss from ideal combining was due to use of 4-bit quantization of the input symbol stream and imperfect scaling. A practical implementation with 8-bit quantization could achieve combining losses of under 0.05 dB over a wide dynamic range of input signal levels. Author

N87-11040*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A VLSI ARCHITECTURE FOR PERFORMING FINITE FIELD ARITHMETIC WITH REDUCED TABLE LOOK-UP c33
I. S. Hsu, T. K. Truong, and I. S. Reed *In its* The Telecommunications and Data Acquisition Report (date) p 143 - 154 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

A new table look-up method for finding the log and antilog of finite field elements has been developed by N. Glover. In his method, the log and antilog of a field element is found by the use of several smaller tables. The method is based on a use of the Chinese Remainder Theorem. The technique often results in a significant reduction in the memory requirements of the problem. A VLSI architecture is developed for a special case of this new algorithm to perform finite field arithmetic including multiplication, division, and the finding of an inverse element in the finite field. Author

N87-11041*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A NEW VLSI COMPLEX INTEGER MULTIPLIER WHICH USES A QUADRATIC-POLYNOMIAL RESIDUE SYSTEM WITH FERMAT NUMBERS c33
T. K. Truong, I. S. Hsu, J. J. Chang, H. C. Shyu, and I. S. Reed *In its* The Telecommunications and Data Acquisition Report (date) p 155 - 163 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

A quadratic-polynomial Fermat residue number system (QFNS) has been used to compute complex integer multiplications. The advantage of such a QFNS is that a complex integer multiplication requires only two integer multiplications. In this article, a new type Fermat number multiplier is developed which eliminates the initialization condition of the previous method. It is shown that the new complex multiplier can be implemented on a single VLSI chip. Such a chip is designed and fabricated in CMOS-pw technology. Author

N87-11042*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.

UNATTENDED DEEP SPACE STATION TRACKING STATION DEVELOPMENT: MONITOR AND CONTROL TECHNOLOGY **c14**

C. Foster *In its* The Telecommunications and Data Acquisition Report (date] p 164 - 170 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 22D

The major developments leading to successful demonstration of fully unattended operation of a Deep Space Network (DSN) station (DSS 13) are reviewed. Unattended operation was demonstrated by reliably tracking, commanding, and delivering telemetry from the Pioneer 8 spacecraft. Transfer of automated monitor and control technology to DSN implementation is summarized, along with related accomplishments. Author

N87-11043*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.

A SYSTEM FOR THE FUNCTIONAL TESTING AND SIMULATION OF CUSTOM AND SEMICUSTOM VLSI CHIPS **c33**

E. M. Olson and L. J. Deutsch *In its* The Telecommunications and Data Acquisition Report (date] p 171 - 180 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09A

A system for the functional testing and simulation of custom and semicustom very large scale integrated (VLSI) chips that are designed using the integrated UNIX-based computer-aided design (CAD) system is described. The testing and simulation system consists of two parts. One of these is a special purpose hardware device that is capable of controlling the digital imputs and outputs on a custom chip. This device, the Digital Microcircuit Functionality Tester (DMFT) system, can be operated by itself or in conjunction with the VAX host computer on the CAD system. The DMFT is integrated into a microprobe station so that these signals can be injected or read from nodes inside the chip, as well as at the pins. The second part of the system is a software package that is installed on the VAX. This software package, logic, includes a full-screen editor for developing chip test sequences and drivers for both the DMFT and the esim logic simulator. Author

N87-11044*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.

PROTOTYPING AND IMPLEMENTING FLIGHT QUALIFIABLE SEMICUSTOM CMOS P-WELL BULK INTEGRATED CIRCUITS IN THE JPL ENVIRONMENT **c33**

E. M. Olson *In its* The Telecommunications and Data Acquisition Report (date] p 181 - 192 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09A

Presently, there are many difficulties associated with implementing application specific custom or semi-custom (standard cell based) integrated circuits (ICs) into JPL flight projects. One of the primary difficulties is developing prototype semi-custom integrated circuits for use and evaluation in engineering prototype flight hardware. The prototype semi-custom ICs must be extremely cost-effective and yet still representative of flight qualifiable versions of the design. A second difficulty is encountered in the transport of the design from engineering prototype quality to flight quality. Normally, flight quality integrated circuits have stringent quality standards, must be radiation resistant and should consume minimal power. It is often not necessary or cost effective, however, to impose such stringent quality standards on engineering models developed for systems analysis in controlled lab environments. This article presents work originally initiated for ground based applications that also addresses these two problems. Furthermore, this article suggests a method that has been shown successful in prototyping flight quality semi-custom ICs through the Metal Oxide Semiconductor Implementation Service (MOSIS) program run by the University of Southern California's Information Sciences Institute. The method has been used successfully to design and fabricate through the MOSIS three different semi-custom prototype CMOS p-well chips. The three designs make use of the work presented and were designed consistent with design techniques and structures that are flight qualifiable, allowing one hour transfer of the design from engineering model status to flight qualifiable foundry-ready status through methods outlined in this article. Author

N87-11045*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Microelectronics Technology Section.

ULYSSES: A FUNCTIONAL DESCRIPTION AND SIMULATION SOFTWARE SYSTEM **c61**

T. W. Griswold and D. F. Hendry *In its* The Telecommunications and Data Acquisition Report (date] p 193 - 202 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09B

Current design tools for digital circuits and systems are not well-integrated among the behavioral, gate, and transistor levels of design. Ulysses is a prototype software system that consists of a description language, a description compiler, and a simulator that make no distinction among these levels. The language is uniform over the entire range of logical descriptions, the description is hierarchical with no fundamental restrictions on depth or mixing of levels, and the simulator is fully integrated with the description. The structure of the language, compiler, and simulator are described in terms of their relationships to the abstractions of physical systems that are made in order to create logical descriptions and models of behavior. Author

N87-11046*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Telecommunications Systems Section.

IMPROVED PERFORMANCE OF A DIGITAL PHASE-LOCKED LOOP COMBINED WITH A FREQUENCY/FREQUENCY-RATE ESTIMATOR **c33**

A. Mileant and M. Simon *In its* The Telecommunications and Data Acquisition Report (date] p 203 - 215 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09C

When a digital phase-locked loop with a long loop update time tracks a signal with high Doppler, the demodualtion losses due to frequency mismatch can become very significant. One way of reducing these Doppler-related losses is to compensate for the Doppler effect using some kind of frequency-rate estimator. The performance of the fixed-window least-squares estimator and the Kalman filter is investigated; several Doppler compensating techniques are proposed. It is shown that the variance of the frequency estimator can be made as small as desired, and with this, the Doppler effect can be effectively compensated. The remaining demodulation losses due to phase jitter in the loop can be less than 0.1 dB. Author

N87-11047*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.

VLA FEEDHORN FOR VOYAGER ENCOUNTER OF NEPTUNE **c33**

F. Manshadi, D. A. Bathker, and H. W. Marlin *In its* The Telecommunications and Data Acquisition Report (date] p 216 - 226 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09C

A high gain, low noise corrugated feedhorn was designed and developed by JPL for use in Very Large Array (VLA) antennas, near Soccoro, New Mexico. The new feedhorn will enable the VLA to support the Voyager encounter of Neptune in August of 1989. This will significantly enhance the receiving capability of the United States for that historic event. Author

N87-11048*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.

X-BAND PREAMPLIFIER FILTER **c33**

F. Manshadi *In its* The Telecommunications and Data Acquisition Report (date] p 227 - 230 (For primary document see N87-11024 02-32)

Avail: NTIS HC A14/MF A01 CSCL 09C

A low-loss bandstop filter designed and developed for the

Deep Space Network's 34-meter high-efficiency antennas is described. The filter is used for protection of the X-band traveling wave masers from the 20-kW transmitter signal. A combination of empirical and theoretical techniques was employed as well as computer simulation to verify the design before fabrication. Author

N87-11049*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
PHYSICAL OPTICS ANALYSIS OF A 4-REFLECTOR ANTENNA, PART 2 **c74**
A. G. Cha *In its* The Telecommunications and Data Acquisition Report (date] p 231 - 243 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 20F

The results of a rigorous analysis of the Deep Space Network (DSN) 70-m antenna S-band (2.295-GHz) RF performance are presented. Previous estimation of 1.6 dB S-band gain improvement of the 70-m antenna over the 64-m antenna has been revised to 1.5 dB by this analysis. The S-band right circularly polarized (RCP) beam position offset relative to X-band (8.45-GHz) beam position is predicted to be 0.0045 deg. (0.04 beamwidth). The effective S-band gain loss resulting from non-coincidence with the X-band is predicted to be 0.02 dB. Therefore, this is no longer a concern for the 64-m to 70-m upgrade project. Author

N87-11050*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
FINITE WORDLENGTH IMPLEMENTATION OF A MEGACHANNEL DIGITAL SPECTRUM ANALYZER **c33**
E. H. Satorius, M. J. Grimm, G. A. Zimmerman, and H. C. Wilck *In its* The Telecommunications and Data Acquisition Report (date] p 244 - 254 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

The results of an extensive system analysis of the megachannel spectrum analyzer currently being developed for use in various applications of the Deep Space Network are presented. The intent of this analysis is to quantify the effects of digital quantization errors on system performance. The results of this analysis provide useful guidelines for choosing various system design parameters to enhance system performance. Author

N87-11051*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. TDA Engineering Office.
DEEP SPACE NETWORK MARK 4A DESCRIPTION
R. J. Wallace and R. W. Burt *In its* The Telecommunications and Data Acquisition Report (date] p 255 - 260 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

The general system configuration for the Mark 4A Deep Space Network is described. The arrangement and complement of antennas at the communications complexes and subsystem equipment at the signal processing centers are described. A description of the Network Operations Control Center is also presented. Author

N87-11052*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Navigation Systems Section.
HEO MULTIMISSION NAVIGATION CONCEPT
J. Ellis *In its* The Telecommunications and Data Acquisition Report (date] p 261 - 267 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

As part of the Network Consolidation Program, the 26-meter Tracking and Communication Subnet was transferred to JPL. Along with this transfer JPL assumed responsibility for tracking and navigation support for Earth orbiter missions normally tracked by the 26-meter sites. The High Earth Orbiter (HEO) Multimission Navigation Facility was formed as a component of the Deep Space Network (DSN) Tracking System for the purpose of supporting Earth orbiter missions and certain classes of deep space missions. This facility has been implemented on a dedicated VAX 11/780 minicomputer within the Network Operations Control Center (NOCC). The primary function of the system is to process radio metric data and estimate the orbit of a spacecraft in near-Earth or deep space environment. The system is capable of processing radio metric data in near-real time and providing the quick turnaround required for Earth orbiter operations. It is also capable of generating precision spacecraft ephemeris for use by the NOCC Support Subsystem and external agencies. This article discusses the implementation and functional operation of the Multimission Navigation Subsystem and describes the support that has been provided for an array of missions. Author

N87-11053*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Navigation Systems Section.
ICE NAVIGATION SUPPORT **c90**
L. Efron, R. J. Muellerschoen, and R. I. Premkumar *In its* The Telecommunications and Data Acquisition Report (date] p 268 - 283 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03B

The International Cometary Explorer (ICE) encounter with Comet Giacobini-Zinner took place 7 years after the spacecraft's original launch on 12 August 1978 as the International Sun Earth Explorer 3 (ISEE-3), part of a three-spacecraft project to study the interaction between the solar wind and the Earth's magnetosphere. Transfer to an interplanetary trajectory was performed via a 119-km-altitute, gravity-assist, lunar swingby on December 1983. Navigation support during interplanetary cruise and comet encounter was provided by orbit determination utilizing radio metric data from the DSN 64-meter antennas in Goldstone, California and Madrid, Spain. Orbit solutions yielding predictions of 50-km geocentric delivery accuracy in the target aim plane were achieved during interplanetary cruise and at comet encounter using 6-to-12-week data arcs between periodic attitude-change maneuvers. One-sigma two-way range and range rate residuals were consistently 40 meters and 0.2 mm/s or better, respectively. Nongravitational forces affected the comet's motion during late August and early September 1985 and caused a 2300-km shift in the orbit of the comet relative to the spacecraft. This necessitated a final ICE orbit trim maneuver 3 days prior to encounter. Near-real-time assessment of two-way 2-GHz (S-band) Doppler pseudo-residuals during the June and July 1985 trajectory change maneuvers aided in calibration of the spacecraft's thrusters in preparation for this final critical maneuver. Post-flight analysis indicates tail centerline passage was achieved within 10 seconds of the predicted time and geocentric position uncertainty at encounter was less than 40 km. M.G.

N87-11054*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Space Physics and Astrophysics Section.
OBJECTIVES AND FIRST RESULTS OF THE NASA SETI SKY SURVEY FIELD TESTS AT GOLDSTONE **c89**
S. Gulkis, M. J. Klein, E. T. Olsen, R. B. Crow, R. M. Gosline, G. S. Downs, M. P. Quirk, A. Lokshin, and J. Solomon *In its* The Telecommunications and Data Acquisition Report (date] p 284 - 300 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03A

Field tests of SETI (Search for Extraterrestrial Intelligence) prototype hardware and software began in March 1985 at Goldstone. With emphasis on the sky survey component of the NASA SETI search strategy, the article describes the survey characteristics, the detection strategy, and preliminary results of system tests. Author

N87-11055*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Tracking Systems and Applications Section.
DEMONSTRATION OF THE FIDUCIAL CONCEPT USING DATA FROM THE MARCH 1985 GPS FIELD TEST **c43**
J. M. Davidson, C. L. Thornton, S. A. Stephens, S.-C. Wu, S. M. Lichten, J. S. Border, O. J. Sovers, T. H. Dixon, and B. G. Williams *In its* The Telecommunications and Data Acquisition Report (date] p 301 - 306 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03A

The first field test of NASA's Global Positioning System (GPS) Geodetic Program took place in March of 1985. The principal objective of this test was the demonstration of the feasibility of

the fiducial station approach to precise GPS-based geodesy and orbit determination. Other objectives included an assessment of the performance of the several GPS receiver types involved in these field tests and the testing of the GIPSY software for GPS data analysis. In this article, the GIPSY (GPS Inferred Positioning System) software system is described and baseline solutions are examined for consistency with independent measurements made using very long baseline interferometry. Author

N87-11056*# IGI Consulting, Inc., Boston, Mass.
US LONG DISTANCE FIBER OPTIC NETWORKS: TECHNOLOGY, EVOLUTION AND ADVANCED CONCEPTS. VOLUME 1: EXECUTIVE SUMMARY Final Report
Oct. 1986 56 p
(Contract NAS3-24682)
(NASA-CR-179479; NAS 1.26:179479) Avail: NTIS HC A04/MF A01 CSCL 17B

Over the past two decades, fiber optics has emerged as a highly practical and cost-efficient communications technology. Its competitiveness vis-a-vis other transmission media, especially satellite, has become a critical question. This report studies the likely evolution and application of fiber optic networks in the United States to the end of the century. The outlook for the technology of fiber systems is assessed and forecast, scenarios of the evolution of fiber optic network development are constructed, and costs to provide service are determined and examined parametrically as a function of network size and traffic carried. Volume 1 consists of the Executive Summary. Volume 2 focuses on fiber optic technology and long distance fiber optic networks. Volume 3 develops a traffic and financial model of a nationwide long distance transmission network. Among the study's most important conclusions are: revenue requirements per circuit for LATA-to-LATA fiber optic links are less than one cent per call minute; multiplex equipment, which is likely to be required in any competing system, is the largest contributor to circuit costs; the potential capacity of fiber optic cable is very large and as yet undefined; and fiber optic transmission combined with other network optimization schemes can lead to even lower costs than those identified in this study. Author

N87-11057*# IGI Consulting, Inc., Boston, Mass.
US LONG DISTANCE FIBER OPTIC NETWORKS: TECHNOLOGY, EVOLUTION AND ADVANCED CONCEPTS. VOLUME 2: FIBER OPTIC TECHNOLOGY AND LONG DISTANCE NETWORKS Final Report
Oct. 1986 151 p
(Contract NAS3-24682)
(NASA-CR-179480; NAS 1.26:179480) Avail: NTIS HC A08/MF A01 CSCL 17B

The study projects until 2000 the evolution of long distance fiber optic networks in the U.S. Volume 1 is the Executive Summary. Volume 2 focuses on fiber optic components and systems that are directly related to the operation of long-haul networks. Optimistic, pessimistic and most likely scenarios of technology development are presented. The activities of national and regional companies implementing fiber long haul networks are also highlighted, along with an analysis of the market and regulatory forces affecting network evolution. Volume 3 presents advanced fiber optic network concept definitions. Inter-LATA traffic is quantified and forms the basis for the construction of 11-, 15-, 17-, and 23-node networks. Using the technology projections from Volume 2, a financial model identifies cost drivers and determines circuit mile costs between any two LATAs. A comparison of fiber optics with alternative transmission concludes the report. Author

N87-11058# Department of the Air Force, Washington, D.C.
TROPOSPHERIC SCATTER COMMUNICATION SYSTEM HAVING ANGLE DIVERSITY Patent
Philip D. Kaplan, inventor (to Air Force) Issued 14 Jan. 1986 6 p Supersedes AD-D011448
(AD-D012263; US-Patent-4,564,935; US-Patent-Appl-SN-569644; US-Patent-Class-370-38) Avail: US Patent and Trademark Office CSCL 17/2

A tropospheric scatter communication system provides diverse angle transmission paths which may be utilized alone or in conjunction with frequency and/or other known diversity system arrangements for improved performance. The diverse angle transmission paths are routed through sum and difference monopulse beams displaced in azimuth. Author (GRA)

N87-11059# Syracuse Univ., N. Y.
ELECTROMAGNETIC FIELD-TO-WIRE COUPLING IN THE SHF/EHF FREQUENCY RANGE Final Technical Report, May - Oct. 1985
A. T. Adams, Jose Perini, M. Miyabayashi, D. H. Shau, and K. Heidary Mar. 1986 91 p
(Contract F30602-81-C-0169)
(AD-A168083; RADC-TR-86-28) Avail: NTIS HC A05/MF A01 CSCL 20/14

A feasibility study has been conducted to examine methods of treating field-to-wire coupling in the SHF/EHF frequency range. In this region, transmission line lengths and wire separations become very large electrically, and field-to-wire coupling problems become intractable. Several types of transmission lines have been examined in the SHF/EHF range, including uniform and non-uniform transmission lines, coaxial transmission lines, and multi-conductor transmission lines. Current distributions are predominantly of the standing-wave or traveling-wave form. The higher order modes are not significant for those cases examined. Rounds may be obtained for induced currents in the field-to-wire problem by considering the transmission line as an antenna and using the equivalent circuit of the receiving antenna which has been extended to multiport receivers. A method has thus been outlined for treating transmission lines at SHF/EHF. GRA

N87-11060# Aerospace Corp., El Segundo, Calif.
MILLIMETER-WAVE RANGE FOR THE QUICK EVALUATION OF LARGE REFLECTOR ANTENNAS WITH COMPLEX FEEDS
Steven Lazar, Howell B. Dyson, and Albert Leong 1 Apr. 1986 17 p
(Contract F04701-85-C-0086)
(AD-A168161; TR-0086(6925-06)-1; SD-TR-86-19) Avail: NTIS HC A02/MF A01 CSCL 14/2

An automated millimeter-wave antenna range capable of measuring primary-feed structure patterns and transferring this data to a mainframe computer for secondary pattern computation is described. Its applicability to the rapid evaluation of complex feed structures as used in a Cassegrain antenna is illustrated. An example of a reflector antenna analysis is compared to a measured pattern. GRA

N87-11061# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
A STUDY OF MICROSTRIP ANTENNAS FOR MULTIPLE BAND AND HIGH FREQUENCY OPERATIONS Final Report, Nov. 1981 - Sep. 1984
Y. T. Lo, S. M. Wright, W. F. Richards, and B. F. Wang Mar. 1986 322 p
(Contract F19628-82-K-0005)
(AD-A169011; UILU-EM-84-15; RADC-TR-86-8) Avail: NTIS HC A14/MF A01 CSCL 09/5

This report consists of four parts. Part 1 is on an Efficient Analysis of Infinite Microstrip Arrays on Electricity Thick Substrates. The emphasis is placed on a numerically efficient method. The analysis also includes the case of infinite arrays with printed dipoles. Part 2 is an extension of the previous work on multiple port microstrip antennas. Experiments were carried out, which showed that this improved theory could predict the loading effect at the second port at the resonant frequency of the input port very accurately. Part 3 is devoted to the theory and experiment of single element dual-frequency microstrip antennas. The main objective is to achieve a dual-frequency operation for the same linear polarization with a single element fed at one port. This is discussed in Part 4. GRA

N87-11062# University of Southern California, Los Angeles.
RESEARCH ISSUES IN POWER CONDITIONING: A WORKSHOP HELD AT LOS ANGELES, CALIFORNIA ON 3-4 DECEMBER 1985 Final Report, 1 Dec. 1985 - 30 Jun. 1986
Martin Gundersen 2 May 1986 96 p Workshop held in Los Angeles, Calif., 3-4 Dec. 1985
(Contract MIPR-ARO-117-86; Grant AF-AFOSR-0044-86)
(AD-A169268; ARO-23483.1-PH-CF) Avail: NTIS HC A05/MF A01 CSCL 10/2

The workshop was organized to address a problem that has arisen in the area of pulsed power, or power conditioning research. The problem is the development of a gap between applied physics research that deals with fundamental device physics, and the development of improved pulsed power devices. The purpose of the workshop was to work to change an impedance mismatch, and foster communication between research and pulsed power engineering. GRA

N87-11063# Naval Ocean Systems Center, San Diego, Calif.
PROPAGATION OF SIGNALS IN THE FREQUENCY BAND BETWEEN 30 MHz AND 100 MHz Final Report, Oct. 1984 - Sep. 1985
W. Powers and R. B. Rose Sep. 1985 99 p
(AD-A169332; NOSC/TR-1087) Avail: NTIS HC A05/MF A01 CSCL 20/14

Propagation in the LoVHF (30 to 100 MHz) frequency band possesses characteristics common to both HF (3 to 30 MHz) and HiVHF (100 to 300 MHz) propagation. It is this feature which makes this frequency band both interesting and complex. The primary interest of this report is the modes of propagation between surface- or near-surface-based transmitters and receivers. For a given range, the strength, geographical and temporal dependence, and likelihood of a particular mode of propagation will be discussed. In the last section, various existing models that could be used to describe the field strength and transmission loss in the LoVHF band are assessed. These models and the discussion of the various modes of propagation fall roughly into two groups: (1) those that affect ranges less than 500 km, and (2) those that affect ranges greater than 500 km. GRA

N87-11064# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Software Technology.
VERIFICATION OF TWO COMMUNICATION PROTOCOLS BY MEANS OF PROCESS ALGEBRA M.S. Thesis - Leiden Univ.
Frits W. Vaandrager Jan. 1986 79 p Submitted for publication Sponsored by European Economic Commission ESPRIT Project 432
(CWI-CS-R8608; B8664607; ETN-86-97758) Avail: NTIS HC A05/MF A01

A Positive Acknowledgement with Retransmission protocol, and a One Bit Sliding Window protocol are verified in the framework of the algebra of communicating processes with silent steps, augmented with additional axioms. The Cluster Fair Abstraction Rule (CFAR) a generalization of Koomen's Fair Abstraction Rule (KFAR) is presented and it is shown that CFAR can be derived from KFAR. The notion of redundancy in a context, which makes it possible to use trace theoretic arguments in process algebra calculations is introduced. For the verification of the second protocol, the technique of local replacement is used. In this technique, a concurrent system is simplified by repeated replacement of components, replacements which leave the behavior of the system invariant. ESA

N87-11065# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
REGULATIONS, CRITERIA, AND MEASUREMENT PRACTICE FOR SUSCEPTIBILITY CRITERIA
C. Wagemaker 9 May 1984 16 p In DUTCH; ENGLISH summary Presented at PATO Course on Electromagnetic Compatibility (EMC), Eindhoven, Netherlands, 13-24 Nov. 1984
(NLR-MP-84089-U; B8664363; ETN-86-98031) Avail: NTIS HC A02/MF A01

Procedures for electromagnetic susceptibility tests were developed in order to guarantee objectivity. The regulations drawn up by the different interest groups are given. The different ways in which susceptibility measurements are performed are described. The choice of test signal levels is discussed. ESA

N87-11066# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Div.
OFFSET UNFURLABLE ANTENNA. PHASE 2A: EXECUTIVE SUMMARY
Paris ESA Nov. 1985 34 p
(Contract ESTEC-5206/82-NL-PB(SC))
(MBB-R-0200/3069-R; ESA-CR(P)-2199; ETN-86-98085) Avail: NTIS HC A03/MF A01

A 4.5 m radial rib reflector was designed for the 4 GHz Intelsat mission. The reflector was redesigned for the M-Sat 2-beam coverage requirements, resulting in a 5 m dia, 850 MHz offset reflector. It features a radial carbon fiber rib concept where foldable main ribs and intermediate ribs tension a gold plated molybdenum mesh to the required surface contour. The accuracy is varied by applying different numbers of ribs (e.g., 16 for 850 MHz or 30 for 12 GHz) and mesh fastening points. The electrical performance criteria used to establish the acceptable mechanical tolerances is that the level of the gore lobes generated by the ribs remains at least 30 dB below the main beam peak under all orbital conditions. ESA

N87-11067# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
ANALYSIS OF DIRECTIONAL COUPLER SIGNALS IN AN OVERMODED WAVEGUIDE SYSTEM
G. Janzen Mar. 1985 28 p
(IPF-85-2; ETN-86-98254) Avail: NTIS HC A03/MF A01

Electric wave fields inside and outside a reflective and lossy microwave transmission line system, as used for electron cyclotron resonance heating of plasmas, are described. The waveguide system is defined by the complex reflection coefficients of two discontinuities leading to accumulated fields, which are measured and analyzed by mode selective directional couplers. The total resonator Q of the loaded waveguide system is calculated and related to the reflection coefficients of the inhomogeneities. ESA

N87-11068# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
COMPONENTS FOR TRANSMISSION OF VERY HIGH POWER MM WAVES (200 kW AT 28, 70 AND 140 GHz) IN OVERMODED CIRCULAR WAVEGUIDES
M. Thumm, V. Erckmann, W. Kasparek, H. Kumric, G. A. Mueller, P. G. Schueller, and R. Wilhelm Mar. 1986 17 p Presented at Mikrowellentechnologie und Optoelektronik (MIOP) 1986 Fachmesse und Konferenz fuer Hoechstfrequenztechnologie, Wiesbaden, West Germany, 10-12 Jun. 1986
(IPF-86-2; ETN-86-98256) Avail: NTIS HC A02/MF A01

Optimized overmoded circular waveguide components of transmission lines developed for high-power (200 kW) millimeter wave applications at 28, 70, and 140 GHz, as e.g., electron cyclotron resonance heating of plasmas for thermonuclear fusion research with gyrotrons, are described. Axisymmetric, narrow, pencil-like beams with well-defined polarization (HE11 hybrid mode) are used at open-ended corrugated waveguide antennas. The HE11 mode is generated from TE0n gyrotron modes by multistep mode conversion: TE0n yields T001 yields TE11 yields HE11 or TE0n yields TE01 yields TM11 yields HE11. Analyses and measurements on mode transducer systems of the first type at 28 and 70 GHz and of the second type at 140 GHz are reported. In all cases the overall efficiency of the complete mode conversion sequence in the desired mode is 92% to 95%. Mode purity in the transmission lines is conserved by using corrugated gradual waveguide bends with optimized curvature distribution and diameter tapers with nonlinear contours. Highly efficient corrugated-wall mode selective filters decouple the different waveguide sections. Mode content and reflected powers are determined by a k-spectrometer. Absolute power calibration is done with calorimetric loads using an organic absorbing fluid. ESA

N87-11069# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Geofysisch Onderzoek.
SOME CONSIDERATIONS OF WAVE PROPAGATION [ENKELE BESCHOUWINGEN OVER GOLFVOORTPLANTING]
P. L. F. M. Verdonk 1986 97 p In DUTCH; ENGLISH summary (KNMI-WR-86-2(GO); B8666192; ISSN-0169-1651; ETN-86-98502) Avail: NTIS HC A05/MF A01

The meaning of group velocity and its relation to conserved quantities are demonstrated. The origin of wave dispersion in terms of nonlocal and relaxation phenomena are clarified. The character of a wave described by an equation with a general type of nonlinearity and general dispersion terms is explained. The steepening of a wave flank and the occurrence of stationary waves are discussed. ESA

N87-11070# Federal Communications Commission, Washington, D. C. Land Mobile Radio/UHF Television Tech. Adv. Comm.
LAND MOBILE RADIO/UHF TELEVISION TECHNICAL ADVISORY COMMITTEE FINAL REPORT IN THE MATTER OF FURTHER SHARING OF THE UHF TELEVISION BAND BY PRIVATE LAND MOBILE RADIO SERVICES Final Report
W. Torak 7 May 1986 124 p
(PB86-206562) Avail: NTIS HC A06/MF A01 CSCL 17B

On May 31, 1985, the Federal Communications Commission adopted a Notice of Proposed Rule Making (Notice) in General Docket No. 85-172 looking toward the use of UHF television spectrum in eight cities throughout the United States by eligible users in the Private Land Mobile Radio Services. Simultaneously, it adopted a Memorandum Opinion and Order (MO&O) in the Docket No. 85-173 proceeding establishing a Land Mobile/UHF Television Technical Advisory Committee to provide assistance to the Commission regarding the possibility of additional land mobile use of UHF television channels. The Report is the work product of the Technical Advisory Committee (TAC) established by the FCC in the Docket No. 85-173 proceeding. GRA

N87-11256# National Aerospace Lab., Amsterdam (Netherlands).
SIMULATION OF MULTITEMPORAL SAR IMAGES
G. J. L. Nooren *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 111-116 (For primary document see N87-11238 02-43)
(Contract ESA-5777/83-NL-MS)
Avail: NTIS HC A25/MF A01

N87-11257# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
THE EFFECT OF ELECTROMAGNETIC WAVE POLARIZATION ON WAVE ATTENUATION IN A VEGETATION CANOPY [EFFET DE LA POLARISATION D'UNE ONDE ELECTROMAGNETIQUE DANS L'ATTENUATION DE L'ONDE DANS UN COUVERT VEGETAL]
A. Lopes and T. Le-Toan *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 117-122 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11258# Universite Catholique de Louvain (Belgium). Lab. de Telecommunications et d'Hyperfrequences.
A TRANSLATION PROPERTY IN ROUGH SURFACE SCATTERING
A. Guissard *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 123-125 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11259# Wageningen Agricultural Univ. (Netherlands). Dept. of Land Surveying and Remote Sensing.
EXPERIMENTS ON MODELING RADAR BACKSCATTER OF FOREST STANDS AND RESEARCH ON CLASSIFICATION
D. H. Hoekman *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 127-132 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11260# Texas Univ., Arlington. Wave Scattering Research Center.
SPACEBORNE SAR DEPOLARISATION AMBIGUITIES
A. J. Blanchard and D. Lukert *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 133-136 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11261# Centre National d'Etudes Spatiales, Toulouse (France).
WIND TUNNEL INVESTIGATION OF THE CHARACTERIZATION OF RADAR BACKSCATTERING BY DIFFERENT WAVE FIELDS [ETUDE EN SOUFFLERIE DE LA CARACTERISATION DE LA RETRODIFFUSION RADAR PAR DIFFERENTS CHAMPS EN VOGUE]
A. Liefermann, A. Ramamonjiarisoa, and B. Jahne (Heidelberg Univ., West Germany) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 137-140 In FRENCH Sponsored by CNES, GRGS, and Inst. Francais de la Recherche pour l'Exploitation de la Mer (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N87-11071 Royal Signals and Radar Establishment, Malvern (England).
SILICON WAFER CLEANING FOR INTEGRATED CIRCUIT FABRICATION
R. W. Hardeman and A. M. Hodge 25 Nov. 1985 21 p
(RSRE-Memo-3907; BR98724; ETN-86-98009) Avail: NTIS HC A02

Silicon wafers cleaned using different immersion methods were compared. The surfaces so produced were assessed. Results obtained after using these cleans are shown to be consistent with those described in the literature. The optimum clean is found to be that described by RCA (1970). This was adopted as a standard procedure and results are encouraging. ESA

N87-11072*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE 1985 GODDARD SPACE FLIGHT CENTER BATTERY WORKSHOP
G. Morrow, ed. Sep. 1986 427 p Workshop held in Greenbelt, Md., 19-21 Nov. 1985
(NASA-CP-2434; Rept-86B0366; NAS 1.55:2434) Avail: NTIS HC A19/MF A01 CSCL 10C

The subjects covered include: advanced energy storage, lithium cell technology, nickel-cadmium design evaluation and component testing, simulated orbital cycling and flight experience, and nickel-hydrogen technology. For individual titles, see N87-11073 through N87-11103.

N87-11073*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NASA LEWIS EVALUATION OF REGENERATIVE FUEL CELL (RFC) SYSTEMS
N. H. Hagedorn, O. D. GonzalezSanabria, and L. L. Kohout *In*

NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 13-18 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Evaluation of two regenerative fuel cell (RFC) systems was begun in-house, and under contracts and grants. The passive hydrogen-oxygen RFC offers the possibility of a high-energy density, long-life storage system for geosynchronous Earth orbit missions. The hydrogen-bromine RFC offers the combination of high efficiency and moderate energy density that could ideally suit low Earth orbit missions if successfully developed. Either or both of these systems would be attractive additions to the storage options available to designers of future missions. B.G.

N87-11074*# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio. Aerospace Power Div.
SODIUM-SULFUR BATTERIES FOR SPACECRAFT ENERGY STORAGE
Ross E. Dueber *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 19 - 30 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Power levels for future space missions will be much higher than are presently attainable using nickel-cadmium and nickel-hydrogen batteries. Development of a high energy density rechargeable battery is essential in being able to provide these higher power levels without tremendous weight penalties. Studies conducted by both the Air Force and private industry have identified the sodium-sulfur battery as the best candidate for a next generation battery system. The advantages of the sodium-sulfur battery over the nickel-cadmium battery are discussed. Author

N87-11075*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
ENERGY STORAGE SYSTEMS COMPARISON FOR THE SPACE STATION
G. vanOmmering *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 31 - 40 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

An overview of the requirements, options, selection criteria and other considerations, and current status with regard to the energy storage subsystem (ESS) for the photovoltaic power system alternative for the space station is provided. Author

N87-11076*# Honeywell Power Sources Center, Horsham, Pa.
GALILEO LI/SO SUB 2 BATTERY MODULES PROGRAM UPDATE
R. A. Smith *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 43 - 65 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

In order to meet the power needs of NASA's Galileo Probe, the Li/SO2 high rate D cells used in the battery modules have undergone some design changes, as upgrading of hardware quality requirements, and significant testing. A description of the design changes and the cell test data that are of a general nature is presented here. This data includes capacities, open circuit voltages, and internal resistance comparisons. A significant data base was built up over the years and continues to grow. Author

N87-11077*# Naval Surface Weapons Center, Silver Spring, Md.
DETERMINING THE INFLUENCE AND EFFECTS OF MANUFACTURING VARIABLES ON SULFUR DIOXIDE CELLS
W. V. Zajac, M. A. Thomas, J. A. Barnes, R Bis, F., P. B. Davis, F. C. DeBold, G. W. Gemmill, and L. A. Kowalchik *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 67 - 74 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A survey of the Li/SO2 manufacturing community was conducted to determine where variability exists in processing. The upper and lower limits of these processing variables might, by themselves or by interacting with other variables, influence safety, performance, and reliability. A number of important variables were identified and a comprehensive design experiment is being proposed to make the proper determinations. Author

N87-11078*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SAFETY HAZARDS ASSOCIATED WITH THE CHARGING OF LITHIUM/SULFUR DIOXIDE CELLS
H. Frank, G. Halpert, D. D. Lawson, J. A. Barnes (Naval Surface Weapons Center, Silver Spring, Md.), and R. F. Bis *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 75 - 92 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A continuing research program to assess the responses of spirally wound, lithium/sulfur dioxide cells to charging as functions of charging current, temperature, and cell condition prior to charging is described. Partially discharged cells that are charged at currents greater than one ampere explode with the time to explosion inversely proportional to the charging current. Cells charged at currents of less than one ampere may fail in one of several modes. The data allows an empirical prediction of when certain cells will fail given a constant charging current. Author

N87-11079*# Electrochem Industries, Inc., Clarence, N.Y.
SAFETY CONSIDERATIONS FOR FABRICATING LITHIUM BATTERY PACKS
James J. Ciesla *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 93 - 106 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Lithium cell safety is a major issue with both manufacturers and end users. Most manufacturers have taken great strides to develop the safest cells possible while still maintaining performance characteristics. The combining of lithium cells for higher voltages, currents, and capacities requires the fabricator of lithium battery packs to be knowledgable about the specific electrochemical system being used. Relatively high rate, spirally wound (large surface area) sulfur oxychloride cells systems, such as Li/Thionyl or Sulfuryl chloride are considered. Prior to the start of a design of a battery pack, a review of the characterization studies for the cells should be conducted. The approach for fabricating a battery pack might vary with cell size. Author

N87-11080*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HEAT DISSIPATION OF HIGH RATE LI-SOCI SUB 2 PRIMARY CELLS
Young I. Cho, Gerald Halpert, and E. Deligiannis *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 107 - 116 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The heat dissipation problem occurring in the lithium thionyl chloride cells discharged at relatively high rates under normal discharge conditions is examined. Four heat flow paths were identified, and the thermal resistances of the relating cell components along each flow path were accordingly calculated. From the thermal resistance network analysis, it was demonstrated that about 90 percent of the total heat produced within the cell should be dissipated along the radial direction in a spirally wound cell. In addition, the threshold value of the heat generation rate at which cell internal temperature could be maintained below 100 C, was calculated from total thermal resistance and found to be 2.9 W. However, these calculations were made only at the cell components' level, and the transient nature of the heat accumulation and dissipation was not considered. A simple transient model based on the lumped-heat-capacity concept was developed to predict the time-dependent cell temperature at different discharge rates. The overall objective was to examine the influence of cell design variable from the heat removal point of view under normal discharge

conditions and to make recommendations to build more efficient lithium cells. Author

N87-11081*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TEST RESULTS OF JPL LISOCl SUB 2 CELLS
G. Halpert, S. Subbarao, S. Dawson, V. Ang, and E. Deligiannis *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 117 - 130 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

In the development of high rate Li-SO-Cl2 cells for various applications, the goal is to achieve 300 watt-hours per kilogram at the C/2 (5 amp) rate in a D cell configuration. The JPL role is to develop the understanding of the performance, life, and safety limiting characteristics in the cell and to transfer the technology to a manufacturer to produce a safe, high quality product in a reproducible manner. The approach taken to achieve the goals is divided into four subject areas: cathode processes and characteristics; chemical reactions and safety; cell design and assembly; and performance and abuse testing. The progress made in each of these areas is discussed. Author

N87-11082*# Moli Energy Ltd., Burnaby (British Columbia).
A 65 Ah RECHARGEABLE LITHIUM MOLYBDENUM DISULFIDE BATTERY
K. Brandt *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 131 - 144 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A rechargeable lithium molybdenum disulfide battery which has a number of superior performance characteristics which includes a high energy density, a high power density, and a long charge retention time was developed. The first cell sizes developed included a C size cell and an AA size cell. Over the last two years, a project to demonstrate the feasibility of the scale up to this technology to a BC size cell with 65 Ah capacity was undertaken. The objective was to develop, build, and test a .6 kWh storage battery consisting of 6 BC cells in series. Author

N87-11083*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EXAMINATION OF DESIGN OPTIONS FOR 35 Ah AMBIENT TEMPERATURE LI-TIS SUB 2 CELLS
D. H. Shen, S. Subba Rao, S. P. S. Yen, and R. B. Somoano *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 145 - 155 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The Jet Propulsion Laboratory is actively engaged in the development of ambient temperature rechargable lithium cells for future NASA geosynchronous Earth orbit (GEO) missions. To achieve these ambitious goals, Li-TiS2, Li-MoS3, and Li-V6O13 systems were examined in detail. Among these three, the Li-TiS2 system has shown the longest life cycle and highest rate capability. Experimental Li-TiS2 batteries (10.5 V, 0.4 Ah) developed in-house have completed eight simulated and accelerated GEO seasons successfully. Inview of the encouraging results, the design options were examined for a scaled-up Li-TiS2 cell. It is hoped that the results of these studies will provide guidelines for prioritizing the research efforts and guiding the selection of optimized materials. Designs for 35 Ah Li-TiS2 cell were examined because present day geosynchronous satellites are powered by batteries of 35 Ah capacity. A computer program was developed to evaluate the influence of various design parameters on the specific energy and the rate capability of the cells. B.G.

N87-11084*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
QUALIFICATION TESTING OF GENERAL ELECTRIC 50 Ah NICKEL-CADMIUM CELLS WITH NEW SEPARATOR AND NEW POSITIVE PLATE PROCESSING
George W. Morrow *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 159 - 168 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Forty-two 50 Ah aerospace nickel-cadmium cells were delivered to Goddard Space Flight Center (GSFC) by General Electric (GE) in February, 1985, for the purpose of evaluating and qualifying a new nylon separator material Pellon 2536, and the new GE Positive Plate Nickel Attack Control Passivation process. Testing began in May, 1985, at the Naval Weapons Support Center (NWSC) in Crane, Indiana with standard initial evaluation tests. Life cycling in both Low Earth Orbit (LEO) and Geosynchronous Orbit (GEO) began in July, 1985, with approximately 1200 LEO cycles complete at this writting. Early test results show that cells with positive plate passivation exhibit higher than normal charge voltage characteristics. Other aspects of performance were nominal. Author

N87-11085*# Aerospace Corp., El Segundo, Calif.
AEROSPACE NICKEL-CADMIUM CELL SEPARATOR QUALIFICATIONS PROGRAM
R. W. Francis and R. L. Haag (Naval Weapons Support Center, Crane, Ind.) *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 169 - 176 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The present space qualified nylon separator, Pellon 2505 ML, is no longer available for aerospace nickel-cadmium (NiCd) cells. As a result of this anticipated unavailability, a joint Government program between the Air Force Space Division and the Naval Research Laboratory was established. Four cell types were procured with both the old qualified and the new unqualified separators. Acceptance, characterization, and life cycling tests are to be performed at the Naval Weapons Support Center, Crane, Ind. (NWSC/Crane). The scheduling and current status of this program are discussed and the progress of testing and available results are projected. Author

N87-11086*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A FLOODED-STARVED DESIGN FOR NICKEL-CADMIUM CELLS
Lawrence H. Thaller *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 177 - 184 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A somewhat analogous situation among groupings of alkaline fuel cells is described where the stochastic aspects were much more accurately documented and then it was illustrated how this problem was eliminated using straight forward principles of pore size engineering. This is followed by a suggested method of adapting these same design principles to nickel-cadmium cells. It must be kept in mind that when cells are cycled to typically twenty percent depth of discharge that eighty percent of the weight of the cell is simply dead weight. Some of this dead weight might be put to better use by trading it for a scheme that would increase the time during which the cell would be working more closely to its optimum set of operating parameters. Author

N87-11087*# Eagle-Picher Industries, Inc., Joplin, Mo.
AN ADVANCED Ni-Cd BATTERY CELL DESIGN
Lee Miller *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 185 - 194 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The evolution of an advanced Ni-Cd space battery cell design continues to prove very promising. High oxygen/hydrogen gas recombination rates (currently up to a C/5 charge rate) and increased electrolyte activation level tolerance (currently up to 5.6 grams Ah of positive capacity) were demonstrated by test. A superior performance, extended life battery cell offering advantages should soon be available for mission applications Author

N87-11088*# Aerospace Corp., Los Angeles, Calif.
SELF-DISCHARGE CHARACTERISTICS OF SPACECRAFT NICKEL-CADMIUM CELLS AT ELEVATED TEMPERATURES
S. W. Donley, J. H. Matsumoto, and W. C. Hwang *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 195 - 214 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The effects of heat generation were determined in NiCd cells during high temperature storage on open circuits. The testing was designed to determine the extent to which thermal stability is a valid concern, at temperature of exposure (externally effected) between 40 and 120 C. B.G.

N87-11089*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MODELING Ni-Cd PERFORMANCE. PLANNED ALTERATIONS TO THE GODDARD BATTERY MODEL
James M. Jagielski *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 217 - 248 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The Goddard Space Flight Center (GSFC) currently has a preliminary computer model to simulate a Nickel Cadmium (Ni-Cd) performance. The basic methodology of the model was described in the paper entitled Fundamental Algorithms of the Goddard Battery Model. At present, the model is undergoing alterations to increase its efficiency, accuracy, and generality. A review of the present battery model is given, and the planned charges of the model are described. Author

N87-11090*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INVESTIGATION OF LONG TERM STORAGE EFFECTS ON AEROSPACE NICKEL-CADMIUM CELL PERFORMANCE
Thomas Y. Yi *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 249 - 254 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A study on evaluation of the long term storage effects on aerospace nickel-cadmium cells currently being performed at NASA/Goddard Space Flight Center (GSFC) is described. A number of cells of 6 Ah and 12 Ah capacities which were stored in shorted condition for 8 to 9 years at the GSFC were selected for this study. These cells will undergo electrical acceptance testing the the GSFC, and life cycling at the NASA Battery Test Facility at the Naval Weapons Facility at the Naval Weapons Support Center (NWSC) in Crane, Indiana; in addition, some cells from the study will undergo destructive analyses. Author

N87-11091*# Naval Weapons Support Center, Crane, Ind.
SATELLITE BATTERY TESTING STATUS
Randy Haag and Steve Hall *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 255 - 266 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Because of the large numbers of satellite cells currently being tested and anticipated at the Naval Weapons Support Center (NAVWPNSUPPCEN) Crane, Indiana, satellite cell testing is being integrated into the Battery Test Automation Project (BTAP). The BTAP, designed to meet the growing needs for battery testing at the NAVWPNSUPPCEN Crane, will consist of several Automated Test Stations (ATSs) which monitor batteries under test. Each ATS will interface with an Automation Network Controller (ANC) which will collect test data for reduction. Author

N87-11092*# Martin Marietta Aerospace, Denver, Colo.
VOLTAGE-TEMPERATURE CHARGE VERIFICATION TESTING OF 34 AMPERE-HOUR NICKEL-CADMIUM CELLS
Paul J. Timmerman and Donald W. Bondeson *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 267 - 284 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

This testing was designed to evaluate various voltage-temperature (V-T) charge curves for use in low-Earth-orbit (LEO) applications of nickel-cadmium battery cells. The trends established relating V-T level to utilizable capacity were unexpected. The trends toward lower capacity at higher V-T levels was predominant in this testing. This effect was a function of the V-T level, the temperature, and the cell history. This effect was attributed to changes occurring in the positive plate. The results imply that for some applications, the use of even lower V-T levels may be warranted. The need to limit overcharge, especially in the early phases of missions, is underlined by this test program. Author

N87-11093*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NOAA 26.5 Ah LEO CHARACTERIZATION TEST
George W. Morrow *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 285 - 303 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The General Electric (GE) 26.5 Ah NOAA-G flight nickel-cadmium cells were obtained from RCA-Astro Electronics to undergo performance characterization testing at the Goddard Space Flight Center (GSFC). This lot of cells was manufactured with passivated positive plate, to control nickel structure attack duing active material impregnation, and less electrolyte than normal (less than 3cc/Ah). The cells were tested in a parametric low Earth orbit (LEO) cycling regime that was previously used to test and characterize standard 50 Ah cells. Life cycle testing at the Naval Weapons Support Center (NWSC), in Crane, followed. The results of the test showed nominal performance in comparison with previous test data on the standard 50. Life cycle testing in the NOAA orbital regime is continuing at NWSC. Author

N87-11094*# Canadian Astronautics Ltd., Ottawa (Ontario).
A HIGH RELIABILITY BATTERY MANAGEMENT SYSTEM
Malcolm H. Moody *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 305 - 315 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Over a period of some 5 years Canadian Astronautics Limited (CAL) has developed a system to autonomously manage, and thus prolong the life of, secondary storage batteries. During the development, the system was aimed at the space vehicle application using nickel cadmium batteries, but is expected to be able to enhance the life and performance of any rechargeable electrochemical couple. The system handles the cells of a battery individually and thus avoids the problems of over, and under, drive that inevitably occur in a battery of cells managed by an averaging system. This individual handling also allow cells to be totally bypassed in the event of failure, thus avoiding the losses associated with low capacity, partial short circuit, and the catastrophe of open circuit. The system has an optional capability of managing redundant batteries simultaneously, adding the advantage of on line reconditioning of one battery, while the other maintains the energy storage capability of the overall system. As developed, the system contains a dedicated, redundant, microprocessor, but the capability exists to have this computing capability time shared, or remote, and operating through a data link. As adjuncts to the basic management system CAL has developed high efficiency, polyphase, power regulators for charge and discharge power conditioning. Author

N87-11095*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RECENT ADVANCES IN NI-H2 TECHNOLOGY AT NASA LEWIS RESEARCH CENTER
Olga D. GonzalezSanabria, Doris L. Britton, John J. Smithrick, and Margaret A. Reid *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 319 - 328 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The NASA Lewis Research Center has concentrated its

efforts on advancing the Ni-H2 system technology for low Earth orbit applications. Component technology as well as the design principles were studied in an effort to understand the system behavior and failure mechanisms in order to increase performance and extend cycle life. The design principles were previously addressed. The component development is discussed, in particular the separator and nickel electrode and how these efforts will advance the Ni-H2 system technology. Author

N87-11096*# Canadian Astronautics Ltd., Ottawa (Ontario).
LIGHTWEIGHT, DIRECT-RADIATING NICKEL HYDROGEN BATTERIES
John R. Metcalfe *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 329 - 348 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Two battery module configurations were developed which, in addition to integrating cylindrical nickel hydrogen (NiH2) cells into batteries, provide advances in the means of mounting, monitoring and thermal control of these cells. The main difference between the two modules is the physical arrangement of the cells: vertical versus horizontal. Direct thermal radiation to deep space is accomplished by substituting the battery structure for an exterior spacecraft panel. Unlike most conventional nickel-cadmium (NiCd) and NiH2 batteries, the cells are not tightly packed together; therefore ancillary heat conducting media to outside radiating areas, and spacecraft deck reinforcements for high mass concentration are not necessary. Testing included electrical characterization and a comprehensive regime of environmental exposures. The designs are flexible with respect to quantity and type of cells, orbit altitude and period, power demand profile, and the extent of cell parameter monitoring. This paper compares the characteristics of the two battery modules and summarizes their performance. Author

N87-11097*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INVESTIGATION OF NICKEL HYDROGEN BATTERY TECHNOLOGY FOR THE RADARSAT SPACECRAFT
D. A. McCoy and J. L. Lackner (Defence Research Establishment, Ottawa, Ontario) *In its* The 1985 Goddard Space Flight Center Battery Workshop (date) p 349 - 360 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The low Earth orbit (LEO) operations of the RADARSAT spacecraft require high performance batteries to provide energy to the payload and platform during eclipse period. Nickel Hydrogen cells are currently competing with the more traditional Nickel Cadmium cells for high performance spacecraft applications at geostationary Earth orbit (GEO) and Leo. Nickel Hydrogen cells appear better suited for high power applications where high currents and high Depths of Discharge are required. Although a number of GEO missions have flown with Nickel Hydrogen batteries, it is not readily apparent that the LEO version of the Nickel Hydrogen cell is able to withstand the extended cycle lifetime (5 years) of the RADARSAT mission. The problems associated with Nickel Hydrogen cells are discussed in the contex of RADARSAT mission and a test program designed to characterize cell performance is presented. Author

N87-11098*# Martin Marietta Aerospace, Denver, Colo.
NICKEL-HYDROGEN LOW-EARTH-ORBIT TEST PROGRAM
Joseph K. McDermott *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 361 - 371 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The incorporation of nickel-hydrogen technology for low-Earth-orbit spacecraft applications requires the establishment of a data base. An extensive test program was established to provide this data base. The test program is outlined and the preliminary test programs is presented. Author

N87-11099*# RCA Astro-Electronics Div., Princeton, N. J.
IMPACT OF SHUTTLE ENVIRONMENT ON PRELAUNCH HANDLING OF NICKEL-HYDROGEN BATTERIES
Robert S. Green *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 373 - 376 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Deployment of the American Satellite Company 1 spacecraft for the Space Shuttle Discovery in August 1985 set a new milestone in nickel-hydrogen battery technology. This communications satellite is equipped with two 35 Ah nickel-hydrogen batteries and it is the first such satellite launched into orbit via the Space Shuttle. The prelaunch activities, combined with the environmental constraints onboard the Shuttle, led to the development of a new battery handling procedure. An outline of the prelaunch activities, with particular attention to battery charging, is presented. Author

N87-11100*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PARAMETRIC TESTS OF A 40-Ah BIPOLAR NICKEL-HYDROGEN BATTERY
Robert L. Cataldo *In its* The 1985 Goddard Space Flight Center Battery Workshop (date] p 377 - 386 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A series of tests were performed to characterize battery performance relating to certain operating parameters which include charge current, discharge current, temperature, and pressure. The parameters were varied to confirm battery design concepts and to determine optimal operating conditions. Author

N87-11101*# Ford Aerospace and Communications Corp., Palo Alto, Calif.
NICKEL-HYDROGEN BATTERIES FROM INTELSAT 5 TO SPACE STATION
G. vanOmmering and A. Z. Applewhite *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 387 - 397 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

The heritage of the Ni-H2 technology that makes the space station application feasible is discussed. It also describes a design for a potential space station Ni-H2 battery system. Specific design values presented here were developed by Ford Aerospace as part of the Rocketdyne team effort on the Phase B Definition and Preliminary Design of the Space Station Power System in support of NASA Lewis Research Center. Author

N87-11102*# Aerospace Corp., El Segundo, Calif.
NICKEL HYDROGEN LOW EARTH ORBIT LIFE TESTING
C. C. Badcock and R. L. Haag (Naval Weapons Support Center, Crane, Ind.) *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 399 - 410 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

A program to demonstrate the long term reliability of NiH2 cells in low Earth orbits (LEO) and support use in mid-altitude orbits (MAO) was initiated. Both 3.5 and 4.5 inch diameter nickel hydrogen cells are included in the test plan. Cells from all U.S. vendors are to be tested. The tests will be performed at -5 and 10 C at 40 and 60% DOD for LEO orbit and 10 C and 80% DOD for MAO orbit simulations. The goals of the testing are 20, 000 cycles at 60% DOD and 30,000 cycles at 40% DOD. Cells are presently undergoing acceptance and characterization testing at Naval Weapons Systems Center, Crane. Author

N87-11103*# Eagle-Picher Industries, Inc., Joplin, Mo.
THE 4.5 INCH DIAMETER IPV NI-H2 CELL DEVELOPMENT PROGRAM
Lee Miller *In* NASA. Goddard Space Flight Center The 1985 Goddard Space Flight Center Battery Workshop (date) p 411 - 417 (For primary document see N87-11072 02-33)
Avail: NTIS HC A19/MF A01 CSCL 10C

Interest in larger capacity Ni-H2 battery cells for space applications has resulted in the initiation of a development/

qualification/production program. Cell component design was completed and component hardware fabricated and/or delivered. Finished cell design projections demonstrate favorable specific energies in the range of 70 to 75 Whr/Kg (32 to 34 Whr/Lb) for capacities of 100 to 250 Ah. It is further planned during this effort to evaluate the advanced cell design technology which has evolved from the work conducted at the NASA/Lewis Research Center.
Author

N87-11104*# Texas Instruments, Inc., Dallas. Central Research Labs.
THE 20 GHz GaAs MONOLITHIC POWER AMPLIFIER MODULE DEVELOPMENT Annual Report, 18 May 1983 - 17 May 1984
7 Jun. 1984 66 p
(Contract NAS3-23781)
(NASA-CR-179830; NAS 1.26:179830) Avail: NTIS HC A04/MF A01 CSCL 09A

The development of a 20 GHz GaAs FET monlithic power amplifier module for advanced communication applications is described. Four-way power combing of four 0.6 W amplifier modules is used as the baseline approach. For this purpose, a monolithic four-way traveling-wave power divider/combiner was developed. Over a 20 GHz bandwidth (10 to 30 GHz), an insertion loss of no more than 1.2 dB was measured for a pair of back-to-back connected divider/combiners. Isolation between output ports is better than 20 dB, and VSWRs are better than 21:1. A distributed amplifier with six 300 micron gate width FETs and gate and drain transmission line tapers has been designed, fabricated, and evaluated for use as an 0.6 W module. This amplifier has achieved state-of-the-art results of 0.5 W output power with at least 4 dB gain across the entire 2 to 21 GHz frequency range. An output power of 2 W was achieved at a measurement frequency of 18 GHz when four distributed amplifiers were power-combined using a pair of traveling-wave divider/combiners. Another approach is the direct common-source cascading of three power FET stages. An output power of up to 2W with 12 dB gain and 20% power-added efficiency has been achieved with this approach (at 17 GHz). The linear gain was 14 dB at 1 W output. The first two stages of the three-stage amplifier have achieved an output power of 1.6 W with 9 dB gain and 26% power-added efficiency at 16 GHz.
Author

N87-11105*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN AND DEVELOPMENT OF A MULTIBEAM 1.4 GHz PUSHBROOM MICROWAVE RADIOMETER
R. W. Lawrence, M. C. Bailey, R. F. Harrington, C. P. Hearn, J. G. Wells, and W. D. Stanley (Old Dominion Univ., Norfolk, Va.) Sep. 1986 65 p
(NASA-TM-89005; NAS 1.15:89005) Avail: NTIS HC A04/MF A01 CSCL 09C

The design and operation of a multiple beam, digital signal processing radiometer are discussed. The discussion includes a brief description of each major subsystem and an overall explanation of the hardware requirements and operation. A series of flight tests was conducted in which sea-truth sites, as well as an existing radiometer were used to verify the Pushbroom Radiometer performance. The results of these tests indicate that the Pushbroom Radiometer did meet the sensitivity design goal of 1.0 kelvin, and exceeded the accuracy requirement of 2.0 kelvin. Additional performance characteristics and test results are also presented.
Author

N87-11106# Department of the Air Force, Washington, D.C.
WAVELENGTH SELECTIVE DEMULTIPLEXER TUNER Patent
Charles R. Husbands, inventor (to Air Force) Issued 18 Feb. 1986 5 p Supersedes AD-D011890
(AD-D012264; US-Patent-4,571,024; US-Patent-Appl-SN-545307; US-Patent-Class-350-96.19) Avail: US Patent and Trademark Office CSCL 20/6

A wavelength selective demultiplexer tuner having an optically transmissive body for receiving an input signal containing a plurality of different wavelengths and transmitting the signal through it is described. An electro-optic block of material is secured to the body of the tuner and a reflective grating or mirror is secured to the electrooptic block of material for redirecting through the body the input signal as a plurality of signals, each containing a different one of the wavelengths. By appropriately varying a voltage placed across the electro-optic block of material, the index of refraction of the latter changes thereby altering the optical paths followed by the plurality of signals redirected through the body. In this manner, each of the signals containing a different one of the wavelengths can be selectively output from the body at different times and at the same, single location. GRA

N87-11107# Department of the Air Force, Washington, D.C.
MINIATURE HIGH PERFORMANCE PULSED MODULATOR APPARATUS Patent
Walter E. Milberger and Franklin B. Jones, inventors (to Air Force) Issued 18 Mar. 1986 6 p Supersedes AD-D011427
(AD-D012266; US-Patent-4,577,166; US-Patent-Appl-SN-643201; US-Patent-Class-332-9T) Avail: US Patent and Trademark Office CSCL 09/5

A pulsed modulator apparatus having a ground deck clock driver unit to provide pulse stretching and on-off trigger signals for a floating deck transistor switch unit. Voltage isolation is achieved between the ground and floating deck units through the use of trigger transformers. Author (GRA)

N87-11108# Burton Technologies, Inc., Raleigh, N.C.
CONTROL OF SURFACE ATTACK BY GALLIUM ALLOYS IN ELECTRICAL CONTACTS Final Report, 1 Aug. 1985 - 31 Mar. 1986
Ralph A. Burton and Ralph G. Burton 28 Mar. 1986 46 p
(Contract N00014-85-C-0893)
(AD-A168168; BTI-0003) Avail: NTIS HC A03/MF A01 CSCL 09/1

Electrical contact between a copper plated steel specimen and brushes of graphite and copper through a film of gallium alloy were investigated. Material compatibility phase changes were studied. Techniques of film renewal were tested as were results in inert atmosphere. Two testing machines were developed for both visual observation and long duration high current testing with computer monitoring and control. GRA

N87-11109# Department of the Air Force, Washington, D.C.
RADIOFREQUENCY AMPLIFIER BASED ON A dc SUPERCONDUCTING QUANTUM INTERFERENCE DEVICE Patent
Claude Hilbert, John M. Martinis, and John Clarke, inventors (to Air Force) Issued 29 Apr. 1986 8 p
(AD-D012353; US-Patent-4,585,999; US-Patent-Appl-SN-604547; US-Patent-Class-330-61R) Avail: US Patent and Trademark Office CSCL 09/5

A low noise radiofrequency amplifier, using a dc SQUID (superconducting quantum interference device) as the input amplifying element. The dc SQUID and an input coil are maintained at superconductivity temperatures in a superconducting shield, with the input coil inductively coupled to the superconducting ring of the dc SQUID. A radiofrequency signal from outside the shield is applied to the input coil and an amplified radiofrequency signal is developed across the dc SQUID ring and transmitted exteriorly of the shield. A power gain of 19.5 + or 0.5 dB has been achieved with a noise temperature of 1.0 + or 0.4 K at a frequency of 100 MHz. Author (GRA)

N87-11110# Rome Air Development Center, Griffiss AFB, N.Y.
PRINTED CIRCUIT TRANSMISSION LINE TRANSITIONS
Frank E. Kozak and Daniel T. McGrath Dec. 1985 30 p
(AD-A169291; RADC-TR-85-241) Avail: NTIS HC A03/MF A01 CSCL 09/1

Three types of printed circuit transmission lines were investigated experimentally: microstrip; stripline; and grounded coplanar waveguide. Formulas for characteristic impedance were verified by measurements of lines on low-dielectric-constant substrates. Several designs of transitions from coaxial cable to microstripline were tested. The best of these was a uniform microstripline with

a flare at the connector end. A transition from coax into coplanar waveguide, and one from stripline into microstrip, had high reflection coefficients. Transitions from coax to stripline, and from coplanar waveguide to microstrip, had low reflection coefficients. GRA

N87-11111# Rome Air Development Center, Griffiss AFB, N.Y.
MICROSTRIP AMPLITUDE-WEIGHTED WILKINSON POWER DIVIDERS
Keith D. Huck Mar. 1986 29 p
(AD-A169450; RADC-TR-85-275) Avail: NTIS HC A03/MF A01 CSCL 05/5

Unequal-split reactive power dividers were examined for use in forming amplitude tapers for microstrip array antennas. Circuits with power ratios of up to 5.0 between arms were constructed on Rexolite substrate, for operation at 4.0 GHz and 7.5 GHz. The 4.0 GHz circuits were very accurate in forming the correct amplitude ratio between outputs, and in maintaining phase balance between outputs. Of those circuits designed for 7.5 GHz, only those with split ratios less than 2.5 worked correctly. This report includes a review of the theory, measured results, and recommendations for improved power dividers. GRA

N87-11112# California Univ., Berkeley. Lawrence Berkeley Lab.
STABILITY OF A VITREOUS ELECTROLYTE FOR POSSIBLE USE IN HIGH-TEMPERATURE LITHIUM/SULFUR CELLS
M. L. Smith, J. Winnick, F. R. McLarnon, and E. J. Cairns Apr. 1986 13 p Presented at the International Workshop on High Temperature Molten Salt Batteries, Argonne, Ill., 16 Apr. 1986
(Contract DE-AC03-76SF-00098)
(DE86-011563; LBL-20497; CONF-8604116-3) Avail: NTIS HC A02/MF A01

A family of lithium-borate glasses has been identified by H. Tuller and coworkers at the Massachusetts Institute of Technology as candidate electrolytes for use in high-temperature Li/S cells. Based upon screening tests, a glass composition (mol%) of 26% Li2O-7% Li2Cl2-67% B2O3 was selected to exhibit an acceptable ionic conductivity of 3 x 10 to the -3 ohm/cm $ohm^{-1}cm^{-1}$ at 400 C, Tg = 475 C, resistance to attack by S at 400 C, and minimal attack by Li at 350 C. A procedure was developed to form and seal glass tubes, and LiSn/glass/S cells were operated at various temperatures. It was possible to charge and discharge cells at current densities up to 70 mA/sq cm (for 1-3 min) or 20 mA/sq cm (for several hr) into the two-phase S-Li2S(sub x) region, but the electrolyte tended to fail when the cell was recharged from near the two-phase/single-phase boundary at approx. 73 mol% S. The charge-discharge curves also exhibited hysteresis effects, and a crystalline reaction layer was observed on the S side of the electrolyte tubes. X-ray diffraction analyses suggested that the reaction layer contained crystalline lithium-borate compounds, and static immersion tests showed that the glass was slowly attacked by polysulfides at the 400 C cell operating temperature. DOE

N87-11113# British Aerospace Public Ltd. Co., Bristol (England).
RADIATION HARDNESS ASSURANCE OF ELECTRONIC COMPONENTS, WITH SPECIAL REFERENCE TO SEMICONDUCTOR DEVICES AND EVALUATION STATISTICS
A. H. George Nov. 1982 21 p
(BAe-BT-13801; LR47675; ETN-86-97960) Avail: NTIS HC A02/MF A01

Statistical requirements of nuclear radiation testing of sensitive semiconductor devices are considered and a procedure to enable an appropriate reliability assessment to be made in the event of a nuclear weapon explosion is outlined. The procedure is demonstrated using reported radiation test data for commercial memory devices. The resulting statistically assessed hardness is used to find the reliability impact at a 95% confidence level on a hypothetical equipment with a specified level of radiation environment and a population of 10 such devices. ESA

N87-11114# British Aerospace Public Ltd. Co., Bristol (England). Laser Systems Dept.
VARACTOR TUNED X-BAND FET OSCILLATOR M.S. Thesis
M. A. Higgins May 1983 257 p
(BAe-BT-14500; LR48626; ETN-86-97964) Avail: NTIS HC A12/MF A01

A variable frequency X-band oscillator was designed. The oscillator is based on field effect transistors and is voltage tuned with a varactor. The oscillator may be a unit on its own or integrated into a larger subsystem, which reduces the overall size and weight. Several designs were implemented using thin film technology and evaluated using two transistor types of the same generic family. The results were fed back into the design to improve overall performance and understanding of the process of implementation. The result is a 1GHz bandwidth tunable oscillator with a center frequency variable with bias. There is a substantial sensitivity of output frequency with bias and hence additional measurements were made. The effect of changing bias on performance is calculated. ESA

N87-11115# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ACTIVE MICROWAVE INSTRUMENTATION TRAVELING WAVE TUBE (TWT) AMPLIFIERS: ELECTRICAL MODES, PHASE 2 Final Report
W. Mueller, G. Riebold, K. Rogalla, A. Schwarz, Ph. Sopper, W. Borst, and P. Malzahn Paris ESA 15 Nov. 1985 203 p
(Contract ESA-5076/82-NL-PP)
(AMI/2/18; ESA-CR(P)-2228; ETN-86-98109) Avail: NTIS HC A10/MF A01

A Traveling Wave Tube Amplifier (TWT-A) and a klystron amplifier were developed for the Active Microwave Instrument of the ESA satellite ERS-1. Performance tests are summarized. Results show the feasibility of building a high power amplifier to operate under ERS-1 conditions and support the selection of either a TWT or a klystron for use on the ERS-1 spacecraft. ESA

N87-11116# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
DESIGN, DEFINITION, AND MANUFACTURE PARTICIPATION FOR THE SAR ELECTRONIC POWER CONVERTER (EPC) BREADBOARD
J. B. Klaassens and F. C. Schwarz Paris ESA May 1983 30 p Prepared for Technische Physische Dienst TNO-TH, Delft, Netherlands
(Contract ESA-4657)
(ESA-CR(P)-2249; ETN-86-98126) Avail: NTIS HC A03/MF A01

A principle of fine regulation applied to the high voltage line supplying a pulsed load (radar tube) is presented. The high voltage power supply system is a combination of a single series resonant converter and a capacitor multiplier in the output stages. The electronic power conversion system uses a Schwarz converter employing a series resonant circuit for the transfer and control of power. An internal frequency of 35 kHz enhances the power density of the converter model. This model provides 16 kV for the helix-cathode circuit of a klystron with an accuracy of 0.5 per mill and 11 kV for the collector-cathode circuit with an accuracy of 5%. Experiments suggest that the improved power supply should alleviate problems associated with high voltage transformers and ensure the high accuracy required for the voltage control for the helix-cathode circuit to avoid distortion in the returning signal of a spaceborne radar system. ESA

N87-11117# Toulouse Univ. (France). Lab. de Chimie-Physique et Electrochimie.
ELECTROMECHANICAL STUDY CONTRIBUTING TO THE FORMULATION OF AN ANALOG EVOLUTIONARY MODEL REPRESENTING NICKEL-CADMIUM BATTERIES [ETUDE ELECTROCHIMIQUE EN VUE DE L'ELABORATION D'UN MODELE EVOLUTIF ANALOGIQUE POUR LA REPRESENTATION DE BATTERIES NICKEL-CADMIUM]
P. Delorme, J. M. Harismendy, and M. Comtat Paris ESA 16 Mar. 1984 78 p In FRENCH
(Contract ESA-4999/82-F-DD(SC))
(Rept-JMH/GB/GR/769-84; ESA-CR(P)-2252; ETN-86-98129)
Avail: NTIS HC A05/MF A01

Nickel cadmium battery open circuit impedance measurements between 0.001 and 1000 Hz, kinetic studies of the dissolution of the separator in KOH solution, and the time evolution of the electrode capacities when subjected to charge-discharge cycles either at constant current or constant voltage are described. The equivalent electrical model shows an assymetry in the representation of the two electrodes. The battery is represented by a circuit implemented by 11 components. It is shown that no single circuit can represent the battery at any load regime. ESA

N87-11118# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
MICROWAVES AND MICROELECTRONICS
Staffan Rudner, Aake Bergquist, and Sven Hagelin May 1986 59 p In SWEDISH; ENGLISH summary
(FOA-C-30426-E; ISSN-0347-3708; ETN-86-98334) Avail: NTIS HC A04/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

The status of microwave components and circuits is presented, especially microwave integrated circuits. The trend to more miniaturization is increasing. Manufacturing processes allow active components of critical dimensions in the submicrometer area to be produced. Prototypes of several circuits and function aggregates are reviewed. ESA

N87-11027*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
A PROTOTYPE DSN X/S-BAND FEED: MODEL 3 DEVELOPMENT
D. A. Bathker and H. F. Reilly *In its* The Telecommunications and Data Acquisition Report (date] p 26 - 32 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

N87-11032*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A RECURSIVE SOLUTION FOR A FADING MEMORY FILTER DERIVED FROM KALMAN FILTER THEORY
J. I. Statman *In its* The Telecommunications and Data Acquisition Report (date] p 70 - 76 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11033*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
AN ESTIMATOR-PREDICTOR APPROACH TO PLL LOOP FILTER DESIGN
J. I. Statman and W. J. Hurd *In its* The Telecommunications and Data Acquisition Report (date] p 77 - 89 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11035*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
PHASE LOCK ACQUISITION FOR SAMPLED DATA PLLS USING THE SWEEP TECHNIQUE
S. Aguirre, D. H. Brown, and W. J. Hurd *In its* The Telecommunications and Data Acquisition Report (date] p 95 - 102 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11040*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A VLSI ARCHITECTURE FOR PERFORMING FINITE FIELD ARITHMETIC WITH REDUCED TABLE LOOK-UP
I. S. Hsu, T. K. Truong, and I. S. Reed *In its* The Telecommunications and Data Acquisition Report (date] p 143 - 154 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11041*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A NEW VLSI COMPLEX INTEGER MULTIPLIER WHICH USES A QUADRATIC-POLYNOMIAL RESIDUE SYSTEM WITH FERMAT NUMBERS
T. K. Truong, I. S. Hsu, J. J. Chang, H. C. Shyu, and I. S. Reed *In its* The Telecommunications and Data Acquisition Report (date] p 155 - 163 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11043*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
A SYSTEM FOR THE FUNCTIONAL TESTING AND SIMULATION OF CUSTOM AND SEMICUSTOM VLSI CHIPS
E. M. Olson and L. J. Deutsch *In its* The Telecommunications and Data Acquisition Report (date] p 171 - 180 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

N87-11044*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
PROTOTYPING AND IMPLEMENTING FLIGHT QUALIFIABLE SEMICUSTOM CMOS P-WELL BULK INTEGRATED CIRCUITS IN THE JPL ENVIRONMENT
E. M. Olson *In its* The Telecommunications and Data Acquisition Report (date] p 181 - 192 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

N87-11046*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Telecommunications Systems Section.
IMPROVED PERFORMANCE OF A DIGITAL PHASE-LOCKED LOOP COMBINED WITH A FREQUENCY/FREQUENCY-RATE ESTIMATOR
A. Mileant and M. Simon *In its* The Telecommunications and Data Acquisition Report (date] p 203 - 215 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11047*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
VLA FEEDHORN FOR VOYAGER ENCOUNTER OF NEPTUNE
F. Manshadi, D. A. Bathker, and H. W. Marlin *In its* The Telecommunications and Data Acquisition Report (date] p 216 - 226 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11048*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
X-BAND PREAMPLIFIER FILTER
F. Manshadi *In its* The Telecommunications and Data Acquisition Report (date] p 227 - 230 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09C

N87-11050*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communications Systems Research Section.
FINITE WORDLENGTH IMPLEMENTATION OF A MEGACHANNEL DIGITAL SPECTRUM ANALYZER
E. H. Satorius, M. J. Grimm, G. A. Zimmerman, and H. C. Wilck *In its* The Telecommunications and Data Acquisition Report (date] p 244 - 254 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09A

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N87-11119# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).

COMPUTATIONAL FLUID DYNAMICS, VOLUME 2
1986 367 p Lecture Series held in Rhode Saint Genese, Belgium, 3-7 Mar. 1986
(VKI-LS-1986-04-Vol-2; ETN-86-97813) Avail: NTIS HC A16/MF A01

Direct numerical simulation of homogeneous strained turbulence; finite element methods for incompressible Navier-Stokes and for shallow water equations; and finite element methods for compressible viscous flows using self adaptive mesh refinements were discussed. For individual titles, see N87-11120 through N87-11122.

N87-11120# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DIRECT NUMERICAL SIMULATION OF HOMOGENEOUS STRAINED TURBULENCE
Dang Khoa *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 2 1986 96 p (For primary document see N87-11119 02-34)
Avail: NTIS HC A16/MF A01

Direct numerical simulation of strained homogenecus turbulent flows of incompressible and compressible fluids is introduced. The equations to be solved and features of the rate of strain tensors required by the homogeneity hypothesis are discussed. The motivations of such simulations and their relationship with the modeling of turbulence in real flows are outlined. Numerical techniques used to solve the unsteady Navier-Stokes equations in the case of periodic boundary conditions are outlined with examples of data processing. The large eddy simulation technique used to overcome the low Reynolds number limitation due to insufficient spatial discretization is mentioned. ESA

N87-11121# Electricite de France, Chatou.
FINITE ELEMENT METHODS FOR INCOMPRESSIBLE NAVIER-STOKES AND FOR SHALLOW WATER EQUATIONS
A. Hauguel and J. Cahouet *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 2 1986 160 p (For primary document see N87-11119 02-34)
Avail: NTIS HC A16/MF A01

Finite element methods to solve turbulent Navier-Stokes and shallow water equations are outlined. The advection-diffusion equation is introduced. The Stokes problem for incompressible and compressible flow is analyzed. Studies using finite element codes in industrial problems with incompressible Navier-Stokes equations, and in environmental studies with shallow water equations are summarized. ESA

N87-11122# Institut National de Recherche d'Informatique et d'Automatique, Le Chesnay (France).
FINITE ELEMENT METHODS FOR THE CALCULATION OF COMPRESSIBLE VISCOUS FLOWS USING SELF-ADAPTIVE MESH REFINEMENTS
M. O. Bristeau and J. Periaux (Avions Marcel Dassault, Saint-Cloud, France) *In* Von Karman Inst. for Fluid Dynamics Computational Fluid Dynamics, Volume 2 1986 108 p (For primary document see N87-11119 02-34)
(Contracts DRET-83-403; DRET-84-014)
Avail: NTIS HC A16/MF A01

Finite element methods for solving compressible viscous flow problems modeled by the unsteady Navier-Stokes equations, written in conservative form or not, are presented. The main numerical ingredients are based on semi or fully implicit centered schemes for time integration, robust least squares and associated preconditioned conjugate gradient algorithms, and self adaptive mesh refinement techniques for accuracy improvement. They were used to simulate two and three dimensional transonic and supersonic flows around geometries of industrial interest. Numerical experiments are in good agreement with measurements. ESA

N87-11123*# Texas Univ., Austin. Dept. of Mechanical Engineering.
THE EFFECT OF A ROW OF HELMHOLTZ RESONATORS ON THE TURBULENCE IN A BOUNDARY LAYER Semiannual Progress Report
Ronald L. Panton 30 Sep. 1986 6 p
(Grant NAG1-610)
(NASA-CR-179832; NAS 1.26:179832) Avail: NTIS HC A02/MF A01 CSCL 20D

Detailed acoustic measurements were made of the resonator's response as the free stream speed was varied from 30 mph to 155 mph. The average sound pressure level (SPL) and peak frequency response clearly show the existence of strong tuning between the boundary layer and the resonator for the Helmholtz (f sub 0) mode as well as for the first standing wave (f sub 1) mode. The narrow speed range for tuning and the gap between the strong tuning for the Helmholtz mode and the first standing wave mode is evident. The frequency at which the peak SPL response occurred at each speed is given. The peak response for the Helmholtz mode occurred at a free stream velocity of 26 m/s (at which RE sub theta = 6,560) with a resonant frequency of 570 Hz and a sound pressure level of 141 dB. The peak response for the first standing wave occurs at the maximum wind tunnel speed of 70 m/s (at which Re sub theta = 14,900) Hz with a resonant frequency of 1,890 Hz and a sound pressure level of 154 dB. At resonance the microphones do not maintain a constant SPL, but rather the latter fluctuates in a seemingly random fashion. The values presented here are time averaged rms values. Of interest was the occurrence of phase locking between adjacent resonators witha phase lag of 180 deg. This report covers the period from 5 May to 30 September on the subject project. Author

N87-11124*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMOHYDRODYNAMIC ANALYSIS FOR LAMINAR LUBRICATING FILMS
Harold G. Elrod and David E. Brewe 1986 14 p Presented at the Leeds-Lyon Symposium on Tribology, Leeds, England, 8-12 Sep. 1986
(NASA-TM-88845; E-3235; NAS 1.15:88845; USAAVSCOM-TR-86-C-33) Avail: NTIS HC A02/MF A01 CSCL 20M

A Galerkin-type analysis to include thermal effects in laminar lubricating films was performed. The lubricant properties were assumed constant except for a temperature-dependent Newtonian viscosity. The cross-film temperature profile is established by collocation at the film boundaries and two interior Lobatto points. The interior temperatures are determined by requiring that the zeroth and first moment of the energy equation be satisfied across the film. The fluidity is forced to conform to a third--degree polynomial appropriate to the Lobatto-point temperatures. Preliminary indications are that the use of just two such sampling points enables satisfactory prediction of bearing performance even in the presence of substantial viscosity variation. Author

N87-11125*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FINITE LENGTH EFFECTS IN TAYLOR-COUETTE FLOW
C. L. Streett and M. Y. Hussaini Sep. 1986 31 p
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178175; ICASE-86-59; NAS 1.26:178175) Avail: NTIS HC A03/MF A01 CSCL 20D

Axisymmetric numerical solutions of the unsteady Navier-Stokes equations for flow between concentric rotating cyclinders of finite length are obtained by a spectral collocation method. These representative results pertain to two-cell/one-cell exchange process, and are compared with recent experiments. Author

N87-11126*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
CONDUCTION INVESTIGATIONS INTO THE MAGNETIC PROPERTIES OF MATTER Final Report, period ending 1 Aug. 1986
H. Chayini and Robert L. Ash Jul. 1986 12 p

(Contract NAS1-17993)
(NASA-CR-179868; NAS 1.26:179868) Avail: NTIS HC A02/MF A01 CSCL 20D

The thermal analysis of a heat exchanger for heating air to temperatures on the order of 3000 C for use in NASA's high temperature wind tunnel is presented. It was ascertained that an externally finned shell-and-tube type of heat exchanger with counterflow could be considered for this application. The methods of estimating the convective heat transfer coefficients are outlined in this report. As a part of thermal design the required size of heat exchanger was predicted. As a result of the extreme length required (approx. = 1/2 km), it was determined that a conventional heat exchanger may not be the most suitable tool for this application. Author

N87-11127*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOME RECENT DEVELOPMENTS IN SPECTRAL METHODS Final Report
M. Y. Hussaini Aug. 1986 20 p Presented at the 10th International Conference on Numerical Methods in Fluid Dynamics Submitted for publication
(Contracts NAS1-17070; NAS1-18107)
(NASA-CR-178178; NAS 1.26:178178; ICASE-86-57) Avail: NTIS HC A02/MF A01 CSCL 20D

This paper is solely devoted to spectral iterative methods including spectral multigrid methods. These techniques are explained with reference to simple model problems. Some Navier-Stokes algorithms based on these techniques are mentioned. Results on transition simulation using these algorithms are presented. Author

N87-11128# Air Force Armament Lab., Eglin AFB, Fla.
THREE-DIMENSIONAL UNSTEADY EULER EQUATIONS SOLUTIONS ON DYNAMIC GRIDS Final Technical Report, Jan. - Jun. 1985
Dave M. Belk, J. M. Janus, and D. L. Whitfield Apr. 1986 30 p
(AD-A168041; AD-E801301; AFATL-TR-86-21) Avail: NTIS HC A03/MF A01 CSCL 20/4

A method is presented for solving the three-dimensional unsteady Euler equations on dynamic grids based on flux vector splitting. The equations are cast in curvilinear coordinates and a finite volume discretization is used for handling arbitrary geometries. The discretized equations are solved using an explicit upwind second-order predictor corrector scheme that is stable for a CFL of 2. Characteristic variable boundary conditions are developed and used for unsteady impermeable surfaces and for the far-field boundary. Dynamic-grid results are presented for an oscillating airfoil and for a store separating from a reflection plate. For the cases considered of stores separating from a reflection plate, the unsteady aerodynamic forces on the store are significantly different from forces obtained by steady-state aerodynamics with the body inclination angle changed to account for plunge velocity. GRA

N87-11129# Air Force Academy, Colo. Research Lab.
VISUALIZATION OF THREE-DIMENSIONAL FORCED UNSTEADY SEPARATED FLOW
M. Robinson, H. Helin, F. Gilliam, J. Russell, and J. Walker 1986 11 p
(AD-A168939; FJSRL-TJ-86-0007) Avail: NTIS HC A02/MF A01 CSCL 20/4

Three-dimensional unsteady flow separation was visualized for a semi-infinite span wing pitched upward at a constant rate from 0 to 60 deg angles of attack. Initially, many of the same complex flow perturbations, including the formation of leading and trailing edge vortices observed from two-dimensional flow separation were evident. Using the semi-infinite wing, the flow field was further complicated by a wing tip vortex that developed orthogonal to the separation induced leading and trailing edge vortices. The tip flow distorted the development of the initially two-dimensional inboard, leading edge vortex. The simple pitching motion history permitted resolution of the development of individual vortices as a function of airfoil motion parameters. Also, vortex-vortex interactions were examined between separation-induced vortices and wingtip vortices. The interactions were characterized for time periods that extended well beyond the actual pitching motions. Author (GRA)

N87-11130# Imperial Coll. of Science and Technology, London (England). Computational Fluid Dynamics Unit.
THE SOLUTION OF THE PARABOLIZED NAVIER-STOKES EQUATIONS
D. Brian Spalding Feb. 1986 19 p Lecture held in Rocquencourt, France, 14 Apr. 1986
(CFD/86/2; ETN-86-97977) Avail: NTIS HC A02/MF A01

Solution of the parabolized Navier-Stokes equation using the stream-function/vorticity method; the velocity/vorticity-gradient method; pressure-uncoupling with the SIVA method; and pressure-uncoupling with the SIMPLE method is summarized. Full-Navier-Stokes solution by SIVA and SIMPLE; the partially-parabolic formulation; and the PHOENICS formulation are described. ESA

N87-11131# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
LA RECHERCHE AEROSPATIALE, BIMONTHLY BULLETIN, NUMBER 1985-5, 228/SEPTEMBER-OCTOBER
Claude Sevestre, ed. ESA May 1986 64 p Transl. into ENGLISH of "La Recherche Aerospatiale, Bulletin Bimestriel, no. 1985-5" Paris, France, ONERA, Sep. Oct. 1985
(ESA-TT-964; ETN-86-97803) Avail: NTIS HC A04/MF A01; HC in English and original report in French available ONERA, Paris, France FF 70

Time-frequency representation of broad band signals; Ni's multigrid method; combustion of a nonmoving droplet (numerical study of the influence of the assumptions leading to the D sq law); rapid convergence numerical methods for calculating reactive flows; and experience in parallelizing numerical algorithms for MIMD architectures, using asynchronous methods are discussed. ESA

N87-11132# British Aerospace Public Ltd. Co., Bristol (England). Mechanical Technology Dept.
ELECTRO-RHEOLOGICAL FLUIDS. A BRIEF DESCRIPTION AND TYPICAL APPLICATIONS
S. D. Rossides Oct. 1982 14 p
(BAe-BT-13744; LR47282; ETN-86-97959) Avail: NTIS HC A02/MF A01

Fiber formation; electrorheological (ER) fluids composition; electrical properties of ER fluids; modes of operation of ER fluids; valve pressure drop calculation; valve type devices; ER clutch; and damping devices are reviewed. ESA

N87-11133# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Reaktorsicherheit.
THE DYNAMICS OF HEAT TRANSFER IN TURBULENT PIPE FLOW, PART 3
Heinz Schmidl Mar. 1986 67 p In GERMAN; ENGLISH summary
(OEFZS-4351; RS-271/86; ETN-86-97881) Avail: NTIS HC A04/MF A01

The energy equation of a turbulent pipe flow was solved. The temperature distribution in the turbulent pipe flow was described by a system of differential equations. The different parameters of the equations were varied. The correlation between the P-functions and the K-factors is explained. A partial solution composed of two series which leads to a hypergeometric differential equation, and the computer program used for the solution are discussed. A general solution consisting of several series was determined; its numerical evaluation is explained. ESA

N87-11134# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Reaktorentwicklung.
A THEORY OF FRACTAL FLUIDS
E. G. Schlechtendahl May 1986 63 p
(KfK-4070; ISSN-0303-4003; ETN-86-98190) Avail: NTIS HC A04/MF A01

A fluid mechanics method for problems where local flow characteristics are different from averages in a control volume is

presented. The method is based on a rigorous treatment of the transport theorem and uses Taylor series expansions of the essential functions whenever exact solutions cannot be obtained. A closed system of partial differential equations is derived. It contains conventional fluid dynamics as a special case, and results which can be derived from the kinetic theory of gases. The equations include balance equations for the conventional quantities mass and momentum, as well as quantities not treated by the conventional theories, such as the first spatial moment of the density distribution (its divergence gives a quantitative measure of the density pattern, bubble flow versus droplet flow), the first spatial moment of the velocity distribution, and the velocity correlation (a symmetrical tensor representing the deviation of the local velocity from its mass weighted average). ESA

N87-11135# Kernforschungszentrum, Karlsruhe (West Germany).
ON THE NUMERICAL INTEGRATION OF VISCOPLASTIC MODELS
V. K. Arya, K. Hornberger, and H. Stamm May 1986 49 p
(KfK-4082; ISSN-0303-4003; ETN-86-98192) Avail: NTIS HC A03/MF A01

Explicit integration methods are examined as to their effectiveness in the integration of nonlinear and stiff constitutive equations of viscoplastic models. The use of a simple Euler-forward method with an automatic time step control strategy is seen to be encouraging. The capabilities of several such time step control strategies are assessed. The success of integration strategies depends on the particular viscoplastic model being integrated. ESA

N87-11136# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.
NUMERICAL SIMULATION OF THE FORMATION OF TWO AND THREE-DIMENSIONAL STRUCTURES IN SHEAR LAYERS AND WAKES Ph.D. Thesis - Karlsruhe Univ., West Germany
Eckart Meiburg Dec. 1985 135 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-10; ISSN-0171-1342; ETN-86-98180) Avail: NTIS HC A07/MF A01; DFVLR, Cologne, West Germany DM 41

The nonlinear formation of two and three-dimensional structures in nominally two-dimensional shear layers and wakes was numerically investigated, assuming spatially periodic flow. The vorticity dynamics was simulated using the Biot-Savart law. The instability of the braid region, the translative instability of the vortex cores, and the helical pairing mechanism were analyzed for the simple shear layer. The wake flow was investigated with regard to possible changes in the topological structure of the vorticity field. Comparisons with experimental observations indicate the importance of subharmonic perturbations in the wake; their origin is, however, unclear. Further investigations are necessary to determine the effects of friction. ESA

N87-11137# Kaiserslautern Univ. (West Germany). Dept. of Mathematics.
ON KNUDSEN FLOWS WITHIN THIN TUBES
Hans Babovsky 1986 27 p
(Preprint-97; ETN-86-98273) Avail: NTIS HC A03/MF A01

The time evolution of a rarefied gas in a long thin tube is studied. The Clausing (1930) hypothesis is tested: Assuming collisions between gas particles can be neglected, the dynamics of the gas is well approximated by a diffusion process. It is proved that the evolution tends to that of a diffusion process as the radius of the tube decreases to zero. ESA

N87-11138# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
SOME CALCULATIONS BASED ON A MATHEMATICAL MODEL FOR FLUID FLOW THROUGH A COLLAPSIBLE TUBE
J. A. vanGelderen 1985 26 p
(Rept-85-41; ETN-86-98471) Avail: NTIS HC A03/MF A01

The generation and stability of self excited oscillations in fluid flowing through an elastic tube subject to transmural pressure were studied using a mathematical model. The tube is modeled partly as an elastic membrane under longitudinal tension and partly having collapse resistance. Poisson's ratio for the elastic material is assumed to be zero. The fluid in the tube is incompressible and inviscid and in unsteady motion. All fluid variables are supposed to be uniform in any cross section normal to the axis of the tube. The coordinate system is attached to the wall of the tube. Solutions for fluid pressure, fluid velocity, distance along the axis, and longitudinal tension are presented. A boundary value problem is solved. ESA

N87-11139# Technische Hogeschool, Delft (Netherlands). Wertuigbouwkunde.
THE SCALING OF TWO PHASE FLOW Thesis [HET SCHALEN VAN TWEE-FASEN STROMING]
A. Dijkshoorn Mar. 1986 108 p
(MEAH-64; Wb/AHD-211; ETN-86-98487) Avail: NTIS HC A06/MF A01

Similarity criteria applicable to gas-liquid flows (scaling laws) were investigated. The scaling laws were derived from the conventional equations governing gas-liquid flows; gravitational acceleration was found to be a limiting parameter for proper scaling. Experiments conducted to verify a scaling down factor of 10 when using artificially increased gravity are described. The pressure drop, void fraction, and flow pattern of the horizontal two-phase flow in a 50 mm diameter pipe and in a rotating 5 mm pipe were compared. Comparison shows that the dimensionless pressure drops are equal within 20%, while the void fractions are equal within the accuracy of the measurements (3%). The flow patterns mainly consist of stratified and intermittent flow. It is concluded that it is possible to scale two-phase flow when using dimensionless numbers. ESA

N87-11140# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
MULTIGRID APPROACHES TO THE EULER EQUATIONS
P. W. Hemker and G. M. Johnson Jan. 1986 16 p Submitted for publication Sponsored by Netherlands Technical Foundation
(CWI-NM-R8602; B8667669; ETN-86-98506) Avail: NTIS HC A02/MF A01

Approaches to the Euler equations for compressible flow are discussed. The multigrid acceleration of the solution process for finding approximations to the steady state solution is emphasized. Methods based on Lax-Wendroff type time-stepping, methods based on semidiscretization and time-stepping, and fully implicit methods based on semidiscretization are covered. The two dimensional case is treated to keep notation simple. ESA

N87-11141# Fleming (W. S.) and Associates, Inc., Syracuse, N.Y.
RESIDENTIAL EARTH-COUPLED HEAT PUMP DEMONSTRATION
P. J. Hughes Oct. 1985 294 p Sponsored in part by New York State Energy Research and Development Authority, Niagara Mohawk Power Corp. and Rochester Gas and Electric Corp.
(PB86-212396; NYSERDA-85-20) Avail: NTIS HC A13/MF A01 CSCL 13A

The report, Residential Earth-coupled Heat Pump Demonstration, describes a field-test program for evaluating nine residential Earth-coupled heat pump systems, located in upstate New York homes. Horizontal and vertical Earth coils were used in conjunction with heat pumps of several different manufacturers to provide heating, air conditioning and domestic hot water at each of the sites. Results of the project found that Earth-coupled heat pumps could significantly reduce the energy required for the heating and cooling functions, while providing a lower and more uniform electric demand. Also, the project report summarized the detailed performance and consumer economics of these systems. GRA

N87-11184*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HOST TURBINE HEAT TRANSFER OVERVIEW
John E. Rohde *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11201*# United Technologies Research Center, East Hartford, Conn.
MASS AND MOMENTUM TURBULENT TRANSPORT EXPERIMENTS
B. V. Johnson and R. Roback *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
(Contract NAS3-22771)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11202*# Garrett Corp., Phoenix, Ariz.
NASA DILUTION JET MIXING, PHASE 3
R. Srinivasan, G. Myers, and C. White *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11206*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
THE 3D INELASTIC ANALYSIS METHODS FOR HOT SECTION COMPONENTS
M. L. Roberts, R. L. McKnight, L. T. Dame, and P. C. Chen *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 3 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11219*# General Motors Corp., Detroit, Mich. Gas Turbine Div.
TURBINE AIRFOIL GAS SIDE HEAT TRANSFER
Edward R. Turner *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 14 p (For primary document see N87-11180 02-39)
(Contract NAS3-23695)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11220*# Scientific Research Associates, Inc., Glastonbury, Conn.
CALCULATION OF TWO- AND THREE-DIMENSIONAL TRANSONIC CASCADE FLOW FIELD USING THE NAVIER-STOKES EQUATIONS
B. C. Weinberg, R.-J. Yang, S. J. Shamroth, and H. McDonald *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
(Contract NAS3-23695)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11221*# United Technologies Research Center, East Hartford, Conn.
MEASUREMENT OF AIRFOIL HEAT TRANSFER COEFFICIENTS ON A TURBINE STAGE
Robert P. Dring and Michael F. Blair *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11222*# Stanford Univ., Calif. Thermosciences Div.
EFFECTS OF VERY HIGH TURBULENCE ON CONVECTIVE HEAT TRANSFER
Robert J. Moffat and Paul K. Maciejewski *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11223*# Tennessee Univ. Space Inst., Tullahoma.
GAS FLOW ENVIRONMENTAL AND HEAT TRANSFER NON-ROTATING 3D PROGRAM
R. A. Crawford *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 5 p (For primary document see N87-11180 02-39)
(Contract NAS3-23278)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11224*# United Technologies Research Center, East Hartford, Conn.
ASSESSMENT OF A 3-D BOUNDARY LAYER CODE TO PREDICT HEAT TRANSFER AND FLOW LOSSES IN A TURBINE
Olof L. Anderson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
(Contract NAS3-23716)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11225*# Pratt and Whitney Aircraft, East Hartford, Conn.
COOLANT PASSAGE HEAT TRANSFER WITH ROTATION, A PROGRESS REPORT
F. C. Kopper *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

N87-11415 Marburg Univ. (West Germany). Fachbereich Physik.
TURBULENCE THEORY FROM A PRESENT-DAY POINT OF VIEW [THEORIE DER TURBULENZ AUS HEUTIGER SICHT]
Siegfried Grossmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 115-118 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N87-11142*# Morgan State Univ., Baltimore, Md.
THE CALIBRATION OF PHOTOGRAPHIC AND SPECTROSCOPIC FILMS. 1: FILM BATCH VARIATIONS OF RECIPROCITY FAILURE IN IIaO FILM. 2: THERMAL AND AGING EFFECTS IN RELATIONSHIP TO RECIPROCITY FAILURE. 3: SHIFTING OF RECIPROCITY FAILURE POINTS AS A FUNCTION OF THERMAL AND AGING EFFECTS Semiannual Report, Dec. 1986
Kevin A. Peters, Pamela F. Atkinson, and Ernest C. Hammond, Jr. 1986 51 p Sponsored by NASA
(NASA-CR-179833; NAS 1.26:179833) Avail: NTIS HC A04/MF A01 CSCL 14E

Reciprocity failure was examined for IIaO spectroscopic film. Three separate experiments were performed in order to study film batch variations, thermal and aging effects in relationship to reciprocity failure, and shifting of reciprocity failure points as a function of thermal and aging effects. The failure was examined over ranges of time between 5 and 60 seconds. The variation to illuminance was obtained by using thirty neutral density filters. A standard sensitometer device imprinted the wedge pattern on the film as exposure time was subjected to variation. The results indicate that film batch differences, temperature, and aging play an important role in reciprocity failure of IIaO spectroscopic film. A shifting of the failure points was also observed in various batches of film. Author

N87-11143*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
USING A 3-DIMENSIONAL LASER ANEMOMETER TO DETERMINE MEAN STREAMLINE PATTERNS IN A TURBULENT FLOW

K. L. Orloff and P. K. Snyder Jul. 1984 16 p
(NASA-TM-85948; A-9723; NAS 1.15:85948) Avail: NTIS HC A02/MF A01 CSCL 14B

The determination of mean streamline patterns by moving the test point in the direction of the measured velocity is shown to produce cumulative errors that are unacceptable. A two-dimensional algorithm that minimizes these errors is presented and is analytically validated using simple potential flows. The algorithm is extended to three-dimensional flows and is again validated analytically. Finally, as an example of a typical application of the algorithm, mean streamlines are measured in a complex, turbulent flow with a three-dimensional laser anemometer. Author

N87-11144*# United Technologies Corp., East Hartford, Conn.
HOT SECTION VIEWING SYSTEM
William W. Morey Sep. 1984 141 p
(Contract NAS3-23156)
(NASA-CR-174773; NAS 1.26:174773; R84-925830-33) Avail: NTIS HC A07/MF A01 CSCL 14B

This report covers the development and testing of a prototype combustor viewing system. The system allows one to see and record images from the inside of an operating gas turbine combustor. The program proceeded through planned phases of conceptual design, preliminary testing to resolve problem areas, prototype design and fabrication, and rig testing. Successful tests were completed with the viewing system in the laboratory, in a high pressure combustor rig, and on a Pratt and Whitney PW20307 jet engine. Both film and video recordings were made during the tests. Digital image analysis techniques were used to enhance images and bring out special effects. The use of pulsed laser illumination was also demonstrated as a means for observing liner surfaces in the presence of luminous flame. Author

N87-11145# Department of the Air Force, Washington, D.C.
RADIATION UPSET THRESHOLD DETECTOR APPARATUS Patent
Edmund J. Vitek, Robert O. Cherney, and Robert F. Snyder, Jr., inventors (to Air Force) Issued 7 Jan. 1986 4 p Supersedes AD-D011030
(AD-D012260; US-Patent-4,563,641; US-Patent-Appl-SN-550286; US-Patent-Class-324-158) Avail: US Patent and Trademark Office CSCL 18/4

This patent discloses a radiation upset threshold detector apparatus for measuring the output from a circuit that is operating in a radiation environment to determine when the radiation upset threshold is exceeded for the circuit. GRA

N87-11146# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A FAST RESPONSE THERMAL CONDUCTIVITY GAGE Final Report
James O. Pilcher, II and Melinda B. Krummerich Apr. 1986 38 p
(AD-A168185; BRL-TR-2726) Avail: NTIS HC A03/MF A01 CSCL 14/2

During the spring of 1983, the Ballistic Research Laboratory measured behind-the-armor effects for several weapons against a variety of targets. One of the major concerns was heat generation during and immediately following impact of the warhead against the targets. Previous tests of this type had used thin skin total heat gages and standard laboratory heat detectors. Thin skin gages record only the maximum temperature attained by the skins' back surface with no indication of the time required to reach this temperature. Although an approximation of the total heat deposition can be made, no rate of deposition can be estimated without knowing the time of the event. The large thermal mass of a typical laboratory detector such as an infrared power meter is designed to measure a steady-state flux and cannot respond quickly enough to register a transient event. Neither gage type can withstand severe blast and shock environments. Since the temperature inside the target rose sharply in a very short time, special thermal fluence gages were fabricated which emphasized the time response of the gage rather than its thermal capacity. This gage is used when the thermal flux is of short duration, 150 milliseconds or less, and of low total energy, 179 calories per square centimeter or less. The maximum operating temperature of the gage is 500 degree Celsius. GRA

N87-11147# Oak Ridge National Lab., Tenn.
ANALYSIS OF LOOP CURRENT STEP RESPONSE DATA OBTAINED FROM IN SITU TESTS OF TEMPERATURE DETECTORS
L. F. Miller and R. L. Shepard May 1986 40 p
(Contract DE-AC05-84OR-21400)
(DE86-011750; ORNL/TM-10087) Avail: NTIS HC A03/MF A01

Methods for obtaining unbiased parameter estimates from data obtained by in situ tests of temperature detectors are evaluated. A computer program that calculates unbiased estimates of parameters that define a dynamic model of the temperature detector and that calculates standard deviations of the model parameters and of the response time is presented. The computer program, along with the associated theoretical development, represent an extension of the previous capability for analyzing data from in situ tests of temperature detectors. DOE

N87-11148# Standard Elektrik Lorenz A.G., Stuttgart (West Germany). Unternehmensgruppe Nachrichtentechnik.
DEVELOPMENT AND TEST OF A MINIATURIZED FIBER-OPTIC GYROSCOPE Final Report, Jun. 1985
Wilfried Auch, Friedmann Mohr, and Otto Strobel Bonn, West Germany BMFT Dec. 1985 167 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-033; ISSN-0170-1339; ETN-86-97846) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33

A fiber-optic rotation rate sensor, based on the Sagnac effect, as a replacement for mechanical gyros in inertial navigation systems was developed. Four different laboratory models of a fiber gyro were developed. With a miniaturized version a sensitivity in the 1 deg/hr range is achieved. Optical components technology was investigated to provide the basis for the size reduction. It is demonstrated that the fiber gyro has the potential to become a rugged, maintenance-free, all-solid state strapdown sensor. ESA

N87-11149# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung fuer Flugversuchstechnik.
DIGITAL DATA RECORDING ON FLOPPY DISKS APPLIED FOR ON-BOARD USE IN HELICOPTERS
Rainer Holland, Horst Meyer, and Peter Pfleging May 1986 37 p In GERMAN; ENGLISH summary
(DFVLR-Mitt-86-10; ISSN-0176-7739; ETN-86-98178) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 16.50

A direct data recording system for helicopter flight tests was developed. The system stores the flight test data in an onboard mass memory. It fulfills the requirements imposed by the high vibration level of helicopters, and by the limited space and weight possibilities. Hardware configuration, software, and terminal are described. The system can be easily built and used. Comparisons with analog data recording shows an improvement of data quality. ESA

N87-11150# National Bureau of Standards, Gaithersburg, Md.
AUTOMATED MEASUREMENT OF FREQUENCY RESPONSE OF FREQUENCY-MODULATED GENERATORS USING THE BESSEL NULL METHOD
J. R. Major, E. M. Livingston, and R. T. Adair Mar. 1986 34 p Sponsored by Army Communications-Electronics Command
(PB86-202991; NBS-TN-1093) Avail: NTIS HC A03/MF A01; also available SOD $1.75 as 003-003-02728-6 CSCL 14B

A Bessel null technique to measure the frequency response of a frequency-modulated RF carrier and a program to automate frequency response measurements of signal generators with output frequencies from 0.450 to 2000 MHz are described. The measurements obtained using the technique are more precise than those obtained by a highly trained technician using a manual system. Automated measurement of the process is desirable

since the manual method is subject to the following problems: (1) excessive time, (2) error in finding the null, and (3) lack of assurance that the null is the first Bessel null. Automated measurements can be performed using a system controller, a spectrum analyzer, a function generator, and a voltmeter (all of which must be compatible and remotely controllable). GRA

N87-11151# National Bureau of Standards, Gaithersburg, Md.
NBS (NATIONAL BUREAU OF STANDARDS) 50 kHz PHASE ANGLE CALIBRATION STANDARD Final Report
R. S. Turgel Apr. 1986 85 p Sponsored by DOD
(PB86-201274; NBS-TN-1220) Avail: NTIS HC A05/MF A01; also available SOD HC $4.00 as 003-0002726-0 CSCL 14B

A detailed description is given of the features of an electrical phase angle calibration standard designed for operation over a frequency span of 2 Hz to 50 kHz. The phase resolution of the calibrator extends from just below 2 millidegrees at the low end of the frequency range to about 5 millidegrees at the high end. The uncertainty in the phase angle is a function of frequency, amplitude, and amplitude ratio of two outputs. It varies from 5-50 millidegrees. GRA

N87-11152# Department of the Navy, Washington, D. C.
ANALOG FIBER GYRO WITH EXTENDED LINEAR RANGE Patent
William K. Burns, inventor (to Navy) and Robert P. Moeller, inventor (to Navy) Issued 4 Mar. 1986 11 p Supersedes AD-D011009 (2339212320; US-Patent-4,573,797; US-Patent-Appl-SN-583549; US-Patent-Class-356-350) Avail: US Patent and Trademark Office CSCL 17/7

A gyroscope system for obtaining an extended linear dynamic range for platform rotation rate measurements comprising a first fiber optic gyroscope with a first optical fiber coil described by a first quantity L1R1/lambda1 where L1 is the length of the first optical fiber coil, R1 is the radius of the first fiber coil, and lambda 1 is the light source wavelength, this first quantity being chosen to provide a linear output for a first range of small rotation rates of the platform; a second fiber optic gyroscope with a second optical fiber coil described by a second quantity L2R2/lambda2 with this second quantity being chosen to provide a linear output for a second range of large rotation rates of the platform, with this second range partially overlapping the first range; voltage controlled oscillators for converting the gyroscopes signals to pulse frequency signals; a circuit for determining whether a reference rotation rate within the overlap between the first and second ranges has been reached and generating a control signal in accordance therewith; a pulse counter; and a switch for switching one or the other of the pulse frequency signals to the pulse counter in accordance with the control signal so that a gyroscope which is operating within its linear range is utilized. Author (GRA)

N87-11185*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
FURTHUR DEVELOPMENT OF THE DYNAMIC GAS TEMPERATURE MEASUREMENT SYSTEM
D. L. Elmore, W. W. Robinson and W. B. Watkins *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11186*# Pratt and Whitney Aircraft, East Hartford, Conn.
DEVELOPMENT OF HEAT FLUX SENSORS IN TURBINE AIRFOILS
William H. Atkinson and Richard R. Strange *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11187*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LASER ANEMOMETERS OF HOT-SECTION APPLICATIONS
Richard G. Seasholtz, Lawrence G. Oberle, and Donald H. Weikle *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11188*# United Technologies Research Center, East Hartford, Conn.
HIGH TEMPERATURE STATIC STRAIN GAGE PROGRAM
Charles Hulse, Richard Bailey, and Howard Grant (Pratt and Whitney Aircraft, East Hartford, Conn.) *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11189*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION RESULTS OF THE 700 DEG C CHINESE STRAIN GAGES
Howard F. Hobart *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11190*# Pratt and Whitney Aircraft, East Hartford, Conn.
DEMONSTRATION TEST OF BURNER LINER STRAIN MEASUREMENTS USING RESISTANCE STRAIN GAGES
Howard P. Grant and Wilbur L. Anderson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 16 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

N87-11275# Institute of Ocean Sciences, Sidney (British Columbia).
DEVELOPMENT OF AN IMAGING OPTICAL SPECTROMETER FOR OCEAN AND LAND REMOTE SENSING
J. F. R. Gower, G. A. Borstad, and A. B. Hollinger (Moniteq Ltd., Concord (Ontario).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 219-225 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11276# Centre National d'Etudes Spatiales, Toulouse (France).
HIGH-SPECTRAL RESOLUTION REMOTE SENSING INSTRUMENTS DEVELOPED AND UNDER DEVELOPMENT AT CNES
P. Vermande *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 227-232 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11292# Arizona Univ., Tucson. Optical Sciences Center.
ABSOLUTE CALIBRATION OF REMOTE SENSING INSTRUMENTS
S. F. Biggar, C. J. Bruegge, B. A. Capron, K. R. Castle, M. C. Dinguirard, R. G. Holm, L. J. Lingg, Y. Mao, J. M. Palmer, A. L. Phillips et al *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 309-314 Sponsored by NASA (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11295# Scripps Institution of Oceanography, La Jolla, Calif.
CALIBRATION OF GOES-5 AND GOES-6 VISSR/VAS SHORT-WAVELENGTH CHANNELS
R. Frouin and C. Gautier *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 327-333 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11298# Technische Univ., Munich (West Germany). Faculty of Geosciences.
CALIBRATION OF MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER CHARGED COUPLE DEVICE (MOMS-CCD) DATA AND QUALITATIVE TEST USING THEMATIC MAPPER (TM) DATA
J. Henkel and H. Kaufmann (Karlsruhe Univ. (West Germany).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 347-350 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

36 LASERS AND MASERS

Includes parametric amplifiers.
For related information see also *76 Solid-State Physics.*

N87-11153 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
ANALYSIS OF LASER FREQUENCY STABILITY OF HETERODYNE MEASUREMENTS
W. R. C. Rowley Feb. 1986 41 p
(NPL-MOM-78; ISSN-0309-3069; ETN-86-97990) Copyright. Avail: Issuing Activity

An optical and electronic system for heterodyne comparison of lasers used as interferometric measurement standards is presented. Optical requirements are discussed and equations for the reduction in signal strength due to imperfect adjustment are given. The photodetector and amplification system are described. The measurement of wideband noise with a spectrum analyzer is treated. The relation between the optical powers of the two lasers, the signal to noise ratio, the system bandwidth, and the probability of counting errors in a heterodyne frequency measurement is explored. For the statistical characterization of frequency stability, the successive sample deviation method is outlined, and its convergence is discussed. The characteristic gradients of the logarithmic stability/time plot are indicated. The effect of laser frequency modulation is analyzed. The importance of measuring the characteristic warm-up frequency fluctuations of a laser, as a guide to its probable limitations, is assessed. ESA

N87-11154# Department of the Air Force, Washington, D.C.
METHOD AND APPARATUS FOR HIGH SPEED, SUSTAINED RECORDING OF INFRARED LASER BEAM PATTERNS Patent
Joseph M. Geary, Darius S. Vunck, Dennis C. Duneman, Ronald L. Sessions, and Charles E. Moeller, inventors (to Air Force) Issued 18 Mar. 1986 5 p Supersedes AD-D011585
(AD-D012265; US-Patent-4,577,103; US-Patent-Appl-SN-643138; US-Patent-Class-250-316.1) Avail: US Patent and Trademark Office CSCL 14/5

This patent discloses a method of photographically recording at high speed the far field pattern of a high energy infrared laser beam over a selected period of time for providing rapid repetitive samples of information on beam parameters such as far field beam intensity, jitter, and absolute beam size and power. A sample from a high energy infrared laser beam is directed into an enclosure that is light tight to visible radiation and contains an operating lensless movie camera loaded with suitable movie film. The infrared beam is focused on the film plane of the camera so that consecutive frames of the film are irradiated by the infrared beam each time the camera shutter is open. The period of irradiation is of sufficient duration to sensitize the film to visible radiation in the areas where the infrared radiation impinges on the film. The position of the camera shutter is detected and an electrical trigger signal generated just before the shutter is closed for each frame. The trigger signal is applied to appropriate circuitry which actuates a light source to generate a pulse of visible light that irradiates the film plane of the camera near the end of each shutter movement to expose each frame of the film. The exposed film strip is developed to provide a continuous record of the infrared laser beam characteristics over the selected period of time. GRA

N87-11155# Washington State Univ., Pullman. Dept. of Physics.
STABILITY OF UV OPTICAL COATINGS IN HOSTILE EXCIMER LASER ENVIRONMENTS Final Report, Jul. 1980 - Dec. 1985
M. A. Loudiana and J. T. Dickinson 15 Jun. 1986 102 p
(Contract N00014-80-C-0798)
(AD-A169406) Avail: NTIS HC A06/MF A01 CSCL 20/5

Experiments simulating the exposure of optical coating materials to excimer laser environments are reported. Included are studies of the effect of ion bombardment on SiO2 exposed to XeF2; the effect of electron bombardment on a Ag surface (clean, or under thin films of ThF4, MgF2, SiO2, or Al2O3 in the presence of XeF2 or F2; the effect of electron bombardment on ThF4 exposed to XeF2; and electron emission from F2 adsorption on tungsten, with a model for the F2 flux dependence and temperature dependence of this phenomenon. GRA

N87-11156# Lawrence Livermore National Lab., Calif.
EVOLUTION OF FREE-ELECTRON LASER DEVELOPMENT
B. E. Newman 1986 21 p Presented at the Los Angeles Symposium and Exhibition on Optical and Electro-optical Engineering, Los Angeles, Calif., 19 Jan. 1986
(Contract W-7405-eng-36)
(DE86-008748; LA-UR-86-996; CONF-860117-9) Avail: NTIS HC A02/MF A01

Recent experimental demonstrations of free-electron laser oscillators and amplifiers have verified the feasibility of these broadly tunable photon sources. We review the current status and their continuing evolution toward ever higher output power and shorter wavelengths. DOE

N87-11157# Los Alamos National Lab., N. Mex.
SINGLE-PULSE LASER EFFECTS MEASUREMENTS AT 248 nm
R. S. Dingus, R. Green, T. R. King, W. Z. Osborne, and C. R. Phipps, Jr. 1986 26 p Presented at the AIAA Laser Effects and Target Meeting, Menlo Park, Calif., 5 Nov. 1986
(Contract W-7405-eng-36)
(DE86-011229; LA-UR-86-1877; CONF-861139-1) Avail: NTIS HC A03/MF A01

We have measured induced impulse and mass loss from exposures of a number of materials to 50 ns, KrF (0.248 microns) laser pulses as a function of incident laser fluence, ambient atmospheric pressure, and angle of incidence. The energy on target was normally about 100 J but was varied down to about 10 J and the beam diameter on target was varied from about 0.1 to 38 mm providing incident laser fluences of from about 10 to the 4th power J/sq m to about 10 to the 10th power J/sq m. Calculations indicate that for fluences in these experiments below about 10 to the 7th power J/sq m, the blowoff hydrodynamics is predominately one dimensional. The ambient atmospheric pressure was varied from about 10 to the 5th power Pa of dry air to a vacuum of less than 10 to the -2 power Pa; the angle of incidence was varied from normal incidence to 10 deg from grazing incidence. In a few cases, the pressure was measured as a function of time, sometimes concurrently with impulse. A number of plasma physics measurements were also performed concurrently. DOE

N87-11031*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Communication Systems Research Section.
SINGLE LONGITUDINAL MODE OPERATION OF SEMICONDUCTOR LASER ARRAYS WITH ETALON CONTROL
H. Hemmati *In its* The Telecommunications and Data Acquisition Report (date] p 66 - 69 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 17B

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N87-11158*# Mechanical Technology, Inc., Latham, N. Y.
FATIGUE LIFE OF LASER CUT METALS Final Report

Michael R. Martin Sep. 1986 54 p
(Contract NAS3-23942; DA Proj. 1L1-61102-AH-45)
(NASA-CR-179501; NAS 1.26:179501; USAAVSCOM-TR-86-C-34; MTI-86TR40) Avail: NTIS HC A04/MF A01 CSCL 13I

Fatigue tests were conducted to determine the actual reduction in fatigue life due to weight removal for balancing by: hand grinding, low power (20 watt) Nd:glass laser, and high power (400 watt) Nd:YAG laser. Author

N87-11159*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
CONTROL OF A FREE-FLYING ROBOT MANIPULATOR SYSTEM Semiannual Report, Aug. 1985 - Feb. 1986
Harold Alexander Feb. 1986 16 p
(Contract NCC2-333)
(NASA-CR-179877; NAS 1.26:179877; SAR-2) Avail: NTIS HC A02/MF A01 CSCL 05H

The development of and test control strategies for self-contained, autonomous free flying space robots are discussed. Such a robot would perform operations in space similar to those currently handled by astronauts during extravehicular activity (EVA). Use of robots should reduce the expense and danger attending EVA both by providing assistance to astronauts and in many cases by eliminating altogether the need for human EVA, thus greatly enhancing the scope and flexibility of space assembly and repair activities. The focus of the work is to develop and carry out a program of research with a series of physical Satellite Robot Simulator Vehicles (SRSV's), two-dimensionally freely mobile laboratory models of autonomous free-flying space robots such as might perform extravehicular functions associated with operation of a space station or repair of orbiting satellites. It is planned, in a later phase, to extend the research to three dimensions by carrying out experiments in the Space Shuttle cargo bay. Author

N87-11160# Ballistic Research Labs., Aberdeen Proving Ground, Md.
RADIAL EXPANSION OF CAVITIES PRODUCED BY THE AXISYMMETRIC STEADY PENETRATION OF HYPERVELOCITY RODS
Brian R. Scott Apr. 1986 115 p
(AD-A168186; BRL-TR-2722) Avail: NTIS HC A06/MF A01 CSCL 19/4

A model for the expansion of a cavity created during the penetration of high-speed rods is presented. This model was formulated by making several assumptions as to the behavior of the deforming target material during the cavity expansion process. The assumptions are supported by previous experimental and finite difference investigations. Upon specification of the matching conditions at the boundaries of the plastic deformation regions, the governing system of nonlinear field equations reduces to simpler ordinary differential equations. Initial conditions are estimated and the resulting initial value problems are solved with a standard Runge-Kutta technique. Parametric trends are subsequently established and the model predictions compare quantitatively well with experimental observations. It is concluded that the model accurately predicts the proper behavior but the accuracy of results depends significantly upon the precision with which the initial conditions and the target material characteristics may be specified. GRA

N87-11161# American Welding Inst., Louisville, Tenn.
STUDY OF THE STATUS AND POTENTIAL OF HIGH ENERGY BEAM WELDING IN SHIPYARD CONSTRUCTION
J. C. Danko Sep. 1985 85 p
(Contracts NB84RAC45137; N00014-85-G-0251)
(AD-A169281; AWI-CR-85-002) Avail: NTIS HC A05/MF A01 CSCL 13/8

This summary report presents the results of the work performed under the National Bureau of Standards contract NB84RAC45137 on the Study of the Status and Potential of High Energy Beam Welding in Shipyard Construction. The objective of this paper study was to assess the possibilities of achieving higher productivity through development of high energy beam welding processes with the intent to contribute to the reduction-to-practice of specific welding equipment and procedures. Part of this study was performed by United Technologies Research Center on laser beam welding and part by Chicago Bridge and Iron Company on electron beam welding. GRA

N87-11162# Lawrence Livermore National Lab., Calif.
DEVELOPMENT OF PRECISION TURNING CAPABILITIES AT LAWRENCE LIVERMORE NATIONAL LABORATORY
S. R. Patterson 12 Jun. 1986 17 p Presented at the 3rd Biennial International Machine Tool Technical Conference, Chicago, Ill., 3 Sep. 1986
(Contract W-7405-eng-48)
(DE86-011884; UCRL-94719; CONF-860981-1) Avail: NTIS HC A02/MF A01

A large vertical turning machine with accuracy approaching one microinch and capabilities to produce nonaxisymmetric workpieces has been developed. Accuracy is achieved through the application of rigid environmental controls, the use of high-resolution laser interferometer feedback, and the application of a supermini computer control system. The machine is actively corrected for variations in bearing performance and machine frame distortion. The ability to introduce fixed amounts of tool motion synchronous with spindle rotation permits correction for workpiece and fixturing centrifugal distortion as well as the production of intentionally nonground workpieces. Increasingly sophisticated and cost-effective microcomputers and a new generation of commercial laser interferometers make the techniques applied to this prototype research machine of interest for future commercial high-precision machine tools. DOE

N87-11163# Department of Energy, Washington, D. C.
AUTOMOTIVE TECHNOLOGY DEVELOPMENT PROGRAM Annual Report To Congress
Dec. 1985 24 p
(Contract DE-AI01-82CS-50286)
(DE86-010883; DOE/CE-0027/4; AR-7) Avail: NTIS HC A02/MF A01

DOE's Automotive Technology Development Program consists of three major engine-related projects: (1) the Automotive Gas Turbine Engine Development Project, (2) the Automotive Stirling Engine Development Project, and (3) the Heavy Duty Transport Technology Project. In addition, basic ceramic materials technology for all engine projects is being developed under the Advanced Materials Development Project. DOE

N87-11164# Air Products and Chemicals, Inc., Allentown, Pa. Advanced Products Dept.
CONCEPTUAL DESIGN OF GTA-1 NEUTRALIZER CRYOPUMP Final Report
R. C. Longsworth and W. A. Steyert 17 Jun. 1986 127 p
(Contract W-7405-eng-36)
(DE86-011759; LA/Sub-D2121G-1) Avail: NTIS HC A07/MF A01

Design studies were carried out on a cryopump for freezing out argon (or N2 or Xe) as it flows at the average rate .05 g/s from each end of a 30 cm diameter injection tube. Conductive and gas cooled cryopanels were studied with the latter recommended. The recommended design consists of a 6 m long vacuum enclosure, consisting of two 46 cm diameter x 2.5 m long tubes containing cylindrical cryopanels which connect to a central housing that contains the injection tube and refrigerator assembly. The refrigeration system consists of six standard Gifford McMahon (GM) cycle refrigerators with remote compressors having a capacity of 39 watts at 20 K plus 120 watts at 77 K for each end, the total being twice this. The cryopanels are cooled by circulating cold helium from the refrigerator system. When pumping argon, there is 27% excess refrigeration at 20 K and 38% at 77 K while for nitrogen there is only a few percent margin. Xenon imposes a lower load than argon. The proposed length of 6 m exceeds the preliminary design goal by 1 m to allow for an additional

section of 77 K cryopanel at the beam ends of the cryopump to intercept thermal radiation from the beam tubes. The cost of the system is estimated to be $202,500 and requires six months to fabricate and test. DOE

N87-11165# Lawrence Livermore National Lab., Calif.
DESIGN AND PERFORMANCE OF A SMALL PRECISION CNC TURNING MACHINE
R. R. Donaldson and D. C. Thompson 26 Feb. 1986 18 p
Presented at the 36th International Institution for Production Engineering Research General Assembly, Jerusalem, Israel, 16 Aug. 1986
(Contract W-7405-eng-48)
(DE86-008032; UCRL-94173; CONF-860839-1) Avail: NTIS HC A02/MF A01

This paper describes the design of a computerized numerical control (CNC) turning machine that is capable of machining workpieces up to 100 mm in diameter with a high contour accuracy and a very low surface roughness. Two nearly identical machines have been built and put into operation using this design, one for serial parts manufacture and the other for research into improving the accuracy of single-point machining; information based on this operational experience is also presented. The first machine has demonstrated an accuracy of 0.1 micron peak-to-valley on contoured workpieces, while the second machine has produced surface roughnesses of 1 nm rms in flat facing of electroless nickel with a diamond tool. DOE

N87-11166# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Fluid Technology.
HEAT EXCHANGEABLE LIQUID INJECTED COMPRESSORS
Jan-Gunnar Persson 30 Jan. 1986 77 p
(ETN-86-97852) Avail: NTIS HC A05/MF A01

Oil and water injection in an air compressor were studied. Water vaporization is found to have a minor influence on cooling in a high speed compressor. The importance of a high liquid surface/volume ratio (i.e., a highly atomized liquid) is clearly seen. The energy requirement for atomization is very high for small droplets, however. The gain in compression power reduction due to injection of a fine spray is counterbalanced by the power required for atomization of the liquid. Experimental results indicate that the droplets form a liquid film, with a much lower surface/volume ratio on the compressor rotors and housing. The main advantage of liquid injection is the improved sealing and cooling of the compressor parts. ESA

N87-11167# British Aerospace Public Ltd. Co., Bristol (England).
A SUMMARY OF GAS SHIELDED ARC WELDING
J. W. Henn Dec. 1982 15 p
(BAe-BT-14107; LR47662; ETN-86-97962) Avail: NTIS HC A02/MF A01

Shielded metal arc weld positions; type of joints; starting the arc; current setting; arc length; travel speed; crater formation; electrode position; and single and multiple pass welds are discussed. Metal inert gas welding current; types of metal transfer; and practical considerations are treated. ESA

N87-11168# British Aerospace Public Ltd. Co., Bristol (England). Mechanical Equipment Dept.
PERFORMANCE CHARACTERISTICS OF A LOW SPEED HYDRAULIC MOTOR DRIVING A POSITION CONTROL SYSTEM
P. J. Gilder Jul. 1983 221 p
(BAe-BT-14978; Inform-Sheet-587; LR48758; ETN-86-97969) Avail: NTIS HC A10/MF A01

A radial piston motor was used in the servo system of a launcher turntable. The motor's internal friction forces were analyzed to calculate the effect of shaft angle and back pressure on developed torque. Equations to model torque and flow losses over the motor's whole operating range were derived. Computer models of the hydraulic motor, (rotary) load and servo amplifier were developed. A test rig was used to investigate the effect of shaft angular position, pressure rise rate, and inlet and outlet pressure on available starting torque. The motor operates with high efficiency under normal operating conditions and rotates smoothly at very low speeds. The frequency response is similar to that of the standard drive unit and the motor can rotate the turntable very smoothly at low speeds under closed loop control. ESA

N87-11169# Sheffield Univ. (England). Dept. of Control Engineering.
IMAGE BASED VISUAL SERVO CONTROL OF A REVOLUTE-COORDINATE (ARM AND ELBOW) ROBOT
A. S. Morris and G. E. Deacon Jan. 1986 26 p
(RR-288; ETN-86-98023) Avail: NTIS HC A03/MF A01

A technique of using an image feature vector directly as the feedback control parameters in a robot driving strategy is described. This avoids the calculation of the inverse kinematic relationships involved in robot driving algorithms based on robot vision systems, and so means a massive reduction in computational effort. The technique is applicable irrespective of the type of camera used in the vision system. ESA

N87-11170# Technische Hochschule, Aachen (West Germany).
APPLICATION OF THE FINITE ELEMENT METHOD TO THE THERMOMECHANICAL ANALYSIS OF DIRECT-FIBER-PREFORM FORGING: POSSIBILITIES AND EXAMPLES [EINSATZ DER METHODE DER FINITEN ELEMENTE BEI DER THERMOMECHANISCHEN ANALYSE DES FREIFORMSCHMIEDENS: MOEGLICHKEITEN UND BEISPIELE]
G. Hirt, M.-L. Cho, and J. Luginsland 1985 6 p In GERMAN
Presented at Umformtechnik 85 Stahlkolloquium, Aachen, West Germany Sponsored by Deutsche Forschungsgemeinschaft
(ETN-86-97826) Avail: NTIS HC A02/MF A01

The possibilities of the finite element method (FEM) for the thermomechanical simulation of processes are demonstrated by the process of direct fiber preform forging. The thermomechanical simulation calculates the thermal and plastomechanical evolution of the recasting process. Examples show good agreement with experimental data; the comparison with experiments is used to find improved friction boundary condition assumptions. Problems related to thermomechanical calculations are discussed. The results of the calculations demonstrate that their quality essentially depends on the accuracy of the given boundary conditions and on the materials data. ESA

N87-11171# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON ROBOTS WITH FLEXIBLE LINKS: DYNAMICS, CONTROL AND STABILITY
Joost J. Kalker and Geert Jan Olsder 1 Oct. 1985 19 p
(Rept-85-34; ETN-86-98464) Avail: NTIS HC A02/MF A01

It is shown that a possibly redundant robot with rigid links driven at the nodes can be stabilized for any feasible, given path of the nodes. This result is generalized to robots with stiff yet flexible links. The Lagrangean equations of motion are used to describe the robot. The controls are the polygenic generalized forces corresponding to the Lagrangean coordinates. The stabilizing controls are exhibited. ESA

N87-11172# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
COMPUTER AIDED DESIGN OF ROBOT MANIPULATORS AND THEIR OPERATIONS
R. J. P. Groothuizen and R. F. vanderWijngaart 2 Apr. 1985 30 p In DUTCH and ENGLISH Presented at the CAPE '85 Nederland Congress on Computer Applications in Production and Engineering, Amsterdam, Netherlands, 2 May 1985
(NLR-MP-85012-U; B8667023; ETN-86-98488) Avail: NTIS HC A03/MF A01

Analytical design methods were used for the design and simulation of robot manipulators. The formulas describing explicitly the kinematics and dynamics of robot manipulators are too large for generation by hand; therefore the benefits of symbolic formula manipulation for generation of these formulas are discussed. It is shown that formulas describing the kinematic aspects can be easily

generated. However, as to the dynamics aspects, the formulas have first to be simplified analytically before generation becomes feasible; this is shown to be possible. A model for a design system for robot manipulators based on these explicit formulas is discussed. ESA

N87-11173# Technische Hogeschool, Eindhoven (Netherlands). Div. of Production Technology and Automation.
THE PREDICTION OF TOOL PRESSURES IN COINING
J. A. H. Ramaekers and S. Hoogenboom Nov. 1984 7 p
(WPB-0132; ETN-86-98530) Avail: NTIS HC A02/MF A01

Compression of a blank between flat punches to study the pressing of sharp edges at the rim of the coin, and compression of a blank with a punch provided with conical engravings are described. Tool load prediction methods based on plasticity theory are presented. Measurements show that tool loads can reach values 5 to 10 times the yield stress of the product material. Theoretical results suggest that the tool load at the end of the process tends to infinity. In practice the tools and press deform elastically. The influence of friction is equivocal. Because of the relatively small slip, the friction shear stress is small, but minor local disturbances of the lubrication can cause high local pressures or poor filling of the engraving. ESA

N87-11174 Clemson Univ., S.C.
CHARACTERIZATION AND CONTROL OF OBJECT ACQUISITION USING A ROBOT HAND Ph.D. Thesis
Joey Keith Parker 1985 339 p
Avail: Univ. Microfilms Order No. DA8607364

Many industrial robots require an end-effector or robot hand for acquiring and grasping objects to perform desired functions such as part loading/unloading and assembly. An understanding of the important considerations in robot hand design is crucial to these industrial tasks since the hand represents the link between the robot system and the manufacturing operation or activity. This understanding has been developed by: (1) identifying and characterizing fundamental principles which govern how robot hands behave during the object acquisition process, then (2) designing and evaluating a proof-of-concept robot hand which demonstrated these principles by acquiring a wider range of objects than present industrial robot hands. The object acquisition process is divided into four stages, and the important design aspects of each stage are developed. Object position and orientation information must be obtained by programming or through sensors for successful object acquisition. Other fundamental aspects are the hand, object, and environmental characteristics which influence robot hand design requirements. Control considerations include the frequent need for simultaneous force and position control of a grasped object, and the control of object robot hand finger impact velocity as the only flexible method for limiting impact forces with robot hands. A two-fingered, microcomputer controlled robot hand was designed, fabricated and tested. With the aid of sensors the proof-of-concept hand is capable of successfully acquiring a variety of objects, from light bulbs to heavy and bulky steel billets, in a controlled manner. Dissert. Abstr.

N87-11504# Fraunhofer-Inst. fuer Arbeitswirtschaft und Organisation, Stuttgart (West Germany).
EVALUATION STUDY OF THE INDIRECT-SPECIFIC FUNDING FOR THE DEVELOPMENT OF INDUSTRIAL ROBOTS, MANIPULATION SYSTEMS, AND THEIR INTELLIGENT PERIPHERY [WIRKUNGSANALYSE DER INDIREKT-SPEZIFISCHEN FOERDERUNG ZUR ENTWICKLUNG VON INDUSTRIEROBOTERN, HANDHABUNGSSYSTEMEN SOWIE ZUGEHOERIGER INTELLIGENTER PERIPHERIE]
R. Bruening, R. Friedrich, and V. Korndoerfer *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 111-141 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

N87-11505# Fraunhofer-Inst. fuer Productionstechnik und Automatisierung, Stuttgart (West Germany).
TECHNICAL AND ORGANIZATIONAL CONCEPTS OF THE APPLICATION OF INDUSTRIAL ROBOTS AND MANIPULATION SYSTEMS (IR/HHS). EXPERIENCES OF THE CONSULTANT CENTER FOR INDUSTRIAL ROBOTS (BZI) [TECHNISCHE AND ORGANISATORISCHE KONZEPTION DES IR/HHS-EINSATZES. ERFAHRUNGEN DES BERATERZENTRUM INDUSTRIEROBOTER (BZI)]
Guenter Schiele *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 143-166 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N87-11175 Cirrus Computers Ltd., Fareham (England).
INVESTIGATION OF OPTIMAL COMPLEXITY OF BITE AND ITS EFFECTS ON RELIABILITY, MAINTAINABILITY, MONITORING AND FAULT PREDICTION
W. R. Moore and R. I. Damper Mar. 1984 47 p
(ETN-86-97976) Copyright. Avail: Issuing Activity

The application of Built-in-Test (BIT) techniques in the maintenance of military and aircraft electronic systems is reviewed. Despite the relative ease with which BIT can be added, and the apparently good performance claimed by designers, there are clear indications that BIT very often fails in practice in its aims of easy maintainability with lowskilled labor. A particular problem is the rate of false-alarms, where fault-free units are removed unnecessarily and there is evidence that the overall maintenance costs could be lower with less sophisticated BIT. The optimum level of BIT is, however, very difficult to predict and a convincing case can be made for the BIT specification to be developed in an interactive way throughout the course of design, development, commissioning and field operation, in the light of the available technology and of the whole maintenance strategy. Against this background, BIT deployment is seen as much a management problem, as a technical one. ESA

N87-11176# Royal Aircraft Establishment, Farnborough (England).
NON-DESTRUCTIVE METHODS OF CHARACTERISING THE STRENGTH OF ADHESIVE-BONDED JOINTS
D. E. W. Stone 7 Oct. 1985 11 p
(RAE-TM-MAT/STR-1065; BR98350; ETN-86-97993) Avail: NTIS HC A02/MF A01

The lack of adequate nondestructive methods to check bond quality of adhesive-bonded joints is discussed. For joints with composite adherends it is concluded that surface contamination prior to bonding must be sought, environmental degradation is not a major problem. With metallic adherends, adhesive strength strongly depends on the detailed nature of the thin oxide layer and the way in which this becomes hydrated causing environmental degradatation. Ultrasonic methods offer the best prospects but it is shown that sophisticated procedures are necessary. ESA

N87-10922# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACECRAFT LOAD, DESIGN AND TEST PHILOSOPHIES
Ben K. Wada *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 271-276 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-11197*# Garrett Corp., Phoenix, Ariz.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT

T. E. Strangman *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

N87-11198*# General Electric Co., Fairfield, Conn.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT
R. V. Hillery *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 3 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

N87-11199*# Pratt and Whitney Aircraft, East Hartford, Conn.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT
Jeanine DeMasi and Keith Sheffler *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

N87-11213*# Pratt and Whitney Aircraft, East Hartford, Conn.
CREEP FATIGUE LIFE PREDICTION FOR ENGINE HOT SECTION MATERIALS (ISOTROPIC): TWO YEAR UPDATE
Vito Moreno *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
(Contract NAS3-23288)
Avail: NTIS HC A17/MF A01 CSCL 14D

N87-11215*# Syracuse Univ., N. Y. Dept. of Mechanical Engineering.
OXIDATION AND LOW CYCLE FATIGUE LIFE PREDICTION
Yoshiki Oshida and Hao-Wen Liu *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 9 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11D

N87-11218*# Pratt and Whitney Aircraft, East Hartford, Conn.
LIFE PREDICTION AND CONSTITUTIVE MODELS FOR ENGINE HOT SECTION ANISOTROPIC MATERIALS
Gustav A. Swanson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N87-11177*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL BEHAVIOR OF THE SPACE SHUTTLE SRM TANG-CLEVIS JOINT
William H. Greene, Norman F. Knight, Jr., and Alan E. Stockwell (PRC Kentron, Inc., Hampton, Va.) Sep. 1986 32 p
(NASA-TM-89018; NAS 1.15:89018) Avail: NTIS HC A03/MF A01 CSCL 20K

The space shuttle Challenger accident investigation focused on the failure of a tang-clevis joint on the right solid rocket motor. The existence of relative motion between the inner arm of the clevis and the O-ring sealing surface on the tang has been identified as a potential contributor to this failure. This motion can cause the O-rings to become unseated and therefore lose their sealing capability. Finite element structural analyses have been performed to predict both deflections and stresses in the joint under the primary, pressure loading condition. These analyses have demonstrated the difficulty of accurately predicting the structural behavior of the tang-clevis joint. Stresses in the vicinity of the connecting pins, obtained from elastic analyses, considerably exceed the material yield allowables indicating that inelastic analyses are probably necessary. Two modifications have been proposed to control the relative motion between the inner clevis arm and the tang at the O-ring sealing surface. One modification, referred to as the capture feature, uses additional material on the inside of the tang to restrict motion of the inner clevis arm. The other modification uses external stiffening rings above and below the joint to control the local bending in the shell near the joint. Both of these modifications are shown to be effective in controlling the relative motion in the joint. Author

N87-11178*# Old Dominion Univ., Norfolk, Va. Dept. of Civil Engineering.
PASSIVE DAMPING CONCEPTS FOR SLENDER COLUMNS IN SPACE STRUCTURES Progress Report, period ending 1 Feb. 1985
Zia Razzaq Feb. 1985 12 p
(Grant NAG1-336)
(NASA-CR-179807; NAS 1.26:179807) Avail: NTIS HC A02/MF A01 CSCL 20K

Research into the identification of potential passive damping concepts for use in very slender structural members was continued. The following damping concepts are under investigation: mass-string dampers; bright zinc chain; polyethylene tubing; external viscoelastic tape; brushes for electrostatic and frictional damping; suspended chambers with oil and discs; and hybrid concepts. Each of these concepts are briefly discussed. Author

N87-11179*# Vigyan Research Associates, Inc., Hampton, Va.
STRESS ANALYSIS OF PATHFINDER-2 MODELS Final Report, 28 Feb. 1980 - 30 Jun. 1984
S. C. Mehrotra and C. T. L. Mills Oct. 1984 39 p
(Contract NAS1-16114)
(NASA-CR-172458; NAS 1.26:172458) Avail: NTIS HC A03/MF A01 CSCL 20K

Stress analysis of the Pathfinder 2 fighter model was performed to determine a method for leading- and trailing-edge attachment that gives acceptable stress levels. Structural modeling of the wing was done using the finite element code SPAR. For the models studied, one ordinary lap joint was found to be satisfactory for the leading-edge flap, however, the alternating surface segmented lap joint method fo attachment was necessary for the trailing-edge flap to obtain acceptable stress levels. Author

N87-11180*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TURBINE ENGINE HOT SECTION TECHNOLOGY, 1984
Oct. 1984 400 p Conference held in Cleveland, Ohio, 23-24 Oct. 1984
(NASA-CP-2339; E-2267; NAS 1.55:2339) Avail: NTIS HC A17/MF A01 CSCL 20K

Presentations were made concerning the hot section environment and behavior of combustion liners, turbine blades, and waves. The presentations were divided into six sessions: instrumentation, combustion, turbine heat transfer, structural analysis, fatigue and fracture, and surface properties. The principal objective of each session was to disseminate research results to date, along with future plans. Topics discussed included modeling of thermal and fluid flow phenomena, structural analysis, fatigue and fracture, surface protective coatings, constitutive behavior, stress-strain response, and life prediction methods. For individual titles, see N87-11181 through N87-11225.

N87-11181*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBUSTION OVERVIEW c25
Donald F. Schultz *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21B

The objective of this effort is to develop improved analytical

models of the internal combustor flow field and liner heat transfer as a means to shorten combustor development time and increase turbine engine hot section life. A four-element approach was selected to meet this objective. First, existing models were utilized to determine their deficiencies. Supporting research was then commenced to improve the exisiting models. While the research effort is in progress, the models are being refined to improve numerics and numerical diffusion. And lastly, the research results and improved numerics will be integrated into existing models.
Author

N87-11182*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SURFACE PROTECTION c26
Stanley R. Levine *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11F

The surface protection subproject consists of three major thrusts: airfoil deposition model; metallic coating life prediction; and thermal barrier coating (TBC) life prediction. The time frame for each of these thrusts and the expected outputs are presented. Further details are given for each thrust such as specific element schedules and the status of performance; in-house, via grant, or via contract.
B.G.

N87-11183*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FATIGUE AND FRACTURE: OVERVIEW
G. R. Halford *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

A brief overview of the status of the fatigue and fracture programs is given. The programs involve the development of appropriate analytic material behavior models for cyclic stress-strain-temperature-time/cyclic crack initiation, and cyclic crack propagation. The underlying thrust of these programs is the development and verification of workable engineering methods for the calculation, in advance of service, of the local cyclic stress-strain response at the critical life governing location in hot section compounds, and the resultant crack initiation and crack growth lifetimes.
B.G.

N87-11184*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HOST TURBINE HEAT TRANSFER OVERVIEW c34
John E. Rohde *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

Improved methods of predicting airfoil local metal temperatures require advances in the understanding of the physics and methods of analytically predicting the following four aerothermal loads: hot gas flow over airfoils, heat transfer rates on the gas-side of airfoils, cooling air flow inside airfoils, and heat transfer rates on the coolant-side of airfoils. A systematic building block research approach is being pursued to investigate these four areas of concern from both the experimental and analytical sides. Experimental approaches being pursued start with fundamental experiments using simple shapes and flat plates in wind tunnels, progress to more realistic cold and hot cascade tests using airfoils, continue to progress in large low-speed rigs and turbines and warm turbines, and finally, combine all the interactive effects in tests using real engines or real engine type turbine rigs. Analytical approaches being pursued also build from relatively simple steady two dimensional inviscid flow and boundary layer heat transfer codes to more advanced steady two and three dimensional viscous flow and heat transfer codes. These advanced codes provide more physics to model better the interactive effects and the true real-engine environment.
Author

N87-11185*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
FURTHUR DEVELOPMENT OF THE DYNAMIC GAS TEMPERATURE MEASUREMENT SYSTEM c35
D. L. Elmore, W. W. Robinson, and W. B. Watkins *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

Candidate concepts capable of generating dynamic temperatures were identified and analyzed for use in verifying experimentally the frequency response of the dynamic gas temperature measurement system. A rotating wheel concept and one other concept will be selected for this purpose. Modifications to the data reduction code algorithms developed were identified and evaluated to reduce substantially the data reduction execution time. These modifications will be incorporated in a new data reduction program to be written in FORTRAN IV.
Author

N87-11186*# Pratt and Whitney Aircraft, East Hartford, Conn.
DEVELOPMENT OF HEAT FLUX SENSORS IN TURBINE AIRFOILS c35
William H. Atkinson and Richard R. Strange *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

The objective is to develop heat flux sensors suitable for use on turbine airfoils and to verify the operation of the heat flux measurement techniques through laboratory experiments. The requirements for a program to investigate the measurement of heat flux on airfoils in areas of strong non-one-dimensional flow were also identified.
B.G.

N87-11187*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LASER ANEMOMETERS OF HOT-SECTION APPLICATIONS c35
Richard G. Seasholtz, Lawrence G. Oberle, and Donald H. Weikle *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

Laser anemometers are being developed for use in the turbine facilities at Lewis that are involved in the Turbine Engine Hot Section Technology Program. The status of the program is given along with some results accomplished since 1983.
B.G.

N87-11188*# United Technologies Research Center, East Hartford, Conn.
HIGH TEMPERATURE STATIC STRAIN GAGE PROGRAM c35
Charles Hulse, Richard Bailey, and Howard Grant (Pratt and Whitney Aircraft, East Hartford, Conn.) *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

Development of electrical resistance strain gages for static strain measurements of nickel or cobalt superalloy parts inside a gas turbine engine on a test stand was inititated. Measurements of this type are of great importance because without reliable knowledge of the stresses and strains which exist in specific components, it will be difficult to fully appreciate where improvements in design and materials can be implemented. The first part of this effort consists of a strain gage alloy development program which will be followed by an investigation of complete strain gage systems. Efforts to date are summarized.
B.G.

N87-11189*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EVALUATION RESULTS OF THE 700 DEG C CHINESE STRAIN GAGES c35
Howard F. Hobart *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

There is a continuing interest and need for resistance strain gages capable of making static strain measurements on components located in the hot section of gas turbine engines. A paper by Tsen-tai Wu describes the development and evaluation of high temperature gauges fabricated from specially developed Fe-Cr-Al-V-Ti-Y alloy wire. Several of these gages and a quantity of P12-2 ceramic adhesive were purchased for evaluation. Nine members of the aircraft turbine engine community were invited to participate in an evaluation of these gages. Each participant was sent one strain gage, a small amount of ceramic adhesive, instructions for mounting the gage on a test beam, and a set of suggestions for the experiment. Data on gage factor variation with temperature, apparent strain, and drift are discussed. Author

N87-11190*# Pratt and Whitney Aircraft, East Hartford, Conn.
DEMONSTRATION TEST OF BURNER LINER STRAIN MEASUREMENTS USING RESISTANCE STRAIN GAGES c35
Howard P. Grant and Wilbur L. Anderson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 16 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14B

A demonstration test of burner liner strain measurements using resistance strain gages as well as a feasibility test of an optical speckle technique for strain measurement are presented. The strain gage results are reported. Ten Kanthal A-1 wire strain gages were used for low cycle fatigue strain measurements to 950 K and .002 apparent strain on a JT12D burner can in a high pressure (10 atmospheres) burner test. The procedure for use of the strain gages involved extensive precalibration and postcalibration to correct for cooling rate dependence, drift, and temperature effects. Results were repeatable within + or - .0002 to .0006 strain, with best results during fast decels from 950 K. The results agreed with analytical prediction based on an axisymmetric burner model, and results indicated a non-uniform circumferential distribution of axial strain, suggesting temperature streaking. Author

N87-11191*# Yale Univ., New Haven, Conn. High Temperature Chemical Reaction Engineering Lab.
TURBINE AIRFOIL DEPOSITION MODELS c07
Daniel E. Rosner *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 22 p (For primary document see N87-11180 02-39)
(Grant NAG3-201)
Avail: NTIS HC A17/MF A01 CSCL 21E

Gas turbine failures associated with sea-salt ingestion and sulfur-containing fuel impurities have directed attention to alkali sulfate deposition and the associated hot corrosion of gas turbine (GT) blades under some GT operating conditions. These salt deposits form thin, molten films which undermine the protective metal oxide coating normally found on GT blades. The prediction of molten salt deposition, flow and oxide dissolution, and their effects on the lifetime of turbine blades are examined. Goals include rationalizing and helping to predict corrosion patterns on operational GT rotor blades and stators, and ultimately providing some of the tools required to design laboratory simulators and future corrosion-resistant high-performance engines. Necessary background developments are reviewed first, and then recent results and tentative conclusions are presented along with a brief account of the present research plans. Author

N87-11192*# Analex Corp., Dayton, Ohio.
EXPERIMENTAL VERIFICATION OF VAPOR DEPOSITION MODEL IN MACH 0.3 BURNER RIGS c26
Sueleyman A. Goekoglu *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 13 p (For primary document see N87-11180 02-39)
(Contract NAS3-23293)
Avail: NTIS HC A17/MF A01 CSCL 11F

A comprehensive theoretical framework of deposition from combustion gases was developed covering the spectrum of various mass delivery mechanisms including vapor, thermophoretically enhanced small particle, and inertially impacting large particle deposition. Rational yet simple correlations were provided to facilitate engineering surface arrival rate predictions. Experimental verification of the deposition theory was validated using burner rigs. Toward this end, a Mach 0.3 burner rig apparatus was designed to measure deposition rates from salt-seeded combustion gases on an internally cooled cylindrical collector. B.G.

N87-11193*# General Electric Co., Fairfield, Conn.
EFFECTS OF SURFACE CHEMISTRY ON HOT CORROSION LIFE c26
R. E. Fryxell and B. K. Gupta (TRW, Inc., Cleveland, Ohio) *In* NASA. Lewis Research Center Turbine Engine Hote Section Technology, 1984 Oct. 1984 14 p (For primary document see N87-11180 02-39)
(Contract NAS3-23926)
Avail: NTIS HC A17/MF A01 CSCL 11F

Hot corrosion life prediction methodology based on a combination of laboratory test data and field service turbine components, which show evidence of hot corrosion, were examined. Components were evaluated by optical metallography, scanning electron microscopy (SEM), and electron micropulse (EMP) examination. B.G.

N87-11194*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COATING LIFE PREDICTION c27
James A. Nesbitt and Michael A. Gedwill *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11G

Hot-section gas-turbine components typically require some form of coating for oxidation and corrosion protection. Efficient use of coatings requires reliable and accurate predictions of the protective life of the coating. Currently engine inspections and component replacements are often made on a conservative basis. As a result, there is a constant need to improve and develop the life-prediction capability of metallic coatings for use in various service environments. The purpose of this present work is aimed at developing of an improved methodology for predicting metallic coating lives in an oxidizing environment and in a corrosive environment. Author

N87-11195*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTRODUCTION TO LIFE MODELING OF THERMAL BARRIER COATINGS c27
Robert A. Miller *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11G

Thermal barrier coatings may be applied to air-cooled turbine section airfoils to insulate such components from hot gases in the engine. The coatings, which typically consist of about 0.01 to 0.04 cm of zirconia-yttria ceramic over about 0.01 cm of NiCrAlY or NiCrAlZr alloy bond coat, allow increased gas temperatures or reduced cooling air flows. This, in turn, leads to marked improvements in engine efficiency and performance. However, certain risks are associated with designing for maximum benefits, and eventually a point is reached where coating loss would immediately jeopardize the underlying component. Therefore, designers must be able to accurately predict the life of a given bill-of-material coating in any particular design. The results of an in-house aeronautics, base research and technology program which is designed to provide the first steps towards developing mission-capable life-prediction models are outlined. Author

N87-11196*# Cleveland State Univ., Ohio.
MECHANICAL BEHAVIOR OF THERMAL BARRIER COATINGS FOR GAS TURBINE BLADES c07
Christopher C. Berndt, Woraphat Phucharoen, and George C. Chang *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
(Contract NCC3-27)
Avail: NTIS HC A17/MF A01 CSCL 21E

Plasma-sprayed thermal barrier coatings (TBCs) will enable turbine components to operate at higher temperatures and lower cooling gas flow rates; thereby improving their efficiency. Future developments are limited by precise knowledge of the material properties and failure mechanisms of the coating system. Details of this nature are needed for realistic modeling of the coating system which will, in turn, promote advancements in coating technology. Complementary experiments and analytical modeling which were undertaken in order to define and measure the important failure processes for plasma-sprayed coatings are presented. The experimental portion includes two different tests which were developed to measure coating properties. These are termed tensile adhesion and acoustic emission tests. The analytical modeling section details a finite element method which was used to calculate the stress distribution in the coating system. Some preliminary results are presented. Author

N87-11197*# Garrett Corp., Phoenix, Ariz.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT **c38**
T. E. Strangman *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

Thermal barrier coatings (TBCs) for turbine airfoils in high-performance engines represent an advanced materials technology that has both performance and durability benefits. In order to achieve these benefits, however, the TBC system must be reliable. Prediction of the lives of two types of strain-tolerant and oxidation-resistant TBC systems that are produced by commercial coating suppliers to the gas turbine industry is examined. The plasma sprayed TBC system, composed of a low-pressure plasma spray (LPPS) applied oxidation resistant NiCrAlY bond coating and an air-plasma-sprayed yttria (8 percent) partially stabilized zirconia insulative layer is applied by both Chromalloy and Klock. The second type of TBC is applied by the electron beam-physical vapor depositon (EB-PVD) process by Temescal. B.G.

N87-11198*# General Electric Co., Fairfield, Conn.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT **c38**
R. V. Hillery *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 3 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

In order to fully exploit thermal barrier coatings (TBCs) on turbine components and achieve the maximum performance benefit, the knowledge and understanding of TBC failure mechanisms must be increased and the means to predict coating life developed. The proposed program will determine the predominant modes of TBC system degradation and then develop and verify life prediction models accounting for those degradation modes. The successful completion of the program will have dual benefits: the ability to take advantage of the performance benefits offered by TBCs, and a sounder basis for making future improvements in coating behavior. Author

N87-11199*# Pratt and Whitney Aircraft, East Hartford, Conn.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT **c38**
Jeanine DeMasi and Keith Sheffler *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

The objective of this program is to develop an integrated life prediction model accounting for all potential life-limiting Thermal Barrier Coating (TBC) degradation and failure modes including spallation resulting from cyclic thermal stress, oxidative degradation, hot corrosion, erosion, and foreign object damage (FOD). The mechanisms and relative importance of the various degradation and failure modes will be determined, and the methodology to predict predominant mode failure life in turbine airfoil application will be developed and verified. An empirically based correlative model relating coating life to parametrically expressed driving forces such as temperature and stress will be employed. The two-layer TBC system being investigated, designated PWA264, currently is in commercial aircraft revenue service. It consists of an inner low pressure chamber plasma-sprayed NiCoCrAlY metallic bond coat underlayer (4 to 6 mils) and an outer air plasma-sprayed 7 w/o Y_2O_3-ZrO_2 (8 to 12 mils) ceramic top layer. B.G.

N87-11200*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AEROTHERMAL MODELING PROGRAM, PHASE 2 **c07**
Edward J. Mularz *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

The accuracy and utility of current aerothermal models for gas turbine combustors must be improved. Three areas of concern are identified: improved numerical methods for turbulent viscous recirculating flows; flow interaction; and fuel injector-air swirl characterization. Progress in each area is summarized. B.G.

N87-11201*# United Technologies Research Center, East Hartford, Conn.
MASS AND MOMENTUM TURBULENT TRANSPORT EXPERIMENTS **c34**
B. V. Johnson and R. Roback *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
(Contract NAS3-22771)
Avail: NTIS HC A17/MF A01 CSCL 20D

An experimental study of mixing downstream of axial and swirling coaxial jets is being conducted to obtain data for the evaluation and improvement of turbulent transport models currently employed in a variety of computational procedures used throughout the propulsion community. Effort was directed toward the acquisition of length scale and dissipation rate data that will provide more accurate inlet boundary conditions for the computational procedures and a data base to evaluate the turbulent transport models in the near jet region where recirculation does not occur. Mass and momentum turbulent transport data with a blunt inner-jet inlet configuration will also be acquired. B.G.

N87-11202*# Garrett Corp., Phoenix, Ariz.
NASA DILUTION JET MIXING, PHASE 3 **c34**
R. Srinivasan, G. Myers, and C. White *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

Many of the gas turbine combustors in operation use multiple rows of dilution jets, and some have geometries that are different from circular holes. The data base available in literature is generally applicable to a single row of circular holes. Tests were performed with uniform mainstream conditions for several orifice plate configurations. Temperature and pressure measurements were made in the test section at 4 axial and 11 transverse stations. These measurements were made with a 60-element rake probe. Test results for some of these cases are discussed. B.G.

N87-11203*# Oklahoma State Univ., Stillwater.
LATERAL JET INJECTION INTO TYPICAL COMBUSTOR FLOWFIELDS **c07**
David G. Lilley *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

The trajectory, penetration and mixing efficiency of lateral air jet injection into typical combustor flowfields in the absence of combustion were investigated so as to characterize the time-mean and turbulence flowfield for a variety of configurations and input parameters, recommend appropriate turbulence model advances, and implement and exhibit results of flowfield predictions. A combined experimental and theoretical approach was followed, in a modified version of the test facility, equipped initially with one

and two lateral jets, located one test-section downstream of the inlet. B.G.

N87-11204*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FLAME RADIATION c25
J. D. Wear *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21B

Total radiation and heat flux data was obtained on a combustor liner by advanced instrumentation. If the results obtained by the special instrumentation are considered to be representative of the total radiation and heat flux, then the effect of variation of engine operating parameters and of fuel type can be more easily obtained. The special instrumentation used for these investigations consisted of five total radiometers and two total heat flux gages. The radiometers were arranged axially and circumferentially through sliding air seals in the outer liner. The two heat flux gages were welded in the outer liner between two circumferential radiometers. Static pressures were obtained on both the cold and the hot side of the outer liner in the area of the heat flux gages. Liner metal temperatures were also obtained. The combustor inlet pressure was varied over a nominal range of 0.5 to 2.07 MPa, inlet air temperature from 550 to 670 K, and fuel-air ratio from about 0.015 to 0.040. The two fuels tested were ASTM Jet A and a fuel designated as ERBS V. Results of the tests are discussed. B.G.

N87-11205*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
BURNER LINER THERMAL/STRUCTURAL LOAD MODELLING c07
R. J. Maffeo *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 9 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

A serious problem exists interfacing the output temperatures and temperature gradients from either the heat transfer codes or engine tests with the input to stress analysis codes. A thermal load transfer code was developed and was used in conjunction with a three-dimensional model of a combustor liner for verification. The 3D heat transfer and stress analysis models of combustor liners and turbine blades were used to validate the mapped temperature produced by the transfer module. Verification cases were made for both finite element and finite difference heat transfer codes. A user manual for the code was written and is available. B.G.

N87-11206*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
THE 3D INELASTIC ANALYSIS METHODS FOR HOT SECTION COMPONENTS c34
M. L. Roberts, R. L. McKnight, L. T. Dame, and P. C. Chen *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 3 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

Advanced 3-D inelastic structural/stress analysis methods and solution strategies for more accurate and yet more cost-effective analysis of combustors, turbine blades, and vanes are being developed. The approach is to develop four different theories, one linear and three higher order with increasing complexities including embedded singularities. Progress in each area is reported. B.G.

N87-11207*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
COMPONENT SPECIFIC MODELING c07
M. L. Roberts *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 21E

Modern jet engine design imposes extremely high loadings and temperatures on hot section components. A series of interdisciplinary modeling and analysis techniques which were specialized to address three specific components (combustor burner linings, hollow air-cooled turbine blades, and air-cooled turbine vanes) were developed and verified. These techniques will incorporate data as well as theoretical methods from many diverse areas, including cycle and performance analysis, heat transfer analysis, linear and nonlinear stress analysis, and mission analysis. Building on the proven techniques already available in these fields, the new methods developed will be integrated to predict temperature, deformation, stress, and strain histories throughout a complete flight mission. B.G.

N87-11208*# Pratt and Whitney Aircraft, East Hartford, Conn.
THE 3-D INELASTIC ANALYSIS METHODS FOR HOT SECTION COMPONENTS (BASE PROGRAM)
E. S. Todd *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

A series of computer codes are sought that would permit more accurate and efficient three-dimensional inelastic structural analysis of combustor liners, turbine blades, and turbine vanes. Each code embodies a progression of mathematical models for increasingly comprehensive representation of the geometrical features, loading conditions, and forms of nonlinear material response that distinguish these three groups of hot section components. B.G.

N87-11209*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH TEMPERATURE STRESS-STRAIN ANALYSIS
Robert L. Thompson *In its* Turbine Engine Hot Section Technology, 1984 Oct. 1984 14 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

The objectives are threefold: to assist in developing predictive tools needed to improve design analyses and procedures for the efficient and accurate prediction of burner liner structural performance and response; to calibrate, validate, and evaluate these predictive tools by comparing the predicted results with the experimental data; and to evaluate existing as well as advanced temperature and strain measurement instrumentation, through both contact and noncontact efforts, in a simulated turbine engine combustor environment. As the predictive tool, tests, test methods, instrumentation, and data acquisition and reduction methods are developed and evaluated, a proven, integrated analysis/experiment method will be developed that will permit the accurate prediction of the cyclic life of a burner liner. Author

N87-11210*# Akron Univ., Ohio.
HIGH-TEMPERATURE CONSTITUTIVE MODELING
D. N. Robinson and J. R. Ellis *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 11 p (For primary document see N87-11180 02-39)
(Grant NAG3-379)
Avail: NTIS HC A17/MF A01 CSCL 20K

Thermomechanical service conditions for high-temperature levels, thermal transients, and mechanical loads severe enough to cause measurable inelastic deformation are studied. Structural analysis in support of the design of high-temperature components depends strongly on accurate mathematical representations of the nonlinear, hereditary, inelastic behavior of structural alloys at high temperature, particularly in the relatively small strain range. Progress is discussed in the following areas: multiaxial experimentation to provide a basis for high-temperature multiaxial constitutive relationships; nonisothermal testing and theoretical development toward a complete thermomechanically path dependent formulation of viscoplasticity; and development of viscoplastic constitutive model accounting for initial anisotropy. B.G.

N87-11211*# Southwest Research Inst., San Antonio, Tex.
CONSTITUTIVE MODELING FOR ISOTROPIC MATERIALS

Ulric S. Lindholm *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

A state-of-the-art review of applicable constitutive models with selection of two for detailed comparison with a wide range of experimental tests was conducted. The experimental matrix contained uniaxial and biaxial tensile, creep, stress relaxation, and cyclic fatigue tests at temperatures to 1093 C and strain rates from .0000001 to .001/sec. Some nonisothermal cycles will also be run. The constitutive models will be incorporated into the MARC finite element structural analysis program with a demonstration computation made for advanced turbine blade configuration. In the code development work, particular emphasis is being placed on developing efficient integration algorithms for the highly nonlinear and stiff constitutive equations. Another area of emphasis is the appropriate and efficient methodology for determing constitutive constants from a minimum extent of experimental data. Author

N87-11212*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
CONSTITUTIVE MODELING FOR ISOTROPIC MATERIALS
V. G. Ramaswamy, R. H. VanStone, L. T. Dame, and J. H. Laflen *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 12 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

The unified constitutive theories for application to typical isotropic cast nickel base supperalloys used for air-cooled turbine blades were evaluated. The specific modeling aspects evaluated were: uniaxial, monotonic, cyclic, creep, relaxation, multiaxial, notch, and thermomechanical behavior. Further development of the constitutive theories to model thermal history effects, refinement of the material test procedures, evaluation of coating effects, and verification of the models in an alternate material will be accomplished in a follow-on for this base program. Author

N87-11213*# Pratt and Whitney Aircraft, East Hartford, Conn.
CREEP FATIGUE LIFE PREDICTION FOR ENGINE HOT SECTION MATERIALS (ISOTROPIC): TWO YEAR UPDATE c38
Vito Moreno *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
(Contract NAS3-23288)
Avail: NTIS HC A17/MF A01 CSCL 14D

Requirements for increased durability of gas turbine hot section components have placed a greater degree of importance on accurate structural analysis and life prediction. Various life prediction approaches for high temperature applications were investigated. Basic models were selected and developed for simple-cycle, isothermal loading conditions. Models will be developed which address thermomechanical cycling, multiaxial conditions, cumulative loading, environmental effects, and cyclic mean stress. Verification tests of models will be conducted on an alternate material and coating system. B.G.

N87-11214*# General Electric Co., Fairfield, Conn. Aircraft Engine Business Group.
ELEVATED TEMPERATURE CRACK GROWTH
K. S. Kim, J. F. Yau, R. H. VanStone, and J. H. Laflen *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

Critical gas turbine engine hot section components such as blades, vanes, and combustor liners tend to develop minute cracks during early stages of operations. The ability of currently available path-independent (P-I) integrals to correlate fatigue crack propagation under conditions that simulate the turbojet engine combustor liner environment was determined. To date, an appropriate specimen design and a crack displacement measurement method were determined. Alloy 718 was selected as the analog material based on its ability to simulate high temperature behavior at lower temperatures in order to facilitate experimental measurements. Available P-I integrals were reviewed and the best approaches are being programmed into a finite element post processor for eventual comparison with experimental data. The experimental data will include cyclic crack growth tests under thermomechanical conditions, and, additionally, thermal gradients. B.G.

N87-11215*# Syracuse Univ., N. Y. Dept. of Mechanical Engineering.
OXIDATION AND LOW CYCLE FATIGUE LIFE PREDICTION c38
Yoshiki Oshida and Hao-Wen Liu *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 9 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 11D

When a metallic material is exposed to a high temperature in an ambient atmosphere, oxidation takes place on the metallic surface. The formed oxides (both surface and grain boundary oxides) are mechanically brittle so that if the stress is high enough the oxides will be cracked. The grain boundary oxide formation in TAZ-8A nickel-base superalloy was studied. The effect of oxide crack nucleus on low cycle fatigue life will be analyzed. The TAZ-8A was subjected to high temperature oxidation tests in air under the stress-free condition. The oxidation temperatures were 600, 800, and 1000 C. The oxidation time varies from 10 to 1000 hours. B.G.

N87-11216*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Engineering Mechanics.
CONSTITUTIVE MODELING OF INELASTIC ANISOTROPIC MATERIAL RESPONSE
D. C. Stouffer *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 4 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

A constitutive equation was developed to predict the inelastic thermomechanical response of single crystal turbine blades. These equations are essential for developing accurate finite element models of hot section components and contribute significantly to the understanding and prediction of crack initiation and propagation. The method used was limited to unified state variable constitutive equations. Two approaches to developing an anisotropic constitutive equation were reviewed. One approach was to apply the Stouffer-Bodner representation for deformation induced anisotropy to materials with an initial anisotropy such as single crystals. The second approach was to determine the global inelastic strain rate from the contribution of the slip in each of the possible crystallographic slip systems. A three dimensional finite element is being developed with a variable constitutive equation link that can be used for constitutive equation development and to predict the response of an experiment using the actual specimen geometry and loading conditions. B.G.

N87-11217*# Connecticut Univ., Storrs.
BIAXIAL CONSTITUTIVE EQUATION DEVELOPMENT
Eric H. Jordan and Kevin P. Walker *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 7 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20K

In developing the constitutive equations an interdisciplinary approach is being pursued. Specifically, both metallurgical and continuum mechanics considerations are recognized in the formulation. Experiments will be utilized to both explore general qualitative features of the material behavior that needs to be modeled and to provide a means of assessing the validity of the equations being developed. The model under development explicitly recognizes crystallographic slip on the individual slip systems. This makes possible direct representation of specific slip system phenomena. The present constitutive formulation takes the anisotropic creep theory and incorporates two state variables into the model to account for the effect of prior inelastic deformation

history on the current rate-dependent response of the material. B.G.

N87-11218*# Pratt and Whitney Aircraft, East Hartford, Conn.
LIFE PREDICTION AND CONSTITUTIVE MODELS FOR ENGINE HOT SECTION ANISOTROPIC MATERIALS c38
Gustav A. Swanson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 14D

The development of directionally solidified and single crystal alloys is perhaps the most important recent advancement in hot section materials technology. The objective is to develop knowledge that enables the designer to improve anisotropic gas turbine parts to their full potential. Two single crystal alloys selected were PWA 1480 and Alloy 185. The coatings selected were an overlay coating, PWA 286, and an aluminide diffusion coating, PWA 273. The constitutive specimens were solid and cylindrical; the fatigue specimens were hollow and cylindrical. Two thicknesses of substrate are utilized. Specimens of both thickness (0.4 and 1.5 mm) will be coated and then tested for tensile, creep, and fatigue properties. B.G.

N87-11219*# General Motors Corp., Detroit, Mich. Gas Turbine Div.
TURBINE AIRFOIL GAS SIDE HEAT TRANSFER c34
Edward R. Turner *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 14 p (For primary document see N87-11180 02-39)
(Contract NAS3-23695)
Avail: NTIS HC A17/MF A01 CSCL 20D

Work is currently underway to develop and characterize an analytical approach, based on boundary layer theory, for predicting the effects of leading edge (showerhead) film cooling on downstream gas side heat transfer rates. Parallel to this work, experiments are being conducted to build a relevant data base for present and future methods verification. Author

N87-11220*# Scientific Research Associates, Inc., Glastonbury, Conn.
CALCULATION OF TWO- AND THREE-DIMENSIONAL TRANSONIC CASCADE FLOW FIELD USING THE NAVIER-STOKES EQUATIONS c34
B. C. Weinberg, R.-J. Yang, S. J. Shamroth, and H. McDonald *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
(Contract NAS3-23695)
Avail: NTIS HC A17/MF A01 CSCL 20D

A Navier-Stokes analysis employing the time-dependent Linearized Block Implicit scheme (LBI) was applied to two-dimensional and three-dimensional transonic turbulent cascade flows. In general, the geometrical configuration of the turbine blade impacts both the grid construction procedure and the implementation of the numerical algorithm. Since modern turbine blades of interest are characterized by very blunt leading edges, rounded trailing edges and high stacking angles, a robust grid construction procedure is required that can accomodate the severe body shape while resolving regions of large flow gradients. A constructive O-type grid generation technique, suitable for cascades with rounded trailing edges, was developed and used to construct the C3X turbine cascade coordinate grid. Two-dimensional calculations were performed employing the Navier-Stokes procedure for the C3X turbine cascade, and the predicted pressure coefficients and heat transfer rates were compared with the experimental data. Three-dimensional Navier-Stokes calculations were also performed. B.G.

N87-11221*# United Technologies Research Center, East Hartford, Conn.
MEASUREMENT OF AIRFOIL HEAT TRANSFER COEFFICIENTS ON A TURBINE STAGE c34
Robert P. Dring and Michael F. Blair *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

The primary basis for heat transfer analysis of turbine airfoils is experimental data obtained in linear cascades. A detailed set of heat transfer coefficients was obtained along the midspan of a stator and a rotor in a rotating turbine stage. The data are to be compared to standard analyses of blade boundary layer heat transfer. A detailed set of heat transfer coefficients was obtained along the midspan of a stator located in the wake of a full upstream turbine stage. Two levels of inlet turbulence (1 and 10 percent) were used. The analytical capability will be examined to improve prediction of the experimental data. B.G.

N87-11222*# Stanford Univ., Calif. Thermosciences Div.
EFFECTS OF VERY HIGH TURBULENCE ON CONVECTIVE HEAT TRANSFER c34
Robert J. Moffat and Paul K. Maciejewski *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 8 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

The effects of high-intensity, large-scale turbulence on turbulent boundary-layer heat transfer are studied. Flow fields were produced with turbulence intensities up to 40% and length scales up to several times the boundary layer thickness. In addition, three different types of turbulence will be compared to see whether they have the same effect on the boundary layer. The three are: the far field of a free jet, flow downstream of a grid, and flow downstream of a simulated gas turbine combustor. Each turbulence field will be characterized by several measures: intensity (by component), scale, and spectrum. Heat transfer will be measured on a 2.5 m long, 0.5 m wide flat plate using the energy-balance technique. The same plate will be used in each of the four flow fields; a low-turbulence tunnel for baseline data, and the three flow situations mentioned. B.G.

N87-11223*# Tennessee Univ. Space Inst., Tullahoma.
GAS FLOW ENVIRONMENTAL AND HEAT TRANSFER NON-ROTATING 3D PROGRAM c34
R. A. Crawford *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 5 p (For primary document see N87-11180 02-39)
(Contract NAS3-23278)
Avail: NTIS HC A17/MF A01 CSCL 20D

The experimental contract objective is to provide a complete set of benchmark quality data for the flow within a large rectangular turning duct. The data are to be used to evaluate and verify three-dimensional internal viscous flow models and computational codes. The analytical contract objective is to select such a computational code and define the capabilities of this code to predict the experimental results. Details of the proper code operation will be defined and improvements to the code modeling capabilities will be formulated. Author

N87-11224*# United Technologies Research Center, East Hartford, Conn.
ASSESSMENT OF A 3-D BOUNDARY LAYER CODE TO PREDICT HEAT TRANSFER AND FLOW LOSSES IN A TURBINE c34
Olof L. Anderson *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 6 p (For primary document see N87-11180 02-39)
(Contract NAS3-23716)
Avail: NTIS HC A17/MF A01 CSCL 20D

Zonal concepts are utilized to delineate regions of application of three-dimensional boundary layer (DBL) theory. The zonal approach requires three distinct analyses. A modified version of the 3-DBL code named TABLET is used to analyze the boundary layer flow. This modified code solves the finite difference form of the compressible 3-DBL equations in a nonorthogonal surface coordinate system which includes coriolis forces produced by coordinate rotation. These equations are solved using an efficient, implicit, fully coupled finite difference procedure. The nonorthogonal

surface coordinate system is calculated using a general analysis based on the transfinite mapping of Gordon which is valid for any arbitrary surface. Experimental data is used to determine the boundary layer edge conditions. The boundary layer edge conditions are determined by integrating the boundary layer edge equations, which are the Euler equations at the edge of the boundary layer, using the known experimental wall pressure distribution. Starting solutions along the inflow boundaries are estimated by solving the appropriate limiting form of the 3-DBL equations. B.G.

N87-11225*# Pratt and Whitney Aircraft, East Hartford, Conn.
COOLANT PASSAGE HEAT TRANSFER WITH ROTATION, A PROGRESS REPORT **c34**
F. C. Kopper *In* NASA. Lewis Research Center Turbine Engine Hot Section Technology, 1984 Oct. 1984 10 p (For primary document see N87-11180 02-39)
Avail: NTIS HC A17/MF A01 CSCL 20D

The objective of this 36-month experimental and analytical program is to develop a heat transfer and pressure drop database, computational fluid dynamic techniques, and correlations for multipass rotating coolant passages with and without flow turbulators. The experimental effort will be focused on the simulation of configurations and conditions expected in the blades of advanced aircraft high pressure turbines so that the effects of Coriolis and buoyancy forces on the coolant side flow can be rationally included in the design of turbine blades. Author

N87-11226# George Washington Univ., Washington, D.C. School of Engineering and Applied Science.
STOCHASTIC CRACK PROPAGATION WITH APPLICATIONS TO DURABILITY AND DAMAGE TOLERANCE ANALYSES Final Report, Jun. 1983 - Feb. 1985
J. N. Yang, W. H. Hsi, and S. D. Manning Sep. 1985 263 p
(Contract F33615-83-K-3226)
(AD-A168040; AFWAL-TR-85-3062) Avail: NTIS HC A12/MF A01 CSCL 20/11

Various stochastic models for fatigue crack propagation under either constant amplitude or spectrum loadings have been investigated. These models are based on the assumption that the crack growth rate is a lognormal random process, including the general lognormal random process, lognormal white noise process, lognormal random variable, and second moment approximations, such as Weibull, gamma, lognormal and Gaussian closure approximations. Extensive experimental data have been used for the correlation study with various stochastic models. These include fastener hole specimens under fighter or bomber spectrum loadings and center-cracked specimens under constant amplitude loads. The data sets for the fastener hole specimens cover adequately different loading conditions, environments, load transfers and crack size range. It is shown that the white noise process is definitely not a valid model for fatigue crack propagation. GRA

N87-11227# Denver Univ., Colo. College of Engineering.
MEASUREMENT OF STRESS DISTRIBUTIONS IN ADHESIVE BONDED JOINTS Final Report, 17 Aug. 1981 - 28 Feb. 1986
P. K. Predecki, C. S. Barrett, and A. B. Lankford 4 Apr. 1986 14 p
(Contract DAAG29-81-K-0150)
(AD-A169176; ARO-18358.4-MS) Avail: NTIS HC A02/MF A01 CSCL 20/11

Triaxial stresses were determined by X-ray diffraction in the Aluminum adherend of a single lap joint at an average depth of .033 mm from the Al/adhesive interface. Access to the joint was gained non-destructively by making one adherend of Be (relatively transparent to CuK alpha radiation) and the other of Al alloy (relatively opaque). The incident X-ray beam passed through the Beryllium and the adhesive (FM-73M, American Cyanamid Co.) and was diffracted from the Al adherend adjacent to the Al/adhesive interface. Changes in the lattice spacing of the (511) + (333) reflection of Al compared with the stress free spacing were used to determine the strain and stress tensors along the bond. Measurements were made in the as-cured and loaded conditions, and on specimens containing an intentional debond. Results for the loaded condition were compared with Texagap-2D finite element calculations for a nominally identical specimen at a depth .033 mm into the Al adherend. The comparison showed a general agreement in trends and magnitudes for all the stress components except at the extremities of the bond. In particular, the measured peel stress at one extremity was substantially larger than the calculated peel stress. The discrepancies between measured and calculated stresses can be explained qualitatively by the presence of an unintentional debond of depth less than 0.5 mm at the one extremity. GRA

N87-11228# Ames Lab., Iowa.
USING ACOUSTIC WAVES FOR THE CHARACTERIZATION OF CLOSED FATIGUE CRACKS
O. Buck, R. B. Thompson, and D. K. Rehbein 1986 26 p Presented at the International Symposium on Fatique Crack Closure, Charleston, S.C., 1 May 1986
(Contract W-7405-eng-82)
(DE86-011404; IS-M-585; CONF-8605141-1) Avail: NTIS HC A03/MF A01

Partial contact of two rough fatigue crack surfaces leads to transmission, reflection, diffraction and mode conversion of an acoustic signal at those contacts (asperities). This paper reviews recent experimental and theoretical efforts to understand such interactions and uses them to quantify contact on actual fatigue cracks in greater detail. It is shown that the size and density of individual contacts, or asperities, can be estimated from acoustic measurements. Furthermore, it is shown that this information is needed to calculate the static stress across a partially closed crack as well as the effective stress intensity range which activates fatigue crack propagation. DOE

N87-11229# Sandia National Labs., Albuquerque, N. Mex.
CURRENT PROBLEMS IN SOLID DYNAMICS
W. Herrmann 1986 15 p Presented at the 30th Anniversary Symposium of the Inst. of Mechanics, Beijing, China, 8 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-011653; SAND-86-1321C; CONF-8606137-1) Avail: NTIS HC A02/MF A01

Current and future problems are addressed in the field of solid dynamics, that is, the response of materials and structures to explosions, high velocity impacts and pulsed radiation. Since such responses usually involve large deformations and nonlinear material behavior, numerical solutions are used almost exclusively for engineering design and performance assessment. Limited potential is forseen for future development of finite difference or finite element methods, but the development of algorithms implementing them, with particular emphasis on data and logic flow on vector and parallel computer architectures, hold promise of large increases in potential efficiency and the capability to do more realistic computer modeling, particularly when algorithms and architectures are developed to work together. Exact analytic solutions to test problems to validate the numerical methods are needed. The question of stability and convergence of the numerical methods for nonlinear problems is very important, and this difficult area needs attention. Many constitutive equations describing nonlinear material behavior are of incremental and rate type, and admit various instabilities and bifurcations in initial-boundary value problems of engineering interest, such instabilities being commonly observed experimentally. Qualitative analysis of such behavior of the differential equations is very important to ensure that special numerical solutions are physically correct. DOE

N87-11230# GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Anlagentechnik.
THE FINITE ELEMENT METHOD FOR CALCULATION OF THE CALIBRATION CURVES FOR FRACTURE MECHANICS SPECIMENS OF VARIOUS THICKNESS FOR THE ELECTRICAL DIRECT CURRENT POTENTIAL CRACK MONITORING SYSTEMS [FINITE-ELEMENT-ANALYSE ZUR ERMITTLUNG DER EICHKURVEN FUER BRUCHMECHANIKPROBEN VERSCHIEDENER DICKE FUER DIE MESSUNG DER TIEFE VON HALB-

KREISFOERMIGEN OBERFLAECHENRISSEN MIT DER ELEKTRISCHEN GLEICHSTROM-POTENTIAL-METHODE]
R. Dietrich and W. Schonfeld 1986 27 p In GERMAN; ENGLISH summary
(GKSS-86/E/3; ISSN-0344-9629; ETN-86-97827) Avail: NTIS HC A03/MF A01

The finite element method is utilized to calculate the calibration curves required for the electrical potential crack-monitoring systems as applied to fracture mechanics specimens with thickness of 5, 10, 15, 18 and 20 mm. The starting crack is a0 = 2 mm for all specimens. ESA

N87-11231# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.
RELEVANCE OF SHORT FATIGUE CRACK GROWTH DATA FOR DURABILITY AND DAMAGE TOLERANCE ANALYSES OF AIRCRAFT
Anders F. Blom Mar. 1986 19 p Presented at Engineering Foundation Second International Conference on Small Fatigue Cracks, Santa Barbara, Calif., 5-10 Jan. 1986 Submitted for publication Sponsored by Swedish Board for Technical Development
(FFA-TN-1986-23; ETN-86-97857) Avail: NTIS HC A02/MF A01

Starting from damage tolerance requirements and proceeding over the experimental and numerical means to verify these requirements, it is concluded that the relevance of short fatigue crack studies is limited to durability of the airframe. For engines, the behavior of short cracks is crucial if a damage tolerant design is to be considered. It is suggested that any type of analysis involving short cracks has to be probabilistic. Such a technique is described. ESA

N87-11232# Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H., Vienna. Inst. fuer Werkstofftechnologie.
IDENTIFICATION OF CREEP MECHANISMS AND QUANTITATIVE DESCRIPTION OF STRESS REGIMES RELEVANT TO DESIGN
Heinz Lahodny, Krystyna Spiradek, and Hans Peter Degischer Mar. 1986 17 p Presented at COST-50 and COST-501 Session on High Temperature Alloys for Gas Turbines and Other Applications, Liege, Belgium, 8-9 Oct. 1986
(OEFZS-4352; WE-389/86; ETN-86-97880) Avail: NTIS HC A02/MF A01

Results of constant load creep tests on different heats of wrought alloy 800H were used to develop a method to identify and quantify steady state creep stages. The creep behavior between 1073 and 1223K is described by steady state strain rate equations for epsilon dot sub n at prevailing dislocation mechanisms and for epsilon dot sub d attributed to diffusional creep. Their limits of validity are stated and the microstructural verification is presented. Creep stage maps and creep test procedures which supply the data for the prediction of the lower time limit to reach certain creep strains are suggested. ESA

N87-11233# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
FATIGUE FRACTURE IN STEEL LANDING GEAR COMPONENTS
R. J. H. Wanhill 7 Jun. 1985 14 p Sponsored by the Royal Netherlands Air Force Scientific Research Division of the Directorate of Material
(NLR-MP-85050-U; B8668293; ETN-86-98492) Avail: NTIS HC A02/MF A01

The characteristics of fatigue and overload fracture in high strength low alloy steel landing gear forgings were investigated. Fatigue fracture was characterized by microserrated acicular ridges and to a lesser extent by striation marks. Overload fracture was by microvoid coalescence (dimples). After corrosion due to outdoor exposure it is possible to identify fatigue fracture, but overload dimples are much less evident. Constant amplitude and block program (flight-by-flight) fatigue crack propagation rates are well correlated by root mean values of the stress intensity factor range. This is encouraging for analytical estimation of service failure crack propagation lives. ESA

N87-11234 Ohio State Univ., Columbus.
EXTENSION OF THE RITZ METHOD TO THE FORCED, DAMPED VIBRATIONS OF ROTATING STRUCTURAL ELEMENTS Ph.D. Thesis
Tyau-Her Young 1986 186 p
Avail: Univ. Microfilms Order No. DA8612425

The Ritz method is used to analyze the free, undamped vibrations of structural elements such as plates and shells, but is seldom applied to solve forced, damped vibration problems. Therefore, an extension of the method is applied to this kind of problem in which the structural elements are either non-rotating or rotating. Two kinds of linear damping (viscous and material damping) are considered, and the forcing function which is either distributed or concentrated at a particular point varies sinusoidally with time. Numerical results are presented for cantilever rectangular plates and shallow shell elements of rectangular planform. The displacements are assumed as linear combinations of simple algebraic polynomials, which permit relatively easy integration and satisfy completely the geometric boundary conditions of the problems. It is found that the end concentrated excitation excites higher bending modes more than the uniformly distributed excitation; material damping damps out higher modes more effectively than viscous damping. Also, the effect of rotation stiffens the system, while the effects of sweep and setting angles not only make the system more flexible but also complicate the response shape. Moreover, unlike in the free, undamped vibration problems, convergence of displacements is not monotonic and is not as good as that of natural frequencies. Dissert. Abstr.

N87-10893# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Mechanical Systems Div.
ESA FRACTURE CONTROL POLICY AND FRACTURE MECHANICS SPECTRA FOR STS PAYLOADS
G. G. Reibaldi, A. A. tenHave, A. U. deKoning, and J. Ph. vanHerwaarden (Royal Netherlands Aircraft Factories Fokker, Amsterdam) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 51-55 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10896# Texas Univ., Austin.
A STUDY OF NODAL COUPLING METHODS
R. R. Craig *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 75-80 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10897# Intespace, Toulouse (France).
EFFECTIVE MODAL PARAMETERS AND TRUNCATION EFFECTS IN STRUCTURAL DYNAMICS [PARAMETRES MODAUX EFFECTIFS ET EFFETS DE TRONCATURE EN DYNAMIQUE DES STRUCTURES]
A. Girard and J. F. Imbert *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 81-86 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10899# Cisigraph, Rungis (France).
FLUID-STRUCTURE INTERACTION: MODAL SYNTHESIS METHOD [INTERACTION FLUIDE STRUCTURE: METHODE DE SYNTHESE MODALE]
R. Savouillan, F. Besnier, and G. Rozenblum *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 93-99 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10901# Rome Univ. (Italy).
COMPUTATIONAL METHODS IN ELASTIC PERIODIC STRUCTURES ANALYSES
Filippo Graziani and Silvano Sgubini *In* ESA Proceedings of an

International Conference on Spacecraft Structures Apr. 1986 p 109-112 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10904# London Univ. (England). Queen Mary Coll.
THE EFFECT OF THE NON-UNIFORM STRESS DISTRIBUTION IN THE BLANKETS OF SINGLE AND TWIN BOOM SOLAR ARRAY PANELS UPON THEIR MODAL CHARACTERISTICS
J. R. Wright *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 125-130 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10906# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France).
PREDICTION OF THE HIGH FREQUENCY RESPONSE OF SATELLITES TO DIFFUSE ACOUSTIC ENVIRONMENTS
B. Troclet, T. DangTrong, and C. Vidal *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 145-150 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10907# Centre National d'Etudes Spatiales, Toulouse (France).
PREDICTION AND CORRELATION OF STRUCTURAL RESPONSE IN ACOUSTIC CHAMBERS [PREVISION ET CORRELATION DE LA REPONSE DE STRUCTURES EN CHAMBRE ACOUSTIQUE]
F. Mercier and H. Defosse *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 151-156 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10908# Centre National d'Etudes Spatiales, Paris (France). Direction des Lanceurs.
LOW FREQUENCY RESPONSE OF AXISYMMETRIC STRUCTURES TO RANDOM NOISE [REPONSES BASEES DE STRUCTURES AXISYMMETRIQUES EN BRUIT DIFFUS]
G. Borello *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 157-162 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10909# Southampton Univ. (England). Inst. of Sound and Vibration Research.
ACOUSTIC RADIATION AND INTERNAL DISSIPATION IN HONEYCOMB PANELS
K. T. Brown *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 163-168 Sponsored by British Aerospace, Filton, England (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10910# Technische Hochschule, Aachen (West Germany). Inst. fuer Leichtbau.
TRANSIENT EXTERNAL LOADS OR INTERFACE FORCES RECONSTRUCTED FROM STRUCTURAL RESPONSE MEASUREMENTS
H. Oery, H. Glaser, and D. Holzdeppe *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 171-177 Sponsored by Deutsche Forschungsgemeinschaft and MBB GmbH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10911# Kassel Univ. (West Germany).
STRUCTURAL SYSTEM IDENTIFICATION USING SINGLE AND MULTIAXIAL VIBRATION TEST DATA
M. Link *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 179-184 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10912# Spar Aerospace Ltd., Ste-Anne-de-Bellevue (Quebec).
DEMONSTRATION OF MODAL SYNTHESIS ON AN EXPERIMENTAL STRUCTURE AND ITS APPLICATION TO LARGE SPACECRAFT
F. Charron, V. L. Jha, H. Lapierre, S. J. Sorocky, and F. R. Vigneron (Department of Communications, Ottawa, Ontario) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 185-190 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10913# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
ANALYSIS/TEST CORRELATION AND UPDATE OF DYNAMIC MATHEMATICAL MODELS
Bernd Caesar *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 191-193 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10914# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. of Aeroelasticity.
APPLYING MODAL SURVEY TEST RESULTS FOR UPDATING DYNAMIC MATHEMATICAL MODELS OF SPACECRAFT STRUCTURES
H. Hueners *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 195-201 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10915# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
A REVIEW OF TIME DOMAIN MODAL TEST METHODS AND APPLICATIONS
Samir R. Ibrahim *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 205-211 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10926# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LOADS ANALYSIS FOR THE GALILEO SPACECRAFT
Marc Trubert *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 293-298 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10930# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mathematics.
CRITICAL ELEMENT CONCEPTS FOR COMPOSITE STRUCTURES
Kenneth L. Reifsnider *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 323-328 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10938# Societe Bertin et Cie, Plaisir (France).
DYNAMICS OF FLEXIBLE MECHANISMS [DYNAMIQUE DE MECANISMES FLEXIBLES]
G. Gallay, F. Gerard, and J. M. Auclair *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 381-386 In FRENCH (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10939# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Group.
ANALYTICAL PREDICTION OF CYLINDRICAL AND CASSINI-SHAPED SHELL CONTOURS AFTER PLASTIC STRETCHING
D. Hummel, J. Franz, and E. D. Sach *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 387-391 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10942# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Strukturmechanik.
OPTIMIZATION OF AXIALLY COMPRESSED CFRP CYLINDERS
R. Zimmermann *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 407-412 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-10943# British Aircraft Corp., Filton (England).
SPACECRAFT STRUCTURAL ACOUSTICS: PROGRESS IN VIBRATION LEVEL PREDICTION
P. J. Williams, R. J. Cummins, and D. C. G. Eaton (European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands) *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 415-428 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N87-11235 Centrum voor Landbouwpublikaties en Landbouwdocumentatie, Wageningen (Netherlands).
REMOTE SENSING METHODS TO DETERMINE THE VITALITY OF VEGETATION
B. vandeLustgraaf 1984 61 p In DUTCH; ENGLISH summary (Literatuuroverzicht-42; ISBN-90-220-0866-5; ETN-86-98073) Copyright. Avail: Issuing Activity

Technical and methodical details of remote sensing to assess damage to vegetation, particularly due to air pollution, are reviewed. Experiments show that remote sensing is as reliable as traditional methods based on field survey. However, field observation remains necessary since the causal agent usually cannot be identified from the remote sensing image. Large scale stereophotos using IR films give a reliable indication of vegetation vitality. Visual and photometric methods support the photoanalysis. Image enhancement techniques show good performance. Spectroradiometry is promising. Multispectral scanners on aircraft of satellites cannot yet compete with photographic techniques. Photographic remote sensing methods are cheaper than field based methods. ESA

N87-11236*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
FOLLOW-ON PROPOSAL IDENTIFYING ENVIRONMENTAL FEATURES FOR LAND MANAGEMENT DECISIONS
Phillip M. Wright and Merrill K. Ridd 1986 26 p
(Grant NAGW-95)
(NASA-CR-179703; NAS 1.26:179703) Avail: NTIS HC A03/MF A01 CSCL 08B

Urban morphology (an examination of spatial fabric and structure), natural ecosystem (investigations emphasizing biophysical processes and patterns), and human ecosystem (emphasizing socio-economic and engineering parameters) were studied. The most critical variable, transpiration, in the ASPCON model, created by Jaynes (1978), describing the hydrology of aspen to conifer succession was studied to improve the accuracy. Transpiration is determined by a canopy transpiration model which estimates consumptive water use (CWU) for specific species and a plant activity index. Also studied was Pinyon-Juniper woodland erosion. B.G.

N87-11237*# California Univ., Santa Barbara. Dept. of Geography.
CANOPY REFLECTANCE MODELING IN A TROPICAL WOODED GRASSLAND Annual Report
David Simonett and Janet Franklin 15 Sep. 1986 57 p
(Grant NAGw-788)
(NASA-CR-179895; NAS 1.26:179895) Avail: NTIS HC A04/MF A01 CSCL 02F

Geometric/optical canopy reflectance modeling and spatial/spectral pattern recognition are used to study the form and structure of savanna in West Africa. An invertible plant canopy reflectance model is tested for its ability to estimate the amount of woody vegetation cover in areas of sparsely wooded grassland from remotely sensed data. Dry woodlands and wooded grasslands, commonly referred to as savannas, are important ecologically and economically in Africa, and cover approximately forty percent of the continent by some estimates. The Sahelian and Sudanian savanna make up the important and sensitive transition zone between the tropical forests and the arid Saharan region. The depletion of woody cover, used for fodder and fuel in these regions, has become a very severe problem for the people living there. LANDSAT Thematic Mapper (TM) data is used to stratify woodland and wooded grassland into areas of relatively homogeneous canopy cover, and then by applying an invertible forest canopy reflectance model to estimate directly the height and spacing of the trees in the stands. Since height and spacing are proportional to biomass in some cases, a successful application of the segmentation/modeling techniques will allow direct estimation of woody biomass, as well as cover density, over significant areas of these valuable and sensitive ecosystems. Sahelian savanna sites in the Gourma area of Mali being used by the NASA/GIMMS project (Global Inventory Modeling and Monitoring System, at Goddard Space Flight Center), in conjunction with CIPEA/Mali (Centre International pour l'Elevage en Afrique) will be used for testing the canopy model. The model will also be tested in a Sudanian zone crop/woodland area in the Region of Segou, Mali. Author

N87-11238# European Space Agency, Paris (France).
PROCEEDINGS OF THE THIRD INTERNATIONAL COLLOQUIUM ON SPECTRAL SIGNATURES OF OBJECTS IN REMOTE SENSING
T. D. Guyenne, ed. Dec. 1985 591 p In ENGLISH and FRENCH Colloquium held in Les Arcs, France, 16-20 Dec. 1985
(ESA-SP-247; ISSN-079-6566; ETN-86-97563) Avail: NTIS HC A25/MF A01

The PROMESS and TOSCANE T remote sensing simulation campaigns; modeling in the microwave region and over land; modeling in the optical domain (visible and infrared); passive spectral methods; active spectral methods; sensor and data calibration; and spectral characterization of objects were discussed. For individual titles, see N87-11239 through N87-11334.

N87-11239# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
AN EXPERIMENTAL CAMPAIGN FOR THE DETERMINATION OF RADAR STRUCTURE OF THE OCEAN AT C BAND
E. Attema *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 3-10 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The determination of the directional wave spectrum and the surface wind field over the ocean, using the instruments of the ERS-1 satellite is discussed. This requires accurate knowledge of the radar signature of the ocean expressed by the radar cross section per unit area, sigma zero. The wave spectrum determination requires a suitable modulation transfer function, and an empirical model for sigma zero and its dependence on wind speed, wind

direction and incidence angle forms the basis for the wind retrieval algorithm. An international experimental campaign was conducted to validate the empirical models and determine model parameters. It is shown how instruments were deployed to ensure a coherent and reliable experimental data set. Instruments included airborne scatterometers, airborne synthetic aperture radar, tower-based scatterometers, wave buoys and meteorological instruments on board aircraft, a research ship, and a research platform. ESA

N87-11240# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
AIRBORNE AND TOWER-BASED SCATTEROMETRY DURING THE PROMESS AND TOSCANE-T CAMPAIGNS
E. Attema *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 11-15 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

During the PROMESS and TOSCANE-T campaigns, scatterometers were used from aircraft and a research platform to measure ocean backscattering as a function of wind speed and direction. The principle of operation of each scatterometer is described. Internal and external calibration procedures are discussed. Absolute accuracy within 1dB is achieved. Flight patterns are outlined and samples of output data are presented. ESA

N87-11241# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
THE PROMESS 84 AND TOSCANE-85 CAMPAIGNS IN-SITU MEASUREMENTS
R. Ezraty, P. Queffeulou, and M. Champagne *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 17-22 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

During the PROMESS and TOSCANE-T campaigns wind vector, temperature, and sea-state measurements were performed using a ship to relate C band scatterometer normalized radar cross sections to the surface wind. The ship disturbing effect is evaluated to overestimate by 12% the wind measurement when the ship route is upwind. The mean wind speed measurement accuracy is estimated to be 0.3 m/sec. The method can be used to assess wind measurement accuracy on buoys using a shipborne reference. During the TOSCANE-T campaign, a network of coastal masts, a meteorological buoy, and a sea-state measuring buoy were deployed. The data analysis reveals that the wind measurements on the buoy are underestimated by 2 to 3 m/sec when the significant wave height is comparable to the measurement height. Coastal measurements must be used with caution because of topographic effects which depend on the wind azimuth with respect to the coast; so a coastal site has also to be calibrated. ESA

N87-11242# Toulouse Univ. (France). Lab. d'Aerologie.
AIRBORNE MEASUREMENT METHODS APPLIED TO THE DETERMINATION OF BOUNDARY CONDITIONS AT THE SEA SURFACE: THE TOSCANE EXPERIMENT [METHODES DE MESURES AEROPORTEES APPLIQUEES A LA DETERMINATION DES CONDITIONS AUX LIMITES SUR LA MER: EXPERIENCE TOSCANE]
P. Durand, F. Said, and A. Druilhet *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 23-28 In FRENCH Sponsored by Inst. National d'Astronomie et de Geophysique (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Two light aircraft were used to collect data on average boundary layer conditions at the sea surface and on turbulent air flow over the sea. The method for calculating turbulent flow is presented. Advantages and disadvantages of the aircraft for this type of data collection are discussed, particularly problems related to perturbations of information on the absolute speed of the aircraft. Consequences for the calculation of wind parameters and motion transfer are outlined. A solution which allows the turbulent horizontal kinetic energy global vertical motion transfer to be reconstructed is given. The relation between parameters calculated at the average flight altitude of 50 m and the conditions at the real boundary layer is considered. ESA

N87-11243# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
TOWARDS A C-BAND RADAR SEA ECHO MODEL FOR THE ERS-1 SCATTEROMETER
A. E. Long *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 29-34 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Specification of a vertical polarization radar echo model, CMOD1, based on airborne circle-flight, and radar scattering cross section measurements from three C-band scatterometer systems to relate normalized surface scattering cross-sections to radar beam incidence angle, wind speed and direction is described. The analyzed circle flight records are used to suggest the model form and to find its parameters by least squares fitting methods. The CMOD1 Specification is expected to be used in design and performance assessment of the ERS-1 scatterometer. ESA

N87-11244# Toulouse Univ. (France). Lab. d'Aerologie.
DYNAMICS OF THE MARINE BOUNDARY LAYER. DETERMINATION OF BOUNDARY CONDITIONS [DYNAMIQUE DE LA COUCHE LIMITE MARINE. DETERMINATION DES CONDITIONS AUX LIMITES]
A. Druilhet, F. Said, and P. Durand *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 35-41 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The dynamics of the atmospheric boundary layer are analyzed in order to determine boundary conditions over the ocean surface. Flow, temperature, and evaporation analysis methods based on average profile measurements and those requiring the measurement of turbulent functions are distinguished. The latter can be used in aircraft campaigns. They make possible the study of the spatial homogeneity of the boundary conditions and thus the integration of scales, a problem specific to satellite-borne remote sensing. ESA

N87-11245# Centre National d'Etudes Spatiales, Toulouse (France).
IN-FLIGHT CALIBRATION DURING PROMESS CAMPAIGN
J. M. Lopez *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 43-47 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Standard radar targets (spherical, corner reflectors, cones, squares) were calibrated. Radar cross sections, and angular coverage are described. Flight tests are summarized. ESA

N87-11246# Technische Hogeschool, Delft (Netherlands). Dept. of Electrical Engineering.
ANALYSIS AND CALIBRATION OF THE DUTCH SCATTEROMETER MEASUREMENTS
P. Snoeij *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 49-51 Sponsored by Dept. of Science Policy, and Netherlands Remote Sensing Board (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The airborne Dutscat scatterometer took part in the ESA C-band scatterometer campaign. The instrument and the calibration of the system using an array of corner reflectors is discussed. The radar cross section per unit area is presented. ESA

N87-11247# Institut Francais du Petrole, Rueil-Malmaison.
SAR IMAGING OF THE SEA SURFACE DURING THE ESA C-BAND WIND SCATTEROMETER CAMPAIGN
P. Piau, C. Blanchet, and L. Gray (Canada Centre for Remote Sensing, Ottawa, Ontario) *In* ESA Proceedings of the Third

international Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 53-57 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The SAR 580 was used during the PROMESS experiment study of wind and wave measurements on the sea surface with C-band radars as will be made by the Active Microwave Instrument (AMI) aboard ERS-1. The meteorological conditions encountered during the experiment allowed a study with a good range of wave heights (1 to 7 m) and wind speeds. The SAR 580 performed measurements with different azimuth angles in C and X-band simultaneously. The wave length and direction of long waves are determined with a good accuracy. The determination of the additive noise level which degrades the determination of the amplitude of the image spectrum is discussed. It is shown that this SAR is very sensitive to range-traveling waves, and much less to the azimuth-traveling ones. ESA

N87-11248# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
ILLUSTRATION OF WIND FIELD TIME AND SPACE STATISTICS DURING THE TOSCANE-T CAMPAIGN **c47**
R. Ezraty, P. Queffeulou, and M. Champagne *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 59-61 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Using selected periods of wind data collected during the TOSCANE-T campaign, the differences that may occur using different speed averaging times are illustrated. A comparison with Pierson's model results is presented in terms of standard deviation. From a simulation, it is shown that differences between 10 mn averages may reach up to 2.6 m/sec within a 1 hr period. Comparisons of speed measurements at different coastal locations show the same order of magnitude of variations although coastal topographic effects are present. ESA

N87-11249# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
SEA WIND FLUCTUATIONS ANALYSIS **c47**
L. Lavanant, P. Queffeulou, and R. Ezraty *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 63-66 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The joint analysis of mesoscale sea wind fluctuations, recorded at two close positions, is presented. This is used to evaluate the time scale and spatial dimensions of the fluctuations and to verify the Taylor hypothesis. The analysis indicates that care must be taken when comparing scatterometer to in-situ data during calibration and validation. ESA

N87-11250# Toulouse Univ. (France). Lab. d'Aerologie.
ANALYSIS OF AIRBORNE MEASUREMENTS OF THE MARINE BOUNDARY LAYER DURING THE TOSCANE EXPERIMENT [ANALYSE DES MESURES AERCPORTEES DANS LA COUCHE LIMITE MARINE AU COURS DE L'EXPERIENCE TOSCANE]
F. Said, P. Durand, B. Koehler, and A. Druilhet *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 67-71 In FRENCH Sponsored by Inst. National d'Astronomie et de Geophysique (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Determination of dynamic atmospheric parameters from the boundary layer above the ocean surface in order to analyze scatterometer data is described. Two aircraft measured friction velocity and wind in the marine boundary layer. Parameterization of data from an area 25 km by 40 km is described. The method used to investigate two dimensional fields is presented. The homogeneity of the field above the sea is illustrated using sea surface temperature data and thermodynamic variables. Surface heat flux, evaporation, and circulation are compared with the wind field, showing a strong correlation. ESA

N87-11251# Physics Lab. RVO-TNO, The Hague (Netherlands).
ANALYSIS OF THE ESA WIND SCATTEROMETER CAMPAIGN DATA
G. P. deLoor *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 73-76 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

All data of the ESA wind scatterometer campaign as provided by the Central Data Library were analyzed. The data obtained fit the available empirical model and the parameters of this model were determined. The data set was related to the measured wind speed at 19.5 m and to the neutral stability wind. They are also compared with other data sets. ESA

N87-11252# Canada Centre for Remote Sensing, Ottawa (Ontario).
THE C AND Ku BAND SCATTEROMETER RESULTS FROM CANADIAN PARTICIPATION IN THE ESA PROMESS OCEAN MEASUREMENT CAMPAIGN
A. L. Gray and R. K. Hawkins *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 77-82 Sponsored by ESA and Innotech Aviation (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Multipolarized C and Ku-band fanbeam scatterometer and X(VV) and C(VV) SAR data were collected by aircraft during the ESA PROMESS ocean backscatter experiment. The C(VV) and Ku(HH) scatterometer data for incidence angles from 10 to 58 deg for straight flight lines and from 15 to 55 deg for circle flights is described. For light to moderate winds it is shown that there are significantly larger changes in Ku backscatter than at C band for the same change in wind speed. For the more important moderate to high speed wind regime however, the advantage Ku-band data has over C-band decreases and, on the basis of backscatter sensitivity, satisfactory performance can be expected from the ERS-AMI wind scatterometer. Results for C(VV) and Ku(HH) indicate that both frequencies respond in approximately the same way to a changing azimuth angle between the radar look and wind directions. ESA

N87-11253# Centre National de la Recherche Scientifique, Strasbourg (France). Groupement Scientifique de Teledetection Spatiale.
DETERMINATION OF LAND SURFACE PARAMETERS BY SATELLITE AND ASSOCIATED INVERSE PROBLEMS [DETERMINATION DES PARAMETERES SOL DE SURFACE A PARTIR DES SATELLITES ET LES PROBLEMES INVERSES ASSOCIES]
F. Becker and M. Raffy *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 85-92 In FRENCH; ENGLISH summary (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Relationships between ground parameters and those derived from satellites are discussed. It is shown that it is not possible to preserve the models at all scales if all parameters are extended in the same way from local to spatial scales. In order to preserve the models, a definition of the parameters at satellite scale is suggested as the result of the inversion of the models of measure. The stability of these models and the pertinence of the proposed definitions are discussed. ESA

N87-11254# Texas Univ., Arlington.
BACKSCATTER MEASUREMENTS FROM SIMULATED VEGETATION STRUCTURES
A. J. Blanchard and A. K. Fung *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 93-98 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Microwave simulation experiments investigated the radar backscatter response to particular vegetation geometries. The vegetation model is constructed of 3/4 inch schedule 40 PVC

pipe, 3/8 inch wide metal hose clamps, and 1 foot square plywood supports. The rings represent the water laden nodes of the natural vegetation. The clamps were easily moved to different locations on the stalk and thereby simulate vegetation with different nodal spacing. The results indicate that simulated targets offer a variety of experimental advantages when attempting to address the understanding of basic interaction phenomena. The simulation allows independent control of both target and system parameters that have an impact on the understanding process. Targets can be tailored to the theoretical model investigated. ESA

N87-11255# Bern Univ. (Switzerland).
MICROWAVE MODELING OF SNOW AND SOIL
E. Schanda *In* ESA of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 99-110 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Microwave scattering and emission of snow and soil with locally and temporally varying parameters, such as moisture content, surface roughness and subsurface structure, is determined by absorption, surface scattering, and volume scattering. Developments in modeling of microwave scatter. and emission properties of snow and soil are summarized. ESA

N87-11256# National Aerospace Lab., Amsterdam (Netherlands).
SIMULATION OF MULTITEMPORAL SAR IMAGES c32
G. J. L. Nooren *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 111-116 (For primary document see N87-11238 02-43)
(Contract ESA-5777/83-NL-MS)
Avail: NTIS HC A25/MF A01

A method to convert multitemporal real aperture images into SAR-like imagery by modifying side-looking airborne radar imagery through the introduction of more speckle is described. Such imagery was used in experiments in segmentation and classification. The experiments show that while single frequency monotemporal radar data are hardly adequate for these tasks, multitemporal images are useful. ESA

N87-11257# Centre d'Etude Spatiale des Rayonnements, Toulouse (France).
THE EFFECT OF ELECTROMAGNETIC WAVE POLARIZATION ON WAVE ATTENUATION IN A VEGETATION CANOPY [EFFET DE LA POLARISATION D'UNE ONDE ELECTROMAGNETIQUE DANS L'ATTENUATION DE L'ONDE DANS UN COUVERT VEGETAL] c32
A. Lopes and T. Le-Toan *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 117-122 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The extinction coefficient of a radar wave traversing vegetation was modeled as a function of polarization and angle of incidence, using data from scatterometers and laboratory experiments. Results show that HH polarized waves suffer less attenuation than VV, and are more suitable for moisture determination of agricultural soils. Vegetation influence is minimal to 20 degrees of incidence in HH mode, while it is significant in VV. Penetration is greater with HH polarization, so that backscattering is influenced down to soil level. For VV polarization, the upper layer contributes most, so this type of polarization is better to study crops such as wheat, where the ears are of interest. ESA

N87-11258# Universite Catholique de Louvain (Belgium). Lab. de Telecommunications et d'Hyperfrequences.
A TRANSLATION PROPERTY IN ROUGH SURFACE SCATTERING c32
A. Guissard *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 123-125 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A translation property is established for the surface face field at any point of an arbitrary surface and applied to the determination of the far zone field scattered by a random rough surface. It is illustrated by the evaluation of the coherent scattered field and of the effective Fresnel reflection coefficients. It is shown that the coherent field scattered by a rough surface is always specular. This property could significantly simplify scattering calculations from arbitrary rough surfaces. ESA

N87-11259# Wageningen Agricultural Univ. (Netherlands). Dept. of Land Surveying and Remote Sensing.
EXPERIMENTS ON MODELING RADAR BACKSCATTER OF FOREST STANDS AND RESEARCH ON CLASSIFICATION c32
D. H. Hoekman *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 127-132 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Radar signatures of forest stands were measured at L and C-band with an airborne multiband scatterometer. Comparison of results with X-band data of the same site shows that radar backscatter levels of coniferous trees increase with increasing wavelength with respect to deciduous trees. At C-band the levels compare. Directional variations of the radar return of two forest stands were investigated. An experiment with big corner reflectors on the forest floor studied the attenuating properties of the forest canopy. At X-band, crowns of deciduous and coniferous trees show high attenuation factors. The attenuation of the canopy as a whole seems to be dominated by canopy architecture and aspect of measurement. Detection probabilities as a function of corner-background ratio are given. ESA

N87-11260# Texas Univ., Arlington. Wave Scattering Research Center.
SPACEBORNE SAR DEPOLARISATION AMBIGUITIES c32
A. J. Blanchard and D. Lukert *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 133-136 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The effect of radar system artifacts on the quality of measured cross polarization was studied for systems which utilize Doppler processing, specifically SAR. Results show that the same conditions regarding antenna polarization are required to recover high quality depolarization data for the SAR system, as the stationary system. There must be sufficient isolation between polarization channels to keep the like polarized scatter from feed into the cross polarized channel. There are additional requirements placed on aliased effects to reduce the effect of like polarized feedthrough into the aliased pulse. Since this effect is transformed to an azimuth position not associated with the resolution cell under consideration, it is more difficult to associate this effect with scattering processes attributed to that cell. ESA

N87-11261# Centre National d'Etudes Spatiales, Toulouse (France).
WIND TUNNEL INVESTIGATION OF THE CHARACTERIZATION OF RADAR BACKSCATTERING BY DIFFERENT WAVE FIELDS [ETUDE EN SOUFFLERIE DE LA CARACTERISATION DE LA RETRODIFFUSION RADAR PAR DIFFERENTS CHAMPS EN VOGUE] c32
A. Liefermann, A. Ramamonjiarisoa, and B. Jahne (Heidelberg Univ., West Germany) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 137-140 In FRENCH Sponsored by CNES, GRGS, and Inst. Francais de la Recherche pour l'Exploitation de la Mer (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The motion phases of waves and sea swell that contribute to C and K-band reflection of radar waves were investigated in a wind tunnel designed to simulate air-sea interactions. Results at vertical incidence for various swells, water waves, winds, and combinations of wind and swell are presented. A very important

contribution of wave breaking to radar backscattering strength is noted. ESA

N87-11262# National Aerospace Lab., Amsterdam (Netherlands).
A SCENE RADIATION MODEL BASED ON FOUR-STREAM RADIATIVE TRANSFER THEORY
W. Verhoef *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 143-150 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

An analytical four-stream radiative transfer model based on Suits's differential equations is applied to the atmosphere-Earth system to investigate the effects of the atmosphere and the view angle on remotely sensed multispectral radiance data from vegetation canopies. This scene radiation model is composed of two atmospheric layers and one vegetation layer resting on a Lambertian soil, combined by the Adding method. Input data for the model are Elterman's data on atmospheric optical depths, Deirmendjian's phase functions for atmospheric haze, visibility, directions of the Sun and of observation, and canopy parameters of the SAIL vegetation reflectance model, such as leaf area index and the leaf angle distribution. ESA

N87-11263# Texas Univ., Arlington.
SCATTERING MODELS FOR CONIFEROUS AND DECIDUOUS VEGETATION
A. K. Fung and M. F. Chen *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 151-156 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A layer of vegetation is modeled as a layer of needle-shaped or disk-shaped leaves. The scattering properties of both layer types are investigated with and without the presence of an irregular ground interface. The backscattering coefficients as a function of the incidence angle, frequency, polarization, leaf moisture, leaf angular distribution, and leaf size are illustrated. The ground surface roughness and ground moisture effects on the backscattering coefficient are shown to be important at small angles of incidence and remain significant at large angles of incidence for horizontal polarization. ESA

N87-11264# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MODELISATION OF THE OPTICAL SCATTERING BEHAVIOUR OF THE VEGETATION CANOPIES
D. S. Kimes *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 157-163 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The three dimensional model of Kimes (1984) which can treat three dimensional variability in heterogeneous scenes, was used to test and expand physical scattering mechanisms involved in reflectance distribution dynamics by analyzing modeling and field data. The major physical phenomena causing the directional scattering behavior of vegetation canopies are presented. These include the strong anisotropic properties of the soil, and the anisotropic scattering properties of the vegetation as described by the phase function of the leaves and the geometric effects caused by vertical layers of leaves. This knowledge serves as a basis for defining optimum directional view angles for remote sensing strategies. An example on using knowledge of the scattering behavior of vegetation to develop techniques for extracting vegetation parameters (spectral albedo) from directional reflectance data is presented. ESA

N87-11265# New York State Univ., Binghamton.
ESTIMATION OF CANOPY PARAMETERS FOR ROW-PLANTED VEGETATION CANOPIES FROM REFLECTANCE DATA THROUGH INVERSION OF CANOPY REFLECTANCE DATA
N. S. Goel and T. Grier *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 165-169 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A canopy reflectance (CR) model for row planted vegetation was tested for soybean canopies in three different stages of growth and for corn canopies in two stages of growth. The model fits the field measured bidirectional CR data quite well. It is shown that by inverting this model, the leaf area index and percent ground cover can be estimated quite accurately from measured canopy reflectances. ESA

N87-11266# Commissariat a l'Energie Atomique, Algiers (Algeria).
MODELING OF THE RELATION BETWEEN AIR TEMPERATURE AND SURFACE TEMPERATURE FOR THE SPATIAL EXTENSION OF SURFACE PARAMETER ANALYSIS MODELS [MODELISATION DE LA RELATION TEMPERATURE DE L'AIR/TEMPERATURE DE SURFACE EN VUE DE L'EXTENSION SPATIALE DES MODELES D'ANALYSE DES PARAMETRES DE SURFACE] c47
A. Abdellaoui *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 171-174 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A semiempirical model using measurements of average, minimum, and maximum temperatures was applied to in situ measurements of the air-surface interface. Results show that the daily dynamics of atmospheric temperature can be generated from the daily dynamics of surface temperature with an absolute maximum error of less than 3 deg. ESA

N87-11267# Centre National de la Recherche Scientifique, Montpellier (France). Lab. d'Ecophysiologie.
EFFECT OF ARCHITECTURAL PARAMETERS AND RADIATIVE CONDITIONS ON THE REMOTE SENSING OF THE LEAF INDEX OF VEGETATION CANOPIES [EFFET DES PARAMETRES ARCHITECTURAUX ET DES CONDITIONS RADIATIVES SUR LA TELEDETECTION DE L'INDICE FOLIAIRE DE COUVERTS VEGETAUX]
J. Dauzat *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 175-178 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A probabilistic radiative transfer model was used to study factors affecting the reflectance of vegetation canopies. It is shown how a leaf area index, practically independent of leafiness and Sun elevation can be established with a three channel radiometer (SPOT satellite type). ESA

N87-11268# Arizona Univ., Tucson. Dept. of Soil and Water Science.
RECONSTRUCTION OF VEGETATION SPECTRA FROM SOIL PLANT CANOPIES
A. R. Huete *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 179-182 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A spectral reconstruction technique was utilized to invert soil-plant canopy reflectances into soil and vegetation component spectra. Canopy spectra were decomposed into abstract eigenspectra, representing unique canopy reflecting components. The eigenspectra were transformed into canopy constituent spectral signatures through a least-squares target testing procedure based on bare soil and full-green canopy endmember spectra. Soil-plant canopy mixtures with different soil backgrounds and plant densities were decomposed and vegetation spectra were successfully reconstructed. It is found that in addition to a unique vegetation component, there exists an interactive soil-plant composite component. ESA

N87-11269# Canada Centre for Remote Sensing, Ottawa (Ontario).
GEOMETRIC MODEL SIMULATIONS OF CONIFER CANOPY REFLECTANCE
F. Cavayas and P. M. Teillet *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 183-189 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A mathematical model to predict the spectral signature of forested terrain as a function of simple canopy parameters, solar illumination geometry, and topography was developed. Basic elements of the forest model are presented, together with simulation results for the reflective spectral bands of the Landsat Thematic Mapper. The model retains basic concepts of the model of Strahler and Li and is also based on the principal of composite spectral signatures. For certain cases of population density and solar zenith angle, the simulation results show very significant changes in pixel reflectance as a function of terrain slope and aspect. ESA

N87-11270# Centre National d'Etudes Spatiales, Toulouse (France). Lab. d'Etudes et Recherches en Teledetection Spati
INFLUENCE OF TOPOGRAPHY AND THE ATMOSPHERE ON RADIOMETRIC MEASUREMENTS IN MOUNTAINOUS REGIONS: TESTS OF A SIGNAL INVERSION MODEL ON LANDSAT THEMATIC MAPPER (TM) DATA [INFLUENCE DE LA TOPOGRAPHIE ET DE L'ATMOSPHERE SUR LES MESURES RADIOMETRIQUES EN REGION MONTAGNEUSE: TEST D'UN MODELE D'INVERSION DU SIGNAL SUR DES DONNEES TM]
C. Proy and C. Leprieur *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 191-197 In FRENCH; ENGLISH summary (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Superposition of a digital terrain model on a Landsat image of the Pyrenees mountains was used to study altitude and exposure effects on the radiometry of each pixel and to assess correction methods. The influence of direct illumination, diffuse anisotropic illumination, and local relief was studied. A method for estimating atmospheric functions from image data was derived. The estimates are used in an inversion model that successively integrates the corrections. ESA

N87-11271# Tel-Aviv Univ. (Israel).
REFLECTIVITY CONTRAST OF FORESTED SLOPES WITH SNOW-COVERED GROUND
J. Ottermann and K. Staenz (Zurich Univ. (Switzerland).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 199-203 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Explicit expressions for the bidirectional reflectivities of terrain with very bright soil and dark trees were developed. The trees are represented as nonreflecting vertical cylinders and quantitatively described by the protrusion parameter (the sum of the products diameter times height over a unit area). The bidirectional reflectivity of the surface is formulated in terms of the reflectivity of the soil plane, considering the obscuration by the dark trees of the direct solar beam and of the radiation pencils reflected from the soil plane. Contrast ratio between the Sun-facing slope and the back slope for forested areas with snow on the ground is analyzed. The results are presented as graphs showing the contrast ratio variability as a function of the illumination and viewing geometry. The effects of finite thickness of the vertical cylinders to the bidirectional reflectivity are also analyzed. ESA

N87-11272# Nottingham Univ. (England). Dept. of Geography.
THE PHYSICAL AND PHYSIOLOGICAL INTERPRETATION OF VEGETATION SPECTRAL SIGNATURES
M. D. Steven *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 205-208 Sponsored by UK Agriculture and Food Research Council (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The near-infrared to red spectral ratio is investigated as a measure of the determinants of primary productivity. Good relationships are found with light interception except when the concentration of chlorophyll varies in leaves. When there is a corresponding variation in efficiency, spectral indices may give a direct measure of productivity. However, chlorophyll varies with applied nitrogen without any effect on efficiency and the indices overpredict differences in productivity. With water stress, variations in efficiency occur without affecting the spectral response and the indices underpredict differences in productivity. Spectral vegetation indices may be used to measure potential productivity, and separate data on stresses are required to assess the limits to that potential. ESA

N87-11273# Institut National de la Recherche Agronomique, Paris (France). Station de Bioclimatologie.
DESCRIPTION OF CROP GEOMETRY, RESTRICTED TO PARTS VIEWED [DESCRIPTION DE LA GEOMETRIE D'UNE CULTURE AVEC RESTITUTION AUX PARTIES VUES]
P. Boissard *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 209-212 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A photogrammetric method for geometric description of the spatial arrangement of plant leaves, stems, and tops was developed. It is a nondestructive, instantaneous method (photography), well suited to heterogeneous canopies like young crops or row structures. The method is illustrated by an example of manual stereoplotting on a maize canopy using a 5 cm contour-interval; and a directional azimuth analysis of highest layer leaves of the same canopy. ESA

N87-11274# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
IMAGING SPECTROMETRY: PAST, PRESENT, FUTURE
M. J. Abrams and A. F. H. Goetz *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 215-218 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Imaging spectrometry for the remote sensing of the Earth from aircraft and satellites is discussed. Results with an aircraft instrument show that remote, direct identification of surface materials is possible. The airborne and spaceborne sensors can acquire images in 100 to 200 spectral bands. The next generation aircraft scanner (AVIRIS) is expected to be operational in 1987. Plans are underway for a Shuttle instrument (SISEX) to fly in 1991. ESA

N87-11275# Institute of Ocean Sciences, Sidney (British Columbia).
DEVELOPMENT OF AN IMAGING OPTICAL SPECTROMETER FOR OCEAN AND LAND REMOTE SENSING c35
J. F. R. Gower, G. A. Borstad, and A. B. Hollinger (Moniteq Ltd., Concord (Ontario).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 219-225 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

To meet the requirements of improved optical land and sea imaging, particularly ocean and coastal chlorophyll fluorescence mapping, an airborne imaging spectrometer called Fluorescence Line Imager was designed and constructed. Results give insights into optical imaging of water color patterns. Examples of the image and spectral data are given. Technical problems and advantages associated with this type of instrument design, and benefits and opportunities for putting such an instrument into space are discussed. ESA

N87-11276# Centre National d'Etudes Spatiales, Toulouse (France).
HIGH-SPECTRAL RESOLUTION REMOTE SENSING INSTRUMENTS DEVELOPED AND UNDER DEVELOPMENT AT CNES
c35
P. Vermande *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 227-232 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The operating principles of a field spectroradiometer are outlined and spectral signatures obtained are shown. A spectro-imager potentially for use on board a satellite is presented. Spectral analysis is performed by interferometry. The capability for detecting low radiance levels is considerbly better than in the case of dispersive instruments and the nature of the output data more amenable to processing in a wide variety of ways. ESA

N87-11277# Canada Centre for Remote Sensing, Ottawa (Ontario).
NARROW-BAND MULTISPECTRAL IMAGERY OF THE VEGETATION RED REFLECTANCE EDGE FOR USE IN GEOBOTANICAL REMOTE SENSING
R. P. Gauthier and R. A. Neville *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 233-236 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The MEIS 2, an airborne pushbroom imager having high sensitivity and high spatial resolution, provided narrow band (3 nm) imagery over areas of geological interest in Canada. Six spectral passbands were selected at wavelengths in the spectral range 680 to 800 nm to resolve the vegetation red reflectance edge. The imagery obtained in these bands was processed to give spectral reflectances. Problems in geobotanical remote sensing to be solved are discussed. A linear model for producing imagery of parameters which characterize the red reflectance edge is introduced. ESA

N87-11278# Institut National de la Recherche Agronomique, Avignon (France).
UTILIZATION OF HIGH SPECTRAL RESOLUTION TO MONITOR THE EVOLUTION OF WHEAT CROPS [UTILISATION DE LA HAUTE RESOLUTION SPECTRALE POUR SUIVRE L'EVOLUTION DE COUVERTS DEBLE]
I. Champion, F. Baret, G. Guyot, and A. Podaire (Centre National d'Etudes Spatiales, Toulouse (France).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 237-240 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The evolution of the reflectance spectra of 16 plots of wheat (4 types sown at 4 different dates) was followed throughout a growth cycle by a high spectral resolution spectroradiometer (1024 bands between 468.5 and 1064 nm). Results show that utilization of narrow spectral bands provides more information than the traditional wide bands. The inflection point on the reflectance curve between 670 and 760 nm and the red dip between 580 and 660 nm provide information on the state of the leaf surfaces and the ratio of ground coverage. A 4 to 5 nm spectral resolution is adequate to reveal the phenomena studied. ESA

N87-11279# Ecole Nationale Superieure de Physique, Strasbourg (France). Groupe de Teledetection.
EMISSIVITY IN THE THERMAL INFRARED: CONDITIONS FOR MEASUREMENT BY BACKSCATTERING AND COMPARISON WITH A PASSIVE MEASUREMENT METHOD [EMISSIVITE DANS L'INFRAROUGE THERMIQUE: CONDITIONS D'UNE MESURE PAR RETRODIFFUSION ET COMPARAISON AVEC UNE METHODE DE MESURE PASSIVE]
F. Becker, F. Nerry, P. Ramanantsizehena, and M. P. Stoll *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 241-244 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Emissivity of bare soils in the spectral band from 8 to 14 nm obtained by backscattering and passive methods are compared. Differences are less than experimental uncertainty. Results using the box method confirm those of the scattering model used in reflectivity calculation. Active remote sensing determination of emissivity from measurements of bidirectional reflectivity in the backscattering direction implies the intervention of a shape factor characteristic of the area observed. Neglect of this factor can cause significant errors in emissivity. ESA

N87-11280# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.
AIRBORNE MEASUREMENTS OF THE SPECTRAL REFLECTANCE OF FRESHWATER ICE
G. A. Leshkevich *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 245-248 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Spectral radiance from open water, old snow, and four freshwater ice types was measured over Saginaw Bay (Lake Huron) from an altitude of 300 m under clear skies. Simultaneous radiance and irradiance measurements were made at (or near) the surface over a reference panel and over the old snow and water. Three measurements were made over each surface type and averaged. After determining the spectral reflectance of the snow and water, an algorithm was applied to calculate the spectral reflectance of the ice types measured from 300 m, corrected for atmospheric attenuation and path radiance. ESA

N87-11281# Department of Civil Engineering, Indore (India).
RADIOMETRIC DATA CHARACTERIZE QUANTIZATION OF SOIL FORMING MINERALS
H. S. Mehta *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 249-251 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Spectral signatures of the soil forming minerals like serpentine, gypsum, clay, quartz, barium sulfate, calcite, dolomite, feldspar, chlorite, biotite, and bentonite were studied. Ground truth was measured by a radiometer compatible to Landsat MSS bands and ISRO model, spectrometer operating in 460 to 1010 nm range with 10 nm spectral resolution, and a spectrophotometer. The spectroradiometer and spectrophotometer data are used to correlate field and laboratory data, respectively. Statistical and graphical analysis of all data show that barium sulfate has the highest spectral reflectance and biotite the lowest. ESA

N87-11282# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
SPECTRAL SIGNATURES OF COASTAL OBJECTS
M. Viollier, T. Belscher, and L. Loubersac *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 253-256 In FRENCH; ENGLISH summary (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Spectral signatures were measured in coastal areas using a high resolution spectroradiometer and a SPOT simulation radiometer. Optical indexes for characterization of seaweeds and strand facies are derived. ESA

N87-11283# Ecole Normale Superieure, Paris (France). Lab. de Geographie.
REFLECTANCE OF STRAND SEDIMENTS: RESULTS OF IN SITU MEASUREMENTS AND A SPOT SIMULATION IN MONT SAINT MICHEL BAY [LES REFLECTANCES DE SEDIMENTS D'ESTRAN: RESULTATS DE MESURE IN-SITU ET D'UNE SIMULATION SPOT EN BAIE DU MONT SAINT-MICHEL]
R. M. Zbinden *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing

Dec. 1985 p 257-263 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The reflectance spectra of sands, dunes, and sediments forming morphosedimentary units typical of strands, identifiable by a SPOT satellite 20 m by 20 m pixel was studied by spectroradiometry. The relations between reflectance, granulometry, surface water content, and sediment calcimetry are shown. Regions where the activity of microalgae mask the signature of fine sediments are revealed. ESA

N87-11284# Oldenburg Univ. (West Germany).
LASER REMOTE SENSING OF THE MARINE ENVIRONMENT: RECENT RESULTS OBTAINED WITH THE OCEANOGRAPHIC LIDAR SYSTEM
D. Diebel-Langhor, T. Hengstermann, and R. Reuter *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 267-272 Sponsored by Commission of the European Communities, Ispra, Italy, Bundesministerium fuer Forschung und Technologie, Bonn, Deutsche Forschungsgemeinschaft, Bonn, and Niedersaechsisches Ministerium fuer Wissenschaft und Kunst, Hannover, West Germany (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A lidar system for research in the coastal zone was developed. Based on spectroscopic methods, data relevant for oceanographic studies and for marine pollution monitoring are obtained. Operated from aircraft, a nearly synoptic investigation of extended areas is achieved. The system was utilized in experiments in the North Sea and the Adriatic. Data on the spectral light turbidity and on the concentration of dissolved organics (Gelbstoff) and chlorophyll-a are reported. By use of nanosec laser pulses and a fast signal receiver depth profiles of the attenuation coefficient down to 6 attenuation lengths were measured. Airborne measurements were performed over marine oil spills. They allow a determination of the oil type, and of the oil film thickness in the micrometer range. ESA

N87-11285# Technische Univ., Munich (West Germany).
THE CO2 LASER IMAGING SPECTROSCOPY FOR EARTH OBSERVATION
F. Lehmann and W. Wiesemann (Battelle Inst., Frankfurt am Main (West Germany).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 273-276 Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Based on the results of CO2-laser laboratory spectroscopy (laser reflection spectroscopy of minerals, soils, rocks, vegetation, moistened surfaces, water, oil spills on water, in the wavelength interval 9.2 to 10.8 microns), and airborne campaigns with the 2-laser profiling instrument DIALEX, a program for the development of an optical multisensor Lidar Multispectral Earth Observation System was started. It combines four CO2-laser imaging spectrometers and an airborne thematic mapper multispectral scanner, to be flown in a Dornier 228 aircraft. ESA

N87-11286# Bern Univ. (Switzerland). Inst. of Applied Physics.
CAN MICROWAVE SIGNATURES BE USED TO RETRIEVE THE WATER EQUIVALENT OF A DRY SNOW PACK?
C. Maetzler *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 277-284 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Based on a long-term program of measuring the interaction of microwaves with the seasonal snow cover at an alpine test site, the potential of microwave remote sensing to retrieve the water equivalent (WE) of the snowpack was tested. For dry winter snow a reasonable estimate is possible for WE less than 80 cm. However, a number of natural disturbances limit this potential. Some changes of the microwave observables can be corrected, others have effects which cannot be determined. It is found that a combination of microwave brightness temperatures tends to enhance the discriminability of dry snow and, simultaneously, cancels effects of the disturbances. This parameter should be used in tests with airborne and satellite data. ESA

N87-11287# Chiba Univ. (Japan). Faculty of Engineering.
IN-VIVO CHLOROPHYLL DETERMINATION OF PLANTS BY LASER-INDUCED FLUOROMETER
K. Takahashi, Y. Emori, Y. Yasuda, and A. Kimura *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 285-288 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Fluorescence spectra of leaves of evergreen and deciduous trees were examined, and the potential of laser induced fluorescence measurement (LIF) in detection of species of trees was assessed. Results show that measurement of LIF of chlorophyll-a in leaves gives a useful means of detecting forest tree information. However, the fluorescence spectra and intensity of the green of of evergreen leaves is not detected by laser at 337.1 nm. Application of LIF to forest trees would not appear to be reliable. ESA

N87-11288# Helsinki Univ. of Technology, Espoo (Finland). Radio Lab.
MICROWAVE SCATTERING LOSS OF DRY SNOW
M. T. Hallikainen *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 289-292 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The extinction coefficient of several snow types at 5 frequencies between 10 GHz and 90 GHz was determined. The temperature of the samples was minus 15 C. Since the dielectric loss of dry snow is low, the extinction coefficient is, in practice, equal to the scattering coefficient. The experimental loss behavior of the samples does not follow the theoretical behavior predicted by Mie theory (assuming spherical snow particles). The measured loss varies substantially depending on the snow type. At 90 GHz maximum and minimum values are 300 dB/m and 15 dB/m, respectively. At 10 GHz the loss is negligible for all snow types. The loss due to surface scattering effects is substantial for refrozen snow at 60 and 90 GHz. ESA

N87-11289# Academia Sinica, Guiyang (China). Inst. of Geochemistry.
MICROWAVE DIELECTRIC PROPERTIES OF MINERALS AND ROCKS
Jin-kai Xiao *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 293-296 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The resonant cavity perturbation method at 9.4 GHz was used to measure the dielectric constants of minerals and rocks. Dielectric properties of the minerals and rocks are summarized. The effects of composition, moisture, and other factors on dielectric properties are discussed. Application of dielectric constant to microwave remote sensing and the correlation between the dielectric constant of the geological objects and the gray-scale values of the SIR-A image are analyzed. ESA

N87-11290# Centre National d'Etudes Spatiales, Toulouse (France).
MICROWAVE SIGNATURES OF SEA ICE IN THE FRAM STRAIT (GREENLAND) IN SUMMER [SIGNATURES MICRO-ONDES DE LA GLACE DE MER EN ETE DANS LE DETROIT DE FRAM]
N. Lannelongue and C. Schgounn *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 297-301 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The backscattering coefficient of sea ice was measured at ground level in summer at null incidence by a scatterometer at 13.6 GHz. Results show that the backscattering coefficient follows variations in air temperature. For oblique angles (less than 30 deg) the backscattering coefficient increases with crystal diameter. At these incidences, old ice and first year ice can be distinguished. ESA

N87-11291# Quebec Univ., Chicoutimi. Lab. de Physique Atmospherique.
ANEMOTHERMOGRAPHIC REMOTE SENSING USING AIRBORNE SENSORS: A NEW METHOD OF MICROMETEOROLOGICAL CARTOGRAPHY [LA TELEDETECTION ANEMOTHERMOGRAPHIQUE PAR CAPTEUR AEROPORTE: UNE NOUVELLE METHODE DE CARTOGRAPHE MICROMETEOROLOGIQUE]
R. Verreault, G. Vachon, G. H. Lemieux, M. Labonte, and S. Perron *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 303-306 In FRENCH Sponsored by Institut Scientifique du Saguenay, Canada, and Quebec Government's Fonds pour la Formation de Chercheurs et l'Aide a la Recherche, Canada (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A method for measuring atmospheric circulation in the atmospheric boundary layer was developed. It uses night time aerial photography by flash lamp at altitudes up to 2500 m. A network of analogical and/or digital transducers measures other meteorological parameters such as surface and atmospheric temperature and moisture content. Anemography was used to study circulation during a temperature inversion at night in an orchard featuring radiative freezing. ESA

N87-11292# Arizona Univ., Tucson. Optical Sciences Center.
ABSOLUTE CALIBRATION OF REMOTE SENSING INSTRUMENTS c35
S. F. Biggar, C. J. Bruegge, B. A. Capron, K. R. Castle, M. C. Dinguirard, R. G. Holm, L. J. Lingg, Y. Mao, J. M. Palmer, A. L. Phillips et al *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 309-314 Sponsored by NASA (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Source-based and detector-based methods for the absolute radiometric calibration of a broadband field radiometer are described. Using such a radiometer, calibrated by both methods, the calibration of the integrating sphere used in the preflight calibration of the Thematic Mapper was redetermined. The results are presented. The in-flight calibration of space remote sensing instruments is discussed. A method which uses the results of ground-based reflectance and atmospheric measurements as input to a radiative transfer code to predict the radiance at the instrument is described. A calibrated, helicopter-mounted radiometer is used to determine the radiance levels at intermediate altitudes to check the code predictions. Results of such measurements for the calibration of the Thematic Mapper on Landsat 5 and an analysis that shows the value of such measurements are described. ESA

N87-11293# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
ATMOSPHERIC EFFECTS IN REMOTE SENSING: A PROGRAM TO SIMULATE SATELLITE SIGNALS IN THE SOLAR SPECTRUM [EFFECTS ATMOSPHERIQUES EN TELEDETECTION: LOGICIEL DE SIMULATION DU SIGNAL SATELLITAIRE DANS LE SPECTRE SOLAIRE]
D. Tanre, C. Deroo, P. Dahaut, M. Herman, J. J. Morcrette, J. Perbos, and P. Y. Deschamps *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 315-319 In FRENCH Sponsored by CNRS, CNES, and ESA (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A computer program which simulates atmospheric radiation effects on satellite tracking signals and data from satellites was developed. The program enables the signal measured at the sensor to be estimated. It takes into account surface reflectance and the effects of the double transversing of the atmosphere: Sun-surface and surface-satellite. Atmospheric absorption and scattering are included. ESA

N87-11294# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
THE FIRST INTERNATIONAL SATELLITE LAND-SURFACE CLIMATOLOGY PROJECT (ISLSCP) FIELD EXPERIMENT (FIFE)
T. J. Schmugge and P. J. Sellers *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 321-325 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The International Satellite Land Surface Climatology Project (ISLSCP) will verify the use of satellite data for the estimation of land-surface properties through field experiments using point measurements on the ground and areal measurements from aircraft overflights. In addition to validating satellite estimates of surface properties, it studies approaches for obtaining areal averages of the radiation, moisture and heat fluxes made using remotely sensed data. The procedure suggested combines the surface point measurements of the fluxes with the aircraft areal observations using a surface energy balance model to interpolate between the point estimates of these fluxes and calculate area-averaged quantities. The surface parameters to be estimated from aircraft observations include: surface radiation temperature, albedo, land cover or vegetation index, and surface soil moisture (the latter to be obtained using passive and active microwave approaches). The area-averages of the surface properties are compared with satellite data where possible. The First ISLSCP Field Experiment is planned for 1987 at a site having relatively uniform vegetation cover in the central great plains of the USA. for 1987 at a site having relatively uniform vegetation cover in the central great plains of the USA. ESA

N87-11295# Scripps Institution of Oceanography, La Jolla, Calif.
CALIBRATION OF GOES-5 AND GOES-6 VISSR/VAS SHORT-WAVELENGTH CHANNELS c35
R. Frouin and C. Gautier *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 327-333 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The GOES-5 and GOES-6 VISSR/VAS short wavelength channels are calibrated for the periods from October 1983 through July 1984 (GOES-5) and from October 1983 through January 1985 (GOES-6). The White Sands Monument area in New Mexico and space are used as calibration targets. The radiance directed to the satellite from the surface target is computed using a radiative transfer model. Measured surface and atmospheric properties are used as input to the model. The coefficients relating the brightness count (CN) to the incident radiance R (R=aC-Nsq+b) are found to vary little (10%) from the mean values for the entire study periods, indicating the good behavior of the instruments in orbit. The mean values are 0.0083 W/sqm/sr/micron (GOES-5) and 0.0089 W/sqm/sr/micron (GOES-6) for a; and -5.2 (GOES-5) and -7.1 (GOES-6) for b. ESA

N87-11296# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
PRELIMINARY RESULTS OF A QUANTITATIVE COMPARISON OF THE SPECTRAL SIGNATURES OF LANDSAT THEMATIC MAPPER (TM) AND MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER (MOMS).
J. Bodechtel (Technische Univ., Munich (West Germany).), J. Zilger, and V. V. Salomonson *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 335-341 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

Operationally acquired Thematic Mapper and experimental MOMS-01 data are evaluated quantitatively concerning the systems spectral response and performance for geoscientific applications. Results show the two instruments to be similar in the spectral bands compared. Although the MOMS scanner has a smaller IFOV, it has a lower modulation transfer function performance for small, low contrast features as compared to Thematic Mapper. This deficiency does not only occur when MOMS was switched to the low gain mode. It is due to the CD arrays used (ITEK CCPD 1728). ESA

N87-11297# Wageningen Agricultural Univ. (Netherlands). Dept. of Land Surveying and Remote Sensing.

MULTISPECTRAL AERIAL PHOTOGRAPHY YIELDING WELL-CALIBRATED REFLECTANCE FACTORS WITH HIGH SPECTRAL, SPATIAL AND TEMPORAL RESOLUTION FOR CROP MONITORING

J. G. P. W. Clevers *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 343-346 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

An airborne multispectral photographic system was designed for crop monitoring. Spectral resolution is: 555 to 580 nm (green), 665 to 700 nm (red) and 840 to 900 nm (infrared). Equipment which was easily available and relatively inexpensive was used, resulting in a high temporal resolution (fortnightly). Using a densitometer with an aperture of 0.25 mm diameter, results in a high spatial resolution (3.14 sqm at scale 1:8000 and 0.44 sqm at 1:3000). With low altitude multispectral photography, reference targets were set up in the field for obtaining calibrated spectral data of crops. High temporal and spatial resolution requirements were satisfied by aerial photography. Results prove the validity of the applied procedure for atmospheric correction and radiometric calibration, resulting in information about crops with larger precision than by conventional field sampling methods. ESA

N87-11298# Technische Univ., Munich (West Germany). Faculty of Geosciences.

CALIBRATION OF MODULAR OPTOELECTRONIC MULTISPECTRAL SCANNER CHARGED COUPLE DEVICE (MOMS-CCD) DATA AND QUALITATIVE TEST USING THEMATIC MAPPER (TM) DATA **c35**

J. Henkel and H. Kaufmann (Karlsruhe Univ. (West Germany).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 347-350 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

Relative and absolute radiometric calibration of MOMS-CCD-Data are demonstrated using a part of an image near Nakuru, Kenya. Preflight calibration data are used for the absolute correction, variance and mean value for relative correction. Landsat-TM Data of the same region are chosen for comparison. To test different sensor data ratio, principal component analysis is applied. ESA

N87-11299# Bern Univ. (Switzerland). Inst. of Applied Physics.

CALIBRATED MICROWAVE SIGNATURE MEASUREMENTS OF SOIL AND WHEAT

R. Hueppi, E. Stotzer, and E. Schanda *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 351-355 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

Emissivities and backscattering coefficients of cultivated fields were measured with a truck-mounted radiometer-scatterometer. The seven channel radiometer works from L to X band with simultaneous H and V polarization and at various nadir and azimuth angles. The noise scatterometer, using the radiometer as receiving part, is designed for like and cross polarization measurements. The microwave signatures are correlated with soil and vegetation parameters. These parameters include soil moisture, dielectric constant and state of growth. Results for bare soil and for wheat are presented. ESA

N87-11300# Stockholm Univ. (Sweden). Dept. of Physical Geography.

A COMPARISON BETWEEN LANDSAT-THEMATIC MAPPER (TM) DATA AND GROUND MEASURED RADIANCE AND SOIL DATA

B. Lunden and E. Fagerlund *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 357-360 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

In order to evaluate Landsat-TM radiance data for bare soils in an agricultural area in central Sweden, a satellite registration was compared with black and white IR air photo densities, field measured radiance data (0.4 to 1.1 microns) and soil data (water content, humus content and grain size distribution) from the same 24-hr period. By means of an air photo, the TM pixels were positioned for comparisons with field data. When comparing satellite data with air photo densities, correlation factors ($r = R_{xy}$) from 0.87 to 0.90 are obtained and with the radiometer data from 0.82 to 0.84. Correlation between TM data and soil water content, the best correlated soil parameter, varies from -0.86 for band 7 to -0.89 for band 2. ESA

N87-11301# Joint Research Centre of the European Communities, Ispra (Italy).

ANALYSIS OF MULTILEVEL MEASUREMENTS OF SPECTRAL SIGNATURES FOR LESS-FAVORED AREAS

G. Marrachi, G. Andreoli, P. Grassi, B. Hosgood, and M. Verbrugghe *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 361-363 (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

The role of remote sensing in economically less-favored areas was studied using spectral signatures measured in situ; airborne radiometer data; and thematic mapper satellite data. Data analysis reveals the difficulties in comparing space and ground data owing to the heterogeneity of the spatial element from which they derive. The spectral signature concept is quite well defined at ground level while the spatial averaging effect becomes more important from higher view level (500 m) up to satellite level at which the effect due to mixed pixels can completely alter the results. The analysis is intended to provide the limits of a reliable classification based on spectral signatures. An attempt to develop the analysis on a multitemporal scale is described. ESA

N87-11302# Universite de Bretagne Occidentale, Brest (France). Lab. d'Oceanographie Physique.

AVHRR DATA PROCESSING FOR UTILIZATION IN DYNAMICAL OCEANOGRAPHY **c48**

V. Mariette and V. Verbeque *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 365-369 Sponsored by CNRS and Inst. Francais de la Recherche pour l'Exploitation de la Mer (For primary document see N87-11238 02-43)

Avail: NTIS HC A25/MF A01

Infrared satellite imagery was compared with an oceanographic cruise in tidal seas. The AVHRR data of NOAA7 geometrically corrected and registered with regard to a Mercator projection were calibrated to obtain sea surface temperature (SST) using a combination of the 11 and 12 micron channels. Analyses of satellite data show that, during the night, the bias is small (0.2 C). In the day time, despite the same pattern for the dynamical structure, SST given by satellite is higher than measured in situ by 1.5 C. To explain these differences, the influence of the energy budget at the air-sea interface upon the upper layer of the ocean was studied. Rather than the use of SST images for the study of evolution of the frontal areas in tidal seas, thermal gradient image analysis is proposed. ESA

N87-11303# Scripps Institution of Oceanography, La Jolla, Calif.
DOWNWARD LONG-WAVE IRRADIANCE AT THE OCEAN SURFACE USING SATELLITE DATA c48
C. Gautier and R. Frouin *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 371-374 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Two methods to estimate the downward longwave irradiance at the ocean surface from a radiative transfer model and satellite observations were developed. Both are based on physical radiative modeling of the longwave radiation in the atmosphere and on satellite observations of atmospheric profiles and clouds. While the radiative effects of clouds are explicitly taken into account in method A, they are only parameterized in method B. The two methods were tested by comparing satellite estimates with surface mesurements made during MILDEX (Oct-Nov 1983). For method A, the correlation coefficient (r) and the standard error (se) are: 0.69 and 23 w/sqm for half-hourly averages and 0.73 and 18 w/sqm for daily averages. For method B, r = 0.58 and se = 24.9 w/sqm for half-hourly averages and 0.53 and 21.7 w/sqm for daily averages. ESA

N87-11304# Sherbrooke Univ. (Quebec).
VARIATION OF ATMOSPHERIC EFFECTS ON MEASURED RADIANCE AS A FUNCTION OF IMAGING ALTITUDE [VARIATIONS DES EFFECTS ATMOSPHERIQUES SUR LES RADIANCES MESUREES EN FONCTION DE L'ALTITUDE DE PRISE DE VUE]
A. Royer, F. Nerry, P. Teillet (Canada Centre for Remote Sensing, Ottawa (Ontario).), and S. Till *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 375-381 In FRENCH (For primary document see N87-11238 02-43)
(Contract CNRC-OSU83-0094))
Avail: NTIS HC A25/MF A01

The effects of atmospheric scattering in the visible and near infrared wavebands on the radiance of water measured by remote sensing were analyzed using data from 3 overflights of the MEIS-2 pushbroom imager at different altitudes. It is shown that over continents, taking into account a vertical aerosol profile according to an exponential law defined by two parameters, the volume reflectance of water for each altitude produces equal values. In marine environment, a law of variation of the optical thickness of aerosols in proportion to altitude, defined by one parameter, enables the volume reflectance of water for each altitude to be evened out to within 0.05%. The method can provide accurate analyses for operational applications to image correction without ground measurements during overflights. ESA

N87-11305# Rijkswaterstaat, The Hague (Netherlands). Survey Dept.
AN ATMOSPHERIC CORRECTION METHOD USING GUZZI-SPECTRORADIOMETER INPUT DATA
L. M. M. Veugen and H. T. C. vanStokkom *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 383-388 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

An atmospheric correction method using input data of a Guzzi-spectroradiometer is presented. The data consist of global and diffuse irradiance data in nine wavelength intervals in the visible and near infrared. The irradiance data are transformed to aerosol spectral optical thicknesses using the model presented in Stokkom and Guzzi (1984). A linear inversion procedure makes possible the computation of the size distribution of the local aerosols. This distribution is used as input for the direct calculation of the transmittances at the wavelength bands of the remote sensor, and for the computation of the aerosol phase function. Together with the known Rayleigh phase function, the diffuse irradiance at the remotely sensed object and the path radiance at the satellite borne sensor are obtained using a Sobolev modified approximate radiative transfer model (SMART-model). ESA

N87-11306# Nottingham Univ. (England). Dept. of Geography.
ESTIMATION OF ATMOSPHERIC CORRECTIONS FROM MULTIPLE AIRCRAFT IMAGERY
M. D. Steven and E. M. Rollin *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 389-392 Sponsored by UK Natural Environment Research Council (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Multiheight measurements from aircraft are used to estimate atmospheric transmittance and path radiance using the known dependence of transmittance on path length. Multiangle measurements from overlapping scans were also applied, but the difference of path lengths offered by the range of scanner angles was insufficient to determine the parameters with accuracy especially with the uncertainties introduced by non-Lambertian reflection. The atmosphere is not horizontally homogeneous in the presence of cloud and even on cloudless days variations in optical depth can occur in dense haze. The variations have a coherent spatial distribution which can be applied to distinguish zones of different atmospheric characteristics. ESA

N87-11307# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MICROWAVE SENSING OF ATMOSPHERIC WATER USING THE FUTURE AMSU SYSTEM
G. Szejwach, I. Jobard (Ecole Polytechnique, Palaiseau (France).), and O. Z. Zaniffe *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 393-396 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Microwave radiances for various conditions of atmospheric temperature, moisture and cloudiness at the frequencies of the AMSU passive sounder system were computed. Results emphasizing precipitating cases are presented. Results from a parameterization scheme to infer total cloud liquid content as well as precipitable water over the ocean are also presented. ESA

N87-11308# Academia Sinica, Guiyang (China). Inst. of Geochemistry.
SPECTRAL STUDY OF ROCKS AND SOME IRON DEPOSITS FROM EASTERN CHINA
Bai-lin Yang and Xuan Ding *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 399-402 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Iron deposits and related rocks from Eastern China are measured to acquire visible and near infrared reflection and infrared absorption spectra on powders and natural outcrops. The study shows that spectral features are related with chemical and mineral compositions of rocks and ores. The absorption bands are caused by H2O and OH (1-) at 1400, 1900, and 2200 nm; CO3 (2-) causes the spectral band at 2300 nm. The absorption bands near 900 and 1100 nm are caused by Fe (3+) and Fe (2-). Infrared spectra of rock alteration products show that kaolinite, quartz, and albite are spectrally sensitive. The typemorphic band of kaolinite is 915 nm. Quartz displays a well-defined double band at 800 and 780 nm, and albite associated absorption spectra (784, 758, 740, and 720 nm). ESA

N87-11309# Research Center Graz (Austria).
SPECTRAL ANALYSIS OF A HEAVY METAL-STRESSED FOREST CANOPY USING LANDSAT TM DATA
C. Banninger *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 403-407 Sponsored by ESA (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Landsat Thematic Mapper (LTM) data acquired in the spring over a metal-stressed coniferous tree stand were used to evaluate their usefulness in detecting geobotanical anomalies associ-

ated with high concentrations of heavy metals in the underlying soil, and to ascertain which ground parameters exert the greatest influence on the recorded data. Thematic Mapper bands 4 and 5, simple band ratio (R41), normalized difference (ND1), first principal component (PC1), band differences (BD1, BD2, and BD3), and the green and brightness indices (TMG and TMB) best discriminate copper-lead-zinc related stress conditions in a spruce tree stand of 30 TM spectral bands and transformations are evaluated. Overall, ND1 and BD1 are the most useful for detecting heavy metal stress in coniferous forests, followed closely by TMG, R41, and BD3.
ESA

N87-11310# Institut National de la Recherche Agronomique, Avignon (France). Dept. de Bioclimatologie.
INVESTIGATION OF THE COMPLEMENTARITY OF THE MIDDLE INFRARED WITH THE VISIBLE AND NEAR INFRARED SPECTRA FOR VEGETATION MONITORING [ETUDE DE LA COMPLEMENTAIRE DU MOYEN INFRAROUGE AVEC LE VISIBLE ET LE PROCHE INFRAROUGE POUR LE SUIVI DE LA VEGETATION]
F. Baret, G. Guyot, A. Begue, P. Maurel, and A. Podaire (Centre National d'Etudes Spatiales, Toulouse (France).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 409-412 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01
The advantages of adding a mid IR channel to the visible and near IR ones of the SPOT satellite for vegetation monitoring were assessed by testing the 1660 to 1695, 1560 to 1685, and 2030 to 2235 nm bands (close to Landsat Thematic Mapper 5 and 7 bands). The 1560 to 1685 nm band provides most information. However, vegetation moisture supply has little influence on the spectral response of canopies in this band. The band is most sensitive to surface optical properties (influenced by soil moisture content) governed by leafiness for a given leaf area index. Canopies with different geometrical structures can be distinguished. ESA

N87-11311# Hunting Geology and Geophysics Ltd., Boreham Wood (England).
AN INVESTIGATION OF SPECTRAL SIGNATURES FROM MINERALISED ROCK OUTCROP AS DEFINED BY AIRBORNE TM DATA OF THE SAUDI ARABIAN SHIELD
A. C. Bird, G. R. Garrard, A. R. Iles, W. P. Loughlin, M. A. Tawfiq, and C. A. Legg *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 413-417 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01
Mineral exploration test sites were selected from an airborne thematic mapper data set covering 30,000 sq km of the Saudi Arabian Shield. In order to study the 11 waveband characteristics of the data, a variety of surface materials was selected from each of 4 test sites and average DN values extracted. The results are presented in tables that rank the surface materials in order of brightness and in graphs that present normalized radiance curves. The tables and graphs aid selection of color composites for discriminating materials. It is also possible to suggest more complex processes that would be useful for the interpretation of the data. The results support the band combination selected for the existing hard copy. ESA

N87-11312# Paris VI Univ. (France). Lab. de Mineralogie et Cristallographie.
EVALUATION OF SPOT FOR MAPPING SEDIMENTARY AND VOLCANIC ROCKS [EVALUATION DE SPOT PUR LA CARTOGRAPHIE DE ROCHES SEDIMENTAIRES ET VOLCANIQUES]
B. Cervelle, J. Chorowicz, L. Epiard-Moreau, J. P. Rudani, and A. Bothorel *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 419-423 In FRENCH Sponsored by SPOT IMAGE, and CNES, Toulouse, France (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01
A SPOT satellite simulation in the Coconino plateau (Arizona) determined the spectral signatures of sedimentary and volcanic rocks from three types of data: laboratory spectra from samples taken from outcrops; ground radiometric measurements in the three SPOT bands; and airborne radiometry data from eight bands, including the thermal infrared. Comparisons show that the SPOT bands cannot identify the lithologies directly (except for hematite soils) but can only differentiate them with respect to known, calibrated zones. The SPOT spatial resolution greatly increases the chances of obtaining petrologically homogeneous pixels. Analysis of airborne data reveals the utility of adding a 1.6 or 2 micron, or thermal, band. ESA

N87-11313# Centre National de la Recherche Scientifique, Montpellier (France). Centre Emberger.
ANALYSIS OF SPOT SIMULATION RADIOMETRIC MEASUREMENTS IN ARID AND SUBHUMID MEDITERRANEAN ENVIRONMENTS [ANALYSE DE MESURES RADIOMETRIQUES DE SIMULATION SPOT EN MILIEUX MEDITERRANEENS ARIDE ET SUB-HUMIDE]
B. Lacaze, L. Lahraoui, G. Debussche, and A. Khelfa *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 425-428 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01
Ground and airborne radiometric measurements were carried out in Mediterranean regions to simulate SPOT satellite performance. Results for the three SPOT channels for the reflectance of the dominant vegetation species are presented. Large scale spatial structure and the average spectral response of the vegetation are revealed. ESA

N87-11314# Agricultural Univ., Poznan (Poland).
RELATION BETWEEN SOIL MOISTURE TENSION AND SPECTRAL REFLECTANCE OF DIFFERENT SOIL IN VISIBLE AND NEAR-INFRARED RANGE
J. Cierniewski *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 429-432 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01
Laboratory spectrophotometrical measurements from 440 to 860 nm were used to determine the mathematical relation between soil water tension and spectral reflectance of bare soils. They were conducted on samples belonging to initial loose denudative soils, typic and eroded gray brown podsolic soils, and typic and degraded black earths. Each of the 88 analyzed soil samples was tested in 12 different moisture conditions from 0 to 7 pF. The discussed relation was described by quadratic equations. Using the relative spectral reflectance coefficient makes possible the practical elimination from this relation of the influence of the soil texture and soil genesis. ESA

N87-11315# Sheffield Univ. (England). Dept. of Geography.
CHARACTERISING VEGETATED SURFACES WITH AIRBORNE MSS DATA
P. J. Curran and H. D. Williamson *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 433-436 (For primary document see N87-11238 02-43)
(Grant SERC-GR3/5096)
Avail: NTIS HC A25/MF A01
Airborne multispectral scanner (MSS) data collected in June were used to estimate the green leaf area index (GLAI) of grassland. The initial accuracy of GLAI estimation was 17% to 40% at the 95% confidence level, for a 6 class classification. By refining the methodology, the accuracy increases to 60% to 82% at the 95% confidence level, for a 5 class classification. To test the methodology the experiment was repeated for the same study area using data collected in August. The initial accuracy of GLAI estimation was 5% to 40% at the 95% confidence level for a 6 class classification. Using the refined methodology the accuracy in-

creases to 58% to 93% at the 95% confidence level for a 5 class classification. ESA

N87-11316# California Univ., Santa Barbara.
SPECTRAL SIGNATURE OF SNOW IN VISIBLE AND NEAR-INFRARED WAVELENGTHS
J. Dozier *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 437-442 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Snow reflectance measurements in the near-infrared (Landsat Thematic Mapper band 4) estimated an effective radiative grain radius, while a measurement in the visible (TM band 2) estimated the extent to which snow albedo is degraded by contamination. The combination of these parameters can be used to calculate snow albedo throughout the solar spectrum. The effective grain radius is approximately the spherical radius that corresponds to the volume/surface ratio of the actual grains. Snow can be distinguished from water and ice clouds in TM band 5, because water is less absorptive than ice in this band and the small crystals in cirrus clouds are more reflective than the larger snow grains. ESA

N87-11317# Joint Research Centre of the European Communities, Ispra (Italy). Centre Commun de Recherche.
GROUND LEVEL RADIOMETRIC MONITORING OF RAINY SEASON FOOD CROPS IN THE SAHEL [SUIVI RADIOMETRIQUE AU SOL DE CULTURES VIVRIERES PLUVIALES EN ZONE SAHELIENNE]
A. Hubaux, G. Ferrari, and J.-M. Gregoire *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 443-449 In FRENCH; ENGLISH summary (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

During the rainy season, relative reflectance measurements were collected on 14 plots of millet, sorghum, and peanuts near Segou, Mali, using a radiometer. The influence of plant phenology and cover percentage on spectral behaviour were studied. The data analysis method, consisting in highlighting all channel space angular relationships with stereograms proves to be an efficient interpretation tool. Correlation between biomass index and yellowing index is quantified for all studied crops. Bare soil effect is determinant to distinguish between millet and sorghum (which has a higher biomass index). Distinction between millet and sorghum, and peanuts may be based on shifts between growth cycles. ESA

N87-11318# Tokyo Univ. (Japan). Inst. of Space and Astronautical Sciences.
MEASUREMENTS OF MICROWAVE BACKSCATTER FROM TREES
H. Hirosawa, H. Ishida, T. Ochi, and Y. Matsuzaka *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 451-454 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Microwave backscatter from two kinds of conifers, Sugi (Japanese cedar) and Sawara (Japanese cypress), at C and X bands, using HH, VV, HV, and VH polarizations was measured. The relationship between the backscattering characteristics and the ground truth data: leaf moisture content, volume ratio of leaves, and calculated dielectric characteristics of leaves and the medium is discussed. ESA

N87-11319# Stockholm Univ. (Sweden). Dept. of Physical Geography.
SPECTRAL MEASUREMENTS FOR ESTIMATION OF BIOMASS ON LIMESTONE GRASSLAND
M. Ihse and E. Rosen *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 455-458 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Green biomass in grassland was estimated through spectral reflectance measurements, using a hand-held instrument. The relationship between the green biomass and the IR/R reflectance ratio was investigated in the dominant plant communities: the Arrbenatherum pratense-community, the Sesleria caerulea-community and the Festuca ovina-community. The best linear correlations are achieved for the A pratense and the S caerulea for the growing phase (rsq = 0.90, 0.96) while correlation is poorer for the F ovina (rsq = 0.56). Several factors influence the relationship: plant community, phenology, vegetation cover, grazing, and strongly colored flowers. There is a strong phenological influence between the growing, maturity and senescense phases (rsq = 0.87, 0.70, 0.96 for A pratense). A good estimate of the average green biomass during the growing phase (+or- 9%) can be made. ESA

N87-11320# Freiburg Univ. (West Germany). Abt. Luftbildmessung und Fernerkundung.
INVESTIGATION OF SPECTRAL REFLECTANCE SIGNATURES ON FOREST DAMAGES USING MULTISPECTRAL DATA
A. Kadro *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 459-462 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Multispectral visible, near infrared and middle infrared spectra were collected over forests at three flight altitudes. Spectral reflectance signatures and a computer aided classification based on the different signatures, for use in a forest damage inventory, are presented. ESA

N87-11321# Stockholm Univ. (Sweden). Remote Sensing Lab.
REFLECTANCE PROPERTIES OF CONIFERS, MEASURED FROM A HELICOPTER
J. Kleman *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 463-466 Sponsored by Swedish Board for Space Activities (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Radiometer measurements from helicopter were carried out over stands of Norway spruce (Picea abies) and Scotch Pine (Pinus sylvestris) 20 km north of Stockholm, Sweden. Continuous reflectance spectra in the wavelength range 0.4 to 1.7 microns were measured over forest stands with different species, ages, crown densities, and field layers. The average reflectances of pine stands with an age of over 40 yr are higher in all bands than the reflectances for comparable spruce stands. In rank order, bands centered at 0.67, 1.6, and 0.48 microns offer the best separation possibilities. The reflectance variations through the summer are small for the two species. The reflectance of the pine stands varies less with deviations from nadir looking than the reflectance of the spruce stands. ESA

N87-11322# Institut National de Recherche d'Informatique et d'Automatique, Rennes (France).
CHARACTERIZATION OF THE SPECTRAL, SPATIAL AND TEMPORAL SIGNATURE OF VINEYARDS AND ORCHARDS: APPLICATION TO SOIL AND CROP REMOTE SENSING [CARACTERISATION DE LA SIGNATURE SPECTRALE, SPATIALE ET TEMPORELLE DES VIGNES ET VERGERS: APPLICATION A LA TELEDETECTION DU SOL ET DE LA CULTURE]
B. Naert *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 467-474 In FRENCH (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The behavior of the spectral signature of pixel components throughout a growth cycle was studied using data from a radiometer operating in the three bands of the SPOT satellite and airborne color infrared photography. Results show that at high resolution, vegetation, bare soil, and shade in vineyards and orchards can be identified. With a decimetric pixel, significant growth stages of the vine are identifiable. At 20 m satellite resolution, only agricultural features are distinguished. Between the two, surface heterogeneity

in the plot can be detected. The relationship between wavelength and identifying parameters, such as soil moisture and reflectance, indicates that in complex cultivated areas every signal parameter must be mastered to permit efficient remote sensing. ESA

N87-11323# Paris VI Univ. (France). Lab. de Mineralogie et Cristallographie.
SPECTRAL SIGNATURES AND MAPPING OF MINERAL DEPOSITS OF SOUTH MOROCCO [SIGNATURES SPECTRALES ET CARTOGRAPHIE DE GISEMENTS MINIERS AU SUD DU MAROC]
B. Cervelle, P. Boucher, J. Chorowicz, G. Tamain, and E. M. Alem *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 475-480 In FRENCH Sponsored by Ministere de la Recherche et de la Technologie (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Landsat multispectral scanner data of three arid zones containing mineral deposits of different types were analyzed to obtain spectral signatures and to map their lithologies (mineral bearing or not). The digital data associated with pixels characteristic of geological structures were corrected for atmospheric absorption and transformed to surface reflectance values. This enabled them to be compared with ground radiometer data and to calibrate them using laboratory spectrometric measurements on weathered rocks. A map of the three deposits was made. ESA

N87-11324# Valencia Univ. (Spain). Dept. of Thermography.
FOLLOWING THE MICROCLIMATIC ALTERATIONS PRODUCED BY FOREST FIRES BY MEANS OF LANDSAT-5 TM SENSOR
M. J. Lopez-Garcia, V. Caselles, and J. Melia *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 481-484 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The microclimatic variation produced by a forest fire was evaluated by comparing Landsat 5 TM sensor data with reference area temperature and Monitoring Index (MI) B4-B7/B4+B7. A month after the fire, the areas affected present temperatures 2 to 3 C higher than the reference areas, and the MI shows a negative value. These differences decrease with time and are not significant 6 yr after the fire. The sensor is considered to be especially suitable to monitor the reforestation of the areas affected by forest fires. ESA

N87-11325# Reading Univ. (England). Dept. of Geography.
SPECTRAL SIGNATURES OF LAND COVER TYPES IN THE SAHEL FOR GEOBOTANICAL MODELING
A. C. Millington *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 485-489 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A geobotanical model based on soil moisture stresses in vegetation for geomorphological mapping is established for the Gambia and central Senegal. Ground radiometric measurements of visible and near IR reflectances were made and the reflectances in the equivalent Landsat multispectral scanner bands 5, 7, 7/5 and the normalized difference vegetation index are calculated and used to test the model. The Mann-Whitney U-test is used to test for statistical separability between land cover classes which are related to geomorphological boundaries. The potential for mapping flood plain geomorphology and exposures of ferricretes is high but it is lower for other applications. ESA

N87-11326# Stockholm Univ. (Sweden). Remote Sensing Lab.
REFLECTANCE PROPERTIES OF BARLEY FOR DIFFERENT AGRONOMICAL TREATMENTS
J. Kleman and E. Fagerland *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 491-494 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The relationship between the agronomical treatment of a crop and its reflectance properties was studied. Field measurements were carried out with a spectroradiometer covering the wavelength range 0.4 to 2.3 microns. Plots of barley (Hordeum distichum L.) were treated with different amounts of irrigation and fertilization. Reflectance factors in selected wavelength bands, ratios of reflectance factors, and color coordinates were analyzed regarding their temporal variations and their relations to biomass, water content on the crop, and grain yield. A blue color coordinate was found to be strongly related to the irrigation differences, but relatively insensitive to the amount of biomass. The information content in the 1.3 to 2.3 micron wavelength range is discussed. ESA

N87-11327# Open Univ., Milton (England). Dept. of Earth Sciences.
AGE-DEPENDENT CHANGES IN THE SPECTRAL RESPONSE OF LAVA SURFACES DUE TO WEATHERING, GROWTH OF LICHEN AND SPREAD OF VASCULAR PLANTS
D. A. Rothery, R. H. Lefebvre (Grand Valley State Coll., Allendale, Mich.), and F. Bevis *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 495-498 Sponsored by UK Science and Engineering Research Council (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The Craters of the Moon (USA) basaltic lavas were studied using Landsat MSS imagery. The appearance of pahoehoe flows with Blue Dragon crusts changes systematically with age. In situ measurements of the bidirectional reflectance factor of natural rock surfaces in the area shows that the aging of the remotely sensed spectral response is a combination of physicochemical changes in the rock surface, colonization of the surface by lichen, with percentage cover and species diversity increasing with age (these effects cause little further change after 8000 yr) and development of vascular plant cover (causing progressive change beyond 8000 yr). ESA

N87-11328# Chiba Univ. (Japan). Faculty of Engineering.
NUTRITIONAL DIAGNOSIS FOR PLANT BY FIELD SPECTRORADIOMETER
G. Saito, Y. Emori, Y. Yasuda, and M. Fukuhara *In* ESA of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 499-502 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The spectral reflectances of sugar beets during growth were measured with a hand held spectroradiometer. Correlations between the spectral reflectances and contents of nitrogen, phosphorus, and potassium of the plants were examined. The plants were grown in 12 treatments of fertilizer in 3 soil types. The relation between green light crop reflectance and sugar concentration is shown. Percentage concentration of sugar increases linearly up to 18% in proportion to reflectance. With reflectance less than 22%, correlation factor is 0.82 and from measured reflectance, sugar concentration can be accurately estimated. The time at which the green light crop reflectances becomes greater than 25% is considered as an optimum harvesting time. ESA

N87-11329# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands).
DIGITAL COMBINATION OF SAR AND (MSS) OPTICAL DATA FOR IDENTIFICATION OF SPECTRAL SIGNATURES
M. Rast and F. Jascolla (Technische Univ., Munich (West Germany).) *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 503-509 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

The intercorrelation between SIR-A SAR data and MSS optical data on the reflectance properties of different soil types and geological features in an arid test site was studied. Application of radar data necessitated the basic evaluation of its spectral information and the comparison with optical data because of the

higher signature information content in the SAR data set in order to better understand surface reflectance in a shorter wavelength, and to assess the combination of different remote sensing information sources in operational application. Gray value profiles of SIR-A data in the area of Lake Nasser (Egypt) were set against Landsat MSS data and compared with field mapped ground truth data. Image merging of data sets with strongly different signature contents is shown to improve analysis. ESA

N87-11330# Canada Centre for Remote Sensing, Ottawa (Ontario).
SPECTRAL MEASUREMENTS OF TREE DEFOLIATION
P. M. Teillat, D. G. Leckie, D. Ostaff, G. Fedosejves, and F. J. Ahern *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 511-516 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Ground-based measurements were acquired in New Brunswick and Nova Scotia to study the spectral reflectance properties of current year and cumulative tree defoliation due to spruce budworm. Spectral reflectances of individual balsam fir trees and other tree types were acquired from 4.4 to 2.4 micrometers by a spectrometer system on a truck. Spectral measurements of tree components, such as red needles, new shoots, year-old needles, multiyear needles; twigs, bark, and lichen were made from 0.4 to 1.1 micrometers with a spectrometer and integrating sphere. The resulting data sets are described and the difficult logistics and constraints of tree spectroscopy are discussed. Analyses of these data should help to provide a sufficient understanding of the spectral properties of budworm defoliation to specify pertinent sensor bands for aircraft survey experiments. ESA

N87-11331# Institut Francais du Petrole, Rueil-Malmaison. Div. Geophysique et Instrumentation.
CONTRIBUTION OF INTERNAL WAVES TO SPECTRAL SIGNATURES [CONTRIBUTION A LA SIGNATURE SPECTRALE DES ONDES INTERNES]
A. Wadsworth and P. Piau *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 517-521 In FRENCH; ENGLISH summary (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Examples of internal wave visualizations from different sensors of the visible and microwave spectrum are shown and their radiometric characteristics are assessed. It is demonstrated that detection is not enhanced with a better geometric resolution and that the real aperture mode of the side-looking imaging radar is well suited for detection and identification of internal wave packets. The high accessibility of a given zone, using SPOT data and the good all-weather detection possibilities of ERS-1 are mentioned. ESA

N87-11332# Stockholm Univ. (Sweden). Dept. of Physical Geography.
LABORATORY MEASUREMENTS OF SPECTRAL REFLECTANCE (0.4 TO 2.3 MICRON) OF BASALTS
K. Wester and B. Lunden *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 523-526 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Age effects on the spectral reflectance of basalts from Iceland measured in the laboratory using a spectroradiometer, and weathered (with and without lichen) and cut rock surfaces were studied. Most of the lichen-free basalts are spectrally featureless. Reflectances are very low. Comparisons between weathered basalts indicate that the older the basalt the higher the reflectance, especially between 0.95 and 2.3 microns. The results also show that the general effect of lichen cover on basalt is to increase the reflectance. The lichen-covered basalts display absorption bands at 0.7 microns (chlorophyll), at 1.4 and 1.9 microns (water). Absorption bands near 1.7 and 2.1 microns are also present. ESA

N87-11333# Academia Sinica, Guiyang (China). Inst. of Geochemistry.
SPECTRAL FEATURES OF ROCKS AND MINERALS FROM BEIYUNOBO REGION AND METALLOGENETIC FORECAST FOR REE IN THE CENTRAL PART OF INNER MONGOLIA
Xuan Ding, Chang-he Ma, and Lai-zhi Gao *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 527-530 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

Reflection spectra of 150 samples of rocks and minerals were determined by spectrophotometer. Results show that the spectra of REE minerals display absorption bands at 0.79, 0,74, and 0.57 microns in order of increasing intensity; Fe-REE and dolomite-REE ores also show visual spectral features at 0.79, and 0,74 microns. Dolomites display an intense absorption feature near 2.35 microns. Because they contain more silica (average 20%) and dark color, limestones do not display the diagnostic band of carbonate at 2.35 microns. The spectral features near 0.74, 0.79, and 2.35 microns can be used as indicators of the REE deposits of Beiyunobo-type in the central part of Nei Mongol. ESA

N87-11334# Valencia Univ. (Spain). Dept. of Thermology.
LANDSAT-5 TM APPLICATION TO THE STUDY OF MODIFICATION OF SPECTRAL SIGNATURES OF CITRIC ORCHARDS AFFECTED BY FROSTS
V. Caselles, S. Gandia, and J. Melia *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 531-534 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

A study of the bidirectional reflectance of citrics given by Landsat 5 was used to evaluate the intensity of strong frost on the Spanish Mediterranean coast in January 1985. Bands 4 and 3 are more useful for monitoring the effects of the cold. The normalized difference index of vegetation calculated from these bands is used to evaluate the zones most influenced (of the order of 55% of the identified citrus orchards). ESA

N87-11335°# National Aeronautics and Space Administration, Washington, D.C.
NASA SCANNER PRODUCES COMPLETE IMAGE OF NORTH ATLANTIC OCEAN
Leon N. Perry 17 Oct. 1986 2 p
(NASA-News-Rel-86-147) Avail: NTIS HC A02/MF A01 CSCL 08B

Using NASA's coastal zone color scanner on the Nimbus-7 satellite, scientists recently completed a computer-generated color image showing, for the first time, the distribution of microscopic plant life, or phytoplankton, in the surface waters of the entire north Atlantic Ocean. The image also shows the land vegetation index for the continents bordering the north Atlantic basin, making the image the first to show measurements of both land and ocean plant abundance on such a large scale. The scanner measured sunlight reflected from the sea surface at five wavelengths to determine ocean color. Data was transmitted to receiving stations at various locations around the Earth. Although the scanner was designed to collect measurements primarily over coastal waters, the image of the north Atlantic Ocean was generated by merging many individual orbits of scanner data to form a composite image representing average conditions in May. The land vegetation index was acquired from observations by the satellite sensor called the advanced very high resolution radiometer onboard the NOAA-6 satellite, launched in June, 1979. Dark green in the image represents high density vegetation. Author

N87-11336°# California Univ., Davis. Dept. of Electrical and Computer Engineering.
LANDSAT D THEMATIC MAPPER IMAGE DIMENSIONALITY REDUCTION AND GEOMETRIC CORRECTION ACCURACY Final Report
Gary E. Ford 1986 111 p

(Contract NAS5-27577)
(NASA-CR-179876; NAS 1.26:179876) Avail: NTIS HC A06/MF A01 CSCL 05B

To characterize and quantify the performance of the Landsat thematic mapper (TM), techniques for dimensionality reduction by linear transformation have been studied and evaluated and the accuracy of the correction of geometric errors in TM images analyzed. Theoretical evaluations and comparisons for existing methods for the design of linear transformation for dimensionality reduction are presented. These methods include the discrete Karhunen Loeve (KL) expansion, Multiple Discriminant Analysis (MDA), Thematic Mapper (TM)-Tasseled Cap Linear Transformation and Singular Value Decomposition (SVD). A unified approach to these design problems is presented in which each method involves optimizing an objective function with respect to the linear transformation matrix. From these studies, four modified methods are proposed. They are referred to as the Space Variant Linear Transformation, the KL Transform-MDA hybrid method, and the First and Second Version of the Weighted MDA method. The modifications involve the assignment of weights to classes to achieve improvements in the class conditional probability of error for classes with high weights. Experimental evaluations of the existing and proposed methods have been performed using the six reflective bands of the TM data. It is shown that in terms of probability of classification error and the percentage of the cumulative eigenvalues, the six reflective bands of the TM data require only a three dimensional feature space. It is shown experimentally as well that for the proposed methods, the classes with high weights have improvements in class conditional probability of error estimates as expected. Author

N87-11337# South Carolina Univ., Columbia. Dept. of Geography.

FEASIBILITY STUDY OF WOOD STORK FORAGING HABITAT MAPPING USING LANDSAT MULTISPECTRAL DATA

J. R. Jensen, M. E. Hodgson, M. Coulter, and H. E. Mackey, Jr. 1986 19 p Presented at the Freshwater Wetlands and Wildlife Symposium, Charleston, S.C., 24 Mar. 1986 Prepared in cooperation with Du Pont de Nemours (E.I.) and Co., Aiken, S.C.
(Contract DE-AC09-76SR-00001)
(DE86-008904; DP-MS-85-119; CONF-8603101-2) Avail: NTIS HC A02/MF A01

The wood stork is a large wading bird which forages in shallow wetlands up to 70 kilometers from the colony. LANDSAT data were evaluated to determine if remote sensing data were suitable for locating and estimating the extent of potential foraging habitat for this species over such a large range. Thematic Mapper data of north-central Georgia and the Savannah River floodplain in South Carolina were obtained May 5, 1984. Spectral signatures from known foraging sites near a colony in Georgia were identified. Computer clustering techniques were used to identify and map shallow water and marsh wetland foraging habitats. Foraging acreages were computed, and maps of the locations of candidate foraging sites were produced for a 1520-square-kilometer area. Remote sensing appears to provide a feasible method of evaluating the regional wetland foraging habitat available to this wide-ranging species. DOE

N87-11338# Sandia National Labs., Albuquerque, N. Mex.

FY 1984 AND FY 1985 GEOCHEMISTRY AND MATERIALS STUDIES IN SUPPORT OF THE MAGMA ENERGY EXTRACTION PROGRAM

H. R. Westrich, L. J. Weirick, R. T. Cygan, M. Reece, P. F. Hlava, H. W. Stockman, and T. M. Gerlach Apr. 1986 66 p
(Contract DE-AC04-76DP-00789)
(DE86-009558; SAND-85-2843) Avail: NTIS HC A04/MF A01

Geochemistry and materials studies are being performed in support of the Magma Energy Extraction Program. The work is largely restricted to: (1) characterizing magmatic environments at sites of interest, (2) testing engineering materials in laboratory simulated magmatic environments, (3) investigating chemical mass transport effects inherent in designs for direct contact heat exchangers, and (4) evaluating degassing hazards associated with drilling into and extracting energy from shallow magma. Magma characterization studies have been completed for shallow magma at Long Valley, Coso volcanic field, and Kilauea volcano. The behavior of 17 commercially available materials has been examined in rhyolite magma at 850(0)C and 200 MPa for periods up to seven days. Analysis of reaction products from materials tests to date indicate that oxidation is the main corrosion problem for most alloys in rhyolitic magma. Considerations of corrosion resistance, high-temperature strength, and cost indicate nickel-base superalloys offer the most promise as candidates for use in rhyolitic magma. DOE

N87-11339# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).

TRAVEL REPORT OF A VISIT TO THE UNITED STATES FROM 17 AUGUST TO 31 AUGUST 1985 [REISVERSLAG VAN EEN BEZOEK AAN DE VERENIGDE STATEN VAN 17 TOT 31 AUGUSTUS 1985]

G. J. A. Nieuwenhuis and J. M. M. Bouwmans Nov. 1985 22 p In DUTCH and ENGLISH
(ICW-1659; ETN-86-98061) Avail: NTIS HC A02/MF A01

Organizational aspects, papers and posters, and conclusions of the International Workshop on Hydrologic Applications of Space Technology are discussed. A course on geographic information systems is presented. The status of remote sensing research in the US is outlined. ESA

N87-11340# Instituut voor Culturrtechniek en Waterhuishouding, Wageningen (Netherlands).

REMOTE SENSING IN HYDROLOGY [DE HYDROLOGIE OP AFSTAND IN BEELD GEBRACHT]

G. J. A. Nieuwenhuis Jan. 1986 18 p In DUTCH
(ICW-1687; ETN-86-98062) Avail: NTIS HC A02/MF A01

Applications of remote sensing techniques are presented. Aerial remote sensing systems are surveyed. The difference between aircraft and satellite remote sensing is discussed. In order to illustrate that electronic aerial sensing techniques lend themselves well to quantitative analysis, results showing the mapping of evaporation using digital reflection and heat images are quoted. Applications of remote sensing in hydrology and agricultural water economy are described. ESA

N87-11341# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.

SNOW STUDIES: STUDY JOURNEY TO SWITZERLAND, JANUARY 1986

Lennart Holm, Jan Kjellgren, and Ain Sume Mar. 1986 30 p In SWEDISH; ENGLISH summary Sponsored by Swedish Material Administration of the Armed Forces
(FOA-C-30419-E1,E3; ISSN-0347-3708; ETN-86-98332) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

Methods and instruments used for snow investigations and results from measurements are described. The methods are based on direct investigation of the snow cover, on remote sensing, and on resonant frequencies measurement. An instrument for field measurement of the dielectric constant connected with the moisture content of the snow, is reported. Reflectance values in a coaxial circuit, as function of the permittivity are mentioned. ESA

N87-11462 Deutscher Wetterdienst, Offenbach am Main (West Germany).

SATELLITE MEASUREMENTS OF THE CLOUDINESS AND THE GLOBAL RADIATION FOR GLOBAL STATISTICS [SATELLITENMESSUNGEN DER BEWOELKING UND GLOBALSTRAHLUNG FUER EINE GLOBALE STATISTIK]

E. Raschke, F. Diekmann, A. Gratzki, J. Jacobs, M. Rieland, and H. J. Lutz *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 224-227 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11055*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Tracking Systems and Applications Section.
DEMONSTRATION OF THE FIDUCIAL CONCEPT USING DATA FROM THE MARCH 1985 GPS FIELD TEST
J. M. Davidson, C. L. Thornton, S. A. Stephens, S.-C. Wu, S. M. Lichten, J. S. Border, O. J. Sovers, T. H. Dixon, and B. G. Williams *In its* The Telecommunications and Data Acquisition Report (date) p 301 - 306 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03A

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N87-11342 Technische Hogeschool Twente, Enschede (Netherlands). Vakgroep Ontwikkelingskunde.
IMPLEMENTATION OF WINDMILLS IN GUJARAT, INDIA
Floris Blankenberg Apr. 1984 74 p
(ETN-86-97720; WP-1) Avail: Issuing Activity

The reasons for failure of implementation of development projects in Third World countries are analyzed through a case study of windmills in India. It is argued that there is no continuity in project planning, there is no attention paid to future developments, the feasibility of the option is not established, the project does not offer a package of facilities, the organizational structure is not considered properly, and the lower level organizations and institutions are not involved. ESA

N87-11343*# Hughes Aircraft Co., Newport Beach, Calif. Solid State Products Div.
SOLAR POWERED HYBRID SENSOR MODULE PROGRAM
J. M. Johnson and H. K. Holmes Mar. 1985 32 p
(Contract NAS1-17179)
(NASA-CR-172495; NAS 1.26:172495) Avail: NTIS HC A03/MF A01 CSCL 10A

Geo-orbital systems of the near future will require more sophisticated electronic and electromechanical monitoring and control systems than current satellite systems with an emphasis in the design on the electronic density and autonomy of the subsystem components. Results of a project to develop, design, and implement a proof-of-concept sensor system for space applications, with hybrids forming the active subsystem components are described. The design of the solar power hybrid sensor modules is discussed. Module construction and function are described. These modules combined low power CMOS electronics, GaAs solar cells, a crystal oscillatory standard UART data formatting, and a bidirectional optical data link into a single 1.25 x 1.25 x 0.25 inch hybrid package which has no need for electrical input or output. Several modules were built and tested. Applications of such a system for future space missions are also discussed. Author

N87-11344*# Engelhard Corp., Edison, N.J. Research and Development Dept.
DEVELOP AND TEST FUEL CELL POWERED ON SITE INTEGRATED TOTAL ENERGY SYSTEMS. PHASE 3: FULL-SCALE POWER PLANT DEVELOPMENT Quarterly Report, Nov. 1985 - Jan. 1986
A. Kaufman, B. Olson, S. Pudick, C. L. Wang, J. Werth, and J. A. Whelan 17 Mar. 1986 20 p
(Contract DEN3-241)
(NASA-CR-175118; DOE/NASA-0241-21; NAS 1.26:175118; QR-19) Avail: NTIS HC A02/MF A01 CSCL 10A

The third in a series of 4kW stacks, consisting of 24 cells of the 13 inch x 23 inch cell size, has been on test for about 1600 hours. This stack is similar to the first two stacks, which ran 7000 and 8400 hours, respectively. The present stack incorporates technology improvements relating to the electrolyte-matrix, the current-collector assembly, and a reduction in the number of cooling plates. Performance is currently averaging about 0.64 per cell at 161 mA sq cm. Author

N87-11345*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPONENT TESTING OF A GROUND BASED GAS TURBINE STEAM COOLED RICH-BURN PRIMARY ZONE COMBUSTOR FOR EMISSIONS CONTROL OF NITROGENEOUS FUELS Final Report
Donald F. Schultz 1986 21 p Presented at the Inter-Agency Advanced Power Group, Washington, D.C., 15-16 Oct. 1986
(NASA-TM-88873; DOE/NASA/-13111/16; E-3280; NAS 1.15:88873) Avail: NTIS HC A02/MF A01 CSCL 10A

This effort summarizes the work performed on a steam cooled, rich-burn primary zone, variable geometry combustor designed for combustion of nitrogeneous fuels such as heavy oils or synthetic crude oils. The steam cooling was employed to determine its feasibility and assess its usefulness as part of a ground based gas turbine bottoming cycle. Variable combustor geometry was employed to demonstrate its ability to control primary and secondary zone equivalence ratios and overall pressure drop. Both concepts proved to be highly successful in achieving their desired objectives. The steam cooling reduced peak liner temperatures to less than 800 K. This low temperature offers the potential of both long life and reduced use of strategic materials for liner fabrication. These degrees of variable geometry were successfully employed to control air flow distribution within the combustor. A variable blade angle axial flow air swirler was used to control primary zone air flow, while the secondary and tertiary zone air flows were controlled by rotating bands which regulated air flow to the secondary zone quench holes and the dilutions holes respectively. Author

N87-11346*# Engelhard Corp., Edison, N.J. Research and Development Dept.
DEVELOP AND TEST FUEL CELL POWERED ON-SITE INTEGRATED TOTAL ENERGY SYSTEMS. PHASE 3: FULL-SCALE POWER PLANT DEVELOPMENT Quarterly Report, Aug. - Oct. 1985
A. Kaufman, B. Olson, S. Pudick, C. L. Wang, J. Werth, and J. A. Whelan 3 Feb. 1986 22 p
(Contract DEN3-241)
(NASA-CR-175117; DOE/NASA-0241/20; NAS 1.26:175117; QR-18) Avail: NTIS HC A02/MF A01 CSCL 10A

The testing of two 25-cell stacks of the 13 inch x 23 inch cell size (about 4kW) was carried out for 7000 and 8400 hours, respectively. A 25kW stack containing 175 cells of the same size and based on the same technology was constructed and is on test. A third 4kW stack, which will contain 24 cells, will comprise several new technology features; these will be assesed for performance and durability in long-term testing. Author

N87-11347*# Engelhard Corp., Edison, N.J. Research and Development Dept.
DEVELOP AND TEST FUEL CELL POWERED ON SITE INTEGRATED TOTAL ENERGY SYSEMS: PHASE 3: FULL-SCALE POWER PLANT DEVELOPMENT Quarterly Report, May - Jul. 1985
A. Kaufman, B. Olson, S. Pudick, C. L. Wang, J. Werth, and J. A. Whelan 9 Oct. 1986 23 p
(Contract DEN3-241)
(NASA-CR-175075; DOE/NASA-0241/19; NAS 1.26:175075; QR-17) Avail: NTIS HC A02/MF A01 CSCL 10A

A 25-cell stack of the 13 inch x 23 inch cell size (about 4kW) remains on test after 8300 hours, using simulated reformate fuel. A similar stack was previously shut down after 7000 hours on load. These tests have been carried out for the purpose of assessing the durability of fuel cell stack components developed through the end of 1983. A 25kW stack containing 175 cells of

the same size and utilizing a technology base representative of the 25-cell stacks has been constructed and is undergoing initial testing. A third 4kW stack is being prepared, and this stack will incorporate several new technology features. Author

N87-11348*# Paragon Pacific, Inc., El Segundo, Calif.
WEST-3 WIND TURBINE SIMULATOR DEVELOPMENT. VOLUME 1: SUMMARY Final Report
S. Sridhar Jul. 1985 24 p
(Contracts DEN3-247; DE-AI01-76ET-20320)
(NASA-CR-174981; DOE/NASA-0247/1-Vol-1; NAS 1.26:174981; PPI-FID-300101-Vol-1) Avail: NTIS HC A02/MF A01 CSCL 10A

This report is a summary description of WEST-3, a new real-time wind turbine simulator developed by Paragon Pacific Inc. WEST-3 is an all digital, fully programmable, high performance parallel processing computer. Contained in the report are descriptions of the WEST-3 hardware and software. WEST-3 consists of a network of Computational Units (CUs) working in parallel. Each CU is a custom designed high speed digital processor operating independently of other CUs. The CU, which is the main building block of the system, is described in some detail. A major contributor to the high performance of the system is the use a unique method for transferring data among the CUs. The software aspects of WEST-3 covered in the report include the preparation of the simulation model (reformulation, scaling and normalization), and the use of the system software (Translator, Linker, Assembler and Loader). Also given is a description of the wind turbine simulation model used in WEST-3, and some sample results from a study conducted to validate the system. Finally, efforts currently underway to enhance the user friendliness of the system are outlined; these include the 32-bit floating point capability, and major improvements in system software. Author

N87-11349# Army Military Personnel Center, Alexandria, Va.
EVALUATION OF IMPROVEMENTS TO BRAYTON CYCLE PERFORMANCE Final Report
Michael A. Spasyk 29 May 1986 121 p
(AD-A169018) Avail: NTIS HC A06/MF A01 CSCL 10/2

This study addresses the problem of finding an energy conversion method to take advantage of the high maximum cycle temperatures achieved with solar central receivers. Most current practice is to use steam-based heat engines with solar receivers but these Rankine cycles cannot operate at the higher possible temperatures. Derivatives of gas-based Brayton cycles are considered to take advantage of the expected increased cycle performance of higher temperatures. Computer modeling was done to examine the effect of maximum temperature on efficiency of two Brayton cycle derivatives and a simple Brayton cycle (GT). The modified Brayton cycles include a combination of intercooling, regeneration, and reheat (IGT) and a Brayton cycle with steam injection (STIG). The turbine inlet temperature, the steam-to-air injection mass ratio (for the STIG), and the compression pressure ratios were treated as parameters in the analysis. Both First Law and Second Law efficiencies were examined. Efficiencies were highest for the IGT followed by the STIG and GT, respectively. Considerable improvements in specific work output were demonstrated by the STIG over both the IGT and GT systems. First and Second law analyses show a gradual increase of efficiency with turbine inlet temperature with diminishing returns at higher temperatures. GRA

N87-11350# Spire Corp., Bedford, Mass.
INVESTIGATION OF HIGH-EFFICIENCY SILICON CONCENTRATOR CELLS
Apr. 1986 130 p
(Contract DE-AC04-76DP-00789)
(DE86-011914; SAND-85-7023) Avail: NTIS HC A07/MF A01

The high-efficiency features of silicon concentrator cells examined include reduction of heavy-doping effects through ion implantation, surface passivation, reduction of cell thickness, patterning to reduce emitter area, passivation to reduce metal/Si contact interaction area, and investigation of back junction solar cells to separate emitter patterning from grid design. This research has achieved V sub OC of 657 mV. Concentrator cell efficiency of up to 20.7% was also attained. The principal finding of this work is that thin high-efficiency designs must have adequate passivation on the front and back surfaces. Lack of passivation at the metal/Si contact interface has emerged as the limiting feature of the best cells. DOE

N87-11351# Varian Associates, Palo Alto, Calif.
FABRICATING HIGH-CONCENTRATION GaAs CELL PHOTOVOLTAIC MODULES
N. R. Kaminar and H. C. Hamaker Apr. 1986 62 p Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-011705; SAND-85-7021) Avail: NTIS HC A04/MF A01

This program comprises the design and manufacture of components of a GaAs-cell, passively-cooled concentrator. A Fresnel lens, 5.44-inches square, was used in conjunction with a solid glass, domed-top secondary optical element to concentrate the light on single-junction GaAs cells. The cell had an active area 0.2 inches in diameter and was soldered directly to the copper heatspreader. The heatspreader was bonded with heat-conductive RTV to an aluminum dissipator, which formed the module housing. The module was designed to be attached to a tracker at the center. Obtained were 26% cell efficiency in flash tests and 19.2% combined lens/cell efficiency outdoors. Optical transmission was lower than expected due to higher than expected losses in the secondary. The secondaries were made using a molding technique applicable to mass production. DOE

N87-11352# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
HPSA: HIGH POWER SOLAR ARRAY STUDY Final Report
C. P. Lee Paris ESA Jul. 1985 156 p
(Contract ESA-6064/84-NL-PB)
(BAe-TP-8071; HPSA/RPT/8071; ESA-CR(P)-2201; ETN-86-98086) Avail: NTIS HC A08/MF A01

A 30 kW solar array design for ESA's Columbus program was established. Realistic array requirements were identified using the ESA recommended designed reference mission. System and subsystem level studies lead to preferred design solutions for silicon and gallium arsenide cell technologies. A development philosophy and test plan to pursue the identification of critical aspects was derived and a preliminary cost appraisal was made. It is concluded that a planar double roll out array employing silicon cells represents the most attractive solution, with a gallium arsenide roll out as a logical derivative. ESA

N87-10925# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Group.
INFLUENCE OF FIBER ORIENTATION AND BOUNDARY CONDITIONS ON THE DYNAMIC BEHAVIOR OF A CYLINDRICALLY TELESCOPING SOLAR ARRAY (INTELSAT 6)
E. D. Sach, H. J. Huettmann, and E. Fritsche *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 289-292 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N87-11353*# Old Dominion Univ., Norfolk, Va. Dept. of Chemical Sciences.
COMPUTATIONAL SOLUTION OF ATMOSPHERIC CHEMISTRY PROBLEMS Final Report, period ending 31 Dec. 1985
Jawed Jafri and Robert L. Ake Aug. 1986 80 p
(Grant NSG-1393)
(NASA-CR-179803; NAS 1.26:179803) Avail: NTIS HC A05/MF A01 CSCL 13B

Extensive studies were performed on problems of interest in atmospheric chemistry. In addition to several minor projects, four major projects were performed and described (theoretical studies

of ground and low-lying excited states of ClO2; ground and excited state potential energy surfaces of the methyl peroxy radical; electronic states ot the FO radical; and theoretical studies S02 (H2O) (sub n)). Author

N87-11354# Royal Netherlands Meteorological Inst., De Bilt.
DRY DEPOSITION PARAMETERIZATION IN LONG RANGE TRANSPORT MODELS
A. Kulig 1986 39 p Sponsored by UNESCO, Paris, France, and the Royal Netherlands Meteorological Institute, De Bilt, Netherlands
(KNMI-WR-86-1; B8666193; ISSN-0169-1651; ETN-86-98501)
Avail: NTIS HC A03/MF A01

Methods for the computation of surface deposition velocities of sulfur and nitrogen dioxide, and sulfate and nitrate particles are derived. The methods may be used in studies of long range (mesoscale and regional scale) pollution transport. The influence of friction velocity and stability of the atmosphere on aerodynamic resistance is discussed. The standard deposition velocities which consist of the surface resistance and resistance of the laminar sublayer adjacent to the surface, are estimated. Mean values of dry deposition velocities for terrain categories useful in long range transport models are proposed. ESA

N87-11370 Deutscher Wetterdienst, Offenbach am Main (West Germany).
LONG RANGE ATMOSPHERIC TRANSPORT OF ANTHROPOGENIC AEROSOLS IN AND THROUGH THE ARCTIC [ATMOSPHAERISCHER FERNTRANSPORT VON ANTHROPOGENEN AEROSOLEN IN UND DURCH DIE ARKTIS]
Wolfgang E. Raatz *In its* Reports of Meteorology, no. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 9-10 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11428 Freie Univ., Berlin (West Germany). Inst. fuer Geophysikalische.
A STATISTICAL METHOD FOR PREDICTION OF POLLUTANT EMISSION [EINE STATISTISCHE METHODE ZUR IMMISSIONSPROGNOSE]
Detlef Carius *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 152-153 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11430 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
NUMERICAL SIMULATION OF THE TURBULENT DIFFUSION ABOVE A ROUGH TERRAIN [NUMERISCHE SIMULATION TURBULENTER DIFFUSION UEBER UNEBENEM GELAENDE]
Michael Wamser and Hans-Dieter Haenel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 156-157 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11432 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
DISPERSION OF ACCIDENTALLY RELEASED HEAVY GASES [AUSBREITUNG STOERFALLARTIG FREIGESETZTER SCHWERER GASE]
Gert Koenig and Michael Schatzmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 160-161 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11450 Deutscher Wetterdienst, Offenbach am Main (West Germany).
INCREASE OF THE DUST MASS CONTENT IN THE AIR OF HAMBURG (WEST GERMANY) [ANSTIEG DES STAUBMASSENGEHALTS DER LUFT IN HAMBURG]
U. Kaminski and P. Winkler *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 198-199 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11451 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
NUMERICAL SIMULATION OF PHOTOSMOG IN A DYNAMIC-KINETIC MODEL OF THE ATMOSPHERIC BOUNDARY LAYER [NUMERISCHE SIMULATION VON PHOTOSMOG IN EINEM DYNAMISCHE-KINETISCHEN MODELL DER ATMOSPHAERISCHEN GRENZSCHICHT]
G. Kramm and F. Herbert *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and our Environment 1986 p 200-201 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N87-11355 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE CURRENT SYSTEM GENERATED BY THE PORCUPINE ARTIFICIAL ION BEAM IN THE IONOSPHERIC BACKGROUND PLASMA
R. Z. Sagdeev, V. N. Oraevsky, E. V. Mishin, V. Ya. Kapitanov, V. G. Korobeinikov, Yu. Ya. Ruzhin, V. A. Rozhansky, O. H. Bauer, G. Haerendel, and R. A. Treumann Mar. 1986 16 p Presented at 26th COSPAR General Assembly, Toulouse, France, 1986 Sponsored in part by DFVLR
(Contracts BMFT-01-D0074A; BMFT-RV14B7/74)
(MPE-Preprint-49; ETN-86-98210) Copyright. Avail: Issuing Activity

The injection of a heavy ion beam into the magnetized ionospheric plasma during the PORCUPINE experiment showed that the beam is electrically depolarized while the electric current is attenuated by only 10%. This stresses the importance role of the ambient ionospheric plasma background and raises the question of how the beam current closes. A theoretical model for the development of the current system in the background plasma, based on the assumption of short-circuiting the current along the magnetic lines of force is presented. The model is supported by the experimental data of PORCUPINE. Results also suggest that plasma turbulence in the ion cyclotron modes is important in producing the anomalous resistivities required. ESA

N87-11356 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
DISCOVERY OF ENERGETIC MOLECULAR IONS (NO+ AND O2+) IN THE STORM TIME RING CURRENT
B. Klecker, E. Moebius, D. Hovestadt, M. Scholer, G. Gloeckler (Maryland Univ., College Park.), and F. M. Ipavich Jun. 1986 15 p Submitted for publication
(MPE-Preprint-53; ASP-55; ETN-86-98213) Avail: Issuing Activity

A few hours after the onset of a large geomagnetic storm, energetic molecular ions in the mass range 28 to 32, predominantly NO(+) and O2(+), were discovered in the outer ring current at L = 7. The data were obtained with the time-of-flight spectrometer SULEICA on the AMPTE/IRM spacecraft. At 160 keV/e mean abundance ratio of the molecular ions relative to O(+) ions is 0.031+0.004. During quiet times no molecular ions are observed, the 1 sigma upper limit of the ratio derived by averaging over

several quiet periods is 0.003. The observations demonstrate the injection of ionospheric plasma into the storm time ring current and the subsequent acceleration to energies of several hundred keV on a time scale of a few hours after the onset of the magnetic storm. ESA

N87-11357# National Academy of Sciences - National Research Council, Washington, D. C. Geophysics Study Committee.
ACTIVE TECTONICS: PART 2: EPEIROGENIC AND INTRA-PLATE MOVEMENTS
Larry D. Brown (Cornell Univ., Ithaca, N.Y.) and Robert E. Reilinger (Air Force Geophysics Lab., Hanscom AFB, Mass.) 1986 16 p
Avail: NTIS HC A02/MF A01

The major deformations of the Earth's surface are largely consistent with the tenets of plate tectonics, which predict that such activity should be focused at the various boundaries along which massive lithospheric plates collide, pull apart, or slide past one another. Yet crustal deformations also occur well into the interior of these plates. Some may represent the distributed effects of distant plate boundaries, as, for example, the earthquakes of the intermontane western United States. Some, such as the geodetically observed uplift over a deep magma chamber in the Rio Grande rift of New Mexico, may correspond to incipient foundation of a new plate boundary. Others, like the subtle, broad uplifts and subsidences in the nominally stable cratonic interiors, are much more puzzling. Such motions often appear estranged, if not divorced, from accepted plate-tectonic processes. Postglacial rebound, a well-known phenomenon in portions of North America and Europe, also appears to be an inadequate explanation for many observations. Understanding contemporary motions of plate interiors is often hindered by the paucity and uncertain accuracy of relevant geophysical and geodetic observations. Yet intraplate tectonics constitutes more than a scientific enigma. Even seemingly slow vertical motions may threaten river courses or seafront properties on socially relevant time scales, and the subtle strain accumulating elsewhere may portend future earthquakes or volcanoes in the least predictable places. Author

N87-11358*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AIRBORNE LIDAR MEASUREMENTS OF EL CHICHON STRATOSPHERIC AEROSOLS, MAY 1983
M. Patrick McCormick and M. T. Osborn (SASC Technologies, Inc., Hampton, Va.) Oct. 1986 91 p
(NASA-RP-1172; L-16176; NAS 1.61:1172) Avail: NTIS HC A05/MF A01

An experimental survey flight to determine the spatial distribution and aerosol characteristics of the El Chichon-produced stratospheric aerosol was conducted in May 1983. The mission included several different sensors flown abroad the NASA Convair 990 at latitudes between 72 deg. and 56 deg. S. This report presents the lidar data from that flight mission. Representative profiles of lidar backscatter ratio, plots of integrated backscattering function versus latitude, and contours of backscatter mixing ratio versus altitude and latitude are given. In addition, tables containing numerical values of the backscatter ratio and backscattering function versus altitude are supplied for each profile. By May 1983, material produced by the El Chichon eruptions of late March-early April 1982 had spread throughout the latitudes covered by this mission. However, the most massive portion of the material resided north of 33 deg. N and was concentrated below 21 km. In this latitude region (33 deg. N to 72 deg. N), peak backscatter ratios at a wavelength of 0.6943 microns varied between 3.5 and 4.5, and the peak integratred backscattering function was about 18 X 10 to the -4 power/sr, corresponding to a peak optical depth calculated to be approximately 0.08. This report presents the results of this mission in a ready-to-use format for atmospheric and climatic studies. Author

N87-11359# Rice Univ., Houston, Tex. Dept. of Space Physics and Astronomy.
COMPUTER SIMULATION OF THE DYNAMICS OF THE NEAR-EARTH PART OF THE GEOMAGNETIC TAIL Final Report, 1 Jan. 1983 - 4 May 1986
R. A. Wolf 5 May 1986 40 p
(Contract F19628-83-K-0016)
(AD-A169449; AFGL-TR-86-0063) Avail: NTIS HC A03/MF A01
CSCL 04/1

The objective of the contract was to extend the Rice Convection Modeling capabilities tailward to include the near Earth part of the geomagnetic tail, in order to include the dynamics of that region in our substorm simulations. The effort was divided into three parts: (1) development of equilibrium magnetic-field models; (2) development of an MHD code for use in the near magnetotail for periods when flows are supersonic or super-Alfvenic; and (3) modification of the Rice Convection Model to make it applicable further out in the magnetotail. GRA

N87-11360# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
DISTRIBUTION, LITHOLOGY AND AGES OF LATE CENOZOIC VOLCANISM ON THE EASTERN MARGIN OF THE GREAT BASIN, WEST-CENTRAL UTAH
W. P. Nash 1986 88 p
(Contract DE-AC07-79ID-12079)
(DE86-009898; DOE/ID-12079/131; ESL-86007-TR) Avail: NTIS HC A05/MF A01

The eastern margin of the Basin and Range province in central Utah is the locus of late Cenozoic volcanic activity and has witnessed several volcanic episodes within the last three million years. The Twin Peaks volcanic center became active 2.7 m.y. ago producing rhyodacite and rhyolite from a shallow silicic magma body accompanied by voluminous eruptions of basalt. Between about 1 and 0.3 m.y. ago there were eruptions of high silica rhyolite from a deep-seated magma source beneath the Mineral Mountains together with primitive and strongly fractionated mafic magmas of the Cove Fort subprovince. Within this volcanic area are two localities, Roosevelt Hot Springs and Sulfurdale, which have high temperature waters at or near the surface. To the north in the Black Rock Desert, volcanism extended from 1.5 m.y to only several hundred years ago. The activity was dominated by basaltic eruptions, but the area contains the youngest known rhyolite body in Utah (0.4 m.y.). Volcanic vents are located along major crustal discontinuities in the Black Rock Desert, along ring fracture systems at Twin Peaks, and are aligned along trends of north-south normal faulting in the Mineral Mountains and Cove Fort areas. DOE

N87-11361# Kiruna Geophysical Inst. (Sweden).
A NEW METHOD OF ORGANIZING SPECTRAL LINE INTENSITY RATIO FLUCTUATIONS OF NIGHTGLOW EMISSIONS
B. Thelin Feb. 1986 17 p Submitted for publication
(KGI-Preprint-087; ISSN-0349-2656; ETN-86-97849) Avail: NTIS HC A02/MF A01

A linearization effect between atmospheric night airglow emissions is presented. A linear graph was obtained for atomic spectral lines and vibrational band spectra when the spectral line intensity ratio fluctuations were plotted versus the photon energies of these emissions. To study this effect, data from photometer investigations of night airglow emissions at different times and places were used. Results show that the Thelin (1986) method of analyzing relative line intensity ratio fluctuations in optical emission spectroscopy of laboratory plasmas is also suitable for the nightglow emissions of the upper atmosphere. ESA

N87-11362# Kiruna Geophysical Inst. (Sweden).
A NEW METHOD OF ORGANIZING SPECTRAL LINE INTENSITY RATIO FLUCTUATIONS OF AURORAL EMISSIONS
B. Thelin Feb. 1986 28 p
(KGI-Preprint-089; ISSN-0349-2656; ETN-86-97851) Avail: NTIS HC A03/MF A01

A linearization effect between atmospheric auroral emissions is presented. The same kind of effect is also found in nightglow emissions from photometer measurements and in the spectrochemical field from studies of optical light sources. Linear graphs were obtained for atomic spectral lines and vibrational band spectra

when the spectral line ratio fluctuations were plotted versus the photon energies of these emissions. The effect was studied with a spectrophotometer in auroral emissions; linear graphs are obtained. The studies of auroral light reveal the importance of the inelastic scattering cross section between electrons-atoms and electrons-molecules. The mean energy of the interacting thermal electrons that are active in the different auroral phases can be determined. ESA

N87-11363# Universite des Sciences et Techniques de Lille (France). Lab. d'Optique Atmospherique.
MODEL OF THE SOLAR RADIATION REFLECTED BY EARTH AND THE ATMOSPHERE BETWEEN 0.35 AND 4 MICRONS [MODELISATION DU RAYONNEMENT SOLAIRE REFLECHI PAR LATMOSPHERE ET LA TERRE ENTRE 0.35 ET 4 MICRONS]
P. Y. Deschamps, M. Herman, and D. Tanre Paris ESA Jan. 1983 178 p In FRENCH
(Contract ESA-4393/80-F-DD(SC))
(ESA-CR(P)-2254; ETN-86-98131) Avail: NTIS HC A09/MF A01

The optical phenomena produced by reflected infrared solar radiation are studied in order to formulate a model useful to satellite designers. The investigated problems include surface reflectance bands, gaseous absorption, and molecular and aerosol diffusion. A numerical model which represents the diffusion phenomena in a simple form and with high accuracy is presented, but the model's domain is restricted to weak concentrations of aerosols and it does not apply to clouds. Examples of satellite instrument corrections using the model are included. ESA

N87-11364# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 500, APRIL 1986. PART 2: (COMPREHENSIVE REPORTS). DATA FOR OCTOBER 1985 AND MISCELLANEA
H. E. Coffey, ed. Apr. 1986 36 p
(Contract N00014-86-F-0049)
(PB86-213873; SGD-500-Pt-2) Avail: NTIS HC A03/MF A01 CSCL 03B

The detailed index for 1985 to 1986, and the data for October 1985 (Meudon carte synoptique, solar flares, solar radio bursts at fixed frequencies, solar X-ray radiation from GOES satellite, mass ejections from the Sun, and active prominences and filaments) are given. GRA

N87-11365# National Geophysical Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 500, APRIL 1986. PART 1: (PROMPT REPORTS). DATA FOR MARCH 1986, FEBRUARY 1986 AND LATE DATA
H. E. Coffey, ed. Mar. 1986 98 p
(Contract N00014-86-F-0049)
(PB86-213865; SGD-500-Pt-1) Avail: NTIS HC A05/MF A01 CSCL 03B

The detailed index for 1985 to 1986; data for March 1986 (advance and worldwide IUWDS alert periods, solar activity indices, solar flares, solar radio emission, Vostok inferred interplanetary magnetic field polarity, Stanford mean solar magnetic field); data for February 1986 (solar active regions, sudden ionospheric disturbances, solar radio spectral observations, cosmic ray measurements by neutron monitor, geomagnetic indices, and radio propagation indices), and late data (cosmic ray measurements by neutron monitor January 1986, solar radio emission February 1986, geomagnetic indices, and calcium plage data) are given. GRA

N87-11366 Michigan Univ., Ann Arbor.
ESTIMATION OF SURFACE ALBEDO AND LIGHT ABSORPTION BY ATMOSPHERIC AEROSOLS UNDER CLEAR SKIES FROM DIGITISED GOES-EAST VISUAL IMAGES Ph.D. Thesis
James Robert Foreman 1986 242 p
Avail: Univ. Microfilms Order No. DA8612517

A method of estimating the Earth's surface albedo and the absorption of solar radiation by atmospheric aerosols from the energy balance with satellite visual images is discussed. A solution is proposed using the calibration of satellite imagery presented by Norton et al. (1980), the atmospheric corrections presented in Nack and Curran (1978) and the clear sky transmissivity model of Hoyt (1978). This method is tested on a set of data for twenty-three clear-sky cases in February, 1982 at the Hampton University Solar Measurement Site in Virginia. The albedos and aerosol light absorptions found are compared with various meteorological and illumination-viewing geometry variables, and the Hoyt (1978) model aerosol absorption predictions. The surface albedos showed a reasonable mean value of 0.177(+ or - 0.054) but showed no significant dependence on any of the parameters tested. They showed a positive dependence of the surface albedo on the solar zenith angle; however, that was low in significance but was in agreement with other work (e.g., Raschke et al., 1973). The aerosol absorptions show reasonable ensemble means in both direct and total solar radiation. Dissert. Abstr.

N87-11373 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
VERTICAL ENERGY FLUXES AND MERIDIONAL HEAT TRANSPORT IN THE NORTH ATLANTIC OCEAN [VERTIKALE ENERGIEFLUESSE UND MERIDIONALER WAERMETRANSPORT IM NORDATLANTIK]
H.-J. Isemer and L. Hasse *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 15-16 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11379 Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
ACCURACY ANALYSIS OF SATELLITE EXPERIMENTS FOR THE MEASUREMENT OF THE RADIATION BUDGET [EINE GENAUIGEKEITSANALYSE VON SATELLITENEXPERIMENTEN ZUR MESSUNG DER STRAHLUNGSBILANZ]
Rolf Stuhlmann, Heinrich Knottenberg, Ehrhard Raschke, and Matthias Wiegner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 29-30 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04A

N87-11382 GKSS-Forschungszentrum Geesthacht (West Germany).
SUBGRID PARAMETERIZATION IN FLOWS WITH HELICITY [SUBGRID-PARAMETRISIERUNG IN STROEMUNGEN MIT HELIZITAET]
M. Lautenschlager, D. Eppel, and W. C. Thacker *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 36-37 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11383 Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
MODELING OF RADIATION AND CLOUD CHARACTERISTICS FOR MODELS OF GENERAL CIRCULATION AND CLIMATE [UEBER DIE MODELLIERUNG VON STRAHLUNGS- UND WOLKENEIGENSCHAFTEN FUER MODELLE DER ALLGEMEINEN ZIRKULATION UND DES KLIMAS]
Burkhardt Rockel, Ehrhard Raschke, and Gaoxiang Zhao *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 38-39 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11385 Osnabrueck Univ. (West Germany). Inst. fuer Biologie/Chemie.
THE CARBON EXCHANGE BETWEEN ATMOSPHERE AND TERRESTRIAL BIOSPHERE [ZUM KOHLENSTOFFAUSTAUSCH ZWISCHEN ATMOSPHAERE UND TERRESTRISCHER BIOSPHAERE]
G. Esser *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference

on the Global Climate and Our Environment 1986 p 42-43 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11386 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
THE CALCULATION OF THE FLOW RESISTANCE OF OROGRAPHIC OBSTACLES USING A MESOSCALE MODEL [STROEMUNGSWIDERSTAND OROGRAPHISCHER HINDERNISSE MIT EINEM MESOSKALIGEN MODELL BERECHNET]
Stefan Emeis and Franz Fiedler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 44-45 In GERMAN Sponsored by Deutschen Forschungsgemeinschaft (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11389 GKSS-Forschungszentrum Geesthacht (West Germany).
A COMPARISON OF SEVERAL MODELS FOR THE CALCULATION OF GROUND TEMPERATURE AND GROUND MOISTURE [EIN VERGLEICH VERSCHIEDENER MODELLE ZUR BERECHNUNG DER BODENTEMPERATUR UND BODENFEUCHTE]
Martin Clausen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 50-51 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11390 Deutscher Wetterdienst, Offenbach am Main (West Germany).
MEASUREMENT, CALCULATION, AND PARAMETERIZATION OF ATMOSPHERIC HEAT RADIATION [MESSUNG, BERECHNUNG UND PARAMETRISIERUNG DER ATMOSPHAERISCHEN WAERMESTRAHLUNG]
G. Czeplak *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 52-53 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11394 Alfred-Wegener-Inst. for Polar Research, Bremerhaven (West Germany).
PHYSICAL PROCESSES IN THE ATMOSPHERIC BOUNDARY LAYER AT THE PACK-ICE BORDER [PHYSIKALISCHE PROZESSE IN DER ATMOSPHAERISCHEN GRENZSCHICHT AM PACKEISRAND]
Christian Wamser and Guenter Kellner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 60-61 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11395 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie.
ATMOSPHERIC PROCESSES AT THE BOUNDARY OF THE ANTARCTIC CONTINENT [ATMOSPHAERISCHE PROZESSE AM RANDE DES ANTARKTISCHEN KONTINENTS]
Christoph Kottmeier, Hans-Juergen Belitz, and Hans-Ulrich Stuckenberg *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 62-63 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11399 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
INTERACTIVE COUPLING OF OCEANIC TOP LAYER MODELS AND ATMOSPHERIC CIRCULATION MODELS [INTERAKTIVE KOPPLUNG VON OZEANISCHEN DECKSCHICHTMODELLEN AN ATMOSPHAERISCHE ZIRKULATIONSMODELLE]
Joachim Biercamp *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 74-75 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11400 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE EFFECTS OF MOUNTAINS ON BLOCKING IN A CIRCULATION MODEL. CONSIDERATION OF THE ANGULAR MOMENTUM BALANCE [GEBIRGSEFFEKTE BEI BLOCKBILDUNGEN IN EINEM ZIRKULATIONSMODELL. BETRACHTUNG DER DREHIMPULSBILANZ]
Guenter Fischer *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 76-77 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11402 Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
COUPLED OCEAN-ATMOSPHERE MODELS WITHOUT DRIFT OF THE PROGNOSTIC VARIABLES [GEKOPPELTE OZEAN-ATMOSPHAEREN-MODELLE OHNE DRIFT DER PROGNOSTISCHEN VARIABLEN]
Robert Sausen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 82-83 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11405 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE RESPONSE OF THE GLOBAL ATMOSPHERE TO THE EXTRAORDINARY EL NINO SEA SURFACE TEMPERATURE ANOMALY IN JANUARY 1983: SIMULATION [DIE ANTWORT DER GLOBALEN ATMOSPHAERE AUF DIE AUSSERGEWOEHNLICHE EL NINO MEERESOBERFLAECHENTEMPERATURANOMALIE IN JANUAR 1983: SIMULATION]
Hans vonStorch and Ulrich Cubasch *In* Deutscher Wetterdienst Reports of Meteorology No. 23: Proceedings of the German Meteorologists' Conference on the Global Climate and Our Environment 1986 p 92-93 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11406 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE RESPONSE OF THE TROPICAL ATMOSPHERE TO THE EXTRAORDINARY EL NINO SEA SURFACE TEMPERATURE ANOMALLY 1982-1983: OBSERVATION [DIE ANTWORT DER TROPISCHEN ATMOSPHAERE AUF DIE AUSSERGEWOEHNLICHE EL NINO MEERESOBERFLAECHENTEMPERATURANOMALIE 1982/83 - BEOBACHTUNG]
Hans vonStorch and Rolf Doberitz *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 94-95 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11408 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
THE SIGNIFICANCE OF INITIALIZATION FOR THE UNSTEADY SIMULATION OF MESOSCALE FLOWS [DIE BEDEUTUNG DER INITIALISIERUNG FUER DIE INSTATIONAERE SIMULATION MESOSKALIGER STROEMUNGEN]
Gerhard Adrian *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 98-99 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11409 GKSS-Forschungszentrum Geesthacht (West Germany).
THE DYNAMIC BASIC STRUCTURE OF THE GEESTHACHT

(WEST GERMANY) MESOSCALE MODEL [DAS DYNAMISCHE GRUNDGERUEST DES GEESTHACHTER MESOSKALENMODELLS]
D. Eppel and H. Kapitza *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 100-101 In GERMAN (For primary document see N87-11367 02-47)
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N87-11412 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie.
SOLAR RADIATION TRANSPORT IN REALISTIC ATMOSPHERES WITH 3-DIMENSIONAL CLOUD FIELDS [SOLARER STRAHLUNGSTRANSPORT IN REALISTISCHEN ATMOSPHAEREN MIT DREIDIMENSIONALEN WOLKENFELDERN]
Thomas Trautmann and Wilford Zdunkowski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 106-107 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11416 Technische Univ., Berlin (West Germany). Inst. fuer Geophysikalische Wissenschaften.
PHENOMENOLOGY OF THE EVOLUTION OF LARGE-SCALE BOUNDARY LAYER STRUCTURES [PHAENOMENOLOGIE DER EVOLUTION GROSSRAEUMIGER GRENZSCHICHSTRUKTUREN]
Hans-Joachim Lange *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 119-120 In GERMAN (For primary document see N87-11367 02-47)
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N87-11417 Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
NUMERICAL INVESTIGATION OF THE NONLINEAR DYNAMICS OF BOUNDARY LAYER ROLLS [NUMERISCHE UNTERSUCHUNGEN ZUR NICHTLINEAREN DYNAMIK VON GRENZCHICHTROLLEN]
Andreas Chlond *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 121-122 In GERMAN (For primary document see N87-11367 02-47)
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N87-11420 Freie Univ., Berlin (West Germany). Inst. fuer Geophysikalisches.
DESCRIPTION OF MATTER-RADIATION INTERACTIONS AS NONLINEAR IRREVERSIBLE PROCESSES [BESCHREIBUNG VON MATERIE-STRAHLUNG-WECHSELWIRKUNGEN ALS NICHT-LINEARE IRREVERSIBLE PROZESSE]
Ulrich Callies *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 131-132 In GERMAN (For primary document see N87-11367 02-47)
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N87-11422 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
INVESTIGATION OF THE APERIODIC BEHAVIOR OF THE SOUTHERN OSCILLATION USING METHODS OF NONLINEAR SYSTEMS ANALYSIS [UNTERSUCHUNG DES APERIODISCHEN VERHALTENS DER SOUTHERN OSCILLATION MIT METHODEN DER NICHTLINEAREN SYSTEMANALYSE]
Andreas Hense *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 135-136 In GERMAN (For primary document see N87-11367 02-47)
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N87-11435 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
THE INFLUENCE OF THE PLANETARY BOUNDARY LAYER ON THE VERTICAL STRUCTURE OF THE HORIZONTAL SIGHT UP TO A HEIGHT OF 300 M [DER EINFLUSS DER PLANETAREN GRENZCHICHT AUF DIE VERTIKALSTRUKTUR DER HORIZONTALSICHT BIS 300 M HOEHE]
Burkhard Pietzner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 166-167 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11440 Deutscher Wetterdienst, Offenbach am Main (West Germany).
SMALL SCALE AND SHORT TERM VARIABILITY OF GLOBAL RADIATION IN THE FEDERAL REPUBLIC OF GERMANY [KLEINRAEUMIGE UND KURZZEITIGE VARIABILITAET DER GLOBALSTRAHLUNG IN DER BUNDESREPUBLIK DEUTSCHLAND]
H. D. Behr *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 176-177 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11446 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
CANALIZATION OF THE ATMOSPHERIC FLOW THROUGH VALLEYS [KANALISIERUNG DER ATMOSPHAERISCHEN STROEMUNG DURCH TAELER]
Franz Fiedler and Stefan Emeis *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 190-191 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11449 Kiel Univ. (West Germany). Abteilung Maritime Meteorologie.
MEASUREMENTS IN THE GROUND LEVEL ATMOSPHERIC LAYER DURING THE EXPERIMENT PUKK [MESSUNGEN IN DER BODENNAHEN LUFTSCHICHT WAEHREND PUKK]
Gerd Hessler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 196-197 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11456 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
MODEL CALCULATIONS OF THE THERMALLY INDUCED MESOSCALE MOUNTAIN WIND CIRCULATION [MODELLRECHNUNGEN ZUR THERMISCH INDUZIERTEN MESOSKALIGEN GEBIRGSWINDZIRKULATION]
F. Somieski and H. Mannstein *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 212-213 In GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11457 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
ANALYSIS OF MESOSCALE TEMPERATURE AND TURBIDITY FIELD [ANALYSE VON MESOSKALIGEN TEMPERATUR- UND TRUEBUNGSFELDERN]
Thomas Viehoff *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 214-215 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11458 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
OROGRAPHIC INFLUENCE ON REGIONAL FLOW CONDITIONS, THE EXAMPLE OF THE NEUWIEDER BASIN. NUMERICAL SIMULATIONS [OROGRAPHISCHE BEEINFLUSSUNG VON REGIONALEN STROEMUNGSVERHAELTNISSEN AM BEISPIEL DES NEUWIEDER BECKENS -NUMERISCHE SIMULATIONEN]
Bernhard Vogel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 216-217 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11459 Institute for Meteorology and Water Economy, Cracow (Poland). Inst. fuer Meteorologie und Wasserwirtschaft.
EVOLUTION OF SODAR ECHOES AS A CLIMATOLOGICAL CHARACTERISTIC OF THE BOUNDARY LAYER [VERLAEUFE VON SODAR-ECHOS ALS KLIMATOLOGISCHE CHARAKTERISTIK DER GRENZSCHICHT]
Jacek Walczewski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 218-219 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N87-11367 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS OF METEOROLOGY, NO. 23: PROCEEDINGS OF THE GERMAN METEOROLOGISTS' CONFERENCE ON THE GLOBAL CLIMATE AND OUR ENVIRONMENT [ANNALEN DER METEOROLOGIE, NR. 23: DEUTSCHE METEOROLOGEN-TAGUNG 1986 DAS GLOBALE KLIMA UND UNSERE UMWELT]
1986 239 p Partly in GERMAN and ENGLISH Conference held in Muenster, West Germany, 14-17 Apr. 1986
(ISBN-3-88148-226-1; ISSN-0072-4122; ETN-86-97831)
Copyright. Avail: Issuing Activity
Climatological research observations, climatological processes, and climate models are presented. Nonlinear evolution processes in the atmosphere are treated. Physical oceanography, meteorological environment protection, and aeronautical meteorology are discussed. For individual titles, see N87-11368 through N87-11462.

N87-11368 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
VARIATIONS OF THE WATER VAPOR CONTENT IN THE LOWER TROPOSPHERE BETWEEN 20 DEG N AND 20 DEG S DURING THE LAST 20 YEARS [VARIATIONEN DES WASSERDAMPFGEHALTES IN DER UNTEREN TROPOSPHAERE ZWISHEN 20 DEG N UND 20 DEG S WAEHREND DER LETZTEN 20 JAHRE]
K. H. Weber, A. Hense, R. Glowienka-Hense, and H. Flohn *In* Deutscher Wetterdienst, Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 5-6 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity
Estimations on a quasiglobal basis of the long term variations of the water vapor content in the free atmosphere are presented. The estimations were made on the basis of the trend of the annual mean of the mixing ratio (i.e. humidity), at 700 hPa and 500 nPa in 20 tropical radiosonde stations. The trend of the annual mean of the temperature of the 200/850 hPa layer was also determined. Comparison of the results of different types of radiosondes and of geographically distributed stations is used to determine if the trends are real. A positive trend of the mixing ratio during the last 20 yr is found: 0.6 g/kg (i.e., 10%) at 700 hPa and 0.3 g/kg (i.e., 20%) at 500 hPa. ESA

N87-11369 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
THE STATISTICAL ESTIMATION OF PURE AND EQUIVALENT CO2 SIGNALS IN CLIMATOLOGICAL TIME SERIES [DIE STATISTISCHE ABSCHAETZUNG DES REINEN UND AEQUIVALENTEN CO2-SIGNALS IN KLIMATOLOGISCHEN ZEITREIHEN]
Christian-Dietrich Schoenwiese *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 7-8 In GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N87-11367 02-47)
Avail: Issuing Activity
Climatological models simulated the expected anthropogenic concentration increase of atmospheric trace gases, especially of CO2 and its greenhouse effect. The simulations were compared with statistical estimations based on observed climatological data and using a multiple regression model. The observed climatological parameters (mean annual values-time series) are the Northern Hemisphere temperature, sea surface temperatures, and global sea level fluctuations. Most of the model calculations are well verified by the regression calculations. ESA

N87-11370 Deutscher Wetterdienst, Offenbach am Main (West Germany).
LONG RANGE ATMOSPHERIC TRANSPORT OF ANTHROPOGENIC AEROSOLS IN AND THROUGH THE ARCTIC [ATMOSPHAERISCHER FERNTRANSPORT VON ANTHROPOGENEN AEROSOLEN IN UND DURCH DIE ARKTIS] **c45**
Wolfgang E. Raatz *In its* Reports of Meteorology, no. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 9-10 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity
The Arctic haze yearly occurring in the atmosphere during spring due to aerosols was investigated. The chemical composition of the aerosols shows that their origin lies in industrial areas at middle latitudes, i.e., long range atmospheric transport must occur. Increased aerosol concentrations are always observed during periods where an Arctic air mass is present; quasi-persistent circulation types were observed for several days, allowing transport across the Arctic. The origin of the transported air mass lies above industrial regions which are under the effect of an anticyclone characterized by drought and stability. Nine circulation types allowing such long range transport are identified. The circulation types show a seasonal variation. The transport is connected with wind velocities of 10 m/sec. The transport zones have a horizontal extent between 250 and 300 km and are at the level between 600 and 800 hPa. ESA

N87-11371 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
THE INFLUENCE OF VOLCANICS ON THE GROUND LEVEL AIR TEMPERATURE (1781-1984) [DER EINFLUSS DES VULKANISMUS AUF DIE BODENNAHE LUFTTEMPERATUR 1781-1984]
Peter Bissolli and Christian-Dietrich Schoenwiese *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 11-12 In GERMAN Sponsored by Deutschen Forschungsgemeinschaft (For primary document see N87-11367 02-47)
Avail: Issuing Activity
The cooling effect of the ground level air temperature due to volcanic activity was investigated. Mean annual temperature estimates for the period 1781 to 1984 were used as Northern Hemisphere temperature series for a statistical analysis. Measuring grid point data were used for regional investigations. The volcanics data time series show that after single especially strong eruptions

a cooling is observed. A correlation analysis of the volcanics parameter with the Northern Hemisphere temperature data shows a negative correlation for all parameters. The coherence between volcanics parameters and the Northern Hemisphere temperature data is mainly significant in the long term (greater than 40 yr) range. The coherence analysis with regional temperature series shows that the long term coherence is mainly significant for high geographical latitudes and continental climates. ESA

N87-11372 Deutscher Wetterdienst, Offenbach am Main (West Germany). Inst. fuer Meereskunde.
DIAGNOSTIC INVESTIGATIONS OF THE INTERTROPICAL CONVERGENT ZONE [DIAGNOSTISCHE UNTERSUCHUNGEN DER INNERTROPISCHEN KONVERGENZZONE]
Eberhard Ruprecht, Michael Hantel, and Peter Speth *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 13-14 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The intertropical convergent zone (ITCZ) in the Atlantic-African domain was investigated as to position and structure of the ITCZ, waves connected with the ITCZ, and budgets relative to the ITCZ. Above the ocean ITCZ position can be determined from METEOSAT pictures in the IR domain. The transition between the two main positions (from January till May, and from June till November) is abrupt. Above the African continent the position of the ITCZ is very difficult to determine due to orographic effects. The periods during which the easterly waves partially responsible for the development of disturbances in the ITCZ occur were determined. It is confirmed that position and intensity of the ITCZ above the ocean are essentially determined by the easterly wave paths. ESA

N87-11373 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
VERTICAL ENERGY FLUXES AND MERIDIONAL HEAT TRANSPORT IN THE NORTH ATLANTIC OCEAN [VERTIKALE ENERGIEFLUESSE UND MERIDIONALER WAERMETRANSPORT IM NORDATLANTIK] c46
H.-J. Isemer and L. Hasse *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 15-16 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A method to interpolate the climatological data set obtained by Bunker for the North Atlantic into a regular 1 deg map grid was developed. The data set contains the mean monthly fields of the meteorological basic parameters of many years, and the deduced energy and momentum flux on the ocean-atmosphere boundary. The meridional heat transfer determined from the fields of the resulting net energy transfer was used to check independently calculated energy fluxes. The value of the short-wavelength radiation above the ocean, calculated by Bunker, was corrected. The parameterization coefficients for latent and sensible heat flux used by Bunker were improved. The differences between the obtained net energy fluxes and meridional heat transport and those of Bunker are discussed. ESA

N87-11374 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
NORTH ATLANTIC OSCILLATION (NAO) IN GROUND PRESSURE AND ITS SIGNIFICANCE FOR THE ATLANTIC-EUROPEAN AREA [DIE NORDATLANTIK-OSZILLATION (NAO) IM BODENDRUCK UND IHRE BEDEUTUNG FUER DEN ATLANTISCH-EUROPAEISCHEN RAUM]
Rita Glowienka-Hense *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 19-20 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The correlation between ground pressure anomalies in the Atlantic Ocean and Europe were investigated. The study is based on a ground pressure series from 1881 till 1984. An isolated signal is filtered from the ground pressure series using a two-step spatial hierarchy and a model based on the fact that the European continent is essentially influenced by the quasistationary centers Ireland low and Azores high. The negative pressure correlation between both centers (existing at least during Winter) is called the NAO. The results show that the NAO is a phenomenon existing above the Atlantic Ocean during the whole year, and having a direct coupling with the European area at least from December till July. ESA

N87-11375 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
MULTIVARIATE STATISTICAL INVESTIGATIONS OF THE PALEOCLIMATOLOGY OF CENTRAL EUROPE [MULTIVARIATE STATISTISCHE UNTERSUCHUNGEN ZUR PALAEOKLIMATOLOGIE MITTELEUROPAS]
Wolfgang Birrong *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the Terman Meteorologists Conference on the Global Climate and Our Environment 1986 p 21-22 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The climate before the beginning of the instrumental era (about 1700) was studied using paleoclimatological information from the last millenium. The correlations between climatological variables and paleontological information were analyzed. Since the paleontological information has a botanic nature, the treated quantities are integrated over the growth period and depend on the evolution of climatological parameters during this period. The results show a positive correlation with the temperatures of the summer half-year, and a negative correlation with the temperature of the summer of the previous year. ESA

N87-11376 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
STATISTICAL ANALYSIS OF SECULAR TEMPERATURE SERIES [STATISTISCHE ANALYSE SAEKULARER TEMPERATURREIHEN]
Juergen Malcher *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 23-24 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04B

A statistical analysis of 114 time series of the temperature near the ground in Europe period 1881 to 1980 was performed. Homogeneity tests were made in order to separate nonmeteorological effects from real climatological effects. Investigations of temperature trends over many years show a complicated picture since the long term variations were not in phase all over Europe. As a measure for the spatial correlations between the observed temperature variations the range for which the correlation is decreased to 0.7 is used. The evaluation shows that this characteristic range continuously increases from low to high latitudes and from maritime to continental climates. The year-to-year temperature variability shows the same geographic behavior as the spatial coherence. The analysis of the persistence interval shows an opposite behavior. The spectral variance analysis of the time series is used to classify the spectra according to the regions. ESA

N87-11377 Technische Hochschule, Darmstadt (West Germany). Inst. fuer Meteorologie.
TIME SERIES ANALYSIS AND COMPOSITE ANALYSIS OF EQUATORIAL OBSERVATIONS FROM SHIPS [ZEITREIHEN- UND KOMPOSITANALYSE AEQUATORIALER SCHIFFSBEOBACHTUNGEN]
Heribert Fleer and Udo Schneider *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p25-26 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04B

Synoptic measurements from ships in the period 1872 to 1983 were studied in order to analyze the temporal and spatial distribution of the sea surface temperature and the wind in the tropical Pacific. The variance spectra of the time series of sea

surface temperature and zonal and meridional wind components show a broad maximum in a period domain of 2 to 7 y,. The composites of the fields of sea surface temperature and ground wind determined to investigate the development of El Nino events and reveal anomalies in sea surface temperature and wind components. ESA

N87-11378 Amt fuer Wehrgeophysik, Traben-Trarbach (West Germany).
A METHOD FOR CORRELATION ANALYSIS IN CLIMATOLOGY [ZUR METHODE DER KORRELATIONSANALYSE IN DER KLIMAFORSCHUNG]
Harald Weingaertner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 27-28 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04B

A measure of contingency was derived in order to determine the contingency between metrically, ordinally and nominally scaled random variables. A contingency coefficient was derived which is zero for completely stochastic independence between the variables, and one for complete dependence. The contingency measure is independent of the chosen classification and is distribution-free. For the special case of a two-dimensional gaussian distribution the contingency coefficient is equal to the classical correlation coefficients. The practical application of distribution-free contingency coefficients in climatology is explained by an autocorrelation analysis of general weather situations. ESA

N87-11379 Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
ACCURACY ANALYSIS OF SATELLITE EXPERIMENTS FOR THE MEASUREMENT OF THE RADIATION BUDGET [EINE GENAUIGEKEITSANALYSE VON SATELLITENEXPERIMENTEN ZUR MESSUNG DER STRAHLUNGSBILANZ] c46
Rolf Stuhlmann, Heinrich Knottenberg, Ehrhard Raschke, and Matthias Wiegner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 29-30 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04A

The sources of error as a function of different scanning geometrics in the Earth Radiation Budget Experiment are presented. The errors result from the filtering of the observed fields due to the limiter radiometer observation fields, and from the nonuniform distribution of measuring values within a region. Another difficulty is that satellites only measure twice per day above each region. The global error is estimated using an Earth radiation model. This is used to predict errors in dependence on shot statistics, satellite orbit, scanning geometry, measuring instrument, inversion algorithm, and approximation process. ESA

N87-11380 Hamburg Univ. (West Germany). Inst. fuer Meereskunde.
CLIMATE-EFFECTIVE TRANSPORT PROCESSES IN THE OCEAN [KLIMAWIRKSAME TRANSPORTPROZESSE IM OZEAN]
Jens Meincke *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 31-33 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04B

The roles of transport processes in the ocean in the climate, from a global and mesoscale point of view, are treated. The global thermohaline system (the largest coherent circulation system of the ocean) is presented. The climatologically most important aspect is the long term storage of anomalies of the heat, water, and gas budget in the declination regions. The poor accuracy of the estimates is expected to be improved by anthropogenic tracers and the measurements in the framework of the World Ocean Circulation Experiment. Mesoscale details of the water mass transformation in the European North Sea are discussed. The coupling between the oceanic transport processes and the climatological system is explained by an anomaly in the effect of the atmospheric conditions on the ocean. ESA

N87-11381 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
MEASUREMENT OF SUBSCALE CLIMATOLOGICAL PROCESSES BY DIAGNOSIS OF SCALED BUDGETS [MESSUNG SUBSKALIGER KLIMAPROZESSE DURCH DIAGNOSE SKALIGER HAUSHALTE]
Michael Hantel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on Global Climate and Our Environmentl 1986 p 34-35 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity CSCL 04B

The indirect measurement of subsynoptic quantities determined as residues of atmospheric budgets is discussed. Subscale fluxes (of mass, energy, momentum, trace elements) cannot be resolved by measuring systems, but have to be known due to the nonlinearity of the fluxes which means that point measurements are essentially not sufficient. The equation of specific moisture containing synoptically analyzed fields and the subsynoptic vertical moisture flux is discussed. Three subsynoptic heat fluxes were measured in the ALPEX-experiment with an accuracy of 30 W/sqm. Application of the method in the ocean results in the measurement of subsynoptic vertical fluxes in the free atmosphere by the diagnosis of synoptic budgets with a minimum of parameterization. ESA

N87-11382 GKSS-Forschungszentrum Geesthacht (West Germany).
SUBGRID PARAMETERIZATION IN FLOWS WITH HELICITY [SUBGRID-PARAMETRISIERUNG IN STROEMUNGEN MIT HELIZITAET] c46
M. Lautenschlager, D. Eppel, and W. C. Thacker *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 36-37 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A turbulence parameterization which emphasizes the turbulence vortex structure is presented. Rotational structures with helicity occurring in the atmosphere on a large scale were treated. Only the interaction between larger atmospheric vortices represented in the length scales of the grid of the numerical simulation model, and can be taken into account. The effect of the motion in the subgrid range which is not resolved in the grid has to be parameterized. The subgrid helicity is taken into account by developing the subgrid fluxes in terms of average, absolute vorticity. The terms containing helicity change the dispersive flow behavior. It is shown that positive helicity retards the transport of short waves, and that this parameterization stabilizes and intensifies rotating structures. ESA

N87-11383 Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
MODELING OF RADIATION AND CLOUD CHARACTERISTICS FOR MODELS OF GENERAL CIRCULATION AND CLIMATE [UEBER DIE MODELLIERUNG VON STRAHLUNGS- UND WOLKENEIGENSCHAFTEN FUER MODELLE DER ALLGEMEINEN ZIRKULATION UND DES KLIMAS] c46
Burkhardt Rockel, Ehrhard Raschke, and Gaoxiang Zhao *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 38-39 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The parameterization of the processes in clouds, playing a role in the energy budget of the climatological system is discussed regading general circulation models (GCM) and climate. The parameterization of cloud coverage and liquid water content does not meet the requirements of radiation transfer models in most of the climatological models. The structure of a cloud and radiation model (CRM) for circulation is described. The relations between

the component of the CRM and the GCM are explained. The GCM provides the input data required for the CRM. ESA

N87-11384 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

THE INTERACTION BETWEEN ADVECTION, RADIATION, TURBULENCE, AND MICROPHYSICS IN THE FORMATION OF ARCTIC STRATUS CLOUDS [ZUR FRAGE DER WECHSELWIRKUNG VON ADVEKTION, STRAHLUNG, TURBULENZ UND MIKROPHYSIK BEI DER BILDUNG ARKTISCHER STRATUSWOLKEN]

P. Wendling and J. E. Finger *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 40-41 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The formation of stratus clouds in the North Polar region is discussed. The determining factors for the formation of stratus clouds are the synoptic conditions and the polar ocean as a source of humidity which is enhanced during the summer months. In most cases stratus can only be formed in the Arctic regions when a depression or advection inversion is available and when warm humid air masses simultaneously flow in the central Arctic. A one-dimensional boundary layer model shows that after condensation and further growth of cloud droplets, a close interaction exists between the radiation characteristics of the Arctic stratus, its vertical extent, and its microphysical, properties (concentration and size distribution of the cloud elements); the important role of aerosols has to be taken into account. The role of entrainment in the formation and disintegration of Arctic stratus clouds is not clarified. Measurements in the Marginal Ice Zone Experiment are discussed. ESA

N87-11385 Osnabrueck Univ. (West Germany). Inst. fuer Biologie/Chemie.

THE CARBON EXCHANGE BETWEEN ATMOSPHERE AND TERRESTRIAL BIOSPHERE [ZUM KOHLENSTOFFAUSTAUSCH ZWISCHEN ATMOSPHAERE UND TERRESTRISCHER BIOSPHAERE] c46

G. Esser *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 42-43 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A model of the carbon flux in the terrestrial biosphere was developed. After coupling to an ocean and atmospheric model, this model was used to investigate the global carbon cycle. Anthropogenic effects from land use changes are taken into account in the model; another determining model criterion is the direct (CO_2-fertilization effect) and indirect (climate) effect of anthropogenic fossile carbon emissions. The model shows for the period 1860-1981 a release of 100 Gt carbon; the global phytomass is increased by 20 Gt due to the fertilization effect. Since 1860 the atmospheric CO_2-concentration increased by 283 ppm, a value which is confirmed by ice samples. ESA

N87-11386 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.

THE CALCULATION OF THE FLOW RESISTANCE OF OROGRAPHIC OBSTACLES USING A MESOSCALE MODEL [STROEMUNGSWIDERSTAND OROGRAPHISCHER HINDERNISSE MIT EINEM MESOSKALIGEN MODELL BERECHNET] c46

Stefan Emeis and Franz Fiedler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 44-45 In GERMAN Sponsored by Deutschen Forschungsgemeinschaft (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The integration of mesoscale obstacles in large scale flow models (numerical forecasting models) is discussed. The flow resistance consists of pressure and friction resistance; only the former is taken into account. The two-dimensional mesoscale model contains the complete momemtum and heat budget equations with a second order closure law for the turbulent flows. The perturbation pressure has a hydrostatic and a dynamic part. Lamination and orographic height were varied as external parameters in the simulation with the model for a single obstacle. In stable lamination the pressure distribution is asymmetric; in neutral lamination it is almost symmetric and the pressure resistance is several times smaller. ESA

N87-11387 Mainz Univ. (West Germany). Inst. fuer Meteorologie.

A TWO-DIMENSIONAL NUMERICAL MODEL FOR FOG PROGNOSIS [EIN ZWEIDIMENSIONALES NUMERISCHES MODELL ZUR NEBELPROGNOSE]

Renate Forkel and Wilford Zdunkowski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 46-47 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A two-dimensional fog model which can take into account relevant processes due to the large number of advective fog development possibilities and the strong local variations of fog, is presented. The atmospheric model provides a prognosis of temperature, global water concentration, aerosol concentration, and wind field. Fog formation in an urban area is described. The model allows sensitivity studies in the mesoscale domain, e.g., for the investigation of factors influencing the fog's life cycle. ESA

N87-11388 Amt fuer Wehrgeophysik, Traben-Trarbach (West Germany).

THE EVAPORATION OF SEVERAL TYPES OF VEGETATION AND ITS MODELING BY A SIMPLE INVENTORY CLIMATE MODEL [DIE VERDUNSTUNG VERSCHIEDENER VEGETATIONSTYPEN UND IHRE MODELLIERUNG DURCH EIN EINFACHES BESTANDKLIMAMODELL]

F. Wollenweber *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 48-49 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The evaporation of natural surfaces was simulated with an inventory climate model. The evaporation depends on biological parameters and meteorological factors. The vegetation inventory was treated in a six-layer model, with a heat budget equation for each inventory layer. The transpiration resistance essentially depends on the resistance of the leaf boundary layer and on the stomata resistance. The flow of latent heat via a vegetation inventory as a function of several parameters is explained. A potential evapotranspiration occurs if it is assumed that the plants can evaporate undisturbed. ESA

N87-11389 GKSS-Forschungszentrum Geesthacht (West Germany).

A COMPARISON OF SEVERAL MODELS FOR THE CALCULATION OF GROUND TEMPERATURE AND GROUND MOISTURE [EIN VERGLEICH VERSCHIEDENER MODELLE ZUR BERECHNUNG DER BODENTEMPERATUR UND BODENFEUCHTE] c46

Martin Clausen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 50-51 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The question of how complex a model for heat and water transport in the ground has to be in order to give a suitable prediction of the soil temperature and moisture, is treated. The model of Sievers et al deduces equations for the temperature, water vapor, and liquid water in the soil from the first fundamental law of thermodynamics and the conservation of mass. This model can be used as a reference for simpler models due to its completeness. McCumber and Pielke use in their mesoscale model a parametric model of the water and heat transport in the soil.

This model is not capable of describing the abrupt occurrence of the evaporation barrier. Very simple models of soil temperature and moisture are sufficient for short term predictions in dry weather and for long term predictions in heavy precipitation. ESA

N87-11390 Deutscher Wetterdienst, Offenbach am Main (West Germany).
MEASUREMENT, CALCULATION, AND PARAMETERIZATION OF ATMOSPHERIC HEAT RADIATION [MESSUNG, BERECHNUNG UND PARAMETRISIERUNG DER ATMOSPHAERISCHEN WAERMESTRAHLUNG] c46
G. Czeplak *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 52-53 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A parameterization formula for the atmospheric heat radiation was made using measurements with a pyrradiometer and radiosondes. The pyrradiometer measurements were compared with the radiation model applied to the radiosonde measurements. The results of the model calculations for a clear-air, nocturnal atmosphere agree well with the pyrradiometer measurements and with the Swinbank parameterization formula. A modified Swinbank formula for operational use is presented. A parameterization formula for the case of a cloudy sky was deduced. The available data are not sufficient for a statistical verification of the formulas. ESA

N87-11391 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
HEATING OF THE ATMOSPHERE BY PARTICLE ABSORPTION SHORT WAVELENGTH RADIATION [ERWAERMUNG DER ATMOSPHAERE INFOLGE ABSORPTION KURZWELLIGER STRAHLUNG IN TEILCHEN]
G. Haenel, R. Busen, and R. Schloss *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 54-55 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

In situ measurements of the solar radiation absorbed by particles in the atmosphere were performed. A measuring method for the particle volume absorption rate of short wave radiation was developed, allowing the experimental determination of the time dependence of the volume absorption rate and the concomitant heating rate of the atmosphere. Further climatologically important parameters can be estimated from the measurements. ESA

N87-11392 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
A COMPARISON BETWEEN DETAILED AND PARAMETERIZED FORMULATIONS OF DROPLET/DROPLET COAGULATION MECHANISMS [EIN VERGLEICH ZWISCHEN DETAILLIERTER UND PARAMETRISIERTER FORMULIERUNG VON TROPFEN/TROPFEN-KOAGULATIONSMECHANISMEN]
K. D. Beheng and G. Doms *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 56-57 In GERMAN Previously announced as N86-21572 (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The coagulation interaction between droplets in clouds in the formation process of precipitation is discussed. The coagulation mechanisms taken into account in the stochastic coagulation equation are autoconversion, accretion, and self collection of cloud droplets and raindrops. The stochastic equation provides a mathematical expression for the modification rates of any moment of the cloud droplet and raindrop part of the droplet distribution function, especially the modification rates of number and mass densities. The latter are compared with parameterization assumptions. As an example, the parameterization method of Kessler is presented. The detailed formulation for a numerical treatment requires an initial droplet spectrum depending on several parameters. The differences between parameterized and detailed rates of rainwater conversion by autoconversion and accretion are substantial. This comparison shows that the Kessler method is not suited for the parameterization of autoconversion and accretion. ESA

N87-11393 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
A SIMPLE PARAMETERIZATION SCHEME FOR THE DETERMINATION OF THE RELATIVE COVERAGE BY CUMULUS CLOUDS [EIN EINFACHES PARAMETRISIERUNGSSCHEMA ZUR BESTIMMUNG DER RELATIVEN BEDECKUNG DURCH CUMULUSWOLKEN]
Paul Becker *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 58-59 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A parameterization scheme which allows the calculation of relative cumulus coverage taking into account the upward-current air tube, the region with active clouds outside this tube (outer region), and decaying cloud material was developed. The scheme allows the determination of the degree of coverage as a function of the specific liquid water content in the cloud, the temperature, and the specific humidity. Good agreement is found between the calculated global coverage and satellite observations. ESA

N87-11394 Alfred-Wegener-Inst. for Polar Research, Bremerhaven (West Germany).
PHYSICAL PROCESSES IN THE ATMOSPHERIC BOUNDARY LAYER AT THE PACK-ICE BORDER [PHYSIKALISCHE PROZESSE IN DER ATMOSPHAERISCHEN GRENZSCHICHT AM PACKEISRAND] c46
Christian Wamser and Guenter Kellner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 60-61 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Measurements were performed from an ice breaker in the sea between Spitsbergen and Greenland in order to study phenomena at the sea ice border. The measurements show the effect of the sea surface characteristics on the development of the atmospheric boundary layer. The variance spectra of the vertical wind component show a strongly reduced turbulence above the ice and suggest intensive convection processes in the boundary layer above the sea which is treated from below. ESA

N87-11395 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie.
ATMOSPHERIC PROCESSES AT THE BOUNDARY OF THE ANTARCTIC CONTINENT [ATMOSPHAERISCHE PROZESSE AM RANDE DES ANTARKTISCHEN KONTINENTS] c46
Christoph Kottmeier, Hans-Juergen Belitz, and Hans-Ulrich Stuckenberg *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 62-63 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Time series of wind and temperature measurements were obtained at an Arctic weather station near the coast. The observed frequency distributions are explained by the predominant synoptic conditions. A quantitative explanation results from the analysis of a formulation of the boundary layer equations with a simple parameterization of friction and baroclinity. ESA

N87-11396 GKSS-Forschungszentrum Geesthacht (West Germany). Inst. fuer Physik.
SCALE-DEPENDENT MODELS FOR CLIMATOLOGY [SKALENABHAENGIGE MODELLE FUER DIE KLIMAFORSCHUNG]
Hartmut Grassl *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 64-66 In

GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Climatology models are introduced. The usual distinction between scales (synoptic or large scale domain, mesoscale or regional domain, microscale) is not always suited for the climatological processes; there is interaction between several system components of different extent. Measurements and numerical models are required to understand these interactions. In many applications the complete set of equations describing the climate model is strongly reduced, depending on the problem to be solved. ESA

N87-11397 Westfaelische Wilhelms Univ., Muenster (West Germany). Inst. fuer Geographie.
CLIMATE MODELS: THEIR APPLICATION IN THE INVESTIGATION OF TRACE GASES AND THE IMPACT ON CLIMATE [KLIMAMODELLE: IHRE ANWENDUNG IN DER SPURENGAS- UND WIRKUNGSFORSCHUNG]
Wilfrid Bach *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 67-71 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Applied climatology in the field of anthropogenic effects on the climate is reviewed. The presence in the atmosphere of the most important trace gases which have an effect on the absorption of sunlight is discussed. The hierarchy of climate models for the simulation of the impact of trace gases is presented; they can be roughly divided into thermodynamic and hydrodynamic models. The energy, carbon cycle, and climate models used to determine the transient response of the climate to CO_2 changes are explained. The contribution of trace gases to the increase of the soil temperature, and simulations for the case of CO_2 are explained. Climate scenarios for the study of the interactions between climate and society are discussed. ESA

N87-11398 Technische Univ., Munich (West Germany). Inst. fuer Meteorologie.
CLIMATE MODELS WITH STOCHASTIC EXCITATION [KLIMAMODELL MIT STOCHASTISCHER ANREGUNG]
Werner Metz *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 72-73 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The contribution of fast fluctuating small-scale (synoptic) phenomena (stochastic excitation) to the variance of atmospheric flow was studied with a climate model based on the quasigeostrophic approximation for a barotropic flow. The integration domain for the model covers the Northern Hemisphere. The observed atmospheric variance and blocking highs were simulated. It is shown that the mechanism of an excitation on synoptic scale is significant for the long term variability of the atmosphere. ESA

N87-11399 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
INTERACTIVE COUPLING OF OCEANIC TOP LAYER MODELS AND ATMOSPHERIC CIRCULATION MODELS [INTERAKTIVE KOPPLUNG VON OZEANISCHEN DECKSCHICHTMODELLEN AN ATMOSPHAERISCHE ZIRKULATIONSMODELLE] c46
Joachim Biercamp *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 74-75 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The inteactive coupling of oceanic and atmospheric models in the study of the interaction between ocean and atmosphere and its role in climate changes, is discussed. This interactive coupling leads to numerical problems due to the different reaction times of the media water and air, and errors due to feedback effects. The two applied models are presented. Empirical correction terms were applied in order to avoid errors due to coupling between the model components; the value of these terms is discussed. ESA

N87-11400 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE EFFECTS OF MOUNTAINS ON BLOCKING IN A CIRCULATION MODEL. CONSIDERATION OF THE ANGULAR MOMENTUM BALANCE [GEBIRGSEFFEKTE BEI BLOCKBILDUNGEN IN EINEM ZIRKULATIONSMODELL. BETRACHTUNG DER DREHIMPULSBILANZ] c46
Guenter Fischer *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 76-77 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Momentum balance equations were analyzed in order to study the effect of mountains on circulation blocking phenomena. In the vertically and zonally averaged angular momentum equation the mountain effect appears via an angular momentum acting via a pressure distribution which competes with the other moments and the flux divergence. Six blocking phenomena due to mountain effects were evaluated and are explained. ESA

N87-11401 Deutscher Wetterdienst, Offenbach am Main (West Germany).
CLOUD PARAMETERIZATION WITH A STATISTICAL METHOD [WOLKENPARAMETRISIERUNG MIT EINEM STATISTISCHEN VERFAHREN]
E. Heise *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 78-79 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The Sasamori (1975) diagnostic method for the calculation of cloud coverage and cloud liquid water content is discussed. This model strongly emphasizes the effect of the vertical velocity. The main assumption is that each atmospheric layer consists of a large number of air packages which have different vertical velocity (statistical distribution) due to turbulent phenomena. The cloud coverage mainly depends on the mean vertical velocity, while the variance has an important influence on the liquid water content. Mean value and variance are estimated in simulation experiments. Significant improvements in the liquid water content are obtained compared to other models. ESA

N87-11402 Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
COUPLED OCEAN-ATMOSPHERE MODELS WITHOUT DRIFT OF THE PROGNOSTIC VARIABLES [GEKOPPELTE OZEAN-ATMOSPHAEREN-MODELLE OHNE DRIFT DER PROGNOSTISCHEN VARIABLEN] c46
Robert Sausen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 82-83 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The avoidance of the drift of prognostic variables by a suitable correction of the fluxes between ocean and atmosphere was studied. This flux correction is explained by a schematic representation of a coupled ocean-atmosphere model. The efficiency of the correction is demonstrated with two examples. ESA

N87-11403 Westfaelische Wilhelms Univ., Muenster (West Germany). Inst. fuer Geographie.
SIMULATION OF THE EFFECT OF ATMOSPHERIC TRACE GASES ON THE GLOBAL AVERAGE TEMPERATURE DISTRIBUTION [SIMULATION DES EINFLUSSES ATMOSPHAERISCHER SPURENGASE AUF DIE GLOBAL GEMITTELTE TEMPERATURVERTEILUNG]
Hans J. Jung and Wilfrid Bach *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 86-87 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The dependence of simulated atmospheric temperature variations on the contribution of single gases and feedback

processes was calculated using a radiative-convective model. The interactions between tropospheric temperature gradients and moisture distribution and between temperature and cloud characteristics are emphasized. The soil temperature change in case of a doubling of the present trace gas concentrations was calculated. The dependence of soil temperature and global cloud coverage degree on the average vertical liquid water content and the duration of presence of H2O in the atmosphere is shown for the case of parameterization of cloud feedback effects. The results of sensitivity studies show that the feedback processes lead to a temperature increase between 1.5 and 2.6 K. ESA

N87-11404 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
SIMULATION OF THE CLOUD COVERAGE IN A CLIMATE MODEL [SIMULATION DER WOLKENBEDECKUNG IN EINEM KLIMAMODELL]
Erich Roeckner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 90-91 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A method for cloud parametrizations in climate models is discussed. The method is based on the separation of the continuity equations for the water vapor and liquid water of clouds. The suppositions for the time integration of the prognostic equations are given. The cloud parameterization method was tested in several hemispheric and global versions of an atmospheric circulation model. A comparison with observed data shows that all parameters simulated with the model are within the scatter. Test calculations show a difference between solar constants with and without clouds. ESA

N87-11405 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE RESPONSE OF THE GLOBAL ATMOSPHERE TO THE EXTRAORDINARY EL NINO SEA SURFACE TEMPERATURE ANOMALY IN JANUARY 1983: SIMULATION [DIE ANTWORT DER GLOBALEN ATMOSPHAERE AUF DIE AUSSERGEWOEHNLICHE EL NINO MEERESOBERFLAECHENTEMPERATURANOMALIE IN JANUAR 1983: SIMULATION] c46
Hans vonStorch and Ulrich Cubasch *In* Deutscher Wetterdienst Reports of Meteorology No. 23: Proceedings of the German Meteorologists' Conference on the Global Climate and Our Environment 1986 p 92-93 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The effect of the sea surface temperature anomalies occuring during El Nino phenomena on atmospheric circulation anomalies was investigated using a simulation calculation with a circulation model. The simulated response agrees well with the atmospheric anomalies observed in 1983. The control circulation experiment consists of 4 simulation calculations and is integrated over 10 yr. The tropical El Nino signal and the extratropical response (Northern Hemisphere; 500 mbar topography) are described. ESA

N87-11406 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
THE RESPONSE OF THE TROPICAL ATMOSPHERE TO THE EXTRAORDINARY EL NINO SEA SURFACE TEMPERATURE ANOMALLY 1982-1983: OBSERVATION [DIE ANTWORT DER TROPISCHEN ATMOSPHAERE AUF DIE AUSSERGEWOEHNLICHE EL NINO MEERESOBERFLAECHENTEMPERATURANOMALIE 1982/83 - BEOBACHTUNG] c46
Hans vonStorch and Rolf Doberitz *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 94-95 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The El Nino events in 1982-1983 were observed. The outgoing long wave radiation (OLR) was routinely measured by satellites. The results show that sea surface temperature (SST), precipitation, and soil pressure oscillate in phase; the correlations between them can be as high as 80% to 90%. Cloud distributions consistent with OLR anomalies are observed. ESA

N87-11407 Deutscher Wetterdienst, Offenbach am Main (West Germany).
MODEL SIMULATIONS OF THE COASTAL EXPERIMENT PUKK [MODELLSIMULATIONEN ZUM KUESTENEXPERIMENT PUKK]
H. W. Detering, D. Etling, and M. Wamser *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 96-97 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The coastal climate was simulated using a two-dimensional numerical mesoscale model. The starting points for the model calculations were the observed geostrophic wind and the temperatures at 2m height measured at several stations in the PUKK region. Significant differences between the calculated and the observed wind structures are found. The reasons are the inaccurate knowledge of the initial conditions and the suppositions concerning the parameterization of the turbulent vertical exchange in the development of the coastal boundary layer. It is shown that besides advection and radiation effects, diffusion phenomena in the lower atmospheric layers have to be well determined in the simulation of mesoscale phenomena. ESA

N87-11408 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.
THE SIGNIFICANCE OF INITIALIZATION FOR THE UNSTEADY SIMULATION OF MESOSCALE FLOWS [DIE BEDEUTUNG DER INITIALISIERUNG FUER DIE INSTATIONAERE SIMULATION MESOSKALIGER STROEMUNGEN] c46
Gerhard Adrian *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 98-99 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

An initialization method for mesoscale models is presented. This method determines the initial values required for unsteady simulations from measurements. The method is based on a variational system which enables spatial extrapolation and interpolation and takes into account the measured data at different times. A functional is defined, the minimum of which is determined. Comparison of simulations with mesoscale data bases show that in the mesoscale gamma the model simulations are determined by the initial values for many hours. Quantative predictions from simulations require an objective initialization method which determines the initial values from measurements. ESA

N87-11409 GKSS-Forschungszentrum Geesthacht (West Germany).
THE DYNAMIC BASIC STRUCTURE OF THE GEESTHACHT (WEST GERMANY) MESOSCALE MODEL [DAS DYNAMISCHE GRUNDGERUEST DES GEESTHACHTER MESOSKALENMODELLS] c46
D. Eppel and H. Kapitza *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 100-101 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

An atmospheric circulation model for the investigation of phenomena in the beta and gamma mesoscale domain was developed. The basic equations are the sound-wave-filtered momentum and energy equations, and the transport equations for air admixtures and for the different phases of the water cycle. The numerical grid can be nonequidistant in all three coordinate directions. The integration algorithm and the conditions which it has to fullfil are described. ESA

N87-11410 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

A MESOSCALE CLIMATE MODEL FOR THE INVESTIGATION OF ATMOSPHERIC FLOWS UNDER THE INFLUENCE OF OROGRAPHY, TURBULENCE, AND CLOUD PHYSICS [EIN MESOSKALIGES KLIMAMODELL ZUR UNTERSUCHUNG ATMOSPHAERISCHER STROEMUNGEN UNTER DEM EINFLUSS VON OROGRAPHIE, TURBULENZ UND WOLKENPHYSIK]

U. Schumann, T. Hauf, H. Hoeller, H. Schmidt, and H. Volkert *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 102-103 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The simulation model MESOSCOP for the study of the effect of mesoscale phenomena on the climate is presented. The model allows the calculation of three-dimensional, unsteady, and nonhydrostatic flows. The basis of the model are the differential balance equations for mass, momentum, and scalar components. Model suppositions for up to eight particle species are used in the cloud physics part. The equations are approximated on the basis of a staggered grid using finite differences. The computer programs have a modular structure according to a uniform scheme, and are vectorized for the Cray, although they can be used on any scalar computer. Preliminary tests show that MESOSCOP is suited for mesoscale climate studies

ESA

N87-11411 Mainz Univ. (West Germany). Inst. fuer Meteorologie.

NUMERICAL SIMULATION OF THE URBAN CLIMATE USING A 3-DIMENSIONAL MODEL [NUMERISCHE SIMULATION DES URBANEN KLIMAS MIT EINEM DREIDIMENSIONALEN MODELL]

Joachim Eichhorn, Reinhold Schrodin, and Wilford Zdunkowski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 104-105 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The simulation model Mainz Urban Simulation Model (MAUSI) for the study of the effects of city planning changes on the urban climate is presented. The model is three-dimensional in order to allow reliable forecasting in extremely inhomogeneous areas. The MAUSI is a nonhydrostatic, mesoscale, highly resolving forecasting model. It uses the equations of motion in their original form, Boussinesq approximated, with a divergence free flow field. The calculations performed for a model city demonstrate the efficiency of the model.

ESA

N87-11412 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie.

SOLAR RADIATION TRANSPORT IN REALISTIC ATMOSPHERES WITH 3-DIMENSIONAL CLOUD FIELDS [SOLARER STRAHLUNGSTRANSPORT IN REALISTISCHEN ATMOSPHAEREN MIT DREIDIMENSIONALEN WOLKENFELDERN]

c46

Thomas Trautmann and Wilford Zdunkowski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 106-107 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The transport of solar radiation (0.28 to 6 micron) in idealized rectangular clouds and regular, horizontally infinitely extended cloud fields with identical cloud elements was studied. The finite analytical model of Davies was used for the description of an isolated rectangular cloud. This model was extended to cloud fields and its limitations were approximately overcome by taking into account reflection on the Earth and water vapor absorption above and below the cloud field. The spectral integration over the solar spectrum was performed with the exponential fit method. The calculations show, in comparison with a nonreflecting Earth surface, an additional solar heating of maximum 0.3 to 0.4 K/hr at the lower boundary of the cloud elements due to multiple reflection between Earth (albedo 20%) and cloud field.

ESA

N87-11413 Technische Hochschule, Darmstadt (West Germany). Inst. fuer Meteorologie.

CONCLUSIONS FROM THE MIGRATION OF BARCHANS ON THE DOMINATING WIND CONDITIONS IN DESERT REGIONS [RUECKSCHLUESSE AUS DER WANDERUNG VON BARCHANEN AUF DIE VORHERRSCHENDEN WINDVERHAELTNISSE IN WUESTENGEBIETEN]

F. Wippermann and G. Gross *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 108-109 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The displacement of barchans was studied in order to determine the dominating wind behavior in a region. Barchans can only be formed where the wind has practically a constant direction. Precise measurements of a dune field with a time difference of a few years allow conclusions as to the dominating wind direction. The correlation between displacement velocity of barchans and the average wind velocity is still largely unexplained. The numerical simulation of the formation and displacement of barchans is explained.

ESA

N87-11414 Freie Univ., Berlin (West Germany).

THE INTERNAL MEMORY OF OPEN HYDRODYNAMIC SYSTEMS [DAS GEDAECHTNIS INTERN OFFENER HYDRODYNAMISCHER SYSTEME]

Heinz Fortak *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 110-114 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The treatment in spectral form of any complex hydrodynamic system (even consisting of partial systems) is explained. In the case of long term integrations, especially for composed systems with different time constants, memory effects have to be taken into account. Increasingly powerful computers open the possibility of a direct numerical integration of the molecular Navier-Stokes equations.

ESA

N87-11415 Marburg Univ. (West Germany). Fachbereich Physik.

TURBULENCE THEORY FROM A PRESENT-DAY POINT OF VIEW [THEORIE DER TURBULENZ AUS HEUTIGER SICHT]

c34

Siegfried Grossmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 115-118 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The rapid progress in the field of turbulence physics during the last decade is depicted. Transition from the turbulent to the laminar state, and the explanation of fully developed turbulence by means of the Navier-Stokes equation are discussed. Weak and strong turbulence are mentioned.

ESA

N87-11416 Technische Univ., Berlin (West Germany). Inst. fuer Geophysikalische Wissenschaften.

PHENOMENOLOGY OF THE EVOLUTION OF LARGE-SCALE BOUNDARY LAYER STRUCTURES [PHAENOMENOLOGIE DER EVOLUTION GROSSRAEUMIGER GRENZSCHICHSTRUKTUREN]

c46

Hans-Joachim Lange *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 119-120 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

A numerical barotropic two-layer model for the large scale dynamic interaction between the atmospheric boundary layer and the free atmosphere is presented. The atmospheric boundary is represented by the usual flat water equations, while the free

atmosphere equations are identical with the Ekman layer vertically integrated equations of motion and momentum. The model generalizes the classical Ekman pumping theory. It is shown that the environment imposes on the free boundary a compulsion to vertical momentum transport from above to below, and the structure formation, the appearance of a front, results from this compulsion. The analogy between this result and the synergetic theory of Benard convection is explained. ESA

N87-11417 Max-Planck-Inst. fuer Meteorologie, Hamburg (West Germany).
NUMERICAL INVESTIGATION OF THE NONLINEAR DYNAMICS OF BOUNDARY LAYER ROLLS [NUMERISCHE UNTERSUCHUNGEN ZUR NICHTLINEAREN DYNAMIK VON GRENZCHICHTROLLEN] c46
Andreas Chiond *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 121-122 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A two-dimensional spectral model was developed for the investigation of the nonlinear dynamics of rolls in an atmospheric boundary layer heated from below and enclosed by an inversion from above. The mathematical-physical basis are the Boussinesq approximated equations of motion, continuity, and heat transfer written in the form of balance equations for a horizontally homogeneous basic flow and a secondary circulation. Subscale processes are parameterized with a gradient supposition. The model can be used to investigate the conditions leading to the formation of convective flow models, and to predict the spatial and temporal structure of the convection above the critical value and the concomitant transport of properties. Calculated and measured profiles of the dimensionless vertical transport of momentum and temperature agree well. ESA

N87-11418 Freie Univ., Berlin (West Germany). Inst. fuer Geophysikalisches.
A NONLINEAR THEORY OF BAROCLINIC INSTABILITY [EINE NICHT-LINEARE THEORIE DER BAROKLINEN INSTABILITAET]
Peter Nevir *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 123-124 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A physical and mathematical model was developed in order to study the nonlinear evolution of a baroclinic weakly unstable wave. The model is a nonlinear extension of the quasi-geostrophic two-layer model of a baroclinic instability in the beta plane, in which friction is caused by Ekman layers on two fixed horizontal boundary planes. The model describes the growth of a barocline wave perturbation in a two-layer shear flow. The bifurcation method of multiple scales was used to derive the evolution of the wave amplitude in the case of a nonlinear baroclinic wave regime with and without frictional dissipation. ESA

N87-11419 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
EVOLUTION THEOREMS FOR DISSIPATIVE PROCESSES. GENERAL AND METEOROLOGICAL ASPECTS [EVOLUTIONSTHEOREME BEI DISSIPATIVEN PROZESSEN - GENERELLE UND METEOROLOGISCHE ASPEKTE]
Fritz Herbert *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 125-130 In GERMAN (For primary document see N87-11367 02-47)
(Contract DFG-HE-1243/1,2)
Avail: Issuing Activity

Evolution principles governing nonlinear irreversible processes which lead to the spontaneous formation of temporal and spatial structures are discussed. Entropy production plays a central role in dissipative nonequilibrium systems. The fundamental theorem of Glansdorff and Prigogine is explained. The minimum-entropy theorem can only be applied to a limited extent due to the nonlinearity of the meteorological processes. The stability behavior of the stationary state of nonlinear irreversible processes is discussed. The condensation growth of cloud droplets, and the energy transfer of unpolarized radiation are treated. It is shown that the thermodynamic behavior can lead to dissipative structure formation due to the effect of nonlinear irreversible processes. Questions raised by the introduction of radiation in the thermodynamics of nonequilibrium processes are discussed. ESA

N87-11420 Freie Univ., Berlin (West Germany). Inst. fuer Geophysikalisches.
DESCRIPTION OF MATTER-RADIATION INTERACTIONS AS NONLINEAR IRREVERSIBLE PROCESSES [BESCHREIBUNG VON MATERIE-STRAHLUNG-WECHSEL WIRKUNGEN ALS NICHT-LINEARE IRREVERSIBLE PROZESSE] c46
Ulrich Callies *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 131-132 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The consideration of interactions between matter and radiation in meteorological phenomena is discussed. The treatment of the radiation field as an independent thermodynamic subsystem opens up all theorems of the theory of irreversible processes for the global system Earth-atmosphere, and eliminates difficulties concerning the formulation of boundary conditions. The theoretical treatment and the numerical modeling of the entropy production due to solar radiation is explained. The nonlinearity of the system excludes the validity of the minimum-entropy principle. ESA

N87-11421 Deutscher Wetterdienst, Offenbach am Main (West Germany).
THERMODYNAMIC ASPECTS OF THE ABSORPTION OF GAS IN DROPLETS [THERMODYNAMISCHE ASPEKTE DER GASAUFNAHME IN TROPFEN] c77
Ulrike Wacker *In its* Reports of Meteorology, No. 23. Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 133-134 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The simultaneous absorption-desorption of several partial trace gases by droplets in the atmosphere was investigated. A general equation for the mass absorption rate of a droplet was derived by considering a closed global system consisting of two open subsystems, namely a droplet and a gas mixture. This general equation can be applied to any gas since it does not contain any assumption which is valid only for specific gases. The time evolution of the gas absorption and the acidification of raindrops can be simulated in order to study formation of acid rain. In order to demonstrate the mutual effect of two gases, the example of the simultaneous absorption/desorption of water vapor and SO2 is treated. ESA

N87-11422 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
INVESTIGATION OF THE APERIODIC BEHAVIOR OF THE SOUTHERN OSCILLATION USING METHODS OF NONLINEAR SYSTEMS ANALYSIS [UNTERSUCHUNG DES APERIODISCHEN VERHALTENS DER SOUTHERN OSCILLATION MIT METHODEN DER NICHTLINEAREN SYSTEMANALYSE] c46
Andreas Hense *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 135-136 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A method for the analysis of measured time series of the Southern Oscillation (SO) was developed in order to explain the aperiodic, chaotic behavior of the SO. The time evolution of the system with n components (degrees of freedom) is described by points in an abstract n-dimensional phase space. When all trajectories coincide (for time tending to infinity), this multitude is called an attractor. The method was applied to time series of the

monthly means of soil pressure, precipitation, and water surface temperatures. The results show that the aperiodic behavior of the SO can be explained by the existence of a singular attractor of fractional dimension 4.2. The method gives no hints as to which variable is dominating, and thus gives no contribution to the physical understanding of the SO. The method only provides an additional verification aid for the modeling of the SO. ESA

N87-11423 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE VENTILATION OF THE WARM WATER SPHERE IN THE NORTH ATLANTIC OCEAN [DIE VENTILATION DER WARMWASSERSPHAERE IM NORDATLANTIK] c48
G. Siedler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 137-140 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The ventilation of water and its significance for the coupled system ocean-atmosphere and for short term climate variations was studied. Ventilation was considered in the general sense of water renewal with changes in the state variables temperature, salt content, and concentration of other dissolved substances. Water renewal in winter is described; the warm water sphere consists of a surface layer with a typical thickness between 20 and 50 m. Transport and mixing below the surface layer are discussed. The dominating time scales for the interaction between atmosphere and ventilated water layers are presented. ESA

N87-11424 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE DEVELOPMENT OF THE SUBTROPICAL MODE-WATER, SIMULATED USING A SURFACE LAYER INTEGRATED ALONG A TRAJECTORY [DIE ENTSTEHUNG DES SUBTROPISCHEN MODE-WASSERS, SIMULIERT MIT EINEM ENTLANG EINER TRAJEKTORIE INTEGRIERTEN DECKSCHICHTMODELL] c48
Wolfgang Barkmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 141-142 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The formation of the subtropical mode-water (or 18C water) was simulated by Lagrangian integrations of a one-dimensional surface layer model. The model is an integral one of the Kraus-Turner type. The absorption of solar radiation in the ocean was calculated with parameterizations. The variation of the surface layer depth and the depths of chosen isopycnics along a trajectory were calculated. The variation along a trajectory of the difference between the yearly maximum surface layer depth of two consecutive years, and the yearly deepening along the trajectory of the surface layer by Ekman pumping are shown. The zone where the subtropical mode-water is formed during spring heating is shown. The inaccuracies of the surface fluxes and the trajectories, as well as the supposed barotropic flow limit the value of a quantitative prediction. ESA

N87-11425 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
DETERMINATION OF THE CIRCULATION IN THE NORTH ATLANTIC OCEAN FROM CLIMATOLOGICAL DATA [BESTIMMUNG DER ZIRKULATION DES NORDATLANTIK AUS KLIMATOLOGISCHEN DATEN] c48
Manfred Wenzel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 143-144 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A three-dimensional velocity field for the North Atlantic was determined using the modified beta-spiral method and a climatological data set for temperature and salinity. The method is based on the thermal wind relation and the geostrophic vorticity balance for the determination of the baroclinic part of the single momentum components. The resulting velocity field is essentially the classical representation of the circulation in the North Atlantic. Single flow bands are strongly spread out due to the climatological approximation to the mean of the data set. ESA

N87-11426 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE CORRELATION BETWEEN WIND AND THE TRAJECTORIES OF SATELLITE-POSITIONED DRIFT BUOYS [ZUR KORRELATION VON WIND UND DEN TRAJEKTORIEN SATELLITENGEORTETER TRIFTBOJEN] c48
Juergen Stahlmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 145-146 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Satellite-positioned drift buoys were used in the North Atlantic in order to examine the relation between wind and drift flow induced by wind. The parameters for the description of this relation are the deflection angle between wind direction and drift flow, and the relation between drift flow and wind shear. A correlation which is independent of the sea zone is obtained by choosing a suitable spectral window which only contains the frequency domain where wind is the only dominating excitation. The results agree with Ekman theory. It was possible to separate the energy maxima due to inertia oscillations and to tides. ESA

N87-11427 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
SATELLITE OBSERVATIONS OF ATMOSPHERICALLY DETERMINED CHANGES OF THE OCEAN SURFACE TEMPERATURE [SATELLITENBEOBACHTUNGEN ATMOSPHAERISCH BEDINGTER AENDERUNGEN DER OBERFLAECHENTEMPERATUR DES OZEANS] c48
Lothar Stramma *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 150-151 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Satellite observations in the IR domain were performed in order to study the heating of the sea surface temperature and the cooling after the passage of hurricanes in the western North Atlantic Ocean. Data taken from the NOAA-7 satellite were corrected for atmospheric effects and for the angle of inclination during the measurement. Comparisons with a temperature sensor 0.6 m under the sea surface were made in order to examine diurnal variations. Large diurnal variations occur in case of strong solar radiation and simultaneous weak wind force. Hurricanes were observed to cause an irreversible mixing of the ocean's surface and transition layers leading to a cooling of the surface layer. The combination of satellite observations and in situ measurements in the ocean is shown to be useful for the study of the interaction between atmosphere and ocean. ESA

N87-11428 Freie Univ., Berlin (West Germany). Inst. fuer Geophysikalische.
A STATISTICAL METHOD FOR PREDICTION OF POLLUTANT EMISSION [EINE STATISTISCHE METHODE ZUR IMMISSIONSPROGNOSE] c45
Detlef Carius *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 152-153 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A statistical method for the prediction of air pollution was developed. The particle motions in an atmospheric turbulence field were approximately composed of piecewise rectilinear motions, the successions of which were statistically treated. The resulting general transport equation of the turbulent diffusion is solved with a Monte Carlo method, the advantages and disadvantages of which are discussed. Results show realistic distributions. ESA

N87-11429 Technische Univ., Munich (West Germany). Lehrstuhl fuer Bioklimatologie und Angewandte Mete.
THE ENERGY BALANCES OF SELECTED TYPES OF SURFACE IN THE MUNICH URBAN AREA [DIE ENERGIEBELANZEN VON

AUSGEWAEHLTEN OBERFLAECHENARTEN IM STADTGEBIET VON MUENCHEN]
Richard Amtmann and Helmut Mayer *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 154-155 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The energy balances of several urban surface types within the urban canopy layer were investigated. The energy balance equation of a surface contains the radiation balance, the soil heat flow, and the flow of sensible and latent heat. The diurnal variations of the different energy flows for a surface of the type meadow and one type of granite plate are discussed. ESA

N87-11430 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
NUMERICAL SIMULATION OF THE TURBULENT DIFFUSION ABOVE A ROUGH TERRAIN [NUMERISCHE SIMULATION TURBULENTER DIFFUSION UEBER UNEBENEM GELAENDE] **c45**
Michael Wamser and Hans-Dieter Haenel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 156-157 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A numerical model for the simulation of the propagation of pollutants in the atmosphere is presented. The normalized concentration distribution was simulated for a 120 m high source in the lee of a Gaussian hill; a general increase of the values in the soil is found compared to a flat terrain. This result qualitatively agrees with wind tunnel test results. The model results show that the Monte Carlo method is successful in complex flow situations, but needs an improved formulation of the turbulence parameters in case of inhomogeneous turbulence conditions. ESA

N87-11431 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
POSSIBLE FIELDS OF APPLICATION OF THE WIND TUNNEL FOR THE SOLUTION OF MICROMETEROLOGICAL PROBLEMS [EINSATZMOEGLICHKEITEN DES WINDKANALS BEI DER LOESUNG MIKROMETEOROLOGISCHER PROBLEME]
Michael Schatzmann, Gert Koenig, and A. Lohmeyer *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 158-159 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Wind tunnel tests were performed in order to provide an analog model of micrometeorological phenomena inside the atmospheric boundary layer. The wind velocity vector is parallel to the isobars and an equilibrium boundary layer at constant height can be made. The vertical velocity distribution can be reproduced, but the rotation of the wind vector with height cannot be realized. The boundary layer turbulence characteristics can be reproduced above a critical Reynolds number. ESA

N87-11432 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
DISPERSION OF ACCIDENTALLY RELEASED HEAVY GASES [AUSBREITUNG STOERFALLARTIG FREIGESETZTER SCHWERER GASE] **c45**
Gert Koenig and Michael Schatzmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 160-161 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Wind tunnel tests were performed for the physical modeling of the diffusion of accidentally released gases which are heavier than air. The modeling laws for the simulation of flow phenomena in wind tunnels were simplified for the case of a spontaneous release of a volume of heavy gas under standard conditions. Probes for the measurement of extremely fluctuating heavy gas concentrations were developed. Comparisons between model results and the results of field tests show good agreement. ESA

N87-11433 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
ICE ACCRETION DEPENDENCE ON CLOUD PHYSICAL PARAMETERS [DER EISANSATZ IN ABHAENGIGKEIT VON WOLKENPHYSIKALISCHEN PARAMETERN]
Hans-Eberhard Hoffmann and Roland Roth *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 162-163 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Ice deposition was investigated in order to determine flight limitations due to icing, and to verify forecasting methods and ice accretion models. A Do-28 aircraft was equipped for icing research to determine the cloud physical parameters, liquid water content, temperature, particle size, and particle phase. The effects of the icing-relevant cloud physical parameters on the accretion of ice below the Ludlam limit were determined by regression. ESA

N87-11434 Deutscher Wetterdienst, Offenbach am Main (West Germany).
ICE ACCRETION CALCULATIONS ON CYLINDRICAL RODS FOLLOWING THE BAIN MODEL, AND COMPARISON WITH EXPERIMENTAL RESULTS (FUCHS, SCHICKEL, KALUZA, UWIRA, 1985) [EISANSATZBERECHNUNGEN AN ZYLINDRISCHEN STAEBEN NACH DEM BAIN-MODELL UND VERGLEICH MIT EXPERIMENTELLEN ERGEBNISSEN]
Werner Fuchs *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 164- 165 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Measurements were performed from a DO-28 aircraft in zones of natural icing in order to determine the parameters required for the model of Bain (1980) which calculates the icing degree on cylindrical rods. These parameters are atmospheric pressure and temperature, size and number of cloud elements, flow velocity, and rod diameter. The Bain model simplifies a model for pure water clouds. Good agreement is found between calculated and measured icing velocities. ESA

N87-11435 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
THE INFLUENCE OF THE PLANETARY BOUNDARY LAYER ON THE VERTICAL STRUCTURE OF THE HORIZONTAL SIGHT UP TO A HEIGHT OF 300 M [DER EINFLUSS DER PLANETAREN GRENZCHICHT AUF DIE VERTIKALSTRUKTUR DER HORIZONTALSICHT BIS 300 M HOEHE] **c46**
Burkhard Pietzner *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 166-167 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The visual range was measured for the investigation of the effect of the planetary boundary layer on the visual profile and for the development of a horizontal visual climatology. The standard visual range was measured on a radio relay mast from fall 1982 till spring 1985 at a height of 2, 9, 80, 153, 223, and 297 m. The vertical structure of the visual range is determined by the vertical gradient of the aerosol concentration and on the relative humidity: both parameters depend on the dominating air masses and on the general weather situation. Rapid variations of the sight profile related to the formation and disintegration of mist, and to the passage of fronts were determined. The diurnal variation of the visual profile as a function of the general weather situation was determined. ESA

N87-11436 Amt fuer Wehrgeophysik, Traben-Trarbach (West Germany).
OPERATIONAL MESOSCALE CEILING ANALYSIS AND FORECASTING USING STATISTICAL CLIMATOLOGICAL METHODS [OPERATIONELLE MESOSKALIGE CEILINGANALYSE UND -VORHERSAGE MIT HILFE STATISTISCH-KLIMATOLOGISCHER METHODEN]
Hans-Joachim Pistorius *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 168-169 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

An operational, objective, computer aided ceiling analysis method was developed. The analysis time points are the synoptic terms at distances of 3 hr each. The analysis domain covers a grid with 100 X 80 points and a mesh distance of 25 km. The grid orography contains 15 height steps. The ceiling analysis is based on the correction method. Preanalysis proves to provide a good first guess. The correction results from the difference between observation and first guess and is weighed as a function of the distance between range and grid point. The graphical presentation of the analysis, sensitivity experiments with different weightings, and an objective verification of the analysis are presented. Ceiling forecasting using first order Markov processes and principal components analysis is explained. ESA

N87-11437 Freie Univ., Berlin (West Germany).
THE INFLUENCE OF WEATHER-ACTIVE FRONTS ON VISUAL FLIGHT CONDITIONS [DER EINFLUSS VON WETTERAKTIVEN FRONTEN AUF SICHTFLUGBEDINGUNGEN]
Manfred Geb, Carsten Lindemann, and Werner Wehry *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 170-171 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Structured information describing the effects of weather-active fronts on visual flight conditions was provided. A potential cloud lower level and the effective ridge height of a wood were considered to determine dangerous levels of visual perception. The leeward and windward side are recognized. The results show that it is necessary to evaluate a broader set of cases with weather-active fronts, and to incorporate experiences of local weather advisers, fine-mesh radar data, and special flight measurements. ESA

N87-11438 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
HYDROLOGICAL BEHAVIOR PATTERN OF ISOLATED LAKES AND THEIR ROLE IN PALEOCLIMATOLOGY [HYDROLOGISCHE VERHALTENSMUSTER VON ABFLUSSLOSEN SEEN UND IHRE ROLLE IN DER PALAEOKLIMAFORSCHUNG]
L. J. Adams and G. Tetzlaff *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 172-173 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The amount of precipitation at isolated lakes was determined to study the paleoclimate. The terms of the water balance equation of a lake in a stable climate (no water level change) can be determined using suitable models. The estimation of the radiation balance is used to determine the evaporation and calculate the precipitation by iteration. Southern West Africa is an application region for paleoclimatological investigations. The application of the model to Lake Ine Kousamene together with several deduced, consistent meteorological and hydrological data shows that 9000 yr ago the precipitation (600 mm/year) was substantially higher then today (75 mm/year). ESA

N87-11439 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
MODELING OF MESOSCALE PROCESSES AT OCEANIC FRONTS [MODELLIERUNG MESOSKALIGER PROZESSE AN OZEANISCHEN FRONTEN]
Aike Beckmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 174-175 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The instability processes occurring at frontal jets were investigated using a quasi-geostrophic multilevel model. The growth rates of unstable frontal waves is shown to strongly depend on the given vertical structure of the flow field. The essential dynamic processes in the fronts appear to be correctly treated in the model. The flow field structure explains meridional heat transfer due to baroclinic instability. ESA

N87-11440 Deutscher Wetterdienst, Offenbach am Main (West Germany).
SMALL SCALE AND SHORT TERM VARIABILITY OF GLOBAL RADIATION IN THE FEDERAL REPUBLIC OF GERMANY [KLEINRAEUMIGE UND KURZZEITIGE VARIABILITAET DER GLOBALSTRAHLUNG IN DER BUNDESREPUBLIK DEUTSCHLAND] c46
H. D. Behr *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment (date) p 176-177 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Methods for the estimation of small scale and short term deviations from the mean values obtained by the global radiation measuring network are presented. This estimation is necessary for solar energy plants because the density of the station network and the time resolution of the measured data cannot arbitrarily be increased. Mean diurnal variations and standard deviations of the hourly sums of the global radiation; mean annual variations of the radiation asymmetry morning-afternoon; and the correlation between the daily sum of global radiation in two stations are shown. ESA

N87-11441 Hamburg Univ. (West Germany). Inst. fuer Meteorologie.
VERIFICATION OF A CUMULUS-CONVECTION PARAMETERIZATION USING DATA SETS FROM TROPICAL AND MEDIUM LATITUDES [VERFIKATION EINER KUMULUS-KONVEKTIONSPARAMETRISIERUNG UNTER VERWENDUNG VON DATENSAETZEN AUS TROPISCHEN UND MITTLEREN GEOGRAPHISCHEN BREITEN]
Helga Behr *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 178-179 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A scheme for the parameterization of cumulus convection was tested using two data sets. The data was taken in the tropical eastern Atlantic (composite easterly waves) during GATE 1974 and during a cold air outbreak above the North Sea in the KONTUR 1981 experiment. The influence of the convective processes on the large scale environment was investigated by heat budget analyses. The observed data and the simulated results agree in both cases. ESA

N87-11442 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
BOUNDARY LAYER INVESTIGATIONS AND AEROLOGICAL MEASUREMENTS AT THE ANTARCTIC RESEARCH STATION GEORG VON NEUMAYER [GRENZSCHICHTUNTERSUCHUNGEN UND AEROLOGISCHE MESSUNGEN AN DER ANTARKTISFORSCHUNGSSTATION GEORG VON NEUMAYER]
H.-J. Belitz, H.-U. Stuckenberg, and Ch. Kottmeier *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 180-181 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The atmosphere including the Antarctic snow surface, and the

ground level boundary layer up to a height of 25 km was investigated. The characteristic boundary layer parameters were determined from measurements of wind velocity, wind direction, air temperature, air humidity, atmospheric pressure, insolation, global radiation, reflected short-wave radiation, and radiation budget. Aerological measurements were performed during radiosonde ascents. The pronounced temperature inversion in the lower troposphere during wintertime, due to radiation losses of the snow surface was clearly observed; a marked tropopause was not observed. Only a very weakly pronounced temperature inversion occurs during summertime; the tropopause is markedly present. The cooling of the stratosphere is substantially less pronounced in winter than in summer. ESA

N87-11443 Deutscher Wetterdienst, Offenbach am Main (West Germany). Abteilung Klimatologie.

CLIMATOLOGICAL DATA OF THE FEDERAL REPUBLIC OF GERMANY [KLIMADATEN DER BUNDESREPUBLIK DEUTSCHLAND]

J. Behrendt and B. Benesch *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 182-183 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The activities of the German weather service are reviewed. The historical evolution of meteorological measurements since the mid 18th century is depicted. The archives of meteorological data and the data processing systems are described. The computer-aided information systems for the documentation of all climatological and climate-relevant data are explained. ESA

N87-11444 Kiel Univ. (West Germany). Inst. fuer Meereskunde.

LOCAL OPTIMAL DETERMINATION OF THE WIND FIELD ON SEA FROM WIND AND PRESSURE OBSERVATIONS USING AN INVERSE METHOD [LOKAL OPTIMALE BESTIMMUNG DES WINDFELDES AUF SEE AUS WINDUND DRUCKBEOBACHTUNGEN MIT EINER INVERSMETHODE]

Ulla Ennenga and Lutz Hasse *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 184-185 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

A method for the high-resolution analysis of wind fields on the basis of synoptic ground observations was developed. The method, which was applied to the North Atlantic Ocean, is based on a local optimization via the adjustment of pressure and wind data with polynomial planes using a boundary layer relation. A local measure of the reliability of the analysis characterizes uncertainties due to the asymmetrically varying data distributions. This analysis reduces the rms deviation between independent observations and analyzed fields. The systematic error of the mean wind velocity is also lower after adjustment. The method allows in a relatively simple way to take into account wind data of different systems with consideration of a weighting corresponding to the accuracy of the data. ESA

N87-11445 Hamburg Univ. (West Germany). Inst. fuer Meereskunde.

SYNOPTIC FLOW FIELDS IN FRONT OF THE NORWEGIAN WEST COAST, MEASURED WITH A HIGH FREQUENCY RADAR [SYNOPTISCHE STROEMUNGSFELDER VOR DER WESTKUESTE NORWEGENS, GEMESSEN MIT EINEM HOCHFREQUENZ-RADAR]

Heinz-H. Essen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 186-187 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

Radar measurements were performed in the Norwegian channel using the measuring system Coastal Oceanic Dynamics Application Radar (CODAR). The wavelengths of the utilized decametric waves correspond to those of the motion of the sea and of the surface flows which effect this motion. The measuring system uses the backscattered HF waves. The Doppler shift is determined by the phase velocity of the scattering sea waves. The CODAR system consists of two radar stations which measure the radial flow component. The spatial resolution is 3 km; the vertical and time approximation to the mean is 0.5 m and 18 min respectively. The CODAR measurements, performed in parallel with hydrographic investigations show complicated flow patterns with several vortices occurring during a measuring period. ESA

N87-11446 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.

CANALIZATION OF THE ATMOSPHERIC FLOW THROUGH VALLEYS [KANALISIERUNG DER ATMOSPHAERISCHEN STROEMUNG DURCH TAELER] c46

Franz Fiedler and Stefan Emeis *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 190-191 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

Numerical simulations were performed using a two-dimensional mesoscale model in order to investigate for which land dimensions the transition from a canalization parallel with the valley to a rotational flow can be expected. The model is nonhydrostatic and takes into account the orography as boundary condition via a coordinate transformation. The model calculates the pressure resistance of typical land forms. An essential feature of the simulations is the strong canalization in the case of a broad (20 km) valley. The narrower the valley, the stronger the flow pattern is determined by the friction forces and thus the more the flow in the direction of the valley is reduced. ESA

N87-11447 Technische Hochschule, Darmstadt (West Germany). Inst. fuer Meteorologie.

CHANGE OF THE LOCAL CLIMATE BY DEFORESTATION. A NUMERICAL SIMULATION EXPERIMENT [VERAENDERUNG DES LOKALKLIMAS DURCH ABHOLZUNGEN - EIN NUMERISCHES SIMULATIONSEXPERIMENT]

Guenter Gross *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 192-193 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

Changes of the local climate due to large scale deforestation were investigated with the numerical model FITNAH. Flow and temperature conditions were calculated in two numerical experiments, with and without forest. The three dimensional, nonequilibrium calculations were performed for a calm, cloudless winter night. The results show that after complete deforestation the wind velocity increases, the ground level temperature decreases, and hence the danger of frost in the lower areas is enhanced. ESA

N87-11448 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

THE USE OF MICROCOMPUTERS FOR GLIDER WEATHER FORECASTING [MICROCOMPUTER-EINSATZ BEI DER SEGELFLUGWETTERBERATUNG]

Dietrich Heimann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 194-195 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The application of numerical methods to glider weather forecasting by the use of cheap and easily transportable microcomputers is discussed. A modular program system was developed to estimate the change of the vertical structure of temperature and humidity in consecutive steps. The different steps in the forecasting, namely large scale advection, heating (diurnal variation), and convective fluctuation (thermal bubble) are explained. Good experience was gained during glider competitions and convection measuring campaigns. ESA

N87-11449 Kiel Univ. (West Germany). Abteilung Maritime Meteorologie.
MEASUREMENTS IN THE GROUND LEVEL ATMOSPHERIC LAYER DURING THE EXPERIMENT PUKK [MESSUNGEN IN DER BODENNAHEN LUFTSCHICHT WAEHREND PUKK] c46
Gerd Hessler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of tha German Meteorologists Conference on the Global Climate and Our Environment 1986 p 196-197 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Wind, temperature, and moisture profiles were measured above the Wadden Sea in the coastal experiment PUKK. The effects of the Wadden Sea on the meteorological parameters of the ground level atmospheric boundary layer were examined. It is shown that in the Wadden area tide-determined variations in the ground level boundary layer occur, in contrast with the free sea; these variations modify the turbulent fluxes. ESA

N87-11450 Deutscher Wetterdienst, Offenbach am Main (West Germany).
INCREASE OF THE DUST MASS CONTENT IN THE AIR OF HAMBURG (WEST GERMANY) [ANSTIEG DES STAUBMASSENGEHALTS DER LUFT IN HAMBURG] c45
U. Kaminski and P. Winkler *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 198-199 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The dust mass concentration increase, registered since 1975 over Hamburg was investigated. The measurement was performed using a radiometric method which determines particles with a radius greater than 5 microns. The measuring series was monitored by filter collectors. The meteorologically induced variations were eliminated for the trend investigations of the dust mass. The dust mass increased from 33 microg/cu m in 1976 to 60 microg/cu m in 1985. The number of incidences per year of a high diurnal average of aerosol mass, and the number density of large aerosol particles also increase. The influence of these increases are not localized due to the relatively long lifetime of the particles. The process responsible for the aerosol increase are discussed. ESA

N87-11451 Johann-Wolfgang-Goethe-Univ., Frankfurt am Main (West Germany). Inst. fuer Meteorologie und Geophysik.
NUMERICAL SIMULATION OF PHOTOSMOG IN A DYNAMIC-KINETIC MODEL OF THE ATMOSPHERIC BOUNDARY LAYER [NUMERISCHE SIMULATION VON PHOTOSMOG IN EINEM DYNAMISCHE-KINETISCHEN MODELL DER ATMOSPHAERISCHEN GRENZSCHICHT] c45
G. Kramm and F. Herbert *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and our Environment 1986 p 200-201 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A one-dimensional meteorological-photochemical atmospheric boundary layer model (ABL) was developed for the numerical study of the production of photochemical smog. The model was used in the investigation of the turbulent vertical transport and the molecular-turbulent deposition of reactive trace gases as a function of temporally fluctuating photolysis takes and of internal and external conditions. The ABL-model, which largely corresponds to the Sasamori model, is explained. Compared with the latter model, the ABL-model shows smaller differences between calculated and measured values. The verification of the global ABL-model is not successful because suitable vertical profiles of wind, temperature, moisture, and trace gases are not available. ESA

N87-11452 GKSS-Forschungszentrum Geesthacht (West Germany).
TEST OF A SIMPLE CLOUD MODEL WITH PRECIPITATION
L. Levkov and D. Eppel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 202-203 (For primary document see N87-11367 02-47)
Avail: Issuing Activity

A cloud parameterization model was incorporated into a three-dimensional hydrostatic mesoscale model for numerical testing. Most of the test conditions follow the Beniston numerical model which solves large scale prediction equations for momentum, heat, and humidity which are linked by an equation of state and a continuity equation; the inelastic approximation is used for mass conservation. Simulations shiow that the proposed scheme well describes the developing, mature, and decaying stage of cumulus clouds. In spite of the strong sensitivity of the mesoscale model to changes in the cloud variables, qualitative agreement in the time evolution of the convection situation is found between calculated and experimental results. ESA

N87-11453 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.
DEVELOPMENT OF VORTEX ROLLS IN CASE OF COLD AIR OUTBREAKS ABOVE THE SEA. A NUMERICAL STUDY [ENTWICKLUNG VON WIRBELROLLEN BEI KALTLUFTAUSBRUECHEN UEBER DEM MEER - EINE NUMERISCHE FALLSTUDIE]
Siegfried Raasch *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 204-205 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The development of vortex rolls which accompany pronounced cloud streets was studied with a two-dimensional numerical model which does not take moisture into account. The investigation of the influence of inversions on the vortex development shows that the lowering of the inversion height slows down the purely dynamically determined vortex development, and that below a certain height the development stops. The comparison between model calculations and observations for the case of a cold air outbreak above the Bering Sea shows good agreement, and demonstrates that the vortex rolls are not only determined by a dynamic instability of the ground flow. ESA

N87-11454 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
NEWS ABOUT THE VISIBILITY OF SIGNAL LIGHTS UNDER THE INFLUENCE OF THE ATMOSPHERE [NEUES ZUR SICHTBARKEIT VON SIGNALLICHT UNTER DEM EINFLUSS DER ATMOSPHAERE] c74
G. H. Ruppersberg *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 206-207 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

The identification of signal lights in the atmosphere was studied. The required threshold intensities of signal lights calculated with Allard's law are only valid up to viewing angles of 0.5 min arc or adaptation luminances of 0.01 cd/sqm. ESA

N87-11455 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
OPERATIONAL EVALUATION OF METEOSAT DATA [OPERATIONELLE AUSWERTUNG VON METEOSAT-DATEN]
J. Schmetz, V. Gaertner, B. Mason, and O. Turpeinen *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 210-211 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Fully automatically deduced METEOSAT results and their utilization possibilities are presented. Consecutive rectified IR photographs are used to determine wind vectors; their is good agreement with rawinsonde observations in the lower troposphere. The water surface temperature is deduced from the IR radiation density for clear areas, and compared with ship observa-

tions for calibration. The cloud analysis is based on a histogram analysis of three channels and provides three cloud levels per segment; this analysis can be used to objectify and automate the estimation of vertical moisture profiles. The moisture of the upper troposphere is calculated from the radiation density measurement in the water vapor channel, and can be used for the initialization of numerical models. The climate data set is suited for climatological studies and for the calculation of the radiation budget at the upper atmosphere boundary. The precipitation index is also determined. ESA

N87-11456 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

MODEL CALCULATIONS OF THE THERMALLY INDUCED MESOSCALE MOUNTAIN WIND CIRCULATION [MODELLRECHNUNGEN ZUR THERMISCH INDUZIERTEN MESOSKALIGEN GEBIRGSWINDZIRKULATION] c46

F. Sornieski and H. Mannstein *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 212-213 In GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie (For primary document see N87-11367 02-47)

Avail: Issuing Activity

A hydrostatic mesoscale model was used to describe thermally induced mountain wind circulation systems. Model simulations for mountains with the horizontal scale of the Alps show the basic structure of the circulation and its sensitivity to variations of surface parameters such as roughness, albedo, and evaporation. For a smaller scale alpine region mountain and valley, winds in long valleys can be simulated realistically if the surrounding mountains are ascending towards the center of the mountains. Aircraft data showing surface temperatures as a function of terrain altitude and surface characteristics verify the model. ESA

N87-11457 Kiel Univ. (West Germany). Inst. fuer Meereskunde.

ANALYSIS OF MESOSCALE TEMPERATURE AND TURBIDITY FIELD [ANALYSE VON MESOSKALIGEN TEMPERATUR- UND TRUEBUNGSFELDERN] c46

Thomas Viehoff *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 214-215 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The kinematic structures in the ocean surface layer were analyzed using a remote temperature and turbidity measurements. This combination reduces the disadvantages of IR measurement with respect to the absorption of sea water. The data of the Advanced Very High Resolution Radiometer (AVHRR) on the NOAA 7 satellite and the Coastal Zone Color Scanner on the NIMBUS 7 satellite were analyzed for the North Atlantic. The sea surface temperature was determined using the IR channels of the AVHRR, the turbidity was determined by the blue/green ratio. The temperature distribution shows stepwise subpolar fronts with meanders of 140 km; the blue/green ratio shows a clear frontal structure. Regional negative correlations between temperature and blue/green ratio occur. ESA

N87-11458 Karlsruhe Univ. (West Germany). Inst. fuer Meteorologie und Klimaforschung.

OROGRAPHIC INFLUENCE ON REGIONAL FLOW CONDITIONS, THE EXAMPLE OF THE NEUWIEDER BASIN. NUMERICAL SIMULATIONS [OROGRAPHISCHE BEEINFLUSSUNG VON REGIONALEN STROEMUNGSVERHAELTNISSEN AM BEISPIEL DES NEUWIEDER BECKENS -NUMERISCHE SIMULATIONEN] c46

Bernhard Vogel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 216-217 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The air flow conditions in the Neuwieder basin were calculated for different geostrophic flow directions using the nonhydrostatic numerical simulation model FITNAH. The results are represented as simulated trajectories which are exemplary for particular locations and starting heights. They show the modifications of the flow field due to the orography. These modifications are of special interest in relation with the propagation in topographically structured regions. Since three-dimensional fields of the turbulence characteristics result simultaneously from the simulations, it is possible to calculate transport and dilution of air admixtures using a Lagrangian propagation model. ESA

N87-11459 Institute for Meteorology and Water Economy, Cracow (Poland). Inst. fuer Meteorologie und Wasserwirtschaft.

EVOLUTION OF SODAR ECHOES AS A CLIMATOLOGICAL CHARACTERISTIC OF THE BOUNDARY LAYER [VERLAEUFE VON SODAR-ECHOS ALS KLIMATOLOGISCHE CHARAKTERISTIK DER GRENZSCHICHT] c46

Jacek Walczewski *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 218-219 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

The information given by the evolution of the backscattered signal (atmospheric echo) of acoustic radar is discussed. The registered signals can have several characteristic forms with four main types, vertical (convective) echoes, horizontal ground level echoes, high altitude horizontal echoes in the absence of lower layers (the free inversion layer), and structures without echoes. This classification can be applied for each hour of observation and can be used to digitize echograms. For a given type of sodar the peak height of the convective echoes is a relative measure for the convection intensity and the depth of the mixing layer. The characteristic forms of the second and the third type can be used to determine the duration of inversion layers. ESA

N87-11460 Bonn Univ. (West Germany). Inst. fuer Meteorologie.

THE VARIABILITY OF SEA SURFACE TEMPERATURES [ZUR VARIABILITAET VON MEERESOBERFLAECHENTEMPERATUREN] c48

Karl-Heinz Weber *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 220-221 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

Long term trends in the sea surface temperature were studied. Maritime meteorological routine observations from ships are available since the mid 19th century; a global data set is available. Like the Northern Hemisphere air temperatures, the water temperatures also show a heating of 0.5 to 0.8 K/50 yr at tropical and medium latitudes of the Atlantic Ocean, but with a shift of 10 to 15 yr. The systematic errors due to varying measuring methods are discussed. ESA

N87-11461 Technische Univ., Hanover (West Germany). Inst. fuer Meteorologie und Klimatologie.

STATISTICS OF WIND SHEAR DUE TO NOCTURNAL BOUNDARY LAYER JET AIRSTREAMS IN NORTH GERMANY [EINE STATISTIK DER MIT NAECHTLICHEN GRENZCHICHTSTRAHLSTROEMEN VERBUNDENEN WINDSCHERUNG IN NORDDEUTSCHLAND]

K.-P. Wittich, J. Hartmann, and R. Roth *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 222-223 In GERMAN (For primary document see N87-11367 02-47)

Avail: Issuing Activity

Shear wind statistics were prepared for air traffic safety. The shear statistics are based on 14 nocturnal wind profiles. These nights were characterized by a boundary layer jet airstream whose wind maximum was 1.5 times the geostrophic ground wind, or even higher. Wind and temperature profile measurements with a 5 m vertical resolution were performed. It is shown that the

nocturnal stabilization of the ground level atmosphere and the formation of a boundary layer jet stream cause an increase of the wind shear. Increasing temperature gradients cause increased shear within certain limits. Strong time variations of wind field and temperature gradients are correlated with high shear. ESA

N87-11462 Deutscher Wetterdienst, Offenbach am Main (West Germany).
SATELLITE MEASUREMENTS OF THE CLOUDINESS AND THE GLOBAL RADIATION FOR GLOBAL STATISTICS [SATELLITENMESSUNGEN DER BEWOELKING UND GLOBALSTRAHLUNG FUER EINE GLOBALE STATISTIK] c43
E. Raschke, F. Diekmann, A. Gratzki, J. Jacobs, M. Rieland, and H. J. Lutz *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 224-227 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

Suitably reduced data sets were made up in the International Satellite Cloud Climatology Project (ISCCP) in order to provide global statistical data about meteorological satellite pictures of cloud cover and global radiation at the soil. Multispectral IR data from NOAA-satellites are available for cloud identification. The high inverse correlation between the reflection and transmission power of cloud fields for solar radiation can be applied using satellite photographs to calculate the global radiation reaching the soil. ESA

N87-11463*# Massachusetts Inst. of Tech., Cambridge. Hydrology and Water Resource Systems.
SPATIAL ANALYSIS OF STORM DEPTHS FROM AN ARIZONA RAINGAGE NETWORK
Neil M. Fennessey, Peter S. Eagleson, Wang Qinliang, and Ignacio Rodriguez-Iturbe Aug. 1986 206 p
(Grants NAG5-388; NSF ATM-84-20781)
(NASA-CR-177186; NAS 1.26:177186; R86-21; Rept-306) Avail: NTIS HC A10/MF A01 CSCL 04B

Eight years of summer rainstorm observations are analyzed by a dense network of 93 raingages operated by the U.S. Department of Agriculture, Agricultural Research Service, in the 150 km Walnut Gulch experimental catchment near Tucson, Arizona. Storms are defined by the total depths collected at each raingage during the noon-to-noon period for which there was depth recorded at any of the gages. For each of the resulting 428 storm days, the gage depths are interpolated onto a dense grid and the resulting random field analyzed to obtain moments, isohyetal plots, spatial correlation function, variance function, and the spatial distribution of storm depth. Author

N87-11464# Naval Oceanography Command Center/Joint Typhoon Warning Center, FPO San Francisco, Calif.
TROPICAL CYCLONE REPORT, 1985 Annual Report, Jan. - Dec. 1985
1985 285 p
(AD-A168284) Avail: NTIS HC A13/MF A01

This annual report is prepared by the staff of the Joint Typhoon Warning Center (JTWC), a combined USAF/USN organization. The mission of the JTWC is multi-faceted and includes: (1) continuous monitoring of tropical weather activity in the Northern and Southern Hemispheres, from 180 degree longtitude westward to the east coast of Africa, and the prompt issuance of appropriate advisories and alterts when tropical cyclon development is anticipated; (2)] issuing warnings on all significant tropical cyclones in the above area of responsibility; (3) determination of reconnaissance requirements for tropical cyclone surveillance and assignment of appropriate priorities; and, (4) post-storm analysis of all significant tropical cyclones occurring within the western North Pacific and North Indian Oceans, which includes an in-depth analysis of tropical cyclones of note and all typhoons. A summary of the South Pacific and South Indian Ocean significant tropical cyclones for 1 July 1984 - 30 June 1985 are included. GRA

N87-11465# Lawrence Livermore National Lab., Calif.
DESIGN AND USE OF ZONALLY-AVERAGED CLIMATE MODELS
M. C. MacCracken and S. J. Ghan Mar. 1986 46 p Presented at the North Atlantic Treaty Organization Advanced Study Institute on Physically-based Modeling and Simulation of Climate and Climatic Change, Erice, Sicily, 11 May 1986
(Contract W-7405-eng-48)
(DE86-008764; UCRL-94338; CONF-860591-1) Avail: NTIS HC A03/MF A01

Zonally-averaged climate models (ZACMs) provide a bridge from one-dimensional models such as energy-balance and radiative-convective models to three-dimensional general circulation models. Each type of model in this hierarchy involves particular simplifications, assumptions, and complexities in its development. As a consequence, each type of model presents particular advantages and disadvantages in investigation of questions of importance to better understanding of climate. While representation of the influence of horizontal eddies on the meridional climate structure presents special difficulties for a ZACM, the inclusion of latitudinal and altitudinal variations and the absence of synoptically-generated climatic variability permit the investigation of a range of climatic perturbations in which the forcing function is relatively small, latitudinally limited, or transient. DOE

N87-11466# Sandia National Labs., Albuquerque, N. Mex.
MINOR SCALE WEATHER-WATCH AND MICROBAROGRAPH PROJECT EXPERIMENTS 8620, 9415, 9416
J. W. Reed and H. W. Church 1986 141 p Presented at the Minor Scale Symposium, Albuquerque, N. Mex., 24 Feb. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009641; SAND-86-0428C; CONF-860285-1) Avail: NTIS HC A07/MF A01

Predictions and measurements of distant airblast propagations were made to identify, control, and document the environmental impact from this large explosion. Special meteorological observations were made to support this as well as other experiments. Rawinsonde balloon upper-air observations were made to about 30 km altitude. Pilot balloons were tracked by optical theodolite to give frequent wind observations to about 3 km above ground. A Tethersonde balloon was operated to give details on atmospheric structure below about 3 km. Rocketsondes were launched to measure temperature and wind conditions at 35to 65-km heights, for explaining long range airblast propagations that focus near 200 km distance. A meteorological tower was set up to give continuous records of wind and temperature at three levels to 23 m height. An anemometer was installed near Ground Zero for reference during wind-sensitive helium bag operations. A weather advisory service was established, using WSMR observations as well as national weather data collections, and communicating through a computer terminal at the Stallion Radiosonde Station. Microbarograph (MB) airblast pressure recorders were operated at thirteen locations, from 3 km to 225 km from GZ. During the 10 days preceding MINOR SCALE, 31 ANFO charges, of 250 lb or 2500 lb yields, were fired to document the long range airblast propagation with MB recordings and upper air weather observations. DOE

N87-11467# Oregon State Univ., Corvallis. Climatic Research Inst.
CHALLENGE OF DETECTING CLIMATE CHANGE INDUCED BY INCREASING CARBON DIOXIDE
W. L. Gates and M. C. MacCracken 1985 12 p Prepared in cooperation with LLNL, Calif.
(Contract W-7405-eng-48)
(DE86-009704; UCRL-15778) Avail: NTIS HC A02/MF A01

The framework that provides the basis for efforts to detect the climatic effects of increasing CO_2 concentrations is discussed. As background, some of the characteristics of climate, how it has changed, and some of the factors that may play a role in inducing such changes are reviewed. This overview also introduces some of the terminology used in CO_2-climate studies. DOE

N87-11468# Scripps Institution of Oceanography, La Jolla, Calif.
LONG-TERM CLIMATE CHANGE IN OBSERVED PHYSICAL PROPERTIES OF THE OCEANS
T. P. Barnett 1985 17 p
(Contract W-7405-eng-48)
(DE86-009706; UCRL-15775) Avail: NTIS HC A02/MF A01

Changes in key ocean variables have been poorly documented over space and time. Temperature, sea level, salinity, and density are each discussed in terms of their importance to the climate system and society, their measurement problems and the availability of data, and their time variability over recent decades. DOE

N87-11469# Massachusetts Univ., Amherst.
DATA BASES FOR ISOLATING THE EFFECTS OF THE INCREASEING CARBON DIOXIDE CONCENTRATION
R. S. Bradley and P. D. Jones 1985 25 p Prepared in cooperation with East Anglia Univ., England
(Contract W-7405-eng-48)
(DE86-009709; UCRL-15769) Avail: NTIS HC A02/MF A01

The history of instrumentally recorded temperature data is discussed and some of the limitations of the data and the methods used in deriving large-scale averages reviewed. Long-term precipitation and pressure data sets and their limitations are also discussed. Finally, data on volcanic aerosol loading of the atmosphere and solar irradiance variations are discussed. DOE

N87-11470# Lawrence Livermore National Lab., Calif.
CONSTRUCTING A COHERENT LONG-TERM GLOBAL TOTAL OZONE CLIMATOLOGY FROM THE BUV, MFR, AND SBUV/TOMS DATA SETS
J. S. Ellis and F. M. Luther Feb. 1986 11 p Presented at the 2d Conference on Satellite Meteorology: Remote Sensing and Applications, Williamsburg, Pa., 12 May 1986
(Contract W-7405-eng-48)
(DE86-009722; UCRL-93549; CONF-8605102-1) Avail: NTIS HC A02/MF A01

The backscatter ultraviolet spectrometer (BUV) aboard the NIMBUS 4 satellite provided global ozone data until mid-1977. The Total Ozone Mapping Spectrometer (TOMS) and Solar Backscattered Ultraviolet (SBUV) instrument aboard the NIMBUS 7 satellite began providing global ozone in November 1978. The only satellite derived global total ozone data available between the termination of the BUV data and the startup of the SBUV/TOMS data is that from the Multichannel Filter Radiometer (MFR) instrument aboard the Defense Meteorological Satellite Program (DMSP) series of satellites. The MFR and the SBUV/TOMS data are compared during the data overlap period in order to determine how well the MFR data might be used to represent the SBUV/TOMS and BUV data during the data gap period. DOE

N87-11471# World Climate Programme, Geneva (Switzerland).
REPORT OF THE COSPAR INTERNATIONAL WORKSHOP ON SATELLITE-DERIVED SEA SURFACE TEMPERATURES FOR GLOBAL CLIMATE APPLICATIONS
E. G. Njoku, ed. and E. P. McClain, ed. Feb. 1986 61 p Workshop held at Camp Springs, Md., 28-31 May 1985
(WCP-110; WMO/TD-93; ETN-86-97805) Avail: NTIS HC A04/MF A01; print copy available at WMO, Geneva, Switzerland

The state of the art of sea surface temperature determinations from satellites was reviewed, and recommendations on the steps necessary to meet the accuracy requirements of the World Climate Research Program were made. The requirements are particularly demanding, especially those for the Tropical Ocean and Global Atmosphere project, for which accuracies of 0.3 C are needed in the warmest regions of the tropical oceans. ESA

N87-11472# World Climate Programme, Geneva (Switzerland).
REPORT OF THE WORKSHOP ON GLOBAL LARGE-SCALE PRECIPITATION DATA SETS FOR THE WORLD CLIMATE RESEARCH PROGRAMME
Jan. 1986 61 p Workshop held at Camp Springs, Md., 24-26 Jul. 1985
(WCP-111; WMO/TD-94; ETN-86-97806) Avail: NTIS M A01; print copy available at WMO, Geneva, Switzerland

An implementation scheme for the use of satellite visible and infrared image data to obtain estimates of large-scale convective-type precipitation and the use of microwave data to obtain instantaneous rain rate measurements, to obtain global large-scale precipitation data sets from a combination of data sources was discussed. Ground-based techniques and data processing were considered. ESA

N87-11473# International Meteorological Inst., Stockholm (Sweden).
[ACTIVITIES REPORT IN METEOROLOGY] Annual Report, Jul. 1984 - Jun. 1985
Nov. 1985 57 p
(AR-84/85; ISSN-0349-0068; ETN-86-97854) Avail: NTIS HC A04/MF A01

Research in dynamic meteorology; chemical meteorology and biogeochemistry; and atmospheric physics is summarized. ESA

N87-11474# Royal Netherlands Meteorological Inst., De Bilt.
MEPRO: A VOLUME OF IMIS PROCEDURES FOR THE USE OF THE OPERATIONAL-METEOROLOGICAL PRACTICE [MEPRO: EEN BUNDEL IMIS-PROCEDURES TEN DIENSTE VAN DE OPERATIONEEL-METEOROLOGISCHE PRAKTIJK]
H. Daan and R. Ivens, ed. 31 Aug. 1984 19 p In DUTCH
(Rept-84-2; ETN-86-98049) Avail: NTIS HC A02/MF A01

A mother program MEPRO was developed in order to implement user codes in IMIS, for weather forecasting. Operation of MEPRO is outlined. ESA

N87-11475# Royal Netherlands Meteorological Inst., De Bilt.
A SIMPLE GUIDANCE FORECAST FOR 100 STATIONS IN EUROPE AS A SUPPORT FOR THE WEATHER REPORT FOR HOLIDAY COUNTRIES [EEN EENVOUDIGE GIDSVERWACHTING VOOR 100 STATIONS IN EUROPA ALS ONDERSTEUNING VAN 'HET WEERBERICHT VOOR DE VAKANTIELANDEN']
C. Lemcke, G. W. Brouwer, and R. Ivens, ed. 12 Sep. 1984 49 p In DUTCH
(Rept-84-4; ETN-86-98050) Avail: NTIS HC A03/MF A01

A holiday weather forecast was developed using statistical interpretation of the maximum temperature and the change of precipitation between 06 and 18 GMT. For each station a choice is made between a standard set of predictors. The perfect-prog method was used since it allows use of one equation per station for all forecast periods. The selection of the weather stations and the meteorological input data is explained. The forecast was verified using as the most important verification measure for the temperature the absolute error, and for the precipitation the Brier score. The temperature forecast is clearly better than the precipitation forecast which can only be marginally used. ESA

N87-11248# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
ILLUSTRATION OF WIND FIELD TIME AND SPACE STATISTICS DURING THE TOSCANE-T CAMPAIGN
R. Ezraty, P. Queffeulou, and M. Champagne *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 59-61 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11249# Institut Francais de Recherche pour l'Exploitation de la Mer, Brest (France).
SEA WIND FLUCTUATIONS ANALYSIS
L. Lavanant, P. Queffeulou, and R. Ezraty *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 63-66 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11266# Commissariat a l'Energie Atomique, Algiers (Algeria).
MODELING OF THE RELATION BETWEEN AIR TEMPERATURE

AND SURFACE TEMPERATURE FOR THE SPATIAL EXTENSION OF SURFACE PARAMETER ANALYSIS MODELS [MODELISATION DE LA RELATION TEMPERATURE DE L'AIR/TEMPERATURE DE SURFACE EN VUE DE L'EXTENSION SPATIALE DES MODELES D'ANALYSE DES PARAMETRES DE SURFACE]
A. Abdellaoui *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 171-174 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N87-11476# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
REPORTS OF THE US - USSR WEDDELL POLYNYA EXPEDITION, OCTOBER-NOVEMBER 1981. VOLUME 8: COLLECTED REPRINTS Special Report
Stephen F. Ackley and Donna R. Murphy Mar. 1986 146 p (AD-A169346; CRREL-SR-86-6) Avail: NTIS HC A07/MF A01 CSCL 08/10

Contents: American and Soviet Expedition into the Southern Sea Ice in October and November 1981; The U.S.-U.S.S.R. Weddell Polynya Expedition; Winter Mixed Layer Entrainment of Weddell Deep Water; Thermohaline Stratification Below the Southern Ocean Sea Ice; Physical Oceanography during WEPOLEX-81; Nutrient Chemistry Program During WEPOLEX-81; Carbonate Chemistry During WEPOLEX-81; Carbon Dioxide Partial Pressure in Surface Waters of the Southern Ocean; The Weddell Gyre; Nutrient Depletion Indicates High Primary Productivity in the Weddell Sea; Zooplankton in the Weddell Sea; Sea Ice and Water Column Plankton Distributions in the Weddell Sea in Late Winter; Late Winter Chlorophyll a Distributions in the Weddell Sea; Siliceous Microfauna in Waters Beneath Antarctic Sea Ice; Antarctic Radiolaria in Late Winter/Early Spring: Weddell Sea Waters; Antarctic Sea Ice Microwave Signatures and Their Correlation with In Situ Ice Observations; Sea Ice Structure and Biological Activity in the Antarctic Marginal Ice Zone; Observations of Pack Ice Properties in the Weddell Sea; Physical, Chemical and Biological Properties of Winter Sea Ice in the Weddell Sea; Elemental Compositions and Concentrations of Microispherules in Snow and Park Ice from the Weddell Sea; Relative Abundance of Diatoms in Weddell Sea Pack Ice; Atmospheric Boundary-Layer Modification, Drag Coefficient, and Surface Heat Flux in the Antarctic Marginal Ice Zone. GRA

N87-11477# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. Systemes Balistiques et Spatiaux.
ADVANCED OCEAN COLOR MONITOR (OCM) FEASIBILITY STUDY, EXECUTIVE SUMMARY Final Report
G. Cerutti-Maori Paris ESA 13 Jul. 1983 36 p Partly in FRENCH and ENGLISH
(Contract ESA-5234/82-F-CF(SE))
(SNIAS-96-CA/LL/O; ESA-CR(P)-2253; ETN-86-98130) Avail: NTIS HC A03/MF A01

After a theoretical analysis of the radiometric and geometric performances of the ocean color monitor instrument and a comparative study of the different configurations, a choice is made to select the instrument characteristics better adjusted to the European Space Agency specifications. It is decided to limit the device to the measurement of the ocean color, abandoning the measurement of the ocean surface temperature. The detailed description of the selected configuration shows that it is compatible with the load of the ERS-2 satellite, having 62 kg mass, 90 W power consumption and a reliability greater than 0.8. ESA

N87-11302# Universite de Bretagne Occidentale, Brest (France). Lab. d'Oceanographie Physique.
AVHRR DATA PROCESSING FOR UTILIZATION IN DYNAMICAL OCEANOGRAPHY
V. Mariette and V. Verbeque *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 365-369 Sponsored by CNRS and Inst. Francais de la Recherche pour l'Exploitation de la Mer (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11303# Scripps Institution of Oceanography, La Jolla, Calif.
DOWNWARD LONG-WAVE IRRADIANCE AT THE OCEAN SURFACE USING SATELLITE DATA
C. Gautier and R. Frouin *In* ESA Proceedings of the Third International Colloquium on Spectral Signatures of Objects in Remote Sensing Dec. 1985 p 371-374 (For primary document see N87-11238 02-43)
Avail: NTIS HC A25/MF A01

N87-11423 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE VENTILATION OF THE WARM WATER SPHERE IN THE NORTH ATLANTIC OCEAN [DIE VENTILATION DER WARMWASSERSPHAERE IM NORDATLANTIK]
G. Siedler *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 137-140 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11424 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE DEVELOPMENT OF THE SUBTROPICAL MODE-WATER, SIMULATED USING A SURFACE LAYER INTEGRATED ALONG A TRAJECTORY [DIE ENTSTEHUNG DES SUBTROPISCHEN MODE-WASSERS, SIMULIERT MIT EINEM ENTLANG EINER TRAJEKTORIE INTEGRIERTEN DECKSCHICHTMODELL]
Wolfgang Barkmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 141-142 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11425 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
DETERMINATION OF THE CIRCULATION IN THE NORTH ATLANTIC OCEAN FROM CLIMATOLOGICAL DATA [BESTIMMUNG DER ZIRKULATION DES NORDATLANTIK AUS KLIMATOLOGISCHEN DATEN]
Manfred Wenzel *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 143-144 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11426 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
THE CORRELATION BETWEEN WIND AND THE TRAJECTORIES OF SATELLITE-POSITIONED DRIFT BUOYS [ZUR KORRELATION VON WIND UND DEN TRAJEKTORIEN SATELLITENGEORTETER TRIFTBOJEN]
Juergen Stahlmann *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 145-146 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11427 Kiel Univ. (West Germany). Inst. fuer Meereskunde.
SATELLITE OBSERVATIONS OF ATMOSPHERICALLY DETERMINED CHANGES OF THE OCEAN SURFACE TEMPERATURE [SATELLITENBEOBACHTUNGEN ATMOSPHAERISCH BEDINGTER AENDERUNGEN DER OBERFLAECHENTEMPERATUR DES OZEANS]
Lothar Stramma *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference

on the Global Climate and Our Environment 1986 p 150-151 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

N87-11460 Bonn Univ. (West Germany). Inst. fuer Meteorologie.
THE VARIABILITY OF SEA SURFACE TEMPERATURES [ZUR VARIABILITAET VON MEERESOBERFLAECHENTEMPERATUREN]
Karl-Heinz Weber *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 220-221 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

51 LIFE SCIENCES (GENERAL)

N87-11478*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 8
Lydia Razan Hooke, ed., Mike Radtke, ed., Victoria Garshnek, ed., Ronald Teeter, ed., and Joseph E. Rowe, ed. (Library of Congress, Washington, D. C.) Oct. 1985 111 p
(Contract NASW-3676)
(NASA-CR-3922(09); NAS 1.26:3922(09)) Avail: NTIS HC A06/MF A01 CSCL 06C

This is the eighth issue of NASA's USSR Space Life Sciences Digest. It contains abstracts of 48 papers recently published in Russian language periodicals and bound collections and of 10 new Soviet monographs. Selected abstracts are illustrated with figures and tables. Additional features include reviews of two Russian books on radiobiology and a description of the latest meeting of an international working group on remote sensing of the Earth. Information about English translations of Soviet materials available to readers is provided. The topics covered in this issue have been identified as relevant to 33 areas of aerospace medicine and space biology. These areas are: adaptation, biological rhythms, biospherics, body fluids, botany, cardiovascular and respiratory systems, cosmonaut training, cytology, endocrinology, enzymology, equipment and instrumentation, exobiology, gastrointestinal system, genetics, group dynamics, habitability and environment effects, hematology, human performance, immunology, life support systems, man-machine systems, mathematical modeling, metabolism, microbiology, musculoskeletal system, neurophysiology, nutrition, operational medicine, personnel selection, psychology, reproductive biology, and space biology and medicine. Author

N87-11479# Washington Univ., Seattle. Bioelectromagnetics Research Lab.
EFFECTS OF LONG-TERM RADIOFREQUENCY RADIATION ON IMMUNOLOGICAL COMPETENCE AND METABOLISM Final Report, Jun. 1983 - Oct. 1985
Chung-Kwang Chou, James A. Clagett, Lawrence L. Kunz, and Arthur W. Guy May 1986 118 p
(Contract F33615-83-C-0620)
(AD-A169064; USAFSAM-TR-85-105) Avail: NTIS HC A06/MF A01 CSCL 06/18

Two groups of 20 rats were exposed 21 h/day for 6 and 12 mo, respectively, to 10-microsecond-pulsed 2450-MHz microwaves at 800 pps and 8-Hz modulation, at an average power density of .48 mW/sq. cm (SAR 0.15-0.4 W/kg) in circularly polarized waveguides. Equal numbers of rats were sham exposed. Effects seen in the previous study (elevated corticosterone level afer 6 wk exposure; increased B and T cells in rats at 13 mo exposure) were not replicated in this study. Quantitative immunological tests involving 70 parameters showed six different showed six different effects. Among them, increased hematopoietic progenitor cells in the marrow was the only consistent effect in both 6- and 12-mo exposed groups. In the second part of the study three groups of rats were exposed 21 h/day to 2450-MHz CW microwaves at an average SAR of 0, 2.5, 5, and 7.5 W/kg (10 rats each) under three environmental temperatures (17.8, 22.2, and 26.7 C) over three 6-wk periods. Metabolism--including body mass, food/water intake, oxygen consumption, and carbon dioxide production--was measured, and health profile and immunological response were monitored. Results show that the effects are highly dependent on exposure level and environmental temperature. GRA

N87-11480# Brookhaven National Lab., Upton, N. Y.
ANAEROBIC MICROBIAL TRANSFORMATIONS IN SUBSURFACE ENVIRONMENTS: HIGHLIGHTS
A. J. Francis Sep. 1985 15 p
(Contract DE-AC02-76CH-00016)
(DE86-008703; DOE/ER-0243) Avail: NTIS HC A02/MF A01

Anaerobic microorganisms under appropriate conditions affect trace metal dissolution and mobilization or immobilization in the subsurface environments by one or more of the following processes: (1) changes in pH and Eh (which affect the valence or ionic state of the metals and enhance their mobility in the subsurface environment by retarding the subsoil binding characteristics); (2) chelation or production of specific sequestering agents (solubilization and leaching of certain elements by microbial metabolites or decomposition products); and (3) bioaccumulation and release of metals due to remineralization elsewhere in the environment. DOE

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N87-11481*# Umpqua Research Co., Myrtle Creek, Ore.
A PROTOTYPE SPACE FLIGHT INTRAVENOUS INJECTION SYSTEM Final Report
Gerald V. Colombo May 1985 65 p
(Contract NAS9-16337)
(NASA-CR-171911; NAS 1.26:171911) Avail: NTIS HC A04/MF A01 CSCL 06E

Medical emergencies, especially those resulting from accidents, frequently require the administration of intravenous fluids to replace lost body liquids. The development of a prototype space flight intravenous injection system is presented. The definition of requirements, injectable concentrates development, water polisher, reconstitution hardware development, administration hardware development, and prototype fabrication and testing are discussed. B.G.

N87-11482# Army Research Inst. of Environmental Medicine, Natick, Mass.
PREDICTION OF THE METABOLIC COST OF EXERCISE FROM MEASUREMENTS DURING RECOVERY
Stephen Legg, J., Joseph Dziados, Robert Mello, James A. Vogel, and Tammy J. Doherty Mar. 1986 19 p
(AD-A168076; USARIEM-M-24/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

This study was designed to determine if post exercise recovery measurements could be used to predict the oxygen uptake (VO2), minute ventilation (V sub E) and heart rate (HR) during exercise. VO2, V sub E and HR were measured in 11 healthy males during the last minute of treadmill running (at various exercise intensities ranging from light to maximal effort) and for each 15 second period during three minutes of standing recovery. For each variable measured, a least squares regression line was calculated from data collected during the interval between 15 and 60 seconds after cessation of exercise. The ability of the Y intercept of this line, denoted B sub O, to predict the observed last-minute exercise value, denoted Y sub O, was enhanced by one of two distinct methods. For VO2 and HR, a linear least squares regression between Y sub O and B sub O was used to calculate correction

co-efficients. The linear regression co-efficients of (B sub O - Y sub O) versus the slope (B sub 1) of the original regression line enhanced the prediction of the observed exercise level of V sub E. In a separate validation experiment using 6 different males, the mean predicted values for VO2, V sub E and HR differed from observed last minute exercise values. It is concluded that the equations described in this study, utilising data collected during the first minute of recovery from exercise, may be useful in estimating the metabolic cost of exercise. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N87-11483# Gulf and Western Applied Science Labs., Waltham, Mass.
RESEARCH IN THE AREA OF VISUAL SEARCH Final Report, 1 Jun. 1983 - 31 May 1986
Leonard F. Scinto Jun. 1986 7 p
(Contract DAAG29-83-C-0014)
(AD-A168923; ARO-20540.2-LS) Avail: NTIS HC A02/MF A01 CSCL 06/16

The research sought to explicate a model of human visual search activity and identify those variables that affect effective visual search. It was also possible to develop and enhance the hardware and software capabilities central to research in the area of visual information processing. This research also addressed significant methodological issues in the analysis of eye movement data. GRA

N87-11484# British Aerospace Public Ltd. Co., Bristol (England). Human Factors Dept.
THE EFFECTS OF TERRAIN CLUTTER ON OBSERVER BEHAVIOUR DURING SEARCH OF COMPLEX SCENERY
L. K. B. Holman Aug. 1982 32 p
(BAe-BT-13535; LR46994; ETN-86-97957) Avail: NTIS HC A03/MF A01

An experiment on visual search in complex scenes was conducted, using a technique for measuring eye movements. Results were used to devise a means to divide scenes into clutter and nonclutter regions. It is shown that 85% of fixations fall within the clutter regions. The ratio of fixation density in clutter versus nonclutter regions corresponds well with target acquisition performance and it is suggested that measures of clutter area and clutter distribution could be used in the prediction of search performance. A suite of programs for microcomputers was written as an aid to the analysis of eye movement studies. ESA

N87-11485# British Aerospace Public Ltd. Co., Bristol (England).
AIR-TO-GROUND TARGET ACQUISITION IN THE PRESENCE OF SENSOR VIBRATION
G. J. Dean Jan. 1983 43 p
(BAe-BT-14222; LR48619; ETN-86-97963) Avail: NTIS HC A03/MF A01

The effect of pitch and roll movements of an airborne sensor relaying information to a remote ground station, an observers' target detection ability was studied using a flight simulator. Such movements may be attributed to wind gusting or coupled vibration. Sixteen video films were shown to each observer and each film contained 15 target tanks to be located. Results show a definite, but not great, decline in the number of correct designations made as pitch and roll increase: from 368 targets correctly designated in the vibration-free condition, to 291 designated in the highest vibration condition. The number of incorrect designations increases as vibration becomes greater. The total number of designations made declines as vibration increases. ESA

N87-11486# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON ACTIONS DUE TO LACK OF INFORMATION
Bengt G. Lundberg 1985 19 p
(Rept-85-45; ETN-86-98475) Avail: NTIS HC A02/MF A01

The problem of making conclusions from representations of knowledge is analyzed. Conclusion-making due to lack of information is studied. The concepts of immediately available information, assumptionally inferable information, and constructively inferable information are introduced. It is shown that it is important to specify the assumptions that are made about a representation, in particular with respect to the conclusions that can be made from the representation. For constructively inferable information, it is shown that the lack of information can only be used to select which among a set of possible conclusions to make. ESA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N87-11487# Human Engineering Labs., Aberdeen Proving Ground, Md.
ANTHROPOMETRIC CONSIDERATIONS FOR A FOUR-AXIS SIDE-ARM FLIGHT CONTROLLER Final Report
William B. DeBellis and Kathleen A. Christ Feb. 1986 22 p
(AD-A168135; HEL-TN-2-86) Avail: NTIS HC A02/MF A01 CSCL 06/14

This report describes the physical conditions of a multiaxis side-arm flight controller and armrest which were selected as being comfortable by a sample of 77 nonpilot and pilot personnel. Data are presented for males and females, right- and left-handed personnel, pilots and nonpilots, and pilots wearing and not wearing chemical-biological (CB) protective gear. Generally, the comfort range for the various armrest and flight controller parameters, as selected by nonpilot, male personnel, is sufficiently broad to include the effects of gender, handedness, protective clothing, and pilot experience. GRA

N87-11488# California Univ., Los Angeles. Motor Control Lab.
CONTROLLING THE TEMPORAL STRUCTURE OF LIMB MOVEMENTS: A RESPONSE Interim Report, period ending Jun. 1985
Richard A. Schmidt May 1986 11 p
(Contract MDA903-85-K-0225; DA Proj. 2Q1-61102-B-74-F)
(AD-A169261; ARI-RN-86-67) Avail: NTIS HC A02/MF A01 CSCL 06/16

This report is a response to a recent article by Berkinblit, et.al., which suggested that motor-program models, in which a centrally programmed temporal structure was a key ingredient, seemed incorrect. In particular, Schmidt takes issue with their discussion of Fel'dman's (1974) mass-spring model which denies a central program for limb movement timing and amplitudes. Schmidt argues that evidence for unidirectional actions and sequential movements limits the utility of the mass-spring model. GRA

N87-11489# Pacific Northwest Labs., Richland, Wash.
DEVELOPMENT OF AN EXPERT SYSTEMS COMPUTER PROGRAM FOR CONTROL PANEL DESIGN ENHANCEMENT
A. L. Franklin, P. J. Pelto, and B. A. Fecht May 1986 15 p
Presented at the Personal Computers: Gas Industry Applications, Las Vegas, Nev., 18 Jun. 1986
(Contract DE-AC06-76RL-01830)
(DE86-012153; PNL-SA-14013; CONF-860658-1) Avail: NTIS HC A02/MF A01

The control panel is the principal human/machine interface and is a key system in assuring the safe and reliable operation of a gas industry facility. The majority of gas industry facilities use hardwired control and display systems. Many newer facilities (and some existing facilities) are installing computer-aided control and display systems. In work conducted for the Gas Research Institute,

Battelle Northwest has developed human factors guidelines for hardwired (DeSteese et al. 1982) and computer-aided (Fecht et al. 1985) control and display systems. The guidelines themselves represent only a fraction of the total information gained during this research activity. Recent developments in the area of artificial intelligence provide a novel means for transferring and sharing expertise gained in developing these guidelines. A proof of principle expert system has been developed to demonstrate the practicality of using an expert system to record and communicate information traditionally presented in manuals and reports. The nature of expert systems not only provides a convenient means for communicating abstract concepts such as expertise and insight, but it also provides aninteractive medium where user access becomes more conversation like. In essence, the manual becomes a mimic of the expert that compiled the information found in the manual. In addition, with an animated or smart manual, the manual itself can become involved in the panel design process by suggesting areas where additional design consideration may be justified. DOE

N87-11490# British Aerospace Public Ltd. Co., Bristol (England). Applied Optics Research Dept.
AN EXPERIMENTAL DESIGN FOR COLOUR SENSITIVITY IN TARGET ACQUISITION
P. L. Philips Dec. 1981 51 p
(BAe-BT-12489-Vol-1; LR46186-Vol-1; ETN-86-97955) Avail: NTIS HC A04/MF A01

An algorithm which represents color discrimination thresholds in a three-dimensional metric color space is described. It is suitable for the design of color sensitivity experiments with display systems. The well-established algorithm for the matching tolerances of large color patches (greater than or = 35 milliradians) was extended to include the effects of small targets down to 1 milliradian. Allowance is made for color vision deficiencies exhibited with normal observers when viewing small target sizes. Variations with target size are very relevant to tolerancing displays in military systems. Experiments to test assumptions made in estimating the magnitude of the algorithm's coefficients, particularly when considering the extrapolation of existing data to differing regions of color space, effects of localized chromatic adaptation of the observer, and the texture interaction between target and background are proposed. ESA

N87-11491# British Aerospace Public Ltd. Co., Bristol (England). Applied Optics Research Dept.
AN EXPERIMENTAL DESIGN FOR COLOUR SENSITIVITY IN TARGET ACQUISITION, VOLUME 2
P. L. Philips Dec. 1981 30 p
(BAe-BT-12489-Vol-2; LR46186-Vol-2; ETN-86-97956) Avail: NTIS HC A03/MF A01

Coefficients for a color discrimination algorithm; MacAdam's geodesic chromaticity diagram; a transformation of Noorlander's et al (1980) data; a transformation of axes for ellipsoid cross sections; 50% probability loci for fit to Noorlander data; and solving the color discrimination algorithm for particular luminance-chromaticity combinations or chromaticity planes are covered. ESA

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N87-11492# Defense Technical Information Center, Alexandria, Va.
AN ASSESSMENT OF CD ROM (COMPACT DISK READ ONLY MEMORY)
Karen J. Jacobson Jun. 1986 13 p
(AD-A169259; DTIC/TR-86/15) Avail: NTIS HC A02/MF A01 CSCL 09/2

Compact Disk Read Only Memory (CD ROM) is one of a group of optical disk that offers great information storage potential. CD ROM Technology uses a laser to burn (record) pits in the light sensitive surface of an optical or plastic coated disk. The typical 4.75 inch CD ROM disk offers enough storage capability to hold the contents of 1,200 standard 5.25 inch floppy disks. This report describes the current state-of-the-art and typical steps in preparing the CD ROM database, including data preparation (data indexing and reformatting), disk premastery, disk mastery, and mass replication. The strengths of CD ROM technology include high data storage density, relatively low costs for widely distributed databases, relatively high random access speeds, and disk durability and integration in the normal office environment. Limitations include the current high costs of premastering and mastering disks, and the lack of standardization among CD ROM producers. CD ROM is not an acceptable storage alternative for databases that are highly volatile, however an erasable optical disk is currently under development. GRA

N87-11493# Oak Ridge National Lab., Tenn.
DOCUMENTATION OF MATERIALS DATA FOR COMPUTER STORAGE AND RETRIEVAL
M. K. Booker 1986 38 p
(Contract DE-AC05-84OR-21400)
(DE86-009509; CONF-860722-11) Avail: NTIS HC A03/MF A01

Paradioxically, the biggest problem with computer data management systems is also the biggest advantage - that such systems allow huge amounts of data to be accessed in a convient fashion. The very mass of data that can be delivered through such systems can result in considerable confusion on the part of the user. A few of the considerations that designers and operators of computerized materials data bases must take into account in order to assure that their data bases are useful and efficient are discussed. In particular, the complex (but vital) problem of documenting and characterizing the data stored in computer data bases in such a fashion as to assure (as far as possible) proper understanding and use of the data by persons accessing the data bases will be examined. B.G.

N87-11494# Oak Ridge National Lab., Tenn.
CESAR RESEARCH IN INTELLIGENT MACHINES
C. R. Weisbin 1986 37 p Presented at the World Conference on Robotics Research, Scottsdale, Ariz., 19 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008226; CONF-860841-1) Avail: NTIS HC A03/MF A01

The Center for Engineering Systems Advanced Research

(CESAR) was established in 1983 as a national center for multidisciplinary, long-range research and development in machine intelligence and advanced control theory for energy-related applications. Intelligent machines of interest here are artificially created operational systems that are capable of autonomous decision making and action. The initial emphasis for research is remote operations, with specific application to dexterous manipulation in unstructured dangerous environments where explosives, toxic chemicals, or radioactivity may be present, or in other environments with significant risk such as coal mining or oceanographic missions. Potential benefits include reduced risk to man in hazardous situations, machine replication of scarce expertise, minimization of human error due to fear or fatigue, and enhanced capability using high resolution sensors and powerful computers. A CESAR goal is to explore the interface between the advanced teleoperation capability of today, and the autonomous machines of the future. DOE

N87-11495# Rome Univ. (Italy). Dipt. di Fisica.
THE ARRAY PROCESSOR WITH EMULATOR (APE) PROJECT: A COMPUTER FOR LATTICE QCD
P. Bacilieri (Istituto Nazionale di Fisica Nucleare, Bologna, Italy), N. Cabibbo, E. Marinari, G. Parisi, F. Costantini (Pisa Univ., Italy), G. Fiorentini, S. Galeotti, D. Passuello, R. Tripiccione, A. Fucci et al 13 Dec. 1984 17 p
(Nota-Interna-839; IFUP-TH-84/40; ETN-86-97936) Avail: NTIS HC A02/MF A01

A single instruction multiple data computer for studying lattice QCD is proposed. Although it can be used as a general purpose array processor controlled by the 3081/E, the hardware is optimized for lattice QCD. The theoretical speed is 1 Giga-Flop, i.e., 6 or 7 times faster than the Cray 1, and the memory can be expanded up to 0.5 Giga-byte. ESA

N87-11496# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
TUMULT: A DISTRIBUTED REAL-TIME MULTI-PROCESSOR SYSTEM
P. G. Jansen Apr. 1985 16 p
(INF-85-3; ETN-86-98160) Avail: NTIS HC A02/MF A01

A project to design and implement a modular extendible multiprocessor system in PASCAL is described. All memory is distributed and processors communicate in parallel via a fast and reliable local switching network instead of a shared bus. A distributed real time operating system is being designed and implemented, consisting of a multitasking subsystem per processor. Processes can communicate via a message passing mechanism. Communication links and processes are dynamically created and disposed of by the application. A distributed exception mechanism is offered to recover from malfunctioning of resources or processes. ESA

N87-11497# MATRA Espace, Toulouse (France). Espace Produits et Technologie.
HIGH SPEED PROGRAMMABLE PROCESSOR FOR USE ON BOARD SATELLITES Final Report
Paris ESA Aug. 1985 92 p
(Contract ESA-4960/81-NL-HP(SC))
(EPT/DI/006/GG/TT; ESA-CR(P)-2206; ETN-86-98090) Avail: NTIS HC A05/MF A01

A high speed programmable processor for satellite onboard image and signal processing and computation was developed. The architecture is an attempt to define a single programmable product which can efficiently replace dedicated logic for real-time on-board functions. Hardware, programming rules, definition of a flight model, evaluation through a specific application, and analysis of other typical applications are considered. State of the art and directions for future developments are discussed. ESA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

N87-11498 Royal Signals and Radar Establishment, Malvern (England).
THE USE OF VALUES WITHOUT NAMES IN A PROGRAMMING SUPPORT ENVIRONMENT
Margaret Stanley Nov. 1985 17 p
(RSRE-Memo-3901; BR98723; ETN-86-98008) Avail: NTIS HC A02

The use in Flex of structured filestores holding anonymous values, supported by a command language that uses capability values in preference to names is described. Capability values are context independent whereas names are context dependent. Structured edfiles, that can hold values as well as text, make it possible to keep values on filestore without naming them. Flex does not need to use naming conventions to show the type of an object. The Flex mode of any value can be displayed directly. Flex does not rely on naming conventions or on structured directories to indicate relationships. They are shown by keeping values in the same structured edfile or by using explicit relationships such as those provided between source text and compiled code and between modules. ESA

N87-11499 Royal Signals and Radar Establishment, Malvern (England).
ORWELLIAN PROGRAMMING IN SAFETY-CRITICAL SYSTEMS
Ian F. Currie 1984 13 p Presented at Conference on System Implementation Languages, Experience and Assessment, Canterbury, England, Aug. 1984; sponsored by International Federation of Information Processing Society, and International Federation of Operations Research Society
(RSRE-Memo-3924; BR99100; ETN-86-98012) Avail: Issuing Activity

The final refinement in the production of a critical program from an elementary language via a compiler to bits in the critical system is discussed. It is argued that existing languages are inherently unsuitable for this purpose since they allow freedoms of expression and thought which, although convenient, lead to misconceptions and obscurities. Orwellian programming should limit freedom of expression so that these tendencies are unthinkable by using a NewSpeak which permits only Good Thoughts. ESA

N87-11500# Kernforschungszentrum, Karlsruhe (West Germany). Projekttraegerschaft Fertigungstechnik.
PROCEEDINGS OF A SPECIALIZED SYMPOSIUM ON THE EVALUATION OF DESIGN AND APPLICATION OF MODERN MANUFACTURING TECHNOLOGIES
I. Bey, ed. and H. Mense, ed. Mar. 1986 172 p In GERMAN; ENGLISH summary Symposium held in Karlsruhe, West Germany, 12 Mar. 1986 Sponsored by BMFT
(KfK-PFT-119; ETN-86-97839) Avail: NTIS HC A08/MF A01

Industrial installation of CAD/CAM systems and the development of robotics and their periphery are presented. Practical experiences with the implementation of CAD/CAM in a medium size company are given. The results of two social scientific inquiries, one concerning CAM planning and control systems in machine building industry, and the other related to the planning process of robot application with its technical, organizational, and social implications are discussed. For individual titles, see N87-11501 through N87-11505.

N87-11501# Fraunhofer-Inst. fuer Systemtechnik und Innovationsforschung, Karlsruhe (West Germany).
FIRST RESULTS OF THE EVALUATION STUDY OF THE INDIRECT-SPECIFIC FUNDING OF THE OPERATIONAL UTILIZATION OF CAD/CAM SYSTEMS [ERSTE ERGEBNISSE DER WIRKUNGSANALYSE DER INDIREKT-SPEZIFISCHEN FOERDERUNG ZUR BETRIEBLICHEN ANWENDUNG VON CAD/CAM-

SYSTEMEN]
G. Lay, M. Boffo, J. Fix-Stern, U. Kuntze, F. Meyer-Krahmer, C. Bartel, St. Leonhardt, M. Muehlberg, I. Schinko, and V. Vogelmann *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 9-73 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

Funding of a program to instal CAD/CAM systems in small companies, especially manufacturers of machine tools, tools, and measuring components, is described. For two thirds of the projects the entreprises broke technologically new ground. ESA

N87-11502# Kernforschungszentrum, Karlsruhe (West Germany).
PRACTICAL EXPERIENCE WITH THE APPLICATION OF CAD/CAM TO A MEDIUM-SIZE COMPANY [PRAKTISCHE ERFAHRUNGEN MIT DEM EINSATZ VON CADCAM IN EINEM MITTELSTAENDISCHEN BETRIEB]
Maurer Soehne *In its* Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 75-83 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

The usefullness of CAD/CAM for small companies was tested. The support of the data processing of the sequence of operations in the CAM domain is clearly strengthened. An improvement of the stock control and the securing of the delivery times are obtained by the integration of inventory management in connection with the material housekeeping and the ordering system. The introduction of CAD in construction shows a marked improvement of the productivity. However, substantial rationalization can only be obtained if a basic organization is present. ESA

N87-11503# Soziologisches Forschungsinst. e.V., Goettingen (West Germany).
MANUFACTURING PLANNING IN MACHINE BUILDING FROM THE POINT OF VIEW OF MANAGEMENT AND WORKSHOP PERSONNEL [FERTIGUNGSSTEUERUNG IM MASCHINENBAU AUS DER PERSPEKTIVE VON UNTERNEHMENSLEITUNG UND WERKSTATTPERSONAL] c31
F. Manske *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 85-109 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

Results of an empirical investigation of the application of computer aided manufacturing planning systems in machine building companies are summarized. Two different management concepts were emphasized, total planning and control of the manufacturing sequence, and frame planning and control. The consequences of the implementation of the concepts for foremen, workers, and management personnel, as well as for company results are given. ESA

N87-11504# Fraunhofer-Inst. fuer Arbeitswirtschaft und Organisation, Stuttgart (West Germany).
EVALUATION STUDY OF THE INDIRECT-SPECIFIC FUNDING FOR THE DEVELOPMENT OF INDUSTRIAL ROBOTS, MANIPULATION SYSTEMS, AND THEIR INTELLIGENT PERIPHERY [WIRKUNGSANALYSE DER INDIREKT-SPEZIFISCHEN FOERDERUNG ZUR ENTWICKLUNG VON INDUSTRIEROBOTERN, HANDHABUNGSSYSTEMEN SOWIE ZUGEHOERIGER INTELLIGENTER PERIPHERIE] c37
R. Bruening, R. Friedrich, and V. Korndoerfer *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 111-141 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

Intended and nonintended effects of introducing robots in small companies were evaluated. Technology development and operational innovation processes were considered. The analysis shows that the program succeeded in reaching the firms. ESA

N87-11505# Fraunhofer-Inst. fuer Productionstechnik und Automatisierung, Stuttgart (West Germany).
TECHNICAL AND ORGANIZATIONAL CONCEPTS OF THE APPLICATION OF INDUSTRIAL ROBOTS AND MANIPULATION SYSTEMS (IR/HHS). EXPERIENCES OF THE CONSULTANT CENTER FOR INDUSTRIAL ROBOTS (BZI) [TECHNISCHE AND ORGANISATORISCHE KONZEPTION DES IR/HHS-EINSATZES. ERFAHRUNGEN DES BERATERZENTRUM INDUSTRIEROBOTER (BZI)] c37
Guenter Schiele *In* Kernforschungszentrum Proceedings of a Specialized Symposium on the Evaluation of Design and Application of Modern Manufacturing Technologies Mar. 1986 p 143-166 In GERMAN (For primary document see N87-11500 02-61)
Avail: NTIS HC A08/MF A01

The results of a social inquiry concerning the planning process of robot application with its technical, organizational, and social implications are presented. The inquiry concentrated on small and medium size industries, and is based on the knowledge obtained in a study on humanized flexible automation systems. The evaluation shows that the potential significance of the implementation of industrial robots is generally recognized and accepted. ESA

N87-11506*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SURVEY OF FUNCTIONAL PROGRAMMING LANGUAGE PRINCIPLES
C. Michael Holloway Sep. 1986 86 p
(NASA-TM-89019; NAS 1.15:89019) Avail: NTIS HC A05/MF A01 CSCL 09B

Research in the area of functional programming languages has intensified in the 8 years since John Backus' Turing Award Lecture on the topic was published. The purpose of this paper is to present a survey of the ideas of functional programming languages. The paper assumes the reader is comfortable with mathematics and has knowledge of the basic principles of traditional programming languages, but does not assume any prior knowledge of the ideas of functional languages. A simple functional language is defined and used to illustrate the basic ideas. Topics discussed include the reasons for developing functional languages, methods of expressing concurrency, the algebra of functional programming languages, program transformation techniques, and implementations of functional languages. Existing functional languages are also mentioned. The paper concludes with the author's opinions as to the future of functional languages. An annotated bibliography on the subject is also included. Author

N87-11507*# Mandex, Inc., Falls Church, Va.
STUDY OF FAULT-TOLERANT SOFTWARE TECHNOLOGY Final Report
T. Slivinski, C. Broglio, C. Wild, J. Goldberg (SRI International Corp., Menlo Park, Calif.), K. Levitt, E. Hitt (Battelle Memorial Inst., Columbus, Ohio), and J. Webb Sep. 1984 155 p
(Contract NAS1-17412)
(NASA-CR-172385; NAS 1.26:172385) Avail: NTIS HC A08/MF A01 CSCL 09B

Presented is an overview of the current state of the art of fault-tolerant software and an analysis of quantitative techniques and models developed to assess its impact. It examines research efforts as well as experience gained from commercial application of these techniques. The paper also addresses the computer architecture and design implications on hardware, operating systems and programming languages (including Ada) of using fault-tolerant software in real-time aerospace applications. It concludes that fault-tolerant software has progressed beyond the pure research state. The paper also finds that, although not perfectly matched, newer architectural and language capabilities provide many of the notations and functions needed to effectively and efficiently implement software fault-tolerance. Author

N87-11508*# Software and Engineering Associates, Inc., Santa Ana Heights, Calif.
IMPROVED TWO-DIMENSIONAL-KINETICS COMPUTER PRO-

GRAM Quarterly Progress Report, 1 Jul - 30 Sep. 1984
1984 23 p
(Contract NAS8-35931)
(NASA-CR-179782; NAS 1.26:179782; QPR-3) Avail: NTIS HC A02/MF A01 CSCL 09B

The objective of this research is to increase the analytical capability of the existing TDK/BLM computer program for performance of OTV thrust chambers. Areas which need further examination and improvement are the thick boundary layer inviscid core flow interaction and the related thrust loss calculation. To warrent highly accurate results the provision of the best available program input data is mandatory as well as the use of sophisticated modeling techniques to reduce computation time with advanced error control criteria. The simulation of wall shocks and Mach-shocks in addition to shocks induced by large concave wall curvature is essential since this interaction with each other produces flow field changes which in turn affect the nozzle performance. Author

N87-11509*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIPROCESSING THE SIEVE OF ERATOSTHENES Final Report
Shahid Bokhari Jun. 1986 27 p Submitted for publication
(Contract NAS1-18107)
(NASA-CR-178131; ICASE-86-41; NAS 1.26:178131) Avail: NTIS HC A03/MF A01 CSCL 09B

The Sieve of Eratosthenes for finding prime numbers in recent years has seen much use as a benchmark algorithm for serial computers while its intrinsically parallel nature has gone largely unnoticed. The implementation of a parallel version of this algorithm for a real parallel computer, the Flex/32, is described and its performance discussed. It is shown that the algorithm is sensitive to several fundamental performance parameters of parallel machines, such as spawning time, signaling time, memory access, and overhead of process switching. Because of the nature of the algorithm, it is impossible to get any speedup beyond 4 or 5 processors unless some form of dynamic load balancing is employed. We describe the performance of our algorithm with and without load balancing and compare it with theoretical lower bounds and simulated results. It is straightforward to understand this algorithm and to check the final results. However, its efficient implementation on a real parallel machine requires thoughtful design, especially if dynamic load balancing is desired. The fundamental operations required by the algorithm are very simple: this means that the slightest overhead appears prominently in performance data. The Sieve thus serves not only as a very severe test of the capabilities of a parallel processor but is also an interesting challenge for the programmer. Author

N87-11510*# Illinois Univ., Urbana-Champaign. Software Systems Research Group.
EOS: A PROJECT TO INVESTIGATE THE DESIGN AND CONSTRUCTION OF REAL-TIME DISTRIBUTED EMBEDDED OPERATING SYSTEMS Mid-Year Report, 1986
R. H. Campbell, Ray B. Essick, Judy Grass, Gary Johnston, Kevin Kenny, and Vince Russo 4 Nov. 1986 205 p
(Grant NsG1-1471)
(NASA-CR-179874; NAS 1.26:179874) Avail: NTIS HC A10/MF A01 CSCL 09B

The EOS project is investigating the design and construction of a family of real-time distributed embedded operating systems for reliable, distributed aerospace applications. Using the real-time programming techniques developed in co-operation with NASA in earlier research, the project staff is building a kernel for a multiple processor networked system. The first six months of the grant included a study of scheduling in an object-oriented system, the design philosophy of the kernel, and the architectural overview of the operating system. In this report, the operating system and kernel concepts are described. An environment for the experiments has been built and several of the key concepts of the system have been prototyped. The kernel and operating system is intended to support future experimental studies in multiprocessing, load balancing, routing, software fault-tolerance, distributed data base design, and real-time processing. Author

N87-11511*# Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
PARALLEL PROCESSORS AND NONLINEAR STRUCTURAL DYNAMICS ALGORITHMS AND SOFTWARE Final Technical Report, 1 Mar. - 30 Oct. 1986
Ted Belytschko 7 Nov. 1986 35 p
(Grant NAG1-650)
(NASA-CR-179889; NAS 1.26:179889) Avail: NTIS HC A03/MF A01 CSCL 09B

A nonlinear structural dynamics program with an element library that exploits parallel processing is under development. The aim is to exploit scheduling-allocation so that parallel processing and vectorization can effectively be treated in a general purpose program. As a byproduct an automatic scheme for assigning time steps was devised. A rudimentary form of the program is complete and has been tested; it shows substantial advantage can be taken of parallelism. In addition, a stability proof for the subcycling algorithm has been developed. Author

N87-11512*# Texas A&M Univ., College Station. Telecommunication and Control Systems Lab.
PERFORMANCE ANALYSIS OF A CASCADED CODING SCHEME WITH INTERLEAVED OUTER CODE
Shu Lin 10 Nov. 1986 21 p
(Grant NAG5-778)
(NASA-CR-179869; NAS 1.26:179869) Avail: NTIS HC A02/MF A01 CSCL 09B

A cascaded coding scheme for a random error channel with a bit-error rate is analyzed. In this scheme, the inner code C sub 1 is an (n sub 1, m sub 1l) binary linear block code which is designed for simultaneous error correction and detection. The outer code C sub 2 is a linear block code with symbols from the Galois field GF (2 sup l) which is designed for correcting both symbol errors and erasures, and is interleaved with a degree m sub 1. A procedure for computing the probability of a correct decoding is presented and an upper bound on the probability of a decoding error is derived. The bound provides much better results than the previous bound for a cascaded coding scheme with an interleaved outer code. Example schemes with inner codes ranging from high rates to very low rates are evaluated. Several schemes provide extremely high reliability even for very high bit-error rates say 10 to the -1 to 10 to the -2 power. Author

N87-11513# Massachusetts Inst. of Tech., Cambridge. Dept. of Elec. Engineering and Computer Sciences.
SIGNAL PROCESSING AND INTERPRETATION USING MULTI-LEVEL SIGNAL ABSTRACTIONS
Evangelos E. Milios Jun. 1986 221 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285)
(AD-A169166; TR-516) Avail: NTIS HC A10/MF A01 CSCL 09/2

This thesis advances multilevel signal abstractions as a useful conceptual framework in signal processing. More specifically, multilevel abstractions for one-dimensional harmonic spectra are developed and demonstrated to be useful in combining heuristics with algorithmic techniques in a variety of signal processing problems associated with real helicopter data, such as adjusting spectral estimation parameters and tracking fundamental frequency and power of helicopter spectra. Furthermore, multilevel abstractions for two-dimensional wavenumber spectra are used as the basis for a diagnosis system that searches for inappropriate parameter settings in an array processing system for direction determination. The diagnosis system illustrates the use of multilevel single abstractions in automating reasoning about complex signal processing systems. GRA

N87-11514# Yale Univ., New Haven, Conn. Dept. of Computer Science.
GAUSSIAN ELIMINATION ON HYPERCUBES
Youcef Saad Mar. 1986 17 p

(Contract N00014-82-K-0184)
(AD-A169293; YALEU/DCS/RR-462) Avail: NTIS
HC A02/MF A01 CSCL 09/2

Several implementations of the Gaussian elimination algorithm for solving dense linear systems on hypercube parallel processors are compared. Two classes of methods, those that require moving the elimination row (or column) to all processors before the elimination proceeds, and those that require only moving data to the nearest neighbors. Algorithms of the second class, which are called pipelined algorithms, require only a ring or grid structure which is embedded into the hypercube. One of the main conclusions is that for Gaussian elimination the additional connectivity of the hypercube topology over a two dimensional grid of processors does not help much in improving efficiency. Another result of the analysis is that there is little reason for using row or column type algorithms instead of grid algorithms. One of the goals of the paper is also to show a simple model of complexity analysis at work, by comparing the estimated times that it provides with the actual execution times. GRA

N87-11515# Yale Univ., New Haven, Conn. Dept. of Computer Science.
A FAST ALGORITHM FOR PARTICLE SIMULATIONS
L. Greengard and V. Rokhlin Apr. 1986 25 p
(Contract N00014-82-K-0184)
(AD-A169294; YALEU/DCS/RR-459) Avail: NTIS
HC A02/MF A01 CSCL 12/1

An algorithm is presented for the rapid evaluation of the potential and force fields in systems involving large numbers of particles whose interactions are Coulombic or gravitational in nature. For a system of N particles, an amount of work of the order O(N2) has traditionally been required to evaluate all pairwise interactions, unless some approximation or truncation method is used. The algorithm of this paper requires an amount of work proportional to N to evaluate all interactions to within roundoff error, making it considerably more practical for large-scale problems encountered in plasma physics, fluid dynamics, molecular dynamics and celestial mechanics. Author (GRA)

N87-11516# Illinois Univ., Urbana. Dept. of Computer Science.
REAL-TIME INTEGRATION FORMULAS WITH OFF-STEP INPUTS AND THEIR STABILITY
C. W. Gear and D. Wang Jun. 1986 22 p
(Contract DE-AC02-76ER-02383)
(DE86-011852; UIUCDCS-R-86-1277; UILU-ENG-86-1731; COO-2383-0123) Avail: NTIS HC A02/MF A01

In real-time integration, additional time delays can be introduced by the computer time needed to compute an output after the input has been sampled. These delays can be reduced by sampling the input between the output points rather than at the same time. The integration formulas have to be adjusted to reflect the off-step inputs. This paper discusses such formulas and examines their stability properties. DOE

N87-11517# Lawrence Livermore National Lab., Calif.
ARC-OLOGY VIA TELL-A-GRAF
D. Biggers 10 Mar. 1986 16 p Presented at the ISSCO Week, New Orleans, La., 10 Mar. 1986
(Contract W-7405-eng-48)
(DE86-009698; UCRL-94340; CONF-860363-3) Avail: NTIS
HC A02/MF A01

This paper addresses the problem of drawing a circle or an arc, or bending text strings around arcs using TELL-A-GRAF software. ARC-OLOGY is a front-end to TELL-A-GRAF and was developed to solve this problem. With this (or a similar) capability the TELL-A-GRAF user will be more able to include circles, arcs and arched text in the design of logos, icons and other graphic representations. This paper describes the process by which the ARC-OLOGY front-end generates the necessary TELL-A-GRAF data. The capability is available via the Flop-Swap for both Nomad2 and dBASE III environments. However, for users desiring this capability in another environment, this description can also be used as basic specifications for an in-house developed front-end. DOE

N87-11518# Rolls-Royce Ltd., Derby (England).
A SUMMARY OF DO-178A
C. D. Jack and M. Bardill 6 Mar. 1986 5 p Presented at Institute of Electrical Engineers' Conference on Software for the Control of Gas Turbines, United Kingdom, 7 Feb. 1985
(PNR-90294; ETN-86-98013) Avail: NTIS HC A02/MF A01

Modifications to the document produced by the Radio Technical Commission for Aeronautics (RTCA) entitled Software Considerations in Airborne Systems and Equipment Certification, generally known as DO-178A (its document number), are outlined. These cover software levels, partitioning, verification assurance, coverage analysis, testing environment, configuration management, and quality assurance. ESA

N87-11519# Politecnico di Milano (Italy). Dipt. di Elettronica.
A PROPOSAL FOR A NEW SOFTWARE RELIABILITY MODEL AND ITS PRELIMINARY ASSESSMENT
Sergio Bittanti, Paolo Bolzern, Carlo Ghezzi, and Riccardo Scattolini 1986 21 p
(Rept-86-001; Rept-85-36; ETN-86-97937) Avail: NTIS
HC A02/MF A01

A software reliability model which is described by a nonlinear differential equation of Riccati type is proposed. The model is an extension of Musa's model. It removes the hypothesis of nonindependent faults and is based on a simple assumption on the nature and structure of errors in a program. The model is validated with respect to experimental data. Parameters are estimated by a simple least squares method. ESA

N87-11520# British Aerospace Public Ltd. Co., Bristol (England). Guidance and Control Dept.
COMPUTER PROGRAM TRAMP: FURTHER EXTENSIONS
A. J. Clough 17 Jan. 1983 72 p
(BAe-BT-13621; LR47589; ETN-86-97958) Avail: NTIS
HC A04/MF A01

The TRAMP program was extended to include an adjoint analysis, covariance analysis, calculation of the steady state Kalman gains, the steady state solution of the linear optimal regulator problem, and time responses in the state space analysis package. Changes and additions made to the nonlinear section of TRAMP are also outlined. ESA

N87-11521# Royal Netherlands Meteorological Inst., De Bilt.
THE IMIS PROGRAM NESO [HET IMIS-PROGRAMMA NESO]
H. M. deGier and R. A. A. M. Ivens 26 Mar. 1984 17 p In DUTCH
(Rept-84-1; ETN-86-98048) Avail: NTIS HC A02/MF A01

An interactive computer program for the determination of the kind of precipitation at temperatures around 0C is presented. The different parts of the program and its interactive character are explained. The different program tasks which the user can choose are presented. Manual input of the data, error detection, suggestions for practical use, and verifications of the method are explained. The value of the program for the forecasting of precipitation is discussed. ESA

N87-11522# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
ABSTRACT GRAMMARS BASED ON TRANSDUCTIONS
Peter R. J. Asveld Jun. 1985 26 p
(INF-85-13; ETN-86-98164) Avail: NTIS HC A03/MF A01

An abstract grammatical model in which the effect (or application) of a production, determined by a so-called transduction, plays the main part rather than the notion of production itself is studied. Under appropriately chosen assumptions on the underlying family T of transductions, elementary, decidability, and complexity properties of the corresponding family L(T) of languages generated by T-grammars are established. These results are special instances of slightly more general properties of so-called gamma-controlled T-grammars, since regular control does not increase the generating

power of T-grammars (in a gamma-controlled T-grammar the iteration of T-transductions is restricted to those sequences of transductions that belong to a given control language, taken from a family gamma of control languages). ESA

N87-11523# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
SOFTWARE TOOLS FOR THE DESIGN OF PROTOCOL SYSTEMS, PART 1 Thesis
Peter vanEijk Oct. 1985 47 p Sponsored by Commission of European Communities ESPRIT/SEDOS project
(INF-85-21; ETN-86-98170) Avail: NTIS HC A03/MF A01

A methodology for protocol systems with an application to Open Systems Interconnection; the concept of formal specification of behavior; and the way it is related to the design methodology are discussed. The functional requirements for an integrated set of tools for the support of the protocol system design process are outlined. Prototypical software structures, i.e., examples of the basic patterns in programs, are analyzed. The mechanisms required to implement the proposed tools are described. Simulation of LOTOS expressions and the feasibility of compilation of LOTOS (i.e., the generation of implementations of LOTOS specifications) and the problems of testing implementations are emphasized. ESA

N87-11524# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
DESIGN AND IMPLEMENTATION OF THE TUBA APPLICATION GENERATION SYSTEM
F. A. vanHoeve and R. Engmann Nov. 1985 54 p
(INF-85-23; ETN-86-98172) Avail: NTIS HC A04/MF A01

The design and implementation of the environments for file processing, screen handling, and report writing of the TUBA system are described. The TUBA system consists of a set of integrated tools for the generation of business oriented applications. The implementation is based on the programming language SIMULA67. Tools and applications have a modular structure, represented by SIMULA class objects. ESA

N87-11525# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Mathematische Verfahren und Datentechnik.
INTERACTIVE DATA ANALYSIS
Karl-Friedrich Doherr and Gerhard Wulff Jan. 1986 48 p
(DFVLR-Mitt-86-07; ISSN-0176-7739; ETN-86-98177) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany, DM 18

To help analyze test data on a mainframe computer, a FORTRAN package for interactive data analysis (DIVA) was developed. The DIVA runs under the operating system IBM OS/VS2 MVS and requires a graphical workstation as terminal. As results, the user gets high resolution graphs of the time histories, Fourier coefficients, power spectra, amount of spectral energy, Fourier synthesis, autocorrelation function, class frequencies, frequency response, coherence function, and cross-plots. The theoretical background of the methods applied are presented together with practical examples. ESA

N87-11526# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
INTRODUCTION TO THE TOOLS FOR USER-FRIENDLY BUSINESS APPLICATIONS (TUBA) SYSTEM [INLEIDING IN HET TUBA-SYSTEEM]
F. A. vanHoeve and R. Engmann Nov. 1985 57 p In DUTCH
(INF-85-24; ISBN-90-365-0021-4; ETN-86-98173) Avail: NTIS HC A04/MF A01

A system which provides automated aids to enable the user (systems designers and programmers) to realize the desired data processing in a simple way is described. It is a generator of administrative applications. The modular structure of the application programs is described. Organization, definition and creation of inventories; creation and manipulation of screens; generation of batch programs and interactive programs; and report-writer functions are discussed. ESA

N87-11527# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON KARMARKAR'S PROJECTIVE METHOD FOR LINEAR PROGRAMMING
C. Roos 1985 66 p
(Rept-85-23; ETN-86-98458) Avail: NTIS HC A04/MF A01

A self-supporting and simplified exposition of the projective method of Karmarkar (1984) for linear programming, and computations with this method are presented. Results agree with Karmarkar's claim that the number of iterations grows on average as quickly as the logarithm of n. Comparing CPU-times, the Simplex method is superior to Karmarkar's method (30 to 50 times faster than the deep step versions of the projective method). If Karmarkar's method can be speeded up by a factor root n, using his modified version, the 2 methods may be competitive for large n (1600), but such modifications only apply to the small step version. A small linear programming problem for which Karamarkar is far more stable than Simplex is found. ESA

N87-11528# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Computer Science.
COMPUTER AIDED EDUCATION IN THE CHOCE OF STUDIES [COMPUTER ONDERSTEUND ONDERWIJS BIJ STUDIEKEUZE]
Charles vanderMast 1985 17 p In DUTCH
(Rept-85-29; ETN-86-98461) Avail: NTIS HC A02/MF A01

Computer aided education (CAE) was introduced to support the study choice process of the students. The motives for the application of CAE are outlined. The structure of the content of the CAE course INFO, as well as the development method in a multidisciplinary team using a prototype are described. Experience after the use of INFO by the students during one school year is discussed. ESA

N87-11529# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
TECHNIQUES FOR REDUCING BOOLEAN EVALUATION TIME IN CONSTRUCTIVE SOLID GEOMETRY (CSG) SCAN-LINE ALGORITHMS
W. F. Bronsvoort 1985 18 p
(Rept-85-43; ETN-86-98473) Avail: NTIS HC A02/MF A01

Techniques to reduce Boolean evaluation time in Atherton's (1983) scan-line hidden surface algorithms for combinations of plane-faced primitives for image generation of complex models were developed. A straighforward implementation of Atherton's algorithm with top-down Boolean evaluation; and Boolean evaluation done bottom-up with a pruned constructive solid geometry (CSG) tree, and with an extension to reduce the number of Boolean evaluations were tested. Results show that the time needed for Boolean evaluation in a CSG scan-line algorithm can be reduced by more than 90%, and the total drawing time by 65% to 80%. ESA

N87-11530# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
REAL TIME DEBUGGING SOFTWARE PACKAGE FOR FLIGHT SIMULATOR SOFTWARE SYSTEM WITH VARIABLE LABELED COMMON BLOCKS
H. W. G. deJonge 2 May 1985 18 p In DUTCH; ENGLISH summary Presented at the Netherlands Society for Informatics, and the Foundation Informatics Research in the Netherlands Symposium, Utrecht, Netherlands, 1-2 Apr. 1985
(NLR-MP-85013-U; B8667024; ETN-86-98489) Avail: NTIS HC A02/MF A01

The support of software development by the application of system defined variables is surveyed. The large software system consists of a large number of modules that share access to data in the direct addressable memory by the use of labeled common blocks in which variable names for addressing fields are used freely. It is proposed to introduce a common-definition file for the management of common variable names, defined on system level, in a similar way as a data dictionary is used for the management of data in data bases. A common-definition file can

be applied for the creation of consistent sources for compilation, interactive debugging, and selection of variables for monitoring and recording of data during program execution. A software system which applies access to such a common-definition files is operational.The system is used for software development in FORTRAN 5. ESA

N87-10889# Technische Hogeschool, Delft (Netherlands).
ABOUT THE DEVELOPMENT OF INTERACTIVE SHELL DESIGN CODES
Johann Arbocz *In* ESA Proceedings of an International Conference on Spacecraft Structures Apr. 1986 p 19-26 (For primary document see N87-10886 02-18)
Avail: NTIS HC A19/MF A01

N87-11045*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Microelectronics Technology Section.
ULYSSES: A FUNCTIONAL DESCRIPTION AND SIMULATION SOFTWARE SYSTEM
T. W. Griswold and D. F. Hendry *In its* The Telecommunications and Data Acquisition Report (date] p 193 - 202 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N87-11531# Yale Univ., New Haven, Conn. Dept. of Computer Science.
DATA COMMUNICATION IN PARALLEL ARCHITECTURES
Youcef Saad and Martin H. Schultz Mar. 1986 24 p
(Contract N00014-82-K-0184)
(AD-A169302; YALEU/DCS/RR-461) Avail: NTIS HC A02/MF A01 CSCL 09/2

In this paper we consider different methods for exchanging data among processors in parallel computers. The most common data exchange operations in parallel numerical methods are examined and different methods for performing them efficiently on each of several ensemble architectures are proposed and analyzed. Our objective is to compare the performance of each particular architecture on each of the data exchange operations. Author (GRA)

N87-11532# Argonne National Lab., Ill.
GUIDE TO SHARING PERSONAL COMPUTER RESOURCES VIA LOCAL AREA NETWORKS
L. Winkler Mar. 1986 69 p
(Contract W-31-109-eng-38)
(DE86-009665; ANL/TM-438) Avail: NTIS HC A04/MF A01

This Guide is for professional staff who commonly need computing tools on personal computers, minicomputers, mainframe computers, and supercomputers. It provides information and recommendations about personal computer local area networks in the context of the larger scheme of computing tools and services at the Laboratory. The material presented here is for the person considering installation of a personal computer local area network. Chapter 1 introduces the reader to the concept of personal computer local area networks and provides background material on networking. Chapter 2 summarizes Computing Services' evaluation of personal computer local area networking in general terms. Chapter 3 describes the technical and functional details of Computing Services' Personal Computer Local Area Network Evaluation and Demonstration Project. Chapters 4 and 5 are for individuals who are familiar with personal computing and who will be responsible for establishing a local area network. Chapter 4 covers technical issues relating to the prototype network installation in Building 221. Chapter 5 warns potential users what to expect when establishing a local area network.DOE

N87-11533# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A SURVEY OF THE TWENTE UNIVERSITY MULTIPROCESSOR (TUMULT) SYSTEM, A REAL TIME MULTIPROCESSOR SYSTEM
Pierre G. Jansen Nov. 1985 11 p
(INF-85-22; ETN-86-98171) Avail: NTIS HC A02/MF A01

A modular extendible multiprocessor system in PASCAL is described. All memory is distributed and processors communicate in parallel via a fast and reliable local switching network instead of a shared bus. A distributed real time operating system is being designed and implemented, consisting of a multitasking subsystem per processor. Processes can communicate via a message passing mechanism. Communication links and processes are dynamically created and disposed by the application. A distributed exception mechanism is offered to recover from malfunctioning of resources or processes. ESA

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N87-11534*# Martin Marietta Corp., Denver, Colo.
EVALUATION OF AUTOMATED DECISIONMAKING METHODOLOGIES AND DEVELOPMENT OF AN INTEGRATED ROBOTIC SYSTEM SIMULATION, APPENDIX A
D. C. Haley, B. J. Almand, M. M. Thomas, L. D. Krauze, K. D. Gremban, J. C. Sanborn, J. H. Kelly, and T. M. Depkovich Sep. 1984 235 p
(Contract NAS1-16759)
(NASA-CR-172402; NAS 1.26:172402; MCR-84-549-App-A) Avail: NTIS HC A11/MF A01 CSCL 09B

A generic computer simulation for manipulator systems (ROBSIM) was implemented and the specific technologies necessary to increase the role of automation in various missions were developed. The specific items developed were: (1) Capability for definition of a manipulator system consisting of multiple arms, load objects, and an environment; (2) Capability for kinematic analysis, requirements analysis, and response simulation of manipulator motion; (3) Postprocessing options such as graphic replay of simulated motion and manipulator parameter plotting; (4) Investigation and simulation of various control methods including manual force/torque and active compliance control; (5) Evaluation and implementation of three obstacle avoidance methods; (6) Video simulation and edge detection; and (7) Software simulation validation. This appendix is the user's guide and includes examples of program runs and outputs as well as instructions for program use. Author

N87-11535*# Martin Marietta Corp., Denver, Colo.
EVALUATION OF AUTOMATED DECISIONMAKING METHODOLOGIES AND DEVELOPMENT OF AN INTEGRATED ROBOTIC SYSTEM SIMULATION, APPENDIX B
D. C. Haley, B. J. Almand, M. M. Thomas, L. D. Krauze, K. D. Gremban, J. C. Sanborn, J. H. Kelly, and T. M. Depkovich Sep. 1984 197 p
(Contract NAS1-16759)
(NASA-CR-172403; NAS 1.26:172403; MCR-84-549-App-B) Avail: NTIS HC A09/MF A01 CSCL 09B

The purpose of the Robotics Simulation (ROBSIM) program is to provide a broad range of computer capabilities to assist in the design, verification, simulation, and study of robotic systems. ROBSIM is programmed in FORTRAN 77 and implemented on a VAX 11/750 computer using the VMS operating system. This programmer's guide describes the ROBSIM implementation and program logic flow, and the functions and structures of the different subroutines. With this manual and the in-code documentation, and

experienced programmer can incorporate additional routines and modify existing ones to add desired capabilities. Author

N87-11536*# Martin Marietta Aerospace, Denver, Colo.
EVALUATION OF AUTOMATED DECISIONMAKING METHODOLOGIES AND DEVELOPMENT OF AN INTEGRATED ROBOTIC SYSTEM SIMULATION. APPENDIX A: ROBSIM USER'S GUIDE
D. C. Haley, B. J. Almand, M. M. Thomas, L. D. Krauze, K. D. Gremban, J. C. Sanborn, J. H. Kelley, T. M. Depkovich, W. J. Wolfe, and T. Nguyen Mar. 1986 302 p
(Contract NAS1-16759)
(NASA-CR-178051; NAS 1.26:178051; MCR-85-665-App-A) Avail: NTIS HC A14/MF A01 CSCL 09B

The purpose of the Robotics Simulation Program is to provide a broad range of computer capabilities to assist in the design, verification, simulation, and study of robotics systems. ROBSIM is program in FORTRAN 77 for use on a VAX 11/750 computer under the VMS operating system. This user's guide describes the capabilities of the ROBSIM programs, including the system definition function, the analysis tools function and the postprocessor function. The options a user may encounter with each of these executables are explained in detail and the different program prompts appearing to the user are included. Some useful suggestions concerning the appropriate answers to be given by the user are provided. An example user interactive run in enclosed for each of the main program services, and some of the capabilities are illustrated. Author

N87-11537# Los Alamos National Lab., N. Mex.
MACHINE LEARNING USING A HIGHER ORDER CORRELATION NETWORK
Y. C. Lee, G. Doolen, H. H. Chen, G. Z. Sun, T. Maxwell, and H. Y. Lee 1986 41 p Presented at the Evolution, Games and Learning Conference, Los Alamos, N. Mex., 20 May 1986 Prepared in cooperation with Maryland Univ., College Park
(Contract W-7405-eng-36)
(DE86-010183; LA-UR-86-1288; CONF-8605108-1) Avail: NTIS HC A03/MF A01

A high-order correlation tensor formalism for neural networks is described. The model can simulate auto associative, heteroassociative, as well as multiassociative memory. For the autoassociative model, simulation results show a drastic increase in the memory capacity and speed over that of the standard Hopfield-like correlation matrix methods. The possibility of using multiassociative memory for a learning universal inference network is also discussed. DOE

N87-11538# Oak Ridge National Lab., Tenn.
ADVANCES IN CONCURRENT COMPUTERS FOR AUTONOMOUS ROBOTS
J. Barhen, E. C. Halbert, and J. R. Einstein 1986 32 p Presented at the World Conference on Robotics Research, Scottsdale, Ariz., 19 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008236; CONF-860841-2) Avail: NTIS HC A03/MF A01

Some of the most challenging computational requirements facing scientists and engineers today arise within the framework of intelligent autonomous systems. To enable robots to work effectively in real time in an unstructured environment, one needs to solve repeatedly a variety of highly complex mathematical problems such as on-line planning, vision, sensor fusion, navigation, manipulator dynamics and control. The computational requirements of most of these problems fall into the supercomputer class, but ultimately one needs to process them onboard the autonomous machine. Currently, the only realistic option is VLSI-based concurrent computation. This paper builds on the recent development of a VLSI hypercube supercomputer, to address the fundamental issue of implementing robotic algorithms on actual concurrent hardware. DOE

N87-11539# Politecnico di Milano (Italy). Dipt. di Elettronica.
A MULTIVARIABLE SELF-TUNING CONTROLLER WITH INTEGRAL ACTION
Riccardo Scattolini 1986 30 p Sponsored by Centro di Teoria dei Sistemi, CNR and Max Planck Inst.
(Rept-86-002; ETN-86-97938) Avail: NTIS HC A03/MF A01

A generalized minimum variance self-tuning control algorithm for multivariable systems described by a CARIMA model is presented. It is shown that the resulting control system exhibits effective integrating properties, thus ensuring the robust zero-error regulation for any constant set point and load disturbance. The major limitations of the technique are concerned with the knowledge a-priori required on the system delay structure. Simulations show that the algorithm is well suited to control minimum phase and/or asymptotically stable plants, while dealing with nonminimum phase and unstable systems calls for a careful tuning of the parameters entering the performance index. In order to improve the performance, modifications to the basic algorithm can be given, such as the direct feedforward compensation of measurable load disturbances, and the development of a continuous time equivalent. ESA

N87-11540# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A NOTE ON WAITING TIMES IN SYSTEMS WITH QUEUES IN PARALLEL
J. P. C. Blanc 1985 13 p
(Rept-85-46; ETN-86-98476) Avail: NTIS HC A02/MF A01

Numerical data concerning the mean and variance of the waiting time distribution for systems with queues in parallel, in which customers choose the shortest queue upon arrival are presented. A numerical method for calculating state probabilities and moments of queue length distributions is outlined. The method is based on power series expansions and recursion. It is applicable to systems with more than one waiting line. Numerical data concerning the mean and variance of the waiting time distribution for systems with queues in parallel, in which customers choose the shortest queue upon arrival are presented. A numerical method for calculating state probabilities and moments of queue length distributions is outlined. The method is based on power series expansions and recursion. It is applicable to systems with more than one waiting line. ESA

N87-11541# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
REDUCTION AND RECONSTRUCTION OF CONTROL KNOWLEDGE IN RULE BASED SYSTEMS. PART 1: REDUCTION THEORY
Cees Witteveen 1985 31 p
(Rept-85-50; ETN-86-98480) Avail: NTIS HC A03/MF A01

A model of rule based systems in which control knowledge can be represented explicitly is introduced. The control structure of this Programmed Rule System (PRS) determines the rule to be chosen next depending on the applicability of the current rule and can be viewed as a straightforward generalization of the Markov control structure for production systems. The relation between control structure and the behavior of a PRS is analyzed. Properties of systems whose observable behaviors (traces) are identical, while their control structures might differ are investigated. It is shown that for every PRS M a most efficient PRS M' can be obtained such that M and M' generate the same observable behavior. Such a PRS M' is called a minimal reduction of M. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N87-11542*# Virginia Univ., Charlottesville. Dept. of Applied Mathematics.
NUMERICAL ALGORITHMS FOR FINITE ELEMENT COMPUTATIONS ON CONCURRENT PROCESSORS Semiannual Report, 1 Mar. - 31 Aug. 1986
J. M. Ortega Sep. 1986 5 p

(Grant NAG1-46)
(NASA-CR-179822; NAS 1.26:179822; UVa/528190/AM87/112) Avail: NTIS HC A02/MF A01 CSCL 12A

The work of several graduate students which relate to the NASA grant is briefly summarized. One student has worked on a detailed analysis of the so-called ijk forms of Gaussian elemination and Cholesky factorization on concurrent processors. Another student has worked on the vectorization of the incomplete Cholesky conjugate method on the CYBER 205. Two more students implemented various versions of Gaussian elimination and Cholesky factorization on the FLEX/32. E.R.

N87-11543*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN EFFICIENT METHOD FOR SOLVING THE STEADY EULER EQUATIONS
Meng-Sing Liou 1986 18 p Presented at the 4th Joint Fluid Mechanics, Plasma Dynamics and Lasers Conference, Atlanta, Ga., 12-14 May 1986; sponsored by AIAA and ASME Previously announced in IAA as A86-38442
(Grant AF-AFOSR-0327-84)
(NASA-TM-87329; E-3051; NAS 1.15:87329; AIAA-86-1079) Avail: NTIS HC A02/MF A01 CSCL 12A

An efficient numerical procedure for solving a set of nonlinear partial differential equations is given, specifically for the steady Euler equations. Solutions of the equations were obtained by Newton's linearization procedure, commonly used to solve the roots of nonlinear algebraic equations. In application of the same procedure for solving a set of differential equations we give a theorem showing that a quadratic convergence rate can be achieved. While the domain of quadratic convergence depends on the problems studied and is unknown a priori, we show that firstand second-order derivatives of flux vectors determine whether the condition for quadratic convergence is satisfied. The first derivatives enter as an implicit operator for yielding new iterates and the second derivatives indicates smoothness of the flows considered. Consequently flows involving shocks are expected to require larger number of iterations. First-order upwind discretization in conjunction with the Steger-Warming flux-vector splitting is employed on the implicit operator and a diagonal dominant matrix results. However the explicit operator is represented by first- and seond-order upwind differencings, using both Steger-Warming's and van Leer's splittings. We discuss treatment of boundary conditions and solution procedures for solving the resulting block matrix system. With a set of test problems for one- and two-dimensional flows, we show detailed study as to the efficiency, accuracy, and convergence of the present method. Author

N87-11544# Vanderbilt Univ., Nashville, Tenn. Dept. of Mathematics.
TOUGHNESS AND MATCHING EXTENSION IN GRAPHS
M. D. Plummer May 1986 17 p
(Contract N00014-85-K-0488)
(AD-A169177) Avail: NTIS HC A02/MF A01 CSCL 12/1

In the present paper, we wish to treat some relationships between toughness of a graph and the n-extendability of the graph. We will prove two results. The first says essentially that if a graph has sufficiently high toughness (and has an even number of points) then it must be n-extendable. The second result applies to graphs with toughness less than one and presents an upper bound on the value of n for which such a graph can be n-extendable. In the final section, we compare and contrast these results with the n-factor results of Enomoto, Jackson, Katerinis and A. Saito. GRA

N87-11545# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
GRID GENERATION AROUND CAR CONFIGURATIONS ABOVE A FLAT GROUND PLANE USING TRANSFINITE INTERPOLATION
Torsten Berglind Nov. 1985 36 p
(FFA-139; ETN-86-97855) Avail: NTIS HC A03/MF A01

A computational procedure for the generation of grids around car configurations above a flat ground plane in two and three dimensions is presented. The procedure is based on transfinite interpolation in which interior grid points are generated from the boundary grid points by interpolation. The use of an 0-0 type of grid automatically clusters grid points in regions where high resolution is needed. Because of the existence of a ground plane very close to the body, the flow region is divided into several subregions, two in the 2D case and three in the 3D case, making it possible to obtain nearly orthogonal grids. At the grid interfaces between subregions continuity conditions on grid points, grid spacing, and grid-line orientation are imposed. Alternative mapping types are discussed and test examples illustrate the capabilities of the method. ESA

N87-11546# Rome Univ. (Italy). Dipt. di Fisica.
EQUIVALENT CLASSES OF INTEGRABLE NONLINEAR EVOLUTION EQUATIONS AND GENERALIZED MIURA TRANSFORMATIONS
Deng-yuan Chen, D. Levi, and Yi-shen Li 13 Jan. 1986 7 p
(Preprint-497; ETN-86-97929) Avail: NTIS HC A02/MF A01

The recursion operator that defines the class of integrable nonlinear evolution equations (NEE) associated to a spectral problem (SP) for matrices of rank two depending quadratically on the spectral parameter is presented. The existence of four different transformations which transform the given SP into that of Zakhorov and Shabat (ZS) is shown. By composing these transformations, the so called elementary Bäcklund transformation for the ZS SP is recovered. The complete equivalence of the given class of NEE to the one associated to the ZS SP can be proved, under given restrictions. ESA

N87-11547# Rome Univ. (Italy). Dipt. di Fisica.
MULTIFRACTAL WAVE FUNCTION AT THE LOCALIZATION THRESHOLD
C. Castellani and L. Peliti 3 Feb. 1986 7 p
(Preprint-499; ETN-86-97931) Avail: NTIS HC A02/MF A01

It is shown that the field theoretical description of the localization transition exhibits anomalous scaling for the moments of the probability density at the localization threshold. This property suggests a multifractal structure of the wave function. The corresponding singularity distribution is analyzed. ESA

N87-11548# Rome Univ. (Italy). Dipt. di Fisica.
TRANSITION TO STOCHASTICITY IN HAMILTONIAN SYSTEMS: SOME NUMERICAL RESULTS
Andrea Malagoli, Giovanni Paladin, and Angelo Vulpiani 14 Apr. 1986 23 p Submitted for publication
(Preprint-503; ETN-86-97934) Avail: NTIS HC A02/MF A01

The correlation dimension, the maximal Lyapunov exponent, and an indicator of the deviation from the harmonic situation of a Hamiltonian system with three degrees of freedom are measured. Results indicate the existence of structures with noninteger correlation dimension at least on finite, but long, observational times. The transition from the motion on the KAM tori to an ergodic motion on the constant energy surface seems to happen smoothly as energy increases, and is difficult to explain in terms of perturbative methods. ESA

N87-11549# Universitaet der Bundeswehr, Neubiberg (West Germany). Facultaet fuer Luft- und Raumfahrttechnik.
A METHOD FOR THE FAST ESTIMATION OF THE BEHAVIOR OF STOCHASTIC DYNAMIC SYSTEMS Ph.D. Thesis [EIN VERFAHREN ZUR SCHNELLEN ABSCHAETZUNG DES VERHALTENS STOCHASTISCHER DYNAMISCHER SYSTEME]
Dietmar Fischer Dec. 1985 98 p In GERMAN
(ETN-86-97823) Avail: NTIS HC A05/MF A01

A Markov chain method for the calculation of the density of Ito's stochastic differential equations and for the solution of the Fokker-Planck equation is presented. The Markov chain is constructed using the explicit Euler forward differences. In the multidimensional case the components at equal times are treated as stochastically independent random variables. This approach overcomes the high calculation and storage requirements necessary for the calculation of Markov chains. Two applications are

discussed, the phase locked loop of the first order in the case of a randomly perturbed input signal, and the yawing angle oscillations of a magnetically stabilized satellite in a randomly perturbed Earth magnetic field. ESA

N87-11550# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A NOTE ON PRIME TERMS
G. F. vanderHoeven Apr. 1985 9 p
(INF-85-5; ETN-86-98161) Avail: NTIS HC A02/MF A01

A method for finding the prime implicants of a Boolean function (propositional formula) is described. The problem of finding the prime term using the solution of Quine-McCluskey can be inefficient in time and space, so the method aims at avoiding unnecessary expansions of the set of possible implicants. It is related to the methods used by Blaauw and Duijvestijn (1985) and by Wilson (1976), though it has a recursive structure which is not present in the other solutions. A correctness proof of the solution is included. ESA

N87-11551# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
A NOTE ON MONOTICITY OF A ROSENBROCK METHOD
W. H. Hundsdorfer Feb. 1986 9 p
(CWI-NM-R8606; B8667663; ETN-86-98510) Avail: NTIS HC A02/MF A01

The dissipative differential equation with stationary solution u sup *, with the difference between any solution U(t) and u sup * nonincreasing with t is considered. Necessary and sufficient conditions in order for a similar monotonicity property to hold for numerical approximations computed from a Rosenbrock method are presented. Results also provide global convergence results for modifications of Newton's method. ESA

N87-11552# Kaiserslautern Univ. (West Germany). Dept. of Mathematics.
DIAGONALLY IMPLICIT RUNGE-KUTTA METHODS FOR PARABOLIC EQUATIONS IN CONSERVATION LAW FORM
Karl Graf Finck vonFinckenstein and Buelent Karasoezen (Middle East Technical Univ., Ankara (Turkey).) Apr. 1986 15 p Sponsored by Kaiserlautern Univ. and Middle East Technical Univ., Ankara, Turkey
(Preprint-980; ETN-86-98272) Avail: NTIS HC A02/MF A01

Numerical performance of diagonally implicit Runge-Kutta (DIRK) methods applied to stiff initial value problems resulting from finite-difference semidiscretization of nonlinear parabolic equations is studied. The quasi linear parabolic initial boundary value problem in one space dimension is discretized with respect to the space variable. The resulting stiff ordinary differential equation system is solved numerically in the time variable by the DIRK method. ESA

N87-11553# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
PAIRWISE-COMPARISON METHODS USING FUZZY NUMBERS ON RATIO SCALES WITH GEOMETRIC PROGRESSION
C. G. E. Boender, J. G. deGraan, and F. A. Lootsma 1985 25 p
(Rept-85-24; ETN-86-98459) Avail: NTIS HC A02/MF A01

An unsolved problem in Van Laarhoven and Pedrycz' (1983) fuzzy pairwise-comparison method to rank and rate a finite number of stimuli is tackled. The decision makers express their preference ratios in fuzzy numbers with triangular membership functions. Using ratio scales with geometric progression to quantify judgmental statements, it is found that the triangles usually exhibit a particular form of symmetry: the parameters satisfy the golden-section rule so that the logarithms of the fuzzy preference ratios have membership functions with isosceles triangles. Under additional conditions (which do not severely limit the practical usefulness of the method) the set of linear equations with fuzzy right-hand sides can be solved. The method only asks the decision makers an estimate of their overall fuzziness, and certain anomalies of the original method can be removed. ESA

N87-11554# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
THE STRUCTURE OF ORBITS IN DYNAMICAL SYSTEMS (REVISED VERSION)
J. M. Aarts 1985 34 p
(Rept-85-28; ETN-86-98460) Avail: NTIS HC A03/MF A01

Spaces which are locally homomorphic to O x IR, topological product of the rationals O and the reals IR, and arcwise connected are studied. It is shown that such spaces are the image of IR under a one-to-one and continuous map having the arc lifting property. A necessary and sufficient condition for a separable and metrizable space X to be the orbit in a flow is presented. A structure theorem is obtained: a space X is the orbit of a Poisson-stable and aperiodic motion if and only if X is homomorphic to the suspension of a universally transitive homomorphism of O. ESA

N87-11555# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
AN ITERATIVE SOLUTION METHOD FOR SOLVING f(A)x=b, USING cg-INFORMATION OBTAINED FOR THE SYMMETRIC POSITIVE DEFINITE MATRIX A
H. A. vanderVorst 1985 23 p
(Rept-85-32; ETN-86-98463) Avail: NTIS HC A02/MF A01

It is shown how intermediate information obtained by the conjugate gradients (cg) algorithm (or by the Lanczos algorithm) can be used to solve f(A)x=b iteratively in an efficient way, for suitable functions f. The case f(A) = Asq is discussed. The problem of solving Ax = b for different right-hand sides b is studied. A variant on an algorithm for that problem which does not seem to suffer from the usual loss of orthogonality in the standard cg and Lanczos algorithms is proposed. ESA

N87-11556# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A CONVERGENCE PROOF OF A MULTIGRID METHOD
I. A. M. Goddijn 1985 61 p
(Rept-85-39; ETN-86-98469) Avail: NTIS HC A04/MF A01

It is shown that the differet levels of a multigrid method are connected by a recurrence relation between operators. Using this relation the convergence-proof of this method, given by Braess and Hackbusch (1983) is reformulated. It is shown that (with modifications) their convergence-proof is valid for more general problems. The deduced convergence-factor of the multigrid method is uniform in the stepsize h and independent of the number of coarse grid corrections, so it is valid for the V-cycle and the W-cycle. ESA

N87-11557# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
MULTIPLE OBJECTIVE MODELING: EXPERIMENTAL RESULTS WITH INTERACTIVE METHODS IN THE NETHERLANDS
Matthijs Kok 1985 34 p Sponsored by Ministry of Economic Affairs, The Hague, Netherlands
(Rept-85-49; ETN-86-98479) Avail: NTIS HC A03/MF A01

An energy supply model which handles economic, environmental, and strategic factors was developed. Results of the model, using an interactive multiobjective linear programming method and preference information of representatives (actors) of organizations and institutes involved in energy policy problem are presented. Several methods and objective functions were used to obtain insight into the fuzziness of the preferences and to investigate empirically the differences between the interactive methods. The behavior of the actors during the interactive process and their treatment of uncertainties is mentioned. ESA

N87-11558# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON NUMERICAL DISPERSION BY UPWIND DIFFERENCING
Bram vanLeer 1985 15 p
(Rept-85-51; ETN-86-98481) Avail: NTIS HC A02/MF A01

Upwind-biased difference schemes for the linear one-dimensional convection equation are defined. It is demonstrated that the numerical dispersion caused by such schemes changes

sign in the middle of the allowed Courant-Friedrichs-Lewy number range. This makes it possible to annihilate dispersive errors in two steps. ESA

N87-11559# Groningen Rijksuniversiteit (Netherlands). Dept. of Mathematics.
COMPARISON OF SOME PARTIAL DIFFERENTIAL EQUATION MODELS OF FLEXIBLE STRUCTURES
J. Bontsema, R. F. Curtain, and J. M. Schumacher 1986 26 p Presented at the 4th IFAC Symposium on Control of Distributed Parameter Systems, Pasadena, Calif., 30 Jun. - 3 Jul. 1986 Sponsored by Netherlands Foundation for Technical Sciences
(TW-270; B8664377; ETN-86-98504) Avail: NTIS HC A03/MF A01

Three partial differential equation models for a flexible beam with different types of damping and varying parameter values are compared. Robust controllers can be designed to stabilize all linear systems whose transfer functions lie within a ball in the L infinity norm. Given a nominal model for the flexible beam, which sets of models can be stabilized by the same finite-dimensional robust controller is calculated. ESA

N87-11560# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
LINEAR STABILITY OF THE HOPSCOTCH SCHEME
W. H. Hundsdorfer and J. G. Verwer Jan. 1986 12 p Submitted for publication
(CWI-NM-R8603; B8667668; ETN-86-98507) Avail: NTIS HC A02/MF A01

The hopscotch numerical integration technique for time-dependent partial differential equations is introduced. Its linear stability properties are examined. A general theorem which provides sufficient conditions for boundedness of the numerical solution during time stepping on a fixed space-time mesh is presented. This theorem has applications in parabolic problems. For the one-space dimensional convection-diffusion equation, a detailed stability analysis of the odd-even scheme combined with central and one-sided finite differences, is presented. Stability based on the spectral condition is compared with von Neumann stability. Although the spectral condition gives no guarantee for stability, it does provide useful information. It is a necessay condition for stronger stability inequalities. In cases where such stronger stability inequalities are very hard to analyze (nonconstant coefficients, boundaries) the spectral condition still may be relatively easy to check, giving an idea of permissable step sizes. ESA

N87-11561# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON THE NUMERICAL INTEGRATION OF SECOND-ORDER INITIAL VALUE PROBLEMS WITH A PERIODIC FORCING FUNCTION
P. J. vanderHouwen, B. P. Sommeijer, K. Strehmel, and R. Weiner Feb. 1986 24 p Submitted for publication
(CWI-NM-R8604; B8667667; ETN-86-98508) Avail: NTIS HC A02/MF A01

Runge-Kutta-Nystrom type methods and predictor-corrector methods for the accurate solution of second-order differential equations of which the solution is dominated by the forced oscillation originating from an external, periodic forcing term are constructed. For a family of second-order explicit and linearly implicit Runge-Kutta-Nystrom methods, it is shown that the forced oscillation is represented with zero phase lag. For a family of predictor-corrector methods of fourth-order, it is shown that the phase lag order and the dissipation order of the forced oscillation can be made arbitrarily high. Numerical examples illustrate the effectiveness of the reduced phase lag methods. ESA

N87-11562# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Methods.
THE ORDER OF B-CONVERGENCE OF ALGEBRAICALLY STABLE RUNGE-KUTTA METHODS
K. Burrage and W. H. Hundsdorfer Feb. 1986 10 p
(CWI-NM-R8607; B8667664; ETN-86-98511) Avail: NTIS HC A02/MF A01

It is shown that for nonlinear dissipative problems, only a small class of Runge-Kutta methods have an order of optimal B-convergence one higher than the stage order. It is proved that such methods have at most classical order three. ESA

N87-11563# Center for Mathematics and Computer Science, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
CONVERGENCE ANALYSIS OF ONE-STEP SCHEMES IN THE METHOD OF LINES
J. M. Sanz-Serna and J. G. Verwer Mar. 1986 15 p Submitted for publication
(CWI-NM-R8608; B8667665; ETN-86-98512) Avail: NTIS HC A02/MF A01

Fundamental results concerning the analysis of one-step schemes for semidiscretizations of evolutionary problems in partial differential equations are exposed. The interplay between the stability and convergence properties of the fully discrete scheme and those of the ordinary differential equations solver is emphasized. Order reduction is treated. ESA

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N87-11564# Rome Univ. (Italy). Dipt. di Fisica.
SCALING LAW AND ASYMPTOTIC DISTRIBUTION OF LYAPUNOV EXPONENTS IN CONSERVATIVE DYNAMICAL SYSTEMS WITH MANY DEGREES OF FREEDOM
G. Paladin and A. Vulpiani 22 Jan. 1986 18 p Submitted for publication
(Nota-Interna-859; ETN-86-97893) Avail: NTIS HC A02/MF A01

The infinite product of 2N x 2N conservative random matrices which mimics the chaotic behavior of hamiltonian systems with N+1 degrees of freedom made of weakly nearest neighbor coupled oscillators is studied. The maximum Lyapunov exponent (L1) exhibits a power law behavior as a function of the coupling constant Sigma: L1 = Sigma sup Beta (Beta = 1/2 or 2/3, depending on the probability distribution of the matrix elements). These power laws do not depend on N and when increasing N, L1 quickly tends to an asymptotic value which only depends on Sigma and the kind of probability distribution chosen for building up the matrices. The spectrum of the Lyapunov exponents is calculated, showing that it has a thermodynamic limit of large N. This suggests the existence of a Kolmogorov entropy per degree of freedom proportional to the asymptotic value. ESA

N87-11565# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
MULTIVARIATE CALIBRATION: A GENERALIZATION OF THE CLASSICAL ESTIMATOR
C. A. J. Lieftinck-Koeijers 1985 26 p
(Rept-85-31; ETN-86-98462) Avail: NTIS HC A03/MF A01

A generalization of the classical estimator for multivariate regression problems is considered. It is shown that this estimator has a finite mean if the dimension, say p, of the response variable is greater than 2, and it is shown that the mean squared error is finite for p greater than 4. Exact expressions for the mean and the mean squared error are given in terms of expectations of Poisson variables, which can be easily approximated. ESA

N87-11566# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
ON LOCAL AND NONLOCAL MEASURES OF EFFICIENCY
Wilbert C. M. Kallenberg and Teresa Ledwina May 1986 31 p
(ISSN-0169-2690; ETN-86-98514) Avail: NTIS HC A03/MF A01

Results on the limiting equivalence of local and nonlocal measures of efficiency are obtained. It is clarified why the equivalence occurs in so many testing and estimation problems. Uniformity of the convergence is a key-point. The concepts of Frechet-type and Hadamard-type differentiability, which imply

uniformity, play an important role. The theory is applied to tests based on linear rank statistics showing equivalence of the local limit of exact Bahadur efficiency and Pitman efficiency. The relation between the inaccuracy rate and the asymptotic variance of L-estimators is investigated. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N87-11567*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
A METHODOLOGY FOR DESIGNING ROBUST MULTIVARIABLE NONLINEAR CONTROL SYSTEMS Ph.D. Thesis
Daniel Backer Grunberg Sep. 1986 233 p
(Grant NAG2-297)
(NASA-CR-179891; NAS 1.26:179891; LIDS-TH-1609) Avail: NTIS HC A11/MF A01 CSCL 12B

A new methodology is described for the design of nonlinear dynamic controllers for nonlinear multivariable systems providing guarantees of closed-loop stability, performance, and robustness. The methodology is an extension of the Linear-Quadratic-Gaussian with Loop-Transfer-Recovery (LQG/LTR) methodology for linear systems, thus hinging upon the idea of constructing an approximate inverse operator for the plant. A major feature of the methodology is a unification of both the state-space and input-output formulations. In addition, new results on stability theory, nonlinear state estimation, and optimal nonlinear regulator theory are presented, including the guaranteed global properties of the extended Kalman filter and optimal nonlinear regulators. Author

N87-11568# General Technology Systems B.V., The Hague (Netherlands).
ECONOMIC STUDY FOR NAVSAT Final Report
G. A. deBoer, M. vanderMatten, R. deBos, M. G. Pearson, S. Ratcliffe, and H. H. Schuringa Paris ESA 30 Oct. 1985 212 p
(Contract ESA-6022/84-F-RD(SC))
(GTS-84051; ESA-CR(P)-2241; ETN-86-98119) Avail: NTIS HC A10/MF A01

The performance and cost of terrestrial radio navigation systems, and the potential benefits and savings of satellite navigation for airlines, shipping, survey, land vehicles, and low orbiting satellites are analyzed. The yearly worldwide cost of radio navigation to airlines is $ 140 M/year (excluding user charges) and to shipping $280 M/year. The yearly cost of the ground system is estimated at $720 M/year. Although the transition to a system like NAVSAT will be lengthy, the benefits will be significant. The potential saving of fuel alone for airlines on the North Atlantic route could amount to $100 M/year (3%) and for shipping $200 M/year worldwide (1%) when mature systems are approved and in general operation. ESA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N87-11569# Stanford Univ., Calif. Systems Optimization Lab.
AN ALGORITHM FOR RESCALING A MATRIX POSITIVE DEFINITE
Hui Hu Apr. 1986 26 p
(Contracts N00014-85-K-0343; DE-AA03-76SF00326; DE-AS03-76ER-72018; Grants NSF DMS-84-20623; NSF ECS-83-12142)
(AD-A169257; SU-SOL-86-10) Avail: NTIS HC A03/MF A01 CSCL 12/1

For a given square real matrix M, we present a general algorithm which decides the existence of a positive diagonal matrix D such that DM is positive definite and which constructs the D if it exists. It is shown that solving this matrix rescaling problem is equivalent to finding a solution of an infinite system of linear inequalities. The algorithm solves the infinite system of linear inequalities by generating and solving a sequence of linear programs. GRA

N87-11570# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A FAMILY OF FIBONACCI-LIKE SEQUENCES
Peter R. J. Asveld Jun. 1985 7 p
(INF-85-10; ETN-86-98163) Avail: NTIS HC A02/MF A01

The recurrence relation Gn = Gn-1 + Gn-2 + Sigma k, j=0 alpha j n sup j with G0 = G1 = 1 is considered. The term Gn is expressed in terms of Fibonacci numbers Fn and Fn-1, and in the parameters alpha 0,..., alpha k. ESA

N87-11571# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
ON RESTRICTIONS OF PROJECTIONS ALONG SEPARABLE METRIC SPACES
Zdenek Frolik 1985 15 p
(Rept-85-42; ETN-86-98472) Avail: NTIS HC A02/MF A01

S-maps and S'-maps are introduced. The connection to continuous mapping from metric spaces preserving isolatedly sigma-decomposable families is shown. A mapping f: X to Y is an S-map if there exists an embedding h of X into Y x S, where S is a separable metrizable space, such that f is h followed by the projection Y x S to Y. A mapping f: X to Y is an S'-map if f is continuous, and there exists a separable metrizable space S, and a subset Z is a subset of X x S which projects onto X, such that the product map f x 1S restricted to Z is an embedding. Both S and S' maps form a category. The two concepts apply directly to the theory of absolute Suslin sets in the class of metrizable spaces. ESA

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N87-11572# California Univ., Berkeley.
INAUGURAL CONFERENCE OF THE BERKELEY RESEARCH GROUP IN NONLINEAR SYSTEMS AND DYNAMICS Final Report, 7 Jan. 1985 - 6 Jan. 1986
S. S. Sastry May 1986 12 p Proceedings of conference
(Contract DAAG29-85-M-0166)
(AD-A169175; ARO-22553.1-MA-CF) Avail: NTIS HC A02/MF A01 CSCL 06/4

Abstracts are presented for the following papers: Nonlinear Problems in Robotics; The Patterns on Molluscan Shells; Turbulence and Low Dimensional Chaos; A Geometric and Asymptotic Approach; Experiments on Nonlinear Dynamics in Solid State Systems; Spectral University in Macromolecular Sensitivity; and Global Dynamical Properties. GRA

N87-11573# Los Alamos National Lab., N. Mex.
FIBER OPTIC, FARADAY ROTATION CURRENT SENSOR
L. R. Veeser and G. W. Day (National Bureau of Standards, Boulder, Colo.) 1986 9 p Presented at the 4th International Conference on Megagauss Magnetic-Field Generation and Related Topics, Santa Fe, N. Mex., 24 Jul. 1986 Prepared in cooperation with National Bureau of Standards, Boulder, Colo.
(Contract W-7405-eng-36)
(DE86-012413; LA-UR-86-2084; CONF-860703-2) Avail: NTIS HC A02/MF A01

The Second Megagauss Conference in 1979 reported experiments using the Faraday magneto-optic effect in a glass rod to measure large electric current pulses or magnetic fields. Since then we have seen the development of single-mode optical fibers carrying polarized light in a closed loop around a current load. A fiber optic Faraday rotation sensor will integrate the flux, instead

of sampling it at a discrete point, to get a measurement independent of the current distribution. Early Faraday rotation experiments using optical fibers to measure currents dealt with problems such as fiber birefringence and difficulties in launching light into the tiny fiber cores. We have built on those experiments, working to reduce the effects of shocks and obtaining higher bandwidths, absolute calibration, and computerized recording and data analysis, to develop the Faraday rotation sensors into a routine current diagnostic. For large current pulses we find reduced sensitivity to electromagnetic interference and other backgrounds than for Rogowski loops; often the fiber optic sensors are useful where conductive probes cannot be used at all. The fiber optic sensors and some practical matters involved in fielding them are described. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution*.

N87-11574 Stuttgart Univ. (West Germany). Inst. fuer Thermodynamik.
DETERMINATION OF THE MASS CONCENTRATION OF THE PARTICLES IN AEROSOLS USING THE SOUND VELOCITY MEASUREMENT Final Report [BESTIMMUNG DES MASSENANTEILS DER PARTIKEL IN AEROSOLEN UEBER DIE MESSUNG DER SCHALLGESCHWINDIGKEIT]
1986 35 p In GERMAN
(FR-235/20-1; ETN-86-97828) Copyright. Avail: Issuing Activity

The method to measure large mass concentration in a gas-particle mixture was developed. The theoretical fundamentals, based on the equations of motion of a multiphase system, are explained. Weak pressure waves propagating through the mixture were used to determine the mass concentration. Two pressure gages measure the propagation velocity and the pressure variation accompanying these waves. The mass concentration can be determined from the Ranking-Hugoniot relations. The results demonstrate the feasibility of the method. ESA

N87-11575*# Georgia Inst. of Tech., Atlanta. School of Mechanical Engineering.
SOUND PROPAGATION OVER UNEVEN GROUND AND IRREGULAR TOPOGRAPHY Semiannual Status Report, Feb. - Aug. 1986
James A. Kearns, Allan D. Pierce, and Geoffrey L. Main Oct. 1986 23 p
(Grant NAG1-566)
(NASA-CR-179827; NAS 1.26:179827; SASR-3) Avail: NTIS HC A02/MF A01 CSCL 20A

Theoretical, computational, and experimental techniques for predicting the effects of irregular topography on long range sound propagation in the atmosphere was developed. Irregular topography here is understood to imply a ground surface that is not idealized as being perfectly flat or that is not idealized as having a constant specific acoustic impedance. The interest focuses on circumstances where the propagation is similar to what might be expected for noise from low altitude air vehicles flying over suburban or rural terrain, such that rays from the source arrive at angles close to grazing incidence. Author

N87-11576*# Pope (L. D.), Woodlands, Tex.
PROPELLER AIRCRAFT INTERIOR NOISE MODEL UTILIZATION STUDY AND VALIDATION
L. D. Pope Sep. 1984 248 p
(Contract NAS1-17281)
(NASA-CR-172428; NAS 1.26:172428; Rept-84-001) Avail: NTIS HC A11/MF A01 CSCL 20A

Utilization and validation of a computer program designed for aircraft interior noise prediction is considered. The program, entitled PAIN (an acronym for Propeller Aircraft Interior Noise), permits (in theory) predictions of sound levels inside propeller driven aircraft arising from sidewall transmission. The objective of the work reported was to determine the practicality of making predictions for various airplanes and the extent of the program's capabilities. The ultimate purpose was to discern the quality of predictions for tonal levels inside an aircraft occurring at the propeller blade passage frequency and its harmonics. The effort involved three tasks: (1) program validation through comparisons of predictions with scale-model test results; (2) development of utilization schemes for large (full scale) fuselages; and (3) validation through comparisons of predictions with measurements taken in flight tests on a turboprop aircraft. Findings should enable future users of the program to efficiently undertake and correctly interpret predictions. Author

N87-11577*# Virginia Polytechnic Inst. and State Univ., Blacksburg.
AN EXPERIMENTAL INVESTIGATION OF THE INTERIOR NOISE CONTROL EFFECTS OF PROPELLER SYNCHROPHASING
J. D. Jones and C. R. Fuller Oct. 1986 103 p
(Grant NAG1-390)
(NASA-CR-178185; NAS 1.26:178185) Avail: NTIS HC A06/MF A01 CSCL 20A

A simplified cylindrical model of an aircraft fuselage is used to investigate the mechanisms of interior noise suppression using synchrophasing techniques. This investigation allows isolation of important parameters to define the characteristics of synchrophasing. The optimum synchrophase angle for maximum noise reduction is found for several interior microphone positions with pure tone source excitation. Noise reductions of up to 30 dB are shown for some microphone positions, however, overall reductions are less. A computer algorithm is developed to decompose the cylinder vibration into modal components over a wide range of synchrophase angles. The circumferential modal response of the shell vibration is shown to govern the transmission of sound into the cylinder rather than localized transmission. As well as investigating synchrophasing, the interior sound field due to sources typical of propellers has been measured and discussed. Author

N87-11578# Rolls-Royce Ltd., Derby (England).
AIRCRAFT NOISE MEASUREMENT: THE 1.2 METRE MICROPHONE HEIGHT SAGA
M. J. T. Smith 18 Feb. 1986 7 p Presented at Internoise 86, Boston, Mass., Jul. 1986
(PNR-90315; ETN-86-98020) Avail: NTIS HC A02/MF A01

The spectral differences in noise measurements on a range of aircraft types, when using microphones placed in a variety of locations between ground level and 10m were studied. Results show that an inverted microphone configuration, on an easily portable plate, can be specified to eliminate the severe ground interference effects experienced with the International Standard 1.2m high microphone. The move towards such a system by ICAO, for propeller powered light aircraft noise certification, is approved. A move away from the 1.2m system used in the certification of other types of aircraft should be encouraged. Further work should be conducted to confirm the ideal microphone-to-plate separation for jet powered aircraft, and to examine whether the otherwise minimal deviations from pressure-doubling can be further reduced. ESA

N87-11579 Stanford Univ., Calif.
SEPARATION OF AIRBORNE AND STRUCTUREBORNE NOISE RADIATED BY PLATES CONSTRUCTED OF CONVENTIONAL AND COMPOSITE MATERIALS WITH APPLICATIONS FOR PREDICTION OF INTERIOR NOISE PATHS IN PROPELLER DRIVEN AIRCRAFT Ph.D. Thesis
Michael C. McGary 1986 315 p
Avail: Univ. Microfilms Order No. DA8612765

The anticipated application of advanced turboprop propulsion systems and the use of composite materials in primary structure is expected to increase the interior noise of future aircraft to unacceptably high levels. The absence of technically and economically feasible noise source-path diagnostics tools has been a prime obstacle in the development of efficient noise control treatments

for propeller driven aircraft. A new diagnostic method which permits the separation and prediction of the fully coherent airborne and structureborne components of the sound radiated by plates or thin shells has been developed. Analytical and experimental studies of the proposed method were performed on plates constructed of both conventional and composite materials. The results of the study indicate that the proposed method can be applied to a variety of aircraft materials, could be used in flight, and has fewer encumbrances than the other diagnostic tools currently available. The study has also revealed that the noise radiation of vibrating plates in low frequency regime due to combined airborne and structureborne inputs possesses a strong synergistic nature. The large influence of the interaction between the airborne and structureborne terms has been hitherto ignored by researchers of aircraft interior noise problems. noise problems. Dissert. Abstr.

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N87-11580 National Physical Lab., Teddington (England). Div. of Radiation Science and Acoustics.
MEASUREMENTS PERFORMED AT THE NATIONAL PHYSICAL LABORATORY FOR AN INTERNATIONAL INTERCOMPARISON OF NEUTRON FLUENCE RATE MEASUREMENTS FOR MONO-ENERGETIC FAST NEUTRONS USING THE 115 SUB In(n, GAMMA) REACTION
J. B. Hunt May 1986 76 p
(NPL-RS(EXT)-81; ETN-86-97991) Copyright. Avail: Issuing Activity

Neutron energies of 144 and 565 keV were measured using transfer devices consisting of matched pairs of indium foils activated via the in-115(n, gamma) In-116m reaction. The relative 54 min In-116m activity was determined with a 4 pi Beta gas flow proportional counter. The neutron fluence received by the indium foil was determined using a calibrated standard long counter. The saturated specific Beta-activity of In-116m per unit neutron fluence rate, at both neutron energies, is reported. Corrections for neutron scattering from the surroundings were easily made, corrections for neutron scattering within the target assembly were difficult to evaluate, particularly at 144 keV. This effect dominates the uncertainties associated with the transfer device at this energy. ESA

N87-11581# Kernforschungszentrum, Karlsruhe (West Germany). Lab. fuer Aerosolphysik und Filtertechnik.
NUCLEATION IN BINARY SUPERSATURATED GAS MIXTURES Thesis - Karlsruhe University, West Germany
Helmut Bunz Feb. 1986 97 p In GERMAN; ENGLISH summary
(KfK-4036; ISSN-0303-4003; ETN-86-97835) Avail: NTIS HC A05/MF A01

Cluster formation in supersaturated gases is discussed. The nucleation in a binary gas mixture was researched using the molecular-dynamics method. The main parameters varied were the ratio of the vapor pressures or the depth of the interaction potentials of the two gases, respectively. A Lennard-Jones (6-12)-potential was used as interaction potential. The calculations show that the cluster formation is influenced only little by the more volatile gas as long as the ratio of the vapor pressure is large. Mixed clusters form only if the ratio of the vapor pressures is drastically reduced. In these cases the intermolecular structures of the different binding types are nearly independent of each other so that the total binding energy of the mixed cluster may be expressed by a simple scaling law based on the binding energies of the pure components. ESA

N87-11582# Rome Univ. (Italy). Dipt. di Fisica.
PHYSICS AND EVENT SIMULATION AT HERA WITH H1 (REPORT OF THE WORKING GROUP OF THE H1 COLLABORATION FOR HERA)
J. Field, D. Haidt, G. Grindhammer, G. dAgostini, and B. Stella 2 Oct. 1985 156 p
(Nota-Interna-854; H1-06/85-23; ETN-86-97888) Avail: NTIS HC A08/MF A01

The design of the HERA facility to study exotics (including fragmentation of partons); photon-gluon fusion and heavy quark production; specific models for compositeness; gamma gamma and low Qsq physics; and the electrons to pions ratio and the leptonic multiplicity of the events were discussed. How the different processes were treated in order to generate files of events; studies of the general features of interesting processes to look for signatures and examine the requested performances of the detector; the existence of substructures (excited electrons and leptoquarks analyzed as processes where compositeness could show up) and photoproduction were treated. ESA

N87-11583# Rome Univ. (Italy). Dipt. di Fisica.
THE EXTERNAL MUON DETECTOR FOR ICARUS
M. Conversi, M. Ferro-Luzzi, F. Massa, E. Pagiola, and J. M. Perreau 21 Feb. 1986 19 p
(Nota-Interna-863; ETN-86-97896) Avail: NTIS HC A02/MF A01

It is argued that physics goals, including unambiguous detection of heavy monopoles below the Parker limit, can be achieved by equipping ICARUS with an appropriate External Muon Detector (EMD). The characteristics of the EMD constituent elements (Resistive Plate Counters, RPC) are reported for the existing RPC version. The structure, use and requirements of the EMD are discussed and cost estimates are given. ESA

N87-11584# Rome Univ. (Italy). Dipt. di Fisica.
THE DISCOVERY OF THE POSITRON
Michelangelo deMaria and Arturo Russo 14 Jun. 1985 84 p Submitted for publication Sponsored by Ministero della Pubblica Istruzione, CNR, and National Museum of American History Smithsonian Fellowship
(Preprint-469; ETN-86-97904) Avail: NTIS HC A05/MF A01

The contribution of Dirac, Anderson, Blackett, and Occhialini to the discovery of the positron are discussed. It is argued that the positron was suggested by Dirac, discovered by Anderson, and confirmed by Blackett and Occhialini. ESA

N87-11585# Rome Univ. (Italy). Dipt. di Fisica.
LIGHT GLUINOS AT THE CERN PPBAR COLLECTOR
G. Altarelli, B. Mele, and S. Petrarca 16 Jul. 1985 15 p Sponsored by Ministero della Pubblica Istruzione
(Preprint-470; ETN-86-97905) Avail: NTIS HC A02/MF A01

The exclusion of light gluinos (with decays gluinos yield quark antiquark photino) in ppbar collisions is discussed. It is found that light gluinos are compatible with existing data, the excluded interval of masses being 15GeV less than or = m sub g less than or = 40GeV. ESA

N87-11586# Rome Univ. (Italy). Dipt. di Fisica.
ELECTROWEAK INTERACTIONS
Luciano Maiani Nov. 1985 38 p Presented at EPS International Europhysics Conference on High Energy Physics, Bari, Italy, 18-24 Jul. 1985
(Preprint-482; CERN-Preprint-TH.4326/85; ETN-86-97917) Avail: NTIS HC A03/MF A01

Data from neutrino, e(+)e(-), and W/Z physics is reviewed. Agreement with theory is excellent. The prospects for more precise tests, at the level of the higher order corrections, are illustrated, particularly the possibility of obtaining the Higgs boson mass, from the size of the virtual corrections. Direct searches for the Higgs boson with high energy machines are considered. Nonleptonic weak processes, and attempts to compute delta S=1,2 amplitudes in lattice QCD are treated. Family unification within orthogonal groups, and the existence of mirror fermions are assessed. Theoretical considerations following the observation of a surprisingly large flux of underground muons from Cygnus X-3 are reported. ESA

N87-11587# Rome Univ. (Italy). Dipt. di Fisica.
MOLECULAR DYNAMICS SIMULATION OF RIGID MOLECULES
G. Ciccotti and J. P. Ryckaert 8 Jan. 1986 84 p Sponsored by Belgium FNRS, and CNR
(Grant NATO-1865)
(Preprint-494; ETN-86-97927) Avail: NTIS HC A05/MF A01

The method of constraints is reviewed. The method was devised to carry out molecular dynamics (MD) simulations of complex molecular systems with internal degrees of freedom frozen, in terms of atomic cartesian coordinates. The method was generalized to treat all kinds of holonomic constraints and was adapted to dynamical simulations in ensembles different from the microcanonical one. The statistical-mechanical formalism for these systems, and the equations of motions are derived. The MD algorithms are discussed, and details on the FORTRAN code are presented. ESA

N87-11588# Rome Univ. (Italy). Dipt. di Fisica.
HYPERPHOTONS AND K MESON DECAYS
M. Lusignoli and A. Pugliese 31 Jan. 1986 11 p Revised
(Preprint-498; ETN-86-97930) Avail. NTIS HC A02/MF A01

The branching ratio for the decay K(+) yields pi(+) + the quantum of a massive vector field coupled to the hypercharge current is calculated. The existence of such a particle was suggested to explain the results of the Eotvos (1922) experiment and of K(0)-Kbar(0) regeneration experiments at high energy. The present experimental upper bound is lower than the theoretical expectation by more than three orders of magnitude. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N87-11589*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF BACKING PLATES ON THE ELECTRON EXPOSURE OF THIN POLYMER FILMS
C. Ken Chang (Christopher Newport Coll., Newport News, Va.), Steven M. Seltzer (National Bureau of Standards, Washington, D.C.), and John W. Wilson Nov. 1986 16 p
(Grant NsG-1614)
(NASA-TM-88995; L-16183; NAS 1.15:88995) Avail: NTIS HC A02/MF A01 CSCL 11B

The effects of backing plates on the radiation dose received by thin nylon films were calculated using recently developed multilayer electron transport codes. The film dose increased with increasing atomic number of the backing plate. The estimated dose could be off by a factor of 2 or more if the backing plate were ignored in the calculations. Author

N87-11590# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
SIMULATION OF THE PRELIMINARY GENERAL ELECTRIC SP-100 SPACE REACTOR CONCEPT USING THE ATHENA COMPUTER CODE
C. D. Fletcher 1986 33 p Presented at the 3d Symposium on Space Nuclear Power Systems, Albuquerque, N. Mex. 13 Jan. 1986
(Contract DE-AC07-76ID-01570)
(DE86-005324; EGG-M-28185; CONF-860102-5) Avail: NTIS HC A03/MF A01

The capability to perform thermal-hydraulic analyses of a space reactor using the ATHENA computer code is demonstrated. The fast reactor, liquid-lithium coolant loops, and lithium-filled heat pipes of the preliminary General electric SP-100 design were modeled with ATHENA. Two demonstration transient calculations were performed simulating accident conditions. Calculated results are available for display using the Nuclear Plant Analyzer color graphics analysis tool in addition to traditional plots. ATHENA-calculated results appear reasonable, both for steady state full power conditions, and for the two transients. This analysis represents the first known transient thermal-hydraulic simulation using an integral space reactor system model incorporating heat pipes. DOE

N87-11591# Hanford Engineering Development Lab., Richland, Wash.
SP-100 GROUND ENGINEERING SYSTEM AT HANFORD, VOLUME 2
1986 253 p
(Contract DE-AC06-76FF-02170)
(DE86-009961; HEDL-7538-Vol-2) Avail: NTIS HC A12/MF A01

The SP-100 reactor is intended to provide a reliable power source for space applications. The reactor development program includes a ground test of the reactor systems to demonstrate that reliability and safety issues have been resolved. The use of an existing containment structure provides a unique facility with large safety margins and ample space. Preliminary seismic analysis shows that current site earthquake criteria can be met. The building is currently utilized to house engineering personnel, and the containment area is in use as an assembly facility. Only minimal activity is required to activate major support systems. All of the principal support facilities are in close proximity to the proposed test site. The various systems and facilities and their status are identified. DOE

74 OPTICS

Includes light phenomena; and optical devices.

For lasers see *36 Lasers and Masers.*

N87-11592 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
CONCAVE DIFFRACTION GRATINGS
M. C. Hutley Oct. 1985 28 p
(NPL-MOM-77; ISSN-0143-7313; ETN-86-97989) Copyright. Avail: Issuing Activity

The need for concave diffraction gratings in ultraviolet, visible, and near infrared spectroscopy is summarized. The relative merits of ruled gratings and those generated using interference or holographic techniques are reviewed. The reduction of aberrations through a suitable choice of recording parameters is discussed, and a grating design which combines the advantages of aberration correction, constant blazed groove profile, and a constant focal distance is described. It is suggested that this grating might form the basis of a simple scanning monochromator performance measurements are described. ESA

N87-11593# Department of the Air Force, Washington, D.C.
OPTICAL FLIP-FLOP SYSTEM Patent
Jack L. Jewell, inventor (to Air Force) Issued 4 Mar. 1986 8 p Supersedes AD-D011165
(AD-D012259; US-Patent-4,573,767; US-Patent-Appl-SN-615612; US-Patent-Class-350-354) Avail: US Patent and Trademark Office CSCL 20/6

An optical flip-flop system has a pair of optically aligned nonlinear Fabry-Perot etalons, one of which acts as a bistable optical device, the other acts as a negative optical gate. The negative optical gate is initially tuned for high transmission and will remain transmissive until impinged upon by a first optical pulse, at which time it will momentarily become nontransmissive. If this nontransmissive state is longer than the recovery time of the bistable optical device, then the bistable optical device will remain nontransmissive until impinged upon by a second optical pulse. Thereupon, the bistable optical device will be transmissive until such time as the negative optical gate becomes nontransmissive again. In this manner the flip-flop system can be readily controlled

by the application of the pair of optical pulses thereto.
Author (GRA)

N87-11594# Department of the Navy, Washington, D. C.
POLYNOMIAL GRATING Patent
John F. Meekins and Herbert Gursky, inventors (to Navy) Issued 25 Mar. 1986 8 p Supersedes AD-D011090
(AD-D012313; US-Patent-4,578,804; US-Patent-Appl-SN-615504; US-Patent-Class-378-84) Avail: US Patent and Trademark Office CSCL 20/6

This patent discloses an apparatus for decomposing far ultraviolet and soft X-ray radiation into its component wavelengths comprising a diffraction grating having a diffraction grating surface defined by a polynomial Z = sum over Q sub K X superscript K and an optimum line spacing.
GRA

N87-11595# Army Missile Command, Redstone Arsenal, Ala. Research Directorate.
REAL-TIME PATTERN RECOGNITION USING A MODIFIED LIQUID CRYSTAL TELEVISION IN A COHERENT OPTICAL CORRELATOR
Don A. Gregory and Tracy D. Hudson 15 Nov. 1985 23 p
(AD-A168042; AD-E950834; AMSMI/RD-RE-86-1-TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

A commercially available flat screen Liquid Crystal Television (LCTV) has been slightly modified and used as a spatial light modulator in a Vander Lugt type coherent optical correlator. The small, (54 mm x 40.5 mm) inexpensive, (approx.= $100) LCTV was used as a replacement for extremely expensive modulators normally used in optical data processing such as the Hughes Liquid Crystal Light Valve and the Litton Magneto-Optic Device. Results show that the resolution, contrast, and speed of the LCTV in its present form, are sufficient for some basic real-time pattern recognition applications.
Author (GRA)

N87-11596# California Inst. of Tech., Pasadena.
OPTICAL FILTERING TECHNIQUES Final Technical Report, Jan. - Jun. 1985
Demetri Psaltis Mar. 1986 53 p
(Contract F30602-81-C-0206)
(AD-A168084; RADC-TR-86-2) Avail: NTIS HC A04/MF A01 CSCL 09/3

The purpose of this study was to examine the potential of using optical information processing technology for adaptive antenna beamforming and null steering. The adaptive beamforming-/null steering problem consists of estimation of the covariance matrix of the noise field and inversion of the covariance matrix to obtain the antenna element weights which optimize the antennas of the covariance matrix to obtain the antenna element weights which optimize the antenna's directional characteristics (gain pattern). This report examines the adaptive beamforming/nulling problem in view of the capabilities of optics and identifies areas where optics can be used to benefit.
GRA

N87-11597# Rome Air Development Center, Griffiss AFB, N.Y.
COMPARISON OF MODAL TO NODAL APPROACHES FOR WAVEFRONT CORRECTION
Donald W. Hanson and Sam E. Fragapane, Jr. Feb. 1986 31 p
(AD-A168088; RADC-TR-85-226) Avail: NTIS HC A03/MF A01 CSCL 20/6

The turbulent atmosphere aberrates optical wavefronts as they propagate through it. These aberrations are responsible for limiting the performance of large aperture ground based optical systems. The issue of whether to implement nodal or modal influence functions to perform wavefront correction in an adaptive optical system is studied. Theoretically, modal wavefront correction is simpler to implement than nodal wavefront correction. This is true for very low mode aberrations, (e.g., tilt, focus). However, for large aperture, visible wavelength, adaptive optical imaging systems the number of modes which are required to be corrected becomes very high. Consequently, for these systems, nodal wavefront correction is more easily implemented.
GRA

N87-11598# Argonne National Lab., Ill.
STABILITY OF MULTILAYERS FOR SHORT-WAVELENGTH OPTICS
E. Ziegler, Y. Lepetre, I. K. Schuller, P. J. Viccaro, and E. Spiller (IBM Watson Research Center, Yorktown Heights, N.Y.) Mar. 1986 8 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation, Monterey, Calif., 24 Mar. 1986
(Contract W-31-109-eng-38)
(DE86-012129; CONF-860316-9) Avail: NTIS HC A02/MF A01

A variety of multilayer mirrors with transition metal absorber layers (W-C, Wre-C, Co-C, and Cr-C) have been fabricated and tested up to 1000 C using standard 0-20 X-ray diffraction, Debye-Scherrer scattering and microcleavage transmission electron microscopy. The 0-20 X-ray diffraction during annealing shows the Bragg peak position to shift toward lower angles with increasing temperature. This irreversible shift starts at around 300 C and is equivalent to as much as 12% expansion of the multilayer period with a temperature change from ambient to 750 C. In all cases a crystallization occurs in the metal component between 650-750 C. The different types of crystalline compounds formed have been identified by the Debye-Scherrer technique. As a consequence of this crystallization abrupt changes occur in the multilayer structure. Electron microscopy shows that the surface roughness increases by formation of hillocks and the layered structure is destroyed. Moreover the X-ray reflectivity decreases considerably. The expansion and crystallization are of great importance in cases where a precise multilayer period is required or in devices intended for high X-ray flux applications.
DOE

N87-11599# Rome Univ. (Italy). Dipt. di Fisica.
LANGEVIN EQUATIONS WITH NEGATIVE DIFFUSION COEFFICIENTS. A NEW APPROACH TO QUANTUM OPTICS
Horace P. Yuen and Paolo Tombesi 13 Feb. 1986 13 p
Sponsored in part by Navy and by NATO
(Nota-Interna-862; ETN-86-97895) Avail: NTIS HC A02/MF A01

Stochastic differential equations with negative diffusion coefficients for applications to the analysis of open quantum systems and nonlinear optical systems are introduced. It is shown how they can be consistently employed for moment calculations. The problem of squeezing is illustrated.
ESA

N87-11600# British Aerospace Public Ltd. Co., Bristol (England). Optics Research Dept.
PASSIVE STEREOSCOPIC RANGEFINDER
O. Burgess Sep. 1981 25 p
(BAe-BT-12300; LR48041; ETN-86-97954) Avail: NTIS HC A02/MF A01

A stereoscopic rangefinder where the apparent displacement of the images is measured automatically using linear photodetector arrays is described. The high accuracy of this method of measurement permits the design of an instrument with a relatively short separation between the two optical systems, i.e., it can cope with smaller angles of parallax. The problem of movement between the two optical systems, due to bending of the instrument, causing a false image displacement is addressed via the use of a single objective lens used by both optical systems, an instrument based on the use of Young's slits for measuring any movement between the systems. It should be possible to build an instrument of 0.5 m separation between the optical systems giving an accuracy of 100 m at 5km (2%).
ESA

N87-11601# British Aerospace Public Ltd. Co., Bristol (England). Optics Research Dept.
APPLICATION OF THE SPOKE FILTER TO DIGITAL IR IMAGES
N. C. Roberts Dec. 1982 18 p
(BAe-BT-13988; ETN-86-97961) Avail: NTIS HC A02/MF A01

A technique that uses a spoke filter to isolate the convex regions in IR images is described. This information can then be used to identify likely target positions. A small number of IR images was processed using this spoke filter and the results indicate that the technique merits further investigation.
ESA

N87-11602# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
AN INFRARED SEARCHLIGHT
Ulf Bjoerkman Jun. 1986 71 p In SWEDISH; ENGLISH summary
(FOA-C-30421-E4; ISSN-0347-3708; ETN-86-98333) Avail: NTIS HC A04/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

An infrared searchlight with semiconductor diodes for scanning in the darkness giving 0.3 W high optical effect in a narrow lobe of + or - 2.5 degrees arc is described. Studies show that diodes to be used are: for less than 10 m up to 15 m, emitting diodes with matrix in an ordinary epoxy capsule; from 50 to 100 m, as above but with a Fresnel lens as collecting lens for the matrix; for less than a few km, laser diodes or optical fibers. The components of the electric circuits are analyzed. ESA

N87-11049*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Radio Frequency and Microwave Subsystems Section.
PHYSICAL OPTICS ANALYSIS OF A 4-REFLECTOR ANTENNA, PART 2
A. G. Cha *In its* The Telecommunications and Data Acquisition Report (date) p 231 - 243 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 20F

N87-11454 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.
NEWS ABOUT THE VISIBILITY OF SIGNAL LIGHTS UNDER THE INFLUENCE OF THE ATMOSPHERE [NEUES ZUR SICHTBARKEIT VON SIGNALLICHT UNTER DEM EINFLUSS DER ATMOSPHAERE]
G. H. Ruppersberg *In* Deutscher Wetterdienst Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 206-207 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N87-11603 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ACTIVE PLASMA EXPERIMENTS
Gerhard Haerendel Jan. 1986 42 p
(MPE-Preprint-43; ASP-49; ISSN-0178-0719; ETN-86-98262) Avail: Issuing Activity

The use of barium plasma clouds for spaceborne experiments and ground-based observation is described. Luminous plasma clouds are generated from releases of barium metal vapor in near-Earth space and subsequently ionized by solar UV radiation. The clouds interact with the magnetic and electric fields, constitute visible tracers of plasma transport, develop odd shapes, and fine structure and can be used for a variety of experiments simulating cosmic processes. ESA

N87-11604 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ADIABATIC COOLING OF THE ARTIFICIAL PORCUPINE PLASMA JET
Yu. Ya. Ruzhin, A. M. Moskalenko, R. A. Treumann, and O. H. Bauer Feb. 1986 26 p Sponsored in part by Deutschen Forschungsgemeinschaft
(Contracts BMFT-01D0074A; BMFT-RV14B7/74)
(MPE-Preprint-46; ISSN-0178-0719; ETN-86-98265) Copyright. Avail: Issuing Activity

Measurements of the plasma density obtained during the interaction of the artificial plasma jet fired into the ionosphere with the body of the PORCUPINE main payload were analyzed for times when there was a well-developed wake effect. The beam temperature found is four times less than the temperature at injection. This is explained by adiabatic cooling of the beam during its initial diamagnetic and current build-up phases at distances < 10 m. Outside this region the beam conserves the temperature achieved. The observation proves that the artificial plasma jet passes through an initial gas-like diamagnetic phase restricted to the vicinity of the beam source where it expands adiabatically. Partial cooling also takes place outside the diamagnetic region where the beam current still builds up. The observations also support a current-closure model of the quasi-neutral ion beam. ESA

N87-11605# Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
ANOMALOUS DIFFUSION ACROSS THE MAGNETIC FIELD-PLASMA BOUNDARY: THE PORCUPINE ARTIFICIAL PLASMA JET
E. V. Mishin, V. Ya. Kapitanov, and R. A. Treumann Feb. 1986 20 p
(MPE-Preprint-47; ETN-86-98208) Avail: NTIS HC A02/MF A01

Observations of nearly undisturbed penetration of the PORCUPINE dense and fast heavy ion beam into the magnetized ionospheric plasma after termination of the short adiabatic phase are discussed. Very fast magnetic field diffusion into the beam is requried. Collisional diffusion and instability of a sharp boundary between magnetic field and plasma yield diffusion times too long to account for the observations. The diffusion is therefore attributed to a transverse electron drift current driven electrostatic instability excited by the diamagnetic current flowing in the boundary layer between the injected beam and the ambient field. ESA

N87-11606# Naval Research Lab., Washington, D. C.
A COLLISIONAL-RADIATIVE MODEL AND SAHA DECREMENTS FOR A NONEQUILIBRIUM OXYGEN PLASMA
Ronald D. Taylor and A. W. Ali 20 May 1986 46 p
(AD-A168082; NRL-MR-5792) Avail: NTIS HC A03/MF A01 CSCL 20/9

When air is heated and becomes highly ionized, the primary constituents consist of nitrogen, oxygen and their ions. Emissions from this plasma provide diagnostic information as well as contribute to cooling the plasma. To describe such a plasma under nonequilibrium conditions one must know the population densities of various excited states. Using a time dependent approach a collisional-radiative model is developed for an oxygen plasma. Effective recombination and ionization coefficients are calculated for two specific cases, optically thin and optically thick in bound-bound UV radiation. The steady state population densities for neutral and ionic states are presented in terms of their deviations from Saha equilibrium predictions. These results show the approach of the plasma to a state of local thermodynamic equilibrium (LTE) as a function of electron temperatures between 1.0 and 3.0 eV and electron densities between 10 to the 16th power and 10 to the 19th power/cc. GRA

N87-11607# Pennsylvania State Univ., University Park.
STUDY OF PLASMA CONVECTION AND WALL INTERACTIONS IN MAGNETIC CONFINEMENT SYSTEMS Final Report, 1 Dec. 1984 - 28 Feb. 1986
T. M. York 1 Jun. 1986 160 p
(Contract DE-AC02-76ET-53018)
(DE86-011919; DOE/ET-53018/13) Avail: NTIS HC A08/MF A01

The subject contract research effort was initiated in September 1976 with two specific tasks: (1) to study the fundamental physics of confinement of an alternate concept (i.e., theta pinch based) devices; and (2) to study and to develop new diagnostic systems for use on major experiments at other locations in the country. There has been active collaboration with Los Alamos National Laboratory and Lawrence Livermore National Laboratory; there has

been proposed collaboration with Princeton Plasma Physics Laboratory, Fusion Research Center at the University of Texas, and General Atomics. DOE

N87-11608# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
[ACTIVITIES REPORT OF THE INSTITUTE FOR PLASMA RESEARCH] Annual Report, 1985
1985 21 p
(ETN-86-98253) Avail: NTIS HC A02/MF A01

Electron cyclotron resonance heating waveguide systems and components for operation at 70 GHz were developed, constructed, and operated. The investigation of density fluctuations in connection with lower hybrid heating at ASDEX produced detectable scattering signals. Spectra of low frequency fluctuations were measured with good signal-to-noise ratios. Preparations for lidar scattering on JET proceeded. At the plasma focus experiment POSEIDON investigations of scaling laws, neutron production, particle acceleration mechanisms and the fine structure of the focus plasma have progressed. Indications of regimes with radiation collapse were observed. ESA

N87-11609# Paris-Sud Univ., Orsay (France). Lab. de Physique des Gaz et des Plasmas.
STUDY OF A DISCHARGE PRODUCED BY A STANDING SURFACE WAVE [ETUDE DUNE DECHARGE CREEE PAR UNE ONDE STATIONNAIRE]
Z. Rakem, E. Bloyet, C. Boisse-Laporte, A. Granier, P. Leprince, and J. Marec Jan. 1986 105 p In FRENCH; ENGLISH summary
(LP-213; ETN-86-98410) Avail: NTIS HC A06/MF A01

A microwave discharge was produced in argon gas at low pressures (0.5 to 3 torr) in capillary quartz tubes (diameter 3 to 5 mm). The discharge characteristics including neutrals temperature and density, electron density, and electric field and wave characteristics were determined. A model describing the wave propagation is given and compared to the experiment. The results allow a good description of this discharge type under the conditions of the experiment. ESA

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N87-11610# International Centre for Theoretical Physics, Trieste (Italy).
SOME ASPECTS OF WAVE-FUNCTIONS IN DISORDERED AND INCOMMENSURATE MODELS
E. Roman and C. Wiecko Sep. 1984 16 p
(DE85-703226; IC-84/160) Avail: NTIS (US Sales Only) HC A02/MF A01

The localization length and fractal dimensionality of wave functions in the random diagonal and off-diagonal Anderson model are studied. This preliminary study is intended to establish how much connection between these two magnitudes exists and how they behave at the transition from the localized to extended regimes both in these random models as well as in the insommensurate models such as Aubry's. DOE

N87-11611# Sandia National Labs., Albuquerque, N. Mex.
CHEMICAL REACTION IN SHOCK COMPRESSION OF SOLIDS
R. A. Graham, B. Morosin, Y. Horie, and E. L. Venturini 1986 7 p Presented at the International Symposium on Intense Dynamic Loading and Its Effects, Beijing, China, 3 Jun. 1986 Prepared in cooperation with North Carolina State Univ., Raleigh.
(Contract DE-AC04-76DP-00789)
(DE86-003502; SAND-85-2411C; CONF-860616-8) Avail: NTIS HC A02/MF A01

The study of shock induced solid state chemistry is presented. Shock modification and chemical reaction were studied by various material probes. The BET method was used to determine the specific surface area. Computerized analysis of scanning electron microscope photographs determined the particle size distribution. Other material probes such as x-ray diffraction, electron spin resonance, transmission electron microscopy, thermal analysis with differential scanning calorimetry and differential thermal analysis as well as optical microscopy were used. DOE

N87-11612# Massachusetts Inst. of Tech., Cambridge. National Magnet Lab.
IMPROVEMENT IN HIGH MAGNETIC FIELD BEHAVIOR OF VANADIUM-GALLIUM SUPERCONDUCTORS BY ENHANCEMENT OF SPIN-ORBIT SCATTERING Progress Report
P. M. Tedrow and R. H. Meservey 14 Feb. 1986 5 p
(Contract DE-FG02-84ER-45094)
(DE86-007857; DOE/ER-45094/3) Avail: NTIS HC A02/MF A01

Goal is to increase the critical magnetic field in V3Ga, by adding high Z impurities. V3Ga films 10 nm thick have been studied. A 6-nm Al over layer was found to optimize T sub c. 0.5 nm Ta overlayer also increased T sub c. There is zero field effect. Tunneling measurements on 10 nm V3Ga show important Fermi-liquid effects. DOE

N87-11613# Brookhaven National Lab., Upton, N. Y.
CRYSTALLOGRAPHY OF ICOSAHEDRAL CRYSTALS
P. Bak 1986 8 p Presented at the Winter School on Aperiodic Crystals, Les Houches, France, 11 Mar. 1986
(Contract DE-AC02-76CH-00016)
(DE86-009945; BNL-37962; CONF-8603112-1) Avail: NTIS HC A02/MF A01

The crystallography of icosahedral crystals is constructed. The actual three-dimensional crystal is represented by a three-dimensional cut in a regular six-dimensional periodic crystal with symmetry described by a six-dimensional space group, and the positions of atoms correspond to an arrangement of hypersurface segments. The resulting crystal cannot in general be viewed as a space-filling arrangemment of a small number of different Penrose tiles. The intensities of Bragg spots are given directly as the intensities of Bragg spots of the six-dimensional crystal. DOE

N87-11614# Stockholm Univ. (Sweden). Dept. of Physics.
ELECTRON TRANSPORT IN INTEGRAL PHOTOEMISSION X-RAY STANDING WAVE ANALYSIS
M. V. Kovalchuk and D. Liljequist Mar. 1986 20 p
(USIP-86-03; ETN-86-97853) Avail: NTIS HC A02/MF A01

Based on Monte Carlo simulations of electron transport, a simple formula for the escape probability P(z) of photoelectrons generated at depth z by an X-ray standing wave field is proposed. The transport theoretical background for this formula is discussed. ESA

N87-11615# Rolls-Royce Ltd., Derby (England). Materials Engineering Group.
COST EFFECTIVE SINGLE CRYSTALS
M. J. Goulette, P. D. Spilling, and R. P. Arthey 18 Feb. 1986 11 p
(PNR-90319; ETN-86-98021) Avail: NTIS HC A02/MF A01

Cost effectiveness constraints in aerospace single crystal technology were met by improving single crystal casting techniques, alloy development, and orientation measurement. The first led to the adoption of the technically more difficult seeding technique as a result of its greater flexibility. The second resulted in the development of a series of three alloys to meet specific turbine applications. The third requirement was met by the development of a rapid and accurate orientation Laue measurement technique (SCORPIO) suitable for the production environment. ESA

N87-11616# Rolls-Royce Ltd., Derby (England). Metallurgical Research Labs.
DEVELOPMENT OF SINGLE CRYSTAL ALLOYS FOR SPECIFIC ENGINE APPLICATIONS
D. A. Ford and R. P. Arthey 17 Feb. 1986 11 p
(PNR-90320; ETN-86-98022) Avail: NTIS HC A02/MF A01

A comprehensive family of alloys which meets the requirements of particular engine applications was developed. Alloy SRR is a high strength alloy to replace DS MM002 in applications where increased creep, tensile, and fatigue strength are required; RR2000 is designed for blades requiring low density or high impact resistance; RR2060 was developed as a nozzle guide vane alloy, with exceptional resistance to environmental attack and thermal fatigue. ESA

N87-11617# Rome Univ. (Italy). Dipt. di Fisica.
EFFECTIVE LANDAU THEORY FOR DISORDERED INTERACTING ELECTRON SYSTEMS: SPECIFIC HEAT BEHAVIOR
C. Castellani and C. DiCastro 21 Feb. 1986 12 p
(Preprint-500; ETN-86-97932) Avail: NTIS HC A02/MF A01

The frequency renormalization parameter of the generalized nonlinear sigma-model introduced to describe the interacting disordered electron system is identified in terms of the specific heat. This enables the effective Landau Fermi liquid picture for this system to be completed and to give the asymptotic behavior of the electronic specific heat in the various universality classes of the metal-insulator transition. ESA

N87-11618*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
STRESS AND EFFICIENCY STUDIES IN EFG Quarterly Progress Report, Oct. 1 - 31 Dec. 1985
15 Jun. 1986 36 p Sponsored in part by DOE Prepared for JPL
(Contracts NAS7-100; JPL-956312)
(NASA-CR-179814; DOE/JPL-956312/14; NAS 1.26:179814; DE86-012138) Avail: NTIS HC A03/MF A01 CSCL 20I

Modeling of the effect of transverse isotherm variation on residual stress has established that significant reductions in stress can be produced when the sheet edge is cooled with respect to the center. The potential to achieve large stress reductions exists but the quantitative details of the stress reductions depend on the creep relaxation. This is not known accurately in the region between 800 C and 1200 C where the residual stress is very sensitive to the transverse isotherm curvature. An apparatus for measurement of stress relaxation in silicon at these temperatures has been built and tested and will be used to examine creep behavior in more detail under a continuation contract. EBIC characterization of dislocated FZ silicon stressed at high temperatures has established correlations between the bulk minority carrier diffusion length and the dislocation density. Other results suggest that stress applied during annealing will influence diffusion length degradation arising from thermal effects. Studies of dislocation electrical activity as a function of dopant concentration indicate that increased dopant concentrations lead to a wider region of low current collection around the dislocation. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N87-11619*# Virginia Univ., Charlottesville. Dept. of Materials Science.
A STUDY OF THE APPLICABILITY OF NUCLEATION THEORY TO QUASI-THERMODYNAMIC TRANSITIONS OF SECOND AND HIGHER EHRENFEST-ORDER, SUPPLEMENT 3 Final Report
R. E. Barker, Jr. Jul. 1986 17 p
(Grant NAG1-419)
(NASA-CR-179836; NAS 1.26:179836; UVA/528320/MS87/103-Supp-3) Avail: NTIS HC A02/MF A01 CSCL 20M

The work includes an investigation of the applicability of the nucleation theory to second and higher order thermodynamic transitions in the Ehrenfest sense, and a number of significant conclusions relevant to first order transitions, as well. The underlying theoretical method consisted of expanding the Gibbs' free energy in a Maclarin or Taylor series and then using fundamental thermodynamic determinable quantities, and interpreting the results. Work was performed on the existence and interpretation of an interfacial energy between phases in a second order transition in addition to an investigation of the solid-liquid interfacial energy for various polymers. Extensive considerations were devoted to various aspects of a particular polymer, polyvinylidene fluoride (PVDF or PVF2), including an experimetal investigation of the effects of an applied electric field on the morphology of melt crystallization and on the nucleation and growth of polarized domains. Author

N87-11620# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
THE DYNAMICALLY COMPRESSED METALLIC STATE: THEORY Final Report, 1 Sep. 1982 - 31 Jan. 1986
N. W. Ashcroft 15 Apr. 1986 7 p
(Contract DAAG29-82-K-0170)
(AD-A169174; ARO-18867.7-PH) Avail: NTIS HC A02/MF A01 CSCL 20/13

This research has combined two major themes: the statistical mechanics of classical systems under conditions typical of shock or explosive environments, and the quantum statistical mechanics of inhomogeneous electron systems embedded in these classical ensembles. The project began with an application of the thermodynamics and structure of the liquid state, but applied in the context of a dynamic solid. The method developed allowed us to reduce Hugoniot data to isotherms without the necessity of invoking any Gruneisen type of law. It was constructed explicitly for the case of insulating systems, but we were already able to see a possible modification for metals. A system that seemed to remain very much an insulator under severe dynamic loading was SiO2, whose band structure (in the fluorite phase) we calculated using the self-consistent augmented spherical wave method. Pressure as a general indicator of trends in electronic structure appears to be a tool of increasing value and versatility. When high pressures are generated by shock methods, there is usually an accompanying increase in temperature, often very substantial. For nuclear driven shocks these temperatures can become so high that an electron system is driven far from degeneracy. GRA

N87-11621# Princeton Univ., N. J. Dept. of Chemical Engineering.
ANALYSIS OF THE DISPERSION FORCE BETWEEN A LAYERED SPHERE AND A CYLINDER Contract Report, Jul. 1984 - Jul. 1985
Dennis C. Prieve and William B. Russel May 1986 45 p
(AD-A169444; CRDEC-CR-86038) Avail: NTIS HC A03/MF A01 CSCL 20/3

The continuum theory developed by Lifshitz and coworkers predicts the van der Waals forces acting between colloidal or macroscopic bodies from knowledge of the dielectric spectra of the individual materials. Formal exact solutions, accounting for the effect of retardation, exist for planar geometries such as flat plates and multilayers and discrete particles such as spheres and cylinders. Each comprises a complicated nested set of sums and/or integrals over a spectrum of wavenumbers and frequencies of the fluctuating electromagnetic modes. The power of the theory lies in the natural accommodation of the many-body effects responsible for the quantitative failure for condensed media of the pairwise additive Hamaker theory. The price is the need for complete dielectric spectra for the component materials and involved numerical calculations which obscure the relationship between these dielectric properties and the essential features of the force. This report contains the analysis of and numerical results for the dispersion force between a coated cylinder and sphere based on rigorous expressions available from the Lifshitz theory for interactions between half spaces. The Derjaguin approximation satisfactorily accounts for the curvature of the bodies since the dimensions are large with respect to the relevant wavelengths. GRA

N87-11622# Stanford Linear Accelerator Center, Calif.
SUPERSTRINGS AND GEOMETRY OF SUPERSPACE
A. Dhar May 1986 13 p Presented at the Tata Institute Winter School on Theoretical Particle Physics, Panchgani, India, 25 Jan. 1986
(Contract DE-AC03-76SF-00515)
(DE86-012044; SLAC-PUB-3961; CONF-860175-1) Avail: NTIS HC A02/MF A01

These lectures present some recent developments in the sigma-model approach to the Green-Schwarz superstring. Among the topics included are: (1) interpretation of the free superstring as a flat superspace sigma-model; (2) propagation of the superstring in curved superspace; and (3) in the presence of background super Yang-Mills fields. The role of the world-sheet fermionic gauge symmetry needed to ensure consistent coupling to background fields is emphasized.
DOE

N87-11623# Rome Univ. (Italy). Dipt. di Fisica.
AN ALTERNATIVE PROOF OF ULTRAVIOLET STABILITY OF THE TWO-DIMENSIONAL MASSIVE SINE GORDON FIELD THEORY IN ALL REGIONS OF COLLAPSE
J. Renn and A. Steinmann 12 Nov. 1985 32 p Sponsored by Studienstiftung des Deutschen Volkes, and Schweizerischer Nationalfonds
(Nota-Interna-855; ETN-86-97889) Avail: NTIS HC A03/MF A01

The upper bound for the ultraviolet stability of the two dimensional cosine interaction in finite volume is proven for alpha epsilon 4 pi, 8 pi where the theory is super-renormalizable. Ultraviolet stability in this interval is proved using renormalization group methods based on a multiscale decomposition of the field by showing that the large fluctuations may be controlled by their small probability.
ESA

N87-11624# Rome Univ. (Italy). Dipt. di Fisica.
AN ALTERNATIVE MODEL FOR THE DENSITY OF STATES IN THE QUANTUM HALL EFFECT
M. Giura, R. Fastampa, and R. Marcon 18 Dec. 1985 11 p Sponsored by Ministero della Pubblica Istruzione, Rome, Italy Prepared in cooperation with CNR, Rome, Italy
(Nota-Interna-858; ETN-86-97892) Avail: NTIS HC A02/MF A01

A model of the density of states in the electron dispersion law in two-dimensional conductors with a weak random potential is presented. It is based on the existence of a critical point of saddle type. The model is used to explain the quantum Hall effect.
ESA

N87-11625# Rome Univ. (Italy). Dipt. di Fisica.
PROBABILISTIC SOLUTIONS OF GENERALIZED BIRTH AND DEATH EQUATIONS AND APPLICATION TO NONRELATIVISTIC ELECTRODYNAMICS
M. Serva 2 Dec. 1985 26 p
(Preprint-483; ETN-86-97918) Avail: NTIS HC A03/MF A01

Probabilistic solutions to the equations describing nonrelativistic quantum electrodynamical systems are presented. The solutions involve, besides the usual diffusion processes, birth and death processes corresponding to the photon number variables. Inequalities are stated, and bounds to the ground state energy of systems composed by a nonrelativistic particle interacting with a field are established. The result is general and is applied as an example to the polaron problem.
ESA

N87-11421 Deutscher Wetterdienst, Offenbach am Main (West Germany).
THERMODYNAMIC ASPECTS OF THE ABSORPTION OF GAS IN DROPLETS [THERMODYNAMISCHE ASPEKTE DER GASAUFNAHME IN TROPFEN]
Ulrike Wacker *In its* Reports of Meteorology, No. 23: Proceedings of the German Meteorologists Conference on the Global Climate and Our Environment 1986 p 133-134 In GERMAN (For primary document see N87-11367 02-47)
Avail: Issuing Activity

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N87-11626# Pacific Northwest Labs., Richland, Wash.
EXPERIENCES WITH A DATA ANALYSIS MANAGEMENT PROTOTYPE
P. J. Cowley, D. B. Carr, and W. L. Nicholson Apr. 1986 6 p Presented at the 18th Symposium on the Interface of Computer Science and Statistics, Fort Collins, Colo., 20 Mar. 1986
(Contract DE-AC06-76RL-01830)
(DE86-011615; PNL-SA-13820; CONF-8603103-2) Avail: NTIS HC A02/MF A01

This paper presents an evaluation of a prototype data analysis management system. This system was designed to aid the analyst in keeping track of the course of a data analysis. Evaluated features include capabilities to graphically depict the course of the analysis to return to previous milestones in the analysis, the ability to use segments of the log that describe the course of the analysis, and the ability to associate both written and spoken documentation with milestones of the analysis.
DOE

N87-11627# Rolls-Royce Ltd., Derby (England).
ENGINEERS: CAN THEY BE MANAGED?
G. Walker 6 Mar. 1986 21 p Presented at Royal Aeronautical Society, Bristol, England, 21 Oct. 1985
(PNR-90307; ETN-86-98018) Avail: NTIS HC A02/MF A01

The advantages of involving engineers in management are discussed. Examples from the aerospace industry are used to illustrate these advantages.
ESA

N87-11628# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
THE INTERFACE WITH DECISION MAKERS AND SOME EXPERIMENTAL RESULTS IN INTERACTIVE MULTIPLE OBJECTIVE PROGRAMMING METHODS
M. Kok 1985 29 p Presented at 2nd Euro Summer Inst. on Multi-Criteria Analysis, Brussels, Belgium, 12 Jul. - 2 Aug. 1985 Sponsored by Ministry of Economic Affairs
(Rept-85-36; ETN-86-98466) Avail: NTIS HC A03/MF A01

The basic concepts of interactive methods in multiple objective linear programming are discussed. The underlying mathematical formulation is investigated. It turns out that these methods are all based on three different types of scalarization. This explains the exchange of information (the interface) between the decision makers and the model. Problems in designing this interface are investigated using results from psychology concerning the ability of a human being to oversee a large number of stimuli. Experiments with a model of a national energy system, and conclusions concerning the use of interacitve methods in long-term planning are presented.
ESA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N87-11629# General Accounting Office, Washington, D. C. Information Management and Technology Div.
DATA MANAGEMENT: DoD SHOULD REDIRECT ITS EFFORTS TO AUTOMATE TECHNICAL DATA DEPOSITORIES
Mar. 1986 45 p
(AD-A168095; GAO/IMTEC-86-7) Avail: NTIS HC A03/MF A01 CSCL 15/5

The Department of Defense's (DOD) technical data repositories (storage centers) are critical to increasing competition in DOD's approximately $22-billion annual spare-parts procurement process. Technical data include the specifications, engineering drawings, descriptions of manufacturing processes, and testing procedures necessary to competitively procure spare parts. Concern about DOD's technical data problems and their effect on competition for spare-parts procurements prompted the Chairman of the House Committee on Government Operations to ask GAO to determine whether: 1) DOD's management of technical data repository automation efforts is adequate and whether these efforts should be consolidated into a single program managed at the DOD level; 2) current repository automation efforts by the military departments and the Defense Logistics Agency are well defined, are based on validated requirements, and have used appropriate procurement methods; and 3) DOD and the Patent and Trademark Office should share studies (to include testing) of new technology. GRA

N87-11630# Logistics Management Inst., Bethesda, Md.
MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL: SYSTEM PLANNING GUIDANCE
Richard W. Hartt and Dennis J. OConnor May 1986 24 p
(Contract MDA903-85-C-0139)
(AD-A168136; LMI-DL503; DTIC-TR-86/13) Avail: NTIS HC A02/MF A01 CSCL 05/2

Guidance is provided to Department of Defense libraries and information centers on implementing the microcomputer-based Local Automation Model, an integrated library system that includes intelligent gateway technology to search, download, analyze, merge and output citations from multiple databases. The document draws on the experience gained in implementing the micro-Lam prototype at the Technical Library, Headquarters US Army Training and Doctrine Command (HQ TRADOC) and provides an outline of tasks to be addressed in implementing the system at other installations. Tasks include deciding which functions to automate, determining requirements for peripheral equipment, and analyzing telecommunications and electrical requirements. Cost estimates for the system are also included. GRA

N87-11631# Politecnico di Milano (Italy). Dipt. di Elettronica.
TRANSLATION AND OPTIMIZATION OF LOGIC QUERIES: THE ALGEBRAIC APPROACH
S. Ceri, G. Gottlob, and L. Lavazza 1986 36 p
(Rept-86-004; ETN-86-97939) Avail: NTIS HC A03/MF A01

A syntax directed translation is developed from rules of function-free logic programs to algebraic equations independent equations solved using a closure operator and systems of interdependent equations by a substitution method. Such solutions define the operational and fixpoint semantics of function-free logic programs and queries operating on a data base. The algebraic approach enables use of traditional results of query optimization in the optimization of a logic query. Top-down and bottom-up strategies are presented. The former are useful if no initial binding is provided with the query; the latter are useful if arguments of the query are bound to constant values. The strategies developed in this way can be efficiently executed on algebraic data base machines. ESA

N87-11632# SYSTAN, Fraenkisch-Crumbach (West Germany).
SUPPORT FOR THE DESIGN AND THE IMPLEMENTATION OF THE SPACECRAFT PERFORMANCE EVALUATION SERVICES
H. M. Rupp Paris ESA 30 Sep. 1985 40 p
(Contract ESA-5868/84-D-IM(SC))
(ESOC/85/1; ESA-CR(P)-2210; ETN-86-98093) Avail: NTIS HC A03/MF A01

The implementation of Spacecraft Performance Evaluation Services (SPES) to provide user oriented services is described. By acquiring practical experience using a standard commercial database management system in ESOCs space data environment, ESOC examined whether such products are suitable to support requirements stemming from the handling of telemetry and related data structures. By using PISA/DB (formerly called PEDMS) as the data management component in SPES, this product was evaluated. The SPES was designed in detail and sections of SPES were implemented, incorporating PISA/DB as the essential data management tool. Results show that PISA/DB is useful, and relatively fast and versatile. ESA

N87-11633# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
MAKING A SIMPLE RELATIONAL DATABASE SYSTEM
Peter vanEijk and Matthijs Kuiper Oct. 1984 11 p
(INF-84-18; ETN-86-98159) Avail: NTIS HC A02/MF A01

The managing of a project to implement a simple data base management system by a group of students is described. The project was finished in time and the system produced is operational, although without sophisticated features. ESA

N87-11634# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
MINIMIZING THE RESPONSE TIME OF A QUERY IN A DISTRIBUTED DATA BASE
Peter M. G. Apers Dec. 1985 29 p
(INF-85-26; ETN-86-98174) Avail: NTIS HC A03/MF A01

To minimize response time in distributed data bases, a two-phase optimization is proposed: a logical optimization, and a physical optimization to map an operation graph produced by the logical optimizer into a schedule for a finite set of resources having a non-zero service speed. This approach is explained in the context of minimizing the response time of queries with Boolean predicates. Simulation-results indicate that the optimization produces very efficient schedules. ESA

N87-11635# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A MODELING APPROACH TO INFORMATION SYSTEM DEVELOPMENT
L. J. B. Essink Dec. 1985 35 p
(INF-85-29; ETN-86-98175) Avail: NTIS HC A03/MF A01

A taxonomy of information system design decision is presented. The framework can be regarded as a paradigm for the development of methodologies and an instrument to integrate parts of several methodologies Four levels of abstraction and eight aspects to model at each level are introduced. A holistic and problem independent methodology supports the modeling regarding all the specified design areas by an analysis framework and descriptive means. The use of model cycles directed to the goals of each level, results in a good level of separability of concern. (The designer's attention is focussed on a specific aspect on a specific level and the results of the modeling process can first be communicated separatly and later as a part of an integrated system model). Each level has its own concepts and it is clear at which level an aspect is depicted. So, a good level of separability of concepts is achieved. ESA

N87-11636# Logica Ltd., London (England). Aerospace Group.
AUTOMATED INFORMATION RETRIEVAL SYSTEM FOR SATELLITES (AIRS). PART 1, CHAPTER 2: DESIGN PHASE

Executive Summary
R. J. Peberdy Paris ESA 1 Jun. 1984 23 p
(Contract ESTEC-5731/83-NL-BI)
(Rept-71.4601; ESA-CR(P)-2212; ETN-86-98094) Avail: NTIS HC A02/MF A01

A data base containing technical, industrial, and operational information on all space systems and their associated Earth stations was designed. It includes all relevant information obtainable from the International Frequency Registration Board (IFBR) documents. Communications and Earth-observation satellites are emphasized. The software necessary to access and maintain the data base and to enable rapid response to general queries whereby information may be presented as a report or used in ESA applications programs; and monitoring of, and response to, the requirements for intersystem coordination of the radio spectrum usage as specified by the IFBR was investigated. ESA

N87-11637# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
CONST: A CONSTRUCTIVE APPROACH TO INFORMATION MODELING
Bengt G. Lundberg 1985 26 p
(Rept-85-44; ETN-86-98474) Avail: NTIS HC A03/MF A01

An approach to information modeling based in the principles of a constructive theory and the formalism of production rules is presented. A constructive approach concerning the nature and representation of abstract objects is taken. The cognitive, formal and metaphysical advantages are discussed, and examples employing the constructive approach are presented. ESA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

N87-11638# Battelle Inst., Frankfurt am Main (West Germany). Applied Economics Center.
SOLID EARTH SATELLITE: MARKET, COST AND BENEFITS STUDY Final Report
Paris ESA Oct. 1985 131 p Prepared in cooperation with Dornier-Werke G.m.b.H. Friedrichshafen, West Germany, Intelplan SA, Deutsches Geodatisches Forschungsinstitut, Stuttgart Univ., West Germany, and CNES, Toulouse, France
(Contract ESA-5756/83-F-FC(SC))
(ESA-CR(P)-2213-Vol-1; ETN-86-98095) Avail: NTIS HC A07/MF A01

Potential markets for POPSAT-derived final products/services were evaluated in a survey of possible applications and their priorities, and through the identification of type and motivation of the potential final users of such systems. The value of the market for POPSAT-derived final products/services in terms of economic, scientific, and social benefits was determined. Quantitative benefit/cost ratios (where applicable) and realistic qualitative statements for those application areas where a quantification turns out to be impossible were derived. Results suggest that potential users do not have a sufficient knowledge of POPSAT capabilities. This community, which includes scientific, governmental, and commercial organizations, is still not able to formulate a definitive opinion on the value of the system. While scientific institutes are in the best position to gather information, there is no doubt that POPSAT is also in a position to satisfy public and commercial enterprises. ESA

N87-11639# Battelle Inst., Frankfurt am Main (West Germany).
SOLID EARTH SATELLITE: MARKET, COST AND BENEFITS STUDY Executive Summary
Paris ESA Oct. 1985 17 p
(Contract ESA-5756/83-F-FC(SC))
(ESA-CR(P)-2213-Vol-2; ETN-86-98096) Avail: NTIS HC A02/MF A01

Potential markets for POPSAT-derived final products/services were evaluated in a survey of possible applications and their priorities, and through the identification of type and motivation of the potential final users of such systems. The value of the market for POPSAT-derived final products/services in terms of economic, scientific, and social benefits was determined. Quantitative benefit/cost ratios (where applicable) and realistic qualitative statements for those application areas where quantification turns out to be impossible were derived. ESA

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

N87-11640# Committee on Science and Technology (U. S. House).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1987
Washington GPO 1986 251 p Report to accompany H.R. 5495 presented by the Committee on Science and Technology to the Committee of the Whole House on the State of the Union, 99th Congress, 2d Session, 16 Sep. 1986
(H-Rept-99-829; GPO-58-629) Avail: US Capitol, House Document Room

Authorization of appropriations to the National Aeronautics and Space Administration for the fiscal year 1987 for research and development; space flight, control, and data analysis; construction of facilities; and research and program management is discussed. B.G.

N87-11641# Committee on Commerce, Science, and Transportation (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION BILL, 1986
1986 26 p A bill, H.R. 5495, referred to the Committee on Science and Technology, 99th Congress, 2d Session, 10 Sep. 1986
(H-Rept-99-829) Avail: US Capitol, House Document Room

Authorized appropriations are summarized for the National Aeronautics and Space Administration for the following: permanently manned space station; space transportation capability development; physics and astronomy; life sciences; planetary exploration; solid earth observations; environmental observations; materials processing in space; communications; information systems; technology utilization; commercial use of space; transatmospheric research and technology; tracking and data advanced systems; space flight, control, and data communication; construction of facilities, including land acquisitions; and research and program management. B.G.

N87-11642# Committee on Appropriations (U. S. Senate).
NASA SPACE PROGRAM
Washington GPO 1986 226 p Hearings before Subcommittees of the Committee on Appropriations, 99th Congress, 2d Session, 25-26 Mar. 1986
(S-Hrg-99-691; GPO-60-030) Avail: Committee on Appropriations

Topics discussed in depth include: industrial utilization and commercialization of space technology; environmental and earth science applications of space technology; intrinsic human values of space explorations; and access to space. B.G.

N87-11643# Committee on Science and Technology (U. S. House).
THE 1987 NASA AUTHORIZATION, VOLUME 1
Washington GPO 1986 171 p Hearings before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science and Technology, 99th Congress, 2d Session, No. 92, 9 Apr. 1986
(GPO-60-960) Avail: Subcommittee on Transportation, Aviation and Materials

The appropriations for the National Aeronautics and Space Administration's fiscal year 1987 aeronautics and transatmospheric reasearch and technology buget requests are examined. B.G.

N87-11644# Army War Coll., Carlisle Barracks, Pa.
THE STRATEGIC DEFENSE INITIATIVE
W. L. Mills 14 Apr. 1986 28 p
(AD-A168147) Avail: NTIS HC A03/MF A01 CSCL 15/3

The Strategic Defense Initiative (SDI) is a research program in which President Reagan asked key scientists and technological leaders to conduct research aimed at determining whether there are cost-effective defensive technologies that could improve the deterrent capability of the United States and allies. The concept of the SDI program envisions a layered defense where hostile missiles could be attacked shortly after launch during the boost and postboost phase, individual attack on the warheads themselves or attack as they approach the end of their flight. Standard arguments for and against the SDI program were examined. Information was gathered using a review of the literature and through analysis of the views of key military and civilian leaders. While it has been argued that a US SDI program will cause instability rather than promote stability, it must be realized that the Soviet Union has been emphasizing defense and survivability and has been pursuing an extensive SDI program for many years. The SDI program facilitated dialogue and negotiations between the United States and the Soviet Union as well as has the potential to enhance our basic defense strategy of deterrence. The program was in part responsible for the successful Geneva Summit meetings in November 1985. The US Congress, the elections of 1988 and US public opinion will play a significant role in the future of the SDI program. GRA

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N87-11645# Office of Naval Research, London (England).
EUROPEAN SCIENCE NOTES, VOLUME 40, NUMBER 7 Monthly Report
C. J. Fox Jul. 1986 39 p
(AD-A168089) Avail: NTIS HC A03/MF A01 CSCL 05/2

European Science Notes is a monthly publication with brief articles on recent developments in European scientific research. A partial list of its contents includes the following: Life Sciences Research at the Inst. for Biochemistry, Free Univ. of Berlin; Research at the Inst. for Biochemistry and Molecular Biology, Technical Univ. of Berlin; Artificial Intelligence Activities at Bristol's New Information Technology Research Center; Fluid Mechanics at the National Aerospace Lab in the Netherlands; Turbulence Research at the Delft Hydraulics Lab.; Turbulence Research at the Eindhoven Univ. of Technology and at the Institut de Mechanique des Fluides de Lille; Oceanography Research at Two UK Universities. GRA

N87-11646# Department of Energy, Washington, D. C.
PROGRAMS OF THE OFFICE OF ENERGY RESEARCH
Apr. 1986 28 p
(DE86-009937; DOE/ER-0191-3) Avail: NTIS HC A03/MF A01

The programs of the Office of Energy Research, DOE, include several thousand individual projects and hundreds of laboratories, universities, and other research facilities throughout the United States. The major programs and activities are described briefly, and include high energy and nuclear physics, fusion energy, basic energy sciences, and health and environmental research, as well as advisory, assessment, support, and scientific computing activities. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N87-11647 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
DIAMAGNETIC EFFECT AND ANOMALOUS TRANSPORT IN EXPANDING PLASMA CLOUDS Active Magnetic Particle Tracer Explorers Reports
C. T. Dum Mar. 1984 31 p
(MPE-Preprint-26; ASP-08; ISSN-0340-8922; ETN-86-98206) Avail: Issuing Activity

Kinetic and instability effects for the diamagnetic phase of magnetospheric barium releases are explored. By anomalous transport, chiefly from ion sound turbulence, electrons are considered as a fluid while Ba ions are treated as particles. This model is compared to predictions of ideal and resistive MHD. Electron dynamics modifies radial profiles, and allows for effects such as the generation of azimuthal magnetic fields and associated poloidal (Hall) currents near the ends of the elongated plasma cloud, by the combined action of radial and axial expansion. Propagation of shear Alfven waves in flux tubes of the ambient plasma may be initiated. Ion distributions should exhibit axially accelerating ion fronts, radial deceleration and reflection, azimuthal differential spinup, and large pressure anisotropies. The diffuse plasma halo and contamination by the ambient plasma is important for instabilities. The ionization process is expected to have a considerable effect in the diamagnetic phase. ESA

N87-11648 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
DATA ACQUISITION AND EVALUATION ELECTRONICS FOR THE ROSAT POSITION SENSITIVE PROPORTIONAL COUNTERS (PSPC'S)
G. Metzner May 1985 16 p Submitted for publication
(MPE-Preprint-33; ETN-86-98207) Copyright. Avail: Issuing Activity

Front-end and evaluation electronics for the ROSAT position sensitive proportional counters (PSPC) were designed and built. For each accepted X-ray event in the energy range from 0.1 to 2.0 keV, the energy and the arrival time, and the location are determined. In order to reduce the telemetry data rate, the event location is calculated on board. An electronic background suppression system for charged particles was incorporated. With this system, a suppression efficiency of 97.5% is measured. With a five-sided anticoincidence, 99% is achieved. Each of the PSPC's, of which only one at a time is active, contains its own charge sensitive amplifiers and pulse shapers. The analog signals of the PSPC's are mixed and routed to the commonly used analog evaluation electronics and the microcomputer. In order to reduce the number of peak detectors and analog to digital converters, the signals are multiplexed. Up to 1000 events/sec can be evaluated. ESA

N87-11649 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
THE POSITION SENSITIVE PROPORTIONAL COUNTER (PSPC) OF THE ROSAT TELESCOPE
U. G. Briel and E. Pfeffermann May 1985 13 p Submitted for publication
(MPE-Preprint-32; ETN-86-98238) Copyright. Avail: Issuing Activity

A position sensitive proportional counter for X-rays in the energy range from 0.1 to 2.0 keV was developed and tested for the prime focal instrument of the ROSAT X-ray telescope. Over the entire sensitive circular area of 80 mm diameter, the energy resolution for 0.93 keV X-rays is 45%. Local deviations of the gas gain from the mean value is < 3%. For X-ray energies of 0.93 and 0.28 keV, the mean position resolution is 250 and 400 microns (FWHM) respectively. When correcting the position of each X-ray event, differences between the nominal and the measured position of pinholes of < 20 micron are achieved. Operating the PSPC in the environment of a Co-60 gamma-ray source, an overall background rejection of > 99% is attained. ESA

N87-11650 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
GAMMA RAY ASTRONOMY FROM SATELLITES AND BALLOONS
Volker Schoenfelder Sep. 1985 20 p Presented at 19th ICRC, La Jolla, Calif., 11-23 Aug. 1985
(MPE-Preprint-39; ETN-86-98260) Copyright. Avail: Issuing Activity

Satellite and balloon observations of cosmic gamma rays are summarized. The MeV-emission of gamma ray bursts is a common feature. Variations in duration and energy spectra from burst to burst may explain the discrepancy between the measured log N-log S dependence and the observed isotropy of bursts. The gamma ray line at 1.809 MeV from A26 is the first detected line from a radioactive nucleosynthesis product. To understand its origin it is necessary to measure its longitude distribution in the Milky Way. Indication of a gamma ray excess from the direction of Loop I is consistent with the picture that the bulk of cosmic rays below 100 GeV is produced in galactic supernova remnants. The interpretation of the large scale distribution of gamma rays in the Milky Way is controversial. An extragalactic origin of the cosmic ray nuclei in the GeV-range cannot be excluded from the gamma ray data. The detection of MeV-emission from Cen A is a promising step towards extragalactic gamma ray astronomy. ESA

N87-11651*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
COMBINED ULTRAVIOLET STUDIES OF ASTRONOMICAL SOURCES Semiannual Progress Report, 1 Feb. - 31 Jul. 1986
S. L. Baliunas, A. K. Dupree, M. Elvis, J. P. Huchra, S. Kenyon, and J. C. Raymond Oct. 1986 11 p
(Grant NAG5-87)
(NASA-CR-179784; NAS 1.26:179784; SAPR-12) Avail: NTIS HC A02/MF A01 CSCL 03A

Topics addressed include: Cygnus Loop; P Cygni profiles in dwarf novae; YY Gem; nova shells; HZ Herculis; activity cycles in cluster giants; Alpha Ori; metal deficient giant stars; ultraviolet spectra of symbiotic stars detected by the Very Large Array; time variability in symbiotic stars; blue galaxies; and quasistellar objects with X-ray spectra. B.G.

N87-11652*# Cornell Univ., Ithaca, N.Y. Center for Radiophysics and Space Research.
FAR-INFRARED SPECTRAL STUDIES FROM THE G. P. KUIPER AIRBORNE OBSERVATORY Final Technical Report, 1 Oct. 1978 - 31 Oct. 1986
Martin Harwit Oct. 1986 8 p
(Grant NsG-2347)
(NASA-CR-179879; NAS 1.26:179879) Avail: NTIS HC A02/MF A01 CSCL 03A

The grant to carry out far-infrared spectral studies of astronomical sources from the G. P. Kuiper Airborne Observatory was first funded in October 1978 and officially ended on October 31, 1986. During these eight years, A variety of previously undetected spectral lines was discovered, and these were used to determine the physical and chemical conditions prevailing in regions of active star formation. They served to clarify the nature of the ionized hydrogen regions often adjacent to star-forming clouds, the characteristics of shocks which may signify the onset of star formation, and the nature of coolants that channel away energy thus enabling a cloud to collapse to form new stars. Author

N87-11653*# North Carolina Univ., Chapel Hill. Dept. of Physics and Astronomy.
UV OBSERVATIONS OF BLUE STRAGGLERS AND POPULATION 2 K DWARFS Final Technical Report, 1 Jul. 1984 - 30 Jun. 1986
Bruce W. Carney and Howard E. Bond (Louisiana State Univ., Baton Rouge.) 1986 4 p
(Grant NAG5-424)
(NASA-CR-179865; NAS 1.26:179865) Avail: NTIS HC A02/MF A01 CSCL 03A

Blue stragglers are stars, found usually in either open or globular clusters, that appear to lie on the main sequence, but are brighter and bluer than the cluster turn-off. Currently, two rival models are invoked to explain this apparently pathological behavior: internal mixing (so that fresh fuel is brought into the stellar core); and mass transfer (by which a normal main sequence star acquires mass from an evolving nearby companion and so moves up the main sequence). The latter model predicts that in the absence of complete mass transfer (i.e., coalescence), blue stragglers should be binary systems with the fainter star in a post-main sequence evolutionary state. It is important to ascertain the cause of this phenomenon since stellar evolution models of main sequence stars play such a vital role in astronomy. If mass transfer is involved, one may easily exclude binaries from age determinations of clusters, but if mixing is the cause, our age determinations will be much less accurate unless we can determine whether all stars or only some mix, and what causes the mixing to occur at all. Author

N87-11654# Borer Electronics A.G., Solothurn (Switzerland).
STUDY OF THE FEASIBILITY OF A CHANNEL MULTIPLEXER OPERATING AT CRYOGENIC TEMPERATURES Final Report
C. Moldovan Paris ESA Nov. 1985 97 p
(Contract ESTEC-6071/84-NL-BI(SC))
(RPT/CRY/62351/BO; ESA-CR(P)-2208; ETN-86-98092) Avail: NTIS HC A05/MF A01

The feasibility of a signal multiplexer able to operate in cryogenic (4 to 100 K) and radiation (20 kRad) environments, namely the cryostat vessel of the ISO mission, is shown. The proposed multiplexing option can be considered useful only if the overall analog multiplexing system significantly reduces the thermal input in the cryostat vessel. This occurs via 300 electrical interconnections which must be made from the electronic units located outside the cryostat to sensors and actuators inside the cryostat vessel. The feasability and efficiency of the multiplexer system is demonstrated. Based on a technology survey, three potential solutions can be retained: GaAs MESFET technology, silicon MOS technology, and silicon micromechanical membrane switches. ESA

N87-11655# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
HIGH ALTITUDE RESEARCH ROCKET PROGRAM ASTRONOMY: PAYLOAD INTER-ZODIAK. REPORT ON SYSTEM DEVELOPMENT, INTEGRATION, TESTING, AND FLIGHT [HOEHENFORSCHUNGSRAKETENPROGRAMM ASTRONOMIE NUTZLAST INTER—ZODIAK, BEREICHT UEBER SYSTEMTWICKLUNG, INTEGRATION, TEST UND FLUG]
Manfred Boison, Gerhard Neumann, and Walter Schnattinger Bonn Bundeministerium fuer Forschung und Technologie Dec. 1985 277 p Partly in ENGLISH and GERMAN Sponsored by Bundesministerium fuer Forschung und Technologie and DFVLR
(BMFT-FB-W-85-025; ISSN-0170-1339; ETN-86-97844) Avail: NTIS HC A13/MF A01; Fachinformations-zentrum, Karlsruhe, West Germany DM33

A rocket program to investigate H and He-atoms excited by extreme ultraviolet (EUV) radiation, with emphasis on the analysis of the zodiacal EUV resonance fluorescence is introduced. Requirements, mechanical construction, attitude control and measurement, and qualification of the payload are described. The procedure of the project, and the launching campaign are

presented. The evolution of the mission and the test data evaluation are discussed. ESA

N87-11656 Columbia Univ., New York.
OBSERVATIONS OF CORONAL X-RAY SOURCES AND AN ANALYSIS OF THE STELLAR CONTRIBUTION TO THE SOFT X-RAY BACKGROUND Ph.D. Thesis
Jean-Pierre Caillault 1985 158 p
Avail: Univ. Microfilms Order No. DA8604607

To establish the prevalence of X-ray emission among field stars, we have conducted a systematic search of over 1700 stars brighter than 10th magnitude observed by the Einstein Observatory. Fewer than 4% of the stars were detected at a limiting flux value of approx. 10(-13) ergs cm(-2)s(-1). We use the observed distribution of X-ray to optical flux ratios for both the detected and undetected stars to limit the X-ray luminosity function for field stars of all spectral types. We have also conducted an extensively soft X-ray survey of the Pleiades open cluster using Einstein. The most luminous G-stars require a substantially different coronal structure than that found on the Sun; a larger scale length for coronal loops may be partially responsible for these high luminosites. The lack of rotational modulation of the emission from most of the late-type stars requires the presence of numerous active regions distributed more uniformly than is the case in the solar corona. A map of the soft X-ray emission along a galactic meridian within +/- 3 deg. of the galactic plane is presented. We find an excess of diffuse M-band emission at low latitudes which exhibits a resolved, double-peaked profile that is roughly symmetric about b(parallel) = 0 deg. with a half-width approx. 1 to 2 deg. We model this component to derive constraints on the scale-height and volume emissivity of the X-ray emitting material. We have carried out a systematic optical identification program of serendipitous X-ray sources discovered by Einstein; eleven of these sources are dM-stars. Dissert. Abstr.

N87-11657 Wisconsin Univ., Madison.
HIGH RESOLUTION SPECTROSCOPY OF RS CVn STARS Ph.D. Thesis
Zeki Eker 1985 127 p
Avail: Univ. Microfilms Order No. DA8601096

High resolution echelle-Reticon observations covering all orbital phases of the bright RS CVn stars sigma Gem and HR 5110 have been obtained. Nine spectra with 0.16 A resolution show that the core of H alpha in sigma Gem varies with orbital phase in agreement with the spot zones identified by Fried et al. (1983) and also that the H alpha brightness of a zone changes in time. Neutral metal lines in the same echelle order have been studied to investigate the properties of the spots. A new method is described to determine soot areas and temperatures from temperature-sensitive metal lines. The lack of observed metal line variation in the normal spot zones requires a temperature difference between spot and photosphere greater than 1000 K and spot area less than 20% of the disk. Lines from the cool secondary of HR 5110 have been detected on 16 spectra with resolution 0.3 A. New mass and light ratios have been determined. Effective temperature of 6750 K and 4700 K for the primary and secondary respectively have been estimated from the line spectrum. The extremely weak H alpha absorption profile of HR 5110 revealed an emission profile after a comparison composite spectrum was subtracted. The strong, variable, residual H alpha emission has two components: a narrow and steady emission peak and a variable and extremely broad component. A simple model with Stark broadening in a dense chromosphere of the K star can explain the broad component, while the narrow peak appears to come from an accretion disk around the primary. Dissert. Abstr.

N87-11658 Princeton Univ., N. J.
PHOTOMETRIC REDSHIFTS AND COSMOLOGY Ph.D. Thesis
Earl Joseph Spillar 1985 103 p
Avail: Univ. Microfilms Order No. DA8607712

How to obtain redshifts of galaxies from photometry through medium width filters is demonstrated. By exploiting the efficiency and red response of a Charge Coupled Device one is able to obtain redshifts for hundreds of faint galaxies in a few hours, which is a considerable speed improvement over spectrographic methods. The sizes of the errors in the redshifts are predictable and are smaller then 0.08 in z. The redshift data is applied to the question of galactic evolution. Comparing the luminosity distribution of galaxies in the sample with that of nearby galaxies it is concluded that galaxies have grown fainter by 0.5 + or - 0.2 mag in the visual band since the epoch of z = 0.55. The ratio of red galaxies to blue galaxies has decreased by 10 + or - 20%. We review the current theoretical understanding of galactic evolution and find our data consistent with it. If evolution does not change the number of galaxies in an undecipherable way, the number per volume fixes the amount of volume at different redshifts. Knowledge of the volume allows the determination of the cosmological deceleration parameter q sub zero. The difficulties in using photometric redshifts to understand the effects of evolution and determine q sub zero are outlined. Dissert. Abstr.

N87-11659 Texas Univ., Austin.
MOLECULAR CLOUDS ASSOCIATED WITH YOUNG OPEN STAR CLUSTERS Ph.D. Thesis
David Todd Leisawitz 1985 407 p
Avail: Univ. Microfilms Order No. DA8609534

Regions around 69 open star clusters were searched for spectral line emission. Of these, 47 regions were completely or nearly completely mapped with a sampling interval of 7.5 arcminutes. The region surveyed around each cluster was at least 10 cluster diameters in size, typically approx. 3 square degrees. The physical characteristics and the kinematics of the ensemble of molecular clouds associated with the clusters are examined. This enables empirical determination of the systematic interaction between young star clusters and the interstellar matter from which they form. Molecular clouds associated with clusters whose ages are less than 5 million years are expanding away from those clusters at approximately 10 km/s, thus explaining the relative paucity of emission detected in the neighborhoods of older clusters. Evidence is found that the clouds, to some extent, dissolve in the stellar radiation field. Results of the survey are consistent with a picture in which molecular cloud complexes are disrupted by a cluster-centered energy source within only approx. 5 Myr of the time massive cluster stars reach the main sequence. Stellar winds probably are sufficcciently energetic to explain the observations. Dissert. Abstr.

N87-11660 California Univ., Berkeley.
DEVELOPMENT OF A CCD CAMERA FOR AN AUTOMATED SUPERNOVA SEARCH AND OBSERVATIONS OF A SUPERNOVA IN NGC 5033 Ph.D. Thesis
Michael Shane Burns 1985 71 p
Avail: Univ. Microfilms Order No. DA8609959

The Berkeley supernova search uses an automated telescope along with a Charge Coupled Device (CCD) camera and a dedicated minicomputer to automatically scan galaxies for supernova. The system is currently able to observe about 500 galaxies in a full night of observing. These images are stored on video tapes which are brought back to the lab the next day for analysis. This paper begins with a brief summary of our observational and theoretical understanding of supernova. The design of the search system is discussed with an emphasis on its current operation. The development and performance of the CCD camera is described in detail as well as the performance of the entire system. Finally, observations of a supernova in NGC 5033 are presented. Dissert. Abstr.

N87-11054*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Space Physics and Astrophysics Section.
OBJECTIVES AND FIRST RESULTS OF THE NASA SETI SKY SURVEY FIELD TESTS AT GOLDSTONE
S. Gulkis, M. J. Klein, E. T. Olsen, R. B. Crow, R. M. Gosline, G. S. Downs, M. P. Quirk, A. Lokshin, and J. Solomon *In its* The Telecommunications and Data Acquisition Report (date) p 284 - 300 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03A

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

For related information see also *75 Plasma Physics.*

N87-11661 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
TORQUE AND ENERGY EXCHANGE BETWEEN AN ACCRETION DISK AND A RAPIDLY SPINNING NEUTRON STAR
W. Priedhorsky Jan. 1985 18 p Submitted for publication Sponsored in part by DOE
(MPE-Preprint-44; ISSN-0178-0719; ETN-86-98263) Copyright. Avail: Issuing Activity

Torque-coupled energy flows are proposed to explain the bimodal behavior of the quasi-periodic oscillations, spectrum, radio outbursts, and optical flux in Sco X-1. Accretion torques move energy in or out a flywheel (stored rotational energy). The material torque from accreting matter reduces the luminosity available at the neutron star surface, thought to be the source of the blackbody component of low-mass X-ray binary spectra. In equilibrium, the material spinup torque must be balanced by a spindown torque against the disk or expelled matter. In spindown work is dissipated in the disk, it becomes brighter. This explains the large excesses of disk over blackbody flux. The disk flux changes only gradually with accretion rate, while the neutron star surface flux increases rapidly, as for the two-component spectral behavior observed in low-mass X-ray binaries. For lower accretion rates, the spindown luminosity of the neutron star dominates, and total luminosity increases with decreasing mass accretion rate. ESA

N87-11662* Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
BIMODAL QUASI-OSCILLATORY AND SPECTRAL BEHAVIOR IN SCO X-1
W. Priedhorsky, G. Hasinger, W. H. G. Lewin, J. Middleditch, A. Parmar, L. Stella, and N. White Jan. 1985 18 p Submitted for publication Sponsored in part by NASA, Alexander von Humboldt Stiftung, John Simon Guggenheim Memorial Foundation, and by DOE
(MPE-Preprint-45; ISSN-0178-0719; ETN-86-98264) Copyright. Avail: Issuing Activity

X-ray observations were made to follow up the discovery of quasi-periodic oscillations (QPO) in Sco X-1. The QPO is observed in the quiescent state, and between flares in the active state. When the source is quiescent, the QPO frequency is 6 Hz and anticorrelated with intensity; in the active state, the frequency ranges from 10 to 20 Hz and is strongly correlated with intensity. At high intensities the QPO dissolves into continuum noise. The QPO rms amplitude decreases with count rate, and increases with photon energy. There are two modes of spectral behavior, with a one-to-one correspondence to the two modes of QPO: the spectral hardness ratio varies more steeply with intensity when the source shows 6 Hz QPO, than for 10 to 20 Hz QPO. Transitions between QPO modes, which occur when the flux is at its lowest levels, correspond to transitions between hardness ratio modes. The QPO frequency changes continuously through the transitions, which last a few hundred seconds. ESA

N87-11663# Fermi National Accelerator Lab., Batavia, Ill.
NEUTRINOS FROM GRAVITATIONAL COLLAPSE
R. Mayle, J. R. Wilson, and D. N. Schramm May 1986 36 p
(Contract DE-AC02-76CH-03000)
(DE86-012304; FNAL/Pub-86/81-A) Avail: NTIS HC A03/MF A01

Detailed calculations are made of the neutrino spectra emitted during gravitational collapse events (Type II supernovae). Those aspects of the neutrino signal which are relatively independent of the collapse model and those aspects which are sensitive to model details are discussed. The easier-to-detect high energy tail of the emitted neutrinos has been calculated using the Boltzmann equation which is compared with the result of the traditional multi-group flux limited diffusion calculations. DOE

N87-11664# Rome Univ. (Italy). Dipt. di Fisica.
ON THE RADIATION EMITTED BY A PARTICLE FALLING INTO A BLACK HOLE IN THE SEMIRELATIVISTIC APPROXIMATION
C. Coretti and V. Ferrari 10 Dec. 1985 25 p
(Nota-Interna-857; ETN-86-97891) Avail: NTIS HC A02/MF A01

The semirelativistic approximation is used to compute the electromagnetic energy emitted when a charged particle falls into a Reissner-Nordstrom black hole. Results are compared with those obtained by integrating numerically the perturbed Maxwell equations in the case of radial fall. The semirelativistic approximation method requires much less computer time, because part of the calculations can be done analytically, and it can be applied to any given geodesic followed by the particle. It is shown that in the case of spherically symmetric black holes the approximate method gives realistic results: it predicts the correct behavior of the radiation versus the angular momentum of the particle and the correct order of magnitude of the amount of energy emitted. When the method is applied to rotating black holes the use of the Boyer-Lindquist coordinates is forbidden by the effects of the infinite rotation of the particle when it approaches the radius of the horizon. It is shown that different choices of the coordinate systems give different results. ESA

N87-11665 California Inst. of Tech., Pasadena.
ON THE CHEMICAL COMPOSITION OF INTERSTELLAR MOLECULAR CLOUDS: A MILLIMETER AND SUBMILLIMETER SPECTRAL LINE SURVEY OF OMC-1 Ph.D. Thesis
Geoffrey A. Blake 1986 318 p
Avail: Univ. Microfilms Order No. DA8605395

Results from a millimeter and submillimeter spectral line survey of the core of the Orion molecular cloud (OMC-1) are presented. The millimeter-wave survey, conducted at the Owens Valley Radio Observatory (OVRO), covers a 55 GHz interval in the 1.3 mm (23 GHz) atmospheric window and contains emission from 29 molecules. Together with the frequency selective submillimeter observations of H2D(+) (372.4 GHz), CI (492.2 GHz), NH3 (572.5 GHz), and HCl (625.9 GHz) performed from the NASA Kuiper Airborne Observatory, over 800 emission lines have been detected from 33 chemically distinct species during the course of this work. The uniformly calibrated results from the unique and extensive OVRO spectral line survey place significant constraints on models of interstellar chemistry, and have allowed the chemical composition of the various regions in OMC-1 to be definitively characterized. A global analysis of the observed abundances has shown that the markedly different chemical compositions of the kinematically distinct Orion subsources may be simply interpreted in the framework of an evolving, initially quiescent, gas phase chemistry influenced by the process of massive star formation. The chemical composition of the extended Orion cloud complex is similar to that found in a number of other objects, but the central regions of OMC-1 have had their chemistry selectively altered by the high velocity outflow from the young star(s) embedded within the interior of the molecular cloud. Dissert. Abstr.

N87-11666 California Univ., Los Angeles.
TYPES AND PROPERTIES OF PLANETARY TORI AND LIMIT ON MASS LOSS FROM SATELLITES Ph.D. Thesis
Tian-Sen Huang 1986 160 p
Avail: Univ. Microfilms Order No. DA8606460

The main objects of this dissertation are to investigate the general equilibrium state properties of planetary tori including the particle number budget and the stabilities, and to study the effects of magnetic field line breaking and corotation lag in large mass injection rate on the properties of planetary tori. A general model for the global balance of neutrals and ions composing planetary plasma tori is proposed. A classification of tori based on neutral source processes and ion loss processes is presented. The equilibrium and stability properties of each type are discussed. The effects of the current sheet on the ion density distribution of the Io torus and the magnetic field of the Jovian magnetosphere are examined. The torus ion density and magnetic field distributions for different plasma transport fluxes are given. By means of the balance between magnetic energy density and corotation energy

density we determine a magnetic field breaking distance. For the present Io torus this distance is 18 times Jovian radii. As the ion transport increases it moves inward, and a maximum limit on plasma transport rate is obtained. A unified torus model is built and the effects of the corotation lags on the properties of the Io H2O torus are considered. Dissert. Abstr.

N87-11667 Indiana Univ., Bloomington.
THE INTERACTION OF A STRONG STELLAR WIND WITH A MULTIPHASE INTERSTELLAR MEDIUM Ph.D. Thesis
Michael Thomas Wolff 1986 353 p
Avail: Univ. Microfilms Order No. DA8607450

The interaction of a strong stellar wind with the interstellar medium produces a hot, low density cavity surrounded by a swept-up shell of gas. This cavity-plus-shell structure is collectively called an interstellar bubble. In calculations prior to this work, researchers assumed that the interstellar medium surrounding the wind-blowing star was described by a constant density and temperature (i.e., was homogeneous). These earlier calculations are improved on by assuming that the interstellar medium surrounding the star is inhomogeneous, or multiphase. These gas flows are modeled by assuming that the inhomogeneous phases of the interstellar medium (the clouds) and the intercloud gas form two distinct but interacting fluids that can exchange mass, momentum and energy with each other. The mass injection from the clouds to the intercloud gas found via the process of thermal evaporation can significantly modify the structure of the interstellar bubble from that found in previous studies. Real early-type wind blowing stars generally have a large luminosity of Lyman continuum photons that can evaporated cold clouds. Two bubble models including this photoevaporation were computed. In an interstellar medium with cold clouds embedded in a hot, low density intercloud gas, the photoevaporation of cold gas causes a dense shell to form that has an observable emission measure. Dissert. Abstr.

N87-11668 Texas Univ., Austin.
VACUUM POLARIZATION ON BLACK HOLE SPACETIMES Ph.D. Thesis
Bruce Philip Jensen 1985 81 p
Avail: Univ. Microfilms Order No. DA8609520

The effects of vacuum polarization in black hole spacetimes are examined. Particular attention is given to the vacuum physics inside the event horizon. The analytic properties of the solutions to the radial wave equation in Schwarzschild spacetime as functions of argument, frequency, and angular momentum are given. These functions are employed to define the Feynmann Green function for a scalar field subject to the Hartle-Hawking boundary conditions. An examination of the Schwarzschild mode functions near r = O is provided. This work is necessary background for a future calculation of (phi sq) and the quantum stress-energy tensor (T sub mu sup upsilon) for small r. Some opinions are given on how this calculation might be performed. A solution of the one-loop Einstein equations for Schwarzschild Anti-deSitter (SAdS) space-time is presented, using Page's approximation to the quantum stress tensor. The resulting perturbed metric is shown to be unphysical, as it leads to a system of fields with infinite total energy. This problem is believed to be due to a failure of Page's method in SAdS. Suggestions are given on how one might correct the method. Dissert. Abstr.

N87-11669 Maryland Univ., College Park.
QUANTUM EFFECTS IN NON-MAXIMALLY SYMMETRIC SPACES Ph.D. Thesis
Tsung-Cheng Shen 1985 155 p
Avail: Univ. Microfilms Order No. DA8614287

Non-maximally symmetric spaces provide a more general background to explore the relation between the geometry of the manifold and the quantum fields defined in the manifold than those with maximally symmetric spaces. A static Taub universe is used to study the effect of curvature anisotropy on the spontaneous symmetry breaking of a self-interacting scalar field. The one-loop effective potential of lambda phi to the 4th power field with arbitrary coupling Xi is computed by zeta function regularization. We find that for massless minimal coupled scalar field, first order phase transition can occur. Keeping the shape invariant but decreasing the curvature radius of the universe induces symmetry breaking. If the curvature radius is held constant, increasing deformation can restore the symmetry. Studies on the higher-dimensional Kaluza-Klein theories are also focused on the deformation effect. Using the dimensional regularization, the effective potential of the free scalar fields in M sup 4 x T sup n and M sup 4 x (taub) to the 3rd power spaces are obtained. The stability criterions for the static solutions of the self-consistent Einstein equations are derived. We find the stablesolutions of the M sup 4 x S sup N topology do not exist. With the Taub space as the internal space, the gauge coupling constants of SU(2), and U(1) can be determined geometrically. The weak angle is therefore predicted by geometry in this model. Dissert. Abstr.

N87-11053*# Jet Propulsion Lab., California Inst. of Tech., Pasadena. Navigation Systems Section.
ICE NAVIGATION SUPPORT
L. Efron, R. J. Muellerschoen, and R. I. Premkumar *In its* The Telecommunications and Data Acquisition Report (date) p 268 - 283 (For primary document see N87-11024 02-32)
Avail: NTIS HC A14/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N87-11670*# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
HIGH PRESSURE COSMOCHEMISTRY APPLIED TO MAJOR PLANETARY INTERIORS: EXPERIMENTAL STUDIES Status Report
Malcolm F. Nicol, Steven Boone, and Huyn-chae Cynn 1 Nov. 1986 4 p
(Grant NAGw-104)
(NASA-CR-177188; NAS 1.26:177188) Avail: NTIS HC A02/MF A01 CSCL 03B

The overall goal of this project is to determine properties of the H-He-C-N-O system, as represented by small molecules composed of these elements, that are needed to constrain theoretical models of the interiors of the major planets. Much of our work now concerns the H2O-NH3 system. This project is the first major effort to measure phase equilibria in binary fluid-solid systems in diamond anvil cells. Vibrational spectroscopy, direct visual observations, and X-ray crystallography of materials confined in externally heated cells are our primary experimental probes. We also are collaborating with the shockwave physics group at Lawrence Livermore Laboratory in studies of the equation of state of a synthetic Uranus fluid and molecular composition of this and other H-C-N-O materials under planetary conditions. Author

N87-11671*# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
THE AMMONIA-WATER PHASE DIAGRAM AND ITS IMPLICATIONS FOR ICY SATELLITES
Mary L. Johnson and Malcolm Nicol 1986 53 p
(Grant NAGw-104)
(NASA-CR-179881; NAS 1.26:179881) Avail: NTIS HC A04/MF A01 CSCL 03B

A Holzapfel-type diamond anvil cell is used to determine the NH3 - H2O phase diagram in the region from 0 to 33 mole percent NH3, 240 to 370 K, and 0 to 5 GPa. The following phases were identified: liquid; water ices Ih, III, V, VI, VII, and VIII; ammonia monohydrate, NH3.H2O; and ammonia dihydrate NH3.2H2O. Ammonia dihydrate becomes prominent at moderate pressures (less than 1 GPa), with planetologically significant implications, including the possibility of layering in Titan's magma ocean.Author

N87-11672*# California Inst. of Tech., Pasadena.
STUDIES OF THE COMPOSITION OF SOLAR PARTICLES AND OF ENERGETIC OXYGEN AND SULFUR NUCLEI TRAPPED IN THE JOVIAN MAGNETOSPHERE Final Report, 15 May 1981 - 15 May 1984
E. C. Stone 7 Nov. 1986 17 p
(Grant NAGw-200)
(NASA-CR-179863; NAS 1.26:179863) Avail: NTIS HC A02/MF A01 CSCL 03B

The Cosmic Ray System (CRS) experiment on board each of the Voyager 1 and 2 spacecraft consists of four Low Energy Telescopes (LETs), two High Energy Telescopes (HETs), the Electron Telescope (TET), and associated electronics. With these instruments it is possible to measure the energy spectrum of electrons over the 3-110MeV energy range and the energy spectra and nuclear charge of atomic nuclei from hydrogen through zinc over the 3-500 MeV/nuc energy range. The exclusive use of solid-state detectors in the CRS telescopes achieves the objectives of reliability over a long mission life, high resolution determinations of energy and charge, and high-count-rate capability during large solar flares and passage through the magnetospheres of the outer planets. Summarized here are some of the many accomplishments that have resulted from the CRS measurements during the period covered by this report, May 15, 1981 to May 15, 1984, including studies of the energetic oxygen and sulfur nuclei trapped in the Jovian magnetosphere. Author

N87-11673*# New York Univ., New York. Dept. of Applied Science.
THE MARTIAN CLIMATE AND ENERGY BALANCE MODELS WITH CO2/H2O ATMOSPHERES Final Report, 1 Mar. 1984 - 31 Mar. 1986
Martin I. Hoffert 31 Mar. 1986 37 p Submitted for publication
(Grant NAGw-573)
(NASA-CR-179888; NAS 1.26:179888) Avail: NTIS HC A03/MF A01 CSCL 03B

The analysis begins with a seasonal energy balance model (EBM) for Mars. This is used to compute surface temperature versus x = sin(latitude) and time over the seasonal cycle. The core model also computes the evolving boundaries of the CO2 icecaps, net sublimational/condensation rates, and the resulting seasonal pressure wave. Model results are compared with surface temperature and pressure history data at Viking lander sites, indicating fairly good agreement when meridional heat transport is represented by a thermal diffusion coefficient D approx. 0.015 W/sq. m/K. Condensational wind distributions are also computed. An analytic model of Martian wind circulation is then proposed, as an extension of the EMB, which incorporates vertical wind profiles containing an x-dependent function evaluated by substitution in the equation defining the diffusion coefficient. This leads to a parameterization of D(x) and of the meridional circulation which recovers the high surface winds predicted by dynamic Mars atmosphere models (approx. 10 m/sec). Peak diffusion coefficients, D approx. 0.6 w/sq m/K, are found over strong Hadley zones - some 40 times larger than those of high-latitude baroclinic eddies. When the wind parameterization is used to find streamline patterns over Martian seasons, the resulting picture shows overturning hemispheric Hadley cells crossing the equator during solstices, and attaining peak intensities during the south summer dust storm season, while condensational winds are most important near the polar caps. Author

N87-11674# Los Alamos National Lab., N. Mex.
RESONANCE CAPTURE AND SATURN'S RINGS
C. W. Patterson May 1986 12 p
(Contract W-7405-eng-36)
(DE86-011733; LA-10727-MS) Avail: NTIS HC A02/MF A01

We have assigned the resonances apparently responsible for the stabilization of the Saturn's shepherd satellites and for the substructure seen in the F-ring and the ringlets in the C-ring. We show that Saturn's narrow ringlets have a substructure determined by three-body resonances with Saturn's ringmoons and the sun. We believe such resonances have important implications to satellite formation. DOE

N87-11675 Florida Univ., Gainesville.
JUPITER'S DECAMETER AND KILOMETER EMISSIONS: SATELLITE EFFECTS AND LONG TERM PERIODICITIES Ph.D. Thesis
Orville Chris St.Cyr 1985 193 p
Avail: Univ. Microfilms Order No. DA8615506

The results of observational studies of Jupiter's decameter (DAM) and kilometer (KOM) radio emissions are presented. The initial goal was to investigate the role of Jupiter's major satellites in modulating these sporadic emissions. The concepts of electromagnetic induction are reviewed in planet-sized bodies and then the Jovian magnetosphere environment and the physical characteristics of the Galilean satellites and Amalthea are described. Since the phase of Io is known to modulate the DAM emission, the problem of orbital resonance among the Galilean satellites is addressed. A secondary goal was to search for long term periodicities and other effects in the groundbased DAM data. Dissert. Abstr.

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N87-11676*# Alabama Univ., Huntsville. Dept. of Physics.
INTERNATIONAL SOLAR-TERRESTRIAL PROGRAM DATA PROCESSING CONSORTIUM Final Report
Roy B. Torbert 3 Sep. 1986 11 p
(NASA Order H-78750B)
(NASA-CR-178919; NAS 1.26:178919; UAH-530) Avail: NTIS HC A02/MF A01 CSCL 03B

The present conception of the data processing scheme is described including the Main Processing Units (MPU) and Satellite Processing Units (SPU) which will acquire the data for the instruments presently planned in the International Solar Terrestrial Physics (ISTP) Project. B.G.

N87-11677# Stanford Univ., Calif. Center for Space Science and Astrophysics.
AN ATLAS OF PHOTOSPHERIC MAGNETIC FIELD OBSERVATIONS AND COMPUTED CORONAL MAGNETIC FIELDS, 1976-1985
J. Todd Hoeksema and Philip H. Scherrer 1986 13 p
(Contracts N00014-86-K-0085; N00014-76-C-0207)
(AD-A168046) Avail: NTIS HC A02/MF A01 CSCL 03/2

Daily magnetogram observations of the large scale photospheric magnetic field have been made. These measurements provide a homogeneous record of the changing solar field through most of Solar Cycle 21. Using the photospheric data, the configuration of the coronal and heliospheric fields can be calculated using a Potential Field -- Source Surface model. This provides a 3 dimensional picture of the heliospheric field evolution during the solar cycle. This note announces the publication of UAG Report 94, an Atlas containing the complete set of synoptic charts of the measured photospheric magnetic field, the computed field at the source surface, and the coefficients of the multipole expansion of the coronal field. The general underlying structures of the solar and heliospheric fields, which determine the environment for solar terrestrial relations and provide the context within which solar activity related events occur, can be approximated from these data. The provision of a homogeneous dataset of the solar magnetic field over nearly an entire sunspot cycle in a convenient, inclusive package will stimulate the studies of the large scale structures of the solar and heliospheric magnetic field, encourage others to consider the relationship of the large scale, ambient field structures to activity on short time scales and smaller spatial scales, and

enable the inclusion of the heliospheric field in analyses of solar terrestrial relations. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N87-11678 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
X-RAY BURSTS FROM GX 17+2: A NEW APPROACH
M. Sztajno, J. vanParadijs, W. H. G. Lewin, A. Langmeier, J. Truemper, and W. Pietsch Mar. 1986 28 p Submitted for publication Sponsored by Alexander von Humboldt Foundation, and John Simon Guggenheim Memorial Foundation
(MPE-Preprint-48; ETN-86-98209) Copyright. Avail: Issuing Activity

A short (10 sec) and long (5 min) X-ray burst from GX 17+2, of maximum intensity 40% above persistent flux level, were detected. A time dependent spectral analysis of the long burst provides a consistent description of the intensity and spectral variations during the burst in terms of the luminosity (and temperature) variation of a hot blackbody (or blackbody-like) emitter. Outside the burst the blackbody component contributes 40% to the persistent emission. This result resolves ambiguity in the classification of bursts from GX 17+2 as type 1 or type 2, and indicates that, in spite of the absence of a distinct softening of the net burst emission, the bursts are due to thermonuclear flashes. ESA

N87-11679 Max-Planck-Inst. fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
SEARCH FOR ORBITAL X-RAY VARIATION IN SCO X-1
W. Priedhorsky and Steve Holt Apr. 1986 18 p Submitted for publication
(MPE-Preprint-51; ETN-86-98211) Copyright. Avail: Issuing Activity

All 5 yrs of 3 to 6 keV monitoring of Sco X-1 by the Ariel 5 all-sky monitor were reanalyzed, to search more sensitively for variation at the 0.787313 day orbital period. The best limits on orbital variations come from data selected to exclude active episodes. Any narrow absorption dip has an average depth < 1.0% 0.1/Delta Phi - (2 sigma) where Delta Phi is the dip width in units of the orbital period. A weak (0.4%) sinusoidal modulation, with 3.2 sigma significance, reaching minimum at phase 0.59 + or - 0.06 with respect to superior conjunction of the optical emission line source is observed. The upper limit to a sinusoidal orbital modulation is 0.7%. Sco X-1 never (at least not for more than 2 hr) dips below its normal quiescent level. ESA

N87-11680* Max-Planck-Inst fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
DISAPPEARANCE OF PERIODIC X-RAY MINIMA IN AM HER
W. Priedhorsky, F. J. Marshall, and D. R. Hearn Apr. 1986 22 p Submitted for publication Sponsored in part by DOE
(Contract NAS5-24441)
(MPE-Preprint-52; ETN-86-98212) Copyright. Avail: Issuing Activity

Optical, soft X-ray, and medium energy X-ray measurements taken during an unusual high state of AM Her are reported. The X-ray and secondary optical minima disappeared from the light curve. The X-ray flux varied periodically. In each X-ray band, the flux during the expected phase of minimum was approximately the same as the average during the rest of the cycle. The optical and medium energy X-ray fluxes were at all-time highs; however, the soft X-ray flux was low by a factor of 3 compared to the nominal high state. This change in the ratio of medium to soft X-ray flux is difficult to fit into the standard scenario for AM Her, where soft X-rays are interpreted as reprocessed optical and medium energy X-ray flux. The peculiar light curve of AM Her was probably caused by a small shift in the position of the accretion column with respect to the rotation axis, so that the normal grazing eclipse of the accretion column did not take place. ESA

N87-11681# Lockheed Missiles and Space Co., Palo Alto, Calif. Space Sciences Lab.
A SPACE RADIATION TEST MODEL STUDY Report, 20 May 1985 - 20 Feb. 1986
R. W. Nightingale, Y. T. Chiu, G. T. Davidson, W. E. Francis, and M. A. Rinaldi 14 Mar. 1986 55 p
(Contract F19628-85-C-0073)
(AD-A169412; LMSC/F134561; LMSC/F146531;
AFGL-TR-86-0064) Avail: NTIS HC A04/MF A01 CSCL 04/1

Dynamic models of the energetic populations in the outer radiation belts are being developed to better understand the extreme variations of particle flux in response to magnetospheric and solar activity. The study utilizes the SCATHA SC3 high energy electron data, covering energies from 47 keV to 5 MeV with fine pitch angle measurements (3 deg field of view) over the L-shell range of 5.3 to 8.7. Butter-fly distributions in the dusk sector signify particle losses due to L shell splitting of the particle drift orbits and the subsequent scattering of the particles from the orbits by the magnetopause. To model the temporal variations and diffusion procsses of the particle populations, the data have been organized into phase space distributions, binned according to altitude (L shell), energy, pitch angle, and time. These distributions can then be mapped to the equator and plotted for fixed first and second adiabatic invariants of the inherent particle motion. A new and efficient method for calculating the third adiabatic invariant using a line integral of the relevant magnetic potential a t the particle mirror points has been developed and is undergoing testing. This method will provide a useful means of displaying the radial diffusion signatures of the outer radiation belts during the more active periods when the L shell parameter is not a good concept due to severe drift-shell splitting. The first phase of fitting the energetic electron phase-space distributions with a combined radial and pitch-angle diffusion formulation is underway. GRA

N87-11682# Rome Univ. (Italy). Dipt. di Fisica.
SCALING VIOLATION IN HADRONIC INTERACTIONS AND THE DEEP UNDERGROUND FLUX OF COSMIC MUONS
G. Auriemma and E. Berardi 10 Jan. 1986 7 p Submitted for publication
(Preprint-495; ETN-86-97928) Avail: NTIS HC A02/MF A01

The spectrum of high energy muons is derived from experimental data in the 200 to 2000 GeV range under the hypothesis that the violation of scaling observed in the central rapidity region, extends also to the fragmentation region. Analytical treatment of the process of muon production in the atmosphere suggests that the violation of scaling gives a logarithmic increase of the underground flux of muons at high energies, with respect to the predictions of the scaling. The amount of this deviation is expected to be small. ESA

99 GENERAL

N87-11683# National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICS AND SPACE REPORT OF THE PRESIDENT
1984 148 p
Avail: NTIS HC A07/MF A01

The achievements for the United States aeronautics and space programs for the year 1984 are summarized. The achievements are presented according to sponsoring agency. B.G.

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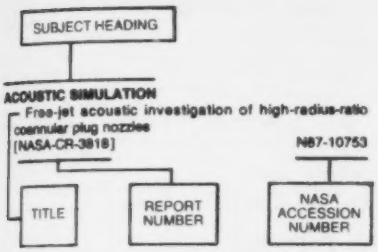

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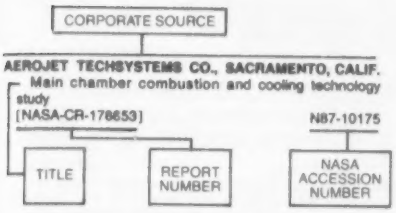

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INSTITUTE OF OCEAN SCIENCES, SIDNEY (BRITISH COLUMBIA).
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INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE (ITALY).
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LOGICA LTD., LONDON (ENGLAND).
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Microcomputer-based local automation model: System planning guidance
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LONDON UNIV. (ENGLAND).
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MAX-PLANCK-INSTITUT FUER STROEMUNGSFORSCHUNG, GOETTINGEN (WEST GERMANY).
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

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NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.

Journal of Research of the National Bureau of Standards, volume 91, number 1, January-February 1986
[PB86-206364] N87-11021

Automated measurement of frequency response of frequency-modulated generators using the Bessel null method
[PB86-202991] N87-11150

NBS (National Bureau of Standards) 50 kHz phase angle calibration standard
[PB86-201274] N87-11151

NATIONAL GEOPHYSICAL DATA CENTER, BOULDER, COLO.

Solar-geophysical data number 500, April 1986. Part 2: (Comprehensive reports). Data for October 1985 and miscellanea
[PB86-213873] N87-11364

Solar-geophysical data number 500, April 1986. Part 1: (Prompt reports). Data for March 1986, February 1986 and late data
[PB86-213865] N87-11365

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MICH.

Airborne measurements of the spectral reflectance of freshwater ice N87-11260

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).

Analysis of laser frequency stability of heterodyne measurements
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NATIONAL SPACE DEVELOPMENT AGENCY, IBARAKI (JAPAN).

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NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.

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NAVAL OCEANOGRAPHY COMMAND CENTER/JOINT TYPHOON WARNING CENTER, FPO SAN FRANCISCO, CALIF.

Tropical cyclone report, 1985
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NAVAL RESEARCH LAB., WASHINGTON, D. C.

A collisional-radiative model and Saha decrements for a nonequilibrium oxygen plasma
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NAVAL SURFACE WEAPONS CENTER, SILVER SPRING, MD.

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NAVAL WEAPONS SUPPORT CENTER, CRANE, IND.

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Crack arrest properties of 9 percent nickel steel and relation between crack-initiation and crack-arrest tests
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NORTH CAROLINA STATE UNIV., RALEIGH.

The crystallization of tough thermoplastic resins in the presence of carbon fibers
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NORTH CAROLINA UNIV., CHAPEL HILL.

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NORTHWESTERN UNIV., EVANSTON, ILL.

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NOTRE DAME UNIV., IND.

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NOTTINGHAM UNIV. (ENGLAND).

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OESTERREICHISCHES FORSCHUNGSZENTRUM SEIBERSDORF G.M.B.H., VIENNA.

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Identification of creep mechanisms and quantitative description of stress regimes relevant to design
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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).

La Recherche Aerospatiale, bimonthly bulletin, number 1985-4, 227/July-August
[ESA-TT-960] N87-11019

Direct numerical simulation of homogeneous strained turbulence N87-11120

La Recherche Aerospatiale, bimonthly bulletin, number 1985-5, 228/September-October
[ESA-TT-964] N87-11131

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE (FRANCE).

Design improvement and radiation, contamination tests. Prestudy 1: Ultraviolet radiation acceleration, volume 1
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Improving radiation/contamination tests
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OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
European Science Notes, volume 40, number 7
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OKLAHOMA STATE UNIV., STILLWATER.
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OREGON STATE UNIV., CORVALLIS.
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OSAKA GAS CO. LTD. (JAPAN).
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PARAGON PACIFIC, INC., EL SEGUNDO, CALIF.
WEST-3 wind turbine simulator development. Volume 1: Summary
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PARIS-SUD UNIV., ORSAY (FRANCE).
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
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PHYSICS LAB. RVO-TNO, THE HAGUE (NETHERLANDS).
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PLESSEY RESEARCH (CASWELL) LTD., TOWCESTER (ENGLAND).
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POPE (L. D.), WOODLANDS, TEX.
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PRATT AND WHITNEY AIRCRAFT, EAST HARTFORD, CONN.
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QUEBEC UNIV., CHICOUTIMI.
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RADIO TECHNICAL COMMISSION FOR AERONAUTICS, WASHINGTON, D. C.
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RCA ASTRO-ELECTRONICS DIV., PRINCETON, N. J.
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READING UNIV. (ENGLAND).
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RENAULT VEHICLES INDUSTRIELS (FRANCE).
Applications of basic research to diesel combustion optimization
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RENSSELAER POLYTECHNIC INST., TROY, N.Y.
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RESEARCH CENTER GRAZ (AUSTRIA).
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RESEARCH INST. OF NATIONAL DEFENCE, LINKOEPING (SWEDEN).
Microwaves and microelectronics
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Snow studies: Study journey to Switzerland, January 1986
[FOA-C-30419-E1,E3] N87-11341
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[FOA-C-30421-E4] N87-11602

RICE UNIV., HOUSTON, TEX.
Computer simulation of the dynamics of the near-earth part of the geomagnetic tail
[AD-A169449] N87-11359

RIJKSWATERSTAAT, THE HAGUE (NETHERLANDS).
An atmospheric correction method using Guzzi-spectroradiometer input data N87-11305

ROCKWELL INTERNATIONAL CORP., LOS ANGELES, CALIF.
Supersonic second order analysis and optimization program user's manual
[NASA-CR-172342] N87-10842

ROLLS-ROYCE LTD., DERBY (ENGLAND).
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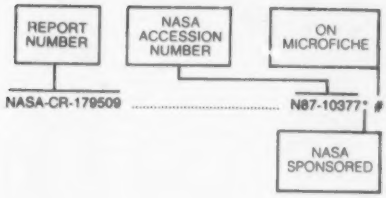

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For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL) 367

52 AEROSPACE MEDICINE 375

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES 378

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 379

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY N.A.

Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 381

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE 381

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS 394

Includes computer networks and special application computer systems.

63 CYBERNETICS 396

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS 396

Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 400

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 402

Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 402

Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

For related information see also *Engineering.*

70 PHYSICS (GENERAL) 402

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

71 ACOUSTICS 403
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 404
Includes atomic structure, electron properties, and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 405
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 405
Includes light phenomena and optical devices.
For lasers see *36 Lasers and Masers.*

75 PLASMA PHYSICS 407
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 408
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 411
Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 412
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 412
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 412
Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY 414
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 415
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 415
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

90 ASTROPHYSICS 431
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also *75 Plasma Physics.*

91 LUNAR AND PLANETARY EXPLORATION 433
Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

92 SOLAR PHYSICS 435
Includes solar activity, solar flares, solar radiation and sunspots.
For related information see *93 Space Radiation.*

93 SPACE RADIATION 436
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

99 GENERAL 436

Note: N.A. means that no abstracts were assigned to this category for this issue.

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CONTRACT NUMBER INDEX I-67
REPORT/ACCESSION NUMBER INDEX I-69

TYPICAL CITATIONS AND ABSTRACTS

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ACCESSION NUMBER → N87-10065*# General Dynamics Corp., Fort Worth, Tex. ← CORPORATE SOURCE

TITLE → **DESIGN AND FABRICATION OF THE NASA DECOUPLER PYLON FOR THE F-16 AIRCRAFT Final Report, Jan. 1982 - Aug. 1983**

AUTHORS → J. D. Clayton, R. L. Haller, and J. M. Hassler, Jr. Jan. 1985 ← PUBLICATION DATE
204 p

CONTRACT OR GRANT → (Contract NAS1-16879)

REPORT NUMBER → (NASA-CR-172354; NAS 1.26:172354) Avail: NTIS ← AVAILABILITY SOURCE

PRICE CODE → HC A10/MF A01 CSCL 01C ← COSATI CODE

The NASA Decoupler Pylon is a passive means of suppressing wing-store flutter. The feasibility of demonstrating this concept on the F-16 aircraft was established through model wind tunnel tests and analyses. As a result of these tests and studies a ship set of Decoupler Pylons was designed and fabricated for a flight test demonstration on the F-16 aircraft. Basic design criteria were developed during the analysis study pertaining to pylon pitch stiffness, alignment system requirements, and damping requirements. A design was developed which utilized an electrical motor for the pylon alignment system. The design uses a four pin, two link pivot design which results in a remote pivot located at the center of gravity of the store when the store is in the aligned position. The pitch spring was fabricated from a tapered constant stress cantilevered beam The pylon has the same external lines as the existing production pylon and is designed to use a MAU-12 ejection rack which is the same as the one used with the production pylon. The detailed design and fabrication was supported with a complete ground test of the pylon prior to shipment to NASA.

Author

VOLUME 25 NUMBER 3 / FEBRUARY 8, 1987

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N87-11684# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERODYNAMICA SINICA (SELECTED ARTICLES)
Binggang Tong, Lixian Zhuang, Kewyant Shen, Xihua Zhuang, and Xueding Liu 29 May 1986 91 p Transl. into ENGLISH from Konggi Donglixue (China), no. 3, 1984 p 20-41; 88-109
(AD-A168449; FTD-ID(RS)T-0496-85) Avail: NTIS HC A05/MF A01 CSCL 20/4

Acta Aerodynamica Sinica, no. 3, 1984, contains the following: A Locally Linearized Panel Method for Calculation of Tridimensional Wind Oscillation Pressure Distribution at Trans/subsonic Speeds; Pressure Intensity Distribution Computation for a Flexible Wing at Transonic Speed; On Relaxation of Transonic Velocity Zero Lift Airfoil Potential Flow and Convergence of Two Self Correcting Wind Tunnels; Observation of Flow Diagrams for Expansion Shockwave Tube; A Numeric Calculation Methodology for the Influence of Ground to Air Interference; and Finite Difference Computations for Radial Wind Flow in a Transonic Two Dimensional Slotted Wall Wind Tunnel. GRA

N87-11685# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ACTA AERONAUTICA ET ASTRONAUTICA SINICA (SELECTED ARTICLES)
Mouji Liu, Wenhan Su, Shuquen Lu, Zinqing Tang, and Anqui Li 29 May 1986 98 p Transl. into ENGLISH from Hang Kong Xuebao (China), v. 6, no. 1, Feb. 1985 p 1-20; 29-37; 49-74
(AD-A168450; FTD-ID(RS)T-1265-85) Avail: NTIS HC A05/MF A01 CSCL 20/4

Acta Aeronautica et Astronautica Sinica, Feb. 1985, contains the following articles: Development in Vortex Motion Research; Application of New Type of Pole Collocation Equations to Determining Laws Controlling a Bi-input Multi-output System; Quick Geometry Generation and Surface Mesh Partition for Arbitrary Three-Dimensional Bodies; Numerical Calculation of Flow Field in Afterburner Diffuser of Turbofan Engine; and Design of an Airborne Optic Fiber Data Bus System. GRA

N87-11686# Transportation Systems Center, Cambridge, Mass.
GENERAL AVIATION ACTIVITY AND AVIONICS SURVEY Annual Summary Report, CY 1984
Oct. 1985 248 p
(AD-A168582; DOT-TSC-FAA-85-3; FAA-MS-85-5) Avail: NTIS HC A11/MF A01 CSCL 01/2

This report presents and a description of the 1984 General Aviation Activity and Avionics Survey. The survey was conducted during 1985 by the FAA to obtain information on the activity and avionics of the United States registered general aviation aircraft fleet, the dominant component of civil aviation in the U.S. The survey was based on a statistically selected sample of about 12.7 percent of the general aviation fleet. A response rate of 59.5 percent was obtained. Survey results are based upon responses but are expanded upward to represent the total population. Survey results revealed that during 1984 an estimated 36.1 million hours of flying time were logged by the 220,943 active general aviation aircraft in the U.S. fleet, yielding a mean annual flight time per aircraft of 158 hours. The active aircraft represented about 82.6 percent of the registered general aviation fleet. The report contains breakdowns of these and other statistics by manufactured/model group, aircraft type, state and region of based aircraft, and primary use. Also included are fuel consumption, lifetime airframe hours, avionics, and engine hours estimates. In addition, tables are included for detailed analysis of the avionics capabilities of the general aviation fleet. Estimates of general aviation miles flown in 1984 have also been included in this report, broken down by aircraft type. GRA

N87-11687# Naval Postgraduate School, Monterey, Calif.
A DYNAMIC MODEL FOR AIRFRAME COST ESTIMATION M.S. Thesis
Ronald L. Brown Mar. 1986 80 p
(AD-A168842) Avail: NTIS HC A05/MF A01 CSCL 14/1

The Department of Defense has historically favored a relatively simple parametric approach to cost estimation. Economic theory has largely been ignored and the learning curve has become the customary analytical tool for relating production quantities to airframe costs. This thesis examines an effort to synthesize neoclassical economic theory with the traditional learning curve methodology. The proposed model implements a dynamic cost function that considers the effects of learning and production rate on the production process. To empirically test its validity, the model is applied to the F-4 Phantom II production program and parameters are estimated using historical production data. Author (GRA)

N87-11688# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A BRIEF INTRODUCTION TO THE HELICOPTER
H. J. G. C. Vodegel 16 Sep. 1986 23 p Submitted for publication
(NLR-MP-85062-U; B8667019; ETN-86-98494) Avail: NTIS HC A02/MF A01

Helicopter geometrical configurations, means of control, and general design features are introduced. Characteristics of the helicopter which differ from those of fixed wing aircraft are described. ESA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N87-11689 Rensselaer Polytechnic Inst., Troy, N.Y.
ANALYSIS OF COMPRESSIBLE BOUNDARY LAYER WITH

REAL GAS EFFECTS Ph.D. Thesis
Suk Chul Kim 1985 410 p
Avail: Univ. Microfilms Order No. DA8607727

One of the problems for the hypersonic flights and the design of future fuel-efficient jet engines is the lack of accurate methods for predicting the boundary layer parameters at high Mach numbers and temperatures. At high Mach numbers and temperatures, the real gas effects should be included in the calculations of the compressible laminar and turbulent boundary layers. By introducing the Mangler-Levy-Lees transformation, the compressible laminar bounary layer equations were transformed into two ordinary differential equations. To solve these equations the Runge-Kutta method of order 5 and 6 was used with a secant method for solving simultaneously the nonlinear equations. Instead of using the perfect gas assumptions, the properties of real gases in the temperature range of 100 to 2500 K were used. The calculations were carried out for free flight conditions, shock tube conditions, and gas turbine conditions. When we compared the real gas solutions with the perfect gas solutions, the real gas effects were significant for the conditions of high Mach numbers and temperatures. The boundary layer parameters from the real gas solutions were quite different from the existing formulas, solutions, and experimental data. At high Mach number and temperatures, the density fluctuation effects on the compressible turbulent boundary layers become significant. For future study of the compressible turbulent boundary layers, experimental data for various conditions were presented and compared with the 1/7 power law for the velocity profiles, and the effects of Mach number and heat transfer on the sublayer thickness were discussed. Dissert. Abstr.

N87-11690 ESDU International Ltd., London (England).
NORMAL FORCE, PITCHING MOMENT AND SIDE FORCE OF AXISYMMETRIC FOREBODY-CYLINDER COMBINATIONS FOR ANGLES OF ATTACK UP TO 90 DEGREES AND MACH NUMBERS UP TO 1.2
Jun. 1986 22 p
(ESDU-86009; ISBN-0-85679-561-5; ISSN-0141-397X) Avail: ESDU

This Data Item ESDU 86009 is an addition to the Aerodynamics Sub-series. A simple, semi-empirical method is presented for estimating normal force and pitching moment that is an extension of that in ESDU 85025 which deals with incidences less than 20 degrees. Although primarily derived using wind-tunnel results on tangent ogive cylinder models, it is expected to give reasonable estimates for any axisymmetric forebody cylinder combination with a smooth forebody shape. A worked example illustrates the use of the method. Large side forces and yawing moments can arise at high incidences in this Mach number range; they are due to asymmetric vortex flow on the leeward side induced by minor imperfections at the nose. The effect of Reynolds number and Mach number on the side force is discussed, and the influence of nose blunting on the axial force distribution is illustrated. ESDU

N87-11691 ESDU International Ltd., London (England).
PITOT AND STATIC ERRORS IN STEADY LEVEL FLIGHT
Jul. 1986 42 p
(ESDU-86006; ISBN-0-85679-558-5; ISSN-0141-4054) Avail: ESDU

This Data Item ESDU 86006 is an addition to the Aircraft Performance Sub-series. All contributions to pressure errors and the implications of the various tests needed to determine the errors in steady level flight are considered. Typical magnitudes of the various contributions are tabulated for typical installations and, where appropriate, estimation methods are given for particular effects for Mach numbers up to 4 at altitudes up to 120,000 ft (36,000 m). ESDU 85011 deals with corrections for nonsteady flight and ESDU 83029 introduces the overall process of correcting for all error sources in flight-test analysis and, in particular, the need for a proper sequence of error correction. ESDU

N87-11692 ESDU International Ltd., London (England).
DRAG AND PRESSURE RECOVERY CHARACTERISTICS OF AUXILIARY AIR INLETS AT SUBSONIC SPEEDS
Apr. 1986 67 p
(ESDU-86002; ISBN-0-85679-554-2; ISSN-0141-397X) Avail: ESDU

This Data Item ESDU 86002 is an addition to the Aerodynamics Sub-series. Methods are provided for estimating the drag and pressure recovery of intakes partially or wholly immersed in the boundary layer. The methods, which are semi-empirical, apply to circular, semi-circular, or rectangular scoop intakes, with or without boundary layer diverter, and flush rectangular intakes having a shallow entrance ramp of rectangular or NACA curved-divergent planform. The effect of the boundary layer on ram drag and pressure recovery at the throat just aft of the lip is derived from theoretical calculations taking account of the velocity profile. Empirical methods, based on a limited data base, predict spillage drag, and for scoop intakes, the contribution from profile drag. ESDU

N87-11693*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
INVESTIGATION OF THE EXTERNAL FLOW ANALYSIS FOR DENSITY MEASUREMENTS AT HIGH ALTITUDE Final Report, 1 Jul. 1979 - 31 Aug. 1982
George K. Bienkowski Nov. 1984 228 p
(Grant NsG-1630)
(NASA-CR-172464; NAS 1.26:172464) Avail: NTIS HC A11/MF A01 CSCL 01A

The results of analysis performed on the external flow around the shuttle orbiter nose regions at the Shuttle Upper Atmosphere Mass Spectrometer (SUMS) inlet orifice are presented. The purpose of the analysis is to quantitatively characterize the flow conditions to facilitate SUMS flight data reduction and subsequent determination of orbiter aerodynamic force coefficients in the hypersonic rarefied flow regime. Experimental determination of aerodynamic force coefficients requires accurate simultaneous measurement of forces (or acceleration) and dynamic pressure along with independent knowledge of density and velocity. The SUMS provides independent measurement of dynamic pressure; however, it does so indirectly and requires knowledge of the relationship between measured orifice conditions and the dynamic pressure which can only be determined on the basis of molecule or theory for a winged configuration. Monte Carlo direct simulation computer codes were developed for both the flow field solution at the orifice and for the internal orifice flow. These codes were used to study issues associated with geometric modeling of the orbiter nose geometry and the modeling of intermolecular collisions including rotational energy exchange and a preliminary analysis of vibrational excitation and dissociation effects. Data obtained from preliminary simulation runs are presented. Author

N87-11694*# Atmospheric Science Associates, Bedford, Mass.
CALCULATION OF WATER DROP TRAJECTORIES TO AND ABOUT ARBITRARY THREE-DIMENSIONAL LIFTING AND NONLIFTING BODIES IN POTENTIAL AIRFLOW Final Report
Hillyer G. Norment Washington NASA Oct. 1985 188 p
(Contract NAS3-22146)
(NASA-CR-3935; E-2687; NAS 1.26:3935) Avail: NTIS HC A08/MF A01 CSCL 01A

Subsonic, external flow about nonlifting bodies, lifting bodies or combinations of lifting and nonlifting bodies is calculated by a modified version of the Hess lifting code. Trajectory calculations can be performed for any atmospheric conditions and for all water drop sizes, from the smallest cloud droplet to large raindrops. Experimental water drop drag relations are used in the water drop equations of motion and effects of gravity settling are included. Inlet flow can be accommodated, and high Mach number compressibility effects are corrected for approximately. Seven codes are described: (1) a code used to debug and plot body surface description data; (2) a code that processes the body surface data to yield the potential flow field; (3) a code that computes flow velocities at arrays of points in space; (4) a code that computes

water drop trajectories from an array of points in space; (5) a code that computes water drop trajectories and fluxes to arbitrary target points; (6) a code that computes water drop trajectories tangent to the body; and (7) a code that produces stereo pair plots which include both the body and trajectories. Accuracy of the calculations is discussed, and trajectory calculation results are compared with prior calculations and with experimental data.

Author

N87-11695*# Georgia Inst. of Tech., Atlanta. Center for Rotary Wing Aircraft Technology.

SOME OBSERVATIONS ON THE BEHAVIOR OF THE LANGLEY MODEL ROTOR BLADE Semiannual Status Report

Lawrence W. Rehfield and Ali R. Atilgan Jul. 1986 49 p
(Grant NAG1-638; Proj. E16-668)
(NASA-CR-179880; NAS 1.26:179880) Avail: NTIS HC A03/MF A01 CSCL 01A

The design of the model rotor and the comparative study of coupled beam theory and the finite element analysis performed earlier at the Aerostructures Directorate by Robert Hodges and Mark Nixon is examined. Attention is focused upon two matters: (1) an examination of the small discrepancies between twist angle predictions under pure torque and radial loading, and (2) an assessment of nonclassical effects in bending behavior. The primary objective is understanding, particularly with regard to cause and effect relationships. Understanding, together with the simple, affordable nature of the coupled beam analysis, provides a sound basis for design.

Author

N87-11696*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PILOT-PRESSURE MEASUREMENTS IN FLOW FIELDS BEHIND A RECTANGULAR NOZZLE WITH EXHAUST JET FOR FREE-STREAM MACH NUMBERS OF 0.00, 0.60, AND 1.20

Lawrence E. Putnam and Charles E. Mercer Nov. 1986 154 p
(NASA-TM-88990; L-16166; NAS 1.15:88990) Avail: NTIS HC A08/MF A01 CSCL 01A

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to measure the flow field in and around the jet exhaust from a nonaxisymmetric nozzle configuration. The nozzle had a rectangular exit with a width-to-height ratio of 2.38. Pitot-pressure measurements were made at five longitudinal locations downstream of the nozzle exit. The maximum distance downstream of the exit was about 5 nozzle heights. These measurements were made at free-stream Mach numbers of 0.00, 0.60, and 1.20 with the nozzle operating at a ratio of nozzle total pressure to free-stream static pressure of 4.0. The jet exhaust was simulated with high-pressure air that had an exit total temperature essentially equal to the free-stream total temperature.

Author

N87-11697*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

BIFURCATIONS IN UNSTEADY AERODYNAMICS

Murray Tobak and Aynur Unal (Santa Clara Univ., Calif.) Jun. 1986 13 p Presented at the 10th US Congress of Applied Mechanics, Austin, Tex., 16-20 Jun. 1986
(NASA-TM-88316; A-86294; NAS 1.15:88316) Avail: NTIS HC A02/MF A01 CSCL 01A

Nonlinear algebraic functional expansions are used to create a form for the unsteady aerodynamic response that is consistent with solutions of the time dependent Navier-Stokes equations. An enumeration of means of invalidating Frechet differentiability of the aerodynamic response, one of which is aerodynamic bifurcation, is proposed as a way of classifying steady and unsteady aerodynamic phenomena that are important in flight dynamics applications. Accomodating bifurcation phenomena involving time dependent equilibrium states within a mathematical model of the aerodynamic response raises an issue of memory effects that becomes more important with each successive bifurcation.

Author

N87-11698*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MAXIMUM LIFT/DRAG RATIO OF FLAT PLATES WITH BLUNTNESS AND SKIN FRICTION AT HYPERSONIC SPEEDS

Michael E. Tauber Jul. 1986 8 p Submitted for publication
(NASA-TM-88338; A-86331; NAS 1.15:88338) Avail: NTIS HC A02/MF A01 CSCL 01A

Newtonian theory is used to derive a simple expression for the maximum lift/drag ratio of flat plates with bluntness and skin friction at hypersonic speeds. The bluntness drag is assumed to be independent of angle of attack. Because the effect of skin friction is of second order over the angle of attack range for maximum lift/drag ratio, it was assumed constant. As an example, the expression is applied to the Space Shuttle.

Author

N87-11699*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TIP VORTICES OF WINGS IN SUBSONIC AND TRANSONIC FLOW: A NUMERICAL SIMULATION

G. R. Srinivasan (JAI Associates, Mountain View, Calif.) and W. J. McCroskey Jul. 1986 7 p Original contains color illustrations
(Contract DAAG29-85-C-0002)
(NASA-TM-88334; A-86415; NAS 1.15:88334;
USAAVSCOM-TM-86-A-4) Avail: NTIS HC A02/MF A01 CSCL 01A

Thin layer Navier-Stokes and Euler equations are numerically solved using a multi-block zonal approach to simulate the formation and roll up of tip vortices of wings in subsonic and transonic flows. Several wing planforms were considered to examine the influence of tip-cap shape, planform geometry and free stream Mach number on the formation process. A good definition of the formation and qualitative roll up of tip vortices was achieved.

Author

N87-11700*# Iowa State Univ. of Science and Technology, Ames. College of Engineering.

APPLICATION OF VISCOUS-INVISCID INTERACTION METHODS TO TRANSONIC TURBULENT FLOWS Final Report

D. Lee and R. H. Pletcher Nov. 1986 292 p
(Grant NAG2-152)
(NASA-CR-179900; NAS 1.26:179900; HTL-42; CFD-16;
ISU-ERI-Ames-87055) Avail: NTIS HC A13/MF A01 CSCL 01A

Two different viscous-inviscid interaction schemes were developed for the analysis of steady, turbulent, transonic, separated flows over axisymmetric bodies. The viscous and inviscid solutions are coupled through the displacement concept using a transpiration velocity approach. In the semi-inverse interaction scheme, the viscous and inviscid equations are solved in an explicitly separate manner and the displacement thickness distribution is iteratively updated by a simple coupling algorithm. In the simultaneous interaction method, local solutions of viscous and inviscid equations are treated simultaneously, and the displacement thickness is treated as an unknown and is obtained as a part of the solution through a global iteration procedure. The inviscid flow region is described by a direct finite-difference solution of a velocity potential equation in conservative form. The potential equation is solved on a numerically generated mesh by an approximate factorization (AF2) scheme in the semi-inverse interaction method and by a successive line overrelaxation (SLOR) scheme in the simultaneous interaction method. The boundary-layer equations are used for the viscous flow region. The continuity and momentum equations are solved inversely in a coupled manner using a fully implicit finite-difference scheme.

Author

N87-11701*# Ohio State Univ., Columbus. Dept. of Aero- and Astro-Engineering.

AN EXPERIMENTAL STUDY OF THE AERODYNAMICS OF A NACA 0012 AIRFOIL WITH A SIMULATED GLAZE ICE ACCRETION Interim Technical Report

Michael B. Bragg Nov. 1986 318 p
(Grant NAG3-28; RF Proj. 712620/762009)
(NASA-CR-179897; NAS 1.26:179897) Avail: NTIS HC A14/MF A01 CSCL 01A

An experimental study was conducted in the Ohio State

University subsonic wind tunnel to measure the detailed aerodynamic characteristics of an airfoil with a simulated glaze ice accretion. A NACA 0012 model with interchangeable leading edges and pressure taps every one percent chord was used. Surface pressure and wake data were taken on the airfoil clean, with forced transition and with a simulated glaze ice shape. Lift and drag penalties due to the ice shape were found and the surface pressure clearly showed that large separation bubbles were present. Both total pressure and split-film probes were used to measure velocity profiles, both for the clean model and for the model with a simulated ice accretion. A large region of flow separation was seen in the velocity profiles and was correlated to the pressure measurements. Clean airfoil data were found to compare well to existing airfoil analysis methods. Author

N87-11702*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FORWARD-SWEPT WING CONFIGURATION DESIGNED FOR HIGH MANEUVERABILITY BY USE OF A TRANSONIC COMPUTATIONAL METHOD
Michael J. Mann and Charles E. Mercer Nov. 1986 185 p
(NASA-TP-2628; L-16120; NAS 1.60:2628) Avail: NTIS HC A09/MF A01 CSCL 01A

A transonic computational analysis method and a transonic design procedure have been used to design the wing and the canard of a forward-swept-wing fighter configuration for good transonic maneuver performance. A model of this configuration was tested in the Langley 16-Foot Transonic Tunnel. Oil-flow photographs were obtained to examine the wind flow patterns at Mach numbers from 0.60 to 0.90. The transonic theory gave a reasonably good estimate of the wing pressure distributions at transonic maneuver conditions. Comparison of the forward-swept-wing configuration with an equivalent aft-swept-wing-configuration showed that, at a Mach number of 0.90 and a lift coefficient of 0.9, the two configurations have the same trimmed drag. The forward-swept wing configuration was also found to have trimmed drag levels at transonic maneuver conditions which are comparable to those of the HiMAT (highly maneuverable aircraft technology) configuration and the X-29 forward-swept-wing research configuration. The configuration of this study was also tested with a forebody strake. Author

N87-11703# Naval Postgraduate School, Monterey, Calif.
CONTRIBUTION TO THE ANALYSIS OF HIGH-LIFT AIRFOIL AERODYNAMICS M.S. Thesis
Hee W. Lee Mar. 1986 102 p
(AD-A168401) Avail: NTIS HC A06/MF A01 CSCL 20/4

This thesis treats the problem of incompressible two-dimensional steady flow past airfoils or airfoil combinations at large angles of attack. A panel method was developed to computer the inviscid flow over two cylinders, airfoil-flap combinations and airfoils in ground effect. In addition, Cebeci's viscous/inviscid interaction method was applied to several airfoils and compared with available experimental data. The agreement is generally quite encouraging. The calculations show the sensitivity of the computations to Reynolds number and transition. More work is required to evaluate the potential and limitations of the viscous/inviscid interaction method. GRA

N87-11704# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
VORTEX SHEDDING OF A SQUARE CYLINDER IN FRONT OF A SLENDER AIRFOIL AT HIGH REYNOLDS NUMBERS. PART 2: COMPRESSIBILITY EFFECT
Takeo Nakagawa, Gerd E. A. Meier, Rainer Timm, and Hans-M. Lent Oct. 1985 33 p Sponsored by Minna-James-Heinemann Foundation, Hannover, West Germany
(MPIS-24/1985; ISSN-0436-1199; ETN-86-98222) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 28

The compressibility effect on vortex shedding behind a square cylinder in front of a NACA 0018 airfoil was visualized. The mean pressure decreases with increasing Mach number (or Reynolds number). There is a tendency for the amplitude of the pressure fluctuations and the fundamental frequency (or vortex shedding frequency) to increase with increasing Mach number (or Reynolds number) except in the very high subsonic Mach number range. When the spacing between the square cylinder and the airfoil is fixed, the Strouhal number behind the square cylinder is kept at an almost constant value up to M=0.63. If the Mach number exceeds a critical value the Strouhal number either decreases or increases suddenly. With increasing Mach number (or Reynolds number), the formation region behind the square cylinder becomes smaller and more asymmetric, and the separating shear layers become more corrugated. ESA

N87-11705# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abteilung Instationaere Aerodynamik.
ANALYTIC SOLUTIONS OF THE NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS FOR TRANSONIC FLOW IN PHYSICAL SPACES
Kuang-Lai Chao Jan. 1986 43 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-14; ISSN-0171-1342; ETN-86-98182) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 15

The nonlinear partial differential equations for steady transonic flow were solved analytically in physical spaces using four different methods. The plane flow and the axisymmetric flow were taken as examples to investigate the nonlinearity of the transonic equations; for both flows many solutions were found, including a finite number of terms. An iteration method makes it possible to derive exact solutions from the nonlinear equations. The method of the separation of variables leads to new functions in conjunction with the Weierstrass elliptic function. ESA

N87-11738*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CALCULATED EFFECTS OF VARYING REYNOLDS NUMBER AND DYNAMIC PRESSURE ON FLEXIBLE WINGS AT TRANSONIC SPEEDS
Richard L. Campbell *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 (date) 19 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

N87-11742*# McDonnell Aircraft Co., St. Louis, Mo.
SENSITIVITY ANALYSIS IN COMPUTATIONAL AERODYNAMICS
Dean R. Bristow *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 10 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

N87-11764*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POST AND A RANDOM-WALK SEARCH MODE
James A. Martin *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 23 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

N87-11765*# Engineering Mechanics Association, Inc., Palo Verde, Calif.
COMPONENT TESTING FOR DYNAMIC MODEL VERIFICATION
T. K. Hasselman and Jon D. Chrostowski *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N87-11706# National Transportation Safety Board, Washington, D. C.
NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATION
16 Jan. 1986 12 p
Avail: NTIS HC A02/MF A01

On November 3, 1984, a Cessna T210L, with a commercial pilot and a private pilot on board, was involved in a flight control malfunction incident during a takeoff ground run at Palwaukee Airport, Wheeling, Illinois. The commercial pilot stated that during the preflight and just before takeoff, the flight controls operated normally. After adding power to take off, he attempted to apply back pressure to rotate, but was unable to move the control yoke. The takeoff was aborted without further incident. A postincident inspection of the airplane revealed that the ribbon wire, Cessna Part No.1570308-1, for the control yoke electrical switches had jammed under the control column bearings, thus restricting the movement of the yoke. When the ribbon wire was removed from under the bearings, but while still installed in the airplane, investigators found an excessive amount of slack in the wire. When the flight controls were moved to their full extension limit, some slack still remained in the ribbon wire. On May 14, 1979, the Cessna Aircraft Corporation issued Service Information Letter No. SE 79-26, regarding 1978 and 1979 Cessna 210 and P210 models. The letter recommended that guides be installed under two of the four bearings to prevent the ribbon wire from becoming caught under the bearings. However, the letter did not address Cessna 210 models manufactured between 1970 and 1977, serial numbers (SN's) 59200 through 62273, or four other Cessna airplanes which incorporate the same ribbon wire arrangement. Author

N87-11707# Arinc Research Corp., Annapolis, Md.
GROUND AIRCRAFT DEICING TECHNOLOGY REVIEW Final Report, Sep. 1984 - Mar. 1986
Deborah Mayer, Joseph Michitsch, and Rosie Yu Mar. 1986 116 p
(Contract DTFA03-84-C-00086)
(DOT/FAA/CT-85/21; Rept-3038-01-1-3985) Avail: NTIS HC A06/MF A01

A review and update of operational, procedural, and system information regarding on-ground deicing of aircraft prior to flight is presented. It reflects current practices of the different segments of aviation with the preponderance of information addressing the ground deicing operations and procedures employed by the airlines. Survey results presented in this report reflect the airlines' adherence to the clean aircraft concept as presented in Advisory Circular 20-117, and also indicates the need for a better understanding of the different types of deicing fluids and facilities currently available. Author

N87-11708# RMS Technologies, Inc., Trevose, Pa.
CRASH DYNAMICS PROGRAM TRANSPORT SEAT PERFORMANCE AND COST BENEFIT STUDY Final Report, Mar. 1984 - Oct. 1985
Mark R. Cannon and Richard E. Zimmermann Oct. 1986 97 p
Prepared in cooperation with Simula, Inc., Tempe, Ariz.
(Contract DTFA03-81-C-00040)
(DOT/FAA/CT-85/36; TR-85433) Avail: NTIS HC A05/MF A01

Work performed to support the Federal Aviation Administration's Crash Dynamics Program is described. An element of the program was the Controlled Impact Demonstration (CID) of a Boeing 720 aircraft. Work related to the CID involved developing modifications of commercial transport seats to improve their structural crashworthiness, then installing them alongside standard, unmodified seats aboard the test aircraft. This was followed by posttest analyses of the CID data and examination of the test specimens. Other supporting work included a literature review of the development of transport seats from the 1950's to the present, an investigation of the elements affecting transport seats' performance in a crash environment, and recommended changes that would improve the seats' survival. Additionally, a study was performed of severe survivable transport accidents between 1970 and 1983 to determine the effect transport seat performance had on passenger survival, and to identify instances where an improved seat/restraint system might have been beneficial. Author

N87-11709# European Space Agency, Paris (France).
COMPARATIVE FLIGHT MEASUREMENT OF ICING PARAMETERS FOR THE DO 28 D2 PROPELLER-DRIVEN AIRCRAFT OF THE GERMAN ARMY TESTING OFFICE 61 AND FOR DFVLR'S FALCON 20 E JET AIRCRAFT IN STRATUS CLOUDS
Klaus-Peter Schickel and Kurt Uwira Sep. 1985 54 p Transl. into ENGLISH from "Vergleichende Flukgmessung der Vereisungsparameter des Propellerflugzeugs DO 28 D2 der Erprobungsstelle 61 der Bundeswehr und des Strahlflugzeugs Falcon 20 E der DFVLR in Stratiformen Wolken" (Oberpfaffenhofen, W. Germany Original language document was announced as N86-10720
(ESA-TT-941; DFVLR-FB-85-16; ETN-86-98240) Avail: NTIS HC A04/MF A01; original German version available at DFVLR, Cologne, West Germany DM 15.50

Two aircraft of different types and instrumentation were compared during a flight operation in icing stratus clouds. The results of the measurements are comparable. It is established that differences between icing and nonicing stratus clouds can be detected in infrared satellite pictures; possible causes of these differences are given. The improvement of forecasts of icing stratus clouds is planned. ESA

N87-11710# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 5 OF 1985 ACCIDENTS
2 Jun. 1986 412 p
(PB86-916919; NTSB/AAB-86/19) Avail: NTIS HC A18/MF A01; also available on subscription, North American Continent HC $2[illegible]0.00/year, all others write for quote CSCL 01B

The publication contains selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1985. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The publication is issued irregularly, normally eighteen times each year. The Brief format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

N87-11711# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.
RUNWAY INCURSIONS AT CONTROLLED AIRPORTS IN THE UNITED STATES Special Investigation Report, 1985 - 1986
6 May 1986 109 p
(PB86-917003; NTSB/SIR-86/01) Avail: NTIS HC A06/MF A01; also available on subscription, North American Continent HC $60.00/year, all others write for quote CSCL 01B

A special investigation discusses the problem of runway incursions based on the results of the Safety Board investigations of 26 selected incidents. Details of the 26 incursions are summarized in an appendix to the report. The report discusses the issues that the Safety Board found most relevant to the runway incursion problem at controlled airports in the United States. The report includes a review of previous runway incursion incidents and accidents that led to recommendations to the Federal Aviation Administration for remedial actions. The effectiveness and status of the remedial actions are evaluated in the report, which concludes with new safety recommendations for actions that the Board believes would significantly reduce the frequency of runway incursions. GRA

N87-11712# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 4 OF 1985 ACCIDENTS
3 Jun. 1986 406 p
(PB86-916918; NTSB/AAB-86/18) Avail: NTIS HC A18/MF A01 CSCL 01B

Selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1985 are given. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

N87-11713# National Transportation Safety Board, Washington, D. C. Bureau of Field Operations.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AND FOREIGN AVIATION, ISSUE NUMBER 3 OF 1985 ACCIDENTS
30 Apr. 1986 416 p
(PB86-916917; NTSB/AAB-86/17) Avail: NTIS HC A18/MF A01 CSCL 01B

Selected aircraft accident reports in Brief Format occurring in U.S. civil and foreign aviation operations during Calendar Year 1985 are given. Approximately 200 General Aviation and Air Carrier accidents contained in the publication represent a random selection. The Brief Format represents the facts, conditions, circumstances and probable cause(s) for each accident. GRA

N87-11714# National Transportation Safety Board, Washington, D. C. Bureau of Safety Programs.
REVIEW OF ACCIDENT DATA: US GENERAL AVIATION CALENDAR YEAR 1982 Annual Report
16 Feb. 1986 246 p
(PB86-201910; NTSB/ARG-86/01) Avail: NTIS HC A11/MF A01 CSCL 01B

A statistical compilation and review of general aviation accidents which occurred in 1982 in the United States, its territories and possessions, and in international waters are given. The accidents reported are all those involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 125, 14 CFR 127, or 14 CFR 135. A review of a subset of all general aviation accidents is given. Each subset represents aircraft of similar types or aircraft being operated for particular purposes. Several tables present accident parameters for 1982 only, and each section includes tabulations which present comparative statistics for 1982 and for the five-year period 1977 to 1981. GRA

N87-11746*# Kentron International, Inc., Hampton, Va.
MULTIDISCIPLINARY OPTIMIZATION APPLIED TO A TRANSPORT AIRCRAFT
Gary L. Giles and G. A. Wrenn (Kentron International, Inc., Hampton, Va.) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

N87-11715# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
MODE S BEACOM SYSTEM: FUNCTIONAL DESCRIPTION
V. A. Orlando and P. R. Drouilhet 29 Aug. 1986 159 p
(Contracts DOT-FA72WAI-261; F19628-85-C-0002)
(DOT/FAA/PM-86/19; ATC-42-Rev-D) Avail: NTIS HC A08/MF A01

Provided is a functional description of the Mode S beacon System, a combined secondary surveillance radar (beacon) and ground-air-ground data link system capable of providing the aircraft surveillance and communications necessary to support ATC automation in future traffic environments. Mode S is capable of common-channel interoperation with the current ATC beacon system, and may be implemented over an extended transition period. Mode S will provide the surveillance and communication performance required by ATC automation, the reliable communications needed to support data link services, and the capability of operating with a terminal or enroute, radar digitizer-equipped, ATC surveillance radar. This material updates that presented in Mode S Beacon System: Functional Description, DOT/FAA/PM-83/8, 15 July 1983. Author

N87-11716# Department of the Air Force, Washington, D.C.
ELECTROLUMINESCENT (EL) REMOTELY-CONTROLLED LANDING ZONE MARKER LIGHT SYSTEM Patent
Chesley S. Pieroway, Alonzo Blount, George L. Britton, and David J. Krile, inventors (to Air Force) Issued 20 May 1986 10 p Supersedes AD-D010858
(AD-D012386; US-Patent-4,590,471; US-Patent-Appl-SN-566351; US-Patent-Class-340-825.69) Avail: US Patent and Trademark Office CSCL 17/7

A remotely-controlled lighting system for austere landing zone lighting includes a plurality of light units each having dual electroluminescent light panels, a plurality of remote controllers each having an electrical receiver, and a separate electrical transmitter. The light panel units and remote controllers, attached electrically, may also be attached physically and placed along the sides of a landing zone, while the separate transmitter is located at a remote, covert place, such as a foxhole. The transmitter and receivers of the remote controllers are capable of being preset to respectively transmit and receive a first sequence of coded pulses for turning on the light panel units and a second sequence for turning off the light units. Also, the transmitter may be operated to repeatedly transmit one of the first or second sequence without transmitting the other sequence between one sequence to ensure that all of the light units are either turned on or turned off. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.* For land transportation vehicles see *85 Urban Technology and Transportation.*

N87-11717*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT EXPERIENCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 1
Jaroslaw Sobieski, comp. 1984 517 p Symposium held in Hampton, Va., 24-26 Apr. 1984
(NASA-CP-2327-Pt-1; NAS 1.55:2327-Pt-1) Avail: NTIS HC A22/MF A01 CSCL 01C

Papers presented at the NASA Symposium on Recent Experiences in Multidisciplinary Analysis and Optimization held at NASA Langley Research Center, Hampton, Virginia April 24 to 26, 1984 are given. The purposes of the symposium were to exchange information about the status of the application of optimization and associated analyses in industry or research laboratories to real life problems and to examine the directions of future developments. Information exchange has encompassed the following: (1) examples of successful applications; (2) attempt and failure examples;

(3) identification of potential applications and benefits; (4) synergistic effects of optimized interaction and trade-offs occurring among two or more engineering disciplines and/or subsystems in a system; and (5) traditional organization of a design process as a vehicle for or an impediment to the progress in the design methodology. For individual titles, see N87-11718 through N87-11749.

N87-11718*# California Univ., Los Angeles.
STRUCTURAL SYNTHESIS: PRECURSOR AND CATALYST
L. A. Schmit *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization Part 1 1984 17 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

More than twenty five years have elapsed since it was recognized that a rather general class of structural design optimization tasks could be properly posed as an inequality constrained minimization problem. It is suggested that, independent of primary discipline area, it will be useful to think about: (1) posing design problems in terms of an objective function and inequality constraints; (2) generating design oriented approximate analysis methods (giving special attention to behavior sensitivity analysis); (3) distinguishing between decisions that lead to an analysis model and those that lead to a design model; (4) finding ways to generate a sequence of approximate design optimization problems that capture the essential characteristics of the primary problem, while still having an explicit algebraic form that is matched to one or more of the established optimization algorithms; (5) examining the potential of optimum design sensitivity analysis to facilitate quantitative trade-off studies as well as participation in multilevel design activities. It should be kept in mind that multilevel methods are inherently well suited to a parallel mode of operation in computer terms or to a division of labor between task groups in organizational terms. Based on structural experience with multilevel methods general guidelines are suggested. Author

N87-11719*# Lockheed-Georgia Co., Marietta.
OPTIMIZATION IN THE SYSTEMS ENGINEERING PROCESS
Loren A. Lemmerman *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 16 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The objective is to look at optimization as it applies to the design process at a large aircraft company. The design process at Lockheed-Georgia is described. Some examples of the impact that optimization has had on that process are given, and then some areas that must be considered if optimization is to be successful and supportive in the total design process are indicated. Optimization must continue to be sold and this selling is best done by consistent good performance. For this good performance to occur, the future approaches must be clearly thought out so that the optimization methods solve the problems that actually occur during design. The visibility of the design process must be maintained as further developments are proposed. Careful attention must be given to the management of data in the optimization process, both for technical reasons and for administrative purposes. Finally, to satisfy program needs, provisions must be included to supply data to support program decisions, and to communicate with design processes outside of the optimization process. If designers fail to adequately consider all of these needs, the future acceptance of optimization will be impeded. Author

N87-11720*# Douglas Aircraft Co., Inc., St. Louis, Mo.
PRACTICAL CONSIDERATIONS IN AEROELASTIC DESIGN
Bruce A. Rommel and Alan J. Dodd *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 12 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The structural design process for large transport aircraft is described. Critical loads must be determined from a large number of load cases within the flight maneuver envelope. The structural design is also constrained by considerations of producibility, reliability, maintainability, durability, and damage tolerance, as well as impact dynamics and multiple constraints due to flutter and aeroelasticity. Aircraft aeroelastic design considerations in three distinct areas of product development (preliminary design, advanced design, and detailed design) are presented and contrasted. The present state of the art is challenged to solve the practical difficulties associated with design, analysis, and redesign within cost and schedule constraints. The current practice consists of largely independent engineering disciplines operating with unorganized data interfaces. The need is then demonstrated for a well-planned computerized aeroelastic structural design optimization system operating with a common interdisciplinary data base. This system must incorporate automated interfaces between modular programs. In each phase of the design process, a common finite-element model for static and dynamic optimization is required to reduce errors due to modeling discrepancies. As the design proceeds from the simple models in preliminary design to the more complex models in advanced and detailed design, a means of retrieving design data from the previous models must be established. Author

N87-11721*# McDonnell Aircraft Co., St. Louis, Mo.
FLUTTER OPTIMIZATION IN FIGHTER AIRCRAFT DESIGN
William E. Triplett *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 17 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The efficient design of aircraft structure involves a series of compromises among various engineering disciplines. These compromises are necessary to ensure the best overall design. To effectively reconcile the various technical constraints requires a number of design iterations, with the accompanying long elapsed time. Automated procedures can reduce the elapsed time, improve productivity and hold the promise of optimum designs which may be missed by batch processing. Several examples are given of optimization applications including aeroelastic constraints. Particular attention is given to the success or failure of each example and the lessons learned. The specific applications are shown. The final two applications were made recently. Author

N87-11722*# Lockheed-Georgia Co., Marietta.
APPLICATION OF THE GENERALIZED REDUCED GRADIENT METHOD TO CONCEPTUAL AIRCRAFT DESIGN
Gary A. Gabriele *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 21 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The complete aircraft design process can be broken into three phases of increasing depth: conceptual design, preliminary design, and detail design. Conceptual design consists primarily of developing general arrangements and selecting the configuration that optimally satisfies all mission requirements. The result of the conceptual phase is a conceptual baseline configuration that serves as the starting point for the preliminary design phase. The conceptual design of an aircraft involves a complex trade-off of many independent variables that must be investigated before deciding upon the basic configuration. Some of these variables are discrete (number of engines), some represent different configurations (canard vs conventional tail) and some may represent incorporation of new technologies (aluminum vs composite materials). At Lockheed-Georgia, the sizing program is known as GASP (Generalized Aircraft Sizing Program). GASP is a large program containing analysis modules covering the many different disciplines involved fin defining the aircraft, such as aerodynamics, structures, stability and control, mission performance, and cost. These analysis modules provide first-level estimates the aircraft properties that are derived from handbook, experimental, and historical sources. Author

N87-11723*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIENCES PERFORMING CONCEPTUAL DESIGN OPTIMIZATION OF TRANSPORT AIRCRAFT
P. Douglas Arbuckle and Steven M. Sliwa *In its* Recent Experiences

in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Optimum Preliminary Design of Transports (OPDOT) is a computer program developed at NASA Langley Research Center for evaluating the impact of new technologies upon transport aircraft. For example, it provides the capability to look at configurations which have been resized to take advantage of active controls and provide and indication of economic sensitivity to its use. Although this tool returns a conceptual design configuration as its output, it does not have the accuracy, in absolute terms, to yield satisfactory point designs for immediate use by aircraft manufacturers. However, the relative accuracy of comparing OPDOT-generated configurations while varying technological assumptions has been demonstrated to be highly reliable. Hence, OPDOT is a useful tool for ascertaining the synergistic benefits of active controls, composite structures, improved engine efficiencies and other advanced technological developments. The approach used by OPDOT is a direct numerical optimization of an economic performance index. A set of independent design variables is iterated, given a set of design constants and data. The design variables include wing geometry, tail geometry, fuselage size, and engine size. This iteration continues until the optimum performance index is found which satisfies all the constraint functions. The analyst interacts with OPDOT by varying the input parameters to either the constraint functions or the design constants. Note that the optimization of aircraft geometry parameters is equivalent to finding the ideal aircraft size, but with more degrees of freedom than classical design procedures will allow. Author

N87-11724*# Integrated Systems, Inc., Palo Alto, Calif.
THE ROLE OF OPTIMIZATION IN STRUCTURAL MODEL REFINEMENT
L. L. Lehman *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 7 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

To evaluate the role that optimization can play in structural model refinement, it is necessary to examine the existing environment for the structural design/structural modification process. The traditional approach to design, analysis, and modification is illustrated. Typically, a cyclical path is followed in evaluating and refining a structural system, with parallel paths existing between the real system and the analytical model of the system. The major failing of the existing approach is the rather weak link of communication between the cycle for the real system and the cycle for the analytical model. Only at the expense of much human effort can data sharing and comparative evaluation be enhanced for the two parallel cycles. Much of the difficulty can be traced to the lack of a user-friendly, rapidly reconfigurable engineering software environment for facilitating data and information exchange. Until this type of software environment becomes readily available to the majority of the engineering community, the role of optimization will not be able to reach its full potential and engineering productivity will continue to suffer. A key issue in current engineering design, analysis, and test is the definition and development of an integrated engineering software support capability. The data and solution flow for this type of integrated engineering analysis/refinement system is shown. Author

N87-11725*# Boeing Commercial Airplane Co., Seattle, Wash.
PIAS: A PROGRAM FOR AN ITERATIVE AEROELASTIC SOLUTION
Marjorie E. Manro *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

A Program for an Iterative Aeroelastic Solution (PIAS) is discussed. This will be a modular computer program that combines the use of a finite-element structural analysis code with any linear or nonlinear aerodynamic code. At this point in time, PIAS has been designed but the software has not been written. The idea for this development originated with P. J. (Bud) Bobbitt of the NASA Langley Research Center. There was initial interest in an aeroelastic solution for a separation-induced leading-edge vortex. Some examples of the flow patterns for a low aspect ratio wing are shown. The Leading-Edge Vortex Program, which calculates pressure distributions including the effects of a separation-induced leading-edge vortex, uses an iterative solution method. This led to the concept of an iteration cycle on configuration shape external to the aerodynamic code. Author

N87-11726*# Hughes Helicopters, Culver City, Calif.
OPTIMIZATION PROCESS IN HELICOPTER DESIGN
A. H. Logan and D. Banerjee *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 19 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

In optimizing a helicopter configuration, Hughes Helicopters uses a program called Computer Aided Sizing of Helicopters (CASH), written and updated over the past ten years, and used as an important part of the preliminary design process of the AH-64. First, measures of effectiveness must be supplied to define the mission characteristics of the helicopter to be designed. Then CASH allows the designer to rapidly and automatically develop the basic size of the helicopter (or other rotorcraft) for the given mission. This enables the designer and management to assess the various tradeoffs and to quickly determine the optimum configuration. Author

N87-11727*# Naval Ship Research and Development Center, Bethesda, Md.
ROLE OF OPTIMIZATION IN INTERDISCIPLINARY ANALYSES OF NAVAL STRUCTURES
S. K. Dhir and M. M. Hurwitz *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 8 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The need for numerical design optimization of naval structures is discussed. The complexity of problems that arise due to the significant roles played by three major disciplines, i.e., structural mechanics, acoustics, and hydrodynamics are discussed. A major computer software effort that has recently begun at the David W. Taylor Naval Ship R&D Center to accommodate large multidisciplinary analyses is also described. In addition to primarily facilitating, via the use of data bases, interdisciplinary analyses for predicting the response of the Navy's ships and related structures, this software effort is expected to provide the analyst with a convenient numerical workbench for performing large numbers of analyses that may be necessary for optimizing the design performance. Finally, an example is included that investigates several aspects of optimizing a typical naval structure from the viewpoints of strength, hydrodynamic form, and acoustic characteristics. Author

N87-11728*# Ford Motor Co., Dearborn, Mich.
APPLICATION OF OPTIMIZATION TECHNIQUES TO VEHICLE DESIGN: A REVIEW
B. Prasad and C. L. Magee *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 25 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The work that has been done in the last decade or so in the application of optimization techniques to vehicle design is discussed. Much of the work reviewed deals with the design of body or suspension (chassis) components for reduced weight. Also reviewed are studies dealing with system optimization problems for improved functional performance, such as ride or handling. In reviewing the work on the use of optimization techniques, one notes the transition from the rare mention of the methods in the 70's to an increased effort in the early 80's. Efficient and convenient optimization and analysis tools still need to be developed so that they can be regularly applied in the early design stage of the vehicle development cycle to be most effective. Based on the reported applications, an attempt is made to assess the potential for automotive application of optimization techniques. The major issue involved remains the creation of quantifiable means of

analysis to be used in vehicle design. The conventional process of vehicle design still contains much experience-based input because it has not yet proven possible to quantify all important constraints. This restraint on the part of the analysis will continue to be a major limiting factor in application of optimization to vehicle design. Author

N87-11729*# General Motors Research Labs., Warren, Mich.
STRUCTURAL OPTIMIZATION IN AUTOMOTIVE DESIGN c37
J. A. Bennett and M. E. Botkin *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 16 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 13I

Although mathematical structural optimization has been an active research area for twenty years, there has been relatively little penetration into the design process. Experience indicates that often this is due to the traditional layout-analysis design process. In many cases, optimization efforts have been outgrowths of analysis groups which are themselves appendages to the traditional design process. As a result, optimization is often introduced into the design process too late to have a significant effect because many potential design variables have already been fixed. A series of examples are given to indicate how structural optimization has been effectively integrated into the design process. Author

N87-11730*# Kentron International, Inc., Hampton, Va.
TRADEOFF METHODS IN MULTIOBJECTIVE INSENSITIVE DESIGN OF AIRPLANE CONTROL SYSTEMS c08
Albert A. Schy and Daniel P. Giesy (Kentron International, Inc., Hampton, Va.) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The latest results of an ongoing study of computer-aided design of airplane control systems are given. Constrained minimization algorithms are used, with the design objectives in the constraint vector. The concept of Pareto optimiality is briefly reviewed. It is shown how an experienced designer can use it to find designs which are well-balanced in all objectives. Then the problem of finding designs which are insensitive to uncertainty in system parameters are discussed, introducing a probabilistic vector definition of sensitivity which is consistent with the deterministic Pareto optimal problem. Insensitivity is important in any practical design, but it is particularly important in the design of feedback control systems, since it is considered to be the most important distinctive property of feedback control. Methods of tradeoff between deterministic and stochastic-insensitive (SI) design are described, and tradeoff design results are presented for the example of the a Shuttle lateral stability augmentation system. This example is used because careful studies have been made of the uncertainty in Shuttle aerodynamics. Finally, since accurate statistics of uncertain parameters are usually not available, the effects of crude statistical models on SI designs are examined. Author

N87-11731*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STAEBL: STRUCTURAL TAILORING OF ENGINE BLADES, PHASE 2 c07
M. S. Hirschbein and K. W. Brown (Pratt and Whitney Aircraft, East Hartford, Conn.) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 13 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 21E

The Structural Tailoring of Engine Blades (STAEBL) program was initiated at NASA Lewis Research Center in 1980 to introduce optimal structural tailoring into the design process for aircraft gas turbine engine blades. The standard procedure for blade design is highly iterative with the engineer directly providing most of the decisions that control the design process. The goal of the STAEBL program has been to develop an automated approach to generate structurally optimal blade designs. The program has evolved as a three-phase effort with the developmental work being performed contractually by Pratt & Whitney Aircraft. Phase 1 was intended as a proof of concept in which two fan blades were structurally tailored to meet a full set of structural design constraints while minimizing DOC+I (direct operating cost plus interest) for a representative aircraft. This phase was successfully completed and was reported in reference 1 and 2. Phase 2 has recently been completed and is the basis for this discussion. During this phase, three tasks were accomplished: (1) a nonproprietary structural tailoring computer code was developed; (2) a dedicated approximate finite-element analysis was developed; and (3) an approximate large-deflection analysis was developed to assess local foreign object damage. Phase 3 is just beginning and is designed to incorporated aerodynamic analyses directly into the structural tailoring system in order to relax current geometric constraints. Author

N87-11732*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
OPTIMIZATION OF CASCADE BLADE MISTUNING UNDER FLUTTER AND FORCED RESPONSE CONSTRAINTS c07
Durbha V. Murthy and Raphael T. Haftka *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
(Grant NAG3-347)
Avail: NTIS HC A22/MF A01 CSCL 21E

In the development of modern turbomachinery, problems of flutter instabilities and excessive forced response of a cascade of blades that were encountered have often turned out to be extremely difficult to eliminate. The study of these instabilities and the forced response is complicated by the presence of mistuning; that is, small differences among the individual blades. The theory of mistuned cascade behavior shows that mistuning can have a beneficial effect on the stability of the rotor. This beneficial effect is produced by the coupling between the more stable and less stable flutter modes introduced by mistuning. The effect of mistuning on the forced response can be either beneficial or adverse. Kaza and Kielb have studied the effects of two types of mistuning on the flutter and forced response: alternate mistuning where alternte blades are identical and random mistuning. The objective is to investigate other patterns of mistuning which maximize the beneficial effects on the flutter and forced response of the cascade. Numerical optimization techniques are employed to obtain optimal mistuning patterns. The optimization program seeks to minimize the amount of mistuning required to satisfy constraints on flutter speed and forced response. Author

N87-11733*# Lockheed-Georgia Co., Marietta.
SIZING-STIFFENED COMPOSITE PANELS LOADED IN THE POSTBUCKLING RANGE c39
S. B. Biggers and J. N. Dickson *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

Stiffened panels are widely used in aircraft structures such as wing covers, fuselages, control surfaces, spar webs, bulkheads, and floors. The detailed sizing of minimum-weight stiffened panels involves many considerations. Use of composite materials introduces additional complexities. Many potential modes of failure exist. Analyses for these modes are often not trivial, especially for those involving large out-of-plane displacements. Accurate analyses of all potential failure modes are essential. Numerous practical constraints arise from manufacturing/cost considerations and from damage tolerance, durability, and stiffness requirements. The number of design variables can be large when lamina thicknesses and stacking sequence are being optimized. A significant burden is placed on the sizing code due to the complex analyses, practical constraints, and number of design variables. On the other hand, sizing weight-efficient panels without the aid of an automated procedure is almost out of the question. The sizing code postbuckled Open-Stiffener Optimum Panels (POSTOP) has been developed to aid in the design of minimum-weight panels

subject to the considerations mentioned above. Developed for postbuckled composite panels, POSTOP may be used for buckling resistant panels and metallic panels as well. The COPES/CONMIN optimizer is used in POSTOP although other options such as those in the ADS system could be substituted with relative ease. The basic elements of POSTOP are shown. Some of these elements and usage of the program are described. Author

N87-11734*# McIntosh Structural Dynamics, Inc., Palo Alto, Calif.
OPTIMAL REDESIGN STUDY OF THE HARM WING
S. C. McIntosh, Jr. and M. E. Weynand (Texas Instruments, Inc., Lewisville) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 13 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The purpose of this project was to investigate the use of optimization techniques to improve the flutter margins of the HARM AGM-88A wing. The missile has four cruciform wings, located near mid-fuselage, that are actuated in pairs symmetrically and antisymmetrically to provide pitch, yaw, and roll control. The wings have a solid stainless steel forward section and a stainless steel crushed-honeycomb aft section. The wing restraint stiffness is dependent upon wing pitch amplitude and varies from a low value near neutral pitch attitude to a much higher value at off-neutral pitch attitudes, where aerodynamic loads lock out any free play in the control system. The most critical condition for flutter is the low-stiffness condition in which the wings are moved symmetrically. Although a tendency toward limit-cycle flutter is controlled in the current design by controller logic, wing redesign to improve this situation is attractive because it can be accomplished as a retrofit. In view of the exploratory nature of the study, it was decided to apply the optimization to a wing-only model, validated by comparison with results obtained by Texas Instruments (TI). Any wing designs that looked promising were to be evaluated at TI with more complicated models, including body modes. The optimization work was performed by McIntosh Structural Dynamics, Inc. (MSD) under a contract from TI. Author

N87-11735*# Boeing Aerospace Co., Seattle, Wash.
A NONLINEAR PROGRAMMING METHOD FOR SYSTEM DESIGN WITH RESULTS THAT HAVE BEEN IMPLEMENTED c61
Frank Hauser *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 11 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

A general nonlinear programming algorithm (NICO) is discussed. An academic optimization example is given. The NICO multi-input, multi-output control system design is discussed. NICO applications relative to launch vehicle autopilot design, space shuttle static balance, transient response criteria in the design of a reentry vehicle control system, and waterjet propulsion and lift system components sized to a large surface effect ship are noted. R.J.F.

N87-11736*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICATION OF OPTIMIZATION TECHNIQUES TO THE DESIGN OF A FLUTTER SUPPRESSION CONTROL LAW FOR THE DAST ARW-2 c08
William M. Adams, Jr. and Sherwood H. Tiffany *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 17 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The design of a candidate flutter suppression (FS) control law for the symmetric degrees of freedom for the DAST ARW-2 aircraft is discussed. The results illustrate the application of several currently employed control law design techniques. Subsequent designs, obtained as the mathematical model of the ARW-2 is updated, are expected to employ similar methods and to provide a control law whose performance will be flight tested. This study represents one of the steps necessary to provide an assessment of the validity of applying current control law synthesis and analysis techniques in the design of actively controlled aircraft. Mathematical models employed in the control law design and evaluation phases are described. The control problem is specified by presenting the flutter boundary predicted for the uncontrolled aircraft and by defining objectives and constraints that the controller should satisfy. A full-order controller is obtained by using Linear Quadratic Gaussian (LQG) techniques. The process of obtaining an implementable reduced-order controller is described. One example is also shown in which constrained optimization techniques are utilized to explicitly include robustness criteria within the design algorithm. Author

N87-11737*# Kansas Univ., Lawrence. Dept. of Aerospace Engineering.
APPLICATIONS OF CONMIN TO WING DESIGN OPTIMIZATION WITH VORTEX FLOW EFFECT
C. Edward Lan *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 12 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Slender wings on supersonic cruise configurations are expected to be thin and highly swept. As a result, edge-separated vortex flow is inevitable and must be accounted for in aerodynamic analysis and design. The present method is based on the method of suction analogy to calculate the total aerodynamic characteristics. The method requires the solution of the attached flow problem, the latter being solved by a low-order panel method in subsonic and supersonic flow. In essence, the lifting pressure is calculated by using a pressure-doublet distribution satisfying the Prandtl-Glauert equation. From the pressure distribution, the leading-edge suction is calculated. The latter is assumed to be the vortex lift through the method of suction analogy. For a cambered wing, the location of vortex-lift action point is important in predicting the aerodynamic characteristics. It is also seen that the effect of camber shape appears nonlinearly in all aerodynamic expressions. To design the camber shape, the camber slope is represented by a cosine Fourier series at each of several spanwise stations. The Fourier coefficients are the design variables. To design a leading-edge flap in the vortex flow (i.e., a vortex flap), the coordinates of corner points and the deflection angle are the design variables. The process of wing design is to determine the camber shape and twist distribution such that an objective function, typically the drag, is minimized, subject to various constraints. Author

N87-11738*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CALCULATED EFFECTS OF VARYING REYNOLDS NUMBER AND DYNAMIC PRESSURE ON FLEXIBLE WINGS AT TRANSONIC SPEEDS c02
Richard L. Campbell *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 (date) 19 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

A computational method is described that includes the effects of static aeroelastic wing deflections in steady transonic aerodynamic calculations. This method, known as the Transonic Aeroelastic Program System (TAPS), interacts a 3D transonic computer code with boundary layer and a linear finite element structural analysis codes to calculate wing pressures and deflections. The nonlinear nature of the transonic flow makes it necessary to couple the aerodynamic and structures codes in an iterative manner. TAPS has been arranged in a modular fashion so that different aerodynamic or structures programs may be used with a minimum of coding changes required. Results obtained using two different aerodynamic codes in TAPS are given, and those results are correlated with experimental data. Author

N87-11739*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFLUENCE OF ANALYSIS AND DESIGN MODELS ON MINIMUM WEIGHT DESIGN
M. Salama, R. K. Ramanathan (Northrop Corp., Hawthorne, Calif.), L. A. Schmit (California Univ., Los Angeles), and I. S. Sarma *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 14 p (For primary

document see N87-11717 03-05)
(Contract NAS7-918)
Avail: NTIS HC A22/MF A01 CSCL 01C

The results of numerical experiments designed to illustrate how the minimum weight design, accuracy, and cost can be influenced by: (1) refinement of the finite element analysis model and associated load path problems, and (2) refinement of the design variable linking model are examined. The numerical experiments range from simple structures where the modelling decisions are relatively obvious and less costly to the more complex structures where such decisions are less obvious and more costly. All numerical experiments used employ the dual formulation in ACCESS-3 computer program. Guidelines are suggested for creating analysis and design models that predict a minimum weight structure with greater accuracy and less cost. These guidelines can be useful in an interactive optimization environment and in the design of heuristic rules for the development of knowledge-based expert optimization systems. Author

N87-11740*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIDISCIPLINARY SYSTEMS OPTIMIZATION BY LINEAR DECOMPOSITION **c66**
J. Sobieski *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 24 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

In a typical design process major decisions are made sequentially. An illustrated example is given for an aircraft design in which the aerodynamic shape is usually decided first, then the airframe is sized for strength and so forth. An analogous sequence could be laid out for any other major industrial product, for instance, a ship. The loops in the discipline boxes symbolize iterative design improvements carried out within the confines of a single engineering discipline, or subsystem. The loops spanning several boxes depict multidisciplinary design improvement iterations. Omitted for graphical simplicity is parallelism of the disciplinary subtasks. The parallelism is important in order to develop a broad workfront necessary to shorten the design time. If all the intradisciplinary and interdisciplinary iterations were carried out to convergence, the process could yield a numerically optimal design. However, it usually stops short of that because of time and money limitations. This is especially true for the interdisciplinary iterations. Author

N87-11741*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL SENSITIVITY ANALYSIS: METHODS, APPLICATIONS, AND NEEDS **c39**
Howard M. Adelman, Raphael T. Haftka (Virginia Polytechnic Inst. and State Univ., Blacksburg), Charles J. Camarda, and Joanne L. Walsh *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 18 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

Some innovative techniques applicable to sensitivity analysis of discretized structural systems are reviewed. These techniques include a finite-difference step-size selection algorithm, a method for derivatives of iterative solutions, a Green's function technique for derivatives of transient response, a simultaneous calculation of temperatures and their derivatives, derivatives with respect to shape, and derivatives of optimum designs with respect to problem parameters. Computerized implementations of sensitivity analysis and applications of sensitivity derivatives are also discussed. Finally, some of the critical needs in the structural sensitivity area are indicated along with Langley plans for dealing with some of these needs. Author

N87-11742*# McDonnell Aircraft Co., St. Louis, Mo.
SENSITIVITY ANALYSIS IN COMPUTATIONAL AERODYNAMICS **c02**
Dean R. Bristow *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 10 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

Information on sensitivity analysis in computational aerodynamics is given in outline, graphical, and chart form. The prediction accuracy if the MCAERO program, a perturbation analysis method, is discussed. A procedure for calculating perturbation matrix, baseline wing paneling for perturbation analysis test cases and applications of an inviscid sensitivity matrix are among the topics covered. R.J.F.

N87-11743*# Kentron International, Inc., Hampton, Va.
AIRCRAFT CONFIGURATION OPTIMIZATION INCLUDING OPTIMIZED FLIGHT PROFILES
L. A. McCullers *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 18 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The Flight Optimization System (FLOPS) is an aircraft configuration optimization program developed for use in conceptual design of new aircraft and in the assessment of the impact of advanced technology. The modular makeup of the program is illustrated. It contains modules for preliminary weights estimation, preliminary aerodynamics, detailed mission performance, takeoff and landing, and execution control. An optimization module is used to drive the overall design and in defining optimized profiles in the mission performance. Propulsion data, usually received from engine manufacturers, are used in both the mission performance and the takeoff and landing analyses. Although executed as a single in-core program, the modules are stored separately so that the user may select the appropriate modules (e.g., fighter weights versus transport weights) or leave out modules that are not needed. Author

N87-11744*# Naval Postgraduate School, Monterey, Calif.
THE ADS GENERAL-PURPOSE OPTIMIZATION PROGRAM
G. N. Vanderplaats *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 10 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The mathematical statement of the general nonlinear optimization problem is given as follows: find the vector of design variables, X, that will minimize f(X) subject to G sub J (x) + or - 0 j=1,m H sub K hk(X) = 0 k=1,l X Lower I approx less than X sub I approx. less than X U over I i = 1,N. The vector of design variables, X, includes all those variables which may be changed by the ADS program in order to arrive at the optimum design. The objective function F(X) to be minimized may be weight, cost or some other performance measure. If the objective is to be maximized, this is accomplished by minimizing -F(X). The inequality constraints include limits on stress, deformation, aeroelastic response or controllability, as examples, and may be nonlinear implicit functions of the design variables, X. The equality constraints h sub k(X) represent conditions that must be satisfied precisely for the design to be acceptable. Equality constraints are not fully operational in version 1.0 of the ADS program, although they are available in the Augmented Lagrange Multiplier method. The side constraints given by the last equation are used to directly limit the region of search for the optimum. The ADS program will never consider a design which is not within these limits. Author

N87-11745*# Iowa Univ., Iowa City. Center for Computer Aided Design.
SHAPE DESIGN SENSITIVITY ANALYSIS OF BUILT-UP STRUCTURES
Kyung K. Choi *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Selection of the best shape of a fillet in a tension bar such that no yielding occurs has long attracted the attention of engineers. Dimensions and notations for the bar and fillet are shown. With symmetry, only the upper half of the bar is considered. The optimal design problem is to find a boundary shape to minimize the total area of the fillet such that no yielding occurs. The classical boundary

value problem is reduced to a variational or energy related problem which not only has excellent properties of existence and uniqueness but also provides the mathematical foundation for finite element analysis. The variational formulation may be viewed as the principle of virtual work and the finite element method as a application of the Galerkin method to the variational equation for approximate solution of the boundary value problem. Author

N87-11746*# Kentron International, Inc., Hampton, Va.
MULTIDISCIPLINARY OPTIMIZATION APPLIED TO A TRANSPORT AIRCRAFT c03
Gary L. Giles and G. A. Wrenn (Kentron International, Inc., Hampton, Va.) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Decomposition of a large optimization problem into several smaller subproblems has been proposed as an approach to making large-scale optimization problems tractable. To date, the characteristics of this approach have been tested on problems of limited complexity. The objective of the effort is to demonstrate the application of this multilevel optimization method on a large-scale design study using analytical models comparable to those currently being used in the aircraft industry. The purpose of the design study which is underway to provide this demonstration is to generate a wing design for a transport aircraft which will perform a specified mission with minimum block fuel. A definition of the problem; a discussion of the multilevel composition which is used for an aircraft wing; descriptions of analysis and optimization procedures used at each level; and numerical results obtained to date are included. Computational times required to perform various steps in the process are also given. Finally, a summary of the current status and plans for continuation of this development effort are given. Author

N87-11747*# Lockheed-California Co., Burbank.
SOME EXPERIENCES IN AIRCRAFT AEROELASTIC DESIGN USING PRELIMINARY AEROELASTIC DESIGN OF STRUCTURES (PAD)
Nick A. Radovcich *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 49 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The design experience associated with a benchmark aeroelastic design of an out of production transport aircraft is discussed. Current work being performed on a high aspect ratio wing design is reported. The Preliminary Aeroelastic Design of Structures (PADS) system is briefly summarized and some operational aspects of generating the design in an automated aeroelastic design environment are discussed. Author

N87-11748*# MacNeal-Schwendler Corp., Los Angeles, Calif.
DESIGN ENHANCEMENT TOOLS IN MSC/NASTRAN c61
D. V. Wallerstein *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 22 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

Design sensitivity is the calculation of derivatives of constraint functions with respect to design variables. While a knowledge of these derivatives is useful in its own right, the derivatives are required in many efficient optimization methods. Constraint derivatives are also required in some reanalysis methods. It is shown where the sensitivity coefficients fit into the scheme of a basic organization of an optimization procedure. The analyzer is to be taken as MSC/NASTRAN. The terminator program monitors the termination criteria and ends the optimization procedure when the criteria are satisfied. This program can reside in several plances: in the optimizer itself, in a user written code, or as part of the MSC/EOS (Engineering Operating System) MSC/EOS currently under development. Since several excellent optimization codes exist and since they require such very specialized technical knowledge, the optimizer under the new MSC/EOS is considered to be selected and supplied by the user to meet his specific needs and preferences. The one exception to this is a fully stressed design (FSD) based on simple scaling. The gradients are currently supplied by various design sensitivity options now existing in MSC/NASTRAN's design sensitivity analysis (DSA). Author

N87-11749*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
THE AUTOMATED STRENGTH-AEROELASTIC DESIGN OF AEROSPACE STRUCTURES PROGRAM Progress Report
E. H. Johnson and V. B. Venkayya (Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 11 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

An ongoing program whose goal is to develop an automated procedure that can assist in the preliminary design of aircraft and space structures is described. The approach and capabilities that are to be included in the final procedures are descussed. By using proven engineering software as a basis for the project, a reliable and interdisciplinary procedure is developed. The use of a control language for module sequencing and execution permits efficient development of the procedure and gives the user significant flexibility in altering or enhancing the procedure. The data base system provides reliable and efficient access to the large amounts of interrelated data required in an enterprise of this sort. In addition, the data base allows interfacing with existing pre- and post-processors in an almost trivial manner. Altogether, the procedure promises to be of considerable utility to preliminary structural design teams. Author

N87-11750*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RECENT EXPERIENCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 2
Jaroslaw Sobieski, comp. 1984 509 p Symposium held in Hampton, Va., 24-26 Apr. 1984
(NASA-CP-2327-Pt-2; L-15830; NAS 1.55:2327-Pt-2) Avail: NTIS HC A22/MF A01 CSCL 01C

The papers presented at the NASA Symposium on Recent Experiences in Multidisciplinary Analysis and Optimization held at NASA Langley Research Center, Hampton, Virginia, April 24 to 26, 1984 are given. The purposes of the symposium were to exchange information about the status of the application of optimization and the associated analyses in industry or research laboratories to real life problems and to examine the directions of future developments. For individual titles, see N87-11751 through N87-11780.

N87-11751*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OVERVIEW: APPLICATIONS OF NUMERICAL OPTIMIZATION METHODS TO HELICOPTER DESIGN PROBLEMS
H. Miura *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 13 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

There are a number of helicopter design problems that are well suited to applications of numerical design optimization techniques. Adequate implementation of this technology will provide high pay-offs. There are a number of numerical optimization programs available, and there are many excellent response/performance analysis programs developed or being developed. But integration of these programs in a form that is usable in the design phase should be recognized as important. It is also necessary to attract the attention of engineers engaged in the development of analysis capabilities and to make them aware that analysis capabilities are much more powerful if integrated into design oriented codes. Frequently, the shortcoming of analysis capabilities are revealed by coupling them with an optimization code. Most of the published work has addressed problems in preliminary system design, rotor system/blade design or airframe design. Very few published results were found in acoustics, aerodynamics and control system design. Currently major efforts

are focused on vibration reduction, and aerodynamics/acoustics applications appear to be growing fast. The development of a computer program system to integrate the multiple disciplines required in helicopter design with numerical optimization technique is needed. Activities in Britain, Germany and Poland are identified, but no published results from France, Italy, the USSR or Japan were found.
Author

N87-11752*# California Univ., Los Angeles.
APPLICATION OF MODERN STRUCTURAL OPTIMIZATION TO VIBRATION REDUCTION IN ROTORCRAFT c08
P. P. Friedmann *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
(Grants NsG-1579; NAG2-226)
Avail: NTIS HC A22/MF A01 CSCL 01C

The helicopter rotor model consists of a four bladed hingeless rotor attached to a fuselage. The helicopter is assumed to be in trimmed forward flight. Each blade is assumed to have flap, lag, and torsional degrees of freedom. The fuselage degrees of freedom are not included in the analysis. Thus the aeroelastic stability and response analysis upon which this study is based is an isolated blade analysis. The helicopter rotor vibration reduction problem expressed as a general class of structural synthesis problems is given.
Author

N87-11753*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HELICOPTER ROTOR BLADE AERODYNAMIC OPTIMIZATION BY MATHEMATICAL PROGRAMMING
Joanne L. Walsh, Gene J. Bingham, and Michael F. Riley (Kentron International, Inc., Hampton, Va.) *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 12 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Formal mathematical programing was applied to the aerodynamic rotor blade design process. The approach is to couple hover and forward flight analysis programs with the general-purpose optimization program CONMIN to determine the blade taper ratio, percent taper, twist distribution, and solidity which minimize the horsepower required at hover while meeting constraints on forward flight performance. Designs obtained using this approach for the blade of a representative Army helicopter compare well with those obtained using a conventional approach involving personnel-intensive parametric studies. Results from the present method can be obtained in 2 days as compared to 5 weeks required by the conventional procedure. Also the systematic manipulation of the design variables by the optimization procedure minimizes the need for the researcher to have a vast body of past experience and data in determining the influence of a design change on the performance.
Author

N87-11754*# Kaman Aerospace Corp., Bloomfield, Conn.
REGRESSION ANALYSIS AS A DESIGN OPTIMIZATION TOOL c64
Richmond Perley *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12A

The optimization concepts are described in relation to an overall design process as opposed to a detailed, part-design process where the requirements are firmly stated, the optimization criteria are well established, and a design is known to be feasible. The overall design process starts with the stated requirements. Some of the design criteria are derived directly from the requirements, but others are affected by the design concept. It is these design criteria that define the performance index, or objective function, that is to be minimized within some constraints. In general, there will be multiple objectives, some mutually exclusive, with no clear statement of their relative importance. The optimization loop that is given adjusts the design variables and analyzes the resulting design, in an iterative fashion, until the objective function is minimized within the constraints. This provides a solution, but it is only the beginning. In effect, the problem definition evolves as information is derived from the results. It becomes a learning process as we determine what the physics of the system can deliver in relation to the desirable system characteristics. As with any learning process, an interactive capability is a real attriubute for investigating the many alternatives that will be suggested as learning progresses.
Author

N87-11755*# Kaman Aerospace Corp., Bloomfield, Conn.
A ROTOR OPTIMIZATION USING REGRESSION ANALYSIS c64
N. Giansante *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 13 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12A

The design and development of helicopter rotors is subject to the many design variables and their interactions that effect rotor operation. Until recently, selection of rotor design variables to achieve specified rotor operational qualities has been a costly, time consuming, repetitive task. For the past several years, Kaman Aerospace Corporation has successfully applied multiple linear regression analysis, coupled with optimization and sensitivity procedures, in the analytical design of rotor systems. It is concluded that approximating equations can be developed rapidly for a multiplicity of objective and constraint functions and optimizations can be performed in a rapid and cost effective manner; the number and/or range of design variables can be increased by expanding the data base and developing approximating functions to reflect the expanded design space; the order of the approximating equations can be expanded easily to improve correlation between analyzer results and the approximating equations; gradients of the approximating equations can be calculated easily and these gradients are smooth functions reducing the risk of numerical problems in the optimization; the use of approximating functions allows the problem to be started easily and rapidly from various initial designs to enhance the probability of finding a global optimum; and the approximating equations are independent of the analysis or optimization codes used.
Author

N87-11756*# United Technologies Research Center, East Hartford, Conn.
OPTIMIZATION OF HELICOPTER ROTOR BLADE DESIGN FOR MINIMUM VIBRATION
M. W. Davis *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 17 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The optimization approach discussed is part of an ongoing effort to develop a general automated procedure for rotor blade design. This procedure can be used to determine the necessary geometric, structural, and material properties of a rotor system to achieve desired objectives relating to vibration, stress, and aerodynamic performance. The approach used for helicopter vibration is emphasized. Based on analytical studies performed at the United Technologies Research Center (UTRC), a simplified vibration analysis was developed to be used in conjunction with a forced response analysis in the optimization process. This simplified analysis improves the efficiency of the design process significantly. Results of applying this approach to the design of an existing rotor blade model are presented.
Author

N87-11757*# Army Research and Technology Labs., Fort Eustis, Va.
APPLICATION OF NUMERICAL OPTIMIZATION TO ROTOR AERODYNAMIC DESIGN
W. A. Pleasants, III and T. J. Wiggins *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Based on initial results obtained from the performance optimization code, a number of observations can be made regarding the utility of optimization codes in supporting design of

rotors for improved performance. (1) The primary objective of improving the productivity and responsiveness of current design methods can be met. (2) The use of optimization allows the designer to consider a wider range of design variables in a greatly compressed time period. (3) Optimization requires the user to carefully define his problem to avoid unproductive use of computer resources. (4) Optimization will increase the burden on the analyst to validate designs and to improve the accuracy of analysis methods. (5) Direct calculation of finite difference derivatives by the optimizer was not prohibitive for this application but was expensive. Approximate analysis in some form would be considered to improve program response time. (6) Program developement is not complete and will continue to evolve to integrate new analysis methods, design problems, and alternate optimizer options. Author

N87-11758*# Army Research and Technology Labs., Fort Eustis, Va. Applied Technology Lab.
AEROELASTIC-AERODYNAMIC OPTIMIZATION OF HIGH SPEED HELICOPTER-COMPOUND ROTOR
L. R. Sutton and R. L. Bennett *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 20 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Several problems related to the aeroelastic/aerodynamic optimization of a high speed helicopter compound rotor are discussed. The helicopter fuselage vibration problem, the effects of fuselage vibrations, the source of external and periodic air loads, typical airfoil environments and configurations, rotor dynamics, vibration reduction, and requirements for the rotor design optimization analysis are among the topics covered. R.J.F.

N87-11759*# Sikorsky Aircraft, Stratford, Conn.
THE STRUCTURAL OPTIMIZATION OF A SPREADER BAR FOR TWIN LIFT HELICOPTER OPERATIONS
Alan Dobyns *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 12 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

An optimization study was performed to develop a minimum weight spreader bar to allow two helicopters to lift the same payload. With this arrangement, the maximum payload that can be lifted is almost doubled without the expense of designing and building a new helicopter. The concept has had some limited use by civil helicopter operators using small helicopters and has been demonstrated in large scale by two CH-54's which successfully lifted a total load of 20 ton. To this point, rather heavy available beams or tower structures have been used for the spreader bar. Since the weight of the bar not only detracts from payload but also adds to the logistics problem, there are more than the usual incentives to minimize weight. Since the design requirement is for classic beam column with uniform side loads resulting from bar weight and aerodynamic drag, the design problem is particularly amenable to optimization. A study has been performed at Sikorsky to establish the minimum weight for a spreader bar sized to carry a load equal to the capacity of two Army BLACK HAWK helicopters. Toward this end, a computer program was written to analyze the spreader bar deflections and stresses and coupled to the NASA developed CONMIN optimization routines. Author

N87-11760*# San Diego State Univ., Calif.
MULTIOBJECTIVE OPTIMIZATION TECHNIQUES FOR STRUCTURAL DESIGN
S. S. Rao *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 8 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

The multiobjective programming techniques are important in the design of complex structural systems whose quality depends generally on a number of different and often conflicting objective functions which cannot be combined into a single design objective. The applicability of multiobjective optimization techniques is studied with reference to simple design problems. Specifically, the parameter optimization of a cantilever beam with a tip mass and a three-degree-of-freedom vabration isolation system and the trajectory optimization of a cantilever beam are considered. The solutions of these multicriteria design problems are attempted by using global criterion, utility function, game theory, goal programming, goal attainment, bounded objective function, and lexicographic methods. It has been observed that the game theory approach required the maximum computational effort, but it yielded better optimum solutions with proper balance of the various objective functions in all the cases. Author

N87-11761*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IDEAS: A MULTIDISCIPLINARY COMPUTER-AIDED CONCEPTUAL DESIGN SYSTEM FOR SPACECRAFT c18
Melvin J. Ferebee, Jr. *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 21 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 22B

During the conceptual development of advanced aerospace vehicles, many compromises must be considered to balance economy and performance of the total system. Subsystem tradeoffs may need to be made in order to satisfy system-sensitive attributes. Due to the increasingly complex nature of aerospace systems, these trade studies have become more difficult and time-consuming to complete and involve interactions of ever-larger numbers of subsystems, components, and performance parameters. The current advances of computer-aided synthesis, modeling and analysis techniques have greatly helped in the evaluation of competing design concepts. Langley Research Center's Space Systems Division is currently engaged in trade studies for a variety of systems which include advanced ground-launched space transportation systems, space-based orbital transfer vehicles, large space antenna concepts and space stations. The need for engineering analysis tools to aid in the rapid synthesis and evaluation of spacecraft has led to the development of the Interactive Design and Evaluation of Advanced Spacecraft (IDEAS) computer-aided design system. The ADEAS system has been used to perform trade studies of competing technologies and requirements in order to pinpoint possible beneficial areas for research and development. IDEAS is presented as a multidisciplinary tool for the analysis of advanced space systems. Capabilities range from model generation and structural and thermal analysis to subsystem synthesis and performance analysis. Author

N87-11762*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
MICROCOMPUTER DESIGN AND ANALYSIS OF THE CABLE CATENARY LARGE SPACE ANTENNA SYSTEM c39
W. Akle *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

The use of microcomputers in the design of a cable catenary large space antenna system is discussed. The development of a system design capability, data base utilization, systems integration, program structure and logic, and integrated graphics output are discussed. R.J.F.

N87-11763*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGN OPTIMIZATION OF THE 34-METER DSN-NCP ANTENNAS c32
Roy Levy *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 16 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20N

The new NASA Deep Space Network (DSN) 34-m-diameter azimuth-elevation (Az-El) antenna structure is an example of an essentially computer-automated design. In addition to pivotal comptuer Lagrange multiplier design optimization software, much of the associated pre- and post-processing was also performed

by computer. The construction of one of these antennas at Goldstone, California, is well advanced and will be completed this summer. A second installation is in progress in Australia. Both atennas will be used primarily for spacecraft tracking and will operate in the 8.5-GHz, 3.5-cm (1.4-in.) wavelength microwave frequency. Author

N87-11764*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
POST AND A RANDOM-WALK SEARCH MODE c02
James A. Martin *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 23 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

Multidisciplinary analysis often requires optimization of nonlinear systems that are subject to constraints. Trajectory optimization is one example of this situation. The Program to Optimize Simulated Trajectories (POST) was used successfully for a number of problems. The purpose is to describe POST and a new optimization approach that has been incorporated into it. Typical uses of POST will also be illustrated. The projected-gradient approach to optimization is the preferred option in POST and is discussed. A new approach to optimization, the random-walk approach, is described, and results with the random-walk approach are presented. Author

N87-11765*# Engineering Mechanics Association, Inc., Palo Verde, Calif.
COMPONENT TESTING FOR DYNAMIC MODEL VERIFICATION c02
T. K. Hasselman and Jon D. Chrostowski *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01A

Dynamic model verification is the process whereby an analytical model of a dynamic system is compared with experimental data, adjusted if necessary to bring it into agreement with the data, and then qualified for future use in predicting system response in a different dynamic environment. These are various ways to conduct model verification. The approach taken here employs Bayesian statistical parameter estimation. Unlike curve fitting, whose objective is to minimize the difference between some analytical function and a given quantity of test data (or curve), Bayesian estimation attempts also to minimize the difference between the parameter values of that funciton (the model) and their initial estimates, in a least squares sense. The objectives of dynamic model verification, therefore, are to produce a model which: (1) is in agreement with test data; (2) will assist in the interpretation of test data; (3) can be used to help verify a design; (4) will reliably predict performance; and (5) in the case of space structures, will facilitate dynamic control. Author

N87-11766*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
DUAL STRUCTURAL-CONTROL OPTIMIZATION OF LARGE SPACE STRUCTURES c18
Achille Messac and James Turner *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 28 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 22B

A new approach is proposed for solving dual structural-control optimization problems for high-order flexible space structures where reduced-order structural models are employed. For a given initial structural dessign, a quadratic control cost is minimized subject to a constant-mass constraint. The sensitivity of the optimal control cost with respect to the stuctural design variables is then determined and used to obtain successive structural redesigns using a contrained gradient optimization algorithm. This process is repeated until the constrained control cost sensitivity becomes negligible. A numerical example is presented which demonstrates that this new approach effectively addresses the problem of dual optimization for potentially very high-order structures. Author

N87-11767*# Howard Univ., Washington, D. C.
STRUCTURAL OPTIMIZATION WITH CONSTRAINTS ON TRANSIENTS RESPONSE c39
Robert Reiss *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 11 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

An exceptionally elegant method for structural optimization with constraints on the static response presented by Shield and Prager is discussed. Their derivation of the optimality condition was facilitated by a reformulation of the structural elasticity equations in terms of what was then a new variational principle, the principle of stationary mutual potential energy. Their optimality condition relates the design variable to an appropriately defined mutual strain energy. An alternative but related approach, based upon the principle of stationary mutual complementary energy, presented by N. C. Haung, is also discussed. The simplicity of these principles lies in the facts that the energy functionals are stationary at the solution to the field equations and that their stationary value is proportional to the quantity to be optimized. Author

N87-11768*# Pratt and Whitney Aircraft, East Hartford, Conn.
OPTIMIZATION APPLICATIONS IN AIRCRAFT ENGINE DESIGN AND TEST c07
T. K. Pratt *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 18 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 21E

Starting with the NASA-sponsored STAEBL program, optimization methods based primarily upon the versatile program COPES/CONMIN were introduced over the past few years to a broad spectrum of engineering problems in structural optimization, engine design, engine test, and more recently, manufacturing processes. By automating design and testing processes, many repetitive and costly trade-off studies have been replaced by optimization procedures. Rather than taking engineers and designers out of the loop, optimization has, in fact, put them more in control by providing sophisticated search techniques. The ultimate decision whether to accept or reject an optimal feasible design still rests with the analyst. Feedback obtained from this decision process has been invaluable since it can be incorporated into the optimization procedure to make it more intelligent. On several occasions, optimization procedures have produced novel designs, such as the nonsymmetric placement of rotor case stiffener rings, not anticipated by engineering designers. In another case, a particularly difficult resonance contraint could not be satisfied using hand iterations for a compressor blade, when the STAEBL program was applied to the problem, a feasible solution was obtained in just two iterations. Author

N87-11769*# Michigan Univ., Ann Arbor.
ON OPTIMAL DESIGN FOR THE BLADE-ROOT/HUB INTERFACE IN JET ENGINES c07
Noboru Kikuchi and John E. Taylor *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
(Grant NAG3-388)
Avail: NTIS HC A22/MF A01 CSCL 21E

Two major problems identified with the design of the blade-root/hub interface are discussed. The first is the so-called friction contact problem which has two special features: unilateral contact and Coulomb's friction. One of the difficulties in this problem is that the portions of contact and sticking/sliding surfaces are not known a priori. The second is the shape optimization problem which is characterized either by the minimization of the maximum contact pressure or by the minimization of the equivalent stress on the boundary. Design variables are the shapes of the blade-root and the hub. It is noted that friction contact and shape optimization problems are strongly coupled in the present design problem. Author

N87-11770*# Iowa Univ., Iowa City.
PROBLEMS IN LARGE-SCALE STRUCTURAL OPTIMIZATION c39

Jasbir S. Arora and Ashok D. Belegundu *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 26 p (For primary document see N87-11750 03-05)
(Grant NSF CEE-82-13851)
Avail: NTIS HC A22/MF A01 CSCL 20K

A general design optimization model for large complex systems is defined. Major features of the model that challenge various optimization algorithms are discussed. Requirements of a model optimization algorithm are identified. Objectives of the study of various algorithms are defined and a basis for conducting such a study is developed. Primal as well as transformation methods are analytically studied and a unified viewpoint of various methods is presented. Several numerical examples are solved using different methods to study their performance. Conclusions drawn from the study are presented and discussed. Areas of future research in nonlinear programming as well as structural optimization are identified and discussed. Author

N87-11771*# New South Wales Univ., Sydney (Australia).
STRUCTURAL OPTIMIZATION OF LARGE OCEAN-GOING STRUCTURES c39

Owen F. Hughes *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 18 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

Ocean-going vehicles and platforms are among the largest structures in the world and are subjected to relatively harsh conditions of motions and loads. Some of them, such as semi-submersible platforms, are a relatively new type of structure and hence there is no formal, well evolved and established structural design code as there is for more traditional structures. More recently, efforts have also been made to develop a design method of this type for ships and other ocean structures. One of the many advantages of a rationally based design method is versatility; it can be used for structures that have widely differing purposes, measures of merit, shapes and sizes. The purpose is to describe a rationally based design method that has been developed within the field of ocean structures, in order that persons dealing with other types of structure can judge whether and to what extent its various features may be useful for those other types. Also, even though some features may not be applicable they might stimulate some useful ideas. Author

N87-11772*# Failure Analysis Associates, Palo Alto, Calif.
FUNDAMENTAL DIFFERENCES BETWEEN OPTIMIZATION CODE TEST PROBLEMS IN ENGINEERING APPLICATIONS c66

E. D. Eason *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

The purpose here is to suggest that there is at least one fundamental difference between the problems used for testing optimization codes and the problems that engineers often need to solve; in particular, the level of precision that can be practically achieved in the numerical evaluation of the objective function, derivatives, and constraints. This difference affects the performance of optimization codes, as illustrated by two examples. Two classes of optimization problem were defined. Class One functions and constraints can be evaluated to a high precision that depends primarily on the word length of the computer. Class Two functions and/or constraints can only be evaluated to a moderate or a low level of precision for economic or modeling reasons, regardless of the computer word length. Optimization codes have not been adequately tested on Class Two problems. There are very few Class Two test problems in the literature, while there are literally hundreds of Class One test problems. The relative performance of two codes may be markedly different for Class One and Class Two problems. Less sophisticated direct search type codes may be less likely to be confused or to waste many function evaluations on Class Two problems. The analysis accuracy and minimization performance are related in a complex way that probably varies from code to code. On a problem where the analysis precision was varied over a range, the simple Hooke and Jeeves code was more efficient at low precision while the Powell code was more efficient at high precision. Author

N87-11773*# Houston Univ., Tex. Dept. of Mechanical Engineering.
A CONCEPTUAL BASIS FOR THE DESIGN OF DAMAGE-TOLERANT STRUCTURAL SYSTEMS c39

Farrokh Mistree, Jon A. Shupe, and Owen F. Hughes (New South Wales Univ., Sydney, Australia) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 36 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

Researchers define damage-tolerant structural systems as those systems which not only have adeqate intact strength to withstand initial failure but also adequate residual strength to minimize the possibility of, and hence the consequences of, further failure. The incorporation of damage tolerance cannot be done in total isolation of the function being required of the system and the costs associated with obtaining improved damage tolerance. The approach, therefore, is to formulate multiple-objective, multi-level decision support problems (DSP), the solutions of which represent a compromise between higher costs and higher damage tolerance. Mulitple-objective decision support problems are easily solved in the linear domain. These formulations, however, include both linear and nonlinear constraints and goals, which in the past, have not been considered due to the resulting complexity. Here, researchers: (1) present a complete discussion and description of decision support problems; (2) identify what further research needs to be done in order to obtain information that is required but not known for solving problems using these models; and (3) identify what needs to be done to implement this prototype method in practice. Author

N87-11774*# Florida Univ., Gainesville. Dept. of Engineering Sciences.
COMMENTS ON GUST RESPONSE CONSTRAINED OPTIMIZATION c08

Prabhat Hajela *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Recent research pertaining to optimum structural design with probabilistic constraints is reviewed. The limitations and complexities introduced in the design as a result of the transition from deterministic to probabilistic constraints are underscored. A concise development of the theoretical aspects of optimum design of aircraft structures subjected to random wind loads is presented and suggestions for future research are offered. An emphasis is placed on the incorporation of recent developments in fracture mechanics in the design constraints. Author

N87-11775*# Boeing Computer Services Co., Seattle, Wash.
APPLYING OPTIMIZATION SOFTWARE LIBRARIES TO ENGINEERING PROBLEMS c61

M. J. Healy *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 21 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

Nonlinear programming, preliminary design problems, performance simulation problems trajectory optimization, flight computer optimization, and linear least squares problems are among the topics covered. The nonlinear programming applications encountered in a large aerospace company are a real challenge to those who provide mathematical software libraries and consultation services. Typical applications include preliminary design studies, data fitting and filtering, jet engine simulations, control system analysis, and trajectory optimization and optimal control. Problem sizes range from single-variable unconstrained minimization to

constrained problems with highly nonlinear functions and hundreds of variables. Most of the applications can be posed as nonlinearly constrained minimization problems. Highly complex optimization problems with many variables were formulated in the early days of computing. At the time, many problems had to be reformulated or bypassed entirely, and solution methods often relied on problem-specific strategies. Problems with more than ten variables usually went unsolved.
Author

N87-11776*# Brigham Young Univ., Provo, Utah.
OPTDES.BYU: AN INTERACTIVE OPTIMIZATION PACKAGE WITH 2D/3D GRAPHICS c61
R. J. Balling, A. R. Parkinson, and J. C. Free *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 12 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

The use of the OPTDES.BYU package developed to assist the engineer in obtaining efficient designs is discussed. The package helps the engineer to perform the following fundamental tasks in the design process: (1) interfacing with existing analysis software; (2) defining and redefining the design problem; (3) searching for improved designs; and (4) interpreting results from the design process.
Author

N87-11777*# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.
ON THE UTILIZATION OF ENGINEERING KNOWLEDGE IN DESIGN OPTIMIZATION c66
Panos Papalambros *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 16 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

Some current research work conducted at the University of Michigan is described to illustrate efforts for incorporating knowledge in optimization in a nontraditional way. The incorporation of available knowledge in a logic structure is examined in two circumstances. The first examines the possibility of introducing global design information in a local active set strategy implemented during the iterations of projection-type algorithms for nonlinearly constrained problems. The technique used algorithms for nonlinearly constrained problems. The technique used combines global and local monotinicity analysis of the objective and constraint functions. The second examines a knowledge-based program which aids the user to create condigurations that are most desirable from the manufacturing assembly viewpoint. The data bank used is the classification scheme suggested by Boothroyd. The important aspect of this program is that it is an aid for synthesis intended for use in the design concept phase in a way similar to the so-called idea-triggers in creativity-enhancement techniques like brain-storming. The idea generation, however, is not random but it is driven by the goal of achieving the best acceptable configuration.
Author

N87-11778*# Iowa Univ., Iowa City. Center for Computer Aided Design.
COMPUTER AIDED ANALYSIS AND OPTIMIZATION OF MECHANICAL SYSTEM DYNAMICS c61
E. J. Haug *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 20 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

The purpose is to outline a computational approach to spatial dynamics of mechanical systems that substantially enlarges the scope of consideration to include flexible bodies, feedback control, hydraulics, and related interdisciplinary effects. Design sensitivity analysis and optimization is the ultimate goal. The approach to computer generation and solution of the system dynamic equations and graphical methods for creating animations as output is outlined.
Author

N87-11779*# Michigan Univ., Ann Arbor.
SHAPE OPTIMIZATION INCLUDING FINITE ELEMENT GRID ADAPTATION c39
Noboru Kikuchi and J. E. Taylor *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 10 p (For primary document see N87-11750 03-05)
(Grant NSF CEE-81-18158)
Avail: NTIS HC A22/MF A01 CSCL 20K

The prediction of optimal shape design for structures depends on having a sufficient level of precision in the computation of structural response. These requirements become critical in situations where the region to be designed includes stress concentrations or unilateral contact surfaces, for example. In the approach to shape optimization discussed here, a means to obtain grid adaptation is incorporated into the finite element procedures. This facility makes it possible to maintain a level of quality in the computational estimate of response that is surely adequate for the shape design problem.
Author

N87-11780*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MULTIDISCIPLINARY APPROACH TO THE DESIGN OF HIGH PRESSURE OXYGEN SYSTEMS
R. L. Johnston *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 13 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

Several examples of spacecraft systems fires are examined. Much of the design, manufacture, inspection, test, and operation of current high pressure oxygen components and systems has been driven by weight, cost, functional, and schedule requirements. As a result, little coordination has been expended on design for safe operation. While the number of oxygen related fires has not been large, their cost, including program losses and delays, has been very large. Most of these failures need not have occurred.
Author

N87-11781*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE PREDICTION OF TRANSONIC LOADING ADVANCING HELICOPTER ROTORS
Roger Strawn and C. Tung Apr. 1986 17 p
(AD-A168217; NASA-TM-88238; A-86198; NAS 1.15:88238; AVSCOM-TM-86-A-1) Avail: NTIS HC A02/MF A01 CSCL 01C

Two different schemes are presented for including the effect of rotor wakes on the finite-difference prediction of rotor loads. The first formulation includes wake effects by means of a blade-surface inflow specification. This approach is sufficiently simple to permit coupling of a full-potential finite-difference rotor code to a comprehensive integral model for the rotor wake and blade motion. The coupling involves a transfer of appropriate loads and inflow data between the two computer codes. Results are compared with experimental data for two advancing rotor cases. The second rotor wake modeling scheme in this paper is a split potential formulation for computing unsteady blade-vortex interactions. Discrete vortex fields are introduced into a three-dimensional, conservative, full-potential rotor code. Computer predictions are compared with two experimental blade-vortex interaction cases.
GRA

N87-11782# National Aerospace Lab., Amsterdam (Netherlands). Structures and Materials Div.
A CHECK OF CRACK PROPAGATION PREDICTION MODELS AGAINST TEST RESULTS GENERATED UNDER TRANSPORT AIRCRAFT FLIGHT SIMULATION LOADING
H. H. vanderLinden 30 Dec. 1985 112 p Sponsored by Netherlands Agency for Aerospace Programs
(NLR-TR-84005-U; B8667272; GARTEUR/TP-008; ETN-86-98497)
Avail: NTIS HC A06/MF A01

Thirteen variations of the F-27 transport spectrum were evaluated by 7 institutes and companies using in total 13 crack propagation prediction methods and models. It is shown that the predictions range from very conservative through accurate to unconservative.
ESA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

N87-11783# Science Applications, Inc., Orlando, Fla.
EVALUATION OF A VISUAL SYSTEM IN ITS SUPPORT OF SIMULATED HELICOPTER FLIGHT Final Report, Sep. 1985 - Feb. 1986
William D. Spears and Winon E. Corley Feb. 1986 113 p Prepared in cooperation with Seville Training Systems Corp.
(Contract N61339-82-D-0006)
(AD-A168829; TR-86-06) Avail: NTIS HC A06/MF A01 CSCL 05/8

The Visual System Component Development Program (VSCDP) was developed by GE under contract with PM TRADE and installed at Williams AFB in spring 1985. Its purpose was to expand the state-of-the-art in visual systems by providing the capability to support nap-of-the-earth (NOE) flight simulation, which requires a high density of visual cues to allow pilots to accurately judge vertical and horizontal distances. The GE system was tested with the computer generated imagery projected in the dome with a radius of 12 feet. The Field of View (FOV) was 140 degrees horizontal by 60 degrees vertical with an enhanced Area of Interest (AOI) of 26 degrees horizontal by 20 degrees vertical inserted in the middle. The imagery centered in pilot's attention regardless of where he was looking in the dome; however, the eye tracker was not functioning for these tests. Nine experienced helicopter pilots participated as subjects. Two kinds of flight mission plans were used: a familiarization flight and a tactical maneuvers flight. The results of the experiment showed that the GE system can support all aspects of helicopter flight simulation. However, problems were found that indicate further work is needed. These included trouble with perceived sizes and distances in the visual scene, and a high incidence of simulator sickness, probably due to processing of motion cues. GRA

N87-11784# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Traegheitsortung und Navigation.
INVESTIGATION OF MAGNETOMETER ERRORS AND THEIR COMPENSATION IN THE BO-105 HELICOPTER
Hans-Juergen Hotop and Norbert Nawa Mar. 1986 62 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-21; ISSN-0171-1342; ETN-86-98187) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 23.50

The errors of a magnetometer as a function of helicopter pitch and roll angles were investigated using flight test data. An error model for compensation is presented. The magnetometer was tested in different locations in the helicopter. Two possibilities of magnetometer error compensation are explained together with their accuracy as a magnetic sensor in an attitude and heading reference system. The use of an on-line algorithm allows compensation during the flight, and hence leads to an improvement of the magnetic attitude information with increasing flight time. ESA

N87-11785# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
SYSTEMS, AVIONICS AND INSTRUMENTATION OF TRANSPORT CATEGORY HELICOPTERS
F. J. Abbink Aug. 1985 37 p Submitted for publication
(NLR-MP-85066-U; B8667703; ETN-86-98495) Avail: NTIS HC A03/MF A01

The development of helicopters for passenger transport is reviewed. The systems, avionics, and instrumentation of an S-76 transport helicopter used for offshore services are described. Developments in helicopter avionics are discussed. ESA

N87-11786# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
A SMALL, FLEXIBLE AND POWERFUL DATA ACQUISITION SYSTEM FOR THE F16 AIRCRAFT
S. S. vanLeeuwen 20 Sep. 1985 18 p
(NLR-MP-85074-U; B8667704; ETN-86-98496) Avail: NTIS HC A02/MF A01

Electrical layout, mechanical properties, performance parameters, and growth facilities of a data acquisition system for the F-16 aircraft are described. The system can be used for flight tests requiring less than 500 parameters. A selection of avionics Muxbus parameters was made, but with modifications the whole Muxbus contents can be recorded. Flight test data is written on tape during the whole flight, and telemetry to a ground-based station is possible. ESA

N87-11787 Kansas Univ., Lawrence.
DESIGN OF A TAKEOFF PERFORMANCE MONITORING SYSTEM Ph.D. Thesis
Raghavachari Srivatsan 1985 218 p
Avail: Univ. Microfilms Order No. DA8608473

An algorithm was developed to monitor the performance of the aircraft during the takeoff phase to improve safety in that flight phase. The algorithm is made up of two segments: a pretakeoff segment and a real time segment. One-time inputs of ambient temperature, pressure, runway wind, aircraft gross weight, and selected flap and stabilizer setting are utilized by the pretakeoff segment in generating a set of standard acceleration performance data in an off-line condition. The real-time segment, in addition to the above one-time inputs, requires the runway length available for rotation, the runway length available for stopping, and an estimated runway rolling friction coefficient. The algorithm was evaluated using a six degree-of-freedom nonlinear aircraft simulation as the plant for several design point test cases and two types of engine malfunctions. Dissert. Abstr.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N87-11788*# Transmission Research, Inc., Cleveland, Ohio.
THE 3600 HP SPLIT-TORQUE HELICOPTER TRANSMISSION
Graham White 18 Dec. 1985 95 p
(Contract NAS3-23931)
(NASA-CR-174932; NAS 1.26:174932) Avail: NTIS HC A05/MF A01 CSCL 21E

Final design details of a helicopter transmission that is powered by GE twin T 700 engines each rated at 1800 hp are presented. It is demonstrated that in comparison with conventional helicopter transmission arrangements the split torque design offers: weight reduction of 15%; reduction in drive train losses of 9%; and improved reliability resulting from redundant drive paths between the two engines and the main shaft. The transmission fits within the NASA LeRC 3000 hp Test Stand and accepts the existing positions for engine inputs, main shaft, connecting drive shafts, and the cradle attachment points. One necessary change to the test stand involved gear trains of different ratio in the tail drive gearbox. Progressive uprating of engine input power from 3600 to 4500 hp twin engine rating is allowed for in the design. In this way the test transmission will provide a base for several years of analytical, research, and component development effort targeted at improving the performance and reliability of helicopter transmission. Author

N87-11789*# Solar Turbines International, San Diego, Calif.
FABRICATION OF COOLED RADIAL TURBINE ROTOR Final Report
Alvin N. Hammer, G. G. Aigret, T. P. Psichogios, and C. Rodgers

Jun. 1986 258 p
(Contract NAS3-22513; DA Proj. 1L1-612209-AH-76)
(NASA-CR-179503; NAS 1.26:179503; SR86-R-4938-39) Avail: NTIS HC A12/MF A01 CSCL 21E

A design and fabrication program was conducted to evaluate a unique concept for constructing a cooled, high temperature radial turbine rotor. This concept, called split blade fabrication was developed as an alternative to internal ceramic coring. In this technique, the internal cooling cavity is created without flow dividers or any other detail by a solid (and therefore stronger) ceramic plate which can be more firmly anchored within the casting shell mold than can conventional detailed ceramic cores. Casting is conducted in the conventional manner, except that the finished product, instead of having finished internal cooling passages, is now a split blade. The internal details of the blade are created separately together with a carrier sheet. The inserts are superalloy. Both are produced by essentially the same software such that they are a net fit. The carrier assemblies are loaded into the split blade and the edges sealed by welding. The entire wheel is Hot Isostatic Pressed (HIPed), braze bonding the internal details to the inside of the blades. During this program, two wheels were successfully produced by the split blade fabrication technique.
Author

N87-11790*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPOUND CYCLE ENGINE PROGRAM
G. A. Bobula, W. T. Wintucky, and J. G. Castor (Garrett Turbine Engine Co., Phoenix, Ariz.) 1986 23 p Presented at the Rotary Wing Propulsion System Specialist Meeting, Williamsburg, Va., 12-14 Nov. 1986; sponsored by the American Helicopter Society
(DA Proj. 1L1-62209-AH-76)
(NASA-TM-88879; E-3286; NAS 1.26:88879;
USAAVSCOM-TR-86-C-37) Avail: NTIS HC A02/MF A01 CSCL 21E

The Compound Cycle Engine (CCE) is a highly turbocharged, power compounded power plant which combines the lightweight pressure rise capability of a gas turbine with the high efficiency of a diesel. When optimized for a rotorcraft, the CCE will reduce fuel burned for a typical 2 hr (plus 30 min reserve) mission by 30 to 40 percent when compared to a conventional advanced technology gas turbine. The CCE can provide a 50 percent increase in range-payload product on this mission. A program to establish the technology base for a Compound Cycle Engine is presented. The goal of this program is to research and develop those technologies which are barriers to demonstrating a multicylinder diesel core in the early 1990's. The major activity underway is a three-phased contract with the Garrett Turbine Engine Company to perform: (1) a light helicopter feasibility study, (2) component technology development, and (3) lubricant and material research and development. Other related activities are also presented. Author

N87-11791# Cambridge Univ. (England). Dept. of Engineering.
PRESSURE AND FLOW FIELD MEASUREMENTS OF AXIAL TURBINE TIP CLEARANCE FLOW IN A LINEAR CASCADE
J. P. Bindon 1986 72 p
(CUED/A-Turbo-TR-123; ISSN-0309-6521) Avail: NTIS HC A04/MF A01

The fluid flow in the tip clearance region of 2D turbine cascade was examined with special reference to unknown factors which cause high heat transfer rates and burnout along the edge of the pressure surface at the tips of unshrouded cooled axial turbine blades. Using a special micro tapping technique, the pressure along a very narrow strip of the pressure surface edge was found to be lower than the cascade outlet pressure by a factor of 2.8. This low pressure, coupled with a boundary layer measured as being extremely thin due to the intense acceleration at gap entry, is believed to cause the high heat transfer rates and to result from tip clearance flow phenomena the existence of which have not been previously realized. The ultra low pressure is primarily caused by the sharp flow curvature demanded of the leakage flow moving up the pressure surface and turning through 90 at gap entry. A low pressure region in the suction corner formed by the mainstream flow moving round the leakage and secondary vortices which creates an added pressure differential to drive the clearance flow; the formation of a separation bubble the blockage from which forms a throat near the pressure surface and hence induces the lowest pressure there; and the apparent attachment of the flow around the corner over the critical zone instead of separation are also discussed.
Author

N87-11792# Materials Research Labs., Ascot Vale (Australia).
INVESTIGATION OF COATING PERFORMANCE AND CORROSION OF COMPRESSOR COMPONENTS IN THE TF30-P-3 ENGINE OF F111C AIRCRAFT
L. V. Wake and B. S. Smith Jan. 1986 32 p
(AD-A168802; MRL-R-984) Avail: NTIS HC A03/MF A01 CSCL 11/3

This report examines factors involved in the degradation of the protective coating, Chromalloy S-A12, employed on the low pressure compressor stators in the Pratt and Whitney TF30-P-3 engine of an RAAF F111 aircraft. The study is confined to the 7th stage of the engine (4th stage; low pressure compressor). The stator examined had experienced considerable corrosion after only 427 hours operation. Stators on other engines are failing for similar reasons. Small corrosion nodules were present on specific areas of each stator vane coating. Sections on the outer ring or shroud were found to be corroded along a geometric arc around the 6 o'clock position of the stage. These included: (1) both surfaces of the outer shroud or ring (2) the air seal around the shroud and (3) the area underneath the air path seal or rub strip. The corrosion nodules on the vanes were associated with discontinuities in the coating. These discontinuities resulted in breakdown of the diffusion coating in surrounding areas forming aluminium, chromium and iron oxides. The elements sulphur and chlorine and to a lesser extent calcium and potassium were also found in the corrosion deposits. These elements are present in the local water supply and a detergent used for aircraft washing. Examination of the compressor washing and drying procedures are recommended.
GRA

N87-11793# Rolls-Royce Ltd., Derby (England).
CONTROL OF GAS TURBINES. THE FUTURE: IS A RADICAL APPROACH NEEDED?
P. H. Riley 12 Feb. 1986 26 p
(PNR-90295; ETN-86-98014) Avail: NTIS HC A03/MF A01

An engine control system which considers systems as well as individual component changes is supported. It is argued that by moving devices which dissipate a large amount of power away from the electronic engine control (EEC) box, inflight shutdown rate due to overheating can be reduced. The EEC reliability per actuator can be improved by changing to an on/off rather than a variable current transducer.
ESA

N87-11731*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STAEBL: STRUCTURAL TAILORING OF ENGINE BLADES, PHASE 2
M. S. Hirschbein and K. W. Brown (Pratt and Whitney Aircraft, East Hartford, Conn.) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 13 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 21E

N87-11732*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
OPTIMIZATION OF CASCADE BLADE MISTUNING UNDER FLUTTER AND FORCED RESPONSE CONSTRAINTS
Durbha V. Murthy and Raphael T. Haftka *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
(Grant NAG3-347)
Avail: NTIS HC A22/MF A01 CSCL 21E

N87-11768*# Pratt and Whitney Aircraft, East Hartford, Conn.
OPTIMIZATION APPLICATIONS IN AIRCRAFT ENGINE DESIGN AND TEST
T. K. Pratt *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 18 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 21E

N87-11769*# Michigan Univ., Ann Arbor.
ON OPTIMAL DESIGN FOR THE BLADE-ROOT/HUB INTERFACE IN JET ENGINES
Noboru Kikuchi and John E. Taylor *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
(Grant NAG3-388)
Avail: NTIS HC A22/MF A01 CSCL 21E

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N87-11794 Stanford Univ., Calif.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF SENSOR LOCATION FOR OPTIMAL AEROELASTIC SYSTEM STATE ESTIMATION Ph.D. Thesis
Gang Liu 1986 184 p
Avail: Univ. Microfilms Order No. DA8608180

One of the major concerns in the design of an active control system is obtaining the information needed for effective feedback. This involves the combination of sensing and estimation. A sensor location index is defined as the weighted sum of the mean square estimation error in which the sensor locations can be regarded as estimator design parameters. The design goal is to choose these locations to minimize the sensor location index. The gradient of the sensor location index with respect to each individual sensor location is formulated and a program using this gradient for systematic optimal sensor location search is developed. The choice of the number of sensors is a tradeoff between the estimation quality based on the same performance index and the total costs of installing and maintaining extra sensors. An experimental study for choosing the sensor location is conducted on an aeroelastic system. It is the physical realization of a two degree of freedom typical section wing. It consists of a NACA 0015 typical section wing with six accelerometers installed inside along the wing chord as the estimator measuring instruments, an existing wind tunnel section, and some other accompanying experimental devices. The system modeling which includes the unsteady aerodynamics model developed by Stephen Rock has been improved. The center of percussion of the rigid two degree of freedom typical section wing has been verified as a sensor location for which the system is unobservable. Experimental results verify the trend of the theoretical predictions of the sensor location index for different sensor locations at various wind speeds. Dissert. Abstr.

N87-11795*# Northrop Corp., Hawthorne, Calif.
VORTEX FLAP TECHNOLOGY: A STABILITY AND CONTROL ASSESSMENT Final Report
K. M. Carey and G. E. Erickson Nov. 1984 361 p
(Contract NAS1-17533)
(NASA-CR-172439; NAS 1.26:172439; NOR-84-158) Avail: NTIS HC A16/MF A01 CSCL 01C

A comprehensive low-speed wind tunnel investigation was performed of leading edge vortex flaps applied to representative aircraft configurations. A determination was made of the effects of analytically- and empirically-designed vortex flaps on the static longitudinal and lateral-directional aerodynamics, stability, and control characteristics of fighter wings having leading-edge swee angles of 45 to 76.5 degrees. The sensitivity to several configuratio modifications was assessed, which included the effects of fla planform, leading- and trailing-edge flap deflection angles, win location on the fuselage, forebody strakes, canards, and centerlin and outboard vertical tails. Six-component forces and moment wing surface static pressure distributions, and surface flow pattern were obtained using the Northrop 21- by 30-inch low-speed win tunnel. Autho

N87-11796*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.
AIRCRAFT AUTOMATIC-FLIGHT-CONTROL SYSTEM WITH INVERSION OF THE MODEL IN THE FEED-FORWARD PATH USING A NEWTON-RAPHSON TECHNIQUE FOR THE INVERSION
G. Allen Smith, George Meyer, and Maurice Nordstrom (Sterling Software, Palo Alto, Calif.) Jul. 1986 96 p
(NASA-TM-88209; A-2-86092; NAS 1.15:88209) Avail: NTIS HC A05/MF A01 CSCL 01C

A new automatic flight control system concept suitable fo aircraft with highly nonlinear aerodynamic and propulsion characteristics and which must operate over a wide flight envelope was investigated. This exact model follower inverts a complete nonlinea model of the aircraft as part of the feed-forward path. The inversion is accomplished by a Newton-Raphson trim of the model at each digital computer cycle time of 0.05 seconds. The combination of the inverse model and the actual aircraft in the feed-forward path alloys the translational and rotational regulators in the feedback path to be easily designed by linear methods. An explanation of the model inversion procedure is presented. An extensive set of simulation data for essentially the full flight envelope for a vertical attitude takeoff and landing aircraft (VATOL) is presented. These data demonstrate the successful, smooth, and precise control that can be achieved with this concept. The trajectory includes conventional flight from 200 to 900 ft/sec with path accelerations and decelerations, altitude changes of over 6000 ft and 2g and 3g turns. Vertical attitude maneuvering as a tail sitter along all axes is demonstrated. A transition trajectory from 200 ft/sec in conventional flight to stationary hover in the vertical attitude includes satisfactory operation through lift-cure slope reversal as attitude goes from horizontal to vertical at constant altitude. A vertical attitude takeoff from stationary hover to conventional flight is also demonstrated. Author

N87-11797*# Kohlman Systems Research, Inc., Lawrence, Kans.
FLIGHT TEST REPORT OF THE NASA ICING RESEARCH AIRPLANE: PERFORMANCE, STABILITY, AND CONTROL AFTER FLIGHT THROUGH NATURAL ICING CONDITIONS Final Report
Jerry L. Jordan, Stewart J. Platz, and William C. Schinstock Oct. 1986 159 p
(Contract NAS3-24547)
(NASA-CR-179515; NAS 1.26:179515; KSR-86-01) Avail: NTIS HC A08/MF A01 CSCL 01C

Flight test results are presented documenting the effect of airframe icing on performance and stability and control of a NASA DHC-6 icing research aircraft. Kohlman System Research, Inc., provided the data acquisition system and data analysis under contract to NASA. Performance modeling methods and MMLE techniques were used to determine the effects of natural ice on the aircraft. Results showed that ice had a significant effect on the drag coefficient of the aircraft and a modest effect on the MMLE derived longitudinal stability coefficients (code version MMLE). Data is also presented on asymmetric power sign slip maneuvers showing rudder floating characteristics with and without ice on the vertical stabilizer. Author

N87-11730*# Kentron International, Inc., Hampton, Va.
TRADEOFF METHODS IN MULTIOBJECTIVE INSENSITIVE DESIGN OF AIRPLANE CONTROL SYSTEMS
Albert A. Schy and Daniel P. Giesy (Kentron International, Inc., Hampton, Va.) *In* NASA. Langley Research Center Recent

Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

N87-11736*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICATION OF OPTIMIZATION TECHNIQUES TO THE DESIGN OF A FLUTTER SUPPRESSION CONTROL LAW FOR THE DAST ARW-2
William M. Adams, Jr. and Sherwood H. Tiffany *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 17 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

N87-11752*# California Univ., Los Angeles.
APPLICATION OF MODERN STRUCTURAL OPTIMIZATION TO VIBRATION REDUCTION IN ROTORCRAFT
P. P. Friedmann *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
(Grants NsG-1578; NAG2-226)
Avail: NTIS HC A22/MF A01 CSCL 01C

N87-11774*# Florida Univ., Gainesville. Dept. of Engineering Sciences.
COMMENTS ON GUST RESPONSE CONSTRAINED OPTIMIZATION
Prabhat Hajela *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 01C

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N87-11798# Federal Aviation Administration, Washington, D.C. Program Engineering and Maintenance Service.
FAA HELICOPTER/HELIPORT RESEARCH, ENGINEERING, AND DEVELOPMENT BIBLIOGRAPHY, 1964-1986
Robert D. Smith Nov. 1986 170 p
(FAA/PM-86/47) Avail: NTIS HC A08/MF A01

This report is a bibliography of FAA heliport related documents published in the 1964 to 1986 time period. The list is limited to documents in which the research, engineering, and development elements of the FAA were involved as sponsors, participants, or authors. Author

N87-11799# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Geotechnical Lab.
ADVANCED CONSTRUCTION PROCEDURES: CONFINED BASES FOR AIRPORT PAVEMENTS Final Report, Sep. 1983 - Mar. 1986
John C. Potter and Philip C. Lambe Sep. 1986 96 p
(Contract DTFA01-83-Y-30606)
(FAA/PM-86/9) Avail: NTIS HC A05/MF A01

Airports for light aircraft must often be built in areas where base course material is inadequate or economically unavailable. Sand grids may provide an economical solution in these cases. Previous work with sand grids has identified optimum grid-cell geometry based on ultimate bearing capacity. Past observations also suggest the nature of sand-grid behavior for small stresses and strains. From these a model was formulated for analyzing the performance of sand grids in pavement systems and spot-checked using field data from a full-scale, accelerated-traffic sand-grid test section. Author

N87-11800*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
METHODS FOR ASSESSING WALL INTERFERENCE IN THE 2-BY 2-FOOT ADAPTIVE-WALL WIND TUNNEL
Edward T. Shairer Jun. 1986 61 p
(NASA-TM-88252; A-86249; NAS 1.15:88252) Avail: NTIS HC A04/MF A01 CSCL 14B

Discussed are two methods for assessing two-dimensional wall interference in the adaptive-wall test section of the NASA Ames 2 x 2-Foot Transonic Wind Tunnel: (1) a method for predicting free-air conditions near the walls of the test section (adaptive-wall methods); and (2) a method for estimating wall-induced velocities near the model (correction methods), both of which methods are based on measurements of either one or two components of flow velocity near the walls of the test section. Each method is demonstrated using simulated wind tunnel data and is compared with other methods of the same type. The two-component adaptive-wall and correction methods were found to be preferable to the corresponding one-component methods because: (1) they are more sensitive to, and give a more complete description of, wall interference; (2) they require measurements at fewer locations; (3) they can be used to establish free-stream conditions; and (4) they are independent of a description of the model and constants of integration. Author

N87-11801*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A DESCRIPTION OF THE ACTIVE AND PASSIVE SIDEWALL-BOUNDARY-LAYER REMOVAL SYSTEMS OF THE 0.3-METER TRANSONIC CRYOGENIC TUNNEL
Charles B. Johnson, A. V. Murthy, and Edward J. Ray Nov. 1986 21 p
(NASA-TM-87764; L-16178; NAS 1.15:87764) Avail: NTIS HC A02/MF A01 CSCL 14B

Results are presented for an operational checkout and shakedown of the active sidewall-boundary-layer removal system newly installed in the Langley 0.3-meter Transonic Cryogenic Tunnel (0.3-m TCT). Prior to the installation of this active removal system, the sidewall-boundary layer was removed passively by exhausting directly to the atmosphere (i.e., no reinjection). With the active removal system using the reinjection compressor, the removal capability is greatly expanded to cover the entire operating envelope of the 0.3-m TCT. Details of the active removal system are presented including the compressor reinjection circuit, the compressor pressure ratio/surge control, and the compressor recirculation loop. The control logic and features of the compressor surge control are explained. Initial tests covering critical operating conditions show mass flow removal rates of about 5 percent at lower Mach numbers can be obtained with the active system. Measured performance characteristics of the compressor are presented. As part of the validation of the active system, limited airfoil tests were made using the new system. Author

N87-11802# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
MOTION CHARACTERISTICS OF THE UTIAS FLIGHT RESEARCH SIMULATOR MOTION-BASE
Peter Robert Grant Jul. 1986 144 p Sponsored in part by Natural Sciences and Engineering Research Council, and by University of Toronto
(UTIAS-TN-261; ISSN-0082-5263) Avail: NTIS HC A07/MF A01

The motion characteristics of the UTIAS Flight Research Simulator Motion-Base were experimentally determined. More specifically describing function tests (under various operating conditions), 1/2 Hz noise level tests, signal-to-noise tests, and hysteresis tests were performed for all six degrees-of-freedom. Dynamic threshold tests were performed for the heave degree-of-freedom. The motion-base was found to have a reasonably flat amplitude response up to 10 Hz in all degrees-of-freedom. Motion in the non-dirven degrees-of-freedom was small compared to the driven channel. The noise of the motion-base was found to be the sum of braodband background noise and harmonics of the driven frequency, with the amplitude of the noise varying with

both the amplitude and frequency of the driving signal. Hysteresis was determined to be neglible. The dynamic threshold was found to be small and quite acceptable for most projected applications involving the motion-base. Author

N87-11803# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE 8 m X 6 m LOW SPEED WIND TUNNEL AT THE CHINESE AERODYNAMIC RESEARCH AND DEVELOPMENT CENTER
Maoxum Wang and Ruikang Pan 30 May 1986 14 p Transl. into ENGLISH from Guoji Hangkong (China), no. 10(260), Oct. 1984 p 2-4
(AD-A168448; FTD-ID(RS)T-0257-86) Avail: NTIS HC A02/MF A01 CSCL 14/2

The low speed wind tunnel at CARDC is a large scale, double experimental section wind tunnel solely designed and built in China. It is primarily used for experiments in the aerodynamic characteristics of aerospace vehicles, i.e., ground wind load of guided missiles and space vehicles; large attack angle of airplanes and guided missiles; large prototypes; aerodynamics of helicopters and vertical short takeoff aircraft; and industrial aerodynamics (e.g., architecture, bridges, fans and automobiles). It passed national certification at the end of 1983 and was officially released for use. This wind tunnel is an open-circuit, closed double experimental section in series, large scale low speed wind tunnel. Its length is 237 m with a maximum width of 40 m and a maximum height of 20.5 m. It consists of air intake assembly, stabilization section, first convergence section, first experimental section, second experimental section, fan section, second divergence section, and air exhaust assembly. GRA

N87-11804# European Space Agency, Paris (France).
DESIGN OF A CONTROL SYSTEM FOR A CRYOGENIC WIND TUNNEL OPTIMIZING A VECTOR PERFORMANCE INDEX
Reinhold Steinhauser Feb. 1986 208 p Transl. into ENGLISH from "Reglerentwurf fuer einen Tieftemperatur-Windkanal mittels Guetevektoroptimierung" (Oberpfaffenhofen, West Germany) Original language document was announced at N86-15329
(ESA-TT-965; DFVLR-FB-85-37; ETN-86-98247) Avail: NTIS HC A10/MF A01; original German version avail. at DFVLR, Cologne, West Germany DM 56

A cryogenic wind tunnel was transformed to reach higher Reynolds numbers using a controller design. The problem of a controller design for a nonlinear multivariable dead time system was solved by linearization, model decomposition, discretization and order reduction to obtain an efficient design algorithm based on pole assignment and performance vector optimization. The controller design behavior on a nonlinear model before and after performance vector optimization was studied. The optimized controller can be applied in a real wind tunnel. The reduced static pressure deviation due to performance vector optimization leads to reduced control costs for suction and injection of gaseous nitrogen. Further development of the control system design equipment as well as the development of a graphic interactive algorithm for the design procedure is recommended. ESA

N87-11805# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
NUMBER AND DURATION OF RUNWAY VISUAL RANGE (RVR) RUNS FOR RVR-VALUES LOWER THAN 225 m
A. H. C. Stalenhoef 1986 25 p In DUTCH; ENGLISH summary
(KNMI-TR-85(FM); ISSN-0169-1708; ETN-86-98500) Avail: NTIS HC A02/MF A01

The number and length of runway visual range (RVR) runs for values of the RVR leass than 225 m were studied in order to obtain a better insight into the appearance of dense fog at Amsterdam airport Schiphol. The study was based on 1 m data of transmissometers and matching background luminance meters at several locations in the airport for the period June 1979 till May 1985. The percentage of time during each month that the transmissometer data were not available on magnetic tape, the number of runs of specified lengths for each location, the local number of runs in the period, the relative frequencies of runs with several lengths for each location, and information about the to duration that the RVR does not exceed a certain level are tabulat An expression for the probability distribution of the duration th dense fog may persist was derived. E

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planet Exploration.*

N87-11806*# National Aeronautics and Space Administratio Washington, D.C.
NASA SELECTS INVESTIGATIONS FOR COMET RENDEZVOU MISSION
Leon Perry 20 Oct. 1986 7 p
(NASA-TM-89261; NASA-News-Release-86-150; P86-10218; NA 1.15:89261) Avail: NASA Scientific and Technical Informatic Facility, P.O. Box 8757, BWI Airport, Md. 21240 CSCL 22A

Thirty-eight possible investigations were selected for the Com Rendezvous Asteroid Flyby (CRAF) mission planned for launch the early 1990s. The mission is designed to send an unmanne U.S. spacecraft to rendezvous with a comet, fly in formation wi it for three years and fire an instrumented penetrator into th comet nucleus. The spacecraft will make close flybys of tw asteroids on its way to the comet encounter. The CRAF missio will conduct a detailed study of the composition and physic properties of the comet nucleus and will observe changes th occur as the comet approaches the Sun. Other mission objec tives include analysis of the gas, dust, and plasma comprising th comet atmosphere and meaurement of the size, shape, an surface properties of the asteroids. The CRAF spacecraft will car 11 to 14 instruments including cameras, dust analyzers, and nucleus penetrator. Results from a 2-year instrument accommoda tion study will determine the final payload composition. B.G

N87-11807# Air Command and Staff Coll., Maxwell AFB, Ala.
SPACE ACTIVITIES OF WESTERN EUROPE
Arthur V. Harriott Apr. 1986 32 p
(AD-A168424; ACSC-86-1070) Avail: NTIS HC A03/MF A01 CSCL 05/1

This paper illustrates the diversity of European space activity and shows how the various national space projects, as well as the joint programs administered by the European Space Agency, have evolved since Europe's entry into the space age. Detailed descriptions of space systems are avoided, as are political and programmatic analyses. The paper attempts to describe succinctly how cooperation among European nations and interaction with the U.S. post-Apollo program have influenced the development of Europe's space activities and space organizations. Author (GRA)

N87-11808# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
SDI (STRATEGIC DEFENSE INITIATIVE) PROGRAM: EVALUATION OF DOE'S (DEPARTMENT OF ENERGY'S) ANSWERS TO QUESTIONS ON X-RAY LASER EXPERIMENT, BRIEFING REPORT
Jun. 1986 13 p
(PB86-209236; GAO/NSIAD-86-140BR; B-223094) Avail: NTIS HC A02/MF A01 CSCL 15C

The briefing report responds to a request that GAO review the Department of Energy's (DOE's) answers to a series of questions raised about the X-ray laser program which DOE is conducting for the Department of Defense's (DOD's) Strategic Defense Initiative Organization (SDIO). Many of these questions resulted from press reports, especially a November 12, 1985, Los Angeles Times article. Essentially, GAO found the X-ray laser program is a research program with many unsolved issues. In their opinion, there was no design flaw in diagnostic instrumentation as mentioned in the Los Angeles Times article. However, analysis of test data by Lawrence Livermore National Laboratory (LLNL) scientists raised questions about the accuracy of some

experimental data. As a result, some diagnostic equipment was reconfigured. These unexpected measurement uncertainties are now much better understood. In the GAO's opinion, there was no need to delay the latest X-ray laser nuclear test. GRA

N87-11809 Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE
12 Sep. 1986 226 p Transl. into ENGLISH from various Russian articles
(JPRS-USP-86-005) Copyright. Avail: NTIS HC A11/MF A01

Topics addressed include: manned mission highlights; space sciences; interplanetary sciences; life sciences; aerospace engineering; space applications; space policy and administration; and launch table. For individual titles, see N87-11810 through N87-11814.

N87-11810 Joint Publications Research Service, Arlington, Va.
COMMENTARY, DIAGRAM OF MIR STATION c18
Mikhail Chernyshov *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 1 - 3 Repr. from Moscow News (Moscow, USSR), no. 20, 25 May - 1 Jun. 1986 p 10 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

The flight from the Mir Space Station to the Salyut-7 Space Station (3,100 kilometers) by cosmonauts Leonid Kizim and Vladimir Solovyov and its applications to future manned space flight are discussed. B.G.

N87-11811 Joint Publications Research Service, Arlington, Va.
STAR CITY: ON THE 25TH ANNIVERSARY OF THE COSMONAUT TRAINING CENTER c99
L. M. Yershov *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 58 - 67 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 5, Sep. - Oct. 1985 p 73-79 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

The history of the Soviet space program is reviewed for the 25th anniversary of the Cosmonaut Training Center (CTC). B.G.

N87-11812 Joint Publications Research Service, Arlington, Va.
TASS REPORTS VEGAS-1 ENCOUNTER WITH HALLEY'S COMET c90
In its USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 112 113 Transl. into ENGLISH from Leningradskaya Pravda (Leiningrad, USSR), 7 Mar. 1986 p 11 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

The Soviet automatic station Vega-1, whose flight is taking place within the framework of the multipurpose international project Venera-kometa Galleya, has successfully performed its program of research of Halley's Comet. On March 6, 1986, the Vega-1 station passed through the comet's gas and dust shell at a distance of about 9,000 kilometers from its nucleus and performed comprehensive scientific studies of this heavenly body for the first time. With the aid of apparatus developed jointly by scientists and specialists of the USSR, Austria, Bulgaria, the German Democratic Republic, Poland, France, the Federal Republic of Germany, and Czechoslovakia, large-scale pictures of the comet nucleus were obtained, and measurements were made of the temperature and other physical chemistry characteristics of the comet. The chemical composition of gas and dust component substances of the comet were analyzed, and studies were made of the electromagnetic fields around the comet and of physical processes taking place in its shell. B.G.

N87-11813 Joint Publications Research Service, Arlington, Va.
BALLOON PROBE AND DESCENT APPARATUS EXPLORATION OF VENUS DISCUSSED c91
Yuriy Zaytsev *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 125 131 Transl. into ENGLISH from Nauka i Tekhnika (Riga, USSR), no. 10, Oct. 1985 p 5-6 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

The automated interplanetary space stations Vega-1 and Vega-2 launched in December, 1984 toward Halley's Comet, have completed the first stage in their planned flight program research on the planet Venus. The fly-by of Venus on the way to Halley's Comet allowed the use of one spacecraft for solving three problems. The first problem was the fundamentally new experiments in studying the circulation of the Venusian atmosphere and its meteorological parameters using a floating balloon probe. The second problem was research on the atmosphere, cloud layer and planetary surface using a descent apparatus. And, finally, the third problem was an investigation of Halley's comet from a fly-by trajectory. A full interpretation of all the data obtained using spectrometers will take several years, since the volume of material is great and a nonstandard solution must be sought for the analysis of the new information. Author

N87-11814 Joint Publications Research Service, Arlington, Va.
INTERVIEW ON MEDICAL PROGRAM OF 237-DAY FLIGHT c52
Oleg Yuryevich Atkov, Oleg Georgiyevich Gazenko, and Yevgeniy Ivanovich Chazov *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 142 152 Transl. into ENGLISH from Zemlya i Veselennaya (Moscow, USSR), no. 5, Sep. - Oct. 1985 p 49-56 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

The crew of Mayaki (beacons), L. D. Kizim, V. A. Solovyev, and O. Yu. Atkov spent 237 days working on board the Salyut-7/Soyuz orbital scientific research complex conducting an intensive program of medical and biological research. The execution of the program, some of the results of the research, and experiments conducted were discussed. B.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

N87-11815*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ANALYTICAL INVESTIGATION OF THE DYNAMICS OF TETHERED CONSTELLATIONS IN EARTH ORBIT, PHASE 2 Quarterly Report, 22 Jun. - 21 Sep. 1986
Enrico C. Lorenzini, David A. Arnold, Mario Cosmo, and Mario D. Grossi Oct. 1986 59 p
(Contract NAS8-36606)
(NASA-CR-178953; NAS 1.26:178953; QR-6) Avail: NTIS HC A04/MF A01 CSCL 22A

The following topics related to the dynamics of the 4-mass tethered system are addressed: (1) the development of damping algorithms for damping the out-of-plane libration of the system and the interaction of the out-of-plane control with the other degrees of freedom; and (2) the development of environmental models to be added to the dynamics simulation computer code. The environmental models are specifically a new drag routine based on the Jacchia's 1977 model, a J(2) model and an accurate thermal model of the wire. Regarding topic (1) a survey of various out-of-plane libration control laws was carried out. Consequently a yo-yo control law with amplitude of the tether length variation proportional to the amplitude of the out-of-game libration has been selected. This control law provides good damping when applied to a (theoretical) two-dimensional system. In the actual 3-dimensional 4-mass tethered system, however, energy is transferred to the least damped degrees of freedom (the out-of-plane lateral deflections are still undamped in the present simulations) in such a way as to decrease the effectiveness of the algorithm for out-of-plane libration control. The addition of damping algorithms for the out-of-plane lateral deflections is therefore necessary. M.G.

N87-11816# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
GEOSTATIONARY ORBITAL ESTIMATION USING A KALMAN

FILTER
G. B. Sincarsin Aug. 1986 70 p Sponsored by DSS
(UTIAS-242; ISSN-0082-5263) Avail: NTIS HC A04/MF A01

The ability of a sequential Kalman filter to predict a geostationary and an approximately geostationary orbit is assessed by comparison with the corresponding orbits predicted by a least-squares batch estimator. Prior to performing this comparison, the perturbation models and observations assumed in each estimator are compared and shown to be essentially the same (except for atmospheric drag). An analytical expression for the state noise matrix, assuming a geostationary reference orbit, is given and used during numerical studies. Numerical results indicate that the Kalman filter performs well for the case of a geostationary orbit. For an approximately geostatinary orbit the performance of the Kalman filter degrades to the point of neutral stability. A parameter study, in which the values of the initial error covariance matrix, the measurement nosie matrix, and the state noise matrix are individually varied, is conducted to assess the sensitivity of the Kalman filter performance. It is concluded that to improve the Kalman filter performance, it is the analytical forms assumed for the error and noise matrices, and not the values normally assigned to these matrices, that deserves further study. Author

N87-11817# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
FAST OPTIMAL ORBIT ESTIMATION FROM GPS MEASUREMENTS
Roberto V. F. Lopes and Helio Koiti Kuga Oct. 1986 38 p
(INPE-4016-NTE/263) Avail: NTIS HC A03/MF A01

This report presents an optimal solution to the problem of local orbit estimation of an Earth satellite from observations of range and range-rate provided by n greater than or equal to 3 distinct stations. The procedure is especially suitable for processing measurements generated by the Global Positioning System (GPS). In addition to the position and velocity vectors estimation, the error covariance matrices of the estimates are obtained. Preliminary results indicate that the algorithm developed, named ORBEST, is a promising tool for precision real orbit estimation. Author

N87-11818# Naval Postgraduate School, Monterey, Calif.
SATELLITE TRACKING AND OBSERVABILITY M.S. Thesis
Michele G. Mort Mar. 1986 151 p
(AD-A168394) Avail: NTIS HC A08/MF A01 CSCL 22/3

This theses examines the observability of targets moving on or near the Earth's surface when viewed by an orbiting satellite. A discussion of basic orbital mechanics is presented as well as a development of a suitable coordinate system. An analysis of non-linear observability is then provided. Lastly an observer is designed and successfully simulated. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N87-11819# Los Alamos National Lab., N. Mex.
EFFECT OF RESISTANCE ON PROJECTILE OSCILLATIONS IN AUGMENTED RAIL GUNS
M. L. Hodgdon, C. M. Fowler, and C. G. Homan 1986 8 p Presented at the 4th International Conference on Megagauss Magnetic-Field Generation and Related Topics, Santa Fe, N. Mex., 14 Jul. 1986 Prepared in cooperation with Watervliet Arsenal
(Contract W-7405-eng-36)
(DE86-012424; LA-UR-86-2267; CONF-860703-6) Avail: NTIS HC A02/MF A01

Approximate solutions for the equation of motion of a projectile in an augmented rail gun are presented. These solutions show that the resistance in the rail gun system plays a role similar to the resistance in an R-C-L circuit. For small values of resistance, the projectile exhibits a slightly damped oscillatory motion, and there is a value of resistance for which the oscillations disappear and the motion appears critically damped. The dependence of the oscillations on the projectile mass and the augmenting field are also discussed. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

N87-11820# Committee on Science and Technology (U. S. House).
DELTA LAUNCH VEHICLE ACCIDENT INVESTIGATION
1986 98 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 125, 5 Jun. 1986
(GPO-63-141) Avail: Subcommittee on Space Science and Applications

The text of the testimony given by several witnesses during the House hearings on the Delta launch vehicle accident of May 3, 1986 is given. Pre-launch procedures, failure analysis, the possibility of sabotage, and design and testing are among the topics discussed. R.J.F.

N87-11821# Naval Postgraduate School, Monterey, Calif.
STATE-SPACE ANALYSIS OF THE TRIDENT 2 MARK 6 GYRO M.S. Thesis
David L. Krueger Mar. 1986 70 p
(AD-A168404) Avail: NTIS HC A04/MF A01 CSCL 17/7

This thesis conducts a state-space analysis of the Mark 6 gyro used in the Trident 2 missile system. Optimal control techniques, utilizing a region controller, have been employed in designing a gyro controller. The response of the system to missile motion is examined and compared to the system response using the current control laws. It is shown that an optimal region controller reduces the gyro error in the system while effectively avoiding gimbal lock, a situation which exists when gyro orientation prevents missile motion from being isolated in an orthogonal three axis coordinate system. Recommendations for the application of additional modern control techniques are included. Author (GRA)

N87-11822# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PROPOSAL FOR REACHING AN OPTIMIZATION OF A SOLID COMBUSTION VEHICLE SATELLITE LAUNCHER AND ITS TRAJECTORY M.S. Thesis [PROPOSTA DE ABORDAGEM PARA A OTIMIZACAO DE UM VEICULO LANCADOR DE SATELITES A COMBUSTIVEL SOLIDO DE SUA TRAJETORIA]
Carlos Odwaldo Bueno Neto Aug. 1986 136 p In PORTUGUESE; ENGLISH summary
(INPE-3968-TDL/232) Avail: NTIS HC A07/MF A01

The simultaneous optimization of mass distribution and of the trajectory of a Satellite Launcher is proposed in order to maximize the payload mass for a specified orbit. The optimization problem is formulated establishing the performance index, dynamic constraints, and terminal constraints. The inequality constraints are included in the dynamic constraints by new state variables, and new terminal constraints. The proposed iteractive solution gives the final state variation as a function of parameters variation about nominal trajectory and suboptimal controls, in each iteraction. The solution is formulated using a gradient type direct search procedure where the parameter variations are linearly estimated through two components: one is the a priori information on the gradient direction, and the other towards terminal constraints satisfaction. Author

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also *03 Air Transportation and Safety* and *18 Spacecraft Design, Testing and Performance*. For space suits see *54 Man/System Technology and Life Support*.

N87-11823# Committee on Science and Technology (U. S. House).
STRATEGY FOR SAFELY RETURNING SPACE SHUTTLE TO FLIGHT STATUS
Washington GPO 15 May 1986 124 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 126, 15 May 1986
(GPO-63-144) Avail: Subcommittee on Space Science and Applications

The current NASA recovery schedule for returning the space shuttle to flight status is based on success-oriented schedules, so that if problems are encountered, delays naturally will result. On the other hand, regardless of the set schedule, safety and reliability must not be sacrificed. Sufficient funding also needs to be properly allocated to fully resolve any and all safety or reliability issues. The strategy for safely returning the space shuttle to flight status is discussed. B.G.

N87-11824# Committee on Science and Technology (U. S. House).
INVESTIGATION OF THE CHALLENGER ACCIDENT
Washington GPO 1986 449 p
(H-Rept-99-1016; GPO-64-420) Avail: US Capitol, House Document Room

The work of the Presidential Commission on the Space Shuttle Challenger Accident (hereafter referred to as the Rogers Commission) and the work of the National Aeronautics and Space Administration in investigating the causes of the accident were reviewed. In addition to reviewing the five volumes of the Rogers Commission, the entire direct on-line Rogers Commission data base, which included full-text and document retrieval capability was also reviewed. The findings and recommendations contained also include materials submitted for the record, staff investigations, interviews, and trips. B.G.

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar*.

N87-11825*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONTINUOUS PREDICTION OF SPARTAN VISIBILITY FROM ORBITER OVER MODELED FREE-FLIGHT MISSION
Joseph C. King Jan. 1985 21 p
(NASA-TM-86242; NAS 1.15:86242) Avail: NTIS HC A02/MF A01 CSCL 09F

Orbital operations in the neighborhood of other satellites or free-flying objects need the ability to see and detect such objects optically. This ability depends primarily on the brightness of the object relative to other sources present. The present analysis and computational procedure provides a means for predicting the visual brightness of a satellite when viewed from a nearby satellite in the same orbit. It is designed specifically for estimating the brightness of Spartan free-flyers from the STS Orbiters which release and later retrieve them, but the basic methods are applicable to other satellite-to-satellite visibility prediction problems. The Spartan reflector model defined herein is illuminated both by direct solar radiation and by the earth (albedo), producing a model source of defined directional intensity. The intensity in the Orbiter direction (along orbit) yields the desired maximum range directly. The required geometric and photometric calculations involve a number of angles in space, which are readily computed from the basic directions defining their sides. The time-dependent directions are determined by straightforward calculation from fundamental relationships and constants. Author

N87-11826# Range Commanders Council, White Sands Missile Range, N. Mex. Inter-range Inst. Group.
TELEMETRY STANDARDS
May 1986 135 p Supersedes IRIG-STANDARD-106-80 (AD-A168818; IRIG-STANDARD-106-86; IRIG-STANDARD-106-80) Avail: NTIS HC A07/MF A01 CSCL 09/6

The Telemetry Group (TG) of the Range Commanders Council (RCC) has prepared this document to foster the compatibility of telemetry transmitting, receiving, and signal processing equipment at all of the Test and Evaluation (T&E) ranges under the cognizance of the RCC. The Range Commanders highly recommend that telemetry equipment operated at the T&E ranges and telemetry equipment used by the range personnel in programs that require test range support, conform to these standards. These standards do not necessarily define the existing capability of any test range, but constitute a guide for the orderly implementation and application of telemetry systems for both the ranges and range users. The scope of capabilities attainable with the utilization of these standards requires a careful consideration of trade-offs. Guidance concerning these trade-offs is provided in the text. These standards provide the necessary criteria on which to base equipment design and modification. The ultimate purpose is to ensure an efficient spectrum and an interference-free operation of the radio link for telemetry systems at the RCC member ranges. etry systems at the RCC member ranges. GRA

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance*, *39 Structural Mechanics*, and *16 Space Transportation*.

N87-11827*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESIGN, CONSTRUCTION AND UTILIZATION OF A SPACE STATION ASSEMBLED FROM 5-METER ERECTABLE STRUTS
Martin M. Mikulas, Jr. and Harold G. Bush Oct. 1986 40 p
(NASA-TM-89043; NAS 1.15:89043) Avail: NTIS HC A03/MF A01 CSCL 22B

Presented are the primary characteristics of the 5-meter erectable truss designated for the space station. The relatively large 5-meter truss dimension was chosen to provide a deep beam for high bending stiffness yet provide convenient mounting locations for space shuttle cargo bay size payloads which are 14.5 ft. (4.4 m) in diameter. Truss nodes and quick-attachment erectable joints are described which provide for evolutionary three-dimensional growth and for simple maintenance and repair. A mobile remote manipulator system is described which is provided to assist in station construction and maintenance. A discussion is also presented of the construction of the space station and the associated EVA time. Author

N87-11828# Johns Hopkins Univ., Laurel, Md. Applied Physics Lab.
CONCEPTUAL DESIGN OF A SYNOPTIC INTERPLANETARY MONITOR PLATFORM AT L SUB 1 (SIMPL) Final Report, 16 Aug. - 30 Nov. 1985

Nov. 1985 193 p Supersedes JHU/APL/SDO-7599
(Contracts MIPR-FY-71-2185000-21; AF Proj. 2311)
(AD-A168522; JHU/APL/SDO-7805; AFGL-TR-85-0310; JHU/APL/SDO-7599) Avail: NTIS HC A09/MF A01 CSCL 03/2

A conceptual design and feasibility study is described for a Synoptic Interplanetary Monitor Platform (SIMPL) to be located at the Earth-Sun interior libration point (L sub 1), about one million miles from Earth. There, SIMPL's magnetometer, solar wind plasma instrument, particle instrument, and radio wave instrument will obtain data to provide the U. S. Air Force Air Weather Service with early warnings of solar-induced disruptions of the terrestrial environment. The data will be processed on-board into militarily useful forecast parameters and transmitted in real-time 24 hours/day to AWS stations worldwide. GRA

N87-11829# State Univ. of New York, Buffalo. Dept. of Mechanical and Aerospace Engineering.
QUALITATIVE RESULTS FOR DISTRIBUTED SYSTEMS WITH DISCRETE AND STIFFNESS WITH APPLICATION TO CONTROL Final Report, 1 Jul. 1982 - 30 Jun. 1985
Daniel J. Inman 26 Aug. 1985 215 p
(Grant AF-AFOSR-0242-82)
(AD-A168622; AFOSR-86-0286TR) Avail: NTIS HC A10/MF A01 CSCL 22/2

Distributed parameter models of large flexible space structures subject to various control techniques have been studied. The main thrust has been to develop qualitative results which are independent of truncation of discretization approaches by treating the fully distributed model. Emphasis has been on controlling the transient response of non-conservative linear partial differential equation models of such structures subject to a few point actuators. Inequalities have been developed between the stiffness and damping operators which when satisfied guarantee that the response of a self-adjoint system will be uniformly exponentially stable. In addition, it has been shown that the inequalities insure that finite dimensional versions of the control problem converge to an optimal control of the fully distributed system subject to compact feedback as the number of modes in the finite model increases. The inequality developed constitutes a generalization of the concept of underdamping normally used with single degree of freedom systems and provides a physical interpretation of the result. GRA

N87-11830# Bedford Research Associates, Mass.
MATHEMATICAL AND STATISTICAL ANALYSIS Final Report, Sep. 1982 - Oct. 1985
F. Battles, P. Burkhardt, A. Campbell, E. Good, and M. B. Hulit Oct. 1985 113 p
(Contract F19628-82-C-0139)
(AD-A169277; AFGL-TR-85-0336) Avail: NTIS HC A06/MF A01 CSCL 04/1

This report presents a summary of analyses and mathematical modeling done in support of some AFGL atmospheric research projects. In particular, work on modeling 1-min instantaneous rainfall rates, infrared emissions, turbopause height analysis, gravity analysis, gaussian smoothing of the refractivity structure constant, rawinsonde data processing, borehole well log analysis and the defense meteorological satellite program processing are discussed. Author (GRA)

N87-11831# Lawrence Livermore National Lab., Calif.
NUCLEAR HARDENING OF OPTICAL COATINGS: ENHANCED ENERGY SHARING CONCEPT, REVISION 1
D. F. Edwards, C. H. Gillespie, T. T. Saito, G. R. Wirtenson, P. Schall (Aerospace Corp., El Segundo, Calif.), and W. Childs 15 Jan. 1986 17 p Presented at the Topical Meeting of the Strategic Defense Initiative Organization, Boulder, Colo., 20 Nov. 1985 Prepared in cooperation with Aerospace Corp., El Segundo, Calif.
(Contract W-7405-eng-48)
(DE86-009726; UCRL-93802-Rev-1; CONF-8511201-1-Rev-1) Avail: NTIS HC A02/MF A01

Satellite component hardening requirements in the early 1970's led to the development of the enhanced energy sharing concept (EESC) for optical mirror coatings. The idea was to increase survivability of aluminum coated fused silica mirrors to pro energy deposition by interposing a thick layer of beryllium betw the aluminum and the substrate. Separating the materials of hig Z by the low Z beryllium redistributes the deposited heat i over a larger volume and reduces the maximum temperature the aluminum film. Theoretical analyses of heat transfer du and after an energy input pulse supported this concept subsequent above-ground and underground tests confirmed greater survivability of this mirror design. In the sections that fol we give an insight into the physical mechanisms responsible nuclear radiation deposition and temperature rise. This is follow by a review of calculations of melt fluence for several mi constructions taking into account only the dominant deposit mechanisms and heat flow. D

N87-11832# British Aerospace Public Ltd. Co., Bristol (Englan Space and Communications Div.
A STUDY OF LARGE SPACE STRUCTURES
N. Foster 5 Jul. 1982 45 p
(LR46869; ETN-86-97949) Avail: NTIS HC A03/MF A01

The structural design requirements for a large space structu are identified. The preferred structural model is the tetrahed truss, capable of being deployed automatically or constructed usi the Shuttle remote manipulator system. Preliminary analysis w performed to show how such a structure could be modelled determine the structural characteristics. Aspects for investigati of the structural modelling are identified, including joint stiffne thermal stability, manufacturing tolerances, deployment dynami and dynamic interaction. ES

N87-11833# Dornier-Werke G.m.b.H., Friedrichshafen (We Germany).
DOCKING MECHANISMS TECHNOLOGY STUDY Final Repo
Paris ESA Nov. 1984 70 p
(Contract ESA-5195/82-NL-BI)
(ESA-CR(P)-2273; ETN-86-98138) Avail: NTIS HC A04/MF A

A zero impact docking concept, where the attitude orbit contr system (AOCS) of the chaser spacecraft performs a close- maneuver within the range of the latching subassembly, proposed. The AOCS-controlled closure is a feasible solution the last meter problem taking typical European rendezvous a docking (RVD) mission scenarios into account. The Europe standard docking interface is characterized by the prism seats the chaser and the handles on the target. The servicing conce fits well within the modular docking mechanism subsyste approach with minimum interface problems. The latching conce giving high modularity and adaptability can be tailored to th specific mission needs without changing the baseline. A minimu of RVD equipment has to be furnished additionally to existin chaser capabilities to perform the RVD last-meter-approach. ES

N87-11834# Teldix Luftfahrt-Ausruestungs G.m.b.H., Heidelber (West Germany).
LARGE WHEEL ACTUATORS DEFINITION STUDY Final Re port
H. Heimel and H. H. Schulz Paris ESA Dec. 1985 243 p
(Contract ESTEC-5907/84-NL-AN(SC))
(Teldix-15-020-880; ESA-CR(P)-2265; ETN-86-98144) Avail: NTI HC A11/MF A01

Large momentum wheels for attitude stabilization and maneu vering of large space vehicles and space structures were studied Wheels with diameters of 50 and 80 cm and momentum ceiling of 300 and 1000 Nms, respectively, and control moment gyro (CMG) derived from them were considered. Spoked wheel design are preferred, and data tables that define wheel families in each of the two size categories are provided. Suggestions for CMG devices bases on these wheels are presented. ES

N87-11835# European Space Tribology Lab., Risley (England).
REPORT ON THE DISMANTLING AND EXAMINATION OF DORNIER SYSTEM GmbH MEDIUM SPEED MECHANISM ON COMPLETION OF A SEVEN YEAR REAL-LIFE TEST

J. A. Duvall Paris ESA Sep. 1985 31 p
(Contract ESA-2584/84)
(ESA-ESTL-65; ESA-CR(P)-2231; ETN-86-98112) Avail: NTIS HC A03/MF A01

A medium speed satellite antenna/platform despin mechanism was examined after it satisfactorily completed a 7 yr real life thermal vacuum test. The mechanism components are in excellent condition. The oil-lubricated bearings are virtually as new without any measurable wear. The oil and grease lubrication is highly satisfactory although oil was lost from the bearings due to the inadequate application of anticreep coating. This oil marginally contaminated the power brush/slip ring components but without any adverse consequences. The wear rate of the brush/slip ring components is relatively low but the 20 brush elements generated 3.0 cc of loose debris which liberally coated all surfaces within the brush/slip ring module. ESA

N87-11836# National Oceanic and Atmospheric Administration, Washington, D. C. National Environmental Satellite, Data and Information Service.
NOAA (NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION) N-ROSS/ERS-1 ENVIRONMENTAL DATA DEVELOPMENT (NNEEDD) PRODUCTS AND SERVICES
F. E. Kniskern Feb. 1986 24 p
(PB86-213527; NOAA/TR/NESDIS-15) Avail: NTIS HC A02/MF A01 CSCL 22B

The study focuses on products and services expected from the Navy-Remote Ocean Sensing System (N-ROSS) and the European Space Agency's (ESA) first Remote-Sensing Satellite (ERS-1). The NOAA N-ROSS/ERS-1 Environmental Data Development (NNEEDD) Activity will put into place a system capable of handling all-all-weather oceanic data planned through the remainder of the century, including the polar-platform associated with the Space Station. The statement may appear all-encompassing, but these two satellite systems carry all generic-types of ocean-measuring instruments except ocean color. The NNEEDD Activity will provide global data from the approved new satellite systems. GRA

N87-11761*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IDEAS: A MULTIDISCIPLINARY COMPUTER-AIDED CONCEPTUAL DESIGN SYSTEM FOR SPACECRAFT
Melvin J. Ferebee, Jr. *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 21 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 22B

N87-11766*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
DUAL STRUCTURAL-CONTROL OPTIMIZATION OF LARGE SPACE STRUCTURES
Achille Messac and James Turner *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 28 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 22B

N87-11810 Joint Publications Research Service, Arlington, Va.
COMMENTARY, DIAGRAM OF MIR STATION
Mikhail Chernyshov *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 1 - 3 Repr. from Moscow News (Moscow, USSR), no. 20, 25 May - 1 Jun. 1986 p 10 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N87-11837*# Information and Control Systems, Inc., Hampton, Va.
SPACE-BASED LASER-DRIVEN MHD GENERATOR: FEASIBILITY STUDY Final Report
S. H. Choi Oct. 1986 52 p
(NASA Order L-28161B)
(NASA-CR-178184; NAS 1.26:178184; Rept-651104) Avail: NTIS HC A04/MF A01 CSCL 10C

The feasibility of a laser-driven MHD generator, as a candidate receiver for a space-based laser power transmission system, was investigated. On the basis of reasonable parameters obtained in the literature, a model of the laser-driven MHD generator was developed with the assumptions of a steady, turbulent, two-dimensional flow. These assumptions were based on the continuous and steady generation of plasmas by the exposure of the continuous wave laser beam thus inducing a steady back pressure that enables the medium to flow steadily. The model considered here took the turbulent nature of plasmas into account in the two-dimensional geometry of the generator. For these conditions with the plasma parameters defining the thermal conductivity, viscosity, electrical conductivity for the plasma flow, a generator efficiency of 53.3% was calculated. If turbulent effects and nonequilibrium ionization are taken into account, the efficiency is 43.2%. The study shows that the laser-driven MHD system has potential as a laser power receiver for space applications because of its high energy conversion efficiency, high energy density and relatively simple mechanism as compared to other energy conversion cycles. Author

N87-11838*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF HARD PARTICLE IMPACTS ON THE ATOMIC OXYGEN SURVIVABILITY OF REFLECTOR SURFACES WITH TRANSPARENT PROTECTIVE OVERCOATS
Daniel A. Gulino 1986 22 p Proposed for presentation at the 25th Aerospace Sciences Meeting, Reno, Nev. 12-15 Jan. 1987; sponsored by the American Institute of Aeronautics and Astronautics
(NASA-TM-88874; E-3281; NAS 1.15:88874) Avail: NTIS HC A02/MF A01 CSCL 10B

Silver mirror samples with protective coatings were subjected to a stream of 27 microns alumina particles to induce pinhole defects. The protective coating consisted of a layer of aluminum dioxide over silver followed by a layer of silicon dioxide over the alumina. Samples were prepared on both graphite-epoxy composite and fused quartz substrates. After exposure to the hard particle stream, the samples were exposed to an oxygen plasma environment in a laboratory plasma asher. The effects of both the hard particles and the oxygen plasma were documented by both reflectance measurements and scanning electron microscopy. The results indicated that oxidative damage to the silver reflecting layer continues beyond that of the erosively exposed silver. Oxidative

undercutting of the silver layer and graphite-epoxy substrate continues in undamaged areas through adjacent, particle damaged defect sites. This may have implications for the use of such mirrors in a space station solar dynamic power system. Author

N87-11839# Department of the Air Force, Washington, D.C.
ELECTRO-OPTICAL CONTROL OF SOLID FUEL ROCKET BURN RATE Patent
Peter C. Winch and Mick Blackledge, inventors (to Air Force) Issued 13 May 1986 9 p
(AD-D012397; US-Patent-4,587,805; US-Patent-Appl-SN-696298; US-Patent-Class-60-234) Avail: US Patent and Trademark Office CSCL 21/8

This invention pertains to a solid fuel rocket burn rate control apparatus wherein grain preheating energy is supplied to the grain region just ahead of the regressing burn face by optical conductors such as fiber optic filaments that are buried in the grain and dispersed across the grain cross section. The optical conductors receive optical energy from one of several types of electrical-to-optical energy transducers such as a semiconductor laser or an incandescent source; the optical conductors promote coning burn action at the burn face of the rocket and allow control of the burn rate by electrically modified optical signals. GRA

N87-11840# Sandia National Labs., Albuquerque, N. Mex.
SIZE DISTRIBUTION OF UNBURNED ALUMINUM PARTICLES IN SOLID PROPELLANT ROCKET MOTOR EXHAUST
R. S. Larson Jun. 1986 20 p
(Contract DE-AC04-76DR-00789)
(DE86-013376; SAND-86-8224) Avail: NTIS HC A02/MF A01

The size distribution of particles of unburned aluminum exiting a solid propellant rocket chamber is calculated by extending a previously developed theoretical model. Both one-dimensional and two-dimensional approximations to the chamber flow field are considered, but particle velocity lags are neglected. Results of the one-dimensional analysis differ from the more realistic two-dimensional results in that they predict a lower overall combustion efficiency and a most probable particle size which is always greater than zero. It is argued that these observations can be explained by the fact that the one-dimensional flow field allows many particles to pass through the chamber with a very short residence time. DOE

23 CHEMISTRY AND MATERIALS (GENERAL)

N87-11841*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SIMULTANEOUS ELECTRICAL RESISTIVITY AND MASS UP-TAKE MEASUREMENTS IN BROMINE INTERCALATED FIBERS
Donald A. Jaworske 1986 10 p Presented at the Fall Meeting of the Materials Research Society, Boston, Mass., 1-5 Dec. 1986
(NASA-TM-88900; E-3324; NAS 1.15:88900) Avail: NTIS HC A02/MF A01 CSCL 11G

Changes in mass and electrical resistivity of several types of pitch-based and vapor-grown graphite fibers were monitored during reaction with bromine. The observed threshold pressure dependent reaction suggested that the fibers were intercalated. In the fully brominated compound, the mass was increased by 44 percent and the resistivity was improved by a factor of 17. In the residue compound, the mass was increased by 22 percent and the resistivity was improved by a factor of 5. Fibers possessing different degrees of graphitization had surprisingly similar changes in both mass and resistivity. Author

N87-11842# Oak Ridge National Lab., Tenn.
MATERIALS SCIENCE AND ENGINEERING AT THE OAK RIDGE NATIONAL LABORATORY. ABSTRACTS
1986 65 p Presented at the Materials Science and Technology Conference, Oak Ridge, Tenn., 14 May 1986
(Contract DE-AC05-84OR-21400)
(DE86-011477; ORNL/M-151; CONF-860579-Absts) Avail: NTIS HC A04/MF A01

Abstracts of 31 papers are arranged under the following headings: surfaces and interfaces, advanced materials, and structural and electronic ceramics. DOE

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

For ceramic materials see *27 Nonmetallic Materials.*

N87-11843 Florida Univ., Gainesville.
FINITE ELEMENT ANALYSIS OF COMPOSITE PLATE IMPACTED BY A PROJECTILE Ph.D. Thesis
Brent Ray Petersen 1985 200 p
Avail: Univ. Microfilms Order No. DA8606751

A dynamic finite element computer program was written to determine the displacements and stresses in a layered fiber-reinforced composite materials plate impacted by a projectile. Yang, Norris, and Stavsky plate theory which includes shear deformation and rotary inertia was used. The variational form of the plate equations of motion was derived from Hamilton's principle and was used to derive the finite element plate equations of motion. Newmark's method was used to integrate the finite element equations with respect to time. The diagonal mass matrix was used. Two types of impact were tried, and inelastic impact, where projectile hits the plate and sticks, and a Hertzian impact, were the force between the projectile and the plate is governed by the Hertzian impact law. Both types of impact produced deflections at the center of the plate which agreed well with deflections determined experimentally while the projectile was in contact with the plate. The Gertzian impact method allowed the projectile to lose contact with the plate and impact a second and possibly a third time. A second impact has been observed experimentally. The finite element program was verified by solving the following three problems which have analytical solutions; static deflection of an isotropic plate with a point load at the center, cylindrical bending of an isotropic plate, and free vibration of an isotropic plate. The finite element program was used to solve plate impact problems which do not have analytical solutions. Dissert. Abstr.

N87-11844 ESDU International Ltd., London (England).
EXAMPLE OF THE USE OF DATA ITEM NO. 85001. CHOICE OF REINFORCEMENT FOR A CIRCULAR HOLE IN A FIBRE REINFORCED LAMINATED PLATE. (DATA RELATING TO ONE PARTICLAR SET OF LAMINATE PROPERTIES)
May 1986 14 p
(ESDU-86003; ISBN-0-85679-555-0; ISSN-0141-4097) Avail: ESDU

This Data Item ESDU 86003 is an addition to the Structures and Composites Sub-series. The program of ESDU 85011, which estimates the strain distribution around a circular hole in a fiber-reinforced composite plate, is used to establish the integrity of such a structure. Working in terms of strains and a simplified overall plate criterion, the program can be used to generate design curves for any selected lay-up of layers with any properties. Those design curves can than be used to determine the minimum reinforcement and its lay-up to ensure that local stresses or strains around the hole boundary nowhere exceed some specified allowable values. An an illustration of the method design curves are given for a particular material, and two fully worked examples show how they are used to establish the form of symmetrical reinforcement, or reinforcement on one side of the plate alone, to meet allowable maximum strain values. ESDU

N87-11845# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
FINITE ELEMENT MODELLING OF COMPOSITES, VOLUME 1

Final Report
F. L. Matthews and K. Daneshjoo Nov. 1985 49 p
(Contract MOD(PE)-2037/0289-XR/STR)
(BR97502; ETN-86-97978) Avail: NTIS HC A03/MF A01

Finite element modeling of composite materials is reviewed, including the use of displacement models, hybrid-stress models, and three dimensional modeling of composites. The joining of advanced fiber composites and the dynamics of composite materials are covered. ESA

N87-11846*# California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
THE ROLE OF DAMAGE-SOFTENED MATERIAL BEHAVIOR IN THE FRACTURE OF COMPOSITES AND ADHESIVES
T. Ungsuwarungsri and W. G. Knauss 1986 43 p
(Grant NAG1-474)
(NASA-CR-179840; NAS 1.26:179840; SM-85-4-1) Avail: NTIS HC A03/MF A01 CSCL 11D

Failure mechanisms of materials under very high strains experienced at and ahead of the crack tip such as formation, growth, and interaction of microvoids in ductile materials, microcracks in brittle solids or crazes in polymers and adhesives are represented by one-dimensional, nonlinear stress-strain relations possessing different ways by which the material loses capacity to carry load up to fracture or total separation. A double cantilever beam (DCB) type specimen is considered. The nonlinear material is confined to a thin strip between the two elastic beams loaded by a wedge. The problem is first modeled as a beam on a nonlinear foundation. The pertinent equation is solved numerically as a two-point boundary value problem for both the stationary and the quasi-stationay propagating crack. A finite element model is then used to model the problem in more detail in order to assess the adequacy of the beam model for the reduction of experimental data to determine in-situ properties of the thin interlayer. Author

N87-11847*# Texas A&M Univ., College Station. Dept. of Mechanical Engineering.
AN IN-SITU STUDY IN SEM OF DELAMINATION IN SEVERAL GRAPHITE/EPOXY COMPOSITE MATERIAL SYSTEMS Annual Progress Report, 1 Feb. 1985 - 31 May 1986
Walter L. Bradley 31 Aug. 1986 96 p
(Grant NAG1-443)
(NASA-CR-179839; NAS 1.26:179839) Avail: NTIS HC A05/MF A01 CSCL 11D

A three point bend fixture compatible with the current loading stage for the Scanning Electron Microscope was designed and fabricated. End-notched flexure tests were run on several materials. Work to date was on AS4/3502, T6T145/F155, and T6T145/F185. Fracture toughness was measured. Fracture of neat resin specimens was begun. The decrease in delaminatin fracture toughness, compared to neat resin toughness, due to rigid fiber filler and interlaminar failure is addressed. An experimental program was designed to try to determine the proper interpretatin for apparent microcracking in neat resin specimens. B.G.

N87-11848*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
IMPACT AND RESIDUAL FATIGUE BEHAVIOR OF ARALL AND AS6/5245 COMPOSITE MATERIALS
W. S. Johnson Oct. 1986 28 p
(NASA-TM-89013; NAS 1.15:89013) Avail: NTIS HC A03/MF A01 CSCL 11D

Aramide fiber reinforced aluminum laminates (ARALL) represent a cross between resin matrix composites and metals. The purpose of this study was to evaluate the impact sensitivity of this concept. Two types of ARALL (7075 aluminum prestrained and 2024 aluminum not prestrained) were tested through static indentation and the results compared to sheet 2024-T3 and 7075-T6 aluminum alloys. A state-of-the-art composite (AS6/5245) was also tested and compared to the ARALL. Further, the two types of ARALL material and the composite were dynamically impacted at two energy levels and fatigue tested to determine residual fatigue strength. Both forms of the ARALL material had worse impact resistance than monolithic sheet aluminum. The ARALL material made with 2024-T3 aluminum had better impact resistance than did the laminates made with 7075-T6 aluminum. The ARALL materials are at least equal to the composite material in impact damage resistance and are better for impact detection. The composite material has higher residual fatigue strength after impact than the ARALL material and is 25 percent lighter. The prestraining of the ARALL greatly reduces the fatigue growth of impact damage. Author

N87-11849# Naval Research Lab., Washington, D. C.
DISPERSION AND BLENDING OF SiC (SILICON CARBIDE) WHISKERS IN RSP ALUMINUM POWDERS Interim Report
C. J. Skowronek, A. Pattnaik, and R. K. Everett 4 Jun. 1986 13 p
(AD-A168836; NRL-MR-5750) Avail: NTIS HC A02/MF A01 CSCL 11/4

Metal matrix composites (MMC's) of research quality are required to establish reliable relationships between material properties, composition, and processing parameters. Systematic variation of composition and consolidation parameters is necessary to determine their effect on composite mechanical and physical properties. To address the problems of material availability, lack of control of material processing parameters, and nonuniform whisker distribution, a program was instituted to develop a technique for producing a uniform blend of metal powders and whiskers for subsequent consolidation and characterization. An ultrasonic method has been developed for separating silicon carbide (SiC) whiskers in the clusters which are typically found in the as-received SiC whiskers made from rice hulls. The method has also been used to disperse the whiskers uniformly in a -325 mesh rapidly solidified (RSP) aluminum powder. Scanning electron microscopic examination of the separated whiskers and the whisker/aluminum powder blend indicate that the whiskers retain a high length to diameter ratio after processing. Fully dense compacts produced by hot isostatic pressing of the blend exhibit a uniform whisker distribution. r processing. Fully dense compacts produced by hot isostatic pressing of the blend exhibit a uniform whisker distribution. GRA

N87-11850# Army Materials Technology Lab., Watertown, Mass.
STATISTICAL STRENGTH COMPARISON OF METAL MATRIX AND POLYMERIC MATRIX COMPOSITES Final Report
Edward M. Wu and Shun-Chin Chou Apr. 1986 33 p
(AD-A168847; MTL-TR-86-11) Avail: NTIS HC A03/MF A01 CSCL 11/4

The reliability of a composite structure depends on the materials strength variability. Unidirectional composites fail sequentially initiating from the very weakest fiber sites with matrix binder, provide local redundancy by transferring load to neighboring fibers until cumulation and clustering of these sites lead to severe stress concentration and ultimate structure failure. As a consequence, the variability of the metal matrix structure is traceable to the strength variability of the constituent fiber, the metal matrix coating process, and the composite wire consolidation process. This report focuses on the partitioning of the first two sources of variability, identification and modeling of the dominant parameters, together with experimental measurements on a current graphite-aluminum composite. The statistical strength of several graphite spools are measured by testing single filament specimens at the beginning and at the end of the spools, thereby characterizing the statistical paraments associated with the strength variability among the spools and within each spool. The graphite-aluminum wire, produced from a continuous liquid infiltration process are tested in tension. The metal matrix statistical strengths from different spools are compared with the respective statistical strength of the parent fiber. The results suggest that, given proper interpretation, single filament fiber strength is a sensitive parameter for quality assurance of metal matrix composites. GRA

N87-11851# Department of the Air Force, Washington, D.C.
AUTOMATED TAPE LAYING MACHINE FOR COMPOSITE

STRUCTURES Patent Application
Samuel E. Hailey, inventor (to Air Force) Filed 28 Apr. 1986 21 p
(AD-D012366; US-Patent-Appl-SN-856544) Avail: NTIS HC A02/MF A01 CSCL 11/4

This invention is related to the manufacture of lightweight graphite composite structures. It is particularly related to automated devices for laying structural tape during manufacture of composite parts. The tape laying device comprises a tape laydown head and a plotting mechanism. The tape laydown head has two tape laying rollers arranged side by side and independently controlled. Generally, the tape laying rollers apply tape sequentially to a form as when the tape head is being moved back and forth. The tape head is oriented with a rotary orientation mechanism. A separate supply structure parallel to the tape head houses tape supply reels and tape cutting means. GRA

N87-11852# McDonnell Aircraft Co., St. Louis, Mo.
STRUCTURAL EVALUATION OF HIGH STRAIN FIBER AND RESIN COMPOSITE MATERIAL SYSTEMS Final Technical Report, Sep. 1984 - Jan. 1986
David L. Buchanan and Paul S. McClellan Apr. 1986 90 p
(Contract F33615-84-C-3231)
(AD-A170464; AFWAL-TR-86-3007) Avail: NTIS HC A05/MF A01 CSCL 11/4

The subject of this program was structural evaluation of high strain fiber and resin composite material systems. The objective was to develop a combined analytical and experimental procedure for performing a structural evaluation, then use it to evaluate the effects of recently developed higher strain fibers and resin systems on strength, durability, and damage tolerance of advanced carbon/epoxy composite material systems. Testing included evaluation of basic lamina properties, static and fatigue testing of laminates with and without stress concentrations, evaluation of tolerance to low energy impact damage, and static and fatigue testing of a multifastener metal-to-composite splice joint. Included in the structural evaluation were analytical methods to predict unnotched and notched laminate strength and mode of failure based on unidirectional ply mechanical properties. GRA

N87-11853# Colorado School of Mines, Golden. Center for Welding Research.
MODELING OF INFILTRATION KINETICS AND INTERFACIAL BOND STRENGTH IN ALUMINUM MATRIX-SILICON CARBIDE COMPOSITES Annual Report, 1 May 1986 - 30 Apr. 1986
G. R. Edwards, D. L. Olson, G. P. Martins, B. R. Lanning, and P. B. Maxwell 1986 33 p
(Contract N00014-85-K-0451)
(AD-A170480; CSM-MT-CWR-023) Avail: NTIS HC A03/MF A01 CSCL 11/6

The objective in this research is to gain a fundamental understanding of the wetting and adhesion of aluminum alloys to SiC. The preliminary approach has been to study the infiltration kinetics of molten aluminum alloys into green silicon carbide compacts and relate the results to the interfacial bond strength. Since both infiltration rate and interfacial bond strength are related to the interfacial tension at the interface, our approach has been to isolate those parameters which affect both infiltration kinetics (i.e., viscosity, density, and pre size) and interfacial bond strength (i.e., enthalpies of solution and electronic contributions) and then to correlate the kinetics and bond strength to the most fundamental parameters. Author (GRA)

N87-11854# Pacific Northwest Labs., Richland, Wash.
EVALUATION OF WATERJET-MACHINED METAL MATRIX COMPOSITE TENSILE SPECIMENS
C. A. Lavender and M. T. Smith Apr. 1986 34 p
(Contract DE-AC06-76RL-01830)
(DE86-012254; PNL-5858) Avail: NTIS HC A03/MF A01

Four magnesium/boron carbide metal matrix composite (MMC) tensile specimens fabricated using the waterjet machining method were evaluated in order to determine the effects of the waterjet material removal process on the composite material surface structure and properties. These results were then compared with data from material conventionally machined. Results showed that while waterjet cutting produces a rough surface finish and does not meet specified dimensional tolerances, the technique appears to be suitable for sectioning and rough machining of metal matrix composites. DOE

N87-11855# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung fuer Werkstoff-Forschung.
FRETTING FATIGUE OF CARBON FIBER REINFORCED PLASTIC LAMINATES
Karl Schulte, Stefan Kutter (Ruhr Univ., Bochum, West Germany), and Klaus Friedrich (Hamburg Univ., West Germany) Apr. 1986 141 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-18; ISSN-0171-1342; ETN-86-98185) Avail: NTIS HC A07/MF A01; DFVLR, Cologne, West Germany DM 59

The fretting fatigue properties of two carbon fiber reinforced plastic (CERP) laminates were compared with plain fatigue tests. Nine fretting variants were obtained by varying three different pressures of fretting pads and pad materials. Apart from the strongly different behavior of both laminates, it is shown that there is an essential influence of fretting on the number of cycles until fracture. A reduction of the number of fatigue cycles due to fretting up to three orders of magnitude is observed. ESA

N87-11856# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
HEAT RESISTANT MATRIX MATERIALS
Ola Dickman Jul. 1986 32 p In SWEDISH; ENGLISH summary
(FOA-C-20618-2.1; ISSN-0347-3694; ETN-86-98330) Avail: NTIS HC A03/MF A01

Epoxy compounds were modified to improve performance in warm or humid environments; the brittleness can be controlled by the hardening process. Polyamide resins were investigated for applications at temperatures higher than admitted for epoxy compounds, but machining difficulties must be overcome. Thermoplastic resins may be less expensive than the epoxy ones, but as they are attacked by volatile liquids, they cannot, probably, be used as a matrix material. Thermoplastic semicristalline resins may be considered as most promising for these applications, as they are very resistant against chemical attack. ESA

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N87-11857*# College of William and Mary, Hampton, Va. Dept. of Physics.
HALOE SCIENCE INVESTIGATION Semiannual Progress Report, Feb. - Jul. 1986
D. Chris Benner 1986 4 p
(Contract NCC1-43)
(NASA-CR-179825; NAS 1.26:179825) Avail: NTIS HC A02/MF A01 CSCL 07D

The Halogen Occulation Experiment (HALOE) gas response test simulations were completed using the HALOE spectroscopic instrument model. A new series of programs were written for routine repetitive runs of the spectroscopic model to make it more user friendly for certain studies. Some of the limitations of the model were eased for atmospheric studies. Atmospheric signal profiles were calculated for inclusion in the electronic model programs. Analysis of additional spectral bands of CO2 in the 3 micron region was continued. A program of measurement of the air broadened halfwidths of spectral lines in the nu (sub 3) fundamental band of CH4 was started and over 40 lines measured. B.G.

N87-11858*# United Technologies Research Center, East Hartford, Conn.
USER'S MANUAL FOR A TEACH COMPUTER PROGRAM FOR THE ANALYSIS OF TURBULENT, SWIRLING REACTING FLOW IN A RESEARCH COMBUSTOR
Louis M. Chiappetta Sep. 1983 120 p
(Contract NAS3-22771)
(NASA-CR-179547; NAS 1.26:179547; R83-915540-27) Avail: NTIS HC A06/MF A01 CSCL 21B

Described is a computer program for the analysis of the subsonic, swirling, reacting turbulent flow in an axisymmetric, bluff-body research combustor. The program features an improved finite-difference procedure designed to reduce the effects of numerical diffusion and a new algorithm for predicting the pressure distribution within the combustor. A research version of the computer program described in the report was supplied to United Technologies Research Center by Professor A. D. Gosman and his students, R. Benodeker and R. I. Issa, of Imperial College, London. The Imperial College staff also supplied much of the program documentation. Presented are a description of the mathematical model for flow within an axisymmetric bluff-body combustor, the development of the finite-difference procedure used to represent the system of equations, an outline of the algorithm for determining the static pressure distribution within the combustor, a description of the computer program including its input format, and the results for representative test cases. Author

N87-11859# Harvard Univ., Cambridge, Mass. Dept. of Chemistry.
REDUCTIVE DISPROPORTIONATION OF CARBON DIOXIDE BY DIANIONIC CARBONYLMETALATES OF THE TRANSITION METALS
Gary R. Lee, John M. Maher, and N. J. Cooper 25 Apr. 1986 32 p
(Contract N00014-83-K-0292)
(AD-A168211; TR-4) Avail: NTIS HC A03/MF A01 CSCL 07/3

Carbon dioxide reacts readily with M2(M'(CO)5) (M = Li, Na, K, M' = W; M = K, M' = Cr, Mo, W) to give the corresponding group 6 hexacarbonyls (M(CO)6) and alkali metal carbonates. The reaction of Li2(W(CO)5) with excess 13CO2 at -78 C gives (W(CO)5(13CO)), confirming that the reaction involves reductive disproportionation of CO2 to CO and CO3(2-). The group 8 carbonylmetalates Na2(M(CO)4) (M = Fe, Ru, Os) react with CO2 to give (M(CO)5) and carbonate, and Na2(V(eta-C5H5)(CO)3) reacts with CO2 to give (V(eta-C5H5)(CO)4) and carbonate, indicating that reductive disproportionation is a general reaction of dianionic carbonylmetalates with CO2. Careful addition of one equivalent of CO2 to a solution of Li2(W(CO)5) at -78 C leads to an intermediate 1:1 adduct with an IR spectrum consistent with formulation as Li2(W(CO)5(eta 1-CO2)). The principal 13C absorption at 223.4 delta of a sample of Li2(W(CO)5(eta 1-13CO2)) prepared at -78 C exhibits Jw-c = 92 Hz, consistent with the central C being directly bonded to W and sp(2) hybridized. Oxide scrambling from coordinated CO2 to coordinated CO at higher temperatures results in complex signals between 205 and 201 sigma assigned to the carbonyl ligands. GRA

N87-11860# Ballistic Research Labs., Aberdeen Proving Ground, Md.
LIFETIMES AND QUENCHING OF THE B STATE OF PO BY ATMOSPHERIC GASES Final Report
Koon N. Wong, William R. Anderson, Anthony J. Kotlar, Mark A. DeWilde, and Leon J. Decker Apr. 1986 46 p
(AD-A168735; BRL-TR-2725) Avail: NTIS HC A03/MF A01 CSCL 07/4

The PO radical was studied because of its importance in several proposed laser photolysis detection schemes for nerve agents under atmospheric conditions. For this reason, interactions of the radical with atmospheric constituents were studied. Pulsed laser excited fluorescence in the B doublet sigma plus - X doublet pi system of gas phase PO was used to measure the lifetime for v' = 0 of the B state. Rotationally resolved measurements for a few selected J' levels, at Ar or He carrier gas pressures of 2 torr, reveal no dependence of the lifetime on the rotational level excited. Earlier measurements of relative fluorescence intensities in the V' = o vibrational progression were reinterpreted to extract the dependence of the electronic transition moment on internuclear distance. Rate constants for quenching of the B state of PO by N2, O2, CO2, and H2O, and upper limits thereof for He and Ar are reported. O2 was found to react with ground state PO. A crude measurement of the rate constant was performed. The poor agreement is in excellent agreement with the previous measurement, but in poor agreement with that of a concurrent study. Further work is required to determine the reason for the discrepancy. GRA

N87-11861# University Coll. of North Staffordshire, Keele (England).
KINETIC AND SPECTROSCOPIC STUDIES OF CHEMICAL INTERMEDIATES AT BOTH HIGH AND LOW TEMPERATURES Final Report, 15 Dec. 1983 - 14 Dec. 1985
Peter Borrell Feb. 1986 20 p
(Grant AF-AFOSR-0035-84)
(AD-A168758; EOARD-TR-86-03) Avail: NTIS HC A02/MF A01 CSCL 07/4

The temperature dependence of the rate constants of a number of elementary energy transfer, chemical and chemiluminescent reactions was measured using a combined discharge-flow/shocktube technique. In addition, the method itself was developed to provide a low temperature (to 100 K) capability. The reactions studied were: The collisional deactivation of O2(b prime sigma g) and O2(a prime delta g) by N2 and H2; the reactions of atomic nitrogen and oxygen with air (Lewis Rayleigh and Air Afterglows); and the quenching of O2(a prime sigma g) by O2 itself. The emissivity of the dimol transition of O2(a prime sigma g) was also measured. GRA

N87-11862# Naval Academy, Annapolis, Md. Dept. of Physics.
THE EFFECT OF HIGH PRESSURE ON ELECTRICAL RELAXATION IN PPO AND ELECTRICAL CONDUCTIVITY IN PPO COMPLEXED WITH LITHIUM SALTS Interim Technical Report
John J. Fontanella and Mary C. Wintersgill Jun. 1986 39 p
(AD-A168894; TR-22) Avail: NTIS HC A03/MF A01 CSCL 07/4

Audio frequency electrical conductivity and relaxation studies have been carried out on Parel 58 elastomer and Parel 58 elastomer complexed with a variety of lithium salts. The measurements have been carried out in vacuum over the temperature range 5-380 K and at pressures up to 0.65 GPA over the temperature range 230 to 380 K. Both the electrical conductivity for the complexed material and the electrical relaxation time associated with the alpha relaxation in the uncomplexed material exhibit VTF or WLF behavior. From the VTF analysis for both the vacuum electrical relaxation time and electrical conductivity, E sub a is found to be about 0.09 eV and T sub o is found to be about 40 C below the central glass transition temperature. In addition, it is found that the activation volumes for the electrical relaxation time and the electrical conductivity are the same when compared relative to t sub o. These results imply that the mechanism controlling ionic conductivity is the same as that for the alpha relaxation namely large scale segmental motions of the polymer chain. GRA

N87-11863# Ballistic Research Labs., Aberdeen Proving Ground, Md.
CALCULATION OF POTENTIAL ENERGY SURFACES FOR HCO AND HNO USING MANY-BODY METHODS Final Report
George F. Adams and Gary D. Bent Jun. 1986 50 p
(AD-A169611; BRL-TR-2737) Avail: NTIS HC A03/MF A01 CSCL 07/4

Many-body perturbation theory calculations of the potential energy surfaces pertinent to the hydrogen dissociation reaction of the ground state of the formyl radical and the three lowest electronic states of hydrogen nitroxide are summarized. The calculations established that MBPT provides a reasonable description of the reaction pathway for those molecules not requiring a multiconfigura-

tion zeroth order wavefunction. The data obtained for the three states of NHO provide basis for a statistical estimate of relative recombination rates in production of these states, leading to a plausible identification of the source of the chemiluminescence that characterizes this chemical species. GRA

N87-11864# Los Alamos National Lab., N. Mex.
SAFETY ASPECTS OF LARGE-SCALE COMBUSTION OF HYDROGEN
F. J. Edeskuty, J. J. Haugh (Electric Power Research Inst., Palo Alto, Calif.), and R. T. Thompson (EG and G Energy Measurements, Inc., Las Vegas, Nev.) 1986 13 p Presented at the 6th CERI World Hydrogen Energy Conference, Vienna, Austria, 20 Jul. 1986 Prepared in cooperation with Electric Power Research Inst., Palo Alto, Calif.; EG and G Energy Measurements, Inc., Las Vegas, Nev.
(Contract W-7405-eng-36)
(DE86-007375; LA-UR-86-669; CONF-860704-2) Avail: NTIS HC A02/MF A01

Recent hydrogen-safety investigations have studied the possible large-scale effects from phenomena such as the accumulation of combustible hydrogen-air mixtures in large, confined volumes. Of particular interest are safe methods for the disposal of the hydrogen and the pressures which can arise from its confined combustion. Consequently, tests of the confined combustion of hydrogen-air mixtures were conducted in a 2100 m³ volume. These tests show that continuous combustion, as the hydrogen is generated, is a safe method for its disposal. It also has been seen that, for hydrogen concentrations up to 13 vol %, it is possible to predict maximum pressures that can occur upon ignition of premixed hydrogen-air atmospheres. In addition information has been obtained concerning the survivability of the equipment that is needed to recover from an accident involving hydrogen combustion. An accident that involved the inadvertent mixing of hydrogen and oxygen gases in a tube trailer gave evidence that under the proper conditions hydrogen combustion can transit to a detonation. If detonation occurs the pressures which can be experienced are much higher although short in duration. DOE

N87-11865# Brigham Young Univ., Provo, Utah. Dept. of Chemistry.
SUPERCRITICAL FLUID CHROMATOGRAPHY/SUPERSONIC JET SPECTROSCOPY Progress Report, Feb. 1 - 30 Apr. 1986
M. L. Lee and S. R. Goates 1986 14 p
(Contract DE-FG22-83PC-60807)
(DE86-011278; DOE/PC-60807/12) Avail: NTIS HC A02/MF A01

Some minor modifications to the supercritical fluid fractionation apparatus were made during this quarter to optimize the performance of the unit. It was decided that a thorough study of the potential of CO2 for the fraction of high-molecular-weight and polar polycyclic aromatic compounds (PAC) be undertaken before construction of the high temperature apparatus should begin. Two main factors were considered when making this decision. First, theoretical solubility parameter data suggested that CO2 might be a better solvent than n-pentane for high-molecular-weight PAC. Second, there were some indications that coal extracts and high-molecular-weight coal-derived fluids could undergo structural changes when heated. Aromatization, condensation, rearrangements, and other types of chemical reactions are expected to occur in coal mixtures at temperatures above 60 C. Therefore, a low temperature fractionation procedure would be much more desirable than a high temperature one. Also, over the past several months, detailed spectroscopic investigations of supercritical fluid/supersonic expansions for several supercritical fluid solvents have been made, including n-pentane, CO2, SF6, and N2O, using as test sample compounds, naphthalene and perylene. During the past quarter, we have concentrated especially on obtaining spectra of perylene which provides a more rigorous test of the system did earlier work with naphthalene. DOE

N87-11866# Lawrence Livermore National Lab., Calif.
HOT-SPOT MODEL FOR CALCULATING THE THRESHOLD FOR SHOCK INITIATION OF PYROTECHNIC MIXTURES
D. E. Maiden and G. L. Nutt 14 May 1986 15 p Presented the 11th International Pyrotechnics Seminar, Vail, Colo., 7 J 1986
(Contract W-7405-eng-48)
(DE86-011638; UCRL-94039; CONF-860739-13) Avail: NT HC A02/MF A01

A model for predicting the pressure required to initiate a reactio in pyrotechnic mixtures is described. The pore temperature determined by calculating the dynamics of pore collapse. A approximate solution for the motion of the pore radius is determine as a function of the pore size, viscosity, yield stress and pressur The heating of the material surrounding the pore is given by a approximate solution of the heat conduction equation with a sourc term accounting for viscoplastic heating as a function of the por motion. Ignition occurs when the surface temperature of the por matches the hot-spot ignition criterion. The hot-spot ignitio temperatures for 2Al/Fe2O3, Ti/2B, and Ti/C are determined Predictions for the ignition pressure of 2Al/Fe2O3 (thermite) ar in resonable agreement with experiment. DO

N87-11867# California Univ., Berkeley. Lawrence Berkeley Lab
STRUCTURE AND ACTIVITY OF Pt-Co ALLOYS AS OXYGE REDUCTION ELECTROCATALYSTS
B. C. Beard and P. N. Ross, Jr. Mar. 1986 30 p
(Contract DE-AC03-76SF-00098)
(DE86-012831; LBL-21184) Avail: NTIS HC A03/MF A01

Carbon supported Pt-Co (3:1 atom ratio) catalysts were prepared in both acid and alkaline aqueous media, followed by heat treatments to promote alloy formation. Both preparations began with a commercial 10% Pt on carbon catalyst with Pt particle sizes of 15 to 30 A. Significantly greater alloying was observed in the acid media prepared catalyst. X-ray diffraction studies of the acid prepared catalyst demonstrated lattice parameters tending away from Pt (3.937 A) and toward that for Pt3Co (3.831 A), greatly increased particle sizes, and significant ordering evidenced by the presence of superlattice reflections. In all cases, the base media prepared catalysts were alloyed to a lesser extent, were of moderately increased particle size and gave no indication of alloy ordering. Activity testing under phosphoric acid fuel cell conditions demonstrated that the most highly alloyed catalysts had the greatest activity. Loss of cobalt in the phosphoric acid environment was the lowest in catalysts which were the most alloyed. DOE

N87-11868# Stanford Univ., Calif.
COMBUSTION GAS SPECTROSCOPY USING TUNABLE LASERS Final Progress Report, 1 Aug. 1983 - 31 Jan. 1986
R. K. Hanson 1986 15 p
(Contract DE-AS03-76ER-70058)
(DE86-012873; DOE/ER-70058/T3) Avail: NTIS HC A02/MF A01

This report summarizes progress during the past 24 months of an ongoing program to develop and apply tunable laser techniques for the measurement of fundamental spectroscopic parameters (line and oscillator strengths, collision linewidths and fluorescence quenching factors) of combustion species. Laser sources utilized include a tunable CW infrared diode laser and a tunable CW visible/UV ring dye laser. During this reporting period, research has proceeded in several areas, including: tunable diode laser measurements of HCN (3-micron band) infrared spectroscopic parameters (band strength and collision linewidths) in a room temperature absorption cell and a shock tube; advanced absorption lineshape model incorporating collision-narrowing (as well as broadening) effects, and its use in fitting high-resolution HCN absorption spectra; wavelength modulation techniques, using a fast-tuning, CW ring dye laser system (visible and intracavity-doubled UV), for absorption and fluorescence measurements of spectroscopic parameters in shock-heated and combustion flows; design and fabrication of a s pecial shock tube test section to enable tunable laser absorption and fluorescence measurements behind reflected shock waves; assembly of computer codes for prediction of gas composition and thermodynamic conditions behind

reflected shock waves in reacting gases, and experimental validation of predicted postshock behavior. DOE

N87-11869# Acurex Corp., Mountain View, Calif. Energy and Environmental Div.
CATALYTIC COMBUSTION COMPONENT AND SYSTEM PROTOTYPE DEVELOPMENT Final Report
J. P. Kesselring and W. V. Krill May 1986 310 p
(Contract EPA-68-02-3122)
(PB86-211380; EPA/600/7-86/021) Avail: NTIS HC A14/MF A01 CSCL 13A

The report gives results of a project to develop the components required for catalytic combustion system operation and evaluation. The systems investigated (firetube boiler, watertube boiler, and gas turbine), when integrated with the catalytic combustor, have potential for both significant reductions in NOx emissions and increases in system thermal efficiency. GRA

N87-11870# National Bureau of Standards, Gaithersburg, Md.
APPLICATION OF COMPUTER TECHNIQUES IN THE PREDICTION OF INORGANIC COMPOUNDS
E. M. Savitskii and V. B. Gribulya 1985 255 p Transl. into ENGLISH of the book "Prognozirovanie Neorganicheskikh Soedinenii s Pomoshchyu EVM" Moscow, USSR, Nauka, 1977 p 1-244 (PB86-205762; TT-79-52025) Avail: NTIS HC A12/MF A01 CSCL 07B

Some results of the study of the application of cybernetics in the prediction of inorganic compounds belonging to binary physico-chemical systems were presented. Computational data on prediction are presented in tables which include all binary systems. The possibility of predicting numerical values of characteristics of compounds with the help of a computer is indicated in those cases where information regarding their behavior patterns may not be available. The book contains a description of the methodological principles of prediction and also reference material necessary in the search for and synthesis of new inorganic substances. The book is intended for scientists and engineers working in the fields of materials science, inorganic chemistry, chemical cybernetics, as also for specialists concerned with the problems of the search for and synthesis of new inorganic materials. GRA

N87-11871# Sandia National Labs., Albuquerque, N. Mex.
HYDROGEN: AIR STEAM FLAMMABILITY LIMITS AND COMBUSTION CHARACTERISTICS AT INTERMEDIATE SCALE
Billy W. Marshall, Jr. Apr. 1986 19 p Presented at the 1986 Spring Technical Meeting of the Combustion Inst., Banff, Alberta, 28-30 Apr. 1986
(Contract DE-AC04-76DP-00789)
(TI86-009861; SAND-85-1616C; CONF-8604144-4) Avail: NTIS HC A02/MF A01

A series of hydrogen:air:steam combustion experiments which were conducted at Sandia National Laboratories are discussed. The purpose of these experiments was to map the entire three component region of flammability and to study the combustion and heat transfer characteristics of these atmospheres inside a 5.6 cu m vessel. E.R.

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-11872# Battelle Memorial Inst., Columbus, Ohio.
CORROSION INFORMATION AND ANALYSIS: CORROSION AND COMPATIBILITY
W. E. Berry Jun. 1986 3 p
(BMI-CIA-14) Avail: NTIS HC A02/MF A01

Abstracts of articles dealing with corrosion and compatibility are given. Corrosion of copper/nickel alloys in seawater, stress-corrosion cracking of brass in sulfate solutions, a mathematical model for predicting corrosion rates, and the fatigue life of welded marine structures are among the topics covered. R.J.F.

N87-11873*# Syracuse Univ., N. Y. Dept. of Mechanical and Aerospace Engineering.
GRAIN BOUNDARY OXIDATION AND FATIGUE CRACK GROWTH AT ELEVATED TEMPERATURES Final Report
H. W. Liu and Yoshiki Oshida Oct. 1986 30 p
(Grant NAG3-348)
(NASA-CR-179529; NAS 1.26:179529) Avail: NTIS HC A03/MF A01 CSCL 11F

Fatigue crack growth rate at elevated temperatures can be accelerated by grain boundary oxidation. Grain boundary oxidation kinetics and the statistical distribution of grain boundary oxide penetration depth were studied. At a constant delta K-level and at a constant test temperature, fatigue crack growth rate, da/dN, is a function of cyclic frequency, nu. A fatigue crack growth model of intermittent micro-ruptures of grain boundary oxide is constructed. The model is consistent with the experimental observations that, in the low frequency region, da/dN is inversely proportional to nu, and fatigue crack growth is intergranular. Author

N87-11874*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ACCEPTANCE CRITERIA FOR WELDS IN ASTM A106 GRADE B STEEL PIPE AND PLATE
C. Michael Hudson, Davis B. Wright, Jr., and Brian N. Leis Oct. 1986 46 p
(NASA-TM-89052; NAS 1.15:89052) Avail: NTIS HC A03/MF A01 CSCL 11F

Based on the RECERT Program findings, NASA-Langley funded a fatigue study of code-unacceptable welds. Usage curves were developed which were based on the structural integrity of the welds. The details of this study are presented in NASA CR-178114. The information presented is a condensation and reinterpretation of the information in NASA CR-178114. This condensation and reinterpretation generated usage curves for welds having: (1) indications 0.20 -inch deep by 0.40-inch long, and (2) indications 0.195-inch deep by 8.4-inches long. These curves were developed using the procedures used in formulating the design curves in Section VIII, Division 2 of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. Author

N87-11875*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PRIMARY ARM SPACING IN CHILL BLOCK MELT SPUN Ni-Mo ALLOYS
S. N. Tewari and T. K. Glasgow 1986 21 p Presented at the Symposium on Enhanced Properties in Structural Metals via Rapid Solidification, Orlando, Fla., 6 Oct. 1986; sponsored by the American Society for Metals
(NASA-TM-88887; E-3297; NAS 1.15:88887) Avail: NTIS HC A02/MF A01 CSCL 11F

Chill block melt spun ribbons of Ni-Mo binary alloys containing 8.0 to 41.8 wt % Mo have been prepared under carefully controlled processing conditions. The growth velocity has been determined as a function of distance from the quench surface from the observed ribbon thickness dependence on the melt puddle residence time. Primary arm spacings measured at the midribbon thickness locations show a dependence on growth velocity and alloy composition which is expected from dendritic growth models for binary alloys directionally solidified in a positive temperature gradient. Author

N87-11876# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
GEOMETRIC STRUCTURE, PSEUDO BAND GAPS, AND SURFACE VIBRATIONAL RESONANCES ON METAL SURFACES Interim Report
M. Persson, Joseph A. Stroscio, and W. Ho Feb. 1986 52 p
(Contract N00014-82-K-0576)
(AD-A168291) Avail: NTIS HC A04/MF A01 CSCL 20/12

It is shown by surface lattice dynamics that a new class of surface vibrational resonances arises in those frequency regions where there is a strong depletion in the bulk phonon density of

states. The presence of these pseudo band gaps is due to the higher Fourier components in the phonon dispersion relations introduced by the particular coordination of atoms in layers parallel to the surface. This phenomenon is illustrated for the fcc (110) surfaces of Cu and Ni and bcc (111) surface of Fe. The pseudo band gap is found to be more pronounced for the longitudinal phonons propagating in the bcc (111) than the fcc (110) directions due to the additional strong multiple interlayer forces arising from its geometric structure. A quantitative analysis based on surface lattice dynamics of the recorded electron energy loss spectra of Cu and Ni suggests that the surface interlayer force constant attains the same value as in bulk, and that the two outermost layers give the dominant contribution to the dipole activity. This resonance is found to exist throughout the gamma-X direction and makes an avoided crossing with a resonance derived from a band gap at the X-point. This novel dispersion behavior should be possible to observe by electron or atom scattering at larger parallel wavevector transfers.
GRA

N87-11877# Amax Materials Research Center, Ann Arbor, Mich.
CARBURIZING STEEL FOR HIGH TEMPERATURE SERVICE Final Report, 1982 - Dec. 1984
T. B. Cameron and D. E. Diesburg Aug. 1985 53 p
(Contract DAAG46-82-C-0066)
(AD-A168327; Rept-82-C-66; AMMRC-TR-85-25) Avail: NTIS HC A04/MF A01 CSCL 13/8

A prime concern in airborne equipment is to avoid a brittle fracture in gearing or bearings which could lead to catastrophic engine or propulsion system failure. Projected requirements for advanced aircraft and helicopters suggest that currently employed through-hardened materials will no longer be adequate for these applications due to their low fracture toughness. Hence there is an interest in carburized materials which have somewhat similar surface characteristics to the through-hardened materials but inherently higher core toughness due to the lower core carbon levels. Five steels similar in composition to CBS1000 and a low carbon M50 composition were evaluated with respect to carburizing characteristics, temper resistance, hot hardness and carburized fracture toughness. Si, Mo and Ni levels were varied in an effort to identify a composition that would maintain a surface hardness of 58 HRC minimum at 315 C (600 F) without a deterioration in fracture toughness properties. Si and Ni were both shown to retard carburization but have little influence on hardness retention or fracture toughness. A composition with 2.3% Ni was shown to have optimum carburizing, hardness and fracture toughness properties. The modified steel showed an improvement over CBS1000 in case fracture toughness but the core fracture toughness was lower than that of CBS1000. This steel was tested in rolling contact fatigue and found to be similar in performance to through-hardened M50.
GRA

N87-11878# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
IMPROVEMENT IN DUCTILITY AND FRACTURE TOUGHNESS OF HIP'D AND ISOTHERMALLY FORGED Ti-6Al-6V-2Sn POWDER WITH HEAT TREATMENT Final Report, Jun. 1978 - Jun. 1986
Ronald P. Simpson, Attwell M. Adair, Francis H. Froes, and Daniel Eylon Jun. 1986 76 p
(AD-A168804; AFWAL-TR-86-4064) Avail: NTIS HC A05/MF A01 CSCL 11/6

This program was aimed at optimizing the mechanical behavior of powder metallurgy compacts of the Ti-6Al-6V-2Sn alloy. Particular emphasis was placed on breaking-up continuous grain boundary alpha which previous work had indicated was detrimental to the properties of concern, particularly ductility and fracture toughness. A range of microstructures were produced in Hydride-Dehydride and Rotating Electrode Powder Compacts using combinations of hot isostatic pressing, extrusion, isothermal forging and heat treatment. Based on the microstructural studies, two heat treatments were selected and used in combination with powder compaction (hot isostatic pressing or extrusion) and isothermal forging to develop mechanical properties which were correlated with processing, microstructure and fractographic features. Tw types of microstructures were identified as having acceptable leve of strength, ductility and fracture toughness: (1) a high volun fraction of fine equiaxed primary alpha in a matrix of transform beta, and (2) a relatively coarse secondary alpha plate dispersi in combination with a small volume fraction of large low aspe ratio primary alpha. The processing routes necessary to develo structures were defined.
GR

N87-11879# Army Close Combat Armaments Center, Watervli N.Y.
THE ELASTIC CONSTANTS OF NI3AI TO 1.4 GPa Fin Report
J. Frankel, J. Vassiliou, J. C. Jamieson, D. P. Dandekar, and W Scholz May 1986 18 p
(AD-A168813; ARCCB-TR-86018) Avail: NTIS HC A02/MF A0 CSCL 11/6

Ni3Al, having the L1 sub 2 ordered structure, belongs to class of intermetallic compounds which shows unusual mechan cal behavior, namely a peak in mechanical strength with a increase in temperature. The peak temperature for Ni3Al is 922 k where the yield stress value is four times its value at roor temperature. A large number of investigations determining th dependence of different physical properties as a function o temperature have been done, but the pressure dependence o the properties of Ni3Al remains to be investigated in depth. Th present report fills this gap in our information by determining th pressure dependence of the three elastic constants c11, c12, an c44 of single-crystal Ni3Al to 1.4 GPa at room temperature. Th pressure derivatives of the elastic constants of single-crystal Ni3A have been determined to 1.4 GPa by both superposition an pulse-echo overlap techniques. Measurements were made o single-crystal specimens of orientation <100> and <110>, thu providing at least one cross-check. The values of c11, c12, an c44 at one atmosphere are found to be 223.5, 149.0, and 12.9 GPa respectively. The pressure derivatives of the elastic constants have been determined.
GRA

N87-11880# Lawrence Livermore National Lab., Calif.
EFFECT OF LASER HARDENING ON MICROSTRUCTURE AND WEAR RESISTANCE IN MEDIUM CARBON/CHROMIUM STEELS
J. Kusinski and G. Thomas Apr. 1986 22 p Presented at the Society of Photo-Optical Instrumentation Engineers International Symposium: Topics in Optical and Optoelectronic Applied Sciences and Engineering, Quebec City, Ontario, 2 Jun. 1986
(Contract DE-AC03-76SF-00098)
(DE86-012021; LBL-21418; CONF-860620-6) Avail: NTIS HC A02/MF A01

Metallographical (optical, TEM, SEM), spectroscopic, abrasive wear resistance and microhardness investigations of Fe/Cr/Mn/C steels heat treated by a continuous CO2 laser are described. Laser hardening resulted in wear resistance of 1.4 to 1.6 times better than that of conventionally hardened steels. Laser melting followed by rapid solidification allows formation of a solidified layer with high wear resistance only when the scanning velocity and mass of the samples were sufficient to realize high cooling rates. The variations in the wear resistance and microhardness with distance from the heated surface were similar. The grain refinement caused by rapid laser-heating and high stresses induced during cooling create essentially fine, highly dislocated lath and internally twinned martensites with some amount of stable, interlath retained austenite. This structure has in turn beneficial effects on wear resistance and toughness. Laser-heat treatment for deep melting of the surface layers of the steels shows only a small improvement in wear resistance. Such heat treatment results in delta ferrite retention (10Cr steel) and chromium segregation to cell boundaries.
DOE

N87-11881# Sandia National Labs., Albuquerque, N. Mex.
INFLUENCE OF DISPLACEMENT DAMAGE ON DEUTERIUM PERMEATION IN 316 STAINLESS STEEL
B. L. Doyle and D. K. Brice 1986 20 p Presented at the 7th

International Conference on Plasma Surface Interactions in Controlled Fusion Devices, Princeton, N.J., 5 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-010463; SAND-85-2866C; CONF-860522-16) Avail: NTIS HC A02

A new permeation system for in situ measurements of the effect of radiation damage on both gas and plasma-driven hydrogen permeation through metal foils has been developed. The source of displacement damage was a beam of 16 MeV carbon ions whose range was significantly greater than the 4 micron foil thickness. Initial ion-driven deuterium permeation results for 316 stainless steel show no evidence for radiation-enhanced effects for temperatures in the range 200 to 400C and displacement damage rates of 0.5 dpa/day. An upper limit for the radiation enhancement of the diffusion coefficient of 100%/(dpa/day) has been established. Good agreement between this data and a transport parameter calculation modified to handle gases has been obtained.
DOE

N87-11882# British Aerospace Public Ltd. Co., Bristol (England). Mechanical Technology Dept.
DISCUSSION OF THE EFFECT OF TEMPERATURE ON THE VERY SHORT TERM PROPERTIES OF METALS AND ALLOYS
S. A. Lee May 1983 33 p
(BAe-BT-14842; LR48867; ETN-86-97967) Avail: NTIS HC A03/MF A01

Material property data for long and short term exposure to high temperatures are compared and the differences observed are explained with reference to the metallurgical stability of the material. The strength behavior of metals containing even small amounts of solute elements varies with temperature and with time. The timewise stability of metal alloys is reduced by strengthening treatments. By modifying the treatments given to alloys for use in short lifetime structures, it may be possible to delay the onset of loss of mechanical properties to a point beyond mission duration.
ESA

N87-11883# Ecole Centrale des Arts et Manufactures, Chatenay-Malabry (France).
BEHAVIOR OF AN INCONEL 718 CONTAINER IN THE PRESENCE OF HYDROGEN Final Report [COMPORTEMENT VIS A VIS DE LHYDROGENE DUN RESERVOIREN INCONEL 718]
P. Y. Azou, M. Groos, Grenet, Jounier, and Wehling Paris ESA Nov. 1985 57 p In FRENCH
(Contract ESTEC-4862/81-NL-JS)
(ESA-CR(P)-2262; ETN-86-98147) Avail: NTIS HC A04/MF A01

The properties of the Inconel 718 alloy in the presence of pressurized hydrogen are reviewed. A hydrogen container for space application is studied at different temperatures, determining the hydrogen loss and the fatigue resistance. The study includes a qualification procedure to test permeability and weld quality by the acoustic emission method. The test results indicate that permeability is low, and the mechanical resistance is above twice the utilization pressure.
ESA

N87-11884# European Space Tribology Lab., Risley (England).
PERFORMANCE LIMITS OF SURFACE-HARDENED ALUMINUM-ALLOY GEARS IN VACUUM
K. T. Stevens Paris ESA Dec. 1985 23 p
(Contract ESA-5615)
(ESA-ESTL-059; ESA-CR(P)-2237; ETN-86-98115) Avail: NTIS HC A02/MF A01

The surfaces of aluminum alloy gears operating in vacuum were treated by Ematal anodizing and the Zinal diffusion process. Without lubrication, both surface treatments fail quickly by cracking of the brittle coatings and subsequent flaking. Treated aluminum gears are not, therefore, recommended for spacecraft applications which demand more than a few thousand tooth encounters. Lubrication with sputter-deposited MoS2 increases the endurance of the Ematal coating by a factor of 15, to 2 million gear revolutions. Coupling an Ematal-treated gear with a self lubricating polyimide/MoS2 gear extends the life further, with no failure after 10 million gear revolutions.
ESA

N87-11885# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung fuer Werkstoff-Forschung.
FATIGUE PROPERTIES OF HIGH STRENGTH TITANIUM ALLOYS AT ELEVATED TEMPERATURES (IMI 685)
Roelof Marissen, Manfred Peters, Karl Schulte, Karl-Heinz Trautmann, Klaus Mull, and Horst Nowack May 1986 42 p
(DFVLR-FB-86-19; ISSN-0171-1342; ETN-86-98277) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 17

The fatigue properties of the Ti alloy IMI 685 were studied at room temperature and at 450 C. At both temperatures lamellar type microstructures show improved fatigue crack propagation behavior compared to equiaxed structures. Similar results are found for low cycle fatigue tests, whereas in the high cycle fatigue range the equiaxed microstructures are superior. Creep deformations and strain aging are thought to play an important role in high temperature fatigue properties.
ESA

N87-11886# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium).
[ACTIVITIES REPORT IN METAL STRUCTURES INDUSTRY SCIENTIFIC AND TECHNICAL STUDIES] Annual Report, 17 Jun. 1985 [RAPPORT ANNUEL DU COMITE PERMANENT AU CONSEIL GENERAL DU 17 JUIN 1985]
1985 58 p In FRENCH
(ISSN-0524-7705; ETN-86-98314) Avail: NTIS HC A04/MF A01

The characterization of metallurgical processes and materials, the development of construction techniques, and the application of computerized systems and procedures were studied. The transformation of plastic materials including composite materials was investigated. Measurement and test methods, numerical control machines, and refractory materials were developed.
ESA

N87-11887# Naval Academy, Annapolis, Md.
APPLICATION OF THE KEY CURVE AND MULTI-SPECIMEN TECHNIQUES TO DYNAMIC J-R CURVE TESTING OF ALLOY STEEL
J. A. Joyce and E. M. Hackett (Naval Ship Research and Development Center, Annapolis, Md.) 1986 63 p
(TI86-901252; NUREG/CR-4579) Avail: NTIS HC A04/MF A01

J-integral R-curve tests were performed on three point bend specimens of a 3-Ni steel at three loading rates; quasi-static, intermediate (25mm/sec) and a drop tower rate (2.54m/sec). The key curve and multispecimen procedures were employed for the higher rate tests and this investigation is focused primarily on details of the test method development. The multispecimen and key curve techniques were found to yield agreement at the elevated loading rates. Numerical smoothing techniques required to apply a key curve method appear to separate the oscillatory high frequency component from the load-displacement record. For the 3-Ni steel tested both J-integral at crack initiation and tearing modulus were found to be elevated with increasing loading rate.
Author

N87-11888# Pacific Northwest Labs., Richland, Wash.
PERFORMANCE DEMONSTRATION TESTS FOR DETECTION OF INTERGRANULAR STRESS CORROSION CRACKING
P. G. Heasler, D. J. Bates, T. T. Taylor, and S. R. Doctor Feb. 1986 65 p Prepared in cooperation with Nuclear Regulatory Commission, Washington, D. C.
(TI86-007894; NUREG/CR-4464; PNL-5705) Avail: NTIS HC A04/MF A01

Detection tests of inservice inspectors, procedures and equipment that are employed to find intergrandular stress corrosion cracks in nuclear power plant piping are evaluated. Performance is described by two fundamental parameters: false cell probability and probability of detection. Acceptable inspection performance and detection tests are therefore defined in terms of these two parameters.
Author

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials*.

N87-11889*# United Technologies Corp., East Hartford, Conn.
MECHANICAL PROPERTIES OF VARIOUS ALLOYS IN HYDROGEN Final Report
Nigel L. Weeks and J. Mucci Jun. 1986 30 p
(Contract NAS8-36040)
(NASA-CR-178874; NAS 1.26:178874; FR-19269) Avail: NTIS HC A03/MF A01 CSCL 11F

Notch tensile tests were conducted to determine the tensile strength of experimental alloys proposed for use in a pressurized gaseous hydrogen environment. The experimental alloys were processed and supplied by the Marshall Space Flight Center. They were supplied in four groups: nickel-base alloys, iron-base alloys, beryllium alloys, and the single-crystal alloy PWA 1480 in seven crystallographic orientations. Testing of the nickel-base, iron-base, and beryllium alloys established the comparative ambient temperature notch tensile strength in 34.5 MPa (5000 psig) gaseous hydrogen environment. After the test results were documented and reported, the test specimens were returned for evaluation. Testing of the single-crystal alloy, PWA 1480, established the notched tensile strength for the various crystallographic orientations in 34.5 MPa (5000 psig) gaseous helium and hydrogen environments at 871 C (1600 F). Strengths established in hydrogen were compared to those in helium to determine environmental degradation due to hydrogen. For the nickel-base alloys, iron-base alloys, and the beryllium alloys, environmental degradation could not be established as no helium environment tests were conducted.

Author

N87-11890*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
ENVIRONMENTALLY STABLE POLYMERS AND COATINGS FOR SPACE APPLICATION: CH-5, SUPPLEMENT 10 Final Report
George Sykes Oct. 1986 39 p
(Grant NAG1-343)
(NASA-CR-177181; NAS 1.26:177181) Avail: NTIS HC A03/MF A01 CSCL 11B

High molecular weight, randomly coupled poly(imide siloxane) soluble block copolymers were synthesized from bis(amino propyl) polydimethylsiloxane equilibrates of various molecular weights, aromatic metalinked diamines, and 3,3'-4,4'-benzophenone tetracarboxylic dianhydride (BTDA). Two synthetic procedures were successfully used to synthesize the poly(amic acid siloxane) intermediates. For both synthetic procedures, a cosolvent system was employed to achieve complete solvation of all components throughout the polymerization. Physical property characterization is continuing.

B.G.

N87-11891*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. Dept. of Polymer Science.
POLYIMIDES CONTAINING OXYETHYLENE UNITS. PART 4: POLYMERIZATION OF DIANHYDRIDES CONTAINING ETHER LINKAGES
Frank W. Harris (Akron Univ., Ohio), Andrea J. Karnavas, Sajal Das, Charles N. Cucuras, and Paul M. Hergenrother 1986 5 p
(NASA-TM-89257; NAS 1.15:89257) Avail: NTIS HC A02/MF A01 CSCL 11B

The development of new composite resins for various aerospace applications is attempted. Although it is highly desirable that these polymers be soluble in order to facilitate processing, they must display considerable solvent-resistance in use. A recent approach has involved the synthesis of a new series of polyimides containing flexible linkages. The polymers were prepared by the polymerization of aromatic dianhydrides with diamines containing oxyethylene linkages. For example, the polymerization of 3,3',4,4'-benzophenonetetracarboxylic dianhydride (BTDA) with 1,2-bis(4-aminophenoxy)ethane (1a) and bis[2-(4-aminophenoxy)ethyl]ether (lb), afforded highly crystalline polyimides that were completely insoluble. However, a polyimide that was amorphous and soluble was obtained from the polymerization of BTDA and an isomer of lb, i.e., bis[2-(3-aminophenoxy)ethyl] ether (4b). In an attempt to obtain a soluble, amorphous polyimide that could be annealed into a crysalline state, block copolymers of 1b and 4b and BTDA were prepared. Copolymers containing less than 20 weight % 1b were soluble in organic solvents. However, these polymers did not crystallize when heated above their Tg's. Copolymers containing higher levels of 1b were semicrystalline and insoluble. The polymerization of the diamines containing oxyethylene linkages with 4,4'-oxydiphthalic anhydride (ODPA) and a new dianhydride, i.e., 4,4'-oxyethyleneoxyethyleneoxydiphthalic anhydride (OEDA) was investigated. It was postulated that the use of these more flexible dianhydrides would result in more processable polyimides. Author

N87-11892*# Pratt and Whitney Aircraft, East Hartford, Conn. Engineering Div.
THERMAL BARRIER COATING LIFE PREDICTION MODEL DEVELOPMENT Annual Report
Jeanine T. DeMasi 5 Nov. 1986 213 p
(Contract NAS3-23944)
(NASA-CR-179508; NAS 1.26:179508; AR-2) Avail: NTIS HC A10/MF A01 CSCL 11G

A methodology is established to predict thermal barrier coating life in a environment similar to that experienced by gas turbine airfoils. Experiments were conducted to determine failure modes of the thermal barrier coating. Analytical studies were employed to derive a life prediction model. A review of experimental and flight service components as well as laboratory post evaluations indicates that the predominant mode of TBC failure involves thermomechanical spallation of the ceramic coating layer. This ceramic spallation involves the formation of a dominant crack in the ceramic coating parallel to and closely adjacent to the topologically complex metal ceramic interface. This mechanical failure mode clearly is influenced by thermal exposure effects as shown in experiments conducted to study thermal pre-exposure and thermal cycle-rate effects. The preliminary life prediction model developed focuses on the two major damage modes identified in the critical experiments tasks. The first of these involves a mechanical driving force, resulting from cyclic strains and stresses caused by thermally induced and externally imposed mechanical loads. The second is an environmental driving force based on experimental results, and is believed to be related to bond coat oxidation. It is also believed that the growth of this oxide scale influences the intensity of the mechanical driving force. Author

N87-11893*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL CONDUCTIVITY OF PRISTINE AND BROMINATED P-100 FIBERS
Ching-cheh Hung and John Miller (Kenyon Coll., Gambier, Ohio) 1986 19 p Presented at the March meeting of the American Physical Society, Las Vegas, Nev., 31 Mar. - 4 Apr. 1986
(NASA-TM-88863; E-3263; NAS 1.15:88863) Avail: NTIS HC A02/MF A01 CSCL 11C

Thermal conductivity of brominated and pristine Union Carbide P-100 graphite fibers in the 30 to 160 C temperature range was determined by measuring thermal conductivities of graphite fiber epoxy composite samples and then excluding the epoxy contribution. A comparative thermal conductivity instrument was used to measure the thermal conductivity of the samples containing fibers. Results showed that the thermal conductivity values were 225 to 370 w/m-K and 215 to 340 w/m-K for pristine and brominated fibers, respectively. Furthermore, the thermal conductivity ratio of brominated to pristine P-100 fibers was 0.89, 0.91, and 0.92 at 55 to 80 C; 108 and 130 C, respectively. Such decrease in thermal conductivity results almost entirely from the 10 percent increase in fiber cross sectional area due to bromination. This result suggests that bromination effects on P-100 fiber structure is small, and that some structural changes, presumably the sharp-angled domain wall

becomes less sharp, occurring in the 80 to 108 C temperature range. Author

N87-11894# Connecticut Univ., Storrs. Inst. of Materials Science.
DEVELOPMENT/APPLICATIONS OF FT-IR ATR (FOURIER TRANSFORM IR ATTENUATED TOTAL INTERNAL REFLECTION) AND PHOTOACOUSTIC DICHROISM TECHNIQUES FOR STRUCTURAL CHARACTERIZATION OF POLYMER SURFACES
Final Report, 1978 - 1985
C. S. Sung 28 May 1986 5 p
(Contract N00014-78-C-0676)
(AD-A168519; U-136) Avail: NTIS HC A02/MF A01 CSCL 07/4

The main objective of this project was to develop new techniques for the characterization of polymer surfaces and interfaces, based on Fourier Transform IR attenuated total internal reflection (ATR) and photoacoustic dichroism (PAS) methods. The project involved both development of FT-IR PAS and ATR dichroism techniques using a specially designed crystal and attachment, and the demonstration of these techniques for the molecular characterization of selected polymer surfaces. Measurement of bulk molecular orientation and degree of crystallinity by transmission IR dichroism is only applicable to very thin polymer films. For thick samples, ATR dichroism was potentially useful, but severe experimental difficulties were encountered in adapting ATR dichroism for the use of the broad polymer community. The major effort during the initial period of the project was devoted toward developing a modified ATR attachment, using a symmetrical, double-edged internal reflection crystal. This modified attachment allows the sample to be rotated without disassembling and reassembling operations which change the contact area between the polymer sample and the ATR crystal. This eliminated the need for the correction of the reflectivities to an internal standard band. The usefulness of this attachment which provides information on two-dimensional orientation has been demonstrated on two types of polypropylene, uniaxially drawn and injection molded. GRA

N87-11895# Atlantic Research Corp., Gainesville, Va.
EXPANDABLE EPOXY APPLICATION Final Draft Report
T. F. Davidson and G. Rogowski 25 Apr. 1986 35 p
(Contract DASG60-84-C-0112)
(AD-A168669; ARC-TR-PL-11976) Avail: NTIS HC A03/MF A01 CSCL 11/4

Epoxy resins are widely used throughout the industry as the matrix in structural composites. Epoxides undergo the least amount of shrinkage during cure of the available composite matrices. However, this shrinkage does affect a reduction in the performance of the composite. This reduction in performance can be the result of poor adhesion between the matrix and the reinforcing fibers or the formation of stress concentrations in the matrix due to the presence of microcracks, both of which lead to the failure of the composite. Cyclic monomers which undergo expansion during a cationic ring opening polymerization have the potential of reducing or eliminating the shrinkage that occurs in epoxy resins. The expansion of the monomers during the polymerization process is due to the transformation of covalent bonds in the monomer ring to Van der Waals type interactions with the formation of the polymer. This expansion can also occur if the cyclic monomers are copolymerized with an epoxy, thus reducing or eliminating the shrinkage. The cyclic monomer chosen for this program was 3,9-bis (5'-norbo rnene-2'yl) 1,5,7,11-tetraoxaspiro 5,5 undecane which showed the most promise in preliminary studies. The objectives of this program are to evaluate the effects of incorporating limited percentages of the bisspiro orthocarbonate in epoxy resins; to determine the improvements in subscale composite motor cases using a bisspiro/epoxy resin, and to determine the merit of fabricating pressure bottles. GRA

N87-11896# Pennsylvania State Univ., University Park. Dept. of Materials Science and Engineering.
SURFACE CHEMISTRY AND STRUCTURAL EFFECTS IN THE STRESS CORROSION OF GLASS AND CERAMIC MATERIALS
Final Report, Jan. 1982 - Jan. 1986
Carlo G. Pantano and John J. Mecholsky 31 Mar. 1986 202 p
(Grant AF-AFOSR-0013-82)
(AD-A170243; AFOSR-86-0502TR) Avail: NTIS HC A10/MF A01 CSCL 11/2

The fracture behavior of glasses in the system $Na_2O.xAl_2O_3.(3-x)SiO_2$ (x=0.0, 0.2, 0.4, 0.6, 0.8 and 1.0) has been evaluated, and independently, their chemical corrosion in aqueous solutions was studied. The changes imposed upon the Al_2O_3/SiO_2 ratio, were intended to influence the network structure of the glass. The V-K sub I diagrams were obtained using the constant moment double cantilever beam technique in a wide variety of environments. The n-parameter in Region I was found to be independent of pH, whereas the presence of velocity plateaus and thresholds was shown to be very dependent upon the composition of the aqueous environment. This behavior was attributed to interactions between the fracture surfaces behind the crack-tip. The dependence of the n-parameter upon the bulk composition and structure of the glass was correlated with the elastic properties of the glass; i.e., the value of the n-parameter did not depend directly upon the corresponding corrosion resistance of the glass. Finally, the static fatigue limit, at least in the case of the $Na_2O.3SiO_2$ (x=0.0) glass, could be explained in terms of crack-healing rather than crack-blunting. Although, this study of fracture within a systematic compositional series of glasses led to critical assessments of the existing models for environment-dependent crack growth in glass. The results of comparable-although less extensive-studies on fluorozirconate glasses and silica sol/gel materials are also reported. GRA

N87-11897# Pacific Northwest Labs., Richland, Wash.
RAMAN DETERMINATION OF MOLECULAR STRUCTURE AND PHYSICAL PROPERTIES OF DIELECTRIC COATINGS
G. J. Exarhos Mar. 1986 27 p Presented at the International Conference on Metallurgical Coatings, San Diego, Calif., 7 Apr. 1986
(Contract DE-AC06-76RL-01830)
(DE86-011620; PNL-SA-13846; CONF-860495-8) Avail: NTIS HC A03/MF A01

Single and multilayer coatings exhibit optical properties controlled by localized chemical bonding and inherent microstructure that result from a particular deposition technique. The application of Raman spectroscopy to characterize such materials is attractive in that it is one of the few available methods that directly probes the chemical bond. Furthermore, optical properties of the coating can advantageously be used to enhance the sensitivity of the Raman probe through interference and resonance phenomena as well as guided wave enhancement techniques. Polycrystallite grain size and extent of grain orientation can also be determined from the spectra. In addition, inherent compressional stress in coatings, manifested in vibrational line shifts, may be quantified; conversely, knowledge of the vibrational frequency dependence on applied pressure will allow an estimate of the coating elastic properties. The capability for real-time in situ analysis represents a major strength of the Raman technique. Examples are discussed detailing real-time microstructural changes in oxidic coatings subjected to temperature fluctuations or high-energy pulsed laser irradiation. DOE

N87-11898# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
MOLECULAR CHARACTERISTICS OF THERMOPLASTIC POLYIMIDES AS FUNCTIONS DIFFERENT CURE CYCLES
Anders Wirsen and Eyvind Helleday Feb. 1986 29 p
(FOA-C-20603-F9; ISSN-0347-3694; ETN-86-97859) Avail: NTIS HC A03/MF A01

Thermoplastic polyimides (DuPont Nr 150A and B) were characterized by light scattering, ultracentrifugation, and viscometry. Only polyimid nr 150 was thoroughly analyzed due to incomplete solubility of most of the B-samples. In optimizing the cure cycles, the cure time before vacuum application is particularly important. At high postcure temperatures considerable degradation and crosslinking might occur. ESA

N87-11899# British Aerospace Public Ltd. Co., Bristol (England). Mechanical Technology Dept.
METHOD FOR PRODUCING A THIN POLYIMIDE FILM ON A SILICON SUBSTRATE
S. A. Lee Apr. 1983 16 p
(BAe-BT-14610; LR48386; ETN-86-97965) Avail: NTIS HC A02/MF A01

The techniques used to produce a 50 micron polyimide film on a 3 in. silicon slice are described. An even layer of polyimide powder was deposited onto a slice as a slurry containing a volatile carrier liquid. After evaporation of this liquid, the slice was placed in a vacuum oven to partially cure the polyimide. To level the polymer (now a viscous liquid) the slice was sandwiched between two optically flat glass plates with a 50 micron steel shim positioned between the slice and glass to regulate the thickness of the completed polymer film. However, the layers are highly stressed and unstable, making them unsuitable for large scale integrated circuits. ESA

N87-11900# Bureau of Mines, University, Ala. Research Center.
HIGH-PURITY, FINE-PARTICLE BORON NITRIDE POWDER SYNTHESIS AT -75 TO 750C, REPORT OF INVESTIGATIONS
R. S. Kalyoncu 1986 16 p
(PB86-217940; BM-RI-9012; LC-85-600346) Avail: NTIS HC A02/MF A01 CSCL 11B

Nonoxide ceramics with improved high-temperature properties could substitute for high-temperature alloys and reduce the Nation's dependence on imports of Cr, Co, Ni, and Mn. To meet the objective, the Bureau of Mines conducted research to synthesize ultrafine reactive boron nitride (BN) powders. BN powders were prepared at temperatures ranging from -75 degrees to 750 degrees C. Low temperature reactions (-75 degrees to 200 degrees C) between boron halides and N compounds led to formation of elemento-organic compounds that were thermally decomposed to ultrafine (approximately 100- to 150-A particle size) reactive BN powders. BN powders were also prepared through the reaction of a low-melting inorganic B compound (boric acid, borax) with an organic N compound (carbimide and thiocarbimide) in N2 and/or ammonia (NH3) atmospheres at temperature between 500 degrees and 750 degrees C. GRA

N87-11901# Bureau of Mines, University, Ala. Research Center.
CORROSION RESISTANCE OF SELECTED CERAMIC MATERIALS TO SULFURIC ACID, REPORT OF INVESTIGATIONS
J. P. Bennett 1986 18 p
(PB86-212354; BM-RI-9011; LC-85-600348) Avail: NTIS HC A02/MF A01 CSCL 11B

The Bureau of Mines is investigating the acid resistance of ceramic materials to identify construction materials for emerging technology in chemical and metallurgical processes. Eight commercial ceramic materials were evaluated: two red shale, two fireclay, one silicon carbide, one silica, one carbon, and one high-alumina. Samples were exposed to 10 wt pct H2SO4 at 50 degrees C and 10, 30, 50, 70, and 90 wt pct H2SO4 at 90 degrees C for time periods of 110 days. Statistically significant changes in cold crushing strength were observed in the silicon carbide and carbon materials. Weight changes and the leach rate of Al, Ga, Fe, K, Mg, Na, Si, and Ti were also monitored. The most severe corrosion conditions were also monitored. The most severe corrosion conditions were at 90 degrees C and 30 to 50 wt pct H2SO4 for the acid proof and at 10 wt pct H2SO4 for the acid-resistant materials. The silica and the high-aluminum materials were the most acid-resistant, followed by the higher density red shale and fire clay. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; the storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *4 Energy Production and Conversion.*

N87-11902# Jet Propulsion Lab., California Inst. of Tech Pasadena.
ANTIMISTING KEROSENE: EVALUATION OF LOW TEMPERATURE PERFORMANCE Final Report, Mar. 1983 - Dec. 198
P. Parikh, A. Yavrouian, R. Petersen, and V. Sarohia Aug. 198
49 p
(Contract DTFA3-80-A-00215)
(DOT/FAA/CT-85/31) Avail: NTIS HC A03/MF A01

The low temperature and freezing behavior of Jet A and AMK fuels was investigated in a 50-gallon capacity wing tank simulator. The fuel in the rectangular simulator was chilled from the top and bottom surfaces while the sides were thermally insulated. The evolution of a vertical temperature profile in the simulator was studied for Jet A and AMK fuels under nearly identical bottom wall temperature histories. A small but noticeable difference between the bulk fuel thermal response of Jet A and AMK was observed with a slower response for AMK. Holdup measurements for AMK were slightly lower than those for Jet A. Rocking of the simulated wing tank did not significantly alter the cool down and freezing behavior. The performance of two boost pumps: one for the DC-10 and the other for the Cessna 441 aircraft, was evaluated with AMK fuel. For both pumps the performance deteriorated when switching from Jet A to AMK. This performance deterioration was far more dramatic for the Cessna 441 boost pump than for the DC-10 boost pump. At low temperature (-30 C) the performance of the DC-10 pump actually improved compared to ambient temperature (20 C) performance. It deteriorated, however, for the Cessna 441 pump. Author

N87-11903# Army Armament Research and Development Command, Dover, N. J. Armament Engineering Directorate.
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY OF PROPELLANTS. PART 1: ANALYSIS OF M1, M6, AND M10 PROPELLANTS
Jerome Haberman May 1986 20 p
(AD-A168206; ARAED-TR-86017-Pt-1) Avail: NTIS HC A02/MF A01 CSCL 07/4

The stabilizer content of propellants in the Army stockpile is periodically determined to monitor their remaining safe life. The available standard methods of analysis are time consuming, and there is evidence that they may give misleading information. These methods are being replaced by state-of-the-art, high performance liquid chromatography (HPLC) using reverse phase columns. High performance liquid chromatography permits the differentiation among the stabilizers and their degradation products together with accurate quantitation. This progress report describes work carried out in the analysis of single base propellants containing diphenylamine (DPA) as the stabilizer. Several degradation products have been identified and the routine determination of these compounds is feasible. The degradation of DPA seems to follow a pattern that is unique for M1 and M6's as compared to the pattern for M10's. It is postulated that the ingredients of the propellants, other than the nitrocellulose (NC), may influence the way in which the DPA degradation products are formed. GRA

N87-11904# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
F100 FUEL SAMPLING ANALYSIS: FOREIGN SAMPLES Final Report, Apr. 1984 - Apr. 1985
Lourdes O. Maurice Mar. 1986 115 p
(AD-A168573; AFWAL-TR-85-2087) Avail: NTIS HC A06/MF A01 CSCL 21/4

Fuel pump cavitator problems experienced with the F100 engine used in the F-15/F-16 aircraft have led to an extensive fuel analysis program to identify properties that might be contributing to fuel

pump failure. This report analyzes the chemical and physical properties of 12 JP-4 and 4 JP-8 fuel samples obtained from Foreign National Air Bases. The fuels analyzed met specifications in all but a few isolated cases, and had no unusual properties. If the fuel is causing fuel pump failure, it must be the result of a property not being measured. The fuels are as good or better than their specifications prescribed. It is concluded that the F100 fuel pump cavitation problems are most likely associated with the mechanical complexity built into the design, rather than the results of the fuel used. GRA

N87-11905# Space Sciences, Inc., Monrovia, Calif.
MASS SPECTROMETRIC INVESTIGATION OF THE THERMAL DECOMPOSITION OF SEVERAL PROPELLANT AND EXPLOSIVE INGREDIENTS Final Report, 1 Aug. 1980 - 31 Dec. 1985
Milton Farber, S. P. Harris, and R. D. Srivastava Feb. 1986 41 p
(Contract N00014-80-C-0711)
(AD-A168611) Avail: NTIS HC A03/MF A01 CSCL 19/1

Thermal decomposition kinetics, including an elucidation of the mechanisms, were determined for several energetic polymeric materials. These materials included poly(3-nitratomethyl-3-methyl) oxetane (p-NMMO), the copolymer, methyl nitramino methyl methy oxetane/azido methyl methyl oxetane (50/50 MNAMMO/AMMO), and the monomer 3,3 bis(methyl nitramino methyl) oxetane (BMNAMO). Experiments were performed on both stabilized and unstabilized dehydrofefo (DHF) to determine its decomposition and evaporation at 132 F. GRA

N87-11906# California Univ., Davis. Dept. of Applied Science.
FUNDAMENTAL STUDY OF DENSE-FLUID DETONATION Final Report, Apr. 1981 - Sep. 1985
William G. Hoover 30 Sep. 1985 40 p
(Contract F49620-81-C-0050; ARPA Order 4077; Contract DA Proj. 291-7)
(AD-A168753; AFOSR-86-0300TR) Avail: NTIS HC A03/MF A01 CSCL 19/4

Equations incorporating adiabatic, isothermal, and isoenergetic constraints are developed and applied to simulations of gases, liquids, and solids to obtain realistic fluid detonation wave profiles. The structure of uniaxially and hydrostatically compressed solids and the transfer of energy among translational and internal molecular modes are studied. Novel computational methods are developed simulating nonequilbrium processes using Guass' Principle of Least Constraint. GRA

N87-11907# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDIES ON THE DYNAMIC MECHANICAL PROPERTIES OF THE COMPOSITE MODIFIED DOUBLE-BASE PROPELLANT
Zhou Zhou, Zhanning Jia, and Qihuai Zhou 29 May 1986 23 p Transl. into ENGLISH from Binggong Xuebaa (China), v. 2, no. 2, May 1985 p 49-58
(AD-A168799; FTD-ID(RS)T-0328-86) Avail: NTIS HC A02/MF A01 CSCL 21/9

The dynamic mechanical properties of the composite modified double-base (CMDB), double-base (DB) and polyvinyl chloride (PVC) composite propellants were measured respectively with a Rheovibron viscoelastometer. The effects of three kinds of solid fillers (aluminium (Al), ammonium perchlorate (AP) and cyclotetraethylenetetranitramine (HMX)) and the different kinds and contents of plasticizers (triacetin (TA), ortho-dibutyl phthalate (DBP) and nitroglycerine (NG)) on the dynamic mechanical properties of the double-base binder were studied. The dynamic mechanical data and spectrums on these ingredients have been obtained at a fixed frequency (3Hz) and a broad range of temperature. At the same time, the impact strengths of the CMDB propellant, the double-base binder and the pvc propellant were also measured at a broad range of temperature. Experimental conclusions have been obtained that the dynamical mechanical properties of the CMDB propellant lie between the DB and PVC composite propellants and depend on its binder system, and that the CMDB propellant has the specific properties of both higher mechanical damping and a strong Beta relaxation at low temperature. GRA

N87-11908# IIT Research Inst., Bartlesville, Okla.
AVIATION TURBINE FUELS, 1985
C. L. Dickson and P. W. Woodward May 1986 15 p
(Contract DE-FC22-83FE-60149)
(DE86-012140; NIPER-144-PPS-86/2) Avail: NTIS HC A02/MF A01

Samples of this report are typical 1985 production and were analyzed in the laboratories of 17 manufacturers of aviation turbine (jet) fuels. The data were submitted for study, calculation, and compilation under a cooperative agreement between the National Institute for Petroleum and Energy Research (NIPER), Bartlesville, Oklahoma, the American Petroleum Institute (API), and the United States Department of Energy (DOE), Bartlesville Project Office. Results for certain properties of 88 samples of aviation turbine fuels are included in the report for military grades JP-4 and JP-5, and commercial type Jet A. Previous aviation fuel survey reports are listed. DOE

N87-11909# Sandia National Labs., Albuquerque, N. Mex.
NUMERICAL ROUTINES FOR PREDICTING IGNITION IN PYROTECHNIC DEVICES
K. G. Pierce Jun. 1986 111 p
(Contract DE-AC04-76DP-00789)
(DE86-013251; SAND-86-1268) Avail: NTIS HC A06/MF A01

Two numerical models of the thermal processes leading to ignition in a pyrotechnic device have been developed. These models are based on finite difference approximations to the heat diffusion equation, with temperature-dependent thermal properties, in a single spatial coordinate. The derivation of the finite difference equations is discussed and the methods employed at boundaries and interfaces are given. The sources of the thermal-properties data are identified and how these data are used is explained. The program structure is explained and example runs of the programs are given. DOE

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

For biological materials see *55 Space Biology*.

No abstracts in this category.

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N87-11910# Texas A&M Univ., College Station. Texas Transportation Inst.
CRITERIA FOR ASPHALT-RUBBER CONCRETE IN CIVIL AIRPORT PAVEMENTS: MIXTURE DESIGN Final Report, Sep. 1983 - Aug. 1986
Freddy L. Roberts, Robert L. Lytton, and Denise Hoyt Jul. 1986 74 p
(Contract DTFA01-83-C-30076)
(DOT/FAA/PM-86/39) Avail: NTIS HC A04/MF A01

A mixture design procedure is developed to allow the use of asphalt-rubber binders in concrete for flexible airport pavement. The asphalt-rubber is produced by reacting asphalt with ground, scrap tire rubber to produce the binder for the asphalt-rubber concrete. Procedures for laboratory preparation of alsphalt-rubber binders using r . equipment setup that was found by researchers to produce laboratory binders with similar properties to field processes are included. The rubber-asphalt concrete mixture design

procedure includes adjustments to the aggregate gradation to permit space for the rubber particles in the asphalt-rubber binder as well as suggested mixing and compaction temperatures, and compaction efforts. While the procedure was used in the laboratory to successfully produce asphalt-rubber concrete mixtures, it should be evaluated in the field to ensure that consistent results can be achieved in a production environment. Author

N87-11911# Environmental Protection Agency, Research Triangle Park, N.C. Atmospheric Sciences Research Lab.
DERIVATION OF DAMAGE FUNCTIONS FOR ATMOSPHERIC DEGRADATION OF MATERIALS
F. H. Haynie and F. W. Lipfert May 1986 21 p
(PB86-213238; EPA-600/D-86-118) Avail: NTIS HC A02/MF A01 CSCL 13B

The information in the paper is directed to those who develop and use damage functions which relate atmospheric degradation of materials to various causal agents in the atmosphere. Such relationships must be quantified mathematically as part of the overall cost-benefit considerations associated with possible pollution control strategies. Damage functions may be derived from theoretical considerations, from controlled experiments in environmental simulation chambers, from essentially uncontrolled field experiments, or from semicontrolled field experiments. The paper discusses optimum ways of combining these methods to improve the credibility and applicability of materials damage functions for use in assessments, with reference to some of the research performed for the National Acid Precipitation Assessment Program. GRA

N87-11912# National Bureau of Standards, Gaithersburg, Md.
NATIONAL FORUM ON THE FUTURE OF AUTOMATED MATERIALS PROCESSING IN US INDUSTRY: THE ROLE OF SENSORS. REPORT OF A WORKSHOP (1ST) HELD AT SANTA BARBARA, CALIFORNIA ON DECEMBER 16-17, 1985
H. T. Yolken and R. Mehrabian Dec. 1985 79 p Workshop held in Santa Barbara, Calif. 16-17 Dec. 1985 Prepared in cooperation with California Univ., Santa Barbara
(PB86-212040; NBSIR-86-3341) Avail: NTIS HC A05/MF A01 CSCL 13H

These are the proceedings of the workshop A National Forum on the Future of Automated Materials Processing in U.S. Industry - The Role of Sensors. This is the first of two workshops to be sponsored by the Industrial Research Institute and the White House Office of Science and Technology Policy, Committee on Materials Working Group on Automation of Materials Processing. The second workshop will address the other two key components required for automated materials processing, process models and artificial intelligence coupled with computer integration of the system. The objective of these workshops is to identify and assess important issues afecting the competitive position of U.S. industry related to its ability to automate production processes for basic and advanced materials and to develop approaches for improved capability through cooperative R&D and associated efforts. GRA

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking*. For search and rescue see *03 Air Transportation and Safety*, and *16 Space Transportation*.

N87-11913*# Arizona State Univ., Tempe. Dept. of Electrical and Computer Engineering.
ELECTROMAGNETIC BACKSCATTERING BY CORNER REFLECTORS Semiannual Report, 1 Feb. - 31 Jul. 1986
Constantine A. Balanis and Timothy Griesser 1986 30 p
(Grant NAG1-562)
(NASA-CR-179846; NAS 1.26:179846) Avail: NTIS HC A03/MF A01 CSCL 20N

The analysis of the backscatter cross section of a dihedral corner reflector, using Geometrical Theory of Diffraction (GTD) and Physical Theory of Diffraction (PTD), is completed in the azimuthal plane, and very good agreement with experimental results is obtained. The advantages and limitations of the GTD and PTD techniques are discussed specifically for radar cross section applications. The utilization of GTD and PTD in oblique incidence diffraction from conducting targets is discussed. Results for equivalent current off-axis diffraction from the flat rectangular plate are presented using the equivalent currents of Knott, Senior, and Michaeli. The rectangular subdivision technique of Sikta, and its extension by Sunatara, alleviate some of the limitations of the equivalent techniques. As yet, neither technique can be used in bistatic scattering or for multiple scattering of a complex target. Author

N87-11914*# Arizona State Univ., Tempe. Dept. of Electrical and Computer Engineering.
ELECTROMAGNETIC BACKSCATTERING BY CORNER REFLECTORS Semiannual Report, 1 Aug. 1985 - 31 Jan. 1986
Constantine A. Balanis and Timothy Griesser 1986 158 p
(Grant NAG1-562)
(NASA-CR-179809; NAS 1.26:179809) Avail: NTIS HC A08/MF A01 CSCL 20N

The Geometrical Theory of Diffraction (GTD), which supplements Geometric Optics (GO), and the Physical Theory of Diffraction (PTD), which supplements Physical Optics (PO), are used to predict the backscatter cross sections of dihedral corner reflectors which have right, obtuse, or acute included angles. These theories allow individual backscattering mechanisms of the dihedral corner reflectors to be identified and provide good agreement with experimental results in the azimuthal plane. The advantages and disadvantages of the geometrical and physical theories are discussed in terms of their accuracy, usefulness, and complexity. Numerous comparisons of analytical results with experimental data are presented. While physical optics alone is more accurate and more useful than geometrical optics alone, the combination of geometrical optics and geometrical diffraction seems to out perform physical optics and physical diffraction when compared with experimental data, especially for acute angle dihedral corner reflectors. Author

N87-11915*# IGI Consulting, Inc., Boston, Mass.
US LONG DISTANCE FIBER OPTIC NETWORKS: TECHNOLOGY, EVOLUTION AND ADVANCED CONCEPTS. VOLUME 3: ADVANCED NETWORKS AND ECONOMICS Final Report
Oct. 1986 598 p
(Contract NAS3-24682)
(NASA-CR-179481; NAS 1.26:179481) Avail: NTIS HC A25/MF A01 CSCL 17B

This study projects until 2000 the evolution of long distance fiber optic networks in the U.S. Volume 1 is the executive Summary. Volume 2 focuses on fiber optic components and systems that are directly related to the operation of long-haul networks. Optimistic, pessimistic and most likely scenarios of technology development are presented. The activities of national and regional companies implementing fiber long haul networks are also highlighted, along with an analysis of the market and regulatory forces affecting network evolution. Volume 3 presents advanced fiber optic network concept definitions. Inter-LATA traffic is quantified and forms the basis for the construction of 11-, 15-, 17-, and 23-node networks. Using the technology projections from Volume 2, a financial model identifies cost drivers and determines circuit mile costs between any two LATAs. A comparison of fiber optics with alternative transmission concludes the report. Author

N87-11916*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
PULSE CODE MODULATION (PCM) ENCODER HANDBOOK FOR AYDIN VECTOR MMP-600 SERIES SYSTEM
Stephen F. Currier and Wayne R. Powell Washington, D.C. Aug.

1986 139 p
(NASA-RP-1171; NAS 1.61:1171) Avail: NTIS HC A07/MF A01 CSCL 17B

The hardware and software characteristics of a time division multiplex system are described. The system is used to sample analog and digital data. The data is merged with synchronization information to produce a serial pulse coded modulation (PCM) bit stream. Information presented herein is required by users to design compatible interfaces and assure effective utilization of this encoder system. GSFC/Wallops Flight Facility has flown approximately 50 of these systems through 1984 on sounding rockets with no inflight failures. Aydin Vector manufactures all of the components for these systems. Author

N87-11917# Naval Ocean Systems Center, San Diego, Calif.
HF (HIGH FREQUENCY) ABSOLUTE TIME OF ARRIVAL SENSING Interim Report, Sep. 1981 - May 1985
R. B. Rose Feb. 1986 118 p
(AD-A168275; NOSC/TD-869) Avail: NTIS HC A06/MF A01 CSCL 17/7

In late 1980 questions arose concerning whether the ionosphere was sufficiently stable to allow precisely measured time of arrival of skywave signals to be used for geolocation in the high frequency (HF) band between 2 and 32 MHz. The chief limitation in the accuracy of this typo of system is the amount of uncertainty in the ionospheric height estimation and its temporal stability. Traditional ionospheric research resources did not address the issue in sufficient detail and time resolution to be of any assistance. In order to understand the exact nature of the ionospheric uncertainties and to quantify their extent, experimentation was proposed to sense the variation in the refraction height of the ionosphere as it relates to the time of arrival of the HF signal. The objective of this work was to determine the range of environmentally induced errors in a skywave Time Difference of Arrival (TDOA) measurement, thereby bounding the ultimate geolocation accuracy one could expect from this technique. The first experimental measurement system started operation in early 1981. This effort involved establishing a continuous absolute Time of Arrival (TOA) experiment over the one-hop midlatitude path between San Diego, California and Fort Collins, Colorado. The system is fully digital and stabilized with a cesium beam standard. This work was supplemented with vertical incidence sounder data at both ends of the path, a collateral Doppler sensing system, and coincident satellite solar data. GRA

N87-11918# General Pneumatics Corp., Scottsdale, Ariz. Western Research Center.
ARCTIC COMMUNICATIONS TECHNIQUES: REMOTE UNATTENDED POWER SYSTEMS Progress Report, 16 Dec. 1985 - 1 Feb. 1986
Graham Walker Feb. 1986 3 p
(Contract N00014-85-C-0856)
(AD-A168289) Avail: NTIS HC A02/MF A01 CSCL 17/2

The purpose of this report is to describe the accomplishments during the reporting period, 16 December 1985 through 1 February 1986, on the project entitled Arctic Communications Techniques: Remote Unattended Power Systems. All of the fabricated component parts for the first Ross-Stirling engine were completed. During the assembly process several interferences between some of the parts in the rotating mechanism were discovered causing drawing changes and subsequent rework to a few of the components. Assembly of the first engine was then completed. On the first attempt the engine ran successfully at approximately 3500 rpm. GRA

N87-11919# Naval Weapons Center, China Lake, Calif.
TECHNIQUES FOR MICROWAVE DIELECTRIC MEASUREMENTS Final Report, Oct. 1982 - Sep. 1985
D. R. Gagnon, D. J. White, G. E. Everett, and D. J. Banks Mar. 1986 85 p
(AD-A168300; AD-E900579; NWC-TP-6643) Avail: NTIS HC A05/MF A01 CSCL 20/3

To fulfill the need for accurate characterization of the properties of electromagnetic window materials at microwave and millimeter-wave frequencies, a number of different techniques have been applied in the development of facilities for dielectric measurements at the Naval Weapons Center. GRA

N87-11920# Massachusetts Technological Lab., Bethesda, Md. Washington Div.
RAIN EFFECTS ON RADIO FREQUENCY PROPAGATION Final Report, 31 Sep. 1985 - 31 Mar. 1986
D. J. Fang and C. S. Lo 31 Mar. 1986 108 p
(Contract F04704-85-C-0144)
(AD-A168342; MTL-WD-8604-T; BMO-TR-86-23) Avail: NTIS HC A06/MF A01 CSCL 20/14

Rain is a principal cause of signal degradation in a terrestrial or satellite transmission in a frequency range from UHF to EHF. This study proceeded with a format for compiling and editing the relevant data, and for making engineering inferences to supplement relevant yet inadequate data, as required for practical applications on a terrestrial or a slant path link. The format was to model the rain-induced attenuation by an empirical relationship on a = aRb L type of power law equation. Five well recognized models (CCIR, Fedi, French, Lin and SAM) were chosen for comparison with database. As for immediate applications, the Lin model is recommended for percentage of time over 0.35 of a year; and for percentage of time less than 0.3%, the French model is considered to be applicable. For more specific applications, such as for cases of low rain-rate regions to high rain-rate regions, low elevation angle paths to high elevation angle paths, etc., best performance models are identified. GRA

N87-11921# Naval Postgraduate School, Monterey, Calif.
PRACTICAL CONSIDERATIONS OF THE TOPOLOGICAL APPROACH TO ELECTROMAGNETIC INTERFERENCE CONTROL M.S. Thesis
Thomas L. Grodek Mar. 1986 127 p
(AD-A168518; NPS-62-86-001) Avail: NTIS HC A07/MF A01 CSCL 20/14

The topological approach to electromagnetic interference control is described and explained for background. Some of the issues concerning the implementation of an equipment-level topological barrier at electronics facilities are discussed. Experiments are conducted on a common 19-inch equipment rack to investigate and evaluate topological grounding techniques and the proper connection of a penetrating conductor filter. Additional experiments are conducted to evaluate the use of double-shielded coaxial cable. GRA

N87-11922# Naval Ocean Systems Center, San Diego, Calif.
SURFACE-SEARCH RADAR PERFORMANCE IN THE EVAPORATION DUCT: GLOBAL PREDICTIONS, REVISION A Final Report, Oct. 1982 - Oct. 1983
K. D. Anderson May 1986 80 p Original contains color illustrations
(AD-A168631; NOSC/TR-923-Rev-A) Avail: NTIS HC A05/MF A01 CSCL 17/9

Surface-search radar systems, if properly designed, may utilize the oceanic surface evaporation duct to detect surface targets at ranges greater than 60 nmi. Theoretical relationships between the thickness of the evaporation duct and maximum detection range are derived for four radars at frequencies of 3, 6, 10, and 18 GHz. Distributions of maximum detection range are calculated from two worldwide duct height climatologies. The analysis considers four targets with three possible radar cross section distributions applied to each target. Since rigorous full mode waveguide analysis of all combinations is impractical, the propagation characteristics are approximated using two single mode techniques. GRA

N87-11923# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Sciences.
A CLASS OF STABLE TRANSMISSION ALGORITHMS FOR VARYING USER MODELS
Michael Paterakis, Leonidas Georgiadis, and P. Papantoni-Kazakos Apr. 1986 29 p

(Contract N00014-85-K-0547; NSF ECS-85-06916)
(AD-A168701; UCT/DEECS/TR-86-7) Avail: NTIS HC A03/MF A01 CSCL 17/2

We consider a broadcast packet radio network with independent and identical users (LID). We require that the time of the transmission channel be slotted, and that transmissions be then synchronous (each packet transmission may only start at the beginning of some slot). We assume ternary feedback per slot (empty versus success versus collision), full feedback sensing by each user, no propagation delays and also that collision results in full destruction of all the involved packets; thus retransmission is then necessary. This report proposed and analyzes a class of stable transmission algorithms whose operation is independent of the number of users in the system and the arrival process per user, as long as the latter is IID. The algorithms in the class are a combination of a random access and reservation techniques. They are synchronous, and they are studied in the full sensing broadcast environment. For any finite number of independent users in the system, and any IID arrival process per user, their throughput is one. Given some IID arrival process per user, given some algorithm in the class, its limit throughput, when user population tends to infinity, is lowered bounded by its limit throughput in the presence of the limit Poisson user model. The latter throughput is also attainable; it coincides with the limit throughput, when the users are Poisson. GRA

N87-11924# Physical Dynamics, Inc., Bellvue, Wash.
AN EQUATORIAL SCINTILLATION MODEL Technical Report, 1 Feb. 1983 - 30 Apr. 1985
Edward J. Fremouw and Robert E. Robins 30 Sep. 1985 75 p
(Contract DNA001-83-C-0097; DNA Proj. I25-AMXI)
(AD-A168723; PD-NW-85-342R; DNA-TR-85-333) Avail: NTIS HC A04/MF A01 CSCL 04/1

Radiowave scintillation in the presence of natural and/or high altitude nuclear disturbances has the potential to disrupt numerous transionospheric radio and radar systems. This report develops a model characterizing the plasma density irregularities that produce scintillation in the naturally disturbed equatorial F layer. The model has been incorporated into Program WBMOD along with subroutines for computing both link geometry and scintillation indices, the latter by means of phase screen diffraction theory. The model is based on similarly extensive analysis of Wideband data from two equatorial stations. It describes irregularities at an effective height of 350 km that are isotropic across the geomagnetic field and elongated by a factor of 50 along the field and whose one dimensional spatial power spectrum obeys a single regime power law with a (negative) spectral index of 1.5. The height-integrated spectral strength of the irregularities is modeled as a function of solar epoch (sunspot number), the angle between the sunset terminator and the geomagnetic field line through the equatorial F layer point in question (a measure of seasonal and longitudinal variation), time after E-layer sunset on that field line, and the F-layer magnetic apex latitude of the point. The report also highlights a factor missing from complete characterization of the joint seasonal/longitudinal variation of scintillation, thought to depend upon thermospheric neutral winds. GRA

N87-11925# Massachusetts Inst. of Tech., Lexington. Lincoln Lab.
A MEASURE OF THE RANDOMNESS OF SIGNALS AND SUGGESTED APPLICATIONS
B. Reiffen 7 Mar. 1986 39 p
(Contract F19628-85-C-0002)
(AD-A168916; TR-750; ESD-TR-86-030) Avail: NTIS HC A03/MF A01 CSCL 09/3

The solution to an optimization or estimation problem depends on some criterion of optimality. Typically, all prospective solutions have an associated measure of goodness, and the optimum solution is that with maximum (or minimum) measure. The choice of measure incorporates whatever is known about the physics of the problem as well as other assumptions. This presentation suggests two closely related measures of the randomness of signals. Each of these measures is related to the uncertainty principle of quantum mechanics. It is further suggested that minimizing either of these measures is an appropriate criterion for the solution of a variety of problems, including spectral estimation, signal extrapolation and/or interpolation, nonparametric signal detection, and phase retrieval. The criterion may be appropriate when the unknown signal is postulated to be simple rather than complex and it is necessary to minimize the number of arbitrary assumptions made about the signal and noise characteristics. GRA

N87-11926# Department of the Air Force, Washington, D.C.
HAND OFF INTEGRATOR APPARATUS FOR SIGNAL DETECTION Patent
Raymond J. Masak, inventor (to Air Force) Issued 27 May 1986 5 p Supersedes AD-D010778
(AD-D012391; US-Patent-4,591,856; US-Patent-Appl-SN-559168; US-Patent-Class-343-17.1R) Avail: US Patent and Trademark Office CSCL 17/9

A hand off integrator apparatus utilizing first and second recirculating integrator units in series to integrate a series of input pulses in order to detect the presence of weak signals in a high background noise environment. GRA

N87-11927# North Carolina Univ., Chapel Hill. Dept. of Statistics.
ON NONGAUSSIAN SIGNAL DETECTION AND CHANNEL CAPACITY
Charles R. Baker Aug. 1985 21 p
(Contracts N00014-81-K-0373; N00014-75-C-04491)
(AD-A170239) Avail: NTIS HC A02/MF A01 CSCL 09/4

A summary of recent research results is given. Three problems are discussed: detection of nonGaussian signals in Gaussian noise, signal detection in nonGaussian spherically-invariant noise, and information capacity of communication channels when the constraint on the transmitted signal is mismatched to the Gaussian channel noise. Author (GRA)

N87-11928# Research Inst. of National Defence, Stockholm (Sweden). Dept. of Central Planning and Administration.
COMPUTER PROGRAM FOR FREQUENCY ASSIGNMENTS TO AERONAUTICAL AND MARITIME BEACONS AND COAST STATIONS IN THE BAND 283.5 TO 1800 kHz
Lars Bergman Feb. 1986 40 p
(FOA-C-60018-E2; ISSN-0281-0255; ETN-86-97865) Avail: NTIS HC A03/MF A01

A computer program created for frequency assignments to aeronautical radio beacons and to beacons in the maritime radionavigation service, but which can also be used for frequency planning in the maritime mobile service is described. Ground wave propagation calculations based on the curves in CCIR Rec 368 are made for propagation over land and sea. Using these results with map studies, manual estimations concerning mixed path propagation can be done. Sky wave propagation is calculated using the curves in CCIR Rec 435-4 for 50 deg geomagnetic latitude in the Northern Hemisphere and for 30 deg in the southern. It is estimated that the necessary accuracy, including the data of the effective radiated power of the transmitters, is not high enough for a more sophisticated method of calculation, including a record of coastlines, so the program was originally not made for automatic frequency assignments. An automatic mode was added, but should be used with caution. ESA

N87-11929# British Aerospace Public Ltd. Co., Bristol (England). Data Processing and Transmission Dept.
CONTROL OF RADIO FREQUENCY INTERFERENCE IN HIGH FREQUENCY SWITCHED MODE POWER SUPPLIES
H. J. A. Mackillican Oct. 1983 28 p
(BAe-BT-15600; LR49412; ETN-86-97971) Avail: NTIS HC A03/MF A01

Electrostatic and electromagnetic radio frequency interference (RFI) in high frequency switched mode power supplies was studied. Sources of RFI and ways to combat it are discussed. ESA

N87-11930# British Aerospace Public Ltd. Co., Bristol (England).
SPECTRAL CONTENT OF A TRANSMITTED FM SIGNAL
J. W. Henn Nov. 1983 11 p
(BAe-BT-15690; LR49724; ETN-86-97973) Avail: NTIS HC A02/MF A01

The spectral content of an FM signal from an FM modulator after passing through a sixth order low pass filter (from a binary input) is derived. The Fourier series of a pulse waveform is analyzed. The spectrum of the transmitted signal is calculated for parameters used for VLSW telemetry. ESA

N87-11931# Marconi Space Systems Ltd., Portsmouth (England).
ADVANCED SAR STUDY Final Report
F. G. Sawyer and M. A. Brown Paris ESA Sep. 1985 150 p Prepared in cooperation with Marconi Co. Ltd., Great Baddow, England, and Dornier-Werke GmbH, Friedrichshafen, West Germany
(Contract ESTEC-5714/83-NL-MS)
(BLS-6345; ESA-CR(P)-2226; ETN-86-98104) Avail: NTIS HC A07/MF A01

The design and performance of satellite SAR systems capable of operation at L, C, and X-Bands on either of two platforms and in combination as L and C, or C and X-Band systems, or as a twin C-Band system were assessed. Baseline solutions are presented, and a number of options are given. Solutions against each of two sets of mission requirements are given with configuration and technology choices. ESA

N87-11932# Borer Electronics A.G., Solothurn (Switzerland).
METEOSAT RAW IMAGE DATA ENCRYPTION Final Report
H. P. Bader, R. Rueppel, A. Bricard, and M. Lepertel Paris ESA Nov. 1985 120 p Prepared in cooperation with Societe Crouzet (Contract ESTEC-5815/84-NL-BI(SC))
(ESA-CR(P)-2234; ETN-86-98113) Avail: NTIS HC A06/MF A01

A stream cypher system is proposed for METEOSAT raw image data encryption. For each transmitted bit the stream cypher generates a key stream bit. This key steam bit is EXORED with the message bit before it is transmitted. The receiver does the same with the received encrypted cypher text bit and gets back the clear text message bit. Since the METEOSAT raw image transmission system already includes a sophisticated bit and line synchronization system, it is proposed that this be used also for cypher synchronization. Onboard and ground implementation, and key management, are described. ESA

N87-11933# Nationaal Inst. voor Kernfysica en Hoge Energiefysica, Amsterdam (Netherlands). Sectie-K.
DATA LINK ISOLATER
J. D. Schipper 1986 14 p In DUTCH
(DIGEL-52; ETN-86-98157) Avail: NTIS HC A02/MF A01

A module which isolates the common-mode signals between input and output was developed. The isolation is required because the zero level in two separated systems which are situated at a distance from each other is never the same. The module consists of two parts connected by optocouplers; one part is fully isolated from the Earth; both parts consist of a line receiver, a line driver, and a power supply. The maximum voltage between input and output of the optocouplers is 1000 V. The maximum bit rate of the module is 5 MB/s. The link via this module fulfils the RS422 standard and is fully duplex. ESA

N87-11934# Institut National Polytechnique, Grenoble (France). Lab. de Genie Informatique.
PROPOSITION OF A DESIGN METHODOLOGY FOR INTEGRATED COMMUNICATION CIRCUITS. IMPLEMENTATION OF A CIRCUIT FOR THE FIP LOCAL NETWORK Ph.D. Thesis [PROPOSITION D'UNE METHODOLOGIE DE CONCEPTION DE CIRCUITS INTEGRES DE COMMUNICATION. REALISATION D'UN COMMUNICATEUR POUR LE RESEAU LOCAL FIP]
Mario DiazNava 1986 226 p In FRENCH; ENGLISH summary Sponsored by Consejo Nacional de Ciencia y Technologia, Mexico
(ETN-86-98399) Avail: NTIS HC A11/MF A01

A design procedure for VLSI circuits based on a library of flexible operators to reduce the design time and to allow untrained engineers to design their own circuits is proposed. The concept is illustrated by the implementation of a VLSI for local networks which allows the communication between automata sensors, and acting devices. It is shown that the design time of such a circuit using this method is considerably reduced. ESA

N87-11935# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
COMPARISONS OF THE TWO-STATE MARKOV AND FRITCHMAN MODELS AS APPLIED TO BIT ERROR STATISTICS IN COMMUNICATION CHANNELS
L. E. Vogler May 1986 30 p Sponsored by RADC
(PB86-213485; NTIA-R-86-193) Avail: NTIS HC A03/MF A01 CSCL 17B

Comparisons of Fritchman's single-error-state model with the two-state Markov model are presented in graphical form for a number of statistical functions, e.g., the error gap distribution (EGD), the block error probability (BLER), and the probability of undetected block error (PUB). Measured data from previously published papers are shown on the curves where these are available, and examples of four types of channels are illustrated: HF, troposcatter, VHF, and switched network. A simple data-fitting procedure is described for the EGD, and its relationships to other statistics of interest are given. GRA

N87-11936# National Bureau of Standards, Gaithersburg, Md. Center for Computer Systems Engineering.
GRIDNET: A HIGHLY SURVIVABLE DIGITAL COMMUNICATIONS NETWORK, PHASE 1 Final Report
A. Mink, G. G Nacht, A. L. Koenig, and A. W. Holt Apr. 1986 33 p Sponsored by Defense Nuclear Agency
(PB86-203015; NBSIR-86-3361) Avail: NTIS HC A03/MF A01 CSCL 17B

GRIDNET is a highly reliable and survivable packet switched, wide area communication network that may consist of thousands of modes and may span thousands of miles. The reliability of GRIDNET is based on redundant transmission of data via two distinct paths and bitwise comparison of the duplicate received data in addition to error detection codes. The survivability of GRIDNET is attributed to its intrinsic topology, which provides for a number of alternative paths between pairs of nodes. A feasibility prototype of a GRIDNET was proposed as a multi-phase research project. The report describes the design of the phase 1 GRIDNET prototype which was constructed. This prototype satisfied all of the Phase 1 operational performance objectives. GRA

N87-11937# National Telecommunications and Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.
EHF (EXTREMELY HIGH FREQUENCY) TELECOMMUNICATIONS SYSTEM ENGINEERING MODEL
K. C. Allen Apr. 1986 75 p Sponsored in part by Army Information Systems Engineering Support Activity
(PB86-214814; NTIA-86-192) Avail: NTIS HC A04/MF A01 CSCL 17B

An EHF Telecommunication System Engineering Model (ETSEM) has been developed as an aid in the design of line-of-sight (LOS) communication systems from 10 to 100 GHz. ETSEM provides tabulation of path geometry parameters and analyzes ray-path and Fresnel zone clearances to help the engineer design the path. ETSEM also predicts the performance (availability) of both digital and analog systems based on state-of-the-art EHF propagation models and equipment specifications. Attenuation by rain, clear-air absorption, and multipath are modeled. These are expected to essentially determine the statistics of link availability as limited by propagation impairments. Performance may be predicted for any interval of months of the year. A climatological data base for North America and Europe provides parameters for the propagation models. ETSEM has been implemented on a

desk-top computer. Weaknesses and limitations of the model are discussed and improvements are suggested. GRA

N87-11763*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DESIGN OPTIMIZATION OF THE 34-METER DSN-NCP ANTENNAS
Roy Levy *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 16 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20N

N87-12408*# National Astronomy and Ionosphere Center, Arecibo, Puerto Rico.
THE ARECIBO S-BAND RADAR PROGRAM
Donald B. Campbell *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 3-4 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

N87-12409*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR
Raymond F. Jurgens, Pamela E. Clark, Richmond M. Goldstein, Steven J. Ostro, Martin A. Slade, Thomas W. Thompson, and R. Stephen Saunders *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 5-7 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

N87-12467*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADAR INVESTIGATION OF ASTEROIDS
Steven J. Ostro *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 118-119 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

N87-12476*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PASSIVE MICROWAVE REMOTE SENSING OF THE ASTEROIDS USING THE VLA: CONTINUATION
William J. Webster, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 133-134 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N87-11938# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RF FIELD PROFILES IN WEAKLY IRREGULAR OPEN RESONATORS
J. J. Barroso, A. Montes, and G. O. Ludwig Jul. 1986 63 p Submitted for publication
(INPE-3957-PRE/975) Avail: NTIS HC A04/MF A01

Open resonators are considered with longitudinal profiles described by continuous and sufficiently smooth functions in order to reduce reflections and mode conversion in the cavity. For these types of resonators, it is shown that the single mode approximation is adequate. Using a Langer transformation, the approximate solution for problems with two turning points is given in terms of a uniform expansion valid for all axial positions; for the fundamental mode, the RF field longitudinal distribution is essentially of the form exp [-w sup 2 (z)/2] where w(z) is determined by the resonator profile. A comparative study of the resonant and selective properties for different resonator types is made, and the influence of the cavity profile on the electric field longitudinal distribution is analyzed. As an example of practical interest, the design of a resonant cavity for a 35Ghz gyrotron operating in the TE sub 021 mode is presented. Author

N87-11939# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
SUBMICROMETER RESOLUTION ETCHING OF INTEGRATED CIRCUIT MATERIALS WITH LASER-GENERATED ATOMIC FLUORINE
G. L. Loper and M. D. Tabat 3 Nov. 1986 18 p
(ATR-85(8347)-1) Avail: NTIS HC A02/MF A01

Submicrometer resolution lithography by ultraviolet laser-induced radical etching is demonstrated. It was previously shown that this method can provide highly specific and efficient etching of various refractory metal/insulator and semiconductor/insulator substrate combinations. Author

N87-11940*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
DISTRIBUTION SYSTEM SIMULATOR
K. A. Bahrami, H. Kirkham, and S. Rahman 15 Aug. 1986 44 p Sponsored in part by DOE
(NASA-CR-179918; JPL-Pub-86-41; NAS 1.26:179918; DOE/ET-29372/6) Avail: NTIS HC A03/MF A01 CSCL 09C

In a series of tests performed under the Department of Energy auspices, power line carrier propagation was observed to be anomalous under certain circumstances. To investigate the cause, a distribution system simulator was constructed. The simulator was a physical simulator that accurately represented the distribution system from below power frequency to above 50 kHz. Effects such as phase-to-phase coupling and skin effect were modeled. Construction details of the simulator, and experimental results from its use are presented. Author

N87-11941# Michigan Univ., Ann Arbor. Dept. of Electrical Engineering and Computer Sciences.
THERMIONIC CATHODE PROJECT Annual Progress Summary Report, 1 Sep. 1984 - 31 Aug. 1985
Ward D. Getty and Mark E. Herniter 9 Jan. 1986 33 p
(Contract N00014-82-K-0448; RR0-1109)
(AD-A168569; APSR-3) Avail: NTIS HC A03/MF A01 CSCL 09/1

A planar cathode, Pierce type electron gun with a design perveance of .0000032 (amps/volts to the 3/2 power) has been operated with a lanthanum hexaboride (LaB6) cathode. The cathode (useful diameter 1.9 cm) is heated by bombardment by electrons from a small tungsten filament. The bombardment heating system is stabilized by a feedback control circuit. The power required to heat the cathode is 315 W bombardment power and 200 W filament power. Heating power has been reduced by careful heat shielding and reduction of heat conduction losses. Significant additional reductions should be possible. The sintered LaB6 cathode disk is 2.5 cm in diameter, 3.2 mm thick, and has a density of 94%. No problems have been encountered with cracking of the disk. Cathode emission is insensitive to repeated exposure to air after allowing the cathode to fully cool. The measured perveance and anode transmission of the gun are 3.2x10(-6) and 94%, respectively. Current densities up to 6.5 A/sq cm have been reached with 5 micrometer pulses. Measurements were made at cathode temperatures of 1300 to 1600 C. GRA

N87-11942# Rhode Island Univ., Kingston. Dept. of Electrical Engineering.
VLSI (VERY LARGE SCALE INTEGRATED CIRCUITS) IMPLEMENTATION OF A QUANTIZED SINUSOID FILTER ALGORITHM AND ITS USE TO COMPUTE THE DISCRETE FOURIER TRANSFORM, PART 2 Final Report, 25 Aug. 1983 - 24 Aug. 1985
Wiehrs L. Collier Mar. 1986 103 p
(Contract N00014-83-K-0664)

(AD-A168605) Avail: NTIS HC A06/MF A01 CSCL 09/5

The design, fabrication specification, and testing of custom very large scale integrated circuits which function as a chip set for realizing narrowband digital filters is described. The approach is based on a Quantized Sinusoid DFT algorithm. These integrated circuits use only a small VLSI chip area and provide fast operation. The design steps and testing are described in detail.Author (GRA)

N87-11943# Arizona Univ., Tucson. Optical Sciences Center.
RADON OPTICAL PROCESSING IN RADON SPACE Final Report, Jul. 1984 - Jan. 1986
Harrison H. Barrett 15 Jun. 1986 166 p
(Grant AF-AFOSR-0188-84)
(AD-A169612) Avail: NTIS HC A08/MF A01 CSCL 09/3

The stated goals of the Radon program were: (1) Theoretical investigation of the role of the Radon transform in signal processing, including enumeration of the operations achievable in Radon space. (2) Construction of a practical system for two dimensional spectral analysis and image filtering. (3) Proof-of-principle experiments for other processing operations, such as bandwidth compression and calculation of the Wigner distribution function. (4) Determination of the feasibility of Radon-space processing of three dimensional data, emphasizing not only system architecture but also storage media capable of saving rapidly retrieving the requisite data arrays. Several 2D signal-processing operations are discovered susceptible to solution in Radon space. These include the Hartley transform, certain joint coordinate-frequency representations (e.g., the Wigner distribution function and Woodward ambiguity functions), certain algorithms for spectrum estimation (e.g., the periodogram and the Yule Walker autoregressive model), and the cepstrum. Most of these Radon space operations have been demonstrated in computer simulations and some have been performed by means of analog hardware in the hybrid Radon space signal processing system. This system can perform a family of processing operations at about five frames per second, limited by the image-rotation rate. Processing is performed by surface acoustic wave (SAW) filters, and the 2D processed signal is displayed on a CRT. GRA

N87-11944# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
ELECTROCHEMICAL INVESTIGATION OF LITHIUM/POTASSIUM CARBONATE EUTECTIC FOR APPLICATION IN MODELING THE MOLTEN CARBONATE FUEL CELL CATHODE Final Progress Report
L. McCoy and M. Schuman Apr. 1986 97 p
(Contract DE-AC21-84MC-21185)
(DE86-001087; DOE/MC-21185/2042) Avail: NTIS HC A05/MF A01

A program involving the design, construction, and operation of a high-temperature cell equipped with a rotating gold disk electrode has been carried out with the objective of identifying and quantifying the principal oxide species present in molten LiKCO3 electrolytes using electrochemical measurements. The dependence of the current on electrode rotational speed at 750 to 800 C indicates that the data are typical of the convective/diffusive transport of an electroactive species from the bulk electrolyte. The reverse is true at 650 C, where the current increases with an increasing voltage sweep rate but is little affected by the speed of electrode rotation. In the latter case, a current by chemical reaction occurring within the electrode boundary layer is indicated. The linear current-voltage increase observed at the lower temperature in the presence of about 20 mol % 02 has not been accounted for. Graphical analysis of the data taken with air and CO2 sparged electrolyte at 750 and 800°C indicates the electroactive species to be the superoxide ion. Computer studies of the same data usi ng regression analysis methodology indicate that the current may instead arise from the reduction of the peroxide ion concurrently with other electroactive material derived from secondary catalytic reactions or electrolyte impurities. Additional data will be required to support either conclusion with certainty. Detailed studies of the electrochemistry of the LiKCO3 electrolyte over a broader range of temperatures and sparge gas compositions are recommended as a means of providing a second basis for identifying the electrode reactions. DOE

N87-11945# Weizmann Inst. of Science, Rehovoth (Israel).
HIGH-EFFICIENCY, THIN-FILM, CADMIUM CHALOCOGENIDE PHOTOELECTROCHEMICAL CELL WITH IN SITU STORAGE Final Subcontract Report, 1 May 1983 - 31 Mar. 1985
J. Manassen, S. Licht, G. Hodes, D. Cahen, and M. Lev Apr. 1986 97 p
(Contract DE-AC02-83CH-10093)
(DE86-004451; SERI/STR-211-2909) Avail: NTIS HC A05/MF A01

A photoelectrochemical cell with in situ storage, based on a Cd(Se,Te) photoelectrode in a polysulfide solution, was constructed. The counter-electrode was cobalt sulfide on brass and the membrane Permion 1010. A reproducible plating method, suitable for a 20-cm² area, was developed, giving a maximum power of 200 mA. Photoetching, criticality important, was done in concentrated hydrochloric acid under reverse bias. The polarization behavior of the large CoS counterelectrodes was studied; the presently used geometry of a frontwall cell gives a polarization loss of about 10%. The water transport through two kinds of membranes was found to depend on the cation in solution. Greater water transport was found with potassium ion than with sodium ion in the electrolyte. A technical version of the cell with in situ storage was produced with the membrane in cylindrical form. Its lower resistance improved the difference between day and night current. After working two months under real weather conditions, the photoelectrode deteriorated to half its initial output. The chemistry of polysulfide solutions was studied, revealing compositions providing maximum stability and efficiency. DOE

N87-11946# General Electric Co., Largo, Fla. Neutron Devices Dept.
COMBINING AUTOMATIC TITRATION OF TOTAL IRON AND SULFUR IN THERMAL BATTERY MATERIALS
N. A. Marley 28 May 1986 35 p
(Contract DE-AC04-76DP-00656)
(DE86-007802; GEPP-TIS-962) Avail: NTIS HC A03/MF A01

Optimal thermal battery performance requires careful control of the iron disulfide content in the catholyte mixture. Previously, the iron and sulfur content of battery materials was determined separately, each requiring a lengthy sample preparation and clean up procedure. A new method has been developed which allows both determinations to be made on the same sample following a simple dissolution procedure. Sample preparation requires oxidation and dissolution with nitric acid followed by dissolution in hydrochloric acid. Iron and sulfur are then determined on sample aliquots by automatic titration. The implementation of this combined procedure for the determination of iron and sulfur by automatic titration has resulted in a substantial reduction in the analysis time. Since sample aliquots are used for each determination, the need to repeat a sample for analysis is rare, improving both the analytical efficiency and sample throughput. Results obtained for sulfur show an improved precision. DOE

N87-11947# Sandia National Labs., Albuquerque, N. Mex.
STUDIES OF HIGH RELIABILITY LONG-LIFE LI/SO SUB 2 CELLS
C. D. Jaeger, S. C. Levy, J. T. Cutchen, and E. V. Thomas 1986 7 p
(Contract DE-AC04-76DP-00789)
(DE86-010478; SAND-86-0191C) Avail: NTIS HC A02/MF A01

To satisfy the need for a five year battery, a long-term test of Li/SO2 cells was initiated. Premature failures were observed and a program was undertaken to identify the cause of these failures. Based on the results of this program, changes in the cell design were made which gave rise to the Sandia modified Li/SO2 cell having improved long-life performance. Several lots of modified cells have been manufactured during the past five years. Acceptance testing of incoming cells from each lot has revealed lot-to-lot variation in performance as well as a small proportion of cells with low capacity. A program to develop a nondestructive methodol-

ogy for identifying cells with low inherent capacity was initiated. Several relevant nondestructive measurement parameters were identified. A decision tree screening technique, based on these parameters, was developed to identify those cells having low capacity. DOE

N87-11948# Los Alamos National Lab., N. Mex.
CALORIMETRIC MEASUREMENTS OF THE EQUIVALENT SERIES RESISTANCE OF LOW-LOSS, HIGH REPETITION RATE PULSE DISCHARGE CAPACITORS
G. G. McDuff and K. R. Rust 1986 6 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011232; LA-UR-86-1860; CONF-860674-1) Avail: NTIS HC A02/MF A01

In high repetition rate pulsed circuits, component losses are a major design consideration. Accurate means of calculating the dissipation loss is essential for determining efficiency and in designing cooling systems for removal of associated heat. In high voltage systems, dielectric loss can be a major contributor to power dissipation. Total energy dissipation in a capacitor is the sum of dielectric, tab, corona, lead connections, and skin effect losses. Dielectric loss is also dependent on temperature, voltage, and frequency which adds to the complexity of determining an accurate value. The total loss component can be described by the equivalent series resistance or ESR. This paper reviews the most common electrical methods used to measure the ESR and particulars that must be considered with these techniques. Finally calorimetric methods of ESR determination are described that are accurate regardless of frequency and voltage and the ESR values of a variety of commercially available pulsed discharge capacitors. DOE

N87-11949# Lawrence Livermore National Lab., Calif.
ALTERNATOR-DRIVEN, MAGNETICALLY SWITCHED MODULATOR
R. Kihara and H. C. Kirbie 1986 8 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract W-7405-eng-48)
(DE86-012189; UCRL-94757; CONF-860674-8) Avail: NTIS HC A02/MF A01

The technique of magnetically switching high-power pulses was recently revitalized with the development of amorphous magnetic alloys and the new power conditioning requirements of pulsed lasers and high-brightness particle accelerators. The most common magnetic switching technique for generating high-repetition-rate pulses consists of a dc power supply, a triggered switch (thyratron or solid-state), and a repeated network of magnetic switches and capacitors. The life of this type of pulser is limited by the aging of liquid and solid dielectric materials and by the reliability of the triggered switch. An alternator-driven, magnetically switched modulator differs from the conventional magnetic modulator in the replacement of the dc power supply and triggered switch with a high-frequency motor-generator set and an all-magnetic circuit. The power conditioning network converts each cycle of the applied ac power into a single, compressed, unipolar pulse. Consequently, the modulator produces a train of pulses with an interpulse separation equal to the period of the alternator. Additional compression can be attained by the addition of successive stages of magnetic switching. The absence of active switches within the network improves the system reliability and extends the service life of the modulator to the limits of component insulation fatigue and alternator bearing wear. This style of magnetic pulse compression was first described by Melville and reproduced at LLNL in order to quantify the network efficiency, jitter and reliability when modern magnetic materials are employed. DOE

N87-11950# Sandia National Labs., Albuquerque, N. Mex.
STATISTICAL DISTRIBUTIONS OF BREAKDOWN VOLTAGES IN A HIGH CURRENT SPARK GAP
L. F. Rinehart and M. T. Buttram 1986 8 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012281; SAND-86-0519C; CONF-860674-5) Avail: NTI HC A02/MF A01

We have designed and constructed a new spark gap test-be to study high current effects and to establish, experimentally, th critical current and other conditions required to generate th extreme value distribution. We are currently measuring the extrem value onset point as a function of current, gap spacing, and variou other parameters. Scanning electron microscope study of electrod surfaces after discharges above and below the extreme valu onset is being performed to correlate surface conditions wit breakdown voltage distributions. The maximum design parameter of the test-bed are 140 kV, >100kA critically damped, >200 k with ringing waveform, 14 kJ/shot, maximum available prime powe 2 MW. A unique low inductance (230 nH with 1.4 f energy storage geometry is used to generate very high current discharges wit no reversal; thus, anode-cathode effects may be studied separatel at >100 kA. Test runs of >10^4 shots are performed for each se of experimental conditions so that very low probability events ca be measured with confidence. These large statistical samples o data are recorded and analyzed by an on-line computer dat acquisition system. We present here the machine design, geometry and data showing the extreme value onset under some experimen tal conditions. DOE

N87-11951# Sandia National Labs., Albuquerque, N. Mex.
ENGINEERING LIMITS OF PHOTOCONDUCTIVE SEMICONDUCTOR SWITCHES IN PULSED POWER APPLICATIONS
F. J. Zutavern and M. W. OMalley 1986 6 p Presented at th 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012282; SAND-86-0434C; CONF-860674-4) Avail: NTIS HC A02/MF A01

The potential of essentially jitter free subnanosecond rise time photoconductive semiconductor switches (PCSS) for pulsed power has been explored in several previous papers. In addition to picosecond rise time and jitter, PCSS also offers low inductance, high repetition rates (GBz), and optical control. In developing large scale PCSS for pulsed power applications, one encounters many aspects of the switch which can be selected or tailored to meet the specific requirements of each application. This paper describes PCSS in terms of the switching parameters which are being stressed to meet these requirements and discusses their theoretical limits as well as those encountered in the laboratory. Recent improvements (from 20 kV/cm to 70 kV/cm) in the surface breakdown strength of silicon wafers for high voltage PCSS are reported. Several specific examples are included to illustrate and emphasize the particular switching parameters being discussed. DOE

N87-11952# Massachusetts Inst. of Tech., Cambridge. Lab. for Electromagnetic and Electronic Systems.
UTILITY-INTERACTIVE INVERTER USING THE dc CURRENT-SOURCE APPROACH
M. F. Schlecht Apr. 1986 161 p
(Contract DE-AC04-76DP-00789)
(DE86-012135; SAND-85-7019) Avail: NTIS HC A08/MF A01

A topological approach to a utility-interactive inverter that treats the photovoltaic array as a current-source, rather than as a voltage-source is presented. The different characteristics resulting from this approach have certain advantages that apply to single-phase residential units as well as to three-phase high power units. Advantages include open-loop control of the ac current waveform, an array voltage that can extend from zero up to some maximum, and the use of an inductor as the dc energy storage element. Simulations showed that the switching frequency for an active-waveshaping inverter can actually be quite low (5 kHz or less) and still obtain a distortion level in the utility current of less than 5% THD. Finally, a 20 kW three-phase current-source converter is described. DOE

N87-11953# AEG-Telefunken, Ulm (West Germany). Fachbereich Technische Roehren.
DEVELOPMENT OF TRAVELING WAVE TUBE (TWT) TRANS-

MITTER AMPLIFIER FOR COMMUNICATION SATELLITES 60 GHz/10 W Final Report, Mar. 1984
Gerold Lippert, Karl-Heinz Bluhm, Peter Malzahn, and Claus Bulka Bonn, West Germany BMFT Dec. 1985 67 p In GERMAN; ENGLISH summary Sponsored by BMFT
(BMFT-FB-W-85-030; ISSN-0170-1339; ETN-86-97845) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14

For communication between geostationary satellites a transmitter using a TWT amplifier with frequencies in the region of 60 GHz and output power of a few watts is proposed. The design objectives for the electron gun were realized using a computer program, which also takes into account the thermal velocities of the electrons, to dimension the electrodes. A focusing electrode and a mixed metal cathode with a low beam compression ratio are employed in the gun. All requirements for the beam focusing system are met using an extremely precise machined integrated PPM system and SmCo5 magnets. An easily manufacturable delay line structure was realized using a diffusion brazed interdigital line consisting of only a few parts. The one stage collector can operate with a strongly reduced potential. ESA

N87-11954# British Aerospace Public Ltd. Co., Bristol (England). Mechanical Equipment Dept.
PERFORMANCE CHARACTERISTICS OF A GEC SERVOAMPLIFIER AND PERMANENT MAGNET ELECTRIC MOTOR
N. Hollister and K. Spreadborough 6 Jun. 1983 79 p
(LR48720; ETN-86-97951) Avail: NTIS HC A05/MF A01

Test results on an electric motor and servoamplifier, considered for launcher control systems, are listed. Tachogenerator calibration, current monitor calibration and stall torque, starting torque and rotational losses, servoamplifier gains, open loop velocity gain, frequency response, step response, and thermal time constant are covered. ESA

N87-11955# Technische Hogeschool, Delft (Netherlands). Afdeling der Elektrotechniek.
STATIC SERIES VOLTAGE MARGIN OF I2L [STATISCHE SERIESPANNINGEN MARGE VAN I2L]
J. vanderPlas May 1985 17 p In DUTCH
(Rept-85SO; ETN-86-98041) Avail: NTIS HC A02/MF A01

The static series voltage margins of logic circuits were calculated using a flip-flop circuit with two one-collector I2L transistors and a stability criterion. The static series voltage margin was calculated for the one-sided (one perturbation source) as well as for the worst case two-sided (two cooperating current sources) using several methods. Both cases show the same results for the margin. The calculation using voltage equations provides the best results. Approximations had to be made since the exact calculation is too difficult. ESA

N87-11956# Technische Hogeschool Twente, Enschede (Netherlands). Afdeling der Elektrotechniek.
CONTROL OF A SERVOMECHANISM FOR AN ELASTIC BEAM Ph.D. Thesis [REGELING VAN EEN SERVOSYSTEEM VOOR EEN ELASTISCHE STAAF]
J. vanVugt 14 Feb. 1986 152 p In DUTCH; ENGLISH summary
(Rept-065.1708/86-0; ETN-86-98069) Avail: NTIS HC A08/MF A01

The modeling and the tip controller of a flexible arm are treated. Modal analysis was used to describe the modes with decoupled differential equations, which makes it possible to represent the modes with the graph technique. The parameters of the model were associated with the mass and compliance of a second order system. The coupling of the differential equations and the parameters of the model depend on the boundary conditions of the beam. For this model it is shown how to use wire strain gages for the identification of the states of the beam. The model is based on the assumption that only the output angle of the servo can be measured. This angle is the input of the model which gives the necessary states in the feedback loop to control the overall system. With this state-feedback controller every beam mode can be damped. ESA

N87-11957# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
A MULTILAYER CHANNEL ROUTER FOR NONRECTANGULAR CHANNELS
Marcel vanVeelen, Albert Schoute, and Ad tenBerg Apr. 1986 17 p
(INF-86-9; RNR-CAD/8604/1; ETN-86-98517) Avail: NTIS HC A02/MF A01

An algorithm for routing multilayer channels whose borders may be irregular and contain connection points in all layers and at every grid position is presented. No restrictions are posed on the wiring in different layers. The routing algorithm opens the way to solve general three dimensional routing problems. The method incorporates a range of strategies which handle connection problems of different complexity. In most (practical) situations a straightforward and fast algorithm is employed. However, as the density of terminals at the borders increases, more complex strategies are required. In the extreme case, which is only of theoretical interest, a solution can even be found if at each channel side all but two grid positions are occupied by terminals. ESA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N87-11958 Stanford Univ., Calif.
A VISCOUS/INVISCID ZONAL METHOD FOR THE COMPUTATION OF 2 AND 3-DIMENSIONAL COMPRESSIBLE FLUID FLOWS WITH SEPARATION
Jack Strigberger 1986 170 p
Avail: Univ. Microfilms Order No. DA8608234

A zonal finite-difference method has been developed to compute compressible high Reynolds number flows with separation. The method utilizes a partitioning of the flow-field so as to solve the full potential equation in a zone where the flow is irrotational and the compressible thin-layer Navier-Stokes or Euler equations in the other zones. This zonal approach is taken in the interests of saving computation time compared with a non-zonal thin-layer Navier-Stokes approach. Proper interaction between the zones is achieved by overlapping them and using the interior solution of one zone to provide appropriate boundary conditions for another zone. Zonal interface inconsistencies can readily arise, and some rules and techniques for their alleviation have been developed. The method has been applied to the steady viscous flows about a circular cylinder and about a hemisphere/cylinder at moderate incidence. Excellent agreement was obtained between zonal and nonzonal computations in two dimensions and reasonable agreement has been obtained in three dimensions. The effects of grid topology and coarseness and of the various approximations and inaccuracies of the constituent flow solvers have been noted. Dissert. Abstr.

N87-11959 ESDU International Ltd., London (England).
EFFECTIVENESS: N SUB TU RELATIONSHIPS FOR THE DESIGN AND PERFORMANCE EVALUATION OF TWO-STREAM HEAT EXCHANGERS
Jul. 1986 144 p Supersedes ESDU-85042
(ESDU-86018; ISBN-0-85679-570-4; ISSN-0141402X) Avail: ESDU

This Data Element ESDU 86018 is an addition to the Heat Transfer Sub-series. Equations and a large number of curves derived from them are given to allow design or performance evaluation of shell-and-tube and crossflow heat exchangers. The curves cover co-current and counter-current flow and various numbers of shells and of tube side passes. Also shown on the curves are the locus of designs for which a temperature cross may occur and the locus of 95% heat transfer effectiveness

which indicates the region of uneconomic design. The method assumes a linear temperature/enthalpy relationship (constant specific heat capacity) for both streams. It applies to boiling or condensing flow of a single component with no temperature change, or boiling and condesning flow of a mixture that is always two phase. It excludes conditions in which transition from single to two phase flow occurs. Worked examples show the application of the method and comparisons are included that show the relative performance of various exchanger designs. ESDU

N87-11960*# Stanford Univ., Calif. Dept. of Mechanical Engineering.

SIMULATIONS OF TURBULENT MIXING AND REACTING FLOWS AND THEIR APPLICATIONS TO TURBULENCE MODELING Semiannual Progress Report

Joel H. Ferziger and Brian J. Cantwell Jul. 1986 21 p
(Grant NAG1-532)
(NASA-CR-179829; NAS 1.26:179829) Avail: NTIS HC A02/MF A01 CSCL 20D

The method of full simulation is applied to reacting turbulent flows. Full simulation has proven of great value as a complement to experiments for the study of nonreacting turbulent flows. It provides insight into the physics of turbulent flows and their modeling. It is natural to try to extend these methods to the simulation of reacting turbulent flows. Because this is one of the first attempts at this type of simulation, a subsidiary goal of this work is to demonstrate the feasibility of using simulation to study turbulent reacting flows. In addition, it is shown that such simulations can be used to provide physical insight into the nature of turbulent combustion and to provide data that will help to construct models that can be used in engineering simulations of turbulent reacting flows. Author

N87-11961*# Wisconsin Univ., Milwaukee. Dept. of Mechanical Engineering.

THIRD-MOMENT CLOSURE OF TURBULENCE FOR PREDICTIONS OF SEPARATING AND REATTACHING SHEAR FLOWS: A STUDY OF REYNOLDS-STRESS CLOSURE MODEL Final Report

R. S. Amano and Pankaj Goel Sep. 1986 91 p
(Grant NAG3-546)
(NASA-CR-177055; NAS 1.26:177055; TF/86/9) Avail: NTIS HC A05/MF A01 CSCL 20D

A numerical study of computations in backward-facing steps with flow separation and reattachment, using the Reynolds stress closure is presented. The highlight of this study is the improvement of the Reynold-stress model (RSM) by modifying the diffusive transport of the Reynolds stresses through the formulation, solution and subsequent incorporation of the transport equations of the third moments, bar-u(i)u(j)u(k), into the turbulence model. The diffusive transport of the Reynolds stresses, represented by the gradients of the third moments, attains greater significance in recirculating flows. The third moments evaluated by the development and solution of the complete transport equations are superior to those obtained by existing algebraic correlations. A low-Reynolds number model for the transport equations of the third moments is developed and considerable improvement in the near-wall profiles of the third moments is observed. The values of the empirical constants utilized in the development of the model are recommended. The Reynolds-stress closure is consolidated by incorporating the equations of k and e, containing the modified diffusion coefficients, and the transport equations of the third moments into the Reynolds stress equations. Computational results obtained by the original k-e model, the original RSM and the consolidated and modified RSM are compared with experimental data. Overall improvement in the predictions is seen by consolidation of the RMS and a marked improvement in the profiles of bar-u(i)u(j)u(k) is obtained around the reattachment region. M.G.

N87-11962*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF VIBRATION AMPLITUDE ON VAPOR CAVITATION IN JOURNAL BEARINGS

David E. Brewe and Bo O. Jacobson (Lulea Univ, Sweden) 1986 17 p Presented at the Nordic Symposium on Tribology, Lulea, Sweden, 15-18 Jun. 1986; sponsored by the Royal Swedish Academy of Engineering Sciences
(NASA-TM-88826; E-3200; NAS 1.15:88826; USAAVSCOM-TR-86-C-26) Avail: NTIS HC A02/MF A01 CSCL 20D

Computational movies were used to analyze the formation and collapse of vapor cavitation bubbles in a submerged journal bearing. The effect of vibration amplitude on vapor cavitation was studied for a journal undergoing circular whirl. The boundary conditions were implemented using Elrod's algorithm, which conserves mass flow through the cavitation bubble as well as through the oil-film region of the bearing. The vibration amplitudes for the different cases studied resulted in maximum eccentricity ratios ranging from 0.4 to 0.9. The minimum eccentricity ratio reached in each case was 0.1. For the least vibration amplitude studied in which the eccentricity ratio varied between 0.1 and 0.4, no vapor cavitation occurred. The largest vibration amplitude (i.e., eccentricity ratios of 0.1 to 0.9) resulted in vapor cavitation present 76 percent of one complete orbit. Author

N87-11963*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ON THE MAXWELLIAN DISTRIBUTION, SYMMETRIC FORM, AND ENTROPY CONSERVATION FOR THE EULER EQUATIONS

Suresh M. Deshpande Nov. 1986 30 p
(NASA-TP-2583; L-16036; NAS 1.60:2583) Avail: NTIS HC A03/MF A01 CSCL 20D

The Euler equations of gas dynamics have some very interesting properties in that the flux vector is a homogeneous function of the unknowns and the equations can be cast in symmetric hyperbolic form and satisfy the entropy conservation. The Euler equations are the moments of the Boltzmann equation of the kinetic theory of gases when the velocity distribution function is a Maxwellian. The present paper shows the relationship between the symmetrizability and the Maxwellian velocity distribution. The entropy conservation is in terms of the H-function, which is a slight modification of the H-function first introduced by Boltzmann in his famous H-theorem. In view of the H-theorem, it is suggested that the development of total H-diminishing (THD) numerical methods may be more profitable than the usual total variation diminishing (TVD) methods for obtaining wiggle-free solutions. Author

N87-11964*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

NUMERICAL SOLUTION OF THE INCOMPRESSIBLE NAVIER-STOKES EQUATIONS IN THREE-DIMENSIONAL GENERALIZED CURVILINEAR COORDINATES

Stuart E. Rogers, Dochan Kwak, and James L. C. Chang (Rockwell International Corp., Canoga Park, Calif.) Jan. 1986 44 p
(NASA-TM-86840; A-85413; NAS 1.15:86840) Avail: NTIS HC A03/MF A01 CSCL 20D

Numerically solving the incompressible Navier-Stokes equations is known to be time consuming and expensive. Testing of the INS3D computers code, which solves these equations with the use of the pseudocompressibility method, shows this method to be an efficient way to obtain the steady state solution. The effects of the waves introduced by the pseudocompressibility method are analyzed and criteria are set and tested for the choice of the pseudocompressibility parameter which governs the artificial sound speed. The code is tested using laminar flow over a two dimensional backward-facing step, and laminar flow over a two dimensional circular cylinder. The results of the computations over the backward-facing step are in excellent agreement with experimental results. The transient solution of the flow over the cylinder impulsively started from rest is in good agreement with experimental results. However, the computed frequency of periodic shedding of vortices behind the cylinder is not in agreement with the experimental value. For a three dimensional test case,

computations were conducted for a cylinder end wall junction. The saddle point separation and horseshoe vortex system appear in the computed field. The solution also shows secondary vortex filaments which wrap around the cylinder and spiral up in the wake. Author

N87-11965*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
LOSSES IN FOUNTAIN-EFFECT PUMPS
Peter Kittel Apr. 1986 9 p
(NASA-TM-88232; A-86184; NAS 1.15:88232) Avail: NTIS HC A02/MF A01 CSCL 20D

Three loss mechanisms in fountain-effect pumps are identified and analyzed. Two of these mechanisms reduce the mechanocaloric effect, by reducing the mass transferred per unit heat input. The first loss mechanism of these losses is the result of normal fluid leakage through the pump. The second loss mechanism is the result of the finite separation between the porous plug and the heater. The third loss mechanism reduces the thermomechanical effect. It results from the Gorter-Mellink interaction within the porous plug. All three of these loss mechanisms are shown to reduce pump efficiency. They are then applied to an example to illustrate the relative significance of the three mechanisms. Author

N87-11966*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THERMAL ANALYSIS OF RADIOMETER CONTAINERS FOR THE 122m HOOP COLUMN ANTENNA CONCEPT
Lawrence A. Dillon-Townes Sep. 1986 54 p
(NASA-TM-89026; NAS 1.15:89026) Avail: NTIS HC A04/MF A01 CSCL 20D

A thermal analysis was conducted for the 122 Meter Hoop Column Antenna (HCA) Radiometer electronic package containers. The HCA radiometer containers were modeled using the computer aided graphics program, ANVIL 4000, and thermally simulated using two thermal programs, TRASYS and MITAS. The results of the analysis provided relationships between the absorptance-emittance ratio and the average surface temperature of the orbiting radiometer containers. These relationships can be used to specify the surface properties, absorptance and reflectance, of the radiometer containers. This is an initial effort in determining the passive thermal protection needs for the 122 m HCA radiometer containers. Several recommendations are provided which expand this effort so specific passive and active thermal protection systems can be defined and designed. Author

N87-11967# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
ASYMPOTIC SOLUTIONS TO COMPRESSIBLE LAMINAR BOUNDARY-LAYER SOLUTIONS FOR DUSTY-GAS FLOW OVER A SEMI-INFINITE FLAT PLATE
B. Y. Wang (Academia Sinica, Beijing, China) and I. I. Glass Aug. 1986 84 p Sponsored in part by Natural Sciences and Engineering Research Council, and by Defence Research Establishment, Suffield
(Contract DNA001-85-C-0368; Grant AF-AFOSR-82-0096)
(UTIAS-310; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

An asymptotic analysis is given of the compressible, laminar boundary-layer flow of a dilute gas-particle mixture over a semi-infinite flat plate. The analysis extends existing work by considerating more realistic drag and heat-transfer relations than those provided by Stokes. A more general viscosity-temperature expression is also incorporated into the analysis. The solution involves a series expansion in terms of the slip parameter of the particles. The numerical results, including the zeroth and first-order approximations for the gas and particle phases, are presented for the two limiting regimes: the large-slip limit near the leading edge and the small-slip limit far downstream. Significant effects on the flow produced by the particles with Stokes' and nonStokes' relations are studied and clarified. The effects of some nondimensional similarity parameters, such as the Reynolds, Prandtl, and Eckert numbers, on the two phase boundary-layer flow are discussed. Author

N87-11968*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF FORCED AND FREE CONVECTIONS ON STRUCTURAL TEMPERATURES OF SHUTTLE ORBITER DURING REENTRY FLIGHT
William L. Ko, Robert D. Quinn, and Leslie Gong 1986 18 p
(NASA-TM-86800; H-1329; NAS 1.15:86800) Avail: NTIS HC A02/MF A01 CSCL 20D

Structural performance and resizing (SPAR) finite-element thermal analysis computer program was used in the heat transfer analysis of the space shuttle orbiter wing subjected to reentry aerodynamic heating. With sufficient external forced convective cooling near the end of the heating cycle, the calculated surface temperatures of the thermal protection system (TPS) agree favorably with the flight data for the entire flight profile. However, the effects of this external forced convective cooling on the structural temperatures were found to be negligible. Both free convection and forced convection elements were introduced to model the internal convection effect of the cool air entering the shuttle interior. The introduction of the internal free convection effect decreased the calculated wing lower skin temperatures by 20 F at most, 1200 sec after touchdown. If the internal convection is treated as forced convection, the calculated wing lower skin temperatures after touchdown can be reduced to match the flight-measured data very closely. By reducing the TPS thicknesses to certain effective thickness to account for the TPS gap heating, the calculated wing lower skin temperatures prior to touchdown can be raised to agree with the flight data perfectly. Author

N87-11969# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MODELING OF EXPLOSIONS: FRAGMENTATION [MODELAGEM DE EXPLOSOES: FRAGMENTACAO]
Walter Gill, Joao AndradedeCarvalho, Jr., and Demetrio Bastos Netto Nov. 1986 12 p In PORTUGUESE; ENGLISH summary
(INPE-4022-NTE/264) Avail: NTIS HC A02/MF A01

A metal encased explosive cylinder is analyzed for the production of primary fragments. The results are applicable to the establishment of safety limits in rocket and munition tests. Author

N87-11970# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IMPROVEMENT OF MECHANICAL MODEL IN THE ENTRAINMENT METHOD FOR COMPRESSIBLE TURBULENT BOUNDARY LAYER
Hanling Bao 29 May 1986 13 p Transl. into ENGLISH from Hangkong Xuebao (China), v. 6, no. 2, Apr. 1985 p 188-193 Original language document was announced in IAA as A85-46824
(AD-A168451; FTD-ID(RS)T-0366-86) Avail: NTIS HC A02/MF A01 CSCL 20/4

This paper presents an improved entrainment method for the two dimensional compressible turbulent boundary layer. This method is simple with short computer time and can be used for the development of calculations for the turbulent boundary layer behind a shock wave. Calculated results from six examples indicate that this method has excellent numerical accuracy. When compared with P. D. Smith's method, the results show a marked improvement. GRA

N87-11971# Illinois Univ., Urbana. Dept. of Chemical Engineering.
VELOCITY MEASUREMENTS FOR TURBULENT NONSEPARATED FLOW OVER SOLID WAVES Progress Report, 1982 - 1985
Kenneth A. Frederick and Thomas J. Hanratty 18 Dec. 1985 280 p
(Contract N00014-82-K-0324)
(AD-A168682; PR-6) Avail: NTIS HC A13/MF A01 CSCL 20/4

Laser-Doppler velocimetry measurements have been made of nonseparated velocity fields over solid sinusoidal wavy surfaces. Time-averaged velocity and turbulent intensity data are given. The measurements were conducted over waves on the bottom wall of a rectangular channel with a cross section of twenty four by two

inches, the two inch dimension being vertical. Two sets of velocity data were obtained at conditions corresponding to flows where linear and nonlinear shear stress responses are observed. The conditions were wave steepnesses 2a lambda, and channel Reynolds numbers of 0.03125, 6400, and 0.05, 38,800 respectively. The wavelength of the waves was two inches. The viscous wall region was of particular interest. Sufficient measurements were taken to give an accurate representation of both the streamwise and normal variation of the viscous wall region. The data was Fourier analyzed to determine the extent of nonlinearities, the wavelength average flowfields, and the amplitudes and phases of the velocity responses. The physical meaning of the data is interpreted in terms of pressure gradient effects along the wave surfaces. Comparisons of the data with prediction from simple eddy viscosity models are also given. GRA

N87-11972# Dynamics Technology, Inc., Torrance, Calif.
CALIBRATION OF SURFACE HOT-FILM SENSORS IN DILUTE POLYMER FLOWS Final Report
Montgomery B. Goforth, Dennis K. McLaughlin, and Robert L. Gran Jun. 1986 51 p
(AD-A168801; DT-8451-02) Avail: NTIS HC A04/MF A01 CSCL 20/4

The purpose of this study was to assess the feasibility of using flush-mounted surface hot-film sensors in dilute polymer solutions to measure mean wall shear stress. Experiments were conducted using hot-film sensors mounted on the surface of a rotating disk. It is shown that a sensor calibration obtained in a pure water flow cannot be used directly to provide accurate skin friction measurements in a dilute polymer flow. However, the repeatability of the results suggests that a functional relation may exist between a sensor's calibration in water and in dilute polymer, thereby permitting precalibration of the sensor in pure water. It is also possible that reasonably consistent measurements may be obtained by precalibration of sensors in controlled polymer solutions (say in a laminar flow regime for which the wall shear stress is unaffected by the presence of the polymer). Experiments were also conducted by injecting concentrated polymer solution (4000 ppm) into the boundary layer of the rotating disk. Drag reduction and hot-film performance comparable to that obtained with homogenous dilute polymer solution was demonstrated. GRA

N87-11973# Dynatech R/D Co., Cambridge, Mass.
DESIGN OF HEAT EXCHANGE ELEMENT FOR PLASTIC FILM HEAT EXCHANGER
E. C. Guyer and D. L. Brownell 28 Dec. 1984 41 p
(Contract DE-AC07-84ID-12550)
(DE86-011042; DOE/ID-12550/T2) Avail: NTIS HC A03/MF A01

This report presents the results of an effort to design a plastic film heat exchanger element (PFHX) suitable for use in an industrial heat pump evaporator. This report addresses the selection of materials, the expected flow and heat transfer behavior, and the mechanical design features of a parallel plate type exchanger that uses thin plastic films as the boundary between the two process fluids. Criteria for material selection are presented, candidate materials are reviewed, and material recommendations are provided. Heat transfer performance is addressed in terms of the overall or total coefficient of heat transfer between condensing steam and a confined falling film of water. Appropriate mechanical designs of water flow manifolds are described along with methods of fabrication and assembly. This report addresses only the individual heat exchange element. DOE

N87-11974# Los Alamos National Lab., N. Mex. Dept. of Mathematics.
QUANTIZED VORTEX FILAMENTS IN INCOMPRESSIBLE FLUIDS
G. A. Goldin (Rutgers - The State Univ., New Brunswick, N. J.), R. Menikoff, and D. H. Sharp 1986 4 p Presented at the International Conference on the Physics of Phase Space, College Park, Md., 20 May 1986 Prepared in cooperation with Los Alamos National Lab., N. Mex.
(Contract W-7405-eng-36)
(DE86-011249; LA-UR-86-1679; CONF-8605145-1) Avail: NTIS HC A02/MF A01

Among the solutions A(sub t)(x) to the Euler equations for a classical incompressible fluid are those describing vortex filaments. Discussed here are quantum analogs of such solutions in 2 and 3 dimensions. DOE

N87-11975# Lawrence Livermore National Lab., Calif.
MONTE CARLO SIMULATION OF FREE JET FLOW FROM A SLIT, REVISION 1
J. B. Anderson, J. D. Foch, M. J. Shaw, R. C. Stern, and B. J. Wu 1986 12 p Presented at the 15th International Symposium on Rarefield Gas Dynamics, Grado, Italy, 16 Jun. 1986 Prepared in cooperation with Pennsylvania State Univ., University Park
(Contract W-7405-eng-48)
(DE86-011877; UCRL-93788-Rev-1; CONF-860636-1-Rev-1) Avail: NTIS HC A02/MF A01

The expansion of a free jet from a slit source into a vacuum has been simulated using the Monte Carlo procedures developed by Bird. The calculations were made for hard-sphere molecules (gamma = 5/3) at several densities to examine the departures from translational equilibrium in the flow field. Results are compared with the predictions of a method-of-characteristics calculation for continuum inviscid flow. The variations of the three components of the kinetic temperature are similar to those of a cylindrical source expansion. Molecular velocities perpendicular to the flow are found to depart from Maxwellian distributions at large distances from the slit. DOE

N87-11976# Energy Concepts Co., Annapolis, Md.
NEW HIGH TEMPERATURE ABSORBENT FOR ABSORPTION HEAT PUMPS Final Report
W. F. Davidson and D. C. Erickson May 1986 60 p
(Contract DE-AC05-84OR-21400)
(DE86-012483; ORNL/Sub-85-22013/1) Avail: NTIS HC A04/MF A01

A new absorption working pair (AWP) for absorption heat pumps has been identified which provides higher temperature capability (260 C), higher lifts, and use of lower cost construction materials, than currently available absorption heat pump working fluid pairs (e.g., LiBr-H2O). Using water as working fluid, the absorbent is a ternary mixture of LiNO3, KNO3, and NaNO3 in the preferred proportions of 53, 28, and 19 weight percent, respectively. In addition to being thermally stable above 260 C, it promotes the formation of a passive and protective corrosion resistant oxide film on both mild steel and all stainless steels. The thermodynamic, corrosion, and stability properties of this new absorbent have been measured. At temperatures of 260 C and higher the absorbent has negligible thermal decomposition, has corrosion rates less than 1 mil/year for both carbon steel and austenitic stainless steel, and provides practical heat pumping lifts of up to 90 C.DOE

N87-11977# Brigham Young Univ., Provo, Utah.
MEASUREMENT AND PREDICTION OF LIQUID MIXTURE THERMAL CONDUCTIVITY AND VISCOSITY Final Report
R. L. Rowley 15 Jun. 1986 22 p
(Contract DE-FG02-84ER-13193)
(DE86-012508; DOE/ER-13193/2) Avail: NTIS HC A02/MF A01

A local composition model has been developed for prediction of liquid mixture thermal conductivities and shear viscosities from pure component values and readily available binary thermodynamic data. The method is applicable to any number of components and requires no adjustable parameters. Viscosities were measured in an Ubelohde capillary viscometer and densities were measured in a Mettler-Paar densitometer over the whole composition range for 24 binary and 20 ternary liquid mixtures at 25 C and ambient pressure. A new, transient, hot-wire thermal conductivity apparatus was constructed and used to measure the thermal conductivity over the whole composition range at 25 C and 1 atm for 24 ternary mixtures, including 14 pure components and the binary limits of the ternaries. These data indicate that the local composition model works quite well for both thermal conductivity and shear viscosity. DOE

N87-11978# California Univ., Santa Barbara. Dept. of Mechanical and Environmental Engineering.
FREE CONVECTION HEAT TRANSFER IN THE CRITICAL REGION OF BINARY FLUID MIXTURES
D. Jump and E. Marschall 1986 7 p Presented at the International Heat Transfer Conference, San Francisco, Calif., 17 Aug. 1986
(Contract DE-AS03-84ER-13164)
(DE86-008856; CONF-860805-9; CONF-8510176-4) Avail: NTIS HC A02/MF A01

Free convection heat transfer from a heated wire to near critical binary mixtures of R-22 and R-115 was investigated experimentally. Measurements included determination of mixture bulk temperature and pressure, wire temperature and heat flux at the wire surface, and mixture concentration. Observed heat transfer and fluid flow patterns were very similar to those known to occur in near critical pure fluids. Modest peaks in heat transfer coefficients were found at small temperature differences for all mixtures. For bulk fluid temperatures slightly below their critical temperatures boiling-like phenomena were observed and the corresponding maximum heat transfer coefficients were found to be up to 600% higher than those obtained at larger temperature differences. DOE

N87-11979# European Space Agency, Paris (France).
BOUNDARY LAYER AND PARABOLIC FLOWS
Roger Grundmann Sep. 1985 109 p Transl. into ENGLISH from "Grenzschicht- und Grenzschichtaehnliche Stroemungen" (Goettingen, West Germany)
(ESA-TT-918; DFVLR-FB-84-46; ETN-86-98239) Avail: NTIS HC A06/MF A01; original German version avail. at DFVLR, Cologne, West Germany DM 32

Calculation methods for two and three-dimensional, laminar, turbulent and transitional, compressible and incompressible and rotating boundary layer flows, and calculation methods for three-dimensional, laminar, compressible and incompressible and rotating parabolic flows are presented. Systems of equations for arbitrary surface-oriented coordinate systems developed by tensor calculation methods are used. ESA

N87-11980# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
LIFT AND DRAG MEASUREMENTS ON A TOWING TANK MODEL OF A TIP VANE TURBINE
L. J. Vermeer Nov. 1985 32 p
(IW-R512; ETN-86-98484) Avail: NTIS HC A03/MF A01

To measure the lift on the tip vanes of a rotating model (nearly impossible in the wind tunnel because the centrifugal force exceeds the lift force by 500 times) a measuring device was designed and built to operate under water in a towing tank. The measured quantities are the radial force on one tip vane and the torque to drive the model, from which respectively the lift and drag coefficient of the tip vane are deduced. This was done for several settings of tip vane angles for tip-speed ratios from 4 to 13 by unity steps. For better turbine simulation a gauze was added behind the model, but all settings were also measured without gauze. The results are suitable for comparison with a time averaged theory. ESA

N87-11981# Thermo Electron Corp., Waltham, Mass.
ADVANCED HEAT-PIPE HEAT EXCHANGER AND MICROPROCESSOR-BASED MODULATING BURNER CONTROLS DEVELOPMENT Annual Report, Jan. 1985 - Jan. 1986
A. Lowenstein, B. Cohen, S. Feldman, M. Spatz, and E. Smith Mar. 1986 115 p
(Contract GRI-5084-241-1069)
(PB86-203239; TE4367-21-86; GRI-0063) Avail: NTIS HC A06/MF A01 CSCL 13A

The development of a novel condensing heat exchanger, a modulating gas burner, and a zone-controlled residential warm-air heating system is described. The condensing heat exchanger uses ten thermosyphons which are manifolded at both the condenser and evaporator ends to achieve a compact low-cost design. Initial tests have demonstrated a + 92 percent steady-state efficiency for a conventional clamshell furnace operating with the thermosyphon heat exchanger located outside the furnace cabinet. A 100,000 -Btu/hr modulating burner has also been developed. Comprehensive study of the burner's operating characteristics has produced guidelines for the design and application of the device. Finally, the modulating burner has been incorporated into a zone-controlled heating system. In parallel with the development of the preceding heating system components, the performance of thermosyphons over a wide range of operating conditions is being explored with the objective of improving design procedures for incorporating these devices into heat exchangers. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N87-11982# Aeronautical Research Labs., Melbourne (Australia).
AN AUTOMATIC CRACK MEASURING SYSTEM USING THE DIRECT-CURRENT POTENTIAL-DIFFERENCE METHOD
G. W. Revill and M. Findlay Nov. 1985 30 p
(ARL-STRUC-R-419; AR-004-056) Avail: NTIS HC A03/MF A01

The development is described of a computer controlled direct-current potential-difference crack measuring system and its application to obtain crack growth rate data from center-cracked-tension specimens. Details of the hardware and the software are included and the method and results of the calibration for this type of specimen are given. Author

N87-11983# Toronto Univ., Downsview (Ontario). Inst. for Aerospace Studies.
RESEARCH ON AN AERODYNAMIC PARTICLE SEPARATOR (THE EPS)
Bernard Etkin Jul. 1986 37 p
(UTIAS-316; ISSN-0082-5255) Avail: NTIS HC A03/MF A01

Research carried out in support of the development of a new particle separator is presented. The latter (EPS) produces multiple fractions simultaneously at a high throughput rate. The cut sizes are roughly in the range 10 to 200 microns. The principle is that particles dissimilar with respect to any of size, density, or shape will follow different and distinct trajectories when injected into a uniform laminar flow of air. The main features of the design are: (1) particles are conveyed pneumatically at high speed into the separation zone; (2) they are separated from the feed air at the entrance to the separation zone by means of the Coanda Effect; (3) the air flow in the separation zone is uniform and laminar, the rms turbulence level being less than 1%; air speed in the separation zone is of the same order as the particle speed; and (4) the particles are subjected to large forces, both aerodynamic and mechanical, at several points on their path from the feed hopper to the separation zone, thus promoting dispersion. The report verifies the design concepts. A detailed model of the flow field permits the calculation of particle trajectories, and hence the prediction of coarse grade efficiency and sharpness of cut d sub 25/d sub 75. The measurements made with glass spheres and other irregular particles (e.g., carbon, cement) provide a general verification of the analytical results. Sharpness of cut values better than 0.8 are achieved down to cut points of about 10 microns. Maximum throughput rates are not yet known, but separations have been made at 480 kg/hr in a separation zone 100 mm wide. Scale-up to larger capacity is straightforward. Author

N87-11984# Naval Postgraduate School, Monterey, Calif.
A SOLID STATE DATA RECORDER FOR SPACE-BASED APPLICATIONS USING MAGNETIC BUBBLE MEMORY M.S. Thesis
Tina-Marie DErcole Mar. 1986 92 p

(AD-A168909) Avail: NTIS HC A05/MF A01 CSCL 14/3

Earthbound recording systems come in may sizes and use various mediums on which to record the data. The harsh environment of space, however, introduces some unique problems. This limits the number of choices not only for the type of system but also for the optimum recording medium. How changes in temperature, radiation, lack of air, etc., affect the performance of the device as a whole must all be considered. Magnetic bubble memory technology implemented in a solid state recorder is a possible solution. Included in this thesis is a description of the development and history of the magnetic bubble memory, along with a comparison to other technologies. The design and implementation of a digital data recorder using off-the-shelf four-megabit devices is presented. A schematic of the data recorder and software used is included in the appendices. Author (GRA)

N87-11985# Sandia National Labs., Albuquerque, N. Mex. Structural Mechanics Lab.

VERIFYING STRAIN GAGE INSTALLATIONS FOR DYNAMIC TESTS

Robert T. Reese and Rodney A. May 1986 10 p Presented at Conference

(DE86-006469; SAND-86-0349C; CONF-860264-1) Avail: NTIS HC A02/MF A01

Strain gages were used to determine the dynamic response of test structures subjected to high speed water entry. The strain gage installations were verified to be functional prior to and after the conclusion of a series of water entry tests. The procedures used to verify the gage installations are described. The methodology developed for this test application will be used on other test projects in which test hardware will be developed into intrumented transducers or for those projects requiring additional analysis of strain gage data and installations. Some of the problems encountered in installing the strain gages are outlined along with the methods and procedures used to solve them. Author

N87-11986# Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.

AUDIOMAGNETOTELLURIC (AMT) SYSTEM

1986 11 p Presented at the 10th Annual Naticnal Engineering Symposium, San Antonio, Tex., 9 Apr. 1986

(Contract DE-AC08-83NV-10282)

(DE86-011274; CONF-8604207-1) Avail: NTIS HC A02/MF A01

The task was to design and build a portable system for collecting and analyzing AMT signals in the 10Hz to 10 kHz frequency range. The system consisted of both a backpack-portable data acquisition system and a data analysis computer. Audio magnetotellurics (AMT) is a way of determining the electrical resistivity distribution of the Earth's subsurface from measurements of natural electric and magnetic fields (lightning strikes). AMT provides a means of geothermal and petroleum exploration. In the past ten years, different approaches to AMT data acquisition instrumentation have been taken. This report summarizes EG and G, Los Alamos Operations Version. DOE

36 LASERS AND MASERS

Includes parametric amplifiers.

For related information see also *76 Solid-State Physics.*

N87-11987# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

A STUDY OF LASER INDUCED IONIZATION OF ALKALI METAL VAPOURS BASED ON SATURATION OF THE FIRST RESONANCE TRANSITION Thesis

Paul Gerard Giles Cardinal Sep. 1986 255 p

(UTIS-299; ISSN-0082-5255) Avail: NTIS HC A12/MF A01

Laser saturation of an atomic resonance represents an extremely efficient method of ionizing a gaseous medium. In the case of an alkali metal vapor it is shown that many collisional-radiative processes contribute to the initial creation of free electrons which, after acquiring additional energy via superelastic collision quenching of the resonance state population, eventually leads to nearly complete ionization of the vapor. This form of laser ionization based on resonance saturation (LIBORS) was studied both theoretically and experimentally in the case of sodium and to a lesser extent for other alkali metal vapors. The theoretical analysis has involved the development of several simple models and significant improvements to an already existing 20-level computer code. A LIBORS experimental facility was assembled for undertaking careful measurements of the interaction in order to test the theoretical models. Measurements of the absorbed laser energy versus that incident provided indirect confirmation of the importance of superelastic electron collisions. Also reported are the first emission based measurement of the spatially averaged free-electron temperature associated with LIBORS. Author

N87-11988# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

LASER BASED INFORMATION SYSTEMS (SELECTED PAGES)

L. Z. Kriksunov 22 May 1986 138 p Transl. into ENGLISH from the book "Sistemy Informatsii s Opticheskimi Kvantovymi Generatorami" Kiev, USSR, Tekhnika, 1970 p 124-131; 134-139; 144-147; 160-229

(AD-A168418; FTD-ID(RS)T-0563-85) Avail: NTIS HC A07/MF A01 CSCL 20/5

A report on laser based information systems contains the following: Methods of Information Reception; Propagation of the Coherent Optical Radiation in the Atmosphere; The Selection of the Main Elements of the Optical Lines and of the Systems for Information Transmission; The Purpose and the Classification of the Devices to Control the Orientation of Laser Beams; Control of the Laser Beam Orientation by Means of Reflectors; Control of the Laser Beam Orientation by Means of the Refractive Devices; Systems for Measuring the Parameters of Moving Objects; Principles of the Range Finders and the Respective Formulas; Methods of Generation of Short-Duration Pulses of Coherent Optical Radiation; Construction of Optical Range Finders with Pulsed and CW Lasers; System of Automatic Tracking of Moving Objects; Optical Gyroscops; Optical Altimeters; and Velocimeters. GRA

N87-11989# Lawrence Livermore National Lab., Calif.

SUMMARY OF CONTROL AND DATA ACQUISITION SYSTEMS FOR NOVA EXPERIMENTS

E. W. McCauley, E. M. Campbell, J. M. Auerbach, D. S. montgomery, V. A. Martin, J. E. Randolph, J. G. Shaw, B. L. Stewart, and G. F. Stone Apr. 1986 22 p Presented at the 6th Topical Conference on High Temperature Plasma Diagnostics, Hilton Head Island, S.C., 9 Mar 1986

(Contract W-7405-eng-48)

(DE86-010563; UCRL-94398; CONF-860324-29) Avail: NTIS HC A02/MF A01

The Nova Laser has completed its first year of operation. During this period, emphasis has been placed on activation of the facility and of the numerous target and beam diagnostics. Two separate target chambers are in use. Nova operation is separated into two broad functions: Laser Operations and Experiments. The Operations Group provides the laser system control, operation and data acquisition and the Experiments Group provides experiment definition, diagnostic instrumentation and overall data processing. On the Operations side, VAX 11/780 computers are used to set up diagnostic operating parameters and collect data recorded by the CAMAC and CCD modules. These data are delivered in files by electronic link to the Laser Experiments and Analysis Facility (LEAF) VAX 11/785 of the Experiments Group for processing. Film data are digitized at LEAF and the film data files are also processed on the LEAF VAX. DOE

N87-11990# Institut Franco-Allemand de Recherches, St. Louis (France).

ABSORPTION OF CO2 LASER BEAMS BY METALLIC ALLOYS. APPLICATION TO LASER THERMAL TREATMENT [ABSORPTION D'UN RAYONNEMENT LASER CO2 CONTINU PAR DI-

FFERENTS ALLIAGES METALLIQUES. APPLICATION AU TRAITEMENT THERMIQUE PAR LASER]
G. Stern and B. Gautier 19 Jul. 1985 23 p In FRENCH Presented at 5th Journees Europeennes Conference Optoelectronique, Paris, France, 21-23 May 1985
(ISL-CO-217/85; ETN-86-97627) Avail: NTIS HC A02/MF A01

The electromagnetic absorption at 10.6 micron wavelength was studied for low alloy steels and titanium alloys, in order to predict the feasibility of continuous CO2 laser thermal treatments. Laser calorimeter and elliptic mirror reflectometer were used. The results show a strong influence of the surface finish. The absorption increases almost linearly with temperature. A two dimensional numerical model of heat diffusion was developed to describe the temperature evolution of 15 x 15 x 2 mm specimens under a 3 kw laser beam. The heat absorbed, 200 to 450 W per sq cm, is insufficient to obtain temper effects. ESA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N87-11991 ESDU International Ltd., London (England).
CALCULATION METHODS FOR STEADILY LOADED AXIAL GROOVE HYDRODYNAMIC JOURNAL BEARINGS. LOW VISCOSITY PROCESS FLUID LUBRICATION.
Jul. 1986 21 p Supersedes ESDU-77013
(ESDU-86008; ISBN-0-85679-560-7; ISSN-0141-2590) Avail: ESDU

This Data Item ESDU 86008 is an addition to the Tribology Sub-series. The advantages are discussed and the essential additional considerations in using a process fluid as a lubricant are explained. Appropriate bearing materials are particularly important and tables of data allow suitable choices for a range of process fluids, with particular emphasis on water. Tables (and graphs) also give those physical properties that are important in bearing design for a number of fluids, including the usable temperature range. A preliminary design procedure allows an initial choice of bearing dimensions to be made and then, using ESDU 85028, it can be decided whether the flow is superlaminar or not. In the latter case, ESDU 84031 is used to calculate the performance and, if necessary, optimize the design, while in the former case ESDU 85028 is used for that purpose. ESDU

N87-11992# ESDU International Ltd., London (England).
VERTICAL DEFLECTION CHARACTERISTICS OF AIRCRAFT TYRES
May 1986 6 p
(ESDU-86005; ISBN-0-85679-557-7; ISSN-0141-4054) Avail: ESDU

This Data Item ESDU 86005 is an addition to the Aircraft Performance Sub-series. The characteristics are given for aircraft-type cross-ply tires under load normal to the runway surfaces. Equations for tire deflection are primarily for establishing aircraft pitch attitude on the ground. Equations for footprint dimensions and areas are required in calculations related to tire behavior on wet or flooded runways. The equations are found to represent load-deflection characteristics and contact area length well and some data were verified for speeds up to 100 knots. ESDU

N87-11993*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SELECTION OF ROLLING-ELEMENT BEARING STEELS FOR LONG-LIFE APPLICATION
Erwin V. Zaretsky 1986 76 p Presented at International Symposium on the Effect of Steel Manufacturing Processes on the Quality of Bearing Steels, Phoenix, Ariz., 4-6 Nov. 1986; sponsored by American Society for Testing and Materials
(NASA-TM-88881; E-3288; NAS 1.15:88881) Avail: NTIS HC A05/MF A01 CSCL 13I

Nearly four decades of research in bearing steel metallurgy and processing have resulted in improvements in bearing life by a factor of 100 over that obtained in the early 1940's. For critical applications such as aircraft, these improvements have resulted in longer lived, more reliable commercial aircraft engines. Material factors such as hardness, retained austenite, grain size and carbide size, number, and area can influence rolling-element fatigue life. Bearing steel processing such as double vacuum melting can have a greater efect on bearing life than material chemistry. The selection and specification of a bearing steel is dependent on the integration of all these considerations into the bearing design and application. The paper reviews rolling-element fatigue data and analysis which can enable the engineer or metallurgist to select a rolling-element bearing steel for critical applications where long life is required. Author

N87-11994*# Catholic Univ. of America, Washington, D.C. Dept. of Electrical Engineering.
ACTIVE CONTROL OF ROBOT MANIPULATOR COMPLIANCE Semiannual Progress Report
Charles C. Nguyen and Farhad J. Pooran Nov. 1986 64 p
(Grant NAG5-780)
(NASA-CR-177183; NAS 1.26:177183) Avail: NTIS HC A04/MF A01 CSCL 13I

Work performed at Catholic University on the research grant entitled Active Control of Robot Manipulator Compliance, supported by NASA/Goddard space Flight Center during the period of May 15th, 1986 to November 15th, 1986 is described. The modelling of the two-degree-of-freedom robot is first presented. Then the complete system including the robot and the hybrid controller is simulated on an IBM-XT Personal Computer. Simulation results showed that proper adjustments of controller gains enable the robot to perform successful operations. Further research should focus on developing a guideline for the controller gain design to achieve system stability. Author

N87-11995*# General Motors Corp., Indianapolis, Ind. Gas Trubine Div.
ADVANCED GAS TURBINE (AGT) TECHNOLOGY PROJECT Final Annual Report, 1985
1 Sep. 1986 160 p
(Contract DEN3-168)
(NASA-CR-179484; DOE/NASA/0168-10; NAS 1.26:179484; EDR-12344) Avail: NTIS HC A08/MF A01 CSCL 21A

Engine testing, ceramic component fabrication and evaluation, component performance rig testing, and analytical studies comprised AGT 100 activities during the 1985 year. Ten experimental assemblies (builds) were evaluated using two engines. Accrued operating time was 120 hr of burning and 170 hr total, bringing cumulative total operating time to 395 hr, all devoid of major failures. Tests identified the generator seals as the primary working fluid leakage sources. Power transfer clutch operation was demonstrated. An alpha SiC gasifier rotor engine test resulted in blade tip failures. Recurring case vibration and shaft whip have limited gasifier shaft speeds to 84%. Ceramic components successfully engine tested now include the SiC scroll assembly, Si3N3 turbine rotor, combustor assembly, regenerator disk bulkhead, turbine vanes, piston rings, and couplings. A compressor shroud design change to reduce heat recirculation back to the inlet was executed. Ceramic components activity continues to focus on the development of state-of-the-art material strength characteristics in full-scale engine hardware. Fiber reinforced glass-ceramic composite turbine (inner) backplates were fabricated by Corning Glass Works. The BMAS/III material performed well in engine testing. Backplates of MAS material have not been engine tested. Author

N87-11996# Pratt and Whitney Aircraft of Canada Ltd., Longueuil (Quebec).
TECHNOLOGY DEVELOPMENT FOR SMALL HIGH SPEED, MAINSHAFT ROLLER BEARINGS Final Report, 10 Sep. 1978 - 30 Oct. 1985
W. K. Crawford, R. Kovacik, and P. F. Brown Apr. 1986 118 p
(Contract F33615-78-C-2049)

(AD-A168694; AFWAL-TR-85-2091) Avail: NTIS HC A06/MF A01 CSCL 13/9

High speed experimental tests on small cylindrical roller bearings provided data on parametric variables. The results were correlated with the analytical model developed under NAPC contract N0014-76-C-0383. Author (GRA)

N87-11997# Applied Fusion Technologies, Inc., Fort Collins, Colo.
RELIABLE WELDING OF HSLA STEELS BY SQUARE WAVE PULSING USING AN ADVANCED SENSING (EDAP) TECHNIQUE
Final Report, 16 Jan. - 30 Apr. 1986
C. Connelly, G. F. Fetzer, R. G. Gann, and T. E. Aurand 30 Apr. 1986 109 p
(Contract N00014-85-C-0759)
(AD-A168762; Rept-0001-AZ) Avail: NTIS HC A06/MF A01 CSCL 13/8

A four part program was undertaken for the purposes of improving the reliability and predictability of welding. This was a Phase I SBIR research effort, funded by ONR, to demonstrate feasability of these proposed concepts: (1) Control automatically, in real time, weld nugget size and penetration. (2) Explore the use of square wave pulse welding for HSLA steels. (3) Develop a data base for pulsed GTA welding of A710 steel. (4) Determine the value of using an advanced video system for welding research. Most of this work was to proceed concurrently and simultaneously. However, difficulties encountered when making single pass, full penetration welds on A710 steels led to the completing of some of the research separately. The major concepts of weld control and pulse welding were both completed with very successful results. GRA

N87-11998# Rockwell International Corp., Golden, Colo. Nuclear Joining.
INERTIAL WELDING OF 1100 ALUMINUM TO TYPE 316 STAINLESS STEEL
D. Yashan, S. Tsang, and M. W. Doughty 1986 36 p
(DE86-009145; RFP-3851) Avail: NTIS HC A03/MF A01

Development done for inertia welds of 1100 aluminum of approximately an H-18 work hardened condition, to type 316 stainless steel is described. The welding was done with a Caterpillar Model 90 inertia machine. Rod diameters were .625 inch for the stainless steel and 1.000 inch for the aluminum. A broad range of weld parameters, as well as various steel surface geometries, were investigated. Test methods for 1100 aluminum to stainless steel friction welds are often limited by the strength of the aluminum. This work used a tensile configuration that has the capability of reaching high tensile stresses at the weld interface. The weld interface is located a very short distance (about .010 inch) from a larger diameter aluminum shoulder, therefore inducing a triaxial stress state in the aluminum near the weld interface. DOE

N87-11999# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
PRELIMINARY TURBULENCE LENGTH SCALE MEASUREMENTS IN A MOTORED IC ENGINE
R. A. Fraser, P. G. Felton, F. V. Bracco, and D. A. Santavicca (Pennsylvania State Univ., University Park) Feb. 1986 14 p Presented at Conference
(Contract DE-AC04-81AL-16338)
(DE86-008171; CONF-860263-2) Avail: NTIS HC A02/MF A01

A recently developed laser Doppler velocimetry system for making two point spatial correlation measurements of velocity fluctuations was applied to the turbulent flow field of an internal combustion engine. Fluctuation integral length scales were measured within the clearance volume of a ported, single cylinder engine with a disc shaped chamber and a compression ration of 8.0. The engine was motored at 600 rpm and the engine flow field had a swirl ratio at top dead center of approximately 4. These measurements were made at the center of the clearance height at 3/4 of the cylinder radius. The integral length scale was found to reach a minimum of approximately 1/5 of the clearance height near TDC. Comparison of the results obtained using this technique with the integral length scales measured in engines by other authors using different methods gives agreement to within a factor of two. Author

N87-12000# Oak Ridge National Lab., Tenn.
HIGH THROUGHPUT CONTINUOUS CRYOPUMP
C. A. Foster 1986 8 p Presented at the 6th Annual TVC AVS Symposium, Oak Ridge, Tenn., 29 Apr. 1986
(Contract DE-AC05-84OR-21400)
(DE86-010623; CONF-8604191-1) Avail: NTIS HC A02/MF A01

A cryocondensation pump with a unique regeneration mechanism that allows continuous operation has been constructed and tested. The pump features a device referred to as the Snail which removes the cryofrost layer as it is moved over the pumping surfaces. A forepump pumps the sublimed gas generated inside the Snail. The compression ratio of the pump is the ratio of the cryopump speed to the leakage conductance of the Snail. Deuterium had been pumped continuously at 30 torr.L/s at a speed of 2000 L/s and a compression ratio of 100. The pump, being all metal sealed and free of lubricating fluids, has many potential applications where untraclean high throughput pumping is desirable. Since the pump regenerates on a time scale of 60 seconds, the inventory in the pump is minimized; an important consideration when pumping radioactive materials such as tritium. Test data and a videotape of the Snail removing the cryofrost will be shown. DOE

N87-12001# Sandia National Labs., Albuquerque, N. Mex.
DESIGN OF A DATA ACQUISITION AND RECORDING SYSTEM FOR A RESISTANCE WELDER
J. E. Hopwood and P. D. Tamayo Jun. 1986 46 p
(Contract DE-AC04-76DP-00789)
(DE86-012214; SAND-86-8001) Avail: NTIS HC A03/MF A01

A data acquisition and recording system has been designed for a resistance welder. Weld current, weld voltage, force, displacement, and power-line voltage are monitored and recorded onto a high-resolution hard-copy recorder and displayed digitally. The system is attached to a production welder at Bendix, Kansas City. The in-process recording of welding parameters is expected to result in improved weld quality and repeatability. DOE

N87-12002# Lawrence Livermore National Lab., Calif.
JOINING METHODS FOR BERYLLIUM: A SURVEY
L. A. Jacobson 16 May 1986 15 p
(Contract W-7405-eng-48)
(DE86-012000; UCID-20750) Avail: NTIS HC A02/MF A01

A number of reports from both open literature and classified sources were reviewed in order to extract information pertinent to the joining of beryllium to itself and to other alloys. The processes that were identified were brazing, gas metal arc welding, electron beam welding, resistance welding, and diffusion bonding. Unpublished results on the characterization of microstructures of beryllium welds containing aluminum suggest that liquid phase separation produces a structure that resists cracking. Features of the phase diagram of beryllium and silver suggest the possibility that a similar phenomenon would occur, leading to welds with higher temperature capability. DOE

N87-12003# Argonne National Lab., Ill.
ELECTROCHEMICAL EFFECTS ON WELD POOL CHEMISTRY IN SUBMERGED ARC AND dc ELECTROSLAG WELDING
M. Blander and D. L. Olson 1986 9 p Presented at the ASM International Trends in Welding Research Meeting, Gatlinburg, Tenn., 18 May 1986 Prepared in cooperation with Colorado School of Mines, Golden
(Contract W-31-109-eng-38)
(DE86-012117; CONF-860594-6) Avail: NTIS HC A02/MF A01

Electrochemical reactions could be an important factor governing the chemistry of weld pools in dc welding. The anodic reaction at the weld wire-slag interface leads to a relatively high Po2 which leads to the formation of an oxide nO2- + M(metal) yields MO(sub n) + 2ne where M is a metal at the weld wire-slag interface and n is related to the valence of M in the oxide. After the molten weld wire forms a droplet which separates from the

wire, the electrochemical reaction ceases and the oxide dissolves in the flux. The cathodic reactions at the weld pool lead to the electrodeposition of metals M sup 2 (slag) + 2e yields M(metal); Si sup 4+ (slag) + 4e yields Si(metal) where M can be Fe sup 2+ , Mn sup 2+, or other metals which are electrodeposited at the interface. The relative amounts of all these deposits will be readjusted by chemical reactions such as Si(metal) + 2MO(slag) yields SiO2(slag) + 2M(metal); Mn(metal) + FeO(slag) yields MnO(slag) + Fe(metal). The resultant changes in the compositions of the weld metal and the slag depend on the rates of the electrodeposition reactions relative to the rates of the back reactions. If the proposed mechanism is correct, experimental data would indicate that both the electrochemical and back reactions appear to be important. Analogous electrochemical reactions can occur at metal-plasma interfaces. DOE

N87-12004# Ford Motor Co., Dearborn, Mich.
RESEARCH ON MATERIALS RELATED TO THE SODIUM HEAT ENGINE Final Report
T. K. Hunt Mar. 1986 88 p
(Contract DE-AC03-76SF-00098)
(DE86-012833; LBL-21232) Avail: NTIS HC A05/MF A01

The Sodium Heat Engine (SHE) is a direct thermal to electrical energy conversion device using sodium beta''-alumina solid electrolyte (BASE) as an ion selective membrane and operating on the basic principle of a thermally regenerative concentration cell. SHE cells have demonstrated high output power densities and should be capable of high efficiency even in units of relatively small output power. The work performed under this subcontract was directed toward gaining an understanding of the problem of electrode stability as related to the Sodium Heat Engine and of the detailed manner in which this high power electrode-electrolyte system functions. Substantial progress toward this objective was made. DOE

N87-12005# European Space Tribology Lab., Risley (England).
[ACTIVITIES REPORT IN SPACE TRIBOLOGY] Progress Report, 1985
M. J. Todd Paris ESA Jan. 1986 17 p
(Contract ESTEC-5815/83-NL-PP)
(ESA-ESTL-77; ESA-CR(P)-2236; ETN-86-98114) Avail: NTIS HC A02/MF A01

The improvement in MoS2 sputtered films, the elucidation of atmosphere effects on composite brushes and on MoS2 films, and a method for Coulomb torque hysteresis prediction are described. Tests on the Giotto despin mechanism are outlined. Cryogenic tribology, solid lubricant films, gear tribology, and numerical analysis are discussed. ESA

N87-12006# Technische Hogeschool, Eindhoven (Netherlands). Div. of Production Technology and Automation.
MEASUREMENT ON THE SERVO-SYSTEMS OF THE ASEA IRB6/2 ROBOT AND ANALYSIS OF SERVOMOTORS FOR ROBOTS
J. Dupas Jul. 1984 115 p
(WPB-0131; ETN-86-98529) Avail: NTIS HC A06/MF A01

Measurements of the dynamic characteristics of the ASEA IRB6/2 robot, and developments in servomotors and drives for robot actuators are described. Measurements show that the effect of the load on each axis is very important, and decreases the dynamic possibilities of the robot. The first axis should be moved by a bigger motor. The fifth axis dynamic characteristics are lowered by the whole kinematic chain, and an improvement could be found in the simplification of the chain. The review of servomotors shows how a permanent magnet material could improve their characteristics. ESA

N87-12007# Technische Hogeschool, Eindhoven (Netherlands). Afdeling der Werktuigbouwkunde.
MODAL ANALYSIS OF ROBOTS [MODALE ANALYSE VAN ROBOTS]
P. A. W. Hijink and A. C. H. vanderWolf Dec. 1984 14 p in DUTCH
(WPB-0144; ETN-86-98531) Avail: NTIS HC A02/MF A01

Modal analysis as an experimental technique to determine the dynamic behavior of robots at given eigenfrequencies is presented. The signal analysis provides the displacements of the robot due to a force. The impulse response function is described using the discrete Fourier transform which is calculated with the fast Fourier transform algorithm. The modal parameters (a measure for amplitude and phase of a vibration) are determined for the chosen eigenfrequencies, and the results are shown on a display, after which data processing is possible using the plot apparatus. The results show that modal analysis is a powerful technique for the testing of industrial robots; and allows an automated reporting for the user as well as for the designer. ESA

N87-12008# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Mechanical Engineering.
STRETCHED CUSPS IN COUPLER CURVES: FOUR-BAR LINKAGES HAVING BALL-MODAL COUPLER POINTS [GESTREKTE KEERPUNTEN IN KOPPELKROMMEN: STANGENVIERZIJDEN MET RECHTGELEIDE OMKEERPUNTEN]
Evert A. Dijksman Dec. 1984 87 p In DUTCH Presented at DET Colloquium on Leer der Mechanismen, Enschede, Netherlands, 19 Oct. 1983
(EUT-84-W-001; B8465643; ISBN-90-6808-001-6;
ISSN-0167-9708; ETN-86-98532) Avail: NTIS HC A05/MF A01

A design in which the coupler point of a four-bar linkage passes through a so-called Ball-nodal (undulation) point is suggested for gripping mechanisms which approach products in a straight way. Solutions based on the Burmester theory appear to be interrelated through Robert's law; this intermixed relationship can be represented by a 3.0 graph. Transformation formulas, necessary to go from one apex to another, are presented. Longer edges represent Burmester transformations, whereas the shorter ones transform a four-bar into an appointed curve cognate according to Robert's law. The main dimensions of the four-bar are given as a function of two independent variables. Graphs giving information about the expected transmission angles are presented. The designer can use them as an indication to find out which four-bars are stretchable and which have transmission angles in the extreme positions of the rocker. ESA

N87-12009# Thermo Electron Corp., Waltham, Mass.
INTEGRATED NATURAL GAS ENGINE COOLING JACKET VAPOR COMPRESSOR PROGRAM, PHASE 1A Annual Report, Feb. - Oct. 1985
F. A. DiBella, J. Balsavich, and F. Becker Dec. 1985 165 p
(Contract GRI-5084-233-1057)
(PB86-215662; TE4369-12-86; GRI-86/0074) Avail: NTIS HC A08/MF A01 CSCL 21E

The project objective is to design and test a prototype integrated Gas Engine Vapor Compression System, a system that is thought to be an attractive and economically viable alternative to currently available cogeneration systems. A unique, alternative cogeneration system has been designed that will provide an industrial or commercial energy user with high-pressure steam and electricity directly from a packaged cogeneration system. The integrated Gas Engine Vapor Compression System concept includes an engine-generator set and a steam screw compressor that is mechanically integrated with the engine. GRA

N87-12010# Mechanical Technology, Inc., Latham, N. Y.
FREE-PISTON STIRLING ENGINE DEVELOPMENT Annual Report, 1 Dec. 1984 - 31 Dec. 1985
R. A. Ackermann Apr. 1986 216 p
(Contract GRI-5082-242-0721)
(PB86-213980; MTI-86TR27; GRI-86/0036) Avail: NTIS HC A10/MF A01 CSCL 13A

The free-piston Stirling engine (FPSE) is being developed as a potential gas-fired prime mover for heat pump applications in the residential market. The heat pump features an advanced FPSE coupled to a Rankine refrigerant compressor through a hermetically sealed diaphragm-activated hydraulic transmission. During the past year, the program has concentrated on develop-

ing the engine and compressor component improvement in performance and realiability. GRA

N87-11729*# General Motors Research Labs., Warren, Mich.
STRUCTURAL OPTIMIZATION IN AUTOMOTIVE DESIGN
J. A. Bonnett and M. E. Botkin *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 16 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 13I

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N87-12011# Rensselaer Polytechnic Inst., Troy, N.Y. Center for Integrated Electronics.
ULTRASONIC IMAGING AND AUTOMATED FLAW DETECTION SYSTEM Final Contract Report
L. Jones, J. F. McDonald, and G. P. Capsimalis Mar. 1986 163 p
(Contract DAAA22-80-C-0170)
(AD-A168195; UI84-1; ARCCB-CR-86011) Avail: NTIS HC A08/MF A01 CSCL 14/2

An automated inspection system is described for detecting, imaging, and classifying flaws in cannon billets. The first phase of the project has produced a flaw detection system capable of triggering rapidly and reliably on flaws down to one-fourth inch in cross-section in billets up to 18 feet in length and 22 inches in diameter. This portion of the system has been optimized for low cost, high speed, simplicity, and maintainability utilizing many commercially available components with a minimum use of one-of-a-kind electronic interface boards. It is a versatile, programmable stand-alone unit capable of scanning one billet every half hour. The second phase system is designed to considerably enhance the images of flaws which have been detected and located using the first phase system by providing a much larger ultrasonic array aperture and digitizing capacity. The resulting hardware is capable of both quasi-optic lens processing and digital holography. GRA

N87-12012# Army Armament Munitions and Chemical Command, Dover, N.J. Requirements and Analysis Office.
SYSTEM SAFETY PROCEDURES FOR NONDEVELOPMENT ITEM (NDI) ACQUISITIONS Final Report
Sami Hoxha May 1986 57 p
(AD-A168353; ARRAD-TR-86001) Avail: NTIS HC A04/MF A01 CSCL 15/5

Greater reliance on NDI types of acquisition is the wave of the future. It is important that the safety community realize this fact and come to grips with it. The means to be able to fit into the nondevelopment item (NDI) process without compromising safety must be developed. This requires both a determined effort on the part of the safety engineer to be involved early in the process and also the development of guidelines that clearly define the system safety role in the NDI acquisition process. NDI presents special safety problems due to the lack of testing, use in environment for which it is not designed, and lack of compliance with normally accepted Army safety standards. In cases where Army standards are not met, a conscious decision must be made whether or not the increased risk is acceptable. Based on this statement, NDI may not meet the safety standards that Army equipment developed through a normal acquisition process are required to meet; however, that does not mean safety has to be compromised. We also must not deviate from the objective of system safety, which is integral to its definition ...optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system life cycle. To accomplish this, a comprehensive System Safety Program Plan must be developed that will adequately interface with the NDI acquisition process. GRA

N87-12013# Florida State Univ., Tallahassee. Dept. of Statistics.
ESTIMATING JOINTLY SYSTEM AND COMPONENT RELIABILITIES USING A MUTUAL CENSORSHIP APPROACH
Hani Doss, Steven Freitag, and Frank Proschan Feb. 1986 35 p
(Contract F49620-85-C-0007)
(AD-A168544; FSU-STATISTICS-M717; TR-86-186-AFOSR; AF-AFOSR-86-0334TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Let F denote the life distribution of a coherent structure of independent components. Suppose that we have a sample of independent systems, each having the structure phi. Each system is continuously observed until it fails. For every component in each system, either a failure time or a censoring time is recorded. A failure time is recorded if the component fails before or at the time of system failure; otherwise a censoring time is recorded. We introduce a method for finding estimates for F(t), quantiles, and other functionals of F, based on the censorship of the component lives by system failure. We present limit theorems that enable the construction of confidence intervals for large samples. Author (GRA)

N87-12014# Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.
APPROXIMATE EVALUATION OF RELIABILITY AND AVAILABILITY VIA PERTURBATION ANALYSIS Annual Progress Report, 1 Jun. 1984 - 31 May 1985
Bruce K. Walker, Siu-Kwong Chu, and Norman M. Wereley Sep. 1985 45 p
(Grant AF-AFOSR-0160-84)
(AD-A168561; AFOSR-86-0314TR) Avail: NTIS HC A03/MF A01 CSCL 09/3

Progress is described on a project whose goal is the development of practical tools for evaluating the reliability and availability of fault-tolerant control or sensor systems. The approach relies on the generation of a Markovian model for the behavior of the system in terms of failures and Redundancy Management decisions. The project entails the investigation of approximate techniques for deriving results from these models. The basic idea is that the time-behavior of the model decomposes into two time scales where the results of interest occur in time frames intermediate to the two time scales. By modifying previous theory, an approximate evaluation scheme is developed and shown to be valid for a number of example cases. Ongoing work is also described. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N87-12015 ESDU International Ltd., London (England).
APPLYING, MEASURING AND MAINTAINING PRETENSION IN STEEL BOLTS
Jul. 1986 24 p Supersedes ESDU-72022
(ESDU-86014; ISBN-0-85679-566-6; ISSN-0141-4089; ISSN-0141-4097) Avail: ESDU

This Data Item ESDU 84014 is an addition to the Stress and Strength Sub-series. Factors are discussed which affect the tension in a bolt, and the methods are indicated by which a desired tension may be obtained, with a comparison of their relative accuracy and cost. Methods of measuring the bolt loads are also discussed. To determine the bolt pretension achieved by application of a known torque, the results of 1900 tests were analyzed to yield curves for both lubricated and unlubricated threads of BSF(BA)

and Unified or ISO metric forms. The test data related to nuts of mild and high strength steel seated on mild or high strength steel or aluminum alloy washers, and lubricants ranged from light oils to extreme pressure greases. No significant trend with material or lubricant could be isolated. Techniques for applying a known torque are considered, and their accuracy reviewed. Methods of locking the nut are described, together with their advantages and disadvantages, and include mechanical, frictional, adhesive, or deformation techniques. ESDU

N87-12016# BAJ Vickers Ltd., Banwell Weston-super-Mare (England).
CORRELATION OF FRACTURE TOUGHNESS AND CHARPY IMPACT TEST RESULTS
P. F. Langstone and D. I. Thorpe Sep. 1985 18 p
(Contract EXP-1/11/859)
(TR1063; BR97191; ETN-86-97979) Avail: NTIS
HC A02/MF A01

A test program to determine whether the Charpy impact test could be used to predict fracture toughness values was carried out. It is shown that there is a reasonably close correlation between Charpy impact and fracture toughness results for high strength, low toughness steels. There is, however, a greater scatter of results with high toughness steels. In material evaluation programs the impact test may be used to indicate the fracture toughness level, with a limited number of K(IC) tests to confirm predicted values. The fracture toughness test, however, must be used where exact K(IC) values are required, e.g., for calculation of the critical crack size in a component. Results also show that the toughness of air melted steel in the transverse orientation is considerably less than in the longitudinal direction; ESR steel has better transverse toughness than air melted grades; and approximate fracture toughness values can be calculated from invalid specimen data. ESA

N87-12017*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CONCENTRATED MASS EFFECTS ON THE FLUTTER OF A COMPOSITE ADVANCED TURBOPROP MODEL
J. K. Ramsey and K. R. V. Kaza Oct. 1986 22 p
(NASA-TM-88854; E-3247; NAS 1.15:88854) Avail: NTIS
HC A02/MF A01 CSCL 20K

The effects on bending-torsion flutter due to the addition of a concentrated mass to an advanced turboprop model blade with rigid hub are studied. Specifically the effects of the magnitude and location of added mass on the natural frequencies, mode shapes, critical interblade phase angle, and flutter Mach number are analytically investigated. The flutter of a propfan model is shown to be sensitive to the change in mass distribution. Static unbalance effects, like those for fixed wings, were shown to occur as the concentrated mass was moved from the leading edge to the trailing edge with the exception of one mass location. Mass balancing is also inferred to be a feasible method for increasing the flutter speed. Author

N87-12018*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
USER MANUAL FOR BUNVIS-RG: AN EXACT BUCKLING AND VIBRATION PROGRAM FOR LATTICE STRUCTURES, WITH REPETITIVE GEOMETRY AND SUBSTRUCTURING OPTIONS
M. S. Anderson, F. W. Williams (Wales Univ. Inst. of Science and Technology, Cardiff), J. R. Banerjee, B. J. Durling, C. L. Herstrom, D. Kennedy, and D. B. Warnaar (Technische Hogeschool, Delft, Netherlands) Nov. 1986 50 p
(NASA-TM-87669; NAS 1.15:87669) Avail: NTIS
HC A03/MF A01 CSCL 20K

A computer program is described which is especially suited for making vibration and buckling calculations for prestressed lattice structures that might be used for space application. Structures having repetitive geometry are treated in a very efficient manner. Detailed instructions for data input are given along with several example problems illustrating the use and capability of the program. Author

N87-12019*# Lockheed Missiles and Space Co., Palo Alto, Calif. Research Lab.
ENHANCEMENTS TO THE STAGS COMPUTER CODE Final Report
C. C. Rankin, P. Stehlin, and F. A. Brogan Washington NASA Nov. 1986 64 p
(Contract NAS1-16723)
(NASA-CR-4000; NAS 1.26:4000; LMSC-D060755) Avail: NTIS
HC A04/MF A01 CSCL 20K

The power of the STAGS family of programs was greatly enhanced. Members of the family include STAGS-C1 and RRSYS. As a result of improvements implemented, it is now possible to address the full collapse of a structural system, up to and beyond critical points where its resistance to the applied loads vanishes or suddenly changes. This also includes the important class of problems where a multiplicity of solutions exists at a given point (bifurcation), and where until now no solution could be obtained along any alternate (secondary) load path with any standard production finite element code. Author

N87-12020*# Lehigh Univ., Bethlehem, Pa. Dept. of Mechanical Engineering and Mechanics.
THE SURFACE CRACK PROBLEM IN AN ORTHOTROPIC PLATE UNDER BENDING AND TENSION
Bing-Hua Wu and F. Erdogan Nov. 1986 78 p
(Grant NGR-39-007-011)
(NASA-CR-179892; NAS 1.26:179892) Avail: NTIS
HC A05/MF A01 CSCL 20K

The elasticity problem for an infinite orthotropic flat plate containing a series of through and part-through cracks and subjected to bending and tension loads is considered. The problem is formulated by using Reissner's plate bending theory and considering three dimensional materials orthotropy. The Line-spring model developed by Rice and Levy is used to formulate the surface crack problem in which a total of nine material constants has been used. The main purpose of this study is to determine the effect of material orthotropy on the stress intensity factors, to investigate the interaction between two asymmetrically arranged collinear cracks, and to provide extensive numerical results regarding the stress intensity factors. The problem is reduced to a system of singular integral equations which is solved by using the Gauss-Chebyshev quadrature formulas. The calculated results show that the material orthotropy does have a significant effect on the stress intensity factor. Author

N87-12021*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
SENSITIVITY ANALYSIS AND APPROXIMATION METHODS FOR GENERAL EIGENVALUE PROBLEMS Final Report
Durbha V. Murthy and Raphael T. Haftka Oct. 1986 124 p
(Grant NAG3-347)
(NASA-CR-179538; NAS 1.26:179538) Avail: NTIS
HC A06/MF A01 CSCL 20K

Optimization of dynamic systems involving complex non-hermitian matrices is often computationally expensive. Major contributors to the computational expense are the sensitivity analysis and reanalysis of a modified design. The present work seeks to alleviate this computational burden by identifying efficient sensitivity analysis and approximate reanalysis methods. For the algebraic eigenvalue problem involving non-hermitian matrices, algorithms for sensitivity analysis and approximate reanalysis are classified, compared and evaluated for efficiency and accuracy. Proper eigenvector normalization is discussed. An improved method for calculating derivatives of eigenvectors is proposed based on a more rational normalization condition and taking advantage of matrix sparsity. Important numerical aspects of this method are also discussed. To alleviate the problem of reanalysis, various approximation methods for eigenvalues are proposed and evaluated. Linear and quadratic approximations are based directly on the Taylor series. Several approximation methods are developed based on the generalized Rayleigh quotient for the eigenvalue problem. Approximation methods based on trace theorem give high accuracy without needing any derivatives. Operation counts

for the computation of the approximations are given. General recommendations are made for the selection of appropriate approximation technique as a function of the matrix size, number of design variables, number of eigenvalues of interest and the number of design points at which approximation is sought. Author

N87-12022*# California Inst. of Tech., Pasadena. Graduate Aeronautical Labs.
OBSERVATION OF THE INITIATION AND PROGRESSION OF DAMAGE IN COMPRESSIVELY LOADED COMPOSITE PLATES CONTAINING A CUTOUT Progress Report
Anthony Waas and Charles Babcock, Jr. Nov. 1986 68 p
(Grant NsG-1483)
(NASA-CR-179911; NAS 1.26:179911; SM-86-34) Avail: NTIS HC A04/MF A01 CSCL 20K

A series of experiments was carried out to determine the mechanism of failure in compressively loaded laminated plates with a circular cutout. Real time holographic interferometry and photomicrography are used to observe the progression of failure. These observations together with post experiment plate sectioning and deplying for interior damage observation provide useful information for modelling the failure process. It is revealed that the failure is initiated as a localised instability in the zero layers, at the hole surface. With increasing load extensive delamination cracking is observed. The progression of failure is by growth of these delaminations induced by delamination buckling. Upon reaching a critical state, catastrophic failure of the plate is observed. The levels of applied load and the rate at which these events occur depend on the plate stacking sequence. Author

N87-12023# Massachusetts Inst. of Tech., Cambridge.
A WEDGE TEST FOR QUANTIFYING FULLY PLASTIC FRACTURE
Frank A. McClintock and Sara J. Wineman 30 May 1986 24 p
(Contract N00014-82-K-0025)
(AD-A168607) Avail: NTIS HC A02/MF A01 CSCL 20/11

A test using two wedges splitting a small, doubly grooved specimen allows measurement of stable, fully plastic crack initiation and growth under variable amounts of triaxiality. In wedge tests, 25 mm cubes of 1018 hot rolled steel in three different orientations exceeded the limit load predicted by plastic slip-line fields. The test gave crack tip initiation displacements of 0.7 to 0.8mm, regardless of orientation. Since microscopic examination of the fracture surfaces indicated that the wedges suppress blunting, the presence of non-zero initiation displacements suggests that a fracture process zone of finite thickness must be established before crack growth. During growth, a specimen with rolling direction normal to the crack plane had a crack growth ductility (minimum displacement per unit ligament reduction) of 0.006 to 0.009, compared to ductilities of 0.016 to 0.027 for specimens with rolling direction parallel to the crack front or parallel to the growth direction. The lower ductility with the crack normal to the rolling direction appears to be due to a smoother fracture surface without zigzagging between inclusion stringers. GRA

N87-12024# Harvard Univ., Cambridge, Mass. Div. of Applied Sciences.
DUGDALE MODEL FOR CIRCUMFERENTIAL THROUGH-CRACKS IN PIPES LOADED BY BENDING
J. L. Sanders, Jr. Mar. 1986 14 p
(Contract N00014-84-K-0510)
(AD-A170260; MECH-77) Avail: NTIS HC A02/MF A01 CSCL 13/13

The paper contains an analytical solution to the title problem by means of the semimembrane theory of cylindrical shells. Results include the crack opening displacements as a function of circumferential angle, the fracture parameter J, and the effects of the crack on the compliance of the pipe. Author (GRA)

N87-12025# Brown Univ., Providence, R. I. Metals Research Lab.
STUDIES OF STRAIN RATE EFFECTS IN THE DEFORMATION OF SOLIDS BY MEANS OF STRESS PULSES AND ULTRASONIC METHODS Progress Report, 1 Sep. 1984 - 31 Mar. 1985
C. Elbaum and A. Hikata 1986 31 p
(Contract DE-FG02-84ER-45165)
(DE86-012208; DOE/ER-45165/2) Avail: NTIS HC A03/MF A01

Strain rate sensitivity and deformation mechanism of LiF single crystals were studied at room temperature. Plastic deformations were induced by a split Hopkinson bar system. The range of strain rate covered is from 0.2/sec to 14/sec. Both annealed and irradiated single crystals of <100> crystallographic orientations were tested. Ultrasonic longitudinal and shear waves were propagated in the sample concurrently with the stress pulses and their attenuation and velocity changes were analyzed. It was found that the glide motions of dislocations are controlled by thermally activated processes with an activation volume of 7.9 x 10 to the -21 cu cm for annealed samples and 2 x 10 to the -21 cu cm for irradiated samples. The activation energy for annealed sample was estimated to be 0.63 eV. The strain rate sensitivity was found to be 0.53 MPa for annealed samples and 2.13 MPa for irradiated samples. The mobile dislocation density at 1.4 x 10 to the -3 shear strain was found to be 4 x 10 to the 7th power cm/cu cm. DOE

N87-12026# Paris VI Univ. (France).
ANALYSIS OF SOME NONLINEAR PROBLEMS. MODELS OF PLATES AND SHELLS Ph.D. Thesis [ANALYSE DE CERTAINS PROBLEMES NON LINEAIRES: MODELES DE PLAQUES ET DE COQUES]
Jean Claude Paumier 1985 311 p In FRENCH and ENGLISH
(ETN-86-98404) Avail: NTIS HC A14/MF A01

Problems related to the implementation of mathematical models and the existence of singularities are explored in cases including a gas combustion semilinear model, two dimensional models of viscoelastic plates and elastic shells, and three dimensional viscoplastic and elastic nonlinear models in plates and shells. The nonlinear problem where a three dimensional elastic plate is constrained in the edge to glide only over the support is studied. ESA

N87-12027# Kansas Univ., Lawrence. Center for Research.
PERFORMANCE AND DESIGN OF COMPOSITE BEAMS WITH WEB OPENINGS
R. C. Donahey and D. Darwin Apr. 1986 284 p Sponsored by American Inst. of Steel Construction
(PB86-213105) Avail: NTIS HC A13/MF A01 CSCL 13M

Fifteen tests to failure were carried out on full scale composite beams with web openings. All beams had ribbed slabs using formed steel deck. Ribs were perpendicular to or parallel to the steel section. The effects of moment-shear ratio, partial composite construction, deck rib orientation, slab thickness, opening shape, opening eccentricity, and modification of the deck over the opening are studied. A strength model and three versions of a practical design technique are developed. The peak loads attained by composite beams with ribbed slabs at web openings are governed by the failure of the slab. Rib failure occurs in slabs with transverse ribs, while longitudinal shear failure occurs in slabs with longitudinal ribs. First yield in the steel around the opening does not give an accurate indication of the section capacity. The strength model and the design techniques accurately predict the strength of composite beams at web openings for beams with solid or ribbed slabs. GRA

N87-12028# Oak Ridge National Lab., Tenn.
FINITE ELEMENT FRACTURE ANALYSIS ON MICROCOMPUTER
J. W. Bryson and B. R. Bass 1986 20 p Presented at conference
(Contracts DE-AC05-84OR-21400; NRC-40-551-75; NRC-40-552-75)
(TI86-006214; CONF-860722-4) Avail: NTIS HC A02/MF A01

The ORVIRT.PC microcomputer program enables one to perform finite element fracture analysis on either an IBM PC/AT or PC/XT. When used together with its companion automatic mesh generation program, ORMGEN.PC, a complete fracture analysis consisting of mesh generation, stress analysis, and fracture analysis

can typically be performed in 30 to 45 minutes. ORVIRT.PC is a stand alone finite element program with the capability to carry out two dimensional linear thermoelastic stress and fracture mechanics analyses. ORVIRT.PC utilizes a virtual crack extension technique that was modified to include thermal strains. While this approach reduces identically to the J-integral for 2-D problems, it offers an advantage in application and programming effort over the latter when thermal loadings are considered. Sample problems are provided demonstrating that an accuracy better than 1% can be obtained with ORVIRT.PC. System requirements are an IBM PC/AT or PC/XT, 512K minimum memory, hard disk, math compressor, and IBM Professional FORTRAN Compiler. Author

N87-11733*# Lockheed-Georgia Co., Marietta.
SIZING-STIFFENED COMPOSITE PANELS LOADED IN THE POSTBUCKLING RANGE
S. B. Biggers and J. N. Dickson *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 15 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11741*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
STRUCTURAL SENSITIVITY ANALYSIS: METHODS, APPLICATIONS, AND NEEDS
Howard M. Adelman, Raphael T. Haftka (Virginia Polytechnic Inst. and State Univ., Blacksburg), Charles J. Camarda, and Joanne L. Walsh *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 18 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11762*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
MICROCOMPUTER DESIGN AND ANALYSIS OF THE CABLE CATENARY LARGE SPACE ANTENNA SYSTEM
W. Akle *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 14 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11767*# Howard Univ., Washington, D. C.
STRUCTURAL OPTIMIZATION WITH CONSTRAINTS ON TRANSIENTS RESPONSE
Robert Reiss *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 11 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11770*# Iowa Univ., Iowa City.
PROBLEMS IN LARGE-SCALE STRUCTURAL OPTIMIZATION
Jasbir S. Arora and Ashok D. Belegundu *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 26 p (For primary document see N87-11750 03-05)
(Grant NSF CEE-82-13851)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11771*# New South Wales Univ., Sydney (Australia).
STRUCTURAL OPTIMIZATION OF LARGE OCEAN-GOING STRUCTURES
Owen F. Hughes *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 18 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11773*# Houston Univ., Tex. Dept. of Mechanical Engineering.
A CONCEPTUAL BASIS FOR THE DESIGN OF DAMAGE-TOLERANT STRUCTURAL SYSTEMS
Farrokh Mistree, Jon A. Shupe, and Owen F. Hughes (New South Wales Univ., Sydney, Australia) *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 36 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 20K

N87-11779*# Michigan Univ., Ann Arbor.
SHAPE OPTIMIZATION INCLUDING FINITE ELEMENT GRID ADAPTATION
Noboru Kikuchi and J. E. Taylor *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 10 p (For primary document see N87-11750 03-05)
(Grant NSF CEE-81-18158)
Avail: NTIS HC A22/MF A01 CSCL 20K

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

N87-12029*# Illinois Natural History Survey, Champaign. Thematic Mapper Working Group.
INTERPRETING FOREST AND GRASSLAND BIOME PRODUCTIVITY UTILIZING NESTED SCALES OF IMAGE RESOLUTION AND BIOGEOGRAPHICAL ANALYSIS Progress Report
Louis R. Iverson, Jerry S. Olson (Illinois Univ., Champaign), Paul G. Risser, Colin Treworgy, Thomas Frank, Elizabeth Cook, and Ying Ke 1986 42 p Prepared in cooperation with Oak Ridge National Lab., Tenn.
(Contract NAS5-28761)
(NASA-CR-176803; NAS 1.26:176803) Avail: NTIS HC A03/MF A01 CSCL 08B

Data acquisition, initial site characterization, image and geographic information methods available, and brief evaluations of first-year for NASA's Thematic Mapper (TM) working group are presented. The TM and other spectral data are examined in order to relate local, intensive ecosystem research findings to estimates of carbon cycling rates over wide geographic regions. The effort is to span environments ranging from dry to moist climates and from good to poor site quality using the TM capability, with and without the inclusion of geographic information system (GIS) data, and thus to interpret the local spatial pattern of factors conditioning biomass or productivity. Twenty-eight TM data sets were acquired, archived, and evaluated. The ERDAS image processing and GIS system were installed on the microcomputer (PC-AT) and its capabilities are being investigated. The TM coverage of seven study areas were exported via ELAS software on the Prime to the ERDAS system. Statistical analysis procedures to be used on the spectral data are being identified. B.G.

N87-12030*# General Electric Co., Lanham, Md. Space Systems Div.
LANDSAT-D PROGRAM. VOLUME 2: GROUND SEGMENT Final Report
26 Oct. 1984 225 p Original contains color imagery. Original photography may be purchased from EROS Data Center, Sioux Falls, S.D. 57198
(Contract NAS5-25300)
(NASA-CR-177174; NAS 1.26:177174; SSD-84SDS4266-Vol-2)
Avail: NTIS HC A10/MF A01 CSCL 08B

Raw digital data, as received from the LANDSAT spacecraft,

cannot generate images that meet specifications. Radiometric corrections must be made to compensate for aging and for differences in sensitivity among the instrument sensors. Geometric corrections must be made to compensate for off-nadir look angle, and to calculate spacecraft drift from its prescribed path. Corrections must also be made for look-angle jitter caused by vibrations induced by spacecraft equipment. The major components of the LANDSAT ground segment and their functions are discussed. B.G.

N87-12031# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TM BAND COMBINATION FOR CROP DISCRIMINATION
Sherry Chou Chen, Getulio T. Batista, and Antonio T. Tardin May 1986 7 p Presented at the International Symposium on Remote Sensity, Resource Development and Environmental Management, Eschede, Netherlands, 25-29 Aug. 1986
(INPE-3905-PRE/946) Avail: NTIS HC A02/MF A01

The LANDSAT Thematic Mapper provides not only more spectral bands but also improved spatial resolutions in the visible and infrared wavelengths as compared to MSS data. However, working with the increased number of wavelength bands presents problems. To learn better how to analyze TM data for agriculture studies, LANDSAT data of a 15x15 Km area in Parana State, Brazil, were acquired on Jan. 19, 1985. The predominant crops were soybeans, corn, and sugarcane. To choose the best combination of the three TM bands to use, the entropy criterion was used. The colors green, red and blue were associated with them according to the magnitudes of their variances to form the color composite. Interpretability of these color images were evaluated visually. For digital analyses the criterion of the Jeffreys-Matusita distance was applied to verify the best band combination if 2,3,4 or 5 TM bands were used. A classification algorithm based on the maximum likelihood decision rule was then employed to classify the study area using the designated TM bands. Classification performances were compared pixel-by-pixel on alphanumeric printouts, the computer time consumed, the classification matrices and the upper bounds of the probability of error. After these analyses, the TM bands which should be used for an effective digital analysis of this agricultural scene were decided.
Author

N87-12032*# Illinois Natural History Survey, Urbana. Thematic Mapper Working Group.
INTERPRETING FOREST AND GRASSLAND BIOME PRODUCTIVITY UTILIZING NESTED SCALES OF IMAGE RESOLUTION AND BIOGEOGRAPHICAL ANALYSIS Progress Report
Louis R. Iverson, Elizabeth A. Cook, Robin L. Graham (Oak Ridge National Lab., Tenn.), Jerry S. Olson, Thomas Frank (Illinois Univ., Urbana), Ying Ke, Colin Treworgy (Illinois State Geological Survey, Urbana), and Paul G. Risser (New Mexico Univ., Albuquerque) 1986 21 p
(Contract NAS5-78781)
(NASA-CR-179739; NAS 1.26:179739; PR-2) Avail: NTIS HC A02/MF A01 CSCL 02C

Several hardware, software, and data collection problems encountered were conquered. The Geographic Information System (GIS) data from other systems were converted to ERDAS format for incorporation with the image data. Statistical analysis of the relationship between spectral values and productivity is being pursued. Several project sites, including Jackson, Pope, Boulder, Smokies, and Huntington Forest are evolving as the most intensively studied areas, primarily due to availability of data and time. Progress with data acquisition and quality checking, more details on experimental sites, and brief summarizations of research results and future plans are discussed. Material on personnel, collaborators, facilities, site background, and meetings and publications of the investigators are included. B.G.

N87-12033*# Minnesota Univ., Minneapolis.
AN ECOLOGIC STUDY OF PEAT LANDFORMS IN CANADA AND ALASKA Progress Report
Paul H. Glaser 1986 9 p
(Contract NAS5-28740)
(NASA-CR-179740; NAS 1.26:179740) Avail: NTIS HC A02/MF A01 CSCL 08B

The role of groundwater and surface runoff in controlling the water chemistry and development of peat landforms in northern Minnesota are described. The LANDSAT imagery taken during spring break-up are particularly valuable in identifying potential zones of groundwater discharge. The vascular floras of raised bogs in eastern North Americas demonstrating the remarkable uniformity of the ombrotrophic flora over broad geographic regions are described. The evolution of peat landforms in the major boreal peatlands of eastern America is examined. The LANDSAT imagery is used to determine the area of patterned to featureless peatlands, the area of ombrotrophic bog relative to minerotrophic fen, and the relative size and degree of streamlining of island landforms entirely composed of peat. Such measurements can be used to assess the role of climate, time, and hydrology in controlling the formation of peatland patterns across broad geographic regions. B.G.

N87-12034*# Washington State Univ., Pullman. Dept. of Agronomy and Soils.
SPECTRAL CHARACTERISTICS AND THE EXTENT OF PALEOSOLS OF THE PALOUSE FORMATION Semiannual Progress Report
B. E. Frazier, Alan Busacca, Yaan Cheng, David Wherry, Judy Hart, and Steve Gill 1986 12 p
(Contract NAS5-28758)
(NASA-CR-179727; NAS 1.26:179727; SAPR-2) Avail: NTIS HC A02/MF A01 CSCL 08G

Spectral relationships were investigated for several bare soil fields which were in summer fallow rotation on the date of the imagery. Printouts of each band were examined and compared to aerial photography. Bands with dissimilar reflectance patterns for known areas were then combined using ratio techniques which were proven useful in other studies (Williams, 1983). Selected ratios were Thematic Mapper (TM) 1/TM4, TM3/TM4, and TM5/TM4. Cluster analyses and Baysian and Fastclass classifier images were produced using the three ratio images. Plots of cluster analysis outputs revealed distinct groupings of reflectance data representing green crops, ripened crops, soil and green plants, and bare soil. Bare soil was represented by a line of clusters on plots of the ratios TM5/TM4 and TM3/TM4. The soil line was investigated further to determine factors involved in the distributin of clusters alone the line. The clusters representing the bare soil line were also studied by plotting the Tm5/TM4, TM1/TM4 dimension. A total of 76 soil samples were gathered and analyzed for organic carbon. Author

N87-12035*# Cornell Univ., Ithaca, N.Y. Dept. of Geological Sciences.
THEMATIC MAPPER STUDY OF ALASKAN OPHIOLITES Semiannual Report
John M. Bird 1986 16 p
(Contract NAS5-28739)
(NASA-CR-179728; NAS 1.26:179728) Avail: NTIS HC A02/MF A01 CSCL 08B

The combinations of Thematic Mapper (TM) bands that best distinguish basalts of the Brooks Range ophiolites were determined. Geochemical analyses, including major, trace, and rare earth elements (REE), are being done in order to study the significance of TM spectral variations that were observed within some of the sampled rock units. An image of the topography of the western Brooks Range and Colville Basin was constructed. Elevation data for the rest of Northern Alaska are being acquired to expand the area covered by the topography image. Two balanced cross sections (one along the eastern margin, the other along the western margin of the Brooks Range) are being constructed, using the techniques of fault-bend and fault-propagation folding. These are being used to obtain regional shortening estimates for the Brooks Range in an attempt to constrain tectonic models for the evolution of Northern Alaska. The TM data are being used to confirm reconnaissance maps and to obtain structural data where no maps exist. Along with the TM data, digital topography, seismic reflection

profiles, and magnetic and gravity surveys are examined to better understand the evolution of the Colville Basin, north of the Brooks Range. B.G.

N87-12036*# Smithsonian Institution, Washington, D. C. Center for Earth and Planetary Studies.
ENVIRONMENTAL PROCESSES AND SPECTRAL REFLECTANCE CHARACTERISTICS ASSOCIATED WITH SOIL EROSION IN DESERT FRINGE REGIONS Semiannual Report
P. A. Jacobberger 11 Aug. 1986 53 p
(Contract NAS5-28774)
(NASA-CR-179729; NAS 1.26:179729) Avail: NTIS HC A04/MF A01 CSCL 08M

Two Thematic Mapper (TM) scenes were acquired. A scene was acquired for the Bahariya, Egypt field area, and one was acquired covering the Okavango Delta site. Investigations at the northwest Botswana study sites have concentrated upon a system of large linear (alab) dunes possessing an average wavelength of 2 kilometers and an east-west orientation. These dunes exist to the north and west of the Okavango Swamp, the pseudodeltaic end-sink of the internal Okavango-Cubango-Culto drainage network. One archival scene and two TM acquisitions are on order, but at present no TM data were acquired for the Tombouctou/Azaouad Dunes, Mali. The three areas taken together comprise an environmental series ranging from hyperarid to semi-arid, with desertization processes operational or incipient in each. The long range goal is to predict normal seasonal variations, so that aperiodic spectral changes resulting from soil erosion, vegetation damage, and associated surface processes would be distinguishable as departures from the norm. B.G.

N87-12037*# Maryland Univ., College Park. Dept. of Geography.
CHARACTERIZATION AND DISCRIMINATION OF SELECTED VEGETATION CANOPIES FROM FIELD OBSERVATIONS OF BIDIRECTIONAL REFLECTANCES M.S. Thesis
Sheila Donovan 1985 163 p
(Contract NCC5-26)
(NASA-CR-179837; NAS 1.26:179837) Avail: NTIS HC A08/MF A01 CSCL 02C

A full evaluation of the bidirectional reflectance properties of different vegetated surfaces was limited in past studies by instrumental inadequacies. With the development of the PARABOLA, it is now possible to sample reflectances from a large number of view angles in a short period of time, maintaining an almost constant solar zenith angle. PARABOLA data collected over five different canopies in Texas are analyzed. The objective of this investigation was to evaluate the intercanopy and intracanopy differences in bidirectional reflectance patterns. Particular attention was given to the separability of canopy types using different view angles for the red and the near infrared (NIR) spectral bands. Comparisons were repeated for different solar zenith angles. Statistical and other quantitative techniques were used to assess these differences. For the canopies investigated, the greatest reflectances were found in the backscatter direction for both bands. Canopy discrimination was found to vary with both view angle and the spectral reflectance band considered, the forward scatter view angles being most suited to observations in the NIR and backscatter view angles giving better results in the red band. Because of different leaf angle distribution characteristics, discrimination was found to be better at small solar zenith angles in both spectral bands. Author

N87-12038*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
REMOTE SENSING OF EARTH TERRAIN Semiannual Report, 1 Mar. - 31 Aug. 1986
J. A. Kong Oct. 1986 11 p
(Grant NAG5-270)
(NASA-CR-177185; NAS 1.26:177185) Avail: NTIS HC A02/MF A01 CSCL 05B

The Mueller matrix and polarization covariance matrix for polarimetric radar systems were studied. The clutter is modelled by a layer of random permittivity, described by a three dimensional correlation function, with variance, and horizontal and vertical correlation lengths. This model is applied, using the wave theory with Born approximations carried to the second order, to find the backscattering elements of the polarimetric matrices. It is found that 8 out of 16 elements of the Mueller matrix are identically zero, corresponding to a covariance matrix with four zero elements. Theoretical predictions are matched with experimental data for vegetation fields. A general mixing formula is derived for discrete scatterers immersed in a host medium. The inclusion particles are assumed to be ellipsoidal. The electric field inside the scatterers is determined by quasistatic analysis, assuming the diameter of the inclusion particles to be much smaller than the wavelength. The results are applicable to general multiphase mixtures. Author

N87-12039# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RELATIONSHIP BETWEEN THE SOUTHERN OSCILLATION EL NINO AND RAINFALL IN SOUTH AMERICA, AFRICA, INDIA, AUSTRALIA AND NEW ZEALAND
R. P. Kane Oct. 1986 66 p Submitted for publication Sponsored in part by Fundo de Nacional Desenvolvimento Cientifico e Tecnologico
(INPE-4005-PRE/998) Avail: NTIS HC A04/MF A01

The relationships between various indices of the Southern Oscillation (SO), El Nino and rainfalls in S. America, Africa, India, Australia and New Zealand are studied. The various SO indices are very well intercorrelated. El Ninos occur if the SO index is very low in the early part of the year. However, correlations with rainfall at most of the above locations (including NE Brazil) are loose, almost nonexistant, except for India and Victoria. For these, the relationship is one-sided i.e., most of the SO/El Nino are associated with droughts; but many droughts are not associated with SO/El Nino, thus severely limiting their prediction potential. Global circulations have an influence only occasionally, and the various rainfalls seem to be mostly influenced by local or semi-global circulation patterns, a study of which may lead to short-term predictions, with an antecedence of a few months. For some rainfall series, significant, prominent periodicities exist in the long periodicity region. In such cases, a study of time series seems to have prediction potentials. Author

N87-12040# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE BRAZILIAN SATELLITE REMOTE SENSING
M. N. Barbosa and D. Bastos-Netto Oct. 1986 21 p Presented at the International Conference on Remote Sensing for Development, Berlin, West Germany, 1-7 Sep. 1986
(INPE-4006-PRE/999) Avail: NTIS HC A02/MF A01

Almost twenty years since the first use of Remote Sensing techniques in Brazil, a review of the results achieved and a plans for the future are made, in accord with the aims and priorities of the new Brazilian Administration. Conscious of this spirit, INPE has revised its ongoing projects and established a new, goal-oriented organization structure. After one year of work, some achievements are already available and are presented in this paper. The analysis of these preliminary results, in conjunction with governmental priorities and the state-of-the-art at the international level, will serve as a guide in the years to come. Author

N87-12041# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
RESEARCH IN EXPERT INTERACTIVE CARTOGRAPHIC SYSTEMS Final Report, 13 May 1985 - 13 May 1986
Andrew J. Hanson 11 May 1986 68 p
(Contracts DACA72-85-C-0008; DA Proj. 854-5)
(AD-A168337; ETL-0417) Avail: NTIS HC A04/MF A01 CSCL 09/4

Applications of interactive expert system techniques to the domain of automated cartography were studied in the context of the SRI Image Understanding Testbed, extended to include Symbolics Lisp Machines and the SRI ImagCalc(TM) software support system. As a sample domain, we chose to work mainly

on the problem of locating generic cultural objects in aerial imagery. The discovery of such objects was accomplished by defining a generic model for rectilinear objects, along with rules for parsing the image geometry and correcting probable errors of the segmentation algorithm. These tools permit the semantic resegmentation of an initial syntactic scene partition to yield well-delineated buildings. The method owes its success to the combined utilization of both high-level and low-level knowledge about the target object context and the image. GRA

N87-12042# Army Engineer Topographic Labs., Fort Belvoir, Va.
TECHNIQUES TO IMPROVE ASTRONOMIC POSITIONING IN THE FIELD
Angel A. Baldini Dec. 1985 55 p
(AD-A168347; ETL-0400) Avail: NTIS HC A04/MF A01 CSCL 08/5

New methods and techniques for improving astronomic positioning in the field are discussed. Latitude and longitude are obtained by observing transit times of pairs of stars over a fixed vertical plane, independent of azimuth and zenith distances. A unique solution is derived for each pair. Higher accuracy in latitude can be obtained by observing transit times of star pairs over the prime vertical, where the parallactic angle reaches its maximum value. The vertical plane of observation can be fixed within 90 arc seconds with respect to the prime vertical without changes in the star's parallactic angle, and a function of it, the latitude, can then be computed. The star transit times over different vertical lines are thereby reduced to the central line or collimation plane, as a function of the parallactic angle. Higher accuracy in longitude can be achieved by observing the transit times of pairs of stars over a vertical plane fixed within 20 arc minutes with respect to the meridian plane. Each individual star pair will determine a solution. Since each pair does not depend on azimuth orientation, the star pairs can be chosen arbitrarily with respect to declination or zenith distance, and short periods of clear sky observations can be utilized. When several pairs are observed an adjustment can be carried out through the equations of conditions that allow one to detect errors in either the transit times or in the star's right ascensions. GRA

N87-12043# Coastal Engineering Research Center, Vicksburg, Miss.
AN ANNOTATED BIBLIOGRAPHY OF THE ATLANTIC REMOTE SENSING LAND-OCEAN EXPERIMENT (ARSLOE) Final Report
Stephen E. Wagner and Ann R. Sherlock Mar. 1986 36 p
(AD-A168703; CERC-86-4) Avail: NTIS HC A03/MF A01 CSCL 08/3

The Atlantic Remote Sensing Land-Ocean Experiment (ARSLOE) was conducted during October and November 1980 at the US Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's Field Research Facility located at Duck, North Carolina. ARSLOE consisted of experiments which were related to ocean waves, remote sensing of ocean fronts, and remote sensing of land cover. This annotated bibliography presents a compilation of published literature which describes the experiment, the measurements made, and the analyses conducted since termination of the experiment. GRA

N87-12044# Naval Postgraduate School, Monterey, Calif.
TWO-DIMENSIONAL POLYGONAL REPRESENTATION OF MAPS FOR USE WITH AUTONOMOUS VEHICLE ROUTE PLANNING
Roger K. Diehl, Robert B. McGhee, and Michael J. Zyda Jun. 1986 85 p
(AD-A170301; NPS52-86-016) Avail: NTIS HC A05/MF A01 CSCL 08/2

We present in this study a two-phase approach to the generation and maintenance of a polygonal cartographic database useful for autonomous vehicle route planning. The database is generated non-interactively from available U.S. Geological Survey topographical maps. The database is maintained interactively by a graphics workstation. The focus of this study is on the non-interactive generation of the polygonal database. The non-interactive generation process uses both a set of heuristics derived from the characteristics of paper maps and classical region growing. This study presents a two-phase approach to the digital map production problem. The first phase is a non-interactive phase in which general information is gleaned from a paper topographical map with the use of an image digitizer and computer vision software. The second phase is an interactive one that focuses on the refinement, correction and revision of the map produced in the first phase. GRA

N87-12045# Wageningen Agricultural Univ. (Netherlands). Vakgroep Natuurbeheer.
TELEDETECTION BY AQUATIC PLANTS. INVESTIGATION OF THE POSSIBILITIES OF MULTISPECTRAL PHOTOGRAPHY AND SPECTRORADIOMETRY [TELEDETECTIE VAN WATERPLANTEN. EEN ONDERZOEK NAAR DE MOGELIJKHEDEN MET MULTISPECTRAAL FOTOGRAFIE EN SPECTRORADIOMETRIE]
K. Philippart Aug. 1985 66 p In DUTCH
(VLT-1985-11; VN-809; ETN-86-98066) Avail: NTIS HC A04/MF A01

The possibilities of teledetection of aquatic plants using multispectral photography and spectroradiometry were assessed. The multispectral photography was performed in natural conditions in the green, red, and near IR wavelength range. The results are unsatisfactory; no correlation between reflection and biomass is found. The spectroradiometry was performed in a laboratory; the reflection spectrum of the object was determined by measuring the intensity in the range between 400 and 800 nm every 10 nm. The effect of the biomass and the degree of vegetation on the reflection are determined. Spectroradiometry gives good results; aquatic plants have a specific reflection spectrum. ESA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N87-12046*# Paragon Pacific, Inc., Torrance, Calif.
WEST-3 WIND TURBINE SIMULATOR DEVELOPMENT
J. A. Hoffman and S. Sridhar Jul. 1985 236 p
(Contracts DEN3-247; DE-AI01-76ET-20320)
(NASA-CR-174983; DOE/NASA/0247-3; NAS 1.26:174983; PPI-FID-300086-Vol-3) Avail: NTIS HC A11/MF A01 CSCL 10A

The software developed for WEST-3, a new, all digital, and fully programmable wind turbine simulator is given. The process of wind turbine simulation on WEST-3 is described in detail. The major steps are, the processing of the mathematical models, the preparation of the constant data, and the use of system software generated executable code for running on WEST-3. The mechanics of reformulation, normalization, and scaling of the mathematical models is discussed in detail, in particular, the significance of reformulation which leads to accurate simulations. Descriptions for the preprocessor computer programs which are used to prepare the constant data needed in the simulation are given. These programs, in addition to scaling and normalizing all the constants, relieve the user from having to generate a large number of constants used in the simulation. Also given are brief descriptions of the components of the WEST-3 system software: Translator, Assembler, Linker, and Loader. Also included are: details of the aeroelastic rotor analysis, which is the center of a wind turbine simulation model, analysis of the gimbal subsystem; and listings of the variables, constants, and equations used in the simulation. Author

N87-12047*# Mechanical Technology, Inc., Latham, N. Y.
CERAMIC AUTOMOTIVE STIRLING ENGINE PROGRAM
Aug. 1986 187 p
(Contracts DEN3-311; DE-AI01-85CE-50112)
(NASA-CR-175042; DOE/NASA-0311/1; NAS 1.26:175042; MTI-85SESD24) Avail: NTIS HC A09/MF A01 CSCL 10B

The Ceramic Automotive Stirling Engine Program evaluated the application of advanced ceramic materials to an automotive Stirling engine. The objective of the program was to evaluate the technical feasibility of utilizing advanced ceramics to increase peak engine operating temperature, and to evaluate the performance benefits of such an increase. Manufacturing cost estimates were also developed for various ceramic engine components and compared with conventional metallic engine component costs. Author

N87-12048*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RESULTS OF THE 1986 NASA/JPL BALLOON FLIGHT SOLAR CALIBRATION PROGRAM
B. E. Anspaugh and R. S. Weiss 1 Nov. 1986 41 p
(NASA-CR-179916; JPL-Pub-86-42; NAS 1.26:179916) Avail: NTIS HC A03/MF A01 CSCL 10A

The 1986 solar cell calibration balloon flight was successfully completed on July 15, 1986, meeting all objectives of the program. Thirty modules were carried to an altitude of 118,000 ft (36.0 km). The calibrated cells can now be used as reference standards in simulator testing of cells and arrays. Author

N87-12049*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SUMMARY ASSESSMENT OF SOLAR THERMAL PARABOLIC DISH TECHNOLOGY FOR ELECTRICAL POWER GENERATION
P. L. Penda, T. Fujita, and J. W. Lucas 15 Sep. 1985 126 p
Sponsored in part by DOE
(JPL Proj. 5105-161)
(NASA-CR-179920; DOE/JPL-1060/89; JPL-Pub-85-55; NAS 1.26:179920) Avail: NTIS HC A07/MF A01 CSCL 10B

An assessment is provided of solar thermal parabolic dish technology for electrical power generation. The assessment is based on the development program undertaken by the Jet Propulsion Laboratory for the U.S. Department of Energy and covers the period from the initiation of the program in 1976 through mid-1984. The program was founded on developing components and subsystems that are integrated into parabolic dish power modules for test and evaluation. The status of the project is summarized in terms of results obtained through testing of modules, and the implications of these findings are assessed in terms of techno-economic projections and market potential. The techno-economic projections are based on continuation of an evolutionary technological development program and are related to the accomplishments of the program as of mid-1984. The accomplishments of the development effort are summarized for each major subsystem including concentrators, receivers, and engines. The ramifications of these accomplishments are assessed in the context of developmental objectives and strategies. Author

N87-12050# Naval Postgraduate School, Monterey, Calif.
HIGH ENERGY ELECTRON RADIATION DEGRADATION OF GALLIUM ARSENIDE SOLAR CELLS M.S. Thesis
Don W. Gold Mar. 1986 137 p
(AD-A168402; NPS-72-86-001) Avail: NTIS HC A07/MF A01 CSCL 10/2

A need existed to perform high energy electron irradiation experiments on gallium arsenide solar cells. To support this research, an automated solar cell test facility was constructed, gallium arsenide solar cells were obtained, and the Naval Postgraduate School LINAC facility was utilized to irradiate the cells to selected fluence levels at 20 MEV energies. Equivalent damage coefficients were calculated, and it was found that the average maximum power output decreased by 50% following a cumulative irradiation by electrons to a total fluence of 1 X 10 to the 15th power sq. cm. GRA

N87-12051# Minnesota Mining and Mfg. Co., St. Paul. Electronic and Information Sector Labs.
RESEARCH ON HIGH-EFFICIENCY SINGLE-JUNCTION MONOLITHIC THIN-FILM AMORPHOUS SILICON SOLAR CELLS Annual Report, 1 Dec. 1984 - 30 Nov. 1985
F. E. Aspen, D. P. Grimmer, R. L. Jacobson, F. R. Jeffrey, and N. T. Tran Apr. 1986 144 p
(Contract DE-AC02-83CH-10093)
(DE86-004453; SERI/STR-211-2924) Avail: NTIS HC A07/MF A01

This report presents results of one year of research on high-efficiency, single-junction, monolithic, thin-film amorphous silicon solar cells. This work consists of five research tasks: (1) amorphous silicon materials, (2) nonsemiconductor materials, (3) solar cells, (4) monolithic, intraconnected cells/submodules, and (5) multichamber deposition systems. The primary goal is to advance the state of the art of flexible thin films using glow-discharge deposition methods. Among other accomplishments, a multichamber deposition system has been installed that can deposit all three p-i-n layers continuously and sequentially, and these layers have demonstrated good IV characteristics. DOE

N87-12052# Delaware Univ., Newark. Inst. of Energy Conversion.
OPTIMIZATION OF p-CuInSe SUB 2/n-CdZnS SOLAR CELLS Final Subcontract Report, 15 Apr. 1984 - 30 Sep. 1985
R. W. Birkmire May 1986 19 p
(Contract DE-AC02-83CH-10093)
(DE86-010700; SERI/STR-211-2931) Avail: NTIS HC A02/MF A01

This research was conducted to fabricate CuInSe2/CdS solar cells on well-characterized CuInSe2 single-crystal wafers in order to improve our understanding of thin-film polycrystalline devices. CuInSe2 wafers were supplied to the Institute of Energy by K. Bachmann of North Carolina State University. CdS was deposited onto the wafers to make CuInSe2/CdS heterojunctions. Some wafers were treated in a Se atmosphere to lower the resistivity and to homogenize properties through the wafer. Not all wafers were single-crystal. The wafers were characterized in terms of resistivity, carrier type, composition and crystallographic structure. The CuInSe2/CdS cells had efficiencies over 4% and open-circuit voltages over 0.45 V. The number of wafers and their quality limited the device performance achievable in this work. DOE

N87-12053# Sandia National Labs., Albuquerque, N. Mex.
PHOTOVOLTAIC TECHNOLOGY EVALUATION
E. C. Boes and M. G. Thomas 1986 5 p Presented at the 2nd International Photovoltaic Science and Engineering Conference, Beijing, China, 1 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010467; SAND-86-2035C; CONF-860874-1) Avail: NTIS HC A02/MF A01

Photovoltaic power system technology is experiencing very rapid development. In order to maintain a current understanding of the status of this technology, the Photovoltaic Technology Evaluation Project conducts an on-going program of evaluating PV hardware at the component, subsystem, and full power system levels. This paper describes: the evaluation of PV power system performance for several major PV installations in the US; recent results from the component and subsystem evaluation activities in our Photovoltaic Advanced Systems Test Facility (PASTF); and development and application of PV power system models to better understand PV power systems' performance. DOE

N87-12054# Sandia National Labs., Albuquerque, N. Mex.
RECEIVER/REACTOR CONCEPTS FOR THERMOCHEMICAL TRANSPORT OF SOLAR ENERGY
R. B. Diver 1986 7 p Presented at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010959; SAND-85-2758C; CONF-860810-3) Avail: NTIS

HC A02

Thermochemical transport of solar energy based on reversible chemical reactions may be a way to take advantage of the high-temperature capabilities of parabolic dishes, while minimizing pipe network heat loss, since energy is transported at ambient temperatures in chemical form. Receiver/Reactor design is a key to making thermochemical transport a reality. In this paper the important parameters for solar receiver and chemical reactor design and how they relate to each other are presented. Three basic receiver/reactor types, applicable to thermochemical receiver design, are identified, i.e.: (1) tube receiver/reactors have tubular reactor elements which are directly heated by solar energy in the receiver; (2) indirect receiver/reactors use an intermediate heat transfer fluid between the receiver and reactor; and, (3) direct absorption receiver/reactors absorb sunlight directly on the reactor catalyst. Advantage, limitations, and risks associated with each design are discussed and examples of those that have been built are given. Each type offers its own set of advantages and risks, and warrant further investigation. DOE

N87-12055# European Space Agency, Paris (France).
MEASUREMENT OF RADIATION INTENSITY AT THE SOLAR TOWER PLANT SSPS/CRS OF THE IEA IN SPAIN
Andreas Brinner Jan. 1986 42 p Transl. into ENGLISH from "Strahlungsintensitaets-Messung am Solarturmkraftwerk SSPS/CRS der IEA in Spanien" Stuttgart, West Germany Original language document was announced as N86-15739
(ESA-TT-961; DFVLR-FB-85-36; ETN-86-98246) Avail: NTIS HC A03/MF A01; original German version avail. at DFVLR, Cologne, West Germany DM 15

The Kendall MK9 radiometer was selected to measure the radiation intensity on the IEA SSPS/CRS solar tower plant in Spain. The measuring signal was applied to calibrate a video camera used for measurement of power density distribution in the aperture of the solar absorber. The measurement results were used to show a relationship between the gray values of a video picture of the ASR receiver under radiation and the absolute radiation intensity measured at three points so as to calculate the absolute irradiation in MW. The tests show good reproducibility and high accuracy. The conversion factors were applied to calculate the flux distribution, the maximum flux and the ASR receiver efficiency. ESA

N87-12056# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.
CONTROL OF WIND POWER STATIONS WITH VARIABLE VELOCITY IN A LARGE RANGE
Bjoern Jakobsson and Eskil Ulen Jun. 1986 92 p In SWEDISH; ENGLISH summary
(FOA-C-20613-E3; ISSN-0347-3694; ETN-86-98326) Avail: NTIS HC A05/MF A01

Wind turbine control was performed by keeping the velocity ratio optimal up to a certain torque. At higher wind speed the turbine speed is allowed to augment at constant torque, to produce more power. When maximum speed is obtained, a blade regulation is inserted: adjustment to optimal speed is done by feedforward control. A torque (dependant on rotor speed) is imparted to the shaft by an electric control. The turbine then goes to the right speed. ESA

N87-12057# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
SURVEY OF PARTIAL REPORTS ON THE INVESTIGATION OF TIP VANES [OVERZICHT EN DEELRAPPORTAGES VAN HET TIPVANE ONDERZOEK (KWANTITATIEVE FASE)]
Th. vanHolten Nov. 1985 112 p In DUTCH
(IW-R514; ETN-86-98485) Avail: NTIS HC A06/MF A01

Application of tip vanes in commercial wind turbines was studied. A quantitative aerodynamic theory was developed and proved to be reasonably reliable. It is concluded that a practical utilization of the tip vane principle in commercial high speed rotors is not yet feasible. ESA

N87-12058# Technische Hogeschool, Delft (Netherlands). Inst. for Wind Energy.
PROGRESS IN CALCULATION METHODS FOR EIGENFREQUENCIES [VOORTGANG IN DE BEREKENINGSMETHODES VOOR DE EIGENFREQUENTIES]
P. A. Joosse Dec. 1985 48 p In DUTCH
(IW-M505; ETN-86-98486) Avail: NTIS HC A03/MF A01

Methods to calculate the uncoupled eigenfrequencies of a (rotating) beam used in wind turbines are described. Improvements in the determination of the flexibility matrix do not lead to an appreciably higher accuracy. The Southwell coefficients deduced from the eigenvibration form are sufficiently accurate. The determination of the bar diagram (rotating eigenfrequencies versus rotor speed) via the nonrotating bending frequency and the Southwell coefficients results in a good approximation which can be used to find the occurrence of interferences. The drag and torsion frequencies are determined with an accuracy comparable to that of the flap frequency. The calculation methods allow the determination of all uncoupled rotor eigenfrequencies. The short calculation time and the accuracy of these methods make them very suitable for parameter variations in the predesign phase. ESA

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N87-12059*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
DEVELOPMENT OF DATA PROCESSING, INTERPRETATION AND ANALYSIS SYSTEM FOR REMOTE SENSING OF TRACE ATMOSPHERIC GAS SPECIES Final Report, period ending Jun. 1986
Barbara B. Gormsen and S. N. Tiwari Aug. 1986 9 p
(Contract NCC1-34)
(NASA-CR-179882; NAS 1.26:179882) Avail: NTIS HC A02/MF A01 CSCL 13B

Highly efficient methods were developed for the analysis and reduction of Measurement of Air Pollution from Satellite (MAPS) data. Specific attention was directed to analyzing the data from the Office of Space and Terrestrial Applications 3 (OSTA-3) correlative measurements of aircraft research flights and from the OSTA-3 shuttle flight. Methods were developed for error analysis of the aircraft and spacecraft instruments. The LSI 11/23 software system was modified and expanded for future data analysis. Author

N87-12060*# Ionics Research, Inc., Houston, Tex.
ORGANICS IN WATER CONTAMINATION ANALYZER, PHASE 1 Final Report
2 Jun. 1986 14 p
(Contract NAS9-17536)
(NASA-CR-179901; NAS 1.26:179901) Avail: NTIS HC A02/MF A01 CSCL 13B

The requirements which would result in identifying the components of an automatic analytical system for the analysis of specific organic compounds in the space station potable water supply are defined. The gas chromatographic system for such an analysis is limited to commercially available off-the-shelf hardware and includes the sample inlet, an ionization detector, capillary columns as well as computerized compound identification. The sampling system will be a special variation of the purge and trap Tenax mode using six-port valves and a 500 microliter water sample. Capillary columns used for the separating of contaminants will be bonded phase fused silica with a silicone stationary phase. Two detectors can be used: photoionization and far ultraviolet, since they are sensitive and compatible with capillary columns. A computer system evaluation and program with the principle of compound identification based on the retention index is presented. Author

N87-12061# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A STUDY OF THE RADIATION BALANCE OF THE AMAZON FOREST [UM ESTUDO SOBRE O BALANCO DE RADIACAO DA FLORESTA AMAZONICA]
Antonio Ocimar Manzi, Yelisetty Viswanadham, Leonardo Deaned-eAbreuSa, and Romisio Geraldo Bouhid Andre Jul. 1986 20 p In PORTUGUESE; ENGLISH summary Presented at the Workshop on GTE/ABLE-2A, Sao Jose dos Campos, Brazil, 3-7 Feb. 1986 (INPE-3956-PRE/974) Avail: NTIS HC A02/MF A01

This work illustrates the behavior of the various components in the radiation balance and two different parameters which are useful statistical and descriptive indexes of net and solar radiation over natural surfaces like the Amaxon tropical rain forest. The experimental site is located at 2 deg 57 min S 59 deg 57 min W in the Ducke Reserve Forest, 25km from Manaus. Local day time data for non-precipitation days during the observation period 23rd July to 22nd August 1984 were selected for analysis. The radiation balance equation was analyzed for different atmospheric humidity conditions. Values of the heating coefficient beta and the longwave radiation exchange coefficient lambda are calculated. The results showed that the absolute value of the parameter beta decreases with relative humidity, whereas the parameter lambda increases.
Author

N87-12062# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Umweltmeteorologie.
INVESTIGATION ON ACIDITY-FORMING IONS IN WET AND DRY DEPOSITION DURING THE WINTER SEASON 1984/85
Monika Paffrath Mar. 1986 72 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-15; ISSN-0171-1342; ETN-86-98183) Avail: NTIS HC A04/MF A01; DFVLR, Cologne, West Germany DM 23.50

The concentrations of the most important acidity-controlling ions, namely sulfate, nitrate, chloride, H(+), and ammonia, were systematically measured in rain, snow, fog, and dry depositions. The measuring and analysis methods included ion chromatography, photometry, and pH-measurements. The results show that the sulfate, nitrate, and ammonia ions dominate, and that dry depositions can be neglected. The mole ratio of nitrate to sulfate in wet depositions is 1 to 0.6. The investigation of correlations between ion deposition rates and wind direction shows that the highest pollutant contribution (SO2, NOx) comes mainly from the west with high precipitation rates. Chlorides come mainly with maritime air masses from the west. Strong monthly variations are observed.
ESA

N87-12063# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Fysische Meteorologie.
TERRAIN CLASSIFICATION FOR REGIONAL TRANSPORT MODELS [TERREINCLASSIFICATIE VOOR REGIONALE VERSPREIDINGSMODELLEN]
G. H. L. Verver 1986 31 p In DUTCH
(KNMI-TR-81(FM); B8666194; ISSN-0169-1708; ETN-86-98499) Avail: NTIS HC A03/MF A01

Terrain classification data and derived meteorological parameters for regional pollution transport models are presented. The data bases which contain land cover and soil data are based on a large number of maps; 52 different land types are classified according to height and density of surface elements, variation of land cover with season, and soil humidity. Twenty-one classes of soil are distinguished according to color and structure of the soil and water permeability.
ESA

N87-12064# Environmental Protection Agency, Research Triangle Park, N.C.
STANDARD REFERENCE PHOTOMETER NETWORK FOR VERIFICATION AND CERTIFICATION OF OZONE STANDARDS Final Report
C. F. Smith and K. A. Rehme May 1986 11 p
(PB86-205465; EPA-600/D-86-107) Avail: NTIS HC A02/MF A01 CSCL 13B

A nationwide network of regionally located Standard Reference Photometers (SRP) for the assay of ozone concentrations has been established to allow state and local air monitoring agencies to compare their ozone standards with authoritative standards maintained and operated under closely controlled conditions. The SRP was developed by the National Bureau of Standards and the Environmental Protection Agency (EPA) as a highly stable, highly precise, computer-controlled instrument for the assay of ozone concentration. EPA's Environmental Monitoring System Laboratory at Research Triangle Park, N. C. is operating an SRP network in cooperation with EPA Regional Office or State Agencies. Currently, network sites are located in RTP, NC; Edison, N.J.; Chicago, Ill; Houston, Tex.; Denver, Col.; and Sacramento, Calif. Each network SRP was fabricated and certified by the NBS before deployment and is recertified annually by EPA. To date 86 comparisons of local 03 standards have been performed with the network SRP's. Of the 55 verifications of local 03 primary standards conducted, 46 comparison results (84%) were within the acceptable range (+ or - 3% agreement). Of the 31 verifications of local 03 transfer standards conducted, all 31 comparison results (100%) were within the acceptable range (+ or - 5% agreement) with 29 (94%) within + or - 3%.
GRA

N87-12065# Environmental Protection Agency, Research Triangle Park, N.C. Environmental Monitoring Systems Lab.
GLOBAL ATMOSPHERIC BACKGROUND MONITORING FOR SELECTED ENVIRONMENTAL PARAMETERS BAPMoN DATA FOR 1981. VOLUME 2: PRECIPITATION CHEMISTRY, CONTINUOUS ATMOSPHERIC CARBON DIOXIDE AND SUSPENDED PARTICULATE MATTER
Jun. 1985 201 p Sponsored in part by United Nations Environment Programme, World Meteorological Organization and NOAA
(PB86-208360; EPA-600/4-85-015-Vol-2; WMO/TD-47-Vol-2) Avail: NTIS HC A10/MF A01 CSCL 13B

The report is the seventh in series reporting precipitation data from stations participating in the World Meterological Organization's network. The report consists of tables of raw data received from network sites around the world.
GRA

N87-12066 Georgia Inst. of Tech., Atlanta.
A COMPARISON OF STRATOSPHERIC AEROSOL AND GAS EXPERIMENT 1 (SAGE 1) AND UMKEHR OZONE PROFILES INCLUDING A SEARCH FOR UMKEHR AEROSOL EFFECTS Ph.D. Thesis
Michael Joseph Newchurch 1986 305 p
Avail: Univ. Microfilms Order No. DA8612319

After briefly reviewing ozone depletion predictions from atmospheric models and results from trend analysis of Umkehr data, the Umkehr method for deducing the vertical profile of ozone is outlined. The theoretical and empirical studies of the aerosol effect on Umkehr measurements are reviewed. A brief description of the Stratospheric Aerosol and Gas Experiment 1 (SAGE 1) is followed by a method for approximating the best presentation of the conditions over the Umkehr ground site as seen by the SAGE 1 satellite.
Dissert. Abstr.

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N87-12067*# Nevada Univ., Reno. Dept. of Geological Sciences.
NATURE AND ORIGIN OF MINERAL COATINGS ON VOLCANIC ROCKS OF THE BLACK MOUNTAIN, STONEWALL MOUNTAIN AND KANE SPRINGS WASH VOLCANIC CENTERS, SOUTHERN NEVADA Semiannual Progress Report, Jan. - Jul. 1986
James V. Taranik, Donald C. Noble, Liang C. Hsu, Amy Hutsinpiller, and David Spatz Jul. 1986 36 p

(Contract NAS5-28765)
(NASA-CR-179738; NAS 1.26:179738) Avail: NTIS HC A03/MF A01 CSCL 08G

Surface coatings on volcanic rock assemblages that occur at select tertiary volcanic centers in southern Nevada were investigated using LANDSAT 5 Thematic Mapper imagery. Three project sites comprise the subject of this study: the Kane Springs Wash, Black Mountain, and Stonewall Mountain volcanic centers. LANDSAT 5 TM work scenes selected for each area are outlined along with local area geology. The nature and composition of surface coatings on the rock types within the subproject areas are determined, along with the origin of the coatings and their genetic link to host rocks, geologic interpretations are related to remote sensing units discriminated on TM imagery. Image processing was done using an ESL VAX/IDIMS image processing system, field sampling, and observation. Aerial photographs were acquired to facilitate location on the ground and to aid stratigraphic differentiation. E.R.

N87-12068*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
MICROWAVE EMISSION AND SCATTERING FROM EARTH SURFACE AND ATMOSPHERE Semiannual Report, 15 Dec. 1985 - 16 Jun. 1986
J. A. Kong and M. C. Lee Jul. 1986 23 p
(Grant NAG5-725)
(NASA-CR-177189; NAS 1.26:177189) Avail: NTIS HC A02/MF A01 CSCL 04A

Nonlinear Electromagnetic (EM) wave interactions with the upper atmosphere were investigated during the period 15 December 1985 to 15 June 1986. Topics discussed include: the simultaneous excitation of ionospheric density irregularities and Earth's magnetic field fluctuations; the electron acceleration by Langmuir wave turbulence; and the occurrence of artificial spread F. The role of thermal effects in generating ionospheric irregularities by Whistler waves, intense Quasi-DC electric fields, atmospheric gravity waves, and electrojets was investigated. A model was developed to explain the discrete spectrum of the resonant ultralow frequency (ULF) waves that are commonly observed in the magnetosphere. Author

N87-12069*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
MEASUREMENT OF H02 AND OTHER TRACE GASES IN THE STRATOSPHERE USING A HIGH RESOLUTION FAR-INFRARED SPECTROMETER AT 28 KM Semiannual Status Report, 1 Jul. 1984 - 31 Dec. 1986
Wesley A. Traub and Kelly V. Chance Nov. 1986 13 p
(Grant NsG-5175)
(NASA-CR-179898; NAS 1.26:179898; SASR-15; SASR-16; SASR-17; SASR-18; SASR-19) Avail: NTIS HC A02/MF A01 CSCL 04A

The highlights of the stratospheric program were reviewed for the past 2.5 years. The major efforts were analysis of the data from the BIC-2 campaign, and the building or new instrumentation to replace that lost at the end of BIC-2. For clarity, the review will be done by topic, rather than chronologically: construction of the initial far-infrared spectrometer, balloon slight program, laboratory measurement, data analysis, and duplicate stabilized platform. B.G.

N87-12070*# Bechtel Corp., San Francisco, Calif.
TECTONIC EVALUATION OF THE NUBIAN SHIELD OF NORTHEASTERN SUDAN USING THEMATIC MAPPER IMAGERY Interim Report
Aug. 1986 101 p Original document contains color illustrations Sponsored by NASA
(NASA-CR-177045; NAS 1.26:177045; IR-2) Avail: NTIS HC A06/MF A01 CSCL 08G

Bechtel is nearing completion of a one-year program that uses digitally enhanced LANDSAT Thematic Mapper (TM) data to compile the first comprehensive regional tectonic map of the Proterozoic Nubian Shield exposed in the northern Red Sea Hills of northeastern Sudan. The status of significant objectives of this study are given. Pertinent published and unpublished geologic literature and maps of the northern Red Sea Hills to establish the geologic framework of the region were reviewed. Thematic mapper imagery for optimal base-map enhancements was processed. Photo mosaics of enhanced images to serve as base maps for compilation of geologic information were completed. Interpretation of TM imagery to define and delineate structural and lithogologic provinces was completed. Geologic information (petrologic, and radiometric data) was compiled from the literature review onto base-map overlays. Evaluation of the tectonic evolution of the Nubian Shield based on the image interpretation and the compiled tectonic maps is continuing. Author

N87-12071# Spectral Sciences, Inc., Burlington, Mass.
A MONTE CARLO DESCRIPTION OF THE SAMPLING OF STRATOSPHERIC ION CLUSTERS VIA A MASS SPECTROMETER Final Report, 26 Jan. 1983 - 30 Sep. 1985
James B. Elgin and James W. Duff Oct. 1985 59 p
(Contract F19628-82-C-0048)
(AD-A168523; SSI-TR-89; AFGL-TR-85-0319) Avail: NTIS HC A04/MF A01 CSCL 04/1

A detailed Monte Carlo simulation of the flow within an ion sampling mass spectrometer is described. The simulation includes effects of non equilibrium flow and acceleration due to electric fields. A scheme for proton hydrate reactions is presented, including estimations of rate constants for agglomeration of H2O onto positive ion clusters and lifetimes of the resulting complex. Complexes can be collisionally excited or stabilized within the model. Test calculations are performed for altitudes of 30 and 38 km. No significant effect of agglomeration of H2O onto ion clusters was predicted in either case, but collisional excitation and subsequent dissociation of clusters was found to be a potentially severe problem. GRA

N87-12072# Weidlinger Associates, Palo Alto, Calif.
A NUMERICAL STUDY OF DIFFRACTION IN REENTRANT GEOLOGIC STRUCTURE Technical Report, 3 Apr. 1984 - 3 Apr. 1985
Gregory L. Wojcik and Rudolf Mak 15 Jul. 1985 86 p
(Contract F19628-84-C-0102)
(AD-A168562; R-8531; AFGL-TR-85-0158; SR-1) Avail: NTIS HC A05/MF A01 CSCL 08/7

Diffraction effects in complicated geologic and topographic structures of interest to the Air Force Geophysics Lab. were investigated. This report examines diffraction by reentrant corners, i.e., corners with included angle greater than 180 degrees, which idealize the abrupt topographic relief commonly found at the base of escarpments and mesas. Reentrant landforms are also common in tectonic regions, and include fault scarps and other block joints. Approximating these regions of high curvature by perfect edges defines so-called generalized models--where curvature is concentrated at singular points (corners) on the free-surface. Diffraction from a single corner is studied in detail. Effects of more realistic distributed curvature in local and regional models will be examined in subsequent reports. The principal tool for the study is finite element modeling, since no mathematical solutions presently exist for P-SV wave edge diffraction in even the simplest geologic diffractors. Diffraction of plane P- and SV-waves and a Rayleigh wave are calculated for various reentrant wedges. This necessary emphasis on numerical simulation is balanced by a mathematical analysis of self-similar vector wave diffraction theory. The analysis yields a formal reduction of the general problem to a system of singular integral equations. The resulting integral expressions provide a new calculational basis for solutions to a variety of diffraction problems in mathematical physics. GRA

N87-12073# Naval Postgraduate School, Monterey, Calif.
SODAR, RAWINSONDE AND SURFACE LAYER MEASUREMENTS AT A COASTAL SITE. PART 2: SCCCAMP (SOUTH CENTRAL COAST AEROMETRIC MONITORING PROJECT) DATA REPORT Technical Report, Jul. 1985 - May 1986
W. J. Shaw, S. Borrmann, S. Fellbaum, C. E. Skupniewicz, and C.

A. Vaucher Apr. 1986 107 p
(AD-A168833; NPS-63-86-001-Pt-2) Avail: NTIS
HC A06/MF A01 CSCL 04/2

This report presents data gathered by the Naval Postgraduate School (NPS) during the South Central Coast Aerometric Monitoring Project (SCCCAMP) in September and October of 1985. The data are from a triaxial monostatic Doppler acoustic sounder and a 20-meter meteorological tower which were located at the Ellwood pier near Goleta, California and from rawinsondes launched from the R/V Acania in the Santa Barbara Channel. GRA

N87-12074# Physical Dynamics, Inc., Bellvue, Wash.
NONLINEAR INTERNAL GRAVITY WAVE PROPAGATION, SATURATION AND ABSORPTION IN THE ATMOSPHERE Final Report, Feb. 1983 - 2 Sep. 1986
Timothy J. Dunkerton 9 Apr. 1986 23 p
(Contracts F49620-83-C-0061; F49620-85-C-0032)
(AD-A170244; PD-NW-86-343R; AFOSR-86-0490TR) Avail: NTIS
HC A02/MF A01 CSCL 04/2

Numerical and theoretical studies of internal gravity waves have been performed to understand the role of convective instabilities in nonlinear, large amplitude gravity waves; the effects of saturation and self acceleration on transient gravity wave, mean flow interaction; the role of local convective instabilities in producing turbulent modifications of potential temperature and trace constituents in breaking gravity waves; and the propagation and refraction of inertial and non inertial gravity waves through observed middle atmosphere wind fields. Simulations with a two dimensional, nonhydrostatic gravity wave model indicate that convective adjustment in unstable gravity waves results in a mean flow modification closely approximated by WKB saturation theory in cases where the incident wave field is nearly monochromatic. Convection also limits, and practically prevents, the evolution to a reflecting nonlinear critical layer, even when the incident wave field is not monochromatic. Some critical layer dislocation is observed due to self acceleration in transient gravity waves. Localization of turbulence in a convectively unstable gravity wave can greatly reduce the mixing of heat and trace constituents and implies a large turbulent Prandtl number. Significant lateral movement and refraction of gravity wave rays is observed for inertia gravity waves in realistic wintertime flows. A formula is derived for the onset of dynamical instability in inertia-gravity waves, having a lower threshold than the corresponding amplitude required for convective instability. GRA

N87-12075# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
PLASMA WAVES ASSOCIATED WITH THE FIRST AMPTE MAGNETOTAIL BARIUM RELEASE Progress Report
D. A. Gurnett, R. R. Anderson, P. A. Bernhardt, H. Luhr, and G. Haerendel 20 May 1986 23 p
(Contracts N00014-82-K-0183; N00014-85-K-0404)
(AD-A170277; U-OF-IOWA-86-23) Avail: NTIS HC A02/MF A01
CSCL 04/1

Plasma waves observed during the March 12, 1985, AMPTE magnetotail barium release are described. Electron plasma oscillations provided local measurements of the plasma density during both the expansion and decay phases. Immediately after the explosion the electron density reached a peak of about -40000/cc and then started decreasing approximately as t to the -2.4 power as the cloud expanded. About 6 minutes after the explosion the electron density suddenly began to increase, reached a secondary peak of about 240/cc, and then slowly decayed down to the pre-event level over a period of about 15 minutes. The density increase is believed to be caused by the collapse of the ion cloud into the diamagnetic cavity created by the initial expansion. The plasma wave intensities observed during the entire event were quite low. In the diamagnetic cavity electrostatic emissions were observed near the barium ion plasma frequency, and in another band at lower frequencies. A broadband burst of electrostatic noise was also observed at the boundary of the diamagnetic cavity. Except for electron plasma oscillations no significant wave activity was observed outside of the diamagnetic cavity. GRA

N87-12076# Pacific Northwest Labs., Richland, Wash.
SPECTRAL DISTRIBUTION AND VARIATION OF SOLAR RADIATION
J. J. Michalsky Apr. 1986 8 p Presented at the American Solar Energy Society Annual Meeting and 11th National Passive Solar Conference, Boulder, Colo., 8 Jun. 1986
(Contract DE-AC06-76RL-01830)
(DE86-012148; PNL-SA-13968; CONF-860655-13) Avail: NTIS
HC A02/MF A01

Measurements of the solar resource have long been made with pyranometers and pyroheliometers. Few, however, have attempted to measure the resource with any appreciable spectral resolution. Several of the solar technologies that could use a spectral data base are described. This is followed by an explanation of how the atmosphere affects the transport of extraterrestrial solar radiation. Present attempts to model these atmospheric effects and current measurement plans for obtaining minimal data base of low spectral resolution data are presented. Finally, suggestions for improving the current state of spectral resource assessment are offered. DOE

N87-12077# State Univ. of New York, Stony Brook.
GEOCHEMISTRY AND ORIGIN OF REGIONAL DOLOMITES Annual Progress Report, 26 Jul. 1985 - 25 Jul. 1986
G. N. Hanson and W. J. Meyers Apr. 1986 26 p
(Contract DE-FG02-85ER-13416)
(DE86-012788; DOE/ER-13416/1) Avail: NTIS HC A03/MF A01

Our studies have included petrographic and geochemical studies of the major generations of glauconite, dolomite and calcite cements, and the shales within the mid-Mississippian Burlington-Keokuk Formations exposed over an area of 80,000 sq km in Iowa, Illinois, and Missouri. Timing based on petrographic relations shows that Dolomite I and possibly II and the four oldest calcite cements formed before the development of paleokarst features during the Pennsylvanian and the oldest dolomite and calcite cements pre-date Mississippi Valley type mineralization, which may have developed in the Pennsylvanian or Permian. Significant differences are observed in the isotopic compositions of C, O, and Sr, as well as in Sr abundances in the different generations of dolomite. The earliest dolomite has C, O, and Sr isotope values close to the range expected for dolomite precipitated in seawater during Osagean time. The later dolomites have higher 87Sr/86Sr ratios, lower d18O and similar d13C values. A major advance is the development of quantitative models for evaluating the simultaneous changes in C, O, and Sr isotopes and trace element abundances in the carbonates and aqueous fluids during diagenesis. These models are now being applied to interpreting the evolution of the fluids responsible for the diagenesis of the Burlington-Keokuk carbonates. DOE

N87-12078# British Aerospace Public Ltd. Co., Bristol (England).
A STUDY IN THE VARIATION IN ATMOSPHERIC TRANSMISSION OF DIFFERENT TEMPERATURE BLACKBODY SOURCES IN THE 3.85 - 4.85 MICRON WAVEBAND
G. Bishop Mar. 1984 11 p
(BAe-BT-16208; LR50172; ETN-86-97975) Avail: NTIS
HC A02/MF A01

The variation in atmospheric transmission with altitude from four different spectral sources was examined. The sources were considered blackbody radiators at temperatures of 300, 600, 900, and 2000 K. Altitudes were ground level, 3, 6, 9, and 12 Km. Results clearly illustrate the altitude dependence in atmospheric transmission across the 3.85 to 4.85 micron band, because the transmission of infrared radiation through the atmosphere strongly depends upon the concentration of water vapor and carbon dioxide. As the altitude increases the atmospheric absorption bands caused by these species become narrower due to the reduced pressure, and thus the transmission over a fixed path length increases. There is also a slight increase in transmission with altitude due to the decrease in atmospheric temperature. A pronounced carbon

dioxide absorption band is centered at 4.3 microns. Its width is reduced at increased altitudes, leading to increased transmission across the defined band. ESA

N87-12079# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
PROJECT CONDORS: CONVECTIVE DIFFUSION OBSERVED BY REMOTE SENSORS Final Report
J. C. Kaimal, W. L. Eberhard, W. M. Moninger, J. E. Gaynor, and S. W. Troxel Jul. 1986 318 p Sponsored by EPA
(PB86-222221; EPA-600/3-86-040) Avail: NTIS HC A14/MF A01 CSCL 04A

Results from two diffusion experiments conducted at the Boulder Atmospheric Observatory (BAO) in 1982 and 1983 are given. The objective was to compare diffusion in the atmospheric convective boundary layer with that observed in laboratory tank experiments and numerical computer models. In both experiments at the BAO, two different tracers, oil fog and aluminized chaff, were released simultaneously and traced by lidar and radar, respectively, for periods up to two hours. In 1982, both tracers were released from the same surface or elevated point; in 1983, the two were also released from separate levels, the oil fog from near the surface, the chaff from an elevated point on the tower. The 1983 experiment included tracer gas releases with in situ samplers measuring surface concentrations downwind of the tower. The BAO tower provided data on the mean and turbulent state of the atmosphere, while mixing depths were monitored by balloon soundings, soda, lidar and radar. GRA

N87-12080# National Academy of Sciences - National Research Council, Washington, D. C.
STUDY USING A THREE-DIMENSIONAL SMOG FORMATION MODEL UNDER CONDITIONS OF COMPLEX FLOW
S. Wakamatsu, K. L. Schere, J. H. Shreffler, and I. Uno May 1986 12 p Sponsored by EPA Prepared in cooperation with Institute for Environmental Studies, Tsukuba, Japan
(Grant EPA-R-812483)
(PB86-213246; EPA-600/D-86-116) Avail: NTIS HC A02/MF A01 CSCL 04A

To clarify the photochemical smog formation mechanisms under conditions of complex flow, the SAI Urban Airshed Model was evaluated using a 1981 field observed data base. In the Tokyo Metropolitan Area higher O3 concentrations are usually observed near the shore in the morning. As the sea breeze layer penetrates inland, this high concentration region travels with it, increasing in concentration with time. A night-time radiation inversion which persists into the early morning prevents the dispersion of primary pollutants emitted from the big coastal industrial zones and the Tokyo Metropolitan Area. The effect is believed to accelerate the formation of secondary pollutants during the next day. The quantitative role and weight of the previous days's secondary pollutants, newly emitted pollutants, temporal variation of mixing height and three-dimensional wind field for the O3 formation mechanisms were investigated. The three-dimensional simulated results showed good quantitative agreement with the observed field data but underestimated the aircraft data. GRA

N87-12081 Washington State Univ., Pullman.
AN ALTERNATE METHOD FOR DETERMINING ATMOSPHERIC STABILITY Ph.D. Thesis
Ruth L. Legg 1985 169 p
Avail: Univ. Microfilms Order No. DA8610369

A method is developed for determining the stability of the atmosphere that can be readily applied to diffusion modeling. The stability is related to the turbulence in the atmosphere, and the degree of turbulence generated by mechanical wind shear and surface heating can be approximated by the Obukhov length. Standard National Weather Service synoptic observations and other readily estimated factors are used to calculate an Obukhov length to estimate turbulence, and the Obukhov length is then categorized into standard Gaussian model stability classes. Climatological and other factors for each site, such as actual solar elevation angle, surface albedo, and moisture available for evaporation are included in the Obukhov estimation procedure. Since standard synoptic weather observations are used, no special instrumentation is required to make the estimates, and climatological data files can be used to calculate a stability climatology. The values of the Obukhov length and stability classes as determined by the derived technique were compared with results calculated using micrometeorological tower data. A high degree of correlation was present between the two methods. Stability climatology was calculated for a number of locations in various regions of the United States and the results compared with presently used EPA/STAR procedure results. The WSU procedure results seem to be in better agreement with basic climatology stability factors than are the EPA/STAR results. Dissert. Abst.

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N87-12082*# South Dakota School of Mines and Technology, Rapid City. Inst. of Atmospheric Sciences.
ATMOSPHERIC ELECTRICAL MODELING IN SUPPORT OF THE NASA F106 STORM HAZARDS PROJECT Annual Report, 15 Mar. 1984 - 14 Mar. 1986
John H. Helsdon Sep. 1986 40 p
(Grant NAG1-463)
(NASA-CR-179801; NAS 1.26:179801; SDSMT/IAS/R-86/07) Avail: NTIS HC A03/MF A01 CSCL 04B

With the use of composite (non-metallic) and microelectronics becoming more prevalent in the construction of both military and commercial aircraft, the control systems have become more susceptible to damage or failure from electromagnetic transients. One source of such transients is the lightning discharge. In order to study the effects of the lightning discharge on the vital components of an aircraft, NASA Langley Research Center has undertaken a Storm Hazards Program in which a specially instrumented F106B jet aircraft is flown into active thunderstorms with the intention of being struck by lightning. One of the specific purposes of the program is to quantify the environmental conditions which are conductive to aircraft lightning strikes. Author

N87-12083*# North Dakota Univ., Grand Forks. Dept. of Atmospheric Sciences.
DATA PROCESSING AND CASE STUDY ANALYSIS OF THUNDERSTORM STUDIES Final Report
Michael R. Poellot 1986 31 p
(Grant NAG5-541)
(NASA-CR-179890; NAS 1.26:179890) Avail: NTIS HC A03/MF A01 CSCL 04B

A case study analysis of the anvil top structure of a May 19,1984, thunderstorm was performed. Wind data were collected and plotted as time series of direction, horizontal velocity, and vertical velocity. A two-dimensional display of the horizontal winds along the flight track was also provided. The microphysical, dynamic, and thermodynamic characteristics of the overshooting tops and the downwind cirrus anvil top were studied. This included spatial and temporal distributions of cloud particle types and concentrations, horizontal and vertical wind in the cloud and its vinicity, and profiles of thermodynamic parameters. B.G.

N87-12084*# Illinois Univ., Urbana-Champaign.
APPLICATION OF SATELLITE DATA TO THE VARIATIONAL ANALYSIS OF THE THREE DIMENSIONAL WIND FIELD
Barbara Ann Chance Washington NASA Oct. 1986 96 p
(Contract NAS8-35530)
(NASA-CR-4022; NAS 1.26:4022) Avail: NTIS HC A05/MF A01 CSCL 04B

A vertical velocity algorithm is developed which blends the strengths of two commonly used techniques, the O'Brien corrected kinematic method and the adiabatic method. The kinematic

method is based on mass continuity, and the adiabatic method is based on the First Law of Thermodynamics. By blending the methods using numerical variational analysis, a final vertical motion estimate is obtained processing information from diverse atmospheric processes. To assign the contribution of each method, a weighting function is constructed. The function weights between O'Brien corrected kinematic divergence values and the adiabatic estimate of vertical motion. Criteria are determined so that more influence is accorded to that estimate which better agrees with physical processes. This algorithm is tested with the AVE-SESAME I data set. The results show that the variational result in most cases succeeded in finding a compromise between the two techniques. A triumph of the algorithm is providing reasonable magnitudes of vertical velocity in the lower stratosphere. Author

N87-12085*# Illinois State Water Survey, Champaign. Climate and Meteorology Section.
MODIFICATION OF A VARIATIONAL OBJECTIVE ANALYSIS MODEL FOR NEW EQUATIONS FOR PRESSURE GRADIENT AND VERTICAL VELOCITY IN THE LOWER TROPOSPHERE AND FOR SPATIAL RESOLUTION AND ACCURACY OF SATELLITE DATA Final Report
G. L. Achtemeier Washington, D.C. NASA Oct. 1986 29 p
(Contract NAS8-36474)
(NASA-CR-4025; NAS 1.26:4025) Avail: NTIS HC A03/MF A01 CSCL 04B

Since late 1982 NASA has supported research to develop a numerical variational model for the diagnostic assimilation of conventional and space-based meteorological data. In order to analyze the model components, four variational models are defined dividing the problem naturally according to increasing complexity. The first of these variational models (MODEL I), the subject of this report, contains the two nonlinear horizontal momentum equations, the integrated continuity equation, and the hydrostatic equation. This report summarizes the results of research (1) to improve the way the large nonmeteorological parts of the pressure gradient force are partitioned between the two terms of the pressure gradient force terms of the horizontal momentum equations, (2) to generalize the integrated continuity equation to account for variable pressure thickness over elevated terrain, and (3) to introduce horizontal variation in the precision modulus weights for the observations. Author

N87-12086*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
PRELIMINARY ESTIMATES OF RADIOSONDE THERMISTOR ERRORS
F. J. Schmidlin, J. K. Luers (Dayton Univ., Ohio.), and P. D. Huffman Washington, D.C. Sep. 1986 19 p
(NASA-TP-2637; NAS 1.60:2637) Avail: NTIS HC A02/MF A01 CSCL 04B

Radiosonde temperature measurements are subject to errors, not the least of which is the effect of long- and short-wave radiation. Methods of adjusting the daytime temperatures to a nighttime equivalent are used by some analysis centers. Other than providing consistent observations for analysis this procedure does not provide a true correction. The literature discusses the problem of radiosonde temperature errors but it is not apparent what effort, if any, has been taken to quantify these errors. To accomplish the latter, radiosondes containing multiple thermistors with different coatings were flown at Goddard Space Flight Center/Wallops Flight Facility. The coatings employed had different spectral characteristics and, therefore, different adsorption and emissivity properties. Discrimination of the recorded temperatures enabled day and night correction values to be determined for the US standard white-coated rod thermistor. The correction magnitudes are given and a comparison of US measured temperatures before and after correction are compared with temperatures measured with the Vaisala radiosonde. The corrections are in the proper direction, day and night, and reduce day-night temperature differences to less than 0.5 C between surface and 30 hPa. The present uncorrected temperatures used with the Viz radiosonde have day-night differences that exceed 1 C at levels below 90 hPa. Additional measurements are planned to confirm these preliminary results and determine the solar elevation angle effect on the corrections. The technique used to obtain the corrections may also be used to recover a true absolute value and might be considered a valuable contribution to the meteorological community for use as a reference instrument. Author

N87-12087# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE ROLE OF MOIST BAROCLINIC INSTABILITY IN THE DEVELOPMENT OF POLAR LOWS AND COMMA CLOUDS
Jose Paulo Bonatti and V. Brahmananda Rao Aug. 1986 49 p Submitted for publication
(INPE-3971-PRE/984) Avail: NTIS HC A03/MF A01

The Mak parameterization of latent heat release is discussed using a finite difference version of a quasi-geostrophic beta-plane model. It is found that his analytical results can be well reproduced with 20-layer vertical resolution. This finite difference version can be used for observed (arbitrary) zonal wind and static stability vertical profiles with more realistic heating. This model with Chang profiles of heating is applied to the North Pacific polar lows studied by Mullen and to a subsynoptic scale (inverted) comma cloud system observed over Central South America. The principal features of these disturbances are reproduced by the model. Thus the generation mechanism of polar lows and comma clouds seems to be the baroclinic instability modified by the latent heat release. Author

N87-12088# Naval Postgraduate School, Monterey, Calif.
CLEAR AIR TURBULENCE ANALYSIS USING ISENTROPIC METHODS M.S. Thesis
John H. Jacobson Mar. 1986 98 p
(AD-A168400) Avail: NTIS HC A05/MF A01 CSCL 04/2

Isentropic analyses were completed subjectively and by the Petersen (1986) objective analysis scheme for a 24-h Clear Air Turbulence (CAT) outbreak over the midwest United States. The purpose of the study is to determine if areas of high CAT potential could be identified by subjective isentropic analyses, and then by the automated analyses produced by the Petersen objective analyses. A background of CAT theory and current CAT forecasting techniques are also presented. The synoptic situation indicates the importance of the jet stream structure in this case. The study reveals that analyzed areas of low Ri and high wind shear correspond very well to reports of CAT. The objective analysis performance is fair overall. It shows a distinctive weakness in the analysis of the wind speed, occasionally producing spurious wind maxima. Analyses of the mass field, frontal slope and Montgomery stream function, are quite successful. GRA

N87-12089# Naval Postgraduate School, Monterey, Calif.
MONTHLY AND SEASONAL CLIMATOLOGY OF THE NORTHERN WINTER OVER THE GLOBAL TROPICS AND SUBTROPICS FOR THE PERIOD 1974 TO 1983. VOLUME 4: 700 mb WINDS Technical Report, May 1985 - May 1986
James S. Boyle and C. P. Chang May 1986 145 p
(AD-A168837; NPS-63-86-003-Vol-4) Avail: NTIS HC A07/MF A01 CSCL 04/2

This atlas of the 700 mb circulation field contains northern winter monthly and seasonal mean wind analyses, velocity potential and stream function from 40 degree S to 60 degrees N over a global belt for the period 1974 through 1983. In addition, the deviations of the individual annual seasonal and monthly means from their respective nine-year means are presented for the same variables. The basic wind data used are the operational Global Band Analyses of the United States Navy's Fleet Numerical Oceanography Center. GRA

N87-12090# Air Force Geophysics Lab., Hanscom AFB, Mass.
WORLD ATLAS OF TOTAL SKY-COVER: ENVIRONMENTAL RESEARCH PAPERS
Charles F. Burger 4 Sep. 1985 120 p
(AD-A170474; AFGL-TR-85-0198; AFGL-ERP-927) Avail: NTIS

HC A06/MF A01 CSCL 04/2

The purpose of this atlas is to establish a global cloud climatology that details seasonal and diurnal variations. The Boehm Sawtooth Wave (BSW) simulation model is used to devise a method for describing the frequency distribution of total sky-cover. Two parameters, scale distance and mean sky-cover, permit the calculation of the sky cover distribution from clear to overcast. This is an efficient means of data storage, since two numbers define the entire frequency distribution. Hence, the frequency distribution of sky cover can be found for locations world-wide using the global analyses of mean sky cover and scale distance given in the atlas. Twenty maps are presented for each of these parameters - one set 4 times daily (0000-0200, 0600--0800, 1200-1400, 1800-2000 LST), for each midseason month (January, April, July, and October), and another set of monthly means for all hours for each midseason month. GRA

N87-12091# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.

ANALYSES OF THE ATMOSPHERIC AEROSOL EXTINCTION IN THE 0.5 TO 14 MICRON REGION

Bertil Nilsson Apr. 1986 178 p

(FOA-C-30396-E1,E3; ISSN-0347-3708; ETN-86-97861) Avail: NTIS HC A09/MF A01

The relation between measured values of the aerosol extinction coefficient at various wavelengths and the simultaneous registered meteorological data was analyzed. Pronounced diurnal and annual variations of aerosol extinction are observed. A model for calculation of the aerosol extinction coefficient in IR wavelengths from meteorological data was tested. The model relates the IR extinction to visibility and to the IR/visible extinction ratio which can be derived from meteorological parameter values. Using the model, statistics of the IR aerosol extinction for various geographical regions and seasons of the year may be calculated from meteorological data. ESA

N87-12092# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.

EQUATORIAL PACIFIC OCEAN CLIMATE STUDIES (EPOCS): PROGRESS AND PLANS

Oct. 1985 96 p

(PB86-213493) Avail: NTIS HC A05/MF A01 CSCL 04B

The ocean is a large and active reservoir of heat that determines many of the climatic attributes of the earth. An attractive approach to improving understanding and prediction of climate variation is investigation of the changes in oceanic heat storage, particularly in regions where the ocean most strongly effects the atmosphere. Interannual sea surface temperature variations which occur in the equatorial Pacific Ocean are the largest and most persistent observed anywhere. The coastal manifestation of the warm phase of these temperature anomalies, known as El Nino, was long identified with the disturbances to the oceanic ecosystem and rainfall pattern in Ecuador and Peru, with severe local and sometimes global consequences. GRA

N87-12093# National Oceanographic Data Center, Washington, D. C.

MARINERS WEATHER LOG, VOLUME 30, NUMBER 2, SPRING 1986

1986 65 p

(PB86-213360) Avail: NTIS HC A04/MF A01 CSCL 04B

Topics addressed include: El Nino/Southern Oscillation Diagnostic Advisory; Eastern north pacific tropical cyclones, 1985; and central north pacific tropical cyclones, 1985. GRA

N87-12094# National Severe Storms Lab., Norman, Okla.

WIND PROFILING OF STORMY AND QUIESCENT ATMOSPHERES WITH MICROWAVE RADARS

D. S. Zrnic, S. D. Smith, A. Witt, R. M. Rabin, and M. Sachidananda Feb. 1986 91 p

(PB86-212545; NOAA-TM-ERL-NSSL-98) Avail: NTIS HC A05/MF A01 CSCL 04B

The feasibility of measuring winds in the lower atmosphere with microwave Doppler radars is discussed. It is assumed that natural scatterers such as hydrometeors and/or refractive index irregularities are the only ones present. Thus, techniques based on tracking balloons or on obtaining echo from chaff are not considered. A technique to obtain environmental winds from measurements in isolated storms observed with a single radar is examined. Results are compared with those from two radars and from nearby rawinsondes. GRA

N87-12095# National Weather Service, Washington, D.C. Climate Analysis Center.

ATLAS OF THE TROPICAL AND SUBTROPICAL CIRCULATION DERIVED FROM NATIONAL METEOROLOGICAL CENTER OPERATIONAL ANALYSES

P. A. Arkin, V. E. Konsky, J. E. Janowiak, and E. A. OLenic Mar. 1986 64 p

(PB86-208923; NOAA-ATLAS-7) Avail: NTIS HC A04/MF A01 CSCL 04B

An atlas of the monthly and seasonal mean tropical and subtropical circulation of the upper troposphere for the period October 1978 to September 1983 as represented by National Meteorological Center operational objective analyses is presented. These analyses are prepared twice daily as a part of the Global Data Assimilation System using an optimum interpolation technique. GRA

N87-12096# National Severe Storms Lab., Norman, Okla.

NATIONAL SEVERE STORMS LABORATORY, FISCAL YEAR 1985 Annual Report, 1 Oct. 1984 - 30 Sep. 1985

Mar. 1986 65 p

(PB86-203841) Avail: NTIS HC A04/MF A01 CSCL 04B

The National Severe Storms Laboratory Annual Report- Fiscal Year 1985, October 1, 1984 to September 30, 1985 contains the following: Organizational chart; Personnel statistics; budget and funding; Program areas; Administrative group; Grants and contracts: Publications and reports of the laboratory, FY 1985; Personnel of the national severe storms laboratory. GRA

N87-12097 Purdue Univ., West Lafayette, Ind.

THE DIRECT AND INDIRECT EFFECTS OF LATENT HEAT RELEASE ON EXTRATROPICAL CYCLONE DEVELOPMENT Ph.D. Thesis

Patricia Margaret Flaherty Pauley 1985 323 p

Avail: Univ. Microfilms Order No. DA8606598

The effects of latent heat release on the development of extratropical cyclones are proposed to be of two types, direct and indirect. The former is represented in diagnostic equations by any term which is expressed in terms of diabatic heating, while an indirect effect can occur through any of the other terms. The National Meteorological Center's LFM model is used to simulate a winter cyclone case over North America for varying conditions of latent heating. Direct effects were computed from model latent heating rates; indirect effects were found by comparing forecasts made with and without latent heating. The first diagnostic equation used was a new formulation of the height tendency equation called the extended height tendency equation. The extended equation is more general than the quasi-geostrophic form, using actual winds and vorticities in place of geostrophic, unsimplified coefficients, and two additional terms, the differential heating term, and the vertical advection of static stability term. Results of this diagnosis show that latent heat release indirectly alters height tendencies ahead of the cyclone by decreasing height falls due to vorticity advection, decreasing (increasing) height rises due to vertical advection of stability. The differential heating term, representing the direct effect of latent heating, was negligible when such heating was omitted from the forecasts but achieved values compartable to the other terms when the heating was included. This term yielded height falls at low levels and height rises at upper levels. Dissert. Abstr.

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N87-12098# Coastal Engineering Research Center, Vicksburg, Miss.
PACIFIC COAST HINDCAST DEEPWATER WAVE INFORMATION Final Report
W. D. Corson, C. F. Abel, R. M. Brooks, P. D. Farrar, and B. J. Groves Mar. 1986 239 p
(AD-A168511; CERC-WIS-14) Avail: NTIS HC A11/MF A01 CSCL 08/3

Twenty years of hindcast significant height, peak period, and mean direction wave information is summarized for 35 North Pacific locations in four data products: (1) percent occurrence tables; (2) wave rose diagrams; (3) mean and largest H sub s and 20-year statistics tables; and 4) a return period table. Brief descriptions and examples for each product are also provided. GRA

N87-12099# Yale Univ., New Haven, Conn. Geology Lab.
INVERSION OF OCEAN DATA Final Report
Manuelo Fiadeiro and George Veronis May 1986 10 p
(AD-A168676) Avail: NTIS HC A02/MF A01 CSCL 08/3

When we began our study of inverse procedures to determine ocean circulation, our intent was to build on past studies. It turned out, however, that much of the earlier work contained elements that were unclear so we were forced to begin again and to establish reliable and reproducible procedures. Our starting point was to accept the problem that Wunsch (1978) had posed and to sort out the methodology for solving it. We were able to derive an empirical search procedure that led to a level of no motion without requiring the mathematical apparatus of inverse theory. We obtained results for two data sets, one from the Tasman-Coral seas and one from the Bermuda Triangle. Since then several data sets that appeared at the outset to be appropriate for an inverse study have been examined. Lack of significant constraints seems to be characteristic of most oceanographic data sets which is not surprising since they were not gathered for the purpose of making the type of study we have undertaken. In most cases a traditional analysis with all its inaccuracies, assumptions and uncertainties provides as much information as one can obtain. Since our studies have indicated the need for additional considerations to constrain the system more effectively, we have formulated the problem of trying to determine the velocity field from tracer distributions. GRA

N87-12100# Royal Australian Navy Research Lab., Edgecliff.
REAL TIME OCEANOGRAPHIC ANALYSIS FOR THE SOUTH WESTERN AUSTRALIAN AREA FOR JULY 1984 TO AUGUST 1985
L. J. Hamilton Dec. 1985 50 p
(AD-A168741; RANRL-TM-(EXT)-21/85) Avail: NTIS HC A03/MF A01 CSCL 08/10

Attempts made at real time oceanographic analyses for the south-western Australian area are shown diagrammatically in the form of contour maps. Results for the period July 1984 to August 1985 are discussed. It is concluded that with present data sources useful sea surface temperature analyses should be possible in late spring, summer, and perhaps early autumn, but not in winter, when cloud coverage severely hinders satellite data acquisition. Subsurface analyses were not possible; almost all data used were for the sea surface. GRA

N87-12101# Rome Univ. (Italy). Dipt. di Fisica.
SOLUTIONS IN STRAITS OF VARYING WIDTH AND DEPTH
D. David, D. Levi, and P. Winternitz 19 Jun. 1985 28 p Sponsored by Canadian Natural Sciences and Engineering Research Council, and Quebec's Gouvernement Fonds pour la Formation de Chercheurs et l'Aide a la Recherche, Canada
(Preprint-465; ETN-86-97900) Avail: NTIS HC A03/MF A01

In order to analyze data on the creation and propagation of large solitary waves in marine straits, a theoretical model extending previous one-dimensional models to the case of straits with varying width and depth, and nonvanishing vorticity, was developed. Starting from the Euler equations for a three dimensional homogeneous incompressible inviscid fluid, a generalized Kadomtsev-Petviashvili equation (GKP) together with its appropriate boundary conditions is derived in the quasi one-dimensional long wave and shallow water approximation. The coefficients of this equation depend on the form of the bottom and on the vorticity; the sides of the straits figure only on the boundary conditions. Under certain restrictions on the vorticity and the geometry of the straits the GKP is reduced to one of several completely integrable partial differential equations, in order to study the evolution of solitons which originate in the straits. ESA

N87-12102# Royal Netherlands Meteorological Inst., De Bilt. Afdeling Oceanografisch Onderzoek.
EVALUATION OF WAVE CALCULATIONS USING GONO IN THE PERIOD OCTOBER 1984 - APRIL 1985 [EVALUATIE VAN DE GOLFBEREKENINGEN MET GONO OVER DE PERIODE OKTOBER 1984 - APRIL 1985]
E. Bouws, G. J. Komen, P. Kruseman, R. A. vanMoerkerken, and H. H. Peeck 1985 24 p In DUTCH; ENGLISH summary
(KNMI-TR-79; B8666195; ISSN-0169-1708; ETN-86-98498) Avail: NTIS HC A02/MF A01

Results of the numerical wave model GONO on wave height, low frequency wave height, wind speed, and wind direction were compared with observations for Euro, Ymuiden, and Pennzoil in the southern North Sea, and Auk and Brent in the northern North Sea. The verification results of the whole period are plotted and give a clear picture of the quality of the analyses and forecasts. ESA

51 LIFE SCIENCES (GENERAL)

N87-12103# Research Inst. of National Defence, Umea (Sweden). Dept. 4.
DETECTION, IDENTIFICATION, AND SETTLING OF BACTERIA FROM AN AEROSOL; TESTING OF A DETECTOR FOR AEROSOLS WITH BACTERIA AND PRELIMINARY INVESTIGATION OF SETTLING ON DIFFERENT SURFACE MATERIALS
Kersti Gustafsson, Pia Hallin, Eva Henningson, Gunilla Linfors, Lena Norlander, and Gunnar Sandstroem May 1986 31 p In SWEDISH; ENGLISH summary
(FOA-C-40229-B2; ISSN-0347-2124; ETN-86-98335) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm, Sweden KR 50

A prototype detector for aerosols with bacteria was tested in different types of terrain where aerosols (with killed Escherichia coli) were generated. The investigation shows that the device detects increases in the total amount of bacteria in outdoor air (1 million bacteria/cc). The detection limit is high related to possible infection doses due to the high background level of outdoor air, but goes down in a cleaner environment. With an enzyme linked immunosorbal assay it is possible to identify the bacteria in the sampled aerosol and with filter hybridization an identification and an approximation of the number was made of bacteria on metal, cloth from uniforms, nitrocellulose filters, and water. ESA

N87-12104# Institut National Polytechnique, Grenoble (France).
IMAGE ANALYSIS, PERCEPTION STRATEGY AND COGNITIVE STRATEGY Ph.D. Thesis [IMAGES, STRATEGIES PERCEPTIVES ET STRATEGIES COGNITIVES D'ANALYSE]
Catherine Garbay 1986 324 p In FRENCH
(ETN-86-98401) Avail: NTIS HC A14/MF A01

The functional analysis of the information perceived in cell microscopy is carried out as well as a study of the human mechanisms of image interpretation. A comparison is made with

computerized procedures to represent and analyze images. The concepts are illustrated by the application to interpreting histological images (cancerous cells). ESA

N87-12105# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 20, NO. 2, MARCH - APRIL 1986
O. G. Gazenko, ed. 23 Jul. 1986 144 p Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar.-Apr. 1986 96 p
(JPRS-USB-86-004) Avail: NTIS HC A07/MF A01

Twenty-one articles addressing various topics in exobiology and aerospace medicine are compiled. Specific subject areas include adaptation theory, radiation safety, physiological effects of weight-lessness, microbiology of closed environments, space flight food supplies, water reclamation methods, and others. For individual titles, see N87-12106 through N87-12123.

N87-12106# Joint Publications Research Service, Arlington, Va.
PHILOSOPHICAL ASPECTS OF ADAPTATION THEORY c53
B. S. Alyakrinskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 1 - 14 Trans. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 6-15 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The general concepts of the problem of adaptation are discussed from the dialectic point of view which, according to F. Engels, is the most important pattern of thinking in natural sciences. Dialectics provides an analog and therefore a method for interpreting developmental processes, universal relationships in nature, and transition from one area of research to another. From the point of view of dialectic laws adaptation acts as a contradictory process of habituation to various environments. The contradictory pattern of the adaptive process and its result is very distinct in terms of heredity and variability. A logical enlargement of the concept of adaptation is the transition to the study of homeostasis which is assumed to be its mechanism, a property which has developed in the course of evolution and fixed in heredity. This adaptive property is contradictory in its essence because homeostasis is a unity of stability and: instability, a fluctuating constancy. In addition to the law of constancy of the inner milieu, there is a law of homeostatic deviations. This concept can be understood through an analysis of the system theory that includes a continuous variation and conservation of structure which indicates its ordered oscillation, that is, its rhythmicity. This clarifies the relationship between homeostasis and biological rhythmicity as a method of maintaining the former. Thus, a consistent analysis of the problem of adaptation can help identify transition from one area of research to another, specifically to the study of oscillatory processes in living systems. Author

N87-12107# Joint Publications Research Service, Arlington, Va.
RADIO-FREQUENCY ELECTROMAGNETIC RADIATION: RADIATION SAFETY c52
B. I. Davydov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 15 - 27 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, No. 2, Mar. - Apr. 1986 p 15-24 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Existing safety standards for electromagnetic radiation in the radio frequency range, including microwave radiation, adopted in the USSR, Great Britain, Poland, Czechoslovakia, USA, Canada, FRG and recommended by IRPA/INIRC are described. It is proposed to use the value 0.4 W/kg as the basic value of an absorbed dose rate which corresponds to the energy flux density 100 W/m(2) for frequencies over 2 GHz. The concepts of an effective dose rate and effective dose are discussed. Various questions of how to provide safety of those working with electromagnetic radiations are considered. Author

N87-12108# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODELS OF FLUID-ELECTROLYTE METABOLISM c52
A. I. Grigoryev and V. V. Verigo *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 28 - 32 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986 p 24-27 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Mathematical modeling of fluid-electrolyte metabolism and fluid homeostasis in real and simulated microgravity is discussed. At the first stage physiological reactions to provocative tests were simulated. The assumptions made yielded satisfactory results, particularly with respect to the excretion of the most important electrolytes in different time intervals of bed rest and recovery. The development of models of fluid homeostasis, taking into consideration tissue elasticity and plasticity and fluid buffering capacity, is discussed. Author

N87-12109# Joint Publications Research Service, Arlington, Va.
PRELIMINARY RESULTS OF MEDICAL INVESTIGATIONS DURING 5-MONTH SPACEFLIGHT ABOARD SALYUT-7-SOYUZ-T ORBITAL COMPLEX c52
Ye. I. Vorobyev, O. G. Gazenko, Ye. B. Shutzhenko, A. I. Grigoryev, A. S. Barer, A. D. Yegorov, and I. A. Skiba *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 33 - 42 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986, p 27-34 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The medical examinations carried out in the 150-day flight were a continuation of previous studies in terms of the approaches and methods used. The novel approach was a biochemical study of body fluids collected during flight. An important place was occupied by medical monitoring and support performed during extravehicular activity (EVA). The medical results of the 150-day flight were consistent with the data obtained during previous spaceflights of similar duration. The health condition and work capacity of the crewmembers throughout the flight (including two EVA events) were good. The changes seen during and after flight were adaptive and disappeared after a relatively short readaptation period. Author

N87-12110# Joint Publications Research Service, Arlington, Va.
PROFESSIONAL WORK CAPACITY AND FUNCTIONAL STATE OF OPERATOR EXPOSED TO REPEATED OPTOKINETIC AND ANTIORTHOSTATIC FACTORS c54
L. N Komilova, L. D. Smirichevskiy, A. V. Trutnev, S. L. Chekanova, I. Ya. Yakovleva, and S. L. Kravchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 43 - 48 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vo. 20, No. 2, Mar. - Apr. 1986, p 35-38 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

It has been shown that optokinetic stimulation that elicits sensory-autonomic manifestations of motion sickness and head-down tilt that simulates fluid redistribution in the cranial direction decrease professional abilities of the operator even after he has developed good skills. Repeated exposures to optokinetic stimulation or head-down tilt have some training effect. However, control tests that include both optokinetic stimulation and head-down tilt give evidence that their training effect is not adequate. Author

N87-12111# Joint Publications Research Service, Arlington, Va.
VENOUS PRESSURE IN JUGULAR VEIN SYSTEM AND EFFECTIVENESS OF BLOOD RETURN TO RIGHT HEART DURING 120-DAY HEAD-DOWN TILT c52
V. G. Doroshev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 49 - 53 Transl. into ENGLISH from Kosmicheskaya

Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986 p 38-41 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Study of time-course variations of venous pressure in the jugular veins can be used to identify individual adaptation to prolonged head-down tilt. The method of measuring blood return to the right heart presented in this article can be employed to evaluate the efficacy of countermeasures during head-down tilt and to predict orthostatic tolerance after it. Author

N87-12112# Joint Publications Research Service, Arlington, Va.
HUMAN HEART FUNCTION IN EARLY HOURS AND DAYS OF HEAD-DOWN TILT (ECHOCARDIOGRAPHIC DATA) c52
V. V. Bystrov, A. F. Zhemavkov, and A. A. Savilov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 54 - 60 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 42-46 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Six healthy volunteers (aged 19 to 24) were exposed to head-down tilt (at 10 deg) for 7 days. The study revealed phasic changes of intracardiac circulation and the pump function which were not accompanied by contractility disorders. On the whole, the changes represented a manifestation of cardiovascular adaptation to hemodynamic shifts that are typical of this type of simulated weightlessness. The echocardiographic parameters varied similarly during the head-down tilt test and the joint Soviet-French experiment onboard Salyut-7. Author

N87-12113# Joint Publications Research Service, Arlington, Va.
HUMAN BLOOD FREE AMINO ACIDS AT EARLY STAGE OF HEAD-DOWN TILT c52
I. G. Popov and A. A. Latskevich *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 61 - 70 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 46-54 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The concentration of 17 free amino acids in plasma of 6 test subjects, aged 20, who were for 7 days exposed to head-down tilt and remained on a controlled diet, was measured. The study revealed an increase in the concentration of most amino acids by the end of day 3 and all amino acids by the end of day 7. This indicates that the diet used is a good source of the required amino acids and that there are processes which facilitate an increase of amino acids during the first days of exposure. The concentration of most amino acids returned to the baseline level on the 7th recovery day. Author

N87-12114# Joint Publications Research Service, Arlington, Va.
BLOOD SERUM ENZYME ACTIVITY IN HEALTHY MAN WITH SIMULATION OF EFFECTS OF WEIGHTLESSNESS c52
I. A. Popova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 71 - 75 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 54-58 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The enzymic activity of blood of healthy male volunteers was examined during 8-day bed rest in the horizontal and head-down (-6 deg) position, water immersion up to the neck and 6-hour head-down tilt (-15 deg). Alkaline phosphatase, cholinesterase (CE), leucine arylamidase (LA), glutamate dehydrogenase (GDH) and gamma-glutamyl transpeptidase (GGTP) were measured. During horizontal bed rest the activities of all the enzymes, except for GDH, decreased in a moderate degree which was very distinct at an early stage of exposure. The activity of GDH and CE decreased significantly after the exposure. The enzymic activity tended to decline during head-down tilt at -6 deg. The LA and GGTP activity decreased to a greater extent, being statistically significant during head-down tilt at -6 deg and in the recovery period. The enzymic activity insignificantly increased during water immersion and 6-hour head-down tilt at -15 deg, remaining in some cases elevated during 5 days after exposure. The lower activity of enzymes (which was significant for some of them) during horizontal and antiorthostatic bed rest was primarily associated with diminished motor activity, whereas increased enzymic activity was related to the gravity-induced blood shift to the intrathoracic area. Author

N87-12115# Joint Publications Research Service, Arlington, Va.
PARAMECIUM TEST FOR TOXIC SUBSTANCES IN HUMAN BLOOD DURING SIMULATED WEIGHTLESSNESS c52
V. I. Lavrov, I. B. Goncharov, A. F. Davydkin, A. P. Ivanov, A. N. Romanov, and V. F. Ivchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 76 - 79 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 58-60 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The paramecium test was used to measure the buildup of toxic substances in the healthy man exposed to simulated weightlessness. The most distinct changes were seen on bed rest days 3 and 7-8 in all test subjects (41 subjects). After bed rest day 8 the parameter reached a plateau, the toxicity level stopped increasing, but the paramecium test time remained shorter than normal. It can therefore be suggested that the prognosis of any disease that may develop in this situation will be worse. In view of this it is important to improve the prophylaxis and treatment of endogenous and exogenous intoxications during spaceflight and to provide active detoxication based on the purification of biological fluids by sorption. Author

N87-12116# Joint Publications Research Service, Arlington, Va.
TYPOLOGICAL CHARACTERISTICS OF CENTRAL HEMODYNAMICS OF MONKEYS IN CLINOSTATIC AND ORTHOSTATIC POSITIONS
A. N. Demin, G. S. Belkaniya, and V. A. Dartsmeliya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 80 - 86 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 60 - 65 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

By tetrapolar rheography central hemodynamics was investigated in 74 rhesus monkeys in the clino- and orthostatic state. The basic hemodynamic parameters were examined in relation to the entire sample, to the group with a higher or lower blood pressure, BP(mean), and to four states of central circulation in orthostatic animals. The typological circulatory differences in the orthostatic state were shown to be determined by qualitatively different hemodynamic mechanisms responsible for BP(mean). The hemodynamic characteristics in the clino- and orthostatic state were found to be reciprocally related. It is recommended to take into consideration the typological differences of hemodynamics that can modify cardiovascular responses to various effects. Author

N87-12117# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS OF CAPILLARIZATION OF WHITE RAT SKELETAL MUSCLE DURING ADAPTATION TO HIGH ALTITUDE OF THE PAMIRS AND ANTARCTICA
V. Sh. Belkin and O. B. Astakhov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 87 - 92 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 65 - 69 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The capillary-myofiber quantitative relations were examined morphometrically in 180 white male rats exposed for 1.5 months

to altitudes of 3488 to 4000 m above sea level (Antarctic and Pamir highlands). During the first three weeks of adaptation drastic changes in the parameter were seen. It is suggested that one of the factors responsible for them is a shift in the functional status of muscle produced by the method of transportation of the animals to the highland environments. Author

N87-12118# Joint Publications Research Service, Arlington, Va.
EFFECT OF LONG-TERM STORAGE ON SOME PARAMETERS OF FAT INGREDIENT OF FREEZE-DRIED PRODUCTS c54
A. K. Sivuk, A. G. Kasatkina, Ye. I. Strukova, V. P. Naydina, and Ye. Ye. Zharkovskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 93 - 97 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 69-72 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The effect of prolonged storage at the temperature 20 +/- 5 C and relative humidity 70 to 80% on the freeze-dried food products packed in a three-layer polymer was investigated. The organoleptic parameters, fat content and fat physicochemical properties were determined in the freshly prepared foods and foods stored for 6, 10 and 14 months. The fat component of cereals and vegetables was found to change during storage: the acid and peroxide numbers increased, products of secondary oxidation accumulated and nonsaturated fatty acids decreased. Among the foodstuffs examined the buckwheat cereal and mashed potatoes proved to be most stable and edible after 14 months of storage. Author

N87-12119# Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF VIABILITY OF QUAIL EMBRYOS AND CHICKS WHEN EGGS ARE EXPOSED TO GAMMA RADIATION AND VIBRATION AS RELATED TO DIFFERENT TERMS OF EGG STORAGE
V. F. Mischenko and A. V. Shafirkin *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 98 - 105 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 72-77 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

The viability of quail embryos and nestlings from the incubation eggs exposed: (1) to gamma radiation at a dose of 300 cGy and stored for 15 days or (2) to gamma-radiation at a dose of 300 cGy and stored for 30 days or (3) to vibration with the acute egg end oriented contrary to the vibration front and stored for 30 days did not decrease as compared to that of the controls stored for the same time period. The viability diminished if the radiation dose was increased to 600 to 1200 cGy or if the egg orientation during vibration was changed. Author

N87-12120# Joint Publications Research Service, Arlington, Va.
RECLAMATION OF WATER USED FOR WASHING BY MEANS OF REVERSE OSMOSIS DURING LONG-TERM SPACE-FLIGHTS c54
S. V. Polyakov, V. D. Volgin, Yu. Ye. Sinyak, Ye. D. Maksimov, and V. I. Novikov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 106 - 109 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 78 - 80 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Experiments on the purification of wash water by means of reverse osmosis membranes MGA-100 were performed. The membrane selectivity with respect to the major components (catamine AB, amine oxide and sodium chloride) was close to 100% whereas membrane permeability was not lower than 70% that of distilled water. The results of a field study in which 330 l of repeatedly used wash water were reclaimed showed that reverse osmosis can be effectively employed for that purpose. Author

N87-12121# Joint Publications Research Service, Arlington, Va.
SANITARY AND MICROBIOLOGICAL ASPECTS OF CLOSED ENVIRONMENT OCCUPIED BY PEOPLE AND ANIMALS c54
V. M. Knyazev, V. I. Korolkov, A. N Viktorov, G. O. Pozharskiy, L. N Petrova, and V. P. Gorshkov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 110 - 113 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 80-82 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Men and animals (dogs) shared an enclosed environment for 30 days. The microorganisms on their skin and in the air were examined. Specific attention was given to staphylococcal pathogens that are potential causal agents of infectious diseases in enclosed bioobjects. The data obtained suggested that conditional pathogens can be exchanged between men and animals sharing an environment and clarify the mechanism(s) of their transfer. The experimental results have been used to develop prophylactic measures against diseases caused by conditional pathogens among men and animals sharing an enclosed environment. Author

N87-12122# Joint Publications Research Service, Arlington, Va.
EFFECT OF HYDROCORTISONE ON OSTEOGENIC FUNCTION OF MOUSE BONE MARROW
T. Ye. Burkovskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 114 - 119 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 83-86 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

Bone marrow cells were implanted into the capsule of the kidney of mice which were then given intraperitoneal injections of hydrocortisone in the dose of 5 mg per animal. The drug influenced different stages of bone histogenesis in a different manner. The stage of onset of bone formation proved to be most sensitive, whereas the earlier and later stages were less sensitive to hydrocortisone. It is concluded that the target cells for hydrocortisone are osteoblasts at the stage of active synthesis of bone proteins rather than cell-precursors of osteogenesis. Author

N87-12123# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF DUPULOENDOLYMPHATIC SYSTEM WITH DIFFERENT CUPULA AND ENDOLYMPH DENSITIES c52
A. V. Kondrachuk and S. P. Sirenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 120 - 130 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 86-92 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

A mathematical model of time-course variations of the cupuloendolymphatic system (semicircular canals) is described which can be described by the Stein-hauzen phenomenological equation for the case of a unidimensional toroid, assuming that the densities of the cupula and endolymph are identical. If the densities are different, the time-course variations of the cupuloendolymphatic system may aggravate and manifest at the powered stages of space flight. Author

N87-12124# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 20, NO. 4, JULY - AUGUST 1986
8 Oct. 1986 154 p Transl. into ENGLISH of Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 96 p
(JPRS-USB-86-006) Avail: NTIS HC A08/MF A01

Presented are translations from a Russian usage language bimonthly journal on aerospace medicine and space biology. Indicative of the articles are these titles: Distinctions of Visual Monitoring of Evaluating Readings in Maneuvered Flight; Capabili-

ties of Ultrasonic Methods of Evaluating Hemodynamics of Cardiovascular System; Psycho- physiological Aspects of Color Coding of Flight and Navigation Information on Onboard Electronic Displays; and Forecasting Operator Work Capacity During Long Term Continuous Work. For individual titles, see N87-12125 through N87-12148.

N87-12125# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS OF VISUAL MONITORING OF INSTRUMENT READINGS IN MANEUVERED FLIGHT c53
I. D. Malinin and V. A. Ponomarenko *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 1-6 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 4-8 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Visual monitoring of flight parameters in a maneuvering flight simulated by a pilot trainer was investigated. Eye movements were recorded using a Japanese cinecamera. It was concluded that visual monitoring and attention concentration included chained routes of predicted sequence which was determined by current events throughout the flight. The most interesting finding was that the chains of gazing switching between angular parameters of spatial position or parameters of pitch and roll flights included several components whereas the chains of gaze switching between one parameter of the angular position and one parameter of the trajectory control or between two parameters of the trajectory control included exclusively one component. Circular or closed routes of gaze switching and chained proper or open multicomponent routes were discriminated. In a complex flight the chained or circular routes between two parameters of the angular coordinates became longer. The microstructure of gaze switching within one indicator (air horizon) is described and important problems requiring further research are discussed. Author

N87-12126# Joint Publications Research Service, Arlington, Va.
CAPABILITIES OF ULTRASONIC METHODS OF EVALUATING HEMODYNAMICS OF CARDIOCEREBROVASCULAR SYSTEM c52
L. G. Simonov and M. S. Gelfenbeyn *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 7-19 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 8-16 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Ultrasonic methods used at present to evaluate hemodynamic parameters of different organs and velocity characteristics of circulating blood are reviewed. The ultrasonic methods make it possible not only to diagnose different vascular lesions but also to investigate the effects of unusual environmental parameters on the human body. A classification is given of the existing and advanced procedures based on ultrasonic location when applied to determine hemodynamic characteristics of the cardiocerebrovascular system. A description is presented of ultrasonic methods used in studying the heart (velocity characteristics of the circulation of cardioelements), brain (pulse oscillations of vessel blood filling in the cranial cavity) and large arteries (blood filling and blood flow velocity). Author

N87-12127# Joint Publications Research Service, Arlington, Va.
PSYCHOPHYSIOLOGICAL ASPECTS OF COLOR-CODING OF FLIGHT AND NAVIGATION INFORMATION ON ONBOARD ELECTRONIC DISPLAYS c54
A. A. Oboznov, A. N. Boyarskiy, and S. I. Buturlin *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 20-24 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 16-19 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Psychophysiological characteristics of pilots were compared when they used a color or a black-and-white electronic indicator in simulating a landing approach on a pilot trainer. No significant differences were seen in the objective evaluations of the visual function or in the precision with which the prescribed flight profile was maintained. However, subjective preferences were given to the color indicator. When the task was more complex (simulation of the deviated landing course), the time spent on looking for significant symbols and on recovering the necessary course decreased, if the pilots used a color indicator. It is concluded that the use of a color indicator can be redundant in performing simple tasks and therefore indifferent for pilot activities but it can be useful in performing complicated tasks when the pilot has to make a precise and quick assessment of the situation. Author

N87-12128# Joint Publications Research Service, Arlington, Va.
FORECASTING OPERATOR WORK CAPACITY DURING LONG-TERM CONTINUOUS WORK c53
A. K. Yepishkin and A. I. Skrypnikov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 25-28 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 19-22 (For primary document see N87-12124 03-51)
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It is shown that the work capacity of operators performing continuously for 46 hours can be predicted on the basis of their electroencephalogram (EEG) and heart rate (HR). It is found that a drastic decrease of work capacity is preceded by a 20 to 30% increase of low frequency (delta and theta) activity and a 15 to 40% decrease of high frequency (alpha and beta) activity as well as by a simultaneous decrease of HR. These changes were revealed 1 to 4 hours before changes in the operator's work capacity. Author

N87-12129# Joint Publications Research Service, Arlington, Va.
BIOCHEMICAL INDICATORS OF EMOTIONAL STRESS IN AIR TRAFFIC CONTROLLERS c53
Ye. L. Kan, V. A. Kupriyanov, K. F. Korovin, and O. O. Malinovskaya *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 29-34 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 22-25 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Air traffic controllers working in automatic and nonautomatic stations showed high values of lipid metabolism parameters as well as significant activation of the sympathoadrenal system (especially, its hormonal component). The level of the parameters under study was correlated with the workload. Author

N87-12130# Joint Publications Research Service, Arlington, Va.
TOLERANCE TO +Gz ACCELERATIONS OF INDIVIDUALS OF DIFFERENT AGES OTHER THAN PILOTS c52
A. R. Kotovskaya, I. F. Vil-Vilyams, and V. Yu. Lukyanyuk *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 35-40 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 25-29 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Ninety-six healthy nonpilots, ages 21 to 50 years, were exposed to 228 rotations on a 7.25 m arm human centrifuge. The study demonstrated aged related changes in +Gz tolerance of 3 to 5 G (for 30 s). The subjects at the age 31 to 40 years showed the highest tolerance while the subjects at the age 21 to 35 and 46 to 50 years the lowest tolerance. Young subjects (21 to 25 years old) often developed an asthenic type of the systolic pressure reaction in the ear lobe and visual disorders whereas older subjects (46 to 50 years old) displayed cardiac arrhythmias, lower heart rate and delayed recovery of blood pressure after exposure. It was also found that 60 to 80% subjects aged over 40 well tolerated acceleration of up to 5 G and therefore can be viewed as potential candidates for cosmonauts. Author

N87-12131# Joint Publications Research Service, Arlington, Va.
VISUAL-OPTICAL ASSESSMENT OF THRESHOLDS OF OBJECT

DISTORTION DUE TO LENS DEFECTS IN FLAT GLASS OF VEHICLE CABINS c74

A. V. Lekarev *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 41-44 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 29-33 (For primary document see N87-12124 03-51)

Avail: NTIS HC A08/MF A01

It was shown experimentally that the threshold values of optical distortions of test objects projected by a collimator during binocular observation through the lens defects of vehicle transparencies depend on their dioptric value and sign, distance between the observer's eyes and the transparencies as well as on the angle of the latter. The experimentally derived dependence can be used to standardize optical parameters of vehicle transparencies.Author

N87-12132# Joint Publications Research Service, Arlington, Va.
USE OF GAS MIXTURES WITH HIGH OXYGEN AND CARBON DIOXIDE CONTENT TO NORMALIZE EXTERNAL RESPIRATION AND BLOOD ACID-BASE EQUILIBRIUM IN PRESENCE OF MUSCLE FATIGUE c52

N. A. Agadzhanyan, N. P. Krasnikov, and S. I. Naydich *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 45-51 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 32-37 (For primary document see N87-12124 03-51)

Avail: NTIS HC A08/MF A01

Use of gas mixtures containing 1% CO_2 + 35% O_2 and 35% O_2 in the air during a passive rest after a high workload led to the neutralization of acid metabolites and recovery of acid-base equilibrium. This was due to a greater oxygen consumption, retention of metabolic CO_2 in plasma and accumulation of endogenous CO_2 in body fluids.

Author

N87-12133# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF HUMAN KINEMATIC REACTIONS TO IMPACTS c52

I. F. Obraztsov, Yu. G. Konakhevich, V. A. Lyapin, and A. V. Maryin *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 52-58 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 37-41 (For primary document see N87-12124 03-51)

Avail: NTIS HC A08/MF A01

The problem of selecting the structure of a mathematical model that describes the kinematic reactions of the human body during traffic accidents is studied. A calculation procedure and a program that allow selection of a structure (up to 17 elements) without deriving repeatedly equations of motion as well as automatic recalculation of all inertia and size parameters is presented.

Author

N87-12134# Joint Publications Research Service, Arlington, Va.
USE OF CENTRAL ELECTROANALGESIA FOR FUNCTIONAL RECOVERY FROM MOTION SICKNESS c52

A. S. Nekhayev, V. D. Vlasov, and V. V. Ivanov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 59-63 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no, 4, Jul. - Aug. 1986 p 42-44 (For primary document see N87-12124 03-51)

Avail: NTIS HC A08/MF A01

Central electroanalgesia (CEAN) is a technique that involves application of pulsating current to the central nervous system in order to enhance its tonicity recover autonomic equilibrium and to reduce parasympathetic cardiovascular reactions. In two experimental runs in which 9 volunteers participated the efficacy of CEAN is preventing motion sickness symptoms produced by Markaryan's test was studied. After two rotations repeated with a one-hour interval vestibular reactions persisted for 7 to 10 hours. CEAN had a positive effect: after a one-hour CEAN session applied between two rotations the tolerance time of the second rotation increased on an average by 76%. An additional exposure to CEAN after rotation eliminated almost completely the adverse effects of rotation and made effective the postrotation work. Due to CEAN parasympathetic reactions of the cardiovascular system typical of the postrotation recovery period were indistinct. These data suggest that CEAN is an effective method to be used to help a rapid recovery of the functional state of the human body during motion sickness.

Author

N87-12135# Joint Publications Research Service, Arlington, Va.
BIOLOGICAL VALUE OF PROTEINS IN FOOD ALLOWANCE OF SALYUT ORBITAL STATION CREWS c54

V. P. Bychkov, T. F. Vlasova, V. N. Gryaznova, Ye. A. Sedova, A. K. Sivuk, V. A. Tretyakova, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 64-69 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsin (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 44-48 (For primary document see N87-12124 03-51)

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The biological value of the protein component of three modifications of the Salyut space diet was measured in laboratory studies and in simulated space flights. Three experimental runs of up to 68 days in duration were carried out on 20 volunteers. During the study the following parameters of protein metabolism were measured: total protein and protein fractions in serum; urea, uric acid and creatinine in blood; total nitrogen, urea, ammonia, uric acid and creatinine in urine. The results obtained showed that the diet modifications provided an adequate nutritional status and a normal level of the above parameters of protein metabolism.

Author

N87-12136# Joint Publications Research Service, Arlington, Va.
EFFECT OF COAMIDE AND FOLICOBALAMIN ON ERYTHROPOIESIS UNDER NORMAL LIVING CONDITIONS AND DURING ANTIORTHOSTATIC HYPOKINESIA c52

R. K. Kiselev, A. M. Chayka, and V. I. Legenkov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 70-75 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 48-53 (For primary document see N87-12124 03-51)

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The study was performed on 41 healthy men, aged 19 to 40, who led a normal life or were exposed to short-term or long-term head-down tilts. The effectiveness of hemostimulants was determined with respect to hemoglobin, red blood cells or reticulocyte counts. Folicobalamine and coamide administration in therapeutic doses increased hemoglobin and reticulocyte blood levels in the ambulant subjects or those exposed to a 7-day head-down tilt. The effect was stable and persisted for 2 to 3 weeks after which the blood parameters returned to the pretest level. Folicobalamine administered at the final stage of 50-day head-down tilt facilitated partial recovery of hemoglobin during the study (which is very important) and rapid recovery after it. The objective and subjective tolerance of the drugs was good. It is therefore concluded that folicobalamine should be taken at the final stage of head-down tilt or spaceflight to alleviate readaptation to the normal environment.

Author

N87-12137# Joint Publications Research Service, Arlington, Va.
HUMAN TOLERANCE TO HIGH-INTENSITY CONTACT HEAT ON INTEGUMENTAL SURFACE c52

A. P. Kozlovskiy and Ye. A. Lushchikov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 76-79 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 53-55 (For primary document see N87-12124 03-51)

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Significant heating of the thermoprotective suit leads to a rapid growth of the temperature of its inner layer which is in contact with the human body. Prediction of the allowable time of high

temperature exposure is important when evaluating safety parameters. The results of measuring the time during which the direct contact between cotton and wool clothes and the forearm skin can be tolerated is presented. The results describe the time and amplitude parameters of the maximally allowable heat exposure. They can be used in testing prototypes of the protective equipment and in selecting their thermophysical characteristics as applied to an extreme environment. Author

N87-12138# Joint Publications Research Service, Arlington, Va.
BEHAVIORAL REACTIONS OF ANIMALS EXPOSED TO SPACEFLIGHT CONDITIONS IN THE PRENATAL PERIOD
Z. I. Apanasenko, M. A. Kuznetsova, and V. Yu. Korotkova *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 55-60 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 55-60 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

The Wistar female rats were flown on the biosatellite Cosmos-1514 during their pregnancy days 13 to 18. Offspring (at the age 1 to 3 months) of four of these rats were used to investigate their behavioral reactions in the open field and mazes of different design, food attraction being applied. Control rats of matched pregnancy term were kept either in a vivarium or in a biosatellite mockup where all flight factors, except for weightlessness, were simulated. It was found that exposure to weightlessness in the above intrauterine developmental period caused no serious changes in the behavioral reactions of rats during their postnatal development. The number of refusals and errors and the latency period were similar in the rats from the flight and control groups. Changes were seen only in fine behavioral regulation. The flown animals displayed a lower research activity in the open field, a longer time of search in the maze, a far longer time for grooming and a greater number of inadequate movements, and a stronger response to external inhibiting stimuli. These changes seem to be caused by a slight attenuation of the basic nervous processes (primarily, inhibitory) and a decrease of their balance and lability. These effects may be associated with an inhibitory influence of space flight factors on the maturation of cortical structures. Author

N87-12139# Joint Publications Research Service, Arlington, Va.
EFFECT OF WEIGHTLESSNESS ON RAT FETUS SKELETAL DEVELOPMENT
L. A. Denisova *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 87-91 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 60-63 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

The size of the ossified areas of skeletal bones of fetuses of white rats flown onboard Cosmos-1514 during their pregnancy days 13 to 18 was compared to that of synchronous and vivarium controls. The effect of zero-g on the pregnant animals in the course of an active formation of fetal bones involved a distinct (13 to 17%) arrest of the development of nearly every area of the fetal skeleton. The signs of the arrest development were more manifest in less mature skeletal structures. Since the Ca-2 content was identical in the flight and control rats, it can be concluded that the inhibited ossification of the flight fetuses was produced by the impairment of mechanisms controlling Ca-2+ incorporation into the growing skeleton. The ossified areas in the skeleton of the flight newborns were significantly larger than those of the synchronous and vivarium controls. This means that during the re-adaptation period (pregnancy days 18 to 23) the inhibited ossification of the fetal skeleton was completely compensated and that the flight newborns (i.e., the rats whose prenatal development occurred in part in zero-g) were ahead of the controls with respect to the ossification rate. Author

N87-12140# Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATE OF SOMATOTROPIC CELLS OF ADENOHYPOPHYSIS IN HYPOKINETIC RATS
Ye. I. Alekseyev *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 92-97 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 63-67 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Morphological and cytokaryometric examinations of the somatotropic cell population of the rat pituitary anterior lobe were performed on hypokinetic days 30, 90 and 165, and 60 days after 165-day hypokinesia (readaptation period). During prolonged hypokinesia the major changes occurred in the cytoplasm of somatotropic cells and were accompanied by an inhibition of the growth hormone synthesis. A higher activity of somatotropic cells during readaptation suggested that diminished motor activity may be responsible for a lower hormone production in the pituitary. The experimental findings and published data allow the conclusion that the inhibition of animal growth which takes place during hypokinesia is closely associated with an inhibited somatotropic function. Author

N87-12141# Joint Publications Research Service, Arlington, Va.
NOREPINEPHRINE USED TO CONTROL ENERGY OF HEAT PRODUCTION AND UTILIZATION OF ATP IN SINGLE MUSCULAR CONTRACTION UNDER NORMAL AND HYPEROXIC CONDITIONS
L. D. Pchelenko *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 98-105 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 67-72 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

The effect of noradrenalin (NA, 0.008 microgram/ml) on the rate of heat release (V) during a single isometric contraction of an isolated diaphragm was investigated in rats kept in air and 99% oxygen for 3 hours. The effect was measured by the electrothermometric method in the presence and in the absence of ATP (0.01 mg/ml) in the incubation solution. Hyperoxia doubled V of muscle contraction. The calorigenic effect of NA was not detected in the norm and was very distinct during hyperoxia so that V sub NA = 0.14 x V sub init + 10.88. ATP increased V both in the normal and hyperoxic state. However, the increase of the initial V level was 5.3-fold in the hyperoxic state and 1.5-fold in the norm. It is concluded that hyperoxia disturbs energy metabolism of muscle contraction through NA-dependent acceleration of ATP-lytic processes and increase in energy expenditures of heat formation in the course of muscle contraction. Author

N87-12142# Joint Publications Research Service, Arlington, Va.
CENTRAL HEMODYNAMIC PARAMETERS DURING DRY IMMERSION OF PATIENTS WITH BORDERLINE HYPERTENSION c52
V. I. Fomichev and To Nam Zeng *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 106-108 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. Aug. 1986 p 73-74 (For primary document see N87-12124 03-51)
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Central hemodynamics parameters were measured in eight men, aged 45 to 55 years, with boundary arterial hypertension using a Soviet-made instrument and a dye (wofaverdin). Measurements were taken before dry immersion, 24 and 120 hours after the onset of dry immersion, and during recovery. Individual variations in the parameters of central hemodynamics to dry immersion were detected. Author

N87-12143# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP BETWEEN CONSTITUTIONAL DISTINCTIONS AND FUNCTIONAL CHARACTERISTICS OF THE CARDIOVASCULAR SYSTEM OF HEALTHY SUBJECTS AND PATIENTS WITH HYPERTENSION IN CLINOSTATIC AND ORTHOSTATIC POSITION c52
G. S. Belkaniya and V. A. Dartsmeliya *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986

p 109-115 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 75-78 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

The results are described of a correlation analysis of the relationship between the basic parameters of central hemodynamics (arterial pressure, cardiac output, stroke volume, peripheral vascular resistance) and primary somatometric characteristics carried out in 90 healthy subjects and 62 patients with arterial hypertension in the clinostatic and orthostatic position. In the orthostatic position the correlation between somatometric characteristics and hemodynamic parameters increased significantly in comparison to the clinostatic position. It is assumed that orthostatic characteristics of circulation are an adequate phenotypical manifestation of the human genotype as a biped living being.
Author

N87-12144# Joint Publications Research Service, Arlington, Va.
SPECIALIZED EQUIPMENT FOR MAGNETIC RECORDING OF PHYSIOLOGICAL DATA FOR EXPERIMENTS ABOARD BIOSATELLITES c52
V. S. Magedov and Yu. S. Koryakov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 116-119 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 79-80 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Large volumes of scientific information have to be recorded when conducting automated phyiological studies in biosatellites. The specificity of conditions of such investigations imposes size and weight restrictions on onboard equipment and precludes the possibility of servicing it during flight. The existing onboard magnetic recorders do not have a long enough continuous running time to record physiological data, and for this reason, it has become necessary to develop specialized magnetic recording equipment (MRE) that would service the purposes and conditions of long term experiments aboard biosatellites. Such equipment must provide for many hours of continuous recording of physiological information within a specified band of recorded frequencies, and limited size and supply of magnetic tapes. The main theoretical premises that enabled the development of a specialized MRE for continuous, long term recording of phsiological signals on magnetic tape. The method of frequency-modulated recording (FMR) was used in this equipment, since it permits maximum density of signal recording on the tape.
Author

N87-12145# Joint Publications Research Service, Arlington, Va.
EVALUATION OF METHOD FOR COLLECTING AND CONCENTRATING ORGANIC TRACE IMPURITIES IN AIR c54
O. A. Sukhorukov, M. V. Azarova, and B. L. Avetisyants *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 120-124 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 81-83 (For primary document see N87-12124 03-51)
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At the present time, in gas chromatography the limit of sensitivity of ionization detectors has been virtually reached, and further raising of the range of detection of trace impurities may proceed either in the direction of increasing the amount of trace impurities per unit sample volume fed to the input of an instrument, or by means of more efficient conversion of information in the course of measurement and data processing at different stages of analysis. Concentration is one of the ways of increasing information per unit sample volume. However, in the course of concentration there could be worsening of metrological characteristics of the analytical measurement process, and there could be increased loss of material due to irreversible adsorption on sorbents and interaction of impurities with one another. Then it becomes necessary to additionally purify the gases and reagents used. All this compels us to investigate more thoroughly the different stages of analysis of trace impurities in the method needed to examine contaminants in the environment and room air. Methods were evaluated of collecting and concentrating trace impurities from the air using a standard method of preparing them (diffusion through a capillary).
Author

N87-12146# Joint Publications Research Service, Arlington, Va.
ENDOCRINE STATUS OF COSMONAUTS FOLLOWING LONG-TERM SPACE MISSIONS c52
N. F. Kalita and R. A. Tigranyan *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 125-128 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 84-86 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

Spaceflights are associated with a set of stress factors that affect many systems of the body, in particular the endocrine system. The studies conducted to date yielded some information concerning the endocrine status of cosmonauts during and after spaceflights. At the same time, in spite of good physical training and conditioning of cosmonauts, individual changes may occur in the reactions of each of them in response to spaceflight factors, which are related to different characteristics, including psychological and age-related ones. For this reason, it is rather important to study the endocrine status of cosmonauts, since this would deepen our understanding of changes that take place in the body. The levels of a number of hormonal and biologically active compounds were examined in cosmonauts who had participated in long term (73 to 185 days) spaceflights and to demonstrate stressor reactions in the acute period of readaptation to Earth's gravity.
Author

N87-12147# Joint Publications Research Service, Arlington, Va.
ORTHOSTATIC CARDIAC RHYTHM RESPONSE IN WAKING MACACA MULATTA MONKEYS
M. D. Goldovskaya, V. P. Melnichenko, and B. S. Kulayev *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 129-131 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 86-88 (For primary document see N87-12124 03-51)
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There are only isolated publications in the literature that describe orthostatic reactions of heart rhythm in waking monkeys. The nature of the responses in those investigations could have been largely determined by an unstable heart rhythm associated with motor excitement of immobilized monkeys. The orthostatic cardiac rhythm response in waking monkeys was evaluated with consideration of this factor.
Author

N87-12148# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF AVIATION AND SPACE MEDICINE, BIOLOGY AND PSYCHOLOGY DISCUSSED AT FIFTEENTH GAGARIN SCIENTIFIC LECTURES c52
G. S. Ratner *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 132-144 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 88-94 (For primary document see N87-12124 03-51)
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The 15th Gagarin Scientific Lecture Series took place from 1 to 10 April 1985. At the first session, one of the papers was delivered by Prof A. D. Yegorov under the title of Biomedical Problems of Long-Term Spaceflights. It dealt with analysis of biological mechanisms of effects of weightlessness and other spaceflight factors on man on the basis of summarization of the results of investigations and experience with spaceflights. The demonstrated patterns and recommendations developed on their basis made it possible to achieve records with regard to duration of human active performance in space. Two papers were delivered at the general meeting of this section, Problems of Aviation and Space Medicine and Psychology. USSR Cosmonaut-Pilot O. Yu. Atkov, candidate of medical sciences, told about the studies he conducted during the 237-day flight aboard the Salyut-7 orbital station. In all, more than 300 biomedical experiments referable to 34 projects were conducted.
Author

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N87-12149# Naval Aerospace Medical Research Lab., Pensacola, Fla.

TEMPORAL TUNING EFFECTS IN THE VISUALLY EVOKED RESPONSE M. S. Thesis - Houston U., Tex. Final Report

Ralph E. Parkansky (Houston Univ., Tex.) Aug. 1985 145 p (AD-A168219; NAMRL-MONOGRAPH-32) Avail: NTIS HC A07/MF A01 CSCL 06/16

Electrophysical and psychophysical evidence indicates that there are channels in the visual system that are more sensitive to either spatially-structured stimuli or luminance-modulated stimuli. This sensitivity or tuning was demonstrated by having the largest or optimum response produced by either spatially-structured or luminance-modulated stimuli. The purpose of this study is to determine if the steady-state visually evoked response to three stimuli is significantly and predictably altered by the choice of temporal frequency. It is expected that, for each observer, there will be an optimal temporal frequency or frequencies corresponding to a given pattern size, contrast and intensity. Also, this relationship will likely vary between individuals, but will remain relatively constant for a given observer over time. Three subjects were each presented with three stimuli. These stimuli were: (1) a square pattern of small checks where each check subtended 15 minutes of arc; (2) a square pattern of large checks where each check subtended 57 minutes of arc; and, (3) an unpatterned square stimul us. The check stimuli were presented in such a manner that alternate checks were 180 deg out of phase with each other and the unpatterned stimulus was presented as a luminance charge. GRA

N87-12150# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

RELATIONSHIP OF FIELD TESTS TO LABORATORY TESTS OF MUSCULAR STRENGTH AND ENDURANCE, AND MAXIMAL AEROBIC POWER

D. G. Bell and I. Jacobs Apr. 1986 22 p (AD-A168260; DCIEM-86-R-22) Avail: NTIS HC A02/MF A01 CSCL 06/18

This study evaluates the relationship between established laboratory tests of selected physical fitness components and a field tests battery (EXPRES) presently used annually to evaluate the physical fitness of Canadian Force personnel. Muscular strength, muscular endurance and maximal aerobic power were evaluated in 33 male personnel. The EXPRES test battery included isometric handgrip dynamometry as an indicator of strength, pushups and situps as indicators of muscular endurance, and maximal aerobic power was predicted from the heart rate response to a submaximal step-test. The laboratory measures of strength consisted of maximal isokinetic and isometric contractions of the body's large muscle groups performed on a computerized strength evaluation system. Maximal power generated during a 30 s cycle ergometer sprint (Wingate Test) was used as the laboratory measure of muscular endurance. Maximal aerobic power was measured directly during exhaustive cycle exercise. When correlation coefficients were calculated for the various field and laboratory tests, the values range from 0.46 - 0.67 for muscular strength, 0.49 - o.58 for endurance, and 0.65 for maximal aerobic power. All correlation coefficients were statistically significant (pless than 0.01), but the standard errors about the regression lines were quite large. GRA

N87-12151# Letterman Army Inst. of Research, San Francisco, Calif.

OCULAR HAZARDS ASSOCIATED WITH LASER EXPOSURE Interim Report, Jan. - Dec. 1985

Harry Zwick and Joan Allen Mar. 1986 18 p (AD-A168506; LAIR-86-60) Avail: NTIS HC A02/MF A01 CSCL 06/18

In our experiments we have investigated the effects of low-level laser exposure on spatial vision measured in animal subjects. In monkeys trained to report minimal visual resolution as well as constrast thresholds for varying size targets (constrast sensitivity) we found that small spot (50 micron) exposure can significantly alter these measures of spatial vision. Such effects have both medical and tactical implications. Because such levels of exposure may produce prolonged change in spatial visual function even at levels below the maximum permissible exposure (MPE) level, the military medical community is faced with a dilemma that repeated exposure could result in considerable tissue destruction in non-regenerating neural retinal tissue long before any significant change in visual function is measurable. Long-term measurements of animal spatial vision has revealed subtle but significant evidence of visual function loss that is associated with low-level laser exposure to the fovea. Such effects may cause sufficient alterations to spatial vision to produce momentary distractions in co mplex military performance, such as target tracking. These potential hazards to human vision and visual performance have motivated development of human visual protective materials to counter low-level, multi-spectral laser exposure, as well as the development of new troop training strategies that should provide countermeasures through improved training scenarios. GRA

N87-12152# Army Research Inst. of Environmental Medicine, Natick, Mass.

SLOWLY-DEVELOPING MODIFICATIONS IN CUTANEOUS CIRCULATORY CONTROL

C. B. Wenger May 1986 11 p (AD-A168702; USARIEM-M31/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

The factors discussed below affect skin blood flow (SkBF) through nonthermal mechanisms. In considering them, however, it is necessary to account for thermoregulatory effects which may operate at the same time, because of the dominant role of the latter in the control of the SkBF. Therefore, these non-thermal factors will be approaches in terms of how they modify the relation of forearm blood flow (ABF), probably the most widely used index of SkBF, to the thermoregulatory signal, as represented by esophageal temperature (T sub es) when skin temperature is not changing. Slowly developing modifications may have time courses ranging from minutes (e.g., transcapillary fluid shifts, peripheral pooling of blood) through hours (e.g., circadian rhythms, dehydration) to weeks (e.g., exercise training, heat acclimation, menstrual cycle). Most of these factors change the threshold for vasodilation, but some also change the slope of the ABF:T sub es relation. Several of the factors that change the threshold for vasodilation likewise change thresholds for other thermoregulatory responses, such as sweating. If the operation of the thermoregulatory system as a whole is shifted to a different temperature level, such a shift represents a change in thermoregulatory set-point. Fever was probably the first condition to be recognized as resulting from a change in thermoregulatory set-point, and as expected, the threshold for forearm vascodilation is elevated in fever. GRA

N87-12153# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

BIOLOGICAL RHYTHMS AND ROTATING SHIFT WORK: SOME CONSIDERATIONS FOR AIR TRAFFIC CONTROLLERS AND MANAGERS Final Report

Carlton E. Melton and Robert S. Bartanowicz Jan. 1986 12 p (AD-A168742; DOT/FAA/AM-86/2) Avail: NTIS HC A02/MF A01 CSCL 06/16

This report is a general review of some of the current themes and practices regarding rotating shift work intended to inform air traffic controllers, technicians, and managers of these issues, and to offer some ideas that may be helpful in dealing with difficulties in this area. There is no pat or easy single solutions to the problems of every employee. Managers are always faced with difficult decisions, and shift work is one of the most difficult because it can become an emotionally charged issue. GRA

N87-12154# Army Research Inst. of Environmental Medicine, Natick, Mass.

HUMAN EXERCISE AND HEAT EXCHANGE IN THERMAL

ENVIRONMENTS
Michael N. Sawka, Andrew J. Young, C. B. Wenger, and Kent B. Pandolf May 1986 12 p
(AD-A168746; USARIEM-M-35/86) Avail: NTIS HC A02/MF A01 CSCL 06/19

The thermal-physiological strain imposed by an exercise-environmental condition depends upon the individual's metabolic rate and the capacity for heat exchange with the environment. In hot environments, applied physiology issues concerning the capacity of humans to thermoregulate include the influence of an individual's acclimation state, aerobic fitness, hydration level, and circadian rhythms as well as the type of physical exercise performed. In cold environments, issues include further investigation of human cold acclimation, as well as the influence of body fat and exercise type on the resistance to hypothermia during cold water exposure. Emerging instrument/engineering technologies for the measurement of core temperature, sweating rate, skin blood flow and shivering offer promise for studying physiological responses in different environments. GRA

N87-12155# Florida Univ., Gainesville.
STRESS AND NEUROENDOCRINE REGULATION OF IMMUNE RESPONSES Annual Report, 30 Jun. 1985 - 31 Mar. 1986
Adrian J. Dunn and Nicholas R. Hall 20 Apr. 1986 15 p
(Contract N00014-85-K-0300; RR0-4108)
(AD-A168768) Avail: NTIS HC A02/MF A01 CSCL 06/19

Work is currently in progress on establishing a consistently reproducible paradigm for stress-induced immunosuppression in the mouse. Preliminary data indicate decreases in spleen and thymus weights, and in T-cell responsivity to mitogens following brief periods of restraint or electric footshock, especially with repeated treatments. Other preliminary data indicate that brain dopaminergic and noradrenergic systems respond acutely to the injection of a viral antigen (NDV), in addition to the previously reported increases in plasma corticosterone. The cerebral responses are particularly evident in hypophysectomized mice, in which we do not observe substantial increases in plasma corticosterone. We have not observed consistent changes in cerebral amines following injection of activated spleen cell supernatants, or thymosin fraction V (Tf-5). In a collaborative study, we found that Tf-5 does not directly alter corticosterone binding to its brain receptors, thus ruling out one potential mechanism for the anti-stress properties of Tf-5. GRA

N87-12156# California Univ., Berkeley. Lawrence Berkeley Lab.
CARBON DIOXIDE INCREASE AND HUMAN HEALTH: DATA AND RESEARCH REQUIREMENTS FOR DETERMINING CONSEQUENCES (INCLUDING A BIBLIOGRAPHY FOR ADDITIONAL READING)
M. R. White, I. Hertz-Picciotto, and M. E. Johnston May 1986 139 p
(Contract DE-AC03-76SF-00098)
(DE86-012760; LBL-21625) Avail: NTIS HC A07/MF A01

The purpose of this study was to determine the data and information needed to eventually define the consequences on human health of elevated C02. To attain this purpose, current knowledge of the effects of climate and weather on human health was reviewed. An increase in atmospheric CO2 is predicted to have several effects which may have an influence, directly and indirectly, on human health. These include climate change, changes in vegetation (due to changes in fertilization and water-use efficiency of plants), changes in ocean chemistry (due to increases in dissolved CO2), and possibly slight changes in human biochemistry and physiology (due to breathing air with elevated concentrations of CO2). This report describes some of the ways that climate and weather influence human health, some of the modifying factors, and the information and data needed to initiate studies of the possible consequences of elevated atmospheric CO2 on human health. DOE

N87-12157# Health Effects Research Lab., Research Triangle Park, N. C.
RADIOFREQUENCY RADIATION: ACTIVITIES AND ISSUES
J. A. Elder Jul. 1986 12 p
(PB86-217155; EPA/600/D-85/135) Avail: NTIS HC A02/MF A01 CSCL 06R

The question of human safety relative to exposure to RF radiation obviously predates the first ANSI guide-line established in 1966, but no enforceable Federal standards or guidelines exist for RF radiation exposure; the ANSI guideline which was revised in 1982 is voluntary or advisory. EPA has been pursuing the goal of promulgating guidance to control exposure of the public to RF radiation. In support of the regulatory activity, a report entitled Biological Effects of Radiofrequency Radiation was published in September 1984. The conclusion of the report was that biological effects occurred at a dose rate of about 1 W/kg, and that these effects may be significant under certain environmental conditions. Examples of adverse biological effects that occur in laboratory animals at dose rates of 2-6 W/kg are death and temporary male sterility. These effects as well as the behavioral changes that are the basis for the ANSI guideline can be attributed to heat stress in animals caused by absorption of RF energy. Some experimental results occur at very low exposure conditions that cause no significant thermal input; these responses are called non-thermal effects. The mechanisms of interaction of non-thermal effects and their physiological significance are a subject of scientific debate. RF radiation research budget reductions, which reflect changes in funding priorities, will leave unresolved many of the questions concerning the biological effects of RF radiation and their possible health implications. GRA

N87-12158# Health Effects Research Lab., Research Triangle Park, N. C.
EFFECTS OF MICROWAVE RADIATION ON THE BLOOD-BRAIN BARRIER
T. R. Ward, J. S. Ali, and M. D. Long May 1986 11 p
(PB86-213220; EPA/600/D-86/113) Avail: NTIS HC A02/MF A01 CSCL 06R

An attempt is made to repeat a portion of the study by Oscar and Hawkins in which pulsed and continuous wave microwave radiation increased permeation of labeled tracers through the blood-brain barrier. At the SAR used (0.1 W/kg) the calculated average brain temperature rise in less than 0.1c. The authors found no changes in permeation. However, there were differences in experimental conditions, including type of tracers, frequency and microwave field configuration. It is possible but unlikely that one of these differences is responsible for the apparent discrepancy in results. GRA

N87-12159 Marquette Univ., Milwaukee, Wis.
SKELETAL MUSCLE FATIGUE: PHYSIOLOGICAL AND BIOCHEMICAL STUDIES Ph.D. Thesis
Joseph Mark Metzger 1985 187 p
Avail: Univ. Microfilms Order No. DA8604956

In the context of this dissertation fatigue can be described as a transient decrease in muscle force generating capacity as a result of sufficiently intense or prolonged work. The diaphragm muscle was utilized as a model to study skeletal muscle physiology and biochemistry during fatiguing work. To address the question of diaphragm adaptability animals were exercise-trained on a treadmill using a high-intensity running protocol. Following training muscle glycogen content was elevated in the diaphragm. Despite this glycogen supercompensation, the fatiguability of the diaphragm was unchanged post training. During fatigue a high correlation existed between declining force and rising lactate. In order to accurately assess the role of acidosis on contractile function glass microelectrodes were constructed and used to determine pH alterations following fatiguing stimulation. It was demonstrated for the first time in mammalian muscles, using the direct microelectrode technique, that pH declines during intense contractile activity and returns to resting levels in a time course similar to the recovery of peak force. Moreover, it was demonstrated that, in contrast to previous reports, the decline in force during fatigue is not related to perturbation in membrane electrical properties. Finally, it was observed that following high and low frequency stimulation force production recovered faster at low compared to high frequencies.

Following stimulation, fusion at low frequencies increased due to fatigue induced prolongation of twitch duration. The net result being a leftward shift in the force-freqeuncy relationship thus augmenting force at low relative to high frequencies. Dissert. Abstr.

N87-11814 Joint Publications Research Service, Arlington, Va.
INTERVIEW ON MEDICAL PROGRAM OF 237-DAY FLIGHT
Oleg Yuryevich Atkov, Oleg Georgiyevich Gazenko, and Yevgeniy Ivanovich Chazov *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 142 152 Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 5, Sep. - Oct. 1985 p 49-56 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

N87-12107# Joint Publications Research Service, Arlington, Va.
RADIO-FREQUENCY ELECTROMAGNETIC RADIATION: RADIATION SAFETY
B. I. Davydov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 15 - 27 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, No. 2, Mar. - Apr. 1986 p 15-24 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12108# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODELS OF FLUID-ELECTROLYTE METABOLISM
A. I. Grigoryev and V. V. Verigo *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 28 - 32 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986 p 24-27 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12109# Joint Publications Research Service, Arlington, Va.
PRELIMINARY RESULTS OF MEDICAL INVESTIGATIONS DURING 5-MONTH SPACEFLIGHT ABOARD SALYUT-7-SOYUZ-T ORBITAL COMPLEX
Ye. I. Vorobyev, O. G. Gazenko, Ye. B. Shulzhenko, A. I. Grigoryev, A. S. Barer, A. D. Yegorov, and I. A. Skiba *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 33 - 42 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986, p 27-34 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12111# Joint Publications Research Service, Arlington, Va.
VENOUS PRESSURE IN JUGULAR VEIN SYSTEM AND EFFECTIVENESS OF BLOOD RETURN TO RIGHT HEART DURING 120-DAY HEAD-DOWN TILT
V. G. Doroshev *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 49 - 53 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vol. 20, No. 2, Mar. - Apr. 1986 p 38-41 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12112# Joint Publications Research Service, Arlington, Va.
HUMAN HEART FUNCTION IN EARLY HOURS AND DAYS OF HEAD-DOWN TILT (ECHOCARDIOGRAPHIC DATA)
V. V. Bystrov, A. F. Zhernavkov, and A. A. Savilov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 54 - 60 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 42-46 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12113# Joint Publications Research Service, Arlington, Va.
HUMAN BLOOD FREE AMINO ACIDS AT EARLY STAGE OF HEAD-DOWN TILT
I. G. Popov and A. A. Latskevich *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 61 - 70 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 46-54 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12114# Joint Publications Research Service, Arlington, Va.
BLOOD SERUM ENZYME ACTIVITY IN HEALTHY MAN WITH SIMULATION OF EFFECTS OF WEIGHTLESSNESS
I. A. Popova *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS -USB-86-004) 23 Jul. 1986 p 71 - 75 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 54-58 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12115# Joint Publications Research Service, Arlington, Va.
PARAMECIUM TEST FOR TOXIC SUBSTANCES IN HUMAN BLOOD DURING SIMULATED WEIGHTLESSNESS
V. I. Lavrov, I. B. Goncharov, A. F. Davydkin, A. P. Ivanov, A. N. Romanov, and V. F. Ivchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 76 - 79 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 58-60 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12123# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF DUPULOENDOLYMPHATIC SYSTEM WITH DIFFERENT CUPULA AND ENDOLYMPH DENSITIES
A. V. Kondrachuk and S. P. Sirenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 120 - 130 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 86-92 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12126# Joint Publications Research Service, Arlington, Va.
CAPABILITIES OF ULTRASONIC METHODS OF EVALUATING HEMODYNAMICS OF CARDIOCEREBROVASCULAR SYSTEM
L. G. Simonov and M. S. Gelfenbeyn *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 7-19 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 8-16 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12130# Joint Publications Research Service, Arlington, Va.
TOLERANCE TO +Gz ACCELERATIONS OF INDIVIDUALS OF DIFFERENT AGES OTHER THAN PILOTS
A. R. Kotovskaya, I. F. Vil-Vilyams, and V. Yu. Lukyanyuk *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 35-40 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 25-29 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12132# Joint Publications Research Service, Arlington, Va.
USE OF GAS MIXTURES WITH HIGH OXYGEN AND CARBON DIOXIDE CONTENT TO NORMALIZE EXTERNAL RESPIRATION AND BLOOD ACID-BASE EQUILIBRIUM IN PRESENCE OF MUSCLE FATIGUE
N. A. Agadzhanyan, N. P. Krasnikov, and S. I. Naydich *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 45-51 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow,

USSR), v. 20, no. 4, Jul. - Aug. 1986 p 32-37 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12133# Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF HUMAN KINEMATIC REACTIONS TO IMPACTS
I. F. Obraztsov, Yu. G. Konakhevich, V. A. Lyapin, and A. V. Maryin *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 52-58 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 37-41 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12134# Joint Publications Research Service, Arlington, Va.
USE OF CENTRAL ELECTROANALGESIA FOR FUNCTIONAL RECOVERY FROM MOTION SICKNESS
A. S. Nekhayev, V. D. Vlasov, and V. V. Ivanov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 59-63 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no, 4, Jul. - Aug. 1986 p 42-44 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12136# Joint Publications Research Service, Arlington, Va.
EFFECT OF COAMIDE AND FOLICOBALAMIN ON ERYTHROPOIESIS UNDER NORMAL LIVING CONDITIONS AND DURING ANTIORTHOSTATIC HYPOKINESIA
R. K. Kiselev, A. M. Chayka, and V. I. Legenkov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 70-75 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 48-53 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12137# Joint Publications Research Service, Arlington, Va.
HUMAN TOLERANCE TO HIGH-INTENSITY CONTACT HEAT ON INTEGUMENTAL SURFACE
A. P. Kozlovskiy and Ye. A. Lushchikov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 76-79 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 53-55 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12142# Joint Publications Research Service, Arlington, Va.
CENTRAL HEMODYNAMIC PARAMETERS DURING DRY IMMERSION OF PATIENTS WITH BORDERLINE HYPERTENSION
V. I. Fomichev and To Nam Zeng *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 106-108 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. Aug. 1986 p 73-74 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12143# Joint Publications Research Service, Arlington, Va.
RELATIONSHIP BETWEEN CONSTITUTIONAL DISTINCTIONS AND FUNCTIONAL CHARACTERISTICS OF THE CARDIOVASCULAR SYSTEM OF HEALTHY SUBJECTS AND PATIENTS WITH HYPERTENSION IN CLINOSTATIC AND ORTHOSTATIC POSITION
G. S. Belkaniya and V. A. Dartameliya *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 109-115 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 75-78 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12144# Joint Publications Research Service, Arlington, Va.
SPECIALIZED EQUIPMENT FOR MAGNETIC RECORDING OF PHYSIOLOGICAL DATA FOR EXPERIMENTS ABOARD BIOSATELLITES
V. S. Magedov and Yu. S. Koryakov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 116-119 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 79-80 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12146# Joint Publications Research Service, Arlington, Va.
ENDOCRINE STATUS OF COSMONAUTS FOLLOWING LONG-TERM SPACE MISSIONS
N. F. Kalita and R. A. Tigranyan *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 125-128 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 84-86 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12148# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF AVIATION AND SPACE MEDICINE, BIOLOGY AND PSYCHOLOGY DISCUSSED AT FIFTEENTH GAGARIN SCIENTIFIC LECTURES
G. S. Ratner *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 132-144 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 88-94 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N87-12160# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
REGISTER OF RESEARCH IN PROGRESS ON MENTAL WORKLOAD
Thomas R. Metzler Feb. 1986 105 p
(AD-A168210; AAMRI-TR-86-007) Avail: NTIS HC A06/MF A01 CSCL 05/8

This report documents current research on operator workload. The register was compiled from responses to a questionnaire data form sent to 76 scientists who are active in basic and applied workload research. The six sections of the register include name and key term indexes, current project descriptions, listings of workload laboratories and potential sources of research support, and a bibliography of significant publications in the area.
GRA

N87-12161# Naval Aerospace Medical Research Lab., Pensacola, Fla.
DEVELOPMENT OF VISION TESTS FOR AIR-TO-AIR TARGET DETECTION Interim Report
W. A. Monaco, A. Morris, and P. V. Hamilton Jul. 1985 23 p
(AD-A168309; NAMRL-RR-1314) Avail: NTIS HC A02/MF A01 CSCL 06/16

This report summarizes the accomplishments leading to the development of a vision testing program currently being administered by the Naval Aerospace Medical Research Laboratory (NAMRL) at the Tactical Air Combat Training Systems; NAS, Oceana, VA. The program is designed to measure and suggest means to improve aircrew visual capabilities. Included in this report is a description of the methods used to select vision tests appropriate for determining the relationship between an individual's visual skill and his ability to detect targets in air-to-air engagements.
GRA

N87-12162# Naval Postgraduate School, Monterey, Calif.
AN APPLICATION OF MULTIDIMENSIONAL SCALING TO

DESCRIBE STRESS AMONG NAVAL HELICOPTER PILOTS M.S. Thesis
Thomas L. Walston, III Mar. 1980 97 p
(AD-A168367) Avail: NTIS HC A05/MF A01 CSCL 06/19

The technique of multidimensional scaling is used in an attempt to determine any patterns utilized by Naval helicopter pilots when grouping a given set of stressors. Both grouping data and ranking data were collected and analyzed from a survey among pilots. Information gained through the ranking data consist of perceptions of the helicopter pilots on how the stressors affect certain performance aspects. Numerical output, as well as graphical plots, were generated to reflect these perceptions. Naval aviation, in general, is a high-stress environment. The variety of stresses associated with flying an aircraft have an impact on the effectiveness with which that task is performed. Helicopter flying has stressful situations, many of which, are unlike those of other aircraft. The missions, flight characteristics, and environment all contribute to these difficulties. It is important for the pilot to be aware of these stressful conditions in order to capably operate the helicopter GRA

N87-12163# European Space Agency, Paris (France).
EXTENDED ANALYSIS OF THE STRUCTURE OF ERROR SCORES IN PSYCHOLOGICAL APTITUDE TESTS
Klaus-Martin Goeters Oct. 1985 46 p Transl. into ENGLISH from "Erweiterte Strukturanalyse von Fehlerwerten in Psychologischen Leistungstests" Hamburg, West Germany Original language document was announced as N86-10780
(ESA-TT-943; DFVLR-FB-85-20; ETN-86-98241) Avail: NTIS HC A03/MF A01; original German version available at DFVLR, Cologne, West Germany DM 16.50

A series of psychological aptitude tests was analyzed with respect to human performance and reliability. A factor analysis of the test scores reveals five components of performance. Three independent error components are extracted: errors in quick visual detection of targets; difficulties in mental processing of numbers and symbols; and erroneous actions under performance stress. All three factors are the expression of a deficient control of performance. They are discussed as functional aspects of decision making and human information processing. ESA

N87-12164# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abteilung Flugphysiologie und -Psychologie.
PERFORMANCE REGULATION AND ERROR CONTROL IN A TEST OF PERCEPTUAL SPEED
Klaus-Martin Goerters Feb. 1986 41 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-13; ISSN-0171-1342; ETN-86-98181) Avail: NTIS HC A03/MF A01; DFVLR, Cologne, West Germany DM 15

A test of perceptual speed (cancellation of figures) in which usually the number of rights and wrongs (omissions) are uncorrelated, was applied to three groups with different instructions. Group 1 was told to work quickly and accurately; group 2 to take care of the speed of work, and group 3 of accuracy. Subjects who where asked by a questionnaire about their attitudes during the work period and about their general style of work, emphasized the factors speed or accuracy while neglecting the other components. This procedure does not achieve the expected success. The result confirms the functional independence of speed of work and error rate in tests of mental concentration. ESA

N87-12165# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abteilung Flugphysiologie und -Psychologie.
THE VALUE OF GLOBAL SELF RATINGS IN DIFFERENTIAL DIAGNOSTICS Ph.D. Thesis - Hamburg Univ., West Germany
Peter Maschke Apr. 1986 229 p In GERMAN; ENGLISH summary
(DFVLR-FB-86-20; ISSN-0171-1342; ETN-86-98186) Avail: NTIS HC A11/MF A01; DFVLR, Cologne, West Germany DM 66.50

Reliability, validity, and faking tendencies of a 10 dimensional personality inventory were compared with the corresponding global self ratings in a situation of job application. Global self ratings do not appear to be faked more than the personality test scales. Although there are distinct differences in reliability between self rating and personality scales, the latter attain only negligibly higher validities. Reasons for these results (unexpected from assumptions of classical testing theory) are discussed. In relation to self ratings performance, there are indications of a capability of self assessment. ESA

N87-12106# Joint Publications Research Service, Arlington, Va.
PHILOSOPHICAL ASPECTS OF ADAPTATION THEORY
B. S. Alyakrinskiy *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 1 - 14 Trans. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 6-15 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12125# Joint Publications Research Service, Arlington, Va.
DISTINCTIONS OF VISUAL MONITORING OF INSTRUMENT READINGS IN MANEUVERED FLIGHT
I. D. Malinin and V. A. Ponomarenko *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 1-6 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 4-8 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12128# Joint Publications Research Service, Arlington, Va.
FORECASTING OPERATOR WORK CAPACITY DURING LONG-TERM CONTINUOUS WORK
A. K. Yepishkin and A. I. Skrypnikov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 25-28 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 19-22 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12129# Joint Publications Research Service, Arlington, Va.
BIOCHEMICAL INDICATORS OF EMOTIONAL STRESS IN AIR TRAFFIC CONTROLLERS
Ye. L. Kan, V. A. Kupriyanov, K. F. Korovin, and O. O. Malinovskaya *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 29-34 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 22-25 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N87-12166*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
THE SPACE STATION: HUMAN FACTORS AND PRODUCTIVITY
Douglas J. Gillan, Michael J. Burns, Clarence L. Nicodemus, and Randy L. Smith 1986 9 p
(Contract NAS9-15800)
(NASA-CR-179905; NAS 1.26:179905) Avail: NTIS HC A02/MF A01 CSCL 05H

Human factor researchers and engineers are making inputs into the early stages of the design of the Space Station to improve both the quality of life and work on-orbit. Effective integration of the human factors information related to various Intravehicular Activity (IVA), Extravehicular Activity (EVA), and teletobotics

systems during the Space Station design will result in increased productivity, increased flexibility of the Space Station systems, lower cost of operations, improved reliability, and increased safety for the crew onboard the Space Station. The major features of productivity examined include the cognitive and physical effort involved in work, the accuracy of worker output and ability to maintain performance at a high level of accuracy, the speed and temporal efficiency with which a worker performs, crewmember satisfaction with their work environment, and the relation between performance and cost. B.G.

N87-12167# Human Engineering Labs., Aberdeen Proving Ground, Md.
A HELICOPTER FLIGHT EVALUATION OF KINESTHETIC-TACTUAL DISPLAYS Interim Report
Alan M. Poston and Richard S. Dunn Mar. 1986 20 p
(AD-A168302; HEL-TN-3-96) Avail: NTIS HC A02/MF A01 CSCL 01/4

The kinesthetic-tactual (KT) display concept employs moveable elements incorporated in a pilot's flight control handgrips. A series of laboratory and simulator studies conducted since 1976 has shown that this touch-based display approach can substitute for visual displays or augment them in useful ways. This report describes the first helicopter flight evaluation and demonstration of KT displays. Flight performance data were collected to compare the conventional visual display condition to KT conditions. Performance results as well as pilot opinion comments are discussed along with conclusions and implications for further KT system development. This is an interim report because in-depth analysis of the flight data is still underway. The most promising potential benefits in mission applications of KT displays are for conditions where visual task demands are high; for example, helicopter terrain flight requiring continuous visual attention outside the cockpit, and where use of conventional visual displays is complicated by night vision devices. GRA

N87-12110# Joint Publications Research Service, Arlington, Va.
PROFESSIONAL WORK CAPACITY AND FUNCTIONAL STATE OF OPERATOR EXPOSED TO REPEATED OPTOKINETIC AND ANTIORTHOSTATIC FACTORS
L. N Kornilova, L. D. Smirichevskiy, A. V. Trutnev, S. L. Chekanova, I. Ya. Yakovleva, and S. L. Kravchenko *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 43 - 48 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), Vo. 20, No. 2, Mar. - Apr. 1986, p 35-38 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12118# Joint Publications Research Service, Arlington, Va.
EFFECT OF LONG-TERM STORAGE ON SOME PARAMETERS OF FAT INGREDIENT OF FREEZE-DRIED PRODUCTS
A. K. Sivuk, A. G. Kasatkina, Ye. I. Strukova, V. P. Naydina, and Ye. Ye. Zharkovskaya *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 93 - 97 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 69-72 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12120# Joint Publications Research Service, Arlington, Va.
RECLAMATION OF WATER USED FOR WASHING BY MEANS OF REVERSE OSMOSIS DURING LONG-TERM SPACE-FLIGHTS
S. V. Polyakov, V. D. Volgin, Yu. Ye. Sinyak, Ye. D. Maksimov, and V. I. Novikov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 106 - 109 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 78 - 80 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12121# Joint Publications Research Service, Arlington, Va.
SANITARY AND MICROBIOLOGICAL ASPECTS OF CLOSED ENVIRONMENT OCCUPIED BY PEOPLE AND ANIMALS
V. M. Knyazev, V. I. Korolkov, A. N Viktorov, G. O. Pozharskiy, L. N Petrova, and V. P. Gorshkov *In its* USSR Report: Space Biology and Aerospace Medicine, Vol. 20, No. 2, Mar. - Apr. 1986 (JPRS-USB-86-004) 23 Jul. 1986 p 110 - 113 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 2, Mar. - Apr. 1986 p 80-82 (For primary document see N87-12105 03-51)
Avail: NTIS HC A07/MF A01

N87-12127# Joint Publications Research Service, Arlington, Va.
PSYCHOPHYSIOLOGICAL ASPECTS OF COLOR-CODING OF FLIGHT AND NAVIGATION INFORMATION ON ONBOARD ELECTRONIC DISPLAYS
A. A. Oboznov, A. N. Boyarskiy, and S. I. Buturlin *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 20-24 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 16-19 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12135# Joint Publications Research Service, Arlington, Va.
BIOLOGICAL VALUE OF PROTEINS IN FOOD ALLOWANCE OF SALYUT ORBITAL STATION CREWS
V. P. Bychkov, T. F. Vlasova, V. N. Gryaznova, Ye. A. Sedova, A. K. Sivuk, V. A. Tretyakova, and A. S. Ushakov *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 64-69 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsin (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 44-48 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

N87-12145# Joint Publications Research Service, Arlington, Va.
EVALUATION OF METHOD FOR COLLECTING AND CONCENTRATING ORGANIC TRACE IMPURITIES IN AIR
O. A. Sukhorukov, M. V. Azarova, and B. L. Avetisyants *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 120-124 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 81-83 (For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N87-12168# Manchester Univ. (England). Dept. of Electrical Engineering.
FEASIBILITY STUDY IN WALL-CODED MAGNETIC BUBBLE MEMORY DEVICES Final Report, Dec. 1984 - Nov. 1985
W. Clegg and G. Ronan Nov. 1985 92 p
(Contract RARDE-2052/064)
(BR99249; ETN-86-97980) Avail: NTIS HC A05/MF A01

Vertical Bloch line memory technology is reviewed. Storage density, power requirements, and access times are discussed. Alternative data storage technologies are assessed. A content-addressable memory chip capable of up to 2500 matching operations for computer aided mapping is described. ESA

N87-12169*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE APPLICATION OF A SPARSE, DISTRIBUTED MEMORY TO THE DETECTION, IDENTIFICATION AND MANIPULATION OF PHYSICAL OBJECTS Semiannual Status Report, Oct. 1985 - Mar. 1986
Pentti Kanerva 1986 5 p
(Contract NAS2-11530)
(NASA-TM-89231; NAS 1.15:89231) Avail: NTIS HC A02/MF A01 CSCL 09B

To determine the relation of the sparse, distributed memory to other architectures, a broad review of the literature was made. The memory is called a pattern memory because they work with large patterns of features (high-dimensional vectors). A pattern is stored in a pattern memory by distributing it over a large number of storage elements and by superimposing it over other stored patterns. A pattern is retrieved by mathematical or statistical reconstruction from the distributed elements. Three pattern memories are discussed. B.G.

N87-12170# Department of the Air Force, Washington, D.C.
MULTIPLE TASK ORIENTED PROCESSOR Patent
Douglas G. Webber and George C. Schenck, inventors (to Air Force) Issued 27 May 1986 13 p Supersedes AD-D010554
(AD-D012392; US-Patent-4,591,976; US-Patent-Appl-SN-505165; US-Patent-Class-364-200) Avail: US Patent and Trademark Office CSCL 17/7

The computer system for missile guidance comprises five parallel processors interconnected by a global bus; with each processor having its own CPU, program memory, temporary memory, and two critical variable memories, interconnected by a local bus. The program memory and critical variable memory are hard MNOS to survive nuclear radiation. Each processor has its own cycle time, synchronized by a master clock. In each processor, the cycle has three phases for intercommunication, task processing, and critical variable storage. Thus the critical variables are stored only after task processing is completed. GRA

N87-12171# British Aerospace Public Ltd. Co., Bristol (England).
OUTLINE HARDWARE DESIGN OF A HIGH SPEED FFT PROCESSOR
J. W. Henn Nov. 1983 26 p
(BAe-BT-15691; LR49725; ETN-86-97974) Avail: NTIS HC A03/MF A01

The radix 2 decimation in time, fast Fourier transform which significantly reduces the number of multiplications to approximately 2Nlog2N real multiplications, which is a considerable saving when N is large, is outlined. Information is presented in such a way as to facilitate hardware development. ESA

N87-12172# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
COMPLETE SYMMETRY IN D2L SYSTEMS AND CELLULAR AUTOMATA
Peter R. J. Asveld Jun. 1985 15 p
(INF-85-14; ETN-86-98165) Avail: NTIS HC A02/MF A01

Completely symmetric D2L systems and cellular automata are introduced by means of an additional restriction on the corresponding classes of symmetric devices. It is shown that completely symmetric D2L systems and cellular automata are still able to simulate Turing machine computations. As corollaries, characterizations of the recursively enumerable languages and of space-bounded complexity classes are obtained. ESA

N87-12173# Institut National Polytechnique, Grenoble (France). Lab. TIM3/INPG.
DEFINITION, STUDY AND DESIGN OF A SPECIFIC SELF-CHECKING MICROPROCESSOR COBRA Ph.D. Thesis [DEFINITION, ETUDE ET CONCEPTION D'UN MICROPROCESSEUR AUTOTESTABLE SPECIFIQUE COBRA]
Adham Osseiran 1986 214 p In FRENCH; ENGLISH summary
(ETN-86-98402) Avail: NTIS HC A10/MF A01

Self-checking circuits based on strongly fault secure functional circuits and strongly code disjoint checkers were developed. The microprocessor is designed for real time applications with built-in self-checking capacity. It processes 19 different signals, supervise 14 logical inputs and has 7 independent outputs. It communicates with an external PROM used as program storage. The design is validated by electrical or logical simulations carried out at each development stage. ESA

N87-12174# Office of Science and Technology, Washington, D.C.
RESEARCH IN VERY HIGH PERFORMANCE COMPUTING: POLICY RECOMMENDATION AND RESEARCH REQUIREMENTS STATEMENT
Nov. 1985 36 p
(PB86-209723) Avail: NTIS HC A03/MF A01 CSCL 09B

The report is concerned with the most powerful computers, generically known as very high performance (VHP) computers. In particular it is concerned with the effects VHP computers will have on the future of the United States. VHP computers include advanced supercomputers used primarily for mathematical modeling, embedded computers used for real-time control, and specialized computers dedicated to a single application such as signal processing. They are used in research, industry, and defense. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

N87-12175 Canadian Information Processing Society, Toronto (Ontario).
GRAPHICS INTERFACE 1986: PROCEEDINGS
1986 416 p In ENGLISH and FRENCH Conference held in Vancouver, British Columbia, 26-30 May 1986; sponsored by the Canadian Man-Computer Communicational Society, the Canadian Image Processing Society, and the National Research Council of Canada
(ISSN-0713-5424) Copyright. Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Topics discussed include: computer graphic applications; artificial intelligence; display algorithms; user interfaces; human animation; hardware; vision/graphics interface; remote sensing and geographic information systems; robots; perception and computational vision; and image processing and pattern recognition. For individual titles, see N87-12176 through N87-12240.

N87-12176# Manitoba Univ., Winnipeg. Dept. of Computer Science.
SOME IMPLICATIONS OF DYNAMIC STRUCTURAL ANALYSIS
J. A. Hoskins and W. D. Hoskins *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 p 7-10 (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In analysing an interlacement structure, the data structure is first created using interactive graphical input to color the cells of the corresponding grid. When the data structure is complete, the factorization algorithm is invoked and the a-posteriori matrix factors computed. The graphical display is then updated. Algorithms for performing continuous dynamic factorization in response to incremental data modifications are considered along with the implications for the corresponding graphical display. B.G.

N87-12177# Manitoba Univ., Winnipeg. Dept. of Computer Science.
AN ENCODING SCHEME FOR PRESENTATION GRAPHICS WITH ANIMATION
Howard J. Ferch *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 p 11-14 (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Bit-mapped raster graphics systems are used in the majority of personal computer systems. As the resolution of these systems increases, and the number of levels of gray-scale, or the number of colors, is increased, the encoding of images becomes of greater concern, particularly for interactive systems, or those using animation. A variation of run-length encoding which is faster, but is similar in its degree of space encoding, to run-length encoding is presented. Its application to a menu-driven presentation graphics system is discussed. One particular advantage of this scheme is its adapatability to the types of animation possible on personal computer raster systems. Author

N87-12178# McMaster Univ., Hamilton (Ontario). Dept. of Mechanical Engineering.
KINEMATIC AND GEOMETRIC MODELLING AND ANIMATION OF ROBOTS
Hoda A. ElMaraghy *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 11 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

At present, most industrial robots are programmed in a teach mode. In the meantime robots are called upon to perform increasingly complex tasks, which make programming by teaching rather tedious and cumbersome. There is an increasing need for effective tools to assist in off-line programming of robots and verifying their programmed moves. A program for modeling and simulting the PUMA 560 and ADEPT 1 robots was developed. The kinematic models required for the transformation from task space to robot configuration space, and vice-verse, are briefly outlined. The robot geometric models and their graphical manipulation were implemented using MOVIE-BYU amd PLOT-19 on a Tektronix 4115-B graphics terminal and a VAX 11/730 minicomputer. The developed kinematic and geometric models are used for off-line simulation, animation, and verification of robot movements during assembly operations. Sample outputs which illustrate the program capabilities such as shaded images, wire-frame animation, arbitrary point tracing, actual movement envelope, and the various menus are included. Author

N87-12179# California Univ., Berkeley. Computer Science Div.
EXPERIENCES WITH USING PROLOG FOR GEOMETRY
Wm. Randolph Franklin, Margaret Nichols (North American Philips Lighting Co., Bloomfield, N.J.), Sumitro Samaddar (Rensselaer Polytechnic Inst., Troy, N.Y.), and Peter Wu *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The Prolog language is a useful tool for geometric and graphics implementations because its primitives, such as unification, match the requirements of many geometric algorithms. Several problems were implemented in Prolog including a subset of Graphics Kernal Standard, convex hull findings, planar graph universal, recognizing groupings of objects, and boolean combinations of polygons using multiple precision rational numbers. Certain paradigms, or standard forms, of geometric programming in Prolog are becoming evident. These include applying a function to every element of a set, executing a procedure so long as a certain geometric pattern exists, and using unification to propagate a transitive function. Certain strengths and weaknesses of Prolog for these applications are now apparent. Author

N87-12180# Martin Marietta Labs., Baltimore, Md. Artificial Intelligence Dept.
THE INFERENCE MACHINE LABORATORY: GRAPHIC TOOLS FOR KNOWLEDGE MANAGEMENT
J. W. Lewis *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The Inference Machine Laboratory is a collection of experiments in applying graphic interfaces to various types of knowledge bases. Each experiment involves a canonical representation, invertible transmations into multiple representations, and multiple directly manipulable views of those representations. Initial experiments include RULE*CALC (simple production rules), HAPStation (OPS5-like production rules), RFIX (diagnostics), and TIMLS (frames in PROLOG). Author

N87-12181# Saskatchewan Univ., Saskatoon. Dept. of Computational Science.
PORTRAY: AN IMAGE SYNTHESIS SYSTEM
Darwyn R. Peachey *In* Canadian Information Processing Society Graphics Interfacd 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

PORTRAY is an image synthesis system which uses ray tracing to produce realistic images of three-dimensional scenes. Scenes are described to PORTRAY in a high-level description language. The basic geometric modeling technique is constructive solid geometry using primitive solids bounded by planes and quadrics. A variety of optical characteristics and phenomena may be specified. The scene description language allows the user to define objects classes which may be used as if they were built-in primitives. PORTRAY uses a number of techniques, including a technique exploiting bounding volume coherence, to imorove its ray tracing performance. PORTRAY is supported by an array of image manipulation tools which share a common image storage format. Author

N87-12182# Nippon Electric Co. Ltd., Kanagawa (Japan). C and C Systems Research Labs.
AN ADAPTIVE SUBDIVISION BY SLIDING BOUNDARY SURFACES FOR FAST RAY TRACING
Keiji Nemoto and Takao Omachi *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An adaptive subdivision algorithm for fast ray tracing implemented on parallel architecture using a three dimensional computer array is presented. The object space is divided into several subregions and boundary surfaces for the subregions are adaptively slid to redistribute loads of the computers uniformly. Since the shape of the subregions is preserved as orthogonal parallelepiped the redistribution overhead can be kept small. The algorithm is quite simple but can avoid load concentration to a particular

computer. Simulation results raveal that the adaptive space subdivision algorithm by sliding boundary surfaces reduces the computing time to 3/4 to 1/5 as much as that for the conventional space subdivision algorithm with no redistribution, which reduces the computing time almost proportionally to the number of computers. Author

N87-12183# Alias Resarch Corp., Toronto (Ontario).
PROFILING GRAPHIC DISPLAY SYSTEMS
Peter Schoeler and Alain Fournier (Toronto Univ. (Ontario).) *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Graphics systems using three dimensional models, and computing a color shaded image for a raster display are very common, and range widely in performance and cost. The first results are presented of a series of profiling of different rendering systems displaying the same scenes on the same machine. The systems studies are a ray-caster, a system using a depth-buffer for visibility determination, and a system using a scan-line Watkins algorithm. The first and last systems have an antializing option. Two types of scenes were used, one made of a constant number of polygons varying in size, and the other made of parametric surfaces varying in level of subdivision. The results, mainly useful for relative comparisons, confirm some predicted behaviors. Author

N87-12184# Pixar Corp., San Rafael, Calif.
USING CACHING AND BREADTH-FIRST SEARCH TO SPEED UP RAY-TRACING Abstract Only
Pat Hanrahan *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Ray-tracing is an expensive image synthesis technique because many more ray-surface intersection calculations are done than are necessary to shade the visible areas of the image. The concept of beam-tracing is extended so that it can be coupled with caching to reduce the number of intersection tests. Two major improvements are made over existing techniques. First, the cache is organized so the cache misses are only generated when another surface is intersected, and second, the search takes place in breath-first order so that coherent regions are completely computed before moving onto the next region. Author

N87-12185# Toronto Univ. (Ontario). Dynamic Graphics Project.
WHAT ARE VISUAL PROGRAMMING, PROGRAMMING BY EXAMPLE AND PROGRAM VISUALIZATION?
Brad A. Myers *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

There is a great interest recently in systems that use graphics to aid in the programming, debugging, and understanding of computer programs. The terms visual programming and program visualization were applied to these systems. Also, there is a renewed interest in using examples to help alleviate the complexity of programming. This technique is called programming by example. This paper attempts to provide more meaning to these terms by giving precise definitions, and then uses these definitions to classify existing systems into a taxonomy. Author

N87-12186# Brigham Young Univ., Provo, Utah. Dept. of Computer Science.
AN EDITING MODEL FOR GENERATING GRAPHICAL USER INTERFACES
Dan R. Olsen, Jr. *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A basic architecture for a User Interface Management System is presented. The problem of updating a display in response to interactive commands is discussed. The basic architecture is then extended to include basic editing and browsing processes on arbitrary data structures. Editing templates are presented as a technique which embodies the entire manipulation process for a particular data structure/data display combination. Such templates in conjunction with the User Interface Management System are able to automatically provide a majority of the code required in an interactive application. Author

N87-12187# Alberta Univ., Edmonton. Dept. of Computing Science.
AUTOMATIC GENERATION OF GRAPHICAL USER INTERFACES
Gurminder Singh and Mark Green *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The issues involved in automatically generating the presentation component of user interfaces is examined. The design and implementation of the presentation component of the University of Alberta User Interface Management System are described. The system is used for automatically generating graphical user interfaces for interactive applications. The system was designed to keep the other components of the user interface device independent, keep the designer's interest alive in the design process, make the design process less cumbersome, and reduce the burden of programming as far as possible. The results presented are based on the experience gained through implementing a system to generate the presentation component of user interfaces automatically. The presentation component can be viewed as the lexical level of the user interface. Author

N87-12188# Waterloo Univ. (Ontario). Computer Graphics Lab.
A FAST ALGORITHM FOR GENERAL RASTER ROTATION
Alan W. Paeth *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The rotation of a digitized raster by an arbitrary angle is an essential function for many raster manipulation systems. A particularly fast algorithm was derived and implemented which rotates (with scaling invariance) rasters arbitrarily; skewing and translation of the raster is also made possible by the implementatin. This operation is conceptually simple, and is a good candidate for inclusion in digital paint or other interactive systems, where near real-time performance is required. Author

N87-12189# Waterloo Univ. (Ontario). Computer Graphics Lab.
A CEL-BASED MODEL FOR PAINT SYSTEMS
Terry M. Higgins and Kellogg S. Booth *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 9 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A comprehensive formal model for a computer paint system is presented providing capabilities beyond those of traditional designs. The system incoporates an alpha channel to enable artwork to have variable opacity in a manner reminiscent of cel painting. Operations which may be performed on these RGBA images include digital painting, airbrushing, erasing, masking, and image compositing. These are implemented as instances of the digital composition algebra introduced by Duff and Porter. The implementation model extends a proposal by Tanner. It is cost-effective and is based on the concept of a virtual frame buffer containing a higher-level description of the image being painted and an associated output transformation that maps the

contents into a standard RGB frame buffer used only for viewing. Ways of implementing the model to take advantage of multiprocessing capabilities in various host and frame buffer architectures are discussed and three implementations are examined. Author

N87-12190# Waterloo Univ. (Ontario). Computer Graphics Lab.
DESIGN AND EXPERIENCE WITH A GENERALIZED RASTER TOOLKIT
Alan W. Paeth and Kellogg S. Booth *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)
Avail: NTIS HC A18/MF A01; also available from the Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Raster manipulation software is often viewed as an ad hoc means to fine-tune the appearance of digital images, or as a means to reformat them to conform to specific hardware requirements. A universally accepted, machine readable, device-independent specification of a raster image is seldom employed. This stands in contrast to the variety of standards for higher-level scene representation. A general raster type was defined, which unifies the design of a toolkit of raster-based software. Operations performed by the tools are closed in the sense that operators map objects having the raster type onto new objects having the raster type. This closure encourages a synthesis of function by allowing composition of operators. Sequences of these operators are surprisingly powerful and have wide application. Author

N87-12191# National Research Council of Canada, Ottawa (Ontario). Lab. for Intelligent Systems.
GRAPHICS TOOLS IN ADAGIO, A ROBOTICS MULTITASKING MULTIPROCESSOR WORKSTATION
Stephen A. MacKay and Peter P. Tanner *In* Canadian Information Processing Society Graphics Interfacd 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The developement of Adagio, a robotics simulation workstation, has involved the implementation of several techniques unique to the system. Based on the message-passing, multitasking multiprocessor real time operating system Harmony, Adagio is programmed using a large number of cooperating tasks. Several techniques are based on the concept of a server, a task that is alone repsonsible for governing a scarce resource. The Graphics Server task, the Data Structure Server task, and the Tracker Server task are responsible for the management of the frame buffer, the 3D geometric data structure, and the screen tracker, respectively. Each of these servers is then a separate tool necessary for the implementation of the whole system. Each runs in parallel with other tasks and can handle requests for service from any task. Author

N87-12192# North Carolina Univ., Chapel Hill. Dept. of Computer Science.
EXPLOITING CLASSES IN MODELING AND DISPLAY SOFTWARE
Turner Whitted and Eric Grant *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 4 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The class concept is one component of object-oriented programming systems which has proven useful in organizing complex software. In experimenting with the use of classes for geometric modeling application, a class hierarchy was derived that yields some conceptual order in the midst of diverse representations of shapes. Rather than searching for a uniform primitive representation, the diversity was accepted and a framework built in which dissimilar models are combined in an orderly manner. Author

N87-12193# New York inst. of Tech., Old Westbury. Computer Graphics Lab.
APPLICATIONS OF WORLD PROJECTIONS
Ned Greene *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Various techniques were developed which employ projections of the world as seen from a particular viewpoint. A uniform framework for representing and utilizing world projection is proposed and argues that the best general purpose representation is the projection onto a cube. Surface shading and texture filtering issues related to environment mapping are discussed including approximate methods for obtaining diffuse and specular shading values from prefiltered environment maps. It is noted that obtaining accurate diffuse reflection and antialiasing specular reflection, which are both problematical with ray tracing, can be effectively handled by environment mapping. Author

N87-12194# Pennsylvania Univ., Philadelphia. Dept. of Computer and Information Science.
ANIMATING HUMAN FIGURES: PERSPECTIVES AND DIRECTIONS
Norman I. Badler *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The overall goal of the work is understanding human motion. In particular, motion performance, observation, description, and notation impacts the form of a motion representation. A representation can be verified by a computer graphics performance, and thus the effective control of natural-appearing human figure movement is a significant and challenging goal. Characteristics of a computationally realizable human movement representation are discussed, including distinctions between hierarchic levels, kinematics, and dynamics. The qualitative factors of Effort-Shape notation are used to suggest extensions to existing movement representations in directions consistent with known characteristics of human movement and conventional animation. It is shown how useful and expressive motion qualities may be at least approximated by a combination of kinematic and dynamics computations, with kinetic control modulated by acceleration and decelerations derived from exisitng interpolation methods. Interactions between motions by phrasing, temporal properties, or relationships may be described and executed within an appropriately detailed model. Author

N87-12195# Simon Fraser Univ., Burnaby (British Columbia). Lab. for Computer and Communications Research.
THE INTERACTIVE SPECIFICATION OF HUMAN ANIMATION
G. Ridsdale, S. Hewitt, and T. W. Calvert *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 10 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The Figure Animation Project in progress at Simon Fraser University is described. The project has two goals for the specification of figure animation: the first is to implement an interactive Figure Animation Test Bed for specifying movement at the detail level and the second is to develop a mechanism for describing figure animation at the scene level. These goals and the approaches to solving them are discussed. In particular, the application of knowledge-based inference to the problem of scene description is examined. Author

N87-12196# Toronto Univ. (Ontario). Dept. of Computer Science.
GOAL DIRECTED ANIMATION USING ENGLISH MOTION COMMANDS
Karin Drewery and John Tsotsos *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A prototype 3D animation system which can execute limited types of English motion commands by solving simple goals and directions is presented. This system had a frame-based knowledge base (KB) to describe objects and another to describe motion. A hierarchical planning system uses the motion descriptions as forward production rules to form a plan for a goal task. Directional commands relative to the object or a reference object can also be processed by refering to the directional description in the motion KB and the object's reference frame. The underlying objective is to develop a method to incorporate goals into a graphical animation system so that it will be a task level system, where a behavior is described in terms of events and relationships and frees the user from specifying all details of a motion. Author

N87-12197# California Univ., Santa Cruz. Computer Graphics and Imaging Lab.

VIRYA: A MOTION CONTROL EDITOR FOR KINEMATIC AND DYNAMIC ANIMATION

Jane Wilhelms *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Virya is an interactive graphical motion control editor for kinematic and dynamic animation. Most animation is controlled kinematically, by designating objects' positions taken over time without consideration for the causes of the motion. An alternative is dynamic motion control, where objects are seen as masses moving under the influence of forces and torques. Dynamic motion control has some advantages in that motion more naturally simulates real world conditions and many complex motions can be automatically calculated, though calculating motion is quite expensive and control is sometimes less intuitive. The editor Virya works both for kinematic and dynamic motion control. It has two main tasks: to specify control functions representing positions (kinematic) or forces and torques (dynamic) controlling motin, and to specify control modes which designate how control functions are interpreted or whether joints are frozen in place, relaxed, or balanced. Using these control modes, the user can designate motion using a convenient kinematic method and still use dynamic analysis as a final step to constrain and add realism. Author

N87-12198# Alberta Univ., Edmonton. Dept. of Computing Science.

NEAR-REAL-TIME CONTROL OF HUMAN FIGURE MODELS

W. W. Armstrong, M. Green, and R. Lake *In* Canadian Information Processing Society Graphics Interfacd 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The animation of human figures is one of the major problems in computer animation. A recent approach to this problem is the use of dynamic analysis to compute the movement of a human figure given the forces and torques operating on the body. One of the main problems with this technique is computing the forces and torques required for particular motions. As a solution to this problem an interactive interface to the dynamics routines was produced. This interface, along with a collection of low level motion processes, can be used to control the motion of a human figure model. Both the user interface to the dynamic routines and the motion processes used are described. Author

N87-12199# British Columbia Univ., Vancouver.

MODELING AND ANIMATING THREE-DIMENSINAL ARTICULATE FIGURES

Danny G. Cachola and Gunther F. Schrack *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A method is described for representing and animating three-dimensional articulate figures. It permits the definition of a model consisting of segments and joints, and the specification of the model motion at a high level of abstraction by the use of a structured programming language. Author

N87-12200# Regina Univ. (Saskatchewan). Dept. of Computer Science.

CONSTRAINT-BASED MODELING OF THREE-DIMENSIONAL SHAPES

Przemyslaw Prusinkiewicz and Dale Streibel *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Constraint-based modeling, so far perceived primarily as a graphics technique for man-machine interaction, provides a viable method for the modeling of complex surfaces. The idea of constraint-based modeling of three-dimensional shapes is described and illustrated by examples. Difficulties related to the practical application of this idea are discussed, and methods for overcoming them are outlined. A potential of the constraint-based approach to the modeling of shapes found in nature is indicated. Author

N87-12201# Toronto Univ. (Ontario). Dept. of Computer Science.

THE STOCHASTIC MODELLING OF TREES

Alain Fournier and David A. Grindal *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 9 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A fast method is presented for the modeling of trees which brings together two interesting techniques. The trees are modeled as convex polyhedra for the description of the gross shape, and three-dimensional texture mapping is used for the detailed features. The essential volume of the tree is represented as the convex intersection of half spaces. The advantages of this representation is that it allows an adaptive level of detail in the display. A special algorithm was used for the display of the convex intersection which computes it directly in the frame buffer. The algorithm also allows the computation of intersecting polyhedra. To transform the convex polyhedra into a more realistic representation of trees, a three-dimensional texture mapping was used to modulate the shape and the color of the basic polyhedra. An irregular nonconvex object was then obtained which is consistent in shape and general appearance regardless of the point of view and the size on the screen. Three dimensional fractional Brownian motion is one of the procedural texture used. Author

N87-12202# New York Inst. of Tech., Old Westbury. Computer Graphics Lab.

METHODS FOR STOCHASTIC SPECTRAL SYNTHESIS

J. P. Lewis *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A number of spectral modeling approaches in the engineering and estimation literature are potentailly applicable to stochastic synthesis in computer graphics. Two specific approaches are developed. The orthogonality principle of estimation theory is used to derive a stochastic subdivision construction with specified autocorrelation and spectrum properties; this approach also provides an alternative theoretical basis for the popular fractal subdivision algorithms. A shaped Poisson point process is a second approach which conveniently separates the spectral and graphic modeling problems. Synthetic textures and terrains are presented as a means of visually evalutaing the constructed noises. Author

N87-12203# New York Inst. of Tech., Old Westbury. Computer Graphics Lab.

INTERACTIVE 3-D MODELING WITH PERSONAL COMPUTERS

Robert W. Thornton and Gregory J. Glass *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986

6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An interactive three-dimensional modeling system, called Facet, is presented. Facet was developed for use during the design of physical artifacts; from studies of simple shapes, spaces, and forms to detailed modeling of complex physical systems. Facet provides a visual medium for enhancing perception of the model and for exploring various alternatives during the design process. In order to make this 3-D modeling medium available and affordable to any interested design professional Facet operates on commonly available IBM or compatible personal computers. In addition to an overall description of Facet and its interactive modeling techniques, several underlying issues in the development of a modeling system are discussed. These issues include: the interactive user interface; 3-D display techniques; and ways of dealing effectively with model complexity. A number of areas for continued development, based on experience with the current implementation, are discussed.
Author

N87-12204# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
LEARNING GRAPHICS PROGRAMMING BY DIRECT COMMUNICATION
Martin Tuori and Tim Pointing *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The process of learning the graphics functions of a computer graphics workstation environment is both assisted and hampered by the presence of an intermediary programming language. Assistance comes in the form of programming language functions for preprocessing, storage declaration, expression evaluation, control flow, and system libraries. Working against the student, compilation of programmed examples is slow, and errors may arise both from the syntax and semantics of the graphics functions, and from those of the programming language. An approach is proposed to learning the graphics functions that temporarily separates the graphics component from other aspects of the overall programming environment; in a sense, training wheels are proposed for the graphics subsystem. The approach was used in creating, for the IRIS series of workstations, a graphics interpreter that allows a student to test out graphics concepts, without the need to write programs. Subroutine calls typed to the interpreter were performed immediately, allowing a quick, trial-and-error approach. It is argued that this approach is a useful addition to conventional learning techniques, and that its success can be attributed to bringing the student programmer into more direct communication with the graphical components of the programming environment.
Author

N87-12205# Waterloo Univ. (Ontario). Computer Graphics Lab.
HARDWARE ASSISTANCE FOR Z-BUFFER VISIBLE SURFACE ALGORITHMS
Kellogg S. Booth, David R. Forsey, and Alan W. Paeth *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 8 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The well-known z-buffer algorithm for solving the visible surface problem has a number of points in its favor, the main one being that it is amenable to very efficient hardware implementation at little additional cost in many existing frame buffer systems. The traditional software implementation of the algorithm assumes explicit initialization of both the image buffer and the z-buffer before each image is generated. A single technique is described for synchronizing initialization and image generation so the two can be performed in parallel, allowing complete overlap to be achieved and effectively eliminating the time needed for explicit initialization of the frame buffer. The technique assumes a modest investment in additional hardware within the frame buffer.
Author

N87-12206# New York Inst. of Tech., Old Westbury. Three Dimensional Animation Systems Group.
ELIMINATING THE DICHOTOMY BETWEEN SCRIPTING AND INTERACTION
John F. Schlag *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Throughout the computer graphics literature, but in modeling and animation lore in particular, the prevalent attitude seems to be that scripting and interaction are irreconcilably different types of user interface. The belief that this dichotomy is a myth is propounded and examples of system which encourage this belief are given. Two of the systems described are a keyframe animation program and a geometric modeling program developed at the NYIT Computer Graphics Laboratory. Both of these systems are used on a daily basis for production, development, and research.
Author

N87-12207# New York Inst. of Tech., Old Westbury. Computer Graphics Lab.
SURVEY OF TEXTURE MAPPING
Paul S. Heckbert *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Texture mapping is one of the most successful techniques in high quality image synthesis. Its use can enhance the visual richness of raster scan images immensely while entailing only a relatively small increase in computation. The technique was applied to a number of surface attributes: surface color, surface normal, specularity, transparency, illumination, and surface displacement, to name a few. Although the list is potentially endless, the techniques of texture mapping are essentially the same in all cases. The fundamentals of texture mapping which can be split into two topics, will be surveyed: the geometric mapping which warps a texture onto a surface, and the filtering which is necessary in order to avoid aliasing. An extensive bibliography is included.
Author

N87-12208# Montreal Univ. (Quebec). MIRALab.
KEYFRAME-BASED SUBACTORS
L. Forest, D. Rambaud, N. Magnenat-Thalmann, and D. Thalmann *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 4 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The concept of keyframe-based subactor attempts to span two major types of animation: parametric keyframe animation and algorithmic animation. In a keyframe-based subactor, all parameter values are defined by interpolation, however, if there is a law defined for one parameter, this law is applied and values computed by interpolation are ignored. The application of keyframe-based subactors to human motion is also discussed.
Author

N87-12209# Otago Univ., Dunedin (New Zealand). Dept. of Computer Science.
THE REPRESENTATION OF WATER
Geoff Wyvill, Andrew Pearce (Calgary Univ. (Alberta).), and Brian Wyvill *In* Canadian Information Processing Society Graphics Interfaced 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Water is the commonest of everyday substances and its many forms have provided subjects for artists for as long as art has existed. But in computer graphics, there seem to be few attempts to make pictures of water. The reason for this is simple. Realistic pictures of water are very hard to produce. Some of

these reasons are examined for this difficulty and some the experimental results reported. Author

N87-12210# Massachusetts Univ., Worcester. Biomedical Imaging Group.

INTERFACING IMAGE PROCESSING AND COMPUTER GRAPHICS SYSTEMS USING AN ARTIFICIAL VISUAL SYSTEM

James M. Coggins, Kevin E. Fogarty, and Fredric S. Fay *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p Prepared in cooperation with Worcester Polytechnic Inst., Mass. (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An Artificial Visual System (AVS) was developed to simplify three-dimensional microscope images for presentation and manipulation in an interactive computer graphics system. The AVS consists of several sets of spatial filters that decompose an image along three different measurement continua. A recombinatin algorithm processes the filter outputs to detect objects, to eliminate noise, and to map the detected objects into points in a multidimensional feature space. Recent discoveries regarding the geometry of the points in the feature space are described. One recent result simplifies the AVS by decreasing the number of filters required to obtain the same measurements. Not only are accurate measurements possible, but certain image distortions can be modeled and counteracted in the feature space. Author

N87-12211# Alberta Univ., Edmonton. Dept. of Computing Science.

CONNECTED COMPONENT LABELING USING MODIFIED LINEAR QUADTREES

Xiaoning Wang and Wayne A. Davis *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 8 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Using the modified linear quadtree proposed , an O(n x N) algorithm for labeling connected components of a region consisting of N BLACK node in a 2 (sub n) by 2 (sub n) binary image is presented. As a direct application of the algorithm, a method for computing the perimeter of a region is also described. Author

N87-12212# California Univ., Berkeley. Computer Graphics Lab.

ASTERISK: AN EXTENSIBLE TESTBED FOR SPLINE DEVELOPMENT

Jonathan R. Gross, Tony D. DeRose, and Brian A. Barsky *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

(Contract N00039-82-C—0235; Grant NSF ECS-82-04381)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Asterisk is a testbed system designed to support the development of new kinds of splines. The key concept is the integration of symbolic computation facilities with tools for interactively modifying and comparing different splines. By modeling a spline as a list of attributes, Asterisk can be used to create and manipulate almost any spline, without making assumptions about the future directions of spline research. Author

N87-12213# Regina Univ. (Saskatchewan). Dept. of Computer Science.

GRAPHICAL APPLICATIONS OF L-SYSTEMS

Przemyslaw Prusinkiewicz *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A method for generating pictures is presented and illustrated with examples. The idea is to generate a string of symbols using an L-system, and to interpret this string as a sequence of commands which control a turtle. Suitable generalizations of the notions of the L-system and of a turtle are introduced. The resulting mathematical model can be used to create a variety of (finite appoximations of) fractal curves, ranging from Koch curves, to classic space-filling curves, to relatively realistic-looking pictures of plants and trees. All these pictures are defined in a uniform and compact way. Author

N87-12214# New York Inst. of Tech., Old Westbury.

FRACTALS, COMPUTERS AND DNA

Peter Oppenheimer *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A fractal computer model of branching objects is presented. This program generates pictures of simple orderly plants, complex gnarled trees, leaves, vein systems, as well as inorganic structures such as river deltas, and snowflakes. More than just a visual simulation, this program models the growth process by mimicking the logic of an organism's genetics. By manipulating the genetic parameters, one can modify the geometry of the object in real time, using tree based graphics hardware. The random effects of the enviromnent are taken into account, to produce greater diversity and realism. The program provides a study in the structure of branching objects that is both scientific and artistic. The results suggest that organism and computers deal with complexity in similar ways, and that the fractal nature of an organism has evolved as a critical means for the survival of the species. Author

N87-12215# McGill Univ., Montreal (Quebec). Computer Vision and Robotics Lab.

A KNOWLEDGE-BASED APPROACH TO COMPUTER VISION SYSTEMS

Martin D. Levine and Wade Hong *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In designing and constructing computer vision systems, many crucial issues need to be addressed. Foremost of these are the control and organization of the visual information processing tasks involved, and the representation and usage of both knowledge and data. As computer vision systems have evolved, growing in complexity and size, these issues have become increasingly important to their overall success. A recent and increasingly popular approach to image understanding, the knowledge-based system, is presented as a framework in which to deal with these issues. The engineering of a computer vision system as a knowledge-based system and these issues, in the context of the evolving system is discussed. Author

N87-12216# Canada Centre for Remote Sensing, Ottawa (Ontario).

INTEGRATION OF REMOTELY SENSED DATA AND GEOGRAPHIC INFORMATION SYSTEMS Abstract Only

David G. Goodenough *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 1 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Canada is heavily dependent upon the effective utilization of its resources. To better manage the resources, resource managers are increasingly turning to computer-based technologies. Two particularly important technologies for resource information management systems are remote sensing and geographic information systems (GIS). Operational resource managers are using the geographic information systems to store digital representations of their resource maps. Associated with these graphical digital maps are databases containing the attributes of map features. The efforts in integrating remote sensing data and GIS are reviewed and the approach at the Canada Centre for Remote Sensing is presented.

A brief discussion of the problem of exchanging data among geographic information systems will also be addressed. Author

N87-12217# IBM France S. A., Paris. Scientific Center.
IMAGE SEGMENTATION BASED ON COLOR AND TEXTURE GRADIENT
Phu Thien Nguyen *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An image segmentation scheme based on a model of human perception of color and texture is proposed. It consists of the following steps: spatial segmentation of each Red-Green-Blue (RGB) image using an edge detector, contour following and closing algorithms; characterization of each intersection by color (statistical parameters of the RGB values of pixels within the intersection), shape (perimeter, area, compactness), orientation, and topology (neighbor, inclusion); merging of the elementary segments based on the selection of their attributes; and segmentation by texture gradient based on the window correlation technique to identify coherent texture regions. Author

N87-12218# Canada Centre for Remote Sensing, Ottawa (Ontario).
MAP/IMAGE CONGRUENCY E'.ALUATION KNOWLEDGE BASED SYSTEM
Gordon W. Plunkett, David G. Goodenough, and Morris Goldberg (Ottawa Univ. (Ontario).) *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A Knowledge Based System (KBS) for analyzing LANDSAT Multispectral Band Scanner (MSS) images and comparing this analysis to corresponding geocartogrphic data is presented. The preprocessing requirements for the LANDSAT and the geocartographic data are discussed for a uniform representation of the data. The segmentation of the LANDSAT data and the interpretation of the segments are presented. The preprocessed data are read into the Map/Image Congruency Evaluation (MICE) KBS where the image elements are classified and then compared with the map data, based on class, segment size, shape, and location. Results of the map/image congruency analysis are output and converted to image form. The MICE KBS is presented and the results generated for the LANDSAT MSS scene of the Prince George area of British Columbia are reviewed. Author

N87-12219# MacDonald, Dettwiler and Associates Ltd., Richmond (British Columbia).
A CONTEXT BASED TECHNIQUE FOR SMOOTHING OF DIGITAL THEMATIC MAPS
Ben Yee, Dean Turpin, Evert Kenk (Ministry of Environment, Victoria (British Columbia).), and Mark Sondheim *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A context based technique for smoothing digital thematic maps produced by multispectral classification of LANDSAT Thematic Mapper data is described. The output of this technique is a maplike product which can be directly used as input to a geographic information system. Author

N87-12220# Centre National d'Etudes Spatiales, Toulouse (France). Div. Traitement de l'Image.
PRINCIPLE OF VISUAL COLOR CODING APPLIED TO SATELLITE IMAGERY [PRINCIPE DE CODAGE VISUEL DE LA COULEUR APPLIQUE A DES IMAGES SATELLITAIRES]
M.-J. Lefevre-Fonollosa and H. Cruchant *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 3 p In FRENCH; ENGLISH summary (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In remote sensing, color is used essentially as a means of enhancing the results of image processing. In recent months, the use of color as a means of processing the spatial information content of image data was investigated. The characteristics of the human visual system were used in an approach to the processing of remote sensing imagery. Specifically, three channels of a spatial radiometer was used to simulate the sensor function of the human eye while the computer processing was used to simulate the function performed by the second segment of the system. When an image is subjected to this type of simulation-processing, the result is three new-images termed the color-coded image, the lighting-coded image, and the color-quantity-coded image. Comments on this approach and its prospects with suitable reference to examples based on the Thematic Mapper and (simulated) SPOT data are included. Author

N87-12221# Alberta Univ., Edmonton. Dept. of Computing Science.
A FILE ORGANIZATION SCHEME FOR POLYGON DATA
Chung Hee Hwang and Wayne A. Davis *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A file organization scheme for representing polygon data by a quadtree is presented. The proposed scheme is an adaptive cell method that is based on extendible hashing and interpolation-based index maintenance. It aims, on the average, to locate the record associated with a given key with one disk access (or at most two), maintaining a high storage utilization ratio. It also aims to process range search and set operations efficiently. The dynamic file organization capabilities of the scheme and the algorithm for range search are described. Author

N87-12222# Machine Vision International Ltd., Ottawa (Ontario).
MATHEMATICAL MORPHOLOGY APPLIED TO RANGE IMAGE PROCESSING
Colin C. Archibald and Stanley R. Sternberg (Machine Vision International Ltd., Ann Arbor, Mich.) *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Methods of low level image processing were predominately derived by generalizing one dimensional signal processing methods to 2 dimensions. Although much progress was made using Fourier domain analysis, it is still unintuitive and inflexible for many types of applications. Mathematical morphology is reviewed as a basis for low level image processing, and demonstrates that image domain transformations can be applied usefully to various types of images. Specifically, range images are processed using grey scale morphology to extract various features used in three dimensional analysis of a scene. This type of scene analysis has broad potential for applications in quality control and automated manufacturing. Author

N87-12223# Simon Fraser Univ., Burnaby (British Columbia). School of Computing Science.
INCREMENTAL CONSTRUCTION OF 3-D MODELS FROM A SEQUENCE OF FRAMED VIEWS: MATCHING PARTIAL OBJECTS
Shun-en Xie and Thomas W. Calvert *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 7 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In the future intelligent mobile robots will be called upon to play many important roles. In many realistic situations, the knowledge of the structure and placement of objects in an environment should be learned rather than built in. Thus the mobile robot must often construct 3-dimensional models for the objects

by analyzing sensed multiple views. An approach which describes the incremental construction of 3-D body model in a practical office or warehouse environment by matching planned multiple views is presented. This approach combines such intelligent robot functions as attention, planning, sensing, learning, and knowledge rectification. A prototype system for matching and constructing 3-D body models was implemented and tested with synthesized images using C-PROLOG under Berkeley UNIX on a VAX 11/750.

Author

N87-12224# Hawaii Univ., Manoa. Dept. of Electrical Engineering.

IMAGE TECHNIQUES FOR THE IDENTIFICATION OF DEPRESSIONS AND OTHER OBSTACLES IN AUTOMATED GUIDANCE OF ROVING ROBOTS

Malek Adjouadi *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The problem of detection of depressions or drop-offs in the automated guidance of roving robots is analyzed. The proposed approach is based on the principle that if one is too near a depression, one is bound to see new information which initially was occluded. To exploit this principle, two steps are undertaken. The first step involves the derivation of the correspondence process to allow the vision system to relate a location of interest in a sequence of frames. The second step involves the development of methods to detect and identify, in this location of interest, the occluded information.

Author

N87-12225# Pittsburgh Univ., Pa. Dept. of Electrical Engineering.

A COMPUTATIONAL THEORY OF 3D SHAPE RECONSTRUCTION FROM IMAGE CONTOURS

Ping Liang and John S. Todhunter *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The computational theory of 3-D shape reconstruction from image contours proposed is based on the variational principles and has the theoretical framework suggested recently by Poggio. By this theory, 3-D shapes can be reconstructed from image contours by general physical constraint assumptions, namely the assumptions of minimum potential energy, isotropism, and homogeneity of the material, and properly defined energy functionals. It is assumed that contours were classified as surface discontinuity boundary contours, surface contours, and extremal boundaries. Minimization of the energy functionals tends to maximize the symmetry and orthogonalize the surface junctions of the reconstructed object. Some early findings are obtained as the natural results of the theory. Theoretical developments and experimental results are successful and promising.

Author

N87-12226# State Univ. of New York, Buffalo. Dept. of Computer Science.

SELECTION AND USE OF IMAGE FEATURES FOR SEGMENTATION OF BOUNDARY IMAGES

Deborah Walters *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An algorithm is developed to segment arbitrary boundary images into sets of boundaries which represent a single object, and to group together lines which correspond to a single object or object part. The algorithm is based on features which were found to be used by humans in the early stages of visual processing, and which have a high correlation with preceptually significant aspects of images. In addition, the data structure used is based on the image representation used in the primate visual cortex. By using perceptually valid features, the algorithm is able to enhance the perceptually significant edges in an image using simple, local, parallel computations. It demonstrates that selective processing, without domain specific knowledge, iterative processing, or top-down control of some mechanism shifts attention.

Author

N87-12227# Waterloo Univ. (Ontario). Dept. of Systems Design Engineering.

CORTICAL REPRESENTATION OF TEXTURE PRIMITIVES

A. E. J. Walford and M. E. Jernigan *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The apparent spatial frequency and orientation organization of the primary visual cortex is used as a basis for texture descriptions. A Frequency, Orientation, neural firing Rate, and spatial Phase (FORP) representation is proposed for the analysis of natural textures and the synthesis of test textures. Higher order tecture analysis such as discrimination and segmentation in this FORP space is discussed.

Author

N87-12228# Oxford Univ. (England). Dept. of Experimental Psychology.

SPEEDED PHASE DISCRIMINATION: EVIDENCE FOR GLOBAL TO LOCAL PROCESSING

J. M. Barr *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In recent years much attention was given to the advantages of multiple resolution preprocessing methods in computer vision. There is strong evidence that the parallel extraction of luminance changes over different spatial scales also occurs in human visual perception. The first experiment confirms the strong evidence that reponses to low resolution signals can be elicited as much as 100 msec faster than to high spatial frequency stimuli of the same contrast. A further experiment measured the reaction time to discriminate the relative phase of the higher frequency component of a luminance grating comprising a fundamental and its second harmonic. It was found that the decision can be made more rapidly when the fundamental is low than high. On the assumption that the gross structure of spatial forms is conveyed by low spatial frequencies, this supports the idea that the substrate for the subjective impression that rough describers of visual forms precede detailed preception. It is the progressive increase in response time with frequency, of the visual mechanisms implementing spatial filtering.

Author

N87-12229# York Univ. (Ontario). Dept. of Psychology.

CORRESPONDENCE IN APPARENT MOTION: DEFINING THE HEURISTICS

Marc Green *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)

Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Correspondence matching in apparent motion is based on two heuristics: match images if they have a similar form and are in close proximity. Psychophysical experiments are used to define these heuristics. Observers judged motion path between images in a competition paradigm. Results showed that the tokens used in form matching are spatial frequency and orientation. Further, proximity is defined in a 3-D spatial reconstruction rather than 2-D retinal coordinates. A possible representation for the computation of correspondence is a multidimensional detector space, with dimensions including spatial frequency, orientation, X, Y, Z (or disparity) coordinates.

Author

N87-12230# Alberta Univ., Edmonton. Dept. of Psychology.

THREE PROCESSING CHARACTERISTICS OF TEXTURE DISCRIMINATION

Terry M. Caelli *In* Canadian Information Processing Society

Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The idea that texture segmentation comes about by the differential outputs of detectors (nonlinear associative filters) computed at each resolvable position on the textured surface is examined. Further, some of the conditions under which primary detector outputs are dynamically compared and associated to develop into a smaller set of texton profiles which capture the predominant differentiating features of the texture regions are considered. Comparison to human psychophysical results are made. Author

N87-12231# Institut National de Recherche d'Informatique et d'Automatique, Rennes (France).
DETERMINING DISPLACEMENT FIELDS ALONG CONTOURS FROM IMAGE SEQUENCES
Patrick Bouthemy *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A framework was proposed for image flow analysis consisting of three major stages: determination of moving edges by some local process; integration of motion information along linked contours; and propagation of motion estimation through homogeneous regions obtained inside these contours. The first two stages will be examined. A procedure, based on some local modeling and maximum likelihood scheme, was designed to perform the first step. After some linking process, constraints provided by the measurements gained from the first stage can be combined to compute the velocity field along contours, by minimizing some simple functional. To this end, a gradient algorithm is used with a recursive estimation from one point to its successor in the chain. Author

N87-12232# Alberta Univ., Edmonton. Dept. of Psychology.
EDGE-ONLY MATCHING TECHNIQUES IN ROBOT VISION
Shyamala Nagendran and Terry M. Caelli *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A computation procedure for detecting arbitrary two-dimensional signal embedded in scenes and independent of orientation/size is developed using pipeline pixel processor procedures. Signals are encoded as edge-only features and cross-correlated with edge-only versions of the input scenes (both in cartesian and log-polar coordinates). These processes are incorporated into a robot visual system capable of locating, moving towards, and pointing to a target signal, again, independent of its size and orientation. Author

N87-12233# British Aerospace Public Ltd. Co., Bristol (England). Naval Weapons Div.
A METHOD OF LEARNING RULES FROM UNCERTAIN DATA APPLIED TO THE COMPUTER VISION PROBLEM
D. Hutber and P. Sims *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The construction of knowledge-based systems of a size large enough to be useful has led to problems of knowledge acquisition. A way of solving this is to enable the computer to automatically generate its own knowledge form sets of sample data. This becomes further complicated when the sample data may have errors or noise in it. A system is described that generates knowledge in the form of rules from uncertain data, in the domain of computer vision. The way in which the uncertainty arises and is processed is discussed, and some sample results are presented. Author

N87-12234# Tennessee Univ., Knoxville. Dept. of Electrical Engineering.
SEQUENTIAL ESTIMATION OF BOUNDARIES IN TEXTURE IMAGES
Dragana Brzakovic and Antonios Liakopoulos (System Dynamics, Inc., Gainesville, Fla.) *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 4 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A method is described for estimating boundaries between perceptually distinct regions in an image. The method is a two step procedure which first identifies image regions which exhibit uniformity. Boundaries between uniform regions are approximated by a complete cubic spline function and the linear recursive filter is used to estimate the values of the function at the knots. Boundaries are assumed to be smooth; however, abrupt changes in boundary location may infrequently occur. In these exceptional cases flexibility of boundary approximation is achieved by adding additional knots at the positions where abrupt changes occur. Author

N87-12235# Simon Fraser Univ., Burnaby (British Columbia). School of Computing Science.
DETECTION OF SPECULARITIES IN COLOUR IMAGES USING LOCAL OPERATORS
Paul N. E. Pellicano *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 6th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

Areas of spectral reflectance, or highlights, can be analyzed for a wide range of information or clues that they give about a scene. A local algorithm for analyzing a moderately unconstrained color image to determine the areas of spectral reflectance is presented. The location of specular reflectances are marked by finding zero-crossings in concave down regions for two-dimensional arrays of intensities representing the color image. These zero-crossings correspond to the centers of the highlight regions. The highlight centers are then expanded to highlight regions by region growing in a direction orthogonal to the local orientation of the hightlight. Thus, at the conclusion of the algorithm, the information known about each highlight includes location, size, and direction. Author

N87-12236# Ecole Polytechnique, Montreal (Quebec). Dept. de Genie Electrique.
COUPLING VISUAL AND DYNAMIC FEATURES TO STUDY HANDWRITTEN SIGNATURES
Jean-Jules Brault and Rejean Plamondon *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 2 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A software tool is proposed for interactive study of spatio-temporal characteristics related to handwritten signatures. The tool fills the gap between visual and dynamic aspects of signatures with specific graphic editing commands that can be used to manipulate on the screen the various representations of features related to a given signature. Also, useful data processing commands allow modification of the content of these representations. Author

N87-12237# McGill Univ., Montreal (Quebec). Dept. of Electrical Engineering.
DETECTING GLASS FIBERS USING COMPUTER VISION
Alfred S. Malowany, Martin D. Levine, Mussa R. Kamal, Ronald Kurz, and Abdol-Reza Mansouri *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

An application of computer vision in the field of chemical

engineering, the processing of images of glass fibers is presented. Fibers are used as reinforcement for several polymer products to enhance their mechanical and thermal performance. In order to evaluate the properties of the polymer products, however, a quantitative measure of fiber length and orientation is required. The algorithm presented here locates the fibers present in a given image and thus enables their quantification in length and orientation. This algorithm operates in two steps. In the first step, feature points in the image are extracted in order to enable the generation of hypotheses as to the possible presence of fibers. In the second, the generated hypotheses are verified and the hypotheses that yield the highest confidence are retained. Author

N87-12238# Washington Univ., Seattle. Dept. of Computer Science.
RECONSTRUCTION AND DISPLAY OF THE RETINA
Kenneth R. Sloan, Jr., David Meyers, and Christine A. Curcio *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

The retina is an approximately spherical structure. In order to gather information such as the density of rods and cones it is necessary to flatten the retina. It is desirable to project these measurements back onto the original spherical form of the retina. The techniques which were developed to perform these tasks are summarized. Author

N87-12239# Communications Research Centre, Ottawa (Ontario).
OPTICAL CHARACTER RECOGNITION OF TOUCHING CHARACTERS
S. Shlien and K. Kubota *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 6 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

A method for isolating and recognizing characters in typeset text containing, touching, or overlapping characters is described. The method relies on vector quantization techniques to represent the text by an ordered sequence of codes. Characters or character fragments are extracted form this code using a form of string matching and network searches. Compatibility relationships are applied to these fragments to obtain a list of possible input strings. Simulations on the Symbolics 3640 workstation do not indicate that this method would replace conventional template matching schemes. Author

N87-12240# Bell Telephone Labs., Inc., Murray Hill, N. J.
CONTOUR LINE REGION SEGMENTATION Abstract Only
Lawrence OGorman and Gerald I. Weil *In* Canadian Information Processing Society Graphics Interface 1986: Proceedings 1986 5 p (For primary document see N87-12175 03-61)
Avail: Canadian Information Processing Society, 243 College Street, 5th Floor, Toronto, Ontario $30.00 Canada, $35.00 USA

In images such as of contour maps, fingerprints, and electric fields, regions of contour lines can be distinguished, and these regions are often used for image understanding. In this work, such images are collectively termed contour line images. The objectives are to determine the properties by which contour line regions are characterized, and to develop an approach using these properties to automatically determine regions. An algorithm is proposed to group lines into regions. This is based in part on the parallel-adjacency criterion which is defined here. The algorithm was applied to several contour line images, and the resultant regions are shown. Author

N87-12241*# Virginia Univ., Charlottesville. Dept. of Computer Science.
DETECTION OF FAULTS AND SOFTWARE RELIABILITY ANALYSIS Annual Progress Report
J. C. Knight Aug. 1986 34 p
(Grant NAG1-605)
(NASA-CR-179835; NAS 1.26:179835; UVA/528243/CS87/101)
Avail: NTIS HC A03/MF A01 CSCL 09B

Multiversion or N-version programming was proposed as a method of providing fault tolerance in software. The approach requires the separate, independent preparation of multiple versions of a piece of software for some application. Specific topics addressed are: failure probabilities in N-version systems, consistent comparison in N-version systems, descriptions of the faults found in the Knight and Leveson experiment, analytic models of comparison testing, characteristics of the input regions that trigger faults, fault tolerance through data diversity, and the relationship between failures caused by automatically seeded faults. B.G.

N87-12242*# Virginia Univ., Charlottesville. Dept. of Computer Science.
A SECOND GENERATION EXPERIMENT IN FAULT-TOLERANT SOFTWARE Semiannual Progress Report, 1 Sep. 1984 - 31 Dec. 1986
J. C. Knight Aug. 1986 28 p
(Grant NAG1-5113)
(NASA-CR-179848; NAS 1.26:179848; UVA/528235/CS87/103)
Avail: NTIS HC A03/MF A01 CSCL 09B

Information was collected on the efficacy of fault-tolerant software by conducting two large-scale controlled experiments. In the first, an empirical study of multi-version software (MVS) was conducted. The second experiment is an empirical evaluation of self testing as a method of error detection (STED). The purpose of the MVS experiment was to obtain empirical measurement of the performance of multi-version systems. Twenty versions of a program were prepared at four different sites under reasonably realistic development conditions from the same specifications. The purpose of the STED experiment was to obtain empirical measurements of the performance of assertions in error detection. Eight versions of a program were modified to include assertions at two different sites under controlled conditions. The overall structure of the testing environment for the MVS experiment and its status are described. Work to date in the STED experiment is also presented. B.G.

N87-12243*# Virginia Univ., Charlottesville. Dept. of Computer Science.
THE IMPLEMENTATION AND USE OF ADA ON DISTRIBUTED SYSTEMS WITH HIGH RELIABILITY REQUIREMENTS Semiannual Progress Report
J. C. Knight, S. T. Gregory, and J. I. A. Urquhart Aug. 1985 36 p
(Grant NAG1-260)
(NASA-CR-179806; NAS 1.26:179806; UVA/528213/CS86/107)
Avail: NTIS HC A03/MF A01 CSCL 09B

The use and implementation of Ada in distributed environments in which reliability is the primary concern were investigated. In particular, the concept that a distributed system may be programmed entirely in Ada so that the individual tasks of the system are unconcerned with which processors they are executing on, and that failures may occur in the software or underlying hardware was examined. Progress is discussed for the following areas: continued development and testing of the fault-tolerant Ada testbed; development of suggested changes to Ada so that it might more easily cope with the failure of interest; and design of new approaches to fault-tolerant software in real-time systems, and integration of these ideas into Ada. B.G.

N87-12244*# Computer Sciences Corp., Hampton, Va.
SMP: A SOLID MODELING PROGRAM VERSION 2.0
Donald P. Randall, Kennie H. Jones, William H. vonOfenheim, Raymond L. Gates, and Christine G. Matthews Sep. 1986 218 p
(Contract NAS1-17999)
(NASA-CR-178183; NAS 1.26:178183) Avail: NTIS HC A10/MF A01 CSCL 09B

The Solid Modeling Program (SMP) provides the capability to model complex solid objects through the composition of primitive geometric entities. In addition to the construction of solid models, SMP has extensive facilities for model editing, display, and analysis.

The geometric model produced by the software system can be output in a format compatible with existing analysis programs such as PATRAN-G. The present version of the SMP software supports six primitives: boxes, cones, spheres, paraboloids, tori, and trusses. The details for creating each of the major primitive types is presented. The analysis capabilities of SMP, including interfaces to existing analysis programs, are discussed. B.G.

N87-12245*# Martin Marietta Aerospace, Denver, Colo.
COMPUTER SIMULATION OF ON-ORBIT MANNED MANEUVERING UNIT OPERATIONS
Gary M. Stuart and Kathy D. Garcia 1986 7 p
(Contract NAS9-17354)
(NASA-CR-179904; NAS 1.26:179904) Avail: NTIS HC A02/MF A01 CSCL 09B

Simulation of spacecraft on-orbit operations is discussed in reference to Martin Marietta's Space Operations Simulation laboratory's use of computer software models to drive a six-degree-of-freedom moving base carriage and two target gimbal systems. In particular, key simulation issues and related computer software models associated with providing real-time, man-in-the-loop simulations of the Manned Maneuvering Unit (MMU) are addressed with special attention given to how effectively these models and motion systems simulate the MMU's actual on-orbit operations. The weightless effects of the space environment require the development of entirely new devices for locomotion. Since the access to space is very limited, it is necessary to design, build, and test these new devices within the physical constraints of earth using simulators. The simulation method that is discussed here is the technique of using computer software models to drive a Moving Base Carriage (MBC) that is capable of providing simultaneous six-degree-of-freedom motions. This method, utilized at Martin Marietta's Space Operations Simulation (SOS) laboratory, provides the ability to simulate the operation of manned spacecraft, provides the pilot with proper three-dimensional visual cues, and allows training of on-orbit operations. The purpose here is to discuss significant MMU simulation issues, the related models that were developed in response to these issues and how effectively these models simulate the MMU's actual on-orbiter operations. Author

N87-12246*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PS: A NONPROCEDURAL LANGUAGE WITH DATA TYPES AND MODULES Final Report
Maya B. Gokhale (Delaware Univ., Newark.) Oct. 1986 20 p Presented at the International Conference on Software Engineering
(Contract NAS1-18107; Grant UDRF-LTR860114)
(NASA-CR-178198; ICASE-86-67; NAS 1.26:178198) Avail: NTIS HC A02/MF A01 CSCL 09B

The Problem Specification (PS) nonprocedural language is a very high level language for algorithm specification. PS is suitable for nonprogrammers, who can specify a problem using mathematically-oriented equations; for expert programmers, who can prototype different versions of a software system for evaluation; and for those who wish to use specifications for portions (if not all) of a program. PS has data types and modules similar to Modula-2. The compiler generates C code. PS is first shown by example, and then efficiency issues in scheduling and code generation are discussed. Author

N87-12247*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PARALLEL SCHEDULING OF RECURSIVELY DEFINED ARRAYS Final Report
Thomas J. Myers and Maya B. Gokhale (Delaware Univ., Newark.) Oct. 1986 26 p Submitted for publication
(Contract NAS1-18107; Grant UDRF-LTR860114)
(NASA-CR-178195; ICASE-86-66; NAS 1.26:178195) Avail: NTIS HC A03/MF A01 CSCL 09B

A new method of automatic generation of concurrent programs which constructs arrays defined by sets of recursive equations is described. It is assumed that the time of computation of an array element is a linear combination of its indices, and integer programming is used to seek a succession of hyperplanes along which array elements can be computed concurrently. The method can be used to schedule equations involving variable length dependency vectors and mutually recursive arrays. Portions of the work reported here have been implemented in the PS automatic program generation system. Author

N87-12248# Defence Science and Technology Organization, Salisbury (Australia). Electronics Research Lab.
MANAGING SOFTWARE COMPLEXITY
P. F. Calder Jul. 1986 49 p
(ERL-0372-RE; AR-004-637) Avail: NTIS HC A03/MF A01

This report examines the methodologies and tools available to the manager and programmer for assisting in the development of large software projects. Author

N87-12249# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
INSTRUMENTATION TOOLS FOR PROGRAM TESTING M.S. Thesis [FERRAMENTAS DE INSTRUMENTACAO PARA TESTES DE PROGRAMAS]
Luiz Fernando Capretz Sep. 1986 109 p In PORTUGUESE; ENGLISH summary
(INPE-3983-TDL/235) Avail: NTIS HC A06/MF A01

Reliable program production is important, a premise taken into account in this work. Several methods, techniques and tools for program testing are studied, and problems and limitations found during the testing process are presented. Finally, a tool for program testing is proposed, which assembles additional information about the programs. This tool analyses commands and assertions put into the source code of the program as comments (probes) and constructs another program (instrumented program), in which, at the time of execution performs display, verification and analysis based on the inserted instrumentation. Author

N87-12250# Naval Postgraduate School, Monterey, Calif.
RECOGNITION OF TWO-DIMENSIONAL SHAPES M.S. Thesis
Gim P. Quek Mar. 1986 103 p
(AD-A168403) Avail: NTIS HC A06/MF A01 CSCL 09/4

A new scheme for coding the boundary of two-dimensional shapes is proposed in this thesis. Random points on the boundary are paired for this coding. Using this scheme, an effective and efficient correlation technique to match two-dimensional shapes is developed. This technique has a number of very desirable characteristics. It is able to match shapes of arbitrary scale and orientation. The given shape may have closed or open boundary or even have a portion of it obstructed from view. Matching can be performed at varying degrees of detail, giving this technique an added robustness against geometric distortions. It also has the capability to discriminate between different shapes. Computation time on the IBM 3033 computer is typically 10 CPU seconds to generate one correlation curve between two shapes, each with a 500-point boundary curve. Author (GRA)

N87-12251# Army Close Combat Armaments Center, Watervliet, N.Y.
A THIN CYLINDER PROBLEM Final Report
G. P. OHara Apr. 1986 21 p
(AD-A168665; ARCCB-MR-86013) Avail: NTIS HC A02/MF A01 CSCL 09/2

A test problem was required for the evaluation of the computer aided design (CAD) system, which is currently being purchased by Benet Weapons Laboratory. We needed a relatively simple finite element stress anlaysis problem which could easily be done on a CAD system, by the potential contractor, to demonstrate a particular system. The geometry selected was a simple thin cylinder of mean radius 1.0 subjected to an axial tension load. The load is distributed at the ends of the cylinder to produced a uniform unit (1.0) nominal stress. The cylinder is 3 PI (9.4278) long and contains a single perforation at mid-length, in the form of a circular hole of radius 0.15. The problem is to find the stress concentration factor (S.C.F.) for the hole when the thickness of the cylinder is

0.0143525. The most desirable solution is for a shell formulation with membrane and vending stiffness terms. Along with the S.C.F., it is also desirable to generate the following graphic output: (1) A deformed structure plot; (2) A maximum principal stress contour plot on the inside surface; and (3) A maximum principal stress contour plot on the outside surface. If necessary, the problem may be reduced to a membrane problem with only one contour plot. GRA

N87-12252# Universal Technology Corp., Dayton, Ohio.
A RESEARCH PLANNING ASSESSMENT FOR APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN MANUFACTURING Interim Report, 1 Feb. - 31 Aug. 1985
William M. Henghold and Thomas Triscari Jan. 1986 212 p
(Contract F33615-83-C-5077)
(AD-A168692; AFWAL-TR-86-4018) Avail: NTIS HC A10/MF A01 CSCL 13/8

The Air Force Wright Aeronautical Laboratories Materials Laboratory is charged with developing a research program for applications of Artificial Intelligence as it relates to manufacturing. As a part of program development, advisory input was sought from experts from industry, academia, and government. A structured methodology was employed which featured a top-down approach leading from concept level articulation, through application area goals and objectives, to project level detail. This report documents the effort in terms of providing methodological background, application area goals and objectives, and results obtained from project generation and assessment. Author (GRA)

N87-12253# Stanford Univ., Calif. Systems Optimization Lab.
A NOTE ON NONLINEAR APPROACHES TO LINEAR PROGRAMMING
Philip E. Gill, Walter Murray, Michael A. Saunders, and Margaret H. Wright Apr. 1986 17 p
(Contracts N00014-85-K-0343; DE-AA03-76SF00326)
(AD-A168698; SOL-86-7) Avail: NTIS HC A02/MF A01 CSCL 12/1

Certain new approaches to linear programming have recently received considerable publicity because of the promise of substantial improvements in efficiency compared to the simplex method. This note briefly discusses several research directions in methods for solving linear programs using nonlinear problem transformations. In particular, we describe application of a barrier transformation to the dual, and the development of sparse least-squares methods based on the LU factorization of the least-squares matrix of its transpose. Author (GRA)

N87-12254# Stanford Univ., Calif. Dept. of Operations Research.
NONLINEAR APPROACHES TO LINEAR PROGRAMMING
P. E. Gill, W. Murray, M. A. Saunders, and M. H. Wright Apr. 1986 16 p Presented at the Workshop on Iterative Methods for Mathematical Programs, Stanford, Calif., 27 Apr., 1986
(Contract DE-AS03-76ER-72018)
(DE86-010692; SOL-86-7; CONF-8604195-1) Avail: NTIS HC A02/MF A01

Certain new approaches to linear programming have recently received considerable publicity because of the promise of substantial improvements in efficiency compared to the simplex method. This note briefly discusses several research directions in methods for solving linear programs using nonlinear problem transformations. In particular, we describe application of a barrier transformation to the dual, and the development of sparse least-squares methods based on the LU factorization of the least-squares matrix or its transpose. DOE

N87-12255# Oak Ridge National Lab., Tenn.
PRO/MAPPER: A PLOTTING PROGRAM FOR THE DEC PRO/300 PERSONAL COMPUTERS UTILIZING THE MAPPER GRAPHICS LANGUAGE
J. W. Wachter May 1986 55 p
(Contract DE-AC05-84OR-21400)
(DE86-012635; ORNL/TM-9833) Avail: NTIS HC A04/MF A01

PRO/Mapper is an application for the Digital Equipment Corporation PRO/300 series of personal computers that facilitates the preparation of visuals such as graphs, charts, and maps in color or black and white. The user prepares an input data file containing English-language commands and writes it into a file using standard editor. PRO/Mapper then reads these files and draws graphs, maps, boxes, and complex line segments onto the computer screen. Axes, curves, and error bars may be plotted in graphical presentations. The commands of PRO/Mapper are a subset of the commands of the more sophisticated MAPPER program written for mainframe computers. The PRO/Mapper commands were chosen primarily for the production of linear graphs. Command files written for the PRO/300 are upward compatible with the Martin Marietta Energy Systems version of MAPPER and can be used to produce publication-quality slides, drawings, and maps on the various output devices of the Oak Ridge National Laboratory mainframe computers. DOE

N87-12256# California Univ., Berkeley. Lawrence Berkeley Lab.
APPLICATION OF PROGRAM POISSON TO AXIALLY-SYMMETRIC PROBLEMS - MAGNETOSTATIC AND ELECTROSTATIC - WITH USE OF A PROLATE SPHEROIDAL BOUNDARY
S. Caspi, M. Helm, and L. J. Laslett Jan. 1986 69 p
(Contract DE-AC03-76SF-00098)
(DE86-012826; LBL-20893) Avail: NTIS HC A04/MF A01

A version of the relaxation program POISSON has been produced that, for magnetostatic problems, can apply a boundary condition consistent with no external sources being present. This capability includes the treatment of axially-symmetric cases (using A* = rhoA as the working variable) with a boundary whose form is that of a prolate spheroid (and hence tends toward spherical in the limit eta = a/square root of (a squared - b squared) approaches infinity. The treatment of electrostatic problems (to obtain solutions for the scalar potential V) necessarily must differ in detail from the treatment of magnetostatic problems in cases of axial symmetry. It seems desirable, therefore, first to review the magnetostatic treatment that has been adopted for such axially-symmetric magnetostatic problems and then to suggest an analogous treatment that might similarly be introduced into the program to permit solution of similar electrostatic problems (again through the introduction of a prolate spheroidal boundary). DOE

N87-12257# British Aerospace Public Ltd. Co., Bristol (England). Sowerby Research Center.
COMPUTER AIDED DESIGN USING ANTHROPOMETRY: A STRATEGY
R. H. Thomas and R. J. Stone Apr. 1984 9 p
(BAe-HC/CAD/84-1; LR50433; ETN-86-97952) Avail: NTIS HC A02/MF A01

Using a wide range of body dimensions relevant to workspace and equipment design, and data from anthropometric studies of 33 international populations (military and civilian) a design menu is to be developed using the display of human operator schematics. The menu is designed for use by non computer specialists on a microcomputer. ESA

N87-12258# British Aerospace Public Ltd. Co., Bristol (England). Image Processing Section.
A STUDY OF RELAXATION LABELLING METHODS AND THEIR ROLE IN COMPUTER VISION
Roberto Desimone Jun. 1983 28 p
(Contract AP-02/8422/003)
(BAe-BT-14885; LR48670; ETN-86-97968) Avail: NTIS HC A03/MF A01

Relaxation labelling in image processing, particularly as a part of an image understanding scheme involving a knowledge-based computer vision system was investigated. Potential applications are examined. Mathematical models adopted for its implementation are described. A computer program was written to model a relaxation labelling process and tested as a method for enhancement of edges within an image. ESA

N87-12259# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
MENTOR USER MANUAL
Huub vanThienen Jun. 1985 45 p
(INF-85-15; ETN-86-98166) Avail: NTIS HC A03/MF A01
The concept of a structured document and its relation with trees and abstract syntaxes is described. The formalism independent aspects of the MENTOR editor are outlined. However, examples are given, using the PASCAL formalism. ESA

N87-12260# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
ATTRIBUTE GRAMMARS IN THE APPLICATIVE PROGRAMMING LANGUAGE TWENTEL
S. Joosten 1 Jul. 1985 13 p
(INF-85-16; ETN-86-98167) Avail: NTIS HC A02/MF A01
It is shown how context free attribute grammars can be described in the applicative programming language TWENTEL. It is demonstrated that the notation is not redundant over the conventional notation. It has the advantage of being executable, which means that it is possible to prototype attribute grammars effectively. Two nontrivial examples are included. ESA

N87-12261# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
SOME BASIC TYPE CHECKERS IN PROLOG
Mirjam Gerritsen Oct. 1985 47 p
(INF-85-20; ETN-86-98169) Avail: NTIS HC A03/MF A01
A simple typeless language is used to explain typechecking mechanisms. A first order typechecking mechanism followed by a Milner-like type deduction system based on principal typing and unification and an extension to a second order typed language are explained. The implementations are given in PROLOG. ESA

N87-12262# Institut National Polytechnique, Grenoble (France). Lab. Circuits et Systemes.
LUSTRE: A DATA FLOW LANGUAGE FOR REAL TIME Ph.D. Thesis [LUSTRE: UN LANGUAGE DECLARATIF POUR LE TEMPS REEL]
Jean-Louis Bergerand 1986 155 p In FRENCH
(ETN-86-98400) Avail: NTIS HC A08/MF A01
The principles found in the definition of the LUCID data flow language are used and extended to design a real time language. Characteristics include the interchangability of variables and expressions which are defined as equal, synchronous operation, hierarchic definition of functions, and self-checking of semantic coherence. It is shown that this language allows the straightforward expression of the equations defining real time algorithms. A comparison with the SIGNAL language is included. ESA

N87-12263# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
USING OFF THE SHELF CODE GENERATORS IN THE DELFT ADA SUBSET (DAS) COMPILER: SOME EXPERIENCES
C. Barkey (Instituut TNO voor Bouwmaterialen en Bouwconstructies, Delft (Netherlands).), J. vanKatwijk, and W. J. Toetenel 1985 36 p
(Rept-85-37; ETN-86-98467) Avail: NTIS HC A03/MF A01
Two code generators, the ACE backend (a variant of the code generator of the portable C compiler) and a code generator from the EM system were used with an Ada compiler. Results show that, apart from minor details, both code generators are usuable and that the size of the code produced is comparable. ESA

N87-12264# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
THE FORTRAN FORMULA MANIPULATOR (FFM)
Alex Fekken Sep. 1985 49 p
(Contract ZWO-10-75-007)
(Rept-293; ETN-86-98524) Avail: NTIS HC A03/MF A01
The FORTRAN formula manipulator (FFM) a set of FORTRAN 77 units to carry out formal manipulations with Poisson series is described. A user guide, programming aids, and examples are presented. ESA

N87-11735*# Boeing Aerospace Co., Seattle, Wash.
A NONLINEAR PROGRAMMING METHOD FOR SYSTEM DESIGN WITH RESULTS THAT HAVE BEEN IMPLEMENTED
Frank Hauser *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 11 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

N87-11748*# MacNeal-Schwendler Corp., Los Angeles, Calif.
DESIGN ENHANCEMENT TOOLS IN MSC/NASTRAN
D. V. Wallerstein *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 22 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

N87-11775*# Boeing Computer Services Co., Seattle, Wash.
APPLYING OPTIMIZATION SOFTWARE LIBRARIES TO ENGINEERING PROBLEMS
M. J. Healy *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 21 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

N87-11776*# Brigham Young Univ., Provo, Utah.
OPTDES.BYU: AN INTERACTIVE OPTIMIZATION PACKAGE WITH 2D/3D GRAPHICS
R. J. Balling, A. R. Parkinson, and J. C. Free *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 12 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

N87-11778*# Iowa Univ., Iowa City. Center for Computer Aided Design.
COMPUTER AIDED ANALYSIS AND OPTIMIZATION OF MECHANICAL SYSTEM DYNAMICS
E. J. Haug *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 20 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 09B

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N87-12265*# Virginia Univ., Charlottesville. Dept. of Computer Science.
THE IMPLEMENTATION AND USE OF ADA ON DISTRIBUTED SYSTEMS WITH HIGH RELIABILITY REQUIREMENTS Semiannual Progress Report, 5 Mar. 1982 - 31 Dec. 1986
J. C. Knight Aug. 1986 73 p
(NASA-CR-179842; NAS 1.26:179842; UVA/528213/CS87/109)
Avail: NTIS HC A04/MF A01 CSCL 09B
The general inadequacy of Ada for programming systems that must survive processor loss was shown. A solution to the problem was proposed in which there are no syntatic changes to Ada. The approach was evaluated using a full-scale, realistic application. The application used was the Advanced Transport Operating System (ATOPS), an experimental computer control system developed for a modified Boeing 737 aircraft. The ATOPS system is a full authority, real-time avionics system providing a large variety of advanced features. Methods of building fault tolerance into concurrent systems were explored. A set of criteria by which the proposed method will be judged was examined. Extensive interaction with personnel from Computer Sciences Corporation and NASA Langley occurred to determine the requirements of the ATOPS software. Backward error recovery in concurrent systems was assessed. B.G.

N87-12266# Georgia Inst. of Tech., Atlanta. Production and Distribution Research Center.
GENERALIZED NETWORK IMPLEMENTATIONS
John J. Jarvis, H. D. Ratliff, and Michael A. Trick 1986 97 p
(Contracts N00014-85-C-0797; N00014-83-K-0147)
(AD-A168296; AD-E900578; PDRC-86-03) Avail: NTIS HC A05/MF A01 CSCL 05/1

Generalized networks are an important class of optimization models, with uses in a wide variety of fields. This report describes the development and implementation of a generalized network algorithm. Jarvis et. al. recommend a generalized network model, system for closure optimization and planning (SCOPE), for crisis action deployment planning. In SCOPE, large generalized networks must be repeatedly solved. These networks have special structure, which results in computational advantages. In this report, a generalized network implementation is developed for solving very large generalized networks. This implementation includes new data structures for storing the basis, in-core/out-of-core handling of the arcs, and special handling of pure network structure. In this report, a detailed examination of the SCOPE model is provided and its effect on implementation issues is discussed. The SCOPE model is highly structured. This report demonstrates how this structure can be used to advantage. In a companion report extensive testing is presented which addresses the question what affects the computation time for a SCOPE model? GRA

N87-12267# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
A NETWORK ARCHITECTURE FOR DATA-DRIVEN SYSTEMS Final Report, 1 Aug. 1982 - 1 Aug. 1984
James E. McDonald Jul. 1985 71 p
(AD-A168764; AFWAL-TR-84-1186) Avail: NTIS HC A04/MF A01 CSCL 09/2

This technical report discusses the hardware and software constructs of a unique computer network designed by the author. The network is especially designed for a multiple computer system operating in a synchronous real-time simulation system environment. The network emulates a shared memory system but has the unique property of being serially linked. All currently available shared memory systems utilize parallel address and data transmission schemes that demand a close proximity of the computers. Now, due to the serial linking, the computers may be hundreds or thousands of meters apart. Innovative data-driven hardware and software concepts applied to the serially-linked shared-memory multi-computer structure allow network transmission and subsequent software execution to be commanded relative to the dynamics of shared data variables. This concept is contrasted to synchronous network transmission and software execution of conventional real-time multi-computer systems. GRA

N87-12268# Pennsylvania Univ., Philadelphia. School of Electrical Engineering.
OPTICAL COMPUTING BASED ON THE HOPFIELD MODEL FOR NEURAL NETS Annual Report
N. H. Hart May 1986 65 p
(Contract N00014-85-K-2036)
(AD-A168767; EO/MO-10) Avail: NTIS HC A04/MF A01 CSCL 06/4

Neural net models and their analogs present a new approach to signal processing that is collective, robust, and fault tolerant. The collective nature of processing means also high throughput where bandwidth or speed of the processing elements i.e., temporal degrees of freedom are traded by spatial degrees of freedom via massive interconnectivity of the elements (neurons) in the network. As a result neural nets can solve computationally extensive problems like those encountered for example in optimization, nearest neighbor search, inverse scattering in a matter of a few time-constants of the processing elements. In biological systems (the brain in particular) this is of the order of a tens of milliseconds since neurons operate with electronic conduction and hence can be made considerably faster with time constants approaching nano-seconds. Collective processing such artificial nets can therefore be extremely fast. The remarkable ability of neural nets in handling sketchy (erroneous or incomplete) information and their fault tolerance (graceful degradation in performance with element failure) make them particularly attractive in pattern recognition, robotics, and autonomous system intended to operate virtually unattended for long time periods. GRA

N87-12269# Department of the Air Force, Washington, D.C.
PLURALITY OF PROCESSORS WHERE ACCESS TO THE COMMON MEMORY REQUIRES ONLY A SINGLE CLOCK INTERVAL Patent
Stanley M. Nissen, Chris J. Grobicki, and William M. Kaupinis, inventors (to Air Force) Issued 27 May 1986 7 p Supersedes AD-D010229
(AD-D012385; US-Patent-4,591,977; US-Patent-Appl-SN-477998; US-Patent-Class-364-200) Avail: US Patent and Trademark Office CSCL 09/2

A multi-microprocessor apparatus utilizing a plurality of central processing unit arranged in a parallel configuration. Each central processing unit which has its own local memory unit, communicates with a common memory unit on a time shared basis that is synchronization between each central processing unit and the common memory unit. GRA

N87-12270# Politecnico di Milano (Italy). Dipt. di Elettronica.
ELAND: AN EXPERT SYSTEM FOR THE CONFIGURATION OF LOCAL AREA NETWORKS APPLICATIONS
L. Tanca and S. Ceri 1986 30 p
(Rept-86-008; ETN-86-97941) Avail: NTIS HC A03/MF A01

A rule-based expert system for configuring Local Area Networks (LAN) and for designing distributed database applications over them is described. The system includes a general-purpose inference machine for solving synthesis problems, based on two separed modules: the Tree Traversal and the Matcher. The former performs a recursive descent on a tree-structured solution space and generates a description of requirements that the final solution should posses; the latter matches these requirements to existing commercial products. The inference machine and its concrete application to the design and configuration of LAN information systems are described. ESA

N87-12271# Rijkswaterstaat, The Hague (Netherlands). Data Processing Div.
LOCAL AREA NETWORKS: CHARACTERISTICS, PROPERTIES, AND STANDARDIZATION [LOCAL AREA NETWORKS: KENMERKEN, EIGENSCHAPPEN EN STANDAARDISATIE]
R. T. vanSon Jan. 1986 38 p In DUTCH
(SWA-85/193; B8662353; ETN-86-98060) Avail: NTIS HC A03/MF A01

The system Local Area Network (LAN) is presented. This network is used for sequential information bit exchange between linked computers or computer periphery, and aims at a cheap and fast solution of so-called in-house data communication problems. Several LAN topologies, transmission techniques used in local networks, routing techniques used in LAN's, network allocation methods, and access methods are presented. The access methods CSMA/CD and token passing are compared. The specifications of the different LAN techniques are compared. The LAN standardization using the Open System Inteconnection reference model is explained. ESA

N87-12272# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
IMPLEMENTATION OF THE TWENTE UNIVERSITY MULTIPROCESSOR (TUMULT)-15 NETWORK INTERFACE FOR THE VME BUS
Gerard J. M. Smit and Paul Havinga May 1986 44 p
(INF-86-11; ISBN-90-365-0041-9; ETN-86-98519) Avail: NTIS HC A03/MF A01

The implementation of a multiprocessor interconnection network is presented. The implemented network inteconnects up to 15 processing elements in a ring topology. All the processing elements are identical and autonomous, which means that each element has its own private memory and a copy of a local operating

system. Each processing element is built up from standard VME-bus compatible modules. Implementation of the interface between the TUMULT network and the VME-bus is described. ESA

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N87-12273*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
RAPID PROTOTYPING FACILITY FOR FLIGHT RESEARCH IN ARTIFICIAL-INTELLIGENCE-BASED FLIGHT SYSTEMS CONCEPTS
Eugene L. Duke, Victoria A. Regenie, and Dwain A. Deets Oct. 1986 19 p
(NASA-TM-88268; H-1367; NAS 1.15:88268) Avail: NTIS HC A02/MF A01 CSCL 09B

The Dryden Flight Research Facility of the NASA Ames Research Facility of the NASA Ames Research Center is developing a rapid prototyping facility for flight research in flight systems concepts that are based on artificial intelligence (AI). The facility will include real-time high-fidelity aircraft simulators, conventional and symbolic processors, and a high-performance research aircraft specially modified to accept commands from the ground-based AI computers. This facility is being developed as part of the NASA-DARPA automated wingman program. This document discusses the need for flight research and for a national flight research facility for the rapid prototyping of AI-based avionics systems and the NASA response to those needs. Author

N87-12274# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
SELECTIVE BACKTRACKING [RETROCESSO SELETIVO]
Paltoio Daun Fraga Apr. 1986 42 p In PORTUGUESE; ENGLISH summary
(INPE-3867-TDL/219) Avail: NTIS HC A03/MF A01

A study for the improvement of depth-first backtracking in logic programming is shown. Sometimes during search, unnecessary backtrack points appear. The goal is to detect these points and return to a node where search is necessary again. Selective backtracking is a set of rules applied to avoid losing efficiency. Author

N87-12275# Texas Univ., Austin. Dept. of Electrical and Computer Engineering.
RESEARCH IN ADAPTIVE AND DECENTRALIZED STOCHASTIC CONTROL. Final Report, 15 Mar. 1984 - 14 Nov. 1985
Steven I. Marcus Jan. 1986 9 p
(Grant AF-AFOSR-0084-84)
(AD-A168752; AFOSR-86-0295TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Significant progress was made in a number of aspects of stochastic systems. The problem of adaptive control of priority assignment in queueing systems was solved. A distance-measures approach to the problem of approximation and identification of queueing systems was studied. A problem of adaptively controlling a discounted-reward finite-state Markov decision process was solved. Major new results were obtained for the problem of adaptive control with incomplete observations. In particular, the author studied in depth a problem of adaptive control with incomplete observations, in which the state is a finite state Markov process. In addition, earlier work on asymptotic approximations in non-linear filtering was completed. Author (GRA)

N87-12276# British Aerospace Public Ltd. Co., Bristol (England). Human Factors Dept.
THE EXTRACTION OF KNOWLEDGE FROM DATA: AN EVALUATION OF INTELLIGENT KNOWLEDGE BASED SYSTEMS (IKBS)
J. B. Bell Aug. 1983 13 p
(BAe-BT-15035; LR49007; ETN-86-97970) Avail: NTIS HC A02/MF A01

Automatic target recognition (ATR) by a sensor-computer system, and analogies with human visual perception are discussed. The best approach to ATR modeling may not involve detailed replication of the brain's processing steps in recording the sensory input. However, the general logic of the brain is relevant, including ways of eliminating redundant information, ways of using selected feature extractors as building blocks at each level of restriction such as position on the generality of the feature, and the use of fuzzy logic to provide continuously variable levels of stringency in the encoding process. The early stages of visual processing were incorporated in the VISIVE program, enabling information on important details in a scene to be extracted. ESA

N87-12277# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
TOPICS IN ARTIFICIAL INTELLIGENCE
A. Nijholt Jun. 1985 29 p
(INF-85-9; ETN-86-98162) Avail: NTIS HC A03/MF A01

Definitions of artificial intelligence are discussed, and perceptual and cognitive problems are distinguished from problems in robotics. These problems are illustrated. Expert systems, and speech, language, and linguistics are covered. ESA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N87-12278 Technische Univ., Munich (West Germany). Inst. fuer Informatik.
DISCRETIZATIONS FOR MULTIGRID METHODS
Ulrich Ruede Aug. 1985 9 p
(TUM-I8519; TUM-INFO-08-85-I19-280/1-FMA; ETN-86-98230)
Copyright. Avail: Issuing Activity

An ordinary differential equation and a two-dimensional Poisson's equation are used as model problems to compare multigrid algorithms using parameterized discretizations for different parameter values. The discretization parameters for the relaxations are tuned so that the high frequency solution components are well represented; the parameters for the calculation of the residual are chosen so that the low frequency components are well represented. This concept improves the final solution errors relative to the exact solution of the continuous problem by one order of magnitude for high frequency modes, the errors becoming smaller than the discretization errors on the finest grid. The discretizations are designed using an approximate Fourier mode analysis neglecting boundary conditions and tested numerically. ESA

N87-12279 Technische Univ., Munich (West Germany). Inst. fuer Informatik.
TREE GRAMMARS AS A PATTERN MATCHING MECHANISM FOR CODE GENERATION
Maria Benk Oct. 1985 26 p Sponsored by Sonderforschungsbereich 49
(TUM-I8524; TUM-INFO-10-85-I24-280-I-FMA; ETN-86-98231)
Copyright. Avail: Issuing Activity

Syntactic tools for code generation using tree grammars, including the basic pattern matching mechanism and extensions of the basic algorithms for the propagation of decisions taken locally are presented. The way to continue after syntactic blocks in special contexts of code generation is outlined. Decidability results on tree languages that are of theoretical interest and of practical use in code generation are given. ESA

N87-12280 ESDU International Ltd., London (England).
NUMERICAL METHODS FOR THE SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: INITIAL VALUE PROBLEMS
Jul. 1986 28 p
(ESDU-86011; ISBN-0-85679-563-1; ISSN-0141-3988) Avail:

ESDU

This Data Item ESDU 86011 is an addition to the Dynamics Sub-series. Methods are presented for solving numerically a set of first-order differential equations with an equal number of initial conditions specified at a single value of the independent variable. A differential equation of order greater than one can also be solved by the methods provided the highest derivative of the dependent variable can be isolated. Two classes of method are covered: single-step methods (specifically Runge-Kutta) and multi-step (specifically predictor-corrector). For Runge-Kutta, formulae are included for five fourth-order method (and several lower-order techniques), and offer flexibility between reducing truncation error and computation time. For predictor-corrector, formulae are given for three approaches and, in two cases, are provided for a number of different orders. The difficulties met with instability and stiff equations are briefly considered. The methods do not apply to boundary value problems or partial differential equations. ESDU

N87-12281*# Mississippi State Univ., Mississippi State. Dept. of Aerospace Engineering.

TRANSFORMATION OF TWO AND THREE-DIMENSIONAL REGIONS BY ELLIPTIC SYSTEMS Semiannual Status Report, 15 Nov. 1985 - 14 May 1986

C. Wayne Mastin and Joe F. Thompson 3 Jul. 1986 22 p

(Grant NsG-1577)

(NASA-CR-179851; NAS 1.26:179851) Avail: NTIS HC A02/MF A01 CSCL 12A

Efforts in transferring computational work from the LRC computer to the IRIS Graphics Workstation at MSU are reported and the computation of a conservative solution of a simple hyperbolic equation on an overlapping grid is discussed. Several conclusions concerning computations on overlapping grids are apparent. Problems only occur when there is a major difference in grid spacing on the individual component grids. In the case of hyperbolic equations, it is necessary that both interpolation and extrapolation be applied at the grid boundaries. When interpolated values are used at outflow boundary points, excessive oscillations in the numerical solution may be the result. The same conclusions would be valid for more complicated systems of hyperbolic equations such as the Euler equations for inviscid flow. Some of the solution values would be extrapolated at the overlap boundary, the exact number depending on the number of characteristics pointing out of the overlap region. It is also possible that similar boundary conditions may be needed for some parabolic equations such as high Reynolds number viscous flow equations. Efforts were also expended on the development of three-dimensional conservative interpolation procedures. Finally, the investigation of grid smoothing procedures were initiated during this reporting period. It was decided that the first grid smoothing algorithms will be based on the concepts of variational grid generation. M.G.

N87-12282*# Alabama Univ., University. Dept. of Mechanical Engineering.

EIGENVALUE ASSIGNMENT STRATEGIES IN ROTOR SYSTEMS Final Report

John N. Youngblood and Kennth J. Welzyn Oct. 1986 95 p

(Grant NAG8-034)

(NASA-CR-179906; NAS 1.26:179906; BER-389-177) Avail: NTIS HC A05/MF A01 CSCL 12A

The work done to establish the control and direction of effective eigenvalue excursions of lightly damped, speed dependent rotor systems using passive control is discussed. Both second order and sixth order bi-axis, quasi-linear, speed dependent generic models were investigated. In every case a single, bi-directional control bearing was used in a passive feedback stabilization loop to resist modal destabilization above the rotor critical speed. Assuming incomplete state measurement, sub-optimal control strategies were used to define the preferred location of the control bearing, the most effective measurement locations, and the best set of control gains to extend the speed range of stable operation. Speed dependent control gains were found by Powell's method to maximize the minimum modal damping ratio for the speed dependent linear model. An increase of 300 percent in stable speed operation was obtained for the sixth order linear system using passive control. Simulations were run to examine the effectiveness of the linear control law on nonlinear rotor models with bearing deadband. The maximum level of control effort (force) required by the control bearing to stabilize the rotor at speeds above the critical was determined for the models with bearing deadband. Author

N87-12283# North Carolina Univ., Chapel Hill. Dept. of Statistics.

M-ESTIMATION FOR DISCRETE DATA: ASYMPTOTIC DISTRIBUTION THEORY AND IMPLICATIONS Technical Report, Aug. 1985 - Aug. 1986

Douglas G. Simpson, Raymond J. Carroll, and David Ruppert Nov. 1985 23 p

(Contract F49620-82-C-0009)

(AD-A168532; MIMEO-SER-1586; AFOSR-86-0320TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The asymptotic distribution of an M-estimator is studied when the underlying distribution is discrete. Asymptotic normality is shown to hold quite generally within the assumed parametric family. When the specification of the model is inexact, however, it is demonstrated that an M-estimator with a non-smooth score function, e.g., a Huber estimator, has a non-normal limiting distribution at certain distributions, resulting in unstable inference in the neighborhood of such distributions. Consequently, smooth score functions are proposed for discrete data. GRA

N87-12284# Rutgers - The State Univ., New Brunswick, N. J.

ANALYSIS AND REGULATION OF NONLINEAR AND GENERALIZED LINEAR SYSTEMS Final Technical Report, 15 Jun. 1980 - 14 Jul. 198

Eduardo D. Sontag 6 Sep. 1985 12 p

(Grant AF-AFOSR-0196-80)

(AD-A168615; AFOSR-86-0285TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Applications are described of various mathematical techniques to problems of regulation and control of nonlinear sampled-data systems and of systems over rings, including delay-differential systems and families of linear systems. An extensive bibliography of papers published is included. Author (GRA)

N87-12285# Vanderbilt Univ., Nashville, Tenn. Dept. of Mathematics.

MATCHING EXTENSION IN BIPARTITE GRAPHS. 1. INTRODUCTION AND TERMINOLOGY

M. D. Plummer Apr. 1986 17 p

(Contract N00014-85K-0488)

(AD-A168666) Avail: NTIS HC A02/MF A01 CSCL 12/1

All graphs in this paper will be finite and connected and will have no loops or parallel lines. Let n and p be positive integers with n < or = (p - 2)/2 and let G be a graph with p points having a perfect matching. Graph G is said to be n-extendable if every matching of size n in G extends to a perfect matching. This paper is concerned primarily with studying n-extendability in bipartite graphs. In the first section of this paper the author gathers together the various characterizations of 1-extendable bipartite graphs mentioned above and then give the natural generalizations to n-extendability with a unified proof of the equivalencies. In another paper the author presented some results on the connectivity of general n-extendable graphs. In the second section of this paper proves a result about connectivity which is peculiar to the bipartite case. GRA

N87-12286# Yale Univ., New Haven, Conn. [illegible]t. of Computer Science.

DYNAMIC GRID MANIPULATION FOR PDES (PARTIAL DIFFERENTIAL EQUATIONS) ON HYPERCUBE PARALLEL PROCESSORS

William D. Gropp Mar. 1986 13 p

(Contract N00014-82-K-0184; Grant AF-AFOSR-0360-84)

(AD-A168679; YALE/DCS/RR-458) Avail: NTIS HC A02/MF A01 CSCL 09/2

Adaptive methods for partial differential Equations can be considered as a problem in managing a dynamic graph on a parallel processor. The properties we want for this graph are that edges in the graph, as much as possible, map to nearest neighbor links in the parallel processor, and that changes to the graph not require a major re-arrangement of the mapping of the nodes of the graph onto the processor. We will discuss a simple restricted set of transformations which are easy to implement on a message passing parallel processor, and discuss in detail the design choices made. These transformations are based on maintaining a graph of bounded node degree at the cost of a small amount of global communication. In designing adaptive algorithms of parallel processors, the communication speeds of the processors can have a major effect on the design. Different hypercubes can be characterized by three parameters: the floating point speed, the I/O startup time, and the I/O transfer rate. One aspect of algorithm design which is influenced by interprocessor communication is data structure granularity. We will discuss how this affects the choice of algorithm as a function of the three parameters for our algorithm and relate this to our experiments. Author (GRA)

N87-12287# Yale Univ., New Haven, Conn. Dept. of Computer Science.
SYSTOLIC ARRAY SYNTHESIS: COMPUTABILITY AND TIME CONES
Jean-Marc Delosme and Ilse C. Ipsen May 1986 23 p
(Contracts N00014-82-K-0184; N00014-84-K-0092; N00014-85-K-0461; Grant NSF ECS-83-14750)
(AD-A168697; YALEU/DCSRR-474) Avail: NTIS HC A02/MF A01 CSCL 09/2

Many important algorithms in signal and image processing, speech and pattern recognition of matrix computations consist of coupled systems of recurrence equations. Systolic arrays are regular networks of tightly coupled simple processors with limited storage that provide cost effective high throughput implementations of many such algorithms. While there are some mathematical techniques for finding efficient schedules for uniform recurrence equations, there is no general theory for more general systems of recurrence equations. The first elements of such a theory are presented in this paper and constitute a significant step towards establishing a complete methodology that determines systolic array implementations for a very general class of coupled systems of recurrence equations; these implementations exhibit provably optimal computation time while satisfying various user-specified constraints. GRA

N87-12288# Aeronautical Research Labs., Melbourne (Australia).
OPTIMAL SAMPLING RATES FOR AUTO REGRESSIVE MODELS
T. G. Ryall Apr. 1986 19 p
(AD-A168740; ARL-STRUC-TM-435) Avail: NTIS HC A02/MF A01 CSCL 12/1

In time series analysis a particular model for a linear system is an autoregression model. Autoregression models are particularly well suited to structural linear systems which have been persistently excited by white noise. The white noise is assumed to be unmeasurable and it is assumed that there is no measurement noise. The variability of the results obtained in practice tends to depend on the sampling rates used. This memo examines in detail the asymptotic convariance matrix for estimates of the damping rate and frequency for a fixed length of record and variable sampling rates in a linear system which is completely described, in continuous time, by a single second order differential equation. It is shown that the selection of sampling rate plays an extremely important role in the quality of estimates. GRA

N87-12289# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
RECONSTRUCTION OF TWO-DIMENSIONAL SIGNALS FROM THE FOURIER TRANSFORM MAGNITUDE Ph.D. Thesis
David Izraelevitz Jun. 1986 161 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285)
(AD-A168792; TR-517) Avail: NTIS HC A08/MF A01 CSCL 09/3

This thesis is concerned with the problem of reconstructing a discrete two-dimensional signal of known support from the Fourier transform magnitude only. This problem arises in many fields where imaging is desired, such as astronomy and wavefront sensing. Since the autocorrelation function is easily calculated from the Fourier transform magnitude, we attack the equivalent problem of signal reconstruction from a known autocorrelation function. The main result of the thesis is a new algorithm for realizing this reconstruction. This algorithm is guaranteed to yield the correct solution given accurate measurements and is much more computationally attractive than previous reconstruction algorithms. The result is based on the detailed analysis of the zeros of a polynomial which is essentially the two-dimensional z-transform of the known autocorrelation signal. From this analysis, a large numbers of zeros of the z-transform of the unknown discrete signal are extracted. This set of zeros is then used to extract the signal values via the solution of a set of linear equations. Examples of the application of this algorithm to several families of images is presented, along with a discussion of the accuracy and computational requirements of the new algorithm. We conclude with a discussion of the application of the ideas of this thesis to the area of two-dimensional filter design and stability testing. Author (GRA)

N87-12290# Massachusetts Univ., Amherst. Dept. of Mathematics and Statistics.
APPROXIMATE COUNTING. A MARTINGALE APPROACH Interim Report, 15 May 1985 - 14 May 1986
Walter A. Rosenkrantz 17 Feb. 1986 14 p
(Grant AF-AFOSR-0167-82)
(AD-A170229; AFOSR-86-0377TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Approximate counting is a probabilistic algorithm for keeping track to large numbers of events by means of counters of limited range. In this paper we present an analysis of this algorithm using the elementary theory of martingales. The methods are also applicable to the analysis of the counter which occurs in the exponential back off protocol. Author (GRA)

N87-12291# Illinois Univ., Urbana. Dept. of Computer Science.
ERROR ESTIMATES FOR DIFFERENTIAL-ALGEBRAIC EQUATIONS
B. J. Leimkuhler Jun. 1986 54 p
(Contract DE-AC02-76ER-02383)
(DE86-012492; DOE/ER-02383/0124; UIUCDCS-R-86-1287; UILU-ENG-86-1741; COO-2383-0124) Avail: NTIS HC A04/MF A01

Recent work has shown that variable stepsize BDF (backward-differentiation formulas) methods converge for a large class of differential-algebraic equations (DAE) of index no greater than two; however, the usual error estimate based on the predictor-corrector difference is not accurate for index-2 problems and can lead to failure in numerical codes. Current research on the error estimation problem for DAEs is surveyed, and a promising alternative estimate based on a projection of the predictor-corrector difference is discussed and numerically tested. DOE

N87-12292# British Aerospace Public Ltd. Co., Bristol (England). Optics Research Dept.
A COMPLEX EXTENSION OF THE HADAMARD TRANSFORM FOR CORRELATION PURPOSES
N. C. Roberts Apr. 1983 23 p
(BAe-BT-14469; LR48296; ETN-86-97966) Avail: NTIS HC A02/MF A01

A transform based on the Hadamard transform which is much faster to compute than the Fourier transform and which provides an approximate correlation is introduced. A program to construct this transform was written and the correlation functions for simple inputs are reproduced. For some inputs a very accurate correlation function is computed and for others larger error terms appear. The dominant peak, however, is always at the point of correlation. ESA

N87-12293# Kaiserslautern Univ. (West Germany). Fachbereich Mathematik.

A STRONGLY POLYNOMIAL ALGORITHM FOR MINIMUM COST SUBMODULAR FLOW PROBLEMS

Satoru Fujishige (Tsukuba Univ. (Japan).), Hans Roeck (Technische Univ., Berlin (West Germany).), and Uwe Zimmermann Jan. 1986 17 p

(Preprint-102; ETN-86-98274) Avail: NTIS HC A02/MF A01

A purely combinatorial strongly polynomial algorithm for submodular flow problems is proposed. It consists in solving a sequence of at most m + n (n - 1) minimum cost submodular flow problems with cost coefficients bounded by nsq, where n is the number of the vertices and where m is the number of the arcs in the underlying graph. The current cost coefficients are calculated by tree projection and scaling. ESA

N87-12294# Kaiserslautern Univ. (West Germany). Dept. of Mathematics.

STATIONARY SOLUTIONS OF THE VLASOV-FOKKER-PLANCK EQUATION

Klaus Dressler Jan. 1986 12 p

(Preprint-104; ETN-86-98275) Avail: NTIS HC A02/MF A01

Stationary solutions of the Vlascv-Fokker-Planck Equation, a modification of the Vlasov-Poisson Equation, obtained by adding a diffusion term with respect to velocity are studied. From a physical point of view it describes a plasma in thermal equilibrium. The existence of stationary solutions is proved for the mollified equation, an existence and uniqueness theorem holds for sufficiently high temperature. ESA

N87-12295# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.

SIMULATION OF A STOCHASTIC PROCESS WITH A NONRATIONAL SPECTRUM

Per-Aake Norlund Jun. 1986 18 p In SWEDISH; ENGLISH summary

(FOA-C-20614-E3; ISSN-0347-3694; ETN-86-98327) Avail: NTIS HC A02/MF A01

A method for simulating stationary processes with arbitrary spectra, based on generating of cosine signals with nearly equidistant angle frequencies weighted against the spectrum density, and with an arbitrary phase angle, is analyzed. The method can be used for the realization of a stochastic process with a nonrational spectrum by Monte Carlo methods. An algorithm in pseudo-code for simulating one dimensional wind turbulence is proposed. ESA

N87-12296# Grenoble-1 Univ. (France). Inst. d'Informatique et de Mathematiques Appliquee.

CONTRIBUTION TO THE STUDY OF NONCONVEX NONDIFFERENTIABLE OPTIMIZATION ALGORITHMS Ph.D. Thesis [CONTRIBUTION A L'ETUDE DES ALGORITHMES DE L'OPTIMISATION NON CONVEXE ET NON DIFFERENTIABLE]

Rachid Benacer 1986 123 p In FRENCH

(ETN-86-98403) Avail: NTIS HC A06/MF A01

A theoretical and algorithmic study of optimization problems is presented. The necessary conditions of first order optimization, subgradient methods converging to local optima, and algorithms to obtain global solutions are examined. It is found that some algorithms give acceptable results for the solution of relatively low complexity problems. Nonconvex quadratic programming is studied to show the adaptation of these algorithms to particular problems. ESA

N87-12297# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.

ON REALIZATION OF NONLINEAR SYSTEMS DESCRIBED BY HIGHER-ORDER DIFFERENTIAL EQUATIONS

A. J. vanderSchaft Jun. 1986 59 p

(Memo-569; ETN-86-98516; ISSN-0169-2690) Avail: NTIS HC A04/MF A01

Systems of smooth nonlinear differential and algebraic equations with external variables are studied. The realization problem is to replace the higher-order implicit differential equations by first-order explicit differential equations and the algebraic equations by mappings to the external variables. This involves the introduction of state variables. It is shown that under general conditions there exist realizations containing a set of auxiliary variables, called driving variables. Sufficient conditions for the existence of realizations involving only state variables and external variables, which can be split into input and output variables are given. It is shown that there are structural obstructions for the existence of such realizations. A constructive procedure to obtain realizations with or without driving variables is presented. The realization procedure is also applied to systems defined by interconnections of state space systems. A theory of equivalence transformations of systems of higher-order differential equations is developed. ESA

N87-12298# Purdue Univ., West Lafayette, Ind. Joint Highway Research Project.

USE OF FUZZY SETS MATHEMATICS TO ASSIST PAVEMENT EVALUATION AND MANAGEMENT. EXECUTIVE SUMMARY (REVISED MARCH 18, 1986) Final Report

M. Andonyadis, A. G. Altschaeffl, and J. L. Chameau Jun. 1985 11 p Sponsored in part by Federal Highway Administration and Indiana Dept. of Highways

(PB86-214780; FHWA/IN/JHRP-85/14-ES-Rev; JHRP-85-14-ES-Rev) Avail: NTIS HC A02/MF A01 CSCL 13B

This report applies the mathematics of fuzzy sets that was created in the companion interim Report by Gunaratne, et al. The new scheme being suggested for pavement management is predicted on the presence of uncertaintly at various stages in pavement management which requires that judgment be used in the process. The fuzzy sets mathematics can methodically combine subjective information and crisp measurement data. Fuzzy sets are used to represent the subjectivity in pavement serviceability ratings and distress surveys, and the variability in Roadmeter, Skid-Tester and Dynaflect readings. The ranking of pavements is formulated using fuzzy multi-attribute decision-making concepts using an expert knowledge base. To use the new scheme required the one-time development of the knowledge base. GRA

N87-12299# Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.

CONTROLLING OUTLIERS IN CONTINGENT VALUATION EXPERIMENTS Final Report

R. Mendelsohn Apr. 1986 26 p

(Contract EPA-68-01-6596)

(PB86-210465; EPA 230/06-86-015) Avail: NTIS HC A03/MF A01 CSCL 12A

There is no established protocol for the analysis of data collected in contingent valuation surveys. This had led to seemingly arbitrary removal of some outlier observations, which leads to questions about the representativeness of the results reported in the literature. The report critiques the methods researchers have used to analyze the data from contingent valuation surveys and suggests procedures for future analyses. Three procedures regress the response on a set of economic and demographic variables (e.g., income, age, sex, prices). Then if the unweighted residuals appear to be normally distributed, analysis should proceed. The first process would drop outliers (iteratively) that are more than (say) six standard deviations from the mean response. The second process would weight observations close to the regression line more heavily than those further away, so that those with true extreme preferences are not eliminated. The third procedure would incorporate known independent sources of bias in the regression. A fourth approach would examine the median response rather than the mean; this would be more like a voting outcome but ignores extreme preferences. Testing of competing approaches is recommended. GRA

N87-12300# National Bureau of Standards, Gaithersburg, Md. Center for Applied Mathematics.

NEAR-OPTIMAL STARTING SOLUTION FOR POLYNOMIAL APPROXIMATION OF A CONTINUOUS FUNCTION IN THE L SUB 1 NORM

P. D. Domich Jun. 1986 28 p
(PB86-215183; NBSIR-86/3389) Avail: NTIS HC A03/MF A01 CSCL 12A

A method of selecting a near-optimal starting basis for a large class of polynomial approximation problems in the L sub 1 norm is given. While it is possible to prove the optimality of these advanced starting solutions for only a small class of problems, empirical evidence indicates the starting bases are nearly optimal for a much larger class of problems. The method used to determine the starting basis and a heuristic justification backed by empirical results supporting its use are given. GRA

N87-12301# National Bureau of Standards, Gaithersburg, Md. Center for Applied Mathematics.
EVALUATION OF L SUB 1 CODES USING POLYNOMIAL APPROXIMATION PROBLEMS
P. D. Domich, K. L. Hoffman, R. H. F. Jackson, P. B. Saunders, and D. R. Shier Jun. 1986 48 p
(PB86-215175; NBSIR-86/3390) Avail: NTIS HC A03/MF A01 CSCL 12A

The methodology and results of a computational experiment which compares the performance of four computer codes which determine the best discrete L sub 1 approximation to a continuous nonlinear function is given. The experiment uses 320 test problems created by a test problem generator. Several performance measures describe solution quality as well as computational effort. Author

N87-11754*# Kaman Aerospace Corp., Bloomfield, Conn.
REGRESSION ANALYSIS AS A DESIGN OPTIMIZATION TOOL
Richmond Perley *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12A

N87-11755*# Kaman Aerospace Corp., Bloomfield, Conn.
A ROTOR OPTIMIZATION USING REGRESSION ANALYSIS
N. Giansante *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 13 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12A

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N87-12302# Stanford Univ., Calif. Dept. of Statistics.
ON THE USE OF RIDGE AND STEIN-TYPE ESTIMATORS IN PREDICTION
Alan E. Gelfand 21 May 1986 26 p
(Contract N00014-86-K-0156)
(AD-A168349; TR-374) Avail: NTIS HC A03/MF A01 CSCL 12/1

For the usual regression model with fixed regressors, there is a considerable literature devoted to alternatives to ordinary least squares estimators of the regression parameters. These alternatives are biased with small variances resulting in reduced mean square error over some (perhaps all) of the parameter space. Two prominent classes of such estimators are ridge type and Stein type estimators. Consider the simplest prediction problem in this context, i.e., prediction at a single new vector of prediction values. The risk (squared error) is calculated for predictors based on estimators in the above families. While the ordinary least squares predictor is admissible, a simulation study reveals that over regions of the parameter space substantial reduction in risk is possible using estimators in these families. A simple preliminary procedure based upon the vector of prediction values is given to select a good estimator from these families. It is apparent that in multiple prediction a single choice of estimator need not be best. GRA

N87-12303# Army Engineer Topographic Labs., Fort Belvoir, Va.
CUMULATIVE PROBABILITY TABLES FOR TESTING CONSENSUS IN RANKING EXPERIMENTS
Michael A. Crombie and Jennifer Webb May 1986 106 p
(AD-A168376; ETL-0418) Avail: NTIS HC A06/MF A01 CSCL 12/1

Probability tables are provided that will enable analysts to test for consensus among N judges when comparisons are made R at a time of M items. The purpose of the tables is to provide a statistical basis for determining whether rank ordering of alternatives can best be determined by reviewing the M options all at once or ranking R less than M at a time. GRA

N87-12304# Arizona Univ., Tucson. Dept. of Mathematics.
DFR (DECREASING FAILURE RATE) PROPERTY OF FIRST PASSAGE TIMES AND ITS PRESERVATION UNDER GEOMETRIC COMPOUNDING
J. G. Shanthikumar Jan. 1986 20 p
(Grant AF-AFOSR-0205-84)
(AD-A168671; AFOSR-86-0275TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

It is shown that if the transition kernel of a discrete time Markov chain with state space (0,1,...) is totally positive of order two (TP2), the first passage time from state 1 to state 0 has decreasing failure rate (DFR). This result is used to show that (i) the sum of a geometric number (i.e., geometric compound) of i.i.d. DFR random variables is DFR and (ii) the number of customers served during a busy period in an M/G/1 queue with increasing failure rate service times is DFR. Recent results of Szekli (1986) and the closure property of i.i.d. DFR random variables under geometric compounding are combined to show that the stationary waiting time in a GI/G/1 (M/G/1) queue with DFR (increasing mean residual) service times is DFR. We also provide sufficient conditions on the inter-renewal times under which the renewal function is concave. These results shed some light on a conjecture of Brown (1981). Author (GRA)

N87-12305# North Carolina Univ., Chapel Hill. Dept. of Statistics.
INFORMATION CAPACITY OF THE MISMATCHED GAUSSIAN CHANNEL
Charles R. Baker Dec. 1985 38 p
(Contracts N00014-81-K-0373; N00014-84-C-0212)
(AD-A170255) Avail: NTIS HC A03/MF A01 CSCL 09/4

Information capacity is determined for the additive Gaussian channel when the constraint is given in terms of a covariance different from that of the channel noise. These results, combined with previous results on capacity when the constraint covariance is the same as the noise covariance, provide a complete and general solution for the information capacity of the Gaussian channel without feedback. They are valid for both continuous-time and discrete-time channels, and require only two assumptions: the noise energy over the observation period is finite (w.p.l.), and the constraint is given in terms of a reproducing kernel Hilbert space norm. Applications include channels with ambient noise having unknown covariance, and channels subject to jamming. The results for the mismatched channel differ markedly from those for the matched channel. GRA

N87-12306# North Carolina Univ., Chapel Hill. Dept. of Statistics.
CONVERGENCE THEOREMS OF SAMPLER PROCESSES WITH APPLICATIONS TO IMAGE PROCESSING
Kenjiro Yanagi Jan. 1986 22 p
(Contracts N00014-81-K-0373; N00014-84-C-0212)
(AD-A170256) Avail: NTIS HC A02/MF A01 CSCL 12/1

We consider sampling methods for multidimensional random fields. We study the convergence of a sampler process generated by the methods stated in Introduction. We can apply convergence theorem to the restoration of degraded images in image processing. Author (GRA)

N87-12307# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
A CENTRAL LIMIT THEOREM FOR MARKOV PATHS AND SOME PROPERTIES OF GAUSSIAN RANDOM FIELDS Technical Report, Sep. 1985 - Aug. 1986
Robert J. Adler and R. Epstein Feb. 1986 62 p
(Contract F49620-85-C-0114)
(AD-A170258; TR-134; AFOSR-86-0380TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

Our primary aim is to build versions of generalized Gaussian processes from simple, elementary components in such a way that as many as possible of the esoteric properties of these elusive objects become intuitive. For generalised Gaussian processes, or fields, indexed by smooth functions or measures on R sub d, our building blocks will be simple Markov processes whose state space is R sub d. Roughly speaking, by summing functions of the local times of the Markov processes we shall, via a central limit theorem type of result, obtain the Gaussian field. This central limit result, together with related results indicating how additive functionals of the Markov processes generate additive functionals of the fields, yield considerable insight into properties of generalised Gaussian processes such as Markovianess, self-similarity, locality of functionals, etc. Although the paper is comprised primarily of new results, and despite the fact that the subject matter is somewhat esoteric, our aims are primarily didactic and expository - we want to try to initiate the uninitiated into some of the mysteries of generalised processes via an easily understood model. Author (GRA)

N87-12308# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ASYMPTOTIC DISTRIBUTIONS OF FUNCTIONS OF THE EIGENVALUES OF THE SAMPLE COVARIANCE MATRIX AND CANONICAL CORRELATION MATRIX IN MULTIVARIATE TIME SERIES
M. Taniguchi and P. R. Krishnaiah Mar. 1986 35 p
(Contracts F49620-85-C-0008; N00014-85-K-0292)
(AD-A170282; TR-86-08; AFOSR-86-0357TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper discusses the asymptotic distributions of eigenvalues of sample covariance matrices of multivariate time series since the eigenvalues play a fundamental role in multivariate problems. Section 2 gives the limiting distribution of eigenvalues of sample covariance matrices for non-Gaussian linear vector processes. Further Section 3 derives the asymptotic expansions of certain functions of eigenvalues of covariance matrix for multivariate Gaussian stationary processes and discuss their applications for time series principal component analysis. In Section 4 the author gives the asymptotic expansions of certain functions of canonical correlation matrix for multivariate Gaussian stationary processes, and discusses some asymptotic properties of a test statistic for canonical correlations. GRA

N87-12309# Army Armament, Munitions and Chemical Command, Aberdeen Proving Ground, Md. Systems Analysis Office.
METHODS FOR CALCULATING THE PROBABILITY DISTRIBUTION OF SUMS OF INDEPENDENT RANDOM VARIABLES Final Report
George J. Schlenker Jul. 1986 79 p
(AD-A170465; AMSMC/SA/MR-8) Avail: NTIS HC A05/MF A01 CSCL 12/1

This report surveys numerical methods for obtaining the probability distribution of a sum of statistically independent random variables. Study objectives are to investigate the relative accuracy and computational effort for each of the following methods: (1) evaluation of closed-form solutions for particular cases, (2) discrete numerical convolution of probability densities, (3) Normal probability approximation to the distribution of a sum, (4) numerical inversion of the Laplace transform of the convolution, (5) Erlang approximation for convolutions of a two-parameter Weibull distribution, (6) convolution of probability densities using the FFT algorithm for calculating finite Fourier transforms, and (7) Monte-Carlo simulation. Methods are sketched for deriving analytic expressions for the distribution of the sum of RVs of certain distributions. Each numerical method is described and illustrated using RVs from several distributional forms, such as uniform, exponential, gamma, and Weibull, as well as mixture models. In terms of run time and accuracy, some methods are particularly suited to certain distributional forms. If problem applications are quite special and if the time for program coding (as well as running) is a consideration, Monte-Carlo simulation may be the preferred method. All computer source programs are listed in annexes. GRA

N87-12310# Sandia National Labs., Albuquerque, N. Mex.
COMPARISON OF MAXIMUS/BOUNDING AND BAYES/MONTE CARLO FOR FAULT TREE UNCERTAINTY ANALYSIS
S. C. Hora (Hawaii Univ., Hilo.) and R. L. Iman Mar. 1986 71 p
Prepared in cooperation with Sandia National Labs., Albuquerque, NM.
(Contract DE-AC04-76DP-00789)
(DE86-011704; SAND-85-2839) Avail: NTIS HC A04/MF A01

A comparison of two methodologies for the analysis of uncertainty in risk analyses is presented. One methodology combines approximate methods for confidence interval estimation of system reliability with a bounding approach for information derived from expert opinion. The other method employs Bayesian arguments to construct probability distributions for component reliabilities using data from experiments and observation and expert opinion. The system reliability distribution is then derived using a conventional Monte Carlo analysis. An extensive discussion of the differences between confidence intervals and Bayesian probability intervals precedes the comparison. The comparison is made using a trial problem from the Arkansas Nuclear One-Unit 1 Nuclear Power Plant. It is concluded that the Maximus/Bounding methodology tends to produce somewhat longer intervals than the Bayes/Monte Carlo method, although this finding is based on comparisons made under nonidentical assumptions regarding the treatment of operator recovery rates. The Bayes/Monte Carlo method is shown to produce useful information regarding the importance of uncertainty about each component's reliability in determining overall uncertainty. DOE

N87-12311# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
COMPUTATION OF THE INVARIANT PROBABILITY OF A NONLINEAR STOCHASTIC SYSTEM AND APPLICATIONS TO QUEUEING SYSTEMS
B. N. Bui, S. Baudas, M. Grojnowski, and H. Korezlioglu Nov. 1985 11 p
(ENST-85D007; ISSN-0751-1345; ETN-86-97866) Avail: NTIS HC A02/MF A01

A method of computation or approximation of the stationary probability of a pair of discrete time stochastic processes, taking their values in finite spaces is presented. One of the processes is considered as a Markovian state process and the other is an observation process. The model can be used in the study of nonlinear transmission channels and voice packet transmission local area networks. The method, inspired from the study of random walks, is a recurrence method and can be extended to more complicated situations. ESA

N87-12312# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Systemes et Communications.
AN APPROACH TO A MARKOVIAN REALIZATION OF TWO-PARAMETER PROCESSES
H. Korezlioglu and P. Loubaton Feb. 1986 24 p
(ENST-86D001; ISSN-0751-1345; ETN-86-97867) Avail: NTIS HC A02/MF A01

The Markovian realization problem for a two-parameter process when the pasts are defined by an increasing sequence of left half-planes is considered. Explicit results for processes with rational spectral densities are given. ESA

N87-12313# Rome Univ. (Italy). Dipt. di Fisica.
THE NONLINEAR SIGMA MODEL: THREE LOOPS RENORMALIZATION AND LATTICE SCALING

M. Falcioni and A. Treves 19 Jun. 1985 27 p
(Preprint-466; ETN-86-97901) Avail: NTIS HC A03/MF A01

The first nonuniversal terms of the renormalization group functions for the nonlinear sigma-model regularized on a lattice, for a choice of different lattice actions were calculated. Such terms fix the leading corrections to universal asymptotic scaling. However, comparison with Monte Carlo simulations shows that the actual deviations from universal scaling are due to nonperturbative effects, and not to perturbative analytic corrections. The latter are nonetheless relevant to determine the ratios of scaling operators to lambda-parameters. ESA

N87-12314# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
MONOTONICITY OF RANK STATISTICS IN SOME NONPARAMETRIC TESTING PROBLEMS
B. F. Schriever Sep. 1985 17 p
(Rept-292; B8575511; ETN-86-98523) Avail: NTIS HC A02/MF A01

For nonparametric testing problems (one-sided two-sample problem, k-sample trend problem, testing independence against positive dependence) a partial ordering over the alternatives is defined. This partial ordering expresses the strength of the deviation from the null-hypothesis. All familiar rank tests turn out to be more powerful under increasing alternatives; that is, all familiar rank statistics preserve the ordering stochastically in samples whenever it is present between underlying distributions. As a tool, the sample equivalence of the ordering is introduced as a partial ordering over pairs of permutations. Functions, defined on pairs of permutations, which preserve this ordering are studied. ESA

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N87-11740*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTIDISCIPLINARY SYSTEMS OPTIMIZATION BY LINEAR DECOMPOSITION
J. Sobieski *In its* Recent Experiences in Multidisciplinary Analysis and Optimization, Part 1 1984 24 p (For primary document see N87-11717 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

N87-11772*# Failure Analysis Associates, Palo Alto, Calif.
FUNDAMENTAL DIFFERENCES BETWEEN OPTIMIZATION CODE TEST PROBLEMS IN ENGINEERING APPLICATIONS
E. D. Eason *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 15 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

N87-11777*# Michigan Univ., Ann Arbor. Dept. of Mechanical Engineering.
ON THE UTILIZATION OF ENGINEERING KNOWLEDGE IN DESIGN OPTIMIZATION
Panos Papalambros *In* NASA. Langley Research Center Recent Experiences in Multidisciplinary Analysis and Optimization, Part 2 1984 16 p (For primary document see N87-11750 03-05)
Avail: NTIS HC A22/MF A01 CSCL 12B

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N87-12315# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
STOCHASTIC INTEGRATION FOR OPERATOR VALUED PROCESSES ON HILBERT SPACES AND ON NUCLEAR SPACES
H. Korezlioglu and C. Martias Mar. 1986 60 p Revised
(Contract F49620-85-C-0144)
(AD-A168501; TR-85; AFOSR-86-0326TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

The representation of a nuclear space valued square integrable martingale by means of another nuclear space valued square integrable martingale is given in terms of stochastic integrals of operator valued processes. The construction of the stochastic integral goes through that of operator valued processes on Hilbert spaces. A new approach is given for the Hilbertian case, so that only the integration of Hilbert-Schmidt operator valued processes is needed to represent square integrable martingales.
Author (GRA)

N87-12316# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Applied Mathematics.
RELATION BETWEEN TAU-FUNCTIONS AS DETERMINANTS AND GROUP ORBITS: PLUECKER RELATIONS
G. Post May 1986 19 p
(Memo-568; ETN-86-98515; ISSN-0169-2690) Avail: NTIS HC A02/MF A01

Two ways of introducing tau-functions of the KP-hierarchy, namely as group-orbit of a highest weight vector, and as polynomial related to elements of a Grassmannian manifold, are shown to be completely equivalent. This is done by considering the principal and the wedge realization of the basic module of the Lie albebra of A infinity. Pluecker relations are discussed. ESA

N87-12317# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
CLASSIFICATION OF WEAKLY INFINITE-DIMENSIONAL SPACES AND ESSENTIAL MAPPINGS
Piet Borst Jul. 1985 79 p
(Rept-289; B8575510; ETN-86-98521) Avail: NTIS HC A05/MF A01

A classification of weakly infinite-dimensional spaces is given by introducing the weak large transfinite dimension w-Ind. This function coincides with the covering dimension dim in the finite case. The classification provided by w-Ind is the same as the one given by Pol's (1983) index for weakly infinite-dimensional compact metric spaces. Results concerning the relation between w-Ind and essential mappings into Henderson's (1968) cubes J sup alpha, where alpha is a countable ordinal number are obtained. It is proved that for a compact metric space X, the following statements are equivalent: index X is greater than or = omega 0 sup alpha (ordinal exponentiation); w-Ind X is greater than or = alpha; there exists an essential mapping of X x C, the product of X with the Cantor set, to J sup alpha. ESA

N87-12318# Vrije Universiteit, Amsterdam (Netherlands). Dept. of Mathematics and Computer Science.
N-DIMENSIONAL TOTALLY DISCONNECTED TOPOLOGICAL GROUPS
Jan vanMill Sep. 1985 13 p
(Rept-296; ETN-86-98527) Avail: NTIS HC A02/MF A01

The space X, called totally disconnected if every two distinct points x, y is a member of X have disjoint neighborhoods which are both open and closed is discussed. It is proved that if G is an LCA group with dim G greater than or = n+1, then G contains a totally disconnected subgroup H with dim H greater than or = n. If G is metrizable then H can be constructed to be a Borel subset of G. ESA

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N87-12319 British Aerospace Public Ltd. Co., Bristol (England). Mechanical Equipment Dept.

LINEAR AND ROTATIONAL ACCELERATION OF A 3D RIGID BODY
K. S. Khan 26 Sep. 1984 12 p
(MED-Info-Sheet-715; LR50995; ETN-86-97953) Avail: Issuing Activity

Rigid body equations of motion based on kinematics principles are derived for accelerometers clustered at and around the center of gravity. Six and nine-accelerometer arrangements are compared. Results show that to compute correct accelerations at a point by employing rigid body kinematics, the angular velocities should be included in the equations. The choice of the location of accelerometers is the key to the solution of rigid body motion problems, i.e., the equations are much simpler to handle for accelerometers stationed at the body axes. The six-accelerometer configuration requires stepwise integrations for the evaluation of rotational accelerations. Step integration may accumulate errors and show instability. The nine accelerometer configuration is much more reliable, since it does not require stepwise integration. Rotational velocities and rotations can be found by integrating the rotational accelerations. ESA

N87-12320*# Alabama Univ., Huntsville. School of Science.
NEW EXPERIMENTS TO CONSTRAIN THE COEFFICIENTS OF THE ROBERTSON TRANSFORMATIONS FOR INERTIAL SYSTEMS Final Report, 30 Sep. 1985 - 30 Sep. 1986
Douglas G. Torr and Larry L. Smaley Nov. 1986 36 p
(Grant NAG8-47)
(NASA-CR-179908; NAS 1.26:179908) Avail: NTIS
HC A03/MF A01 CSCL 20C

A feasibility study was conducted to evaluate a measurement of the variability in the one-way speed of light by a direct-time-of-flight approach. The proposed experiment design was successfully completed and the initial tests indicated that the approach is viable. Author

N87-12321# Rome Univ. (Italy). Dipt. di Fisica.
ON THE QUANTIZATION OF ANOMALOUS THEORIES
M. Testa and K. Yoshida 26 Jul. 1985 10 p
(Preprint-473; ETN-86-97908) Avail: NTIS HC A02/MF A01

The possible definition of the Gauss law operator in an anomalous gauge theory is discussed. It is shown that the most natural choice does not lead to any anomaly in the commutation rules. The case of two dimensional theories is considered. ESA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N87-12322*# Lockheed-California Co., Burbank.
WINDOW ACOUSTIC STUDY FOR ADVANCED TURBOPROP AIRCRAFT Final Report
R. A. Prydz and F. J. Balena Aug. 1984 48 p
(Contract NAS1-16441)
(NASA-CR-172391; NAS 1.26:172391; LR-30727) Avail: NTIS
HC A03/MF A01 CSCL 20A

An acoustic analysis was performed to establish window designs for advanced turboprop powered aircraft. The window transmission loss requirements were based on A-weighted interior noise goals of 80 and 75 dBA. The analytical results showed that a triple pane window consisting of two glass outer panes and an inner pane of acrylic would provide the required transmission loss and meet the sidewall space limits. Two window test articles were fabricated for laboratory evaluation and verification of the predicted transmission loss. Procedures for performing laboratory tests are presented. Author

N87-12323*# Douglas Aircraft Co., Inc., Long Beach, Calif.
LIGHTWEIGHT SIDEWALLS FOR AIRCRAFT INTERIOR NOISE CONTROL Final Report
D. N. May, K. J. Plotkin, R. G. Selden, and B. H. Sharp Feb. 1985 154 p
(Contract NAS1-17263)
(NASA-CR-172490; NAS 1.26:172490) Avail: NTIS
HC A08/MF A01 CSCL 20A

A theoretical and experimental study was performed to devise lightweight sidewalls for turboprop aircraft. Seven concepts for new sidewalls were analyzed and tested for noise reduction using flat panels of 1.2 m x 1.8 m (4 ft x 6 ft), some of which were aircraft-type constructions and some of which were simpler, easier-to-construct panels to test the functioning of an acoustic principle. Aircraft-application sidewalls were then conceived for each of the seven concepts, and were subjectively evaluated for their ability to meet aircraft nonacoustic design requirements. As a result of the above, the following sidewall concepts were recommended for further investigation: a sidewall in which the interior cavity is vented to ceiling and underfloor areas; sidewalls with wall-mounted resonators, one having a conventional trim panel and one a limp one; and a sidewall with a stiff outer wall and a limp trim panel. These sidewalls appear to promise lower weights than conventional sidewalls adjusted to meet similar acoustic requirements, and further development may prove them to be practical. Author

N87-12324# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
NUMERICAL STUDY OF THE DAMPING OF ACOUSTIC WAVES IN A DUCT WITH SPLITTER PLATES
J. R. Piechena and G. E. A. Meier Jul. 1985 171 p Sponsored by Max-Planck Gesellschaft
(MPIS-20/1985; ISSN-0436-1199; ETN-86-98219) Avail: NTIS
HC A08/MF A01; Fachinformationszentrum, Karlruhe, West Germany DM32

The finite element method was applied to study the performance of solid and resistive splitter plates as muffler elements. Two-dimensional effects were treated. The acoustic performance of a wide range of solid muffler elements was calculated in terms of transmission and insertion loss. A resistive muffler element was analyzed. The optical range of flow resistance of the splitter plate material was predicted. Experiment results are in good accordance with numerical results. ESA

N87-12325# European Space Agency, Paris (France).
TWO METHODS FOR CALCULATING ACOUSTIC WAVE PROPAGATION THROUGH AN INTERFACE
Come Crance Jan. 1986 134 p Transl. into ENGLISH from "Presentation de Deux Methodes de Calcul de Propagation dOndes Acoustiques en Presence dUn Dioptre" (Chatillon, France) Original language document was announced as N86-18128
(ESA-TT-955; ONERA-NT-1985-2; ETN-86-98243) Avail: NTIS
HC A07/MF A01

Two methods for calculating the amplitudes of acoustic waves propagated through a plane boundary are presented. The first is analytical and is based on the Cagniard method. It is used for solving the reflection and transmission of pulsed waves from an infinite line source or a point source at an infinite plane boundary separating two media with different acoustic velocities and densities; and the reflection of an acoustic pulse from an infinite line source or a point source at a plane boundary described as a surface of acoustic impedance Z. The second method is based on a fast Fourier transform algorithm. It is used to evaluate Sommerfeld type integrals. Its results are compared with those given by the stationary phase method and by the geometrical acoustics approximation. ESA

N87-12326# European Space Agency, Paris (France).
ON SOUND PROPAGATION IN CENTRIFUGAL FAN CASINGS
Manfred Bartenwerfer and Teofani Gikadi Dec. 1985 44 p Transl. into ENGLISH from "Zur Schallausbreitung in Gehaeusen von Radialventilatoren" (Berlin, West Germany) Original language document was announced at N86-16053
(ESA-TT-957; DFVLR-FB-85-32; ETN-86-98244) Avail: NTIS
HC A03/MF A01; original German version avail. at DFVLR, Cologne, West Germany DM 11

Sound propagation in radial fan hollow casings was studied

for cylindrical and spiral-shaped casings of the same volume and width. After measurement of the sound reflection through the different casings a monopole or dipole sound source of reduced expansion at the casing cut-off was introduced and the frequency responses in the intake and outflow canals determined. The influence of casing geometry and the flow in the casing on the rejection level and on the system frequency responses was determined. The applicability of the one-mode approximation for description of the frequency responses was verified. Torsional sound in the outflow canal can be reduced with a phase-variable sound source synchronous with the rotation frequency at the cut-off. ESA

N87-12327# Institut Franco-Allemand de Recherches, St. Louis (France).
INTRODUCTION TO HELICOPTER NOISE [INTRODUCTION AU BRUIT DES HELICOPTERES]
J. Haertig 7 Feb. 1984 25 p In FRENCH
(ISL-NB-401/84; ETN-86-98405) Avail: NTIS HC A02/MF A01

Literature on the intensity and characteristics of the external noise produced by helicopters was reviewed. Several types of noise are described and illustrated by measurements and calculations. ESA

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N87-12328*# Baylor Coll. of Medicine, Houston, Tex. Dept. of Medicine.
IN VIVO NUCLEAR MAGNETIC RESONANCE IMAGING Final Report
Adrian LeBlanc 30 May 1986 34 p
(Contract NAS9-17256)
(NASA-CR-179902; NAS 1.26:179902) Avail: NTIS HC A03/MF A01 CSCL 20H

During the past year the Woodlands Baylor Magnetic Resonance Imaging (MRI) facility became fully operational. A detailed description of this facility is given. One significant instrument addition this year was the 100 MHz, 40cm bore superconducting imaging spectrometer. This instrument gives researchers the capability to acquire high energy phosphate spectra. This will be used to investigate ATP, phosphocreatinine and inorganic phosphate changes in normal and atrophied muscle before, during and after exercise. An exercise device for use within the bore of the imaging magnet is under design/construction. The results of a study of T sub 1 and T sub 2 changes in atrophied muscle in animals and human subjects are given. The imaging and analysis of the lower leg of 15 research subjects before and after 5 weeks of complete bedrest was completed. A compilation of these results are attached. Author

N87-12329# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
STATISTICAL MECHANICS OF CHARGED OBJECTS: GENERAL METHOD AND APPLICATIONS TO SIMPLE SYSTEMS
Y. Rosenfeld and L. Blum 27 May 1986 51 p
(Contract N00014-81-C-0776)
(AD-A168918; TR-21) Avail: NTIS HC A04/MF A01 CSCL 20/13

Real fluids are composed of molecules that are objects of complex geometries and charge distributions. By studying the asymptotic high density limit (AHDL) and the asymptotic strong coupling limit (ASCL) one is able to reduce the problem of computing the thermodynamics and correlation functions of the system to a geometrical calculation involving overlap integrals between the objects. In previous work a simple geometrical, physically intuitive meaning of the direct correlation functions (dcf) I for point charges in a background (as interactions between smeared charges) and hard sphere (as overlap volumes) within the mean spherical approximation (MSA) was given, thus also revealing its analytic structure. A general variational approach to study a system composed of complex charged molecules is discussed. In this approach the variational trial functions for the free energy functional are constructed from the asymptotic limiting (AL) forms of the direct correlation functions. A number of examples are discussed, and in each case the variational form of the direct correlation is given explicitly. The relation to Onsager's procedure of immersing the system in a infinite conducting fluid of obtaining an energy bound is discussed in detail. GRA

N87-12330# Rome Univ. (Italy). Dipt. di Fisica.
RELEVANCE AT AN INTERMEDIATE-RANGE FORCE FOR NEUTRON-ANTINEUTRON OSCILLATION EXPERIMENTS
F. Massa 14 Mar. 1986 6 p
(Nota-Interna-864; ETN-86-97897) Avail: NTIS HC A02/MF A01

The existence of a massive hyperphoton coupled either to the hypercharge or to the baryonic quantum number is discussed. The former possibility is ruled out since a coupling to the hypercharge would lead to a rate for process K(+) yields pi(+) + gamma m (a real hyperphoton) much larger (more than three orders of magnitude) than the upper bound established experimentally for the occurrence of this process. The effect of this interaction on the possible observation of neutron-antineutron oscillations with a free neutron beam is considered. ESA

N87-12331# Rome Univ. (Italy). Dipt. di Fisica.
STRANGE DIBARYONS
G. dAgostini, G. Auriemma, G. Marini, G. Martellotti, F. Massa, A. Nigro, A. Rambaldi, A. Sciubba, J. P. deBrion, A. Caillet et al 26 Mar. 1986 31 p Presented at Topical Seminar on Few and Many Quark Systems, Pisa, Italy, 25-29 Mar. 1985
(Nota-Interna-865; ETN-86-97898) Avail: NTIS HC A03/MF A01

Dibaryonic systems with strangeness S=-2 and S=-1 were studied with a missing mass spectrometer, searching for narrow structures in a mass interval in the neighborhood of the YN, YY thresholds (between 2.0 and 2.5 GeV/csq). No evidence for the presence of structures is found in the reaction K(-)d yields K(+) + MM (B=2, I=1, S=-2) and in the reactions K(-)d yields pi(+) + MM, pi(-)d yields K(+) + MM (B=2, I=3/2, S=-1), at 1.4 GeV/c incident momentum. The production of a strange dibaryonic system (B=2, I=1/2, S=-1) called H1(+) (M=2130 MeV/csq) was studied with incident momenta between 0.9 and 1.4 GeV/c, in the reaction K(-)d yields pi(-) + H1(+) and in the line reversed reaction pi(+)d yields K(+) + H1(+). ESA

N87-12332# Rome Univ. (Italy). Dipt. di Fisica.
PRECISION TESTS OF THE ELECTROWEAK THEORY AT THE Z DEG.
G. Altarelli 17 Jun. 1985 64 p Presented at LEP Physics Jamboree, Geneva, Switzerland, 19 Mar. 1985
(Preprint-464; ETN-86-97899) Avail: NTIS HC A04/MF A01

Experiment parameters needed to examine the electroweak theory via the Z(0) boson are discussed. Measurement of boson mass and width are considered. Asymmetry and Z(0) decay, Higgs searches, and neutrino counts are included. ESA

N87-12333# Rome Univ. (Italy). Dipt. di Fisica.
MULTICHANNEL NONPOTENTIAL SCATTERING THEORY
R. Mignani 17 Sep. 1985 28 p Submitted for publication
(Preprint-476; ETN-86-97911) Avail: NTIS HC A03/MF A01

Multichannel scattering theory is extended to the Lie-isotopic case, in order to take account of contact, nonpotential, nonhamiltonian forces among the colliding particles. It is shown that in the time dependent and in the stationary framework, the basic tools and equations of the conventional treatment (including channel propagators and wave operators, interchannel scattering and transition operators, and Lippmann-Schwinger equations) admit consistent generalizations to the nonpotential case. A two-isohilbert space formulation of the subject, based on the introduction of a Lie-isotopic asymptotic Hilbert space, is also presented. ESA

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N87-12334# Stanford Linear Accelerator Center, Calif.
SUPERSYMMETRY: PROCEEDINGS
E. C. Brennan, ed. Jul. 1985 705 p Presented at the SLAC Summer Institute on Particle Physics, Stanford, Calif. 29 Jul. 1985
(Contract DE-AC03-76SF-00515)
(DE86-007853; SLAC-296; CONF-850768) Avail: NTIS HC A99/MF A01

Some lectures in these proceedings examine the theoretical basis for supersymmetry, recent developments in theories with compact dimensions, and experimental searches for supersymmetric signatures. Technologies are explored for obtaining very high energy electron-positron colliding beams. Separate abstracts were prepared for 35 papers in these conference proceedings. DOE

N87-12335# Hanford Engineering Development Lab., Richland, Wash.
SP-100 GROUND ENGINEERING SYSTEM TEST AT HANFORD POTENTIAL BIDDERS' SITE TOUR, DECEMBER 18, 1985
J. L. Ethridge Dec. 1985 77 p
(Contract DE-AC06-76FF-02170)
(DE86-009964; HEDL-7575) Avail: NTIS HC A05/MF A01

Photographs and technical drawings are presented providing information on the SP-100 test facilities at the Hanford Engineering Development Laboratory. DOE

N87-12336# Rome Univ. (Italy). Dipt. di Fisica.
A HARDWARE PROCESSOR FOR A MISSING ENERGY TRIGGER
A. Frenkel, G. Martellotti, E. Petrolo, A. Tusi, F. Cesaroni, M. DeVincenzi, A. Sciubba, and R. Roosen 10 Jul. 1985 13 p Submitted for publication
(Preprint-468; ETN-86-97903) Avail: NTIS HC A02/MF A01

A hardware processor coupled to a hadron calorimeter to generate a missing energy trigger is described. Its main characteristics, on-line resolution, and response time (13.8 microsec) are discussed. All modules operated satisfactorily for 8 months. ESA

74 OPTICS

N87-12337*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
POWER SYSTEM APPLICATIONS OF FIBER OPTIC SENSORS
A. R. Johnston, S. P. Jackson, H. Kirkham, and C. Yeh Jun. 1986 85 p Sponsored in part by DOE
(NASA-CR-179921; JPL-Pub-86-22; NAS 1.26:179921; DOE/ET-29372/5) Avail: NTIS HC A05/MF A01 CSCL 20F

This document is a progress report of work done in 1985 on the Communications and Control for Electric Power Systems Project at the Jet Propulsion Laboratory. These topics are covered: Electric Field Measurement, Fiber Optic Temperature Sensing, and Optical Power transfer. Work was done on the measurement of ac and dc electric fields. A prototype sensor for measuring alternating fields was made using a very simple electroscope approach. An electronic field mill sensor for dc fields was made using a fiber optic readout, so that the entire probe could be operated isolated from ground. There are several instances in which more precise knowledge of the temperature of electrical power apparatus would be useful. This report describes a number of methods whereby the distributed temperature profile can be obtained using a fiber optic sensor. The ability to energize electronics by means of an optical fiber has the advantage that electrical isolation is maintained at low cost. In order to accomplish this, it is necessary to convert the light energy into electrical form by means of photovoltaic cells. JPL has developed an array of PV cells in gallium arsenide specifically for this purpose. This work is described. Author

N87-12338# George Washington Univ., Washington, D.C. Dept. of Electrical Engineering and Computer Science.
DEVELOPMENT OF ALGORITHMS AND HARDWARE FOR STRUCTURED-LIGHT VISION Final Report
Murray H. Loew, Reza Momenan, Gao Shangkai, and James Hargrove 1986 319 p
(Contract N00014-83-K-0578)
(AD-A168197) Avail: NTIS HC A14/MF A01 CSCL 20/6

Computer vision is finding increased application in robotics and for shipbuilding, construction, machining, sorting, and inspection. An essential part of a computer vision system is the ability to measure range (distance) to points on the surfaces of three-dimensional objects. This information allows the description of such intrinsic characteristics of objects as orientation, surface condition, and dimensions. A goal of the work described here was the development, testing, and evaluation of a real-time system for measuring range, suitable for the kinds of applications described above. A second goal was the development of algorithms for description of objects, based on their range-image representations. We have shown the feasibility, and measured the performance, of a prototype ranging system that uses a technique called structured light; GWU has also derived and implemented algorithms for rapid description of a limited class of objects using only the data that would be supplied by such a system. Included are a FORTRAN computer program and the following papers: (1) PIPE: A Specialized Computer Architecture for Robot Vision; (2) A New Method for Characterization of Shape; (3) The Quadcode and Its Arithmetic; (4) Adjacency Detection Using Quadcodes. GRA

N87-12339# Arizona Univ., Tucson. Optical Sciences Center.
LARGE OPTICS TECHNOLOGY Final Report, 14 Apr. 1980 - 31 Dec. 1984
Robert R. Shannon 22 May 1986 28 p
(Contract N00014-80-C-0565)
(AD-A168222) Avail: NTIS HC A03/MF A01 CSCL 20/6

The purpose of this contract was to support and evaluate work done in the area of high energy laser beam projection systems. The principal areas of interest were the support of the DARPA LODE/LAMP/Alpha programs and particularly large optics technology. The contract was divided into three areas of importance: a review of the various project components to provide scientific engineering and technical assistance; the preparation of analyses as needed in the various project areas; and participation in specific technical meetings, including some proposal review. Another area of interest was the support of related work in the area of optics to provide technical information of importance to specific parts of the high-energy laser program. Reports were produced on the following subjects: Absolute Aspheric Measurement; Effect of Coatings on Aberrations; Modeling of Errors in Systems; Extrapolated Mean Square Methods; Subaperture testing; Absolute Measurement of Radius of Curvature; Wavefront Errors Produced by Multilayer Thin Film Optical Coatings; Analysis of alignment and Surface Figure Errors in Optical Systems; Extrapolated Least Squares Optimization Applied to Lens Design; and Testing of Large Telescopes. GRA

N87-12340# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
SIMPLIFIED DESIGN EQUATIONS FOR AN OPTICAL QUARTER-WAVE STACK REFLECTION FILTER Interim Report, Jul. 1981 - Jun. 1985
Robert J. Spry Apr. 1986 26 p
(AD-A168442; AFWAL-TR-86-4021) Avail: NTIS HC A03/MF A01 CSCL 20/6

Formulas are presented which describe the major operational parameters of the high-rejection, narrow bandwidth, quarter wave stack optical interference filter. Mathematical equivalence is

demonstrated between the results of the development of two prominent, present day theoreticians. To facilitate the understanding of the utility of the simplified equations, a practical design problem has been analyzed. Further areas for application of the equations are suggested. GRA

N87-12341# Naval Postgraduate School, Monterey, Calif.
OPTICAL PHASE CONJUGATION VIA FOUR-WAVE MIXING IN BARIUM TITANATE M.S. Thesis
James R. Ryan Mar. 1986 72 p
(AD-A168908) Avail: NTIS HC A04/MF A01 CSCL 20/6

Optical phase conjugation is a nonlinear optical phenomenon that replicates a distorted electromagnetic wave. This process has potential in distortion correction, pointing and tracking, improved laser resonators, image enhancement, and optical communcations. Nonlinear effects that can produce a phase conjugate wave include; photorefraction, Brillouin scattering, Raman scattering, Kerr-like four-wave mixing, photon echoes, three wave mixing, and electro-restrictive effects. Photorefraction in a crystal of barium titanate can produce a phase conjugate replica of a laser beam through four-wave mixing. Barium titanate is unique because self generated conjugate returns will form from corner reflections. Self pumped optical phase conjugation was achieved at six wavelengths between 457.9 and 514 nm. Factors affecting the return included the laser wavelength, intensity, and angle of incidence with the c axis. The average return amounted to about 25% of the incident beam. The phase conjugate return interacted with the laser modes, significantly increasing the laser power. GRA

N87-12342# Department of the Air Force, Washington, D.C.
DYNAMIC BAR PATTERN METHOD Patent
Gilbert G. Kuperman and Donald L. Wallquist, inventors (to Air Force) Issued 27 May 1986 9 p Supersedes AD-D010777
(AD-D012383; US-Patent-4,591,998; US-Patent-Appl-SN-556861; US-Patent-Class-364-521) Avail: US Patent and Trademark Office CSCL 14/2

Digital apparatus for generating moving grates of stimulus modulated bar patterns is disclosed. The bar patterns are modulated according to sinusoidal or other mathematical relations and can be alternately displayed as color and/or intensity variations on the display screen. Multiple display images, operator control of grate movement, and the use of image processing apparatus are also incorporated. Author (GRA)

N87-12343# Department of the Air Force, Washington, D.C.
PHASE-ONLY OPTICAL FILTER FOR USE IN AN OPTICAL CORRELATION SYSTEM Patent
Joseph L. Horner, inventor (to Air Force) Issued 13 May 1986 16 p Supersedes AD-D011093
(AD-D012396; US-Patent-4,588,260; US-Patent-Appl-SN-596471; US-Patent-Class-350-162.13) Avail: US Patent and Trademark Office CSCL 20/6

A phase-only optical filter capable of being utilized within a phase-only optical correlation system is described. The phase-only optical filter is made by mathematically generating preselected phase-only information by a fast Fourier Transform technique. This generated phase-only information is transferred onto an unexposed holographic film. Therefore, the film is developed and subsequently bleached. The resultant bleached film is the phase-only filter which, when utilized in a correlation system, provides substantially 100% utilization of the source of electromagnetic radiation during the correlation process. GRA

N87-12344# Office of Naval Research, London (England).
OPTICS '86: FOUR WESTERN EUROPEAN COUNTRIES REVIEW RECENT ACHIEVEMENTS
Paul Roman 27 Jun. 1986 10 p Conference held in The Hague, Netherlands, 21-24 May 1986
(AD-A170262; ONRL-C-5-86) Avail: NTIS HC A02/MF A01 CSCL 20/6

The conference in The Hague covered a very broad field of topics, including optoelectronics. This review highlights presentations on nonlinear optics, optical data storage and optical computing, image processing, and novel optical materials. GRA

N87-12345# Eastman Kodak Co., Rochester, N. Y. Government Systems Div.
FRESNEL LENS STUDY
May 1986 54 p Prepared in cooperation with Sandia National Labs.,Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-012249; SAND-86-7034) Avail: NTIS HC A04/MF A01

Thick film sol-gel technology was evaluated to determine the feasibility of utilizing sol-gels to produce embossable materials ultimately for the production of all-glass Fresnel optics. The feasibility study has utilized the relatively undeveloped branch of organically modified sol-gels. The results of this work show that organically modified sol-gels possess properties which allow the formation of thick, patternable and adherent coatings. The study resulted in the fabrication of over 600 samples based on over 100 sol-gel formulations. Samples were evaluated for clarity, transmittance and other optical properties. Environmental tests were performed on selected groups. Although moderate success was obtained on producing a Fresnel lens layer bonded to glass, a fully densified lens was not achieved. The process and chemistries indicate that improvements based on these materials and techniques may lead to an acceptable all-glass Fresnel lens. DOE

N87-12346# MATRA Espace, Toulouse (France).
DESIGN STUDY OF A PUSH-BROOM IMAGER FOR THE THERMAL INFRARED Final Report [ETUDE CONCEPTUELLE DUN IMAGEUR PUSH-BROOM POUR L INFRA-ROUGE THERMIQUE]
P. Hollier, B. Laurent, F. Pasternak, P. Merat, P. Nicolas, J. Vermeiren, and B. Dierickx Paris ESA 1 Mar. 1986 305 p Partly in FRENCH and ENGLISH
(Contract ESTEC-6051/84-NL-PB(SC))
(Matra-094/PH/UB/137.85; ESA-CR(P)-2258; ETN-86-98135) Avail: NTIS HC A14/MF A01

A design and feasibility study of an instrument to produce thermal images of the Earth in 2 spectral bands between 10 and 12 microns is presented. The spatial resolution is 30 m and the radiometric resolution is 0.1 K. The study includes a parametric design and the analysis of problems due to the extension of the push-broom concept to the thermal infrared domain. A preliminary definition of the instrument is based on this analysis and shows that the high spatial resolution implies a mass on the order of 320 kg while for 50 m resolution that mass could be reduced to 120 kg. The development time of such an instrument is estimated as 8 yr. ESA

N87-12347# Research Inst. of National Defence, Linkoeping (Sweden). Dept. 3.
OBSERVATION WITH VIDEO EQUIPMENT IN THE WAVELENGTH RANGE 1.2 TO 2.0 MICROMETER
Carl Hugo Aagren Apr. 1986 21 p In SWEDISH; ENGLISH summary
(FOA-C-30417-E1; ISSN-0347-3708; ETN-86-98331) Avail: NTIS HC A02/MF A01; Swedish Inst. of National Defence, Stockholm, Sweden KR 50

A camera used in the near infrared range (NIR) which can be equipped with different image tubes was tested. The sensitive material is a mixture of PbO and PbS. When observations are limited to the higher wavelengths a carefully prepared filtration of the visible wavelength range must be carried out: types of filters are mentioned. All image generation observations in the 1.0 and 2.0 micrometer area are sharply influenced by water, the absorption band of which is between 1.3 and 1.5 for water vapor and 1.4 to 1.6 for liquid water and snow. Examples of snow photographs are given. A military application of video observation in NIR is the detection of winter camouflage. The NIR camera can also detect heat radiation from an object, but only when its temperature is above 200 C: this device is thus not competitive with IR cameras for this application. ESA

N87-12131# Joint Publications Research Service, Arlington, Va.
VISUAL-OPTICAL ASSESSMENT OF THRESHOLDS OF OBJECT DISTORTION DUE TO LENS DEFECTS IN FLAT GLASS OF VEHICLE CABINS
A. V. Lekarev *In its* USSR Report: Space Biology and Aerospace Medicine (JPRS-USB-86-006) 8 Oct. 1986 p 41-44 Transl. into ENGLISH from Kosmicheskaya Biologiya i Aviakosmicheskaya Meditsina (Moscow, USSR), v. 20, no. 4, Jul. - Aug. 1986 p 29-33
(For primary document see N87-12124 03-51)
Avail: NTIS HC A08/MF A01

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N87-12348# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REDUCTION OF THE GENERAL SPITZER-HAERM PROBLEM IN PLASMA PHYSICS
Antonio Carlos deAlmeida Ferreira Aug. 1986 15 p Submitted for publication
(INPE-3978-PRE/989) Avail: NTIS HC A02/MF A01

The general Spitzer-Haerm problem is unfolded through a redefinition of the dependent variable into two separate simpler problems. The first takes the form of a second order differential equation, and the second that of an integration over the solution of the first problem, which provides the distribution function or, directly, the current and the heat flow. It is shown that the current and the heat flow can in general be synthesized from the solutions of the differential equation for two specific forms of the driving term. Author

N87-12349# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THEORETICAL BEHAVIOR OF FULLY IONIZED MULTIPLE SPECIES MAGNETIZED PLASMAS UNDER ROTATION
J. A. Bittencourt Jun. 1986 59 p
(INPE-3915-RPE-510) Avail: NTIS HC A04/MF A01

A multiple species fluid model for a fully ionized, magnetized plasma under rotation is described. The basic fluid equations are the continuity and momentum equations for each species, including centrifugal, electromagnetic, pressure gradient and collisional forces, in cylindrical geometry. This model is used to describe the steady state behavior of the fully ionized cylindrical plasma column in a laser-initiated vacuum-arc plasma centrifuge. It is shown that there is a family of theoretically possible dynamical equilibrium configurations, which can be achieved by different combinations of ion rotation velocity, radial ion density distribution, and radial dependence of internal electric potential. A numerical analysis is presented which shows the radial distribution and parametric dependences of the various plasma parameters under equilibrium conditions, including the ion separation factor, considering a nickel-copper plasma. The numerical results are analyzed and discussed in light of experimentally measured plasma characteristics in a vacuum-arc plasma centrifuge. Author

N87-12350# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
A COMPUTATIONAL STUDY OF THE INFLUENCE OF MOLECULAR NITROGEN AND LASER ABSORPTION ON PLASMA CHANNEL FORMATION CREATED BY LASER RESONANCE SATURATION OF SODIUM VAPOR
Silvester Siu Kai Wong Apr. 1986 221 p Sponsored in part by Sandia National Lab., and by AF
(UTIAS-292; ISSN-0082-5255) Avail: NTIS HC A10/MF A01

Two aspects of plasma channel formation based on laser resonance saturation are examined. The influence of molecular nitrogen and attenuation of the laser pulse on the ionization are considered separately. The nitrogen molecules are shown to primarily cool the free electrons through vibrational excitation and to increase the rate of collisional quenching of the laser pumped resonance state population. A simplified 5-level model for sodium atoms was also developed for analyzing the laser ionization based on resonance saturation-LIBORS process. Results from this simplified model are found to be in excellent agreement with the more detailed 20-level model, and this model enables the attenuation of the laser pulse to be calculated as it creates ionization along its path. A comparison of the transmitted laser energy predicted by this model and that observed in a series of experiments is found to be quite good. The investigation provides further understanding and insights into the ionization of alkali vapors by resonant (or near resonant) laser irradiation and confirms the major role played by electron superelastic collisions. Author

N87-12351# Naval Research Lab., Washington, D. C.
NON-MAXWELLIAN FREE-ENERGY GENERATION IN THE MAGNETOTAIL DUE TO CHAOTIC PARTICLE MOTION
J. Chen and P. J. Palmadesso 30 May 1986 15 p
(AD-A168504; NRL-MR-5788) Avail: NTIS HC A02/MF A01 CSCL 04/1

It has previously been shown that the charged-particle motion in a magnetotail-like magnetic field is generally non-integrable and that the particle orbits can be classified into three distinct types; the bounded integrable orbits, unbounded stochastic orbits and unbounded transient orbits. The three distinct types of orbits occupy disjoint regions of the phase space. As a result, the different regions of the phase space retain the memory of the existing distribution function for different lengths of time. The concept of differential memory in single-particle distributions is discussed. Physical implications for the dynamical properties of the magnetotail plasmas, and the possible generation of non-Maxwellian features in the distribution function are discussed. GRA

N87-12352# Polytechnic Inst. of New York, Farmingdale. Graduate Center.
MILLIMETER WAVE GENERATION BY RELATIVISTIC ELECTRON BEAMS Final Report, 1 Oct. 1982 - 30 Sep. 1985
Spencer S. Kuo, Bernard R. Cheo, K. K. Tiong, and M. H. Whang 1 Nov. 1985 47 p
(Grant AF-AFOSR-0001-83)
(AD-A168624; POLY-85-011; AFOSR-86-0306TR) Avail: NTIS HC A03/MF A01 CSCL 20/9

The classical technique of transformation and characteristics is employed to analyze the problem of strong turbulence in unmagnetized plasmas. The effects of resonance broadening and perturbation expansion are treated simultaneously without time securities. The renormalization procedure is used in the transformed Vlasov equation to analyze the turbulence and to derive explicitly a diffusion equation. Analyses are extended to inhomogeneous plasma and the relationship between the transformation and ponderomotive force is obtained. GRA

N87-12353# Lawrence Livermore National Lab., Calif.
RADIAL FOKKER-PLANCK MODEL FOR PLASMAS CONFINED BY MAGNETIC MIRROR FIELDS
A. H. Futch May 1986 86 p
(Contract W-7405-eng-48)
(DE86-012225; UCID-20781) Avail: NTIS HC A05/MF A01

A time-dependent computer model has been developed for the spatially dependent distribution function f(r,v,t). An orbit averaged Fokker-Planck equation treats Coulomb collisions and various atomic physics processes. The motivation for the present code is to provide an accurate treatment of gyro-radius effects and realistic beam geometries which have been neglected in previous Fokker-Planck codes. Finite width beams may be offset from the plasma center to determine beam injection for build-up studies. The inclusion of a finite gyro-radius is essential for studying radial transport due to both quasilinear fluctuations and charge exchange collisions. Charge exchange with energetic beam atoms and plasma erosion due to charge-exchange collisions with thermal gas are both included. Quasilinear diffusion terms include the effects of turbulent diffusion in the model. The model has been

used to study particle and energy confinement times in the 2XIIB experiment and in the mirror plug of the TMX experiment. Calculated values of T(sub e) decrease from classical Fokker-Planck values (1000 eV for 2XIIB) to the 50 eV to 200 eV range observed in 2XIIB and TMX experiments. Radial density profiles and magnetic field agree with experiments. DOE

N87-12354 California Univ., Berkeley.
MAGNETOHYDRODYNAMIC SHOCKS IN MOLECULAR CLOUDS Ph.D. Thesis
David Fisher Chernoff 1985 471 p
Avail: Univ. Microfilms Order No. DA8609976

Part one develops the mathematical and physical theory of one dimensional, time-independent subalfvenic flow in partially ionized gas with magnetic fields, for application to shocks in molecular clouds. Unlike normal gas dynamic shocks, the neutral flow may be continuous and cool if the gas radiates efficiently and does not self-ionize. Analytic solutions are given in the limit that the neutral gas is either adiabatic or isothermal (cold). Numerical techniques are developed and applied to find the neutral flow under general circumstances. Part two extends the theory and results of part one in three ways: (1) to faster, superalfvenic flows, (2) to complex gases containing heavy charged particles (grains) in addition to ions, electrons and neutrals, and (3) to the entire range in (Omega tau), the ratio of charged particle damping time to gyroperiod, expected in gas flows in molecular clouds. Dissert. Abstr.

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

N87-12355*# Illinois Univ., Urbana. Dept. of Electrical and Computer Engineering.
SEMICONDUCTOR SUPERLATTICE PHOTODETECTORS Semi-annual Report, 1 Jan - 30 Jun. 1986
S. L. Chuang, K. Hess, J. J. Coleman, and J. P. Leburton 1986 44 p
(Grant NAG1-500)
(NASA-CR-179850; NAS 1.26:179850) Avail: NTIS HC A03/MF A01 CSCL 20L

During the past half-year, the research effort centered on further investigating both the new superlattice photomultiplier with tunneling-assisted impact ionization and the photodetector based on the real space transfer mechanism. A brief outline of the current status of these projects is presented. Detailed analyses are included in Appendices A and B. New results of the tunneling-assisted impact ionization are presented. Author

N87-12356*# North Carolina State Univ., Raleigh. Dept. of Chemistry.
ZONE LEVELING AND SOLUTION GROWTH OF COMPLEX COMPOUND SEMICONDUCTORS IN SPACE Final Report, 1 May 1983 - 30 Sep. 1986
Klaus J. Bachmann 16 Oct. 1986 28 p
(Grant NAG1-354)
(NASA-CR-179884; NAS 1.26:179884) Avail: NTIS HC A03/MF A01 CSCL 20L

A research program on complex semiconducting compounds and alloys was completed that addressed the growth of single crystals of CdSe(y)Te(1-y), Zn(x)Cd(1-x)Te, Mn(x)Cd(1-x)Te, InP(y)As(1-y) and CuInSe2 and the measurement of fundamental physico-chemical properties characterizing the above materials. The purpose of this ground based research program was to lay the foundations for further research concerning the growth of complex ternary compound semiconductors in a microgravity environment. Author

N87-12357*# Eloret Corp., Sunnyvale, Calif.
SIMULATION STUDIES FOR SURFACES AND MATERIALS STRENGTH Semiannual Report, 1 May - 31 Oct. 1986
Timur Halicioglu Oct. 1986 6 p
(Contract NCC2-297)
(NASA-CR-177046; NAS 1.26:177046) Avail: NTIS HC A02/MF A01 CSCL 20L

During this reporting period three investigations were carried out. The first area of research concerned the analysis of the structure-energy relationship in small clusters. This study is very closely related to the improvement of the potential energy functions which are suitable and simple enough to be used in atomistic simulation studies. Parameters obtained from ab initio calculations for dimers and trimers of Al were used to estimate energetics and global minimum energy structures of clusters continuing up to 15 Al atoms. The second research topic addressed modeling of the collision process for atoms impinging on surfaces. In this simulation study qualitative aspects of the O atom collision with a graphite surface were analyzed. Four different O/graphite systems were considered and the aftermath of the impact was analyzed. The final area of investigation was related to the simulation of thin amorphous Si films on crystalline Si substrates. Parameters obtained in an earlier study were used to model an exposed amorphous Si surface and an a-Si/c-Si interface. Structural details for various film thicknesses were investigated at an atomistic level. M.G.

N87-12358# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DENSITY OF STATES DUE TO PAIRING OF IMPURITIES IN SEMICONDUCTOR SYSTEMS
E. A. deAndradaeSilva, I. C. daCunhaLima, and A. FerreiradaSilva Oct. 1986 18 p Submitted for publication
(INPE-4009-PRE/1001) Avail: NTIS HC A02/MF A01

The pair formation of hydrogen - like impurities in 3-D and 2-D systems is studied. The density of states is obtained for the ground state of the H2 - like molecule and H2+ - like ion for concentrations realizable in doped semiconductors and MOS structures. The joint density of states for the transition H2 yields H2+ is also obtained. The calculated bandwidth shows that pair formation is relevant in those systems. Author

N87-12359# California Inst. of Tech., Pasadena. Div. of Chemistry and Chemical Engineering.
ELECTRON TUNNELING MICROSCOPY Final Report, 1 Sep. 1984 - 30 Nov. 1985
John D. Baldeschwieler 20 May 1986 4 p
(Contract N00014-89-K-0638)
(AD-A168234) Avail: NTIS HC A02/MF A01 CSCL 14/5

Within the past few years a new technique for surface studies has been introduced by researchers at the IBM Research Laboratory in Zurich, Switzerland which is capable of atomic resolution. This method, called Scanning Tunneling Microscopy (STM), involves positioning a probe a few angstroms from the surface of interest using a piezoelectric ceramic. A small potential is applied across the gap and the electron tunneling current is measured. The probing tip is then scanned across the surface in two dimensions also using piezoelecric ceramics while adjusting the distance between the tip and surface to maintain a constant current. In this way the tip is made to follow the contours of the surface. The resolution obtained in this way is about 3A in the surface plane, and 0.1 A normal to the surface. GRA

N87-12360# State Univ. of New York, Buffalo. Dept. of Chemistry.
SYNTHESIS AND CRYSTAL AND MOLECULAR STRUCTURE OF IN(C5Me5)-AN APPARENT OCTAHEDRAL CLUSTER
O. T. Beachley, Jr., Melvyn R. Churchill, James C. Fettinger, J. C. Pazik, and L. Victoriano 29 May 1986 13 p Submitted for publication
(Contract N00014-78-C-0562)
(AD-A166281; TR-15) Avail: NTIS HC A02/MF A01 CSCL 07/4

The new compound In(C5Me5) has been prepared and characterized by an X-ray structural study as an octahedral cluster. This new indium(I) compound is a golden yellow, volatile crystalline

solid at room temperature. An X-ray structural study demonstrates that the compound crystallizes in the rhombohedral space group R3 (C superscript 2 sub 3i; No. 148) with unit cell parameters (hexagonal setting) a=20.182(4), c=13.436(3)angstrom, V-4739(2) angstrom and Z=18. The structure refined to R sub F=3.6% and R sub wF=3.3% for all 1870 unique data. The crystal consists of an octahedral cluster (In(C5Me5)6) with indium atoms on the interior and eta 5 -C5Me5 units on the exterior. All pentamethylcyclopentadienyl rings exhibit eta 5-coordination to indium but the centroid indium vectors do not point toward the center of the hexaindium cluster as in other main-group clusters. GRA

N87-12361# Illinois Univ., Urbana. Coordinated Science Lab.
DEEP-LEVEL TRANSIENT SPECTROSCOPY STUDIES OF GALLIUM ARSENIDE - ALUMINUM GALLIUM ARSENIDE HETEROSTRUCTURES AND SUPERLATTICES
Paul A. Martin May 1986 82 p
(Contracts N00014-76-C-0806; DAAG29-84-K-0001)
(AD-A168328; UILU-ENG-86-2212) Avail: NTIS HC A05/MF A01 CSCL 20/12

This report presents the results of two projects. First, the feasibility of using deep-level transient spectroscopy (DLTS) to measure conduction band-edge discontinuities in GaAS-AlGaAs quantum-well heterostructures is evaluated theoretically and experimentally. Second, defects in GaAs - AlGaAs superlattices are examined using DLTS. Deep-level transient spectroscopy is reviewed, as are theoretical and experimental attempts to predict and measure band offsets. A theory of electron capture into and emission out of quantum wells in response to pulsed bias is developed. DLTS studies of GaAs AlGaAs quantum-well structures are presented and compared with the results of previous studies of defects in MOCVD GaAs and AlGaAs. Emission of electrons out of the GaAs quantum well is observed, but at emission rates in excess of those predicted by thermionic emission or by phonon assisted tunneling. In the absence of a model for the emission process, meaningful data for band-edge discontinuities cannot be extracted from the measured emission rates. Further characterization of the emission process would be of great value in the development of devices based on heterojunction technology. Data are also presented from a DLTS study of defect states in GaAs - AlGaAs superlattices. Doubling the layer thickness from 50 to 100 A resulted in a dramatic change in the defects observed. This is accounted for by the presence of a conducting miniband in one super-lattice and its absence in the other. GRA

N87-12362# California Univ., San Diego, La Jolla. Dept. of Electrical Engineering and Computer Science.
INTERFACIAL PROPERTIES OF GERMANIUM NITRIDE DIELECTRIC LAYERS IN GERMANIUM Final Report, 1 Jul. 1984 - 30 Jun. 1985
L. G. Meiners 1986 9 p
(Contract N00014-84-K-0459)
(AD-A168332) Avail: NTIS HC A02/MF A01 CSCL 20/3

The first year's effort on this project has been primarily devoted to the design and construction of a low-pressure chemical vapor deposition system for growth of the germanium nitride layers. The gas manifold layout is shown schematically, as is the reactor assembly, and the vacuum pumping assembly. The generator-cavity system is capable of delivering 0-600 W of microwave power at 2.45 GHz. The power generating section has been constructed from components contained in a portable home microwave oven and the cavity was assembled from easily machinable pieces. The cw magnetron source was mounted directly on a cylindrical microwave cavity. The plasma was contained in an on-axis 20-mm o.d. quartz tube. Design tradeoffs and operating information are discussed. GRA

N87-12363# California Univ., Santa Barbara.
RESEARCH ON SEMICONDUCTOR HETEROSTRUCTURES Final Report, Jun. 1977 - 85
Herbert Kroemer May 1986 10 p
(Contract N00014-77-C-0430)
(AD-A168357) Avail: NTIS HC A02/MF A01 CSCL 20/12

A wide diversity of topics related to various new properties of semiconductor heterostructures were investigated, ranging from an intense occupation with the problem of the band lineup at semiconductor heterojunctions, to the problem of the MBE growth of GaAs/Ge alloys and the structure of these alloys, with a variety of topics in between. The development, under this contract, of the C-V profiling technique for the determination of heterojunction band offsets has since then emerged as the most reliable technique of offset determination and which has widely displaced the quantum well absorption technique as the preferred method of offset determination. Below-gap light emission from staggered-lineup heterojunctions has become unusually timely with the discovery that the (Al, Ga)As/GaAs heterosystem is a staggered-lineup system. Several other topics investigated also contributed to an advancement of the understanding of semiconductor heterostructures. GRA

N87-12364# Optical Society of America, Washington, D. C.
TOPICAL MEETING ON MICROPHYSICS OF SURFACES, BEAMS AND ADSORBATES HELD AT SANTA FE, NEW MEXICO ON 4 - 6 FEBRUARY 1985 Final Technical Digest
Jarus W. Quinn 18 Dec. 1985 123 p Meeting held at Santa Fe, N. Mex., 4-6 Feb. 1985
(Grant AF-AFOSR-0018-85)
(AD-A168618; AFOSR-86-0309TR) Avail: NTIS HC A06/MF A01 CSCL 07/5

The Topical Meeting on Microphysics of Surfaces, Beams, and Adsorbates was organized within the interdisciplinary area of molecule/surface interactions induced, or studied, by laser and ion beam techniques. Especially emphasized was the molecular physics and electromagnetism of beam activated chemical reactions for applications in fabrication of semiconductor devices, in photocatalysis, and in optical recording. Emphasis was on the laser spectroscopy of molecular collision and reaction processes on surfaces, new sensitive or high resolution spectroscopies for studies of adsorbates, and optical methods applied to surface characterization. GRA

N87-12365# California Univ., San Diego. Dept. of Electrical Engineering and Computer Science.
RESEARCH ON MATERIALS AND COMPONENTS FOR OPTO-ELECTRONIC SIGNAL PROCESSING Interim Report, 1 Oct. 1984 - 30 Nov. 1985
William S. Chang, Albert L. Kellner, Timothy VanEck, L. M. Walpita, and H. H. Wieder 26 Dec. 1985 19 p
(Grant AF-AFOSR-0389-84)
(AD-A168751; AFOSR-86-0283TR) Avail: NTIS HC A02/MF A01 CSCL 09/1

Electroabsorption and electrorefraction properties of heterostructures and multiple quantum-well structures in III-V semiconductors were investigated for spatial modulation and optical fiber communication applications. Optical waveguides are fabricated and evaluated. A new device, the gate controlled photo diode (GCPD) has been conceived and demonstrated. It has potential applications in optical signal processing. GRA

N87-12366# Rockwell International Corp., Thousand Oaks, Calif. Microelectronics Research and Development Center.
LSI/VLSI ION IMPLANTED PLANAR GaAs IC PROCESSING Final Report, 1 Jan. 1983 - 31 Mar. 1985
C. G. Kirkpatrick Nov. 1985 55 p
(Contract F49620-83-C-0042; ARPA Order 3384)
(AD-A168786; MRDC41129.12FR; AFOSR-86-0304TR) Avail: NTIS HC A04/MF A01 CSCL 09/1

The scope of this program was two-fold: (1) to complete and stabilize the development of a planar fabrication process for high speed digital integrated circuits on 3-inch GaAs wafers, and (2) to utilize gate arrays up to the 1k equivalent gate level as the demonstration circuits for this process development. In addition to optimizing equipment and handling techniques for 3-inch GaAs wafers, the process development task concentrated on test chip characterizations, threshold voltage uniformity control, and materi-

sis evaluation. Piezoelectrically generated device non-uniformities were a primary consideration during this time. The gate array development involved two masked sets. The first was used to establish process and design criteria for gate arrays, as well as to fabricate a 5 x 5 multiplier. The second mask set was an extension of the previous work, and was used to fabricate gate arrays of the 1k equivalent gate complexity. The Mayo Foundation provided the expertise for auto-routing and personalization techniques.
Author (GRA)

N87-12367# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
SURFACE VIBRATIONS AND (2X1) SUPERSTRUCTURES ON FCC(110) METAL SURFACES
Joseph A. Stroscio, M. Persson, and W. Ho Jun. 1986 49 p
(Contracts N00014-82-K-0576; N00014-81-K-0505)
(AD-A168788; TR-22) Avail: NTIS HC A03/MF A01 CSCL 07/4

Electron energy loss spectra are presented for a number of adsorbate overlayers which form (2x1) superstructures on the fcc(110) surface of Nickel and Copper. These include (2x1) structures of H, N2, CO, and O. Lattice dynamical slab calculations are used to analyze the vibrational properties observed in the loss spectra which result from symmetry selection rules for dipole activity of the surface phonons. The calculated spectral densities, together with the symmetry selection rules, are used to analyze proposed models for the adsorbate overlayer structures. GRA

N87-12368# Illinois Univ., Urbana. Coordinated Science Lab.
HIGH SPEED COMPOUND SEMICONDUCTOR DEVICES IN LAYERED STRUCTURES Final Report, 1 Jan. 1983 - 31 Dec. 1985
Hadis Morkoc 25 Feb. 1986 68 p
(Contract F49620-83-K-0021)
(AD-A168866; AFOSR-86-0301TR) Avail: NTIS HC A04/MF A01 CSCL 20/12

Much progress has been made in the growth of GaAs on Si, GaAs MESFETs, MODFETs, HBTs, lasers on Si, modeling of MODFETs and MODFET ring oscillators, InGaAs/AlGaAs MODFETs, InGaAs hot electron transistors, GaAs/AlAs resonant tunneling transistors, single and multi quantum wells. Accomplishments were reported in about 200 journal articles, 50 conference papers and 25 seminars over the past three years. Only the GaAs on Si, In sub yGa sub1-7As/AlGaAs MODFET and INGaAs hot electron transistor related research accomplishments are summarized in this document. A list of publications covering all of the research funded by the AFOSR is provided as an appendix for those who are interested. Author (GRA)

N87-12369# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PREPARATION AND INVESTIGATION OF AMORPHOUS GALLIUM ARSENIDE FILMS
Rulin Wu, Kunji Chen, and Zoya Yang 11 Jun. 1986 19 p Transl. into ENGLISH from Bandaoti Zuebao (China), v. 6, no. 4, Jul. 1985 p 355-361
(AD-A168907; FTD-ID(RS)T-0304-86) Avail: NTIS HC A02/MF A01 CSCL 20/12

A new method for the preparation of a-GaAs films – Plasma Enhanced Chemical Transport Deposition (PECTD) is described. The experimental results indicate that a bright smooth surface, a nearly stoichiometric composition and a good reproducibility of the a-GaAs films could be obtained if proper technological conditions were selected and controlled. The growth mechanism of PECTD is also discussed. GRA

N87-12370# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
THE DISCRETE SITE STICKY WALL MODEL Interim Technical Report
J. P. Badiali, L. Blum, and M. L. Rosinberg 27 May 1986 13 p
(Contract N00014-81-C-0776)
(AD-A168910; TR-23) Avail: NTIS HC A02/MF A01 CSCL 20/13

The interface between a solid and a liquid is modelled by a flat surface with an array of sticky sites which could be placed on a regular lattice, or also randomly. It is first shown that the thermodynamics and distribution functions can be expressed entirely in terms of the distribution functions of the system without the sticky sites. Furthermore, the problem of the occupation of the sites (equivalent to the adsorption isotherm), is a lattice problem which exhibits phase transitions and critical points. A simple application to the interface between a solid and a fluid of hard spheres is discussed. GRA

N87-12371# Rensselaer Polytechnic Inst., Troy, N.Y.
RESEARCH ON MERCURY CADMIUM TELLURIDE Annual Report, 15 Feb. 1985 - 15 Feb. 1986
Sorab K. Ghandhi 20 May 1986 84 p
(Contract N00014-85-K-0151)
(AD-A170477) Avail: NTIS HC A05/MF A01 CSCL 07/4

This report summarizes work done during the first year of the program. Progress on the proposed tasks is described, together with a review of accomplishments. These include the design of a new epitaxial reactor, the growth of high quality CdTe and HgCdTe on both GaAs and CdTe substrates, and the development of a comprehensive theory for the growth of CdTe in OMCVD systems. GRA

N87-12372# Wisconsin Univ., Madison. Materials Science Center.
INTERFACIAL REACTIONS BETWEEN AMORPHOUS W-S1 THIN FILMS AND POLYCRYSTALLINE OVERLAYERS
R. E. Thomas, J. H. Perepezko, and J. D. Wiley 1986 7 p Presented at the Fall Meeting of the Materials Research Society, Boston, Mass., Dec. 1985 Submitted for publication
(Contract DE-FG02-84ER-45096)
(DE86-008959; CONF-851217-63) Avail: NTIS HC A02/MF A01

Interactions between amorphous metal thin films and either a substrate or an overlayer can limit their effectiveness as diffusion barrier. It was found previously that Au and Al polycrystalline thin films in contact with amorphous W-Si lowers the crystallization temperature of the a-(W-Si) by at least 100 C. In contrast Cu and Mo have no apparent effect on the stability of the amorphous layer. The mechanisms leading to premature crystallization are not well understood. Amorphous W.72Si.28 was deposited by sputtering onto single crystal substrates. Overlayers of Al were then evaporated onto the W-Si. Using Auger electron spectroscopy depth profiling coupled with cross section transmission electron microscopy, interfacial reactions were studied between the amorphous layer and polycrystalline Al. Auger profiling results show that in the case of Al overlayers, W and Si diffuse out of the a-(W-Si) into the Al where WAl12 forms. These results can be explained in the context of three binary diffusion couples, W-Si, W-Al, and Al-Si, and the individual interactions associated with these couples. Author

N87-12373# Ames Lab., Iowa.
DENSITY OF STATES AT MID GAP IN HYDROGENATED AMORPHOUS SILICON
E. Yahya and H. R. Shanks 1986 6 p Presented at the 3rd International Symposium on Optical and Optoelectrical Applied Science and Engineering, Innsbruck, Austria, 14 Apr. 1986
(Contract W-7405-eng-82)
(DE86-011403; IS-M-584; CONF-8604210-1) Avail: NTIS HC A02/MF A01

The density of states distributions near mid gap in a series of hydrogenated amorphous silicon films have been determined from space charge limited current measurements. The measurements were made on Au/aSi:H Schottky diode structures prepared by reactive rf sputter deposition. Samples with hydrogen concentrations near 16% as determined from infrared absorption had densities of states of 3 x 10 to the 14th power states/cu cm eV. The experimental results indicate that high quality aSi:H films with low densities of states can be obtained under certain deposition conditions and that the density of states at mid gap is hydrogen concentration dependent with a minimum near 16%. For a given hydrogen concentration, films thicker than 2 micrometers yielded

the lowest density of states consistent with a model in which diffusion currents can be neglected and where surface and interface layers have a higher defect density than the bulk of the film. DOE

N87-12374# Rome Univ. (Italy). Dipt. di Fisica.
TUNNELING IN ONE DIMENSION: GENERAL THEORY, INSTABILITIES, RULES OF CALCULATION, APPLICATIONS
G. Jona-Lasinio, F. Martinelli, and E. Scoppola 2 Sep. 1985 40 p Submitted for publication
(Preprint-475; ETN-86-97910) Avail: NTIS HC A03/MF A01

Techniques used to analyze the semiclassical limit in quantum mechanics are illustrated by one dimensional tunneling problems. A set of rules obeyed by the logarithmic derivative of the ground state wave function which are valid in any situation are presented. Double well problems are discussed. Tunneling through sequences of two types of barriers in situations of increasing complexity is analyzed. Inductive methods to derive the behavior in a long sequence from the analysis of short subsequences are obtained. Results are sufficient to treat physically interesting problems. A hierarchical model where tunneling can be analyzed over all possible scales is treated. ESA

N87-12375# British Aerospace Public Ltd. Co., Bristol (England). Materials Research Dept.
ANALYSIS OF THE LIQUID CRYSTAL LIGHT VALVE USING BI12SIO20 AS THE PHOTOCONDUCTOR
S. S. Makh Nov. 1983 31 p
(LR49625; ETN-86-97950) Avail: NTIS HC A03/MF A01

The liquid crystal light valve (LCLV) using BSO as the photoconductor was analyzed, under ac conditions, using an equivalent electrical circuit. This permits the behavior of the LCLV to be examined as a function of temporal frequency of the driving voltage. Theoretical modulation transfer function curves can be drawn to look at the effects of photoconductor thickness on the device resolution. An analysis carried out by Aubourg et al (1982) who report that a 25V ac voltage is sufficient to switch the liquid crystal was repeated. Similar results are not obtained. ESA

N87-12376# British Aerospace Public Ltd. Co., Bristol (England). Materials Research Dept.
A MODEL FOR THE LIQUID CRYSTAL LIGHT VALVE. PART 1: ANALYSIS OF CHARGE TRAPPING IN THE BSO AND ITS EFFECT ON THE DEVICE RESOLUTION
S. S. Makh Jan. 1984 57 p
(BAe-BT-15603; LR49836; ETN-86-97972) Avail: NTIS HC A04/MF A01

The effect of charge trapping on the resolution of the Pockels readout optical modulator was analyzed according to Owechko and Tanguay (1979 to 1980). The variation of sensitivity and resolution is examined as a function of spatial frequency and charge separation. The model of Owechko and Tanguay is modified to solve the geometry of the liquid crystal light valve using bismuth silicon oxide as the photoconductor. The appropriate differential equations are set up and solved and the variation of sensitivity and resolution is examined as a function of symmetric and asymmetric charge location and spatial frequency. ESA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N87-12377 ESDU International Ltd., London (England).
HEAT CAPACITY AND ENTHALPY OF LIQUIDS: ALKANES
May 1986 46 p Supersedes ESDU-77025
(ESDU-86007; ISBN-0-85679-559-3; ISSN-0141-4062; ISSN-0141-4070) Avail: ESDU

This Data Item ESDU 86007 is an addition to the Physical data, chemical engineering, and Physical data, mechanical engineering Sub-series. The heat capacity and enthalpy data are given for 70 alkanes tabulated at 10 K intervals between the normal melting point and 0.96 critical temperature along the saturation line. The data were obtained by fitting a polynomial equation to experimental data for heat capacity for each compound taken from a wide range of sources in the literature; the constants of the equations were also faired with molecular structure for compounds that were members of the same chemical series. The enthalpy values were obtained by integrating the specific heat capacity polynomial for each compound. The coefficients of the equations are tabulated together with values of critical temperature and normal melting point for each compound. An estimation of the accuracy of the predictions is included. ESDU

N87-12378# Rome Univ. (Italy). Dipt. di Fisica.
ON THE MASSIVE SINE GORDON EQUATION IN ALL REGIONS OF COLLAPSE
F. Nicolo, J. Renn, and A. Steinmann 12 Nov. 1985 66 p Sponsored by Studienstiftung des Deutschen Volkes, and Schweizerischer Nationalfonds
(Nota-Interna-856; ETN-86-97890) Avail: NTIS HC A04/MF A01

The ultraviolet stability for the cosine interaction in two dimensions and finite volume is rederived for values alpha sq epsilon 4 pi, 32/5 pi and proved for the remaining alpha sq epsilon 4 pi, 8 pi using renormalization group methods developed by Gallavotti and Nicolo (1985) to portray renormalized effective potentials arising from a multiscale decomposition. ESA

N87-12379# Rome Univ. (Italy). Dipt. di Fisica.
SOLITON SURFACES 7. RELATIVISTIC STRING IN EXTERNAL FIELD: GENERAL INTEGRAL AND PARTICULAR SOLUTIONS
A. Sym, O. Ragnisco, D. Levi, and M. Bruschi Jul. 1985 8 p Submitted for publication
(Preprint-467; ETN-86-97902) Avail: NTIS HC A02/MF A01

The general integral of the equations of motion of a relativistic string in a constant external field is given. The N-soliton excitations are constructed and one-soliton excitation is discussed. The one soliton excitation produces a motion analogous to the helicoidal motion of an electron in a constant magnetic field. ESA

N87-12380# Rome Univ. (Italy). Dipt. di Fisica.
THE 1915 EPISTOLARY CONTROVERSY BETWEEN A. EINSTEIN AND T. LEVI-CIVITA
Carlo Cattani and Michelangelo deMaria 25 Jul. 1985 55 p Presented at 4th Marcell Grossmann Meeting on the Recent Developments of General Relativity, Rome, Italy, 17-21 Jun. 1985
(Preprint-472; ETN-86-97907) Avail: NTIS HC A04/MF A01

The variational approach to General Relativity developed by Einstein in 1914 is examined. The limited covariance properties of the gravitational field equations derived with this method by Einstein are discussed. The scientific controversy which took place between Einstein and Levi-Civita is reconstructed. It is concluded that Levi-Civita had an important, although indirect, influence on Einstein's subsequent formulation of generally covariant gravitational field equations. ESA

N87-12381# Rome Univ. (Italy). Dipt. di Fisica.
STOCHASTIC MECHANICS OF A DIRAC PARTICLE IN TWO SPACE-TIME DIMENSIONS
Gian Fabrizio deAngelis, Giovanni Jona-Lasinio, Maurizio Serva, and Nino Zanghi 2 Sep. 1985 15 p Submitted for publication
(Preprint-474; ETN-86-97909) Avail: NTIS HC A02/MF A01

The stochastic mechanics of a Dirac particle interacting with an arbitrary external electromagnetic field in two dimensional Minkowski space is developed. The construction provides a consistent stochastic interpretation of solutions of the true (real time) Dirac equation and gives a stochastic description of the Zitterbewegung. ESA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N87-12382# National Science Foundation, Washington, D.C.
ACADEMIC SCIENCE/ENGINEERING: R AND D FUNDS, FISCAL YEAR 1984 (DETAILED STATISTICAL TABLES)
Apr. 1986 17 p
(PB86-216017) Avail: NTIS HC A02/MF A01 CSCL 05I

Tabular data for fiscal year 1984 is reported which were collected from a sample of 403 institutions of higher education from the universe of 566 schools granting a graduate science or engineering degree and/or performing at least $50,000 in separately budgeted reaearch and development expenditures. In addition, the universe includes 17 federally funded research and development centers. Data are tabulated by: (1)source of funds; (2)science and engineering disciplines; (3)character of work; (4)institutional control (public/private); (5)largest performers' ranking; (6)total and federally financed current fund expenditures for research equipment; and (7)capital expenditures for facilities and equipment for research, development, and instruction. Trend tables are included for most elements. Survey coverage, methodology, sampling procedure, and response rates are described and copies of the survey instruments are included. Author

N87-12383# Temple Univ., Philadelphia, Pa. Inst. for Survey Research.
METHODOLOGICAL APPROACH TO THE 1984 NEW ENTRANTS SURVEY Final Report, 1984 - 1985
May 1986 241 p Sponsored by NSF
(Grant NSF SRS-82-02228)
(PB86-212305; NSF/SRS-82-02228) Avail: NTIS HC A11/MF A01 CSCL 05I

The report presents a description of the methodology of the 1984 New Entrants Survey. The survey was administered in 1984-85 to a sample of baccalaureate and master's degree recipients in science and engineering fields who had received their degree during the academic years 1980, 1982, and 1983. In addition to a description of the survey methodology, the report presents estimates of sampling error and survey response rates. Data collection instruments and associated materials are presented in the appendix. GRA

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N87-12384*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRATEGIC PLAN, 1985
1985 33 p
(NASA-TM-89263; NAS 1.15:89263) Avail: NTIS HC A03/MF A01 CSCL 05A

The Lewis Strategic Plan was updated for 1985 and beyond. Major programs for the space station, the advanced turboprop, the Advanced Communications Technology Satellite (ACTS), and the Altitude Wind Tunnel were begun or greatly expanded during 1984. In parallel, The Lewis aeropropulsion research and technology program was extensively evaluated and reviewed; a reduced and reoriented program emerged. The thrusts and implementation plans for these programs are described as they pertain to the individual directorates. Other key accomplishments and plans are summarized. B.G.

N87-12385# Florida State Univ., Tallahassee. Dept. of Statistics.
ON THE ELEMENTARY THEOREMS OF DECISION THEORY
Narassinga R. Chaganty Jun. 1986 20 p
(Contract DAAL03-86-K-0094)
(AD-A170285; FSU-STATISTICS-M732; TR-D-91-ARO; ARO-23699.1-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This document considers a statistical decision problem in which nature has a finite number of states. The elementary theorems of decision theory, namely the Minimax theorem, the Complete class room theorem, and theorems on the structure of admissible rules, are proved in most texts under the assumptions that the risk set is closed from below and bounded from below. The condition that the risk set is bounded from below is sufficient for the existence of the lower boundary points; however, that it is not necessary can be seen from simple examples. The purpose of this paper is to extend the elementary theorems of decision theory to include the case in which the risk set is not bounded from below and the set of lower boundary points is nonempty. The author also shows that if the risk set is bounded from above then it is necessary for the risk set to be bounded from below for the set of lower boundary points to be nonempty. Examples are presented to illustrate this theorems. Author (GRA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N87-12386*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PUBLICATIONS OF THE JET PROPULSION LABORATORY, 1984
1 Jul. 1985 35 p
(NASA-CR-179870; JPL-Bibl-39-26; NAS 1.26:179870) Avail: NTIS HC A03/MF A01 CSCL 05B

The Jet Propulsion Laboratory (JPL) bibliography 39-26 describes and indexes by primary author the externally distributed technical reporting, released during calendar year 1984, that resulted from scientific and engineering work performed, or managed, by the Jet Propulsion Laboratory. Three classes of publications are included: (1) JPL Publications (82-, 83-, 84-series, etc.), in which the information is complete for a specific accomplishment; (2) articles from the quarterly Telecommunications and Data Acquisition (TDA) Program Report (42-series); and (3) articles published in the open literature. Author

N87-12387# Air Command and Staff Coll., Maxwell AFB, Ala.
USING OPTICAL DISK AS THE STORAGE MEDIA DEVICE FOR THE MASTER PERSONNEL FILES
Terry L. Brooks Apr. 1986 38 p
(AD-A168390; ACSC-86-0350) Avail: NTIS HC A03/MF A01 CSCL 09/2

Growing demands on the HQ Air Force Military Personnel Center (AFMPC) system warranted research on optical disk computer technology to determine its potential to enhance the personnel system's capability, and to complement the Honeywell systems in this already demanding environment. This paper reviews the current state-of-the-art and recommends that HQ AFMPC budget for the acquisition of an optical disk prototype system to further explore the advantages of this type of storage media device to the HQ AFMPC processing environment. This storage media will serve as a supplement to the current Honeywell system. Other suggested Optical disk applications for HQ AFMPC to pursue include: possible replacement for the numerous paper records that are placed on microfilm at HQ AFMPC. This area requires a labor intensive environment for transferring records from paper to microfiche. The use of the optical disk system could reduce or possibly eliminate the manpower requirement for this paper to microfilm transition. Reduction in the space requirements of the storage media computer equipment at HQ AFMPC. This could result in a possible elimination of the bulky offline storage

systems (magnetic tape) and a reduction in the manpower requirement. GRA

N87-12388# California Univ., Berkeley. Lawrence Berkeley Lab.
A USER'S GUIDE TO THE SOCIOECONOMIC ENVIRONMENTAL DEMOGRAPHIC INFORMATION SYSTEM (SEEDIS)
Fredic C. Gey Jan. 1986 130 p
(AD-A168917; IWR-86-UM-1) Avail: NTIS HC A07/MF A01 CSCL 05/3

SEEDIS, the Lawrence Berkeley Laboratory's Socio-Economic Environmental-Demographic Information system, is an integrated information system for retrieving, analyzing, and displaying selected portions of large data bases. These include a wide variety of geographically linked data on the United States' population, economy, agriculture, employment, mortality, air quality, and energy production and use. For Corps of Engineers' planners, SEEDIS is primarily useful for obtaining demographic and socioeconomic data for economic base studies, social profiles and other plan formulation and evaluation tasks. Using SEEDIS Corps analysts can: (1) retrieve over 50,000 pieces of information at county levels of detail and over 1,000 pieces of data for sub-county levels of geography; (2) transform SEEDIS data into formats useable by statistical analysis programs (SPSS and SAS) as well as by popular microcomputer Spreadsheet programs (LOTUS 1-2-3); and (3) download SEEDIS files or transformed files to microcomputer using communications software. This manual guides a new SEEDIS user on a step-by-step tour through the elements of SEEDIS. This journey is illustrated by examples screens, each of which builds upon previous ones. The examples focus on a three county geographic area (the Topeka Kansas SMSA) and on data from the 1947 to 1977 County Data Book and 1980 Census summary tape files. GRA

N87-12389# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ARMY TECHNOLOGY DEVELOPMENT. IBIS QUERY. SOFTWARE TO SUPPORT THE IMAGE BASED INFORMATION SYSTEM (IBIS) EXPANSION FOR MAPPING, CHARTING AND GEODESY Final Report
Steven Z. Friedman, Richard E. Walker, and Robert B. Aitken Jun. 1986 126 p
(AD-A169609; JPL-D-2802; ETL-0422) Avail: NTIS HC A07/MF A01 CSCL 09/2

The Image Based Information System (IBIS) has been under development at the Jet Propulsion Laboratory (JPL) since 1975. It is a collection of more than 90 programs that enable processing of image, graphical, tabular data for spatial analysis. IBIS can be utilized to create comprehensive geographic data bases. From these data, an analyst can study various attributes describing characteristics of a given study area. Even complex combinations of disparate data types can be synthesized to obtain a new perspective on spatial phenomena. In 1984, new query software was developed enabling direct Boolean queries of IBIS data bases through the submission of easily understood expressions. An improved syntax methodology, a data dictionary, and display software simplified the analysts' tasks associated with building, executing, and subsequently displaying the results of a query. The primary purpose of this report is to describe the features and capabilities of the new query software. A secondary purpose of this report is to compare this new query software to the query software developed previously (Friedman, 1982). With respect to this topic, the relative merits and drawbacks of both approaches are covered. GRA

N87-12390# Brown Univ., Providence, R. I. Center for Neural Science.
PSYCHOLOGICAL CONCEPTS IN A PARALLEL SYSTEM
James A. Anderson and Gregory L. Murphy 27 Jun. 1986 50 p Submitted for publication
(Contract N00014-81-K-0136; Grants NSF BNS-82-14728; NSF BNS-83-15145)
(AD-A169615) Avail: NTIS HC A03/MF A01 CSCL 05/10

Many parallel information processing systems have been proposed which are loosely based on the architecture of the nervous system. Many of the testable predictions of these systems fall in the realm of cognitive science since they perform some computations well and some poorly and have pronounced psychologies. In such system, simple elements are connected to each other; the elements act like neurons in that they sum excitation and inhibition from other elements. Information is represented as large state vectors of element activities, and it can be shown that simple synaptic learning rules can serve to associate arbitrary state vectors using a matrix of connections. One version of this class of models has been shown in the past to form concepts and to perform classification computations. This paper discusses the general importance and structure of psychological concepts and describes three simulations of a simple neural model that attempts to reproduce a few of the important properties of human concept formation. GRA

N87-12391# Argonne National Lab., Ill.
NATIONAL ENERGY SOFTWARE CENTER
L. R. Eyberger 1986 7 p Presented at the VIM-44 Conference, Columbus, Ohio, 7 Apr. 1986
(Contract W-31-109-eng-38)
(DE86-010515; CONF-8604193-1) Avail: NTIS HC A02/MF A01

A short introduction is given to the services of the National Energy Software Library at the Argonne National Laboratory. The objectives, history, and software collection of the center are presented. Information on ordering from the software collection of the library is also included. DOE

N87-12392# Sandia National Labs., Albuquerque, N. Mex.
PDES LOGICAL LAYER INITIATION TASKS Final Report
J. C. Kelly 28 Apr. 1986 684 p
(Contract DE-AC04-76DP-00789)
(DE86-012289; SAND-86-1048C) Avail: NTIS HC A99/MF A01

PDES stands for Product Data Exchange Standard. A long-term project, chaired by Kalman Brauner of the Boeing Company, existed within the IGES Committee to develop PDES. This project had two primary objectives: (1) to develop an exchange standard for product data in support of industrial automation, and (2) to represent the US position in the International Standards Organization (ISO) arena relative to the development of a single worldwide standard for the exchange of product data. Product Data is taken to be more general than product definition data. It includes data relevant to the entire life cycle of a product; manufacturing, quality assurance, testing, and support. Development of an exchange standard for product data involved settling on a set of logical structures to contain the product data information, and also settling on the manner in which these structures will be implemented in computer form. DOE

N87-12393# Politecnico di Milano (Italy). Dipt. di Elettronica.
COMPUTING COVERS FOR EMBEDDED FUNCTIONAL DEPENDENCIES
Georg Gottlob 1986 33 p
(Rept-86-006; ETN-86-97940) Avail: NTIS HC A03/MF A01

A reduction by resolution algorithm for computing covers for the functional dependencies embedded in a subset of a given relation schema is presented. Although the problem of computing covers for embedded dependencies is inherently exponential, the algorithm behaves polynomially for several classes of inputs. It can be used for the solution of related problems in the theory of data base design, such as deciding whether a given data base scheme is in Boyce-Codd Normal Form or decomposing a scheme into Boyce-Codd Normal Form. ESA

N87-12394# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
ESTIMATING BUCKET ACCESSES: A PRACTICAL APPROACH
Alle IJbema and Henk Blanken Jul. 1985 32 p
(INF-85-18; ETN-86-98168) Avail: NTIS HC A03/MF A01

The data base query optimization problem of estimating the number of bucket accesses, when drawing randomly and without replacement k balls from m buckets containing together n balls is discussed. The expected number of buckets from which at least

one ball has been drawn depends strongly on the distribution of the balls over the buckets. A set of ball distributions covering many practical situations is defined. For a member of this set the expected number of upper and lower bound for this number can be given. A very fast method to approximate this expected number for an arbitrary member of the set is given. ESA

N87-12395# Institut National Polytechnique, Grenoble (France). Lab. de Genie Informatique.
LOGICAL TREATMENT OF KNOWLEDGE SEMANTIC INTEGRITY AND ORGANIZATION IN DATA BASE MANAGEMENT SYSTEMS Ph.D. Thesis [TRAITEMENT LOGIQUE DE L'INTEGRETE ET DE L'ORGANISATION SEMANTIQUE DES CONNAISSANCES DANS LES SYSTEMES DE GESTION DE BASES DE DONNEES]
Judith Olivares 1986 164 p In FRENCH Sponsored by Fondation Venezuelienne Gran Mariscal d'Ayacucho
(ETN-86-98398) Avail: NTIS HC A08/MF A01

Data semantic integrity in data base management systems was studied. The organization of knowledge such as general laws of an environmental reality is analyzed using a method which allows their coherent definition. The proposed ideas are formalized using first order predicate calculus. Prolog language is used to implement these ideas. It is shown that this logics approach is applicable to obtain a uniform treatment of data semantic integrity, operation on open or closed data universes, and the treatment of implicit data. ESA

N87-12396# Technische Hogeschool Twente, Enschede (Netherlands). Dept. of Informatics.
EXTENDING A RELATIONAL INTERFACE WITH RECURSION
Peter M. G. Apers, Maurice A. W. Houtsma, and Frank Brandse May 1986 26 p
(INF-86-10; ISBN-90-365-0040-0; ETN-86-98518) Avail: NTIS HC A03/MF A01

The mu-calculus is used to extend a relational interface with recursion. With a mu-calculus, regular and non regular recursion can be expressed uniformly. Transition graphs are used to graphically represent a regular recursive query. Algorithms to process the transitive closure and regular recursive queries are proposed. The latter is based on transforming transition graphs. The minimization objectives are the number of joins and unions. ESA

N87-12397# Office of Technology Assessment, Washington, D.C.
FEDERAL GOVERNMENT INFORMATION TECHNOLOGY: MANAGEMENT, SECURITY AND CONGRESSIONAL OVERSIGHT
Feb. 1986 190 p
(PB86-205499; OTA-cIT-297; LC-86-600507) Avail: NTIS HC A09/MF A01 CSCL 05B

Five major issues are addressed: management of information technology, including strategic planning, innovation, procurement, and the information resources management (IRM) concept; information systems security and computer crime; information technology and decision support; management of government information dissemination; and opportunities for using information technology in conducting congressional oversight. GRA

N87-12398# National Technical Information Service, Springfield, Va.
NTIS (NATIONAL TECHNICAL INFORMATION SERVICE) PRIVATIZATION STUDY RESPONSES TO APRIL 28, 1986 FEDERAL REGISTER NOTICE REQUEST FOR PUBLIC COMMENT
Jun. 1986 304 p
(PB86-211240) Avail: NTIS HC A14/MF A01 CSCL 05B

Approximately 96 responses to the 1986 Federal Register notice requesting public comment on the National Technical Information Service privatization study are given. A compilation of responses only is given: no evaluation or summary is included. GRA

N87-12399# University of Southern California, Los Angeles. School of Communications.
PUBLIC PERSPECTIVES ON GOVERNMENT INFORMATION TECHNOLOGY: A REVIEW OF SURVEY RESEARCH ON PRIVACY, CIVIL LIBERTIES AND THE DEMOCRATIC PROCESS
W. H. Dutton and R. G. Meadow Jun. 1985 91 p Sponsored in part by Office of Technology Assessment
(PB86-218419) Avail: NTIS HC A05/MF A01 CSCL 05B

The primary purpose is to review survey research on public attitudes toward governmental uses of new communication, computing, and information technologies. Particular attention is paid to the implications of governmental information technologies for civil liberties and democratic processes. A secondary purpose is to identify generalizations about the public's views toward these issues that tend to be supported or refuted across surveys. A third and final purpose is to speculate on possible public reactions to governmental uses of emerging technologies which have implications for privacy or other civil liberties. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

N87-12400# Committee on Commerce, Science, and Transportation (U. S. Senate).
AUTHORIZATION OF APPROPRIATIONS FOR THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR FISCAL YEAR 1987
Washington GPO Sep. 1986 85 p Report to accompany S. 2714 Presented by the Committee on Commerce, Science and Transportation of the 99th Congress, 2d Session, 29 Sep. 1986
(S-Rept-99-501; GPO-71-010) Avail: US Capitol, Senate Document Room

Information is given relative to Senate Bill 2714. This is a bill to authorize appropriations for NASA for research and development, space flight, control and data communications, construction of facilities, and research and program management, among other purposes. R.J.F.

N87-12401# Committee of Conference (U. S. Congress).
MAKING APPROPRIATIONS FOR THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT AND FOR SUNDRY INDEPENDENT AGENCIES, BOARDS, COMMISSIONS, CORPORATIONS AND OFFICES FOR THE FISCAL YEAR ENDING SEPTEMBER 30, 1987
1986 31 p Report to accompany H.R. 5313 presented by the Committee of Conference to the 99th Congress, 2d Session, 27 Oct. 1986
(GPO-64-330) Avail: US Capitol, House Document Room

The recommendations by the managers for the House and Senate on the appropriations for the Department of Housing and Urban Development, and sundry independent agencies, boards, commissions, corporations, and offices for the fiscal year ending September 30, 1987 are discussed. B.G.

N87-12402# Committee on Science and Technology (U. S. House).
HEARINGS BEFORE THE SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS OF THE COMMITTEE ON SCIENCE AND TECHNOLOGY, 99TH CONGRESS, 2ND SESSION, NO. 132, 25, 27 FEBRUARY; 11, 13, 20 MARCH; 9, 10 APRIL, 1986, VOLUME 2

1986 799 p
(GPO-61-777) Avail: US Capitol, House Document Room
The National Aeronautics and Space Administration fiscal year 1987 budget is examined. The impact of the loss of the Challenger and its crew on the space program is assessed. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N87-12403# Executive Office of the President, Washington, D.C.
BIENNIAL SCIENCE AND TECHNOLOGY REPORT TO THE CONGRESS, 1983-1984
Oct. 1985 165 p
(PB86-209632) Avail: NTIS HC A08/MF A01 CSCL 05D
The report provides a comprehensive statement of science and technology policy priorities. It also highlights future opportunities in selected areas of research. The following topics are discussed: Decisions and actions in science and technology; Outlook in selected areas of science and engineering; Federal research and development programs; International cooperation in science and technology. GRA

N87-12404# Wisconsin Univ., Milwaukee. Center for Urban Transportation Studies.
TECHNOLOGY TRANSFER PRIMER Final Report
R. P. Schmitt, E. A. Beimborn, and M. J. Mulroy Jul. 1985 64 p
Sponsored by Federal Highway Administration
(PB86-205341; FHWA/TS-84/226) Avail: NTIS HC A04/MF A01 CSCL 05A
A general definition and broad overview of the Technology Transfer (T2) Process is provided from a general point of view. The operative elements which need to be included in a successful T2 process are described. Also, included are generic outlines, guidelines and helpful checklists on verbal communication techniques and the preparation of visual aid materials. Table of Contents: The nature of change; The human element; Principles of communication; Basic communication skills; Written communication; Techniques to help us see; Meetings, workshops, and conferences; Technology transfer in actions; and Evaluations. GRA

N87-12405# Office of Science and Technology, Washington, D.C.
NATIONAL AERONAUTICAL R AND D GOALS: TECHNOLOGY FOR AMERICA'S FUTURE
Mar. 1985 13 p
(PB86-209772) Avail: NTIS HC A02/MF A01 CSCL 05A
Specific goals is three areas were addressed: subsonics, supersonics, and transatmospherics. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N87-12406*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
VARIABILITY STUDIES OF 3C 371 Final Report, 1 Apr. 1985 - 30 Sep. 1986
Diana M. Worrall Oct. 1986 4 p
(Contract NAG8-523)
(NASA-CR-179772; NAS 1.26:179772) Avail: NTIS HC A02/MF A01 CSCL 03A
The compact extragalactic radio source, 3C 371, was observed with the X-ray detectors of the EXOSAT satellite for 19.5 hours in 2 observing periods separated by 18 days. This resulted in the discovery of X-ray variability of the source on time scales between 8 hours and about 25 minutes and the confirmation of earlier reports of variability on longer time scales. The short time scale variability agrees remarkably well with earlier predictions based on fitting multifrequency data from the source to a relativistically beamed inhomogeneous synchrotron self-Compton (SSC) jet model. This SSC model is frequently applied to BL Lac objects and related sources, such as 3C 371. However, the number of free parameters in model fits tends to be large, and so independent support such as from this work is important. The X-ray spectral results for 3C 371 also may provide qualitative support for the SSC model in that the spectrum probably consists of two components, with the steeper one at low photon energies. In terms of the model, the low-energy spectrum would be dominated by synchrotron emission extending down to radio energies, whereas the higher energy X-rays would be dominated by Compton radiation. M.G.

N87-12407*# National Aeronautics and Space Administration, Washington, D.C.
REPORTS OF PLANETARY ASTRONOMY, 1985
Sep. 1986 217 p
(NASA-TM-89189; NAS 1.15:89189) Avail: NTIS HC A10/MF A01 CSCL 03A
This is a compilation of abstracts of reports from Principal Investigators funded through NASA's Planetary Astronomy Program, Office of Space Science and Applications. The purpose is to provide a document which succinctly summarizes work conducted in this program for 1985. Each report contains a brief statement on the strategy of investigation and lists significant accomplishments within the area of the author's funded grant or contract, plans for future work, and publications. For individual titles, see N87-12408 through N87-12497.

N87-12408*# National Astronomy and Ionosphere Center, Arecibo, Puerto Rico.
THE ARECIBO S-BAND RADAR PROGRAM c32
Donald B. Campbell *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 3-4 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I
Reduction to images of the 1983 monostatic Venus mapping data was completed. Analysis of the images, including detailed comparisons with Pioneer Venus data and Soviet Venera 15/16 images, continued. Feature locations in Arecibo Venus radar images produced between 1975 and 1983 were used to make a new determination of the rotation vector. This result is of general interest but was also required for planning and cartographic purposes for the Magellan mission. A new set of observations of Venus were made in March/April 1985, aimed at imaging low northern and high southern latitudes, including the south polar region, at 1 to 2km resolution. A limited number of ranging observations were made to Mercury and Venus. Ten asteroids were detected increasing the number studied with the Arecibo system to almost 40. A system to allow high time resolution, as well as high Doppler frequency resolution, studies of small asteroids or comets which make close approaches to the Earth was implemented. A radar

detection of Halley's Comet was obtained when it approached to within 0.62 AU of the Earth in November/December of last year. It is still uncertain whether the echo is a reflection from the nucleus or from a cloud of cm-sized particles in the vicinity of the nucleus. E.R.

N87-12409*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GOLDSTONE SOLAR SYSTEM RADAR **c32**
Raymond F. Jurgens, Pamela E. Clark, Richmond M. Goldstein, Steven J. Ostro, Martin A. Slade, Thomas W. Thompson, and R. Stephen Saunders *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 5-7 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

Information is provided about physical nature planetary surfaces and their topography as well as dynamical properties such as orbits and spin states using ground based radar as a remote sensing tool. Accessible targets are the terrestrial planets: the Earth's Moon, Mercury, Venus and Mars, the outer planets rings and major moons, and many transient objects such as asteroids and comets. Data acquisition utilizes the unique facilities of the Goldstone Deep Space Network, occasionally the Arecibo radar, and proposed use of the VLA (very large array). E.R.

N87-12410*# Hawaii Univ., Honolulu. Planetary Geosciences Div.
RESEARCH IN PLANETARY ASTRONOMY
Thomas B. McCord *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 8-10 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The composition, structure and processes operating on the surfaces of solar system objects were determined using the Mauna Kea observing facilities and modern instrumentation. Reflectance spectroscopy and multispectral imaging in the 0.3 to 5.0 micrometers spectral region are the major techniques used. Major focus was in qualifying and using the new imaging spectrometer and the 2-D IR detectors for spectroscopy and imaging. The major observational program emphasis was on preparing for the next Mars opposition, and searching for compositional units in the lunar highlands. E.R.

N87-12411*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ADVANCED INFRARED ASTRONOMY
Michael J. Mumma, Drake Deming, Fred Espenak, and Theodor Kostiuk *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 11-13 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The CO2 laser heterodyne spectrometer was used at the 3-m IRTF on Mauna Kea to make measurements of Mars during the 1984 opposition. Analysis of the observations of the mesospheric non-thermal emission demonstrated the existence of a warming of the Mars polar mesosphere, similar to the seasonal effects which are well known to occur at the Earth's mesopause. A search for CO2 and NH3 on Comet Halley was done with the new Kitt Peak system as well as with the IRTF heterodyne system. A Lamb-dip absorption cell was designed and constructed. Its use will allow extreme frequency stabilization of the laser local oscillator, which will greatly facilitate measurements of winds and dynamical phenomena. The Lamb-dip cell was used at Kitt Peak to study zonal and meridional winds in the atmosphere of Venus. Water vapor was detected in Comet Halley using Fourier transform spectrometer. The 2.65 micrometer upsilon sub 3 band was seen in emission, confirming non-thermal-equilibrium excitation models for comets. A study was made of the variability of Jovian ethane emission. The average volume mixing ratio of ethane in the Jovian stratosphere was found to be 3x10 to the -6 power, with the greatest variability seen in the auroral regions. E.R.

N87-12412*# New Mexico State Univ., Las Cruces. Dept. of Astronomy.
LONG-TERM CHANGES IN REFLECTIVITY AND LARGER SCALE MOTIONS IN THE ATMOSPHERES OF JUPITER AND SATURN **c91**
Reta F. Beebe *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 17-18 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

A multi-color, broad-band photographic program for monitoring atmospheric variability of Jupiter and Saturn with the 61-cm, f/75 telescope was continued. The archivial product consists of approximately 20 sequential images on 3 1/4 x 4 1/4 glass plates with a plate scale of 4.53 arc sec/mm. An eleven-step sensitometric wedge, recorded times of acquisition, and fiducial marks which determine the orientation of the plate, are recorded on each individual plate. This allows accurate positional measurements, as well as detailed relative surface brightness determinations. Detailed measurements of the Red Spot are being utilized in a study of zonal velocity variation and the ability to predict the longitude of the Red Spot during the Galileo mission. An ongoing 5-color series of Saturn has been maintained to map the seasonal changes in the belt-zone reflectivity. Digitization of a series of blue images containing the Red Spot and a series of red and blue images excluding the Red Spot are being processed and reduced to normalized surface brightness maps. This data is being utilized to map time-dependent brightness variations of selected features, belts, and ones. E.R.

N87-12413*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY SPECTROSCOPY **c91**
J. T. Bergstralh *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 19 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Spectroscopic and spectrophotometric data on the atmospheres of comets, the outer planets, and Titan at ultraviolet to near-infrared wavelengths were acquired. These data support an effort aimed at characterizing the physical properties and distribution of aerosol particles in the atmospheres of these bodies. New spectrophotometry was acquired of Uranus at 0.2 < lambda < 0.3 micrometer with IUE; archival IUE spectrophotometry of Uranus and Neptune in this wavelength range was acquired and recalibrated. New estimates of radiometric Bond albedos and global energy budges of Uranus, Neptune and Titan were published. E.R.

N87-12414*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SEARCH FOR VOLATILES IN THE SURFACE OF ICY SATELLITES **c91**
R. H. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 20 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

It is proposed to measure the reflectance spectra of the icy satellites of Jupiter, Saturn and Uranus in the spectral region 1.8 to 2.4 micrometers. These observations use the new Cooled Grating Array Spectrometer using a 32-element InSb photodiode array detector and produce spectra of higher resolution and precision than any data yet obtained; the ultimate scientific objective is to search for the signatures of methane clathrate, ammonium hydroxide or carbon monoxide clathrate (compounds predicted to exist on icy surfaces in the outer solar system by several theories of formation of these bodies) in the region of the spectrum where water ice has a relative maximum in reflectance. At the very least, these data will allow upper limits to be placed on the amount of these chemical species that can be present. The specific targets is Europa, Ganymede, Enceladus, Ariel and Titania, bodies that have the highest probability of having some or all of these volatiles on their surface according to current formation models. E.R.

N87-12415*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Science.
THEORETICAL AND OBSERVATIONAL PLANETARY PHYSICS c91
John Caldwell *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 21-22 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

This program supports NASA's deep space exploration missions, particularly those to the outer Solar System, and also NASA's Earth-orbital astronomy missions, using ground-based observations, primarily with the NASA IRTF at Mauna Kea, Hawaii, and also with such instruments as the Kitt Peak 4 meter Mayall telescope and the NRAO VLA facility in Socorro, New Mexico. An important component of the program is the physical interpretation of the observations. There were two major scientific discoveries resulting from 8 micrometer observations of Jupiter. The first is that at that wavelength there are two spots, one near each magnetic pole, which are typically the brightest and therefore warmest places on the planet. The effect is clearly due to precipitating high energy magnetospheric particles. A second ground-based discovery is that in 1985, Jupiter exhibited low latitude (+ or - 18 deg.) stratospheric wave structure. E.R.

N87-12416*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
PORTABLE HIGH SPEED PHOTOMETRY SYSTEMS FOR OBSERVING OCCULTATIONS
James L. Elliot and Edward W. Dunham *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 23-24 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Ring orbit studies for Uranus have been particularly fruitful because of the ability, through occultations, to obtain data of high spatial resolution at the rate of 1 to 2 times per year. The occultation program at M.I.T. involves: (1) identifying the scientific questions that can be answered by occultation events, (2) predicting the zone of visibility for the useful events, (3) maintaining and improving a set of portable high-speed photometric systems, (4) obtaining the observations, and (5) reducing the data and interpreting the results. Two stellar occultations by Uranus occurred in May 1985, and were observed with a network of large telescopes that encompassed the Northern and Southern Hemispheres. Portable quartz-oscillator time standards were used at all observatories, and were calibrated before and after each event. Observations obtained form Cerro Tololo and McDonald Observatories of the 4 May and 24 May 1985 occultations by the Uranian rings clearly show a companion to the delta ring on both the immersion and emersion traces. The occultation by Ceres that occurred on 12 November 1984 was observed. Preliminary results give a mean diameter of 933 + or - 10 km, which implies a geometric albedo, Pv = 0.07 + or - 0.01 and a density 2.7 + or - 0.3 gm cu/cm. Hence Ceres is likely composed of silicate material throughout. E.R.

N87-12417*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH-RESOLUTION IMAGING OF SOLAR SYSTEM OBJECTS
Bruce A. Goldberg *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 25 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

A very extensive Io sodium imaging program beginning with the first images of the cloud and culminating in comprehensive characterization of the cloud's appearance and behavior as a function of both time and Io's orbital position now forms the basis for a collaborative modeling analysis and a continued observational study with emphasis on understanding how the cloud's behavior is diagnostic of spatial and temporal variations in the physical conditions of the inner Jovian magnetosphere. The sodium cloud was found to have a variety of systematic variations, a pronounced east-west orbital asymmetry, and temporal changes which could be diagnostic of time changes in both Io and its plasma environment. New comet imaging programs initiated at the 3.6-meter Canada-France-Hawaii Telescope draw upon both ultra high time resolution and high spatial resolution imaging capabilities. Seven observing runs between Dec. 1984 and May 1986 were devoted to observing Halley, Giacobini-Zinner, and several other comets. Among these observations were the first images of Halley through IHW filters, and images of Giacobini-Zinner during the ICE encounter which have been directly correlated with ICE magnetic field measurements. E.R.

N87-12418*# Harvard Univ., Southboro, Mass. Pierce Hall.
HIGH RESOLUTION IMAGING
Richard Goody, Costas Papaliolios, and James Beletic *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 26-27 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Diffraction-limited telescopic observations were obtained of solar system objects and a program of research into Uranus, Neptune, Pluto and the asteroids based upon the data obtained was persued. Two camera systems appropriate for this work were developed. Most importantly, the PAPA photon address camera was developed and proven. Algorithms were developed for both phase and amplitude recovery and were validated on theoretical and laboratory data and to a limited extent on telescopic data. A laboratory simulator was constructed that was used for development but is also available for controlled investigation of image reconstruction. During 1985 two successful expeditions were made to Hawaii and Cerro Tololo and a large body of data on Pluto, Uranus, Neptune and two asteroids are on tape. E.R.

N87-12419*# Hawaii Univ., Honolulu. Inst. of Astronomy.
RESEARCH IN PLANETARY ASTRONOMY AND OPERATION OF THE 2.2-METER TELESCOPE
David N. B. Hall, Dale P. Cruikshank, David Morrison, and William M. Sinton *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 28-31 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The turn-around in the secular change in brightness of Pluto was detected, the planet is now beginning to brighten. The spectral signature was found of an ammonia bearing compound in the surface ices of Europa. Specific Io volcanic hotspots were detected from infrared photometry of the mutual events of the Jovian satellites. The polarized emission from the volcanic hotspots on Io was discovered and the locations of those hotspots were determined. The orbit of Charon was refined from speckle observations of the Pluto-Charon system. The spectral properties of liquid nitrogen-methane mixtures with reference to the infrared spectrum of Triton were studied. Major progress was made in modeling asteroid lightcurves from a modern theory of photometric properties of the asteroid surfaces. Several additional olivine-rich asteroids from near-infrared spectrophotometry were discovered. Important photometric, spectroscopic, narrow-band imaging data on Comet P/Halley was acquired, along with Schmidt photographs of Comet P/Halley and its tail. E.R.

N87-12420*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIORS OF THE GIANT PLANETS c91
W. B. Hubbard *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 32-33 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

The interior structure of the Jovian planets was studied by means of observational data obtained by ground-based astronomy. Recent work was oriented toward a determination of oblateness from occultation measurements of the shape of planetary atmospheres. This provides a determination of the degree of central condensation of the planet, which is then compared with interior models and theoretical equations of state. As a serendipitous result of the attempts to measure the oblateness of Neptune, a partial Neptune ring (or arc) was discovered following an occultation observation on July 22, 1984. During 1985, older observations were reexamined to determine whether Neptune

arcs had been detected (but not identified) during previous occultations. It appears that Neptunian arcs may locally imitate Uranian rings, with an 1981 event resembling Uranus' epsilon ring, while an 1984 event was more similar to the thinner Uranian rings such as the alpha ring. E.R.

N87-12421*# Arizona Univ., Tucson. Lunar and Planetary Lab.
STUDIES OF EXTENDED PLANETARY ATMOSPHERES c91
Donald M. Hunten and Robert A. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 34-35 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Telescopic observations were made of gases and plasmas in the Jupiter system, and related phenomena such as the recently-discovered sodium atmosphere of Mercury. Sodium absorption in Io's atmosphere was observed to distances as large as 5 Io radii during the mutual-eclipse season of the Jovian satellites. Analysis of Jovian disk spectra has proceeded, as planned, from an emphasis on the H2 ortho-para ratio to analysis of methane absorptions and determination of cloud structure. Several 2-channel photometers were constructed in 1978 for the Uranus event at which the rings were discovered and a smaller, single-channel unit was built more recently. Although the photometers themselves are still fully usable, the data-acquisition systems have major deficiencies. E.R.

N87-12422*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PLANETARY INFRARED ASTRONOMY USING A CRYOGENIC POSTDISPERSER ON FOURIER TRANSFORM SPECTROMETERS
Donald E. Jennings, Virgil G. Kunde, Rudolf A. Hanel, William C. Maguire, and Gerald M. Lamb *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 36-37 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

High resolution infrared spectra of planets from ground-based observatories were analyzed and instrumentation to improve sensitivity was developed. A cryogenic postdisperser (a narrow bandpass spectral filter) for use with Fourier transform spectrometers (FTS's) at facility observatories was constructed. This instrument has improved the sensitivity of FTS observations at 8 to 20 microns by about an order of magnitude. Spectra of Jupiter, Saturn and Comet Halley were obtained using the postdisperser with FTS facilities at the Kitt Peak 4-meter and McMath telescopes. Spectral resolution as high as 0.01/cm was achieved. E.R.

N87-12423*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF OUTER PLANET SATELLITES c91
T. V. Johnson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 38 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Infrared observations were made of the outer planet satellites. These data provide vital information about the thermophysical properties of satellite surfaces, including internal heat sources for Io. Observations include both broad and narrow band measurements in the 2 to 20 micrometer spectral range. Types of observation and target priority were determined to make maximum use of existing data from Voyager and other missions, on-going and planned missions such as Galileo, were supported and techniques and data for planning new missions and instrumentation were developed. E.R.

N87-12424*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY SUBMILLIMETER SPECTROSCOPY
M. J. Klein *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 39 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

A comprehensive observational strategy was developed for the detection and measurement of molecular lines in the millimeter and submillimeter spectra of planetary atmospheres and comets. A sound observational strategy and the associated analytical capability to begin observations from the Caltech Submm Observatory (CSO) on Mauna Kea in FY 87-88. Comet Halley was observed from the NASA-KAO with the dual-frequency (0.8 and 1.6 mm) receiver and conducted a search for NH3 with the DSN 64 m antenna. E.R.

N87-12425*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Science.
INFRARED SPECTROSCOPY OF JUPITER AND SATURN
Roger F. Knacke *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 40-41 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The origin of carbon monoxide has been a puzzle for some time, and it has become apparent that CO serves as a tracer of disequilibrium processes in the Jovian atmosphere. High resolution spectra with a Fabry-Perot spectrometer was obtained. From a detailed synthetic spectral analysis of the CO line profiles, it was established that the CO is located in the troposphere of Jupiter. It must therefore be a product of convection upward from hotter levels in the deep atmosphere, and is not a product of infall of material from above the stratosphere. Six lines of CO in Saturn was detected, a surprising result because disequilibrium models predicted that the CO mixing ratio would be too low to be observable if upward convection is the dominant mechanism. Therefore several possibilities for the origin of the CO now exist, none completely satisfactory at this time. E.R.

N87-12426*# Lowell Observatory, Flagstaff, Ariz.
OUTER PLANET STUDIES
Barry L. Lutz and G. Wesley Lockwood *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 42-43 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Spectrophotometric observation were completed of Titan and determinations of its geometric and Bond albedos and completion of like observations of Uranus, pre-Voyager encounter. CH3D was studied in the spectrum of Uranus and a determination of the CH3D/CH4 mixing ratio in its atmosphere. The observations needed for a direct calibration of the Sun against Vega was completed. The study was continued of CH3D in the spectra of Saturn and Titan. High resolution observations of [O I], C2 and C-12 C-13 in the coma of P/Halley were also studied. E.R.

N87-12427*# Southwest Research Inst., San Antonio, Tex. Dept. of Space Science.
MODELING AND INVESTIGATIVE STUDIES OF JOVIAN LOW FREQUENCY EMISSIONS c91
J. D. Menietti, J. L. Green, N. F. Six, and S. Gulkis *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 44-45 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

The Voyager data in a newly produced noise-reduced and recalibrated format has been received. New color spectrograms were developed on high resolution color terminals which display this data. The production of these new spectrograms utilizing the new format data is quite important, because it eliminates a serious problem of noise contamination and miscalibration in the old data set. In addition, a new Jovian plasma model was introduced, which includes the Io torus and accounts for 7 ionic species. The new plasma model is important in the ray tracing of hectometric (HOM) and kilometric (KOM) radiation which may be influenced by the Io torus. E.R.

N87-12428*# California Inst. of Tech., Pasadena.
SUBMILLIMETER AND MILLIMETER OBSERVATIONS OF SOLAR SYSTEM OBJECTS
D. O. Muhleman *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 46 (For primary document see

N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The millimeter wavelength 3-element array at OVRO was used to observe Halley's comet in carbon monoxide (negative result) and to set an upper limit from continuum flux of 15 km on the size of the nucleus, assumed to be a black body. The Saturn system was observed with the array and ring brightness temperatures at a wavelength of 2.7 mm were obtained. A B-ring temperature of 30 K was compared to the results at lambda = 2 cm of about 7 K indicates the measurement of true emission from the Ring particles at mm-wavelengths. Brightness temperatures of Titan, Neptune, Uranus, Io, Europa, Ganymede, and Callisto were made, all tied to Mars. Accurate microwave spectra of all these objects from 3 mm to 6 cm were obtained. E.R.

N87-12429*# California Inst. of Tech., Pasadena.
LUNAR AND PLANETARY STUDIES
D. O. Muhleman *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 47-48 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Observations were made and analyzed for Uranus, Saturn, and Titan in the continuum at the VLA and some spectroscopy at OVRO. Accurate A, B, C ringe brightness temperatures from Saturn are a basis of scattering theory calculations. Variations of 2 cm limb darkening with pole orientation were modeled and are shown to originate in the deep atmosphere. E.R.

N87-12430*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF PLANETARY ATMOSPHERES
Glenn S. Orton, Kevin H. Baines, and Jay T. Bergstralh *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 49-50 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Infrared data was obtained on planetary atmospheres which provides critical information on atmospheric structure, composition, and cloud properties in support of planetary missions such as Voyager and Galileo. Mapping of Jupiter and Saturn in thermal and reflected solar radiation is a high-priority monitoring and exploratory activity. Some of these images of Jupiter are shown. Radiation at 17.8 micrometer probes the upper tropospheric temperature structure where spatial structure bears a strong resemblance to visible and near-infrared reflected sunlight such as at 2.0 micrometer. At 7.8 micrometer, stratospheric temperatures appear to have a three-banded structure, enhancements near the magnetic poles and occasional transient features such as the equatorial filament near the right limb. Clouds or hazes are observed high in the stratosphere looking at wavelengths such as 2.2 micrometer, where gaseous opacity is very strong. Other maps examine cloud properties from thermal radiation not strongly influenced by gaseous opacity and the distribution of condensable gases, such as ammonia. Millimeter and submillimeter filtered radiometric observations were made of Jupiter, Uranus and Neptune via collaborative work. Radiometric observations of Uranus and Neptune at 21 and 32 micrometer were acquired and analyzed as well as grating array spectra in the ranges of 8 to 14 micrometer, 16 to 23 micrometer, and 18 to 32 micrometer. These showed evidence for C2H2 in the stratosphere of Uranus and C2H4 in the stratosphere of Neptune. E.R.

N87-12431*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.
SPECTROSCOPIC OBSERVATIONS OF THE PLANETS
Tobias Owen *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 51-52 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The first phase of a program to determine D/H in the atmospheres of all of the major planets and Titan was completed. D/H on Titan and Uranus is significantly higher than on Jupiter and Saturn. Titan has the highest value, consistent with the possibility for hydrogen escape. These measurements were all made in terms of CH3D/CH4. They suggest that at least two reservoirs for deuterium exist in the outer solar system - a large one in hydrogen and a much smaller one in hydrogen-containing compounds that have not isotopically equilibrated with the hydrogen. This result also demonstrates that a large fraction of the carbon in the outer solar nebula was in the form of methane and it supports the nucleation model for the formation of the outer planets. Other studies included an investigation of the phosphine abundance over the Great Red Spot (GRS) of Jupiter, pre-Voyager determination of the amount of acetylene on Uranus, and the carbon isotope ratio in Halley's Comet. UV spectra of the GRS obtained with the IUE show no evidence of the enhancement of phosphine that would be expected if the red color of this object is caused by P4. E.R.

N87-12432*# Wisconsin Univ., Madison. Dept. of Physics.
GROUND-BASED OBSERVATIONS OF THE JUPITER PLASMA TORUS
Frank Scherb and Fred L. Roesler *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 53-54 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The intensity variation of (SIII) 9531 A emission from the hot plasma torus of Jupiter was measured using a scanning Fabry-Perot spectrometer. During the observational period, which covered 43 rotations of Jupiter, the (SIII) intensities showed a periodic variation consistent with a zone of enhanced emission approximately 90 deg in longitude, rotating with a period of 10.2 hours, or 2.8% longer than Jupiter's rotational period. Dessler developed a theoretical model of account for Jovian magnetospheric phenomena that differ in repetition period by 3%. In his model, periodic modulation of magnetospheric phenomena is controlled in part by the spin period of magnetic features below the surface of the planet. The differing observed periods are then due to differential rotation of the subsurface magnetic features at different latitudes. A consequence that follows from this concept of differential rotation of the internal planetary magnetic field is that not all the apparent subcorotational plasma flow in the torus is caused by plasma mass loading, as described by Hill and his associates. As a result, the mass loading required to produce the residual subcorotational flow is less than previously estimated. E.R.

N87-12433*# Texas Univ., Austin. Dept. of Astronomy.
A CONTINUED PROGRAM OF PLANETARY STUDY AT THE UNIVERSITY OF TEXAS MCDONALD OBSERVATORY
Harlan J. Smith, Edwin S. Barker, William D. Cochran, and Laurence M. Trafton *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 55-56 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The beginning of eclipses of the Pluto-Charon system was detected. The onset of coma formation of P/Halley at 5.4 au was detected and evidence of sublimation at 4.8 au when CN emission was detected. Extensive spatial maps of the gas in the comae of comets Halley and Giacobini-Zinner were obtained in fall 1985. Halley was time variable, and Giacobini-Zinner was depleted in C2 and C3 relative to CN. Comet Kopff was shown to have a pre-perihelion brightness maximum of its gas, consistent with mantle development if the comet is a high obliquity object. New Haser model scale lengths for CN, C3, and C2 were determined using results from the Faint Comet Survey. Spectra of 12 asteroids in unusual orbits showed no evidence of any comet-like emission features. In particular, 3200 Phaethon (1983 TB) has no gas or dust coma, in spite of the similarity of its orbit with the Geminid meteor stream. Data were analyzed on Saturn's H2 and CH4 bands for the recent southern summer using a Tomasko-Doose type of haze distribution. This haze model fits the data moderately well, giving a CH4 mixing ratio of (4.2 + or 0.4)x003. Simple functions were found to approximate the collision-induced rotation-translation thermal opacity of H2. E.R.

N87-12434*# Washington Univ., St. Louis, Mo. Dept. of Earth and Planetary Science.

GROUND-BASED STUDIES OF JUPITER, URANUS, AND NEPTUNE IN SUPPORT OF THE GALILEO AND VOYAGER MISSIONS
William Hayden Smith *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 57-59 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Profiles were obtained for Uranus at a spectral resolution exceeding 450,000 for four quadrupole lines of H2. A preliminary reduction of the line profile for the S3(0) transition is shown. Excellent data for the determination of the HD abundance for Uranus was obtained for the R5(0) and R5(1) transitions. An HD profile is shown. Preliminary analysis yields a value for the D/H ratio similar to that for Jupiter. Complete spatial coverage was obtained of Jupiter in spectrally resolved NH3 lines for which the molecular parameters are known. The S4(1) and S3(1) H2 features for Neptune were observed. While the S4(1) feature has the same equivalent width as for Uranus, the S3(1) feature is about 40% smaller. The Titan observations have confirmed the previous observations of the 6819 A CH4 feature for Titan. The profile width is consistent with the surface pressure determined via Voyager observations. E.R.

N87-12435*# California Inst. of Tech., Pasadena.
RESEARCH IN PLANETARY ASTRONOMY AT PALOMAR OBSERVATORY
B. T. Soifer and P. Goldreich *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 60-61 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The goals of this program are three fold. The ring systems in the outer solar system were studied. New comets and asteroids in the solar system were surveyed. The volatile surface coverings of the primitive bodies in the outer solar system were studied via infrared spectroscopy. E.R.

N87-12436*# Massachusetts Inst. of Tech., Cambridge. Electronics Research Lab.
ANALYSIS OF JOVIAN DECAMETRIC DATA: STUDY OF RADIO EMISSION MECHANISMS
David H. Staelin *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 62 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Catalogues of approx. 200 decametric arcs and approx. 200 gaps between arcs were studied, in an effort to reconcile the data with predictions for the model wherein reflections of Io-induced currents each emit in a conical pattern and yield a distinct radio arc. The most recent interpretations of this data suggest that these Io-produced Alfven waves persist for at least one or two passages of Io, and that the emission cone half angles are approx. 40 to 90 deg., varying from arc to arc. Below 1.2 MHz it was discovered that Jupiter emits radiation strongly modulated in frequency with periods of approx. 200 kHz; this quasi-sinusoidal emission (MSA) can shift more than 180 deg. in phase over periods of 6 seconds, although these shifts are usually much smaller. MSA is not strongly correlated with the longitudes of Io or Jupiter, and typically occurs in patches covering approx. 500 kHz or more for periods of a few minutes. Furthermore, this modulation sometimes resembles a train of impulses in frequency with exponential decays toward high frequencies. Comparison of these results with the previous studies of V-shaped S-bursts is suggestive of an emission mechanism. E.R.

N87-12437*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY FABRY-PEROT SPECTROSCOPY
J. T. Trauger *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 63 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Uranus and Jupiter HD/H2 spectra determine bulk D/H ratios which are significantly different from theoretical expectations, with the Uranus D/H about half the Jovian value. Feasibility of Mars photochemistry study with a PEPSIOS spectrometer was demonstrated with visible band O2, H2O, and CO2 spectra; and near infrared (1.57 micron) spectra of CO and CO2; and NASA/IRTF observations have been proposed in support of the Mars Observer mission objectives. Analysis of monochromatic images clearly resolve the azimuthal and radial structure in the Jovian nebula (ion partitioning, temperature structure, ion/neutral interactions), adding a unique and important post-Voyager perspective and providing a baseline for forthcoming Galileo experiments. Simultaneous ground based and IUE observations of Jovian nebula are under analysis. Doppler resolved image sequences (data cubes) of Io sodium neutrals clearly isolate the high velocity charge exchange jet, a sensitive ground-based probe of the tenuous neutral atmosphere of Io. E.R.

N87-12438*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VISIBLE PHASE CURVES OF URANUS AND NEPTUNE AND SCATTERING IN THEIR ATMOSPHERES c91
Daniel Wenkert *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 64 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

The Voyager 1 and Voyager 2 narrow angle cameras have been imaging Uranus and Neptune (through several filters) from distances of several AU for the past four years. The justification for this is to determine the way in which the albedoes of the two planets vary with angle from the sun. The Voyager 1 spacecraft has already reached a phase angle of approx. 40 deg. for Neptune and approx. 70 deg. for Uranus. The albedo of a gaseous planet depends on the phase angle (angle from the sun through the planet to the observer), the color being observed, and the vertical distribution and nature of aerosols and clouds in the atmosphere of the planet. Since the colors are known and the phase angles, and phase curves will be used to constrain models of the aerosol and cloud structrures of Uranus and Neptune. A knowledge of the way albedo varies with phase angle allows one to compute the total amount of sunlight being absorbed by a planet. With knowledge of the solar flux incident on the planet and knowledge of how much infrared is being emitted by the planet (at least in the direction of the Earth and sun) one can determine a rough extimate of the internal heat source of the planet. Although Jupiter and Saturn have measured internal heat sources of magnitude comparable to their absorbed energy from the sun, preliminary results indicate that Uranus may not have an internal heat and that Neptune if it has one that heat source is small. E.R.

N87-12439*# Maryland Univ., College Park. Astronomy Program.
OBSERVATIONS OF COMETS AND ASTEROIDS
Michael F. AHearn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 67 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The origin and evolution of the solar system is studied by carrying out a wide variety of observational programs on the small bodies of the solar system. The more immediate observational goal is to determine the physical and chemical nature primarily of comets and secondarily of asteroids. This requires observations at all wavelengths from ultraviolet to radio as well as theoretical modelling. Author

N87-12440*# Lowell Observatory, Flagstaff, Ariz.
PLANETARY RESEARCH AT LOWELL OBSERVATORY c91
William A. Baum, Robert L. Millis, Barry L. Lutz, Edward L. G. Bowell, Tobias J. Kreidl, and David C. Schleicher *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 68-70 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Narrowband CCD profiles of C2 and grains in several comets (including P/Halley and P/Giacobini-Zinner) were performed. Rotational light curves were made of Comet P/Arend-Rigaux

(visible and infrared) yielding the size, shape, albedo, and rotation period of the nucleus. Production rates were measured as a function of heliocentric distance for OH, CN, and C2 in P/Giacobini-Zinner and for OH, NH, CN, C3, and C2 in P/Halley. Detection and measurement was made of forbidden (O I) lines near 6300 and 5577 A in P/Halley, permitting the production rate of oxygen from CO to be distinguished from that from H2O. Identification of C-12C-13 lines in cometary spectra indicating a possible enrichment of C-13 over the telluric value was made. An assessment of techniques for detecting (determining the existence of) a trans-Neptunian comet belt is included. E.R.

N87-12441*# Hawaii Univ., Honolulu. Planetary Geosciences Div.
INFRARED SPECTRAL STUDIES OF ASTEROIDS
Jeffrey F. Bell *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 71-72 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The first comprehensive spectrophotometric survey in the near-infrared (0.8 to 2.5 microns) was carried out with the NASA Infrared Telescope Facility and special filters optimized for spectroscopy of solid surfaces. About 105 asteroids have been observed (in 52 photometric passbands) to date. These spectra provide a much improved database for determining the mineralogy of the various asteroid spectral classes previously defined on the basis of visible (0.3 to 1.0 micron) data. Preliminary results from analysis of these spectra include: (1)Class 'A' asteroids are dominated by olivine and correspond to the rare brachinite meteorites; (2)Class 'S' asteroids have highly variable olivine/pyroxene ratios inconsistent with chondritic compositions; (3)Classes 'P' and 'D' are apparently 'ultracarbonacous' material which extends the known range of chondrites to lower condensation temperatures; (4)The distribution of spectral types shows that the asteroids were heated by a mechanism whose intensity declined rapidly with solar distance; and (5)Spectra of the proposed flyby targets for CRAF were used to evaluate the results obtainable from this mission. E.R.

N87-12442*# Lowell Observatory, Flagstaff, Ariz.
STUDIES OF ASTEROIDS AND COMETS
Edward L. G. Bowell, Kari Lumme, Lawrence C. Wasserman, Tobias J. N. Kreidl, Schelte J. Bus, and Brian A. Skiff *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 73-74 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

About 3000 accurate positions of asteroids and comets were measured concentrating particularly on close-Earth approachers, but also targeting asteroids in need for follow-up observations because of unusual orbital characteristics or poor observational history. In 1985, 36 of the discoveries were numbered. Very accurate + or - 0.1 arcsec?) positional measurements were made of P/Halley on four nights in November and December 1985 in support of Giotto mission navigation. The asteroid orbit files were maintained, and ephemeris data for observational planning were supplied to colleagues worldwide. Considerable progress was made in understanding how information on asteroid shapes, surface albedo variegation, and rotational states can be derived from lightcurve and phase curve data. The analytical formulation was completed of a new asteroid magnitude system for the International Astronomical Union; the system was adopted at the New Delhi General Assembly by IAU Commission 20. Photographic photometry of about 10000 images of faint asteroids observed during the course of the United Kingdom Schmidt-CalTech Asteroid Survey in 1981 was continued, completing the microdensitometric scanning and all process of software development for data handling. E.R.

N87-12443*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
IMAGING STUDIES OF COMETS
John C. Brandt *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 75 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Extensive photography was conducted on comet Giacobini-Zinner in support of the flyby of the International Cometary Explorer (ICE) through the plasma tail on 9/11/85, and a dense series of plates was secured of Halley's Comet during the 7-month interval approximately centered on perihelion, i.e., 1985 November - 1986 May. The hundreds of high quality plates of Halley contain copious numbers of dramatic plasma events, including DE's, helical waves, and turning tail rays. Initial study of the plate material lends support to the magnetic sector boundary model of DE's developed by Niedner and Brandt. E.R.

N87-12444*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ATLAS OF COMET HALLEY 1910 II c90
John C. Brandt and Bertram Donn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 76 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

An Atlas of Comet Halley 1910 II photographs and spectra is being prepared. The major section consists of 838 photographic observations from fifteen observatories around the world. Multiple images of many photographs are reproduced to bring out detail in the near nucleus region, in the coma and in the tail. The Atlas contains a total of 1209 photographic images of the 1910 apparition. In addition there are sections showing drawings from 1935 and 1910. A short section compares 1910 drawings and photographs. The final two sections display digitally processed images from 1910 and 1910 spectra. A three part appendix contains diagrams of various data associated with the 1910 apparition, a set of tables of all 1910 images and a bibliography. Author

N87-12445*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPOSITION OF FAINT COMETS c90
Larry W. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 77 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

The study uses an emission line, differential imaging camera built by the Science Operations Branch. This instrument allows photometric data to be obtained over a large area of a comet in a large number of resolution elements. The detector is a 100x100 Reticon array which with interchangeable optics can give resolutions from 2' to 30' over a field of 1' to 15'. The camera through its controlling computer can simultaneously take images in on-line and continuum filters and through computer subtraction and calibration present a photometric image of the comet produced by only the emission of the molecule under study. Initial work has shown two significant problems. First the auxiliary equipment of the telescope has not allowed the unambiguous location of faint comets so that systematic observations could be made, and secondly initial data has not shown much molecular emission from the faint comets which were located. Work last year on a software and hardware display system and this year on additional guide motors on the 36-inch telescope has allowed the differential camera to act as its own finder and guide scope. Comet IRAS was observed in C2 and CO+, as well as an occultation by the comet of SAO029103. The perodic comet Giacobini-Zinner was also observed in C2. E.R.

N87-12446*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF SMALL SOLAR-SYSTEM BODIES
Robert H. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 78-79 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Observations of Europa using the Cooled Grating Array Spectrometer have resulted in the discovery of new absorption features in the spectrum of the trailing side of Europa which have

been attributed to either magnetospherically implanted sulfur compounds or recently emplaced hydrates of ammonia. More observations are planned to determine which of these two classes of compounds are responsible. Two asteroid occultations have been observed so far, but with some negative results (the occultations paths shifted sufficiently that the groups responsible for timing the visual occultation got no data). High-quality data in the thermal infrared were obtained nevertheless; those data are useful for constraint of thermal models of asteroids and will be analyzed in that context. Work was completed to perfect a computer code that will fit a triaxial-ellipsoid thermal model to the IR data while constrained by the visual lightcurve. E.R.

N87-12447*# Planetary Science Inst., Tucson, Ariz.
INFRARED IMAGING AND PHOTOMETRY OF COMET GIACOBINI-ZINNER
Humberto Campins *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 80-81 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Infrared images and photometry were obtained to determine the spatial distribution and physical characteristics (temperature, albedo, size distribution, total mass, etc.) of the grains in the coma of Comet GZ. A 10.8 m image of Comet GZ obtained on August 4 represents the first groundbased thermal-infrared image of a Comet. Among the most significant results are: (1)An estimate of the number of grains that the ICE spacecraft must have encountered, which led the plasma wave team to conclude that they could only detect impacts on the antennae and not on the whole body of the ICE spacecraft; (2)The discovery of a population of large grains (radius > 100 micrometer), not observed in most other comets, which formed a curved tail near the nucleus (within 80 arcsec or 34,000 km); and (3)the detection of structure in the spatial distribution in the coma of the particle albedo, which was tentatively attributed to the presence of very fluffy grains which are likely to have multiple internal scattering of incident sunlight. The albedo map of Comet GZ was obtained by combining the 10.8 micrometer image shown with a simultaneous image taken at 0.68 micrometer, a bandpass which isolates the scattered continuum. E.R.

N87-12448*# Planetary Science Inst., Tucson, Ariz.
PLANETARY ASTRONOMY
Clark R. Chapman, D. R. Davis, R. Greenberg, and W. K. Hartmann *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 82-84 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Comets were studied during their relatively quiescent phases at large distances from the sun. This program, has resulted in a variety of CCD images of comets in several visible and near-IR bands selected to sample the continuum, rather than emission features. The most extensive dataset was obtained for P/Halley during January 1985 (plus scattered earlier data), near the time the comet turned on. The data were reduced in a preliminary fashion. Other comets predicted to be relatively inactive (including Neujmin 1 and Arend-Rigaux) were most active than expected. P/Gehrels 3 was also observed. E.R.

N87-12449*# Arizona Univ., Tucson. Steward Observatory.
SPECKLE INTERFEROMETRY APPLIED TO ASTEROIDS AND OTHER SOLAR SYSTEM OBJECTS
Jack D. Drummond and E. Keith Hege *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 85-86 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Speckle interferometry is a high angular resolution technique that allows study of resolved asteroids. By following the changing size, shape, and orientation of minor planets, and with a few general assumptions (e.g., geometric scattering, triaxial ellipsoid figures, no albedo features), it is possible to directly measure an asteroid's true dimensions and the direction of its spin axis in one or two nights. A particular subset of triaxial ellipsoid figures are equilibrium shapes, and would imply that some asteroids are thoroughly fractured. Such shapes if they exist among the asteroids would allow a determination of bulk density since there is a unique relation among spin period, size, shape, and density. The discovery of even a single rubble pile, (just as the finding of even one binary asteroid by speckle interferometric techniques) would drastically alter the notion of asteroids as small solid planets. The Pluto/Charon system was studied to aid in improving the orbital elements necessary to predict the eclipse/occultation season currently in progress. Four asteroids were reduced to their size, shape, and pole direction: 433 Eros, 532 Herculina, 511 Davida, and 2 Pallas. E.R.

N87-12450*# Arizona Univ., Tucson.
PLANETARY SPECTROSCOPY
Uwe Fink *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 87-88 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Infrared spectroscopic studies of the solar system in support of spacecraft investigations were researched. The studies include the physical behavior of comets, the atmospheres of the gaseous planets, and the solid surfaces of satellites and asteroids. Studies of the gaseous and solid emanations of comets using the techniques of CCD spectroscopy and imaging were focused on. An intensive observational effort was mounted, to observe comet Halley with the recently developed state of the art CCD camera system. Comet P/Giacobini-Zinner was observed. The major emphasis was placed on spectroscopy and a synoptic spectrum at least once a month was obtained. A large number of images of Halley for particular emission species and continuum regions were also obtained. The species in vestigated were: C3 (4060 A), CO+ (4505), C2 (5139), NH2 (5980), H2O+ (6185), OI (6300) and CN (9180). E.R.

N87-12451*# Arizona Univ., Tucson.
PHOTOMETRY OF SMALL ASTEROIDS AND COMETARY CORES
Tom Gehrels, Wieslaw Z. Wisniewski, and Ben H. Zellner *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 89 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The first asteroid lightcurves have now been made with a new technique of CCD photometry. The apparent magnitude is fainter (V>17) than what can be done with the 1.52-m Catalina reflector with a photomultiplier photometer. With the CCD system, however, the lightcurve shows remarkably good repetition; finding the asteroid is, of course, no problem as the object is recognized later by its motion on the CCD. Asteroid 1985RV has a lightcurve amplitude of about 0.4 mag and its period of rotation P = 4.0 hours, on the assumption that the lightcurve has two maxima and two minima as is the case for nearly all other asteroids. The diameter is about 3 km. 1985RV is a first example of results that are being obtained on asteroids and comets with CCD in the Catalinas, Kitt Peak, and Cerro Tololo. E.R.

N87-12452*# Arizona Univ., Tucson.
CCD SCANNING FOR ASTEROIDS AND COMETS
Tom Gehrels and Robert S. McMillan *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 90-91 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

A change coupled device (CCD) is used in a scanning mode to find new asteroids and recover known asteroids and comet nuclei. Current scientific programs include recovery of asteroids and comet nuclei requested by the Minor Planet Center (MPC), discovery of new asteroids in the main belt and of unusual orbital types, and follow-up astrometry of selected new asteroids discovered. The routine six sigma limiting visual magnitude is 19.6 and slightly more than a square degree is scanned three times every 90 minutes of observing time during the fortnight centered on New Moon. Semiautomatic software for detection of moving objects is in routine use; angular speeds as low as 11.0 arcseconds per hour were distinguished from the effects of the Earth's

atmosphere on the field of view. A typical set of three 29-minute scans near the opposition point along the ecliptic typically nets at least 5 new main-belt asteroids down to magnitude 19.6. In 18 observing runs (months) 43 asteroids were recovered, astrometric and photometric data on 59 new asteroids were reported, 10 new asteroids with orbital elements were consolidated, and photometry and positions of 22 comets were reported. E.R.

N87-12453*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED PHOTOMETRY OF PERIODIC COMETS
Martha S. Hanner *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 92-93 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

18 comets, ranging in helicentric distance from 1 to 5 AU were observed with the NASA IRTF. Highlights for 1985-86 include: (1)Halley was detected 1/85 and 3/85 at R = 5 and 4.5 AU; (2) Regular Halley monitoring program was set up in collaboration with IRTF staff; (3)Nucleus of Arend-Rigaux was detected, light curve observed (0.6 m amplitude at 10 microns) and radius derived (5 km); (4)Dust coma of Giacobini-Zinner was observed at time of ICE encounter; and (5)Mapping of the thermal emission spectrum simultaneously with the S/C encounters is scheduled for March 1986. Author

N87-12454*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TABLE MOUNTAIN OBSERVATORY SUPPORT TO OTHER PROGRAMS
Alan W. Harris and James W. Young *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 94 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Over 20 asteroids were observed photometrically for period determinations and phase relation studies. These included 1036 Ganymed, the largest Mars-crossing asteroid known, and 1627 Ivar, an earth-approaching asteroid which is a potential space mission target. Doppler images of P/Halley from TMO were obtained. Initial testing of the JPL/TMO CCD camera system has supported by imaging P/Giacobini-Zinner and P/Halley. E.R.

N87-12455*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANET-CROSSING ASTEROID SEARCH (PCAS)
E. F. Helin *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 95 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

511 independent fields were photographed with the 0.46m Schmidt during 15 observing runs along with a limited number of 1.2m Schmidt exposures. From these fields 122 new asteroids were reported. Special sets of field using the 1.2m Schmidt are continuing to yield numerous new faint asteroids. The combined result from both telescopes include 4 Mars-crossers, 3 Hungarias, 2 Phocaeas, a unique high inclination object (1985XB), 1 Apollo (1985PA) and Aten (3362) Khufu. Halley was regularly monitored (astrometry and large-scale phenomena) IHW participation. Scientifically value photographs were obtained from both 0.46m and 1.2m Schmidt Telescopes. Other accessible comets were observed including G-Z. Recently a new comet (1986d) was discovered. E.R.

N87-12456*# Five-College Astronomy Dept., Amherst, Mass.
RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES c91
William M. Irvine and F. Peter Schloerb *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 96-97 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The research effort was concentrated toward comet P/Halley, although observations of other comets including Giacobini-Zinner, Hartley-Good and Thiele were made as opportunities arise. In preparing for the apparition of P/Halley, detailed predictions for the emission in the 18 cm OH transitions were made in order to assist observers and to indicate what type of data would be particularly valuable. Likewise, since occultations by the comet of background radio sources can provide unique types of information, the tracks of P/Halley and P/Giacobini-Zinner were surveyed with the NRAO Very Large Array, background sources were mapped, and a catalogue of occulted sources published. Beginning in September, 1985, regular observations of the 18 cm OH lines have been made for P/Halley using the 43 m antenna of the NRAO in Greenbank, West Virginia. These data promise to provide the most accurate time sequence for the OH emission for any comet ever obtained at radio wavelengths. From the linewidth and shape, information is obtained on the kinetics of the gas in the cometary coma. An extensive series of observations have been undertaken with 14 m antenna to study emission from the HCN molecule in P/Halley. These data provide the first definitive detection of this component of the cometary ices. Interesting variations in the production of HCN were observed with time scales less than a day. Likewise, there appeared to be variations in the ratio of the hyperfine components of the J = 1-0 transition. E.R.

N87-12457*# Massachusetts Inst. of Tech., Cambridge. Dept. of Earth, Atmospheric and Planetary Sciences.
OPTICAL INVESTIGATION OF COMET HALLEY
David C. Jewitt *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 98-99 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The optical properties of comet p/Halley are being investigated. Initial research has revealed the basic characteristics of the nucleus and provided unique insights into the formation and structure of the coma and the plasma tail. The study is among the most intensive conducted for any comet. The results from comet p/Halley may be useful in the interpretation of results from other comets. Author

N87-12458*# Arizona Univ., Tucson. Lunar and Planetary Lab.
COMETARY SPECTROSCOPY
Stephen Larson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 100-101 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The spectroscopic and morphological characteristics of comets over a wide range of heliocentric distances are investigated as they may suggest or constrain models of cometary formation environments and evolution. This program also contributes to the understanding of the general comet population with which spacecraft data will be compared. Long slit spectra and direct images of all observable comets (M2<18) are obtained on a monthly basis with either a UV sensitive microchannel plate or a red sensitive CCD spectrograph/camera. Scale lengths of the principal emission of OH, NH, CN, C3, C2, NH2 and OI different comets can be compared. The direct images are used for studies of dust anisotropy which can provide data on the spin vector and gross surface morphology. Author

N87-12459*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INFRARED OBSERVATIONS OF PLANETS
Larry A. Lebofsky and George H. Rieke *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 102-103 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

A positive correlation was found between the strength of the 3-micron water feature and the strength of the absorption feature shortward of 0.4 microns. This is similar to what is seen in laboratory spectra of carbonaceous chondrites whose silicate compositions range from hydrated phyllosilicates to anhydrous olivine. Features were found in the IRAS images that appear to be related to solar system objects. Analysis of the data has yielded narrow trails of dust coincident with the orbits of comets Temple 2, Encke, and Gunn. Dust is found both ahead and behind comet orbital positions due to low-velocity ejection of large particles during perihelion passage. The occultation diameters of Ceres and Pallas were used

to improve the standard thermal model used in the reduction of thermal IR observations of asteroids. E.R.

N87-12460*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID TEAM
D. L. Matson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 104 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Work on asteroid classification continued was rewarded with the discovery of two Earth-approaching M asteroids. The M class is rare and these are the first found among the near-Earth asteroids to have the spectral albedo characteristic of this class. The two asteroids are newly discovered 1986 DA and 1986 EB which were observed at N and Q bandpasses (i.e., 10 and 20 microns) with the 3 m IRTF telescope and at five wavelengths from 0.36 to 0.85 microns from Kitt peak National Observatory's 0.36 m telescope. The derived diameters are about 2 km for both objects. In the asteroid radiometry program N or Q photometry was obtained for more than 40 asteroids in Feb. 1986. Radiometric diameter calibration support were provided for stellar occultations of stars by 230 Athamantis and 129 Antigone. The data were reduced but not analyzed. Infrared spectra (0.8 to 2.6 microns) of 60 asteroids were reduced and are now ready for compositional analysis. E.R.

N87-12461*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS AND SUBSEQUENT ORBITAL INVESTIGATIONS
R. E. McCrosky and B. G. Marsden *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 105 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

During the past year some 500 observations were made on 66 nights and published on the MPCs (Minor Planet Circulars/ Minor Planets and Comets). In addition, a handful of measurements of earlier plates were completed and published. 121 of the observations published referred to comets. Of special importance were observations of comets (P/Giacobini-Zinner and P/Halley) in connection with the NASA ICE and ESA Giotto missions, but a special effort was made to get good coverage of almost all of the observable comets. Observations were also made of (2060) Chiron and of the earth-approaching objects (1627) Ivar, (1866) Sisyphys, (1943) Anteros, (3362) 1984 QA, 1985 JA, PA, TB and WA, and 1986 DA and EB. 46 minor planets were given permanent numbers entirely as a result of the observations. Author

N87-12462*# Maryland Univ., College Park. Astronomy Program.
PLANET-CROSSING ASTEROIDS: INTERRELATIONSHIPS WITHIN THE SOLAR SYSTEM c90
Lucy-Ann McFadden and Michael F. AHearn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 106-107 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Near-infrared reflectance spectra 0.6 to 2.5 micrometer were acquired of asteroids 1627 Ivar (Amor), 43 Ariadne, 335 Roberta, 386 Siegena and 695 Bella (3:1 Kirkwood Gap) with the IRTF, Mauna Kea. CCD spectra 0.5-1.0 micrometer were acquired of 1866 Sisyphus (Apollo), 17 Thetis, 695 Bella, 797 Montana, and 877 Walkure (3:1 Kirkwood Gap) using facilities at Cerro Tololo Inter-American Observatory. An upper limit on the production rate of CN in asteroid 3200 Phaeton of $< 4 \times 10$ to the 23rd power sec was determined based on photometric measurement: at 3871A using facilities at Lowell Observatory. This value is in the range of the lowest production rate measured for a comet, however, it does not constitute a positive detection of CN in this asteroid. A first attempt of look for companion objects or evidence of dust debris associated with this asteroid was made with a CCD camera. Whereas the search extended to 19th magnitude (corresponding to 150m and 330m for albedos of 0.15 and 0.03 respectively), a look close enough to the asteroid was not attained to definitively eliminate the presence of coorbiting dust debris. E.R.

N87-12463*# Lowell Observatory, Flagstaff, Ariz.
OCCULTATION STUDIES OF THE SOLAR SYSTEM c90
Robert L. Millis, Lawrence H. Wasserman, Edward L. G. Bowell, and Otto G. Franz *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 108-109 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Determination of the size, shape, mean density, and albedo of Ceres was made. Predictions for 133 occultations of bright stars occurring in 1986 and 1987 were completed and published, as have predictions of occultations of stars by Comet Halley. Twenty-nine mutual events involving Galilean satellites were observed at Flagstaff in 1985. E.R.

N87-12464*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
PHOTOMETRY OF COMET HALLEY
John S. Neff and Tracy A. Ellis *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 110-111 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Observations of Comet Giacobini-Zinner were obtained on one night and of Comet Halley of three nights. When the comet becomes high enough it is hoped to obtain further observations of Comet Halley. Considerable progress was made in developing a probabalistic model for the emission of neutral dust by the nucleus of the comet. A preliminary comparison between the model and the observed intensity profiles in continuum filters is made. The model can also be used to compute the expected impact rates of dust on spacecraft flying past the comet. E.R.

N87-12465*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROCESSES IN COMETS c90
Ray L. Newburn, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 112-113 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Final revisions were made in the study of continuum spectrophotometry of 17 comets done at Lick Observatory. Changes based upon this study were introduced into the Divine-Newburn cometary modelling paradigm. Work was begun on modifications to all of the theory based upon the direct nucleus and coma observations made by the Halley space missions. Author

N87-12466*# Minnesota Univ., Minneapolis. Dept. of Astronomy.
STUDY OF COMETS AT WAVELENGTHS BETWEEN 0.5 AND 18 MICRONS c90
Edward P. Net and Robert D. Gehrz *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 114-117 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Since 1969 every bright comet was measured which has reached a distance of one astronomical unit from the sun. Observing techniques were developed which make it possible to observe as close as elongation 3 deg., and to find, track and measure comets at all wavelengths in full daylight. Comet Halley was measured on twenty four occasions between December 12, 1985 and March 25, 1986. Clear weather seems to come on holidays, and days on which are observed including Winter Solstice, Christmas, New Years, Valentines day, Super Bowl Sunday and the Vernal Equinox. Halley is observed within hours of perihelion passage. Author

N87-12467*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADAR INVESTIGATION OF ASTEROIDS c32
Steven J. Ostro *In* NASA, Washington Reports of Planetary

Astronomy, 1985 Sep. 1986 p 118-119 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

The number of radar detected asteroids has climbed from 6 to 40 (27 mainbelt plus 13 near-Earth). The dual-circular-polarization radar sample now comprises more than 1% of the numbered asteroids. Radar results for mainbelt asteroids furnish the first available information on the nature of these objects at macroscopic scales. At least one object (2 Pallas) and probably many others are extraordinarily smooth at centimeter-to-meter scales but are extremely rough at some scale between several meters and many kilometers. Pallas has essentially no small-scale structure within the uppermost several meters of the regolith, but the rms slope of this regolith exceeds 20 deg.; much larger than typical lunar values (approx. 7 deg.). The origin of these slopes could be the hypervelocity impact cratering process, whose manifestations are likely to be different on low-gravity, low-radius-of-curvature objects from those on the terrestrial planets. The range of mainbelt asteroid radar albedoes is very broad and implies big variations in regolith porosity or metal concentration, or both. The highest albedo estimate, for 16 Psyche, is consistent with a surface having porosities typical of lunar soil and a composition nearly completely metallic. Therefore, Psyche might be the collisionally stripped core of a differentiated small plant, and might resemble mineralogically the parent bodies of iron meteorites. E.R.

N87-12468*# Wisconsin Univ., Madison. Dept. of Physics.
GROUND-BASED OBSERVATION OF COMET HALLEY
Frank Scherb and Fred L. Roesler *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 120-121 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Approximately five hundred Fabry-Perot scans of H2O+, H alpha, and (OI) emissions from comets Halley, Hartley-Good, and Thiele were obtained at Kitt Peak in November, December and January. The analysis of the data is in a very early stage, but preliminary results were obtained on the production rate Q(H) of hydrogen, Q(D) of metastable oxygen, and Q(H2O) of water. The rate Q(H) varied with heliocentric distance R as R to the power -3.5 + or - 0.5. The rate Q(D) varied as R to the power -4.8 + or - 0.1. The ratio of Q(H2O) to Q(D) was 15 + or - 5. E.R.

N87-12469*# Geological Survey, Flagstaff, Ariz.
RECOVERY OF THE UCAS ASTEROIDS
Eugene M. Shoemaker and Schelte J. Bus *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 122-123 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The astrometric measurements of the original 1961 UCAS survey plates were computed, leading to a grand total of 1252 orbits for newly discovered asteroids ranging in absolute magnitude from H = 10.5 to 19.5. New programs were created and existing computer routines were revised at Lowell Observatory, which has streamlined the process of correctly identifying asteroid images on archival photographic plates. The recovery and accurate measurements were made of 130 UCAS asteroids at other oppositions on plates taken by C. T. Kowal at Palomar Mountain in 1978 and 1979. When added to the 90 other UCAS objects identified by other investigators, this brings the total of multiple-opposition orbits to 220. Of the 56 UCAS asteroids known to be planet crossing, 11 were recovered at second oppositions. The recovery and accurate measurements of about 20 non-UCAS asteroids identified on the plates were examined. E.R.

N87-12470*# Washington Univ., St. Louis, Mo. Dept. of Earth and Planetary Sciences.
HIGH RESOLUTION SPECTRAL IMAGERY OF COMETS
William Hayden Smith *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 124 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

C-13/C-12 data at a spectral resolution of 75,000, resolving the background interferences was obtained. Some data was obtained for N-15/N-14. In April, observations were obtained for the D/H ratio. The model analysis of these observations is beginning with the goal of presentation at the Heidelberg Halley meeting. A very large quantity of observations were obtained of both features with variations on the time scale of an hour being measured. At times, the 5577 feature dominates, and at times it is nearly absent. To date, a large body of data have been obtained for C2, NH2, (O I), and probably H2O+, CN, and from the MKO data, OH. These features can all be correlated with respect to their relative velocities and distribution at the time of observation. The Greenstein effect will be used to measure similar results for CN, OH, and few other selected molecular features. E.R.

N87-12471*# California Univ., Berkeley. Dept. of Astronomy.
SPATIALLY RESOLVED QUANTITATIVE SPECTROSCOPY OF COMETS
Hyron Spinrad *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 125-126 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The pristine nucleus of a comet, in particular, its chemical composition is studied. More immediate goals are to quantitatively compare the mass-loss-rates of various periodic comets, and to map out the distribution of coma region ions and neutral radicals with the hope of indirectly determining their parent molecules. Author

N87-12472*# Massachusetts Inst. of Tech., Cambridge. Lincoln Lab.
A SEARCH FOR EARTH-APPROACHING ASTEROIDS
L. G. Taff *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 127 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

New automated methods were developed for the detection and discrimination of Earth-approaching asteriods. Specifically, utilizing state-of-the-art, electron-bombarded, silicon diode, beam scanned, low light level television cameras and the most advanced video processing equipment available. The improvement of the limiting magnitude for a 50% probability of detection, increase the areal search rate, and minimize the burden on humans of the search effort. To this end, three increasingly automated and sophisticated versions of the data acquisition, storage, and processing systems, were designed and implemented. The celestial sphere were searched for Earth-approaching minor planets. An example of this effort is the recent cataloging of 1982 HS=3343 VNEDZEL. This particular high eccentricity, high inclination object is of a type even more rare than are Earth-approaching asteriods. Several of these were found. E.R.

N87-12473*# Arizona Univ., Tucson.
POLE ORIENTATION, SIDEREAL PERIOD, AND SENSE OF ROTATION OF ASTEROIDS
Ronald C. Taylor and Tom Gehrels *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 128 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Pole orientations of asteroids were determined. The method, called photometric astrometry, takes precise epochs of lightcurves into account. Pole determination research on asteroids 532 Herculina, 45 Eugenia, and 3 Juno continues. Discrepancies between various pole determination techniques presently being used are analyzed. The study of asteroid shapes and creating a generalized master pole determination technique also continues which will incorporate the best features of several current methods. E.R.

N87-12474*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ASTEROID SHAPES AND POLE ORIENTATION FROM VISUAL AND INFRARED PHOTOMETRY
Edward F. Tedesco *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 129-130 (For primary document

see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The shape and pole orientation of asteroid 16 Psyche was determined. New evidence supporting the shorter, five hour, period for 4 Vesta was presented. The first mutual eclipse event between Pluto and Charon was detected. The organization of an international campaign to obtain lightcurves and other data on the Pluto-Charon mutual events was started. E.R.

N87-12475*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROPERTIES OF ASTEROIDS c90
Glenn J. Veeder *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 ' p 131-132 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

The physical properties of asteroids were studied by telescopic observations and laboratory and theoretical work. Spectrophotometry from 0.3 to 1.1 microns and 1.2, 1.6 and 2.2 micron photometry allow spectral-compositional classification of asteroids. Based on laboratory data and telescopic observations, it was found that infrared measurements at 1.2, 1.6 and 2.2 microns provide a relatively rapid and accurate method for the classification of minor planets and are important in comparing asteroids with meteorites. This technique was proven and employed in an expanded survey of Apollo-Amor-Aten and other unusual asteroids recently scanned by IRAS. Author

N87-12476*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PASSIVE MICROWAVE REMOTE SENSING OF THE ASTEROIDS USING THE VLA: CONTINUATION c32
William J. Webster, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 133-134 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 17I

The structure and composition parameters for a selected set of the main belt asteroids were inferred by employing microwave remote sensing techniques developed for Earth observations. Precise flux density measurements made with the Very Large Array (VLA) and the 11 m mm-wave antenna of the National Radio Astronomy Observatory are used to define the microwave continuum spectra of these asteroids. These spectra were inverted in order to estimate the near-surface bulk properties (radii, roughness, composition) independent of previous optical or infrared spectroscopy. Author

N87-12477*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORIGIN OF ASTEROIDS AND SMALL BODIES c90
J. G. Williams and J. Gibson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 135 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

During the past year three periodic comets were recovered. They were Tsuchinshan 2, Whipple, and Daniel. Follow up positions on four newly discovered comets appeared on IAU cards: Machholz, Hartley, Maury, and Shoemaker 3. Halley was captured shortly after its 1985 conjunction and a set of exposures in late summer was one of the earliest showing tail development. A variety of interesting asteroids were also captured. Author

N87-12478*# Arizona State Univ., Tempe. Dept. of Physics.
SPECTROSCOPY OF COMETS
Susan Wyckoff and Peter A. Wehinger *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 136-137 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Comets constitute the most accessible samples of the outer solar system in its most primitive state. The physical and chemical properties of comet nuclei were determined to infer the conditions and processes related to the origin and evolution of the outer solar system. The procedure is to acquire and analyze digital spectra of a sample of comets covering a large range in heliocentric distance. During 1984 to 1986 the emphasis has been on Comet P/Halley (1982i). Large ground-based telescopes and state-of-the-art detectors were used to observe Comet P/Halley pre- and post-perihelion, covering a heliocentric distance range, 0.9 to 6.1 AU. Author

N87-12479*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMETARY DYNAMICS c90
Donald K. Yeomans *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 138 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

In order to provide observers with accurate cometary ephemerides, up-to-date astrometric positions must be used to update the existing orbit and ephemeris for each object. In addition, nongravitational forces must be taken into account; these forces are assumed due to the rocket effect of outgassing cometary ices. Once successfully modeled, the cometary nucleus spin direction, spin axis evolution, and the volatility of the nucleus ices can be inferred. The predicted ephemerides also become far more accurate. Author

N87-12480*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
WORKSHOP ON EARTH-ORBITAL PLANETARY ASTRONOMY
Jay T. Bergstrahl and Michael J. S. Belton (Kitt Peak National Observatory, Tucson, Ariz.) *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 141-142 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

During the last 15 years, a revolution has occurred in the understanding of the physical nature of the solar system. The most conspicuous contributions have come from investigations on spacecraft, ranging from the early Explorers to the current Voyagers. Less conspicuous but equally important are the discoveries that have come from parallel investigations in ground-based, airborne and Earth-orbital astronomy. The role of Earth-based remote observations in achieving the goals of Solar System Exploration's Planetary Astronomy Program are currently under review. To assess the specific need for future Earth-orbital facilities, a workshop was convened at Jet Propulsion Laboratory on 13 to 15 January, 1986. The charter of the workshop included requests to (1)identify and need for Earth-orbital observations within the context of the current goals of the Solar System Exploration Program and (2)identify candidate facilities and instruments required to support these needs. Author

N87-12481*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SPECTROSCOPIC PLANETARY DETECTION
Drake Deming, Fred Espenak, John J. Hillman, Theodor Kostiuk, Michael J. Mumma, and Donald E. Jennings *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 143-144 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The Sun-as-a-star was monitored using the McMath Fourier transform spectometer (FTS) on Kitt Peak in 1983. In 1985 the first measurement was made using the laser heterodyne technique. The FTS measurements now extend for three years, with errors of order 3 meters/sec at a given epoch. Over this 3 year period, a 33 meter/sec change was measured in the apparent velocity of integrated sunlight. The sense of the effect is that a greater blueshift is seen near solar minimum, which is consistent with expectations based on considering the changing morphology of solar granular convection. Presuming this effect is solar-cycle-related, it will mimic the Doppler reflex produced by a planetary companion of approximately two Jupiter masses, with an 11 year orbital period. Thus, Jupiter itself is below the threshold for detection by spectroscopic means, without an additional technique for discrimination. However, for planetary companions in shorter

period orbits (P approx. 3 years) the threshold for unambiguous detection is well below one Jupiter mass. Author

N87-12482*# Pittsburgh Univ., Pa.
A SURVEY OF NEARBY STARS FOR THE PERTURBATATIVE EFFECTS OF EXTRASOLAR PLANETARY SYSTEMS
George D. Gatewood and John W. Stein *In* NASA, Washington Reports of Planetry Astronomy, 1985 Sep. 1986 p 145-146 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

A new photoelectric astrometric system, the Multichannel Astrometric Photometer (MAP), was developed, and it was used in a regular observing program designed to detect extrasolar planetary systems. The 76-cm refractor of the Allegheny Observatory was fully renovated to make it suitable as the observing instrument for the MAP. The MAP itself was designed, constructed and tested in actual operation. A data analysis system was developed and tested. E.R.

N87-12483*# Hawaii Univ., Honolulu. Inst. for Astronomy.
DETERMINATION OF STELLAR RADIAL VELOCITY PRECISION ATTAINABLE WITH A COUDE SPECTROGRAPH
William D. Heacox *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 147 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

An instrument to measure highly accurate radial velocities of stars, in order to detect low-mass stellar and planetary companions was proposed. The University of Hawaii's Institute for Astronomy has assembled nearly all the resources needed to realize the highest radial velocity precision attainable with conventional coude spectrographs. E.R.

N87-12484*# Arizona Univ., Tucson.
STELLAR OBSERVATIONS WITH THE VOYAGER EUV OBJECTIVE GRATING SPECTROGRAPH
Jay B. Holberg, R. S. Polidan, and D. C. Barry *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 148-149 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

During the periods of interplanetary cruise the Voyager ultraviolet spectrometers are used to provide unique and otherwise unobtainable observations in the extreme ultraviolet (EUV, 500 to 1200) and the far ultraviolet (FUV, 912 to 1220 A). These observations include the spectra of hot stellar sources as well as emission from the interplanetary medium. Recent results of note include: (1)Extensive spectrophotometric coverage of a superoutburst of the dwarf nova VW Hydri, which showed a clear 1/2 day delay in the outburst at 1000 A relative to that observed in the optical and a curious dip in the FUV light curve near maximum light. The Voyager observations were part of a comprehensive and highly successful campaign involving EXOSAT, IUE and ground based observations of this dwarf nova; (2)A comprehensive study of Be star spectra and variability. These results show the critical importance of FUV observations in the study of the effects of stellar rotation in hot stars; (3)The detection of a strong O VI absorption feature in the spectrum of the PG 1159-like object H1504+65. This detection along with the optical identification of weak O IV lines was a key to the interpretation of this object; which is of extremely high (>150,000K) temperature and appears to be a unique example of a stellar atmosphere devoid of H and He; (4)An analysis of an extremely long duration spectrum of the EUV and FUV sky background, which establishes important new upper limits on both continuum and line emission. This result also provide the first detection of interplanetary Lyman gamma. Author

N87-12485*# Arizona Univ., Tucson. Lunar and Planetary Lab.
THE RADIAL VELOCITY SEARCH FOR EXTRASOLAR PLANETS c90
Robert S. McMillen and Peter H. Smith *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 150-151 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Stars are observed with a ground-based instrument designed to measure small changes in the line-of-sight velocities. The purpose of the observations is to detect large planets by the oscillatory reflex motion they induce on the stars they are orbiting. The instrument is an optical spectrometer for which wavelengths are first calibrated by transmission through a tunable Fabry-Perot etalon interferometer. Changes in the line-of-sight velocities are revealed by changes in the Doppler shift of the absorption-line spectra of stars. The scrambling of incident light by an optical fiber and the stability of wavelength calibration by a tilt-tunable Fabry-Perot etalon provide immunity to systematic errors that historically have effected more conventional radial velocity spectrographs. A cross-dispersed echelle spectrograph spatially separates the orders of constructive interference transmitted through the etalon. Selecting several echelle diffraction orders in the vicinity of 4250 to 4750 A, which are imaged on a CCD, about 350 points on the profile of the stellar spectrum are sampled by successive orders of interferometric transmission through the etalon. Author

N87-12486*# Five-College Astronomy Dept., Amherst, Mass.
JETS, MASS OUTFLOWS AND DISKS ASSOCIATED WITH YOUNG STELLAR OBJECTS c90
Stephen E. Strom *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 152-155 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Over the past 3 years, a series was obtained of the CCD images of regions surrounding young stellar objects (YSO's) located in a variety of environments with the goal of providing a census of the properties of mass outflows associated these objects. A catalog describing the optical morphology and kinematics of 38 mass outflows associated with young stellar objects (YSOs) was completed. The direct detection was reported of disks surrounding HL Tau and LI551/IRS 5 -- both sources of optical jets and large-scale mass outflows. In each case, the disk dimensions are on the order of several hundred astronomical units and the disk dust masses approximately 10 to the -7th power solar masses. A program aimed at indirect detection of circumstellar disks associated with YSOs was started. The technique involves comparison of an observed bolometric luminosity (L(bol)) with an independent measure of the true luminosity (L(spec)) of a YSO which derives from the observed strengths of surface-gravity-sensitive spectral features. E.R.

N87-12487*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY OPTICAL AND INFRARED IMAGING
Richard J. Terrile and Bradford A. Smith *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 156-157 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Images were acquired of a circumstellar disk of orbiting material around the nearby star beta Pictoris. This material is believed to be associated with the formation of planets and provides a first look at a planetary system much younger than our own. Preliminary work was also done to acquire multicolor photometric data and polarimetry on the beta Pictoris disk as well. A coronagraphic search for other proto-planetary systems is also underway. Coronagraphic imaging provided the first clear images and a determination of the geometric albedo of the rings of Uranus. A search for material around the asteroid Amphitrite showed that the region around the asteroid was free of particles larger than 500 meters in radius or diffuse material with an optical depth larger than .000001. NASA IRTF infrared images of Jupiter and Saturn are providing information on the relative heights and cloud top temperatures of atmospheric features. Author

N87-12488*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERPLANETARY AND INTERSTELLAR DUST c90
Scott Sandford *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 165-166 (For primary document

see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

Several processed polycyclic aromatic hydrocarbons (PAH) samples were produced to date. The Raman spectra and D/H ratios of these samples will be studied in the near future. A manuscript was sent to Icarus which gives a detailed discussion of the possibility of using solar flare tracks in interplanetary dust particles (IDPs) to determine a cometary vs. asteroidal source of the IDPs. The technique looks promising and a program was started to measure the large number of IDP track density necessary to address the issue of the source(s) of the dust. The results could potentially tell a great deal about comets and/or asteroids. E.R.

N87-12489*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A RESEARCH PROPOSAL ON SPECTROSCOPY OF GASES AND SOLIDS OBSERVED IN THE SOLAR SYSTEM
Francisco P. J. Valero, Louis J. Allamandola, Charles Chackerian, Jr., Lawrence P. Giver, and David Goorvitch *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 167-168 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

It is well recognized and accepted that the interpretation and analysis of any type of remote planetary spectroscopic observation requires that basic molecular parameters be available. Furthermore, the newly developed capabilities of air, ground, and space borne spectrometers trained on bodies in the solar system are producing results which are extremely difficult to understand on the basis of available data. This is particularly true in the case of spectral features arising from gases and volatiles condensed as ices. With the objective to continue to extend the understanding of spectroscopic observations of solar system objects (including comets), laboratory studies of both gas phase molecules and ices and dusts are proposed. Author

N87-12490*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE INTERNATIONAL HALLEY WATCH
Ray L. Newburn, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 171-173 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The International Halley Watch has been designed to maximize the scientific value of ground-based observations of Halley's Comet. Important in their own right, such observations have also enhanced the value of space observations, setting the brief duration flyby data in the context of the overall apparition, placing the extremely high resolution encounter data into the normal scale of observations, and filling in missing data. The IHW has standardized observing techniques wherever useful and possible, coordinated the observing, and is now collecting data from publication in a comprehensive Halley Archieve. The IHW has been designed to avoid the problems of 1910 where the two major monographs on Halley were not published until 21 and 24 years later and where much data remains unpublished to this day. The Giacobini-Zinner Watch preovided support to the ICE mission and complements the IHW by using the same ground-based techniques at the same time of study another very different comet for comparison. Author

N87-12491*# Maryland Univ., College Park. Astronomy Program.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR PHOTOMETRY AND POLARIMETRY
Michael F. AHearn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 174 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The last of the 75 sets of standard filters were distributed, including re-allocation of several sets from north to south at the beginning of 1986. Observations of the photometric standard stars from several observatories were collected and synthesized into a standard system of magnitudes. Transformation equations were derived to yield absolute fluxes in various cometary emission bands and in the continuum. These transformations turned out to vary with the comet's radial velocity for some filters and with the filter's temperature for some filters, and from one set of filters to another, all effects were quantitatively assessed. Non-linearities in the extinction, observed through the OH filter, were modelled and techniques for linearizing the extinction were developed. Although not among the official goals of the IHW, NASA Headquarters chose to work through the IHW to develop two CCD camera systems. Two iterations of an archive format were performed and a third is in the works. E.R.

N87-12492*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR LARGE SCALE PHENOMENA
John C. Brandt and Malcolm B. Niedner, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 175-176 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The largest scale structures of comets, their tails, are extremely interesting from a physical point of view, and some of their properties are among the most spectacular displayed by comets. Because the tail(s) is an important component part of a comet, the Large-Scale Phenomena (L-SP) Discipline was created as one of eight different observational methods in which Halley data would be encouraged and collected from all around the world under the aspices of the International Halley Watch (IHW). The L-SP Discipline Specialist (DS) Team resides at NASA/Goddard Space Flight Center under the leadership of John C. Brandt, Malcolm B. Niedner, and their team of image-processing and computer specialists; Jurgan Rahe at NASA Headquarters completes the formal DS science staff. The team has adopted the study of disconnection events (DE) as its principal science target, and it is because of the rapid changes which occur in connection with DE's that such extensive global coverage was deemed necessary to assemble a complete record. Author

N87-12493*# Five-College Astronomy Dept., Amherst, Mass.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR RADIO SCIENCE
William M. Irvine, F. P. Schloerb, E. Gerard, R. D. Brown, and P. Godfrey *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 177-178 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Some 34 radio observatories in 18 countries are participating in the Radio Science Net of the International Halley Watch. Approximately 100 radio astronomers are contributing to this effort, which has included observations of comets P/Crommelin and P/Giacobini-Zinner as well as P/Halley. It is clear that the record of data for the 18 cm OH ground state lambda doublet, which provides fundamental information on the gas production rate, kinematics, and potentially the magnetic field in the coma, will be vastly more complete and of higher accuracy than has even been obtained on any previous comet. The coverage by a number of radio observatories will enable short period variations to be studied and correlated with simultaneous data obtained at other wavelengths. Likewise, the first definitive detection of the important parent molecule hydrogen cyanide in a comet was obtained and is being studied by groups in the United States, Sweden, and France. The first detection of the comet with the Very Large Array telescope operated by NRAO was achieved and has produced exciting results for the distribution of emission at high angular resolution from the OH radical. At this writing data are still being obtained and being processed, and there are still strong indications that exciting information will be obtained from radar studies of P/Halley and from searches for additional parent molecules. Author

N87-12494*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Science.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS

FOR INFRARED SPECTROSCOPY AND RADIOMETRY
Roger F. Knacke and T. Encrenaz *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 179-180 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The Infrared Net has been active in all areas of comet science in its domain. The more than 100 members of the net and 30 participating observatories are still engaged in observations, and only a preliminary discussion of the highlights of the program is possible at this time. Author

N87-12495*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR NEAR-NUCLEUS STUDIES
Stephen Larson, Zdenek Sekanina, and Jurgen Rahe *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 181-182 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The purpose of the Near-Nucleus Studies Net is to study the processes taking place in the near-nucleus environment as they relate to the nature of nucleus. This accomplished by measuring the spatial and temporal distribution of dust, gases and ions in the coma on high resolution images taken from many observatories around the world. By modeling the motions of discrete dust features in Comet Halley, it is often possible to determine the locations of the emission sources on the surface and learn about the nucleus structure. In addition to the general goals shared by all IHW nets, the scientific goals of the net has been to determine (1)the gross surface structure of the nucleus, (2)the nucleus spin vector, (3)the distribution and evolution of jet sources and (4)the interrelationships between the gas, dust and ion components of the coma. An additional Comet Giacobini-Zinner watch was carried out by the NNSN in support of the NASA International Cometary Explorer flyby. Author

N87-12496*# Arizona State Univ., Tempe. Dept. of Physics.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR SPECTROSCOPY AND SPECTROPHOTOMETRY
Susan Wyckoff, M. C. Feston, and P. Wehinger *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 183-184 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

Spectroscopic observations of Comets P/Crommelin, P/Giacobini-Zinner and P/Halley are coordinated, preliminary results are delivered to the astronomical community and the data collected from observers throughout the world are archived. The ASU IHW Center has the additional responsibility of maintaining the IHW Electronic Bulletin Board which reports real-time information on the status of Comet P/Halley. Access to this electronic bulletin board via telephone modem connection is available to any astronomer upon request. Author

N87-12497*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INTERNATIONAL HALLEY WATCH: DISCIPLINE SPECIALISTS FOR ASTRONOMY
Donald K. Yeomans, Richard West, Robert Harrington, and Brian Marsden *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 185 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

The Astrometry Network of the International Halley Watch (IHW) has organized and coordinated more than 300 astrometric observers from 47 countries in an effort to provide for accurate positional information on comets Halley and Giacobini-Zinner. This information is being used to constantly update the existing orbits and ephemerides for the various flight projects to these two comets and also for the other ground-based observers within the IHW organization. The astrometric data, as well as the resultant orbits and ephemerides, are being distributed to all requesting observers and they will be cataloged within the general IHW archive system. Author

N87-12498# Rochester Univ., N. Y. Inst. of Optics.
HIGH ANNULAR RESOLUTION STELLAR INTERFEROMETRY Final Report, 1 Dec. 1980 - 30 Nov. 1984
J. C. Dainty 31 Jul. 1985 255 p
(Grant AF-AFOSR-0003-81)
(AD-A168755; AFOSR-86-0312TR) Avail: NTIS HC A12/MF A01 CSCL 03/1

Research carried out on high annular resolution stellar interferometry is divided into many headings. Some areas of research are atmospheric turbulence, space time structure of images, speckled speckle, and detection of grating behind diffusers. Other areas of investigation are the phase problem, infrared speckle interferometry and phase conjugation. E.R.

N87-12499# Technische Hogeschool, Delft (Netherlands). Dept. of Mathematics and Informatics.
A NEW CROSS-CORRELATION METHOD TO DERIVE SHIFTS FROM STELLAR SPECTRA
P. Monderen, C. deLoore, and P. J. Rousseeuw 1985 22 p
(Rept-85-38; ETN-86-98468) Avail: NTIS HC A02/MF A01

A method to determine shifts between stellar spectra, based on the sum of the absolute values of the differences of the intensities is proposed. A minimum of the objective function is sought, and it becomes much easier to determine the optimal wavelength shift. The method is robust against inaccuracies in the data, making it especially appropriate to analyze fuzzy data. The method was tested on artificial profiles as well as on the spectrum of Beta Arietis and the light curve an Al Velorum star. In all cases it compares favorably with the classical approach. ESA

N87-12500 Harvard Univ., Cambridge, Mass.
ASTRONOMICAL OBSERVATIONS WITH AN INFRARED ARRAY CAMERA Ph.D. Thesis
Richard Mark Tresch-Fienberg 1985 251 p
Avail: Univ. Microfilms Order No. DA8602271

Astronomical observations with an infrared array camera demonstrate that arrays are excellent for high spatial resolution photometric mapping of celestial objects. A 16 x 16 pixel array camera system based on a bismuth-doped silicon charge injection device optimized for use in the 8 to 13 micron atmospheric window is described. Observing techniques and image processing algorithms that are unique to the use of an array detector are also discussed. Multi-wavelength, 1 to 2 arcsec resolution images of three different celestial objects are presented. For the galactic center, maps of the infrared color temperature and emission optical depth are derived. The results are consistent with a model in which a low density region with a massive luminosity source at its center is encircled by a ring of gas and dust from which material may be infalling toward the nucleus. Multiple liminosity sources are not required to explain the infrared appearance of the galactic center. Images of Seyfert galaxy NGC 1068 are the first to resolve the infrared structure of the nucleus and show that it is similar to that at optical and radio wavelengths. Infrared emission extended northeast of the nucleus is identified with the radio jet. Combined with optical spectra and charge coupled device images, the new data imply a casual relationship between the Seyfert activity in the nucleus and the starburst in the disk. Infrared images confirm the presence of two populations of dust grains having different spatial distributions in planetary nebula NGC 7027. Continuum and unidentified feature emission appear to arise from different regions within and perhaps immediately surrounding the ionized zone. Dissert. Abstr.

N87-12501 Florida Univ., Gainesville.
THE OBSERVATION AND ANALYSIS OF LUNAR OCCULTATIONS OF STARS WITH AN EMPHASIS ON IMPROVEMENTS TO DATA ACQUISITION INSTRUMENTATION AND REDUCTION TECHNIQUES Ph.D. Thesis
Glenn H. Schneider 1985 534 p
Avail: Univ. Microfilms Order No. DA8606759

A program of observation and analysis of lunar occultations was conceived, developed, and carried out using the facilities of

the University of Florida's Rosemary Hill Observatory (RHO). The successful implementation of the program required investigation into several related areas. First, after an upgrade to the RHO 76-cm. reflecting telescope, a microprocessor controlled fast photoelectric data acquisition system was designed and built for the occultation data acquisition task. Second, the currently available model-fitting techniques used in the analysis of occultation observations were evaluated. A number of numerical experiments on synthesized and observational data were carried out to improve the performance of the numerical techniques. Among the numerical methods investigated were solution schemes employing partial parametric adjustment, parametric grouping into computational subsets, and preprocessing of the observational data by a number of smoothing techniques for a variety of noise conditions. Third, a turn-Key computational software system, incorporating data transfer, reduction, graphics and display, was developed to carry out all the necessary and related computational tasks in an interactive environment. Twenty-four occultation observations were obtained during the period March 1983 to March 1984. The observational data and the solutions resulting from the subsequent reductions are presented graphically and tabularly for each of the occultation events. Several angular diameter determinations were made. Among those of particular interest were 32 Librae, 1 Geminorum-B1, and X07596. The visual/spectroscopic binary 1 Geminorum was discovered to have a fourth, previously undetected, component. Two other stars, X13534 and X13607, were found to be binary with companions closer than 15 milliseconds of arc. Previously unknown faint companions were discovered for ZC1221 and ZC0126. Dissert. Abstr.

N87-12502 Harvard Univ., Cambridge, Mass.
MULTIWAVELENGTH STUDIES OF CYGNUS X-3 Ph.D. Thesis
Lawrence Alan Molnar 1985 216 p
Avail: Univ. Microfilms Order No. DA8602248

Observations of low-level radio emission from Cyg X-3 show that this emission is characterized by successive flares whose spectral evolution is similar to the giant radio flares observed in Cyg X-3. As with the giant flares, we interpret these flares to be expanding sources of electron synchrotron radiation. We find that the timing of the flare onsets are periodic with a period several percent longer than the binary orbital period. We suggest the radio period is the result of periodic modulation of the binary separation. Modulation at the radio period may be caused by precession of the line of apsides in an eccentric orbit. We perform three body simulations that show that the modulation of the binary separation in a triple system may mimic the radio period much of the time, but would also show well-defined phase jumps twice per orbit of the third star. We present VLBI data at 1.3 cm wavelength that confirm our interpretation of the flares as expanding sources. We find that the effect of X-ray scattering by the interstellar medium on the observed X-ray light curve is to decrease the depth of modulation from its intrinsic value for photon energies less than 6 keV. EXOSAT observations of the X-ray light curve show that the shape of the light curve as well as its depth is dependent on photon energy. These data are not consistent with either cocoon or stellar wind models for the light curve. They are consistent with an accretion disk corona model. We review the evidence for detections of gamma rays and secondary muons from Cyg X-3 and find no convincing evidence for either. Dissert. Abstr.

N87-12503 Johns Hopkins Univ., Baltimore, Md.
X-RAY AND RADIO IMAGES OF FOUR SUPERNOVA REMNANTS WITH THREE DISTINCT X-RAY SIGNATURES Ph.D. Thesis
Yutaka Matsui 1986 156 p
Avail: Univ. Microfilms Order No. DA8601282

Radio images of Kepler's supernova remnant (SNR) and new X-ray images of the three SNRs--PKS1209-52, W28, and 3C400.2 were investigated. Although all of them are shell-like SNRs at radio wavelengths, there are distinct X-ray signatures among them. New high resolution radio images of Kepler's SNR reveal shell structure which is very similar to that of the X-ray image. Linear polarization mapping at 6 cm shows the existence of a radial component in the magnetic field. There is a correlation between rotation measure and X-ray surface brightness, which makes it possible to estimate a total magnetic field of 7 x 10(-5) gauss and an energy density of relativistic electron 6 x 10(-10) ergs cm(-3) in the shell. The correlation between radio emissivity and X-ray emissivity can be ascribed to acceleration of thermal electrons to relativistic energies at the shock front. The X-ray image of PKS1209-52 reveals fragmented shell structure which resembles the radio image. There is, however, a compact X-ray source near its center. The inhomogeneous nature of the X-ray emission is most likely a result of the interaction of the blast wave with the inhomogeneous interstellar medium. The age of PKS1209- 52 is in the range 10,000 to 23,000 years depending on the nature of the ambient medium. The SNRs W28 and 3C400.2 have centrally-peaked X-ray emission despite their radioshell morphologies. Comparisons of their X-ray and radio properties with known Crab-like SNRs suggest that the synchrotron radiation process is not a very plausible X-ray production mechanism. If the SNRs have evolved in relatively dense regions as suggested by radio and optical observations, they may have already evolved into the late adiabatic or radiative stage. Dissert. Abstr.

N87-12504 Colorado Univ., Boulder.
OPTICAL SPECTROSCOPIC STUDIES OF WOLF-RAYET CARBON AND OXYGEN STARS Ph.D. Thesis
Ana Victoria Torres 1985 164 p
Avail: Univ. Microfilms Order No. DA8608647

This thesis analyses the optical spectra of 65 galactic and 18 LMC WC and WO stars. Up to now, the classification of WC stars had been based on visual estimates of ratios of line strengths. Using the ratios of O V 5590 A, C III 5696 A and C IV 5801,12 A, and the full width half maximum (FWHM) of the lambda 4650 line, I have quantified the WC subtype classification, which represents an ionization/excitation sequence. A few galactic stars are reclassified and nearly all LMC stars are found to be of subtype WC4, rather than WC5, as previously classified. The wind terminal velocities are estimated for the majority of the stars in our sample by using the property that the FWHM of the lines correlate with excitation potential. In those cases when the ultraviolet (UV) spectrum is available, the agreement with the terminal velocity measured from UV P Cygni profiles is very good. The values range between 800 and 5000 km s(-1), with the earliest WC subtypes showing the highest velocities. Two WO stars show terminal velocities as high as 6000 and 7000 km s(-1). The C/He ratio is determined for WC stars using local thermodynamic equilibrium (LTE) and recombination theory. These models give C/He ratios larger than those calculated by other means and they are several times greater than solar, in agreement with evolutionary models of stars that are burning helium in the core. The calculations suggest that the C/He ratios do not depend on spectra subclass. If true, this implies that there is no evolutionary connection between WCE and WCL stars. Dissert. Abstr.

N87-12505 Stanford Univ., Calif.
AN XUV SPECTROSCOPIC OBSERVATION OF THE WHITE DWARF STAR HZ 43 Ph.D. Thesis
Walter Hal Tompkins 1986 91 p
Avail: Univ. Microfilms Order No. DA8608237

A soft X-ray objective grating spectrometer utilizing grazing incidence optics was designed for astronomical observations, assembled at Stanford, calibrated and flown in 1983. The target was the hot white dwarf star HZ 43, which is of particular interest because it is one of the two brightest non-solar extreme ultraviolet sources in the sky. The emission is thought to be thermal in origin, with an effective temperature of 60,000 degrees. The basic experimental configuration involved a confocal, coaxial pair of nested Wolter-Schwarzschild Type 1 telescopes, an annulus of free standing gold 500 l/mm transission gratings, and a microchannel plate detector in the focal plane with proximity focussed resistive anode readout. The point response function was measured in the visible. The angular size (full width at half maximum) was 25 arc seconds with a sharp central core of less than 5 arc second angular extent. The instrument as a whole was calibrated

in a vacuum facility at U.C. Berkeley. Each telescope was illuminated with a pencil of monochromatic light at the following wavelengths: 68, 130, 160, 170, 218, and 256 A. A gas flow proportional counter was used as an absolute detector to monitor the source intensity. Maximum sensitivity was between 60 to 150 A with a peak spectrometer effective area including both first orders of 0.2 cm(2). Dissert. Abstr.

N87-12506 Harvard Univ., Cambridge, Mass.
X-RAY STUDIES OF BL LACERTAE OBJECTS Ph.D. Thesis
Grzegorz Maria Madejski 1986 254 p
Avail: Univ. Microfilms Order No. DA8609747

Spectral X-ray data is presented for BL Lac objects observed by the Imaging Proportional Counter (IPC) and the Monitor Proportional Counter (MPC) aboard the Einstein Observatory and the data are interpreted in a context of overall radiation spectra using synchrotoron and synchrotron self-Compton models. The objects considered are: OJ 287, PKS 0735+178, I Zw 186, PKS 0548-322, Mkn 180, BL Lacerte, PKS 2155-304, H 0414-009, and H 0323+022. The overall electromagnetic distribution in those objects as arising due to the synchrotron process was interpreted in at least two spatial regions, with sizes respectively: approximately 10 to the 18th power cm for the radio component and approximately 10 to the 16th power cm for the optical component.Dissert. Abstr.

N87-12507 California Univ., Los Angeles.
A PHOTOMETRIC INVESTIGATION OF THE RICH SUPERCLUSTER FOURTEEN FIFTY-ONE PLUS TWENTY-TWO Ph.D. Thesis
Robin Bruce Ciardullo 1986 170 p
Avail: Univ. Microfilms Order No. DA8614076

The morphological properties of rich supercluster 1451 + 22 are investigated using photographic galaxy photometry in a two color system especially sensitive to redshift. By measuring some 125,000 galaxies in five Palomar Schmidt fields, the supercluster's shape, density profile, density contrast, and galaxy population are found. The data suggest that the structure of 1451 + 22 is that of a face-on pancake, flattened against the plane of the sky, although spherical models are not ruled out. Filaments which are rich in early type galaxies do exist, but most of the mass of the supercluster lies outside these regions. In addition, 1451 + 22 seems to exhibit a core-halo structure, with the central degree containing a much higher galaxy density and a larger percentage of elliptical and SO galaxies than the outer regions. If 1451 + 22 is flat, the mean luminosity density contrast of the supercluster over the field is rho/rho sub field approx 10, and the total mass of the system probably M is greater than 10 to the 16th power solar masses. If the supercluster is quasi-spherical, the observed density contrast is rho/rho sub field approx 5, implying a total mass to light ratio of M/L solar luminosity approx.130, and a cosmological density parameter omega approx 0.3. Dissert. Abstr.

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

For related information see also *75 Plasma Physics*.

N87-12508*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTARCTIC METEORITE NEWSLETTER, VOLUME 9, NUMBER 1
Feb. 1986 29 p Sponsored in part by NSF
(NASA-TM-89230; NAS 1.15:89230) Avail: NTIS HC A03/MF A01 CSCL 03B

Topics addressed include: petrographic descriptions of new meteorites; homogeneous powders of Antarctic meteorites; policy on consortium studies, and saw-cut surfaces of Shergottite EETA79001. B.G.

N87-12509*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS AND SUBSEQUENT ORBITAL INVESTIGATIONS Semiannual Progress Report, 1 May - 31 Oct. 1986
Richard E. McCrosky and Brian G. Marsden Nov. 1986 10 p
(Grant NGR-09-015-212)
(NASA-CR-179859; NAS 1.26:179859; SAPR-26) Avail: NTIS HC A02/MF A01 CSCL 03B

The 155-cm reflector was used for observations of comets and minor planets on 32 nights during April-October. The distribution was fairly uniform, ranging from 45 in June and September to 28 in July: on September 1 a total of 17 observations was made. A table is included which lists the 230 measurements published during the semester. These include six additional measurements going back to 1984 and the republication of a previously misidentified 1976 observation as a new discovery. Thirty-two of the observations refer to comets, 83 to numbered minor planets, and the remainder to unnumbered minor planets. Among the older-numbered minor planets observed were the Earth-approaching objects (3103) 1982 BB, (3199) 1982 RA (Nefertiti), (3361) 1982 HR and (3362) 1984 QA (Khufu), some of which were of interest for radar experiments. Unnumbered Earth-approaching objects observed were 1963 RH, 1983 RD, 1985 TB and 1986 DA, as well as the new discoveries 1986 JK, 1986 LA and 1986 PA. M.G.

N87-12510*# Carnegie Institution of Washington, D. C.
CHROMOSPHERIC ACTIVITY OF COOL GIANT STARS Final Report
Thomas Y. Steiman-Cameron 23 Nov. 1986 9 p
(Grant NAG5-425)
(NASA-CR-177184; NAS 1.26:177184) Avail: NTIS HC A02/MF A01 CSCL 03B

During the seventh year of IUE twenty-six spectra of seventeen cool giant stars ranging in spectral type from K3 thru M6 were obtained. Together with spectra of fifteen stars observed during the sixth year of IUE, these low-resolution spectra have been used to: (1) examine chromospheric activity in the program stars and late type giants in general, and (2) evaluate the extent to which nonradiative heating affects the upper levels of cool giant photospheres. The stars observed in this study all have well determined TiO band strengths, angular diameters (determined from lunar occulations), bolometric fluxes, and effective temperatures. Chromospheric activity can therefore be related to effective temperatures providing a clearer picture of activity among cool giant stars than previously available. The stars observed are listed. Author

N87-12511 Harvard Univ., Cambridge, Mass.
NON-THERMAL RADIATION MECHANISMS AND PROCESSES IN SS 433 AND ACTIVE GALACTIC NUCLEI Ph.D. Thesis
David Louis Band 1985 307 p
Avail: Univ. Microfilms Order No. DA8602188

Studies of the jet emitting compact binary system SS 433 and the non-thermal synchrotron-self-Compton scattering process reveal features of the interaction of compact objects with their environments. The Einstein MPC X-ray observations of SS 433 are best fit by a non-thermal power law spectrum where both the intensity and (energy) spectral index varied on a timescale of hours to days. Flares characterized by an intensity increase and a hardening of the spectral index are attributed (within the context of the slaved disk model) to accretion surges that occur at certain orbital phases in a binary with a Roche-lobe filling primary whose spin axis is misaligned with the orbit axis. The synchrotron-self-Compton methodology in spherical geometries is refined, emphasizing both geometrical and spectral factors for both homogeneous and inhomogeneous sources. Electron and photon energy distribution cutoffs, as well as the high energy Klein-Nishina scattering cross-section, are considered in the spectral calculation. Physically reasonable variations on the standard model create observable breaks, spectral index changes, and peaks in the observed spectrum. Finally, the model of expanding sources (perhaps embedded in jets) is extended to include both continuous electron injection and inverse Compton X-ray production. Application of

this methodology to SS 433 suggests that the radio flares require additional electron injection into the expanding sources in the jets, while the X-ray emission cannot originate in these expanding sources. Analogous to the sources with radio quiet quasars, a self-consistent non-thermal source within the binary can satisfy observational constraints. Dissert. Abstr.

N87-12512 Cornell Univ., Ithaca, N.Y.
GALAXY GROUPS: NEUTRAL HYDROGEN AND DYNAMICS Ph.D. Thesis
Stephen Ewing Schneider 1986 213 p
Avail: Univ. Microfilms Order No. DA8607210

Observations of galaxies and intergalactic gas via the 21 cm line of neutral hydrogen are used to investigate the dynamics of galaxy groups. A study of 36 apparent groups observed at Arecibo demonstrates the variety of problems encountered when using galaxy redshifts to determine dynamical masses, and it is argued that inherent selection effects in such group samples prevent a meaningful interpretation of group dynamics. Fortuitously, a cloud-complex of intergalactic gas was discovered during the observations which allows a detailed dynamical study of the large-scale distribution of matter in the M96 group of galaxies. The intergalactic gas is distributed around the group's two central galaxies along a simple and uniquely-defined Keplerian orbit. This remarkable 200 kpc diameter ring of gas provides one of the only direct and well-constrained determinations of the mass of a group of galaxies away from any of the luminous matter in the group. From the modest mass-to-light ratio found, and from the structure of the orbit, it appears that any dark matter in the group is concentrated toward the individual galaxies. The intergalactic gas also provides a probe of the intergalactic environment away from the hot gas in galaxy clusters, and possible sub-thermal effects in diffuse intergalactic neutral hydrogen are considered. The internal dynamics of the intergalactic gas are examined in VLA observations, and the cloud gas is found to break up into clumps of gas that may be dynamically independent. Several scenarios for the origin and maintenance of the ring of intergalactic gas are considered, and the relationship of the gas to the surrounding galaxies is studied. Dissert. Abstr.

N87-12513 Texas Univ., Austin.
THE EMISSION LINES FROM ACCRETION DISKS IN CATACLYSMIC VARIABLE SYSTEMS Ph.D. Thesis
Frederic Victor Hessman 1985 406 p
Avail: Univ. Microfilms Order No. DA8609512

The line profiles and relative fluxes of the emission lines in the quiescent spectra of cataclysmic variables contain information about the physical state of the material in the accretion disks around the white dwarfs. Seven physical and phenomenological models for the emission line regions are discussed and the resulting emission line profiles and fluxes computed. The available observations are compared with detailed, theoretical, LTE accretion disks constructed using a wide variety of models for the viscosity. The structure of the optically thin parts of the disk is difficult to reconcile with that of simple disk models using heating due to viscous dissipation alone. H beta and H delta emission line profiles from Cassegrain spectra of SS Cygni have been deconvolved into radial emissivity distributions that are adequately characterized by a power-law in radius with an index of about-1.6. The excitation temperature measured by these Balmer lines is effectively constant over the entire disk. A detailed analysis of high resolution Coude observations indicates that the accretion disk line flux is modulated at high velocities in phase with the orbit. This extra emission can be adequately modeled by a sinusoidal variation in azimuth which is peaked towards the center of the disk. The impact of this model on the implied structure of the accretation disk and of the central star is discussed. Dissert. Abstr.

N87-12514 Maryland Univ., College Park.
THE PHYSICAL CHARACTERISTICS OF THE X-RAY EMITTING GAS IN CLUSTERS OF GALAXIES AND CONSTRAINTS ON DARK MATTER Ph.D. Thesis
Mark Jeffrey Henriksen 1985 216 p
Avail: Univ. Microfilms Order No. DA8608610

A model independent approach to the analysis of the X-ray emission from rich clusters of galaxies was formulated and applied to both spectral and imaging data. Temperature and density profiles are found which show, with 90% confidence, that the intracluster medium in many clusters is better fit by a nonisothermal equation of state than an isothermal one. This means that isothermal models are not adequate to describe the intracluster medium. More accurate abundances are determined for 10 clusters. As a result, weak evidence is found that hotter more evolved cluster have a lower iron abundance that cooler, less evolved ones. These results question the existing enrichment scenarios for the intracluster medium. Constraints are derived on the amount and distribution of mass which binds the gas. The centrally peaked X-ray emission observed in the X-ray images is successfully modeled by a Gaussian function added to a diffuse component. This analysis indicates that the luminosity in the central component was overestimated. The model advocated is able to derive all of the parameters which describe the intracluster medium in a self-consistent manner. Dissert. Abstr.

N87-12515 Cornell Univ., Ithaca, N.Y.
TOPICS IN THE THEORY OF NEUTRON STAR COOLING Ph.D. Thesis
Robert Clifton Duncan 1986 136 p
Avail: Univ. Microfilms Order No. DA8607319

The neutrino emissivity was calculated for interacting, degenerate quark matter, which may make up the dense cores of neutron stars. Quantum chromodynamic interactions between quarks are included to first order. Also considered, is the very early cooling epoch, lasting up to approximately 1 minute after formation, when a neutron star is optically thick to neutrons. The threshold color temperature of the emergent neutrino flux was determined. Estimates of the total mass loss from a hot neutron star which is cooling from an initially isothermal state were made. Implications of these results for Type II supernovae are briefly discussed. Dissert. Abstr.

N87-12516 Indiana Univ., Bloomington.
THE EVOLUTION OF ACTIVE GALACTIC NUCLEI Ph.D. Thesis
Laurence Paul David 1985 144 p
Avail: Univ. Microfilms Order No. DA8607408

Detailed, self-consistent, computer simulations are presented for the evolution of active galactic nuclei. A one-dimensional Fokker-Planck code is used to determine the evolution of the stellar system, and another code which integrates the steady-state, one-dimensional hydrodynamics equations is used to determine the flow profile of the interstellar medium. Dissert. Abstr.

N87-12517 Maryland Univ., College Park.
NUMERICAL HYDRODYNAMIC MODELS OF PLANETARY NEBULAE Ph.D. Thesis
Matthew Simon Bobrowsky 1985 188 p
Avail: Univ. Microfilms Order No. DA8614202

Numerical models were calculated using the equations of mass, momentum, and energy conservation. The hydrodynamic equations are expressed in different form in order to facilitate numerical solution for the evolution of the gas. The dependent variables are defined at discrete points on a grid in the m-t plane (Lagrangian coordinates), in which the time steps are chosed to satisfy the Courant condition for numerical stability. Energy input is provided by photoionization of hydrogen and, in one case, a stellar wind, while cooling occurs mainly by de-excitation from excited electronic states of the more common ion. The models contain ionization and shock fronts depending on the various boundary conditions used. Dissert. Abstr.

N87-12518 Maryland Univ., College Park.
THE EARTH'S NUTATIONAL MOTION DETERMINED FROM RADIO INTERFEROMETRY Ph.D. Thesis
George Harry Kaplan 1985 224 p
Avail: Univ. Microfilms Order No. DA8614243

The connected-element radio interferometer at the National Radio Astronomy Observatory site at Green Bank, West Virginia, has been used since 1978 in a continuous program of astrometric observations. These observations have been used to obtain new information on the periodic motion of the Earth's rotation axis in inertial space. Observational determinations of this motion, referred to as astronomical nutation, provide information on the internal structure and dynamics of the Earth. Additionally, the reduction of various types of high-precision geodetic and astrometric data require that this motion be accurately known. A general description of various aspects of the Earth's rotation is given, and the basic physical origin of the nutational motion is developed. A discussion of the various effects which enter into highly accurate modern theories of this motion is given. The observing program and data reduction procedures are described. Finally, the results obtained are presented and their implications discussed. It is found that to the level of accuracy of the Green Bank data analyzed here, theories developed from modern Earth models adequately describe the nutational motion. Dissert. Abstr.

N87-11812 Joint Publications Research Service, Arlington, Va.
TASS REPORTS VEGAS-1 ENCOUNTER WITH HALLEY'S COMET
In its USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 112 113 Transl. into ENGLISH from Leningradskaya Pravda (Leiningrad, USSR), 7 Mar. 1986 p 11 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

N87-12444*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ATLAS OF COMET HALLEY 1910 II
John C. Brandt and Bertram Donn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 76 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12445*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPOSITION OF FAINT COMETS
Larry W. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 77 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12462*# Maryland Univ., College Park. Astronomy Program.
PLANET-CROSSING ASTEROIDS: INTERRELATIONSHIPS WITHIN THE SOLAR SYSTEM
Lucy-Ann McFadden and Michael F. AHearn *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 106-107 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12463*# Lowell Observatory, Flagstaff, Ariz.
OCCULTATION STUDIES OF THE SOLAR SYSTEM
Robert L. Millis, Lawrence H. Wasserman, Edward L. G. Bowell, and Otto G. Franz *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 108-109 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12465*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROCESSES IN COMETS
Ray L. Newburn, Jr. *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 112-113 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12466*# Minnesota Univ., Minneapolis. Dept. of Astronomy.
STUDY OF COMETS AT WAVELENGTHS BETWEEN 0.5 AND 18 MICRONS
Edward P. Net and Robert D. Gehrz *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 114-117 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12475*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PHYSICAL PROPERTIES OF ASTEROIDS
Glenn J. Veeder *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 ' p 131-132 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12477*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ORIGIN OF ASTEROIDS AND SMALL BODIES
J. G. Williams and J. Gibson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 135 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12479*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
COMETARY DYNAMICS
Donald K. Yeomans *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 138 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12485*# Arizona Univ., Tucson. Lunar and Planetary Lab.
THE RADIAL VELOCITY SEARCH FOR EXTRASOLAR PLANETS
Robert S. McMillen and Peter H. Smith *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 150-151 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12486*# Five-College Astronomy Dept., Amherst, Mass.
JETS, MASS OUTFLOWS AND DISKS ASSOCIATED WITH YOUNG STELLAR OBJECTS
Stephen E. Strom *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 152-155 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12488*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INTERPLANETARY AND INTERSTELLAR DUST
Scott Sandford *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 165-166 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N87-12519*# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
EXTENDED ATMOSPHERES OF OUTER PLANET SATELLITES AND COMETS Annual Report, 1 Aug. 1985 - 31 Jul. 1986
William H. Smyth and Michael R. Combi Sep. 1986 28 p (Contract NASw-3966)
(NASA-CR-176888; NAS 1.26:176888) Avail: NTIS HC A03/MF A01 CSCL 03B

An analysis of the extended atmospheres of outer planet satellites and comets is made. Primary emphasis is placed on cometary atmospheres because of the return of Comet P/Halley.

As part of a collaborative effort with A.I.F. Stewart, observations of the hydrogen coma of Comet P/Giacobini-Zinner obtained from the Pioneer Venus Orbiter ultraviolet spectrometer (PVOUVS) were successfully analyzed at AER and are reported. In addition, significant pre-modeling and post-modeling activities to support and analyze the PVOUVS observations of Comet P/Halley successfully acquired in late 1985 and early 1986 are also discussed. Progress in model preparation for third-year analysis of the Voyager UVS Lyman-alpha brightness distribution emitted by hydrogen atoms in the Saturn system is also summarized.
Author

N87-12520*# Brigham Young Univ., Provo, Utah. Dept. of Physics and Astronomy.
PIONEER 10 AND 11 (JUPITER AND SATURN) MAGNETIC FIELD EXPERIMENTS Final Report
Douglas E. Jones Oct. 1986 133 p
(Grant NAG2-145)
(NASA-CR-179856; NAS 1.26:179856) Avail: NTIS HC A07/MF A01 CSCL 03B

Magnet field data obtained by the vector helium magnetometer (VHM) during the encounters of Jupiter (Pioneer 10 and 11) and Saturn (Pioneer 11) was analyzed and interpreted. The puzzling characteristics of the Jovian and Saturnian magnetospheric magnetic fields were studied. An apparent substorm (including thinning of the dayside tail current sheet) was observed at Jupiter, as well as evidence suggesting that at the magnetopause the cusp is at an abnormally low latitude. The characteristics of Saturn's ring current as observed by Pioneer 11 were dramatically different from those suggested by the Voyager observations. Most importantly, very strong perturbations in the azimuthal ring current magnetic field suggest that the plane of the ring was not in the dipole equatorial plane, being tilted 5 to 10 deg relative to the dipole and undergoing significant changes during the encounter. When these changing currents were corrected for, an improved planetary field determination was obtained. In addition, the ring and azimuthal currents at Saturn displayed significantly different time dependences.
Author

N87-12521*# Smithsonian Institution, Washington, D. C. Center for Earth and Planetary Studies.
BASALT DEPTHS IN LUNAR BASINS USING IMPACT CRATERS AS STRATIGRAPHIC PROBES: EVALUATION OF A METHOD USING ORBITAL GEOCHEMICAL DATA Final Report
Constance G. Andre Oct. 1986 27 p
(Grant NAGw-444)
(NASA-CR-179858; NAS 1.26:179858) Avail: NTIS HC A03/MF A01 CSCL 03B

A rare look at the chemical composition of subsurface stratigraphy in lunar basins filled with mare basalt is possible at fresh impact craters. Mg/Al maps from orbital X-ray flourescence measurements of mare areas indicate chemical anomalies associated with materials ejected by large post-mare impacts. A method of constraining the wide-ranging estimates of mare basalt depths using the orbital MG/Al data is evaluated and the results are compared to those of investigators using different indirect methods. Chemical anomalies at impact craters within the maria indicate five locations where higher Mg/Al basalt compositions may have been excavated from beneath the surface layer. At eight other locations, low Mg/Al anomalies suggest that basin-floor material was ejected. In these two cases, the stratigraphic layers are interpreted to occur at depths less than the calculated maximum depth of excavation. In five other cases, there is no apparent chemical change between the crater and the surrounding mare surface. This suggests homogeneous basalt compositions that extend down to the depths sampled, i.e., no anorthositic material that might represent the basin floor was exposed. Author

N87-11813 Joint Publications Research Service, Arlington, Va.
BALLOON PROBE AND DESCENT APPARATUS EXPLORATION OF VENUS DISCUSSED
Yuriy Zaytsev *In its* USSR Report: Space (JPRS-USP-86-005) 12 Sep. 1986 p 125 131 Transl. into ENGLISH from Nauka i Tekhnika (Riga, USSR), no. 10, Oct. 1985 p 5-8 (For primary document see N87-11809 03-12)
Avail: NTIS HC A11/MF A01

N87-12412*# New Mexico State Univ., Las Cruces. Dept. of Astronomy.
LONG-TERM CHANGES IN REFLECTIVITY AND LARGER SCALE MOTIONS IN THE ATMOSPHERES OF JUPITER AND SATURN
Reta F. Beebe *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 17-18 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12413*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PLANETARY SPECTROSCOPY
J. T. Bergstralh *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 19 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12414*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SEARCH FOR VOLATILES IN THE SURFACE OF ICY SATELLITES
R. H. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 20 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12415*# State Univ. of New York, Stony Brook. Dept. of Earth and Space Science.
THEORETICAL AND OBSERVATIONAL PLANETARY PHYSICS
John Caldwell *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 21-22 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12420*# Arizona Univ., Tucson. Lunar and Planetary Lab.
INTERIORS OF THE GIANT PLANETS
W. B. Hubbard *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 32-33 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12421*# Arizona Univ., Tucson. Lunar and Planetary Lab.
STUDIES OF EXTENDED PLANETARY ATMOSPHERES
Donald M. Hunten and Robert A. Brown *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 34-35 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12423*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
INFRARED OBSERVATIONS OF OUTER PLANET SATELLITES
T. V. Johnson *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 38 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

N87-12427*# Southwest Research Inst., San Antonio, Tex. Dept. of Space Science.
MODELING AND INVESTIGATIVE STUDIES OF JOVIAN LOW FREQUENCY EMISSIONS
J. D. Menietti, J. L. Green, N. F. Six, and S. Gulkis *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 44-45 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12438*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VISIBLE PHASE CURVES OF URANUS AND NEPTUNE AND SCATTERING IN THEIR ATMOSPHERES

Daniel Wenkert *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 64 (For primary document see N87-12407 03-39)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12440*# Lowell Observatory, Flagstaff, Ariz.
PLANETARY RESEARCH AT LOWELL OBSERVATORY
William A. Baum, Robert L. Millis, Barry L. Lutz, Edward L. G. Bowell, Tobias J. Kreidl, and David C. Schleicher *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 68-70 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03B

N87-12456*# Five-College Astronomy Dept., Amherst, Mass.
RADIATIVE TRANSFER IN PLANETARY ATMOSPHERES
William M. Irvine and F. Peter Schloerb *In* NASA, Washington Reports of Planetary Astronomy, 1985 Sep. 1986 p 96-97 (For primary document see N87-12407 03-89)
Avail: NTIS HC A10/MF A01 CSCL 03A

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N87-12522*# Tufts Univ., Medford, Mass. Dept. of Physics and Astronomy.
SIMULTANEOUS SOLAR MAXIMUM MISSION (SMM) AND VERY LARGE ARRAY OBSERVATIONS OF SOLAR ACTIVE REGIONS Annual Report, 1 Sep. 1985 - 30 Oct. 1986
Kenneth R. Lang 30 Oct. 1986 158 p
(Grant NAG5-501)
(NASA-CR-177187; NAS 1.26:177187) Avail: NTIS HC A08/MF A01 CSCL 03B

The research deals mainly with Very Large Array and Solar Maximum Mission observations of the ubiquitous coronal loops that dominate the structure of the low corona. As illustrated, the observations of thermal cyclotron lines at microwave wavelengths provide a powerful new method of accurately specifying the coronal magnetic field strength. Processes are delineated that trigger solar eruptions from coronal loops, including preburst heating and the magnetic interaction of coronal loops. Evidence for coherent burst mechanisms is provided for both the Sun and nearby stars, while other observations suggest the presence of currents that may amplify the coronal magnetic field to unexpectedly high levels. The existence is reported of a new class of compact, variable moving sources in regions of apparently weak photospheric field. Author

N87-12523*# California Univ., Irvine. Dept. of Physics.
SOLAR FLARE X-RAY POLARIMETRY Final Scientific Report, 1 Apr. 1984 - 30 Sep. 1986
G. A. Chanan and R. Novick (Columbia Univ., New York) Oct. 1986 36 p
(Grant NAGw-588)
(NASA-CR-179899; NAS 1.26:179899) Avail: NTIS HC A03/MF A01 CSCL 03B

The motivation for high quality solar flare X-ray polarization measurements are discussed in general. The design of the proposed instrument is described and then the sensitivity and energy response are discussed. The laboratory work which demonstrates that the earlier lithium contamination problem was solved, is described. B.G.

N87-12524# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
LOW LEVEL DECIMETRIC (1.6 GHz) SOLAR BURST ACTIVITY
H. S. Sawant, J. E. R. Costa, R. H. Trevisan, C. J. B. Lattari, and P. Kaufmann Oct. 1986 23 p Submitted for publication
(INPE-4004-PRE/997) Avail: NTIS HC A02/MF A01

Observations of solar bursts were carried out in the month of July 1985 for about two weeks in R and L circular polarization with high sensitivity (0.01 s.f.u.) and high time resolution (3 msec) at 1.6 GHz, by using the 13.7 m Itapetinga antenna. Five intervals of solar burst activity, each one lasting for a couple of minutes, were observed and indicated a variety of decimetric bursts. Predominantly two classes of fast burst were observed: i.e., spike and blip. However, some of those bursts were two orders of magnitude less intense than those reported earlier. Detailed properties of all these bursts are presented. Low level blips have typical duration approx. 350 msec, excitation time approx. 130 + or - 25 msec, decay time approx. 200 + or - 25 msec and a low degree of circular polarization of about 15%. Investigation of these properties suggests that blips probably originate at second harmonic by beam plasma interaction. Also, low level ms-spikes with the half power duration in the range of 5 to 20 msec suggest that source sizes should be smaller than 50 Km and/or the bandwidth of emission should be 0.001%, if the process of emission is electron cyclotron maser. Author

N87-12525# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RELATIVE TIMINGS OF MM-WAVES AND ASSOCIATED M-WAVES SOLAR BURSTS
H. S. Sawant, R. H. Trevisan, J. E. R. Costa, P. Zlobec, and M. Masserotti Oct. 1986 27 p Submitted for publication
(INPE-4013-PRE/1004) Avail: NTIS HC A03/MF A01

Observations of type III bursts (starting frequencies 237 to 408 MHz) and meter-wave narrowband fine time (approx. 300 msec) structures obtained with high sensitivity and high time resolution were compared with millimeter (22 GHz) wavelength bursts obtained simultaneously. For the major time structure (approx. 1 sec) the differences observed in the peak time of the type III burst and the associated mm -lambda emission are in the range of + or - 1 sec. In most cases, the type III burst peaked later by approx. 500 msec compared to the associated mm-lambda bursts. These observed time delays, along with the starting frequency (237 MHz) of the type III bursts suggest that the type III emission should be at the fundamental. Acceleration of the electrons should be time dependent and the acceleration region should be located where the electron density is approx. 10 to the 9th power/cu cm. Narrowband m-lambda fine structures with duration up to approx. 200 msec were found to be often associated with mm-lambda time structures, and the difference in their peak times was about + or - 150 msec on the average. Also in most cases, the peaks of narrowband m-lambda fine time structures led the associated mm-lambda time structures by approx. 150 msec. These observed time differences are three times smaller than those observed in the case of the type III bursts and in majority of cases, of opposite sign. These average small differences and their sign can be accounted for, if the narrowband m-lambda fine structures are assumed to be due to processes of secondary acceleration, and source of acceleration region should be near the region where m-lambda fine structure is produced. Author

N87-12526 Stanford Univ., Calif.
VOYAGER MICROWAVE SCINTILLATION MEASUREMENTS OF SOLAR WIND PLASMA PARAMETERS Ph.D. Thesis
Jan Morris Martin 1985 206 p
Avail: Univ. Microfilms Order No. DA8602508

During the solar conjunctions of Voyager 1 and 2 spacecraft in August 1979, September 1980, and November 1982, temporal variations of intensity and frequency of the dual-wavelength (3.6 and 13 cm) radio transmissions from the spacecraft were observed and subsequently analyzed to infer characteristics of the solar wind plasma flow. Measurements of the temporal wave structure function were used to estimate the spectral index of the power law spatial spectrum of irregularities. Theoretical intensity scintillation spectra were compared with measured intensity spectra to obtain least-squares estimates of: (1) mean velocity, (2) random velocity, (3) axial ratio, and (4) electron density standard deviation. Uncertainties in parameter estimates were calculated by standard propagation of errors techniques. Several conclusions may be drawn from these scintillation measurements: (1) the lack of

latitudinal variation of density fluctuations and mean velocity is consistent with the shrinkage or disappearance of the north polar coronal hole in 1979-80 (the latitudinal variation observed in density fluctuations in 1982 confirm the hole reappearance); (2) simultaneous intensity and phase scintillation spectra provide strong evidence that the underlying spatial spectrum of density fluctuations is not Gaussian (the results are consistent with a power law spatial spectrum); (3) measured density fluctuations at 10 solar radii are consistent with fast-mode wave theory of solar wind heating, but at 20 solar radii measured values are 2 to 5 times theoretical values. Dissert. Abstr.

N87-12527 Colorado Univ., Boulder.
LARGE-SCALE STRUCTURE AND DYNAMICS OF SOLAR ACTIVE REGIONS OBSERVED IN THE FAR ULTRAVIOLET Ph.D. Thesis
James Andrew Klimchuk 1985 210 p
Avail: Univ. Microfilms Order No. DA8608618

In this thesis high resolution Dopplergrams in CIV (1548) are examined for the purpose of understanding the large scale dynamics of solar active regions and the closely related problem of magnetic structure. The Dopplergrams are compared with photospheric magnetograms and H sub alpha filtergrams in order to determine the relationship of the flows to the overall magnetic field topology. These observations sample three different heights in the atmosphere and can potentially be used to map the field from the photosphere up through the transition region. Vector properties of the flow and field are inferred from center-to-limb variations in the measured Doppler shift and longitudinal field component. It was found that spatial correlations between features seen in Dopplegrams, magnetograms, and filtergrams are quite close, and that active regions can be naturally divided into three basic parts; strong field regions, weak field corridors between opposite polarities, and surrounding weak field areas. Sizable uncertainties in the Dopplergram interpretation have prevented the description of the transition region flows unambiguously. Two possible scenarios that are consistent with the data are identified. In the most likely of the two, the flows vanish within corridors and surrounding areas, and they produce constant (across the disk) absolute red shifts of about 18 km/s within strong field regions. Dissert. Abstr.

N87-12528 Maryland Univ., College Park.
GAMMA RAYS AND NEUTRONS FROM SOLAR FLARES Ph.D. Thesis
Ronald James Murphy 1985 224 p
Avail: Univ. Microfilms Order No. DA8614259

Recent observations with the Gamma-Ray Spectrometer (GRS) on the Solar Maximum Mission (SMM), along with observations from a number of ground-based and spacecraft detectors, contain a wealth of information on particle acceleration in solar flares. The analysis and interpretation of this data is crucial to the understanding of the flare process. A general analysis of gamma-ray and neutron production in solar flared and a comparison of theoretical calculations with data are presented. An overview of the flare phenomenon is given, recent gamma-ray and particle observations are discussed, the theory of each production process is reviewed and detailed calculations are presented, and a comparison of these calculations with data is made. Dissert. Abstr.

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N87-12529# Rome Univ. (Italy). Dipt. di Fisica.
HIGH ENERGY NEUTRINO EMISSION FROM BINARY X-RAY SOURCES
G. Auriemma, H. Bilokon, and A. F. Grillo 23 Jul. 1985 10 p
Presented at 1st Symposium on Underground Physics, St. Vincent, Italy, 25-28 Apr. 1985
(Preprint-471; ETN-86-97906) Avail: NTIS HC A02/MF A01

The production of high energy neutrinos associated with the gamma-ray production in Cyg X3, Vela X1, and LMC X4 X-ray sources is discussed. It is shown that based on the observational parameters of the binary systems, the time average of the ratio of the neutrino luminosity to gamma-ray luminosity is 30. The neutrino flux is modulated with the orbital period of the system and the neutrino light curve is determined by the density profile of the companion star. The X-ray binaries can be both ultrahigh energy gamma-ray and neutrino emitters with a neutrino luminosity comparable to their X-ray luminosity. The brightest of these could be detected by neutrino telescopes such as DUMAND and MACRO. ESA

99 GENERAL

N87-12530*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
RESEARCH AND TECHNOLOGY Annual Report, 1985
Jan. 1986 138 p
(NASA-TM-86852; A-85045; NAS 1.15:86852) Avail: NTIS HC A07/MF A01 CSCL 05A

This report describes various research and technology activities at Ames Moffett and Ames Dryden. Highlights of these accomplishments indicate the Center's varied and highly productive research efforts for 1985. Author

N87-12531*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RESEARCH AND TECHNOLOGY, 1986 Annual Report
1986 113 p
(NASA-TM-89037; NAS 1.15:89037) Avail: NTIS HC A06/MF A01 CSCL 05A

The mission of the NASA Langley Research Center is to increase the knowledge and capability of the United States in a full range of aeronautics disciplines and in selected space disciplines. This mission will be accomplished by: performing innovative research relevant to national needs and Agency goals; transferring technology to users in a timely manner; and providing development support to other United States Government agencies, industry, and the NASA centers. This report contains highlights of the major accomplishments and applications made during the past year. The highlights illustrate both the broad range of the research and technology activities at the NASA Langley Research Center and the contributions of this work toward maintaining United States leadership in aeronautics and space research. Author

N87-11811 Joint Publications Research Service, Arlington, Va.
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Typical Subject Index Listing

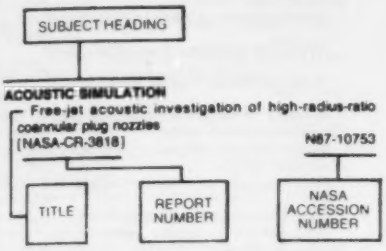

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EHF (Extremely High Frequency) telecommunications system engineering model
[PB86-214814] N87-11937
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Monthly and seasonal climatology of the northern winter over the global tropics and subtropics for the period 1974 to 1983. Volume 4: 700
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Atlas of the tropical and subtropical circulation derived from National Meteorological Center operational analyses
[PB86-206923] N87-12095

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Global atmospheric background monitoring for selected environmental parameters BAPMoN data for 1981. Volume 2: Precipitation chemistry, continuous atmospheric carbon dioxide and suspended particulate matter
[PB86-208360] N87-12065
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National Forum on the Future of Automated Materials Processing in US Industry: The Role of Sensors. Report of a workshop (1st) held at Santa Barbara, California on December 16-17, 1985
[PB86-212040] N87-11912
Advanced heat-pipe heat exchanger and microprocessor-based modulating burner controls development
[PB86-203239] N87-11961
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[NASA-TM-88861] N87-11993

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[AD-A170260] N87-12024
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Joining methods for beryllium: A survey
[DE86-012000] N87-12002
BIBLIOGRAPHIES
FAA helicopter/heliport research, engineering, and development bibliography, 1964-1986
[FAA/PM-86/47] N87-11798
Corrosion information and analysis: Corrosion and compatibility
[BMI-CIA-14] N87-11872
An annotated bibliography of the Atlantic Remote Sensing Land-Ocean Experiment (ARSLOE)
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Register of research in progress on mental workload
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Publications of the Jet Propulsion Laboratory, 1984
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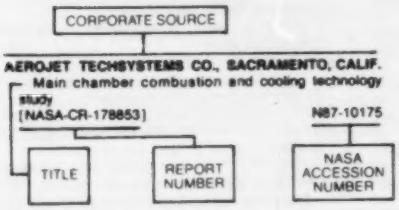

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[DE86-012826] N87-12256
A user's guide to the socioeconomic environmental demographic information system (SEEDIS)
[AD-A169917] N87-12369
CALIFORNIA UNIV., DAVIS.
Fundamental study of dense-fluid detonation
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Solar flare X-ray polarimetry
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CALIFORNIA UNIV., SAN DIEGO, LA JOLLA.
Interfacial properties of germanium nitride dielectric layers in germanium
[AD-A166332] N87-12362
CALIFORNIA UNIV., SANTA BARBARA.
National Forum on the Future of Automated Materials Processing in US Industry: The Role of Sensors. Report of a workshop (1st) held at Santa Barbara, California on December 16-17, 1985
[PB86-212040] N87-11912
Free convection heat transfer in the critical region of binary fluid mixtures
[DE86-008868] N87-11978
Research on semiconductor heterostructures
[AD-A166367] N87-12368
CALIFORNIA UNIV., SANTA CRUZ.
VIRYA: A motion control editor for kinematic and dynamic animation N87-12197
CAMBRIDGE UNIV. (ENGLAND).
Pressure and flow field measurements of axial turbine tip clearance flow in a linear cascade
[CUED/A-TURBO-TR-123] N87-11791
CANADA CENTRE FOR REMOTE SENSING, OTTAWA (ONTARIO).
Integration of remotely sensed data and geographic information systems N87-12218
Map/image congruency evaluation knowledge based system N87-12219
CANADIAN INFORMATION PROCESSING SOCIETY, TORONTO (ONTARIO).
Graphics Interface 1986: Proceedings
[ISBN-0713-5434] N87-12175
CARNEGIE INSTITUTION OF WASHINGTON, D. C.
Chromospheric activity of cool giant stars
[NASA-CR-177184] N87-12510
CATHOLIC UNIV. OF AMERICA, WASHINGTON, D.C.
Active control of robot manipulator compliance
[NASA-CR-177183] N87-11994
CENTRE DE RECHERCHES SCIENTIFIQUES ET TECHNIQUES DE L'INDUSTRIE DES FABRICATIONS METALLIQUES, BRUSSELS (BELGIUM).
Activities report in metal structures industry scientific and technical studies
[ISBN-0624-7705] N87-11986
CENTRE NATIONAL D'ETUDES SPATIALES, TOULOUSE (FRANCE).
Principle of visual color coding applied to satellite imagery N87-12220
COASTAL ENGINEERING RESEARCH CENTER, VICKSBURG, MISS.
An annotated bibliography of the Atlantic Remote Sensing Land-Ocean Experiment (ARSLOE)
[AD-A168703] N87-12043
Pacific Coast hindcast deepwater wave information
[AD-A169511] N87-12098
COLLEGE OF WILLIAM AND MARY, HAMPTON, VA.
HALOE science investigation
[NASA-CR-179825] N87-11857
COLORADO SCHOOL OF MINES, GOLDEN.
Modeling of infiltration kinetics and interfacial bond strength in aluminum matrix-silicon carbide composites
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Electrochemical effects on weld pool chemistry in submerged arc and dc electroslag welding
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Optical spectroscopic studies of Wolf-Rayet carbon and oxygen stars N87-12504
Large-scale structure and dynamics of solar active regions observed in the far ultraviolet N87-12527
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Making appropriations for the Department of Housing and Urban Development and for sundry independent agencies, boards, commissions, corporations and offices for the fiscal year ending September 30, 1987
[GPO-84-330] N87-12401
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION (U. S. SENATE).
Authorization of appropriations for the National Aeronautics and Space Administration for Fiscal Year 1987
[S-REPT-99-801] N87-12400
COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
Delta launch vehicle accident investigation
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Hearings before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2nd Session, No. 132, 25, 27 February; 11, 13, 20 March; 9, 10 April, 1986, Volume 2
[GPO-61-777] N87-12402

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Optical character recognition of touching characters
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SMP: A solid modeling program version 2.0
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[AD-A168701] N87-11923
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Geometric structure, pseudo band gaps, and surface vibrational resonances on metal surfaces
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Thematic mapper study of Alaskan ophiolites
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Surface vibrations and (2x1) superstructures on FCC(110) metal surfaces
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DEFENCE SCIENCE AND TECHNOLOGY ORGANIZATION, SALISBURY (AUSTRALIA).
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Fretting fatigue of carbon fiber reinforced plastic laminates
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).
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ECOLE NATIONALE SUPERIEURE DES TELECOMMUNICATIONS, PARIS (FRANCE).
Computation of the invariant probability of a nonlinear stochastic system and applications to queuing systems
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Audiomagnetotelluric (AMT) system
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ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.
Derivation of damage functions for atmospheric degradation of materials
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Standard reference photometer network for verification and certification of ozone standards
[PB86-205495] N87-12064
Global atmospheric background monitoring for selected environmental parameters BAPMoN data for 1981. Volume 2: Precipitation chemistry, continuous atmospheric carbon dioxide and suspended particulate matter
[PB86-206360] N87-12066
ESDU INTERNATIONAL LTD., LONDON (ENGLAND).
Normal force, pitching moment and side force of axisymmetric forebody-cylinder combinations for angles of attack up to 90 degrees and Mach numbers up to 1.2
[ESDU-86009] N87-11690
Pitot and static errors in steady level flight
[ESDU-86008] N87-11691
Drag and pressure recovery characteristics of auxiliary air inlets at subsonic speeds
[ESDU-86002] N87-11692
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Effectiveness: N sub TU relationships for the design and performance evaluation of two-stream heat exchangers
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Calculation methods for steadily loaded axial groove hydrodynamic journal bearings. Low viscosity process fluid lubrication.
[ESDU-86006] N87-11991
Vertical deflection characteristics of aircraft tyres
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Applying, measuring and maintaining pretension in steel bolts
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Numerical methods for the solution of ordinary differential equations: Initial value problems
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Heat capacity and enthalpy of liquids: Alkanes
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EUROPEAN SPACE AGENCY, PARIS (FRANCE).
Comparative flight measurement of icing parameters for the DO 28 D2 propeller-driven aircraft of the German Army Testing Office 61 and for DFVLR's Falcon 20 E jet aircraft in stratus clouds
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Design of a control system for a cryogenic wind tunnel optimizing a vector performance index
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On sound propagation in centrifugal fan casings
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EUROPEAN SPACE TRIBOLOGY LAB., RISLEY (ENGLAND).
Report on the dismantling and examination of Dornier System GmbH medium speed mechanism on completion of a seven year real-life test
[ESA-ESTL-95] N87-11835
Performance limits of surface-hardened aluminum-alloy gears in vacuum
[ESA-ESTL-059] N87-11884
Activities report in space tribology
[ESA-ESTL-77] N87-12005
EXECUTIVE OFFICE OF THE PRESIDENT, WASHINGTON, D. C.
Biennial science and technology report to the Congress, 1983-1984
[PB86-209632] N87-12403

F

FAILURE ANALYSIS ASSOCIATES, PALO ALTO, CALIF.
Fundamental differences between optimization code test problems in engineering applications N87-11772
FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
FAA helicopter/heliport research, engineering, and development bibliography, 1964-1986
[FAA/PM-86/47] N87-11798
Biological rhythms and rotating shift work: Some considerations for air traffic controllers and managers
[AD-A168742] N87-12153
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On the elementary theorems of decision theory
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Application of optimization techniques to vehicle design: A review N87-11728
Research on materials related to the sodium heat engine
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G

GENERAL ACCOUNTING OFFICE, WASHINGTON, D. C.
SDI (Strategic Defense Initiative) Program: Evaluation of DOE's (Department of Energy's) answers to questions on X-ray laser experiment, briefing report
[PB86-209236] N87-11808

GENERAL ELECTRIC CO., LANHAM, MD.
LANDSAT-D program. Volume 2: Ground segment
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GENERAL ELECTRIC CO., LARGO, FLA.
Combining automatic titration of total iron and sulfur in thermal battery materials
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GENERAL MOTORS CORP., INDIANAPOLIS, IND.
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GENERAL MOTORS RESEARCH LABS., WARREN, MICH.
Structural Optimization in automotive design
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GENERAL PNEUMATICS CORP., SCOTTSDALE, ARIZ.
Arctic communications techniques: Remote unattended power systems
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GEOLOGICAL SURVEY, FLAGSTAFF, ARIZ.
Recovery of the UCAS asteroids N87-12489

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Development of algorithms and hardware for structured-light vision
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GEORGIA INST. OF TECH., ATLANTA.
Some observations on the behavior of the Langley model rotor blade
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A comparison of Stratospheric Aerosol and Gas Experiment 1 (SAGE 1) and Umkehr ozone profiles including a search for Umkehr aerosol effects
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Generalized network implementations
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GRENOBLE-1 UNIV. (FRANCE).
Contribution to the study of nonconvex nondifferentiable optimization algorithms
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H

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
SP-100 ground engineering system test at Hanford Potential Bidders' Site Tour, December 18, 1985
[DE86-009984] N87-12335

HARVARD UNIV., CAMBRIDGE, MASS.
Reductive disproportionation of carbon dioxide by dianionic carbonylmetalates of the transition metals
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HEALTH EFFECTS RESEARCH LAB., RESEARCH TRIANGLE PARK, N. C.
Radiofrequency radiation: Activities and issues
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Effects of microwave radiation on the blood-brain barrier
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HOWARD UNIV., WASHINGTON, D. C.
Structural optimization with constraints on transient response N87-11767

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HUMAN ENGINEERING LABS., ABERDEEN PROVING GROUND, MD.
A helicopter flight evaluation of kinesthetic-tactual displays
[AD-A168302] N87-12167

I

IBM FRANCE S. A., PARIS.
Image segmentation based on color and texture gradient N87-12217

IGI CONSULTING, INC., BOSTON, MASS.
US long distance fiber optic networks: Technology, evolution and advanced concepts. Volume 3: Advanced networks and economics
[NASA-CR-179481] N87-11915

IIT RESEARCH INST., BARTLESVILLE, OKLA.
Aviation turbine fuels, 1985
[DE86-012140] N87-11908

ILLINOIS NATURAL HISTORY SURVEY, CHAMPAIGN.
Interpreting forest and grassland biome productivity utilizing nested scales of image resolution and biogeographical analysis
[NASA-CR-176603] N87-12029

ILLINOIS NATURAL HISTORY SURVEY, URBANA.
Interpreting forest and grassland biome productivity utilizing nested scales of image resolution and biogeographical analysis
[NASA-CR-179739] N87-12032

ILLINOIS STATE WATER SURVEY, CHAMPAIGN.
Modification of a variational objective analysis model for new equations for pressure gradient and vertical velocity in the lower troposphere and for spatial resolution and accuracy of satellite data
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ILLINOIS UNIV., URBANA.
Velocity measurements for turbulent nonseparated flow over solid waves
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Error estimates for differential-algebraic equations
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Semiconductor superlattice photodetectors
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ILLINOIS UNIV., URBANA-CHAMPAIGN.
Application of satellite data to the variational analysis of the three dimensional wind field
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IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND).
Finite element modelling of composites, volume 1
[BR97502] N87-11845

INDIANA UNIV., BLOOMINGTON.
The evolution of active galactic nuclei N87-12516

INFORMATION AND CONTROL SYSTEMS, INC., HAMPTON, VA.
Space-based laser-driven MHD generator: Feasibility study
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INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS (FRANCE).
Absorption of CO2 laser beams by metallic alloys. Application to laser thermal treatment
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Introduction to helicopter noise
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INSTITUT NATIONAL DE RECHERCHE D'INFORMATIQUE ET D'AUTOMATIQUE, RENNES (FRANCE).
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INSTITUT NATIONAL POLYTECHNIQUE, GRENOBLE (FRANCE).
Proposition of a design methodology for integrated communication circuits. Implementation of a circuit for the FIP local network
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Image analysis, perception strategy and cognitive strategy
[ETN-86-98401] N87-12104
Definition, study and design of a specific self-checking microprocessor COBRA
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Logical treatment of knowledge semantic integrity and organization in data base management systems
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INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
Fast optimal orbit estimation from GPS measurements
[INPE-4016-NTE/263] N87-11817
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INTEGRATED SYSTEMS, INC., PALO ALTO, CALIF.
The role of optimization in structural model refinement
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IONICS RESEARCH, INC., HOUSTON, TEX.
Organics in water contamination analyzer, phase 1
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IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Application of viscous-inviscid interaction methods to transonic turbulent flows
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IOWA UNIV., IOWA CITY.
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Publications of the Jet Propulsion Laboratory, 1984
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Conceptual design of a synoptic interplanetary monitor platform at L sub 1 (SIMPL)
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
USSR report: Space
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Radial Fokker-Planck model for plasmas confined by magnetic mirror fields
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LEHIGH UNIV., BETHLEHEM, PA.
The surface crack problem in an orthotropic plate under bending and tension
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LETTERMAN ARMY INST. OF RESEARCH, SAN FRANCISCO, CALIF.
Ocular hazards associated with laser exposure
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LOCKHEED-CALIFORNIA CO., BURBANK.
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Effect of resistance on projectile oscillations in augmented rail guns
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Investigation of coating performance and corrosion of compressor components in the TF30-P-3 engine of F111C aircraft
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[MPIS-24/1985] N87-11704
Numerical study of the damping of acoustic waves in a duct with splitter plates
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NATIONAAL INST. VOOR KERNFYSICA EN HOGE ENERGIEFYSICA, AMSTERDAM (NETHERLANDS).
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Study using a three-dimensional smog formation model under conditions of complex flow
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
NASA selects investigations for comet rendezvous mission
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Reports of planetary astronomy, 1985
[NASA-TM-89159] N87-12407
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
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Antarctic meteorite newsletter, volume 9, number 1
[NASA-TM-89230] N87-12508
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Pilot-pressure measurements in low fields behind a rectangular nozzle with exhaust jet for free-stream Mach numbers of 0.00, 0.60, and 1.20
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Polyimides containing oxyethylene units. Part 4: Polymerization of dianhydrides containing ether linkages
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Thermal analysis of radiometer containers for the 122m hoop column antenna concept
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User manual for SUNVIS-RQ: An exact buckling and vibration program for lattice structures, with repetitive geometry and substructuring options
[NASA-TM-87669] N87-12015
PS: A nonprocedural language with data types and modules
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Parallel scheduling of recursively defined arrays
[NASA-CR-178195] N87-12247
Research and technology, 1986
[NASA-TM-89037] N87-12531

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
STAEBL: Structural tailoring of engine blades, phase 2 N87-11731
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Selection of rolling-element bearing steels for long-life application
[NASA-TM-88861] N87-11993
Concentrated mass effects on the flutter of a composite advanced turboprop model
[NASA-TM-88854] N87-12017
Strategic plan, 1986
[NASA-TM-89263] N87-12364

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WALLOPS FLIGHT CENTER, WALLOPS ISLAND, VA.
Pulse Code Modulation (PCM) encoder handbook for Aydin Vector MMP-600 series system
[NASA-RP-1171] N87-11916
Preliminary estimates of radiosonde thermistor errors
[NASA-TP-2637] N87-12098

NATIONAL AEROSPACE LAB., AMSTERDAM (NETHERLANDS).
A brief introduction to the helicopter
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A check of crack propagation prediction models against test results generated under transport aircraft flight simulation loading
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Systems, avionics and instrumentation of transport category helicopters
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[NLR-MP-85074-U] N87-11796

NATIONAL ASTRONOMY AND IONOSPHERE CENTER, ARECIBO, PUERTO RICO.
The Arecibo S-band radar program N87-12408

NATIONAL BUREAU OF STANDARDS, GAITHERSBURG, MD.
Application of computer techniques in the prediction of inorganic compounds
[PB86-205762] N87-11870
National Forum on the Future of Automated Materials Processing in US Industry: The Role of Sensors. Report of a workshop (1st) held at Santa Barbara, California on December 16-17, 1985
[PB86-212040] N87-11912
GRIDNET: A highly survivable digital communications network, phase 1
[PB86-209015] N87-11936
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[PB86-215163] N87-12300
Evaluation of L sub 1 codes using polynomial approximation problems
[PB86-215175] N87-12301

NATIONAL INST. FOR ENVIRONMENTAL STUDIES, TSUKUBA (JAPAN).
Study using a three-dimensional smog formation model under conditions of complex flow
[PB86-213246] N87-12080

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
Project CONDORS: Convective diffusion observed by remote sensors
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
NOAA (National Oceanic and Atmospheric Administration) N-ROSS/ERS-1 Environmental Data Development (NNEEDD) products and services
[PB86-213527] N87-11836

NATIONAL OCEANOGRAPHIC DATA CENTER, WASHINGTON, D. C.
Mariners Weather Log, volume 30, number 2, spring 1986
[PB86-213360] N87-12093

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA (ONTARIO).
Graphics tools in Adagio, a robotics multitasking multiprocessor workstation N87-12191

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C.
Academic science/engineering: R and D funds, fiscal year 1984 (detailed statistical tables)
[PB86-216017] N87-12362

NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.
Wind profiling of stormy and quiescent atmospheres with microwave radars
[PB86-212545] N87-12094
National Severe Storms Laboratory, fiscal year 1985
[PB86-203641] N87-12096

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
NTIS (National Technical Information Service) privatization study responses to April 28, 1986 Federal register notice request for public comment
[PB86-211240] N87-12398

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, BOULDER, COLO.
Comparisons of the two-state Markov and Fritchman models as applied to bit error statistics in communication channels
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EHF (Extremely High Frequency) telecommunications system engineering model
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NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
National Transportation Safety Board safety recommendation N87-11705
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 5 of 1985 accidents
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Runway incursions at controlled airports in the United States
[PB86-917003] N87-11711
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 4 of 1985 accidents
[PB86-916916] N87-11712
Aircraft accident reports: Brief format, US civil and foreign aviation, issue number 3 of 1985 accidents
[PB86-916917] N87-11713
Review of accident data: US general aviation calendar year 1982
[PB86-201910] N87-11714

NATIONAL WEATHER SERVICE, WASHINGTON, D.C.
Atlas of the tropical and subtropical circulation derived from National Meteorological Center operational analyses
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The effect of high pressure on electrical relaxation in PPO and electrical conductivity in PPO complexed with lithium salts
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HF (High Frequency) absolute time of arrival sensing
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Surface-search radar performance in the evaporation duct: Global predictions, Revision A
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[AD-A170301] N87-12044
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Sodar, rawinsonde and surface layer measurements at a coastal site. Part 2: SCCCAMP (South Central Coast Aerometric Monitoring Project) data report
[AD-A168833] N87-12073
Clear air turbulence analysis using isentropic methods
[AD-A168400] N87-12088
Monthly and seasonal climatology of the northern winter over the global tropics and subtropics for the period 1974 to 1983. Volume 4: 700
[AD-A168837] N87-12089
An application of multidimensional scaling to describe stress among naval helicopter pilots
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Dispersion and blending of SiC (silicon carbide) whiskers in RSP aluminum powders
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Non-Maxwellian free-energy generation in the magnetotail due to chaotic particle motion
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NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
Techniques for microwave dielectric measurements
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Nature and origin of mineral coatings on volcanic rocks of the Black Mountain, Stonewall Mountain and Kane Springs Wash volcanic centers, southern Nevada
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NEW MEXICO STATE UNIV., LAS CRUCES.
Long-term changes in reflectivity and larger scale motions in the atmosphere of Jupiter and Saturn N87-12412

NEW SOUTH WALES UNIV., SYDNEY (AUSTRALIA).
Structural optimization of large ocean-going structures N87-11771
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Zone leveling and solution growth of complex compound semiconductors in space
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Data processing and case study analysis of thunderstorm studies
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Vortex flap technology: A stability and control assessment
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NUCLEAR REGULATORY COMMISSION, WASHINGTON, D. C.
Performance demonstration tests for detection of intergranular stress corrosion cracking
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Finite element fracture analysis on microcomputer
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Interpreting forest and grassland biome productivity utilizing nested scales of image resolution and biogeographical analysis
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PRO/Mapper: a plotting program for the DEC PRO/300 personal computers utilizing the MAPPER graphics language
[DE86-012835] N87-12255
OFFICE OF NAVAL RESEARCH, LONDON (ENGLAND).
Optics '86: Four Western European Countries Review Recent Achievements
[AD-A170262] N87-12344
OFFICE OF SCIENCE AND TECHNOLOGY, WASHINGTON, D. C.
Research in very high performance computing: Policy recommendation and research requirements statement
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National aeronautical R and D goals: Technology for America's future
[PB86-209772] N87-12406
OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D.C.
Federal government information technology: Management, security and congressional oversight
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OHIO STATE UNIV., COLUMBUS.
An experimental study of the aerodynamics of a NACA 0012 airfoil with a simulated glaze ice accretion
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OLD DOMINION UNIV., NORFOLK, VA.
Development of data processing, interpretation and analysis system for remote sensing of trace atmospheric gas species
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OPTICAL SOCIETY OF AMERICA, WASHINGTON, D. C.
Topical Meeting on Microphysics of Surfaces, Beams and Adsorbates held at Santa Fe, New Mexico on 4 - 6 February 1985
[AD-A168618] N87-12364
OTAGO UNIV., DUNEDIN (NEW ZEALAND).
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PARIS VI UNIV. (FRANCE).
Analysis of some nonlinear problems. Models of plates and shells
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Animating human figures: Perspectives and directions N87-12194
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[REPT-86-006] N87-12393
POLYTECHNIC INST. OF NEW YORK, FARMINGDALE.
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[AD-A169694] N87-11996
PRINCETON UNIV., N. J.
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PUERTO RICO UNIV., RIO PIEDRAS.
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Use of fuzzy sets mathematics to assist pavement evaluation and management. Executive summary (revised March 18, 1986)
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Analyses of the atmospheric aerosol extinction in the 0.5 to 14 micron region
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[FOA-C-30417-E1] N87-12347
RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
Heat resistant matrix materials
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Simulation of a stochastic process with a nonrational spectrum
[FOA-C-20614-E3] N87-12295
RESEARCH INST. OF NATIONAL DEFENCE, UMEA (SWEDEN).
Detection, identification, and settling of bacteria from an aerosol; testing of a detector for aerosols with bacteria and preliminary investigation of settling on different surface materials
[FOA-C-40229-B2] N87-12103
RHODE ISLAND UNIV., KINGSTON.
VLSI (Very Large Scale Integrated circuits) implementation of a quantized sinusoid filter algorithm and its use to compute the discrete Fourier transform, part 2
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Local area networks: Characteristics, properties, and standardization
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RMS TECHNOLOGIES, INC., TREVOSE, PA.
Crash dynamics program transport seat performance and cost benefit study
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ROCHESTER UNIV., N. Y.
High annular resolution stellar interferometry
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Electrochemical investigation of lithium/potassium carbonate eutectic for application in modeling the molten carbonate fuel cell cathode
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ROCKWELL INTERNATIONAL CORP., GOLDEN, COLO.
Inertial welding of 1100 aluminum to type 316 stainless steel
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ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF.
LSI/VLSI ion implanted planar GaAs IC processing
[AD-A168786] N87-12366
ROLLS-ROYCE LTD., DERBY (ENGLAND).
Control of gas turbines. The future: Is a radical approach needed?
[PNR-90295] N87-11793
ROME UNIV. (ITALY).
Solutions in straits of varying width and depth
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The nonlinear sigma model: Three loops renormalization and lattice scaling
[PREPRINT-466] N87-12313
On the quantization of anomalous theories
[PREPRINT-473] N87-12321
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Precision tests of the electroweak theory at the Z dog.
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Soliton surfaces 7. Relativistic string in external field: General integral and particular solutions
[PREPRINT-467] N87-12379
The 1915 epistolary controversy between A. Einstein and T. Levi-Civita
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Stochastic mechanics of a Dirac particle in two space-time dimensions
[PREPRINT-474] N87-12381
High energy neutrino emission from binary X-ray sources
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ROYAL AUSTRALIAN NAVY RESEARCH LAB., EDGECLIFF.
Real time oceanographic analysis for the south western Australian area for July 1984 to August 1985
[AD-A168741] N87-12100
ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Number and duration of Runway Visual Range (RVR) runs for RVR-values lower than 225 m
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Terrain classification for regional transport models
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Evaluation of wave calculations using GONO in the period October 1984 - April 1985
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Analysis and regulation of nonlinear and generalized linear systems
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Evaluation of a visual system in its support of simulated helicopter flight
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Environmental processes and spectral reflectance characteristics associated with soil erosion in decert fringe regions
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Basalt depths in lunar basins using impact craters as stratigraphic probes: Evaluation of a method using orbital geochemical data
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SOCIETE CROUZET, VALENCE (FRANCE).
METEOSAT raw image data encryption
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SOLAR TURBINES INTERNATIONAL, SAN DIEGO, CALIF.
Fabrication of cooled radial turbine rotor
[NASA-CR-179503] N87-11789
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, RAPID CITY.
Atmospheric electrical modeling in support of the NASA F106 Storm Hazards Project
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Modeling and investigative studies of Jovian low frequency emissions N87-12427
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Mass spectrometric investigation of the thermal decomposition of several propellant and explosive ingredients
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A Monte Carlo description of the sampling of stratospheric ion clusters via a mass spectrometer
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Stretched cusps in coupler curves: Four-bar linkages having Ball-modal coupler points
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Control of a servomechanism for an elastic beam
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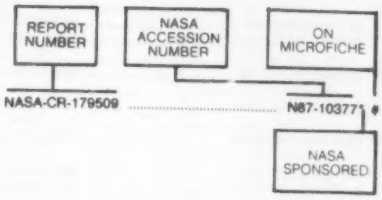

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For related information see also *34 Fluid Mechanics and Heat Transfer.*

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ACCESSION NUMBER → **N87-12542*#** Queensland Univ., St. Lucia (Australia). Dept. of Mechanical Engineering.

TITLE → **FURTHER SHOCK TUNNEL STUDIES OF SCRAMJET PHENOMENA**

AUTHORS → R. G. Morgan, A. Paull, N. A. Morris, and R. J. Stalker 12 May 1986 112 p ← PUBLICATION DATE

CONTRACT OR GRANT → (Grant NAGw-674)

REPORT NUMBER → (NASA-CR-179937; NAS 1.26:179937; RR-10-86) Avail: NTIS ← AVAILABILITY SOURCE

PRICE CODE → HC A06/MF A01 CSCL 01A ← COSATI CODE

Scramjet phenomena were studied using the shock tunnel T3 at the Australian National University. Simple two dimensional models were used with a combination of wall and central injectors. Silane as an additive to hydrogen fuel was studied over a range of temperatures and pressures to evaluate its effect as an ignition aid. The film cooling effect of surface injected hydrogen was measured over a wide range of equivalence. Heat transfer measurements without injection were repeated to confirm previous indications of heating rates lower than simple flat plate predictions for laminar boundary layers in equilibrium flow. The evious results were reproduced and the discrepancies are discussed in terms of the model geometry and departures of the flow from equilibrium. In the thrust producing mode, attempts were made to increase specific impulse with wall injection. Some preliminary tests were also performed on shock induced ignition, to investigate the possibility in flight of injecting fuel upstream of the combustion chamber, where it could mix but not burn. B.G.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N87-12532* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Oct. 1986 152 p
(NASA-SP-7037(205); NAS 1.21:7037(205)) Avail: NTIS HC A08 CSCL 01A

This bibliography lists 517 reports, articles and other documents introduced into the NASA scientific and technical information system in September 1986. M.G.

N87-12533# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECT OF A WINGLET ON THE SPATIAL VORTEX OF A SLENDER BODY AT HIGH ANGLE OF ATTACK
Wang Zixing and Wu Genxing 7 Jul. 1986 15 p Transl. into ENGLISH from Konggi Donglixue Xuebao (China), v. 3, no. 1, 1985 p 49-53
(AD-A169925; FTD-ID(RS)T-0267-86) Avail: NTIS HC A02/MF A01 CSCL 20/4

The experimental investigation of the effect of a winglet on the spatial vortex of a slender body at a high angle of attack is presented. This investigation clearly shows that the circulation of the body vortex is minimized by the winglet and the vortex position is lower than that without the winglet, so that the asymmetric problem can be solved. GRA

N87-12534# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE PORTFOLIO MODEL OF TECHNOLOGICAL DEVELOPMENT IN THE AIRCRAFT INDUSTRY M.S. Thesis
David M. Snyder May 1986 56 p
(AD-A170832; AFIT/CI/NR-86-84T) Avail: NTIS HC A04/MF A01 CSCL 05/3

The aircraft industry has long been considered the quintessential high technology industry. By examining the dynamics of technological change in this industry the portfolio model of technological advancement is developed. This model may be used to describe technological advancement in large sophisticated, technology intensive systems. The rapid advancement of individual technologies as measured by improvements in specific performance parameters is evident in the aircraft industry. However, the ability of a technology to improve performance in one or more key performance parameter may lead to adverse effects in other performance parameters or may not be compatible with other technological developments that are occurring in the industry. Individual technical improvements can be characterized as either portfolio reinforcing or portfolio shifting depending on whether or not they promote shift in the way the technologies are combined into a total system or portfolio. The commercially and economically successful products appear to be those that combine technologies into an optimum bundle of performance characteristics or portfolio. Technologies that flourish are not always the technologies on the leading edge of the performance frontier, but are those technologies that product the optimum portfolio. Author (GRA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N87-12535 Texas Univ., Austin.
VISCOUS-INVISCID INTERACTION IN TRANSONIC SEPARATED FLOW OVER SOLID AND POROUS AIRFOILS AND CASCADES Ph.D. Thesis
Charles Randolph Olling 1985 185 p
Avail: Univ. Microfilms Order No. DA8609621

Viscous-inviscid interaction is used to compute steady two-dimensional, transonic separated flows for cascades and isolated airfoils. The full-potential code of Dulikravich is coupled with both a laminar/transition/turbulent integral boundary-layer/tubulent wake code written by the author and the finite-difference boundary-layer code of Drela using the semi-inverse method of Carter or Wigton. The transpiration coupling concept is applied. An option for a porous airfoil with passive physical transpiration is also included. Examples are presented which demonstrate that such flows can be calculated with engineering accuracy by the present code. The equivalent transpiration velocity can be larger in cascades than for isolated airfoils. Carter's update formula gives smoother solutions for a strong shock than Wigton's update formulas, although Wigton's formulas are preferred in the early coupling cycles for cascades. The computations show that passive physical transpiration can lead to a lower drag coefficient and higher lift coefficient, a weaker shock and elimination of shock-induced separation. The extent of the porous region and permeability factor distribution of the porous region must be chosen carefully if these improvements are to be achieved. Dissert. Abstr.

N87-12536 ESDU International Ltd., London (England).
INTRODUCTION TO AERODYNAMICS DERIVITIVES, EQUATIONS OF MOTION AND STABILITY
Oct. 1986 64 p Supersedes ESDU-Aero-A.00.00.02, ESDU-Aero-A.00.00.03, ESDU-Aero-A.00.00.04, and ESDU-67039
(ESDU-86021; ISBN-0-85679-573-9; ISSN-0141-397X) Avail: ESDU

This Data Item ESDU 86021 is an addition to the Aerodynamics Sub-series. It is a comprehensive introduction to the concept and use of derivatives in determining aircraft stability. After explaining a systematic method for expressing aerodynamic forces, moments, and derivatives in dimensionless form, the equations of motion for an aircraft treated as a rigid body are developed and the linearized small-perturbation form introduced. The conditions are outlined for the separation of the equations

into a lateral and a longitudinal set, and a detailed study is made of the behavior of an aircraft disturbed with controls fixed from straight symmetric level flight. A comprehensive practical worked example illustrates the use of the techniques. A comparison is made between the ISO notation for derivatives used by ESDU, and the most widely used notation in the US, equations are given for deriving the longitudinal derivatives from the force and moment coefficients, and reference is included to all the ESDU validated data for lateral derivatives. Also included is the traditional treatment for static stability leading to the definitions of static and maneuver margins, and the relation between static stability and dynamic stability is discussed. Finally, a description is given in simple physical terms of commonly occurring lateral modes of an aircraft following a small disturbance. ESDU

N87-12537 ESDU International Ltd., London (England).
PROPELLAR/BODY INTERACTION FOR THRUST AND DRAG
Aug. 1986 20 p
(ESDU-86017; ISBN-0-85679-569-0; ISSN-0141-397X) Avail: ESDU

Available as part of the ESDU Sub-series on Aerodynamics, this document gives a simple method of estimating the thrust decrement and drag increment due to the interaction of propeller flow with a body (or nacelle) at zero incidence. It applies to smoothly contoured bodies with a tractor propeller at or near the nose or a pusher propeller at or near the tail and the propellers may be counter-rotating. It applies to Mach numbers up to 80 per cent of critical for the spinner-body combination. The method predicts the propulsive thrust in terms of the shaft thrust developed to within 2 or 3 per cent of thrust. A detailed discussion of the factors affecting the interaction effects is included. A comprehensive worked example shows how the method is used in combination with the method of ESDU 83001 for the propeller free-air thrust and of ESDU 78019 for the body drag propeller-off. ESDU

N87-12538*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MACH 6 EXPERIMENTAL AND THEORETICAL STABILITY AND PERFORMANCE OF A FINNED CYLINDRICAL BODY AT ANGLES OF ATTACK UP TO 65 DEG
Edward R. Hartman and Patrick J. Johnston Sep. 1986 45 p
(NASA-TM-89050; NAS 1.15:89050) Avail: NTIS HC A03/MF A01 CSCL 01A

A theoretical and experimental investigation of the longitudinal and lateral-directional stability and control of a finned cylindrical body has been conducted at Mach 6. The angle-of-attack range extended from 20 to 65 deg. to encompass maximum lift. Stability, performance, and trim could be accurately predicted with the fins in the + arrangement but this was not the case when the fins were in the x orientation where windward fin choking occurred at angles of attack above 50 deg. reducing their effectiveness and causing pitch up. Author

N87-12539*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AN EXPERIMENTAL INVESTIGATION OF FREE-TIP RESPONSE TO A JET
Larry A. Young Sep. 1986 56 p
(NASA-TM-88250; A-86234; NAS 1.15:88250) Avail: NTIS HC A04/MF A01 CSCL 01A

The aerodynamic response of passively oscillating tips appended to a model helicopter rotor was investigated during a whirl test. Tip responsiveness was found to meet free-tip rotor requirements. Experimental and analytical estimates of the free-tip aerodynamic spring, mechanical spring, and aerodynamic damping were calculated and compared. The free tips were analytically demonstrated to be operating outside the tip resonant response region at full-scale tip speeds. Further, tip resonance was shown to be independent of tip speed, given the assumption that the tip forcing frequency is linearly dependent upon the rotor rotational speed. Author

N87-12540# Royal Aircraft Establishment, Farnborough (England).
AN APPROXIMATE METHOD OF ESTIMATING THE AERODYNAMIC INTERFERENCE BETWEEN TWO PARALLEL BODIES IN A SUPERSONIC FLOW (AXIAL FORCE)
Hirofumi Kondo Mar. 1985 28 p Transl. into ENGLISH from Technical Report of National Aerospace Laboratory, TR-751, 1983
(BR-100271; RAE-Trans-2131) Avail: NTIS HC A03/MF A01

An approximate method of estimating the aerodynamic interference between two parallel bodies in a supersonic flow is discussed. The formulae are derived from linearized theory. The formulae for calculating the wave drag on one body are obtained as functions of Mach number, cone semi-vertex angle, and the relative distances between bodies. Theoretical calculations are compared with wind tunnel test results, and fairly good agreement is noted. It is pointed out that the present method can easily be applied to a combination of more than two bodies. Author

N87-12541*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF PORT CORNER GEOMETRY ON THE INTERNAL PERFORMANCE OF A ROTATING-VANE-TYPE THRUST REVERSER
Bobby L. Berrier and Francis J. Capone Dec. 1986 51 p
(NASA-TP-2624; L-16135; NAS 1.60:2624) Avail: NTIS HC A04/MF A01 CSCL 01A

An investigation has been conducted in the static-test facility of the Langley 16-Foot Transonic Tunnel to determine the effects of reverser port geometry on the internal performance of a nonaxisymmetric rotating-vane-type thrust reverser. Thrust reverser vane positions representing a spoiled-trust (partially deployed) position and a full-reverse-thrust (fully deployed) position were tested with each port geometry variable. The effects of upstream port corner radius and wall angle on internal performance were determined. In addition, the effect of the length of a simulated cooling liner (blunt-base step) near the reverser port entrance was investigated; five different lengths were tested. All tests were conducted with no external flows, and nozzle pressure ratio was varied from 1.2 to 5.0. Author

N87-12542*# Queensland Univ., St. Lucia (Australia). Dept. of Mechanical Engineering.
FURTHER SHOCK TUNNEL STUDIES OF SCRAMJET PHENOMENA
R. G. Morgan, A. Paull, N. A. Morris, and R. J. Stalker 12 May 1986 112 p
(Grant NAGw-674)
(NASA-CR-179937; NAS 1.26:179937; RR-10-86) Avail: NTIS HC A06/MF A01 CSCL 01A

Scramjet phenomena were studied using the shock tunnel T3 at the Australian National University. Simple two dimensional models were used with a combination of wall and central injectors. Silane as an additive to hydrogen fuel was studied over a range of temperatures and pressures to evaluate its effect as an ignition aid. The film cooling effect of surface injected hydrogen was measured over a wide range of equivalence. Heat transfer measurements without injection were repeated to confirm previous indications of heating rates lower than simple flat plate predictions for laminar boundary layers in equilibrium flow. The previous results were reproduced and the discrepancies are discussed in terms of the model geometry and departures of the flow from equilibrium. In the thrust producing mode, attempts were made to increase specific impulse with wall injection. Some preliminary tests were also performed on shock induced ignition, to investigate the possibility in flight of injecting fuel upstream of the combustion chamber, where it could mix but not burn. B.G.

N87-12543# Department of the Air Force, Washington, D.C.
LENGTH ADJUSTABLE STRUT LINK WITH LOW AERODYNAMIC DRAG Patent
Dudley O. Nash and James A. Crowley, inventors (to Air Force) Issued 25 Feb. 1986 8 p Supersedes AD-D011851
(AD-D012279; US-Patent-4,571,936; US-Patent-Appl-SN-753462;

US-Patent-Class-60-39.31) Avail: US Patent and Trademark Office CSCL 13/5

This invention relates to a low aerodynamic drag structural link suitable for use within the housing of a turbofan jet engine. The link includes length adjustment capability, pivotal end mounting provision, maintained airstream orientation capability, low mass and jam nut length and orientation locking. Several variations in link construction including a single ball and socket arrangement, varying link cross-section along its longitudinal length and the use of fairing nose and tail inserts are disclosed. GRA

N87-12544# JAI Associates, Mountain View, Calif.
NUMERICAL SIMULATION OF TIP VORTICES OF WINGS IN SUBSONIC AND TRANSONIC FLOWS
G. R. Srinivasan, W. J. McCroskey, J. D. Baeder, and T. A. Edwards 1986 26 p
(Contract DAAG29-85-C-0002)
(AD-A169116; ARO-21731.1-EG) Avail: NTIS HC A03/MF A01 CSCL 20/4

The formation and roll up process of the tip vortices of wings in subsonic and transonic flows is numerically simulates using a hybrid scheme of solving a zonal algorithm for thin layer Navier Stokes/Euler equations. The results are in good agreement with the available limited experimental data including the tip vortex strength. GRA

N87-12545# Analytical Methods, Inc., Redmond, Wash.
A SUMMARY OF THE DEVELOPMENT OF INTEGRAL AERODYNAMIC METHODS FOR THE COMPUTATION OF ROTOR WAKE INTERACTIONS Final Report, 1 Aug. 1981 - 30 Aug. 1984
J. M. Summa Mar. 1986 13 p
(Contract DAAG29-81-C-0032)
(AD-A169254; AMI-8605; ARO-18391.3-EG-S) Avail: NTIS HC A02/MF A01 CSCL 20/4

The purpose of the research reported here is to develop basic methodology for a generalized forward flight aerodynamic analysis method for isolated rotors. All of the work thus far has been concerned with the development of integral methods. Efforts have concentrated on analytical modeling studies and code development for fundamental vortex/blade interactions that occur in forward flight. Calculations show that vortex core deformations can be simulated but that numerical errors in the core growth should be removed in order to study such phenomena as bursting. The computed trajectory of a tip vortex passing another wing is also validated with experiment as well as the prediction of vortex induced separations. The calculation of the rotor wake in hover has been improved and the importance of secondary vortex roll ups for a modern rotor is discussed. Finally, a time stepping panel method has been formulated and verified by application to impulsively started wings. A pilot code version for unsteady rotor motions is described along with its preliminary application to a two bladed rotor. GRA

N87-12546# National Aeronautical Establishment, Ottawa (Ontario).
FORCED OSCILLATION OF A TWO-DIMENSIONAL AIRFOIL WITH NONLINEAR AERODYNAMIC LOADS
B. H. Lee and P. LeBlanc Jan. 1986 52 p
(AD-A169350; NAE-LR-617; NRC-25411) Avail: NTIS HC A04/MF A01 CSCL 20/4

Forced oscillation of a two dimensional airfoil with attached and separated flows is investigated using nonlinear unsteady aerodynamics for pitching motion derived from a time synthesization technique utilizing oscillatory loop data determined experimentally. Both one and two degree of freedom oscillations are considered. The structural dynamic equations of motion are integrated by a time marching finite difference scheme. The airfoil response is examined for different values of spring stiffness and magnitudes of externally applied moment. For two degree of freedom vibration, only small plunge amplitude is considered and the aerodynamic loads are approximated by the superposition of nonlinear terms due to pitch and linear terms due to plunge. The presence of a small amplitude plunging motion increases the pitch amplitude slightly for attached flow, while a decrease in pitch amplitude is predicted for separated flow. GRA

N87-12547 Stanford Univ., Calif.
AN ANALYSIS OF BLADE VORTEX INTERACTION AERODYNAMICS AND ACOUSTICS Ph.D. Thesis
Duck Joo Lee 1985 176 p
Avail: Univ. Microfilms Order No. DA8602500

The impulsive noise associated with helicopter flight due to blade-vortex interaction, sometimes called blade slap, is analyzed especially for the case of a close encounter of the blade-tip vortex with a following blade. Three parts of the phenomena are considered: the tip-vortex structure generated by the rotating blade, the unsteady pressure produced on the following blade during the interaction, and the acoustic radiation due to the unsteady pressure field. To simplify the problem, we confine our analysis to the situation where the vortex is aligned parallel to the blade span in which case the maximum acoustic pressure results. The 2-dimensional incompressible flow is assumed with uniform motion of the blade. The tip-vortex is modelled so that the circulation near the tip is rolled into a concentrated vortex and the extreme case of the interaction is studied when the following blade cuts through the center of this vortex core, which is turbulent and viscous. It is further assumed that during the interaction, there is no distortion of the vortex path or of the vortex itself, in other words the interaction occurs only through the boundary condition on the blade giving an unsteady pressure on the blade surface. Acoustic radiation due to the interaction is analyzed in space-fixed coordinates and in the time domain with the unsteady pressure on the blade surface as the source of chordwise compact, but spanwise noncompact radiation. Maximum acoustic pressure is related to the vortex core size and Reynolds number which are in turn functions of the blade-tip aerodynamic parameters. Finally noise reduction and performance are considered. Dissert. Abstr.

N87-12548 Texas Technological Univ., Lubbock.
A NUMERICAL MODEL FOR TWO-DIMENSIONAL UNSTEADY FLOW CALCULATIONS WITH A SURFACE PANEL METHOD Ph.D. Thesis
Bong-Jin Im 1985 132 p
Avail: Univ. Microfilms Order No. DA8607765

A numerical model for two-dimensional airfoils in unsteady motion with boundary layer separation is described. The airfoil and wake surfaces are represented by a finite set of combined source and vortex panels. The source strengths are prescribed to have the same magnitude as the normal relative velocity on the surface due to the free-stream and motion of the airfoil. The vortex strengths on the airfoil surface are determined by applying a kinematic surface tangency condition to a Green's function representation of the potential field, while simultaneously enforcing the Kutta condition. Wake shedding is governed by a dynamic free surface condition and the characteristics of the flow near any boundary layer separation points. Wake deformation is predicted by applying geometric free surface conditions. Calculation results are presented for steady motion, impulsively started rectilinear motion, harmonic pitch oscillations, and constant pitching motions. Experimental data and analytical solutions are also presented for comparison. Dissert. Abstr.

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N87-12549# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT/INCIDENT SUMMARY REPORTS: ERIE, PENNSYLVANIA, OCTOBER 14, 1984; ALBUQUERQUE, NEW MEXICO, FEBRUARY 11, 1985

30 Sep. 1986 17 p
(PB86-910407; NTSB-AAR-86-02-Sum) Avail: NTIS
HC A02/MF A01

This publication is a compilation of the reports of two separate aircraft accidents investigated by the National Transportation Safety Board. The accident locations and their dates are as follows: Erie, Pennsylvania, October 14, 1984; and Albuquerque, New Mexico, February 11, 1985.

Author

N87-12550# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation.

AIRCRAFT ACCIDENT REPORT: BAR HARBOR AIRLINES FLIGHT 1808, BEECH BE-99, N300WP, AUBURN-LEWISTON MUNICIPAL AIRPORT, AUBURN, MAINE, AUGUST 25, 1985

30 Sep. 1986 77 p
(PB86-910408; NTSB-AAR-86-06) Avail: NTIS HC A05/MF A01

About 2205 e.d.t. on August 25, 1985, Bar Harbor Airlines Flight 1818, a Beech Aircraft Corporation Model 99 crashed about 1 mile southwest of the Auburn-Lewiston Municipal Airport at Auburn, Maine, while making an instrument landing system (ILS) approach to runway 4. The weather was indefinite 300-foot ceiling, sky obscured, visibility 1 mile in light drizzle and fog. The flight was a regularly scheduled commuter flight between Boston-Logan International Airport and Bangor, Maine, with intermediate stops at Auburn, Augusta, and Waterville, Maine. All six passengers and the two flightcrew members were killed in the accident. The airplane was destroyed by impact forces and postcrash fire. The National Transportation Safety Board determined that the probable cause of the accident was the captain's continuation of an unstabilized approach which resulted in a descent below glidescope. Contributing to the unstabilized approach was the radar controller's issuance and the captain's acceptance of a nonstandard air traffic control radar vector resulting in an excessive intercept with the localizer.

Author

N87-12551# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.

ANALYSIS AND VERIFICATION OF THE ICING SCALING EQUATIONS. VOLUME 1: REVISION Final Report, 1 Aug. 1981 - 31 Mar. 1984

Gary A. Ruff Mar. 1986 80 p Prepared in cooperation with Arnold Engineering Development Center, Arnold AFS, Tenn.
(AD-A167976; AEDC-TR-85-30-Vol-1-Rev) Avail: NTIS
HC A05/MF A01 CSCL 08/12

Study objectives were to evaluate the equations governing the ice-accretion process to identify proposed scaling parameters and to conduct tests to determine which, is any, of the proposed methods produced scale ice accretions. Study results include: (1) A set of equations that can be used to calculate test conditions so that scaled ice shapes are produced on geometrically similar bodies was developed and experimentally verified. (2) Posttest evaluation of the scaling parameters based on the actual test conditions was necessary for accurate evaluation of test results. (3) An icing similitude computer code, SIMICE, was developed to calculate similitude conditions using the verified scaling equations. (4) The equations were applicable over the range of meteorological conditions found in natural icing, with the possible exception of velocity. (5) Velocity is the primary limitation of the scaling equations. To maintain scaled flow fields and droplet impingement characteristics, both the model and full-scale velocities must yield a Reynolds number > or = 200,000 and < the velocity giving the critical Mach number of the body geometry. (6) At values of dynamic pressure of approximately 1.6 psia, shedding characteristics of the ice accretion were observed to affect the final ice shape.

GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Space Communications, Spacecraft Communications, Command and Tracking* and *32 Communications and Radar.*

N87-12552*# Douglas Aircraft Co., Inc., Long Beach, Calif.

GUIDANCE LAW SIMULATION STUDIES FOR COMPLEX APPROACHES USING THE MICROWAVE LANDING SYSTEM (MLS)

J. B. Feather Nov. 1986 80 p
(Contract NAS1-18028)
(NASA-CR-178182; NAS 1.26:178182) Avail: NTIS
HC A05/MF A01 CSCL 17G

This report documents results for MLS guidance algorithm development conducted by DAC for NASA under the Advance Transport Operating Systems (ATOPS) Technology Studies program (NAS1-18028). The study consisted of evaluating guidance laws for vertical and lateral path control, as well as speed control, by simulating an MLS approach for the Washington National Airport. This work is an extension and generalization of a previous ATOPS contract (NAS1-16202) completed by DAC in 1985. The Washington river approach was simulated by six waypoints and one glideslope change and consisted of an eleven nautical mile approach path. Tracking performance was generated for 10 cases representing several different conditions, which included MLS noise, steady wind, turbulence, and windshear. Results of this simulation phase are suitable for use in future fixed-base simulator evaluations employing actual hardware (autopilot and a performance management system), as well as crew procedures and information requirements for MLS.

Author

N87-12553# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE EFFECT OF COUPLING IN AN INERTIAL NAVIGATION PLATFORM STABILIZED SYSTEM MADE UP OF THREE SINGLE-DEGREE-OF-FREEDOM GYROSCOPES

Di Bo-Hao 13 Jun. 1986 17 p Transl. into ENGLISH from Chuanbo Gongcheng (China), no. 4, 1985 p 38-42
(AD-A169110; FTD-ID(RS)T-0283-86) Avail: NTIS
HC A02/MF A01 CSCL 17/7

We shall refer to three interacting single-axis systems as a three-axis system. If the interaction between the single-axis systems is weak, the three-axis system can be studied in the single-axis approximation. This approximation could lead to great simplification in the analysis and solution of the problem. On the contrary, if the interaction between the systems is strong, the single-axis approximation is not applicable to the three-axis system. To arrive at the criteria for the applicability of the single-axis approximation, it is necessary to study the effect of coupling between the systems. One type of coupling involves the polar angle and the azimuthal angle. It depends on the geometry of the frame between the platform axes. This type of coupling can be eliminated by a coordinate transformation or an orthogonal transformation. GRA

N87-12554# Boston Univ., Mass. Dept. of Electrical Computer and Systems Engineering.

MEDIUM-FREQUENCY DATA LINK FOR DIFFERENTIAL NAVSTAR/GPS BROADCASTS Final Report, Sep. 1985 - Apr. 1986

Per K. Enge, Michael F. Ruane, and Lee Sheynblatt Jun. 1986 95 p
(Contract DTRS57-85-C-00091)
(AD-A169788; DOT-TSC-CG-86-1; DOT-CG-N-02-86) Avail: NTIS
HC A05/MF A01 CSCL 17/7

Differential GPS must communicate differential corrections to civilian users of the Global Positioning System. Modulation of existing marine radiobeacons can provide the needed communica-

tion link for DGPS, provided the operation of existing radiobeacon direction finding equipment is maintained and adequate DGPS range is provided in the presence of atmospheric noise and skywave fading. Existing DF and ADF units were studied through a manufacturers' survey, and a radiobeacon modulation scheme has been proposed that maintains reliable DF and a ADF operation. MSK modulation with a frequency offset of 325 Hz is recommended, with a power offset of -3dB. This scheme limits ADF bearing errors to under 3 deg based on analysis of the modulation energy entering the effective passbands of the various ADF designs. CCir data on atmospheric noise and multipath were studies and a rate 1/2 convolutional code with constraint length 6 is recommended to provide a DGPS bit error probability of less than 0.00001. Reliable DGPS range for 10 nautical mile beacons will be 100 km, and for 30 nm beacons, 195 km. Discussion of interleaving to control atmospheric burst noise is included. GRA

N87-12555# Naval Postgraduate School, Monterey, Calif.
SOME TACTICAL ALGORITHMS FOR SPHERICAL GEOMETRY
Rex H. Shudde Mar. 1986 31 p
(AD-A170615; NPS55-86-008) Avail: NTIS HC A03/MF A01 CSCL 17/7

This report presents two great circle navigation algorithms, a closest point of approach algorithm and intercept algorithm. It also presents an implementation program for the algorithms that is written in the BASIC language for an IBM PC. Instead of using classical spherical geometry or the general spherical triangle, these algorithms incorporate rectangular coordinates and vectors on the surface of the spherical. The intent of the report is to provide algorithms for spherical Earth models that can be used for situations in which flat Earth models are not appropriate, but that do not require the sophistication of rotating Earth models. Author (GRA)

N87-13275# Strathclyde Univ., Glasgow (Scotland). Dept. of Electronic and Electrical Engineering.
FIBRE OPTIC GYROSCOPES IN INERTIAL NAVIGATION
Brian Culshaw and John D. Nuttall (Ferranti Ltd., Edinburgh (Scotland).) *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*. For land transportation vehicles see *85 Urban Technology and Transportation*.

N87-12556 ESDU International Ltd., London (England).
SIMPLIFIED FORMS OF PERFORMANCE EQUATIONS. ADDENDUM A: EFFECT ON AEROPLANE LEVEL SPEED OF SMALL CHANGES IN THRUST, DRAG, WEIGHT, POWER
May 1986 14 p Supersedes ESDU-EG2/1
(ESDU-86004-Add-A; ISBN-0-85679-556-9; ISSN-0141-4054) Avail: ESDU

This Data Item ESDU 86004 is an addition to the Aircraft Performance Sub-series. Equations and curves are given for a method that neglects the effects of any consequential changes in the other independent variables although, at the cost of increased complexity, a means of including such effects (in particular, compressibility effects on drag) is provided. Several worked examples show how well the simple method compares with actual operations data. This document is an Addendum to ESDU 80032, and illustrates how the equations of motion given there combined with a parabolic drag law yield valuable results. ESDU

N87-12557*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA ROTOR SYSTEMS RESEARCH AIRCRAFT: FIXED-WING CONFIGURATION FLIGHT-TEST RESULTS
R. E. Erickson, J. L. Cross, R. M. Kufeld, C. W. Acree, D. Nguyen, and R. W. Hodge (Sikorsky Aircraft, Stratford, Conn.) Feb. 1986 124 p
(NASA-TM-86789; A-85363; NAS 1.15:86789) Avail: NTIS HC A06/MF A01 CSCL 01C

The fixed-wing, airplane configuration flight-test results of the Rotor System Research Aircraft (RSRA), NASA 740, at Ames/Dryden Flight Research Center are documented. Fourteen taxi and flight tests were performed from December 1983 to October 1984. This was the first time the RSRA was flown with the main rotor removed; the tail rotor was installed. These tests confirmed that the RSRA is operable as a fixed-wing aircraft. Data were obtained for various takeoff and landing distances, control sensitivity, trim and dynamics stability characteristics, performance rotor-hub drag, and acoustics signature. Stability data were obtained with the rotor hub both installed and removed. The speed envelope was developed to 261 knots true airspeed (KTAS), 226 knots calibrated airspeed (KCAS) at 10,000 ft density altitude. The airplane was configured at 5 deg. wing incidence with 5 deg. wing flaps as a normal configuration. Level-flight data were acquired at 167 KCAS for wing incidence from 0 to 10 deg. Step inputs and doublet inputs of various magnitudes were utilized to acquire dynamic stability and control sensitivity data. Sine-wave inputs of constantly increasing frequency were used to generate parameter identification data. The maximum load factor attained was 2.34 g at 206 KCAS. Author

N87-12558*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE HANDLING QUALITIES AND FLIGHT CHARACTERISTICS OF THE GRUMMAN DESIGN 698 SIMULATED TWIN-ENGINE TILT NACELLE V/STOL AIRCRAFT
Megan A. Eskey and Samuel B. Wilson, III Jun. 1986 112 p
(NASA-TM-86785; A-85361; NAS 1.15:86785) Avail: NTIS HC A06/MF A01 CSCL 01C

This paper describes three government-conducted, piloted flight simulations of the Grumman Design 698 vertical and short takeoff and landing (V/STOL) aircraft. Emphasis is placed on the aircraft's handling qualities as rated by various NASA, Navy, and Grumman Aerospace Corporating pilots with flight experience ranging from conventional takeoff and landing (CTOL) to V/STOL aircraft. Each successive simulation incorporated modifications to the aircraft in order to resolve the flight problems which were of most concern to the pilots in the previous simulation. The objective of the first simulation was to assess the basic handling qualities of the aircraft with the noncross-shafted propulsion system. The objective of the second simulation was to examine the effects of incorporating the cross-shafted propulsion system. The objective of the third simulation was to examine inoperative single-engine characteristics with and without cross-shafted engines. Author

N87-12559*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A HEATER MADE FROM GRAPHITE COMPOSITE MATERIAL FOR POTENTIAL DEICING APPLICATION
Ching-cheh Hung, Michael E. Dillehay (Cleveland State Univ., Ohio), and Mark Stahl 1986 22 p Proposed for presentation at the 25th Aerospace Sciences Meeting, Reno, Nev., 12-15 Jan. 1987; sponsored by AIAA
(NASA-TM-88888; E-3298; NAS 1.15:88888) Avail: NTIS HC A02/MF A01 CSCL 01C

A surface heater was developed using a graphite fiber-epoxy composite as the heating element. This heater can be thin, highly electrically and thermally conductive, and can conform to an irregular surface. Therefore it may be used in an aircraft's thermal deicing system to quickly and uniformly heat the aircraft surface. One-ply of unidirectional graphite fiber-epoxy composite was laminated between two plies of fiber glass-epoxy composite, with nickel foil contacting the end portions of the composite and partly exposed beyond the composites for electrical contact. The model heater used brominated P-100 fibers from Amoco. The fiber's

electrical resistivity, thermal conductivity and density were 50 micro ohms per centimeter, 270 W/m-K and 2.30 gm/cubic cm, respectively. The electricity was found to penetrate through the composite in the transverse direction to make an acceptably low foil-composite contact resistance. When conducting current, the heater temperature increase reached 50 percent of the steady state value within 20 sec. There was no overheating at the ends of the heater provided there was no water corrosion. If the foil-composite bonding failed during storage, liquid water exposure was found to oxidize the foil. Such bonding failure may be avoided if perforated nickel foil is used, so that the composite plies can bond to each other through the perforated holes and therefore lock the foil in place. Author

N87-12716# Joint Publications Research Service, Arlington, Va.
POSSIBLE MILITARY APPLICATIONS OF STRATOSPHERIC AIRSHIP DISCUSSED
Junichi Kimura, Ryuichi Takeda, Yukichi Fujimatsu, and Toshiyuki Kato *In its* Japan Report: Science and Technology (JPRS-JST-86-023) 29 Aug. 1986 p 49-62 Transl. into ENGLISH from Boei Gijutsu (Tokyo, Japan), Nov. 1985 p 48-58 (For primary document see N87-12715 04-31)
Avail: NTIS HC A04/MF A01

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography.*

No abstracts in this category.

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N87-12560# Cambridge Univ. (England). Dept. of Engineering.
VISUALISATION OF AXIAL TURBINE TIP CLEARANCE FLOW USING A LINEAR CASCADE
J. P. Bindon 1986 66 p
(CUED/A-Turbo/TR-122; ISSN-0309-6521) Avail: NTIS HC A04/MF A01

Gas tracer techniques were not successful in revealing anything except the very generalized movement of fluid from the mainstream into the tip clearance gap. Smoke flow visualization at low Reynolds numbers revealed much of the intricate detail of the flow structure in and around the tip clearance region. Smoke traces were injected both into the mainstream fluid via a rake and also through holes in the blade surface. At low values of clearance, there was no evidence of any separation bubble in the clearance gap and the flow was attached and well behaved as it moved from pressure to suction side. Traces injected on the pressure surface moved radially to enter the clearance gap. In passing round the pressure corner, the traces became transparent indicating an acceleration around the corner. This confirms the measurements elsewhere of extremely low values of pressure on the pressure surface corner. This local high velocity would cause a high heat transfer coefficient on the corner. A test was done to investigate the possibility of cooling the pressure corner by radially exhausting cooling air from the pressure surface near the tip. Qualitative heat transfer studies using a radiantly heated optical film appeared not to be able to resolve the small scale effects near the pressure corner but did clearly show the area of low heat transfer where the separation bubble flow stagnates and separates. Author

N87-12561# Department of the Air Force, Washington, D.C.
THRUST REVERSER-EXHAUST NOZZLE ASSEMBLY FOR A GAS TURBINE ENGINE Patent
Edward B. Thayer, inventor (to Air Force) Issued 27 May 1986 8 p Supersedes AD-D011101
(AD-D012390; US-Patent-4,591,097; US-Patent-Appl-SN-611041; US-Patent-Class-239-265.29) Avail: US Patent and Trademark Office CSCL 21/5

This patent discloses an improved thrust reverser/exhaust nozzle assembly which has a plurality of blocker devices located in the divergent section of the exhaust nozzle and a plurality of deflector devices located in the convergent section of the nozzle. The blocker and deflector devices are linked together such that they move simultaneously and maintain a substantially constant engine between forward and reverse thrust conditions. GRA

N87-12562# Allied Bendix Aerospace, Utica, N.Y. Fluid Power Div.
COMPONENT IMPROVEMENT PROGRAM TASK 83-01, 36E133 AIR TURBINE STARTER
L. Williams Feb. 1986 36 p
(Contract N00019-80-G-0607)
(AD-A169483; Rept-8720-3173U) Avail: NTIS HC A03/MF A01 CSCL 09/3

The objective of this task was to replace the mechanical cutout switch with a solid-state electronic cutout switch to improve accuracy and reliability of the automatic start cycle termination in the S-3A and F-14A aircraft. The function of the cutout switch is to terminate the start cycle at a predetermined speed. It was determined that the existing electronic circuit can be used for the 36E133/123 with only a minor resistor change to accommodate the subject unit's cutout speed. Breadboard testing was successfully completed and satisfactorily demonstrated feasibility. GRA

N87-12563# Dayton Univ., Ohio. Research Inst.
RESEARCH ON MECHANICAL PROPERTIES FOR ENGINE LIFE PREDICTION Interim Report, 1 Aug. 1984 - 31 Jul. 1985
Noel E. Ashbaugh, M. Khobaib, George A. Hartman, Tusit Weerasooriya, and A. M. Rajendran May 1986 74 p
(Contract F33615-84-C-5051)
(AD-A169570; UDR-TR-85-132; AFWAL-TR-85-4154) Avail: NTIS HC A04/MF A01 CSCL 20/11

Analytical and experimental investigations have been performed to determine crack growth behavior of metals under conditions typical of the service environments of aircraft gas turbine engines. To evaluate baseline crack growth behavior, investigations have also been conducted at elevated temperature in vacuum. The work performed can be divided into three general categories -- development of experimental and automation techniques, material characterization testing, and analytic studies. An automated laser interferometric displacement-measurement system using linear array cards has been developed. Enhancements of existing system for the measurement of crack lengths and displacements are described. A number of computer automation applications are also described. Fatigue and creep crack growth tests and creep rupture and hot corrosion tests were performed. Description of the experimental techniques and the results for these tests are included. Results of analytical investigations in both material modeling and methodology development are presented, including discussions of applications within the laboratory. GRA

N87-12564# Department of the Air Force, Washington, D.C.
TURBINE AIR SEAL WITH FULL BACKSIDE COOLING Patent Application
George Liang, inventor (to Air Force) Filed 12 May 1986 21 p
(AD-D012405; US-Patent-Appl-SN-861909) Avail: NTIS HC A02/MF A01 CSCL 11/1

This patent application relates to air seals for use in turbo-

machinery and, more particularly relates to an air seal assembly with increased cooling that is adapted to withstand elevated engine operating temperatures. The air seal comprises a full 360 degree seal ring that assemblies to the turbine by means of interlocking flanges. A two piece impingement plate which is positioned adjacent to the air seal controls and meters cooling air flow that cools ceramic seal. The backside of air seal is thereby fully cooled before heated cooling air is exhausted from the seal through holes at expansion slots and edge holes at the axial edges of the air seal. GRA

N87-12565# Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.
EFFECTS OF TEST CELL RECIRCULATION ON HIGH-BYPASS TURBOFAN ENGINES DURING SIMULATED ALTITUDE TESTS Final Report, Oct. 1984 - May 1985
R. M. Dugas Aug. 1986 89 p Prepared in cooperation with AEDC, Arnold AFS, Tenn.
(AD-A171418; AEDC-TR-85-55) Avail: NTIS HC A05/MF A01 CSCL 21/5

An experimental and analytical program was conducted to determine the nature of the flow field around a subscale model of a high bypass turbofan engine installed in a representatively scaled altitude test cell. The engine model employed variable geometry and flow conditions in order to determine their effects on test cell recirculating flows, which can affect engine performance during altitude testing. Flow field data were obtained from both two axis laser Doppler velocimeters, as well as from pressure and temperature instrumentation installed on the model and test cell. Review of full and 1/10 scale test data and the results of the subscale tests indicate that test cell recirculation effects are a function of cell geometry. Measurement of test cell effects is dependent on a baseline test configuration, such as an outdoor test, where the effects are not present. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

For related information see also *05 Aircraft Design, Testing and Performance.*

N87-12566°# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF A NONLINEAR PARAMETER EXTRACTION MATHEMATICAL MODEL INCLUDING THE TERM C(SUBm(SUB DELTA e SQUARED))
William T. Suit Oct. 1986 18 p
(NASA-TM-87731; NAS 1.15:87731) Avail: NTIS HC A02/MF A01 CSCL 01C

Shuttle flight test data were used to determine values for the short-period parameters. The best identified, as judged by its estimated standard deviation, was the elevon effectiveness parameter C (sub m (sub sigma e squared)). However, the scatter about the preflight prediction of C (sub m (sub sigma e squared)) was large. Other investigators have suggested that adding nonlinear terms to the mathematical model used to identify C (sub m (sub sigma e)) could reduce the scatter. The results of this investigation show that C (sub m (sub sigma e squared)) is the only identifiable nonlinear parameter applicable and that the changes in C (sub m (sub sigma e)) values when C (sub m (sub sigma e squared)) is included are in the order of ten percent for the data estimated. Author

N87-12567# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
AN APPLICATION OF A LISP BASED EXPERT SYSTEM FOR FAILURE DIAGNOSIS OF THE CH-47 FLIGHT CONTROL HYDRAULIC SYSTEM
Christopher J. Loh 2 Mar. 1986 58 p
(Contract DAAG29-84-K-0048)
(AD-A168970; ARO-20155.5-MA) Avail: NTIS HC A04/MF A01 CSCL 09/2

An investigation of the hydraulic flight control system of a Boeing CH-47 Chinook helicopter utilizing artificial intelligence techniques will be undertaken. Specifically, a knowledge based expert system will employ situation-action rules (production rules) to diagnose a failure and subsequently identify specific devices(s) which caused that failure. Moreover, because the behavior of the system is directly responsive to the goals the system is attempting to achieve, the expert system's inference engine performs a backward-chaining process via a goal-driven control strategy. The List Processing Language (LISP) is used to facilitate data processing and symbolic logic expression. GRA

N87-12568# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
A PROTOTYPE MAINTENANCE EXPERT SYSTEM FOR THE CH-47 FLIGHT CONTROL HYDRAULIC SYSTEM
Christopher J. Loh 28 Apr. 1986 182 p
(Contract DAAG29-84-K-0048)
(AD-A169019; MAE-1751; ARO-20155.8-MA) Avail: NTIS HC A09/MF A01 CSCL 14/2

An investigation of the hydraulic flight control system of a Boeing CH-47 Chinook helicopter using artificial intelligence techniques will be undertaken. Specifically, a knowledge based expert system will employ situation-action rules (production rules) to diagnose a failure and subsequently identify specific device(s) which caused that failure. Moreover, because the behavior of the system is directly responsive to the goals the system is directly attempting to achieve, the expert system's inference engine performs a backward-chaining process via a goal-driven control strategy. This strategy involves finding rules that demonstrate the hypothesis and then verifying the facts that enable the rule to work. The List Processing Language (LIPS) is used to facilitate data processing and symbolic logic expression manipulation. GRA

N87-12569# New Mexico Univ., Albuquerque.
APPLICATION OF THE AIPA (APPROXIMATE ITERATIVE PREPROCESSING ALGORITHM) TO F-106 DATA Final Report, Jul. 1984 - Jul. 1985
Sung-Won Park and J. T. Cordaro Jun. 1986 12 p
(Contract F29601-84-K-0045)
(AD-A169084; AFWL-TN-85-52) Avail: NTIS HC A02/MF A01 CSCL 20/14

This report covers the application of the AIPA numerical algorithm to measured data from the F-106 fly-by electromagnetic pulse test conducted at the AFWL in 1984. The algorithm was partially successful at reducing the data. The amplitudes of the normalized coupling coefficients for the first three poles were determined. GRA

N87-12570# Ballistic Research Labs., Aberdeen Proving Ground, Md.
BLAST GUST LOADING ON A 35 DEGREE SWEPT-BACK WING Final Report
Charles L. Fisher May 1986 141 p
(AD-A169415; BRL-MR-3519) Avail: NTIS HC A07/MF A01 CSCL 01/3

The Ballistic Research Lab (BRL) performed shock loading tests on a generic wing in the 2.44 meter shock tube. This model was previously tested on the rocked sled facility at Holloman AFB, New Mexico, and is documented in report number DNA 5211F. The purpose of the BRL test was to determine if the data gathered at Holloman AFB on gust loading of the wing could be duplicated in the shock tube. On Feb 20 and 25, 1985, tests were conducted in the BRL shock tube to obtain pressure data on a 35 degree sweptback generic wing model. These data are subsequently compared with equivalent data taken on the same model at the Holloman sled track. GRA

N87-12571# Hughes Research Labs., Malibu, Calif.
FLIGHT MODEL DISCHARGE SYSTEM Report, Nov. 1984 -

Dec. 1985
R. R. Robson, W. S. Williamson, and J. Santoru Feb. 1986 170 p
(Contract F19628-83-C-0143)
(AD-A169423; AFGL-TR-86-0036; SR-2) Avail: NTIS HC A08/MF A01 CSCL 22/1

The viability of the Flight Model Discharge System (FMDS) concept has been demonstrated by the successful fabrication and testing of a breadboard system. The FMDS is a spacecraft charge-control system designed to overcome the problem of charge buildup on a space vehicle which occurs during periods of adverse space-environmental conditions. Operational characteristics of the entire system are presented, including the electrostatic analyzers, surface potential monitors, transient pulse monitor, plasma source, and microprocessor-based controller, including its software. Results of the breadbhoard demonstration testing and the preliminary flight hardware design are also included.

Author (GRA)

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N87-12572# Essex Corp., Orlando, Fla.
SIMULATOR DESIGN FEATURES FOR HELICOPTER LANDING ON SMALL SHIPS. 1: A PERFORMANCE STUDY Final Report, 1 Sep. 1981 - 26 Apr. 1985
Daniel P. Westra and Gavan Lintern 27 Sep. 1985 63 p
(Contract N61339-81-C-0105)
(AD-A169514; NAVTRASYSCEN-81-C-0105-13) Avail: NTIS HC A04/MF A01 CSCL 05/9

The Visual Technology Research Simulator (VTRS) at the Naval Training Systems Center was used to study the effects of six simulator features on performance for helicopter landings on small ships. The purpose of the experiment was to obtain information relevant to the design of simulators for skill maintenance and transition training, and to obtain information for decisions about future transfer-of-training studies. The six simulator factors were scene detail (high detail ship deck and hangar markings versus no deck and hangar markings), field of view (VTRS-wide versus reduced SH-60B operational flight trainer field of view), system visual lab (217 msec versus 117 msec), g-seat acceleration cuing (off versus on), and collective sound cuing (off versus on). These factors were tested across two levels of seastate and pilot experience. Pilots who participated in the experiment were experienced Navy H-3 rotary wing pilots. Results indicated large effects of scene detail, small to moderate effects for visual lag, small effects for field of view, and no meaningful effects for the g-seat factors and collective sound. Performance was better with the high-detail ship, the shorter visual lag, and the VTRS-wide field of view. Transfer-of-training research is recommended as the next step to further explore these findings and to obtain information directly relevant to the design of simulators for use by student pilots.

GRA

N87-12573# Essex Corp., Orlando, Fla.
SIMULATOR DESIGN AND INSTRUCTIONAL FEATURES FOR CARRIER LANDING: A FIELD TRANSFER STUDY Final Report
D. P. Westra, G. Lintern, D. J. Sheppard, K. E. Thomley, and R. Mauk 18 Jun. 1986 91 p
(Contract N61339-85-C-0044)
(AD-A169962; NAVTRASYSCEN-85-C-0044-2) Avail: NTIS HC A05/MF A01 CSCL 01/2

A transfer-of-training experiment was conducted as part of the carrier landing behavioral research program at the Visual Technology Research Simulator (VTRS). Experimental results provide information on the design and use of simulators for training the aircraft carrier landing task and also provide input on design issues for the Navy's new T-45 training system. Two visual display variables and two simulator training variables were selected for inclusion in this experiment: scene detail (day contrasted with night); field of view (wide versus narrow); approach type (circling, modified straight-in or segmented); and number of simulator trials (20, 40, or 60). 72 student pilots were trained on the VTRS prior to going through the Field Carrier Landing Practice (FCLP) phase of their pilot training program. Performance of these students at FCLP was contrasted with that of a group of 54 students who did not receive simulator training. Results show that students trained in the simulator performed better at FCLP than the control students. There was no transfer advantage for those trained with a daytime high-detail scene compared to those trained with a lower cost nighttime low-detail scene. There was also no transfer advantage for those trained with a wide FOV compared to those trained with the wide field of view compared to those trained with the lower cost narrow FOV scene.

GRA

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N87-12574# Committee on Science and Technology (U. S. House).
NATIONAL COMMISSION ON SPACE REPORT
1986 76 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 129, 22 Jul. 1986
(GPO-63-143) Avail: Subcommittee on Space Science and Applications

The National Commission on Space was established by Congress in 1984 to formulate a long range agenda for U.S. civilian space activity, so long range goals, opportunities, and policy options could be identified. The process which the Commission followed to arrive at its conclusions, what those conclusions were, as well as the alternatives that were considered are discussed. The objectives and the financial projection requested to achieve them are examined.

B.G.

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

N87-12575 Colorado Univ., Boulder.
METER-LEVEL ORBIT DETERMINATION OF GEOSYNCHRONOUS SATELLITES BY AN ECONOMICAL TRACKING SYSTEM Ph.D. Thesis
TingHua Wang 1985 153 p
Avail: Univ. Microfilms Order No. DA8608651

A high-precision and low cost geosynchronous satellite tracking system was proposed. The tracking system main components are two geosynchronous satellites, four automatic ground stations and a very-long-baseline interferometry (VLBI) system. The automatic ground stations provide the doubly difference ranging measurements without precision clocks. The VLBI system consists of four one meter antennas positioned on orthogonal 6000 km baselines and uses a GPS signal for clock synchronization. A quick and simple initialization algorithm was developed to provide a reliable initial estimate. An efficient and stable two-stage Quasi-Newton-Raphson orbit determination program, in which the state perturbation transition matrix was introduced to simplify the mathematical derivation, always converges to the desired solution in five iterations. The artificial weighting matrices were carefully adjusted to desensitize the effect of the imperfection of measurements and modeling. An algorithm dependent linearized covariance method, based on batch-processing, weighted least-squares

estimation algorithm was derived and the error resulting from the process disturbances was evaluated carefully. Based on the anticipated characteristics of the 1990 era VLBI, doubly differenced ranging and dynamic model, a one meter position accuracy of geosynchronous satellites has been achieved. Dissert. Abstr.

N87-12576# Aerospace Corp., El Segundo, Calif. Electronics Research Lab.
VECTOR ANALYSIS AND SATELLITE FOOTPRINTS
R. H. Ott 20 Jun. 1986 54 p
(Contract F04701-85-C-0086)
(AD-A169832; TR-0086(6749)-1; SD-TR-86-31) Avail: NTIS HC A04/MF A01 CSCL 20/14

The use of vector analysis for deriving algorithms for generating earth coverage footprints from satellites in arbitrary orbits is presented. Extensive analysis and results are given for two examples: (1) a satellite in geosynchronous orbit, and (2) a satellite in subsynchronous orbit. The antenna beam on the satellite can be elliptic in cross section with arbitrary orientation of semi-minor and semi-major axes. GRA

N87-12577# Texas Univ., Austin.
OPTIMAL DESCENDING, HYPERSONIC TURN TO HEADING
G. R. Eisler and D. G. Hull 1986 15 p Presented at the Atmospheric Flight Mechanics Conference, Williamsburg, Va., 18 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010989; SAND-86-2061C; CONF-860882-2) Avail: NTIS HC A02/MF A01

Approximations are made to the point-mass equations of motion for flight within the atmosphere. Optimal controls are formulated for a reentry vehicle to execute a maximum-terminal-velocity turn to a specified heading while executing steep, descent trajectories. A Newton scheme is used repetitively to solve a nonlinear algebraic system for two parameters in the control equations to provide the on-line guidance. Trajectory comparisons from the repetitive solution of the optimal control problem, pure numerical optimization, and simulation of sample-data guidance show good agreement, if the atmospheric model is accurate. DOE

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air).*

N87-12578# Range Commanders Council, White Sands Missile Range, N. Mex. Data Reduction and Computing Group.
DIRECTORY OF RANGE DATA CONVERSION AND PROCESSING SYSTEM, REVISION
17 Jul. 1986 556 p
(AD-A169629; DR/CG-157-84-Rev) Avail: NTIS HC A24/MF A01 CSCL 09/2

The members and associate members of the Data Reduction and Computing Group (DR&CG) of the Range Commanders Council (RCC) have exchanged information on the hardware and software systems in use at their respective ranges and agencies at regular intervals with great success. Since other range representatives found this information to be valuable, the group published a Directory of Data Conversion and Processing Systems, RCC Document 127-73, in 1973. This third edition, 157-84, contains nine chapters, with information updated since the 1980 edition. The directory covers the following topics: range data conversion, processing systems, pre/post flight computer systems, real-time computer systems, film readers, frequency and wave analysis system, data transmission system, printers and plotters, range instrumentation computer systems, telemetry front and systems, terminals and graphic displays, micrographics equipment, embedded computer. GRA

N87-12579# Range Commanders Council, White Sands Missile Range, N. Mex. Inter-Range Operations Group.
JOINT OPERATING PROCEDURE FOR INTERRANGE SCHEDULING
May 1986 11 p Supersedes report dated Jun. 1983, AD-A130680
(AD-A169636; RCC/IOG-550-86) Avail: NTIS HC A02/MF A01 CSCL 05/1

This document defines policies and procedures necessary to accomplish the orderly interrange scheduling operations support services involving two or more major ranges and test facilities. The policies and procedures described herein will be used by Department of Defense major ranges and test facilities engaged in mutual operations support and by all range users requesting support from two or more ranges. GRA

N87-12580*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LUNAR LABORATORY
P. W. Keaton (Los Alamos National Lab., N. Mex.) and M. B. Duke 1986 11 p Presented at the Committee on Space Research (COSPAR), Toulouse, France, 30 Jun. 1986 Sponsored in part by NASA
(Contract W-7405-eng-36)
(NASA-TM-89209; NAS 1.15:89209; DE86-0123433;
LA-UR-86-2213; CONF-8606145-1) Avail: NTIS HC A02/MF A01

An international research laboratory can be established on the Moon in the early years of the 21st Century. It can be built using the transportation system now envisioned by NASA, which includes a space station for Earth orbital logistics and orbital transfer vehicles for Earth-Moon transportation. A scientific laboratory on the Moon would permit extended surface and subsurface geological exploration; long-duration experiments defining the lunar environment and its modification by surface activity; new classes of observations in astronomy; space plasma and fundamental physics experiments; and lunar resource development. The discovery of a lunar source for propellants may reduce the cost of constructing large permanent facilities in space and enhance other space programs such as Mars exploration. DOE

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.

For related information see also *20 Spacecraft Propulsion and Power.*

N87-12581*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR ARRAY FLIGHT DYNAMIC EXPERIMENT
Richard W. Schock Washington May 1986 27 p
(NASA-TP-2598; NAS 1.60:2598) Avail: NTIS HC A03/MF A01 CSCL 10A

The purpose of the Solar Array Flight Dynamic Experiment (SAFDE) is to demonstrate the feasibility of on-orbit measurement and ground processing of large space structures dynamic characteristics. Test definition or verification provides the dynamic characteristic accuracy required for control systems use. An illumination/measurement system was developed to fly on space shuttle flight STS-31D. The system was designed to dynamically evaluate a large solar array called the Solar Array Flight Experiment (SAFE) that had been scheduled for this flight. The SAFDE system consisted of a set of laser diode illuminators, retroreflective targets, an intelligent star tracker receiver and the associated equipment to power, condition, and record the results. In six tests on STS-41D, data was successfully acquired from 18 retroreflector targets and ground processed, post flight, to define the solar array's dynamic

characteristic. The flight experiment proved the viability of on-orbit test definition of large space structures dynamic characteristics. Future large space structures controllability should be greatly enhanced by this capability.
Author

N87-12582# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE CHINESE GUIDED MISSILES STRIDE TOWARD MODERNIZATION
H. Zhangnuo and Y. Mu 19 May 1986 11 p Transl. into ENGLISH from Hangkong Zhishi (China), no. 9, Sep. 1985 p 17-18
(AD-A169017; FTD-ID(RS)T-0237-86) Avail: NTIS HC A02/MF A01 CSCL 16/4

The 1985 April issue of the Japanese Aviation Intelligence magazine published an article written by Doi Hiroshi on the status of our country's guided missile technology striding toward modernization. It is solely to provide our readers with some information on what comments are being made abroad about our country's modernization of national defense.
GRA

N87-12583# Texas Univ., Austin. Dept. of Aerospace Engineering and Engrg. Mech.
ADVANCED GUIDANCE ALGORITHMS FOR HOMING MISSILES WITH BEARING-ONLY MEASUREMENTS Annual Technical Report
Jason L. Speyer and David G. Hull 20 May 1986 10 p
(Grant AF-AFOSR-0371-84)
(AD-A170833; AFOSR-86-0595TR) Avail: NTIS HC A02/MF A01 CSCL 17/7

The research of this grant is directed toward the development of an advanced guidance system (navigation filter and guidance law) for a short-range air-to-air missile having a passive seeker (angle-only measurements). During this year, four subjects have been investigated. First, additional experience has been gained with the modified-gain extended Kalman filter; it is becoming apparent that it works the same as or better than the extended Kalman filter for the homing missile problem. Second, a new target-acceleration model has been developed to replace the first-order Gauss-Markov process normally used; this model allows target acceleration vector to rotate and keeps its magnitude within bounds. Third, because the homing missile problem with angle-only measurements is nonlinear, the guidance law affects the performance of the filter; a new guidance law based on maximizing a measure of the size of the information matrix has been developed and has been shown to improve filter performance. Fourth, a study of the use of new theory on fault detection has been initiated; the intent is to use this theory to detect target maneuvers (the target maneuver appears as a fault) so that the filter can be restarted.
Author (GRA)

N87-12584# Ballistic Research Labs., Aberdeen Proving Ground, Md.
STABILITY OF LIQUID-FILLED PROJECTILES WITH UNUSUAL CONING FREQUENCIES Final Report
Charles H. Murphy Jul. 1986 30 p
(AD-A171460; AD-F300802; BRL-MR-3530) Avail: NTIS HC A03/MF A01 CSCL 19/1

For a liquid-filled shell, a key parameter is r, the ratio of coning frequency to spin frequency. This report considers the stability implications of r in the unusual intervals (-1,0) and (1,3). It is shown that for a low viscosity liquid treated by the Stewartson-Wedemeyer theory there is no possibility of unstable motion in these two regions.
GRA

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e. shuttle operations; and space rescue techniques.
For related information see also *03 Air Transportati and Safety* and *18 Spacecraft Design, Testing and Perf mance*. For space suits see *54 Man/System Technolo and Life Support*.

N87-12585*# National Aeronautics and Space Administratio Marshall Space Flight Center, Huntsville, Ala.
DEVELOPMENT TESTING OF LARGE VOLUME WATE SPRAYS FOR WARM FOG DISPERSAL
V. W. Keller, B. J. Anderson, R. A. Burns, G. G. Lala (New Yor State Univ., Albany), M. B. Meyer, and K. V. Beard (Illinois Univ. Urbana-Champaign) Washington Jun. 1986 112 p
(NASA-TP-2607; NAS 1.60:2607) Avail: NTIS HC A06/MF A01 CSCL 14B

A new brute-force method of warm fog dispersal is described. The method uses large volume recycled water sprays to create curtains of falling drops through which the fog is processed by the ambient wind and spray induced air flow. Fog droplets are removed by coalescence/rainout. The efficiency of the technique depends upon the drop size spectra in the spray, the height to which the spray can be projected, the efficiency with which fog laden air is processed through the curtain of spray, and the rate at which new fog may be formed due to temperature differences between the air and spray water. Results of a field test program, implemented to develop the data base necessary to assess the proposed method, are presented. Analytical calculations based upon the field test results indicate that this proposed method of warm fog dispersal is feasible. Even more convincingly, the technique was successfully demonstrated in the one natural fog event which occurred during the test program. Energy requirements for this technique are an order of magnitude less than those to operate a thermokinetic system. An important side benefit is the considerable emergency fire extinguishing capability it provides along the runway.
Author

N87-12586# Committee on Science and Technology (U. S. Senate).
INVESTIGATION OF THE CHALLENGER ACCIDENT, VOLUME 2
1986 592 p Hearings before the Committee on Science and Technology, 99th Congress, 2d Session, No. 139, 15-26; 23-24 Jul. 1986
(GPO-64-548) Avail: Committee on Science and Technology

Testimony from three of the principal contractors responsible for developing space shuttle flight hardware is presented relative to the Challenger accident.
B.G.

17 SPACE COMM., SPACECRAFT COMM., COMMAND & TRACKING

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.
For related information see also *04 Aircraft Communications and Navigation* and *32 Communications and Radar*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance, 39 Structural Mechanics,* and *16 Space Transportation*.

N87-12587*# Martin Marietta Aerospace, New Orleans, La.
GENERAL PURPOSE AFT CARGO CARRIER STUDY, VOLUME 1 Final Technical Report
May 1985 393 p
(Contract NAS8-35564)
(NASA-CR-178905; NAS 1.26:178905) Avail: NTIS HC A17/MF A01 CSCL 22B

The Space Transportation System (STS) documents were reviewed to determine their applicability to the Aft Cargo Carrier (ACC). The ACC requirements were developed to assure that the appropriate STS requirements were met. Payload accommodations/interface was discussed. The configuration, structural details, and subsystems of the ACC design are described. Mission analysis, planning schedules, and cost are summarized. B.G.

N87-12588# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ATTITUDE CONTROL OF AN ARTIFICIAL SATELLITE BY EXTENDING THE LINEAR QUADRATIC REGULATOR THEORY
Luiz Carlos Gadelha deSouza and Marcelo L. deOliveira e Souza Jul. 1986 8 p In PORTUGUESE; ENGLISH summary Presented at the 6th Congresso Brasileiro de Automatica, Belo Horizonte, Brazil, 25-28 Nov. 1986
(INPE-3959-PRE/977) Avail: NTIS HC A02/MF A01

A new attitude control law for artificial satellites is presented. It is based on an extension of the theory of linear quadratic regulator to the case where the dynamics is described by a weakly nonlinear system of equations (Euler's equations) with respect to a reference system fixed to the satellite. Only the phase in which the satellite has small angles and angular velocities is considered. During it the control law is approximately linear with respect to the state. The results obtained are partial (since this is on-going research), but suggest that: (1) the nonlinear terms of the equations are relevant in the initial instants only, but they become negligible later; (2) despite those terms, the implemented control law reduces the angular velocities and angles faster than other law already simulated with success; (3) that law permits an approximate calculation of the energy expended in the process. Author

N87-12589# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A PROCEDURE FOR ATTITUDE DETERMINATION OF ARTIFICIAL SATELLITES UTILIZING TECHNIQUES OF STATIC AND DYNAMIC OPTIMAL ESTIMATION
Sebastiao Eduardo Corsatto Varotto, Valcir Orlando, and Roberto Vieira daFonseca Lopes Aug. 1986 7 p In PORTUGUESE; ENGLISH summary Presented at the 6th Congresso Brasileiro de Automatica, Belo Horizonte, Brazil, 25-28 Nov. 1986
(INPE-3966-PRE/981) Avail: NTIS HC A02/MF A01

This work presents an algorithm for optimal attitude estimation of artificial satellites, suitable for real time applications. The attitude estimation at each sampling time is made in two phases. In the first one a preliminary estimation is obtained by a least squares method based only on instantaneous information from noninertial attitude sensors. This is made by using the algorithm known as QUEST (Quartenion Estimator). In the second phase, the preliminary estimate, after being conveniently treated, is used as an observation to be processed by a stochastic estimator: the extended Kalman filter. The procedure is tested by means of numerical simulation in a digital computer in a problem of three-axis attitude determination of an artificial satellite. This is a gravity gradient stabilized satellite which uses attitude sensors of two types; solar and magnetic. The analysis of the results shows good performance in terms of precision, robustness and processing time compared to direct application of an extended Kalman filter estimator. Author

N87-12590# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PROCEDURE FOR ONE AXIS SATELLITES ATTITUDE CONTROL WITH MAGNETIC ACTUATION
Luiz Danilo Damasceno Ferreira, Valcir Orlando, and Atair Rios Neto May 1986 8 p In PORTUGUESE; ENGLISH summary Presented at the 2nd Congresso Latino Americano de Control Automatico, Argentina
(INPE-3895-PRE/937) Avail: NTIS HC A02/MF A01

The modelling and analysis phases of an attitude control system for low orbit artificial satellites using magnetic coil are presented. The function of the system is to maintain the satellite aligned with the local vertical. The control system development is considered through the application of stochastic control concepts. The satellite motion is described by the equations of motion based on Newtonian formulation. Starting from the Separation Principle, a sequential procedure is developed in which the state estimation and control problems are handled simultaneously. The state estimate is provided by Kalman filter by using the information about the positions of the satellite and of the coil parameters. The controller acts on the satellite in real time, since the coil is the only control element. Author

N87-12591# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
RELATIVE MOTION OF THE SUN ON AN ARTIFICIAL SATELLITE [MOVIMENTO RELATIVO DO SOL SOBRE UM SATELITE ARTIFICIAL]
Valder Matos deMedeiros and Luis Carlos Gadelha deSouza Sep. 1986 18 p In PORTUGUESE; ENGLISH summary
(INPE-3985-NTE/260) Avail: NTIS HC A02/MF A01

Starting with the orbital elements of an artificial satellite, and the right ascension and declination of the Sun, one obtains by posol subroutine the spherical coordinates of the Sun with respect to a reference system fixed to the satellite, thus making possible the study of satellite movement in the laboratory. Author

N87-12592*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
VIEWPORT CONCEPT FOR SPACE STATION MODULES
Freddie Douglas, III Aug. 1986 26 p
(NASA-TM-86559; NAS 1.15:86559) Avail: NTIS HC A03/MF A01 CSCL 22B

The generic design of a 20-in. diameter viewport for the space station modules is discussed. It should possess the capabilities of meteoroid/debris protection (with no metallic cover), redundancies in its meteoroid/debris protection, and pressure sealing systems. In addition, it should provide ease of change out for maintenance or repair. The design does not take into account the bumper-shield effect of the outermost panes in the meteoroid/debris analysis. Author

N87-12593*# National Aeronautics and Space Administration, Washington, D.C.
UPPER STAGE SELECTED FOR PLANETARY MISSIONS
26 Nov. 1986 2 p
(NASA-News-Release-86-161; P86-10229) Avail: NTIS HC A02/MF A01 CSCL 22B

The National Aeronautics and Space Administration has selected the Inertial Upper Stage (IUS), a launch vehicle which fits in the cargo bay of the Space Shuttle as the baseline option to carry probes to Jupiter, Venus, and the Sun. The planetary payloads and the IUS are briefly described. B.G.

N87-12594# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
BRIEF ANALYSIS OF NORMAL ATTITUDE ACCURACIES OF

SATELLITES WITH WHEELS OR GAS JETS [BREVE ANALISE DAS PRECISOES EM ATITUDE NORMAL DE SATELITES COM RODAS OU COM JATOS A GAS]
Marcelo LopesdeOliveiraeSouza Sep. 1986 11 p In PORTUGUESE; ENGLISH summary
(INPE-3993-NTE/262) Avail: NTIS HC A02/MF A01

The normal attitude accuracies reached by some satellites using (reaction or momentum) wheels or (cold or hot) gas jets are briefly analyzed. To do so (in the available time), the data on some successfully launched satellites are compiled in 4 tables. From their analysis it is concluded that: (1) the use of wheels is a necessary condition (NC) for reaching high accuracies (less than or equal to 1'); (2) this does not happen with gas jets, whose use is not a sufficient condition(SC) either; (3) all the analyzed remote sensing (and predecessor) satellites use wheels, besides having circular, sun-synchronous and on-phase orbits; (4) these facts are extremely relevant for redefining the characteristics of MECB's Remote Sensing Mission (unless it were changed e.g., by a ANS-like one). Author

N87-12595# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
DENSITY AND ELECTROSTATIC POTENTIAL DISTRIBUTION AROUND A CYLINDRICAL SATELLITE [DISTRIBUICAO DE DENSIDADE E POTENCIAL ELECTROSTATIC EM TORNO DE UM SATELITE CILINDRICO]
Hans-U. Pilchowski and Isabel MdeMoraes Jul. 1986 11 p In PORTUGUESE; ENGLISH summary Presented at SBPC, Curitiba, Brazil, 9-16 Jul. 1986
(INPE-3953-NTE/258) Avail: NTIS HC A02/MF A01

The electrostatic potential distribution around a cylindrical satellite, moving with a constant speed, is presented. Magnetic field effects are neglected. The method of characteristics for solving quasi-linear partial differential equations is employed to get the approximate number density of ions and electrons. The Poisson's equation is solved by the method of finite differences, using Newton's method. The dependence of the nondimensional potential on the speed ratio, ratio of characteristic length by Deybe length, are discussed. Author

N87-12596# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COMPARISON OF METHODS FOR THE CALCULATION OF THERMAL CONTACT RESISTANCE OF THE FIRST BRAZILIAN SATELLITE M.S. Thesis, 6 Dec. 1985 [COMPARACAO DE METODOS PARA O CALCULO DA RESISTENCIA TERMICA DE CONTATOS DO PRIMEIRO SATELITE BRASILEIRO]
Marcia B. H. Mantelli Apr. 1986 105 p In PORTUGUESE; ENGLISH summary
(INPE-3864-TDL/217) Avail: NTIS HC A06/MF A01

A comparative study of the methods developed for the calculation of thermal contact resistance between two surfaces submitted to a perpendicular heat flux is presented. Several factors affecting this resistance are analyzed and a brief historical review of the works in this field is made, spotting the methods of interest for spacial applications. These are compared to experimental data so as to establish the most proper method for the couplings of the first Brazilian satellite. Author

N87-12597*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN APPROACH TO DESIGN KNOWLEDGE CAPTURE FOR THE SPACE STATION
D. B. Wechsler (Mitre Corp., Houston, Tex.) and K. R. Crouse 1986 14 p
(NASA-TM-89272; NAS 1.15:89272) Avail: NTIS HC A02/MF A01 CSCL 22B

The design of NASA's space station has begun. During the design cycle, and after activation of the space station, the reoccurring need will exist to access not only designs, but also deeper knowledge about the designs, which is only hinted in the design definition. Areas benefiting from this knowledge include training, fault management, and onboard automation. NASA's Artificial Intelligence Office at Johnson Space Center and Th MITRE Corporation have conceptualized an approach for captu and storage of design knowledge. Auth

N87-12598*# National Aeronautics and Space Administratio Washington, D.C.
MODELING THE FUNDAMENTAL CHARACTERISTICS AN PROCESSES OF THE SPACECRAFT FUNCTIONING
V. I. Bazhenov, M. I. Osin, and Yu. V. Zakharov Sep. 1986 322 Transl. into ENGLISH of the book "Modelirovaniye Osnovnyk Kharakteristic i Protsessov Funktsionironvaniya Kosmicheskik Apparatov" Moscow, USSR, Mashinostroenie, 1985 240 p Trans by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-4005)
(NASA-TM-87999; NAS 1.15:87999) Avail: NTI HC A14/MF A01 CSCL 22B

The fundamental aspects of modeling of spacecraft characteri tics by using computing means are considered. Particular attentic is devoted to the design studies, the description of physic appearance of the spacecraft, and simulated modeling of spacecra systems. The fundamental questions of organizing the on-th ground spacecraft testing and the methods of mathematic modeling were presented. Auth

N87-12599# Defence Research Establishment, Ottawa. (Ontario
SARSAT (SEARCH AND RESCUE SATELLITE) OPERATIONA DATA CATEGORIZATION AND ACCURACY STUDIES
W. R. McPherson and S. Y. Slinn Sep. 1985 50 p
(AD-A169748; DREO-TN-85-26) Avail: NTIS HC A03/MF A0 CSCL 17/2

The definition of what data is transferred from the SARSA ground tracking station to operational search and rescue use influences how well the action beacon alert data can be use Based on an evaluation of operational search and rescue incide data collected during the SARSAT Demonstration and Evaluatio categorization and accuracy studies indicate that methods can b developed which will significantly improve the operational actionir of SARSAT generated beacon alert data. The results of thes studies are presented and recommended approaches to th handling of SARSAT data are given. GR

N87-12600# M/A-COM, Inc., Vienna, Va. Government System Div.
MILSTAR MODELING SURVEY Final Report, 25 Feb. 1986 15 Jun. 1986
26 Jun. 1986 41 p
(Contract DCA100-84-C-0009)
(AD-A169789) Avail: NTIS HC A03/MF A01 CSCL 17/2

This task was intended to aid the MILSATCOM Satellit Office (MSO) in its efforts to acquire a capability for compute modeling of the MILSTAR system. The modeling needs of th MSO were examined first, and a survey of existing MILSTAR mode was then conducted. Finally, estimates were made on th level-of-effort necessary to develop a new, general purpos MILSTAR model appropriate for the MSO. GR

N87-12601# California Univ., Los Angeles. Dept. of Materia Science and Engineering.
NEW MATERIALS FOR SPACECRAFT STABILITY AND DAMI ING: A FEASIBILITY STUDY Final Technical Report, 1 Oc 1983 - 30 Sep. 1984
John D. Mackenzie Nov. 1985 52 p
(Grant AF-AFOSR-0221-83)
(AD-A169826; AFOSR-86-0308TR) Avail: NTIS HC A04/MF A0 CSCL 11/4

A preliminary feasibility study has been conducted on som new materials for use as structure components of spacecraft These included some new glasses, glass-ceramics, fibers an composites such as low expansion copper aluminosilicat glasses, hollow and oval glass fibers and hollow fiber-glas polymer composites. The low temperature expansion coefficient elastic moduli and damping constants were measured. Recom mendations are made for further research and development

some selected materials which appeared to be promising candidates for spacecraft structures. GRA

N87-12602# California Univ., Los Angeles. Dept. of Electrical Engineering.
A MATHEMATICAL FORMULATION OF A LARGE SPACE STRUCTURE CONTROL PROBLEM Interim Report
A. V. Balakrishnan Sep. 1985 8 p
(Grant AF-AFOSR-0318-83)
(AD-A169950; AFOSR-86-0444TR) Avail: NTIS HC A02/MF A01 CSCL 22/2

This paper presents an abstract-mathematical formulation of a Large Space Structure Control problem. The physical apparatus consists of a softly supported antenna attached to the space shuttle by a flexible beam-like truss. The control objective is to slew the antenna on command within the given accuracy and maintaining stability. The control forces and torques are applied at the shuttle end as well as the antenna end and in addition provision is made for a small number of 2-axis proof-mass actuators along the beam. The beam motion is modelled by partial differential equations. Of the variety of control problems possible we touch only on the time-optimal probable. Author (GRA)

N87-12603# Los Alamos National Lab., N. Mex.
SIMPLE DEFENSE CONSERVATIVE MODEL FOR MASS REQUIREMENTS OF HYPERVELOCITY PROJECTILE IMPACT SHIELDS FOR REENTRY VEHICLES
G. R. Spillman 1986 19 p Presented at the Hypervelocity Impact Symposium, San Antonio, Tex., 21 Oct. 1986
(Contract W-7405-eng-36)
(DE86-012407; LA-UR-86-2112; CONF-861091-1) Avail: NTIS HC A02/MF A01

Simple analytical modeling of the physics of interaction of hypervelocity (50 to 100 km/s) projectiles with a bumper shield countermeasure is given. The interaction of projectile and bumper expansion between bumper and underlying vehicle and interaction of bumper/projectile debris cloud with vehicle are examined. Projectile/bumper interactions are treated with ideal gas strong-shock and rarefaction equations. Projectile shock decay from bumper rarefaction is approximated by an impulsive shock similarity solution. A crude model for edge rarefactions is derived. Expansion of debris is treated as an expansion superimposed upon a translation with partition derived from a simple inelastic collision model. The effect of nonunity aspect ratio of compressed debris is included. Debris colliding elastically with the vehicle will impart momentum equal to twic[illegible] incident normal component. Impulse may be reduced up to [illegible] 2 by stagnation radiative losses for small projectiles ar[illegible] .iper/vehicle stand-off. Impulse can be enhanced by ve[illegible] on from radiative coupling, shock heating (inadequate stand-o[illegible] or liquid droplet microcratering (inadequate bumper thickness). Estimates of required bumper mass are given for a specific example. DOE

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N87-12604# Naval Research Lab., Washington, D. C.
THE SPACE STATION MILLIMETER FACILITY
K. W. Weiler, B. K. Dennison, R. M. Bevilacqua, J. H. Spencer, and K. J. Johnston 9 Jun. 1986 58 p
(AD-A168983; NRL-MP-5794) Avail: NTIS HC A04/MF A01 CSCL 22/2

A large millimeter wavelength interferometer array is proposed for construction on the planned Space Station (The Space Station Millimeter Facility--SSMF). It will have manifold applications in both basic and applied research and will be the premier instrument in the world at high radio frequencies. Earth resource mapping, middle atmospheric studies, and high frequency radio astronomy are only a few of the areas which will be significantly advanced by the availability of such an instrument. Particularly in astronomy, the ability to do observations above the disturbing and absorbing effects of the Earth's atmosphere will allow opportunities for exploration of all objects from the Sun, through the Solar System bodies, to the interstellar medium of the Milky Way and other galaxies, and out to the most distant quasars with resolution and sensitivity equalling or exceeding all existing or planned millimeter wavelength telescopes. One of the last unexplored regions of the electromagnetic spectrum, the mm-IR gap, can finally be closed. A flexible design for the SSMF is proposed, and estimate of its construction costs is made, and numerous scientific applications in a number of disciplines are discussed. GRA

N87-12605# Farran Technology Ltd., Ballincollig (Ireland).
MILLIMETER WAVE COMPONENTS Final Report
W. M. Kelly, S. U. Lidholm, B. Lyons, and G. T. Wrixon Paris ESA Nov. 1985 108 p
(Contract ESTEC-5353/83-NL-GM(SC))
(FTL-118521; ESA-CR(P)-2224; ETN-86-98103) Avail: NTIS HC A06/MF A01

Studies and component developments for the realization of low noise spaceborne radiometers between 90 and 300 GHz are summarized. The availability of local oscillator power in this frequency region via either fundamental sources or frequency multipliers is examined, as is the concept of subharmonic mixing as an alternative to fundamental mixing using a frequency doubler. A doubler from 91.5 to 183 GHz and a subharmonic mixer at 183 GHz were developed and their performance assessed. Preferred receiver designs at a number of frequencies of interest are proposed. ESA

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion,* and *15 Launch Vehicles and Space Vehicles.*

N87-12606*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED SOLAR DYNAMIC SPACE POWER SYSTEMS PERSPECTIVES, REQUIREMENTS AND TECHNOLOGY NEEDS
Miles O. Dustin, Joseph M. Savino, Dovie E. Lacy, Robert P. Migra (Sverdrup Technology, Inc., Arnold Air Force Station, Tenn.), Albert J. Juhasz, and Carolyn E. Coles 1986 30 p Proposed for presentation at the Solar Energy Conference, Honolulu, Hawaii, 22-23 Mar. 1987; sponsored by ASME, JSME and JSES
(NASA-TM-88884; E-3292; NAS 1.15:88884) Avail: NTIS HC A03/MF A01 CSCL 10B

Projected NASA, Civil, Commercial, and Military missions will require space power systems of increased versatility and power levels. The Advanced Solar Dynamic (ASD) Power systems offer the potential for efficient, lightweight, survivable, relatively compact, long-lived space power systems applicable to a wide range of power levels (3 to 300 kWe), and a wide variety of orbits. The successful development of these systems could satisfy the power needs for a wide variety of these projected missions. Thus, the NASA Lewis Research Center has embarked upon an aggressive ASD reserach project under the direction of NASA's Office of Aeronautics and Space Technology (DAST). The project is being implemented through a combination of in-house and contracted efforts. Key elements of this project are missions analysis to determine the power systems requirements, systems analysis to identify the most attractive ASD power systems to meet these requirements, and to guide the technology development efforts, and technology development of key components. Author

N87-12607*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SHIFTS IN SHUTTLE SRM PERFORMANCE BECAUSE OF AMMONIUM PERCHLORATE CRYSTAL SHAPE ON MISSIONS 51-I/J AND 61-A/B
Douglas L. Blackwell Aug. 1986 25 p
(NASA-TM-86561; NAS 1.15:86561) Avail: NTIS HC A02/MF A01 CSCL 21H

The design of the Space Shuttle vehicle configuration requires that the SRMs produce thrust within tightly-controlled limits. These limits provide assurance that Shuttle ascent performance goals will be achieved within the vehicle flight load constraints. The SRM's will perform within these limits if overall SRM reproducibility is maintained. This report will initially describe the excellent performance reproducibility of the 24 SRMs during the first 12 flights [STS-8 through STS-26 (Mission 51-F)] using the HPM SRM. Secondly, this report will describe the transient phenomena which interrupted the reproducibility in the first 20 sec of flight for four flights (Missions 51-I/J and 61-A/B). The cause of this 20 sec phenomena is postulated to be a change in the crystal shape of the ammonium perchlorate used in the propellant. This shape change coincided with the performance shift on these four flights. The ballistic effect of the crystal shape change is manifested as a change to the generic HUMP or BARF curve of the Shuttle SRM thrust/pressure-time curve. As the crystal shape change was corrected by the vendor, the performance produced by the Shuttle SRM returned to normal. Author

N87-12608*# Vibration and Acoustics, Inc., Huntsville, Ala.
SSME MAIN INJECTOR 4000 HERTZ PHENOMENON Final Report, 22 Apr. - 21 Jul. 1986
G. D. Johnston 21 Aug. 1986 8 p
(NASA Order W-85081B)
(NASA-CR-178934; NAS 1.26:178934) Avail: NTIS HC A02/MF A01 CSCL 21H

Several Space Shuttle Main Engines (SSME) have experienced very high acceleration responses measured in the main injector of the powerhead during static firings. Data from previous hot fire SSME tests relating to the 4000 hertz phenomenon were reviewed to provide a better understanding of the nature of this structural response. The objective was to technically understand the way this phenomenon works, recommend a fix and test the fix. B.G.

N87-12609*# Stanford Univ., Calif. Space, Telecommunications and Radio Science Lab.
HIGH VOLTAGE CHARACTERISTICS OF THE ELECTRODYNAMIC TETHER AND THE GENERATION OF POWER AND PROPULSION Final Report
P. Roger Williamson 23 Jan. 1986 15 p
(Contract NAS8-35502)
(NASA-CR-178949; NAS 1.26:178949) Avail: NTIS HC A02/MF A01 CSCL 10B

The Tethered Satellite System (TSS) will deploy and retrieve a satellite from the Space Shuttle orbiter with a tether of up to 100 km in length attached between the satellite and the orbiter. The characteristics of the TSS which are related to high voltages, electrical currents, energy storage, power, and the generation of plasma waves are described. A number of specific features of the tether system of importance in assessing the operational characteristics of the electrodynamic TSS are identified. B.G.

N87-12610# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
ADVANCED ELECTRIC PROPULSION MPD (MAGNETOPLASMADYNAMIC) Final Report, 15 Aug. 1979 - 31 May 1986
A. J. Kelley, W. VonJaskowsky, J. Polk, and R. G. Jahn May 1986 35 p
(Contract F04611-79-C-0039)
(AD-A169792; AFRPL-TR-86-044) Avail: NTIS HC A03/MF A01 CSCL 21/3

An in-situ method of measuring MPD (Magnetoplasmadynamic) thruster component erosion has been developed and tested on a reference multimegawatt thruster configuration. The technique involves activation of selected areas on the components to be studied by precisely controlled high energy (Me4V) ion beam bombardment. Monitoring the decrease in activity during thruster operation provides a precise (sub-micron accuracy), quantitative measure of the amount of material removed from the surface. In preliminary tests, erosion of the tungsten cathode occurred at all operating conditions, but a number of factors contributed to the lack of detectable erosion of the copper anode or the boron nitride insulator. These results tentatively indicate that cathode erosion is linearly related to the charge transfer, but scatter in the individual test sequence erosion rate data prevents a more definitive conclusion to be drawn at this time. Nevertheless, a comparison of erosion data obtained at two different pulse lengths (1 msec, 2 msec) indicates that cathode material loss is generally independent of the number of current transients. Work is continuing in a broad effort to refine the Surface Layer Activation (SLA) technique and to obtain a data base for additional thrusters. GRA

N87-12611# Argonne National Lab., Ill.
COMPUTATIONAL AND EXPERIMENTAL STUDY OF FLOW-INDUCED VIBRATION OF THE SSME MAIN INJECTOR POST
S. S. Chen, J. A. Jendrzejczyk, and M. W. Wambsganss 1986 25 p Presented at the Conference on Advanced Earth-to-Orbit Propulsion Technology, Huntsville, Ala., 13 May 1986
(Contract W-31-109-eng-38)
(DE86-012119; CONF-8605142-1) Avail: NTIS HC A02/MF A01

The Space Shuttle Main Engine (SSME) liquid-oxygen (LOX) posts are subjected to high-velocity turbulent flow from the transfer ducts. In a preliminary assessment of the vibration problem, it was determined that the two potential excitation mechanisms for LOX post vibration are fluidelastic instability and turbulent buffeting. A fundamental study is being conducted to understand the problem and to develop techniques to avoid detrimental vibrational effects with the objective of improving engine life. This paper summarizes the results of an analytical model for fluidelastic instability and test results for turbulent buffeting of a tube array in crossflow. A general theory of fluidelastic instability for a tube array in crossflow is presented. Various techniques to obtain the motion-dependent fluid-force coefficients are discussed and the general instability characteristics are summarized. The theory is also used to evaluate the results of other mathematical models for crossflow-induced instability. The fluid excitation forces acting on a tube array are presented as a function of Reynolds number, incoming flow conditions, and tube location in an array. The experimental data show the general characteristics of flow across a tube array. As the flow passes through each row of tubes, the fluid is subjected to resistance, the effect of which is to convert some of the fluid pressure energy to turbulent energy. In the first few rows, the transformation of energy occurs in a somewhat orderly manner. As the flow reaches the interior tubes, unsteadiness of the flow increases and, usually, a randomness of the flow and its pressure fluctuation exists in the flow field. DOE

23 CHEMISTRY AND MATERIALS (GENERAL)

N87-12612# Sandia National Labs., Albuquerque, N. Mex.
POTENTIAL APPLICATIONS OF ARTIFICIALLY STRUCTURED MATERIALS FOR X-RAY MICROANALYSIS
A. D. Romig, Jr. 1986 17 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010459; SAND-86-1032C; CONF-860829-25) Avail: NTIS HC A02/MF A01

These materials are artificially structured on the atomic scale and exhibit properties uniquely different than those found in naturally occurring or conventionally processed materials. Recent

advances in high vacuum deposition techniques have made these materials possible, since the manufacture of ASMs requires very clean environments and the capability to deposit layers with thicknesses ranging from fractions of a nm to a few nm. ASMs have been made from semiconductors, metals, metal-semiconductor combinations and metal-nonmetal combinations. The ASMs produced by layering high atomic number (Z) metals and low Z nonmetals or metals have unique X-ray interaction properties in that they can be used to produce normal incidence X-ray mirrors. It is the objective of this paper to review this new class of materials, with special emphasis on the high Z/low Z multilayer materials, describe applications for these materials currently in use for microanalysis and suggest future applications which should be considered by the X-ray microanalysis community. DOE

24 COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

For ceramic materials see *27 Nonmetallic Materials.*

N87-12613*# Washington Univ., St. Louis, Mo. Lab. for Ultrasonics.

QUANTITATIVE NON-DESTRUCTIVE EVALUATION OF COMPOSITE MATERIALS BASED ON ULTRASONIC WAVE PROPAGATION Semiannual Progress Report, 15 Mar. - 14 Sep. 1986

James G. Miller 1986 24 p

(Grant NsG-1601)

(NASA-CR-179831; NAS 1.26:179831) Avail: NTIS HC A02/MF A01 CSCL 11D

The application and interpretation of specific ultrasonic nondestructive evaluation techniques are studied. The Kramers-Kronig or generalized dispersion relationships are applied to nondestructive techniques. Progress was made on an improved determination of material properties of composites inferred from elastic constant measurements. E.R.

N87-12614*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

INVESTIGATION OF THE EFFECTS OF SHORT CHAIN PROCESSING ADDITIVES ON POLYMERS

Raj J. Singh, Terry L. StClair, and J. Richard Pratt Nov. 1986 10 p

(NASA-TM-89023; NAS 1.15:89023) Avail: NTIS HC A02/MF A01 CSCL 11D

The effects of low level concentrations of several short chain processing additives on the properties of the 4,4'-bis(3,4-dicarboxyphenoxy) diphenylsulfide dianhydride (BDSDA)/4,4'-diaminodiphenyl ether (ODA)/1,3'-diaminobenzene (m-phenylene diamine) (MPA) (422) copolyimide were investigated. It was noted that 5 percent MPD/phthalic anhydride (PA) is more effective than 1 percent ODA/PA and BDSDA/aniline (AN) in strengthening the host material. However, the introduction of 10 percent BDSDA/AN produces disproportionately high effects on free volume and free electron density in the host copolyimide. Author

N87-12615# MSNW, Inc., San Marcos, Calif.

PLASMA JOINING OF METAL MATRIX COMPOSITES Interim Technical Report, Dec. 1985 - Jan. 1986

J. H. Reynolds and L. Yang Feb. 1986 30 p

(Contract DAAG29-85-C-0027)

(AD-A169056; ARO-22817.2-MS-S) Avail: NTIS HC A03/MF A01 CSCL 11/4

Microstructural details of the first 1110 Al/SiC and Al(Zr)/SiC recomposited powders are described. These powders will be used for initial low pressure plasma depositions. Modeling of expected bulk and interfacial reactions and degradation mechanisms in plasma processing of the composite powder filler metals is described in detail. GRA

N87-12616# Martin Marietta Aerospace, Denver, Colo.

METALLURGICAL CHARACTERIZATION OF THE INTERFACES AND THE DAMPING MECHANISMS IN METAL MATRIX COMPOSITES Progress Report, 4 Feb. 1984 - 15 Apr. 1986

Mohan S. Misra 15 Apr. 1986 5 p

(Contract N00014-84-C-0413)

(AD-A169186; MCR-85-605-ISSUE-3) Avail: NTIS HC A02/MF A01 CSCL 11/4

Fiber reinforced metal matrix composites (MMC) are candidate structural materials for space applications because of their high specific modulus, low CTE, high electrical and thermal conductivity and high environmental resistance. Furthermore, the need for dynamic dimensional precision and weight savings in space structures suggests inherent material damping as an additional property requirement. A preliminary investigation indicates MMC exhibit improved damping with respect to conventional structural alloys of aluminum or titanium. In the present investigation, a graphite-aluminum composite (P55/6061) has been selected to study the microstructural features and mechanisms responsible for damping in MMC. The objectives for this reporting period have been as follows: establish a reliable test method and its limitations; develop reproducible damping test data at different frequencies and strain amplitude; thorough metallurgical characterizations of interfaces; suggest an operative damping mechanism in MMC; and recommendations for further investigations. GRA

N87-12617# Texas A&M Univ., College Station. Mechanics and Materials Research Center.

STRESS EFFECTS ON MOISTURE TRANSPORT IN AN EPOXY RESIN AND ITS COMPOSITE

Y. Weitsman and M. Henson Jun. 1986 11 p

(Contract N00014-82-K-0562)

(AD-A169306; MM-4762-86-15) Avail: NTIS HC A02/MF A01 CSCL 11/4

This paper presents the results of a experimental investigation of stress effects on the sorption of water vapor in an epoxy resin and its composite. Such effects were noted by several researchers in both polymers and composites, although these earlier investigations did not present a comprehensive study of the phenomenon. This paper summarizes results which were obtained recently. It is shown that in both epoxy and graphite/epoxy composites, external stresses affect the diffusion process. In the case of the resin, stresses appear to raise the moisture saturation levels while in composites stresses appear to affect the entire sorption process, accentuating the a-symmetries between absorption and desorption behavior. In both materials the moisture transport process departs both quantitatively and qualitatively from the predictions of classical, Fickean diffusion. GRA

N87-12618# Army Materials and Mechanics Research Center, Watertown, Mass. Ceramics Research Div.

MECHANICAL TESTING OF A COATED CARBON-CARBON COMPOSITE AT ELEVATED TEMPERATURES IN AIR Final Report

George D. Quinn and Jacob J. Stiglich, Jr. May 1986 24 p

(AD-A169355; MTL-TR-86-15) Avail: NTIS HC A02/MF A01 CSCL 11/4

The controlled nucleation thermochemical deposition (CNTD) process can apply a silicon carbide coating to carbon/carbon (C/C) composites. Coated C/C composite materials are potentially useful in advanced gas turbine engines particularly as static components, although rotating components are feasible. Success of such a system will require a coating that will ensure oxidation resistance and mechanical integrity. This report represents a preliminary characterization of mechanical properties of a silicon carbide coated, C/C composite at ambient and elevated temperature in air. The coating was applied by the controlled nucleation thermochemical deposition (CNTD) process. The strength, static fatigue, and oxidation results of the coated composite were favorable at temperatures up to 2372 F (1300 C) in air. GRA

N87-12619# Texas A&M Univ., College Station. Mechanics and Materials Research Center.

COUPLED DAMAGE AND MOISTURE-TRANSPORT IN FIBER-REINFORCED POLYMERIC COMPOSITES
Y. Weitsman Jan. 1986 50 p
(Contract N00014-82-K-0562)
(AD-A169379; MM-4762-86-2) Avail: NTIS HC A03/MF A01 CSCL 11/4

This paper presents a mathematical model for the coupling between moisture diffusion and damage in fiber-reinforced, polymeric composites. In these materials, moisture was observed to cause damage by a multitude of minute debondings at the fiber/matrix interfaces. The model employs concepts of continuum damage theory to describe those debondings. Formal evolutionary expressions are derived and related to the extent of damage, the stress field, moisture content and moisture gradient. The effects of damage on moisture diffusion and on reductions in moduli are aslo formulated. Qualitative comparisons with experimental results are provided. GRA

N87-12620# Southwest Research Inst., San Antonio, Tex.
MICROMECHANISMS OF CRACK GROWTH AND FRACTURE TOUGHNESS IN METAL MATRIX COMPOSITES Technical Report, 29 Apr. 1985 - 29 Apr. 1986
D. L. Davidson, J. Lankford, and G. R. Leverant Jun. 1986 47 p
(Contract N00014-85-C-0206)
(AD-A169839; SWRI-06-8602) Avail: NTIS HC A03/MF A01 CSCL 11/4

Subcritical crack growth and rapid fracture of the mechanically alloyed aluminum alloy IN-9052 reinforced with SiC particles have been investigated. Fatigue crack growth rates for the composite exceed those of the unreinforced alloy, except that the threshold stress intensity for growth is higher for the composite. Fracture toughness of the composite is about 9 square root of M cubed compared to a (reported) value of 29 square root of M cubed for the unreinforced alloy. The contributions to fracture toughness from work done within the plastic zone and in formation of the void sheet have been computed using analytical models. Fracture toughness is shown to result almost entirely from work done within the plastic zone of the growing crack. The matrix microstructure and the particulate characteristics are found to account for the elastic and fracture properties of this composite. GRA

N87-12621# Department of the Air Force, Washington, D.C.
PROCESS FOR CARBON-CARBON COMPOSITE FABRICATION Patent Application
Plotzker, inventor (to Air Force) et al Filed 16 Apr. 1986 16 p
(AD-D012413; US-Patent-Appl-SN-852597) Avail: NTIS HC A02/MF A01 CSCL 11/4

A fabrication process and apparatus are disclosed that achieve a higher density carbon-carbon article, than the prior art processes by maintaining a vertical temperature gradient in a reservoir of pitch (e.g., 550 C at the bottom to 250 C at the top) into which a carbon fiber preform is immersed. The use of the vertical temperature gradient results in a reservoir of hot fluid pitch around the upper end of the preform during pitch impregnation of the preform. This permits the fluid pitch to drain down by gravity into the interstices of the carbon fiber and the hardening pitch below. The next step of the process involves gradually increasing the pitch-hardening temperature from bottom to top to harden the pitch from bottom to top. Thereafter, the impregnated preform is carbonized at high temperature. This method takes advantage of the thermal conductivity of the carbon fibers and does not require extremely high pressures. In fact, a high pressure would be a detriment since it results in closed pores. The process of the present disclosure depends on the development of large, connected pores that can be more easily filled. This manner results in the production of suitable carbonized billets in a fraction of the time currently required and using much less energy. GRA

N87-12622# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CARBON FIBERS
A. A. Konkin and N. F. Konnova 22 Aug. 1986 35 p Transl. into ENGLISH from Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva (USSR), v. 17, no. 6, 1972 p 632-639
(AD-A171370; AD-F250645; FTD-ID(RS)T-0761-86) Avail: NTIS HC A03/MF A01 CSCL 11/2

In connection with development of missile construction, aircraft construction, mastery of space, and also other branches of technology arose acute need for high temperature (oxidation resistant) fibrous materials, reinforced plastics on basis of which were intended for exploitation at high temperatures. Common natural and synthetic fibers, including thermoresistant, could not satisfy these requirements. As a result of intensive investigations, carried out for latter by decade are developed methods of obtaining large number of high temperature (oxidation resistant) fibers different in properties, predominantly on basis of inorganic compounds. To the important of them relate carbon, boric, carbide, metallic, on the basis of oxides of the elements and some other compounds. Filamentary crystals (whisker) occupy special position in view of unique mechanical properties. This group of fibers is located on different levels of technical development. GRA

N87-12623# Argonne National Lab., Ill.
STABILITY OF MULTILAYERS AT HIGH TEMPERATURES
E. Ziegler, Y. Lepetre, I. K. Schuller, and E. Spiller (IBM Watson Research Center, Yorktown Heights, N.Y.) 1986 10 p Presented at the SPIE Technical Symposium on Applications of Artificial Intelligence, Orlando, Fla., 31 Mar. 1986 Prepared in cooperation with IBM Watson Research Center, Yorktown Heights, N.Y.
(Contract W-31-109-eng-38)
(DE86-010526; CONF-860366-7) Avail: NTIS HC A02/MF A01

The temperature stability of metal (W, WRe, Co, Cr)-carbon multilayers has been studied using X-ray diffraction (theta-2theta and Debye-Scherrer) and electron microscopy. Results show that in all cases a crystallization occurs in the temperature range 650 to 750 C. As a consequence of this crystallization, the layered structure is destroyed, the surface of the film becomes rough and the X-ray reflectivity is considerably reduced. These results imply that efficient cooling or new multilayer structures will have to be developed for use at high temperatures or under high X-ray incident flux. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N87-12624 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 2C: ALKADIENES AND ALKYNES
Feb. 1986 60 p
(ESDU-86001-Pt-2C; ISBN-0-85679-553-4; ISSN-0141-4062) Avail: ESDU

This Data Item ESDU 86001 is an addition to the Physical Data, Chemical Engineering Sub-series. Vapor pressure data are given for 36 compounds. The data were obtained by a method described in ESDU 84021 involving a critical evaluation of experimental results in the literature, extrapolated by a recent reliable method into the low pressure region, and fitted by a Wagner equation applying over the full liquid range from the freezing to the critical point. The coefficients of the equation are given for each compound and three tables of vapor pressure are included: in SI units at 5 K intervals, in atmospheres at 5 C intervals, and in lbf/sq in at 10 F intervals. The sources of the data used are listed, and a table gives likely uncertainties in values predicted by the equation that should be allowed for in any critical situation. Critically evaluated vapor pressure data for alkanes are available in ESDU 84022, 84028, and 85002 and for alkenes in ESDU 85008 and 85016. ESDU

N87-12625 ESDU International Ltd., London (England).
VAPOUR PRESSURES AND CRITICAL POINTS OF LIQUIDS. PART 3A: C6 TO C10 ALKYLBENZENES
Jul. 1986 56 p Supersedes ESDU-73029
(ESDU-86012-Pt-3A; ISBN-0-85679-564-X; ISSN-0141-4062) Avail: ESDU

Available as part of the ESDU Sub-series on Physical Data, Chemical Engineering, this ESDU gives vapor pressure for 36 compounds. The data were obtained by a method described in ESDU 84021 involving a critical evaluation of experimental results in the literature, extrapolated by a recent reliable method into the low pressure region, and fitted by a Wagner equation applying over the full liquid range from the freezing to the critical point. The coefficients for the equation are given for each compound and three tables of vapor pressure are included: in SI units at 5 K intervals, in atmospheres at 5 C intervals, in lbf/sq in at 10 F intervals. The sources of the data used are listed, and a table gives likely uncertainties in values predicted by the equation that should be allowed for in any critical situation. ESDU

N87-12626*# Alabama Univ., Huntsville. Dept. of Chemistry.
CELLULAR SOLIDIFICATION OF TRANSPARENT MONOTECTICS Semiannual Report
William F. Kaulker Dec. 1986 12 p
(Grant NAG8-069)
(NASA-CR-177039; NAS 1.26:177039) Avail: NTIS HC A02/MF A01 CSCL 07D

Understanding how liquid phase particles are engulfed or pushed during freezing of a monotectic is addressed. The additional complication is that the solid-liquid interface is nonplanar due to constitutional undercooling. Some evidence of particle pushing where the particles are the liquid phase of the monotectic was already observed. Cellular freezing of the succinonitrile-glycerol system also occurred. Only a few compositions were tested at that time. The starting materials were not especially pure so that cellular interface observed was likely due to the presence of unkown impurities, the major portion of which was water. Topics addressed include: the effort of modeling the particle pushing process using the computer, establishing an apparatus for the determination of phase diagrams, and the measurement of the temperature gradients with a specimen which will solidify on the temperature gradient microscope stage. Author

N87-12627# California Univ., Davis. Dept. of Mechanical Engineering.
COMBUSTION AND MICRO-EXPLOSION OF WATER/OIL EMULSIONS IN HIGH PRESSURE ENVIRONMENTS Final Report, 7 Dec. 1984 - 6 Dec. 1985
Chung K. Law 11 Mar. 1986 9 p
(Contract DAAG29-85-K-0010)
(AD-A168976; ARO-22486.2-EG) Avail: NTIS HC A02/MF A01 CSCL 21/2

During the reporting period we have accomplished all the objectives as stated in the proposal on gaining fundamental understanding in the combustion and micro-explosion properties of droplets of water/oil emulsions and miscible multicomponent fuel blends. Specifically, the gasification mechanisms of these multicomponent droplets have been unambiguously identified, the relative importance of the various physical and chemical factors influencing soot formation in droplet burning have been systematically assessed, and the ignition limits of fuel droplets vaporizing over a hot plate have been determined. Highlights of the specific accomplishments are separately summarized. GRA

N87-12628# Rutgers - The State Univ., New Brunswick, N. J. Dept. of Mechanical, Industrial and Aerospace Engineering.
RELATIONSHIP OF IN-CYLINDER GASEOUS AND PARTICULATE CONCENTRATION TO RADIATIVE HEAT TRANSFER IN DIRECT INJECTION-TYPE DIESEL COMBUSTION Final Report, 1 Feb. 1983 - 31 Jan. 1986
K. T. Rhee, S. L. Chang, Jeff Matonick, and Chirs Sheft 15 Apr. 1986 135 p
(Contract DAAG29-83-K-0042)
(AD-A168979; ARO-19869.13-EG) Avail: NTIS HC A07/MF A01 CSCL 21/2

The objective of the reported research was to investigate the relationship of radiation heat transfer to the in-cylinder species distribution in direct injection-type diesel engine combustion. In order to implement this objective, both the experimental and computational methods were employed during the course of the study. In the experiment, in order to obtain the in-cylinder species distribution at successive engine crank angles, a rapid sampling valve has been used on a laboratory-built single cylinder direct injection-type diesel engine. The engine for the data acquisition was constructed basically by combining a reciprocating system of an ASTM gasoline engine and a newly constructed engine cylinder head. We encountered a series of problems in the engine requiring replacement of engine components. At the end, the engine was regarded unable to meet the need of operating for an extended period of time for data gathering. Consequently, it was decided to use a new single cylinder engine. In the computational work, a radiation heat transfer model was developed to predict spectral radiation heat transfer through the engine combustion chamber wall for given in-cylinder species distributions. The discovery of a new integral function, a new exact solution of blackbody functions, a new empirical equation of adiabatic flame temperature of fuel/air systems, an analytical solution of equation of radiation functions, a parametric analysis of diesel radiation heat transfer, etc. are reported. GRA

N87-12629# Washington State Univ., Pullman.
OPTICAL SPECTROSCOPY OF DYNAMICALLY COMPRESSED LIQUIDS Final Report, 1 Apr. 1977 - 30 Jun. 1986
George E. Duvall 30 Jun. 1986 42 p
(Contract N00014-77-C-0232)
(AD-A169013; SDL-0058-FTR) Avail: NTIS HC A03/MF A01 CSCL 07/4

The objectives of this work are described in the Introduction. Accomplishments are listed and experimental approaches are described briefly. A summary is given of spectroscopy experiments in CS2 and other materials. Conclusions are: (1) there is no evidence in CS2 of an unique shock effect other than that resulting from rapid increase of pressure and temperature which accompanies compression, (2) metastable states, which can be sampled only by rapid compression, are achieved in these experiments, (3) chemical reaction rates can be measured and critical pressures and temperatures can be determined from spectral measurements in this regime, (4) changes in the UV and visible spectra of liquids studied vary from no observable effect to shifts of thousands of angstroms in absorption band edges for pressure less than 130 kbars, (5) observed spectral changes in liquid CS2 are cooperative in nature and become very small or zero at infinite dilution, (6) a combination of static high pressure and shock compression measurements is particularly valuable in unravelling the physical processes, involved, (7) shock experiments appear to represent a particularly useful adjunct to and extension of chemical processes in liquids under conditions of high temperatures and pressures. GRA

N87-12630# Lawrence Livermore National Lab., Calif.
APPLICATION OF PATTERN RECOGNITION TO METAL ION CHEMICAL IONIZATION MASS SPECTRA Interim Technical Report
R. A. Forbes, E. C. Tews, B. S. Freiser, M. B. Wise, and S. P. Perone Oct. 1985 28 p
(Contract N00014-86-F-0033)
(AD-A169061; TR-4) Avail: NTIS HC A03/MF A01 CSCL 07/4

Pattern recognition methods were used to evaluate the information content of mass spectrometry data obtained using transition metal ions as an ionization source. Data sets consisting of the chemical ionization mass spectra for Fe+ and Y+ with 72 organics (representing the six classes alkane, alkene, ketone, aldehyde, ether, and alcohol) and 24 alkanes (representing the three subclasses linear, branched, and cyclic) were subjected to pattern recognition analysis using a k-nearest neighbor approach with feature weightings. The reactivities of Fe+ and Y+ toward

the classes of compounds studied were characterized using classification accuracies as a measure of selectivity, and important chemical information was extracted from the raw data by empirical feature selection methods. A total recognition accuracy of 81% was obtained for the recognition of the six organic classes and 96% accuracy was obtained for the recognition of the three subclasses of alkanes. GRA

N87-12631# International Business Machines Corp., San Jose, Calif. Almaden Research Center.
ELECTRODE/ELECTROLYTE INTERPHASE STUDY USING POLARIZATION MODULATED FT-IR REFLECTION ABSORPTION SPECTROSCOPY
K. Kunimatsu, H. Seki, W. G. Golden, J. G. Gordon, II, and M. R. Philpott 16 May 1986 24 p
(Contract N00014-82-C-0583)
(AD-A169081; TR-9) Avail: NTIS HC A02/MF A01 CSCL 07/4

The polarization modulated Fourier transform infrared reflection-absorption spectroscopy (FT-IRRAS) is applied to the studies of adsorption and oxidation of CO on a platinum electrode in 0.5M sulfuric acid and of adsorption of cyanide on gold and silver electrodes in 0.5M sulfuric potassium sulfate. The absorption intensity of the CO on platinum electrode is ca. 4 to 5% while that of the CN(-) on silver and gold is 0.2 to 0.5%. The potential dependence of the vibrational spectra was observed for both systems. Oxidation of the linearly adsorbed CO layer proceeds by different mechanisms depending on whether CO was adsorbed at a potential in the double layer region or in the hydrogen region, i.e., at the edges of the CO islands in the former case and randomly in the latter case, in which the bridged CO species plays an important role. The vibrational frequency of the linearly adsorbed CO changes linearly with potential at a rate of 30 cm-1/volt, which is independent of anion specific adsorption. The origin of the shift is most reasonably explained by the first order Stark effect. For Ag, Au/CN(-) systems, the surface cyanide species is the linearly adsorbed CH(-). The anodic reaction products in the solution from cyanide ions and the electrode are also observed in the vibrational spectra. The bands due to surface species and those due to solution species are distinguished by measuring the spectra with s and p-polarized lights. GRA

N87-12632# International Business Machines Corp., San Jose, Calif. Almaden Research Center.
CARBON MONOXIDE ADSORPTION ON A PLATINUM ELECTRODE STUDIED BY POLARIZATION MODULATED FT-IR REFLECTION-ABSORPTION SPECTROSCOPY. 2: CO ADSORBED AT A POTENTIAL IN THE HYDROGEN REGION AND ITS OXIDATION IN ACIDS
K. Kunimatsu, H. Seki, W. G. Golden, J. G. Gordon, II, and M. R. Philpott 16 May 1986 22 p Submitted for publication
(Contract N00014-82-C-0583)
(AD-A169082; TR-10-Pt-2) Avail: NTIS HC A02/MF A01 CSCL 07/4

The carbon monoxide layer on a platinum electrode, which is adsorbed at 0.05 V relative to a normal hydrogen electrode (NHE) in 0.515 M sulfuric acid, and its oxidation to carbon dioxide at higher electrode potentials has been studied by both electrochemical and in-situ Fourier transform infrared reflection-absorption spectroscopy (FT-IRRAS). Polarization modulated FT-IRRAS was used to measured the vibrational spectra of adsorbed carbon monoxide as well as the evolved CO2 as a function of electrode potential. It is shown that the dominant surface species is linearly adsorbed CO, but that the bridge bonded species is oxidized first at about 0.20 V, giving rise to a decrease in the linear C-O stretching frequency of along with a broadening of the band. Oxidation of the linearly adsorbed CO begins at 0.35 V, producing a further, sharp decrease in the C-O stretching frequency as well as a considerable broadening of the band. It is concluded that the oxidation of the CO adlayer produced at 0.05 V occurs randomly throughout the adlayer, in contrast to oxidation at island edges, which is characteristic of CO adsorbed at 0.4 V. It is proposed that the difference in behavior of these two kinds of adsorbed CO is due to crystallographic modification of the platinum surface surface when the CO is adsorbed at 0.05 V in the hydrogen region which results in a higher density of bridge bonded CO. GRA

N87-12633# Texas Univ., Austin. Dept. of Chemistry.
ELECTROCHEMISTRY IN NEAR-CRITICAL AND SUPERCRITICAL FLUIDS. 3: STUDIES OF Br(-), I(-) AND HYDROQUINONE IN AQUEOUS SOLUTIONS
William M. Flarsheim, Yu-Min Tsou, Isaac Trachtenberg, Keith P. Johnson, and Allen J. Bard Feb. 1986 37 p
(Contract N00014-84-K-0428)
(AD-A169138; TR-3) Avail: NTIS HC A03/MF A01 CSCL 07/4

A new type of apparatus has been constructed for carrying out electrochemistry in nearcritical and supercritical aqueous solutions. The following systems have been studied at a platinum electrode: H2O/O2, I(-)/I2, Br(-)/Br2, and hydroquinone/benzoquinone. The compact, alumina flow-cell can be heated or cooled quickly, and can be recharged with fresh electrolyte solution while at high temperature and pressure. A large reduction in the potential required for the electrolysis of water was observed. Diffusivities have been measured for iodide ions and hydroquinone. General agreement with the Stokes-Einstein model was observed in the temperature range 25 C to 375 C. GRA

N87-12634# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
NEW RESULTS ON LOW TEMPERATURE THERMAL OXIDATION OF SILICON Interim Report
E. A. Irene 20 Jun. 1986 36 p
(Contract N00014-83-K-0571)
(AD-A169603; TR-5) Avail: NTIS HC A03/MF A01 CSCL 07/4

The commonly accepted linear-parabolic oxidation model for the thermal oxidation of Si includes two rate processes in a steady state: reaction between Si and oxidant at the Si-SiO2 interface; and transport of oxidant through the SiO2 film. Based on available data, it is argued that the former process seems dominant for thin film growth in dry O2. A number of measured SiO2 film and Si-SiO2 interface measured properties are reported, as well as the variation of these properties with oxidation temperature and Si substrate orientation. These properties include; refractive index, density, intrinsic stress, interface fixed oxide charge and interface trapped charge. It is also observed that all of these properties display similar oxidation temperature and inert anneal behavior plus a complex orientation dependence. Through the use of a modified form for the interface reaction, a better understanding is obtained of both the origin of these measured properties, and new oxidation data taken on five Si orientations and at lower oxidation temperatures than previously reported. GRA

N87-12635# Virginia Inst. of Marine Science, Gloucester Point. Dept. of Chemical Oceanography.
INVESTIGATION OF DEVIATIONS FROM IDEALITY IN THE TWO LIQUID PHASE REGION OF SYSTEMS OF MEDIUM MOLECULAR WEIGHT HYDROCARBON MIXTURES AND WATER Final Report, 1 Jan. 1983 - 31 Dec. 1985
David R. Burris and William G. MacIntyre Feb. 1986 115 p
(Grant AF-AFOSR-0036-83)
(AD-A169752; AFOSR-86-0397TR) Avail: NTIS HC A06/MF A01 CSCL 07/4

Two-phase systems of liquid hydrocarbon mixture, containing medium molecular weight aromatic and aliphatic hydrocarbons, and water were examined in both equilibrium and kinetic experiments. Knowledge of the aqueous solution behavior of liquid hydrocarbon mixtures is important in determining the fate of hydrocarbon components of fuels and petroleum in environmental release situations. The equilibrium solute concentration for a component is given by the product of the pure compound solubility, its mole fraction in the hydrocarbon phase and its activity coefficient in the hydrocarbon phase. Hydrocarbon phase activity coefficients determined for binary hydrocarbon mixtures using static vapor pressure measurements (at 20 and 70 degs.) and those determined using water solubility results (at 20 and 70 degs.) did not differ significantly. This indicated that component aqueous phase

ctivity coefficients did not decrease measurably in the presence of hydrocarbon co-solutes, in contradiction to some previously published observations, and that the presence of water in the hydrocarbon phase was not significant at these temperatures. Methods for predicting multicomponent mixture solubilities were demonstrated. Aqueous solution behavior of mixtures containing a chlorinated hydrocarbon or a fatty acid surfactant was also determined. GRA

N87-12636# California Univ., Santa Barbara. Dept. of Chemistry.
ON THE INTERPLAY BETWEEN CHEMICAL REACTIONS AND PHASE TRANSITIONS FOR MOLECULES ADSORBED ON SOLID SURFACES
Mark Stiles and Horia Metiu Jul. 1986 28 p Prepared in cooperation with Cornell Univ.
(Contract N00014-82-K-0576)
(AD-A169818; TR-25) Avail: NTIS HC A03/MF A01 CSCL 07/4

There is a large body of experimental evidence suggesting that the rate of product formation in a reaction between adsorbed molecules is deeply modified when one of the reagents undergoes a phase transition or, more broadly speaking, an aggregation of some kind. Specific examples are H2 and CO oxydation; methanol transformation into a methoxy radical on O/Cu; the water reaction with oxygen to form 20H; the decomposition of N2O on Pt(111) which is affected by a phase transition in the outermost Pt layer; and the oxidation of Ni. It is suspected that similar effects might operate on supported metal catalysts. We use Monte Carlo simulations to examine the manner in which reagent aggregation affects the reaction rate between molecules adsorbed on a solid surface. We discuss the temperature and concentration dependence of the rate of product formation. GRA

N87-12637# Oak Ridge National Lab., Tenn.
IMPORTANCE OF INTERFACIAL PHENOMENA IN SEPARATION SCIENCE AND TECHNOLOGY
C. D. Scott 1986 13 p Presented at the Interfacial Phenomena in the New and Emerging Technologies, Boulder, Colo., 29 May 1986
(Contract DE-AC05-84OR-21400)
(DE86-011063; CONF-8605119-1) Avail: NTIS HC A02/MF A01

The different types of separation technologies have many common features that can be used to define a unified field. All separation processes bring about a spatial differentiation of the components of a mixture. In most cases, the separation is conducted in a heterogeneous process which requires the movement of the component of interest to, or through, an interface between phases. Thus, interfacial phenomena will frequently represent important, or even controlling, mechanisms in the separation process. There will be important needs and opportunities for interfacial research in support of advanced separation concepts. Some of these needs will be pointed out for selected areas of new or emerging technologies. DOE

N87-12638# Illinois Univ., Urbana. Dept. of Chemistry.
TRANSPORT AND RELAXATION PROCESSES IN SUPERCRITICAL FLUIDS Progress Report
J. Jonas 1986 5 p
(Contract DE-FG22-85PC-80503)
(DE86-007847; DOE/PC-80503/T1) Avail: NTIS HC A02/MF A01

We have tested our improved NMR method for determining diffusion coefficients using a sample of HO. We obtain the literature value for D to within the error of the experiment (+3%). This NMR diffusion experiment now allows us to obtain diffusion data for the naphthalene-CO system. Spin echo modulation is no longer a problem, so we may monitor the proton NMR signal from naphthalene which has the necessary sensitivity to obtain diffusion data. Diffusion measurements are now in progress. These are the first NMR diffusion measurements on a solid-supercritical fluid system. We have recently been testing the feasibility of obtaining high resolution sulfur-33 NMR spectra of solids containing sulfur dissolved in supercritical fluids. Typically sulfur linewidths in these molecules are very large (greater than 10kHz) when dissolved in liquid solution. However, the viscosity of a supercritical fluid is much less than that of a simple liquid, and thus a sulfur containing compound dissolved in a supercritical fluid should have a greatly narrowed linewidth. This would allow the characterization of sulfur containing coal liquids, for example. We have investigated the system dibenzothiophene-supercritical ethylene in this way. Unfortunately, the NMR sensitivity of ^{33}S is quite poor, and the signal to noise ratios were not sufficient to obtain the spectrum. DOE

N87-12639# Sandia National Labs., Albuquerque, N. Mex.
ELECTRON SPECTROSCOPY IN FUNDAMENTAL CATALYTIC STUDIES
D. W. Goodman and J. E. Houston 1986 12 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-008781; SAND-86-0779C; CONF-860829-11) Avail: NTIS HC A02/MF A01

A detailed understanding of the chemical nature of surface impurities and overlayers is critical to many technologically important phenomena. Modern surface spectroscopies provide us with the capability to probe many subtleties of surface/adsorbate systems and have proved to be invaluable to the development of our understanding of surface catalyzed reactions and related phenomena. This paper illustrates this point with two specific examples, the production of surface carbon in catalytic methanation over nickel and the modification of electronic properties of copper by an underlying ruthenium substrate. DOE

N87-12640# Sandia National Labs., Albuquerque, N. Mex.
ELECTRON MICROPROBE ANALYSIS: THE UPPER LIMIT OF SUBMICRON SPECTROSCOPY
P. F. Hlava and W. F. Chambers 1986 5 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009540; SAND-86-0921C; CONF-860829-18) Avail: NTIS HC A02/MF A01

In the electron microprobe, a beam of high energy electrons is focussed to a fine point on the surface of a fairly thick specimen and the X rays produced are analyzed to determine the chemistry of the point. The spacial resolution of this instrument for chemical analysis, then, is defined by the volume of material from which the X ray signal originates. This, in turn, is related to factors such as the diameter of the electron beam, the spreading of the electron beam as it penetrates into the sample and interacts with the atoms of the sample to generate X rays, and the extent to which these primary X rays penetrate beyond the region of electron beam interaction and generate secondary X rays by the process of fluorescence. Beam voltage, current, and diameter can all be easily controlled by the analyst. Once the electrons enter the specimen, however, the analyst loses control of their density. Each individual electron follows a unique, erratic path as it passes near, passes through, or collides with parts of the atoms in the specimen. Monte Carlo calculations are a means by which many investigators have tried to model the paths of individual electrons and the interaction volume that large numbers of such electrons define. DOE

N87-12641# United Technologies Research Center, East Hartford, Conn.
OPTICAL DIAGNOSTICS FOR DIESEL ENGINE APPLICATIONS Final Technical Report
G. M. Dobbs and J. J. Sangiovanni Nov. 1985 108 p
(Contract DE-AC04-83AL-23523)
(DE86-010747; DOE/AL-23523/T1) Avail: NTIS HC A06/MF A01

Investigations have been conducted on the applicability and limitations of Coherent anti-Stokes Raman Spectroscopy (CARS) measurement of temperature and species concentration, and

laser light scattering/extinction measurement of soot number density and particle size, to diesel combustion. Experiments were conducted under simulated diesel conditions in high-pressure laminar diffusion flames and in a simulated droplet environment. Consideration was given to the effect of the presence of soot particles, fuel droplets, or fuel-rich vapor on the laser-diagnostic techniques. Problems which arise in making CARS measurements of temperature or species concentration under severely sooting conditions were studied in high-pressure flames. A new absorption interference was noted which was assigned to absorption by the C produced by ablation of soot particles by the incident laser beam. CARS conditional sampling strategies for simultaneously determining temperature and whether fuel or soot was present during a combustion event were conceived and experimentally investigated. The light scattering from fuel droplets as an interference to the measurement of accurate soot size and number density distribution parameters was studied in a droplet apparatus. A critical review of the effects of multiple scattering processes on laser light extinction/scattering in diesel combustion was conducted.
DOE

N87-12642# Johns Hopkins Univ., Baltimore, Md. Dept. of Chemical Engineering.
PHASE EQUILIBRIUM PREDICTIONS FOR POLAR AND HYDROGEN BONDING MIXTURES
M. D. Donohue, P. Vimalchand, and G. D. Ikonomou 1986 9 p
(Contract DE-AC02-81ER-10982)
(DE86-011812; DOE/ER-10982/T1) Avail: NTIS HC A02/MF A01

The Perturbed-Hard-Chain Theory (PHCT) has been generalized to treat pure compounds and mixtures with polar forces (dipoles and quadrupoles) as well as hydrogen bonding. The generalization to polar compounds is based on the perturbation expansion for anisotropic molecules by Gubbins and coworkers. The effects of hydrogen bonding are taken into account using an approach similar to that of Heidemann and Prausnitz. With these two generalizations, accurate mixture VLE and LLE predictions can be made, even for highly non-ideal systems, using pure component parameters alone.
DOE

N87-12643# Lawrence Livermore National Lab., Calif.
AXIAL DETONATOR FOR SIMULTANEOUS IGNITION OF MULTIPLE HE POINTS
D. J. Steinberg and J. P. Wade Jul. 1986 10 p Presented at the 4th International Conference on Megagauss Magnetic-Field Generation and Related Topics, Santa Fe, N. Mex., 14 Jul. 1986
(Contract W-7405-eng-48)
(DE86-011878; UCRL-93826; CONF-860703-1) Avail: NTIS HC A02/MF A01

We have designed and tested an exial detonator, 2.54 cm in diameter and constructed of 2.54-cm-long modules, that simultaneously ignites many points on the axis of a long cylinder of high explosive, which in turn uniformly expands a metal cylinder. Detonators containing up to 47 modules have been successfully tested with an RMS deviation of 0.04 to 0.05 microns. DOE

N87-12644# Sandia National Labs., Albuquerque, N. Mex.
REAL-TIME EXPERIMENTAL MEASUREMENTS OF ISOTOPIC EXCHANGE BETWEEN GASEOUS HYDROGEN AND PALLADIUM HYDRIDE POWDER
G. W. Foltz and C. F. Melius Jun. 1986 38 p
(Contract DE-AC04-76DP-00789)
(DE86-012610; SAND-86-8225) Avail: NTIS HC A03/MF A01

A gas flow apparatus has been constructed and used to study the isotopic exchange reaction occurring between the solid and gas phases in hydrogen (deuterium) gas flows directed through packed-powder beds of beta-phase palladium dueteride (hydride). Spontaneous Raman light scattering is employed to obtain a real-time analysis of the isotopic composition of the gas (H2, D2, HD) exiting from the bed. In addition, gas pressure and flow rate measurements are made on the flow simultaneously with the composition measurements.
DOE

N87-12645# Sandia National Labs., Albuquerque, N. Mex.
DOUBLE-RESONANCE TECHNIQUES FOR HIGH-RESOLUTION RAMAN-SPECTROSCOPY
P. Esherick and A. Owyoung 1986 3 p Presented at the 10th International Conference on Raman Spectroscopy, Eugene, Ore., 31 Aug 1986
(Contract DE-AC04-76DP-00789)
(DE86-009640; SAND-86-0959C; CONF-860853-1) Avail: NTIS HC A02/MF A01

In an effort to improve the sensitivity of coherent Raman spectroscopies we have been investigating double-resonance techniques that can combine the high-resolution of stimulated Raman spectroscopy with the sensitivity of electronically resonant spectroscopies such as multiphoton ionization. One such technique that has been highly successful in our laboratory is ionization detected stimulated Raman spectroscopy (IDSRS). In IDSRS, resonant laser ionization is used to detect vibrationally excited molecules produced via stimulated Raman pumping. In a two-step process molecules are first excited to v = 1 levels via a driven stimulated Raman transition. Following this the rotational/vibrational distribution is probed with resonant laser ionization by a tunable UV source. Raman spectra are then obtained by scanning the frequency of one of the Raman pump sources and monitoring the ionization signal as a function of the frequency difference (Stokes shift) between this laser and the second, fixed-frequency, visible pump laser.
DOE

N87-12646# California Univ., Berkeley. Lawrence Berkeley Lab.
RAMAN SPECTROSCOPIC INVESTIGATION OF MOLECULAR HYDROGEN
K. Veirs Dec. 1985 114 p
(Contracts W-7405-eng-36; DE-AC03-76SF-00098)
(DE86-012836; LBL-20565; LA-UR-86-276) Avail: NTIS HC A06/MF A01

A state of the art gas phase Raman spectrometer was assembled at Los Alamos National Laboratory. Basic research results, both experimental and theoretical, on Raman cross sections and line positions were applied to the problem of accurate temperature determinations of molecular hydrogen at room temperature. Results are reported for Raman line positions, cross sections, and temperature determinations in gas phase hydrogen.
DOE

N87-12647# Sandia National Labs., Albuquerque, N. Mex.
COMPARATIVE THERMAL CONDUCTIVITY MEASUREMENTS AT SANDIA NATIONAL LABORATORIES
J. N. Sweet, E. P. Roth, M. Moss, G. M. Haseman, and J. A. Anaya Jun. 1986 75 p
(Contract DE-AC04-76DP-00789)
(DE86-012926; SAND-86-0840) Avail: NTIS HC A04/MF A01

A detailed examination has been made on the use of the comparative method for measuring the thermal conductivity of solid materials. Existing data analysis methods are discussed and new techniques, based on generalized linear least squares methods, are presented. An error analysis is made to determine the potential accuracy, reproducibility, and repeatability of the technique. For the case in which the reference conductivity is known to a relative accuracy of +-5%, the overall relative accuracy of the measurement is shown to be about +-6%. Experimental data are presented for the conductivities of commonly used reference materials; Pyrex 7740, Pyroceram 9606, Inconel 718, and Armco iron. Data are also given for two potential reference materials: fused silica and 304 stainless steel.
DOE

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N87-12648# Missouri Univ., Rolla. Materials Research Center.
NEUTRON DIFFRACTION STUDIES OF SOME RARE EARTH-

TRANSITION METAL DEUTERIDES Final Report, 15 Nov. 1983 - 1 Dec. 1985
William J. James May 1986 92 p
(Contract DAAG29-83-K-0159)
(AD-A168995; ARO-19783.4-MS) Avail: NTIS HC A05/MF A01 CSCL 11/6

Neutron diffraction experiments were performed on Ho6Mn23. At 77K it is found to have a face-centered cubic crystal structure and a non-collinear magnetic structure, with the Ho moments tilted at an angle of 33.4 to the Mn moments. The Ho atom carries a moment of 3.8 mu sub B, while the Mn moments at the b, d, f sub 1 and f sub 2 sites are 2.1, 2.0, 2.2 and 1.9 mu sub B respectively, comparable to those found in Y6Mn23. The very low moment on the Ho atom is rationalized as resulting from the fanning of the weakly coupled rare earth moments around the net Ho moment direction, giving a low spatially averaged value. Neutron diffraction studies of three Y6(Fe1-xAlx)23 compounds (x=0.05, 0.10, 0.15) at 523K and 77K reveal substantial preferential atomic ordering of Fe and Al atoms on the four transition crystallographic sites. The Fe atoms exhibit different magnetic moments on the four sites. The ternary alloys, Y6(FexMn1-x)23, exhibit interesting magnetic behavior over a range of solid solutions of iron and manganese. The effects of the substitution of Fe by Al in the R2 (Fe1-xAlx)14B compounds (R = Y, rare earths) on their magnetic properties have been investigated. The present experimental data indicate that intermetallic compounds based on Nd2(Fe1-x-yAlxCoy) 14B have both high Curie temperatures and high coercive fields. The magnetocrystalline anisotropy of (Nd1-xSmx)2Fe14B and (Nd1-xPrx)2Fe14B has been studied by X-ray and magnetic measurements. GRA

N87-12649# State Univ. of New York, Albany. Dept. of Physics.
NUCLEAR REACTION ANALYSIS OF HYDROGEN IN METALS Final Report, Jan. 1982 - Sep. 1985
William A. Lanford 23 Mar. 1986 10 p
(Contract DAAG29-82-K-0036)
(AD-A169032; ARO-18265.20-MS) Avail: NTIS HC A02/MF A01 CSCL 07/5

Research accomplishments of a contract to utilize nuclear reaction analysis to study hydrogen in materials are summarized. These include development of new techniques (high sensitivity, non-vacuum, Doppler spectroscopy, superlattice...), the application of these techniques to study stress and electric current effects on hydrogen distribution in metals and the application of these methods to a variety of new materials. The papers prepared under this contract can be grouped under four headings: (1) Development of new techniques for study of hydrogen in materials, (2) Studies of how macroscopic variables (stress and electric currents) effect the distribution of hydrogen in metals, (3) Studies of the effects of hydrogen in various new thin film materials, and (4) Reviews. GRA

N87-12650# Colorado School of Mines, Golden. Center for Welding Research.
THE INFLUENCE OF WELDING FLUX ON THE PYROMETALLURGICAL, PHYSICAL AND MECHANICAL BEHAVIOR OF WELD METAL Final Report, 15 Feb. 1983 - 14 Feb. 1986
David L. Olson 15 May 1986 24 p
(Contract DAAG29-83-K-0046)
(AD-A169067; MT-CWR-086-017; ARO-20174.12-MS) Avail: NTIS HC A02/MF A01 CSCL 11/6

The pyrochemical behavior of submerged arc welding flux was investigated. The nature of the pyrochemical reactions are described. Mechanistic models for the pyrochemical behavior are suggested. The submerged arc welding was performed on both low carbon and high strength low alloy steels. Both thermodynamic and kinetic models are discussed. Ferrous weld metal phase transformations were investigated. The role of weld metal oxygen, weld metal inclusion and strain on the formation of acicular ferrite was characterized, analyzed and modeled. Advanced high purity - homogeneous multi-component welding fluxes were made using the sol gel process for making glass. These sol gel fluxes were used to make flux cored wires. The sol gel filled flux cored wires were used to weld microalloyed HSLA steels and were found to have excellent arc stability and low moisture content. Sol gel fluxes offer the consistency necessary for welding systems which will use in situ sensing and microprocessor control. A capacitance technique has been developed for moisture content measurements of the coating on covered electrodes. Aluminum weld metal cracking has been characterized for both binary and commercial aluminum alloys. A new model for the prediction of the susceptible and extent of hot cracking has been developed. GRA

N87-12651# Southern Univ., Baton Rouge, La. Dept. of Chemistry.
TRANSITION METAL. 2: COMPLEXES OF DITHIACYCLOPHANES Final Report, 20 Sep. 1982 - 19 Sep. 1985
Earl Doomes, Thornton Rhodes, and Derald Chriss 25 Mar. 1986 16 p
(Grant DAAG29-82-G-0013)
(AD-A169107; ARO-19740.1-CH-H) Avail: NTIS HC A02/MF A01 CSCL 07/3

This investigation is related to our recent report on the synthesis and characterization of cobalt (II), copper (II), and nickel (II) complexes of the new macrocyclic ligand, 7-oxa-2,12-dithia(13)(2,6)pyridinopphane (1). The coordination chemistry of a series of structurally related macrocylclic ligands (1-8) was investigated. Macrocycles studied include oxa-, dioxa-, and thia- dithiapyridinophanes (2a, 2b, and 3a, respectively), oxa-, dioxa-, trioxa- and polymethylene-dithiaparacyclophanes (4a and 5, 4b and b) and 2,10-dithia(3.3) (2,6)pyridinophane (9). The pyridinophanes (2a, 2b, 3a and 9) formed stable crystalline complexes when treated with methanol solutions of cobalt (II), copper (II), and nickel (II) salts. However, cobalt (II) and nickel (II) salts did not form crystalline complexes when combined with the paracylcophanes (4, 5, and 6). Electronic spectra, electrolytic conductivities and magnetic susceptibilities data, and elemental analyses were utilized in the characterization of these complexes. Solution and solid state effective magnetic moments were identical for each complex derived from the oxapyridinophane 1, indicating that the same species exists in both phases. Overall, physical data support monomeric structures of general formula M(II)LX2 (where M(II) = the transition metal (II) cation, L= macrocycle, and X = halogen or thiocyanate) for all complexes studied. GRA

N87-12652# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Sciences.
SEMICONDUCTOR/INSULATOR FILMS FOR CORROSION PROTECTION Final Report
F. C. Jain Oct. 1985 52 p
(Contract N62269-83-M-3295)
(AD-A169119; NADC-86028-60) Avail: NTIS HC A04/MF A01 CSCL 20/12

Aluminum surfaces exhibit significantly improved corrosion protection when they are coated with suitable semiconductor/insulator thin films. These coatings, generally realized in Metal-Semiconductor (MS) or Metal-Insulator-Semiconductor (MIS) structural configurations, give rise to an interfacial electric field which acts as an effective built-in electronic barrier. This active barrier significantly impedes the transfer of electrons from the aluminum surface to foreign species which cause oxidation by accepting the electrons. Anodic polarization data on numerous samples fabricated in both MS (e.g., Al-Indium Tin Oxide (ITO)) and MIS (e.g., Al-SiO2-ITO) configurations have demonstrated the protective nature of the built-in active electronic barrier. In particular, we have observed a rest potential of -1.126 volts (1% NaCl, 2pH solution) for Al-SiO2-pITO samples in polarization tests. The electronic barrier heights have been shown to increase with: (1) the presence of a thin (20-100 A) SiO2 layer at the metal-semiconductor interface; and (2) the energy gap of ITO which depends upon the indium content. A comparison of these results with data obtained on plasma-deposited Al-Si3N4 samples is presented. GRA

N87-12653# Army Close Combat Armaments Center, Watervliet, N.Y.
EMBRITTLEMENT OF A HIGH AND A LOW STRENGTH STEEL IN LIQUID LEAD ENVIRONMENT Final Report
M. H. Kamdar Apr. 1986 28 p
(AD-A169443; ARCCB-TR-86014) Avail: NTIS HC A03/MF A01 CSCL 11/6

A study has been made of the cyclic fatigue fracture behavior of single-edge notched specimens of 4340 type high strength (yield stress 160 Ksi) and alloy steel of low strength (yield stress 100 Ksi) with and without a fatigue precrack tested in liquid lead and argon at 700 F. The high strength steel specimens were severely embrittled by liquid lead with stress intensity at fracture some two orders of magnitude lower in liquid lead than in the argon environment. The embrittlement susceptibility was the same for both the notched specimens and for the specimens that had a fatigue precrack at the root of the notch. On the other hand, identical as-notched specimens of low strength steel were immune to lead embrittlement. However, when these specimens were fatigue precracked, they were severely embrittled by liquid lead. This variation is susceptibility to embrittlement is discussed in terms of the prevalent reduction in cohesion mechanism of liquid metal embrittlement. The implications of these results in determining the embrittlement susceptibility or elimination are also discussed. GRA

N87-12654# Terra Tek, Inc., Salt Lake City, Utah.
FRACTURE TOUGHNESS OF CIP-HIP BERYLLIUM AT ELEVATED TEMPERATURES Final Report, 13 May 1980 - 13 Feb. 1981
L. M. Barker and A. H. Jones Apr. 1986 25 p
(Contract DAAG46-80-C-0038)
(AD-A169769; TR-81-50; MTL-TR-86-10) Avail: NTIS HC A02/MF A01 CSCL 11/6

The fracture toughness of CIP-HIP (Cold Isostatic Pressed-Hot Isostatic Pressed) Beryllium was determined using the short bar fracture toughness (K sub IcSB) method. The K sub IcSB value measured was 10.96 MPa x the square root of m at room temperature. This falls well within the expected range of 9 to 12 MPa x the square root of m as observed from previous fracture toughness measurements of beryllium. Toughness increased rapidly between 400 F and 500 F reaching a value of 16.7 MPa x the square root of m at 500 F. GRA

N87-12655# Battelle Memorial Inst., Columbus, Ohio.
MICROMECHANISMS AND TOUGHNESS FOR CLEAVAGE FRACTURE OF STEEL
A. R. Rosenfield and B. S. Majumdar Jun. 1986 14 p
(Contract DAAG29-85-K-0035)
(AD-A169906; ARO-21673.2-MS) Avail: NTIS HC A02/MF A01 CSCL 11/6

A complete understanding of the fracture mechanisms of steel in the ductile/brittle transition region requires analysis not only of crack initiation, but also of crack propagation. This paper reviews micrographic and fractographic experiments that give insight into both phenomena, and suggests a frame-work through which both may be related. Unstable cleavage crack initiation can occur after some blunting of the original fatigue precrack or after some stable crack growth. In either event, instability appears to be triggered by the fracture of a brittle micro-constituent ahead of the precrack. The large scatter in reported KIc values within the transition region reflects the size distribution and relative scarcity of these trigger particles. While a large number of models have attempted to correlate toughness in the ductile/brittle transition regime to events occurring ahead of the crack tip, surprisingly little attention has been paid to events occurring behind the crack front. Fractographic evidence as well as metallographic sectioning of arrested cracks show that the mechanism of rapid crack propagation by cleavage is affected strongly by partial crack-plane deflection which leaves unbroken ligaments in its wake. The tearing of these ligaments by dimple-rupture is the dominant energy-absorbing mechanism. Etch-pit experiments using an Fe-Si alloy show that the crack-tip stress intensity based on plastic zone size is extremely low. GRA

N87-12656# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
FATIGUE BEHAVIOR OF LONG AND SHORT CRACKS IN WROUGHT AND POWDER ALUMINUM ALLOYS Annual Report, 15 Apr. 1985 - 1 May 1986
Robert O. Ritchie and Weikang Yu 1 May 1986 127 p
(Grant AF-AFOSR-0181-82)
(AD-A169980; UCB/RP/86/A1040; AFOSR-86-0447TR) Avail: NTIS HC A07/MF A01 CSCL 11/6

The fatigue behavior of short cracks, which are small compared to the scale of the microstructure, small compared to the scale of local plasticity or simply physically small (i.e., < or = 1 mm), must be considered as one of the major factors limiting the application of defect-tolerant fatigue design for airframe and engine components. Accordingly, the current program is aimed at identifying factors which govern the growth of such short cracks (in contrast to long cracks) in a series of commercial aluminum alloys, with specific reference to behavior at near-threshold levels (below approx. .000001)mm/cycle. In this annual report, the status of the program is described in terms of (1) a description of results on the role of compression overloads in influencing fatigue crack growth in a new aluminum-lithium alloy (2090) and a comparison of behavior with results in 2124 and 7150, (2) an evaluation of the role of crack tip shielding in controlling the growth of short (50 to 400 micrometers) through-thickness cracks and small (10 to 400 micrometers) surface cracks in 2124, and (3) a general assessment of the small crack problem. It is concluded that the near-threshold behavior of long cracks and the near- and sub-threshold behavior of small cracks is strongly influenced by considerations of crack tip shielding, specifically from crack deflection and crack closure mechanisms. GRA

N87-12657# Drexel Univ., Philadelphia, Pa. Dept. of Materials Engineering.
A FUNDAMENTAL STUDY OF P/M PROCESSED ELEVATED TEMPERATURE ALUMINUM ALLOYS Annual Technical Report, 1 Oct. 1984 - 30 Sep. 1985
A. Lawley and M. J. Koczak Oct. 1985 28 p
(Grant AF-AFOSR-0010-82)
(AD-A170697; AFOSR-86-0567TR) Avail: NTIS HC A03/MF A01 CSCL 11/6

The ambient and elevated temperature strength and microstructural stability of powder processed Al-Fe-Ni alloys are being evaluated with respect to processing mode, microstructure, and microstructural stability. The overall objective is to establish a basic understanding of processing-microstructure relations in this new class of alloys in order to establish design guidelines for limiting stresses and temperatures. In the current program year, rapidly solidified prealloyed powder containing 0.19 volume fraction of FeNiAl9 dispersoid (similar to 0.18 micrometer) was mechanically alloyed (MA) and subsequently hot extruded to full density. The MA alloy is stronger than the non MA alloy at temperatures up to about 300 C. In addition, MA enhances microstructural stability at elevated temperature; for example there is no significant coarsening of the FeNiAl9 after 624 hours at 450 C. Improvements in alloy strength and stability are attributed to the presence of fine scale (similar to 30 nm) oxides and carbides introduced during MA, and which are distributed uniformly throughout the matrix, at matrix intermetallic interfaces, and on sungrain boundaries. This fine-scale dispersoid provides effective resistance to dislocation bowing (Orowan mechanism) below 300 C. At higher temperatures, dislocation climb is the controlling mechanism and the small oxides/carbides are no longer effective barriers to climb. GRA

N87-12658# Illinois Univ., Urbana. Dept. of Materials Science.
EFFECT OF HYDROGEN ON THE MECHANICAL PROPERTIES AND FRACTURE BEHAVIOR OF HIGH PURITY ALUMINUM
Felix Zeides and Howard K. Birnbaum Jul. 1986 131 p
(Contract NOOO14-83-K-0468)
(AD-A171214) Avail: NTIS HC A07/MF A01 CSCL 11/6

In this study of hydrogen effects on 99.999% pure aluminum, hydrogen was introduced by a corrosion process. Two corrosive media were used; deionized pure water was used for dynamic

hydrogen charging during mechanical tests and an alkaline solution for hydrogen precharging. Hydrogen was found to change the response of the material to plastic deformation causing softening and plastic deformation localization on the macroscale and slip line coarsening as well as an increase in their waviness on the microscale. Hydrogen did not cause an earlier onset of the macroscopic plastic instability, i.e., necking. Hydrogen modified the fracture mode from a totally ductile, chisel point type to a more brittle transgranular or intergranular fracture. Fracture started only after onset of necking. The hydrogen induced fracture modification is believed to result from the plastic deformation modification and from the effect of hydrogen on microvoid nucleation. Some fracture surfaces were covered with a film that was occasionally fragmented by a network of cracks which is believed to be a post fracture effect caused by adhesive wear between opposite fracture surfaces. Hydrogen charging resulted in formation of bulk vacancy clusters, linear dimensions shrinkage and grain growth which were interpreted as evidence for vacancy production during the corrosion reaction and for a significant hydrogen-vacancy binding enthalpy. GRA

N87-12659# Los Alamos National Lab., N. Mex.
EFFECT OF STRAIN AND STRAIN RATE ON RESIDUAL MICROSTRUCTURES IN COPPER
M. F. Stevens and P. S. Follansbee 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract W-7405-eng-36)
(DE86-007361; LA-UR-86-797; CONF-860829-2) Avail: NTIS HC A02/MF A01

Several specimens of OFE Cu were deformed in compression to study the resulting microstructures at equivalent levels of threshold stress and strain. Equiaxed, diffuse dislocation cells are more persistent in Cu when tested at strain rates exceeding 10 sec. At quasi-static strain rates, dislocation collapse into more distinct, narrow microbands occurs at lower strain levels. DOE

N87-12660# Los Alamos National Lab., N. Mex.
EFFECT OF RESIDUAL STRAIN ON TWINNING IN SHOCK-LOADED COPPER
G. T. Gray, III 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract W-7405-eng-36)
(DE86-007362; LA-UR-86-796; CONF-860829-1) Avail: NTIS HC A02/MF A01

Under shock-loading, twinning is observed in metals that do not twin under conventional loading conditions, for example, copper and nickel where the stacking fault energy is about 78 and 129 ergs/cm^2, respectively. Contradictions in the published data on the twinning stress in copper (from 1.6 GPa in thin films to 14.5 to 20 GPa in bulk specimens) suggest differences associated with experimental techniques. This study examines the role of residual plastic strain (epsilon sub res) on the deformation substructures, particularly twinning, in shock-loaded copper. DOE

N87-12661# Los Alamos National Lab., N. Mex.
INITIATION OF PITTING CORROSION IN MARTENSITIC STAINLESS STEELS
W. R. Cieslak, R. E. Semarge, and F. S. Bovard 1986 11 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-007627; SAND-86-0251C; CONF-860829-3) Avail: NTIS HC A02/MF A01

The form of localized corrosion known as pitting often initiates preferentially at microstructural inhomogeneities. The pit initiation resistance, therefore, is controlled by the characteristics of the initiation sites, rather than by the bulk material composition. This investigation correlates the pit initiation resistance, as measured by critical pitting potentials, with preferred pit initiation sites for 3 martensitic stainless steels. Pit initiation sites are determined by secondary electron (SE) and backscattered electron (BSE) imaging and energy dispersive and wavelength dispersive spectrometries (EDS and WDS) with a scanning electron microscope (SEM) and an electron probe microanalyzer (EPMA). DOE

N87-12662# Oak Ridge National Lab., Tenn.
APFIM STUDY OF ANTIPHASE AND GRAIN BOUNDARIES IN NI AI
J. A. Horton and M. K. Miller 1986 5 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008494; CONF-860829-4) Avail: NTIS HC A02/MF A01

Ni Al is an ordered intermetallic material and is potentially useful for high temperature applications. Unlike most alloys the yield stress of Ni Al actually increases with an increase in temperature. Unfortunately, pure Ni Al exhibits a brittle intergranular fracture and, consequently, low ductility. However, doping Ni Al with boron improves the mechanical properties and can result in room temperature ductilities up to 50% and a completely transgranular failure. Auger electron spectroscopy (AES) has shown that boron segregates to those boundaries which can be made to fail intergranularly and that no embrittling agents are found on fracture surfaces of pure NiAl. Atom probe field-ion microscopy (APFIM) is an excellent technique to study the structure and chemistry of good boundaries, especially for light elements such as boron. Results from this study have shown that boron segregates to both grain boundries and antiphase boundaries (APB) and that a thin phase is usually present at the grain boundaries in rapidly solidified Ni Al. DOE

N87-12663# Oak Ridge National Lab., Tenn.
APFIM STUDIES OF PHASE TRANSFORMATIONS
M. K. Miller 1986 15 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008533; CONF-860829-8) Avail: NTIS HC A02/MF A01

The atom probe field-ion microscope (APFIM) has proven to be a very effective instrument for studying phase transformations in many metallic systems. The atom probe field-ion microscope provides a technique for direct observation and quantification of important microstructural and chemical features of the transformation such as the three-dimensional morphology of the evolving phases, the wavelength and spatial extent of the solute-rich regions, the sharpness of the interface between the phases, and the changes in composition of the coexisting phases. The atomic spatial resolution of the instrument permits the earliest stages of phase transformations to be investigated experimentally. The unrestricted mass range permits the location and quantification of all elements, including the light elements such as carbon and boron, to be determined. In this paper a summary of some of the types of information relating to phase transformations that may be obtained with the atom probe is outlined. DOE

N87-12664# Kernforschungsanlage, Juelich (West Germany).
RADIATION-INDUCED SEGREGATION TO GRAIN BOUNDARIES IN A NI-SI ALLOY
W. Kesternich, N. H. Packan (Oak Ridge National Lab., Tenn.), and H. Schroeder 1986 3 p Presented at the 11th International Congress on Electron Microscopy, Kyoto, Japan, 31 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-010027; CONF-860854-3) Avail: NTIS HC A02/MF A01

Solute transport by radiation-induced segregation (RIS) leads to local changes of alloy composition. RIS was studied in a binary Ni-8 at. % Si alloy by 7-MeV-proton and 28-MeV-alpha particle irradiations. Damage levels varied between 0.1 and 0.3 dpa. The irradiations were carried out at 475 C, the expected peak RIS temperature; preimplantation of helium at 700 C was carried out in some specimens. Solute segregation was studied by energy-dispersive X-ray analysis (EDX). Using very fine electron-beam

probes of 2 nm diameter from a high-brightness field-emission source, microchemical profiles across the grain boundaries were measured. Radiation-induced precipitation of Ni3Si was investigated by dark-field transmission electron microscopy (TEM). DOE

N87-12665# Lawrence Livermore National Lab., Calif.
DESIGN OF STRONG, DUCTILE, HSLA AND DUAL PHASE STEELS
G. Thomas Jan. 1986 31 p Presented at the 1st Indo/US Workshop on Iron and Technology, Ranchi, India, 6 Jan. 1986
(Contract DE-AC03-76SF-00098)
(DE86-011313; LBL-21303; CONF-860174-1) Avail: NTIS HC A03/MF A01

The alloy design programs at Berkeley which utilize the concept of two-phase steels as a means of optimizing these mutually exclusive properties are described. The idea is to design composite microstructures whereby the advantages of the second phase are optimized while the less desirable features of this phase are mitigated simultaneously by the presence of the other constituent phase. The size, distribution, shape and volume fraction of the second phase critically control the mechanical properties, especially fracture and fatigue of the dual phase systems. As a consequence, these structures offer a degree of metallurgical flexibility that is absent in single phase structures or in many precipitation strengthened systems, for attaining optimum sets of mechanical properties. Examples are presented here of martensite/austenite (approx. 2 to 5%) mixtures designed for optimum combinations of high strength, toughness, and wear properties in medium carbon steels, e.g., for mining and agricultural applications, and martensite/ferrite (approx. 80%) structure for high strength, cold formability and improved low temperature ductility in low carbon steels. Use of the latter for sheet, line pipe rods and wires is considered. DOE

N87-12666# Oak Ridge National Lab., Tenn.
BAINITE IN CHROMIUM-MOLYBDENUM STEELS
R. L. Klueh 1986 6 p Presented at the International Conference on Martensitic Transformations (ICOMAT-86), Nara, Japan, 26 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-011781; CONF-860879-1) Avail: NTIS HC A02/MF A01

Classically, bainite is divided into an upper and lower variety, as distinguished by microstructural differences that are related to the isothermal-transformation temperature at which the bainite is formed. Two other microstructural variations have been proposed: granular (massive) and carbide-free acicular bainite. These varieties form more readily during a continuous cool. The effect of the bainite microstructure on mechanical properties was investigated. Carbide-free acicular and granular bainite were produced by varying the cooling rate from the austenitization temperature in a 3Cr-1.5Mo steel. A cooling rate of about 100 C/min produced acicular bainite and 7 C/min produced granular bainite. After tempering to a similar ultimate tensile strength (UTS), there were marked differences in the impact behavior of the acicular and granular bainite. The tempered acicular structure developed superior Charpy V-notch impact properties: an upper shelf energy of 225 J and a ductile-brittle transition temperature of -70 C for UTS of 770 MPa. Similar impact properties for the granular bainite were obtained only after the steel was tempered to a UTS of 590 MPa. Electron microscopy studies indicated that there were differences in the precipitate and dislocation distributions in the two bainite structures, which must cause the difference in properties. DOE

N87-12667# Oak Ridge National Lab., Tenn.
USE OF ANALYTICAL ELECTRON MICROSCOPY IN EVALUATING FERRITE STABILITY IN AUSTENITIC STAINLESS STEEL WELDS
J. M. Vitek and S. A. David 1986 13 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008537; CONF-860829-6) Avail: NTIS HC A02/MF A01

Stainless steel weld filler metals are prone to hot-cracking during welding. If the primary mode of solidification is ferrite formation rather than austenite formation, the tendency for hot-cracking is reduced. Type 308 stainless steel is such a filler metal which solidifies as primary ferrite and is relatively immune to hot-cracking problems. During further cooling, the primary ferrite transforms to austenite. When such duplex austenite plus ferrite weld microstructures are subjected to elevated temperature applications, the residual ferrite is unstable and transforms. Analytical electron microscopy has been used to study the ferrite stability. Results have provided insight into the stability of ferrite during welding and also during service at elevated temperatures. This paper considers three cases in which the use of analytical electron microscopy has led to understanding of ferrite stability in duplex type 308 stainless steel welds. DOE

N87-12668# Sandia National Labs., Albuquerque, N. Mex.
MICROSTRUCTURAL STUDY OF HIGH ENERGY DENSITY DISSIMILAR METAL WELDS
M. J. Ciesiak, C. R. Hills, and T. J. Headley 1986 15 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009284; SAND-86-0812C; CONF-860829-17) Avail: NTIS HC A02/MF A01

Electron microscopy analysis of two different CO2 laser welded dissimilar metal combinations revealed the presence of minor constituents which could be attributed to terminal solidification events. In the case of the 15-5 PH/HP 9-4-20 welds, a NbC/austenite eutectic-type constituent was identified, which accounted for the observed fusion-zone hot cracks in these welds. The identity of the interdendritic constituent first observed optically by Patterson and Milewski in 304L/625 GTA welds has been confirmed as Laves phase. It was further determined that this phase is enriched in Mo and Nb relative to the austenite matrix. DOE

N87-12669# Oak Ridge National Lab., Tenn.
SITE OCCUPATIONS IN Li SUB 2 ORDERED ALLOYS BY AXIAL ELECTRON CHANNELING MICROANALYSIS
J. Bentley 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009421; CONF-860829-22; CONF-860854-1) Avail: NTIS HC A02/MF A01

Experiments using analytical electron microscopes were performed on Ni3Al alloys with additions of Fe, Co, or Hf. Corrections had to be made for delocalization effects. Results agree with atom probe field-ion microscopy. DOE

N87-12670# California Univ., Berkeley. Lawrence Berkeley Lab.
ATOMIC RESOLUTION STUDY OF PRECIPITATES IN AN Al-Ge ALLOY
U. Dahmen, C. Nelson, and K. H. Westmacott Mar. 1986 5 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC03-76SF-00098)
(DE86-011308; LBL-21287; CONF-860829-27) Avail: NTIS HC A02/MF A01

The difficulty of precipitating germanium in dilute aluminum-germanium alloys is due to a large difference in crystal structures (face-centered cubic and diamond cubic) accompanied by a substantial volume expansion of 36%. A great variety of precipitate morphologies and orientation relationships are observed. A frequently found morphology is that of <100> needles. By selected area diffraction and Moire fringes it has been established that <100> Al and <110> Ge are parallel along the needle axis. The typical aspect ratio of about 100 has made it difficult in the past to investigate the cross-sectional shape and internal structure of these needles, although some indications of internal twinning were found in plates. In the present work, the Berkeley Atomic Resolution Microscope was used to examine needles in

cross section by imaging along the <110> Ge <100> Al needle axis. DOE

N87-12671# Pacific Northwest Labs., Richland, Wash.
APPLICATION OF HYDROGEN EMBRITTLEMENT MODELS TO THE CRACK GROWTH BEHAVIOR OF FUSION REACTOR MATERIALS
R. H. Jones Mar. 1986 27 p Presented at the 2nd International Conference on Fusion Reactor Materials (ICFRM-2), Chicago, Ill., 13 Apr. 1986
(Contract DE-AC06-76RL-01830)
(DE86-011614; PNL-SA-13478; CONF-860421-51) Avail: NTIS HC A03/MF A01

Hydrogen induced crack growth rates of HT-9 have been estimated for three sources of hydrogen: the plasma, nuclear reaction and aqueous corrosion. Estimates of crack growth rates were derived using hydrogen embrittlement models which describe the temperature and hydrogen activity dependence of cracking. A crack growth rate of 10 to the -3 cm/s at a reactor operating temperature of 400 C was obtained for a steady-state hydrogen concentration of 0.5 appM resulting from (n,p) reactions, while a much slower crack growth rate was predicted for the same steady-state hydrogen concentration with an alternate model. These calculations have shown the need for further research to assess the effect of temperature on crack growth. Other sources of hydrogen give very slow hydrogen induced crack growth rates at reactor operating temperatures, while significant hydrogen induced crack growth rates are possible at lower temperatures. For instance, hydrogen from a cathodic corrosion reaction could produce a crack growth rate of 10 to the -7 cm/s at 25 C which could be significant during extended downtime. Also, a non-equilibrium hydrogen uptake from the plasma could occur from surface reaction controlled effects, and a crack growth rate of 10 to the -1 cm/s was estimated for this condition at a temperature of 75 C. DOE

N87-12672# Sandia National Labs., Albuquerque, N. Mex.
CHARACTERIZATION OF THE ATOMIC EMISSION IN INCONEL 718 ALLOY METAL VAPOR ARCS
R. L. Williamson, H. C. Peebles, L. A. Bertram, W. A. Hareland, and F. J. Zanner 1986 21 p Presented at the Vacuum Metallurgy Conference on Specialty Melting and Processing, Pittsburgh, Pa., 9 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012178; SAND-86-1356C; CONF-8606148-1) Avail: NTIS HC A02/MF A01

Visible and UV emission spectroscopy was used to identify and study various atomic species in the plasma of a vacuum arc furnace during a remelt of Inconel 718. The studies were carried out at a base pressure of 10 mtorr, and with the furnace backfilled with CO to a total pressure of 100 mtorr. Various emitting species were identified, and the internal energy distributions of a number of these species were mapped out using Boltzmann plots. Internal temperatures of 6000 to 7000 K were measured for the neutral atomic species in the low pressure arc, while a value of 11,600 K was obtained for the ion temperature. In addition, the density of the highly volatile element Mn in the interelectrode region was found to be greatly enhanced compared to its relative abundance in the bulk alloy, indicating the importance of vaporization in determining the atomic composition of the arc plasma. Increasing the furnace pressure resulted in an increase in the temperature of the neutral species of 1500 to 4000 K, and an apparent suppression of the Mn vaporization rate. DOE

N87-12673# Los Alamos National Lab., N. Mex.
MECHANICS OF METAL FORMING
P. R. Dawson, G. M. Eggert, and K. K. Mathur 1986 32 p Presented at the 10th US National Congress of Applied Mechanics Conference, Austin, Tex., 16 Jun. 1986 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract W-7405-eng-36)
(DE86-012414; LA-UR-86-2065; CONF-8606132-1) Avail: NTIS HC A03/MF A01

A metal forming model is outlined for analyzing large strain bulk operations such as forging, rolling, and drawing. Plastic deformations are assumed to be viscoplastic in that the strain rate dependent flow stress depends on the strain hardening through an internal variable that evolves with the deformations. Volumetric deformations are linked to the growth of voids (porosity) using a damage model in which the porosity serves as an internal variable. Several applications are presented that demonstrate by comparison to experimental data that the model can simulate effectively the response of a workpiece under realistic forming conditions. DOE

N87-12674# Oak Ridge Y-12 Plant, Tenn.
DIAMOND-MACHINED ALUMINUM ALLOY 5083 SURFACES: CONTROLLED EXPOSURE EVALUATION
J. W. Koger, comp. Jun. 1986 10 p
(Contract DE-AC05-84OS-21400)
(DE86-012572; Y/DV-525) Avail: NTIS HC A02/MF A01

Electron spectroscopy for chemical analysis (ESCA) and scanning electron microscopy (SEM) were used to evaluate the effects of relative humidity of 0% to 85% RH and for time exposures of 1 to 100 d at room temperature on diamond-machined aluminum alloy 5083. The ESCA results showed that, in most cases, a limiting oxide thickness of approx. 12 A forms on the surface. Results showed that alloy to be slightly dependent on RH but independent of exposure time. The SEM examination revealed no observable difference in surface morphology when subjected to the controlled exposure parameters. DOE

N87-12675# Oak Ridge Y-12 Plant, Tenn.
CLEANING OF ALUMINUM ALLOY 5083
J. W. Koger, comp. Jun. 1986 6 p
(Contract DE-AC05-84OS-21400)
(DE86-012573; Y/DV-524) Avail: NTIS HC A02/MF A01

The purpose of this investigation was to evaluate several different cleaning procedures on welds with very low heat inputs. The study evaluated the Oak Ridge Y-12 Plant's chemical cleaning, another type of chemical cleaning, ion cleaning, and diamond-machined cleaning. The results showed that the diamond-machining process provides better weld joint surfaces and sound welds with minimum oxide inclusion and porosity. DOE

N87-12676# Pacific Northwest Labs., Richland, Wash.
CRACK-TIP CHEMISTRY AND FRACTURE MECHANICS-BASED MODEL OF THE CRACK GROWTH RATE/STRESS INTENSITY RELATIONSHIP FOR Ni + P
R. H. Jones, M. J. Danielson, and C. A. Oster Feb. 1986 15 p Presented at the ASM Metals Congress/TMS-AIME Fall Meeting, Toronto, Ontario, Canada, 13 Oct. 1985
(Contract DE-AC06-76RL-01830)
(DE86-011106; PNL-SA-13447; CONF-8510160-18) Avail: NTIS HC A02/MF A01

A crack-tip chemistry model capable of describing the K/sub ISCC/ and stages I and II crack growth rate kinetics of Ni + P has been developed. This model incorporates the electrochemistry in the crack, IR drop effects, corrosion rate effects along the crack wall, material yield strength and plastic flow properties, and crack geometry parameters. The model predicts that cracking proceeds with a well defined threshold followed by a stage I with a rapid increase in crack growth rate and a stage II in which the crack growth rate is independent of the stress intensity; however, the threshold is underpredicted. A discussion of crack-tip shielding and critical strain effects on these calculations is presented. A critical fracture strain concept can account for the difference in the calculated and measured K/sub ISCC/. Crack growth rates in the stage II regime are underpredicted by a factor of 5. Mechanical fracture occurring simultaneously with anodic dissolution could account for this difference, but direct evidence for such a process is not available. DOE

N87-12677# Pittsburgh Univ., Pa. Dept. of Metallurgical and Materials Engineering.
MICROCHEMICAL ANALYSIS OF POLYCRYSTALLINE NI3AI AND OTHER ORDERED ALLOYS USING THE FIELD-ION MI-

CROSCOPE ATOM PROBE Progress Report
S. S. Brenner 10 Jan. 1986 11 p
(Contract DE-FG02-85ER-45213)
(DE86-013157; DOE/ER-45213/2) Avail: NTIS HC A02/MF A01

The goal of the study is to elucidate the mechanism by which boron and other solutes affect the ductility and strength of polycrystalline Ni3Al and other ordered intermetallics. The study is part of a BES-sponsored interlaboratory effort to bring various analytical and theoretical methods to bear on this question. The first discussion meeting of the members of this group was held at the Oak Ridge National Laboratory on September 20, 1985. Our initial field-ion microscopy and atom probe microanalysis results on Ni3Al were represented at that meeting. This paper summarizes the results of our study obtained during the first six months of the contract period. DOE

N87-12678# International Centre for Theoretical Physics, Trieste (Italy).
FINITE MEAN-FREE-PATHS AND THE ELECTRICAL RESISTIVITY OF LIQUID SIMPLE METALS AND BINARY ALLOYS
T. M. A. Khajil, F. Daver, and M. Tomak Aug. 1985 10 p Prepared in cooperation with Middle East Technical Univ., Ankara, Turkey
(DE86-702662; IC-85/165) Avail: NTIS (US Sales Only) HC A02/MF A01

The finite mean-free-path correction to the Ziman formalism of resistivity for liquid metals is studied. The resistivities of a series of simple liquid metals and some binary alloys are calculated using the Ferraz-March approach. DOE

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

For composite materials see *24 Composite Materials*.

N87-12679*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECTS OF GRAPHITIZATION ON THE ENVIRONMENTAL STABILITY OF BROMINATED PITCH-BASED FIBERS
James R. Gaier and Melissa E. Slabe (Cleveland State Univ., Ohio) 1986 13 p Presented at the Fall Meeting of the Materials Research Society, Boston, Mass., 1-5 Dec. 1986
(NASA-TM-88899; E-3323; NAS 1.15:88899) Avail: NTIS HC A02/MF A01 CSCL 11C

The residual bromine graphite intercalation compounds of high modulus pitch-based fibers (Amoco P-55, P-75, P-100, and P-120) were formed and their resistances were monitored under a variety of environmental conditions. A threshold graphitization was observed below which the bromination reaction does not occur to an appreciable extent. The graphitization of the P-55 fibers falls below that threshold, precluding an extensive reaction. The P-75, P-100, and P-120 fibers all form bromination compounds which are stable at ambient conditions, under vacuum, and under high humidity (100 percent humidity at 60 C). The thermal stability of the resistivity increased with decreasing graphitization, with the stable temperature for P-120 being 100 C; for P-100, 200 C; and for P-75, 250 C. When cost is a consideration, bromination of pitch-based fibers is an economical way to achieve low resistivities. Author

N87-12680*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF THE EFFECTS OF COBALT IONS ON EPOXY PROPERTIES
Jag J. Singh and Diane M. Stoakley Dec. 1986 16 p
(NASA-TP-2639; L-16196; NAS 1.60:2639) Avail: NTIS HC A02/MF A01 CSCL 11G

The effects of Co(acac)sub x complexes on MY-720 epoxy properties have been investigated. It appears that Co2(+) ions form antibonding or nonbonding orbitals which increase the free volume and also reduce the cohesiveness of the host epoxy. The effects of Co2(+) ions, on the other hand, seem to result in increased Cohesiveness of the epoxy. The experimental values of magnetic moments of both types of ions in MY-720 suggest that the orbital momentum contributions of the (3d) electrons are partially conserved, though the effect is more pronounced for Co2(+) ions. The coordination environment of the cobalt ions in the host epoxy does not appear to be uniquely defined. These results indicate that the effects of metal ions on resin properties cannot be easily predicted on the basis of ligand field theory argument alone. Complex interactions between metal ions and host epoxy molecular structure suggest the desirability of parallel experimental investigations of electronic, magnetic, and mechanical properties of metal ion-containing epoxy samples for comparison with theory. Author

N87-12681*# Lehigh Univ., Bethlehem, Pa. Emulsion Polymers Inst.
ELECTROKINETIC PROPERTIES OF POLYMER COLLOIDS Final Report
F. J. Micale and D. Y. Fuenmayor Mar. 1986 14 p
(Contract NAS8-35989)
(NASA-CR-178938; NAS 1.26:178938) Avail: NTIS HC A02/MF A01 CSCL 11B

The surface of polymer colloids, especially polystyrene latexes, were modified for the purpose of controlling the electrokinetic properties of the resulting colloids. Achievement required a knowledge of electrical double layer charging mechanism, as a function of the electrolyte conditions, at the polymer/water interface. The experimental approach is to control the recipe formulation in the emulsion polymerization process so as to systematically vary the strong acid group concentration on the surface of the polymer particles. The electrophoretic mobility of these model particles will then be measured as a function of surface group concentration and as a function of electrolyte concentration and type. An effort was also made to evaluate the electrophoretic mobility of polystyrene latexes made in space and to compare the results with latexes made on the ground. Author

N87-12682# Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
FRAGMENTATION DYNAMICS OF ENERGETIC MATERIALS Final Report, 10 Jan. 1983 - 9 Jan. 1986
Edward R. Grant 13 May 1986 35 p
(Contract DAAG29-83-C-0020)
(AD-A168925) Avail: NTIS HC A03/MF A01 CSCL 07/5

A molecular beam unimolecular fragmentation mass spectrometer has been developed and applied to the study of primary dissociation processes in energetic materials. The experimental approach uses infrared multiphoton excitation to prepare isolated molecules in the beam for dissociation. Visible laser induced multiphoton ionization detects products with time-of-flight scattering angle and internal quantum state resolution. This report describes the method, spectroscopic results on CH2, CH3CHO, sym-C3N3H3 and NO2, together with experimental observations on the primary decomposition dynamics of NO2, and RCHCH2O with R = CH3, C2H5, and C6H13. GRA

N87-12683# Naval Academy, Annapolis, Md. Dept. of Physics.
IONIC CONDUCTIVITY IN SOLID, CROSSLINKED DIMETHYLSILOXANE-ETHYLENE OXIDE COPOLYMER NETWORKS CONTAINING SODIUM Interim Report
John J. Fontanella and Mary C. Wintersgill Jun. 1986 30 p
(Contract N00014-86-F-0001)
(AD-A169038; TR-21) Avail: NTIS HC A03/MF A01 CSCL 07/4

The preparation of an ion-conducting elastomeric solid based on a dimethylsiloxane-ethylene oxide copolymer complexed with a sodium salt is described. 23Na Nuclear Magnetic Resonance measurements reveal the presence of both bound and mobile sodium species throughout the temperature range -120 to 100 C. Electrical conductivity measurement over a similar temperature range are found to be consistent with the configurational entropy model for transport, with a T sub o parameter about 50 C below the central glass transition temperature T sub g. GRA

N87-12684# Boston Univ., Mass. Center for Polymer Studies.
PERCOLATION AND LOW DENSITY MATERIALS: THEORY AND APPLICATIONS Final Technical Report, 1 Oct. 1981 - 30 Sep. 1985
W. Klein, S. Redner, and H. E. Stanley May 1986 29 p
(Contract DAAG29-82-K-0003)
(AD-A169204; ARO-18263.30-PH) Avail: NTIS HC A03/MF A01 CSCL 20/11

A principal component of the contract has been the development of the renormalization group, with specific emphasis on applications to percolation and random materials. The main accomplishment is summarized in a series of several papers. One of these was identified by the Science Citation Index as being among the 100 most-cited physics papers during 1980 to 1981. This paper dealt with the problem of how the Wilson renormalization group could be applied to random systems in a fashion that yielded specific numbers that could be compared with real systems. The approach developed rests on the essential idea of percolation, that elements must connect across a macroscopic distance. This approach was extended to continuum percolation shortly thereafter, confirming that results first obtained for lattice systems also hold when there is no lattice. Other random systems, like linear and branched polymers, were found to be made tractable by the suitable modifications of our original approach. GRA

N87-12685# State Univ. of New York, Stony Brook. Dept. of Chemistry.
CHARACTERIZATION AND DYNAMICAL STUDIES OF POLYMERS IN DIPOLAR (APROTIC) LIQUIDS Final Report, 5 Jul. 1982 - 4 Jan. 1986
Ben Chu 14 Apr. 1986 7 p
(Contract DAAG29-82-K-0143)
(AD-A169243; Rept-6340A; ARO-19251.5-CH) Avail: NTIS HC A02/MF A01 CSCL 20/4

The aerodynamic breakup of liquids is an essential mechanism in many processes, e.g., fuel atomization in liquid rocket engine, turbojet afterburners and ramjets, paint spraying, aerial dissemination of insecticides, and explosive dissemination of fuels. Only limited studies have been conducted on the aerodynamic breakup of viscoelastic fluids where molecular parameters must necessarily play an important role in the control of both the magnitude of the mean mass diameter of the droplets and the droplet size distribution. The viscoelastic properties of bulk liquid can be altered by using polymer additives whose molecular weight, concentration an dcomposition control the conversion of bulk liquid into specific droplet sizes for a fixed stress and geometry. In this report, we want to summarize the experimental preparations we have made to characterize both static and dynamic properties of polymer additives in dipolar (aprotic) liquids. We have developed a generalized technique to determine the molecular weight, the molecular weight distribution, the polymer composition, the interaction parameters expressed in terms of the second virial coefficients, including both thermodynamic and hydrodynamic interactions for copolymers by means of laser light scattering. As a specific example, we characterized acryloid k-125, a quasiterpolymer used in aerodynamic breakup tests. GRA

N87-12686# Illinois Inst. of Tech., Chicago.
THE CONTROL OF POLYMER MECHANICAL BEHAVIOR BY SURFACE MODIFICATION Final Report, 1 May 1979 - 4 Jul. 1985
Lawrence J. Broutman 15 May 1986 10 p
(Contract DAAG29-79-C-0094)
(AD-A169252; ARO-16425.3-MS; ARO-19026.1-MS) Avail: NTIS HC A02/MF A01 CSCL 11/9

The effect of a brittle surface layer on the mechanical behavior of polymers has been studied. The brittle surface layer has been simulated by laminating a thin film to a polymer or by ultra violet irradiation of the surface. Fracture mechanics theories have been utilized to account for the phenomenon of surface embrittlement. A criterion has been established suggesting that embrittlement will only occur when the dynamic stress intensity factor in the brittle layer reaches a value greater than the arrest toughness of the ductile substrate. It has also been shown that the embrittlement phenomenon can be described in terms of a critical crack velocity or critical thickness. It is shown that brittle films less than .005 inches thick can cause brittle failure of polymers such as polycarbonate and ABS. It is also shown that cracks can attain velocities of up to 200 m/sec when propagating through such films. GRA

N87-12687# Department of the Air Force, Washington, D.C.
LOW TEMPERATURE FORMATION OF MULLITE Patent Application
Bulent E. Yoldas, inventor (to Air Force) Filed 28 May 1986 15 p
(AD-D012404; US-Patent-Appl-SN-867727) Avail: NTIS HC A02/MF A01 CSCL 07/1

This patent application relates to a process for preparing high purity, stoichiometric aluminum silicate (mullite). The method prepares mullite ($3Al_2O_3.2SiO_2$) by partially hydrolyzing ae dilute silicon alkoxide solution, combining an aluminum alkoxide with the partially hydrolyzed silicon alkoxide, eliminating terminal alkoxide groups and firing the material to about 985 C. GRA

N87-12688# Battelle Columbus Labs., Ohio.
HOT ISOSTATIC PRESSING OF CERAMIC POWDER COMPACTS Final Report, 1 Jun. 1984 - 31 Dec. 1985
J. K. McCoy and A. J. Markworth 15 Jan. 1986 174 p
(Grant AF-AFOSR-0238-82)
(AD-A169971; AFOSR-86-0348TR) Avail: NTIS HC A08/MF A01 CSCL 11/2

The densification of aluminum oxide in hot isostatic pressing has been studied in detail. Methods for calculating maps of densification rate as a function of temperature and applied pressure have been developed. A new mechanism, interface-reaction-controlled grain-boundary diffusion has been found which describes the densification of high-purity, fine-grained (grain radius of 0.7 micrometers) aluminum oxide powder at temperatures up to 1423 K. Theoretical models have been developed for this mechanism for both the initial and final stages of densification. Standard geometries have been used for the models; the initial stage is described in terms of impinging spherical particles, and the final stage is described in terms of isolated pores. The theoretical model is found to describe the data for fractional densities up to at least 0.9, although it breaks down for higher densities. From theoretical studies of final stage, we find indications that the discrepancy between theory and experiment is due at least in part to neglect of the effects of a distribution of pore sizes. GRA

N87-12689# Southwest Research Inst., San Antonio, Tex. Dept. of Materials Sciences.
STUDY OF HIGH TEMPERATURE FAILURE MECHANISMS IN CERAMICS Annual Report, 1 Apr. 1985 - 31 Mar. 1986
Richard A. Page and James Lankford Apr. 1986 25 p
(Contract F49620-85-C-0073)
(AD-A170001; SWRI-8578/2; AFOSR-86-0485TR) Avail: NTIS HC A02/MF A01 CSCL 11/2

This report summarizes the results of a fundamental study involving experimental characterization and analytical modeling of grain boundary cavitation and creep crack growth in structural ceramics exposed to pure tensile loading. The major experimental techniques employed in the program are the use of small-angle neutron scattering to characterize cavity nucleation and growth and stereoimaging analysis to characterize the stress and strain fields associated with growing creep cracks. In the first section of the report, the experimental progress is summarized. The design of the pure tensile creep apparatus, which is being used for the creation of bulk damage and for creep crack growth, is discussed. The progress made in the determination of surface preparation conditions that are adequate for the stereoimaging analysis is also discussed. The second section of the report describes the results of a critical review of recent experimental and theoretical studies of creep cavitation in ceramics. The results of this critical study have identified a number of stochastic aspects of cavitation. The stochastic nature of cavitation arises primarily due to the depen-

dence of both cavity nucleation and cavity growth on grain boundary sliding. A degree of randomness is also imposed by the nonuniform distribution of nucleation sites. GRA

N87-12690# Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Adhesion Science.
AN INTERDISCIPLINARY APPROACH TO PREDICTIVE MODELING OF STRUCTURAL ADHESIVE BONDING. CHARACTERIZATION OF Ti-6Al-4V OXIDES AND THE ADHESIVE/OXIDE INTERPHASE Annual Report, 18 Jun. 1984 - 18 Sep. 1985
J. A. Filbey and J. P. Wightman May 1986 70 p
(Contract N00014-82-K-0185)
(AD-A170484; CAS/CHEM-4-86; AR-86) Avail: NTIS HC A04/MF A01 CSCL 11/1

Ti-6-4, being a high strength, lightweight, corrosion resistant alloy, possesses many uses for structural adhesive bonding. Many researchers are therefore finding better pretreatments, characterizing the oxide surface and evaluating bonding performance. The work reported here will encompass both oxide characterization and evaluation of adhesive bonds. The chemical composition of oxides created by specific pretreatments was studied by XPS, AES, SIMS, contact angles, and indicator dyes. The surface topography and structure was probed by SEM, STEM, and profilometry. Following the procedures of Carre and Schultz with aluminum substrates, values for the surface energy of the Ti-6-4 oxides are obtained using an interfacial contact angle method. Because of the present interest in the use of Ti-6-4 for high temperature applications, the thermal stability of the oxide layer was investigated. Following Pike's successful use of inorganic primers as adhesion promoters on aluminum substrates, studies were begun to characterize a titanate primer. Finally, both lap shear and wedge tests have been used to evaluate the adhesive/oxide interphase. GRA

N87-12691 Department of the Navy, Washington, D. C.
RUSTY BOLT INTERMODULATION INTERFERENCE REDUCER Patent
Ramanathan Panayappan and John C. Cooper, inventors (to Navy) Issued 27 May 1986 4 p Supersedes AD-D011748
(AD-D012417; US-Patent-4,591,510; US-Patent-Appl-SN-722579; US-Patent-Class-427-125) Avail: US Patent and Trademark Office CSCL 17/2

A chemical composition formed from a chelating agent, polymeryable bonding agent, and a high dielectric solvent eliminates intermodulation interference when applied to rusty bolt junctions. Author (GRA)

N87-12692 Department of the Navy, Washington, D. C.
ADHESIVE REPAIR PATCH Patent
Leighton H. Peebles, Jr., inventor (to Navy) Issued 27 May 1986 4 p Supersedes AD-D011478
(AD-D012422; US-Patent-4,591,511; US-Patent-Appl-SN-635866; US-Patent-Class-427-142) Avail: US Patent and Trademark Office CSCL 11/1

A method for effecting repairs or the damaged component of a machinery in the field which would otherwise require high temperature treatment of the damaged components to form a metal-oxide epoxy joint in a shop. The method includes preparing a repair patch which includes a metal sheet with the metal oxide layer thereon, applying a thin high performance protective coating thereover, covering thereof with a sacrificial backing sheet and then curing the adherent-top coat backing sheet to form a highly durable bonded system which can be stored until needed. At the time of repair the backing sheet is removed by sanding or grit blasting and the adherent is applied to the structure to be repaired under ordinary temperature conditions. Author (GRA)

N87-12693# Honeywell, Inc., Bloomington, Minn. Physical Sciences Center.
SYNTHESIS OF CONJUGATED POLYMERS WITH ALTERNATING AROMATIC AND QUINONOID SEQUENCES VIA ELIMINATION ON PRECURSORS
Samson A. Jenekhe 14 Aug. 1986 15 p
(Contract N00014-84-C-0699)
(AD-A171331; TR-3) Avail: NTIS HC A02/MF A01 CSCL 07/3

An elimination reaction for the formation of conjugated polymers from polymer precursors containing alternating sp superscript 3 carbon atom and conjugated segments in the main chain is described. The resulting conjugated polymers with alternating aromatic and quinonoid sequences are inaccessible by conventional polymerization processes. The Pi-electron conjugation extension process is exemplified by reactions performed on poly(5,5',alpha-bithiophenediyl p acetoxybenzylidene) at 23 C and followed by electronic and infrared spectra. The semiconductor band gap narrowed from an initial value of 1.53 eV for the precursor polymer to about 0.83 eV for the conjugated derivative. Further evidence for the sp superscript 3 to sp superscript 2 carbon atom conversion by the elimination process is provided by infrared data. GRA

N87-12694# Sandia National Labs., Albuquerque, N. Mex.
RAMAN SPECTROSCOPY OF CARBORANES AND POLYCARBORANESILOXANES
J. A. Shelnutt 1986 15 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-009030; SAND-86-0806C; CONF-860629-15) Avail: NTIS HC A02/MF A01

Raman spectra of some m-carboranesiloxane polymers are compared with each other and with the spectrum of o-carborane and boron carbide. The comparisons and additional polarization studies allow the assignment of some vibrations to the icosahedral 1,7-dicarboranyl units, siloxy polymer connecting units, and substituent groups of the silicon atoms. The Raman investigation is directed toward understanding the interaction of carborane icosahedral units of boron-carbide semiconductor materials. DOE

N87-12695# Los Alamos National Lab., N. Mex.
PHYSICAL CHARACTERISTICS OF DIBLOCK POLYACETYLENE COPOLYMERS: PROCESSABILITY-CONDUCTIVITY CORRELATION
M. Aldissi, M. Hou, and J. Farrell 1986 7 p Presented at the International Conference on Science and Technology of Synthetic Metals, Kyoto, Japan, 1 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011218; LA-UR-86-1744; CONF-8606133-3) Avail: NTIS HC A02/MF A01

The physical properties of polyacetylene diblock copolymers containing polystyrene (PS) or polyisoprene (PI) blocks of various compositions are studied using electron spin resonance, resonance Raman scattering, and room temperature conductivity measurements. This study is performed to investigate the processability-conductivity correlation in these materials and their viability as conducting systems. DOE

N87-12696# Los Alamos National Lab., N. Mex.
EFFECT OF CHAIN RIGIDITY ON CONDUCTIVITY OF CONJUGATED POLYMERS
M. Aldissi 1986 7 p Presented at the International Conference on Science and Technology of Synthetic Metals, Kyoto, Japan, 1 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011263; LA-UR-86-1565; CONF-8606133-2) Avail: NTIS HC A02/MF A01

There are several ways to introduce processability to conjugated polymers, and one of them is discussed here. The basic approach involves the introduction of flexible centers in a conjugated backbone with a periodicity that allows the existence of conjugated sequences characterized by an electron mobility high enough to result in electronic conduction upon oxidation or reduction. The process consists of the use of AsF5 as a polymerization catalyst, and AsF3 as a non-conventional medium for the reaction. The Lewis acid coupling reactions, via which the polymerization occurs, result in soluble materials. Characteristics

the materials obtained by polymerizing acetylene and some omatic compounds are discussed. DOE

37-12697# Los Alamos National Lab., N. Mex.
LECTRON-ELECTRON INTERACTION EFFECTS IN QUASI-NE-DIMENSIONAL CONDUCTING POLYMERS AND RELATED YSTEMS
K. Campbell, D. Baeriswyl, and S. Mazumdar 1986 7 p
esented at the International Conference on Science and echnology of Synthetic Metals, Kyoto, Japan, 1 Jun. 1986
epared in cooperation with Eidgenoessische Technische ochschule, Zurich (Switzerland) and GTE Labs, Inc., Waltham, ass.
ontract W-7405-eng-36)
E86-012434; LA-UR-86-2207; CONF-8606133-5) Avail: NTIS C A02/MF A01
We review recent results on the role of electron-electron (e-e) teractions in quasi-one-dimensional conducting polymers and lated systems. Within the Peierls-Hubbard model, the effects of oth short-range (on-site U and nearest neighbor V sub 1) and ng-range (V sub j/, j is greater than or equal to 2) are examined, e former using quantum Monte Carlo and the latter with exact agonalization of finite size systems and analytic arguments. We so discuss optical absorption properties in the presence of ectronic correlation, focusing on the weak and strong coupling nits. DOE

87-12698# Oak Ridge National Lab., Tenn.
ENSIFICATION OF GRAPHITES BY IRRADIATION
. R. Kennedy and D. Mindermann (SIGRI Electrogradhit G.m.b.H., eitingen West Germany) 1986 7 p Presented at the Carbon onference, Baden-Baden, West Germany, 30 Jun. 1986 Prepared cooperation with Sigri Elektrographit G.m.b.H., Meitingen Germany, F.R.)
Contracts DE-AC06-76RL01857; DE-AC05-84OR-21400)
DE86-010026; CONF-8606113-2) Avail: NTIS HC A02/MF A01
Information is presented on neutron-induced dimensional hanges in the highly anisotropic hexagonal crystal structure of raphite. The sensitivity of bulk density to the densification can e confirmed to some extent by a comparison of the effect of xidation on the dimensional changes of graphite. The oxidation radiation results are limited, requiring assumptions that the linear crease occur isotropically for these anisotropic graphites. DOE

87-12699# Oak Ridge National Lab., Tenn.
IETALS AND CERAMICS DIVISION MATERIALS SCIENCES ROGRAM Annual Progress Report, period ending 31 Dec. 985
. O. Stiegler, comp. Jun. 1986 315 p
Contract DE-AC05-84OR-21400)
DE86-013512; ORNL/TM-10033) Avail: NTIS HC A14/MF A01
Structural characterization, high-temperature alloy research, tructural ceramics, radiation effects, structure and properties of urfaces and interfaces, and collaborative research centers are iscussed. DOE

87-12700# Midwest Research Inst., Golden, Colo.
OLID-STATE ELECTROCHROMIC SWITCHABLE WINDOW ILAZINGS Progress Report
. K. Benson, C. E. Tracy, and M. P. Ruth Apr. 1986 71 p
Contract DE-AC02-83CH-10093)
DE86-004455; SERI/PR-255-2627) Avail: NTIS C A04/MF A01
Multilayer, solid-state electrochromic coatings have been repared and characterized. The electrochromic activity is based n hydrogen-ion insertion into a microcrystalline tungsten oxide H sub x WO sub y) layer from a hydrated microcrystalline agnesium fluoride layer. The coatings typically consist of four yers deposited sequentially onto glass: transparent conductor in-doped indium oxide, ITO) 330 nm; electrochromic material (H ub x WO sub y) 500 nm; hydrated fast-ion conductor/electron urrent blocking layer (MgF) 100 nm; and transparent conductor old) 13 nm. Solar-weighted and photopic-weighted optical properties are reported for individual layers and complete multilayer coatings. The electrooptic response of complete solid-state coatings is also reported. Maximum transmittance through the four layer coatings with gold conductive layers was limited to 32% solar and 56% visible. Replacing the gold conductive layer with a tin-doped indium oxide layer increased the maximum transmittance to 59% solar and 64% visible but impaired the electrochromic response. Large area coatings were fabricated (700 cm^2) and shown to operate in the same manner as the 12 cm^2 test specimens. Preliminary analyses were made of possible production costs and possible energy savings benefits which would be derived from optimal use of such switchable window coatings. DOE

N87-12701# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
LASER SEALED VACUUM INSULATING WINDOW Patent Application
D. K. Benson, inventor (to DOE) and C. E. Tracy, inventor (to DOE) Filed 19 Aug. 1985 27 p
(Contract DE-AC02-83CH-10093)
(DE86-013678; US-Patent-Appl-SN-767218) Avail: NTIS HC A03/MF A01
A laser sealed evacuated window panel is comprised of two glass panes held spaced apart in relation to each other by a plurality of spherical glass beads and glass welded around the edges to provide an evacuated space between the glass panes that is completely glass sealed from the exterior. The glass welded edge seal is obtained by welding the edges of the glass panes together with a laser beam while the glass panes and bead spacers are positioned in a vacuum furnace and heated to the annealing point of the glass to avoid stress fracture in the aren of the glass weld. The laser welding in the furnace can be directed around the perimeter of the galss panel by a combination of rotating the glass panel and linearly translating or aiming the laser with a relay mirror. DOE

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N87-12702# Weapons Systems Research Lab., Salisbury (Australia).
METHODS FOR THE SYNTHESES OF MONO-, DI-, TRI- AND TETRANITRO DERIVATIVES OF DIPHENYLAMINE
N. J. Curtis Jan. 1986 21 p
(WSRL-0436-TR; AR-004-307) Avail: NTIS HC A02/MF A01
A critical review of the methods available for the syntheses of the title compounds is presented. Concise procedures are given for the preparation of these compounds, obtained in useful yield from readily available starting materials. Author

N87-12703# Dayton Univ., Ohio.
PULSED-LASER, HIGH SPEED PHOTOGRAPHY OF ROCKET PROPELLANT SURFACE DEFLAGRATION Final Report, 1 May 1983 - 30 Sep. 1985
Roger J. Becker May 1986 104 p
(Contract F04611-83-K-0023)
(AD-A169308; UD-TR-85-147; AFRPL-TR-86-039) Avail: NTIS HC A06/MF A01 CSCL 21/9
High speed movies of solid propellant deflagration have long provided useful qualitative information on propellant behavior. Consequently, an extension of performance to include quantitative behavior of the surface, particularly the spatial relationship of particles across the surface, the temporal behavior of particles through extended periods of time, and accurate measurements of particle sizes, is highly desirable. Such measurements require the ability to take detailed movies across an extensive surface through

the propellant flame for longer periods than the residence time of a given particle. For such experiments, camera optics employing magnification are undesirable, since they severely limit both the field of view and the depth of field, and hence, the useful duration of a frame sequence. Unfortunately, high resolution without magnification pushes both the diffraction limits and the performance capabilities of standard lenses. At this limit, the modulation transfer function (MTF) of the camera optics and film will greatly affect performance. The MTF of the optics can be improved by a factor of two or more at practical spatial frequencies by the use of monochromatic light, such as the reflected light from a laser. This is especially true for off-axis rays, and important consideration when an extended field-of-view is required. The use of an intense, short-pulsed laser has the additional advantage of suppressing flame brightness and motion blur. GRA

N87-12704# Rockwell International Corp., Canoga Park, Calif. Rocketdyne Div.
PREPARATION OF ENERGETIC COMPOUNDS Final Report, 1 May 1984 - 30 Jun. 1985
M. B. Frankel, M. A. Cunningham, J. F. Weber, and L. R. Grant Jul. 1986 37 p
(Contract N00014-84-C-0234)
(AD-A170022; RI/RD86-216) Avail: NTIS HC A03/MF A01 CSCL 19/1

There is a continual quest to upgrade the performance of state-of-the-art propellants and explosives. The three principal ingredinets of these systems are the oxidizer, plasticizer, and polymeric binder. Consequently, a major effort has been carried out in the past years to synthesize and characterize high-energy, high-density compounds that could be utilized for these applications. Recent research work by Dr. H. G. Adolph at the Naval Surface Weapons Center (NSWC) has revealed three attractive new propellant and/or explosive ingredients. These compounds are 1,3,3,5,7,7-hexanitrooctahydro-1,5-diazocine, a high-energy solid oxidizer candidate; 4,5-bis(fluorodinitromethyl)-1,3-dioxalane (DHFEFO), a high density liquid plasticizer candiate; and certain fluorinate polyformals, which are high density prepolymer candidates. The objective of this program was to synthesize and characterize sufficient quantities of these materials so that they could be a more fully evaluated by the technical staffs at NSWC and the Naval Weapons Center (NWC). GRA

N87-12705# Monsanto Co., Dayton, Ohio.
DETERMINATION OF THE COEFFICIENT OF THERMAL EXPANSION OF JP-4 FUELS Interim Report, Apr. 1983 - Jul. 1985
Donovan S. Duvall, Michael D. Hale, Donald J. Lewis, and Arthur D. Snyder Dec. 1985 51 p
(Contract F33615-81-C-2035)
(AD-A171495; AFWAL-TR-85-2093) Avail: NTIS HC A04/MF A01 CSCL 21/4

Precise density determinations were made on 100 JP-4 jet fuels using a Mettler/Paar Model ADS-55 density measuring system. Statistical analysis of the density measurements was performed using a computerized nonlinear regression technique; and coefficient of thermal expansion values were calculated for each fuel at 60 F. A majority of the fuels (88 out of 100) were consistent with the API published volume series correction for crude oils. GRA

N87-12706# Brookhaven National Lab., Upton, N. Y.
PRODUCTION OF A CLEAN CARBON FUEL DERIVED FROM COAL FOR USE IN STATIONARY AND MOBILE HEAT ENGINES
M. Steinberg Apr. 1986 25 p Presented at the 8th International Symposium on Coal Slurry Fuels Preparation and Utilization, Orlando, Fla., 27 May 1986
(Contract DE-AC02-76CH-00016)
(DE86-011203; BNL-38086; CONF-860548-2) Avail: NTIS HC A02/MF A01

Described is the development of a new process called HYDROCARB and the production of a new fuel product called CARBOLINE (an acronym for carbon-gasoline), which has potential world-wide economic usefulness. It is a clean carbon fuel which can be used in stationary, steam, and electrical power generating plants and for mobile transportation engines. The HYDROCARB process converts any abundantly available carbonaceous raw material such as coal, peat, tar, biomass (wood), agricultural materials and commercial and industrial wastes, into a clean carbon fuel. This fuel is produced in two forms: one is a solid particulate carbon black, which can readily be burned in a boiler, turbine, or internal combustion engine, and the other is a clean liquid carbon fuel made by mixing the solid particulate carbon black with either water, alcohol, gasoline, oils or other conventional liquid fuel to form a mix or slurry fuel CARBOLINE. Because of the vast resources of coal throughout the world, the new process will have greatest applicability in the conversion of coal to clean solid carbon fuel and to a liquid CARBOLINE mix fuel competitive with world petroleum derived fuel costs. DOE

N87-12707# Los Alamos National Lab., N. Mex.
ANVIL DETONATOR: A 300EC-STABLE, HOT-WIRE-IGNITED, NONPRIMARY-EXPLOSIVE DEVICE
R. H. Dinegar and J. O. Johnson Jul. 1986 8 p
(Contract W-7405-eng-36)
(DE86-013635; LA-10749-MS) Avail: NTIS HC A02/MF A01

The search for a combination of explosives and low-energy means of initiation that will function in the 300 C region appears to be successfully concluded. PYX, NONA, HNS-II, and KP have been employed satisfactorily as donor charges in hot-wire-ignited, flying-plate assemblies. The standard method of construction used in flying-plate detonators is unsatisfactory, however. A completely new and novel design that results in consistent initiation, employing a shock-up process has been developed. In this anvil detonator, PYX is the donor charge and NONA is the acceptor explosive. DOE

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.

For biological materials see *55 Space Biology*.

No abstracts in this category.

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N87-12708*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PLASMA ASSISTED SURFACE COATING/MODIFICATION PROCESSES: AN EMERGING TECHNOLOGY
Talivaldis Spalvins 1986 15 p Presented at the 1st International Ion Nitriding Conference, Cleveland, Ohio, 15-17 Sep. 1985; sponsored by the American Society for Metals
(NASA-TM-88885; E-3274; NAS 1.15:88885) Avail: NTIS HC A02/MF A01 CSCL 13H

A broad understanding of the numerous ion or plasma assisted surface coating/modification processes is sought. An awareness of the principles of these processes is needed before discussing in detail the ion nitriding technology. On the basis of surface modifications arising from ion or plasma energizing and interactions, it can be broadly classified as deposition of distinct overlay coatings (sputtering-dc, radio frequency, magnetron, reactive; ion plating-diode, triode) and surface property modification without forming a discrete coating (ion implantation, ion beam mixing, laser beam irradiation, ion nitriding, ion carburizing, plasma oxidation). These techniques offer a great flexibility and are capable

ailoring desirable chemical and structural surface properties pendent of the bulk properties. Author

-12709# Texas Technological Univ., Lubbock. Dept. of Civil ineering.
E APPLICATION OF BOUNDARY-ELEMENT TECHNIQUES SOME SOIL-STRUCTURE INTERACTION PROBLEMS Final ort
. Vallabhan and Jayaraman Sivakumar Apr. 1986 91 p
ntract DACW39-83-M-1805)
-A168999; ATC-86-2) Avail: NTIS HC A05/MF A01 CSCL 13

Boundary-element technique research performed to solve -structure interaction problems is the basis for this report. cifically, it was designed to answer questionable situations for hydraulic U-Lock structures erected on elastic soil. A review rlier research that employed the Kelvin-type element directed decision in favor of Flamant-type boundary element. Both stant and linear elements were developed and many sample blems were dealt with to illustrate the capabilities of these ments in the problem situations of soil-structure relationships. Flamant-type boundary element proved to be convenient, gave ter results for displacement problems using the constant ment, offered satisfactory behavior description of soil-structure ponse, required considerably fewer elements than the conven- al model, provided more accuracy in stress analysis of structure, was confirmed as very beneficial for use in input data paration. Research was also conducted on soil-structure raction problems with the structure modeled by the finite- ment method and the soil modeled by the boundary-element thod. A model problem suggested by the AEWES was selected study and solving. The emphasis was to develop a convenient economical technique to couple the boundary- and finite- ment methods of analysis. A computer code for coupling the methods has been developed in FORTRAN. GRA

7-12710# Department of the Air Force, Washington, D.C.
GHT SOCKET REMOVAL TOOL Patent Application
omas E. Brokenshire, inventor (to Air Force) Filed 28 Apr. 86 7 p
D-D012368; US-Patent-Appl-SN-856248) Avail: NTIS A02/MF A01 CSCL 13/9

This invention relates to tools for the repair and removal of t sockets having bayonet type receptacles. The invention mprises a tool for simplifying the removal of this type light socket. e tool comprises a cylindrical shaft having mating pins positioned insertion into the bayonet type receptacle. The mating pins gister with notches in the receptacle in order to firmly position shaft within the receptacle. The tool and the light socket ceptacle are then held stationary with a handle portion during moval of socket fasteners. GRA

7-12711# Rockwell International Corp., Columbus, Ohio. North erican Aircraft Operations.
BRICATION AND TESTING OF LIGHTWEIGHT HYDRAULIC STEM SIMULATOR HARDWARE Final Report, 15 May 80 - 15 Nov. 1985
liam N. Bickel and Robert K. Haning Jan. 1986 279 p
ontract N62269-80-C-0261)
D-A169884; NA-85-0134; NADC-79024-60) Avail: NTIS A13/MF A01 CSCL 13/7

The Lightweight Hydraulic System (LHS) Advanced Develop- ent Program is a multi-phase investigation of the concept of ing an 8000 psi operating pressure level to achieve smaller and hter weight hydraulic components than those used in aircraft th conventional 3000 psi systems. This report presents the sults of Phase II in which a full scale A-7E 8000 psi dual stem hydraulic simulator was fabricated and tested. Tests nducted were proof pressure, system integration, baseline, namic performance, and 600 hours of endurance cycling. No ajor technological problems were encountered. Four flight ntrol actuators accumulated over 3,000,000 cycles; one pump cumulated over 1000 hours of operation (Phase I and Phase II). Hydraulic system math models were corroborated by test data. A weight and space analysis update projected 33.1% and 36.3% savings, respectively, over an equivalent 3000 psi system. A study of simulator operating experience indicated a 23% improvement in reliability over a comparable 3000 psi system. An additional 600 hours of simulator endurance cycling are scheduled for completion in FY '86. GRA

N87-12712# Department of the Air Force, Washington, D.C.
TDD ANTENNA: FOIL FORMED, SUBSTRATE LOADED LASER WELDED ASSEMBLY Patent Application
N. L. Alfing, inventor (to Air Force) Filed 19 May 1986 9 p
(AD-D012411; US-Patent-Appl-SN-864221) Avail: NTIS HC A02/MF A01 CSCL 16/4

The antenna assembly is formed by building a shell housing by punch press operation. The housing contains the antenna features. The dielectric with load and connector is placed into the housing. Then a back is placed onto the assembly and the unit is enclosed by laser welding. This design allows the fabrication of the housing to be constructed with the antenna features built in and is simpler and less costly than prior designs. GRA

N87-12713# Hydrogen Consultants, Inc., Denver, Colo.
PHASE CHANGE THERMAL ENERGY STORAGE METHODS FOR COMBAT VEHICLES, PHASE 1 Final Report
F. E. Lynch Jun. 1986 63 p
(Contract DAAK70-85-C-0077)
(AD-A170492) Avail: NTIS HC A04/MF A01 CSCL 13/1

Three alternative cooling methods, based on latent heat absorption during phase changes, were studied for potential use in combat vehicle microclimate temperature control. Metal hydrides absorb heat as they release hydrogen gas. Plastic crystals change from one solid phase to another, absorbing heat in the process. Liquid air boils at cryogenic temperature and absorbs additional sensible heat as the cold gas mixes with the microclimate air flow. System designs were prepared for each of the three microclimate cooling concepts. These designs provide details about the three phase change materials, their containers and the auxiliary equipment needed to implement each option onboard a combat vehicle. The three concepts were compared on the basis of system mass, system volume and the energy required to regenerate them after use. Metal hydrides were found to be the lightest and smallest option by a large margin. The energy needed to regenerate a hydride thermal storage system can be extracted from the vehicle's exhaust gases. GRA

N87-12714# Los Alamos National Lab., N. Mex.
ANALYSIS OF MAGNETIC REFRIGERATION SYSTEMS WITH STAGED REGENERATORS BASED ON AN IDEALIZED MAGNETIC MATERIAL ENTROPY MODEL: 1
W. C. Overton, Jr. May 1986 78 p
(Contract W-7405-eng-36)
(DE86-013638; LA-10676-MS) Avail: NTIS HC A05/MF A01

We have performed a computer analysis of magnetic refrigerators consisting of a single magnetic-material (MM) stage (with T sub c = 70.5 K and resembling GdNi), a hot heat exchanger for rejecting heat to an LN sink, a cold heat exchanger for removing heat from a cold cryogenic load and an external regenerator having an integral number n of isolated stages with 5 less than or equal to n less than or equal to 10. We use the abbreviation REGMR for such a system. An idealized entropy-versus-temperature model is used to represent the magnetic material. The single MM stage REGMR model proves capable of producing refrigeration from 77 K down to less than 30 K. We estimate two such REGMRs in tandem could produce refrigeration to less than 15 K, depending on the cryogenic load. The numerical analysis is based on strict conservation of energy and we neglect the small hydrodynamic losses of the ^{4}He exchange-gas system and heat-transfer irreversibilities. Performance is evaluated in terms of the lowest temperature achievable, the number of cycles required to reach cyclic equilibrium, the effect of regenerator stage mass and number of stages, and the effect of cryogenic loads. A systematic comparison of the REGMR cycle with other thermodynamic cycles shows the

former is unique. The coefficient of performance is evaluated and the REGMR efficiency is determined by comparison with the ideal gas Carnot-cycle refrigerator. DOE

N87-12715# Joint Publications Research Service, Arlington, Va.
JAPAN REPORT: SCIENCE AND TECHNOLOGY
29 Aug. 1986 75 p Transl. into ENGLISH from various Japanese articles
(JPRS-JST-86-023) Avail: NTIS HC A04/MF A01

Topics addressed include: aerospace sciences, biotechnology, chemical engineering, computers, defense industry, and nuclear development. For individual titles, see N87-12716 through N87-12717.

N87-12716# Joint Publications Research Service, Arlington, Va.
POSSIBLE MILITARY APPLICATIONS OF STRATOSPHERIC AIRSHIP DISCUSSED **c05**
Junichi Kimura, Ryuichi Takeda, Yukichi Fujimatsu, and Toshiyuki Kato *In its* Japan Report: Science and Technology (JPRS-JST-86-023) 29 Aug. 1986 p 49-62 Transl. into ENGLISH from Boei Gijutsu (Tokyo, Japan), Nov. 1985 p 48-58 (For primary document see N87-12715 04-31)
Avail: NTIS HC A04/MF A01

The possibilities of a stratospheric airship of the LB (lifting body) types are studied from the aspect of operation. The meteorological conditions that most severly restrict its operation are considered. The advantages that the stratospheric airship has over other aircraft and artificial satellites are discussed. B.G.

N87-12717# Joint Publications Research Service, Arlington, Va.
STATUS OF LASER ENRICHMENT TECHNOLOGY UPDATED **c36**
Yasushi Sakabe *In its* Japan Report: Science and Technology (JPRS-JST-86-023) 29 Aug. 1986 p 63-69 Transl. into ENGLISH from Purometeusu (Tokyo, Japan), Nov. 1985 p 41-43 (For primary document see N87-12715 04-31)
Avail: NTIS HC A04/MF A01

The principles of uranium enrichment by a laser method, the technology's current status and future prospects, centered on research and development activity at the Japan Atomic Energy Research Institute and the Institute of Physical and Chemical Research are described. B.G.

32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking.* For search and rescue see *03 Air Transportation and Safety,* and *16 Space Transportation.*

N87-12718*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
PULSE CODE MODULATION (PCM) DATA STORAGE AND ANALYSIS USING A MICROCOMPUTER
David E. Massey Aug. 1986 8 p
(NASA-TP-2629; Rept-822.3; NAS 1.60:2629) Avail: NTIS HC A02/MF A01 CSCL 17B

The current widespread use of microcomputers has led to the creation of some very low-cost instrumentation. A Pulse Code Modulation (PCM) storage device/data analyzer -- a peripheral plug-in board especially constructed to enable a personal computer to store and analyze data from a PCM source -- was designed and built for use on the NASA Sounding Rocket Program for PMC encoder configuration and testing. This board and custom-written software turns a computer into a snapshot PCM decommutator which will accept and store many hundreds or thousands of PCM telemetry data frames, then sift through them repeatedly. These data can be converted to any number base and displayed, examined for any bit dropouts or changes (in particular, words or frames), graphically plotted, or statistically analyzed. Author

N87-12719*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
TONE CALIBRATION TECHNIQUE: A DIGITAL SIGNALING SCHEME FOR MOBILE APPLICATIONS
Faramaz Davarian 15 Sep. 1986 72 p
(NASA-CR-179915; JPL-Pub-86-40; NAS 1.26:179915; MSAT-X-138) Avail: NTIS HC A04/MF A01 CSCL 17B

Residual carrier modulation is conventionally used in a communication link to assist the receiver with signal demodulation and detection. Although suppressed carrier modulation has a slight power advantage over the residual carrier approach in systems enjoying a high level of stability, it lacks sufficient robustness to be used in channels severely contaminated by noise, interference and propagation effects. In mobile links, in particular, the vehicle motion and multipath waveform propagation affect the received carrier in an adverse fashion. A residual carrier scheme that uses a pilot carrier to calibrate a mobile channel against multipath fading anomalies is described. The benefits of this scheme, known as tone calibration technique, are described. A brief study of the system performance in the presence of implementation anomalies is also given. B.G.

N87-12720# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
FAULT TOLERANCE MECHANISMS FOR A NETWORK COMMUNICATION MULTIPROCESSOR [MECANISMOS DE TOLERANCIA A FALHAS PARA O MULTIPROCESSADOR DE COMUNICACAO EM REDE]
Antonio Esio Marcondes Salgado Jul. 1986 17 p In PORTUGUESE; ENGLISH summary Presented at the 1st Symposium on Computer Systems Tolerances and Faults, Sao Jose dos Compos, Brazil, Oct. 1985
(INPE-3958-PRE/876) Avail: NTIS HC A02/MF A01

The goal is to analyze the actual configuration of the Network Communication Multiprocessor (MCR) concerning the availability and reliability of the equipment. A proposal for a new configuration, including fault tolerance mechanisms is presented. Author

N87-12721*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE FLIGHT OPERATIONS COMMUNICATIONS PHRASEOLOGY AND TECHNIQUES
Steven R. Noneman Aug. 1986 16 p
(NASA-TM-86562; NAS 1.15:86562) Avail: NTIS HC A02/MF A01 CSCL 17B

Communications are a critical link in space flight operations. Specific communications phraseology and techniques have been developed to allow rapid and clear transfer of information. Communications will be clear and brief through the use of procedural words and phrases. Communications protocols standardize the required information transferred. The voicing of letters and numbers is discussed. The protocols used in air-to-ground communications are given. A glossary of communications terminology is presented in the appendix. Author

N87-12722# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
RECONSTRUCTION OF UNDERSAMPLED PERIODIC SIGNALS
Anthony J. Silva Jan. 1986 116 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285)
(AD-A168897; TR-514) Avail: NTIS HC A06/MF A01 CSCL 09/3

Under certain conditions, a periodic signal of unknown fundamental frequency can still be recovered when sampled below the Nyquist rate, or twice the highest frequency present in the waveform. A new sampling criterion has been proposed which enumerates such conditions. It has been shown that in theory, if the signal and sampling frequencies are not integrally related, and the signal is band-limited (to a range the extent of which is known but otherwise unrestricted), then the signal waveshape can always

e recovered. If the fundamental frequency is known to lie within range not spanning any multiple of half the sampling rate, then e temporal scaling for the reconstructed waveform can be etermined uniquely, as well. Procedures have also been proposed r reducing time-scale ambiguity when the latter condition is not et. A previously presented time domain algorithm for reconructing aliased periodic signals has been implemented and odified. A new algorithm, operating in the frequency domain, as been proposed and implemented. In the new algorithm, the gnal fundamental frequency is first estimated from the discrete ourier transform of the aliased data through an iterative procedure. his estimate is then used to sort the aliased harmonics. GRA

87-12723# Air Force Systems Command, Wright-Patterson AFB, hio. Foreign Technology Div.
IETRICS OF CLOSED WORLD OF FRIEDMANN, AGITATED Y ELECTRIC CHARGE (TOWARDS A THEORY ELECTROMAGETIC FRIEDMANN'S)
I. A. Markov and V. P. Frolov 10 Jun. 1986 34 p Transl. into NGLISH from Teoreticheskaya i Matematicheskaya Fizika (USSR), 3, no. 1, Apr. - Jun. 1970 p 3-17
AD-A168981; FTD-ID(RS)T-0475-86) Avail: NTIS C A03/MF A01 CSCL 20/10

The generalization is considered of the well known Tolman roblem to the case of electrically charged dust like matter of the entral symmetrical system. The first integrals of the correspondent ystem of the Einstein Maxwell equations are found. The problem specificated in such a way that with the full charge of the ystem going to zero, the metrics of the closed Friedman world rises. Such a system is considered at the initial moment, that of aximal enlargement. With any non-vanishing but no matter how mall value of the electric charge the metrics is unclosed. The etrics of the almost-Friedmanian part of the world allows the ontinuation through the narrow manhole (at the small charge) as e Nordstroem Reissner metrics with the parameters m sub 0 sq (chi) = e sub o. The expression for the electric potential in the anhole phi sub h = c-squared/sq rt chi does not depend upon e value of the electric charge. The radius of the manhole r sub = e sub 0 sq. rt (chi)/c-squared increases with the increase of e charge. The state of the manhole as given by the classical escription appears as essentially unstable from the quantum hysics viewpoint. The production of various pairs in the enormous lectric fields of the manhole gives rise to the polarization of the atter up to effective charge Z < 137e irrespective of the initial o matter how great) charge of the system. GRA

87-12724# Saint Louis Univ., Mo.
g WAVE EXCITATION AND PROPAGATION IN PRESENCE OF NE-, TWO- AND THREE-DIMENSIONAL HETEROGENEITIES cientific Report, 1 Apr. - 30 Sep. 1985
I. B Herrmann 27 Jan. 1986 61 p
Contract F19628-85-K-0029)
AD-A169004; AFGL-TR-86-0025; SR-1) Avail: NTIS IC A04/MF A01 CSCL 20/14

In order to understand high frequency wave propagation, recise methods of generation of synthetic seismograms are equired. This report examines the trapezoidal integration rule used y Bouchon to evaluate Hankel transforms of the Sommerfeld ernel. Numerical problems arise for integrals of some J sub 0 r) functions. A modification of the numerical integration technique, sing a shifter mid-point rectangular rule rather than a trapezoidal ule alleviates some of the problem. For calibration of numerical tegration techniques, the Haskell solution for point sources in a holespace are extended. GRA

87-12725# Syracuse Univ., N. Y. Dept. of Electrical and omputer Engineering.
OMPUTER PROGRAMS FOR ELECTROMAGNETIC SCATTERNG FROM A SLOTTED TM CYLINDRICAL CONDUCTOR BY HE PSEUDO-IMAGE METHOD Interim Technical Report
oseph R. Mautz and Roger F. Harrington Nov. 1985 53 p
Contract DAAG29-84-K-0078)
AD-A169016; SYRU/DECE/TR-85/5; TR-4; ARO-21378.5-EL) Avail: NTIS HC A04/MF A01 CSCL 20/3

Two computer programs are described and listed. Suppose that an infinitely thin perfectly conducting cylindrical surface with an infinitely long but narrow gap is illuminated by a TM plane wave. The first program uses two different methods, the methods of solution with and without pseudo-image, to calculate the tangential electric field in the gap. The second program uses the Fourier series method of solution to calculate the tangential electric field in the gap for the special case in which the surface is a nearly complete circular cylindrical shell and the TM plane were propagates perpendicular to the plane of the gap. To enable the user to verify that they are running correctly, both programs are provided with sample input and output data. GRA

N87-12726# Applied Physics, Inc., Albuquerque, N. Mex.
RADAR CROSS-SECTION OF DAMPED CYLINDERS AND DIELECTRIC STRIPS Quarterly Progress Report, Mar. - Jun. 1986
Richard Holland and Kah-Song Cho 13 Mar. 1986 53 p
(Contract N00014-85-C-0852)
(AD-A169027; API-TR-127) Avail: NTIS HC A04/MF A01 CSCL 17/9

This report presents 2D RCS (echo width) calculations for electrically and magnetically conducting circular cylinders with and without an electromagnetically damping coat. Similar calculations for dielectric cylinders and thin dielectric strips are also given. In all cases, results computed by our new TDFD code and transformed to the frequency domain are compared and overlaid with calculations performed directly in the frequency domain. Detailed preliminary documentation of the TDFD RCS code is given. GRA

N87-12727# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
BASIC AND APPLIED RESEARCH IN THE FIELD OF ELECTRONICS AND COMMUNICATIONS Final Report, 1 Nov. 1982 - 31 Oct. 1985
Jonathan Allen 19 Mar. 1986 32 p
(Contract DAAG29-83-K-0003)
(AD-A169029; ARO-19838.94-EL) Avail: NTIS HC A03/MF A01 CSCL 17/2

During this period, considerable progress was made on experimental and theoretical designs for optical waveguide switches, multiplexors, and demultiplexors that can operate at a rate of 20 gigahertz, centered around the waveguide Mach-Zehnder interferometer. Extensive investigations into device applications of coupled waveguide structures have led to the ability to inject power into one of n input waveguide ports, and deliver power from any selected port using these techniques. Basic logic gates have been formed, building the interferometer in gallium arsenide, and simple exclusive OR gates have been demonstrated. Quantum noise in phase locked laser oscillators was studied, with the goal of using light that produces noise levels less than shot noise, and hence, is in a squeezed state. Oscillations in this mode have been successfully demonstrated. During this contract, a femtosecond laser facility was built which led to the achievement of optical pulses as short as 16 femtoseconds, with a center wavelength of approximately 625 nanometers, comprised of only eight optical cycles. GRA

N87-12728# Naval Postgraduate School, Monterey, Calif.
MAXIMIZATION OF THE CAPACITY OF THE MOST SURVIVABLE CONNECTIONS IN A NETWORK M.S. Thesis
Richard V. Stockton Mar. 1986 71 p
(AD-A169065) Avail: NTIS HC A04/MF A01 CSCL 17/2

The United States is becoming increasingly dependent on telecommunications to maintain societal structure. Today, the use of communication and computer networks has attained a level which affects all lives. The loss of these networks would have a monumental effect on the everyday lives of virtually every person in the U.S. and even the world. This thesis discusses network survivability which is considered to be a function of the number of independent parallel paths between a source and destination node. A methodology is developed to determine the connectivity of a

network and then the number of independent parallel paths are determined by restricting the connectivity solution set. The capacity of the parallel paths are then maximized given that the links are not characterized by uniform capacities. GRA

N87-12729# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
A TEST ON THE RELIABILITY AND PERFORMANCE OF THE VERBEX SERIES 4000 VOICE RECOGNIZER
P. Suntharalingam Sep. 1985 21 p
(Contract DAAG29-84-K-0048)
(AD-A169066; MAE-1748; ARO-20155.6-MA) Avail: NTIS HC A02/MF A01 CSCL 17/2

Voice recognition systems are becoming increasingly widespread as forms of data entry. One such use of speech input would be as an aid to pilot communication in the cockpit. The Verbex Series 4000 Voice Recognizer (VVR) was chosen as the input channel for a forthcoming flight simulation system. The VVR is a speaker dependent unit with the ability to recognize continuous speech. An additional feature of the VVR is its use of structured grammars in defining the speech format. Tests were run to determine the VVR's reliability, and also to investigate the variations in performance for different grammar structures. Author (GRA)

N87-12730# Massachusetts Inst. of Tech., Cambridge. Pesearch Lab. of Electronics.
KNOWLEDGE-BASED PITCH DETECTION
Webster P. Dove Jun. 1986 226 p
(Contract N00014-81-K-0742; Grant NSF ECS-84-07285)
(AD-A169069; TR-518) Avail: NTIS HC A11/MF A01 CSCL 17/2

Many problems in signal processing involve a mixture of numerical and symbolic knowledge. Examples of problems of this sort include the recognition of speech and the analysis of images. This tnesis focuses on the problem of employing a mixture of symbolic and numerical knowledge within a single system, through the development of a system directed at a modified pitch detection problem. For this thesis, the conventional pitch detection problem was modified by providing a phonetic transcript and sex/age information as input to the system, in addition to the acoustic waveform. The Pitch Detector's Assistant (PDA) system that was developed is an interactive facility for evaluating ways of approaching this problem. The PDA system allows the user to interrupt processing at any point, change either input data, derived data, or problem knowledge and continue execution. Author (GRA)

N87-12731# Harry Diamond Labs., Adelphi, Md.
TRANSMISSION THROUGH FERRITE SAMPLES AT SUBMILLIMETER FREQUENCIES
Clyde A. Morrison, Barbara J. Bencivenga, and George J. Simonis May 1986 20 p
(AD-A169178; HDL-TR-2079) Avail: NTIS HC A02/MF A01 CSCL 20/14

A theoretical analysis is presented of the transmission spectra of thin magnetized ferrite slabs. The energy range chosen was 1 less than nu-bar less than 120 per cm (30 GHz less than f less than 3600 GHz). The magnetic field was assumed to lie in the plane of the ferrite slab, and the incident electromagnetic radiation was polarized parallel and perpendicular to the magnetic field. For measurements of the magnetic properties near resonance, we show that extremely stable sources are required. However, we show that meaningful measurements can be made far from magnetic resonances using a conventional Fourier transform spectrometer. GRA

N87-12732# Rome Air Development Center, Griffiss AFB, N.Y.
PHASED ARRAYS 1985 SYMPOSIUM: PROCEEDINGS
Hans P. Steyskal Aug. 1985 323 p Presented at the Phased Arrays Symposium, Bedford, Mass., 15-18 Oct. 1985; sponsored by RADC
(AD-A169316; RADC-TR-85-171) Avail: NTIS HC A14/MF A01 CSCL 09/5

The Phased Arrays '85 Symposium, sponsored by the Rome Air Development Center, the MITRE Corporation, and the University of Massachusetts, was held at the MITRE Corporation 15 to 18 October and reviewed the state-of-the-art of phased array antenna systems and of the technology for next generation systems. This report contains the full papers which were presented with clearance for unlimited distribution. GRA

N87-12733# Rome Air Development Center, Griffiss AFB, N.Y.
SURFACE CORRELATION RELATIONSHIPS IN ROUGH SURFACE SCATTERING Report, for Sep. 1984 - Sep. 1985
R. J. Papa, J. F. Lennon, and R. L. Taylor Mar. 1986 36 p
(AD-A169327; RADC-TR-86-21) Avail: NTIS HC A03/MF A01 CSCL 20/14

There are a number of approaches to the calculation of the electromagnetic scattering from rough surfaces. These techniques are important in the determination of the effects of the real environment on radar and communications systems. The models contain descriptions of the surface in terms of the statistical distribution of the heights and their degree of correlation. These features are then related to a normalized radar cross section for the terrain, sigma deg, through an electromagnetic analysis. In this report we are concerned with questions involving the application of physical optics principles to the analysis. This is important since this approach is used extensively both as a complete solution and as part of composite models. Secondly, we discussed several areas where the statistics and correlation have important roles in determining the scattering from a random rough surface. This is significant in that the usual assumption of a Gaussian distribution of heights with Gaussian correlation may not apply to all types surfaces. Power spectra results suggest that other forms would be more appropriate for some cases. In the beginning of this report, we examine statistical descriptors of a surface and establish the relationship between them and the conditions for applying a physical optics model to the scattering from that surface. We then examine the sensitivity of the distribution of scattered power to changes in the form of the surface height statistics and correlation function. GRA

N87-12734# Rome Air Development Center, Griffiss AFB, N.Y.
FOREGROUND EFFECTS ON TROPOSCATTER DIGITAL COMMUNICATION SYSTEMS Report, Nov. 1984 - Aug. 1985
Edward E. Altshuler Dec. 1985 22 p
(AD-A169380; RADC-TR-85-232) Avail: NTIS HC A02/MF A01 CSCL 17/2

Troposcatter antennas are usually pointed very close to the horizon to maximize system gain. As a result, multipath reflections from the foreground may arise. These multipath signals may have time delays that are significantly longer than direct signals, which are scattered within the common volume and thus degrade system performance. In this report, the effects of terrain-reflected multipath signals on troposcatter digital communication systems are examined. The distance that a ray travels from the transmitting antenna to a point within the common volume is calculated. The maximum differential distance that can occur for a pair of rays that intersect the common volume is than determined for a set of troposcatter geometries. The total distance that a terrain-reflected ray traverses in going from the antenna to the common volume is also calculated. It is found that, for typical troposcatter/foreground geometries, the differential distance between a direct ray and a foreground-reflected ray is small compared with the maximum differential distance that exists between direct rays within the common volume. Thus, multipath signals that would have time delays significantly longer than those scattered within the common volume must be scattered from a region outside the common volume. GRA

N87-12735# Department of the Air Force, Washington, D.C.
TRACKING SERVO COMPENSATOR WITH RATE AIDING Patent
Bill E. Burkett, inventor (to Air Force) Issued 20 May 1986 12 p Supersedes AD-D011372
(AD-D012388; US-Patent-4,590,476; US-Patent-Appl-SN-640902;

US-Patent-Class-343-7.4) Avail: US Patent and Trademark Office CSCL 17/9

A tracking servo compensator is disclosed for radar systems which steer their antenna beams using a servo-mechanism that physically moves the antenna. The disclosed tracking servo compensator permits switching between trackers (e.g., from area to point track) and from one tracked target to another without undersirable transients that could cause loss of track. Rate aiding and target range estimates are provided when tracker base motion is known. The compensator works by providing a servo signal that continually monitors the error in a servo signal that continually monitors the error in estimated track point line-of-sight angular velocity independent of which tracker is employed or the target being tracked. When base motion is known, this signal is used to update the target range estimate so that an accurate rate aiding signal is available. The servo provides smooth controlled-speed transitions between track points during mode switching, and provides an input for manual slewing of the tracker platform during offset track conditions. It also provides an estimate of platform to track point range. GRA

N87-12736# Royal Signals and Radar Establishment, Malvern (England).

A BRIEF REVIEW OF ADAPTIVE NULL STEERING TECHNIQUES

J. G. McWhirter Feb. 1986 36 p

(AD-A169548; RSRE-MEMO-3939; DRIC-BR-99244) Avail: NTIS HC A03/MF A01 CSCL 20/4

A brief theoretical review of adaptive null steering is presented. The basic theory is first outlined in the context of sidelobe cancellation systems as well as general antenna arrays. Various approaches to the practical implementation of adaptive null steering are then discussed. These fall into the two main categories of closed loop methods and direct solution methods. The closed loop methods are very cost-effective and suitable in principle, for either analog or digital processing. However, their rate of convergence is fundamentally limited and too slow for some applications. The direct solution methods do not suffer from this problem but tend to be suitable only for digital processing and are more expensive from the computational point of view. However they are well suited to parallel processing and now provide a very practical alternative due to recent advances in VLSI circuit technology. A brief discussion on the effects of multi-path propagation on adaptive null steering systems concludes this review. GRA

N87-12737# Defence Research Establishment Valcartier (Quebec).

METHOD OF RAY INTENSITY CALCULATION AS APPLIED TO ANOMALOUS PROGAGATION

D. Dion Jun. 1986 49 p

(AD-A169553; DREV-4407/86) Avail: NTIS HC A03/MF A01 CSCL 20/14

A ray tracing theory incorporating the ray intensity calculation has recently been developed at DREV. This report studies the applicability of this new ray theory to radar propagation. Using this theory, we tried to characterize the anomalous behavior of the propagation due to the refractivity of the troposphere. This report summarizes the ray theory and the validity of this approach for the study of radar propagation. A computer model has been developed to calculate ray trajectories and intensities. Considering the case of a simple surface duct, the results have shown that the intensity computation is an effective and powerful way of detecting and locating in space such singular propagation phenomena as caustics and radio holes. GRA

N87-12738# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Sciences.

CARRIER-SENSE STACK ALGORITHMS FOR MULTIPLE ACCESS COMMUNICATION CHANNELS

Lazaros Merakos Mar. 1986 68 p

(Contract N00014-85-K-0547)

(AD-A169774; UCT/DEECS/TR-86-3) Avail: NTIS HC A04/MF A01 CSCL 09/2

We consider the random multiple access of a collision-type, packet-switched channel, for the Poisson user model in a local area network environment, where carrier sensing techniques are possible due to small propagation delays. We propose and analyze random access algorithms that are representative of a new class of stable algorithms with limited sensing and free access characteristics. Limited sensing algorithms require that users sense the channel only while they have a packet to transmit, and, therefore, they have practical advantages over algorithms that require continuous channel sensing. The free access characteristics of the proposed algorithms simplify their implementation, since newly arrived packets are transmitted upon arrival, provided that the channel is sensed idle. Utilizing the regenerative character of the stochastic processes that are associated with the random access system, we derive lower bounds on the maximum stable throughput, and tight upper and lower bounds on the induced mean packet delay. The proposed algorithms are easy-to-implement, and they combine inherently stable operation and high performance with modest channel sensing requirements. GRA

N87-12739# Illinois Univ., Urbana. Electromagnetic Communication Lab.

DIELECTRIC ANTENNAS FOR MILLIMETER-WAVE APPLICATIONS

G. M. Wilkins and R. Mittra May 1986 38 p

(Contracts DAAG29-85-K-0183; N00014-84-C-0149)

(AD-A169885; UIEMC-86-5; UILU-ENG-86-2547; ARO-22634.3-EL) Avail: NTIS HC A03/MF A01 CSCL 09/5

A number of designs of dielectric antennas for millimeter-wave applications are presented. Included are details of the basic configuration and performance of these devices, along with discussions of modifications and their use as components in millimeter-wave integrated circuits. Specific areas of discussion include: dielectric rod antennas; periodically modulated surface-wave antennas; complex propagation constant; components for millimeter-wave integrated circuits. GRA

N87-12740# Department of the Air Force, Washington, D.C.

MULTI-ELEMENT ADAPTIVE ANTENNA ARRAY Patent Application

Kenneth R. Finken, inventor (to Air Force) Filed 3 Feb. 1986 19 p

(AD-D012410; US-Patent-Appl-SN-824994) Avail: NTIS HC A02/MF A01 CSCL 17/7

A phased array antenna is disclosed including a central reference element. This is surrounded by a plurality of sub-elements which form the adaptive elements of the array and have no feed networks. Each adaptive element is essentially an L stub, with the adaptive elements oriented such that the L top loading is circumferential around the reference element. The plurality of adaptive elements, all with different orientations of the linear top loading allows the complex weights and adaptive nulling algorithm to generate any required polarization, and form an adaptive null to any arbitrary polarized interferring signal as required. GRA

N87-12741# California Univ., Los Angeles. Dept. of Computer Science.

ADVANCED TELEPROCESSING SYSTEMS Semiannual Technical Report, 1 Oct. 1984 - 30 Sep. 1985

Leonard Kleinrock 30 Sep. 1985 130 p

(Contracts MDA903-82-C-0064; DARPA Order 2496)

(AD-A170007) Avail: NTIS HC A07/MF A01 CSCL 09/2

Research published during this reporting period covers a broad spectrum of results in the areas of random access communications, computer networks, and distributed processing (a new and rapidly growing area of research and practical importance). In this latter area, the major works involved the behavior of distributed algorithms for election and traversal in networks, and the evaluation of the achievable and achieved parallelism in parallel processing systems. A general model of distributed processing exposed a potential areas of networks and multiaccess, our results focus on improved and innovative models. A major contribution of our

research during this reporting period is a dissertation entitled Distributed Algorithms for Election in Unidirectional and Complete Networks, by Yehuda Afek. This entire dissertation forms the body of this report. GRA

N87-12742# Naval Research Lab., Washington, D. C.
SIMULATION OF CIFF (CENTRALIZED IFF) REMOTE CONTROL DISPLAYS Memorandum Report, Feb. 1985 - Feb. 1986
Darlene L. Tucker and Lawrence M. Leibowitz 27 Jun. 1986 61 p
(AD-A170387; NRL-MR-5806) Avail: NTIS HC A04/MF A01 CSCL 17/2

This report presents the software simulation of the Remote-Control-Display (RCS) proposed to be used in the Centralized IFF (CIFF) system. A description of the simulation programs along with simulated menu formats are presented. A sample listing of the simulation programs and a brief description of the program operation are also included. Author (GRA)

N87-12743# Oregon Graduate Center for Study and Research, Beaverton. Dept. of Applied Physics and Electronic Science.
DIGEST: PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON OPTICAL AND MILLIMETER WAVE PROPAGATION AND SCATTERING IN THE ATMOSPHERE Final Report, 22 Apr. 1986 - 21 Apr. 1987
Richard A. Elliott May 1986 410 p Conference held in Florence, Italy, 27-30 May 1986
(Grant DAAL03-86-G-0088)
(AD-A170393; ARO-23498.1-EL-CF) Avail: NTIS HC A18/MF A01 CSCL 04/1

The conference was held as scheduled. Topics covered include scintillation theory, two-frequency scintillation, imaging and scintillation, coherence theory, lidar, surface scattering, nonlinear effects, transmission remote sensing, particle scattering and scintillations. Author (GRA)

N87-12744# Columbia Univ., New York. Dept. of Electrical Engineering.
PROBLEMS IN INTEGRATED DIGITAL NETWORKS Final Report, 1 Apr. 1985 - 31 Mar. 1986
Mischa Schwartz, Thomas Stern, and Aurel Lazar 13 Jun. 1986 11 p
(Contract N00014-85-K-0371)
(AD-A170442; Rept-1) Avail: NTIS HC A02/MF A01 CSCL 17/2

This final report covers work carried out under ONR Grant N00014-85-K-0371. The basic problems addressed concerned the integration of diverse traffic types--e.g., voice, data, video, facsimile, etc. into a common digital network. The work fell into three areas: (1) Hybrid Multiplexing; (2) Voice in Integrated Systems; and (3) Decentralized Optimal Flow Control. Author (GRA)

N87-12745 Department of the Navy, Washington, D. C.
TWIN APERTURE PHASED ARRAY LENS ANTENNA Patent
Theodore C. Cheston, inventor (to Navy) Issued 1 Apr. 1986 6 p Supersedes AD-D010381
(AD-D012415; US-Patent-4,580,140; US-Patent-Appl-SN-505570; US-Patent-Class-343-372) Avail: US Patent and Trademark Office CSCL 17/9

A phased array lens antenna which includes a lens having two faces disposed substantially at a right angle to each other. Transmit-receive modules which includes phase-shifter are shared between the two lens faces. Two lens antenna positioned in back-to-back relationship about a ship superstructure scan 260 deg. Author (GRA)

N87-12746# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE EFFECTS OF HIGH SUSTAINED ACCELERATION ON THE ACOUSTIC PHONETIC STRUCTURE OF SPEECH: A PRELIMINARY INVESTIGATION
Zinny S. Bond, Thomas J. Moore, and Timothy R. Anderson 21 May 1986 37 p
(AD-A170563; AAMRL-TR-86-011) Avail: NTIS HC A03/MF A01 CSCL 05/7

The acoustic-phonetic structure of speech produced under adverse circumstances such as high levels of noise, vibration, and stress, has received little investigation. The purpose of this study was to provide some preliminary data concerning speech produced under high sustained acceleration. Acoustical measurements were made of a set of words spoken by two subjects at 1 G and +6 Gz. Words produced under acceleration differed from words produced at 1 G in both spectral and durational characteristics. The formant shifts observed were similar for both speakers. The first format increased for the majority of vowels. The second format tended to be lower for the front vowels /i, epsilon/ and higher for the back vowel (u). Acceleration resulted in a raising of the first formant and a lowering of the second formant relative to the same diphthongs produced at 1 G. Author (GRA)

N87-12747# Illinois Univ., Urbana. Coordinated Science Lab.
A NEW METHOD OF SYNTHETIC APERTURE RADAR IMAGE RECONSTRUCTION USING MODIFIED CONVOLUTION BACK-PROJECTION ALGORITHM
Mita D. Desai Aug. 1986 99 p
(Contract N00014-84-C-0149)
(AD-A170652; UILU-ENG-86-2225) Avail: NTIS HC A05/MF A01 CSCL 17/9

Synthetic Aperture Radar (SAR) imager reconstruction falls into the class of inverse (deconvolution) problems. A spotlight mode SAR system obtains projections of the ground areas at various look angles. The image of the ground area is then reconstructioned from this set of projections. The Convolution Back-Projection (CBP) algorithm is widely used in Computer Aided Tomography (CAT). In this work, the CBP algorithm has been modified so that it can be applied to image reconstruction from SAR data. A quantitative evaluation using extensive computer simulation of the CBP algorithm for spotlight mode SAR is presented. Its performance is then compared with the FFT method with respect to parameters such as multiplicative noise ratio (MNR), central processing unit CPU time, and computational complexity. It has been shown that the CBP-SAR algorithm is a high quality reconstruction method that can be implemented in real-time. The parallelism inherent in the algorithm can be exploited for parallel architectures that are suitable for very large scale integration implementation. Samples from each projection can be summed into the proper pixels in the final image, as required by the back-projection operation, so that the final image is produced shortly after the final projection has arrived. Author (GRA)

N87-12748# Harry Diamond Labs., Adelphi, Md.
ELECTRIC AND MAGNETIC FIELD COUPLING THROUGH A BRAIDED-SHIELD CABLE: TRANSFER ADMITTANCE AND TRANSFER IMPEDANCE
Huey A. Roberts, Susan B. MacDonald, and Joseph Capobianco Jul. 1986 24 p
(AD-A171490; HDL-TR-2090) Avail: NTIS HC A02/MF A01 CSCL 20/14

Electric and magnetic coupling parameters are measured for a braided-shield cable. Starting with a general solution for the internal response of an externally excited cable, simple expressions which relate the coupling parameters to the internal and external currents and voltages result when the electrically short line approximation is used. These expressions are applied to experimental configurations in which the external excitation is either predominately magnetic or electric, and the internal loading is configured to exclude either the electrically or magnetically induced internal currents. The experimental results are compared with theoretical calculations appearing in the literature, and the relative importance of the electric and magnetic coupling effects is discussed. Author (GRA)

N87-12749# Texas A&M Univ., College Station. Dept. of Physics.
MEASUREMENT AND CALCULATION OF THE STOKES OR MUELLER MATRIX FOR THE SCATTERING OF ELECTROMAGNETIC RADIATION FROM IRREGULAR PARTICLES Final

Report, 1 Jul. 1983 - 31 May 1986
Edward S. Fry, George W. Kattawar, and Chia-Ren Hu 14 Sep. 1986 9 p
(Contract DAAG29-83-K-0074)
(AD-A171502; ARO-19938.7-GS) Avail: NTIS HC A02/MF A01
CSCL 20/3

This work significantly advances the understanding of electromagnetic interactions with small particles whose dimensions are of the order of a wavelength. A joint theoretical experimental approach is used so that theoretical predictions could be provided with experimental back up and vice versa. Extensive results on electromagnetic interactions with cubes and sphere multiplets have been obtained. Beautiful symmetry theorems for forward and backward scattering have been discovered. A major theoretical bonus has been the formulation of a new and very efficient method for obtaining electromagnetic scattering properties of an arbitrarily shaped particle which is built from smaller particles whose scattering has been determined. GRA

N87-12750# Lawrence Livermore National Lab., Calif.
NEW ELECTROMAGNETIC EFFECTS ASSOCIATED WITH CAVITY-BACKED APERTURES
J. W. Ziolkowski 1986 6 p Presented at the URSI International Symposium on Electromagnetic Theory in Budapest, Budapest, Hungary, 25 Aug. 1986
(Contract W-7405-eng-48)
(DE86-008768; UCRL-93482; CONF-860849-1) Avail: NTIS HC A02/MF A01

A number of canonical problems that describe coupling through apertures into enclosed regions have been solved. The scattering data generated by these cavity-backed aperture (CBA) solutions share a common property: they are dominated by resonance features closely connected to the presence of the cavity. The behavior of these CBA resonance features will be described for variations in frequencies, angles of incidence, look angles, aperture sizes, and interior object characteristics. In particular, it will be demonstrated that standard bistatic cross-sections contain information about the interior of the cavity. DOE

N87-12751# California Univ., Berkeley. Electronics Research Lab.
STABILIZING EFFECTS OF FINITE-AMPLITUDE RF WAVES ON THE INTERCHANGE INSTABILITY
T. F. Otani 28 Feb. 1986 26 p
(Contract DE-AS03-76ET-53064)
(DE86-013042; UCB/ERL-M-86/18) Avail: NTIS HC A03/MF A01

The effects of the presence of a finite-amplitude RF wave on the interchange instability are studied theoretically in a three-dimensional quasineutral Darwin two-fluid system. An exact energy conservation law is developed for the system equations. The perturbed dynamical quantities are expanded to second order in the fluid displacements and it is demonstrated that a Lagrangian exists for the system. The interchange perturbation energy is calculated and terms associated with the perturbed magnetic potential energy are analyzed. For the terms studied, it is found that no stabilization of the incompressible interchange mode occurs unless the RF wave has a parallel-propagating component, and that coupling to perpendicular-propagating sidebands does not influence the stability of perpendicularly-propagating interchange modes. The stabilizing influence of these terms also does not depend directly on the presence of RF field gradients. The analysis suggests a physical mechanism by which RF stabilization can occur - the RF wave stabilizes the interchange mode by forcing the mode to bend magnetic field lines. DOE

N87-12752# Los Alamos National Lab., N. Mex.
CIRCUIT CONSIDERATIONS FOR REPETITIVE RAILGUNS
M. Honih 1986 8 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract W-7405-eng-36)
(DE86-012369; LA-UR-86-2043; CONF-860674-9) Avail: NTIS HC A02/MF A01

Railgun electromagnetic launchers have significant military and scientific potential. They provide direct conversion of electrical energy to projectile kinetic energy, and they offer the hope of achieving projectile velocities greatly exceeding the limits of conventional guns. With over 10 km/sec already demonstrated, railguns are attracting attention for tactical and strategic weapons systems and for scientific equation-of-state research. The full utilization of railguns will require significant improvements in every aspect of system design projectile, barrel, and power source - to achieve operation on a large scale. This paper will review fundamental aspects of railguns, with emphasis on circuit considerations and repetitive operation. DOE

N87-12753# International Centre for Theoretical Physics, Trieste (Italy).
PROPAGATION OF ELECTROMAGNETIC WAVES IN SUPERLATTICES
Hang Shi and Chien-hua Tsai Aug. 1985 19 p
(DE86-702660; IC-85/163) Avail: NTIS (US Sales Only) HC A02/MF A01

The propagation characteristics of electromagnetic waves in infinite and semi-infinite superlattice media are discussed with special reference to the dispersions, attenuations and densities of states of various modes of polarization. DOE

N87-13291# Rome Univ. (Italy). Dipt. di Energetica.
BISTABILITY IN NONLINEAR WAVEGIUDES
M. Bertolotti, C. Sibilia, and I. Anselmi *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

N87-13294# Communications Research Centre, Ottawa (Ontario). Optical Communications Program.
OPTOELECTRONIC BROADBAND SWITCHING FOR COMMUNICATIONS AND SIGNAL PROCESSING
R. I. MacDonald and D. K. W. Lam *In* AGARD Guided Optical Structures in the Military Environment May 1986 10 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

N87-12954# Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSATING AURORAS ON FREQUENCY-TIME CHARACTERISTICS OF RADIO SIGNALS REFLECTED FROM AURORAL IONOSPHERE Abstract Only
A. A. Arykov, I. N. Bardeyev, A. N. Vasilyev, V. G. Korotkov, A. M. Royzen, and S. A. Rumyantsev *In its* USSR Report: Earth ScienceS (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 243-246 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12955# Joint Publications Research Service, Arlington, Va.
PHASE FLUCTUATIONS OF IONOSPHERE RADIO SIGNALS Abstract Only
V. D. Gusev and M. B. Vinogradova *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 247-252 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12956# Joint Publications Research Service, Arlington, Va.
TRANSVERSE RESONANCES OF EARTH-IONOSPHERE WAVE GUIDE IN AURORAL REGION Abstract Only
V. S. Smirnov and A. A. Ostapenko *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 253-257 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12957# Joint Publications Research Service, Arlington, Va.
REGULAR NOISE BACKGROUND IN VLF-RADIATION AND WORLD THUNDERSTORM CENTERS Abstract Only
G. I. Druzhin, T. V. Toropchinova, and V. I. Shapayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 258-264 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12958# Joint Publications Research Service, Arlington, Va.
SPATIAL RADIO WAVE ATTENUATION DURING VERTICAL SOUNDING OF IONOSPHERE Abstract Only
P. F. Denisenko, V. I. Vodolazkin, and G. G. Vertogradov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 322-325 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-13149# AEG-Telefunken, Ulm (West Germany). Abteilung H14E27.
OBSTACLE-WARNING RADAR FOR HELICOPTERS [DAS HINDERNISWARN-RADAR FUER HUBSCHRAUBER - EINE ANTHROPOTECHNISCHE PROBLEMSTELLUNG]
G. M. Och *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 25-33 in GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics.*

N87-12754# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MEASUREMENT OF TIME-DEPENDENT ELECTRIC CURRENT WITH ROGOWSKI COIL [MEDIDA DE CORRENTE ELETRICA VARIAVEL NO TEMPO COM BOBINA DE ROGOWSKI]
R. S. Dallaqua and Edson DelBosco Apr. 1986 23 p in PORTUGUESE; ENGLISH summary
(INPE-3875-RPE/506) Avail: NTIS HC A02/MF A01

An apparatus to measure time-dependent electric current known as the Rogowski coil is described. The characteristic parameters which define it, the active integrator network, the calibration process of the Rogowski/integrator coil set, and the results of the experiment developed at INPE are presented. Author

N87-12755# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CONSTRUCTIVE AND OPERATIONAL CHARACTERISTICS OF A SYNCHRONOUS INDUCTION MOTOR [MOTOR SINCRONO DE INDUCAO: CARACTERISTICAS CONSTRUTIVAS E OPERACIONAIS]
Mario Cesar Ricci Aug. 1986 38 p in PORTUGUESE; ENGLISH summary
(INPE-3976-RPE/517) Avail: NTIS HC A03/MF A01

The constructive and operational characteristics of a Synchronous Induction Motor are described. A qualitative general torque equation is obtained and start adverse operation is analysed. Motor performance curves are presented when operated as a synchronous or stepping motor. Author

N87-12756*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DEVELOPMENT OF LOW-TEMPERATURE TRANSISTOR MODULES TO IMPROVE THE MSFC MID-INFRARED ARRAY Final Report
C. M. Telesco, R. Decher, and P. Peters Oct. 1986 11 p
(NASA-TM-86566; NAS 1.15:86566) Avail: NTIS HC A02/MF A01 CSCL 09A

This report describes the low-temperature transistor modules designed for use with the MSFC mid-infrared array. The modules were developed in the Space Science Laboratory at Marshall Space Flight Center with Center Director's Discretionary Funds. The transistors (JFETs), which operate at a temperature of 77 K, are epoxied to a copper surface attached to a Teflon substrate. The module substrate insulates the JFETs from the 1.5K detector work surfaces and provides a convenient mounting structure for additional components such as solder pins. These modules have maintained their structural integrity during repeated temperature cycling, and they have to be convenient during maintenance and servicing of the infrared array. Author

N87-12757# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STABILIZATION OF VOLTAGE-CONTROLLED OSCILLATORS THROUGH RESONANT CAVITIES [ESTABILIZACAO DE OSCILADORES CONTROLADOS POR TENSAO ATRAVES DE CAVIDADES RESSONANTES]
Paulo Mello Marshall and Carlos E. Santana Jul. 1986 14 p in PORTUGUESE; ENGLISH summary
(INPE-3941-RPE/512) Avail: NTIS HC A02/MF A01

Described is a design procedure for cavity stabilization of voltage-controlled oscillators. The procedure is applied to the design of a voltage controlled oscillator, mechanically tuned in the 0.95 GHz to 1.35 GHz frequency band. Author

N87-12758# Pennsylvania State Univ., University Park. Materials Research Lab.
NEW ULTRA LOW PERMITTIVITY COMPOSITES FOR USE IN CERAMIC PACKAGING OF Ga:As INTEGRATED CIRCUITS Annual Report, 1 Aug. 1984 - 31 Jul. 1985
L. E. Cross 18 Sep. 1985 70 p
(Contract N00014-84-K-0721)
(AD-A168877) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report documents work performed to develop materials systems for use in the ceramic packaging of Ga:As integrated circuits. Topics under study at Penn State are: dielectrics produced from Macro-Defect-Free (MDF) cements. Both aluminate and silicate based cements have been studied. The objectives of the first year's work have been to show that suitable test tablets can be produced which exhibit dielectric losses less than 1% into the frequency range of 2.5 GHz. Current work is focused upon lowering the permittivity level using silica microballoons dispersed in the matrix. Sol-gel preparation of both thick (25 microns) and thin (0.5 microns) SiO_2 and silica:alumina films has shown that in the diphasis system, it is possible to produce crack-free monoliths with permittivities in the range 1.6 to 2.0 and loss tangents below .003. In the thin films, capping of columnar sputtered etched films has been demonstrated. For etched Schott and Vycor glass structures, permittivities in the range 2.5 to 3.0 have been measured with excellent low loss properties. Sputtered silicon films have been sucessfully etched to yield highly planar columnar structures up to 25 microns meters thick. Experiments are in progress to convert the silicon to SiO_2 by an oxidation step and capping of the columnar structure using sol-gel coatings has been achieved. In a parallel program at Interamics, new families of borosilicate glass bonded alumina ceramics are being developed. GRA

N87-12759# Stanford Univ., Calif. Information Systems Lab.
SIGNAL ESTIMATION, SCATTERING THEORY AND INTERPOLATION PROBLEMS IN ONE AND TWO DIMENSIONS Final Report, 1 Jan. 1983 - 31 Dec. 1985
Thomas Kailath 28 Feb. 1986 32 p
(Contract DAAG29-83-K-0028)
(AD-A168969; ARO-19876.47-MA) Avail: NTIS HC A03/MF A01 CSCL 09/5

This document reviews research in these fields: (1) Inverse cattering Theory; (2) VLSI and Parallel Architectures in Signal rocessing; (3) Adaptive Identification and Signal Processing; and) Stochastic System Modeling and Realization. GRA

87-12760# Michigan Univ., Ann Arbor. Solid-State Electronics ab.
ILLIMETER-WAVE HETEROJUNCTION TWO-TERMINAL DE-CES Final Report, 22 Jul. 1982 - 31 May 1986
S. Dogan, J. R. East, M. E. Elta, and G. I. Haddad May 1986 3 p
ontract N00014-82-K-2040)
D-A168985; Rept-020046-F) Avail: NTIS HC A10/MF A01 SCL 09/1
The objective of this study is to investigate the performance heterojunction MITATT (mixed tunnel-avalanche transit time) odes at millimeter-wave frequencies. Along with the heterojunction ITATT diodes, GaAs double-drift IMPATT (impact ionization valanche transit-time) diodes were also fabricated and their RF rformance were evaluated. GRA

87-12761# North Carolina Univ., Chapel Hill. Dept. of Computer cience.
VLSI-BASED HIGH-PERFORMANCE RASTER IMAGE SYSTEM nal Report, 19 Sep. 1983 - 18 Mar. 1986
onry Fuchs and John Poulton 8 May 1986 56 p
ontract DAAG29-83-K-0148; Grant NSF ECS-83-00970)
D-A169068; ARO-21107.3-EL-A) Avail: NTIS HC A04/MF A01 SCL 09/5
Our research objective is to create affordable, high-rformance, 3-D raster display systems that harness the highly rallel computational power of custom VLSI circuits. We want to ake this power available in an open system that encourages vention of new parallel algorithms for image generation and image ocessing. The system has many potential applications including ght and tactical displays, computer-aided mechanical design, and edical diagnosis and therapy. As in other systems, ours includes array of memory chips forming an image buffer from which the deo screen is refreshed. The novel feature of our design is that r memory chips have been custom-designed to include proces-g circuitry so that each pixel (dot on display) can carry out its m image-generation calculations. Calculations are distributed roughout each chip in such a way that only a very small nount of circuitry is required for each pixel. In our current chips, s processing circuitry takes up about one-third of the total area, th the remainder devoted to pixel memory. During the three ars of this work, we have achieved significant experimental sults. We have developed algorithms for fast image generation, cluding very rapid rendering of spheres and shadow-casting (our stem is the only graphics machine, to our knowledge, that can nder true shadows in real time). GRA

7-12762# Texas Technological Univ., Lubbock. Pulsed Power 5.
ORDINATED RESEARCH PROGRAM IN PULSED POWER YSICS Annual Report, 10 Jan. 1984 - 31 Oct. 1985
Kristiansen, G. Schaefer, K. Schoenbach, and H. Krompholz Dec. 1985 209 p
ant AF-AFOSR-0032-84)
)-A169113; AFOSR-86-0305TR) Avail: NTIS HC A10/MF A01 CL 10/2
The program's, related to pulsed power research, main phasis is on gaining a better understanding of repetitive opening d closing switch phenomena. The main effort is on diffuse charge opening switch phenomena. The main effort is on diffuse charge opening switches but considerable progress has also in made on understanding and describing fundamental, transient charge phenomena. Some effort has also been given to studies electrode erosion and insulator damage in high power closing tches. In addition several smaller studies have considered ous novel ideas and concepts to determine their potential for her investigations. GRA

N87-12763# Department of the Air Force, Washington, D.C.
THE DEPARTMENT OF DEFENSE VERY HIGH SPEED INTEGRATED CIRCUIT (VHSIC) TECHNOLOGY AVAILABILITY PROGRAM PLAN FOR THE COMMITTEES ON ARMED SERVICES, UNITED STATES CONGRESS
30 Jun. 1986 81 p
(AD-A169250) Avail: NTIS HC A05/MF A01 CSCL 09/5
The House and Senate Conferees on Armed Services requested that the Secretary of Defense develop a plan to be submitted to the Committees on Armed Services of the Senate and the House of Representatives for a program to ensure that Very High Speed Integrated Circuit (VHSIC) technology is made available to weapon system developers as VHSIC components become available and mature. This report will show in summary form how all of the activities of the VHSIC program are directly aimed at making the most advanced integrated circuit technology available to weapon system developers. Author (GRA)

N87-12764# Houston Univ., Tex. Dept. of Electrical Engineering.
DEVELOPMENT OF A NUMERICAL PROCEDURE TO TREAT WIRES ATTACHED TO ARBITRARILY SHAPED CONDUCTING BODIES Final Report, 1 Sep. 1983 - 28 Feb. 1986
Donald R. Wilton and Stuart A. Long 15 Apr. 1986 84 p
(Contract DAAG29-83-K-0127)
(AD-A169384; ARO-21098.1-EL) Avail: NTIS HC A05/MF A01 CSCL 09/5
A numerical analysis procedure was developed which modeled wire radiating structures, conducting surfaces, and the junctions between them. In addition, an experimental investigation was undertaken to determine the admittance of a monopole antenna attached to a conducting box-a configuration which models several actual radiating systems. Experimental measurements and numerically predicted data were compared with good correlation noted. GRA

N87-12765# Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE 1984 IR AND D (INDEPENDENT RESEARCH AND DEVELOPMENT) ADVANCED PACKAGING STUDY
G. V. Clatterbaugh and H. C. Charles, Jr. Jun. 1986 41 p
(Contract N00024-85-C-5301)
(AD-A169388; JHU/APL/TG-1353) Avail: NTIS HC A03/MF A01 CSCL 09/1
An advanced multiyear electronic packaging project has been started. The project is a comprehensive interactive one involving theory, modeling, structure fabrication, and reliability testing. Highlights of the first year's activities are presented in this report. Important results include: the creation of integrated thermal and thermomechanical models, the prediction of lifetimes under environmental and operational stress conditions, model verification and validation by carefully controlled experimentation, development of assembly techniques, and the invention of a new method for preparing controlled solder joint height and geometry. GRA

N87-12766# Energy Research Corp., Danbury, Conn.
AIRCRAFT BATTERY STATE OF CHARGE AND CHARGE CONTROL SYSTEM Interim Report, 1 Jul. 1984 - 30 Jun. 1985
Sivaswamy Viswanathan and Allen Charkey Feb. 1986 60 p
(Contract F33615-83-C-2435)
(AD-A169411; AFWAL-TR-85-2104) Avail: NTIS HC A04/MF A01 CSCL 10/2
This Interim Report describes work done in developing an aircraft battery state of charge and charge control system. The basis for this system developed by ERC is a nickel-oxygen (NiO2) Pilot cell (0.374 Ah). This pilot cell is cycled in tandem with a nickel-cadmium battery. The oxygen pressure of the pilot cell is utilized to determine and control the state of charge of the nickel-cadmium battery. The NiO2 pilot cell baseline performance was determined during this period. The effect of using different nickel electrodes (ERC, SAFT, MARATHON) was also performed. GRA

N87-12767# Department of the Army, Washington, D. C.
TEMPERATURE AND FREQUENCY COMPENSATED ARRAY BEAM STEERING UNIT Patent Application
Kenneth D. Claborn and William C. Bailey, inventors (to Army) Filed 30 Apr. 1986 18 p
(AD-D012365; US-Patent-Appl-SN-859283) Avail: NTIS HC A02/MF A01 CSCL 09/5

Beam pointing errors and sidelobes resulting from temperature variations on the aperture and power divider of a series phased array antenna operating at a plurality of selected operating channel frequencies and having uniformly spaced elements are compensated for by placing a temperature sensor on both the aperture and power divider and converting the respective temperature outputs to digital signals which are fed to a digital beam steering unit. A pair of programmed memories are included in the beam steering unit which respond to an address or pointer corresponding to the digitized temperature values and the selected operating frequency to read out stored digitized beam steering phase gradients and feed phase correction which are combined and sequentially applied at regular intervals to symmetrically located phase shifter pairs. A uniformly compensated beam is thereafter radiated at a predetermined phase angle. GRA

N87-12768# Department of the Air Force, Washington, D.C.
CRYOGENIC WOUND ROTOR FOR LIGHTWEIGHT, HIGH VOLTAGE GENERATORS Patent Application
Charles E. Oberly, inventor (to Air Force) Filed 23 Apr. 1986 28 p
(AD-D012370; US-Patent-Appl-SN-855047) Avail: NTIS HC A03/MF A01 CSCL 10/2

Liquid hydrogen is used to completely cool all elements of the generator including bearings, stator conductor, rotor conductor, magnetic flux shield, and excitation mechanisms. By essentially immersing the generator in liquid hydrogen, cryogenic interface problems are minimized. The conductor windings will utilize pure metals such as aluminum to minimize the weight and the ohmic heat loss in the machine. Complication of liquid helium cooling for superconducting windings and quench phenomena due to thermal instabilities in the superconductors are eliminated. The use of extremely low resistance of liquid hydrogen cooled aluminum permits heat removal in the confined space of the rotor field winding at magnetic field and current density that can exceed that of superconductors. Because iron is not required in the generator, very high voltages can be generated. GRA

N87-12769# Department of the Air Force, Washington, D.C.
Ni-Co ALLOY PLAQUE FOR CATHODE OF Ni-Cd BATTERY Patent Application
John J. Lander, inventor (to Air Force) Filed 27 Mar. 1986 14 p
(AD-D012375; US-Patent-Appl-SN-844637) Avail: NTIS HC A02/MF A01 CSCL 11/6

The present invention relates generally to Ni-Cd batteries, and, in particular, relates to the plaque material attached to the cathode. Because of the wide use of nickel-cadmium batteries, the corrosion rates of nickel and nickel-cobalt alloys are of interest to nickel-cadmium battery electrochemical theory and its technology. The plaque material of the cathode consists of a Ni-Co alloy in solid solution wherein the cobalt is by weight percent one to ten percent of the alloy. Conventional methods of applying the plaque material to the nickel core may be used. It is therefore an object of the present invention to provide an improved cathode for a nickel-cadmium battery wherein the nickel corrosion is substantially lessened in the plaque material. One process of making the plaque uses a nickel powder slurry that is applied to a nickel-plated steel core. This is then sintered at a high temperature which results in a very porous structure and an welding of the nickel grains to the core. This plaque is then soaked in appropriate salts to make either a positive or a negative plate; nickel salts make a positive plate and a cadmium salts a negative plate, for example. After impregnation, the plaque is placed in an electrolyte and an electric current is passed therethrough to convert the salts to their final form. In the nickel-cadmium cell, nickel hydroxide is the active material in the positive plate. GRA

N87-12770# Department of the Air Force, Washington, D.C.
UNIQUE MECHANIZATION TO FAULT ISOLATE FAILURES OF AN ELECTRON TUBE RADIO FREQUENCY (RF) AMPLIFIER AND ITS HIGH VOLTAGE POWER SUPPLY Patent Application
Daniel G. Miller, inventor (to Air Force) Filed 4 Mar. 1986 11 p
(AD-D012376; US-Patent-Appl-SN-835923) Avail: NTIS HC A02/MF A01 CSCL 09/5

An electronics circuit for improving the fault isolation of failures between an electron tube radio frequency (RF) amplifier and its high voltage power supply is disclosed. High voltage power supplies control their output voltage by comparing a feedback voltage against a reference. This comparison is used to develop an error voltage which, in turn, drives a pulsewidth modulator that corrects the feedback voltage to the reference. The output of a digital-to-analog converter (DAC) is used as the reference voltage. The DAC is driven by a counter which would count to the correct reference voltage represented by a specific count. The final count is determined by a comparator which compares the counter output to the desired final counter and stops the counter when it is reached. GRA

N87-12771# Air Force Weapons Lab., Kirtland AFB, N. Mex.
PRELIMINARY MATERIAL TESTING OF CERAMIC AND WOOD Final Report, 1 Feb. - 1 May 1985
Raymond W. Nethers and David W. Metzger May 1986 10 p
(AD-A169557; AFWL-TN-85-47) Avail: NTIS HC A02/MF A01 CSCL 13/3

Results of preliminary tests of various construction materials subjected to high voltage electrical discharge are reported along with test conduct. Two high voltage construction materials, a wood post and a ceramic insulator, were tested. As a corollary a typical wood fastening system, similar to a TRESTLE joint, was tested. Flashing over of the ceramic insulator caused no damage, while flashing over of the wood at high overvoltages causes considerable damage. Fastening systems in sparse pattern does not appear to change the standoff voltage of the wooden beam used as an insulator. GRA

N87-12772# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Sciences.
COMPACTION WITH AUTOMATIC JOG INTRODUCTION M.S. Thesis
F. M. Maley May 1986 37 p
(Contract N00014-80-C-0622)
(AD-A169679; VLSI-MEMO-86-316) Avail: NTIS HC A03/MF A01 CSCL 09/5

This thesis presents an algorithm for one-dimensional compaction of VLSI layouts. It differs from older methods in treating wires not as objects to be moved, but as constraints on the positions of other circuit components. These constraints are determined for each wiring layer using the theory of planar routing. Assuming that the wiring layers can be treated independently, the algorithm minimizes the width of a layout, automatically inserting as many jogs in wires as necessary. It runs in time 0(n4) on input of size n. Several heuristics are suggested for improving the algorithm's practical performance. The compaction algorithm takes as input a data structure called a sketch, which explicitly distinguishes between flexible components (wires) and rigid components (modules). The algorithm first finds constraints on the positions of modules that ensure enough space is left for wires. Next, it solves the system of constraints by a standard graph-theoretic technique, obtaining a placement for the modules. It then relies on a single-layer router to restore the wires to each circuit layer. An efficient single-layer router is already known; it is able to minimize the length of every wire, though not the number of jogs. As given, the compaction algorithm applies only to a VLSI model that requires wires to run a rectilinear grid. This restriction is needed only because the theory of planar routing (and single-layer routers) has not yet been extended to other models. GRA

N87-12773# Illinois Univ., Urbana. Computer Systems Group.
TOTALLY SELF-CHECKING CIRCUITS AND TESTABLE CMOS

CIRCUITS Ph.D. Thesis
Niraj K. Jha Jun. 1986 123 p
(Contract N00039-80-C-0556)
(AD-A189756; CSG-51; UILU-ENG-86-2217) Avail: NTIS HC A06/MF A01 CSCL 09/5

A Totally Self-Checking (TSC) circuit belongs to a class of circuits used for Concurrent Error Detection (CED) purposes. It consists of a functional circuit that has encoded inputs and outputs and a checker that monitors these outputs and gives and error indication. It is known that the traditional stuck-at fault model is not sufficient to model realistic physical failures. Techniques for implementing existing gate-level TSC circuits in CMOS, Domino-CMOS and standard CMOS technologies, so that they are TSC with respect to physical failures, are described. Design methods which reduce the transistor count, delay, and the number of tests of TSC checkers are also given. Another problem in the area of TSC circuits concerns embedded checkers whose inputs are not directly controllable. If they do not get all the required codewords to test them they cannot be guaranteed to be TSC. A new encoding technique and a design procedure to solve this problem are presented. It has been shown previously that the two-pattern tests used to test CMOS circuits can be invalidated by timing skews. A necessary and sufficient condition is derived to find out whether or not an AND-OR or and OR-AND CMOS realization exists for a given function so that a valid test set can always be found, even in the presence of arbitrary timing skews. A new Hybrid CMOS realization is introduced to take care of the cases in which this is not possible. GRA

N87-12774# Department of the Air Force, Washington, D.C.
HIGH FREQUENCY, HIGH VOLTAGE MOSFET ISOLATION AMPLIFIER Patent Application
Jones, inventor (to Air Force) et al Filed 3 Jun. 1986 24 p
(AD-D012403; US-Patent-Appl-SN-870045) Avail: NTIS HC A02/MF A01 CSCL 09/5

The present invention utilizes a high voltage isolation amplifier as the drive means for the inductor of a programmable microwave attenuator. A pair of power MOSFET devices are used to control the current flow through a magnetic yoke. The power MOSPET devices cooperate with floating operational amplifier drive circuits to act as a transconductance amplifiers and pass a load current according to command. The MOSFET isolation amplifier apparatus allows stable high frequency linear operation of MOSFET power stages and provides precise regulation of a load current through a magnetic yoke load. Variations of transfer characteristics and input parameters in the MOSFET power stages are corrected by use of a feedback signal which is generated in a current sense resistor by the load current. Such a power stage allows the implementation of isolation amplifiers which can provide high power high frequency linear regulation at elevated voltages and currents. GRA

N87-12775# Department of the Air Force, Washington, D.C.
IN-LINE DETERMINATION OF PRESENCE OF LIQUID PHASE MOISTURE IN SEALED IC PACKAGES Patent Application
N. K. Annamalai, inventor (to Air Force) Filed 19 May 1986 14 p
(AD-D012408; US-Patent-Appl-SN-864222) Avail: NTIS HC A02/MF A01 CSCL 09/3

The present invention includes an aparatus and a process for detecting moisture in sealed Integrated Circuit (IC) packages from the effect of such moisture upon the electrical characteristics of the devices. When the conductance of an IC is measured as a function of temperature across two selected pins in the absence of moisture, a decrease in conductance is seen as the temperature decreases. When moisture is present in the form of water, conductance will exhibit a sharp increase. Moisture present in the package condenses on the chip when it is called. Hence, a change in the conductance slope from positive to negative with respect to temperature, as the chip is cooled, indicates the presence of moisture in the liquid phase. Similarly, the conductance will decrease sharply when the water freezes. The presence of moisture is revealed by taking comparative measurements of conductance while cooling and heating the integrated circuit. The four sharp transitions are the following: (1) water condensing on the chip; (2) the super called water freezing into ice; (3) ice melting into water; and (4) water evaporating into the cavity. The change in conductance is quite large compared to the change in capacitance when moisture is present in the package. GRA

N87-12776# Department of the Air Force, Washington, D.C.
INTERRUPT CONTROL SWITCH INTERFACE SYSTEM Patent Application
Buddy L. Holmes, inventor (to Air Force) Filed 10 Apr. 1986 60 p
(AD-D012414; US-Patent-Appl-SN-849991) Avail: NTIS HC A04/MF A01 CSCL 09/2

Switch contacts may be monitored without pulling them. The apparatus comprises an input port module and up to eight switch reader modules, with 128 switch contacts to each. The input port module has four Z80 PIOs providing a total of eight ports for the switch reader modules, and a S-100 bus to a processor. In each switch reader module, a clock provides a four-phase cycle. An address counter cycles to address the 128 switch contacts. In a RUN mode, the operation is to address a switch contact via a multiplex unit on phase one, load the data into a latch on phase two, the output of the latch being the input of a 128-bit shift register, compare the current and previous states represented by the inputs and outputs of the shift register on phase three, advance the shift register on phase four, and advance the address counter on phase one for reading the next switch contact. During phase three, if the switch contact being addressed has changed state, the comparator generates a strobe pulse which is supplied to the port for the switch reader to initiate an interrupt to the processor. At the same time that a strobe pulse is generated, a scan inhibit command is supplied from the comparator to stop the clock. Data from the address counter and the latch output are supplied via the input port module to the processor. The processor then returns a ready signal to resume the scan. There is also a LOAD mode using 512 (4 X 128) read operations to cycle the clock and load the 128 bits of the shift register. GRA

N87-12777# Washington Univ., Seattle. Dept. of Computer Science.
DECLARATIVE DESCRIPTIONS FOR VLSI GENERATORS Interim Report
Meei-Chiueh Y. Liem Jun. 1986 115 p
(Contracts MDA903-85-K-0072; ARPA Order 4563)
(AD-A169952; TR-86-08-06-03) Avail: NTIS HC A06/MF A01 CSCL 09/5

This thesis presents a declarative generator model which can be used to guide the generation of a circuit in VLSI design. The descriptions in the model provide four equivalent representations of a circuit. They are the layout description, the mixed mode description, the schematic description, and the functional description. Each serves a unique purpose in the VLSI design process. They are correlated through corresponding components. These descriptions are declarative, abstract, robust, and structured in a hierarchical manner. The syntax and semantics of the declarative descriptions are introduced. Their applications are illustrated by examples. The declarative descriptions are shown to greatly facilitate the VLSI design process and serve as a comprehensive tool that documents the designer's ideas as well as the complexities of a circuit. Author (GRA)

N87-12778# Utah Univ., Salt Lake City. Dept. of Electrical Engineering.
EXPERIMENTAL VERIFICATION OF SOLITON THEORY USING A MICROWAVE CROSSED-FIELD AMPLIFIER Final Report, Sep. 1982 - Sep. 1985
Stephen W. Shpock Apr. 1986 71 p
(Contract F30602-82-C-0161)
(AD-A170011; RADC-TR-85-271) Avail: NTIS HC A04/MF A01 CSCL 20/3

The soliton approach of describing the operation of a microwave crossed-field amplifier (CFA) is experimentally investigated

using the Varian SFD-262 S-band CFA as the test vehicle. Theoretical predictions of voltage characteristics with corresponding observed data show close agreement over a wide range of magnetic field values. A detailed description of the experimental process is given as well as a working introduction to soliton theory. Author (GRA)

N87-12779# Aerospace Corp., El Segundo, Calif.
PICOSECOND OPTOELECTRONIC DIAGNOSTICS OF FIELD EFFECT TRANSISTORS
Donald E. Cooper and Steven C. Moss 15 Jun. 1986 15 p
(Contract F04701-85-C-0086)
(AD-A170503; TR-0086(6945-06)-3; SD-TR-86-42) Avail: NTIS HC A02/MF A01 CSCL 09/1

The frequency-dependent scattering parameters of an unpackaged GaAs field effect transistor have been measured using picosecond optoelectronic diagnostic techniques. The large bandwidth available and simple de-embedding procedures make these techniques very promising for characterization of devices operating in the millimeter-wave region. Author (GRA)

N87-12780 Department of the Navy, Washington, D. C.
ZINC/AIR CELL CATHODE Patent
John J. McEvoy, inventor (to Navy) Issued 29 Apr. 1986 5 p
(AD-D012425; US-Patent-4,585,710; US-Patent-Appl-SN-726443; US-Patent-Class-429-27) Avail: US Patent and Trademark Office CSCL 10/3

This invention relates to a cathode for an air depolarized cell in which the hydrophobic catalytic cathode contains or in integrally drophobi catalytic cathode contains or is integrally coated with, on the surface adjacent the cell separator, an absorbent material such as the gelling material used in the anode. The absorbent material, integrated with the cathode surface, adheres the separator to the cathode thereby preventing delamination and provides an electrolyte reservoir for the hydrophobic cathode. GRA

N87-12781# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
INVESTIGATION OF A NEW CONCEPT IN SEMICONDUCTOR MICROWAVE OSCILLATORS Annual Report, 1 May 1985 - 30 Apr. 1986
James A. Cooper, Jr. 20 May 1986 32 p
(Grant AF-AFOSR-0193-85)
(AD-A170772; AFOSR-86-0527TR) Avail: NTIS HC A03/MF A01 CSCL 09/5

The goal of this research is to fabricate and characterize a new type of semiconductor device known as a contiguous-domain transferred oscillator. This device differs from existing semiconductor oscillators in several fundamental ways, and should be capable of direct electronic tuning in the range from a few gigahertz to a few hundred gigahertz. During the first year of this project, test chips were designed, masks were made, and a processing schedule was worked out. Three aspects of the processing required special attention: implant activation, resistive gate formation, and silicon nitride deposition. Uncapped flash annealing was used for implant activation, and satisfactory results were achieved. GRA

N87-12782# Purdue Univ., West Lafayette, Ind. School of Electrical Engineering.
INVESTIGATION OF A NEW CONCEPT IN SEMICONDUCTOR MICROWAVE OSCILLATORS Interim Report
James A. Cooper, Jr. 13 Nov. 1985 4 p
(Grant AF-AFOSR-0193-85)
(AD-A170831; AFOSR-86-0597TR) Avail: NTIS HC A02/MF A01 CSCL 09/5

Our project centers on the fabrication and characterization of a new type of millimeter-wave semiconductor oscillator, the so-called Contiguous-Domain Transferred-Electron Oscillator. To date, the only operational information we have about this device has been derived from computer simulation, and therefore our objective is to obtain experimental verification. The device is interesting (and potentially important) because it operates in a fundamentally different way from any existing semiconductor oscillator device, with the result that it should be capable of very high frequency oscillation (over 100 GHz) without the requirement for sub-micron drift dimensions. In addition, the oscillations are not based on a transit-time effect, and thus the frequency can be changed during operation by simply changing the rate at which carriers are admitted into the drift channel. The structure is similar to a conventional GaAs MESFET or MODFET, except that the gate is made resistive and has two contacts, one near the source and the other near the drain. We will not describe the operation of the device in detail here, but refer the reader to the original proposal and to the enclosed article. GRA

N87-12783# Columbia Univ., New York. Dept. of Electrical Engineering.
DIRECT WRITING OF MICROSTRUCTURES FOR SOLID-STATE ELECTRONICS Final Report, 1 Feb. 1984 - 31 Jan. 1986
Richard M. Osgood, Jr. 19 Apr. 1986 54 p
(Contracts F49620-84-C-0022; ARPA Order 4487; AF Proj. 2301)
(AD-A170837; AFOSR-86-0555TR) Avail: NTIS HC A04/MF A01 CSCL 09/5

This report summarizes two years of research on new laser processing techniques on opto- and microelectronics. The main results are in: (1) the demonstration of UV laser direct writing of low resistivity metal lines, and the subsequent demonstration of the usefulness of laser writing (via deposition) in the reconfiguring of an LSI circuitry; and (2) the discovery, characterization, and understanding of the techniques of light-guided etching for the fabrication of ultra-high-aspect-ratio microelectronics structures. In the case of light-guided etching, an application of the technique to optical interconnects has already been demonstrated. Author (GRA)

N87-12784# Naval Research Lab., Washington, D. C.
INPUT IMPEDANCE OF AN INFINITE LINEAR SCANNED ARRAY OF FLAT RECTANGULAR STRIPS INSIDE A DIELECTRIC LOADED PARALLEL PLATE WAVEGUIDE
S. N. Samaddar 29 Jul. 1986 58 p
(AD-A171275; NRL-MR-5830) Avail: NTIS HC A04/MF A01 CSCL 09/5

Impedance variation as a function of H-plane scan angles of an infinite linear array of flat rectangular monopoles (strips) inside a dielectric loaded parallel plate waveguide is studied both theoretically and experimentally in the S-band frequencies. In theoretical analysis simplified along the probes (monopole strips) and neglect of the effect of the gap at the junction of a probe and its coaxial feed line, were made. It is found that this simplified theory can predict qualitatively the experimental data of interest, such as input impedance. Both theory and experiments show that a dielectric slab with a relatively low dielectric constant (1.3) inserted in an appropriate manner can improve the bandwidth and impedance performance of the array. Certain experimental results show a bandwidth of about 28% with respect to the center frequency 3.5 GHz, having a VSWR <2. Another interesting result is the relation between the width W of a flat rectangular probe and the radius rho of a circular probe situated similarly inside two identical rectangular waveguides. The probe impedances or VSWR's for these situations are found to be the same, respectively, for all practical purposes when W approx. 4.882 rho, which was obtained numerically representing a correction to the electrostatic result W = 4 rho found by Wheeler. Author (GRA)

N87-12785# Naval Postgraduate School, Monterey, Calif.
TWO-DIMENSIONAL BEAMFORMING USING A FREQUENCY DOMAIN COMPLEX LEAST MEAN-SQUARES (LMS) ADAPTIVE FILTER M.S. Thesis
Francis Chan Jun. 1986 138 p
(AD-A171396) Avail: NTIS HC A07/MF A01 CSCL 09/5

The complex LMS adaptive algorithm developed by Widrow is used in the frequency domain to estimate the azimuth and elevation angles of a plane wave incident upon a planar array. The complex LMS algorithm is applied to two cases. The first case is a passive detection problem. The second case is a pulse communication problem. In both cases, complex weights are determined using

ne complex LMS algorithm which cophase all of the output lectrical signals from the planar array. Three versions of the omplex LMS algorithm are studied and their performances are ompared. Author (GRA)

87-12786# Naval Postgraduate School, Monterey, Calif.
HE ANALYSIS OF A TRANSISTOR CAP AS A HEAT DISSIPA-OR M.S. Thesis
athleen C. Bryant Jun. 1986 71 p
AD-A171398) Avail: NTIS HC A04/MF A01 CSCL 09/1

This thesis develops and utilizes electro-thermal analogies to nalyze the amount of heat dissipated in a typical transistor cap. series of parametric curves are developed to illustrate the results btained. These curves may be used by circuit designers in order o obtain a more precise estimate of the heat sink system equirements. Author (GRA)

87-12787# Lawrence Livermore National Lab., Calif.
ABRICATION OF GATE ARRAY INTERCONNECT STRUC-URES USING DIRECT-WRITE DEPOSITION PROCESSES
. Mitlitsky, J. C. Whitehead, A. F. Bernhardt, and B. M. McWilliams 986 13 p Presented at the Les Houche Winter School, France, 5 Mar. 1986
Contract W-7405-eng-48)
DE86-010785; UCRL-94494; CONF-8603122-1) Avail: NTIS C A02/MF A01

General principles of laser direct-write deposition processes re reviewed. Device interconnection of CMOS gate arrays by eans of computer-controlled, laser-induced thermochemical urface reactions is described. Maskless, automated five-minute terconnection of 1000 gate CMOS array dies is described using iscretionary laser-induced chemical vapor deposition. Eight 25-stage ring oscillators written on a single CMOS gate array die ere shown to have the device-limited performance of similar atterns manufactured by a photolithographically patterned luminum-silicon alloy. These results suggest the feasibility of using is method, Laser Pantography (LP), for rapid implementation of rototype and limited volume semi-custom VLSI circuits immediately fter their design is completed. DOE

87-12788# Science Applications International Corp., San Diego, alif.
ODIUM-SULFUR BATTERY SYSTEMS DEVELOPMENT
. J. Beninga and B. L. Butler May 1986 23 p Presented at e Intersociety Energy Conversion Engineering Conference, San iego, Calif., 25 Aug. 1986
Contract DE-AC04-76DP-00789)
DE86-011424; SAND-86-7102C; CONF-860810-12) Avail: NTIS C A02/MF A01

Results of Na-S battery systems analyses are presented. The erformance of various network configurations for a load leveling attery in the presence of multiple cell failures was assessed with e use of a computer model. Results indicate that the life of a attery can be extended by a factor of 3 to 4 with the use of a witch to assure either open circuit or short circuit failure of each ell. Other means of extending the life of the battery are presented. uture work is outlined for the effort to design a 100 MW-h Na-S ad leveling battery. DOE

87-12789# Sandia National Labs., Albuquerque, N. Mex.
THIUM AMBIENT-TEMPERATURE BATTERY RELIABILITY ROGRAM, MAY 1983-APRIL 1985
D. Jaeger, N. H. Hall, and E. V. Thomas Jun. 1986 61 p
ontract DE-AC04-76DP-00789)
E86-012247; SAND-85-1518) Avail: NTIS HC A04/MF A01

From May 1983 through April 1985 Sandia National Laborato-s continued to develop and evaluate nondestructive methodology predicting the reliability of primary lithium batteries. During this riod, considerable time was spent improving the microcalorimetry ta acquisition and processing software and completing the rve-fitting algorithm for the impedance data. All initial measure-ents were conducted, and all cells either completed the storage rtion of the text matrix or remained in storage. Some statistical analyses were completed. Several nondestructive measurement variables that correlate well with remaining capacity were identified. Finally, the status of the program was evaluated and the program was tentatively extended to October 1986. DOE

N87-12790# Sandia National Labs., Albuquerque, N. Mex.
NANOSECOND SPARK GAP SWITCHING MEASUREMENTS
J. W. Ginn, D. N. Hendricks, and M. T. Buttram Jun. 1986 5 p Presented at the 17th Power Modulator Symposium, Seattle, Wash., 23 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012279; SAND-86-0512C; CONF-860674-7) Avail: NTIS HC A02/MF A01

The switching time of gas and oil dielectric spark gaps was measured in the nanosecond and subnanosecond time regime. The observed switching characteristics of the two spark gaps were compared with those predicted by empirical formulas. The formulas used primarily were those developed in somewhat slower time regimes by J.C. Martin. For the given geometry, the switching times of both gaps were dominated by the resistive phase rather than by any inductive effects. The rise times observed from the output of the gas switch were consistently greater than those predicted for resistive phase duration in a gas spark. With charge times of from 50 to 60 ns to electric field values of from 170 to 350 kV/cm, 10% to 90% output rise times of from 2.8 to 8.2 ns were observed. The dielectric strength of the oil switch was consistent with the empirical prediction for oil breakdown. The oil gap was charged to electric field values of from 1.4 to 3.1 MV/cm with effective charge times of from 1.3 to 20 ns. Its output rise time was less than or equal to 400 ps. This result is not inconsistent with the empirical prediction for resistive phase duration in an oil spark. Measurement of times shorter than this were limited by the bandwidth of the available equipment. DOE

N87-12791# Varian Associates, Salt Lake City, Utah.
A 60 GHz GYROTRON DEVELOPMENT PROGRAM Final Report, Apr. 1979 - Jun. 1984
J. F. Shively, R. E. Bier, M. Caplan, M. K. Cheng, E. Choi, C. C. Conner, L. J. Craig, S. J. Evans, S. J. Evers, and K. L. Felch 1986 707 p
(Contract DE-AC05-84OR-21400)
(DE86-012488; ORNL/Sub-79-21453/21) Avail: NTIS HC A99/MF A01

The original objective of this program was to develop a microwave amplifier or oscillator capable of producing 200 kW CW power output at 110 GHz. The use of cyclotron resonance interaction was pursued, and the design phases of this effort are discussed. Later, however, the program's objective was changed to develop a family of oscillators capable of producing 200 kW of peak output power at 60 GHz. Gyrotron behavior studies were performed at 28 GHz to obtain generic design information as quickly as possible. The first experimental device at 60 GHz produced over 200 kW of peak power at a pulse duration of 20 microsec. Heating problems and mode interference were encountered. The second experimental tube incorporated an optimized gun location but also suffered from mode interference. The third experimental tube included modifications that reduced mode interference. It demonstrated 200 kW of peak output at 100 ms pulse duration. The fourth experimental tube, which used an older RF circuit design but in a CW configuration, produced 71.5 kW CW. The fifth experimental tube incorporated a thinner double-disc output window which improved window bandwidth and reduced window loss. This tube also incorporated modifications to the drift tunnel and cavity coupling, which had proven successful in the third experimental pulse tube tests. It produced 123 kW of CW output power at 60 GHz RF load coolant boiling and tube window failure terminated the tests. A new waterload was designed and constructed, and alternative window designs were explored. A secondary task of developing a 56 GHz CW tube produced in excess of 100 kW CW at this alternate frequency. Testing of the sixth experimental tube resulted in operation at CW output power in the range of 200 to 206 kW for an hour. The seventh tube was operated for about forty-five minutes with CW power output over 200 kW. DOE

N87-12792# Los Alamos National Lab., N. Mex.
EFFICIENT, MONOCHROMATIC, HIGH-POWER MICROWAVE GENERATOR
T. J. T. Kwan and C. M. Snell 1986 6 p Presented at the 6th International Conference on High Power Particle Beams, Kobe, Japan, 9 Jun. 1986
(Contract W-7405-eng-36)
(DE86-012385; LA-UR-86-1937; CONF-860665-8) Avail: NTIS HC A02/MF A01

Microwave generation by electron beams in virtual cathode configurations can achieve significant power levels. However, most designs inherently have two competing mechanisms generating microwaves; namely the oscillating virtual cathode and the reflexing electrons. These two mechanisms tend to interfere destructively with each other. Specifically, the reflexing electrons subject the electron beam to two-stream instability, causing considerable heating of the electron beam. In addition, the space-charge of the reflexing electrons can cause the diode independence to fluctuate, resulting in oscillations of the electron beam energy. We have investigated a novel idea to remove these undesirable effects and we found that high-power, narrow-band, and monochromatic microwaves could be generated with efficiency of 10 to 20%.DOE

N87-12793# California Univ., Berkeley. Lawrence Berkeley Lab.
ZINC/NICKEL OXIDE BATTERY MEMBRANE SEPARATOR STUDIES Final Report, 15 Jul. 1984 - 1 Jul. 1985
D. N. Bennion and J. S. Bradshaw Mar. 1986 19 p
(Contract DE-AC03-76SF-00098)
(DE86-012824; LBL-21261) Avail: NTIS HC A02/MF A01

Fourteen different macrocyclic compounds were synthesized for possible use in anionic exchange membranes and several polymerized with polyvinylbenzyl chloride. Two others were used in polyvinyl alcohol (PVA) membranes. Work continued to develop a suitable polymer material for the membranes. PVA could be cross-linked using a crown-ether dialdehyde as a cross-linking agent to produce a membrane with high ionic conductivity (0.02 mho/cm) and reasonable short-term stability in strong caustic solution at room temperatures. Selectivity of the membrane for hydroxide ions was essentially the same as that in the solution itself. Two new fabrication methods for polypropylene membranes were investigated and developed. Development of a two-dimensional code of a zinc-nickel oxide cell was begun. DOE

N87-12794# Sandia National Labs., Albuquerque, N. Mex
SAW TRANSDUCTION IN ELECTROSTRICTIVE SUBSTRATES
G. R. Laguna and B. A. Auld 1986 5 p Presented at the International Symposium on Ultrasonics, Ferroelectrics and Frequency Control, Bethlehem, Pa., 9 Jun. 1986 Prepared in cooperation with Stanford Univ.
(Contract DE-AC04-76DP-00789)
(DE86-011651; SAND-86-1347C; CONF-8606121-3) Avail: NTIS HC A02/MF A01

Using electrostrictive materials for surface acoustic wave (SAW) device substrates allows for electronic control of the frequency response of the device. Centrosymmetric materials will not be piezoelectric, but by applying a static dc biasing electric field, a piezoelectric response can be induced in the substrate. If this bias field is spatially varying, then the induced piezoelectric response will also be spatially varying. In fact, since the piezoelectric response is controlled by the dc biasing electric field, changing the bias distribution will change the response of the filter. This allows for a real-time electronically programmable SAW device. The constitutive relations for pure electrostrictive materials are manipulated to show this induced piezoelectric response under an applied electric bias field. Normal mode theory is used to obtain the response of SAW devices in which a spatially varying piezoelectric response is established. The result is similar to that for standard piezoelectric theory except that the pertinent variable now becomes the spatially varying piezoelectric response. Experimental results for several spatially varying piezoelectric patterns are presented. DOE

N87-12795# Los Alamos National Lab., N. Mex.
MODELING OF HIGH-EXPLOSIVE DRIVEN PLASMA COMPRESSION OPENING SWITCHES
A. E. Greene, I. R. Lindemuth, and J. H. Goforth 1986 8 p Presented at the 4th International Conference on Megagauss Magnetic-Field Generation and Related Topics, Santa Fe, N. Mex., 14 Jul. 1986
(Contract W-7405-eng-36)
(DE86-012421; LA-UR-86-2200; CONF-860703-8) Avail: NTIS HC A02/MF A01

The initial path of the current through a plasma compression switch is through a thin (500-nm thick) metal foil. The current explodes the foil to form the seed for the conducting plasma. The behavior of the foil at this point is the same as an exploding metal fuse for which we have a simple model. We have, therefore, chosen this model as our starting point. The fuse model assumes that the foil material is homogeneous and is characterized by a single temperature and density. The thickness of the foil is assumed to be much less than the magnetic diffusion skin depth so that the magnetic field varies linearly across the foil. For the present application we assume that the side of the foil away from the channel is fixed in space while the side by the channel is untamped. The foil/plasma will, therefore, cross the channel at the expansion velocity as the foil explodes. Equations for the electrical resistance of the foil, the magnetic fields, the motion of the foil, and the kinetic and internal energies are all solved selfconsistantly. The electrical resistivity, the pressure, and the specific energy of aluminum are taken from the Los Alamos SESAME EOS library. In the case of aluminum we have created a SESAME-style table based on the theory of More and Lee which we have modified to agree with experiment where possible. DOE

N87-12796# Los Alamos National Lab., N. Mex.
TRANSFORMERS FOR EXPLOSIVE PULSED POWER COUPLING TO VARIOUS LOADS
B. L. Freeman and W. H. Bostick 1986 10 p Presented at the 4th International Conference on Megagauss Magnetic-Field Generation and Related Topics, Santa Fe, N. Mex., 14 Jul. 1986
(Contract W-7405-eng-36)
(DE86-012425; LA-UR-86-2259; CONF-860703-7) Avail: NTIS HC A02/MF A01

Tape-wound step-up transformers have been fabricated and used with magnetic flux compression generators in the past with effective coupling coefficients of approx. 0.76. We have attempted to design some units with coefficients in the range of 0.85 to 0.92 by taking advantage of newer dielectrics. The intent is to raise the voltage stress from less than or equal to 0.39 MV/cm to the range of 0.98 to 1.97 MV/cm. This has the effect of making the secondary thinner and permitting a higher coupling efficiency. Several designs for coupling the 13.2-cm-wide by 52.8-cm-long plate generator to loads in the range of 10 to 30 with an output of approx. 1 MV have been studied. These designs must take into account that the primary of the transformer is switched into the circuit as a load in parallel with the generator's ballast inductor. A final design examines the constraints imposed by attempting to transform the output of a plate generator up to 10 MV into a high impedance load. A voltage stress of 3.9 MV/cm is required in this particular design for 140 kV per turn in the secondary winding. DOE

N87-12797# Lawrence Livermore National Lab., Calif.
ELECTRONIC ENGINEERING DEPARTMENT THRUST AREA REPORT, FY 1985
J. Hymer, ed., M. Genin, ed., S. Taft, ed., J. Canada, ed., K. Gleason, ed., and D. Sapone, ed. Apr. 1986 197 p
(Contract W-7405-eng-48)
(DE86-013172; UCRL-53700-85) Avail: NTIS HC A09/MF A01

The work of the Electronics Engineering Department Thrust Area for FY-85 is described. The work includes: diagnostics and microelectronic engineering; signal and control engineering; microwave and pulsed power engineering; computer-aided engineering; modeling and simulation engineering; and systems

engineering. Discussions on each of the thrust areas have been separately indexed for inclusion in the Energy Data Base. DOE

N87-12798# California Univ., Berkeley. Lawrence Berkeley Lab.
FEASIBILITY STUDY OF A NEW ZINC-AIR BATTERY CONCEPT USING FLOWING ALKALINE ELECTROLYTE
P. N. Ross, Jr. Apr. 1986 32 p Presented at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug. 1986
(Contract DE-AC03-76SF-00098)
(DE86-013461; LBL-21437; CONF-860810-18) Avail: NTIS HC A03/MF A01

Proof-of-principle experiments are reported for a new concept in electrically rechargeable zinc-air batteries. The zinc electrode is a porous flow-thru type using a copper foam metal substrate with zinc deposition onto the foam metal from concentrated zincate electrolyte (as used in zinc-slurry type batteries). The bifunctional air electrode employs low-cost materials, being fabricated entirely from carbon-based precursors and small amounts of nickel and/or cobalt oxide. Corrosion measurements on the graphite materials in the air electrode indicate sufficient corrosion resistance for 8000 h life on charge. A prototype single cell was constructed having 1.5 Ah capacity producing 1.2 V discharge -2.0 charge at the three hour rate and has produced stable voltages for more than 150 cycles. Based on the 1.5 Ah prototype characteristics, design calculations for a 32 kWh battery project an energy density of about 110 Wh/kg, peak power density of 140 W/kg, electrical efficiency of 60% and an attractive materials cost of less than or equal to $20 per kWh. DOE

N87-12799# Sandia National Labs., Albuquerque, N. Mex.
VERY LOW BANDWIDTH, UNATTENDED IMAGER FOR SURVEILLANCE APPLICATIONS
P. H. Eichel and C. V. Jakowatz, Jr. 1986 7 p Presented at the 30th SPIE Technical Symposium on Optics and Optoelectronic Engineering, San Diego, Calif., 17 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-013570; SAND-86-0599C; CONF-860880-14) Avail: NTIS HC A02/MF A01

The need arises in certain vehicular surveillance applications for an electronic imager that can perform without human interaction and can transmit definitive images over very low bandwidth channels. The investigators have found that line scan imagers offer particular advantages toward these ends. Specifically, the use of a line scan imager facilitates the following processing steps: (1) segmentation of the vehicle from the background, (2) automatic exposure control, (3) light level equalization prior to quantization, and (4) implementation of an adaptive sampling scheme. These processing steps together with the source encoder may be implemented on a relatively low throughput processor and achieve near real time operation. The specific encoding method used here is an extended differential pulse code modulation (DPCM). A prototype system has been developed, producing medium resolution images at less than 10K bits per frame. DOE

N87-12800# Allied Bendix Corp., Kansas City, Mo.
IMAGE ENHANCEMENT EQUIPMENT CAPABILITIES Status Report
D. G. Moore Jul. 1986 22 p
(Contract DE-AC04-76DP-00613)
(DE86-013615; BDX-613-3511) Avail: NTIS HC A02/MF A01

Three inspection problems were investigated by using image enhancement techniques. This document includes descriptions of installation and development of an image enhancement system. A detailed description of the hardware and software structures is also included. Two examples portray system capabilities. The operating parameters used on the examples are included. An outline of the developed general-purpose inspection techniques used to meet further milestones is discussed briefly. DOE

N87-12801# Johnson Controls, Inc., Milwaukee, Wis.
PERFORMANCE OF ADVANCED LEAD ACID BATTERIES FOR ELECTRIC VEHICLES
B. K. Mahato, G. H. Brilmyer, and K. R. Bullock 1986 20 p Presented at the International Power Sources Symposium, Brighton, England, 8 Sep. 1986
(Contract W-31-109-eng-38)
(DE85-011476; CONF-860913-1) Avail: NTIS (US Sales Only) HC A02/MF A01

New applications for lead-acid batteries, such as electric vehicle propulsion, demand high specific energy and power and good cycle life. A research and development program at Johnson Controls, Inc., sponsored in part by the United States Department of Energy through Argonne National Laboratory, has been underway since 1978 to develop advanced electric vehicle batteries. Cell test results on and Advanced Battery design developed under this program are described. Capacity, energy and power delivered at various discharge rates are shown. Material distribution and utilization are described, and the effects of discharge rate and temperature on the material utilization of both electrodes is determined. Cycle life data at 100% depth of discharge are also presented. DOE

N87-12802# Sandia National Labs., Albuquerque, N. Mex.
LI CORROSION RESISTANT GLASSES FOR HEADERS IN AMBIENT TEMPERATURE LI BATTERIES Patent Application
E. E. Hellstrom, inventor (to DOE) and R. D. Watkins, inventor (to DOE) Filed 11 Oct. 1985 18 p
(Contract DE-AC04-76DP-00789)
(DE86-013754; US-Patent-Appl-SN-786561) Avail: NTIS HC A02/MF A01

Glass compositions containing 10 to 50 mol% CaO, 10 to 50 mol% Al_2O_3, 30 to 60 mol% B_2O_3, and 0 to 30 mol% MgO are provided. These compositions are capable of forming a stable glass-to-metal seal possessing electrical insulating properties for use in a lithium battery. Also provided are lithium cells containing a stainless steel body and molybdenum center pin electrically insulated by means of a seal produced according to the invention. DOE

N87-12803# Department of Energy, Washington, D. C.
VERY HIGH EFFICACY ELECTRODELESS HIGH INTENSITY DISCHARGE LAMPS Patent Application
P. D. Johnson, inventor (to DOE) (California Univ., Berkeley. Lawrence Berkeley Lab.) Filed 3 Oct. 1985 13 p
(Contract DE-AC03-76SF-00098)
(DE86-013760; US-Patent-Appl-SN-783730) Avail: NTIS HC A02/MF A01

An electrodeless arc lamp comprises an outer jacket hermetically sealing and thermally protecting an arc tube inside which has an upwardly convex bottom center section. The absence of chemically reactive electrode material makes it possible to use metal halides other than iodides. The tube contains chlorides, bromides or a mixture thereof of scandium and sodium in a nearly equimolar relationship in addition to mercury and an inert gas. Good color balance can be obtained at reduced reservoir temperature and with less power loss. Reduction in wall temperature makes it possible to attain longer lamp life. DOE

N87-12804# Iowa State Univ. of Science and Technology, Ames. Heat Transfer Lab.
HEAT TRANSFER CHARACTERISTICS OF SIMULATED MICROELECTRONIC CHIPS UNDER NORMAL AND ENHANCED CONDITIONS
K. A. Park and A. E. Bergles Nov. 1985 200 p Sponsored by IBM Corp., Poughkeepsie, N.Y.
(PB86-224425; ISU-ERI-AMES-86211; HTL-35) Avail: NTIS HC A09/MF A01 CSCL 09A

The heat transfer characteristics of simulated microelectronic chips were investigated with direct immersion cooling in Freon-TF (R-113). The basic heater was 4.5 mm x 4.5mm electrically heated foil. The studies of plain heaters included natural convection, nucleate boiling, and critical heat flux. Water was included as a working fluid for natural convection. Ultrasonic agitation and heat sinks were studied as enhanced cooling methods. The height effect for single flush heaters agrees qualitatively with the conventional

theory of natural convection; however, even the widest heaters have coefficients higher than predicted because of leading edge effects. The increase of the heat transfer coefficient with decreasing width is correlated. The protruding heaters have about 15% higher coefficients than the flush heaters. Data for natural convection were also obtained for in-line and staggered arrays of flush heaters with varying distances between heaters. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics.*

N87-12805 ESDU International Ltd., London (England).
FLUID TRANSIENTS IN PIPES. ESTIMATION OF MAXIMUM PRESSURES AND FORCES IN STEAM LINES
Sep. 1986 73 p
(ESDU-86015; ISBN-0-85679-567-4; ISSN-0141-4011) Avail: ESDU

Available as part of the ESDU Sub-series on Fluid Mechanics (Internal Flow), this document gives a graphical method for estimating the time-dependent pressure changes and piping forces that follow from a rapid value closure in a one-pipe system of constant cross-section carrying superheated steam. The method also assumes a frictionless flow and ignores wave steepening effects. A computer program listing in FORTRAN is also included that applies to any gas that obeys the perfect gas law, and takes into account the effects of both wall friction and wave steepening. In that case sections of the pipeline can have different cross-sectional areas and that can be used to treat a pipeline with branched ends. Worked examples are included for both methods and in the case of the computer program show specimen print-out of the input data, and of the output which includes the time variation of pressure, velocity and density at three points in the pipeline chosen by the user together with values of maximum and minimum pressure at 25 points (a value that is also open to choice by the user). The example is run for a valve with a linear variation of area with time, and for one with a nonlinear characteristic. ESDU

N87-12806*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TIME-DEPENDENT SOLUTION FOR AXISYMMETRIC FLOW OVER A BLUNT BODY WITH IDEAL GAS, CF4, OR EQUILIBRIUM AIR CHEMISTRY
H. Harris Hamilton, II and John R. Spall Jul. 1986 40 p
(NASA-TM-87675; NAS 1.15:87675) Avail: NTIS HC A03/MF A01 CSCL 20D

A time-asymptotic method has been used to obtain steady-flow solutions for axisymmetric inviscid flow over several blunt bodies including spheres, paraboloids, ellipsoids, and spherically blunted cones. Comparisons with experimental data and results of other computational methods have demonstrated that accurate solutions can be obtained using this approach. The method should prove useful as an analysis tool for comparing with experimental data and for making engineering calculations for blunt reentry vehicles. Author

N87-12807# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
FINITE-DIFFERENCE SOLUTIONS FOR COMPRESSIBLE LAMINAR BOUNDARY-LAYER FLOWS OF A DUSTY GAS OVER A SEMI-INFINITE FLAT PLATE
B. Y. Wang and I. I. Glass Aug. 1986 121 p Sponsored in part by Natural Science and Engineering Research Council of Canada, and Defence Research Establishment, Suffield
(Contracts F-AFOSR-82-0096; DNA001-85-0368)
(UTIAS-311; ISSN-0082-5255) Avail: NTIS HC A06/MF A01

A finite difference method is used to investigate compressible, laminar boundary-layer flows of a dilute dusty gas over a semi-infinite flat plate. Details are given of the implicit finite difference schemes as well as the boundary conditions, initial conditions, and compatibility conditions for solving the gas-particle boundary layer equations. The flow profiles for both the gas and particle phases were obtained numerically along the whole length of the plate from the leading edge to far downstream of it. The finite difference solutions in the large-slip region and the small-slip region are compared with the asymptotic solutions and good agreement is achieved. The boundary-layer characteristics of interest, including the wall shear stress, the wall heat transfer rate and the displacement thickness are calculated. The alteration of the flow properties owing to the presence of particles is discussed in detail. It was found that the boundary-layer flow of a dusty gas can be divided into three distinct flow regimes which are characterized by quasi-frozen, nonequilibrium and quasi-equilibrium flows and that at a critical distance from the leading edge the particle velocity at the wall decelerates to zero and near-equilibrium is achieved between the gas and particle flows. Author

N87-12808*# Stanford Univ., Calif.
TRANSITION AND MIXING IN AXISYMMETRIC JETS AND VORTEX RINGS
Gary A. Allen, Jr. and Brian J. Cantwell Washington NASA Oct. 1986 246 p
(Grants NsG2-392; NAG2-21)
(NASA-CR-3893; NAS 1.26:3893) Avail: NTIS HC A11/MF A01 CSCL 20D

A class of impulsively started, axisymmetric, laminar jets produced by a time dependent joint source of momentum are considered. These jets are different flows, each initially at rest in an unbounded fluid. The study is conducted at three levels of detail. First, a generalized set of analytic creeping flow solutions are derived with a method of flow classification. Second, from this set, three specific creeping flow solutions are studied in detail: the vortex ring, the round jet, and the ramp jet. This study involves derivation of vorticity, stream function, entrainment diagrams, and evolution of time lines through computer animation. From entrainment diagrams, critical points are derived and analyzed. The flow geometry is dictated by the properties and location of critical points which undergo bifurcation and topological transformation (a form of transition) with changing Reynolds number. Transition Reynolds numbers were calculated. A state space trajectory was derived describing the topological behavior of these critical points. This state space derivation yielded three states of motion which are universal for all axisymmetric jets. Third, the axisymmetric round jet is solved numerically using the unsteady laminar Navier Stokes equations. These equations were shown to be self similar for the round jet. Numerical calculations were performed up to a Reynolds number of 30 for a 60x60 point mesh. Animations generated from numerical solution showed each of the three states of motion for the round jet, including the Re = 30 case. Author

N87-12809# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MODULATION TRANSFER FUNCTION (MTF) OF THE GEOMETRICAL IMAGE RESOLUTION OF THE THERMAL INFRARED BAND M.S. Thesis [FUNCAO DE TRANSFERENCIA DE MODULACAO (MTF) NA RESOLUCAO GEOMETRICA DE IMAGENS NA FAIXA DO INFRAVERMELHO TERMAL]
Hiromiti Yoshioka Jul. 1986 94 p In PORTUGUESE; ENGLISH summary
(INPE-3964-TDL/231) Avail: NTIS HC A05/MF A01

The modulation transfer function (MTF) of an imaging system is composed by the MTF's of its subsystems. The MTF of the system contributes to the formation of the EIFOV (Effective Instantaneous Field of View). In this work the MTF of an imaging system operating in a thermal infrared band was calculated. In this way, it was possible to theoretically establish the EIFOV of the equipment. Then, several experiments consisting of flights over targets with well-known temperature and dimensions were made. The images were analyzed using a microdensitometer and the

resultant curves compared to those estimated in theory. Degradations in the EIFOV due to roll movements of the airborne platform were observed. A stabilized platform can solve this problem.
Author

N87-12810# Royal Aircraft Establishment, Farnborough (England).
THE CALCULATION OF SEPARATED FLOWS OF LOW-VISCOSITY LIQUIDS USING THE BATCHELOR MODEL
S. I. Chernyshenko Apr. 1985 13 p Transl. into ENGLISH from Mekhanika Zhidkosti i Gaza, v. 2, 1984 p 40-45
(BR-100272; RAE-Trans-2133) Avail: NTIS HC A02/MF A01

Conditions of applicability and examples of application of the Batchelor Model (BM) are considered. The application of the BM to flow near a plate mounted perpendicularly to a wall at the stagnation point is examined, and a method for solving the corresponding eddy-potential problem is described. The application of a precise form of the condition for determining vorticity is also examined. It is shown that eddy-potential flow cannot be the limit (at Re approaching infinity) of laminar flow behind a step; arguments in favor of an analogous conclusion with regard to flow past blunt bodies are presented.
Author

N87-12811# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
ANALYSIS OF THE NONLINEAR STABILITY OF CIRCULAR COUETTE FLOW Final Report, 16 Jun. 1982 - 15 Dec. 1985
Thorwald Herbert Jun. 1986 78 p
(Contract DAAG29-82-K-0129)
(AD-A168951; ARO-18744.15-MA) Avail: NTIS HC A05/MF A01
CSCL 20/4

The work under this contract aimed at three major goals: (1) Reveal the origin of the despin moment that may cause severe flight instability of spin-stabilized artillery shells with liquid payloads; (2) Explore the potential of high-order perturbation methods for describing nonlinear properties of single modes and mode interactions in hydrodynamic stability; and (3) Analyze the mechanism of state selection in unstable circular Taylor-Couette flow.
GRA

N87-12812# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
PRESSURE CALCULATION FOR TWO-DIMENSIONAL FLOW INSIDE HYDRAULIC STRUCTURES Final Report
Robert S. Bernard Apr. 1986 36 p
(AD-A169039; WES/MP/HL-86-2) Avail: NTIS HC A03/MF A01
CSCL 20/4

When static pressure inside a hydraulic structure falls below some critical value, voids containing water vapor form therein. The voids then collapse with great force, pitting and eroding the internal surfaces of the structure. The formation/collapse of these voids is called cavitation, and the prevention thereof is a prime concern in structural design. The VORTEX code has been used to calculate pressure distributions for three distinct flow conditions in the outlet works for Taylorsville Lake, Salt River, Kentucky. A method has been developed for computing the two-dimensional pressure distributions inside hydraulic structures. Velocities are first obtained by finite difference solution of the Navier-Stokes equations in stream-function/vorticity form. Pressure is then calculated by numerical integration of the momentum equation. The method was incorporated for arbitrary geometry in the VORTEX computer code, which uses boundary-fitted grids generated by the WESCOR code. Computed results compare well with piezometric data from physical-model tests for the Taylorsville outlet works, indicating that the VORTEX code may be useful in identifying and eliminating low conditions that promote cavitation.
GRA

N87-12813# York Univ. (Ontario). Dept. of Earth and Atmospheric Science.
FLOW Q SPIN-UP FROM REST Final Report, 15 May 1982 - 15 Dec. 1985
Keith D. Aldridge May 1986 35 p
(Contract DAAG29-82-K-0113)
(AD-A169106; ARO-18784.3-EG) Avail: NTIS HC A03/MF A01
CSCL 19/4

Eigenfrequencies and decay rates of inertial waves have been measured for both Newtonian and non-Newtonian fluids contained in a cylindrical cavity while the fluid spins up from rest. The waves were excited by precessing the lid of the container until resonance was reached and detected by measuring disturbance pressure differences while the waves decayed freely. Measurements extend from 0.5 spin up times to steady state and over a range of Reynolds numbers 100-45,000 for the Newtonian fluids with precession amplitudes in the range 0.006-0.0328 radians. Measured eigenfrequencies agree to within a few percent with those previously calculated. Decay rates compare less favorably because they are more difficult to measure experimentally and to calculate theoretically. New methods of analysis were developed to recover the eigenfrequencies and decay rates. Previously used iterative techniques were modified to allow for the removal of the effects of recording filters and also automate the procedures used made possible with improved estimates of errors. New results for non Newtonian fluids which show shear thickening are presented. These fluids have anomalous behavior in the dependence of eigenfrequency and decay rate on time since the container's rotation began compared to that of a Newtonian fluid.
GRA

N87-12814# Stanford Univ., Calif. Center for Large Scale Scientific Computation.
ADAPTIVE GRID TECHNIQUES FOR ELLIPTIC FLUID-FLOW PROBLEMS
S. C. Caruso, J. H. Ferziger, and J. Oliger Dec. 1985 205 p
(Contract N00014-82-K-0335)
(AD-A169471; CLASSIC-85-10) Avail: NTIS HC A10/MF A01
CSCL 20/4

The adaptive grid techniques are described for elliptic fluid flow problems. The method is an extension of a local refinement technique developed by Berger for systems of hyperbolic equations. Local refined grids are overlaid on a coarser base grid. Recursive use of this technique allows an arbitrary degree of grid refinement. Two classes of elliptic flows are identified; they are characterized as having strong or weak viscous inviscid interactions. Adaptive solution strategies, active and passive, respectively, are developed for each class. The simpler method is used to solve the steady, laminar, incompressible Navier Stokes equations. Central differencing of the convective terms is implemented with the defect-correction method to stabilize the solution method for all cell Reynolds numbers. Uniform grid calculations are performed for the laminar backstep flow. Richardson estimated solution and truncation errors are compared to accurate estimates of the same quantities for the backstep flow. The solution error is well predicted. The truncation error estimates are less accurate, but they reliably indicate where grid refinement is required. Active adaptive calculations of the backstep are made, using boundary aligned refinement.
GRA

N87-12815# Naval Postgraduate School, Monterey, Calif.
IN-LINE AND TRANSVERSE FORCES ON SMOOTH AND ROUGH CYLINDERS IN OSCILLATORY FLOW AT HIGH REYNOLDS NUMBERS Interim Report, Jul. 1985 - Jul. 1986
Turgut Sarpkaya 4 Jul. 1986 176 p
(Grant NSF CEE-82-10264)
(AD-A169562; NPS69-86-003) Avail: NTIS HC A09/MF A01
CSCL 20/4

This report presents the results of an extensive experimental investigation of the in line and transverse forces acting on smooth, sand roughened, and marine roughened circular cylinders (k/D = 1/50) of identical length to diameter ratio (L/D = 2) placed in a sinusoidally oscillating flow. The drag, inertia, and the maximum force coefficients have been determined through the use of the Fourier analysis. The transverse force (lift) has been analyzed in terms of its root mean square value. In addition, the amplitude of the first ten harmonics have been determined. The results are presented in both graphical and tabulated form in terms of the Reynolds number, Keulegan Carpenter number, relative roughness and the frequency parameter beta (= Re/K).
GRA

N87-12816# Dayton Univ., Ohio. Research Inst.
COMPUTATIONAL FLUID DYNAMIC STUDIES OF CERTAIN DUCTED BLUFF-BODY FLOWFIELDS RELEVANT TO TURBOJET COMBUSTORS. VOLUME 1: TIME-DEPENDENT CALCULATIONS WITH THE k-EPSILON TURBULENCE MODEL FOR AN EXISTING CENTERBODY COMBUSTOR Final Report, 16 Aug. 1984 - 30 Sep. 1985
M. S. Raju and L. Krishnamurthy Jul. 1986 53 p
(Contract F22615-84-C-2411)
(AD-A171434; UDR-TR-85-82-Vol-1; AFWAL-TR-86-2004-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 21/2

A numerical investigation of the near-wake region in a ducted bluff-body combustor by finite-difference computations is reported. The numerical predictions are based upon the time-dependent, compressible Navier-Stokes equations and the k-epsilon turbulence model. The standard k-epsilon turbulence model was modified to account for the nonstationary terms. The time-dependent calculations predictions addressed the nonreacting near-wake flow field of the centerbody combustor with only the annular air stream present. Flowfield predictions for a combustor inlet mass flow of 2 kg/s with the time-dependent formulation incorporating the k-epsilon turbulence model show the attainment of a steady-state recirculating flow in the near wake. The slow axial migration of the recirculation vortex towards the exit boundary which was noticed in the earlier time-dependent calculations without a turbulence model is not longer present. Present results have thus eliminated the appearance of reverse flow at the exit boundary with the consequent incompatibility of the boundary conditions, and thereby the spu rious shedding-like behavior observed previously. The steady-state results in the present study demonstrate internal consistency with the time-averaged measurements and predictions for the locations of the vortex center and the centerline rear stagnation point. GRA

N87-12817# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
NATURAL CONVECTION IN AN ENCLOSURE WITH DISCRETE ROUGHNESS ELEMENTS ON A VERTICAL HEATED WALL
S. Shakerin, M. S. Bohn (Midwest Research Inst., Golden, Colo.), and R. I. Loehrke Feb. 1986 9 p Presented at the International Heat Transfer Conference, San Francisco, Calif., 17 Aug. 1986 Prepared in cooperation with Solar Energy Research Inst., Golden, Colo.
(Contract DE-AC02-83CH-10093)
(DE86-004424; SERI/TP-252-2812; CONF-860805-7) Avail: NTIS HC A02/MF A01

Natural convection flow next to a heated wall with single and repeated, two-dimensional, rectangular roughness elements is studied numerically and experimentally. The objective is to determine how these roughness elements influence heat transfer rates from the wall. Each roughness element consists of a thermally conducting, horizontal cylinder of rectangular cross section attached to the heated, isothermal wall of an enclosure. The height of roughness is on the order of the boundary layer thickness. Dye flow visualization in water confirms the numerical prediction that the steady flow over these elements does not separate. Only at high Rayleigh numbers, when the boundary layer below the roughness is unsteady, is local instantaneous flow reversal observed. Although steady flow reversals near the wall are not predicted or observed, nearly stagnant regions are formed, particularly between closely spaced cylinders. The surface heat flux in these stagnant regions is relatively low, so the total heat transfer rate may be nearly the same as for a smooth wall in spite of the increased surface area. DOE

N87-12818# Sandia National Labs., Albuquerque, N. Mex.
APPLICATION OF FLUX-CORRECTED TRANSPORT (FCT) TO HIGH RAYLEIGH NUMBER NATURAL CONVECTION IN A POROUS MEDIUM
R. J. Gross, M. R. Baer, and C. E. Hickox 1986 29 p Presented at the International Heat Transfer Conference, San Francisco, Calif., 17 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-004603; SAND-85-1552C; CONF-860805-4) Avail: NTIS HC A03/MF A01

A numerical technique designed to solve a wide class of convectively dominated flow problems is applied to natural convective flow in a porous medium at large Rayleigh number. The technique is a finite difference method based on flux-corrected transport (FCT) and possesses four desirable numerical properties: stability, accuracy, monotonicity, and conservation. Steady natural convection is investigated for Rayleigh numbers as large as 10,000. An efficient methodology for obtaining steady state solutions is illustrated. A simulation is performed for transient thermal convection at a Rayleigh number of 2500. Transient natural convection involving both heat and mass transfer is illustrated for a Rayleigh number of 2500, Lewis number of 2, and buoyancy ratio of 0.1. All simulations are performed in a square cavity with heated vertical side walls. DOE

N87-12819# Sandia National Labs., Albuquerque, N. Mex.
DETONATION CELLULAR STRUCTURE AND IMAGE PROCESSING
J. E. Shepherd and S. R. Tieszen 1986 31 p Presented at the 21st International Symposium on Combustion, Munich, West Germany, 3 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-006467; SAND-86-0033; CONF-860804-8) Avail: NTIS HC A03/MF A01

Gaseous detonations universally exhibit an instability that is manifested as cellular patterns on witness plates (sooted foils) or open shutter photographs. The characteristic dimension or cell width lambda of the periodic cellular pattern has previously been shown to correlate with failure diameter, critical diffraction aperture dimension and direct initiation energy requirements. Due to the importance of predicting these parameters in assessing detonability hazards, a quantitative method for cell size mesurement is urgently needed. We discuss a technique based on digital image processing of sooted foil records and illustrate the results with data from experiments performed in the Heated Detonation Tube facility at Sandia. We demonstrate that image processing can be used to eliminate some of the uncertainty now present in cell size measurements. The possibility of quantifying cellular irregularity is also explored. DOE

N87-12820# Pacific Northwest Labs., Richland, Wash.
GENERALIZATION OF ONE-DIMENSIONAL SOLUTE TRANSPORT: A STOCHASTIC-CONVECTIVE FLOW CONCEPTUALIZATION
C. S. Simmons Apr. 1986 14 p Presented at the 6th Annual AGU Front Range Branch Hydrology Days, Fort Collins, Colo., 16 Apr. 1986
(Contract DE-AC06-76RL-01830)
(DE86-011117; PNL-SA-13861; CONF-8604214-1) Avail: NTIS HC A02/MF A01

A stochastic-convective representation of one-dimensional solute transport is derived. It is shown to conceptually encompass solutions of the conventional convection-dispersion equation. This stochastic approach, however, does not rely on the assumption that dispersive flux satisfies Fick's diffusion law. Observable values of solute concentration and flux, which together satisfy a conservation equation, are expressed as expectations over a flow velocity ensemble, representing the inherent random processess that govern dispersion. Solute concentration is determined by a Lagrangian pdf for random spatial displacements, while flux is determined by an equivalent Eulerian pdf for random travel times. A condition for such equivalence is derived for steady nonuniform flow, and it is proven that both Lagrangian and Eulerian pdfs are required to account for specified initial and boundary conditions on a global scale. Furthermore, simplified modeling of transport is justified by proving that an ensemble of effectively constant velocities always exists that constitutes an equivalent representation. An example of how a two-dimensional transport problem can be reduced to a single-dimensional stochastic viewpoint is also presented to further clarify concepts. DOE

N87-12821# Sandia National Labs., Albuquerque, N. Mex.
TUDY OF NUMERICAL SOLUTION METHODS FOR TWO-HASE FLOWS
. J. Gross and M. R. Baer Apr. 1986 50 p
Contract DE-AC04-76DP-00789)
DE86-012265; SAND-84-1633) Avail: NTIS HC A03/MF A01

A time-splitting numerical technique is developed to solve ystems of highly coupled, hyperbolic partial differential equations. he method is illustrated by solving two different model two-phase ow problems. Results obtained by the technique are compared o results obtained from three established numerical methods: pwind differencing, the method of lines and flux-corrected ransport, and to known exact solutions. To demonstrate the ability f the time splitting technique in solving a complex two-phase ow with transportive and phase interaction exhibiting greatly isparate timescales, the problem of deflagration-to-detonation ransition in a granular explosive is solved numerically. The results how that the time-splitting method offers increased accuracy, but hat in one dimension the method is 20% to 500% computationally nore costly. However, in multidimensional calculations, time-plitting should offer an economy of computer cost and storage. DOE

N87-12822# Los Alamos National Lab., N. Mex.
REE-LAGRANGIAN HYDRODYNAMICS USING MASSLESS RACER POINTS
. A. Clark 1986 6 p Presented at the Numerical Methods in luid Dynamics, Beijing, China, 23 Jun. 1986
Contract W-7405-eng-36)
DE86-012406; LA-UR-86-2118; CONF-8606136-1) Avail: NTIS IC A02/MF A01

The partial differential equations (PDEs) describing the time volution of compressible fluid flow in two and three dimensions re usually solved numerically in the Eulerian frame of reference s opposed to the Lagrangian frame. This is especially true of lows involving large distortions. Lagrangian codes based upon agrangian cells do not run very long when the cells become istorted. In order to avoid the problem of cell distortion we have eveloped a Lagrangian code named HOBO based upon massless racer points. These tracer points can be thought of as being mbedded in, and moving with the fluid. The PDEs which we are rying to solve at each of the points are four equations which epresent conservation of mass, momentum and energy, and an quation of state. DOE

N87-12823# City Coll. of the City Univ. of New York. Inst. of Applied Chemical Physics.
THEORY OF DEVELOPED HYDRODYNAMICAL TURBULENCE
. Levich 1986 6 p
(Contract DE-AC02-80ER-10559)
(DE86-012796; DOE/ER-10559/T2) Avail: NTIS IC A02/MF A01

Several topics are briefly discussed in this progress report. The concept of turbulence based on a theory of helical fluctuations s discussed. The fluid mechanics of three phase bubble motion n a capillary tube is discussed. The influence of surfactants on roplet translation and mass transfer in a continuous phase is resented. DOE

N87-12824# Los Alamos National Lab., N. Mex.
APPARATUS FOR DOWNWARD TRANSPORT OF HEAT Patent Application
. A. Neeper, inventor (to DOE) and J. C. Hedstrom, inventor (to OE) Filed Aug. 1985 24 p
Contract W-7405-eng-36)
DE86-013700; US-Patent-Appl-SN-762367) Avail: NTIS IC A02/MF A01

An apparatus for the downward transport of heat by vaporiza-ion of a working fluid, usually from a collector which can be owered by the Sun to a condenser which drains the condensed orking fluid to a lower reservoir, is controlled by a control valve hich is operationally dependent upon the level of working fluid n either the lower reservoir or an upper reservoir which feeds the collector. Condensed working fluid is driven from the lower to the upper reservoir by vaporized working fluid whose flow is controlled by the control valve. The upper reservoir is in constant communication with the condenser which prevents a buildup in temperature/pressure as the apparatus goes through successive pumping cycles. DOE

N87-12825# International Centre for Theoretical Physics, Trieste (Italy).
PERIODIC HEAT TRANSFER THROUGH AN INHOMOGENEOUS MEDIUM
M. Y. Balla Oct. 1985 10 p
(DE86-702988; IC-85/220) Avail: NTIS (US Sales Only) HC A02/MF A01

One dimensional heat conduction equation has been investigated for periodic heat transfer in an inhomogeneous bounded medium. Exact analytical solutions for some typical thermal conductivity profiles have been obtained. Also an approximate solution has been attempted for the first time for heat conduction problems which is applicable for any arbitrary variation of thermal conductivity. Numerical appreciation for a parabolic thermal conductivity profile shows that results from approximate approach are in excellent agreement with those obtained by the exact analytical approach. DOE

N87-12826# Iowa State Univ. of Science and Technology, Ames.
ANALYSIS OF LAMINAR FLOW HEAT TRANSFER IN UNIFORM TEMPERATURE CIRCULAR TUBES WITH TAPE INSERTS
R. M. Manglik and A. E. Bergles May 1986 148 p Sponsored by Brown Fintube Co., Houston, Tex.
(PB86-224763; ISU-ERI-AMES-86290; HTL-39) Avail: NTIS HC A07/MF A01 CSCL 20M

Constant property, laminar flow heat transfer in a semicircular tube with uniform wall temperature has been analyzed to define the lower bound of heat transfer augmentation in circular tubes with twisted-tape inserts. Two thermal boundary conditions, which correspond to the two extremes of the fin effect of twisted tapes encountered in practical applications, are considered. Numerical solutions, employing finite-difference formulations for the governing momentum and energy equations were carried out for the thermal entrance region and for fully developed flow. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N87-12827# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A VARIATIONAL PRINCIPLE FOR THE PLASMA CENTRIFUGE
Gerson Otto Ludwig Sep. 1986 13 p Presented at the 15th International Symposium on Rarified Gas Dynamics, Grado, Italy, Jun. 1986
(INPE-3989-PRE/992) Avail: NTIS HC A02/MF A01

A variational principle is derived which describes the stationary state of the plasma column in a plasma centrifuge. Starting with the fluid equations in a rotating frame the theory is developed using the method of irreversible thermodynamics. This formulation easily leads to an expression for the density distribution of the l-species at sedimentation equilibrium, taking into account the effect of the electric and magnetic forces. Assuming stationary boundary conditions and rigid rotation nonequilibrium states the condition for thermodynamic stability integrated over the volume of the system reduces, under certain restrictions, to the principle of minimum entropy production in the stationary state. This principle yields a variational problem which is equivalent to the original

problem posed by the stationary fluid equations. The variational method is useful in achieving approximate solutions that give the electric potential and current distributions in the rotating plasma column consistent with an assumed plasma density profile.

Author

N87-12828*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE MULTISPECTRAL ATMOSPHERIC MAPPING SENSOR (MAMS): INSTRUMENT DESCRIPTION, CALIBRATION AND DATA QUALITY
Gary J. Jedlovec, W. Paul Menzel, Robert Atkinson, Gregory S. Wilson, and John Arvesen Aug. 1986 42 p
(NASA-TM-86565; NAS 1.15:86565) Avail: NTIS
HC A03/MF A01 CSCL 14B

A new instrument has been developed to produce high resolution imagery in eight visible and three infared spectral bands from an aircraft platform. An analysis of the data and calibration procedures has shown that useful data can be obtained at up to 50 m resolution with a 2.5 milliradian aperture. Single sample standard errors for the measurements are 0.5, 0.2, and 0.9 K for the 6.5, 11.1, and 12.3 micron spectral bands, respectively. These errors are halved when a 5.0 milliradian aperture is used to obtain 100 m resolution data. Intercomparisons with VAS and AVHRR measurements show good relative calibration. MAMS development is part of a larger program to develop multispectral Earth imaging capabilities from space platforms during the 1990s. Author

N87-12829*# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.
ADVANCED OPTICAL SMOKE METERS FOR JET ENGINE EXHAUST MEASUREMENT Final Report
Robert W. Pitz Sep. 1986 43 p
(Contract NAS3-24084)
(NASA-CR-179459; NAS 1.26:179459) Avail: NTIS
HC A03/MF A01 CSCL 14B

Smoke meters with increased sensitivity, improved accuracy, and rapid response are needed to measure the smoke levels emitted by modern jet engines. The standard soiled tape meter in current use is based on filtering, which yields long term averages and is insensitive to low smoke levels. Two new optical smoke meter techniques that promise to overcome these difficulties have been experimentally evaluated: modulated transmission (MODTRAN) and photothermal deflection spectroscopy (PDS). Both techniques are based on light absorption by smoke, which is closely related to smoke density. They are variations on direct transmission measurements which produce a modulated signal that can be easily measured with phase sensitive detection. The MODTRAN and PDS techniques were tested on low levels of smoke and diluted samples of NO2 in nitrogen, simulating light adsorption due to smoke. The results are evaluated against a set of ideal smoke meter criteria that include a desired smoke measurement range of 0.1 to 12 mg cu.m. (smoke numbers of 1 to 50) and a frequency response of 1 per second. The MODTRAN instrument is found to be inaccurate for smoke levels below 3 mg/cu.m. and is able to make a only about once every 20 seconds because of its large sample cell. The PDS instrument meets nearly all the characteristics of an ideal smoke meter: it has excellent sensitivity over a range of smoke levels from 0.1 to 20 mg/cu.m. (smoke numbers of 1 to 60) and good frequency response (1 per second).

Author

N87-12830*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUPPLEMENTARY CALIBRATION TEST OF THE TIP-AERODYNAMICS- AND ACOUSTICS-TEST PRESSURE TRANSDUCERS
Michael E. Watts Jul. 1986 44 p
(NASA-TM-88312; A-86273; NAS 1.15:88312) Avail: NTIS
HC A03/MF A01 CSCL 14B

A calibration test is described that was performed to supplement the normal calibration of the 188 pressure transducers used in the Tip Aerodynamics and Acoustics Test. This calibration led to the identification of 15 transducers which had a slope change of greater than 7% from the initial calibration. The calibration procedure is described and the results presented. The effect of the slope changes on the pressure distributions are described, followed by a method to compensate for these changes. Author

N87-12831*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DEVELOPMENT OF BURIED WIRE GAGES FOR MEASUREMENT OF WALL SHEAR STRESS IN BLASTANE EXPERIMENTS Interim Report, Oct. 1986
Sreedhara V. Murthy (University of the Pacific, Stockton, Calif.) and Frank W. Steinle Sep. 1986 38 p
(Contract NCC2-357)
(NASA-TM-89212; NAS 1.15:89212) Avail: NTIS
HC A03/MF A01 CSCL 14B

Buried Wire Gages operated from a Constant Temperature Anemometer System are among the special types of instrumentation to be used in the Boundary Layer Apparatus for Subsonic and Transonic flow Affected by Noise Environment (BLASTANE). These Gages are of a new type and need to be adapted for specific applications. Methods were developed to fabricate Gage inserts and mount those in the BLASTANE Instrumentation Plugs. A large number of Gages were prepared and operated from a Constant Temperature Anemometer System to derive some of the calibration constants for application to fluid-flow wall shear-stress measurements. The final stage of the calibration was defined, but could not be accomplished because of non-availability of a suitable flow simulating apparatus. This report provides a description of the Buried Wire Gage technique, an explanation of the method evolved for making proper Gages and the calibration constants, namely Temperature Coefficient of Resistance and Conduction Loss Factor.

Author

N87-12832# Department of the Air Force, Washington, D.C.
METAL THICKNESS MEASUREMENTS USING RADIOGRAPHY Patent Application
P. M. Achrekar, inventor (to Air Force) Filed 16 Apr. 1986 11 p
(AD-D012373; US-Patent-Appl-SN-852683) Avail: NTIS
HC A02/MF A01 CSCL 11/6

The present invention relates broadly to a radiographic inspection technique, and in particular to a metal thickness measurement method using radiography. The localized areas wherein the effective metal thickness is less than the minimum that is required for radiation shielding and which can render a shielding enclosure functionless, is readily determined. The invention comprises a process for assuring metal thickness in small regions. The actual metal thickness of small regions can be verified by comparing the optical densities of sections of the metal i.e., stepwedge. A comparator microphotometer, which compares optical densities of spectrum lines from spectrophotometers, compares the optical density of spectrum lines on an exposed spectrum plate (metal under test) with a standard plate (stepwedge).

GRA

N87-12833# Department of the Air Force, Washington, D.C.
HIGH RESOLUTION OPTICAL FIBER PRINT HEAD Patent
Michael J. Meier, inventor (to Air Force) Issued 20 May 1986 4 p Supersedes AD-D010348
(AD-D012384; US-Patent-4,590,492; US-Patent-Appl-SN-502028; US-Patent-Class-346-107R) Avail: US Patent and Trademark Office CSCL 14/5

A high resolution printing head for a line printer using photographic recording medium has a plurality of modules connected to form a two dimensional printing array. Each module has three fiber optic ribbons bonded together to form a staggered array of fibers. An apertured mask is photolithographically attached to the two dimensional array so that there is one aperture positioned over each fiber. The aperture has a cross-section less than the fiber so there is no overlapping of output light from each fiber and the apertures are also staggered so that a three fold increase in line density is achieved over conventional single ribbon arrays.

GRA

N87-12834# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
EVALUATION OF THE COLLINS/ROCKWELL TWO AXIS GYRO/ACCELEROMETER SENSOR CLUSTER (PHASE 3 UNIT)
Chris Roberts and Aubrey Rodgers Oct. 1985 40 p
(AD-A169810; AD-E950849; AMSMI/TR-RD-GC-86-2) Avail: NTIS HC A03/MF A01 CSCL 17/7

The Phase 3 Two-Axis Gyro/Accelerometer (TAGA) cluster is a strapdown IMU (Inertial Measurement Unit) with prelaunch self-calibration capabilities. The self-calibration mechanism allows for computer directed self tests which measure eight major performance parameters prior to launch. The purpose of this evaluation is to confirm performance stability of these eight parameters. The performance stability will decide the method of thermal compensation. Author (GRA)

N87-12835# Army Missile Command, Redstone Arsenal, Ala. Guidance and Control Directorate.
EVALUATION OF THE MULTIFUNCTION SENSOR ACCELERATION SENSITIVE TERMS MU SUB A AND MU SUB B
Chris Roberts and Aubrey Rodgers Oct. 1985 26 p
(AD-A169811; AD-E950850; AMSMI/TR-RD-GC-86-1) Avail: NTIS HC A03/MF A01 CSCL 17/7

Collins makes the assumption that g-sensitive terms MUA2 and MUB2 are small and therefore negligible. The purpose of this study is to determine if this assumption is valid. Laboratory tests were carefully performed to confirm the magnitudes of these terms. The results clearly show a significant gyro error when the terms are assumed small, stable, and negligible. Author (GRA)

N87-12836 Department of the Navy, Washington, D. C.
FIBER-OPTIC MAGNETIC GRADIOMETER WITH VARIABLE MAGNETIC BIASING FIELDS Patent
Kee P. Koo and George H. Sigel, Jr., inventors (to Navy) Issued 27 May 1986 10 p
(AD-D012423; US-Patent-4,591,786; US-Patent-Appl-SN-641656; US-Patent-Class-324-244) Avail: US Patent and Trademark Office CSCL 17/6

This patent discloses a fiber optic magnetic gradiometer for measuring both ac and dc magnetic field gradient. The gradiometer utilizes an optical interferometer with magnetostrictive magnetic field sensing elements in each of the interferometer arms. Ac and dc magnetic field biasing is achieved by disposing each of the magnetic field sensing elements within its own magnetic field coil and utilizing a variable dc current source for applying dc current to each magnetic coil. An ac current source at frequency w sub o connected across the circuits of the dc current sources is used in conjuction with a variable attenuator to control the ac bias to the respective magnetic coils. The detected output from the interferometer is processed either by bandpass filters or a spectrum analyzer to obtain the signal component w sub o, which is proportional to the external dc gradient magnetifc field, and at w sub o + w sub s, (where w sub s is external ac magnetic field frequency), which is proportional to the external ac magnetic field gradient. GRA

N87-12837# Air Force Weapons Lab., Kirtland AFB, N. Mex.
HOLOGRAPHIC STORAGE IN ION-IMPLANTED, FERROELECTRIC-PHASE PLZT CERAMICS
J. A. Bullington, S. Mancha, R. Carter, R. Heimlich, and C. E. Land (Sandia National Labs., Albuquerque, N. Mex.) 1986 15 p Presented at the International Symposium on Ultrasonics, Ferroelectrics and Frequency Control, Bethlehem, Pa., 9 Jun. 1986 Prepared in cooperation with Sandia National Labs., Albuquerque, N. Mex.
(Contract DE-AC04-76DP-00789)
(DE86-010475; SAND-86-0990C; CONF-8606121-1) Avail: NTIS HC A02/MF A01

Holographic storage has been achieved in thin, optically polished plates of Ni + Ne implanted, ferroelectric-phase PLZT 7/65/35 ceramics using a photoferroelectric storage process first reported in 1976. Exposure energies used for the present experiments were 6 to 7 mJ/cm(2) at 514 nm wavelength which represents an improvement of three orders of magnitude over the photosensitivity of the transverse-field assisted photoinduced change of refractive index in unmodified ferroelectric-phase PLZT reported by Micheron et al. in 1972. DOE

N87-12838# Sandia National Labs., Albuquerque, N. Mex.
DEVELOPMENT OF A LARGE-APERTURE PLZT SHUTTER WITH ENHANCED OPERATIONAL/ENVIRONMENTAL CAPABILITIES
J. O. Harris, Jr., R. P. Cutler, and G. R. Dulleck 1986 6 p Presented at the International Symposium on Ultrasonics, Ferroelectrics and Frequency Control, Bethlehem, Pa., 9 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-011643; SAND-85-2748C; CONF-8606121-2) Avail: NTIS HC A02/MF A01

PLZT thermal/flash protective shutters ranging in size from 25mm to 101mm in diameter have been developed by Sandia National Laboratories for industrial and military applications. A larger diameter shutter, 147mm, with enhanced environmental and operational capabilities was required for window ports. This paper describes a production PLZT shutter which provides these characteristics via the incorporation of new lens sealing techniques, packaging design, polarizers, and electronic subsystems. DOE

N87-12839# Lawrence Livermore National Lab., Calif.
SLITLESS, INTENSIFIED READOUT, GATED SPECTROMETER: WAVELENGTH AND EFFICIENCY CALIBRATION, TIME RESPONSE CHARACTERIZATION
M. Gerassimenko and M. C. Fowler Jun. 1986 9 p Presented at the 30th SPIE Technical Symposium on Optics and Optoelectronic Engineering, San Diego, Calif., 17 Aug. 1986
(Contract W-7405-eng-48)
(DE86-012349; UCRL-94098; CONF-860880-10) Avail: NTIS HC A02/MF A01

A spectrometer has been developed specifically for the X-ray laser effort at Lawrence Livermore National Laboratory (LLNL). The instrument takes advantage of the small divergence and size of the lasing source by positioning all three components - the source, a custom-ruled grating, and a microchannel plate (MCP) detector - on the Rowland circle. The sum of incident and diffracted angles is kept constant. Illuminating a pinhole at the source location with a z-pinch produces wavelength calibration at several energy ranges in the 65- to 200-eV interval. The same source used in conjunction with the MCP camera and Kodak 101 film yields the absolute detector efficiency. Ion bombardment of a beryllium target at the source location produces the X-rays necessary to determine the absolute efficiency of the grating-detector combination at 107 eV. Grating efficiency is then deduced from the MCP efficiency at that energy. Three 25- stripline structures on the MCP allow sub-nanosecond gating of the spectrometer, which improves the signal-to-background ratio. The rise time response of the entire MCP detector-cable assembly is about 200 ps. We also measured the transmission of the filters that are used in suppressing ultraviolet backgrounds. DOE

N87-12840# Sandia National Labs., Albuquerque, N. Mex.
TIME PROJECTION COMPTON SPECTROMETER (TPCS)
G. T. Baldwin and J. R. Lee 1986 24 p Presented at the 23rd Annual Conference on Nuclear and Space Radiation Effects, Providence, R.I., 20 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012950; SAND-86-0357C; CONF-860706-13) Avail: NTIS HC A02/MF A01

We present a new technique for measuring the energy spectrum of X-rays emitted by high-intensity, medium-voltage flash X-ray sources. The method sorts Compton electrons by drift velocity time-of-flight in a non-uniform magnetic field. We explain the conceptual design of the spectrometer, show how we have modeled it using Monte Carlo methods, and discuss the procedure for unfolding X-ray spectrum information from electron time-of-flight data. The technique appears promising, especially for short-pulse X-ray sources. DOE

N87-12841# Massachusetts Inst. of Tech., Cambridge.
DEVELOPMENT OF AN INEXPENSIVE, HIGH RESOLUTION POSITRON MULTIWIRE PROPORTIONAL COUNTER Progress Report, 1985
1986 13 p
(Contract DE-AC02-78EV-04969)
(DE86-011576; DOE/EV-04969/T5) Avail: NTIS HC A02/MF A01

The 10cm chamber had been used in conjunction with the new reconstruction algorithm. Ongoing investigations are testing system performance, including three-dimensional resolution and contrast ratio for various objects. The chambers have experienced reliability problems, even with the 90% argon-10% ethane mixture. This new gas has helped stability somewhat, but we must still compromise sensitivity by running at less than desired anode voltages. This results in two effects: loss of anode events, and a reduced number of valid cathode events. This translates into a reduced coincidence event rate. Some electronic problems have also developed, resulting in the loss of one anode amplifier in chamber 1 and a non-uniform cathode sensitivity in chamber 2.
DOE

N87-12842# Sandia National Labs., Albuquerque, N. Mex.
DOUBLE-ENDED TUNING FORK QUARTZ ACCELEROMETER
W. J. Kass and G. S. Snow 1986 22 p Presented at the 40th Annual Symposium on Frequency Control, Philadelphia, Pa., 28 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-012277; SAND-86-0219C; CONF-8605156-1) Avail: NTIS HC A02/MF A01

Quartz accelerometers with frequency output have been designed and built using etched double-ended tuning fork technology. These devices consist of two tuning forks connected in a cantilever beam configuration with beryllium-copper spacers which serves as a proof mass and inboard spacer. The frequency outputs of each tuning fork resonant circuit are mixed to yield an output frequency of approximately 1kHz at zero acceleration. The sensitivity of the devices is approximately 1Hz/G. The fundamental vibration frequency of the cantilever beam is 2200Hz in this undamped device. Shock testing up to 1500G has indicated good survivability characteristics. Individual fork measurements compared with assembled cantilevers tested in a +- 1G field in the temperature range of -55C to +85C indicate that residual stresses associated with assembly contributes to the temperature sensitivity of the bias frequency. Centrifuge testing has been conducted over the range of 0-120G with an indicated non-linearity of less than 2mG.
DOE

N87-12969*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
RADIOMETRIC CALIBRATION OF THE AIRBORNE IMAGING SPECTROMETER
Deanne Tucker and Gregg Vane *in its* Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 17-20 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 14B

N87-12970*# Stanford Telecommunications, Inc., Sunnyvale, Calif.
COMPARISON OF VARIOUS TECHNIQUES FOR CALIBRATION OF AIS DATA
Dar A. Roberts, Yasushi Yamaguchi (Geological Survey of Japan, Kawasaki.), and Ronald J. P. Lyon *In* JPL Proceedings of the Second Airborn Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 21-30 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.
For related information see also *76 Solid-State Physics.*

N87-12843# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
INFLUENCE OF A STRONG LASER FIELD ON THE STOPPING POWER FOR CHARGED TEST PARTICLES IN FUSION PLASMAS
N. R. Arista, R. M. O. Galvao, and L. C. M. Miranda Aug. 1986 26 p Submitted for publication
(INPE-3977-PRE/988) Avail: NTIS HC A03/MF A01

The influence of a high-intensity electromagnetic wave on the classical energy loss rate of the ion in nondegenerate plasmas is calculated. It is shown that the laser field decreases the plasma stopping power and makes it anisotropic with respect to the polarization of the wave electric field.
Author

N87-12844# California Inst. of Tech., Pasadena. Dept. of Applied Physics.
HIGH POWER SEMICONDUCTOR LASER SOURCES Annual Report, 12 Mar. 1985 - 11 Mar. 1986
R. Lang, J. Salzman, and Amnon Yariv 10 Jun. 1986 14 p
(Contract N00014-85-K-0211)
(AD-A168900) Avail: NTIS HC A02/MF A01 CSCL 20/12

Unstable semiconductor lasers have been fabricated and their potential as high power laser sources has been analyzed.
GRA

N87-12845# TRW Electronics and Defense Sector, Redondo Beach, Calif.
APPLICATION OF NONLINEAR OPTICS TO FREE ELECTRON LASER SYSTEMS Final Report, Dec. 1984 - May 1986
C. Shih, G. Neil, J. Menders, and T. Yang 6 Jun. 1986 149 p
(Contract N00014-84-C-0668)
(AD-A168950) Avail: NTIS HC A07/MF A01 CSCL 20/5

Novel free electron laser (FEL) resonator concepts employing nonlinear optics techniques were developed in support of advanced FEL technologies. Among these concepts, three major schemes were studied for details as to their potential applications to the ground-based FEL systems: phase conjugate cavity and phase conjugate outcoupling for RF linac FEL resonators, and phase conjugate beam conversion for induction linac FEL devices. These schemes involve the utilization of some novel nonlinear optics techniques that have received very little attention before: multiple pulse stimulated Brillouin scattering, short-pulse four wave mixing, and four wave stimulated Brillouin scattering. Theoretical studies, modeling and proof of principle experiments have been performed to explore these phenomena. The analytical theory and numerical simulation showed the feasibility of these techniques to meet the system requirements and also determined parametrically the operational conditions. The experiments for short-pulse four wave mixing and four wave stimulated Brillouin scattering were conducted in carbon disulfide and acetone media, respectively. The results verified the scaling relations and demonstrated high conjugate reflectivities (about 1000) for a weak signal.
GRA

N87-12846# Naval Research Lab., Washington, D. C.
HIGH GAIN FREE ELECTRON LASER OSCILLATORS
W. P. Marable, P. Sprangle, and Cha-Mei Tang 6 Jun. 1986 21 p
(AD-A169002; NRL-MR-5679) Avail: NTIS HC A02/MF A01 CSCL 20/5

We have carried out a fully relativistic, nonlinear analysis of the spatial and temporal evolution of multiple modes within a free electron laser oscillator. The analysis is both analytical and numerical, and is conducted self-consistently with the framework of the Vlasov-Maxwell system of equations, including the collective effects produced by the longitudinal space-charge wave potential. The analytic calculation of the small signal gain yields a dispersion relation for the moderate to high gain (Gamma L > 1) operation of the free electron laser. The numerical simulations verify the analytic results for the linear gain regime and predicts high efficiencies for the nonlinear saturated state of the radiation fields.
GRA

N87-12847# District of Columbia Univ., Washington, D. C.
FEASIBILITY OF INVESTIGATING SMITH-PURCELL FREE-ELECTRON LASER CONFIGURATIONS BY ELECTRON ENERGY LOSS STUDIES Final Report, Sep. 1980 - Dec. 1985
Leslie C. Speller and Arthur N. Thorpe (Howard Univ., Washington, D. C.) 9 Jun. 1986 11 p
(Grant DAAG29-80-G-0013)
(AD-A169059; ARO-17852.1-PH-H) Avail: NTIS HC A02/MF A01 CSCL 20/5

An electron beam of energies 20 - 25 KeV was passed over an optical metallic grating (600 lines/mm) and the energy loss spectrum was obtained. The loss peak values, determined to be between approx. (1.8 - 1.9eV), were in fair agreement with the predicted values. However, these results could not be reproduced. GRA

N87-12848# Air Force Academy, Colo.
OPTICAL ROTATION SENSORS Final Report, Oct. 1980 - Nov. 1985
James R. Rotge, Bill J. Simmons, G. Thomas Kroncke, and Daniel J. Stech May 1986 44 p
(AD-A169357; FJSRL-TR-86-0002) Avail: NTIS HC A03/MF A01 CSCL 17/7

Research efforts were concentrated on passive ring laser rotation sensor technology. Initial efforts were performed on supportive projects, e.g., laser stabilization, followed by a 0.62 sq m passive resonant ring laser gyro (PRRLG), leading to the development of a 60 sq m system mounted on the pneumatically supported isolation test platform (Iso-Pad) at FJSRL. Numerous sub-system tasks and a feasibility 0.62 sq m PRRLG were completed, supporting projections of very high resolution performance by a large 60 sq m PRRLG. The expected performance of the large PRRLG, on the order of 10 to the minus 10th power ERU (earth rate units), would provide an accurate error model applicable to Air Force operational ring laser gyros, a new source of geophysical data, e.g., earth wobble and variations in earth rotation, a proven design concept applicable to Air Force sensor needs as reference to MX instruments tests, and relativity experiments. This report documents the many accomplishments leading to, and the status of the large PRRLG at the date of the PRRLG stop order, November 1985. GRA

N87-12849# Boeing Aerospace Co., Seattle, Wash.
FEL (FREE ELECTRON LASER) OPTICS COATING TEST PROGRAM (DESIGN PHASE OF SAMPLE INTRODUCTION CHAMBER) Final Report
John L. Adamski and David A. G. Deacon Feb. 1986 76 p
(Contracts N00014-85-C-0039; ARPA Order 9031)
(AD-A169474) Avail: NTIS HC A05/MF A01 CSCL 20/5

The performance of the free electron laser for the directed energy weapons application depends critically on only three technologies: the high brightness accelerator, the FEL amplifier, and the cavity optics. The goal of this program is to examine the performance of the optical elements under the combined loading of the fundamental and the harmonic emissions of the FEL amplifier. The performance of both the RF linac based FEL and the induction linac based FEL may be subject to significant limitations due to UV-induced absorption in the early optical elements following the FEL amplifier. These limitations are expected to appear suddenly at a certain fluence level, with little warning. Our central objective in this program is to measure the rate of the UV induced absorption, and to identify the scaling parameters so that we can predict with some confidence the performance limitations of the optics. When these limits are reached in the experimental programs, a knowledge of the scaling relations and possible countermeasures will be invaluable in planning an appropriate response to the problem. GRA

N87-12850# Department of the Army, Washington, D. C.
CYLINDRICAL LASER WELDER Patent Application
Thomas E. Honeycutt and Thomas G. Roberts, inventors (to Army) Filed 15 May 1986 7 p
(AD-D012398; US-Patent-Appl-SN-864638) Avail: NTIS HC A02/MF A01 CSCL 13/9

Brass retainer rings are currently fastened to artillery shells by spinning each shell at a high rate and then jamming the ring on it so that it is fastened or welded by friction between the two objects. This is an energy-inefficient process which heats and weakens more material than is desirable. The shell spinning at a high rate is also potentially dangerous. A laser welder is provided that generates output energy focused on a circular or cylindrical shape for simultaneously welding around a 360 degs circumference without unnecessarily heating large amounts of material. The welder may be used to fasten cylindrical shaped objects, gears and shafts together, which is difficult to do by conventional means. The welder may also be used to fasten one cylinder to another. To accomplish the welding, a laser has an unstable optical cavity arranged with its feedback mirror centered to generate a circular output beam having an obscuration in the center. A circularly-symmetric, off-axis concave mirror focuses the output beam onto the objects being fastened and away from the center line or axis of the circular beam. GRA

N87-12851# Rochester Univ., N. Y. Dept. of Chemistry.
HETEROGENEOUS CATALYSIS WITH LASERS Final Report, 1 Jun. 1980 - 31 Aug. 1986
Thomas F. George Jun. 1986 14 p
(Contract N00014-80-C-0472)
(AD-A169601; UROCHESTER/DC/85/TR-72) Avail: NTIS HC A02/MF A01 CSCL 07/5

Theoretical techniques have been developed to describe a variety of laser-induced molecular rate processes occurring at solid surfaces which are involved in heterogeneous catalysis. Such processes include adsorption, migration, chemical reactions and desorption. The role of surface phonons in laser-selective processes and laser heating has been analyzed. The importance of electronic degrees of freedom has been considered for semiconductor and metal substrates, with special emphasis on the laser excitation of surface states. Surface-modified photochemistry has also been investigated, where the effect of a metal surface on the resonance fluorescence spectrum of a laser-driven atom/molecule has been assessed by means of surface-dressed optical Bloch equations. It is seen that the spectrum can be significantly different from the gas-phase case. Two related gas-surface collision processes have also been studied. First, the feasibility of the formation of the electron-hole pairs in a semiconductor by vibrationally excited molecules has been explored. Second, charge transfer in ion-surface collisions has been examined for both one-electron and two-electron transfer processes. Work has been initiated on microstructures and rough structures, including clusters and surface gratings. GRA

N87-12852# Rockwell International Science Center, Thousand Oaks, Calif.
IODINE MONOFLUORIDE ENERGY TRANSFER STUDIES Final Report, 13 Jun. 1983 - 31 Oct. 1984
A. T. Pritt Jun. 1986 77 p
(Contract F29601-83-C-0048)
(AD-A169781; SC5366.51FR; AFWL-TR-85-04) Avail: NTIS HC A05/MF A01 CSCL 20/5

Electronic-to-electronic (E-E) energy transfer from NF(b superscript 1 sigma +) to IF(X superscript 1 sigma +), producing IF(B superscript 3 Pi(O+)), was investigated using both spatially resolved data from a chemiluminescence flow tube apparatus and temporarily resolved data following pulsed excitation in a flow tube. The b superscript 1 sigma + state of NF was generated by the F-HN3 reaction under steady-state flow tube conditions and by the NF(a superscript 1 delta)+I* pooling reaction for the temporally resolved studies. Results of this study show that the source of IF(B superscript 3 Pi(O+)) in these chemiluminescence reactions stems from E-E energy transfer, that the rate of the transfer reaction depends strongly on the vibrational distribution in the ground state of IF, that the rate is independent of the vibrational distribution in the NF(b superscript 1 sigma +), and that the efficiency of the transfer rate is greater than 20%. The rate constant for the E-E energy transfer was measured to be 1.5 + or - 0.2 x 10 to the

-11 power cc/molecule/s for an IF(x superscript 1 sigma +) vibrational distribution corresponding to 800 K. These results are explained in terms of an energy transfer mechanism requiring that the individual state-to-state rates are proportional to the probabilities associated with vertical transitions. GRA

N87-12853# California Univ., Los Angeles.
HIGH REPETITION RATE ELECTRON BEAM RF-ACCELERATION AND SUB-MILLIMETER WAVE GENERATION VIA A FREE ELECTRON LASER Report, 15 Aug. 1985 - 14 Feb. 1986
N. C. Luhmann, Jr. and D. B. McDermott 14 Feb. 1986 6 p
(Contract N00014-84-K-0569)
(AD-A169846; AD-E750914) Avail: NTIS HC A02/MF A01 CSCL 20/5

We investigate through numerical simulation the advantages of a multicavity linac for improving the quality of the electron beam due to the technique of phase synchronism. This will also increase the shunt resistance of the accelerator which is desirous if very high energy is the goal. However, if a particular energy is required, then the shunt resistance must be held constant. Fortunately, a cavity's quality factor, Q, is approximately inversely proportional to its length if its aspect ratio is much less than one. Therefore, the shunt resistance can be controlled by varying the length of the cavities. GRA

N87-12854# Department of the Army, Washington, D. C.
DOPPLER EFFECT LASER VELOCITY MEASURING SYSTEM Patent
George R. Edlin, inventor (to Army) Issued 17 Jun. 1986 8 p
(AD-D012401; US-Patent-4,595,287; US-Patent-Appl-SN-571766; US-Patent-Class-356-28.5) Avail: US Patent and Trademark Office CSCL 20/6

The frequency shift of reflected laser beam from a target is transformed into an angular measurement which is proportional to the velocity of the target relative to the measurement platform. The system uses the refraction angle of the reflected beam from a movable optical grating to produce the angular measurement. GRA

N87-12855# Toronto Univ. (Ontario). Chemical Labs.
STUDY IN MOLECULAR LASERS Final Report, 1 Jun. 1984 - 31 May 1985
George Burns Aug. 1985 7 p
(Grant AF-AFOSR-0127-84)
(AD-A169933; AFOSR-86-0422TR) Avail: NTIS HC A02/MF A01 CSCL 07/4

Principal progress was achieved in the field classical studies of diatom dissociation. 3-D trajectory calculations of dissociating bromine and fluorine were conducted over a range of temperatures, and using several significantly different potential energy surfaces. A library consisting over a two million trajectories was accummulated. These trajectories were used to test the strong collision assumption, important in several theories of unimolecular reactions and in some theories of thermal diatom dissociation. The assumption was shown to be not valid for the case of dissociating bromine and fluorine. Properties of the steady state of dissociating diatoms were investigated. Papers, now in preparation, involve study of nonequilibrium energy and angular momentum distribution functions; accumulation, interpretation and classification of data on inelastic and reactive collisions; and study of scaling factors and vibrational-rotational coupling in dissociating diatoms. Experiments, still in progress, aimed at measuring recombination rates of fluorine atoms. Time delayed photoelectric effect was explained in terms of a release of trapped electrons at the surface of photocathode. GRA

N87-12856# Illinois Univ., Urbana. Charged Particle Research Lab.
OPTICAL PUMPING OF HIGH POWER LASERS WITH AN ARRAY OF PLASMA PINCHES Final Report, 1 Nov. 1981 - 31 Oct. 1984
Kyekyoon K. Kim 1 Apr. 1986 31 p
(Grant AF-AFOSR-0017-82)
(AD-A169960; AFOSR-86-0479TR) Avail: NTIS HC A03/MF A01 CSCL 20/5

Two dense plasma focus systems, the hypocycloidal pinch and the Mather type were investigated as the potential excitation light sources for high energy, short wavelength lasers. Using the hypocycloidal pinch (HCP), extensive lasing experiments were successfully performed, for the first time, on organic dyes producing results indicative of the capabilities and limitations the HCP system as an optical pump. A proof of principle lasing experiment was also performed for the first time using the Mather type dense plasma focus (MDPF) sucsessfully. Results thus far indicate that both HCP and MDPF are excellent high energy, short wavelength optical pumps and that as an optical pump, the MDPF system is more versatile, efficient, and powerful than the HCP system, especially in the short wavelength spectral region. GRA

N87-12857 Department of the Navy, Washington, D. C.
RESONANT PHOTON PUMPING MECHANISMS FOR A PLASMA X-RAY LASER Patent
Raymond C. Elton, inventor (to Navy) Issued 27 May 1986 7 p
Supersedes AD-D010901
(AD-D012416; US-Patent-4,592,056; US-Patent-Appl-SN-569686; US-Patent-Class-372-5) Avail: US Patent and Trademark Office CSCL 20/5

This patent discloses a lasing system for lasing at X-ray wavelengths. In one embodiment, a neon-like sulfur ion S(6+) plasma is caused to radiate on its 3d to 2 p transition to pump a lithium like neon Ne(7+) plasma to obtain X-ray lasing. In a second embodiment, a lithium-like silicon Si(11+) ion plasma is caused to radiate on the 3d to 2p transition to pump lithium like magnesium Mg(9+) plasma to obtain X-ray lasing. GRA

N87-12858# Battelle Columbus Labs., Ohio.
LASER PRODUCED X-RAY FOR HIGH RESOLUTION LITHOGRAPHY AND A PHOTOIONIZATION LASER Final Report
Harold Epstein, Dave Applebaum, and Bernerd Campbell 14 Feb. 1986 83 p
(Grant AF-AFOSR-0066-82)
(AD-A170782; AFOSR-86-0553TR) Avail: NTIS HC A05/MF A01 CSCL 20/8

The majority of the project was spent investigating laser produced X rays for high resolution lithography. This work involved measurements over an extensive parameter matrix. Specifically, efficiency of conversions to X rays was qualified as a function of: (1) laser pulse energy, (2) laser pulse width, (3) plasma profile, (4) laser wavelength, (5) target atomic number, (6) initial focal area, and (7) focal ratio of the lens. Experimental research was performed on a photoionization X ray laser concept. Specifically, a thin polyethylene, oxidicarbonate film was vaporized. Fifteen nanoseconds into its expansion, the vapor was illuminated by a 200 psec Fe spectrum X ray pulse. Photoionization of the inner K shell of oxygen was then observed. The potential efficiency of this type of laser was found to be comparatively low. GRA

N87-12859# Yale Univ., New Haven, Conn.
POPULATION INVERSIONS IN LASER-INITIATED VACUUM ARCS Final Report, 1 Feb. 1981 - 31 Jan. 1986
Mahadevan Krishnan and Gary L. Haller 17 Jun. 1986 77 p
(Grant AF-AFOSR-0077-81)
(AD-A170811; AFOSR-86-0522TR) Avail: NTIS HC A05/MF A01 CSCL 20/3

Population inversions were studied in laser initiated vacuum arcs. Inversion mechanisms include three body recombination pumping in expanding, laser produced plasmas, and resonant photoexcitation using line radiation. Significant gain was measured on the Balmer lines H sub alpha and H sub beta in expanding, laser produced plasmas of carbon/polyethylene. Research then focused on resonant photoexcitation of one ion by line radiation from another ion. Fluorescence was measured at UV wavelengths in CII pumped by Al III. A new class of photoexcited lasers was identified, in Be like ions, with wavelengths from 2177A in C III pumped by Mn VI, to 200 A in Mg IX pumped by Al XI. Fluorescence

and small signal gain were measured in C III pumped by Mn VI. Finally, laser oscillation was demonstrated in C III at 2177 and 2163A. These are the first UV lasers to be pumped by resonant photoexcitation. By isoelectronic scaling, it should be possible to produce soft X-ray lasers using the principles elucidated by this research. Photopumped lasers could prove to be the most efficient soft X-ray lasers in the future. GRA

N87-12860# Sandia National Labs., Albuquerque, N. Mex.
KINETIC AND THERMODYNAMIC STUDIES OF PULSED LASER IRRADIATION
P. S. Peercy and M. O. Thompson 1986 10 p Presented at the Society of Photo-Optical Instrumentation Engineers International Symposium: Topics in Optical and Optoelectronic Applied Sciences and Engineering, Quebec City, Canada, 2 Jun. 1986 Prepared in cooperation with Cornell Univ., Ithaca, N.Y.
(Contract DE-AC04-76DP-00789)
(DE86-012175; SAND-85-2830C; CONF-860620-8) Avail: NTIS HC A02/MF A01

Simultaneous measurements of the transient conductance, to determine the molten layer thickness versus time, and the time-dependent surface reflectance, to determine the melt duration at the surface during pulsed laser irradiation, are reviewed. These real-time measurements have been applied in a variety of studies of Si and Si-based alloys. In crystalline Si, melt initiates at the surface and propagates to some depth, whereupon the motion of the liquid/solid interface reverses and the material solidifies. In amorphous Si, these measurements were used to determine the melting temperature of the amorphous phase and the mechanism by which explosive crystallization occurs. In Si implanted with impurities, combined transient conductance and reflectance measurements reveal the occurrence of such novel melt and solidification scenarios as internal nucleation of melt and surface nucleation of solid on molten Si. Internal melts, which were previously unexpected, appear to be quite common and explain unusual microstructures observed by TEM. DOE

N87-12861# Sandia National Labs., Albuquerque, N. Mex.
REACTOR-PUMPED LASER EXPERIMENTS IN THE SANDIA SPR-3 FACILITY
D. A. McArthur, G. N. Hays, D. R. Neal, P. S. Pickard, and J. K. Rice 1986 15 p Presented at the Fast Burst Reactor Workshop, Albuquerque, N. Mex., 8 Apr. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012163; SAND-86-1011C; CONF-860420-4) Avail: NTIS HC A02/MF A01

Experiments on the excitation of short-wavelength gas lasers have recently been performed in the central cavity of the Sandia fast burst reactor SPR-III. Small-signal gain coefficients approx. 0.7%/cm were measured in XeF laser mixtures excited with either the He-3 (n,p)T reaction or with fission fragments emitted from the wall of the laser cell. Specialized apparatus helpful in performing these measurements is described. Preliminary experiments included measurement of radiation effects on cell window materials and laser mirrors, and measurement of energy deposition in the laser gas as a function of time for various cell geometries and polyethylene moderator thicknesses. The optical distortion of the laser medium by the energy deposition process was much more severe for fission fragment excitation. Fluorescence spectra were also measured for XeF laser mixtures with an optical multichannel analyzer, and these spectra were consistent with the XeF gain measurements. DOE

N87-12862# Naval Research Lab., Washington, D. C.
COMPARISON OF RAYLEIGH-TAYLOR GROWTH WITH 1.0 M AND 0.25 M LASERS
M. H. Emery, J. H. Gardner, and S. E. Bodner 29 May 1986 13 p
(DE86-012217; NRL-MR-5796) Avail: NTIS HC A02/MF A01

It is shown through numerical simulation that the Rayleigh-Taylor growth rate in laser-ablatively accelerated targets is reduced below the classical value (kg)(sup 1/2), by factors of 3 to 4 with 0.25 micron laser light. The simulation results are supported by an analytical expression for the growth rates. These results provide further evidence for the viability of high-aspect ratio shells in direct-drive laser fusion. DOE

N87-12863# Los Alamos National Lab., N. Mex.
CO SUB 2 LASER SUSTAINED CW DISCHARGE ATOMIC BEAM SOURCE
J. B. Cross, D. A. Cremers, L. H. Spangler, M. A. Hoffbauer, and F. A. Archuleta 1986 11 p Presented at the 15th International Symposium on Rarefied Gas Dynamics, Grado, Italy, 16 Jun. 1986
(Contract W-7405-eng-36)
(DE86-012383; LA-UR-86-1943; CONF-860636-3) Avail: NTIS HC A02/MF A01

A high pressure, supersonic, laser sustained plasma nozzle beam source was developed for the production of intense (greater than 10 to the 19th power particles/s/sr) beams of atomic and/or radical species having kinetic energies in the range of 1 to 10 eV. A high plasma temperature (10 to 30,000 K) is produced in the throat of a hydrodynamic expansion nozzle by sustaining a CW optical discharge in a gas using a high power CW CO2 laser. Gas mixtures are expanded through the nozzle/discharge region creating energetic atoms and molecules. An oxygen atom beam was produced with a kinetic energy of 2 to 3 eV and an intensity of approximately 10 to the 18th power O-atoms/s/sr. O-atom collisions (1 eV) from an uncharacterized nickel surface shows strong specular scattering with approximately 50% energy loss to the surface. Argon beams having kinetic energies between 5 to 10 eV with intensities of greater than 10 to the 19th power atoms/s/sr were also produced. DOE

N87-12864# Los Alamos National Lab., N. Mex.
THEORY AND SIMULATION OF HIGH-BRIGHTNESS ELECTRON BEAM PRODUCTION FROM LASER-IRRADIATED PHOTOCATHODES IN THE PRESENCE OF dc AND RF ELECTRIC FIELDS
M. E. Jones and W. Peter 1986 14 p Presented at the 6th International Conference on High Power Particle Beams, Kobe, Japan, 9 Jun. 1986
(Contract W-7405-eng-36)
(DE86-012384; LA-UR-86-1941; CONF-860665-7) Avail: NTIS HC A02/MF A01

To take advantage of properties of laser-controlled photodiodes to produce electron beams, a new set of diode design criteria are needed. An analytical and numerical study of the geometrical and temporal factors that affect the design of high-brightness electron beams is presented. This study extends our previous work on this concept to include the effects of laser pulse shape, and emittance effects in the presence of RF fields. In general, the diode will not be space-charge limited. Therefore, the conventional Pierce electrode shapes are not appropriate. Furthermore, the finite temporal profile of the electron beams introduces a time-dependent space charge into the design problem. The approach taken here to minimize the emittance growth from the temporal profile of the space charge is to operate at low perveance. To obtain high currents, large electric fields are required. We exploit the fact that the electron emission is controlled by the laser and is independent of the voltage on the diode. The diode can then be driven by an rf field. In principle, operating at higher frequency allows higher breakdown limits, so the perveance can be made very small. However, operating at too high an RF frequency introduces other detrimental effects. DOE

N87-12865# California Univ., Berkeley. Lawrence Berkeley Lab.
HIGH-GAIN FREE ELECTRON LASERS AS GENERATORS OF SHORT WAVELENGTH COHERENT RADIATION
K. J. Kim and C. Pellegrini (Brookhaven National Lab., Upton, N. Y.) May 1986 10 p Presented at the Topical Meeting on Short Wavelength Coherent Radiation: Generation and Application, Monterey, Calif., 24 Apr. 1986 Prepared in cooperation with Brookhaven National Lab., Upton, N.Y.
(Contract DE-AC03-76SF-00098)
(DE86-012500; LBL-21562; CONF-8604220-1) Avail: NTIS

HC A02/MF A01

The development of coherent radiation in high-gain free electron lasers, either from initial noise or from low-power input radiation, is analyzed in terms of three-dimensional Maxwell-Klimontovich equations. Exponential growth and saturation, transverse radiation profiles, transverse coherence and spectral features are discussed. Two possible systems of high-gain free electron lasers, one based on a storage ring and by-pass, another based on a linac and damping rings, are considered for the generation of 400 A radiation. DOE

N87-12866# Los Alamos National Lab., N. Mex.
MOESSBAUER-BORRMANN SUPERRADIANCE
G. C. Baldwin, M. S. Feld, J. P. Hannon, J. T. Hutton, and G. T. Trammell 1986 12 p Presented at the International Colloquium on X-ray Lasers, Aussois, France, 14 Apr. 1986 Prepared in cooperation with Massachusetts Inst. of Tech. and Rice Univ.
(Contract W-7405-eng-36)
(DE86-012373; LA-UR-86-2010; CONF-8604224-2) Avail: NTIS HC A02/MF A01

The kinetic behavior of a gamma-ray laser is comprised of an array of isomeric nuclei located at regular lattice sites in a perfect single crystal of dimensions and structure so chosen as to favor anomalous emission into that Borrmann mode having the maximum possible number of component Bragg-reflected beams, which greatly reduces the excitation requirements. The analysis of several hypothetical systems shows that superradiance, rather than amplified spontaneous emission, will then be the preferred mode of deexcitation, provided the nuclei can be pumped rapidly to a short-lived Moessbauer level while preserving crystal integrity. This warrants a search for solutions to the major problems: candidate nuclides, preparation of a storage isomer, and interlevel transfer from storage to lasing state. DOE

N87-13286# Plessey Co. Ltd., Romsey (England).
A STUDY OF METHODS OF PHASE NOISE REDUCTION OF SEMICONDUCTOR LASERS FOR SENSOR APPLICATIONS
J. P. Dakin and P. B. Withers *In* AGARD Guided Optical Structures in the Military Environment May 1986 7 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

N87-12717# Joint Publications Research Service, Arlington, Va.
STATUS OF LASER ENRICHMENT TECHNOLOGY UPDATED
Yasushi Sakabe *In its* Japan Report: Science and Technology (JPRS-JST-86-023) 29 Aug. 1986 p 63-69 Transl. into ENGLISH from Purometeusu (Tokyo, Japan), Nov. 1985 p 41-43 (For primary document see N87-12715 04-31)
Avail: NTIS HC A04/MF A01

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N87-12867 California Univ., Los Angeles.
ON THE DEXTERITY OF ROBOTIC MANIPULATORS Ph.D. Thesis
ZoneChang Jim Lai 1986 195 p
Avail: Univ. Microfilms Order No. DA8606465

The dissertation deals with the dexterity of 6R manipulators. It consists of four parts. In the first part, the characteristics of a robot's service angle to a given point are studied by introducing the concepts of service sphere and free service region. It is shown that the entire service angle can be categorized into a number of free service regions. The relationship between the service angle and service regions is subsequently formulated into a set of theorems and criteria. In the second part, the singularity problem of six-link robots is investigated. This problem is studied by introducing the concepts of singular state with finite internal degree-of-freedom and singular state with infinitesimal internal degree-of-freedom. A set of theorems and corollaries about a robot's singular states are presented. The third part investigates the motion characteristics of a six-link robot when its hand is considered to be attached to a given point with a ball-and-socket joint. The characteristics of the locus of joint six in the neighborhood of some interesting points is studied. The fourth part studies the dexterity of various wrist structures. In this part, a general wrist, with its last link having common normal and twist angle equal zero, is first investigated. Later, both Euler-Angle and Roll-Pitch-Yaw wrists are studied in detail. Conditions which govern the superiority between these two wrist structures over each other are derived. Dissert. Abstr.

N87-12868 ESDU International Ltd., London (England).
FRICTIONAL AND RETARDING FORCES ON AIRCRAFT TYRES. PART 4: ESTIMATION OF EFFECTS OF YAW
Sep. 1986 29 p
(ESDU-86016-Pt-4; ISBN-0-85679-568-2; ISSN-0141-4054) Avail: ESDU

Available as part of the ESDU Sub-series on Aircraft Performance, this ESDU gives expressions and data for calculating the forces and moments acting on the tire-ground contact area during unbraked and braked yawed rolling. The methods have been verified against experimental data drawn from a wide range of sources in the literature for speeds up to 100 knots, for a wide range of tire sizes, inflation pressures, vertical loads and runway surface conditions. Applications include estimation of minimum control speed on the ground and investigation of stopping performance with asymmetric reverse thrust and/or asymmetric braking and/or cross winds and/or low friction surface. ESDU

N87-12869*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE EVALUATION OF A NUMBER OF PROTOTYPES FOR THE FREE-TIP ROTOR CONSTANT-MOMENT CONTROLLER
Larry A. Young Feb. 1986 76 p
(NASA-TM-86664; A-85059; NAS 1.15:86664) Avail: NTIS HC A05/MF A01 CSCL 01C

The development of several prototypes of a constant moment controller, a critical component of the free-tip rotor (FTR) concept, is described. Also presented are the experimental results of a whirl test designed to select a final controller configuration to be included in a future wind-tunnel test of this innovative rotor system. A brief explanation of the FTR concept and its history are included. The paper documents the controller design constraints, each prototype's operating principle, the evaluation test, and the individual prototype test results. A recommended design is identified, along with the selection rationale. Author

N87-12870# Wisconsin Univ., Madison Engine Combustion Lab.
DIESEL CYLINDER GAS-SIDE HEAT FLUX TO A CERAMIC SURFACE Final Report, 18 May 1981 - 30 Jun. 1985
Gary L. Borman and Jeffrey C. Huang 1 Jun. 1986 42 p
(Contract DAAG29-81-K-0082)
(AD-A168948; ARO-18188.3-EG) Avail: NTIS HC A03/MF A01 CSCL 21/7

Results of four research projects each dealing with instantaneous heat flux to the cylinder head of reciprocating engine are given. The projects are: heat flux measurements in a diesel engine with variations in injection pressure, nozzle tips and swirl; development of instrumentation for radiation measurements in a diesel cylinder; heat flux measurements to various surfaces on the head of diesel engine including a normaly cooled metal surface, an insulated metal surface and a zirconia surface; and initial attempts to simultaneously measure the fluid motion and heat flux in a motored engine boundary layer. The variation of injection pressure nozzle tips and swirl in a direct injection diesel showed strong coupling between combustion and heat flux. An instrument for radiation measurement which uses a wall jet to reduce convection is described. Compression of the jet by the combustion heat release prevents zeroing of the convection. The major portion of the research was devoted to heat flux measurements to the surface of an instrumentation plug in the head of a single

COM-LABECO diesel. Comparisons made between data for ulated and uninsulated surfaces show that the hot metal surface ve reduced time averaged heat transfer, but gave a higher peak at flux than a normally cooled surface. Data for zirconia plate face showed a reduction in peak flux which was larger than dicted from the rise in surface temperature alone. GRA

7-12871# Office of Naval Research, London (England).
ELDING RESEARCH IN SCANDINAVIA: AN ASSESSMENT
nneth D. Challenger 11 Jun. 1986 8 p
D-A169036; ONRL-R-2-86) Avail: NTIS HC A02/MF A01 CSCL 6

This report briefly describes the contributions that the Scandivian countries--Denmark, Finland, Norway, and Sweden--are king. Topics which should be closely followed by US research- are: hyperbaric welding, computer aided design/computer ed manufacturing, applications to welding, mathematical deling of the weld process, and hydrogen assisted cracking of el welds. GRA

7-12872# National Aeronautical Establishment, Ottawa (Ont-).
TERATURE REVIEW ON THE DESIGN OF COMPOSITE ECHANICALLY FASTENED JOINTS
Poon Feb. 1986 71 p
D-A169112; NAE-AN-37; NRC-25442) Avail: NTIS A04/MF A01 CSCL 13/5

This report presents a literature review of the state-of-the-art alytical and experimental methodologies adopted in the aeroace industry for the design of mechanically fastened joints in mposite structures. Results and conclusions obtained from the blished literature relating to the effects of critical parameters, ich include composite material system, fastener configuration d joint geometry, on the mechanical behavior and failure modes composite mechanically fastened joints are discussed. Further earch required to improve the design of composite mechanically tened joints is identified as a result of this review. GRA

7-12873# Office of Naval Research, London (England).
ELDING SCIENCE AND TECHNOLOGY IN EUROPE: A SURY AND ASSESSMENT
nneth D. Challenger 20 Jun. 1986 12 p
D-A169279; ONRL-R-3-86) Avail: NTIS HC A02/MF A01 CSCL 8

Welding research is organized and coordinated differently within ch country, but the International Institute of Welding, serves to ordinate the results on an international scale. The UK, West rmany, and Scandinavia are leading the technological progress Western Europe, but Eastern Europe places more emphasis on lding research than does the West. In all of Europe the research ds to be applied rather than basic. This report includes a list key people. GRA

7-12874# Department of the Air Force, Washington, D.C.
PER GRIPPER VARIABLE VANE ARM Patent Application
E. Ludwick, inventor (to Air Force) Filed 27 Mar. 1986 12 p
D-D012364; US-Patent-Appl-SN-844636) Avail: NTIS A02/MF A01 CSCL 13/5

This patent application discloses a variable vane assembly ch entails a vane arm which integrally engages with a vane m without the use of threaded fasteners. The vane stem has a with parallel slots on opposite sides which are spaced below end of the tip. At the end of the tip is an end slot which is pendicular to the parallel slots. The tip of the vane stem has a ped side parallel with the end slot. The vane arm is a flat e metal strip that serves as the vane blade and integrally nects with the end slot. The vane arm is a flat wide metal that serves as the vane blade and integrally connects with vane stem using two ears, which are turned inwards to age with the parallel slots in the vane stem. Additionally, a tral leaf exists between the two ears which turns downwards it in the end slot in the tip of the vane stem. The central leaf thereby acts as an axial retainer and allows the vane arm to be rotated with the rotation of the vane stem. GRA

N87-12875# Department of the Air Force, Washington, D.C.
SLIDING DUCT SEAL Patent Application
Andrew MacGee, inventor (to Air Force) Filed 24 Apr. 1986 14 p
(AD-D012369; US-Patent-Appl-SN-855243) Avail: NTIS HC A02/MF A01 CSCL 11/1

A seal assembly for forming an air seal around conduits or accessories crossing aircraft engine bypass ducts is discussed. The seal assembly comprises a seal retainer plate, a seal plate and a seal ring. The seal ring has two opposingly spring legs which seat and form air seals at the duct wall and the seal plate. GRA

N87-12876# Department of the Air Force, Washington, D.C.
MULTI USE GRIPPER FOR INDUSTRIAL ROBOT Patent Application
Steven P. Jones, inventor (to Air Force) Filed 21 Apr. 1986 17 p
(AD-D012371; US-Patent-Appl-SN-854234) Avail: NTIS HC A02/MF A01 CSCL 13/9

This document describes a robot gripping device for holding and gripping a variety of electronic components. The robot gripping device comprises a guide frame, a drive motor and gripping blocks having fingers. One finger has three prongs on a fingertip. Another finger has two prongs on a fingertip. The fingertips accommodate axial resistor-type components at v-grooves and radial capacitor-type components are accommodated by fingertip portions. Cylindrical can shaped components are accommodated by a slight beveling at fingertip portions as well as a set back of portion on prong. The fingers are capable of controlled movements to various centered positions by means of motor. When the fingers are brought together they interlock. Author (GRA)

N87-12877# Department of the Air Force, Washington, D.C.
SHOCK ABSORBING DEVICE WITH INTEGRAL PRESSURE RELIEF VALVE Patent Application
Robert L. Franzen, inventor (to Air Force) Filed 25 Nov. 1985 22 p
(AD-D012379; US-Patent-Appl-SN-801341) Avail: NTIS HC A02/MF A01 CSCL 13/7

This patent application discloses a liquid spring shock absorbing device, comprising an hydraulic piston with an integral surge valve. The hydraulic piston is positioned within a fluid filled piston housing and is made up of a piston body, a spring reaction plate and a piston head. A large belleville spring and a small belleville spring are positioned adjacent to the spring reaction plate. Short duration shocks are transmitted by the fluid to cause rotation of the small belleville spring which opens relief valve port. Long duration, high intensity shocks cause compression of both belleville springs, opening of relief valve port and movement of hydraulic piston. GRA

N87-12878# Department of the Air Force, Washington, D.C.
OVER-CENTER TOGGLE LATCH Patent
Farley T. Hinds, inventor (to Air Force) Issued 13 May 1986 4 p
Supersedes AD-D011753
(AD-D012393; US-Patent-4,588,216; US-Patent-Appl-SN-640623; US-Patent-Class-292-113) Avail: US Patent and Trademark Office CSCL 13/5

An improved low profile over-center toggle latch having a latch arm with an internally threaded latch barrel nut for adjustable cooperation with a threated latch draw bolt is presented. The bolt is pivotally coupled to a latch handle assembly. The latter comprises projecting sidewalls and a grip end. The latch handle assembly is mounted by means of integral flanges cooperating with journals defined in a mounting stirrup, the latter being mounted on the container body. GRA

N87-12879# Department of the Air Force, Washington, D.C.
MULTIPLE RATE SHOCK ISOLATOR DAMPING VALVE Patent

Robert M. Foster, inventor (to Air Force) 13 May 1986 8 p
Supersedes AD-D011429
(AD-D012394; US-Patent-4,588,053; US-Patent-Appl-SN-651961; US-Patent-Class-188-275) Avail: US Patent and Trademark Office CSCL 13/7

In this patent a hydraulic shock isolator damping valve exhibiting variable damping on degree of valve extension is described which comprises a hydraulic cylinder defining closed fluid reservoirs at each end, a piston within the cylinder and interconnecting the structural members between which relative movement is damped, the piston having first and second axially spaced portions sized for slidably engaging the inner surface of the cylinder and including an intermediate third axial portion of reduced outer diametric size, the first and second portions including a predetermined number of axial holes sized for displacement of fluid through the piston in response to movement of the piston through the piston in response to movement of the piston through the fluid, and an annular member of outer diameter smaller than the first and second portions slidable on the third portion between confronting surfaces of the first and second portions, the annular member including a pair of peripheral flanges, each including axial holes smaller in size and corresponding in number to and registering with axial holes is the first and second portions. GRA

N87-12880# Department of the Air Force, Washington, D.C.
SELF-LOCKING OUTER AIR SEAL WITH FULL BACKSIDE COOLING Patent Application
George Liang, inventor (to Air Force) Filed 12 May 1986 14 p
(AD-D012406; US-Patent-Appl-SN-861908) Avail: NTIS HC A02/MF A01 CSCL 11/1

This patent application describes an air seal assembly for a gas turbine engine comprising a full ring cover plate and seal segment attached to impingement boxes. The impingement boxes have counter mounted hooks that interlock with a turbine flange and cover plate to secure the seal assembly. Holes in the impingement boxes direct cooling air to the entire backs the of seal. Seals are mounted to the impingement boxes by pedestals are positioned to enhance seal flexibility since axial edges are unrestrained. GRA

N87-12881# Department of the Air Force, Washington, D.C.
IMPROVED VANE PLATFORM SEALING AND RETENTION MEANS Patent Application
George A. Bonner, inventor (to Air Force) Filed 12 May 1986 16 p
(AD-D012407; US-Patent-Appl-SN-861905) Avail: NTIS HC A02/MF A01 CSCL 11/1

This patent application describes improved vane platform feather seal is disclosed for use in turbine engines. This feather seal contains a flat, thin feather seal, which is attached by adhesive to ease assembly to an L-shaped retainer plate to result in a combined thickness of 0.032 inches. This new seal may be used to replace the inner vane platform seals which are currently used in F-100 turbine engines, which have a history of not bending easily to conform to seal slots. The new seal provides improved platform sealing without loss of platform retention in the event of vane burn through. GRA

N87-12882# Rensselaer Polytechnic Inst., Troy, N.Y. Dept. of Mechanical Engineering, Aeronautical Engineering and Mechanics.
FUNDAMENTAL RESEARCH ON TRIBOLOGY Final Report, Mar. 1983 - May 1986
Frederick F. Ling Jul. 1986 38 p
(Contract DAAG29-83-K-0058)
(AD-A169974; ARO-19879.25-EG) Avail: NTIS HC A03/MF A01 CSCL 11/8

Tribology, the science and technology of friction-lubrication-wear, is vital to the design, manufacture and utilization of virtually every system with moving parts. Its purpose is to optimize the energy efficiency, product durability and reliability of machines and systems. Topics investigated by an interdisciplinary team were: surface mechanics; studies of microscopic surface phenomena prior to microscopic changes; surface reaction kinetic studies related to wear processes; physicochemical processes in the contact line region; thermal control of friction; fundamental study of solid lubrication in the SEM; lubricated sliding studies in the SEM; friction reduction in an I.C. engine; start-stop evaluation of gas bearing materials; continuous wear measurement by on-line Ferrography; and wear of copper-based brake material. GRA

N87-12883# Illinois Univ., Urbana. Dept. of Mechanical and Industrial Engineering.
EFFECT OF CONVECTION ON WELD POOL SHAPE AND MICROSTRUCTURE Progress Report, 15 Apr. 1984 - 14 Apr. 1986
J. Mazumder, M. M. Chen, C. L. Chan, and R. Zehr Jul. 1986 146 p
(Contract N00014-84-K-0315)
(AD-A170488) Avail: NTIS HC A07/MF A01 CSCL 11/6

The role of convection in weld pools is of great interest due to its effect on weld pool shapes and weld defects. A quantitative understanding of convection in the weld pool is being developed. In this part of the effort major emphasis has been to model surface tension driven flow. The Lorentz force effect is incorporated towards the end of the two year effort. The significant achievements of the program are: (1) Stagnation flow analysis for center of the weldpool which provided algebraic expressions for temperature and velocity. This solution clarifies the scaling problems; (2) Three dimensional axisymmetric model for surface tension driven flow with flat surface assumption which predicted the pool shape for stationary heat source such as in the case of spot welds; (3) Three dimensional perturbation model for surface tension driven flow with flat surface which predict velocity field, temperature field, effect of trace elements and self-consistent prediction of the pool shape and cooling rate; (d) Three dimensional model with flat and free surface which predicted same as above with more realistic boundary condition. This model can also predict effect of Lorentz Force. A series of controlled experiments has been carried out to verify pool shape and liquid velocity. This verified the trend predicted by the model. GRA

N87-12884# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INTEGRATING COMPUTER VISION WITH A ROBOT ARM SYSTEM M.S. Thesis
James E. Wingate 1986 51 p
(AD-A171278; AFIT/CI/NR-86-127T) Avail: NTIS HC A04/MF A01 CSCL 17/8

The goal of this project is to interface an image processing system to a robot arm system. Computer vision is used to compute the location and orientation of a block in the work space so that the block may be grasped and manipulated by a robot arm. A detailed explanation of how information flows from the image processor to the robot arm system is given. This flow can be broken down into three different steps. In the first step, a gradient map from a digitized image of the work space is transferred, one line at a time, from the Grinnell image processor to its host, a VAX 11/750. As each line of the gradient map is uploaded, the coordinates of pixels on the edges of a block (edge pixels) are stored in an array. Storing the coordinates of only the edge pixels results in significant image compression. The second step involves processing the edge pixel coordinate array to extract relevant features. The location of the corners of a block is all that is needed to compute the location of the centroid and the orientation of the block in the work space. In step three, the centroid and roll ang le information is sent from the VAX to the robot arm system host, a DUAL microcomputer. One of the robot arms is selected and appropriate commands are sent to that arm to grasp and manipulate the block. GRA

N87-12885# Oak Ridge Y-12 Plant, Tenn.
HEAT MEASUREMENTS IN INERTIA WELDING OF ALUMINUM TO STEEL
R. J. Reagan Jun. 1986 21 p
(Contract DE-AC05-84OR-21400)

DE86-012463; Y/DW-627) Avail: NTIS HC A02/MF A01
Measurements of the total heat generated at the interface during ertia welding of 316 stainless steel to aluminum-1100 (99.5% ure) at the Oak Ridge Y-12 Plant are presented. Transient emperature measurements of the weld are also given. A full eatment of calorimetric methods is included in the discussion. In easuring the heat generated during the weld, it was found that e conversion efficiency of kinetic energy in the flywheel to ctional heat energy at the interface is greater than 85%. DOE

87-12886# Oak Ridge National Lab., Tenn.
VELDING PROCEDURE SPECIFICATION. MANUAL GAS TUNG-TEN ARC AND SEMIAUTOMATIC GAS METAL ARC WELDING F CHROMIUM-NICKEL STEEL. SUPPLEMENT 1: RECORDS OF ROCEDURE QUALIFICATION TESTS
. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 15 p
Contract DE-AC05-84OR-21400)
DE86-012521; ORNL/M-15/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-306-ASME-6 is qualified under Section IX of e ASME Boiler and Pressure Vessel Code for manual gas ngsten arc and semiautomatic gas metal arc welding of 300 eries Cr-Ni steels (P-8-1), in thickness range 0.375 to 2.0 inch; ler metal is ER3XX (F-6, A-8); shielding gases are argon (GTAW) nd 98-2 argon-oxygen. DOE

87-12887# Oak Ridge National Lab., Tenn.
IACHINE GAS METAL ARC WELDING OF CARBON STEEL. VELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: ECORDS OF PROCEDURE QUALIFICATION TESTS
. H. Wodtke and D. R. Frizzell Jun. 1986 12 p
Contract DE-AC05-84OR-21400)
DE86-012530; ORNL/M-6/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-110-ASME-1 is qualified under Section IX of e ASME Boiler and Pressure Vessel Code for machine gas etal arc welding of carbon steels (P-1-1), in thickness range .280 to 0.75 inch; filler metal is E70S-3 (F-6, A-1); shielding gas 95-5 argon-oxygen. DOE

87-12888# Oak Ridge National Lab., Tenn.
VELDING PROCEDURE SPECIFICATION. SEMIAUTOMATIC AS METAL ARC WELDING OF CARBON STEELS. SUPPLE-ENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 10 p
Contract DE-AC05-84OR-21400)
DE86-012531; ORNL/M-5/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-109-ASME-2 is qualified under Section IX of e ASME Boiler and Vessel Code for semiautomatic gas metal rc welding of carbon steel (P-1-1), in thickness range 0.187 to 0 inch; filler metal is ER70S-3 (F-6, A-1); shielding gas is 95-5 rgon-oxygen. DOE

87-12889# Oak Ridge National Lab., Tenn.
VELDING PROCEDURE SPECIFICATION. MANUAL GAS TUNG-TEN ARC AND SEMIAUTOMATIC GAS METAL ARC WELDING F CARBON STEEL. SUPPLEMENT 1: RECORDS OF PRO-EDURE QUALIFICATION TESTS
H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 14 p
ontract DE-AC05-84OR-21400)
E86-012532; ORNL/M-4/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-107-ASME-1 is qualified under Section IX of e ASME Boiler and Vessel Code for manual gas tungsten arc d semiautomatic gas metal arc welding of carbon steel (P-1-1), thickness range of 0.237 to 2.0 inch; filler metal is ER70S-3 -6d, A-1); shielding gas for GTAW is argon and for GMAW is -5 argon-oxygen. DOE

7-12890# Oak Ridge National Lab., Tenn.
AS TUNGSTEN ARC AND SHIELDED METAL ARC WELDING F CARBON STEEL. WELDING PROCEDURE SPECIFICATION. PPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION ESTS
H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 13 p
ontract DE-AC05-84OR-21400)
(DE86-012533; ORNL/M-3/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-104-ASME-2 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc and shielded metal arc welding of carbon steels (P-1-1), in thickness range 0.25 to 1.0 inch; filler metals are E70S-3 (F-6, A-1) (GTAW) and E6010 (F-3, A-1) (SMAW): shielding gas is argon (GTAW). DOE

N87-12891# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS. SHIELDED METAL ARC WELDING OF CARBON STEEL
C. H. Wodtke, D. R. Frizzell, and J. H. Mitchell Jun. 1986 14 p
(Contract DE-AC05-84OR-21400)
(DE86-012535; ORNL/M-1/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-101-ASME-2 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for shielded metal arc welding of carbon steels (P-1-1), in thickness range 0.125 to 0.75 inch; filler metal is E6010 (F-3, A-1). DOE

N87-12892# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION. GAS TUNGSTEN ARC WELDING OF CHROMIUM-NICKEL STEEL TO CHROMIUM-MOLYBDENUM STEEL. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 11 p
(Contract DE-AC05-84OR-21400)
(DE86-012536; ORNL/M-36/S1) Avail: NTIS HC A02/MF A01
Procedure WPS--2104-ASME-1 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of 300 series Cr-Ni steels (P-8-1) to 2 1/4-1Mo steels (P-5-1), in thickness range 0.187 to 1.0 inch; filler metal is ERNiCr-3 (F-43); shielding gas is argon. DOE

N87-12893# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF ALUMINUM ALLOYS 6XXX. WELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 23 p
(Contract DE-AC05-84OR-21400)
(DE86-012548; ORNL/M-24/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-1003 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of aluminum alloys 6061 and 6063 (P-23), in thickness range 0.035 to 0.516 inch; filler metal is ER4043 (F-23) or ER5356 (F-22); shielding gas is argon. DOE

N87-12894# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF CARBON STEEL TO NICKEL-CHROMIUM-IRON. WELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke and D. R. Frizzell Jun. 1986 15 p
(Contract DE-AC05-84OR-21400)
(DE86-012549; ORNL/M-51/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-2651-ASME-1 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of carbon steel (P-1-1) to nickel-chromium-iron (P-43), in thickness range 0.125 to 0.432 inch; filler metal is ERNiCr-3 (F-43); shielding gas is argon. DOE

N87-12895# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF CHROMIUM-NICKEL STEEL TO NICKEL-MOLYBDENUM-CHROMIUM-IRON. WELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 17 p
(Contract DE-AC05-84OR-21400)
(DE86-012550; ORNL/M-50/S1) Avail: NTIS HC A02/MF A01
Procedure WPS-2604-ASME-5 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of 300 series Cr-Ni steels (P-8-1) to nickel-molybdenum-

chromium-iron (P-44), in thickness range 0.035 to 0.5 inch; filler metal is ERNiCr-3 (F-43); shielding gas is argon. DOE

N87-12896# Oak Ridge National Lab., Tenn.
WELDING PROCEDURE SPECIFICATION: GAS TUNGSTEN ARC WELDING OF NICKEL TO NICKEL-CHROMIUM-IRON. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 19 p
(Contract DE-AC05-84OR-21400)
(DE86-012557; ORNL/M-43/S1) Avail: NTIS HC A02/MF A01

Procedure WPS-2302-ASME-3 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of nickel N02200 or N02201 (P-41) to nickel-chromium-iron N06600 (P-43), in thickness range 0.035 to 0.432 inch; filler metal is ERNiCrFe-5 (F-43); shielding gas is argon. DOE

N87-12897# Oak Ridge National Lab., Tenn.
GAS TUNGSTEN ARC WELDING OF ALUMINUM ALLOYS 3004, 5052 AND 5X54 TO 6XXX. WELDING PROCEDURE SPECIFICATION. SUPPLEMENT 1: RECORDS OF PROCEDURE QUALIFICATION TESTS
C. H. Wodtke, D. R. Frizzell, and W. A. Plunkett Jun. 1986 10 p
(Contract DE-AC05-84OR-21400)
(DE86-012561; ORNL/M-39/S1) Avail: NTIS HC A02/MF A01

Procedure WPS-2203 is qualified under Section IX of the ASME Boiler and Pressure Vessel Code for gas tungsten arc welding of aluminum alloys 3004, 5052, 5154, and 5454 (P-22) to 6061 and 6063 (P-23), in thickness range 0.062 to 0.5 inch; filler metal is ER4043 (F-23); shielding gas is argon. DOE

N87-12898# Lawrence Livermore National Lab., Calif.
BUFFERED EXPLOSIONS IN STEEL PRESSURE VESSELS
L. A. Glenn 1986 12 p Presented at the 9th International Conference on High Energy Rate Fabrication, Novosibirsk, USSR, 18 Aug. 1986
(Contract W-7405-eng-48)
(DE86-008763; UCRL-94255; CONF-860844-1) Avail: NTIS HC A02/MF A01

The impulse delivered to the walls of a vessel containing an explosion will increase if material is placed between the walls and the charge. If the impulse application time is small in comparison with the eigenperiod of the vessel, the wall stress will increase in direct proportion to the impulse. Conversely, if the application period can be extended beyond half the eigenperiod, the peak stress will be proportional to the ratio of the impulse to the delivery period. With powder or granular buffers, it is possible for the delivery period to increase faster than the impulse as the buffer mass is increased. This is the reason why certain powders, or porous materials, can provide stress reduction even below that observed by evacuating the space between the walls and the explosive. If the buffer material is to serve as an effective mitigator, it must collapse on shock loading to a final density that depends only weakly on pressure; the criterion is that the wave speed in the material that impacts the wall must be small compared with the impact (particle) speed. This behavior apparently occurs with salt, at least for modest values of the charge parameter, but to a lesser extent with snow under the same conditions. The vermiculite data are comparable to the salt in the charge parameter region where the two overlap; with increasing explosive, however, the vermiculite appears to behave like the snow and its effectiveness as a mitigator rapidly diminishes. It is also clear that once the wave speed criterion is seriously violated, the use of a powder buffer will result in a higher wall stress than if only air filled the space between walls and charge. DOE

N87-12899# Lawrence Livermore National Lab., Calif.
SHOWER AND HIGH-PRESSURE OIL TEMPERATURE CONTROL
D. B. DeBra (Stanford Univ., Calif.), R. A. Victor, and J. B. Bryan Mar. 1986 20 p Presented at the 36th International Institution for Production Engineering Research General Assembly, Jerusalem, Israel, 16 Aug. 1986 Prepared in cooperation with Lawrence Livermore National Lab., Calif.
(Contract W-7405-eng-48)
(DE86-009398; UCRL-94273; CONF-860839-2) Avail: NTIS HC A02/MF A01

Oil showering for temperature control of precision tools is an effective way of achieving close temperature stability and isolation from variations in room air temperature. The oil must be controlled to temperature variations less than tolerances specified for machine and parts. Principal disturbances come from heat transfer into the plumbing between the heat exchanger and the tool and from variations in the chill water in the heat exchanger. We describe the successful employment of measuring techniques, isolation from disturbances, and the use of integral control with proportional and commercially available temperature controllers. Commercially available heat exchangers are low-pressure devices. For high-pressure oil applications a pump follows the heat exchanger, and, because of the high velocities and large surface area, the oil passing the pump is sensitive to heat from its motor and from room air. Combinations of feedback from different locations in the system are discussed. Compromises with regard to measuring at the functional point versus minimizing time delay, and the importance of measuring near the site of disturbing heat sources lead to multiple sensors in some cases. Each measurement may be used through integral feedback to provide the best performance. The introduction of integral control to commercial a-c bridge controllers can be awkward. Six approaches are compared, and the millidegree performance of our current designs is presented. DOE

N87-12900# Oak Ridge National Lab., Tenn.
LOCALIZED ION MILLING OF METALLIC AND CERAMIC TEM SPECIMENS
A. T. Fisher and J. Bentley 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009538; CONF-860829-23) Avail: NTIS HC A02/MF A01

The utility of localized ion milling in the preparation of metallic and ceramic specimens for TEM and AEM is being evaluated from the standpoint of optimizing procedures and identifying limitations and milling characteristics. The equipment used was a Gatan model 645 precision ion milling system (PIMS). This device is a scanning ion beam instrument with which selected areas of a sample can be imaged by either secondary electron or secondary ion signals and selectively ion milled in a small region within the imaged area. The 1 to 10 keV ion beam can be focussed to a 2 micron spot. Specimens are thinned without removing them from the electron microscope specimen holder. DOE

N87-12901# SKF Industries, Inc., King of Prussia, Pa.
MECHANICAL INTERACTIONS OF ROUGH SURFACES Quarterly Progress Report, Apr. 1 - 30 Jun. 1986
J. I. McCool Jun. 1986 7 p
(Contract DE-AC02-84ER-13163)
(DE86-010886; DOE/ER-13163/11) Avail: NTIS HC A02/MF A01

Simulation studies have been performed to yield the complete distribution of asperity contact area, load and pressure as a function of the separation of rough surfaces. Microcontact models ordinarily yield just the average value of these quantities with no measure of the scatter about the average. The low sliding speed microcontact flash temperature distribution is shown to be computable as a by product of the determination of the microcontact area distribution. A Coulomb friction model for traction in the mixed film regime is tested against published data. The required Coulomb friction coefficient is found to be unreasonably large. A suggested explanation is that only contacts larger than some critical minimum can cause loss of electrical insulation between sliding disks. Preliminary ceramic microfracture experiments have resulted in plastic deformation rather than fracture at asperity tips. DOE

N87-12902# Los Alamos National Lab., N. Mex.
LIQUID METAL THERMOACOUSTIC ENGINE
G. W. Swift, A. Migliori, and J. C. Wheatley 1986 7 p Presented

at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug., 1986
(Contract W-7405-eng-36)
(DE86-011264; LA-UR-86-1548; CONF-860810-6) Avail: NTIS HC A02/MF A01

We are studying a liquid metal thermoacoustic engine both theoretically and experimentally. This type of engine promises to produce large quantities of electrical energy from heat at modest efficiency with no moving parts. A sound wave is usually thought of as consisting of pressure oscillations, but always attendant to the pressure oscillation are temperature oscillations. The combination produces a rich variety of thermoacoustic effects. These effects are usually so small that they are never noticed in everyday life; nevertheless under the right circumstances they can be harnessed to produce powerful heat engines, heat pumps, and refrigerators. In our liquid metal thermoacoustic engine, heat flow from a high temperature source to a low temperature sink generates a high-amplitude standing acoustic wave in liquid sodium. This acoustic power is converted to electric power by a simple magnetohydrodynamic effect at the acoustic oscillation frequency. We have developed a detailed thermoacoustic theory applicable to this engine, and find that a reasonably designed liquid sodium engine operating between 700 C and 100 C should generate about 60 W/cm(2) of acoustic power at about 1/3 of Carnot's efficiency. Construction of a 3000 W-thermal laboratory model engine has just been completed, and we have exciting preliminary experimental results as of the time of preparation of this manuscript showing, basically, that the engine works. We have also designed and built a 1 kHz liquid sodium magnetohydrodynamic generator and have extensive measurements on it. It is now very well characterized both experimentally and theoretically. The first generator of its kind, it already converts acoustic power to electric power with 40% efficiency. DOE

N87-12903# Oak Ridge National Lab., Tenn.
LINEAR HARMONIC ANALYSIS OF FREE-PISTON STIRLING ENGINES
N. C. J. Chen and F. P. Griffin Jun. 1986 104 p
(Contract DE-AC05-84OR-21400)
(DE86-012451; ORNL/CON-172) Avail: NTIS HC A06/MF A01

The equations that govern the behavior of free-piston Stirling engines are nonlinear differential equations. Traditional solution methods have been time-stepping integrations that can be plagued by numerical instabilities and can use large amounts of computer time. Closed-form analytical solutions are possible if the working gas behaves isothermally or if the nonlinear terms in the governing equations are replaced with accurate approximations. An almost closed-form solution method, called the linear harmonic analysis (LHA), has been developed for free-piston Stirling engine applications by representing all of the periodic variables with harmonic functions. The solution method accounts for the important thermodynamic losses that are coupled together in free-piston engines, yet it is efficient enough for optimization studies. The LHA method was compared with a standard numerical integration method to verify its mathematical accuracy. The LHA and numerical predictions for a sample free-piston Stirling engine configuration differed by less than 5% for all important parameters. Sensitivity studies using the LHA method have also shown that the thermodynamic loss assumptions used in an analysis can have a significant impact on the predicted dynamic behavior of a free-piston Stirling engine. DOE

N87-12904# Sandia National Labs., Albuquerque, N. Mex.
EFFECTS OF INERTIA WELD PARAMETERS AND CONTAMINATION ON WELD FLASH SHAPE AND ON JOINT STRENGTH: AN IMPROVED STUDY
M. W. Mote Jun. 1986 41 p
(Contract DE-AC04-76DP-00789)
(DE86-013074; SAND-85-8239) Avail: NTIS HC A03/MF A01

Inertia welds of four dissimilar metal pairs in three configurations were made with extensive variations in energy and force to discover limits for the weld process and assure that process monitoring of welds provides quality assessment. In a related study of the effect of surface contamination, using one set of welding parameters, we showed that in two cases wherein only one of the metals in the pair deforms, contamination can preclude welding without altering weld configuration or upset. However, contamination had no effect on all-steel welds. DOE

N87-12905# Auburn Univ., Ala.
SENSOR CONTROLLED ROBOTIC WELDING FOR NUCLEAR APPLICATIONS Annual Progress Report
B. A. Chin, N. H. Madsen, and J. S. Goodling 30 May 1986 18 p
(Contract DE-FG05-85NE-37949)
(DE86-013110; DOE/NE-37949/1) Avail: NTIS HC A02/MF A01

Significant accomplishments towards the development of an adaptive robotic welding system have been made during the first eight months of the project. The project is currently within budget and on schedule. Accomplishments were both scientific and programmatic in form. A list of the scientific accomplishments follows: demonstrated that the thermal profiles generated for intentionally induced defects during the welding process are similar in steel, aluminum and stainless steel. The conclusion is therefore that infrared sensing is applicable to the welding of over 90% of all materials used in the energy industry. Completed design and testing of a first generation communication system used to transfer information from the infrared camera to the computer in a near real time form. This demonstrates that information can be obtained, sorted, transferred and received in a time frame consistent with on-line process control. Demonstrated rudimentary seam tracking using infrared sensing and closed loop logic routines. A linear relationship exists between measured peak surface temperature and depth of penetration. Similarily, a linear relationship exists between measured infrared width and weld bead width. These relations suggest that penetration parameters may be controlled using surface measurements as obtained by infrared thermography. DOE

N87-12906# Allied Bendix Corp., Kansas City, Mo.
RESISTANCE SEAM WELDING
R. G. Thatcher Jul. 1986 16 p
(Contract DE-AC04-76DP-00613)
(DE86-013288; BDX-613-3557) Avail: NTIS HC A02/MF A01

Work was conducted to develop the capability to produce miniature resistance seam welds at the Bendix Kansas City Division (BKC) of Allied Corporation. This effort was initiated to weld aluminum foil to polyimide-backed copper foil on a flat cable. A parallel gap resistance welding head capable of accessing material from one side only was designed and fabricated for this purpose. Welds were made between aluminum and copper foils using the parallel gap resistance seam welding head. Bonds were made proving the welding head design was feasible. Aluminum to copper weld joints were analyzed by cross sectioning, electron beam microprobe analysis, and environmental testing. As expected with this material combination, testing indicated the presence of brittle, crack sensitive intermetallics in the weld zone. Work was expanded to develop a general resistance seam welding process capable of welding metal foils where there was access to both sides of the material. An opposed electrode welding head was designed and fabricated for this purpose. DOE

N87-12907# Allied Bendix Corp., Kansas City, Mo.
REVIEW OF ROBOTIC COMPONENT INSERTION SYSTEM FOR PRINTED WIRING ASSEMBLIES
K. J. Groot Jul. 1986 12 p
(Contract DE-AC04-76DP-00613)
(DE86-013510; BDX-613-3512) Avail: NTIS HC A02/MF A01

Robotic insertion systems for printed wiring assemblies are currently in use in industry. These systems can be interfaced with current BKC processing to increase efficiency, decrease cost, and improve quality. The requirements for a system which would satisfy BKC requirements are outlined. DOE

N87-12908# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

CONCURRENT ULTRASONIC WELD EVALUATION SYSTEM Patent Application
D. W. Hood, inventor (to DOE), J. A. Johnson, inventor (to DOE), and H. B. Smartt, inventor (to DOE) Filed Sep. 1985 22 p
(Contract DE-AC07-76ID-01570)
(DE86-013772; US-Patent-Appl-SN-772527) Avail: NTIS HC A02/MF A01

A system for concurrent, non-destructive evaluation of partially completed welds for use in conjunction with an automated welder is described. The system utilizes real time, automated ultrasonic inspection of a welding operation as the welds are being made by providing a transducer which follows a short distance behind the welding head. Reflected ultrasonic signals are analyzed utilizing computer based digital pattern recognition techniques to discriminate between good and flawed welds on a pass by pass basis. The system also distinguishes between types of weld flaws. DOE

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N87-12909# Committee on Science and Technology (U. S. House).
NASA'S QUALITY ASSURANCE PROGRAM
1986 163 p Hearing before the Subcommittee on Space Science and Applications of the Committee on Science and Technology, 99th Congress, 2d Session, No. 126, 21 May 1986
(GPO-63-142) Avail: Subcommittee on Space Science and Applications

The number of quality assurance personnel have declined dramatically since the Apollo Program. The facts and implications of the decline were examined. A system of checks and balances to accomplish quality control were also discussed. A panel of well-known experts described how an ideal quality assurance program should work. B.G.

N87-12910*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
NDE RELIABILITY AND PROCESS CONTROL FOR STRUCTURAL CERAMICS
George Y. Baaklini 1986 17 p Proposed for presentation at the 32nd International Gas Turbine Conference and Exhibition, Anaheim, Calif., 31 May - 4 Jun. 1987; sponsored by ASME
(NASA-TM-88870; E-3276; NAS 1.15:88870) Avail: NTIS HC A02/MF A01 CSCL 14D

The reliability of microfocus x-radiography and scanning laser acoustic microscopy for detecting microvoids in silicon nitride and silicon carbide was statistically evaluated. Materials- and process-related parameters that influenced the statistical findings in research samples are discussed. The use of conventional x-radiography in controlling and optimizing the processing and sintering of an Si3N4-Si02-Y203 composition designated NASA 6Y is described. Radiographic evaluation and guidance helped develop uniform high-density Si3N4 modulus-of-rupture bars with improved four-point flexural strength (657, 544, and 462 MPa at room temperature, 1200 C, and 1370 C, respectively) and reduced strength scatter. Author

N87-12911# Army Belvoir Research and Development Center, Fort Belvoir, Va.
RELIABILITY PREDICTION MODELS FOR MECHANICAL EQUIPMENT Interim Report, Oct. 1985 - Oct. 1986
James D. Raze Oct. 1985 66 p
(AD-A169775; Rept-2425) Avail: NTIS HC A04/MF A01 CSCL 13/9

The purpose of this report is to present a proposed methodology for predicting the reliability of mechanical equipment and solicit comments as to the potential utility of a complete handbook of reliability prediction procedures. The prediction methodology being developed considers the critical failure modes of a mechanical component, its material strengths, and the operating stresses at the component level. This method of analysis permits a prediction of the failure rate for each component of a mechanical system based upon the operating environment. GRA

N87-12912# Naval Personnel Research and Development Center, San Diego, Calif. Human Factors and Organizational Systems Lab.
QUALITY MANAGEMENT: AN ANNOTATED BIBLIOGRAPHY
Marilyn Monda, Pattie J. Thrapp, and Edith L. Goldberg Jun. 1986 92 p
(AD-A169816; HFOSL-TN-72-86-07) Avail: NTIS HC A05/MF A01 CSCL 05/1

As America strives to compete in the international marketplace, many U.S. businesses have adopted a new way of managing and measuring quality and productivity. The quality management methods focus on the systematic measurement and control of work processes. Successful quality management programs are credited with increases in profit, reduction of waste, and improved management-worker relations. This annotated bibliography is oriented toward those persons who are new to or only recently acquainted with the concept of quality management. The main body of journal articles, books, videotapes, and magazines selected from academia and industry focus on the introduction of the concepts, the terminology, and the personalities associated with the quality management movement. Citations include information about the author, date, title, and source, as well as a set of terms that summarize the key concepts of the citation and a brief abstract. Several articles are identified and recommended as an orientation to the field of total quality management. GRA

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance.*

N87-12913 Maryland Univ., College Park.
A NEW AND EFFICIENT FORMULATION FOR FINITE ELEMENT ANALYSIS OF THIN SHELL STRUCTURES UNDERGOING SMALL AND LARGE DEFLECTION Ph.D. Thesis
Jeong-Joo Rhiu 1985 238 p
Avail: Univ. Microfilms Order No. DA8608851

New finite element formulations are developed based on the Hellinger-Reissner principle with independent strain. By dividing assumed strain fields into the lower order part and the higher order part, the new formulations can be made much more efficient than the standard mixed formulations. Moreover, the present approach provides a rational way of introducing stabilization matrix to suppress undesirable spurious kinematic modes in finite element formulations. A nine node degenerate solid shell element based on the new formulation has been developed and tested for linear thin plate and shell problems. The numerical results indicate that this element is free of locking and successful in suppressing undesirable spurious kinematic modes. This nine node element is also extended to the analysis of thin shells undergoing large deflection in conjunction with the total Lagrangian scheme. A proper choice of integration strategy leads to a much simplified and less expensive formulation for geometrically nonlinear thin shells. Dissert. Abstr.

N87-12914 ESDU International Ltd., London (England).
GUIDE TO THE USE OF DATA ITEMS ON THE FATIGUE STRENGTH OF WELDED JOINTS IN STEELS
Jul. 1986 23 p
(ESDU-86013; ISBN-0-85679-565-8; ISSN-0141-4089; ISSN-0144-2805) Avail: ESDU

Available as part of the ESDU Sub-series on Stress and Strength and on Engineering Structures, this ESDU discusses

actors that affect the fatigue strength of a welded joint and, in articular, from fracture mechanics arguments shows that the trength is independent of the strength properties of the parent aterial. Similar arguments show the likely effect of size is to oduce the fatigue strength over that found in smaller joints (such s laboratory specimens on which many of the fatigue data vailable depend). The influence of residual stresses, and in turn eir effect on the way mean stress is experienced, is discussed, nd the use of thermal stress relieving is considered. Various esign options for joints are indicated, together with likely crack itiation sites in each case. A complete directory of some 0 possible types of welded joints for which fatigue data are cluded in other ESDU documents (75016, 76007, 76032, 77011, 8016, 78023 and 81007) are listed together with their equivalent pe and class of weld as defined in BS 5400. ESDU

87-12915*# Case Western Reserve Univ., Cleveland, Ohio. ept. of Civil Engineering.
NALYSIS OF MIXED-MODE CRACK PROPAGATION USING HE BOUNDARY INTEGRAL METHOD Final Report
exander Mendelson and Louis J. Ghosn Sep. 1986 194 p
irant NAG3-396)
IASA-CR-179518; NAS 1.26:179518) Avail: NTIS C A09/MF A01 CSCL 20K

Crack propagation in a rotating inner raceway of a high speed lier bearing is analyzed using the boundary integral equation ethod. The method consists of an edge crack in a plate under nsion, upon which varying Hertzian stress fields are superimsed. A computer program for the boundary integral equation ethod was written using quadratic elements to determine the ess and displacement fields for discrete roller positions. Mode I d Mode II stress intensity factors and crack extension forces G b 00 (energy release rate due to tensile opening mode) and G b r0 (energy release rate due to shear displacement mode) re computed. These calculations permit determination of that ck growth angle for which the change in the crack extension ces is maximum. The crack driving force was found to be the ernating mixed-mode loading that occurs with each passage of most heavily loaded roller. The crack is predicted to propagate a step-like fashion alternating between radial and inclined gments, and this pattern was observed experimentally. The ximum changes DeltaG sub 00 and DeltaG sub r0 of the crack ension forces are found to be good measures of the crack pagation rate and direction. Author

7-12916# Ecole Polytechnique, Montreal (Quebec). Dept. of chanical Engineering.
NAMIC ANALYSIS OF ANISOTROPIC CONICAL SHELLS
uni A. Lakis and Hamid Ouriche Oct. 1986 128 p
M/RT-86-36) Avail: NTIS HC A07/MF A01

An analysis is presented of the static and dynamic equilibrium thin anisotropic and non-uniform conical shells, subjected to arent boundary conditions. The procedure used was a hybrid based on Sander's shell theory and on the finite element hod as applied to thin shells having variable thickness and otropic elastic properties, but limited to cases of linear elasticity. displacement functions were derived from Sander's equations. stiffness and mass matrices were derived by exact analysis gration. The free vibration problem of conical shells was iced to an eigenvalues and eigenvectors problem. The vergence of the method proved to be satisfactory and the uencies and displacements were compared with existing lts. Author

-12917# Ecole Polytechnique, Montreal (Quebec). Dept. of hanical Engineering.
-LINEAR ANALYSIS OF CYLINDRICAL SHELLS
i A. Lakis and Alberto Toledano Sep. 1986 103 p
/RT-86-37) Avail: NTIS HC A06/MF A01

theory to predict the influence of geometric nonlinearities e natural frequencies of an empty anisotropic cylindrical shell presented. It was a hybrid of finite element and classical thin theories. Sanders-Koiter's nonlinear and strain-displacement relations were used. Displacement functions were evaluated using linearized equations of motion. Modal coefficients were then obtained for these displacement functions. Expressions for the mass, linear and nonlinear stiffness matrices were derived through the finite element method. The uncoupled equations were solved with the help of elliptic functions. The period and frequency variations were first determined as a function of shell amplitudes and then compared with the results in the literature. Author

N87-12918# Ecole Polytechnique, Montreal (Quebec). Dept. of Mechanical Engineering.
ANALYSIS OF ANISOTROPIC THIN CONICAL SHELLS
Aouni A. Lakis and Patrick Boisnaud 1986 146 p
(EPM/RT-86-38) Avail: NTIS HC A07/MF A01

A theory is presented for the static and dynamic analysis of thin conical anisotropic shells with bending resistance subject to an arbitrary distribution of loads. Sander's basic equilibrium equations were reduced to three differential equations of motion. Displacement, deformation, and stress relative to arbitrary boundary loadings and arbitrary distributed load were determined as a function of the shell characteristics. All boundary condition cases were derived in terms of eight constants. This theory was developed for thin shells where thickness is a function of the longitudinal direction generator to give homogeneous equations of motion. The numerical analysis is devoted to solving the characteristic equations for isotropic shells. The results are presented in the form of tables and graphs. The graphs are given in terms of the thickness-to-length ratio. Author

N87-12919# Ecole Polytechnique, Montreal (Quebec). Dept. of Mechanical Engineering.
DYNAMIC ANALYSIS OF A TIMOSHENKO BEAM USING A FINITE ELEMENT APPROACH
Aouni A. Lakis and N. D. Trinh 1986 179 p
(EPM/RT-86-34) Avail: NTIS HC A09/MF A01

The finite element method was used in this investigation in order to determine the static and dynamic behavior of non-uniform Timoshenko beams subjected to various boundary conditions. When using this approach, the general displacement functions are based on the cubic polynomial expansion of the three principal quantities as degrees of freedom: transverse displacement, rotation of the cross section and shear deformation. The stiffness and mass matrices, however, are derived from expressions of the strain and kinetic energy which are based on the assumptions of curved, slightly curved and straight beams. In addition, a formula was obtained from the general equation for a slightly curved beam and as a result, frequency equations for a straight beam were obtained for ten common types, taking into account all the forced and natural boundary conditions. Good agreement was achieved by comparing the results of these models with exact solutions, as well as with other numerical methods for straight and tapered beams. In order to test the rate of convergence, the natural frequencies of typical cases were calculated as a function of the number of elements. Results showed that the model converged rapidly and required only a small number of elements to achieve good results. Finally, the present analysis demonstrated the reliability of the model chosen by including the transverse shear and rotary inertia effects at the higher modes. Author

N87-12920# Ecole Polytechnique, Montreal (Quebec). Dept. of Mechanical Engineering.
FREE VIBRATION OF AXISYMMETRIC AND BEAM-LIKE CYLINDRICAL SHELLS, PARTIALLY FILLED WITH LIQUID
Aouni A. Lakis and Marwan Sinno 1986 142 p
(EPM/RT-86-35) Avail: NTIS HC A07/MF A01

A theory is presented for the determination of free vibration characteristics of anisotropic thin cylindrical shells, partially or completely filled with liquid for two circumferential wave numbers, n = 0 breathing and n = 1 beam-like. The method used was a hybrid one, based on the finite element method and supported by classical shell theories. The shell was subdivided into cylindrical finite elements and the displacement functions were obtained using

the shell's equations. Expressions for the mass and stiffness matrices for a finite element and for the whole structure were obtained. Similarly, a finite element was developed for the liquid in cases of potential flow. The natural frequencies of the shell in vacuo and partially filled were obtained and compared with existing experiments and other theories. Author

N87-12921*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EFFECTS OF VARIABLES UPON PYROTECHNICALLY INDUCED SHOCK RESPONSE SPECTRA
James Lee Smith May 1986 61 p
(NASA-TP-2603; NAS 1.60:2603) Avail: NTIS HC A04/MF A01 CSCL 20K

Throughout the aerospace industry, large variations of 50 percent (6 dB) or more are continually noted for linear shaped charge (LSC) generated shock response spectra (SRS) from flight data (from the exact same location on different flights) and from plate tests (side by side measurements on the same test). A research program was developed to investigate causes of these large SRS variations. A series of ball drop calibration tests to verify calibration of accelerometers and a series of plate tests to investigate charge and assembly variables were performed. The resulting data were analyzed to determine if and to what degree manufacturing and assembly variables, distance from the shock source, data acquisition instrumentation, and shock energy propagation affect the SRS. LSC variables consisted of coreload, standoff, and apex angle. The assembly variable was the torque on the LSC holder. Other variables were distance from source of accelerometers, accelerometer mounting methods, and joint effects. Results indicated that LSC variables did not affect SRS as long as the plate was severed. Accelerometers mounted on mounting blocks showed significantly lower levels above 5000 Hz. Lap joints did not affect SRS levels. The test plate was mounted in an almost free-free state; therefore, distance from the source did not affect the SRS. Several varieties and brands of accelerometers were used, and all but one demonstrated very large variations in SRS. Author

N87-12922*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FACTORS INFLUENCING ELASTIC STRESSES IN DOUBLE CANTILEVER BEAM SPECIMENS
J. H. Crews, Jr., K. N. Shivakumar (Analytical Services and Materials, Inc., Hampton, Va.), and I. S. Raju Nov. 1986 34 p
(NASA-TM-89033; NAS 1.15:89033) Avail: NTIS HC A03/MF A01 CSCL 20K

An elastic stress analysis was conducted for a double cantilever beam (DCB) specimen using finite-element methods. The purpose of this study was to identify the important parameters that influence stresses ahead of the delamination front. The study focused on an aluminum DCB specimen, typical of adhesively-bonded joints, and on a graphite/epoxy specimen representing a cocured composite. Opening mode sigma sub y stresses ahead of the crack tip were calculated and compared with those for a monolithic reference specimen. Beyond the singularity-dominated region very near the crack tip, the sigma sub y distribution was elevated compared to the monolithic case. Both the adhesive thickness and the adherend transverse (thickness-direction) stiffness were found to influence the elevation of sigma sub y. In contrast, adherend thickness and longitudinal stiffness has very little effect on this stress distribution. Estimates for adhesive yielding beyond the aluminum DCB crack tip showed that both the area and height of the plastic zone increased to a peak value for increasing adhesive thicknesses. Results from this study would provide insight for comparing data from different DCB specimens and for designing new DCB specimens. Author

N87-12923*# Pratt and Whitney Aircraft, East Hartford, Conn.
ON 3-D INELASTIC ANALYSIS METHODS FOR HOT SECTION COMPONENTS (BASE PROGRAM) Annual Status Report
R. B. Wilson, M. J. Bak, S. Nakazawa, and P. K. Banerjee Feb. 1986 206 p
(Contract NAS3-23697)
(NASA-CR-175060; NAS 1.26:175060; ASR-2; PWA-5940-36) Avail: NTIS HC A10/MF A01 CSCL 29K

A 3-D Inelastic Analysis Method program is described. This program consists of a series of new computer codes embodying a progression of mathematical models (mechanics of materials, special finite element, boundary element) for streamlined analysis of: (1) combustor liners, (2) turbine blades, and (3) turbine vanes. These models address the effects of high temperatures and thermal/mechanical loadings on the local (stress/strain)and global (dynamics, buckling) structural behavior of the three selected components. Three computer codes, referred to as MOMM (Mechanics of Materials Model), MHOST (Marc-Hot Section Technology), and BEST (Boundary Element Stress Technology), have been developed and are briefly described in this report. Author

N87-12924*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A CONSTITUTIVE LAW FOR FINITE ELEMENT CONTACT PROBLEMS WITH UNCLASSICAL FRICTION
Michael E. Plesha and Bruce M. Steinetz Nov. 1986 19 p
(NASA-TM-88838; E-3181; NAS 1.15:88838; ICOMP-86-1) Avail: NTIS HC A02/MF A01 CSCL 20K

Techniques for modeling complex, unclassical contact-friction problems arising in solid and structural mechanics are discussed. A constitutive modeling concept is employed whereby analytic relations between increments of contact surface stress (i.e., traction) and contact surface deformation (i.e., relative displacement) are developed. Because of the incremental form of these relations, they are valid for arbitrary load-deformation histories. The motivation for the development of such a constitutive law is that more realistic friction idealizations can be implemented in finite element analysis software in a consistent, straightforward manner. Of particular interest is modeling of two-body (i.e., unlubricated) metal-metal, ceramic-ceramic, and metal-ceramic contact. Interfaces involving ceramics are of engineering importance and are being considered for advanced turbine engines in which higher temperature materials offer potential for higher engine fuel efficiency. Author

N87-12925# Washington Univ., Seattle. Dept. of Mechanical Engineering.
A STUDY OF THE MECHANISM OF DYNAMIC DUCTILE FRACTURE OF TWO-PHASE MATERIALS Final Report, 1982 - 1985
Minoru Taya, Ian W. Hall, and H. S. Yoon 30 May 1986 35 p
(Contract DAAG29-82-K-0144)
(AD-A168966; ARO-18325.7-EG) Avail: NTIS HC A03/MF A01 CSCL 20/11

Dynamic ductile fracture of two phase material have been investigated in two stages. The first stage is a model study where an idealized two phase material, single crystal Cu-SiO2 was used to study the initiation and growth of voids, the dislocation morphology and the other microscopic behavior that took place in the as-impacted specimen. Important findings are voids were nucleated from only a fraction of secondary particles SiO2, the larger strain has induced the higher void density, and the dislocation cell structures were formed with the average cell size being constant for the range of strain rates investigated. Analytical models were constructed with the aim of simulating the void growth in a two phase material subjected to high strain rate deformation, static void growth model and dynamic void growth model. A comparison of the void density indicated the static void growth model can predict the experimental results reasonably well for the smaller strain, but it fails to predict for the larger strain, while the dynamic void growth model can simulate the void growth well for the entire range of strain and strain rates. The second stage conducts a series of experiments on more realistic two phase materials, Al-Si alloy and SiC(w) or SiC(p)/Al composite. The mode of the initiation and growth of voids was observed in the specimens that were impacted by Split Hopkinson bar test. The void density was also measured along the specimen axis and its values were compared

with the analytical results by the static void growth model, resulting in a reasonably good agreement. GRA

N87-12926# Brown Univ., Providence, R. I. Div. of Engineering.
AN ANALYSIS OF SHEAR BAND DEVELOPMENT INCORPORATING HEAT CONDUCTION
J. LeMonds and A. Needleman May 1986 37 p
(Contract DAAG29-85-K-0003)
(AD-A168972; ARO-22306.5-EG) Avail: NTIS HC A03/MF A01 CSCL 20/13

We incorporate the effects of material temperature sensitivity and heat conduction into an infinite band type analysis of shear localization. Full account is taken of finite geometry changes, but inertial effects are neglected. An energy balance is written between homogeneously deforming bands in a manner that models conditions in our recent finite element study of shear band development from internal inhomogeneities in a solid subject to plane strain compression. The band analysis requires specification of an imperfection amplitude and a length scale over which heat conduction effects are significant. These are chosen to match results of a finite element analysis. The predictions of the simple band analysis and the results of full finite element calculations are then compared for a wide range of material properties for both isotropic and kinematic hardening characterizations of the flow potential surface. The predicted dependence of the onset of localization on material properties such as strain hardening and strain rate sensitivity is the same for both types of analysis. GRA

N87-12927# Brown Univ., Providence, R. I. Div. of Engineering.
FINITE ELEMENT ANALYSES OF SHEAR LOCALIZATION IN RATE AND TEMPERATURE DEPENDENT SOLIDS
J. LeMonds and A. Needleman May 1986 59 p
(Contract DAAG29-85-K-0003)
(AD-A169057; ARO-22306.6-EG) Avail: NTIS HC A04/MF A01 CSCL 20/11

The effects of strain hardening, strain rate sensitivity, thermal softening, heat conduction and the imposed strain rate on the shear localizaton process in plane strain compression are examined. Deformation, stress and temperature fields are computed in an infinite solid which contains a periodic rectangular array of inhomogeneities. The inhomogeneities give rise to non-uniform deformation fields which, under certain conditions, may localize in the form of a shear band. Boundary conditions are prescribed such that the resulting fields possess periodicity with respect to the inhomogeneity distribution. In this manner, attention may be confined to a rectangular region of the solid which surrounds a single inhomogeneity. Full two-dimensional analyses are performed within the context of a viscoplasticity theory which, in the rate independent limit, corresponds to flow theory with combined isotropic and kinematic hardening. Full account is taken of finite strain and rotation effects, but attention is confined to quasi-static loading. The initiation and propagation of shear bands is examined for the bounding theories of isotropic and kinematic hardening. The predicted response depends significantly on the multi-axial hardening characterization of the solid. GRA

N87-12928# Brown Univ., Providence, R. I.
FEASIBILITY STUDY OF TEST PROBLEMS FOR FINITE ELEMENT/FINITE DIFFERENCE PROGRAMS FOR STRUCTURAL DYNAMICS Final Technical Report, 1 Aug. 1985 - 31 Jan. 1986
P. S. Symonds and H. Kolsky 12 Mar. 1986 12 p
(Contract DAAG29-85-K-0201)
(AD-A169058; ARO-23225.1-EG) Avail: NTIS HC A02/MF A01 CSCL 13/13

This research has resulted in additional calculations which will provide essential guides to future work. Using the Shanley model as a cheap and effective tool, calculated results show the influence of the geometrical parameter eta (= thickness of sandwich beam/half span) and of damping. It is seen that the anomalous behavior occurs only in a small range of thickness. Damping changes the response behavior fundamentally: counter-intuitive behavior still occurs but in a much more irregular manner, suggestive of chaotic behavior. Calculations using ABAQUS for the pinned uniform beam of standard dimensions and for a test specimen of slightly different dimensions show the characteristic diagrams for the two cases. It is surprising that qualitatively different shapes are obtained for the critical range of loads. The anomalous behavior being studied is evidently sensitive to parameters in unexpected ways. GRA

N87-12929# California Univ., Berkeley.
INTERNATIONAL CONFERENCE/WORKSHOP ON SMALL FATIGUE CRACKS (2ND) HELD IN SANTA BARBARA, CALIFORNIA ON 5-10 JANUARY 1986 Final Report
Robert O. Ritchie and James Lankford 31 Mar. 1986 31 p
Conference held in Santa Barbara, 5-10 Jan. 1986
(Grant DAAG29-85-G-0110)
(AD-A169060; ARO-23038.1-MS-CF) Avail: NTIS HC A03/MF A01 CSCL 11/6

This document provides a description and technical summary of the Second International Engineering Foundation Conference/Workshop on Small Fatigue Cracks, held in Santa Barbara, California, 5 to 10 January, 1986. It provides a current assessment of the pertinent issues with respect to definition, differences in behavior compared to long cracks, environmental effects, driving forces for small crack extension, intrinsic thresholds, and the application of small crack methodology to life prediction and alloy design. A listing of the conference participants and the technical program are appended to the report. GRA

N87-12930# Brown Univ., Providence, R. I. Div. of Engineering.
A FINITE ELEMENT METHOD FOR LOCALIZED FAILURE ANALYSIS
Michael Ortiz, Yves Leroy, and Alan Needleman 15 Apr. 1986 43 p
(Contract N00014-85-K-0720; Grant NSF NSM-84-19338)
(AD-A169117) Avail: NTIS HC A03/MF A01 CSCL 12/1

A method is proposed which aims at enhancing the performance of general classes of elements in problems involving strain localization. The method exploits information concerning the process of localization which is readily available at the element level. A bifurcation analysis is used to determine the geometry of the localized deformation modes. When the onset of localization is detected, suitably defined shape functions are added to the element interpolation which closely reproduce the localized modes. The extra degrees of freedom representing the amplitudes of these modes are eliminated by static condensation. The proposed methodology can be applied to 2D and 3D problems involving arbitrary rate-independent material behavior. Numerical examples demonstrate the ability of the method to resolve the geometry of localized failure modes to the highest resolution allowed by the mesh. Author (GRA)

N87-12931# Naval Research Lab., Washington, D. C.
INFLUENCE OF SHEAR MODULUS ON THE BEHAVIOR OF ACOUSTICALLY TRANSPARENT MATERIALS Interim Report, 9 Jan. 1984 - 12 Jan. 1985
Pieter S. Dubbelday 30 Apr. 1986 16 p
(AD-A169289; NRL-MR-5745) Avail: NTIS HC A02/MF A01 CSCL 17/1

Materials are under construction that match the density, rho and dilatational sound speed, c as closely as possible to the values of seawater, while maintaining sufficient rigidity to serve for structural purposes. The demand for rigidity implies a larger shear modulus than is typical for the usual rho-c elastomers. Matching of density and sound speed results in transparency for fluids only; the finite shear modulus in a solid admits the presence of a shear wave, which causes deviation from ideal rho-c behavior. In this report the effect is analyzed of a finite shear modulus on the reflection of plane waves by an infinite plate of the rho-c material. Examples are given of the reflection coefficient as a function of incidence angle for various combinations of density and sound speed close to ideal, and various ratios of plate thickness to dilatational wavelength. The effect of a finite loss factor in the shear modulus is known. GRA

N87-12932# Texas A&M Univ., College Station. Mechanics and Materials Center.
STRESS ASSISTED DIFFUSION IN ELASTIC AND VISCOELASTIC MATERIALS
Y. Weitsman Nov. 1985 37 p
(Contract N00014-82-K-0562)
(AD-A169296; MM-4762-85-19) Avail: NTIS HC A03/MF A01 CSCL 11/9

The governing field equations and boundary conditions for stress assisted diffusion are derived from basic principles of continuum mechanics and irreversible thermodynamics. Attention is confined to elastic and viscoelastic material response, with emphasis on isotropy and the case of small strains. It is shown that both the diffusion process and the saturation levels are stress dependent. In viscoelastic materials the time-dependence of the moisture boundary condition causes the saturation level to drift with time. In addition, the diffusion process becomes nonlinear in stress, in spite of the linearity of the mechanical behavior. GRA

N87-12933# Dayton Univ., Ohio.
MAGNA (MATERIALLY AND GEOMETRICALLY NONLINEAR ANALYSIS). ADDENDUM 1, PARTS 1-4 Final Report, Sep. 1982 - Mar. 1984
R. A. Brockman May 1986 191 p
(Contract F33615-82-K-3402)
(AD-A169383; AFWAL-TR-82-3098-ADD-1) Avail: NTIS HC A09/MF A01 CSCL 20/11

The finite element program MAGNA (Materially And Geometrically Nonlinear Analysis), has been developed for nonlinear static and dynamic analysis of complex three dimensional structures. This program is applicable to large structural response problems involving bars, membranes, beams, plates, shells, and three dimensional solids, experiencing large displacements, finite strains, large rotations, and plastic deformation. This revision package reflects a number of additions and modifications to the MAGNA software. These include the migration of CDC program versions from NOS/BE to the NOS operating system, conversion of source code to FORTRAN-77 (ANSI X3.9-1978), elimination of file naming and numbering conflicts among different program options, usage of CRAY COS V1.11 lk which is compatible with both CRAY-1 and CRAY-X/MP computers, conversion to IBM computers under the OS/VS2 MVS operating system, modification of VAX/VMS and CRAY restart options, addition of a cyclic symmetry feature in natural frequency analysis with an option for static condensation. GRA

N87-12934# Army Close Combat Armaments Center, Watervliet, N.Y.
LINEAR ELASTIC FRACTURE TESTING: CURRENT STATUS WITHIN ASTM COMMITTEE E-24 ON FRACTURE
John H. Underwood Apr. 1986 20 p
(AD-A169442; ARCCB-TR-86015) Avail: NTIS HC A02/MF A01 CSCL 20/11

The current status of elastic-stress-controlled fracture testing within ASTM is summarized, including example test results from high-strength steel forgings used for cannon. Plane-strain fracture toughness test methods were emphasized. Areas for future work were also discussed, including rapid crack growth tests, correlative tests, and tests for composite materials. GRA

N87-12935# North Carolina Univ., Chapel Hill. Dept. of Chemistry.
INTRINSIC SIO2 FILM STRESS MEASUREMENTS ON THERMALLY OXIDIZED SI Interim Report
E. Kobeda and E. A. Irene 20 Jun. 1986 28 p
(Contract N00014-83-K-0571)
(AD-A169602; TR-7) Avail: NTIS HC A03/MF A01 CSCL 07/4

We have investigated the effects of varying Si oxidation conditions on intrinsic film stress for SiO2 films formed on Si. This study includes stress measurements on four Si orientations: (100), (110), (111), and (311); at oxidation temperatures ranging from 700 to 1100 C; wet (H2O) vs. dry (O2) oxidations for (100) and (111) surfaces; and the effects of post-oxidation annealing on stress. We find an orientation dependence for intrinsic stress which scales in the following manner: (110) > (311) > (100) > (111); a reduction in stress for wet vs. dry studies; and an even larger reduction for post-oxidation anneals. A recently proposed step model seems to account for the differences in stress with Si orientation. A number of Si oxidation models based on intrinsic stress are compared in their ability to describe the observed behavior, and we conclude that within the Deal-Grove oxidation model, the linear rate constant is strongly influenced by stress in the initial regime while stress is also likely to be important for thicker films. GRA

N87-12936# Washington Univ., St. Louis, Mo. Center for Computational Mechanics.
COMPUTATION OF THE AMPLITUDE OF STRESS SINGULAR TERMS FOR CRACKS AND REENTRANT CORNERS Final Report
Barna A. Szabo and Ivo Babuska Feb. 1986 35 p
(Contract N00014-85-K-0169; Grant AF-AFOSR-0315-82)
(AD-A169796; AD-E900585; WU/CCM-86/1) Avail: NTIS HC A03/MF A01 CSCL 20/11

The theoretical basis and performance characteristics of two new methods for the computation of the coefficients of the terms of asymptotic expansions at reentrant corners from finite element solutions are presented. The methods, called the contour integral method and the cutoff function method, are very efficient: The coefficients converge to their true values as fast as the strain energy, or faster. In order to make the presentation as simple as possible, we assume that the elastic body is homogeneous and isotropic, is loaded by boundary tractions only and, in the neighborhood of the reentrant corner, its boundaries are stress free. The methods described herein can be adapted to cases without such restrictions. GRA

N87-12937# Army Close Combat Armaments Center, Watervliet, N.Y.
COMPUTATION OF RESIDUAL STRESSES DUE TO PHASE TRANSFORMATIONS DURING QUENCHING OF HOLLOW CYLINDERS Final Report
J. D. Vasilakis Jul. 1986 39 p
(AD-A170493; ARCCB-TR-86024) Avail: NTIS HC A03/MF A01 CSCL 20/11

A previous paper described a method for computing the stresses due to the combined effects of transient temperatures and material phase transformations. The general purpose finite element program ADINAT/ADINA was used to compute both the transient temperatures and the associated stresses. The problem considered was that of an axisymmetric hollow cylinder undergoing a water-spray quench. The present work considers a similar model, but is better able to describe the residual stress state because of the availability of a more accurate set of properties for the material expansion due to the phase transformation. Effects on the transient and residual stresses due to modifications of the material expansion and varying quench rates are discussed. It was found that the stresses due to the transformation are more severe than those due to the transient temperatures alone. Inelastic behavior is found to occur in all the cases considered and high residual stresses can exist on the inner and outer surfaces. While dependent on actual material composition, these residual stresses can lead to quench cracking. The model describes the rapid quenching of steel gun tubes for the purpose of developing a martensitic grain structure and desired physical properties in the tube. GRA

N87-12938# Army Close Combat Armaments Center, Watervliet, N.Y.
UNLOADING-COMPLIANCE AND LOAD-DROP ANALYSIS OF J(Ic) TEST OF IRRADIATED 348 STAINLESS STEEL Final Technical Report
J. H. Underwood, F. M. Haggag, and W. G. Reuter Jun. 1986 31 p
(AD-A170494; ARCCB-TR-86021) Avail: NTIS HC A03/MF A01 CSCL 11/6

Procedures for determining J integral fracture toughness were applied to load versus load-line displacement data from a series of three point bend specimens of irradiated 348 stainless steel tested at 23 C and 427 C. ASTM Method E813 for J sub Ic was emphasized, using both unloading-compliance and load-drop measures of crack growth. An effective modulus procedure was included in the unloading compliance method using recently published load line displacement results. Two procedures were used for calculating J sub Ic from the J versus unloading compliance crack growth plots: the linear fit procedure from E813 and a power law fit with a 0.2 mm offset value of J sub Ic. Based on the results of these various procedures, conclusions were reached regarding the most consistent measures of fracture toughness from these data. Suggestions were given regarding the use of effective modulus with unloading compliance measurement of crack growth and the limitations of the load drop method for measuring crack growth. GRA

N87-12939# Fairchild Republic Co., Farmingdale, N.Y.
ASSESSMENT OF DAMAGE TOLERANCE REQUIREMENTS AND ANALYSES: A USER'S MANUAL FOR CRACK GROWTH AND CRACK INITIATION ANALYSIS: DAMGRO Final Report, Sep. 1982 - May 1986
Mier Levy and Albert Kuo 31 May 1986 142 p
Contract F33615-82-C-3215)
AD-A171209; AFWAL-TR-86-3028) Avail: NTIS
HC A07/MF A01 CSCL 01/3

A structural test program of typical aircraft structural configurations was conducted to assess the current Air Force damage tolerance design requirements defined in MIL-A-83444. The specimens, made of 2024-T3XX and 7075-T6XX, were subjected to randomized flight-by-flight spectra, representative of fighter/trainer and bomber/cargo type loading spectra, respectively, and to a constant amplitude loading spectrum. A total of two-hundred fifty-six specimens were tested. The test results were correlated with analytical predictions using crack growth and crack initiation methods. As a result of this study, recommendation is provided to the validity of MIL-A-83444, to develop guidelines for selection of critical crack locations, and to assess the state-of-the art analytical capabilities in predicting crack growth and crack initiation time. This report presents the user's manual of the computer program DAMGRO. This program has been developed in conjunction with this contract, and used to predict the crack growth and crack initiation of the structural test specimens. Author (GRA)

N87-12940# Oak Ridge National Lab., Tenn.
INFLUENCE OF EXPERIMENTAL SCATTER ON THE ANALYSIS AND EXTRAPOLATION OF STRESS-RUPTURE DATA
J. K. Booker 1986 24 p Presented at the ASME Pressure Vessel and Piping Conference and Exhibit, Chicago, Ill., 20 Jul. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009510; CONF-860722-10; CONF-860727-3) Avail: NTIS
HC A02/MF A01

A great deal of research has been performed in the area of analysis and extrapolation of stress rupture data for more than three decades. Most of this work has concentrated on development of clever model forms for describing behavior in a simple mathematical way. However, little direct consideration has been given to the importance of inherent data scatter for such analyses. This paper presents a direct discussion of that topic, including an illustration of the impact of data scatter for several computer simulated data sets for which true behavior and the true amount of scatter are known by definition. The results clearly indicate that less attention should be paid to development of clever model forms for fitting data, and more should be paid to the use of sound, valid statistical techniques for the fitting of whatever models are used. DOE

N87-12941# Sandia National Labs., Albuquerque, N. Mex.
SHOCK-INDUCED SOLID STATE CHEMISTRY: THEORETICAL BACKGROUND
Nellori Jun. 1986 63 p
(Contract DE-AC04-76DP-00789)
(DE86-012741; SAND-86-0922) Avail: NTIS HC A04/MF A01

This report is a survey of the theoretical background of solid state chemistry relevant to high pressure shock wave loading. It is intended to be a study of selected theoretical concepts which are important for laying a foundation to make quantitative predictions concerning shock-induced chemical processes in nonenergetic solids. Since solid state reactions are often quite complex even under static conditions, the report is not intended to offer quick solutions to the very complex, and sometimes ill defined problems, but is to build a perspective to gain theoretical insight into some of them. The plan of the report is as follows: In Section 2, we collected a few relationships about chemical reactions from classical thermodynamics. In Section 3, we reviewed the nonequilibrium solid states created under shock wave loading with special focus on defects and heat and mass transport. Section 4 deals with selected concepts that may be useful to cope with reactions that result from the highly defective nonequilibrium states. Section 5 discusses several approaches for integrating microscopic mechanisms into continuum framework. Section 6 contains some recommendations for future research. DOE

N87-12942# Brookhaven National Lab., Upton, N. Y.
MOLECULAR DYNAMIC STUDIES OF CRACK PROPAGATION. THE ROLE OF THE INTERATOMIC POTENTIAL
G. J. Dienes 1986 6 p Presented at the Role of Hungarians in the Scientific and Technological Progress of the World, Budapest, Hungary, 4 Aug. 1986
(Contract DE-AC02-76CH-00016)
(DE86-009942; BNL-37980; CONF-860852-1) Avail: NTIS
HC A02/MF A01

We have used the molecular dynamic simulation technique in studying a variety of solid state problems, ranging from equation-of-state and shock wave propagation to epitaxy and various aspects of crack propagation. In these simulations, which are classical, Newton's equations-of-motion are solved for each particle at every step to yield positions, velocities, forces and energies. An important limitation of the technique is that one has to put an interatomic potential into the calculation. Within these restrictions the technique is exact and is very powerful in automatically incorporating many body and anharmonic effects into the calculation. For complicated processes, such as crack propagation, there is a practical limitation to two dimensions, simply by the availability of computing capabilities, if a large enough sample, representative of bulk processes is to be used. DOE

N87-12943# Ames Lab., Iowa.
CRACK PROPAGATION IN HIGH STRAIN REGIONS OF A STEEL CONTAINMENT
F. Fanous and L. Greimann 1986 15 p Presented at the 3rd Workshop on Integrity of Containments for Nuclear Power Plants, Washington, D.C., 21 May 1986
(Contract W-7405-eng-82)
(DE86-011437; IS-M-578; CONF-860507-8) Avail: NTIS
HC A02/MF A01

During a severe accident, a containment may develop a controlled relatively small leak before the pressure reaches the point where general rupture of the shell occurs. Another hypothesis states that an overall failure will occur with total release of the vessel contents. This work represents a preliminary study to predict crack propagation from an initially small defect in a high strain location in a typical steel containment. The J integral approach is used. A virtual crack extension method for calculating J is developed for use with general finite element programs. Two through cracks with different lengths were found to be unstable at the pressure which caused a surface crack to propagate through the containment thickness. In other words, the resulting through crack will not be stable and general failure will occur with the almost instantaneous release of the vessel contents. DOE

N87-12944# Oak Ridge National Lab., Tenn.
DATA REQUIREMENTS TO MODEL CREEP IN 9Cr-1Mo-V STEEL

R. W. Swindeman 1986 7 p Presented at the 3rd Symposium on Nonlinear Constitutive Relations for High Temperature Applications, Cleveland, Ohio, 11 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-011754; CONF-8606138-2) Avail: NTIS HC A02/MF A01

Models for creep behavior are helpful in predicting response of components experiencing stress redistributions due to cyclic loads, and often the analyst would like information that correlates strain rate with history assuming simple hardening rules such as those based on time or strain. On the other hand, much progress has been made in the development of unified constitutive equations that include both hardening and softening through the introduction of state variables whose evolutions are history dependent. Although it is difficult to estimate specific data requirements for general application, there are several simple measurements that can be made in the course of creep testing and results reported in data bases. The issue is whether or not such data could be helpful in developing unified equations, and, if so, how should such data be reported. Data produced on a martensitic 9Cr-1Mo-V-Nb steel were examined with these issues in mind. DOE

N87-12945# Sandia National Labs., Albuquerque, N. Mex.
USING COMBINED EXPERIMENT/ANALYSIS TO GENERATE DYNAMIC CRITICAL STRESS INTENSITY DATA
D. V. Swenson and A. R. Ingraffea 1986 34 p Presented at the 19th National Symposium on Fracture Mechanics (ASTM), San Antonio, Tex., 30 Jun. 1986 Prepared in cooperation with Cornell Univ.
(Contract DE-AC04-76DP-00789)
(DE86-013578; SAND-86-1337C; CONF-860675-3) Avail: NTIS HC A03/MF A01

In this paper, we give a short description of a finite element model of mixed-mode dynamic crack propagation. We then discuss the use of combined experiment/analysis procedures to generate critical stress intensity data as a function of crack velocity. Because of the sensitivity of the analysis to boundary conditions and specified crack velocity, it is difficult to generate reliable K sub ID (v) data using this approach. This is due to uncertainties in both the analysis and measured crack position. Suggestions are made for alternate test methods to reduce some of these uncertainties. DOE

42 GEOSCIENCES (GENERAL)

N87-12946# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES
10 Sep. 1986 112 p Transl. into ENGLISH from various Russian articles
(JPRS-UES-86-007) Avail: NTIS HC A06/MF A01

Articles from various Russian publications on the Earth Sciences are translated. Major subject headings are Meteorology, Oceanography, Terrestrial Geophysics, Physics of the Atmosphere, and Arctic and Anarctic Research. Representative titles might be: Meteorological Effects of Geotectonic Phenomena Hypothesized; Two Layer Structure of Magnetically Active Layer of Oceanic Lithosphere; Fossil Finds by Siberian Paleontologists Add to Understanding of Life Development Chronology; Evaluating Nonlinear Effects in Propagation of Acoustic Pulse in Atmospheric Surface Layer in Inversions; and Proposals for Advancement of Year Round Arctic Shipping. For individual titles, see N87-12947 through N87-12958.

N87-12947# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL EFFECTS OF GEOTECTONIC PHENOMENA HYPOTHESIZED Abstract Only c47
G. Afanasyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Sovetskaya Litva (Riga, USSR), 27 Apr. 1986 p 2 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

When meteorological data for several years in succession are carefully analyzed: heightened or lowered atmospheric pressures are observed more frequently over certain regions of the planet than others, at which cyclones and anticyclones originate. The natural conclusion, is that the source of the weather is located in the depths of the planet, in its mantle. This hypothesis was advanced at a conference on geotectonics which took place in the USSR. When the mantle interacts with the earth's core, so-called mantle channels form. They are fluctuating columns of matter 25 to 30 kilometers in diameter and 2,900 kilometers tall. This leads to the appearance of gravitational anomalies which are too weak to affect molecules of air directly, but they are quite sufficient to alter, by 1,000 times or more, the concentration of aerosols-droplets of water about 0.2 micrometer in diameter which are suspended in the air. These aerosols are condensation centers for water vapors, and their concentration directly affects the weather, as meteorologists demonstrated long ago. If the concentration changed in a certain place, the heatbalance of the atmosphere also changed there; areas heightened or lowered pressure occurred, and a cyclone or anticyclone was formed. E.R.

N87-12948# Joint Publications Research Service, Arlington, Va.
THIRD INTERNATIONAL SYMPOSIUM ON TROPICAL METEOROLOGY Abstract Only c47
V. N. Ivanov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fiziki Atmosfery i Okeana (Moscow, USSR), v. 22, no. 2, Feb. 1986 p 221-223 Symposium held in Yalta, 24-31 Mar. 1985 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

The Third International Symposium on Tropical Meteorology was held at Yalta. The 100 specialists present represented scientific institutes in the USSR, Cuba and Vietnam. Twelve special reports and 18 other communications were presented on the subject of tropical meteorology and hurricane research. The subjects dealt with included prediction of the trajectories of tropical cyclones, generation and development of tropical cyclones, numerical and laboratory modeling of tropical cyclones, structure and energetics of tropical cyclones, clouds and artificial inducement of precipitation. Three types of prognostic models (hydrodynamic, statistical and semiempirical) were discussed. Author

N87-12949# Joint Publications Research Service, Arlington, Va.
AVAILABLE POTENTIAL ENERGY IN UPPER LAYER OF WORLD OCEAN Abstract Only c46
V. S. Arsenyev and V. A. Burkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 287, no. 4, Apr. 1986 p 986-989 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

The available potential energy (APE) is calculated for large scale motion in the entire world ocean (with the exception of the Arctic Ocean) to a depth of 1500 m. The highest values of APE are found to occur in the regions of Antarctic divergence (more than 55 x 10 to the 5th J/sq m), subpolar divergence in the Atlantic (more than 35 x 10 to the 5th J/sq m), and northern subtropical convergence in the Pacific south of Japan (more than 30 x 10 to the 5th J/sq m). E.R.

N87-12950# Joint Publications Research Service, Arlington, Va.
DESERTIFICATION: GLOBAL ECOLOGICAL PROBLEM Abstract Only c46
N. S. Orlovskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Voprosy Filisofii (Moscow, USSR), no. 2, Feb. 1986 p 113-123 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

It is suggested that western practices and analyses of desertification fail to take social factors into account, and do not promote progressive technology that would preserve the environment while bringing progress. It is claimed that Soviet practices

have minimized ecological damage by use of a different socioeconomic structure and by planning. In Central Asia, efforts since the 1930's have focused on controlling shifting sands with both dry grass and brush, as well as physicochemical means. In Turkmenistan sand dune damage to irrigated fields is completely controlled, although some local areas of desertification have been noted near well sites and in industrialized desert areas. Prevention of land damage in irrigated areas has required careful drainage system construction to avoid mineral deposits while making maximum use of ground water reserves. Technological backwardness is noted in some irrigated areas of Central Asia, and the extent of saline soils of various types is of concern. Disposal of irrigation water after its use is another problem still being resolved in Central Asia. Irrigation and water disposal in the basins of Syrdarya, Amudarya and Ili Rivers have caused a decline in the level of the Aral Sea. In addition, lands in the deltas of the Syrdarya and Amudarya have suffered desertification.

Author

N87-12951# Joint Publications Research Service, Arlington, Va.
EVALUATING NONLINEAR EFFECTS IN PROPAGATION OF ACOUSTIC PULSE IN ATMOSPHERIC SURFACE LAYER IN INVERSIONS Abstract Only **c71**
I. P. Chunchuzov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery i Okeana (Moscow, USSR), v. 22, no. 2, Feb. 1986 p 151-159 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

The general features of propagation of powerful acoustic disturbances in the atmospheric surface layer were analyzed. They can be generated by natural sources, such as volcanic eruptions, earthquakes and thunderstorms or by such artificial sources as powerful exlosions. An attempt was made to clarify the contribution made by nonlinear effects to the process of propagation of powerful acoustic disturbances in a surface waveguide. It is shown that in some cases such a nonlinear process of waveguide propagation of sound can be described by a nonlinear equation which is a nonlinear analogue of the well-known parabolic equation. Proceeding on this basis, it is shown that in the case of a point source nonlinear effects and waveguide dispersion can result in the appearance of cylindrical solitons at great distances which attenuate with distance far more slowly than a linearly propagated pulse. An equation is derived whose solution describes ow change of the initially plane soliton in the course of propagaion.

Author

N87-12952# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL RESEARCH ON TURBULENCE IN UPPER-LEVEL TROPOSPHERIC CLOUDS Abstract Only **c46**
. K. Dmitriyev, T. P. Kapitanova, V. D. Litvinova, N. Z. Pinus, G. . Potertikova, and G. N. Shur *In its* USSR Report: Earth Sciences IPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH om Izvestiya Akademii Nauk SSSR: Fizika Atmosfery i Okeana Moscow, USSR), v. 22, no. 2, Feb. 1986 p 143-150 (For primary ocument see N87-12946 04-42)
vail: NTIS HC A06/MF A01

Flight studies of turbulence in cirrus clouds were made in late 981 and early 1982. The experiments were carried out with a de array of scientific instrumentation for measuring mean mperature, humidity, wind velocity and direction, fluctuations of mperature and the horizontal and vertical components of the nd vector. Parameters were measured in two ranges of spatial ales of disturbance (from hundreds of meters to 2 to 3 km and m 5 to 6 to 30 to 40 km). The two ranges correspond to ro- and mesoscale pulsations. Horizontal flights with a length to 500 km were made at 5 to 6 levels. Nineteen multilever nt experiments were made. Flights were made in cirrostratus uds and in the clear sky. The collected data were used in structing vertical atmospheric sections and in tabulating the ults of synchronous measurements of the vertical and horizontal tuations of velocity and temperature fluctuations, rate of ipation of turbulent energy into heat, rate of evening-out of perature inhomogeneities and structural characteristic of the fluctuating temperature field. This made it possible to define the distinguishing characteristics of turbulence in cirrostratus clouds and in jet streams.

Author

N87-12953# Joint Publications Research Service, Arlington, Va.
SOLAR CONTROL OF GEOPHYSICAL PHENOMENA Abstract Only **c46**
V. F. Loginov and G. V. Fedorovich *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 1, Jan. - Feb. 1986 p 58-61 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

An all-union conference on Interrelationship of Meteorological Phenomena and Processes in Circumterrestrial Space was held in Moscow. The purpose was a review of progress in study of different mechanisms of interrelationships of geophysical and meteorological processes and phenomena in the upper atmosphere and in space. The change in the influx of solar radiation to the Earth during the last century was studied. On the basis of data on parameters of the Earth's orbit and brightness of the solar disk they concluded that the influx of solar radiation is decreasing not only due to a change in the brightness of the solar disk, but also due to a change in the parameters of the Earth's orbit with a duration from several years to several decades. Changes in composition and temperature of the ozone layer under the influence of UV radiation and cosmic rays was discussed. Although ozone for the most part is found in the lower and middle stratosphere and solar flares have little effect on its total content, there is good basis for assuming that the ozone mechanism plays a definite role in changes in weather and climate. The role was also studied of the Earth's electrical field in solar-terrestrial relationships, which plays an important role in the propagation of disturbances in the circumterrestrial medium and must be taken into account in studying the process of preparation of earthquakes.

Author

N87-12954# Joint Publications Research Service, Arlington, Va.
EFFECT OF PULSATING AURORAS ON FREQUENCY-TIME CHARACTERISTICS OF RADIO SIGNALS REFLECTED FROM AURORAL IONOSPHERE Abstract Only **c32**
A. A. Arykov, I. N. Bardeyev, A. N. Vasilyev, V. G. Korotkov, A. M. Royzen, and S. A. Rumyantsev *In its* USSR Report: Earth ScienceS (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 243-246 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

The spectrum of constant wave radio signals reflected and dissipated by the ionosphere can provide much information about processes in the ionosphere. Experimental study of dynamics of spectral variations of radio signals reflected from the auroral ionosphere during periods of pulsating auroras is reported. The experiments were conducted on a 60 km path at a geomagnetic latitude averaging 63 deg. A constant signal with plane polarization was sent at 3.3 MHz. Analysis of experimental data show that the undisturbed signal, in a band of several Hz around the working frequency, was expanded noticeably in amplitude by the aurora disturbances. Optical pulsations and spectral variations support the explanation of spectral variations as a result of Doppler frequency shifts and changes in electron concentration profiles. Auroras with an interval of about 10 seconds were accompanied by specific variations in SW radio signals reflected in the E region of the auroral ionosphere. Spectral variations are explained by the Doppler shift of signal frequency during changes in ionization density created by rapidly changing currents of precipitating electrons during pulsating auroras.

Author

N87-12955# Joint Publications Research Service, Arlington, Va.
PHASE FLUCTUATIONS OF IONOSPHERE RADIO SIGNALS Abstract Only **c32**
V. D. Gusev and M. B. Vinogradova *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR),

v. 26, no. 2, Mar. - Apr. 1986 p 247-252 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

Phase fluctuations were observed in reflections of radio signals in regions of the ionosphere containing various inhomogeneities. While these fluctuations affect operations of radio systems, they also offer new information about the structure and dimensions of scattering inhomogeneities. Geometric optics are used for correct expression of wave phase reflections from the ionosphere during oblique propagation. Calculations take account of dielectric permeability and beam trajectories. A second series of calculations related to determination of phase fluctuations of waves during propagation in a fixed-thickness layer with slant incidence relative to the boundary. Fluctuations of horizontal beam shift at the output from the distributive layer are also treated mathematically. Results indicate that ionosphere inhomogeneities can be used to determine dielectric properties of materials. Author

N87-12956# Joint Publications Research Service, Arlington, Va.
TRANSVERSE RESONANCES OF EARTH-IONOSPHERE WAVE GUIDE IN AURORAL REGION Abstract Only c32
V. S. Smirnov and A. A. Ostapenko *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 253-257 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

Contemporary studies of low freqeuncy radiation have defined the precise structure of such signals in the auroral region. A study is reported of spectral and polarized features of transverse resonances and the relationship to ionospheric parameters. So-called Schumann resonances were studied with frequencies from a few to tens of Hz. Strong attenuation in that range virtually excludes wave interference and makes it difficult to generate global resonances in the kiloherz frequency range. Thus, modulations in those frequencies are local in nature. They make it possible to use a plane model of the earth-ionosphere wave guide and allow direct determination of the wave equation, which is discussed. Results show that at high latitude degeneration effects are manifested in periods of leakage of hard particles when the ionosphere is at low altitudes; soft particles are found when the ionosphere limits are at higher altitudes. A stepped mathematical model gave a rough approximation of actual ionization. Ordinary and extraordinary modes were found to correspond to waves of left and right polarization, respectively, with relatively low values for particle disintegration. Theoretical values correlated well with experimental data on low-frequency radiation wave. Author

N87-12957# Joint Publications Research Service, Arlington, Va.
REGULAR NOISE BACKGROUND IN VLF-RADIATION AND WORLD THUNDERSTORM CENTERS Abstract Only c32
G. I. Druzhin, T. V. Toropchinova, and V. I. Shapayev *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 258-264 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

Regular noise emissions (RNE) in VLF radiations are typified by their constant nature. Attempts to develop qualitative analysis procedures for defining various sources in the RNE amplitude by observing the day-long course of intensity at several recording stations are reported. Signal azimuth findings were made using a magnetic dipole antenna. A preliminary hypothesis held that only two sources, discrete and isotropic points, contributed to RNE amplitude. Actually, it was found that two or more sources could be involved simultaneously. Errors for three factors are discussed: the RNE source with extreme limits, several simultaneous discrete sources and measurement error parameters. Varying evening and nighttime readings were recorded, with minor morning changes as well. They were found at all recording stations. Quasi-constant azimuths of radiation during definite periods indicate that localized RNE sources should exist during these periods. During fall and winter periods, world thunderstorm cells were found to play a key role in RNE formation, but further research is needed to determine whether thunderstorm activity alone accounts for RNE generation. Author

N87-12958# Joint Publications Research Service, Arlington, Va.
SPATIAL RADIO WAVE ATTENUATION DURING VERTICAL SOUNDING OF IONOSPHERE Abstract Only c32
P. F. Denisenko, V. I. Vodolazkin, and G. G. Vertogradov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Geomagnetizm i Aeronomiya (Moscow, USSR), v. 26, no. 2, Mar. - Apr. 1986 p 322-325 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

Radio wave attenuation due to energy losses in the ionosphere was studied. The field is expressed by the equation: E = A exp(-L sub e/r sub eff). It concentrates on determining the effective distance in the actual ionosphere in relation to an illuminated area of the earth's surface. The vector of the inverse geomagnetic field strength effect is also included in the mathematical model. It is noted that the results are reliable for all but the longitudinal propagation of regular radio waves. Corrections are suggested. The method has a correctable level of error. Author

43 EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N87-12959# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GEOLOGIC REMOTE SENSING AT INPE: AN OVERVIEW
Chan Chiang Liu, Jose Eduardo Rodrigues, and Paulo Roberto Martini Aug. 1986 18 p Presented at the Seminar on Geologic Applications of Remote Sensing, Sao Jose dos Campos, Brazil, Dec. 1985
(INPE-3975-PRE/987) Avail: NTIS HC A02/MF A01

In Brazil, LANDSAT imagery has been used for regional geological and mineral resources mapping. The launching of the first LANDSAT is a milestone in the history of geological surveys by remote sensing techniques in this country. Because LANDSAT images give a bird's eye view of the earth's surface, this regional geological mapping has been carried out first, and then followed by structural and geotectonic studies. On the other hand, because LANDSAT data in digital format on Computer Compatible Tapes (CCT) are available to be analyzed by computer-processing techniques, research for mineral deposits and rock formation identification have been possible especially in recent years. Author

N87-12960# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EVALUATION OF REMOTE SENSING TECHNIQUES TO THE DETECTION OF CHANGES IN A FLUVIAL SYSTEM DUE TO HUMAN INFLUENCE: THE EXAMPLE OF CANAS RIVER BASIN (SAO PAULO STATE, BRAZIL)
Evlyn M. L. M. Novo and Adilson Avansi deAbreu (Sao Paulo Univ. (Brazil).) Aug. 1986 36 p Submitted for publication
(INPE-3970-PRE/983) Avail: NTIS HC A03/MF A01

The main objective of this study is to exemplify the use of remote sensing data to evaluate human interference in fluvial systems. River Canas Basin was selected as a test site since it belongs to the Paraiba River basin where human action has disrupted natural equilibrium. Multitemporal aerial photography was analyzed so as to detect changes in fluvial morphology. The rate of environmental change was checked against remote sensing data available by using field work information. Results permitted identification river channel changes over time as well as local factors which explain the variability of change rates. Author

87-12961# Instituto de Pesquisas Espaciais, Sao Jose dos ampos (Brazil).

ROP YIELD MODELING FOR CLIMATE IMPACT STUDIES. ART 1: REASONING AND RESULTS

austo Carlos deAlmeida Aug. 1986 12 p Presented at the ASA Meeting on Assessment of Climate Impact on Agriculture in emiarid and High Altitude Regions, Laxenburg, Austria, 8-12 Oct. 984

NPE-3967-PRE/982-Pt-1) Avail: NTIS HC A02/MF A01

The use of regression crop yield models (RCY) for Climate pact Assessment Studies requires some basic features some-nes not encountered in most RCY models. Many of the RCY odels developed have a different aim, i.e., to give a reasonable timate of the yield of a given crop, for a given location, based a historical technological trend and suitably chosen meteorologi-l variables. In general they offer good prediction efficacy, i.e., curacy and lead time, but should be carefully analyzed when ed for other purposes, such as in Climate Impact Assessment udies. Depending on what kind of climate scenario we are dealing h, the RCY model chosen has to be able to assimilate the pact of the respective meteorological variables on yield. For , the model should be representative, i.e., should not depend the historical time series period we chose to work with. Its ression coefficients should be stable with no change in sign l present a very small (combined) variance, otherwise the climate ect, represented by changes of the meteorological variables ng tested, can be masked by its (the regression coefficients) ance.

Author

-12962# Instituto de Pesquisas Espaciais, Sao Jose dos npos (Brazil).

ERGY RECEIPT PARTITIONING OVER THE AMAZON FOR-

nardo DeanedeAbreuSa, Yelisetty Viswanadham, and Antonio mar Manzi Aug. 1986 46 p Submitted for publication

E-3980-PRE/990) Avail: NTIS HC A03/MF A01

The present study involved determination of the experimental rgy receipt partitioning over the tropical Amazon forest. Diurnal ation of net radiation (Q*), sensible heat flux (Q sub H) and t heat flux (Q sub E) is presented. The daytime Q sub E is in e with Q* and it is always an important term in the energy nce. The daily averaged Q sub E is 59 to 100% of the daily whereas Q sub H is 5 to 28% at the Amazon forest site eg. 57 deg. S; 59 deg. 57 deg W) for the sample periods. results present evidence that Q sub E over the Amazon t is greater than Q* in the afternoon hours. The role of ible heat advection in maintaining large Q sub E over the t surface is discussed. Hourly Bowen ratio (beta) values for compaigns are presented. During daylight hours, the differ-s in beta are not significant, and exhibit a systematic pattern. only time that the variation in Bowen ratio increased signifi-y was a sunrise and sunset when the thermal structure of the as changing from a strong inversion to lapse and vice versa. diurnal beta values changed from -3.50 to 0.85. The mean beta calculated from values from 0700 to 1600h, varied 0.05 to 0.85.

Author

12963# Instituto de Pesquisas Espaciais, Sao Jose dos os (Brazil).

RT OF THE AD-HOC COMMISSION ON REMOTE SENSING ATORIO DA COMISSAO AD-HOC EM SENSORIAMENTO TO]

986 31 p In PORTUGUESE; ENGLISH summary

3981-NTE/259) Avail: NTIS HC A03/MF A01

e results of the Commission for the Remote Sensing following INPE's Director request is presented. Author

2964# Instituto de Pesquisas Espaciais, Sao Jose dos s (Brazil).

TITION OF SENSIBLE AND LATENT HEAT FLUXES E THE TERRA FIRMA AREA IN THE AMAZON FOREST IENT METHOD) [PARTICAO DE FLUXOS DE CALOR VEL E DE CALOR LATENTE ACIMA DA FLORESTA AMAZONICA DE TERRA FIRME (METODO DOS GRADIEN-TES)]

Leonardo DeanedeAbreuSa, Antonio Ocimar Manzi, and Yelisetty Viswanadham Aug. 1986 18 p In PORTUGUESE; ENGLISH summary Presented at the 30th Reuaniao Anual da S.B.P.C., Curitiba, Brazil, 9-16 Jul., 1986

(INPE-3972-PRE/985) Avail: NTIS HC A02/MF A01

A partition of net radiation to sensible and latent heat fluxes above the Amazon Forest canopy is studied. The observational site (2 degrees 57 minutes S, 59 degrees W) of the Terra firma area in the Amazon forest is near Manaus, AM. The Bowen ratio values for distinct layers above the canopy are calculated using the profile method. Diurnal variation of these values are presented. The results show that the daytime Bowen ratios obtained during nonprecipiatation days for higher layer are greater than for lower layer. This may be attributed to the influence of this transpiration from adjacnt air layers above the canopy. This process reduces the temperature of the adjacent air layers above the canopy and increases the specific humidity in those layers. The data obtained for the period July 1984 to April 1985 were utilized in the analysis.

Author

N87-12965*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ERS-1 SAR DATA PROCESSING

Kon Leung, Thomas Bicknell, and Kenneth Vines 1 Sep. 1986 34 p

(NASA-CR-179913; JPL-Pub-86-33; NAS 1.26:179913) Avail: NTIS HC A03/MF A01 CSCL 05B

To take full advantage of the synthetic aperature radar (SAR) to be flown on board the European Space Agency's Remote Sensing Satellite (ERS-1) (1989) and the Canadian Radarsat (1990), the implementation of a receiving station in Alaska is being studied to gather and process SAR data pertaining in particular to regions within the station's range of reception. The current SAR data processing requirement is estimated to be on the order of 5 minutes per day. The Interim Digital Sar Processor (IDP) which was under continual development through Seasat (1978) and SIR-B (1984) can process slightly more than 2 minutes of ERS-1 data per day. On the other hand, the Advanced Digital SAR Processore (ADSP), currently under development for the Shuttle Imaging Radar C (SIR-C, 1988) and the Venus Radar Mapper, (VMR, 1988), is capable of processing ERS-1 SAR data at a real time rate. To better suit the anticipated ERS-1 SAR data processing requirement, both a modified IDP and an ADSP derivative are being examined. For the modified IDP, a pipelined architecture is proposed for the mini-computer plus array processor arrangement to improve throughout. For the ADSP derivative, a simplified version is proposed to enhance ease of implementation and maintainability while maintaing real time throughput rates. These processing systems are discussed and evaluated.

Author

N87-12966# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PHOTOGRAPHIC SENSORS: BASIC CONCEPTS [SENSORES FOTOGRAFICOS: CONCEITOS BASICOS]

Chan Chang Liu and Jose Eduardo Rodrigues Sep. 1986 43 p In PORTUGUESE; ENGLISH summary

(INPE-3990-MD/031) Avail: NTIS HC A03/MF A01

This paper of photographic systems is prepared for the Postgraduate course on Remote Sensing of the Instituto de Pesquisas Espaciais (INPE) and is suitable both as teaching material or as reference. It provides almost all aspects of photography, taking and processing photographs, physical factors affecting their quality, type of camera, films, filters and so on. This work is not exhaustive but is a summary of subjects extensively covered in the literature. Therefore, readers should be quickly able to understand and apply the photographic remote sensing techniques to their disciplines.

Author

N87-12967*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A COMPUTATIONAL METHOD TO MODEL RADAR RETURN

RANGE IN A POLYGONALLY BASED, COMPUTER-GENERATED-IMAGERY SIMULATION

F. J. Moran and J. D. Phillips Jul. 1986 22 p

(NASA-TM-88324; A-86313; NAS 1.15:88324) Avail: NTIS HC A02/MF A01 CSCL 08B

Described is a method for modeling a ground-mapping radar system for use in simulations where the terrain is in a polygonal form commonly used with computer generated imagery (CGI). The method employs a unique approach for rapidly rejecting polygons not visible to the radar to facilitate the real-time simulation of the radar return. This rapid rejection of the nonvisible polygons requires the precalculation and storage of a set of parameters that do not vary during the simulation. The calculation of a radar range as a function of the radar forward-looking angle to the CGI terrain is carried out only for the visible polygons. This method was used as part of a simulation for terrain-following helicopter operations on the vertical motion simulator at the NASA Ames Research Center. It proved to be an efficient means for returning real-time simulated radar range data. Author

N87-12968*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PROCEEDINGS OF THE SECOND AIRBORNE IMAGING SPECTROMETER DATA ANALYSIS WORKSHOP

Gregg Vane, ed. and Alexander F. H. Goetz, ed. 15 Aug. 1986 218 p Workshop held in Pasadena, Calif., 6-8 May 1986 Sponsored by NASA

(NASA-CR-179924; JPL-Pub-86-35; NAS 1.26:179924) Avail: NTIS HC A10/MF A01 CSCL 05B

Topics addressed include: calibration, the atmosphere, data problems and techniques, geological research, and botanical and geobotanical research. For individual titles, see N87-12969 through N87-12987.

N87-12969*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RADIOMETRIC CALIBRATION OF THE AIRBORNE IMAGING SPECTROMETER c35

Deanne Tucker and Gregg Vane *In its* Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 17-20 (For primary document see N87-12968 04-43)

Avail: NTIS HC A10/MF A01 CSCL 14B

Several laboratory calibration tests were developed for the Airborne Imaging Spectrometer (AIS). The goals of these tests are to adjust the physical alignment of the detector within the optical system and set the spectral endpoints, and produce a calibration file of multipliers which equalizes the relative responses of each of the detector elements in the entire two-dimensional array. Tests are also performed as part of an ongoing effort to provide absolute radiometric calibration. The tests are described and the merits and limitations of each are discussed. Author

N87-12970*# Stanford Telecommunications, Inc., Sunnyvale, Calif.

COMPARISON OF VARIOUS TECHNIQUES FOR CALIBRATION OF AIS DATA c35

Dar A. Roberts, Yasushi Yamaguchi (Geological Survey of Japan, Kawasaki.), and Ronald J. P. Lyon *In* JPL Proceedings of the Second Airborn Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 21-30 (For primary document see N87-12968 04-43)

Avail: NTIS HC A10/MF A01 CSCL 14B

The Airborne Imaging Spectrometer (AIS) samples a region which is strongly influenced by decreasing solar irradiance at longer wavelengths and strong atmospheric absorptions. Four techniques, the Log Residual, the Least Upper Bound Residual, the Flat Field Correction and calibration using field reflectance measurements were investigated as a means for removing these two features. Of the four techniques field reflectance calibration proved to be superior in terms of noise and normalization. Of the other three techniques, the Log Residual was superior when applied to areas which did not contain one dominant cover type. In heavily vegetated areas, the Log Residual proved to be ineffective. After removing anomalously bright data values, the Least Upper Bound Residual proved to be almost as effective as the Log Residual in sparsely vegetated areas and much more effective in heavily vegetated areas. Of all the techniques, the Flat Field Correction was the noisiest. Author

N87-12971*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ANALYSIS OF AIS RADIOMETRY WITH EMPHASIS ON DETERMINATION OF ATMOSPHERIC PROPERTIES AND SURFACE REFLECTANCE

J. E. Conel, S. Adams, R. E. Alley, G. Hoover, and S. Schultz *In its* Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 31-51 (For primary document see N87-12968 04-43)

Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer data from Mono Lake, California, were studied in order to establish spectral radiance of test areas under solar illumination. The objective is to provide a method of atmospheric correction for major absorbers from the spectrometer data themselves. Crucial to the analysis is radiometric calibration of the instrument. Good agreement is found between calculated and measured radiances for uniform surface targets (beaches), but simulations of atmospheric properties with LOWTRAN lead to unreasonably low values of atmospheric precipitable water. Absorptions from carbon dioxide are not detected in the AIS data, but are strongly present in the LOWTRAN model. The apparent low contrast of all atmospheric absorption bands leads to a study of contamination from overlapping spectral orders in the AIS data. The suspected contamination is shown unambiguously to be present beyond approximately 1500 nm and consists of an extra radiance term including atmospheric bands from the delta/2 wavelength interval. A rigorous removal of the unwanted spectral contamination does not seem possible for any data taken in the rock mode. Rough estimates for tree-mode observations might be pieced together is a suitable after-the-fact radiometric calibration of the instrument can be formulated. Author

N87-12972*# Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Mineral Physics and Mineralogy.

AIRBORNE SPECTRORADIOMETRY: THE APPLICATION OF AIS DATA TO DETECTING SUBTLE MINERAL ABSORPTION FEATURES

Terry D. Cocks and Andy A. Green *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 52-62 (For primary document see N87-12968 04-43)

Avail: NTIS HC A10/MF A01 CSCL 05B

Analysis of Airborne Imaging Spectrometer (AIS) data acquired in Australia has revealed a number of operational problems. Horizontal striping in AIS imagery and spectral distortions due to order overlap were investigated. Horizontal striping, caused by grating position errors can be removed with little or no effect on spectral details. Order overlap remains a problem that seriously compromises identification of subtle mineral absorption features within AIS spectra. A spectrometric model of the AIS was developed to assist in identifying spurious spectral features, and will be used in efforts to restore the spectral integrity of the data. Author

N87-12973*# Geological Survey, Lakewood, Colo. Geologic Div.

ATMOSPHERIC-WATER ABSORPTION FEATURES NEAR 2.2 MICROMETERS AND THEIR IMPORTANCE IN HIGH SPECTRAL RESOLUTION REMOTE SENSING

Fred A. Kruse and Roger N. Clark *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 63-73 (For primary document see N87-12968 04-43)

Avail: NTIS HC A10/MF A01 CSCL 05B

Selective absorption of electromagnetic radiation by atmospheric gases and water vapor is an accepted fact in terrestrial remote sensing. Until recently, only a general knowledge of atmospheric effects was required for analysis of remote sensing

lata; however, with the advent of high spectral resolution imaging levices, detailed knowledge of atmospheric absorption bands has ecome increasingly important for accurate analysis. Detailed study f high spectral resolution aircraft data at the U.S. Geological urvey has disclosed narrow absorption features centered at pproximately 2.17 and 2.20 micrometers not caused by surface ineralogy. Published atmospheric transmission spectra and tmospheric spectra derived using the LOWTRAN-5 computer odel indicate that these absorption features are probably water apor. Spectral modeling indicates that the effects of atmospheric bsorption in this region are most pronounced in spectrally flat aterials with only weak absorption bands. Without correction and etailed knowledge of the atmospheric effects, accurate mapping surface mineralogy (particularly at low mineral concentrations) not possible. Author

87-12974*# National Aeronautics and Space Administration. nes Research Center, Moffett Field, Calif.
ESTRIPING AIS DATA USING FOURIER FILTERING TECHQUES
ris Hlavka *In* JPL Proceedings of the Second Airborne Imaging ectrometer Data Analysis Workshop 15 Aug. 1986 p 74-80 or primary document see N87-12968 04-43)
ail: NTIS HC A10/MF A01 CSCL 05B
Airborne Imaging Spectrometers (AIS) data collected in 1984 d 1985 showed pronounced striping in the vertical and horizontal actions. This striping reduced the signal to noise ratio so that tures of the spectra of forest canopies were obscured or altered noise. This noise was removed by application of a notch filter the Fourier transform of the imagery in each waveband. Author

7-12975*# Brown Univ., Providence, R. I. Dept. of Geological ences.
UNDANCE AND DISTRIBUTION OF MINERAL COMPONENTS SOCIATED WITH MOSES ROCK (KIMBERLITE) DIATREME
n F. Mustard and Carle M. Pieters *In* JPL Proceedings of the cond Airborne Imaging Spectrometer Data Analysis Workshop Aug. 1986 p 81-85 (For primary document see N87-12968 43)
il: NTIS HC A10/MF A01 CSCL 05B
The surface mineralogy in and around Moses Rock diatreme, imberlite-bearing dike in SW Utah, was examined using rnally calibrated Airborne Imaging Spectrometer (AIS) data. inct near-infrared absorption characteristics of clays, gypsum, serpentine (a key marker for kinberlite concentration) allowed surface units containing these components to be identified ially and the relative abundance of each component mead. Within the dike itself, channels and dispersed components imberlite and blocks of country rocks were accurately deterd. Author

-12976*# Stanford Telecommunications, Inc., Sunnyvale, Calif. . of Applied Earth Sciences.
IPARISON OF THE 1984 AND 1985 AIS DATA OVER THE IATSE RANGE (YERINGTON), NEVADA
P. Lyon *In* JPL Proceedings of the Second Airborne Imaging trometer Data Analysis Workshop 15 Aug. 1986 p 86-95 primary document see N87-12968 04-43)
NTIS HC A10/MF A01 CSCL 05B
he Singatse Range is composed of a series of 53 types of nic, plutonic, metamorphic, and sedimentary rocks. In addition urassic plutonic rocks are also of economic interest for their r mineralization which is contained in a porphyry dike swarm. 1984 and 1985 flight results from the Airborne Imaging rometer (AIS) instrument flown in the NASA/JPL C-130 t are contrasted and compared. The 1984 data are less than the 1985, in which many sets of vertical stripings from etectors can be seen. Significantly however, enough of the hermal alteration patterns can be seen in each line at the crossing points that one can say that the specific targets detected in both year's flights. The spectra of both years rrupted by the second-order effect from the grating, but O-H bond absorption at essentially correct wavelengths for sericite and/or kaolinite can be seen. Author

N87-12977*# Nevada Univ., Reno. School of Mines.
IDENTIFICATION OF HYDROTHERMAL ALTERATION ASSEMBLAGES USING AIRBORNE IMAGING SPECTROMETER DATA
Sandra C. Feldman and James V. Taranik *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 96-101 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B
Airborne Imaging Spectrometer (AIS) data, field and laboratory spectra and samples for X-ray diffraction analysis were collected in argillically altered Tertiary volcanic rocks in the Hot Creek Range, Nevada. From laboratory and field spectral measurements in the 2.0 to 2.4 micron range and using a spectroradiometer with a 4 nm sampling interval, the absorption band centers for kaolinite were located at 2.172 and 2.215 microns, for montmorillonite at 2.214 micron and for illite at 2.205. Based on these values and the criteria for resolution and separtion of spectral features, a spectral sampling interval of less than 4 nm is necessary to separate the clays. With an AIS spectral sampling interval of 9.3 nm, a spectral matching algorithm is more effective for separating kaolinite, montmorillonite, ad illite in Hot Creek Range than using the location of absorption minima alone. Author

N87-12978*# Nevada Univ., Reno. School of Mines.
DETECTION OF HYDROTHERMAL ALTERATION AT VIRGINIA CITY, NEVADA USING AIRBORNE IMAGING SPECTROMETRY (AIS)
Amy Hutsinpiller and James V. Taranik *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 102-108 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B
Airborne Imaging Spectrometer (AIS) data were collected over Virginia City, Nevada; an area of gold and silver mineralization with extensive surface exposures of altered volcanic rocks. The data were corrected for atmospheric effects by a flat-field method, and compared to library spectra of various alteration minerals using a spectral analysis program SPAM. Areas of strong clay alteration were identified on the AIS images that were mapped as kaolinitic, illitic, and sericitic alterations zones. Kaolinitic alteration is distinguishable in the 2.1 to 2.4 and 1.2 to 1.5 micrometer wavelength regions. Montmorillonite, illite, and sericite have absorption features similar to each other at 2.2 micrometer wavelength. Montnorillonite and illite also may be present in varying proportions within one Ground Instantaneous Field of View (GIFOV). In general AIS data is useful in identifying alteration zones that are associated with or lie above precious metal mineralization at Virginia City. Author

N87-12979*# Commonwealth Scientific and Industrial Research Organization, Ryde (Australia). Div. of Mineral Physics and Mineralogy.
PRELIMINARY GEOLOGICAL INVESTIGATION OF AIS DATA AT MARY KATHLEEN, QUEENSLAND, AUSTRALIA
Jon F. Huntington, Andy A. Green, Maurice D. Craig, and Terry D. Cocks *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 109-131 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B
The Airborne Imaging Spectrometer (AIS) was flown over granitic, volcanic, and calc-silicate terrain around the Mary Kathleen Uranium Mine in Queensland, in a test of its mineralocial mapping capabilities. An analysis strategy and restoration and enhancement techniques were developed to process the 128 band AIS data. A preliminary analysis of one of three AIS flight lines shows that the data contains considerable spectral variation but that it is also contaminated by second-order leakage of radiation from the near-infrared region. This makes the recognition of expected spectral absorption shapes very difficult. The effect appears worst in terrains containing considerable vegetation. Techniques that try

to predict this supplementary radiation coupled with the log residual analytical technique show that expected mineral absorption spectra can be derived. The techniques suggest that with additional refinement correction procedures, the Australian AIS data may be revised. Application of the log residual analysis method has proved very successful on the cuprite, Nevada data set, and for highlighting the alunite, linite, and SiOH mineralogy. Author

N87-12980*# Geological Survey, Denver, Colo. Geologic Div.
USE OF DIGITAL MUNSELL COLOR SPACE TO ASSIST INTERPRETATION OF IMAGING SPECTROMETER DATA: GEOLOGIC EXAMPLES FROM THE NORTHERN GRAPEVINE MOUNTAINS, CALIFORNIA AND NEVADA
Fred A. Kruse, Daniel H. Knepper, Jr., and Roger N. Clark *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 132-138 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Techniques using Munsell color transformations were developed for reducing 128 channels (or less) of Airborne Imaging Spectrometer (AIS) data to a single color-composite-image suitable for both visual interpretation and digital analysis. Using AIS data acquired in 1984 and 1985, limestone and dolomite roof pendants and sericite-illite and other clay minerals related to alteration were mapped in a quartz monzonite stock in the northern Grapevine Mountains of California and Nevada. Field studies and laboratory spectral measurements verify the mineralogical distributions mapped from the AIS data. Author

N87-12981*# Geological Survey, Reston, Va.
NEAR-INFRARED DETECTION OF AMMONIUM MINERALS AT IVANHOE HOT SPRINGS, NEVADA
M. Dennis Krohn *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 138-144 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer (AIS) data were collected over the fossil hot spring deposit at Ivanhoe, Nevada in order to determine the surface distribution of NH4-bearing minerals. Laboratory studies show that NH4-bearing minerals have characteristic absorption features in the near-infrared (NIR). Ammonium-bearing feldspars and alunites were observed at the surface of Ivanhoe using a hand-held radiometer. However, first look analysis of the AIS images showed that the line was about 500 m east of its intended mark, and the vegetation cover was sufficiently dense to inhibit preliminary attempts at making relative reflectance images for detection of ammonium minerals. Author

N87-12982*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ANALYSIS OF AIS DATA OF THE BONANZA CREEK EXPERIMENTAL FOREST, ALASKA
Michael A. Spanner and David L. Peterson *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 144-152 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer (AIS) data were acquired in 1985 over the Bonanza Creek Experimental Forest, Alaska for the analysis of canopy characteristics including biochemistry. Concurrent with AIS overflights, foliage from fifteen coniferous and deciduous forest stands were analyzed for a variety of biochemical constituents including nitrogen, lignin, protein, and chlorophyll. Preliminary analysis of AIS spectra indicates that the wavelength region between 1450 to 1800 namometers (nm) displays distinct differences in spectral response for some of the forest stands. A flat field subtraction (forest stand spectra - flat field spectra) of the AIS spectra assisted in the interpretation of features of the spectra that are related to biology. Author

N87-12983*# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
SOIL TYPES AND FOREST CANOPY STRUCTURES IN SOUTHERN MISSOURI: A FIRST LOOK WITH AIS DATA
Glen M. Green and Raymond E. Arvidson *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 153-161 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Spectral reflectance properties of deciduous oak-hickory forests covering the eastern half of the Rolla Quadrangle were examined using Thematic Mapper (TM) data acquired in August and December, 1982 and Airborne Imaging Spectrometer (AIS) data acquired in August, 1985. For the TM data distinctly high relative reflectance values (greater than 0.3) in the near infrared (Band 4, 0.73 to 0.94 micrometers) correspond to regions characterized by xeric (dry) forests that overlie soils with low water retention capacities. These soils are derived primarily from rhyolites. More mesic forests characterized by lower TM band 4 relative reflectances are associated with soils of higher retention capacities derived predominately from non-cherty carbonates. The major factors affecting canopy reflectance appear to be the leaf area index (LAI) and leaf optical properties. The Suits canopy reflectance model predicts the relative reflectance values for the xeric canopies. The mesic canopy reflectance is less well matched and incorporation of canopy shadowing caused by the irregular nature of the mesic canopy may be necessary. Preliminary examination of high spectral resolution AIS data acquired in August of 1985 reveals no more information than found in the broad band TM data. Author

N87-12984*# Geological Survey, Reston, Va.
GEOBOTANICAL STUDIES AT PILOT MOUNTAIN, NORTH CAROLINA USING THE AIRBORNE IMAGING SPECTROMETER
N. M. Milton, P. A. Walsh, and T. L. Purdy *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 162-170 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer (AIS) data were acquired for several vegetation types within the humid temperate eastern United States. The spectral region covered, 0.9 to 2.1 microns, was little used in vegetation studies. A preliminary analysis of spectral curves suggests that variations between vegetation spectra may be useful for discriminating plant communities. Calibration and normalization procedures must be refined to compensate for cloud cover, detector and other system noise, and possible second-order effects. Author

N87-12985*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
TRACE ELEMENT-INDUCED STRESS IN FRESHWATER WETLAND VEGETATION: PRELIMINARY RESULTS
Byron L. Wood and Louisa H. Beck (California Univ., Berkeley.) *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 171-179 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer (AIS) data were acquired over an area of freshwater wetlands in Central California on September 23, 1985. Plant samples were subsequently collected along the flight line with the goal of relating plant tissue chemistry to spectral reflectance in the near-infrared region. It was determined that a consistent relationship existed between spectral response and plant tissue chemistry. This was especially evident in the 1500 to 1700 nm region. Author

N87-12986*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PATTERNS OF VEGETATION IN THE OWENS VALLEY, CALIFORNIA
Susan L. Ustin (California Univ., Berkeley.), Barrett N. Rock, and Roy A. Woodward *In its* Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 180-186 (For primary document see N87-12968 04-43)
Avail: NTIS HC A10/MF A01 CSCL 05B

Spectral characteristics of semi-arid shrub communities were examined using Airborne Imaging Spectrometer (AIS) data collected in the tree mode on 23 May 1985. Mesic sites with relatively high vegetation density and distinct zonation patterns exhibited greater spectral signature variations than sites with more xeric shrub communities. Spectral signature patterns were not directly related to vegetation density or physiognomy, although spatial maps derived from an 8-channel maximum likelihood classification were supported by photo-interpreted surface features. In AIS data, the principal detected effect of shrub vegetation on the alluvial fans is to lower reflectance across the spectrum. These results are similar to those reported during a period of minimal physiological activity in autumn, indicating that shadows cast by vegetation canopies are an important element of soil-vegetation interaction under conditions of relatively low canopy cover. Author

N87-12987*# Oregon State Univ., Corvallis. Environmental Remote Sensing Lab.

AIS SPECTRA OF DESERT SHRUB CANOPIES

Rjay Murray, Dennis L. Isaacson, Barry J. Schrumpf, William J. Ripple, and Anthony J. Lewis *In* JPL Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop 15 Aug. 1986 p 187-193 (For primary document see N87-12968 04-43) Avail: NTIS HC A10/MF A01 CSCL 05B

Airborne Imaging Spectrometer (AIS) data were collected 30 August 1985 from a desert shrub community in central Oregon. Spectra from artificial targets placed on the test site and rom bare soil, big sagebrush (Artemesia tridentata wyomingensis), silver sagebrush (Artemesia cana bolander), and exposed olcanic rocks were studied. Spectral data from grating position 3 tree mode) were selected from 25 ground positions for analysis y Principal Factor Analysis (PFA). In this grating position, as many s six factors were identified as significant in contributing to spectral tructure. Channels 74 through 84 (tree mode) best characterized etween-class differences. Other channels were identified as ondiscriminating and as associated with such errors as excessive tmospheric absorption and grating positin changes. The test site as relatively simple with the two species (A. tridentata and A. ana) representing nearly 95% of biomass and with only two ineral backgrounds, a montmorillonitic soil and volcanic rocks. as in this study, six factors of spectral structure can be extracted om a single grating position from data acquired over a simple egetation community, then AIS data must be considered rich in formation-gathering potential. Author

7-12988# Instituto de Pesquisas Espaciais, Sao Jose dos mpos (Brazil).

RETROSPECT: THE IMPACT OF RESEARCH PRODUCTION THE AREA OF REMOTE SENSING [EM RETROSPECTIVE: IMPACTO DA PRODUCAO CIENTIFICA NA AREA DE SENRIAMENTO REMOTO]

yn Marcia LeaodeMoraesNovo Sep. 1986 48 p In PORTUESE; ENGLISH summary

PE-3987-NTE/261) Avail: NTIS HC A03/MF A01

Research in the area of remote sensing and its impact on the zilian scientific community is analyzed. A historical approach adopted establishing a relationship among the main developnt phases of remote sensing in Brazil and the main research s adopted by the Remote Sensing Department. It was concluded the Remote Sensing Project had its main objectives changed g with its history. The lack of human resources prepared to with this new subject can be considered the main reason for scientific production. While in other areas of INPE, people sent to receive special training in developed countries, in Remote Sensing area it did not happen. Author

12989# Instituto de Pesquisas Espaciais, Sao Jose dos pos (Brazil).

ORT ON THE ACTIVITIES OF THE IRRIGATED CROP VEY IN SAO PAULO STATE FROM REMOTE SENSING DUCTS, PHASE 2 [RELATORIO DE ATIVIDADES DO JETO CADASTRAMENTO DE AREAS IRRIGADAS NO ADO DE SAO PAULO ATRAVES DE DADOS DE SENSOR-IAMENTO REMOTO, FASE 2]

Sergio dosAnjosFerreiraPinto, Evlyn Marcia LeaodeMoraesNovo, Mario Valerio Filho, Sherry Chou Chen, and Roberto Rosa Jul. 1986 63 p In PORTUGUESE; ENGLISH summary Original document contains color illustrations

(INPE-3950-RPE/513) Avail: NTIS HC A04/MF A01

The methodology used in the project Irrigated Crop Survey in Sao Paulo State and its main results are presented. The project developed through a joint agreement between INPE/MCT and DAEE/S.P. The Itatiba/Braganca Paulista (SP) test site was selected. Sequential TM/LANDSAT data were applied with the objective of evaluating the total irrigated area. Field data were collected which permitted comparison between two methods for irrigated area estimation: direct expansion model using only field data collected in sample segments, regression model combining ground information extracted from remote sensing products. The performance of TM composites TM 2 (BLUE); TM 3 (GREEN) and TM 4 (RED); TM 5 (BLUE); TM 3 (GREEN) and TM 4 (RED) were compared to identify the best mix to detect irrigated crops. The results demonstrated that a reduction of 94.02% in the estimated variance was obtained by using the regression model. The comparison of the increase of date-to-date irrigated area from May to October showed that the 3 first overpasses were sufficient to map some 90% of the total irrigated area. The performance of the TM composites were not significantly different in relation to its potential for detecting irrigated crops. Author

N87-12990# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

GENERATION OF IMAGES WITH RECORDED AUXILLARY DATA FOR THE LANDSAT THEMATIC MAPPER (TM) IMAGERY M. S. Thesis, Mar. 1985 [GERACAO DE IMAGENS COM DADOS AUXILIARES REGISTRADOS A IMAGENS TM—LANDSAT]

Jose Borges Escada, Jr. Sep. 1986 66 p In PORTUGUESE; ENGLISH summary

(INPE-3982-TDL/234) Avail: NTIS HC A04/MF A01

A system for storing and recovering auxiliary data is implemented so that the latter can be correlated with a given Thematic Mapper scene in a way that these auxiliary data can be treated as a Thematic Mapper image. The resources available at the Processing Subsystem of the Image Generation Department of INPE (Instituto de Pesquisas Espaciais - Institute for Space Research) for generating photographic or digital images will then allow the generation of geocoded artificial images with the same characteristics of a Thematic Mapper scene. The gray levels associated with each geocoded image pixel will represent not the terrain radiometry, but the corresponding auxiliary data. Author

N87-12991# Atmospheric and Environmental Research, Inc., Cambridge, Mass.

INTERCOMPARISON OF DMSP OLS, NOAA AVHRR, GOES VISSR (DEFENSE METEOROLOGICAL SATELLITE PROGRAM OPERATIONAL LINESCAN SYSTEM, NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION ADVANCED VERY HIGH RESOLUTION RADIOMETER, GOES VISIBLE INFRARED SPIN-SCAN RADIOMETER) AND LANDSAT MSS IMAGERY FOR CLOUD PR OPERTY DETERMINATION: RECOMMENDATIONS FOR DIGITAL DATA ANALYSIS Final Report, 18 Jun. - 18 Dec. 1985

R. G. Isaacs, J. C. Barnes, L. D. Petro, and R. D. Worsham 18 Jan. 1986 144 p

(Contract F19628-85-C-0102)

(AD-A169285; P142F; AFGL-TR-86-0012) Avail: NTIS HC A07/MF A01 CSCL 04/2

Concurrent visible and infrared cloud imagery from four satellite sensors (DMSP OLS, NOAA AVHRR, GOES VISSR, LANDSAT MSS) have been intercompared. Inherent differences in cloud field analyses are noted due to sensor characteristics such as spatial and spectral resolution and scene/sensor geometry. Digital data were manipulated to simulate one sensor's data from that of another. Recommendations for further analysis of the collected data sets are provided. GRA

N87-12992# Pacific Northwest Labs., Richland, Wash.
REMOTE SENSING TO DETECT ECOLOGICAL IMPACTS ASSOCIATED WITH ACID DEPOSITION Final Report
P. VanVoris and G. E. Wukelic May 1986 67 p
(Contract DE-AC06-76RL-01830)
(DE86-011649; EPRI-EA-4607) Avail: NTIS HC A04/MF A01

A planning study was conducted to determine the potential applications of remote sensing for detecting ecological impacts that have been reportedly caused by acid deposition. The project was divided into two phases: a technology assessment phase (Phase I) and a prototype demonstration (Phase II). The emphasis of the project was on detecting ecological change, not on determining the cause of that change. The latter is the role of ground-based research. Phase I consisted of an assessment of terrestrial and aquatic components that are indicative of sensitivity to acid deposition. The assessment identified remote sensing as the optimal cost-effective method for measuring the rate of change of land use, crop type, and forest canopy health over large geographic areas. In Phase II, spectral reflectance in the near-infrared region of the spectrum from forest canopies of Camel's Hump State Forest from two Landsat scenes from the summers of 1976 and 1983 were compared. Significant increases in spectral reflectance from the forest were detected when the pixels were compared, and it is hypothesized that this increase is indicative of a decline in forest growth and canopy closure. However, because of project limitations, no ground-truth data were collected by Battelle-Northwest scientists to verify the findings of the remote sensing analyses. A comprehensive research program is recommended to further investigate the use of remote sensing to detect ecological damage and its relationship to possible causative agents. Future research should also focus on the use of remote sensing for identifying ecosystems that may be sensitive to perturbations like acid deposition and improving our ability to model ecological processes. Priority should be given to detecting, monitoring, and modeling changes in forested watersheds. DOE

N87-12993# Butler Univ., Indianapolis, Ind.
COMPARISON OF TROPICAL FOREST SURVEYS
J. Molofsky, C. A.S. Hall (Cornell Univ., Ithaca, N.Y.), and N. Myers Jun. 1986 70 p Prepared in cooperation with Cornell Univ., Ithaca, NY.; Myers (Norman), Oxford (UK).
(Contract DE-AC05-84OR-21400)
(DE86-011699; DOE/NBB-0078) Avail: NTIS HC A04/MF A01

This report examines the two most recent studies of tropical forest areas and rates of forest loss: Norman Myers' conversion of Tropical Moist Forests (1980), and the FAO/UNEP Tropical Forest Resources Assessment Project in order to identify and clarify discrepancies between them. The apparent discrepancy between their respective estimates of deforestation rates has been the basis of a continuing controversy. Myers' report was concerned principally with the conversion of virgin forests to other land use and the resulting extinction of tropical species. The FAO/UNEP report emphasized the availability of forest resources to meet the future fuelwood, housing, and economic needs of UN member states. The present paper attempts to identify more precisely the differences between the two studies in order to integrate the large tropical forest data base from these two sources into a cohesive whole. Specifically, we identify those countries covered in both surveys where the largest differences occur. The study was not designed to assess all discrepancies between Myers and FAO but only the discrepancies for those countries where both investigators have given specific numbers. DOE

N87-12994# Computer Applied Techniques Ltd., Malahide (Ireland).
STUDY OF SATELLITE SYSTEMS TO MONITOR EARTH'S RADIATION BUDGET Final Report
E. OMongain, S. Daultry, and J. G. Campbell Paris ESA Jan. 1986 158 p
(Contract ESA-5716/83-NL-MS)
(CAP-420-071; ESA-CR(P)-2230; ETN-86-98111) Avail: NTIS HC A08/MF A01

The problems of designing a system to simulate the end-to-end process of satellite based Earth Radiation Budget (ERB) measurements were investigated. Such a system would be used to simulate and determine the accuracy achievable in ERB studies with different orbit and instrument scenarios. A practical system to simulate the process is outlined. Effective modeling of error sources, in the measurement and inversion process, is important. Key elements of the system are an Earth radiation model, a measurement system model, and a data processing model; this latter element includes the simulation of calibration and inversion processes. ESA

N87-12995# Executive Office of the President, Washington, D. C. Office of Science and Technology Policy.
EARTH SCIENCES RESEARCH IN THE CIVIL SPACE PROGRAM
Oct. 1985 42 p
(PB86-232014) Avail: NTIS HC A03/MF A01 CSCL 22A

The report has been prepared in response to the President's National Space Strategy Directive to the Office of Science and Technology Policy to review and define the goals and missions of the various agencies in the area of Earth Science research. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

N87-12996# Minnesota Univ., Minneapolis. Dept. of Chemistry.
A STUDY OF ENERGY CONVERSION DEVICES USING PHOTOACTIVE ORGANOMETALLIC ELECTROCATALYSTS Final Report, Feb. 1982 - Jun. 1985
John F. Evans and Kent R. Mann 23 May 1986 32 p
(Contract DAAG29-82-K-0063)
(AD-A169096; ARO-18767.9-CH) Avail: NTIS HC A03/MF A01 CSCL 10/2

The purpose of this project was to examine the feasibility of the use of transition metal hexakis arylisocyanide complexes confined to polymeric thin films in solar energy conversion systems. The chemical systems of interest were chromium, molybdenum and tungsten arylisocyanide complexes which had been previously examined in terms of their solution spectroscopy and photochemistry and had been found to have rather long excited state lifetimes. Since we had shown that charge transfer complexes in thin polymer films supported on electrode surfaces were viable routes to solar energy conversion composites, we chose to extend our studies to include these more promising complexes. The goals of the project then became threefold: 1) examine the thermodynamics and kinetics of charge transfer in the systems in which we had shown feasibility (polymeric ferrocenes) so as to understand the physical phenomena which were liable to control the overall efficiency and turnover numbers for the polymer bound photoelectrocatalysts, 2) further characterize the electrochemistry and physical inorganic chemistry of the more promising Cr, Mo and W hexakis arylisocyanide photoelectrocatalysts, and 3) examine ways by which these MLCT complexes could be entrapped in various polymer matrices. GRA

N87-12997# Midwest Research Inst., Golden, Colo.
STATUS AND FUTURE OF GOVERNMENT-SUPPORTED AMORPHOUS SILICON RESEARCH IN THE US
W. L. Wallace and E. S. Sabisky Jun. 1986 6 p Presented at the 2nd International Photovoltaic Science and Engineering Conference, Beijing, China, 1 Aug. 1986
(Contract DE-AC02-83CH-10093)
(DE86-010702; SERI/TP-211-2960; CONF-860874-2) Avail: NTIS HC A02/MF A01

The Amorphous Silicon Research Project (ASRP) was estab-

lished at the Solar Energy Research Institute in 1983 and is responsible for all US Department of Energy government supported research activities in the field of amorphous silicon photovoltaics. The objectives and research directions of the project have been established by a Five-Year Research Plan, which was developed at SERI in cooperation with the Department of Energy in 1984 and is divided into research on single-junction and multi-junction solar cells. DOE/SERI has recently initiated a new three year program to be performed in collaboration with US industry to perform work on high efficiency amorphous silicon solar cells and submodules. The objectives of this initiative are: (1) to achieve 18% efficiencies for small area multi-junction amorphous silicon cells, and (2) to achieve amorphous silicon submodule efficiencies in the 10 to 13% range for single-junction and multi-junction submodule configurations over areas of at least 1000 cm².

DOE

N87-12998# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF REGENERABLE ENERGY STORAGE FOR SPACE MULTIMEGAWATT APPLICATIONS
M. Olszewski 1986 5 p Presented at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug., 1986
(Contract DE-AC05-84OR-21400)
(DE86-011070; CONF-860810-9) Avail: NTIS HC A02/MF A01

A program has recently been initiated as a part of the national Strategic Defense Initiative (SDI) to develop energy storage echnology for space power applications. This program is jointly conducted by the Department of Energy and the Department of Defense. It is focused on the development of advanced technolo-gies in regenerable energy storage that will be required for generation f multimegawatt levels of sprint power for SDI space missions. Energy storage technology considered in the program relate to evices that have a high specific capacity for energy storage, which can provide high levels of electric power on demand, and which may be recharged with electric power. The devices of rincipal interest are electrochemical batteries, chemical fuel cells, nd electromechanical flywheels (the latter includes the motors nd generators used to provide the electrical to mechanical oupling). The intent of the program is to resolve technical feasibility sues associated with an electrically regenerable energy storage ystem satisfying SDI needs. Specifically, energy storage technolo- will be developed through the proof-of-concept stage within e next six years that provides a specific power greater than 5 kW/kg with an energy storage density of at least 450 kJ/kg.

DOE

87-12999# Los Alamos National Lab., N. Mex.
TEGRATED HEAT PIPE-THERMAL STORAGE DESIGN FOR SOLAR RECEIVER
S. Keddy, J. T. Sena, K. Woloshun, M. A. Merrigan, and G. idenreich (Sundstrand Corp., Rockford, Ill.) 1986 8 p Presented the Intersociety Energy Conversion Engineering Conference, n Diego, Calif., 25 Aug., 1986
ontract W-7405-eng-36)
E86-011235; LA-UR-86-1840; CONF-860810-5) Avail: NTIS A02/MF A01

Light-weight heat pipe wall elements that incorporate a thermal rage subassembly within the vapor space are being developed part of the Organic Rankine Cycle Solar Dynamic Power Systems IC-SDPS) receiver for the space station application. The rating temperature of heat pipe elements is in the 770 to °K range with a design power throughput of 4.8 kW per pipe. total heat pipe length is 1.9 M. The Rankine cycle boiler t transfer surfaces are positioned within the heat pipe vapor ce, providing a relatively constant temperature input to the orizer. The heat pipe design employs axial arteries and ibution wicked thermal storage units with potassium as the ding fluid. Stainless steel is used as the containment tube and en material. Performance predictions for this configuration have n conducted and the design characterized as a function of y geometry, distribution wick thickness, porosity, pore size, and permeability. Details of the analysis and of fabrication and assembly procedures are presented.

DOE

N87-13000# Nevada Univ., Boulder City.
DUAL TEMPERATURE THERMAL STORAGE WITH COMPLEX COMPOUNDS
U. Rockenfeller and J. F. Martin (Oak Ridge National Lab., Tenn.) 1986 6 p Presented at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug., 1986 Prepared in cooperation with Oak Ridge National Lab., TN.
(Contract DE-AC05-84OR-21400)
(DE86-011511; CONF-860810-11) Avail: NTIS HC A02/MF A01

Storage of thermal energy through the formation or dissociation of complex compounds is described. A solid-vapor reaction of an absorbant, a metal inorganic salt, and an absorbate, the ligand of the complex provides energy storage for a heat pump cycle. One system is capable of dual temperature storage; that is, storage of cool for air conditioning and storage of heat for heating. Laboratory experiments which define the material and reaction characteristics of a sodium bromide/ammonia system were performed. The reaction rates, storage density and other operating parameters are described in functional form. The performance of a heat pump storage system is projected from these experimentally determined properties. The resulting system compares favorably with existing cool storage systems and with proposed heat or cool storage systems.

DOE

N87-13001# California Polytechnic State Univ., San Luis Obispo.
PROOF OF FEASIBILITY OF A NOVEL INVERTER FOR PHOTOVOLTAIC POWER CONDITIONING
A. Dickerson Apr. 1986 78 p
(Contract DE-AC04-76DP-00789)
(DE86-012729; SAND-86-7031) Avail: NTIS HC A05/MF A01

The Dickerson inverter concept obtains a sinewave current from an array that is segmented into a number of subarrays. These subarrays are switched among the ac phases so that the current from a given subarray is continuous and each phase is connected at all times to one or more subarrays. The control scheme assures a unity power factor current with real-time adjustment to power-system disturbances. A proof-of-concept inverter has been operated into a three-phase power system, with the dc supplied from a motor-generator set plus regulators that closely simulated the current-voltage characteristics of a photovoltaic array. The performance for the inverter has been projected for a 480V, three-phase system at the 50 kVA level. Computer simulations showed 98% utilization of array power was possible with efficiency better than 98% and harmonic content of 18% without filtering. An analysis of filtering costs indicates that reduction to 5% can be achieved at under $0.003 per watt for typical central-station applications. A more complex configuration was also analyzed with results of 99% utilization, 8% harmonic content, and the same efficiency. The intended power range for these inverters is 50 to 250 kVA per unit. The cost to produce the inverter at the 50 kVA level in quantities of 1000 units is estimated to be $0.05 per watt.

DOE

N87-13002# Sandia National Labs., Albuquerque, N. Mex.
PROCEEDINGS OF THE SOLAR THERMAL TECHNOLOGY CONFERENCE
R. B. Diver, ed. Jun. 1986 345 p Presented at the Solar Thermal Central Receiver and Distributed Receiver Annual Conference, Albuquerque, N. Mex. 17 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-011703; SAND-86-0536; CONF-860619) Avail: NTIS HC A15/MF A01

The Solar Thermal Technology Conference was held on June 17 to 19, 1986 at the Marriott Hotel, Albuquerque, New Mexico. The meeting was sponsored by the United States Department of Energy and Sandia National Laboratories. Topics covered during the conference included a status summary of the Sandia Solar Thermal Development Project, perspectives on central and distributed receiver technology including energy collection and conversion technologies, systems analyses and applications

experiments. The proceedings contain summaries (abstracts plus principal visual aids) of the presentations made at the conference. DOE

N87-13003# Delaware Univ., Newark. Inst. of Energy Conversion.
STABLE, HIGH-EFFICIENCY, CuInSe2-BASED POLYCRYSTALLINE THIN-FILM TANDEM SOLAR CELLS Semiannual Subcontract Report, 16 Mar. 1985 - 15 Sep. 1985
R. W. Birkmire, J. E. Phillips, and J. D. Meakin May 1986 116 p
(Contract DE-AC02-83CH-10093)
(DE86-010705; SERI/STR-211-2951) Avail: NTIS HC A06/MF A01

The major obstacle to developing a high-efficiency CdTe/CdS cell has been the lack of reproducibility. A number of process modifications have been made to overcome this. Some progress was made with a cell in which the CdTe is deposited onto a transparent ohmic contact; however, difficulties continued to be encountered in controlling the CdTe conductivity. Effort has been redirected to a cell in which the CdTe is deposited onto the CdS, leaving an exposed CdTe surface to which ohmic contact can be made. Research on the CuInSe/CdS cell has established that high efficiency can be achieved over a broad CuInSe composition range and a wide substrate temperature range. DOE

N87-13004# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SOLID STATE PHOTOVOLTAIC RESEARCH BRANCH ANNUAL REPORT, FY 1985
May 1986 214 p
(Contract DE-AC02-83CH-10093)
(DE86-010708; SERI/PR-212-2877) Avail: NTIS HC A10/MF A01

This report summarizes the progress of the Solid State Photovoltaics Research Branch of the Solar Energy Research Institute from 1 October 1984 through 30 September 1985. The five technical sections of the report cover these main areas of SERI's in-house research: Semiconductor Crystal Growth, Amorphous Silicon Research, Polycrystalline Thin Films, III-V High-Efficiency Photovoltaic Cells, and Solid State Theory. The task in each section was to explain the purpose and major accomplishments of the work in the context of the US Department of Energy's Photovoltaic Research Program plans. Lists of current, relevant publications are also included. DOE

N87-13005# New Mexico State Univ., Las Cruces. Physical Science Lab.
EXPERIMENTAL INVESTIGATION OF THERMOCHEMICAL TRANSPORT FOR SOLAR APPLICATIONS USING SULFUR TRIOXIDE
J. H. McCrary, G. E. McCrary, and J. I. Martinez May 1986 102 p
Prepared in cooperation with Sandia National Labs.
(Contract DE-AC04-76DP-00789)
(DE86-011762; SAND-86-7028) Avail: NTIS HC A06/MF A01

The high temperature catalytic dissociation of sulfur trioxide and the synthesis of its products in a closed-loop system presents an attractive prospect for converting, transporting and recovering solar energy. A laboratory scale, closed-loop, sulfur-oxide based experimental system was assembled and operated on the NMSU campus to demonstrate technical feasibility and to study the engineering problems associated with this chemical cycle. The system, which operated at a nominal 500 watts of energy conversion, contained most of the elements of a large scale power plant. Twelve separate experiments were performed with the system in a study of system stability during start-up and shut-down procedures and dissociator temperature variations. Descriptions of the laboratory closed-loop and the chemical reactors are given along with the experimental procedure, conditions, and results for each of the tests. Extensive discussion is given on the solar implications that the results from these experiments may have, and recommendations are made for follow-on experiments that may assist in resolving potential problems for thermochemical transport in a solar-powered plant. DOE

N87-13006# Sandia National Labs., Albuquerque, N. Mex.
PHOTOVOLTAIC CONCENTRATOR TECHNOLOGY PROJECT, FOURTEENTH PROJECT INTEGRATION MEETING, JUNE 10-11, 1986
May 1986 263 p Proceedings of the 14th Concentrator Photovoltaic Integration Meeting, Albuquerque, N. Mex., 10 Jun. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012051; SAND-86-0058/1; CONF-8606123-Pt-1-Summ)
Avail: NTIS HC A12/MF A01

The meeting reported on covered research on photovoltaic concentrators and their components, including concentrator cells, cell assemblies, Fresnel lenses and concentrator modules, tracking structures and control systems, and complete concentrator arrays. This report contains abstracts of presentations made at the meeting and status summaries for current research contracts. DOE

N87-13007# Oak Ridge National Lab., Tenn.
STEFAN-TYPE PROBLEM WITH VOID FORMATION AND ITS EXPLICIT SOLUTION
A. D. Solomon and D. G. Wilson Jun. 1986 26 p
(Contract DE-AC05-84OR-21400)
(DE86-013521; ORNL-6277) Avail: NTIS HC A03/MF A01

The density of most materials changes under melting and freezing. For certain materials being considered as potential latent heat storage materials for use in a space station, this density change may be large. A density change induces a change of volume of the material occupying a given container and this creates vapor bubbles or voids. We have formulated a problem that models a phase change process with such a void and that has an explicit solution. We examine the solution to gain a further understanding of the thermal and phase change performance of a material in which such voids form. We also look at the related problem of melting a material in which a void is initially present. Examples are given of the performance of a lithium fluoride phase change material subject to melting and freezing. DOE

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N87-13008# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A PARTITION OF SENSIBLE AND LATENT HEAT FLUXES ABOVE THE TERRA FIRMA AREA IN THE AMAZON FOREST [UMA PARTICAO DE FLUXOS DE CALOR SENSIVEL E DE CALOR LATENTE ACIMA DA FLORESTA AMAZONICA DE TERRA FIRME]
Leonardo DeanedeAbreuSa, Antonio Ocimar Mansi, and Yelisetty Viswanadham Jul. 1986 27 p In PORTUGUESE; ENGLISH summary Presented at a Workshop on GTE/ABLE-2A at INPE, 3-7 Feb. 1986
(INPE-3949-PRE/970) Avail: NTIS HC A03/MF A01

The partition of net radiation to sensible and latent fluxes above the Amazonian forest is studied. The Bowen ratio daily variability is discussed and its values are compared when calculated by different methods and distinct height above canopy. The variation of potential temperature gradient above forest canopy as a function of net radiation is also studied. Small values of potential temperature gradients and large values of net radiation obtained during daytime indicate that there was a strong convective activity in the Amazonian region. These results agreed very well with other forest observational results. The data utilized were collected from 21 to 24, August, 1984, related to the third field campaign of the Micrometeorological Experiment in the Amazon Basin. Author

N87-13009# Oak Ridge National Lab., Tenn.
EVALUATING ECOSYSTEM RESPONSE TO TOXICANT STRESS: A STATE SPACE APPROACH
A. R. Johnson 1986 30 p Presented at the 10th Symposium on Aquatic Toxicology and Hazard Assessment, New Orleans, La., 4 May, 1986

(Contract DE-AC05-84OR-21400)
(DE86-011777; CONF-8605137-3) Avail: NTIS HC A03/MF A01

Ecosystems can be regarded as complex biogeochemical systems maintained in a state of thermodynamic nonequilibrium by the flow of materials and energy. The state of such a system at any given time is generally assumed to be characterized by a finite set of variables. If these variables are taken to be the components of a vector, the instantaneous state of an ecosystem can be represented by a single point in an abstract multidimensional space. As an ecosystem undergoes changes in state, changes in the position of the corresponding vector will result, tracing out a state trajectory over time. Within the state space approach formulated above, the response of an ecosystem to a perturbation, such as the introduction of a toxicant, can be viewed as a displacement of the state vector away from its unperturbed trajectory. Such an approach was used to analyze data from a study of the response of experimental ponds and microcosms to chronic additions of a coal-derived synthetic oil. Ecosystem-level response surfaces and dose-response curves were derived based on the average separation (distance of displacement) of exposed ecosystems relative to controls. The results exhibited patterns analogous to those observed in classical toxicology based on organismal response, and could be used to define acceptable exposure conditions. The state space approach described here provides a coherent and objective framework for summarizing a large multivariate data set, and it should be of general use in providing both qualitative and quantitative descriptions of the behavior of perturbed ecosystems. DOE

N87-13010# California Univ., Berkeley. Lawrence Berkeley Lab.
CHARACTERIZATION OF INFORMATION REQUIREMENTS FOR STUDIES OF CO2 EFFECTS: WATER RESOURCES, AGRICULTURE, FISHERIES, FORESTS AND HUMAN HEALTH
M. R. White, ed. Dec. 1985 244 p
(Contract DE-AC03-76SF-00098)
(DE86-012477; DOE/ER-0236) Avail: NTIS HC A11/MF A01

The report discusses how climate change and vegetative response will affect selected areas of our way of life as a result of increased carbon dioxide concentrations. Needs for future research are identified. Separate abstracts have been prepared for individual chapters. DOE

N87-13011# National Bureau of Standards, Washington, D.C. Gas and Particulate Science Div.
HIGH ACCURACY STANDARDS AND REFERENCE METHODOLOGY FOR CARBON DIOXIDE IN AIR
W. L. Zielinski, Jr., E. E. Hughes, I. L. Barnes, J. W. Elkins, and H. L. Rook Jun. 1986 100 p
(Contract DE-AI01-76PR-06010)
(DE86-012643; DOE/PR-06010/31) Avail: NTIS HC A05/MF A01

This report summarizes the activities and accomplishments of a three-year NBS program for the development of standards and reference methodology for carbon dioxide (CO) in air that was designed to: (1) develop defined Standard Reference Materials (SRM's) for CO in air at atmospheric concentrations having a total uncertainty (95% confidence level) not exceeding 0.1% relative; (2) assess the equivalency of absolute gravimetry employed by the National Bureau of Standards (NBS) and absolute manometry employed by the Scripps Institution of Oceanography (SIO) for the development of accurate standards for CO in air at atmospheric concentrations; and (3) develop a state-of-the-art isotope dilution mass spectrometer (ID-MS) system and associated methodology to serve as an NBS-based reference method for absolute independent confirmation of CO concentrations in CO in air standards. DOE

N87-13012# Oak Ridge National Lab., Tenn.
DIRECT EFFECTS OF ATMOSPHERIC CO2 ENRICHMENT ON PLANTS AND ECOSYSTEMS: A BIBLIOGRAPHY WITH ABSTRACTS
B. R. Strain and J. D. Cure Jun. 1986 197 p
(Contract DE-AC05-84OR-21400)
(DE86-013525; ORNL/CDIC-13) Avail: NTIS HC A09/MF A01

This bibliography contains 1032 references, with author abstracts or summaries where possible, on the subject of direct effects of atmospheric CO enrichment on plants and ecosystems. The references are indexed by keywords, which appear in the title or abstract of the reference or describe the subject of the paper. The bibliography is preceded by an introduction, which summarizes the possible global consequences of increased atmospheric concentrations of carbon dioxide with emphasis on the direct effects on plants and their responses. DOE

N87-13013# Sonoma Technology, Inc., Santa Rosa, Calif.
SOUTHERN CALIFORNIA AIR QUALITY STUDY (SCAQS) SUGGESTED PROGRAM PLAN Final Report
D. Blumenthal, J. Watson, and D. Lawson Jun. 1986 187 p
(Contract ARB-A4-114-32)
(PB86-223427; ARB-R-86/278) Avail: NTIS HC A09/MF A01 CSCL 04A

The program plan outlines a suggested measurement and management approach and reviews the technical background for the Southern California Air Quality Study(SCAQS). SCAQS will be a multi-year, integrated, cooperative study which will be funded by government agencies, industry groups, and individual corporate sponsors. The goal of SCAQS is to develop a comprehensive air quality and meteorological data base for the South Coast Air Basin that can be used to test, evaluate, and improve elements of air quality simulation models for oxidants, PM-10, fine particles, toxic air contaminants, and acidic species. In addition, SCAQS will address specific technical questions regarding the emission, transport, transformation, and deposition of pollutants. The study is planned to take place in 1987 during six weeks in early summer and four weeks in late fall. Extensive routine air quality, aerosol, and meteorological measurements and additional special studies will take place on about 19 days during the study. GRA

N87-13014# Battelle Pacific Northwest Labs., Richland, Wash.
STUDY OF THE FORMATION AND TRANSPORT OF ACIDIC SPECIES BY NON-PRECIPITATING CUMULUS CLOUDS DURING VENTEX-84
A. J. Alkezweeny Jul. 1986 41 p Sponsored by EPA
(PB86-220357; EPA/600/3-86/039) Avail: NTIS HC A03/MF A01 CSCL 04A

The report is the second in a series that describes the VENTEX field studies conducted near Lexington, K.Y. The first one was published by Alkezweeny (1984). In the report, description of the experiment conducted during the summer of 1984 (VENTEX-84), from July 8 to August 18, are presented, and samples of the data collected are given. Possible uses of the data and example of data manipulation are illustrated. The principal objectives of the program are as follows: to determine the productiion of sulfate and nitrate aerosol particles by non-precipitating cumulus clouds; and to investigate the vertical transport of pollutants caused by cumulus convection. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N87-13015*# International Council of Scientific Unions, Urbana, Ill.
MIDDLE ATMOSPHERE PROGRAM. HANDBOOK FOR MAP, VOLUME 21
C. F. Sechrist, Jr., ed. Jul. 1986 117 p Sponsored by NASA and UNESCO
(NASA-CR-179893; NAS 1.26:179893; MAP-HANDBOOK-21)
Avail: SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Topics covered include: minutes of the Middle Atmospheric

Program (MAP) Steering Committee; workshops on atmospheric tides; national reports on MAP activities; and dynamics project report. For individual titles, see N87-13016 through N87-13019.

N87-13016*# International Council of Scientific Unions, Urbana, Ill.

ATMOSPHERIC TIDES MIDDLE ATMOSPHERE PROGRAM (ATMAP): REPORT OF THE WORKSHOP, KYOTO, JAPAN, DECEMBER 5-6, 1984

Jeffrey M. Forbes, ed., T. Aso, S. Avery, S. Bowhill, L. Coy, J. Forbes, G. Fraser, S. Fukao, S. Kato, D. Kurshner et al *In its* Middle Atmosphere Program. Handbook for Map, volume 21 Jul. 1986 p 12-55 (For primary document see N87-13015 04-46)

Avail: SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Experimentalists, data analysts, and theoreticians were brought together to study and interpret the results of four solstice campaigns conducted prior to the symposium. Emphasis was placed on campaigns III and V. Topics discussed included: review of the data and evaluation of the consistency with available theoretical models; interpretation of the data; recommendations on how the Atmospheric Tides Middle Atmosphere Program (ATMAP) results should reach the open literature such that the advancement of middle atmosphere science and the proprietary rights of the individual experimenters are best served; and recommendations concerning future campaigns and the future emphasis of ATMAP.

B.G.

N87-13017*# Boston Univ., Mass.

PROCEEDINGS OF THE WORKSHOP ON ATMOSPHERIC TIDES, PRAGUE, CZECHOSLOVAKIA, AUGUST 14, 1985

Jeffrey M. Forbes *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, volume 21 Jul. 1986 p 56-64 (For primary document see N87-13015 04-46)

Avail: SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

The pros and cons of various methods of extracting tidal fields from radar data were discussed.

B.G.

N87-13018*# International Council of Scientific Unions, Urbana, Ill.

MINUTES OF MAP/WINE EXPERIMENTERS MEETING, PRAGUE, CZECHOSLOVAKIA, AUGUST 13, 1985

U. vonZahn *In its* Middle Atmosphere Program. Handbook for MAP, volume 21 Jul. 1986 p 65-69 (For primary document see N87-13015 04-46)

Avail: SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

Topics addressed include: methods of tidal analysis; tidal climatologies for the month of December and June; guidelines for construction of monthly climatologies; and future plans. B.G.

N87-13019*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

COORDINATED STUDY OF THE BEHAVIOR OF THE MIDDLE ATMOSPHERE IN WINTER: MONTHLY MEAN COMPARISONS OF SATELLITE AND RADIOSONDE DATA AND DERIVED QUANTITIES

William L. Grose, ed. and Clive D. Rodgers, ed. (Oxford Univ. (England).) *In* International Council of Scientific Unions Middle Atmosphere Program. Handbook for MAP, volume 21 Jul. 1986 p 79-110 (For primary document see N87-13015 04-46)

Avail: SCOSTEP Secretariat, Illinois Univ., 1406 West Green Street, Urbana, Ill. 61801 CSCL 04A

A series of workshops were conducted for intercomparison of middle atmosphere data from a variety of sounding systems. The purposes were several: intercomparison of temperature data from various sources: characterization of any observed differences with an attempt to understand those differences, and to provide guidance to users of the data as to the validity of derived quantitites.

B.G.

N87-13020# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

STRATOSPHERIC BALLOON EXPERIMENTS Final Report

U. B. Jayanthi, J. Brega, C. D. Pritsopoulo, F. S. Blanco, and R. V. Correa Sep. 1986 35 p

(INPE-3995-RPE/519) Avail: NTIS HC A03/MF A01

Three stratospheric balloon-borne experiments were conducted at the Tenente Rodolfo Marsh and Comandante Ferraz Stations in the Antarctic region to study the x-ray and gamma ray atmospheric background. The first experiment was flown in January 1984 to measure gamma ray flux and spectrum in the 0.2 to 4.8 MeV range at different altitudes. Experiments more sophisticated with similar objectives for x-rays (28.5 to 185 KeV) and for gamma rays (0.2 to 4.8 KeV) and for gamma rays (0.2 to 4.8 MeV) were conducted in two balloon flights in Jan/Feb. 1985 at Cmte. Ferraz base. The altitude spectral data is required to construct source functions at these latitude ranges. It was also desireable to use ceiling float data for the detection of enhanced line emissions and charge particle precipitation events. The gamma ray experiment provided ground radioactivity obtaining at the Cmte. Ferraz base and gamma ray spectra at lower stratospheric altitudes. The x-ray data near ceiling altitudes have been utilized to evaluate atmospheric build-up effects.

Author

N87-13021*# Maryland Univ., College Park. Dept. of Physics and Astronomy.

DEVELOPMENT OF A SENSITIVE SUPERCONDUCTING GRAVITY GRADIOMETER FOR GEOLOGICAL AND NAVIGATIONAL APPLICATIONS Final Report, Jul. 1980 - Jul. 1985

H. J. Paik and J.-P. Richard Washington NASA Sep. 1986 217 p

(Contract NAS8-33822)

(NASA-CR-4011; NAS 1.26:4011) Avail: NTIS HC A10/MF A01 CSCL 08G

A sensitive and stable gravity gradiometer would provide high resolution gravity measurements from space. The instrument could also provide precision tests of fundamental laws of physics and be applied to inertial guidance systems of the future. This report describes research on the superconducting gravity gradiometer program at the University of Maryland from July 1980 to July 1985. The report describes the theoretical and experimental work on a prototype superconducting gravity gradiometer. The design of an advanced three-axis superconducting gravity gradiometer is also discussed.

Author

N87-13022*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

DESCRIPTION OF DATA ON THE NIMBUS 7 LIMS MAP ARCHIVE TAPE: OZONE AND NITRIC ACID

Ellis E. Remsberg, Robert J. Kurzeja, Kenneth V. Haggard, James M. Russell, III, and Larry L. Gordley Dec. 1986 73 p

(NASA-TP-2625; L-16136; NAS 1.60:2625) Avail: NTIS HC A04/MF A01 CSCL 04A

The Nimbus 7 Limb Infrared Monitor of the Stratosphere (LIMS) data set has been processed into a Fourier coefficient representation with a Kalman filter algorithm applied to profile data at individual latitudes and pressure levels. The algorithm produces synoptic data at noon Greenwich Mean Time (GMT) from the asynoptic orbital profiles. This form of the data set is easy to use and is appropriate for time series analysis and further data manipulation and display. Ozone and nitric acid results are grouped together in this report because the LIMS vertical field of views (FOV's) and analysis characteristics for these species are similar. A comparison of the orbital input data with mixing ratios derived from Kalman filter coefficients indicates errors in mixing ratio of generally less than 5 percent, with 15 percent being a maximum error. The high quality of the mapped data was indicated by coherence of both the phases and the amplitudes of waves with latitude and pressure. Examples of the mapped fields are presented, and details are given concerning the importance of diurnal variations, the removal of polar stratospheric cloud signatures, and the interpretation of bias effects in the data near the tops of profiles.

Author

N87-13023*# Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
MIDDLE ATMOSPHERE MODELING Final Report
Darrell F. Strobel Jun. 1985 23 p
(Grant NAG5-489)
(NASA-CR-179934; NAS 1.26:179934) Avail: NTIS HC A02/MF A01 CSCL 04A

Breaking gravity waves generate and maintain a background level of turbulence which is capable of producing substantial cooling and/or heating in the upper mesosphere and lower thermosphere. The net thermodynamic effect of breaking gravity waves is critically dependent on the eddy Prandt number (P sub t) applicable to mesospheric turbulence. When P sub t is approximately 1, the calculations of the heat budget for the mesopause region imply that the globally averaged eddy or turbulent diffusion coefficient cannot exceed .000001 sq cm/s. This upper limit on turbulant diffusion applies to both potential temperature transport and chemically inert tracer transport when radiative damping is neglible. For chemically active species larger diffusion coefficients are permitted, because the effective eddy diffusion coefficient is increased by an additive term L/2 gamma (sup 2), where L is the chemical loss rate and gamma is the vertical wavenumber. For P sub t is approximately 4 to 6, the turbulent diffusion of momentum (D sub M) is sufficiently greater than the turbulent diffusion of heat (D sub H) that the conversion of gravity wave energy to heat with high efficiency nearly balances the divergence of the downward eddy heat flux in the wave breaking zone. Therefore the heat budget of the mesopause region would no longer provide a powerful and useful constraint on D sub H. If P sub t exceeds 6 with high efficiency for energy conversion to heat, gravity waves would heat the mesosphere throughout the wave breaking region. Author

N87-13024*# Science and Technology Corp., Hampton, Va.
SAGE 2 SATELLITE DATA SET VALIDATION Final Report
Geoffrey S. Kent and Pi-Huan Wang Nov. 1986 131 p
(Contract NAS1-17959)
(NASA-CR-178189; NAS 1.26:178189; STC-TR-2108) Avail: NTIS HC A07/MF A01 CSCL 04A

The results of a validation study of data obtained by the Stratospheric Aerosol and Gas Experiment 2 satellite experiment (SAGE 2) are given. Preliminary SAGE 2 data have been available for the period October, 1984 to May, 1985. In addition, the results of two correlative experimental measurement series have been studied in detail, as well as climatological data obtained by other techniques, including ground-based and airborne lidar. The study shows the SAGE 2 data to be of great potential value to studies of the microphysics of stratospheric aerosols, the chemistry of trace gases and stratospheric dynamics. A small number of unidentified errors in the current preliminary data set are described. These will be removed from the next version of the data set which is anticipated to be of archival quality. Author

N87-13025# Air Force Geophysics Lab., Hanscom AFB, Mass.
A SEMI-EMPIRICAL LOW-LATITUDE IONOSPHERIC MODEL Environmental Research Papers
David N. Anderson, Michael Mendillo, and Bruce Herniter 10 Oct. 1985 108 p
(AD-A168899; AFGL-TR-85-0254; AFGL-ERP-933) Avail: NTIS HC A06/MF A01 CSCL 04/1

Since current empirical models specifying low-latitude electron density profiles severely underestimate the daytime plasma density scale-height and total electron content (TEC), a Semi-empirical, Low-latitude, Ionospheric Model (SLIM) was developed which is not only more realistic but is also computationally fast. Electron density profiles (180 to 1800 km) are theoretically calculated as a function of latitude (every 2 deg between 24 N and 24 S dip latitude) and local time (every half-hour over 24 hours LT) by solving the time-dependent plasma continuity equation. Assuming a Chapman-like profile, sets of coefficients are then generated which reproduce these individual profiles. The coefficients themselves are easily stored, quickly retrieved and form the basis for a fast, portable, semi-empirical computer code. This report describes briefly the input parameters used to theoretically calculate profiles and the procedures used to generate the coefficients. The SLIM profiles are compared with the Chiu and Bent empirical models for Equinox, solar maximum conditions. Finally electron densities, the coefficients, TEC and 6300 A airglow intensities are listed in tabular form for three seasons (Equinox, June solstice, and December solstice) and two solar cycle periods (solar maximum and solar minimum). Author (GRA)

N87-13026# North Carolina State Univ., Raleigh. Dept. of Marine, Earth and Atmospheric Science.
THEORETICAL STUDY ON THE CORRELATION BETWEEN WIDEBAND ELECTROMAGNETIC SPECTRA AND GEOLOGICAL STRUCTURES Final Report, 1 Sep. 1983 - 28 Feb. 1986
I. J. Won Apr. 1986 56 p
(Contract DAAG29-83-K-0152)
(AD-A168971; ARO-20065.2-GS) Avail: NTIS HC A04/MF A01 CSCL 08/7

A theoretical study has been performed to establish a mathematical means to compute the electromagnetic response of an earth having continuous and arbitrary conductivity variations, and to formulate a transfer function that can convert a wideband frequency-domain response to a continuous conductivity-depth function. The study was based upon past experiences in both theoretical and experimental aspects of frequency-domain electromagnetic method. A new formal integral representation was formulated for Maxwell's equations for a medium having an arbitrary conductivity function. It was shown that the representation is suitable for forward problems and, through a proper integral transform, the inverse may possibly exist. An attempt is being made to derive a transfer conductivity-depth profile. Author (GRA)

N87-13027# Southwest Research Inst., San Antonio, Tex.
MAGNETOSPHERIC PLASMA STUDIES USING DATA FROM THE DYNAMICS EXPLORER HIGH AND LOW ALTITUDE PLASMA INSTRUMENTS Final Report, 15 Apr. 1982 - 31 Dec. 1985
J. N. Barfield Feb. 1986 83 p
(Contract F19628-82-K-0024)
(AD-A169010; AFGL-TR-86-0034) Avail: NTIS HC A05/MF A01 CSCL 04/1

The reported research focused primarily upon plasma processes in and near the plasma cusp. The following areas were studied: plasma injection and transport in the mid-altitude polar cusp; observations of counterstreaming electrons at high altitudes; observations of upward electron beams and their relationship to region 1 Birkeland currents; observations of the electron population responsible for the 6300A SAR arc emission, polar rain observations; polar wind observations; and observations of ion and electron acceleration events produced by parallel electric fields. The primary observing platform for the research reported here was Dynamic Explorer 1 (DE-1). The DE-1 High Altitude Plasma Instrument (HAPI) consists of five electrostatic analyzers mounted in a fan-shaped angular array at angles of 45, 78, 90, 102, and 135 deg. with respect to the spacecraft spin axis. Each analyzer makes differential measurements of electrons and positive ions over an energy/charge range of 5 eV/e to 32 keV/e. Energy stepping proceeds at commandable rates of up to 64 sec, providing three-dimensional plasma distribution functions at the six second spin rate or DE-1. GRA

N87-13028# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
THE CURRENT-VOLTAGE RELATIONSHIP IN AURORAL CURRENT SHEETS Progress Report, 1986
D. R. Weimer, D. A. Gurnett, C. K. Goertz, J. D. Menietti, and J. L. Burch Mar. 1986 38 p
(Contract N00014-85-K-0404)
(AD-A169074; U-OF-IOWA-86-21) Avail: NTIS HC A03/MF A01 CSCL 04/1

The current-voltage relation within narrow auroral current sheets is examined through the use of high-resolution data from the high altitude Dynamics Explorer 1 satellite. The north-south per-

pendicular electric field and the east-west magnetic field are shown for three cases in which there are large amplitude, oppositely directed paired electric fields and narrow current sheets. These data are shown to indicate that there is a linear Ohm's law relationship between the current density and the parallel potential drop within the narrow current sheets. This linear relationship had previously been verified for large-scale auroral formations greater than 20 km wide at the ionosphere. The evidence shown here extends our knowledge down to the scale size of discrete auroral arcs.
Author (GRA)

N87-13029# Oklahoma State Univ., Stillwater. Electronics Lab.
INSTRUMENTATION RESEARCH AND SUPPORT SERVICES Final Report, 13 Feb. 1981 - 30 Jun. 1985
R. F. Buck 30 Sep. 1985 109 p
(Contract F19628-81-C-0079)
(AD-A169278; AFGL-TR-85-0255) Avail: NTIS HC A06/MF A01 CSCL 14/2

This report summarizes upper air research support services supplied to the Air Force Geophysics Laboratory. These services include design and construction of both air-borne and ground based equipment, as well as the supply of personnel and related equipment at a number of remote sites. Both analog and digital systems are described. Related activities have included studies and research activities directed toward anticipated future requirements for support.
Author (GRA)

N87-13030# Saint Louis Univ., Mo.
Lg WAVE EXCITATION AND PROPAGATION IN PRESENCE OF ONE-, TWO-, AND THREE-DIMENSIONAL HETEROGENEITIES Scientific Report, 1 Oct. 1985 - 31 Mar. 1986
R. B. Herrmann 1 Feb. 1986 26 p
(Contract F19628-85-K-0029)
(AD-A169325; AFGL-TR-86-0026; SR-2) Avail: NTIS HC A03/MF A01 CSCL 08/11

A detailed study of Lg wave excitation and propagation from a sequence of earthquakes in New Brunswick is performed. Primary conclusions are that Lg Q increases with frequency. Perhaps more importantly for regional source studies is the observation of significant high frequency Pn and Sn arrivals at 1000 km which are much greater than the Lg arrival. Source estimates based on the Lg provide reasonable estimates of seismic moment, but corner frequencies differ from short distance measurements.
GRA

N87-13031# SRI International Corp., Menlo Park, Calif.
COORDINATED RADAR AND SATELLITE STUDIES OF IONOSPHERIC CURRENTS IN THE AURORAL ZONE AND POLAR CAP Final Report, 1 Sep. 1982 - 31 Dec. 1985
Roland T. Tsunoda, Anne Q. Smith, John D. Kelly, and Robert M. Robinson Dec. 1985 39 p
(Contract F19628-82-K-0045)
(AD-A169466; AFGL-TR-86-0022) Avail: NTIS HC A03/MF A01 CSCL 04/1

The objective is to provide real time surveillance of short term predictions in the electrodynamic state of the ionosphere and magnetosphere. The desired approach is to obtain all necessary environmental information by remote sensing or by in situ sampling from satellites; the parameters include electric fields, field-aligned currents, and ionospheric conductivities. Recently, a DMSP (Defense Meteorological Satellite Program) satellite has been launched (Flight 7) equipped with a triaxial fluxgate magnetometer. To qualify this type of instrument for participation in the above objective, an investigation was made of field aligned currents estimated from two different approaches: using magnetometer measurements made by the DMSP-F7 satellite and using ionospheric measurements made by the Sondrestrom incoherent scatter radar. Three events are analyzed when near simultaneous measurements were made by both instruments during satellite passes over the radar. Varying degrees of correlation were found in the derived field aligned currents. In all three cases, the gross features measured by the two methods were similar. The differences are discussed in terms of measurement error, analysis approximation, and geophysical uncertainties.
GRA

N87-13032# Air Force Geophysics Lab., Hanscom AFB, Mass.
COLLECTION OF IONS IN THE STRATOSPHERE Interim Report, Sep. 1984 - Sep. 1985
Christopher Sherman 9 Dec. 1985 41 p
(AD-A169905; AFGL-TR-85-0317; AFGL-ERP-944) Avail: NTIS HC A03/MF A01 CSCL 04/1

The processes involved in sampling of ions in the stratosphere have been examined and ranked in order of importance. Several typical calculations related to collection of ions in the stratosphere have been made. In this procedure, difficulties that may arise in solving such problems have been pointed out. The overall program, if continued, would be strengthened by further theoretical support along the lines initiated here.
GRA

N87-13033# Air Force Geophysics Lab., Hanscom AFB, Mass.
BALLOON-BORNE, HIGH ALTITUDE GRAVIMETRY: THE FLIGHT OF DUCKY 1a (11 OCTOBER 1983) Interim Scientific Report, Nov. 1982 - Dec. 1985
Andrew R. Lazarewicz, Brenda J. Schilinski, Ralph J. Cowie, Catherine L. Rice, Peter Moss, and Leonard N. Carter (Bedford Research Associates, Mass.) 31 Dec. 1985 86 p
(AF Proj. 7600)
(AD-A169942; AFGL-TR-85-0342; AFGL-ERP-943) Avail: NTIS HC A05/MF A01 CSCL 08/5

Gravity measurements from a high-altitude balloon were made in late September to verify global and upward-continued gravity models. The first flight was intended to provide balloon motion and environment data with a preliminary estimate of the quality of measured gravity values. A balloon operates in a dynamic, largely unpredictable environment; thus, the gravimeter senses accelerations due to balloon motions as well as gravitational acceleration. Independent measurements of balloon motions from an intertial navigation package (three accelerometers, three rate gyros, three-axis magnetometer and two tiltmeters) combined with ground tracking (X, Y and Z position and velocity) will allow for separation of balloon-induced accelerations from gravitational acceleration to 1 mGal, using tracking data to an accuracy of about 5 cm/sec in velocity for Eotvos corrections, and position to 1 m. This first engineering flight was planned to coincide with the lowest seasonal wind velocities over Holloman AFB, where AFGL has its permanent balloon launch facility. Mild wind velocities are desired to provide the most benign environment possible during the testing phase, and to keep the balloon within tracking range. The experiment design, launch, and flight operations, and a first look at the data are presented.
GRA

N87-13034# Massachusetts Inst. of Tech., Cambridge. Earth Resources Lab.
DEVELOPMENT OF ULTRASONIC MODELLING TECHNIQUES FOR THE STUDY OF SEISMIC WAVE SCATTERING DUE TO CRUSTAL INHOMOGENEITIES Final Report, 13 Apr. 1983 - 30 Sep. 1985
M. N. Toksoz, Anton M. Dainty, and Edmond E. Charrette, III Mar. 1986 86 p
(Contract F19628-83-K-0027)
(AD-A170017; AFGL-TR-86-0087) Avail: NTIS HC A05/MF A01 CSCL 08/11

Scattering of Rayleigh waves from surface features was investigated using three-dimensional ultrasonic models at frequencies near 1 MHz and two dimensional finite difference calculations. Models were constructed of aluminum blocks and an aluminum powder-epoxy composite of lower density and seismic velocity. The aluminum has similar seismic velocities and density to igneous and metamorphic rocks while the composite is similar to sedimentary materials. Kilometers in the earth are scaled to millimeters in the models which makes 1 MHz in the models equivalent to 1 Hz in the earth, typical of the frequencies observed in regional seismograms. Relief on the models which was a few millimeters, the order of a wavelength, was restricted to an isolated circular mesa of composite on a metal block and an isolated circular

depression both unfilled and filled with composite. Calculations were made for similar situations by the finite difference method; comparisons indicated a general similarity in the seismograms, allowing us to use the finite difference calculations to gain physical insight into the scattering process. Topography alone produces attenuation due to scattering into reflected surface waves and body waves. Adding low velocity composite to the model considerably changes this picture. GRA

N87-13035# Denver Univ., Colo. Dept. of Physics.
MEASUREMENT OF ATMOSPHERIC EMISSION SPECTRA AT HIGH ALTITUDES Final Report, 8 Nov. 1982 - 8 Nov. 1985
F. H. Murcray, F. J. Murcray, D. G. Murcray, and A. Goldman 22 Nov. 1985 14 p
(Contract F19628-83-K-0006)
(AD-A170143; AFGL-TR-86-0061) Avail: NTIS HC A02/MF A01 CSCL 04/1

The objective of this contract has been to obtain high spectral resolution atmospheric emission data at altitudes up to 40 km. In order to accomplish this cryogenically cooled moving mirror Michelson interferometer system was constructed that is capable of operating independently while being carried aloft by a large balloon. Interpretation of the atmospheric emission spectra obtained under this contract requires a computer program that can calculate theoretical atmospheric emission spectra on a line by line basis. All such programs rely on an accurate list of line parameters of molecules of atmospheric interest. GRA

N87-13036# Air Force Geophysics Lab., Hanscom AFB, Mass.
IMPROVING foF2 PREDICTION FOR THE SUNRISE TRANSITION PERIOD Final Report, Oct. 1984 - Sep. 1985
B. S. Dandekar and J. Buchau 29 Jan. 1986 65 p
(AD-A170457; AFGL-TR-86-0026; AFGL-ERP-946) Avail: NTIS HC A04/MF A01 CSCL 04/1

During the 2- to 3-hr sunrise transition period, the relative change in foF2 is 20 to 60 percent per hour and is independent of solar activity. The change is largest in winter and smallest in summer. To prevent the skip distance from changing by more than 250 km, that is, to maintain continuous illumination of at least 50 percent of the barrier (nominal width 500 km), requires that the operating frequency be changed for every 6 percent change in foF2. Thus, in the case of an OTH system, the operating frequency has to be adjusted during the sunrise period every 6 to 20 min (seasonal dependence) for satisfactory performance. To accommodate such rapid changes, an empirical algorithm has been tested for improved foF2 predictions during sunrise. The prediction scheme is based on the availability of relevant (under the oblique raypath) real time ionospheric data. GRA

N87-13037# Ohio State Univ., Columbus. Dept. of Civil Engineering.
AN ANALYSIS OF THE ACOUSTIC CHARACTERISTICS OF ABSS (ACOUSTIC BACKSCATTER SYSTEM) AND ITS DEPLOYMENTS Report, 1 Oct. 1982 - 31 Mar. 1986
Keith W. Bedford and Charles M. Libicki Jul. 1986 110 p
(Contract N00014-83-K-0003)
(AD-A170487) Avail: NTIS HC A06/MF A01 CSCL 17/1

The benthic boundary layer is the interface between the world ocean and the earth beneath. Extending from the top of the Ekman layer, where bottom drag begins to exert its influence on the general oceanic circulation, down to a few centimeters below the sediment surface, it is the site of exchange of momentum, heat, solutes and suspended load. To aid in investigating these zones the ABSS (Acoustic Backscatter System) a combination 5 MHz - 1 MHz system is deployed by the High Energy Benthic Boundary Layer Experiment (HEBBLE) team on the Nova Scotian Rise at a depth of 4800m. This device can, without entering the observed flow, sense suspended sediment simultaneously in over 100 1-cm range bins, as frequently as one hundred times per second, while the low frequency transducer of ABSS looks upward through the Ekman layer, using the same measurement principle, but in 20 cm range bins. Inasfar as their sampling density in space and time for turbulent fluid mechanical data, these devices are quite unprecedented. GRA

N87-13038# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A SIMPLE SOLAR, SPECTRAL MODEL FOR STUDYING THE EFFECTS OF CLOUD COVER AND SURFACE ALBEDO ON THE INCOMING SOLAR RADIATION Ph.D. Thesis
Alfred M. Powell, Jr. 1986 131 p
(AD-A171284; AFIT/CI/NR-86-123D) Avail: NTIS HC A07/MF A01 CSCL 04/1

The effect of cloud cover and surface albedo on the solar insolation at the surface of the Earth was investigated. The model uses Bird's (1984) clear sky model for direct normal and diffuse horizontal irradiance as its basis. Bird's model was modified to include inclined surfaces and cloud cover. The clouds were modelled using parameterizations developed by Welch, Cox and Davis (1980) and a weighting technique to account for cloud shape using plane parallel calculations. The radiative transfer in the cloud was modelled by a two stream approximation known as the Shuster Schwarzchild method. The model results were compared with clear sky broadband and spectral observations, and cloudy broadband observations. The effects of cloud amount, cloud thickness, cloud type, and surface albedo are demonstrated. Cloud amount and cloud thickness are the predominant cloud factors affecting insolation. High surface albedos tend to slow the decrease in insolation due to increasing cloud cover; while low surface albedos cause greater variation in insolation under the same circumstances. GRA

N87-13039# Lawrence Livermore National Lab., Calif.
ATMOSPHERIC ILLUMINATION AND SHADOWS, REVISION 1
N. L. Max 15 Jan. 1986 8 p Presented at SIGGRAPH '86, Dallas, Tex., 18 Aug., 1986
(Contract W-7405-eng-48)
(DE86-010971; UCRL-93965-Rev-1; CONF-860875-1-Rev-1) Avail: NTIS HC A02/MF A01

The shadow volume algorithm of Frank Crow was reorganized to provide information on the regions of illuminated space in front of each visible surface. This information is used to calculate the extra intensity due to atmospheric scattering, so when the atmosphere is partly in shadow, columns of scattered light will be visible. For efficiency in sorting the shadow edges, the image is computed in polar coordinates. DOE

N87-13040# Lawrence Livermore National Lab., Calif.
PARAMETERIZED NUMERICAL FIT TO TOTAL COLUMN OZONE CHANGES CALCULATED BY THE LLNL 1-D MODEL OF THE TROPOSPHERE AND STRATOSPHERE
P. S. Connell May 1986 24 p
(Contract W-7405-eng-48)
(DE86-011008; UCID-20762) Avail: NTIS HC A02/MF A01

In this note we present a numerical parameterization of the results of the LLNL one-dimensional model for total column ozone change in terms of surface emissions or abundances of the various source species. The LLNL model was used in an earlier study to evaluate a significant number of time-dependent scenarios of future trends in the emissions or atmospheric abundances of CFC-11, CFC-12, CFC-22, CFC-113, CCl, CHCCl, CO, CH, NO, Halon-1301 and Halon-1211. This parameterization produces calculated ozone changes within about 2% (column ozone change relative to the 1985 model atmosphere) of the actual complete model calculation for a wide range of scenarios and ozone changes. It therefore can approximately represent the actual 1-D model for the purposes of economic analysis of regulatory strategies. It is, however, crucial to note that the 1-D model results, and consequently this parameterization, are subject to substantial uncertainties. Future improvements in our knowledge of atmospheric photochemical kinetics and transport in the troposphere and stratosphere should be expected to modify these current results. DOE

N87-13041 Drexel Univ., Philadelphia, Pa.
CONVECTIVE SURFACE LAYERS: INFLUENCE OF THE BOUND-

ARY LAYER DEPTH Ph.D. Thesis
Kurt Tyler Loveland 1985 256 p
Avail: Univ. Microfilms Order No. DA8605423

Two methods, one semi-empirical and the other theoretical, are employed to develop a new theory for predicting the behavior of turbulence characteristics in convective surface layers. This theory is based on three length scales; the height above the ground, the Monin-Obukhov length, and the boundary layer depth (h). The chief advantages are its relative simplicity, its ability to predict the height dependence of the mean gradients and second moments in a manner consistent with their observed behavior in the atmosphere and in large-eddy simulations, and it is consistent with the theoretical requirements of free convection similarity. The semi-empirical method is based on nonlinear least squares fits to a generalized Businger-Dyer formulation with up to four unknown parameters. Using data obtained primarily from the Kansas and Minnesota field experiments, this method is applied to the universal functions for the wind and temperature gradients, the standard deviation of the horizontal wind velocity, the variances of vertical velocity and temperature, the streamwise heat flux, and the turbulence dissipation. Dissert. Abstr.

N87-13045*# Colorado Univ., Boulder. Dept. of Astrophysics, Planetary and Atmospheric
THEORETICAL AND EXPERIMENTAL STUDIES IN SUPPORT OF THE GEOPHYSICAL FLUID FLOW EXPERIMENT
John Hart and Juri Toomre *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

N87-13046*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL AND EXPERIMENTAL DESIGN STUDIES FOR THE ATMOSPHERIC GENERAL CIRCULATION EXPERIMENT
William W. Fowlis, David H. Hathaway, Timothy L. Miller, Glyn O. Roberts (Roberts Associates, Inc., Vienna, Va.), and Kenneth J. Kopecky (Drake Univ., Des Moines, Iowa.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04A

N87-13049*# Pennsylvania State Univ., University Park. Dept. of Meteorology.
THE USE OF SATELLITE DATA IN UNDERSTANDING AND PREDICTING CONVECTIVE AND LARGE-SCALE DYNAMICAL PROCESSES
John A. Dutton, John H. E. Clark, and Hampton N. Shirer *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04A

N87-12949# Joint Publications Research Service, Arlington, Va.
AVAILABLE POTENTIAL ENERGY IN UPPER LAYER OF WORLD OCEAN Abstract Only
V. S. Arsenyev and V. A. Burkov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Doklady Akademii Nauk SSSR (Moscow, USSR), v. 287, no. 4, Apr. 1986 p 986-989 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12950# Joint Publications Research Service, Arlington, Va.
DESERTIFICATION: GLOBAL ECOLOGICAL PROBLEM Abstract Only
N. S. Orlovskiy *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Voprosy Filisofii (Moscow, USSR), no. 2, Feb. 1986 p 113-123 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12952# Joint Publications Research Service, Arlington, Va.
EXPERIMENTAL RESEARCH ON TURBULENCE IN UPPER-LEVEL TROPOSPHERIC CLOUDS Abstract Only
V. K. Dmitriyev, T. P. Kapitanova, V. D. Litvinova, N. Z. Pinus, G. A. Potertikova, and G. N. Shur *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery i Okeana (Moscow, USSR), v. 22, no. 2, Feb. 1986 p 143-150 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12953# Joint Publications Research Service, Arlington, Va.
SOLAR CONTROL OF GEOPHYSICAL PHENOMENA Abstract Only
V. F. Loginov and G. V. Fedorovich *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Zemlya i Vselennaya (Moscow, USSR), no. 1, Jan. - Feb. 1986 p 58-61 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N87-13042 ESDU International Ltd., London (England).
CHARACTERISTICS OF ATMOSPHERIC TURBULENCE NEAR THE GROUND. PART 3: VARIATIONS IN SPACE AND TIME FOR STRONG WINDS (NEUTRAL ATMOSPHERE)
Oct. 1986 39 p Supersedes ESDU-75001
(ESDU-86010-Pt-3; ISBN-0-85679-562-3; ISSN-0143-2702) Avail: ESDU

This Data Item ESDU 86010 is an addition to the Wind Engineering Sub-series. It is the third in a group providing comprehensive atmospheric turbulence characteristics, and deals with the relationship between values measured at two points in space of the three turbulence velocity components. It covers joint-probability, cross-correlations, coherence and phase angle (giving cross-spectral densities) and integral length scales of all turbulence components in any direction. The data apply throughout the atmospheric boundary layer and for different types of terrain. Since the length scales are all related to that for the along-wind component in the along-wind direction, effects of roughness changes on all of them can be accounted for through their effect on that length scale predicted using ESDU 85020. The data were derived from the von Karman equations modified to take acount of the distorting (anisotropic) effects near the ground. The theoretical basis allows rational extrapolation from measurements made at moderate wind speeds to much higher design speed case when, in particular, much longer length scales are obtained. ESDU

N87-13043*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NASA/MSFC FY-85 ATMOSPHERIC PROCESSES RESEARCH REVIEW
William W. Vaughan, comp. and Fay Porter, comp. Oct. 1985 143 p Review held in Huntsville, Ala. 7-9 May 1985 and in Columbia, Md., 8-12 Jul. 1985
(NASA-CP-2402; M-503; NAS 1.55:2402) Avail: NTIS HC A07/MF A01 CSCL 04B

The two main areas of focus for the research program are global scale processes and mesoscale processes. Geophysical fluid processes, satellite doppler lidar, satellite data analysis, atmospheric electricity, doppler lidar wind research, and mesoscale modeling are among the topics covered. For individual titles, see N87-13044 through N87-13096.

N87-13044*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THEORETICAL AND EXPERIMENTAL STUDIES OF BAROCLINIC PROCESSES
Tim Miller, Fred Leslie, Dan Fitzjarrald, and Nathaniel Reynolds *In its* NASA/MSFC FY-85 Atmospheric Processes Research

Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

An experimental study in a baroclinic annulus with heating and cooling on the upper and lower horizontal surfaces was completed. Four basic regimes of flow were observed: (1) axisymmetric flow, (2) cellular (deep) convection, (3) convective rolls (boundary layer), and (4) baroclinic instability. There was no symmetric (or nearly symmetric) baroclinic instability observed, although it was determined by numerical calculations that we transversed regions in parameter space where the symmetric instability was present. The non-symmetric baroclinic instability (Eady type) was observed instead. Although the vertical depth was rather small and hence viscous damping was strong, large-amplitude baroclinic waves were made possible by imposing a very weak static stability. Author

N87-13045*# Colorado Univ., Boulder. Dept. of Astrophysics, Planetary and Atmospheric

THEORETICAL AND EXPERIMENTAL STUDIES IN SUPPORT OF THE GEOPHYSICAL FLUID FLOW EXPERIMENT c46

John Hart and Juri Toomre *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Meteorologists and astrophysicists interested in large scale planetary and solar circulations have come to recognize the importance of rotation and stratification in determining the character of these flows. In particular, the effect of latitude-dependent Coriolis force on nonlinear convection is thought to play a crucial role in such phenomena as differential rotation on the Sun, cloud band orientation on Jupiter, and the generation of magnetic fields in thermally driven dynamos. The continuous low-gravity environment of the orbiting space shuttle offers a unique opportunity to make laboratory studies of such large-scale thermally driven flows under the constraint imposed by rotation and sphericity. This is possible because polarization forces in a dielectric liquid, which are linearly dependent on fluid temperature, give rise to an effectively radial buoyancy force when a radial electrostatic field is imposed. The Geophysical Fluid Flow Cell (GFFC) is an implementation of this ideal in which fluid is contained between two rotating hemispheres that are differentially heated and stressed with a large a-c voltage. The experiment, to be flown on Spacelab III (currently set for launch April 29, 1985), will explore non-linear mode selection and high Rayleigh number turbulence in a rotating convecting spherical shell of liquid. Experiments will be carried out in a low driving parameter range where some limited numerical experimentation is currently feasible, as well as in a parameter range significantly beyond numerical computation for many years. Author

N87-13046*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

THEORETICAL AND EXPERIMENTAL DESIGN STUDIES FOR THE ATMOSPHERIC GENERAL CIRCULATION EXPERIMENT c46

William W. Fowlis, David H. Hathaway, Timothy L. Miller, Glyn O. Roberts (Roberts Associates, Inc., Vienna, Va.), and Kenneth J. Kopa (Drake Univ., Des Moines, Iowa.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04A

The major criterion for the Atmospheric General Circulation Experiment (AGCE) design is that it be possible to realize strong baroclinic instability in the spherical configuration chosen. A configuration was selected in which a hemispherical shell of fluid is subjected to latitudinal temperature gradients on its spherical boundaries and the latitudinal boundaries are insulators. Work in the laboratory with a cylindrical version of this configuration revealed more instabilities than baroclinic instability. Since researchers fully expect these additional instabilities to appear in the spherical configuration also, they decided to continue the laboratory cylindrical annulus studies. Four flow regimes were identified: an axisymmetric Hadley circulation, boundary layer convection, baroclinic waves and deep thermal convection. Regime diagrams were prepared. Author

N87-13047*# Simpson Weather Associates, Inc., Charlottesville, Va.

MULTISCALE MODELING TO EVALUATE PROPOSED SPACE-BASED DOPPLER LIDAR SAMPLING STRATEGIES

G. D. Emmitt *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A proposal has been made to place a pulsed Doppler lidar on a space platform (Huffaker, et al., 1980; Emmitt, 1982) in a low earth orbit (200 to 800 km) to measure the atmospheric winds with a spatial resolution commensurate with the current continental rawinsonde network density - i.e., 300 to 500 km resolution. In the case of the space-based doppler lidar, the full range of space scales applies. Single shot pulses with dimensions of 10 x 1000 meters are used to sample areas 100,000 x 100,000 meters to resolved mass flow structure with wavelength of 1 million meters. Simulation studies, therefore, require an equally broad range of atmospheric models. A general circulation model is appropriate to answer questions regarding the impact of a global wind measuring system upon synoptic forecasts. Since the nominal resolution of the spacebased system is expected to be a few 100's of kilometers, then a numerical model with mesoscale dynamics is required. The meaning of an average Doppler shift within a laser pulse volume must be evaluated with models of turbulent/convective scale motions and aerosol gradients. Examples of how models on all these scales have been applied in an ongoing simulation study are presented. In particular, the uncertainties in a mesoscale wind estimate are separated into those arising from pulse scale variances and those due to sample distribution within a prescribed resolution volume. Trade-offs between accuracy and representativeness are discussed in terms of the model results. Author

N87-13048*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ESTIMATION OF PRECIPITATION FROM GOES IR IMAGERY DURING FGGE: APPLICATION TO DIAGNOSTIC STUDIES

Franklin R. Robertson *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 5 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The objectives were to (1) develop a method of estimating open-ocean rainfall and associated latent heat release via GOES IR satellite imagery; (2) to use remote precipitation estimates to investigate the role of diabatic forcing in the maintenance of the South Pacific Convergence Zone (SPCZ) during FGGE SOP-1/; and (3) to assess the significance of non-quasigeostrophic transports of energy in several cyclogenetic events preceding the development of a North Atlantic blocking episode during FGGE SOP-1. The bulk of the early FY-85 work was directed toward development of the single pixel indexing technique (SPI) which assigns a rain rate to GOES IR black-body temperatures, T sub b, via a non-linear statistical relationship developed with raingauge measurements. The method was tested against radar-derived rainfall during GATE raingauge measurements over coastal North Carolina and island stations in the South Pacific Ocean. Skill was found comparable to Arkin's method (1979 MWR) in convective situations. The results suggest that transferring a rain algorithm from one oceanic regime to another may not require substantial modification of coefficients or tunable parameters. Twelve H mean rainfall amounts were produced for the region bounded by 10 deg. N, 50 deg. S, 120 deg W and 170 deg. E during the period January 10 to 16, 1979. These estimates constitute a basic input to diagnostic calculations of diabatic heating over the SPCZ region. ECMWF level III-b data analyses was used to compute several components of the APE balance in the South Pacific during the period January 10 to 18, 1979. Author

N87-13049*# Pennsylvania State Univ., University Park. Dept. of Meteorology.

THE USE OF SATELLITE DATA IN UNDERSTANDING AND PREDICTING CONVECTIVE AND LARGE-SCALE DYNAMICAL PROCESSES c46

John A. Dutton, John H. E. Clark, and Hampton N. Shirer *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04A

A two-layer truncated baroclinic spectral model was developed to study the long-term evolution of disturbances to a baroclinically unstable mean flow. Topography and crudely-parameterized radiative processes were accounted for. As a result of Robert Schlaak's discovery of the underlying barotropic nature of the index oscillation as well as reviewers suggestions about the original manuscript, the model has been revised to allow for barotropic as well as baroclinic wave-mean flow interactions. The form-drag exerted by the topography on the barotropic part of the mean flow is larger than on the baroclinic part and thus researchers anticipate significant changes from the original calculations on the index oscillation when it is strongly modulated by topography. Researchers believe that since the index oscillation accounts for a significant portion of atmospheric temporal variance, the long term predictability could be improved if reliable forecasts of the index oscillation were available. Two spectral models of the index oscillation, one barotropic and the other baroclinic, have been developed. The latter allows for moisture, radiation, land-sea temperature contrasts, and energy exchanges with the underlying surface.

Author

N87-13050*# Illinois State Water Survey, Champaign.

VARIATION OBJECTIVE ANALYSES FOR CYCLONE STUDIES

Gary L. Achtemeier, Stanley Q. Kidder, and Harry T. Ochs *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 4 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The objectives were to: (1) develop an objective analysis technique that will maximize the information content of data available from diverse sources, with particular emphasis on the incorporation of observations from satellites with those from more traditional immersion techniques; and (2) to develop a diagnosis of the state of the synoptic scale atmosphere on a much finer scale over a much broader region than is presently possible to permit studies of the interactions and energy transfers between global, synoptic and regional scale atmospheric processes. The variational objective analysis model consists of the two horizontal momentum equations, the hydrostatic equation, and the integrated continuity equation for a dry hydrostatic atmosphere. Preliminary tests of the model with the SESMAE I data set are underway for 12 GMT 10 April 1979. At this stage of purpose of the analysis is not the diagnosis of atmospheric structures but rather the validation of the model. Model runs for rawinsonde data and with the precision modulus weights set to force most of the adjustment of the wind field to the mass field have produced 90 to 95 percent reductions in the imbalance of the initial data after only 4-cycles through the Euler-Lagrange equations. Sensitivity tests for linear stability of the 11 Euler-Lagrange equations that make up the VASP Model 1 indicate that there will be a lower limit to the scales of motion that can be resolved by this method. Linear stability criteria are violated where there is large horizontal wind shear near the upper tropospheric jet.

Author

N87-13051*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.

UTILIZATION OF SATELLITE CLOUD INFORMATION TO DIAGNOSE THE ENERGY STATE AND TRANSFORMATIONS IN EXTRATROPICAL CYCLONES

Phillip J. Smith *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

An important component of the research was a continuing investigation of the impact of latent release on extratropical cyclone development. Previous efforts to accomplish this task have focused on the energy balance and the vertical motion field of an intense winter extratropical cyclone over the United States. During this fiscal year researchers turned their attention to a more fundamental diagnostic variable, the height tendency. Central to this effort is the use of a modified form of the quasi-geostrophic height tendency equation, in which geostrophic wind components have been replaced by observed winds and a latent heat release term has been added. This methodology was adopted to produce a simple diagnostic model which retains the essential mechanisms of quasi-geostrophic theory but more faithfully describes observed wave development when the Rossby Number approaches and exceeds 0.5. Results to date indicate that the new model yields height tendencies that are superior to those obtained from the quasi-geostrophic formulation and are sufficiently close to the observed tendencies to be a useful tool for diagnosing the principle large-scale forcing mechanisms in th e700-300 mb layer. Of the three forcing terms included in the new model, vortity advection is in general dominant. The most persistent challenge to this dominance is made by the thermal advection. On the whole, latent heat release plays a secondary role. Finally, during the rapid intensification observed for this cyclone, all three processes complement each other in forcing height falls.

Author

N87-13052*# Purdue Univ., West Lafayette, Ind. Dept. of Geosciences.

DYNAMICS AND ENERGETICS OF THE SOUTH PACIFIC CONVERGENCE ZONE DURING FGGE SOP-1

Dayton G. Vincent *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The major research objectives are to diagnose the physical processes responsible for the maintenance of the South Pacific Convergence Zone (SPCZ) and to examine the role of the SPCZ in the large-scale circulation patterns of the Southern Hemisphere. To accomplish these objectives researchers used several data sources which include: a modified set of Level III-b upper air analyses, originally produced by ECMWF (Vincent, 1982); subjectively analyzed surface analyses for the South Pacific based on island station reports (Vincent, 1985); outgoing longwave radiation values supplied to us by NOAA/NESDIS; and equivalent black body temperatures and precipitation rates derived by Robertson. In the past year researchers found that wave number four plays an inportant role in the Southern Hemisphere tropics during the 15-day period when the sPCZ was a dominant feature, particularly with regard to the baroclinic conversion of potential to kinetic energy (Huang and Vincent, 1985). The convectively-active SPCZ area was found to make a significant contribution to this conversion process; thus, it appears that baroclinic effects and latent heating are important in maintaining the SPCZ. Recently efforts concentrated on two research tasks, an examination of cyclone activity within the SPCZ (Kann, 1985; Vincent, 1985; Vincent and Kann, 1985; and a study of the heat and moisture budgets in the South Pacific (Miller, et al., 1985). It was found that cyclonic disturbances occurred with regularity in the Zone from 10 to 17 January.

Author

N87-13053*# Texas A&M Univ., College Station. Dept. of Meteorology.

APPLICATION OF SATELLITE DATA TO TROPIC/SUBTROPIC MOISTURE COUPLING

James P. McGuirk and Aylmer H. Thompson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The objective is to develop analysis tools for use of satellite data to interpret synoptic-scale systems in data-void regions. Interim goals are to: (1) quantify the synoptic information content of satellite data; and (2) utilize these data in the diagnosis of moisture bursts

in the eastern tropical Pacific Ocean. Researchers developed and implemented a statistical procedure for using TIROS N microwave data to infer infrared channel data for overcast conditions; they used the same procedure for deducing full TIROS N channel radiance profiles from NOAA 5 VTPR channel data over regions where the TIROS N data are missing. An empirical orthogonal function analysis of twice-daily channel radiance fields over the tropical eastern Pacific was completed. The vertically oriented eigenfunctions were interpreted in terms of typical meteorological events. The horizontal distribution of the eigenfunction amplitudes relates these meteorological signals to moisture bursts. A pair of moisture burst climatologies is complete: one of four years using infrared imagery (including the highly anomalous 1982 to 83 cold season); the other implementing 850 to 200 mb wind analyses in conjunction with GOES imagery. A number of different evaluations of the synoptic evolution of moisture fields (enhanced infrared imagery, moisture channel data, FGGE humidity analysis, and in situ station and sounding observations) are compared. All have limitations; all can be utilized together; all together are still less than adequate in the tropical Pacific. Author

N87-13054*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. Dept. of Geology and Geophysics.

OBSERVATIONAL AND THEORETICAL STUDIES OF THE EVOLVING STRUCTURE OF BAROCLINIC WAVES: ATTRACTOR DYNAMICS OF GLOBAL WEATHER SYSTEMS

Barry Saltzman, Anthony R. Hansen, Richard N. Nagle, and Chung-Muh Tang (Universities Space Research Association, Columbia, Md.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Significant progress was made in developing a six-component dry model of mid-latitude baroclinic wave evolution, and a ten-component moist model. These models include representations of airflow over mountians and non-adiabatic processes. As a first step, the properties of a reduced, three component, baroclinic system are studied. The classical baroclinic stability criteria emerge as the properties of one of the three equilibria admitted, with the remaining two equilibria forming the attractor region for the observed weather activity. Passive tracer evolution in a baroclinic wave was studied. A model in which only constituents trapped within low atmospheric levels are considered, has been extended to include the possibility for fluxes into the upper levels of the atmosphere. The reported results for the lower levels achieved previously are shown to be qualitatively similar to those obtained by these new calculations in which the vertical flux constraint is removed. An extensive study of an 8-year record of global outgoing longwave radiation for the Northern Hemisphere reveals that blocking events exhibit only a weak signature of blocking highs, as measured by relatively low values of the ratio of the standard deviation to the mean value of the observed long wave outgoing radiation. Though present in many cases, the signature is not a strongly distinctive feature of the blocking episodes. Author

N87-13055*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

DEEP CONVECTION IN MESOSCALE CONVECTIVE SYSTEMS

Steven J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

A study was undertaken to examine the evolution of radar echoes and lightning attending the convective storms in mesoscale convective systems (MCS) and the relationships between the spatial and temporal evolution of deep convection and the storm environment, precipitation, severe weather, and lightning. The total number of ground discharges ranges from 10,000 to 30,000 over the life cycle of the MCS with peak sustained rates (for up to 10 consecutive hours) in excess of 2000 per hour. The peak lightning activity occurs from 5 to 20 hours after the first storms and anywhere from 7 hours prior to 7 hours after the time of the maximum areal extent of the MCS for very similar synoptic environments. Thus, it appears that mesoscale and sub-synoptic scale mechanisms are responsible for these large temporal variation in lightning activity. In addition, we have found that the lightning rates in MCS's are not related to either the size or the duration of the MCS. Preliminary results suggest that the MCA's with embedded squall lines produce the greatest flash rates. Author

N87-13056*# National Oceanic and Atmospheric Administration, Norman, Okla.

SEVERE STORM ELECTRICITY

W. David Rust and Donald R. MacGorman *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 5 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

During FY-85, Researchers conducted a field program and analyzed data. The field program incorporated coordinated measurements made with a NASA U2. Results include the following: (1) ground truth measurements of lightning for comparison with those obtained by the U2; (2) analysis of dual-Doppler radar and dual-VHF lightning mapping data from a supercell storm; (3) analysis of synoptic conditions during three simultaneous storm systems on 13 May 1983 when unusually large numbers of positive cloud-to-ground (+CG) flashes occurred; (4) analysis of extremely low frequency (ELF) wave forms; and (5) an assessment of a cloud -ground strike location system using a combination of mobile laboratory and fixed-base TV video data. Author

N87-13057*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

STORM SEVERITY DETECTION (RF)

R. L. Johnson (Southwest Research Inst., San Antonio, Tex.) and S. J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Atmospheric electrical emissions occurring in association with Hurricane Alicia were observed by two crossed baseline phase linear interferometers. The sensors were located in San Antonio, Texas, and at Marshall Space Flight Center (MSFC), Huntsville, Alabama. An analysis of the data has indicated that the direction finding (DF) performance of the San Antonio site was extremely good while the DF performance at the MSFC site evidenced erratic behavior. A check of the data acquisition hardware revealed an intermitted problem in one of the radio receiver channels. Since the system has experienced several lightning strikes during the early spring of 1984, it was necessary to ship the entire rack of equipment back to SwRI for refurbishment. Analysis of the DF data from the interferometer site at San Antonio is being done. A limited subset of the MSFC data acquired during Hurricane Alicia has been found to be valid. These were data which satisfied the phase linearity criteria. Approximately 2,000 location estimates have been produced on the valid data. The results of the DF analysis and the location data are being correlated with the McIDAS data base at Marshall Space Flight Center, and with the radar summary data provided by the Hurricane Research Division using the National weather Service radar Facility at Galveston, Texas. Author

N87-13058*# Wisconsin Univ., Madison. Space Science and Engineering Center.

STUDIES OF LIGHTNING DATA IN CONJUNCTION WITH GEOSTATIONARY SATELLITE DATA

Brian Auvine and David Martin *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Since January, work has been proceeding on the first phase of this project: the creation of an extensive real-time lightning data base accessible via the Space Science and Engineering

Center McIdas system. The purpose of this endeavor is two-fold: to enhance the availability and ease of access to lightning data among the various networks, governmental and research agencies; and to test the feasiblity and desirability of such efforts in succeeding years. The final steps in the creation of the necessary communications links, hardware, and software are in the process of being completed. Operations ground rules for access among the various users have been discussed and are being refined. While the research planned for the last year of the project will rely for the most part on archived, quality-controlled data from the various networks, the real-time data will provide a valuable first-look at potentially interesting case studies. For this purpose, tools are being developed on McIdas for display and analysis of the data as they become available. In conjunction with concurrent GOES real-time imagery, strike locations can be plotted, gridded and contoured, or displayed in various statistical formats including frequency distributions, histograms, and scatter plots. The user may also perform these functions in relation to arbitrarily defined areas on the satellite image. By mid-May these preparations for the access and analysis of real-time lightning data are expected to be complete. Author

N87-13059*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
LIGHTNING MAPPER AND THE FUTURE
Hugh J. Christian *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A trade-off analysis was completed that reveals how the lightning mapper detection efficiency will change as a function of interference filter bandwidth, pixel field of view, and telescope aperture. It is shown that the critical parameter on which we have minimum flexibility is filter band-width. The problem is that too narrow a filter bandwidth is incompatible with wide areal coverage. The trade-off analysis demonstrates that an 80 percent lightning detection efficiency will technically be relatively straight-forward, while a 90 percent detection efficiency will apparently be difficult to achieve. Three focal plane designs are currently under consideration. One would use a single large, solid state silicon integrating array with multiple output channels and off-the-focal-plane analog, time domain, background removing fibers. A second design would use the same technology, but the sensor would consist of up to four virtually independent focal plane arrays. This design reduces the areal coverage of each detector. Thus narrower interference filters could be utilized. Superior performance would be realized at a probable increase in cost. The final design would use a three-dimensional focal plane in order to perform background removal at the focal plane. Superior performance would be achieved along with reduced weight and power requirements. Unfortunately, this focal plane technology is still under development. Author

N87-13060*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE SHUTTLE/MESOSCALE LIGHTNING EXPERIMENT
Otha H. Vaughan, Jr., B. Vonnegut (State Univ. of New York, Binghamton.), and Marx Brook (New Mexico Inst. of Mining and Technology, Socorro.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A payload integration plan (PIP) is now being developed with Johnson Space Center integration personnel which covers management, structural thermal, electrical power/avionics, training, ground operations, safety requirements, etc., in support of this experiment. If a Shuttle flight can be identified, researchers hope to conduct the experiment in the late summer or fall of 1985. Some preliminary TV lightning data has been collected by Shuttle crews on 41D and 51D and researchers are doing an analysis of it. Additional flights will be conducted to obtain data on Mesoscale Lightning Observations. Researchers will continue to study how to improve the data collection using the onboard TV cameras. By more interaction with the crews who have used the TV camera to obtain TV of lightning, they are planning to optimize the crew time and have better TV camera operations management to produce more useful data. As the crews are better trained in the use of the gain control settings and/or camera iris operations, the quality of the TV data will be improved. Author

N87-13061*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL CHARACTERISTICS OF LIGHTNING AND THUNDERSTORM CURRENTS
E. Philip Krider (Arizona Univ., Tucson.) and Richard J. Blakeslee *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Researchers determined that lightning can be used to determine the diurnal variations of thunderstorms, i.e., storms that produce audible thunder, and that these variations are also in good agreement with diurnal variations in rainfall and convective activity. Measurements of the Maxwell current density, J sub m, under active thunderstorms show that this physical quantity is quasi-steady between lightning discharges and that lightning does not produce large changes in J sub m. Maps of J sub m show contours of iso-current density that are consistent with the locations of radar echos and the locations of where lightning has altered the cloud charge distribution. Author

N87-13062*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTICAL CHARACTERISTICS OF LIGHTNING
Steven J. Goodman *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A study of the optical characteristics of cloud-to-ground dischargers and how they compare with intracloud flashes was completed. Time resolved optical (7774A) and electric field-change waveforms were measured above clouds from a U2 airplane coincident with ground-based measurements of lightning. The optical pulse trains are studied for within and between flash variability. Specifically, for each flash researchers examine the 10, 50 (full width half maximum), and 90 percent pulse widths; the 10-10, 10-50, 10-90, and 10-peak percent amplitude rise times; the radiances (optical power densities); radiant energy densities; and pulse intervals. The optical pulse characteristics of first strokes, subsequent strokes, the intracloud components of cloud-to-ground flashes and intracloud flashes as viewed from above cloud are shown to exhibit very similar waveshapes, radiances and radiant energy densities. Descriptive statistics on these pulse categories were tabulated for 25 visually confirmed cloud-to-ground flashes (229 optical pulses) and 232 intracloud flashes (3126 optical pulses). A companion study of lightning observations above and below cloud in storms, storm complexes, and mesoscale convective systems has also been completed. Researchers compared the mapping of total lightning activity from above clouds with ground-based measurements and storm evolution. Although the total (IC + CG) lightning activity is the more representative indication of thunderstorm growth and decay, the ground strike data can be used to locate, diagnose, and track storm evolution in a number of instances. Author

N87-13063*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AIRBORNE ATMOSPHERIC ELECTRICITY EXPERIMENTS
Richard J. Blakeslee *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

During the 1984 U2 spring flight program, lightning spectra were measured in the wavelengths from 380 nm to 900 nm with a temporal resolution of 5 ms. With this capability, researchers simultaneously acquired both visible near-infrared lightning spectra

on a pulse to pulse basis, so that the spectral variability within a flash, as well as flash to flash variations, can be studied. Preliminary results suggest that important variations do occur, particularly in the strengths of the hydrogen and singly ionized nitrogen emission lines. Also, the results have revealed significant differences in the integrated energy distributions between the lightning spectra measured above clouds and the spectral measurements of cloud-to-ground lightning made at the ground. In particular, the ratio of the energy in the near-IR to that in the visible is around 1 to 2 for cloud top spectra versus about 1/3 for surface observations. Detailed analyses of the 1984 lightning spectral data is being conducted. This data should provide improved understanding about the optical transmission properties of thunderclouds and the physics of the lightning discharge process. Efforts continue on developing and testing background signal removal algorithms using U2 spectometer and optical array sensor day-flight data sets. The goal of this research is to develop an algorithm satisfying Lightning Mapper Sensor requirements. Author

N87-13064*# Mississippi Univ., University.
MOBILE INTERCEPT OF STORMS
Roy T. Arnold *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The primary goal was to acquire lightning data to serve as ground truth for U2 overflights. Researchers were successful in instrumenting the Univ. of Mississippi/National Severe Storms Lab. (UM/NSSL) mobile laboratory and in coordinating storm intercept through communication to the U2 provided by airplane guidance at NSSL and through direct communication with the U2 pilot from a portable transceiver in the mobile lab. A demonstration showed that a mobile laboratory can be directed within a large geographical area and used to collect ground truth data for comparison with airborne data on a routine basis with proper utilization of forecasts, nowcasts, and communication among all participants. After the U2 flights, researchers turned their attention solely to intercepting severe storms within the area of Oklahoma with good Doppler radar coverage. They incorporated a second vehicle, which followed the mobile lab and from which they released instrumented balloons. This project utilized a standard meteorological rawinsonde and a balloon-borne electric field meter. They were successful in flying, tracking, and receiving data from mobily launched balloons on several days. Researchers believe that they have demonstrated the ability to obtain meteorological and electrical data in severe storms using instrumented balloons. This also includes the capability to launch into the mesocyclone region and for multiple launches in the same storm. Author

N87-13065*# State Univ. of New York, Albany. Dept. of Atmospheric Science.
REMOTE OBSERVATIONS OF SEVERE STORMS
Richard E. Orville *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The focus of current research activities is on: (1) analyzing spectra from cloud-to-ground lightning and intracloud lightning; (2) site error analyses and sensitivity tests for direction finders in the East Coast network; (3) integration of lightning location data with satellite images on the Wisconsin McIDAS system; and (4) fundamental studies of the relation between meteorological parameters and characteristics of lightning determined by the SUNYA Lightning Detection Network. Author

N87-13066*# California Univ., Davis. Dept. of Land, Air and Water Resources.
AIRBORNE DOPPLER MEASUREMENTS OF THE CENTRAL CALIFORNIA EXTENDED SEA BREEZE
John J. Carroll *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

One data acquisition flight was executed in the late summer of 1984. The flight paths were designed to obtain measurements of the extended sea breeze penetration into the central valley of California over several hours. Data from this flight are being processed at Marshall Space Flight Center prior to release for analysis. Author

N87-13067*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYSIS OF DOPPLER LIDAR DATA
Jeffry Rothermel *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Dual Doppler lidar analyses of data taken by pulsed lidars demonstrated feasibility of deriving wind fields from coordinated lidar scans. Limited case histories of thunderstorm outflows were obtained. Co-located comparison between Marshall Space Flight Center lidar and NCAR 5.5 cm radar demonstrated desirability of lidar in cases of marginal radar reflectivity in clear air and low-elevation scans. Analysis continued on backscattered intensity and velocity measurements made from April 1983 to February 1984. A slant path method was used to calculate vertical profiles of volumetric backscatter and adsorption in the lower troposphere. High-quality VAD scans were identified as candidates for investigating feasibility of calculating horizontal motion fields using single Doppler lidar. Activities during FY-85 also included participation in Fall 1984 airborne Doppler lidar flight experiments. Preliminary data review was begun using McIdas system. Analysis of backscatter and absorpiton profiles continues. Focus is on understanding spatial and temporal variations, as well as frequency distribution, of backscatter at several tropospheric levels. Results from this study provide input to evaluation of clean/dirty airmass hypothesis of aerosol distribution. Assistance is being given to preparation of a comprehensive, global backscatter measurement plan. Analysis of data from Fall 1984 flight experiments is just beginning. Work has begun on preprocessing data to minimize errors due to electro-optic modulator malfunction during flights. Author

N87-13068*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AIRBORNE DOPPLER LIDAR ACTIVITIES
D. R. Fitzjarrald and J. W. Bilbro *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

During August and September 1984, 20 research flights were conducted by the CV990 with airborne doppler lidar installed. Nine of these flights were dedicated to the Lidar project. Excellent data were obtained in the Carquenez Strait downwind of San Francisco Bay, showing the divergence of the flow as it passes into the Central Valley. The data clearly show the horizontal and vertical structure of the wind flow in the pass region and adjoining parts of the Central Valley. Data were also obtained in the vicinity of Mount Shasta in northern California, showing the flow in the lee of the isolated mountain. Preliminary analyses of these flights using the McIdas interactive graphics system have been accomplished, and procurements have been initiated for detailed scientific analyses. A partial failure of a crucial optical component resulted in contamination of a portion of the wind data that were obtained in the Mount Shasta and subsequent flights. Analyses are underway to attempt reconstruction of the data to minimize the effects of the failure. Data were obtained in conjunction with a microwave wind profiler at Penn State University. It is expected that data reconstruction will be of use in this case. Procurement has been initiated for scientific analyses of these results. The improved airborne Lidar system performed well. In most of the research flights a large number of different scan angles were used to obtain the vertical structure of the wind fields being investigated. Author

N87-13069*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RESPONSE OF THE MESOSCALE ATMOSPHERE TO DIABATIC

HEATING

Franklin R. Robertson *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

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A study was initiated to determine the influence of convective latent heat release/diabatic heating on the production of kinetic energy during AVE/SESAME I. The primary focus has been on the relative importance of thermally forced modification of the wind field through thickness and height gradient changes versus inertial-advective effects via the diabatic component of vertical motion. Preliminary results have shown that because of the strong vertical shear over the convective region, ageostrophic response is primarily caused by the latter process. The diagnostic parameterization of convective heating has been extended for use in conjunction with satellite precipitation estimates in data-poor oceanic regions. An initial application was made to a mesoscale convective system embedded in the South Pacific convergence zone. Comparison to the heating field diagnosed as a residual in the thermodynamic equation using the ECMWF III-b analyses showed that the methodology will be useful in explaining the observed heating fields and determining the relative contribution of moist processes to the total diabatic heating. Research activities are now concentrated in the following areas: (1) Determining the sensitivity of vertical heating profiles to partitioning of gridscale versus convective precipitation; (2) assessing the possible effects of incorrect analyzed gridscale vertical motions on residuals in the heat budgets computed with the ECMWF III-b data sets.

Author

N87-13070*# Wisconsin Univ., Madison. Space Science and Engineering Center.

MESOSCALE AGEOSTROPHIC CIRCULATIONS ASSOCIATED WITH BAROCLINIC JET STREAKS

Donald R. Johnson *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

In regard to research completed, a complete list of publications and theses sponsored through the support of the NASA Severe Storms Research Project under NASA contract NAS8-33222 is given.

Author

N87-13071*# Chicago Univ., Ill.

ANALYSIS OF SATELLITE DATA FOR SENSOR IMPROVEMENT (DETECTION OF SEVERE STORMS FROM SPACE

T. Theodore Fujita *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric PRocesses Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

A climatological study of downbursts in Arkansas, Louisiana, Tennessee, Mississippi, Alabama, and Georgia was carried out, as well as studies of the Huntsville area microbursts on July 7, 1984, and a Decatur microburst on August 1984.

Author

N87-13072*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SEVERE STORM DETECTION WITH PASSIVE 37 GHz OBSERVATIONS

Roy W. Spencer, Michael R. Howland (Wisconsin Univ., Madison.), and David W. Martin *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The research objective was to determine the information content of satellite passive 37 GHz brightness temperatures on the severity of thunderstorms through the measurement of the attenuation (scattering) signature of precipitation. The severe storm detection potential of satellite-observed passive 37 GHz radiances was evaluated by comparing Nimbus-7 Scanning Multi-channel Microwave Radiometer (SMMR) data to reports of severe weather contained in the NSSFC severe weather log for calendar years 1979 and 1980 over the United States east of the Rocky Mountains. Heavy thunderstorms have a characteristic signature in the form of localized very low 37 GHz T sub B from scattering by precipitation-size ice particles (thick cirrus being transparent at this frequency). The local noon and midnight snapshots taken by the SMMR on alternating days (with incomplete areal coverage of the U.S. on any given day) were scanned to find cases of strong scattering by precipitation, revealed by large differences between the 18 and 37 GHz brightness temperatures, the 37 GHz T sub B being at least 20 C lower than the 18 GHz T sub B. The value of the 37 GHz T sub b was then compared to severe weather reports within one hour of the SMMR observation time, in the vicinity of the SMMR-observed storm. It was found that the degree to which the T sub B were lowered was a fairly good indicator of the probability that the storm was severe. Of 263 storms observed by the SMMR during 1979 and 1980, 54 percent had severe weather associated with them for a T sub b below 203 K, while 8 percent of those above this threshold were severe.

Author

N87-13073*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

AUTOMATED MESOSCALE WINDS DERIVED FROM GOES MULTISPECTRAL IMAGERY

Gregory S. Wilson and Robert J. Atkinson (General Electric Co., Huntsville, Ala.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

An automated technique for extracting mesoscale winds from sequences of GOES visible infrared spin scan radiatiometer (VISSR) image pairs has been developed, tested extensively, and configured for quasi-real time research applications on the Atmospheric Sciences Division's research computing sytem. The entire system of computer codes was successfully vectorized for execution on an array processor resulting in job turnaround in less than 1 hour. An objective quality control system provides much greater than 99 percent accuracy in eliminating questionable wind estimates. Dynamical analysis of cloud wind divergence has revealed temporally consistent convergence centers on the meso-beta scale that are highly correlated with ongoing and future developing convective storms.

Author

N87-13074*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SATELLITE PASSIVE MICROWAVE RAIN MEASUREMENT TECHNIQUES FOR LAND AND OCEAN

Roy W. Spencer *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Multiseasonal rainfall was found to be measurable over land with satellite passive microwave data, based upon comparisons between Nimbus 7 Scanning Multichannel Microwave Radiometer (SMME) brightness temperatures (T sub B) and operational WSR-57 radar rain rates. All of the SMMR channels (bipolarized 37, 21, 18, 10.7, and 6.6. GHz T sub B) were compared to radar reflectivities for 25 SMMR passes and 234 radar scans over the U.S. during the spring, summer, and fall of 1979. It was found that the radar rain rates were closely related to the difference between 37 and 21 GHz T sub B. This result is due to the volume scattering effects of precipitation which cause emissivity decreases with frequency, as opposed to emissive surfaces (e.g., water) whose emissivities increase with frequency. Two frequencies also act to reduce the effects of thermometric temperature variations on T sub B to a miminum. During summer and fall, multiple correlation coefficients of 0.80 and 0.75 were obtained. These approach the limit of correlation that can be expected to exist between two very different data sources, especially in light of the errors attributable to manual digitization of PPI photographs of variable quality from various operational weather radar not calibrated for research purposes. During the spring, a significantly lower (0.63) correlation was found. This poorer performance was traced to cases of wet, unvegetated soil being sensed at the

lower frequencies through light rain, partly negating the rain scattering signal. Author

N87-13075*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
REMOTE SENSING OF SEVERE CONVECTIVE STORMS
R. J. Hung (Alabama Univ., Huntsville.), R. E. Smith, and G. S. West *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The Tibet Plateau significantly affects the initiation and development of heavy rainfall and severe storms in China, just as the Rocky Mountains influence local severe storms in the United States. The study shows that the heavy rainfall in the Plateau area is usually preceded by a high growth rate of the convective clouds, followed by a rapid collapse of the cloud top. The study also shows that the tops of the convective clouds associated with heavy rainfall over the Plateau usually lie between the altitude of the two tropopauses which exist over the Plateau. There is good agreement between the collapsing of the cloud as observed from the satellite imagery, and the beginning of the rainfall observed by the ground stations and also between the dissipation of the cloud observed from the satellite infrared imagery, and the ending of the rainfall, observed by the ground stations. Comparison of the volumetric dissipation of clouds per unit area over the location of the ground station with the rainfall recorded at that station shows a linear relationship for rainfall mounts exceeding 8 mm. The ratio of observed rainfall at the ground station over the satellite observed cloud volume dissipation per unit area was also computed. The result shows that the ratio is almost constant with the value of 9.55 mm/(pixel . km/pixel) for rainfall amounts exceeding 15 mm; and the variation is less then 10 percent for rainfall mounts between 8 and 15 mm. Needless to say, further investigation is required to verify this ratio. Author

N87-13076*# Drexel Univ., Philadelphia, Pa. Dept. of Physics and Atmospheric Science.
LAMPS SOFTWARE AND MESOSCALE PREDICTION STUDIES
D. J. Perkey *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
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The full-physics version of the LAMPS model has been implemented on the Perkin-Elmer computer. In Addition, LAMPS graphics processors have been rewritten to the run on the Perkin-Elmer and they are currently undergoing final testing. Numerical experiments investigating the impact of convective parameterized latent heat release on the evolution of a precipitating storm have been performed and the results are currently being evaluated. Curent efforts include the continued evaluation of the impact of initial conditions on LAMPS model results. This work will help define measurement requirements for future research field projects as well as for observations in support of operational forecasts. Also, the impact of parameterized latent heat on the evolution of precipitating systems is continuing. This research is in support of NASA's proposed Earth Observation Mission (EOM).

N87-13077*# South Dakota School of Mines and Technology, Rapid City.
MESOSCALE-CLOUD SCALE SIMULATION OF CONVECTIVE RESPONSE
Fred J. Kopp and Richard T. McNider (Alabama Univ., Huntsville.) *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The importance of mesoscale moisture information in the forecasting of weather events is being studied. A test is being prepared with the March 6, 1982 Vertical Atmospheric Sounder/Atmospheric Variability Experiment (VAS/AVE) case study to be run on the sub-synoptic scale model (SSM). Intracomparison of three carefully designed simulations should isolate the role of mesoscale information in the initial conditions for both moisture and vertical motion. Three simulations will be made for the period 1200Z 6 March to 0000Z 7 March starting with the regular synoptic time data of 1200Z. The distinction between the three cases arises from data manipulation at 1800Z midway through the forecast period. Comparison of results for the 1800Z to 0000Z time period will give the information desired. Author

N87-13078*# Universities Space Research Association, Huntsville, Ala.
MESOSCALE RESEARCH ACTIVITIES WITH THE LAMPS MODEL
Michael W. Kalb *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
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Researchers achieved full implementation of the LAMPS mesoscale model on the Atmospheric Sciences Division computer and derived balanced and real wind initial states for three case studies: March 6, April 24, April 26, 1982. Numerical simulations were performed for three separate studies: (1) a satellite moisture data impact study using Vertical Atmospheric Sounder (VAS) precipitable water as a constraint on model initial state moisture analyses; (2) an evaluation of mesoscale model precipitation simulation accuracy with and without convective parameterization; and (3) the sensitivity of model precipitation to mesoscale detail of moisture and vertical motion in an initial state. Author

N87-13079*# Wisconsin Univ., Madison. Dept. of Meteorology.
COOPERATIVE VAS PROGRAM WITH NASA MARSHALL SPACE FLIGHT CENTER
David D. Houghton *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The importance of mesoscale moisture information in the forecasting of weather events is discussed. A test is being prepared with the March 6, 1982 Vertical Atmospheric Sounder/Atmospheric Variability Experiment (VAS/AVE) case study to be run on the sub-synoptic scale model (SSM). Model intracomparison of three carefully designed simulations should isolate the role of mesoscale information in the initial conditions for both mositure and vertical motion. Three simulations will be made for the period 1200Z 6 March to 0000Z 7 March starting with the regular synoptic time data of 1200Z. The distinction between the three cases arises from data manipulation at 1800Z midway through the forecast period: (1) Control Case: no alterations at 1800Z. (2) Moisture Information Suppression: at 1800Z the model simulation field for water vapor, which by this time contains considerable mesoscale structure, is replaced by a smoothed version from which the mesoscale structure has been eliminated. No other variables are structure altered. (3) Vertical Motion Information Suppression: at 1800Z the model is subjected to a dead start procedure which primarily imposes a nondivergent constraint of the horizontal motion field field suppressing vertical motion. The main effect is to eliminate the mesoscale component. Comparison of results for the 1800Z to 0000Z time period will give the information desired. Author

N87-13080*# Wisconsin Univ., Madison. Space Science and Engineering Center.
THE ASSIMILATION OF SATELLITE SOUNDINGS, WINDS AND SATELLITE PRODUCTS IN A MESOSCALE ANALYSIS/FORECAST SYSTEM
George R. Diak and William L. Smith *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Investigations in FY-85 were centered on three case study days in 1982. Two of these, March 6 and April 24, were Atmospheric Variability Experiment/Verical Atmospheric Sounder (AVE/VAS) days for which high spatial and temporal resolution RAOB and

Vertical Atmospheric Sounder (VAS) data sets were available. The third investigation day, April 26, was a day of interesting severe weather. In the last part of FY-84 and early FY-85 we were able to demonstrate most importantly the complimentary nature of satellite soundings and winds in a forecast/analysis system. In our variational analysis scheme, cloud drift and water vapor winds enter into the height field as gradient information. The cloud drift winds especially, have the character of supplying information in cloudy areas where satellite soundings are not possible. In the April 26 experiments, analyses and forecasts using the combination satellite winds and soundings were superior to those using only soundings. Good consistency was shown between independent satellite forecasts from different initialization times run to the same verification time. A significant accomplishment in FY-85 was expanding experiments on April 26 to include quasi-continuous initialization inserting satellite soundings and winds from several different times into an analysis/forecast. Contrary to the first set of experiments on April 26, here forecast initialization fields were not independent, but contained satellite information from two data times. Author

N87-13081*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

NUMERICAL SIMULATION OF CONVECTIVE RESPONSE TO MESOSCALE FORCING

Richard T. McNider (Alabama Univ., Huntsville.), Fred J. Kopp (South Dakota School of Mines and Technology, Rapid City.), Michael W. Kalb (Universities Space Research Association, Huntsville, Ala.), and Gregory Wilson, S. *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

A two-dimensional mesoscale model was used to initialize a two-dimensional cloud model with both mesoscale thermodynamic and dynamic information utilized in the initialization. The Mesoscale-cloud mdoel linkage was used to examine differential convective response due to mesoscale variations for the April 24, 1982 Atmospheric Variability Experiment-Vertical Atmospheric Sounder (AVE-VAS), Case 4. On this day both data analyses and mesoscale model simulations indicated strong variations in thermodynamic and dynamic structure across the panhandle of Texas where a moderately strong convective line formed. Using the cloud model, the current research has shown a preferred area for strong convection to occur due to concomitant mesoscale convergence and mesoscale destabilization of the atmosphere. Author

N87-13082*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.

A SUMMARY OF RESEARCH ON MESOSCALE ENERGETICS OF SEVERE STORM ENVIRONMENTS

Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

The goals of this research were to better understand interactions between areas of intense convection and their surrounding mesoscale environments by using diagnostic budgets of kinetic (KE) and available potential energy (APE). Three cases of intense convection were examined in detail. 1) Atmospheric Variability Experiments (AVE) carried out on 24 to 25 April 1975 were studied. Synoptic scale data at 3 to 6 hour intervals, contained two mesoscale convective complexes (MCCs). Analyses included total KE budgets and budgets of divergent and rotational components of KE. 2) AVE-Severe Environmental Storms and Mesoscale Experiments (SESAME)-4 carried out on 10 to 11 April 1979 were studied. Synotpic and meso alpha-scale data (250 km spacing, 3 hour intervals), contained the Red River Valley tornado outbreak. Analyses included total KE budgets (separate synoptic and mesoscale version), budgets for the divergent and rotational components, and the generation of APE by diabatic processes. 3) AVE-SESAME 5 studies were carried out on 20 to 31 May 1979. Synoptic and meso beta-scale data (75 km spacing, 1 1/2 to 3 hour intervals), contained a small MCC. Analyses include separate KE budgets for the synotic and meso beta-scales and a water vapor budget. Major findings of these investigations are: (1) The synoptic scale storm environment contains energy conversions and transports that are comparable to those of mature midlatitude cyclones. (2) Energetic in the mesoscale storm environment are often an order of magnitude larger than those in an undisturbed region. (3) Mesoscale wind maxima form in the upper troposphere on the poleward sides of convective areas, whereas speeds decrease south of storm regions. Author

N87-13083*# Wisconsin Univ., Madison. Space Science and Engineering Center.

TIME COMPOSITE SOUNDING

Christopher Hayden *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)

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In the time composite sounding mode, the Vertical Atmospheric Sounder (VAS) data is collected in a series of images of one spin each rather than in the dwell sound mode where single lines are repeatedly scanned. A drawback of the time composite method is temporal smearing of the data, but to compensate this there is also the chance that shifting cloud patterns will permit better spatial coverage. Time composite sounding was performed for a single case study, June 14, 1984. Four, ten minute single spin swaths were processed. The principal conclusion was that the time composite results were at least equivalent to the conventional dwell sounding results, despite the fact that compositing was done in a less than optimum way because of software limitations. Author

N87-13084*# Colorado State Univ., Fort Collins.

INVESTIGATIONS OF SEVERE/TORNADIC THUNDERSTORM DEVELOPMENT AND EVOLUTION BASED ON SATELLITE AND AVE/SESAME/VAS DATA

Thomas H. VonderHaar and James F. W. Purdom *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 4 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

Development of cloud relative tracking for severe thunderstorm identification and the beginning of the development of mesoscale airmass characteristics based on vertical atmospheric sounding data were accomplished. Author

N87-13085*# Wisconsin Univ., Madison. Dept. of Meteorology.

DETECTION OF ROTATING THUNDERSTORMS USING SATELLITE IMAGERY

C. E. Anderson and Robert Schlesinger *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)

Avail: NTIS HC A07/MF A01 CSCL 04B

In the case of the Carolina tornadoes, researchers prepared visible and IR GOES imagery covering the period 2000 Z when the storm entered South Carolina from Georgia until it exited North Carolina at 0200 Z into Virginia. The GOES IR imagery clearly demonstrated that this storm was imbedded in a continuously propagating mesolow with a well defined cold dome. The ground damage track paralleled exactly with the cold dome throughout the storm's life across the Carolinas. There were no advanced very high resolution radiometer (AVHRR) data during the period to allow researchers to inspect the cloud top for warm temperature anomalies. The Carolina storm did exhibit rightward deviating outflow which was oriented about 60 degrees to the 300 mb streamlines. The tornadoes of April 27, 1984 were part of a tornado producing cold front which stretched from Oklahoma to Minnesota. As the front moved eastward it touched off numerous tornadoes in eastern Wisconsin. GOES imagery for this data was prepared and it was strikingly clear that all along the North-South oriented squall line, the individual tunderstorms had cirrus plumes which had remarkable right deviation to the upper air flow. Unlike the Carolina long track supercell cell-mesolow system, these storms

were isolated individual thunderstorms which touched off at least 16 tornadoes in eastern Wisconsin stretching from the Milwaukee area on the south to Vilas County in the north. The monster tornado of June 8, 1984 which leveled 90 percent of the village of Barneveld, Wisconsin and killed 9 persons is also discussed.
Author

N87-13086*# Saint Louis Univ., Mo. Dept. of Earth and Atmospheric Sciences.
STATISTICAL ANALYSIS AND USE OF VAS RADIANCE DATA
Henry E. Fuelberg *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Researchers goals are to describe the information content of Vertical Atmospheric Sounder (VAS) radiance data, especially the 6.7 micrometers water vapor channel, to better interpret the atmosphere's water vapor structure from 6.7 micrometers imagery, and to investigate new analysis and forecasting techniques utilizing retrieved VAS soundings. Researchers made major progress toward these goals during FY-85. They are investigating 6.7 micrometer imagery on 6 to 7 March 1982, a day when special mesoscale ground truth data were collected during the 1982 atmospheric variability experiment/vertical amospheric sounder (AVE/VAS) field experiment. A dark (dry) image streak having mesoscale details was located over the special data region, and it provides the major focus of the case study. Mesoscale radiosonde-derived humidity data are found to verify fine scale features of the image that are not evident from the standard National Weather Service network. Thus, VAS imagery is a reliable detector of mesoscale moisture structure during this case. To investigate causes for the image streak, researchers are calculating water vapor budgets. Subsidence is found to be a factor in the current case as well; however, patterns of descent are not related to the jet streak according to traditional conceptual models. Thus, it appears that more research into jet stream dynamics is needed in order to better interpret 6.7 micrometer imagery.
Author

N87-13087*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
IMPROVED SATELLITE RETRIEVALS AND MESOSCALE MOISTURE VARIABILITY
Gary J. Jedlovec *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The investigations over the past year have led to the finalization of results from the study of mesoscale atmospheric parameters derived from the visible infrared spin scan radiometer (VISSR) atmospheric sounder (VAS). Soundings from several retrieval techniques for the 6 to 7 March 1982 special observation period were evaluated for mesoscale accuracy. Specific results and comparisons between data from a regression and two physical retrieval schemes are forthcoming in the Journal of Atmospheric and Oceanic Technology (JTech) this year. A generalization of these results is outlined. Large temperature and moisture biases existed in the VAS derived profiles, particularly in layers near inversions. Standard errors ranged from 1 to 3 C and 3 to 6 C for temperature and dewpoint, respectively. Parameters derived from VAS soundings (geopotential height, thickness, and precipitable water) often reflected the temperature and moisture profile biases. VAS derived mesoscale gradients were often weaker than those from corresponding rawinsonde data. Little improvement was made in defining the vertical structure of the atmosphere over the first guess information. VAS soundings were able to improve in the horizontal structure due to the high spatial resolution of the radiance data.
Author

N87-13088*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
STUDIES OF HUMID CONTINENTAL HAZE DURING SPACE
David A. Bowdle and William A. Greene *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A concept for a solar radiometer network to provide supporting data during the Satellite Preciptiation and Cloud Experiment (SPACE) was developed. Each of the 9 prime and 10 supplementary SPACE ground sites will be equipped with an upward pointing global solar pyranometer. About half of the sites will also be equipped with upward pointing diffuse (shade ring) solar pyranometers, and a downward pointing global albedo pyranometer. These radiometers will be used to monitor the spatial and temporal variability of solar insolation and haze optical depth. The insolation data will ultimately be input to numerical models of the pre-storm and near-storm boundary layer. The optical depth data will be compared with simultaneous measurements from airborne and satellite-based passive visible radiometers and airborne lidars.
Author

N87-13089*# Alabama Univ., Huntsville. Environmental and Energy Center.
PRELIMINARY PLANNING FOR THE SATELLITE PRECIPITATION AND CLOUD EXPERIMENT (SPACE) FIELD PROGRAM
Steven F. Williams and Richard T. McNider *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

Preliminary planning has been performed to support NASA/Marshall Space Flight Center (MSFC) in the coordination of the field experiment to be conducted in Central Tennessee, Northern Alabama, and Mississippi during the Spring/Summer of 1986. The goal of Satellite Precipitation and Cloud Experiments (SPACE) is to investigate mesoscale cloud/precipitation systems and development of associated satellite remote sensing technology. The field program will incorporate remote sensing observations from aircraft, satellite imagery, radar observations, ground based lightning measurements, rawinsonde observations, and various surface meteorological observations. The coordination of existing and special observation networks will provide a data base for analysis of precipitation events and provide ground truth comparisons for remote sensing capabilities. Existing surface-based observational networks include National Weather Service Meso/Alpha Scale Rawinsonde, radar, and surface measurements; the Tennessee Valley Authority automated and manual precpitation recording stations; and NASA/MSFC lightning measurement stations. Special observational features to be implemented include a meso/beta scale rawinsonde network, a special surface observational network within the rawinsonde network, and the installation of a RADAP II/ICRAD data processing unit on the National Weather Service radar at Nashville, TN. Initial coordination of these observational requirements to accomplish the goals of SPACE have been performed.
Author

N87-13090*# New Technology, Inc., Huntsville, Ala.
ATMOSPHERIC MODELING AND SENSOR SIMULATION (AMASS) STUDY
Karen G. Parker *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 3 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

A 4800 band synchronous communications link was established between the Perkin-Elmer (P-E) 3250 Atmospheric Modeling and Sensor Simulation (AMASS) system and the Cyber 205 located at the Goddard Space Flight Center. An extension study of off-the-shelf array processors offering standard interface to the Perkin-Elmer was conducted to determine which would meet computational requirements of the division. A Floating Point Systems AP-120B was borrowed from another Marshall Space Flight Center laboratory for evaluation. It was determined that available array processors did not offer significantly more capabilities than the borrowed unit, although at least three other vendors indicated that standard Perkin-Elmer interfaces would be marketed in the future. Therefore, the recommendation was made to continue

to utilize the 1209 ad to keep monitoring the AP market. Hardware necessary to support requirements of the ASD as well as to enhance system performance was specified and procured. Filters were implemented on the Harris/McIDAS system including two-dimensional lowpass, gradient, Laplacian, and bicubic interpolation routines.

N87-13091*# Wisconsin Univ., Madison. Space Science and Engineering Center.
THE METEOROLOGICAL INTERACTIVE DATA DISPLAY SYSTEM
Verner E. Suomi and J. T. Young *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

During FY-85 the data gathering process was completed. This gave researchers a reasonably complete picture of the Shuttle's operational weather support units and requirements. They expanded on the site visits of FY-84 with telephone follow-up. They finalized recommendations and wrote the final report. The final report was accepted by NASA and has been published as NASA Contractor Report CR-171416. Author

N87-13092*# Wisconsin Univ., Madison. Space Science and Engineering Center.
A DESIGN STUDY FOR A THREE-DIMENSIONAL DISPLAY COMPUTER TERMINAL FOR METEOROLOGICAL INFORMATION
Verner E. Suomi, Robert J. Krauss, Bill Hibbard, and J. T. Young *In* NASA. Marshall Space Flight Center NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The software developed on this project in FY-84 was put into final form and documented for McIDAS user access. The various users have been asked to utilize the techniques and to provide feedback to the developers. Researchers have received limited feedback to date, but nearly all has been helpful and generally favorable. The stereo display has been used by most of the operational users of McIDAS or its progenies. Specifically, the National Hurricane Center, the National Severe Storm Forecast Center, the National Meteorological Center, and the Cape Canaveral Forecast Facility have all made use of the 4-D display techniques to help evaluate meteorological situations on various occasions. Author

N87-13093*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INTERACTIVE INFORMATION PROCESSING FOR NASA'S MESOSCALE ANALYSIS AND SPACE SENSOR PROGRAM
Karen G. Parker (New Technology, Inc., Huntsville, Ala.), Laura MacLean, Norman Reavis, Gregory Wilson, John S. Hickey (Atsuko Computing International, Huntsville, Ala.), Michael Dickerson, Shogo Karitani, and David Keller (Universities Space Research Association, Huntsville, Ala.) *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 14 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The Atmospheric Sciences Division (ASD) of the Systems Dynamics Laboratory at NASA's Marshall Space Flight Center (MSFC) is currently involved in interactive information processing for the Mesoscale Analysis and Space Sensor (MASS) program. Specifically, the ASD is engaged in the development and implementation of new space-borne remote sensing technology to observe and measure mesoscale atmospheric processes. These space measurements and conventional observational data are being processed together to gain an improved understanding of the mesoscale structure and the dynamical evolution of the atmosphere relative to cloud development and precipitation processes. To satisfy its vast data processing requirements, the ASD has developed a Researcher Computer System consiting of three primary computer systems which provides over 20 scientists with a wide range of capabilities for processing and displaying a large volumes of remote sensing data. Each of the computers performs a specific function according to its unique capabilities. Author

N87-13094*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
DOPPLER WIND PROFILE EXPERIMENT
James E. Arnold *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 1 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The data collection phase of a Doppler wind measurement experiment supported by high-resolution Jimsphere/FPS-16 wind data and Windsonde data was carried out at the Kennedy Space Center in February, March and early April of 1985. The Doppler wind measurements were made using a hybrid doppler profiler put in place by the Johnson Space Center and a SOUSY profiler operated by Radian Corporation. Both systems operated at 50 Mhz. Although the doppler profiler systems were located 10 km apart to enable concurrent operation of the systems for data comparison, little concurrent data were obtained due to set-up delays with the SOUSY system, and system problems with the WPL system during the last month of the test. During the test period, special serial Jimsphere soundings were taken at two-hour intervals on six days in March and April in addition to balloon soundings taken in support of the Shuttle launch operations. In addition, there is temperature, moisture and wind information available from the daily morning Radiosonde sounding taken at the Kennedy site. The balloon release point was at the same location as the SOUSY profiler. Vertical resolution of the SOUSY profiler was 150 M to approximately 20 km. The vertical resolution of the WPL profiler was 290 M to 10 km and 870 M to 17 km. Winds determined form the Jimsphere balloon have a vertical resolution of 30 M. Author

N87-13095*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MULTISPECTRAL ATMOSPHERIC MAPPING SENSOR OF MESOSCALE WATER VAPOR FEATURES
Paul Menzel (Wisconsin Univ., Madison.), Gary Jedlovec, Greg Wilson, Robert Atkinson, and William Smith, w4560409 *In its* NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 4 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The Multispectral atmospheric mapping sensor was checked out for specified spectral response and detector noise performance in the eight visible and three infrared (6.7, 11.2, 12.7 micron) spectral bands. A calibration algorithm was implemented for the infrared detectors. Engineering checkout flights on board the ER-2 produced imagery at 50 m resolution in which water vapor features in the 6.7 micron spectral band are most striking. These images were analyzed on the Man computer Interactive Data Access System (McIDAS). Ground truth and ancillary data was accessed to verify the calibration. Author

N87-13096*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FIRST MEETING OF THE WORKING GROUP ON THE SHUTTLE MICROWAVE PRECIPITATION RADIOMETER (SMPR)
In its NASA/MSFC FY-85 Atmospheric Processes Research Review Oct. 1985 2 p (For primary document see N87-13043 04-47)
Avail: NTIS HC A07/MF A01 CSCL 04B

The working group agreed that the first (primary) objective should be the determination of methods for the accurate measurement of total rain water and total cloud water with passive microwave methods. There was no argument on the points concerning nonlinear relationships between T sub B and rain rate (R) over the range of important rain rates (half of oceanic rainfall occurs at rates greater than 15 mm h-1), such that variations in rain rate within a footprint lead to an incorrect measurement of the average rate for that footprint, and one cannot determine the characteristics of the sensed rain area. This is especially true

near 18 GHz, where the dynamic range above 15 mm h-1 is very small because this frequency does not clearly fall in either a scattering regime or emissive regime at these wavelengths. It is also not clear whether very low frequency (emissive) techniques will be the best at measuring rain processes, or high frequency (scattering) techniques, where precipitation-size ice plays a major role in the signal attenuation. It is still not known what signal of rain is at certain rates on an observational basis because of the many different conditions that can exist within a single satellite observed footprint. Author

N87-13097# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
SUMMARY OF 1986 ATLANTIC TROPICAL CYCLONE ACTIVITY AND VERIFICATION OF AUTHOR'S SEASONAL FORECAST
William M. Gray 24 Nov. 1986 22 p Sponsored by NSF
Avail: NTIS HC A02/MF A01

Tropical cyclone activity which occurred in the Atlantic in 1986 and which verified the seasonal forecast of this activity that was issued in late May and updated in late July was summarized. This forecast was based on previous research which relates seasonal Atlantic hurricane activity to: the El Nino (EN); the Quasi-Biennial Oscillation (QBO) of equatorial 30 mb strateospheric wind; the Carribbean Basin-Gulf of Mexico Sea-Level Pressure Anomaly (SLPA) in spring and eary summer; and lower latitude Caribbean Basin 200 mb zonal wind anomaly in June and July. Author

N87-13098*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RADIATION FLUX TABLES FOR ICRCCM USING THE GLA GCM RADIATION CODES
Harshvardhan Jun. 1986 97 p
(NASA-TM-89270; NAS 1.15:89270) Avail: NTIS HC A05/MF A01 CSCL 04B

Tabulated values of longwave and shortwave radiation fluxes and also cooling and heating rates in the atmosphere for standard atmospheric profiles are presented. The radiation codes used in the Goddard general circulation model were employed for the computations. These results were obtained for an international intercomparison projected called Intercomparison of Radiation Codes in Climate Models (ICRCCM). Author

N87-13099# Federal Aviation Administration, Atlantic City, N.J. Technical Center.
THE SITING, INSTALLATION AND OPERATIONAL SUITABILITY OF THE AUTOMATED WEATHER OBSERVING SYSTEM (AWOS) AT HELIPORTS Final Report, Feb. 1985- Apr. 1986
Rene A. Matos, John R. Sackett, Philip M. Shuster, and Rosanne M. Weiss Aug. 1986 70 p
(DOT/FAA/PM-86/30; DOT/FAA/CT-85/9) Avail: NTIS HC A04/MF A01

The Federal Aviation Administration (FAA) Technical Center was tasked to site, install, and evaluate an Automated Weather Observing System (AWOS) at a heliport. The conclusions of the evaluation of the AWOS at the Technical Center's Interim Concept Development Heliport are given. By using the AWOS equipment installed at the Interim Concept Development Heliport, in conjunction with literature research, the following test objectives were addressed: (1) locations in the vicinity of the heliport in which helicopter operations could influence the environment causing transient AWOS sensor performance were identified; (2) areas for sensor location near the heliport that provided the most beneficial information to the pilot were identified; (3) optimal sensor location in relationship to predominant approach and departure paths was determined; (4) siting criteria and recommendations for AWOS equipment installation at heliports were developed; (5) the operational suitability of the AWOS equipment for heliport installations was determined; and (6) additional maintenance requirements for the AWOS as the result of heliport installation were identified.

N87-13100# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
STATION CLIMATIC SUMMARIES, EUROPE Data Summary Report
Apr. 1986 436 p Supersedes USAFETAC/DS-84/019
(AD-A167888; USAFETAC/DS-86/033; USAFETAC/DS-84/019) Avail: NTIS HC A19/MF A01 CSCL 04/2

This report contains a collection of summarized monthly and annual climatic data for specific locations in Europe. Summarized climatological elements are: percent frequency of occurrence of ceiling and visibility; means, extremes and number of days with specified values of temperature, precipitation, and snowfall; means of relative humidity, vapor pressure, dew point, pressure altitude, and cloud cover; prevailing wind direction, with mean and extreme speeds; and number of days with thunderstorms and fog. GRA

N87-13101# Air Force Geophysics Lab., Hanscom AFB, Mass.
SENSITIVITY TESTS OF A SURFACE-LAYER WINDFLOW MODEL TO EFFECTS OF STABILITY AND VEGETATION
John M. Lanicci 25 Oct. 1985 54 p
(AD-A169136; AFGL-TR-85-0265; AFGL-ERP-934) Avail: NTIS HC A04/MF A01 CSCL 04/2

This study examines the sensitivity of surface-layer windflow over gently rolling terrain to different stability conditions, both with and without the effects of vegetation used to modify terrain heights and determine surface roughness. The numerical model used produces simulations of surface-layer windflow by using Gauss's Principle of Least Constraints to allow an initially uniform windfield to adjust to topography and buoyancy forces while conserving mass. The model experiments used simulated meteorological data (at only one observation point) and detailed terrain and vegetation data (on a 51-by-51 grid with 100 m spacing) for an area covering 5 by 5 km over the Fort Polk Military Reservation in Louisiana. Results show that the model simulates topographically induced flows such as cold air drainage and upslope flow, despite the simple physics employed. We also show that the presence of tall vegetation over the area (mainly coniferous and deciduous trees) alters the flow patterns under various stability conditions. These effects are shown to be caused primarily by changes in the area of chemical transport and diffusion, because they mean that even gently rolling terrain influences the surface windflow, and that tall vegetation has a considerable influence as well. GRA

N87-13102# South Dakota School of Mines and Technology, Rapid City. Inst. of Atmospheric Sciences.
A DETAILED ANALYSIS OF THE INFLUENCE OF EDDY EXCHANGE PROCESSES UPON THE DEVELOPMENT OF RADIATION FOG Final Report, 19 Sep. 1983 - 18 Mar. 1986
Ronald M. Welch Apr. 1986 41 p
(Contract DAAG29-83-K-0165)
(AD-A169233; SDSMT/IAS/R-86/03; ARO-20576.3-GS) Avail: NTIS HC A03/MF A01 CSCL 04/1

After decades of theoretical development, fog models have evolved to the point of qualitative agreement with observations. Current models are capable of simulating observed quasi-periodic oscillations in fog variables as well as the various stages of fog growth. It is now anticipated that continued efforts towards greater model sophistication will lead to at least limited quantitative agreement with observations and improved predictive capability. Application of very high resolution Landsat digital data to fog episodes has revealed the stratocumulus nature of fog. That other satellite imagery has shown little hint of this cellular structure is due to the fact that the fog elements are generally smaller than the spatial resolution available on these satellite platforms. The ratio of wavelength between cells and the height of the boundary layer is in agreement with values obtained for Benard cells and longitudinal rolls in cloud systems. The processes occurring in fogs are similar, but on a smaller scale, to those responsible for these boundary layer cloud systems. Therefore, further studies of fog processes are expected to provide quantitative information concerning the processes responsible for Benard cells, longitudinal rolls and cloud top entrainment instability. GRA

N87-13103# North Carolina Univ., Raleigh.
MICROMETEOROLOGICAL TRANSITIONS IN THE MORNING

BOUNDARY LAYER OVER ROLLING TERRAIN Final Report, 1982 - 1985
Allen J. Riordan and Jerry M. Davis 20 Mar. 1986 34 p
(Contract DAAG29-82-K-0183)
(AD-A169237; ARO-19649.3-GS) Avail: NTIS HC A03/MF A01 CSCL 04/2

Six years of temperature and wind data from two 60m micrometeorological towers in the piedmont of the Carolinas were analyzed. One tower was near a large lake, the other in mostly-forested terrain. Statistics of the basic tower measurements were generated and their time evolution was described for the morning transition period near sunrise. A stepwise regression model was developed and tested to predict the daily transition time at each site based on tower variables. To determine large-scale influences on the local inversion and its morning transition, the local tower data from each site were then related to the synoptic-scale pressure field over the eastern one-third of the United States. To accomplish the comparison, an objective typing scheme was developed in which the gridded daily sea-level pressure field was expressed in terms of eigenvector types. Results document the average morning transition sequence in terms of systematic changes in radiation, wind and temperatures. The regression models are quite similar at both sites and predict transition time with a least-squared regression of 0.76 for clear mornings at the forested site. The eigenvector analysis successfully categorized each day's pressure field into ten types. These showed very close association with the local inversion intensity at sunrise, but had very little relation to morning transition time at each site. Author (GRA)

N87-13104# Atmospheric and Environmental Research, Inc., Cambridge, Mass.
IMPROVING NUMERICAL WEATHER PREDICTION BY MAXIMIZING THE USE OF ASSIMILATED SATELLITE DATA Final Report, 1 Jan. 1983 - 31 Dec. 1985
L. D. Kaplan, J. F. Louis, R. N. Hoffman, R. G. Isaacs, and W. J. Gutowski 20 Dec. 1985 169 p
(Contract F19628-83-C-0027)
(AD-A169295; P79-FINAL; AFGL-TR-85-0298) Avail: NTIS HC A08/MF A01 CSCL 04/2

An extensive literature review showed a disparity between the large amount of satellite data currently or potentially available for meteorological parameters and the relatively small amount that is actually utilized. The review also documented the various existing data retrieval techniques. Algorithms were developed and modified to retrieve temperature and moisture profiles from satellite infrared and millimeter/microwave radiances. Tools were developed, based on existing Air Force computer codes, to include and test the effect of satellite data in numerical weather prediction. The use of the logarithm of specific humidity as a forecast variable was investigated. The FGGE level II and III data sets existing at AFGL were completed to include all of the special observing periods and to form the basis of data assimilation tests. Finally, an attempt was made to optimize a cloudiness parameterization scheme on the basis of satellite retrievals. A number of recommendations are made for further work in satellite data retrieval, data assimilation and numerical weather prediction. They include the continuation of some of the items presented here, as well as suggestions for new avenues of research. GRA

N87-13105# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F ELLINGTON ANGB, TEXAS Data Summary Report, Jul. 1941 - Feb. 1986
21 May 1986 298 p
(AD-A169389; USAFETAC/DS-86/024) Avail: NTIS HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: Ellington ANGB FL. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A132186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N87-13106# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS (RUSSWO). PARTS A-F, FORT RICHARDSON, ALASKA Data Summary Report, Feb. 1977 - Feb. 1986
16 Jun. 1986 292 p
(AD-A169390; USAFETAC/DS-86/025) Avail: NTIS HC A13/MF A01 CSCL 04/2

A six-part statistical data summary of surface weather observations for: FT Richardson AK. Summary consists of: PART A, Weather Conditions and Atmospheric Phenomena; PART B, Precipitation; PART C, Surface Winds; PART D, Ceiling and Visibility; PART E, Psychrometric Summaries; PART F, Pressure Summaries. See USAFETAC/TN-83/001 (AD-A123186), An Aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs) for complete descriptions of contents and instructions for use. Author (GRA)

N87-13107# Air Force Environmental Technical Applications Center, Scott AFB, Ill.
WHEELER AFB, HAWAII LIMITED SURFACE OBSERVATIONS CLIMATIC SUMMARY (LISOCS), PARTS 1-5 Data Summary Report, Jun. 1974 - May 1984
17 Jun. 1986 231 p
(AD-A169391; USAFETAC/DS-86/026) Avail: NTIS HC A11/MF A01 CSCL 04/2

A statistical data summary is given of surface weather observation climatology for Wheeler AFB, HI. This summary is similar to the Revised Uniform Summary of Surface Weather Observations (RUSSWO), but is based on data collected from limited-duty weather observing stations; i.e., those that take weather observations less than 24 hours a day, 7 days a week. The summary is in five parts: Part 1, Weather Conditions and Atmospheric Phenomena; Part 2, Surface winds; Part 3, Ceiling and Visibility; Part 4, Psychrometric summaries; and Part 5 Pressure Summaries. Note that Precipitation, is omitted. See USAFETAC/TN-83/001 9AD-A132186), An aid for Using the Revised Uniform Summary of Surface Weather Observations (RUSSWOs), for complete descriptions of contents and instructions for use. Author (GRA)

N87-13108# Research and Data Systems, Inc., Lanham, Md.
CONVERSION OF THE NOLAPS (NAVY OPERATIONAL LOCAL ATMOSPHERIC PREDICTION SYSTEM) MODEL TO THE HP9845 Final Report, 1-11 Apr. 1985
Phillip Ardanuy Feb. 1986 40 p
(Contract N00228-84-D-3155; F59-551)
(AD-A169538; NEPRF-CR-86-03) Avail: NTIS HC A03/MF A01 CSCL 04/2

As a first effort in developing an atmospheric predictive capability for the Tactical Environment Support System (TESS), the model used for the Navy Operational Local Atmospheric Prediction System (NOLAPS) is converted to the HP9845B, Option 275. Three primary steps are involved in this conversion. First, the model is converted from FORTRAN to BASIC code, made to duplicate exisiting model results, and benchmarked for time purpose. The converted model in renamed NOWLAPS (Navy Over-Water Local Atmospheric Prediction System). Second, a user-interactive capability is developed for this desk-top system. And third, an interactive graphics package is developed to display the model results. GRA

N87-13109# Ophir Corp., Lakewood, Colo.
A SENSITIVITY STUDY OF A ONE-DIMENSIONAL TIME-DEPENDENT WARM CUMULUS CLOUD MODEL Scientific Report, No. 2, 1 Jan. - 31 Aug. 1985
Raina J. Eckhardt Sep. 1985 16 p
(Contract F19628-83-C-0130)
(AD-A170141; AFGL-TR-85-0331) Avail: NTIS HC A02/MF A01 CSCL 04/1

A one-dimensional time-dependent computer cloud model was initiated with a composite of two soundings from day 226 of the GATE project. The soundings were recorded on August 14, 1974 at 1200 Z, off the west coast of Africa from two ships, the Dallas (USA) and Vise (USSR). The model simulates the life cycle of a cylindrical shaped warm cumulus cloud which is in hydrostatic equilibrium. Although it is formulated in one-dimension, it includes effects from the surrounding environment by turbulent and dynamic entrainment. A series of model runs were executed in which several parameters were varied in order to observe their effects on the evolution of the model cloud. These parameters were: cloud radius, heat pulse duration, cloud condensation nuclei, and model time step duration. GRA

N87-13110# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
A REVIEW OF MICROBURSTS AND THEIR ANALYSIS AND DETECTION WITH DOPPLER RADAR M.S. Thesis
Gerald L. Freeman 1986 75 p
(AD-A170458; AFIT/CI/NR-86-98T) Avail: NTIS
HC A04/MF A01 CSCL 04/2

Microbursts are small downbursts, less than 4km in outflow size, with peak winds lasting only 2 to 5 minutes. They can be classified as either midair or surface microbursts and also either wet or dry microbursts. All microbursts are characterized by a vertical downrush of air with a divergent outflow at its base. The parent clouds associated with microbursts are: Cumulonimbus; Towering Cumulus; and Anvil Cirrus. Most origin theories credit thermodynamic factors with microburst creation. Wolfson (1983) contends that microbursts result from dynamically induced vertical pressure gradients that are intrinsic characteristics of strong mesocyclone circulation. Doppler radar is the primary tool for detecting and observing microbursts. Wind field mapping is accomplished by either a single, dual or triple radar configuration. Single radar analysis methods require the most external assumptions but are the least expensive. Multiple radar techniques provide more accuracy but are more costly. Wilson and Roberts (1983) propose a number of alternatives for realtime operational detection of microbursts in an airport environment. Of these alternatives they chose a single radar, on airport configuration as the optimum choice when considering economic feasibility as well as technical performance. Author (GRA)

N87-13111# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
EXTRATERRESTRIAL FORCING, ATMOSPHERIC ELECTRICITY AND THE OCCURRENCE OF THUNDERSTORMS M.S. Thesis
Angelo M. Nuzzo Aug. 1986 91 p
(AD-A170463; AFIT/CI/NR-86-99T) Avail: NTIS
HC A05/MF A01 CSCL 04/2

It is generally accepted by many scientists that a cause-effect relationship exists between solar activity and weather. Statistical evidence is provided to support this concept; atmospheric electricity and stratospheric-tropospheric exchange are highlighted. Although many accept the idea, there are those who are skeptical about such a relationship because no definite physical mechanism exists between the two. This is a topic of much discussion and debate. It is believed that the shielding of the Earth from galactic cosmic rays during increased periods of solar activity plays a key role in the process. Several of the mechanisms discussed rely on this concept. The emphasis will be on the attention in this area. On the topic of the atmospheric electrical mechanism, two hypotheses are presented: those of Markson and Hale. Finally, the stratospheric-tropospheric exchange mechanism is introduced. This mechanism is similar to the atmospheric electrical mechanism in that it also depends on the possible modulation of the thunderstorm generator by solar activity. Tropopause folding events are presented as a vital link in the stratospheric-tropospheric exchange mechanism. Author (GRA)

N87-13112# Naval Air Systems Command, Washington, D. C.
US NAVY CLIMATIC STUDY OF THE CARIBBEAN SEA AND GULF OF MEXICO. VOLUME 2: EAST CARIBBEAN SEA
Mar. 1986 221 p
(AD-A171487; NAVAIR-50-1C-544-Vol-2) Avail: NTIS
HC A10/MF A01 CSCL 04/2

Charts for: clouds; precipitation; visibility tables; ceiling-visibility (mid range); ceiling-visibility (low range); wind-visibility-cloudiness; scalar mean wind speed; wind speed less than 11 and greater than or = to 34 knots; wind speed 11-21 and 22-33 knots; surface wind roses; air and sea temperature; wave height isopleths; wave height tables; surface currents (seasonal). GRA

N87-13113# Sandia National Labs., Albuquerque, N. Mex.
METEOROLOGICAL TOWER DATA, YUCCA RIDGE (YR) SITE, JANUARY-JUNE 1983. NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS PROJECT
H. W. Church, D. L. Freeman, K. Boro, and R. T. Egami Jun. 1986 50 p Prepared in cooperation with Nevada Univ., Reno
(Contract DE-AC04-76DP-00789)
(DE86-012732; SAND-85-1053) Avail: NTIS HC A03/MF A01

The purpose of the NNWSI meteorological data collection program is to support environmental evaluations of site suitability for a nuclear waste repository. This is the first in a series of data summaries for the Yucca Ridge Site in southern Nevada and covers the 6-month period of January to June, 1983. DOE

N87-13114# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.
METEOROLOGICAL SUMMARY OF WATOX (WESTERN ATLANTIC OCEAN EXPERIMENT) 1985 RESEARCH INTENSIVE, FEBRUARY-APRIL
R. S. Artz, U. Dayan, and S. G. Sheridan May 1986 79 p
(PB86-226792; NOAA-TM-ERL-ARL-143) Avail: NTIS
HC A05/MF A01 CSCL 04B

Flow along the mid-Atlantic Coast and over Bermuda was studied using the NOAA King Air Aircraft and two ground sampling stations. The period studied was mid-February through mid-April 1985. The report presents the surface synoptic charts and the air parcel forecast trajectories associated with these events along with a climatology indicating what types of events were sought and how many could be expected between February and April of a typical year. Finally, the meteorological tools available for each forecast are discussed and examples are given. GRA

N87-13115# National Weather Service, Kansas City, Mo.
SOME PROPOSALS FOR MODIFYING THE PROBABILITY OF PRECIPITATION PROGRAM OF THE NATIONAL WEATHER SERVICE
W. E. Sangster and M. D. Manker Jul. 1986 38 p
(PB86-226636; NOAA-TM-NWS-CR-82) Avail: NTIS
HC A03/MF A01 CSCL 04B

The technical memorandum proposes reducing the number of probability classes from 12 (or 13) to six in order to allow a new kind of verification display. Also, some new scores designed to put more emphasis on catching the larger amounts with high PoP's will be presented. The possibilities of changing the thresholds for the probability event from the present .01 inch to three thresholds of Trace, .04 inch will be explored. GRA

N87-13116# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Sciences Group.
CALIBRATION AND ACCURACY OF THE NOAA/ERL GUST PROBE SYSTEM AND INTERCOMPARISON WITH OTHER SYSTEMS
G. G. Greenhut and R. O. Gilmer Oct. 1985 36 p
(PB86-221736; NOAA-TM-ERL-ESG-22) Avail: NTIS
HC A03/MF A01 CSCL 04B

The calibration techniques for the National Oceanic and Atmospheric Administration/Environmental Research Laboratories (NOAA/ERL) gust probe system are reviewed and the instrumental errors associated with the measurement of the fluxes of latent and sensible heat and momentum are calculated. Power spectra and cospectra of the fluctuating meteorological variables are displayed and comparisons of the eddy fluxes from the gust probe system with bulk aerodynamic calculations are reviewed. GRA

N87-13117# National Oceanic and Atmospheric Administration, Boulder, Colo. Environment Sciences Group.
EFFECTS OF REDUCED SPATIAL RESOLUTION ON THE NEXRAD STORM SEQUENCE ALGORITHMS
C. McAdie May 1986 61 p
(PB86-221728; NOAA-TM-ERL-ESG-21) Avail: NTIS HC A04/MF A01 CSCL 04B

The spatial resolution of radar reflectivities obtained from NCAR's CP-2 Doppler radar on 4 June 1983, 2130-2230 G.m.t., is reduced by averaging and skipping range gates, and skipping entire rays. The number of storms identified by the NEXRAD Storm Sequence algorithms increases as the averaging of skipping interval is lengthened. Causes of the increase are ground clutter effects, multiple identification of storms, and enhanced detection of small storms. Large isolated thunderstorms are consistently identified at all spatial resolutions tested. GRA

N87-12947# Joint Publications Research Service, Arlington, Va.
METEOROLOGICAL EFFECTS OF GEOTECTONIC PHENOMENA HYPOTHESIZED Abstract Only
G. Afanasyev *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Sovetskaya Litva (Riga, USSR), 27 Apr. 1986 p 2 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

N87-12948# Joint Publications Research Service, Arlington, Va.
THIRD INTERNATIONAL SYMPOSIUM ON TROPICAL METEOROLOGY Abstract Only
V. N. Ivanov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 1 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fiziki Atmosfery i Okeana (Moscow, USSR), v. 22, no. 2, Feb. 1986 p 221-223 Symposium held in Yalta, 24-31 Mar. 1985 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

48 OCEANOGRAPHY

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

N87-13118# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ON THE WALKER CIRCULATION OF 1983-84
Mary Toshie Kayano, V. Brahmananda Rao, and Antonio Divino Moura Jul. 1986 16 p Submitted for publication
(INPE-3952-PRE/971) Avail: NTIS HC A02/MF A01

The El Nino - Southern Oscillation (ENSO) event of 1983 was extraordinary in many ways. First indication of positive sea surface temperature (SST) anomalies appeared in Central Pacific during the southern winter rather than near the coast of South America during the southern summer as happened in other events. By the beginning of 1983, the Southern Oscillation Index (SOI) reached a value of 3.5 standard deviations below normal, the lowest on record since 1935. Several recent papers have documented the onset phase of this event. What is not adequately discussed is the collapse phase of this ENSO event and the return to normal atmospheric conditions. Further, an overlooked aspect of this ENSO event is the associated Walker circulation and its vertical structure. In this note we show that the return to normal conditions was associated with a spectacular reversal of several atmospheric characteristics. Our calculations showed significant correlation between the SOI and one important atmospheric property, hitherto not well examined, namely, water vapor. Our results also show an awesome interconnection between such properties of the atmosphere as vertical velocity, water vapor, rainfall and thermodynamic structure to the phase of ENSO. Author

N87-13119# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
MIZEX: A PROGRAM FOR MESOSCALE AIR-ICE-OCEAN INTERACTION EXPERIMENTS IN ARCTIC MARGINAL ICE ZONES. 8: A SCIENCE PLAN FOR A WINTER MARGINAL ICE ZONE EXPERIMENT IN THE FRAM STRAIT/GREENLAND SEA, 1987/89
Kenneth Davidson, Ira Dyer, Dean Horn, Ola Johannessen, and Peter Mikhalevsky Apr. 1986 58 p
(AD-A169070; CRREL-SR-86-9) Avail: NTIS HC A04/MF A01 CSCL 20/1

The present plan is motivated by the need to improve our understanding of the fundamentals of acoustic propagation, noise, and electromagnetic remote sensing in the winter marginal ice zone (MIZ). The plan strongly emphasizes oceanography, ice dynamics, and meteorology. In fact, the latter disciplines must be deeply enough researched to resolve fundamental questions entailing air/ice/ocean interaction, heat and mass exchanges and balances, growth and decay of ice-edge eddies, etc. Detailed scientific objectives are examined for oceanography, meteorology, ice physics, remote sensing, and acoustics together with detailed experimental plans, and a discussion of logistics for these experiments. GRA

N87-13120# Environmental Research Inst. of Michigan, Ann Arbor. Radar Div.
NONLINEAR INTERACTIONS IN THE MICROWAVE SENSING OF OCEANIC INTERNAL WAVES
David R. Lyzenga 15 Feb. 1986 47 p Sponsored by Navy
(AD-A169776; ERIM-155900-37-R) Avail: NTIS HC A03/MF A01 CSCL 08/3

Theories for the interaction of surface waves with internal wave-induced surface currents are reviewed, and applied to the problem of microwave sensing of internal waves. Several types of nonlinearities are discussed, including those associated with the wave-current interaction process (within the context of infinitesimal-amplitude wave theory), those associated with nonlinear surface wave dynamics, and those associated with electromagnetic scattering from nonlinear surface waves. Results of a numerical integration of the wave equation are presented and compared with linearized perturbation solutions in order to illustrate some of these nonlinearities. GRA

N87-13121# Rhode Island Univ., Kingston. Graduate School of Oceanography.
THE GULF STREAM DYNAMICS EXPERIMENT. INVERTED ECHO SOUNDER DATA REPORT FOR THE JUNE 1984 TO MAY 1985 DEPLOYMENT PERIOD Summary Report, Jun. 1984 - May 1985
Karen L. Tracey, Meghan Cronin, and D. Randolph Watts Dec. 1985 185 p
(Contract N00014-81-C-0062; Grant NSF OCE-82-01222)
(AD-A170758; URI/GSO-TR-85-3) Avail: NTIS HC A09/MF A01 CSCL 08/10

The Gulf Stream Dynamics Experiment was conducted in the region just northeast of Cape Hatteras from April 1983 to May 1985 to study the propagation and growth characteristics of Gulf Stream meanders. Data collected as part of the field experiment included inverted echo sounders, current meter moorings, and AXBT survey flights. This report documents the inverted echo sounder data collected from June 1984 to May 1985. Time series plots of the half-hourly travel time and low-pass filtered thermocline depth measurements are presented for eighteen instruments. Bottom pressure and temperature, measured at four of the sites, are also plotted. Basic statistics are given for all the data records shown. Maps of the thermocline depth field in a 240 km by 460 km region are presented at daily intervals. Author (GRA)

51 LIFE SCIENCES (GENERAL)

N87-13122*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CREW FACTORS IN FLIGHT OPERATIONS. PART 3: THE OPERATIONAL SIGNIFICANCE OF EXPOSURE TO SHORT-HAUL AIR TRANSPORT OPERATIONS
H. Clayton Foushee, John K. Lauber, Michael M. Baetge (Informatics General Corp., Palo Alto, Calif.), and Dorothea B. Acomb (San Jose State Univ., Calif.) Aug. 1986 67 p
(NASA-TM-88322; A-86338; NAS 1.15:88322) Avail: NTIS HC A04/MF A01 CSCL 06S

Excessive flightcrew fatigue has potentially serious safety consequences. Laboratory studies have implicated fatigue as a causal factor associated with varying levels of performance deterioration depending on the amount of fatigue and the type of measure utilized in assessing performance. These studies have been of limited utility because of the difficulty of relating laboratory task performance to the demands associated with the operation of a complex aircraft. The performance of 20 volunteer twin-jet transport crews is examined in a full-mission simulator scenario that included most aspects of an actual line operation. The scenario included both routine flight operations and an unexpected mechanical abnormality which resulted in a high level of crew workload. Half of the crews flew the simulation within two to three hours after completing a three-day, high-density, short-haul duty cycle (Post-Duty condition). The other half flew the scenario after a minimum of three days off duty (Pre-Duty) condition). The results revealed that, not surprisingly, Post-Duty crews were significantly more fatigued than Pre-Duty crews. However, a somewhat counter-intuitive pattern of results emerged on the crew performancemeasures. In general, the performance of Post-Duty crews was significantly better than that of Pre-Duty crews, as rated by an expert observer on a number of dimensions relevant to flight safety. Analyses of the flightcrew communication patterns revealed that Post-Duty crews communicated significantly more overall, suggesting, as has previous research, that communication is a good predictor of overall crew performance. Author

N87-13123# State Univ. of New York, Buffalo. Dept. of Biophisical Sciences.
MECHANICAL TRANSDUCTION: UNIFICATION
Frederick Sachs Jun. 1986 4 p Repr. from NIPS, v. 1, Jun. 1986 p 98-100
(Contract DAAG29-85-K-0135)
(AD-A171191; ARO-22560.1-LS) Avail: NTIS HC A02/MF A01 CSCL 06/3

The transduction mechanical stimuli into electrical responses is essential for audition, kinesthesis, proprioception, and autonomic sensation of pressure and volume. The primary event in transduction is the opening of an ion channel whose linkage to the cytoskeleton provides high sensitivity. When linked to adapting mechanical structures, this scheme can account for the presently known properties of various mechanical transducers.Author (GRA)

N87-13124# Brookhaven National Lab., Upton, N. Y.
X-RAY FLUORESCENCE WITH SYNCHROTRON RADIATION
K. W. Jones, B. M. Gordon, A. L. Hanson, J. G. Pounds, and G. Schidlovsky Mar. 1986 10 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC02-76CH-00016)
(DE86-010543; BNL-38006; CONF-860829-26) Avail: NTIS HC A02/MF A01

X-ray fluorescence (XRF) has long been used to make measurements of trace element concentrations in biological materials with very high sensitivity. It has not been previously possible to work with micrometer spatial resolutions because of the relatively low brightness of X-ray tubes. This situation is much improved by using synchrotron storage ring X-ray sources since the brightness of the synchrotron source is many orders of magnitude higher than is obtained with the most intense tube sources. These intense sources open the possibility of using the XRF technique for measurements with resolutions of approximately cellular dimensions. A description of a current research project at Brookhaven which uses synchrotron radiation induced X-ray emission (SRIXE) is presented to illustrate a specific application of the method in biology. DOE

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N87-13125* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Nov. 1986 53 p
(NASA-SP-7011(290); NAS 1.21:7011(290)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 125 reports, articles and other documents introduced into the NASA scientific and technical information system in October 1986. M.G.

N87-13126# Anco Engineers, Inc., Culver City, Calif.
RADIOGRAPHIC DETERMINATION OF MASS AND INERTIAL TENSOR OF ANATOMICAL SEGMENTS Final Report
May 1986 43 p
(Contract N00014-85-C-0594)
(AD-A169122; ANCO-1663.15) Avail: NTIS HC A03/MF A01 CSCL 06/19

The Naval Medical Research and Development Command desires to nondestructively measure the inertial properties of nonhuman primate bodies and limbs, with possible extension to humans. The results can be used in building accurate body dynamics models for crash and seat ejection studies. ANCO has investigated the use of multi-axis radiographs (X-ray photographs) of anatomical segments with high energy photons, which allows the determination of total mass, center of gravity, and the inertia tensor. This technique does not require any knowledge of the nature of the tissues studied (or their absorption coefficient) and does not require expensive CT-scan equipment. It was concluded that by using relatively inexpensive and simple equipment, the inertial properties could be determined with an accuracy of 5% to 10%, except for the off-diagonal terms of the inertia tensor where the errors could be larger. This larger error, however, is of limited concern in body dynamic studies. GRA

N87-13127# Army Research Inst. of Environmental Medicine, Natick, Mass.
HYPOTHERMIC EFFECTS ON VASCULAR CONTRACTILITY AND REACTIVITY
N. R. Bandick and D. E. Roberts 1 Jan. 1986 23 p
(AD-A169142) Avail: NTIS HC A02/MF A01 CSCL 06/19

This study compared the reactive and contractile properties of helical strips of femoral arteries taken from normothermic rabbits and rabbits that were anesthetized with pentobarbitol and cooled to 25 C at a rate of 7 C per hour. The purpose of this comparison was to see if intrinsic factors would alter the sensitivity and/or contractility of this vascular muscle to norepinephrine during whole body hypothermia. We found that, after two hours of in-vivo hypothermia, the hypothermic derived tissue was from 10 to 100X more sensitive to norepinephrine than the normothermic derived tissue. This augmented sensitivity continued while the tissue was in-vitro for at least twelve hours. The dose-response curves of the hypothermic derived arteries were shifted to the left of the normothermic arteries resulting in a greater contractility at lower levels of agonist. Moreover, the normothermic tissue contracted slower than the hypothermic. The maximal tension developed by the strips was equivalent. This study has identified prolonged alternations of receptor sensitivities and contractility properties attributable to in-vivo influences than can, in part, explain the disruptions of blood pressure during and following whole body hypothermia. GRA

N87-13128# Army Research Inst. of Environmental Medicine, Natick, Mass.
QUANTIFICATION OF RESPIRATORY MUSCLE PERFORMANCE
Stephen R. Muza Jun. 1986 17 p
(AD-A169208; USARIEM-M38/86) Avail: NTIS HC A02/MF A01 CSCL 06/16

Quantification of respiratory muscle force, velocity and length are usually indirect measurements assessed from pressure, air flow and volume, respectively. Pressure produced by the respiratory muscles is measured at sites within the airways, rib cage and abdomen. Quantification of diaphragmatic tension is obtained by measurement of transdiaphragmatic pressure (P sub di) (gastric minus esophageal pressures). The strength of the inspiratory muscles working in concert is the voluntary static maximum inspiratory pressure measured at the mouth, briefly sustained near functional residual capacity (FRC). The inspiratory muscles' velocity of shortening is quantified by measuring the inspiratory flow rate (V sub I). Since the V sub I varies over the duration of inspiration (T sub I), the mean inspiratory flow rate (V sub I/T sub I) is typically used. Finally, changes in the respiratory muscles' length are inferred from measurements of volume. The duration of sustained voluntary hyperpnea is inversely related to the time-pressure integral of the diaphragm (T sub I/T sub T.P sub di/P sub di max) and the mean V sub I. Thus, measurements of pressure, flow and volume yield quantitative indices of respiratory muscle performance. GRA

N87-13129# Michigan Univ., Ann Arbor. Transportation Research Inst.
ANALYSIS OF HEAD AND NECK DYNAMIC RESPONSE OF THE US ADULT MILITARY POPULATION Final Annual Technical Report, 1 Oct. 1984 - 1 Feb. 1986
A. C. Bosio and B. M. Bowman 15 Apr. 1986 135 p
(Contract N00014-81-K-0603)
(AD-A169563; UMTRI-86-14; FATR-3) Avail: NTIS HC A07/MF A01 CSCL 06/19

Mechanisms of head/neck dynamic response were investigated for NBDL volunteer data in -Gx and +Gy acceleration vectors with the MVMA 2-D and VOM 3-D Crash Victim Simulation models. Computer simulation of human subject response yielded mechanical constants pertinent to the design of a Biofidelic Manikin (BFM). Improved biofidelity for a two-joint neck model was achieved by relocating the lower neck pivot point inferior and posterior to anatomic T1. In -Gx, the magnitude and duration for condyles extension, in particular, was improved while satisfactory acceleration response was maintained. Exercising the neck model at -6Gx and -15Gx showed that it was necessary to use nonlinear stiffnesses for the lower neck joint in flexion. Two modes of extension motion at the occipital condyles were seen in the volunteer subjects. The first mode was extension with rebound (some subjects demonstrating flexion). The second mode was peak extension followed by further increase in the extension motion. The two modes of condyles extension appear to depend on some pre-test condition - probably muscle tensing since the short duration of the head and neck motion in a test (300 ms) should not allow muscular reaction beginning after the onset of the test to be a factor. Simulations with a model that has passive neck elements give only the extension with rebound response, i.e., mode one response. Thus, on the basis of simulations, it can probably be said that mode one response results for subjects who are not pretensed and mode two response results for pretensed subjects. GRA

N87-13130# Technion - Israel Inst. of Tech., Haifa. Faculty of Medicine.
SLEEPABILITY AND WAKEABILITY FOLLOWING SLEEP DEPRIVATION Final Report, period ending Aug. 1982
Peretz Lavie May 1986 30 p
(Contracts DAJA37-81-C-0237; DA Proj. 2Q1-61102-B-74-D)
(AD-A169578; ARI-RN-86-64) Avail: NTIS HC A03/MF A01 CSCL 06/19

This research note discusses experiments investigating the infrastructure of arousal during the habitual waking day following one night of total sleep deprivation. Based on the data collected during the experiment, it can be concluded that wakeability, the ability to remain awake, and sleepability, the ability to fall asleep, following sleep deprivation, are not complimentary processes, but are probably governed by different mechanisms. The practical implications of these results to the scheduling of replacement naps are discussed. GRA

N87-13131# Army Research Inst. of Environmental Medicine, Natick, Mass.
HUMAN THERMOREGULATORY MODEL FOR IMMERSION IN COLD WATER
Peter Tikuisis, Richard R. Gonzalez, and Kent B. Pandolf Jun. 1986 35 p
(AD-A169779; USARIEM-M-39/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

A mathematical model of thermoregulation has been developed to simulate human physiological responses to cold-water immersion. Data were obtained from experiments where thirteen healthy male volunteers were totally immersed under resting and nude conditions for 1 h in water temperatures of 20 and 28 C. Mean measured rectal temperature (T sub re) fell by about 0.9 and 0.5 C in 20 and 28 C water for all subjects, yet mean measured metabolic rate (M) rose by about 275 and 90 W for the lean mass group (n=7) and 195 and 45 W for the normal mass group (n=6). To predict the observed T sub re and M values, the present model differed from its predecessors by (a)determining a thermally neutral body temperature profile such that the measured and predicted initial values of T sub re and M were matched, (b)including thermal inputs for shivering from the skin independent of their inclusion with the central temperature to account for the observed initial rapid rise in M, (c)confining the initial shivering to the trunk region to avoid an overly large predicted initial rate of rectal cooling, and (d) calculating the steady state of convective heat loss by assuming a zero rate of heat storage in the skin compartment. GRA

N87-13132# National Maritime Research Center, Kings Point, N. Y. Computer Aided Operations Research Facility.
APPLICATION OF HEART RATE MEASUREMENTS TO MARITIME RESEARCH SIMULATOR
Elliot Wald Mar. 1986 68 p
(AD-A169988; CAORF-60-7805-01) Avail: NTIS HC A04/MF A01 CSCL 06/16

An experiment was performed on the Ship Simulator of the Computer Aided Operations Research Facility (CAORF) to determine the feasibility of relating the instantaneous heart rates of test subjects with the nature of their on-bridge activity at the time of measurement. It was found that experienced mariners confronted with potential collision situations on the simulator or with difficult maneuvering problems in restricted waters generally experienced elevated heart rates indicative of increased cognitive and emotional arousal. It was also found that variability of heart rate appears to be useful in differentiatng workload demands imposed on the mariner by different navigation conditions. The fact that physiological reactions were observed to occur on the simulator in situations which would be expected to be emotionally arousing indicates, first, that the simulator is recreating, to a degree, the real-world atmosphere, and second, that heart rate measurements can be usefully applied in future research to detect emotional and or cognitive levels of arousal. GRA

N87-13133# Beth Israel Hospital, Boston, Mass.
FRACTURE AND VISCOELASTIC CHARACTERISTICS OF THE HUMAN CERVICAL SPINE
W. T. Edwards, W. C. Hayes, Y. F. Kou, M. S. Coffee, and A. A. White, III 1986 221 p
(Contract F49620-81-K-0010)
(AD-A170002; AFOSR-86-0453TR) Avail: NTIS HC A10/MF A01 CSCL 06/16

Cervical spine segments were tested both nondestructively and destructively to determine the load-displacement relationships and

vertebral strength. For this study, a servo-hydraulic multi-degree of freedom material testing machine was designed and constructed. This new system, called the Planar Testing Apparatus (PTA), was used to generate motions needed to characterize the sagittal response of spine segments. A study of the viscoelastic properties of two vertebrae lumbar spine segments was conducted following the completion of the PTA to check and demonstrate the test system. The results from sever lumbar specimens were also included in this report. The cervical spine segments consisted of three vertebrae and their interconnecting soft tissue, discs, and ligaments. A noninvasive electro-mechanical displacement measuring apparatus was constructed to monitor the six degree of freedom motion of the middle vertebral body as it moved relative to the two adjacent vertebrae during the mechanical tests. Results for cervical spine specimens indicated that a low displacement rates (less than 5 mm/sec or 5 deg/sec) there was no dependence of spinal segment stiffness on displacement rate. Curves for load vs. displacement (both axila and shear) and moment vs. sagittal bending displayed large regions of small load and low slope as displacements increased. GRA

N87-13134# Army Research Inst. of Environmental Medicine, Natick, Mass.
SELF-PACED HEAT ACCLIMATION PROCEDURES
Lawrence E. Armstrong, Roger W. Hubbard, Jane P. DeLuca, and Elaine L. Christensen Mar. 1986 39 p
(AD-A170533; USARIEM-T-8/86) Avail: NTIS HC A03/MF A01 CSCL 06/19

The purpose of this investigation was to evaluate the effectiveness of self-paced heat acclimation (SPHA) procedures. Fourteen males performed 100 nmin of intermittent exercise during 9 SPHA work-rest cycles, on eight days. Exercise consisted of 8.279 P or - 0.527 to 9.799 + or - 0.433 km of treadmill running per day. SPHA trials were effective in improving heat tolerance in that significant ($p < .05$) reductions were observed (day 1 vs day 8) in final heart rate (HR), Delta HR, final rectal temperatures (Tre), Delta Tre, final mean weighted skin temperature (Tsk), and Delta Tsk. Resting plasma volume expanded significantly ($p < .05$) from day 1 to day 4, but sweat rate was unchanged. Group mean exercise intensities and ratings of perceived exertion were not statistically different from days 2 7, let the number of trials terminate because subjects exceeded HR and Tre safety limits (22 out of 112 trials) declined during heat acclimation (days 1-4 = 16, days 5-8 = 6). Symptoms of heat illness (piloerection, chills, dizziness, vomiting) were observed in 16.1% of all trials; 11 out of 14 subjects (78.6%) experienced one or more or these symptoms during SPHA trials. GRA

N87-13135# Yale Univ., New Haven, Conn. Dept. of Ophthalmology and Visual Science.
LIMITS OF PATTERN DISCRIMINATION IN HUMAN VISION Final Report, Jan. 1983 - Dec. 1985
Joy Hirsch 3 Feb. 1986 30 p
(Contract F49620-83-C-0026)
(AD-A170756; AFOSR-86-0569TR) Avail: NTIS HC A03/MF A01 CSCL 05/10

This investigation was focused on identification of various limits of human spatial discrimination, two-dimensional sampling properties of the retinal photoreceptor lattice, and the consequences for spatial vision. Highlights from this study are briefly listed: (1) Foveal Spatial Discriminations are hyperacuity tasks; (2) The spatial-frequency discrimination function (delta f/f vs f) is segmented; (3) The discrimination segments can be related to retinal sampling; (4) Scaling mechanisms apply to low resolution tasks; (5) The photoreceptor lattice is a highly ordered hexagonal array; (6) A hexagonal component exists in spatial discrimination; and (7) A new metric model of spatial vision is based on visual sampling. GRA

N87-13136# Michigan Univ., Ann Arbor.
HIGH-RESOLUTION ANALYSIS OF EYE MOVEMENTS Final Report, 15 Jun. 1983 - 15 Nov. 1984
John Jonides 15 Apr. 1986 12 p
(Grant AF-AFOSR-0269-83)
(AD-A170779; AFOSR-86-0512TR) Avail: NTIS HC A02/MF A01 CSCL 06/16

A computerized laboratory was constructed to monitor eye movements, to present visual stimuli, and to collect and record the performance of human subjects in information processing tasks. Author (GRA)

N87-13137# Harvard Medical School, Boston, Mass. Dept. of Physiology and Biophysics.
PHARMACOLOGICAL RESETTING OF THE CIRCADIAN SLEEP-WAKE CYCLE Final Technical Report, 1 Apr. 1983 - 31 Mar. 1986
Martin C. Moore-Ede 30 May 1986 27 p
(Grant AF-AFOSR-0194-83)
(AD-A170804; AFOSR-86-0545TR) Avail: NTIS HC A03/MF A01 CSCL 06/16

This research program developed strategies to reset the timing of the circadian (approximately 24-hour) sleep-wake cycle so that individuals could be maintained fully awake in any predetermined time in the 24-hour day. This capability would be of direct benefit in minimizing the deleterious effects of jet-lag and could promote alertness in facilities which must be staffed 24 hours a day. The studies utilized a diurnal primate primate, the squirrel monkey (Saimiri sciureus), with a well defined circadian neurophysiology and sleep-wake physiology. This animal has a consolidated sleep-wake cycle that is comparable to that in humans. During the three-year period of funding, the circadian sleep-wake organization in squirrel monkeys was characterized, and the rate of resynchronization after phase shifts of environmental light-dark cycles was determined. GRA

N87-13138# Sloan-Kettering Inst. for Cancer Research, New York. Biophysics Lab.
BIOLOGICAL AND CLINICAL DOSIMETRY, JULY 1, 1964 TO DECEMBER 31, 1984 Final Report
J. S. Laughlin and L. Zeitz 1986 191 p
(Contract DE-AC02-76EV-03522)
(DE86-006947; DOE/EV-03522/T4) Avail: NTIS HC A09/MF A01

Systems for the determination of absorbed dose in biological research and clinical applications are developed. The primary method under study is the local absorbed dose calorimeter. In addition, secondary dosimetric systems such as ionization chambers, chemical dosimeters and thermoluminescent dosimeters (TLD) are being developed and applied to provide an absolute basis for the evaluation and comparison of experiments, treatments and other procedures using radiation. In keeping with these objectives this project has accomplished significant advances in the following areas: (1) local absorbed dose calorimetry; (2) neutron dosimetry; (3) dosimetry of ultra-high intensity radiation sources; (4) solid state detector and germanium gamma camera program; (5) dosimetry for brachytherapy; and (6) non-isolated sensor calorimeters. DOE

N87-13139# Pacific Northwest Labs., Richland, Wash.
PHYSICAL INTERACTION OF 1-Hz TO 100 kHz ELECTRIC AND MAGNETIC FIELDS WITH LIVING ORGANISMS
W. T. Kaune Apr. 19[illegible] 45 p Presented at the 22nd Annual Meeting of the National Council on Radiation Protection and Measurements, Washington, D.C., 2 Apr. 1986
(Contract DE-AC06-76RL-01830)
(DE86-012323; PNL-SA-13962; CONF-860451-1) Avail: NTIS HC A03/MF A01

The paper discusses, from a physical point of view, interactions between biological systems and electric and/or magnetic fields characterized by frequencies extending from 1 Hz to 100 kHz. DOE

N87-13155# Ludwig-Maximilians-Universitaet, Munich (West Germany). Orthopaedische Klinik und Poliklinik.
INVESTIGATION OF VIBRATIONS OF THE SPINAL COLUMN OF HEALTHY SUBJECTS [SCHWINGUNGSUNTERSUCHUNGEN

DER WIRBELSAEULE GESUNDER PROBANDEN]
J. Piehler, F.-W. Hagena, C. J. Wirth, F. Huettig (Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).), and K. Sauer (Hochschule der Bundeswehr, Munich (West Germany).) *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 114-126 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N87-13140*# New Mexico Inst. of Mining and Technology, Socorro.
NOSL EXPERIMENT SUPPORT Final Report, 1 Jan. 1980 - 31 Jul. 1986
Marx Brook 2 Oct. 1986 4 p
(Contract NAS8-33817)
(NASA-CR-178947; NAS 1.26:178947) Avail: NTIS HC A02/MF A01 CSCL 05I

An optical lightning detector was constructed and flown, along with Vinton cameras and a Fairchild Line Scan Spectrometer, on a U-2 during the summer of 1979. The U-2 lightning data was obtained in daylight, and was supplemented with ground truth taken at Langmuir Laboratory. Simulations were prepared as required to establish experiment operating procedures and science training for the astronauts who would operate the Night/Day Optical Survey of Thunderstorm Lightning (NOSL) equipment during the STS-2 NOSL experiment on the Space Shuttle. Data was analyzed and papers were prepared for publication. B.G.

N87-13141*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CREW COMMUNICATION AS A FACTOR IN AVIATION ACCIDENTS
Joseph Goguen, Charlotte Linde, and Miles Murphy Aug. 1986 29 p
(NASA-TM-88254; A-86254; NAS 1.15:88254) Avail: NTIS HC A03/MF A01 CSCL 05I

The crew communication process is analyzed. Planning and explanation are shown to be well-structured discourse types, described by formal rules. These formal rules are integrated with those describing the other most important discourse type within the cockpit: the command-and-control speech act chain. The latter is described as a sequence of speech acts for making requests (including orders and suggestions), for making reports, for supporting or challenging statements, and for acknowledging previous speech acts. Mitigation level, a linguistic indication of indirectness and tentativeness in speech, was an important variable in several hypotheses, i.e., the speech of subordinates is more mitigated than the speech of superiors, the speech of all crewmembers is less mitigated when they know that they are in either a problem or emergency situation, and mitigation is a factor in failures of crewmembers to initiate discussion of new topics or have suggestions ratified by the captain. Test results also show that planning and explanation are more frequently performed by captains, are done more during crew- recognized problems, and are done less during crew-recognized emergencies. The test results also indicated that planning and explanation are more frequently performed by captains than by other crewmembers, are done more during crew-recognized problems, and are done less during-recognized emergencies.

N87-13142# New York Univ., New York.
PERCEPTUAL FACTORS IN WORKLOAD: A NEUROMAGNETIC STUDY Annual Report, 1 Jan. - 31 Dec. 1985
Lloyd Kaufman and Samuel J. Williamson 28 Feb. 1986 55 p
(Contract F49620-85-K-0004)
(AD-A169934; AFOSR-86-0417TR; AR-1) Avail: NTIS HC A04/MF A01 CSCL 05/10

A background section describes the neuromagnetic method and its history. There were an elevation of N1 and P2 (using a quasi-steady state stimulus). The fields associated with these sources increased in intensity during attention. This is not due to the activity of sources recruited during attention, but to Modulated activity of neurons in or near primary auditory cortex. This is consistent with a Triesman like filter theory of attention. Also, physical parameters of stimulation, e.g., loudness, have little or no effects. However, the effect is sharply diminished when both stimuli are presented to both ears with equal loudness. A collaboration with other investigators is planned to compare our results with results obtained in a more conventional manner. A new method for obtaining graded levels of attention is described. A visual experiment is underway, and is giving us similar results. A single-position method for determining the location, orientation and strength of the dipole source is described. This method will be applied to a P300 study, which will follow-up an odd-ball study just completed. The latter gave results similar to those obtained previously, but the method is sufficiently insensitive to determine if changing P300 latency is due to a change in source. The planned experiment should make this possible. GRA

N87-13143# Essex Corp., Orlando, Fla.
EYE MOVEMENTS AS AN INDEX OF MENTAL WORKLOAD Final Report, 15 Jul. 1985 - 14 Mar. 1986
James G. May, Robert S. Kennedy, Mary C. Williams, William P. Dunlap, and Julie R. Brannan 17 Mar. 1986 20 p
(Contract F49620-85-C-0121)
(AD-A169941; AFOSR-86-0416TR) Avail: NTIS HC A02/MF A01 CSCL 06/5

Two investigations were carried out to assess the feasibility of using eye movement measures as nonintrusive indicants of mental workload. In the first experiment, measures of saccadic latency and eye movement velocity were obtained during alternating eye movement scans while subjects were differentially task loaded by simple, moderate, and complex auditory tone counting. The latency and eye movement velocity measures changed but did not differ reliably as tone counting complexity (workload) was increased. In the second experiment, the spatial extent of spontaneous saccades was measured under three levels of tone counting complexity. The results indicated that the extent of such eye movements varied inversely (p less than .0151) as tone counting complexity increased. This index appears to hold promise for the development of an objective indicator of mental workload. Author (GRA)

N87-13144# Illinois Univ., Champaign. Cognitive Psychophysiology Lab.
THE EVENT RELATED BRAIN POTENTIAL AS AN INDEX OF INFORMATION PROCESSING AND COGNITIVE ACTIVITY. A PROGRAM OF BASIC RESEARCH. SUPPLEMENT A: NEUROMAGNETIC STUDIES Annual Progress Report, 20 Apr. 1984 - 31 Dec. 198
Lloyd Kaufman and Emanuel Donchin 31 Mar. 1986 23 p
(Contract F49620-85-C-0041)
(AD-A169978; CPL-86-1A; AFOSR-86-0451TR-Suppl-A) Avail: NTIS HC A02/MF A01 CSCL 05/10

A study was conducted to evaluate the feasibility of obtaining concurrent measures of event-related potentials (ERPs), and event-related magnetic fields (ERFs). Subjects participated in an oddball task while simultaneous ERPs and ERFs were recorded. Isocontour field maps generated for the P300 component are consistent with the suggestion that the P300 may be generated in, or near, the hippocampal formation. GRA

N87-13145# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
THE FLIGHT SERVICE STATION TRAINING PROGRAM: 1981-1985 Final Report
John J. Convey Jun. 1986 18 p
(AD-A171485; DOT/FAA/AM/86-6) Avail: NTIS HC A02/MF A01 CSCL 05/9

This report describes the performance of the ATC classes in the Flight Service Station Training Program 1981 to 1985 on the skills tests and laboratory exercises in Preflight (pilot briefing), Inflight, and Emergency Services. Over 80% of the final grade for the program is based on these measures. The average scores of the classes on the skills tests, especially on Inflight, have increased from 1981 to 1985. The different forms of both the Preflight test and the Emergency Services test appear to be equivalent as intended; however, Form G and Form H of the Inflight test are easier than Form D and Form E. The average scores of the classes on the laboratory tests were constant from 1981 to 1985; however, the averages on the Inflight laboratory exercises have declined steadily. Overall, these classes have performed better on the skills tests and laboratory exercises, except for Inflight, than did the reference classes of 1978 and 1979. GRA

N87-13153# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Bonn (West Germany).
THE MEASUREMENT OF THE PSYCHOLOGICAL WORKLOAD DURING TASK-RELATED ACTIVITIES, INCLUDING CAR DRIVING, BY COMPETING TIME INTERVAL ESTIMATION [DIE MESSUNG DER PSYCHISCHEN BEANSPRUCHUNG WAEHREND AUFGANENBEZOGENER TAETIGKEITEN EINSCHLIESSLICH FAHRZEUGFUEHRUNG DURCH KONKURRIERENDE ZEITINTERVALLSCHAETZUNGEN]
Dieter Wiegand *In its* Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 84-93 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

N87-13146# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Bonn (West Germany).
PROCEEDINGS OF A SYMPOSIUM ON THE EVALUATION OF MAN-MACHINE SYSTEMS: METHODS AND PROBLEMS [BEWERTUNG VON MENSCH-MASCHINE-SYSTEMEN. METHODEN UND PROBLEMATIK]
1985 277 p Partly in GERMAN and ENGLISH Symposium held in Cologne, West Germany, 14-15 Nov. 1985
(DGLR-85-04; ISBN-3-922010-30-X; ETN-86-98080) Avail: NTIS HC A13/MF A01

Anthropometric handicaps in helicopter cockpits; an obstacle-warning radar for helicopters; the workload and stress of a cockpit crew; and the simulation of human service reliability in the manual control of aircraft were studied. The system-ergonomic workload in highly automated process control tasks; and psychological workload during task-related activities were analyzed. A research method to determine the quality of task mastering by navigators in ship guidance; and the vibrations of the spinal column were tested. Human factors engineering in nuclear power plant control; and the ergonomic requirements for the design of control rooms were investigated. The possibilities of the eye-mark investigation as an anthropotechnical method to study man machine systems; measures, basic conceptions and inquiry techniques for the evaluation of man machine systems were studied. The empirical determination of the acceptable user surface in automated air conditioning systems was investigated. For individual titles, see N87-13147 through N87-13165. ESA

N87-13147# Forschungsinstitut fuer Anthropotechnik, Wachtberg (West Germany).
EVALUATION OF MAN MACHINE SYSTEMS: INTRODUCTION AND OVERVIEW [BEWERTUNG VON MENSCH-MASCHINE-SYSTEMEN, EINFUEHRUNG UND UEBERSICHT]
K.-P. Gaertner and W. Stein *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 2-9 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

The organization, evaluation, and study of man-machine systems are discussed. Decisions to be made during each of these tasks are specified. Emprirical and model-based methods of studying man-machine systems are briefly addressed. Problems to be overcome in reconciling the various goals involved in optimizing man-machine systems are considered. ESA

N87-13148# Institute of Aviation Medicine, Manching (West Germany).
ANTHROPOMETRIC HANDICAPS IN THE CONSTRUCTION OF A HELICOPTER COCKPIT [ANTHROPOMETRISCHE VORGABEN FUER DIE KONSTRUKTION EINES HUBSCHRAUBER-COCKPITS]
G. Kroh *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 10-24 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Helicopter pilots were used to test the dummy cockpit of a helicopter now under dwevelopment in order to develop a data base for the seating and the steering organs. Seated tests showed that the postures assumed by the pilots during flights generally did not agree with those envisioned in the construction specifications. This was due to the relatively large discrepancy in arm length between the 5th and the 99th percentile. To prevent their arms from getting tired, the pilots pushed the seat back farther than expected by the designer. Suggestions are also briefly made for the location of the stick and pedals. ESA

N87-13149# AEG-Telefunken, Ulm (West Germany). Abteilung H14E27.
OBSTACLE-WARNING RADAR FOR HELICOPTERS [DAS HINDERNISWARN-RADAR FUER HUBSCHRAUBER - EINE ANTHROPOTECHNISCHE PROBLEMSTELLUNG] c32
G. M. Och *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 25-33 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

An obstacle warning radar concept for helicopters is described in both the test and operational phases. A radar sonde is mounted on the front of the helicopter under a radome and senses the atmosphere forward over a range of 180 deg azimuth and 32 deg elevation. The ray is directed by a fast-rotating mirror, resulting in an image-renewal rate of two per second. Obstacles can be detected to a distance of 800 m. depending on atmospheric conditions and obstacle size. ESA

N87-13150# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
DETERMINATION OF THE LOAD AND STRESS OF A COCKPIT CREW DURING AIRCRAFT PILOTING USING TASK NETWORKS AND THE SIMULATION LANGUAGE SAINT [ERMITTLUNG VON PILOTENBELASTUNG BZW. -BEANSPRUCHUNG BEI DER FLUGZEUGFUEHRUNG MIT HELFE VON AUFGABEN-NETZWERKEN UND SAINT]
M. Fricke, U. Kopp, and D. Niemeyer *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 34-45 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

The load/stress on a cockpit crew of a B 727 during an ILS CAT I flight was investigated by digital simulation of more than 20 flights. A model describing the complex working process of the flight crew and its interaction with the environment is developed. The simulation flights are described, and the various tasks engaged in by the crew during the flights are specified and discussed. ESA

N87-13151# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Hubschrauber und FLugzeuge.

APPLICATION OF THE TASK TAXONOMY METHOD TO THE SIMULATION OF HUMAN SERVICE RELIABILITY IN THE MANUAL CONTROL OF AIRCRAFT [ANWENDUNG DER METHODE DER AUFGABENTAXONOMIE ZUR SIMULATION MENSCHLICHEN BEDIENZUVERLAESSIGKEIT BEI DER MANUELLEN STEUERUNG VON FLUGZEUGEN]

K. Brauser *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 46-61 In GERMAN (For primary document see N87-13146 04-54)
(MBB/LKE-301/S/PUB/216) Avail: NTIS HC A13/MF A01

The method of problem taxonomy, based on data on human reliability and aimed at obtaining improved surveying and evaluation of such data, is described. The simulation of the problem of manual steering of an aircraft pitching axis during landing approach using this method together with the simulation program SAINT is discussed. The human error probability for various steering errors obtained using the method is reported. ESA

N87-13152# Forschungsinstitut fuer Anthropotechnik, Wachtberg (West Germany).

SYSTEM-ERGONOMIC WORKLOAD ANALYSIS FOR HIGHLY AUTOMATED PROCESS CONTROL TASKS [SYSTEMERGONOMISCHE BELASTUNGSANALYSEN BEI HOCHAUTOMATISIERTEN PROZESSFUEHRUNGSAUFGABEN]

B. Doering *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 62-83 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

A method to evaluate the ergonomic design of the interface operator-process guiding center in a highly automated shipbuilding industry was developed. The method determines task difficulty due to this intersection, on the basis of load factors the value of which are subjectively evaluated. The acquired information can be a basis for an improved interface design. A simulation model which reproduces the work process of the operator and the technical processes including perturbation, and which allows a comparative evaluation of different work situations was developed. The difficulties of the single tasks of the work process are classified by the model. The result of the simulation is information about the duration of the single work difficulties, as well as an integrative workload index which allows a comparative evaluation of the effects of different perturbations on the work situations. ESA

N87-13153# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Bonn (West Germany).

THE MEASUREMENT OF THE PSYCHOLOGICAL WORKLOAD DURING TASK-RELATED ACTIVITIES, INCLUDING CAR DRIVING, BY COMPETING TIME INTERVAL ESTIMATION [DIE MESSUNG DER PSYCHISCHEN BEANSPRUCHUNG WAEHREND AUFGANENBEZOGENER TAETIGKEITEN EINSCHLIESSLICH FAHRZEUGFUEHRUNG DURCH KONKURRIERENDE ZEITINTERVALLSCHAETZUNGEN] c53

Dieter Wiegand *In its* Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 84-93 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Time interval estimations were performed on subjects to determine psychological workloads of car drivers. Active time interval estimates were given by 101 subjects at rest and during activity. The estimates concerned tests related to driving and driver's choice, and a trip with a 5T truck. Distinction was made between traffic-free and traffic-loaded driving, as well as between experienced and inexperienced drivers. The results show that the dispersion of the time estimate distributions makes a highly significant distinction between the different reference loads; this is also valid for the subdivisions in the driving tests. The tests show that the measuring method is also suited for field conditions. ESA

N87-13154# Fachhochschule, Hamburg (West Germany). Fachbereich Seefahrt.

DEVELOPMENT OF A RESEARCH METHOD TO DETERMINE THE QUALITY OF TASK MASTERING BY NAVIGATORS IN SHIP GUIDANCE [ENTWICKLUNG EINES UNTERSUCHUNGSVERFAHRENS ZUR ERMITTLUNG DER QUALITAET DER AUFGABENBEWAELTIGUNG VON NAUTIKERN BEI DER SCHIFFSFUEHRUNG]

Jens Froese, Anita Damico (Merchant Marine Research Center, New York, N.Y.), Ulrich Pedersen (Hapag-Lloyd A.G., Hamburg (West Germany).), and Nadine Sablowski (Hamburg Univ. (West Germany).) *In* DGLR Proceedings of a Symposium on Evaluation of Man-Machine Systems: Methods and Problems 1985 p 94-113 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

An evaluation method for the effects of ship bridge occupation and installation on the quality of navigation was developed using the ship navigation and simulation program SUSAN. Preliminary results show that the method is suitable for research purposes. ESA

N87-13155# Ludwig-Maximilians-Universitaet, Munich (West Germany). Orthopaedische Klinik und Poliklinik.

INVESTIGATION OF VIBRATIONS OF THE SPINAL COLUMN OF HEALTHY SUBJECTS [SCHWINGUNGSUNTERSUCHUNGEN DER WIRBELSAEULE GESUNDER PROBANDEN] c52

J. Piehler, F.-W. Hagena, C. J. Wirth, F. Huettig (Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).), and K. Sauer (Hochschule der Bundeswehr, Munich (West Germany).) *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 114-126 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Kinetics tests were conducted to determine the magnitude of the deforming forces on the human spinal column. The vibration test setup including a digital vibration control system is described. Results reveal complex spinal column characteristics: in each plane of the spine a specific transmission behavior is observed. The supposition that the transmission behavior of all other spinal column sections can be deduced from one single position is questioned. ESA

N87-13156# Technischer Uerberwachungs-Verein Rheinland, e.V., Cologne (West Germany). Inst. fuer Unfallforschung und Ergonomie.

REVIEW OF THE METHODS APPLIED IN THE FEDERAL REPUBLIC OF GERMANY TO INVESTIGATE HUMAN FACTORS IN NUCLEAR POWER PLANT CONTROL [UEBERLICK UEBER IN DER BRD ANGEWANDTE METHODEN ZUR UNTERSUCHUNG MENSCHLICHER FAKTOREN IN KERNKRALTWERKSWARTEN]

D. B. Thomas *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 127-136 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Human factors evaluation methods for nuclear power plants are presented. Field studies provide primary information, but laboratory studies in which the variables can be manipulated without the contaminating influence of external factors, are required for predictions but are missing for German nuclear power plants and cannot simply be taken from other countries because the operational parameters are different. ESA

N87-13157# Technischer Uerberwachungs-Verein Rheinland, e.V., Cologne (West Germany). Inst. fuer Unfallforschung und Ergonomie.

SIMULATION OF DISTURBANCES ON THE NUCLEAR POWER PLANT SIMULATOR. THE PROBLEM OF THE INTERPRETATION OF OPERATOR ACTIONS AND THEIR COGNITIVE BACKGROUNDS AS A BASIS FOR DESIGN RECOMMENDATIONS [STOERUNGSSIMULATION AM KRAFTWERKSIMULATOR - ZUM PROBLEM DER INTERPRETATION VON OPERATEURHANDLUNGEN UND DEREN KOGNITIVER HINTERGRUENDE ALS BASIS FUER GESTALTUNGSEMPFEHLUNGEN]

Gerhard Becker *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985

p 137-154 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Parameters which influence the correctness of the mental model representation of unusual process evolutions were studied on a simulator in order to improve the understanding of operators in nuclear power plants. The operator's position and complex technical connections are described. Power control, steam barrier supply, and turbine condenser in a power plant are described. The simulated disturbance situation and the behavior of the operators are discussed. The results show that, even in the case of simple disturbances, error management is a very complex and diversified task. Knowledge-based, rule-based, and skill-based operator's behavior are discussed. ESA

N87-13158# Kraftwerk Union A.G. Reaktortechnik, Erlangen (West Germany).
ERGONOMIC REQUIREMENTS FOR THE DESIGN OF CONTROL ROOMS. EVALUATION METHOD [ERGONOMISCHE ANFORDERUNGEN AN DIE WARTENGESTALTUNG -BEWERTUNGSMETHODE]
W. Hinz *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 155-164 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

A method for the ergonomic qualitative evaluation of control rooms (command post, control stand) is presented. The aim was to develop design standards in order to secure suitable working conditions. Each operational situation is classified with respect to the action which the operators have to take in order to evaluate and influence the process. The method provides a starting point for a more objective evaluation, but requires expert designers because a number of evaluation criteria are lacking. ESA

N87-13159# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
A METHOD FOR THE OPTIMUM DESIGN OF THE MAN MACHINE INTERFACE [EIN VERFAHREN ZUR OPTIMALEN GESTALTUNG DER MENSCH-MASCHINE-SCHNITTSTELLE]
V. Behrendt, H.-D. Hartfiel (Kraftwerk Union A.G. Reaktortechnik, Erlangen (West Germany).), H.-R. Mannhaupt (Technische Univ., Munich (West Germany).), W. Preuss (Cologne Univ. (West Germany).), and D.-B. Thomas *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 165-186 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

A task-related, ergonomic method for the optimization of man machine systems was developed and applied to nuclear power plants. The operator's tasks and the man machine interface are analyzed. A catalog of ergonomic design recommendations is given. The relations between these recommendations and the operations are explained. The applicability of the method is demonstrated in principle, but a number of open questions still remains. ESA

N87-13160# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugfuehrung.
THE EYE-MARK INVESTIGATION AS AN ANTHROPOTECHNICAL METHOD TO STUDY MAN MACHINE SYSTEMS [DIE BLICKZIELUNTERSUCHUNG ALS ANTHROPOTECHNISCHE UNTERSUCHUNGSMETHODE IM MENSCH-MASCHINE-SYSTEM]
Rainer Uckermann *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 187-199 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Methods and instrumentation used in research on the sequence of eye fixations performed by an aircraft pilot as he guides an aircraft are discussed. The oculogram method, the cornea-reflex method, and the motionless method used in the DEBIC apparatus are summarized, and the apparatus used by the DFVLR are described. Research results obtained using these methods and apparatus are briefly discussed. ESA

N87-13161# Technische Univ., Brunswick (West Germany). Fachgebeit Arbeitswissenschaft.
BASIC CONCEPTIONS FOR THE EVALUATION OF MAN MACHINE SYSTEMS [GRUNDKONZEPT FUER DIE BEWERTUNG VON MENSCH-MASCHINE-SYSTEMEN]
J.-H. Kirchner *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 200-212 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

The requirements for evaluating man-machine systems are given, and evaluation procedures are discussed in detail. Direct and indirect evaluation of man-machine systems is addressed. A concept for such evaluation is developed, stressing its ergonomic aspects. ESA

N87-13162# Dortmund Univ. (West Germany). Inst. fuer Arbeitsphysiologie.
INQUIRY TECHNIQUES FOR THE EVALUATION OF MAN MACHINE SYSTEMS [BEFRAGUNGSTECHNIKEN BEI DER BEWERTUNG VON MENSCH-MASCHINE-SYSTEMEN]
Martin Schuette *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 213-228 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

The study of loads imposed on a person and the resulting psychophysical consequences for that person in the context of a man-machine interaction is discussed. Both environmentally caused and task-based loads are considered. Two approaches to investigating these aspects of man-machine systems are examined, an older one-dimensional approach and a more recent multidimensional one. The resulting evaluation of loads in either absolute or relative terms is discussed. ESA

N87-13163# Standard Elektrik Lorenz A.G., Stuttgart (West Germany). Forchungszentrum.
A MEASURE OF USABILITY
W. Flohrer *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 229-238 (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

In order to evaluate the usability of technical equipment not only the time of operation and the error rate have to be considered but also the learning process, i.e., the function time of operation versus number of repeated test trials. The analysis of data (test results), collected over many years, has shown, that the learning curve can be approximated by a simple mathematical formula; the parameters of which differ from one system, device or equipment to another but can easily be calculated. The parameters found can be used to evaluate technical equipment with respect to its usability. Such a measure of usability could enable the engineer or manager to compare technical equipment not only by technical viewpoints or costs but also by one criterion of human factors engineering. ESA

N87-13164# Muenster Univ. (West Germany). Psychologisches Inst. 2.
EVALUATION OF THE BEARING AND KNOWLEDGE REQUIREMENTS OF MAN MACHINE SYSTEMS [DIE BEWERTUNG DER LERN- UND WISSENSANFORDERUNGEN VON MENSCH-MASCHINE-SYSTEMEN]
Tom Boesser *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 239-248 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

The division of the learning process into an acquisition and an exercise phase is outlined. Examples of learning processes

are given. The theoretical and methodological fundamentals of the evaluation method are explained. The method was tested on a number of simple examples and proves to be usable. Problems encountered in the practical application of the method are presented. The implementation of improvements is planned. ESA

N87-13165# Siemens A.G., Karlsruhe (West Germany). Systemtechnische Entwicklung.
EMPIRICAL DETERMINATION AMONG SUPERINTENDENTS OF THE ACCEPTABLE USER SURFACE IN DIGITALLY AUTOMATED HEATING-VENTILATION AIR CONDITIONING SYSTEMS [EMPIRISCHE ERMITTLUNG DER FUER HAUSMEISTER AKZEPTABLEN BENUTZEROBERFLAECHE BEI DIGITAL AUTOMATISIERTEN HEIZUNGS-LUEFTUNGS-KLIMA-ANLAGEN]
H. J. Charwat *In* DGLR Proceedings of a Symposium on the Evaluation of Man-Machine Systems: Methods and Problems 1985 p 249-269 In GERMAN (For primary document see N87-13146 04-54)
Avail: NTIS HC A13/MF A01

Inquiries were conducted among superintendents of heating-ventilation air (HVA) conditioning systems in order to provide information for an acceptable and successful design of such systems. The user surface is only correct if it is accordance with the knowledge, the comprehension, the expectations, and the practical behavior of the potential user. The superintendents' tasks were divided into six groups. A set of increasingly concrete questions was asked for each group (method of stepwise concretization) in order to exclude any suggestive effect. Verbal understanding problems were overcome by visualization. A design of a control system based on the results of these inquiries is presented. ESA

N87-13166*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE ECOLOGY OF MICROORGANISMS IN A SMALL CLOSED SYSTEM: POTENTIAL BENEFITS AND PROBLEMS FOR SPACE STATION
Elizabeth B. Rodgers Oct. 1986 61 p
(NASA-TM-86563; NAS 1.15:86563) Avail: NTIS HC A04/MF A01 CSCL 06K

The inevitble presence on the space station of microorganisms associated with crew members and their environment will have the potential for both benefits and a range of problems including illness and corrosion of materials. This report reviews the literature presenting information about microorganisms pertinent to Environmental Control and Life Support (ECLS) on the space station. The perspective of the report is ecological, viewing the space station as an ecosystem in which biological relationships are affected by factors such as zero gravity and by closure of a small volume of space. Potential sites and activities of microorganisms on the space station and their environmental limits, microbial standards for the space station, monitoring and control methods, effects of space factors on microorganisms, and extraterrestrial contamination are discussed. Author

N87-13167*# McDonnell-Douglas Astronautics Co., Houston, Tex.
ADVANCED EVA SYSTEM DESIGN REQUIREMENTS STUDY Final Technical Report
Jan. 1986 248 p
(Contract NAS9-17299)
(NASA-CR-171942; NAS 1.26:171942; MDC-W0072) Avail: NTIS HC A11/MF A01 CSCL 05H

Design requirements and criteria for the Space Station Advanced Extravehicular Activity System (EVAS) including crew enclosures, portable life support systems, maneuvering propulsion systems, and related extravehicular activity (EVA) support equipment were defined and established. The EVA mission requirements, environments, and medical and physiological requirements, as well as opertional, procedures, and training issues were considered. B.G.

N87-13168# Olis Engineering, Sedalia, Colo.
CONCEPT STUDY - VEHICLE WASTE DISPOSAL SYSTEM Final Report, 1 Aug. 1985 - 28 Jan. 1986
Carter K. Lord 28 Jan. 1986 30 p
(Contract DAAE07-85-C-R089)
(AD-A169045; TACOM-TR-13155) Avail: NTIS HC A03/MF A01 CSCL 13/6

This concept study was initiated to investigate the feasibility of developing a waste disposal system to process and dispose of human waste generated in combat vehicles operating in a nuclear, biological, and chemical (NBC) contaminated environment. GRA

N87-13169# Naval Biodynamics Lab., New Orleans, La.
GUIDELINES FOR SAFE HUMAN EXPERIMENTAL EXPOSURE TO IMPACT ACCELERATION
Marc S. Weiss and Leonard S. Lustick 1986 33 p
(AD-A169347; NBDL-86R006) Avail: NTIS HC A03/MF A01 CSCL 06/19

The objective of the human volunteer impact experiments at the Naval Biodynamics Laboratory (NBDL) is to provide a quality data base for modeling human dynamic and phsyiological responses to impact, and for establishing the relationship between dynamic response parameters and injury. To achieve this objective, the human volunteer impact experiments must be conducted at levels of impact that may produce discomfort but are safe in as much as the experiments have an acceptably low probability of producing any permanent or irreversible injury. These safe levels of impact are derived from one or more of the following sources: (1) exposures employed in previous NBDL research with human subjects; (2) human exposure data from other research sources; (3) exposures using human surrogates/human cadavers; and, (4) mathematical modeling techniques. Based on a review of these sources, limits suggested to the Committee for the Protection of Human Subjects as safe guidelines are included. These are recommended limits for torso-restrained NBDL volunteers, where the freely moving head and neck are the anatomical segments most at risk. GRA

N87-13170# Department of the Air Force, Washington, D.C.
RAPID ACTING ELECTRO-PNEUMATIC ANTI-G SUIT CONTROL VALVE Patent Application
Robert E. VanPatten, inventor (to Air Force) Filed 24 Feb. 1986 23 p
(AD-D012377; US-Patent-Appl-SN-831901) Avail: NTIS HC A02/MF A01 CSCL 13/7

This patent application discloses a novel anti-G suit valve system which provides very rapid response to imminent high acceleration. The disclosed embodiments of the new valve system can be retrofitted to existing mechanical and anti-G valves to create a hybrid valve system capable of achieving the desired qualities of fast triggering of the valve in response to imminent acceleration and maximum rate inflation of the anti-G suit. The new valve system measures acceleration and, by differentiation, the rate of change of acceleration. When both acceleration and rate of change of acceleration exceed preselected values, a solenoid mounted in place of the press-to-test button on a mechanical anti-G valve is energized for a preselected period of time to fully depress the valve spindle, providing maximum rate delivery of pressurized air. The hybrid valve reverts to normal operation at the end of the preselected period of time. Another embodiment monitors an aircraft computer control system digital data bus and adds the requirement of detecting preselected signal values from the data bus to trigger the delivery of pressurized air. A modification of this embodiment requires only the detection of the preselected data bus signal values to initiate maximum rate delivery of pressurized air for the preselected period of time. The anti-G suit valve system may also be operated by manually determining the imminent likelihood of high acceleration and manually actuating the maximum rate delivery. GRA

N87-13171# Department of the Air Force, Washington, D.C.
IMPROVED ANTI-G SUIT Patent Application
Thomas J. Jennings, inventor (to Air Force) Filed 24 Feb. 1986 14 p
(AD-D012378; US-Patent-Appl-SN-831886) Avail: NTIS HC A02/MF A01 CSCL 15/5

This patent application discloses an improved anti-G suit which incorporates stiffening inserts sized and shaped to cover each inflatable air bladder and inserted between the bladders and the anti-G suit fabric. The stiffeners may be made of polypropylene, neoprene rubber, or a composite structure of Kevlar fabric and polyethylene. A butt strap covers the buttocks of an aircrew member and is secured by belts extending across the abdominal and the high bladders of the anti-G suit. Inflation of the air bladders pulls the strap butt to compress the butt strap tightly against the aircrew member's buttocks. GRA

N87-13172# Computer Technology Associates, Inc., McLean, Va.
HUMAN PERFORMANCE ASPECTS OF SMALL SCREEN DISPLAYS: A LITERATURE REVIEW REVEALING THE LACK OF SPECIFIC RESEARCH Final Report
Rebecca L. Shannon and Lisa J. Stewart May 1986 59 p
(Contract DAAK11-84-D-0008)
(AD-A170660; HEL-TN-5-86) Avail: NTIS HC A04/MF A01 CSCL 05/10

Literature from diverse disciplines pertinent to the human performance aspects of small screen displays was examined. In particular, four subtopics were focused on. They include: display size, defined as number of characters per number of lines; protocols, defined as ways users interact with a system to achieve their goals; abbreviations; and vocabulary. The results indicate the lack of specific research on small screen displays but also indicate a trend in current research interest and towards interest in the near future. The report points out other research trends and voids and contains an annotated bibliography of more than 100 source documents. Author (GRA)

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

N87-13173# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
UTILIZATION OF IMPACT DOT MATRIX PRINTERS [UTILITARIOS PARA IMPRESSORAS MATRICIAIS EM PROCESSAMENTO DIGITAL DE IMAGENS]
Adriana Abrahao, Moacir Godoy, Jr., and Joao Argemiro deCarvalho Paiva Sep. 1986 54 p In PORTUGUESE; ENGLISH summary
(INPE-3991-RPE/518) Avail: NTIS HC A04/MF A01

Instructions for using a graphic output system adapted to an impact dot matrix printer are presented. This system represents an improvement on conventional printing systems developed for alphanumeric printers. Author

N87-13174# Massachusetts Univ., Amherst. Dept. of Electrical and Computer Engineering.
YIELD AND PERFORMANCE ENHANCEMENT THROUGH REDUNDANCY IN VLSI AND WSI MULTI-PRECESSOR SYSTEMS
Israel Koren and Dhiraj K. Pradhan 1986 52 p
(Grant AF-AFOSR-0052-84)
(AD-A169930; AFOSR-86-0389TR) Avail: NTIS HC A04/MF A01 CSCL 09/2

New challenges have been brought to fault-tolerant computing and processor architecture research because of developments in IC technology. One emergent area is development of architectures, built by interconnecting a large number of processing elements on a single chip or wafer. Two important areas, related to such VLSI processor arrays, are the focus of this paper; they are fault-tolerance, and yield improvement techniques. Fault-tolerance in these VLSI processor arrays is of real practical significance; it provides for much-needed reliability improvement. Therefore, we first describe the underlying concepts of fault-tolerance at work in these multi-processor systems. These precepts are useful to then present certain techniques that will incorporate fault-tolerance integrally into the design. In the second part of the paper we discuss models that evaluate how yield enhancement and reliability improvement may be achieved by certain fault-tolerant techniques. Author (GRA)

N87-13175# Sandia National Labs., Albuquerque, N. Mex.
RELIABILITY STUDY OF RETENTION AND MEMORY GATE INTEGRITY IN A 1K MNOS RAM
R. D. Nasby, W. M. Miller, and R. L. White 1986 6 p Presented at the 8th IEEE Non-Volatile Semiconductor Memory Workshop, Vail, Colo., 18 Aug. 1986
(Contract DE-AC04-76DP-00789)
(DE86-010483; SAND-86-2079C; CONF-860872-1) Avail: NTIS HC A02/MF A01

The reliability of a 1K MNOS RAM with regards to retention and nitride gate integrity has been demonstrated. Over 400 devices were screened and life tested to demonstrate 0.999 reliability during device life. The device was a 1K MNOS memory used in a RAM application with an erase/write cycle of 32 microseconds and a life specification of 1E7 cycles. DOE

N87-13176# Sandia National Labs., Albuquerque, N. Mex.
SPRINT 3: SERIAL-PARALLEL REMOTE INTERFACE SYSTEM DEVELOPMENT REPORT
J. S. Rathbun Mar. 1986 55 p
(Contract DE-AC04-76DP-00789)
(DE86-010590; SAND-84-2273) Avail: NTIS HC A04/MF A01

This development report/reference manual describes a high-speed digital Serial/Parallel Remote Interface System (SPRINT), which was developed to function as a primary data interface in the Remote Digitizing/High-Density Digital Recording system currently under development to interface the Remote Complex Wave Vibration Test Facility (Bldg. 6610) with the Central Vibration Test Control Facility (Bldg. 6650) at SNLA/AIII. The SPRINT system described in this report provides serial transmission of high-speed parallel data originating in Bldg. 6610 via synchronous fiber-optic links to Bldg. 6650, where the incoming serial data is converted back to parallel form and transferred to disc media for subsequent processing/reduction. From an input/output standpoint, the SPRINT system is electrically transparent, capable of providing parallel data through rates of up to 1 megaword/sec for 22-bit parallel input data while maintaining a serial bit-error rate of less than 10^{-15} with virtual immunity to EMI/RFI associated noise. This report will discuss the electrical characteristics and operation of the SPRINT system from both system and component-level viewpoints. DOE

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

N87-13177# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A PROCEDURE FOR AUTOMATIC TREATMENT OF DYNAMIC SYSTEMS STATE OBSERVATION BIAS ERRORS
Valcir Orlando and Atair Rios Neto May 1986 8 p In PORTUGUESE; ENGLISH summary
(INPE-3908-PRE/918) Avail: NTIS HC A02/MF A01

Bias type errors are generally present in measurements either due to the equipment or to external phonomena. In this work a procedure to directly treat biased observations in the Kalman filter state estimation process, with no need of a priori bias correction, is presented. To do this a dynamic compensation process is used by modelling the observation bias as a first-order Gauss Markov dynamic process. The resulting bias dynamic equations are then incorporated into the dynamic system equations. The procedure was tested by computerized simulation of a low altitude artificial satellite orbit estimation, using range and range rate simulated tracking data considering atmospheric refraction bias errors. Author

N87-13178*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
OBSERVATION MODEL AND PARAMETER PARTIALS FOR THE JPL VLBI PARAMETER ESTIMATION SOFTWARE MASTERFIT-1986
O. J. Sovers and J. L. Fanselow 1 Aug. 1986 68 p
(NASA-CR-179919; JPL-Pub-83-39-Rev-2; NAS 1.26:179919) Avail: NTIS HC A04/MF A01 CSCL 09B

In applications of radio interferometry to geodynamics and astrometry, observed values of delay and delay rate obtained from observations of many different radio sources must be passed simultaneously through a multiparameter estimation routine to extract the significant model parameters. As the accuracy of radio interferometry has improved, increasingly complete models for the delay and delay rate observables have been developed. The current status of the delay model used in the Jet Propulsion Laboratory multiparameter estimation program MASTERFIT is described. It is assumed that the reader has at least a cursory knowledge of the principles of very long baseline interferometery. The delay model is the sum of four major model components: geometry, clock, troposphere, and ionosphere. Current models for these components, as well as their partial derivatives with respect to parameters that are to be adjusted by multiparameter fits to the data are presented. The geometric delay is discussed. The technique used to obtain the delay rate model from the delay model is described. The values of physical constants used in MASTERFIT are given. Model improvements that may be required by more accurate data in the future are outlined. Author

N87-13179# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
TOOL TO DEVELOP REAL TIME SIMULATION SYSTEMS M.S. Thesis [FERRAMENTA PARA DESENVOLVIMENTO DE SISTEMAS DE SIMULACAO EM TEMPO REAL]
Carmen Lucia RuybaldosSantos Aug. 1986 196 p In PORTUGUESE; ENGLISH summary
(INPE-3979-TDL/233) Avail: NTIS HC A09/MF A01

The development of a tool for testing and documenting the constituent subsystems of a real time simulation system, written in FORTRAN language, is described. This tool can be seen as an environment to simulate the operation of all subsystems of the simulated system, except one: the subsystem under test. The documentation of each subsystem is attached to it. Simulation results are presented by means of tables and curves. The tool was used in perfecting the flight simulator for the Empresa Brasileira de Aeronautica (EMBRAER) T-27 airplane, developed at the Centro tecnico Aeroespacial - CTA (IPD-PEA). Accompanying the report are printouts regarding the results of a simulation and documentation for the atmosphere subsystem which is part of the simulator described above. Author

N87-13180# Stanford Univ., Calif. Systems Optimization Lab.
USER'S GUIDE FOR NPSOL (VERSION 4.0): A FORTRAN PACKAGE FOR NONLINEAR PROGRAMMING
Philip E. Gill, Walter Murray, Michael A. Saunders, and Margaret H. Wright Jan. 1986 60 p
(Contracts N00014-85-K-0343; DAAG29-84-K-0156)
(AD-A169115; SOL-86-2; ARO-21592.8-MA) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report forms the user's guide for Version 4.0 of NPSOL, a set of Fortran subroutines designed to minimize a smooth function subject to constraints, which may include simple bounds on the variables, linear constraints and smooth nonlinear constraints. (NPSOL may also be used for unconstrained, bound-constrained and linearly constrained optimization.) The user must provide subroutines that define the objective and constraint functions and (optionally) their gradients. All matrices are treated as dense, and hence NPSOL is not intended for large sparse problems. NPSOL uses a sequential quadratic programming (SQP) algorithm, in which the search directions is the solution of a quadratic programming (QP) subproblem. The algorithm treats bounds, linear constraints and nonlinear constraints separately. The Hessian of each QP subproblem is a positive-definite quasi-Newton approximation to the Hessian of the Lagrangian function. The steplength at each iteration is required to produce a sufficient decrease an augmented Lagrangian merit function. Each QP subproblem is solved using a quadratic programming package with several features that improve the efficiency of an SPQ algorithm. Author (GRA)

N87-13181# Army Military Personnel Center, Alexandria, Va.
SPECIAL ASSOCIATIVE PREPROCESSING STRUCTURES FOR QUALITATIVE FEATURE EXTRACTION Final Report
Michael C. Bibby 11 Jun. 1986 173 p
(AD-A169147) Avail: NTIS HC A08/MF A01 CSCL 09/2

Existing pattern recognition and classification algorithms in computer vision require vast amounts of computations on input data. As a result, memory access time is a critical parameter in system performance. Tremendous parallelism in structure and algorithm is required for the system to operate in real-time. A preprocessing structure for qualitative feature extraction which meets these system requirements is presented. In general, the structural architecture consists of a cellular array of pixel-processors each containing an inherently parallel associative memory element. As such, memory access time is minimal and parallelism is maximized. By varying this basic structure with regard to interconnection and additional logic, specific structures result which are capable of extracting measures of specific qualitative features. In this thesis two specific structures are described which extract, respectively, the qualitative features of texture regularity and line trend. Applications of these structures are presented. Low-level simulation and performance estimates indicate these applications are viable and amenable to real-time operation. Suggestions for the development of structures which extract other features or multiple features are described. GRA

N87-13182# Stanford Univ., Calif. Systems Optimization Lab.
AN IMPLICIT ENUMERATION ALGORITHM WITH BINARY-VALUED CONSTRAINTS
Yieh-Hwang Wan Mar. 1986 113 p
(Contract N00014-85-K-0343)
(AD-A169256; SU-SOL-86-5) Avail: NTIS HC A06/MF A01 CSCL 09/2

In many capital budgeting problems, the basic decisions simply are whether to approve or reject various capital investment proposals. This naturally gives rise to binary decision variables and an integer programming formulation of the problem. In fact, this type of problem is one of the most important areas of application of integer programming. General-purpose algorithms for binary integer programming frequently are applied to capital

budgeting problems. However, such problems generally have a great deal of special structure, including contraints for mutually exclusive alternatives, contingent alternatives, and other interdependencies. (A project which can be undertaken at different discrete levels is a good example for mutually exclusive alternatives and a simple kind of contingent alternative concerns two-stage projects, where the second stage can be undertaken only if its first stage couterpart has been undertaken already. A similar relationship also can exist between two groups of mutually exclusive alternatives.) Many group contingent constraints, which are common in capital budgeting problems and scheduling problems, are binary valued. A capital budgeting model is presented. GRA

N87-13183# Naval Postgraduate School, Monterey, Calif
A SOFTWARE IMPLEMENTATION OF AN INTERACTIVE GRAPHICS SYSTEM FOR THREE DIMENSIONAL MODELING AND LAYOUT M.S. Thesis
Surasak Mungsing Mar. 1986 52 p
(AD-A169264) Avail: NTIS HC A04/MF A01 CSCL 05/8

This thesis examines interactive techniques for viewing a 3-D building model in a walkthrough fashion and for placing 3-D piping into a 3-D building model. The focus of research is software implementation using the C programming language and the IRIS Graphics Library on the Silicon Graphics Inc. IRIS Turbo 2400 interactive graphics system. The first part of the research is concerned with drawing, viewing a 3-D building model, and examining interactive techniques required for building walkthrough mechanisms. The second part is concerned with the development of techniques necessary to allow the placement of 3-D piping into a 3-D building model using 2-D graphics display and a mouse device. The algorithms and implementation of these techniques are presented. GRA

N87-13184# California Univ., Irvine. Dept. of Information and Computer Science.
LANGUAGE ACQUISITION AND MACHINE LEARNING Interim Report, Jun. - Dec. 1985
Pat Langley and Jamie G. Carbonell 1 Feb. 1986 40 p
(Contract N00014-84-K-0345)
(AD-A169581; UCI-ICS-TR-86-12; TR-4) Avail: NTIS HC A03/MF A01 CSCL 09/2

Recent progress in the field of machine learning is reviewed and implications for computational models of language acquisition examined. As a framework for understanding this research, the authors propose four component tasks involved in learning from experience-aggregation, clustering, characterization, and storage. They then consider four common problems studied by machine learning researchers, i.e., learning from examples, heuristics learning, conceptual clustering, and learning macro-operators, describing each in terms of the framework. After this, they turn to the problem of grammar acquisition, relating this problem to other learning tasks and reviewing four AI systems that have addressed the problem. Finally, they note some limitations of the earlier work and propose an alternative approach to modeling the mechanisms underlying language acquisition. Author (GRA)

N87-13185# George Washington Univ., Washington, D.C. Inst. for Management Science and Engineering.
THE CONTINUOUS PROJECTIVE SUMT METHOD FOR CONVEX PROGRAMMING
Garth P. McCormick 4 Jun. 1986 24 p
(AD-A169847; AD-E750914; GWU/IMSE/SERIAL-T-507/86) Avail: NTIS HC A02/MF A01 CSCL 12/1

An algorithm for solving convex programming problems is derived from the differential equations characterizing the trajectory of unconstrained minimizers of the classical logarithmic barrier function method. Convergence of this continuous Projective SUMT (sequential unconstrained minimization techniques) method to a global solution of a convex programming problem is proved under minimal assumptions. Extension of the algorithm to a form which handles linear equality constraints produces a differential equation analogue of Karmarkar's projective method for linear programming. The concluding discussion includes a discrete form of the algorithm. GRA

N87-13186# IIT Research Inst., Rome, N.Y.
CATALOG OF RESOURCES FOR EDUCATION IN ADA (TRADE NAME) AND SOFTWARE ENGINEERING (CREASE), VERSION 4.0
May 1986 312 p
(Contract MDA903-83-C-0306)
(AD A169892) Avail: NTIS HC A14/MF A01 CSCL 09/2

Over the last twenty-five years software technology has made enormous strides. The Ada program serves as a focal point for the consolidation of state-of-the-art thinking about this technology. Proper use of the technology can contribute significantly to controlling the cost and improving the quality of software. However, this is a sophisticated technology, and its proper use depends upon sophisticated education and training for the people applying it. The effectiveness of the Ada programming language will be determined by the degree to which people are able to use it to implement software engineering practices in applications programming. A carefully planned education and training program, which teaches both fundamental software engineering concepts and the effective use of the Ada language, is therefore essential. This publication is intended to serve as a source of information about resources available to those who are planning such programs, with the hope that will not only serve as a ready reference, but will also increase awareness of the many aspects of education in Ada and Software Engineering. Author (GRA)

N87-13187# Wisconsin Univ., Madison. Dept. of Computer Sciences.
SOR (SUCCESSIVE OVER-RELAXATION) MGR (MULTIGRID ALGORITHM)(nu) EXPERIMENTS ON THE CRYSTAL MULTICOMPUTER
David Kamowitz Jan. 1986 49 p
(Grants NSF MCS-81-05904; AF-AFOSR-0275-82)
(AD-A169929; AFOSR-86-0411TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report describes distributed implementations of the red/black SOR algorithm and of the MGR(nu) multigrid algorithm on the Crystal multicomputer. Rates of convergence and observed effciencies for both algorithms are compared. GRA

N87-13188# Texas Univ., Austin. Dept. of Computer Sciences.
HIGH PERFORMANCE PARALLEL COMPUTING Final Report, 1 Feb. 1984 - 31 Jan. 1985
J. C. Browne and G. J. Lipovski 22 Jan. 1986 23 p
(Contract F49620-84-C-0020)
(AD-A169981; AFOSR-86-0457TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

The 1984/85 accomplishments of the research project High Performance Parallel Computing included bringing the prototype of the Texas Reconfigurable Array Computer (TRAC) to a configuration and to a state of stability where it could support execution of simple assembly language programs, initial development of a unified model of parallel computation which is a basis for a programming environment uniting process and data flow models of parallel computation, bringing to operational status on an alternative host one of the two parallel programming languages (the Computation Structures Language, CSL) originally intended for use on TRAC, exploration of the expressive capabilities of this programming language, initiation of development of a graphical programming language based on the unified model of parallel computation mentioned preceding, major progress on a graphically interfaced Petri Net-based performance modeling system for parallel computations and development of algorithms for scheduling of circuits to realize configurations in configurable banyan network based computer architectures. GRA

N87-13189# Georgia Inst. of Tech., Atlanta. Production and Distribution Research Center.
AN IMPLICIT ENUMERATION PROCEDURE FOR THE GENERAL LINEAR COMPLEMENTARITY PROBLEM

Faiz A. Al-Khayyal Jun. 1986 41 p
(Contract N00014-86-K-0173)
(AD-A170397; PDRC-86-05) Avail: NTIS HC A03/MF A01 CSCL 12/1

An algorithm is presented for solving a quadr :tic programming formulation of the linear complementarity problem. No assumptions on the problem data are required. The algorithm is designed to solve the problem by implicitly enumerating the 2 superscript n complementary cones. Geometrically, the procedure amounts to searching the extreme points of a sequence of faces of the constraint polyhedron of decreasing dimension. An extension to the procedure for finding all solutions of an arbitrary complementarity problem is also discussed. The procedure has been implemented and tested on forty randomly generated problems (up to fifty dimensional) having dense indefinite defining matrices. The results of these tests demonstrate the superiority of this approach over two competing methods. GRA

N87-13190# Clarkson Univ., Potsdam, N.Y. Dept. of Electrical and Computer Engineering.
A RULE-BASED PATTERN MATCHING SYSTEM FOR THE RECOGNITION OF THREE-DIMENSIONAL LINE DRAWN OBJECTS: A FOUNDATION FOR VIDEO TRACKING
Y. S. Fong 1986 83 p
(Contract N00014-85-C-2421)
(AD-A170701) Avail: NTIS HC A05/MF A01 CSCL 09/2

Object recognition is an important subtask in image understanding, moving object tracking, and scene analysis. When identifying an object in a scene, it is essential that the same object is recognized from different view angles. Also, in cases where the object is occluded or the image is noisy, the recognition is expected to function under the existence of uncertainty. A system for object recognition, with emphasis on view angle independence, is studied. The system uses simple line drawn objects as the input image. An algorithm to extract important information from the image is developed. A rule-based pattern matching scheme is used to recognize the object in the image. In each decision made, a confidence factor is associated to indicate the system's certainty in making this decision. This study shows that the rule-based pattern matching system is a useful and flexible framework for object recognition and scene analysis. Author (GRA)

N87-13191# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
INTRODUCTION TO THE THEORY OF NESTED TRANSACTIONS
Nancy Lynch and Michael Merritt Jul. 1986 65 p Prepared in cooperation with Bell Telephone Labs., Murray Hill, N.J.
(Contracts N00014-85-K-0168; N00014-83-K-0125; DAAG29-84-K-0058; Grant NSF DCR-83-02391)
(AD-A171428; MIT/LCS/TR-367) Avail: NTIS HC A04/MF A01 CSCL 09/2

This paper develops the foundation for a general theory of nested transactions. We present a simple formal model for studying concurrency and resiliency in a nested environment. This model has distinct advantages over the many alternatives, the greatest of which is the unification of a subject replete with formalisms, correctness conditions and proof techniques. The authors are presently engaged in an ambitious project to recast the substantial amount of work in nested transactions within this single intuitive framework. These pages contain the preliminary results of that project - a description of the model, and its use in stating and proving correctness conditions for two variations of a well-known algorithm. GRA

N87-13192# Institute for Defense Analyses, Alexandria, Va.
PROCEEDINGS OF THE IDA WORKSHOP ON FORMAL SPECIFICATION AND VERIFICATION OF ADA (TRADE NAME) (1ST) HELD IN ALEXANDRIA, VIRGINIA ON 18-20 MARCH 1985
Clyde G. Roby Dec. 1985 389 p Workshop held in Alexandria, Va., 18-20 Mar. 1985
(Contract MDA903-84-C-0031)
(AD-A171507; AD-E500793; IDA-M-146; IDA/HQ-85-30658) Avail: NTIS HC A17/MF A01 CSCL 09/2

The first IDA Workshop identified current issues in Ada verification: the uses of formal verification; what verification techniques and verification systems are available; what practical experience is there in the use of these approaches and who has this experience; what impact does Ada have on verification (both before and during coding activities); what are the major problems in the verification field; and what needs to be done to overcome these problems. Slides presented at the two-and-half day workshop are included. GRA

N87-13193# Oak Ridge National Lab., Tenn.
MATRIX FACTORIZATION ON A HYPERCUBE MULTIPROCESSOR
G. A. Geist and M. T. Heath Aug. 1985 21 p Presented at the Conference on Hypercube Multiprocessors, Knoxville, Tenn. 26 Aug. 1985
(Contract DE-AC05-84OR-21400)
(DE86-011775; CONF-8508178-1) Avail: NTIS HC A02/MF A01

This paper is concerned with parallel algorithms for matrix factorization on distributed-memory, message-passing multiprocessors, with special emphasis on the hypercube. Both Cholesky factorization of symmetric positive definite matrices and LU factorization of nonsymmetric matrices using partial pivoting are considered. The use of the resulting triangular factors to solve systems of linear equations by forward and back substitutions is also considered. Efficiencies of various parallel computational approaches are compared in terms of empirical results obtained on an Intel iPSC hypercube. DOE

N87-13194# Stanford Univ., Calif. Dept. of Operations Research.
SINGLE-PHASE METHOD FOR QUADRATIC PROGRAMMING
S. C. Hoyle Apr. 1986 69 p
(Contract DE-AS03-76ER-72018)
(DE86-012156; SOL-86-9) Avail: NTIS HC A04/MF A01

This report describes a single-phase quadratic programming (QP) method. A need for such a method is apparent when solving a sequence of closely-related QPs. One example of this is in the area of nonlinear programming, which uses sequential quadratic programming. Another example is sensitivity analysis involving the constraints. In both of these examples, if the quadratic problem are large-scale and the initial point is infeasible, the single-phase method of this report may be particularly useful. If the Hessian is indefinite, the method will find a local minimum when solving a dense QP, and a constrained stationary point when solving a large-scale QP. If the Hessian is positive definite, it will find the global minimum. The single-phase method of this report is an active-set method which solves a sequence of equality-constrained quadratic programs (EQP). It differs from other active-set methods in that the current iterate may violate constraints in the working set (the prediction of thhe active set). Special care has been taken to avoid rank deficiency in the working set. An efficient means of solving the successive EQPs of a large-scale problem is included. Finally, an implementation of the method for dense QPs is described. DOE

N87-13195# Lawrence Livermore National Lab., Calif.
USING 3-DIMENSIONAL GRAPHICS TO VISUALIZE MULTIVARIATE SCIENTIFIC DATA
S. L. Grotch Apr. 1986 15 p Presented at the Symposium on Measurement of Toxic Air Pollutants, Raleigh, N.C., 27 Apr. 1986
(Contract W-7405-eng-48)
(DE86-010788; UCRL-93658; CONF-860426-2) Avail: NTIS HC A02/MF A01

The two dimensional plot is unquestionably the most common-place graphics tool of the scientist. Yet in dealing with problems often involving high dimensionality, more sophisticated representations (such as 3D) are only infrequently used. In the work reported here, several real-world examples are used to illustrate the wide variety and the resultant interpretive potential possible through the use of three dimensional graphics. These examples are a study of climate data and of air pollution monitoring. Among the

variety of 3D plots presented are discrete point plots; mesh-like surface plots showing either theoretical or empirical model behavior; and combinations of points and surfaces. Some of the many techniques available to enhance the utility of such graphics are shown. DOE

N87-13196# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Computer Science.
HOMPACK: A SUITE OF CODES FOR GLOBALLY CONVERGENT HOMOTOPY ALGORITHMS
L. T. Watson, S. C. Billups (Sandia National Labs., Albuquerque, N. Mex.), and A. P. Morgan (General Motors Research Labs., Warren, Mich.) 11 Nov. 1985 26 p Presented at the SIAM National Meeting, Boston, MA., 21 Jul. 1986 Prepared in cooperation with Sandia National Labs., Albuquerque, NM.; General Motors Research Labs., Warren, MI.
(Contract DE-AC04-76DP-00789)
(DE86-011644; SAND-86-1328C; CONF-860744-1; TR-85-34) Avail: NTIS HC A03/MF A01

There are algorithms for finding zeros or fixed points of nonlinear systems of equations that are globally convergent for almost all starting points, i.e., with probability one. The essence of all such algorithms is the construction of an appropriate homotopy map and then tracking some smooth curve in the zero set of this homotopy map. HOMPACK provides three qualitatively different algorithms for tracking the homotopy zero curve: ordinary differential equation based, normal flow, and augmented Jacobian matrix. Separate routines are also provided for dense and sparse Jacobian matrices. A high level driver is included for the special case of polynomial systems. DOE

N87-13197# Sandia National Labs., Albuquerque, N. Mex. Scientific Operating Systems Div.
INTERPRETIVE MODEL FOR A CONCURRENCY METHOD
C. L. Carter Jun. 1986 24 p
(Contract DE-AC04-76DP-00789)
(DE86-012743; SAND-86-0586) Avail: NTIS HC A02/MF A01

A Concurrency Method is a language embodying the data flow characteristics of data-drive and single-assignment. The interpreter for A Concurrency Method models a physical machine with an architecture directed toward this language. The interpreter is a complete system with scheduler, editor, load balancer and message handler. This model embraces some architectural features in other data flow machines and models and combines these features in a manner most conductive to this language. DOE

N87-13198# Oak Ridge National Lab., Tenn.
SURVEY OF THE CHARACTERISTICS OF VERY HIGH LEVEL LANGUAGES
R. S. Loffman 1986 5 p Presented at the 17th International Rochester Conference, Rochester, N.Y., 2 Jun. 1986
(Contract DE-AC05-84OR-21400)
(DE86-012240; CONF-8606152-1) Avail: NTIS HC A02/MF A01

Although there is no consensus on the characteristics of very high level languages (VHLLs), ample evidence exists that users of such languages have several expectations. As a result of an extensive survey of the literature and communications with researchers, it was concluded that six characteristics of VHLLs are desired. These are that the language: (1) be nonprocedural, (2) allow implicit referencing, (3) provide a good interface between user and computer, (4) allow for verification, (5) be extensible, and (6) provide the means for better data representation. It was also concluded that no existing language has all six characteristics. DOE

N87-13199# Oak Ridge National Lab., Tenn.
SOLVING SCIENTIFIC PROBLEMS ON HYPERCUBE PARALLEL COMPUTERS
R. C. Ward 15 May 1986 5 p Presented at the Supercomputing Decision for Scientific Computing Conference, Fairfax, Va., 15 May 1986
(Contract DE-AC05-84OR-21400)
(DE86-012622; CONF-8605160-1) Avail: NTIS HC A02/MF A01

The presentation discusses the research activities on hypercube parallel computers at Oak Ridge National Laboratory and assesses the potential of hypercubes for solving large scale scientific computational problems. Items discussed are the reasons ORNL purchased two hypercube computers, the results of basic research on matrix computations, the status of the seven applications projects being converted to run on the hypercube, the suggested steps for programming parallel computers, and the advantages and problem areas of the hypercube architecture for solving today's scientific problems. DOE

62 COMPUTER SYSTEMS

Includes computer networks and special application computer systems.

N87-13200# Sparta, Inc., McLean, Va.
DEPARTMENT OF DEFENSE GATEWAY ARCHITECTURE AND FUNCTIONAL REQUIREMENTS Final Report
11 Dec. 1985 64 p
(Contract DCA100-84-C-0085)
(AD-A169086; URW-5-DCA-043) Avail: NTIS HC A04/MF A01 CSCL 17/2

This document presents the functional requirements for DoD Internetwork gateways. The requirements themselves are highlighted in Sections 3 and 5 through 7. In addition, Section 1 discusses the motivations for these requirements in terms of Gateway's role the DoD Internetwork; Section 2 discusses successful gateway designs. Section 4 illuminates several gateway design tradeoff areas, where design options can be used to match specific operational and performance requirements. GRA

N87-13201# California Univ., Berkeley.
DISTRIBUTED NAME SERVERS: NAMING AND CACHING IN LARGE DISTRIBUTED COMPUTING ENVIRONMENTS
Douglas B. Terry Dec. 1985 133 p
(Contracts N00039-84-C-0089; ARPA Order 4871)
(AD-A169225) Avail: NTIS HC A07/MF A01 CSCL 09/2

Name services facilitate sharing in distributed environments by allowing objects to be named unambiguously and maintaining a set of application-defined attributes for each named object. Existing distributed name services, which manage names based on their syntactic structure, may lack the flexibility needed by large, diverse, and evolving computing communities. A new approach, structure-free name management, separates three activities; choosing names, selecting the storage sites for object attributes, and resolving an object's name to its attributes. Administrative entities apportion the responsibility for managing various names, while the name service's information needed to locate an object's attributes can be independently reconfigured to improve performance or meet changing demands. An analytical performance model for distributed name services provides assessments of the effect of various design and configuration choices on the cost of name service operations. Measurements of Xerox's Grapevine registration service are used as inputs to the model to demonstrate the benefits of replicating an object's attributes to coincide with sizeable localities of interest. Additional performance benefits result from client's acquiring local caches of name service data treated as hints. A cache management strategy that maintains a minimum level of cache accuracy is shown to be more effective than the usual technique of maximizing the hit ratio. Author (GRA)

N87-13202# California Univ., Berkeley.
AVAILABILITY AND CONSISTENCY OF GLOBAL INFORMATION IN COMPUTER NETWORKS Final Report, 1 Sep. 1983 - 31 Oct. 1985
C. V. Ramamoorthy May 1986 212 p
(Contract DAAG29-83-K-0086)
(AD-A169247; ARO-19159.3-EL) Avail: NTIS HC A10/MF A01 CSCL 09/2

A principal feature of computer networks is the ability of the

various sites of the network to access and update shared information. At the application level, the global information takes the form of shared file systems, databases, etc., and at lower levels, it takes the form of status information used in controlling the network. This research focused techniques for maintaining the availability of global information in the face of various kinds of failures and the consistency of global information in the presence of concurrency. Two failure models were considered: the crash model, in which failures are instantly detected, and the malfunction model, in which an indefinite period of time may lapse before failures are detected. A network status maintenance scheme based on a global clock facility was designed for the crash model. For the malfunction model, an approach to maintaining the correctness of global information and preventing error propagation was developed. Centralized and distributed deadlock detection algorithms were developed for distributed databases. Author (GRA)

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

N87-13203*# Martin Marietta Aerospace, Denver, Colo.
EVALUATION OF AUTOMATED DECISIONMAKING METHODOLOGIES AND DEVELOPMENT OF AN INTEGRATED ROBOTIC SYSTEM SIMULATION. APPENDIX B: ROBSIM PROGRAMMER'S GUIDE
D. C. Haley, B. J. Almand, M. M. Thomas, L. D. Krauze, K. D. Gremban, J. C. Sanborn, J. H. Kelly, T. M. Depkovich, W. J. Wolfe, and T. Nguyen Mar. 1986 318 p
(Contract NAS1-16759)
(NASA-CR-178052; NAS 1.26:178052; MCR-85-665-App-B) Avail: NTIS HC A14/MF A01 CSCL 09B

The purpose of the Robotic Simulation (ROBSIM) program is to provide a broad range of computer capabilities to assist in the design, verification, simulation, and study of robotic systems. ROBSIM is programmed in FORTRAM 77 and implemented on a VAX 11/750 computer using the VMS operating system. The programmer's guide describes the ROBSIM implementation and program logic flow, and the functions and structures of the different subroutines. With the manual and the in-code documentation, an experienced programmer can incorporate additional routines and modify existing ones to add desired capabilities. E.R.

N87-13204# Xerox Corp., Palo Alto, Calif. Intelligent Systems Lab.
SOAR USER'S MANUAL Report, 1 Jan. 1982 - 15 Jun. 1985
John E. Laird 31 Jan. 1986 118 p
(Contracts N00014-82-C-0067; F33615-81-K-1539)
(AD-A169005; ISL-15) Avail: NTIS HC A06/MF A01 CSCL 05/10

Soar is an architecture for general intelligence that has been applied to a variety of tasks: many of the classic artificial intelligence (AI) toy tasks such as the Tower of Hanoi, and the Blocks World; tasks that appear to involve complex, non-search reasoning, such as syllogisms, the three wise men puzzle, and sequence extrapolation; and large tasks requiring expert-level knowledge, such as the R1 computer-configuration task. This chapter provides a brief overview of the Soar architecture. In Soar, every task or problem is formulated as heuristic search in a problem space to achieve a goal. A problem space consists of a set of states and a set of operators that transform one state into another. Problem solving is the process of moving from a given initial state in the problem space through immediate states generated by operators until a desired state is reached that is recognized as attaining the goal. For each goal, there is always a single current problem space, state, and operator. The current problem space, state and operator, together with the goal, form a context. Goals (and their contexts) can have subgoals (and associated contexts), which form a strict goal-subgoal hierarchy. Soar is an architecture for problem solving and learning, based on heuristic search and chunking. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N87-13205# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A GENERALIZED PROJECTION METHOD FOR THE SOLUTION OF ALGEBRAIC LINEAR SYSTEMS
Ricardo L. U. deFreitasPinto and Atair Rios Neto Apr. 1986 21 p Sponsored by Instituto de Pesquisas Espaciais, Sao Jose dos Compos (Brazil) Submitted for publication
(INPE-3874-PRE/930) Avail: NTIS HC A02/MF A01

A sequential procedure for the solution of systems of algebraic linear equations with the number of equations less than or equal to the number of unknowns is presented. Following a strategy based on properties of matrices that can be considered as a generalization of the concept of a projection matrix, an algorithm is developed with a structure inspired in the linear estimation Kalman filter. Associated properties are presented and explored in terms of practical applications, together with numerical examples. The applications include pseudoinversion, optimization of quadratic objective functions with linear constraints, and iterative techniques for the solution of ill-conditioned linear systems. Author

N87-13206# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PERFORMANCE ANALYSIS OF SOME NUMERICAL ALGORITHMS IN THE RESOLUTION OF ODES ARTIFICIAL SATELLITE PROBLEMS [ANALISE DE DESEMPENHO DE ALGUNS ALGORITMOS NUMERICOS NA RESOLUCAO DE EDOS EM PROBLEMAS DE SATELITES ARTIFICIAIS]
Kondapalli Rama Rao Sep. 1986 16 p In PORTUGUESE; ENGLISH summary Presented at the 7th Congresso Latino-Americano sobre Metodos Computacionais para Engenharia, Sao Carlos, Brazil, 4-7 December 1986
(INPE-3996-PRE/995) Avail: NTIS HC A02/MF A01

A preliminary analysis of performance of some numerical algorithms (three Runge-Kutta algorithms of different orders, one multistep algorithm, and two extrapolation algorithms) for the resolution of ordinary differential equations (ODEs) of artificial satellite problems, is performed. Choosing a set of test problems, the analysis is done comparing these algorithms in terms of number of derivative function evaluations, accuracy obtained, overhead, and total processing time. The preliminary results and some useful conclusions concerning these algorithms are presented. Author

N87-13207# Clarkson Univ., Potsdam, N.Y. Dept. of Mathematics and Computer Science.
NONLINEAR WAVES Final Report, 1 Jun. 1976 - 31 May 1986
Mark J. Ablowitz and Athanssisos S. Fokas 27 May 1986 144 p
(Contract N00014-76-C-0867)
(AD-A168934) Avail: NTIS HC A07/MF A01 CSCL 12/1

The central theme involved in this work is the continuing study of certain fundamental features associated with the nonlinear wave propagation arising in and motivated by physical problems. The usefulness of the work is attested to by the varied applications, and wide areas of interest in physics, engineering and mathematics. The work accomplished involves wave propagation in a number of areas including fluid mechanics, plasma physics, theoretical physics, statistical mechanics, nonlinear optics, multidimensional solitons, multidimensional inverse problems, Painleve equations, direct linearization of certain nonlinear wave equations, DBAR problems, Riemann Hilbert boundary value problems, algebraic methods and symmetry analysis of multidimensional systems, differential geometry, etc. Of particular interest to the Navy is the recent discovery that many of the equations describing ship

hydrodynamics in channels of finite depth obey nonlinear equations which have been studied extensively. GRA

N87-13208# Chicago Univ., Ill.
SOME INVESTIGATIONS INTO VARIABLE MESHES FOR NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Final Report, Jul. 1982 - Jul. 1985
Todd F. Dupont 22 May 1986 9 p
(Contract DAAG29-82-K-0157)
(AD-A168977; ARO-19524.1-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

This study involved investigation of numerical methods for the approximate solution of partial differential equations. Specifically, the following two topics were investigated: Spatial meshes that change with time; and Space-time finite elements. The work involved both theoretical investigations and computational experiments. GRA

N87-13209# Rice Univ., Houston, Tex. Dept. of Mathematical Sciences.
ITERATIVE METHODS FOR LARGE LINEAR AND NONLINEAR LEAST SQUARES PROBLEMS Final Report, 1 Feb. 1983 - 31 Jan. 1986
John E. Dennis 31 Mar. 1986 6 p
(Contract DAAG29-83-K-0035)
(AD-A169028; ARO-19428.4-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

Under a grant to 8 graduate students the most exciting research accomplishment is a new trust region approach to global convergence for nonlinear programming problems. Testing has also begun on a variable metric variant of the Kamarkar linear programming algorithm that could be of great practical significance if very preliminary tests are any indication. Other interesting work has been a unified convergence analysis for the many variants of the conjugate gradient method, a convergence analysis of the popular Nelder-Mead algorithm, a novel use of interactive computer graphics to obtain user preferences in multi-objective optimization, a convergence analysis of the EM algorithm for mixture density estimation, and a survey of all the work done by researchers in various fields on nonlinear programming problems in which some subset of the variables always appear linearly. GRA

N87-13210# Stanford Univ., Calif. Dept of Operations Research.
THE OPTIMAL LINEAR COMBINATION OF CONTROL VARIATES IN THE PRESENCE OF BIAS
Peter W. Glynn and Donald L. Iglehart Mar. 1986 23 p
(Contract DAAG29-84-K-0030; Grant NSF ECS-84-04809)
(AD-A169111; TR-12; ARO-20927.12-MA) Avail: NTIS HC A02/MF A01 CSCL 12/1

The method of control variates has been extensively studied as a technique for obtaining variance reductions for complex simulations. The method basically requires that the practitioner be able to identify processes for which the asymptotic mean is known; the knowledge of those asymptotic means is then used to obtain a variance reduction. The authors' goal is to study a specific aspect of the small-sample theory for control variates. Their particular interest focuses on the loss of efficiency incurred when only the asymptotic mean is known, as opposed to the true (small-sample) mean. The results obtained have implications for the application of control variates to the steady-state estimation problem. Specifically, in many steady-state simulations, only the asymptotic means of the control variates are known. The results obtained here complement other small-sample studies on control variates in which the focus is on the degradation in performance caused by estimation of the optimal control coefficients. Our methods can also be used to study small-sample properties of the method of multiple estimates. GRA

N87-13211# California Univ., Berkeley.
AN INTUITIVE APPROACH TO GEOMETRIC CONTINUITY FOR PARAMETRIC CURVES AND SURFACES
Tony D. DeRose and Brian A. Barsky 1986 11 p
(Contracts N00039-84-C-0089; ARPA Order 4871)
(AD-A169654) Avail: NTIS HC A02/MF A01 CSCL 12/1

This report defines the nth order geometric continuity for parametric curves and surfaces, and derived the Beta constraints that are necessary and sufficient for it. Derivation of the Beta constraints is based on a simple principle of reparametrisation in conjunction with the univariate chain rule for curves, and the bivariate chain rule for surfaces. This approach uncovers the connection between geometric continuity for curves and geometric continuity for surfaces, provides new insight into the nature of geometric continuity in general, and allows the determination of the Beta constraints with less effort than previously required. Use of the Beta constraints for G to the nth power continuity allows the introduction of n shape parameters for curves, and n(n+3) shape functions for surfaces. The shape parameters and shape functions may be used to modify the shape of a geometrically continuous curve or surface, respectively. However, geometric continuity is only appropriate for applications where rate aspects of the parametrisations are unimportant since discontinuities in rate are allowed. GRA

N87-13212# Maryland Univ., College Park. Inst. for Physical Science and Technology.
REGULARITY OF THE SOLUTION OF ELLIPTIC PROBLEMS WITH PIECEWISE ANALYTIC DATA. PART 1: BOUNDARY VALUE PROBLEMS FOR LINEAR ELLILPTIC EQUATION OF SECOND ORDER Final Report
I. Babuska and B. Guo May 1986 73 p
(Contract N00014-85-K-0169)
(AD-A169771; BN-1047-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 12/1

This paper is the first in a series devoted to the analysis of the regularity of the solution of elliptic partial differential equations with piecewise analytic data. The present paper analyzes the case of linear, second order partial differential of elliptic type. These results are essential for the design and the analysis of the h-p version of the finite element method for solving the elliptic differential equations of structural engineering. GRA

N87-13213# Maryland Univ., College Park. Inst. for Physical Science and Technology.
ASYMPTOTICALLY EXACT A-POSTERIORI ERROR ESTIMATOR FOR BIQUADRATIC ELEMENTS Final Report
Ivo Babuska and Dehao Yu (Academia Sinica, Beijing (China).) Jun. 1986 35 p
(Contract N00014-85-K-0169; Grant NSF DMS-83-15216)
(AD-A169798; AD-E900585; BN-1050) Avail: NTIS HC A03/MF A01 CSCL 12/1

The paper addresses the finite element method with a-posterioria error estimation for elements of degree p=1 and p=2. It gives the formulae for the error indicators and error estimators. Basic mathematical characterization of the estimators are given and it is shown that the estimators for p = 1 and p = 2 have different structures. Numerical examples show the effectivity of the approach and the high quality of the estimator. GRA

N87-13214# Maryland Univ., College Park. Inst. for Physical Science and Technology.
AN EXPERT-SYSTEM-LIKE FEEDBACK APPROACH IN THE HP-VERSION OF THE FINITE ELEMENT METHOD Final Report
I. Babuska and Ernst Rank May 1986 53 p
(Contract N00014-85-K-0169)
(AD-A169855; AD-E750914; BN-1048) Avail: NTIS HC A04/MF A01 CSCL 12/1

It has been theoretically shown that exponential rate of convergence in the energy norm can be obtained by a proper combination of the h- and p- extension of the finite element method for essentially all engineering problems in plane elasticity, including those with singularities in the exact solution. In this paper we present an expert system frame, which guides the user to an optimal selection of the mesh and degree distribution. After a crude preliminary computation the expert system predicts the

performance of various mesh and degree combinations and provides the analyst with rational support for his decisions about the mesh design, numerical examples show that the suggested approach gives superior results with minimum effort in human data preparation and computer time. GRA

N87-13215# Maryland Univ., College Park. Dept. of Management Sciences and Statistics.
NOTE ON A CHARACTERIZATION OF EXPONENTIAL DISTRIBUTIONS Technical Report, Sep. 1985 - Aug. 1986
Samuel Kota and F. W. Steutel Jul. 1986 5 p
(Contract N00014-84-K-0301)
(AD-A169896; UM/MSS-86/4) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let U be uniformly distributed on (0,1) and let Y and Y' =(d) Y be random vectors with nonnegative components, U, Y and Y' independent. It is shown that the relation Y =(d) U(Y + Y') is satisfied if and only if the components of Y are multiples of a single exponentially distributed random variable. M.G.

N87-13216# Colorado Univ., Boulder. Dept. of Computer Science.
SOLVING SYSTEMS OF NONLINEAR EQUATIONS BY TENSOR METHODS
Robert B. Schnabel and Paul D. Frank Jun. 1986 32 p
(Contract DAAG29-84-K-0140; NSF DCR-84-03483)
(AD-A169927; CU-CS-334-86; ARO-21453.3-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

Tensor methods are a class of general purpose methods for solving systems of nonlinear equations. They are especially intended to efficiently solve problems where the Jacobian matrix at the solution is singular or ill-conditioned, while remaining at least as efficient as standard methods on nonsingular problems. Their distinguishing feature is that they base each iteration on a quadratic model of the nonlinear function. The model has a simple second order term that allows it to interpolate more information about the nonlinear function than standard, linear model based methods, without significantly increasing the cost of forming, storing, or solving the model. This paper summarizes two types of tensor methods, derivative tensor methods that calculate an analytic or finite difference Jacobian at each iteration, and secant tensor methods that avoid Jacobian evaluations. Both are shown to require no more function or derivative information per iteration, and hardly more storage or arithmetic operations per iteration, than standard linear model based methods. Computational results are presented that indicate that both tensor methods are consistently at least as reliable as the corresponding linear model based methods, and are significantly more efficient, both cn nonsingular and on singular test problems. Author (GRA)

N87-13217# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
VALIDITY OF EDGEWORTH EXPANSIONS OF MINIMUM CONTRAST ESTIMATORS FOR GAUSSIAN ARMA PROCESSES
Masanobu Taniguchi Dec. 1985 45 p
(Contract F49620-85-C-0008)
(AD-A169931; TR-85-49; AFOSR-86-0398TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Let (X sub t) be a Gaussian Autoregression Multivariant Analysis (ARMA) process with spectral density f sub p (lambda), where p is an unknown parameter. To estimate multivarant analysis we propose a minimum contrast estimation method which includes the maximum likelihood method and the quasi-maximum likelihood method as special cases. Let p-bar sub T be the minimum contrast estimator of p. Then we derive the Edgeworth expansion of the distribution of p-bar sub T up to third order, and provide its validity. By this Edgeworth expansion we can see that this minimum contrast estimator is always second-order asymptotically efficient in the class of second-order asymptotically median unbiased estimators. Also the third-order asymptotic comparisons among minimum contrast estimators will be discussed. GRA

N87-13218# Maryland Univ., College Park. Dept. of Mathematics.
ZERO-CROSSINGS ANALYSIS
Benjamin Kedem Jan. 1986 73 p
(Grant AF-AFOSR-0187-82)
(AD-A169937; AFOSR-86-0413TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

A coherent development of zero crossing based methods and theory appropriate for fast signal analysis are advanced. Quite a few ideas pertaining to zero crossing counts found in the literature can be expressed and interpreted with the help of this more general setup. A central issue addressed in some detail, is the fruitful connection which exists between zero crossing counts and linear filtering. This connection is explored and interpreted with the help of a certain zero crossing spectral representation, is then applied in spectral analysis, detection and discrimination. Zero crossing counts in filtered time series are called higher order crossings. The theme of the work is that higher order crossings analysis provides a useful descriptive as well as analytical tool that can in many respects match spectral analysis. To a great extent these two types of analysis are in fact equivalent, but each emphasizes a different point of view. Advantages offered by higher order crossings are great simplicity and a drastic data reduction. GRA

N87-13219# Arizona Univ., Tucson.
INEQUALITIES FOR PROBABILITY CONTENTS OF CONVEX SETS VIA GEOMETRIC AVERAGE
Moshe Shaked and Y. L. Tong Nov. 1985 19 p Prepared in cooperation with Georgia Inst. of Tech.
(Grants NSF MCS-82-00098; AF-AFOSR-0205-84)
(AD-A169938; AFOSR-86-0399TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper derives an inequality for a large class of density functions and a large class fo convex sets. The most general results are given for the bivariate case. An extention to the n-dimensional case appears to be difficult except for some special cases such as the case of independent identically distributed random variables or when the underlying joint density is spherically symmetric. The class of convex sets considered includes D sub infinity and D sub 2 as special cases and special applications are given for elliptically contoured distributions and scale parameters families. In all these cases, universal upper bounds on the probability contents can be given by substituting the values of the a sub i's by their geometric mean. GRA

N87-13220# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
LONG TIME ESTIMATES FOR THE HEAT KERNEL ASSOCIATED WITH A UNIFORMLY SUBELLIPIC SYMMETRIC SECOND ORDER OPERATOR
S. Kusuoka (Tokyo Univ. (Japan).) and D. Stroock Jun. 1986 39 p
(Contract DAAG29-84-K-0005; Grant NSF DMS-84-15211)
(AD-A169949; LIDS-P-1568; ARO-20980.54-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

Second order subelliptic operators have been the subject of a considerable amount of research in recent years. Starting with the paper Rothschild and Stein, in which the sharp form of Hormander's famous subellipticity theorem is proved, and continuing through the work of Fefferman and Phong and Sanchez-Calle, it has become increasingly clear that precise regularity estimates for these operators depend intimately on the geometry associated with the operator under consideration. The main purpose of this article is to obtain bounds, from above and below, on p(t,x,y), t epsilon (1, infinity), in terms of standard heat kernels. GRA

N87-13221# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
UPPER BOUNDS FOR SYMMETRIC MARKOV TRANSITION FUNCTIONS
E. A. Carlen, S. Kusuoka (Tokyo Univ. (Japan).), and D. W. Stroock Jun. 1986 52 p
(Contract DAAG29-84-K-0005; Grant NSF DMS-84-15211)

(AD-A170010; LIDS-P-1569; ARO-20980.53-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

A large number of properties which are peculiar to symmetric Markov semigroups stem from the fact that such semigroups can be analyzed simultaneously by Hilbert space techniques as well as techniques coming from maximum principle considerations. The feature of symmetric Markov semigroups in which this fact is most dramatically manifested is the central role played by the Dirichlet form. In particular, the Dirichlet form is a remarkably powerful tool with which to compare symmetric Markov semigroups. The present paper consists of a number of examples which illustrate this point. There exist tight relationships between uniform decay estimates on the semigroup and certain Sobolev like inequalities involving the Dirichlet form. GRA

N87-13222# Maryland Univ., Baltimore. Dept. of Mathematics.
THE h-p VERSION OF THE FINITE ELEMENT METHOD WITH QUASIUNIFORM MESHES Summary Report
Ivo Babuska and Manil Suri 1 May 1986 64 p
(Grants NSF DMS-83-15216; AF-AFOSR-0322-85)
(AD-A170144; MRR-86-1; AFOSR-86-0362TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

The h-p version is analyzed with a quasiuniform mesh and uniform p to get an error estimate which is simultaneously optimal in both p and h. Estimates are also proven for the h-p version when the solution has singularities in the corners of the domain and in the case when essential (Dirichlet) conditions are prescribed but are not in the subspace of finite elements. Finally, a numerical example is presented which illustrates the applicability of the developed (asymptotic) theory in a range of h and p used in practice. B.G.

N87-13223# Clarkson Univ., Potsdam, N.Y.
EIGENVECTORS OF GRAPHS Annual Report, 1 Jul. 1985 - 1960 Jun. 1986
David L. Powers 26 Jun. 1986 11 p
(Contract N00014-85-K-0497)
(AD-A170562) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let z be an eigenvector of the adjacency matrix A of a connected graph G. Say a vertix is positive, nonnegative, zero, etc. if the same is true of the corresponding element of z. If z is an eigenvector for the second largest eigenvalue of A, it is known that the nonnegative vertices of G form a connected subgraph. This separation of vertices according to sign provides the basis for studying the structure of G as revealed by its eigenvectors, inequalities on the number of edges joining positive and negative vertices, bounds on the number of zero vertices, bounds on multiplicities and some description of the variability of the elements of z. The rows of an eigenmatrix provide a mapping of the vertices of G into m-dimensional euclidean space. Some graphs thus draw themselves. This phenomenon is especially interesting if the graph is the skeleton of a polytope. GRA

N87-13224# North Carolina Univ., Chapel Hill. Center for Stochastic Processes.
SEMIGROUPS AND POISSON-APPROXIMATION Technical Report, Sep. 1985 - Aug. 1986
P. Deheuvels and D. Pfeifer Dec. 1985 13 p
(Contract F49620-85-C-0144)
(AD-A170944; AFOSR-86-0339TR; TR-132) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper extends previous work of the authors on Poisson approximation for (general) independent Bernoulli summands with respect to the total variation distance, without imposing any conditions on the underlying parameters. This enables one to study also the case of unbounded means, without asymptotic uniform smallness of the individual summands, provided that the variance increases with the same rate as the mean. An important practical situation in which such an asymptotic behavior occurs is described by Ross's Markov chain model for the Simplex Algorithm in linear programming, which will be discussed as an example of possible application. Author (GRA)

N87-13225# Stanford Univ., Calif. Dept. of Operations Research.
ALGORITHM FOR POSITIVE DEFINITE LEAST SQUARE ESTIMATION OF PARAMETERS
Hui Hu May 1986 17 p
(Contract DE-AS03-76ER-72018)
(DE86-012159; SOL-86-12) Avail: NTIS HC A02/MF A01

An algorithm for positive definite least square estimation of parameters is presented. This estimation problem arises from the PILOT dynamic macro-economic model and is equivalent to an infinite convex quadratic program. It differs from ordinary least square estimations in that the fitting matrix is required to be positive definite. The algorithm solves the infinite convex quadratic program by generating and solving a sequence of ordinary convex quadratic programs. By specifying a constant, the algorithm will find an approximate optimal solution after finitely many interations, or will tend to an optimal solution in the limit. The algorithm is generalized to solve a class of infinite convex programs. DOE

N87-13226# Oak Ridge National Lab., Tenn.
QUANTITATIVE ASSESSMENT OF THE EFFECT OF PARTIAL PIVOTING IN SPARSE ORDINARY DIFFERENTIAL EQUATION SOLVERS
S. Thompson May 1986 29 p
(Contract DE-AC05-84OR-21400)
(DE86-012592; ORNL-6207) Avail: NTIS HC A03/MF A01

The effect of partial pivoting in automatic ordinary differential equation solvers which utilize sparse matrix techniques is discussed. Two solvers are considered, the well-known LSODES solver and a derivate LSOD28. LSODES uses the Yale Sparse Matrix Package which does not perform partial pivoting. LSOD28 uses the Harwell MA28 Sparse Matrix Package which does perform partial pivoting. Results are presented for a benchmark problem which contains several features typically present in realistic problems. The results demonstrate that both solvers perform satisfactorily. At the same time, they demonstrate the relative effects of partial pivoting for the benchmark problem. In particular, they suggest that partial pivoting substantially improves neither the efficiency nor the reliability of LSODES for such problems. They support the argument that partial pivoting is not necessarily required in adaptive solvers to solve complex problems accurately and efficiently. DOE

N87-13227*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
QUALITY ASSESSMENT AND CONTROL OF FINITE ELEMENT SOLUTIONS Final Report
I. Babuska (Maryland Univ., College Park.) and Ahmed K. Noor May 1986 50 p Prepared in cooperation with George Washington Uni
(Grant NGR-09-010-078; Contract N00014-85-K-0169)
(NASA-TM-89208; NAS 1.15:89208; AD-A169773; BN-1049) Avail: NTIS HC A03/MF A01 CSCL 12/1

Status and some recent developments in the techniques for assessing the reliability of finite element solutions are summarized. Discussion focuses on a number of aspects including: the major types of errors in the finite element solutions; techniques used for a posteriori error estimation and the reliability of these estimators; the feedback and adaptive strategies for improving the finite element solutions; and postprocessing approaches used for improving the accuracy of stresses and other important engineering data. Also, future directions for research needed to make error estimation and adaptive movement practical are identified. Author (GRA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N87-13228# Princeton Univ., N. J.
DESIGN AND ANALYSIS OF EXPERIMENTS AND MORE REAL-

ISTIC TECHNIQUES FOR DATA ANALYSIS Final Report, 30 Jun. 1976 - 31 Jan. 1986
John W. Tukey Mar. 1986 51 p
(Contract DAAG29-79-C-0205; Grant DAAG29-76-G-0298)
(AD-A168921; ARO-19442.26-MA; ARO-14244.15-MA; ARO-16669.28-MA) Avail: NTIS HC A04/MF A01 CSCL 12/1

The research has focused on on data analysis techniques. Some of the more innovative contributions include: graphical analysis of variance, configural polysampling, so far the only direct approach to robustness in actual finite-sized samples, compromise MLEs as a more flexible, often closely approximate approach to robustness, calculations for many explicit randomizations as the trustworthy and stringent analysis for the randomized experiment, simple devices for presenting motion using an overhead projector, work on pushback techniques and related ideas, effective confidence intervals based on only 2 of the observed values in a sample, new insight into multiple comparisons, fits with many exact-zero residuals sharing other good properties, and a deeper insight into, and robust procedures for, analysis of variance. GRA

N87-13229# Illinois Univ., Chicago. Dept. of Information and Decision.
STATISTICAL MODELS AND METHODS FOR CLUSTER ANALYSIS AND IMAGE SEGMENTATION Final Report, 15 Jun. 1982 - 15 Jun. 1985
Stanley L. Sclove 15 Mar. 1986 18 p
(Contract DAAG29-82-K-0155)
(AD-A169145; U1C/DQM/ARO-85-2; ARO-19085.12-MA) Avail: NTIS HC A02/MF A01 CSCL 17/8

Clustering of individuals, segmentation of time series and segmentation of numerical images can all be considered as labeling problems, for each can be described in terms of pairs (x sub t, g sub t), t = 1,2,...,n, where x sub t is the observation at instance t and g sub t is the unobservable label of instance t. The labels are to be estimated, along with any unspecified distributional parameters. In cluster analysis the values of t are the individuals (cases) observed and the x's are independent. In time series the values of t are time instants and there is temporal correlation. In numerical image segmentation the values of t denote picture elements (pixels) and spatial correlation between neighboring pixels can be utilized. The idea in segmentation is that signals and time series often are not homogeneous but rather are generated by mechanisms or processes with various phases. Similarly, images are not homogeneous but contain various objects. Segmentation is a process of attempting to recover automatically the phases or objects. Author (GRA)

N87-13230# Florida State Univ., Tallahassee. Dept. of Statistics.
ASYMPTOTIC THEORY FOR SIEVE ESTIMATORS IN SEMI-MARTINGALE REGRESSION MODELS
Ian W. McKeague Mar. 1986 35 p
(Contract DAAG29-82-K-0168)
(AD-A169207; FSU-STATISTICS-M722; TR-D-86-ARO; ARO-19367.35-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

This paper studies the estimation of functions alpha sub 1, ..., alpha sub p describing the temporal influence of p covariate processes in a regression model for semi-martingales. McKeague (1986) introduced sieve estimators for alpha sub 1, ..., alpha sub p and established consistency in sq l-norm. In this paper the asymptotic distribution theory for the integrated sieve estimators is developed. Smoothed sieve estimators are shown to be pointwise consistent and rates of convergence are provided. Author (GRA)

N87-13231# Stanford Univ., Calif. Dept. of Operations Research.
RECURSIVE MOMENT FORMULAS FOR SEMI-MARKOV PROCESSES
Chia-Hon Chien Apr. 1986 30 p
(Contract DAAG29-84-K-0030; Grant NSF MCS-82-03483)
(AD-A169253; ARO-20927.13-MA; SU-TR-13) Avail: NTIS HC A03/MF A01 CSCL 12/1

Let X = (X(t):t > or = 0) be an irreducible semi-markov process (SMP) on countable state space E. For fixed Z an element of E, let T(z) =inf(t > or = 0:X(t-)not =z, X(t)=z) and set Y(f) = integral from 0 to T sub z of f(X(t))dt, where f: E approaches R is an arbitrary function. Our objective is to study the mixed moments of the form E pi from i = 1 to r of Y(f sub i), when f sub i: E approaches R is an arbitrary function, for i = 1,2,...r, and r is a positive integer. This quantity is especially relevant to the regenerative simulation. Also, several useful variations and generalizations are introduced and studied. GRA

N87-13232# Florida State Univ., Tallahassee. Dept. of Statistics.
A REVERSAL ARGUMENT FOR STORAGE MODELS DEFINED ON SEMI-MARKOV PROCESSES
Eric S. Tollar Feb. 1986 39 p
(Contract DAAG29-82-K-0168)
(AD-A169262; FSU-TR-M721; TR-D-85-ARO; ARO-19367.36-MA) Avail: NTIS HC A03/MF A01 CSCL 12/1

For many storage models defined on some semi-Markov process X(t), the asymptotic distribution of the imbedded discrete time process can often be determined by exploiting the properties of the dual of the underlying Markov chain X sub n, which effectively reverses the process. If this is the case, a technique is given which under certain regularity conditions shows the asymptotic distribution of the entire continuous time process can be obtained, and is equal to an altered version of the reversed discrete time process. It is shown this method not only can be applied to models where the asymptotic distribution was previously unknown, but can also improve upon characterizing many of the results for models in which the asymptotic behavior is obtained by a renewal argument. Author (GRA)

N87-13233# Stanford Univ., Calif. Dept. of Statistics.
A UNIFIED APPROACH TO CONSTRUCTING NONPARAMETRIC RANK TESTS
Douglas E. Critchlow 6 Jul. 1986 66 p
(Contract N00014-86-K-0156)
(AD-A169815; TR-376) Avail: NTIS HC A04/MF A01 CSCL 12/1

One shortcoming of the present theory of rank tests is that such tests have usually been constructed on a case by case basis, in a quite ad hoc (albeit clever) manner. This paper attempts to provide the basis for a more unified approach to rank tests. It investigates a general, yet simple construction, which simultaneously generates many rank test statistics, for a multitude of hypothesis testing situations. The proposed construction uses metrics on the permutation group in a novel way: the proposed test statistic is the distance between two sets of permutations. This new construction is applied systematically to the two-sample and multi-sample location problems, the two-way layout problem, the one-sample location problem, the two-sample dispersion problem with equal medians, and the problem of testing for trend. It is shown that the construction works in a variety of testing situations; gives rise to many familiar rank test statistics; produces several other test statistics which are less familiar, yet equally plausible; and enables one to extend rank tests to other hypothesis testing situations. Some connections with the existing nonparametric theory are discussed. GRA

N87-13234# Georgia Inst. of Tech., Atlanta.
HEREDITY OF STATIONARY AND REVERSIBLE STOCHASTIC PROCESSES
Richard F. Serfozo 25 Mar. 1986 6 p
(Grant AF-AFOSR-0367-84)
(AD-A169926; AFOSR-86-0381TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

When a stochastic process (a random measure, set, field, etc. on a group) is stationary, ergodic, or reversible, then certain functions of this process inherit these properties. This document presents sufficient conditions for this inheritance. Author (GRA)

N87-13235# Georgia Inst. of Tech., Atlanta.
EXTREME VALUES OF BIRTH AND DEATH PROCESSES AND QUEUES
Richard F. Serfozo 25 Mar. 1986 28 p
(Grant AF-AFOSR-0367-84)
(AD-A169932; AFOSR-86-0384TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

This document studies the asymptotic behavior of maximum values of birth and death processes over large time intervals. In most cases, the distributions of these maxima, under standard linear normalizations, either do not converge or they converge to a degenerate distribution. However, by allowing the birth and death rates to vary in a certain manner as the time interval increases, we show that the maxima do indeed have three possible limit distributions. Two of these are classical extreme value distributions and the third one is a new distribution. This third distribution is the best one for practical applications. Our results are for transient as well as recurrent birth and death processes and related queues. For transient processes, the focus is on the maxima conditioned that they are finite. Author (GRA)

N87-13236# South Carolina Univ., Columbia. Dept. of Statistics.
SMOOTH NONPARAMETRIC QUANTILE ESTIMATION UNDER CENSORING: SIMULATIONS AND BOOTSTRAP METHODS
W. J. Padgett and L. A. Thombs May 1986 29 p
(Contract MIPR-ARO-139-85; Grant AF-AFOSR-0156-84)
(AD-A169935; TR-116; Rept-62N05-17; AFOSR-86-0431TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

The objectives of this paper are two-fold. One is to report results of extensive Monte Carlo simulations which demonstrate the behavior of the mean squared error of the kernel estimator with respect to bandwidth. These simulations provide a method of choosing an optimal bandwidth when the form of the lifetime and censoring distributions are known. Also, they compare the kernel-type estimator with the product-limit qauntile estimator. Five commonly used parametric lifetime distributions, two censoring mechanisms, and four different kernel functions are considered in this study, which is an extension of the brief simulations for exponential distributions reported by Padgett (1986). The second objective is to present a nonparametric method for bandwidth selection based on the bootstrap for right-censored data. This data-based procedure used the bootstrap to estimate mean squared error, and is both an extension and modification of the methods proposed by Padgett. Bandwidth selection using the bootstrap is important for small and moderately large samples since no exact expressions exist for the mean squared error of the kernel-type quantile estimator. GRA

N87-13237# North Carolina Univ., Chapel Hill. Chapel Hill Center for Stochastic Processes.
EXTREMAL PROCESSES, RECORD TIMES AND STRONG APPROXIMATION
Dietmar Pfeifer Dec. 1985 15 p
(Contract F49620-85-C-0144)
(AD-A169972; TR-131; AFOSR-86-0340TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Given an i.i.d. sequence of random variables (r.v.'s) with continuous cumulative distribution function (CDF) F, the author presents a simple construction for the jump times of an extremal process on the same probability space which interpolate the given record times. This gives another approach to the strong approximation of extremal processes as developed by Deheuvels (1981, 1982, 1983), and allows for a more detailed investigation of the relationship between the record times of the given sequence and the jump times of the extremal process. In particular, it is shown that the number S of surplus jump time points in (1, infinity) over the record times is approximately Poisson distributed with an exact mean of E(S) = 1 - C, C denoting Euler's constant. Author (GRA)

N87-13238# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
ON REDUCTION OF DIMENSIONALITY UNDER MULTIVARIATE REGRESSION AND CANONICAL CORRELATION MODELS
P. R. Krishnaiah Apr. 1986 53 p
(Contract F49620-85-C-0008)
(AD-A170025; TR-86-10; AFOSR-86-0343TR) Avail: NTIS HC A04/MF A01 CSCL 12/1

In this paper, the author gives a review of the literature on various techniques for determination of the ranks of regression matrix and canonical correlation matrix. Also, methods of selection of important original variables under multivariate regression and canonical correlation models are reviewed. The methods reviewed involve not only tests of hypotheses but also model selection methods based upon information theoretic criteria. Author (GRA)

N87-13239# Pittsburgh Univ., Pa. Dept. of Mathematics and Statistics.
A MULTIVARIATE EXTENSION OF HOEFFDING'S LEMMA
Henry W. Block and Zhaoben Fang Nov. 1985 24 p
(Contract N00014-84-K-0084; Grant AF-AFOSR-0113-84)
(AD-A170170; TR-85-10; AFOSR-86-0410TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Hoeffding's Lemma gives an integral representation of the covariance of two random variables in terms of difference between their joint and marginal probability functions. This identity has been found to be a useful tool in studying the dependence structure of various random vectors. A generalization of this result for more than two random variables is given. This involves an integral representation of the multivariate joint cumulant. Applications of this result include characterizations of independence. Relationships with various types of dependence are also given. Author (GRA)

N87-13240# Arizona Univ., Tucson.
A BAYESIAN APPROACH TO QUANTILE AND RESPONSE PROBABILITY ESTIMATION WITH APPLICATIONS IN RELIABILITY
Moshe Shaked and Nozer D. Singpurwalla (George Washington Univ., Washington, D.C.) Aug. 1985 24 p Prepared in cooperation with George Washington Univ.
(Grant AF-AFOSR-0205-84)
(AD-A170455; AFOSR-86-0352TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper studies a Bayesian approach for the estimation of potency curve which is assumed to be nondecreasing and cocave. This is done by assigning a Dirichlet prior to transformations of some unknown parameters. The choice is made of the prior and investigate several aspects of the problem, such as the properties of the posterior distribution as well as a numerical implementation of the suggested procedure. A procedure for estimating the quantiles is also given. Applications in reliability theory are described. The procedure is illustrated numerically via an example from a government laboratory. GRA

N87-13241# Pittsburgh Univ., Pa. Center for Multivariate Analysis.
PATTERN RECOGNITION BASED ON SCALE INVARIANT DISCRIMINANT FUNCTIONS
Tarmo M. Pukkila and C. R. Rao Apr. 1986 18 p
(Contract F49620-85-C-0008)
(AD-A170809; TR-86-09; AFOSR-86-0575TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Some probability models for classifying individuals as belonging to one of two or more populations using scale invariant discriminant functions are considered. The investigation is motivated by practical situations where the observed data on an individual are in the form of ratios of some basic measurements or measurements scaled by an unknown non-negative number. The probability models are obtained by considering a p-vector random variable X with a known distribution and deriving the distribution of the random vector Y = G(X) .1 X, where G(X) is a non-negative measure of size such that G(lambda X) = Lambda G(X) for lambda > 0. Explicit expressions are obtained for the densities of what are called

Angular Gaussian, Compositional Gaussian, Type 1 and Compositional Gaussian, Type 2 distributions. Author (GRA)

N87-13242# California Univ., Berkeley. Lawrence Berkeley Lab.
TWO ISSUES CONCERNING THE ANALYSIS OF GROUPED DATA
S. Selvin Feb. 1986 15 p Presented at the Conference of the Society for Epidemiologic Research, Pittsburg, Pa., 11 Jun. 1986
(Contract DE-AC03-76SF-00098)
(DE86-008401; LBL-20963; CONF-860694-1) Avail: NTIS HC A02/MF A01

Simple statistical models are used to illustrate two important issues arising in the analysis of grouped data. The consequences are explored of grouping continuous data and analyzing the resulting contingency table. Specifically, an expression for the loss of power is derived when an odds ratio is used to assess risk measured by a continuous variable. Also explored are the consequences of employing correlation and regression coefficients to analyze summary variables derived from grouped data (ecologic data). An expression is given that demonstrates the magnitude of a bias (ecologic fallacy) resulting from analyzing a specific type of grouped data. DOE

66 SYSTEMS ANALYSIS

includes mathematical modeling; network analysis; and operations research.

N87-13243*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
FEEDBACK SYSTEM DESIGN WITH AN UNCERTAIN PLANT
D. Milich, L. Valavani, and M. Athans Oct. 1986 6 p
(Grant NAG2-297; Contract NOOO14-82-K-0582; Grant NSF ECS-82-10960; NR Proj. 606-003)
(NASA-CR-176887; NAS 1.26:176887; LIDS-P-1614) Avail: NTIS HC A02/MF A01 CSCL 12B

A method is developed to design a fixed-parameter compensator for a linear, time-invariant, SISO (single-input single-output) plant model characterized by significant structured, as well as unstructured, uncertainty. The controller minimizes the H(infinity) norm of the worst-case sensitivity function over the operating band and the resulting feedback system exhibits robust stability and robust performance. It is conjectured that such a robust nonadaptive control design technique can be used on-line in an adaptive control system. Author

N87-13244# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
APPLICATION OF A NETWORK ASSOCIATIVE SCENE ANALYSIS MODEL [EMPREGO DE UM MODELO DE REDE ASSOCIATIVA NA ANALISE DE CENAS]
Paulo Ouvera Simoni and Celso de Renna e Souza Jul. 1986 16 p In PORTUGUESE; ENGLISH summary Presented at the 2nd Portuguese Meeting of Artifical Intelligence, Lisbon, Portugal, 9-11 Oct. 1986
(INPE-3945-PRE/967) Avail: NTIS HC A01/MF A01

A knowledge representation associative network model is described, based in concept structuring and use of formulae and decision rules for relating concepts, plus part and predicate relations. The general decision rule format is such that quantified expressions may occur in the premise and in the conclusion. An inference procedure for the part relation is presented allowing a representation compression, and the problem of conflicts brought about by this procedure is discussed. For the use of the knowledge stored in the network, relative to a given application, a control mechanism is defined, with associated structures that store alterations, in the form of concept and predicate instances, that must be propagated, as well as problems for which solutions are sought. It is shown that these control structures permit forward and backward rule chaining. Characteristics of various scene analysis models are discussed, and it is shown how the control mechanism, associated to a mixed initiative process for obtaining measures, permits a generalization of these models. Author

N87-13245# Institute for Defense Analyses, Alexandria, Va.
DUEL BETWEEN AN ASAT (ANTI-SATELLITE) WITH MULTIPLE KILL VEHICLES AND A SPACE-BASED WEAPONS PLATFORM WITH KINETIC ENERGY WEAPONS Final Report, Oct. 1984 - Dec. 1985
Pythagoras Cutchis Jan. 1986 38 p
(Contract MDA903-84-C-0031)
(AD-A168946; AD-E500768; IDA-M-144; IDA/HQ-86-30858) Avail: NTIS HC A03/MF A01 CSCL 15/3

A mathematical model is described for a duel between a ground-based anti-satellite (ASAT) and a space-based weapons platform defending itself with kinetic energy weapons. The ASAT carries one to six kill vehicles and the space platform may first attack the ASAT booster with one to three defense missiles. If the ASAT kill vehicles collectively survive the boost phase, they are each subject to a post-boost phase attack consisting of one to three defense missiles. A formula for the probability of killing the space platform with a single ASAT launch is derived as a function of the vehicle reliabilities, target detection probabilities, kill probabilities, and number of participating vehicles. Formulas are also given for the probability of kill if the space platform defends itself with a high-energy laser or with both high-energy laser and defense missiles. Illustrative examples are calculated for the case in which the space platform is defended by defense missiles only. It is assumed that all offense and defense reliabilities, detection probabilities, and kill probabilities are equal to 0.90. A sensitivity analysis illustrates the effect of a variation in any one of the assumed parameters on the probability of killing the space platform when all other parameters are held equal to 0.90. GRA

N87-13246# Army Research Office, Research Triangle Park, N. C.
PROCEEDINGS OF THE CONFERENCE ON THE DESIGN OF EXPERIMENTS IN ARMY RESEARCH DEVELOPMENT AND TESTING (31ST) HELD AT THE MADISON, WISCONSIN ON 23-25 OCTOBER 1986 Interim Technical Report
Jun. 1986 292 p
(AD-A169473; ARO-86-2) Avail: NTIS HC A13/MF A01 CSCL 12/1

Partial Contents are approaches to statistical validation of simulation models; Distribution under dependence of nonparametric two-sample tests; statistical models and methods for cluster analysis and segmentation; A comparison of methods for factor analysis of visibility; Small composite design; Considerations in small sample quantal response testing; Human factors affecting subjective judgments; Use of expert opinion in the reliability assessment of the M-1 Abrams tank; Application of hypothesis testing to performance appraisal; Models for contingency table data; On a class of probability density functions; Plotting mathematical functions on a standard line printer; Statistical comparison of the ability of camouflage colors to blend with terrain background under high and low sun angles; Weibull tail modeling for estimating confidence on quantiles from censored samples; The Lindstrom-Madden method for series systems with repeated components; How to display data badly; and Accelerated life test: an overview and some recent advances. GRA

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N87-13247# California Univ., Santa Barbara. Dept. of Mathematics.
MATRIX THEORY Annual Report, 1 Jul. 1985 - 30 Jun. 1986
Henry K. Minc 20 Jun. 1986 6 p
(Contract N00014-85-K-0489)
(AD-A169139) Avail: NTIS HC A02/MF A01 CSCL 12/1

Research activity during the past year concerned permanents

of (0,1) circulants. A method for constructing a recurrence formula for expressing the permanent of any (0,1)-circulant is developed in terms of permanents of (0,1) circulants of the same type of lower orders. GRA

N87-13248# Stanford Univ., Calif. Systems Optimization Lab.
MAINTAINING LU FACTORS OF A GENERAL SPARSE MATRIX
Philip E. Gill, Walter Murray, Michael A. Saunders, and Margaret H. Wright May 1986 33 p
(Contracts N00014-85-K-0343; DAAG29-84-K-0156; DE-AA03-76SF-00326; DE-AS03-76ER-72018; Grants NSF DCR-84-13211; NSF ECS-83-12142)
(AD-A169255; SU-SOL-86-6) Avail: NTIS HC A03/MF A01 CSCL 12/1

The authors describe a set of procedures for computing and updating an LU factorization of a sparse matrix A, where A may be square (possibly singular) or rectangular. The procedures include a Markowitz factorization and a Bartels-Golub update, similar to those of Reid (1976, 1982). The updates provided are addition, deletion or replacement of a row or column of A, and rank-one modification. (Previously, column replacement has been the only update available). Various design features of the implementation (LUSOL) are described, and computational comparisons are made with the LA05 and MA28 packages of Reid (1976) and Duff (1977). GRA

70 PHYSICS (GENERAL)

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

N87-13249# Department of the Army, Washington, D. C.
PARAMETRIC LINEAR VARIATION OF A LEAKAGE FREE PERMANENT MAGNET FIELD SOURCE Patent Application
Herbert Leupold, Ernest Potenziani, II, and John Clarke, inventors (to Army) Filed 30 May 1986 18 p
(AD-D012359) Avail: NTIS HC A02/MF A01 CSCL 20/3

This patent application discloses a magnetic circuit with a remanence varying cylindrical magnet having a bore and a remanence varying cladding magnet circumscribing the cylindrical magnet creating a longitudinally increasing axial magnetic field within the bore. The cladding magnet has a radial magnetization transverse to the axial magnetization of the cylindrical magnet resulting in a constant magnetic potential along the outer exterior surface of the magnetic circuit. GRA

N87-13250# Crucible Materials Corp., Pittsburgh, Pa. Crucible Research Center.
TEMPERATURE COMPENSATION IN THE 2:17 TYPE MAGNETS Final Report, Jan. 1983 - Dec. 1985
K. S. Narasimhan, F. E. Camp, Bao-Min Ma, and C. J. Willman Mar. 1986 18 p
(Contract DAAG29-83-C-0007)
(AD-A169487; ARO-19511.3-MS) Avail: NTIS HC A02/MF A01 CSCL 20/3

Development of temperature compensated magnets was undertaken in both '2:17' and NdFeB type of alloys. A number of alloys has been identified that can produce energy product in excess of 40 MGOe in the uncompensated material. Computer programs were developed for identifying key compositions that were then processed successfully into temperature compensated magnets. Current materials can produce temperature compensated magnets with an energy product not exceeding 22 MGOe. Further work is necessary to develop temperature compensated magnets with an energy product exceeding 30 MGOe. GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation. For noise pollution see *45 Environment Pollution.*

N87-13251 ESDU International Ltd., London (England).
COMPUTER-BASED ESTIMATION PROCEDURE FOR COAXIAL JET NOISE. INCLUDING FAR-FIELD SUBSONIC JET MIXING NOISE DATABASE FOR STATIONARY, COPLANAR CONICAL NOZZLES
Sep. 1986 108 p Supersedes ESDU-85043
(ESDU-86019; ISBN-0-85679-571-2; ISSN-0307-0115) Avail: ESDU

This Data Item ESDU 86019 is an addition to the Noise Sub-series. A program listing is provided for interpolating within or extrapolating a data base. The variables considered make it particularly applicable to estimating noise from co-axial jets. A comprehensive data base is provided for jet mixing noise of static engines with conical nozzles, but the user may provide an alternative data base that could include installation and flight effects as well as other noise components (such as combustion and shock noise) or may supplement the provided data base with additinal data. The interpolation/extrapolation routine uses a least-squares fitting procedure in which two or three independent variables may be involved. Two of the variables are the primary jet velocity and the velocity ratio of the two streams but the third may be chosen by the user. Appropriate weighting of the data is included. The program is listed in both BASIC and FORTRAN and is available as appropriate media (magnetic tape or punched cards) as ESDUpac 1055. ESDU 85018 deals with the case of the single-stream jet. ESDU

N87-13252*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CRUISE NOISE OF COUNTERROTATION PROPELLER AT ANGLE OF ATTACK IN WIND TUNNEL
James H. Dittmar Oct. 1986 35 p
(NASA-TM-88869; E-3275; NAS 1.15:88869) Avail: NTIS HC A03/MF A01 CSCL 20A

The noise of a counterrotation propeller at angle of attack was measured in the NASA Lewis 8- by 6-Foot Supersonic Wind Tunnel at cruise conditions. Noise increases of as much as 4 dB were measured at positive angles of attack on the tunnel side wall, which represented an airplane fuselage. These noise increases could be minimized or eliminated by operating the counterrotation propeller with the front propeller turning up-inboard. This would require oppositely rotating propellers on opposite sides of the airplane. Noise analyses at different bandwidths enabled the separate front- and rear-propeller tones, as well as the total noise, at each harmonic to be determined. A simplified noise model was explored to show how the observed circumferential noise patterns of the separate propeller tones might have occurred. The total noise pattern, which represented the sum of the front- and rear-propeller tones at a particular harmonic, showed trends that would be hard to interpret without the separate-tone results. Therefore it is important that counterrotation angle-of-attack noise data be taken in such a manner that the front- and rear-propeller tones can be separated. Author

N87-13253# Department of the Air Force, Washington, D.C.
MULTICHANNEL PHASE NOISE MEASUREMENT SYSTEM Patent Application
Stephen P. Caldwell, inventor (to Air Force) Filed 21 Apr. 1986 16 p
(AD-D012372; US-Patent-Appl-SN-853827) Avail: NTIS HC A02/MF A01 CSCL 14/2

A multichannel phase noise measuring system is disclosed which is capable of measuring the phase noise of two signal sources operating between 100 MHz and 24 GHz. This system has two input channels and a mixer which produces a difference frequency betweeen the signals received in the input channels. The difference frequency containing the phase noise is frequency multiplied and amplified to raise the phase noise level 12 dB. The

multiplied and amplified difference signal is phase locked to a commercially available frequency synthesizer with inferior noise characteristics to the units being tested. By amplifying the phase noise of the original signls above the phase noise levels of the commerically available frequency synthesizer, they become measurable. GRA

N87-12951# Joint Publications Research Service, Arlington, Va.
EVALUATING NONLINEAR EFFECTS IN PROPAGATION OF ACOUSTIC PULSE IN ATMOSPHERIC SURFACE LAYER IN INVERSIONS Abstract Only
I. P. Chunchuzov *In its* USSR Report: Earth Sciences (JPRS-UES-86-007) 10 Sep. 1986 2 p Transl. into ENGLISH from Izvestiya Akademii Nauk SSSR: Fizika Atmosfery i Okeana (Moscow, USSR), v. 22, no. 2, Feb. 1986 p 151-159 (For primary document see N87-12946 04-42)
Avail: NTIS HC A06/MF A01

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

N87-13254# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
CALCULATED VERSUS EXPERIMENTAL CHARGE DENSITY DISTRIBUTION OF Be METAL
A. J. Pindor, S. H. Vosko, and C. J. Unrigar Jun. 1986 21 p
(Contract N00014-82-K-0576)
(AD-A168924; TR-23) Avail: NTIS HC A02/MF A01 CSCL 20/8

We have performed self-consistent Linearized Augmented Plane Wave calculations of the charge density of metallic beryllium, with and without warping of the interstitial potential, using the Local Density Approximation for the exchange and correlation energy functional. Overall agreement with the newest x-ray form factors is good, and it is argued that the remaining discrepancies have their source in the inadequacy of the local Density Approximation and, for some reflections, in neglecting the non-sphericity of the core charge density. GRA

N87-13255# Argonne National Lab., Ill.
BAND DESCRIPTION OF MATERIALS WITH LOCALIZING ORBITALS
D. D. Koelling Mar. 1986 31 p Presented at the Special Sanibel Symposium, St. Augustine, Fla., 8 Mar. 1986
(Contract W-31-109-eng-38)
(DE86-010529; CONF-8603121-2) Avail: NTIS HC A03/MF A01

Density functional theory is a form of many-body theory which maps the problem onto an equivalent single particle-like system by limiting to the ground state (or some limited ensemble). So it should be surprising that this ground state theory could have relevance to the excitation properties of a material , and yet it does when used carefully. However, the most interesting materials involve active orbitals which are at least partially localized in space and this has profound effects both on the ground state and the excitation spectrum. A long term interest is in Ce and actinide compounds such that the popular concerns are mixed valence, heavy fermions, and the various forms of magnetic transitions. Band structure calculations can give a great deal of information concerning the mechanisms and degree of the localization as shown by examples using the Ce and U L12 structured materials and the Ce cubic Laves phase materials. There are some difficulties due to an incomplete knowledge of the functionals involved which causes an underestimate of the local character. This is illustrated and discussed. DOE

N87-13256# Oak Ridge National Lab., Tenn.
PHOTOEMISSION FROM OBLATE SILVER SPHEROIDS WITH POLARIZED VACUUM UV EXCITATION
E. T. Arakawa, J. P. Goudonnet, and T. Inagaki 1986 4 p Presented at the 8th International Conference on Vacuum Ultraviolet Radiation Physics, Lund, Sweden, 4 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-008896; CONF-860845-1) Avail: NTIS HC A02/MF A01

A 3 nm thick silver film was evaporated on a quartz slide and then heated for 60 s at 400 C. The resulting spheroids were 60 nm in diameter with average center-to-center distance of 110 nm. These particles were flattened out along the substrate normal with a typical ratio of minor axis length to major axis length being 0.2. Photoemission measurements were made using a Seya-Namioka monochromator with an air discharge lamp. The dependence of the photo yield on the polarization of the incident light was determined with a VUV transmission polarizer made of cleaved LiF plates. DOE

N87-13257# Brookhaven National Lab., Upton, N. Y.
POLARIZED H(-) SOURCE DEVELOPMENT AT BNL
J. G. Alessi, A. Hershcovitch, A. Kponou, T. Niinikoski, and T. Sluyters 1986 4 p Presented at the Linear Accelerator Conference, Stanford, Calif., 2 Jun. 1986
(Contract DE-AC02-76CH-00016)
(DE86-012704; BNL-38233; CONF-860629-16) Avail: NTIS HC A02/MF A01

The AGS polarized H source (PONI-1) now produces currents of 25-40 A, and has operated reliably during polarized physics runs. A new polarized source, having as its goal mA's of H-vector, is now under development. An atomic hydrogen beam has been cooled to about 20 K with a forward flux of approx. 10 atoms/s/sr. A superconducting solenoid having a calculated acceptance angle of 0.1 sr for the cold H beam, is now being built. An ionizer for the resulting polarized H beam based on resonant charge exchange of H with D, is being tested. 500 A of H have been produced by ionizing an unpolarized H beam using this ionizer. DOE

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N87-13258# Westinghouse Research and Development Center, Pittsburgh, Pa.
MODELS AND RADIATION OF RAILGUN PLASMA ARMATURES WITH NON-IDEAL PLASMA PROPERTIES Final Report, 1 Oct. 1983 - 30 Sep. 1985
Y. C. Thio and L. S. Frost 30 May 1986 52 p
(Contract DAAG29-83-C-0030)
(AD-A169349; ARO-20115.2-EG) Avail: NTIS HC A04/MF A01 CSCL 20/7

A theoretical framework for modeling the characteristics of railgun plasma armatures is developed taking into account non ideal transport properties and equation of state. The electrical resistivity of the plasma is calculated as a sum of contributions from electron ion and electron neutral collisions. Non ideal correction to the ionization potential and pressure in Saha's equation and the equation of state is included. A steady-state magneto-gasdynamic model improved over earlier works is developed. In this model, the net Lorentz force exerted on the plasma armature is exactly accounted for. The model studies the radiation emanating from the plasma armature. It is found, on the one hand, that the radiation from the plasma armature under the conditions of most railgun experiments conducted in the past is sufficiently high to cause ablation. On the other hand, the modelling results also indicate that there indeed exist domains of operating parameters in which radiative ablation of the wall materials can be completely eliminated. Whether these favorable domains of operating parameters can be realized in practice remains a development of the future, though preliminary experiments conducted in a companion program sponsored by DoE and experiments in other institutions based upon the theoretical

recommendations developed here have produced significant reduction of ablation of the rails. GRA

N87-13259# Columbia Univ., New York. Dept. of Physics.
THEORETICAL HIGH ENERGY PHYSICS Progress Report, 1 May 1985 - 30 Apr. 1986
T. D. Lee May 1986 23 p
(Contract DE-AC02-76ER-02271)
(DE86-012669; DOE/ER-02271/109; COO-2271-109) Avail: NTIS HC A02/MF A01

Activities are reported in these areas: lattice QCD numerical studies; U(1)-vector current in the presence of arbitrary left and right chiral gauge fields and an arbitrary Higgs field; spectrum degeneracy of non-relativistic spin 1/2 particles in the field of a dyon; multiloop amplitudes of the closed bosonic and fermionic Polyakov strings in their critical dimensions; second order Coulomb scattering of an electron by a system with near degeneracy between states of opposite parity; production and annihilation of heavy neutrinos in the early universe; the effect of retardation on the energy levels of Rydberg helium atoms; Hawking radiation from black holes; the Eden model of cluster growth; and the quantum Hall effect. DOE

N87-13260# Los Alamos National Lab., N. Mex.
COMPACT REACTOR/ORC POWER SOURCE
K. L. Meier, W. L. Kirchner, and G. J. Willcutt 1986 7 p Presented at the Intersociety Energy Conversion Engineering Conference, San Diego, Calif., 25 Aug., 1986
(Contract W-7405-eng-36)
(DE86-011252; LA-UR-86-1643; CONF-860810-7) Avail: NTIS HC A02/MF A01

A compact power source that combines an organic Rankine Cycle (ORC) electric generator with a nuclear reactor heat source is being designed and fabricated. Incorporating existing ORC technology with proven reactor technology, the compact reactor/ORC power source offers high reliability while minimizing the need for component development. Thermal power at 125 kWt is removed from the coated particle fueled, graphite moderated reactor by heat pipes operating at 500 C. Outside the reactor vessel and connected to the heat pipes are vaporizers in which the toluene ORC working fluid is heated to 370 C. In the turbine-alternator-pump (TAP) combined-rotating unit, the thermal energy of the toluene is converted to 25 kWe of electric power. Lumped parameter systems analyses combined with a finite element thermal analysis have aided in the power source design. The analyses have provided assurance of reliable multiyear normal operation as well as full power operation with upset conditions, such as failed heat pipes and inoperative ORC vaporizers. Because of inherent high reliability, long life, and insensitivity to upset conditions, this power source is especially suited for use in remote, inaccessible locations where fuel delivery and maintenance costs are high. DOE

N87-13261# Los Alamos National Lab., N. Mex.
SPACE NUCLEAR SAFETY PROGRAM Progress Report, Oct. - Dec. 1984
T. G. George, comp. May 1986 55 p
(Contract W-7405-eng-36)
(DE86-012767; LA-10673-PR) Avail: NTIS HC A04/MF A01

This quarterly report covers studies related to the use of (Pu-238)O2 in radioisotope power systems carried out for the Office of Special Nuclear Projects of the US Department of Energy by Los Alamos National Laboratory. Most of the studies discussed are ongoing; the results and conclusions described may change as the work progresses. DOE

N87-13262# Los Alamos National Lab., N. Mex.
NEUTRONIC DESIGN STUDIES FOR AN UNATTENDED, LOW POWER REACTOR
R. G. Palmer and J. W. Durkee, Jr. 1986 23 p Presented at the Advances in Reactor Physics and Safety Meeting, Saratoga Springs, N.Y., 17 Sep., 1986
(Contract W-7405-eng-36)
(DE86-011228; LA-UR-86-1879; CONF-860906-13) Avail: NTIS HC A02/MF A01

The Los Alamos National Laboratory is involved in the design and demonstrations of a small, long-lived nuclear heat and electric power source for potential applications at remote sites where alternate fossil energy systems would not be cost effective. This paper describes the neutronic design analysis that was performed to arrive at two conceptual designs, one using thermoelectric conversion, the other using an organic Rankine cycle. To meet the design objectives and constraints a number of scoping and optimization studies were carried out. The results of calculations of control worths, temperature coefficients of reactivity and fuel depletion effects are reported. DOE

N87-13263# Rensselaer Polytechnic Inst., Troy, N.Y. Div. of Nuclear Engineering.
COMPACT REACTOR STUDIES Technical Progress Report, 1 Dec. 1985 - 30 Nov. 1986
D. Steiner Jun. 1986 11 p
(Contract DE-FG02-85ER-52118)
(DE86-013247; DOE/ER-52118/T2) Avail: NTIS HC A02/MF A01

This is a status report on technical progress relative to the tasks identified for the first year of this activity (1 December 1985 - 30 November 1986). The continuation of this proposal in this submission describes plans for the second year of the project. It is noted that a new task is proposed as part of the effort for next year. The new task is in the area of blanket design for the Engineering Test Reactor (ETR). The ETR activity is a new effort within the Office of Fusion Energy and planning. The RPI Fusion Engineering Program has been conducting research on a novel blanket concept which we believe may be of substantial benefit to the ETR activity. Thus, we are requesting additional support to participate in the ETR activity. DOE

74 OPTICS

N87-13264*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THEORY FOR COMPUTING THE FIELD SCATTERED FROM A SMOOTH INFLECTED SURFACE
Raymond L. Barger and Allen K. Dominek 1986 23 p
(NASA-TP-2632; L-16157; NAS 1.60:2632) Avail: NTIS HC A01/MF A01 CSCL 20F

A theory is described for computing the reflected or scattered field from a smooth body with inflection points. These inflections occur in certain directions at each surface point for which the total (Gaussian) curvature is zero or negative. For surface illumination in one of these critical directions, the usual reflection formulas obtained by the high-frequency approximation are inapplicable, and a shadow zone exists in the reflected field. Scattering into the shadow zone is treated, as well as specular reflection. This theory should have a variety of applications such as for certain optics problems, computer graphics modeling of three-dimensional shapes, and the design and analysis of specialized microwave reflector antennas. Author

N87-13265# California Inst. of Tech., Pasadena. Dept. of Applied Research.
PHASE CONJUGATE OPTICS AND PICOSECOND OPTOELECTRONICS Final Report, 14 Feb. 1983 - 28 Feb. 1986
S. K. Kwong, G. Rakuljic, J. Paslaski, and A. Yariv 8 May 1986 13 p
(Contract DAAG29-83-K-0048)
(AD-A169180; ARO-19881.26-PH) Avail: NTIS HC A02/MF A01 CSCL 20/6

Large Coupling coefficient (>10/cm) photorefractive crystals have been developed. The infrared response and the temperature dependence of these crystals have been studied. The applications of these crystals such as image subtraction, wavefront

conversion and bistable oscillations have been developed. The ultimate bandwidth limitations of the self-pumped phase conjugate mirror have been investigated. High speed detectors for use at the 1.3 micrometers region have been developed. During this reporting period we have been conducting research on properties of photorefractive crystals and their applications, and the phase conjugation of picosecond light pulses. GRA

N87-13266# Department of the Air Force, Washington, D.C.
METHOD OF FABRICATING HIGH EFFICIENCY BINARY PLANAR OPTICAL ELEMENTS Patent Application
Wilfrid Veldkamp, inventor (to Air Force) Filed 16 Apr. 1986 43 p
(AD-D012374; US-Patent-Appl-SN-852587) Avail: NTIS HC A03/MF A01 CSCL 20/6

The high diffraction efficiency regime of binary gratings occurs at periodicities on the order of a wavelength in order to produce grating which diffract radiation with efficiencies of greater than 90%, a fabrication procedure is disclosed which uses holographic and very large scale integration techniques which allow fine control over the periodicity and depth parameters to produce binary planar optical elements having a ratio of lambda/T greater than one (where lambda equals the wavelength of an illuminating wavefront, and T equals the grating periodicity). Additionally, the disclosed process produces high optical quality diffractive elements with phase precision of as high as lambda/100. These diffractive elements include laser beam multiplexers, beam profile shapers, and binary lenses which are lossless optical transfer functions. GRA

N87-13267# Department of the Air Force, Washington, D.C.
THREE DIMENSIONAL OPTICAL RECEIVER HAVING PROGRAMMABLE GAIN SENSOR STAGES Patent
Nathan Bluzer, inventor (to Air Force) Issued 20 May 1986 12 p Supersedes AD-D010970
(AD-D012389; US-Patent-4,590,505; US-Patent-Appl-SN-569639; US-Patent-Class-337-24) Avail: US Patent and Trademark Office CSCL 17/8

A three dimensional optical image receiver having sensor stages with a programmable gain capability is presented. Operation of the receiver occurs entirely in the charge domain upon the charge initially generated by the optical signal. GRA

N87-13268# Department of the Army, Washington, D. C.
BEAM STEERING MIRROR CONSTRUCTION Patent Application
Frederick G. Eitel, inventor (to Army) Filed 28 Apr. 1986 9 p
(AD-D012399; US-Patent-Appl-SN-856263) Avail: NTIS HC A02/MF A01 CSCL 20/6

A beam steering mirror is trunnion mounted about a primary axis relative to a ring structure. The ring structure is trunnion mounted on a secondary axis 90 deg from the primary axis of the beam steering mirror and in the same plane. The ring structure is trunnion mounted about its secondary axis relative to a stationary support structure. The ring structure and the beam steering mirror each have electric torque actuators for adjusting the beam steering mirror and the ring structure relative to the stationary support structure. GRA

N87-13269# Dayton Univ., Ohio. Research Inst.
OPTICAL PROCESSING Interim Report, 1 Jun. - 31 Dec. 1985
Steven C. Gustafson 31 Dec. 1985 522 p
(Contract N00014-85-K-0479)
(AD-A169882; UDR-TR-85-148) Avail: NTIS HC A22/MF A01 CSCL 09/2

The technical contributions were as follows: (1) Optical parallel 2-D neighborhood processor and optical processor assessment technique; (2) High accuracy with moderately accurate components and optical fredkin gate architectures; (3) Integrated optical threshold computing, pipelined polynomial processor, and all optical analog/digital converter; (4) Adaptive optical associative memory model with attention; (5) Effectiveness of parallelism and connectivity in optical computers; (6) Optical systolic array processing using an integrated acoustooptic module; (7) Optical threshold elements and networks, holographic threshold processors, adaptive matched spatial filtering, and coherence theory in optical computing; (8) Time-varying optical processing for sub-pixel targets, optical Kalman filtering, and adaptive matched filtering; (9) Optical degrees of freedom, ultra short optical pulses, number representations, content-addressable-memory processors, and integrated optical Givens rotation devices; (10) Optical J-K flip flop analysis and interfacing for optical computers; (11) Matrix multiplication algorithms and limits of incoherent optical computers; (12) Architecture for machine vision with sensor fusion, pattern recognition functions, and neural net implementations; (13) Optical computing algorithms, architectures, and components; and (14) Dynamic optical interconnections, advantages and architectures. GRA

N87-13270# Department of the Air Force, Washington, D.C.
METHOD AND APPARATUS FOR RAPID OPTICAL PHASING Patent Application
Mark G. Baciak, inventor (to Air Force) Filed 30 Apr. 1986 18 p
(AD-D012412; US-Patent-Appl-SN-857621) Avail: NTIS HC A02/MF A01 CSCL 20/6

This document discloses a method and apparatus for rapid optical phasing of optical devices utilizing white light interference fringe finding. The apparatus comprises a white light source, a beam splitter, a scanning mirror and a stationary reflective surface. The scanning mirror is moved in piston while reflected light is observed by an electro optic sensor at a receiver. A nulled pattern has been previously established at the receiver. An electrical signal from the electro optic sensor is mounted at amplification and recording means to identify variations in reflected light intensity that are caused by white light fringes. White light fringes only occur at zero optical difference, i.e., when the scanning mirror and stationary reflective surface are in phase. GRA

N87-13271# Galileo Electro-Optics Corp., Sturbridge, Mass.
FEASIBILITY OF MAKING COHERENT FIBER-OPTIC ARRAYS FROM FUSED SILICA Final Report
J. E. Rourke, Dean J. Geraci, and Mark L. DeLong Jul. 1986 24 p
(Contract DAAA15-85-C-0111)
(AD-A170873; BRL-CR-558) Avail: NTIS HC A02/MF A01 CSCL 20/6

Coherent fiber-optic bundles offer opportunities for application of state-of-the-art electro-optic imaging techniques to the sighting and fire-control problem. However, conventional fiber-optics are limited in this application by their high attenuation coefficients (up to 2000 dB/km). Fused silica fiber with its low attenuation (1-50 dB/km), offers substantial improvement. GRA

N87-13272# California Univ., Berkeley. Lawrence Berkeley Lab.
X-RAY DATA BOOKLET, REVISION
D. Vaughan, ed. Apr. 1986 154 p
(Contract DE-AC03-76SF-00098)
(DE86-012650; LBL-PUB-490-Rev.) Avail: NTIS HC A08/MF A01

A compilation of data is presented. Included are properties of the elements, electron binding energies, characteristic x-ray energies, fluorescence yields for K and L shells, Auger energies, energy levels for hydrogen-, helium-, and neonlike ions, scattering factors and mass absorption coefficients, and transmission bands of selected filters. Also included are selected reprints on scattering processes, x-ray sources, optics, x-ray detectors, and synchrotron radiation facilities. DOE

N87-13273# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Electromagnetic Wave Propulsion Panel.
GUIDED OPTICAL STRUCTURES IN THE MILITARY ENVIRONMENT
H. Hodara, ed. and P. Crosignani, ed. Loughton, England May 1986 310 p Meeting held in Istanbul, Turkey, 23-27 Sep. 1985
(AGARD-CP-383; ISBN-92-835-0391-0) Avail: NTIS HC A14/MF A01

A new technology has arisen and is expanding quickly; single

mode structures in the form of optical fibers and planar waveguides operating at long wavelength, 1.3 micron and beyond, with minimum attenuation and dispersion. Fibers with attenuation below 0.5 dB/km, and bandwidths in the hundreds of GHz-Km have opened up long distance, repeaterless transmission on land and underwater. In addition, the single mode structure has bred a new class of passive devices: sensors capable of detecting sound, magnetic field, motion, temperature, humidity and many other characteristics, all of them approaching the theoretical detection limit. New active components are developing: single mode, high efficiency, long life chips operating at room temperature, electro-optic switches and components capable of generating new frequencies through Raman scattering and other nonlinear phenomena. For individual titles, see N87-13274 through N87-13306.

N87-13274# Naval Research Lab., Washington, D. C.
PROGRESS IN OPTICAL FIBER SENSORS
T. G. Giallorenzi *In* AGARD Guided Optical Structures in the Military Environment May 1986 13 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A review of the status of Optical Fiber Sensor Technology is presented and the effects of laser noise and demodulation techniques on performance are reviewed. Recent work on the development of fiber telemetry scheme for use with optical fiber sensors is also detailed. Author

N87-13275# Strathclyde Univ., Glasgow (Scotland). Dept. of Electronic and Electrical Engineering.
FIBRE OPTIC GYROSCOPES IN INERTIAL NAVIGATION c04
Brian Culshaw and John D. Nuttall (Ferranti Ltd., Edinburgh (Scotland).) *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The potential application of fiber optic gyroscopes (FOG) in interial navigation (IN) systems is discussed. The requirements for IN are briefly reviewed and compared to the reported performance of experimental FOG's. This leads to the identification of areas in which further work is necessary, in both physical understanding and technological developments. Author

N87-13276# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
COMPARISON OF RING LASER AND FIBER-OPTIC GYRO TECHNOLOGY
E. Udd, S. F. Watanabe, and R. F. Cahill *In* AGARD Guided Optical Structures in the Military Environment May 1986 14 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Substantial progress has been made in recent years toward the development of producible fiber-optic rotation sensors. These devices have the potential of being the solid-state replacement for many applications currently using mechanical gyro technology. Ring laser gyro technology which has been under development for approximately 23 years is now being introduced into commercial and military aircraft for inertial navigation. The fundamentals of the usage of Sagnac interferometry for rotation sensing is reviewed as well as the differences between fiber-optic gyro and ring laser gyro technology. Examples are given of applications where fiber-optic gyro or ring laser gyro technology is particularly suitable. Distinctions are made between analog fiber-optic gyros which offer the lowest possible cost but are limited in performance capability and digital fiber-optic gyros which offer the wide dynamic range and accurate scale factor correction required for more stringent applications. Author

N87-13277# Litton Systems (Canada) Ltd., Rexdale, (Ontario). Advanced Optical Systems Group.
CLOSED LOOP FIBER OPTIC GYRO
D. H. Lewis, B. Bednarz, J. A. Dankowych, K. Jew, G. Joslin, and W. A. Young *In* AGARD Guided Optical Structures in the Military Environment May 1986 10 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A breadboard closed loop gyroscope using ordinary single mode fiber and a multi-mode diode laser is described. Closed loop rotation rate bias stability data are presented for both short term and long term. The performance of the gyro is displayed in the frequency domain as well as in the time domain. The performance achieved was a rotation rate noise of 5 deg/hr for 1 sec. integration, 0.55 deg/hr for 100 second integration and an extrapolated drift of 0.09 deg/hr. The long term (6 hours) bias stability was 1 deg/hr. Author

N87-13278# Plessey Co. Ltd., Romsey (England).
PROGRESS WITH MULTIPLEXED SENSOR ARRAYS BASED ON REFLECTION AT SPLICED JOINTS BETWEEN SENSORS
J. P. Dakin, C. A. Wade, and P. B. Withers *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Recent progress made in developing a time-division-multiplexed, fiber optic hydrophone array using optical time domain reflectometry (OTDR) techniques is reported. Recently, improvements have been made in four main areas: (1) development of partially reflecting splices; (2) development of a high power single mode gas laser for use in the present system; (3) development of a balanced-optical-path arrangement to allow shorter coherence length sources to be used in future systems; and (4) development of an all-fiber frequency shifter, with the ultimate aim of producing a complete all-fiber system. E.R.

N87-13279# Plessey Co. Ltd., Romsey (England).
MAGNETIC AND PRESSURE SENSORS USING THE COMPENSATED POLARIMETRIC SENSOR CONFIGURATION
J. P. Dakin, C. R. Batchellor, and J. A. Rex *In* AGARD Guided Opitcal Structures in the Military Environment May 1986 7 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The identical lengths of high birefringence fiber spliced together with a 90 deg axial rotation to couple their orthogonal birefringent axes form the basis of a compensated polarimetric optical fiber sensor. This can be used to detect differential strains in the two fiber lengths caused by such phenomena as hydrostatic pressure or magnetic fields (the strain being introduced by magnetostrictive material bonded to the fiber). Magnetic and pressure sensors were constructed using this principle and show good sensitivity yet better stability then Mach-Zehnder arrangements. Author

N87-13280# Consiglio Nazionale delle Ricerche, Florence (Italy). Istituto de Ricerca sulle Onde Elettromagnetiche.
FIBER OPTIC DEVICE FOR TEMPERATURE REMOTE SENSING
A. M. Scheggi, M. Brenci, G. Conforti, F. Cosi, R. Falciai, and A. G. Mignani *In* AGARD Guided Optical Structures in the Military Environment May 1986 5 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

An optical-fiber temperature sensor is presented which is based on light amplitude modulation induced by a thermosensitive cladding applied on the distal end of the fiber. The experimental set-up for detecting and processing the signal is described, and the measured characteristics of the thermometer are reported. Author

N87-13281# National Bureau of Standards, Boulder, Colo.
OPTICAL FIBER SENSORS FOR THE MEASUREMENT OF PULSED ELECTRIC CURRENTS
G. W. Day, J. D. O. McFadden, L. R. Veeser (Los Alamos National Lab., N. Mex.), G. I. Chandler, and R. W. Cernosek (Sandia National Labs., Albuquerque, N. Mex.) *In* AGARD Guided Optical Structures in the Military Environment May 1986 9 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Recent progress in the design of fiber sensors for pulsed electric currents is reviewed. Several of the most useful sensor configurations are described and compared. Models are used to predict the transfer function of these sensors, their sensitivity to non-ideal fiber properties, particularly linear birefringence, and methods for overcoming these problems. Other recent research is examined to suggest the prospect for sensors with improved sensitivity and stability. Author

N87-13282# Fondazione Ugo Bordoni, Rome (Italy). Istituo Superiore P. T.
NONLINEAR ELLIPSE ROTATION IN A LOW-BIREFRINGENCE OPTICAL FIBER
B. Crosignani, S. Trillo, P. DiPorto, and S. Wabnitz *In* AGARD Guided Optical Structures in the Military Environment May 1986 3 p Prepared in cooperation with Rome Univ., Italy (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The rotation of the polarization ellipse taking place in a low-birefringence single mode optical fiber and associated with the nonlinear optical Kerr effect is theoretically investigated. A detailed description of a proposed experiment for measuring the nonlinear refractive index through the ellipse rotation is also furnished. Author

N87-13283# Thomson-CSF, Orsay (France). Lab. Central de Recherches.
PROGRESS IN OPTICAL FIBER GYROSCOPES USING INTEGRATED OPTICS
H. C. Lefevre, J. P. Bettini, S. Vatoux, and M. Papuchon *In* AGARD Guided Optical Structures in the Military Environment May 1986 13 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A quarter of a liter brass-board of a fibergyro using a multifunction integrated optic circuit (splitter, polarizer and phase modulator), a superluminescent diode and 250 meters of polarization holding fiber is described. The photon noise limited random walk performance is 0.004 deg/sq. rt. H. A simple model to evaluate birefringence induced non-reciprocities, and an original method of signal processing, the digital phase ramp, to solve the problem of scale factor linearity and accuracy are also presented. Author

N87-13284# Bell Telephone Labs., Inc., Murray Hill, N. J.
WAVELENGTH DIVISION MULTIPLEXING AT 1.5 MICRONS FOR HIGH CAPACITY OPTICAL TRANSMISSION
J. Hegarty, N. A. Olsson, and R. A. Logan *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A method is described for multiplexing several channels of information, closely spaced in wavelength, together in one single-mode fiber. The results are reported of a recent 10-channel experiment at 1.5 micrometers in which 10 distributed feedback lasers, modulated at 2 Gbits/s, were multiplexed together and transmitted over 68.3 km of fiber giving a system capacity of 1.37 terabit-km/s. The channel spacing was 1.35 nm and the multiplexer insertion loss was 3 db. Crosstalk, including Raman crosstalk, was found to be negligible. Author

N87-13285# Consiglio Nazionale delle Ricerche, Florence (Italy). Istituto di Recerca sulle Onde Elettromagnetiche.
A SPHERICAL WAVEGUIDE MULTIPLEXER-DEMULTIPLEXER
V. Russo, S. Sottini, G. C. Righini, and S. Trigari *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A wavelength multiplexer-demultiplexer (MUX - DEMUX) which can work also a tapping element was suggested and tested. This device is based on the imaging properties of a hemispheric geodesic lens. The aberrations of this lens were evaluated and some examples of the potential performance of the device are given: in particular the MUX - DEMUX seems to be quite interesting in the case of monomode fibers, showing a diffraction limited performance. Experimental tests are in progress, utilizing a spherical waveguide fabricated by ion exchange on a glass substrate, and gratings with 540 or 1200 grooves/mm. The results already available are quite encouraging and confirm the expected advantages of this approach with respect to previous devices. Author

N87-13286# Plessey Co. Ltd., Romsey (England).
A STUDY OF METHODS OF PHASE NOISE REDUCTION OF SEMICONDUCTOR LASERS FOR SENSOR APPLICATIONS
J. P. Dakin and P. B. Withers *In* AGARD Guided Optical Structures in the Military Environment May 1986 7 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Many optical sensors based on fiber interferometry have been proposed. The majority of these use interferometers of the Mach-Zehnder or Michelson type, in which the optical path lengths of the two arms are often unequal. Under these conditions, a highly coherent light source is necessary to avoid signal/noise degradation due to fluctuations in the phase or frequency of the source. Single mode gas lasers are sufficiently coherent, but their large size, critical alignment requirements, and cost, limit their appeal as light sources for optical sensors. Semiconductor lasers, however, are compact, rugged and potentially low-priced devices, but the magnitude of the phase noise is such that, to obtain microradian sensitivity in interferometric sensors, only path differences less than one millimetre between the signal and reference arms can be tolerated. This imbalance may be increased if the magnitude of the laser phase noise can be reduced using either passive optical feedback or active control of the laser drive current. Both approaches are described. Described first are proposed experiments to examine the feasibility of using an array of suitably spaced mirrors to provide passive optical feedback. Secondly, experiments to measure phase noise reduction produced by active control of the laser drive current are reported together with their results. Author

N87-13287# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
OPTICAL QUADRATURE DEMODULATOR FOR COHERENT DETECTION AND SENSOR APPLICATIONS
S. F. Watanabe, A. A. Joseph, H. B. Turner, S. A. Holmes, and J. T. Freidah *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A new device was designed, built and demonstrated which provides exceptional performance in a very small, potentially very low cost unit. Balanced quadrature detection for homodyne or heterodyne detection of phase or frequency encoded signal information is accomplished with microradian phase sensitivities over a broad range of environments and for a broad dynamic range of signal levels and frequencies. Results of current development testing are presented along with brief discussions of potential applications to coherent detection for interferometers, sensors, and communications. Author

N87-13288# Siemens A.G., Munich (West Germany). Research Labs.
EFFECTS OF OPTICAL FEEDBACK ON THE PERFORMANCE OF HIGH DATA RATE SINGLE-MODE FIBER SYSTEMS
R. Keil, K. Mathyssek, and E. Hoermann *In* AGARD Guided Optical Structures in the Military Environment May 1986 15 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Performance measurements data accomplished on a 678 Mbit/s single-mode fiber optic transmission system for various laser diode structures and more importantly under different near- and far-end optical feedback conditions are presented. Specifically, for two integral coupling schemes i.e., the drawn fiber taper with a lens and hemispherically ended graded index fiber lens (GRINFLENS) the near-end optical feedback are modelled and

simple method for its experimental assessment are given. Feedback induced variations of lasing spectra and of mode partition noise and their influences on bit error rate (BER) data are experimentally determined for a dispersive single-mode fiber transmission link with the two coupling arrangements. Comparative measurements were done with a butt-coupled fiber and with a non-dispersive fiber system. Furthermore, far-end reflections from a connector joint and their quantitative influence on BER data were investigated. Author

N87-13289# Barr and Stroud Ltd., Glasgow (Scotland).
PERFORMANCE OF INTEGRATED OPTICAL FREQUENCY SHIFTERS PIGTAILED TO HIGH BIREFRINGENCE FIBRES USING ION-MILLED GROOVES
I. Andonovic, W. Johnstone, D. N. Macfadyen, A. McDonach, M. S. Ner, and S. Beaumont *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p Prepared in cooperation with Glasgow Univ., Scotland (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The practical application of lithium niobate integrated optical devices in the severe military environmants that will be experienced by the fiber optic gyroscope, requires the development of a cheap, efficient and robust means of interconnecting optical fibers and integrated optical chips. One technique for fiber to chip coupling is the use of ion-milled alignment grooves in the Lithium Niobate substrate to accurately locate the fiber end with the end of the waveguide. This technique uses a photolithographic process for the most precise alignment stages and is therefore amenable to mass production and automation. Efficient coupling of light was observed between optical fibers chemically etched to a diameter of about ten microns and waveguides formed by the indiffusion of titanium. The use of chemically etched optical fibers and ion-milled grooves allows a high packing density of chip/fiber connections, offereing space saving in terms of device lengths as well as lateral separation. Results are presented for the coupling of light to integrated optical waveguides from high birefringence optical fibers using ion-milled alignment grooves, and the degree of polarisation preservation achieved is related to the performance of integrated optical phase modulators. Author

N87-13290# Arizona Univ., Tucson. Optical Sciences Center.
NONLINEAR PLANAR GUIDED WAVE INTERACTIONS AND DEVICES
G. I. Stegeman, C. T. Seaton, and H. G. Winful (GTE Labs., Inc., Waltham, Mass.) *In* AGARD Guided Optical Structures in the Military Environment May 1986 9 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

A variety of applications of third-order nonlinear integrated optics to optical signal processing are discussed. These include guided wave devices based on an intensity-dependent refractive index such as upper and lower threshold devices, all-optical switching devices, all-optical modulation devices, optical logic, and optical bistability. Multiple waveforms mixing with degenerate four-wave mixing to produce signal convolution and time inversion on a picosecond time scale are also discussed. Author

N87-13291# Rome Univ. (Italy). Dipt. di Energetica.
BISTABILITY IN NONLINEAR WAVEGIUDES c32
M. Bertolotti, C. Sibilia, and I. Anselmi *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The propagation of electromagnetic waves in a nonlinear waveguide is studied. For simplicity a three layer structure is considered with the two external media of semi-infinite extent. The mode dispersion equation is derived together with the power carried by the single mode in the structure, showing that bistability can occur in some case. Author

N87-13292# Arizona Univ., Tucson. Optical Sciences Center.
INTEGRATED OPTICS OPTICAL LIMITERS
C. T. Seaton, J. D. Valera, and G. I. Stegeman *In* AGARD Guided Optical Structures in the Military Environment May 1986 7 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Two novel, low-power, guided-wave optical limiters were demonstrated. Both are based on intensity-dependent refractive indices and involve phenomena unique to optical waveguides. The first utilizes newly discovered nonlinear guided waves that exhibit optical-limiting action for a film bounded by a nonlinear medium. The second relies on an intensity-dependent reduction in coupling efficiency when waveguide modes are excited by prism or grating couplers. In both cases, preliminary experiments have demonstrated optical limiting action. Author

N87-13293# ANT Nachrichtentechnik, Backnang (West Germany).
PIN-FET PREAMPLIFIER FOR HIGH-SPEED OPTICAL TRANSMISSION SYSTEMS
B. Schwaderer *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The design of a hybrid integrated PIN-FET transimpedance preamplifier is given for long-haul optical transmission systems at 1.3 micrometers wavelength with bit rates of 140 Mbit/s and 565 Mbit/s. The preamplifier uses a GaInAs/InP PIN-photodiode with a dark current of less than 10 nA, a high spectral responsivity of greater than 0.7 A/W at 5V bias supply and a GaAs-MESFET with 45 mS transconductance and about 0.7 pF input capacitance. Using transimpedance-resistors of 50 kilo-ohm and 25 kilo-ohm the design goals of receiver sensitivities are -43 dBm for the 140 Mbit/s system and -36.7 dBm for the 565 Mbit/s system respectively for BER equal to or less than 10(-9). The measured values of - 42.8 dBm and - 35.8 dBm including connector losses are within the predicted ranges. Author

N87-13294# Communications Research Centre, Ottawa (Ontario). Optical Communications Program.
OPTOELECTRONIC BROADBAND SWITCHING FOR COMMUNICATIONS AND SIGNAL PROCESSING c32
R. I. MacDonald and D. K. W. Lam *In* AGARD Guided Optical Structures in the Military Environment May 1986 10 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

By employing a hybrid technology using electronic and optical integration, optical isolation levels can be attained in a switch matrix without the need to switch light. Bandwidths of several GHz, subnanosecond switching time and crosstalk below 50 dB were demonstated in monolithically integrated optoelectronic switch matrices. These devices show high promise as central switches in star configuration communication systems where very high bandwidth or very large array size is required. Advantages over foreseeable alternative technologies include size and power consumption as well as performance. In addition, optoelectronic switch matrices have unique properties that suggest their application in a number of signal processing situations where precise broadband signal delays are required, such as in the phasing of arrays, or the production of tunable filters. Recent work in these areas are described. Author

N87-13295# Siemens A.G., Munich (West Germany). Research Labs.
ACOUSTOOPTIC SPECTRUM ANALYZER USING A PLANAR BRAGG-CELL
M. Stockmann and P. Clemens *In* AGARD Guided Optical Structures in the Military Environment May 1986 5 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The design principles and the performance characteristics of a miniaturized acoustooptic RF-spectrum analyzer are presented. The device yields a time-band-width-product of more than 300. Using a planar Bragg-cell fabricated on a LiNbO3 substrate and air between Bragg-cell and detector array the time-bandwidth-product was doubled compared to the minibulk as well as the

integrated optic spectrum analyzer for the same device length. The time resolution of the spectrum analyzer is 33 usec and its linear dynamic range 28 dB. Author

N87-13296# Naval Research Lab., Washington, D. C. Optical Sciences Div.
PREPARATION AND PROPERTIES OF INFRARED TRANSMITTING HEAVY METAL FLUORIDE GLASS OPTICAL FIBERS
Danh C. Tran *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

In present silica fiber technology, optical attenuation at the intrinsic minimum level of about 0.15 dB/km at 1.6 micrometer has been attained. Non-oxide glasses based on heavy metal fluorides potentially can offer intrinsic minimum losses several orders of magnitude lower than that of silica, owing to a lower Rayleigh scattering loss contribution and an extended infrared absorption edge. As a result, heavy metal fluoride glasses are most promising for long distance repeaterless optical communication heavy metal fluoride glasses are most promising for long distance repeaterless optical comunication systems. The published literature on fluoride glasses and fiber is studied to provide a complete review of the present state-of-the-art in the field. Candidate fluoride glasses for fiberization are evaluated on the basis of their infrared transparency as well as their glass forming ability. The synthesis of high optical quality bulk fluoride glasses by conventional casting and the fabrication of fibers using both preform and crucible techniques are discussed. The optical properties of the fluoride glass fiber are evaluated based on the absorption loss contribution associated with hydroxyl groups and transition metal/rare-earth impurities, and on the scattering loss component arising from both Rayleigh scattering and processing induced defects such as microcrystallization, phase separation and particle inclusions. Author

N87-13297# Standard Telecommunication Labs. Ltd., Harlow (England).
GLASS FIBRES FOR TRANSMISSION IN THE 8-12 MICROMETERS WAVEBAND
N. J. Pitt and M. G. Scott *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Chalcogenide glasses, crystalline halides and hollow waveguides were assessed for transmission in the 8 to 12 micrometer waveband. Of these, chalcogenide glasses were selected for development of fiber optic materials. The bulk properties of a range of glasses were studied and compositions chosen to optimize transmission and thermal stability. The role of major impurities and the procedures used to minimise them are described. Selected compositions were drawn into long lengths of polymer coated fiber with diameters controlled accurately up to 500 micrometers. Current fibers transmit at CO2 laser wavelengths with losses of 5 to 10 dB/m but potential for substantial improvement still exists. Mechanical testing has shown that with suitable coatings chalcogenide fibers are flexible enough to sustain a bend radius of the order of 1 cm. Author

N87-13298# Stanford Univ., Calif. Crystal Science Div.
SINGLE CRYSTAL FIBERS
Robert S. Feigelson *In* AGARD Guided Optical Structures in the Military Environment May 1986 9 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Single crystal fibers are just now emerging as a new frontier in both materials science and device technology. Various methods have already been developed for the preparation of single crystal fibers of a wide range of materials with useful properties. Along with discussions of fiber growth methods and potential applications for single crystal fibers, current research on the growth of laser, nonlinear optic, and IR transmitting single crystal fibers are also discussed. Author

N87-13299# Rennes Univ. (France). Lab. de Chimie Minerale D.
FLUORIDE GLASSES FOR INFRARED WAVEGUIDES [VERRES FLUORES POUR GUIDES D'ONDE INFRA ROUGE]
J. Lucas *In* AGARD Guided Optical Structures in the Military Environment May 1986 7 p In FRENCH (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The realization of optical waveguides is more promising beginning with materials in the glassy state than to begin with polycrystalline or monocrystalline materials. At the present time, the glasses which correspond to the best compromise between the bandwidth of transmission, the ultra-transparence potential, low diffusion loss, and fiber preparation techniques are the fluoride glasses. The tetrafluoride glasses with a zirconium base permits transmission through fiber of up to 4 microns, those with a base of the heavy metals (thorium, indium, rare earths, etc.) up to 5 microns. The potential applications in long distance telecommunications (considering very low theoretical losses, 10(-3) dB/km) are discussed as well as short distance applications involving collection technologies and energy transport. Author

N87-13300# British Telecom Research Labs., Ipswich (England).
WIDE BANDWIDTH, LONG DISTANCE FIBRE-OPTIC COMMUNICATION SYSTEMS
S. D. Walker, L. C. Blank, and L. Bickers *In* AGARD Guided Optical Structures in the Military Environment May 1986 9 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Recent advances in laser, fiber and receiver technology have allowed a series of unrepeated optical transmission system experiments to be carried out. These spans ranged from 90 km to 250 km at line-rates from 34 Mbit/s to 2 Gbit/s. At data-rates of 34 Mbit/s and 140 Mbit/s, a single-line 1.525 micrometers distributed feedback laser was used in conjunction with step-index monomode fiber spans up to 251.6 km. In a second set of experiments, a 1.55 micron multi-longitudinal-mode laser gave error-free transmission over lengths of dispersion-shifted fiber up to 233 km. For gigabit transmission experiments, a 1.535 micron single-line laser and dispersion-shifted fiber provided a further system option which resulted in a recent fully-regenerated 2 Gbit/s, 90 km trial featuring commercially-available GaAs logic components. The various system configurations implemented are described and the technical options for further long-span, unrepeatered optical transmission experiments using current and developmental direct-detection technology in the 1.5 micron wavelength region are reviewed. Author

N87-13301# TRW, Inc., Redondo Beach, Calif. Fiber Optic Communications.
PERFORMANCE OF RF FIBER OPTIC LINKS
Thomas R. Joseph and William E. Stephens *In* AGARD Guided Optical Structures in the Military Environment May 1986 12 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

RF fiber optic links have numerous applications to microwave systems. To fully exploit their usefulness, the RF system designer must understand their properties in terms of the performance parameters that are used to describe the terminal properties of other RF components such as loss, signal to noise, linearity, and dynamics. The performance of direct and external modulation fiber optic links in terms of those parameters are explained. Specific examples of a 4.1 to 4.7 GHz direct modulation link and a 2.0 to 12.0 GHz external modulation link are used. Author

N87-13302# Shape Technical Center, The Hague (Netherlands).
FIBER OPTICS: A SURVIVABLE AND COST-EFFECTIVE TRANSMISSION MEDIUM FOR TERRESTRIAL NETWORKS
M. Aslam *In* AGARD Guided Optical Structures in the Military Environment May 1986 10 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The performance of a fiber-optic transmission system is

affected by nuclear radiation. The nuclear scenario is discussed vis the terrestrial network, the essential characteristics are identified, and on this basis the principles for the design of a strategic communication fiber-optic cable system are derived. The details of a cost analysis applicable to various scenarios are also given; the costs of each scenario are compared with those of a microwave line-of-site system of approximately the same capacity. Author

N87-13303# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Dynamics Div.
SINGLE-MODE-FIBERS FOR FIBEROPTIC-GUIDED MISSILES: A COMPARISON WITH GRADED-INDEX MULTIMODE FIBERS
K. H. Niederhofer and W. D. Schuck *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

For a few years there have been activities in the application of optical fibers as a broadband, secure transmission medium between a ground-station and tactical missiles for ranges of about 10 km. The idea is to put the gunner's eye, i.e., a suitable imaging device, into the missile to provide a lock-on-after-launch capability together with a man-in-the-loop option. A key problem is the rapid payout of the fiber from the missile during flight. Several successful flight test campaigns have been carried out, where Kevlar-reinforced graded-index multimode fibers have been used for transmission of command- and TV-signals. The affects of additional attenuation resulting from the reinforcement, the bobbin-technology and payout process are well controlled. For the first development of fiberoptic guidance systems single-mode transmission was not taken into account, since the suitable components were expensive, sensible and not readily available. Today the single-mode technology is quite advanced and offers some benefits compared with multimode transmission. The most important points are the higher bandwidth and the lower attenuation. As long as the missile range is below 10 km, this is no decisive advantage, but it encourages the extension of the missile range to much more than 10 km. The comparison of costs gives no clear-cut statement, but the production costs for single-mode fibers tend to be below that of multimode fibers. If the hardness against nuclear radiation is compared, single-mode fibers give the better results. Author

N87-13304# Hughes Research Labs., Malibu, Calif.
LIGHTWAVE TECHNOLOGY IN FUTURE RADAR EQUIPMENT DESIGNS
C. M. Gee, A. E. Popa, and H. W. Yen *In* AGARD Guided Optical Structures in the Military Environment May 1986 8 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

Lightwave device technology can be implemented in future active aperture radar arrays. Transmitter and receiver components for a fiber optic antenna feed manifold in which the transceiver modules are connected to a central computer are reviewed. Present link signal to noise limitations imposed by the performance of these components are analyzed, and promising trends in component development are discussed. Author

N87-13305# Army Communications-Electronics Command, Fort Monmouth, N.J.
TACTICAL FIBER OPTIC ASSEMBLY REQUIREMENTS
Vasilios E. Kalomiris *In* AGARD Guided Optical Structures in the military Environment May 1986 9 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The unique features of militarized fiber optic assemblies are outlined. The stringent requirements that make tactical deployment a challenge to the fiber optic industry are summarized. The requirements are broken down to the component level: fiber, cable and connector. These demands on components are necessary to assure successful system operation. The compilation of specifications is presented in tabular form to serve as a reference for those interested in satisfying a host of ground systems needs. The significance of the performance of the cable assembly in the performance of the optical subsystem is also described. In addition, the requirements that the transceivers have to meet are reported and a comparison of the tactical and fixed plant is presented. E.R.

N87-13306# Bell Communications Research, Inc., Morristown, N.J. Exchange Network Research Div.
A HYBRID TRANSMISSION SCHEME ON SINGLE MODE FIBERS FOR TACTICAL COMMUNICATIONS
Steven S. Cheng *In* AGARD Guided Optical Structures in the Military Environment May 1986 6 p (For primary document see N87-13273 04-74)
Avail: NTIS HC A14/MF A01

The availability of single-mode fibers and long wavelength devices enables the system designers to consider new link design with much improved performance not presently available in either the multimode fiber or the traditional metallic conductor systems. A hybrid transmission scheme is proposed on single-mode fibers in a star configuration. At the command post, a primary laser and its standby laser running at the cw mode are followed by an optical splitter. Each output port is then externally modulated for downstream transmission. At each remote site, a dedicated LED is used for upstream transmission where the bandwidth requirement and therefore the dispersion penalty is generally lower. The cost, reliability and flexibility of this hybrid transmission scheme are examined. The use of bidirectional WDM devices and remote external modulators with polarization control is described as two potential variations to enhance this basic hybrid scheme. The deployment of such a system will provide cost effective transmission links in a tactical environment suitable for high bandwidth analog and digital transmission. Author

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N87-13307*# Alabama Univ., Huntsville. School of Science.
SPACE PLASMA RESEARCH Final Report, Aug. 1980 - Aug. 1986
Richard H. Comfort and James L. Horwitz Sep. 1986 26 p (Contract NAS8-33982)
(NASA-CR-178965; NAS 1.26:178965) Avail: NTIS HC A03/MF A01 CSCL 20I

Four basic areas were covered: development of analysis techniques and software and numerical simulations; data analysis and interpretation; spacecraft sheath studies; and laboratory studies. The important details were documented in terms of either appropriate software documentation or publication in referred publication, conference proceeding and technical reports. The major accomplishments are summarized, followed by a chronological listing of the publications and presentations which resulted from the research. B.G.

N87-13308# Puerto Rico Univ., Rio Piedras. Dept. of Physics.
FLUIDS IN CONTACT WITH A HARD SURFACE: UNIVERSITY OF THE BRIDGE FUNCTIONS FOR THE DENSITY PROFILE
Y. Rosenfeld and L. Blum 27 May 1986 32 p (Contract N00014-81-C-0776)
(AD-A168945; AD-E500768; TR-22) Avail: NTIS HC A03/MF A01 CSCL 20/9

The modified hypernetted chain theory (MHNC) for density profiles of fluids in contact with a hard, smooth surface is found to possess a remarkably simple and interesting property: The accuracy of the MHNC and the universality of the bridge functions for the density profiles can be tested without resort to any detailed solution of the integral equations. It is given by the degree of universality of the bulk bridge parameter when expressed in terms of the second partial derivative of the free energy with respect to a certain density equation. This function (F) as obtained from MHNC calculations for bulk simple fluids is found to be remarkably

independent of the pair potential. As an example for the accuracy of the resulting method, the one component plasma near a hard wall is discussed. Author (GRA)

N87-13309# Air Force Geophysics Lab., Hanscom AFB, Mass.
MEDIUM- AND LONG-WAVELENGTH INFRARED EMISSION FROM A LASER-PRODUCED OXYGEN PLASMA
Jonathan B. Lurie and James C. Baird 31 Dec. 1985 29 p
(AD-A169475; AFGL-TR-0341; AFGL-ERP-942) Avail: NTIS HC A03/MF A01 CSCL 20/9

Experiments on a laser-produced oxygen plasma were observed by medium wavelength (MWIR) and long wavelength (LWIR) infrared emission. This research is part of a continuing series of LINUS (Laser Induced Nuclear Simulation) experiments starting in the short wavelength infrared (SWIR) and extended to longer wavelengths to continue studies on highly excited oxygen atom states produced by three-body recombination in a highly ionized, laser-produced plasma. The first observations of emission in the 5 to 8 micron region from a recombining oxygen plasma are reported, including the first experimental observation of 6h sup 3,5H yields 5g sup 3,5G sup 0 and 6g sup 3,5G sup 0 yields 5f sup 3,5 F calculated to be at 7.450 microns and 7.426 microns, respectively. The observed linewidths of these MWIR emissions are discussed using a Stark lineshape analysis. GRA

N87-13310# Physical Sciences Inc., Andover, Mass.
IONIZATION PHENOMENA ABOUT THE SPACE SHUTTLE Final Report, 15 Jul. 1985 - 15 Jan. 1986
George E. Caledonia, James C. Person, and D. Hastings Jan. 1986 75 p
(Contract F19628-85-C-0098)
(AD-A170542; PSI-098/TR-555; AFGL-TR-86-0045) Avail: NTIS HC A04/MF A01 CSCL 20/9

The available information on observations of neutral and ionic species and plasma properties around the Space Shuttle has been reviewed. Possible Shuttle environment electron/ion generation mechanisms have been evaluated. In particular, ion observations have been successfully interpreted within the framework of a kinetic analysis which incorporates Shuttle cloud/ambient interactions, flow, and electromagnetic effects. GRA

N87-13311# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.
TARA VACUUM SYSTEM
R. S. Post, P. Brindza, P. Goodrich, and M. P. Gaudreau Nov. 1985 8 p Presented at the 32nd AVS National Vacuum Symposium and Topical Conference, Houston, Tex., 19 Nov. 1985
(Contract DE-AC02-78ET-51013)
(DE86-011873; DOE/ET-51013/171; PFC/CP-86-4; CONF-851174-42) Avail: NTIS HC A02/MF A01

The Tara tandem mirror experiment vacuum system will be discussed including system design, specifications, and performance required for plug thermal barrier operation. A detailed description of the major pumping systems, reflux control, plasma pumping, measurement and control, fast gas handling and quality control procedures will be presented. Data from the two 5 month periods of operation will be presented. DOE

N87-13312# Los Alamos National Lab., N. Mex.
TWO-DIMENSIONAL DYNAMICS OF THE PLASMA WAKEFIELD ACCELERATOR
R. Keinigs, M. E. Jones, and J. J. Su (California Univ., Los Angeles.) 1986 12 p Presented at the 6th International Conference on High Power Particle Beams, Kobe, Japan, 9 Jun. 1986 Prepared in cooperation with California Univ., Los Angeles.
(Contract W-7405-eng-36)
(DE86-012382; LA-UR-86-1952; CONF-860665-6) Avail: NTIS HC A02/MF A01

The plasma wakefield accelerator (PWFA) is an accelerator concept based on utilizing a large amplitude plasma wave to accelerate relativistic electrons to ultra-high energy. The plasma wave represents the wave produced by a relativistic beam as it passes through a cold plasma. As the beam enters the plasma its space charge polarizes the background. When the beam has passes the plasma is left with a large oscillating induced charge. The wakefields are derived assuming that the charge and current profiles of the driving bunch remain fixed. An estimate is made of the condition necessary for maintaining the profile of the driving bunch. The current required to result in an accelerating field approaching the wavebreaking limit is estimated. The beam dynamics for a small beam are simulated based on these estimates. The results of the studies reported indicate that the self-consistent transverse motion of the driving bunch makes pulse tailoring impossible to maintain. DOE

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N87-13313*# National Aeronautics and Space Administration, Pasadena Office, Calif.
FET CHARGE SENSOR AND VOLTAGE PROBE Patent
Paul A. Robinson, Jr. Issued 12 Aug. 1986 7 p
(NASA-Case-NPO-16045-1; US-Patent-4,605,946; US-Patent-Appl-SN-641146; US-Patent-Class 357-23.1; US-Patent-Class-357-23.12; US-Patent-Class-357-29; US-Patent-Class-357-52; US-Patent-Class-357-30; US-Patent-Class-250-338; US-Patent-Class-250-370) Avail: US Patent and Trademark Office CSCL 20L

A MOSFET structure having a biased gate covered with an insulator is described. The insulator is of such a thickness as to render the structure capable of giving a measure of accumulated charge. The structure is also capable of being used in a stacked structure as a particle spectrometer. E.R.

N87-13314# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
COMPARISON OF 2D MEMORY SEU TRANSPORT SIMULATION WITH EXPERIMENTS
R. Koga and W. A. Kolasinski 1 Sep. 1986 27 p
(ATR-86(8139)-2) Avail: NTIS HC A03/MF A01

Single event upset (SEU) simulations in SRAM were performed, and the results are compared to experimental data on 16K bit memories. The simulations consisted of simultaneous calculations of charge transport and transient circuit response for four cross-coupled CMOS transistors following the introduction of a slab of excess carries into the off p-channel drain. The experiments collected upset rates produced in the memories by 163 MeV argon ions directed normally to the chip surface. Agreement between experiment and calculation was achieved when the p-channel transistors were integrated into a single block of silicon as in the memory cell layout and scaling was done on the Auger coefficients to compensate for an inherent 2D effect. Author

N87-13315# Department of the Air Force, Washington, D.C.
QUARTZ GROWTH ON X-SEEDS Patent
Alton F. Armington and John J. Larkin, inventors (to Air Force) Issued 18 Mar. 1986 5 p Supersedes AD-D011031
(AD-D012269; US-Patent-4,576,808; US-Patent-Appl-SN-566130; US-Patent-Class-423-335) Avail: NTIS Avail: US Patent and Trademark Office CSCL 20/2

According to the present invention, dislocation-free quartz crystal boules, which are especially valuable for use in frequency and timing device applications, can be produced by utilizing a seed crystal cut or sliced from the X-plus region of a synthetically grown quartz boule. The seed crystal takes the form of a rectangular prism shaped slab or plate with its length directed along the crystallographic Y-axis orientation, its width directed along the X-axis orientation, its width directed along the X-axis orientation, and its thickness in the Z-axis orientation. Accordingly, the primary object of this invention is to provide synthetic quartz seed crystals for use in growing substantially dislocation-free quartz crystal boules

for use in timing and frequency devices. Another object of this invention is to greatly reduce the number of dislocations and other defects in synthetic quartz grown for oscillator applications. Still another object of this invention is to provide Z-faced quartz seed crystals cut or sliced from the X-plus growing region of a quartx crystal boule. GRA

N87-13316# California Univ., Berkeley. Dept. of Chemical Engineering.
PLASMA-ENHANCED DEPOSITION AND PROCESSING OF TRANSITION METALS AND TRANSITION METAL SILICIDES FOR VLSI Final Report, 1 Feb. 1983 - 31 Jan. 1986
Dennis W. Hess 20 May 1986 16 p
(Contract DAAG29-83-K-0039)
(AD-A168963; ARO-19996.9-MS) Avail: NTIS HC A02/MF A01 CSCL 20/12

Radiofrequency (rf) discharges have been used to deposit films of tungsten, molybdenum and titanium silicide. As-deposited tungsten films, from tungsten hexafluoride and hydrogen source gases, were metastable (beta W), with significant (>1 atomic percent) fluorine incorporation. Film resistivities were 40-55 micro ohm - cm due to the beta W, but dropped to about 8 micro ohm cm after a short heat treatment at 700 C which resulted in a phase transition to alpha W (bcc form). The high resistivity (>10,000 micro ohm) associated with molybdenum films deposited from molybdenum hexafluoride and hydrogen appeared to be a result of the formation of molybdenum trifluoride in the deposited material. Titanium silicide films formed from a discharge of titanium tetrachloride, silane, and hydrogen, displayed resistivities of about 150 micro ohm cm, due to small amounts of oxygen and chlorine incorporated during deposition. Plasma etching studies of tungsten films with fluorine containing gases suggest that the etchant species for tungsten in these discharges are fluorine atoms. GRA

N87-13317# Texas Instruments, Inc., Dallas.
INCREMENTAL QUENCH RESEARCH
L. Colombo and A. J. Syllaios 30 May 1986 50 p
(Contract DAAG29-85-C-0005)
(AD-A168960; TI-U1-134375-F; ARO-22602.1-MS-A) Avail: NTIS HC A03/MF A01 CSCL 20/2

The growth of large homogeneous (Hg,Cd)Te single crystals by the incremental quenching process/traveling heater method was investigated. The method is based on the sequential freezing of shallow melts that have large surface-to-volume ratios onto a large diameter growing ingot. The resulting polycrystalline (Hg,Dd) Te ingot has a bimodal microstructure with small grains on the outer surface and dendrides at the center of the ingot. Subsequent annealing of the ingots at a temperature below the solidus promotes grain growth on the order of 25 mm in diameter. Crowth of large area crystals by the traveling heater method has been successfully demonstrated where 22- by 40-mm crystals have been grown without a seed. The crystals show very low subgrain boundary structures with dislocation densities ranging from 50,000 per sq cm to 300,000 per sq cm as measured by the etch pit method. The electrical characteristics of smaller crystals (20 mm in diameter) grown by the traveling heater method have shown purification during growth. GRA

N87-13318# Colorado State Univ., Fort Collins. Dept. of Physics.
MICROWAVE LOSS PROPERTIES OF HEXAGONAL FERRITES FOR MILLIMETER WAVE APPLICATIONS Final Report, 15 Aug. 1984 - 14 Feb. 1986
Carl E. Patton 15 Mar. 1986 13 p
(Contract DAAG29-84-K-0172)
(AD-A168982; ARO-21210.2-MS) Avail: NTIS HC A02/MF A01 CSCL 20/2

This short term post LRCP contract was designed to explore the application of the off-resonance effective linewidth technique to hexagonal ferrite materials at X-band frequencies. This objective has been accomplished. It has been demonstrated that the technique works quite well for both uniaxial and planar ferrite materials. The key result for millimeter wave applications is that a significant part of the microwave losses in these materials appears to be related to inhomogeneities. The effective losses which would determine insertion loss parameters for off-resonance device applications would appear to be much lower than one would infer from a direct ferromagnetic resonance linewidth determination. It was also possible to use the technique to measure the off-resonance loss properties in uniaxial materials at X-band, even though the large anisotropy fields precluded the observation of the FMR peak. The application of the technique to planar samples has also led to a new approach to the analysis of fundamental microwave relaxation processes in ferrite materials. GRA

N87-13319# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
SEARCH FOR FAR INFRARED RADIATION FROM OPTICALLY AND ACOUSTICALLY PUMPED DEFECT MODES Final Report, 14 Feb. 1983 - 13 Feb. 1986
A. J. Sievers 15 Apr. 1986 54 p
(Contract DAAG29-83-K-0044)
(AD-A169159; ARO-19793.4-PH) Avail: NTIS HC A04/MF A01 CSCL 20/5

More than one elastic ground state configuration has been found for both monatomic and polyatomic defects matrix isolated in alkali halide crystals. Multiple ground states give rise to persistent changes in the vibrational absorption spectrum of molecules when the internal vibrational modes of the defect are excited with a high resolution but tunable IR laser. The end result is that spectral holes with a width characteristic of the dephasing time of the vibrational mode can be created in the inhomogeneously strain broadened spectrum. The technique has been used to identify CN-:Na+, a new kind of vibrational defect which hole burns and also shows vibrational fluorescence in the IR. The discovery of the first solid state IR vibrational laser was a direct consequence of these kinds of measurements. The observations of transient and persistent hole burning, of vibrational fluorescence and of vibrational laser radiation demonstrate that diatomic molecules are more weakly coupled to the lattice than are polyatomics. GRA

N87-13320# Ceres Corp., Waltham, Mass.
STUDY TO DETERMINE THE FEASIBILITY OF UTILIZING SKULL-MELTING TECHNIQUES FOR THE GROWTH OF SINGLE CRYSTALS OF YTTRIUM VANADATE Final Report, 15 Sep. 1982 - 14 Sep. 1984
Joseph F. Wenckus and Wilson P. Menashi 1 Apr. 1986 32 p
(Contract DAAG29-81-C-0035)
(AD-A169249; ARO-18492.1-PH-S) Avail: NTIS HC A03/MF A01 CSCL 20/2

The goal of this program is to explore the feasibility of utilizing RF induction heated skull-melting techniques for the growth of optical quality crystals of yttrium vanadate (YVO4). In a parallel effort, experiments were also carried out to explore the fusion and recrystallization of yttrium aluminum garnet (YAG) in a cold crucible. Yttrium vanadate melts were achieved in cold crucibles up to 157 mm in diameter operating at an RF frequency of 3 MHz. However, attempts to Czochralski crystal growth were not successful due to poor thermal geometry and dissociation of the skull-contained melt. Experiments suggest that oxygen overpressures in excess of 2 atmos. may be useful in suppressing the dissociation rate of YVO4 melts. Skull-melting of YAG was achieved using an RF frequency of 3 MHz (no melting was observed at lower frequencies). However, the melts tended to slowly de-couple and freeze spontaneously; stable melts could not be maintained for periods beyond 2-3 hours. GRA

N87-13321# Arizona State Univ., Tempe. Center for Solid State Electronics Research.
DEGENERACY IN THE ENSEMBLE MONTE CARLO METHOD FOR HIGH FIELD TRANSPORT IN SEMICONDUCTORS
P. Lugli and D. K. Ferry 1 Jul. 1986 8 p
(Contracts N0014-84-K-0053; RRO210301; NR Proj. 619003)
(AD-A169456; N86.3) Avail: NTIS HC A02/MF A01 CSCL 20/12

An algorithm to include the Pauli exclusion principle in the Ensemble Monte Carlo method is presented. The results indicate that significant changes in the transport properties of GaAs have to be expected when degenerate conditions are reached. Important repercussions should be found in the modeling of microwave devices, where one often deals with highly doped regions. GRA

N87-13322# Department of the Air Force, Washington, D.C.
RAPID SYNTHESIS OF INDIUM PHOSPHIDE Patent Application
J. A. Adamski, inventor (to Air Force) Filed 25 Nov. 1985 23 p
(AD-D012362; US-Patent-Appl-SN-801348) Avail: NTIS HC A02/MF A01 CSCL 20/12

This invention relates to an improved method for fabricating a highly pure, crystalline semiconductor material having stoichiometric proportions. More particularly, this invention concerns itself with an improved method for producing highly pure, stoichiometric indium phosphide crystalline materials (which are especially useful as substrates for epitaxy procedures) in a rapid manner as compared with past procedures. Indium phosphide, a group III-V semiconductor compound, has been found to be especially useful in two areas of technical interest. Its large band gap (1.35 eV) and high electron mobility make it useful as a semiconductor material, especially when employed in its highly pure form, and as a crystalline substrate for device fabrication by epitaxial deposition techniques. This abstract discloses a process for the high pressure synthesis of InP using an independent temperature control of a three zone furnace incorporating a heat pipe provides a stable temperature profile throughout the synthesis cycle. Internal/external pressure control of the quartz ampoule is maintained by use of a water cooled baffle and a temperature/pressure balancing program. Complete synthesis is achieved in less than five hours. GRA

N87-13323# Cornell Univ., Ithaca, N.Y. Lab. of Atomic and Solid State Physics.
SPHERICAL CLUSTERS OF SIMPLE METALS: MADELUNG ENERGIES AND STRUCTURE
M. Manninen Jun. 1986 14 p
(Contract N00014-82-K-0576)
(AD-A169560; TR-24) Avail: NTIS HC A02/MF A01 CSCL 20/12

Recent experiments on the magic numbers of small sodium clusters suggest that variation of the binding energy of clusters as a function of their size is dominated by the filling of energy levels of electrons moving in a spherical potential. For large clusters it is expected that the electron density distribution starts to be more and more spherical as the cluster increases. The purpose of this communication is to show that if the electron density distribution is assumed to be spherically symmetric, the resulting ionic configuration is determined mainly due to a classical Madelung energy. Furthermore it is shown that the ground state structures of the clusters are generally not small pieces of simple lattices (bcc, fcc, or hcp), but take always a more spherical shape (e.g., icosahedral in the case of a 13 atom cluster). The variation of the structural energy as a function of the cluster size is found to be somewhat smaller than the variation arising from the filling of single electron energy shells giving support to the idea that the dominant magic numbers are determined by the electronic shell structure of a square well potential. GRA

N87-13324# Johns Hopkins Univ., Baltimore, Md.
QUANTUM CHEMICAL INVESTIGATIONS OF THE MECHANISM OF CATIONIC POLYMERIZATION AND THEORETICAL PREDICTION OF CRYSTAL DENSITIES AND DECOMPOSITION PATHWAYS OF ENERGETIC MOLECULES Annual Summary Report, 1 Oct. 1984 - 30 Sep. 1985
Joyce J. Kaufman 15 Nov. 1985 56 p
(Contract N00014-80-C-0003)
(AD-A169805; AD-E900585; TR-6) Avail: NTIS HC A04/MF A01 CSCL 07/4

Contents of this report include Conversion of Our Programs to CRAY Vector Supercomputers; Calculations for Cationic Polymerization of Energetic Monomers; MRD-CI Calculations on Decomposition Pathways of Energetic Nitrocompounds; POLY-CRYST; Ab-Initio Atom Class - Atom Class Potential Functions and Prediction of Crystal Densities. In anticipation of significant access to the NRL CRAY XMP-12 supercomputer we devoted major attention this past year to converting our programs to that computer, which runs under a COS operating systems. As a preliminary to carrying out MRD-CI calculations on the attack of oxetane on protonated oxetane in the propagation step of cationic polymerization, we initiated MRD-CI calculations on opening the oxetane ring and the protonated oxetane ring. We carried out MRD-CI calculations for the dissociation of the >C-NO2 bond in nitrobenzene. We continued testing of our POLY-CRYST program for ab-initio calculations in crystals and polymers. We also implemented further additions to the INTER-MOLASYS program including the capability of calculating the dispersion energy contributions by a variation-perturbation procedure. We have also calculated further ab-initio atom class-atom class potential functions. GRA

N87-13325# California Univ., Los Angeles. Dept. of Chemistry and Biochemistry.
DONOR-ACCEPTOR ONE STEP ENERGY TRANSFER VIA EXCHANGE COUPLING ON A FRACTAL LATTICE Interim Technical Report
C. L. Yang and M. A. El-Sayed 7 Jul. 1986 29 p
(Contract N00014-83-K-0341)
(AD-A169843; TR-48) Avail: NTIS HC A03/MF A01 CSCL 20/12

Temporal behavior of donor intensity, I sub D (t), resulting from one step donor-acceptor electronic excitation energy transfer process via exchange mechanism is calculated on fractal lattices, with discrete dilation symmetry, of Euclidean dimension, d = 2, and fractal dimension, D, ranging from 1.99 to 1.0. I sub D (t) is fitted to the approximate equation of Klafter-Blumen (K-B) which is useful in fitting experimental results to determine fractal dimension from the slope of the expected straight line obtained by plotting in(-in I sub d (t)), vs. in 1 sub D t). The result for fractal lattice with D = 1.99 indicates that the approximation is appropriate for the time range used in our calculations. The results for different fractal lattices also show that the K-B equation indeed gives a straight line for structure when D/d is not much smaller than unity. As this ratio decreases, deviation from the expected straight line results and an oscillatory behavior is observed. From the latter structural information (i.e., fractal dimensionality, and geometrical parameters characterizing the fractal lattices) as well as the molecular interaction parameter gamma, the distance dependence of the exchange interaction can be determined. GRA

N87-13326# Geoscience, Ltd., Solana Beach, Calif.
THERMOPHYSICAL PROPERTIES MEASUREMENTS OF GALLIUM ARSENIDE AND CADMIUM TELLURIDE Final Report, 1 Nov. 1984 - 31 Aug. 1986
H. F. Poppendiek, C. M. Sabin, D. J. Connelly, P. M. Peuron, and R. J. Whaley Jun. 1986 19 p
(Contract DAAG29-85-C-0003)
(AD-A169901; GLR-254; ARO-22600.1-MS-A) Avail: NTIS HC A02/MF A01 CSCL 20/12

Geoscience is under contract to the U.S. Army to measure thermophysical properties of two semiconductor materials, cadmium telluride and gallium arsenides. The specific properties to be determined are coefficient of linear thermal expansion, specific heat, grey body emissivity, and thermal conductivity. During this study, Geoscience developed a new method of making infrared emissivity measurements at higher temperatures with no particular limitations. This final report summarizes the results of emissivity and coefficient of thermal expansion measurements made for both cadmium telluride and gallium arsenide. GRA

N87-13327# Brown Univ., Providence, R. I. Div. of Engineering.
PICOSECOND NONLINEAR RESONANT INTERACTIONS IN SEMICONDUCTORS Final Report, 1 Jan. 1982 - 30 Sep. 1985
Arto V. Nurmikko 15 Mar. 1986 60 p

(Contract F49620-82-C-0044)
(AD-A169992; AFOSR-86-0448TR) Avail: NTIS HC A04/MF A01 CSCL 09/1

This research was aimed at advancing understanding and utilization of selected optical properties of semiconductors containing magnetic elements. Emphasis was placed on the interaction of such materials with ultrashort pulses of laser radiation in order to study coupled electronic and magnetic excitations under selected nonequilibrium conditions. We hoped to generate novel results through experimental research for applications to fast optoelectronic devices. The mixed crystal semiconductors (Cd, Mn)Se and (Cd, Mn)Te were used. The contract work has generated a number of firsts, e.g., we measured the formation of local, microscopic magnetically oriented domains through real-time spectroscopy with picosecond laser pulses. Author (GRA)

N87-13328# Rockwell International Corp., Thousand Oaks, Calif. Science Center.
GROWTH OF FERRO-ELECTRIC TUNGSTEN BRONZE EPITAXIAL THIN FILMS FOR ELECTRO-OPTIC DEVICE APPLICATIONS Final Report, 30 Sep. 1982 - 30 Nov. 1985
R. R. Neurgaonkar and J. R. Oliver Jun. 1986 65 p
(Contract N00014-82-C-2466; DARPA Order 4540)
(AD-A170783; SC5340.13FR) Avail: NTIS HC A04/MF A01 CSCL 22/2

Strontium Barium Biobates:60 doped with Ce and Fe crystals have now been grown with improved optical quality using the Czochralski technique. The liquid phase epitaxial (LPE) growth of SBN:46 on SBN:60 substrate has also been successfully demonstrated, with particularly good results for (100) and (110) film orientations. The recent photorefractive measurements on Ce doped SBN:60 crystals show that the Tungsten Bronze, SBN:60 crystals are superior in many respects to BaTi03 because of enhanced two beam coupling coefficients, sensitivity and the overall flexibility of tungsten bronze crystals. La3+-doped SBN:50 single crystals have also been grown for pyroelectric detector studies and it was found that the growth of doped crystals is possible. Crystals as large as 1 to 1.5 cm in diameter have been grown successfully. Current measurements show that this composition exhibits excellent pyroelectric and dielectric properties to use in longitudinal configuration; hence, work is in progress to use this composition for pyroelectric detector applications. The role of other cations such as calcium and yttrium has also been studied and they appear to be promising for the proposed device applications. GRA

N87-13329# Optical Society of America, Washington, D. C.
PROCEEDINGS OF THE TOPICAL MEETING ON THE MICROPHYSICS OF SURFACES, BEAMS AND ADSORBATES HELD IN SANTA FE, NEW MEXICO ON 4-6 FEBRUARY 1985 Final Report, 1 Nov. 1984 - 18 Dec. 1985
Jarus W. Quinn 18 Dec. 1985 208 p Meeting held in Santa Fe, N. Mex., 4-6 Feb. 1985
(Grant AF-AFOSR-0018-85)
(AD-A170797; AFOSR-86-0469TR) Avail: NTIS HC A10/MF A01 CSCL 07/4

The Topical Meeting on Microphysics of Surfaces, Beams, and Adsorbates was organized within the interdisciplinary area of molecule/surface interactions induced, or studied, by laser and ion beam techniques. Especially emphasized was the molecular physics and electromagnetism of beam activated chemical reactions for applications in fabrication of semiconductor devices, in photocatalysis, and in optical recording. Emphasis was on the laser spectroscopy of molecular collision and reaction processes on surfaces, new sensitive or high resolution spectroscopies for studies of adsorbates, and optical methods applied to surface characterization. GRA

N87-13330# Brown Univ., Providence, R. I. Div. of Engineering.
PICOSECOND NONLINEAR RESONANT INTERACTIONS IN SEMICONDUCTORS Annual Report, 1 Jan. - 31 Dec. 1984
Arto V. Nurmikko Mar. 1986 15 p
(Contract F49620-82-C-0044)
(AD-A170813; AFOSR-86-0525TR; AR-3) Avail: NTIS HC A02/MF A01 CSCL 20/12

This research was aimed at advancing understanding and utilization of selected optical properties of semiconductors containing magnetic elements. Emphasis was placed on the interaction of such materials with ultrashort pulses of laser radiation in order to study coupled electronic and magnetic excitations under selected nonequilibrium conditions. We hoped to generate novel results through experimental research for applications to fast optoelectronic devices. The mixed crystal semiconductors (Cd, Mn)Se and (Cd, Mn)Te were used. The contract work has generated a number of firsts, e.g., we measured the formation of local, microscopic magnetically oriented domains through real-time spectroscopy with picosecond laser pulses. Author (GRA)

N87-13331# Hughes Research Labs., Malibu, Calif.
KINETICS AND MECHANISMS ON THE MOLECULAR BEAM ETCHING OF SEMICONDUCTORS Final Report, 15 Aug. 1982 - 15 Feb. 1986
H. P. Gillis Jul. 1986 58 p
(Contract DAAG29-82-C-0020)
(AD-A171360; ARO-19068.1-EL) Avail: NTIS HC A04/MF A01 CSCL 13/8

The main issue addressed was the role of the ion beam in control of anisotropy and selectivity in the ion-beam assisted etching (IBAE) of layered samples of Si and SiO2, as are used in CMOS gate applications. The results on patterned samples were correlated directly with the geometrical relationship of the incident beams and the sample. Rate data were obtained which suggest that the reaction proceeds by facilitated attack of reactant species at defect sites created by the ion beam. It was demonstrated that ion beam energy greater than 500 eV caused inadequate selectivity between Si and SiO2. It was shown that inadequate selectivity is the main problem holding back implementation of IBAE as a practical process. It is suggested that additional work in the direction of low energy IBAE (50-500 eV) be pursued. GRA

N87-13332# Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
QUANTUM 1/F NOISE IN SOLID STATE DOUBLE DEVICES, IN PARTICULAR Hg(1-x)CdxTe DIODES Final Report, 16 Sep. 1985 - 15 Mar. 1986
A. vanderZiel 22 May 1986 33 p
(Contract DAAG29-85-K-0235)
(AD-A171438; ARO-22874.1-EL) Avail: NTIS HC A03/MF A01 CSCL 20/10

It is shown how one can discriminate between two modes of diffusion 1/f noise fluctuations in p-n diodes: (1) all minority carriers contribute to the noise; (2) only the excess minority carriers contribute to the noise. The n(+)-p Hg(1-x)Cd(x)Te diodes seem to follow case (1) at back bias. For forward biased diodes S sub I(f)/I-sq is independent of bias, as expected for surface recombination in the p-region. P+-i-n Si diodes seem to follow case (2) at first sight, but this would be an erroneous conclusion, since in these diodes the noise is caused by recombination in the space charge region. The experiments give Si(f)/(abs. vol. I) = constant, as expected for recombination 1/f noise. In Hg1-xCdxTe the carrier lifetime has not yet been established, and hence the alpha sub H/tau data cannot be used to evaluate alpha sub H. It seems reasonable, however, that for x = 0.30 the estimated value of alpha sub H lies between the coherent state value .0046 and the incoherent state value .00005 depending on the value of tau. More accurate determination of tau (both theoretical and experimental) are being planned. GRA

N87-13333# Case Western Reserve Univ., Cleveland, Ohio.
EPITAXIAL CRYSTALLIZATION AND EPITAXIAL POLYMERIZATION AS TOOLS FOR MOLECULAR ENGINEERING Final Report, 1 Sep. 1983 - 31 Aug. 1986
Jerome B. Lando and Scott E. Rickert 30 Jul. 1986 15 p
(Contract DAAG29-83-K-0130)
(AD-A171506; ARO-20280.1-CH) Avail: NTIS HC A02/MF A01 CSCL 20/12

A study has been made of the use of epitaxial crystallization of polymers, epitaxial polymerization and combinations of surface interactions and reactions to produce polymer epilayers with unique structures, morphologies, and properties. Classically, epitaxial crystallization of polymers is the oriented crystallization of polymers during interaction with a crystalline substrate. Epitaxial polymerization involves the crystallization of a monomer on a crystalline substrate and subsequent polymerization initiated thermally by ionizing radiation or by chemical doping. In addition, a technique termed graphoepitaxy has been utilized which results from crystallization along deliberate deformities or topologies such as grooves in the substrate surface, and not necessarily crystallographic interactions. GRA

N87-13334# State Univ. of New York, Stony Brook. Dept. of Materials Science and Engineering.
ENERGETICS OF DISLOCATION RELAXATION ASSOCIATED WITH CLEAVAGE IN Cd-DOPED ZINC CRYSTALS AS PROBED BY SYCHROTRON TOPOGRAPHY
H. A. Schmitz, J. C. Bilello, and Z. Rek (Stanford Univ., Calif.) 1986 38 p Presented at the International Conference on Low-Energy Dislocation Structures, Charlottesville, Va., 10 Aug. 1986 Prepared in cooperation with Stanford Univ., CA.
(Contract DE-FG02-84ER-45098)
(DE86-002968; DOE/ER-45098/11; CONF-860809-1) Avail: NTIS HC A03/MF A01

An almost ten-fold increase in the cleavage energy of 0.1% Cd-doped zinc crystals has been previously reported in the literature and attributed to an increase in the intrinsic surface energy. The energetics of the cleavage process as a function of dopant concentration over the range 0.01, 0.03, 0.06 and 0.13% Cd has been systematically measured and correlated with the observed dislocation microstructure induced by crack initiation and growth. The dislocation relaxation zones were determined by nondestructive observations using synchrotron radiation topography. Since the primary cleavage and slip systems are co-planar, previous workers have ignored plastic relaxation and assumed fracture had to proceed in a purely brittle fashion. Synchrotron topography results indicated extensive plastic relaxation at the crack tip and also downstream during crack propagation. Based on these observations a modified Griffith analysis could be used to determine the relative contributions to the cleavage energy due to the intrinsic surface and dislocation relaxation processes. It was concluded that the latter process is the dominant factor in controlling the fracture toughness of these alloys. DOE

N87-13335# Oak Ridge National Lab., Tenn.
RECRYSTALLIZATION BEHAVIOR OF ION BEAM MODIFIED ALPHA-Al SUB 2 O SUB 3
P. S. Sklad 1986 5 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986
(Contract DE-AC05-84OR-21400)
(DE86-009353; CONF-860829-21) Avail: NTIS HC A02/MF A01

Transmission electron microscopy was used to study amorphized implanted O-Al O. The response of the as-implanted amorphous layer to thermal aging varied with annealing temperature and time. The recrystallization is total and epitaxial at 1190°C. DOE

N87-13336# Sandia National Labs., Albuquerque, N. Mex.
ELECTRON DIFFRACTION ANALYSIS OF THE PENTAGONAL ARRANGEMENT OF GRAINS FOUND IN CVD PURE Ni FILMS
A. N. Campbell, M. J. Carr, and J. B. VanderSande (Massachusetts Inst. of Tech., Cambridge.) 1986 3 p Presented at the Annual Joint Meeting of the Electron Microscopy of America and the Microbeam Analysis Society, Albuquerque, N. Mex., 10 Aug. 1986 Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.
(Contract DE-AC04-76DP-00789)
(DE86-009023; SAND-86-0567C; CONF-860829-16) Avail: NTIS HC A02/MF A01

The structure of each crystal in the pentagon is fcc, as verified by diffraction patterns from individual grains. It is suggested that the large pentagonal regions observed were nucleated by small decahedral clusters of Ni atoms during the early stages of the deposition. However, for grains as large as those shown the body centered orthorhombic structure is not stable; at some point during the growth process the crystal structure reverted to the energetically preferred fcc. The relative orientation between the individual crystals, having been established by the decahedral nucleus, was preserved during growth. The 7.5 deg. mismatch was taken up evenly around the pentagon by the formation of dislocations and/or secondary twins at the boundaries. DOE

N87-13337# Ames Lab., Iowa.
IN-SITU INTERDIFFUSION MEASUREMENTS IN HgTe-CdTe SUPERLATTICES
J. L. Staudenmann, R. D. Horning, R. D. Knox, J. Reno, I. K. Sou, J. P. Faurie, and D. K. Arch 1986 17 p Presented at the Northeast Regional Meeting on Semiconductor-based Heterostructure Interfacial Structure and Stability, Murray Hill, N.J., 1 May 1986
(Contract W-7405-eng-82)
(DE86-011429; IS-M-576; CONF-8605111-2) Avail: NTIS HC A02/MF A01

HgTe-CdTe superlattices have been proposed as a tunable narrow bandgap semiconductor (E sub g approx. 0.1 to 0.16 eV) having potential applications in the long wavelength infrared region. The usefulness of such narrow band gap optical material relies on the stability of the constitutent Hg, Cd, and Te atoms across the heterointerfaces of the superlattice structure (interdiffusion). Temperature dependent in-situ x-ray diffraction measurements have been carried out on several HgTe-CdTe samples to determine the extent of interdiffusion of the Hg, Cd, and Te atoms in the superlattice region. The estimated interdiffusion constants D(T) are based on the analysis of the x-ray satellite intensities as a function of time for given temperatures T. The results show that the diffused (1,1,1) HgTe-CdTe superlattices are intrinsically more stable than Hg(1-x)Cd(x)Te alloys: the superlattice diffusion constants are considerably lower than those for alloys. The results further show that, even at room temperature, the lifetime of such a HgTe-CdTe superlattice device is probably limited and that it also seems to depend upon the environment. DOE

N87-13338# Southern Univ., Baton Rouge, La. Dept. of Physics.
EXPERIMENTAL THIN FILM DEPOSITION AND SURFACE ANALYSIS TECHNIQUES
W. E. Collins and B. Rambabu 1986 14 p Presented at the International Workshop on Ionic Batteries, Singapore, Singapore, 2 Jun. 1986
(Contract W-7405-eng-36)
(DE86-011222; LA-UR-86-1781; CONF-8606159-1) Avail: NTIS HC A02/MF A01

An attempt has been made to present some of the thin-film deposition and surface analysis techniques which may be useful in growing superionic conducting materials. Emphasis is made on the importance of being careful in selecting process parameters and materials in order to produce films with properties outlined in this article. Also, special care should be given to proper consideration of grain boundary effects. DOE

N87-13339# Sandia National Labs., Albuquerque, N. Mex.
STRUCTURAL FEATURES AT THE SI-SIO2 INTERFACE
K. L. Brower Jul. 1986 30 p Presented at the 4th International Symposium on Magnetic Resonance in Colloid and Interface Science, Munster, West Germany, 21 Jul. 1986
(Contract DE-AC04-76DP-00789)
(DE86-012947; SAND-86-0787C; CONF-860748-1) Avail: NTIS HC A03/MF A01

Electron paramagnetic resonance studies of defects at the Si-SiO2 interface are presented which deal with the hyperfine interactions, strain effects, and spin-spin interactions. Our hyperfine studies include studies of the O-17 and Si-29 hyperfine interactions associated with dangling bonds localized on Si atoms at the (001)

and (111) Si-SiO2 interfaces. These studies indicate that oxygen is not an immediate part of the defect structure. Strain is manifested in the EPR spectra by Zeeman and hyperfine broadening effects from which we deduce that the rms deviation in the vertical position of the defect Si atoms is approximately 0.02 A. A computational model for calculating the dipolar contribution to the linewidth due to unpaired spins at the interface is presented. The contribution to the total linewidth of the P/sub b/ Zeeman resonance, which is 2.1 G (fwhm), is calculated to be 0.35 G for the case in which the applied magnetic field is perpendicular to the (111) Si-SiO2 interface. DOE

N87-13340# International Centre for Theoretical Physics, Trieste (Italy).
POSSIBILITY OF USING DC CONDUCTIVITY FOR INVESTIGATING PHASE TRANSITION IN AMORPHOUS SEMICONDUCTORS
M. K. El-Mously and N. K. Mina Jul. 1985 16 p Prepared in cooperation with Ain Shams Univ., Cairo (Egypt)
(DE86-702646; IC-85/119) Avail: NTIS (US Sales Only) HC A02/MF A01

Different formulas were applied to deduce the effective or the generalized electrical conductivity of double phase systems. These formulas were revised and fitted to the experimental data of the binary systems amorphous-crystal (a-c) and liquid-crystal (l-c) for pure elementary selenium and selenium doped by other elements. Both connected medium and statistical mixture theories can be applied depending on the nature of the system under investigation. DOE

N87-13341# International Centre for Theoretical Physics, Trieste (Italy).
SURFACE GREEN FUNCTION MATCHING FOR A THREE-DIMENSIONAL NON-LOCAL CONTINUUM
J. O. A. Idiodi Jul. 1985 21 p
(DE86-702647; IC-85/125) Avail: NTIS (US Sales Only) HC A02/MF A01

With a view toward helping to bridge the gap, from the continuum side, between discrete and continuum models of crystalline, elastic solids, explicit results are presented for nonlocal stress tensors that describe exactly some lattice dynamical models that have been widley used in the literature for cubic lattices. The Surface Green Function Matching (SGFM) method, which has been used successfully for a variety of surface problems, is then extended, within a continuum approach, to a nonlocal continuum that models a three-dimensional discrete lattice. The practical use of the method is demonstrated by performing a fairly complete analytical study of the vibrational surface modes of the SSC semi-infinite medium. Some results are presented for the (100) direction of the (001) surface of the SCC lattice. DOE

N87-13342# International Centre for Theoretical Physics, Trieste (Italy).
SURFACE AND ADSORPTION-LIKE STATES WITHIN THE NEARLY FREE ELECTRON APPROXIMATION
L. Jurczyszyn Jul. 1985 11 p
(DE86-702651; IC-85/136) Avail: NTIS (US Sales Only) HC A02/MF A01

The energy properties of surface and absorption-like states were considered. In comparison with quasi-three-dimensional model which was presented earlier, the model described in this paper has pure three-dimensional character. Electronic states in fcc crystals were described using two-band model of the nearly free electron approximation. Absorbed atoms, treated as scattering centers were described by the small radium potential approximation. DOE

N87-13343# International Centre for Theoretical Physics, Trieste (Italy).
THEORY OF FRACTIONAL QUANTUM HALL EFFECT
I. Z. Kostadinov Aug. 1985 27 p
(DE86-702652; IC-85/141) Avail: NTIS (US Sales Only) HC A03/MF A01

A theory of the Fractional Quantum Hall Effect is constructed based on magnetic flux fractionization, which lead to instability of the system against selfcompression. A theorem is proved stating that arbitrary potentials fail to lift a specific degeneracy of the Landau level. For the case of 1/3 fractional filling a model 3-particles interaction is constructed breaking the symmetry. The rigid 3-particles wave function plays the role of order parameter. In a BCS type of theory the gap in the single particles spectrum is produced by the 3-particles interaction. The mean field critical behavior and critical parameters are determined as well as the Ginsburg-Landau equation coefficients. The Hall conductivity is calculated from the first principles and its temperature dependence is found. The simultaneous tunnelling of 3,5,7 etc. electrons and quantum interference effects are predicted. DOE

N87-13344# International Centre for Theoretical Physics, Trieste (Italy).
USE OF WANNIER FUNCTION IN THE CALCULATIONS OF BAND STRUCTURE OF COVALENT CRYSTALS
Dong Lu and Guang Yang Oct. 1985 14 p Prepared in cooperation with Fudan Univ., Shanghai, China
(DE86-702668; IC-85/191) Avail: NTIS (US Sales Only) HC A02/MF A01

A variational procedure has been used to build up Wannier functions to study the energy bands of diamond, silicon and O-tin. For the case of silicon the Wannier function, density of charge and band structure are calculated self-consistently and a simple method in a non-self-consistent way has been used to compute the band structure of diamond, silicon and O-tin. The method seems to be effective to describe the electronic properties of covalent crystals. DOE

N87-13345# International Centre for Theoretical Physics, Trieste (Italy).
TUNNELING EFFECT IN SUPERCONDUCTORS WITH MAGNETIC IMPURITIES
M. Ahmed Jul. 1985 14 p
(DE86-702723; IC-85/109) Avail: NTIS (US Sales Only) HC A02/MF A01

We investigate the influence of transition metal impurities on the amplitude of the Josephson tunneling current. We consider a junction made up of two identical superconductors containing transition metal impurities and define a parameter K which is the normalized difference of the derivative of Josephson currents for superconductin pairs with and without magnetic impurities. We find K=0 for U/Pi Gamma is greater than 1 and K=0.129 for U/Pi Gamma is much greater than 1 in the Abrikosov-Gorkov theory, as well as large deviations of K from this value for 1 is greater than U/Pi Gamma is greater than 3, where U/Pi Gamma is the parameter of the Anderson theory. DOE

N87-13346# International Centre for Theoretical Physics, Trieste (Italy).
FLUX SPIRAL INSTABILITY IN A TRANSPORT CURRENT CARRYING TYPE 2 SUPERCONDUCTOR
L. N. Shehata and A. G. Saif Aug. 1985 18 p
(DE86-702724; IC-85/153) Avail: NTIS (US Sales Only) HC A02/MF A01

The nucleation of vortex flux lines on a surface of a transport current carrying type 2 superconductor in the presence of an external magnetic field H (sub e) occurs at H (sub e) is approximately = H (sub c1), the first critical field. A spiral flux line in a long cylinder and in a long thin ellipsoid is investigated. In the latter case the force-free magnetic fields are also considered. DOE

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N87-13347# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF ENGINEERING THERMOPHYSICS (SELECTED ARTICLES)
Lianfeng Duan, Baochang Dong, Zhaolong Wang, Yaolin Gao, and Keming Li 24 Jun. 1986 51 p Transl. into ENGLISH from Gongcheng Rewuli Xuebao China), v. 3, no. 2, May 1982 p 123-130, 135-137, 183-189
(AD-A169452; FTD-ID(RS)T-0312-86) Avail: NTIS HC A04/MF A01 CSCL 13/7

The Journal of Engineering Thermophysics, vol.3, no.2, May 1982, contains articles on the following topics: Effect of Part Span Shroud on Performance of a Single Stage Compressor, Effect of the Rear Stage Casing Treatment on the Overall Performance of a Multistage Axial Flow Compressor; Investigations on Performance of Swept Wing aircraft; Cascade of Axial Flow Compressor; and Thermal Performance of Turbine Vane with Ceramic Coatings with Enhanced Cooling. GRA

N87-13348# International Centre for Theoretical Physics, Trieste (Italy).
INDUCED QUANTUM TORSION
G. Denardo and E. Spallucci Jul. 1985 14 p Prepared in cooperation with Istituto Nazionale di Fisica Nucleare, Trieste (Italy)
(DE86-702616; IC-85/111) Avail: NTIS (US Sales Only) HC A02/MF A01

We study pregeometry in the framework of a Poincare gauge theory. The Rieman-Cartan space-time is shown to be an effective geometry for this model in the low energy limit. By using Heat Kernal techniques we find the induced action for curvature and torsion. We obtain in this way the usual Einstein-Hilbert action plus an axial Maxwell term describing the propagation of a massless, axial vector torsion field. DOE

N87-13349# International Centre for Theoretical Physics, Trieste (Italy).
SUPERCONFORMAL TENSOR CALCULUS AND MATTER COUPLINGS IN SIX DIMENSIONS
E. Bergshoeff, E. Sezgin, and A. van Proeyen Jul. 1985 59 p Prepared in cooperation with Louvain Univ. (Belgium)
(DE86-702617; IC-85/112) Avail: NTIS (US Sales Only) HC A04/MF A01

Using superconformal tensor calculus we constructed general interactions of N=2, d=6 supergravity with a tensor multiplet and a number of scalar, vector, and linear multiplets. We start from the superconformal algebra which we realize on a 40 + 40 Weyl multiplet and on several matter multiplets. A special role is played by the tensor multiplet, which cannot be treated as an ordinary matter multiplet, but leads to a second 40 + 40 version of the Weyl multiplet. We also obtain a 48 + 48 off-shell formulation of Poincare supergravity coupled to a tensor multiplet. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N87-13350# Naval Postgraduate School, Monterey, Calif.
REGRESSION MODELS OF QUARTERLY OVERHEAD COSTS FOR SIX GOVERNMENT AEROSPACE CONTRACTORS M.S. Thesis
David J. Jerabek Mar. 1986 94 p
(AD-A169185) Avail: NTIS HC A05/MF A01 CSCL 14/1

Since overhead costs constitute a large percentage of total cost for aerospace contractors, it is important to be able to predict them accurately. The research performed in this thesis takes six government aerospace contractors and obtains regression models of their overhead costs that can be utilized for forecasting purposes. This method is preferable to some of the more commonly used methods because it estimates overhead costs directly, eliminating reliance upon predicted overhead rates. After the data were transformed to eliminate the effects of autocorrelation, excellent structural results were obtained for five of the six aerospace contractors. A Monte Carlo simulation was performed to compare various estimators of the autocorrelation. Two of the estimators were found to be superior. These two estimators are both two-stage estimators that are calculated utilizing Wallis's test statistic for fourth-order autocorrelation. Author (GRA)

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

For computer documentation see *61 Computer Programming and Software.*

N87-13351# Army Field Artillery School, Fort Sill, Okla. Library Div.
GOVERNMENT LIBRARIES. A PERIODICALS BIBLIOGRAPHY, TOGETHER WITH LIST OF BIBLIOGRAPHIES AND INDEXES Final Report
Lester L. Miller, Jr. 4 Jul. 1986 21 p
(AD-A169422; USAFAS/MSTLD/SB116) Avail: NTIS HC A02/MF A01 CSCL 05/2

This two part number presents research on government libraries, here and aboard. The second portion consists of a bio-bibliography on bibliographies and indexes compiled by the Morris Swett Technical Library staff. GRA

N87-13352# Orlando Technology, Inc., Shalimar, Fla.
TSAR (THEATER SIMULATION OF AIRBASE RESOURCES) DATABASE DICTIONARY F-4E Final Report, 1 Aug. 1985 - 31 Jul. 1986
Dale Robinson and Cliff Gornto 28 Mar. 1986 257 p
(AD-A169575) Avail: NTIS HC A12/MF A01 CSCL 05/2

A significant problem for analysts and simulation model users is the availability of complete documentation of input databases. The Theater Simulation of Airbase Resources (TSAR) model is no exception. This TSAR dictionary documents the F-4E database by translating the database codes to their English equivalents, presents graphic network models for the decision logic networks for aircraft repair tasks, and a cross-reference index to facilitate its use by modelers and analysts. GRA

N87-13353# Naval Postgraduate School, Monterey, Calif.
FEDERAL INFORMATION SYSTEMS MANAGEMENT: PROBLEMS, SOLUTIONS AND MORE PROBLEMS Final Report
Dan C. Boger, Carl R. Jones, and Norman R. Lyons Jul. 1986 28 p
(AD-A171366; AD-F250645; NPS-54-86-006) Avail: NTIS

HC A03/MF A01 CSCL 05/1

Although there are numerous problems associated with the management of Federal information systems, the usual solutions proposed for these problems have had and will have little, if any, effects. This paper examines the characteristics of Federal information systems and shows that most proposed solutions are directed at symptoms of the problems and not at their underlying causes. These solutions do not reflect the public sector nature of Federal information systems and hence, are either unrealistic or ineffectual. The authors do not propose another panacea. GRA

N87-13354# Sandia National Labs., Albuquerque, N. Mex.
ELECTRONIC FORMS. HOW CLOSE TO VALUE-ADDED PROCESSING
J. R. Schofield, Jr. Apr. 1986 49 p Presented at the USDOE/Contracts Automated Office Support Systems (AOSS) Conference, Pittsburgh, Pa., 14 May 1986
(Contract DE-AC04-76DP-00789)
(DE86-010484; SAND-86-1072C; CONF-8605126-1) Avail: NTIS HC A03/MF A01

The number of automated applications developed to support administrative activities continues to grow. While electronic mail and word processing are familiar office automation activities, other areas are under development consideration. One of the newer areas is electronic forms. The features that electronic forms need to employ, the challenges to electronic forms implementation and the integration with organizational data processing strategy are the subject of this paper. Purpose of this paper is to identify related issues for the reader. An electronic form is used in this paper to describe a system that captures, edits, routes, processes, tracks, secures and archives data electronically. The term form is used synonomously with electronic form. Paper forms are so identified. DOE

N87-13355# Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
DATA TAGGING IN THE ENERGY DATA BASE
A. E. Ekkebus 1986 6 p Presented at the 14th Consultative Meeting of the INIS Liaison Officers, Washington, D.C., 5 May 1986
(Contract DE-AC05-84OR-21400)
(DE86-010621; CONF-8605125-1) Avail: NTIS HC A02/MF A01

The purpose of this study was to survey the use of data tagging in the Energy Data Base. INIS records are a subset of the Energy Data Base. The survey audience consisted of twelve heavy users of the Energy Data Base; primarily they are in the libraries of the national laboratories supported by the US Department of Energy. The libraries were contacted and told of this study. They were given an explanation of data tagging in late January and were requested to be aware of potential uses of data tagging during the study period that would extend until mid-March. At the end of the period, the libraries were contracted for their opinions about various aspects of data tagging. DOE

N87-13356# California Univ., Berkeley. Lawrence Berkeley Lab.
FURTHER RESULTS ON INTERPOLATION SEARCHING OF DATABASES
Z. J. Li and H. K.T. Wong Feb. 1986 25 p
(Contract DE-AC03-76SF-00098)
(DE86-012822; LBL-20708) Avail: NTIS HC A02/MF A01

Known results of the Interpolation Search Algorithm on ordered tables are extended in three ways. First, the effect of batching the search queries is examined. Second, the basically main-memory algorithm is applied to a more typical database environment, i.e., a blocked secondary memory. Third, a hybrid algorithm is examined to remedy the worst case behavior of the pure Interpolation Search in the event of non-uniform distribution of the ordered file while retaining the average complexity. Algorithms, analytic expressions and experiment results of these extensions are given and described. Analytic expressions of these algorithms are validated by the experiments. DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

N87-13357# Committee on Appropriations (U. S. House).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR 1987, PART 7
1986 257 p Hearings before the Subcommittee on HUD and Independent Agencies of the Committee on Appropriations, 99th Congress, 2d Session, 13 May 1986
(GPO-61-970) Avail: Subcommittee on HUD and Independent Agencies

Appropriations for the 1987 Fiscal Year for National Aeronautics and Space Administration programs are discussed. B.G.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see also *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N87-13358*# Denver Univ., Colo.
THE UNCOUNTED BENEFITS: FEDERAL EFFORTS IN DOMESTIC TECHNOLOGY TRANSFER
Richard L. Chapman and Kathryn Hirst Jul. 1986 366 p
(Contract NASw-3466)
(NASA-CR-177044; NAS 1.26:177044) Avail: NTIS HC A16/MF A01 CSCL 05A

Organized technology transfer activities conducted by the agencies of the U.S. government are described. The focus is upon agency or departmental level activity rather than the laboratory level. None of the programs on which information was collected has been assessed or evaluated individually. However, the aggregate programs of the government have been judged in terms of obvious gaps and opportunities for future improvement. An overview, descriptions of the various agency or department programs of technology transfer, a list of persons interviewed or consulted during the survey, and a bibliography of publications, reports and other material made available to the study staff are given. An extensive appendix of illustrative material collected from the various programs is also given. Author

N87-13359*# National Aeronautics and Space Administration. Lewis Research Center. Cleveland, Ohio.
PROGRESS OF STIRLING CYCLE ANALYSIS AND LOSS MECHANISM CHARACTERIZATION Final Report
Roy C. Tew, Jr. 1986 19 p Presented at the 24th Automotive Technology Development Meeting, Dearborn, Mich., 27-30 Oct. 1986; sponsored by Society of Automotive Engineers
(NASA-TM-88891; DOE/NASA-50112/67; E-3302; NAS 1.15:88891) Avail: NTIS HC A01/MF A01 CSCL 10B

An assessment of Stirling engine thermodynamic modeling

and design codes shows a general deficiency; this deficiency is due to poor understanding of the fluid flow and heat transfer phenomena that occur in the oscillating flow and pressure level environment within the engines. Stirling engine thermodynamic loss mechanisms are listed. Several experimental and computational research efforts now underway to characterize various loss mechanisms are reviewed. The need for additional experimental rigs and rig upgrades is discussed. Recent developments and current efforts in Stirling engine thermodynamic modeling are also reviewed. Author

N87-13360# Naval Postgraduate School, Monterey, Calif.
AN EXAMINATION OF TECHNOLOGY TRANSFER AS A TOOL FOR MANAGEMENT M.S. Thesis
Don B. McCorkendale Mar. 1986 58 p
(AD-A169184) Avail: NTIS HC A04/MF A01 CSCL 05/1

An examination of the technology transfer process as it relates to contemporary management practice is made. The objective is to acquaint the reader with the concept of technology transfer and the mechanism of information flow within business organizations. Included is an in-depth analysis of the predictive model of technology transfer with an amphasis on the interrelationship between management and the factors affecting information flow. Author (GRA)

N87-13361# Pacific Northwest Labs., Richland, Wash.
TECHNOLOGY TRANSFER AT PACIFIC NORTHWEST LABORATORY Annual Report, FY 1985
M. Clement, J. M. Rusin, K. Drumheller, I. D. Hays, L. C. Schmid, and S. K. Edler Jan. 1986 54 p
(Contract DE-AC06-76RL-01830)
(DE86-012333; PNL-SA-13717) Avail: NTIS HC A04/MF A01

Technology transfer activities at Pacific Northwest Laboratory (PNL) for FY 1985 are summarized in this report. Objectives of these activities are as follows: Transfer federally funded and PNL-developed technology to state and local governments and the private sector; encourage and develop strong relationships between the region's educational institutions (elementary through college levels) to aid technology development and application; and assist in the transfer of federally funded technology that is developed elsewhere. DOE

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio, gamma-ray, and infrared astronomy, and astrometry.

N87-13362*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
SPACE INFRARED TELESCOPE FACILITY WIDE FIELD AND DIFFRACTION LIMITED ARRAY CAMERA (IRAC) Semiannual Status Report, 1 Mar. - 31 Aug. 1986
Giovanni G. Fazio Oct. 1986 69 p
(Grant NAG2-316)
(NASA-CR-177041; NAS 1.26:177041; SASR-4) Avail: NTIS HC A04/MF A01 CSCL 03A

IRAC focal plane detector technology was developed and studies of alternate focal plane configurations were supported. While any of the alternate focal planes under consideration would have a major impact on the Infrared Array Camera, it was possible to proceed with detector development and optical analysis research based on the proposed design since, to a large degree, the studies undertaken are generic to any SIRTF imaging instrument. Development of the proposed instrument was also important in a situation in which none of the alternate configurations has received the approval of the Science Working Group. E.R.

N87-13363*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INFRARED REFLECTION NEBULAE IN ORION MOLECULAR CLOUD 2
Yvonne Pendleton, M. W. Werner, R. Capps (Hawaii Univ., Honolulu.), and D. Lester (Texas Univ., Austin.) Jun. 1986 46 p
(NASA-TM-88259; A-86276; NAS 1.15:88259) Avail: NTIS HC A03/MF A01 CSCL 03A

New obervations of Orion Molecular Cloud-2 have been made from 1-100 microns using the NASA Infrared Telescope Facility and the Kuiper Airborne Observatory. An extensive program of polarimetry, photometry and spectrophotometry has shown that the extended emission regions associated with two of the previously known near infrared sources, IRS1 and IRS4, are infrared reflection nebulae, and that the compact sources IRS1 and IRS4 are the main luminosity sources in the cloud. The constraints from the far infrared observations and an analysis of the scattered light from the IRS1 nebula show that OMC-2/IRS1 can be characterized by L less than or equal to 500 Solar luminosities and T approx. 1000 K. The near infrared (1-5) micron albedo of the grains in the IRS1 nebula is greater than 0.08. Author

N87-13364 Arizona Univ., Tucson.
INVESTIGATIONS OF LONG-PERIOD DQ HERCULIS STAR Ph.D. Thesis
William Roy Penning 1986 190 p
Avail: Univ. Microfilms Order No. DA8613445

The magnetic rotator model has long been the favored explanation for coherent photometric modulations in the DQ Herculis class of cataclysmic variables. However, to date, all evidence supporting this model has been of the indirect variety. Unlike their synchronously rotating cousins, the AM Herculis objects, DQ Herculis stars have not yet been discovered to emit polarized radiation. Therefore, in light of this crucial lack, the evidence used to place these objects in the magnetic cataclysmic variable category has been strictly circumstantial, based primarily on the coherence of the photometric periodicities. For this work, time-resolved spectroscopy of four long-period DQ Herculis stars was performed. In addition, two of the same objects were observed with a new, sensitive circular polarimeter. Coherent variations in the wavelength of emission lines were found with the spectroscopic observations. A model is put forth, explaining this phenomenon as being due to varying illumination from a bright spot on the primary. This adds strength to the magnetic rotator model. Circular polarization was definitely found in one object studied, and possibly in a second. In a later chapter of the thesis, the model of the rotating bright spot illuminating the disk is explored in further detail, including modeling with a minicomputer. Afterward, a problem brought out by the low polarization coupled with large amplitude photometric variations and a cool spectrum is investigated, namely, whether it is possible to produce large amounts of cyclotron radiation without producing large amounts of circular polarization. Dissert. Abstr.

90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

For related information see also *75 Plasma Physics.*

N87-13365*# Michigan Univ., Ann Arbor. Dept. of Astronomy.
OBSERVATIONAL STUDY OF ION-ELECTRON EQUILIBRATION AND OF CLOUD EVAPORATION IN SUPERNOVA REMNANTS UNDER THE HEAO-2 GUEST INVESTIGATOR PROGRAM Final Project Report, 1 Jun. 1985 - 30 Sep. 1986

Richard G. Teske 30 Sep. 1986 11 p
(Grant NAG8-535)
(NASA-CR-179922; NAS 1.26:179922) Avail: NTIS
HC A02/MF A01 CSCL 03B

Observations of three selected supernovae remnants (Cygnus Loop, IC 443, and Puppis A) were made in the forbidden coronal iron lines (Fe X) lambda 6374 and (Fe XIV) lambda 5303. The resulting data was compared quantitatively with Einstein images of the same objects, and an attempt was made to determine (a) the process by which ion and electron energies are equilibrated behind the shock front in the ISM and (b) whether cloud evaporation occurs within the hot remnant interiors. Spatially-resolved X ray emission were modeled for Sedov-Taylor blast wave models of supernovae remnants (SNR) under conditions of non-equilibrium ionization. The computations are intended to provide results that can be directly compared with Einstein high resolution image (HRI) and imaging proportional counter (IPS) data. The computer program for predicting the spatial distribution of HRI and IPS counting rates was completed, and final testing of it had begun. E.R.

N87-13366*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
HIGH ENERGY NEUTRINO ABSORPTION AND ITS EFFECTS ON STARS IN CLOSE X-RAY BINARIES
T. K. Gaisser and F. W. Stecker Jul. 1986 21 p Submitted for publication
(NASA-TM-89269; NAS 1.15:89269) Avail: NTIS
HC A02/MF A01 CSCL 03B

The physics and astrophysics of high energy neutrino production and interactions in close X-ray binary systems are studied. These studies were stimulated by recent observations of ultrahigh energy gamma-rays and possibly other ultrahigh energy particles coming from the directions of Cygnus X-3 and other binary systems and possessing the periodicity characteristics of these systems. Systems in which a compact object, such as a neutron star, is a strong source of high energy particles which, in turn, produce photons, neutronos and other secondary particles by interactions in the atmosphere of the companion star were considered. The highest energy neutrinos are absorbed deep in the companion and the associated energy deposition may be large enough to effect its structure or lead to its ultimate disruption. This neutrino heating was evaluated, starting with a detailed numerical calculation of the hadronic cascade induced in the atmosphere of the companion star. For some theoretical models, the resulting energy deposition from neutrino absorption may be so great as to disrupt the companion star over an astronomically small timescale of the order of 10,000 years. Even if the energy deposition is smaller, it may still be high enough to alter the system substantially, perhaps leading to quenching of high energy signals from the source. Given the cosmic ray luminosities required to produce the observed gamma rays from cygnus X-3 and LMX X-4, such a situation may occur in these sources. E.R.

N87-13367*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE TWO STATES OF CYG X-1 AND RELATED SOURCES
Demosthenes Kazanas Jul. 1986 15 p Submitted for publication
(NASA-TM-89265; NAS 1.15:89265) Avail: NTIS
HC A02/MF A01 CSCL 03B

A model for active galactic nuclei (AGN), employing quasi-spherical accretion onto a black hole, when scaled down to solar mass objects, provides a straightforward account of the bimodal spectral behavior of Cyg X-1 and the other galactic black hole candidates. It is argued that the change in the spectrum is due to the drastic increase of the source compactness (L/R) with the accretion rate m and the subsequent conversion of most of the energy released by accretion into e(+)e(-) pairs. It is also argued that similar changes may be observed in active galactic nuclei. Author

N87-13368*# Pennsylvania State Univ., University Park. Dept. of Astronomy
CONTINUUM RADIATION FROM ACTIVE GALACTIC NUCLEI: A STATISTICAL STUDY
Takashi Isobe, Eric D. Feigelson (National Science Foundation, Washington, D.C.), Kulinder P. Singh (Danish Space Research Inst., Lyngby.), and Ajit Kembhavi (Tata Inst. of Fundamental Research, Bombay (India).) 1986 81 p
(Grant NAG8-555)
(NASA-CR-179925; NAS 1.26:179925) Avail: NTIS
HC A05/MF A01 CSCL 03B

The physics of the continuum spectrum of active galactic nuclei (AGNs) was examined using a large data set and rigorous statistical methods. A data base was constructed for 469 objects which include radio selected quasars, optically selected quasars, X-ray selected AGNs, BL Lac objects, and optically unidentified compact radio sources. Each object has measurements of its radio, optical, X-ray core continuum luminosity, though many of them are upper limits. Since many radio sources have extended components, the core component were carefully selected out from the total radio luminosity. With survival analysis statistical methods, which can treat upper limits correctly, these data can yield better statistical results than those previously obtained. A variety of statistical tests are performed, such as the comparison of the luminosity functions in different subsamples, and linear regressions of luminosities in different bands. Interpretation of the results leads to the following tentative conclusions: the main emission mechanism of optically selected quasars and X-ray selected AGNs is thermal, while that of BL Lac objects is synchrotron; radio selected quasars may have two different emission mechanisms in the X-ray band; BL Lac objects appear to be special cases of the radio selected quasars; some compact radio sources show the possibility of synchrotron self-Compton (SSC) in the optical band; and the spectral index between the optical and the X-ray bands depends on the optical luminosity. Author

N87-13369# Naval Postgraduate School, Monterey, Calif.
CLASSIFICATION OF N-TYPE CARBON STARS M.S. Thesis
William V. Bollwerk Jun. 1986 75 p
(AD-A171399) Avail: NTIS HC A04/MF A01 CSCL 03/2

Carbon stars are in an advanced state of evolution and are of interest for understanding the rapid evolutionary processes during late stages of stellar evolution. They are cool ($T<4000K$) stars with an atmospheric carbon to oxygen ratio (C/O) greater than one. Most other classes of stars exhibit atmospheric $C/O < 1$. Low resolution spectrophotometry has been used to examine the relationship between spectral class and effective temperatures in a sample of eleven cool carbon stars. Using effective temperatures from lunar occultation observations of Tsuji and Ridgeway et al, CN and C2 features have been examined for their utility as classification criteria. It is found that C2 strength is not a reliable temperature classification parameter, while CN should be useful. Comparison of the carbon star classification systems of Keenan and Morgan and that of Richer with recent derived temperatures and the results of this study indicates that the Richer classification system more accurately reflects the temperatures of cool carbon stars. GRA

N87-13370# Paraiba Univ., Joao Pessoa (Brazil). Dept. de Fisica.
SUPERGRAVITY
V. deOliveiraRivelles 1985 53 p In PORTUGUESE
(DE86-701481; INIS-BR-426) Avail: NTIS (US Sales Only)
HC A04/MF A01

The main aspects of the supergravity are presented. Several implications are discussed when the global symmetry is transformated in a local one. The super symmetric Higgs mechanism as well as the Kaluza-Klein theory are also discussed. DOE

N87-13371# Los Alamos National Lab., N. Mex.
LOS ALAMOS SCIENCE, NUMBER 13, SPRING 1986
N. G. Cooper 1986 75 p
(Contract W-7405-eng-36)

(DE86-012864; LA-UR-86-730) Avail: NTIS HC A04/MF A01

A review of the advances that have been made in the field of X-ray astrophysics is presented. A discussion of the information which can be gleaned from the spectra is also presented. The internal dynamics of neutron stars is discussed. Models of neutron star structure are discussed. A cooperative experiment which measured the spectra of Cygnus X-3 (10^9 to 10^{18} hertz) is discussed. The role of angular momentum in the cosmology of the universe is discussed. DOE

N87-13372# International Centre for Theoretical Physics, Trieste (Italy).

CANONICAL QUANTIZATION OF GRAVITY

T. Christodoulakis and J. Zanelli Jul. 1985 15 p Prepared in cooperation with Chile Univ., Santiago

(DE86-702615; IC-85/102) Avail: NTIS (US Sales Only) HC A02/MF A01

We present a scheme for carrying out in part the program of quantization of gravity in canonical form. The idea is to exploit the covariance of any Lagrangian theory under changes in the generalized coordinates, to select a particular ordering for the operator constraints of quantum gravity. A modified form of the canonical commutation relations (CRSs) is used which maintains full covariance under diffeomorphisms in three-space. The resulting commutator algebra of these operators is found to close, as required by consistency. Some remarks are made about the possible renormalizability and unitarity of the resulting theory, as well as the possible vanishing of the renormalized cosmological constant. DOE

N87-13373# International Centre for Theoretical Physics, Trieste (Italy).

ASTRO-PARTICLE-PHYSICS

A. Salam Sep. 1985 6 p

(DE86-702946; IC-85/227) Avail: NTIS (US Sales Only) HC A02/MF A01

Opening remarks at the Fourth Marcel Grossman Meeting, 17 to 21 June 1985, in Rome, Italy, are reported. The meeting was concerned with the symbiosis of cosmology and particle physics. Numerous connections between work in particle physics and cosmology, in both experimental and theoretical areas, are pointed out. DOE

N87-13374 Washington Univ., Seattle.

PLANE-PARALLEL AND BOW SHOCK MODELS OF HERBIG-HARO OBJECTS Ph.D. Thesis

Alejandro Christian Raga 1985 154 p

Avail: Univ. Microfilms Order No. DA8613204

It is now generally accepted that the emission line spectrum of Herbig-Haro objects is formed in the recombination region behind a shock wave. Plane-parallel shock wave models have been quite successful at reproducing many of the observed characteristics of these spectra, but in order to be able to predict line profiles and the spatial distribution of the emission, at least two-dimensional models are needed. In this thesis, a model for a bow shock formed around a bullet (which moves supersonically with respect to the surrounding medium) is developed, and is then used to predict position-velocity diagrams (i.e., long-slit spectra) and two-dimensional intensity contour maps for several emission lines. The thesis is divided into two parts: (1) A calculation of stationary, plane parallel shock wave models, in which a full treatment of the pre-shock region is included. The emission line spectra of both the pre- and the post-shock regions are predicted. (2) The development of a bow shock model (for a gas with an important radiative energy loss), from which the spatially resolved line spectrum is predicted. A qualitative comparison of the predictions from the bow shock models with recent observations of Herbig-Haro objects HH 1 and HH 32 shows that, at least for these two objects, a good agreement between the observations and the theory of a radiating bow shock is obtained. This seems to indicate that the emission line spectra of these two Herbig-Haro objects are formed in the recombination region behind a bow shock. Dissert. Abstr.

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance.*

N87-13375°# National Aeronautics and Space Administration, Washington, D.C.

THE UPPER ATMOSPHERE OF VENUS: A TENTATIVE EXPLANATION OF ITS ROTATION

C. Boyer Sep. 1986 13 p Transl. into ENGLISH from L'Astronomie (France), v. 100, Feb. 1986 p 77-83 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-88505; NAS 1.15:88505) Avail: NTIS HC A02/MF A01 CSCL 03B

The upper atmosphere of Venus seems to revolve every 4 days, while the planet rotates in 243 days. Mariner 10 UV data on the changing positions of dark spots in the upper Venusian clouds have supported estimations of speeds ranging from 120-240 m/s. High rates of acceleration and deceleration occur on the night side, the former between -110 to -90 deg and the latter continuing to -50 deg. Arch and Y formations have been seen repeatedly between -110 to -70 deg. The highest are seen at about -90 deg and the lowest at about -30 deg. The temperature of the cloud layer at 60 km altitude is about 20 C, the pressure is nearly one earth atmosphere, and complex molecules, including O, C, H, N and S and combinations of these are present in abundance. Author

N87-13376°# National Aeronautics and Space Administration, Washington, D.C.

RELIEF AND GEOLOGY OF THE NORTH POLAR REGION OF THE PLANET VENUS

R. O. Kuzmin, G. A. Burba, V. P. Shashkina, A. F. Bogomolov, N. V. Zherikhin, G. I. Skrypnik, L. V. Kudrin, M. Yu. Bergman, O. N. Rzhiga, A. I. Sidorenko et al Sep. 1986 25 p Transl. into ENGLISH from Astronomicheskiy Vestnik (Moscow, USSR), v. 20, no. 3, 1986 p 177-196 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-4005)

(NASA-TM-88498; NAS 1.15:88498) Avail: NTIS HC A02/MF A01 CSCL 03B

Description of topographic features is given for the North polar region of the planet Venus. Principal geomorphic types of terrain are characterized as well as their geologic relations. Relative ages of geologic units in Venus North polar region are discussed. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

For related information see *93 Space Radiation.*

N87-13377# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

SOLAR FLUX AND GEOMAGNETIC ACTIVITY PREDICTION

Roberto VieriradaFonsecaLopez, Helio Koiti Kuga, and Valdemir Carrara May 1986 6 p Presented at TELECON, Rio De Janeiro, Brazil, 10-13 Oct. 1985

(INPE-3884-PRE/934) Avail: NTIS HC A02/MF A01

The main concern is the establishment of prediction models for the solar activity which greatly influences the behavior of the upper atmosphere constituent elements. Such models are aimed at applications in orbit computations of close earth satellites (< 1000 km) which, within this altitude range, are affected by atmospheric drag. Author

N87-13378# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REPETITION RATES OF FAST PULSES IN MM-WAVES/X-RAY SOLAR BURSTS
E. Correia and P. Kaufmann Aug. 1986 29 p Presented at the 2nd CESRA Workshop, Aubigny, France, Jun. 1986 Sponsored in part by FINEP
(INPE-3974-PRE/986) Avail: NTIS HC A03/MF A01

The solar burst of 21 May, 1984, 1326 UT, presented radio spectral emission with turnover frequency above 90 GHz, well correlated in time with hard X-ray emission. It consisted of seven major time structures (1-3 seconds in duration), and each structure consisted of various fast pulses (30-60 ms rise times). The spectral indices between 30-90 GHz, and the power-law indices at hard X-ray exhibited sudden changes for each major time structure. The subsecond pulses are nearly in phase at 30 and 90 GHz, but the relative amplitude of the pulses at 90 GHz (approx. = 50%) were considerably larger than at 30 GHz (less than 5%). It was found that the 90 GHz and the 100 keV X-rays fluxes are proportional to the repetition rates of the subsecond pulses, and that the hard X-rays power law indices harden for higher repetition rates.
Author

N87-13379*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAX '91: AN ADVANCED PAYLOAD FOR THE EXPLORATION OF HIGH ENERGY PROCESSES ON THE ACTIVE SUN
Jun. 1986 62 p
(NASA-TM-89271; NAS 1.15:89271) Avail: NTIS HC A04/MF A01

The results of a NASA science working group established to study a follow-on to the Solar Maximum Mission are given. A complement of instruments is suggested, with the primary objective of studying the physics of energetic processes in cosmic plasmas by observing high-energy phenomena in solar flares. High-quality flare observations will be possible with these instruments during the next peak in solar activity expected to last from 1990 through at least 1995. The primary objective of MAX '91 is to study energetic processes in cosmic plasmas by observing high-energy phenomena in solar flares. These processes, which are of general astrophysical importance, include energy release, particle acceleration, and energy transport. Results from comprehensive observing programs conducted during the last solar cycle have demonstrated the great scientific potential of high-energy emissions for addressing these central physical processes. Consequently, a payload optimized for observations of high-energy solar flare phenomena is suggested for MAX '91. It consists of the following four specific instruments: (1) a Fourier-transform X-ray and gamma-ray imager covering the energy range from a few keV to 1 MeV with arcsecond spatial resolution; (2) a cooled germanium X-ray and gamma-ray spectrometer with keV spectral resolution covering the energy range from 10 keV to 50 MeV; (3) Bragg spectrometers with high spectral resolution at wavelengths between 1 and 9 angstrons; and (4) a soft X-ray, EUV, or UV imaging instrument with arcsecond spatial resolution.
Author

N87-13380# Alaska Univ., Fairbanks. Geophysical Inst.
A STUDY OF THE RELATIONSHIP BETWEEN SOLAR ACTIVITY AND INTERPLANETARY FIELD VARIATIONS Final Report, 14 May - 30 Sep. 1985
S. I. Akasofu and L. C. Lee Feb. 1986 25 p
(Contract F19628-85-K-0045)
(AD-A169983; AFGL-TR-86-0032) Avail: NTIS HC A02/MF A01 CSCL 03/2

The origin of large values of the interplanetary magnetic field Bz component, the nature of the so-caled driver gas, the origin of the high speed solar wind streams are the three major issues in solar-terrestrial physics. Several initial attempts are made to study them and find new steps toward a better understanding. GRA

N87-13381# Louisiana State Univ., Baton Rouge. Dept. of Physics and Astronomy.
SOLAR FLARES AND MAGNETOSPHERIC PARTICLES: INVESTIGATIONS BASED UPON THE ONR-60 EXPERIMENTS AND ONR-604 EXPERIMENTS Annual Letter Report, 1 May 1985 - 30 Jun. 1986
John P. Wefel 27 Jun. 1986 16 p
(Contract N00014-83-K-0365)
(AD-A170620) Avail: NTIS HC A02/MF A01 CSCL 04/1

The project involves analysis of the data returned from the ONR-602 (Phoenix-1) experiment on the S81-1 in mission in 1982, correlation of the Phoenix-1 dataset with other measurements and scientific planning for the launch and operation of a sister experiment, ONR-604, on the CRES mission. During the past year significant progress was made in understanding the ONR-602 instrument performance and the dataset, in analyzing the low energy protons observed in the equatorial belt, in summarizing solar energetic particle observations, and in working with the CRRES/SPACERAD Science Team. GRA

N87-13382# Los Alamos National Lab., N. Mex.
MAGNETIC FIELD RE-ARRANGEMENT AFTER PROMINENCE ERUPTION
R. A. Kopp and G. Poletto 1986 6 p Presented at the NASA Workshop on Coronal and Prominence Plasmas, Berkeley Springs, W. Va., 8 Apr. 1986 Prepared in cooperation with Osservatorio Astrofisico di Arcetri, Florence (Italy).
(Contract W-7405-eng-36)
(DE86-012393; LA-UR-86-1906; CONF-8604219-1) Avail: NTIS HC A02/MF A01

It has long been known that magnetic reconnection plays a fundamental role in a variety of solar events. Although mainly invoked in flare problems, large-scale loops interconnecting active regions, evolving coronal hole boundaries, the solar magnetic cycle itself, provide different evidence of phenomena which involve magnetic reconnection. A further example might be given by the magnetic field rearrangement which occurs after the eruption of a prominence. Since most often a prominence reforms after its disappearance and may be observed at about the same position it occupied before erupting, the magnetic field has to undergo a temporary disruption to relax back, via reconnection, to a configuration similar to the previous one. The above sequence of events is best observable in the case of two-ribbon (2-R) flares but most probably is associated with all filament eruptions. Even if the explanation of the magnetic field rearrangement after 2-R flares in terms of reconnection is generally accepted, the lack of a three-dimensional model capable of describing the field reconfiguration, has prevented, up to now, a thorough analysis of its topology as traced by H£/x-ray loops. The purpose of the present work is to present a numerical technique which enables one to predict and visualize the reconnected configuration, at any time, and therefore allows one to make a significant comparison of observations and model predictions throughout the whole process. DOE

N87-13383# Los Alamos National Lab., N. Mex.
LARGE-SCALE ELECTRIC FIELDS RESULTING FROM MAGNETIC RECONNECTION IN THE CORONA
R. A. Kopp and G. Poletto 1986 6 p Presented at the NASA Workshop on Coronal and Prominence Plasmas, Berkeley Springs, W. Va., 8 Apr. 1986 Prepared in cooperation with Osservatorio Astrofisico di Arcetri
(Contract W-7405-eng-36)
(DE86-012391; LA-UR-86-1907; CONF-8604219-2) Avail: NTIS HC A02/MF A01

The method of Forbes and Priest (2-D model) is applied to the large two-ribbon flare of July 29, 1973, for which both detailed H£ observations and magnetic data are available. For this flare the ribbons were long, nearly straight, and parallel to each other, and the 2-D model for the coronal field geometry may be adequate. The temporal profile E(t) is calculated and indicates that reconnection sets in at the beginning of the decay phase. From this time the electric field grows rapidly to a maximum value of about 2 V/cm within just a few minutes. Thereafter it decreases monotonically with time.
DOE

N87-13384# International Centre for Theoretical Physics, Trieste (Italy).
EQUILIBRIUM CONFIGURATION OF CORONAL LOOPS
V. Krishan Aug. 1985 10 p
(DE86-702711; IC-85/96) Avail: NTIS (US Sales Only) HC A02/MF A01

The steady-state pressure structure of a solar coronal loop is describable by a superposition of Chandrasekhar-Kendall functions. Each Chandrasekhar-Kendall function represents a force-free state. We extend this work to study the dynamical evolution of the loop as it moves outwards in the external medium while constantly maintaining its minimal energy configuration. This enables one to calculate the rate of energy dissipation as the loop moves outwards remaining in the minimal energy state under the invariance of the magnetic helicity and the magnetic fluxes. It is found that the nonaxisymmetric state becomes more favorable when the external pressure falls below a critical value. DOE

N87-13385 Georgia Inst. of Tech., Atlanta.
MODEL STUDIES OF SOLAR SPECTRAL IRRADIANCE AT THE BOTTOM AND TOP OF A CLOUDY ATMOSPHERE Ph.D. Thesis
Mark Vaughan Paris 1985 146 p
Avail: Univ. Microfilms Order No. DA8604013

The development and testing of a spectral model for transmission of solar radiation through a cloudy atmosphere are described. Clear-sky effects include absorption by ozone, water vapor, the uniformly-mixed gases and aerosols; and scattering by air molecules (Rayleigh scattering) and aerosols. These optical effects are treated with a Beer's Law relationship using extinction coefficients for each of 145 spectral intervals from 0.29 to 3.0 microns. Cloud optical effects are treated with the delta-Eddington approximation. The model calculates spectral irradiances at the surface and the top of the atmosphere. The model is tested against 221 hours of broad-band and spectral (greater than 630 nm) irradiances measured at the Georgia Tech Solar Energy Meteorological Research and Training Site. Upward irradiances at the top of the atmosphere are converted into directional radiances through empirical bidirectional reflectance factors and the resulting radiances are compared against radiances for 168 hours measured by satellite at the same time and at the same hours measured by satellite at the same time and at the same location. The model reproduces measured surface irradiances with a root-mean-square error of 11.7% of the model mean. The directional reflectances have an rms error of 16.4% of the model mean; when nine outlying points are removed from the data, the remaining data have an rms error of 12.5% of the mean. Testing of the model indicates that it has sufficient accuracy for such purposes as calibration of satellite sensors in the visible spectrum. Dissert. Abstr.

N87-13386 California Univ., Los Angeles.
THE CARBON TWELVE TO CARBON THIRTEEN ISOTOPE RATIO OF THE INTERSTELLAR MEDIUM IN THE NEIGHBORHOOD OF THE SUN Ph.D. Thesis
Isabel Hawkins 1986 293 p
Avail: Univ. Microfilms Order No. DA8614091

The C-12/C-13 ratio in the interstellar medium (ISM) was obtained from optical observations of interstellar CH+ toward five stars in the solar neighborhood. This isotope ratio is a probe of nucleosynthesis and imposes stringent constraints on galactic chemical evolutionary models. As a result of this work, we have found that the local interstellar medium C-12/C-13 abundance ratios toward four different lines of sight are uniform within 14%. We thus provide concrete evidence in favor of the existence of a homogeneous ISM in a small scale. The similarity among the C-12/C-13 ratios determined in four interstellar clouds possessing different physical conditions, precludes the possibility that fractionation or selective photodissociation of CH+ are taking place in these regions. We can then safety state that the (12)CH+/(13) CH+ isotope ratios we have observed are representative of the C-12/C-13 ratios in the gas. We have thus calculated a weighted mean ratio of 43 +/- 4 from the measured values toward our program stars. From our observations we have been able to assess the amount of processing of material by nucleosynthesis in stars that has occurred since the formation of the Sun. Since our derived ISM ratios are a factor of two smaller than the value of 89 in the solar system, we concluded that the ISM has evolved chemically since the formation of the Sun, in accordance with the predictions put forth by the majority of the galactic chemical evolutionary models. Dissert. Abstr.

N87-13387*# Stanford Univ., Calif. Center for Space Science and Astrophysics.
RAPID FLUCTUATIONS IN SOLAR FLARES
P. A. Sturrock Apr. 1986 31 p
(Contracts N00014-85-K-0111; NGL-05-020-272)
(NASA-CR-179894; NAS 1.26:179894; AD-A169586; AD-E500769; CSSA-ASTRO-86-29) Avail: NTIS HC A03/MF A01 CSCL 03/2

Study of rapid fluctuations in the emission of radiation from solar flares provides a promising approach for probing the magnetoplasma structure and plasma processes that are responsible for a flare. It is proposed that elementary flare bursts in X ray and microwave emission may be attributed to fine structure of the coronal magnetic field, related to the aggregation of photospheric magnetic field into magnetic knots. Fluctuations that occur on a sub-second time scale may be due to magnetic islands that develop in current sheets during magnetic reconnection. The impulsive phase may sometimes--or possibly always--represent the superposition of a large number of the elementary energy release processes responsible for elementary flare bursts. If so, one faces the challenge of trying to explain the properties of the impulsive phase in terms of the properties of the elementary processes. For instance, if the impulsive phase produces a power law energy distribution of energetic particles, this may be due to scaling laws governing the elementary processes rather than to power-law accelerations in each elementary event. GRA

93 SPACE RADIATION

Includes cosmic radiation; and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N87-13388# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A SURVEY OF HARD-X-RAYS AT BALLOON ALTITUDES OF THE EARTH'S ATMOSPHERE
O. Pinto, Jr., W. D. Gonzalez, and J. M. daCosta Jul. 1986 9 p
Sponsored in part by Fundo Nacional de Desenvolvimento Cientifico e Tecnologico Submitted for publication
(INPE-3954-PRE/972) Avail: NTIS HC A02/MF A01

A brief discussion of hard X-ray measurements in the Earth's atmosphere is presented. In this context, recent measurements using balloon-borne detectors in the South Atlantic Magnetic Anomaly (SAMA) have provided the first evidence of the presence of hard X-rays produced by natural electron precipitation in this region. These hard X-rays are compared to those due to other sources. Author

N87-13389# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
CONTRIBUTIONS TO THE 18TH INTERNATIONAL COSMIC RAY CONFERENCE
J. Bernard Blake, J. F. Fennell, R. Koga, N. Katz, D. S. P. Dearborn (Arizona Univ., Tucson.), and Steven H. Margolis (Washington Univ., St. Louis, Mo.) 10 Mar. 1986 20 p Conference held in Bangalore, India
(ATR-86(9558)-11) Avail: NTIS HC A02/MF A01

Four papers presented at the 18th International Cosmic Ray Conference are compiled. Topic areas include: ultraheavy cosmic rays, secondary production of gamma rays in the Jovian magnetosphere, the stellar upper mass limit in an OB association, and a

data processing unit for satellite- borne composition instrumentation. For individual titles, see N87-13390 through N87-13393.

N87-13390# Washington Univ., St. Louis, Mo. Center for the Space Sciences.
THE ULTRAHEAVY COSMIC RAYS: PROPAGATION AND SELECTIVE ACCELERATION
Steven H. Margolis and J. Bernard Blake (Aerospace Corp., El Segundo, Calif.) *In* Aerospace Corp. Contributions to the 18th International Cosmic Ray Conference 10 Mar. 1986 p 1-4 Previously announced in IAA as A85-23003 (For primary document see N87-13389 04-93)
Avail: NTIS HC A02/MF A01

Results of calculations of ultraheavy cosmic ray propagation are examined in the light of recent observations and theoretical advances with the objective of distinguishing the effects of propagation from nucleosynthesis and preferential acceleration. The results presented here have been calculated by the method described in Margolis (1983), with elements from iron (Z = 26) to uranium (Z = 92) combined in a single calculation. The source abundances of Anders and Ebihara (1982) have been used as a reference composition. It is shown, in particular, that the relative abundances of Sr and Ba are substantially increased by using the modified ionization potential dependence (MIPD) compared with solar abundance and the first ionization potential dependence (FIPD) models. In contrast, Pb shows similar enhancements in both FIPD and MIPD models. IAA

N87-13391# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
THE SECONDARY PRODUCTION OF GAMMA RAYS IN THE JOVIAN MAGNETOSPHERE
J. Bernard Blake and Steven H. Margolis (Washington Univ., St. Louis, Mo.) *In its* Contributions to the 18th International Cosmic Ray Conference 10 Mar. 1986 p 5-8 Previously announced as A85-22972 (For primary document see N87-13389 04-93)
Avail: NTIS HC A02/MF A01

Photons in the MeV and above energy range resulting from interactions of energetic protons and electrons in the Jovian magnetosphere with the Jovian satellite Amalthea are studied. The photon flux as a function of Jovian radii is found to be 0.2/sq R(J) per sq cm/sec, a relatively low value. If the magnetospheric configuration at Jupiter is similar to that of the Earth, a nearly radiation-free region may exist below the trapped particles, but sufficiently high for an observing satellite to orbit with a reasonable drag lifetime. IAA

N87-13392# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
THE STELLAR UPPER MASS LIMIT IN AN OB ASSOCIATION AND IMPLICATIONS FOR COSMIC RAYS AND COSMIC ABUNDANCES
J. Bernard Blake and D. S. P. Dearborn (Arizona Univ., Tucson.) *In its* Contributions to the 18th International Cosmic Ray Conference 10 Mar. 1986 p 9-12 (For primary document see N87-13389 04-93)
Avail: NTIS HC A02/MF A01

Some implications are considered of the possibility that the collapse of the solar nebula was induced by the supernova of an extremely massive star or, at least, such a star was in the vicinity of the protosolar nebula prior to its collapse to form the solar system. A very large star in the vicinity of the protosolar nebula can contribute to the protosolar nebula in several ways which differ from a smaller (but still large) star: (1) the high mass-loss rate of a very large star implies the dispersion into the nearby interstellar medium of many solar masses of freshly synthesized material (a substantial dilution can occur before its contribution is masked); (2) a significant amount of Al-26 is synthesized and dispersed well before the subsequent supernova; (3) energy is available in the stellar wind for accelerating cosmic rays in sufficient quantities to heavily irradiate nearby material; (4) the absence of freshly synthesized Pu-244 (no resetting of the plutonium clock) can be understood in a natural way; and (5) a significant amount of Pd-107 can be dispersed into the interstellar medium during a WC stage. Author

N87-13393# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.
A VERSATILE DATA PROCESSING UNIT (DPU) FOR SATELLITE-BORNE COMPOSITION INSTRUMENTATION
J. Bernard Blake, J. F. Fennell, R. Koga, and N. Katz *In its* Contributions to the 18th International Cosmic Ray Conference 10 Mar. 1986 p 13-16 Previously announced in IAA as A85-22970 (For primary document see N87-13389 04-93)
Avail: NTIS HC A02/MF A01

A data processing unit (DPU) for use with a charge-composition experiment to be flown aboard the VIKING auroral research satellite is described. The design of this DPU is such that it can be readily adapted to a variety of cosmic-ray composition experiments. IAA

N87-13394*# New Hampshire Univ., Durham. Gamma-Ray Astronomy Group.
THE GAMMA-RAY SPECTROMETER EXPERIMENT ON THE SOLAR MAXIMUM MISSION SATELLITE Final Report, 16 Oct. 1984 - 15 Apr. 1986
E. L. Chupp 15 Apr. 1986 67 p
(Contracts NAS5-28609; NAS5-23761)
(NASA-Cr-177877; NAS 1.26:177877) Avail: NTIS HC A04/MF A01 CSCL 03B

Observations by the Gamma-Ray Spectrometer (GRS) on the Solar Maximum Mission (SMM) are examined. This detector system is sensitive to high-energy X-rays, gamma-rays, and energetic neutrons. These neutral quanta provide a probe of the highest energy processes in a flare. The GRS has recorded over 150 flares since launch. In addition to the solar discoveries, the SMM GRS has made important discoveries about cosmic gamma-ray sources. These discoveries are summarized. B.G.

N87-13395*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NEUTRON AND ANTINEUTRON PRODUCTION IN ACCRETION ONTO COMPACT OBJECTS
Charles D. Dermer and Reuven Ramaty Jul. 1986 16 p Submitted for publication
(NASA-TM-89264; NAS 1.15:89264) Avail: NTIS HC A02/MF A01 CSCL 03B

Nuclear reactions in the hot accretion plasma surrounding a collapsed star are a source of neutrons, primarily through spallation and pion-producing reactions, and antineutrons, principally through the reaction p+p yields p+p+n+anti-n. We calculate spectra of neutrons and antineutrons produced by a variety of nonthermal energetic particle distributions in which the target particles are either at rest or in motion. If only neutral particles are free to escape the interaction site, a component of the proton and antiproton fluxes in the cosmic radiation results from the neutrons and antineutrons which leave the accretion plasma and subsequently decay in the interstellar medium. This additional antiproton component could account for the enhanced flux of antiprotons in the cosmic radiation, compared to values expected from the standard leaky-box model of cosmic-ray propagation and confinement. Moreover, the low-energy antiproton flux measured by Buffington et al. (1981) could result from target-particle motion in the accretion plasma. This model for the origin of antiprotons predicts a narrow 2.223 MeV line which could be observable. Author

N87-13396# Ames Lab., Iowa.
VERY HIGH ENERGY GAMMA RAY ASTROPHYSICS
R. C. Lamb and D. A. Lewis 25 Mar. 1986 14 p
(Contract DE-AC02-80ER-10774)
(DE86-013319; DOE/ER-10774/6) Avail: NTIS HC A02/MF A01

The Whipple Observatory's atmospheric Cerenkov camera has detected TeV radiation from four galactic sources: the Crab Nebula, Cygnus X-3, Hercules X-1, and 4U0115+63. Recent simulations encourage the view that unwanted cosmic-ray background showers may be suppressed by a large factor. Emphasis

in the coming year will be on determining optimum selection criteria for enhancing gamma-ray signals and in developing a prototype camera with finer angular resolution as a first step towards implementation of the HERCULES concept. DOE

N87-13397# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
CHARACTERIZATION OF THE GAMMA RADIATION IN SPACE AND IN THE ATMOSPHERE
M. A. Lee May 1986 53 p
(Contract DE-AC07-76ID-01570)
(DE86-013445; EGG-PHY-7272) Avail: NTIS HC A04/MF A01

A characterization of the gamma-ray fields found in space and in the atmosphere is given. Included are values for the energies and intensities of gamma rays as observed in several experiments and reported in the open literature. Characteristics of the diffuse gamma-ray continuum are presented along with a brief discussion of the sources of this radiation. Also given are discrete gamma-ray line energies and intensities which have been observed in space and in the atmosphere. DOE

N87-13398 Virginia Univ., Charlottesville.
X-RAY EMISSION FROM SUPERNOVA REMNANTS Ph.D. Thesis
Andrew James SackvilleHamilton 1984 327 p
Avail: Univ. Microfilms Order No. DA8517472

This thesis deals with the x-ray spectra of supernova remnants (SNRs), and in particular the x-ray spectra of the two young Type 1 SNRs SN1006 and Tycho. Firstly an extensive grid of nonequilibrium model spectra of SNRs in the adiabatic blast stage of evolution is computed, and numerous diagnostics of the state and composition of the blast wave plasma are plotted over parameter space. It is demonstrated that the spectrum of an adiabatic blast wave is a good approximation to several other model SNR structures in which emission is dominated by gas undergoing quasi steady state ionization near a shock front. None of these structures appears able to account for the observed spectra of SN1006 or Tycho. A new similarity solution for the early time evolution of uniform ejecta moving into an external medium is presented. It is argued that the x-ray spectra of SN1006 and Tycho are consistent with emission mainly from a reverse shock into 1.4 M(solar) of initially uniform density SN ejecta consisting of pure heavy elements, moving into a uniform medium. Satisfactory fits to the observed spectra are obtained with a two layer structure of ejecta, an outer layer of unprocessed material, and an inner layer of mixed processed heavy elements. The structure of ejecta inferred is similar for both SN1006 and Tycho, the marked difference between the two spectra being attributed largely to the lower density of the ambient medium around SN1006. The results are consistent with the theory of Type 1 SNe as exploded white dwarfs, and resolve the apparent problems of too little iron, and too much total mass, deduced by other authors from earlier analyses of the x-ray emission of SN1006 and Tycho. Dissert. Abstr.

N87-13399 Stanford Univ., Calif.
OBSERVATIONS ON THE STANFORD 4800 KG GRAVITY WAVE DETECTOR WITH A COSMIC RAY MONITOR Ph.D. Thesis
Bruce Evan Moskowitz 1986 120 p
Avail: Univ. Microfilms Order No. DA8612771

The group at Stanford University has constructed a 4800 kg cryogenic detector which is the most sensitive detector for gravitational radiation successfully operated to date. In this dissertation data are presented from the 1985 run of 36.8 days aggregate collection time. Over the full bandwidth of approximately 13 Hz, the optimum detector noise temperature was found to be 8 mK when the system was operated at 4.3 K. An actual filter was implemented over a 5 Hz bandwidth which yielded the filtered noise temperature of 15 mK. Filtering over the entire bandwidth and operation of a dilution refrigerator at 1 K should lower the noise temperature to below 3 mK. The rate of events whose signal temperature exceeded 0.6 K was found to be higher than that for a similar run in 1981, partly due to greater general activity in the laboratory. A preliminary coincidence experiment was conducted between the Stanford detector and a room temperature detector in Guangzhou, China. In a total of 9.38 days of simultaneous data collection the number of coincidences observed was entirely consistent with random statistics. In the second half of this dissertation, the effect of cosmic rays on a gravity wave bar detector is considered. A one-dimensional thermoacoustic model is used to predict the size of the signal. Measurable effects are restricted to rarer events which may easily be vetoed as gravity wave candidates. Dissert. Abstr.

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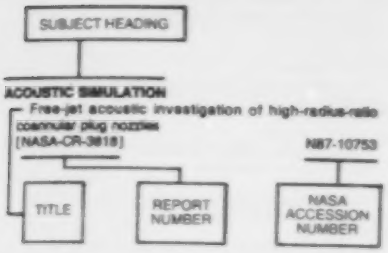

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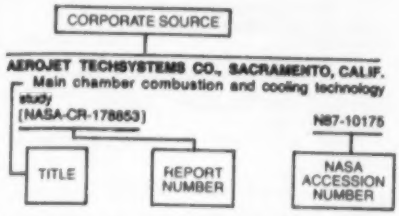

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MIZEX: A program for mesoscale air-ice-ocean interaction experiments in arctic marginal ice zones. 8: A science plan for a winter marginal ice zone experiment in the Fram Strait/Greenland Sea, 1987/89
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ARMY COMMUNICATIONS-ELECTRONICS COMMAND, FORT MONMOUTH, N.J.
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Investigation of the Challenger accident, volume 2
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Airborne spectroradiometry: The application of AIS data to detecting subtle mineral absorption features N87-12972
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SARSAT (Search and Rescue Satellite) operational data categorization and accuracy studies
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Method of ray intensity calculation as applied to anomalous propagation
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Introduction to aerodynamics derivitives, equations of motion and stability
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Effect of convection on weld pool shape and microstructure
[AD-A170488] N87-12883

INSTITUTE FOR DEFENSE ANALYSES, ALEXANDRIA, VA.
Proceedings of the IDA Workshop on Formal Specification and Verification of Ada (trade name) (1st) held in Alexandria, Virginia on 18-20 March 1985
[AD-A171607] N87-13192
Duel between an ASAT (anti-satellite) with multiple kill vehicles and a space-based weapons platform with kinetic energy weapons
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INSTITUTO DE PESQUISAS ESPACIAIS, SAO JOSE DOS CAMPOS (BRAZIL).
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A survey of hard-X-rays at balloon altitudes of the Earth's atmosphere
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INTERNATIONAL BUSINESS MACHINES CORP., SAN JOSE, CALIF.
Electrode/electrolyte interphase study using polarization modulated FT-IR reflection absorption spectroscopy
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Carbon monoxide adsorption on a platinum electrode studied by polarization modulated FT-IR reflection-absorption spectroscopy. 2: CO adsorbed at a potential in the hydrogen region and its oxidation in acids
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INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS, TRIESTE (ITALY).
Finite mean-free-paths and the electrical resistivity of liquid simple metals and binary alloys
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INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS, URBANA, ILL.
Middle Atmosphere Program. Handbook for MAP, volume 21
[NASA-CR-179893] N87-13015
Atmospheric Tides Middle Atmosphere Program (ATMAP): Report of the workshop, Kyoto, Japan, December 5-6, 1984 N87-13016
Minutes of MAP/WINE experimenters meeting, Prague, Czechoslovakia, August 13, 1985 N87-13018

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Heat transfer characteristics of simulated microelectronic chips under normal and enhanced conditions
[PB86-224425] N87-12804
Analysis of laminar flow heat transfer in uniform temperature circular tubes with tape inserts
[PB86-224763] N87-12826

IOWA UNIV., IOWA CITY.
The current-voltage relationship in auroral current sheets
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ISTITUTO NAZIONALE DI FISICA NUCLEARE, TRIESTE (ITALY).
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JAI ASSOCIATES, MOUNTAIN VIEW, CALIF.
Numerical simulation of tip vortices of wings in subsonic and transonic flows
[AD-A169116] N87-12544

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Tone calibration technique: A digital signaling scheme for mobile applications
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Proceedings of the Second Airborne Imaging Spectrometer Data Analysis Workshop
[NASA-CR-179924] N87-12968
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Phase equilibrium predictions for polar and hydrogen bonding mixtures
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Quantum chemical investigations of the mechanism of cationic polymerization and theoretical prediction of crystal densities and decomposition pathways of energetic molecules
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JOHNS HOPKINS UNIV., SILVER SPRING, MD.
The 1984 IR and D (Independent Research and Development) advanced packaging study
[AD-A169388] N87-12785

JOHNSON CONTROLS, INC., MILWAUKEE, WIS.
Performance of advanced lead acid batteries for electric vehicles
[DE85-011476] N87-12801

JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Japan report: Science and Technology
[JPRS-JST-86-023] N87-12715
Possible military applications of stratospheric airship discussed N87-12716
Status of laser enrichment technology updated N87-12717
USSR report: Earth sciences
[JPRS-UES-86-007] N87-12946
Meteorological effects of geotectonic phenomena hypothesized N87-12947

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KRAFTWERK UNION A.G. REAKTORTECHNIK, ERLANGEN (WEST GERMANY).
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Application of pattern recognition to mass ion chemical ionization mass spectra
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Electronic Engineering Department Thrust Area report, FY 1985
[DE86-013172] N87-12797
Silicon, intensified readout, gated spectrometer: Wavelength and efficiency calibration, time response characterization
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Buffered explosions in steel pressure vessels
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Atmospheric illumination and shadows, revision 1
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Electrokinetic properties of polymer colloids
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[DE86-012362] N87-13312
Los Alamos Science, number 13, spring 1986
[DE86-012664] N87-13371
Magnetic field re-arrangement after prominence eruption
[DE86-012393] N87-13382
Large-scale electric fields resulting from magnetic reconnection in the corona
[DE86-012391] N87-13383
LOUISIANA STATE UNIV., BATON ROUGE.
Solar flares and magnetospheric particles: Investigations based upon the ONR-80 experiments and ONR-604 experiments
[AD-A170620] N87-13381
LOUVAIN UNIV. (BELGIUM).
Superconformal tensor calculus and matter couplings in six dimensions
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LUDWIG-MAXIMILIANS-UNIVERSITAET, MUNICH (WEST GERMANY).
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M/A-COM, INC., VIENNA, VA.
MILSTAR modeling survey
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MARTIN MARIETTA AEROSPACE, DENVER, COLO.
Metallurgical characterization of the interfaces and the damping mechanisms in metal matrix composites
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Evaluation of automated decisionmaking methodologies and development of an integrated robotic system simulation. Appendix B: ROBSIM programmer's guide
[NASA-CR-178052] N87-13203
MARTIN MARIETTA AEROSPACE, NEW ORLEANS, LA.
General purpose aft cargo carrier study, volume 1
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MARTIN MARIETTA ENERGY SYSTEMS, INC., OAK RIDGE, TENN.
Data tagging in the Energy Data Base
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MARYLAND UNIV., BALTIMORE.
The h-p version of the finite element method with quasiuniform meshes
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Zero-crossings analysis
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MASSACHUSETTS UNIV., AMHERST.
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MCDONNELL-DOUGLAS ASTRONAUTICS CO., HOUSTON, TEX.
Advanced EVA system design requirements study
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MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
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Optical quadrature demodulator for coherent detection and sensor applications N87-13287
MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., MUNICH (WEST GERMANY).
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MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
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[NASA-CR-179922] N87-13385

MIDDLE EAST TECHNICAL UNIV., ANKARA (TURKEY).
Finite mean-free-paths and the electrical resistivity of liquid simple metals and binary alloys
[DE86-702862] N87-12578

MIDWEST RESEARCH INST., GOLDEN, COLO.
Solid-state electrochromic switchable window glazings
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Laser sealed vacuum insulating window
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Status and future of government-supported amorphous silicon research in the US
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Solid State Photovoltaic Research Branch annual report, FY 1985
[DE86-010708] N87-13004

MINNESOTA UNIV., MINNEAPOLIS.
A study of energy conversion devices using photoactive organometallic electrocatalysts
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Quantum 1/F noise in solid state double devices, in particular Hg(1-x)CdxTe diodes
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MISSOURI UNIV., ROLLA.
Neutron diffraction studies of some rare earth-transition metal deuterides
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Determination of the coefficient of thermal expansion of JP-4 fuels
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MSNW, INC., SAN MARCOS, CALIF.
Plasma joining of metal matrix composites
[AD-A169056] N87-12615

MUENSTER UNIV. (WEST GERMANY).
Evaluation of the bearing and knowledge requirements of man machine systems N87-13164

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NATIONAL AERONAUTICAL ESTABLISHMENT, OTTAWA (ONTARIO).
Forced oscillation of a two-dimensional airfoil with nonlinear aerodynamic loads
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Literature review on the design of composite mechanically fastened joints
[AD-A169112] N87-12872

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
Aeronautical Engineering: A continuing bibliography with indexes
[NASA-SP-7037(205)] N87-12532
Upper stage selected for planetary missions
[NASA-NEWS-RELEASE-86-161] N87-12593
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Aerospace Medicine and Biology: A continuing bibliography with indexes
[NASA-SP-7011(290)] N87-13125
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[NASA-TM-88498] N87-13376

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
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[NASA-TM-88250] N87-12539
NASA rotor systems research aircraft: Fixed-wing configuration flight-test results
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[NASA-TM-88259] N87-13363

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
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Welding research in Scandinavia: An assessment
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OPTICAL SOCIETY OF AMERICA, WASHINGTON, D. C.
Proceedings of the Topical Meeting on the Microphysics of Surfaces, Beams and Adsorbates held in Santa Fe, New Mexico on 4-6 February 1985
[AD-A170797] N87-13329

OREGON GRADUATE CENTER FOR STUDY AND RESEARCH, BEAVERTON.
Digest: Proceedings of the International Conference on Optical and Millimeter Wave Propagation and Scattering in the Atmosphere
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Photovoltaic Concentrator Technology Project, Fourteenth Project Integration Meeting, June 10-11, 1986
[DE86-012051] N87-13006
Meteorological tower data, Yucca Ridge (YR) site, January-June 1983. Nevada Nuclear Waste Storage Investigations Project
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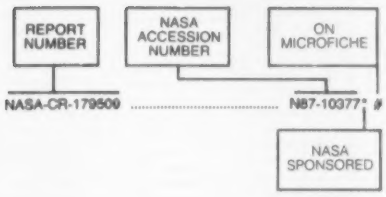

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